Svetloe Radio Astronomical Observatory

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Abstract

This report summarizes information about the Svetloe Radio Astronomical Observatory activities in 2012. Last year, a number of changes took place in the observatory to improve some technical characteristics and to upgrade some units to their required status. The report provides an overview of current geodetic VLBI activities and gives an outlook for the future.

1. General Information

The Svetloe Radio Astronomical Observatory (Figure 1) was created by the Institute of Applied Astronomy (IAA) as the first station of the Russian VLBI network QUASAR [1].

The sponsoring organization of the project is the Russian Academy of Sciences (RAS). The Svetloe Radio Astronomical Observatory is situated near the village Svetloe, in the Priozersky district, Leningrad Region (Table 1). The geographic location of the observatory is shown on the IAA RAS Website: *http://www.ipa.nw.ru/PAGE/rusipa.htm*. The main instruments of the observatory are the 32-m radio telescope equipped with special technical systems for VLBI observations, GPS/GLONASS/Galileo receivers, and the SLR system.

Figure 1. Svetloe observatory.

Table 1. Svetloe Observatory location and address.

Longitude	$29°47'$
Latitude	$60°32'$

Leningrad region, Priozerski district
188833 Russia
rahimov@osvtl.spb.ru

2. Technical Staff

Prof. Ismail Rahimov — the head of the observatory,
Vladimir Tarasov — the chief engineer,
Tatiana Andreeva — the engineer, and
Andrey Mikhailov — FS, pointing system control specialist.

3. Technical and Scientific Information

Table 2. Technical parameters of the radio telescope.

Year of construction	2000
Mount	AZEL
Azimuth range	$\pm 270°$ (from south)
Elevation range	from $-5°$ to $95°$
Maximum azimuth *	
- velocity	0.83 °/s
- tracking velocity	2.5 $'$/s
- acceleration	12.0 $'/s^2$
Maximum elevation *	
- velocity	0.5 °/s
- tracking velocity	0.8 $'$/s
- acceleration	12.0 $'/s^2$
Pointing accuracy	better than $10''$
Configuration	Cassegrain (with asymmetrical subreflector)
Main reflector diameter	32 m
Subreflector diameter	4 m
Focal length	11.4 m
Main reflector shape	quasi-paraboloid
Subreflector shape	quasi-hyperboloid
Main reflector surface accuracy	$\pm$ 0.5 mm
Frequency range	1.4–22 GHz
Axis offset *	5.5 ± 2.0 mm

* These values were changed to optimize the performance of the antenna system. The axis offset was measured in summer 2011 by geodesist Andrey Shamov.

4. Co-location of VLBI, GPS/GLONASS, and SLR System

The Topcon GPS/GLONASS/Galileo receiver with meteo station WXT-510 is in operation (Figure 2).

Figure 2. Topcon GPS/GLONASS/Galileo receiver at Svetloe observatory.

The SLR system "Sazhen-TM" (Figure 3) was mounted in October 2011 and joined ILRS in March 2012.

The technical characteristics of the system are presented in Table 3.

Figure 3. "Sazhen-TM" SLR system at Svetloe observatory.

5. Current Status and Activities

The Svetloe observatory participates in IVS and domestic VLBI observing programs. In 2012, Svetloe station participated in 28 diurnal IVS-R4, IVS-T2, and EURO sessions and in 18 IVS Intensive sessions.

Table 3. Technical parameters of the SLR system "Sazhen-TM".

Ranging distance, day	400-6000 km
Ranging distance, night	400-23000 km
Aperture	25 cm
Wavelength	532 nm
Beam divergence	12″
Laser pulse frequency	300 Hz
Pulse energy	2.5 mJ
Mass	170 kg
Normal points precision	1 cm
Angular precision	1-2″

Svetloe participated in 47 diurnal sessions of the domestic Ru-E program for determining all Earth orientation parameters, and in 36 one-hour Ru-U sessions to obtain Universal Time using e-VLBI data transfer.

6. Outlook

We have the following plans for the coming year:

- To participate in IVS observations
- To carry out domestic observing programs to obtain Universal Time with e-VLBI data transfer and Earth orientation parameters once a week
- To carry out SLR observations of geodetic and navigation satellites
- To participate in EVN and RADIOASTRON observing sessions
- To continue geodetic monitoring of the antenna parameters.

References

[1] Finkelstein A., Ipatov A., Smolentsev S. The Network "Quasar": 2008-2011 // "Measuring the future", Proceedings of the Fifth IVS General Meeting, A. Finkelstein, D. Behrend (eds.), St. Petersburg, "Nauka", 2008. pp. 39–46.