

Svetloe Radio Astronomical Observatory 2015–2016 Report

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Abstract The current status as well as activities in 2015 and 2016 of the Svetloe Radio Astronomical Observatory are considered.

1 General Information

The “Quasar” VLBI Network is a unique Russian astronomical instrument created in the Institute of Applied Astronomy of the Russian Academy of Sciences (IAA RAS). The Network consists of three observatories including Svetloe in the Leningrad Region, Badary in Eastern Siberia, and Zelenchukskaya in the Northern Caucasus, and the Data Processing Center in St. Petersburg. Svetloe Observatory (Figure 1) was the first to be put into operation in 1999, the next was Zelenchukskaya in 2002, and finally Badary in 2005. Each observatory is equipped with at least three co-located instruments of different techniques: VLBI, SLR, combined GNSS receivers, and the DORIS system (Badary Observatory) [1]. The main instrument in each of three observatories is a 32-m radio telescope (RT-32), which provides a completely automatic process of observing radio sources and satellites in a radiometric or a radio interferometric mode. The main technical characteristics of the antennas are presented in Table 1. The RT-32 radio telescopes equipped with highly sensitive receivers provide signal amplification in 1.35 cm, 3.5 cm, 6 cm, 13 cm, and from 18 cm to 21 cm frequency bands in both circular polarizations. The baselines of

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the radio interferometer vary from 2,000 to 4,400 km. All observatories are linked by optical fiber lines and are equipped with identical hydrogen Time Standards, Water Vapor Radiometers, and meteorological stations, which are used by all types of observations.



Fig. 1 Svetloe Observatory.

2 Activities during the Past Two Years

Upgrading of the “Quasar” VLBI Network started in 2012. The aim of the upgrade was to create a Radio Interferometer of the new generation for improving the accuracy, reliability, and efficiency of providing the Earth rotation parameters to consumers in Russia and abroad. The Radio Interferometer of the new generation is designed to operate as part of the “Quasar” and international VLBI Networks. Currently, this new Radio Interferometer operates successfully and consists of two multi-band fast rotating Antenna Systems with

Table 1 Specifications of RT-32.

Mount	alt-azimuth
Configuration	Cassegrain
Subreflector scheme	asymmetrical
Main mirror diameter	32 m
Subreflector diameter	4 m
Focal length	11.4 m
Azimuth speed	1.0 °/sec
Elevation speed	0.5 °/sec
Limits by Az	$\pm 265^\circ$
Limits by El	$0^\circ - 85^\circ$
Axis offset	-6.7 ± 1.0 mm
Tracking accuracy	± 10 arcsec
Surface accuracy (RMS)	0.5 mm
Frequency range	1.4 – 22 GHz
Polarization	LCP + RCP

a mirror diameter of 13.2-m (RT-13), which were installed at the Zelenchukskaya and Badary observatories in 2015 [2]. Installation works at Svetloe Observatory are scheduled to be completed in 2018.

During 2015–2016, RT-32 at Svetloe Observatory participated in both IVS and domestic (Ru-E and Ru-I) VLBI observations. Activities of the observatory are presented in Table 2. e-VLBI data transfer is used in the Svetloe for the domestic Ru-I sessions.

Table 2 VLBI observations of RT-32 of Svetloe Observatory.

Sessions	2015	2016
IVS-R4	23	18
IVS-T2	1	5
EUROPE	2	5
IVS-Intensive	19	18
Ru-E	37	35
Ru-I	16	4

3 Future Plans

In the next two years, the Svetloe Observatory will continue to participate in IVS and domestic VLBI observations, upgrade of the existing equipment, and replacement of obsolete equipment.

References

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