# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 196001 2002 $RX_{238}$ | 15.6 | $X$ | 32.49159 | 207.88864 | 230.26645 | 4.19228 | 0.2200233 | 0.18330239 | 3.0691914 | 20 | — | — |
| 196002 2002 $RU_{239}$ | 15.1 | $X$ | 252.51780 | 16.43516 | 153.05121 | 11.32765 | 0.0629696 | 0.18012366 | 3.1051950 | 20 | 12 24.3 | 19.6 |
| 196003 2002 $RJ_{240}$ | 15.1 | $X$ | 100.28240 | 350.14137 | 323.98848 | 8.85502 | 0.0726560 | 0.17832066 | 3.1260909 | 20 | 12 29.8 | 19.8 |
| 196004 2002 $RN_{241}$ | 15.9 | $X$ | 138.38584 | 253.14664 | 12.26154 | 3.28987 | 0.1491273 | 0.17911941 | 3.1167905 | 20 | 12 12.0 | 21.0 |
| 196005 Róbertschiller | 15.4 | $X$ | 19.04161 | 211.23355 | 173.23748 | 5.94867 | 0.1053596 | 0.17212079 | 3.2007162 | 20 | 12 20.9 | 19.7 |
| 196006 2002 $RJ_{242}$ | 15.6 | $X$ | 225.42394 | 226.48301 | 321.31739 | 10.13346 | 0.1021872 | 0.17871508 | 3.1214898 | 20 | 12 7.3 | 20.3 |
| 196007 2002 $RT_{242}$ | 15.6 | $X$ | 117.16178 | 115.63479 | 184.35035 | 9.70292 | 0.0615603 | 0.17978472 | 3.1090965 | 20 | 12 29.1 | 20.4 |
| 196008 2002 $RV_{242}$ | 15.1 | $X$ | 28.19492 | 41.95123 | 317.39624 | 8.57936 | 0.0906667 | 0.17403666 | 3.1771830 | 20 | 11 29.8 | 19.5 |
| 196009 2002 $RF_{248}$ | 15.7 | $X$ | 61.87507 | 124.07836 | 228.84717 | 8.39616 | 0.0856576 | 0.17708024 | 3.1406725 | 20 | — | — |
| 196010 2002 $RP_{248}$ | 16.2 | $X$ | 26.21679 | 248.25477 | 140.51185 | 2.70834 | 0.1051965 | 0.17697074 | 3.1419679 | 20 | — | — |
| 196011 2002 $RR_{250}$ | 15.8 | $X$ | 75.44304 | 52.57888 | 283.24965 | 7.96847 | 0.0999520 | 0.17915288 | 3.1164024 | 20 | 12 31.2 | 20.4 |
| 196012 2002 $RY_{250}$ | 15.5 | $X$ | 141.12677 | 259.91357 | 16.11882 | 10.75589 | 0.0586459 | 0.18058931 | 3.0998549 | 20 | 12 27.0 | 20.3 |
| 196013 2002 $RN_{254}$ | 16.1 | $X$ | 266.86034 | 346.48815 | 279.84283 | 1.21179 | 0.0153061 | 0.19600869 | 2.9350748 | 20 | 2 21.1 | 20.0 |
| 196014 2002 $RV_{258}$ | 17.6 | $X$ | 98.86696 | 91.93205 | 324.09097 | 2.02723 | 0.0415822 | 0.24695687 | 2.5160657 | 20 | 1 30.2 | 20.8 |
| 196015 2002 $RD_{263}$ | 15.4 | $X$ | 129.16151 | 47.09494 | 198.76645 | 10.16444 | 0.0204212 | 0.17154107 | 3.2079233 | 20 | 11 6.5 | 20.1 |
| 196016 2002 $RE_{263}$ | 15.0 | $X$ | 359.65461 | 246.35102 | 220.74436 | 8.48003 | 0.0886582 | 0.18261223 | 3.0769196 | 20 | — | — |
| 196017 2002 $RH_{273}$ | 16.1 | $X$ | 78.67591 | 317.35349 | 350.16083 | 4.99008 | 0.1051692 | 0.17496541 | 3.1659296 | 20 | 11 30.2 | 20.8 |
| 196018 2002 $RP_{279}$ | 16.5 | $X$ | 170.49359 | 198.11261 | 151.43315 | 1.39761 | 0.0383416 | 0.19463298 | 2.9488890 | 20 | 2 10.1 | 20.8 |
| 196019 2002 $SM_{1}$ | 14.9 | $X$ | 42.06080 | 141.02296 | 243.38975 | 8.40045 | 0.0590857 | 0.17987355 | 3.1080728 | 20 | — | — |
| 196020 2002 $SC_{2}$ | 15.6 | $X$ | 113.69722 | 114.09483 | 179.65522 | 6.59793 | 0.1222472 | 0.17570682 | 3.1570174 | 20 | 12 21.3 | 20.6 |
| 196021 2002 $ST_{2}$ | 16.0 | $X$ | 13.51149 | 233.99254 | 262.50427 | 17.94447 | 0.0781294 | 0.35717489 | 1.9673521 | 20 | — | — |
| 196022 2002 $SQ_{5}$ | 15.4 | $X$ | 117.39342 | 164.06021 | 174.89225 | 8.52003 | 0.1265133 | 0.18182839 | 3.0857561 | 20 | — | — |
| 196023 2002 $SW_{6}$ | 15.8 | $X$ | 336.75483 | 155.04530 | 108.81690 | 3.20030 | 0.0112380 | 0.20317409 | 2.8656545 | 20 | 5 19.0 | 19.7 |
| 196024 2002 $SB_{7}$ | 15.2 | $X$ | 359.71881 | 40.06042 | 20.45553 | 9.11368 | 0.0725228 | 0.17433327 | 3.1735782 | 20 | — | — |
| 196025 2002 $SP_{9}$ | 15.7 | $X$ | 47.59249 | 254.04599 | 166.34096 | 2.31961 | 0.0808119 | 0.18131604 | 3.0915663 | 20 | — | — |
| 196026 2002 $SL_{13}$ | 14.7 | $X$ | 31.24826 | 57.57059 | 0.55243 | 15.75320 | 0.0659619 | 0.18053484 | 3.1004783 | 20 | — | — |
| 196027 2002 $SB_{14}$ | 15.4 | $X$ | 83.67935 | 227.50724 | 65.11233 | 1.98335 | 0.1592608 | 0.17176441 | 3.2051419 | 20 | 11 24.1 | 20.3 |
| 196028 2002 $SF_{14}$ | 15.9 | $X$ | 127.51648 | 270.63763 | 46.45813 | 2.34314 | 0.1919415 | 0.18185338 | 3.0854734 | 20 | — | — |
| 196029 2002 $SL_{14}$ | 15.6 | $X$ | 95.36001 | 107.59924 | 227.96125 | 1.42231 | 0.1004348 | 0.17831812 | 3.1261206 | 20 | — | — |
| 196030 2002 $SJ_{20}$ | 14.9 | $X$ | 84.69467 | 289.92443 | 9.19605 | 11.68787 | 0.1751427 | 0.17253244 | 3.1956229 | 20 | 12 1.8 | 20.1 |
| 196031 2002 $SV_{20}$ | 15.7 | $X$ | 68.94064 | 334.41678 | 50.64309 | 1.95295 | 0.1850742 | 0.18066030 | 3.0990428 | 20 | — | — |
| 196032 2002 $SH_{21}$ | 15.0 | $X$ | 77.02509 | 346.70079 | 14.50213 | 9.80443 | 0.0561589 | 0.17859790 | 3.1228549 | 20 | — | — |
| 196033 2002 $SU_{21}$ | 15.4 | $X$ | 30.75652 | 243.18889 | 108.89994 | 2.37037 | 0.1579973 | 0.17039098 | 3.2223422 | 20 | 12 4.4 | 19.7 |
| 196034 2002 $SV_{25}$ | 14.8 | $X$ | 55.02301 | 290.02766 | 37.85019 | 11.48879 | 0.1044010 | 0.17019030 | 3.2248747 | 20 | 11 25.9 | 19.5 |
| 196035 Haraldbill | 15.0 | $X$ | 351.34792 | 261.84763 | 209.73245 | 25.01270 | 0.2833600 | 0.17455030 | 3.1709470 | 20 | — | — |
| 196036 2002 $SL_{40}$ | 15.4 | $X$ | 340.15522 | 73.89912 | 12.21174 | 25.78818 | 0.2708019 | 0.17271568 | 3.1933624 | 20 | — | — |
| 196037 2002 $SX_{42}$ | 15.5 | $X$ | 65.27267 | 313.91545 | 32.07580 | 10.64297 | 0.1748500 | 0.17492737 | 3.1663886 | 20 | — | — |
| 196038 2002 $SM_{43}$ | 15.2 | $X$ | 19.31606 | 356.58026 | 356.80182 | 3.64687 | 0.1040135 | 0.16777759 | 3.2557177 | 20 | 11 11.1 | 19.4 |
| 196039 2002 $SS_{44}$ | 15.1 | $X$ | 3.22885 | 29.89644 | 20.07265 | 14.01050 | 0.1386144 | 0.17225089 | 3.1991043 | 20 | — | — |
| 196040 2002 $SC_{45}$ | 15.0 | $X$ | 8.84087 | 19.99336 | 31.88176 | 8.97090 | 0.0657679 | 0.17357857 | 3.1827704 | 20 | — | — |
| 196041 2002 $SO_{48}$ | 14.6 | $X$ | 302.54842 | 73.79681 | 27.27133 | 15.17605 | 0.0728739 | 0.17152776 | 3.2080892 | 20 | 11 30.4 | 19.0 |
| 196042 2002 $SD_{49}$ | 15.2 | $X$ | 54.15131 | 267.89105 | 97.14028 | 4.75485 | 0.1707197 | 0.17509758 | 3.1643362 | 20 | — | — |
| 196043 2002 $ST_{49}$ | 15.2 | $X$ | 344.47319 | 94.98737 | 0.85032 | 6.39021 | 0.1378465 | 0.17702576 | 3.1413168 | 20 | — | — |
| 196044 2002 $SU_{50}$ | 15.3 | $X$ | 44.23576 | 245.99279 | 167.82921 | 4.37166 | 0.1589632 | 0.18028418 | 3.1033516 | 20 | — | — |
| 196045 2002 $SN_{53}$ | 14.6 | $X$ | 24.98074 | 98.68484 | 346.59539 | 15.72731 | 0.2004395 | 0.17772034 | 3.1331267 | 20 | — | — |
| 196046 2002 $SE_{56}$ | 15.3 | $X$ | 50.40071 | 237.82778 | 128.18144 | 5.85598 | 0.1671323 | 0.17446395 | 3.1719932 | 20 | — | — |
| 196047 2002 $SS_{57}$ | 15.0 | $X$ | 14.95289 | 41.17541 | 36.36474 | 16.09165 | 0.2324541 | 0.17785669 | 3.1315252 | 20 | — | — |
| 196048 2002 $SM_{60}$ | 15.1 | $X$ | 74.32141 | 281.35014 | 27.63419 | 12.25455 | 0.0859640 | 0.17314881 | 3.1880347 | 20 | 11 23.0 | 19.9 |
| 196049 2002 $SS_{61}$ | 14.8 | $X$ | 0.22579 | 56.17802 | 329.31829 | 12.21506 | 0.0879115 | 0.17186725 | 3.2038632 | 20 | 11 20.5 | 19.2 |
| 196050 2002 $SG_{63}$ | 15.5 | $X$ | 33.01313 | 295.87614 | 37.53989 | 4.52370 | 0.0918379 | 0.17048099 | 3.2212078 | 20 | 11 5.1 | 19.9 |
| 196051 2002 $SW_{65}$ | 15.3 | $X$ | 149.93066 | 267.32389 | 20.19890 | 9.45043 | 0.1207675 | 0.18318175 | 3.0705387 | 20 | — | — |
| 196052 2002 $SB_{66}$ | 15.6 | $X$ | 159.55259 | 275.93863 | 52.24414 | 5.20188 | 0.0766604 | 0.18980045 | 2.9987337 | 20 | 1 8.1 | 20.1 |
| 196053 2002 $SE_{68}$ | 16.1 | $X$ | 357.83527 | 302.11117 | 128.02025 | 0.57949 | 0.0751490 | 0.17643029 | 3.1483811 | 20 | — | — |
| 196054 2002 $TK$ | 15.0 | $X$ | 12.10116 | 282.42691 | 4.18362 | 8.44208 | 0.1114965 | 0.15901639 | 3.3742309 | 20 | 8 10.8 | 19.3 |
| 196055 2002 $TC_{1}$ | 15.6 | $X$ | 49.23349 | 319.77820 | 35.26648 | 5.14073 | 0.1518380 | 0.17400762 | 3.1775364 | 20 | 12 30.5 | 20.1 |
| 196056 2002 $TK_{2}$ | 15.3 | $X$ | 26.28647 | 170.99085 | 201.82639 | 10.36979 | 0.1649489 | 0.17138723 | 3.2098426 | 20 | 12 23.9 | 19.7 |
| 196057 2002 $TN_{12}$ | 15.6 | $X$ | 52.91690 | 204.69421 | 149.19650 | 5.82182 | 0.1275882 | 0.17400375 | 3.1775836 | 20 | 12 29.7 | 20.2 |
| 196058 2002 $TU_{15}$ | 15.0 | $X$ | 339.79331 | 195.73375 | 193.81039 | 4.33008 | 0.0341901 | 0.16863589 | 3.2446614 | 20 | 10 28.9 | 19.3 |
| 196059 2002 $TT_{16}$ | 15.3 | $X$ | 337.30671 | 272.91820 | 191.39011 | 15.55128 | 0.0746121 | 0.17804006 | 3.1293747 | 20 | — | — |
| 196060 2002 $TD_{20}$ | 14.9 | $X$ | 317.14097 | 119.53564 | 10.29050 | 16.26732 | 0.2191910 | 0.17537300 | 3.1610224 | 20 | — | — |
| 196061 2002 $TC_{26}$ | 15.1 | $X$ | 26.73186 | 299.76179 | 112.30430 | 3.84261 | 0.1867908 | 0.17502980 | 3.1651530 | 20 | — | — |
| 196062 2002 $TN_{33}$ | 14.8 | $X$ | 58.85986 | 197.54679 | 194.92173 | 15.22753 | 0.1483823 | 0.17998665 | 3.1067706 | 20 | — | — |
| 196063 2002 $TD_{34}$ | 15.3 | $X$ | 345.01035 | 32.66632 | 354.74477 | 4.94942 | 0.0937797 | 0.16747828 | 3.2595956 | 20 | 11 1.6 | 19.4 |
| 196064 2002 $TG_{34}$ | 14.9 | $X$ | 243.22410 | 140.58545 | 17.06953 | 7.66341 | 0.0410898 | 0.17144454 | 3.2091272 | 20 | 11 27.9 | 19.5 |
| 196065 2002 $TK_{38}$ | 14.9 | $X$ | 358.81578 | 205.47604 | 220.25376 | 4.88575 | 0.1495876 | 0.17133168 | 3.2105364 | 20 | — | — |
| 196066 2002 $TH_{45}$ | 14.8 | $X$ | 93.41411 | 265.52458 | 7.18513 | 18.33631 | 0.1525144 | 0.17106086 | 3.2139241 | 20 | 11 3.6 | 20.0 |
| 196067 2002 $TF_{55}$ | 15.0 | $X$ | 134.69957 | 286.44156 | 26.40009 | 10.33124 | 0.0897250 | 0.18203808 | 3.0833859 | 20 | — | — |
| 196068 2002 $TW_{55}$ | 18.0 | $X$ | 293.33865 | 251.12315 | 33.57456 | 59.37068 | 0.6648061 | 0.31995311 | 2.1171185 | 20 | 3 26.5 | 23.4 |
| 196069 2002 $TY_{62}$ | 14.6 | $X$ | 317.32680 | 128.67482 | 352.99327 | 8.16299 | 0.2200130 | 0.17338145 | 3.1851823 | 20 | — | — |
| 196070 2002 $TA_{65}$ | 14.8 | $X$ | 114.90932 | 118.95085 | 243.60675 | 12.99177 | 0.1144035 | 0.18670291 | 3.0318101 | 20 | 1 2.4 | 19.2 |
| 196071 2002 $TE_{65}$ | 15.5 | $X$ | 8.62195 | 241.80220 | 209.15823 | 11.35692 | 0.2251855 | 0.17683907 | 3.1435273 | 20 | — | — |
| 196072 2002 $TE_{69}$ | 14.7 | $X$ | 55.10954 | 84.14913 | 225.77792 | 24.65944 | 0.2933878 | 0.17257104 | 3.1951464 | 20 | 11 30.8 | 19.6 |
| 196073 2002 $TQ_{74}$ | 15.2 | $X$ | 86.72883 | 275.87960 | 87.13376 | 5.44358 | 0.1066846 | 0.18089144 | 3.0964022 | 20 | — | — |
| 196074 2002 $TT_{74}$ | 14.8 | $X$ | 63.23874 | 291.49885 | 28.65938 | 15.67603 | 0.1348773 | 0.17142280 | 3.2093986 | 20 | 11 28.8 | 19.6 |
| 196075 2002 $TD_{76}$ | 15.0 | $X$ | 68.36039 | 160.47489 | 218.73495 | 8.92629 | 0.0736453 | 0.17853392 | 3.1236010 | 20 | — | — |
| 196076 2002 $TL_{77}$ | 15.2 | $X$ | 14.99411 | 188.74434 | 225.29852 | 5.20607 | 0.1345649 | 0.17422851 | 3.1748502 | 20 | — | — |
| 196077 2002 $TT_{79}$ | 14.4 | $X$ | 50.09069 | 290.38935 | 46.82005 | 26.59233 | 0.2504232 | 0.17001816 | 3.2270510 | 20 | 12 17.8 | 19.5 |
| 196078 2002 $TH_{80}$ | 14.7 | $X$ | 318.45214 | 252.30994 | 208.49656 | 12.63125 | 0.1187560 | 0.17268186 | 3.1937793 | 20 | 12 24.3 | 18.8 |
| 196079 2002 $TN_{81}$ | 15.1 | $X$ | 94.10662 | 285.72232 | 91.94533 | 7.31360 | 0.1347375 | 0.18566891 | 3.0430558 | 20 | — | — |
| 196080 2002 $TX_{83}$ | 14.8 | $X$ | 6.83385 | 38.37083 | 45.42118 | 14.84790 | 0.2745461 | 0.17550940 | 3.1593843 | 20 | — | — |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 196081 2002 $TO_{84}$ | 15.0 | $X$ | 35.75343 | 166.77817 | 120.77822 | 2.57645 | 0.2210019 | 0.16269325 | 3.3231991 | 20 | 10 1.4 | 19.1 |
| 196082 2002 $TB_{86}$ | 15.3 | $X$ | 336.96267 | 211.31693 | 221.70649 | 5.26827 | 0.1520493 | 0.17176633 | 3.2051180 | 20 | 12 21.1 | 19.0 |
| 196083 2002 $TH_{87}$ | 15.5 | $X$ | 334.20501 | 174.17615 | 235.48322 | 0.68348 | 0.1394649 | 0.16833037 | 3.2485862 | 20 | 11 15.2 | 19.4 |
| 196084 2002 $TH_{88}$ | 14.9 | $X$ | 152.14481 | 60.43725 | 241.21593 | 8.35554 | 0.0302859 | 0.17982387 | 3.1086452 | 20 | — | — |
| 196085 2002 $TU_{88}$ | 15.0 | $X$ | 72.83508 | 61.09571 | 251.43974 | 7.15211 | 0.1359611 | 0.17034923 | 3.2228686 | 20 | 12 3.4 | 19.8 |
| 196086 2002 $TD_{90}$ | 15.0 | $X$ | 30.16750 | 177.36219 | 231.78444 | 11.50075 | 0.1126684 | 0.17573900 | 3.1566320 | 20 | — | — |
| 196087 2002 $TU_{96}$ | 15.5 | $X$ | 64.11691 | 211.89252 | 168.14929 | 6.46928 | 0.0919834 | 0.17913304 | 3.1166325 | 20 | — | — |
| 196088 2002 $TR_{99}$ | 15.1 | $X$ | 8.11979 | 110.52092 | 319.82325 | 9.68108 | 0.1165597 | 0.17880746 | 3.1204145 | 20 | — | — |
| 196089 2002 $TB_{102}$ | 15.3 | $X$ | 111.81098 | 78.27588 | 224.09114 | 4.32089 | 0.0992037 | 0.17553504 | 3.1590767 | 20 | 12 27.8 | 20.1 |
| 196090 2002 $TS_{102}$ | 15.0 | $X$ | 45.65915 | 204.02088 | 211.80358 | 8.37687 | 0.0975000 | 0.18028552 | 3.1033362 | 20 | — | — |
| 196091 2002 $TG_{103}$ | 15.1 | $X$ | 2.08643 | 233.36465 | 215.03061 | 11.96583 | 0.1551645 | 0.17680331 | 3.1439512 | 20 | — | — |
| 196092 2002 $TH_{113}$ | 14.8 | $X$ | 334.73662 | 166.29384 | 253.10612 | 10.54655 | 0.0478204 | 0.17099018 | 3.2148096 | 20 | 11 27.5 | 18.9 |
| 196093 2002 $TW_{113}$ | 14.8 | $X$ | 125.45908 | 6.64924 | 273.35424 | 9.97849 | 0.2248154 | 0.17627932 | 3.1501783 | 20 | 12 19.5 | 20.1 |
| 196094 2002 $TT_{117}$ | 15.0 | $X$ | 331.41812 | 273.78022 | 242.20462 | 12.63869 | 0.1186464 | 0.18289410 | 3.0737573 | 20 | — | — |
| 196095 2002 $TR_{119}$ | 14.6 | $X$ | 174.50806 | 30.75124 | 254.84114 | 8.23528 | 0.0469321 | 0.18061732 | 3.0995343 | 20 | — | — |
| 196096 2002 $TK_{120}$ | 14.9 | $X$ | 332.33766 | 209.73521 | 245.00285 | 10.12531 | 0.1208293 | 0.17278838 | 3.1924665 | 20 | — | — |
| 196097 2002 $TP_{123}$ | 15.1 | $X$ | 71.86608 | 145.35367 | 221.69379 | 11.46301 | 0.0756002 | 0.17922747 | 3.1155377 | 20 | — | — |
| 196098 2002 $TW_{123}$ | 14.9 | $X$ | 133.32559 | 13.93453 | 284.78673 | 9.89740 | 0.1732871 | 0.18000250 | 3.1065882 | 20 | — | — |
| 196099 2002 $TE_{125}$ | 15.3 | $X$ | 113.82052 | 83.82402 | 254.15194 | 9.50095 | 0.0477536 | 0.18106898 | 3.0943778 | 20 | — | — |
| 196100 2002 $TZ_{126}$ | 14.8 | $X$ | 92.76217 | 199.22601 | 92.55740 | 6.46268 | 0.1250052 | 0.17301156 | 3.1897205 | 20 | 11 29.6 | 19.6 |
| 196101 2002 $TD_{127}$ | 14.9 | $X$ | 344.60304 | 124.25680 | 287.75119 | 8.20126 | 0.1162080 | 0.17122911 | 3.2118184 | 20 | 12 4.9 | 18.9 |
| 196102 2002 $TA_{133}$ | 15.2 | $X$ | 349.41292 | 236.65382 | 167.28140 | 9.89409 | 0.1317912 | 0.16935398 | 3.2354829 | 20 | 12 4.8 | 19.3 |
| 196103 2002 $TX_{133}$ | 14.5 | $X$ | 17.29976 | 284.74977 | 0.18545 | 13.04505 | 0.0726334 | 0.15727815 | 3.3990466 | 20 | 8 14.9 | 19.1 |
| 196104 2002 $TC_{134}$ | 14.3 | $X$ | 8.67855 | 142.81980 | 241.91058 | 8.84886 | 0.1240144 | 0.17091125 | 3.2157994 | 20 | 12 8.7 | 18.3 |
| 196105 2002 $TC_{137}$ | 14.6 | $X$ | 83.86153 | 106.92598 | 229.64125 | 14.69515 | 0.1004690 | 0.17487564 | 3.1670129 | 20 | — | — |
| 196106 2002 $TV_{142}$ | 15.1 | $X$ | 354.85628 | 287.67358 | 119.52266 | 5.99192 | 0.1355290 | 0.17093160 | 3.2155442 | 20 | 12 17.1 | 19.0 |
| 196107 2002 $TH_{145}$ | 15.7 | $X$ | 21.24975 | 264.14875 | 164.44670 | 0.78430 | 0.1095402 | 0.17877574 | 3.1207837 | 20 | — | — |
| 196108 2002 $TX_{147}$ | 14.6 | $X$ | 318.98555 | 138.13552 | 293.01052 | 12.88114 | 0.1255896 | 0.17281140 | 3.1921831 | 20 | 11 15.9 | 18.7 |
| 196109 2002 $TS_{148}$ | 15.1 | $X$ | 22.00537 | 229.56150 | 210.04233 | 16.46724 | 0.0253449 | 0.18483396 | 3.0522132 | 20 | — | — |
| 196110 2002 $TB_{157}$ | 15.4 | $X$ | 158.00924 | 280.02579 | 104.59696 | 10.26314 | 0.1631875 | 0.19289427 | 2.9665829 | 20 | 3 23.1 | 20.3 |
| 196111 2002 $TM_{168}$ | 14.6 | $X$ | 144.81179 | 232.66418 | 13.74146 | 27.42903 | 0.2363893 | 0.17545067 | 3.1600894 | 20 | 11 16.3 | 20.5 |
| 196112 2002 $TH_{169}$ | 14.4 | $X$ | 352.41072 | 116.19225 | 281.77865 | 11.66942 | 0.1875072 | 0.17008663 | 3.2261850 | 20 | 12 5.4 | 18.2 |
| 196113 2002 $TY_{169}$ | 14.4 | $X$ | 55.72579 | 107.29618 | 255.03218 | 11.41315 | 0.0808595 | 0.17522063 | 3.1628545 | 20 | — | — |
| 196114 2002 $TD_{170}$ | 14.8 | $X$ | 322.59889 | 115.78208 | 343.27066 | 20.94647 | 0.3268518 | 0.16968739 | 3.2312434 | 20 | 12 31.4 | 17.9 |
| 196115 2002 $TN_{170}$ | 15.1 | $X$ | 148.47488 | 146.40377 | 272.94895 | 10.71481 | 0.0383933 | 0.19740640 | 2.9212041 | 20 | 4 5.2 | 19.5 |
| 196116 2002 $TY_{170}$ | 14.7 | $X$ | 100.28024 | 71.18477 | 257.51262 | 11.95034 | 0.1112457 | 0.17729501 | 3.1381356 | 20 | — | — |
| 196117 2002 $TE_{173}$ | 15.0 | $X$ | 78.56088 | 312.17621 | 28.07507 | 17.87675 | 0.1629861 | 0.17682070 | 3.1437451 | 20 | — | — |
| 196118 2002 $TY_{173}$ | 15.1 | $X$ | 86.42510 | 249.96862 | 117.91065 | 7.66042 | 0.1414363 | 0.18088950 | 3.0964243 | 20 | — | — |
| 196119 2002 $TO_{174}$ | 14.5 | $X$ | 62.49617 | 354.99146 | 53.27234 | 10.38590 | 0.0853116 | 0.18213416 | 3.0823015 | 20 | — | — |
| 196120 2002 $TA_{178}$ | 14.4 | $X$ | 1.24248 | 203.33745 | 261.85031 | 16.65253 | 0.2394738 | 0.17569544 | 3.1571537 | 20 | — | — |
| 196121 2002 $TW_{185}$ | 14.6 | $X$ | 358.36328 | 194.39166 | 215.04404 | 12.32120 | 0.1690828 | 0.17259431 | 3.1948593 | 20 | 12 27.9 | 18.6 |
| 196122 2002 $TL_{193}$ | 15.2 | $X$ | 317.97521 | 59.59507 | 0.77199 | 13.64982 | 0.0671705 | 0.16889378 | 3.2413576 | 20 | 10 31.3 | 19.6 |
| 196123 2002 $TN_{193}$ | 14.9 | $X$ | 38.47461 | 4.33324 | 3.08179 | 7.61285 | 0.0671809 | 0.17361316 | 3.1823477 | 20 | 12 20.3 | 19.4 |
| 196124 2002 $TU_{194}$ | 15.0 | $X$ | 321.28001 | 116.90993 | 11.75239 | 10.21433 | 0.0363591 | 0.17941136 | 3.1134084 | 20 | — | — |
| 196125 2002 $TM_{202}$ | 15.0 | $X$ | 167.94867 | 245.71422 | 50.53261 | 9.78227 | 0.1221525 | 0.18448475 | 3.0560637 | 20 | — | — |
| 196126 2002 $TE_{206}$ | 15.4 | $X$ | 50.87183 | 111.42830 | 255.47249 | 3.10238 | 0.1553113 | 0.17359422 | 3.1825792 | 20 | — | — |
| 196127 2002 $TP_{206}$ | 14.7 | $X$ | 45.17212 | 150.15793 | 234.29880 | 10.48029 | 0.1139120 | 0.17439117 | 3.1728756 | 20 | — | — |
| 196128 2002 $TQ_{206}$ | 14.8 | $X$ | 30.27952 | 147.41192 | 220.68476 | 22.32838 | 0.1342236 | 0.17027591 | 3.2237937 | 20 | 12 17.4 | 19.4 |
| 196129 2002 $TT_{210}$ | 15.0 | $X$ | 315.98573 | 64.15904 | 39.19423 | 6.83359 | 0.1041931 | 0.17102711 | 3.2143469 | 20 | 12 24.3 | 19.1 |
| 196130 2002 $TK_{213}$ | 15.4 | $X$ | 3.06158 | 232.59214 | 197.25110 | 9.22541 | 0.1590777 | 0.17451910 | 3.1713250 | 20 | — | — |
| 196131 2002 $TE_{225}$ | 14.8 | $X$ | 45.74542 | 159.22987 | 229.17741 | 9.74735 | 0.0786578 | 0.17507083 | 3.1646585 | 20 | — | — |
| 196132 2002 $TG_{231}$ | 14.7 | $X$ | 40.38655 | 254.30510 | 147.08391 | 16.65395 | 0.1566926 | 0.17886800 | 3.1197105 | 20 | — | — |
| 196133 2002 $TO_{238}$ | 15.0 | $X$ | 114.81977 | 275.42963 | 31.09344 | 12.73253 | 0.0834635 | 0.17417685 | 3.1754779 | 20 | — | — |
| 196134 2002 $TH_{240}$ | 15.0 | $X$ | 7.71462 | 40.59722 | 32.44051 | 9.48993 | 0.0767895 | 0.17503044 | 3.1651454 | 20 | — | — |
| 196135 2002 $TZ_{244}$ | 14.9 | $X$ | 3.32213 | 208.75129 | 194.50619 | 9.59567 | 0.0739728 | 0.17072855 | 3.2180932 | 20 | 12 18.3 | 19.3 |
| 196136 2002 $TW_{247}$ | 15.2 | $X$ | 348.99272 | 212.50406 | 187.38053 | 3.38055 | 0.0530302 | 0.16938301 | 3.2351133 | 20 | 11 23.5 | 19.5 |
| 196137 2002 $TR_{248}$ | 15.3 | $X$ | 11.68896 | 109.80448 | 284.05507 | 16.94419 | 0.1495301 | 0.17224154 | 3.1992201 | 20 | 12 28.4 | 19.3 |
| 196138 2002 $TX_{253}$ | 14.5 | $X$ | 330.99128 | 107.30473 | 5.31038 | 24.21734 | 0.1683270 | 0.17463635 | 3.1699052 | 20 | — | — |
| 196139 2002 $TW_{261}$ | 15.8 | $X$ | 175.53299 | 289.00672 | 95.27146 | 3.27971 | 0.1175921 | 0.19550795 | 2.9400842 | 20 | 4 2.6 | 20.4 |
| 196140 2002 $TO_{264}$ | 15.4 | $X$ | 350.83439 | 87.42380 | 321.93949 | 2.27305 | 0.1324273 | 0.16945022 | 3.2342578 | 20 | 12 12.2 | 19.3 |
| 196141 2002 $TL_{268}$ | 15.2 | $X$ | 6.35573 | 62.69880 | 334.00183 | 9.20645 | 0.2016512 | 0.17229527 | 3.1985549 | 20 | 12 31.4 | 19.1 |
| 196142 2002 $TB_{270}$ | 15.1 | $X$ | 359.26350 | 243.31279 | 226.04640 | 9.09399 | 0.1048166 | 0.18010807 | 3.1053742 | 20 | — | — |
| 196143 2002 $TZ_{270}$ | 15.1 | $X$ | 122.08406 | 106.99099 | 230.81163 | 8.87272 | 0.0799940 | 0.18106377 | 3.0944373 | 20 | — | — |
| 196144 2002 $TE_{274}$ | 15.1 | $X$ | 349.84148 | 95.18682 | 339.23020 | 4.31496 | 0.1629512 | 0.17193740 | 3.2029916 | 20 | — | — |
| 196145 2002 $TU_{279}$ | 14.5 | $X$ | 272.92611 | 46.18654 | 313.38419 | 8.98716 | 0.1008973 | 0.14977202 | 3.5116853 | 20 | 6 13.8 | 19.6 |
| 196146 2002 $TY_{281}$ | 15.1 | $X$ | 25.31068 | 77.37821 | 312.39758 | 7.27410 | 0.2569150 | 0.17261104 | 3.1946528 | 20 | — | — |
| 196147 2002 $TX_{294}$ | 14.5 | $X$ | 158.12350 | 77.68864 | 282.82327 | 13.65935 | 0.1958240 | 0.18876199 | 3.0097217 | 20 | 2 16.3 | 19.7 |
| 196148 2002 $TE_{317}$ | 15.3 | $X$ | 35.63200 | 84.98914 | 305.91024 | 9.58162 | 0.0850908 | 0.17894773 | 3.1187837 | 20 | — | — |
| 196149 2002 $TG_{319}$ | 15.9 | $X$ | 223.03269 | 19.53890 | 234.22067 | 1.95651 | 0.1445984 | 0.18813608 | 3.0163934 | 20 | — | — |
| 196150 2002 $TT_{337}$ | 17.8 | $X$ | 262.83471 | 237.70595 | 95.85998 | 3.56662 | 0.1495574 | 0.31538659 | 2.1375055 | 20 | 4 19.6 | 20.6 |
| 196151 2002 $UG_{7}$ | 14.9 | $X$ | 39.56180 | 288.89768 | 61.38299 | 19.54938 | 0.1264497 | 0.16950079 | 3.2336143 | 20 | 12 6.9 | 19.5 |
| 196152 2002 $UG_{9}$ | 15.2 | $X$ | 142.82800 | 282.71489 | 117.96888 | 13.62902 | 0.2127520 | 0.19009399 | 2.9956458 | 20 | 4 2.1 | 20.4 |
| 196153 2002 $UO_{31}$ | 14.9 | $X$ | 211.79629 | 343.40814 | 260.77415 | 8.27209 | 0.0487031 | 0.17880293 | 3.1204673 | 20 | — | — |
| 196154 2002 $UH_{47}$ | 14.8 | $X$ | 119.95517 | 251.95210 | 55.54546 | 26.94290 | 0.2336726 | 0.17688245 | 3.1430133 | 20 | — | — |
| 196155 2002 $UJ_{51}$ | 15.1 | $X$ | 66.63797 | 126.82575 | 290.88770 | 14.29103 | 0.0948096 | 0.18842655 | 3.0132927 | 20 | 1 5.9 | 18.9 |
| 196156 2002 $UM_{61}$ | 15.5 | $X$ | 123.90058 | 146.41163 | 238.90419 | 8.71252 | 0.0674498 | 0.19230612 | 2.9726285 | 20 | 1 31.7 | 20.0 |
| 196157 2002 $UV_{61}$ | 15.3 | $X$ | 98.83166 | 140.90708 | 217.02983 | 9.37839 | 0.1514413 | 0.18391363 | 3.0623872 | 20 | — | — |
| 196158 2002 $VV_{8}$ | 14.7 | $X$ | 29.70191 | 330.62490 | 75.72657 | 16.18921 | 0.2724382 | 0.17356858 | 3.1828925 | 20 | — | — |
| 196159 2002 $VT_{17}$ | 15.1 | $X$ | 321.01368 | 213.37368 | 131.58044 | 6.94844 | 0.1112652 | 0.15416722 | 3.4446204 | 20 | 7 31.2 | 19.3 |
| 196160 2002 $VW_{26}$ | 14.4 | $X$ | 197.43260 | 108.50116 | 10.70829 | 14.05410 | 0.0554761 | 0.15457159 | 3.4386101 | 20 | 8 24.4 | 19.6 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 196161 2002 $VM_{37}$ | 15.0 | X | 236.67611 | 137.32082 | 294.43743 | 5.64699 | 0.0615848 | 0.15221974 | 3.4739381 | 20 | 8 3.6 | 20.0 |
| 196162 2002 $VW_{41}$ | 17.8 | X | 236.57733 | 301.63165 | 51.93108 | 2.85040 | 0.1760778 | 0.31153116 | 2.1551048 | 20 | 4 14.4 | 20.8 |
| 196163 2002 $VD_{43}$ | 14.9 | X | 241.34578 | 203.65659 | 181.46908 | 9.95940 | 0.0979007 | 0.14724015 | 3.5518276 | 20 | 6 9.8 | 20.4 |
| 196164 2002 $VZ_{46}$ | 14.8 | X | 322.77997 | 247.13161 | 212.41923 | 12.13780 | 0.0566807 | 0.16975864 | 3.2303392 | 20 | 12 28.6 | 19.3 |
| 196165 2002 $VV_{51}$ | 15.4 | X | 63.10528 | 331.99351 | 120.34571 | 6.42392 | 0.2111316 | 0.18319376 | 3.0704045 | 20 | 3 1.8 | 19.1 |
| 196166 2002 $VE_{54}$ | 14.9 | X | 309.06673 | 283.05391 | 226.54111 | 22.63042 | 0.1423905 | 0.17328913 | 3.1863135 | 20 | — | — |
| 196167 2002 $VO_{57}$ | 15.4 | X | 39.12279 | 178.77794 | 206.26672 | 16.81634 | 0.1502515 | 0.17332645 | 3.1858561 | 20 | — | — |
| 196168 2002 $VW_{62}$ | 14.6 | X | 298.38555 | 241.11229 | 224.50661 | 12.64692 | 0.0524890 | 0.16866737 | 3.2442576 | 20 | 12 4.6 | 19.0 |
| 196169 2002 $VF_{69}$ | 14.4 | X | 66.39421 | 101.28408 | 245.78477 | 17.00043 | 0.1527519 | 0.17129626 | 3.2109789 | 20 | — | — |
| 196170 2002 $VZ_{80}$ | 14.5 | X | 350.52835 | 56.57203 | 79.28526 | 21.94830 | 0.2193333 | 0.17473334 | 3.1687322 | 20 | — | — |
| 196171 2002 $VH_{96}$ | 14.9 | X | 38.98864 | 347.50098 | 54.85070 | 17.17894 | 0.0421870 | 0.17500009 | 3.1655113 | 20 | — | — |
| 196172 2002 $VZ_{99}$ | 14.0 | X | 52.64657 | 138.88436 | 235.47619 | 26.23022 | 0.1453417 | 0.17669091 | 3.1452843 | 20 | — | — |
| 196173 2002 $VT_{118}$ | 14.1 | X | 345.72695 | 102.84255 | 49.34451 | 26.42422 | 0.2191639 | 0.17606147 | 3.1527764 | 20 | — | — |
| 196174 2002 $WQ_{11}$ | 16.2 | X | 268.72638 | 283.35191 | 64.98381 | 25.29162 | 0.2980013 | 0.31303284 | 2.1482069 | 20 | 5 4.5 | 19.5 |
| 196175 2002 $XR_{2}$ | 17.5 | X | 196.59906 | 165.30232 | 189.19337 | 3.31792 | 0.1634692 | 0.30328411 | 2.1939983 | 20 | 3 7.9 | 20.8 |
| 196176 2002 $XQ_{6}$ | 14.9 | X | 311.72834 | 65.55898 | 57.26739 | 16.22851 | 0.0281252 | 0.17154376 | 3.2078897 | 20 | — | — |
| 196177 2002 $XY_{7}$ | 14.8 | X | 49.65033 | 315.32674 | 63.93017 | 14.14686 | 0.1213574 | 0.17193877 | 3.2029746 | 20 | — | — |
| 196178 2002 $XA_{49}$ | 15.3 | X | 18.13506 | 352.61414 | 94.99460 | 2.20682 | 0.2290443 | 0.17358316 | 3.1827144 | 20 | — | — |
| 196179 2002 $XZ_{60}$ | 15.6 | X | 49.90409 | 17.63083 | 45.45891 | 1.61388 | 0.1635680 | 0.17532538 | 3.1615947 | 20 | — | — |
| 196180 2002 $XH_{86}$ | 16.6 | X | 212.36641 | 29.49626 | 6.67107 | 3.74523 | 0.1654512 | 0.30964381 | 2.1638531 | 20 | 5 16.5 | 19.8 |
| 196181 2002 $XE_{116}$ | 17.0 | X | 325.60535 | 48.12740 | 135.19746 | 4.54233 | 0.0624099 | 0.28406684 | 2.2918650 | 20 | — | — |
| 196182 2002 $YP_{10}$ | 17.3 | X | 106.66375 | 126.36145 | 23.23476 | 1.29314 | 0.0793966 | 0.30583730 | 2.1817706 | 20 | 6 22.3 | 19.8 |
| 196183 2002 $YQ_{11}$ | 16.6 | X | 249.27940 | 263.01970 | 89.38876 | 5.77188 | 0.2054781 | 0.30866049 | 2.1684464 | 20 | 4 25.1 | 19.7 |
| 196184 2002 $YP_{13}$ | 16.8 | X | 162.29281 | 217.48359 | 245.32351 | 2.56310 | 0.0119393 | 0.30871015 | 2.1682138 | 20 | 6 24.0 | 19.1 |
| 196185 2002 $YB_{29}$ | 17.2 | X | 89.58723 | 217.17953 | 305.64380 | 3.83104 | 0.1809010 | 0.30310776 | 2.1948492 | 20 | 7 3.9 | 19.9 |
| 196186 2002 $YF_{31}$ | 15.0 | X | 1.75983 | 4.65915 | 130.21828 | 5.94491 | 0.1172213 | 0.17260929 | 3.1946744 | 20 | 1 6.3 | 18.9 |
| 196187 2002 $YB_{32}$ | 17.2 | X | 189.83212 | 292.18392 | 121.87403 | 1.06148 | 0.1508952 | 0.30649585 | 2.1786442 | 20 | 5 19.9 | 20.5 |
| 196188 2003 $AS_{4}$ | 14.9 | X | 342.97885 | 138.01192 | 351.86429 | 16.31859 | 0.1926439 | 0.17450297 | 3.1715204 | 20 | — | — |
| 196189 2003 $AG_{28}$ | 15.0 | X | 33.03233 | 346.59344 | 115.26316 | 12.42322 | 0.0958887 | 0.17331934 | 3.1859432 | 20 | 1 13.9 | 18.8 |
| 196190 2003 $AC_{29}$ | 16.8 | X | 84.12532 | 175.39109 | 303.90338 | 5.38010 | 0.0780384 | 0.29710817 | 2.2242981 | 20 | 4 1.6 | 19.2 |
| 196191 2003 $AX_{34}$ | 17.1 | X | 165.70838 | 174.02319 | 255.73181 | 4.23581 | 0.1196673 | 0.30611714 | 2.1804407 | 20 | 5 14.7 | 20.1 |
| 196192 2003 $AN_{39}$ | 16.8 | X | 218.54738 | 198.34060 | 212.08197 | 3.64073 | 0.1455742 | 0.30957491 | 2.1641742 | 20 | 6 14.4 | 19.8 |
| 196193 2003 $AD_{40}$ | 16.7 | X | 59.92289 | 203.00100 | 261.67004 | 5.36913 | 0.0987677 | 0.29088281 | 2.2559216 | 20 | 2 4.5 | 18.9 |
| 196194 2003 $AZ_{43}$ | 17.1 | X | 276.39935 | 318.77981 | 31.54115 | 2.73936 | 0.2016300 | 0.31312497 | 2.1477855 | 20 | 5 21.5 | 19.4 |
| 196195 2003 $AW_{49}$ | 15.3 | X | 336.96140 | 135.26325 | 16.84612 | 1.81056 | 0.3025843 | 0.16952664 | 3.2332857 | 20 | — | — |
| 196196 2003 $AU_{57}$ | 16.8 | X | 19.19461 | 86.56227 | 86.17789 | 6.34036 | 0.0969882 | 0.29323621 | 2.2438353 | 20 | 3 9.7 | 18.9 |
| 196197 2003 $AC_{75}$ | 16.7 | X | 198.39244 | 22.71636 | 42.95880 | 6.79827 | 0.1305778 | 0.30865116 | 2.1684901 | 20 | 6 13.7 | 19.8 |
| 196198 2003 $AF_{94}$ | 16.8 | X | 306.96944 | 158.67593 | 351.78926 | 4.83722 | 0.0935671 | 0.27921831 | 2.3183204 | 20 | — | — |
| 196199 2003 $BA$ | 16.3 | X | 322.08730 | 18.32126 | 154.79651 | 5.38623 | 0.1395276 | 0.28249954 | 2.3003340 | 20 | — | — |
| 196200 2003 $BZ_{1}$ | 14.5 | X | 260.15346 | 292.14872 | 304.19345 | 24.14932 | 0.1463051 | 0.17007751 | 3.2263003 | 20 | 1 2.9 | 19.7 |
| 196201 2003 $BP_{7}$ | 17.0 | X | 78.18711 | 176.64398 | 271.44534 | 1.20720 | 0.1545278 | 0.29201086 | 2.2501081 | 20 | 2 21.4 | 18.9 |
| 196202 2003 $BL_{9}$ | 16.3 | X | 117.45977 | 173.98142 | 259.22635 | 6.43403 | 0.0676607 | 0.29587907 | 2.2304537 | 20 | 3 12.5 | 19.0 |
| 196203 2003 $BB_{10}$ | 17.1 | X | 353.36893 | 330.27284 | 235.90793 | 3.67128 | 0.1337438 | 0.29396144 | 2.2401433 | 20 | 3 2.6 | 19.0 |
| 196204 2003 $BQ_{12}$ | 16.9 | X | 74.76551 | 62.40998 | 60.09068 | 4.15826 | 0.1383581 | 0.29416401 | 2.2391148 | 20 | 4 7.0 | 19.1 |
| 196205 2003 $BQ_{15}$ | 16.7 | X | 109.63840 | 359.14353 | 81.12579 | 5.96302 | 0.1012659 | 0.29360203 | 2.2419711 | 20 | 3 24.8 | 19.4 |
| 196206 2003 $BM_{17}$ | 16.4 | X | 282.03342 | 165.54286 | 44.89828 | 5.74336 | 0.1935546 | 0.27928851 | 2.3179319 | 20 | — | — |
| 196207 2003 $BC_{19}$ | 16.6 | X | 203.35899 | 136.52687 | 260.17786 | 4.07824 | 0.1350500 | 0.30357439 | 2.1925994 | 20 | 5 9.7 | 19.9 |
| 196208 2003 $BG_{20}$ | 16.8 | X | 151.31361 | 92.77823 | 31.22536 | 6.30401 | 0.0687853 | 0.30637651 | 2.1792100 | 20 | 7 13.8 | 19.6 |
| 196209 2003 $BY_{21}$ | 16.5 | X | 346.52617 | 222.10597 | 295.46831 | 5.64712 | 0.0935234 | 0.28648562 | 2.2789467 | 20 | — | — |
| 196210 2003 $BM_{25}$ | 16.7 | X | 77.10856 | 250.67581 | 254.47902 | 4.70283 | 0.0860599 | 0.29670258 | 2.2263247 | 20 | 5 3.1 | 19.0 |
| 196211 2003 $BT_{30}$ | 16.2 | X | 74.93436 | 86.32693 | 305.00641 | 9.82543 | 0.1576593 | 0.28366327 | 2.2940382 | 20 | — | — |
| 196212 2003 $BV_{31}$ | 17.2 | X | 98.99721 | 199.56808 | 275.67137 | 4.48508 | 0.1170202 | 0.29821836 | 2.2187743 | 20 | 4 25.9 | 19.8 |
| 196213 2003 $BL_{32}$ | 17.0 | X | 123.38025 | 282.91611 | 127.74452 | 4.91828 | 0.1635777 | 0.29365203 | 2.2417166 | 20 | 3 8.9 | 19.9 |
| 196214 2003 $BD_{37}$ | 15.9 | X | 223.63569 | 258.49652 | 334.30517 | 5.10105 | 0.1656295 | 0.27199646 | 2.3591771 | 20 | — | — |
| 196215 2003 $BG_{38}$ | 16.8 | X | 13.80045 | 91.30540 | 115.12415 | 4.81298 | 0.0827464 | 0.29744158 | 2.2226356 | 20 | 4 20.1 | 18.9 |
| 196216 2003 $BA_{42}$ | 17.1 | X | 109.89958 | 355.86729 | 140.71436 | 2.99209 | 0.0699531 | 0.30246851 | 2.1979406 | 20 | 6 6.5 | 19.7 |
| 196217 2003 $BR_{42}$ | 15.0 | X | 331.49480 | 19.94330 | 160.71595 | 11.34431 | 0.0512393 | 0.17258887 | 3.1949264 | 20 | 1 25.3 | 19.4 |
| 196218 2003 $BH_{44}$ | 16.6 | X | 286.78086 | 219.15757 | 324.05876 | 6.57722 | 0.0876735 | 0.27942334 | 2.3171862 | 20 | — | — |
| 196219 2003 $BF_{46}$ | 17.1 | X | 222.74200 | 240.81141 | 133.08608 | 1.45488 | 0.1761345 | 0.30440061 | 2.1886301 | 20 | 4 28.0 | 20.4 |
| 196220 2003 $BK_{51}$ | 17.3 | X | 62.36900 | 149.32407 | 284.41191 | 1.45009 | 0.1501741 | 0.28684184 | 2.2770595 | 20 | — | — |
| 196221 2003 $BM_{52}$ | 17.2 | X | 139.01023 | 351.79055 | 112.29594 | 4.89408 | 0.0379196 | 0.30048737 | 2.2075908 | 20 | 5 26.4 | 19.8 |
| 196222 2003 $BW_{52}$ | 16.3 | X | 193.65566 | 254.77826 | 349.55943 | 5.85157 | 0.1974450 | 0.27239470 | 2.3568772 | 20 | — | — |
| 196223 2003 $BO_{53}$ | 17.6 | X | 35.81787 | 167.97350 | 3.90631 | 1.58567 | 0.0888452 | 0.29451238 | 2.2373487 | 20 | 4 4.1 | 19.5 |
| 196224 2003 $BA_{55}$ | 16.4 | X | 149.92345 | 202.77224 | 18.46990 | 2.30994 | 0.1834805 | 0.26252555 | 2.4155813 | 20 | 11 12.5 | 20.3 |
| 196225 2003 $BD_{57}$ | 17.1 | X | 165.48751 | 294.49200 | 129.09075 | 3.18259 | 0.1191555 | 0.30263283 | 2.1971448 | 20 | 5 7.8 | 20.2 |
| 196226 2003 $BS_{61}$ | 17.1 | X | 318.75654 | 277.91890 | 246.28160 | 1.44763 | 0.0991031 | 0.28273983 | 2.2990305 | 20 | — | — |
| 196227 2003 $BR_{63}$ | 16.9 | X | 160.14401 | 345.17416 | 86.29121 | 5.79861 | 0.0789096 | 0.30055451 | 2.2072620 | 20 | 5 10.8 | 19.9 |
| 196228 2003 $BM_{64}$ | 17.2 | X | 49.05103 | 3.00665 | 127.18769 | 4.74535 | 0.1062921 | 0.29284058 | 2.2458558 | 20 | 2 27.1 | 19.2 |
| 196229 2003 $BC_{67}$ | 17.4 | X | 47.57441 | 140.16068 | 329.12180 | 2.15879 | 0.1175551 | 0.28807817 | 2.2705399 | 20 | 1 23.9 | 19.2 |
| 196230 2003 $BO_{80}$ | 16.8 | X | 353.99851 | 108.09916 | 44.02701 | 6.21009 | 0.0912182 | 0.28380738 | 2.2932616 | 20 | — | — |
| 196231 2003 $BL_{82}$ | 17.1 | X | 133.62091 | 97.31025 | 25.59276 | 5.06353 | 0.0796552 | 0.30494440 | 2.1860275 | 20 | 6 18.6 | 20.0 |
| 196232 2003 $BN_{84}$ | 17.5 | X | 254.96956 | 249.90755 | 301.97140 | 1.27004 | 0.1566283 | 0.27439384 | 2.3454156 | 20 | — | — |
| 196233 2003 $BC_{92}$ | 17.9 | X | 87.72310 | 283.37065 | 152.48069 | 4.83921 | 0.1755798 | 0.29042624 | 2.2582853 | 20 | 2 24.1 | 20.0 |
| 196234 2003 $CH_{2}$ | 16.6 | X | 335.49452 | 95.97807 | 110.18974 | 5.20046 | 0.1299861 | 0.28758233 | 2.2731491 | 20 | 2 4.8 | 18.9 |
| 196235 2003 $CJ_{2}$ | 16.7 | X | 302.19092 | 197.08418 | 11.74115 | 6.03246 | 0.1468171 | 0.28216138 | 2.3021715 | 20 | — | — |
| 196236 2003 $CV_{2}$ | 16.8 | X | 80.44162 | 209.72709 | 280.68623 | 4.50567 | 0.0789906 | 0.29649348 | 2.2273713 | 20 | 4 13.4 | 19.2 |
| 196237 2003 $CL_{10}$ | 16.9 | X | 178.38059 | 250.30656 | 214.85740 | 3.76980 | 0.1099169 | 0.30705627 | 2.1759925 | 20 | 7 17.3 | 20.0 |
| 196238 2003 $CY_{10}$ | 16.0 | X | 248.53289 | 232.78213 | 355.92509 | 9.15119 | 0.1323336 | 0.27652896 | 2.3333271 | 20 | — | — |
| 196239 2003 $CZ_{17}$ | 17.0 | X | 101.59535 | 86.09171 | 59.43438 | 5.02914 | 0.0886343 | 0.29969275 | 2.2114912 | 20 | 6 10.2 | 19.5 |
| 196240 2003 $CH_{18}$ | 16.9 | X | 8.97981 | 202.18780 | 287.77527 | 3.90322 | 0.0848458 | 0.28483455 | 2.2877450 | 20 | — | — |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 196241 2003 $CT_{19}$ | 17.1 | X | 55.07286 | 276.55886 | 165.43624 | 5.31873 | 0.1221286 | 0.28524976 | 2.2855244 | 20 | — | — |
| 196242 2003 $CV_{21}$ | 17.4 | X | 121.92541 | 247.02885 | 181.85465 | 2.09827 | 0.1679650 | 0.29587611 | 2.2304686 | 20 | 3 30.9 | 20.4 |
| 196243 2003 $DS_{2}$ | 16.5 | X | 296.11481 | 233.97726 | 338.76626 | 6.48162 | 0.1442692 | 0.28122399 | 2.3072844 | 20 | — | — |
| 196244 2003 $DH_{8}$ | 16.4 | X | 267.40010 | 64.86174 | 147.57924 | 7.74860 | 0.1224675 | 0.27771469 | 2.3266808 | 20 | — | — |
| 196245 2003 $DB_{9}$ | 17.3 | X | 160.48123 | 16.72557 | 31.07442 | 4.62481 | 0.1283330 | 0.29705004 | 2.2245883 | 20 | 4 10.7 | 20.5 |
| 196246 2003 $DL_{9}$ | 16.9 | X | 4.84030 | 112.18608 | 32.51554 | 7.26303 | 0.0492121 | 0.28553182 | 2.2840190 | 20 | 1 6.1 | 19.5 |
| 196247 2003 $DP_{9}$ | 16.5 | X | 282.27032 | 185.65269 | 3.37871 | 5.95564 | 0.1151676 | 0.27503650 | 2.3417606 | 20 | — | — |
| 196248 2003 $DX_{13}$ | 16.9 | X | 322.61268 | 123.16477 | 87.43401 | 1.54479 | 0.1752342 | 0.28618496 | 2.2805426 | 20 | 1 14.9 | 19.4 |
| 196249 2003 $DA_{14}$ | 16.5 | X | 256.70711 | 103.32859 | 88.70991 | 3.32387 | 0.1482515 | 0.27173678 | 2.3606799 | 20 | — | — |
| 196250 2003 $DN_{17}$ | 16.4 | X | 168.40068 | 53.32693 | 179.16002 | 4.79312 | 0.1032539 | 0.26473033 | 2.4021507 | 20 | 12 19.0 | 19.8 |
| 196251 2003 $DL_{21}$ | 16.4 | X | 173.06569 | 99.28689 | 163.89124 | 6.35133 | 0.1116649 | 0.27095070 | 2.3652436 | 20 | — | — |
| 196252 2003 $DY_{23}$ | 16.8 | X | 173.41371 | 51.90348 | 171.61623 | 4.61659 | 0.0997860 | 0.26467532 | 2.4024836 | 20 | 12 13.6 | 20.3 |
| 196253 2003 $DC_{24}$ | 16.7 | X | 191.83509 | 263.67296 | 355.87335 | 6.79386 | 0.0839164 | 0.27297567 | 2.3535319 | 20 | — | — |
| 196254 2003 $DU_{24}$ | 17.4 | X | 256.36987 | 242.45693 | 336.92449 | 1.66612 | 0.1386859 | 0.27675876 | 2.3320354 | 20 | — | — |
| 196255 2003 $EZ$ | 16.4 | X | 277.93943 | 203.45899 | 353.51984 | 6.70442 | 0.1862672 | 0.27546295 | 2.3393431 | 20 | — | — |
| 196256 2003 $EH_{1}$ | 16.2 | X | 45.65169 | 171.33967 | 282.98167 | 70.84022 | 0.6189155 | 0.17852174 | 3.1237431 | 20 | 1 25.9 | 20.2 |
| 196257 2003 $EM_{3}$ | 16.9 | X | 93.25298 | 3.72650 | 82.83698 | 4.13561 | 0.1257528 | 0.29161694 | 2.2521339 | 20 | 3 13.2 | 19.3 |
| 196258 2003 $EM_{5}$ | 16.9 | X | 210.78032 | 269.22819 | 273.68147 | 1.29223 | 0.1247212 | 0.26542536 | 2.3979554 | 20 | 11 30.9 | 20.0 |
| 196259 2003 $ED_{6}$ | 16.6 | X | 204.87357 | 44.14079 | 16.08905 | 5.54459 | 0.1421926 | 0.30557130 | 2.1830366 | 20 | 6 12.6 | 19.7 |
| 196260 2003 $EE_{7}$ | 17.1 | X | 137.67864 | 138.03804 | 316.49070 | 4.28770 | 0.1168721 | 0.29915120 | 2.2141594 | 20 | 5 16.3 | 20.1 |
| 196261 2003 $EQ_{9}$ | 17.2 | X | 283.37517 | 319.57999 | 219.05059 | 1.99517 | 0.1477251 | 0.27455751 | 2.3444834 | 20 | — | — |
| 196262 2003 $EK_{10}$ | 16.9 | X | 268.50048 | 233.86923 | 314.14933 | 5.19628 | 0.1310978 | 0.27410147 | 2.3470831 | 20 | — | — |
| 196263 2003 $EW_{10}$ | 16.5 | X | 317.76767 | 283.42541 | 219.95556 | 3.38338 | 0.1847747 | 0.27627942 | 2.3347319 | 20 | — | — |
| 196264 2003 $EE_{11}$ | 15.9 | X | 306.60111 | 224.65184 | 329.78226 | 6.89091 | 0.1217989 | 0.27940189 | 2.3173048 | 20 | — | — |
| 196265 2003 $EF_{11}$ | 16.5 | X | 357.72971 | 341.42936 | 210.85017 | 2.64571 | 0.2337391 | 0.28700372 | 2.2762032 | 20 | 2 6.0 | 18.2 |
| 196266 2003 $EC_{12}$ | 17.2 | X | 315.94900 | 188.17297 | 325.47962 | 3.07363 | 0.1640782 | 0.27646541 | 2.3336847 | 20 | — | — |
| 196267 2003 $EF_{12}$ | 16.6 | X | 185.38267 | 44.08418 | 189.91686 | 10.51033 | 0.1775817 | 0.26473836 | 2.4021021 | 20 | 12 30.7 | 20.4 |
| 196268 2003 $ES_{15}$ | 16.7 | X | 273.60387 | 355.56646 | 227.50699 | 5.04475 | 0.0903735 | 0.27906085 | 2.3191924 | 20 | — | — |
| 196269 2003 $EG_{17}$ | 16.5 | X | 343.13301 | 51.96094 | 120.79101 | 6.50520 | 0.0630316 | 0.28388410 | 2.2928484 | 20 | 1 10.3 | 19.1 |
| 196270 2003 $EK_{19}$ | 16.5 | X | 202.65857 | 275.22695 | 328.57187 | 5.00103 | 0.1823253 | 0.27066665 | 2.3668980 | 20 | — | — |
| 196271 2003 $ED_{20}$ | 17.2 | X | 358.63811 | 210.48034 | 296.93021 | 1.98445 | 0.1010465 | 0.28319188 | 2.2965832 | 20 | — | — |
| 196272 2003 $EE_{21}$ | 17.4 | X | 354.20384 | 184.00033 | 336.71998 | 2.89535 | 0.1123251 | 0.28363951 | 2.2941663 | 20 | 1 3.9 | 19.6 |
| 196273 2003 $EC_{22}$ | 16.6 | X | 339.86919 | 94.34411 | 127.55619 | 4.83322 | 0.0951833 | 0.29052947 | 2.2577504 | 20 | 3 12.1 | 18.8 |
| 196274 2003 $ET_{22}$ | 16.5 | X | 345.32323 | 98.68951 | 66.84241 | 3.69120 | 0.1583546 | 0.28319650 | 2.2965582 | 20 | — | — |
| 196275 2003 $EJ_{23}$ | 16.9 | X | 273.66233 | 94.06768 | 75.57960 | 3.56311 | 0.1726074 | 0.27198093 | 2.3592670 | 20 | — | — |
| 196276 2003 $EP_{24}$ | 16.9 | X | 281.19003 | 101.04431 | 79.83470 | 4.18516 | 0.1139182 | 0.27424063 | 2.3462891 | 20 | — | — |
| 196277 2003 $EH_{26}$ | 16.3 | X | 243.66974 | 242.57092 | 359.81828 | 7.89254 | 0.0767599 | 0.27801269 | 2.3250179 | 20 | — | — |
| 196278 2003 $ES_{26}$ | 17.1 | X | 329.84435 | 151.34627 | 7.07026 | 3.35388 | 0.1091102 | 0.28014822 | 2.3131873 | 20 | — | — |
| 196279 2003 $ET_{28}$ | 16.5 | X | 349.23858 | 350.71624 | 159.64469 | 8.79495 | 0.1375600 | 0.28005540 | 2.3136984 | 20 | — | — |
| 196280 2003 $EL_{29}$ | 16.8 | X | 176.14275 | 137.92827 | 85.93510 | 3.79057 | 0.1538816 | 0.26223598 | 2.4173593 | 20 | 12 11.6 | 20.4 |
| 196281 2003 $EM_{29}$ | 16.7 | X | 304.88065 | 150.56575 | 35.77766 | 3.62495 | 0.1637654 | 0.27812498 | 2.3243921 | 20 | — | — |
| 196282 2003 $EX_{31}$ | 16.6 | X | 294.11024 | 357.26740 | 249.71353 | 5.02980 | 0.1288526 | 0.28676293 | 2.2774772 | 20 | 2 1.0 | 19.5 |
| 196283 2003 $ES_{33}$ | 16.6 | X | 305.38498 | 34.43078 | 180.62788 | 5.24141 | 0.1099216 | 0.28297487 | 2.2977572 | 20 | 1 7.9 | 19.6 |
| 196284 2003 $EO_{36}$ | 17.3 | X | 255.06938 | 11.99880 | 173.42500 | 0.94227 | 0.1277538 | 0.27160807 | 2.3614256 | 20 | — | — |
| 196285 2003 $ET_{41}$ | 16.2 | X | 13.28064 | 118.22588 | 146.65760 | 5.87392 | 0.2642983 | 0.23868662 | 2.5738545 | 20 | 8 6.6 | 18.2 |
| 196286 2003 $ED_{45}$ | 17.0 | X | 91.06859 | 245.63082 | 276.90587 | 4.54048 | 0.0809495 | 0.29866973 | 2.2165383 | 20 | 6 19.7 | 19.7 |
| 196287 2003 $EQ_{45}$ | 16.4 | X | 311.61376 | 176.71082 | 323.19554 | 5.53005 | 0.0796130 | 0.27274632 | 2.3548511 | 20 | — | — |
| 196288 2003 $EU_{48}$ | 16.6 | X | 201.42491 | 161.91552 | 56.96895 | 3.06533 | 0.1542230 | 0.26585408 | 2.3953768 | 20 | — | — |
| 196289 2003 $EZ_{48}$ | 16.7 | X | 202.00130 | 100.06292 | 134.22906 | 5.18685 | 0.1137108 | 0.26885035 | 2.3775462 | 20 | — | — |
| 196290 2003 $EP_{49}$ | 17.2 | X | 316.56771 | 189.85820 | 356.98937 | 1.44757 | 0.1359398 | 0.28012681 | 2.3133052 | 20 | — | — |
| 196291 2003 $EP_{50}$ | 16.2 | X | 175.79275 | 286.58602 | 355.46597 | 10.22744 | 0.1631806 | 0.27210753 | 2.3585351 | 20 | — | — |
| 196292 2003 $ES_{52}$ | 16.3 | X | 271.87510 | 170.81997 | 58.76400 | 8.51802 | 0.0846375 | 0.28064310 | 2.3104672 | 20 | — | — |
| 196293 2003 $EV_{58}$ | 16.8 | X | 275.31471 | 128.97822 | 73.57886 | 5.14895 | 0.1454274 | 0.27596627 | 2.3364978 | 20 | — | — |
| 196294 2003 $ER_{59}$ | 15.4 | X | 238.95334 | 271.65527 | 290.20167 | 19.62409 | 0.1736498 | 0.27023195 | 2.3694356 | 20 | — | — |
| 196295 2003 $EP_{61}$ | 16.9 | X | 26.55654 | 23.10587 | 95.58117 | 4.58152 | 0.0641138 | 0.28274414 | 2.2990071 | 20 | 1 1.9 | 19.4 |
| 196296 2003 $EY_{61}$ | 16.7 | X | 21.01743 | 190.24693 | 87.76101 | 3.10416 | 0.1172684 | 0.24339659 | 2.5405421 | 20 | 8 23.5 | 19.4 |
| 196297 2003 $FA$ | 17.0 | X | 42.26276 | 301.01932 | 0.28890 | 14.46226 | 0.1354499 | 0.25324983 | 2.4742103 | 20 | 10 25.8 | 20.4 |
| 196298 2003 $FQ$ | 16.8 | X | 163.95781 | 163.49327 | 74.85452 | 5.73457 | 0.1581053 | 0.26376807 | 2.4079894 | 20 | 12 17.6 | 20.3 |
| 196299 2003 $FN_{1}$ | 16.1 | X | 42.58478 | 315.76150 | 188.50032 | 24.90091 | 0.2652588 | 0.28870870 | 2.2672329 | 20 | 3 23.9 | 17.1 |
| 196300 2003 $FW_{3}$ | 16.4 | X | 31.55701 | 240.95128 | 12.18538 | 23.65664 | 0.3228205 | 0.24021938 | 2.5628942 | 20 | 9 16.4 | 19.4 |
| 196301 2003 $FG_{6}$ | 16.5 | X | 169.98000 | 234.42773 | 8.00959 | 6.67215 | 0.0774374 | 0.26336814 | 2.4104265 | 20 | — | — |
| 196302 2003 $FJ_{10}$ | 17.0 | X | 80.34778 | 119.98252 | 16.61141 | 6.02971 | 0.1209879 | 0.29321043 | 2.2439669 | 20 | 5 1.1 | 19.3 |
| 196303 2003 $FG_{12}$ | 17.2 | X | 12.95304 | 256.07312 | 234.63590 | 1.70494 | 0.1031021 | 0.28094353 | 2.3088197 | 20 | — | — |
| 196304 2003 $FY_{14}$ | 16.2 | X | 189.58801 | 217.18889 | 12.62718 | 6.25378 | 0.0930209 | 0.26527590 | 2.3988560 | 20 | — | — |
| 196305 2003 $FN_{15}$ | 16.9 | X | 247.91128 | 217.92345 | 26.22924 | 2.28479 | 0.1765739 | 0.27465493 | 2.3439290 | 20 | — | — |
| 196306 2003 $FT_{16}$ | 17.0 | X | 271.48296 | 203.91238 | 42.32656 | 2.04520 | 0.1673641 | 0.27979593 | 2.3151286 | 20 | 1 5.0 | 20.3 |
| 196307 2003 $FL_{19}$ | 16.7 | X | 245.20416 | 110.61863 | 125.24050 | 7.64385 | 0.1020118 | 0.27716784 | 2.3297402 | 20 | — | — |
| 196308 2003 $FX_{23}$ | 17.0 | X | 220.55405 | 69.29834 | 148.21738 | 1.71320 | 0.1333278 | 0.26909577 | 2.3761005 | 20 | — | — |
| 196309 2003 $FD_{24}$ | 17.2 | X | 144.26149 | 121.43732 | 142.09384 | 1.19201 | 0.1863029 | 0.26248020 | 2.4158596 | 20 | 12 29.0 | 21.0 |
| 196310 2003 $FO_{24}$ | 16.4 | X | 15.86926 | 116.29435 | 52.58258 | 6.55326 | 0.1107396 | 0.28742701 | 2.2739679 | 20 | 2 26.9 | 18.5 |
| 196311 2003 $FV_{28}$ | 16.1 | X | 231.77772 | 101.97375 | 110.86455 | 6.18464 | 0.1342741 | 0.26837008 | 2.3803820 | 20 | — | — |
| 196312 2003 $FB_{29}$ | 16.7 | X | 359.93074 | 17.85971 | 157.19665 | 10.72855 | 0.0771517 | 0.28376514 | 2.2934892 | 20 | 2 5.9 | 19.1 |
| 196313 2003 $FF_{31}$ | 17.4 | X | 193.30609 | 14.09489 | 73.63693 | 7.08555 | 0.1384717 | 0.30645952 | 2.1788164 | 20 | 7 9.7 | 20.6 |
| 196314 2003 $FF_{34}$ | 16.5 | X | 216.48894 | 191.99627 | 42.62758 | 1.09276 | 0.1661788 | 0.26956590 | 2.3733370 | 20 | — | — |
| 196315 2003 $FR_{34}$ | 17.3 | X | 282.29044 | 80.77687 | 92.87123 | 0.75162 | 0.1210155 | 0.27283626 | 2.3543335 | 20 | — | — |
| 196316 2003 $FZ_{34}$ | 13.1 | X | 184.59599 | 20.15538 | 131.73384 | 1.86944 | 0.0207377 | 0.08193249 | 5.2500721 | 20 | 9 6.9 | 20.2 |
| 196317 2003 $FR_{37}$ | 16.5 | X | 308.70823 | 188.35350 | 359.09485 | 6.31632 | 0.0771126 | 0.27868097 | 2.3212995 | 20 | — | — |
| 196318 2003 $FZ_{37}$ | 13.2 | X | 313.56544 | 197.51938 | 208.46564 | 5.04055 | 0.0353141 | 0.08478521 | 5.1316376 | 20 | 9 29.7 | 19.8 |
| 196319 2003 $FB_{39}$ | 16.8 | X | 280.68201 | 100.32288 | 83.62222 | 3.10098 | 0.1377435 | 0.27398025 | 2.3477754 | 20 | — | — |
| 196320 2003 $FE_{40}$ | 16.4 | X | 36.63395 | 48.76151 | 213.86964 | 3.56754 | 0.1513741 | 0.24440709 | 2.5335346 | 20 | 8 29.7 | 19.2 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 196321 2003 $FU_{41}$ | 17.0 | X | 58.26379 | 326.61861 | 165.49987 | 6.34058 | 0.0794708 | 0.28836173 | 2.2690512 | 20 | 3 14.6 | 19.1 |
| 196322 2003 $FY_{41}$ | 16.4 | X | 147.63563 | 21.49906 | 192.37046 | 2.89353 | 0.1251210 | 0.25633328 | 2.4543287 | 20 | 11 2.4 | 20.1 |
| 196323 2003 $FT_{42}$ | 17.1 | X | 185.64329 | 53.17340 | 178.83431 | 5.10333 | 0.1951610 | 0.26460834 | 2.4028890 | 20 | 12 27.4 | 20.7 |
| 196324 2003 $FV_{43}$ | 16.2 | X | 59.89137 | 332.13029 | 358.80854 | 6.57774 | 0.1567814 | 0.26034101 | 2.4290754 | 20 | — | — |
| 196325 2003 $FL_{47}$ | 17.1 | X | 178.54532 | 38.40247 | 192.44171 | 0.71863 | 0.1411731 | 0.26294815 | 2.4129925 | 20 | 12 23.8 | 20.7 |
| 196326 2003 $FM_{49}$ | 16.6 | X | 340.09393 | 135.86867 | 77.67709 | 2.96633 | 0.1530949 | 0.28586385 | 2.2822500 | 20 | 2 20.6 | 18.9 |
| 196327 2003 $FE_{51}$ | 17.0 | X | 19.94932 | 123.84298 | 37.99359 | 4.42516 | 0.0629441 | 0.28881132 | 2.2666958 | 20 | 2 23.6 | 19.3 |
| 196328 2003 $FB_{54}$ | 17.0 | X | 304.26866 | 163.45635 | 37.89860 | 3.16165 | 0.1593852 | 0.27871597 | 2.3211052 | 20 | — | — |
| 196329 2003 $FW_{54}$ | 16.6 | X | 286.41157 | 128.90966 | 69.69011 | 6.17027 | 0.1104406 | 0.27478459 | 2.3431916 | 20 | — | — |
| 196330 2003 $FN_{55}$ | 17.3 | X | 293.48976 | 272.00808 | 267.53499 | 3.27804 | 0.1785169 | 0.27662679 | 2.3327770 | 20 | — | — |
| 196331 2003 $FY_{56}$ | 17.1 | X | 225.31922 | 112.15468 | 118.64895 | 1.96989 | 0.1378719 | 0.27209586 | 2.3586025 | 20 | — | — |
| 196332 2003 $FM_{58}$ | 16.6 | X | 3.83756 | 17.92093 | 109.59653 | 2.95203 | 0.0967456 | 0.28043913 | 2.3115873 | 20 | — | — |
| 196333 2003 $FS_{60}$ | 16.6 | X | 26.15050 | 24.24821 | 124.34688 | 4.77291 | 0.0817012 | 0.28624989 | 2.2801977 | 20 | 2 12.9 | 18.6 |
| 196334 2003 $FM_{64}$ | 16.0 | X | 126.08160 | 303.34453 | 30.20305 | 10.19321 | 0.1506385 | 0.27107023 | 2.3645482 | 20 | — | — |
| 196335 2003 $FH_{68}$ | 16.7 | X | 52.62132 | 48.87984 | 54.11944 | 5.72377 | 0.1088711 | 0.28338058 | 2.2955636 | 20 | 1 26.2 | 18.9 |
| 196336 2003 $FN_{71}$ | 16.8 | X | 141.90859 | 198.27418 | 67.99312 | 2.97431 | 0.1650449 | 0.26171779 | 2.4205490 | 20 | 12 30.9 | 20.6 |
| 196337 2003 $FG_{73}$ | 16.1 | X | 187.26410 | 208.96242 | 29.39369 | 7.20869 | 0.1203739 | 0.26506343 | 2.4001378 | 20 | — | — |
| 196338 2003 $FB_{74}$ | 16.4 | X | 202.86359 | 177.38202 | 54.01503 | 5.32434 | 0.1835210 | 0.26600385 | 2.3944775 | 20 | — | — |
| 196339 2003 $FM_{76}$ | 17.2 | X | 209.59329 | 222.82377 | 327.80912 | 1.78178 | 0.1490112 | 0.26347922 | 2.4097490 | 20 | 12 5.7 | 20.6 |
| 196340 2003 $FH_{78}$ | 16.5 | X | 308.33643 | 115.54062 | 174.88168 | 5.12924 | 0.2425803 | 0.23249512 | 2.6193497 | 20 | 4 9.7 | 19.7 |
| 196341 2003 $FV_{78}$ | 17.1 | X | 279.96629 | 291.38748 | 237.93681 | 1.85396 | 0.1322211 | 0.27125060 | 2.3634998 | 20 | — | — |
| 196342 2003 $FP_{79}$ | 16.1 | X | 283.99620 | 108.89196 | 112.79098 | 7.72010 | 0.0601255 | 0.28040154 | 2.3117939 | 20 | — | — |
| 196343 2003 $FA_{83}$ | 16.1 | X | 282.57503 | 39.88972 | 175.39216 | 8.14871 | 0.0973138 | 0.27645943 | 2.3337184 | 20 | — | — |
| 196344 2003 $FJ_{83}$ | 16.7 | X | 294.19128 | 85.98717 | 150.50629 | 6.07346 | 0.1027752 | 0.28105013 | 2.3082359 | 20 | 1 23.8 | 19.6 |
| 196345 2003 $FB_{84}$ | 16.8 | X | 133.26107 | 90.96485 | 45.42495 | 4.32160 | 0.1080452 | 0.30345315 | 2.1931834 | 20 | 7 10.9 | 19.7 |
| 196346 2003 $FU_{88}$ | 15.6 | X | 304.55930 | 69.93635 | 221.52812 | 11.49015 | 0.2066388 | 0.22976376 | 2.6400675 | 20 | 4 8.8 | 19.1 |
| 196347 2003 $FA_{89}$ | 16.7 | X | 267.80753 | 347.51583 | 233.98699 | 3.02070 | 0.1688363 | 0.27542718 | 2.3395456 | 20 | — | — |
| 196348 2003 $FS_{89}$ | 16.7 | X | 269.28323 | 257.18141 | 301.87801 | 3.92292 | 0.0372456 | 0.27357894 | 2.3500708 | 20 | — | — |
| 196349 2003 $FC_{90}$ | 16.4 | X | 233.86329 | 241.57893 | 335.56263 | 6.59547 | 0.0540416 | 0.27061778 | 2.3671830 | 20 | — | — |
| 196350 2003 $FM_{90}$ | 16.6 | X | 29.15656 | 244.10397 | 270.16479 | 5.14281 | 0.0495431 | 0.28627897 | 2.2800432 | 20 | 2 23.0 | 19.1 |
| 196351 2003 $FC_{91}$ | 16.6 | X | 331.36480 | 162.10871 | 327.82221 | 6.22659 | 0.1505952 | 0.27433525 | 2.3457495 | 20 | — | — |
| 196352 2003 $FG_{96}$ | 16.5 | X | 209.95911 | 219.97314 | 13.67209 | 5.87447 | 0.1811236 | 0.26980318 | 2.3719453 | 20 | — | — |
| 196353 2003 $FC_{101}$ | 16.8 | X | 279.48501 | 349.03464 | 180.38452 | 4.46769 | 0.0904700 | 0.27202171 | 2.3590311 | 20 | — | — |
| 196354 2003 $FL_{102}$ | 16.5 | X | 212.39237 | 206.53605 | 7.33330 | 1.95003 | 0.1670758 | 0.26672904 | 2.3901355 | 20 | — | — |
| 196355 2003 $FB_{103}$ | 16.8 | X | 105.89796 | 268.14371 | 10.63222 | 1.29412 | 0.1467458 | 0.25882029 | 2.4385809 | 20 | 12 12.8 | 20.6 |
| 196356 2003 $FV_{103}$ | 16.6 | X | 276.74020 | 32.13348 | 200.12920 | 7.17955 | 0.0556537 | 0.27971813 | 2.3155579 | 20 | 1 2.8 | 19.7 |
| 196357 2003 $FD_{104}$ | 16.8 | X | 286.88216 | 247.02341 | 277.15792 | 2.13492 | 0.1814515 | 0.27174628 | 2.3606249 | 20 | — | — |
| 196358 2003 $FT_{104}$ | 16.4 | X | 210.62510 | 110.33711 | 113.18688 | 1.48746 | 0.1636243 | 0.26553283 | 2.3973084 | 20 | — | — |
| 196359 2003 $FE_{105}$ | 16.7 | X | 159.90617 | 235.72813 | 359.42881 | 1.47033 | 0.0921216 | 0.26146243 | 2.4221248 | 20 | 12 13.1 | 20.2 |
| 196360 2003 $FR_{106}$ | 16.8 | X | 202.74658 | 225.26220 | 43.76637 | 2.82589 | 0.1780991 | 0.27111826 | 2.3642689 | 20 | — | — |
| 196361 2003 $FS_{106}$ | 16.8 | X | 278.36087 | 177.34649 | 56.53317 | 3.45657 | 0.1251086 | 0.27908027 | 2.3190848 | 20 | — | — |
| 196362 2003 $FT_{108}$ | 16.9 | X | 156.47748 | 161.95285 | 86.12071 | 3.59111 | 0.1592440 | 0.26213028 | 2.4180091 | 20 | 12 22.2 | 20.6 |
| 196363 2003 $FA_{109}$ | 16.4 | X | 249.89325 | 335.53439 | 253.52352 | 5.86947 | 0.1572759 | 0.27336812 | 2.3512789 | 20 | — | — |
| 196364 2003 $FX_{110}$ | 12.7 | X | 80.93907 | 346.84461 | 282.70597 | 5.27253 | 0.0517083 | 0.08180909 | 5.2553504 | 20 | 9 26.7 | 19.8 |
| 196365 2003 $FX_{113}$ | 16.8 | X | 252.87496 | 205.53873 | 352.02722 | 3.35250 | 0.1705904 | 0.27065612 | 2.3669594 | 20 | — | — |
| 196366 2003 $FY_{113}$ | 16.4 | X | 137.36450 | 222.19904 | 353.25717 | 6.59426 | 0.1462362 | 0.25451085 | 2.4660309 | 20 | 10 22.6 | 20.3 |
| 196367 2003 $FA_{114}$ | 16.9 | X | 271.13550 | 259.39558 | 335.02396 | 2.73219 | 0.1198613 | 0.27820858 | 2.3239264 | 20 | — | — |
| 196368 2003 $FO_{114}$ | 16.4 | X | 176.61567 | 357.91959 | 234.55757 | 4.29304 | 0.2478402 | 0.26058051 | 2.4275868 | 20 | 12 15.3 | 20.5 |
| 196369 2003 $FY_{115}$ | 15.9 | X | 349.91337 | 21.88269 | 227.04016 | 11.37394 | 0.1384603 | 0.23343755 | 2.6122951 | 20 | 5 9.3 | 18.6 |
| 196370 2003 $FL_{117}$ | 17.1 | X | 269.16353 | 97.86381 | 103.36174 | 3.98222 | 0.1597448 | 0.27493107 | 2.3423592 | 20 | — | — |
| 196371 2003 $FA_{118}$ | 16.4 | X | 169.37108 | 203.31845 | 42.23965 | 7.35783 | 0.1992349 | 0.26386587 | 2.4073944 | 20 | 12 28.8 | 20.2 |
| 196372 2003 $FH_{119}$ | 16.3 | X | 165.90204 | 129.96747 | 100.36083 | 2.56094 | 0.1464946 | 0.26009659 | 2.4305969 | 20 | 12 9.8 | 19.9 |
| 196373 2003 $FO_{127}$ | 16.2 | X | 26.53044 | 92.23465 | 204.75725 | 3.99488 | 0.2325999 | 0.24538251 | 2.5268161 | 20 | 10 16.9 | 19.1 |
| 196374 2003 $FO_{130}$ | 16.6 | X | 274.12579 | 160.76583 | 69.80090 | 7.21901 | 0.0554002 | 0.28047386 | 2.3113965 | 20 | — | — |
| 196375 2003 $FR_{131}$ | 15.9 | X | 0.58944 | 115.94987 | 176.07742 | 13.92470 | 0.1731950 | 0.23817912 | 2.5775094 | 20 | 8 6.1 | 18.6 |
| 196376 2003 $GM_{1}$ | 16.0 | X | 259.77387 | 356.43698 | 188.11868 | 6.98915 | 0.0883708 | 0.26880912 | 2.3777894 | 20 | — | — |
| 196377 2003 $GM_{2}$ | 16.7 | X | 313.44352 | 4.53413 | 178.96396 | 5.91959 | 0.0356483 | 0.27837185 | 2.3230176 | 20 | — | — |
| 196378 2003 $GU_{2}$ | 16.8 | X | 223.73544 | 245.68530 | 347.10147 | 5.94242 | 0.0691437 | 0.27103504 | 2.3647528 | 20 | — | — |
| 196379 2003 $GE_{3}$ | 16.5 | X | 299.33708 | 16.74812 | 177.41846 | 1.23784 | 0.1802810 | 0.27831513 | 2.3233332 | 20 | — | — |
| 196380 2003 $GM_{3}$ | 17.0 | X | 276.77988 | 312.73281 | 197.17105 | 1.50025 | 0.1467867 | 0.26932967 | 2.3747246 | 20 | — | — |
| 196381 2003 $GZ_{3}$ | 16.8 | X | 263.15219 | 209.11696 | 3.66355 | 2.32675 | 0.1376672 | 0.27403390 | 2.3474689 | 20 | — | — |
| 196382 2003 $GZ_{4}$ | 16.8 | X | 263.53298 | 101.57727 | 47.31081 | 2.89244 | 0.1536231 | 0.26641445 | 2.3920167 | 20 | 12 26.7 | 19.3 |
| 196383 2003 $GC_{5}$ | 16.7 | X | 173.18393 | 254.85572 | 22.52429 | 2.12853 | 0.1921201 | 0.26699827 | 2.3885285 | 20 | — | — |
| 196384 2003 $GW_{5}$ | 16.8 | X | 157.88943 | 215.95808 | 5.33856 | 1.96225 | 0.1318577 | 0.25796805 | 2.4439488 | 20 | 11 20.7 | 20.5 |
| 196385 2003 $GM_{6}$ | 16.0 | X | 23.16872 | 62.37463 | 193.65993 | 12.88370 | 0.2141709 | 0.23755954 | 2.5819890 | 20 | 8 2.8 | 18.8 |
| 196386 2003 $GR_{6}$ | 16.5 | X | 267.73270 | 141.74753 | 98.85030 | 4.39985 | 0.1378595 | 0.27623840 | 2.3349631 | 20 | — | — |
| 196387 2003 $GU_{6}$ | 16.7 | X | 329.82163 | 125.92953 | 87.86574 | 6.26879 | 0.1106102 | 0.28291190 | 2.2980982 | 20 | 2 12.1 | 19.2 |
| 196388 2003 $GS_{8}$ | 16.4 | X | 223.62174 | 13.39646 | 196.21126 | 2.12642 | 0.1544911 | 0.26627934 | 2.3928257 | 20 | — | — |
| 196389 2003 $GG_{11}$ | 16.8 | X | 226.86401 | 264.20552 | 349.29266 | 1.97746 | 0.1297869 | 0.27352064 | 2.3504047 | 20 | — | — |
| 196390 2003 $GZ_{12}$ | 16.4 | X | 244.98255 | 346.79757 | 184.96816 | 5.15963 | 0.1855626 | 0.26585721 | 2.3953580 | 20 | 12 22.6 | 19.1 |
| 196391 2003 $GQ_{19}$ | 17.3 | X | 134.15779 | 100.93832 | 177.09954 | 0.96628 | 0.1420896 | 0.26208570 | 2.4182832 | 20 | — | — |
| 196392 2003 $GX_{22}$ | 16.5 | X | 206.07714 | 46.43257 | 173.49630 | 3.79141 | 0.1091687 | 0.26411119 | 2.4059033 | 20 | — | — |
| 196393 2003 $GD_{23}$ | 17.0 | X | 285.07802 | 195.77691 | 350.30251 | 3.82738 | 0.1425207 | 0.27403805 | 2.3474453 | 20 | — | — |
| 196394 2003 $GL_{23}$ | 15.4 | X | 266.37582 | 271.58927 | 17.50831 | 23.72873 | 0.2408561 | 0.22395586 | 2.6855161 | 20 | 3 3.4 | 20.0 |
| 196395 2003 $GE_{24}$ | 17.2 | X | 140.08620 | 114.95751 | 117.17825 | 2.28621 | 0.1361088 | 0.25631519 | 2.4544441 | 20 | 11 17.8 | 20.9 |
| 196396 2003 $GH_{24}$ | 16.4 | X | 233.94056 | 79.41775 | 131.46682 | 7.45417 | 0.0659924 | 0.26894641 | 2.3769801 | 20 | — | — |
| 196397 2003 $GS_{25}$ | 17.0 | X | 195.63922 | 133.61596 | 82.45266 | 3.91980 | 0.1330812 | 0.26569773 | 2.3963164 | 20 | 12 25.1 | 20.4 |
| 196398 2003 $GW_{27}$ | 16.4 | X | 173.48147 | 242.59328 | 340.69553 | 1.75169 | 0.1535648 | 0.26060994 | 2.4274040 | 20 | 12 7.7 | 19.9 |
| 196399 2003 $GE_{32}$ | 16.8 | X | 203.53476 | 33.02214 | 187.17577 | 14.53218 | 0.0765693 | 0.26571032 | 2.3962407 | 20 | — | — |
| 196400 2003 $GM_{32}$ | 16.8 | X | 263.61214 | 18.60521 | 152.45853 | 4.47035 | 0.1037943 | 0.26866955 | 2.3786128 | 20 | — | — |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| | Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | m | | ° | ° | ° | ° | | ° | | | | |
| 196401 | 2003 $GM_{33}$ | 17.0 | X | 333.92247 | 117.15702 | 45.80801 | 1.97567 | 0.1486436 | 0.27818786 | 2.3240418 | 20 | — | — |
| 196402 | 2003 $GN_{34}$ | 16.3 | X | 21.14578 | 263.85681 | 359.46075 | 12.64768 | 0.2225764 | 0.24031610 | 2.5622066 | 20 | 8 20.9 | 18.9 |
| 196403 | 2003 $GW_{34}$ | 16.4 | X | 2.76454 | 90.27851 | 150.72001 | 11.91812 | 0.1468123 | 0.23469103 | 2.6029853 | 20 | 5 26.7 | 19.2 |
| 196404 | 2003 $GO_{37}$ | 16.7 | X | 308.76206 | 182.85300 | 0.57276 | 5.19179 | 0.1357779 | 0.27670204 | 2.3323540 | 20 | — | — |
| 196405 | 2003 $GX_{37}$ | 16.7 | X | 268.32351 | 197.78966 | 52.36171 | 5.48360 | 0.1150779 | 0.27962132 | 2.3160923 | 20 | 1 11.9 | 20.1 |
| 196406 | 2003 $GF_{42}$ | 17.1 | X | 261.22140 | 87.73500 | 106.30954 | 3.10063 | 0.1585924 | 0.27182368 | 2.3601768 | 20 | — | — |
| 196407 | 2003 $GM_{46}$ | 17.0 | X | 99.44688 | 358.65538 | 82.64508 | 6.32231 | 0.0691429 | 0.28640520 | 2.2793733 | 20 | 3 7.3 | 19.7 |
| 196408 | 2003 $GW_{47}$ | 12.4 | X | 27.66660 | 270.50140 | 58.83831 | 11.16617 | 0.0276351 | 0.08244185 | 5.2284253 | 20 | 10 6.9 | 19.3 |
| 196409 | 2003 $GN_{48}$ | 16.9 | X | 25.79071 | 189.30652 | 85.38629 | 5.36285 | 0.2162302 | 0.24252779 | 2.5466057 | 20 | 9 13.6 | 19.6 |
| 196410 | 2003 $GN_{49}$ | 16.4 | X | 261.37677 | 14.46960 | 127.07258 | 4.80583 | 0.1270030 | 0.26399384 | 2.4066163 | 20 | 12 15.7 | 19.1 |
| 196411 | Umurhan | 17.5 | X | 112.20754 | 218.08422 | 201.38184 | 2.06645 | 0.0989954 | 0.28411276 | 2.2916180 | 20 | 2 24.5 | 20.2 |
| 196412 | 2003 $GK_{54}$ | 16.7 | X | 143.37992 | 179.56251 | 80.09429 | 4.50249 | 0.1535641 | 0.26115189 | 2.4240446 | 20 | 12 24.3 | 20.5 |
| 196413 | 2003 $GS_{54}$ | 16.2 | X | 119.80841 | 142.56088 | 170.65280 | 7.26564 | 0.1279767 | 0.26592512 | 2.3949501 | 20 | — | — |
| 196414 | 2003 $GS_{55}$ | 16.1 | X | 17.81806 | 51.33614 | 181.21531 | 8.18159 | 0.1569482 | 0.23374081 | 2.6100352 | 20 | 6 12.2 | 18.8 |
| 196415 | 2003 $HE$ | 17.0 | X | 237.01239 | 357.47660 | 230.58462 | 1.60203 | 0.1417822 | 0.26869719 | 2.3784497 | 20 | — | — |
| 196416 | 2003 $HP_{1}$ | 16.2 | X | 52.28561 | 102.41267 | 138.29745 | 4.52439 | 0.1192390 | 0.24237781 | 2.5476562 | 20 | 8 18.8 | 19.4 |
| 196417 | 2003 $HP_{2}$ | 16.2 | X | 185.88093 | 162.23378 | 43.08490 | 6.96241 | 0.0720151 | 0.25988701 | 2.4319035 | 20 | 12 5.0 | 19.6 |
| 196418 | 2003 $HX_{5}$ | 16.5 | X | 213.79547 | 11.42959 | 165.16758 | 6.62931 | 0.0833837 | 0.26088985 | 2.4256674 | 20 | 12 2.4 | 19.8 |
| 196419 | 2003 $HF_{9}$ | 16.1 | X | 44.02475 | 64.07909 | 216.96982 | 7.28609 | 0.1681144 | 0.24589390 | 2.5233115 | 20 | 10 8.8 | 19.2 |
| 196420 | 2003 $HO_{9}$ | 15.4 | X | 266.34109 | 62.75317 | 204.24652 | 13.40150 | 0.1499638 | 0.22031983 | 2.7149823 | 20 | 1 30.8 | 19.9 |
| 196421 | 2003 $HS_{9}$ | 17.4 | X | 314.36976 | 356.97842 | 146.23626 | 1.74076 | 0.1308285 | 0.27190854 | 2.3596856 | 20 | — | — |
| 196422 | 2003 $HF_{11}$ | 17.7 | X | 113.01211 | 236.12588 | 198.34412 | 5.99235 | 0.1404693 | 0.28900254 | 2.2656958 | 20 | 3 23.2 | 20.4 |
| 196423 | 2003 $HL_{12}$ | 16.3 | X | 167.66008 | 93.02591 | 180.30964 | 6.56277 | 0.1213760 | 0.26659060 | 2.3909628 | 20 | — | — |
| 196424 | 2003 $HJ_{14}$ | 16.2 | X | 333.27076 | 83.53089 | 161.80845 | 12.58847 | 0.1749886 | 0.22963325 | 2.6410677 | 20 | 3 31.8 | 19.1 |
| 196425 | 2003 $HA_{20}$ | 16.8 | X | 175.03508 | 235.00605 | 15.25791 | 2.16177 | 0.1195359 | 0.26335509 | 2.4105061 | 20 | — | — |
| 196426 | 2003 $HB_{20}$ | 16.8 | X | 25.90326 | 238.68187 | 17.55525 | 3.46518 | 0.1596501 | 0.23959649 | 2.5673343 | 20 | 8 5.5 | 19.5 |
| 196427 | 2003 $HG_{20}$ | 16.4 | X | 35.70765 | 60.49072 | 205.70962 | 6.08075 | 0.1706785 | 0.24247925 | 2.5469456 | 20 | 9 4.7 | 19.4 |
| 196428 | 2003 $HJ_{20}$ | 17.0 | X | 197.51788 | 184.54681 | 70.73286 | 3.20626 | 0.1822723 | 0.26652265 | 2.3913692 | 20 | — | — |
| 196429 | 2003 $HS_{20}$ | 16.8 | X | 230.60365 | 279.89544 | 300.27347 | 0.58952 | 0.1344852 | 0.26861933 | 2.3789093 | 20 | — | — |
| 196430 | 2003 $HE_{21}$ | 16.2 | X | 333.32569 | 249.15143 | 38.90479 | 13.33139 | 0.1633190 | 0.23588898 | 2.5941651 | 20 | 5 30.5 | 19.0 |
| 196431 | 2003 $HB_{22}$ | 16.0 | X | 313.13070 | 241.81258 | 51.65763 | 12.48066 | 0.2761515 | 0.23053816 | 2.6341520 | 20 | 4 18.3 | 19.1 |
| 196432 | 2003 $HA_{28}$ | 17.0 | X | 172.73210 | 269.77854 | 340.55151 | 1.67821 | 0.1418388 | 0.26227174 | 2.4171395 | 20 | — | — |
| 196433 | 2003 $HO_{28}$ | 16.5 | X | 252.68101 | 197.16901 | 31.35346 | 6.76058 | 0.1650213 | 0.27126340 | 2.3634255 | 20 | — | — |
| 196434 | 2003 $HW_{29}$ | 15.9 | X | 16.18872 | 220.58705 | 62.59259 | 3.46215 | 0.1921893 | 0.23961648 | 2.5671914 | 20 | 9 2.4 | 18.4 |
| 196435 | 2003 $HD_{30}$ | 16.3 | X | 239.56659 | 209.12911 | 10.04102 | 5.52735 | 0.1338321 | 0.26870012 | 2.3784324 | 20 | — | — |
| 196436 | 2003 $HL_{30}$ | 16.6 | X | 227.14493 | 173.96635 | 56.61075 | 3.02576 | 0.1626051 | 0.26809861 | 2.3819886 | 20 | — | — |
| 196437 | 2003 $HU_{31}$ | 16.7 | X | 220.14675 | 105.18949 | 152.17057 | 1.99226 | 0.0931224 | 0.27113111 | 2.3641942 | 20 | — | — |
| 196438 | 2003 $HM_{33}$ | 17.5 | X | 117.03847 | 134.39735 | 141.10410 | 1.82917 | 0.1635243 | 0.25654916 | 2.4529517 | 20 | 12 19.2 | 21.3 |
| 196439 | 2003 $HU_{33}$ | 16.6 | X | 291.77412 | 146.14328 | 20.28397 | 5.65637 | 0.1142180 | 0.27258089 | 2.3558038 | 20 | — | — |
| 196440 | 2003 $HQ_{35}$ | 12.6 | X | 92.01234 | 246.34590 | 23.85719 | 20.95848 | 0.0210151 | 0.08396149 | 5.1651461 | 20 | 10 10.6 | 19.4 |
| 196441 | 2003 $HL_{36}$ | 16.8 | X | 159.17189 | 293.59324 | 27.96335 | 6.63661 | 0.1385699 | 0.27337411 | 2.3512445 | 20 | — | — |
| 196442 | 2003 $HF_{37}$ | 16.4 | X | 250.19466 | 227.13686 | 344.26655 | 5.11321 | 0.1706760 | 0.26994152 | 2.3711348 | 20 | — | — |
| 196443 | 2003 $HK_{37}$ | 16.8 | X | 234.97988 | 359.97716 | 237.79435 | 5.30471 | 0.1389833 | 0.26955349 | 2.3734098 | 20 | — | — |
| 196444 | 2003 $HQ_{37}$ | 16.6 | X | 190.26487 | 274.81390 | 274.70920 | 3.37828 | 0.2209550 | 0.25822005 | 2.4423585 | 20 | 11 5.6 | 20.6 |
| 196445 | 2003 $HW_{37}$ | 16.1 | X | 28.34420 | 49.30396 | 246.52731 | 8.39595 | 0.2116498 | 0.24374041 | 2.5381524 | 20 | 10 11.2 | 19.1 |
| 196446 | 2003 $HP_{39}$ | 16.7 | X | 296.36677 | 1.11687 | 187.40106 | 1.56952 | 0.1770476 | 0.27397800 | 2.3477882 | 20 | — | — |
| 196447 | 2003 $HO_{43}$ | 16.6 | X | 239.26241 | 355.55841 | 185.75594 | 4.28456 | 0.1466330 | 0.26452263 | 2.4034080 | 20 | — | — |
| 196448 | 2003 $HH_{44}$ | 16.8 | X | 207.60671 | 184.55838 | 86.49152 | 3.55760 | 0.1128493 | 0.27126426 | 2.3634205 | 20 | — | — |
| 196449 | 2003 $HB_{47}$ | 16.8 | X | 186.58127 | 77.11398 | 149.22668 | 2.42315 | 0.1643702 | 0.26071152 | 2.4267734 | 20 | 12 23.8 | 20.4 |
| 196450 | 2003 $HH_{47}$ | 15.5 | X | 47.02796 | 105.36887 | 70.06106 | 23.62647 | 0.2610120 | 0.28956609 | 2.2627552 | 20 | 5 30.7 | 17.3 |
| 196451 | 2003 $HO_{47}$ | 16.6 | X | 262.05882 | 64.48000 | 106.73494 | 2.09062 | 0.1267488 | 0.26672488 | 2.3901603 | 20 | — | — |
| 196452 | 2003 $HO_{48}$ | 16.0 | X | 3.14508 | 17.93759 | 244.28823 | 10.50400 | 0.2010796 | 0.23494178 | 2.6011329 | 20 | 6 27.8 | 18.3 |
| 196453 | 2003 $HC_{49}$ | 15.5 | X | 316.78966 | 226.04223 | 74.24314 | 15.92229 | 0.2578086 | 0.22982708 | 2.6395826 | 20 | 5 8.6 | 18.5 |
| 196454 | 2003 $HF_{50}$ | 16.5 | X | 16.97562 | 119.97581 | 137.90468 | 4.36843 | 0.1207813 | 0.23766821 | 2.5812020 | 20 | 7 14.9 | 19.2 |
| 196455 | 2003 $HG_{50}$ | 16.1 | X | 277.20179 | 153.10072 | 185.35797 | 14.99626 | 0.1398892 | 0.23124200 | 2.6288042 | 20 | 5 19.5 | 19.9 |
| 196456 | 2003 $HJ_{51}$ | 16.3 | X | 298.41733 | 131.38515 | 189.20674 | 12.70845 | 0.2757588 | 0.23223253 | 2.6213239 | 20 | 5 2.2 | 19.7 |
| 196457 | 2003 $HG_{52}$ | 16.6 | X | 293.32101 | 327.44254 | 162.69543 | 5.76728 | 0.0836317 | 0.26477601 | 2.4018744 | 20 | — | — |
| 196458 | 2003 $HS_{52}$ | 16.5 | X | 339.70100 | 64.80844 | 177.38573 | 3.71434 | 0.1493626 | 0.23026249 | 2.6362540 | 20 | 4 9.5 | 19.3 |
| 196459 | 2003 $HV_{52}$ | 17.0 | X | 142.08039 | 261.57238 | 29.09414 | 1.97172 | 0.1844053 | 0.26203857 | 2.4185732 | 20 | — | — |
| 196460 | 2003 $HF_{53}$ | 15.9 | X | 306.03403 | 258.64502 | 11.75947 | 16.77387 | 0.2829399 | 0.22659519 | 2.6646219 | 20 | 3 9.7 | 19.6 |
| 196461 | 2003 $HV_{53}$ | 16.1 | X | 109.11971 | 269.58987 | 44.09283 | 6.28286 | 0.1074109 | 0.26401855 | 2.4064661 | 20 | — | — |
| 196462 | 2003 $HQ_{54}$ | 16.5 | X | 264.86556 | 18.53441 | 160.67225 | 1.62283 | 0.1090585 | 0.26736258 | 2.3863582 | 20 | — | — |
| 196463 | 2003 $HV_{57}$ | 16.6 | X | 33.68078 | 305.89983 | 89.76665 | 8.66910 | 0.1054951 | 0.26248808 | 2.4158112 | 20 | — | — |
| 196464 | 2003 $HH_{58}$ | 17.1 | X | 277.16557 | 156.31781 | 3.88662 | 2.41216 | 0.1345130 | 0.26785740 | 2.3834184 | 20 | — | — |
| 196465 | 2003 $JG_{5}$ | 16.1 | X | 326.48553 | 262.89131 | 53.15597 | 13.29185 | 0.2930706 | 0.23548469 | 2.5971335 | 20 | 6 10.2 | 18.2 |
| 196466 | 2003 $JB_{7}$ | 16.7 | X | 274.59668 | 35.29851 | 153.58736 | 2.76309 | 0.1440440 | 0.26966614 | 2.3727488 | 20 | — | — |
| 196467 | 2003 $JX_{8}$ | 16.4 | X | 186.24117 | 89.12883 | 134.36242 | 5.58297 | 0.1399444 | 0.26062024 | 2.4273400 | 20 | 12 22.4 | 19.9 |
| 196468 | 2003 $JH_{9}$ | 16.8 | X | 258.63650 | 52.07831 | 136.95230 | 2.89252 | 0.1374217 | 0.26794617 | 2.3828919 | 20 | — | — |
| 196469 | 2003 $JN_{9}$ | 17.0 | X | 207.93106 | 137.93428 | 78.34236 | 3.20388 | 0.1588471 | 0.26224165 | 2.4173244 | 20 | — | — |
| 196470 | 2003 $JJ_{10}$ | 16.4 | X | 191.00939 | 157.24216 | 99.05092 | 5.11318 | 0.1287297 | 0.26631047 | 2.3926393 | 20 | — | — |
| 196471 | 2003 $JH_{11}$ | 16.4 | X | 57.33553 | 350.19025 | 33.49380 | 6.81077 | 0.1371608 | 0.26552570 | 2.3973513 | 20 | — | — |
| 196472 | 2003 $JY_{11}$ | 17.2 | X | 146.05170 | 35.78035 | 222.01923 | 0.58004 | 0.1527861 | 0.26022175 | 2.4298175 | 20 | 12 24.4 | 21.0 |
| 196473 | 2003 $JD_{12}$ | 16.4 | X | 344.18568 | 65.93762 | 205.75376 | 4.28050 | 0.1508705 | 0.23590797 | 2.5940259 | 20 | 6 1.2 | 18.8 |
| 196474 | 2003 $JX_{13}$ | 16.1 | X | 58.15239 | 76.22447 | 173.50323 | 6.56213 | 0.2382084 | 0.24160055 | 2.5531173 | 20 | 9 26.6 | 19.6 |
| 196475 | 2003 $JV_{15}$ | 17.0 | X | 238.08519 | 155.38267 | 40.05210 | 3.13512 | 0.1326038 | 0.26581065 | 2.3956377 | 20 | — | — |
| 196476 | Humfernandez | 15.4 | X | 250.50723 | 159.84544 | 130.96950 | 15.61872 | 0.2281965 | 0.21760953 | 2.7374789 | 20 | 2 12.0 | 19.9 |
| 196477 | 2003 $JB_{18}$ | 16.5 | X | 260.15780 | 122.65838 | 203.89047 | 12.76017 | 0.1142509 | 0.22864858 | 2.6486447 | 20 | 4 14.2 | 20.2 |
| 196478 | 2003 $KC$ | 17.1 | X | 350.83360 | 53.56974 | 110.96749 | 4.52783 | 0.1182182 | 0.27807010 | 2.3246979 | 20 | 1 3.9 | 19.3 |
| 196479 | 2003 $KU$ | 16.5 | X | 137.07316 | 232.94276 | 10.53236 | 12.33943 | 0.1992080 | 0.25490940 | 2.4634598 | 20 | 11 24.5 | 20.8 |
| 196480 | 2003 $KF_{1}$ | 16.0 | X | 336.77115 | 58.56523 | 185.62666 | 13.16325 | 0.2363971 | 0.22801237 | 2.6535693 | 20 | 3 24.6 | 18.4 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 196481 VATT | 17.5 | X | 260.36687 | 77.21660 | 74.68187 | 2.74715 | 0.1328059 | 0.26145755 | 2.4221549 | 20 | 12 26.6 | 20.2 |
| 196482 2003 $KW_3$ | 16.0 | X | 4.19708 | 289.41084 | 351.47469 | 6.44918 | 0.1999737 | 0.23683450 | 2.5872560 | 20 | 8 4.1 | 18.2 |
| 196483 2003 $KV_6$ | 16.7 | X | 327.03373 | 266.37588 | 199.36076 | 5.21339 | 0.1570255 | 0.26509472 | 2.3999489 | 20 | — | — |
| 196484 2003 $KK_9$ | 16.2 | X | 29.20864 | 268.47689 | 1.32908 | 7.19899 | 0.1799400 | 0.23972279 | 2.5664324 | 20 | 9 4.2 | 19.0 |
| 196485 2003 $KG_{10}$ | 17.0 | X | 164.44783 | 163.76594 | 71.05186 | 2.11569 | 0.0625456 | 0.26001157 | 2.4311267 | 20 | 12 19.6 | 20.2 |
| 196486 2003 $KZ_{11}$ | 16.4 | X | 173.16760 | 150.44352 | 117.91284 | 3.44131 | 0.1791255 | 0.26318051 | 2.4115720 | 20 | — | — |
| 196487 2003 $KA_{12}$ | 16.8 | X | 44.25718 | 183.83797 | 80.75061 | 6.28292 | 0.1919735 | 0.24183831 | 2.5514436 | 20 | 9 24.8 | 20.0 |
| 196488 2003 $KM_{12}$ | 12.8 | X | 312.11768 | 274.20266 | 148.47849 | 9.60691 | 0.0240771 | 0.08184395 | 5.2538581 | 20 | 10 20.8 | 19.7 |
| 196489 2003 $KC_{14}$ | 15.4 | X | 315.40658 | 136.62703 | 192.18103 | 31.94551 | 0.2833501 | 0.23153987 | 2.6265491 | 20 | 6 7.4 | 18.9 |
| 196490 2003 $KB_{17}$ | 16.3 | X | 24.59774 | 150.21528 | 135.96133 | 6.55678 | 0.1712184 | 0.24104119 | 2.5570656 | 20 | 9 19.4 | 19.1 |
| 196491 2003 $KJ_{17}$ | 15.3 | X | 335.31793 | 101.31361 | 225.33178 | 15.91241 | 0.2692557 | 0.23616414 | 2.5921497 | 20 | 7 24.1 | 17.6 |
| 196492 2003 $KX_{19}$ | 16.5 | X | 280.08803 | 47.42875 | 136.59983 | 6.41511 | 0.0554708 | 0.26819850 | 2.3813971 | 20 | — | — |
| 196493 2003 $KB_{20}$ | 16.0 | X | 75.88355 | 90.73955 | 156.18441 | 6.57237 | 0.1080414 | 0.24439381 | 2.5336265 | 20 | 9 27.6 | 19.5 |
| 196494 2003 $KF_{33}$ | 17.6 | X | 39.10586 | 32.99400 | 103.47335 | 3.55581 | 0.1467123 | 0.28369412 | 2.2938719 | 20 | 2 21.7 | 19.3 |
| 196495 2003 $LJ_1$ | 16.1 | X | 25.10571 | 46.04696 | 165.91812 | 8.54219 | 0.0334294 | 0.23113152 | 2.6296418 | 20 | 5 18.0 | 19.5 |
| 196496 2003 $LB_3$ | 17.0 | X | 274.13061 | 172.60999 | 51.54080 | 2.87685 | 0.0428740 | 0.27531289 | 2.3401931 | 20 | — | — |
| 196497 2003 $LZ_3$ | 15.9 | X | 356.65281 | 206.99033 | 69.01733 | 12.80186 | 0.1670581 | 0.23403924 | 2.6078159 | 20 | 7 4.6 | 18.4 |
| 196498 2003 $LY_5$ | 15.8 | X | 46.07393 | 54.66929 | 229.97609 | 12.98921 | 0.1512188 | 0.23867957 | 2.5739052 | 20 | 10 10.9 | 19.2 |
| 196499 2003 $LV_6$ | 15.7 | X | 349.96750 | 101.33301 | 171.14433 | 12.72838 | 0.2468349 | 0.23254675 | 2.6189620 | 20 | 6 11.6 | 18.0 |
| 196500 2003 $LW_6$ | 15.6 | X | 31.51441 | 187.07953 | 77.07400 | 13.59835 | 0.1168326 | 0.23759867 | 2.5817055 | 20 | 8 25.2 | 18.9 |
| 196501 2003 $LX_6$ | 15.8 | X | 14.18447 | 215.45984 | 76.10655 | 8.91346 | 0.1883463 | 0.23789994 | 2.5795255 | 20 | 9 13.9 | 18.6 |
| 196502 2003 $MA_1$ | 15.3 | X | 296.17808 | 329.12116 | 280.31362 | 14.56673 | 0.2466993 | 0.21765961 | 2.7370590 | 20 | 1 29.7 | 19.5 |
| 196503 2003 $MX_6$ | 15.3 | X | 49.32731 | 99.98954 | 135.32559 | 12.36879 | 0.1978372 | 0.23824609 | 2.5770264 | 20 | 8 19.9 | 18.3 |
| 196504 2003 $MT_8$ | 16.3 | X | 339.77676 | 30.38123 | 238.81110 | 4.48363 | 0.2165018 | 0.22773894 | 2.6556929 | 20 | 5 11.3 | 18.4 |
| 196505 2003 $MD_9$ | 15.8 | X | 254.92318 | 36.21394 | 251.12106 | 12.81524 | 0.2153699 | 0.21494513 | 2.7600544 | 20 | 2 6.9 | 20.6 |
| 196506 2003 $MW_{11}$ | 15.7 | X | 235.96024 | 64.10849 | 280.91066 | 8.07387 | 0.1613306 | 0.21858096 | 2.7293622 | 20 | 4 3.7 | 20.2 |
| 196507 2003 $MN_{12}$ | 15.3 | X | 353.10334 | 354.64246 | 238.80010 | 13.41532 | 0.1127002 | 0.22313375 | 2.6921084 | 20 | 4 22.5 | 18.3 |
| 196508 2003 $MY_{12}$ | 15.8 | X | 273.01722 | 190.73645 | 125.34266 | 11.16211 | 0.2073004 | 0.22063735 | 2.7123768 | 20 | 4 9.3 | 20.0 |
| 196509 2003 $MA_{13}$ | 16.0 | X | 25.26132 | 73.71156 | 286.95503 | 11.68689 | 0.3156689 | 0.24315299 | 2.5422386 | 20 | — | — |
| 196510 2003 $NR_1$ | 15.9 | X | 288.04096 | 355.53806 | 299.37845 | 8.36009 | 0.1973005 | 0.22141932 | 2.7059870 | 20 | 3 22.1 | 19.8 |
| 196511 2003 $NS_2$ | 15.9 | X | 347.81216 | 182.11314 | 120.07169 | 14.24764 | 0.1937829 | 0.23618617 | 2.5919885 | 20 | 7 27.1 | 18.0 |
| 196512 2003 $NZ_2$ | 15.4 | X | 321.82688 | 192.61235 | 122.75044 | 15.02765 | 0.0920428 | 0.22851789 | 2.6496545 | 20 | 6 29.9 | 18.7 |
| 196513 2003 $NA_5$ | 15.8 | X | 271.96961 | 296.53048 | 323.40507 | 7.32538 | 0.2446798 | 0.21571718 | 2.7534650 | 20 | 1 24.1 | 20.2 |
| 196514 2003 $NQ_5$ | 15.5 | X | 39.88481 | 70.06688 | 240.75120 | 11.35165 | 0.0681998 | 0.24099780 | 2.5573725 | 20 | 10 25.9 | 18.9 |
| 196515 2003 $NP_{11}$ | 16.0 | X | 282.86374 | 333.54848 | 273.49364 | 8.51241 | 0.1406070 | 0.21313921 | 2.7756230 | 20 | 1 27.7 | 20.1 |
| 196516 2003 $OJ$ | 14.6 | X | 355.02125 | 179.04080 | 222.49357 | 15.72081 | 0.1576736 | 0.18071729 | 3.0983912 | 20 | 12 14.6 | 18.4 |
| 196517 2003 $OP$ | 16.1 | X | 37.48021 | 242.82686 | 34.91306 | 2.86715 | 0.2059155 | 0.23769795 | 2.5809867 | 20 | 10 1.7 | 19.1 |
| 196518 2003 $OS_3$ | 15.9 | X | 260.09498 | 136.46261 | 165.42343 | 4.24046 | 0.0769988 | 0.21570602 | 2.7535599 | 20 | 3 19.5 | 19.9 |
| 196519 2003 $OL_4$ | 15.5 | X | 282.04938 | 227.34576 | 147.94713 | 5.44944 | 0.1362062 | 0.23099388 | 2.6306863 | 20 | 7 14.2 | 18.8 |
| 196520 2003 $OP_6$ | 15.5 | X | 184.83968 | 264.43669 | 109.25284 | 12.02997 | 0.2948364 | 0.21049405 | 2.7988277 | 20 | 4 4.0 | 20.8 |
| 196521 2003 $OE_9$ | 16.1 | X | 29.32074 | 67.38687 | 191.09148 | 12.86471 | 0.1524226 | 0.23226305 | 2.6210943 | 20 | 8 7.8 | 19.3 |
| 196522 2003 $OJ_{10}$ | 15.5 | X | 225.23691 | 265.72993 | 138.74713 | 12.01859 | 0.1824822 | 0.22355881 | 2.6886949 | 20 | 6 10.9 | 19.9 |
| 196523 2003 $OJ_{15}$ | 16.3 | X | 223.16587 | 112.88045 | 184.61470 | 12.17013 | 0.3003205 | 0.21059373 | 2.7979445 | 20 | 1 25.7 | 21.6 |
| 196524 2003 $OS_{15}$ | 16.5 | X | 275.24656 | 42.36323 | 228.69254 | 7.92199 | 0.2763206 | 0.21530608 | 2.7569688 | 20 | 2 2.4 | 21.1 |
| 196525 2003 $OT_{15}$ | 16.3 | X | 187.54711 | 119.25249 | 226.55957 | 8.26728 | 0.1875385 | 0.20873951 | 2.8144894 | 20 | 2 23.5 | 21.1 |
| 196526 2003 $OY_{15}$ | 15.5 | X | 277.67302 | 28.74334 | 263.42179 | 8.03783 | 0.1319857 | 0.21637945 | 2.7478438 | 20 | 3 15.9 | 19.6 |
| 196527 2003 $OZ_{17}$ | 16.0 | X | 339.44123 | 250.95947 | 31.51458 | 4.45897 | 0.2843111 | 0.22895300 | 2.6462965 | 20 | 5 22.1 | 17.8 |
| 196528 2003 $OE_{18}$ | 15.5 | X | 265.09942 | 165.19175 | 231.38092 | 8.74552 | 0.0923860 | 0.23029665 | 2.6359933 | 20 | 7 24.2 | 19.1 |
| 196529 2003 $OA_{20}$ | 16.0 | X | 239.73457 | 32.62077 | 306.57070 | 8.24371 | 0.1393828 | 0.21887927 | 2.7268816 | 20 | 4 1.7 | 20.3 |
| 196530 2003 $OB_{20}$ | 15.2 | X | 121.86117 | 44.55512 | 263.74535 | 9.81930 | 0.0693071 | 0.19583038 | 2.9368561 | 20 | — | — |
| 196531 2003 $OC_{20}$ | 15.8 | X | 291.53687 | 197.12684 | 192.87444 | 4.32016 | 0.1305380 | 0.23441224 | 2.6050488 | 20 | 8 19.6 | 18.7 |
| 196532 2003 $OY_{20}$ | 16.0 | X | 33.78600 | 186.48908 | 83.75068 | 4.41683 | 0.2062597 | 0.23541991 | 2.5976099 | 20 | 9 17.1 | 19.0 |
| 196533 2003 $OK_{21}$ | 14.9 | X | 263.55201 | 292.31113 | 49.66695 | 10.08050 | 0.2794777 | 0.21821812 | 2.7323867 | 20 | 4 21.0 | 19.2 |
| 196534 2003 $OR_{21}$ | 15.4 | X | 258.46416 | 262.26074 | 122.71724 | 13.70130 | 0.1777611 | 0.22716559 | 2.6601595 | 20 | 6 20.8 | 19.3 |
| 196535 2003 $OR_{27}$ | 15.6 | X | 259.95906 | 176.44713 | 137.34169 | 8.44894 | 0.1188070 | 0.21754586 | 2.7380130 | 20 | 4 1.0 | 19.7 |
| 196536 2003 $OF_{28}$ | 15.5 | X | 209.38166 | 279.55881 | 79.49360 | 3.27561 | 0.0971643 | 0.21465491 | 2.7625417 | 20 | 4 4.2 | 19.6 |
| 196537 2003 $OK_{29}$ | 16.1 | X | 187.46431 | 50.28965 | 303.17764 | 0.96199 | 0.1053507 | 0.20975319 | 2.8054143 | 20 | 3 4.8 | 20.3 |
| 196538 2003 $OR_{29}$ | 15.4 | X | 73.03147 | 74.42460 | 319.12601 | 7.11445 | 0.0972023 | 0.19655457 | 2.9296379 | 20 | — | — |
| 196539 2003 $OA_{30}$ | 16.1 | X | 142.28778 | 32.98615 | 339.85487 | 8.05584 | 0.3056574 | 0.20334753 | 2.8640249 | 20 | 2 29.3 | 21.1 |
| 196540 Weinbaum | 16.4 | X | 230.32984 | 152.04997 | 207.58312 | 8.47064 | 0.2702043 | 0.21795614 | 2.7345759 | 20 | 4 13.6 | 21.1 |
| 196541 2003 $OW_{32}$ | 16.1 | X | 235.83080 | 354.90611 | 297.29758 | 2.72985 | 0.0700746 | 0.20999639 | 2.8032478 | 20 | 2 9.9 | 20.3 |
| 196542 2003 $PZ$ | 15.7 | X | 237.51803 | 324.02569 | 348.73465 | 9.24771 | 0.2648609 | 0.21212487 | 2.7844643 | 20 | 2 26.1 | 20.5 |
| 196543 2003 $PS_1$ | 16.0 | X | 208.79504 | 24.04375 | 325.37566 | 7.25957 | 0.2307492 | 0.21292572 | 2.7774780 | 20 | 3 16.1 | 20.9 |
| 196544 2003 $PB_2$ | 15.3 | X | 198.01906 | 66.90089 | 309.81775 | 12.12292 | 0.1552452 | 0.21457365 | 2.7632391 | 20 | 4 5.6 | 20.1 |
| 196545 2003 $PQ_7$ | 15.3 | X | 34.21089 | 353.61014 | 271.66683 | 8.70598 | 0.0553026 | 0.23358643 | 2.6111850 | 20 | 8 11.6 | 18.7 |
| 196546 2003 $PT_{11}$ | 15.9 | X | 293.82460 | 168.63990 | 163.25343 | 13.98652 | 0.2603469 | 0.22580898 | 2.6708034 | 20 | 5 15.6 | 19.6 |
| 196547 2003 $QE_2$ | 16.4 | X | 272.40226 | 132.19435 | 166.62147 | 2.02942 | 0.1198650 | 0.21538542 | 2.7562917 | 20 | 3 24.5 | 20.2 |
| 196548 2003 $QN_2$ | 16.1 | X | 180.51172 | 192.40264 | 213.50360 | 5.70779 | 0.0226139 | 0.21732565 | 2.7398622 | 20 | 4 30.4 | 20.0 |
| 196549 2003 $QR_3$ | 15.8 | X | 250.40353 | 164.62423 | 125.38130 | 10.57683 | 0.1384158 | 0.21282975 | 2.7783130 | 20 | 2 18.7 | 20.1 |
| 196550 2003 $QP_5$ | 15.3 | X | 231.53026 | 345.66852 | 348.69411 | 9.36756 | 0.3392513 | 0.21455664 | 2.7633851 | 20 | 3 12.9 | 20.3 |
| 196551 2003 $QW_6$ | 16.0 | X | 288.77111 | 69.59058 | 302.48525 | 2.88626 | 0.1118086 | 0.22833901 | 2.6510381 | 20 | 7 24.2 | 19.2 |
| 196552 2003 $QD_7$ | 15.7 | X | 174.84206 | 25.74013 | 344.61725 | 3.78813 | 0.1193357 | 0.20935068 | 2.8090090 | 20 | 3 13.3 | 19.9 |
| 196553 2003 $QO_7$ | 15.2 | X | 42.50976 | 25.93441 | 333.55515 | 14.68056 | 0.1819255 | 0.18581436 | 3.0414676 | 20 | — | — |
| 196554 2003 $QZ_7$ | 16.3 | X | 245.00223 | 8.13185 | 292.72045 | 2.45283 | 0.0751972 | 0.21250262 | 2.7811635 | 20 | 2 29.2 | 20.5 |
| 196555 2003 $QU_9$ | 16.1 | X | 238.34159 | 289.26803 | 9.74982 | 9.41117 | 0.1963154 | 0.21255863 | 2.7806750 | 20 | 2 16.5 | 20.8 |
| 196556 2003 $QH_{12}$ | 15.7 | X | 258.80977 | 203.38355 | 147.40685 | 6.79937 | 0.0477136 | 0.21980777 | 2.7191971 | 20 | 5 25.5 | 19.5 |
| 196557 2003 $QU_{12}$ | 15.5 | X | 181.82194 | 280.83584 | 80.67421 | 5.39194 | 0.0859823 | 0.21041251 | 2.7995507 | 20 | 3 11.4 | 19.8 |
| 196558 2003 $QB_{13}$ | 15.4 | X | 210.70543 | 277.81242 | 93.95717 | 5.62616 | 0.1689551 | 0.21398064 | 2.7683419 | 20 | 4 19.5 | 20.0 |
| 196559 2003 $QG_{13}$ | 15.6 | X | 232.97740 | 296.38722 | 33.67525 | 4.03621 | 0.0980130 | 0.21225752 | 2.7833041 | 20 | 3 23.6 | 19.7 |
| 196560 2003 $QQ_{14}$ | 15.9 | X | 218.89760 | 169.77624 | 184.99620 | 11.41658 | 0.1417263 | 0.21488154 | 2.7605989 | 20 | 4 5.7 | 20.2 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 196561 2003 $QY_{15}$ | 15.9 | $X$ | 190.27198 | 190.81337 | 186.50713 | 13.56805 | 0.2519344 | 0.21144269 | 2.7904501 | 20 | 4 6.9 | 20.8 |
| 196562 2003 $QU_{18}$ | 15.6 | $X$ | 291.33603 | 175.31006 | 142.43461 | 10.13403 | 0.1878198 | 0.22171495 | 2.7035811 | 20 | 5 4.9 | 19.3 |
| 196563 2003 $QU_{19}$ | 15.6 | $X$ | 213.20889 | 250.39613 | 134.96582 | 8.12538 | 0.0903379 | 0.21737584 | 2.7394404 | 20 | 5 12.8 | 19.8 |
| 196564 2003 $QJ_{20}$ | 16.3 | $X$ | 285.96209 | 163.60339 | 140.83207 | 5.79212 | 0.2954779 | 0.21982066 | 2.7190908 | 20 | 3 25.4 | 20.3 |
| 196565 2003 $QX_{20}$ | 15.2 | $X$ | 204.05576 | 255.25058 | 357.53276 | 18.48534 | 0.2318450 | 0.19824307 | 2.9129791 | 20 | — | — |
| 196566 2003 $QE_{24}$ | 16.4 | $X$ | 44.67543 | 68.52752 | 221.25422 | 2.72245 | 0.1607991 | 0.23768338 | 2.5810922 | 20 | 10 19.6 | 19.6 |
| 196567 2003 $QP_{25}$ | 14.7 | $X$ | 226.48798 | 188.94677 | 315.90077 | 14.98490 | 0.0496386 | 0.18201154 | 3.0836856 | 20 | 10 18.5 | 19.4 |
| 196568 2003 $QL_{27}$ | 16.3 | $X$ | 299.60325 | 87.66754 | 197.43859 | 3.25534 | 0.2631951 | 0.22164320 | 2.7041645 | 20 | 3 18.0 | 20.0 |
| 196569 2003 $QY_{28}$ | 14.9 | $X$ | 91.22578 | 316.71668 | 14.46436 | 9.97119 | 0.0845031 | 0.18996790 | 2.9969712 | 20 | — | — |
| 196570 2003 $QW_{31}$ | 15.8 | $X$ | 262.13605 | 172.72214 | 164.14282 | 4.22417 | 0.0703791 | 0.22009308 | 2.7168466 | 20 | 5 7.6 | 19.6 |
| 196571 2003 $QB_{32}$ | 15.9 | $X$ | 302.81661 | 318.75609 | 321.60605 | 7.97181 | 0.1768404 | 0.21997102 | 2.7178516 | 20 | 3 26.1 | 19.6 |
| 196572 2003 $QS_{32}$ | 15.8 | $X$ | 271.41514 | 187.78149 | 150.31451 | 5.96098 | 0.0708718 | 0.22076789 | 2.7113075 | 20 | 5 21.5 | 19.5 |
| 196573 2003 $QR_{34}$ | 15.6 | $X$ | 152.08194 | 260.99986 | 136.37869 | 5.12020 | 0.0778604 | 0.21146790 | 2.7902283 | 20 | 3 22.2 | 19.7 |
| 196574 2003 $QK_{36}$ | 15.6 | $X$ | 238.97632 | 175.59804 | 174.22454 | 8.86705 | 0.1901657 | 0.21624496 | 2.7489830 | 20 | 4 16.2 | 20.0 |
| 196575 2003 $QV_{36}$ | 16.0 | $X$ | 231.47040 | 332.91471 | 351.90515 | 7.84649 | 0.2185625 | 0.21240512 | 2.7820146 | 20 | 3 7.9 | 20.7 |
| 196576 2003 $QE_{40}$ | 15.6 | $X$ | 197.20833 | 193.03620 | 157.55547 | 1.96648 | 0.2142927 | 0.20975588 | 2.8053903 | 20 | 3 11.4 | 20.5 |
| 196577 2003 $QT_{40}$ | 15.8 | $X$ | 230.14014 | 163.75800 | 139.42561 | 5.53522 | 0.1257864 | 0.21093464 | 2.7949290 | 20 | 2 14.7 | 20.1 |
| 196578 2003 $QV_{40}$ | 15.8 | $X$ | 274.75835 | 184.11099 | 154.97121 | 9.96099 | 0.1583045 | 0.22277702 | 2.6949815 | 20 | 5 15.4 | 19.7 |
| 196579 2003 $QD_{41}$ | 15.6 | $X$ | 270.12751 | 296.84203 | 350.57724 | 9.19020 | 0.1795247 | 0.21333265 | 2.7739449 | 20 | 3 1.7 | 19.9 |
| 196580 2003 $QJ_{41}$ | 14.8 | $X$ | 60.50951 | 305.17975 | 348.03720 | 10.84076 | 0.1891085 | 0.17940723 | 3.1134562 | 20 | 11 1.6 | 19.5 |
| 196581 2003 $QS_{45}$ | 15.7 | $X$ | 139.07407 | 313.18130 | 156.49000 | 9.21125 | 0.0143246 | 0.22063200 | 2.7124207 | 20 | 6 1.9 | 19.5 |
| 196582 2003 $QS_{46}$ | 15.8 | $X$ | 195.36849 | 254.88801 | 106.83861 | 10.16838 | 0.2466485 | 0.21211403 | 2.7845592 | 20 | 3 27.3 | 20.8 |
| 196583 2003 $QM_{48}$ | 16.0 | $X$ | 139.90947 | 81.71149 | 264.49464 | 1.27033 | 0.0988181 | 0.20025783 | 2.8934082 | 20 | 1 8.5 | 20.2 |
| 196584 2003 $QX_{48}$ | 15.7 | $X$ | 277.74266 | 175.18323 | 140.00155 | 5.43418 | 0.0381748 | 0.21884697 | 2.7271500 | 20 | 5 4.7 | 19.4 |
| 196585 2003 $QJ_{49}$ | 15.5 | $X$ | 357.45863 | 305.70523 | 144.27385 | 12.66367 | 0.0741322 | 0.19324184 | 2.9630247 | 20 | — | — |
| 196586 2003 $QC_{50}$ | 15.2 | $X$ | 282.71201 | 244.74929 | 18.60734 | 8.95904 | 0.1295333 | 0.21156651 | 2.7893613 | 20 | 2 23.6 | 19.2 |
| 196587 2003 $QJ_{50}$ | 15.4 | $X$ | 211.99198 | 236.10752 | 113.08318 | 8.74383 | 0.2351585 | 0.21190371 | 2.7864014 | 20 | 3 24.2 | 20.3 |
| 196588 2003 $QA_{51}$ | 15.4 | $X$ | 176.76877 | 200.44796 | 141.70211 | 6.88531 | 0.0715266 | 0.20410380 | 2.8569457 | 20 | 2 8.9 | 19.7 |
| 196589 2003 $QG_{51}$ | 15.7 | $X$ | 213.23750 | 298.54331 | 43.26862 | 6.07609 | 0.0565443 | 0.20973600 | 2.8055675 | 20 | 3 20.6 | 19.9 |
| 196590 2003 $QL_{53}$ | 15.4 | $X$ | 102.35013 | 287.28452 | 98.98405 | 3.23928 | 0.0896626 | 0.19993164 | 2.8965545 | 20 | 1 11.9 | 19.4 |
| 196591 2003 $QL_{56}$ | 15.7 | $X$ | 231.52722 | 182.62045 | 148.96955 | 10.24511 | 0.1441069 | 0.21280321 | 2.7785439 | 20 | 3 21.9 | 20.2 |
| 196592 2003 $QE_{60}$ | 15.8 | $X$ | 193.71130 | 24.11456 | 2.92498 | 12.27695 | 0.1120571 | 0.21299200 | 2.7769018 | 20 | 4 17.8 | 20.3 |
| 196593 2003 $QC_{61}$ | 15.3 | $X$ | 226.11345 | 241.53113 | 108.19398 | 6.09306 | 0.1771211 | 0.21321514 | 2.7749640 | 20 | 4 6.7 | 19.9 |
| 196594 2003 $QG_{64}$ | 16.2 | $X$ | 305.70031 | 265.41067 | 90.17905 | 3.69982 | 0.3059091 | 0.22482115 | 2.6786210 | 20 | 6 25.3 | 19.0 |
| 196595 2003 $QX_{64}$ | 15.8 | $X$ | 204.15223 | 307.12785 | 58.01288 | 5.00240 | 0.1170909 | 0.21283579 | 2.7782603 | 20 | 4 6.2 | 20.1 |
| 196596 2003 $QH_{65}$ | 16.0 | $X$ | 354.99545 | 300.95228 | 117.63772 | 14.18685 | 0.1527169 | 0.24374055 | 2.5381514 | 20 | — | — |
| 196597 2003 $QJ_{66}$ | 15.9 | $X$ | 224.25905 | 217.56418 | 159.10392 | 9.96798 | 0.1683906 | 0.21794855 | 2.7346394 | 20 | 5 8.3 | 20.4 |
| 196598 2003 $QK_{66}$ | 15.3 | $X$ | 285.89733 | 258.40995 | 344.55776 | 10.74936 | 0.1882751 | 0.21043958 | 2.7993106 | 20 | 1 25.4 | 19.5 |
| 196599 2003 $QX_{66}$ | 16.1 | $X$ | 222.50555 | 252.44783 | 81.29096 | 3.18106 | 0.2318083 | 0.21345115 | 2.7729181 | 20 | 3 11.9 | 21.0 |
| 196600 2003 $QH_{68}$ | 16.6 | $X$ | 271.92132 | 153.41485 | 148.05603 | 3.96441 | 0.1768535 | 0.21698131 | 2.7427601 | 20 | 3 20.8 | 20.7 |
| 196601 2003 $QY_{68}$ | 16.9 | $X$ | 305.23780 | 270.56248 | 349.53690 | 21.42013 | 0.0340730 | 0.39197157 | 1.8491253 | 20 | 3 9.6 | 18.4 |
| 196602 2003 $QQ_{70}$ | 16.3 | $X$ | 24.24627 | 272.72951 | 90.82078 | 5.82421 | 0.1037053 | 0.24243756 | 2.5472376 | 20 | 12 20.6 | 19.4 |
| 196603 2003 $QT_{70}$ | 16.4 | $X$ | 10.48533 | 305.20489 | 95.98591 | 6.02296 | 0.1970232 | 0.24410546 | 2.5356212 | 20 | — | — |
| 196604 2003 $QH_{74}$ | 15.7 | $X$ | 189.05963 | 116.44530 | 285.13644 | 7.00092 | 0.2322028 | 0.21516962 | 2.7581343 | 20 | 5 1.7 | 20.6 |
| 196605 2003 $QM_{75}$ | 16.0 | $X$ | 227.32009 | 166.64568 | 187.29418 | 9.22426 | 0.1964026 | 0.21505785 | 2.7590899 | 20 | 4 9.4 | 20.6 |
| 196606 2003 $QX_{75}$ | 15.5 | $X$ | 299.59178 | 112.56905 | 186.13150 | 12.97844 | 0.2067677 | 0.22027849 | 2.7153219 | 20 | 4 15.5 | 19.0 |
| 196607 2003 $QC_{76}$ | 15.1 | $X$ | 20.78406 | 73.19199 | 338.86853 | 18.85602 | 0.2803119 | 0.18660864 | 3.0328310 | 20 | — | — |
| 196608 2003 $QE_{77}$ | 15.3 | $X$ | 301.03815 | 320.79269 | 330.79978 | 8.59594 | 0.1578485 | 0.21816592 | 2.7328226 | 20 | 4 10.2 | 19.1 |
| 196609 2003 $QQ_{78}$ | 16.5 | $X$ | 231.37051 | 58.35255 | 200.34046 | 20.69699 | 0.0516025 | 0.37396214 | 1.9080260 | 20 | — | — |
| 196610 2003 $QK_{79}$ | 15.7 | $X$ | 137.88035 | 74.98948 | 333.68840 | 9.57135 | 0.1556759 | 0.20692364 | 2.8309312 | 20 | 3 23.6 | 20.1 |
| 196611 2003 $QA_{85}$ | 15.9 | $X$ | 125.84589 | 104.03760 | 186.09954 | 11.04049 | 0.1403600 | 0.19065651 | 2.9897506 | 20 | 12 30.7 | 20.9 |
| 196612 2003 $QQ_{89}$ | 15.3 | $X$ | 229.53013 | 35.69239 | 263.24069 | 13.06849 | 0.1829927 | 0.21078147 | 2.7962828 | 20 | 2 2.1 | 20.1 |
| 196613 2003 $QN_{90}$ | 15.2 | $X$ | 194.87524 | 86.88075 | 348.06097 | 12.53449 | 0.1170428 | 0.21844070 | 2.7305304 | 20 | 6 22.4 | 19.6 |
| 196614 2003 $QB_{96}$ | 16.5 | $X$ | 52.22524 | 188.52384 | 11.33649 | 2.60709 | 0.0375393 | 0.21783359 | 2.7356014 | 20 | 6 7.7 | 20.1 |
| 196615 2003 $QY_{107}$ | 16.5 | $X$ | 337.55284 | 196.54749 | 84.68266 | 4.08669 | 0.2401312 | 0.22682941 | 2.6627873 | 20 | 5 22.9 | 18.6 |
| 196616 2003 $QE_{108}$ | 17.2 | $X$ | 47.39178 | 219.07756 | 349.13041 | 22.99786 | 0.0622572 | 0.39908605 | 1.8270833 | 20 | 6 24.7 | 19.4 |
| 196617 2003 $QQ_{111}$ | 14.5 | $X$ | 62.65447 | 310.81208 | 36.39687 | 14.72808 | 0.2188908 | 0.18157007 | 3.0886821 | 20 | — | — |
| 196618 2003 $QG_{114}$ | 16.1 | $X$ | 201.76228 | 342.32668 | 12.66032 | 4.41271 | 0.0846853 | 0.21153156 | 2.7896686 | 20 | 3 21.7 | 20.4 |
| 196619 2003 $RH_3$ | 15.8 | $X$ | 250.01096 | 319.54709 | 351.69365 | 4.11828 | 0.0509540 | 0.21299304 | 2.7768927 | 20 | 3 21.8 | 19.8 |
| 196620 2003 $RN_4$ | 15.6 | $X$ | 2.50907 | 45.48694 | 248.80170 | 13.25221 | 0.1439515 | 0.22904152 | 2.6456145 | 20 | 8 6.3 | 18.7 |
| 196621 2003 $RH_5$ | 15.6 | $X$ | 151.27188 | 73.50503 | 351.97592 | 7.11019 | 0.2203509 | 0.21077551 | 2.7963355 | 20 | 4 30.2 | 20.5 |
| 196622 2003 $RN_5$ | 15.6 | $X$ | 214.58031 | 253.68186 | 112.87716 | 8.80790 | 0.2464859 | 0.21288272 | 2.7778521 | 20 | 4 15.5 | 20.6 |
| 196623 2003 $RX_5$ | 14.9 | $X$ | 144.13464 | 254.37883 | 148.34905 | 15.41962 | 0.1530881 | 0.20470521 | 2.8513473 | 20 | 3 29.1 | 19.5 |
| 196624 2003 $RK_9$ | 16.3 | $X$ | 169.40731 | 241.02281 | 180.29849 | 3.68153 | 0.0989591 | 0.21602756 | 2.7508270 | 20 | 5 10.0 | 20.6 |
| 196625 2003 $RM_{10}$ | 20.2 | $X$ | 258.90172 | 287.27688 | 341.32092 | 13.72785 | 0.5916312 | 0.39261473 | 1.8471053 | 20 | — | — |
| 196626 2003 $RH_{11}$ | 15.6 | $X$ | 250.75135 | 19.96319 | 263.40472 | 7.51544 | 0.1964049 | 0.21026732 | 2.8008394 | 20 | 2 3.3 | 20.2 |
| 196627 2003 $RR_{14}$ | 16.0 | $X$ | 298.96637 | 260.63079 | 41.28751 | 5.06569 | 0.1914807 | 0.22146098 | 2.7056477 | 20 | 4 20.3 | 19.6 |
| 196628 2003 $RV_{16}$ | 16.0 | $X$ | 166.53472 | 116.09964 | 304.12308 | 8.27733 | 0.1484706 | 0.21356611 | 2.7719230 | 20 | 5 3.5 | 20.6 |
| 196629 2003 $RH_{20}$ | 15.9 | $X$ | 36.06374 | 345.27763 | 13.94865 | 4.86137 | 0.1593832 | 0.18324061 | 3.0698811 | 20 | 12 22.9 | 20.1 |
| 196630 2003 $RH_{21}$ | 16.0 | $X$ | 94.38516 | 193.73086 | 159.92441 | 1.95788 | 0.1715355 | 0.19279290 | 2.9676227 | 20 | — | — |
| 196631 2003 $RE_{22}$ | 15.6 | $X$ | 254.00411 | 333.02562 | 320.41152 | 11.98171 | 0.1089011 | 0.21069944 | 2.7970085 | 20 | 2 25.7 | 19.8 |
| 196632 2003 $SH_1$ | 16.4 | $X$ | 90.32917 | 89.27784 | 296.35239 | 2.90518 | 0.1424546 | 0.19605648 | 2.9345978 | 20 | 1 3.6 | 20.0 |
| 196633 2003 $SO_2$ | 16.5 | $X$ | 283.95335 | 334.30534 | 341.17133 | 4.31255 | 0.1055751 | 0.21820365 | 2.7325075 | 20 | 4 29.2 | 20.3 |
| 196634 2003 $SC_3$ | 15.1 | $X$ | 317.31068 | 106.71021 | 337.90355 | 3.78988 | 0.0414334 | 0.18233692 | 3.0800159 | 20 | 12 7.5 | 19.2 |
| 196635 2003 $SO_3$ | 15.7 | $X$ | 221.38399 | 41.33960 | 328.51907 | 5.49995 | 0.0654648 | 0.21423275 | 2.7661696 | 20 | 4 28.6 | 19.9 |
| 196636 2003 $SA_4$ | 16.3 | $X$ | 46.80779 | 274.91786 | 177.47288 | 2.08593 | 0.0341572 | 0.19845840 | 2.9108716 | 20 | 1 13.8 | 20.1 |
| 196637 2003 $SF_8$ | 15.9 | $X$ | 133.95090 | 136.95213 | 213.83809 | 1.27555 | 0.0585422 | 0.19727811 | 2.9224704 | 20 | 1 2.8 | 19.9 |
| 196638 2003 $SO_{10}$ | 15.5 | $X$ | 244.11258 | 328.71038 | 194.82071 | 9.92699 | 0.0284421 | 0.18397567 | 3.0616988 | 20 | 12 12.6 | 19.9 |
| 196639 2003 $SD_{13}$ | 15.6 | $X$ | 98.58131 | 242.94741 | 156.51510 | 2.44676 | 0.1025357 | 0.19957407 | 2.9000132 | 20 | 1 24.8 | 19.4 |
| 196640 Mulhacén | 15.5 | $X$ | 76.99355 | 195.16611 | 288.62078 | 7.31227 | 0.0506293 | 0.21024202 | 2.8010640 | 20 | 3 30.6 | 19.4 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 196641 2003 $SP_{17}$ | 15.9 | $X$ | 130.82632 | 141.32178 | 197.82689 | 8.04723 | 0.1618668 | 0.19572230 | 2.9379372 | 20 | — | — |
| 196642 2003 $SR_{17}$ | 15.2 | $X$ | 196.01607 | 42.82290 | 193.91732 | 10.72108 | 0.0483083 | 0.19008469 | 2.9957435 | 20 | — | — |
| 196643 2003 $SH_{18}$ | 15.7 | $X$ | 214.52124 | 83.71097 | 177.72801 | 13.42464 | 0.1245290 | 0.20112915 | 2.8850458 | 20 | — | — |
| 196644 2003 $ST_{23}$ | 15.8 | $X$ | 1.40986 | 274.59835 | 164.95018 | 5.04020 | 0.1838219 | 0.18805387 | 3.0172725 | 20 | — | — |
| 196645 2003 $SW_{23}$ | 15.4 | $X$ | 303.06675 | 227.16776 | 357.34284 | 9.60146 | 0.0828739 | 0.20650875 | 2.8347216 | 20 | 2 6.6 | 19.3 |
| 196646 2003 $SY_{23}$ | 15.7 | $X$ | 217.45750 | 180.43310 | 197.26452 | 4.79422 | 0.1739722 | 0.21446281 | 2.7641910 | 20 | 4 30.8 | 20.3 |
| 196647 2003 $SL_{25}$ | 15.4 | $X$ | 349.83928 | 34.97306 | 224.53478 | 4.96534 | 0.0540033 | 0.21809484 | 2.7334164 | 20 | 5 29.2 | 18.8 |
| 196648 2003 $SP_{25}$ | 16.1 | $X$ | 65.07906 | 102.92427 | 329.59852 | 4.09751 | 0.1294046 | 0.19671228 | 2.9280718 | 20 | 1 24.7 | 19.5 |
| 196649 2003 $SG_{26}$ | 15.6 | $X$ | 117.47041 | 65.65911 | 357.06185 | 11.06619 | 0.1520144 | 0.20463609 | 2.8519894 | 20 | 3 21.8 | 19.9 |
| 196650 2003 $SM_{26}$ | 15.5 | $X$ | 124.86611 | 19.74748 | 295.62584 | 7.76654 | 0.0749305 | 0.19071679 | 2.9891206 | 20 | — | — |
| 196651 2003 $SN_{28}$ | 15.5 | $X$ | 151.00894 | 116.04344 | 336.51810 | 6.86582 | 0.0929040 | 0.21456019 | 2.7633546 | 20 | 5 27.6 | 19.8 |
| 196652 2003 $SG_{30}$ | 15.4 | $X$ | 332.02330 | 179.85430 | 216.14737 | 1.56061 | 0.1221022 | 0.17872462 | 3.1213787 | 20 | 10 27.7 | 19.2 |
| 196653 2003 $SV_{30}$ | 15.5 | $X$ | 295.87904 | 296.63203 | 17.01537 | 7.60964 | 0.0715186 | 0.21702790 | 2.7423676 | 20 | 5 18.3 | 19.2 |
| 196654 2003 $SS_{34}$ | 16.1 | $X$ | 206.71589 | 81.70483 | 281.13107 | 4.18767 | 0.0925817 | 0.21311161 | 2.7758626 | 20 | 4 2.6 | 20.3 |
| 196655 2003 $SY_{34}$ | 16.0 | $X$ | 172.20467 | 187.08648 | 140.01631 | 2.67427 | 0.0532217 | 0.20049234 | 2.8911515 | 20 | 1 16.2 | 20.2 |
| 196656 2003 $SA_{35}$ | 15.3 | $X$ | 99.02437 | 250.18952 | 136.01227 | 3.02275 | 0.0373879 | 0.19738028 | 2.9214618 | 20 | — | — |
| 196657 2003 $SR_{36}$ | 14.7 | $X$ | 63.29292 | 308.56921 | 9.49257 | 10.97996 | 0.1039934 | 0.18181479 | 3.0859099 | 20 | 11 25.2 | 19.3 |
| 196658 2003 $SJ_{37}$ | 15.7 | $X$ | 327.77074 | 32.00629 | 268.06954 | 7.60510 | 0.1047734 | 0.22364308 | 2.6880195 | 20 | 6 15.9 | 18.7 |
| 196659 2003 $SR_{38}$ | 15.4 | $X$ | 160.70459 | 99.83988 | 291.03159 | 5.02694 | 0.0831413 | 0.20683780 | 2.8317144 | 20 | 3 19.9 | 19.8 |
| 196660 2003 $SQ_{40}$ | 15.0 | $X$ | 295.34870 | 115.69855 | 343.77505 | 10.41152 | 0.0353537 | 0.18021146 | 3.1041863 | 20 | 11 24.4 | 19.4 |
| 196661 2003 $SL_{41}$ | 14.7 | $X$ | 281.64244 | 111.19456 | 351.88832 | 26.32103 | 0.1965340 | 0.17440954 | 3.1726528 | 20 | 10 10.9 | 19.1 |
| 196662 2003 $SO_{43}$ | 15.6 | $X$ | 140.99489 | 8.57033 | 320.16676 | 6.14445 | 0.0729504 | 0.19759138 | 2.9193806 | 20 | — | — |
| 196663 2003 $SL_{44}$ | 15.4 | $X$ | 203.81029 | 52.94190 | 313.63907 | 4.46616 | 0.1132600 | 0.21145113 | 2.7903759 | 20 | 4 3.8 | 19.8 |
| 196664 2003 $SD_{46}$ | 15.5 | $X$ | 133.73723 | 295.49001 | 93.43985 | 3.17967 | 0.0828750 | 0.20336024 | 2.8639055 | 20 | 2 21.1 | 19.5 |
| 196665 2003 $SJ_{46}$ | 15.3 | $X$ | 174.32535 | 148.05710 | 169.00982 | 9.40366 | 0.0957767 | 0.19972247 | 2.8985765 | 20 | 1 8.8 | 19.9 |
| 196666 2003 $SF_{47}$ | 16.0 | $X$ | 268.58031 | 116.95983 | 292.12558 | 3.34072 | 0.1665379 | 0.22665249 | 2.6641728 | 20 | 8 5.5 | 19.5 |
| 196667 2003 $SN_{50}$ | 15.9 | $X$ | 167.35313 | 175.14277 | 295.41764 | 5.32232 | 0.0186376 | 0.22366517 | 2.6878425 | 20 | 7 8.9 | 19.6 |
| 196668 2003 $SW_{50}$ | 15.6 | $X$ | 132.03562 | 327.36479 | 184.91996 | 14.69142 | 0.0374388 | 0.22290349 | 2.6939620 | 20 | 7 18.1 | 19.7 |
| 196669 2003 $SK_{51}$ | 15.3 | $X$ | 137.87203 | 229.79061 | 178.13239 | 16.99415 | 0.0786560 | 0.20589622 | 2.8403409 | 20 | 3 18.2 | 19.4 |
| 196670 2003 $ST_{52}$ | 15.3 | $X$ | 338.52764 | 125.69558 | 263.28852 | 3.47064 | 0.1691423 | 0.17600360 | 3.1534675 | 20 | 10 28.6 | 18.7 |
| 196671 2003 $SU_{53}$ | 16.0 | $X$ | 354.21728 | 4.14849 | 192.41038 | 8.78922 | 0.0849678 | 0.21056041 | 2.7982396 | 20 | 3 7.9 | 19.5 |
| 196672 2003 $SY_{54}$ | 15.1 | $X$ | 105.13870 | 63.31024 | 325.26557 | 9.49636 | 0.1228138 | 0.19832503 | 2.9121766 | 20 | 1 24.5 | 19.0 |
| 196673 2003 $SZ_{54}$ | 15.6 | $X$ | 151.41873 | 177.30802 | 254.31051 | 5.87040 | 0.1152318 | 0.21201294 | 2.7854442 | 20 | 5 3.3 | 19.8 |
| 196674 2003 $SR_{56}$ | 15.9 | $X$ | 262.10135 | 33.48423 | 322.76710 | 5.31036 | 0.0275460 | 0.22034552 | 2.7147712 | 20 | 6 6.9 | 19.7 |
| 196675 2003 $SV_{56}$ | 15.9 | $X$ | 308.83290 | 270.04100 | 345.89870 | 14.67054 | 0.0977127 | 0.21330763 | 2.7741618 | 20 | 3 16.6 | 19.5 |
| 196676 2003 $SQ_{59}$ | 15.8 | $X$ | 173.19667 | 75.72369 | 350.96300 | 9.70611 | 0.2462016 | 0.21453592 | 2.7635630 | 20 | 5 19.3 | 20.9 |
| 196677 2003 $ST_{60}$ | 15.5 | $X$ | 59.70901 | 188.68917 | 305.06022 | 2.87780 | 0.0322467 | 0.20873284 | 2.8145493 | 20 | 3 20.6 | 19.3 |
| 196678 2003 $SD_{61}$ | 15.8 | $X$ | 256.21974 | 298.69911 | 58.86843 | 3.59856 | 0.1964848 | 0.21997506 | 2.7178183 | 20 | 5 10.5 | 20.0 |
| 196679 2003 $SP_{61}$ | 15.1 | $X$ | 42.83901 | 175.58954 | 153.70400 | 11.23832 | 0.0412861 | 0.18057171 | 3.1000563 | 20 | 11 11.4 | 19.6 |
| 196680 2003 $SB_{63}$ | 15.6 | $X$ | 171.00268 | 77.02772 | 273.86933 | 5.70652 | 0.0883922 | 0.20493560 | 2.8492099 | 20 | 2 12.3 | 19.9 |
| 196681 2003 $SZ_{63}$ | 16.1 | $X$ | 188.12122 | 1.79397 | 329.61936 | 1.29187 | 0.0962288 | 0.20436719 | 2.8544905 | 20 | 2 8.8 | 20.5 |
| 196682 2003 $SK_{64}$ | 15.1 | $X$ | 175.27782 | 292.86948 | 12.89056 | 12.11482 | 0.0347053 | 0.19635462 | 2.9316265 | 20 | — | — |
| 196683 2003 $SY_{64}$ | 15.3 | $X$ | 88.15467 | 358.48722 | 9.29530 | 12.45332 | 0.1381843 | 0.19179780 | 2.9778785 | 20 | — | — |
| 196684 2003 $SZ_{64}$ | 15.7 | $X$ | 65.04068 | 171.33969 | 183.67976 | 5.76194 | 0.2809474 | 0.18639467 | 3.0351516 | 20 | — | — |
| 196685 2003 $SB_{65}$ | 15.9 | $X$ | 180.45930 | 340.09905 | 358.55109 | 1.70503 | 0.0756271 | 0.20269359 | 2.8701816 | 20 | 2 9.5 | 20.3 |
| 196686 2003 $SC_{65}$ | 15.5 | $X$ | 276.25414 | 307.15738 | 4.65874 | 5.57174 | 0.1568304 | 0.21575798 | 2.7531179 | 20 | 4 8.4 | 19.5 |
| 196687 2003 $SH_{65}$ | 15.4 | $X$ | 222.32152 | 15.01532 | 289.17833 | 10.45838 | 0.0197720 | 0.20648544 | 2.8349349 | 20 | 2 10.1 | 19.6 |
| 196688 2003 $SQ_{66}$ | 15.6 | $X$ | 137.33145 | 112.74257 | 338.79744 | 15.32210 | 0.1464883 | 0.21189469 | 2.7864805 | 20 | 5 11.4 | 20.2 |
| 196689 2003 $SY_{67}$ | 15.6 | $X$ | 20.45749 | 60.70379 | 203.86910 | 13.67828 | 0.0677360 | 0.22530172 | 2.6748107 | 20 | 7 20.8 | 19.2 |
| 196690 2003 $SD_{70}$ | 16.1 | $X$ | 99.54368 | 9.19467 | 21.19008 | 1.14379 | 0.1865109 | 0.19684316 | 2.9267738 | 20 | 1 28.0 | 20.1 |
| 196691 2003 $SO_{70}$ | 15.6 | $X$ | 237.15624 | 285.89912 | 45.19377 | 9.73597 | 0.1702698 | 0.21485441 | 2.7608313 | 20 | 3 26.5 | 20.1 |
| 196692 2003 $SE_{71}$ | 16.1 | $X$ | 194.30947 | 217.11410 | 211.78478 | 12.56774 | 0.1699342 | 0.21778000 | 2.7360501 | 20 | 6 11.8 | 20.7 |
| 196693 2003 $SX_{73}$ | 15.3 | $X$ | 21.81812 | 15.88234 | 358.43746 | 11.74723 | 0.1773522 | 0.18179913 | 3.0860871 | 20 | 12 25.5 | 19.5 |
| 196694 2003 $SD_{74}$ | 16.4 | $X$ | 313.13820 | 142.90478 | 285.08669 | 3.12142 | 0.1282929 | 0.23732836 | 2.5836655 | 20 | 11 23.1 | 19.1 |
| 196695 2003 $SL_{74}$ | 15.4 | $X$ | 334.84967 | 131.27745 | 275.67985 | 2.07106 | 0.0994225 | 0.17922899 | 3.1155200 | 20 | 11 14.9 | 19.3 |
| 196696 2003 $SK_{75}$ | 15.7 | $X$ | 172.92927 | 70.10845 | 359.03154 | 6.96854 | 0.1989111 | 0.21339071 | 2.7734417 | 20 | 5 22.5 | 20.4 |
| 196697 2003 $SY_{76}$ | 16.6 | $X$ | 304.03588 | 145.30461 | 161.17920 | 2.45633 | 0.0922415 | 0.22239112 | 2.6980982 | 20 | 5 19.8 | 20.0 |
| 196698 2003 $SV_{77}$ | 15.8 | $X$ | 140.91845 | 126.60855 | 335.76910 | 14.54494 | 0.1696754 | 0.21383692 | 2.7695822 | 20 | 6 3.0 | 20.5 |
| 196699 2003 $SX_{78}$ | 15.2 | $X$ | 61.57822 | 77.00782 | 257.14028 | 8.44337 | 0.1684929 | 0.18335017 | 3.0686581 | 20 | 12 23.1 | 19.8 |
| 196700 2003 $SX_{80}$ | 15.9 | $X$ | 157.20555 | 120.17429 | 154.67734 | 2.64230 | 0.0763833 | 0.18726275 | 3.0257645 | 20 | — | — |
| 196701 2003 $SC_{82}$ | 16.3 | $X$ | 81.78086 | 245.09761 | 168.63669 | 5.90502 | 0.1465615 | 0.19710991 | 2.9241327 | 20 | 1 26.1 | 20.0 |
| 196702 2003 $SS_{82}$ | 15.9 | $X$ | 62.48134 | 246.49777 | 180.00055 | 5.97910 | 0.0812804 | 0.19657628 | 2.9294222 | 20 | 1 6.6 | 19.7 |
| 196703 2003 $SR_{83}$ | 16.1 | $X$ | 307.65179 | 247.51260 | 44.91702 | 2.76327 | 0.0363234 | 0.21669549 | 2.7451714 | 20 | 5 13.1 | 19.5 |
| 196704 2003 $SM_{85}$ | 15.4 | $X$ | 162.34804 | 145.75215 | 298.80536 | 12.48276 | 0.1172839 | 0.21557664 | 2.7546616 | 20 | 5 31.0 | 19.8 |
| 196705 2003 $SC_{86}$ | 15.1 | $X$ | 40.67270 | 14.02259 | 8.59973 | 10.70444 | 0.0673435 | 0.18458100 | 3.0550012 | 20 | — | — |
| 196706 2003 $SS_{87}$ | 15.4 | $X$ | 201.56992 | 171.81910 | 209.71627 | 13.50206 | 0.1950428 | 0.21098822 | 2.7944558 | 20 | 4 20.4 | 20.2 |
| 196707 2003 $SB_{89}$ | 15.5 | $X$ | 183.01894 | 82.89700 | 300.36972 | 7.77944 | 0.1560895 | 0.21234692 | 2.7825229 | 20 | 4 2.5 | 20.1 |
| 196708 2003 $SC_{92}$ | 16.3 | $X$ | 209.04344 | 46.93757 | 3.12818 | 3.85447 | 0.1196550 | 0.21817717 | 2.7327287 | 20 | 6 3.8 | 20.5 |
| 196709 2003 $SH_{93}$ | 15.5 | $X$ | 125.14803 | 22.37103 | 341.80247 | 3.84822 | 0.1482386 | 0.19601780 | 2.9349839 | 20 | 1 21.2 | 19.9 |
| 196710 2003 $SH_{94}$ | 15.1 | $X$ | 68.43256 | 139.97435 | 232.68357 | 8.00681 | 0.1267256 | 0.18897488 | 3.0074610 | 20 | — | — |
| 196711 2003 $SS_{97}$ | 16.5 | $X$ | 133.85763 | 352.44952 | 62.51209 | 1.20816 | 0.0674633 | 0.20919131 | 2.8104355 | 20 | 3 21.4 | 20.6 |
| 196712 2003 $SO_{98}$ | 15.4 | $X$ | 350.91840 | 70.92273 | 316.59920 | 7.95444 | 0.1601556 | 0.17851476 | 3.1238245 | 20 | 11 17.3 | 19.1 |
| 196713 2003 $SJ_{101}$ | 15.3 | $X$ | 327.22379 | 121.31348 | 321.73866 | 17.61564 | 0.1609662 | 0.18281478 | 3.0746464 | 20 | 12 23.1 | 19.0 |
| 196714 2003 $SM_{102}$ | 14.9 | $X$ | 54.38948 | 181.60866 | 229.11342 | 8.70331 | 0.0706060 | 0.19350971 | 2.9602896 | 20 | — | — |
| 196715 2003 $SQ_{102}$ | 15.2 | $X$ | 68.01174 | 184.62156 | 246.31070 | 5.16769 | 0.1160975 | 0.19814362 | 2.9139537 | 20 | 1 23.1 | 18.8 |
| 196716 2003 $SJ_{103}$ | 15.0 | $X$ | 335.25866 | 198.52899 | 199.14304 | 9.68846 | 0.1037104 | 0.17709709 | 3.1404733 | 20 | 11 4.8 | 18.9 |
| 196717 2003 $SL_{104}$ | 15.9 | $X$ | 112.20791 | 150.45517 | 189.15280 | 13.65126 | 0.1268514 | 0.19178981 | 2.9779612 | 20 | — | — |
| 196718 2003 $SW_{104}$ | 15.2 | $X$ | 99.32070 | 59.02677 | 8.69485 | 11.97035 | 0.0267390 | 0.20176220 | 2.8790078 | 20 | 2 23.3 | 19.2 |
| 196719 2003 $SM_{107}$ | 15.1 | $X$ | 197.21284 | 30.57372 | 262.13800 | 3.77364 | 0.1256250 | 0.19828309 | 2.9125871 | 20 | 1 4.3 | 19.6 |
| 196720 2003 $SB_{108}$ | 15.4 | $X$ | 248.94757 | 120.93879 | 244.94145 | 8.56488 | 0.0437629 | 0.21653397 | 2.7465364 | 20 | 5 31.7 | 19.0 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 196721 2003 $SM_{109}$ | 14.9 | $X$ | 71.48506 | 66.72218 | 215.80051 | 18.01685 | 0.1387659 | 0.17656152 | 3.1468208 | 20 | 10 29.1 | 19.3 |
| 196722 2003 $SV_{109}$ | 15.0 | $X$ | 17.59206 | 17.39722 | 347.32358 | 10.13698 | 0.0856995 | 0.17879183 | 3.1205964 | 20 | 11 21.1 | 19.3 |
| 196723 2003 $SB_{111}$ | 14.8 | $X$ | 30.81217 | 344.70498 | 10.87144 | 12.39249 | 0.1419347 | 0.17860244 | 3.1228020 | 20 | 12 5.9 | 19.2 |
| 196724 2003 $SD_{114}$ | 14.9 | $X$ | 61.29797 | 349.51838 | 38.38675 | 11.29531 | 0.0838574 | 0.19307673 | 2.9647137 | 20 | — | — |
| 196725 2003 $SY_{115}$ | 15.2 | $X$ | 221.31671 | 127.20091 | 251.93881 | 13.91761 | 0.2138423 | 0.21669435 | 2.7451811 | 20 | 5 1.3 | 19.9 |
| 196726 2003 $SB_{118}$ | 16.2 | $X$ | 62.19831 | 60.97355 | 339.21636 | 13.50005 | 0.2775238 | 0.19080563 | 2.9881927 | 20 | — | — |
| 196727 2003 $SB_{119}$ | 15.5 | $X$ | 228.91645 | 55.58249 | 291.46294 | 5.44127 | 0.0571815 | 0.21154243 | 2.7895730 | 20 | 4 8.5 | 19.7 |
| 196728 2003 $SH_{119}$ | 16.0 | $X$ | 180.56528 | 218.43842 | 202.78445 | 13.41341 | 0.2386927 | 0.21469330 | 2.7622123 | 20 | 5 22.2 | 20.9 |
| 196729 2003 $SU_{119}$ | 16.2 | $X$ | 242.20893 | 348.63078 | 348.72625 | 3.28069 | 0.1003588 | 0.21447352 | 2.7640990 | 20 | 4 9.1 | 20.4 |
| 196730 2003 $SG_{120}$ | 15.7 | $X$ | 257.57136 | 295.72800 | 31.30222 | 2.04044 | 0.0316152 | 0.21506311 | 2.7590449 | 20 | 4 23.0 | 19.3 |
| 196731 2003 $SP_{121}$ | 16.2 | $X$ | 134.96339 | 4.50724 | 309.94989 | 4.29089 | 0.0501275 | 0.19329098 | 2.9625225 | 20 | — | — |
| 196732 2003 $ST_{121}$ | 15.2 | $X$ | 355.21093 | 275.46988 | 315.91710 | 11.06747 | 0.0841290 | 0.21814313 | 2.7330129 | 20 | 4 20.9 | 18.8 |
| 196733 2003 $SA_{122}$ | 16.0 | $X$ | 151.85791 | 105.71507 | 308.55324 | 6.44658 | 0.1705786 | 0.21036660 | 2.7999581 | 20 | 4 13.6 | 20.6 |
| 196734 2003 $SM_{125}$ | 15.8 | $X$ | 23.60629 | 113.51446 | 338.45873 | 7.88863 | 0.0936974 | 0.19235018 | 2.9721746 | 20 | — | — |
| 196735 2003 $SG_{126}$ | 14.5 | $X$ | 71.53964 | 290.35341 | 347.92272 | 17.09709 | 0.0664614 | 0.17326055 | 3.1866638 | 20 | 10 8.1 | 19.2 |
| 196736 Munkácsy | 16.5 | $X$ | 217.73688 | 323.47139 | 42.74499 | 2.57851 | 0.0589780 | 0.21453112 | 2.7636042 | 20 | 4 22.8 | 20.3 |
| 196737 2003 $SX_{127}$ | 15.8 | $X$ | 42.08254 | 359.87970 | 2.30783 | 10.28330 | 0.0728993 | 0.18304901 | 3.0720230 | 20 | 12 21.7 | 20.2 |
| 196738 2003 $SC_{133}$ | 15.2 | $X$ | 65.05902 | 108.38867 | 205.23381 | 14.65116 | 0.1924391 | 0.17916136 | 3.1163040 | 20 | 12 5.4 | 20.1 |
| 196739 2003 $SZ_{133}$ | 15.3 | $X$ | 217.68399 | 248.00702 | 51.42035 | 2.77756 | 0.0371986 | 0.20336994 | 2.8638144 | 20 | 2 2.5 | 19.3 |
| 196740 2003 $SF_{135}$ | 15.4 | $X$ | 185.25664 | 63.14453 | 214.59403 | 9.64442 | 0.0709058 | 0.19685653 | 2.9266413 | 20 | — | — |
| 196741 2003 $SJ_{137}$ | 16.0 | $X$ | 325.51385 | 62.76233 | 297.29826 | 2.38390 | 0.1016063 | 0.22760548 | 2.6567309 | 20 | 9 7.1 | 19.1 |
| 196742 2003 $SO_{137}$ | 15.9 | $X$ | 187.53414 | 188.29126 | 214.52013 | 1.33492 | 0.0796206 | 0.21117817 | 2.7927798 | 20 | 5 4.9 | 20.0 |
| 196743 2003 $SY_{137}$ | 14.4 | $X$ | 340.32036 | 189.98119 | 214.39039 | 15.58584 | 0.1242968 | 0.17707380 | 3.1407486 | 20 | 11 21.6 | 18.2 |
| 196744 2003 $SU_{139}$ | 15.6 | $X$ | 33.14806 | 217.37623 | 191.64606 | 10.68720 | 0.1053929 | 0.18905464 | 3.0066150 | 20 | — | — |
| 196745 2003 $SY_{139}$ | 15.7 | $X$ | 104.95910 | 175.68189 | 229.29241 | 1.12338 | 0.0748989 | 0.20053696 | 2.8907227 | 20 | 2 4.4 | 19.6 |
| 196746 2003 $SU_{142}$ | 14.6 | $X$ | 78.51792 | 333.64007 | 45.49302 | 16.06123 | 0.1478184 | 0.18970596 | 2.9997293 | 20 | — | — |
| 196747 2003 $SY_{143}$ | 15.8 | $X$ | 235.86255 | 65.37090 | 290.01296 | 3.23740 | 0.1527208 | 0.21378058 | 2.7700688 | 20 | 4 19.9 | 20.3 |
| 196748 2003 $SB_{144}$ | 15.5 | $X$ | 314.44518 | 244.47781 | 270.52329 | 8.35878 | 0.0808925 | 0.19114919 | 2.9846111 | 20 | — | — |
| 196749 2003 $SF_{144}$ | 14.9 | $X$ | 86.96198 | 5.75695 | 325.53963 | 21.80425 | 0.1089319 | 0.18667199 | 3.0321448 | 20 | — | — |
| 196750 2003 $SR_{148}$ | 15.6 | $X$ | 90.19466 | 109.68639 | 254.64023 | 3.09436 | 0.1145491 | 0.19047728 | 2.9916258 | 20 | — | — |
| 196751 2003 $SL_{149}$ | 16.1 | $X$ | 205.32756 | 318.05477 | 37.87304 | 4.80175 | 0.1198299 | 0.20883940 | 2.8135918 | 20 | 3 26.9 | 20.5 |
| 196752 2003 $SO_{149}$ | 15.8 | $X$ | 112.29780 | 222.44360 | 147.27677 | 2.74996 | 0.0840850 | 0.19500829 | 2.9451042 | 20 | 1 3.8 | 19.8 |
| 196753 2003 $SV_{149}$ | 15.1 | $X$ | 121.42631 | 225.31364 | 138.01593 | 9.92687 | 0.0247936 | 0.19800263 | 2.9153368 | 20 | — | — |
| 196754 2003 $SM_{151}$ | 15.8 | $X$ | 205.99002 | 287.19653 | 96.91196 | 6.54310 | 0.1000236 | 0.21436807 | 2.7650054 | 20 | 5 2.7 | 20.0 |
| 196755 2003 $SQ_{153}$ | 15.4 | $X$ | 82.83762 | 148.36889 | 136.35362 | 10.13243 | 0.1259449 | 0.18053622 | 3.1004625 | 20 | 11 15.3 | 20.2 |
| 196756 2003 $SU_{154}$ | 18.1 | $X$ | 131.94737 | 110.72188 | 0.69568 | 20.84491 | 0.0827672 | 0.39099710 | 1.8521964 | 20 | 5 22.2 | 20.6 |
| 196757 2003 $SZ_{154}$ | 15.8 | $X$ | 255.77012 | 25.40834 | 322.17690 | 5.34032 | 0.0474550 | 0.21561141 | 2.7543654 | 20 | 5 13.8 | 19.7 |
| 196758 2003 $SP_{155}$ | 15.0 | $X$ | 303.18428 | 156.76739 | 277.59949 | 2.19509 | 0.1446334 | 0.17633500 | 3.1495151 | 20 | 10 26.3 | 18.9 |
| 196759 2003 $SM_{156}$ | 15.1 | $X$ | 154.43225 | 80.80859 | 193.12834 | 9.98443 | 0.0774716 | 0.18800468 | 3.0177988 | 20 | — | — |
| 196760 2003 $SO_{160}$ | 15.5 | $X$ | 164.00142 | 358.95522 | 50.33575 | 8.13885 | 0.0858753 | 0.21106628 | 2.7937668 | 20 | 4 19.5 | 19.7 |
| 196761 2003 $SL_{162}$ | 15.4 | $X$ | 321.99315 | 101.77697 | 280.77056 | 0.96470 | 0.1768039 | 0.17119591 | 3.2122336 | 20 | 9 17.1 | 19.1 |
| 196762 2003 $SP_{162}$ | 15.1 | $X$ | 303.66421 | 235.71490 | 182.34074 | 16.45311 | 0.1154533 | 0.17349973 | 3.1837345 | 20 | 10 10.8 | 19.0 |
| 196763 2003 $ST_{162}$ | 16.0 | $X$ | 32.44388 | 172.12433 | 175.45365 | 0.98885 | 0.1732404 | 0.17856883 | 3.1231939 | 20 | 12 5.2 | 20.2 |
| 196764 2003 $SU_{162}$ | 15.7 | $X$ | 122.52261 | 151.10460 | 193.65648 | 8.87079 | 0.1075165 | 0.19275732 | 2.9679879 | 20 | — | — |
| 196765 2003 $SM_{163}$ | 15.4 | $X$ | 269.51151 | 287.76813 | 31.90274 | 6.74169 | 0.0668398 | 0.21291370 | 2.7775826 | 20 | 4 23.7 | 19.1 |
| 196766 2003 $SN_{163}$ | 15.7 | $X$ | 261.82588 | 268.38259 | 44.86863 | 4.46806 | 0.0922568 | 0.21105458 | 2.7938700 | 20 | 4 4.2 | 19.6 |
| 196767 2003 $SQ_{164}$ | 15.7 | $X$ | 198.63329 | 334.24798 | 43.41076 | 5.98142 | 0.1702335 | 0.21005546 | 2.8027223 | 20 | 4 14.7 | 20.2 |
| 196768 2003 $ST_{164}$ | 14.8 | $X$ | 311.46002 | 330.31545 | 71.86815 | 3.51802 | 0.1632863 | 0.17222162 | 3.1994667 | 20 | 9 28.2 | 18.5 |
| 196769 2003 $SX_{164}$ | 15.9 | $X$ | 71.07930 | 250.21787 | 88.29438 | 2.82133 | 0.1160390 | 0.18337660 | 3.0683632 | 20 | — | — |
| 196770 2003 $SK_{167}$ | 15.6 | $X$ | 298.21335 | 243.99532 | 45.73279 | 5.94144 | 0.0377433 | 0.21495989 | 2.7599281 | 20 | 4 26.9 | 19.2 |
| 196771 2003 $SU_{169}$ | 16.1 | $X$ | 216.78472 | 290.99149 | 58.87522 | 0.69874 | 0.0830384 | 0.21090733 | 2.7951702 | 20 | 3 31.0 | 20.4 |
| 196772 Fritzleiber | 16.0 | $X$ | 148.87161 | 185.75820 | 200.53439 | 1.31893 | 0.0760074 | 0.20557577 | 2.8432918 | 20 | 3 3.2 | 20.0 |
| 196773 2003 $SJ_{171}$ | 15.7 | $X$ | 52.87893 | 351.00995 | 28.22589 | 7.28810 | 0.1567421 | 0.18768731 | 3.0211998 | 20 | — | — |
| 196774 2003 $SW_{177}$ | 15.8 | $X$ | 142.78568 | 149.98415 | 295.06340 | 3.11821 | 0.0739227 | 0.21340573 | 2.7733116 | 20 | 5 7.8 | 19.9 |
| 196775 2003 $SA_{178}$ | 15.4 | $X$ | 34.68186 | 101.04459 | 331.54166 | 7.20527 | 0.0724209 | 0.19223026 | 2.9734106 | 20 | — | — |
| 196776 2003 $SV_{180}$ | 16.1 | $X$ | 167.89494 | 162.35972 | 187.66141 | 1.85826 | 0.0764509 | 0.20659774 | 2.8339075 | 20 | 2 8.5 | 20.4 |
| 196777 2003 $SE_{181}$ | 15.9 | $X$ | 229.08782 | 353.35107 | 351.54658 | 2.29713 | 0.1211566 | 0.21219552 | 2.7838462 | 20 | 4 3.6 | 20.1 |
| 196778 2003 $SM_{181}$ | 15.5 | $X$ | 186.04145 | 30.82584 | 269.05556 | 0.96114 | 0.0729182 | 0.19794158 | 2.9159362 | 20 | — | — |
| 196779 2003 $SN_{181}$ | 16.2 | $X$ | 105.67596 | 101.99822 | 206.83097 | 9.74004 | 0.2605010 | 0.18801762 | 3.0176603 | 20 | — | — |
| 196780 2003 $SD_{182}$ | 15.4 | $X$ | 207.62006 | 300.27980 | 102.15945 | 8.82397 | 0.2306484 | 0.21213527 | 2.7843733 | 20 | 5 21.5 | 20.2 |
| 196781 2003 $SA_{184}$ | 15.7 | $X$ | 237.27374 | 233.17630 | 356.48182 | 3.45938 | 0.0303248 | 0.19360875 | 2.9592801 | 20 | — | — |
| 196782 2003 $ST_{184}$ | 15.8 | $X$ | 77.47975 | 352.89974 | 47.24182 | 2.61875 | 0.0944942 | 0.19461338 | 2.9490870 | 20 | — | — |
| 196783 2003 $SY_{184}$ | 15.6 | $X$ | 182.37565 | 279.61538 | 28.21558 | 6.12292 | 0.0520802 | 0.19808626 | 2.9145163 | 20 | 1 5.4 | 19.9 |
| 196784 2003 $SN_{185}$ | 15.4 | $X$ | 160.04548 | 85.77965 | 322.58142 | 10.97662 | 0.1383931 | 0.21291036 | 2.7776116 | 20 | 4 9.8 | 20.0 |
| 196785 2003 $SR_{186}$ | 15.8 | $X$ | 173.76433 | 198.37383 | 232.14642 | 8.36672 | 0.1384916 | 0.21390173 | 2.7690227 | 20 | 5 26.3 | 20.2 |
| 196786 2003 $SP_{187}$ | 14.9 | $X$ | 43.94013 | 255.56774 | 63.72907 | 9.58382 | 0.1350726 | 0.17998446 | 3.1067958 | 20 | 11 11.4 | 19.1 |
| 196787 2003 $SY_{187}$ | 15.4 | $X$ | 272.24168 | 291.08271 | 352.60935 | 13.86215 | 0.0482415 | 0.21151526 | 2.7898118 | 20 | 3 14.4 | 19.1 |
| 196788 2003 $SF_{188}$ | 15.4 | $X$ | 189.77504 | 22.84324 | 51.42851 | 10.34405 | 0.1706731 | 0.21675189 | 2.7446952 | 20 | 6 13.6 | 19.9 |
| 196789 2003 $SA_{189}$ | 16.0 | $X$ | 264.71123 | 278.44989 | 57.03194 | 2.08554 | 0.0839437 | 0.21657389 | 2.7461989 | 20 | 5 6.0 | 19.8 |
| 196790 2003 $SY_{190}$ | 16.2 | $X$ | 237.36277 | 155.17161 | 172.18215 | 4.38403 | 0.0640275 | 0.21084415 | 2.7957286 | 20 | 3 27.2 | 20.2 |
| 196791 2003 $SM_{191}$ | 15.2 | $X$ | 338.43412 | 165.07391 | 240.28634 | 8.34040 | 0.0423093 | 0.18076351 | 3.0978629 | 20 | 11 17.5 | 19.1 |
| 196792 2003 $SA_{196}$ | 14.7 | $X$ | 72.21626 | 89.76641 | 213.52089 | 22.29907 | 0.1314919 | 0.17872431 | 3.1213823 | 20 | 11 23.5 | 19.5 |
| 196793 2003 $SL_{196}$ | 15.1 | $X$ | 62.47369 | 89.53635 | 8.62607 | 9.42837 | 0.0088238 | 0.19952509 | 2.9004878 | 20 | 2 11.9 | 19.2 |
| 196794 2003 $SK_{197}$ | 15.6 | $X$ | 87.27234 | 148.17478 | 176.63417 | 9.99277 | 0.0987235 | 0.18592094 | 3.0403052 | 20 | 12 31.3 | 20.3 |
| 196795 2003 $SM_{197}$ | 15.4 | $X$ | 4.01308 | 243.33651 | 176.61761 | 8.50637 | 0.0769555 | 0.18588481 | 3.0406991 | 20 | — | — |
| 196796 2003 $SU_{197}$ | 15.1 | $X$ | 229.28223 | 347.45635 | 169.99392 | 9.60169 | 0.0533377 | 0.18023045 | 3.1039682 | 20 | 11 15.2 | 19.7 |
| 196797 2003 $SU_{198}$ | 15.3 | $X$ | 136.86649 | 334.27742 | 339.38167 | 9.92022 | 0.0544973 | 0.18929233 | 3.0040976 | 20 | — | — |
| 196798 2003 $SG_{199}$ | 14.8 | $X$ | 160.53252 | 69.27084 | 238.09742 | 9.18112 | 0.0771368 | 0.19274025 | 2.9681632 | 20 | — | — |
| 196799 2003 $SO_{199}$ | 15.3 | $X$ | 120.42943 | 319.83057 | 5.02651 | 5.32252 | 0.1411377 | 0.18927346 | 3.0042973 | 20 | — | — |
| 196800 2003 $SX_{200}$ | 15.2 | $X$ | 352.99965 | 97.10759 | 314.82009 | 15.52946 | 0.2219929 | 0.18133518 | 3.0913487 | 20 | — | — |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 196801 2003 $SY_{202}$ | 16.2 | $X$ | 247.26995 | 117.41921 | 180.92597 | 4.21080 | 0.1058093 | 0.20962944 | 2.8065182 | 20 | 2 26.4 | 20.4 |
| 196802 2003 $SJ_{204}$ | 14.4 | $X$ | 13.77727 | 324.26266 | 41.48579 | 17.30405 | 0.1473483 | 0.17526430 | 3.1623292 | 20 | 11 23.9 | 18.5 |
| 196803 2003 $SG_{206}$ | 15.1 | $X$ | 279.63053 | 223.75691 | 232.86048 | 8.32832 | 0.0853297 | 0.18108069 | 3.0942444 | 20 | 10 27.5 | 19.3 |
| 196804 2003 $SZ_{208}$ | 15.4 | $X$ | 230.39808 | 9.64768 | 288.92939 | 7.21700 | 0.2058668 | 0.21162373 | 2.7888585 | 20 | 2 4.5 | 20.1 |
| 196805 2003 $SZ_{209}$ | 15.4 | $X$ | 14.80592 | 34.81121 | 346.94354 | 4.93263 | 0.1442407 | 0.17958052 | 3.1114529 | 20 | 12 18.8 | 19.4 |
| 196806 2003 $SQ_{218}$ | 15.2 | $X$ | 87.42624 | 154.39513 | 223.04070 | 9.92355 | 0.1043257 | 0.18878448 | 3.0094828 | 20 | — | — |
| 196807 Beshore | 15.1 | $X$ | 114.77733 | 292.85244 | 38.93584 | 11.03079 | 0.0915352 | 0.18670389 | 3.0317994 | 20 | — | — |
| 196808 2003 $SH_{223}$ | 15.8 | $X$ | 118.53706 | 308.62480 | 49.88280 | 10.33844 | 0.0501535 | 0.19139585 | 2.9820463 | 20 | — | — |
| 196809 2003 $SU_{223}$ | 14.5 | $X$ | 39.19406 | 136.14707 | 223.92559 | 26.34396 | 0.1616400 | 0.17913210 | 3.1166433 | 20 | 12 23.1 | 19.2 |
| 196810 2003 $SC_{224}$ | 16.9 | $X$ | 283.45930 | 159.29570 | 275.29554 | 2.26019 | 0.0929207 | 0.23388457 | 2.6089655 | 20 | 10 14.0 | 20.0 |
| 196811 2003 $SF_{225}$ | 15.3 | $X$ | 93.11557 | 186.69926 | 196.92961 | 9.55654 | 0.0269685 | 0.19341571 | 2.9612487 | 20 | — | — |
| 196812 2003 $SH_{225}$ | 15.8 | $X$ | 211.97014 | 333.50699 | 22.64256 | 2.92693 | 0.1262265 | 0.20985322 | 2.8045227 | 20 | 4 1.2 | 20.0 |
| 196813 2003 $SO_{225}$ | 16.2 | $X$ | 78.87923 | 324.59214 | 55.17274 | 2.70973 | 0.2561855 | 0.19119157 | 2.9841699 | 20 | — | — |
| 196814 2003 $SU_{225}$ | 14.7 | $X$ | 71.28357 | 118.40009 | 198.57405 | 9.32855 | 0.0701857 | 0.17894512 | 3.1188140 | 20 | 12 1.6 | 19.3 |
| 196815 2003 $SN_{227}$ | 15.0 | $X$ | 98.80154 | 71.86318 | 239.25177 | 3.99879 | 0.1400863 | 0.18460003 | 3.0547913 | 20 | 12 29.9 | 19.8 |
| 196816 2003 $SH_{229}$ | 15.9 | $X$ | 119.00563 | 231.17865 | 95.74396 | 2.39154 | 0.1813434 | 0.19006309 | 2.9959705 | 20 | — | — |
| 196817 2003 $SZ_{230}$ | 15.5 | $X$ | 328.66559 | 239.45605 | 14.49472 | 14.31459 | 0.1120198 | 0.21681881 | 2.7441304 | 20 | 4 10.9 | 18.9 |
| 196818 2003 $SJ_{231}$ | 15.1 | $X$ | 262.80229 | 355.99540 | 166.28941 | 18.70106 | 0.0617813 | 0.18781236 | 3.0198586 | 20 | 12 30.5 | 19.5 |
| 196819 2003 $SC_{232}$ | 16.1 | $X$ | 171.60088 | 179.37409 | 167.25970 | 14.04221 | 0.1918661 | 0.20361902 | 2.8614785 | 20 | 2 13.8 | 20.9 |
| 196820 2003 $SR_{232}$ | 15.1 | $X$ | 136.08984 | 147.89119 | 165.99051 | 10.24794 | 0.0859475 | 0.19004055 | 2.9962074 | 20 | — | — |
| 196821 2003 $SC_{233}$ | 15.6 | $X$ | 320.70409 | 237.88548 | 36.54480 | 10.94215 | 0.1141378 | 0.21662880 | 2.7457348 | 20 | 4 27.4 | 18.9 |
| 196822 2003 $SM_{234}$ | 15.5 | $X$ | 54.21717 | 21.67774 | 6.57575 | 12.07306 | 0.1374637 | 0.19079210 | 2.9883339 | 20 | — | — |
| 196823 2003 $SN_{234}$ | 15.8 | $X$ | 177.67203 | 19.91205 | 71.30552 | 4.47559 | 0.1661552 | 0.21696519 | 2.7428960 | 20 | 6 24.8 | 20.3 |
| 196824 2003 $SS_{235}$ | 15.5 | $X$ | 174.49386 | 100.47446 | 355.38803 | 11.14527 | 0.1293167 | 0.21725044 | 2.7404945 | 20 | 6 28.8 | 20.1 |
| 196825 2003 $SV_{235}$ | 15.2 | $X$ | 135.39428 | 19.89290 | 233.06410 | 6.02057 | 0.0439397 | 0.18094476 | 3.0957939 | 20 | 11 23.6 | 19.8 |
| 196826 2003 $SJ_{236}$ | 16.3 | $X$ | 216.32840 | 151.64356 | 191.77213 | 6.12742 | 0.0621064 | 0.21049975 | 2.7987772 | 20 | 3 22.8 | 20.3 |
| 196827 2003 $SO_{236}$ | 16.2 | $X$ | 117.22687 | 175.63027 | 182.66246 | 10.76723 | 0.1517716 | 0.19634948 | 2.9316776 | 20 | 1 4.1 | 20.5 |
| 196828 2003 $SB_{237}$ | 16.0 | $X$ | 45.31369 | 11.65905 | 3.80525 | 5.25677 | 0.0735505 | 0.18630946 | 3.0360770 | 20 | — | — |
| 196829 2003 $SE_{238}$ | 16.2 | $X$ | 295.51695 | 115.30382 | 218.04057 | 5.03971 | 0.1273114 | 0.22464481 | 2.6800226 | 20 | 6 7.5 | 19.6 |
| 196830 2003 $SK_{241}$ | 16.8 | $X$ | 80.92750 | 138.71096 | 14.98864 | 3.42131 | 0.0305219 | 0.21445839 | 2.7642290 | 20 | 5 14.6 | 20.5 |
| 196831 2003 $SA_{243}$ | 16.2 | $X$ | 147.80151 | 299.09894 | 55.74802 | 2.84446 | 0.1034607 | 0.20027946 | 2.8931999 | 20 | 1 28.6 | 20.5 |
| 196832 2003 $SA_{246}$ | 15.7 | $X$ | 16.62429 | 135.03048 | 63.16574 | 1.25617 | 0.0100366 | 0.21213716 | 2.7843567 | 20 | 4 15.4 | 19.3 |
| 196833 2003 $SS_{247}$ | 15.7 | $X$ | 128.39507 | 128.30534 | 191.15594 | 9.66152 | 0.1287202 | 0.19113159 | 2.9847943 | 20 | — | — |
| 196834 2003 $SZ_{247}$ | 15.7 | $X$ | 152.17613 | 200.84052 | 175.95916 | 2.08750 | 0.0833806 | 0.20459820 | 2.8523414 | 20 | 2 25.1 | 19.9 |
| 196835 2003 $SS_{248}$ | 15.6 | $X$ | 200.15395 | 210.24610 | 51.99951 | 2.61187 | 0.0508844 | 0.19438271 | 2.9514197 | 20 | — | — |
| 196836 2003 $SY_{248}$ | 15.9 | $X$ | 210.71586 | 198.17683 | 161.10898 | 4.11057 | 0.1089795 | 0.21015229 | 2.8018613 | 20 | 4 5.2 | 20.2 |
| 196837 2003 $SX_{249}$ | 15.0 | $X$ | 8.00786 | 58.09839 | 20.57734 | 9.10038 | 0.1295359 | 0.18562337 | 3.0435535 | 20 | — | — |
| 196838 2003 $SE_{250}$ | 15.0 | $X$ | 116.90494 | 297.87469 | 26.29488 | 11.46634 | 0.0914619 | 0.18695436 | 3.0290910 | 20 | — | — |
| 196839 2003 $SG_{250}$ | 15.0 | $X$ | 17.00499 | 10.20101 | 30.82824 | 8.18982 | 0.1489187 | 0.18188367 | 3.0851307 | 20 | — | — |
| 196840 2003 $SM_{253}$ | 16.2 | $X$ | 292.52346 | 303.65563 | 12.45947 | 5.16711 | 0.1132529 | 0.22023404 | 2.7156873 | 20 | 5 10.9 | 19.9 |
| 196841 2003 $SO_{253}$ | 15.5 | $X$ | 22.84703 | 4.70460 | 193.62200 | 9.81827 | 0.0458596 | 0.21342226 | 2.7731683 | 20 | 4 26.3 | 19.0 |
| 196842 2003 $SZ_{253}$ | 16.2 | $X$ | 310.72368 | 253.63829 | 225.99775 | 2.27179 | 0.0563281 | 0.24545986 | 2.5262853 | 20 | — | — |
| 196843 2003 $SD_{254}$ | 15.4 | $X$ | 153.01188 | 317.95902 | 313.94522 | 8.00887 | 0.1868459 | 0.18662280 | 3.0326776 | 20 | — | — |
| 196844 2003 $SR_{254}$ | 15.5 | $X$ | 190.61787 | 269.62835 | 7.96152 | 1.98917 | 0.0998670 | 0.19540143 | 2.9411526 | 20 | — | — |
| 196845 2003 $SE_{257}$ | 16.1 | $X$ | 171.24883 | 137.01807 | 166.61645 | 10.77579 | 0.1504798 | 0.19907000 | 2.9049066 | 20 | — | — |
| 196846 2003 $SR_{257}$ | 16.0 | $X$ | 156.00078 | 279.73044 | 101.53153 | 2.19776 | 0.0536497 | 0.20481345 | 2.8503426 | 20 | 3 4.4 | 20.0 |
| 196847 2003 $SM_{258}$ | 15.8 | $X$ | 144.73864 | 245.89761 | 189.75552 | 2.22085 | 0.1126214 | 0.20890228 | 2.8130272 | 20 | 5 2.7 | 19.9 |
| 196848 2003 $SQ_{259}$ | 15.7 | $X$ | 20.94921 | 317.52900 | 108.45213 | 2.22770 | 0.2572725 | 0.18558091 | 3.0440178 | 20 | — | — |
| 196849 2003 $ST_{259}$ | 15.5 | $X$ | 358.80347 | 22.02428 | 32.22357 | 9.63155 | 0.1484655 | 0.18137802 | 3.0908620 | 20 | — | — |
| 196850 2003 $SE_{260}$ | 14.7 | $X$ | 305.15853 | 235.37480 | 219.56376 | 25.42064 | 0.1880491 | 0.17550147 | 3.1594796 | 20 | 11 21.9 | 18.3 |
| 196851 2003 $SB_{261}$ | 15.8 | $X$ | 233.78602 | 141.05540 | 236.00207 | 5.81178 | 0.1342729 | 0.21823078 | 2.7322811 | 20 | 5 18.1 | 20.0 |
| 196852 2003 $SR_{262}$ | 15.8 | $X$ | 101.18427 | 309.69078 | 119.82751 | 3.16907 | 0.0484222 | 0.20359792 | 2.8616762 | 20 | 2 27.3 | 19.7 |
| 196853 2003 $SF_{263}$ | 14.9 | $X$ | 297.06940 | 78.67259 | 44.66060 | 9.80423 | 0.0746466 | 0.18506408 | 3.0496825 | 20 | 12 26.9 | 19.0 |
| 196854 2003 $SW_{266}$ | 15.9 | $X$ | 116.13689 | 232.62833 | 110.14961 | 1.72315 | 0.1252142 | 0.19263651 | 2.9692287 | 20 | — | — |
| 196855 2003 $SZ_{266}$ | 15.6 | $X$ | 83.40609 | 317.00392 | 7.01034 | 11.31643 | 0.1120465 | 0.18421709 | 3.0590232 | 20 | 12 28.6 | 20.4 |
| 196856 2003 $SF_{268}$ | 15.8 | $X$ | 269.37182 | 49.21993 | 263.75604 | 2.58466 | 0.0846339 | 0.21180796 | 2.7872410 | 20 | 4 11.4 | 19.6 |
| 196857 2003 $SL_{268}$ | 16.5 | $X$ | 143.95054 | 159.66248 | 297.90292 | 1.95456 | 0.0966354 | 0.21151496 | 2.7898145 | 20 | 5 27.7 | 20.7 |
| 196858 2003 $SB_{269}$ | 16.1 | $X$ | 194.60856 | 185.60868 | 198.87765 | 4.63102 | 0.0849605 | 0.21063230 | 2.7976029 | 20 | 4 19.7 | 20.4 |
| 196859 2003 $SF_{271}$ | 15.1 | $X$ | 31.02406 | 229.30268 | 133.20013 | 12.09895 | 0.0888841 | 0.17980885 | 3.1088183 | 20 | 12 11.5 | 19.5 |
| 196860 2003 $SG_{272}$ | 15.4 | $X$ | 356.50708 | 27.26010 | 208.79237 | 12.68860 | 0.0646464 | 0.21606563 | 2.7505038 | 20 | 5 7.3 | 18.8 |
| 196861 2003 $SL_{272}$ | 15.1 | $X$ | 74.73185 | 82.62066 | 277.65912 | 4.47624 | 0.0707455 | 0.18802331 | 3.0175994 | 20 | — | — |
| 196862 2003 $SC_{273}$ | 14.9 | $X$ | 346.06063 | 74.93644 | 358.13466 | 10.37687 | 0.0586494 | 0.18216983 | 3.0818990 | 20 | — | — |
| 196863 2003 $SX_{277}$ | 16.0 | $X$ | 64.11529 | 78.37182 | 327.48966 | 9.11282 | 0.1058695 | 0.19226064 | 2.9730973 | 20 | — | — |
| 196864 2003 $SL_{278}$ | 15.3 | $X$ | 114.98554 | 43.94411 | 336.15693 | 8.97033 | 0.0628671 | 0.19625027 | 2.9326656 | 20 | 1 18.5 | 19.4 |
| 196865 2003 $ST_{278}$ | 14.4 | $X$ | 60.33762 | 37.07934 | 234.28139 | 16.25002 | 0.0966078 | 0.17068275 | 3.2186689 | 20 | 9 20.2 | 19.2 |
| 196866 2003 $SY_{280}$ | 16.0 | $X$ | 353.97310 | 295.71029 | 270.43941 | 2.38614 | 0.0310398 | 0.20974759 | 2.8054642 | 20 | 3 24.0 | 19.6 |
| 196867 2003 $SF_{282}$ | 15.7 | $X$ | 34.49203 | 228.82330 | 214.46147 | 11.00332 | 0.1199304 | 0.19231567 | 2.9725301 | 20 | — | — |
| 196868 2003 $SG_{282}$ | 15.7 | $X$ | 254.85063 | 107.56363 | 194.08684 | 7.86036 | 0.0897204 | 0.20889204 | 2.8131191 | 20 | 3 10.6 | 20.0 |
| 196869 2003 $ST_{284}$ | 15.8 | $X$ | 99.44391 | 348.52312 | 10.92867 | 11.11554 | 0.1035420 | 0.19211352 | 2.9746150 | 20 | — | — |
| 196870 2003 $SC_{289}$ | 15.0 | $X$ | 156.12084 | 256.99206 | 40.21259 | 11.42274 | 0.0622130 | 0.19205615 | 2.9752073 | 20 | — | — |
| 196871 2003 $SY_{289}$ | 15.8 | $X$ | 173.87084 | 324.98816 | 91.67974 | 5.42739 | 0.0871789 | 0.21266589 | 2.7797399 | 20 | 5 9.3 | 20.1 |
| 196872 2003 $SS_{292}$ | 15.1 | $X$ | 319.89247 | 184.24520 | 259.69515 | 8.16574 | 0.1295342 | 0.18087878 | 3.0965467 | 20 | 12 8.8 | 18.6 |
| 196873 2003 $SB_{293}$ | 15.3 | $X$ | 160.16393 | 3.77530 | 341.19806 | 9.60226 | 0.1114153 | 0.20122873 | 2.8840939 | 20 | 1 31.4 | 19.8 |
| 196874 2003 $SD_{294}$ | 16.8 | $X$ | 139.22396 | 315.03066 | 34.37583 | 22.04568 | 0.1019603 | 0.37250463 | 1.9129998 | 20 | — | — |
| 196875 2003 $SN_{298}$ | 15.6 | $X$ | 213.21522 | 85.86487 | 195.59544 | 11.34111 | 0.1358763 | 0.20073344 | 2.8888361 | 20 | 1 4.2 | 20.4 |
| 196876 2003 $SW_{299}$ | 15.5 | $X$ | 93.92969 | 171.78408 | 191.11634 | 9.13029 | 0.0225141 | 0.19058727 | 2.9904746 | 20 | — | — |
| 196877 2003 $SJ_{300}$ | 15.1 | $X$ | 105.17414 | 182.27870 | 295.31562 | 7.89989 | 0.1124061 | 0.21206070 | 2.7850260 | 20 | 5 8.9 | 19.2 |
| 196878 2003 $SW_{304}$ | 15.2 | $X$ | 58.50887 | 300.45824 | 0.49564 | 10.45882 | 0.1370419 | 0.17666278 | 3.1456182 | 20 | 11 1.9 | 19.8 |
| 196879 2003 $SE_{306}$ | 15.6 | $X$ | 104.28034 | 331.43386 | 337.86854 | 7.61502 | 0.2147220 | 0.18449105 | 3.0559941 | 20 | — | — |
| 196880 2003 $SY_{307}$ | 15.2 | $X$ | 76.06128 | 325.57495 | 329.33047 | 9.37990 | 0.0246901 | 0.17951376 | 3.1122243 | 20 | 10 31.1 | 19.8 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 196881 2003 $SN_{308}$ | 15.1 | X | 53.56382 | 58.71196 | 298.87702 | 15.11823 | 0.1210384 | 0.18320248 | 3.0703071 | 20 | — | — |
| 196882 2003 $SX_{309}$ | 15.6 | X | 325.13136 | 185.14200 | 65.79005 | 3.92884 | 0.0301743 | 0.21205631 | 2.7850644 | 20 | 4 14.6 | 19.2 |
| 196883 2003 $SK_{311}$ | 15.9 | X | 49.67657 | 346.52113 | 79.63584 | 1.55987 | 0.1488248 | 0.19293589 | 2.9661563 | 20 | — | — |
| 196884 2003 $SE_{312}$ | 15.3 | X | 1.79744 | 23.71239 | 112.90754 | 3.16363 | 0.0621272 | 0.19783854 | 2.9169487 | 20 | 1 7.5 | 19.0 |
| 196885 2003 $SP_{314}$ | 16.1 | X | 196.99559 | 193.13711 | 100.43314 | 3.63847 | 0.1792994 | 0.20048321 | 2.8912393 | 20 | 1 6.1 | 20.9 |
| 196886 2003 $SF_{317}$ | 15.7 | X | 237.83425 | 207.36479 | 77.97815 | 3.20254 | 0.0265847 | 0.20314268 | 2.8659499 | 20 | 2 9.2 | 19.8 |
| 196887 2003 $SE_{320}$ | 15.6 | X | 328.34231 | 297.46281 | 194.24302 | 5.66308 | 0.1976525 | 0.19112210 | 2.9848930 | 20 | — | — |
| 196888 2003 $SM_{320}$ | 15.5 | X | 92.73219 | 134.46543 | 192.22111 | 7.12381 | 0.0062139 | 0.18619895 | 3.0372781 | 20 | 12 30.8 | 19.9 |
| 196889 2003 $SQ_{321}$ | 16.0 | X | 32.44608 | 90.30723 | 302.53131 | 5.03818 | 0.1420599 | 0.18505694 | 3.0497609 | 20 | — | — |
| 196890 2003 $SK_{322}$ | 16.0 | X | 317.90577 | 134.81138 | 89.49223 | 3.20677 | 0.0109903 | 0.20300436 | 2.8672516 | 20 | 3 5.1 | 19.8 |
| 196891 2003 $SK_{329}$ | 16.9 | X | 349.66100 | 113.17060 | 179.96968 | 4.41542 | 0.2223392 | 0.22632996 | 2.6667032 | 20 | 7 14.3 | 19.0 |
| 196892 2003 $SJ_{347}$ | 16.6 | X | 7.93842 | 98.76028 | 177.36050 | 2.89430 | 0.1131301 | 0.22568298 | 2.6717973 | 20 | 7 23.4 | 19.5 |
| 196893 2003 $TS$ | 15.7 | X | 117.19800 | 2.07723 | 343.21554 | 9.77228 | 0.0973581 | 0.19183206 | 2.9775239 | 20 | — | — |
| 196894 2003 $TL_{3}$ | 16.1 | X | 163.52818 | 260.73117 | 107.45292 | 3.27392 | 0.1092152 | 0.20374000 | 2.8603456 | 20 | 3 1.0 | 20.5 |
| 196895 2003 $TM_{3}$ | 15.3 | X | 97.29890 | 175.24884 | 180.42905 | 14.45463 | 0.1411323 | 0.19092204 | 2.9869779 | 20 | — | — |
| 196896 2003 $TA_{5}$ | 14.9 | X | 87.89033 | 88.25003 | 222.50913 | 9.48301 | 0.0740183 | 0.18176100 | 3.0865187 | 20 | 12 12.8 | 19.5 |
| 196897 2003 $TR_{6}$ | 14.8 | X | 205.78917 | 255.51121 | 54.95069 | 13.72143 | 0.0662832 | 0.20294361 | 2.8678238 | 20 | 2 6.2 | 19.3 |
| 196898 2003 $TF_{10}$ | 14.8 | X | 296.73885 | 146.39318 | 300.59154 | 21.63395 | 0.1985573 | 0.17385028 | 3.1794534 | 20 | 10 13.5 | 19.2 |
| 196899 2003 $TX_{10}$ | 15.6 | X | 331.95405 | 29.30810 | 143.22087 | 2.60265 | 0.0016915 | 0.19828512 | 2.9125673 | 20 | 1 18.6 | 19.7 |
| 196900 2003 $TA_{11}$ | 15.3 | X | 20.25095 | 287.57875 | 167.73190 | 12.78056 | 0.2512565 | 0.18845791 | 3.0129584 | 20 | — | — |
| 196901 2003 $TS_{11}$ | 17.1 | X | 279.09020 | 52.53559 | 204.19840 | 22.39096 | 0.0759268 | 0.38163535 | 1.8823642 | 20 | 1 14.6 | 19.9 |
| 196902 2003 $TG_{14}$ | 15.1 | X | 88.65223 | 54.88709 | 303.04467 | 10.53411 | 0.1703856 | 0.18852010 | 3.0122958 | 20 | — | — |
| 196903 2003 $TA_{16}$ | 16.1 | X | 178.36081 | 330.27657 | 41.73783 | 11.45361 | 0.1577275 | 0.20665114 | 2.8334193 | 20 | 3 24.9 | 20.8 |
| 196904 2003 $TC_{16}$ | 15.4 | X | 254.71675 | 243.52670 | 78.57771 | 5.39194 | 0.0656090 | 0.21182911 | 2.7870555 | 20 | 4 11.5 | 19.3 |
| 196905 2003 $TH_{17}$ | 15.8 | X | 173.69160 | 167.85539 | 169.98544 | 2.66602 | 0.0588035 | 0.20055834 | 2.8905172 | 20 | 1 30.7 | 20.1 |
| 196906 2003 $TF_{18}$ | 16.1 | X | 340.88721 | 127.75286 | 283.40821 | 5.26430 | 0.1041328 | 0.23886597 | 2.5725660 | 20 | 12 18.5 | 18.8 |
| 196907 2003 $TC_{19}$ | 16.0 | X | 206.74759 | 145.37276 | 221.48646 | 1.33258 | 0.1113312 | 0.21100073 | 2.7943453 | 20 | 4 9.1 | 20.4 |
| 196908 2003 $TU_{21}$ | 15.6 | X | 244.48661 | 107.74813 | 143.54402 | 2.46383 | 0.0347611 | 0.19866539 | 2.9088494 | 20 | 1 5.5 | 19.7 |
| 196909 2003 $TF_{22}$ | 15.6 | X | 40.98776 | 359.13569 | 320.62971 | 9.84470 | 0.0649938 | 0.17640925 | 3.1486313 | 20 | 10 22.7 | 20.1 |
| 196910 2003 $TL_{29}$ | 15.4 | X | 286.72605 | 187.92623 | 26.17058 | 2.41718 | 0.0619199 | 0.19807107 | 2.9146653 | 20 | 1 6.6 | 19.5 |
| 196911 2003 $TN_{30}$ | 16.4 | X | 83.02223 | 332.07353 | 54.91881 | 2.82568 | 0.0901561 | 0.19263382 | 2.9692563 | 20 | — | — |
| 196912 2003 $TR_{30}$ | 15.9 | X | 343.81143 | 302.92921 | 166.97405 | 2.68658 | 0.1725450 | 0.18689049 | 3.0297811 | 20 | — | — |
| 196913 2003 $TX_{33}$ | 16.4 | X | 325.46586 | 143.85891 | 71.34480 | 2.98556 | 0.0169370 | 0.20445781 | 2.8536469 | 20 | 3 2.4 | 20.2 |
| 196914 2003 $TJ_{37}$ | 15.7 | X | 168.72030 | 44.28095 | 49.83392 | 10.28502 | 0.1346426 | 0.21629572 | 2.7485529 | 20 | 6 19.2 | 20.2 |
| 196915 2003 $TO_{45}$ | 16.3 | X | 325.11681 | 141.75478 | 316.20936 | 5.50513 | 0.1394375 | 0.18252345 | 3.0779172 | 20 | — | — |
| 196916 2003 $TS_{45}$ | 15.6 | X | 146.94423 | 343.26625 | 295.82054 | 5.11643 | 0.0699377 | 0.18617995 | 3.0374848 | 20 | — | — |
| 196917 2003 $TD_{48}$ | 16.0 | X | 147.32361 | 226.21057 | 237.11611 | 5.96666 | 0.2776409 | 0.21311768 | 2.7758100 | 20 | 6 16.9 | 21.0 |
| 196918 2003 $TE_{54}$ | 16.1 | X | 122.03001 | 35.52312 | 78.39104 | 5.82156 | 0.0154800 | 0.21312164 | 2.7757756 | 20 | 5 15.6 | 19.8 |
| 196919 2003 $TP_{54}$ | 16.0 | X | 317.30778 | 150.69271 | 151.75310 | 6.63165 | 0.0272354 | 0.21748666 | 2.7385098 | 20 | 6 11.5 | 19.6 |
| 196920 2003 $TX_{54}$ | 15.5 | X | 21.93593 | 75.01407 | 58.82381 | 9.68269 | 0.1134196 | 0.19807509 | 2.9146259 | 20 | 2 4.8 | 19.1 |
| 196921 2003 $TL_{57}$ | 14.6 | X | 329.19966 | 4.69220 | 22.58837 | 24.42509 | 0.0949834 | 0.17073740 | 3.2179820 | 20 | 10 12.1 | 18.6 |
| 196922 2003 $US_{1}$ | 16.0 | X | 182.39379 | 123.52940 | 277.02133 | 2.54730 | 0.0991053 | 0.21094260 | 2.7948587 | 20 | 4 25.7 | 20.3 |
| 196923 2003 $UG_{2}$ | 15.9 | X | 311.66632 | 310.84835 | 213.90618 | 9.93901 | 0.0603074 | 0.19272702 | 2.9682990 | 20 | — | — |
| 196924 2003 $UX_{3}$ | 16.0 | X | 223.40334 | 198.25980 | 164.63059 | 3.79411 | 0.1210575 | 0.21244001 | 2.7817100 | 20 | 4 21.8 | 20.2 |
| 196925 2003 $UF_{4}$ | 14.6 | X | 35.03433 | 122.37246 | 234.53027 | 21.94984 | 0.1558979 | 0.17947852 | 3.1126317 | 20 | 12 15.8 | 19.0 |
| 196926 2003 $UG_{5}$ | 15.7 | X | 104.11985 | 354.84202 | 355.95738 | 27.67963 | 0.0443859 | 0.19116869 | 2.9844081 | 20 | — | — |
| 196927 2003 $UQ_{6}$ | 14.8 | X | 11.53582 | 143.32164 | 231.37738 | 26.99889 | 0.1694529 | 0.17740138 | 3.1368811 | 20 | 12 6.7 | 18.9 |
| 196928 2003 $UB_{7}$ | 14.6 | X | 9.00019 | 18.83088 | 335.14977 | 28.59710 | 0.1809623 | 0.17495688 | 3.1660325 | 20 | 10 22.0 | 19.0 |
| 196929 2003 $UF_{10}$ | 14.5 | X | 263.02357 | 134.29219 | 3.62064 | 22.48687 | 0.2053767 | 0.17584513 | 3.1553617 | 20 | 10 30.0 | 19.1 |
| 196930 2003 $UA_{11}$ | 16.0 | X | 324.99444 | 233.92552 | 213.28493 | 4.67040 | 0.2970247 | 0.17741049 | 3.1367737 | 20 | 12 21.2 | 18.5 |
| 196931 2003 $UF_{12}$ | 16.6 | X | 151.49880 | 209.76247 | 207.56561 | 1.38238 | 0.2285995 | 0.20529458 | 2.8458875 | 20 | 4 23.6 | 21.3 |
| 196932 2003 $UV_{12}$ | 15.1 | X | 244.54449 | 349.01552 | 220.17630 | 13.04886 | 0.0282667 | 0.18880645 | 3.0092493 | 20 | — | — |
| 196933 2003 $UY_{14}$ | 15.4 | X | 68.12202 | 170.33753 | 219.79972 | 9.62000 | 0.0704519 | 0.18945700 | 3.0023566 | 20 | — | — |
| 196934 2003 $UD_{15}$ | 15.7 | X | 124.15279 | 316.56791 | 21.79829 | 11.86568 | 0.0931357 | 0.19136003 | 2.9824183 | 20 | — | — |
| 196935 2003 $UH_{16}$ | 14.5 | X | 73.98437 | 267.84368 | 42.60820 | 22.37460 | 0.0802545 | 0.17759441 | 3.1346077 | 20 | 11 23.3 | 19.2 |
| 196936 2003 $UL_{16}$ | 15.3 | X | 40.39730 | 299.44636 | 63.59819 | 2.32681 | 0.1577578 | 0.18045512 | 3.1013913 | 20 | 12 31.9 | 19.6 |
| 196937 2003 $US_{16}$ | 14.9 | X | 141.87316 | 39.64296 | 282.46671 | 8.89935 | 0.1284934 | 0.19159481 | 2.9799815 | 20 | — | — |
| 196938 Delgordon | 15.7 | X | 338.44530 | 167.74755 | 235.88065 | 6.69030 | 0.1673627 | 0.17419143 | 3.1753007 | 20 | 11 17.3 | 19.0 |
| 196939 2003 $UB_{23}$ | 15.2 | X | 69.96251 | 343.03444 | 36.19505 | 9.64761 | 0.1452757 | 0.18751890 | 3.0230084 | 20 | — | — |
| 196940 2003 $UW_{23}$ | 15.4 | X | 262.36462 | 51.71584 | 43.76353 | 1.31105 | 0.1317725 | 0.17005946 | 3.2265285 | 20 | 9 26.1 | 19.9 |
| 196941 2003 $UZ_{23}$ | 15.6 | X | 54.56823 | 60.18917 | 356.88693 | 10.19952 | 0.1179196 | 0.19062276 | 2.9901034 | 20 | — | — |
| 196942 2003 $UM_{24}$ | 17.1 | X | 245.52390 | 74.02598 | 236.21411 | 20.91138 | 0.0271594 | 0.38422161 | 1.8739077 | 20 | 2 16.5 | 19.7 |
| 196943 2003 $UC_{28}$ | 15.1 | X | 130.28721 | 61.21529 | 230.85607 | 10.85129 | 0.1632694 | 0.18433194 | 3.0577524 | 20 | — | — |
| 196944 2003 $UO_{28}$ | 15.3 | X | 75.97543 | 98.08610 | 224.42286 | 11.10623 | 0.1554259 | 0.17998329 | 3.1068093 | 20 | 12 21.6 | 20.1 |
| 196945 Guerin | 16.2 | X | 77.74819 | 61.14979 | 322.86243 | 4.00702 | 0.1456297 | 0.19143647 | 2.9816244 | 20 | — | — |
| 196946 2003 $UX_{31}$ | 16.3 | X | 261.50676 | 275.90842 | 52.59034 | 2.90178 | 0.1456934 | 0.21463157 | 2.7627419 | 20 | 4 15.8 | 20.3 |
| 196947 2003 $UT_{35}$ | 14.9 | X | 294.49677 | 298.39345 | 148.62014 | 14.72844 | 0.1640946 | 0.17545266 | 3.1600654 | 20 | 10 31.9 | 19.0 |
| 196948 2003 $US_{38}$ | 15.1 | X | 38.19669 | 173.78318 | 181.94270 | 11.14989 | 0.0434856 | 0.17972875 | 3.1097419 | 20 | 12 5.6 | 19.6 |
| 196949 2003 $UR_{40}$ | 14.8 | X | 39.80833 | 127.36379 | 226.36756 | 20.78152 | 0.1338613 | 0.17860241 | 3.1228025 | 20 | 12 14.8 | 19.3 |
| 196950 2003 $UZ_{41}$ | 16.2 | X | 347.97516 | 67.71593 | 32.19489 | 2.30046 | 0.0587565 | 0.18892914 | 3.0079463 | 20 | — | — |
| 196951 2003 $UO_{46}$ | 16.2 | X | 251.14423 | 251.43625 | 36.67772 | 2.42895 | 0.0378633 | 0.20429233 | 2.8551878 | 20 | 2 27.0 | 20.2 |
| 196952 2003 $UX_{48}$ | 15.8 | X | 85.00449 | 232.20929 | 142.17465 | 2.55462 | 0.3170349 | 0.19102622 | 2.9858917 | 20 | 1 9.3 | 19.5 |
| 196953 2003 $UJ_{50}$ | 15.6 | X | 52.47409 | 126.44289 | 276.21164 | 9.42891 | 0.1505191 | 0.18704647 | 3.0280964 | 20 | — | — |
| 196954 2003 $UA_{52}$ | 14.9 | X | 267.48763 | 191.37415 | 296.38778 | 9.58560 | 0.0637951 | 0.17806928 | 3.1290323 | 20 | 11 20.1 | 19.3 |
| 196955 2003 $UQ_{52}$ | 15.2 | X | 235.42618 | 324.91083 | 319.09930 | 10.55670 | 0.1386179 | 0.20126020 | 2.8837932 | 20 | 1 29.2 | 19.8 |
| 196956 2003 $UR_{52}$ | 15.6 | X | 10.12837 | 133.80445 | 314.94739 | 8.61141 | 0.0306227 | 0.18849302 | 3.0125843 | 20 | — | — |
| 196957 2003 $UV_{52}$ | 15.2 | X | 98.58644 | 51.95156 | 290.10548 | 8.41625 | 0.1089846 | 0.18736174 | 3.0246986 | 20 | — | — |
| 196958 2003 $UK_{53}$ | 15.6 | X | 31.49061 | 122.74518 | 321.40914 | 9.81606 | 0.0403801 | 0.19049828 | 2.9914059 | 20 | — | — |
| 196959 2003 $UM_{53}$ | 15.2 | X | 8.26217 | 79.42095 | 352.47976 | 15.61794 | 0.1098728 | 0.18438365 | 3.0571807 | 20 | — | — |
| 196960 2003 $UA_{54}$ | 14.8 | X | 290.40393 | 133.72914 | 359.92664 | 17.04690 | 0.1747825 | 0.17881530 | 3.1203233 | 20 | 12 17.5 | 18.8 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 196961 2003 $UE_{54}$ | 14.9 | X | 99.86909 | 324.83743 | 355.37870 | 11.76020 | 0.1134506 | 0.18290299 | 3.0736578 | 20 | — | — |
| 196962 2003 $UR_{54}$ | 16.1 | X | 30.13882 | 266.02339 | 234.91636 | 22.75142 | 0.0259929 | 0.37777768 | 1.8951570 | 20 | 1 13.1 | 18.4 |
| 196963 2003 $UD_{56}$ | 15.0 | X | 97.94318 | 236.28736 | 55.06708 | 12.05252 | 0.1917127 | 0.18200561 | 3.0837527 | 20 | 12 8.9 | 20.0 |
| 196964 2003 $UT_{56}$ | 15.1 | X | 15.40801 | 58.54231 | 47.57197 | 11.99642 | 0.0825405 | 0.18956700 | 3.0011951 | 20 | — | — |
| 196965 2003 $UV_{56}$ | 15.5 | X | 3.18166 | 238.61105 | 219.67113 | 10.29787 | 0.1437867 | 0.18554830 | 3.0443744 | 20 | — | — |
| 196966 2003 $UC_{57}$ | 15.6 | X | 254.29543 | 334.63705 | 68.62563 | 6.15086 | 0.1642113 | 0.21841709 | 2.7307271 | 20 | 7 11.1 | 19.5 |
| 196967 2003 $UK_{57}$ | 15.8 | X | 32.10902 | 330.96445 | 57.13201 | 5.96202 | 0.1322847 | 0.18161654 | 3.0881552 | 20 | — | — |
| 196968 2003 $UR_{57}$ | 14.7 | X | 354.76862 | 62.80951 | 9.15467 | 14.79726 | 0.0265229 | 0.18519593 | 3.0482349 | 20 | — | — |
| 196969 2003 $UV_{58}$ | 14.6 | X | 76.63470 | 276.15967 | 0.98210 | 11.14471 | 0.0501684 | 0.17484796 | 3.1673472 | 20 | 10 14.3 | 19.2 |
| 196970 2003 $UU_{59}$ | 15.0 | X | 227.38929 | 266.34595 | 303.00972 | 15.05135 | 0.0312395 | 0.18659597 | 3.0329684 | 20 | — | — |
| 196971 2003 $UG_{61}$ | 16.1 | X | 292.38449 | 282.84750 | 92.12015 | 8.36629 | 0.2113263 | 0.22529435 | 2.6748690 | 20 | 7 17.9 | 19.3 |
| 196972 2003 $UO_{62}$ | 15.2 | X | 122.81384 | 306.22962 | 64.86602 | 9.99830 | 0.0307547 | 0.19763448 | 2.9189561 | 20 | 1 11.3 | 19.4 |
| 196973 2003 $UP_{62}$ | 15.8 | X | 242.18557 | 267.29551 | 37.75615 | 17.73833 | 0.2491118 | 0.21039343 | 2.7997200 | 20 | 2 29.6 | 20.9 |
| 196974 2003 $UC_{64}$ | 14.9 | X | 162.25434 | 186.94610 | 152.84802 | 13.41539 | 0.1053651 | 0.19740823 | 2.9211860 | 20 | 1 24.3 | 19.4 |
| 196975 2003 $UU_{64}$ | 15.1 | X | 17.59803 | 26.72927 | 79.77686 | 17.09788 | 0.1421147 | 0.19091468 | 2.9870546 | 20 | — | — |
| 196976 2003 $UA_{65}$ | 14.9 | X | 90.53499 | 231.26818 | 111.78631 | 11.21901 | 0.1083372 | 0.18736494 | 3.0246642 | 20 | — | — |
| 196977 2003 $UN_{66}$ | 14.9 | X | 23.68553 | 286.16363 | 136.02103 | 14.38437 | 0.2053213 | 0.18543034 | 3.0456654 | 20 | — | — |
| 196978 2003 $UZ_{69}$ | 16.2 | X | 160.04269 | 286.21248 | 129.44883 | 2.90102 | 0.0751214 | 0.20969620 | 2.8059225 | 20 | 4 22.3 | 20.3 |
| 196979 2003 $UN_{70}$ | 15.8 | X | 303.23432 | 10.45039 | 171.78113 | 4.70958 | 0.0473764 | 0.19425345 | 2.9527288 | 20 | — | — |
| 196980 2003 $UC_{75}$ | 14.8 | X | 41.54277 | 185.39479 | 251.66756 | 10.89459 | 0.0321913 | 0.19438553 | 2.9513911 | 20 | — | — |
| 196981 2003 $UV_{76}$ | 15.6 | X | 50.78653 | 94.34736 | 283.59857 | 9.24227 | 0.1205647 | 0.18584609 | 3.0411214 | 20 | — | — |
| 196982 2003 $UC_{79}$ | 15.0 | X | 94.52643 | 297.43575 | 32.49729 | 15.63804 | 0.0799534 | 0.18367563 | 3.0650320 | 20 | — | — |
| 196983 2003 $UH_{79}$ | 15.3 | X | 241.71245 | 223.80408 | 121.44443 | 7.71833 | 0.0562385 | 0.21175994 | 2.7876624 | 20 | 4 27.6 | 19.4 |
| 196984 2003 $UQ_{79}$ | 15.3 | X | 161.25841 | 143.44328 | 249.08293 | 4.68702 | 0.0735354 | 0.20500104 | 2.8486035 | 20 | 3 22.5 | 19.5 |
| 196985 2003 $UY_{79}$ | 15.1 | X | 301.18010 | 258.16813 | 190.99492 | 20.57870 | 0.2663869 | 0.17305916 | 3.1891356 | 20 | 10 29.1 | 18.6 |
| 196986 2003 $UC_{80}$ | 14.6 | X | 354.03003 | 172.26476 | 198.59773 | 28.20200 | 0.1592894 | 0.17339548 | 3.1850105 | 20 | 11 3.2 | 18.4 |
| 196987 2003 $UO_{81}$ | 15.1 | X | 92.55817 | 251.30202 | 123.19174 | 7.43139 | 0.2079001 | 0.19117032 | 2.9843911 | 20 | 1 3.2 | 18.9 |
| 196988 2003 $UC_{82}$ | 15.3 | X | 221.66535 | 324.17949 | 60.96604 | 11.25392 | 0.2276620 | 0.21409916 | 2.7673201 | 20 | 5 11.1 | 19.9 |
| 196989 2003 $UF_{83}$ | 14.7 | X | 30.61615 | 327.68776 | 89.64253 | 8.56549 | 0.2225944 | 0.18543608 | 3.0456025 | 20 | — | — |
| 196990 2003 $UH_{83}$ | 15.1 | X | 137.15476 | 62.03910 | 266.03184 | 9.38381 | 0.0666084 | 0.19102903 | 2.9858625 | 20 | — | — |
| 196991 2003 $UF_{84}$ | 16.0 | X | 280.41275 | 307.19205 | 207.03018 | 10.11591 | 0.0666200 | 0.18366788 | 3.0651183 | 20 | — | — |
| 196992 2003 $US_{84}$ | 16.3 | X | 32.94994 | 253.92503 | 198.17735 | 5.38498 | 0.1821342 | 0.19051393 | 2.9912420 | 20 | — | — |
| 196993 2003 $UJ_{85}$ | 16.1 | X | 67.63210 | 291.92197 | 103.32144 | 2.18251 | 0.0556681 | 0.18919204 | 3.0051592 | 20 | — | — |
| 196994 2003 $UW_{85}$ | 14.7 | X | 107.01009 | 299.91989 | 30.92959 | 16.11532 | 0.1059180 | 0.18480037 | 3.0525830 | 20 | — | — |
| 196995 2003 $US_{87}$ | 14.6 | X | 182.24444 | 296.84856 | 288.65864 | 15.93927 | 0.0760585 | 0.18578918 | 3.0417424 | 20 | 12 10.9 | 19.3 |
| 196996 2003 $UZ_{88}$ | 15.6 | X | 275.65760 | 286.57828 | 91.31191 | 15.48337 | 0.1334910 | 0.21944272 | 2.7222119 | 20 | 7 8.8 | 19.3 |
| 196997 2003 $UA_{90}$ | 15.5 | X | 218.32035 | 111.93288 | 174.91611 | 10.43999 | 0.1307794 | 0.20023277 | 2.8936497 | 20 | 1 15.1 | 20.3 |
| 196998 2003 $UV_{93}$ | 15.9 | X | 28.85186 | 209.54318 | 203.24667 | 1.56505 | 0.1922470 | 0.18692968 | 3.0293576 | 20 | — | — |
| 196999 2003 $UH_{94}$ | 16.1 | X | 23.69746 | 159.78417 | 236.25629 | 1.62729 | 0.1993259 | 0.18352847 | 3.0666703 | 20 | — | — |
| 197000 2003 $UE_{96}$ | 16.0 | X | 236.73254 | 310.83583 | 45.45881 | 5.17201 | 0.0859688 | 0.21325938 | 2.7745802 | 20 | 4 29.7 | 20.1 |
| 197001 2003 $UH_{96}$ | 16.1 | X | 301.06442 | 199.82746 | 93.16405 | 2.63565 | 0.0246080 | 0.21286341 | 2.7780201 | 20 | 5 7.5 | 19.8 |
| 197002 2003 $UV_{96}$ | 14.9 | X | 278.23377 | 143.36507 | 10.76380 | 9.01870 | 0.0775041 | 0.18628584 | 3.0363336 | 20 | — | — |
| 197003 2003 $UN_{97}$ | 15.6 | X | 330.20574 | 186.40742 | 197.13992 | 5.78970 | 0.1088494 | 0.17220742 | 3.1996426 | 20 | 10 7.1 | 19.6 |
| 197004 2003 $UT_{97}$ | 15.6 | X | 359.26746 | 40.92331 | 30.33760 | 6.28322 | 0.1016734 | 0.18374941 | 3.0642115 | 20 | — | — |
| 197005 2003 $UY_{97}$ | 15.5 | X | 15.50138 | 3.79365 | 63.30866 | 2.12664 | 0.1522087 | 0.18549335 | 3.0449756 | 20 | — | — |
| 197006 2003 $UZ_{97}$ | 15.5 | X | 140.99857 | 288.31796 | 70.52101 | 2.96367 | 0.0829821 | 0.19682005 | 2.9270029 | 20 | 1 24.2 | 19.7 |
| 197007 2003 $UB_{99}$ | 14.7 | X | 87.52204 | 274.17469 | 47.82743 | 20.49149 | 0.0894810 | 0.18093835 | 3.0958670 | 20 | 12 25.2 | 19.6 |
| 197008 2003 $UQ_{100}$ | 14.9 | X | 78.64869 | 243.33773 | 89.54694 | 6.09984 | 0.1782459 | 0.18302275 | 3.0723168 | 20 | — | — |
| 197009 2003 $UZ_{100}$ | 15.5 | X | 229.29651 | 210.24760 | 74.59793 | 3.79917 | 0.1806784 | 0.20216240 | 2.8752070 | 20 | 1 22.7 | 20.2 |
| 197010 2003 $UB_{101}$ | 16.0 | X | 207.49798 | 319.64312 | 67.14933 | 4.29015 | 0.1047344 | 0.21231049 | 2.7828411 | 20 | 5 5.8 | 20.2 |
| 197011 2003 $UC_{101}$ | 15.4 | X | 65.53187 | 2.90270 | 41.84220 | 12.07325 | 0.1653351 | 0.19124303 | 2.9836346 | 20 | — | — |
| 197012 2003 $UG_{102}$ | 14.9 | X | 63.69683 | 218.03507 | 135.23816 | 9.55778 | 0.1288117 | 0.18331563 | 3.0690436 | 20 | — | — |
| 197013 2003 $UU_{102}$ | 15.8 | X | 238.29764 | 271.10639 | 54.38256 | 5.36224 | 0.1105132 | 0.20906258 | 2.8115891 | 20 | 3 24.0 | 20.0 |
| 197014 2003 $UC_{103}$ | 15.9 | X | 23.71474 | 347.23902 | 96.69488 | 2.93111 | 0.2082487 | 0.18852293 | 3.0122656 | 20 | — | — |
| 197015 2003 $UD_{103}$ | 15.4 | X | 170.77309 | 201.74516 | 109.83369 | 3.06192 | 0.0903307 | 0.19505613 | 2.9446226 | 20 | — | — |
| 197016 2003 $UY_{104}$ | 15.7 | X | 82.47763 | 119.47616 | 352.35179 | 1.80335 | 0.0179245 | 0.20559514 | 2.8431132 | 20 | 3 22.2 | 19.3 |
| 197017 2003 $UL_{105}$ | 16.1 | X | 62.66443 | 280.18743 | 201.86269 | 5.43017 | 0.0609148 | 0.20304967 | 2.8668250 | 20 | 3 13.6 | 19.8 |
| 197018 2003 $UL_{106}$ | 15.7 | X | 85.82383 | 99.81483 | 42.18428 | 7.74448 | 0.1314008 | 0.20881882 | 2.8137767 | 20 | 5 20.9 | 19.6 |
| 197019 2003 $US_{107}$ | 16.3 | X | 32.32992 | 37.94798 | 19.65780 | 2.18350 | 0.1038367 | 0.18713609 | 3.0271296 | 20 | — | — |
| 197020 2003 $UV_{107}$ | 16.1 | X | 120.61076 | 7.09932 | 40.40008 | 2.40350 | 0.0672111 | 0.20054335 | 2.8906613 | 20 | 2 26.9 | 20.2 |
| 197021 2003 $UR_{112}$ | 15.1 | X | 157.07837 | 126.16178 | 181.01983 | 9.97445 | 0.0784422 | 0.19118617 | 2.9842261 | 20 | — | — |
| 197022 2003 $UY_{113}$ | 16.0 | X | 302.93499 | 328.47711 | 116.31956 | 5.27886 | 0.0844415 | 0.23557955 | 2.5964362 | 20 | 12 1.4 | 19.0 |
| 197023 2003 $UZ_{114}$ | 16.0 | X | 120.16502 | 31.00510 | 36.67652 | 2.18131 | 0.0699718 | 0.20212690 | 2.8755437 | 20 | 3 22.3 | 19.9 |
| 197024 2003 $UG_{116}$ | 15.6 | X | 125.32829 | 305.24556 | 107.64229 | 3.61202 | 0.1256247 | 0.20167554 | 2.8798326 | 20 | 3 17.8 | 19.8 |
| 197025 2003 $UX_{120}$ | 16.9 | X | 165.06317 | 175.01029 | 178.81273 | 1.34610 | 0.1942772 | 0.20201308 | 2.8766237 | 20 | 2 18.1 | 21.7 |
| 197026 2003 $UY_{122}$ | 15.6 | X | 52.08443 | 22.98248 | 285.89714 | 11.08392 | 0.1852332 | 0.23440801 | 2.6050801 | 20 | 11 24.0 | 19.4 |
| 197027 2003 $UA_{124}$ | 16.1 | X | 310.40488 | 140.22504 | 302.92239 | 13.21156 | 0.1641054 | 0.23763918 | 2.5814122 | 20 | 12 9.5 | 18.7 |
| 197028 2003 $UJ_{124}$ | 15.1 | X | 321.87810 | 188.92872 | 249.22944 | 11.56971 | 0.1538860 | 0.18029136 | 3.1032692 | 20 | 12 4.1 | 18.6 |
| 197029 2003 $UA_{125}$ | 15.5 | X | 322.75953 | 208.14689 | 46.59999 | 13.73343 | 0.2119134 | 0.21312598 | 2.7757379 | 20 | 3 27.2 | 18.9 |
| 197030 2003 $UM_{126}$ | 15.7 | X | 50.52469 | 91.47445 | 319.23685 | 6.25443 | 0.1867478 | 0.18883894 | 3.0089041 | 20 | — | — |
| 197031 2003 $UK_{128}$ | 15.9 | X | 232.07996 | 129.75344 | 230.59147 | 5.41995 | 0.0692706 | 0.21223401 | 2.7835096 | 20 | 4 30.5 | 20.0 |
| 197032 2003 $UZ_{129}$ | 15.1 | X | 37.33116 | 102.80565 | 273.94954 | 8.90454 | 0.0884229 | 0.18069187 | 3.0986817 | 20 | — | — |
| 197033 2003 $UB_{131}$ | 15.9 | X | 19.62775 | 96.24919 | 329.81926 | 9.93203 | 0.1323832 | 0.18553067 | 3.0445673 | 20 | — | — |
| 197034 2003 $UP_{131}$ | 15.4 | X | 45.69591 | 338.24671 | 355.26734 | 10.21628 | 0.1583691 | 0.17648018 | 3.1477876 | 20 | 11 29.9 | 19.9 |
| 197035 2003 $UG_{132}$ | 15.3 | X | 53.27529 | 69.72720 | 287.65379 | 4.05816 | 0.2593242 | 0.18193621 | 3.0845368 | 20 | — | — |
| 197036 2003 $UQ_{132}$ | 15.0 | X | 41.42112 | 70.03715 | 19.06901 | 13.89799 | 0.1387936 | 0.19017655 | 2.9947787 | 20 | 1 12.0 | 18.7 |
| 197037 2003 $UG_{133}$ | 14.8 | X | 132.53896 | 345.70182 | 261.07860 | 14.71541 | 0.0619813 | 0.17888798 | 3.1194782 | 20 | 11 11.8 | 19.6 |
| 197038 2003 $UC_{134}$ | 15.1 | X | 110.99315 | 333.51953 | 329.51960 | 10.98576 | 0.1248588 | 0.18430622 | 3.0580369 | 20 | — | — |
| 197039 2003 $UH_{134}$ | 14.9 | X | 125.60446 | 36.26024 | 245.72396 | 11.47776 | 0.1181449 | 0.18291966 | 3.0734710 | 20 | 12 19.6 | 19.7 |
| 197040 2003 $UO_{135}$ | 16.3 | X | 216.03750 | 310.54969 | 49.58302 | 4.23727 | 0.1067858 | 0.21070213 | 2.7969848 | 20 | 4 11.7 | 20.5 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 197041 2003 $UP_{135}$ | 15.4 | X | 355.90936 | 122.58537 | 280.67246 | 8.46642 | 0.0692443 | 0.17789788 | 3.1310419 | 20 | 12 9.6 | 19.5 |
| 197042 2003 $UW_{135}$ | 14.8 | X | 64.09731 | 293.15661 | 17.97804 | 16.47009 | 0.2549168 | 0.17760123 | 3.1345274 | 20 | 12 4.4 | 19.9 |
| 197043 2003 $UD_{137}$ | 15.7 | X | 256.31248 | 278.85481 | 43.18779 | 6.08675 | 0.0308504 | 0.21008358 | 2.8024722 | 20 | 4 16.4 | 19.5 |
| 197044 2003 $UZ_{137}$ | 15.0 | X | 57.48677 | 160.94992 | 189.79697 | 7.77780 | 0.1148379 | 0.18131528 | 3.0915749 | 20 | 12 30.7 | 19.6 |
| 197045 2003 $UC_{139}$ | 15.6 | X | 192.31955 | 238.17588 | 144.81417 | 10.65802 | 0.1397118 | 0.21054027 | 2.7984181 | 20 | 4 18.6 | 20.2 |
| 197046 2003 $UE_{140}$ | 15.6 | X | 79.01266 | 232.43272 | 151.79426 | 10.51978 | 0.1040732 | 0.19167438 | 2.9791566 | 20 | — | — |
| 197047 2003 $UN_{140}$ | 16.3 | X | 345.56464 | 294.77628 | 115.37126 | 5.79068 | 0.1162919 | 0.23953692 | 2.5677599 | 20 | 12 26.2 | 19.2 |
| 197048 2003 $UO_{140}$ | 15.8 | X | 160.27806 | 270.69941 | 145.79245 | 7.32731 | 0.1271442 | 0.21008939 | 2.8024206 | 20 | 4 27.8 | 20.3 |
| 197049 2003 $UT_{141}$ | 15.6 | X | 76.73258 | 171.04076 | 167.80028 | 10.48846 | 0.0969716 | 0.18540953 | 3.0458933 | 20 | — | — |
| 197050 2003 $UW_{142}$ | 15.6 | X | 353.22363 | 145.41411 | 264.15217 | 6.98596 | 0.1448815 | 0.17896237 | 3.1186136 | 20 | 12 20.6 | 19.2 |
| 197051 2003 $UD_{143}$ | 14.7 | X | 66.28648 | 309.03815 | 22.58546 | 10.53715 | 0.0934990 | 0.17916009 | 3.1163187 | 20 | 12 14.4 | 19.4 |
| 197052 2003 $UK_{145}$ | 15.8 | X | 187.43967 | 155.20531 | 189.32438 | 2.19639 | 0.1646356 | 0.20172497 | 2.8793620 | 20 | 2 24.8 | 20.5 |
| 197053 2003 $UH_{147}$ | 14.7 | X | 9.29870 | 314.59751 | 77.03110 | 11.72302 | 0.1378794 | 0.17802545 | 3.1295458 | 20 | 12 21.5 | 18.6 |
| 197054 2003 $UH_{149}$ | 16.0 | X | 145.21169 | 322.26917 | 58.25334 | 4.15190 | 0.1841110 | 0.20211609 | 2.8756462 | 20 | 3 4.7 | 20.5 |
| 197055 2003 $UC_{150}$ | 15.5 | X | 15.35414 | 169.90662 | 165.98201 | 5.75025 | 0.1630238 | 0.17458119 | 3.1705729 | 20 | 10 26.1 | 19.4 |
| 197056 2003 $UJ_{150}$ | 15.4 | X | 55.92463 | 297.07846 | 118.30138 | 9.99291 | 0.1233184 | 0.18862128 | 3.0112184 | 20 | — | — |
| 197057 2003 $UC_{151}$ | 15.2 | X | 162.28580 | 260.26856 | 45.05107 | 11.83919 | 0.0519837 | 0.19160992 | 2.9798247 | 20 | — | — |
| 197058 2003 $UV_{152}$ | 14.1 | X | 30.43724 | 287.13056 | 76.85099 | 26.94729 | 0.2184550 | 0.17726157 | 3.1385302 | 20 | 12 26.5 | 18.5 |
| 197059 2003 $UZ_{153}$ | 15.7 | X | 192.04809 | 124.44407 | 157.46281 | 1.37811 | 0.0379268 | 0.19206494 | 2.9751166 | 20 | — | — |
| 197060 2003 $UK_{154}$ | 15.1 | X | 297.45063 | 326.79295 | 173.16666 | 10.74860 | 0.1187132 | 0.18502470 | 3.0501152 | 20 | — | — |
| 197061 2003 $UN_{157}$ | 15.4 | X | 5.67971 | 179.25284 | 266.42273 | 8.99133 | 0.0943111 | 0.18738446 | 3.0244541 | 20 | — | — |
| 197062 2003 $UU_{157}$ | 15.5 | X | 301.47573 | 226.64526 | 181.81917 | 1.50671 | 0.1418244 | 0.16969811 | 3.2311073 | 20 | 9 19.7 | 19.3 |
| 197063 2003 $UO_{158}$ | 15.9 | X | 338.83916 | 222.58309 | 271.86171 | 1.15618 | 0.1711506 | 0.18578175 | 3.0418235 | 20 | — | — |
| 197064 2003 $UB_{159}$ | 15.4 | X | 329.43974 | 343.25191 | 46.53178 | 4.55687 | 0.1628059 | 0.17136846 | 3.2100771 | 20 | 10 13.6 | 19.0 |
| 197065 2003 $UK_{160}$ | 16.2 | X | 42.15958 | 159.42627 | 275.39630 | 0.59473 | 0.1113752 | 0.19051620 | 2.9912183 | 20 | — | — |
| 197066 2003 $UO_{160}$ | 16.0 | X | 21.53108 | 70.76730 | 7.61691 | 0.92419 | 0.0484970 | 0.18815239 | 3.0162191 | 20 | — | — |
| 197067 2003 $UJ_{161}$ | 15.4 | X | 318.42895 | 80.57296 | 10.36555 | 6.29451 | 0.2481779 | 0.17841130 | 3.1250321 | 20 | 12 10.0 | 18.4 |
| 197068 2003 $UN_{162}$ | 14.8 | X | 46.54671 | 323.46536 | 49.10453 | 16.93776 | 0.1574345 | 0.18340263 | 3.0680729 | 20 | — | — |
| 197069 2003 $UM_{163}$ | 15.6 | X | 169.32521 | 219.56300 | 146.56989 | 5.60631 | 0.1167986 | 0.20240083 | 2.8729486 | 20 | 3 4.3 | 20.0 |
| 197070 2003 $UN_{163}$ | 14.9 | X | 57.65714 | 332.26900 | 49.77275 | 9.93207 | 0.1394605 | 0.18500659 | 3.0503142 | 20 | — | — |
| 197071 2003 $UQ_{163}$ | 15.5 | X | 122.10269 | 143.14276 | 192.20397 | 7.22196 | 0.1986952 | 0.19098972 | 2.9862722 | 20 | — | — |
| 197072 2003 $UJ_{167}$ | 14.7 | X | 222.23170 | 143.92408 | 239.56055 | 8.52728 | 0.2676906 | 0.21444136 | 2.7643754 | 20 | 5 5.9 | 19.5 |
| 197073 2003 $UV_{168}$ | 15.0 | X | 3.07214 | 328.69729 | 44.72484 | 7.94565 | 0.1492482 | 0.17506324 | 3.1647501 | 20 | 11 19.3 | 18.7 |
| 197074 2003 $UU_{169}$ | 16.1 | X | 190.73904 | 318.04238 | 40.68665 | 7.35953 | 0.1198241 | 0.20512780 | 2.8474299 | 20 | 3 18.2 | 20.6 |
| 197075 2003 $UE_{170}$ | 15.9 | X | 112.00893 | 113.97522 | 294.53593 | 1.68458 | 0.1182714 | 0.19790581 | 2.9162876 | 20 | 2 23.6 | 19.9 |
| 197076 2003 $UK_{172}$ | 15.2 | X | 43.38317 | 149.00850 | 174.87673 | 9.57864 | 0.0751221 | 0.17512328 | 3.1640266 | 20 | 11 7.9 | 19.6 |
| 197077 2003 $UR_{173}$ | 15.3 | X | 24.97580 | 182.36664 | 211.88929 | 9.07723 | 0.0932466 | 0.18086820 | 3.0966675 | 20 | — | — |
| 197078 2003 $UT_{174}$ | 15.5 | X | 19.08546 | 91.38369 | 234.06588 | 3.52059 | 0.1768919 | 0.17248348 | 3.1962277 | 20 | 10 17.4 | 19.5 |
| 197079 2003 $UU_{174}$ | 15.4 | X | 346.21055 | 85.88106 | 41.39105 | 4.67643 | 0.1557551 | 0.18816734 | 3.0160593 | 20 | — | — |
| 197080 2003 $UY_{176}$ | 15.8 | X | 128.09136 | 25.91187 | 303.90446 | 7.98411 | 0.0960051 | 0.18892334 | 3.0080079 | 20 | — | — |
| 197081 2003 $UF_{177}$ | 15.5 | X | 37.01991 | 61.81057 | 325.63713 | 8.04249 | 0.0671790 | 0.18208408 | 3.0828666 | 20 | — | — |
| 197082 2003 $UR_{177}$ | 16.1 | X | 176.24528 | 74.55820 | 261.41685 | 0.90883 | 0.0266793 | 0.19987034 | 2.8971466 | 20 | 1 29.7 | 20.3 |
| 197083 2003 $UY_{178}$ | 14.9 | X | 101.61768 | 73.94314 | 203.02611 | 9.17620 | 0.0701289 | 0.17764943 | 3.1339604 | 20 | 11 17.6 | 19.5 |
| 197084 2003 $UF_{179}$ | 15.0 | X | 357.70981 | 50.09921 | 40.16400 | 15.79676 | 0.0061338 | 0.18720110 | 3.0264288 | 20 | — | — |
| 197085 2003 $UK_{179}$ | 16.0 | X | 131.88380 | 7.15916 | 48.66839 | 6.17733 | 0.2535575 | 0.20216205 | 2.8752103 | 20 | 4 9.2 | 20.8 |
| 197086 2003 $UE_{182}$ | 15.8 | X | 325.97016 | 131.71298 | 36.00900 | 11.66978 | 0.0364558 | 0.19483186 | 2.9468819 | 20 | 1 2.4 | 20.0 |
| 197087 2003 $UG_{182}$ | 15.7 | X | 188.33622 | 181.90655 | 144.36096 | 2.56289 | 0.0576301 | 0.19973279 | 2.8984767 | 20 | 2 2.0 | 19.8 |
| 197088 2003 $UH_{182}$ | 15.5 | X | 121.58633 | 248.49291 | 57.79331 | 3.46793 | 0.0993908 | 0.18610717 | 3.0382766 | 20 | — | — |
| 197089 2003 $UO_{182}$ | 16.1 | X | 100.42811 | 47.47981 | 267.32836 | 1.65811 | 0.1552897 | 0.18475658 | 3.0530654 | 20 | — | — |
| 197090 2003 $UV_{182}$ | 15.4 | X | 28.33747 | 220.21708 | 211.29354 | 10.84271 | 0.0846942 | 0.18868152 | 3.0105774 | 20 | — | — |
| 197091 2003 $UO_{183}$ | 15.5 | X | 141.63046 | 245.90702 | 106.14800 | 3.03284 | 0.1046931 | 0.19581748 | 2.9369851 | 20 | 1 18.8 | 19.9 |
| 197092 2003 $UX_{183}$ | 15.9 | X | 74.50701 | 229.22353 | 212.60219 | 5.48405 | 0.1028909 | 0.19689346 | 2.9262754 | 20 | 2 13.1 | 19.7 |
| 197093 2003 $UY_{184}$ | 15.0 | X | 288.92485 | 90.35342 | 53.39937 | 11.18835 | 0.0478852 | 0.18273886 | 3.0754980 | 20 | — | — |
| 197094 2003 $UC_{186}$ | 15.5 | X | 25.92089 | 161.22580 | 256.84412 | 8.62617 | 0.0820627 | 0.18609103 | 3.0384523 | 20 | — | — |
| 197095 2003 $UW_{187}$ | 15.3 | X | 286.04254 | 271.53764 | 169.49575 | 5.45719 | 0.1281722 | 0.17217979 | 3.1999849 | 20 | 10 11.6 | 19.4 |
| 197096 2003 $UB_{189}$ | 15.3 | X | 151.59524 | 62.98419 | 244.39075 | 9.08699 | 0.0328863 | 0.18924896 | 3.0045566 | 20 | — | — |
| 197097 2003 $UX_{189}$ | 15.1 | X | 332.20284 | 196.68260 | 239.89037 | 9.21421 | 0.0165021 | 0.17938976 | 3.1136583 | 20 | 12 16.5 | 19.5 |
| 197098 2003 $UU_{190}$ | 15.2 | X | 359.28696 | 159.44572 | 196.90601 | 7.35482 | 0.1040342 | 0.17220153 | 3.1997156 | 20 | 10 18.9 | 19.0 |
| 197099 2003 $UZ_{190}$ | 15.6 | X | 313.66766 | 263.82609 | 183.48169 | 4.49122 | 0.1306599 | 0.17746182 | 3.1361688 | 20 | 12 2.3 | 19.3 |
| 197100 2003 $UA_{192}$ | 15.4 | X | 6.90712 | 40.84735 | 28.53631 | 11.50862 | 0.0953863 | 0.18358540 | 3.0660363 | 20 | — | — |
| 197101 2003 $UF_{192}$ | 15.6 | X | 38.61570 | 29.83965 | 29.05116 | 3.69460 | 0.1329546 | 0.18752544 | 3.0229381 | 20 | — | — |
| 197102 2003 $UC_{193}$ | 15.6 | X | 226.88942 | 291.89305 | 353.29803 | 4.64364 | 0.0763177 | 0.20202677 | 2.8764938 | 20 | 1 25.3 | 19.9 |
| 197103 2003 $UQ_{193}$ | 15.6 | X | 352.79099 | 183.40630 | 237.95503 | 2.13837 | 0.0602606 | 0.18336004 | 3.0685480 | 20 | 12 28.2 | 19.5 |
| 197104 2003 $UD_{195}$ | 15.7 | X | 43.57084 | 343.00065 | 39.72817 | 9.63836 | 0.0971660 | 0.18212209 | 3.0824376 | 20 | — | — |
| 197105 2003 $UW_{195}$ | 15.2 | X | 37.55016 | 288.70258 | 207.75047 | 9.50874 | 0.0752349 | 0.19765153 | 2.9187883 | 20 | 2 24.9 | 19.0 |
| 197106 2003 $UK_{198}$ | 16.2 | X | 132.61553 | 313.81490 | 79.45356 | 3.07633 | 0.0787629 | 0.20046252 | 2.8914382 | 20 | 2 25.2 | 20.3 |
| 197107 2003 $UR_{198}$ | 15.9 | X | 354.40516 | 317.62932 | 108.52043 | 2.93130 | 0.2054277 | 0.18195586 | 3.0843148 | 20 | — | — |
| 197108 2003 $UP_{202}$ | 15.2 | X | 21.32047 | 136.95408 | 200.25663 | 9.28837 | 0.2181894 | 0.17451625 | 3.1713594 | 20 | 11 13.4 | 19.1 |
| 197109 2003 $UG_{203}$ | 15.5 | X | 73.92462 | 6.69436 | 25.51873 | 10.76238 | 0.0552069 | 0.18950319 | 3.0018687 | 20 | — | — |
| 197110 2003 $UN_{203}$ | 15.7 | X | 100.95808 | 42.46450 | 353.65688 | 1.73363 | 0.1330315 | 0.19486137 | 2.9465843 | 20 | 1 29.6 | 19.7 |
| 197111 2003 $UZ_{204}$ | 15.6 | X | 72.98486 | 81.18158 | 293.57976 | 12.51613 | 0.0903056 | 0.18803955 | 3.0174257 | 20 | — | — |
| 197112 2003 $UO_{205}$ | 15.9 | X | 52.23719 | 311.35648 | 92.11226 | 2.99811 | 0.1065494 | 0.18986639 | 2.9980393 | 20 | — | — |
| 197113 2003 $UU_{205}$ | 14.3 | X | 26.68425 | 126.75606 | 244.77256 | 15.58008 | 0.2275748 | 0.17791747 | 3.1308120 | 20 | — | — |
| 197114 2003 $UC_{208}$ | 16.1 | X | 47.11473 | 226.21914 | 230.43846 | 6.58480 | 0.2224340 | 0.19224695 | 2.9732385 | 20 | 2 2.6 | 19.2 |
| 197115 2003 $UG_{208}$ | 15.8 | X | 129.31629 | 58.43554 | 31.01072 | 2.42354 | 0.0148283 | 0.20730959 | 2.8274165 | 20 | 4 22.1 | 19.5 |
| 197116 2003 $UB_{209}$ | 15.4 | X | 103.73626 | 257.23449 | 4.47379 | 11.62725 | 0.1003871 | 0.17375867 | 3.1805707 | 20 | 10 30.4 | 20.3 |
| 197117 2003 $UO_{209}$ | 15.4 | X | 139.43729 | 142.81374 | 127.97338 | 3.40589 | 0.1072297 | 0.18426552 | 3.0584871 | 20 | 12 20.0 | 20.1 |
| 197118 2003 $UU_{209}$ | 16.7 | X | 214.86235 | 88.27674 | 264.61723 | 0.96681 | 0.0299029 | 0.20882428 | 2.8137276 | 20 | 4 3.7 | 20.6 |
| 197119 2003 $UR_{211}$ | 15.2 | X | 247.37339 | 294.68958 | 235.28133 | 10.92241 | 0.0925016 | 0.17841827 | 3.1249507 | 20 | 12 13.6 | 19.6 |
| 197120 2003 $UQ_{214}$ | 15.0 | X | 34.90284 | 78.48803 | 6.16736 | 11.38486 | 0.0731707 | 0.19278646 | 2.9676889 | 20 | — | — |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 197121 2003 $UN_{215}$ | 15.1 | $X$ | 290.94900 | 259.28429 | 199.70468 | 15.46193 | 0.1020340 | 0.17658206 | 3.1465767 | 20 | 11 14.8 | 19.3 |
| 197122 2003 $UU_{215}$ | 15.5 | $X$ | 137.72474 | 117.13607 | 194.40816 | 12.36243 | 0.1939188 | 0.19075194 | 2.9887534 | 20 | — | — |
| 197123 2003 $UQ_{218}$ | 14.2 | $X$ | 120.51657 | 280.01901 | 68.82884 | 13.26681 | 0.1648613 | 0.18993893 | 2.9972759 | 20 | — | — |
| 197124 2003 $UQ_{223}$ | 15.1 | $X$ | 2.17337 | 151.66434 | 251.83725 | 9.26547 | 0.1293369 | 0.17808820 | 3.1288107 | 20 | 12 24.6 | 19.1 |
| 197125 2003 $UK_{225}$ | 15.2 | $X$ | 137.74233 | 257.58413 | 16.76923 | 9.78639 | 0.0313961 | 0.18131737 | 3.0915512 | 20 | 12 20.8 | 19.8 |
| 197126 2003 $UX_{225}$ | 15.4 | $X$ | 64.99867 | 20.03820 | 271.79071 | 3.26520 | 0.1414726 | 0.17404623 | 3.1770665 | 20 | 10 31.9 | 20.0 |
| 197127 2003 $UJ_{227}$ | 15.3 | $X$ | 71.60135 | 164.58647 | 250.80702 | 5.16011 | 0.1185144 | 0.19250447 | 2.9705862 | 20 | 1 10.9 | 19.1 |
| 197128 2003 $UX_{227}$ | 15.7 | $X$ | 340.78212 | 84.74322 | 26.66004 | 15.37604 | 0.1871973 | 0.18374201 | 3.0642939 | 20 | — | — |
| 197129 2003 $UG_{229}$ | 15.7 | $X$ | 69.31231 | 357.18874 | 338.12266 | 4.14842 | 0.1349908 | 0.18075548 | 3.0979547 | 20 | 12 28.6 | 20.3 |
| 197130 2003 $UX_{230}$ | 16.2 | $X$ | 283.47042 | 45.86685 | 261.70140 | 3.37687 | 0.1272204 | 0.21464901 | 2.7625922 | 20 | 4 15.5 | 20.0 |
| 197131 2003 $UQ_{232}$ | 15.6 | $X$ | 9.88908 | 249.89424 | 219.74845 | 5.79209 | 0.2103808 | 0.18904734 | 3.0066924 | 20 | — | — |
| 197132 2003 $UY_{233}$ | 15.2 | $X$ | 164.56527 | 227.50822 | 6.59202 | 9.65312 | 0.0990039 | 0.18003162 | 3.1062532 | 20 | 11 28.6 | 20.1 |
| 197133 2003 $UF_{235}$ | 16.1 | $X$ | 311.10968 | 141.15019 | 23.03767 | 2.35578 | 0.0895676 | 0.19082278 | 2.9880136 | 20 | — | — |
| 197134 2003 $UK_{237}$ | 15.1 | $X$ | 238.35885 | 277.50019 | 352.02414 | 7.02940 | 0.2286629 | 0.20081368 | 2.8880665 | 20 | 1 11.4 | 20.2 |
| 197135 2003 $UK_{240}$ | 15.4 | $X$ | 76.72428 | 21.51362 | 38.78728 | 11.08273 | 0.0949575 | 0.19316106 | 2.9638507 | 20 | 1 25.2 | 19.4 |
| 197136 2003 $UZ_{240}$ | 14.9 | $X$ | 345.80783 | 20.57304 | 24.72523 | 12.80491 | 0.0392137 | 0.17648483 | 3.1477324 | 20 | 11 23.3 | 19.3 |
| 197137 2003 $UG_{244}$ | 15.2 | $X$ | 2.22846 | 8.78043 | 48.52625 | 11.12391 | 0.0850282 | 0.17910757 | 3.1169279 | 20 | — | — |
| 197138 2003 $UY_{246}$ | 16.2 | $X$ | 247.21807 | 313.84404 | 334.82724 | 0.62954 | 0.1371394 | 0.20480230 | 2.8504461 | 20 | 2 13.6 | 20.5 |
| 197139 2003 $UB_{247}$ | 15.3 | $X$ | 83.99696 | 157.41096 | 193.34173 | 4.81754 | 0.1181784 | 0.18442809 | 3.0566896 | 20 | — | — |
| 197140 2003 $UA_{248}$ | 16.2 | $X$ | 100.48162 | 61.56618 | 306.78479 | 0.44184 | 0.0283583 | 0.19112554 | 2.9848572 | 20 | — | — |
| 197141 2003 $UE_{249}$ | 15.2 | $X$ | 58.81432 | 14.19791 | 295.15897 | 3.51070 | 0.1539038 | 0.17688214 | 3.1430169 | 20 | 11 17.2 | 19.7 |
| 197142 2003 $UW_{250}$ | 15.5 | $X$ | 271.50641 | 177.45907 | 279.16910 | 4.07457 | 0.1428488 | 0.17062073 | 3.2194488 | 20 | 10 5.2 | 20.0 |
| 197143 2003 $UG_{251}$ | 16.7 | $X$ | 160.16902 | 207.86946 | 219.62465 | 3.00464 | 0.0814797 | 0.20964140 | 2.8064115 | 20 | 5 6.6 | 20.9 |
| 197144 2003 $UX_{255}$ | 15.2 | $X$ | 179.46243 | 157.79896 | 161.91014 | 5.61726 | 0.1260873 | 0.19676353 | 2.9275634 | 20 | 1 18.9 | 19.9 |
| 197145 2003 $US_{256}$ | 16.3 | $X$ | 327.75073 | 263.45637 | 116.53161 | 3.19835 | 0.2271169 | 0.22978305 | 2.6399197 | 20 | 10 12.1 | 18.3 |
| 197146 2003 $UM_{258}$ | 16.3 | $X$ | 22.19199 | 12.34714 | 79.55773 | 0.41488 | 0.1761401 | 0.18912896 | 3.0058273 | 20 | — | — |
| 197147 2003 $UW_{258}$ | 14.7 | $X$ | 210.16653 | 229.11505 | 73.03541 | 11.78969 | 0.2567768 | 0.19941488 | 2.9015563 | 20 | 1 28.1 | 20.0 |
| 197148 2003 $UL_{261}$ | 15.0 | $X$ | 3.79277 | 44.26429 | 37.12930 | 10.50944 | 0.0682468 | 0.18587857 | 3.0407671 | 20 | — | — |
| 197149 2003 $US_{263}$ | 15.9 | $X$ | 253.85960 | 342.10146 | 90.86444 | 6.33958 | 0.1041055 | 0.22434799 | 2.6823860 | 20 | 8 30.9 | 19.5 |
| 197150 2003 $US_{265}$ | 14.6 | $X$ | 37.93475 | 101.70904 | 238.95120 | 16.36994 | 0.1855598 | 0.17647313 | 3.1478715 | 20 | 12 4.9 | 18.9 |
| 197151 2003 $UU_{266}$ | 15.4 | $X$ | 42.30258 | 321.09715 | 99.16195 | 3.48930 | 0.0922733 | 0.18762748 | 3.0218419 | 20 | — | — |
| 197152 2003 $UU_{267}$ | 15.3 | $X$ | 354.63252 | 359.91644 | 64.69048 | 6.39193 | 0.1519054 | 0.17957549 | 3.1115110 | 20 | — | — |
| 197153 2003 $UE_{271}$ | 15.1 | $X$ | 53.61669 | 327.15676 | 99.29657 | 13.41246 | 0.1172907 | 0.19297909 | 2.9657136 | 20 | — | — |
| 197154 2003 $UD_{272}$ | 15.4 | $X$ | 350.87252 | 247.42696 | 208.62851 | 8.78102 | 0.1548072 | 0.18269134 | 3.0760313 | 20 | — | — |
| 197155 2003 $UJ_{272}$ | 15.4 | $X$ | 39.80954 | 125.87308 | 208.29842 | 15.84932 | 0.2251061 | 0.17667927 | 3.1454225 | 20 | 12 5.5 | 19.9 |
| 197156 2003 $UL_{272}$ | 15.1 | $X$ | 89.62551 | 114.55130 | 204.39228 | 15.75150 | 0.1227855 | 0.18101007 | 3.0950492 | 20 | 12 27.0 | 20.1 |
| 197157 2003 $UZ_{272}$ | 15.2 | $X$ | 2.71060 | 19.90751 | 34.65886 | 9.98297 | 0.0766582 | 0.18030947 | 3.1030613 | 20 | — | — |
| 197158 2003 $UF_{273}$ | 15.4 | $X$ | 201.58905 | 344.72048 | 75.03685 | 9.93936 | 0.1358287 | 0.21210188 | 2.7846655 | 20 | 6 8.3 | 19.9 |
| 197159 2003 $UH_{273}$ | 14.8 | $X$ | 85.66671 | 99.44841 | 227.07914 | 16.81301 | 0.2445022 | 0.18097328 | 3.0954686 | 20 | — | — |
| 197160 2003 $UJ_{273}$ | 14.8 | $X$ | 215.32508 | 126.95354 | 68.80755 | 10.26567 | 0.0336460 | 0.17882351 | 3.1202278 | 20 | 12 14.3 | 19.3 |
| 197161 2003 $UM_{273}$ | 15.6 | $X$ | 100.33442 | 197.84934 | 206.37703 | 11.49341 | 0.0575093 | 0.19478543 | 2.9473501 | 20 | 1 24.5 | 19.9 |
| 197162 2003 $UU_{273}$ | 14.8 | $X$ | 103.35781 | 97.94173 | 199.95619 | 15.68451 | 0.0892289 | 0.17884663 | 3.1199589 | 20 | 12 14.5 | 19.8 |
| 197163 2003 $UJ_{274}$ | 15.6 | $X$ | 53.52296 | 65.80518 | 349.60052 | 7.59099 | 0.1156413 | 0.19061956 | 2.9901369 | 20 | — | — |
| 197164 2003 $UA_{276}$ | 15.2 | $X$ | 17.12117 | 234.47965 | 238.21596 | 6.73298 | 0.0839427 | 0.19061859 | 2.9901470 | 20 | — | — |
| 197165 2003 $UE_{277}$ | 15.4 | $X$ | 27.40145 | 195.47756 | 211.59152 | 0.86058 | 0.2550475 | 0.18298367 | 3.0727542 | 20 | — | — |
| 197166 2003 $UG_{277}$ | 16.1 | $X$ | 117.93193 | 224.07126 | 270.41867 | 2.97049 | 0.0455677 | 0.21355046 | 2.7720584 | 20 | 6 9.5 | 20.0 |
| 197167 2003 $UM_{277}$ | 15.6 | $X$ | 238.59120 | 279.99670 | 63.99197 | 6.01147 | 0.0765224 | 0.21265331 | 2.7798495 | 20 | 4 18.7 | 19.7 |
| 197168 2003 $UE_{279}$ | 15.5 | $X$ | 159.04045 | 253.03411 | 112.03176 | 3.09897 | 0.1374305 | 0.19868359 | 2.9086717 | 20 | 2 23.9 | 20.0 |
| 197169 2003 $UH_{279}$ | 15.3 | $X$ | 290.80553 | 202.25283 | 279.78162 | 8.02210 | 0.1185041 | 0.18077828 | 3.0976942 | 20 | 12 11.1 | 19.1 |
| 197170 2003 $UZ_{279}$ | 15.2 | $X$ | 32.66050 | 234.53365 | 182.98499 | 9.16049 | 0.1411211 | 0.18542631 | 3.0457095 | 20 | — | — |
| 197171 2003 $US_{280}$ | 15.8 | $X$ | 22.91768 | 359.21980 | 93.32870 | 3.24413 | 0.1448754 | 0.18808662 | 3.0169222 | 20 | — | — |
| 197172 2003 $UU_{280}$ | 16.1 | $X$ | 60.39510 | 279.78661 | 76.55445 | 5.52650 | 0.2807216 | 0.18318099 | 3.0705472 | 20 | — | — |
| 197173 2003 $UW_{280}$ | 15.4 | $X$ | 348.74235 | 53.23250 | 61.21447 | 1.49661 | 0.1936812 | 0.18455053 | 3.0553375 | 20 | — | — |
| 197174 2003 $UG_{282}$ | 15.5 | $X$ | 38.97449 | 238.22883 | 126.99384 | 6.54043 | 0.1520648 | 0.17945426 | 3.1129122 | 20 | 12 31.6 | 19.8 |
| 197175 2003 $UT_{282}$ | 15.3 | $X$ | 44.63932 | 327.46665 | 102.85909 | 11.00412 | 0.2537754 | 0.18748158 | 3.0234096 | 20 | — | — |
| 197176 2003 $UE_{286}$ | 16.7 | $X$ | 105.66225 | 113.19607 | 203.88351 | 2.77173 | 0.1507152 | 0.18553783 | 3.0444889 | 20 | — | — |
| 197177 2003 $UJ_{287}$ | 15.3 | $X$ | 215.47003 | 5.67788 | 222.30827 | 8.27698 | 0.2368387 | 0.18378599 | 3.0638050 | 20 | 12 29.8 | 20.2 |
| 197178 2003 $UF_{294}$ | 15.0 | $X$ | 136.85232 | 330.09079 | 348.86291 | 10.13540 | 0.1019147 | 0.19263118 | 2.9692835 | 20 | — | — |
| 197179 2003 $UM_{296}$ | 16.2 | $X$ | 231.07190 | 142.78490 | 195.97909 | 3.38112 | 0.1032855 | 0.21016079 | 2.8017857 | 20 | 3 30.7 | 20.5 |
| 197180 2003 $UT_{296}$ | 15.2 | $X$ | 199.08806 | 99.69497 | 175.61025 | 1.73738 | 0.0866268 | 0.19462259 | 2.9489940 | 20 | — | — |
| 197181 2003 $UU_{296}$ | 16.4 | $X$ | 197.59326 | 211.47023 | 194.91356 | 4.46573 | 0.0740044 | 0.21398999 | 2.7682613 | 20 | 5 21.3 | 20.4 |
| 197182 2003 $UP_{303}$ | 15.3 | $X$ | 129.52517 | 26.78896 | 266.43896 | 8.57969 | 0.0578942 | 0.18420201 | 3.0591901 | 20 | — | — |
| 197183 2003 $UO_{309}$ | 15.2 | $X$ | 301.95874 | 197.58542 | 249.47887 | 8.75938 | 0.0602157 | 0.17757856 | 3.1347941 | 20 | 11 17.7 | 19.2 |
| 197184 2003 $UT_{309}$ | 15.3 | $X$ | 42.15366 | 60.39567 | 39.56560 | 12.64303 | 0.0393138 | 0.19757273 | 2.9195643 | 20 | 1 20.8 | 19.4 |
| 197185 2003 $UV_{309}$ | 15.8 | $X$ | 251.01449 | 197.54865 | 115.09002 | 6.35249 | 0.0740416 | 0.20913247 | 2.8109626 | 20 | 3 25.9 | 19.9 |
| 197186 2003 $UN_{310}$ | 15.1 | $X$ | 269.85141 | 128.28279 | 17.30591 | 17.37196 | 0.0666678 | 0.17999047 | 3.1067267 | 20 | 12 14.4 | 19.6 |
| 197187 2003 $UV_{314}$ | 15.8 | $X$ | 302.11056 | 262.16499 | 108.28519 | 1.71142 | 0.0837901 | 0.22277774 | 2.6949757 | 20 | 8 15.9 | 19.1 |
| 197188 2003 $UB_{315}$ | 15.1 | $X$ | 142.94192 | 238.48291 | 49.63885 | 11.56013 | 0.0637961 | 0.18194652 | 3.0844202 | 20 | — | — |
| 197189 Raymond | 15.5 | $X$ | 303.04905 | 267.43819 | 177.83347 | 9.79118 | 0.0978326 | 0.17918766 | 3.1159991 | 20 | 11 16.9 | 19.6 |
| 197190 2003 $UF_{318}$ | 16.2 | $X$ | 124.80108 | 302.57051 | 149.04775 | 4.98864 | 0.0297045 | 0.20988795 | 2.8042133 | 20 | 4 22.9 | 20.1 |
| 197191 2003 $VE$ | 17.1 | $X$ | 68.74632 | 235.79662 | 257.32067 | 16.05096 | 0.0765742 | 0.38235095 | 1.8800148 | 20 | 3 10.1 | 19.1 |
| 197192 2003 $VK$ | 15.3 | $X$ | 26.90431 | 329.34990 | 77.94206 | 10.69767 | 0.0936684 | 0.18311207 | 3.0713176 | 20 | — | — |
| 197193 2003 $VX$ | 15.2 | $X$ | 346.60424 | 118.70142 | 311.76396 | 21.51770 | 0.2585550 | 0.17823077 | 3.1271420 | 20 | — | — |
| 197194 2003 $VX_1$ | 15.3 | $X$ | 146.68707 | 121.91492 | 249.43763 | 6.64452 | 0.0456691 | 0.19767565 | 2.9185509 | 20 | 2 7.2 | 19.6 |
| 197195 2003 $VQ_5$ | 15.7 | $X$ | 105.26916 | 305.48505 | 39.69023 | 1.02030 | 0.1907145 | 0.18803164 | 3.0175103 | 20 | — | — |
| 197196 Jamestaylor | 15.2 | $X$ | 130.70463 | 299.77192 | 64.94397 | 10.15918 | 0.1495688 | 0.19280913 | 2.9674563 | 20 | 1 30.1 | 19.8 |
| 197197 2003 $VH_9$ | 15.2 | $X$ | 310.41607 | 65.64884 | 61.24562 | 12.30367 | 0.0642421 | 0.18058374 | 3.0999186 | 20 | — | — |
| 197198 2003 $VV_9$ | 15.0 | $X$ | 339.31603 | 152.36084 | 330.63014 | 7.87383 | 0.2065112 | 0.18349933 | 3.0669950 | 20 | — | — |
| 197199 2003 $VS_{11}$ | 15.2 | $X$ | 348.33287 | 37.94243 | 44.07659 | 11.05570 | 0.0546057 | 0.18197202 | 3.0841321 | 20 | — | — |
| 197200 2003 $WJ$ | 15.7 | $X$ | 44.74074 | 170.28477 | 213.68021 | 8.37572 | 0.1385081 | 0.18273965 | 3.0754891 | 20 | — | — |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 197201 2003 $WL$ | 15.5 | $X$ | 106.41209 | 266.84683 | 82.80435 | 5.51368 | 0.1202367 | 0.18763810 | 3.0217280 | 20 | — | — |
| 197202 2003 $WA_{1}$ | 15.7 | $X$ | 33.50067 | 303.86133 | 95.63100 | 2.34949 | 0.1391161 | 0.18278193 | 3.0750148 | 20 | — | — |
| 197203 2003 $WJ_{1}$ | 15.0 | $X$ | 52.79213 | 318.71910 | 55.23299 | 17.42005 | 0.0518882 | 0.18138210 | 3.0908156 | 20 | — | — |
| 197204 2003 $WY_{1}$ | 15.3 | $X$ | 66.53084 | 313.67718 | 97.00380 | 11.11798 | 0.0829534 | 0.18965690 | 3.0002466 | 20 | — | — |
| 197205 2003 $WJ_{3}$ | 15.5 | $X$ | 87.50818 | 218.24429 | 224.37743 | 10.41255 | 0.0723548 | 0.19723422 | 2.9229039 | 20 | 2 25.2 | 19.7 |
| 197206 2003 $WW_{3}$ | 14.9 | $X$ | 295.04511 | 289.76171 | 211.76299 | 10.06472 | 0.1722929 | 0.17844956 | 3.1245854 | 20 | — | — |
| 197207 2003 $WE_{4}$ | 15.3 | $X$ | 322.36701 | 267.51125 | 229.33481 | 8.60601 | 0.0897276 | 0.18376847 | 3.0639997 | 20 | — | — |
| 197208 2003 $WY_{7}$ | 14.8 | $X$ | 345.38244 | 168.09278 | 248.58190 | 20.85546 | 0.1602110 | 0.17539805 | 3.1607214 | 20 | 12 15.8 | 18.5 |
| 197209 2003 $WQ_{8}$ | 14.3 | $X$ | 293.84091 | 232.75797 | 262.71770 | 15.54966 | 0.1997474 | 0.17793576 | 3.1305974 | 20 | 12 23.1 | 17.8 |
| 197210 2003 $WM_{11}$ | 15.0 | $X$ | 16.93017 | 112.31656 | 293.55549 | 8.26013 | 0.1079045 | 0.18033277 | 3.1027940 | 20 | — | — |
| 197211 2003 $WN_{17}$ | 15.0 | $X$ | 19.06903 | 108.47507 | 318.53547 | 11.49029 | 0.0783272 | 0.18367449 | 3.0650448 | 20 | — | — |
| 197212 2003 $WT_{18}$ | 14.9 | $X$ | 311.18186 | 214.31066 | 282.04395 | 13.04000 | 0.0132464 | 0.18351929 | 3.0667726 | 20 | — | — |
| 197213 2003 $WL_{19}$ | 15.6 | $X$ | 72.37160 | 83.64285 | 285.30235 | 7.17281 | 0.1075124 | 0.18435095 | 3.0575423 | 20 | — | — |
| 197214 2003 $WT_{23}$ | 15.1 | $X$ | 315.05121 | 301.57286 | 211.15807 | 10.14662 | 0.1191539 | 0.18506277 | 3.0496969 | 20 | — | — |
| 197215 2003 $WY_{24}$ | 16.9 | $X$ | 118.97790 | 182.90754 | 266.46033 | 19.70735 | 0.0689830 | 0.38111120 | 1.8840897 | 20 | 3 22.1 | 19.4 |
| 197216 2003 $WR_{26}$ | 17.2 | $X$ | 68.22301 | 96.60975 | 356.22995 | 19.41372 | 0.1003270 | 0.36849050 | 1.9268675 | 20 | 1 25.9 | 19.0 |
| 197217 2003 $WB_{27}$ | 15.9 | $X$ | 318.69464 | 101.31324 | 4.41431 | 6.47807 | 0.1423459 | 0.17905749 | 3.1175090 | 20 | — | — |
| 197218 2003 $WL_{28}$ | 15.2 | $X$ | 248.48509 | 134.01613 | 34.70002 | 9.95609 | 0.0542462 | 0.17862174 | 3.1225771 | 20 | 12 18.1 | 19.6 |
| 197219 2003 $WH_{30}$ | 15.6 | $X$ | 8.93151 | 61.33209 | 36.06229 | 10.66479 | 0.0197502 | 0.18709678 | 3.0275536 | 20 | — | — |
| 197220 2003 $WY_{31}$ | 15.4 | $X$ | 142.56242 | 79.23801 | 245.89718 | 9.19062 | 0.1038123 | 0.19119588 | 2.9841252 | 20 | — | — |
| 197221 2003 $WR_{32}$ | 15.5 | $X$ | 292.52337 | 195.06662 | 273.65476 | 3.70655 | 0.1298710 | 0.17477825 | 3.1681893 | 20 | 11 23.8 | 19.5 |
| 197222 2003 $WF_{35}$ | 15.4 | $X$ | 93.78375 | 7.99649 | 331.41238 | 9.84011 | 0.0803455 | 0.18477202 | 3.0528953 | 20 | — | — |
| 197223 2003 $WS_{35}$ | 15.6 | $X$ | 18.01717 | 104.70806 | 350.32965 | 8.63830 | 0.0906224 | 0.18893620 | 3.0078714 | 20 | — | — |
| 197224 2003 $WX_{35}$ | 15.4 | $X$ | 19.25305 | 17.91121 | 27.70147 | 10.99872 | 0.0395413 | 0.18106107 | 3.0944680 | 20 | — | — |
| 197225 2003 $WQ_{39}$ | 14.9 | $X$ | 210.14868 | 260.81149 | 262.71834 | 9.45403 | 0.0461088 | 0.17233955 | 3.1980070 | 20 | 10 26.1 | 19.7 |
| 197226 2003 $WW_{39}$ | 15.0 | $X$ | 29.99193 | 64.80168 | 277.85600 | 6.60558 | 0.0428047 | 0.17348013 | 3.1839744 | 20 | 11 5.1 | 19.5 |
| 197227 2003 $WR_{40}$ | 15.4 | $X$ | 89.78784 | 114.42551 | 260.72699 | 9.29614 | 0.0785403 | 0.18675981 | 3.0311942 | 20 | — | — |
| 197228 2003 $WT_{40}$ | 15.3 | $X$ | 8.72602 | 351.08968 | 35.79197 | 4.92562 | 0.2426284 | 0.17728170 | 3.1382927 | 20 | 12 29.6 | 19.0 |
| 197229 2003 $WZ_{42}$ | 17.3 | $X$ | 203.30278 | 119.64678 | 218.56634 | 21.92755 | 0.0478199 | 0.37917247 | 1.8905065 | 20 | 2 2.2 | 20.0 |
| 197230 2003 $WG_{45}$ | 15.1 | $X$ | 177.82482 | 356.06204 | 263.85956 | 8.36285 | 0.0234654 | 0.18134250 | 3.0912656 | 20 | — | — |
| 197231 2003 $WO_{45}$ | 15.2 | $X$ | 11.41991 | 323.92250 | 124.81781 | 13.06929 | 0.2211412 | 0.18346318 | 3.0673978 | 20 | — | — |
| 197232 2003 $WM_{46}$ | 15.6 | $X$ | 169.56849 | 200.87369 | 84.46851 | 2.57415 | 0.1354944 | 0.18951553 | 3.0017384 | 20 | — | — |
| 197233 2003 $WD_{50}$ | 14.9 | $X$ | 124.08997 | 31.35007 | 253.99318 | 14.98729 | 0.0645138 | 0.18012103 | 3.1052252 | 20 | 12 19.5 | 19.5 |
| 197234 2003 $WF_{50}$ | 15.1 | $X$ | 308.35047 | 86.94795 | 19.16330 | 10.54953 | 0.0472268 | 0.17915885 | 3.1163330 | 20 | 12 20.8 | 19.4 |
| 197235 2003 $WU_{53}$ | 15.9 | $X$ | 48.51883 | 59.55277 | 352.81160 | 4.16147 | 0.0992483 | 0.18872908 | 3.0100717 | 20 | — | — |
| 197236 2003 $WA_{57}$ | 16.0 | $X$ | 92.56074 | 222.03444 | 214.86613 | 7.51378 | 0.0459893 | 0.19939127 | 2.9017854 | 20 | 2 21.9 | 20.0 |
| 197237 2003 $WQ_{57}$ | 15.5 | $X$ | 332.77807 | 202.21034 | 251.31464 | 7.78964 | 0.0728467 | 0.17965410 | 3.1106033 | 20 | — | — |
| 197238 2003 $WW_{58}$ | 15.0 | $X$ | 156.07942 | 235.29851 | 59.04418 | 9.12389 | 0.1561759 | 0.18677481 | 3.0310319 | 20 | — | — |
| 197239 2003 $WO_{59}$ | 15.2 | $X$ | 114.48154 | 204.91110 | 79.24695 | 5.94774 | 0.0358599 | 0.17647100 | 3.1478968 | 20 | 12 6.2 | 19.9 |
| 197240 2003 $WD_{60}$ | 15.6 | $X$ | 125.45622 | 276.49614 | 78.96448 | 1.38507 | 0.2025204 | 0.19277823 | 2.9677733 | 20 | 1 17.6 | 20.0 |
| 197241 2003 $WO_{60}$ | 15.6 | $X$ | 41.54581 | 169.51679 | 247.55555 | 6.18553 | 0.1875575 | 0.18526658 | 3.0474599 | 20 | — | — |
| 197242 2003 $WA_{63}$ | 15.8 | $X$ | 57.49314 | 91.21510 | 18.10096 | 2.12879 | 0.1007647 | 0.19476372 | 2.9475691 | 20 | 2 26.4 | 19.4 |
| 197243 2003 $WL_{63}$ | 15.7 | $X$ | 48.34307 | 165.05829 | 250.09143 | 8.37967 | 0.0455453 | 0.18586105 | 3.0409583 | 20 | — | — |
| 197244 2003 $WZ_{63}$ | 14.9 | $X$ | 66.37057 | 81.08125 | 240.08413 | 8.46197 | 0.0673492 | 0.17467570 | 3.1694292 | 20 | 11 29.0 | 19.3 |
| 197245 2003 $WJ_{65}$ | 16.1 | $X$ | 102.28746 | 201.07986 | 174.61045 | 0.99005 | 0.2056256 | 0.19125120 | 2.9835497 | 20 | 1 16.6 | 20.2 |
| 197246 2003 $WL_{65}$ | 15.3 | $X$ | 299.06458 | 260.20826 | 203.10455 | 2.03227 | 0.0722369 | 0.17517932 | 3.1633517 | 20 | 12 2.9 | 19.4 |
| 197247 2003 $WW_{66}$ | 15.8 | $X$ | 323.65777 | 216.87506 | 267.27906 | 0.52280 | 0.1812302 | 0.17952441 | 3.1121012 | 20 | — | — |
| 197248 2003 $WS_{67}$ | 15.4 | $X$ | 324.42305 | 177.16712 | 244.20337 | 9.85361 | 0.0614803 | 0.17310385 | 3.1885867 | 20 | 11 16.1 | 19.7 |
| 197249 2003 $WW_{68}$ | 15.4 | $X$ | 41.60490 | 269.92773 | 77.14832 | 4.34101 | 0.0350979 | 0.17378481 | 3.1802518 | 20 | 11 26.0 | 19.9 |
| 197250 2003 $WM_{70}$ | 15.8 | $X$ | 318.54911 | 328.92852 | 111.80156 | 2.31681 | 0.1515396 | 0.17694872 | 3.1422285 | 20 | 11 30.8 | 19.3 |
| 197251 2003 $WU_{70}$ | 14.8 | $X$ | 305.07736 | 206.41057 | 278.40050 | 20.11759 | 0.1196717 | 0.18049073 | 3.1009835 | 20 | — | — |
| 197252 2003 $WN_{71}$ | 15.4 | $X$ | 324.16272 | 140.73311 | 342.24826 | 13.00238 | 0.1208439 | 0.18192730 | 3.0846375 | 20 | — | — |
| 197253 2003 $WA_{72}$ | 15.1 | $X$ | 67.05288 | 1.32053 | 28.65103 | 9.70913 | 0.0534205 | 0.18492100 | 3.0512554 | 20 | — | — |
| 197254 2003 $WB_{72}$ | 15.3 | $X$ | 353.70195 | 127.74326 | 38.69696 | 12.05444 | 0.0760010 | 0.19313947 | 2.9640716 | 20 | 2 7.3 | 19.3 |
| 197255 2003 $WF_{72}$ | 15.1 | $X$ | 256.51129 | 170.90085 | 344.82987 | 5.00681 | 0.1684033 | 0.17361407 | 3.1823365 | 20 | 11 24.9 | 19.6 |
| 197256 2003 $WE_{74}$ | 14.4 | $X$ | 337.25933 | 117.25204 | 260.12717 | 17.36083 | 0.1135116 | 0.16899935 | 3.2400076 | 20 | 10 2.4 | 18.8 |
| 197257 2003 $WG_{74}$ | 15.5 | $X$ | 345.77635 | 183.40060 | 315.17378 | 3.15933 | 0.1038681 | 0.18658544 | 3.0330825 | 20 | — | — |
| 197258 2003 $WY_{74}$ | 16.7 | $X$ | 324.94558 | 114.80627 | 51.07366 | 21.66557 | 0.0828883 | 0.36511752 | 1.9387163 | 20 | — | — |
| 197259 2003 $WQ_{75}$ | 15.4 | $X$ | 39.06862 | 132.37086 | 289.28869 | 7.78523 | 0.0820755 | 0.18834549 | 3.0141573 | 20 | — | — |
| 197260 2003 $WZ_{75}$ | 15.7 | $X$ | 21.38688 | 136.96091 | 316.60228 | 7.99861 | 0.0981241 | 0.18894934 | 3.0077320 | 20 | — | — |
| 197261 2003 $WZ_{77}$ | 15.3 | $X$ | 319.58513 | 118.34573 | 281.48343 | 11.57414 | 0.1639460 | 0.17207092 | 3.2013345 | 20 | 9 30.9 | 19.3 |
| 197262 2003 $WG_{78}$ | 15.5 | $X$ | 322.93841 | 123.08190 | 326.32646 | 4.10118 | 0.1160486 | 0.17826626 | 3.1267269 | 20 | 12 20.1 | 19.2 |
| 197263 2003 $WU_{78}$ | 15.2 | $X$ | 118.76917 | 240.32921 | 31.27863 | 9.06174 | 0.0584194 | 0.17540455 | 3.1606432 | 20 | 11 25.7 | 20.0 |
| 197264 2003 $WS_{79}$ | 15.4 | $X$ | 297.46205 | 331.16069 | 265.62925 | 8.71082 | 0.0470131 | 0.19771627 | 2.9181511 | 20 | 2 14.3 | 19.6 |
| 197265 2003 $WB_{80}$ | 15.0 | $X$ | 345.34366 | 208.92697 | 258.87857 | 13.70039 | 0.0819198 | 0.18315690 | 3.0708164 | 20 | — | — |
| 197266 2003 $WM_{88}$ | 15.2 | $X$ | 285.40069 | 78.83991 | 89.46776 | 10.76386 | 0.0195000 | 0.18297407 | 3.0728617 | 20 | — | — |
| 197267 2003 $WL_{89}$ | 15.4 | $X$ | 43.67958 | 148.74498 | 231.44504 | 9.05340 | 0.0830056 | 0.18102453 | 3.0948844 | 20 | — | — |
| 197268 2003 $WT_{89}$ | 15.8 | $X$ | 128.71491 | 46.30127 | 278.41711 | 4.40770 | 0.1731333 | 0.18858042 | 3.0116534 | 20 | — | — |
| 197269 2003 $WJ_{93}$ | 14.4 | $X$ | 214.10184 | 294.17322 | 246.15917 | 21.90186 | 0.1417488 | 0.17259731 | 3.1948223 | 20 | 11 11.2 | 19.4 |
| 197270 2003 $WA_{95}$ | 15.8 | $X$ | 92.86872 | 135.23519 | 257.99699 | 1.88652 | 0.1292608 | 0.19142725 | 2.9817201 | 20 | 1 15.0 | 19.7 |
| 197271 2003 $WJ_{95}$ | 15.4 | $X$ | 345.21825 | 12.74747 | 90.42842 | 3.43280 | 0.1087126 | 0.18195192 | 3.0843593 | 20 | — | — |
| 197272 2003 $WB_{96}$ | 15.5 | $X$ | 68.18897 | 155.65320 | 216.13933 | 2.42373 | 0.1540565 | 0.18550957 | 3.0447982 | 20 | — | — |
| 197273 2003 $WQ_{96}$ | 16.3 | $X$ | 44.61898 | 75.64116 | 2.19704 | 1.88331 | 0.1909979 | 0.18983768 | 2.9983416 | 20 | 1 3.7 | 19.3 |
| 197274 2003 $WR_{96}$ | 15.9 | $X$ | 114.69926 | 308.52687 | 84.36112 | 3.34590 | 0.0818080 | 0.19568363 | 2.9383243 | 20 | 2 4.5 | 20.0 |
| 197275 2003 $WQ_{97}$ | 15.6 | $X$ | 63.39433 | 179.41207 | 192.63106 | 7.58914 | 0.0475764 | 0.18326958 | 3.0695576 | 20 | — | — |
| 197276 2003 $WS_{98}$ | 14.7 | $X$ | 323.04632 | 63.43335 | 318.55081 | 17.67278 | 0.1288379 | 0.16966826 | 3.2314862 | 20 | 9 13.9 | 18.9 |
| 197277 2003 $WJ_{100}$ | 14.9 | $X$ | 132.51482 | 97.68893 | 259.14308 | 15.00229 | 0.1248054 | 0.19122692 | 2.9838022 | 20 | 1 14.6 | 19.4 |
| 197278 2003 $WB_{101}$ | 15.4 | $X$ | 273.44818 | 297.28433 | 90.53933 | 13.91625 | 0.1856577 | 0.22255596 | 2.6967658 | 20 | 7 11.4 | 18.9 |
| 197279 2003 $WD_{102}$ | 16.1 | $X$ | 150.79386 | 314.69023 | 60.36925 | 3.25743 | 0.2200677 | 0.19940688 | 2.9016340 | 20 | 3 5.5 | 20.9 |
| 197280 2003 $WL_{102}$ | 15.1 | $X$ | 181.37216 | 35.19458 | 237.39884 | 10.95112 | 0.0473067 | 0.18611016 | 3.0382441 | 20 | — | — |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 197281 2003 $WG_{103}$ | 15.3 | $X$ | 43.65185 | 80.60478 | 74.65699 | 4.73266 | 0.1260468 | 0.19833723 | 2.9120571 | 20 | 4 9.1 | 18.8 |
| 197282 2003 $WP_{104}$ | 14.0 | $X$ | 174.48966 | 332.47802 | 246.79842 | 24.86788 | 0.0463704 | 0.17266228 | 3.1940207 | 20 | 11 24.4 | 18.8 |
| 197283 2003 $WR_{106}$ | 15.8 | $X$ | 16.26098 | 54.07675 | 48.63900 | 3.99928 | 0.1715548 | 0.18594234 | 3.0400719 | 20 | — | — |
| 197284 2003 $WV_{107}$ | 15.7 | $X$ | 63.25564 | 348.03915 | 51.56374 | 1.59132 | 0.0646616 | 0.18760332 | 3.0221015 | 20 | — | — |
| 197285 2003 $WV_{109}$ | 15.6 | $X$ | 184.16968 | 355.07062 | 348.03378 | 2.45595 | 0.1773797 | 0.20078032 | 2.8883863 | 20 | 2 21.6 | 20.2 |
| 197286 2003 $WD_{110}$ | 15.1 | $X$ | 221.60070 | 270.90863 | 292.93327 | 7.15003 | 0.0612654 | 0.17958936 | 3.1113508 | 20 | 12 28.4 | 19.4 |
| 197287 2003 $WR_{113}$ | 15.9 | $X$ | 41.06581 | 81.86802 | 278.83693 | 3.39046 | 0.1342565 | 0.17876567 | 3.1209008 | 20 | 12 26.2 | 20.3 |
| 197288 2003 $WW_{115}$ | 15.9 | $X$ | 279.75946 | 105.13318 | 288.66915 | 5.08772 | 0.1499228 | 0.22108456 | 2.7087179 | 20 | 8 2.3 | 19.2 |
| 197289 2003 $WK_{119}$ | 15.2 | $X$ | 100.85222 | 68.22532 | 295.52756 | 4.72506 | 0.2492422 | 0.18884353 | 3.0088554 | 20 | 1 7.3 | 19.3 |
| 197290 2003 $WP_{119}$ | 15.3 | $X$ | 97.70732 | 322.65122 | 59.45028 | 13.01423 | 0.1373492 | 0.18888920 | 3.0083704 | 20 | 1 10.4 | 19.5 |
| 197291 2003 $WZ_{119}$ | 15.0 | $X$ | 354.45867 | 37.09656 | 67.77518 | 18.80624 | 0.1052481 | 0.18226776 | 3.0807951 | 20 | — | — |
| 197292 2003 $WC_{120}$ | 15.5 | $X$ | 337.90510 | 69.46371 | 61.35986 | 11.74251 | 0.3056403 | 0.18046991 | 3.1012220 | 20 | — | — |
| 197293 2003 $WT_{121}$ | 15.2 | $X$ | 142.15906 | 303.17200 | 57.98417 | 10.30405 | 0.0916400 | 0.19095332 | 2.9866516 | 20 | 2 1.3 | 19.8 |
| 197294 2003 $WX_{122}$ | 15.3 | $X$ | 334.04159 | 22.51103 | 9.74369 | 4.84043 | 0.1652485 | 0.17082905 | 3.2168309 | 20 | 10 23.1 | 18.9 |
| 197295 2003 $WK_{123}$ | 15.3 | $X$ | 111.63544 | 334.82183 | 53.48213 | 11.01560 | 0.1048761 | 0.19169387 | 2.9789547 | 20 | 2 1.6 | 19.7 |
| 197296 2003 $WM_{125}$ | 14.8 | $X$ | 17.29525 | 346.55250 | 74.73586 | 24.96712 | 0.1640861 | 0.17894524 | 3.1188127 | 20 | — | — |
| 197297 2003 $WS_{126}$ | 14.6 | $X$ | 356.87082 | 0.88074 | 72.86981 | 18.31422 | 0.1192075 | 0.17737812 | 3.1371552 | 20 | — | — |
| 197298 2003 $WC_{128}$ | 14.2 | $X$ | 17.47211 | 313.40528 | 108.70854 | 23.47216 | 0.2246519 | 0.17622439 | 3.1508330 | 20 | — | — |
| 197299 2003 $WH_{128}$ | 15.3 | $X$ | 126.11222 | 67.00947 | 257.20830 | 7.86639 | 0.1069005 | 0.18878711 | 3.0094548 | 20 | — | — |
| 197300 2003 $WN_{128}$ | 15.4 | $X$ | 285.03696 | 324.50961 | 245.74635 | 9.61105 | 0.0132259 | 0.19343847 | 2.9610164 | 20 | 1 5.6 | 19.6 |
| 197301 2003 $WK_{129}$ | 15.5 | $X$ | 176.55262 | 81.59117 | 200.05474 | 3.08871 | 0.0535260 | 0.18693388 | 3.0293122 | 20 | — | — |
| 197302 2003 $WY_{129}$ | 15.9 | $X$ | 44.32967 | 80.91440 | 341.57361 | 3.12898 | 0.1008383 | 0.18748645 | 3.0233571 | 20 | — | — |
| 197303 2003 $WS_{131}$ | 15.1 | $X$ | 251.18163 | 261.27748 | 265.63587 | 6.67406 | 0.1373681 | 0.17487382 | 3.1670349 | 20 | 12 7.6 | 19.3 |
| 197304 2003 $WR_{132}$ | 15.5 | $X$ | 340.21186 | 58.32553 | 84.92537 | 3.04808 | 0.1869921 | 0.18584553 | 3.0411276 | 20 | — | — |
| 197305 2003 $WJ_{133}$ | 15.5 | $X$ | 22.26516 | 230.89466 | 242.90607 | 9.29580 | 0.0664303 | 0.19005511 | 2.9960543 | 20 | 1 7.9 | 19.4 |
| 197306 2003 $WD_{138}$ | 14.6 | $X$ | 334.85820 | 27.49761 | 69.75188 | 16.22156 | 0.1775150 | 0.17778691 | 3.1323446 | 20 | — | — |
| 197307 2003 $WW_{139}$ | 14.8 | $X$ | 31.51303 | 335.08619 | 69.39924 | 10.83484 | 0.2619337 | 0.18197631 | 3.0840837 | 20 | — | — |
| 197308 2003 $WC_{140}$ | 14.7 | $X$ | 327.77671 | 15.00955 | 83.99910 | 24.49697 | 0.1760896 | 0.17586095 | 3.1551725 | 20 | — | — |
| 197309 2003 $WS_{140}$ | 15.3 | $X$ | 38.24012 | 206.08690 | 271.85283 | 3.49959 | 0.2193609 | 0.18996861 | 2.9969638 | 20 | 2 14.9 | 18.3 |
| 197310 2003 $WG_{141}$ | 16.7 | $X$ | 124.53836 | 324.47644 | 74.15773 | 23.44001 | 0.1111381 | 0.37355548 | 1.9094105 | 20 | 2 7.8 | 19.1 |
| 197311 2003 $WJ_{141}$ | 14.9 | $X$ | 66.98050 | 170.65955 | 274.42661 | 10.70741 | 0.1345046 | 0.19043052 | 2.9921155 | 20 | 2 9.7 | 18.8 |
| 197312 2003 $WB_{142}$ | 14.3 | $X$ | 339.84542 | 296.00003 | 95.74315 | 18.34778 | 0.2617256 | 0.17014393 | 3.2254607 | 20 | 11 13.7 | 17.6 |
| 197313 2003 $WM_{143}$ | 15.0 | $X$ | 307.25493 | 301.22495 | 104.60123 | 12.46039 | 0.1151113 | 0.16988798 | 3.2286994 | 20 | 10 5.1 | 19.3 |
| 197314 2003 $WQ_{143}$ | 15.1 | $X$ | 298.45939 | 117.80472 | 326.55908 | 8.03825 | 0.0661087 | 0.17444648 | 3.1722050 | 20 | 11 5.6 | 19.5 |
| 197315 2003 $WE_{144}$ | 15.5 | $X$ | 86.86423 | 261.52264 | 79.81658 | 2.20001 | 0.0291930 | 0.18206043 | 3.0831336 | 20 | — | — |
| 197316 2003 $WN_{146}$ | 14.9 | $X$ | 265.18005 | 303.35685 | 163.74460 | 13.15515 | 0.0801618 | 0.17146366 | 3.2088887 | 20 | 10 24.4 | 19.4 |
| 197317 2003 $WW_{146}$ | 15.3 | $X$ | 6.80306 | 241.23319 | 176.95208 | 16.46107 | 0.2340730 | 0.18114293 | 3.0935356 | 20 | — | — |
| 197318 2003 $WZ_{146}$ | 15.0 | $X$ | 45.07580 | 156.44152 | 258.61452 | 12.26677 | 0.0993921 | 0.18396103 | 3.0618612 | 20 | — | — |
| 197319 2003 $WN_{147}$ | 15.5 | $X$ | 45.84030 | 327.88493 | 92.54711 | 11.65491 | 0.0698662 | 0.18603841 | 3.0390252 | 20 | — | — |
| 197320 2003 $WP_{147}$ | 15.2 | $X$ | 45.35185 | 176.42772 | 198.76192 | 9.30239 | 0.1424745 | 0.18049906 | 3.1008881 | 20 | — | — |
| 197321 2003 $WT_{147}$ | 15.0 | $X$ | 291.86385 | 272.77142 | 233.23897 | 11.77497 | 0.1401287 | 0.17882789 | 3.1201768 | 20 | — | — |
| 197322 2003 $WZ_{148}$ | 15.9 | $X$ | 15.82176 | 21.64874 | 42.39301 | 10.37070 | 0.1109943 | 0.18257400 | 3.0773491 | 20 | — | — |
| 197323 2003 $WW_{149}$ | 15.5 | $X$ | 327.32173 | 219.79639 | 226.24291 | 15.47394 | 0.1071621 | 0.17719989 | 3.1392586 | 20 | 12 21.1 | 19.5 |
| 197324 2003 $WX_{149}$ | 15.3 | $X$ | 348.30068 | 257.38606 | 188.29477 | 17.40313 | 0.1842678 | 0.18001026 | 3.1064990 | 20 | — | — |
| 197325 2003 $WF_{151}$ | 14.6 | $X$ | 334.84596 | 294.77231 | 141.90208 | 27.13379 | 0.2411795 | 0.17187923 | 3.2037144 | 20 | 12 29.4 | 18.3 |
| 197326 2003 $WP_{152}$ | 15.5 | $X$ | 234.95437 | 329.92835 | 347.80656 | 5.97879 | 0.0602927 | 0.20359401 | 2.8617128 | 20 | 3 12.6 | 19.5 |
| 197327 2003 $WF_{153}$ | 15.1 | $X$ | 46.06583 | 287.40418 | 115.95351 | 16.37780 | 0.1162149 | 0.18527331 | 3.0473860 | 20 | — | — |
| 197328 2003 $WK_{157}$ | 15.1 | $X$ | 23.48027 | 264.16459 | 154.82701 | 16.03782 | 0.0803857 | 0.18248669 | 3.0783305 | 20 | — | — |
| 197329 2003 $WL_{158}$ | 16.3 | $X$ | 104.79104 | 35.03692 | 350.44063 | 1.45823 | 0.1150461 | 0.19467299 | 2.9484849 | 20 | 1 18.7 | 20.3 |
| 197330 2003 $WE_{167}$ | 16.2 | $X$ | 105.56013 | 207.69391 | 244.24456 | 1.11643 | 0.0298320 | 0.20424203 | 2.8556565 | 20 | 3 27.9 | 20.1 |
| 197331 2003 $WN_{168}$ | 15.5 | $X$ | 114.31813 | 236.73752 | 122.77546 | 10.68094 | 0.0805980 | 0.19036503 | 2.9928016 | 20 | — | — |
| 197332 2003 $WM_{169}$ | 16.9 | $X$ | 121.15470 | 358.16666 | 73.94832 | 22.58458 | 0.0975371 | 0.37518727 | 1.9038701 | 20 | 4 2.6 | 19.6 |
| 197333 2003 $WD_{170}$ | 15.1 | $X$ | 28.20892 | 256.06795 | 137.82107 | 10.26350 | 0.0787286 | 0.18023018 | 3.1039713 | 20 | — | — |
| 197334 2003 $WH_{170}$ | 15.1 | $X$ | 333.55201 | 282.02463 | 186.98465 | 17.42237 | 0.1600556 | 0.18037615 | 3.1022966 | 20 | — | — |
| 197335 2003 $WT_{173}$ | 16.0 | $X$ | 111.50584 | 288.72523 | 72.24041 | 4.06027 | 0.1021515 | 0.18975605 | 2.9992014 | 20 | — | — |
| 197336 2003 $WB_{176}$ | 15.8 | $X$ | 141.65715 | 245.56083 | 24.00721 | 3.86086 | 0.1118037 | 0.17769323 | 3.1334454 | 20 | 12 19.3 | 20.7 |
| 197337 2003 $WE_{176}$ | 16.3 | $X$ | 174.60118 | 308.42209 | 37.05778 | 2.78524 | 0.1261992 | 0.19770897 | 2.9182229 | 20 | 2 15.3 | 20.9 |
| 197338 2003 $WR_{176}$ | 16.1 | $X$ | 97.99952 | 250.25472 | 141.08520 | 3.56502 | 0.1212123 | 0.19155844 | 2.9803586 | 20 | 1 18.1 | 20.1 |
| 197339 2003 $WW_{176}$ | 15.6 | $X$ | 337.33123 | 217.30909 | 230.60154 | 5.62638 | 0.0164094 | 0.17895963 | 3.1186454 | 20 | — | — |
| 197340 2003 $WG_{178}$ | 15.9 | $X$ | 208.91798 | 137.71981 | 183.63412 | 1.64048 | 0.0675520 | 0.20295164 | 2.8677481 | 20 | 2 17.4 | 20.2 |
| 197341 2003 $WU_{181}$ | 14.9 | $X$ | 335.79207 | 123.38040 | 278.57328 | 9.94049 | 0.1312914 | 0.17108546 | 3.2136160 | 20 | 11 6.1 | 19.0 |
| 197342 2003 $WG_{192}$ | 14.9 | $X$ | 283.80875 | 148.76560 | 8.98318 | 15.25055 | 0.1259992 | 0.17972209 | 3.1098188 | 20 | — | — |
| 197343 2003 $XH_{1}$ | 15.1 | $X$ | 34.17861 | 65.03564 | 16.93995 | 9.91566 | 0.0806901 | 0.18786022 | 3.0193457 | 20 | — | — |
| 197344 2003 $XD_{2}$ | 14.9 | $X$ | 326.43459 | 27.48637 | 96.80078 | 10.34878 | 0.1799096 | 0.18093578 | 3.0958963 | 20 | — | — |
| 197345 2003 $XK_{4}$ | 15.5 | $X$ | 26.76302 | 354.26419 | 108.93485 | 8.27681 | 0.1587398 | 0.18785405 | 3.0194117 | 20 | 1 2.6 | 18.6 |
| 197346 2003 $XF_{6}$ | 15.5 | $X$ | 13.04813 | 129.95746 | 307.90127 | 9.48535 | 0.1993728 | 0.18184591 | 3.0855578 | 20 | — | — |
| 197347 2003 $XN_{7}$ | 15.3 | $X$ | 89.23603 | 338.12903 | 92.93608 | 12.82656 | 0.0952338 | 0.19361465 | 2.9592200 | 20 | 2 25.8 | 19.5 |
| 197348 2003 $XV_{7}$ | 15.5 | $X$ | 22.14482 | 125.17864 | 21.36843 | 7.60642 | 0.2892302 | 0.18970251 | 2.9997656 | 20 | 2 26.4 | 17.9 |
| 197349 2003 $XB_{8}$ | 14.9 | $X$ | 309.84482 | 162.75159 | 313.81068 | 16.81690 | 0.1870944 | 0.17742449 | 3.1366087 | 20 | — | — |
| 197350 2003 $XR_{8}$ | 14.0 | $X$ | 80.99936 | 34.35736 | 289.21503 | 23.04154 | 0.2792643 | 0.18030310 | 3.1031344 | 20 | — | — |
| 197351 2003 $XT_{8}$ | 14.8 | $X$ | 28.29165 | 1.59802 | 64.15546 | 16.33419 | 0.2298180 | 0.18311559 | 3.0712783 | 20 | — | — |
| 197352 2003 $XU_{8}$ | 15.4 | $X$ | 16.14298 | 77.38631 | 352.29422 | 15.43058 | 0.2063127 | 0.18223190 | 3.0811993 | 20 | — | — |
| 197353 2003 $XO_{9}$ | 14.9 | $X$ | 348.19775 | 123.49076 | 323.89627 | 13.18058 | 0.1124379 | 0.17879861 | 3.1205175 | 20 | — | — |
| 197354 2003 $XM_{10}$ | 14.2 | $X$ | 71.01669 | 344.83994 | 55.93644 | 29.91882 | 0.2751878 | 0.18190141 | 3.0849302 | 20 | 1 19.3 | 18.4 |
| 197355 2003 $XR_{11}$ | 15.0 | $X$ | 64.03623 | 196.13707 | 164.39356 | 19.99452 | 0.2319415 | 0.18297142 | 3.0728914 | 20 | — | — |
| 197356 2003 $XS_{11}$ | 14.9 | $X$ | 107.46636 | 286.48953 | 88.90125 | 13.93091 | 0.0839533 | 0.18876625 | 3.0096765 | 20 | 1 6.0 | 19.0 |
| 197357 2003 $XH_{12}$ | 15.6 | $X$ | 37.62318 | 270.38078 | 146.32298 | 3.40756 | 0.2028051 | 0.18429028 | 3.0582132 | 20 | — | — |
| 197358 2003 $XR_{13}$ | 15.0 | $X$ | 69.09355 | 290.96808 | 94.05360 | 11.38792 | 0.1381137 | 0.18512914 | 3.0489679 | 20 | — | — |
| 197359 2003 $XF_{15}$ | 16.9 | $X$ | 20.87720 | 237.76331 | 269.17496 | 17.15899 | 0.0785922 | 0.37239580 | 1.9133725 | 20 | 1 8.7 | 18.3 |
| 197360 2003 $XM_{18}$ | 15.2 | $X$ | 111.07314 | 324.79392 | 32.46973 | 10.61767 | 0.1075511 | 0.18755572 | 3.0226127 | 20 | — | — |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 197361 2003 $XN_{18}$ | 15.0 | $X$ | 352.85909 | 172.23807 | 306.38975 | 10.30665 | 0.0652432 | 0.18511676 | 3.0491039 | 20 | — | — |
| 197362 2003 $XR_{19}$ | 15.8 | $X$ | 31.77620 | 142.36374 | 301.97044 | 3.88679 | 0.1694283 | 0.18616658 | 3.0376302 | 20 | — | — |
| 197363 2003 $XH_{20}$ | 15.5 | $X$ | 345.18419 | 74.26470 | 43.60383 | 4.72666 | 0.1186570 | 0.17967053 | 3.1104137 | 20 | — | — |
| 197364 2003 $XC_{21}$ | 15.4 | $X$ | 12.78674 | 52.63726 | 23.83600 | 5.00845 | 0.1293579 | 0.17911686 | 3.1168202 | 20 | — | — |
| 197365 2003 $XF_{21}$ | 14.8 | $X$ | 205.29484 | 45.63735 | 94.73733 | 8.66137 | 0.0481446 | 0.16009096 | 3.3591147 | 20 | 9 27.8 | 19.9 |
| 197366 2003 $XQ_{21}$ | 15.7 | $X$ | 20.47357 | 70.35023 | 57.37276 | 5.13252 | 0.1545367 | 0.18639110 | 3.0351903 | 20 | 1 25.2 | 19.1 |
| 197367 2003 $XF_{22}$ | 14.9 | $X$ | 283.29640 | 117.03997 | 34.19834 | 15.23614 | 0.1772527 | 0.17295318 | 3.1904383 | 20 | 12 26.3 | 19.1 |
| 197368 2003 $XV_{24}$ | 16.2 | $X$ | 64.90177 | 70.77777 | 332.07744 | 4.40199 | 0.1190931 | 0.18809103 | 3.0168751 | 20 | — | — |
| 197369 2003 $XW_{25}$ | 14.5 | $X$ | 55.25768 | 271.59549 | 97.58582 | 10.46978 | 0.1178821 | 0.18039035 | 3.1021338 | 20 | — | — |
| 197370 2003 $XQ_{31}$ | 15.7 | $X$ | 146.92787 | 210.12727 | 101.82906 | 2.63074 | 0.1421859 | 0.18728002 | 3.0255784 | 20 | — | — |
| 197371 2003 $XR_{34}$ | 15.7 | $X$ | 42.82547 | 64.95419 | 333.35312 | 8.00865 | 0.1855589 | 0.18076337 | 3.0978646 | 20 | — | — |
| 197372 2003 $XA_{35}$ | 15.4 | $X$ | 8.29000 | 56.06987 | 297.03245 | 14.21410 | 0.1331334 | 0.23226141 | 2.6211066 | 20 | 11 11.0 | 18.8 |
| 197373 2003 $XD_{36}$ | 15.3 | $X$ | 104.15762 | 350.68706 | 43.67701 | 11.16897 | 0.1120357 | 0.19117351 | 2.9843579 | 20 | 2 1.3 | 19.6 |
| 197374 2003 $XQ_{36}$ | 15.2 | $X$ | 28.33356 | 338.56820 | 43.37099 | 11.55919 | 0.0917958 | 0.17672516 | 3.1448779 | 20 | 12 29.4 | 19.6 |
| 197375 2003 $XS_{37}$ | 15.7 | $X$ | 296.93859 | 51.53247 | 299.59295 | 8.26253 | 0.2049175 | 0.22006923 | 2.7170429 | 20 | 6 21.9 | 18.9 |
| 197376 2003 $XB_{39}$ | 15.3 | $X$ | 59.31748 | 3.66751 | 64.10178 | 6.99218 | 0.1465262 | 0.18605989 | 3.0387913 | 20 | 1 13.9 | 18.9 |
| 197377 2003 $XS_{39}$ | 14.7 | $X$ | 13.84980 | 16.51702 | 49.39162 | 18.27057 | 0.2626563 | 0.18060690 | 3.0996536 | 20 | — | — |
| 197378 2003 $XD_{40}$ | 15.7 | $X$ | 310.30395 | 236.79142 | 238.64681 | 8.91547 | 0.0509518 | 0.17827199 | 3.1266599 | 20 | — | — |
| 197379 2003 $XD_{42}$ | 15.6 | $X$ | 21.07687 | 51.16719 | 10.53028 | 5.33164 | 0.1409634 | 0.17858914 | 3.1229571 | 20 | — | — |
| 197380 2003 $YN$ | 14.7 | $X$ | 35.86748 | 291.93922 | 116.29098 | 17.46269 | 0.2399996 | 0.17840950 | 3.1250531 | 20 | — | — |
| 197381 2003 $YZ$ | 17.0 | $X$ | 186.79554 | 265.26637 | 80.02712 | 21.88035 | 0.0673641 | 0.37438433 | 1.9065913 | 20 | 2 6.9 | 19.6 |
| 197382 2003 $YZ_2$ | 14.9 | $X$ | 199.42701 | 333.88587 | 109.61285 | 14.89967 | 0.3687375 | 0.21390594 | 2.7689864 | 20 | 6 28.0 | 20.3 |
| 197383 2003 $YC_3$ | 15.0 | $X$ | 40.72239 | 25.55750 | 16.56419 | 17.31205 | 0.2070041 | 0.18016163 | 3.1047587 | 20 | — | — |
| 197384 2003 $YE_5$ | 16.0 | $X$ | 359.53854 | 232.32606 | 187.70978 | 5.88719 | 0.1543725 | 0.17855174 | 3.1233932 | 20 | — | — |
| 197385 2003 $YM_5$ | 16.0 | $X$ | 324.42010 | 266.97257 | 188.52837 | 7.43666 | 0.1768375 | 0.17669818 | 3.1451980 | 20 | 12 29.5 | 19.5 |
| 197386 2003 $YA_{10}$ | 15.6 | $X$ | 12.58304 | 100.03171 | 307.09233 | 10.40037 | 0.1977067 | 0.17923621 | 3.1154363 | 20 | — | — |
| 197387 2003 $YD_{11}$ | 15.7 | $X$ | 13.96791 | 31.77799 | 26.19646 | 6.68013 | 0.2769996 | 0.17997464 | 3.1069088 | 20 | — | — |
| 197388 2003 $YN_{11}$ | 15.4 | $X$ | 343.97709 | 130.71887 | 315.43833 | 12.39208 | 0.0796762 | 0.17642798 | 3.1484085 | 20 | — | — |
| 197389 2003 $YD_{12}$ | 14.5 | $X$ | 309.56676 | 219.95596 | 276.32475 | 22.38146 | 0.1017209 | 0.17950782 | 3.1122929 | 20 | — | — |
| 197390 2003 $YC_{13}$ | 15.0 | $X$ | 2.13127 | 100.24356 | 308.73808 | 8.84291 | 0.2347598 | 0.17508081 | 3.1645382 | 20 | — | — |
| 197391 2003 $YY_{15}$ | 14.9 | $X$ | 359.14847 | 32.88246 | 62.20221 | 7.98991 | 0.1523810 | 0.17747049 | 3.1360667 | 20 | — | — |
| 197392 2003 $YC_{23}$ | 15.5 | $X$ | 190.29420 | 290.94982 | 114.68369 | 6.36012 | 0.2833167 | 0.20611191 | 2.8383590 | 20 | 5 11.5 | 20.7 |
| 197393 2003 $YO_{23}$ | 15.5 | $X$ | 335.86234 | 122.68587 | 26.67884 | 8.44604 | 0.2450448 | 0.18314844 | 3.0709110 | 20 | — | — |
| 197394 2003 $YQ_{23}$ | 15.3 | $X$ | 1.18348 | 66.84017 | 14.65966 | 8.94936 | 0.1146846 | 0.18054078 | 3.1004103 | 20 | — | — |
| 197395 2003 $YC_{25}$ | 15.0 | $X$ | 63.78674 | 313.96822 | 84.33860 | 11.69539 | 0.1359339 | 0.18414734 | 3.0597956 | 20 | — | — |
| 197396 2003 $YK_{27}$ | 15.4 | $X$ | 20.31729 | 7.24822 | 93.63234 | 2.31483 | 0.1486349 | 0.18518340 | 3.0483724 | 20 | — | — |
| 197397 2003 $YU_{28}$ | 14.8 | $X$ | 39.48785 | 265.94495 | 81.37928 | 14.82907 | 0.2212311 | 0.17557049 | 3.1586514 | 20 | 12 19.3 | 19.1 |
| 197398 2003 $YU_{29}$ | 14.8 | $X$ | 68.73761 | 326.88773 | 76.89165 | 8.76588 | 0.2881388 | 0.18381660 | 3.0634648 | 20 | 1 19.5 | 18.3 |
| 197399 2003 $YJ_{30}$ | 15.8 | $X$ | 21.79969 | 10.80961 | 44.04315 | 3.20037 | 0.2084127 | 0.18116545 | 3.0932792 | 20 | — | — |
| 197400 2003 $YX_{30}$ | 15.1 | $X$ | 40.37001 | 292.33274 | 75.73499 | 11.77465 | 0.0405758 | 0.17473876 | 3.1686666 | 20 | 12 19.9 | 19.5 |
| 197401 2003 $YQ_{32}$ | 15.2 | $X$ | 34.40560 | 100.80325 | 274.24480 | 14.22278 | 0.3146159 | 0.17768697 | 3.1335190 | 20 | — | — |
| 197402 2003 $YN_{34}$ | 15.6 | $X$ | 299.34153 | 70.64573 | 73.17746 | 1.92654 | 0.1410752 | 0.17750842 | 3.1356199 | 20 | — | — |
| 197403 2003 $YR_{34}$ | 16.2 | $X$ | 53.47841 | 73.88756 | 338.11047 | 2.03771 | 0.2133934 | 0.18570773 | 3.0426318 | 20 | — | — |
| 197404 2003 $YO_{35}$ | 15.1 | $X$ | 349.52252 | 297.20922 | 86.63546 | 6.41276 | 0.1398448 | 0.17094189 | 3.2154151 | 20 | 11 10.7 | 18.9 |
| 197405 2003 $YU_{39}$ | 15.2 | $X$ | 343.67132 | 127.57404 | 319.11942 | 3.57572 | 0.1641410 | 0.17479582 | 3.1679770 | 20 | — | — |
| 197406 2003 $YO_{42}$ | 15.4 | $X$ | 252.54689 | 267.09465 | 226.17230 | 1.37297 | 0.2379226 | 0.16482593 | 3.2944710 | 20 | 10 14.4 | 20.3 |
| 197407 2003 $YD_{46}$ | 14.8 | $X$ | 169.48020 | 201.47092 | 39.96652 | 16.22996 | 0.0337164 | 0.17529890 | 3.1619130 | 20 | 12 13.9 | 19.6 |
| 197408 2003 $YR_{46}$ | 15.8 | $X$ | 348.20368 | 17.30610 | 13.59120 | 2.57484 | 0.2047977 | 0.17326155 | 3.1866516 | 20 | 11 20.5 | 19.1 |
| 197409 2003 $YT_{47}$ | 15.2 | $X$ | 300.67500 | 229.76277 | 270.01622 | 3.85544 | 0.1098108 | 0.17809898 | 3.1286845 | 20 | — | — |
| 197410 2003 $YW_{47}$ | 15.0 | $X$ | 344.90860 | 336.20854 | 79.99894 | 10.27625 | 0.0845969 | 0.17415702 | 3.1757189 | 20 | 12 10.1 | 18.9 |
| 197411 2003 $YU_{49}$ | 15.7 | $X$ | 353.93446 | 104.19473 | 33.87196 | 1.28667 | 0.1673748 | 0.18516930 | 3.0485271 | 20 | — | — |
| 197412 2003 $YB_{50}$ | 15.2 | $X$ | 29.77113 | 112.35305 | 266.65000 | 14.85258 | 0.2083118 | 0.17758258 | 3.1347469 | 20 | — | — |
| 197413 2003 $YD_{50}$ | 15.6 | $X$ | 355.40801 | 6.45855 | 66.93002 | 2.83876 | 0.1152282 | 0.17773731 | 3.1329273 | 20 | — | — |
| 197414 2003 $YK_{50}$ | 15.5 | $X$ | 331.79679 | 42.73679 | 76.86337 | 2.54807 | 0.1535728 | 0.17921433 | 3.1156899 | 20 | — | — |
| 197415 2003 $YK_{51}$ | 15.2 | $X$ | 283.37551 | 46.50852 | 94.22381 | 7.53499 | 0.1439415 | 0.17232251 | 3.1982178 | 20 | 12 17.9 | 19.0 |
| 197416 2003 $YY_{51}$ | 14.9 | $X$ | 347.62619 | 127.28645 | 296.52993 | 3.94985 | 0.1248947 | 0.17324196 | 3.1868918 | 20 | 12 26.1 | 18.9 |
| 197417 2003 $YY_{54}$ | 14.8 | $X$ | 31.54714 | 300.97833 | 81.75784 | 10.88398 | 0.0762907 | 0.17832141 | 3.1260821 | 20 | — | — |
| 197418 2003 $YA_{57}$ | 15.4 | $X$ | 56.92508 | 288.63789 | 143.09597 | 3.38118 | 0.1956262 | 0.18856029 | 3.0118677 | 20 | 1 18.9 | 18.7 |
| 197419 2003 $YB_{60}$ | 15.4 | $X$ | 11.85380 | 98.61049 | 246.93942 | 7.98794 | 0.2395375 | 0.17123811 | 3.2117059 | 20 | 11 8.8 | 19.0 |
| 197420 2003 $YG_{63}$ | 15.0 | $X$ | 6.62644 | 328.01006 | 116.60589 | 9.53732 | 0.1913878 | 0.17947709 | 3.1126482 | 20 | — | — |
| 197421 2003 $YP_{63}$ | 14.9 | $X$ | 319.44135 | 67.63353 | 45.94377 | 13.18084 | 0.1114652 | 0.17478866 | 3.1680635 | 20 | — | — |
| 197422 2003 $YB_{66}$ | 15.3 | $X$ | 167.89548 | 87.60218 | 214.73745 | 10.69185 | 0.0145828 | 0.18496073 | 3.0508184 | 20 | — | — |
| 197423 2003 $YS_{67}$ | 15.7 | $X$ | 78.39639 | 267.69401 | 90.17804 | 3.95259 | 0.1194751 | 0.18247781 | 3.0784304 | 20 | — | — |
| 197424 2003 $YE_{69}$ | 14.7 | $X$ | 13.63840 | 185.37133 | 274.13317 | 17.72895 | 0.1956061 | 0.18024000 | 3.1038586 | 20 | — | — |
| 197425 2003 $YE_{70}$ | 15.0 | $X$ | 336.15151 | 15.00651 | 127.87535 | 6.06134 | 0.1136918 | 0.17954528 | 3.1118601 | 20 | — | — |
| 197426 2003 $YY_{70}$ | 15.0 | $X$ | 40.28537 | 8.94405 | 71.99875 | 13.67365 | 0.2028745 | 0.18698870 | 3.0287202 | 20 | — | — |
| 197427 2003 $YG_{72}$ | 15.2 | $X$ | 31.47167 | 355.55099 | 73.31276 | 12.95599 | 0.1384763 | 0.18339216 | 3.0681897 | 20 | — | — |
| 197428 2003 $YE_{73}$ | 15.0 | $X$ | 273.63323 | 205.34484 | 292.71099 | 5.51428 | 0.1397657 | 0.17227914 | 3.1987546 | 20 | 11 30.5 | 19.2 |
| 197429 2003 $YM_{73}$ | 14.5 | $X$ | 212.45545 | 270.16770 | 278.29594 | 19.53711 | 0.0395574 | 0.17056526 | 3.2201467 | 20 | 11 30.1 | 19.3 |
| 197430 2003 $YE_{78}$ | 14.9 | $X$ | 32.34426 | 287.51571 | 89.20377 | 11.40043 | 0.2492981 | 0.17645358 | 3.1481039 | 20 | — | — |
| 197431 2003 $YO_{78}$ | 15.9 | $X$ | 177.12711 | 180.52913 | 295.29743 | 7.94481 | 0.1421340 | 0.21088293 | 2.7953858 | 20 | 7 24.9 | 20.3 |
| 197432 2003 $YT_{78}$ | 14.3 | $X$ | 42.48112 | 76.61706 | 285.63253 | 19.71262 | 0.0527342 | 0.17145992 | 3.2089353 | 20 | 12 17.8 | 18.8 |
| 197433 2003 $YA_{80}$ | 14.8 | $X$ | 321.58234 | 200.82976 | 296.03353 | 9.49243 | 0.1970321 | 0.17763375 | 3.1341449 | 20 | — | — |
| 197434 2003 $YG_{81}$ | 15.0 | $X$ | 64.49282 | 4.42550 | 74.50862 | 11.01827 | 0.0751597 | 0.18874644 | 3.0098871 | 20 | 1 28.8 | 19.0 |
| 197435 2003 $YS_{81}$ | 14.7 | $X$ | 183.70005 | 292.40268 | 290.93573 | 7.98323 | 0.0449413 | 0.17022219 | 3.2244719 | 20 | 12 8.4 | 19.4 |
| 197436 2003 $YU_{83}$ | 15.4 | $X$ | 131.90611 | 284.12228 | 62.03269 | 6.36258 | 0.1926506 | 0.19121662 | 2.9839093 | 20 | 1 12.7 | 19.9 |
| 197437 2003 $YD_{85}$ | 15.2 | $X$ | 324.73897 | 323.16108 | 132.71699 | 5.93379 | 0.1402369 | 0.17575939 | 3.1563878 | 20 | 12 30.3 | 18.8 |
| 197438 2003 $YL_{85}$ | 15.1 | $X$ | 120.94781 | 262.81887 | 101.41119 | 13.31647 | 0.1358201 | 0.18924210 | 3.0046292 | 20 | 1 15.6 | 19.4 |
| 197439 2003 $YK_{86}$ | 15.4 | $X$ | 44.14884 | 179.95677 | 213.85085 | 4.60990 | 0.2746405 | 0.18272499 | 3.0756535 | 20 | — | — |
| 197440 2003 $YJ_{88}$ | 15.2 | $X$ | 290.78467 | 61.58550 | 110.10012 | 2.30328 | 0.1176155 | 0.17789008 | 3.1311333 | 20 | — | — |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 197441 2003 $YN_{94}$ | 15.2 | X | 259.41541 | 262.29138 | 283.00434 | 8.80329 | 0.3511722 | 0.16649523 | 3.2724136 | 20 | 12 7.5 | 19.8 |
| 197442 2003 $YV_{94}$ | 14.7 | X | 277.35070 | 41.33439 | 88.63704 | 10.72957 | 0.0593811 | 0.17408695 | 3.1765710 | 20 | 12 7.5 | 18.9 |
| 197443 2003 $YK_{96}$ | 15.7 | X | 28.47100 | 312.15725 | 105.27839 | 7.33800 | 0.1359156 | 0.18107683 | 3.0942884 | 20 | — | — |
| 197444 2003 $YQ_{102}$ | 14.7 | X | 324.96138 | 0.62093 | 101.59165 | 11.98426 | 0.1420215 | 0.17151832 | 3.2082069 | 20 | — | — |
| 197445 2003 $YG_{103}$ | 16.8 | X | 214.45841 | 62.71927 | 316.53633 | 17.61317 | 0.1344396 | 0.38059654 | 1.8857878 | 20 | 4 14.3 | 19.7 |
| 197446 2003 $YS_{103}$ | 15.1 | X | 73.36640 | 292.08913 | 88.01679 | 11.76632 | 0.1432252 | 0.18574311 | 3.0422453 | 20 | — | — |
| 197447 2003 $YE_{104}$ | 15.1 | X | 292.19632 | 19.30464 | 101.81935 | 6.33823 | 0.1289625 | 0.17313397 | 3.1882169 | 20 | 12 9.3 | 19.0 |
| 197448 2003 $YR_{106}$ | 15.4 | X | 301.88985 | 275.03345 | 216.17836 | 3.75954 | 0.1442086 | 0.17274370 | 3.1930171 | 20 | — | — |
| 197449 2003 $YK_{111}$ | 14.9 | X | 0.18294 | 194.77654 | 202.36489 | 16.31373 | 0.1790222 | 0.17643187 | 3.1483622 | 20 | 12 18.5 | 18.9 |
| 197450 2003 $YQ_{114}$ | 15.1 | X | 47.38350 | 292.95069 | 117.37816 | 10.48962 | 0.1149867 | 0.17997407 | 3.1069153 | 20 | — | — |
| 197451 2003 $YW_{114}$ | 14.8 | X | 333.21798 | 7.48568 | 93.88690 | 12.70226 | 0.1272956 | 0.17516148 | 3.1635666 | 20 | — | — |
| 197452 2003 $YS_{115}$ | 15.2 | X | 347.57879 | 33.19871 | 42.49513 | 9.77942 | 0.0780955 | 0.17424295 | 3.1746748 | 20 | — | — |
| 197453 2003 $YY_{116}$ | 14.6 | X | 64.54360 | 281.07991 | 82.04978 | 17.07430 | 0.2374743 | 0.17769193 | 3.1334607 | 20 | — | — |
| 197454 2003 $YT_{117}$ | 16.9 | X | 121.36915 | 21.73477 | 315.11553 | 17.06998 | 0.0750238 | 0.36023606 | 1.9561910 | 20 | — | — |
| 197455 2003 $YN_{119}$ | 16.0 | X | 328.60952 | 82.15194 | 355.89546 | 4.12894 | 0.1613096 | 0.17252231 | 3.1957481 | 20 | 12 13.0 | 19.6 |
| 197456 2003 $YW_{121}$ | 15.5 | X | 264.87631 | 248.91135 | 241.40409 | 4.35811 | 0.1137235 | 0.17115648 | 3.2127270 | 20 | 11 13.1 | 19.9 |
| 197457 2003 $YG_{124}$ | 16.0 | X | 218.14870 | 296.57435 | 72.10334 | 3.06811 | 0.0903534 | 0.20209931 | 2.8758054 | 20 | 4 25.5 | 20.3 |
| 197458 2003 $YS_{125}$ | 14.3 | X | 342.11932 | 165.53739 | 285.39409 | 20.37577 | 0.0622549 | 0.17788454 | 3.1311984 | 20 | — | — |
| 197459 2003 $YT_{125}$ | 15.3 | X | 348.76055 | 11.39535 | 47.84430 | 11.33177 | 0.2098864 | 0.17595579 | 3.1540386 | 20 | 12 31.1 | 18.9 |
| 197460 2003 $YO_{126}$ | 15.1 | X | 30.89924 | 7.22501 | 30.26827 | 8.64249 | 0.2031880 | 0.17942176 | 3.1132881 | 20 | — | — |
| 197461 2003 $YJ_{127}$ | 15.7 | X | 44.97608 | 69.84106 | 333.63721 | 9.32358 | 0.1796695 | 0.18144701 | 3.0900784 | 20 | — | — |
| 197462 2003 $YN_{129}$ | 14.9 | X | 320.69795 | 69.92945 | 70.35026 | 9.63325 | 0.1948663 | 0.17513598 | 3.1638737 | 20 | — | — |
| 197463 2003 $YP_{129}$ | 16.9 | X | 57.90716 | 143.67991 | 314.70130 | 19.41736 | 0.1066372 | 0.36730984 | 1.9309944 | 20 | 1 8.8 | 18.3 |
| 197464 2003 $YY_{130}$ | 15.4 | X | 246.02876 | 169.68847 | 3.49103 | 5.87573 | 0.1233988 | 0.17128798 | 3.2110825 | 20 | 12 9.3 | 20.0 |
| 197465 2003 $YQ_{131}$ | 14.9 | X | 270.73147 | 148.19537 | 11.45248 | 5.48037 | 0.1250379 | 0.17396720 | 3.1780286 | 20 | 12 25.9 | 19.2 |
| 197466 2003 $YM_{136}$ | 15.4 | X | 12.40002 | 44.95693 | 58.95554 | 5.97049 | 0.1845995 | 0.17928009 | 3.1149280 | 20 | — | — |
| 197467 2003 $YL_{139}$ | 15.1 | X | 27.61496 | 32.10366 | 11.43747 | 9.15432 | 0.2010725 | 0.18050303 | 3.1008426 | 20 | — | — |
| 197468 2003 $YP_{141}$ | 14.8 | X | 67.32909 | 1.33077 | 24.38988 | 9.10443 | 0.2250822 | 0.18372977 | 3.0644299 | 20 | — | — |
| 197469 2003 $YQ_{141}$ | 15.0 | X | 19.63300 | 349.03360 | 61.45139 | 15.44079 | 0.1704115 | 0.17800054 | 3.1298378 | 20 | — | — |
| 197470 2003 $YG_{142}$ | 14.4 | X | 341.70462 | 76.25876 | 68.96530 | 18.06236 | 0.2366551 | 0.18125458 | 3.0922652 | 20 | — | — |
| 197471 2003 $YO_{144}$ | 15.3 | X | 18.06017 | 283.33568 | 157.08438 | 4.80446 | 0.1281357 | 0.18037656 | 3.1022919 | 20 | — | — |
| 197472 2003 $YO_{156}$ | 15.7 | X | 24.29005 | 186.12084 | 218.67658 | 4.37692 | 0.1233978 | 0.18033441 | 3.1027752 | 20 | — | — |
| 197473 2003 $YX_{159}$ | 14.8 | X | 52.67931 | 355.07031 | 24.93485 | 11.80974 | 0.1890261 | 0.18055725 | 3.1002218 | 20 | — | — |
| 197474 2003 $YH_{161}$ | 14.8 | X | 13.26033 | 54.62187 | 44.04500 | 10.09657 | 0.0599645 | 0.18416751 | 3.0595722 | 20 | — | — |
| 197475 2004 $AR_{2}$ | 15.5 | X | 79.44752 | 240.34170 | 289.21997 | 6.97634 | 0.1493282 | 0.19992784 | 2.8965912 | 20 | 6 21.8 | 19.4 |
| 197476 2004 $AK_{7}$ | 15.1 | X | 13.99290 | 354.54804 | 70.39362 | 5.76239 | 0.1145456 | 0.17508416 | 3.1644978 | 20 | — | — |
| 197477 2004 $AB_{11}$ | 15.7 | X | 78.82349 | 19.37687 | 23.63416 | 5.95988 | 0.1241304 | 0.18526104 | 3.0475206 | 20 | 1 9.7 | 19.7 |
| 197478 2004 $BL_{2}$ | 14.5 | X | 335.53683 | 56.77758 | 124.06450 | 3.86781 | 0.1107956 | 0.12437374 | 3.9748150 | 20 | 2 2.5 | 19.5 |
| 197479 2004 $BG_{4}$ | 17.1 | X | 95.96660 | 109.16841 | 306.35312 | 17.74437 | 0.1199972 | 0.36793120 | 1.9288197 | 20 | 1 13.9 | 18.3 |
| 197480 2004 $BE_{8}$ | 15.3 | X | 75.89691 | 324.89906 | 310.85695 | 12.60878 | 0.1750317 | 0.21945111 | 2.7221426 | 20 | 10 31.7 | 19.7 |
| 197481 2004 $BR_{15}$ | 15.5 | X | 340.55669 | 345.14789 | 100.76386 | 2.53065 | 0.1770093 | 0.17344162 | 3.1844456 | 20 | — | — |
| 197482 2004 $BZ_{21}$ | 16.4 | X | 169.11065 | 317.58095 | 0.88343 | 19.40379 | 0.0783143 | 0.36146781 | 1.9517445 | 20 | — | — |
| 197483 2004 $BG_{24}$ | 15.3 | X | 9.80638 | 238.44767 | 228.98966 | 1.72965 | 0.2362059 | 0.18119699 | 3.0929203 | 20 | — | — |
| 197484 2004 $BQ_{24}$ | 15.9 | X | 22.55338 | 102.55629 | 309.90751 | 3.36172 | 0.1876859 | 0.17616469 | 3.1515447 | 20 | — | — |
| 197485 2004 $BX_{26}$ | 17.3 | X | 22.74190 | 95.30519 | 33.88531 | 21.59637 | 0.0888426 | 0.36353951 | 1.9443225 | 20 | — | — |
| 197486 2004 $BQ_{29}$ | 16.0 | X | 155.35836 | 344.37573 | 96.63050 | 3.35680 | 0.1621747 | 0.19995097 | 2.8963678 | 20 | 5 23.1 | 20.6 |
| 197487 2004 $BV_{38}$ | 15.4 | X | 304.83980 | 225.31225 | 105.04036 | 6.37960 | 0.1039656 | 0.20879846 | 2.8139596 | 20 | 6 20.8 | 18.7 |
| 197488 2004 $BL_{45}$ | 14.8 | X | 18.62483 | 170.86514 | 273.32532 | 10.87679 | 0.1956706 | 0.18183363 | 3.0856967 | 20 | — | — |
| 197489 2004 $BC_{46}$ | 14.8 | X | 66.71672 | 274.00550 | 96.25490 | 12.96460 | 0.1173304 | 0.18064367 | 3.0992329 | 20 | — | — |
| 197490 2004 $BU_{47}$ | 15.8 | X | 308.78510 | 218.99878 | 309.24563 | 2.04336 | 0.1241623 | 0.17876670 | 3.1208888 | 20 | — | — |
| 197491 2004 $BA_{58}$ | 16.7 | X | 359.06390 | 292.31832 | 143.85938 | 24.15301 | 0.1060421 | 0.35212719 | 1.9861087 | 20 | — | — |
| 197492 2004 $BW_{60}$ | 15.6 | X | 347.58352 | 310.95092 | 125.62071 | 3.75631 | 0.1414289 | 0.17326924 | 3.1865574 | 20 | — | — |
| 197493 2004 $BU_{68}$ | 17.1 | X | 56.86847 | 277.49337 | 182.91532 | 22.08469 | 0.1263093 | 0.36779818 | 1.9292848 | 20 | 1 3.1 | 19.1 |
| 197494 2004 $BC_{81}$ | 15.6 | X | 7.01660 | 64.34968 | 39.64856 | 5.10627 | 0.1956469 | 0.17987667 | 3.1080369 | 20 | — | — |
| 197495 2004 $BU_{81}$ | 15.4 | X | 322.64173 | 66.92279 | 20.17370 | 5.24633 | 0.1463322 | 0.17036043 | 3.2227273 | 20 | 12 13.2 | 19.2 |
| 197496 2004 $BJ_{83}$ | 14.7 | X | 354.55202 | 271.87194 | 171.81286 | 25.72004 | 0.2811512 | 0.17724629 | 3.1387107 | 20 | — | — |
| 197497 2004 $BP_{85}$ | 14.7 | X | 307.33001 | 260.67246 | 233.32440 | 24.24652 | 0.2510517 | 0.17442063 | 3.1725183 | 20 | — | — |
| 197498 2004 $BU_{85}$ | 17.1 | X | 345.06726 | 282.77695 | 163.38332 | 23.42136 | 0.0884186 | 0.35268449 | 1.9840159 | 20 | — | — |
| 197499 2004 $BB_{87}$ | 16.2 | X | 87.30488 | 263.89547 | 139.22469 | 23.86710 | 0.1282214 | 0.36154007 | 1.9514844 | 20 | — | — |
| 197500 2004 $BX_{90}$ | 15.0 | X | 347.93455 | 295.66761 | 145.70462 | 10.97558 | 0.2053679 | 0.17191425 | 3.2032792 | 20 | — | — |
| 197501 2004 $BS_{91}$ | 14.6 | X | 219.03458 | 294.38679 | 170.94768 | 16.70948 | 0.1233137 | 0.15415151 | 3.4448543 | 20 | 8 17.8 | 20.1 |
| 197502 2004 $BA_{96}$ | 17.2 | X | 308.87956 | 138.40981 | 346.78035 | 18.53799 | 0.0747069 | 0.35210255 | 1.9862013 | 20 | — | — |
| 197503 2004 $BN_{97}$ | 15.9 | X | 144.86420 | 294.66130 | 117.43869 | 3.08935 | 0.1118997 | 0.19474989 | 2.9477088 | 20 | 4 5.3 | 20.3 |
| 197504 2004 $BS_{117}$ | 15.5 | X | 69.49188 | 2.67676 | 45.89492 | 5.99244 | 0.2827895 | 0.18539322 | 3.0460719 | 20 | 1 26.5 | 19.0 |
| 197505 2004 $BG_{120}$ | 15.3 | X | 330.07215 | 83.71361 | 46.57359 | 16.06621 | 0.2088672 | 0.17630655 | 3.1498539 | 20 | — | — |
| 197506 2004 $BP_{120}$ | 14.7 | X | 300.62672 | 100.68639 | 60.10982 | 27.03169 | 0.1415116 | 0.17523893 | 3.1626344 | 20 | — | — |
| 197507 2004 $BR_{145}$ | 14.9 | X | 53.79424 | 293.31718 | 104.11216 | 9.61899 | 0.1559931 | 0.18177769 | 3.0863298 | 20 | — | — |
| 197508 2004 $BV_{148}$ | 15.6 | X | 352.21660 | 13.12890 | 65.95968 | 3.15841 | 0.0697848 | 0.17317376 | 3.1877285 | 20 | — | — |
| 197509 2004 $BF_{163}$ | 15.2 | X | 342.71421 | 203.98392 | 205.10286 | 7.37210 | 0.0872192 | 0.16809867 | 3.2515707 | 20 | 11 27.3 | 19.3 |
| 197510 2004 $CE_{3}$ | 17.5 | X | 25.10942 | 107.26333 | 35.24488 | 21.27526 | 0.0792066 | 0.36737834 | 1.9307543 | 20 | 1 19.9 | 19.7 |
| 197511 2004 $CA_{19}$ | 15.9 | X | 349.90777 | 265.20671 | 158.10032 | 1.61297 | 0.1640798 | 0.17220637 | 3.1996557 | 20 | 12 31.9 | 19.6 |
| 197512 2004 $CN_{28}$ | 15.9 | X | 351.99388 | 305.23402 | 114.82700 | 3.66594 | 0.1588791 | 0.17145060 | 3.2090516 | 20 | 12 30.7 | 19.6 |
| 197513 2004 $CF_{36}$ | 14.8 | X | 319.36838 | 49.99659 | 48.16481 | 13.49738 | 0.0805467 | 0.16746934 | 3.2597116 | 20 | 12 21.5 | 19.1 |
| 197514 2004 $CC_{52}$ | 17.1 | X | 242.71804 | 173.87334 | 46.81568 | 22.27405 | 0.0538249 | 0.35260288 | 1.9843220 | 20 | — | — |
| 197515 2004 $CX_{57}$ | 15.1 | X | 212.05750 | 227.46074 | 94.87038 | 12.67494 | 0.0054511 | 0.18878385 | 3.0094894 | 20 | 3 1.7 | 19.5 |
| 197516 2004 $CG_{89}$ | 15.6 | X | 261.19172 | 219.01263 | 106.31425 | 7.42017 | 0.0489027 | 0.19687930 | 2.9264156 | 20 | 4 27.2 | 19.8 |
| 197517 2004 $CU_{103}$ | 15.3 | X | 349.40359 | 258.20931 | 288.07789 | 3.86138 | 0.1206724 | 0.18302129 | 3.0723332 | 20 | 2 17.4 | 19.1 |
| 197518 2004 $CJ_{106}$ | 14.9 | X | 255.95770 | 354.37250 | 292.98123 | 13.33308 | 0.0693789 | 0.18516709 | 3.0485514 | 20 | 2 23.8 | 19.5 |
| 197519 2004 $DF_{1}$ | 14.7 | X | 29.53046 | 278.40025 | 150.29599 | 23.48863 | 0.2907684 | 0.17932681 | 3.1143869 | 20 | — | — |
| 197520 2004 $DP_{10}$ | 15.6 | X | 351.46755 | 73.00359 | 19.17224 | 3.91075 | 0.1897258 | 0.17369767 | 3.1813153 | 20 | — | — |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 197521 2004 $DF_{21}$ | 17.0 | $X$ | 33.71821 | 79.43026 | 334.51766 | 16.20109 | 0.1290342 | 0.35322362 | 1.9819965 | 20 | — | — |
| 197522 2004 $DS_{22}$ | 15.1 | $X$ | 6.57438 | 36.88175 | 125.16097 | 3.61405 | 0.1764525 | 0.18242685 | 3.0790037 | 20 | 2 12.9 | 18.3 |
| 197523 2004 $DQ_{39}$ | 17.4 | $X$ | 328.75845 | 124.02226 | 320.84460 | 16.94264 | 0.0715737 | 0.34815829 | 2.0011742 | 20 | — | — |
| 197524 2004 $DN_{44}$ | 17.7 | $X$ | 326.24231 | 91.82347 | 164.34148 | 6.49917 | 0.0781109 | 0.31252406 | 2.1505378 | 20 | 4 10.4 | 19.8 |
| 197525 Versteeg | 16.2 | $X$ | 58.03233 | 312.02758 | 135.52565 | 0.61061 | 0.1492231 | 0.18198750 | 3.0839572 | 20 | 2 6.4 | 19.9 |
| 197526 2004 $EF_{3}$ | 15.3 | $X$ | 45.30065 | 51.41848 | 122.11952 | 13.34345 | 0.1160264 | 0.19055666 | 2.9907949 | 20 | 5 8.9 | 19.3 |
| 197527 2004 $EL_{17}$ | 15.0 | $X$ | 2.81594 | 36.44968 | 87.49367 | 9.04236 | 0.1981781 | 0.17546110 | 3.1599642 | 20 | — | — |
| 197528 2004 $EM_{19}$ | 14.6 | $X$ | 25.78689 | 150.60607 | 1.67819 | 8.31486 | 0.0853417 | 0.12336309 | 3.9964945 | 20 | 3 12.4 | 19.7 |
| 197529 2004 $EU_{26}$ | 15.5 | $X$ | 229.83210 | 103.51595 | 343.29049 | 4.87427 | 0.0805713 | 0.14783632 | 3.5422724 | 20 | 8 13.3 | 20.7 |
| 197530 2004 $EH_{32}$ | 17.1 | $X$ | 250.53079 | 75.86380 | 222.51675 | 3.73158 | 0.1995693 | 0.30226677 | 2.1989184 | 20 | 2 12.9 | 20.5 |
| 197531 2004 $EL_{45}$ | 17.9 | $X$ | 317.63544 | 99.32631 | 165.80191 | 2.95508 | 0.1723182 | 0.30916636 | 2.1660803 | 20 | 3 23.0 | 19.7 |
| 197532 2004 $ED_{57}$ | 16.3 | $X$ | 13.44819 | 233.08491 | 205.24550 | 20.45218 | 0.0961007 | 0.35342199 | 1.9812548 | 20 | — | — |
| 197533 2004 $EZ_{59}$ | 16.9 | $X$ | 259.39482 | 329.16484 | 307.17848 | 4.87231 | 0.2113392 | 0.29749570 | 2.2223660 | 20 | 1 25.7 | 20.3 |
| 197534 2004 $EL_{61}$ | 15.7 | $X$ | 39.77029 | 233.22463 | 247.47801 | 1.12521 | 0.1588655 | 0.18258027 | 3.0772787 | 20 | 2 18.9 | 19.2 |
| 197535 2004 $EH_{62}$ | 17.4 | $X$ | 277.09606 | 253.53537 | 353.40705 | 2.53646 | 0.1285564 | 0.29948452 | 2.2125162 | 20 | 1 12.7 | 20.3 |
| 197536 2004 $EJ_{64}$ | 15.3 | $X$ | 34.27167 | 2.19757 | 98.01282 | 12.25518 | 0.0905941 | 0.17864563 | 3.1222987 | 20 | 1 12.7 | 19.1 |
| 197537 2004 $EW_{71}$ | 14.5 | $X$ | 91.78789 | 111.11593 | 347.68105 | 8.66634 | 0.1569447 | 0.12673809 | 3.9252255 | 20 | 4 9.3 | 20.2 |
| 197538 2004 $EH_{79}$ | 17.1 | $X$ | 336.56650 | 189.69004 | 52.71879 | 3.54309 | 0.1422152 | 0.30648386 | 2.1787011 | 20 | 3 28.5 | 18.9 |
| 197539 2004 $EJ_{83}$ | 17.5 | $X$ | 8.65551 | 302.96777 | 321.76470 | 2.11073 | 0.1553927 | 0.31616783 | 2.1339829 | 20 | 7 21.5 | 18.6 |
| 197540 2004 $EF_{84}$ | 17.0 | $X$ | 307.67097 | 92.03975 | 149.00764 | 4.83792 | 0.1207134 | 0.30149772 | 2.2026561 | 20 | 2 11.2 | 19.3 |
| 197541 2004 $EB_{85}$ | 17.5 | $X$ | 309.42263 | 43.21598 | 201.33134 | 3.73178 | 0.0979411 | 0.30534088 | 2.1841347 | 20 | 2 20.5 | 20.1 |
| 197542 2004 $EU_{97}$ | 15.7 | $X$ | 71.97318 | 350.51269 | 77.54844 | 2.36608 | 0.1723014 | 0.18025073 | 3.1037355 | 20 | 2 7.3 | 19.6 |
| 197543 2004 $FO_{2}$ | 15.9 | $X$ | 148.52949 | 103.72246 | 196.62798 | 20.68321 | 0.2645346 | 0.28287937 | 2.2982743 | 20 | — | — |
| 197544 2004 $FP_{11}$ | 15.2 | $X$ | 12.30434 | 229.61161 | 314.55402 | 7.97904 | 0.0807866 | 0.18502133 | 3.0501523 | 20 | 3 20.7 | 19.2 |
| 197545 2004 $FG_{12}$ | 15.1 | $X$ | 356.78194 | 245.76955 | 310.64793 | 8.46714 | 0.2824380 | 0.18280560 | 3.0747493 | 20 | 2 27.1 | 18.0 |
| 197546 2004 $FE_{16}$ | 17.6 | $X$ | 341.10028 | 271.38399 | 340.19211 | 3.91230 | 0.1424855 | 0.31118892 | 2.1566846 | 20 | 4 17.6 | 19.3 |
| 197547 2004 $FR_{27}$ | 17.5 | $X$ | 6.90116 | 223.40993 | 351.97955 | 4.97158 | 0.0761602 | 0.31031981 | 2.1607095 | 20 | 4 15.6 | 19.4 |
| 197548 2004 $FY_{30}$ | 16.2 | $X$ | 202.38612 | 217.88086 | 70.85644 | 23.90418 | 0.2410014 | 0.28815612 | 2.2701304 | 20 | — | — |
| 197549 2004 $FW_{36}$ | 16.8 | $X$ | 240.00474 | 243.51363 | 49.75564 | 4.80832 | 0.1747081 | 0.29768270 | 2.2214352 | 20 | 2 1.9 | 20.2 |
| 197550 2004 $FS_{46}$ | 17.1 | $X$ | 36.51262 | 272.20628 | 310.81752 | 2.19084 | 0.1077041 | 0.31429400 | 2.1424564 | 20 | 6 30.7 | 18.7 |
| 197551 2004 $FZ_{57}$ | 17.4 | $X$ | 266.57987 | 102.26272 | 191.63359 | 4.90399 | 0.1966268 | 0.30402423 | 2.1904361 | 20 | 2 22.6 | 20.5 |
| 197552 2004 $FC_{68}$ | 16.4 | $X$ | 160.68225 | 246.50619 | 32.62600 | 23.02666 | 0.2319152 | 0.27987068 | 2.3147164 | 20 | — | — |
| 197553 2004 $FD_{85}$ | 14.7 | $X$ | 339.12991 | 37.79694 | 121.12751 | 7.79063 | 0.1334236 | 0.17475475 | 3.1684733 | 20 | — | — |
| 197554 2004 $FB_{98}$ | 14.1 | $X$ | 27.64118 | 105.22534 | 72.15001 | 11.31819 | 0.1063106 | 0.12551423 | 3.9507001 | 20 | 4 18.5 | 19.3 |
| 197555 2004 $FR_{107}$ | 17.5 | $X$ | 272.84703 | 152.83475 | 112.56030 | 3.86139 | 0.1983004 | 0.29822204 | 2.2187561 | 20 | 1 25.3 | 20.7 |
| 197556 2004 $FY_{115}$ | 17.4 | $X$ | 283.50305 | 161.55261 | 121.35106 | 7.82948 | 0.1921577 | 0.30413255 | 2.1899159 | 20 | 3 1.1 | 20.4 |
| 197557 2004 $FC_{116}$ | 16.8 | $X$ | 234.52616 | 228.43839 | 64.09113 | 7.43891 | 0.2064472 | 0.29681758 | 2.2257496 | 20 | 1 26.4 | 20.4 |
| 197558 2004 $FL_{122}$ | 14.1 | $X$ | 78.03285 | 256.88509 | 208.52612 | 7.73095 | 0.0825628 | 0.12343765 | 3.9948850 | 20 | 3 23.4 | 19.6 |
| 197559 2004 $FU_{125}$ | 17.3 | $X$ | 286.37358 | 75.12884 | 179.61541 | 5.42478 | 0.1361341 | 0.30109142 | 2.2046372 | 20 | 1 30.6 | 20.3 |
| 197560 2004 $FH_{128}$ | 17.0 | $X$ | 246.46044 | 331.33880 | 343.94360 | 3.94127 | 0.1753460 | 0.30354575 | 2.1927373 | 20 | 3 4.6 | 20.1 |
| 197561 2004 $FR_{129}$ | 16.6 | $X$ | 257.97884 | 290.82742 | 311.74690 | 4.71745 | 0.0559306 | 0.29627647 | 2.2284588 | 20 | — | — |
| 197562 2004 $FO_{140}$ | 17.2 | $X$ | 281.89027 | 300.10623 | 320.67358 | 3.60155 | 0.1443330 | 0.30120641 | 2.2040760 | 20 | 2 2.9 | 19.9 |
| 197563 2004 $FH_{148}$ | 12.7 | $X$ | 125.22527 | 20.83646 | 210.11533 | 30.34666 | 0.0911991 | 0.08293818 | 5.2075451 | 20 | 10 5.1 | 20.0 |
| 197564 2004 $GG_{2}$ | 16.3 | $X$ | 112.32862 | 78.28869 | 247.61531 | 20.99028 | 0.3182822 | 0.28084479 | 2.3093609 | 20 | — | — |
| 197565 2004 $GG_{9}$ | 16.9 | $X$ | 307.26594 | 275.62913 | 10.60156 | 3.94810 | 0.1558632 | 0.30646523 | 2.1787893 | 20 | 4 9.5 | 19.2 |
| 197566 2004 $GC_{11}$ | 16.8 | $X$ | 195.05174 | 243.97675 | 31.18053 | 5.90794 | 0.1543917 | 0.28443705 | 2.2898759 | 20 | — | — |
| 197567 2004 $GN_{12}$ | 17.2 | $X$ | 291.68501 | 29.48910 | 256.03167 | 5.06226 | 0.1653329 | 0.30470408 | 2.1871767 | 20 | 3 12.9 | 19.9 |
| 197568 2004 $GM_{15}$ | 14.8 | $X$ | 359.86652 | 75.26878 | 106.27862 | 26.03111 | 0.2788524 | 0.17950871 | 3.1122827 | 20 | 2 22.9 | 18.1 |
| 197569 2004 $GY_{22}$ | 17.5 | $X$ | 327.45955 | 84.63473 | 196.74263 | 2.93703 | 0.1650041 | 0.30974829 | 2.1633665 | 20 | 5 8.6 | 19.2 |
| 197570 2004 $GZ_{29}$ | 17.3 | $X$ | 341.41017 | 158.93781 | 95.73157 | 0.71489 | 0.1538891 | 0.30795574 | 2.1717534 | 20 | 4 24.7 | 18.7 |
| 197571 2004 $GQ_{30}$ | 16.9 | $X$ | 316.30961 | 94.96339 | 128.86291 | 2.99442 | 0.1130924 | 0.29927515 | 2.2135480 | 20 | 1 31.9 | 19.5 |
| 197572 2004 $GF_{33}$ | 16.7 | $X$ | 284.94041 | 8.58541 | 216.76250 | 6.75548 | 0.1637492 | 0.29465450 | 2.2366292 | 20 | — | — |
| 197573 2004 $GP_{33}$ | 17.5 | $X$ | 309.82607 | 42.64217 | 204.88834 | 2.72690 | 0.1113403 | 0.30292949 | 2.1957102 | 20 | 2 23.8 | 19.9 |
| 197574 2004 $GU_{33}$ | 16.8 | $X$ | 263.63347 | 218.68028 | 51.31499 | 8.61351 | 0.1297561 | 0.29588295 | 2.2304342 | 20 | 1 30.8 | 20.1 |
| 197575 2004 $GW_{36}$ | 16.3 | $X$ | 6.68629 | 250.16647 | 242.37008 | 18.98194 | 0.0777096 | 0.35634057 | 1.9704218 | 20 | — | — |
| 197576 2004 $GX_{40}$ | 17.6 | $X$ | 236.68137 | 322.37227 | 326.15334 | 1.59573 | 0.1660471 | 0.29560323 | 2.2318411 | 20 | 1 23.0 | 20.8 |
| 197577 2004 $GF_{47}$ | 15.9 | $X$ | 358.74889 | 305.80821 | 177.90973 | 0.52843 | 0.1539628 | 0.17216735 | 3.2001390 | 20 | — | — |
| 197578 2004 $GX_{79}$ | 17.5 | $X$ | 205.61275 | 67.07446 | 231.15437 | 4.35121 | 0.1863036 | 0.29101257 | 2.2552510 | 20 | 1 7.3 | 21.1 |
| 197579 2004 $HP$ | 16.5 | $X$ | 243.08830 | 267.31133 | 46.18386 | 7.86941 | 0.1886620 | 0.30100297 | 2.2050690 | 20 | 3 2.6 | 20.0 |
| 197580 2004 $HZ_{1}$ | 17.8 | $X$ | 287.80377 | 240.48525 | 47.62219 | 4.28664 | 0.1733415 | 0.30290693 | 2.1958192 | 20 | 3 15.8 | 20.5 |
| 197581 2004 $HQ_{2}$ | 17.3 | $X$ | 291.52856 | 96.88803 | 228.31901 | 1.75630 | 0.1398617 | 0.31129383 | 2.1562000 | 20 | 5 17.3 | 19.5 |
| 197582 2004 $HP_{4}$ | 16.9 | $X$ | 294.79620 | 212.62554 | 50.49625 | 5.33337 | 0.0998338 | 0.30247957 | 2.1978870 | 20 | 3 1.9 | 19.6 |
| 197583 2004 $HX_{5}$ | 17.3 | $X$ | 169.59986 | 49.60393 | 187.59396 | 4.61830 | 0.1888150 | 0.27529375 | 2.3403015 | 20 | 12 21.6 | 20.9 |
| 197584 2004 $HJ_{9}$ | 17.2 | $X$ | 296.24299 | 225.24742 | 8.55602 | 3.54780 | 0.0748363 | 0.29850146 | 2.2173712 | 20 | 1 25.8 | 19.8 |
| 197585 2004 $HA_{10}$ | 16.7 | $X$ | 325.32508 | 213.00710 | 80.09149 | 7.07956 | 0.1182187 | 0.30969764 | 2.1636024 | 20 | 5 31.4 | 18.2 |
| 197586 2004 $HQ_{11}$ | 12.6 | $X$ | 347.27395 | 162.91870 | 201.79392 | 11.72206 | 0.0218811 | 0.08435675 | 5.1489992 | 20 | 9 23.0 | 19.4 |
| 197587 2004 $HR_{11}$ | 17.3 | $X$ | 120.10046 | 145.03935 | 141.36824 | 3.07304 | 0.2116429 | 0.27376398 | 2.3490117 | 20 | — | — |
| 197588 2004 $HE_{12}$ | 17.1 | $X$ | 160.27091 | 162.20817 | 338.04607 | 42.70838 | 0.4658945 | 0.39311480 | 1.8455385 | 20 | 8 25.4 | 20.9 |
| 197589 2004 $HC_{20}$ | 17.2 | $X$ | 287.15816 | 44.38596 | 225.36758 | 3.73544 | 0.1356919 | 0.30087776 | 2.2056808 | 20 | 2 20.3 | 20.2 |
| 197590 2004 $HT_{30}$ | 16.4 | $X$ | 174.89933 | 249.10015 | 83.01918 | 11.66571 | 0.2651043 | 0.28761992 | 2.2729510 | 20 | 1 29.7 | 20.3 |
| 197591 2004 $HQ_{36}$ | 17.0 | $X$ | 239.38019 | 75.72855 | 219.88080 | 5.60671 | 0.1886559 | 0.29572414 | 2.2312327 | 20 | 1 31.3 | 20.7 |
| 197592 2004 $HH_{38}$ | 16.4 | $X$ | 221.66825 | 212.32174 | 95.90855 | 6.14811 | 0.1888561 | 0.29546496 | 2.2325373 | 20 | 2 3.7 | 19.9 |
| 197593 2004 $HA_{43}$ | 12.3 | $X$ | 256.07730 | 215.25978 | 232.31021 | 22.85482 | 0.0231990 | 0.08155343 | 5.2663277 | 20 | 9 4.4 | 19.6 |
| 197594 2004 $HD_{49}$ | 17.5 | $X$ | 187.86272 | 274.41904 | 45.98787 | 3.52086 | 0.2651067 | 0.29084025 | 2.2561417 | 20 | 1 24.2 | 21.3 |
| 197595 2004 $HH_{60}$ | 17.4 | $X$ | 225.99040 | 42.75341 | 240.67229 | 3.84376 | 0.2672733 | 0.28946144 | 2.2633006 | 20 | 1 6.5 | 21.3 |
| 197596 2004 $HV_{61}$ | 17.1 | $X$ | 314.15337 | 27.26161 | 241.06862 | 4.31016 | 0.1478737 | 0.30487959 | 2.1863372 | 20 | 3 24.3 | 19.3 |
| 197597 2004 $HZ_{61}$ | 16.5 | $X$ | 267.02151 | 157.31735 | 133.96922 | 6.71193 | 0.1640288 | 0.30038024 | 2.2081156 | 20 | 2 25.6 | 19.5 |
| 197598 2004 $HR_{62}$ | 17.0 | $X$ | 331.70352 | 64.77276 | 266.81731 | 0.67992 | 0.1531207 | 0.31686167 | 2.1308665 | 20 | 8 21.1 | 18.0 |
| 197599 2004 $JY_{2}$ | 17.6 | $X$ | 342.34543 | 32.10353 | 249.70435 | 1.15375 | 0.1930704 | 0.31001685 | 2.1621170 | 20 | 6 11.5 | 18.4 |
| 197600 2004 $JC_{3}$ | 17.6 | $X$ | 243.68943 | 261.89854 | 17.52513 | 1.60079 | 0.1863516 | 0.29289482 | 2.2455786 | 20 | 1 17.8 | 21.1 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 197601 2004 $JE_3$ | 17.7 | $X$ | 347.30883 | 1.91056 | 234.21868 | 3.52890 | 0.0831569 | 0.30545870 | 2.1835730 | 20 | 4 13.1 | 19.6 |
| 197602 2004 $JT_4$ | 17.5 | $X$ | 245.98778 | 65.42715 | 232.54484 | 4.69932 | 0.1995692 | 0.29573963 | 2.2311548 | 20 | 2 8.6 | 21.1 |
| 197603 2004 $JF_8$ | 17.7 | $X$ | 218.69564 | 140.22229 | 192.94175 | 3.60513 | 0.1879098 | 0.29819047 | 2.2189127 | 20 | 2 29.9 | 21.3 |
| 197604 2004 $JS_{14}$ | 16.8 | $X$ | 308.87774 | 217.68337 | 93.16891 | 5.08268 | 0.1922717 | 0.30763848 | 2.1732463 | 20 | 5 16.2 | 18.7 |
| 197605 2004 $JH_{15}$ | 15.6 | $X$ | 262.88382 | 197.09985 | 99.54247 | 3.22311 | 0.1353216 | 0.17634432 | 3.1494041 | 20 | 3 13.9 | 20.3 |
| 197606 2004 $JP_{16}$ | 17.3 | $X$ | 307.08507 | 101.53711 | 170.76897 | 2.26053 | 0.1291064 | 0.30335159 | 2.1936729 | 20 | 3 25.1 | 19.5 |
| 197607 2004 $JQ_{16}$ | 16.9 | $X$ | 130.59801 | 32.17563 | 230.81211 | 4.47833 | 0.1586651 | 0.27198563 | 2.3592397 | 20 | 12 18.7 | 20.5 |
| 197608 2004 $JR_{16}$ | 17.7 | $X$ | 168.12271 | 65.50829 | 211.36571 | 2.54679 | 0.1933669 | 0.27987246 | 2.3147065 | 20 | — | — |
| 197609 2004 $JY_{16}$ | 16.9 | $X$ | 248.73363 | 112.68227 | 128.01722 | 4.69319 | 0.1186000 | 0.28891930 | 2.2661310 | 20 | — | — |
| 197610 2004 $JR_{18}$ | 16.9 | $X$ | 260.28205 | 189.91401 | 100.57319 | 3.60566 | 0.1197191 | 0.29906014 | 2.2146088 | 20 | 2 21.9 | 19.8 |
| 197611 2004 $JJ_{20}$ | 17.0 | $X$ | 350.53460 | 49.47190 | 191.58776 | 3.50268 | 0.0903621 | 0.30587491 | 2.1815917 | 20 | 4 28.3 | 18.9 |
| 197612 2004 $JM_{20}$ | 17.1 | $X$ | 274.49772 | 203.35222 | 70.68125 | 7.72527 | 0.1351596 | 0.29700084 | 2.2248339 | 20 | 2 16.9 | 20.2 |
| 197613 2004 $JU_{23}$ | 17.2 | $X$ | 233.44285 | 106.89062 | 203.78489 | 2.48202 | 0.1604991 | 0.29724144 | 2.2236332 | 20 | 2 15.8 | 20.6 |
| 197614 2004 $JP_{24}$ | 16.8 | $X$ | 245.55606 | 108.61061 | 221.27148 | 3.45266 | 0.1337449 | 0.30220196 | 2.1992328 | 20 | 3 25.2 | 19.8 |
| 197615 2004 $JQ_{26}$ | 17.3 | $X$ | 237.65745 | 230.80435 | 51.43386 | 7.52749 | 0.2654926 | 0.29080385 | 2.2563300 | 20 | 1 14.9 | 21.3 |
| 197616 2004 $JG_{32}$ | 17.6 | $X$ | 319.79925 | 252.18104 | 34.74755 | 5.47676 | 0.1797975 | 0.30798074 | 2.1716359 | 20 | 4 28.6 | 19.5 |
| 197617 2004 $JD_{34}$ | 17.2 | $X$ | 280.18136 | 61.90181 | 198.22777 | 5.94276 | 0.1458133 | 0.29621723 | 2.2287559 | 20 | 1 29.6 | 20.4 |
| 197618 2004 $JK_{34}$ | 16.5 | $X$ | 163.57422 | 178.66098 | 101.85232 | 6.23632 | 0.2400380 | 0.27795278 | 2.3253520 | 20 | — | — |
| 197619 2004 $JC_{37}$ | 12.4 | $X$ | 139.62448 | 334.90860 | 245.45136 | 23.34040 | 0.0672463 | 0.08369944 | 5.1759216 | 20 | 10 1.3 | 19.8 |
| 197620 2004 $JL_{39}$ | 12.5 | $X$ | 77.29165 | 197.91384 | 88.73097 | 18.09047 | 0.0747901 | 0.08288676 | 5.2096986 | 20 | 10 25.2 | 19.6 |
| 197621 2004 $JN_{40}$ | 17.1 | $X$ | 348.90570 | 359.76580 | 146.82446 | 7.35270 | 0.0934710 | 0.29242717 | 2.2479720 | 20 | — | — |
| 197622 2004 $JA_{41}$ | 16.7 | $X$ | 133.55161 | 166.17082 | 155.99128 | 10.64401 | 0.2767166 | 0.27675633 | 2.3320490 | 20 | — | — |
| 197623 2004 $JY_{41}$ | 17.6 | $X$ | 334.71163 | 64.66384 | 185.61793 | 5.52537 | 0.1764768 | 0.30443938 | 2.1884443 | 20 | 3 30.5 | 19.4 |
| 197624 2004 $JO_{43}$ | 12.8 | $X$ | 143.68548 | 1.00456 | 204.24342 | 7.66023 | 0.0721550 | 0.08346347 | 5.1856728 | 20 | 9 23.8 | 20.0 |
| 197625 2004 $JJ_{44}$ | 17.2 | $X$ | 317.18076 | 40.84179 | 178.64164 | 5.79488 | 0.0898450 | 0.29787509 | 2.2204786 | 20 | 1 29.6 | 19.9 |
| 197626 2004 $JM_{45}$ | 16.3 | $X$ | 303.57444 | 164.97547 | 170.21783 | 5.12006 | 0.1491608 | 0.31082743 | 2.1583564 | 20 | 6 22.4 | 18.2 |
| 197627 2004 $KO$ | 17.7 | $X$ | 213.97213 | 218.56928 | 33.68443 | 3.29962 | 0.2006169 | 0.28354674 | 2.2946667 | 20 | — | — |
| 197628 2004 $KS_1$ | 13.0 | $X$ | 286.39205 | 17.50572 | 50.17715 | 6.75778 | 0.0598285 | 0.08403022 | 5.1623293 | 20 | 9 22.7 | 19.7 |
| 197629 2004 $KH_3$ | 18.0 | $X$ | 259.69913 | 242.69934 | 56.26174 | 4.14711 | 0.1699245 | 0.29806015 | 2.2195594 | 20 | 2 28.8 | 21.2 |
| 197630 2004 $KJ_4$ | 12.5 | $X$ | 254.92215 | 55.16094 | 49.19213 | 7.32797 | 0.0642978 | 0.08310401 | 5.2006152 | 20 | 9 27.4 | 19.5 |
| 197631 2004 $KN_8$ | 16.9 | $X$ | 286.89540 | 154.53815 | 103.45107 | 3.88438 | 0.0916180 | 0.29870510 | 2.2163633 | 20 | 2 13.3 | 19.5 |
| 197632 2004 $KV_9$ | 16.9 | $X$ | 166.65081 | 26.03226 | 253.55876 | 10.06409 | 0.2434285 | 0.27890947 | 2.3200314 | 20 | — | — |
| 197633 2004 $KD_{10}$ | 16.8 | $X$ | 266.65280 | 333.10696 | 352.19888 | 4.04119 | 0.2003622 | 0.30329781 | 2.1939322 | 20 | 4 4.2 | 19.8 |
| 197634 2004 $KV_{10}$ | 17.4 | $X$ | 293.77600 | 155.33615 | 111.41953 | 5.55384 | 0.1066207 | 0.30043125 | 2.2078657 | 20 | 3 4.2 | 20.0 |
| 197635 2004 $KS_{11}$ | 17.3 | $X$ | 247.31007 | 206.32849 | 100.68782 | 7.95079 | 0.1592053 | 0.29703186 | 2.2246790 | 20 | 2 28.6 | 20.7 |
| 197636 2004 $KU_{16}$ | 17.2 | $X$ | 193.69537 | 130.22399 | 112.15956 | 2.28879 | 0.1481133 | 0.27130965 | 2.3631569 | 20 | — | — |
| 197637 2004 $KB_{18}$ | 16.3 | $X$ | 119.57779 | 340.40877 | 10.88066 | 11.43532 | 0.2487328 | 0.27415199 | 2.3467948 | 20 | — | — |
| 197638 2004 $LM$ | 16.6 | $X$ | 252.63661 | 32.59477 | 202.35618 | 22.91657 | 0.1882075 | 0.28669553 | 2.2778342 | 20 | — | — |
| 197639 2004 $LJ_2$ | 17.1 | $X$ | 293.77389 | 335.64999 | 258.81689 | 3.29795 | 0.1086549 | 0.29457098 | 2.2370520 | 20 | 1 17.7 | 19.9 |
| 197640 2004 $LE_8$ | 16.5 | $X$ | 115.83579 | 63.76632 | 290.40487 | 7.75260 | 0.2253715 | 0.27363203 | 2.3497668 | 20 | — | — |
| 197641 2004 $LG_8$ | 16.7 | $X$ | 153.75849 | 0.22044 | 291.14800 | 11.05400 | 0.2525518 | 0.27447411 | 2.3449583 | 20 | — | — |
| 197642 2004 $LF_{11}$ | 17.3 | $X$ | 263.74871 | 107.39483 | 177.32756 | 4.11952 | 0.1284978 | 0.29665745 | 2.2265505 | 20 | 2 15.4 | 20.3 |
| 197643 2004 $LO_{11}$ | 17.6 | $X$ | 292.88316 | 195.87580 | 54.84940 | 2.10932 | 0.1567804 | 0.29714828 | 2.2240979 | 20 | 2 1.9 | 20.3 |
| 197644 2004 $LD_{22}$ | 16.4 | $X$ | 60.23125 | 304.65536 | 345.47262 | 3.18694 | 0.2501756 | 0.25701351 | 2.4499962 | 20 | 11 21.5 | 20.1 |
| 197645 2004 $LE_{25}$ | 17.0 | $X$ | 158.28264 | 177.63814 | 130.01702 | 3.55944 | 0.2365764 | 0.27738643 | 2.3285161 | 20 | — | — |
| 197646 2004 $LK_{25}$ | 16.3 | $X$ | 105.59383 | 213.54559 | 112.95293 | 9.72168 | 0.2580236 | 0.26956308 | 2.3733536 | 20 | — | — |
| 197647 2004 $LG_{28}$ | 17.4 | $X$ | 108.09252 | 125.97081 | 181.27242 | 6.92613 | 0.1480973 | 0.26794854 | 2.3828779 | 20 | — | — |
| 197648 2004 $LT_{29}$ | 17.0 | $X$ | 156.73658 | 276.64865 | 133.92510 | 6.93340 | 0.0832682 | 0.29336456 | 2.2431808 | 20 | 4 9.8 | 20.1 |
| 197649 2004 $MT$ | 17.0 | $X$ | 330.03810 | 61.19453 | 175.88440 | 4.13619 | 0.0815735 | 0.30103833 | 2.2048964 | 20 | 3 17.1 | 19.2 |
| 197650 2004 $MH_1$ | 16.9 | $X$ | 139.37759 | 91.42086 | 206.70109 | 4.23817 | 0.2100571 | 0.27114136 | 2.3641346 | 20 | — | — |
| 197651 2004 $MW_1$ | 16.6 | $X$ | 125.74158 | 11.34724 | 316.83291 | 5.17767 | 0.2164686 | 0.27409000 | 2.3471486 | 20 | — | — |
| 197652 2004 $MW_6$ | 17.1 | $X$ | 156.77051 | 241.23807 | 60.44711 | 3.33724 | 0.2223308 | 0.27619310 | 2.3352184 | 20 | — | — |
| 197653 2004 $MH_8$ | 15.8 | $X$ | 103.09934 | 278.66391 | 357.18730 | 12.93825 | 0.2392791 | 0.26415214 | 2.4056547 | 20 | 12 9.8 | 20.1 |
| 197654 2004 $NX$ | 16.6 | $X$ | 183.09088 | 2.12756 | 278.00005 | 6.17836 | 0.1041996 | 0.27769603 | 2.3267851 | 20 | — | — |
| 197655 2004 $NZ$ | 17.5 | $X$ | 166.71687 | 125.15631 | 194.21117 | 1.70268 | 0.2031722 | 0.27971840 | 2.3155564 | 20 | 1 1.6 | 21.1 |
| 197656 2004 $NK_1$ | 17.0 | $X$ | 116.41564 | 17.81517 | 332.61947 | 4.21780 | 0.1643029 | 0.27436039 | 2.3456062 | 20 | — | — |
| 197657 2004 $NL_1$ | 16.6 | $X$ | 90.12401 | 335.44039 | 342.38231 | 5.49497 | 0.1873955 | 0.26570906 | 2.3962482 | 20 | — | — |
| 197658 2004 $NM_1$ | 16.0 | $X$ | 97.00199 | 29.69433 | 299.41117 | 6.95431 | 0.1394468 | 0.26666794 | 2.3905006 | 20 | — | — |
| 197659 2004 $NA_2$ | 16.6 | $X$ | 225.59748 | 8.98121 | 293.68121 | 5.50165 | 0.1838144 | 0.28591200 | 2.2819938 | 20 | 1 30.5 | 20.3 |
| 197660 2004 $NE_2$ | 16.6 | $X$ | 58.29665 | 335.40224 | 19.19945 | 2.87662 | 0.2028303 | 0.26478536 | 2.4018179 | 20 | — | — |
| 197661 2004 $NN_3$ | 16.8 | $X$ | 129.77249 | 230.32746 | 104.52390 | 7.86039 | 0.1856361 | 0.27563914 | 2.3383461 | 20 | — | — |
| 197662 2004 $NX_3$ | 16.9 | $X$ | 132.86411 | 117.55076 | 188.10640 | 2.01935 | 0.2058525 | 0.27218701 | 2.3580759 | 20 | — | — |
| 197663 2004 $NA_5$ | 16.8 | $X$ | 140.37387 | 352.82785 | 307.70618 | 1.94407 | 0.1987708 | 0.27325621 | 2.3519208 | 20 | — | — |
| 197664 2004 $NR_5$ | 16.7 | $X$ | 21.84375 | 259.51311 | 81.52328 | 5.48982 | 0.2016152 | 0.25693212 | 2.4505136 | 20 | 12 6.8 | 19.7 |
| 197665 2004 $NF_6$ | 16.9 | $X$ | 161.08974 | 152.90088 | 152.97513 | 5.96191 | 0.1718991 | 0.27640093 | 2.3340477 | 20 | — | — |
| 197666 2004 $NM_6$ | 16.5 | $X$ | 106.80407 | 148.41814 | 155.82769 | 7.49123 | 0.1082244 | 0.26615642 | 2.3935624 | 20 | — | — |
| 197667 2004 $NK_{10}$ | 16.3 | $X$ | 103.32039 | 244.27262 | 115.48336 | 7.88405 | 0.2069054 | 0.27226895 | 2.3576028 | 20 | — | — |
| 197668 2004 $NG_{12}$ | 16.9 | $X$ | 77.68739 | 313.52954 | 20.53065 | 2.98110 | 0.2458843 | 0.26492069 | 2.4009998 | 20 | — | — |
| 197669 2004 $NY_{13}$ | 16.9 | $X$ | 129.48775 | 221.00184 | 108.46892 | 7.91110 | 0.1589475 | 0.27282681 | 2.3543879 | 20 | — | — |
| 197670 2004 $NL_{14}$ | 17.3 | $X$ | 69.08185 | 167.53636 | 169.85907 | 3.69759 | 0.2256249 | 0.26458841 | 2.4030096 | 20 | — | — |
| 197671 2004 $NQ_{14}$ | 17.2 | $X$ | 174.35743 | 354.30961 | 273.55523 | 3.76567 | 0.1602959 | 0.27467760 | 2.3438000 | 20 | — | — |
| 197672 2004 $NB_{15}$ | 17.0 | $X$ | 87.68767 | 228.62174 | 135.16666 | 7.63578 | 0.2733169 | 0.27000017 | 2.3707915 | 20 | — | — |
| 197673 2004 $NJ_{15}$ | 17.1 | $X$ | 154.08620 | 192.29262 | 138.88476 | 3.68838 | 0.1833993 | 0.27854619 | 2.3220482 | 20 | 1 2.3 | 20.3 |
| 197674 2004 $NU_{15}$ | 16.9 | $X$ | 47.91424 | 132.47470 | 203.98856 | 1.57261 | 0.2081874 | 0.26055442 | 2.4277488 | 20 | — | — |
| 197675 2004 $NX_{16}$ | 17.5 | $X$ | 58.15016 | 145.42377 | 197.13572 | 1.95783 | 0.2061861 | 0.26356765 | 2.4092099 | 20 | — | — |
| 197676 2004 $NM_{20}$ | 16.5 | $X$ | 88.20217 | 113.25224 | 206.89308 | 3.84036 | 0.2471972 | 0.26557058 | 2.3970812 | 20 | — | — |
| 197677 2004 $NP_{20}$ | 16.4 | $X$ | 59.03233 | 55.54777 | 248.72050 | 5.47360 | 0.1406096 | 0.25876162 | 2.4389495 | 20 | 11 26.4 | 19.8 |
| 197678 2004 $NR_{21}$ | 16.9 | $X$ | 158.14592 | 182.70200 | 129.57048 | 5.78104 | 0.2392193 | 0.27587712 | 2.3370011 | 20 | — | — |
| 197679 2004 $NN_{23}$ | 16.9 | $X$ | 51.69869 | 118.98192 | 227.21024 | 4.49552 | 0.1330756 | 0.26259083 | 2.4151810 | 20 | — | — |
| 197680 2004 $NA_{24}$ | 16.4 | $X$ | 35.77272 | 60.56863 | 276.19976 | 6.95115 | 0.1687693 | 0.25695062 | 2.4503960 | 20 | 12 14.3 | 19.6 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 197681 2004 $NL_{24}$ | 16.6 | X | 102.86092 | 59.83275 | 256.82024 | 3.74291 | 0.2085749 | 0.26519046 | 2.3993712 | 20 | — | — |
| 197682 2004 $NC_{26}$ | 17.1 | X | 130.74009 | 64.40427 | 276.21603 | 6.15339 | 0.2323186 | 0.27533789 | 2.3400514 | 20 | — | — |
| 197683 2004 $NK_{26}$ | 17.2 | X | 141.76364 | 52.44754 | 243.94143 | 1.71995 | 0.1805238 | 0.27240239 | 2.3568328 | 20 | — | — |
| 197684 2004 $NL_{27}$ | 16.8 | X | 153.62579 | 355.20569 | 275.21041 | 4.78461 | 0.2202435 | 0.27145301 | 2.3623248 | 20 | — | — |
| 197685 2004 $NQ_{27}$ | 16.6 | X | 128.29540 | 87.82435 | 152.83332 | 5.72314 | 0.1640588 | 0.26210588 | 2.4181591 | 20 | 11 19.4 | 20.5 |
| 197686 2004 $NK_{28}$ | 17.4 | X | 206.61497 | 125.04301 | 187.79691 | 1.73016 | 0.1412199 | 0.28602780 | 2.2813779 | 20 | 1 26.1 | 20.8 |
| 197687 2004 $NJ_{29}$ | 16.5 | X | 135.13987 | 6.31190 | 265.80554 | 5.78720 | 0.1713617 | 0.26714065 | 2.3876797 | 20 | — | — |
| 197688 2004 $NU_{30}$ | 16.6 | X | 63.08248 | 245.09808 | 107.18590 | 3.16965 | 0.2506576 | 0.26434463 | 2.4044867 | 20 | — | — |
| 197689 2004 $NO_{31}$ | 15.6 | X | 61.43845 | 88.14090 | 209.61094 | 21.65990 | 0.2080183 | 0.25628449 | 2.4546402 | 20 | 11 28.6 | 19.5 |
| 197690 2004 $OE_{2}$ | 17.0 | X | 31.50501 | 140.78095 | 187.84500 | 2.10912 | 0.2049987 | 0.25764044 | 2.4460201 | 20 | 12 4.1 | 20.1 |
| 197691 2004 $OB_{3}$ | 16.9 | X | 94.70717 | 165.62720 | 195.95174 | 1.96122 | 0.2141592 | 0.27088251 | 2.3656405 | 20 | — | — |
| 197692 2004 $OJ_{3}$ | 17.0 | X | 206.96870 | 345.65956 | 307.32461 | 4.44946 | 0.1610316 | 0.28265691 | 2.2994800 | 20 | 1 3.4 | 20.4 |
| 197693 2004 $OF_{4}$ | 16.6 | X | 91.25099 | 321.52646 | 348.55326 | 5.19168 | 0.2430740 | 0.26561049 | 2.3968410 | 20 | — | — |
| 197694 2004 $OP_{4}$ | 17.2 | X | 114.02307 | 205.31469 | 128.29324 | 2.99603 | 0.2224826 | 0.27204231 | 2.3589120 | 20 | — | — |
| 197695 2004 $OV_{4}$ | 16.9 | X | 112.56095 | 168.72231 | 118.87651 | 3.92186 | 0.2329653 | 0.26666292 | 2.3905305 | 20 | — | — |
| 197696 2004 $OW_{4}$ | 16.6 | X | 95.92008 | 99.33872 | 204.91051 | 1.07242 | 0.1833529 | 0.26495948 | 2.4007655 | 20 | — | — |
| 197697 2004 $OC_{5}$ | 16.9 | X | 65.08204 | 306.81975 | 25.14824 | 1.31757 | 0.2281884 | 0.26217148 | 2.4177557 | 20 | — | — |
| 197698 2004 $OE_{6}$ | 16.6 | X | 61.40346 | 291.35864 | 48.40203 | 8.33589 | 0.2526588 | 0.26032729 | 2.4291607 | 20 | — | — |
| 197699 2004 $ON_{7}$ | 16.4 | X | 22.36056 | 49.92893 | 298.81567 | 7.31606 | 0.1746012 | 0.25856974 | 2.4401559 | 20 | 12 13.8 | 19.4 |
| 197700 2004 $OV_{7}$ | 17.4 | X | 69.46527 | 206.38205 | 131.35526 | 2.98675 | 0.2501820 | 0.26432227 | 2.4046223 | 20 | — | — |
| 197701 2004 $OS_{8}$ | 16.7 | X | 133.30485 | 183.00497 | 105.30097 | 4.73455 | 0.1334732 | 0.27036163 | 2.3686779 | 20 | — | — |
| 197702 2004 $OB_{9}$ | 16.9 | X | 69.58409 | 47.64011 | 265.45653 | 1.55557 | 0.2063976 | 0.26196282 | 2.4190394 | 20 | 12 25.8 | 20.7 |
| 197703 2004 $OL_{9}$ | 17.5 | X | 182.57505 | 298.53434 | 33.35180 | 3.49303 | 0.2092552 | 0.28373375 | 2.2936583 | 20 | 2 1.4 | 21.1 |
| 197704 2004 $OQ_{9}$ | 15.8 | X | 101.28980 | 346.25218 | 313.72290 | 15.09733 | 0.2984620 | 0.26612626 | 2.3937432 | 20 | — | — |
| 197705 2004 $OV_{11}$ | 16.2 | X | 138.66634 | 337.25631 | 345.86827 | 6.66273 | 0.1173693 | 0.27328596 | 2.3517501 | 20 | — | — |
| 197706 2004 $PH$ | 16.8 | X | 54.87647 | 171.59409 | 209.21959 | 3.63268 | 0.2137726 | 0.26490537 | 2.4010924 | 20 | — | — |
| 197707 Paulnohr | 16.9 | X | 229.15742 | 36.82757 | 261.32804 | 6.88713 | 0.1848789 | 0.28591608 | 2.2819721 | 20 | 1 26.8 | 20.6 |
| 197708 2004 $PQ_{1}$ | 16.8 | X | 59.96741 | 340.95418 | 36.51273 | 3.14986 | 0.1972530 | 0.26821067 | 2.3813251 | 20 | — | — |
| 197709 2004 $PE_{2}$ | 16.8 | X | 265.29565 | 305.49838 | 347.74269 | 6.96763 | 0.1851839 | 0.29249206 | 2.2476395 | 20 | 2 24.9 | 20.0 |
| 197710 2004 $PU_{2}$ | 15.6 | X | 96.99678 | 278.75415 | 39.71239 | 22.03193 | 0.3463150 | 0.26420324 | 2.4053445 | 20 | — | — |
| 197711 2004 $PB_{3}$ | 16.6 | X | 74.64955 | 252.44326 | 98.50017 | 3.90600 | 0.2114243 | 0.26630341 | 2.3926815 | 20 | — | — |
| 197712 2004 $PS_{3}$ | 16.4 | X | 176.17771 | 273.40811 | 332.82595 | 6.11969 | 0.0895403 | 0.26957929 | 2.3732584 | 20 | — | — |
| 197713 2004 $PZ_{3}$ | 17.3 | X | 154.18179 | 308.75100 | 324.50505 | 2.08792 | 0.2278529 | 0.27174930 | 2.3606074 | 20 | — | — |
| 197714 2004 $PR_{4}$ | 16.6 | X | 25.11966 | 175.79961 | 208.34328 | 4.62395 | 0.1859964 | 0.26057058 | 2.4276485 | 20 | — | — |
| 197715 2004 $PS_{7}$ | 16.4 | X | 123.64618 | 347.87940 | 298.58461 | 2.16102 | 0.1858930 | 0.26621079 | 2.3932365 | 20 | — | — |
| 197716 2004 $PV_{7}$ | 16.7 | X | 98.70657 | 144.55144 | 170.82482 | 4.89027 | 0.2434391 | 0.26566792 | 2.3964956 | 20 | — | — |
| 197717 2004 $PE_{8}$ | 16.6 | X | 215.73882 | 170.81430 | 145.00588 | 7.18385 | 0.1420763 | 0.28549400 | 2.2842207 | 20 | 2 7.8 | 20.1 |
| 197718 2004 $PM_{8}$ | 16.9 | X | 143.11201 | 36.21169 | 310.98543 | 2.07770 | 0.1897739 | 0.27651191 | 2.3334231 | 20 | 1 12.4 | 19.9 |
| 197719 2004 $PR_{8}$ | 16.5 | X | 78.16182 | 350.77838 | 330.78636 | 5.72645 | 0.1897985 | 0.26214243 | 2.4179343 | 20 | — | — |
| 197720 2004 $PD_{13}$ | 16.8 | X | 67.43439 | 153.25578 | 185.95633 | 2.04232 | 0.1806467 | 0.26309584 | 2.4120894 | 20 | — | — |
| 197721 2004 $PB_{14}$ | 17.3 | X | 138.60717 | 316.39096 | 20.30875 | 2.92021 | 0.2076532 | 0.27461322 | 2.3441663 | 20 | — | — |
| 197722 2004 $PG_{14}$ | 16.9 | X | 58.99437 | 313.73493 | 38.49842 | 2.69596 | 0.2264630 | 0.26245761 | 2.4159982 | 20 | — | — |
| 197723 2004 $PE_{15}$ | 16.3 | X | 130.41708 | 275.47501 | 12.92519 | 6.14043 | 0.1149892 | 0.26589683 | 2.3951200 | 20 | — | — |
| 197724 2004 $PF_{16}$ | 17.0 | X | 68.19442 | 278.70147 | 26.51002 | 3.98797 | 0.2233577 | 0.25835733 | 2.4414932 | 20 | 12 15.5 | 20.9 |
| 197725 2004 $PC_{17}$ | 16.6 | X | 206.38793 | 331.35702 | 302.20692 | 3.30784 | 0.1168274 | 0.27758078 | 2.3274291 | 20 | — | — |
| 197726 2004 $PR_{17}$ | 17.2 | X | 205.87660 | 179.43222 | 91.76182 | 2.87867 | 0.1942733 | 0.27919572 | 2.3184454 | 20 | — | — |
| 197727 2004 $PS_{17}$ | 17.0 | X | 66.01281 | 23.22625 | 346.33216 | 4.84982 | 0.2587578 | 0.26583903 | 2.3954672 | 20 | — | — |
| 197728 2004 $PH_{19}$ | 16.8 | X | 92.82768 | 329.80438 | 31.67179 | 1.72239 | 0.1976764 | 0.26909043 | 2.3761319 | 20 | — | — |
| 197729 2004 $PJ_{19}$ | 16.5 | X | 112.84077 | 164.66563 | 110.63369 | 2.45929 | 0.1750271 | 0.26201606 | 2.4187117 | 20 | 12 16.5 | 20.5 |
| 197730 2004 $PP_{19}$ | 17.2 | X | 107.88778 | 298.59564 | 18.68015 | 3.06887 | 0.1842692 | 0.26652797 | 2.3913374 | 20 | — | — |
| 197731 2004 $PR_{19}$ | 16.5 | X | 102.09847 | 329.43664 | 338.36651 | 9.76122 | 0.2433516 | 0.26471204 | 2.4022613 | 20 | — | — |
| 197732 2004 $PM_{21}$ | 16.7 | X | 96.76976 | 190.94998 | 153.02284 | 3.89606 | 0.2067332 | 0.26718360 | 2.3874238 | 20 | — | — |
| 197733 2004 $PJ_{22}$ | 17.4 | X | 49.34291 | 63.40973 | 265.79718 | 0.50857 | 0.1900654 | 0.25956046 | 2.4339427 | 20 | 12 23.6 | 20.8 |
| 197734 2004 $PR_{23}$ | 16.9 | X | 55.64026 | 282.73853 | 25.27479 | 1.39903 | 0.1834609 | 0.25802176 | 2.4436096 | 20 | 12 2.4 | 20.3 |
| 197735 2004 $PN_{24}$ | 16.2 | X | 64.58185 | 194.78964 | 113.27529 | 2.27476 | 0.1816283 | 0.25933414 | 2.4353586 | 20 | 12 12.2 | 19.8 |
| 197736 2004 $PO_{24}$ | 17.3 | X | 64.98320 | 345.03454 | 3.42213 | 2.06326 | 0.2216342 | 0.26374344 | 2.4081393 | 20 | — | — |
| 197737 2004 $PQ_{24}$ | 16.9 | X | 228.04643 | 291.39063 | 339.68538 | 4.97249 | 0.1022915 | 0.28183135 | 2.3039684 | 20 | — | — |
| 197738 2004 $PR_{24}$ | 16.2 | X | 85.31573 | 359.22592 | 337.18427 | 7.00052 | 0.1074332 | 0.26635239 | 2.3923882 | 20 | — | — |
| 197739 2004 $PU_{24}$ | 16.9 | X | 131.99067 | 286.16989 | 356.57585 | 2.00929 | 0.2041050 | 0.26796724 | 2.3827670 | 20 | — | — |
| 197740 2004 $PC_{25}$ | 16.9 | X | 105.89583 | 291.94046 | 68.65988 | 0.63568 | 0.2264640 | 0.27219294 | 2.3580417 | 20 | — | — |
| 197741 2004 $PU_{25}$ | 16.8 | X | 30.98614 | 268.09080 | 85.31322 | 1.79304 | 0.2346597 | 0.25820746 | 2.4424379 | 20 | — | — |
| 197742 2004 $PD_{27}$ | 16.5 | X | 145.09492 | 196.54969 | 102.69291 | 6.50705 | 0.1344311 | 0.27254386 | 2.3560172 | 20 | — | — |
| 197743 2004 $PN_{27}$ | 16.3 | X | 92.68415 | 351.06195 | 348.02950 | 10.46673 | 0.2650881 | 0.26730614 | 2.3866941 | 20 | — | — |
| 197744 2004 $PA_{28}$ | 16.7 | X | 100.49724 | 104.22455 | 231.52786 | 6.13465 | 0.1309957 | 0.26861306 | 2.3789463 | 20 | — | — |
| 197745 2004 $PP_{29}$ | 17.3 | X | 149.17721 | 172.15470 | 123.89630 | 3.01745 | 0.1739626 | 0.27155415 | 2.3617382 | 20 | — | — |
| 197746 2004 $PN_{30}$ | 16.5 | X | 356.20359 | 211.01190 | 170.61552 | 6.20412 | 0.1226618 | 0.25895794 | 2.4377167 | 20 | 12 12.0 | 19.2 |
| 197747 2004 $PW_{30}$ | 17.4 | X | 159.99645 | 119.02435 | 151.72794 | 1.56200 | 0.1451098 | 0.27079858 | 2.3661292 | 20 | — | — |
| 197748 2004 $PR_{31}$ | 16.9 | X | 134.23261 | 288.40750 | 347.44291 | 0.79476 | 0.1729709 | 0.26661256 | 2.3908315 | 20 | — | — |
| 197749 2004 $PW_{31}$ | 16.3 | X | 81.68716 | 193.05729 | 138.02394 | 6.81743 | 0.1646545 | 0.26428226 | 2.4048650 | 20 | — | — |
| 197750 2004 $PY_{31}$ | 16.5 | X | 56.02880 | 343.75113 | 8.89127 | 1.14846 | 0.2178925 | 0.26209924 | 2.4182000 | 20 | — | — |
| 197751 2004 $PK_{32}$ | 16.7 | X | 113.09917 | 184.04599 | 132.95597 | 8.26743 | 0.1776115 | 0.26774380 | 2.3840925 | 20 | — | — |
| 197752 2004 $PE_{33}$ | 17.1 | X | 83.58400 | 38.45406 | 338.43183 | 0.93504 | 0.2024326 | 0.27006145 | 2.3704328 | 20 | — | — |
| 197753 2004 $PM_{33}$ | 16.8 | X | 95.86434 | 359.97277 | 22.03327 | 5.13238 | 0.1330705 | 0.27420319 | 2.3465026 | 20 | — | — |
| 197754 2004 $PX_{33}$ | 17.4 | X | 47.19050 | 127.33413 | 187.19808 | 1.15487 | 0.1837352 | 0.25643914 | 2.4536532 | 20 | 12 1.4 | 20.7 |
| 197755 2004 $PY_{33}$ | 17.1 | X | 192.87068 | 105.71878 | 154.50477 | 5.29733 | 0.2111081 | 0.27496667 | 2.3421570 | 20 | — | — |
| 197756 2004 $PJ_{34}$ | 16.9 | X | 35.15620 | 350.36559 | 335.52807 | 2.39207 | 0.2105118 | 0.25561609 | 2.4589173 | 20 | 12 4.7 | 20.2 |
| 197757 2004 $PL_{34}$ | 16.7 | X | 167.40733 | 317.64335 | 336.39798 | 1.15698 | 0.1576445 | 0.27439248 | 2.3454233 | 20 | — | — |
| 197758 2004 $PO_{34}$ | 16.7 | X | 56.11199 | 238.94882 | 140.14311 | 4.20771 | 0.1200825 | 0.26670923 | 2.3902538 | 20 | — | — |
| 197759 2004 $PU_{34}$ | 17.1 | X | 75.81524 | 200.37368 | 135.94087 | 6.37971 | 0.2353213 | 0.26342792 | 2.4100618 | 20 | — | — |
| 197760 2004 $PV_{34}$ | 16.8 | X | 42.36782 | 183.24037 | 158.50447 | 1.70986 | 0.1916984 | 0.25840190 | 2.4412125 | 20 | 12 31.6 | 20.1 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 197761 2004 $PC_{35}$ | 16.9 | $X$ | 108.16514 | 199.27780 | 124.39532 | 2.99213 | 0.1941861 | 0.26705879 | 2.3881676 | 20 | — | — |
| 197762 2004 $PG_{35}$ | 16.7 | $X$ | 66.75299 | 14.79810 | 313.97093 | 4.03743 | 0.0913852 | 0.26068718 | 2.4269245 | 20 | 12 31.5 | 20.0 |
| 197763 2004 $PK_{35}$ | 16.9 | $X$ | 84.41988 | 353.67042 | 305.15521 | 1.29311 | 0.1676344 | 0.26009809 | 2.4305876 | 20 | 12 18.8 | 20.5 |
| 197764 2004 $PP_{35}$ | 16.8 | $X$ | 116.71219 | 348.54463 | 350.43650 | 4.23076 | 0.1527528 | 0.27060648 | 2.3672489 | 20 | — | — |
| 197765 2004 $PB_{38}$ | 16.7 | $X$ | 86.72661 | 330.81319 | 346.78566 | 4.55491 | 0.1923772 | 0.26260529 | 2.4150923 | 20 | — | — |
| 197766 2004 $PE_{38}$ | 16.4 | $X$ | 34.38483 | 356.59440 | 17.84948 | 2.07001 | 0.1706093 | 0.26030025 | 2.4293290 | 20 | — | — |
| 197767 2004 $PD_{39}$ | 17.1 | $X$ | 255.20500 | 348.60996 | 300.84260 | 1.85013 | 0.2087523 | 0.28857517 | 2.2679322 | 20 | 2 8.0 | 20.7 |
| 197768 2004 $PT_{39}$ | 16.8 | $X$ | 147.90476 | 306.00780 | 327.60955 | 7.30581 | 0.2044640 | 0.26793655 | 2.3829490 | 20 | — | — |
| 197769 2004 $PX_{39}$ | 16.6 | $X$ | 231.92613 | 324.26721 | 328.96631 | 5.76468 | 0.1082769 | 0.28381638 | 2.2932131 | 20 | 1 28.3 | 19.9 |
| 197770 2004 $PG_{40}$ | 16.2 | $X$ | 152.42408 | 325.74259 | 341.96018 | 10.18366 | 0.1328264 | 0.27154911 | 2.3617674 | 20 | — | — |
| 197771 2004 $PE_{42}$ | 17.0 | $X$ | 112.58910 | 115.76995 | 213.99818 | 2.08461 | 0.2184231 | 0.26996081 | 2.3710219 | 20 | — | — |
| 197772 2004 $PG_{45}$ | 17.0 | $X$ | 147.78092 | 228.78313 | 122.78907 | 7.61829 | 0.1280705 | 0.27759848 | 2.3273301 | 20 | 1 15.2 | 20.0 |
| 197773 2004 $PJ_{45}$ | 16.6 | $X$ | 111.01293 | 213.52460 | 56.67621 | 3.04935 | 0.1780967 | 0.26077718 | 2.4263661 | 20 | 12 8.4 | 20.4 |
| 197774 2004 $PN_{45}$ | 16.5 | $X$ | 101.90845 | 351.46854 | 306.93063 | 2.85692 | 0.1572652 | 0.26253031 | 2.4155521 | 20 | — | — |
| 197775 2004 $PR_{45}$ | 16.7 | $X$ | 58.66521 | 47.67909 | 314.58970 | 5.35639 | 0.1484664 | 0.26262475 | 2.4149730 | 20 | — | — |
| 197776 2004 $PS_{45}$ | 17.0 | $X$ | 42.11055 | 136.48406 | 214.16838 | 3.47150 | 0.1624956 | 0.25847371 | 2.4407603 | 20 | — | — |
| 197777 2004 $PW_{45}$ | 16.9 | $X$ | 130.51947 | 39.84632 | 340.73767 | 6.74212 | 0.1074219 | 0.28240464 | 2.3008493 | 20 | 1 30.7 | 19.8 |
| 197778 2004 $PJ_{46}$ | 16.8 | $X$ | 260.07516 | 352.27657 | 297.78454 | 5.78604 | 0.1420249 | 0.29116826 | 2.2544470 | 20 | 2 17.1 | 20.1 |
| 197779 2004 $PO_{46}$ | 17.3 | $X$ | 87.33970 | 131.07856 | 237.95635 | 2.58538 | 0.2376186 | 0.26905299 | 2.3763523 | 20 | — | — |
| 197780 2004 $PW_{46}$ | 16.8 | $X$ | 48.57385 | 172.59102 | 195.39512 | 1.81578 | 0.2418508 | 0.26213340 | 2.4179899 | 20 | — | — |
| 197781 2004 $PZ_{47}$ | 16.8 | $X$ | 64.53476 | 133.87753 | 220.89390 | 2.63304 | 0.1869545 | 0.26526118 | 2.3989448 | 20 | — | — |
| 197782 2004 $PA_{48}$ | 17.1 | $X$ | 65.11949 | 175.39796 | 197.37215 | 2.61154 | 0.1993503 | 0.26761225 | 2.3848737 | 20 | — | — |
| 197783 2004 $PR_{48}$ | 16.5 | $X$ | 39.06873 | 43.04738 | 335.29392 | 5.87112 | 0.1301385 | 0.26450537 | 2.4035125 | 20 | — | — |
| 197784 2004 $PA_{50}$ | 16.6 | $X$ | 199.28122 | 330.11882 | 351.08752 | 5.40732 | 0.1436607 | 0.28368998 | 2.2938942 | 20 | 1 31.8 | 20.2 |
| 197785 2004 $PK_{50}$ | 16.6 | $X$ | 38.36996 | 227.39490 | 91.58582 | 4.43191 | 0.2008401 | 0.25565851 | 2.4586453 | 20 | 11 29.2 | 19.7 |
| 197786 2004 $PU_{50}$ | 16.9 | $X$ | 72.41176 | 228.58112 | 101.52365 | 4.44348 | 0.1014903 | 0.26372519 | 2.4082504 | 20 | — | — |
| 197787 2004 $PN_{51}$ | 16.8 | $X$ | 68.36473 | 248.92740 | 84.30809 | 3.62955 | 0.2240472 | 0.26205572 | 2.4184677 | 20 | — | — |
| 197788 2004 $PR_{51}$ | 16.4 | $X$ | 65.88989 | 330.46665 | 7.33163 | 5.22846 | 0.2011516 | 0.26209484 | 2.4182270 | 20 | — | — |
| 197789 2004 $PN_{52}$ | 16.9 | $X$ | 118.53156 | 322.67015 | 8.59572 | 3.63254 | 0.1951277 | 0.27014007 | 2.3699729 | 20 | — | — |
| 197790 2004 $PP_{54}$ | 16.4 | $X$ | 104.11877 | 355.20663 | 310.31036 | 6.43460 | 0.1486101 | 0.26493544 | 2.4009107 | 20 | — | — |
| 197791 2004 $PP_{55}$ | 16.5 | $X$ | 79.21275 | 226.62826 | 125.00205 | 7.07608 | 0.1306300 | 0.26577306 | 2.3958635 | 20 | — | — |
| 197792 2004 $PQ_{57}$ | 16.2 | $X$ | 56.07760 | 119.67312 | 311.78005 | 11.37798 | 0.1969801 | 0.27453408 | 2.3446168 | 20 | — | — |
| 197793 2004 $PB_{58}$ | 16.8 | $X$ | 69.67235 | 138.89569 | 166.07600 | 6.69593 | 0.1951209 | 0.25951345 | 2.4342367 | 20 | 12 15.0 | 20.6 |
| 197794 2004 $PK_{58}$ | 16.4 | $X$ | 114.89370 | 10.25798 | 310.43772 | 6.00459 | 0.1338798 | 0.26898391 | 2.3767592 | 20 | — | — |
| 197795 2004 $PG_{60}$ | 16.4 | $X$ | 0.50347 | 229.62805 | 177.04709 | 7.22118 | 0.1114906 | 0.25994820 | 2.4315218 | 20 | — | — |
| 197796 2004 $PJ_{60}$ | 16.7 | $X$ | 5.87779 | 349.99540 | 48.89414 | 3.31895 | 0.2011364 | 0.25832071 | 2.4417240 | 20 | — | — |
| 197797 2004 $PA_{61}$ | 16.9 | $X$ | 93.92316 | 54.51405 | 276.39898 | 3.24726 | 0.1619043 | 0.26566708 | 2.3965007 | 20 | — | — |
| 197798 2004 $PX_{61}$ | 16.0 | $X$ | 105.92263 | 306.29307 | 35.98999 | 8.68950 | 0.1383921 | 0.26605455 | 2.3941733 | 20 | — | — |
| 197799 2004 $PD_{63}$ | 16.8 | $X$ | 69.56092 | 176.46510 | 153.13072 | 7.20600 | 0.1607460 | 0.26178683 | 2.4201234 | 20 | — | — |
| 197800 2004 $PU_{64}$ | 16.7 | $X$ | 76.07499 | 31.92102 | 284.25864 | 6.26344 | 0.1142838 | 0.26023679 | 2.4297239 | 20 | 12 27.8 | 20.0 |
| 197801 2004 $PR_{65}$ | 17.1 | $X$ | 217.76647 | 280.60331 | 9.27381 | 8.28309 | 0.2336646 | 0.28491311 | 2.2873244 | 20 | 1 10.6 | 21.1 |
| 197802 2004 $PG_{66}$ | 16.9 | $X$ | 39.35304 | 356.90467 | 7.20952 | 1.13818 | 0.1944868 | 0.25993566 | 2.4316001 | 20 | — | — |
| 197803 2004 $PH_{67}$ | 16.8 | $X$ | 303.12784 | 13.22096 | 258.66186 | 4.80243 | 0.0896778 | 0.29392222 | 2.2403426 | 20 | 3 23.0 | 19.4 |
| 197804 2004 $PB_{68}$ | 16.6 | $X$ | 211.27429 | 121.07442 | 182.95107 | 7.00410 | 0.1410619 | 0.28338587 | 2.2955350 | 20 | 1 18.9 | 20.2 |
| 197805 2004 $PY_{68}$ | 17.1 | $X$ | 41.55563 | 168.63287 | 172.48272 | 2.51344 | 0.1895322 | 0.25993633 | 2.4315959 | 20 | 12 29.9 | 20.4 |
| 197806 2004 $PZ_{68}$ | 16.9 | $X$ | 48.50997 | 286.25281 | 111.11672 | 3.02475 | 0.0058220 | 0.27068416 | 2.3667960 | 20 | — | — |
| 197807 2004 $PH_{69}$ | 16.8 | $X$ | 92.62065 | 67.10046 | 346.11014 | 6.32872 | 0.1490731 | 0.27759421 | 2.3273540 | 20 | 1 29.8 | 19.3 |
| 197808 2004 $PN_{70}$ | 17.2 | $X$ | 100.90285 | 207.43749 | 136.03730 | 1.89610 | 0.1929111 | 0.26802063 | 2.3824506 | 20 | — | — |
| 197809 2004 $PU_{71}$ | 17.2 | $X$ | 98.42889 | 313.90110 | 39.74690 | 1.78277 | 0.2048533 | 0.27040276 | 2.3684377 | 20 | — | — |
| 197810 2004 $PX_{72}$ | 17.2 | $X$ | 86.87075 | 249.81350 | 122.44123 | 2.05434 | 0.2011389 | 0.27038163 | 2.3685611 | 20 | — | — |
| 197811 2004 $PN_{73}$ | 17.0 | $X$ | 152.58925 | 182.35298 | 136.58871 | 5.75763 | 0.2492106 | 0.27545207 | 2.3394047 | 20 | — | — |
| 197812 2004 $PR_{73}$ | 17.3 | $X$ | 84.47713 | 17.34861 | 12.52389 | 3.01138 | 0.2386817 | 0.27169849 | 2.3609017 | 20 | — | — |
| 197813 2004 $PK_{74}$ | 16.6 | $X$ | 78.88460 | 299.72422 | 27.00559 | 2.48885 | 0.2062336 | 0.26286624 | 2.4134938 | 20 | — | — |
| 197814 2004 $PQ_{74}$ | 16.9 | $X$ | 114.25066 | 274.58283 | 97.97910 | 3.25276 | 0.2031464 | 0.27550965 | 2.3390787 | 20 | 1 13.1 | 19.5 |
| 197815 2004 $PJ_{75}$ | 16.8 | $X$ | 52.76612 | 65.53201 | 340.03035 | 11.04579 | 0.1168845 | 0.26927450 | 2.3750489 | 20 | — | — |
| 197816 2004 $PO_{76}$ | 17.0 | $X$ | 209.81039 | 288.67686 | 335.01908 | 3.97618 | 0.1356132 | 0.27913665 | 2.3187725 | 20 | — | — |
| 197817 2004 $PW_{77}$ | 16.9 | $X$ | 102.16677 | 66.19315 | 257.00115 | 4.78441 | 0.1432237 | 0.26727266 | 2.3868934 | 20 | — | — |
| 197818 2004 $PX_{77}$ | 16.9 | $X$ | 75.55006 | 176.41578 | 200.18987 | 4.55139 | 0.1594406 | 0.26934776 | 2.3746183 | 20 | — | — |
| 197819 2004 $PZ_{78}$ | 17.2 | $X$ | 18.93124 | 203.94377 | 141.83315 | 7.65732 | 0.1905724 | 0.25453981 | 2.4658439 | 20 | 12 7.8 | 20.2 |
| 197820 2004 $PE_{79}$ | 16.6 | $X$ | 49.69402 | 149.78522 | 224.96880 | 3.94474 | 0.1799899 | 0.26368545 | 2.4084924 | 20 | — | — |
| 197821 2004 $PZ_{79}$ | 16.8 | $X$ | 41.02727 | 343.04476 | 27.64616 | 2.85546 | 0.2024342 | 0.26077480 | 2.4263808 | 20 | — | — |
| 197822 2004 $PN_{80}$ | 15.4 | $X$ | 99.07630 | 213.03527 | 317.59739 | 14.19593 | 0.1497680 | 0.23796416 | 2.5790614 | 20 | 7 20.8 | 19.1 |
| 197823 2004 $PD_{81}$ | 16.9 | $X$ | 317.15407 | 345.28700 | 16.88278 | 1.35043 | 0.2149736 | 0.24583829 | 2.5236921 | 20 | 8 19.8 | 18.7 |
| 197824 2004 $PU_{81}$ | 16.5 | $X$ | 29.66546 | 337.48031 | 349.30175 | 6.13965 | 0.1292323 | 0.25427944 | 2.4675268 | 20 | 11 14.2 | 19.6 |
| 197825 2004 $PL_{82}$ | 17.6 | $X$ | 56.06521 | 280.57431 | 95.62910 | 2.48973 | 0.2027541 | 0.26471730 | 2.4022295 | 20 | — | — |
| 197826 2004 $PL_{84}$ | 15.6 | $X$ | 188.69362 | 216.55138 | 165.55515 | 14.68889 | 0.1998121 | 0.22317587 | 2.6917697 | 20 | 4 12.9 | 20.3 |
| 197827 2004 $PT_{88}$ | 17.5 | $X$ | 96.31309 | 35.39397 | 349.05783 | 3.59296 | 0.1286413 | 0.27506992 | 2.3415709 | 20 | — | — |
| 197828 2004 $PE_{91}$ | 17.4 | $X$ | 137.25489 | 110.10539 | 208.65726 | 1.78200 | 0.2187289 | 0.27148313 | 2.3621501 | 20 | — | — |
| 197829 2004 $PT_{91}$ | 16.7 | $X$ | 138.66924 | 79.51373 | 202.07817 | 4.89975 | 0.1282123 | 0.26693320 | 2.3889166 | 20 | — | — |
| 197830 2004 $PC_{92}$ | 16.9 | $X$ | 31.12468 | 44.34684 | 300.36398 | 5.64800 | 0.1289783 | 0.25590146 | 2.4570889 | 20 | 12 12.4 | 20.0 |
| 197831 2004 $PV_{94}$ | 17.2 | $X$ | 68.88817 | 233.85397 | 157.52243 | 2.72749 | 0.1818029 | 0.26831437 | 2.3807115 | 20 | — | — |
| 197832 2004 $PW_{94}$ | 17.6 | $X$ | 97.11798 | 100.96014 | 223.99741 | 2.24460 | 0.2335764 | 0.26616733 | 2.3934970 | 20 | — | — |
| 197833 2004 $PN_{95}$ | 17.0 | $X$ | 163.60637 | 83.89981 | 230.51292 | 4.59722 | 0.1246401 | 0.27527759 | 2.3403931 | 20 | — | — |
| 197834 2004 $PR_{95}$ | 16.1 | $X$ | 143.76976 | 286.24901 | 355.75014 | 12.64551 | 0.2318784 | 0.27024965 | 2.3693322 | 20 | — | — |
| 197835 2004 $PZ_{95}$ | 17.1 | $X$ | 61.61334 | 236.47114 | 148.08386 | 2.70517 | 0.2070105 | 0.26675590 | 2.3899750 | 20 | — | — |
| 197836 2004 $PL_{96}$ | 16.8 | $X$ | 211.75092 | 17.37218 | 231.61189 | 1.74599 | 0.1696622 | 0.27457485 | 2.3443847 | 20 | — | — |
| 197837 2004 $PW_{98}$ | 16.6 | $X$ | 95.28963 | 281.66258 | 69.71836 | 7.07693 | 0.1672684 | 0.26831007 | 2.3807369 | 20 | — | — |
| 197838 2004 $PF_{99}$ | 16.0 | $X$ | 218.07452 | 343.49175 | 22.60011 | 8.71482 | 0.2424857 | 0.22672742 | 2.6635858 | 20 | 4 13.0 | 20.5 |
| 197839 2004 $PN_{99}$ | 14.9 | $X$ | 248.93706 | 33.01645 | 290.26041 | 17.07933 | 0.2938339 | 0.22778089 | 2.6553669 | 20 | 3 5.2 | 19.9 |
| 197840 2004 $PY_{100}$ | 16.4 | $X$ | 78.23307 | 113.38837 | 209.79205 | 1.66997 | 0.2237317 | 0.26175484 | 2.4203206 | 20 | — | — |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 197841 2004 $PL_{104}$ | 17.0 | $X$ | 250.20168 | 28.14305 | 225.56271 | 5.25378 | 0.0727472 | 0.28141500 | 2.3062403 | 20 | — | — |
| 197842 2004 $PH_{107}$ | 16.3 | $X$ | 27.53421 | 340.95707 | 53.93310 | 8.06549 | 0.0865292 | 0.26278834 | 2.4139707 | 20 | — | — |
| 197843 2004 $PK_{109}$ | 15.8 | $X$ | 271.21135 | 154.07057 | 351.31661 | 11.27437 | 0.1494398 | 0.26311344 | 2.4119818 | 20 | — | — |
| 197844 2004 $PJ_{110}$ | 17.2 | $X$ | 137.41704 | 285.53079 | 1.78453 | 3.47523 | 0.2264838 | 0.26819278 | 2.3814309 | 20 | — | — |
| 197845 Michaelvincent | 17.2 | $X$ | 329.87010 | 31.17569 | 2.21350 | 6.41797 | 0.1817881 | 0.25150132 | 2.4856646 | 20 | 11 9.9 | 19.3 |
| 197846 2004 $PU_{112}$ | 16.5 | $X$ | 39.93870 | 11.04966 | 3.54407 | 7.48486 | 0.1246209 | 0.26333321 | 2.4106397 | 20 | — | — |
| 197847 2004 $QJ_{2}$ | 16.4 | $X$ | 79.98023 | 333.48115 | 36.50899 | 5.81286 | 0.1408871 | 0.27012760 | 2.3700458 | 20 | — | — |
| 197848 2004 $QQ_{2}$ | 16.9 | $X$ | 114.75947 | 259.89096 | 135.73762 | 7.04391 | 0.0961727 | 0.28017292 | 2.3130514 | 20 | 1 26.9 | 19.6 |
| 197849 2004 $QG_{3}$ | 16.5 | $X$ | 50.97428 | 258.04120 | 54.55706 | 5.76694 | 0.1588143 | 0.25674907 | 2.4516782 | 20 | 11 29.5 | 19.7 |
| 197850 2004 $QL_{3}$ | 15.8 | $X$ | 26.19154 | 49.87473 | 345.94919 | 28.56203 | 0.2253858 | 0.26191685 | 2.4193225 | 20 | — | — |
| 197851 2004 $QB_{5}$ | 16.1 | $X$ | 106.72871 | 314.76296 | 7.33289 | 7.00553 | 0.1372909 | 0.26786490 | 2.3833739 | 20 | — | — |
| 197852 2004 $QZ_{6}$ | 17.2 | $X$ | 113.82487 | 219.22176 | 80.77984 | 6.18974 | 0.1720819 | 0.26597358 | 2.3946592 | 20 | — | — |
| 197853 2004 $QA_{7}$ | 17.0 | $X$ | 105.16209 | 242.65466 | 64.72150 | 5.64475 | 0.2228464 | 0.26589640 | 2.3951226 | 20 | — | — |
| 197854 2004 $QZ_{10}$ | 16.6 | $X$ | 102.21807 | 234.86874 | 83.58243 | 7.56115 | 0.1945531 | 0.26569182 | 2.3963519 | 20 | — | — |
| 197855 2004 $QK_{11}$ | 16.4 | $X$ | 10.26366 | 274.31610 | 59.53541 | 5.35199 | 0.1882644 | 0.25201433 | 2.4822902 | 20 | 11 6.2 | 19.0 |
| 197856 Tafelmusik | 16.6 | $X$ | 91.25106 | 210.24501 | 34.64939 | 4.16860 | 0.1671267 | 0.25448769 | 2.4661805 | 20 | 10 18.9 | 20.1 |
| 197857 2004 $QX_{18}$ | 16.8 | $X$ | 104.51098 | 323.93668 | 27.57261 | 2.92743 | 0.1982070 | 0.26938540 | 2.3743971 | 20 | — | — |
| 197858 2004 $QT_{19}$ | 16.2 | $X$ | 327.45878 | 251.20746 | 190.96279 | 6.48237 | 0.0652723 | 0.26062009 | 2.4273410 | 20 | — | — |
| 197859 2004 $QH_{22}$ | 14.8 | $X$ | 150.32025 | 129.58972 | 281.64754 | 23.81970 | 0.2486696 | 0.28274040 | 2.2990273 | 20 | 4 1.3 | 19.2 |
| 197860 2004 $QO_{25}$ | 15.2 | $X$ | 281.82124 | 111.62313 | 292.79759 | 21.53416 | 0.0660118 | 0.24192475 | 2.5508358 | 20 | 8 25.2 | 18.8 |
| 197861 2004 $QS_{25}$ | 16.6 | $X$ | 27.29947 | 313.49582 | 36.22975 | 10.50694 | 0.2565309 | 0.25510745 | 2.4621847 | 20 | — | — |
| 197862 2004 $RB_{1}$ | 17.1 | $X$ | 75.90546 | 333.69092 | 8.47310 | 2.81170 | 0.2187213 | 0.26281841 | 2.4137866 | 20 | — | — |
| 197863 2004 $RF_{1}$ | 16.0 | $X$ | 40.58736 | 352.48153 | 35.68460 | 9.70420 | 0.1982292 | 0.26409192 | 2.4060204 | 20 | — | — |
| 197864 Florentpagny | 16.4 | $X$ | 158.85377 | 52.82978 | 234.26683 | 5.27548 | 0.2349843 | 0.27085566 | 2.3657968 | 20 | — | — |
| 197865 2004 $RU_{4}$ | 16.6 | $X$ | 115.58960 | 276.10524 | 32.46537 | 8.36456 | 0.1320969 | 0.26522278 | 2.3991763 | 20 | — | — |
| 197866 2004 $RM_{5}$ | 16.8 | $X$ | 74.60861 | 347.16193 | 38.97425 | 7.60074 | 0.1205288 | 0.26824640 | 2.3811136 | 20 | — | — |
| 197867 2004 $RS_{5}$ | 16.9 | $X$ | 73.60611 | 275.50658 | 106.01867 | 7.17033 | 0.1363606 | 0.26747180 | 2.3857085 | 20 | — | — |
| 197868 2004 $RQ_{6}$ | 16.3 | $X$ | 111.84947 | 241.20582 | 121.29000 | 8.75622 | 0.1351667 | 0.27225736 | 2.3576697 | 20 | — | — |
| 197869 2004 $RZ_{7}$ | 16.2 | $X$ | 339.48693 | 113.28595 | 167.51410 | 17.23583 | 0.2017816 | 0.23651371 | 2.5895949 | 20 | 6 3.3 | 19.0 |
| 197870 Erkman | 15.9 | $X$ | 213.78422 | 51.81066 | 335.90636 | 12.92151 | 0.1825102 | 0.22862784 | 2.6488049 | 20 | 5 2.9 | 20.5 |
| 197871 2004 $RD_{8}$ | 17.0 | $X$ | 359.09699 | 298.36543 | 10.92580 | 2.75379 | 0.1077950 | 0.24675715 | 2.5174231 | 20 | 8 29.8 | 19.5 |
| 197872 2004 $RK_{8}$ | 16.5 | $X$ | 89.73708 | 62.20566 | 262.22827 | 3.72487 | 0.1411133 | 0.26263809 | 2.4148912 | 20 | — | — |
| 197873 2004 $RB_{9}$ | 16.9 | $X$ | 74.13416 | 166.92933 | 168.35634 | 4.24806 | 0.2137668 | 0.26121093 | 2.4236793 | 20 | — | — |
| 197874 2004 $RG_{11}$ | 16.4 | $X$ | 232.74572 | 44.55371 | 315.66115 | 3.27778 | 0.0805903 | 0.23177436 | 2.6247772 | 20 | 4 28.3 | 20.3 |
| 197875 2004 $RN_{13}$ | 17.6 | $X$ | 51.99865 | 212.43610 | 169.52235 | 2.44460 | 0.1798479 | 0.26370757 | 2.4083576 | 20 | — | — |
| 197876 2004 $RT_{13}$ | 17.5 | $X$ | 73.94051 | 319.08779 | 23.38440 | 1.74167 | 0.1900545 | 0.26210801 | 2.4181460 | 20 | — | — |
| 197877 2004 $RF_{14}$ | 17.7 | $X$ | 67.63026 | 40.63575 | 325.08627 | 1.15975 | 0.1581356 | 0.26548317 | 2.3976073 | 20 | — | — |
| 197878 2004 $RJ_{14}$ | 15.9 | $X$ | 82.35801 | 212.21863 | 330.70474 | 8.49804 | 0.0986576 | 0.23847463 | 2.5753797 | 20 | 7 8.8 | 19.4 |
| 197879 2004 $RD_{15}$ | 17.0 | $X$ | 87.43093 | 237.97045 | 169.66201 | 4.74595 | 0.1626836 | 0.27441705 | 2.3452833 | 20 | 1 13.6 | 19.3 |
| 197880 2004 $RU_{15}$ | 17.3 | $X$ | 64.04447 | 247.99048 | 102.01293 | 2.65883 | 0.2024336 | 0.26254289 | 2.4154749 | 20 | — | — |
| 197881 2004 $RY_{15}$ | 17.3 | $X$ | 67.21092 | 311.17567 | 43.39832 | 3.37425 | 0.2035756 | 0.26362268 | 2.4088747 | 20 | — | — |
| 197882 2004 $RL_{16}$ | 16.8 | $X$ | 54.22710 | 306.04702 | 72.81428 | 3.46851 | 0.1949369 | 0.26418349 | 2.4054644 | 20 | — | — |
| 197883 2004 $RO_{16}$ | 17.1 | $X$ | 122.28437 | 251.15576 | 95.52828 | 3.06511 | 0.1721393 | 0.27190835 | 2.3596867 | 20 | — | — |
| 197884 2004 $RL_{21}$ | 16.8 | $X$ | 337.54442 | 240.31677 | 174.01788 | 4.53757 | 0.1678258 | 0.25571823 | 2.4582625 | 20 | 12 29.9 | 19.1 |
| 197885 2004 $RX_{21}$ | 17.1 | $X$ | 34.71917 | 27.62155 | 352.24723 | 0.73543 | 0.1953023 | 0.26075015 | 2.4265338 | 20 | — | — |
| 197886 2004 $RB_{22}$ | 17.6 | $X$ | 42.89968 | 335.65938 | 331.81164 | 0.49264 | 0.1751044 | 0.25356673 | 2.4721484 | 20 | 11 14.9 | 20.9 |
| 197887 2004 $RQ_{22}$ | 16.7 | $X$ | 278.53097 | 191.14930 | 155.39898 | 5.81225 | 0.1009630 | 0.23670728 | 2.5881829 | 20 | 6 6.2 | 20.1 |
| 197888 2004 $RR_{22}$ | 17.0 | $X$ | 108.08200 | 194.63893 | 54.11339 | 1.17686 | 0.1863437 | 0.25649353 | 2.4533063 | 20 | 11 9.7 | 20.8 |
| 197889 2004 $RV_{22}$ | 17.1 | $X$ | 135.39940 | 351.53607 | 352.80303 | 4.54528 | 0.1495353 | 0.27404684 | 2.3473951 | 20 | — | — |
| 197890 2004 $RB_{23}$ | 17.0 | $X$ | 87.14344 | 283.52659 | 13.31051 | 2.18121 | 0.1629933 | 0.25965023 | 2.4333817 | 20 | 12 18.4 | 20.6 |
| 197891 2004 $RR_{23}$ | 16.7 | $X$ | 40.98637 | 10.47347 | 42.14194 | 3.26134 | 0.1849141 | 0.26479252 | 2.4017746 | 20 | — | — |
| 197892 2004 $RD_{25}$ | 16.5 | $X$ | 58.79243 | 348.50167 | 3.70744 | 8.16559 | 0.2441728 | 0.26118586 | 2.4238344 | 20 | — | — |
| 197893 2004 $RZ_{29}$ | 16.8 | $X$ | 37.07394 | 217.64833 | 138.78770 | 3.29273 | 0.1913848 | 0.25994256 | 2.4315570 | 20 | — | — |
| 197894 2004 $RJ_{30}$ | 17.2 | $X$ | 65.86422 | 5.95677 | 21.29967 | 3.42029 | 0.1400912 | 0.26855172 | 2.3793085 | 20 | — | — |
| 197895 2004 $RS_{30}$ | 17.4 | $X$ | 160.05065 | 21.53035 | 286.32172 | 2.62635 | 0.1390381 | 0.27480362 | 2.3430834 | 20 | — | — |
| 197896 2004 $RO_{31}$ | 16.7 | $X$ | 30.68532 | 283.48539 | 143.54300 | 5.85901 | 0.1098042 | 0.26885204 | 2.3775363 | 20 | — | — |
| 197897 2004 $RR_{31}$ | 16.4 | $X$ | 345.61531 | 50.84029 | 0.84076 | 7.44632 | 0.1312834 | 0.25833529 | 2.4416321 | 20 | — | — |
| 197898 2004 $RS_{32}$ | 16.4 | $X$ | 157.33731 | 237.77574 | 25.57187 | 6.00678 | 0.1334216 | 0.26678349 | 2.3898102 | 20 | — | — |
| 197899 2004 $RV_{32}$ | 16.9 | $X$ | 14.29822 | 354.20241 | 36.69547 | 2.75082 | 0.2230806 | 0.25850827 | 2.4405427 | 20 | — | — |
| 197900 2004 $RH_{36}$ | 17.2 | $X$ | 266.97380 | 232.46397 | 43.78188 | 4.20504 | 0.2126493 | 0.28840504 | 2.2688241 | 20 | 2 3.7 | 20.6 |
| 197901 2004 $RK_{38}$ | 16.4 | $X$ | 265.87933 | 13.49830 | 59.07245 | 3.80628 | 0.1445140 | 0.24601716 | 2.5224687 | 20 | 9 11.9 | 19.4 |
| 197902 2004 $RL_{38}$ | 16.4 | $X$ | 67.64283 | 319.25035 | 36.42844 | 4.74408 | 0.0735412 | 0.26342360 | 2.4100882 | 20 | — | — |
| 197903 2004 $RL_{39}$ | 17.2 | $X$ | 329.72283 | 337.04195 | 18.05625 | 2.41181 | 0.1362967 | 0.24685724 | 2.5167426 | 20 | 9 12.1 | 19.5 |
| 197904 2004 $RM_{39}$ | 16.1 | $X$ | 27.03860 | 189.48317 | 120.50831 | 1.77270 | 0.1184442 | 0.18800437 | 3.0178021 | 20 | 10 6.6 | 20.0 |
| 197905 2004 $RY_{41}$ | 16.4 | $X$ | 279.75507 | 150.85035 | 193.21942 | 32.71542 | 0.2148740 | 0.23374156 | 2.6100295 | 20 | 5 17.5 | 20.5 |
| 197906 2004 $RB_{42}$ | 16.3 | $X$ | 212.16346 | 118.03122 | 193.85377 | 10.59633 | 0.1820720 | 0.21714508 | 2.7413809 | 20 | 2 4.0 | 21.0 |
| 197907 2004 $RD_{42}$ | 16.2 | $X$ | 226.37580 | 198.95579 | 189.41444 | 17.57862 | 0.2572052 | 0.22938680 | 2.6429590 | 20 | 5 17.9 | 20.9 |
| 197908 2004 $RC_{43}$ | 17.2 | $X$ | 79.65705 | 176.27920 | 165.61878 | 2.42256 | 0.1974396 | 0.26448361 | 2.4036443 | 20 | — | — |
| 197909 2004 $RH_{43}$ | 17.4 | $X$ | 73.02496 | 70.92237 | 325.46099 | 1.80760 | 0.1951591 | 0.26991893 | 2.3712672 | 20 | — | — |
| 197910 2004 $RG_{45}$ | 16.3 | $X$ | 0.75817 | 265.82469 | 178.54782 | 6.82391 | 0.0857084 | 0.26629355 | 2.3927406 | 20 | — | — |
| 197911 2004 $RK_{46}$ | 17.2 | $X$ | 91.86298 | 186.62460 | 137.50728 | 1.98697 | 0.1937809 | 0.26395899 | 2.4068281 | 20 | — | — |
| 197912 2004 $RQ_{46}$ | 17.4 | $X$ | 351.84075 | 309.59482 | 351.23865 | 7.37057 | 0.2322647 | 0.24410996 | 2.5355901 | 20 | 8 9.9 | 19.2 |
| 197913 2004 $RT_{47}$ | 17.2 | $X$ | 88.01094 | 346.93652 | 356.51635 | 2.42888 | 0.2110543 | 0.26543139 | 2.3979191 | 20 | — | — |
| 197914 2004 $RP_{48}$ | 17.3 | $X$ | 145.84845 | 159.08674 | 127.18423 | 3.13739 | 0.2225709 | 0.26896436 | 2.3768744 | 20 | — | — |
| 197915 2004 $RK_{49}$ | 16.9 | $X$ | 5.81818 | 267.36318 | 142.12982 | 3.04382 | 0.1531792 | 0.25980430 | 2.4324196 | 20 | — | — |
| 197916 2004 $RU_{49}$ | 16.4 | $X$ | 343.99968 | 30.52508 | 352.85294 | 14.56173 | 0.1175298 | 0.25265094 | 2.4781187 | 20 | 11 14.5 | 19.4 |
| 197917 2004 $RB_{51}$ | 17.3 | $X$ | 98.67968 | 233.51410 | 64.64761 | 2.44945 | 0.2150308 | 0.26212638 | 2.4180330 | 20 | — | — |
| 197918 2004 $RO_{51}$ | 17.2 | $X$ | 63.00836 | 18.37798 | 36.69207 | 2.62713 | 0.2150911 | 0.26952338 | 2.3735866 | 20 | — | — |
| 197919 2004 $RZ_{51}$ | 16.4 | $X$ | 46.24169 | 169.21892 | 149.50098 | 5.93590 | 0.0482137 | 0.25371230 | 2.4712027 | 20 | 11 17.3 | 19.6 |
| 197920 2004 $RL_{52}$ | 16.6 | $X$ | 324.27547 | 313.87309 | 357.14648 | 6.82518 | 0.1646860 | 0.23949594 | 2.5680528 | 20 | 6 19.2 | 19.4 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 197921 2004 $RQ_{53}$ | 16.3 | X | 185.39361 | 251.39069 | 15.93125 | 8.84626 | 0.2022571 | 0.27226999 | 2.3575968 | 20 | — | — |
| 197922 2004 $RA_{54}$ | 17.1 | X | 42.91187 | 255.45557 | 76.72441 | 3.28440 | 0.1921314 | 0.25600683 | 2.4564147 | 20 | 12 19.7 | 20.4 |
| 197923 2004 $RO_{54}$ | 17.1 | X | 203.80805 | 285.73573 | 10.36043 | 5.64076 | 0.2608696 | 0.28033144 | 2.3121793 | 20 | 1 7.8 | 21.2 |
| 197924 2004 $RQ_{54}$ | 16.6 | X | 33.75768 | 21.30982 | 8.70925 | 5.73326 | 0.1898836 | 0.26114476 | 2.4240887 | 20 | — | — |
| 197925 2004 $RK_{56}$ | 16.8 | X | 32.72167 | 253.74814 | 108.69875 | 4.43683 | 0.2387911 | 0.25745510 | 2.4471939 | 20 | — | — |
| 197926 2004 $RZ_{57}$ | 16.4 | X | 133.44104 | 310.48941 | 289.48596 | 4.74684 | 0.0885358 | 0.25704894 | 2.4497711 | 20 | 11 19.5 | 20.0 |
| 197927 2004 $RW_{59}$ | 16.6 | X | 23.87312 | 344.42320 | 340.25717 | 5.29948 | 0.1449534 | 0.25185151 | 2.4833600 | 20 | 11 4.9 | 19.6 |
| 197928 2004 $RE_{60}$ | 16.9 | X | 11.03497 | 221.44106 | 180.79446 | 4.34952 | 0.1453582 | 0.25970465 | 2.4330418 | 20 | — | — |
| 197929 2004 $RN_{60}$ | 17.6 | X | 144.34075 | 85.85226 | 234.09138 | 1.40218 | 0.2392469 | 0.27269841 | 2.3551269 | 20 | — | — |
| 197930 2004 $RJ_{61}$ | 16.4 | X | 1.89476 | 202.11169 | 189.15337 | 5.36049 | 0.0309254 | 0.25775166 | 2.4453164 | 20 | 12 20.2 | 19.4 |
| 197931 2004 $RQ_{62}$ | 16.6 | X | 290.75864 | 146.93932 | 179.76170 | 12.12734 | 0.2301754 | 0.23613282 | 2.5923789 | 20 | 5 7.7 | 20.1 |
| 197932 2004 $RV_{64}$ | 17.0 | X | 19.05560 | 216.61416 | 173.09251 | 2.89374 | 0.2151287 | 0.25811976 | 2.4429911 | 20 | — | — |
| 197933 2004 $RV_{66}$ | 17.1 | X | 170.95085 | 271.91862 | 31.34912 | 3.18633 | 0.2190965 | 0.27462839 | 2.3440800 | 20 | — | — |
| 197934 2004 $RC_{67}$ | 17.1 | X | 80.55509 | 187.63214 | 150.96305 | 1.82355 | 0.2026074 | 0.26282631 | 2.4137382 | 20 | — | — |
| 197935 2004 $RW_{67}$ | 16.8 | X | 40.93371 | 22.76325 | 3.85296 | 5.04816 | 0.2224387 | 0.26119668 | 2.4237674 | 20 | — | — |
| 197936 2004 $RK_{68}$ | 16.5 | X | 97.32815 | 286.33069 | 32.93498 | 4.22201 | 0.1833477 | 0.26320027 | 2.4114513 | 20 | — | — |
| 197937 2004 $RG_{69}$ | 16.8 | X | 171.88944 | 248.55810 | 42.63907 | 3.36716 | 0.2193763 | 0.27279950 | 2.3545450 | 20 | — | — |
| 197938 2004 $RF_{70}$ | 16.4 | X | 14.70703 | 250.03783 | 158.93681 | 6.90760 | 0.1039665 | 0.26173035 | 2.4204716 | 20 | — | — |
| 197939 2004 $RR_{70}$ | 17.0 | X | 135.20824 | 188.93608 | 94.95501 | 3.33973 | 0.2183185 | 0.26614608 | 2.3936244 | 20 | — | — |
| 197940 2004 $RT_{70}$ | 16.9 | X | 190.81646 | 232.98542 | 38.74520 | 2.73367 | 0.1877611 | 0.27345751 | 2.3507664 | 20 | — | — |
| 197941 2004 $RH_{71}$ | 16.7 | X | 349.34974 | 41.40604 | 30.85583 | 4.47251 | 0.1752038 | 0.25910848 | 2.4367724 | 20 | — | — |
| 197942 2004 $RD_{72}$ | 15.6 | X | 305.48207 | 289.93771 | 174.29281 | 15.04548 | 0.0453574 | 0.26012747 | 2.4304045 | 20 | — | — |
| 197943 2004 $RO_{72}$ | 16.1 | X | 262.33139 | 1.69479 | 351.13811 | 22.05184 | 0.0655100 | 0.23339441 | 2.6126170 | 20 | 5 20.1 | 20.2 |
| 197944 2004 $RA_{74}$ | 16.7 | X | 122.64969 | 102.25450 | 175.78444 | 4.12737 | 0.1834814 | 0.26264485 | 2.4148498 | 20 | 12 28.1 | 20.6 |
| 197945 2004 $RE_{74}$ | 16.2 | X | 28.99422 | 276.95753 | 182.86869 | 7.27837 | 0.1392542 | 0.27145901 | 2.3622900 | 20 | — | — |
| 197946 2004 $RY_{75}$ | 16.5 | X | 355.96554 | 335.43873 | 73.71122 | 3.14724 | 0.1778897 | 0.25626921 | 2.4547377 | 20 | — | — |
| 197947 2004 $RZ_{80}$ | 16.6 | X | 256.90751 | 20.79695 | 359.05186 | 2.28937 | 0.1283414 | 0.23652938 | 2.5894805 | 20 | 6 17.9 | 20.2 |
| 197948 2004 $RX_{81}$ | 16.7 | X | 308.05583 | 295.64424 | 246.88626 | 1.35839 | 0.1336856 | 0.27085976 | 2.3657729 | 20 | — | — |
| 197949 2004 $RC_{82}$ | 17.2 | X | 70.50021 | 20.18448 | 286.32459 | 0.56410 | 0.1766937 | 0.25949710 | 2.4343389 | 20 | 12 15.5 | 20.9 |
| 197950 2004 $RC_{83}$ | 16.8 | X | 170.54426 | 60.03008 | 198.26750 | 2.41047 | 0.1529840 | 0.26723683 | 2.3871067 | 20 | — | — |
| 197951 2004 $RR_{83}$ | 17.2 | X | 319.92199 | 319.69828 | 358.28795 | 2.96956 | 0.0961495 | 0.23578490 | 2.5949285 | 20 | 6 30.2 | 20.0 |
| 197952 2004 $RA_{84}$ | 15.9 | X | 31.29475 | 114.99544 | 248.58815 | 9.35296 | 0.2203026 | 0.25875176 | 2.4390114 | 20 | — | — |
| 197953 2004 $RN_{85}$ | 15.9 | X | 307.09919 | 5.88966 | 281.90397 | 13.29250 | 0.2334814 | 0.23355857 | 2.6113927 | 20 | 3 27.8 | 19.6 |
| 197954 2004 $RF_{86}$ | 17.5 | X | 139.40461 | 107.20603 | 200.78683 | 3.31078 | 0.1823170 | 0.27170056 | 2.3608897 | 20 | — | — |
| 197955 2004 $RS_{87}$ | 16.5 | X | 326.90254 | 97.88941 | 184.23735 | 13.36369 | 0.1987296 | 0.23593202 | 2.5938496 | 20 | 5 8.8 | 19.3 |
| 197956 2004 $RZ_{89}$ | 16.5 | X | 68.91977 | 80.96944 | 302.53382 | 5.79133 | 0.1239045 | 0.26891236 | 2.3771808 | 20 | — | — |
| 197957 2004 $RV_{94}$ | 16.7 | X | 102.60705 | 163.12753 | 214.17426 | 5.57528 | 0.1177028 | 0.27307665 | 2.3529517 | 20 | — | — |
| 197958 2004 $RA_{95}$ | 16.3 | X | 136.32389 | 307.90151 | 311.17634 | 6.76125 | 0.1145992 | 0.26187218 | 2.4195975 | 20 | 12 18.1 | 19.9 |
| 197959 2004 $RD_{97}$ | 16.7 | X | 51.92034 | 61.89472 | 284.42557 | 6.40887 | 0.0846460 | 0.25893964 | 2.4378315 | 20 | — | — |
| 197960 2004 $RR_{97}$ | 16.4 | X | 40.86731 | 148.39626 | 191.66413 | 6.26552 | 0.1355328 | 0.25742057 | 2.4474128 | 20 | 12 20.1 | 19.7 |
| 197961 2004 $RB_{98}$ | 17.3 | X | 58.61531 | 196.64232 | 219.93588 | 4.80445 | 0.1621955 | 0.27056459 | 2.3674932 | 20 | — | — |
| 197962 2004 $RT_{99}$ | 16.7 | X | 263.67248 | 329.68280 | 281.23100 | 4.69373 | 0.1516921 | 0.28259649 | 2.2998078 | 20 | 1 3.8 | 19.9 |
| 197963 2004 $RP_{102}$ | 16.3 | X | 333.61809 | 153.39062 | 329.95236 | 6.37702 | 0.0548230 | 0.26824432 | 2.3811259 | 20 | — | — |
| 197964 2004 $RF_{103}$ | 16.6 | X | 250.18039 | 348.35768 | 286.57130 | 6.97108 | 0.2960355 | 0.28614527 | 2.2807534 | 20 | 1 13.4 | 20.5 |
| 197965 2004 $RR_{103}$ | 16.1 | X | 105.72358 | 54.44937 | 215.65992 | 8.87055 | 0.1180758 | 0.25635887 | 2.4541653 | 20 | 11 30.9 | 19.8 |
| 197966 2004 $RX_{105}$ | 16.4 | X | 73.01614 | 126.25253 | 211.66537 | 9.58506 | 0.2679729 | 0.26128734 | 2.4232068 | 20 | — | — |
| 197967 2004 $RV_{106}$ | 16.5 | X | 17.07575 | 213.72155 | 303.77489 | 5.90932 | 0.1051951 | 0.28395355 | 2.2924745 | 20 | 2 7.9 | 18.7 |
| 197968 2004 $RV_{108}$ | 16.2 | X | 155.11378 | 245.07118 | 312.87933 | 5.57829 | 0.0906515 | 0.25322260 | 2.4743877 | 20 | 10 17.8 | 20.0 |
| 197969 2004 $RW_{108}$ | 17.1 | X | 87.21584 | 73.99973 | 252.87818 | 2.18934 | 0.1431218 | 0.26344925 | 2.4099317 | 20 | — | — |
| 197970 2004 $RZ_{109}$ | 16.3 | X | 213.65309 | 77.78303 | 350.69951 | 27.22202 | 0.3900410 | 0.22741895 | 2.6581835 | 20 | 6 17.9 | 21.9 |
| 197971 2004 $RW_{110}$ | 17.2 | X | 166.85136 | 85.76781 | 235.32514 | 1.21313 | 0.2214526 | 0.27622080 | 2.3350623 | 20 | 1 5.9 | 20.8 |
| 197972 2004 $RZ_{112}$ | 15.8 | X | 243.67041 | 193.83311 | 215.30542 | 30.06524 | 0.2425845 | 0.23459721 | 2.6036793 | 20 | 6 22.6 | 20.5 |
| 197973 2004 $RB_{132}$ | 17.3 | X | 58.84911 | 117.70707 | 21.20352 | 1.04991 | 0.1621005 | 0.28597138 | 2.2816779 | 20 | 4 6.6 | 19.3 |
| 197974 2004 $RM_{135}$ | 16.9 | X | 75.18013 | 255.32396 | 4.28456 | 6.98757 | 0.1317603 | 0.25138335 | 2.4864423 | 20 | 10 14.7 | 20.4 |
| 197975 2004 $RY_{137}$ | 16.3 | X | 116.17174 | 70.06245 | 195.70531 | 7.13928 | 0.1004452 | 0.26157963 | 2.4214013 | 20 | 12 6.5 | 20.0 |
| 197976 2004 $RX_{139}$ | 15.9 | X | 12.71714 | 15.31875 | 0.76691 | 7.58000 | 0.2190135 | 0.25589096 | 2.4571562 | 20 | — | — |
| 197977 2004 $RF_{141}$ | 16.5 | X | 137.83553 | 254.51508 | 52.40104 | 5.33869 | 0.2408819 | 0.26899402 | 2.3766996 | 20 | — | — |
| 197978 2004 $RU_{141}$ | 16.8 | X | 55.29733 | 320.80986 | 31.16547 | 2.69676 | 0.1868569 | 0.25965198 | 2.4333708 | 20 | — | — |
| 197979 2004 $RV_{144}$ | 16.9 | X | 91.52938 | 190.60171 | 136.31171 | 5.18334 | 0.1607251 | 0.26571734 | 2.3961985 | 20 | — | — |
| 197980 2004 $RW_{144}$ | 16.9 | X | 108.44440 | 285.58717 | 42.04127 | 3.57399 | 0.2543607 | 0.26856327 | 2.3792403 | 20 | — | — |
| 197981 2004 $RG_{145}$ | 17.0 | X | 106.21325 | 295.60445 | 21.22746 | 5.27572 | 0.2217946 | 0.26649130 | 2.3915568 | 20 | — | — |
| 197982 2004 $RW_{146}$ | 16.8 | X | 57.53014 | 263.03978 | 196.00970 | 4.47123 | 0.1909681 | 0.27585123 | 2.3371474 | 20 | 2 5.0 | 18.6 |
| 197983 2004 $RP_{147}$ | 17.2 | X | 6.40083 | 174.29456 | 212.22332 | 0.72939 | 0.1959481 | 0.25565551 | 2.4586646 | 20 | — | — |
| 197984 2004 $RW_{149}$ | 16.4 | X | 0.56122 | 308.47233 | 165.21532 | 7.80073 | 0.1575820 | 0.26857970 | 2.3791433 | 20 | — | — |
| 197985 2004 $RC_{150}$ | 16.5 | X | 62.19999 | 149.87832 | 125.54454 | 6.04261 | 0.1765969 | 0.25068593 | 2.4910517 | 20 | 10 29.9 | 20.0 |
| 197986 2004 $RM_{151}$ | 15.4 | X | 174.56923 | 215.37393 | 192.07848 | 12.63721 | 0.1484504 | 0.22163455 | 2.7042348 | 20 | 4 29.6 | 19.8 |
| 197987 2004 $RT_{151}$ | 16.0 | X | 243.46546 | 227.19225 | 172.63831 | 7.48946 | 0.1855691 | 0.23201880 | 2.6229334 | 20 | 6 21.6 | 20.0 |
| 197988 2004 $RR_{155}$ | 16.8 | X | 251.97892 | 23.63961 | 232.11587 | 5.42031 | 0.1684084 | 0.28145094 | 2.3060440 | 20 | — | — |
| 197989 2004 $RC_{156}$ | 17.0 | X | 16.71753 | 78.48785 | 297.86108 | 5.12902 | 0.0965282 | 0.25728437 | 2.4482764 | 20 | 12 30.6 | 19.9 |
| 197990 2004 $RT_{156}$ | 16.9 | X | 5.32651 | 55.94878 | 316.68350 | 4.16833 | 0.1628972 | 0.25418056 | 2.4681667 | 20 | 12 18.1 | 19.6 |
| 197991 2004 $RS_{158}$ | 16.2 | X | 280.58937 | 99.26990 | 187.61996 | 10.12011 | 0.0680716 | 0.22687721 | 2.6624133 | 20 | 3 24.8 | 19.7 |
| 197992 2004 $RH_{159}$ | 16.9 | X | 343.25781 | 169.39561 | 310.45725 | 3.39583 | 0.1248244 | 0.26877002 | 2.3780200 | 20 | — | — |
| 197993 2004 $RQ_{163}$ | 17.2 | X | 53.09183 | 188.45683 | 198.15229 | 1.88251 | 0.2066398 | 0.26366329 | 2.4086273 | 20 | — | — |
| 197994 2004 $RG_{165}$ | 16.2 | X | 31.09891 | 243.76393 | 200.50547 | 21.96081 | 0.3256158 | 0.26715776 | 2.3875778 | 20 | — | — |
| 197995 2004 $RD_{167}$ | 17.0 | X | 95.40807 | 231.73364 | 111.02412 | 4.67140 | 0.1402668 | 0.26641266 | 2.3920274 | 20 | — | — |
| 197996 2004 $RT_{170}$ | 15.7 | X | 342.24418 | 292.53418 | 358.54360 | 13.15235 | 0.0936596 | 0.23574359 | 2.5952316 | 20 | 7 1.5 | 18.9 |
| 197997 2004 $RC_{171}$ | 17.2 | X | 97.50799 | 168.27163 | 229.05622 | 1.48304 | 0.1504882 | 0.27551442 | 2.3390517 | 20 | 1 13.7 | 19.5 |
| 197998 2004 $RO_{171}$ | 16.7 | X | 25.80292 | 48.22896 | 1.36914 | 6.37738 | 0.1168060 | 0.26372718 | 2.4082383 | 20 | — | — |
| 197999 2004 $RP_{177}$ | 16.6 | X | 219.29872 | 60.76757 | 222.74024 | 6.76834 | 0.1060236 | 0.27925836 | 2.3180987 | 20 | 1 1.9 | 20.1 |
| 198000 2004 $RS_{177}$ | 16.5 | X | 321.66608 | 137.66542 | 286.81039 | 5.63796 | 0.1107343 | 0.25504150 | 2.4626091 | 20 | 12 9.9 | 18.9 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 198001 2004 $RJ_{179}$ | 16.7 | $X$ | 184.64311 | 333.56175 | 307.43740 | 5.85941 | 0.1190300 | 0.27294947 | 2.3536825 | 20 | — | — |
| 198002 2004 $RO_{179}$ | 16.4 | $X$ | 76.74984 | 99.25398 | 268.52016 | 5.29412 | 0.1265020 | 0.26584338 | 2.3954410 | 20 | — | — |
| 198003 2004 $RS_{181}$ | 16.5 | $X$ | 76.17985 | 78.10166 | 227.88715 | 4.58850 | 0.1308527 | 0.25740589 | 2.4475058 | 20 | 12 15.9 | 20.1 |
| 198004 2004 $RB_{182}$ | 16.2 | $X$ | 254.34716 | 153.52197 | 207.24512 | 5.46240 | 0.0734714 | 0.23327481 | 2.6135099 | 20 | 5 28.2 | 19.8 |
| 198005 2004 $RS_{186}$ | 16.5 | $X$ | 187.53624 | 45.75990 | 234.75794 | 5.77586 | 0.1067202 | 0.27202777 | 2.3589961 | 20 | — | — |
| 198006 2004 $RE_{187}$ | 16.3 | $X$ | 357.93960 | 153.41934 | 244.80381 | 7.29157 | 0.1018434 | 0.25607557 | 2.4559751 | 20 | — | — |
| 198007 2004 $RO_{191}$ | 16.5 | $X$ | 60.89492 | 70.09379 | 232.19971 | 5.18154 | 0.1064938 | 0.25282934 | 2.4769528 | 20 | 11 20.7 | 19.8 |
| 198008 2004 $RP_{191}$ | 16.5 | $X$ | 116.22839 | 115.67957 | 216.57603 | 6.23305 | 0.1311344 | 0.26715012 | 2.3876233 | 20 | — | — |
| 198009 2004 $RC_{198}$ | 16.6 | $X$ | 326.47161 | 28.33012 | 289.32733 | 4.88050 | 0.1359652 | 0.23845990 | 2.5754857 | 20 | 7 7.4 | 19.2 |
| 198010 2004 $RU_{199}$ | 15.5 | $X$ | 189.91757 | 58.87731 | 354.33939 | 12.55263 | 0.1740975 | 0.22385474 | 2.6863248 | 20 | 5 14.9 | 20.1 |
| 198011 2004 $RK_{200}$ | 16.6 | $X$ | 332.41840 | 125.87330 | 211.54675 | 17.76562 | 0.3276909 | 0.24243320 | 2.5472681 | 20 | 7 28.8 | 18.7 |
| 198012 2004 $RF_{201}$ | 15.7 | $X$ | 261.22889 | 179.04911 | 261.95353 | 12.66315 | 0.2412764 | 0.23845279 | 2.5755369 | 20 | 8 22.4 | 19.5 |
| 198013 2004 $RJ_{201}$ | 15.7 | $X$ | 269.12680 | 351.47169 | 4.30115 | 10.60294 | 0.1835329 | 0.23054332 | 2.6341127 | 20 | 5 20.7 | 19.7 |
| 198014 2004 $RS_{202}$ | 17.2 | $X$ | 215.86722 | 256.40042 | 153.15327 | 3.32309 | 0.1083240 | 0.23445746 | 2.6047138 | 20 | 6 12.3 | 21.0 |
| 198015 2004 $RP_{204}$ | 15.8 | $X$ | 60.81118 | 357.55313 | 222.05565 | 9.14053 | 0.0673047 | 0.23893254 | 2.5720882 | 20 | 7 20.6 | 19.2 |
| 198016 2004 $RL_{205}$ | 16.1 | $X$ | 255.84335 | 171.03714 | 156.23779 | 14.69282 | 0.2690316 | 0.22905828 | 2.6454855 | 20 | 3 28.7 | 20.6 |
| 198017 2004 $RW_{209}$ | 16.3 | $X$ | 153.75641 | 90.57623 | 217.59709 | 10.37944 | 0.1911709 | 0.27292685 | 2.3538125 | 20 | — | — |
| 198018 2004 $RC_{218}$ | 15.9 | $X$ | 347.69585 | 9.06962 | 290.74034 | 11.63132 | 0.2118673 | 0.23990581 | 2.5651270 | 20 | 7 22.2 | 17.7 |
| 198019 2004 $RH_{220}$ | 15.4 | $X$ | 233.87170 | 123.58294 | 313.64758 | 15.13134 | 0.1204914 | 0.23568986 | 2.5956260 | 20 | 8 7.1 | 19.1 |
| 198020 2004 $RJ_{221}$ | 14.7 | $X$ | 351.58642 | 37.62689 | 330.25639 | 14.43773 | 0.1384665 | 0.24384222 | 2.5374459 | 20 | 11 4.3 | 17.8 |
| 198021 2004 $RW_{221}$ | 17.2 | $X$ | 65.29696 | 92.27210 | 208.16168 | 4.89252 | 0.0776851 | 0.25438416 | 2.4668496 | 20 | 11 20.6 | 20.4 |
| 198022 2004 $RZ_{224}$ | 16.3 | $X$ | 256.00355 | 101.08634 | 44.15531 | 0.87719 | 0.0641035 | 0.25878679 | 2.4387914 | 20 | 12 19.3 | 19.0 |
| 198023 2004 $RC_{225}$ | 16.3 | $X$ | 299.70310 | 318.39752 | 347.82065 | 9.39873 | 0.1751847 | 0.23447839 | 2.6045588 | 20 | 4 24.5 | 19.7 |
| 198024 2004 $RB_{226}$ | 16.9 | $X$ | 78.51664 | 266.35275 | 15.21764 | 4.57179 | 0.1733230 | 0.25526944 | 2.4611429 | 20 | 11 20.5 | 20.6 |
| 198025 2004 $RX_{229}$ | 16.7 | $X$ | 293.83026 | 140.54604 | 203.70950 | 3.53595 | 0.0985657 | 0.23518095 | 2.5993692 | 20 | 6 24.8 | 19.9 |
| 198026 2004 $RB_{230}$ | 16.7 | $X$ | 113.53814 | 146.39163 | 298.46678 | 0.98265 | 0.0413020 | 0.21957092 | 2.7211522 | 20 | 3 29.4 | 20.4 |
| 198027 2004 $RB_{231}$ | 16.4 | $X$ | 315.85349 | 252.62006 | 13.34139 | 7.10974 | 0.2170897 | 0.22826651 | 2.6515994 | 20 | 3 23.1 | 19.4 |
| 198028 2004 $RX_{231}$ | 16.6 | $X$ | 164.97112 | 291.91793 | 181.95353 | 2.24007 | 0.1547810 | 0.23087859 | 2.6315620 | 20 | 7 11.7 | 20.7 |
| 198029 2004 $RD_{233}$ | 17.3 | $X$ | 307.83110 | 120.83958 | 184.79284 | 5.16233 | 0.2118997 | 0.23375743 | 2.6099114 | 20 | 5 5.4 | 20.3 |
| 198030 2004 $RO_{238}$ | 17.1 | $X$ | 89.81573 | 86.57166 | 179.26169 | 10.12807 | 0.1471689 | 0.25434458 | 2.4671055 | 20 | 11 12.8 | 20.9 |
| 198031 2004 $RA_{240}$ | 17.5 | $X$ | 10.76300 | 72.82747 | 337.17843 | 0.67864 | 0.1546171 | 0.26031560 | 2.4292335 | 20 | — | — |
| 198032 2004 $RS_{241}$ | 16.4 | $X$ | 217.24869 | 76.20631 | 351.74786 | 11.72564 | 0.1602555 | 0.23572853 | 2.5953421 | 20 | 7 5.6 | 20.6 |
| 198033 2004 $RR_{244}$ | 16.8 | $X$ | 190.20339 | 102.22358 | 140.05264 | 2.52316 | 0.1479679 | 0.26774199 | 2.3841032 | 20 | — | — |
| 198034 2004 $RW_{244}$ | 16.8 | $X$ | 357.92626 | 243.71422 | 40.25966 | 1.99027 | 0.1293529 | 0.24086469 | 2.5583147 | 20 | 7 19.8 | 19.4 |
| 198035 2004 $RK_{253}$ | 16.1 | $X$ | 120.63870 | 259.87455 | 17.08496 | 23.46370 | 0.1330087 | 0.26252302 | 2.4155968 | 20 | 12 23.9 | 20.4 |
| 198036 2004 $RU_{254}$ | 16.4 | $X$ | 27.84902 | 247.87534 | 82.73137 | 7.27684 | 0.0995702 | 0.25223701 | 2.4808291 | 20 | 11 15.5 | 19.5 |
| 198037 2004 $RY_{254}$ | 16.5 | $X$ | 73.73736 | 261.90187 | 63.72625 | 7.30926 | 0.1686764 | 0.26017077 | 2.4301349 | 20 | — | — |
| 198038 2004 $RP_{256}$ | 17.0 | $X$ | 85.90735 | 333.84495 | 356.55596 | 5.07190 | 0.1198667 | 0.26315421 | 2.4117327 | 20 | — | — |
| 198039 2004 $RW_{257}$ | 17.2 | $X$ | 60.72090 | 254.93076 | 165.16082 | 3.76485 | 0.0817187 | 0.27151978 | 2.3619375 | 20 | — | — |
| 198040 2004 $RT_{266}$ | 17.2 | $X$ | 274.81877 | 23.47062 | 326.13248 | 4.92750 | 0.1420063 | 0.23585684 | 2.5944008 | 20 | 5 27.8 | 20.8 |
| 198041 2004 $RN_{272}$ | 16.9 | $X$ | 85.21407 | 48.39597 | 154.44287 | 5.94439 | 0.1248104 | 0.24131364 | 2.5551406 | 20 | 8 10.8 | 20.3 |
| 198042 2004 $RF_{275}$ | 17.1 | $X$ | 291.59329 | 13.16194 | 217.40669 | 3.35999 | 0.2004132 | 0.28431925 | 2.2905083 | 20 | — | — |
| 198043 2004 $RF_{276}$ | 17.4 | $X$ | 29.08867 | 50.71592 | 324.09932 | 1.06677 | 0.1978438 | 0.25997982 | 2.4313247 | 20 | — | — |
| 198044 2004 $RR_{276}$ | 17.0 | $X$ | 22.96967 | 71.61766 | 339.72365 | 6.29912 | 0.0905292 | 0.26587056 | 2.3952777 | 20 | — | — |
| 198045 2004 $RJ_{281}$ | 17.2 | $X$ | 255.63844 | 118.91442 | 314.12088 | 1.41724 | 0.1495621 | 0.24344733 | 2.5401891 | 20 | 8 25.4 | 20.5 |
| 198046 2004 $RB_{285}$ | 17.1 | $X$ | 283.18535 | 245.78260 | 151.38127 | 4.53699 | 0.0999809 | 0.24385735 | 2.5373409 | 20 | 8 23.8 | 20.0 |
| 198047 2004 $RL_{288}$ | 16.7 | $X$ | 197.96088 | 269.34795 | 180.70250 | 3.21005 | 0.2339095 | 0.23046661 | 2.6346972 | 20 | 7 9.1 | 21.3 |
| 198048 2004 $RR_{290}$ | 15.7 | $X$ | 186.17688 | 202.17835 | 209.20474 | 15.11983 | 0.0563666 | 0.22858818 | 2.6491112 | 20 | 5 15.1 | 19.5 |
| 198049 2004 $RV_{290}$ | 16.5 | $X$ | 150.13356 | 317.34495 | 348.53103 | 5.66039 | 0.1458356 | 0.26955782 | 2.3733845 | 20 | — | — |
| 198050 2004 $RR_{294}$ | 17.1 | $X$ | 352.94374 | 206.99597 | 312.22380 | 1.69147 | 0.1081686 | 0.27712126 | 2.3300012 | 20 | 1 1.7 | 19.7 |
| 198051 2004 $RS_{298}$ | 16.2 | $X$ | 58.04969 | 30.14191 | 175.22795 | 8.35422 | 0.1379725 | 0.23571847 | 2.5954160 | 20 | 7 9.4 | 19.6 |
| 198052 2004 $RU_{298}$ | 16.9 | $X$ | 10.83764 | 106.54042 | 174.63121 | 3.57903 | 0.1486134 | 0.24226617 | 2.5484388 | 20 | 8 10.8 | 19.3 |
| 198053 2004 $RY_{301}$ | 17.3 | $X$ | 198.87646 | 238.20963 | 37.28937 | 2.80117 | 0.2023204 | 0.27560188 | 2.3385569 | 20 | — | — |
| 198054 2004 $RL_{305}$ | 17.2 | $X$ | 75.29848 | 198.44781 | 135.31603 | 4.71007 | 0.1820332 | 0.26054123 | 2.4278308 | 20 | — | — |
| 198055 2004 $RF_{307}$ | 15.2 | $X$ | 239.87541 | 322.07350 | 83.16281 | 12.98358 | 0.2079570 | 0.22842317 | 2.6503869 | 20 | 6 22.1 | 19.2 |
| 198056 2004 $RT_{309}$ | 16.8 | $X$ | 89.34725 | 270.62770 | 45.61314 | 6.84516 | 0.1238266 | 0.26173480 | 2.4204442 | 20 | — | — |
| 198057 2004 $RB_{310}$ | 16.0 | $X$ | 269.05157 | 203.75282 | 225.36962 | 5.94019 | 0.3071986 | 0.23860408 | 2.5744481 | 20 | 8 10.4 | 19.5 |
| 198058 2004 $RD_{311}$ | 16.9 | $X$ | 85.43375 | 295.48613 | 36.59635 | 4.42514 | 0.2828540 | 0.26198726 | 2.4188890 | 20 | — | — |
| 198059 2004 $RM_{316}$ | 15.9 | $X$ | 16.47154 | 41.34878 | 218.03437 | 14.30507 | 0.0648823 | 0.23837404 | 2.5761041 | 20 | 7 8.2 | 19.3 |
| 198060 2004 $RH_{320}$ | 16.6 | $X$ | 19.45281 | 138.74114 | 229.72364 | 8.82627 | 0.1495664 | 0.25548300 | 2.4597712 | 20 | 12 30.3 | 19.7 |
| 198061 2004 $RC_{322}$ | 16.7 | $X$ | 228.54714 | 111.33693 | 278.70878 | 3.27918 | 0.2270822 | 0.23060511 | 2.6336421 | 20 | 5 21.3 | 20.9 |
| 198062 2004 $RH_{322}$ | 16.1 | $X$ | 333.74556 | 44.33859 | 242.28072 | 4.07631 | 0.2940189 | 0.23646235 | 2.5899699 | 20 | 5 12.1 | 17.8 |
| 198063 2004 $RL_{323}$ | 15.9 | $X$ | 185.94952 | 209.19875 | 221.45202 | 13.54154 | 0.2721124 | 0.22705216 | 2.6610455 | 20 | 6 5.5 | 20.8 |
| 198064 2004 $RG_{325}$ | 15.4 | $X$ | 274.55168 | 326.12001 | 12.36563 | 16.23715 | 0.0985550 | 0.22860784 | 2.6489594 | 20 | 5 14.5 | 19.2 |
| 198065 2004 $RO_{325}$ | 16.5 | $X$ | 284.19029 | 169.53369 | 246.15173 | 12.68643 | 0.2863675 | 0.23939830 | 2.5687510 | 20 | 8 13.3 | 19.8 |
| 198066 2004 $RB_{326}$ | 15.8 | $X$ | 258.29028 | 19.48949 | 349.31938 | 11.52100 | 0.1813030 | 0.23017000 | 2.6369602 | 20 | 5 25.6 | 19.9 |
| 198067 2004 $RS_{327}$ | 16.9 | $X$ | 13.07817 | 162.56841 | 196.70709 | 7.34576 | 0.0832072 | 0.25416817 | 2.4682470 | 20 | 11 30.3 | 19.9 |
| 198068 2004 $RU_{328}$ | 16.4 | $X$ | 305.98940 | 357.47585 | 338.01195 | 4.84127 | 0.1529839 | 0.23682099 | 2.5873544 | 20 | 6 23.7 | 19.3 |
| 198069 2004 $RW_{330}$ | 16.9 | $X$ | 148.28154 | 255.48876 | 25.68468 | 2.19630 | 0.1661453 | 0.26656777 | 2.3910993 | 20 | — | — |
| 198070 2004 $RQ_{333}$ | 16.1 | $X$ | 55.22911 | 288.99448 | 34.16930 | 8.66844 | 0.2605696 | 0.25741994 | 2.4474168 | 20 | 12 29.3 | 20.0 |
| 198071 2004 $RT_{341}$ | 17.3 | $X$ | 118.64660 | 44.03129 | 267.20525 | 1.73439 | 0.0744157 | 0.26747568 | 2.3856855 | 20 | — | — |
| 198072 2004 $RH_{342}$ | 16.4 | $X$ | 78.16068 | 52.56838 | 239.75719 | 5.15047 | 0.1057140 | 0.25722754 | 2.4486370 | 20 | 11 28.5 | 19.7 |
| 198073 2004 $RM_{345}$ | 16.9 | $X$ | 156.67659 | 195.16244 | 213.01520 | 1.17510 | 0.0798879 | 0.22105047 | 2.7089964 | 20 | 4 7.4 | 20.9 |
| 198074 2004 $SH_{2}$ | 16.7 | $X$ | 54.67917 | 299.16620 | 75.62033 | 3.69808 | 0.2110242 | 0.26136208 | 2.4227448 | 20 | — | — |
| 198075 2004 $SK_{3}$ | 16.3 | $X$ | 34.00927 | 21.43278 | 16.43640 | 12.53564 | 0.2194828 | 0.26506385 | 2.4001353 | 20 | — | — |
| 198076 2004 $SF_{4}$ | 15.9 | $X$ | 18.33130 | 225.25816 | 319.39954 | 12.08558 | 0.1187094 | 0.22619424 | 2.6677698 | 20 | 3 24.4 | 19.0 |
| 198077 2004 $SS_{4}$ | 16.1 | $X$ | 255.49326 | 247.96518 | 192.47006 | 10.53447 | 0.2031624 | 0.23851860 | 2.5750631 | 20 | 8 24.0 | 19.7 |
| 198078 2004 $SN_{14}$ | 16.1 | $X$ | 109.42752 | 245.67593 | 74.52557 | 7.88564 | 0.1323943 | 0.26427190 | 2.4049279 | 20 | — | — |
| 198079 2004 $SP_{14}$ | 16.2 | $X$ | 333.37088 | 241.47536 | 79.50687 | 7.55487 | 0.2359488 | 0.24187409 | 2.5511921 | 20 | 7 20.5 | 18.0 |
| 198080 2004 $SM_{15}$ | 17.2 | $X$ | 23.89122 | 323.16436 | 31.67340 | 10.68146 | 0.2124465 | 0.25469037 | 2.4648720 | 20 | 12 28.8 | 20.5 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 198081 2004 $SY_{15}$ | 16.5 | X | 49.32645 | 29.30233 | 34.73486 | 10.21528 | 0.1891149 | 0.26802125 | 2.3824469 | 20 | — | — |
| 198082 2004 $SB_{18}$ | 16.4 | X | 325.43938 | 234.19058 | 129.91311 | 10.80084 | 0.2685081 | 0.24522404 | 2.5279047 | 20 | 9 13.6 | 18.0 |
| 198083 2004 $SA_{19}$ | 16.8 | X | 149.71375 | 329.57814 | 324.24200 | 3.92210 | 0.1455365 | 0.26826133 | 2.3810253 | 20 | — | — |
| 198084 2004 $SG_{21}$ | 15.4 | X | 145.78201 | 266.43467 | 144.95086 | 23.50600 | 0.2990379 | 0.21641167 | 2.7475711 | 20 | 4 22.4 | 20.7 |
| 198085 2004 $SD_{22}$ | 16.8 | X | 20.34954 | 291.98179 | 74.60183 | 2.26225 | 0.1900310 | 0.25766329 | 2.4458755 | 20 | — | — |
| 198086 2004 $SL_{23}$ | 16.6 | X | 276.07307 | 211.98100 | 18.65669 | 2.81313 | 0.1158319 | 0.27490435 | 2.3425110 | 20 | — | — |
| 198087 2004 $ST_{24}$ | 16.3 | X | 146.35234 | 160.10805 | 255.24411 | 2.01976 | 0.0903212 | 0.21959276 | 2.7209718 | 20 | 4 5.2 | 20.3 |
| 198088 2004 $SH_{25}$ | 16.6 | X | 22.55720 | 216.27471 | 27.89825 | 3.54379 | 0.0925433 | 0.23281893 | 2.6169204 | 20 | 7 1.9 | 19.5 |
| 198089 2004 $ST_{25}$ | 17.6 | X | 5.23819 | 203.22339 | 206.82541 | 3.96455 | 0.2174654 | 0.25599397 | 2.4564969 | 20 | — | — |
| 198090 2004 $SC_{27}$ | 17.1 | X | 228.44318 | 322.10522 | 273.63041 | 1.41411 | 0.1675743 | 0.27365943 | 2.3496099 | 20 | — | — |
| 198091 2004 $SS_{27}$ | 17.6 | X | 345.02760 | 272.00588 | 171.92302 | 9.02964 | 0.2057067 | 0.26059823 | 2.4274767 | 20 | — | — |
| 198092 2004 $SU_{27}$ | 17.5 | X | 341.88781 | 265.35610 | 183.64741 | 1.98380 | 0.1543804 | 0.26184640 | 2.4197564 | 20 | — | — |
| 198093 2004 $SW_{30}$ | 16.4 | X | 216.49271 | 1.72510 | 9.59435 | 2.46043 | 0.1128861 | 0.22675013 | 2.6634079 | 20 | 4 23.5 | 20.4 |
| 198094 2004 $SK_{32}$ | 16.4 | X | 339.01362 | 247.40305 | 50.80482 | 6.10177 | 0.2101643 | 0.23819298 | 2.5774094 | 20 | 6 27.1 | 18.6 |
| 198095 2004 $SY_{32}$ | 16.1 | X | 55.71284 | 28.10147 | 40.84966 | 9.43836 | 0.1160837 | 0.26878434 | 2.3779355 | 20 | — | — |
| 198096 2004 $SR_{37}$ | 16.1 | X | 227.45969 | 309.16514 | 62.10720 | 4.88841 | 0.1192043 | 0.22761571 | 2.6566514 | 20 | 5 5.6 | 20.0 |
| 198097 2004 $SL_{38}$ | 16.6 | X | 310.88847 | 152.89964 | 184.56877 | 13.96469 | 0.1823378 | 0.23873797 | 2.5734855 | 20 | 6 29.7 | 19.7 |
| 198098 2004 $SL_{40}$ | 15.5 | X | 120.18904 | 268.43991 | 171.28394 | 8.46690 | 0.2056370 | 0.21472001 | 2.7619832 | 20 | 4 22.9 | 19.8 |
| 198099 2004 $SO_{40}$ | 16.3 | X | 282.96426 | 353.68429 | 9.11624 | 4.72473 | 0.2742133 | 0.23498326 | 2.6008268 | 20 | 6 5.4 | 19.8 |
| 198100 2004 $SQ_{41}$ | 16.8 | X | 227.46606 | 322.75870 | 267.25739 | 6.22723 | 0.0701649 | 0.27099848 | 2.3649655 | 20 | — | — |
| 198101 2004 $SJ_{44}$ | 17.1 | X | 115.89925 | 94.37117 | 215.74250 | 2.40558 | 0.1987957 | 0.26402348 | 2.4064362 | 20 | — | — |
| 198102 2004 $SX_{47}$ | 15.5 | X | 5.05645 | 290.43181 | 13.06159 | 15.12998 | 0.1241261 | 0.23927508 | 2.5696328 | 20 | 9 6.9 | 18.4 |
| 198103 2004 $SZ_{48}$ | 15.8 | X | 118.42638 | 320.62519 | 21.64185 | 10.70371 | 0.2189384 | 0.27024278 | 2.3693723 | 20 | — | — |
| 198104 2004 $SO_{49}$ | 16.8 | X | 5.02087 | 240.02871 | 194.32228 | 5.98409 | 0.1100751 | 0.26261021 | 2.4150622 | 20 | — | — |
| 198105 2004 $SS_{50}$ | 16.3 | X | 334.34848 | 281.80362 | 11.63805 | 14.48466 | 0.2223351 | 0.23664627 | 2.5886278 | 20 | 6 1.6 | 18.9 |
| 198106 2004 $SH_{51}$ | 15.6 | X | 163.27487 | 7.98839 | 47.23815 | 13.46790 | 0.1559924 | 0.21770698 | 2.7366619 | 20 | 4 28.7 | 20.0 |
| 198107 2004 $SG_{52}$ | 16.4 | X | 212.84364 | 297.45907 | 324.30931 | 6.35063 | 0.0871063 | 0.27271115 | 2.3550535 | 20 | — | — |
| 198108 2004 $SU_{53}$ | 16.5 | X | 72.62609 | 261.40639 | 80.72554 | 3.07904 | 0.1201765 | 0.25956499 | 2.4339144 | 20 | — | — |
| 198109 2004 $SY_{54}$ | 15.3 | X | 204.52448 | 261.34475 | 159.97860 | 12.89300 | 0.1636021 | 0.22539754 | 2.6740525 | 20 | 6 13.4 | 19.8 |
| 198110 Heathrhoades | 16.2 | X | 283.70924 | 197.11401 | 219.00663 | 4.07029 | 0.2145866 | 0.23963006 | 2.5670945 | 20 | 8 30.6 | 19.0 |
| 198111 2004 $SZ_{56}$ | 16.0 | X | 196.02987 | 63.46889 | 138.67751 | 6.09345 | 0.0751369 | 0.25848456 | 2.4406920 | 20 | 12 13.7 | 19.4 |
| 198112 2004 $TM_{1}$ | 16.2 | X | 163.81244 | 185.56471 | 208.28047 | 7.91112 | 0.2699130 | 0.21801963 | 2.7340450 | 20 | 4 5.9 | 21.0 |
| 198113 2004 $TY_{1}$ | 16.9 | X | 126.15043 | 121.76631 | 200.93374 | 6.11406 | 0.1338349 | 0.26731866 | 2.3866196 | 20 | — | — |
| 198114 2004 $TQ_{2}$ | 17.0 | X | 312.96790 | 305.04385 | 208.77737 | 9.48896 | 0.1496724 | 0.26456675 | 2.4031408 | 20 | — | — |
| 198115 2004 $TV_{2}$ | 15.8 | X | 79.39618 | 221.70902 | 12.01990 | 4.68662 | 0.1887416 | 0.24234384 | 2.5478942 | 20 | 9 23.3 | 19.5 |
| 198116 2004 $TJ_{4}$ | 16.8 | X | 324.22735 | 177.29082 | 202.72058 | 0.72528 | 0.2011724 | 0.24502145 | 2.5292979 | 20 | 10 6.5 | 18.8 |
| 198117 2004 $TF_{5}$ | 15.8 | X | 44.12104 | 113.26884 | 38.33615 | 6.46723 | 0.0042521 | 0.21697485 | 2.7428146 | 20 | 3 23.4 | 19.4 |
| 198118 2004 $TJ_{6}$ | 16.7 | X | 11.08798 | 212.24275 | 148.36820 | 15.17572 | 0.2108672 | 0.25349583 | 2.4726093 | 20 | 12 19.5 | 19.9 |
| 198119 2004 $TX_{8}$ | 17.5 | X | 53.40842 | 321.74419 | 27.25246 | 1.46118 | 0.1970693 | 0.25799726 | 2.4437643 | 20 | — | — |
| 198120 2004 $TZ_{11}$ | 17.1 | X | 112.39270 | 278.30885 | 45.46418 | 3.65963 | 0.2048057 | 0.26564206 | 2.3966512 | 20 | — | — |
| 198121 2004 $TM_{12}$ | 15.8 | X | 173.59413 | 317.39633 | 171.32055 | 13.13462 | 0.2029054 | 0.23045297 | 2.6348012 | 20 | 8 5.4 | 20.4 |
| 198122 2004 $TY_{14}$ | 17.1 | X | 92.64411 | 197.72853 | 159.82988 | 3.61679 | 0.1444768 | 0.26588386 | 2.3951979 | 20 | — | — |
| 198123 2004 $TB_{15}$ | 17.1 | X | 228.88620 | 75.62322 | 352.56992 | 2.67129 | 0.1050142 | 0.23679670 | 2.5875313 | 20 | 7 22.9 | 20.7 |
| 198124 2004 $TT_{15}$ | 17.2 | X | 8.32351 | 28.63421 | 31.24462 | 2.81515 | 0.1747089 | 0.25989312 | 2.4318654 | 20 | — | — |
| 198125 2004 $TV_{17}$ | 16.4 | X | 312.27814 | 312.68736 | 28.23185 | 11.96407 | 0.3129098 | 0.23894572 | 2.5719936 | 20 | 6 13.3 | 19.1 |
| 198126 2004 $TS_{18}$ | 16.4 | X | 310.90757 | 194.79357 | 158.14667 | 7.16739 | 0.1551331 | 0.23937766 | 2.5688987 | 20 | 7 27.7 | 19.2 |
| 198127 2004 $TE_{23}$ | 16.8 | X | 155.81769 | 342.65331 | 273.32575 | 1.83762 | 0.1719762 | 0.26200269 | 2.4187940 | 20 | 12 30.5 | 20.5 |
| 198128 2004 $TS_{25}$ | 16.4 | X | 244.12940 | 210.88442 | 333.34038 | 1.54882 | 0.1755461 | 0.26114185 | 2.4241067 | 20 | — | — |
| 198129 2004 $TG_{28}$ | 16.3 | X | 242.97529 | 353.78615 | 184.12261 | 5.63134 | 0.0435064 | 0.26015619 | 2.4302257 | 20 | — | — |
| 198130 2004 $TZ_{30}$ | 16.7 | X | 221.03085 | 65.11539 | 334.53558 | 5.28134 | 0.2308310 | 0.23005793 | 2.6378165 | 20 | 5 25.8 | 21.2 |
| 198131 2004 $TS_{31}$ | 16.2 | X | 232.35075 | 179.91179 | 225.97505 | 3.25887 | 0.2447377 | 0.23181801 | 2.6244477 | 20 | 6 12.8 | 20.4 |
| 198132 2004 $TQ_{32}$ | 16.4 | X | 30.17357 | 307.43636 | 273.73621 | 2.34982 | 0.0333170 | 0.22895770 | 2.6462602 | 20 | 6 4.9 | 19.7 |
| 198133 2004 $TX_{33}$ | 16.3 | X | 300.10190 | 300.22998 | 79.47937 | 3.11039 | 0.1416226 | 0.24118205 | 2.5560699 | 20 | 8 21.8 | 18.9 |
| 198134 2004 $TT_{34}$ | 16.1 | X | 155.06306 | 231.33105 | 187.92531 | 9.57518 | 0.1429324 | 0.22164332 | 2.7041636 | 20 | 4 25.3 | 20.3 |
| 198135 2004 $TK_{35}$ | 16.7 | X | 165.78596 | 309.53326 | 212.48211 | 5.98026 | 0.0884247 | 0.24122716 | 2.5557513 | 20 | 9 12.3 | 20.5 |
| 198136 2004 $TX_{35}$ | 16.6 | X | 337.05651 | 326.87622 | 9.37983 | 3.91189 | 0.1537956 | 0.24190010 | 2.5510092 | 20 | 8 28.6 | 19.0 |
| 198137 2004 $TT_{36}$ | 16.5 | X | 183.33327 | 18.03469 | 15.55409 | 1.74149 | 0.0842976 | 0.22310493 | 2.6923402 | 20 | 4 17.9 | 20.5 |
| 198138 2004 $TW_{37}$ | 16.5 | X | 229.90562 | 155.60184 | 27.27315 | 6.97197 | 0.0702696 | 0.25681408 | 2.4512644 | 20 | 12 31.9 | 19.6 |
| 198139 2004 $TT_{38}$ | 17.0 | X | 84.15471 | 19.54314 | 169.55183 | 2.33541 | 0.0854892 | 0.23238953 | 2.6201431 | 20 | 7 15.5 | 20.5 |
| 198140 2004 $TB_{39}$ | 17.5 | X | 130.39763 | 109.92652 | 179.14842 | 2.64406 | 0.1693173 | 0.26204842 | 2.4185126 | 20 | — | — |
| 198141 2004 $TB_{40}$ | 16.5 | X | 169.46510 | 16.08580 | 203.23498 | 2.41538 | 0.1329058 | 0.25520537 | 2.4615548 | 20 | 11 29.9 | 20.1 |
| 198142 2004 $TF_{42}$ | 16.5 | X | 301.75532 | 99.60395 | 285.90267 | 2.33157 | 0.1164661 | 0.24122905 | 2.5557379 | 20 | 9 2.9 | 19.3 |
| 198143 2004 $TA_{46}$ | 16.6 | X | 41.34482 | 31.02533 | 264.33549 | 1.17642 | 0.0978548 | 0.24486324 | 2.5303873 | 20 | 10 13.8 | 19.8 |
| 198144 2004 $TK_{46}$ | 16.7 | X | 30.41323 | 323.26556 | 352.62557 | 1.55333 | 0.1173599 | 0.24679087 | 2.5171938 | 20 | 10 29.7 | 19.6 |
| 198145 2004 $TC_{48}$ | 15.8 | X | 41.40470 | 224.13984 | 29.72331 | 4.43249 | 0.1810279 | 0.23793236 | 2.5792912 | 20 | 9 1.5 | 18.8 |
| 198146 2004 $TE_{50}$ | 16.4 | X | 311.85923 | 341.58601 | 334.15625 | 3.76463 | 0.1478059 | 0.23222624 | 2.6213712 | 20 | 6 4.7 | 19.4 |
| 198147 2004 $TR_{51}$ | 16.3 | X | 214.57045 | 135.81899 | 261.31179 | 2.94970 | 0.0986881 | 0.22661394 | 2.6644749 | 20 | 5 25.8 | 20.2 |
| 198148 2004 $TY_{52}$ | 16.4 | X | 312.27401 | 29.94477 | 22.52510 | 1.08865 | 0.1550398 | 0.24604678 | 2.5222663 | 20 | 11 1.1 | 18.6 |
| 198149 2004 $TL_{53}$ | 16.5 | X | 193.44891 | 28.57028 | 37.74666 | 3.97832 | 0.1738921 | 0.22680765 | 2.6629576 | 20 | 6 7.4 | 20.9 |
| 198150 2004 $TM_{53}$ | 16.7 | X | 163.08418 | 226.91280 | 203.62578 | 1.36736 | 0.0462836 | 0.22318412 | 2.6917033 | 20 | 5 11.9 | 20.3 |
| 198151 2004 $TN_{53}$ | 16.9 | X | 210.48310 | 44.54854 | 34.34307 | 4.08587 | 0.1105711 | 0.23174603 | 2.6249912 | 20 | 7 15.3 | 20.8 |
| 198152 2004 $TY_{53}$ | 16.7 | X | 239.46275 | 194.70563 | 172.78990 | 0.73301 | 0.1034612 | 0.22695895 | 2.6617739 | 20 | 5 15.0 | 20.5 |
| 198153 2004 $TD_{55}$ | 16.2 | X | 210.70392 | 134.20122 | 187.50768 | 2.08799 | 0.3037812 | 0.21846037 | 2.7303664 | 20 | 2 14.9 | 21.2 |
| 198154 2004 $TJ_{55}$ | 16.5 | X | 263.67569 | 336.28662 | 71.95754 | 1.88579 | 0.1631503 | 0.23667284 | 2.5884340 | 20 | 7 31.1 | 19.7 |
| 198155 2004 $TD_{61}$ | 16.6 | X | 186.12121 | 148.79374 | 155.09101 | 7.34459 | 0.1284591 | 0.27482996 | 2.3429337 | 20 | — | — |
| 198156 2004 $TB_{66}$ | 16.9 | X | 46.51258 | 220.15048 | 133.27337 | 3.51450 | 0.1925900 | 0.25699153 | 2.4501359 | 20 | — | — |
| 198157 2004 $TM_{66}$ | 15.8 | X | 271.68866 | 310.07352 | 62.40101 | 9.46105 | 0.0581069 | 0.23432749 | 2.6056769 | 20 | 7 9.2 | 19.3 |
| 198158 2004 $TP_{69}$ | 16.0 | X | 248.25263 | 297.34103 | 94.61993 | 4.14871 | 0.0762232 | 0.23496238 | 2.6009809 | 20 | 6 30.9 | 19.3 |
| 198159 2004 $TA_{71}$ | 16.6 | X | 195.94549 | 53.37703 | 231.66941 | 4.73188 | 0.2178627 | 0.27417377 | 2.3466705 | 20 | — | — |
| 198160 2004 $TR_{71}$ | 17.4 | X | 223.18494 | 152.14365 | 260.42204 | 0.46605 | 0.0818028 | 0.23300479 | 2.6155286 | 20 | 6 26.8 | 21.1 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 198161 2004 $TR_{72}$ | 16.7 | $X$ | 228.59418 | 120.56432 | 81.72439 | 2.02932 | 0.1339669 | 0.26006083 | 2.4308198 | 20 | — | — |
| 198162 2004 $TG_{73}$ | 15.9 | $X$ | 298.20965 | 227.39174 | 27.34449 | 9.48398 | 0.1013301 | 0.21936421 | 2.7228614 | 20 | 3 6.1 | 19.6 |
| 198163 2004 $TS_{73}$ | 16.1 | $X$ | 226.82762 | 204.83389 | 224.09640 | 8.48198 | 0.2272923 | 0.23243621 | 2.6197923 | 20 | 7 7.0 | 20.5 |
| 198164 2004 $TZ_{73}$ | 16.8 | $X$ | 291.38911 | 25.39316 | 345.38160 | 2.30673 | 0.2462091 | 0.23758020 | 2.5818394 | 20 | 7 4.7 | 19.7 |
| 198165 2004 $TZ_{75}$ | 15.9 | $X$ | 274.31802 | 135.22650 | 209.82885 | 13.73055 | 0.2117300 | 0.23139924 | 2.6276132 | 20 | 5 12.9 | 19.6 |
| 198166 2004 $TP_{77}$ | 16.3 | $X$ | 151.89121 | 170.92746 | 17.41977 | 9.03426 | 0.0862167 | 0.24304025 | 2.5430247 | 20 | 10 4.1 | 20.0 |
| 198167 2004 $TO_{79}$ | 16.5 | $X$ | 203.59812 | 242.27002 | 208.35987 | 2.91140 | 0.1657210 | 0.23234484 | 2.6204791 | 20 | 7 18.1 | 20.7 |
| 198168 2004 $TM_{81}$ | 17.1 | $X$ | 270.95821 | 28.97293 | 348.00034 | 2.51417 | 0.1250679 | 0.23653964 | 2.5894057 | 20 | 7 3.5 | 20.4 |
| 198169 2004 $TM_{86}$ | 17.1 | $X$ | 282.03040 | 234.61801 | 196.04455 | 2.90170 | 0.0595236 | 0.24740301 | 2.5130400 | 20 | 10 14.8 | 20.1 |
| 198170 2004 $TQ_{90}$ | 16.4 | $X$ | 287.04870 | 124.83687 | 242.96218 | 3.13482 | 0.1555719 | 0.23696862 | 2.5862797 | 20 | 7 8.4 | 19.6 |
| 198171 2004 $TA_{92}$ | 17.1 | $X$ | 130.43469 | 57.67286 | 215.68101 | 4.98425 | 0.1335001 | 0.25796418 | 2.4439732 | 20 | 12 28.4 | 20.9 |
| 198172 2004 $TF_{93}$ | 16.7 | $X$ | 161.46474 | 236.65838 | 1.93804 | 1.00418 | 0.1412927 | 0.25610036 | 2.4558165 | 20 | 12 15.1 | 20.5 |
| 198173 2004 $TV_{97}$ | 16.4 | $X$ | 291.83265 | 170.99326 | 190.52902 | 2.63601 | 0.0769341 | 0.23643099 | 2.5901989 | 20 | 7 19.3 | 19.7 |
| 198174 2004 $TY_{101}$ | 16.1 | $X$ | 236.91944 | 37.98333 | 226.58999 | 5.08943 | 0.0384191 | 0.20829051 | 2.8185326 | 20 | 1 10.4 | 20.3 |
| 198175 2004 $TG_{103}$ | 16.1 | $X$ | 224.59792 | 291.53503 | 242.81755 | 4.10252 | 0.0270569 | 0.25287493 | 2.4766551 | 20 | 12 18.6 | 19.1 |
| 198176 2004 $TK_{103}$ | 15.6 | $X$ | 57.79043 | 43.75959 | 226.36937 | 10.13109 | 0.0976076 | 0.24219787 | 2.5489179 | 20 | 9 29.2 | 19.0 |
| 198177 2004 $TL_{103}$ | 16.5 | $X$ | 267.93720 | 242.26037 | 210.27853 | 12.43895 | 0.2175229 | 0.24434326 | 2.5339758 | 20 | 9 25.8 | 19.7 |
| 198178 2004 $TL_{104}$ | 16.0 | $X$ | 303.89275 | 204.70779 | 132.25073 | 10.23904 | 0.1060057 | 0.23454583 | 2.6040595 | 20 | 6 29.4 | 19.3 |
| 198179 2004 $TJ_{106}$ | 16.2 | $X$ | 89.99542 | 219.02291 | 176.20953 | 6.00094 | 0.0449817 | 0.27158904 | 2.3615359 | 20 | — | — |
| 198180 2004 $TH_{107}$ | 16.1 | $X$ | 258.70295 | 244.34087 | 188.59570 | 14.79905 | 0.0998152 | 0.24260984 | 2.5460315 | 20 | 9 4.1 | 19.5 |
| 198181 2004 $TE_{108}$ | 16.4 | $X$ | 81.15168 | 242.70298 | 75.28243 | 6.46296 | 0.1072657 | 0.25744007 | 2.4472892 | 20 | — | — |
| 198182 2004 $TR_{108}$ | 15.6 | $X$ | 11.36838 | 226.07768 | 10.03816 | 8.93561 | 0.1513829 | 0.23304265 | 2.6152454 | 20 | 5 31.8 | 18.3 |
| 198183 2004 $TD_{109}$ | 15.9 | $X$ | 239.06026 | 193.34394 | 219.61297 | 14.53870 | 0.0735268 | 0.23371841 | 2.6102019 | 20 | 7 14.2 | 19.8 |
| 198184 2004 $TU_{109}$ | 15.3 | $X$ | 247.67965 | 269.04204 | 118.72439 | 12.86032 | 0.1749438 | 0.23228284 | 2.6209453 | 20 | 6 13.1 | 19.3 |
| 198185 2004 $TC_{114}$ | 15.9 | $X$ | 230.18528 | 236.74377 | 227.42533 | 3.90151 | 0.2262108 | 0.23734062 | 2.5835765 | 20 | 8 24.4 | 19.9 |
| 198186 2004 $TE_{114}$ | 15.9 | $X$ | 326.69443 | 258.48634 | 58.39923 | 3.60135 | 0.1837419 | 0.23519294 | 2.5992807 | 20 | 7 1.2 | 18.2 |
| 198187 2004 $TM_{124}$ | 16.1 | $X$ | 10.25569 | 64.12552 | 36.76311 | 10.01847 | 0.1493109 | 0.26731819 | 2.3866224 | 20 | — | — |
| 198188 2004 $TC_{125}$ | 16.0 | $X$ | 289.51934 | 262.46846 | 34.80228 | 11.89245 | 0.1550816 | 0.22990421 | 2.6389921 | 20 | 4 8.4 | 19.6 |
| 198189 2004 $TG_{125}$ | 16.8 | $X$ | 264.07452 | 58.03058 | 16.03346 | 5.53956 | 0.1557772 | 0.24360647 | 2.5390826 | 20 | 9 8.8 | 19.8 |
| 198190 2004 $TD_{126}$ | 17.2 | $X$ | 28.07752 | 233.92064 | 85.09604 | 3.84837 | 0.2375283 | 0.25106509 | 2.4885431 | 20 | 11 20.7 | 20.2 |
| 198191 2004 $TU_{127}$ | 16.9 | $X$ | 128.44360 | 280.54542 | 57.72670 | 7.93612 | 0.1298297 | 0.26940739 | 2.3742679 | 20 | — | — |
| 198192 2004 $TR_{128}$ | 17.0 | $X$ | 26.81261 | 248.55113 | 135.33686 | 2.55754 | 0.1662775 | 0.25751929 | 2.4467872 | 20 | — | — |
| 198193 2004 $TK_{129}$ | 16.6 | $X$ | 294.20420 | 284.68967 | 96.38367 | 4.45596 | 0.1468057 | 0.24062341 | 2.5600246 | 20 | 8 12.2 | 19.4 |
| 198194 2004 $TH_{131}$ | 16.8 | $X$ | 0.52624 | 257.40901 | 69.58244 | 4.66687 | 0.2728614 | 0.24508448 | 2.5288642 | 20 | 10 21.6 | 18.8 |
| 198195 2004 $TY_{133}$ | 15.8 | $X$ | 270.82038 | 129.23109 | 216.75993 | 14.30090 | 0.1745651 | 0.23011251 | 2.6373994 | 20 | 5 14.9 | 19.5 |
| 198196 2004 $TY_{136}$ | 15.5 | $X$ | 142.20558 | 90.78351 | 4.82370 | 13.73600 | 0.0878862 | 0.22326215 | 2.6910761 | 20 | 5 18.3 | 19.7 |
| 198197 2004 $TO_{137}$ | 16.5 | $X$ | 318.05503 | 24.38738 | 65.63006 | 4.22628 | 0.2120546 | 0.25258339 | 2.4785605 | 20 | — | — |
| 198198 2004 $TZ_{137}$ | 16.5 | $X$ | 347.93329 | 192.39051 | 127.39348 | 4.44547 | 0.2991105 | 0.24283755 | 2.5444396 | 20 | 9 5.4 | 17.7 |
| 198199 2004 $TA_{138}$ | 16.1 | $X$ | 193.06242 | 215.67369 | 186.03466 | 12.94055 | 0.1875559 | 0.22400678 | 2.6851091 | 20 | 5 9.6 | 20.7 |
| 198200 2004 $TX_{138}$ | 16.4 | $X$ | 215.63522 | 84.85480 | 328.63750 | 10.45307 | 0.1244545 | 0.23226753 | 2.6210605 | 20 | 6 15.7 | 20.6 |
| 198201 2004 $TY_{141}$ | 16.5 | $X$ | 320.93749 | 214.42845 | 75.60345 | 1.95838 | 0.0536290 | 0.23175327 | 2.6249365 | 20 | 5 27.1 | 19.7 |
| 198202 2004 $TE_{142}$ | 16.0 | $X$ | 115.20661 | 131.18496 | 253.88589 | 2.68013 | 0.1062900 | 0.20982169 | 2.8048037 | 20 | 1 26.2 | 19.9 |
| 198203 2004 $TL_{142}$ | 16.9 | $X$ | 155.89021 | 133.18085 | 314.74731 | 0.99552 | 0.0443386 | 0.22718109 | 2.6600386 | 20 | 5 25.5 | 20.6 |
| 198204 2004 $TH_{144}$ | 15.7 | $X$ | 332.66937 | 242.22271 | 33.49142 | 12.39837 | 0.1575205 | 0.23047954 | 2.6345986 | 20 | 5 11.6 | 18.4 |
| 198205 2004 $TM_{149}$ | 16.6 | $X$ | 128.49109 | 238.97598 | 263.01649 | 2.37666 | 0.0785665 | 0.23102907 | 2.6304192 | 20 | 7 6.4 | 20.4 |
| 198206 2004 $TH_{150}$ | 16.6 | $X$ | 242.98170 | 318.80911 | 243.99679 | 1.40914 | 0.1461349 | 0.26378367 | 2.4078944 | 20 | — | — |
| 198207 2004 $TZ_{150}$ | 17.0 | $X$ | 191.64373 | 324.88436 | 290.13737 | 1.29151 | 0.1632808 | 0.26655026 | 2.3912041 | 20 | — | — |
| 198208 2004 $TV_{156}$ | 17.2 | $X$ | 236.89080 | 2.97982 | 52.83464 | 2.32509 | 0.0786155 | 0.23570117 | 2.5955430 | 20 | 7 19.1 | 20.8 |
| 198209 2004 $TE_{160}$ | 15.7 | $X$ | 275.25176 | 71.87903 | 219.03866 | 12.41889 | 0.1788184 | 0.22231351 | 2.6987261 | 20 | 3 5.4 | 19.9 |
| 198210 2004 $TF_{163}$ | 16.4 | $X$ | 4.05151 | 79.69578 | 186.55308 | 2.68919 | 0.1887387 | 0.23333987 | 2.6130241 | 20 | 7 6.5 | 18.7 |
| 198211 2004 $TN_{164}$ | 15.7 | $X$ | 171.93443 | 279.41513 | 202.12265 | 12.30584 | 0.1302250 | 0.23149909 | 2.6268575 | 20 | 7 25.5 | 20.1 |
| 198212 2004 $TU_{165}$ | 17.1 | $X$ | 163.80537 | 303.09313 | 300.26945 | 1.76622 | 0.1842078 | 0.26175629 | 2.4203117 | 20 | 12 21.7 | 20.9 |
| 198213 2004 $TE_{166}$ | 17.1 | $X$ | 216.23214 | 68.04850 | 211.62940 | 2.62309 | 0.1363929 | 0.27670521 | 2.3323362 | 20 | — | — |
| 198214 2004 $TQ_{167}$ | 16.7 | $X$ | 265.35685 | 96.00717 | 200.63515 | 3.71026 | 0.1273781 | 0.22514924 | 2.6760182 | 20 | 3 10.8 | 20.7 |
| 198215 2004 $TR_{167}$ | 17.0 | $X$ | 272.32610 | 97.02676 | 234.71307 | 0.72938 | 0.1085981 | 0.23141545 | 2.6274905 | 20 | 5 6.5 | 20.5 |
| 198216 2004 $TY_{168}$ | 16.7 | $X$ | 254.85083 | 183.53757 | 174.46290 | 7.02999 | 0.2708527 | 0.23161372 | 2.6259908 | 20 | 5 3.2 | 20.9 |
| 198217 2004 $TS_{171}$ | 15.6 | $X$ | 1.02683 | 96.11909 | 157.82512 | 13.78148 | 0.0791323 | 0.23135935 | 2.6279152 | 20 | 6 9.9 | 19.0 |
| 198218 2004 $TZ_{173}$ | 15.3 | $X$ | 237.38856 | 19.04010 | 359.47343 | 13.13723 | 0.2934694 | 0.22527786 | 2.6749995 | 20 | 5 5.7 | 20.1 |
| 198219 2004 $TM_{175}$ | 16.9 | $X$ | 282.56751 | 188.48104 | 213.38779 | 3.13018 | 0.2391056 | 0.23936648 | 2.5689787 | 20 | 8 4.4 | 19.9 |
| 198220 2004 $TQ_{175}$ | 17.0 | $X$ | 251.32111 | 212.55643 | 208.07985 | 2.76648 | 0.1974486 | 0.23683179 | 2.5872757 | 20 | 7 25.8 | 20.7 |
| 198221 2004 $TK_{176}$ | 15.8 | $X$ | 200.63303 | 217.27376 | 216.29258 | 10.68922 | 0.2415257 | 0.22638762 | 2.6662504 | 20 | 6 20.3 | 20.5 |
| 198222 2004 $TL_{176}$ | 16.1 | $X$ | 340.20070 | 275.72533 | 43.11823 | 4.43982 | 0.2474669 | 0.23916242 | 2.5704397 | 20 | 8 6.0 | 17.8 |
| 198223 2004 $TL_{180}$ | 17.5 | $X$ | 310.62200 | 306.65861 | 152.29371 | 2.36671 | 0.1757515 | 0.25597584 | 2.4566129 | 20 | — | — |
| 198224 2004 $TX_{180}$ | 17.5 | $X$ | 100.87527 | 132.63819 | 167.05460 | 2.20000 | 0.2360027 | 0.26163929 | 2.4210332 | 20 | — | — |
| 198225 2004 $TR_{182}$ | 16.3 | $X$ | 120.11845 | 107.51255 | 329.27406 | 4.17217 | 0.0783051 | 0.21922755 | 2.7239928 | 20 | 3 31.1 | 20.2 |
| 198226 2004 $TF_{184}$ | 17.0 | $X$ | 159.54708 | 150.86037 | 346.92325 | 4.26112 | 0.1817228 | 0.23444519 | 2.6048047 | 20 | 8 7.9 | 21.3 |
| 198227 2004 $TE_{186}$ | 16.2 | $X$ | 117.86666 | 342.43858 | 225.36673 | 3.88662 | 0.0282676 | 0.24280790 | 2.5446468 | 20 | 9 14.9 | 19.7 |
| 198228 2004 $TO_{186}$ | 16.3 | $X$ | 305.95496 | 312.09285 | 208.92276 | 6.53308 | 0.1317313 | 0.26558537 | 2.3969922 | 20 | — | — |
| 198229 2004 $TV_{186}$ | 17.3 | $X$ | 131.32097 | 306.91847 | 2.35451 | 2.37202 | 0.1827043 | 0.26635510 | 2.3923720 | 20 | — | — |
| 198230 2004 $TW_{188}$ | 16.2 | $X$ | 296.40937 | 347.41214 | 197.39149 | 6.58847 | 0.0690364 | 0.26996865 | 2.3709760 | 20 | — | — |
| 198231 2004 $TY_{194}$ | 16.1 | $X$ | 66.87883 | 357.35463 | 253.65474 | 3.64804 | 0.1450744 | 0.24148882 | 2.5539048 | 20 | 9 23.2 | 19.6 |
| 198232 2004 $TU_{195}$ | 17.4 | $X$ | 123.02206 | 54.75619 | 233.70516 | 1.95333 | 0.1896721 | 0.26005881 | 2.4308323 | 20 | — | — |
| 198233 2004 $TY_{195}$ | 17.1 | $X$ | 220.67619 | 153.36863 | 303.23584 | 1.26880 | 0.0486740 | 0.23868698 | 2.5738520 | 20 | 8 26.1 | 20.6 |
| 198234 2004 $TN_{198}$ | 16.5 | $X$ | 218.06463 | 272.59874 | 191.47157 | 3.73303 | 0.1641532 | 0.23770297 | 2.5809503 | 20 | 8 19.0 | 20.3 |
| 198235 2004 $TU_{202}$ | 15.6 | $X$ | 279.68337 | 271.30048 | 38.39040 | 14.38064 | 0.0361006 | 0.22203024 | 2.7010210 | 20 | 4 28.1 | 19.2 |
| 198236 2004 $TW_{202}$ | 16.9 | $X$ | 350.95940 | 300.01289 | 21.75288 | 4.44965 | 0.2072740 | 0.24018165 | 2.5631626 | 20 | 9 8.9 | 18.9 |
| 198237 2004 $TR_{203}$ | 16.0 | $X$ | 23.55934 | 19.53770 | 240.02675 | 5.98591 | 0.0789084 | 0.23101349 | 2.6305374 | 20 | 7 22.3 | 19.2 |
| 198238 2004 $TB_{204}$ | 16.2 | $X$ | 225.04602 | 50.84173 | 40.48467 | 14.73416 | 0.2042265 | 0.23391093 | 2.6087695 | 20 | 8 13.3 | 20.6 |
| 198239 2004 $TE_{204}$ | 16.2 | $X$ | 247.63480 | 350.70644 | 317.00945 | 1.68207 | 0.0691537 | 0.21629246 | 2.7485805 | 20 | 3 12.3 | 20.0 |
| 198240 2004 $TR_{204}$ | 16.5 | $X$ | 10.61983 | 90.19817 | 229.13487 | 2.35199 | 0.0863243 | 0.24081819 | 2.5586440 | 20 | 9 27.9 | 19.6 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 198241 2004 $TU_{204}$ | 16.4 | $X$ | 222.56795 | 98.72108 | 242.53158 | 1.56309 | 0.1978688 | 0.22061494 | 2.7125606 | 20 | 3 19.4 | 21.0 |
| 198242 2004 $TV_{204}$ | 16.7 | $X$ | 259.17809 | 94.99758 | 265.18046 | 1.05966 | 0.0630235 | 0.22748312 | 2.6576835 | 20 | 6 3.6 | 20.2 |
| 198243 2004 $TN_{206}$ | 16.1 | $X$ | 325.58135 | 139.32481 | 203.57266 | 3.41434 | 0.1193214 | 0.23737435 | 2.5833318 | 20 | 8 13.0 | 18.8 |
| 198244 2004 $TS_{206}$ | 16.4 | $X$ | 100.09765 | 273.25593 | 212.38184 | 2.26449 | 0.0601088 | 0.21956134 | 2.7212314 | 20 | 5 8.1 | 20.1 |
| 198245 2004 $TB_{209}$ | 17.0 | $X$ | 90.16571 | 85.41294 | 204.91514 | 4.78223 | 0.1502295 | 0.25647984 | 2.4533936 | 20 | 12 12.2 | 20.8 |
| 198246 2004 $TS_{211}$ | 15.8 | $X$ | 335.58191 | 151.32258 | 216.51969 | 14.37563 | 0.1241069 | 0.24482490 | 2.5306514 | 20 | 10 9.8 | 18.4 |
| 198247 2004 $TP_{213}$ | 15.9 | $X$ | 63.46214 | 2.20522 | 210.11162 | 13.00312 | 0.0806516 | 0.23478543 | 2.6022875 | 20 | 7 15.5 | 19.6 |
| 198248 2004 $TB_{214}$ | 16.8 | $X$ | 251.05947 | 167.77657 | 244.52872 | 3.23585 | 0.1942506 | 0.23581728 | 2.5946909 | 20 | 7 15.0 | 20.5 |
| 198249 2004 $TA_{216}$ | 16.3 | $X$ | 317.34013 | 6.72091 | 315.97897 | 1.79024 | 0.1477680 | 0.23457480 | 2.6038451 | 20 | 6 25.8 | 19.0 |
| 198250 2004 $TS_{216}$ | 16.5 | $X$ | 293.63738 | 322.21502 | 124.31075 | 8.23689 | 0.1782937 | 0.25172227 | 2.4842099 | 20 | 11 17.1 | 18.9 |
| 198251 2004 $TV_{218}$ | 17.1 | $X$ | 226.35026 | 130.43079 | 354.86442 | 4.64950 | 0.1657234 | 0.24320006 | 2.5419106 | 20 | 9 25.7 | 20.8 |
| 198252 2004 $TD_{222}$ | 16.1 | $X$ | 261.49754 | 184.75266 | 158.57549 | 13.35165 | 0.1900914 | 0.22951559 | 2.6419702 | 20 | 5 2.1 | 20.2 |
| 198253 2004 $TE_{222}$ | 15.8 | $X$ | 285.49704 | 152.38674 | 176.97008 | 16.34516 | 0.1615350 | 0.23162766 | 2.6258854 | 20 | 5 15.7 | 19.5 |
| 198254 2004 $TJ_{224}$ | 17.4 | $X$ | 350.93802 | 41.49620 | 259.80564 | 1.60722 | 0.1273269 | 0.23998521 | 2.5645612 | 20 | 7 31.4 | 19.8 |
| 198255 2004 $TK_{224}$ | 17.6 | $X$ | 233.67108 | 353.08652 | 236.11027 | 2.24542 | 0.0563859 | 0.26823135 | 2.3812026 | 20 | — | — |
| 198256 2004 $TY_{228}$ | 16.8 | $X$ | 326.08596 | 322.61497 | 359.88531 | 0.68197 | 0.1128883 | 0.23720038 | 2.5845947 | 20 | 7 16.2 | 19.5 |
| 198257 2004 $TQ_{229}$ | 16.7 | $X$ | 175.73725 | 229.92669 | 212.67706 | 0.23523 | 0.0465318 | 0.22927318 | 2.6438321 | 20 | 6 12.0 | 20.3 |
| 198258 2004 $TX_{238}$ | 16.6 | $X$ | 137.61110 | 240.94618 | 257.74383 | 1.35087 | 0.0424403 | 0.23072489 | 2.6327306 | 20 | 7 10.1 | 20.0 |
| 198259 2004 $TN_{242}$ | 16.2 | $X$ | 80.14072 | 263.86303 | 84.34161 | 7.79379 | 0.1287096 | 0.26433271 | 2.4045590 | 20 | — | — |
| 198260 2004 $TZ_{242}$ | 16.0 | $X$ | 270.47987 | 261.01324 | 87.12224 | 13.91254 | 0.1934651 | 0.23239637 | 2.6200917 | 20 | 5 17.4 | 19.8 |
| 198261 2004 $TJ_{243}$ | 16.8 | $X$ | 226.55425 | 106.87795 | 351.93939 | 3.15229 | 0.1275711 | 0.23789248 | 2.5795794 | 20 | 8 27.2 | 20.5 |
| 198262 2004 $TS_{247}$ | 15.9 | $X$ | 306.21993 | 250.33284 | 85.37480 | 13.86690 | 0.2221196 | 0.23660512 | 2.5889279 | 20 | 6 12.7 | 18.5 |
| 198263 2004 $TW_{249}$ | 15.8 | $X$ | 238.84374 | 210.23560 | 133.20459 | 14.37339 | 0.2640667 | 0.22582622 | 2.6706674 | 20 | 4 6.4 | 20.6 |
| 198264 2004 $TB_{257}$ | 16.3 | $X$ | 248.29702 | 342.36524 | 25.11529 | 14.85770 | 0.1188461 | 0.23025039 | 2.6363463 | 20 | 5 19.4 | 20.3 |
| 198265 2004 $TH_{261}$ | 17.2 | $X$ | 5.99320 | 98.73255 | 195.43866 | 9.78025 | 0.2382467 | 0.24213196 | 2.5493804 | 20 | 8 30.9 | 19.4 |
| 198266 2004 $TT_{262}$ | 15.7 | $X$ | 208.61204 | 318.38401 | 35.00302 | 7.37916 | 0.1495855 | 0.21966337 | 2.7203887 | 20 | 3 26.4 | 20.0 |
| 198267 2004 $TV_{263}$ | 16.2 | $X$ | 271.65673 | 45.64516 | 269.45581 | 2.72576 | 0.0787371 | 0.22435704 | 2.6823138 | 20 | 4 17.1 | 19.9 |
| 198268 2004 $TK_{264}$ | 15.7 | $X$ | 337.56807 | 257.92570 | 21.07578 | 5.88020 | 0.1430691 | 0.23084070 | 2.6318500 | 20 | 5 28.7 | 18.5 |
| 198269 2004 $TQ_{264}$ | 15.9 | $X$ | 55.30224 | 267.75589 | 16.53371 | 5.00261 | 0.1494467 | 0.24573592 | 2.5243929 | 20 | 10 25.3 | 19.3 |
| 198270 2004 $TU_{264}$ | 16.8 | $X$ | 268.67123 | 70.59668 | 286.91272 | 0.90597 | 0.1655037 | 0.23187771 | 2.6239973 | 20 | 5 28.1 | 20.5 |
| 198271 2004 $TG_{265}$ | 16.8 | $X$ | 254.64475 | 329.20874 | 17.64628 | 2.62006 | 0.1254061 | 0.22743098 | 2.6580897 | 20 | 5 2.3 | 20.5 |
| 198272 2004 $TV_{266}$ | 16.6 | $X$ | 164.53899 | 243.68583 | 21.42607 | 2.07539 | 0.1779992 | 0.26151979 | 2.4217707 | 20 | — | — |
| 198273 2004 $TW_{266}$ | 16.4 | $X$ | 340.06091 | 75.82861 | 208.44688 | 3.63521 | 0.1249479 | 0.23192711 | 2.6236247 | 20 | 6 13.6 | 19.1 |
| 198274 2004 $TM_{270}$ | 16.8 | $X$ | 135.33446 | 227.36441 | 79.51728 | 2.56135 | 0.1886236 | 0.26476949 | 2.4019138 | 20 | — | — |
| 198275 2004 $TE_{274}$ | 16.1 | $X$ | 289.18667 | 57.79758 | 270.23706 | 1.52454 | 0.2107614 | 0.23111701 | 2.6297519 | 20 | 5 7.7 | 19.6 |
| 198276 2004 $TC_{276}$ | 15.8 | $X$ | 217.45105 | 93.55485 | 218.16945 | 12.17434 | 0.2289795 | 0.21593891 | 2.7515798 | 20 | 2 5.9 | 20.8 |
| 198277 2004 $TD_{276}$ | 16.6 | $X$ | 250.34498 | 233.17590 | 217.35850 | 4.53755 | 0.2389774 | 0.23892688 | 2.5721288 | 20 | 8 26.9 | 20.4 |
| 198278 2004 $TR_{282}$ | 16.2 | $X$ | 143.65990 | 253.86290 | 163.60091 | 5.24218 | 0.1105507 | 0.21974981 | 2.7196752 | 20 | 4 9.0 | 20.3 |
| 198279 2004 $TB_{290}$ | 16.8 | $X$ | 305.87378 | 279.36909 | 336.69523 | 3.86642 | 0.1007570 | 0.22218330 | 2.6997804 | 20 | 3 12.9 | 20.1 |
| 198280 2004 $TU_{293}$ | 16.7 | $X$ | 324.20923 | 111.20765 | 242.29769 | 1.65722 | 0.1705535 | 0.24060817 | 2.5601326 | 20 | 8 24.1 | 19.0 |
| 198281 2004 $TW_{293}$ | 17.1 | $X$ | 24.57563 | 295.16320 | 17.43112 | 1.81951 | 0.0824605 | 0.24344099 | 2.5402331 | 20 | 10 11.1 | 20.0 |
| 198282 2004 $TR_{295}$ | 16.5 | $X$ | 246.03394 | 312.87184 | 37.13880 | 2.48366 | 0.2029667 | 0.22637448 | 2.6663536 | 20 | 4 19.9 | 20.8 |
| 198283 2004 $TM_{296}$ | 16.1 | $X$ | 283.61869 | 65.03883 | 224.72990 | 7.68995 | 0.1084137 | 0.22095666 | 2.7097631 | 20 | 3 24.9 | 19.9 |
| 198284 2004 $TM_{297}$ | 15.7 | $X$ | 211.35862 | 244.00535 | 221.60251 | 27.24899 | 0.1869684 | 0.23393647 | 2.6085796 | 20 | 8 3.5 | 20.5 |
| 198285 2004 $TT_{297}$ | 15.3 | $X$ | 71.10157 | 235.74673 | 261.45006 | 13.17897 | 0.0378414 | 0.22232286 | 2.6986505 | 20 | 4 4.9 | 19.1 |
| 198286 2004 $TF_{298}$ | 15.5 | $X$ | 149.20893 | 192.31807 | 258.43375 | 12.49015 | 0.0521493 | 0.22555742 | 2.6727888 | 20 | 5 21.3 | 19.2 |
| 198287 2004 $TK_{298}$ | 17.4 | $X$ | 100.49347 | 266.81617 | 30.51181 | 2.09784 | 0.1982248 | 0.25983564 | 2.4322240 | 20 | — | — |
| 198288 2004 $TF_{299}$ | 15.6 | $X$ | 24.79109 | 338.18543 | 280.85822 | 17.87996 | 0.1287633 | 0.23755584 | 2.5820159 | 20 | 7 27.7 | 18.6 |
| 198289 2004 $TT_{300}$ | 15.6 | $X$ | 81.06803 | 155.91866 | 303.95732 | 7.22139 | 0.1873400 | 0.21081793 | 2.7959604 | 20 | 3 25.7 | 19.3 |
| 198290 2004 $TW_{301}$ | 16.3 | $X$ | 220.40536 | 2.08385 | 6.72972 | 14.16150 | 0.2940365 | 0.22397250 | 2.6853831 | 20 | 4 13.4 | 21.2 |
| 198291 2004 $TO_{302}$ | 16.5 | $X$ | 177.66150 | 232.74153 | 174.00337 | 4.86882 | 0.1689822 | 0.22270480 | 2.6955641 | 20 | 5 1.6 | 20.9 |
| 198292 2004 $TF_{307}$ | 15.9 | $X$ | 221.02418 | 166.96429 | 240.94628 | 13.47813 | 0.1378076 | 0.23109456 | 2.6299222 | 20 | 6 12.8 | 19.9 |
| 198293 2004 $TW_{307}$ | 16.1 | $X$ | 259.34450 | 122.63078 | 316.64276 | 6.00482 | 0.1076400 | 0.24239891 | 2.5475083 | 20 | 9 12.7 | 19.4 |
| 198294 2004 $TB_{308}$ | 16.0 | $X$ | 198.06255 | 152.62850 | 233.94854 | 5.23183 | 0.0494367 | 0.22502320 | 2.6770173 | 20 | 4 25.2 | 19.8 |
| 198295 2004 $TY_{308}$ | 16.1 | $X$ | 270.31647 | 317.41548 | 344.78353 | 11.26347 | 0.1824985 | 0.22565240 | 2.6720387 | 20 | 3 16.1 | 20.1 |
| 198296 2004 $TK_{309}$ | 16.8 | $X$ | 290.68052 | 47.61817 | 318.33314 | 5.72794 | 0.1147990 | 0.23764098 | 2.5813991 | 20 | 7 19.5 | 20.0 |
| 198297 2004 $TR_{314}$ | 17.0 | $X$ | 101.47330 | 21.32576 | 271.38795 | 2.12692 | 0.1554247 | 0.25793182 | 2.4441777 | 20 | 12 25.9 | 20.9 |
| 198298 2004 $TH_{318}$ | 16.4 | $X$ | 132.94670 | 134.89063 | 17.39179 | 6.66764 | 0.1860341 | 0.23011415 | 2.6373868 | 20 | 8 3.6 | 20.7 |
| 198299 2004 $TE_{320}$ | 16.7 | $X$ | 334.11296 | 98.35124 | 195.55128 | 3.75076 | 0.0615152 | 0.23211691 | 2.6221942 | 20 | 6 21.5 | 19.8 |
| 198300 2004 $TQ_{323}$ | 16.7 | $X$ | 170.57901 | 286.39946 | 53.78150 | 3.18384 | 0.1941163 | 0.27456243 | 2.3444554 | 20 | 1 31.9 | 20.4 |
| 198301 2004 $TR_{323}$ | 16.3 | $X$ | 118.48432 | 352.30491 | 75.13022 | 1.64716 | 0.0541767 | 0.21356084 | 2.7719685 | 20 | 3 16.9 | 20.1 |
| 198302 2004 $TW_{324}$ | 16.5 | $X$ | 171.11931 | 46.68694 | 16.40770 | 7.07532 | 0.1594535 | 0.22325727 | 2.6911153 | 20 | 5 12.8 | 20.8 |
| 198303 2004 $TX_{324}$ | 16.1 | $X$ | 311.95498 | 354.30333 | 291.69671 | 1.97022 | 0.0789085 | 0.22701117 | 2.6613657 | 20 | 5 3.7 | 19.3 |
| 198304 2004 $TC_{325}$ | 16.3 | $X$ | 193.78003 | 250.53978 | 210.67695 | 6.44034 | 0.1510207 | 0.23256092 | 2.6188556 | 20 | 7 21.9 | 20.5 |
| 198305 2004 $TK_{328}$ | 16.6 | $X$ | 327.00716 | 278.07785 | 96.83947 | 7.90925 | 0.1743933 | 0.24569012 | 2.5247066 | 20 | 10 10.9 | 18.9 |
| 198306 2004 $TX_{328}$ | 15.9 | $X$ | 310.12247 | 217.17855 | 114.57816 | 11.15099 | 0.1322571 | 0.23754401 | 2.5821016 | 20 | 6 28.7 | 18.9 |
| 198307 2004 $TT_{330}$ | 15.8 | $X$ | 224.55557 | 318.64084 | 53.63567 | 4.65136 | 0.1283967 | 0.22469493 | 2.6796241 | 20 | 5 3.1 | 19.8 |
| 198308 2004 $TQ_{332}$ | 16.1 | $X$ | 128.94456 | 54.19921 | 234.52523 | 1.38203 | 0.0555458 | 0.19304037 | 2.9650860 | 20 | 12 31.5 | 20.5 |
| 198309 2004 $TW_{333}$ | 15.9 | $X$ | 164.67093 | 0.98028 | 44.83020 | 2.96325 | 0.0371374 | 0.21878298 | 2.7276817 | 20 | 4 11.7 | 19.6 |
| 198310 2004 $TX_{333}$ | 16.6 | $X$ | 267.82582 | 203.29266 | 198.08651 | 1.29310 | 0.1885297 | 0.23607176 | 2.5928259 | 20 | 7 22.2 | 19.9 |
| 198311 2004 $TS_{335}$ | 17.0 | $X$ | 194.00085 | 256.88480 | 220.25819 | 6.69907 | 0.1671909 | 0.23316142 | 2.6143572 | 20 | 8 9.8 | 21.2 |
| 198312 2004 $TZ_{335}$ | 16.0 | $X$ | 185.43205 | 157.88342 | 216.25728 | 5.89093 | 0.0651793 | 0.21742345 | 2.7390405 | 20 | 3 25.5 | 20.0 |
| 198313 2004 $TE_{336}$ | 16.7 | $X$ | 127.83244 | 180.62867 | 199.76134 | 1.05376 | 0.0691317 | 0.20819225 | 2.8194194 | 20 | 1 31.0 | 20.7 |
| 198314 2004 $TN_{336}$ | 16.4 | $X$ | 275.27770 | 239.67473 | 73.51322 | 2.23057 | 0.1236717 | 0.22421076 | 2.6834803 | 20 | 4 14.8 | 20.0 |
| 198315 2004 $TC_{339}$ | 15.6 | $X$ | 231.96324 | 178.45164 | 154.10422 | 14.52155 | 0.3032272 | 0.22381965 | 2.6866055 | 20 | 3 14.0 | 20.4 |
| 198316 2004 $TU_{339}$ | 17.1 | $X$ | 335.50163 | 181.94651 | 171.91837 | 1.01387 | 0.0827833 | 0.24329681 | 2.5412366 | 20 | 9 19.9 | 19.7 |
| 198317 2004 $TX_{339}$ | 16.2 | $X$ | 183.07146 | 279.25479 | 184.74746 | 3.33219 | 0.1602049 | 0.23155463 | 2.6264375 | 20 | 7 15.9 | 20.5 |
| 198318 2004 $TJ_{342}$ | 16.6 | $X$ | 306.46803 | 66.34850 | 227.90588 | 2.23950 | 0.2149253 | 0.22846385 | 2.6500723 | 20 | 4 15.5 | 19.8 |
| 198319 2004 $TW_{342}$ | 16.5 | $X$ | 179.42568 | 247.51790 | 216.88291 | 5.87279 | 0.2117603 | 0.22781752 | 2.6550822 | 20 | 7 11.6 | 21.0 |
| 198320 2004 $TY_{346}$ | 16.6 | $X$ | 228.09399 | 112.82953 | 322.01048 | 2.86401 | 0.1626966 | 0.23449823 | 2.6044119 | 20 | 7 23.9 | 20.4 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 198321 2004 $TO_{348}$ | 16.3 | $X$ | 63.42373 | 95.66079 | 219.54749 | 7.56643 | 0.1499723 | 0.25069380 | 2.4909996 | 20 | 12 14.6 | 20.0 |
| 198322 2004 $TT_{349}$ | 16.1 | $X$ | 269.84662 | 169.20033 | 181.23913 | 4.31363 | 0.2315022 | 0.23140043 | 2.6276042 | 20 | 5 12.3 | 19.8 |
| 198323 2004 $TE_{355}$ | 15.9 | $X$ | 282.23935 | 340.75305 | 46.22494 | 12.54120 | 0.0494749 | 0.24045252 | 2.5612374 | 20 | 8 22.0 | 19.4 |
| 198324 2004 $TG_{355}$ | 16.7 | $X$ | 75.15028 | 252.30201 | 110.44164 | 6.96193 | 0.1268088 | 0.26357961 | 2.4091370 | 20 | — | — |
| 198325 2004 $TM_{356}$ | 15.8 | $X$ | 138.42055 | 221.99469 | 59.87882 | 13.23093 | 0.2093178 | 0.26365083 | 2.4087032 | 20 | — | — |
| 198326 2004 $TX_{358}$ | 16.7 | $X$ | 82.08308 | 282.07852 | 313.39371 | 2.26652 | 0.1185681 | 0.24266467 | 2.5456480 | 20 | 9 18.6 | 20.1 |
| 198327 2004 $TR_{359}$ | 16.0 | $X$ | 179.72072 | 165.00086 | 190.44085 | 3.55971 | 0.0848775 | 0.21622420 | 2.7491590 | 20 | 2 26.6 | 20.1 |
| 198328 2004 $TC_{361}$ | 16.3 | $X$ | 97.90038 | 141.53591 | 348.00410 | 3.07894 | 0.1300678 | 0.22080642 | 2.7109921 | 20 | 5 19.5 | 20.2 |
| 198329 2004 $TJ_{361}$ | 16.5 | $X$ | 339.76915 | 333.02576 | 336.70594 | 4.39842 | 0.1218674 | 0.23912311 | 2.5707214 | 20 | 7 23.5 | 19.0 |
| 198330 2004 $TJ_{366}$ | 16.7 | $X$ | 157.89424 | 212.25176 | 228.06638 | 2.35009 | 0.1016450 | 0.22284779 | 2.6944109 | 20 | 5 21.3 | 20.5 |
| 198331 2004 $TS_{366}$ | 17.0 | $X$ | 224.65744 | 328.04699 | 159.29205 | 2.29684 | 0.1235762 | 0.24176527 | 2.5519575 | 20 | 10 2.6 | 20.5 |
| 198332 2004 $TZ_{367}$ | 16.6 | $X$ | 314.81518 | 247.43962 | 96.58058 | 1.80418 | 0.1804672 | 0.23791615 | 2.5794083 | 20 | 7 19.3 | 19.2 |
| 198333 2004 $UA$ | 15.7 | $X$ | 4.87267 | 246.50092 | 34.79319 | 4.38200 | 0.0988543 | 0.23390966 | 2.6087789 | 20 | 7 27.6 | 18.6 |
| 198334 2004 $UQ_{1}$ | 16.0 | $X$ | 280.25979 | 19.97019 | 37.53318 | 33.93335 | 0.2999713 | 0.23784614 | 2.5799145 | 20 | 9 9.4 | 19.9 |
| 198335 2004 $UP_{2}$ | 15.8 | $X$ | 345.51990 | 249.21685 | 69.42748 | 10.48584 | 0.2094635 | 0.24248534 | 2.5469029 | 20 | 8 25.8 | 18.0 |
| 198336 2004 $UR_{3}$ | 15.7 | $X$ | 345.67424 | 131.08946 | 241.50442 | 9.11052 | 0.2752824 | 0.24471583 | 2.5314033 | 20 | 11 25.5 | 17.6 |
| 198337 2004 $UE_{4}$ | 15.5 | $X$ | 180.04989 | 143.27113 | 354.85390 | 25.84296 | 0.2355964 | 0.23402561 | 2.6079171 | 20 | 8 31.3 | 20.1 |
| 198338 2004 $UB_{5}$ | 16.1 | $X$ | 199.21953 | 46.06550 | 54.08971 | 5.60317 | 0.1688721 | 0.23552008 | 2.5968733 | 20 | 7 28.4 | 20.3 |
| 198339 2004 $UW_{5}$ | 16.4 | $X$ | 244.16833 | 49.52466 | 40.55633 | 1.03879 | 0.1978730 | 0.23853106 | 2.5749735 | 20 | 8 27.1 | 20.1 |
| 198340 2004 $UO_{6}$ | 16.4 | $X$ | 333.13477 | 9.61539 | 306.66295 | 4.30375 | 0.1444925 | 0.23831005 | 2.5765652 | 20 | 7 18.3 | 19.0 |
| 198341 2004 $UR_{8}$ | 16.6 | $X$ | 313.52564 | 10.62732 | 8.59578 | 3.15890 | 0.1795082 | 0.24133114 | 2.5550171 | 20 | 9 11.2 | 18.8 |
| 198342 2004 $UC_{9}$ | 15.1 | $X$ | 306.44650 | 70.64091 | 250.94980 | 25.71151 | 0.1278424 | 0.23226816 | 2.6210557 | 20 | 6 7.3 | 18.2 |
| 198343 2004 $VG$ | 16.3 | $X$ | 189.51532 | 59.95985 | 336.53155 | 10.78213 | 0.2006867 | 0.22242774 | 2.6978021 | 20 | 4 23.4 | 21.0 |
| 198344 2004 $VU$ | 15.6 | $X$ | 100.91850 | 274.72805 | 174.94439 | 8.10554 | 0.0873165 | 0.21441470 | 2.7646045 | 20 | 3 27.9 | 19.3 |
| 198345 2004 $VM_{2}$ | 16.3 | $X$ | 23.70588 | 336.68567 | 277.47321 | 3.80673 | 0.0525109 | 0.23406461 | 2.6076274 | 20 | 7 13.7 | 19.4 |
| 198346 2004 $VL_{3}$ | 16.2 | $X$ | 355.15419 | 104.67655 | 204.84163 | 6.17279 | 0.1766106 | 0.23892452 | 2.5721457 | 20 | 8 22.5 | 18.6 |
| 198347 2004 $VZ_{4}$ | 15.8 | $X$ | 160.78344 | 123.76171 | 336.23594 | 4.01159 | 0.0662105 | 0.22634801 | 2.6665614 | 20 | 6 17.6 | 19.7 |
| 198348 2004 $VA_{5}$ | 15.5 | $X$ | 201.23373 | 179.92813 | 237.05417 | 12.35539 | 0.1580140 | 0.22667167 | 2.6640225 | 20 | 6 3.8 | 19.7 |
| 198349 2004 $VD_{5}$ | 15.6 | $X$ | 48.62888 | 213.21342 | 38.87865 | 15.52036 | 0.0588383 | 0.23454364 | 2.6040757 | 20 | 8 27.6 | 19.3 |
| 198350 2004 $VA_{6}$ | 16.6 | $X$ | 267.31124 | 218.10554 | 234.70649 | 3.82788 | 0.1411377 | 0.24502919 | 2.5292446 | 20 | 10 9.3 | 19.5 |
| 198351 2004 $VD_{6}$ | 15.8 | $X$ | 116.17775 | 308.51740 | 217.08543 | 10.56922 | 0.1146015 | 0.22832451 | 2.6511504 | 20 | 7 23.7 | 19.9 |
| 198352 2004 $VZ_{6}$ | 16.3 | $X$ | 338.08880 | 233.18789 | 76.59335 | 8.43845 | 0.1603562 | 0.23474429 | 2.6025916 | 20 | 7 18.1 | 18.8 |
| 198353 2004 $VL_{8}$ | 16.4 | $X$ | 261.06314 | 254.63760 | 123.88708 | 3.00133 | 0.2217548 | 0.23218356 | 2.6216924 | 20 | 6 8.8 | 20.3 |
| 198354 2004 $VM_{8}$ | 16.2 | $X$ | 327.18762 | 283.65378 | 65.90225 | 12.27235 | 0.2851444 | 0.24116837 | 2.5561665 | 20 | 8 24.4 | 18.1 |
| 198355 2004 $VZ_{9}$ | 15.8 | $X$ | 183.56074 | 275.18506 | 192.53423 | 11.05078 | 0.1628119 | 0.22944430 | 2.6425175 | 20 | 7 19.3 | 20.3 |
| 198356 2004 $VC_{10}$ | 15.9 | $X$ | 224.39806 | 278.10747 | 150.71890 | 5.45285 | 0.1303388 | 0.23180481 | 2.6245474 | 20 | 7 14.3 | 19.8 |
| 198357 2004 $VG_{10}$ | 16.3 | $X$ | 180.80029 | 229.31299 | 43.87042 | 6.61039 | 0.1247893 | 0.26520433 | 2.3992876 | 20 | — | — |
| 198358 2004 $VR_{10}$ | 15.6 | $X$ | 234.72209 | 164.90940 | 271.11203 | 13.18190 | 0.0741677 | 0.23582955 | 2.5946009 | 20 | 8 7.7 | 19.5 |
| 198359 2004 $VS_{12}$ | 15.4 | $X$ | 318.70601 | 70.05125 | 317.53371 | 5.81513 | 0.1517612 | 0.24249044 | 2.5468672 | 20 | 10 3.6 | 17.9 |
| 198360 2004 $VX_{12}$ | 16.3 | $X$ | 327.68736 | 241.83851 | 99.32204 | 4.75519 | 0.2653249 | 0.23944341 | 2.5684284 | 20 | 8 5.2 | 18.0 |
| 198361 2004 $VF_{13}$ | 15.7 | $X$ | 258.04702 | 249.55926 | 103.98862 | 6.10106 | 0.1369616 | 0.22665212 | 2.6641757 | 20 | 5 15.8 | 19.5 |
| 198362 2004 $VW_{13}$ | 16.1 | $X$ | 249.15196 | 298.94549 | 124.50004 | 8.30989 | 0.1597503 | 0.23481644 | 2.6020585 | 20 | 8 2.1 | 19.6 |
| 198363 2004 $VF_{14}$ | 15.6 | $X$ | 228.18773 | 352.17035 | 56.18146 | 15.45110 | 0.0719488 | 0.22863057 | 2.6487838 | 20 | 6 27.3 | 19.5 |
| 198364 2004 $VM_{14}$ | 16.9 | $X$ | 93.57114 | 125.30052 | 318.90365 | 1.84928 | 0.1918851 | 0.27313982 | 2.3525888 | 20 | 3 20.1 | 19.7 |
| 198365 2004 $VJ_{15}$ | 16.2 | $X$ | 9.64266 | 236.67366 | 68.59842 | 8.17837 | 0.1656226 | 0.24057304 | 2.5603819 | 20 | 9 22.4 | 18.9 |
| 198366 2004 $VZ_{16}$ | 16.2 | $X$ | 342.00909 | 89.25830 | 231.60586 | 13.50928 | 0.1381656 | 0.23856751 | 2.5747112 | 20 | 8 6.4 | 19.2 |
| 198367 2004 $VP_{18}$ | 16.5 | $X$ | 211.68500 | 152.77396 | 273.97611 | 1.24005 | 0.0605405 | 0.23005606 | 2.6378308 | 20 | 7 3.8 | 20.1 |
| 198368 2004 $VV_{18}$ | 16.4 | $X$ | 191.55006 | 340.48768 | 40.86314 | 4.16995 | 0.1076287 | 0.22054998 | 2.7130931 | 20 | 4 12.3 | 20.4 |
| 198369 2004 $VR_{19}$ | 15.5 | $X$ | 327.73542 | 87.54719 | 229.82330 | 13.96989 | 0.1554525 | 0.23342679 | 2.6123754 | 20 | 7 4.1 | 18.4 |
| 198370 2004 $VS_{19}$ | 15.9 | $X$ | 338.13076 | 101.32950 | 226.98774 | 2.87543 | 0.2441117 | 0.23891821 | 2.5721910 | 20 | 8 12.7 | 17.6 |
| 198371 2004 $VQ_{20}$ | 15.9 | $X$ | 310.16832 | 302.84548 | 58.49420 | 6.36096 | 0.1204118 | 0.23824924 | 2.5770036 | 20 | 8 16.7 | 18.8 |
| 198372 2004 $VE_{21}$ | 16.5 | $X$ | 289.75042 | 264.13414 | 125.69341 | 2.39789 | 0.1184438 | 0.23765791 | 2.5812765 | 20 | 8 20.6 | 19.3 |
| 198373 2004 $VZ_{21}$ | 16.5 | $X$ | 253.09137 | 282.13994 | 85.37224 | 3.17391 | 0.2273367 | 0.22937585 | 2.6430432 | 20 | 5 16.7 | 20.6 |
| 198374 2004 $VA_{22}$ | 16.2 | $X$ | 338.62265 | 137.71921 | 205.76306 | 3.00645 | 0.2061370 | 0.24063516 | 2.5599413 | 20 | 9 10.3 | 18.1 |
| 198375 2004 $VG_{23}$ | 16.8 | $X$ | 216.64122 | 203.33838 | 186.56155 | 2.05247 | 0.2130438 | 0.22564056 | 2.6721321 | 20 | 5 12.7 | 21.1 |
| 198376 2004 $VB_{24}$ | 15.7 | $X$ | 199.11073 | 229.40881 | 192.85304 | 13.02157 | 0.1673628 | 0.22663036 | 2.6643462 | 20 | 6 8.7 | 20.3 |
| 198377 2004 $VQ_{25}$ | 16.4 | $X$ | 254.88981 | 11.52748 | 7.98505 | 2.82550 | 0.0912685 | 0.23048642 | 2.6345462 | 20 | 6 20.1 | 19.9 |
| 198378 2004 $VP_{27}$ | 16.0 | $X$ | 207.94090 | 80.67416 | 337.97772 | 14.01218 | 0.0846647 | 0.23092404 | 2.6312167 | 20 | 6 16.9 | 20.2 |
| 198379 2004 $VJ_{28}$ | 16.2 | $X$ | 211.53137 | 183.65695 | 281.84188 | 1.00721 | 0.1613183 | 0.23390230 | 2.6088336 | 20 | 8 14.9 | 20.2 |
| 198380 2004 $VT_{28}$ | 15.9 | $X$ | 127.36287 | 171.15814 | 239.53576 | 4.01525 | 0.0650335 | 0.21161189 | 2.7889625 | 20 | 3 5.4 | 19.9 |
| 198381 2004 $VB_{29}$ | 16.2 | $X$ | 51.19604 | 228.57242 | 67.24286 | 3.98580 | 0.0290167 | 0.24325417 | 2.5415336 | 20 | 10 18.9 | 19.4 |
| 198382 2004 $VM_{29}$ | 16.6 | $X$ | 2.59394 | 97.18761 | 209.99701 | 5.90628 | 0.1300461 | 0.23845781 | 2.5755008 | 20 | 8 30.2 | 19.3 |
| 198383 2004 $VR_{29}$ | 16.5 | $X$ | 11.94766 | 112.73036 | 137.65441 | 1.71303 | 0.0615063 | 0.22779092 | 2.6552889 | 20 | 6 20.3 | 19.5 |
| 198384 2004 $VD_{30}$ | 16.2 | $X$ | 192.82100 | 291.94554 | 145.74847 | 1.73132 | 0.0833157 | 0.22796824 | 2.6539118 | 20 | 6 24.7 | 20.1 |
| 198385 2004 $VW_{32}$ | 16.6 | $X$ | 223.26562 | 203.51068 | 192.07762 | 4.90846 | 0.0721236 | 0.22680585 | 2.6629717 | 20 | 6 5.6 | 20.4 |
| 198386 2004 $VB_{33}$ | 15.9 | $X$ | 231.33365 | 253.66420 | 129.59558 | 3.64293 | 0.0458444 | 0.22606067 | 2.6688206 | 20 | 6 1.8 | 19.5 |
| 198387 2004 $VL_{33}$ | 16.6 | $X$ | 121.66770 | 332.15341 | 191.22878 | 5.26521 | 0.1357446 | 0.22833811 | 2.6510451 | 20 | 7 30.4 | 20.6 |
| 198388 2004 $VQ_{33}$ | 16.4 | $X$ | 266.79747 | 166.36424 | 172.40696 | 4.11895 | 0.1423210 | 0.22709238 | 2.6607312 | 20 | 5 5.6 | 20.1 |
| 198389 2004 $VH_{34}$ | 16.9 | $X$ | 232.97706 | 346.93242 | 87.97090 | 4.65453 | 0.1529836 | 0.23411426 | 2.6072588 | 20 | 7 30.9 | 20.6 |
| 198390 2004 $VW_{38}$ | 16.2 | $X$ | 61.75856 | 184.27825 | 64.80860 | 4.81277 | 0.1963661 | 0.23648672 | 2.5897920 | 20 | 9 25.5 | 19.8 |
| 198391 2004 $VQ_{40}$ | 16.0 | $X$ | 81.34816 | 309.40881 | 203.90551 | 4.11794 | 0.0525556 | 0.22119719 | 2.7077983 | 20 | 5 19.3 | 19.6 |
| 198392 2004 $VE_{43}$ | 16.7 | $X$ | 175.23952 | 26.27345 | 221.15396 | 2.09256 | 0.1476108 | 0.25679102 | 2.4514112 | 20 | — | — |
| 198393 2004 $VE_{44}$ | 16.6 | $X$ | 189.60012 | 267.32849 | 157.94046 | 2.88582 | 0.0458308 | 0.22525192 | 2.6752049 | 20 | 6 6.1 | 20.4 |
| 198394 2004 $VF_{44}$ | 16.4 | $X$ | 202.20606 | 230.16108 | 159.37028 | 2.80112 | 0.0959234 | 0.22233287 | 2.6985695 | 20 | 5 4.0 | 20.4 |
| 198395 2004 $VL_{47}$ | 16.7 | $X$ | 273.87931 | 195.45861 | 178.75782 | 4.09163 | 0.1709753 | 0.23273702 | 2.6175344 | 20 | 6 25.7 | 20.2 |
| 198396 2004 $VV_{51}$ | 16.4 | $X$ | 310.74374 | 163.32319 | 179.39208 | 4.43805 | 0.1134502 | 0.23418496 | 2.6067340 | 20 | 7 17.3 | 19.4 |
| 198397 2004 $VG_{52}$ | 16.0 | $X$ | 246.33176 | 239.54789 | 144.28916 | 3.63859 | 0.0996578 | 0.22924080 | 2.6440811 | 20 | 6 14.3 | 19.7 |
| 198398 2004 $VR_{52}$ | 15.5 | $X$ | 5.83274 | 226.93441 | 60.31060 | 12.44951 | 0.1664492 | 0.23521104 | 2.5991475 | 20 | 8 18.5 | 18.3 |
| 198399 2004 $VT_{52}$ | 16.5 | $X$ | 162.79992 | 224.50759 | 181.93489 | 4.10555 | 0.1257900 | 0.21811177 | 2.7332749 | 20 | 4 15.4 | 20.7 |
| 198400 2004 $VA_{53}$ | 16.5 | $X$ | 103.02727 | 349.27626 | 82.69650 | 7.54549 | 0.1247624 | 0.27305387 | 2.3530825 | 20 | 3 10.7 | 19.5 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 198401 2004 $VB_{53}$ | 16.2 | $X$ | 250.67971 | 226.46971 | 164.56974 | 2.59799 | 0.1233572 | 0.22955069 | 2.6417009 | 20 | 6 25.8 | 19.9 |
| 198402 2004 $VL_{54}$ | 15.5 | $X$ | 151.72534 | 102.13894 | 350.20637 | 14.21463 | 0.1093323 | 0.22338243 | 2.6901101 | 20 | 5 26.8 | 19.9 |
| 198403 2004 $VA_{55}$ | 15.4 | $X$ | 91.72314 | 215.07753 | 145.88822 | 11.50927 | 0.1209531 | 0.19872730 | 2.9082453 | 20 | — | — |
| 198404 2004 $VW_{56}$ | 16.6 | $X$ | 203.89652 | 25.48938 | 17.52483 | 6.64482 | 0.2384565 | 0.22548195 | 2.6733851 | 20 | 5 15.4 | 21.3 |
| 198405 2004 $VY_{56}$ | 16.3 | $X$ | 218.55035 | 22.47372 | 328.93779 | 3.98987 | 0.1244633 | 0.22004880 | 2.7172111 | 20 | 3 30.5 | 20.6 |
| 198406 2004 $VZ_{56}$ | 16.7 | $X$ | 200.29587 | 63.72654 | 35.55608 | 12.83909 | 0.2304293 | 0.23023936 | 2.6364305 | 20 | 7 26.9 | 21.4 |
| 198407 2004 $VG_{58}$ | 15.5 | $X$ | 33.30797 | 337.02068 | 253.22981 | 11.05152 | 0.1097422 | 0.22753078 | 2.6573124 | 20 | 6 30.4 | 18.6 |
| 198408 2004 $VT_{59}$ | 16.8 | $X$ | 153.02823 | 96.72275 | 348.11054 | 4.26089 | 0.2447351 | 0.22069928 | 2.7118694 | 20 | 5 27.7 | 21.6 |
| 198409 2004 $VF_{62}$ | 16.6 | $X$ | 334.55941 | 232.41834 | 138.89754 | 9.49832 | 0.1922492 | 0.24495057 | 2.5297858 | 20 | 10 22.5 | 18.9 |
| 198410 2004 $VN_{62}$ | 15.6 | $X$ | 356.30767 | 238.59895 | 111.03911 | 15.45960 | 0.1585062 | 0.24415460 | 2.5352810 | 20 | 11 4.3 | 18.6 |
| 198411 2004 $VB_{63}$ | 16.6 | $X$ | 333.52061 | 160.30633 | 223.50127 | 2.69370 | 0.2623718 | 0.24552035 | 2.5258704 | 20 | 11 9.7 | 18.0 |
| 198412 2004 $VD_{63}$ | 16.1 | $X$ | 247.40368 | 322.32948 | 91.87241 | 2.26545 | 0.1246921 | 0.23272861 | 2.6175975 | 20 | 7 23.4 | 19.6 |
| 198413 2004 $VP_{63}$ | 16.9 | $X$ | 85.79701 | 324.33764 | 83.55707 | 3.18876 | 0.1973942 | 0.26863518 | 2.3788157 | 20 | 1 19.5 | 19.2 |
| 198414 2004 $VJ_{65}$ | 16.2 | $X$ | 299.90306 | 177.43667 | 149.69469 | 3.77277 | 0.0914881 | 0.23084839 | 2.6317915 | 20 | 6 11.3 | 19.4 |
| 198415 2004 $VE_{70}$ | 15.1 | $X$ | 17.08981 | 98.75112 | 311.93403 | 10.09889 | 0.0542608 | 0.19234459 | 2.9722322 | 20 | — | — |
| 198416 2004 $VU_{70}$ | 16.0 | $X$ | 148.64653 | 42.88818 | 77.52263 | 3.68142 | 0.0507021 | 0.22665476 | 2.6641550 | 20 | 6 29.7 | 19.9 |
| 198417 2004 $VF_{71}$ | 15.9 | $X$ | 312.32584 | 257.90546 | 140.64455 | 9.56741 | 0.0561236 | 0.24358821 | 2.5392096 | 20 | 10 20.2 | 19.0 |
| 198418 2004 $VH_{72}$ | 15.9 | $X$ | 240.61355 | 151.37672 | 232.11296 | 12.72931 | 0.1742121 | 0.22836185 | 2.6508614 | 20 | 5 29.7 | 20.0 |
| 198419 2004 $VA_{73}$ | 16.1 | $X$ | 304.96277 | 214.63595 | 192.95491 | 13.04185 | 0.0906096 | 0.24327818 | 2.5413664 | 20 | 10 15.5 | 18.9 |
| 198420 2004 $VL_{73}$ | 15.9 | $X$ | 237.17168 | 256.67058 | 175.61618 | 10.61050 | 0.1670490 | 0.23340221 | 2.6125588 | 20 | 7 27.6 | 20.0 |
| 198421 2004 $VM_{77}$ | 16.7 | $X$ | 190.02805 | 283.24705 | 163.17511 | 4.37515 | 0.1034129 | 0.22817210 | 2.6523308 | 20 | 7 2.1 | 20.7 |
| 198422 2004 $VV_{77}$ | 15.8 | $X$ | 235.44491 | 234.69210 | 156.75375 | 13.43946 | 0.1724171 | 0.22829255 | 2.6513978 | 20 | 6 5.8 | 20.2 |
| 198423 2004 $VK_{80}$ | 16.5 | $X$ | 248.60532 | 228.19226 | 180.76665 | 7.60016 | 0.1863232 | 0.23297705 | 2.6157363 | 20 | 7 8.2 | 20.5 |
| 198424 2004 $VL_{80}$ | 16.0 | $X$ | 194.66506 | 271.18761 | 199.10594 | 8.58302 | 0.1605944 | 0.23158168 | 2.6262330 | 20 | 8 2.1 | 20.3 |
| 198425 2004 $VT_{81}$ | 16.1 | $X$ | 290.88067 | 65.86151 | 211.83663 | 10.77149 | 0.2367055 | 0.22074911 | 2.7114613 | 20 | 2 28.5 | 20.3 |
| 198426 2004 $VR_{82}$ | 15.6 | $X$ | 205.92136 | 183.63109 | 249.90834 | 14.44476 | 0.0881447 | 0.22907922 | 2.6453243 | 20 | 7 2.0 | 19.6 |
| 198427 2004 $VW_{84}$ | 17.5 | $X$ | 230.33208 | 116.07413 | 284.53733 | 0.74696 | 0.0845111 | 0.22743198 | 2.6580819 | 20 | 6 18.9 | 21.4 |
| 198428 2004 $VX_{89}$ | 15.9 | $X$ | 218.29444 | 187.18794 | 252.22338 | 11.30733 | 0.1426015 | 0.23120987 | 2.6290478 | 20 | 7 18.2 | 20.1 |
| 198429 2004 $VC_{90}$ | 15.8 | $X$ | 171.50376 | 137.24398 | 18.16663 | 6.68629 | 0.2307980 | 0.23211767 | 2.6221885 | 20 | 9 9.3 | 20.3 |
| 198430 2004 $VB_{93}$ | 15.8 | $X$ | 207.63561 | 94.74748 | 266.49129 | 4.88209 | 0.0763977 | 0.22029961 | 2.7151484 | 20 | 4 1.4 | 19.8 |
| 198431 2004 $VG_{93}$ | 16.6 | $X$ | 212.81424 | 69.06059 | 28.11476 | 7.89956 | 0.1585022 | 0.23368638 | 2.6104404 | 20 | 8 9.3 | 20.7 |
| 198432 2004 $VL_{95}$ | 16.0 | $X$ | 301.19706 | 203.51651 | 148.37756 | 1.74527 | 0.0892969 | 0.23218777 | 2.6216607 | 20 | 7 18.5 | 19.2 |
| 198433 2004 $VZ_{110}$ | 16.3 | $X$ | 160.08614 | 68.08254 | 43.55262 | 3.41584 | 0.0251752 | 0.22919000 | 2.6444718 | 20 | 7 1.3 | 19.8 |
| 198434 2004 $WX$ | 16.2 | $X$ | 261.58884 | 271.20948 | 103.98875 | 4.95080 | 0.2329345 | 0.23151729 | 2.6267199 | 20 | 6 3.8 | 20.0 |
| 198435 2004 $WN_{2}$ | 15.2 | $X$ | 7.68154 | 283.31003 | 35.08642 | 7.91413 | 0.1400426 | 0.24006061 | 2.5640241 | 20 | 10 1.9 | 17.9 |
| 198436 2004 $WH_{3}$ | 15.4 | $X$ | 351.84569 | 204.80381 | 71.13430 | 16.39528 | 0.1558392 | 0.22909244 | 2.6452225 | 20 | 6 22.2 | 18.0 |
| 198437 2004 $WV_{3}$ | 16.2 | $X$ | 111.03098 | 330.36278 | 160.00584 | 1.92866 | 0.1098855 | 0.22073003 | 2.7116176 | 20 | 6 3.9 | 20.0 |
| 198438 2004 $WA_{6}$ | 15.8 | $X$ | 299.67630 | 318.65416 | 354.97629 | 4.72623 | 0.2833873 | 0.23151068 | 2.6267699 | 20 | 4 19.7 | 19.3 |
| 198439 2004 $WT_{6}$ | 15.7 | $X$ | 214.67073 | 71.03748 | 47.63499 | 12.74367 | 0.1818013 | 0.23614295 | 2.5923047 | 20 | 9 9.7 | 19.9 |
| 198440 2004 $WV_{6}$ | 15.8 | $X$ | 58.21282 | 223.65320 | 272.34101 | 4.87723 | 0.1991964 | 0.21074105 | 2.7966403 | 20 | 4 11.6 | 19.0 |
| 198441 2004 $WK_{7}$ | 15.6 | $X$ | 356.23237 | 145.82559 | 340.65812 | 4.67603 | 0.0827088 | 0.20048037 | 2.8912666 | 20 | — | — |
| 198442 2004 $WR_{7}$ | 16.6 | $X$ | 250.93479 | 291.57048 | 84.42284 | 1.65689 | 0.1493276 | 0.22973500 | 2.6402879 | 20 | 6 2.9 | 20.3 |
| 198443 2004 $WC_{9}$ | 15.3 | $X$ | 87.58704 | 173.70242 | 287.41769 | 8.50704 | 0.1513544 | 0.21217462 | 2.7840290 | 20 | 3 29.6 | 19.2 |
| 198444 2004 $WX_{10}$ | 16.2 | $X$ | 150.58818 | 69.96745 | 55.48427 | 5.96439 | 0.0692990 | 0.22635066 | 2.6665406 | 20 | 7 10.3 | 20.1 |
| 198445 2004 $XD_{3}$ | 15.6 | $X$ | 248.90471 | 223.06213 | 113.00439 | 12.72990 | 0.2018390 | 0.22388320 | 2.6860971 | 20 | 4 11.7 | 20.1 |
| 198446 2004 $XS_{3}$ | 15.6 | $X$ | 210.68063 | 283.61790 | 71.03554 | 4.65670 | 0.0928082 | 0.21718395 | 2.7410538 | 20 | 3 31.7 | 19.8 |
| 198447 2004 $XB_{4}$ | 16.0 | $X$ | 255.43893 | 11.33539 | 20.57961 | 5.60175 | 0.1575805 | 0.23082095 | 2.6320001 | 20 | 6 28.6 | 19.8 |
| 198448 2004 $XV_{4}$ | 16.0 | $X$ | 266.38905 | 24.29883 | 17.96610 | 3.15025 | 0.1923529 | 0.23448086 | 2.6045405 | 20 | 7 22.1 | 19.4 |
| 198449 2004 $XM_{5}$ | 15.7 | $X$ | 258.42640 | 296.02542 | 168.00121 | 13.23102 | 0.1351176 | 0.24107946 | 2.5567950 | 20 | 10 15.9 | 19.0 |
| 198450 Scattolin | 15.8 | $X$ | 139.55820 | 125.40451 | 261.20927 | 7.93330 | 0.1677727 | 0.20884953 | 2.8135008 | 20 | 2 27.7 | 20.3 |
| 198451 2004 $XX_{6}$ | 15.8 | $X$ | 72.40596 | 197.23091 | 272.04766 | 12.17246 | 0.0975767 | 0.27252365 | 2.3561336 | 20 | 3 1.1 | 18.8 |
| 198452 2004 $XH_{8}$ | 16.0 | $X$ | 233.90550 | 39.60715 | 23.77496 | 6.15327 | 0.2355491 | 0.22990385 | 2.6389949 | 20 | 7 8.0 | 20.3 |
| 198453 2004 $XL_{8}$ | 15.7 | $X$ | 164.57853 | 349.55689 | 77.22057 | 7.75645 | 0.0892831 | 0.22026625 | 2.7154225 | 20 | 5 11.9 | 19.7 |
| 198454 2004 $XP_{8}$ | 15.7 | $X$ | 211.27910 | 17.64684 | 7.79985 | 4.58408 | 0.3607583 | 0.22345494 | 2.6895280 | 20 | 4 26.6 | 20.8 |
| 198455 2004 $XU_{9}$ | 15.4 | $X$ | 293.91661 | 303.14097 | 67.00981 | 12.68793 | 0.0641163 | 0.23251934 | 2.6191679 | 20 | 8 10.7 | 18.9 |
| 198456 2004 $XJ_{10}$ | 15.2 | $X$ | 192.83079 | 149.69518 | 249.14279 | 11.59642 | 0.0423468 | 0.21996798 | 2.7178766 | 20 | 5 4.6 | 19.1 |
| 198457 2004 $XK_{12}$ | 15.1 | $X$ | 252.32232 | 266.89521 | 73.51050 | 13.34222 | 0.2066572 | 0.22266546 | 2.6958816 | 20 | 4 19.4 | 19.5 |
| 198458 2004 $XN_{12}$ | 14.9 | $X$ | 236.30380 | 264.86449 | 252.87017 | 9.52997 | 0.1433177 | 0.18053372 | 3.1004911 | 20 | 11 8.6 | 19.4 |
| 198459 2004 $XF_{13}$ | 15.4 | $X$ | 347.43279 | 21.64950 | 64.63620 | 2.86958 | 0.0810850 | 0.19058226 | 2.9905270 | 20 | — | — |
| 198460 2004 $XA_{16}$ | 16.1 | $X$ | 314.51914 | 136.97844 | 231.90342 | 1.77372 | 0.2226643 | 0.23809842 | 2.5780918 | 20 | 8 20.2 | 18.1 |
| 198461 2004 $XG_{16}$ | 15.3 | $X$ | 226.39469 | 246.65046 | 187.16315 | 21.55135 | 0.1456576 | 0.23068125 | 2.6330626 | 20 | 7 18.6 | 19.8 |
| 198462 2004 $XU_{17}$ | 16.2 | $X$ | 252.18436 | 290.53935 | 153.97161 | 12.53552 | 0.2756046 | 0.23691727 | 2.5866534 | 20 | 8 17.2 | 20.1 |
| 198463 2004 $XT_{19}$ | 16.0 | $X$ | 112.58921 | 345.33979 | 67.23313 | 2.88571 | 0.0681482 | 0.20706758 | 2.8296191 | 20 | 2 23.2 | 19.8 |
| 198464 2004 $XP_{21}$ | 15.1 | $X$ | 338.67624 | 202.91292 | 270.24851 | 10.25981 | 0.0616257 | 0.19300597 | 2.9654382 | 20 | — | — |
| 198465 2004 $XL_{22}$ | 16.8 | $X$ | 81.75901 | 35.38295 | 78.12688 | 3.71076 | 0.1241859 | 0.27521999 | 2.3407196 | 20 | 4 4.5 | 19.3 |
| 198466 2004 $XR_{22}$ | 16.5 | $X$ | 305.44975 | 203.26136 | 185.07216 | 2.06053 | 0.1126413 | 0.23866275 | 2.5740261 | 20 | 9 14.5 | 19.3 |
| 198467 2004 $XD_{24}$ | 16.4 | $X$ | 200.58499 | 33.51526 | 95.17755 | 5.83324 | 0.2143146 | 0.23406673 | 2.6076117 | 20 | 9 1.8 | 20.7 |
| 198468 2004 $XE_{24}$ | 16.2 | $X$ | 265.13191 | 249.24168 | 127.43445 | 2.72094 | 0.1528225 | 0.23110035 | 2.6298783 | 20 | 6 20.5 | 19.6 |
| 198469 2004 $XT_{24}$ | 15.8 | $X$ | 156.63254 | 148.29510 | 304.26225 | 7.57605 | 0.2958331 | 0.21872601 | 2.7281553 | 20 | 6 11.2 | 20.8 |
| 198470 2004 $XW_{25}$ | 15.7 | $X$ | 299.39889 | 16.54254 | 56.11156 | 5.89580 | 0.2314917 | 0.23999962 | 2.5644585 | 20 | 10 27.2 | 17.9 |
| 198471 2004 $XD_{27}$ | 15.9 | $X$ | 152.60222 | 135.56584 | 322.18771 | 4.29903 | 0.1287372 | 0.21966275 | 2.7203938 | 20 | 6 7.9 | 20.2 |
| 198472 2004 $XG_{32}$ | 16.1 | $X$ | 175.73784 | 232.39936 | 128.52697 | 1.26386 | 0.0849152 | 0.21079283 | 2.7961824 | 20 | 3 1.8 | 20.4 |
| 198473 2004 $XK_{33}$ | 15.7 | $X$ | 267.48429 | 229.23770 | 86.46888 | 5.61025 | 0.1077855 | 0.21898815 | 2.7259778 | 20 | 4 12.9 | 19.6 |
| 198474 2004 $XO_{36}$ | 16.1 | $X$ | 318.84566 | 257.41312 | 92.10871 | 0.48732 | 0.2861506 | 0.23670291 | 2.5882148 | 20 | 7 20.4 | 17.7 |
| 198475 2004 $XK_{37}$ | 16.5 | $X$ | 352.26668 | 124.68670 | 201.67457 | 2.78188 | 0.2107159 | 0.24048199 | 2.5610281 | 20 | 9 17.2 | 18.7 |
| 198476 2004 $XE_{38}$ | 15.9 | $X$ | 186.64607 | 234.12009 | 180.51524 | 12.57347 | 0.1724222 | 0.22216922 | 2.6998945 | 20 | 5 20.2 | 20.5 |
| 198477 2004 $XH_{38}$ | 16.3 | $X$ | 296.23764 | 179.00317 | 177.44270 | 14.83733 | 0.2685081 | 0.23512512 | 2.5997806 | 20 | 6 17.9 | 19.8 |
| 198478 2004 $XP_{38}$ | 15.9 | $X$ | 276.17749 | 231.10081 | 212.48743 | 21.02848 | 0.1098216 | 0.24072808 | 2.5592824 | 20 | 10 14.3 | 19.0 |
| 198479 2004 $XD_{39}$ | 15.6 | $X$ | 119.18046 | 345.44609 | 176.54593 | 13.00989 | 0.1006274 | 0.22641857 | 2.6660075 | 20 | 7 21.9 | 19.7 |
| 198480 2004 $XW_{40}$ | 16.0 | $X$ | 312.34630 | 316.66853 | 29.57882 | 3.49832 | 0.3263169 | 0.23655233 | 2.5893131 | 20 | 6 20.8 | 18.2 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 198481 2004 $XV_{41}$ | 15.4 | $X$ | 236.46948 | 210.39105 | 316.07979 | 1.56337 | 0.1604670 | 0.17515896 | 3.1635970 | 20 | 11 16.6 | 20.2 |
| 198482 2004 $XK_{42}$ | 15.7 | $X$ | 356.26191 | 136.54021 | 54.24932 | 5.19551 | 0.0113353 | 0.21138979 | 2.7909157 | 20 | 3 12.2 | 19.4 |
| 198483 2004 $XU_{47}$ | 16.1 | $X$ | 103.89678 | 109.77290 | 4.52123 | 2.68424 | 0.1125458 | 0.21266485 | 2.7797490 | 20 | 5 4.7 | 20.0 |
| 198484 2004 $XS_{48}$ | 15.7 | $X$ | 163.69452 | 159.11011 | 259.48629 | 9.12600 | 0.1550386 | 0.21612884 | 2.7499675 | 20 | 4 30.1 | 20.3 |
| 198485 2004 $XD_{49}$ | 15.1 | $X$ | 203.89382 | 81.82476 | 295.72771 | 11.86256 | 0.1641635 | 0.21694401 | 2.7430745 | 20 | 4 12.2 | 19.8 |
| 198486 2004 $XV_{51}$ | 15.0 | $X$ | 181.26142 | 232.40585 | 328.06271 | 30.93643 | 0.2362091 | 0.23044346 | 2.6348736 | 20 | 10 20.6 | 20.2 |
| 198487 2004 $XP_{57}$ | 15.6 | $X$ | 109.21748 | 237.03085 | 267.58916 | 7.90701 | 0.1356418 | 0.21701512 | 2.7424753 | 20 | 6 23.3 | 19.5 |
| 198488 2004 $XT_{57}$ | 16.3 | $X$ | 94.93883 | 206.15872 | 192.39427 | 1.61243 | 0.1078507 | 0.20000228 | 2.8958724 | 20 | 1 19.6 | 20.2 |
| 198489 2004 $XD_{59}$ | 15.0 | $X$ | 237.33439 | 134.37189 | 80.08306 | 11.41035 | 0.0439220 | 0.18816645 | 3.0160688 | 20 | — | — |
| 198490 2004 $XS_{59}$ | 15.4 | $X$ | 172.18635 | 62.45611 | 294.46549 | 7.67384 | 0.2102216 | 0.21026332 | 2.8008748 | 20 | 2 25.2 | 20.2 |
| 198491 2004 $XD_{62}$ | 16.1 | $X$ | 224.71081 | 328.01871 | 84.19862 | 14.09892 | 0.2798041 | 0.22884701 | 2.6471134 | 20 | 6 11.8 | 20.5 |
| 198492 2004 $XU_{62}$ | 15.8 | $X$ | 245.23063 | 231.99927 | 70.95156 | 6.13060 | 0.1372015 | 0.21377121 | 2.7701497 | 20 | 3 1.8 | 20.2 |
| 198493 2004 $XD_{65}$ | 15.9 | $X$ | 135.54894 | 103.97352 | 348.30921 | 5.59821 | 0.0229114 | 0.21928076 | 2.7235522 | 20 | 5 2.1 | 19.6 |
| 198494 2004 $XR_{66}$ | 16.0 | $X$ | 113.18049 | 66.29869 | 272.33106 | 5.44945 | 0.1279490 | 0.25796006 | 2.4439993 | 20 | — | — |
| 198495 2004 $XP_{69}$ | 15.8 | $X$ | 224.19111 | 314.48707 | 55.83823 | 6.86421 | 0.0404171 | 0.21993307 | 2.7181642 | 20 | 5 7.3 | 19.6 |
| 198496 2004 $XV_{72}$ | 16.1 | $X$ | 82.26794 | 25.99364 | 61.22085 | 8.54562 | 0.2257762 | 0.27284763 | 2.3542682 | 20 | 3 19.2 | 18.7 |
| 198497 2004 $XA_{73}$ | 16.6 | $X$ | 250.84326 | 163.24855 | 250.11235 | 2.63257 | 0.2057134 | 0.23389652 | 2.6088766 | 20 | 7 14.7 | 20.4 |
| 198498 2004 $XD_{73}$ | 16.1 | $X$ | 302.93405 | 67.19355 | 3.08929 | 0.16285 | 0.1792903 | 0.24528110 | 2.5275126 | 20 | 11 6.6 | 18.4 |
| 198499 2004 $XJ_{73}$ | 15.6 | $X$ | 271.95407 | 257.34615 | 76.79233 | 14.34319 | 0.2436373 | 0.22757723 | 2.6569508 | 20 | 4 26.8 | 19.7 |
| 198500 2004 $XN_{73}$ | 15.6 | $X$ | 162.79328 | 249.35289 | 186.25181 | 24.14020 | 0.3031193 | 0.21968463 | 2.7202132 | 20 | 5 27.9 | 21.0 |
| 198501 2004 $XN_{74}$ | 15.8 | $X$ | 281.72770 | 156.62100 | 257.44578 | 3.26725 | 0.2267759 | 0.23546819 | 2.5972548 | 20 | 8 21.9 | 18.8 |
| 198502 2004 $XP_{76}$ | 14.9 | $X$ | 287.72120 | 237.39727 | 257.20035 | 14.31857 | 0.0624638 | 0.18625087 | 3.0367137 | 20 | 12 28.2 | 18.9 |
| 198503 2004 $XC_{77}$ | 16.5 | $X$ | 166.60364 | 185.93988 | 256.96728 | 1.77199 | 0.1705811 | 0.22188198 | 2.7022241 | 20 | 6 4.4 | 20.9 |
| 198504 2004 $XG_{77}$ | 15.9 | $X$ | 250.87525 | 285.43797 | 84.75541 | 5.15730 | 0.1480088 | 0.22754294 | 2.6572177 | 20 | 5 26.8 | 19.8 |
| 198505 2004 $XP_{77}$ | 15.4 | $X$ | 265.88467 | 48.47896 | 260.53462 | 7.25235 | 0.0733728 | 0.21749776 | 2.7384166 | 20 | 3 31.9 | 19.5 |
| 198506 2004 $XG_{78}$ | 15.5 | $X$ | 337.04913 | 165.10375 | 290.28143 | 3.85917 | 0.0906687 | 0.18968381 | 2.9999629 | 20 | — | — |
| 198507 2004 $XK_{81}$ | 15.2 | $X$ | 74.15407 | 270.86766 | 262.17876 | 12.51932 | 0.1303566 | 0.21615968 | 2.7497060 | 20 | 6 16.7 | 18.8 |
| 198508 2004 $XY_{81}$ | 15.6 | $X$ | 227.92198 | 338.67370 | 98.14096 | 16.16531 | 0.0663505 | 0.22861264 | 2.6489224 | 20 | 8 8.2 | 19.5 |
| 198509 2004 $XL_{82}$ | 15.9 | $X$ | 258.11936 | 105.11935 | 336.55120 | 2.61525 | 0.1104156 | 0.23829022 | 2.5767082 | 20 | 9 15.0 | 19.2 |
| 198510 2004 $XZ_{82}$ | 15.8 | $X$ | 186.25455 | 265.45908 | 73.20890 | 3.00015 | 0.0389286 | 0.20646807 | 2.8350939 | 20 | 2 14.6 | 19.8 |
| 198511 2004 $XK_{84}$ | 15.6 | $X$ | 320.84718 | 327.56525 | 246.94320 | 7.09597 | 0.0630286 | 0.20725633 | 2.8279009 | 20 | 2 13.5 | 19.5 |
| 198512 2004 $XF_{85}$ | 16.4 | $X$ | 210.67469 | 188.12288 | 278.75254 | 1.24604 | 0.0979115 | 0.22988179 | 2.6391637 | 20 | 8 21.0 | 20.1 |
| 198513 2004 $XK_{87}$ | 16.9 | $X$ | 270.81105 | 266.65399 | 193.83399 | 2.58632 | 0.1120391 | 0.24454355 | 2.5325921 | 20 | 10 31.5 | 19.7 |
| 198514 2004 $XW_{87}$ | 16.6 | $X$ | 67.61881 | 12.26926 | 79.70327 | 3.93798 | 0.1397017 | 0.26627195 | 2.3928700 | 20 | 2 13.1 | 18.9 |
| 198515 2004 $XY_{88}$ | 15.6 | $X$ | 247.81980 | 79.59084 | 273.38337 | 3.99575 | 0.0784745 | 0.21873107 | 2.7281132 | 20 | 5 7.7 | 19.5 |
| 198516 2004 $XC_{89}$ | 16.5 | $X$ | 273.79080 | 33.09689 | 11.12397 | 4.26994 | 0.2131259 | 0.23547905 | 2.5971749 | 20 | 8 1.4 | 19.7 |
| 198517 2004 $XG_{92}$ | 15.9 | $X$ | 146.77652 | 108.12755 | 58.19726 | 15.47438 | 0.0544765 | 0.23187173 | 2.6240424 | 20 | 9 6.2 | 20.0 |
| 198518 2004 $XG_{96}$ | 15.8 | $X$ | 231.41012 | 70.65699 | 295.54014 | 8.21483 | 0.1891335 | 0.21974476 | 2.7197169 | 20 | 4 24.1 | 20.3 |
| 198519 2004 $XY_{96}$ | 16.2 | $X$ | 47.54378 | 140.14163 | 68.45186 | 5.77992 | 0.0500364 | 0.21739134 | 2.7393102 | 20 | 6 14.7 | 19.7 |
| 198520 2004 $XZ_{96}$ | 16.2 | $X$ | 280.64701 | 335.46991 | 58.76764 | 4.44100 | 0.1264924 | 0.23123440 | 2.6288618 | 20 | 8 11.9 | 19.4 |
| 198521 2004 $XX_{97}$ | 15.7 | $X$ | 73.56207 | 124.89529 | 297.41668 | 10.93844 | 0.0356460 | 0.19733352 | 2.9219233 | 20 | 1 12.8 | 19.5 |
| 198522 2004 $XF_{98}$ | 15.0 | $X$ | 65.01902 | 39.19697 | 294.93794 | 9.12579 | 0.0631253 | 0.18091228 | 3.0961645 | 20 | 12 13.6 | 19.5 |
| 198523 2004 $XX_{100}$ | 16.5 | $X$ | 270.44412 | 337.92891 | 21.19907 | 2.29274 | 0.1046428 | 0.22640701 | 2.6660982 | 20 | 6 10.5 | 19.9 |
| 198524 2004 $XN_{101}$ | 16.0 | $X$ | 199.01586 | 66.58462 | 273.77033 | 3.28079 | 0.0770327 | 0.20990689 | 2.8040446 | 20 | 2 28.1 | 20.3 |
| 198525 2004 $XJ_{103}$ | 14.9 | $X$ | 335.73451 | 151.95046 | 319.09114 | 12.46884 | 0.3213854 | 0.18295359 | 3.0730910 | 20 | — | — |
| 198526 2004 $XO_{103}$ | 15.9 | $X$ | 103.21048 | 264.63039 | 213.04340 | 4.15555 | 0.0518403 | 0.21758785 | 2.7376607 | 20 | 4 30.4 | 19.7 |
| 198527 2004 $XA_{104}$ | 15.7 | $X$ | 342.94706 | 113.81401 | 49.93635 | 4.83022 | 0.0400302 | 0.19912778 | 2.9043447 | 20 | 1 18.6 | 19.6 |
| 198528 2004 $XJ_{105}$ | 16.1 | $X$ | 311.34121 | 334.90475 | 27.56527 | 5.81045 | 0.2206275 | 0.23836193 | 2.5761914 | 20 | 8 6.7 | 18.5 |
| 198529 2004 $XY_{105}$ | 15.5 | $X$ | 205.77167 | 122.73335 | 277.56989 | 8.40722 | 0.0621797 | 0.22227648 | 2.6990258 | 20 | 5 21.4 | 19.4 |
| 198530 2004 $XJ_{106}$ | 16.4 | $X$ | 231.28250 | 38.22733 | 67.23493 | 13.75527 | 0.2311591 | 0.23500333 | 2.6006788 | 20 | 9 4.7 | 20.7 |
| 198531 2004 $XM_{106}$ | 16.9 | $X$ | 75.90904 | 104.32901 | 316.48489 | 4.10917 | 0.1815428 | 0.26569662 | 2.3963230 | 20 | 1 18.6 | 19.1 |
| 198532 2004 $XS_{106}$ | 16.0 | $X$ | 103.00641 | 153.66245 | 21.81914 | 2.99121 | 0.0503195 | 0.22510366 | 2.6763794 | 20 | 7 17.2 | 19.7 |
| 198533 2004 $XU_{106}$ | 16.1 | $X$ | 244.08659 | 70.70349 | 24.36479 | 4.14942 | 0.1350137 | 0.23641151 | 2.5903412 | 20 | 9 12.3 | 19.5 |
| 198534 2004 $XV_{107}$ | 15.1 | $X$ | 296.11179 | 268.11586 | 78.31928 | 13.92055 | 0.2408490 | 0.23006220 | 2.6377838 | 20 | 6 7.7 | 18.3 |
| 198535 2004 $XB_{109}$ | 15.3 | $X$ | 226.57619 | 107.56011 | 269.15775 | 13.27101 | 0.0975950 | 0.22399475 | 2.6852053 | 20 | 5 10.9 | 19.5 |
| 198536 2004 $XW_{110}$ | 15.7 | $X$ | 337.47281 | 281.24371 | 55.84549 | 17.52845 | 0.3305751 | 0.24054571 | 2.5605758 | 20 | 9 14.4 | 17.5 |
| 198537 2004 $XR_{111}$ | 16.5 | $X$ | 231.39033 | 75.55578 | 35.40945 | 4.36197 | 0.1838142 | 0.23357804 | 2.6112476 | 20 | 9 11.7 | 20.3 |
| 198538 2004 $XT_{119}$ | 16.0 | $X$ | 208.25584 | 82.03216 | 290.57514 | 3.37832 | 0.0909084 | 0.21384354 | 2.7695250 | 20 | 4 16.9 | 20.3 |
| 198539 2004 $XJ_{121}$ | 16.0 | $X$ | 99.50764 | 27.96878 | 95.08238 | 3.21819 | 0.1670782 | 0.21130735 | 2.7916415 | 20 | 5 19.7 | 20.1 |
| 198540 2004 $XK_{122}$ | 15.8 | $X$ | 164.03087 | 256.48067 | 123.77563 | 6.48940 | 0.1713684 | 0.21432466 | 2.7653788 | 20 | 3 19.9 | 20.3 |
| 198541 2004 $XD_{123}$ | 15.9 | $X$ | 283.08343 | 242.83106 | 123.28500 | 1.49585 | 0.1220474 | 0.23123546 | 2.6288537 | 20 | 7 5.6 | 19.2 |
| 198542 2004 $XB_{124}$ | 15.2 | $X$ | 331.48441 | 195.99029 | 256.11845 | 9.10339 | 0.1108322 | 0.18668286 | 3.0320272 | 20 | — | — |
| 198543 2004 $XG_{126}$ | 15.5 | $X$ | 198.52050 | 208.60606 | 269.91315 | 13.65488 | 0.1690802 | 0.22810936 | 2.6528171 | 20 | 8 12.3 | 20.0 |
| 198544 2004 $XO_{126}$ | 15.8 | $X$ | 199.38937 | 252.97008 | 113.51132 | 3.52830 | 0.1011507 | 0.21429135 | 2.7656653 | 20 | 4 3.3 | 20.0 |
| 198545 2004 $XR_{131}$ | 15.6 | $X$ | 97.91053 | 229.60206 | 311.39601 | 5.65107 | 0.0543764 | 0.22527789 | 2.6749993 | 20 | 7 18.4 | 19.3 |
| 198546 2004 $XS_{131}$ | 15.2 | $X$ | 211.83680 | 285.93475 | 54.66879 | 9.91176 | 0.0810378 | 0.21263402 | 2.7800176 | 20 | 3 19.1 | 19.5 |
| 198547 2004 $XZ_{131}$ | 16.0 | $X$ | 246.62604 | 74.24785 | 338.91635 | 2.86702 | 0.2467768 | 0.23096576 | 2.6308998 | 20 | 7 5.7 | 20.0 |
| 198548 2004 $XB_{132}$ | 16.0 | $X$ | 153.23957 | 102.52050 | 288.74431 | 11.93691 | 0.2061851 | 0.21188198 | 2.7865919 | 20 | 3 16.9 | 20.8 |
| 198549 2004 $XB_{133}$ | 16.0 | $X$ | 187.96959 | 219.43916 | 249.32753 | 2.89351 | 0.1841063 | 0.22549567 | 2.6732767 | 20 | 7 25.4 | 20.4 |
| 198550 2004 $XL_{133}$ | 15.9 | $X$ | 171.54876 | 99.79912 | 347.51377 | 5.04405 | 0.1124799 | 0.22448884 | 2.6812638 | 20 | 6 13.6 | 20.1 |
| 198551 2004 $XN_{133}$ | 15.7 | $X$ | 348.71213 | 336.39287 | 340.91891 | 5.31804 | 0.1522565 | 0.23662238 | 2.5888020 | 20 | 8 22.2 | 18.0 |
| 198552 2004 $XP_{134}$ | 16.2 | $X$ | 222.01698 | 68.91890 | 28.27788 | 6.25881 | 0.0775544 | 0.23302875 | 2.6153493 | 20 | 8 27.6 | 19.9 |
| 198553 2004 $XP_{136}$ | 15.9 | $X$ | 190.44900 | 359.48595 | 70.38437 | 16.65644 | 0.1714622 | 0.22314198 | 2.6920422 | 20 | 6 8.9 | 20.4 |
| 198554 2004 $XV_{136}$ | 16.2 | $X$ | 130.13113 | 128.79094 | 356.67100 | 3.62728 | 0.2090187 | 0.21848218 | 2.7301848 | 20 | 6 26.9 | 20.7 |
| 198555 2004 $XU_{144}$ | 15.8 | $X$ | 271.76778 | 240.21442 | 182.23744 | 4.77874 | 0.2396274 | 0.23527705 | 2.5986613 | 20 | 8 16.7 | 19.2 |
| 198556 2004 $XE_{145}$ | 15.3 | $X$ | 186.27098 | 300.13300 | 107.40661 | 10.26512 | 0.2253543 | 0.22055814 | 2.7130262 | 20 | 5 12.3 | 20.1 |
| 198557 2004 $XB_{146}$ | 15.5 | $X$ | 325.79470 | 72.31166 | 250.69474 | 13.69925 | 0.1284699 | 0.23345860 | 2.6121381 | 20 | 7 11.4 | 18.4 |
| 198558 2004 $XE_{148}$ | 15.5 | $X$ | 297.26525 | 253.02147 | 101.06118 | 6.78629 | 0.3920051 | 0.23231587 | 2.6206969 | 20 | 5 26.6 | 18.9 |
| 198559 2004 $XF_{148}$ | 15.5 | $X$ | 118.44422 | 8.46416 | 126.62494 | 14.67770 | 0.1362032 | 0.21372706 | 2.7705312 | 20 | 6 22.2 | 19.8 |
| 198560 2004 $XA_{149}$ | 16.4 | $X$ | 153.06621 | 67.56868 | 83.04139 | 2.98931 | 0.1009934 | 0.23017151 | 2.6369487 | 20 | 8 16.8 | 20.4 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 198561 2004 $XX_{151}$ | 16.2 | $X$ | 281.93658 | 291.22485 | 344.41832 | 3.74868 | 0.0255079 | 0.21276178 | 2.7789047 | 20 | 3 19.2 | 20.0 |
| 198562 2004 $XQ_{153}$ | 16.5 | $X$ | 190.88955 | 41.42384 | 280.52469 | 1.02984 | 0.0599328 | 0.20408863 | 2.8570873 | 20 | 1 30.1 | 20.8 |
| 198563 2004 $XY_{155}$ | 16.9 | $X$ | 184.51404 | 68.90528 | 331.32643 | 2.59040 | 0.1809725 | 0.21955994 | 2.7212429 | 20 | 4 27.5 | 21.5 |
| 198564 2004 $XB_{158}$ | 16.0 | $X$ | 184.65718 | 121.00544 | 276.69530 | 0.54093 | 0.0909849 | 0.21508070 | 2.7588945 | 20 | 4 24.9 | 20.1 |
| 198565 2004 $XU_{161}$ | 16.4 | $X$ | 183.52543 | 102.18601 | 14.20707 | 2.87469 | 0.0662778 | 0.22944012 | 2.6425496 | 20 | 8 6.1 | 20.2 |
| 198566 2004 $XB_{162}$ | 15.5 | $X$ | 354.48454 | 323.24418 | 18.56594 | 12.20232 | 0.2192961 | 0.24247419 | 2.5469810 | 20 | 10 18.3 | 17.5 |
| 198567 2004 $XK_{162}$ | 15.9 | $X$ | 160.52983 | 120.56643 | 316.93890 | 8.18721 | 0.1528968 | 0.21609195 | 2.7502805 | 20 | 5 20.5 | 20.5 |
| 198568 2004 $XF_{164}$ | 15.3 | $X$ | 189.09977 | 244.49459 | 204.11300 | 21.44475 | 0.0426253 | 0.22593562 | 2.6698052 | 20 | 7 2.9 | 19.6 |
| 198569 2004 $XE_{168}$ | 16.1 | $X$ | 12.69592 | 47.71683 | 126.92356 | 3.60760 | 0.1698046 | 0.20319010 | 2.8655040 | 20 | 3 10.5 | 19.1 |
| 198570 2004 $XW_{171}$ | 15.5 | $X$ | 23.23663 | 26.17439 | 13.26370 | 2.32995 | 0.0705176 | 0.18955150 | 3.0013587 | 20 | — | — |
| 198571 2004 $XP_{172}$ | 16.2 | $X$ | 252.53053 | 351.32129 | 35.42263 | 2.60117 | 0.1028672 | 0.22995945 | 2.6385696 | 20 | 6 25.3 | 19.8 |
| 198572 2004 $XA_{177}$ | 15.8 | $X$ | 286.04742 | 193.79450 | 68.59584 | 6.06345 | 0.0564316 | 0.20631900 | 2.8364594 | 20 | 3 7.6 | 19.8 |
| 198573 2004 $XX_{177}$ | 15.8 | $X$ | 171.88328 | 116.01766 | 53.68124 | 14.36668 | 0.1069074 | 0.24033277 | 2.5620881 | 20 | 10 6.6 | 19.8 |
| 198574 2004 $XK_{182}$ | 16.5 | $X$ | 203.69470 | 104.19555 | 344.83708 | 12.59540 | 0.2378657 | 0.23021098 | 2.6366472 | 20 | 7 15.9 | 21.2 |
| 198575 2004 $YM$ | 15.1 | $X$ | 218.12718 | 41.35350 | 31.94876 | 29.42968 | 0.1880983 | 0.22738131 | 2.6584768 | 20 | 7 12.1 | 20.0 |
| 198576 2004 $YU_{3}$ | 16.4 | $X$ | 347.59126 | 305.72671 | 97.79953 | 2.32341 | 0.1238232 | 0.24364100 | 2.5388428 | 20 | 12 22.8 | 19.1 |
| 198577 2004 $YG_{4}$ | 16.1 | $X$ | 29.68313 | 79.32198 | 279.36088 | 3.70942 | 0.1994385 | 0.24543788 | 2.5264361 | 20 | — | — |
| 198578 2004 $YX_{7}$ | 16.1 | $X$ | 329.70647 | 78.67601 | 230.01522 | 7.96117 | 0.0944595 | 0.23005724 | 2.6378218 | 20 | 7 1.9 | 19.2 |
| 198579 2004 $YR_{11}$ | 15.7 | $X$ | 33.60136 | 52.15275 | 91.51129 | 3.36490 | 0.1194276 | 0.20253856 | 2.8716460 | 20 | 3 6.0 | 18.9 |
| 198580 2004 $YV_{11}$ | 15.6 | $X$ | 340.64543 | 136.06542 | 96.73485 | 4.80741 | 0.0412055 | 0.20932162 | 2.8092690 | 20 | 4 12.5 | 19.2 |
| 198581 2004 $YR_{12}$ | 15.9 | $X$ | 206.34888 | 291.18858 | 105.90974 | 6.43327 | 0.0344183 | 0.21623263 | 2.7490875 | 20 | 5 21.9 | 19.8 |
| 198582 2004 $YT_{13}$ | 15.2 | $X$ | 101.09905 | 74.82817 | 289.14594 | 9.37981 | 0.1069591 | 0.19286719 | 2.9668607 | 20 | — | — |
| 198583 2004 $YQ_{20}$ | 15.4 | $X$ | 256.33219 | 54.19577 | 120.00849 | 6.07350 | 0.0906632 | 0.18168772 | 3.0873486 | 20 | 12 31.1 | 19.5 |
| 198584 2004 $YQ_{21}$ | 15.2 | $X$ | 234.08923 | 47.55040 | 121.85084 | 10.22476 | 0.0181916 | 0.17758011 | 3.1347759 | 20 | 12 8.6 | 19.7 |
| 198585 2004 $YR_{29}$ | 16.1 | $X$ | 241.89088 | 88.09907 | 352.90814 | 6.98625 | 0.1916680 | 0.23116705 | 2.6293724 | 20 | 8 14.1 | 19.9 |
| 198586 2004 $YQ_{31}$ | 15.7 | $X$ | 311.46214 | 234.84236 | 166.34918 | 9.66437 | 0.0915352 | 0.24195094 | 2.5506518 | 20 | 10 18.9 | 18.6 |
| 198587 2004 $YD_{32}$ | 15.7 | $X$ | 255.26739 | 17.82824 | 58.17905 | 15.35073 | 0.0939703 | 0.23326080 | 2.6136145 | 20 | 9 15.3 | 19.5 |
| 198588 2004 $YP_{32}$ | 15.7 | $X$ | 286.15301 | 327.56587 | 67.39044 | 5.55470 | 0.2706640 | 0.23369465 | 2.6103788 | 20 | 7 27.8 | 18.8 |
| 198589 2004 $YQ_{33}$ | 16.2 | $X$ | 171.68926 | 304.86268 | 135.11828 | 12.49418 | 0.2662329 | 0.21731721 | 2.7399331 | 20 | 6 8.3 | 21.3 |
| 198590 2004 $YV_{34}$ | 15.8 | $X$ | 4.55792 | 146.55458 | 295.97476 | 2.54957 | 0.1271169 | 0.18738636 | 3.0244337 | 20 | — | — |
| 198591 2004 $YB_{35}$ | 16.1 | $X$ | 236.15159 | 233.30140 | 204.27671 | 16.02641 | 0.1778482 | 0.23307410 | 2.6150101 | 20 | 7 29.6 | 20.4 |
| 198592 Antbernal | 15.5 | $X$ | 227.12612 | 211.56330 | 117.57732 | 7.17899 | 0.0577903 | 0.20858200 | 2.8159061 | 20 | 3 21.1 | 19.7 |
| 198593 2005 $AK_{1}$ | 15.0 | $X$ | 50.44430 | 250.56107 | 98.47970 | 11.80464 | 0.0673562 | 0.18102730 | 3.0948528 | 20 | 12 15.4 | 19.4 |
| 198594 2005 $AR_{1}$ | 15.6 | $X$ | 276.27029 | 266.40966 | 138.64766 | 6.24125 | 0.2853433 | 0.23217132 | 2.6217845 | 20 | 7 22.9 | 18.9 |
| 198595 2005 $AD_{5}$ | 15.0 | $X$ | 23.53750 | 264.32055 | 88.57992 | 10.31496 | 0.1012214 | 0.17687254 | 3.1431307 | 20 | 11 21.1 | 19.2 |
| 198596 2005 $AR_{5}$ | 15.8 | $X$ | 71.01881 | 82.66939 | 71.57820 | 8.63639 | 0.1598430 | 0.20983428 | 2.8046915 | 20 | 5 23.1 | 19.3 |
| 198597 2005 $AU_{5}$ | 15.3 | $X$ | 250.32000 | 159.86152 | 333.31284 | 6.85062 | 0.1203111 | 0.17566251 | 3.1575482 | 20 | 10 26.7 | 19.9 |
| 198598 2005 $AD_{6}$ | 15.5 | $X$ | 247.68731 | 138.40724 | 343.88117 | 5.85345 | 0.1749374 | 0.17352687 | 3.1834026 | 20 | 10 3.9 | 20.2 |
| 198599 2005 $AE_{7}$ | 16.0 | $X$ | 166.13159 | 83.78748 | 22.20907 | 4.60059 | 0.1514929 | 0.21931015 | 2.7233088 | 20 | 7 3.2 | 20.4 |
| 198600 2005 $AJ_{7}$ | 15.6 | $X$ | 329.81317 | 310.85445 | 59.96162 | 5.09300 | 0.2861630 | 0.23718974 | 2.5846720 | 20 | 10 5.9 | 17.0 |
| 198601 2005 $AE_{11}$ | 16.1 | $X$ | 254.35473 | 157.99559 | 268.45082 | 4.69480 | 0.2137588 | 0.23169712 | 2.6253606 | 20 | 8 3.1 | 19.8 |
| 198602 2005 $AG_{11}$ | 15.7 | $X$ | 147.52252 | 241.41889 | 113.99558 | 5.94377 | 0.2351334 | 0.26504047 | 2.4002764 | 20 | 2 2.6 | 19.3 |
| 198603 2005 $AY_{15}$ | 16.2 | $X$ | 242.15360 | 308.44390 | 115.90619 | 2.82774 | 0.2243909 | 0.22891192 | 2.6466130 | 20 | 7 17.7 | 20.3 |
| 198604 2005 $AT_{18}$ | 15.6 | $X$ | 270.09236 | 49.88458 | 101.83003 | 3.53142 | 0.0935758 | 0.18254273 | 3.0777005 | 20 | 12 21.8 | 19.6 |
| 198605 2005 $AM_{19}$ | 15.8 | $X$ | 136.18334 | 255.14440 | 113.41481 | 2.94911 | 0.0963969 | 0.19870868 | 2.9084269 | 20 | 1 31.5 | 20.1 |
| 198606 2005 $AF_{22}$ | 16.8 | $X$ | 51.54319 | 178.92981 | 317.86362 | 6.29680 | 0.2906091 | 0.26925451 | 2.3751665 | 20 | 4 8.6 | 18.7 |
| 198607 2005 $AL_{22}$ | 14.6 | $X$ | 224.45486 | 177.31584 | 299.27263 | 16.59923 | 0.1257598 | 0.17149439 | 3.2085054 | 20 | 9 1.7 | 19.7 |
| 198608 2005 $AH_{23}$ | 15.9 | $X$ | 298.94736 | 340.98476 | 80.73761 | 4.13427 | 0.2250695 | 0.23717834 | 2.5847549 | 20 | 10 10.2 | 18.1 |
| 198609 2005 $AJ_{23}$ | 15.9 | $X$ | 139.93683 | 318.69313 | 119.57055 | 12.47713 | 0.1986483 | 0.20998701 | 2.8033313 | 20 | 5 11.7 | 20.7 |
| 198610 2005 $AN_{23}$ | 15.4 | $X$ | 334.05499 | 113.01938 | 336.32389 | 5.69839 | 0.1179459 | 0.18127629 | 3.0920183 | 20 | — | — |
| 198611 2005 $AJ_{24}$ | 16.2 | $X$ | 91.05536 | 159.60545 | 277.60058 | 6.31487 | 0.2397303 | 0.20312318 | 2.8661333 | 20 | 3 18.6 | 20.3 |
| 198612 2005 $AK_{24}$ | 16.0 | $X$ | 294.68007 | 199.44999 | 238.74650 | 3.81361 | 0.2352167 | 0.23956118 | 2.5675865 | 20 | 10 21.8 | 18.2 |
| 198613 2005 $AU_{24}$ | 15.6 | $X$ | 129.64280 | 309.17479 | 169.36530 | 8.20341 | 0.1486364 | 0.21429952 | 2.7655950 | 20 | 6 13.5 | 20.0 |
| 198614 2005 $AO_{26}$ | 15.6 | $X$ | 153.12515 | 337.53886 | 129.50635 | 12.06715 | 0.1543402 | 0.21841908 | 2.7307105 | 20 | 6 22.5 | 20.1 |
| 198615 2005 $AY_{26}$ | 15.6 | $X$ | 16.68954 | 195.86319 | 276.33966 | 7.29062 | 0.0501577 | 0.19183998 | 2.9774420 | 20 | — | — |
| 198616 Lucabracali | 15.5 | $X$ | 240.80816 | 229.83660 | 119.29272 | 7.10813 | 0.0543192 | 0.21454119 | 2.7635177 | 20 | 5 1.3 | 19.5 |
| 198617 2005 $AU_{31}$ | 15.6 | $X$ | 97.45263 | 8.33644 | 111.37599 | 15.06182 | 0.2044771 | 0.21034395 | 2.8001591 | 20 | 5 21.9 | 19.9 |
| 198618 2005 $AA_{33}$ | 15.9 | $X$ | 216.63530 | 117.02941 | 297.29078 | 14.56659 | 0.1921930 | 0.22515175 | 2.6759983 | 20 | 6 13.5 | 20.4 |
| 198619 2005 $AD_{33}$ | 15.9 | $X$ | 5.54107 | 295.94758 | 106.99893 | 10.68786 | 0.0566434 | 0.24438465 | 2.5336898 | 20 | — | — |
| 198620 2005 $AJ_{36}$ | 16.0 | $X$ | 102.74692 | 268.60083 | 242.82356 | 4.51791 | 0.0092042 | 0.21531032 | 2.7569326 | 20 | 6 7.4 | 19.7 |
| 198621 2005 $AJ_{41}$ | 16.3 | $X$ | 328.18536 | 61.40241 | 118.01454 | 3.34651 | 0.1280963 | 0.25994453 | 2.4315447 | 20 | — | — |
| 198622 2005 $AU_{41}$ | 16.1 | $X$ | 228.28457 | 1.38030 | 62.85822 | 3.19096 | 0.0938536 | 0.22455274 | 2.6807551 | 20 | 7 17.3 | 20.0 |
| 198623 2005 $AB_{42}$ | 15.9 | $X$ | 271.98290 | 61.95249 | 345.65317 | 11.48534 | 0.2764363 | 0.23360271 | 2.6110637 | 20 | 7 26.2 | 19.5 |
| 198624 2005 $AE_{42}$ | 15.5 | $X$ | 333.21545 | 38.15879 | 2.32950 | 13.16413 | 0.1638607 | 0.24148178 | 2.5539544 | 20 | 11 20.6 | 18.2 |
| 198625 2005 $AA_{46}$ | 15.6 | $X$ | 78.62599 | 68.83885 | 42.33873 | 12.41584 | 0.0730474 | 0.20472348 | 2.8511776 | 20 | 3 29.3 | 19.5 |
| 198626 2005 $AQ_{46}$ | 15.8 | $X$ | 10.75615 | 329.33167 | 271.91695 | 3.68496 | 0.1003795 | 0.21588254 | 2.7520587 | 20 | 6 6.7 | 18.9 |
| 198627 2005 $AE_{47}$ | 15.7 | $X$ | 144.55395 | 338.30435 | 115.53566 | 10.23103 | 0.1905151 | 0.21232675 | 2.7826991 | 20 | 5 31.9 | 20.3 |
| 198628 2005 $AH_{47}$ | 15.8 | $X$ | 259.02149 | 337.66932 | 224.28072 | 2.78099 | 0.1084830 | 0.18736140 | 3.0247023 | 20 | — | — |
| 198629 2005 $AM_{50}$ | 16.1 | $X$ | 186.37082 | 225.12187 | 190.11239 | 4.78728 | 0.1567647 | 0.21740218 | 2.7392192 | 20 | 5 19.6 | 20.6 |
| 198630 2005 $AR_{51}$ | 16.1 | $X$ | 258.32043 | 176.78866 | 19.17335 | 4.61904 | 0.0884427 | 0.18470967 | 3.0535823 | 20 | — | — |
| 198631 2005 $AW_{51}$ | 16.0 | $X$ | 42.62042 | 108.19724 | 359.38807 | 4.21915 | 0.0453143 | 0.19710816 | 2.9241500 | 20 | 1 29.5 | 19.9 |
| 198632 2005 $AQ_{52}$ | 15.4 | $X$ | 134.19391 | 227.84743 | 98.72701 | 9.37002 | 0.0812116 | 0.18842158 | 3.0133456 | 20 | — | — |
| 198633 2005 $AG_{54}$ | 15.5 | $X$ | 337.00919 | 170.50767 | 41.82055 | 2.89144 | 0.1270350 | 0.19899177 | 2.9056679 | 20 | 3 2.2 | 18.9 |
| 198634 Burgaymarta | 15.7 | $X$ | 171.93075 | 340.56108 | 311.46970 | 8.89220 | 0.0587702 | 0.18896117 | 3.0076065 | 20 | — | — |
| 198635 2005 $AT_{54}$ | 15.9 | $X$ | 174.54638 | 80.86011 | 358.55474 | 12.36394 | 0.1411091 | 0.21972987 | 2.7198398 | 20 | 6 4.8 | 20.5 |
| 198636 2005 $AM_{57}$ | 15.5 | $X$ | 269.77702 | 313.59007 | 191.31334 | 6.48385 | 0.1198673 | 0.17855763 | 3.1233245 | 20 | 12 8.9 | 19.6 |
| 198637 2005 $AN_{57}$ | 15.7 | $X$ | 181.09762 | 38.20979 | 18.77873 | 12.44829 | 0.1493152 | 0.21615558 | 2.7497407 | 20 | 5 12.8 | 20.2 |
| 198638 2005 $AL_{60}$ | 15.8 | $X$ | 108.50041 | 231.91482 | 37.23988 | 3.75248 | 0.0386700 | 0.17223537 | 3.1992965 | 20 | 11 10.8 | 20.4 |
| 198639 2005 $AU_{60}$ | 15.3 | $X$ | 229.40710 | 277.15284 | 311.50612 | 8.86786 | 0.0363798 | 0.18665454 | 3.0323339 | 20 | — | — |
| 198640 2005 $AC_{62}$ | 16.2 | $X$ | 66.86468 | 91.66946 | 349.58608 | 3.03766 | 0.1605787 | 0.19813994 | 2.9139898 | 20 | 2 11.5 | 19.5 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 198641 2005 $AD_{65}$ | 16.5 | $X$ | 95.86582 | 273.87939 | 155.88387 | 2.22918 | 0.0409196 | 0.20082729 | 2.8879360 | 20 | 2 19.2 | 20.5 |
| 198642 2005 $AY_{65}$ | 15.9 | $X$ | 331.19115 | 205.37258 | 246.73154 | 1.96671 | 0.0375419 | 0.18254808 | 3.0776404 | 20 | — | — |
| 198643 2005 $AO_{71}$ | 15.9 | $X$ | 101.91563 | 237.11873 | 206.36437 | 1.47843 | 0.0368691 | 0.20402278 | 2.8577020 | 20 | 3 13.7 | 19.7 |
| 198644 2005 $AA_{76}$ | 15.4 | $X$ | 54.25734 | 292.55967 | 232.99580 | 11.97143 | 0.1676598 | 0.20564995 | 2.8426080 | 20 | 5 13.7 | 18.6 |
| 198645 2005 $AJ_{76}$ | 15.6 | $X$ | 234.00782 | 217.44195 | 358.89230 | 4.60162 | 0.1101959 | 0.18291669 | 3.0735043 | 20 | — | — |
| 198646 2005 $AV_{78}$ | 15.4 | $X$ | 113.99914 | 297.92845 | 44.27254 | 2.97819 | 0.2216243 | 0.18791120 | 3.0187995 | 20 | — | — |
| 198647 2005 $AS_{79}$ | 15.6 | $X$ | 86.28990 | 293.90814 | 117.28975 | 13.06227 | 0.0519658 | 0.19448021 | 2.9504331 | 20 | 1 17.6 | 19.6 |
| 198648 2005 $AK_{80}$ | 16.1 | $X$ | 231.06574 | 201.49616 | 72.26200 | 3.32965 | 0.0196389 | 0.19462891 | 2.9489302 | 20 | 1 19.4 | 20.3 |
| 198649 2005 $BY_{3}$ | 15.3 | $X$ | 98.70576 | 248.39994 | 125.14801 | 10.66317 | 0.0573532 | 0.19327764 | 2.9626589 | 20 | — | — |
| 198650 2005 $BR_{4}$ | 16.1 | $X$ | 184.73098 | 55.89300 | 55.03745 | 3.38736 | 0.0302423 | 0.22438918 | 2.6820576 | 20 | 8 1.6 | 19.8 |
| 198651 2005 $BR_{8}$ | 15.0 | $X$ | 82.66396 | 30.72531 | 320.90522 | 14.35657 | 0.0410268 | 0.18462772 | 3.0544858 | 20 | — | — |
| 198652 2005 $BS_{9}$ | 15.0 | $X$ | 300.93805 | 148.94336 | 301.28181 | 14.54321 | 0.0258035 | 0.17545231 | 3.1600696 | 20 | 11 20.0 | 19.6 |
| 198653 2005 $BY_{9}$ | 16.0 | $X$ | 88.13638 | 112.49321 | 332.61359 | 5.35680 | 0.0997412 | 0.20337041 | 2.8638100 | 20 | 3 6.9 | 19.8 |
| 198654 2005 $BL_{10}$ | 14.9 | $X$ | 80.69924 | 248.49652 | 89.73852 | 11.08021 | 0.0650102 | 0.18084938 | 3.0968823 | 20 | — | — |
| 198655 2005 $BV_{10}$ | 15.6 | $X$ | 184.15446 | 293.76649 | 97.56641 | 10.08864 | 0.2190822 | 0.21395257 | 2.7685840 | 20 | 4 22.4 | 20.5 |
| 198656 2005 $BH_{13}$ | 15.8 | $X$ | 90.06088 | 3.98055 | 88.60290 | 3.23768 | 0.0249358 | 0.20389542 | 2.8588919 | 20 | 3 10.5 | 19.7 |
| 198657 2005 $BF_{16}$ | 15.8 | $X$ | 99.68673 | 145.85811 | 334.35500 | 3.67538 | 0.0157274 | 0.21248186 | 2.7813447 | 20 | 4 22.2 | 19.5 |
| 198658 2005 $BT_{16}$ | 15.5 | $X$ | 55.69714 | 29.65941 | 63.65894 | 7.14591 | 0.0398849 | 0.19866299 | 2.9088728 | 20 | 1 29.5 | 19.4 |
| 198659 2005 $BH_{18}$ | 15.4 | $X$ | 235.60761 | 295.04759 | 340.26090 | 9.62185 | 0.0531092 | 0.19781898 | 2.9171409 | 20 | 1 25.6 | 19.7 |
| 198660 2005 $BW_{18}$ | 15.7 | $X$ | 115.95328 | 208.59422 | 122.94801 | 3.05368 | 0.0362797 | 0.18587971 | 3.0407547 | 20 | — | — |
| 198661 2005 $BZ_{18}$ | 15.7 | $X$ | 138.61183 | 39.10181 | 53.39275 | 5.28329 | 0.0957366 | 0.21306564 | 2.7762619 | 20 | 5 15.5 | 19.8 |
| 198662 2005 $BB_{20}$ | 15.0 | $X$ | 15.61549 | 61.41075 | 324.60244 | 15.45113 | 0.1023381 | 0.17926889 | 3.1150577 | 20 | 12 20.7 | 19.3 |
| 198663 2005 $BA_{22}$ | 15.8 | $X$ | 225.41661 | 151.85283 | 80.30694 | 1.59243 | 0.1300159 | 0.18379240 | 3.0637337 | 20 | — | — |
| 198664 2005 $BE_{23}$ | 16.2 | $X$ | 350.67506 | 110.36273 | 49.22398 | 2.61280 | 0.0487491 | 0.19501393 | 2.9450474 | 20 | 1 23.2 | 20.0 |
| 198665 2005 $BK_{23}$ | 15.8 | $X$ | 295.89847 | 122.25671 | 323.08995 | 14.39402 | 0.1039678 | 0.17432369 | 3.1736944 | 20 | 10 26.6 | 20.3 |
| 198666 2005 $BN_{23}$ | 15.4 | $X$ | 341.33271 | 12.57387 | 16.20575 | 3.58886 | 0.0431381 | 0.17130935 | 3.2108154 | 20 | 10 29.5 | 19.6 |
| 198667 2005 $BQ_{24}$ | 15.4 | $X$ | 184.21747 | 260.82153 | 136.01073 | 13.32928 | 0.3483318 | 0.21459670 | 2.7630411 | 20 | 4 29.9 | 20.9 |
| 198668 2005 $BV_{25}$ | 16.5 | $X$ | 130.46214 | 213.65541 | 247.77783 | 2.00259 | 0.1589144 | 0.21118941 | 2.7926808 | 20 | 5 23.8 | 20.7 |
| 198669 2005 $BA_{26}$ | 15.2 | $X$ | 123.71216 | 355.73596 | 311.81759 | 11.45393 | 0.1755843 | 0.24361662 | 2.5390121 | 20 | — | — |
| 198670 2005 $BJ_{28}$ | 16.6 | $X$ | 55.60332 | 130.84381 | 325.28584 | 5.61636 | 0.1911139 | 0.19824249 | 2.9129848 | 20 | 2 15.6 | 19.7 |
| 198671 2005 $BK_{28}$ | 15.7 | $X$ | 249.33083 | 235.28905 | 330.63674 | 3.67103 | 0.1051413 | 0.18353138 | 3.0666379 | 20 | — | — |
| 198672 2005 $BJ_{42}$ | 15.7 | $X$ | 152.65046 | 138.69969 | 117.49744 | 2.43131 | 0.1424715 | 0.17608182 | 3.1525334 | 20 | 12 13.7 | 20.8 |
| 198673 2005 $BG_{44}$ | 14.6 | $X$ | 311.29242 | 258.55199 | 178.96890 | 22.40400 | 0.0752240 | 0.17679177 | 3.1440880 | 20 | 11 21.1 | 19.1 |
| 198674 2005 $CU_{1}$ | 15.1 | $X$ | 175.31967 | 281.72350 | 312.88265 | 8.32514 | 0.0448803 | 0.17771115 | 3.1332347 | 20 | 12 14.3 | 19.8 |
| 198675 2005 $CY_{2}$ | 16.3 | $X$ | 177.31545 | 306.11002 | 126.62991 | 4.43149 | 0.1809591 | 0.21690111 | 2.7434362 | 20 | 6 2.1 | 20.8 |
| 198676 2005 $CW_{4}$ | 16.4 | $X$ | 11.61561 | 127.09090 | 356.39510 | 5.16664 | 0.2060629 | 0.19325527 | 2.9628874 | 20 | — | — |
| 198677 2005 $CE_{5}$ | 14.8 | $X$ | 262.68384 | 9.81870 | 145.07966 | 11.39359 | 0.1722238 | 0.17619773 | 3.1511507 | 20 | 12 5.2 | 19.2 |
| 198678 2005 $CN_{5}$ | 15.6 | $X$ | 114.32709 | 304.39744 | 135.89788 | 6.81299 | 0.0457560 | 0.20125225 | 2.8838691 | 20 | 3 29.8 | 19.7 |
| 198679 2005 $CM_{6}$ | 14.9 | $X$ | 192.45678 | 257.99975 | 325.87031 | 8.40621 | 0.0492790 | 0.17484540 | 3.1673781 | 20 | 12 19.6 | 19.6 |
| 198680 2005 $CN_{6}$ | 14.9 | $X$ | 217.61189 | 231.55276 | 328.41062 | 10.99966 | 0.0307109 | 0.17548753 | 3.1596468 | 20 | 12 22.5 | 19.6 |
| 198681 2005 $CC_{8}$ | 16.0 | $X$ | 122.31494 | 85.59434 | 42.85500 | 5.18760 | 0.1045279 | 0.21481208 | 2.7611940 | 20 | 6 13.2 | 20.0 |
| 198682 2005 $CL_{8}$ | 16.3 | $X$ | 16.09109 | 294.26797 | 82.30983 | 3.15078 | 0.2214678 | 0.24417651 | 2.5351294 | 20 | — | — |
| 198683 2005 $CC_{10}$ | 16.1 | $X$ | 325.27698 | 50.79267 | 28.10626 | 4.03081 | 0.0560302 | 0.17575064 | 3.1564925 | 20 | 12 9.4 | 20.2 |
| 198684 2005 $CY_{11}$ | 15.7 | $X$ | 153.63544 | 161.28721 | 112.39015 | 9.72329 | 0.0706278 | 0.24254201 | 2.5465062 | 20 | — | — |
| 198685 2005 $CH_{12}$ | 15.9 | $X$ | 160.18966 | 343.84058 | 83.07868 | 5.54770 | 0.1941807 | 0.21247603 | 2.7813956 | 20 | 5 11.9 | 20.5 |
| 198686 2005 $CY_{12}$ | 16.1 | $X$ | 139.34811 | 343.81029 | 109.10177 | 5.48274 | 0.0243365 | 0.21036895 | 2.7999372 | 20 | 5 12.1 | 20.0 |
| 198687 2005 $CH_{15}$ | 16.6 | $X$ | 298.36773 | 350.04643 | 105.08681 | 2.86776 | 0.0602798 | 0.24159127 | 2.5531827 | 20 | 12 10.3 | 19.5 |
| 198688 2005 $CJ_{18}$ | 16.3 | $X$ | 100.37637 | 218.58909 | 247.48660 | 1.34202 | 0.0434646 | 0.20625212 | 2.8370725 | 20 | 4 10.3 | 20.3 |
| 198689 2005 $CO_{19}$ | 16.4 | $X$ | 114.41866 | 337.38296 | 175.67784 | 1.94567 | 0.1623587 | 0.21518393 | 2.7580121 | 20 | 7 12.3 | 20.5 |
| 198690 2005 $CX_{19}$ | 15.4 | $X$ | 316.92916 | 21.78083 | 131.98011 | 6.85809 | 0.0142988 | 0.18593012 | 3.0402052 | 20 | — | — |
| 198691 2005 $CH_{20}$ | 15.4 | $X$ | 278.38831 | 40.20253 | 126.12602 | 7.77847 | 0.0583008 | 0.18237477 | 3.0795898 | 20 | — | — |
| 198692 2005 $CT_{20}$ | 15.6 | $X$ | 289.76987 | 220.41569 | 311.54585 | 8.48439 | 0.0968787 | 0.18444873 | 3.0564616 | 20 | — | — |
| 198693 2005 $CA_{22}$ | 15.8 | $X$ | 96.03045 | 313.46677 | 125.93203 | 8.52337 | 0.0246318 | 0.20025900 | 2.8933970 | 20 | 3 2.3 | 19.8 |
| 198694 2005 $CR_{22}$ | 14.5 | $X$ | 135.16801 | 282.09748 | 338.38049 | 22.15969 | 0.0917537 | 0.17304018 | 3.1893689 | 20 | 11 26.8 | 19.9 |
| 198695 2005 $CX_{22}$ | 15.5 | $X$ | 104.73867 | 354.81023 | 110.18468 | 10.41360 | 0.0910435 | 0.20643374 | 2.8354082 | 20 | 4 26.6 | 19.6 |
| 198696 2005 $CT_{23}$ | 14.8 | $X$ | 266.89932 | 182.24576 | 290.11817 | 14.19883 | 0.0406523 | 0.17245287 | 3.1966060 | 20 | 10 30.4 | 19.5 |
| 198697 2005 $CT_{24}$ | 15.7 | $X$ | 335.41695 | 305.92382 | 177.85264 | 10.99354 | 0.1804731 | 0.18768241 | 3.0212524 | 20 | — | — |
| 198698 2005 $CU_{24}$ | 15.7 | $X$ | 47.54884 | 290.19936 | 230.26416 | 13.95331 | 0.0917185 | 0.20462913 | 2.8520540 | 20 | 4 13.4 | 19.3 |
| 198699 2005 $CC_{25}$ | 15.8 | $X$ | 128.78208 | 50.14986 | 71.92936 | 13.99664 | 0.1197072 | 0.21213980 | 2.7843336 | 20 | 6 13.3 | 19.9 |
| 198700 Nataliegrünewald | 15.9 | $X$ | 101.14880 | 50.05010 | 359.25086 | 13.07551 | 0.2232886 | 0.20209914 | 2.8758070 | 20 | 2 29.3 | 20.0 |
| 198701 2005 $CC_{26}$ | 15.4 | $X$ | 173.52418 | 284.21491 | 139.78134 | 12.83867 | 0.1203611 | 0.21547251 | 2.7555490 | 20 | 5 21.0 | 19.9 |
| 198702 2005 $CE_{26}$ | 16.4 | $X$ | 172.49153 | 272.64764 | 321.81039 | 1.19271 | 0.1536541 | 0.23927906 | 2.5696043 | 20 | 12 16.6 | 20.5 |
| 198703 2005 $CF_{26}$ | 15.6 | $X$ | 220.89872 | 31.23593 | 133.73452 | 2.03310 | 0.1320644 | 0.17292674 | 3.1907635 | 20 | 11 2.6 | 20.4 |
| 198704 2005 $CB_{38}$ | 15.5 | $X$ | 306.57693 | 13.33375 | 122.49209 | 5.71905 | 0.1028269 | 0.18130174 | 3.0917288 | 20 | — | — |
| 198705 2005 $CK_{43}$ | 16.0 | $X$ | 186.32683 | 295.88804 | 137.69209 | 4.11823 | 0.1808169 | 0.21784492 | 2.7355066 | 20 | 6 10.8 | 20.5 |
| 198706 2005 $CA_{47}$ | 15.6 | $X$ | 327.96978 | 317.38059 | 142.84610 | 2.64089 | 0.0597301 | 0.17978699 | 3.1090703 | 20 | — | — |
| 198707 2005 $CF_{48}$ | 15.6 | $X$ | 288.84854 | 173.23396 | 347.33651 | 4.88002 | 0.1172923 | 0.18167111 | 3.0875367 | 20 | — | — |
| 198708 2005 $CY_{48}$ | 15.6 | $X$ | 330.83327 | 115.03079 | 343.41849 | 12.54593 | 0.2534683 | 0.18136613 | 3.0909970 | 20 | — | — |
| 198709 2005 $CC_{49}$ | 15.4 | $X$ | 345.82089 | 283.07360 | 164.15137 | 16.67902 | 0.2461998 | 0.18222906 | 3.0812313 | 20 | — | — |
| 198710 2005 $CN_{49}$ | 15.1 | $X$ | 263.75369 | 9.40900 | 158.28742 | 6.34690 | 0.1192371 | 0.17878975 | 3.1206206 | 20 | 12 28.1 | 19.2 |
| 198711 2005 $CM_{50}$ | 15.2 | $X$ | 39.17892 | 96.05482 | 323.24600 | 10.34776 | 0.0630692 | 0.18542329 | 3.0457426 | 20 | — | — |
| 198712 2005 $CS_{51}$ | 14.9 | $X$ | 250.13495 | 165.90792 | 334.11590 | 11.47433 | 0.0824104 | 0.17222784 | 3.1993897 | 20 | 11 6.7 | 19.7 |
| 198713 2005 $CA_{54}$ | 15.3 | $X$ | 265.40999 | 112.08882 | 7.40336 | 5.32997 | 0.0316107 | 0.17159443 | 3.2072582 | 20 | 11 10.7 | 19.8 |
| 198714 2005 $CT_{56}$ | 15.8 | $X$ | 28.23555 | 298.61795 | 105.29956 | 2.97668 | 0.0954516 | 0.18328782 | 3.0693540 | 20 | — | — |
| 198715 2005 $CD_{58}$ | 15.6 | $X$ | 289.51219 | 254.62598 | 244.00618 | 4.30297 | 0.0919089 | 0.18053668 | 3.1004573 | 20 | — | — |
| 198716 2005 $CR_{58}$ | 15.8 | $X$ | 184.25511 | 71.72029 | 320.90452 | 14.00739 | 0.3302311 | 0.21319941 | 2.7751005 | 20 | 4 13.4 | 21.3 |
| 198717 Szymczyk | 15.5 | $X$ | 9.11116 | 138.56910 | 306.04032 | 11.01445 | 0.1126303 | 0.18618949 | 3.0373811 | 20 | — | — |
| 198718 2005 $CC_{64}$ | 15.9 | $X$ | 181.45534 | 351.68802 | 78.62489 | 4.76655 | 0.1304756 | 0.21445153 | 2.7642879 | 20 | 6 2.3 | 20.1 |
| 198719 2005 $CP_{64}$ | 15.4 | $X$ | 282.29407 | 252.69380 | 279.98495 | 8.45130 | 0.0493888 | 0.18387948 | 3.0627664 | 20 | — | — |
| 198720 2005 $CN_{72}$ | 15.8 | $X$ | 141.59542 | 254.81369 | 127.70745 | 10.38849 | 0.0892237 | 0.19738491 | 2.9214161 | 20 | 2 23.9 | 20.1 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 198721 2005 $CR_{74}$ | 15.7 | X | 220.93231 | 110.01316 | 99.85626 | 6.24957 | 0.1255930 | 0.17779193 | 3.1322856 | 20 | 12 26.1 | 20.4 |
| 198722 2005 $CU_{78}$ | 14.7 | X | 251.20031 | 298.88084 | 323.83706 | 1.94592 | 0.1785556 | 0.12494379 | 3.9627158 | 20 | 1 24.2 | 20.7 |
| 198723 2005 $EV_{4}$ | 15.2 | X | 54.39531 | 345.46593 | 15.18798 | 3.98115 | 0.0573933 | 0.17340614 | 3.1848800 | 20 | 12 30.4 | 19.7 |
| 198724 2005 $EH_{5}$ | 15.8 | X | 339.50264 | 83.34782 | 74.38707 | 3.28191 | 0.1678115 | 0.18825816 | 3.0150892 | 20 | — | — |
| 198725 2005 $EY_{12}$ | 14.9 | X | 130.67495 | 264.01217 | 355.80992 | 11.06223 | 0.0829446 | 0.16921233 | 3.2372884 | 20 | 11 22.7 | 20.0 |
| 198726 2005 $EP_{18}$ | 15.6 | X | 293.93484 | 90.55674 | 3.79999 | 10.06430 | 0.0962856 | 0.16956322 | 3.2328207 | 20 | 11 7.6 | 19.9 |
| 198727 2005 $EF_{21}$ | 14.9 | X | 197.30987 | 254.82241 | 2.27285 | 9.66884 | 0.0286882 | 0.18063940 | 3.0992818 | 20 | — | — |
| 198728 2005 $EG_{21}$ | 14.9 | X | 58.21612 | 204.60733 | 150.35844 | 10.36650 | 0.0319883 | 0.17391084 | 3.1787152 | 20 | 12 24.8 | 19.6 |
| 198729 2005 $EE_{23}$ | 15.8 | X | 333.25138 | 258.12037 | 164.07089 | 1.89077 | 0.0845175 | 0.17264750 | 3.1942031 | 20 | 11 30.4 | 19.8 |
| 198730 2005 $EF_{23}$ | 15.9 | X | 278.20518 | 263.40382 | 277.44500 | 0.49082 | 0.1006674 | 0.18137670 | 3.0908770 | 20 | — | — |
| 198731 2005 $EM_{23}$ | 15.9 | X | 297.92111 | 301.14802 | 171.49669 | 5.55435 | 0.1428002 | 0.17569444 | 3.1571657 | 20 | 12 7.3 | 19.7 |
| 198732 2005 $EQ_{23}$ | 15.3 | X | 291.41730 | 118.51817 | 340.36366 | 10.85401 | 0.1005412 | 0.17165881 | 3.2064563 | 20 | 11 8.6 | 19.6 |
| 198733 2005 $EV_{23}$ | 15.8 | X | 294.65276 | 354.60644 | 155.47414 | 0.51009 | 0.1242571 | 0.17995504 | 3.1071344 | 20 | — | — |
| 198734 2005 $EM_{24}$ | 15.0 | X | 280.40747 | 17.09866 | 117.57799 | 6.36522 | 0.0967161 | 0.17484892 | 3.1673356 | 20 | 12 13.1 | 19.2 |
| 198735 2005 $EC_{25}$ | 15.9 | X | 340.90383 | 89.13539 | 90.98026 | 3.88404 | 0.1703783 | 0.19147909 | 2.9811819 | 20 | 1 21.5 | 19.6 |
| 198736 2005 $EB_{28}$ | 15.4 | X | 229.09847 | 57.99522 | 152.53347 | 0.70636 | 0.1324459 | 0.17542399 | 3.1604097 | 20 | — | — |
| 198737 2005 $EW_{28}$ | 16.1 | X | 231.87793 | 30.28562 | 103.58744 | 3.96169 | 0.1215896 | 0.22944779 | 2.6424907 | 20 | 10 19.4 | 19.7 |
| 198738 2005 $EO_{29}$ | 15.5 | X | 111.36892 | 108.13427 | 112.14389 | 5.06203 | 0.0722042 | 0.21979696 | 2.7192862 | 20 | 9 28.2 | 19.4 |
| 198739 2005 $EN_{32}$ | 14.8 | X | 339.03515 | 69.17570 | 15.77146 | 5.67467 | 0.1195931 | 0.17729290 | 3.1381605 | 20 | — | — |
| 198740 2005 $EK_{34}$ | 15.7 | X | 351.43471 | 260.20320 | 236.73322 | 2.39119 | 0.1183328 | 0.18865384 | 3.0108719 | 20 | — | — |
| 198741 2005 $EY_{34}$ | 15.1 | X | 303.62230 | 311.66153 | 189.48541 | 14.36024 | 0.1914526 | 0.17862075 | 3.1225886 | 20 | — | — |
| 198742 2005 $EN_{35}$ | 15.6 | X | 245.98027 | 268.78016 | 309.88252 | 3.15749 | 0.2334394 | 0.17808053 | 3.1289005 | 20 | — | — |
| 198743 2005 $EX_{36}$ | 15.1 | X | 219.93076 | 166.08881 | 34.86368 | 6.69483 | 0.1279757 | 0.17155121 | 3.2077968 | 20 | 12 12.4 | 19.9 |
| 198744 2005 $EM_{42}$ | 16.2 | X | 142.20634 | 237.98636 | 237.55081 | 1.41568 | 0.1658045 | 0.21201366 | 2.7854380 | 20 | 6 22.5 | 20.6 |
| 198745 2005 $EC_{48}$ | 15.1 | X | 281.54189 | 331.07893 | 161.05243 | 9.61847 | 0.0509481 | 0.17518405 | 3.1632949 | 20 | 12 16.8 | 19.6 |
| 198746 2005 $EC_{51}$ | 15.1 | X | 243.82527 | 19.97014 | 138.24370 | 2.03139 | 0.1480250 | 0.17252532 | 3.1957109 | 20 | 11 17.2 | 19.6 |
| 198747 2005 $EN_{51}$ | 16.5 | X | 286.03896 | 37.10551 | 83.65932 | 0.97367 | 0.2535722 | 0.23960318 | 2.5672864 | 20 | 12 4.8 | 18.7 |
| 198748 2005 $EV_{55}$ | 15.7 | X | 278.00176 | 259.78348 | 263.80899 | 0.84511 | 0.0616734 | 0.17873163 | 3.1212971 | 20 | — | — |
| 198749 2005 $EM_{58}$ | 15.7 | X | 346.14788 | 152.57242 | 339.25167 | 3.90263 | 0.0711955 | 0.18480367 | 3.0525468 | 20 | — | — |
| 198750 2005 $ER_{58}$ | 15.3 | X | 310.72007 | 128.55380 | 351.09741 | 10.63285 | 0.1567383 | 0.17778610 | 3.1323541 | 20 | — | — |
| 198751 2005 $EP_{59}$ | 15.3 | X | 5.08718 | 119.39052 | 295.62290 | 3.91053 | 0.1479179 | 0.17680998 | 3.1438721 | 20 | — | — |
| 198752 2005 $EA_{60}$ | 19.8 | X | 315.35061 | 116.68715 | 334.32130 | 1.76107 | 0.5231618 | 0.24770565 | 2.5109927 | 20 | — | — |
| 198753 2005 $EL_{73}$ | 16.1 | X | 244.34931 | 40.44989 | 167.44628 | 2.91760 | 0.1016946 | 0.18303045 | 3.0722307 | 20 | — | — |
| 198754 2005 $EJ_{74}$ | 15.6 | X | 304.98177 | 261.90827 | 226.57788 | 2.91075 | 0.1887777 | 0.18139489 | 3.0906704 | 20 | — | — |
| 198755 2005 $EY_{76}$ | 15.5 | X | 93.35723 | 33.62030 | 320.47102 | 1.82307 | 0.0984912 | 0.17879185 | 3.1205962 | 20 | — | — |
| 198756 2005 $EJ_{82}$ | 15.7 | X | 99.35670 | 228.95250 | 100.47275 | 0.33974 | 0.0636251 | 0.18072724 | 3.0982774 | 20 | — | — |
| 198757 2005 $EU_{85}$ | 15.7 | X | 277.68982 | 79.65681 | 61.42716 | 2.00803 | 0.1261279 | 0.17576951 | 3.1562667 | 20 | 12 13.2 | 19.8 |
| 198758 2005 $EG_{86}$ | 15.9 | X | 208.70213 | 29.15394 | 120.75074 | 5.70731 | 0.0370573 | 0.22793437 | 2.6541747 | 20 | 10 23.5 | 19.6 |
| 198759 2005 $EX_{86}$ | 16.0 | X | 72.65105 | 20.19890 | 3.19461 | 0.64557 | 0.0723966 | 0.18055224 | 3.1002792 | 20 | — | — |
| 198760 2005 $EC_{90}$ | 15.1 | X | 347.02547 | 303.72077 | 148.51395 | 11.47725 | 0.0606780 | 0.18129623 | 3.0917915 | 20 | — | — |
| 198761 2005 $EU_{90}$ | 15.4 | X | 299.01644 | 337.51663 | 156.50637 | 6.14456 | 0.1015636 | 0.17867933 | 3.1219061 | 20 | — | — |
| 198762 2005 $EA_{91}$ | 15.1 | X | 237.61962 | 342.49756 | 169.29003 | 15.22708 | 0.1032657 | 0.17059331 | 3.2197938 | 20 | 11 10.7 | 20.0 |
| 198763 2005 $EG_{92}$ | 14.8 | X | 323.00591 | 276.22520 | 175.19840 | 25.09498 | 0.1881809 | 0.17548016 | 3.1597353 | 20 | 12 22.0 | 18.8 |
| 198764 2005 $EY_{92}$ | 14.9 | X | 75.17215 | 68.77012 | 348.77386 | 21.23573 | 0.2284689 | 0.19141723 | 2.9818241 | 20 | 2 11.7 | 18.8 |
| 198765 2005 $EX_{94}$ | 15.1 | X | 307.07066 | 355.72346 | 69.15401 | 6.68197 | 0.0905544 | 0.16847958 | 3.2466679 | 20 | 10 26.5 | 19.3 |
| 198766 2005 $EC_{96}$ | 15.1 | X | 289.71782 | 181.50139 | 304.32065 | 8.13618 | 0.0456014 | 0.17700390 | 3.1415755 | 20 | 12 20.4 | 19.3 |
| 198767 2005 $EF_{96}$ | 15.9 | X | 92.93317 | 308.31992 | 189.40521 | 7.65896 | 0.1659410 | 0.20894521 | 2.8126419 | 20 | 5 31.2 | 20.0 |
| 198768 2005 $EO_{96}$ | 15.1 | X | 194.89632 | 13.03130 | 211.70882 | 8.70154 | 0.0633368 | 0.17620530 | 3.1510604 | 20 | 12 21.8 | 19.8 |
| 198769 2005 $EW_{96}$ | 15.3 | X | 304.72544 | 262.80795 | 252.39555 | 8.94124 | 0.0990152 | 0.18449498 | 3.0559507 | 20 | — | — |
| 198770 2005 $EG_{97}$ | 14.9 | X | 208.14398 | 325.57918 | 192.71812 | 10.06027 | 0.0232238 | 0.16783698 | 3.2549496 | 20 | 10 22.7 | 19.5 |
| 198771 2005 $EY_{97}$ | 15.5 | X | 75.05315 | 265.28294 | 187.47884 | 10.10060 | 0.0850138 | 0.19719519 | 2.9232896 | 20 | 2 25.3 | 19.4 |
| 198772 2005 $EG_{99}$ | 15.6 | X | 349.45308 | 317.56517 | 186.79530 | 8.91140 | 0.0430136 | 0.18881435 | 3.0091654 | 20 | 1 2.9 | 19.8 |
| 198773 2005 $EN_{99}$ | 16.0 | X | 327.57604 | 142.62496 | 293.36018 | 4.82582 | 0.2554960 | 0.24260145 | 2.5460902 | 20 | — | — |
| 198774 2005 $EC_{100}$ | 15.3 | X | 318.25976 | 90.50129 | 21.18277 | 10.74973 | 0.0861655 | 0.17741441 | 3.1367275 | 20 | — | — |
| 198775 2005 $ED_{100}$ | 15.1 | X | 199.15366 | 195.92593 | 33.18175 | 9.98219 | 0.0441832 | 0.17458789 | 3.1704919 | 20 | — | — |
| 198776 2005 $ET_{101}$ | 14.9 | X | 248.20644 | 321.94003 | 195.07211 | 7.54255 | 0.0631765 | 0.16860627 | 3.2450413 | 20 | 12 1.9 | 19.5 |
| 198777 2005 $EY_{101}$ | 16.0 | X | 256.82587 | 11.88946 | 95.67405 | 5.80176 | 0.2354095 | 0.23183206 | 2.6243417 | 20 | 10 1.4 | 19.5 |
| 198778 2005 $EG_{109}$ | 15.6 | X | 18.14194 | 284.04979 | 208.63322 | 10.27408 | 0.0492968 | 0.19262126 | 2.9693854 | 20 | 1 23.9 | 19.7 |
| 198779 2005 $EA_{111}$ | 15.0 | X | 321.16777 | 315.35176 | 124.09755 | 15.08926 | 0.0821872 | 0.17190170 | 3.2034351 | 20 | 12 6.4 | 19.3 |
| 198780 2005 $EP_{113}$ | 15.1 | X | 46.63326 | 54.72558 | 13.44047 | 10.18559 | 0.1142458 | 0.18530384 | 3.0470514 | 20 | — | — |
| 198781 2005 $EK_{114}$ | 16.3 | X | 354.26432 | 280.70804 | 145.78496 | 2.16960 | 0.1519392 | 0.17767556 | 3.1336532 | 20 | — | — |
| 198782 2005 $EM_{115}$ | 15.0 | X | 255.21932 | 175.17973 | 18.80600 | 7.44570 | 0.1996992 | 0.17638620 | 3.1489056 | 20 | — | — |
| 198783 2005 $ES_{118}$ | 15.0 | X | 344.74421 | 267.98282 | 243.18211 | 8.81652 | 0.0397218 | 0.18787149 | 3.0192248 | 20 | 1 5.4 | 19.1 |
| 198784 2005 $EU_{121}$ | 15.3 | X | 41.82175 | 84.57539 | 291.75506 | 2.80618 | 0.0795209 | 0.17571348 | 3.1569376 | 20 | — | — |
| 198785 2005 $EH_{124}$ | 15.6 | X | 330.12423 | 12.54260 | 71.36639 | 2.67716 | 0.1565618 | 0.17451954 | 3.1713196 | 20 | 12 24.3 | 19.2 |
| 198786 2005 $EP_{129}$ | 15.1 | X | 91.47358 | 134.66331 | 143.97440 | 6.96896 | 0.1299070 | 0.17056285 | 3.2201771 | 20 | 11 14.6 | 20.1 |
| 198787 2005 $EV_{129}$ | 16.1 | X | 220.71861 | 89.01509 | 164.19386 | 2.81374 | 0.0717173 | 0.18785090 | 3.0194455 | 20 | — | — |
| 198788 2005 $EQ_{131}$ | 15.2 | X | 199.77826 | 50.87495 | 159.61779 | 11.14144 | 0.0106989 | 0.17577462 | 3.1562054 | 20 | 12 16.9 | 19.9 |
| 198789 2005 $EV_{132}$ | 16.1 | X | 288.85562 | 87.61808 | 303.40047 | 5.93670 | 0.0502634 | 0.22056392 | 2.7129788 | 20 | 8 26.1 | 19.7 |
| 198790 2005 $EH_{133}$ | 15.7 | X | 187.90781 | 18.94565 | 59.09758 | 10.31098 | 0.1840367 | 0.21648271 | 2.7469699 | 20 | 6 16.6 | 20.3 |
| 198791 2005 $EC_{134}$ | 15.1 | X | 359.63691 | 203.99557 | 214.72802 | 8.86963 | 0.0738684 | 0.17425531 | 3.1745246 | 20 | 12 31.9 | 19.4 |
| 198792 2005 $EW_{136}$ | 15.0 | X | 264.25230 | 343.36740 | 164.43380 | 5.22356 | 0.1157649 | 0.17062155 | 3.2194385 | 20 | 12 4.0 | 19.4 |
| 198793 2005 $EN_{137}$ | 15.5 | X | 326.53104 | 319.86107 | 150.58922 | 1.74916 | 0.1683170 | 0.17641934 | 3.1485112 | 20 | — | — |
| 198794 2005 $EX_{137}$ | 15.7 | X | 326.39415 | 61.67323 | 55.02763 | 2.05325 | 0.1465150 | 0.17692831 | 3.1424702 | 20 | — | — |
| 198795 2005 $EY_{140}$ | 15.9 | X | 158.03029 | 235.82445 | 37.05375 | 1.14830 | 0.1082997 | 0.17943545 | 3.1131297 | 20 | — | — |
| 198796 2005 $ET_{152}$ | 15.6 | X | 237.25231 | 181.29888 | 33.04465 | 5.48071 | 0.0967165 | 0.17562545 | 3.1579924 | 20 | — | — |
| 198797 2005 $EF_{156}$ | 15.7 | X | 265.77628 | 57.97206 | 45.82811 | 8.35314 | 0.1597556 | 0.23636625 | 2.5906718 | 20 | 10 20.3 | 18.7 |
| 198798 2005 $EM_{156}$ | 14.9 | X | 42.86981 | 342.76025 | 83.53156 | 10.85916 | 0.0302849 | 0.18701908 | 3.0283921 | 20 | — | — |
| 198799 2005 $EL_{157}$ | 15.9 | X | 282.11712 | 232.11097 | 345.07341 | 1.88022 | 0.0198152 | 0.18715453 | 3.0269307 | 20 | 1 12.3 | 20.0 |
| 198800 2005 $EZ_{166}$ | 16.0 | X | 337.99951 | 268.73836 | 182.76194 | 8.55696 | 0.0675589 | 0.17626987 | 3.1502909 | 20 | — | — |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 198801 2005 $EH_{172}$ | 14.9 | $X$ | 243.37715 | 252.93526 | 297.09175 | 3.64863 | 0.1151164 | 0.17365038 | 3.1818929 | 20 | 12 28.6 | 19.2 |
| 198802 2005 $ET_{175}$ | 15.4 | $X$ | 24.96808 | 253.14801 | 180.11184 | 10.41675 | 0.0865857 | 0.18322824 | 3.0700194 | 20 | — | — |
| 198803 2005 $EW_{177}$ | 16.0 | $X$ | 119.92503 | 285.29915 | 67.63028 | 1.56798 | 0.1030901 | 0.18972577 | 2.9995205 | 20 | — | — |
| 198804 2005 $EW_{180}$ | 16.4 | $X$ | 116.85261 | 204.46814 | 220.44732 | 1.68615 | 0.0217800 | 0.20179318 | 2.8787132 | 20 | 3 6.9 | 20.4 |
| 198805 2005 $EE_{190}$ | 16.2 | $X$ | 210.65673 | 211.28432 | 169.01221 | 5.05895 | 0.1325048 | 0.21275236 | 2.7789866 | 20 | 4 30.4 | 20.7 |
| 198806 2005 $ES_{194}$ | 15.5 | $X$ | 266.84042 | 184.44219 | 340.25405 | 3.00911 | 0.2320828 | 0.17581978 | 3.1556650 | 20 | 12 11.6 | 19.6 |
| 198807 2005 $EX_{195}$ | 16.0 | $X$ | 342.82353 | 262.09190 | 205.72131 | 2.63717 | 0.1797681 | 0.18123100 | 3.0925333 | 20 | — | — |
| 198808 2005 $EY_{196}$ | 15.1 | $X$ | 83.21422 | 243.24930 | 217.53531 | 13.11629 | 0.0629798 | 0.19724890 | 2.9227589 | 20 | 3 12.5 | 19.2 |
| 198809 2005 $EG_{201}$ | 15.6 | $X$ | 248.41549 | 64.20105 | 87.26947 | 13.56982 | 0.2152992 | 0.23844963 | 2.5755597 | 20 | 11 21.1 | 18.9 |
| 198810 2005 $EK_{201}$ | 15.4 | $X$ | 88.99463 | 51.82308 | 66.45490 | 15.82720 | 0.1023181 | 0.20525291 | 2.8462727 | 20 | 4 26.1 | 19.4 |
| 198811 2005 $EF_{203}$ | 15.7 | $X$ | 349.13426 | 0.29491 | 72.04012 | 2.33097 | 0.1536372 | 0.17543653 | 3.1602592 | 20 | — | — |
| 198812 2005 $EV_{207}$ | 16.4 | $X$ | 325.66410 | 343.79067 | 248.58253 | 2.29770 | 0.0767271 | 0.20225439 | 2.8743352 | 20 | 3 14.7 | 20.1 |
| 198813 2005 $EB_{217}$ | 15.9 | $X$ | 160.78420 | 66.13948 | 36.02629 | 10.30818 | 0.1454446 | 0.21550296 | 2.7552894 | 20 | 6 22.1 | 20.4 |
| 198814 2005 $EJ_{218}$ | 14.7 | $X$ | 288.99481 | 218.39486 | 283.36357 | 9.51985 | 0.0453898 | 0.17807863 | 3.1289227 | 20 | — | — |
| 198815 2005 $EJ_{222}$ | 14.6 | $X$ | 49.40486 | 195.67702 | 46.60204 | 9.04405 | 0.0618536 | 0.15230289 | 3.4726735 | 20 | 8 2.1 | 19.5 |
| 198816 2005 $EZ_{222}$ | 15.2 | $X$ | 300.97474 | 316.68083 | 160.22591 | 5.58829 | 0.1378612 | 0.17357734 | 3.1827854 | 20 | 12 16.9 | 19.2 |
| 198817 2005 $EZ_{244}$ | 15.3 | $X$ | 62.89338 | 244.30597 | 177.44469 | 9.95530 | 0.0445693 | 0.18593261 | 3.0401780 | 20 | — | — |
| 198818 2005 $EK_{247}$ | 15.5 | $X$ | 301.59181 | 91.73461 | 15.59370 | 9.45339 | 0.0652594 | 0.17477272 | 3.1682562 | 20 | 12 10.1 | 19.8 |
| 198819 2005 $ES_{247}$ | 15.5 | $X$ | 55.11004 | 70.50011 | 11.53466 | 9.53267 | 0.0594881 | 0.19019866 | 2.9945466 | 20 | 1 18.3 | 19.6 |
| 198820 Iwanowska | 15.0 | $X$ | 16.02952 | 305.71274 | 131.91006 | 12.34114 | 0.1027792 | 0.18235574 | 3.0798041 | 20 | — | — |
| 198821 2005 $ER_{258}$ | 15.2 | $X$ | 281.66119 | 120.39560 | 2.88469 | 12.50076 | 0.1153674 | 0.17040158 | 3.2222085 | 20 | 11 23.4 | 19.6 |
| 198822 2005 $EW_{263}$ | 15.1 | $X$ | 174.76047 | 278.60265 | 315.44219 | 9.56058 | 0.0487971 | 0.17408932 | 3.1765423 | 20 | 12 11.8 | 19.9 |
| 198823 2005 $ES_{264}$ | 15.8 | $X$ | 23.49793 | 219.93673 | 206.52150 | 4.99883 | 0.1540389 | 0.18079119 | 3.0975468 | 20 | — | — |
| 198824 2005 $EV_{265}$ | 15.2 | $X$ | 285.58239 | 179.61512 | 354.12612 | 4.83600 | 0.0995516 | 0.17877204 | 3.1208267 | 20 | — | — |
| 198825 2005 $EW_{272}$ | 15.7 | $X$ | 35.92136 | 1.29515 | 46.24708 | 2.84080 | 0.0448497 | 0.17979349 | 3.1089953 | 20 | — | — |
| 198826 2005 $EY_{272}$ | 15.1 | $X$ | 73.96543 | 337.62027 | 3.21795 | 10.40032 | 0.0716249 | 0.17301500 | 3.1896782 | 20 | 12 31.8 | 19.9 |
| 198827 2005 $EA_{273}$ | 15.2 | $X$ | 236.69192 | 322.15162 | 247.03443 | 8.63602 | 0.0548269 | 0.18077363 | 3.0977473 | 20 | — | — |
| 198828 2005 $EA_{277}$ | 15.6 | $X$ | 309.42909 | 78.81211 | 21.67111 | 0.25558 | 0.1353688 | 0.17096465 | 3.2151298 | 20 | 12 9.0 | 19.3 |
| 198829 2005 $EP_{279}$ | 14.9 | $X$ | 327.25089 | 177.29941 | 277.77615 | 13.63694 | 0.0875566 | 0.17961353 | 3.1110717 | 20 | — | — |
| 198830 2005 $EX_{285}$ | 14.9 | $X$ | 151.88707 | 213.34672 | 67.50782 | 17.81025 | 0.0595174 | 0.17627608 | 3.1502170 | 20 | — | — |
| 198831 2005 $EL_{290}$ | 15.3 | $X$ | 97.14509 | 324.64653 | 290.52486 | 8.58870 | 0.1544866 | 0.22059754 | 2.7127031 | 20 | 10 27.8 | 19.7 |
| 198832 2005 $EY_{295}$ | 15.9 | $X$ | 55.46982 | 81.85941 | 333.41635 | 0.97102 | 0.0367205 | 0.18842684 | 3.0132896 | 20 | — | — |
| 198833 2005 $EB_{315}$ | 15.6 | $X$ | 64.22882 | 223.78133 | 111.26697 | 4.70240 | 0.0611462 | 0.17365082 | 3.1818875 | 20 | 12 12.1 | 20.1 |
| 198834 2005 $EW_{326}$ | 15.4 | $X$ | 110.49386 | 338.33956 | 313.31284 | 8.07307 | 0.0485173 | 0.17613649 | 3.1518811 | 20 | 12 11.0 | 20.1 |
| 198835 2005 $GY_{2}$ | 15.3 | $X$ | 300.32122 | 97.47185 | 41.78326 | 10.37826 | 0.1932815 | 0.17593962 | 3.1542318 | 20 | — | — |
| 198836 2005 $GP_{39}$ | 15.2 | $X$ | 347.33100 | 66.34503 | 50.27293 | 18.31021 | 0.1623383 | 0.18116614 | 3.0932714 | 20 | — | — |
| 198837 2005 $GT_{47}$ | 14.5 | $X$ | 296.21245 | 317.77601 | 156.77429 | 18.47437 | 0.1040125 | 0.17132283 | 3.2106470 | 20 | 12 11.2 | 19.0 |
| 198838 2005 $GB_{54}$ | 14.7 | $X$ | 296.43195 | 313.84239 | 211.24098 | 18.40618 | 0.2299229 | 0.17742994 | 3.1365445 | 20 | — | — |
| 198839 2005 $GV_{54}$ | 17.0 | $X$ | 219.53404 | 353.82601 | 338.65207 | 2.17038 | 0.2106130 | 0.25754589 | 2.4466187 | 20 | 3 4.1 | 21.0 |
| 198840 2005 $GZ_{57}$ | 16.2 | $X$ | 316.49112 | 63.15186 | 39.26626 | 6.05671 | 0.1681092 | 0.17229835 | 3.1985168 | 20 | 12 22.4 | 19.8 |
| 198841 2005 $GL_{74}$ | 15.1 | $X$ | 320.82549 | 284.47461 | 176.57415 | 13.63683 | 0.2240419 | 0.17535279 | 3.1612652 | 20 | 12 28.9 | 18.5 |
| 198842 2005 $GT_{85}$ | 15.8 | $X$ | 23.81016 | 68.92830 | 46.04652 | 2.24238 | 0.0224276 | 0.18745525 | 3.0236927 | 20 | 1 14.2 | 19.8 |
| 198843 2005 $GW_{108}$ | 15.8 | $X$ | 342.93511 | 277.48316 | 177.48670 | 4.09210 | 0.2436902 | 0.17622381 | 3.1508398 | 20 | — | — |
| 198844 2005 $GP_{119}$ | 15.6 | $X$ | 122.35314 | 276.02527 | 289.78007 | 12.17134 | 0.1425429 | 0.21771030 | 2.7366341 | 20 | 9 17.1 | 20.2 |
| 198845 2005 $GF_{120}$ | 14.8 | $X$ | 284.72131 | 302.23609 | 209.92200 | 7.26873 | 0.1607505 | 0.17396284 | 3.1780817 | 20 | 12 31.8 | 18.8 |
| 198846 2005 $GV_{178}$ | 14.4 | $X$ | 325.10735 | 239.30979 | 259.11430 | 25.30089 | 0.1613747 | 0.17858133 | 3.1230481 | 20 | — | — |
| 198847 2005 $GO_{189}$ | 15.9 | $X$ | 107.21870 | 159.23631 | 155.91413 | 0.82425 | 0.1471442 | 0.17546734 | 3.1598891 | 20 | — | — |
| 198848 2005 $GK_{196}$ | 15.5 | $X$ | 88.78259 | 331.89291 | 17.38085 | 4.96323 | 0.0743553 | 0.17645388 | 3.1481005 | 20 | — | — |
| 198849 2005 $HJ_{7}$ | 16.2 | $X$ | 341.38002 | 330.52859 | 167.79637 | 2.36979 | 0.1062268 | 0.18376201 | 3.0640715 | 20 | — | — |
| 198850 2005 $JC_{88}$ | 15.1 | $X$ | 13.04570 | 268.14515 | 205.54148 | 8.18070 | 0.0414055 | 0.18400835 | 3.0613362 | 20 | — | — |
| 198851 2005 $JY_{98}$ | 14.8 | $X$ | 290.95523 | 279.26391 | 228.44482 | 21.82052 | 0.1952891 | 0.17341032 | 3.1848287 | 20 | 12 29.1 | 18.8 |
| 198852 2005 $JS_{103}$ | 15.1 | $X$ | 9.63468 | 8.20510 | 25.87618 | 3.61352 | 0.0318606 | 0.16852989 | 3.2460218 | 20 | 12 10.4 | 19.5 |
| 198853 2005 $JY_{152}$ | 16.0 | $X$ | 334.86195 | 190.72433 | 315.17461 | 0.53732 | 0.1142968 | 0.18332231 | 3.0689690 | 20 | — | — |
| 198854 2005 $JZ_{178}$ | 15.5 | $X$ | 41.57219 | 253.78598 | 205.51192 | 7.54179 | 0.2051046 | 0.18591490 | 3.0403711 | 20 | 1 26.1 | 18.8 |
| 198855 2005 $LH_{3}$ | 17.3 | $X$ | 196.42677 | 132.53567 | 198.68209 | 20.85248 | 0.0885789 | 0.37604466 | 1.9009751 | 20 | 1 20.6 | 20.2 |
| 198856 2005 $LR_{3}$ | 16.9 | $X$ | 143.96284 | 26.34136 | 73.81927 | 25.00380 | 0.3352590 | 0.46329876 | 1.6541008 | 20 | 6 14.0 | 19.3 |
| 198857 2005 $LJ_{7}$ | 15.0 | $X$ | 310.44970 | 268.60000 | 236.82740 | 20.53447 | 0.1977011 | 0.17340831 | 3.1848534 | 20 | — | — |
| 198858 2005 $LN_{51}$ | 12.8 | $X$ | 314.12193 | 255.74602 | 136.91375 | 15.67666 | 0.1434985 | 0.08211756 | 5.2421811 | 20 | 9 7.9 | 19.3 |
| 198859 2005 $MP_{32}$ | 17.1 | $X$ | 260.85062 | 304.97499 | 313.91496 | 17.94523 | 0.0542720 | 0.37202287 | 1.9146510 | 20 | 1 6.4 | 19.3 |
| 198860 2005 $NX_{41}$ | 16.7 | $X$ | 298.72991 | 251.84764 | 313.59798 | 16.97182 | 0.0439309 | 0.36782116 | 1.9292044 | 20 | — | — |
| 198861 2005 $OX_{2}$ | 16.8 | $X$ | 88.55681 | 154.70688 | 245.36544 | 19.88274 | 0.0903978 | 0.36113697 | 1.9529363 | 20 | — | — |
| 198862 2005 $QK_{8}$ | 17.2 | $X$ | 229.48454 | 260.34571 | 322.51795 | 17.66568 | 0.0612875 | 0.35862791 | 1.9620346 | 20 | — | — |
| 198863 2005 $QL_{23}$ | 17.6 | $X$ | 231.94989 | 257.65097 | 88.58625 | 0.92628 | 0.1441055 | 0.31026016 | 2.1609864 | 20 | 4 1.9 | 20.4 |
| 198864 2005 $QS_{84}$ | 16.5 | $X$ | 333.57111 | 284.75990 | 276.73114 | 3.19746 | 0.1265083 | 0.23785923 | 2.5798198 | 20 | 2 3.2 | 19.5 |
| 198865 2005 $QT_{157}$ | 17.3 | $X$ | 226.35055 | 343.30785 | 359.51748 | 8.34204 | 0.1735539 | 0.30776384 | 2.1726561 | 20 | 3 20.8 | 20.7 |
| 198866 2005 $QU_{167}$ | 17.0 | $X$ | 166.96048 | 136.27009 | 181.21900 | 22.00901 | 0.0785702 | 0.36223314 | 1.9489944 | 20 | — | — |
| 198867 2005 $QO_{181}$ | 17.0 | $X$ | 109.24223 | 234.23503 | 131.31616 | 3.56275 | 0.0936562 | 0.28700593 | 2.2761915 | 20 | — | — |
| 198868 2005 $RB_{1}$ | 16.5 | $X$ | 120.29521 | 136.56175 | 207.32326 | 24.25440 | 0.0762501 | 0.35619774 | 1.9709485 | 20 | — | — |
| 198869 2005 $RO_{24}$ | 16.8 | $X$ | 179.11731 | 120.59330 | 220.95772 | 5.76476 | 0.2279808 | 0.29697575 | 2.2249593 | 20 | 2 6.5 | 20.5 |
| 198870 2005 $RS_{27}$ | 16.5 | $X$ | 114.69208 | 51.74080 | 336.97903 | 7.37199 | 0.1251651 | 0.29156613 | 2.2523956 | 20 | 1 21.9 | 19.2 |
| 198871 2005 $RY_{32}$ | 16.7 | $X$ | 196.44516 | 117.93892 | 173.22010 | 7.33615 | 0.1927756 | 0.29423809 | 2.2387390 | 20 | — | — |
| 198872 2005 $SU_{2}$ | 18.0 | $X$ | 222.90061 | 44.42701 | 333.32266 | 1.15616 | 0.1704777 | 0.31159253 | 2.1548218 | 20 | 5 2.4 | 21.0 |
| 198873 2005 $SZ_{28}$ | 16.7 | $X$ | 192.73562 | 290.68998 | 334.70568 | 5.31073 | 0.0733270 | 0.28615292 | 2.2807128 | 20 | — | — |
| 198874 2005 $SK_{30}$ | 17.6 | $X$ | 239.78751 | 44.34029 | 285.17965 | 0.94270 | 0.1931565 | 0.30883920 | 2.1676098 | 20 | 3 14.7 | 20.8 |
| 198875 2005 $SA_{44}$ | 17.2 | $X$ | 184.40123 | 288.12548 | 348.01188 | 4.46758 | 0.1520168 | 0.28739291 | 2.2741478 | 20 | — | — |
| 198876 2005 $SD_{48}$ | 16.9 | $X$ | 29.28368 | 257.84223 | 211.16609 | 6.59785 | 0.1136043 | 0.28934399 | 2.2639130 | 20 | — | — |
| 198877 2005 $SH_{71}$ | 16.7 | $X$ | 54.88023 | 342.16361 | 18.86330 | 21.56996 | 0.1330785 | 0.34847842 | 1.9999484 | 20 | — | — |
| 198878 2005 $SJ_{93}$ | 17.9 | $X$ | 35.31705 | 350.54919 | 209.42243 | 4.89395 | 0.1038447 | 0.30823907 | 2.1704224 | 20 | 5 20.4 | 19.8 |
| 198879 2005 $SC_{123}$ | 17.0 | $X$ | 186.75853 | 353.26239 | 338.96032 | 6.28478 | 0.1406841 | 0.29828475 | 2.2184451 | 20 | 1 31.6 | 20.3 |
| 198880 2005 $SN_{140}$ | 17.9 | $X$ | 211.96356 | 125.93479 | 162.15007 | 3.34275 | 0.1311415 | 0.29549036 | 2.2324094 | 20 | — | — |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 198881 2005 $SX_{180}$ | 17.2 | $X$ | 221.40255 | 351.12017 | 325.14453 | 1.60991 | 0.1839872 | 0.30346493 | 2.1931266 | 20 | 2 11.6 | 20.4 |
| 198882 2005 $SH_{187}$ | 16.9 | $X$ | 180.02574 | 17.05026 | 311.23874 | 4.60602 | 0.1773800 | 0.29649046 | 2.2273864 | 20 | 1 21.5 | 20.3 |
| 198883 2005 $ST_{215}$ | 17.2 | $X$ | 85.80684 | 80.98763 | 316.69894 | 2.30735 | 0.1509438 | 0.28678011 | 2.2773863 | 20 | — | — |
| 198884 2005 $SH_{253}$ | 17.1 | $X$ | 90.93933 | 162.32253 | 14.61563 | 6.36153 | 0.0604995 | 0.31452536 | 2.1414056 | 20 | 7 10.0 | 19.6 |
| 198885 2005 $SE_{281}$ | 16.6 | $X$ | 235.22261 | 24.72119 | 213.96989 | 6.51627 | 0.0794899 | 0.28366110 | 2.2940499 | 20 | — | — |
| 198886 2005 $TT_{10}$ | 16.7 | $X$ | 185.61091 | 314.44582 | 3.13424 | 7.59147 | 0.1754371 | 0.29363501 | 2.2418032 | 20 | 1 15.0 | 20.2 |
| 198887 2005 $TE_{63}$ | 17.3 | $X$ | 65.57592 | 314.75844 | 137.89303 | 1.46631 | 0.1468594 | 0.29133605 | 2.2535813 | 20 | 2 4.2 | 19.0 |
| 198888 2005 $TY_{77}$ | 16.9 | $X$ | 172.05172 | 335.39774 | 16.58348 | 6.03502 | 0.2827732 | 0.29665389 | 2.2265683 | 20 | 2 20.9 | 20.8 |
| 198889 2005 $TW_{81}$ | 17.0 | $X$ | 343.58200 | 198.10807 | 354.15128 | 5.61458 | 0.0875749 | 0.29876383 | 2.2160729 | 20 | 2 3.1 | 19.2 |
| 198890 2005 $TH_{83}$ | 16.9 | $X$ | 244.72144 | 25.48041 | 337.42894 | 5.14146 | 0.2057151 | 0.31144254 | 2.1555135 | 20 | 4 29.9 | 20.2 |
| 198891 2005 $TF_{90}$ | 15.9 | $X$ | 108.09972 | 329.26692 | 83.38415 | 26.89461 | 0.2430725 | 0.28637700 | 2.2795229 | 20 | 3 19.4 | 19.6 |
| 198892 2005 $TO_{104}$ | 17.0 | $X$ | 96.25123 | 96.65469 | 327.66150 | 6.70692 | 0.0864904 | 0.29300817 | 2.2449994 | 20 | 2 6.3 | 19.4 |
| 198893 2005 $TW_{138}$ | 18.2 | $X$ | 249.26011 | 134.32002 | 175.68722 | 4.61575 | 0.1596831 | 0.30590451 | 2.1814510 | 20 | 2 29.9 | 21.5 |
| 198894 2005 $TL_{152}$ | 16.4 | $X$ | 295.13303 | 38.60603 | 131.54429 | 4.08756 | 0.1264137 | 0.26954995 | 2.3734306 | 20 | — | — |
| 198895 2005 $TQ_{168}$ | 17.4 | $X$ | 25.02412 | 257.59849 | 230.63594 | 2.28121 | 0.0958264 | 0.29070152 | 2.2568595 | 20 | 1 8.9 | 19.5 |
| 198896 2005 $TC_{173}$ | 17.1 | $X$ | 174.08073 | 337.67709 | 18.79273 | 5.92683 | 0.2136298 | 0.29741005 | 2.2227927 | 20 | 2 24.4 | 20.6 |
| 198897 2005 $UZ_{7}$ | 16.4 | $X$ | 269.12548 | 338.18263 | 227.47604 | 4.03477 | 0.1020578 | 0.28412605 | 2.2915465 | 20 | — | — |
| 198898 2005 $US_{16}$ | 17.9 | $X$ | 238.83182 | 139.58659 | 202.15890 | 3.09738 | 0.1581892 | 0.30766481 | 2.1731223 | 20 | 4 1.4 | 20.8 |
| 198899 2005 $UQ_{27}$ | 17.3 | $X$ | 151.81048 | 143.74538 | 215.33303 | 3.44700 | 0.1450127 | 0.29351636 | 2.2424073 | 20 | 1 28.2 | 20.4 |
| 198900 2005 $UH_{30}$ | 17.2 | $X$ | 233.49105 | 295.51513 | 46.05948 | 1.62954 | 0.1866831 | 0.30481455 | 2.1866482 | 20 | 3 26.1 | 20.4 |
| 198901 2005 $UX_{30}$ | 18.5 | $X$ | 230.79116 | 171.65539 | 205.07041 | 1.78769 | 0.0610956 | 0.30985206 | 2.1628835 | 20 | 5 20.4 | 21.2 |
| 198902 2005 $UE_{32}$ | 17.1 | $X$ | 305.37463 | 16.02867 | 216.44475 | 4.04576 | 0.1126070 | 0.29657411 | 2.2269675 | 20 | 1 28.0 | 19.9 |
| 198903 2005 $UA_{33}$ | 17.2 | $X$ | 240.93936 | 323.86036 | 209.31230 | 2.24127 | 0.1417292 | 0.27036469 | 2.3686600 | 20 | 12 26.9 | 20.0 |
| 198904 2005 $UH_{33}$ | 17.3 | $X$ | 183.11526 | 10.47923 | 195.33580 | 2.03657 | 0.1208754 | 0.26727096 | 2.3869035 | 20 | 11 30.2 | 20.6 |
| 198905 2005 $UJ_{33}$ | 17.6 | $X$ | 205.43795 | 120.76652 | 153.43573 | 2.38567 | 0.1043657 | 0.28773403 | 2.2723500 | 20 | — | — |
| 198906 2005 $UL_{38}$ | 17.1 | $X$ | 341.41273 | 267.10624 | 202.77565 | 2.44357 | 0.0805367 | 0.27646847 | 2.3336675 | 20 | — | — |
| 198907 2005 $UO_{40}$ | 17.1 | $X$ | 53.38282 | 205.09283 | 217.33964 | 2.53547 | 0.1487872 | 0.28187351 | 2.3037386 | 20 | — | — |
| 198908 2005 $UZ_{41}$ | 17.1 | $X$ | 208.57264 | 208.16882 | 111.90642 | 2.28468 | 0.0688622 | 0.29502477 | 2.2347574 | 20 | 2 5.1 | 20.0 |
| 198909 2005 $UZ_{49}$ | 17.4 | $X$ | 234.43507 | 77.26642 | 287.79353 | 2.06635 | 0.0785518 | 0.30912471 | 2.1662749 | 20 | 5 5.2 | 20.1 |
| 198910 2005 $UX_{59}$ | 16.9 | $X$ | 244.25993 | 142.52162 | 219.27323 | 2.90195 | 0.1255564 | 0.30954413 | 2.1643176 | 20 | 5 8.6 | 19.7 |
| 198911 2005 $UM_{64}$ | 17.0 | $X$ | 86.74371 | 228.79462 | 184.04332 | 9.45013 | 0.0746480 | 0.28654189 | 2.2786483 | 20 | 1 3.9 | 19.6 |
| 198912 2005 $UV_{73}$ | 16.8 | $X$ | 72.10657 | 273.78459 | 220.45866 | 3.49098 | 0.0617807 | 0.29880576 | 2.2158656 | 20 | 4 4.6 | 19.1 |
| 198913 2005 $UD_{112}$ | 17.6 | $X$ | 144.90482 | 153.55248 | 263.14146 | 2.99874 | 0.1326165 | 0.29858457 | 2.2169597 | 20 | 4 3.8 | 20.6 |
| 198914 2005 $UE_{112}$ | 17.0 | $X$ | 3.13955 | 181.87056 | 38.09177 | 7.48919 | 0.0758710 | 0.30197415 | 2.2003387 | 20 | 4 19.4 | 19.1 |
| 198915 2005 $UZ_{126}$ | 17.6 | $X$ | 15.86504 | 259.66149 | 214.43633 | 1.16173 | 0.1707287 | 0.28298781 | 2.2976871 | 20 | — | — |
| 198916 2005 $UU_{130}$ | 16.8 | $X$ | 282.58566 | 57.57388 | 244.95639 | 3.48569 | 0.2253989 | 0.30800074 | 2.1715419 | 20 | 3 17.8 | 19.8 |
| 198917 2005 $UG_{131}$ | 17.1 | $X$ | 276.03187 | 359.78790 | 238.98201 | 4.74687 | 0.0779927 | 0.28999937 | 2.2605009 | 20 | 1 6.4 | 20.0 |
| 198918 2005 $UP_{132}$ | 17.2 | $X$ | 169.21137 | 243.75199 | 142.96301 | 6.78939 | 0.1298239 | 0.29910325 | 2.2143960 | 20 | 3 24.6 | 20.3 |
| 198919 2005 $UT_{142}$ | 17.3 | $X$ | 276.86074 | 46.92835 | 226.45879 | 2.99271 | 0.1427826 | 0.29971623 | 2.2113757 | 20 | 2 12.8 | 20.2 |
| 198920 2005 $UP_{158}$ | 17.4 | $X$ | 245.96976 | 21.22411 | 14.15950 | 0.38882 | 0.1136533 | 0.31539417 | 2.1374712 | 20 | 6 30.5 | 19.6 |
| 198921 2005 $US_{160}$ | 17.0 | $X$ | 237.69782 | 216.20881 | 111.84849 | 4.23881 | 0.1169207 | 0.30505434 | 2.1855022 | 20 | 3 18.5 | 20.0 |
| 198922 2005 $US_{174}$ | 17.2 | $X$ | 9.43049 | 258.88528 | 339.84480 | 1.97236 | 0.1295155 | 0.30771291 | 2.1728958 | 20 | 6 1.9 | 18.6 |
| 198923 2005 $UJ_{180}$ | 17.1 | $X$ | 214.82653 | 120.17201 | 124.00941 | 2.75055 | 0.1306840 | 0.27923854 | 2.3182084 | 20 | — | — |
| 198924 2005 $UA_{181}$ | 17.6 | $X$ | 70.90805 | 281.40839 | 196.65965 | 2.56390 | 0.1147642 | 0.29405646 | 2.2396607 | 20 | 3 18.3 | 19.8 |
| 198925 2005 $UE_{185}$ | 17.6 | $X$ | 135.27690 | 189.30330 | 139.69466 | 0.78636 | 0.0971327 | 0.28223108 | 2.3017924 | 20 | — | — |
| 198926 2005 $UW_{203}$ | 17.2 | $X$ | 154.66464 | 62.46694 | 145.20693 | 0.44091 | 0.1361226 | 0.26116030 | 2.4239925 | 20 | 11 1.7 | 20.9 |
| 198927 2005 $UO_{216}$ | 16.7 | $X$ | 205.13173 | 333.37273 | 57.60965 | 6.91819 | 0.1104574 | 0.30544577 | 2.1836346 | 20 | 5 6.0 | 19.6 |
| 198928 2005 $UP_{216}$ | 16.2 | $X$ | 292.57361 | 117.63005 | 58.39199 | 13.15990 | 0.0119141 | 0.28004913 | 2.3137329 | 20 | — | — |
| 198929 2005 $UK_{217}$ | 16.7 | $X$ | 64.87816 | 201.13097 | 236.80380 | 7.68525 | 0.1668969 | 0.28541669 | 2.2846331 | 20 | 1 12.8 | 18.6 |
| 198930 2005 $UW_{241}$ | 17.5 | $X$ | 296.00712 | 2.89008 | 324.49911 | 1.97660 | 0.2130356 | 0.31426312 | 2.1425967 | 20 | 5 13.6 | 19.5 |
| 198931 2005 $UP_{242}$ | 17.7 | $X$ | 102.11706 | 80.01867 | 8.54465 | 5.43559 | 0.1058870 | 0.29485972 | 2.2355913 | 20 | 3 23.3 | 20.0 |
| 198932 2005 $UX_{243}$ | 17.2 | $X$ | 156.77019 | 64.90425 | 280.42635 | 4.24008 | 0.1791784 | 0.28993445 | 2.2608383 | 20 | 1 20.6 | 20.5 |
| 198933 2005 $UY_{249}$ | 16.9 | $X$ | 272.04973 | 345.61567 | 349.11728 | 2.04255 | 0.1631044 | 0.30999066 | 2.1622387 | 20 | 4 28.6 | 19.6 |
| 198934 2005 $UR_{251}$ | 17.4 | $X$ | 89.35322 | 222.09402 | 223.91767 | 3.82521 | 0.1016161 | 0.29402462 | 2.2398224 | 20 | 2 26.5 | 19.8 |
| 198935 2005 $UO_{253}$ | 16.7 | $X$ | 88.09618 | 110.89863 | 291.94202 | 7.01409 | 0.1088608 | 0.28597388 | 2.2816646 | 20 | — | — |
| 198936 2005 $US_{260}$ | 17.4 | $X$ | 325.61967 | 214.83270 | 73.66315 | 3.06297 | 0.1929624 | 0.31335341 | 2.1467415 | 20 | 5 11.7 | 18.6 |
| 198937 2005 $UX_{263}$ | 17.6 | $X$ | 306.53091 | 227.63993 | 59.48888 | 4.82682 | 0.1499858 | 0.31021254 | 2.1612076 | 20 | 4 12.8 | 19.7 |
| 198938 2005 $US_{273}$ | 15.9 | $X$ | 102.41941 | 197.14855 | 48.96384 | 7.39105 | 0.1112572 | 0.24685476 | 2.5167595 | 20 | 10 26.9 | 19.7 |
| 198939 2005 $UG_{276}$ | 17.0 | $X$ | 355.32417 | 270.41105 | 288.72027 | 1.34760 | 0.1368497 | 0.29806905 | 2.2195152 | 20 | 2 24.8 | 18.8 |
| 198940 2005 $UA_{279}$ | 17.2 | $X$ | 352.21079 | 338.37605 | 205.67069 | 4.39584 | 0.1142169 | 0.29366342 | 2.2416586 | 20 | 1 30.0 | 19.5 |
| 198941 2005 $UV_{281}$ | 17.2 | $X$ | 231.64421 | 10.36013 | 223.63502 | 5.26522 | 0.0880218 | 0.28079423 | 2.3096381 | 20 | — | — |
| 198942 2005 $UW_{289}$ | 16.3 | $X$ | 101.83169 | 358.03162 | 272.28721 | 5.07556 | 0.1058754 | 0.26541542 | 2.3980153 | 20 | 11 27.2 | 19.7 |
| 198943 2005 $UZ_{290}$ | 16.9 | $X$ | 28.12045 | 289.67435 | 265.23234 | 4.88759 | 0.0243671 | 0.30347549 | 2.1930758 | 20 | 4 19.8 | 19.4 |
| 198944 2005 $UM_{292}$ | 16.8 | $X$ | 197.05632 | 293.33826 | 11.38575 | 4.62265 | 0.1829468 | 0.29234762 | 2.2483798 | 20 | 1 8.9 | 20.4 |
| 198945 2005 $UQ_{296}$ | 17.1 | $X$ | 270.96518 | 357.00204 | 238.22142 | 5.05065 | 0.1324555 | 0.28843788 | 2.2686518 | 20 | — | — |
| 198946 2005 $UB_{297}$ | 17.0 | $X$ | 230.16550 | 151.84227 | 50.28931 | 2.96350 | 0.1475187 | 0.27244277 | 2.3565999 | 20 | — | — |
| 198947 2005 $UR_{298}$ | 17.0 | $X$ | 155.41440 | 142.07402 | 224.85054 | 5.56777 | 0.0644690 | 0.29260277 | 2.2470725 | 20 | 2 1.6 | 19.9 |
| 198948 2005 $UB_{308}$ | 18.1 | $X$ | 279.53730 | 227.29762 | 22.86800 | 1.30036 | 0.0616675 | 0.29341405 | 2.2429286 | 20 | 1 28.5 | 20.9 |
| 198949 2005 $UG_{322}$ | 16.9 | $X$ | 172.30300 | 306.68624 | 266.45857 | 2.47215 | 0.1068333 | 0.26421576 | 2.4052685 | 20 | 11 28.1 | 20.2 |
| 198950 2005 $UW_{327}$ | 16.8 | $X$ | 173.19715 | 319.58182 | 34.01175 | 5.47762 | 0.1002462 | 0.29352600 | 2.2423582 | 20 | 2 13.0 | 19.9 |
| 198951 2005 $UJ_{330}$ | 17.5 | $X$ | 135.33357 | 147.73543 | 132.76020 | 1.93577 | 0.1704203 | 0.27360960 | 2.3498952 | 20 | — | — |
| 198952 2005 $UR_{346}$ | 17.1 | $X$ | 173.96156 | 325.07574 | 242.39090 | 3.10947 | 0.1321509 | 0.26384175 | 2.4075410 | 20 | 11 20.8 | 20.6 |
| 198953 2005 $US_{348}$ | 16.8 | $X$ | 52.02611 | 94.32888 | 349.00289 | 7.76849 | 0.0543221 | 0.28772545 | 2.2723952 | 20 | — | — |
| 198954 2005 $UE_{350}$ | 16.8 | $X$ | 202.54078 | 226.24043 | 101.11389 | 6.03770 | 0.1956029 | 0.29739993 | 2.2228431 | 20 | 2 11.1 | 20.3 |
| 198955 2005 $UJ_{355}$ | 17.3 | $X$ | 151.56675 | 93.60809 | 294.14996 | 2.96020 | 0.0951059 | 0.29537536 | 2.2329888 | 20 | 2 29.1 | 20.3 |
| 198956 2005 $UL_{355}$ | 16.6 | $X$ | 198.62777 | 317.44072 | 17.51108 | 5.99778 | 0.1443419 | 0.29597072 | 2.2299932 | 20 | 2 17.2 | 19.9 |
| 198957 2005 $UN_{378}$ | 17.9 | $X$ | 196.79244 | 209.30395 | 208.43258 | 5.32272 | 0.0930303 | 0.30917496 | 2.1660402 | 20 | 6 3.4 | 20.7 |
| 198958 2005 $UY_{379}$ | 17.2 | $X$ | 239.76710 | 150.40311 | 138.73700 | 2.07054 | 0.1442798 | 0.29577865 | 2.2309586 | 20 | 1 27.2 | 20.5 |
| 198959 2005 $UU_{382}$ | 15.5 | $X$ | 190.76453 | 254.38651 | 184.33140 | 15.80351 | 0.1994049 | 0.17640183 | 3.1487196 | 20 | 6 19.5 | 21.1 |
| 198960 2005 $US_{425}$ | 17.2 | $X$ | 162.51602 | 274.22907 | 31.20407 | 4.83061 | 0.2205221 | 0.28673932 | 2.2776022 | 20 | — | — |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 198961 2005 $UC_{430}$ | 17.4 | X | 46.51523 | 280.82406 | 244.84698 | 4.85484 | 0.0984714 | 0.29905859 | 2.2146165 | 20 | 4 13.2 | 19.4 |
| 198962 2005 $UJ_{435}$ | 17.3 | X | 309.14289 | 59.87407 | 171.07475 | 2.02305 | 0.0985354 | 0.29662429 | 2.2267164 | 20 | 2 3.2 | 19.8 |
| 198963 2005 $UA_{438}$ | 16.9 | X | 246.93979 | 324.11434 | 263.51824 | 4.95147 | 0.1089589 | 0.28511377 | 2.2862510 | 20 | — | — |
| 198964 2005 $UC_{439}$ | 17.0 | X | 223.66309 | 312.17028 | 40.29250 | 4.16747 | 0.1878804 | 0.30377971 | 2.1916114 | 20 | 3 31.7 | 20.5 |
| 198965 2005 $UC_{442}$ | 16.5 | X | 29.78666 | 182.44029 | 251.85549 | 8.46258 | 0.1999782 | 0.27776284 | 2.3264120 | 20 | — | — |
| 198966 2005 $UR_{444}$ | 17.1 | X | 63.20794 | 166.23288 | 249.02895 | 1.92515 | 0.1539825 | 0.28263048 | 2.2996234 | 20 | — | — |
| 198967 2005 $UT_{445}$ | 16.9 | X | 196.81833 | 232.48093 | 83.65279 | 4.79246 | 0.1377089 | 0.29165814 | 2.2519218 | 20 | 1 21.1 | 20.3 |
| 198968 2005 $UF_{506}$ | 15.7 | X | 186.58651 | 251.54216 | 127.91323 | 6.92270 | 0.0690486 | 0.21584800 | 2.7523524 | 20 | 4 7.2 | 19.8 |
| 198969 2005 $UJ_{508}$ | 16.6 | X | 32.28333 | 273.86573 | 299.37723 | 3.93570 | 0.1353646 | 0.23643369 | 2.5901792 | 20 | 6 7.9 | 19.4 |
| 198970 2005 $UP_{508}$ | 17.2 | X | 149.36774 | 254.57283 | 27.45080 | 2.59195 | 0.1928139 | 0.27530828 | 2.3402192 | 20 | — | — |
| 198971 2005 $UU_{512}$ | 16.3 | X | 149.17809 | 247.31021 | 25.23352 | 1.36554 | 0.1350457 | 0.18428023 | 3.0583244 | 20 | 12 30.8 | 21.2 |
| 198972 2005 $UB_{527}$ | 17.7 | X | 0.66641 | 221.64709 | 309.99843 | 0.76391 | 0.0541712 | 0.29117512 | 2.2544116 | 20 | 2 4.4 | 19.9 |
| 198973 2005 $VO_{3}$ | 17.9 | X | 110.80566 | 264.26557 | 161.74966 | 2.66076 | 0.1237901 | 0.29391724 | 2.2403679 | 20 | 3 6.3 | 20.4 |
| 198974 2005 $VN_{4}$ | 17.0 | X | 227.54578 | 214.15446 | 117.67166 | 2.73392 | 0.1358241 | 0.30150388 | 2.2026261 | 20 | 3 10.9 | 20.2 |
| 198975 2005 $VO_{9}$ | 17.6 | X | 209.37234 | 109.56663 | 183.29858 | 2.51796 | 0.1489289 | 0.29005395 | 2.2602173 | 20 | 1 3.6 | 20.9 |
| 198976 2005 $VS_{15}$ | 17.2 | X | 106.46059 | 199.75298 | 238.81562 | 6.07663 | 0.1326333 | 0.29707143 | 2.2244814 | 20 | 3 15.8 | 19.9 |
| 198977 2005 $VD_{16}$ | 15.3 | X | 16.03514 | 265.13128 | 245.41342 | 22.97028 | 0.2388986 | 0.28605500 | 2.2812332 | 20 | 1 5.9 | 17.3 |
| 198978 2005 $VT_{29}$ | 17.0 | X | 17.86748 | 0.62075 | 210.55750 | 3.56333 | 0.0327378 | 0.30241992 | 2.1981760 | 20 | 4 30.9 | 19.4 |
| 198979 2005 $VF_{30}$ | 18.1 | X | 315.16134 | 189.79875 | 98.16887 | 2.28088 | 0.1708920 | 0.30814822 | 2.1708489 | 20 | 4 24.5 | 19.9 |
| 198980 2005 $VW_{30}$ | 17.2 | X | 191.63944 | 229.59971 | 81.90980 | 4.34994 | 0.2106553 | 0.29066872 | 2.2570292 | 20 | 1 13.6 | 20.7 |
| 198981 2005 $VK_{35}$ | 16.9 | X | 225.93362 | 244.65032 | 315.70558 | 2.43828 | 0.1160596 | 0.27522921 | 2.3406674 | 20 | — | — |
| 198982 2005 $VL_{44}$ | 17.6 | X | 314.09102 | 21.56249 | 251.22258 | 4.16392 | 0.0923360 | 0.30777014 | 2.1726265 | 20 | 4 9.8 | 20.0 |
| 198983 2005 $VY_{64}$ | 17.4 | X | 292.70350 | 5.32242 | 141.84310 | 2.27673 | 0.0034633 | 0.27792361 | 2.3255147 | 20 | — | — |
| 198984 2005 $VJ_{67}$ | 16.9 | X | 198.36495 | 249.64494 | 327.51994 | 1.39416 | 0.1717771 | 0.27079065 | 2.3661754 | 20 | 12 26.1 | 20.3 |
| 198985 2005 $VH_{73}$ | 17.4 | X | 141.71334 | 252.17076 | 107.12244 | 3.24503 | 0.0853319 | 0.28757194 | 2.2732038 | 20 | 1 10.9 | 20.3 |
| 198986 2005 $VB_{82}$ | 17.1 | X | 180.56560 | 261.17520 | 119.28647 | 4.91585 | 0.1271806 | 0.29925071 | 2.2136685 | 20 | 3 28.4 | 20.3 |
| 198987 2005 $VY_{86}$ | 15.8 | X | 82.77732 | 183.66401 | 302.87759 | 8.49992 | 0.1326535 | 0.21963732 | 2.7206038 | 20 | 4 23.0 | 19.5 |
| 198988 2005 $VN_{99}$ | 16.7 | X | 183.18550 | 74.90247 | 293.81933 | 6.21646 | 0.1392444 | 0.29998779 | 2.2100410 | 20 | 3 10.4 | 20.1 |
| 198989 2005 $VT_{101}$ | 17.3 | X | 88.90296 | 269.66146 | 150.85262 | 3.10445 | 0.1406113 | 0.28818717 | 2.2699674 | 20 | 1 28.6 | 19.6 |
| 198990 2005 $VS_{110}$ | 17.6 | X | 298.29515 | 101.98907 | 210.11829 | 3.84872 | 0.1726904 | 0.31277837 | 2.1493719 | 20 | 5 2.1 | 19.5 |
| 198991 2005 $VQ_{116}$ | 17.0 | X | 213.99719 | 314.82044 | 352.05740 | 3.99846 | 0.0662795 | 0.29276500 | 2.2462424 | 20 | 1 25.9 | 19.9 |
| 198992 2005 $VL_{124}$ | 16.5 | X | 26.03329 | 121.93373 | 187.90485 | 0.97429 | 0.2089928 | 0.24200663 | 2.5502605 | 20 | 10 29.4 | 19.3 |
| 198993 Epoigny | 17.7 | X | 75.02433 | 251.17530 | 240.15613 | 5.10869 | 0.0824847 | 0.29714417 | 2.2241184 | 20 | 4 7.3 | 20.1 |
| 198994 2005 $WL_{18}$ | 17.9 | X | 208.57327 | 261.49657 | 112.97277 | 0.05925 | 0.2018547 | 0.30384885 | 2.1912789 | 20 | 4 13.9 | 21.2 |
| 198995 2005 $WM_{25}$ | 17.7 | X | 164.35326 | 5.48343 | 325.29915 | 1.67315 | 0.2216463 | 0.28919472 | 2.2646920 | 20 | 1 14.3 | 21.0 |
| 198996 2005 $WJ_{36}$ | 17.4 | X | 269.01196 | 123.81131 | 107.07628 | 2.22700 | 0.0797993 | 0.28333957 | 2.2957851 | 20 | — | — |
| 198997 2005 $WT_{36}$ | 17.9 | X | 319.57628 | 86.96891 | 210.20769 | 1.75757 | 0.0522042 | 0.30738339 | 2.1744484 | 20 | 6 4.9 | 20.0 |
| 198998 2005 $WO_{41}$ | 17.8 | X | 342.48151 | 240.73828 | 50.36235 | 3.63048 | 0.0608551 | 0.31264374 | 2.1499889 | 20 | 7 6.3 | 19.7 |
| 198999 2005 $WR_{44}$ | 16.5 | X | 143.80296 | 349.31711 | 247.04100 | 7.48075 | 0.0695473 | 0.26348761 | 2.4096978 | 20 | 11 28.6 | 19.7 |
| 199000 2005 $WW_{45}$ | 16.8 | X | 171.64449 | 316.46616 | 64.19393 | 6.68914 | 0.1931385 | 0.29798823 | 2.2199165 | 20 | 3 23.9 | 20.3 |
| 199001 2005 $WM_{51}$ | 17.5 | X | 217.00132 | 309.34463 | 62.54682 | 3.35350 | 0.0199234 | 0.30124926 | 2.2038671 | 20 | 4 28.8 | 20.1 |
| 199002 2005 $WO_{55}$ | 16.9 | X | 157.77434 | 136.93260 | 272.62661 | 1.61653 | 0.1335561 | 0.29624428 | 2.2286202 | 20 | 4 9.3 | 20.1 |
| 199003 2005 $WJ_{56}$ | 18.1 | X | 328.00741 | 297.69631 | 288.05427 | 21.61628 | 0.1520321 | 1.04954236 | 0.9589649 | 20 | — | — |
| 199004 2005 $WM_{66}$ | 17.1 | X | 253.45651 | 324.52531 | 234.81091 | 3.76410 | 0.0325070 | 0.27614810 | 2.3354721 | 20 | — | — |
| 199005 2005 $WH_{67}$ | 17.0 | X | 147.61128 | 5.81949 | 226.69282 | 2.64232 | 0.0838304 | 0.26250058 | 2.4157345 | 20 | 11 27.5 | 20.2 |
| 199006 2005 $WY_{68}$ | 17.4 | X | 202.49964 | 16.22659 | 250.08465 | 3.26106 | 0.1230750 | 0.27945560 | 2.3170079 | 20 | — | — |
| 199007 2005 $WH_{70}$ | 17.1 | X | 150.51948 | 332.05578 | 252.52803 | 0.61588 | 0.1257865 | 0.26183650 | 2.4198174 | 20 | 11 18.9 | 20.6 |
| 199008 2005 $WP_{72}$ | 16.9 | X | 32.00737 | 201.52034 | 277.85616 | 4.34775 | 0.0728205 | 0.28635529 | 2.2796381 | 20 | 1 10.4 | 19.2 |
| 199009 2005 $WU_{73}$ | 17.3 | X | 162.93496 | 294.35133 | 57.99936 | 4.36795 | 0.1944924 | 0.29266785 | 2.2467394 | 20 | 2 7.8 | 20.7 |
| 199010 2005 $WK_{80}$ | 17.0 | X | 219.87107 | 16.56507 | 261.91061 | 2.64892 | 0.2657737 | 0.28560236 | 2.2836429 | 20 | — | — |
| 199011 2005 $WZ_{86}$ | 16.9 | X | 175.42312 | 206.76490 | 16.46597 | 0.92475 | 0.1398994 | 0.25920996 | 2.4361363 | 20 | 12 10.5 | 20.4 |
| 199012 2005 $WS_{87}$ | 16.9 | X | 125.49459 | 68.98405 | 268.44937 | 6.12055 | 0.0856272 | 0.27557998 | 2.3386807 | 20 | — | — |
| 199013 2005 $WJ_{89}$ | 16.6 | X | 44.10937 | 191.13441 | 257.12368 | 3.34952 | 0.0965657 | 0.28263845 | 2.2995802 | 20 | — | — |
| 199014 2005 $WS_{89}$ | 17.0 | X | 274.30309 | 214.21998 | 103.02030 | 5.50772 | 0.1521417 | 0.30782959 | 2.1723467 | 20 | 4 12.1 | 19.7 |
| 199015 2005 $WF_{91}$ | 16.5 | X | 196.47644 | 296.52431 | 259.44611 | 7.63681 | 0.0409823 | 0.26510416 | 2.3998919 | 20 | 12 11.7 | 19.5 |
| 199016 2005 $WF_{92}$ | 16.6 | X | 337.51278 | 276.24272 | 245.89909 | 4.81711 | 0.0956280 | 0.28306639 | 2.2972619 | 20 | — | — |
| 199017 2005 $WS_{93}$ | 17.3 | X | 9.89592 | 267.04659 | 260.41160 | 1.93749 | 0.0793930 | 0.28408945 | 2.2917433 | 20 | 2 11.6 | 19.4 |
| 199018 2005 $WB_{94}$ | 18.0 | X | 4.04386 | 61.78425 | 242.91662 | 1.81684 | 0.1410109 | 0.31927368 | 2.1201210 | 20 | 9 17.3 | 19.7 |
| 199019 2005 $WG_{95}$ | 16.6 | X | 285.85606 | 270.20380 | 242.94832 | 6.20806 | 0.0391036 | 0.27193142 | 2.3595533 | 20 | — | — |
| 199020 2005 $WA_{98}$ | 16.7 | X | 248.34898 | 255.39432 | 289.33849 | 1.70355 | 0.1196351 | 0.26646853 | 2.3916930 | 20 | — | — |
| 199021 2005 $WB_{98}$ | 16.6 | X | 224.15590 | 221.45526 | 77.14532 | 6.97508 | 0.1178580 | 0.28728028 | 2.2747421 | 20 | 1 27.1 | 19.9 |
| 199022 2005 $WD_{99}$ | 17.0 | X | 291.53319 | 347.80294 | 244.56052 | 6.02499 | 0.0743533 | 0.28821573 | 2.2698174 | 20 | 1 16.9 | 19.9 |
| 199023 2005 $WR_{101}$ | 17.5 | X | 189.53939 | 160.02866 | 241.07968 | 6.15334 | 0.0587211 | 0.30235598 | 2.1984858 | 20 | 5 1.2 | 20.2 |
| 199024 2005 $WZ_{103}$ | 17.3 | X | 65.83497 | 237.42108 | 195.46272 | 2.44881 | 0.1376183 | 0.28569410 | 2.2831540 | 20 | 1 5.3 | 19.2 |
| 199025 2005 $WO_{104}$ | 17.6 | X | 177.16952 | 161.92426 | 200.81587 | 3.99836 | 0.1845473 | 0.29622896 | 2.2286970 | 20 | 3 1.1 | 21.2 |
| 199026 2005 $WC_{105}$ | 17.1 | X | 33.11633 | 259.04289 | 172.46788 | 8.09130 | 0.1045215 | 0.28025912 | 2.3125771 | 20 | — | — |
| 199027 2005 $WZ_{116}$ | 15.4 | X | 2.68899 | 317.68750 | 238.15441 | 11.70838 | 0.2043061 | 0.22314700 | 2.6920018 | 20 | 3 7.2 | 18.2 |
| 199028 2005 $WT_{117}$ | 16.8 | X | 235.68733 | 342.41719 | 1.17729 | 4.20588 | 0.1769015 | 0.30445846 | 2.1883529 | 20 | 3 30.5 | 20.1 |
| 199029 2005 $WX_{118}$ | 16.9 | X | 345.74446 | 157.01975 | 66.12908 | 5.62157 | 0.0714160 | 0.29761836 | 2.2217554 | 20 | 3 27.6 | 19.1 |
| 199030 2005 $WQ_{135}$ | 17.9 | X | 91.61509 | 305.66637 | 101.67713 | 4.91789 | 0.1768826 | 0.28206536 | 2.3026939 | 20 | 1 22.2 | 20.0 |
| 199031 2005 $WX_{136}$ | 18.4 | X | 338.62218 | 251.69918 | 52.36583 | 1.42411 | 0.1953461 | 0.31873170 | 2.1225237 | 20 | 7 17.0 | 19.2 |
| 199032 2005 $WT_{138}$ | 17.0 | X | 101.73042 | 16.67574 | 260.07135 | 2.85527 | 0.1110892 | 0.26358418 | 2.4091092 | 20 | 12 5.5 | 20.6 |
| 199033 2005 $WU_{139}$ | 16.9 | X | 222.18753 | 173.39376 | 333.32562 | 0.49556 | 0.1203763 | 0.25714318 | 2.4491725 | 20 | 10 27.2 | 20.3 |
| 199034 2005 $WU_{141}$ | 15.3 | X | 293.47443 | 302.89940 | 291.12974 | 14.61141 | 0.1793588 | 0.21215473 | 2.7842031 | 20 | 1 19.9 | 19.4 |
| 199035 2005 $WC_{143}$ | 17.1 | X | 230.28997 | 195.54340 | 65.06117 | 3.80299 | 0.1508747 | 0.28417074 | 2.2913063 | 20 | — | — |
| 199036 2005 $WY_{148}$ | 16.7 | X | 256.56499 | 98.77845 | 284.35172 | 4.57270 | 0.0618762 | 0.31246770 | 2.1507964 | 20 | 7 5.7 | 19.0 |
| 199037 2005 $WB_{149}$ | 16.4 | X | 198.52804 | 288.14737 | 320.28682 | 6.01592 | 0.0836299 | 0.27379107 | 2.3488567 | 20 | — | — |
| 199038 2005 $WC_{151}$ | 17.3 | X | 100.88006 | 68.38644 | 63.31159 | 5.67013 | 0.1193918 | 0.29749227 | 2.2223831 | 20 | 5 24.8 | 19.9 |
| 199039 2005 $WL_{154}$ | 16.5 | X | 286.49642 | 211.70081 | 290.82526 | 3.03597 | 0.0986511 | 0.26814106 | 2.3817372 | 20 | — | — |
| 199040 2005 $WS_{154}$ | 17.3 | X | 38.87156 | 70.46881 | 76.61737 | 3.92199 | 0.0675774 | 0.29085257 | 2.2560780 | 20 | 3 4.5 | 19.5 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 199041 2005 $WY_{156}$ | 17.4 | X | 37.50872 | 57.35854 | 40.99397 | 3.25113 | 0.0945922 | 0.28060712 | 2.3106647 | 20 | — | — |
| 199042 2005 $WB_{157}$ | 17.1 | X | 199.95189 | 204.74876 | 177.49512 | 1.56249 | 0.2034893 | 0.30232968 | 2.1986133 | 20 | 4 16.8 | 20.6 |
| 199043 2005 $WH_{157}$ | 17.0 | X | 126.27963 | 321.39021 | 97.22626 | 6.21353 | 0.1248244 | 0.28974541 | 2.2618216 | 20 | 3 20.3 | 20.0 |
| 199044 2005 $WU_{157}$ | 17.0 | X | 342.38051 | 231.90299 | 286.27787 | 2.13856 | 0.1709368 | 0.27666855 | 2.3325423 | 20 | — | — |
| 199045 2005 $WA_{158}$ | 17.3 | X | 194.39008 | 288.49151 | 89.90251 | 6.43229 | 0.1491023 | 0.29762579 | 2.2217184 | 20 | 4 10.1 | 20.7 |
| 199046 2005 $WU_{158}$ | 16.7 | X | 141.61812 | 145.35559 | 260.68208 | 4.52237 | 0.1684416 | 0.29386506 | 2.2406331 | 20 | 3 19.9 | 20.0 |
| 199047 2005 $WB_{167}$ | 17.8 | X | 165.51782 | 347.38403 | 325.04619 | 2.86255 | 0.1837578 | 0.28897872 | 2.2658204 | 20 | — | — |
| 199048 2005 $WX_{174}$ | 16.2 | X | 309.87116 | 213.21527 | 287.95956 | 4.64472 | 0.1225532 | 0.27070865 | 2.3666532 | 20 | — | — |
| 199049 2005 $WN_{178}$ | 15.3 | X | 295.20894 | 28.31421 | 331.02625 | 13.38860 | 0.1306913 | 0.23275920 | 2.6173681 | 20 | 7 16.9 | 18.6 |
| 199050 2005 $WS_{185}$ | 17.2 | X | 5.91186 | 182.26017 | 274.62781 | 0.99075 | 0.1506881 | 0.27557294 | 2.3387206 | 20 | — | — |
| 199051 2005 $WF_{188}$ | 16.7 | X | 329.57823 | 348.22867 | 325.63120 | 3.23625 | 0.0479240 | 0.24095632 | 2.5576660 | 20 | 7 14.9 | 19.7 |
| 199052 2005 $WO_{188}$ | 15.8 | X | 39.20719 | 51.59163 | 127.41564 | 5.02522 | 0.0501536 | 0.21682048 | 2.7441163 | 20 | 4 25.5 | 19.3 |
| 199053 2005 $WA_{195}$ | 17.6 | X | 65.92183 | 278.40445 | 206.66907 | 4.93475 | 0.1977855 | 0.29152291 | 2.2526182 | 20 | 4 3.4 | 19.4 |
| 199054 2005 $WB_{195}$ | 17.3 | X | 125.41769 | 241.41084 | 200.54637 | 4.88835 | 0.0471482 | 0.29760042 | 2.2218446 | 20 | 4 5.2 | 19.8 |
| 199055 2005 $WU_{195}$ | 17.4 | X | 92.98639 | 153.37871 | 290.00017 | 5.93174 | 0.0589060 | 0.28474373 | 2.2882314 | 20 | 2 22.2 | 20.0 |
| 199056 2005 $WQ_{204}$ | 17.5 | X | 100.95098 | 186.38513 | 288.48484 | 2.92406 | 0.1448700 | 0.29126238 | 2.2539613 | 20 | 5 3.5 | 20.2 |
| 199057 2005 $XT_{1}$ | 17.2 | X | 254.77078 | 287.74890 | 33.21260 | 2.03927 | 0.2148643 | 0.30349179 | 2.1929972 | 20 | 3 17.7 | 20.5 |
| 199058 2005 $XC_{5}$ | 16.6 | X | 203.39401 | 226.40347 | 132.44078 | 5.80104 | 0.1315738 | 0.29980788 | 2.2109251 | 20 | 3 23.2 | 19.8 |
| 199059 2005 $XP_{6}$ | 17.2 | X | 294.64087 | 112.29642 | 75.42494 | 4.82401 | 0.1131055 | 0.27931786 | 2.3177695 | 20 | — | — |
| 199060 2005 $XR_{7}$ | 16.4 | X | 192.99202 | 7.66915 | 256.58612 | 7.31784 | 0.0882879 | 0.27834792 | 2.3231508 | 20 | — | — |
| 199061 2005 $XE_{13}$ | 17.0 | X | 345.79288 | 15.68367 | 232.76361 | 5.00351 | 0.1754898 | 0.29985042 | 2.2107159 | 20 | 4 20.3 | 18.7 |
| 199062 2005 $XD_{15}$ | 16.8 | X | 186.92421 | 32.34906 | 200.86054 | 5.88650 | 0.1021021 | 0.26627419 | 2.3928566 | 20 | — | — |
| 199063 2005 $XE_{16}$ | 17.0 | X | 162.38395 | 124.04596 | 265.18564 | 4.55308 | 0.0788995 | 0.29345112 | 2.2427397 | 20 | 3 12.1 | 19.9 |
| 199064 2005 $XP_{16}$ | 17.4 | X | 130.66594 | 27.80747 | 92.41316 | 4.89050 | 0.0634958 | 0.30219510 | 2.1992661 | 20 | 6 9.6 | 20.2 |
| 199065 2005 $XY_{19}$ | 17.2 | X | 150.12993 | 354.10850 | 284.90725 | 2.04331 | 0.1465795 | 0.27315387 | 2.3525082 | 20 | — | — |
| 199066 2005 $XA_{22}$ | 16.4 | X | 130.17637 | 13.84832 | 285.55838 | 7.72331 | 0.1301192 | 0.27380989 | 2.3487491 | 20 | — | — |
| 199067 2005 $XO_{32}$ | 17.0 | X | 88.27648 | 315.59808 | 95.19012 | 4.28453 | 0.1421010 | 0.28504663 | 2.2866100 | 20 | 1 15.0 | 19.1 |
| 199068 2005 $XM_{40}$ | 16.3 | X | 297.34906 | 219.50256 | 292.85846 | 5.03364 | 0.0972152 | 0.26953965 | 2.3734911 | 20 | — | — |
| 199069 2005 $XN_{41}$ | 17.8 | X | 95.89681 | 316.02574 | 137.35262 | 3.01736 | 0.2031430 | 0.29254752 | 2.2473555 | 20 | 4 7.7 | 20.4 |
| 199070 2005 $XX_{45}$ | 16.6 | X | 121.51526 | 281.87847 | 306.69742 | 3.68172 | 0.1010293 | 0.25510555 | 2.4621969 | 20 | 10 22.6 | 20.3 |
| 199071 2005 $XJ_{51}$ | 16.5 | X | 30.40140 | 107.69071 | 317.19292 | 6.23499 | 0.0660748 | 0.27350407 | 2.3504996 | 20 | — | — |
| 199072 2005 $XR_{56}$ | 16.9 | X | 65.34292 | 229.50150 | 247.37805 | 6.19747 | 0.0552332 | 0.29178070 | 2.2512912 | 20 | 2 25.4 | 19.4 |
| 199073 2005 $XV_{57}$ | 15.3 | X | 146.18012 | 117.98307 | 164.99478 | 10.20050 | 0.0536612 | 0.18736063 | 3.0247106 | 20 | — | — |
| 199074 2005 $XQ_{63}$ | 17.2 | X | 55.85238 | 101.91915 | 64.99094 | 4.87771 | 0.0825645 | 0.29785025 | 2.2206021 | 20 | 5 2.7 | 19.2 |
| 199075 2005 $XS_{65}$ | 17.4 | X | 224.34840 | 343.01396 | 31.63433 | 4.74054 | 0.1367505 | 0.30559203 | 2.1829378 | 20 | 5 2.1 | 20.3 |
| 199076 2005 $XX_{65}$ | 16.7 | X | 64.27880 | 236.36073 | 247.30055 | 6.46239 | 0.0583332 | 0.29076311 | 2.2565407 | 20 | 3 4.8 | 19.2 |
| 199077 2005 $XA_{68}$ | 15.4 | X | 149.27097 | 112.64755 | 335.88921 | 15.16563 | 0.0606985 | 0.22270031 | 2.6956003 | 20 | 5 14.1 | 19.6 |
| 199078 2005 $XB_{74}$ | 16.9 | X | 51.79731 | 52.88331 | 51.52974 | 5.88995 | 0.1442156 | 0.28398275 | 2.2923174 | 20 | 1 29.4 | 18.9 |
| 199079 2005 $XS_{77}$ | 16.6 | X | 80.68011 | 297.84270 | 2.94280 | 3.27714 | 0.1247633 | 0.26503665 | 2.4002995 | 20 | 12 14.9 | 20.2 |
| 199080 2005 $XC_{78}$ | 17.1 | X | 134.74784 | 310.43619 | 82.28379 | 5.73524 | 0.1740923 | 0.28952725 | 2.2629576 | 20 | 3 1.3 | 20.3 |
| 199081 2005 $XP_{79}$ | 15.6 | X | 171.80258 | 250.20918 | 315.75049 | 3.46092 | 0.1189783 | 0.17710136 | 3.1404228 | 20 | 11 2.4 | 20.6 |
| 199082 2005 $XM_{82}$ | 16.9 | X | 341.97299 | 124.92663 | 61.93967 | 7.91174 | 0.0283954 | 0.29029277 | 2.2589775 | 20 | 2 4.0 | 19.6 |
| 199083 2005 $XY_{91}$ | 17.0 | X | 224.84557 | 28.65311 | 7.04177 | 6.29388 | 0.1196203 | 0.30956923 | 2.1642007 | 20 | 6 1.7 | 19.9 |
| 199084 2005 $XN_{104}$ | 15.4 | X | 133.51589 | 179.14060 | 114.42636 | 5.33303 | 0.0622457 | 0.19144804 | 2.9815042 | 20 | — | — |
| 199085 2005 $XO_{104}$ | 16.0 | X | 317.36410 | 19.72739 | 317.73315 | 11.81813 | 0.2445858 | 0.23800553 | 2.5787625 | 20 | 7 6.2 | 18.4 |
| 199086 2005 $XS_{114}$ | 16.4 | X | 345.57395 | 210.92229 | 85.44438 | 2.72833 | 0.0671197 | 0.23436967 | 2.6053642 | 20 | 7 14.1 | 19.3 |
| 199087 2005 $XF_{115}$ | 15.9 | X | 276.73888 | 24.26744 | 168.72305 | 4.07201 | 0.0475357 | 0.19525343 | 2.9426387 | 20 | — | — |
| 199088 2005 $XX_{116}$ | 18.1 | X | 171.08911 | 199.50120 | 150.42642 | 1.61454 | 0.2505130 | 0.29308014 | 2.2446319 | 20 | 2 13.9 | 21.6 |
| 199089 2005 $YC_{7}$ | 17.2 | X | 125.19687 | 101.12892 | 337.75252 | 6.54818 | 0.1153375 | 0.29394255 | 2.2402393 | 20 | 4 7.9 | 20.2 |
| 199090 2005 $YO_{7}$ | 17.5 | X | 316.80350 | 81.77182 | 61.59575 | 2.06483 | 0.1288386 | 0.27036069 | 2.3686834 | 20 | — | — |
| 199091 2005 $YF_{10}$ | 17.3 | X | 225.19068 | 297.42168 | 215.98840 | 1.32414 | 0.1372449 | 0.25821939 | 2.4423627 | 20 | 11 6.8 | 20.7 |
| 199092 2005 $YZ_{11}$ | 16.1 | X | 274.87916 | 2.47525 | 281.28672 | 5.20438 | 0.1669549 | 0.22501631 | 2.6770720 | 20 | 2 28.1 | 20.2 |
| 199093 2005 $YX_{17}$ | 17.1 | X | 287.15936 | 290.47789 | 308.92507 | 3.63591 | 0.1138171 | 0.28960647 | 2.2625449 | 20 | 1 17.3 | 20.0 |
| 199094 2005 $YD_{22}$ | 16.0 | X | 2.57105 | 179.75834 | 103.91584 | 9.18766 | 0.1050187 | 0.23825961 | 2.5769288 | 20 | 7 27.0 | 18.8 |
| 199095 2005 $YO_{23}$ | 17.2 | X | 138.59013 | 241.50012 | 107.16944 | 12.85704 | 0.2428022 | 0.28238011 | 2.3009825 | 20 | 1 14.8 | 20.3 |
| 199096 2005 $YF_{24}$ | 17.0 | X | 124.12118 | 135.91588 | 117.95124 | 2.70942 | 0.0888244 | 0.25576338 | 2.4579732 | 20 | 11 28.4 | 20.5 |
| 199097 2005 $YU_{27}$ | 17.0 | X | 85.73793 | 262.48426 | 80.06796 | 3.22624 | 0.2037907 | 0.26884634 | 2.3775699 | 20 | — | — |
| 199098 2005 $YN_{28}$ | 16.2 | X | 21.33549 | 166.27863 | 102.42485 | 4.60816 | 0.1505725 | 0.23670924 | 2.5881686 | 20 | 8 13.8 | 18.9 |
| 199099 2005 $YH_{31}$ | 17.6 | X | 40.10248 | 357.13390 | 118.01442 | 0.62978 | 0.1529540 | 0.28220967 | 2.3019088 | 20 | 1 19.9 | 19.4 |
| 199100 2005 $YL_{31}$ | 17.6 | X | 122.62822 | 112.63843 | 278.84967 | 1.45794 | 0.2069134 | 0.28654267 | 2.2786442 | 20 | 2 15.9 | 20.5 |
| 199101 2005 $YR_{31}$ | 17.2 | X | 143.69284 | 319.42462 | 104.27727 | 5.91297 | 0.1384930 | 0.29385048 | 2.2407072 | 20 | 4 17.4 | 20.4 |
| 199102 2005 $YO_{34}$ | 16.7 | X | 333.28303 | 305.95408 | 138.34520 | 3.42753 | 0.0250086 | 0.26320547 | 2.4114195 | 20 | — | — |
| 199103 2005 $YY_{35}$ | 16.5 | X | 18.15830 | 13.71113 | 113.01287 | 5.74541 | 0.0853106 | 0.27995934 | 2.3142276 | 20 | — | — |
| 199104 2005 $YF_{43}$ | 17.4 | X | 116.40696 | 268.54606 | 118.58316 | 6.99551 | 0.2009042 | 0.28406735 | 2.2918622 | 20 | 2 3.1 | 20.1 |
| 199105 2005 $YM_{43}$ | 17.1 | X | 111.64732 | 277.25710 | 119.11916 | 7.57415 | 0.1222554 | 0.28320920 | 2.2964896 | 20 | 1 27.8 | 19.7 |
| 199106 2005 $YP_{46}$ | 17.1 | X | 194.96357 | 250.58807 | 124.72714 | 5.79177 | 0.1008550 | 0.29536206 | 2.2330558 | 20 | 4 6.1 | 20.2 |
| 199107 2005 $YH_{47}$ | 17.0 | X | 358.13327 | 356.99389 | 19.86549 | 1.35162 | 0.1935016 | 0.25898851 | 2.4375249 | 20 | 12 18.7 | 19.3 |
| 199108 2005 $YO_{47}$ | 16.8 | X | 335.92651 | 169.89645 | 351.39038 | 2.47334 | 0.1637290 | 0.27678467 | 2.3318899 | 20 | — | — |
| 199109 2005 $YJ_{48}$ | 17.1 | X | 239.41506 | 114.01457 | 98.90357 | 3.37054 | 0.1338354 | 0.26619179 | 2.3933503 | 20 | — | — |
| 199110 2005 $YJ_{49}$ | 17.0 | X | 10.55906 | 156.38349 | 280.43228 | 5.94034 | 0.1738619 | 0.27090261 | 2.3655234 | 20 | — | — |
| 199111 2005 $YN_{49}$ | 17.3 | X | 293.68360 | 20.30830 | 199.17689 | 1.01040 | 0.1224792 | 0.27823441 | 2.3237826 | 20 | — | — |
| 199112 2005 $YN_{50}$ | 16.8 | X | 70.92342 | 189.00719 | 150.22534 | 2.68804 | 0.2163380 | 0.26694960 | 2.3888187 | 20 | — | — |
| 199113 2005 $YO_{56}$ | 16.6 | X | 217.74233 | 89.33918 | 87.03603 | 3.08177 | 0.1471349 | 0.25612413 | 2.4556646 | 20 | 11 26.2 | 20.0 |
| 199114 2005 $YG_{58}$ | 15.2 | X | 104.91046 | 321.88472 | 288.57356 | 15.41813 | 0.1180580 | 0.18082232 | 3.0971913 | 20 | 10 17.5 | 20.3 |
| 199115 2005 $YV_{60}$ | 16.8 | X | 52.51671 | 292.97558 | 287.09917 | 2.57050 | 0.0791421 | 0.24154709 | 2.5534940 | 20 | 7 13.8 | 19.8 |
| 199116 2005 $YZ_{60}$ | 17.3 | X | 225.94571 | 20.06620 | 257.46110 | 2.05516 | 0.1387816 | 0.28783597 | 2.2718135 | 20 | — | — |
| 199117 2005 $YC_{67}$ | 16.3 | X | 81.90352 | 171.67807 | 75.72679 | 3.41212 | 0.1434001 | 0.24454070 | 2.5326117 | 20 | 10 9.8 | 19.9 |
| 199118 2005 $YV_{75}$ | 17.0 | X | 19.44593 | 211.20462 | 47.51869 | 3.10690 | 0.1626099 | 0.23637136 | 2.5906345 | 20 | 7 27.5 | 19.6 |
| 199119 2005 $YF_{77}$ | 16.9 | X | 260.87274 | 210.03136 | 83.58123 | 6.61576 | 0.1300503 | 0.29102945 | 2.2551638 | 20 | 2 28.5 | 20.1 |
| 199120 2005 $YX_{78}$ | 16.5 | X | 342.29063 | 342.93104 | 297.38569 | 3.04347 | 0.1934413 | 0.23411619 | 2.6072444 | 20 | 6 6.5 | 18.8 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 199121 2005 $YG_{82}$ | 17.0 | X | 287.12803 | 45.26950 | 126.84021 | 2.74676 | 0.1281160 | 0.26902532 | 2.3765153 | 20 | — | — |
| 199122 2005 $YT_{82}$ | 17.0 | X | 165.30674 | 83.08183 | 140.80048 | 1.79600 | 0.1382945 | 0.25471270 | 2.4647279 | 20 | 12 1.0 | 20.7 |
| 199123 2005 $YW_{83}$ | 17.2 | X | 48.02619 | 182.84306 | 170.58050 | 2.14042 | 0.2081294 | 0.26454880 | 2.4032495 | 20 | — | — |
| 199124 2005 $YQ_{90}$ | 16.8 | X | 286.80041 | 296.32586 | 279.21761 | 5.21505 | 0.0633753 | 0.27702857 | 2.3305209 | 20 | — | — |
| 199125 2005 $YJ_{92}$ | 16.6 | X | 281.11235 | 218.02941 | 124.93537 | 4.83217 | 0.0505554 | 0.23494977 | 2.6010739 | 20 | 6 12.4 | 19.9 |
| 199126 2005 $YA_{94}$ | 16.6 | X | 331.99955 | 115.46659 | 331.89039 | 7.48422 | 0.0988412 | 0.26484508 | 2.4014568 | 20 | — | — |
| 199127 2005 $YF_{94}$ | 16.6 | X | 291.22962 | 158.73658 | 351.57331 | 5.11494 | 0.1662715 | 0.26595294 | 2.3947831 | 20 | — | — |
| 199128 2005 $YG_{94}$ | 17.0 | X | 335.52304 | 129.38712 | 348.24008 | 4.99472 | 0.0822733 | 0.27088460 | 2.3656283 | 20 | — | — |
| 199129 2005 $YN_{94}$ | 17.3 | X | 92.77643 | 98.23141 | 336.13049 | 1.32817 | 0.1293809 | 0.28838796 | 2.2689137 | 20 | 2 22.4 | 19.5 |
| 199130 2005 $YJ_{95}$ | 15.4 | X | 320.34384 | 350.11867 | 281.42820 | 13.11844 | 0.1042169 | 0.22705565 | 2.6610182 | 20 | 4 17.8 | 19.0 |
| 199131 2005 $YC_{96}$ | 17.4 | X | 165.27156 | 39.97881 | 20.06817 | 1.97526 | 0.1028672 | 0.29650205 | 2.2273284 | 20 | 4 30.4 | 20.6 |
| 199132 2005 $YO_{96}$ | 17.3 | X | 172.66807 | 318.20596 | 57.93826 | 4.05917 | 0.2144631 | 0.29484703 | 2.2356555 | 20 | 3 18.8 | 20.9 |
| 199133 2005 $YT_{98}$ | 17.1 | X | 76.43960 | 111.42549 | 317.45519 | 5.18183 | 0.1774496 | 0.28307107 | 2.2972366 | 20 | 1 26.8 | 19.0 |
| 199134 2005 $YN_{100}$ | 16.9 | X | 62.01641 | 242.52402 | 102.49119 | 5.96060 | 0.2087447 | 0.26381489 | 2.4077045 | 20 | — | — |
| 199135 2005 $YE_{107}$ | 17.5 | X | 56.19302 | 234.33358 | 286.66212 | 0.69255 | 0.1355516 | 0.29288240 | 2.2456420 | 20 | 5 1.3 | 19.3 |
| 199136 2005 $YU_{107}$ | 17.3 | X | 62.62301 | 114.01897 | 148.16056 | 2.81494 | 0.1322967 | 0.24521165 | 2.5279898 | 20 | 10 4.5 | 20.7 |
| 199137 2005 $YN_{108}$ | 17.4 | X | 326.18526 | 317.17087 | 179.65992 | 1.58187 | 0.1018572 | 0.27173500 | 2.3606902 | 20 | — | — |
| 199138 2005 $YX_{112}$ | 17.2 | X | 141.95765 | 20.59459 | 228.38284 | 0.82669 | 0.1239130 | 0.25780176 | 2.4449996 | 20 | 12 10.2 | 20.8 |
| 199139 2005 $YN_{116}$ | 16.9 | X | 97.36436 | 315.46559 | 99.92484 | 8.26544 | 0.0937978 | 0.28223621 | 2.3017645 | 20 | 1 29.9 | 19.5 |
| 199140 2005 $YA_{117}$ | 16.6 | X | 262.85838 | 148.74863 | 14.11985 | 1.17480 | 0.1105248 | 0.26261791 | 2.4150150 | 20 | — | — |
| 199141 2005 $YJ_{121}$ | 17.2 | X | 237.17201 | 329.35044 | 59.72819 | 0.73272 | 0.0987177 | 0.30651949 | 2.1785322 | 20 | 6 11.1 | 19.7 |
| 199142 2005 $YB_{126}$ | 16.7 | X | 176.27502 | 213.52027 | 48.05777 | 3.27521 | 0.1827410 | 0.26580071 | 2.3956974 | 20 | — | — |
| 199143 2005 $YC_{126}$ | 17.0 | X | 217.38925 | 199.52821 | 86.30575 | 6.90061 | 0.1037883 | 0.28023472 | 2.3127113 | 20 | 1 3.7 | 20.2 |
| 199144 2005 $YL_{127}$ | 17.0 | X | 118.09631 | 106.95197 | 280.83864 | 9.80986 | 0.1250882 | 0.28800145 | 2.2709432 | 20 | 1 22.7 | 19.6 |
| 199145 2005 $YY_{128}$ | 18.2 | X | 237.23633 | 314.78100 | 300.31481 | 3.77151 | 0.7315991 | 0.46520441 | 1.6495805 | 20 | — | — |
| 199146 2005 $YQ_{136}$ | 17.2 | X | 170.27783 | 58.16041 | 310.04097 | 4.81518 | 0.2413425 | 0.29225178 | 2.2488713 | 20 | 3 4.8 | 20.8 |
| 199147 2005 $YV_{136}$ | 17.1 | X | 121.44109 | 25.06843 | 315.09140 | 5.28340 | 0.2426907 | 0.27648911 | 2.3335513 | 20 | — | — |
| 199148 2005 $YG_{143}$ | 16.6 | X | 48.71374 | 52.59083 | 326.43269 | 5.30046 | 0.1245218 | 0.26596428 | 2.3947150 | 20 | — | — |
| 199149 2005 $YV_{145}$ | 17.2 | X | 92.55135 | 86.79423 | 341.15529 | 5.39768 | 0.0490038 | 0.28461336 | 2.2889301 | 20 | 2 2.2 | 19.7 |
| 199150 2005 $YJ_{150}$ | 17.2 | X | 204.59069 | 308.90945 | 84.07386 | 7.05353 | 0.1349778 | 0.30054601 | 2.2073036 | 20 | 5 8.6 | 20.4 |
| 199151 2005 $YC_{154}$ | 17.2 | X | 145.14578 | 358.39794 | 61.70007 | 3.00286 | 0.0787310 | 0.29337933 | 2.2431055 | 20 | 4 6.3 | 20.0 |
| 199152 2005 $YG_{156}$ | 17.6 | X | 217.94288 | 270.76757 | 71.68258 | 1.45494 | 0.1321492 | 0.29732291 | 2.2232270 | 20 | 3 15.2 | 20.7 |
| 199153 2005 $YP_{159}$ | 17.4 | X | 166.67079 | 81.39078 | 219.57217 | 3.57498 | 0.0740521 | 0.27473586 | 2.3434687 | 20 | — | — |
| 199154 2005 $YV_{164}$ | 16.7 | X | 349.20529 | 106.27868 | 321.82094 | 7.87189 | 0.0874327 | 0.26533492 | 2.3985003 | 20 | — | — |
| 199155 2005 $YH_{166}$ | 16.6 | X | 32.23999 | 31.85806 | 206.87469 | 3.37066 | 0.0838033 | 0.23461593 | 2.6035408 | 20 | 7 8.4 | 19.7 |
| 199156 2005 $YL_{170}$ | 17.0 | X | 278.71784 | 313.97964 | 156.47843 | 4.12773 | 0.0521721 | 0.25851319 | 2.4405118 | 20 | 12 7.5 | 19.8 |
| 199157 2005 $YN_{170}$ | 16.9 | X | 343.53237 | 117.67035 | 200.69653 | 3.31932 | 0.0184946 | 0.24162182 | 2.5529675 | 20 | 8 10.9 | 20.0 |
| 199158 2005 $YG_{171}$ | 17.1 | X | 359.28909 | 6.81541 | 154.65444 | 3.29183 | 0.1023162 | 0.28207643 | 2.3026337 | 20 | 1 14.4 | 19.3 |
| 199159 2005 $YW_{171}$ | 14.9 | X | 176.76182 | 300.14550 | 271.86026 | 15.03902 | 0.1654603 | 0.18514635 | 3.0487790 | 20 | 11 12.6 | 20.1 |
| 199160 2005 $YD_{174}$ | 16.0 | X | 263.92654 | 262.32400 | 154.27845 | 10.50438 | 0.1769163 | 0.24741617 | 2.5129509 | 20 | 8 9.3 | 19.1 |
| 199161 2005 $YV_{176}$ | 17.6 | X | 321.88424 | 146.66031 | 41.98842 | 0.88255 | 0.0833495 | 0.27938226 | 2.3174133 | 20 | — | — |
| 199162 2005 $YC_{178}$ | 15.9 | X | 9.68081 | 347.27620 | 296.65632 | 12.09824 | 0.2360672 | 0.23848270 | 2.5753216 | 20 | 8 20.1 | 18.2 |
| 199163 2005 $YN_{179}$ | 16.9 | X | 227.19616 | 49.46162 | 160.07623 | 3.96715 | 0.1363334 | 0.26397710 | 2.4067180 | 20 | — | — |
| 199164 2005 $YB_{180}$ | 16.7 | X | 17.17763 | 285.06664 | 166.37410 | 4.53430 | 0.0774062 | 0.27418483 | 2.3466074 | 20 | — | — |
| 199165 2005 $YK_{180}$ | 17.0 | X | 171.57312 | 231.20028 | 159.57984 | 4.45319 | 0.2042929 | 0.29660117 | 2.2268321 | 20 | 4 4.1 | 20.4 |
| 199166 2005 $YS_{180}$ | 16.8 | X | 297.73214 | 155.08493 | 4.35187 | 7.97338 | 0.0903994 | 0.26952996 | 2.3735480 | 20 | — | — |
| 199167 2005 $YH_{182}$ | 15.8 | X | 81.21749 | 341.08530 | 255.77346 | 9.80967 | 0.1001283 | 0.24404567 | 2.5360354 | 20 | 9 12.7 | 19.5 |
| 199168 2005 $YP_{184}$ | 17.2 | X | 336.47773 | 25.80489 | 125.44428 | 3.05823 | 0.1343795 | 0.27536815 | 2.3398799 | 20 | — | — |
| 199169 2005 $YZ_{200}$ | 16.3 | X | 285.78080 | 9.76756 | 302.32038 | 11.24263 | 0.0451700 | 0.22817079 | 2.6523410 | 20 | 5 3.5 | 20.0 |
| 199170 2005 $YK_{202}$ | 15.4 | X | 141.29576 | 313.86839 | 285.08904 | 8.50023 | 0.2539815 | 0.18471537 | 3.0535195 | 20 | 11 15.0 | 20.9 |
| 199171 2005 $YD_{204}$ | 16.8 | X | 35.74091 | 23.89021 | 327.73671 | 0.43794 | 0.1994294 | 0.25935439 | 2.4352318 | 20 | — | — |
| 199172 2005 $YH_{204}$ | 17.1 | X | 23.19435 | 318.70704 | 120.98051 | 3.23789 | 0.1588742 | 0.27290796 | 2.3539212 | 20 | — | — |
| 199173 2005 $YU_{211}$ | 16.8 | X | 181.06815 | 188.87950 | 57.46252 | 5.44761 | 0.0043406 | 0.26424071 | 2.4051172 | 20 | — | — |
| 199174 2005 $YR_{212}$ | 16.8 | X | 261.48855 | 105.32541 | 70.96927 | 4.96380 | 0.1456374 | 0.26587554 | 2.3952478 | 20 | — | — |
| 199175 2005 $YN_{213}$ | 16.5 | X | 320.91988 | 62.15830 | 17.10970 | 7.10750 | 0.0786317 | 0.26189540 | 2.4194546 | 20 | 12 31.2 | 19.2 |
| 199176 2005 $YW_{216}$ | 17.0 | X | 54.82750 | 217.32172 | 313.06182 | 5.52660 | 0.1036606 | 0.29264926 | 2.2468346 | 20 | 5 6.2 | 19.3 |
| 199177 2005 $YU_{219}$ | 15.6 | X | 184.99831 | 175.60943 | 298.21444 | 10.90662 | 0.1666482 | 0.23518820 | 2.5993157 | 20 | 7 30.1 | 19.7 |
| 199178 2005 $YY_{220}$ | 16.7 | X | 115.96637 | 192.09997 | 282.10239 | 6.28396 | 0.0658407 | 0.29502582 | 2.2347521 | 20 | 5 10.2 | 19.6 |
| 199179 2005 $YD_{226}$ | 17.0 | X | 192.14418 | 243.00799 | 266.31617 | 2.28287 | 0.0471024 | 0.25314703 | 2.4748801 | 20 | 10 1.2 | 20.3 |
| 199180 2005 $YQ_{227}$ | 17.1 | X | 289.31060 | 103.58996 | 196.80097 | 2.06718 | 0.0706298 | 0.22838937 | 2.6506484 | 20 | 4 23.2 | 20.4 |
| 199181 2005 $YA_{235}$ | 16.7 | X | 179.69883 | 234.73548 | 358.56916 | 2.06950 | 0.1310899 | 0.26077821 | 2.4263597 | 20 | 12 28.7 | 20.1 |
| 199182 2005 $YD_{246}$ | 17.2 | X | 233.09054 | 227.71558 | 215.27763 | 3.17941 | 0.0514824 | 0.24307821 | 2.5427599 | 20 | 8 22.8 | 20.6 |
| 199183 2005 $YU_{256}$ | 17.7 | X | 319.93609 | 292.97539 | 157.70700 | 4.38381 | 0.1785809 | 0.26288705 | 2.4133664 | 20 | — | — |
| 199184 2005 $YS_{263}$ | 16.6 | X | 91.64656 | 287.55078 | 44.15949 | 4.41618 | 0.1746644 | 0.26731422 | 2.3866460 | 20 | — | — |
| 199185 2005 $YU_{264}$ | 17.0 | X | 3.30459 | 316.58368 | 324.27569 | 3.57307 | 0.2005188 | 0.23530459 | 2.5984585 | 20 | 7 30.9 | 19.0 |
| 199186 2005 $YF_{267}$ | 16.4 | X | 26.00574 | 184.77274 | 91.13931 | 5.46856 | 0.1292417 | 0.23729007 | 2.5839434 | 20 | 8 31.1 | 19.3 |
| 199187 2005 $YP_{269}$ | 16.7 | X | 201.67538 | 3.97078 | 139.22899 | 6.25361 | 0.1326829 | 0.24341093 | 2.5404423 | 20 | 9 28.2 | 20.5 |
| 199188 2005 $YY_{269}$ | 15.8 | X | 247.29101 | 275.32262 | 287.49915 | 3.69323 | 0.0973248 | 0.19714363 | 2.9237993 | 20 | — | — |
| 199189 2005 $YL_{270}$ | 16.9 | X | 106.50272 | 52.20785 | 309.26186 | 7.16256 | 0.1635771 | 0.27529072 | 2.3403187 | 20 | — | — |
| 199190 2005 $YF_{273}$ | 17.5 | X | 118.66696 | 275.68505 | 142.69636 | 6.90599 | 0.1756754 | 0.28836766 | 2.2690201 | 20 | 3 16.1 | 20.4 |
| 199191 2005 $YQ_{282}$ | 17.1 | X | 342.73798 | 117.92010 | 292.68262 | 2.39750 | 0.1755232 | 0.26024212 | 2.4296907 | 20 | — | — |
| 199192 2005 $YK_{290}$ | 15.5 | X | 301.07097 | 282.86451 | 312.91631 | 12.43269 | 0.1292264 | 0.21388504 | 2.7691668 | 20 | 2 6.8 | 19.3 |
| 199193 2006 $AM$ | 16.1 | X | 286.10754 | 333.04073 | 183.67215 | 9.56795 | 0.1816518 | 0.26584301 | 2.3954433 | 20 | — | — |
| 199194 Calcatreppola | 17.2 | X | 145.41532 | 329.14300 | 44.30164 | 4.17390 | 0.1485474 | 0.28737155 | 2.2742605 | 20 | 2 13.1 | 20.3 |
| 199195 2006 $AD_1$ | 16.6 | X | 332.55869 | 149.62685 | 151.73721 | 4.28284 | 0.1328660 | 0.23635466 | 2.5907566 | 20 | 6 24.4 | 19.3 |
| 199196 2006 $AZ_2$ | 15.2 | X | 278.07754 | 289.41344 | 119.22155 | 29.26131 | 0.1099264 | 0.24060942 | 2.5601238 | 20 | 9 4.9 | 18.8 |
| 199197 2006 $AX_3$ | 16.7 | X | 285.36804 | 190.90746 | 353.98540 | 3.20674 | 0.1823372 | 0.26931300 | 2.3748226 | 20 | — | — |
| 199198 2006 $AC_5$ | 17.8 | X | 177.83963 | 60.80210 | 19.57337 | 5.54973 | 0.1785585 | 0.30370132 | 2.1919885 | 20 | 6 11.7 | 21.2 |
| 199199 2006 $AP_5$ | 15.1 | X | 316.13905 | 280.54470 | 336.79226 | 26.00119 | 0.1317804 | 0.21997052 | 2.7178557 | 20 | 3 15.8 | 18.8 |
| 199200 2006 $AE_6$ | 15.3 | X | 308.23673 | 357.52246 | 277.71632 | 12.75181 | 0.0957634 | 0.22241934 | 2.6978700 | 20 | 4 5.4 | 19.1 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 199201 2006 $AP_{10}$ | 17.0 | X | 87.89318 | 24.56283 | 63.99157 | 3.88775 | 0.1517685 | 0.28646360 | 2.2790635 | 20 | 3 12.6 | 19.4 |
| 199202 2006 $AE_{11}$ | 17.4 | X | 224.11085 | 303.17549 | 288.49736 | 2.22463 | 0.0243429 | 0.26970119 | 2.3725433 | 20 | — | — |
| 199203 2006 $AZ_{17}$ | 16.6 | X | 74.63965 | 45.63536 | 51.26521 | 5.53841 | 0.1849334 | 0.28472779 | 2.2883168 | 20 | 3 9.7 | 18.8 |
| 199204 2006 $AT_{18}$ | 15.2 | X | 142.84084 | 333.94448 | 270.88438 | 3.63160 | 0.1714685 | 0.18445540 | 3.0563879 | 20 | 11 23.3 | 20.3 |
| 199205 2006 $AB_{19}$ | 16.7 | X | 144.06557 | 292.17108 | 174.50934 | 2.14760 | 0.0341210 | 0.23029503 | 2.6360056 | 20 | 6 4.7 | 20.3 |
| 199206 2006 $AN_{19}$ | 16.0 | X | 141.52508 | 173.63195 | 326.01616 | 8.71604 | 0.1978628 | 0.23074110 | 2.6326073 | 20 | 7 25.9 | 20.4 |
| 199207 2006 $AB_{20}$ | 16.4 | X | 1.42343 | 81.82247 | 75.73730 | 7.56158 | 0.0429141 | 0.28230160 | 2.3014091 | 20 | 1 20.7 | 19.1 |
| 199208 2006 $AX_{20}$ | 17.5 | X | 156.18559 | 29.37265 | 8.07932 | 5.16738 | 0.1759032 | 0.29266081 | 2.2467754 | 20 | 3 26.9 | 20.8 |
| 199209 2006 $AR_{21}$ | 16.1 | X | 287.97627 | 96.26738 | 53.29321 | 7.26404 | 0.0673726 | 0.26459507 | 2.4029693 | 20 | — | — |
| 199210 2006 $AS_{21}$ | 15.3 | X | 332.82971 | 240.20382 | 340.51891 | 13.04450 | 0.1358215 | 0.21553320 | 2.7550317 | 20 | 3 1.7 | 18.7 |
| 199211 2006 $AW_{21}$ | 17.0 | X | 342.82057 | 70.48587 | 16.41751 | 6.82081 | 0.0896861 | 0.26466749 | 2.4025309 | 20 | — | — |
| 199212 2006 $AH_{22}$ | 16.8 | X | 58.74302 | 45.50879 | 66.61936 | 9.25643 | 0.1939934 | 0.28339181 | 2.2955030 | 20 | 3 6.5 | 18.9 |
| 199213 2006 $AK_{22}$ | 16.4 | X | 284.76266 | 126.98227 | 55.35986 | 11.10319 | 0.0958561 | 0.26731673 | 2.3866311 | 20 | — | — |
| 199214 2006 $AY_{27}$ | 16.3 | X | 126.79839 | 349.92379 | 154.47627 | 3.41549 | 0.1310531 | 0.22665176 | 2.6641785 | 20 | 7 11.8 | 20.3 |
| 199215 2006 $AF_{29}$ | 16.8 | X | 303.53759 | 142.94248 | 321.53798 | 1.87009 | 0.1651449 | 0.26040711 | 2.4286643 | 20 | — | — |
| 199216 2006 $AJ_{29}$ | 15.9 | X | 214.95912 | 335.86367 | 155.13265 | 11.30877 | 0.1176158 | 0.24203776 | 2.5500418 | 20 | 9 28.7 | 19.6 |
| 199217 2006 $AO_{30}$ | 16.9 | X | 7.13895 | 110.75969 | 47.81386 | 2.69845 | 0.0993722 | 0.28077631 | 2.3097363 | 20 | 1 25.6 | 19.1 |
| 199218 2006 $AL_{32}$ | 16.4 | X | 251.49614 | 76.49882 | 94.92112 | 5.20351 | 0.0919314 | 0.26095168 | 2.4252842 | 20 | — | — |
| 199219 2006 $AO_{37}$ | 16.8 | X | 24.92082 | 188.89211 | 118.04708 | 5.80190 | 0.1499263 | 0.24478024 | 2.5309592 | 20 | 10 17.6 | 19.8 |
| 199220 2006 $AD_{41}$ | 16.0 | X | 260.56095 | 303.85611 | 320.81266 | 11.20449 | 0.1328931 | 0.21074092 | 2.7966415 | 20 | 1 29.8 | 20.3 |
| 199221 2006 $AD_{42}$ | 17.4 | X | 114.89975 | 95.70283 | 286.76510 | 5.73417 | 0.1092330 | 0.27947447 | 2.3169036 | 20 | 1 11.5 | 20.2 |
| 199222 2006 $AR_{42}$ | 17.6 | X | 325.20587 | 245.81125 | 205.12220 | 1.55679 | 0.1431227 | 0.26296973 | 2.4128605 | 20 | — | — |
| 199223 2006 $AO_{43}$ | 15.5 | X | 181.07042 | 256.36021 | 326.45882 | 8.80442 | 0.1932993 | 0.18049658 | 3.1009164 | 20 | 11 26.8 | 20.9 |
| 199224 2006 $AF_{45}$ | 15.6 | X | 355.21452 | 210.03544 | 65.10016 | 15.76391 | 0.1117939 | 0.22941922 | 2.6427100 | 20 | 6 28.2 | 18.6 |
| 199225 2006 $AC_{47}$ | 16.6 | X | 273.08609 | 123.16238 | 73.77669 | 6.91881 | 0.0524411 | 0.27089961 | 2.3655409 | 20 | — | — |
| 199226 2006 $AL_{48}$ | 15.2 | X | 123.04395 | 43.03128 | 319.09923 | 14.25343 | 0.1570776 | 0.20310948 | 2.8662622 | 20 | 1 17.9 | 19.4 |
| 199227 2006 $AO_{49}$ | 17.2 | X | 211.87181 | 271.60484 | 76.84501 | 5.41355 | 0.1085858 | 0.29391226 | 2.2403932 | 20 | 3 19.9 | 20.4 |
| 199228 2006 $AN_{52}$ | 17.1 | X | 33.13348 | 264.63733 | 233.82723 | 2.17136 | 0.1732854 | 0.28226469 | 2.3016097 | 20 | 2 9.9 | 18.9 |
| 199229 2006 $AY_{58}$ | 15.9 | X | 47.61497 | 142.14612 | 110.86837 | 4.02166 | 0.2733244 | 0.23690660 | 2.5867311 | 20 | 9 24.1 | 19.3 |
| 199230 2006 $AV_{65}$ | 16.9 | X | 331.22073 | 110.91153 | 106.57561 | 5.07654 | 0.0860033 | 0.28464333 | 2.2887694 | 20 | 2 22.8 | 19.3 |
| 199231 2006 $AB_{66}$ | 15.6 | X | 349.66413 | 194.98725 | 171.22982 | 10.20066 | 0.1045998 | 0.24291357 | 2.5439088 | 20 | 11 4.9 | 18.5 |
| 199232 2006 $AF_{68}$ | 17.2 | X | 38.14325 | 223.76897 | 151.82866 | 1.63832 | 0.1950492 | 0.26450511 | 2.4035141 | 20 | — | — |
| 199233 2006 $AT_{68}$ | 17.1 | X | 261.08574 | 319.36384 | 281.63116 | 2.31687 | 0.1682127 | 0.27409499 | 2.3471201 | 20 | — | — |
| 199234 2006 $AC_{70}$ | 17.5 | X | 101.08441 | 308.99098 | 155.75359 | 2.29796 | 0.1054232 | 0.29095516 | 2.2555476 | 20 | 4 14.9 | 20.0 |
| 199235 2006 $AU_{72}$ | 16.2 | X | 317.61512 | 168.09965 | 138.28312 | 8.63048 | 0.1987618 | 0.23180787 | 2.6245243 | 20 | 5 27.2 | 19.1 |
| 199236 2006 $AA_{73}$ | 16.6 | X | 198.93098 | 305.26996 | 295.62237 | 4.90636 | 0.1007460 | 0.26714231 | 2.3876698 | 20 | — | — |
| 199237 2006 $AJ_{74}$ | 16.5 | X | 304.35084 | 154.22369 | 343.01777 | 4.51289 | 0.1749446 | 0.26500096 | 2.4005150 | 20 | — | — |
| 199238 2006 $AM_{77}$ | 16.0 | X | 235.25405 | 176.60392 | 134.05752 | 6.29067 | 0.1115276 | 0.21742406 | 2.7390354 | 20 | 2 29.8 | 20.2 |
| 199239 2006 $AQ_{77}$ | 17.3 | X | 174.39848 | 151.69241 | 183.32518 | 1.68346 | 0.2171357 | 0.28227957 | 2.3015288 | 20 | 1 28.1 | 21.0 |
| 199240 2006 $AW_{84}$ | 17.1 | X | 314.34228 | 97.89524 | 38.92879 | 2.17582 | 0.1405265 | 0.26633014 | 2.3925214 | 20 | — | — |
| 199241 2006 $AC_{85}$ | 15.9 | X | 56.55382 | 177.12859 | 52.10097 | 11.18604 | 0.1937334 | 0.23013326 | 2.6372408 | 20 | 8 25.5 | 19.5 |
| 199242 2006 $AK_{86}$ | 16.1 | X | 261.43473 | 132.24060 | 26.13754 | 15.30832 | 0.0760953 | 0.26047037 | 2.4282710 | 20 | — | — |
| 199243 2006 $AO_{90}$ | 17.0 | X | 47.61258 | 151.14547 | 200.44833 | 0.58681 | 0.1951233 | 0.26425220 | 2.4050474 | 20 | — | — |
| 199244 2006 $AK_{91}$ | 17.2 | X | 39.37982 | 191.48195 | 135.80502 | 7.02420 | 0.1295002 | 0.25513042 | 2.4620369 | 20 | 12 1.8 | 20.5 |
| 199245 2006 $AR_{92}$ | 16.9 | X | 37.74923 | 307.74405 | 310.54878 | 2.50187 | 0.0373371 | 0.23715110 | 2.5849528 | 20 | 8 8.4 | 20.2 |
| 199246 2006 $AJ_{97}$ | 15.9 | X | 63.22566 | 185.41866 | 24.29850 | 10.33896 | 0.0594920 | 0.23120539 | 2.6290817 | 20 | 7 13.4 | 19.5 |
| 199247 2006 $AE_{98}$ | 15.7 | X | 109.49704 | 107.52603 | 112.55435 | 0.27908 | 0.1410837 | 0.17161717 | 3.2069749 | 20 | 9 23.6 | 20.7 |
| 199248 2006 $AM_{100}$ | 15.6 | X | 258.39121 | 130.70484 | 150.03435 | 5.59667 | 0.0131562 | 0.21564895 | 2.7540458 | 20 | 2 27.3 | 19.4 |
| 199249 2006 $AZ_{101}$ | 15.1 | X | 89.08963 | 312.88870 | 317.58660 | 9.75001 | 0.1535193 | 0.17582962 | 3.1555473 | 20 | 10 30.6 | 20.1 |
| 199250 2006 $AE_{102}$ | 17.2 | X | 340.69891 | 195.85058 | 192.40413 | 1.99349 | 0.1722930 | 0.25631914 | 2.4544189 | 20 | 11 29.1 | 19.3 |
| 199251 2006 $BZ$ | 15.9 | X | 342.67353 | 333.51155 | 121.07210 | 27.20446 | 0.1412504 | 0.27099089 | 2.3650097 | 20 | — | — |
| 199252 2006 $BF_{2}$ | 17.0 | X | 117.80786 | 279.93241 | 129.58845 | 7.34142 | 0.0837660 | 0.28365500 | 2.2940828 | 20 | 2 17.8 | 19.7 |
| 199253 2006 $BN_{2}$ | 16.6 | X | 5.91003 | 9.58232 | 122.05154 | 5.71458 | 0.1773084 | 0.27521546 | 2.3407453 | 20 | — | — |
| 199254 2006 $BU_{2}$ | 16.0 | X | 165.67397 | 55.14795 | 66.15260 | 4.34727 | 0.0392771 | 0.23462266 | 2.6034910 | 20 | 7 22.9 | 19.6 |
| 199255 2006 $BB_{4}$ | 16.2 | X | 116.45626 | 110.69664 | 133.66871 | 1.69074 | 0.1654535 | 0.17953392 | 3.1119913 | 20 | 10 31.7 | 21.2 |
| 199256 2006 $BQ_{5}$ | 16.0 | X | 0.52739 | 338.96834 | 138.75670 | 2.84843 | 0.0177666 | 0.20286922 | 2.8685248 | 20 | — | — |
| 199257 2006 $BW_{9}$ | 16.3 | X | 270.37578 | 188.30681 | 123.64913 | 3.89731 | 0.0750035 | 0.22376990 | 2.6870037 | 20 | 4 15.0 | 20.0 |
| 199258 2006 $BN_{11}$ | 15.7 | X | 342.35560 | 310.57105 | 319.28760 | 13.91507 | 0.0835667 | 0.22530521 | 2.6747830 | 20 | 5 27.3 | 19.2 |
| 199259 2006 $BF_{12}$ | 16.8 | X | 60.13925 | 71.77869 | 175.68740 | 0.62661 | 0.0163146 | 0.24237495 | 2.5476762 | 20 | 8 22.5 | 20.0 |
| 199260 2006 $BJ_{12}$ | 17.0 | X | 133.29317 | 243.53788 | 220.56320 | 4.25749 | 0.0954170 | 0.29746385 | 2.2225246 | 20 | 5 24.2 | 19.8 |
| 199261 2006 $BN_{12}$ | 15.7 | X | 244.03260 | 227.70067 | 133.74375 | 9.48098 | 0.0555758 | 0.22358756 | 2.6884644 | 20 | 5 20.8 | 19.6 |
| 199262 2006 $BB_{13}$ | 16.4 | X | 318.80341 | 324.29460 | 136.93237 | 6.85667 | 0.0757078 | 0.26123931 | 2.4235038 | 20 | — | — |
| 199263 2006 $BB_{14}$ | 16.9 | X | 316.79353 | 199.91214 | 306.00120 | 4.49604 | 0.1327516 | 0.26953231 | 2.3735342 | 20 | — | — |
| 199264 2006 $BC_{14}$ | 17.0 | X | 299.92038 | 146.91413 | 315.64844 | 1.31683 | 0.0954438 | 0.25989304 | 2.4318659 | 20 | 12 27.7 | 19.3 |
| 199265 2006 $BT_{15}$ | 16.6 | X | 245.59997 | 24.64689 | 291.87940 | 1.09023 | 0.1312043 | 0.22203547 | 2.7009786 | 20 | 3 14.9 | 20.6 |
| 199266 2006 $BC_{20}$ | 15.7 | X | 83.13339 | 352.73996 | 131.30959 | 9.66565 | 0.0944262 | 0.21981148 | 2.7191665 | 20 | 4 22.8 | 19.4 |
| 199267 2006 $BW_{20}$ | 17.1 | X | 286.17521 | 256.66309 | 228.11414 | 0.60728 | 0.1453284 | 0.25994268 | 2.4315563 | 20 | — | — |
| 199268 2006 $BB_{22}$ | 16.4 | X | 352.70243 | 277.09576 | 134.49455 | 7.81603 | 0.1378716 | 0.26083622 | 2.4260000 | 20 | — | — |
| 199269 2006 $BZ_{22}$ | 15.2 | X | 138.41206 | 129.22759 | 152.91176 | 10.04876 | 0.1006609 | 0.18497226 | 3.0506916 | 20 | 12 31.9 | 20.1 |
| 199270 2006 $BC_{29}$ | 16.0 | X | 75.16417 | 314.33371 | 146.71689 | 9.97891 | 0.1149519 | 0.21545304 | 2.7557150 | 20 | 3 13.1 | 19.4 |
| 199271 2006 $BU_{30}$ | 15.9 | X | 133.89389 | 47.34150 | 343.93921 | 6.04431 | 0.0658588 | 0.21310060 | 2.7759582 | 20 | 2 20.6 | 19.9 |
| 199272 2006 $BS_{31}$ | 16.2 | X | 352.72022 | 326.35642 | 359.71371 | 4.97046 | 0.1139240 | 0.24009932 | 2.5637486 | 20 | 9 11.1 | 18.7 |
| 199273 2006 $BV_{31}$ | 17.2 | X | 8.42741 | 60.76253 | 9.18281 | 2.53738 | 0.1748953 | 0.26673284 | 2.3901127 | 20 | — | — |
| 199274 2006 $BW_{31}$ | 16.7 | X | 204.09936 | 111.94085 | 113.77388 | 2.57433 | 0.1445674 | 0.25853308 | 2.4403866 | 20 | — | — |
| 199275 2006 $BU_{32}$ | 15.9 | X | 247.81047 | 232.38383 | 126.60872 | 4.45823 | 0.1051013 | 0.22484883 | 2.6784012 | 20 | 5 14.7 | 19.7 |
| 199276 2006 $BY_{33}$ | 16.0 | X | 22.19979 | 288.33043 | 138.68448 | 2.72955 | 0.0542971 | 0.19478589 | 2.9473455 | 20 | — | — |
| 199277 2006 $BA_{34}$ | 15.4 | X | 310.50251 | 154.24227 | 337.33829 | 10.48599 | 0.0317087 | 0.19246515 | 2.9709908 | 20 | — | — |
| 199278 2006 $BV_{37}$ | 16.2 | X | 168.20571 | 179.38550 | 65.85562 | 1.06421 | 0.1380480 | 0.18880434 | 3.0092717 | 20 | 12 16.9 | 21.1 |
| 199279 2006 $BN_{40}$ | 15.9 | X | 101.35003 | 298.12739 | 153.05550 | 5.97318 | 0.0326425 | 0.21412735 | 2.7670773 | 20 | 3 23.1 | 19.6 |
| 199280 2006 $BE_{44}$ | 15.5 | X | 193.03675 | 86.07549 | 152.27025 | 10.94531 | 0.0650022 | 0.18989757 | 2.9977112 | 20 | — | — |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 199281 2006 $BU_{44}$ | 15.8 | $X$ | 111.33581 | 164.96817 | 143.48974 | 4.21868 | 0.1682760 | 0.18437737 | 3.0572501 | 20 | — | — |
| 199282 2006 $BS_{45}$ | 16.1 | $X$ | 206.46064 | 14.02496 | 323.61135 | 4.89635 | 0.0620884 | 0.21266367 | 2.7797592 | 20 | 3 4.1 | 20.1 |
| 199283 2006 $BW_{46}$ | 16.1 | $X$ | 89.68469 | 327.21699 | 306.72453 | 3.15887 | 0.1372460 | 0.24534073 | 2.5271030 | 20 | 11 17.4 | 19.8 |
| 199284 2006 $BB_{47}$ | 16.8 | $X$ | 304.97549 | 149.35551 | 329.02150 | 1.85786 | 0.1401659 | 0.26161203 | 2.4212014 | 20 | — | — |
| 199285 2006 $BP_{53}$ | 17.3 | $X$ | 353.95122 | 12.41378 | 125.16850 | 2.71924 | 0.1189008 | 0.27265657 | 2.3553678 | 20 | — | — |
| 199286 2006 $BC_{54}$ | 17.2 | $X$ | 3.37549 | 114.32732 | 337.22656 | 1.85233 | 0.1650518 | 0.26726507 | 2.3869386 | 20 | — | — |
| 199287 2006 $BX_{54}$ | 16.6 | $X$ | 349.72445 | 112.63659 | 191.85644 | 3.06828 | 0.0688537 | 0.23617499 | 2.5920703 | 20 | 7 31.8 | 19.5 |
| 199288 2006 $BX_{56}$ | 17.8 | $X$ | 121.47585 | 57.54158 | 313.35068 | 0.98573 | 0.1874338 | 0.27937009 | 2.3174806 | 20 | 1 17.1 | 20.6 |
| 199289 2006 $BO_{57}$ | 16.1 | $X$ | 242.08157 | 345.43720 | 336.54039 | 5.08275 | 0.0883039 | 0.22002972 | 2.7173681 | 20 | 3 21.1 | 20.2 |
| 199290 2006 $BQ_{58}$ | 15.9 | $X$ | 59.91224 | 220.26945 | 288.79296 | 3.87250 | 0.1028169 | 0.21866709 | 2.7286454 | 20 | 4 17.8 | 19.3 |
| 199291 2006 $BB_{60}$ | 16.3 | $X$ | 337.28202 | 260.21993 | 338.46768 | 7.35262 | 0.1539491 | 0.21582215 | 2.7525721 | 20 | 3 28.7 | 19.5 |
| 199292 2006 $BD_{63}$ | 15.8 | $X$ | 128.56372 | 273.66607 | 279.67445 | 11.46715 | 0.1149133 | 0.23756005 | 2.5819854 | 20 | 9 8.7 | 19.9 |
| 199293 2006 $BC_{66}$ | 16.5 | $X$ | 283.18329 | 240.37871 | 83.33701 | 3.32444 | 0.1180485 | 0.22836055 | 2.6508714 | 20 | 5 9.5 | 20.1 |
| 199294 2006 $BN_{68}$ | 16.8 | $X$ | 172.23440 | 217.96675 | 31.24737 | 1.65944 | 0.1538584 | 0.25853872 | 2.4403511 | 20 | — | — |
| 199295 2006 $BQ_{68}$ | 16.8 | $X$ | 247.36750 | 237.80549 | 56.44917 | 1.30006 | 0.0327885 | 0.21561519 | 2.7543332 | 20 | 2 29.0 | 20.7 |
| 199296 2006 $BA_{76}$ | 16.5 | $X$ | 230.11025 | 325.90694 | 4.03119 | 4.96292 | 0.1088592 | 0.21924633 | 2.7238373 | 20 | 3 18.3 | 20.6 |
| 199297 2006 $BB_{79}$ | 17.2 | $X$ | 63.43207 | 78.61622 | 48.54730 | 3.20135 | 0.1096498 | 0.28376565 | 2.2934864 | 20 | 3 21.7 | 19.5 |
| 199298 2006 $BL_{79}$ | 15.6 | $X$ | 96.93471 | 252.85429 | 35.55660 | 5.28867 | 0.1665584 | 0.17801777 | 3.1296359 | 20 | 12 2.6 | 20.6 |
| 199299 2006 $BV_{79}$ | 16.3 | $X$ | 271.04656 | 300.74975 | 76.48282 | 4.47296 | 0.1459471 | 0.23374943 | 2.6099710 | 20 | 6 30.3 | 19.6 |
| 199300 2006 $BB_{80}$ | 15.6 | $X$ | 273.17459 | 301.79134 | 9.25725 | 8.30645 | 0.0328126 | 0.21916646 | 2.7244990 | 20 | 4 20.0 | 19.4 |
| 199301 2006 $BC_{82}$ | 17.0 | $X$ | 81.37138 | 67.50725 | 346.91142 | 8.63015 | 0.2307513 | 0.27728844 | 2.3290646 | 20 | 1 26.9 | 19.1 |
| 199302 2006 $BD_{82}$ | 15.4 | $X$ | 70.95258 | 156.66302 | 126.57596 | 7.31943 | 0.1497996 | 0.17237193 | 3.1976065 | 20 | 11 2.0 | 20.2 |
| 199303 2006 $BM_{83}$ | 17.5 | $X$ | 111.16246 | 294.97590 | 61.58825 | 2.19640 | 0.2073957 | 0.27508879 | 2.3414639 | 20 | — | — |
| 199304 2006 $BV_{83}$ | 16.8 | $X$ | 165.28212 | 271.48278 | 4.10665 | 2.48281 | 0.1686111 | 0.26328275 | 2.4109477 | 20 | — | — |
| 199305 2006 $BR_{86}$ | 17.3 | $X$ | 217.16536 | 196.13786 | 37.48277 | 1.58461 | 0.1410310 | 0.26332465 | 2.4106919 | 20 | — | — |
| 199306 2006 $BL_{91}$ | 16.9 | $X$ | 17.73034 | 293.30102 | 161.27600 | 3.31419 | 0.0471852 | 0.26938409 | 2.3744048 | 20 | — | — |
| 199307 2006 $BR_{93}$ | 15.7 | $X$ | 275.14418 | 356.95823 | 324.89662 | 6.44111 | 0.1355624 | 0.22169110 | 2.7037750 | 20 | 4 20.4 | 19.7 |
| 199308 2006 $BS_{93}$ | 18.1 | $X$ | 359.23365 | 299.29046 | 183.46059 | 1.02707 | 0.1330502 | 0.27111702 | 2.3642761 | 20 | — | — |
| 199309 2006 $BF_{98}$ | 17.1 | $X$ | 300.79955 | 132.47228 | 48.05311 | 1.26594 | 0.1528270 | 0.26977787 | 2.3720937 | 20 | — | — |
| 199310 2006 $BB_{99}$ | 15.5 | $X$ | 276.13706 | 194.65553 | 75.35254 | 10.64980 | 0.1127893 | 0.21532549 | 2.7568031 | 20 | 2 27.4 | 19.6 |
| 199311 2006 $BJ_{99}$ | 16.8 | $X$ | 70.69583 | 120.56143 | 137.31961 | 4.50505 | 0.1978878 | 0.23900122 | 2.5715954 | 20 | 10 16.9 | 20.6 |
| 199312 2006 $BN_{101}$ | 17.5 | $X$ | 345.63138 | 250.45450 | 77.75452 | 0.77242 | 0.0345716 | 0.24159167 | 2.5531798 | 20 | 8 29.8 | 20.4 |
| 199313 2006 $BZ_{101}$ | 15.2 | $X$ | 300.52144 | 347.03548 | 319.17409 | 12.12583 | 0.1326720 | 0.22490179 | 2.6779807 | 20 | 5 1.5 | 18.9 |
| 199314 2006 $BG_{102}$ | 16.4 | $X$ | 44.39906 | 251.72130 | 184.85576 | 1.78661 | 0.0448038 | 0.20292526 | 2.8679967 | 20 | — | — |
| 199315 2006 $BN_{103}$ | 16.2 | $X$ | 108.72061 | 139.91359 | 159.91862 | 9.45175 | 0.1213087 | 0.18395688 | 3.0619072 | 20 | 12 25.2 | 21.2 |
| 199316 2006 $BR_{103}$ | 17.1 | $X$ | 39.88356 | 75.90467 | 328.69267 | 3.82624 | 0.0910255 | 0.26446405 | 2.4037628 | 20 | — | — |
| 199317 2006 $BQ_{107}$ | 16.3 | $X$ | 306.15820 | 155.97617 | 104.97367 | 2.95297 | 0.0418909 | 0.22077547 | 2.7112455 | 20 | 3 30.9 | 19.9 |
| 199318 2006 $BA_{113}$ | 16.5 | $X$ | 341.22622 | 273.68451 | 30.82204 | 2.59371 | 0.1712717 | 0.23319634 | 2.6140962 | 20 | 7 15.6 | 18.9 |
| 199319 2006 $BJ_{114}$ | 15.7 | $X$ | 259.38416 | 17.95844 | 319.93499 | 10.16355 | 0.0946292 | 0.22645943 | 2.6656867 | 20 | 4 25.8 | 19.7 |
| 199320 2006 $BB_{117}$ | 18.4 | $X$ | 44.53410 | 176.69467 | 276.52188 | 0.93131 | 0.1485332 | 0.27602982 | 2.3361392 | 20 | — | — |
| 199321 2006 $BN_{117}$ | 16.9 | $X$ | 345.95837 | 250.78681 | 85.00940 | 3.93299 | 0.0838558 | 0.24367549 | 2.5386032 | 20 | 9 14.1 | 19.7 |
| 199322 2006 $BC_{118}$ | 16.0 | $X$ | 40.08949 | 157.48506 | 212.65997 | 2.31832 | 0.0389452 | 0.18791633 | 3.0187445 | 20 | 12 25.4 | 20.3 |
| 199323 2006 $BB_{120}$ | 16.0 | $X$ | 120.31276 | 71.30725 | 223.93974 | 2.38651 | 0.1374719 | 0.18620953 | 3.0371630 | 20 | 12 31.4 | 20.9 |
| 199324 2006 $BD_{122}$ | 16.1 | $X$ | 171.19865 | 42.79017 | 330.62514 | 11.37979 | 0.0948292 | 0.21455892 | 2.7633655 | 20 | 3 9.6 | 20.4 |
| 199325 2006 $BJ_{122}$ | 17.2 | $X$ | 268.64563 | 208.75351 | 157.18702 | 1.32727 | 0.0852224 | 0.23117630 | 2.6293022 | 20 | 6 20.8 | 20.5 |
| 199326 2006 $BR_{122}$ | 15.8 | $X$ | 317.70905 | 154.78084 | 346.80968 | 1.44159 | 0.0695800 | 0.19684323 | 2.9267732 | 20 | — | — |
| 199327 2006 $BR_{128}$ | 16.1 | $X$ | 10.10469 | 245.86245 | 359.97277 | 1.48232 | 0.0110631 | 0.22734348 | 2.6587717 | 20 | 6 8.7 | 19.6 |
| 199328 2006 $BC_{131}$ | 16.3 | $X$ | 213.18715 | 301.13012 | 157.65569 | 5.06814 | 0.1294597 | 0.23846891 | 2.5754208 | 20 | 8 10.8 | 20.0 |
| 199329 2006 $BH_{131}$ | 15.4 | $X$ | 163.22929 | 252.36741 | 341.31358 | 10.01278 | 0.0729333 | 0.18156653 | 3.0887222 | 20 | 11 27.8 | 20.2 |
| 199330 2006 $BS_{131}$ | 16.3 | $X$ | 222.07649 | 215.63798 | 149.78624 | 2.34988 | 0.0901573 | 0.22068817 | 2.7119604 | 20 | 4 25.0 | 20.3 |
| 199331 2006 $BT_{131}$ | 16.5 | $X$ | 290.02200 | 307.65118 | 338.01923 | 1.50212 | 0.0632052 | 0.21623399 | 2.7490760 | 20 | 4 5.7 | 20.2 |
| 199332 2006 $BU_{131}$ | 16.0 | $X$ | 104.16112 | 237.30620 | 156.76145 | 5.42719 | 0.1289898 | 0.20496753 | 2.8489140 | 20 | 1 27.7 | 19.9 |
| 199333 2006 $BZ_{131}$ | 16.1 | $X$ | 199.11341 | 166.12003 | 38.49199 | 0.96611 | 0.0938408 | 0.18297799 | 3.0728179 | 20 | 12 1.4 | 20.7 |
| 199334 2006 $BS_{133}$ | 16.8 | $X$ | 174.54840 | 102.73903 | 8.54043 | 1.33602 | 0.0350159 | 0.23122089 | 2.6289642 | 20 | 7 19.7 | 20.5 |
| 199335 2006 $BX_{133}$ | 16.4 | $X$ | 198.28504 | 357.16376 | 4.72786 | 2.06232 | 0.0959796 | 0.21638616 | 2.7477870 | 20 | 3 25.6 | 20.5 |
| 199336 2006 $BU_{138}$ | 16.3 | $X$ | 304.53292 | 328.05848 | 312.63016 | 3.17017 | 0.0644972 | 0.21962310 | 2.7207212 | 20 | 4 17.3 | 19.9 |
| 199337 2006 $BE_{147}$ | 15.9 | $X$ | 213.31150 | 197.20828 | 155.55878 | 6.76943 | 0.0464074 | 0.21869479 | 2.7284150 | 20 | 4 2.6 | 19.8 |
| 199338 2006 $BM_{148}$ | 17.2 | $X$ | 83.26412 | 31.83913 | 40.58397 | 6.16148 | 0.1708847 | 0.28319271 | 2.2965787 | 20 | 2 15.1 | 19.5 |
| 199339 2006 $BS_{150}$ | 17.1 | $X$ | 234.54355 | 287.42973 | 79.58929 | 2.89073 | 0.1181203 | 0.30360317 | 2.1924608 | 20 | 5 5.9 | 20.0 |
| 199340 2006 $BA_{155}$ | 17.0 | $X$ | 354.38974 | 322.20352 | 119.89833 | 4.15622 | 0.1026122 | 0.26343678 | 2.4100078 | 20 | — | — |
| 199341 2006 $BM_{157}$ | 16.4 | $X$ | 197.67471 | 43.53054 | 11.20473 | 1.90643 | 0.0665375 | 0.22603521 | 2.6690210 | 20 | 5 31.4 | 20.1 |
| 199342 2006 $BW_{157}$ | 16.9 | $X$ | 156.61242 | 37.92125 | 88.78861 | 1.49395 | 0.0531876 | 0.23079921 | 2.6321653 | 20 | 7 18.2 | 20.7 |
| 199343 2006 $BY_{157}$ | 16.6 | $X$ | 148.54138 | 328.46735 | 127.49148 | 2.96428 | 0.0224332 | 0.22330678 | 2.6907176 | 20 | 5 26.4 | 20.3 |
| 199344 2006 $BL_{158}$ | 16.6 | $X$ | 174.18408 | 304.11977 | 148.49403 | 3.79895 | 0.1419408 | 0.23066961 | 2.6331512 | 20 | 6 23.6 | 20.7 |
| 199345 2006 $BS_{158}$ | 16.9 | $X$ | 13.94183 | 288.71568 | 58.60358 | 2.98253 | 0.1909497 | 0.25640032 | 2.4539008 | 20 | 12 1.7 | 19.6 |
| 199346 2006 $BP_{161}$ | 16.0 | $X$ | 312.33345 | 247.82919 | 218.07180 | 8.61108 | 0.1813618 | 0.26044015 | 2.4284589 | 20 | — | — |
| 199347 2006 $BA_{162}$ | 17.0 | $X$ | 79.14181 | 27.84247 | 72.27871 | 5.45414 | 0.1044566 | 0.28438365 | 2.2901625 | 20 | 3 8.9 | 19.5 |
| 199348 2006 $BW_{162}$ | 15.9 | $X$ | 269.63378 | 175.65951 | 133.49255 | 5.32891 | 0.0863880 | 0.22096415 | 2.7097018 | 20 | 4 9.5 | 19.7 |
| 199349 2006 $BB_{163}$ | 15.5 | $X$ | 334.14323 | 359.34167 | 319.27005 | 11.43811 | 0.1865728 | 0.23543725 | 2.5974823 | 20 | 7 22.6 | 17.8 |
| 199350 2006 $BJ_{163}$ | 15.6 | $X$ | 351.03327 | 138.52902 | 136.46631 | 15.55886 | 0.0899315 | 0.22921637 | 2.6442690 | 20 | 6 22.7 | 18.8 |
| 199351 2006 $BT_{165}$ | 16.9 | $X$ | 310.23955 | 169.65788 | 326.19957 | 4.87820 | 0.1666955 | 0.26441129 | 2.4040826 | 20 | — | — |
| 199352 2006 $BD_{167}$ | 16.2 | $X$ | 272.77164 | 205.22729 | 131.04468 | 3.38615 | 0.1513935 | 0.22649351 | 2.6654193 | 20 | 5 8.4 | 19.9 |
| 199353 2006 $BP_{168}$ | 16.1 | $X$ | 68.65218 | 61.79029 | 1.02962 | 1.70414 | 0.0563298 | 0.20277132 | 2.8694481 | 20 | 1 7.9 | 19.8 |
| 199354 2006 $BR_{179}$ | 16.5 | $X$ | 9.02637 | 299.55532 | 342.13443 | 2.74502 | 0.1616209 | 0.23270483 | 2.6177758 | 20 | 8 9.7 | 18.9 |
| 199355 2006 $BD_{180}$ | 18.1 | $X$ | 69.43133 | 276.21869 | 120.21194 | 2.92023 | 0.2111273 | 0.27347781 | 2.3506501 | 20 | — | — |
| 199356 2006 $BW_{182}$ | 16.3 | $X$ | 340.75877 | 207.42915 | 115.87696 | 2.14091 | 0.1849210 | 0.23579409 | 2.5948611 | 20 | 8 13.8 | 18.4 |
| 199357 2006 $BY_{182}$ | 14.8 | $X$ | 99.91357 | 154.25148 | 145.79742 | 11.92571 | 0.2595800 | 0.18154739 | 3.0889393 | 20 | 12 25.7 | 20.3 |
| 199358 2006 $BZ_{182}$ | 16.0 | $X$ | 260.59911 | 204.09742 | 133.02604 | 4.35258 | 0.1003124 | 0.22382527 | 2.6865606 | 20 | 5 2.3 | 19.7 |
| 199359 2006 $BG_{183}$ | 15.2 | $X$ | 143.08156 | 77.33204 | 202.43158 | 2.78125 | 0.0539212 | 0.18785993 | 3.0193488 | 20 | — | — |
| 199360 2006 $BP_{186}$ | 16.8 | $X$ | 321.30096 | 263.15029 | 16.49553 | 2.25349 | 0.1346676 | 0.22027529 | 2.7153482 | 20 | 5 2.2 | 19.8 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 199361 2006 $BV_{186}$ | 16.3 | $X$ | 179.93417 | 167.24300 | 323.63974 | 6.97099 | 0.1391206 | 0.23700145 | 2.5860409 | 20 | 8 17.8 | 20.4 |
| 199362 2006 $BR_{188}$ | 16.0 | $X$ | 94.92923 | 190.09283 | 356.91456 | 11.71276 | 0.1122620 | 0.22937275 | 2.6430669 | 20 | 8 3.5 | 19.9 |
| 199363 2006 $BQ_{189}$ | 16.3 | $X$ | 192.66112 | 273.39851 | 36.31654 | 4.72604 | 0.1481826 | 0.20126848 | 2.8837141 | 20 | 1 21.4 | 21.1 |
| 199364 2006 $BY_{190}$ | 15.7 | $X$ | 251.20089 | 114.29788 | 74.45843 | 4.08985 | 0.1464827 | 0.18344787 | 3.0675685 | 20 | — | — |
| 199365 2006 $BN_{192}$ | 17.1 | $X$ | 155.73305 | 231.37582 | 296.25229 | 2.44143 | 0.0650824 | 0.24068251 | 2.5596054 | 20 | 9 9.4 | 20.7 |
| 199366 2006 $BP_{195}$ | 16.2 | $X$ | 170.98584 | 101.51270 | 309.35767 | 8.78000 | 0.0676774 | 0.22263187 | 2.6961528 | 20 | 4 22.0 | 20.3 |
| 199367 2006 $BZ_{198}$ | 15.5 | $X$ | 257.49955 | 47.66668 | 323.98226 | 14.51459 | 0.0603863 | 0.23003491 | 2.6379925 | 20 | 6 18.2 | 19.4 |
| 199368 2006 $BE_{201}$ | 16.7 | $X$ | 293.75973 | 53.10410 | 179.07990 | 3.30523 | 0.0755616 | 0.21376746 | 2.7701821 | 20 | 1 31.7 | 20.7 |
| 199369 2006 $BY_{201}$ | 15.8 | $X$ | 118.45577 | 348.30747 | 352.95336 | 4.04859 | 0.1395894 | 0.19934583 | 2.9022263 | 20 | — | — |
| 199370 2006 $BA_{203}$ | 16.3 | $X$ | 164.72102 | 245.56442 | 107.62845 | 3.07619 | 0.0705546 | 0.21011038 | 2.8022338 | 20 | 2 9.2 | 20.5 |
| 199371 2006 $BA_{211}$ | 15.5 | $X$ | 99.85974 | 220.66120 | 314.59004 | 12.77656 | 0.1083373 | 0.22519714 | 2.6756387 | 20 | 7 21.4 | 19.3 |
| 199372 2006 $BZ_{211}$ | 15.1 | $X$ | 211.76494 | 47.53706 | 151.38612 | 10.40579 | 0.0647914 | 0.18485966 | 3.0519303 | 20 | 12 13.1 | 19.7 |
| 199373 2006 $BT_{216}$ | 15.6 | $X$ | 92.45220 | 269.44999 | 288.61681 | 10.73600 | 0.0277464 | 0.23251813 | 2.6191769 | 20 | 7 29.0 | 19.2 |
| 199374 2006 $BW_{218}$ | 17.1 | $X$ | 99.57919 | 264.42321 | 119.26294 | 6.18398 | 0.2021128 | 0.27697439 | 2.3308248 | 20 | 1 6.2 | 19.4 |
| 199375 2006 $BB_{219}$ | 16.1 | $X$ | 277.96160 | 281.29174 | 340.91305 | 4.39988 | 0.0964292 | 0.21220456 | 2.7837672 | 20 | 2 17.8 | 20.1 |
| 199376 2006 $BO_{222}$ | 16.8 | $X$ | 293.12573 | 258.94586 | 304.99926 | 2.20235 | 0.1140382 | 0.27228516 | 2.3575093 | 20 | — | — |
| 199377 2006 $BW_{223}$ | 16.5 | $X$ | 86.37155 | 303.19707 | 297.67441 | 2.98722 | 0.1556691 | 0.23827399 | 2.5768252 | 20 | 10 3.5 | 20.3 |
| 199378 2006 $BA_{224}$ | 16.8 | $X$ | 359.06182 | 39.78879 | 267.65951 | 1.58272 | 0.1256933 | 0.23666855 | 2.5884653 | 20 | 8 24.9 | 19.5 |
| 199379 2006 $BX_{226}$ | 17.2 | $X$ | 298.32939 | 359.87557 | 158.42261 | 4.84589 | 0.1157853 | 0.26452894 | 2.4033697 | 20 | — | — |
| 199380 2006 $BK_{227}$ | 16.5 | $X$ | 331.33379 | 102.47364 | 148.93681 | 0.20151 | 0.0529485 | 0.21776358 | 2.7361877 | 20 | 4 19.8 | 20.0 |
| 199381 2006 $BP_{227}$ | 16.9 | $X$ | 190.70523 | 284.04561 | 158.44148 | 1.37532 | 0.1818416 | 0.23218312 | 2.6216957 | 20 | 6 25.6 | 21.2 |
| 199382 2006 $BH_{240}$ | 16.0 | $X$ | 345.26998 | 159.95510 | 117.59357 | 6.30250 | 0.0919326 | 0.22830394 | 2.6513096 | 20 | 6 15.2 | 19.0 |
| 199383 2006 $BY_{247}$ | 16.1 | $X$ | 69.64714 | 174.84803 | 117.34530 | 2.62354 | 0.1477798 | 0.17614897 | 3.1517322 | 20 | 11 9.6 | 20.7 |
| 199384 2006 $BC_{248}$ | 17.0 | $X$ | 6.26499 | 243.69988 | 138.24592 | 5.96949 | 0.1231403 | 0.25493122 | 2.4633193 | 20 | 12 26.3 | 20.0 |
| 199385 2006 $BT_{248}$ | 16.9 | $X$ | 268.81439 | 274.49928 | 128.12503 | 4.71217 | 0.1392981 | 0.24062566 | 2.5600086 | 20 | 8 3.1 | 20.0 |
| 199386 2006 $BV_{249}$ | 17.2 | $X$ | 317.88872 | 331.18266 | 141.91430 | 6.77236 | 0.0798068 | 0.26386717 | 2.4073864 | 20 | — | — |
| 199387 2006 $BP_{251}$ | 17.3 | $X$ | 42.97761 | 69.80870 | 322.32581 | 5.63121 | 0.1536746 | 0.26488942 | 2.4011888 | 20 | — | — |
| 199388 2006 $BA_{252}$ | 16.4 | $X$ | 179.56139 | 56.09485 | 150.64870 | 2.00579 | 0.0867162 | 0.18175307 | 3.0866085 | 20 | 11 15.0 | 21.2 |
| 199389 2006 $BH_{254}$ | 18.1 | $X$ | 119.83881 | 117.05029 | 303.03810 | 2.79480 | 0.2020727 | 0.28681464 | 2.2772035 | 20 | 3 20.2 | 21.2 |
| 199390 2006 $BD_{255}$ | 17.4 | $X$ | 347.82465 | 109.51534 | 314.05042 | 2.82192 | 0.1192364 | 0.26021392 | 2.4298662 | 20 | — | — |
| 199391 2006 $BN_{255}$ | 15.8 | $X$ | 321.41167 | 127.28661 | 162.42073 | 3.49510 | 0.0413636 | 0.22606854 | 2.6687587 | 20 | 5 29.4 | 19.2 |
| 199392 2006 $BB_{257}$ | 16.0 | $X$ | 356.85695 | 188.68528 | 121.82918 | 4.32209 | 0.1435613 | 0.23516674 | 2.5994738 | 20 | 8 28.5 | 18.6 |
| 199393 2006 $BJ_{264}$ | 16.2 | $X$ | 166.83379 | 236.19760 | 96.99338 | 3.29159 | 0.0675535 | 0.20271748 | 2.8699561 | 20 | 1 18.8 | 20.4 |
| 199394 2006 $BU_{264}$ | 16.4 | $X$ | 129.71588 | 242.39947 | 146.65144 | 4.99666 | 0.1161092 | 0.20906407 | 2.8115757 | 20 | 2 18.9 | 20.5 |
| 199395 2006 $BE_{265}$ | 15.9 | $X$ | 252.64347 | 184.82261 | 152.74887 | 13.98240 | 0.2056394 | 0.22096980 | 2.7096556 | 20 | 4 14.7 | 20.3 |
| 199396 2006 $BA_{266}$ | 15.5 | $X$ | 141.56399 | 65.88157 | 195.23320 | 8.95978 | 0.0547953 | 0.17464963 | 3.1697446 | 20 | 12 9.1 | 20.3 |
| 199397 2006 $BD_{266}$ | 16.2 | $X$ | 339.59084 | 192.46617 | 57.24326 | 2.78678 | 0.1615004 | 0.20953386 | 2.8073717 | 20 | 4 20.4 | 19.3 |
| 199398 2006 $BO_{266}$ | 15.7 | $X$ | 209.66151 | 94.24504 | 42.30332 | 11.59076 | 0.1274025 | 0.23622050 | 2.5917374 | 20 | 9 30.4 | 19.6 |
| 199399 2006 $BT_{268}$ | 16.3 | $X$ | 35.15859 | 348.41515 | 54.29396 | 9.82064 | 0.0689954 | 0.26483229 | 2.4015341 | 20 | — | — |
| 199400 2006 $BZ_{273}$ | 17.1 | $X$ | 52.14645 | 12.91841 | 35.03787 | 1.90855 | 0.1790311 | 0.27019277 | 2.3696647 | 20 | — | — |
| 199401 2006 $BG_{274}$ | 17.4 | $X$ | 241.27295 | 195.00275 | 332.17847 | 1.07106 | 0.1287323 | 0.25370710 | 2.4712364 | 20 | 12 16.4 | 20.5 |
| 199402 2006 $BW_{274}$ | 15.5 | $X$ | 88.72850 | 325.84174 | 346.26885 | 10.92946 | 0.1724790 | 0.18008074 | 3.1056883 | 20 | 12 24.4 | 20.6 |
| 199403 2006 $CM_{9}$ | 15.4 | $X$ | 338.29799 | 251.20835 | 81.23069 | 14.65846 | 0.2173015 | 0.23542877 | 2.5975447 | 20 | 8 30.4 | 17.9 |
| 199404 2006 $CG_{14}$ | 17.1 | $X$ | 257.94480 | 137.12425 | 296.14765 | 1.12844 | 0.1224604 | 0.24566576 | 2.5248735 | 20 | 9 2.3 | 20.2 |
| 199405 2006 $CV_{17}$ | 15.9 | $X$ | 284.43632 | 132.47074 | 83.80559 | 3.15940 | 0.0203302 | 0.20509352 | 2.8477471 | 20 | 1 10.7 | 19.9 |
| 199406 2006 $CF_{19}$ | 17.1 | $X$ | 100.50232 | 297.50721 | 269.64904 | 2.65281 | 0.0327460 | 0.23860442 | 2.5744457 | 20 | 8 22.9 | 20.5 |
| 199407 2006 $CF_{21}$ | 15.6 | $X$ | 39.35477 | 350.52719 | 124.22469 | 23.73035 | 0.1408422 | 0.27595229 | 2.3365767 | 20 | 1 19.4 | 17.7 |
| 199408 2006 $CC_{27}$ | 16.3 | $X$ | 292.32311 | 134.05081 | 111.54935 | 2.81503 | 0.0539465 | 0.21329162 | 2.7743007 | 20 | 2 20.4 | 20.2 |
| 199409 2006 $CW_{29}$ | 16.1 | $X$ | 176.24596 | 82.88231 | 164.96565 | 6.07645 | 0.0845678 | 0.25861395 | 2.4398778 | 20 | — | — |
| 199410 2006 $CY_{34}$ | 16.4 | $X$ | 43.07965 | 147.66209 | 155.32689 | 6.27509 | 0.1957576 | 0.24593786 | 2.5230109 | 20 | 11 13.0 | 19.8 |
| 199411 2006 $CZ_{38}$ | 16.7 | $X$ | 22.22251 | 273.11390 | 169.45451 | 5.86311 | 0.0689992 | 0.26733899 | 2.3864986 | 20 | — | — |
| 199412 2006 $CR_{41}$ | 16.6 | $X$ | 120.37412 | 285.85703 | 284.36917 | 2.31141 | 0.0640668 | 0.23849921 | 2.5752027 | 20 | 9 23.7 | 20.3 |
| 199413 2006 $CV_{42}$ | 15.6 | $X$ | 115.33311 | 11.53285 | 307.25202 | 7.18727 | 0.3059376 | 0.25543680 | 2.4600678 | 20 | — | — |
| 199414 2006 $CV_{43}$ | 16.5 | $X$ | 338.62750 | 338.87468 | 137.04728 | 7.99322 | 0.2613429 | 0.26667442 | 2.3904618 | 20 | — | — |
| 199415 2006 $CY_{43}$ | 15.4 | $X$ | 109.19664 | 308.73104 | 156.03003 | 9.63343 | 0.1124197 | 0.21144523 | 2.7904278 | 20 | 5 2.7 | 19.5 |
| 199416 2006 $CJ_{53}$ | 16.0 | $X$ | 339.30247 | 5.10938 | 133.73870 | 2.93611 | 0.0123509 | 0.20284858 | 2.8687194 | 20 | — | — |
| 199417 2006 $CJ_{57}$ | 16.4 | $X$ | 128.08157 | 193.11939 | 172.02779 | 2.15132 | 0.0819784 | 0.20293296 | 2.8679241 | 20 | 1 15.2 | 20.4 |
| 199418 2006 $CU_{57}$ | 15.8 | $X$ | 12.62241 | 89.31179 | 121.52190 | 5.97984 | 0.0538839 | 0.21782058 | 2.7357103 | 20 | 4 29.4 | 19.3 |
| 199419 2006 $DG$ | 16.1 | $X$ | 125.66633 | 177.32524 | 38.57858 | 9.25167 | 0.0386889 | 0.24362834 | 2.5389307 | 20 | 10 10.3 | 19.5 |
| 199420 2006 $DQ_{1}$ | 17.1 | $X$ | 231.54579 | 22.55038 | 47.25964 | 3.51007 | 0.1061457 | 0.30670950 | 2.1776324 | 20 | 8 3.2 | 19.7 |
| 199421 2006 $DX_{1}$ | 17.7 | $X$ | 28.42744 | 51.09631 | 25.04608 | 2.03856 | 0.1606490 | 0.27067491 | 2.3668499 | 20 | — | — |
| 199422 2006 $DZ_{1}$ | 16.1 | $X$ | 210.16938 | 222.30501 | 142.17845 | 9.58008 | 0.0740539 | 0.22033108 | 2.7148898 | 20 | 4 14.4 | 20.2 |
| 199423 2006 $DR_{6}$ | 16.0 | $X$ | 107.22237 | 262.68241 | 143.77607 | 4.48105 | 0.1001299 | 0.20992481 | 2.8038851 | 20 | 2 11.7 | 19.6 |
| 199424 2006 $DA_{7}$ | 15.9 | $X$ | 172.15760 | 138.20197 | 347.41220 | 12.60613 | 0.1626430 | 0.23347414 | 2.6120222 | 20 | 8 6.6 | 20.2 |
| 199425 2006 $DD_{8}$ | 15.4 | $X$ | 180.26554 | 178.41420 | 23.15488 | 5.31651 | 0.1273211 | 0.17627341 | 3.1502488 | 20 | 11 5.3 | 20.5 |
| 199426 2006 $DE_{8}$ | 15.6 | $X$ | 306.85386 | 246.47224 | 138.65092 | 3.68409 | 0.0879628 | 0.23769653 | 2.5809969 | 20 | 9 16.0 | 18.6 |
| 199427 2006 $DC_{12}$ | 16.1 | $X$ | 45.27076 | 5.49989 | 170.07995 | 3.99734 | 0.0538279 | 0.21862552 | 2.7289912 | 20 | 4 28.9 | 19.6 |
| 199428 2006 $DS_{12}$ | 16.1 | $X$ | 129.63192 | 112.01554 | 2.11424 | 13.43850 | 0.1545732 | 0.22507029 | 2.6766440 | 20 | 6 5.4 | 20.5 |
| 199429 2006 $DJ_{13}$ | 16.8 | $X$ | 307.03773 | 215.75122 | 287.83939 | 4.07095 | 0.1639739 | 0.26458442 | 2.4030338 | 20 | — | — |
| 199430 2006 $DP_{19}$ | 16.3 | $X$ | 159.68041 | 263.42266 | 345.27037 | 8.35618 | 0.1007241 | 0.18503588 | 3.0499924 | 20 | 12 13.2 | 21.2 |
| 199431 2006 $DD_{20}$ | 17.2 | $X$ | 39.99412 | 359.15069 | 24.84686 | 2.57928 | 0.2146294 | 0.26367991 | 2.4085261 | 20 | — | — |
| 199432 2006 $DH_{22}$ | 15.6 | $X$ | 136.32751 | 193.75939 | 71.88715 | 2.46734 | 0.1400242 | 0.18064440 | 3.0992246 | 20 | 12 10.9 | 20.6 |
| 199433 2006 $DY_{22}$ | 16.1 | $X$ | 52.31764 | 140.43055 | 3.83448 | 4.85244 | 0.1001585 | 0.21431633 | 2.7654504 | 20 | 3 31.9 | 19.5 |
| 199434 2006 $DJ_{23}$ | 16.8 | $X$ | 290.96212 | 320.94346 | 10.05314 | 3.58886 | 0.1006058 | 0.22589191 | 2.6701496 | 20 | 5 31.7 | 20.1 |
| 199435 2006 $DT_{24}$ | 16.1 | $X$ | 273.83992 | 316.19241 | 357.58831 | 5.70912 | 0.0591102 | 0.21937479 | 2.7227738 | 20 | 4 20.7 | 20.0 |
| 199436 2006 $DV_{25}$ | 16.5 | $X$ | 218.89358 | 241.53050 | 149.34955 | 4.31856 | 0.1643499 | 0.22743933 | 2.6580246 | 20 | 5 19.4 | 20.8 |
| 199437 2006 $DN_{26}$ | 16.6 | $X$ | 9.61556 | 67.49480 | 203.34516 | 1.38829 | 0.0416824 | 0.23027306 | 2.6361733 | 20 | 7 14.4 | 19.8 |
| 199438 2006 $DR_{30}$ | 16.5 | $X$ | 163.50383 | 236.29651 | 170.99086 | 12.21767 | 0.1511652 | 0.21812237 | 2.7331864 | 20 | 4 20.3 | 21.0 |
| 199439 2006 $DN_{31}$ | 16.4 | $X$ | 226.61201 | 4.85733 | 234.27166 | 0.90922 | 0.2046636 | 0.19114168 | 2.9846892 | 20 | — | — |
| 199440 2006 $DU_{31}$ | 15.8 | $X$ | 67.82945 | 278.27863 | 349.63570 | 2.36582 | 0.0498922 | 0.16922464 | 3.2371313 | 20 | 9 23.7 | 20.3 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 199441 2006 $DY_{31}$ | 15.8 | $X$ | 144.12203 | 263.54237 | 17.98754 | 0.32719 | 0.1029526 | 0.18489651 | 3.0515249 | 20 | — | — |
| 199442 2006 $DL_{33}$ | 16.4 | $X$ | 313.09845 | 176.65350 | 160.93661 | 0.25164 | 0.0979459 | 0.22863049 | 2.6487844 | 20 | 7 16.2 | 19.5 |
| 199443 2006 $DN_{33}$ | 15.9 | $X$ | 273.76051 | 136.25410 | 39.22845 | 0.84699 | 0.0550798 | 0.19068168 | 2.9894874 | 20 | — | — |
| 199444 2006 $DM_{34}$ | 15.2 | $X$ | 96.94734 | 162.91589 | 177.41705 | 24.38580 | 0.2636471 | 0.18438940 | 3.0571172 | 20 | — | — |
| 199445 2006 $DU_{34}$ | 16.2 | $X$ | 227.14774 | 310.14828 | 298.02303 | 0.74761 | 0.0427956 | 0.19616019 | 2.9335633 | 20 | — | — |
| 199446 2006 $DM_{35}$ | 16.2 | $X$ | 40.11153 | 354.72660 | 166.29195 | 3.62214 | 0.0305669 | 0.21272748 | 2.7792033 | 20 | 3 30.9 | 19.9 |
| 199447 2006 $DG_{36}$ | 16.1 | $X$ | 235.84727 | 213.65002 | 173.22021 | 3.55291 | 0.0536487 | 0.22444136 | 2.6816419 | 20 | 6 11.2 | 19.8 |
| 199448 2006 $DQ_{37}$ | 15.5 | $X$ | 100.50072 | 93.52248 | 166.09357 | 6.81579 | 0.0395741 | 0.17240740 | 3.1971679 | 20 | 10 23.6 | 20.1 |
| 199449 2006 $DD_{38}$ | 16.2 | $X$ | 51.75668 | 119.02708 | 0.15105 | 5.05381 | 0.0105744 | 0.21114795 | 2.7930463 | 20 | 2 20.9 | 20.0 |
| 199450 2006 $DF_{38}$ | 16.3 | $X$ | 36.61086 | 145.77860 | 5.43698 | 3.85408 | 0.0392937 | 0.21421168 | 2.7663510 | 20 | 3 13.4 | 19.7 |
| 199451 2006 $DH_{38}$ | 17.5 | $X$ | 348.33180 | 302.79928 | 173.02116 | 1.23444 | 0.1402995 | 0.26843667 | 2.3799883 | 20 | — | — |
| 199452 2006 $DK_{38}$ | 15.9 | $X$ | 163.15716 | 221.63672 | 149.66162 | 11.65663 | 0.0179782 | 0.21338014 | 2.7735333 | 20 | 2 24.9 | 19.7 |
| 199453 2006 $DL_{39}$ | 15.9 | $X$ | 226.54811 | 244.68271 | 25.98738 | 2.16472 | 0.0444444 | 0.19880249 | 2.9075119 | 20 | 1 8.6 | 20.2 |
| 199454 2006 $DQ_{39}$ | 16.0 | $X$ | 59.28769 | 197.57917 | 20.07815 | 13.48795 | 0.1027231 | 0.23118809 | 2.6292129 | 20 | 7 28.8 | 19.7 |
| 199455 2006 $DY_{40}$ | 14.8 | $X$ | 269.68574 | 349.41579 | 166.28858 | 20.50958 | 0.0253706 | 0.18536005 | 3.0464353 | 20 | — | — |
| 199456 2006 $DF_{41}$ | 16.0 | $X$ | 122.98472 | 8.33017 | 136.03470 | 2.59706 | 0.0292793 | 0.22871803 | 2.6481086 | 20 | 6 27.7 | 19.6 |
| 199457 2006 $DN_{41}$ | 15.2 | $X$ | 351.34460 | 305.48622 | 271.43377 | 11.62029 | 0.1318258 | 0.21472313 | 2.7619565 | 20 | 3 21.4 | 18.7 |
| 199458 2006 $DJ_{45}$ | 16.1 | $X$ | 278.76883 | 180.36955 | 151.50982 | 6.47127 | 0.1376757 | 0.22672642 | 2.6635936 | 20 | 5 13.0 | 19.7 |
| 199459 2006 $DT_{46}$ | 16.2 | $X$ | 182.52956 | 54.51438 | 353.62528 | 5.82291 | 0.0173130 | 0.21930407 | 2.7233591 | 20 | 5 3.4 | 20.0 |
| 199460 2006 $DB_{47}$ | 15.7 | $X$ | 152.29913 | 174.42639 | 139.26053 | 0.85531 | 0.1460396 | 0.19124180 | 2.9836474 | 20 | — | — |
| 199461 2006 $DP_{52}$ | 15.6 | $X$ | 145.44161 | 321.97900 | 226.45611 | 15.81712 | 0.0868250 | 0.24132089 | 2.5550894 | 20 | 9 21.5 | 19.6 |
| 199462 2006 $DZ_{52}$ | 16.5 | $X$ | 167.89834 | 192.31684 | 269.25965 | 1.44176 | 0.1205755 | 0.22927180 | 2.6438428 | 20 | 6 28.7 | 20.7 |
| 199463 2006 $DX_{57}$ | 16.1 | $X$ | 252.13115 | 125.59251 | 189.30273 | 2.52831 | 0.0597067 | 0.21317847 | 2.7752822 | 20 | 3 28.3 | 20.0 |
| 199464 2006 $DY_{57}$ | 16.9 | $X$ | 233.17554 | 296.40682 | 182.31054 | 4.91941 | 0.1213709 | 0.24423441 | 2.5347287 | 20 | 10 1.9 | 20.2 |
| 199465 2006 $DX_{58}$ | 15.7 | $X$ | 216.84551 | 102.46303 | 200.94202 | 1.44254 | 0.0468870 | 0.20238628 | 2.8730863 | 20 | 2 4.8 | 19.8 |
| 199466 2006 $DC_{59}$ | 16.0 | $X$ | 269.92608 | 304.57414 | 271.78743 | 0.87306 | 0.0549676 | 0.19717241 | 2.9235148 | 20 | — | — |
| 199467 2006 $DW_{59}$ | 15.8 | $X$ | 134.79090 | 267.62971 | 181.35383 | 12.90004 | 0.1031364 | 0.21828639 | 2.7318171 | 20 | 5 9.8 | 20.0 |
| 199468 2006 $DF_{60}$ | 16.0 | $X$ | 188.72675 | 196.42592 | 188.23093 | 5.93217 | 0.0770653 | 0.21398025 | 2.7683453 | 20 | 4 13.8 | 20.0 |
| 199469 2006 $DR_{60}$ | 17.9 | $X$ | 344.61980 | 288.30434 | 186.08452 | 3.82868 | 0.1732770 | 0.26430223 | 2.4047439 | 20 | — | — |
| 199470 2006 $DL_{62}$ | 17.5 | $X$ | 34.98707 | 278.18410 | 216.64652 | 3.23841 | 0.2555050 | 0.28013603 | 2.3132544 | 20 | 2 10.3 | 18.7 |
| 199471 2006 $DR_{64}$ | 15.6 | $X$ | 42.54290 | 209.42527 | 351.20251 | 12.71092 | 0.0871954 | 0.22335872 | 2.6903004 | 20 | 5 28.7 | 19.2 |
| 199472 2006 $DT_{64}$ | 15.8 | $X$ | 234.53598 | 182.14743 | 134.09232 | 5.11492 | 0.0591059 | 0.21357290 | 2.7718643 | 20 | 3 11.2 | 19.9 |
| 199473 2006 $DW_{64}$ | 15.4 | $X$ | 122.53163 | 151.95889 | 129.49132 | 10.17994 | 0.0701800 | 0.18443855 | 3.0565740 | 20 | 12 15.9 | 20.2 |
| 199474 2006 $DD_{66}$ | 15.3 | $X$ | 310.18938 | 194.49586 | 56.96835 | 14.49340 | 0.1211132 | 0.21114179 | 2.7931006 | 20 | 3 20.1 | 19.2 |
| 199475 2006 $DQ_{66}$ | 15.7 | $X$ | 352.99537 | 4.14576 | 176.21594 | 15.49742 | 0.1332404 | 0.20921518 | 2.8102218 | 20 | 2 8.5 | 19.2 |
| 199476 2006 $DS_{66}$ | 17.4 | $X$ | 322.34163 | 31.68302 | 84.22246 | 3.10395 | 0.1573471 | 0.26375902 | 2.4080445 | 20 | — | — |
| 199477 2006 $DV_{66}$ | 15.8 | $X$ | 31.93814 | 16.42708 | 180.74645 | 12.99077 | 0.1283049 | 0.21793204 | 2.7347774 | 20 | 5 16.8 | 19.1 |
| 199478 2006 $DE_{73}$ | 16.7 | $X$ | 3.02734 | 92.88626 | 55.56648 | 3.38021 | 0.1449121 | 0.27375109 | 2.3490854 | 20 | — | — |
| 199479 2006 $DM_{73}$ | 15.6 | $X$ | 303.20268 | 17.74414 | 15.01431 | 15.67026 | 0.1343132 | 0.23668942 | 2.5883132 | 20 | 9 19.2 | 18.4 |
| 199480 2006 $DY_{73}$ | 16.8 | $X$ | 187.48603 | 123.41326 | 351.93776 | 4.36586 | 0.1873445 | 0.23649122 | 2.5897591 | 20 | 8 4.6 | 21.0 |
| 199481 2006 $DO_{74}$ | 16.3 | $X$ | 171.78597 | 240.55994 | 125.18631 | 4.23451 | 0.1067035 | 0.21354669 | 2.7720910 | 20 | 3 5.4 | 20.5 |
| 199482 2006 $DE_{76}$ | 17.2 | $X$ | 43.38498 | 40.10511 | 12.46329 | 3.95730 | 0.1786936 | 0.26775799 | 2.3840083 | 20 | — | — |
| 199483 2006 $DY_{76}$ | 15.2 | $X$ | 129.34772 | 238.54675 | 61.77771 | 2.35431 | 0.1577787 | 0.18602504 | 3.0391709 | 20 | — | — |
| 199484 2006 $DA_{77}$ | 16.4 | $X$ | 304.97320 | 222.86060 | 154.23522 | 9.84278 | 0.1758913 | 0.23978218 | 2.5660086 | 20 | 8 19.8 | 18.8 |
| 199485 2006 $DH_{79}$ | 16.3 | $X$ | 59.01046 | 220.18395 | 189.06730 | 1.83247 | 0.0271184 | 0.19667664 | 2.9284256 | 20 | — | — |
| 199486 2006 $DP_{79}$ | 16.6 | $X$ | 22.90803 | 283.62458 | 176.08193 | 6.82617 | 0.0545599 | 0.26933299 | 2.3747051 | 20 | — | — |
| 199487 2006 $DY_{81}$ | 16.1 | $X$ | 257.43464 | 325.73936 | 169.72710 | 0.59514 | 0.0116732 | 0.18127905 | 3.0919869 | 20 | 11 26.4 | 20.5 |
| 199488 2006 $DB_{83}$ | 16.3 | $X$ | 204.49980 | 328.87141 | 343.12781 | 1.03658 | 0.1195315 | 0.20271121 | 2.8700152 | 20 | 2 2.2 | 20.7 |
| 199489 2006 $DO_{83}$ | 17.6 | $X$ | 65.77998 | 157.85999 | 251.08192 | 1.23395 | 0.2116250 | 0.27070160 | 2.3666943 | 20 | — | — |
| 199490 2006 $DT_{84}$ | 16.3 | $X$ | 169.03871 | 45.34387 | 319.60172 | 3.13171 | 0.1146776 | 0.20930433 | 2.8094237 | 20 | 2 29.6 | 20.7 |
| 199491 2006 $DD_{85}$ | 16.1 | $X$ | 206.65636 | 167.93797 | 181.71724 | 4.70819 | 0.0777658 | 0.21282389 | 2.7783639 | 20 | 3 19.7 | 20.3 |
| 199492 2006 $DX_{87}$ | 15.9 | $X$ | 96.25575 | 263.39429 | 61.89445 | 1.08080 | 0.1343264 | 0.18372046 | 3.0645334 | 20 | — | — |
| 199493 2006 $DG_{89}$ | 16.7 | $X$ | 351.66638 | 202.32243 | 221.21923 | 0.51358 | 0.0315166 | 0.18569049 | 3.0428201 | 20 | 12 27.8 | 20.6 |
| 199494 2006 $DR_{91}$ | 16.3 | $X$ | 308.80253 | 162.30039 | 48.50241 | 2.70796 | 0.0079029 | 0.20365412 | 2.8611498 | 20 | 2 5.7 | 20.2 |
| 199495 2006 $DS_{92}$ | 15.7 | $X$ | 219.95767 | 155.89966 | 27.38766 | 1.03210 | 0.1299928 | 0.18141820 | 3.0904056 | 20 | 11 23.9 | 20.3 |
| 199496 2006 $DA_{94}$ | 15.8 | $X$ | 47.23658 | 290.43627 | 177.59055 | 1.95102 | 0.0224360 | 0.20270518 | 2.8700721 | 20 | 2 1.3 | 19.5 |
| 199497 2006 $DE_{94}$ | 16.4 | $X$ | 253.91173 | 48.56470 | 178.75932 | 2.75486 | 0.0407930 | 0.19486775 | 2.9465201 | 20 | — | — |
| 199498 2006 $DX_{95}$ | 16.3 | $X$ | 48.68626 | 82.76862 | 28.96796 | 0.74819 | 0.0605979 | 0.20415966 | 2.8564246 | 20 | 2 11.1 | 19.7 |
| 199499 2006 $DN_{96}$ | 15.4 | $X$ | 140.48664 | 320.61802 | 1.81043 | 10.04643 | 0.0978845 | 0.19001411 | 2.9964853 | 20 | — | — |
| 199500 2006 $DD_{103}$ | 16.5 | $X$ | 46.78772 | 270.17033 | 0.58940 | 2.60402 | 0.0345133 | 0.23551762 | 2.5968914 | 20 | 9 7.5 | 19.9 |
| 199501 2006 $DG_{104}$ | 16.4 | $X$ | 291.72927 | 164.70236 | 214.50208 | 2.21477 | 0.0976778 | 0.23507214 | 2.6001712 | 20 | 8 9.9 | 19.4 |
| 199502 2006 $DH_{110}$ | 15.4 | $X$ | 177.72645 | 236.00615 | 13.05094 | 6.60899 | 0.1417382 | 0.18423783 | 3.0587936 | 20 | 12 29.3 | 20.3 |
| 199503 2006 $DZ_{110}$ | 16.3 | $X$ | 143.65530 | 331.56661 | 359.12406 | 10.91752 | 0.0364764 | 0.19513580 | 2.9438211 | 20 | — | — |
| 199504 2006 $DT_{112}$ | 17.5 | $X$ | 212.96627 | 132.03867 | 298.76311 | 1.38497 | 0.1434051 | 0.23286703 | 2.6165601 | 20 | 7 4.1 | 21.4 |
| 199505 2006 $DT_{115}$ | 16.7 | $X$ | 171.14990 | 344.97567 | 69.49180 | 2.59478 | 0.0225965 | 0.21652775 | 2.7465890 | 20 | 4 30.3 | 20.6 |
| 199506 2006 $DF_{117}$ | 16.1 | $X$ | 281.62165 | 108.09628 | 162.34398 | 6.83218 | 0.0235478 | 0.20862146 | 2.8155510 | 20 | 3 13.9 | 19.8 |
| 199507 2006 $DQ_{118}$ | 16.0 | $X$ | 176.73249 | 19.53215 | 13.97298 | 2.30818 | 0.0398914 | 0.21489736 | 2.7604634 | 20 | 4 9.9 | 20.0 |
| 199508 2006 $DJ_{122}$ | 15.1 | $X$ | 191.42871 | 192.96514 | 76.17624 | 10.80541 | 0.0977400 | 0.19109148 | 2.9852119 | 20 | — | — |
| 199509 2006 $DV_{122}$ | 15.1 | $X$ | 280.95864 | 205.77988 | 42.86708 | 15.94233 | 0.0919954 | 0.20517336 | 2.8470083 | 20 | 2 12.7 | 19.5 |
| 199510 2006 $DW_{122}$ | 15.9 | $X$ | 80.73338 | 338.24687 | 168.72500 | 8.40679 | 0.1506822 | 0.21770217 | 2.7367022 | 20 | 5 26.4 | 19.7 |
| 199511 2006 $DH_{124}$ | 16.2 | $X$ | 92.80503 | 120.00607 | 291.09561 | 1.11247 | 0.0523575 | 0.20465780 | 2.8517876 | 20 | 1 24.2 | 19.9 |
| 199512 2006 $DR_{124}$ | 16.7 | $X$ | 232.91199 | 265.96240 | 24.89270 | 2.27161 | 0.0342225 | 0.20391449 | 2.8587136 | 20 | 2 9.4 | 20.8 |
| 199513 2006 $DU_{127}$ | 16.4 | $X$ | 326.86570 | 259.28814 | 10.69779 | 2.18311 | 0.1327362 | 0.22227628 | 2.6990274 | 20 | 4 28.1 | 19.5 |
| 199514 2006 $DW_{134}$ | 16.1 | $X$ | 112.64503 | 88.23831 | 347.53780 | 5.13430 | 0.0340965 | 0.21437822 | 2.7649181 | 20 | 3 16.1 | 19.8 |
| 199515 2006 $DF_{135}$ | 16.2 | $X$ | 127.32247 | 59.65144 | 350.55239 | 3.57202 | 0.1029145 | 0.21340048 | 2.7733571 | 20 | 3 11.2 | 20.3 |
| 199516 2006 $DM_{137}$ | 17.2 | $X$ | 11.15102 | 328.23291 | 99.09783 | 3.44736 | 0.1726175 | 0.26386498 | 2.4073998 | 20 | — | — |
| 199517 2006 $DJ_{139}$ | 16.1 | $X$ | 330.68607 | 295.50108 | 37.81854 | 6.00381 | 0.0937904 | 0.23306022 | 2.6151139 | 20 | 8 13.5 | 19.1 |
| 199518 2006 $DQ_{141}$ | 16.1 | $X$ | 196.74208 | 288.57349 | 90.35373 | 3.08060 | 0.0948754 | 0.21788794 | 2.7351464 | 20 | 4 15.5 | 20.2 |
| 199519 2006 $DH_{143}$ | 16.1 | $X$ | 1.94314 | 152.65473 | 353.25538 | 1.47930 | 0.0084548 | 0.20439596 | 2.8542226 | 20 | 1 22.0 | 19.8 |
| 199520 2006 $DT_{143}$ | 15.9 | $X$ | 338.49707 | 108.66200 | 148.50261 | 3.64498 | 0.0413234 | 0.22025211 | 2.7155387 | 20 | 5 10.4 | 19.4 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 199521 2006 $DX_{143}$ | 15.9 | $X$ | 269.24190 | 301.36575 | 353.06944 | 4.33030 | 0.0474332 | 0.21418196 | 2.7666069 | 20 | 3 24.0 | 19.6 |
| 199522 2006 $DX_{147}$ | 16.2 | $X$ | 73.34753 | 79.05024 | 326.14064 | 0.93022 | 0.0865080 | 0.19821138 | 2.9132896 | 20 | — | — |
| 199523 2006 $DM_{150}$ | 16.2 | $X$ | 221.10168 | 168.10341 | 314.77485 | 3.59402 | 0.0762178 | 0.24187975 | 2.5511523 | 20 | 9 26.4 | 19.8 |
| 199524 2006 $DV_{152}$ | 16.3 | $X$ | 174.03802 | 156.27149 | 246.22257 | 1.02907 | 0.0820493 | 0.21563974 | 2.7541242 | 20 | 4 19.4 | 20.5 |
| 199525 2006 $DJ_{156}$ | 16.5 | $X$ | 256.83532 | 244.89088 | 128.76862 | 2.40184 | 0.1171047 | 0.22850581 | 2.6497479 | 20 | 6 11.2 | 20.0 |
| 199526 2006 $DC_{164}$ | 17.5 | $X$ | 310.44136 | 203.37118 | 269.41261 | 1.25595 | 0.1555762 | 0.25962852 | 2.4335174 | 20 | — | — |
| 199527 2006 $DT_{179}$ | 15.8 | $X$ | 110.96901 | 64.53635 | 9.83081 | 3.95824 | 0.0861940 | 0.21254472 | 2.7807962 | 20 | 3 20.6 | 19.7 |
| 199528 2006 $DF_{188}$ | 15.7 | $X$ | 89.45090 | 222.53347 | 116.55690 | 3.57954 | 0.2543455 | 0.18265116 | 3.0764824 | 20 | — | — |
| 199529 2006 $DB_{189}$ | 15.7 | $X$ | 136.39428 | 261.29247 | 10.07648 | 10.32949 | 0.0348485 | 0.18152698 | 3.0891708 | 20 | 12 15.4 | 20.4 |
| 199530 2006 $DJ_{190}$ | 16.7 | $X$ | 253.21250 | 325.94998 | 140.55719 | 4.28980 | 0.1618815 | 0.24561622 | 2.5252130 | 20 | 10 7.4 | 20.0 |
| 199531 2006 $DV_{191}$ | 16.1 | $X$ | 239.74369 | 35.75193 | 48.86630 | 4.81475 | 0.0924713 | 0.23678725 | 2.5876002 | 20 | 8 31.0 | 19.6 |
| 199532 2006 $DX_{196}$ | 15.7 | $X$ | 156.43151 | 226.72994 | 291.14548 | 12.06239 | 0.0951958 | 0.23660744 | 2.5889110 | 20 | 8 24.2 | 19.8 |
| 199533 2006 $DN_{197}$ | 15.8 | $X$ | 111.81744 | 294.28323 | 212.32154 | 13.59557 | 0.0310681 | 0.22497531 | 2.6773972 | 20 | 6 15.7 | 19.7 |
| 199534 2006 $DM_{198}$ | 15.6 | $X$ | 152.57909 | 122.86135 | 116.82883 | 2.64238 | 0.1156417 | 0.18077320 | 3.0977523 | 20 | 11 26.2 | 20.6 |
| 199535 2006 $DU_{199}$ | 15.4 | $X$ | 10.04272 | 40.28248 | 234.71282 | 10.83834 | 0.0492802 | 0.23204462 | 2.6227388 | 20 | 7 18.7 | 18.9 |
| 199536 2006 $DT_{201}$ | 14.7 | $X$ | 109.68676 | 110.68818 | 168.73488 | 22.58305 | 0.0294564 | 0.18037622 | 3.1022957 | 20 | 11 28.7 | 19.6 |
| 199537 2006 $DY_{201}$ | 15.1 | $X$ | 160.03052 | 247.00436 | 351.85143 | 15.28913 | 0.1392072 | 0.18447966 | 3.0561199 | 20 | 11 28.1 | 20.3 |
| 199538 2006 $DE_{203}$ | 15.7 | $X$ | 266.85076 | 214.39512 | 57.92680 | 4.98024 | 0.0337576 | 0.21092979 | 2.7949718 | 20 | 2 27.4 | 19.6 |
| 199539 2006 $DN_{203}$ | 16.5 | $X$ | 358.84210 | 248.75118 | 219.74616 | 6.35457 | 0.0531413 | 0.26793604 | 2.3829520 | 20 | — | — |
| 199540 2006 $DD_{206}$ | 16.2 | $X$ | 241.52852 | 193.32746 | 185.66286 | 5.62313 | 0.0477372 | 0.22590405 | 2.6700539 | 20 | 6 8.8 | 20.0 |
| 199541 2006 $DV_{206}$ | 15.8 | $X$ | 251.10709 | 36.38742 | 345.18614 | 6.42217 | 0.2041890 | 0.22766043 | 2.6563034 | 20 | 6 2.6 | 19.9 |
| 199542 2006 $DM_{208}$ | 16.1 | $X$ | 177.33854 | 121.10599 | 295.04508 | 1.31154 | 0.0561242 | 0.21790097 | 2.7350374 | 20 | 5 9.8 | 20.1 |
| 199543 2006 $DL_{210}$ | 15.9 | $X$ | 322.33954 | 220.11682 | 1.03737 | 4.52004 | 0.1299559 | 0.20640002 | 2.8357171 | 20 | 2 19.2 | 19.6 |
| 199544 2006 $DG_{212}$ | 16.2 | $X$ | 189.34889 | 78.74989 | 332.20669 | 2.74908 | 0.0999059 | 0.21992395 | 2.7182394 | 20 | 5 15.9 | 20.4 |
| 199545 2006 $DB_{215}$ | 16.4 | $X$ | 75.62724 | 192.08320 | 245.44328 | 1.08405 | 0.0458861 | 0.20230683 | 2.8738385 | 20 | 2 2.9 | 20.1 |
| 199546 2006 $DT_{216}$ | 16.7 | $X$ | 271.54196 | 352.68793 | 5.14975 | 6.16257 | 0.0562333 | 0.22557288 | 2.6726666 | 20 | 6 17.8 | 20.4 |
| 199547 2006 $ET_{7}$ | 17.2 | $X$ | 327.69684 | 248.73242 | 162.27342 | 3.38501 | 0.1957404 | 0.25171031 | 2.4842886 | 20 | 12 6.5 | 19.3 |
| 199548 2006 $EN_{10}$ | 16.0 | $X$ | 238.55288 | 207.73496 | 147.16129 | 4.09402 | 0.0944721 | 0.21906619 | 2.7253303 | 20 | 4 30.2 | 20.1 |
| 199549 2006 $EQ_{11}$ | 16.9 | $X$ | 318.13348 | 89.45560 | 153.18605 | 3.55848 | 0.0076041 | 0.21269176 | 2.7795144 | 20 | 3 27.6 | 20.6 |
| 199550 2006 $EE_{15}$ | 16.1 | $X$ | 242.23067 | 237.04370 | 92.07868 | 0.53327 | 0.0714608 | 0.21356836 | 2.7719035 | 20 | 4 2.8 | 19.9 |
| 199551 2006 $EE_{17}$ | 16.0 | $X$ | 167.04910 | 271.64038 | 74.95991 | 2.97950 | 0.0671873 | 0.20153266 | 2.8811935 | 20 | 2 4.9 | 20.2 |
| 199552 2006 $EC_{18}$ | 16.0 | $X$ | 241.84361 | 148.75166 | 70.41637 | 2.99443 | 0.0977428 | 0.19036391 | 2.9928134 | 20 | — | — |
| 199553 2006 $EU_{18}$ | 16.4 | $X$ | 316.20234 | 343.63978 | 352.97783 | 1.80683 | 0.0907842 | 0.22882527 | 2.6472811 | 20 | 7 21.4 | 19.3 |
| 199554 2006 $EA_{20}$ | 16.1 | $X$ | 205.49502 | 136.14112 | 254.49049 | 4.68959 | 0.0586433 | 0.21859291 | 2.7292627 | 20 | 5 9.0 | 20.1 |
| 199555 2006 $EV_{24}$ | 16.2 | $X$ | 96.90413 | 137.22432 | 162.28040 | 5.49582 | 0.1566922 | 0.18109315 | 3.0941025 | 20 | 12 16.1 | 21.2 |
| 199556 2006 $EF_{27}$ | 15.0 | $X$ | 145.44624 | 297.75377 | 260.64520 | 3.76830 | 0.1127149 | 0.17095377 | 3.2152661 | 20 | 9 28.6 | 20.0 |
| 199557 2006 $EQ_{34}$ | 17.0 | $X$ | 299.33487 | 78.01811 | 19.52062 | 6.44686 | 0.0875099 | 0.25167487 | 2.4845218 | 20 | 12 16.5 | 19.9 |
| 199558 2006 $EV_{34}$ | 15.4 | $X$ | 112.88287 | 269.42478 | 53.52401 | 3.56997 | 0.1457566 | 0.18482198 | 3.0523451 | 20 | — | — |
| 199559 2006 $EZ_{34}$ | 16.0 | $X$ | 194.00759 | 218.76971 | 124.17742 | 3.29146 | 0.0704443 | 0.20640363 | 2.8356839 | 20 | 2 28.7 | 20.3 |
| 199560 2006 $EB_{40}$ | 16.2 | $X$ | 239.61812 | 173.58668 | 184.58918 | 11.68580 | 0.1448376 | 0.22053209 | 2.7132399 | 20 | 5 1.2 | 20.4 |
| 199561 2006 $EO_{40}$ | 15.8 | $X$ | 159.62495 | 64.12380 | 335.08044 | 6.18989 | 0.0537075 | 0.21341438 | 2.7732366 | 20 | 3 27.1 | 19.8 |
| 199562 2006 $EO_{41}$ | 16.2 | $X$ | 79.76872 | 287.00907 | 304.44783 | 4.17826 | 0.0812676 | 0.23152529 | 2.6266594 | 20 | 9 3.4 | 19.8 |
| 199563 2006 $EP_{41}$ | 15.6 | $X$ | 356.09576 | 17.72770 | 195.85588 | 13.25034 | 0.1242619 | 0.21173732 | 2.7878609 | 20 | 4 1.7 | 18.5 |
| 199564 2006 $ES_{41}$ | 14.9 | $X$ | 183.10696 | 19.96230 | 205.55222 | 13.71315 | 0.1312055 | 0.17958823 | 3.1113639 | 20 | 12 7.0 | 19.9 |
| 199565 2006 $EH_{43}$ | 16.8 | $X$ | 236.06671 | 200.47811 | 153.28539 | 3.24392 | 0.1673273 | 0.22253853 | 2.6969066 | 20 | 4 19.3 | 21.1 |
| 199566 2006 $EG_{47}$ | 16.2 | $X$ | 333.17747 | 213.01581 | 92.91219 | 3.23523 | 0.0739198 | 0.22901114 | 2.6458485 | 20 | 7 6.5 | 19.3 |
| 199567 2006 $EA_{48}$ | 15.2 | $X$ | 74.48763 | 165.47484 | 117.06925 | 7.70135 | 0.1647669 | 0.17157769 | 3.2074669 | 20 | 11 6.6 | 20.1 |
| 199568 2006 $EF_{48}$ | 16.0 | $X$ | 247.48825 | 214.06899 | 124.87371 | 5.95910 | 0.1847401 | 0.21911743 | 2.7249054 | 20 | 4 12.2 | 20.3 |
| 199569 2006 $ED_{57}$ | 15.8 | $X$ | 129.82932 | 80.29467 | 185.71458 | 8.99929 | 0.1287304 | 0.17936293 | 3.1139688 | 20 | 12 6.0 | 20.9 |
| 199570 2006 $EA_{58}$ | 16.6 | $X$ | 31.18416 | 239.95318 | 192.87665 | 6.24102 | 0.2225054 | 0.26920141 | 2.3754788 | 20 | — | — |
| 199571 2006 $EK_{62}$ | 15.7 | $X$ | 350.35154 | 19.78706 | 201.06377 | 7.63262 | 0.1538935 | 0.21164379 | 2.7886822 | 20 | 3 29.7 | 18.8 |
| 199572 2006 $EN_{65}$ | 16.4 | $X$ | 117.73920 | 340.47689 | 208.00550 | 3.71381 | 0.0713975 | 0.23105786 | 2.6302007 | 20 | 8 22.6 | 20.1 |
| 199573 2006 $EE_{67}$ | 16.0 | $X$ | 70.91868 | 154.79910 | 153.61528 | 10.14999 | 0.0662892 | 0.17794970 | 3.1304340 | 20 | 11 22.0 | 20.6 |
| 199574 Webbert | 17.7 | $X$ | 285.20240 | 272.33167 | 142.39981 | 0.12123 | 0.0532354 | 0.24438124 | 2.5337133 | 20 | 9 27.6 | 20.9 |
| 199575 2006 $EU_{72}$ | 16.2 | $X$ | 140.45757 | 129.21339 | 184.39325 | 24.63604 | 0.0671691 | 0.19086157 | 2.9876087 | 20 | — | — |
| 199576 2006 $EZ_{72}$ | 16.3 | $X$ | 158.05557 | 47.45301 | 11.56330 | 5.10187 | 0.1157940 | 0.21806615 | 2.7336561 | 20 | 4 24.1 | 20.4 |
| 199577 2006 $FH_{1}$ | 17.1 | $X$ | 144.42015 | 157.03301 | 50.77174 | 0.90136 | 0.0569823 | 0.24089967 | 2.5580670 | 20 | 10 19.9 | 20.6 |
| 199578 2006 $FQ_{2}$ | 15.6 | $X$ | 101.98349 | 286.55004 | 53.60513 | 5.38098 | 0.1487615 | 0.18397685 | 3.0616857 | 20 | — | — |
| 199579 2006 $FV_{2}$ | 17.0 | $X$ | 219.07260 | 68.52284 | 59.12897 | 1.28400 | 0.1160452 | 0.24023488 | 2.5627840 | 20 | 9 27.2 | 20.7 |
| 199580 2006 $FD_{3}$ | 16.3 | $X$ | 250.53439 | 140.82779 | 162.24629 | 2.20124 | 0.0428567 | 0.20706135 | 2.8296759 | 20 | 3 14.2 | 20.2 |
| 199581 2006 $FM_{8}$ | 16.6 | $X$ | 248.79343 | 90.70140 | 28.20069 | 2.56776 | 0.1216102 | 0.24384749 | 2.5374093 | 20 | 10 22.2 | 19.7 |
| 199582 2006 $FT_{8}$ | 15.9 | $X$ | 306.23088 | 170.66436 | 36.72592 | 2.35332 | 0.0467787 | 0.19904897 | 2.9051112 | 20 | 1 24.3 | 19.8 |
| 199583 2006 $FO_{10}$ | 15.5 | $X$ | 56.44370 | 324.18805 | 192.93259 | 14.13253 | 0.2232765 | 0.21682775 | 2.7440550 | 20 | 5 16.4 | 18.8 |
| 199584 2006 $FS_{12}$ | 15.3 | $X$ | 86.45957 | 316.53736 | 30.32228 | 10.59679 | 0.1529764 | 0.18250161 | 3.0781627 | 20 | — | — |
| 199585 2006 $FP_{13}$ | 15.0 | $X$ | 92.03978 | 144.78031 | 183.36187 | 9.30474 | 0.1072269 | 0.17967210 | 3.1103955 | 20 | — | — |
| 199586 2006 $FH_{14}$ | 15.8 | $X$ | 150.89428 | 80.84860 | 187.17511 | 10.37481 | 0.1096020 | 0.17947147 | 3.1127131 | 20 | 12 26.0 | 20.9 |
| 199587 2006 $FD_{16}$ | 16.0 | $X$ | 24.41964 | 215.24772 | 2.13872 | 4.51473 | 0.0506507 | 0.21867227 | 2.7286023 | 20 | 5 22.3 | 19.4 |
| 199588 2006 $FO_{16}$ | 15.7 | $X$ | 151.74960 | 113.62083 | 248.85428 | 1.18133 | 0.0553327 | 0.20221958 | 2.8746650 | 20 | 2 4.8 | 19.8 |
| 199589 2006 $FV_{17}$ | 16.1 | $X$ | 204.37092 | 325.64910 | 176.19362 | 4.37415 | 0.0777332 | 0.23759613 | 2.5817240 | 20 | 10 2.4 | 19.7 |
| 199590 2006 $FC_{18}$ | 15.4 | $X$ | 173.01577 | 87.69563 | 193.94248 | 10.06094 | 0.0660050 | 0.18576224 | 3.0420365 | 20 | — | — |
| 199591 2006 $FJ_{19}$ | 15.2 | $X$ | 59.81024 | 334.89728 | 26.95343 | 10.55072 | 0.0858335 | 0.17990903 | 3.1076641 | 20 | — | — |
| 199592 2006 $FU_{19}$ | 16.5 | $X$ | 286.59427 | 219.05104 | 33.07861 | 2.42103 | 0.0116053 | 0.20311253 | 2.8662335 | 20 | 2 28.9 | 20.5 |
| 199593 2006 $FB_{20}$ | 16.1 | $X$ | 52.70381 | 296.54937 | 188.79378 | 1.76189 | 0.0131487 | 0.20293058 | 2.8679465 | 20 | 2 29.4 | 20.1 |
| 199594 2006 $FC_{20}$ | 16.5 | $X$ | 352.68902 | 79.07963 | 194.81452 | 1.79501 | 0.0284832 | 0.21912772 | 2.7248201 | 20 | 6 22.6 | 19.9 |
| 199595 2006 $FH_{20}$ | 16.2 | $X$ | 194.11348 | 187.84288 | 45.22324 | 2.19542 | 0.0251003 | 0.18038984 | 3.1021395 | 20 | — | — |
| 199596 2006 $FD_{23}$ | 16.4 | $X$ | 122.42995 | 249.64544 | 163.96515 | 4.90251 | 0.2027279 | 0.21113531 | 2.7931578 | 20 | 3 22.5 | 20.5 |
| 199597 2006 $FK_{23}$ | 16.1 | $X$ | 126.95835 | 155.49536 | 41.18334 | 4.02399 | 0.1000521 | 0.23283213 | 2.6168216 | 20 | 9 18.1 | 19.9 |
| 199598 2006 $FV_{23}$ | 16.3 | $X$ | 55.51433 | 91.88021 | 158.21695 | 2.59495 | 0.0492330 | 0.22803353 | 2.6534052 | 20 | 8 23.1 | 19.7 |
| 199599 2006 $FX_{23}$ | 16.7 | $X$ | 231.53874 | 75.32582 | 45.19217 | 3.45572 | 0.1177827 | 0.24052972 | 2.5606893 | 20 | 10 3.2 | 20.1 |
| 199600 2006 $FS_{24}$ | 16.2 | $X$ | 330.06984 | 211.84456 | 54.70753 | 5.13501 | 0.0258631 | 0.21476764 | 2.7615749 | 20 | 5 11.3 | 19.6 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 199601 2006 $FU_{24}$ | 16.7 | $X$ | 177.83577 | 309.99285 | 183.66447 | 3.79585 | 0.1493128 | 0.23286041 | 2.6166097 | 20 | 8 17.8 | 21.0 |
| 199602 2006 $FH_{25}$ | 15.9 | $X$ | 192.40997 | 42.14813 | 222.79464 | 0.35313 | 0.0893422 | 0.18677538 | 3.0310258 | 20 | — | — |
| 199603 2006 $FN_{25}$ | 15.9 | $X$ | 75.72424 | 323.25526 | 196.65729 | 13.68813 | 0.0573728 | 0.21579799 | 2.7527775 | 20 | 5 22.2 | 19.7 |
| 199604 2006 $FN_{26}$ | 15.1 | $X$ | 215.84885 | 109.98130 | 100.72205 | 3.95918 | 0.1707996 | 0.18234072 | 3.0799732 | 20 | 12 17.7 | 19.6 |
| 199605 2006 $FG_{34}$ | 16.0 | $X$ | 60.85812 | 264.69671 | 325.18169 | 5.69584 | 0.1760870 | 0.22493215 | 2.6777397 | 20 | 8 22.5 | 19.4 |
| 199606 2006 $FL_{34}$ | 15.0 | $X$ | 171.66490 | 217.87486 | 32.21139 | 11.94645 | 0.0963511 | 0.17885700 | 3.1198384 | 20 | 12 25.7 | 20.0 |
| 199607 2006 $FP_{34}$ | 15.8 | $X$ | 178.68471 | 130.81973 | 352.34684 | 13.56520 | 0.1654626 | 0.23156190 | 2.6263825 | 20 | 8 10.1 | 20.2 |
| 199608 2006 $FK_{35}$ | 15.3 | $X$ | 29.65490 | 76.70138 | 46.69401 | 10.91047 | 0.0587345 | 0.20142511 | 2.8822190 | 20 | 2 2.8 | 19.2 |
| 199609 2006 $FR_{36}$ | 15.9 | $X$ | 49.31092 | 159.41831 | 2.43797 | 8.91651 | 0.1109854 | 0.21524563 | 2.7574850 | 20 | 4 19.3 | 19.3 |
| 199610 2006 $FJ_{37}$ | 15.1 | $X$ | 208.65782 | 231.60066 | 350.02877 | 15.88200 | 0.0328553 | 0.18328155 | 3.0694240 | 20 | — | — |
| 199611 2006 $FS_{38}$ | 15.3 | $X$ | 116.44444 | 128.71746 | 144.32758 | 6.06845 | 0.1246686 | 0.17511457 | 3.1641316 | 20 | 12 1.3 | 20.3 |
| 199612 2006 $FE_{39}$ | 15.9 | $X$ | 174.49997 | 200.71167 | 141.37297 | 2.94463 | 0.0692107 | 0.20548584 | 2.8441213 | 20 | 2 6.1 | 20.1 |
| 199613 2006 $FN_{40}$ | 16.1 | $X$ | 264.64099 | 240.41560 | 141.50377 | 3.64417 | 0.1232107 | 0.22863890 | 2.6487195 | 20 | 7 1.2 | 19.6 |
| 199614 2006 $FQ_{40}$ | 16.1 | $X$ | 102.15302 | 178.56123 | 140.15711 | 4.27064 | 0.1018551 | 0.18635553 | 3.0355766 | 20 | — | — |
| 199615 2006 $FD_{41}$ | 15.9 | $X$ | 49.79054 | 191.81050 | 26.13303 | 12.55737 | 0.1158768 | 0.22059579 | 2.7127175 | 20 | 7 13.7 | 19.5 |
| 199616 2006 $FX_{41}$ | 16.5 | $X$ | 328.22230 | 320.55600 | 156.90196 | 2.79247 | 0.1550490 | 0.25862675 | 2.4397973 | 20 | — | — |
| 199617 2006 $FR_{42}$ | 15.9 | $X$ | 71.94695 | 322.91931 | 135.47724 | 2.85756 | 0.0242536 | 0.20329207 | 2.8645457 | 20 | 2 22.2 | 19.6 |
| 199618 2006 $FG_{43}$ | 15.0 | $X$ | 149.38241 | 283.21548 | 31.73379 | 11.05817 | 0.0903054 | 0.18993364 | 2.9973316 | 20 | — | — |
| 199619 2006 $FT_{43}$ | 17.0 | $X$ | 164.47523 | 131.27389 | 40.75408 | 4.36872 | 0.1596549 | 0.23949562 | 2.5680551 | 20 | 9 25.5 | 21.1 |
| 199620 2006 $FN_{44}$ | 15.3 | $X$ | 211.26375 | 160.84231 | 52.57341 | 8.59413 | 0.1260584 | 0.18080523 | 3.0973864 | 20 | 12 20.2 | 20.0 |
| 199621 2006 $FL_{45}$ | 15.4 | $X$ | 203.57785 | 269.16315 | 137.52784 | 5.90738 | 0.0208853 | 0.22073874 | 2.7115462 | 20 | 5 31.7 | 19.1 |
| 199622 2006 $FR_{45}$ | 15.4 | $X$ | 347.05128 | 203.63261 | 31.27633 | 12.51080 | 0.1493757 | 0.21482572 | 2.7610771 | 20 | 4 14.5 | 18.2 |
| 199623 2006 $FV_{45}$ | 16.0 | $X$ | 39.67771 | 329.54315 | 184.06835 | 7.03807 | 0.0826507 | 0.21094664 | 2.7948230 | 20 | 3 23.8 | 19.2 |
| 199624 2006 $FD_{46}$ | 15.7 | $X$ | 141.43780 | 120.15934 | 185.19557 | 11.37955 | 0.0595841 | 0.18803391 | 3.0174860 | 20 | — | — |
| 199625 2006 $FH_{47}$ | 15.1 | $X$ | 328.23299 | 259.74739 | 151.67862 | 12.50756 | 0.0658309 | 0.17612997 | 3.1519589 | 20 | 11 13.9 | 19.4 |
| 199626 2006 $FV_{49}$ | 15.7 | $X$ | 154.65862 | 90.25442 | 155.87828 | 7.05359 | 0.2060662 | 0.17664748 | 3.1457999 | 20 | 12 4.3 | 21.2 |
| 199627 2006 $FV_{52}$ | 16.2 | $X$ | 132.16244 | 286.22997 | 195.56429 | 12.32006 | 0.1246896 | 0.22234118 | 2.6985022 | 20 | 6 17.7 | 20.5 |
| 199628 2006 $FA_{53}$ | 15.9 | $X$ | 274.84598 | 105.50377 | 83.79320 | 2.58900 | 0.0288627 | 0.19070759 | 2.9892167 | 20 | — | — |
| 199629 2006 $FB_{53}$ | 15.9 | $X$ | 130.16601 | 275.06261 | 157.53432 | 4.28156 | 0.0816293 | 0.21049808 | 2.7987920 | 20 | 4 10.7 | 20.0 |
| 199630 2006 $GS$ | 16.1 | $X$ | 182.11903 | 220.65512 | 161.70372 | 6.56955 | 0.0639470 | 0.21200470 | 2.7855164 | 20 | 4 4.6 | 20.2 |
| 199631 Giuseppesprizzi | 15.8 | $X$ | 124.36497 | 142.28135 | 273.43268 | 2.39054 | 0.0917809 | 0.20954285 | 2.8072914 | 20 | 3 12.4 | 19.7 |
| 199632 2006 $GX_{1}$ | 15.6 | $X$ | 131.21501 | 297.82668 | 24.96913 | 12.80629 | 0.1251248 | 0.18792485 | 3.0186533 | 20 | — | — |
| 199633 2006 $GF_{3}$ | 15.9 | $X$ | 335.22476 | 167.83250 | 90.82860 | 9.31931 | 0.1778767 | 0.21147200 | 2.7901923 | 20 | 4 26.6 | 19.0 |
| 199634 2006 $GA_{4}$ | 16.1 | $X$ | 216.09975 | 138.41172 | 323.90577 | 2.37975 | 0.0277880 | 0.23700354 | 2.5860256 | 20 | 8 30.4 | 19.4 |
| 199635 2006 $GW_{4}$ | 16.1 | $X$ | 281.63192 | 261.26218 | 61.80488 | 5.43877 | 0.1218473 | 0.21714906 | 2.7413474 | 20 | 5 6.2 | 19.8 |
| 199636 2006 $GU_{5}$ | 14.8 | $X$ | 103.29384 | 133.20913 | 136.82465 | 6.10626 | 0.1302094 | 0.17116949 | 3.2125642 | 20 | 11 15.9 | 19.9 |
| 199637 2006 $GY_{5}$ | 15.3 | $X$ | 211.46560 | 96.05521 | 157.14616 | 9.51993 | 0.0282688 | 0.19088368 | 2.9873781 | 20 | — | — |
| 199638 2006 $GH_{9}$ | 16.2 | $X$ | 112.40884 | 82.61205 | 92.77636 | 3.33319 | 0.0215086 | 0.22704853 | 2.6610738 | 20 | 7 25.5 | 19.7 |
| 199639 2006 $GF_{11}$ | 16.3 | $X$ | 274.10397 | 255.38588 | 59.56080 | 4.57589 | 0.0621688 | 0.21353802 | 2.7721661 | 20 | 4 25.1 | 20.0 |
| 199640 2006 $GC_{12}$ | 15.9 | $X$ | 218.67935 | 69.87827 | 27.08984 | 22.26625 | 0.0945261 | 0.23338517 | 2.6126859 | 20 | 8 31.6 | 20.1 |
| 199641 2006 $GR_{12}$ | 16.2 | $X$ | 87.58520 | 187.86904 | 156.01154 | 5.54470 | 0.0567875 | 0.18271014 | 3.0758203 | 20 | — | — |
| 199642 2006 $GF_{17}$ | 16.0 | $X$ | 206.37779 | 225.87282 | 182.69355 | 7.04140 | 0.1151946 | 0.22084214 | 2.7106998 | 20 | 6 1.0 | 20.2 |
| 199643 2006 $GO_{17}$ | 16.3 | $X$ | 104.97210 | 121.49961 | 178.64238 | 5.72213 | 0.1333934 | 0.17549048 | 3.1596115 | 20 | 12 21.2 | 21.3 |
| 199644 2006 $GB_{18}$ | 15.6 | $X$ | 178.47410 | 152.74995 | 83.63299 | 2.13054 | 0.1486327 | 0.17871410 | 3.1215012 | 20 | 12 13.7 | 20.6 |
| 199645 2006 $GD_{18}$ | 16.0 | $X$ | 128.81446 | 286.52277 | 51.21549 | 4.34302 | 0.1066909 | 0.18874410 | 3.0099120 | 20 | — | — |
| 199646 2006 $GC_{21}$ | 15.8 | $X$ | 276.51890 | 122.58236 | 171.57252 | 6.00401 | 0.0424494 | 0.20880777 | 2.8138760 | 20 | 4 4.5 | 19.6 |
| 199647 2006 $GR_{21}$ | 16.4 | $X$ | 310.54408 | 16.61224 | 197.32534 | 6.17458 | 0.0565997 | 0.20376756 | 2.8600877 | 20 | 2 2.1 | 20.3 |
| 199648 2006 $GT_{22}$ | 15.5 | $X$ | 97.95978 | 256.10820 | 57.18648 | 5.43488 | 0.0711340 | 0.17685156 | 3.1433793 | 20 | 12 25.1 | 20.3 |
| 199649 2006 $GM_{23}$ | 15.6 | $X$ | 277.91712 | 308.22263 | 194.79429 | 9.76031 | 0.0346860 | 0.18089880 | 3.0963183 | 20 | 12 27.2 | 20.0 |
| 199650 2006 $GK_{30}$ | 16.8 | $X$ | 350.26181 | 34.59458 | 64.78488 | 4.77311 | 0.2001777 | 0.26061980 | 2.4273428 | 20 | — | — |
| 199651 2006 $GV_{31}$ | 15.1 | $X$ | 106.78833 | 218.55617 | 107.74427 | 11.45803 | 0.1140356 | 0.18154120 | 3.0890095 | 20 | — | — |
| 199652 2006 $GW_{32}$ | 15.6 | $X$ | 152.69012 | 75.73633 | 181.48938 | 2.52132 | 0.1382895 | 0.18153535 | 3.0890759 | 20 | 12 15.9 | 20.7 |
| 199653 2006 $GF_{37}$ | 16.1 | $X$ | 184.38732 | 250.77006 | 75.03087 | 3.00997 | 0.0489916 | 0.19749108 | 2.9203690 | 20 | 1 29.1 | 20.4 |
| 199654 2006 $GL_{38}$ | 14.4 | $X$ | 136.61559 | 211.72112 | 61.98163 | 28.20019 | 0.1909178 | 0.17502089 | 3.1652605 | 20 | 12 16.4 | 19.9 |
| 199655 2006 $GC_{39}$ | 15.7 | $X$ | 93.66051 | 323.95519 | 207.25753 | 12.71926 | 0.1816248 | 0.22056987 | 2.7129300 | 20 | 7 13.5 | 20.0 |
| 199656 2006 $GC_{42}$ | 15.1 | $X$ | 157.70358 | 13.77270 | 218.00948 | 16.47126 | 0.1527188 | 0.17450758 | 3.1714645 | 20 | 11 20.4 | 20.3 |
| 199657 2006 $GP_{42}$ | 15.2 | $X$ | 119.59857 | 141.46986 | 153.32597 | 11.76811 | 0.0439790 | 0.18027742 | 3.1034291 | 20 | 12 25.7 | 20.0 |
| 199658 2006 $GD_{43}$ | 16.9 | $X$ | 203.40707 | 130.23955 | 321.19133 | 3.20705 | 0.1826316 | 0.23516256 | 2.5995047 | 20 | 7 19.1 | 21.2 |
| 199659 2006 $GD_{44}$ | 16.8 | $X$ | 81.10432 | 152.85722 | 59.09238 | 4.48255 | 0.0117490 | 0.22475305 | 2.6791621 | 20 | 8 1.7 | 20.3 |
| 199660 2006 $GR_{45}$ | 16.0 | $X$ | 232.02049 | 31.46228 | 144.15762 | 6.96195 | 0.0750673 | 0.26116902 | 2.4239386 | 20 | 12 25.3 | 19.1 |
| 199661 2006 $GV_{46}$ | 16.1 | $X$ | 224.41290 | 320.89933 | 46.87820 | 5.82291 | 0.0678207 | 0.21513030 | 2.7584704 | 20 | 5 1.8 | 19.9 |
| 199662 2006 $GB_{47}$ | 15.0 | $X$ | 226.17671 | 169.52545 | 31.03426 | 11.32084 | 0.0409634 | 0.18241142 | 3.0791773 | 20 | — | — |
| 199663 2006 $GG_{47}$ | 15.5 | $X$ | 138.75959 | 254.48229 | 27.34545 | 9.25578 | 0.0523450 | 0.18007839 | 3.1057153 | 20 | 12 31.4 | 20.2 |
| 199664 2006 $GX_{47}$ | 16.6 | $X$ | 339.49447 | 157.35490 | 78.92100 | 0.53659 | 0.0835755 | 0.20999384 | 2.8032705 | 20 | 4 9.3 | 20.1 |
| 199665 2006 $GX_{48}$ | 15.7 | $X$ | 231.39862 | 269.31550 | 218.36190 | 12.85993 | 0.1295667 | 0.24071752 | 2.5593573 | 20 | 10 7.6 | 19.4 |
| 199666 2006 $GA_{49}$ | 15.2 | $X$ | 82.69163 | 268.32032 | 37.77333 | 5.24682 | 0.1173656 | 0.16967965 | 3.2313417 | 20 | 12 3.4 | 20.1 |
| 199667 2006 $GF_{50}$ | 15.6 | $X$ | 0.06990 | 350.48361 | 259.42448 | 9.88333 | 0.1642303 | 0.21675261 | 2.7446891 | 20 | 5 31.3 | 18.1 |
| 199668 2006 $GH_{50}$ | 15.2 | $X$ | 49.72904 | 105.83617 | 102.10897 | 13.28825 | 0.1205419 | 0.21900213 | 2.7258617 | 20 | 6 27.7 | 18.6 |
| 199669 2006 $GM_{52}$ | 15.2 | $X$ | 92.76241 | 225.19987 | 92.85806 | 10.75076 | 0.0883062 | 0.17880088 | 3.1204911 | 20 | 12 27.1 | 19.7 |
| 199670 2006 $GM_{54}$ | 16.1 | $X$ | 197.80053 | 7.57031 | 43.71127 | 3.14105 | 0.1885247 | 0.21641098 | 2.7475769 | 20 | 5 23.2 | 20.6 |
| 199671 2006 $HV$ | 16.0 | $X$ | 217.68665 | 332.39207 | 149.24800 | 4.29725 | 0.1706626 | 0.23812788 | 2.5778792 | 20 | 9 11.5 | 19.8 |
| 199672 2006 $HV_{2}$ | 15.5 | $X$ | 187.74241 | 163.08063 | 91.99254 | 2.85693 | 0.1391137 | 0.18371558 | 3.0645877 | 20 | — | — |
| 199673 2006 $HH_{3}$ | 15.5 | $X$ | 282.01511 | 231.18959 | 195.08982 | 13.84241 | 0.1260347 | 0.23766977 | 2.5811907 | 20 | 9 26.3 | 18.6 |
| 199674 2006 $HX_{3}$ | 15.9 | $X$ | 147.26598 | 307.10914 | 144.81355 | 5.31310 | 0.1037957 | 0.21638331 | 2.7478111 | 20 | 5 26.2 | 20.1 |
| 199675 2006 $HE_{4}$ | 16.6 | $X$ | 18.83572 | 322.85152 | 304.11780 | 2.34916 | 0.1549478 | 0.23148230 | 2.6269846 | 20 | 8 4.9 | 19.3 |
| 199676 2006 $HC_{5}$ | 15.6 | $X$ | 103.17561 | 169.03676 | 15.20094 | 13.96611 | 0.0595166 | 0.22688442 | 2.6623569 | 20 | 8 4.8 | 19.6 |
| 199677 Terzani | 15.5 | $X$ | 352.02639 | 143.92565 | 20.49424 | 17.92843 | 0.1335135 | 0.20087235 | 2.8875041 | 20 | 1 28.0 | 19.3 |
| 199678 2006 $HA_{8}$ | 15.4 | $X$ | 272.08002 | 345.56026 | 193.28561 | 6.74774 | 0.1497865 | 0.18617669 | 3.0375202 | 20 | — | — |
| 199679 2006 $HN_{8}$ | 15.9 | $X$ | 233.94399 | 132.58541 | 194.43801 | 13.86670 | 0.0626689 | 0.21051063 | 2.7986807 | 20 | 3 21.3 | 20.1 |
| 199680 2006 $HT_{8}$ | 15.9 | $X$ | 351.67232 | 314.06155 | 266.97427 | 2.15961 | 0.0494414 | 0.21302529 | 2.7766125 | 20 | 4 8.3 | 19.5 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 199681 2006 $HQ_{12}$ | 16.1 | *X* | 84.71024 | 53.31585 | 12.70206 | 1.93713 | 0.0522986 | 0.20287659 | 2.8684553 | 20 | 2 2.2 | 19.8 |
| 199682 2006 $HV_{13}$ | 15.8 | *X* | 288.36139 | 225.95464 | 6.36487 | 16.90814 | 0.0936446 | 0.20133699 | 2.8830599 | 20 | 2 1.2 | 20.2 |
| 199683 2006 $HL_{15}$ | 16.0 | *X* | 146.48359 | 351.51426 | 165.25484 | 5.32957 | 0.1994543 | 0.22897304 | 2.6461420 | 20 | 8 18.6 | 20.5 |
| 199684 2006 $HY_{16}$ | 16.1 | *X* | 231.35197 | 25.09271 | 273.80160 | 1.35938 | 0.0432700 | 0.19767499 | 2.9185574 | 20 | 2 16.2 | 20.3 |
| 199685 2006 $HJ_{17}$ | 16.2 | *X* | 148.28795 | 285.57493 | 209.99124 | 14.54673 | 0.1362112 | 0.23000592 | 2.6382141 | 20 | 7 19.5 | 20.7 |
| 199686 2006 $HK_{17}$ | 15.2 | *X* | 164.85714 | 188.43803 | 57.87419 | 13.63343 | 0.1216112 | 0.17745869 | 3.1362056 | 20 | 12 12.7 | 20.2 |
| 199687 Erősszsolt | 15.9 | *X* | 208.80364 | 101.40672 | 110.32358 | 2.57444 | 0.1211253 | 0.18186585 | 3.0853323 | 20 | 12 16.9 | 20.7 |
| 199688 Kisspéter | 16.0 | *X* | 112.67405 | 138.02894 | 178.23544 | 11.29628 | 0.1073460 | 0.18307468 | 3.0717358 | 20 | — | — |
| 199689 2006 $HA_{22}$ | 16.2 | *X* | 97.42753 | 353.88865 | 119.84862 | 3.37022 | 0.0447059 | 0.21009066 | 2.8024092 | 20 | 4 18.5 | 20.0 |
| 199690 2006 $HG_{22}$ | 16.6 | *X* | 128.19093 | 296.90044 | 161.24959 | 3.93645 | 0.0602723 | 0.21313232 | 2.7756829 | 20 | 5 8.5 | 20.6 |
| 199691 2006 $HO_{23}$ | 16.3 | *X* | 150.59297 | 266.27176 | 196.70054 | 12.19636 | 0.2310467 | 0.22234526 | 2.6984692 | 20 | 6 17.3 | 21.1 |
| 199692 2006 $HT_{23}$ | 16.1 | *X* | 307.49937 | 317.41330 | 191.30691 | 3.96625 | 0.0257275 | 0.18570187 | 3.0426958 | 20 | — | — |
| 199693 2006 $HB_{24}$ | 15.8 | *X* | 93.75902 | 136.30458 | 205.83425 | 9.44474 | 0.0458954 | 0.18009098 | 3.1055706 | 20 | — | — |
| 199694 2006 $HE_{28}$ | 15.9 | *X* | 155.02174 | 275.22209 | 200.22951 | 15.31535 | 0.0963677 | 0.21912338 | 2.7248561 | 20 | 6 30.5 | 20.3 |
| 199695 2006 $HB_{30}$ | 16.3 | *X* | 207.85819 | 44.80738 | 106.95613 | 5.04602 | 0.1828981 | 0.24096388 | 2.5576125 | 20 | 10 10.8 | 20.2 |
| 199696 2006 $HD_{31}$ | 15.6 | *X* | 282.51108 | 308.06821 | 178.83358 | 12.38693 | 0.1467485 | 0.18088778 | 3.0964441 | 20 | 12 3.0 | 19.7 |
| 199697 2006 $HC_{33}$ | 15.6 | *X* | 284.02363 | 99.31461 | 66.55352 | 1.88489 | 0.1038472 | 0.18976208 | 2.9991379 | 20 | — | — |
| 199698 2006 $HG_{35}$ | 15.6 | *X* | 209.85985 | 328.76369 | 199.16936 | 0.55850 | 0.1349822 | 0.17155504 | 3.2077491 | 20 | 10 24.8 | 20.6 |
| 199699 2006 $HC_{40}$ | 15.5 | *X* | 10.39770 | 228.54813 | 195.86991 | 9.34513 | 0.0772724 | 0.18033893 | 3.1027234 | 20 | — | — |
| 199700 2006 $HF_{40}$ | 15.7 | *X* | 342.40962 | 204.78643 | 151.37465 | 5.38676 | 0.0364081 | 0.16030983 | 3.3560567 | 20 | 9 20.3 | 20.2 |
| 199701 2006 $HV_{40}$ | 16.4 | *X* | 157.09085 | 316.91309 | 173.62407 | 13.41056 | 0.2028325 | 0.22517800 | 2.6757903 | 20 | 7 24.5 | 21.1 |
| 199702 2006 $HB_{41}$ | 15.0 | *X* | 352.31056 | 249.72464 | 145.95258 | 11.56903 | 0.1120048 | 0.16920856 | 3.2373364 | 20 | 11 28.7 | 19.2 |
| 199703 2006 $HR_{42}$ | 15.9 | *X* | 334.73365 | 321.97192 | 203.10908 | 0.83338 | 0.0713789 | 0.19881023 | 2.9074364 | 20 | 1 4.6 | 19.6 |
| 199704 2006 $HF_{43}$ | 15.7 | *X* | 231.88265 | 175.47963 | 42.53102 | 10.76599 | 0.1246860 | 0.18356171 | 3.0663000 | 20 | — | — |
| 199705 2006 $HR_{45}$ | 15.5 | *X* | 152.74821 | 155.01551 | 108.87558 | 2.55613 | 0.1375985 | 0.17904298 | 3.1176775 | 20 | 12 22.9 | 20.5 |
| 199706 2006 $HW_{45}$ | 15.8 | *X* | 347.91756 | 272.48309 | 180.90155 | 9.23513 | 0.0271191 | 0.18724888 | 3.0259139 | 20 | — | — |
| 199707 2006 $HU_{46}$ | 15.8 | *X* | 160.49223 | 195.96379 | 108.49254 | 5.23658 | 0.1102378 | 0.18535508 | 3.0464897 | 20 | — | — |
| 199708 2006 $HD_{56}$ | 16.0 | *X* | 162.12600 | 328.06978 | 175.48166 | 6.35789 | 0.1473119 | 0.22883315 | 2.6472203 | 20 | 8 14.8 | 20.3 |
| 199709 2006 $HU_{56}$ | 15.2 | *X* | 162.29040 | 55.65876 | 223.30993 | 10.52001 | 0.1887701 | 0.17943172 | 3.1131729 | 20 | — | — |
| 199710 2006 $HL_{58}$ | 16.5 | *X* | 68.94206 | 50.93861 | 139.11968 | 5.31833 | 0.0391208 | 0.21794649 | 2.7346566 | 20 | 6 18.7 | 20.2 |
| 199711 2006 $HR_{59}$ | 16.0 | *X* | 349.90486 | 151.69573 | 87.67122 | 4.13418 | 0.0638767 | 0.21225262 | 2.7833469 | 20 | 5 2.2 | 19.3 |
| 199712 2006 $HY_{60}$ | 15.6 | *X* | 201.71445 | 21.29238 | 224.11557 | 1.56440 | 0.1982774 | 0.18076292 | 3.0978697 | 20 | — | — |
| 199713 2006 $HD_{65}$ | 15.4 | *X* | 272.39975 | 315.75235 | 210.83202 | 8.75949 | 0.0691716 | 0.18239047 | 3.0794131 | 20 | — | — |
| 199714 2006 $HK_{68}$ | 15.4 | *X* | 199.64751 | 6.92570 | 230.98042 | 15.55967 | 0.0455390 | 0.18031972 | 3.1029437 | 20 | — | — |
| 199715 2006 $HJ_{78}$ | 14.7 | *X* | 258.56402 | 194.21106 | 75.46474 | 2.89457 | 0.2053401 | 0.12671669 | 3.9256674 | 20 | 2 5.3 | 20.8 |
| 199716 2006 $HS_{79}$ | 16.2 | *X* | 229.80984 | 348.93900 | 129.85957 | 0.85522 | 0.1179570 | 0.23632150 | 2.5909989 | 20 | 9 27.3 | 19.9 |
| 199717 2006 $HZ_{81}$ | 15.8 | *X* | 7.36271 | 208.68660 | 219.01078 | 8.79944 | 0.0636727 | 0.18016639 | 3.1047040 | 20 | — | — |
| 199718 2006 $HE_{83}$ | 15.2 | *X* | 332.02720 | 176.03331 | 226.43777 | 4.93247 | 0.1194109 | 0.16789652 | 3.2541801 | 20 | 11 2.1 | 19.1 |
| 199719 2006 $HV_{83}$ | 15.0 | *X* | 15.07539 | 321.08970 | 83.88376 | 10.27693 | 0.2141325 | 0.17596355 | 3.1539459 | 20 | — | — |
| 199720 2006 $HV_{84}$ | 15.1 | *X* | 157.16655 | 224.30498 | 62.60273 | 17.83435 | 0.0758681 | 0.17955664 | 3.1117288 | 20 | — | — |
| 199721 2006 $HX_{84}$ | 15.6 | *X* | 47.59665 | 184.36053 | 218.14635 | 15.55695 | 0.0757930 | 0.18199672 | 3.0838530 | 20 | — | — |
| 199722 2006 $HS_{85}$ | 16.4 | *X* | 2.95485 | 119.38216 | 157.67179 | 2.02561 | 0.0494977 | 0.22378271 | 2.6869012 | 20 | 7 12.9 | 19.6 |
| 199723 2006 $HR_{86}$ | 16.1 | *X* | 212.77269 | 14.88542 | 137.75680 | 4.87697 | 0.1328504 | 0.24096642 | 2.5575946 | 20 | 10 21.9 | 19.8 |
| 199724 2006 $HE_{87}$ | 15.0 | *X* | 121.10316 | 155.88204 | 191.78017 | 10.61960 | 0.1527113 | 0.19013338 | 2.9952320 | 20 | — | — |
| 199725 2006 $HO_{87}$ | 16.5 | *X* | 184.83137 | 189.38111 | 192.96694 | 6.27973 | 0.0390088 | 0.21119931 | 2.7925934 | 20 | 4 5.8 | 20.4 |
| 199726 2006 $HR_{87}$ | 15.6 | *X* | 136.14053 | 212.82994 | 196.41041 | 9.24797 | 0.1583298 | 0.20900671 | 2.8120901 | 20 | 3 24.9 | 19.9 |
| 199727 2006 $HJ_{88}$ | 15.8 | *X* | 232.58460 | 222.06796 | 207.91870 | 8.75183 | 0.0812916 | 0.23042285 | 2.6350307 | 20 | 7 28.8 | 19.7 |
| 199728 2006 $HF_{95}$ | 16.1 | *X* | 145.47993 | 295.56608 | 186.64915 | 7.34422 | 0.1561390 | 0.22196135 | 2.7015798 | 20 | 7 3.2 | 20.5 |
| 199729 2006 $HO_{101}$ | 15.2 | *X* | 158.26034 | 204.34837 | 79.59838 | 10.80711 | 0.0547682 | 0.17961246 | 3.1110841 | 20 | — | — |
| 199730 2006 $HX_{104}$ | 15.5 | *X* | 175.83414 | 74.54207 | 178.71892 | 9.28572 | 0.0309481 | 0.18035724 | 3.1025133 | 20 | — | — |
| 199731 2006 $HO_{107}$ | 15.1 | *X* | 23.48480 | 209.14422 | 194.04563 | 10.99382 | 0.0648587 | 0.17950841 | 3.1122861 | 20 | — | — |
| 199732 2006 $HR_{109}$ | 15.6 | *X* | 220.73325 | 283.04505 | 192.43902 | 11.28202 | 0.1496059 | 0.23316339 | 2.6143424 | 20 | 9 5.7 | 19.6 |
| 199733 2006 $HY_{109}$ | 15.5 | *X* | 191.77391 | 244.58767 | 236.48008 | 13.06757 | 0.0495853 | 0.23057463 | 2.6338742 | 20 | 8 16.0 | 19.6 |
| 199734 2006 $HK_{110}$ | 13.8 | *X* | 97.11435 | 32.88456 | 251.20441 | 21.55048 | 0.0788600 | 0.17006973 | 3.2263987 | 20 | 11 19.3 | 18.6 |
| 199735 2006 $HF_{111}$ | 15.3 | *X* | 143.66860 | 64.35641 | 176.76713 | 10.85176 | 0.0850933 | 0.17042550 | 3.2219070 | 20 | 11 19.1 | 20.4 |
| 199736 2006 $HA_{112}$ | 15.5 | *X* | 249.00385 | 292.33520 | 181.14615 | 12.76182 | 0.2151126 | 0.23875564 | 2.5733585 | 20 | 9 30.6 | 18.8 |
| 199737 2006 $HX_{113}$ | 16.0 | *X* | 39.42034 | 71.04255 | 72.96056 | 2.96814 | 0.0568805 | 0.20113420 | 2.8849974 | 20 | 3 11.7 | 19.8 |
| 199738 2006 $HG_{115}$ | 16.6 | *X* | 311.51108 | 208.77495 | 81.33206 | 1.80008 | 0.0376863 | 0.21392314 | 2.7688380 | 20 | 5 15.7 | 20.2 |
| 199739 2006 $HU_{123}$ | 16.6 | *X* | 181.83858 | 73.72289 | 58.44253 | 4.19304 | 0.0547819 | 0.22878170 | 2.6476172 | 20 | 8 26.5 | 20.4 |
| 199740 2006 $HX_{151}$ | 16.3 | *X* | 159.77829 | 224.29453 | 193.74430 | 3.34143 | 0.0879528 | 0.21268810 | 2.7795463 | 20 | 4 24.8 | 20.4 |
| 199741 Weidner | 16.3 | *X* | 259.21803 | 83.19299 | 62.64244 | 2.14975 | 0.0686872 | 0.17469779 | 3.1691621 | 20 | 12 1.8 | 20.6 |
| 199742 2006 $JD$ | 15.2 | *X* | 197.57091 | 224.27481 | 66.28316 | 11.38303 | 0.0722874 | 0.18618876 | 3.0373890 | 20 | 1 2.9 | 19.8 |
| 199743 2006 $JS_{2}$ | 15.0 | *X* | 23.53990 | 346.73165 | 35.81488 | 17.70043 | 0.0990411 | 0.17701440 | 3.1414513 | 20 | 12 23.7 | 19.5 |
| 199744 2006 $JP_{8}$ | 15.7 | *X* | 16.63524 | 210.79898 | 234.80791 | 10.17782 | 0.1085517 | 0.18737939 | 3.0245087 | 20 | — | — |
| 199745 2006 $JF_{9}$ | 14.8 | *X* | 77.95107 | 156.26843 | 233.22870 | 12.57215 | 0.1206562 | 0.18548184 | 3.0451016 | 20 | — | — |
| 199746 2006 $JZ_{11}$ | 15.1 | *X* | 298.77299 | 101.57225 | 92.77216 | 9.82466 | 0.0333433 | 0.19111604 | 2.9849562 | 20 | 1 1.8 | 19.4 |
| 199747 2006 $JX_{13}$ | 15.9 | *X* | 34.69445 | 2.14292 | 195.84788 | 9.33914 | 0.0762852 | 0.21246721 | 2.7814725 | 20 | 5 16.3 | 19.4 |
| 199748 2006 $JD_{14}$ | 15.6 | *X* | 194.20392 | 47.58999 | 221.03288 | 5.13973 | 0.1801172 | 0.18391775 | 3.0623415 | 20 | — | — |
| 199749 2006 $JH_{14}$ | 16.3 | *X* | 19.84286 | 197.21141 | 27.39757 | 5.20637 | 0.0983840 | 0.21417680 | 2.7666513 | 20 | 5 28.7 | 19.6 |
| 199750 2006 $JO_{25}$ | 16.1 | *X* | 201.49436 | 51.34611 | 45.17768 | 9.64717 | 0.1374487 | 0.22866665 | 2.6485052 | 20 | 7 28.8 | 20.4 |
| 199751 2006 $JL_{27}$ | 15.7 | *X* | 356.71089 | 44.62369 | 214.22487 | 10.41778 | 0.1183736 | 0.21558412 | 2.7545978 | 20 | 6 7.5 | 18.9 |
| 199752 2006 $JS_{28}$ | 15.8 | *X* | 236.31112 | 45.35230 | 126.45734 | 3.28960 | 0.0647500 | 0.17736989 | 3.1372523 | 20 | 12 6.7 | 20.3 |
| 199753 2006 $JD_{36}$ | 15.9 | *X* | 185.55722 | 308.59569 | 210.81576 | 6.96762 | 0.1390065 | 0.23499387 | 2.6007485 | 20 | 9 27.1 | 20.1 |
| 199754 2006 $JJ_{38}$ | 15.8 | *X* | 119.35202 | 280.32982 | 192.30792 | 6.77457 | 0.0473492 | 0.21481457 | 2.7611726 | 20 | 5 14.8 | 19.6 |
| 199755 2006 $JD_{39}$ | 15.9 | *X* | 72.82142 | 9.97977 | 116.71977 | 3.10235 | 0.0128585 | 0.20282108 | 2.8689787 | 20 | 3 29.9 | 19.8 |
| 199756 2006 $JN_{40}$ | 16.6 | *X* | 116.99561 | 358.49273 | 125.82297 | 3.91896 | 0.1328951 | 0.21647931 | 2.7469987 | 20 | 6 5.8 | 20.7 |
| 199757 2006 $JB_{45}$ | 15.1 | *X* | 175.04667 | 188.82163 | 47.31170 | 9.58253 | 0.0740279 | 0.17435008 | 3.1733741 | 20 | 12 12.6 | 20.0 |
| 199758 2006 $JU_{46}$ | 15.4 | *X* | 251.79901 | 170.51695 | 42.71099 | 6.56325 | 0.1824402 | 0.18556200 | 3.0442246 | 20 | — | — |
| 199759 2006 $JH_{48}$ | 16.1 | *X* | 231.04775 | 291.66399 | 201.71461 | 10.78240 | 0.1432351 | 0.24034054 | 2.5620329 | 20 | 10 14.6 | 19.6 |
| 199760 2006 $JB_{50}$ | 15.7 | *X* | 3.84787 | 210.62895 | 202.75620 | 10.65059 | 0.0875373 | 0.18036436 | 3.1024318 | 20 | — | — |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 199761 2006 $JT_{50}$ | 16.1 | $X$ | 176.97529 | 162.28070 | 204.22408 | 4.61101 | 0.0290854 | 0.20235530 | 2.8733796 | 20 | 3 6.6 | 20.2 |
| 199762 2006 $JC_{56}$ | 14.9 | $X$ | 136.47627 | 202.87044 | 37.26019 | 10.30652 | 0.0268990 | 0.17025838 | 3.2240150 | 20 | 11 6.3 | 19.7 |
| 199763 Davidgregory | 16.1 | $X$ | 104.80446 | 149.65233 | 162.14979 | 0.56932 | 0.1179208 | 0.17637761 | 3.1490079 | 20 | — | — |
| 199764 2006 $KN_{1}$ | 15.2 | $X$ | 209.62635 | 175.62693 | 48.03149 | 12.76128 | 0.1087257 | 0.17930708 | 3.1146154 | 20 | — | — |
| 199765 2006 $KT_{3}$ | 16.6 | $X$ | 156.40111 | 24.33412 | 189.58292 | 3.41663 | 0.0830479 | 0.24113064 | 2.5564332 | 20 | 11 10.1 | 20.3 |
| 199766 2006 $KJ_{4}$ | 15.8 | $X$ | 326.37737 | 324.86892 | 121.96645 | 1.83045 | 0.0233122 | 0.17477573 | 3.1682198 | 20 | 12 20.6 | 20.1 |
| 199767 2006 $KW_{12}$ | 15.8 | $X$ | 190.59338 | 305.18229 | 136.58924 | 14.60825 | 0.1419865 | 0.22198194 | 2.7014128 | 20 | 6 26.3 | 20.3 |
| 199768 2006 $KN_{16}$ | 16.3 | $X$ | 163.40614 | 304.19047 | 109.47275 | 1.72010 | 0.0686270 | 0.21322018 | 2.7749203 | 20 | 4 22.5 | 20.2 |
| 199769 2006 $KA_{22}$ | 15.3 | $X$ | 166.85103 | 178.76889 | 115.95445 | 7.01477 | 0.0356553 | 0.18265475 | 3.0764421 | 20 | — | — |
| 199770 2006 $KB_{23}$ | 15.0 | $X$ | 162.99518 | 185.71711 | 98.13108 | 17.85930 | 0.1935786 | 0.17942964 | 3.1131969 | 20 | — | — |
| 199771 2006 $KQ_{23}$ | 15.3 | $X$ | 209.03051 | 203.38473 | 47.21044 | 6.55388 | 0.2076943 | 0.18202536 | 3.0835296 | 20 | — | — |
| 199772 2006 $KY_{23}$ | 15.2 | $X$ | 237.50741 | 63.87790 | 112.95356 | 10.75686 | 0.0257813 | 0.17709248 | 3.1405277 | 20 | 12 19.5 | 19.6 |
| 199773 2006 $KB_{28}$ | 16.2 | $X$ | 66.67455 | 230.48126 | 198.72215 | 0.96674 | 0.0382171 | 0.19187694 | 2.9770596 | 20 | 1 13.0 | 20.0 |
| 199774 2006 $KK_{30}$ | 15.8 | $X$ | 226.96965 | 154.75403 | 50.73774 | 1.50678 | 0.1187762 | 0.17999369 | 3.1066896 | 20 | 12 28.9 | 20.2 |
| 199775 2006 $KL_{31}$ | 16.5 | $X$ | 313.53426 | 317.09124 | 273.37935 | 0.99547 | 0.0250992 | 0.20098822 | 2.8863942 | 20 | 3 3.6 | 20.3 |
| 199776 2006 $KF_{36}$ | 15.0 | $X$ | 161.00275 | 37.47761 | 191.99424 | 17.05359 | 0.0321334 | 0.16823809 | 3.2497740 | 20 | 11 22.9 | 20.0 |
| 199777 2006 $KL_{53}$ | 16.5 | $X$ | 17.19400 | 37.89607 | 175.91115 | 4.58885 | 0.0468512 | 0.20918787 | 2.8104663 | 20 | 5 9.0 | 20.1 |
| 199778 2006 $KW_{60}$ | 15.2 | $X$ | 251.73671 | 28.49790 | 207.54321 | 12.07313 | 0.0413377 | 0.18801002 | 3.0177416 | 20 | — | — |
| 199779 2006 $KV_{72}$ | 15.5 | $X$ | 269.07669 | 9.80399 | 174.97915 | 9.74789 | 0.0718689 | 0.18321735 | 3.0701410 | 20 | — | — |
| 199780 2006 $KY_{75}$ | 16.0 | $X$ | 356.81956 | 147.40507 | 15.39323 | 2.82911 | 0.1163847 | 0.19809876 | 2.9143937 | 20 | 1 29.9 | 19.5 |
| 199781 2006 $KJ_{80}$ | 15.7 | $X$ | 89.95911 | 150.64652 | 172.31820 | 6.49500 | 0.0275874 | 0.17328925 | 3.1863120 | 20 | 12 22.8 | 20.4 |
| 199782 2006 $KZ_{89}$ | 15.7 | $X$ | 238.86610 | 123.26257 | 29.10722 | 10.64155 | 0.1628821 | 0.24463871 | 2.5319353 | 20 | 11 14.1 | 19.1 |
| 199783 2006 $KG_{98}$ | 15.0 | $X$ | 177.19072 | 133.60290 | 102.75467 | 12.54546 | 0.0532974 | 0.17379229 | 3.1801605 | 20 | 12 17.6 | 19.7 |
| 199784 2006 $KL_{105}$ | 16.1 | $X$ | 180.63360 | 43.88659 | 194.01268 | 10.02596 | 0.0263999 | 0.17845384 | 3.1245354 | 20 | 12 25.1 | 20.8 |
| 199785 2006 $KK_{110}$ | 15.7 | $X$ | 118.07335 | 288.31350 | 30.06160 | 9.56103 | 0.1041759 | 0.17991677 | 3.1075750 | 20 | — | — |
| 199786 2006 $KQ_{115}$ | 15.4 | $X$ | 21.35383 | 18.03807 | 76.47646 | 11.45730 | 0.0840383 | 0.18803349 | 3.0174905 | 20 | — | — |
| 199787 2006 $LG_{3}$ | 15.6 | $X$ | 231.17388 | 280.15732 | 131.78671 | 11.63209 | 0.0602885 | 0.21970073 | 2.7200803 | 20 | 7 7.5 | 19.5 |
| 199788 2006 $LU_{3}$ | 14.8 | $X$ | 12.16679 | 216.00171 | 194.28028 | 9.22760 | 0.0799518 | 0.17421887 | 3.1749673 | 20 | — | — |
| 199789 2006 $MV_{5}$ | 15.6 | $X$ | 339.15473 | 211.84557 | 100.62098 | 6.87446 | 0.0682523 | 0.21185050 | 2.7868679 | 20 | 7 25.1 | 19.0 |
| 199790 2006 $MN_{7}$ | 15.2 | $X$ | 89.26812 | 114.28665 | 290.97577 | 17.51846 | 0.0903178 | 0.17877839 | 3.1207528 | 20 | 1 20.7 | 19.5 |
| 199791 2006 $MN_{9}$ | 12.5 | $X$ | 37.92917 | 58.15908 | 271.65393 | 10.60657 | 0.0791673 | 0.08263861 | 5.2201228 | 20 | 10 16.2 | 19.3 |
| 199792 2006 $PJ_{1}$ | 12.7 | $X$ | 88.99560 | 332.45072 | 307.04490 | 21.41404 | 0.0408058 | 0.08364718 | 5.1780773 | 20 | 10 6.8 | 19.9 |
| 199793 2006 $PK_{14}$ | 12.7 | $X$ | 30.63717 | 24.29328 | 317.89664 | 7.50374 | 0.0978294 | 0.08265937 | 5.2192488 | 20 | 10 23.6 | 19.4 |
| 199794 2006 $QF_{105}$ | 15.1 | $X$ | 46.49173 | 153.47110 | 305.08408 | 9.24114 | 0.0610086 | 0.17638695 | 3.1488968 | 20 | 1 26.8 | 19.2 |
| 199795 2006 $UB_{198}$ | 16.4 | $X$ | 287.54785 | 275.69043 | 57.21206 | 1.04640 | 0.1841694 | 0.19263213 | 2.9692737 | 20 | 5 17.4 | 20.5 |
| 199796 2006 $UN_{217}$ | 12.8 | $X$ | 329.57840 | 144.83854 | 269.06434 | 1.52058 | 0.1032177 | 0.08198470 | 5.2478429 | 20 | 10 23.9 | 19.3 |
| 199797 2006 $UY_{240}$ | 15.8 | $X$ | 229.03095 | 118.90300 | 184.42815 | 5.41029 | 0.1747185 | 0.24450388 | 2.5328660 | 20 | 2 7.0 | 20.0 |
| 199798 2006 $UF_{256}$ | 16.9 | $X$ | 190.19129 | 68.02605 | 285.10539 | 21.26220 | 0.1268484 | 0.38018485 | 1.8871489 | 20 | 2 10.7 | 19.7 |
| 199799 2006 $WY_{200}$ | 17.0 | $X$ | 183.16676 | 305.29182 | 278.71737 | 11.08375 | 0.1196671 | 0.34931637 | 1.9967488 | 20 | — | — |
| 199800 2006 $YF_{11}$ | 16.8 | $X$ | 359.84978 | 246.44540 | 298.45750 | 19.05605 | 0.0082274 | 0.38020164 | 1.8870934 | 20 | 2 6.9 | 18.6 |
| 199801 2007 $AE_{12}$ | 19.3 | $X$ | 127.09551 | 86.88629 | 245.51352 | 2.28496 | 0.5693274 | 0.45089060 | 1.6843096 | 20 | — | — |
| 199802 2007 $BA_{18}$ | 16.9 | $X$ | 270.97826 | 240.91589 | 347.24422 | 5.10964 | 0.2101916 | 0.29080163 | 2.2563415 | 20 | — | — |
| 199803 2007 $BJ_{66}$ | 17.0 | $X$ | 114.29069 | 134.08944 | 147.71235 | 1.91281 | 0.1744654 | 0.26964023 | 2.3729009 | 20 | 12 26.8 | 20.9 |
| 199804 2007 $BD_{70}$ | 16.2 | $X$ | 61.79526 | 36.69186 | 179.44750 | 6.84248 | 0.1112165 | 0.23881054 | 2.5729640 | 20 | 7 25.5 | 19.6 |
| 199805 2007 $BE_{70}$ | 16.0 | $X$ | 286.44731 | 125.38591 | 189.27229 | 12.93917 | 0.1819470 | 0.22785912 | 2.6547590 | 20 | 4 22.8 | 19.6 |
| 199806 2007 $CA$ | 16.6 | $X$ | 169.55749 | 270.88308 | 24.96904 | 20.75151 | 0.0733442 | 0.36079734 | 1.9541617 | 20 | — | — |
| 199807 2007 $CY_{51}$ | 17.0 | $X$ | 193.26082 | 299.75050 | 301.41483 | 3.25243 | 0.2002135 | 0.27630011 | 2.3346154 | 20 | — | — |
| 199808 2007 $CA_{57}$ | 16.6 | $X$ | 164.46011 | 94.33091 | 122.78587 | 3.18508 | 0.1346502 | 0.26613047 | 2.3937180 | 20 | 11 24.5 | 20.2 |
| 199809 2007 $CE_{61}$ | 17.0 | $X$ | 104.37617 | 98.32194 | 357.48351 | 16.58603 | 0.0695406 | 0.38023368 | 1.8869874 | 20 | 3 20.9 | 18.6 |
| 199810 2007 $DO_{8}$ | 14.5 | $X$ | 110.26549 | 156.98556 | 100.15321 | 28.84444 | 0.1227261 | 0.18025134 | 3.1037284 | 20 | 11 17.9 | 19.8 |
| 199811 2007 $DD_{13}$ | 16.8 | $X$ | 161.69507 | 7.04985 | 197.60162 | 1.71173 | 0.1303906 | 0.26460296 | 2.4029215 | 20 | 11 5.6 | 20.5 |
| 199812 2007 $DE_{17}$ | 17.2 | $X$ | 235.47740 | 196.83638 | 104.49904 | 4.06734 | 0.1803460 | 0.30056492 | 2.2072110 | 20 | 2 6.5 | 20.6 |
| 199813 2007 $DN_{28}$ | 17.9 | $X$ | 334.59814 | 283.09085 | 25.70589 | 2.39485 | 0.1431111 | 0.31983057 | 2.1176592 | 20 | 7 18.3 | 19.2 |
| 199814 2007 $DD_{33}$ | 16.9 | $X$ | 113.73302 | 211.26805 | 22.08826 | 1.50257 | 0.1292913 | 0.25768062 | 2.4457658 | 20 | 10 24.1 | 20.6 |
| 199815 2007 $DL_{34}$ | 17.3 | $X$ | 168.92978 | 113.19945 | 129.47850 | 1.85865 | 0.1464873 | 0.27020838 | 2.3695734 | 20 | 12 29.9 | 20.7 |
| 199816 2007 $DR_{36}$ | 17.5 | $X$ | 252.19138 | 110.17220 | 118.82365 | 1.19264 | 0.1847155 | 0.28353046 | 2.2947545 | 20 | — | — |
| 199817 2007 $DY_{49}$ | 17.4 | $X$ | 137.99148 | 42.59418 | 356.71764 | 19.67651 | 0.1256889 | 0.37848946 | 1.8927802 | 20 | 2 29.3 | 19.4 |
| 199818 2007 $DG_{53}$ | 17.2 | $X$ | 132.09997 | 44.62506 | 243.45268 | 2.50755 | 0.1469646 | 0.27120023 | 2.3637925 | 20 | — | — |
| 199819 2007 $DU_{53}$ | 17.0 | $X$ | 105.60118 | 5.25246 | 305.67675 | 1.69067 | 0.2175233 | 0.26907147 | 2.3762435 | 20 | — | — |
| 199820 2007 $DF_{71}$ | 17.3 | $X$ | 171.37923 | 197.33756 | 125.32547 | 3.01074 | 0.1406180 | 0.28904008 | 2.2654997 | 20 | 1 3.6 | 20.3 |
| 199821 2007 $DA_{83}$ | 15.1 | $X$ | 128.38499 | 63.59114 | 176.03867 | 24.20226 | 0.2844852 | 0.17918003 | 3.1160876 | 20 | 11 11.7 | 21.0 |
| 199822 2007 $DJ_{85}$ | 17.0 | $X$ | 138.61571 | 161.50635 | 156.33836 | 6.86214 | 0.0912689 | 0.28476103 | 2.2881387 | 20 | — | — |
| 199823 2007 $DL_{97}$ | 16.4 | $X$ | 11.30748 | 261.88825 | 349.16435 | 4.52852 | 0.1733292 | 0.23698773 | 2.5861406 | 20 | 6 28.7 | 18.9 |
| 199824 2007 $DO_{97}$ | 17.4 | $X$ | 78.76601 | 331.84899 | 172.00648 | 4.06375 | 0.0884325 | 0.30853872 | 2.1690169 | 20 | 5 6.1 | 19.6 |
| 199825 2007 $DX_{97}$ | 17.9 | $X$ | 313.31949 | 55.92400 | 191.33948 | 1.92218 | 0.1600120 | 0.29935346 | 2.2131619 | 20 | 2 21.4 | 20.2 |
| 199826 2007 $DB_{105}$ | 17.6 | $X$ | 204.19894 | 318.95038 | 340.85872 | 1.94116 | 0.2176702 | 0.28794649 | 2.2712321 | 20 | 1 10.1 | 21.4 |
| 199827 2007 $DE_{105}$ | 18.4 | $X$ | 336.19389 | 51.55104 | 178.25983 | 3.82745 | 0.0840720 | 0.30357442 | 2.1925993 | 20 | 3 15.6 | 20.4 |
| 199828 2007 $DK_{105}$ | 16.9 | $X$ | 294.25386 | 161.17259 | 319.38023 | 3.01059 | 0.0260284 | 0.27336530 | 2.3512951 | 20 | — | — |
| 199829 2007 $DL_{112}$ | 16.8 | $X$ | 336.18976 | 76.01986 | 178.12198 | 6.43917 | 0.1367001 | 0.22947259 | 2.6423002 | 20 | 4 22.9 | 19.6 |
| 199830 2007 $EH_{8}$ | 16.8 | $X$ | 217.85405 | 176.86649 | 95.15028 | 2.83001 | 0.2253193 | 0.28404583 | 2.2919780 | 20 | — | — |
| 199831 2007 $EA_{15}$ | 17.8 | $X$ | 165.47045 | 310.36766 | 340.19940 | 5.58551 | 0.1861106 | 0.28107015 | 2.3081263 | 20 | — | — |
| 199832 2007 $EX_{20}$ | 17.4 | $X$ | 112.79865 | 279.27564 | 14.11383 | 2.52237 | 0.2167191 | 0.26648845 | 2.3915738 | 20 | — | — |
| 199833 2007 $EP_{23}$ | 15.8 | $X$ | 233.53624 | 150.59617 | 133.94671 | 5.02816 | 0.1819091 | 0.21328506 | 2.7743575 | 20 | 1 23.8 | 20.3 |
| 199834 2007 $EG_{24}$ | 17.2 | $X$ | 220.92014 | 77.73532 | 143.77540 | 4.27235 | 0.1283584 | 0.27534683 | 2.3400008 | 20 | — | — |
| 199835 2007 $EK_{25}$ | 17.2 | $X$ | 164.56443 | 280.44399 | 314.48679 | 0.50620 | 0.1328176 | 0.26469253 | 2.4023794 | 20 | 12 15.8 | 20.9 |
| 199836 2007 $EE_{27}$ | 17.4 | $X$ | 82.86934 | 328.20514 | 329.51523 | 3.67669 | 0.2111240 | 0.25789575 | 2.4444055 | 20 | 12 18.6 | 21.3 |
| 199837 2007 $EC_{30}$ | 17.3 | $X$ | 202.43652 | 160.77960 | 145.73313 | 7.05477 | 0.1723483 | 0.28955639 | 2.2628058 | 20 | 1 14.6 | 20.8 |
| 199838 Hafili | 15.7 | $X$ | 272.28518 | 240.18189 | 18.95784 | 8.25614 | 0.1641792 | 0.21687691 | 2.7436403 | 20 | 2 2.0 | 19.9 |
| 199839 2007 $ER_{45}$ | 17.5 | $X$ | 131.16474 | 220.24871 | 31.00058 | 1.01574 | 0.0903574 | 0.26168635 | 2.4207429 | 20 | 12 3.0 | 21.0 |
| 199840 2007 $EB_{47}$ | 17.3 | $X$ | 128.87353 | 50.21829 | 198.93799 | 2.37677 | 0.1487846 | 0.26011584 | 2.4304770 | 20 | 11 28.6 | 21.0 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 199841 2007 $EC_{47}$ | 16.9 | $X$ | 136.31702 | 245.32996 | 355.87910 | 2.21361 | 0.1457494 | 0.26035768 | 2.4289717 | 20 | 11 24.9 | 20.8 |
| 199842 2007 $EE_{47}$ | 17.4 | $X$ | 282.52947 | 36.92790 | 191.42483 | 3.11894 | 0.0861554 | 0.28930199 | 2.2641321 | 20 | — | — |
| 199843 2007 $EX_{53}$ | 16.2 | $X$ | 235.72691 | 254.77366 | 41.31027 | 3.32722 | 0.1801302 | 0.21316862 | 2.7753677 | 20 | 2 9.6 | 20.8 |
| 199844 2007 $EX_{63}$ | 17.4 | $X$ | 268.49898 | 48.14440 | 158.94156 | 4.96502 | 0.0613622 | 0.28585610 | 2.2822913 | 20 | — | — |
| 199845 2007 $EN_{71}$ | 16.9 | $X$ | 103.61289 | 244.84070 | 55.97530 | 2.45761 | 0.2013880 | 0.26500463 | 2.4004928 | 20 | — | — |
| 199846 2007 $EY_{71}$ | 16.7 | $X$ | 312.28438 | 205.43301 | 27.34618 | 4.42848 | 0.1285796 | 0.29672917 | 2.2261917 | 20 | 2 7.7 | 19.3 |
| 199847 2007 $EJ_{75}$ | 16.4 | $X$ | 103.35888 | 320.47430 | 358.62889 | 6.28785 | 0.1319508 | 0.27021977 | 2.3695069 | 20 | — | — |
| 199848 2007 $EK_{75}$ | 16.0 | $X$ | 289.22363 | 74.90045 | 186.36652 | 14.45599 | 0.1243677 | 0.22180599 | 2.7028413 | 20 | 2 21.9 | 19.9 |
| 199849 2007 $EB_{76}$ | 17.2 | $X$ | 168.78779 | 248.29050 | 11.13895 | 1.26354 | 0.1568848 | 0.27037309 | 2.3686110 | 20 | — | — |
| 199850 2007 $EC_{79}$ | 16.6 | $X$ | 179.29487 | 277.77531 | 305.74959 | 1.72827 | 0.1356379 | 0.26660472 | 2.3908784 | 20 | 12 16.7 | 20.2 |
| 199851 2007 $ER_{79}$ | 16.6 | $X$ | 279.62840 | 116.40189 | 196.01907 | 5.67270 | 0.2153397 | 0.22701323 | 2.6613496 | 20 | 4 5.4 | 20.4 |
| 199852 2007 $EB_{80}$ | 16.0 | $X$ | 1.89330 | 289.19818 | 348.66079 | 17.21340 | 0.2317550 | 0.23800161 | 2.5787909 | 20 | 8 2.0 | 18.3 |
| 199853 2007 $EP_{83}$ | 17.1 | $X$ | 194.82431 | 46.99589 | 185.96269 | 3.90102 | 0.2112754 | 0.27154467 | 2.3617931 | 20 | — | — |
| 199854 2007 $EL_{86}$ | 15.8 | $X$ | 328.66385 | 242.16204 | 4.54428 | 6.84762 | 0.2592720 | 0.22542601 | 2.6738274 | 20 | 3 10.9 | 18.8 |
| 199855 2007 $EO_{87}$ | 17.2 | $X$ | 36.72173 | 260.26947 | 200.70420 | 21.98165 | 0.0651740 | 0.36047883 | 1.9553126 | 20 | — | — |
| 199856 2007 $ER_{91}$ | 16.9 | $X$ | 65.18270 | 173.09248 | 108.62444 | 2.31355 | 0.1647279 | 0.25985148 | 2.4321251 | 20 | 11 8.5 | 20.2 |
| 199857 2007 $EC_{97}$ | 16.5 | $X$ | 292.82579 | 113.40901 | 198.53190 | 11.86185 | 0.1427402 | 0.23102193 | 2.6304734 | 20 | 5 3.4 | 19.8 |
| 199858 2007 $EW_{97}$ | 17.0 | $X$ | 35.55604 | 330.07653 | 167.81244 | 22.88518 | 0.0175492 | 0.37655104 | 1.8992705 | 20 | 1 24.3 | 19.2 |
| 199859 2007 $EB_{101}$ | 16.8 | $X$ | 101.95745 | 169.98209 | 111.81839 | 4.18154 | 0.1127154 | 0.26321872 | 2.4113386 | 20 | 12 12.4 | 20.3 |
| 199860 2007 $EP_{113}$ | 16.8 | $X$ | 289.11515 | 17.11873 | 208.80200 | 4.78330 | 0.1494622 | 0.29045452 | 2.2581387 | 20 | — | — |
| 199861 2007 $EG_{117}$ | 16.3 | $X$ | 204.95747 | 181.22833 | 148.99712 | 5.53656 | 0.1238725 | 0.21571047 | 2.7535221 | 20 | 2 22.8 | 20.5 |
| 199862 2007 $EY_{118}$ | 16.4 | $X$ | 252.10213 | 228.11513 | 95.70326 | 2.45811 | 0.1150464 | 0.22506960 | 2.6766494 | 20 | 4 3.0 | 20.2 |
| 199863 2007 $EM_{119}$ | 16.2 | $X$ | 353.88234 | 252.01486 | 29.07435 | 12.45387 | 0.1733162 | 0.23556731 | 2.5965262 | 20 | 7 8.6 | 18.9 |
| 199864 2007 $EN_{119}$ | 16.4 | $X$ | 163.91484 | 247.41857 | 37.33753 | 6.95400 | 0.1042304 | 0.27331834 | 2.3515643 | 20 | — | — |
| 199865 2007 $ED_{133}$ | 17.3 | $X$ | 313.67960 | 36.24105 | 169.55588 | 3.21089 | 0.0699447 | 0.29381870 | 2.2408688 | 20 | 1 10.6 | 20.1 |
| 199866 2007 $EQ_{135}$ | 17.9 | $X$ | 202.00424 | 108.76789 | 181.36127 | 4.77402 | 0.1310075 | 0.28621596 | 2.2803779 | 20 | — | — |
| 199867 2007 $ES_{141}$ | 17.8 | $X$ | 289.10428 | 345.09644 | 200.61897 | 5.50297 | 0.1012419 | 0.28422548 | 2.2910121 | 20 | — | — |
| 199868 2007 $EF_{145}$ | 17.3 | $X$ | 262.46850 | 255.97968 | 52.39374 | 2.76515 | 0.2074048 | 0.30199801 | 2.2002228 | 20 | 3 10.2 | 20.6 |
| 199869 2007 $EN_{165}$ | 16.7 | $X$ | 190.31806 | 99.99179 | 157.92254 | 6.45638 | 0.0804281 | 0.27530718 | 2.3402254 | 20 | — | — |
| 199870 2007 $EP_{165}$ | 17.4 | $X$ | 43.15419 | 92.85981 | 27.27625 | 22.95257 | 0.0642156 | 0.36749649 | 1.9303405 | 20 | 1 19.4 | 19.7 |
| 199871 2007 $EG_{166}$ | 17.0 | $X$ | 207.22980 | 217.74066 | 343.35114 | 1.78371 | 0.1363185 | 0.27047291 | 2.3680282 | 20 | 12 19.9 | 20.0 |
| 199872 2007 $EP_{169}$ | 16.5 | $X$ | 194.07450 | 163.91224 | 146.38393 | 2.95721 | 0.1233316 | 0.21000970 | 2.8031294 | 20 | 1 20.2 | 21.0 |
| 199873 2007 $EQ_{169}$ | 17.2 | $X$ | 158.34122 | 249.46636 | 37.42353 | 5.06154 | 0.1909811 | 0.27141112 | 2.3625678 | 20 | — | — |
| 199874 2007 $ER_{171}$ | 17.5 | $X$ | 313.54645 | 241.81037 | 20.00571 | 7.77720 | 0.0874695 | 0.29958447 | 2.2120241 | 20 | 3 28.1 | 19.8 |
| 199875 2007 $EB_{196}$ | 17.0 | $X$ | 299.92946 | 209.21790 | 18.71338 | 20.74205 | 0.0483977 | 0.37191530 | 1.9150202 | 20 | 1 18.9 | 19.6 |
| 199876 2007 $EE_{198}$ | 17.3 | $X$ | 273.19130 | 96.37185 | 128.44868 | 3.26184 | 0.1154827 | 0.28437005 | 2.2902355 | 20 | — | — |
| 199877 2007 $ES_{199}$ | 16.7 | $X$ | 155.06173 | 138.33255 | 121.06739 | 2.14066 | 0.1489033 | 0.26888945 | 2.3773158 | 20 | — | — |
| 199878 2007 $EV_{202}$ | 15.5 | $X$ | 115.79415 | 170.61378 | 71.97198 | 3.20717 | 0.2005376 | 0.17963988 | 3.1107674 | 20 | 10 31.2 | 20.6 |
| 199879 2007 $EJ_{213}$ | 16.7 | $X$ | 59.38236 | 304.70379 | 10.19185 | 2.61583 | 0.1745156 | 0.26159804 | 2.4212877 | 20 | 12 14.7 | 20.2 |
| 199880 2007 $EP_{213}$ | 16.7 | $X$ | 57.08161 | 289.83821 | 26.41932 | 2.31749 | 0.1242561 | 0.26192913 | 2.4192468 | 20 | 12 7.9 | 19.9 |
| 199881 2007 $ER_{213}$ | 16.8 | $X$ | 250.52343 | 156.74135 | 187.33410 | 6.93457 | 0.2169285 | 0.30666500 | 2.1778430 | 20 | 4 12.6 | 19.9 |
| 199882 2007 $EZ_{213}$ | 17.1 | $X$ | 189.35285 | 52.27932 | 200.91446 | 6.84376 | 0.0905477 | 0.27226094 | 2.3576490 | 20 | — | — |
| 199883 2007 $ES_{214}$ | 16.7 | $X$ | 223.14839 | 131.71797 | 137.66736 | 5.00422 | 0.1535462 | 0.28417478 | 2.2912845 | 20 | — | — |
| 199884 2007 $EP_{218}$ | 16.3 | $X$ | 4.59176 | 336.09350 | 2.70755 | 11.88543 | 0.2019558 | 0.25366134 | 2.4715336 | 20 | 10 31.6 | 18.9 |
| 199885 2007 $ED_{220}$ | 17.2 | $X$ | 111.07125 | 348.81397 | 33.31064 | 7.29854 | 0.1259110 | 0.28523754 | 2.2855896 | 20 | 1 8.3 | 19.9 |
| 199886 2007 $FH$ | 17.2 | $X$ | 184.28030 | 243.45339 | 19.69977 | 4.98107 | 0.2128970 | 0.27548567 | 2.3392145 | 20 | — | — |
| 199887 2007 $FF_{10}$ | 16.8 | $X$ | 205.22122 | 257.41957 | 340.29865 | 5.04774 | 0.1561386 | 0.27288574 | 2.3540489 | 20 | — | — |
| 199888 2007 $FW_{11}$ | 16.7 | $X$ | 188.17550 | 144.70131 | 163.71156 | 6.40729 | 0.1696898 | 0.29132170 | 2.2536553 | 20 | 1 3.7 | 20.1 |
| 199889 2007 $FM_{19}$ | 16.8 | $X$ | 338.59001 | 87.69483 | 178.82362 | 14.49481 | 0.1647992 | 0.23403276 | 2.6078640 | 20 | 5 13.9 | 19.7 |
| 199890 2007 $FT_{30}$ | 17.0 | $X$ | 64.10702 | 290.59949 | 9.66745 | 1.38001 | 0.1670272 | 0.25617516 | 2.4553385 | 20 | 11 29.4 | 20.4 |
| 199891 2007 $FG_{34}$ | 17.1 | $X$ | 101.33889 | 83.86265 | 172.33883 | 0.74351 | 0.1400478 | 0.25757029 | 2.4464643 | 20 | 11 10.4 | 20.7 |
| 199892 2007 $FO_{35}$ | 16.6 | $X$ | 249.54385 | 14.04106 | 199.51728 | 21.07400 | 0.0592889 | 0.35842065 | 1.9627909 | 20 | — | — |
| 199893 2007 $FC_{37}$ | 16.9 | $X$ | 132.84024 | 262.86311 | 30.99647 | 6.28192 | 0.1299954 | 0.26771483 | 2.3842645 | 20 | — | — |
| 199894 2007 $FO_{37}$ | 16.4 | $X$ | 263.71387 | 100.38492 | 173.74242 | 4.29813 | 0.0695282 | 0.21687012 | 2.7436976 | 20 | 2 17.6 | 20.4 |
| 199895 2007 $FK_{38}$ | 16.6 | $X$ | 55.44323 | 270.76103 | 282.78000 | 3.50877 | 0.2701369 | 0.23529075 | 2.5985604 | 20 | 7 12.1 | 19.6 |
| 199896 2007 $FB_{39}$ | 16.1 | $X$ | 352.16170 | 239.07686 | 356.99225 | 12.74664 | 0.2259294 | 0.22674737 | 2.6634296 | 20 | 4 12.7 | 18.5 |
| 199897 2007 $FO_{41}$ | 17.3 | $X$ | 152.16044 | 296.20576 | 4.17427 | 6.93307 | 0.1371433 | 0.27661999 | 2.3328152 | 20 | — | — |
| 199898 2007 $FD_{42}$ | 17.3 | $X$ | 345.07650 | 107.43496 | 196.34392 | 3.28371 | 0.1431500 | 0.24243422 | 2.5472609 | 20 | 7 22.9 | 19.7 |
| 199899 2007 $GV$ | 15.9 | $X$ | 61.50530 | 32.19354 | 159.39085 | 10.76555 | 0.1422772 | 0.23682795 | 2.5873037 | 20 | 6 26.9 | 19.3 |
| 199900 Brunoganz | 15.8 | $X$ | 311.59921 | 234.75538 | 58.05736 | 15.57607 | 0.1643493 | 0.22843565 | 2.6502904 | 20 | 5 3.2 | 18.9 |
| 199901 2007 $GG_{5}$ | 16.7 | $X$ | 94.38481 | 200.12009 | 136.64043 | 3.75050 | 0.2314664 | 0.26805038 | 2.3822743 | 20 | — | — |
| 199902 2007 $GC_{9}$ | 16.8 | $X$ | 207.84877 | 171.79883 | 73.02876 | 3.40540 | 0.1849824 | 0.27372763 | 2.3492196 | 20 | — | — |
| 199903 2007 $GO_{14}$ | 15.9 | $X$ | 222.01648 | 143.72726 | 153.13269 | 12.45892 | 0.3006788 | 0.21127202 | 2.7919527 | 20 | 1 25.4 | 21.1 |
| 199904 2007 $GW_{14}$ | 16.0 | $X$ | 308.09534 | 56.81744 | 213.40565 | 10.35326 | 0.1571437 | 0.22564558 | 2.6720925 | 20 | 3 24.0 | 19.4 |
| 199905 2007 $GN_{16}$ | 16.8 | $X$ | 91.82190 | 122.31042 | 223.74238 | 6.29718 | 0.1319707 | 0.26939111 | 2.3743635 | 20 | — | — |
| 199906 2007 $GS_{16}$ | 16.5 | $X$ | 299.83448 | 288.85235 | 28.64599 | 12.98848 | 0.1743830 | 0.23006443 | 2.6377668 | 20 | 5 11.9 | 19.8 |
| 199907 2007 $GB_{17}$ | 16.4 | $X$ | 315.27509 | 295.37383 | 20.79832 | 2.48905 | 0.1865030 | 0.23258229 | 2.6186952 | 20 | 6 5.6 | 19.2 |
| 199908 2007 $GK_{17}$ | 17.0 | $X$ | 10.39891 | 78.40561 | 219.87396 | 16.26710 | 0.1904223 | 0.24048240 | 2.5610252 | 20 | 9 4.9 | 19.9 |
| 199909 2007 $GY_{18}$ | 16.6 | $X$ | 27.29340 | 345.41827 | 34.66331 | 3.09296 | 0.1831551 | 0.26307679 | 2.4122058 | 20 | — | — |
| 199910 2007 $GM_{19}$ | 17.7 | $X$ | 97.56877 | 255.57262 | 31.90434 | 1.39165 | 0.1759249 | 0.25646596 | 2.4534821 | 20 | 12 16.8 | 21.7 |
| 199911 2007 $GH_{20}$ | 15.6 | $X$ | 8.88187 | 128.95862 | 228.53205 | 8.11479 | 0.0414691 | 0.18033338 | 3.1027871 | 20 | 10 29.4 | 19.7 |
| 199912 2007 $GO_{21}$ | 15.8 | $X$ | 32.20170 | 164.90143 | 166.64801 | 1.07904 | 0.1736245 | 0.17533494 | 3.1614798 | 20 | 11 14.8 | 20.0 |
| 199913 2007 $GO_{22}$ | 17.0 | $X$ | 129.64169 | 209.29139 | 44.54841 | 3.14162 | 0.1647823 | 0.25737696 | 2.4476892 | 20 | 12 3.9 | 21.0 |
| 199914 2007 $GW_{22}$ | 16.3 | $X$ | 15.22492 | 92.17627 | 207.82845 | 7.54632 | 0.1984710 | 0.24153371 | 2.5535883 | 20 | 9 23.3 | 18.9 |
| 199915 2007 $GC_{23}$ | 16.1 | $X$ | 9.35856 | 166.58640 | 214.62514 | 6.72802 | 0.2365131 | 0.25907065 | 2.4370096 | 20 | — | — |
| 199916 2007 $GN_{23}$ | 17.1 | $X$ | 105.86933 | 90.74948 | 179.73050 | 1.05329 | 0.1559087 | 0.25530594 | 2.4609083 | 20 | 12 2.7 | 20.9 |
| 199917 2007 $GL_{26}$ | 17.4 | $X$ | 184.42223 | 32.69332 | 185.63529 | 0.34082 | 0.1293876 | 0.26413246 | 2.4057742 | 20 | 12 15.7 | 20.9 |
| 199918 2007 $GO_{26}$ | 17.4 | $X$ | 19.19410 | 116.25722 | 156.26810 | 5.66537 | 0.1709698 | 0.23964400 | 2.5669950 | 20 | 8 17.1 | 20.0 |
| 199919 2007 $GJ_{27}$ | 15.8 | $X$ | 134.72825 | 308.61698 | 85.24219 | 5.51084 | 0.0759813 | 0.21261320 | 2.7801991 | 20 | 2 27.8 | 19.8 |
| 199920 2007 $GC_{28}$ | 16.1 | $X$ | 222.88428 | 137.71972 | 160.82044 | 5.98788 | 0.0982596 | 0.21306930 | 2.7762301 | 20 | 2 2.0 | 20.3 |

# ELEMENTS AND OPPOSITION DATES IN 2020

ECLIPTIC AND EQUINOX 2000.0, EPOCH 2020 MAY 31.0 TT

| Planet | $H$ | $G$ | $M$ | $\omega$ | $\Omega$ | $i$ | $e$ | $\mu$ | $a$ | TE | Oppos. | $V$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | m | | ° | ° | ° | ° | | ° | | | | |
| 199921 2007 $GS_{29}$ | 15.7 | $X$ | 21.93488 | 38.15210 | 225.04027 | 11.84419 | 0.1255615 | 0.23664489 | 2.5886378 | 20 | 7 28.2 | 18.9 |
| 199922 2007 $GX_{31}$ | 15.7 | $X$ | 329.58046 | 314.18752 | 312.13883 | 12.35581 | 0.1795779 | 0.22721481 | 2.6597753 | 20 | 4 13.7 | 18.9 |
| 199923 2007 $GU_{33}$ | 16.8 | $X$ | 119.05785 | 130.83626 | 158.11456 | 0.47808 | 0.1357543 | 0.18653058 | 3.0336771 | 20 | 12 23.3 | 21.7 |
| 199924 2007 $GC_{34}$ | 16.9 | $X$ | 265.27938 | 238.01093 | 318.50737 | 3.04974 | 0.1086509 | 0.27914342 | 2.3187350 | 20 | — | — |
| 199925 2007 $GZ_{35}$ | 17.1 | $X$ | 103.74528 | 229.42680 | 55.94712 | 6.61742 | 0.1162230 | 0.26031073 | 2.4292637 | 20 | 12 17.6 | 20.6 |
| 199926 2007 $GG_{36}$ | 17.6 | $X$ | 25.07937 | 114.33094 | 124.34119 | 2.69051 | 0.1466402 | 0.31015176 | 2.1614899 | 20 | 7 10.0 | 19.0 |
| 199927 2007 $GO_{36}$ | 16.6 | $X$ | 18.68110 | 216.14924 | 49.15054 | 10.42716 | 0.1734627 | 0.23735006 | 2.5835080 | 20 | 8 10.7 | 19.5 |
| 199928 2007 $GB_{37}$ | 15.4 | $X$ | 97.89347 | 234.61598 | 49.74741 | 9.52044 | 0.1974372 | 0.18128862 | 3.0918781 | 20 | 12 1.4 | 20.4 |
| 199929 2007 $GG_{37}$ | 17.3 | $X$ | 188.19795 | 240.48783 | 51.12063 | 7.67577 | 0.1126926 | 0.27877976 | 2.3207511 | 20 | — | — |
| 199930 2007 $GA_{39}$ | 16.4 | $X$ | 345.49770 | 103.27850 | 149.04423 | 2.63422 | 0.1526284 | 0.22908684 | 2.6452656 | 20 | 5 5.8 | 19.0 |
| 199931 2007 $GJ_{40}$ | 16.5 | $X$ | 159.84964 | 162.70862 | 163.87775 | 2.20705 | 0.0612178 | 0.20465990 | 2.8517682 | 20 | 1 2.0 | 20.5 |
| 199932 2007 $GL_{40}$ | 16.6 | $X$ | 24.70591 | 77.62928 | 169.48290 | 1.78061 | 0.0847263 | 0.23559368 | 2.5963324 | 20 | 7 8.7 | 19.7 |
| 199933 2007 $GV_{40}$ | 17.4 | $X$ | 126.44606 | 55.73284 | 213.48064 | 6.97564 | 0.0995089 | 0.26084532 | 2.4259435 | 20 | 12 20.4 | 21.0 |
| 199934 2007 $GR_{45}$ | 17.3 | $X$ | 126.37411 | 101.13522 | 162.67611 | 3.14383 | 0.1984234 | 0.25815205 | 2.4427874 | 20 | 12 13.9 | 21.4 |
| 199935 2007 $GB_{48}$ | 15.9 | $X$ | 61.38050 | 190.04654 | 111.46061 | 2.43713 | 0.1682728 | 0.17480604 | 3.1678535 | 20 | 11 13.7 | 20.5 |
| 199936 2007 $GO_{49}$ | 15.6 | $X$ | 303.99609 | 106.13929 | 186.94223 | 13.62608 | 0.1153770 | 0.22796489 | 2.6539378 | 20 | 4 28.9 | 19.0 |
| 199937 2007 $GU_{49}$ | 16.7 | $X$ | 269.10513 | 325.67402 | 201.12687 | 21.71046 | 0.0463957 | 0.35096393 | 1.9904949 | 20 | — | — |
| 199938 2007 $GD_{51}$ | 17.1 | $X$ | 228.69524 | 30.04300 | 214.63502 | 5.74371 | 0.0888442 | 0.27700187 | 2.3306707 | 20 | — | — |
| 199939 2007 $GU_{51}$ | 15.6 | $X$ | 46.77247 | 190.22294 | 118.75339 | 6.12639 | 0.1282957 | 0.17703793 | 3.1411728 | 20 | 11 2.2 | 20.0 |
| 199940 2007 $GD_{59}$ | 17.1 | $X$ | 156.33941 | 138.85289 | 238.88011 | 3.43586 | 0.1522756 | 0.29102875 | 2.2551674 | 20 | 2 26.8 | 20.4 |
| 199941 2007 $GD_{61}$ | 16.9 | $X$ | 314.07797 | 305.84726 | 265.16743 | 2.28530 | 0.0698287 | 0.29036367 | 2.2586097 | 20 | 1 19.2 | 19.6 |
| 199942 2007 $GQ_{65}$ | 17.2 | $X$ | 176.74739 | 0.46121 | 5.75734 | 3.72287 | 0.0496272 | 0.29292191 | 2.2454401 | 20 | 2 28.8 | 20.1 |
| 199943 2007 $GO_{67}$ | 16.5 | $X$ | 227.01520 | 9.48468 | 315.06111 | 1.25405 | 0.2230408 | 0.21417456 | 2.7666707 | 20 | 3 3.1 | 21.1 |
| 199944 2007 $GM_{73}$ | 16.9 | $X$ | 279.41636 | 149.46291 | 110.82097 | 6.73476 | 0.0928207 | 0.29185626 | 2.2509026 | 20 | 2 7.8 | 19.8 |
| 199945 2007 $GC_{75}$ | 15.7 | $X$ | 200.31102 | 168.36331 | 160.92856 | 4.66970 | 0.1313871 | 0.21033773 | 2.8002143 | 20 | 2 17.3 | 20.2 |
| 199946 2007 $HE_{2}$ | 17.4 | $X$ | 121.93690 | 70.08097 | 202.97274 | 3.04836 | 0.0734566 | 0.26232325 | 2.4168231 | 20 | 12 20.8 | 20.8 |
| 199947 Qaidam | 15.3 | $X$ | 323.90682 | 242.16998 | 56.50269 | 16.29672 | 0.2918716 | 0.23047086 | 2.6346648 | 20 | 5 10.5 | 17.9 |
| 199948 2007 $HK_{9}$ | 16.2 | $X$ | 93.38580 | 88.05501 | 272.62978 | 0.94335 | 0.0833442 | 0.19880209 | 2.9075158 | 20 | — | — |
| 199949 2007 $HR_{15}$ | 15.6 | $X$ | 312.45242 | 111.09548 | 179.94834 | 11.55576 | 0.1173090 | 0.22798157 | 2.6538083 | 20 | 5 9.2 | 18.9 |
| 199950 Sierpc | 16.3 | $X$ | 87.52528 | 277.73484 | 25.57239 | 7.71759 | 0.1398863 | 0.26380841 | 2.4077439 | 20 | 12 26.2 | 20.1 |
| 199951 2007 $HE_{24}$ | 16.0 | $X$ | 43.49427 | 353.01699 | 249.90854 | 3.14441 | 0.1963174 | 0.23692949 | 2.5865645 | 20 | 8 18.9 | 19.2 |
| 199952 2007 $HZ_{25}$ | 16.8 | $X$ | 54.29702 | 35.25478 | 208.02464 | 6.91389 | 0.0920333 | 0.23996092 | 2.5647342 | 20 | 8 17.6 | 20.2 |
| 199953 Mingnaiben | 16.2 | $X$ | 154.43858 | 160.02621 | 116.12511 | 6.80535 | 0.0924960 | 0.26933022 | 2.3747214 | 20 | — | — |
| 199954 2007 $HP_{28}$ | 17.0 | $X$ | 302.53044 | 91.03555 | 189.83941 | 12.48387 | 0.2542498 | 0.22652404 | 2.6651798 | 20 | 3 16.5 | 20.6 |
| 199955 2007 $HD_{30}$ | 16.4 | $X$ | 57.15776 | 309.54159 | 42.85595 | 4.20950 | 0.2211500 | 0.26562668 | 2.3967437 | 20 | — | — |
| 199956 2007 $HK_{35}$ | 17.2 | $X$ | 99.98130 | 235.31597 | 22.76421 | 4.58318 | 0.1617753 | 0.25271340 | 2.4777103 | 20 | 11 11.0 | 21.0 |
| 199957 2007 $HA_{38}$ | 16.7 | $X$ | 44.94537 | 261.91089 | 57.54271 | 6.21396 | 0.2047226 | 0.25462003 | 2.4653259 | 20 | 12 6.9 | 20.2 |
| 199958 2007 $HT_{41}$ | 16.2 | $X$ | 224.75940 | 81.80580 | 224.82013 | 7.82295 | 0.0993334 | 0.21250361 | 2.7811549 | 20 | 2 11.4 | 20.6 |
| 199959 2007 $HJ_{44}$ | 16.2 | $X$ | 114.71655 | 258.69967 | 10.63841 | 2.82343 | 0.1864945 | 0.18028856 | 3.1033013 | 20 | 11 27.9 | 21.2 |
| 199960 2007 $HZ_{47}$ | 16.9 | $X$ | 31.84951 | 190.87098 | 193.39611 | 6.39033 | 0.1410553 | 0.26557835 | 2.3970344 | 20 | — | — |
| 199961 2007 $HF_{48}$ | 17.6 | $X$ | 30.77029 | 89.50108 | 191.53013 | 5.66396 | 0.1404770 | 0.24241654 | 2.5473848 | 20 | 9 14.2 | 20.5 |
| 199962 2007 $HB_{50}$ | 16.7 | $X$ | 326.09880 | 207.77271 | 146.89774 | 5.02664 | 0.0704698 | 0.24455308 | 2.5325263 | 20 | 9 6.2 | 19.6 |
| 199963 2007 $HD_{52}$ | 15.1 | $X$ | 3.09794 | 226.06106 | 191.57319 | 9.99545 | 0.0904205 | 0.19091285 | 2.9870737 | 20 | — | — |
| 199964 2007 $HQ_{53}$ | 17.0 | $X$ | 352.18928 | 300.61647 | 181.49144 | 5.76892 | 0.0412100 | 0.27963973 | 2.3159906 | 20 | — | — |
| 199965 2007 $HG_{65}$ | 16.1 | $X$ | 83.13952 | 217.72754 | 80.40651 | 13.36431 | 0.1608385 | 0.25603294 | 2.4562476 | 20 | 12 15.3 | 19.9 |
| 199966 2007 $HL_{65}$ | 15.7 | $X$ | 6.41609 | 84.70385 | 173.40784 | 11.78960 | 0.0489552 | 0.23368686 | 2.6104368 | 20 | 6 22.2 | 19.1 |
| 199967 2007 $HG_{67}$ | 17.6 | $X$ | 102.10520 | 81.26244 | 161.46094 | 2.97242 | 0.1611949 | 0.25264351 | 2.4781673 | 20 | 10 26.8 | 21.5 |
| 199968 2007 $HE_{68}$ | 17.1 | $X$ | 123.75839 | 213.62462 | 75.65577 | 3.43284 | 0.0888790 | 0.26651491 | 2.3914155 | 20 | — | — |
| 199969 2007 $HV_{72}$ | 16.2 | $X$ | 80.06544 | 134.68224 | 134.44858 | 1.99915 | 0.1573021 | 0.17464897 | 3.1697526 | 20 | 10 25.1 | 21.0 |
| 199970 2007 $HE_{75}$ | 16.2 | $X$ | 110.80440 | 126.03826 | 134.68489 | 1.93629 | 0.1308505 | 0.17947747 | 3.1126438 | 20 | 11 12.4 | 21.1 |
| 199971 2007 $HA_{76}$ | 17.3 | $X$ | 227.43132 | 2.06216 | 193.39417 | 3.07441 | 0.1623799 | 0.26852097 | 2.3794901 | 20 | — | — |
| 199972 2007 $HC_{84}$ | 17.0 | $X$ | 73.68721 | 216.68895 | 223.42081 | 20.14724 | 0.1174707 | 0.36493213 | 1.9393729 | 20 | 1 2.5 | 18.8 |
| 199973 2007 $HX_{85}$ | 16.3 | $X$ | 343.45654 | 141.93657 | 188.20982 | 8.61609 | 0.1774077 | 0.23922803 | 2.5699697 | 20 | 8 29.1 | 18.5 |
| 199974 2007 $HY_{89}$ | 17.6 | $X$ | 173.89461 | 289.23993 | 5.69897 | 6.22649 | 0.1366829 | 0.28096649 | 2.3086940 | 20 | — | — |
| 199975 2007 $HG_{90}$ | 16.3 | $X$ | 350.10175 | 56.49098 | 204.87204 | 12.57586 | 0.1527375 | 0.23005407 | 2.6378460 | 20 | 5 29.0 | 19.1 |
| 199976 2007 $JR$ | 15.8 | $X$ | 315.50388 | 168.93736 | 177.09785 | 14.71621 | 0.1086360 | 0.23611539 | 2.5925065 | 20 | 7 29.5 | 19.1 |
| 199977 2007 $JB_{1}$ | 17.3 | $X$ | 19.62950 | 248.41744 | 38.57712 | 4.38756 | 0.2402205 | 0.24105260 | 2.5569849 | 20 | 9 23.1 | 19.8 |
| 199978 2007 $JZ_{1}$ | 15.6 | $X$ | 9.55611 | 215.21675 | 85.84932 | 11.52261 | 0.1614420 | 0.23849925 | 2.5752024 | 20 | 9 16.9 | 18.5 |
| 199979 2007 $JS_{4}$ | 15.8 | $X$ | 14.30404 | 72.92177 | 188.94895 | 7.70501 | 0.1619035 | 0.23312784 | 2.6146082 | 20 | 7 18.4 | 18.6 |
| 199980 2007 $JN_{5}$ | 17.1 | $X$ | 123.13096 | 214.68599 | 48.50109 | 2.32412 | 0.1248259 | 0.26021642 | 2.4298507 | 20 | 12 9.7 | 20.7 |
| 199981 2007 $JQ_{12}$ | 16.0 | $X$ | 346.92131 | 53.08134 | 184.54484 | 10.31420 | 0.1460406 | 0.22375089 | 2.6871559 | 20 | 4 18.3 | 18.8 |
| 199982 2007 $JG_{13}$ | 16.5 | $X$ | 0.12427 | 300.94883 | 357.51603 | 2.54527 | 0.1867820 | 0.23750143 | 2.5824102 | 20 | 8 20.3 | 18.6 |
| 199983 2007 $JJ_{13}$ | 15.8 | $X$ | 11.11054 | 264.33613 | 59.66996 | 13.53981 | 0.1948003 | 0.24255865 | 2.5463897 | 20 | 10 26.7 | 18.6 |
| 199984 2007 $JP_{16}$ | 16.9 | $X$ | 211.79693 | 62.21374 | 195.73099 | 6.72533 | 0.0820601 | 0.27799539 | 2.3251144 | 20 | — | — |
| 199985 2007 $JG_{17}$ | 17.8 | $X$ | 315.45341 | 61.43571 | 127.74188 | 1.63056 | 0.0973517 | 0.28443510 | 2.2898863 | 20 | — | — |
| 199986 Chervone | 15.2 | $X$ | 267.17917 | 221.17397 | 85.67456 | 13.79488 | 0.1631855 | 0.21884104 | 2.7271993 | 20 | 3 30.6 | 19.5 |
| 199987 2007 $JL_{21}$ | 15.6 | $X$ | 102.51662 | 256.72866 | 14.28424 | 9.73536 | 0.2115667 | 0.17706997 | 3.1407939 | 20 | 11 18.9 | 20.8 |
| 199988 2007 $JM_{21}$ | 16.2 | $X$ | 253.91078 | 6.92875 | 288.22268 | 2.30015 | 0.1733848 | 0.21397278 | 2.7684097 | 20 | 2 22.9 | 20.5 |
| 199989 2007 $JK_{23}$ | 15.6 | $X$ | 337.44976 | 227.54991 | 88.54339 | 8.54131 | 0.2041635 | 0.23382980 | 2.6093729 | 20 | 7 24.5 | 17.8 |
| 199990 2007 $JT_{23}$ | 16.9 | $X$ | 356.14790 | 89.85529 | 205.58104 | 1.74466 | 0.2152619 | 0.23533680 | 2.5982214 | 20 | 8 6.0 | 19.0 |
| 199991 2007 $JX_{24}$ | 17.1 | $X$ | 303.13454 | 205.61417 | 142.30697 | 0.77273 | 0.1285329 | 0.23652414 | 2.5895188 | 20 | 7 10.7 | 19.8 |
| 199992 2007 $JW_{25}$ | 16.1 | $X$ | 132.53628 | 280.00220 | 177.19903 | 6.07842 | 0.0714957 | 0.22604698 | 2.6689283 | 20 | 5 13.6 | 19.9 |
| 199993 2007 $JP_{27}$ | 16.0 | $X$ | 143.30856 | 3.27605 | 149.70030 | 13.34849 | 0.1836591 | 0.24221155 | 2.5488219 | 20 | 8 11.5 | 20.1 |
| 199994 2007 $JJ_{29}$ | 17.1 | $X$ | 273.31432 | 11.90849 | 213.44441 | 4.48424 | 0.1764210 | 0.28212146 | 2.3023886 | 20 | — | — |
| 199995 2007 $JV_{33}$ | 16.1 | $X$ | 83.92140 | 135.63583 | 186.55090 | 10.28860 | 0.1726145 | 0.18149279 | 3.0895588 | 20 | 12 30.5 | 21.1 |
| 199996 2007 $JA_{34}$ | 16.6 | $X$ | 197.29210 | 189.92423 | 216.59760 | 3.51692 | 0.0193610 | 0.23152410 | 2.6266684 | 20 | 5 22.4 | 20.0 |
| 199997 2007 $JB_{36}$ | 15.1 | $X$ | 320.42156 | 212.59958 | 101.74537 | 33.84649 | 0.1884453 | 0.23197994 | 2.6232263 | 20 | 6 17.8 | 18.1 |
| 199998 2007 $JU_{39}$ | 16.4 | $X$ | 341.22309 | 270.63190 | 353.87715 | 7.67937 | 0.2053568 | 0.22705822 | 2.6609981 | 20 | 5 5.5 | 19.0 |
| 199999 2007 $JZ_{39}$ | 16.1 | $X$ | 258.17865 | 172.15547 | 145.61126 | 5.75385 | 0.1228931 | 0.21837694 | 2.7310618 | 20 | 4 2.4 | 20.1 |
| 200000 2007 $JT_{40}$ | 15.8 | $X$ | 271.07007 | 203.50346 | 116.87333 | 7.70429 | 0.1525087 | 0.22093257 | 2.7099601 | 20 | 4 18.2 | 19.8 |