RASFX Correlator Processing Result

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RASFX correlator designed in IAA RAS in 2014 is mainly used for the UT1 determination. Since November 2015 there is regular daily VLBI data processing with R13M antennas of Badary and Zelenchukskaya observatories. At present more than 900 sessions were processed. Results of observations are shown. Sessions information (duration, frequency channels, bandwidth, polarization, bands, etc) and analisys of processing (UT1 and formal errors definition) are presented. DiFX correlator is also used for processing UT1 sessions. The result of the RASFX and DiFX correlators comparison is given.

Keywords: RASFX, Processing, Analyse.

1 Introdution

Russian Academy of Science correlator based on FX method of data processing was developed in Institute of Aplied Astronomy [1, 2]. Experimental sessions of observations have been beginning since November, 2015 and continues to present. This contribution contains some statistic of observations processing and results of processing analyses.

2 Processing statistic

All sessions processed by RASFX correlator are single-based, have a bandwidth 512 MHz, 2-bit sampling and following frequency settings:
1 S-channel with right and left polarizations + 2 X-channels with right polarization;
1 S-channel + 1 X-channel with right polarization;
1 S-channel + 3 X-channels with right polarization;
1 S-channel + 1 Ka-channel with right polarization;
1 S-channel with right and left polarizations + 3 X-channels with right polarization;

1 S-channel + 1 X-channel + 1 Ka-channel with right polarization;
1 S-channel + 3 X-channels with right polarization and 1 S-channel + 3 X-channels with left polarization.
Percentage ratios of different bands are shown in Fig. 1.

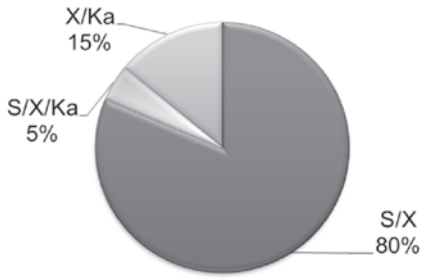

Fig. 1. Percentage ratios of different bands

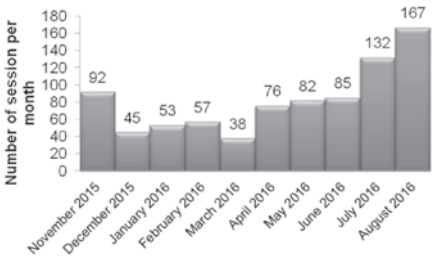

Fig. 2. Number of sessions per month during 10 month of processing

The next three figures contain statistic information about sessions and scans inside sessions. Fig. 2 shows number of sessions per month since November, 2015. Scans inside sessions were varied since digits of seconds till 1.5 minutes as it's shown in Fig. 3. During experimental VLBI observations and processing seldom there were some troubles with data recording, data transfer, data validity and data consistency, so it possible to estimate how many scans correlator managed by Fig. 4 viewing.

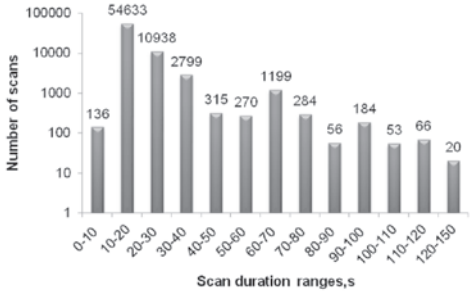

Fig. 3. Number of scans inside range during 10 month of processing

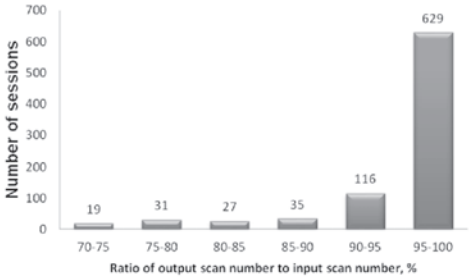

Fig. 4. Correlation fringes existence estimation for 10 month of processing

3 Analyses results

The next three figures presents UT1-UTC estimations got after analyses of RASFX correlator processing results. Full set of UT1-UTC estimations from November, 2015 to present are shown in Fig. 5. It is important to compare RASFX analyse results with analyse results made with another correlators. Analyse results of RASFX and DIFX correlators got with RT13 are shown in Fig. 6. Fig. 7 contains UT1-UTC estimation of ARC correlator got with RT32.

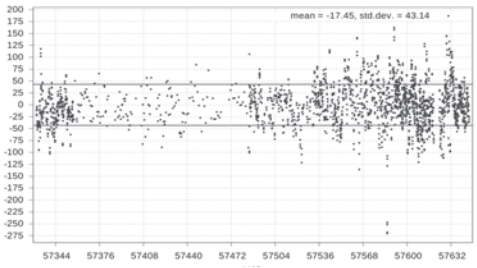

Fig. 5. Analyses UT1-UTC for sessions during 10 month of processing

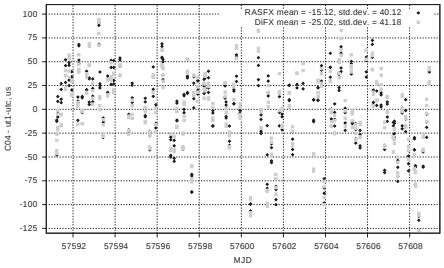

Fig. 6. Processing analyses comparison between RASFX and DIFX correlators

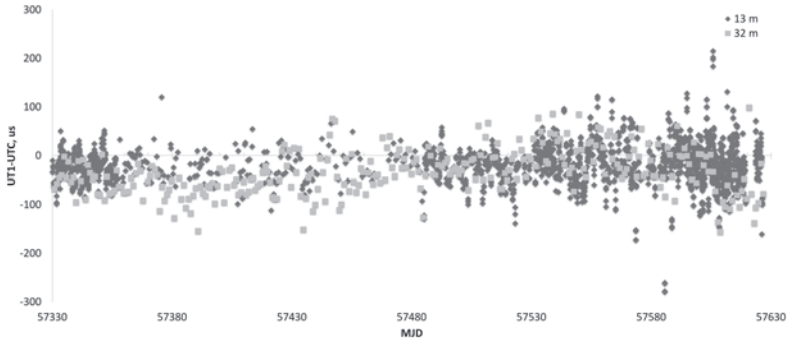

Fig. 7. Processing analyses comparison between RASFX and ARC correlators

4 Conclusion

In conclution, it should to notice that sessions of observations are about to continue. It is being planned to make correlations between narrow (32 MHz) and wide (512 MHz) bands, that allows to collaborate with foreign VLBI systems and compare systems accuracies of UT1-UTC estimation.

References

1. *Surkis I., Ken V., et. al.* The RASFX VGOS GPU Based Software Correlator // The 13^{th} EVN Symposium & Users Meeting Proceedings. Trudy IPA RAN, 2017. — Is. 41. — P. 123–126.
2. *Mishin V., et.al.* VGOS GPU Based Software Correlator Design // Presentations 3rd International VLBI Technology Workshop. — 2014.