Svetloe Radio Astronomical Observatory

Sergey Smolentsev, Ismail Rachimov

Abstract

This report provides information about changes in the Svetloe Radio Astronomy Observatory (SvRAO) status in period spanning after the last IVS report. The activities during 2003, the current status, and future plans are described. In 2003, after successful installation of a Mark 3A terminal in cooperation with NASA, SvRAO started participation in IVS observing program, which is our main achievement during last year, and a major milestone for the QUASAR project.

1. Introduction

Svetloe Radio Astronomical Observatory (SvRAO) was founded by the Institute of Applied Astronomy (IAA) as the first station of Russian VLBI network QUASAR. Sponsoring organization of the project is Russian Academy of Sciences. The site is located at the Karelian Neck near Svetloe village about 100 km north from St. Petersburg. The basic instruments of the observatory are 32-m radio telescope RTF-32 and technical systems provided realization of VLBI observations.

During last years Svetloe observatory regularly participated in various radio astronomy programs including VLBI and RL VLBI observations of quasars, Sun, planets, asteroids using recording terminal S2-RT. In particular, several observing sessions were performed on the baseline Svetloe–Zelenchukskaya.

In 2003, after successful installation of a Mark 3A terminal in cooperation with NASA, on Mar 6, 2003 SvRAO started participation in IVS observing program, which is our main achievement during last year, and a major milestone for the QUASAR project [1].

2. Participation in IVS Observing Programs

During 2003 Svetloe IVS station participated in 21 R4, T2 and EURO sessions (Table 1).

Table 1. List of IVS sessions observed at SvRAO in 2003.

Month	R4	T2	EURO
March	2	1	
April	2	1	
May	1	1	1
June	1		
July	2		
August	2		
September	2		1
October	3		
November	1		
Total	16	3	2

Four R4 sessions were not correlated in time because of delay in tape delivering due to customs problems. Four scheduled experiments were not observed due to BBC upgrade at Signatron (USA),

one experiment was not observed due to planned repair of radio telescope, and one experiment was cancelled. Totally 16 sessions were correlated and are available for scientific analysis.

An analysis of the observations performed at the IAA by means of OCCAM software allowed us to determine SVETLOE coordinates at the millimeter level of accuracy. It was also shown that including Svetloe observatory in the IVS network yields essential improvement of the accuracy of determination of the EOP. We processed the same observations using all participating stations and excluding SVETLOE from the network. The results of comparison showed a decrease both in EOP uncertainty and postfit wrms [2].

3. Radio Telescope

Geodetic control measurements at the radio telescope dish surface were fulfilled (Fig 1). The antenna was painted in August 2003.

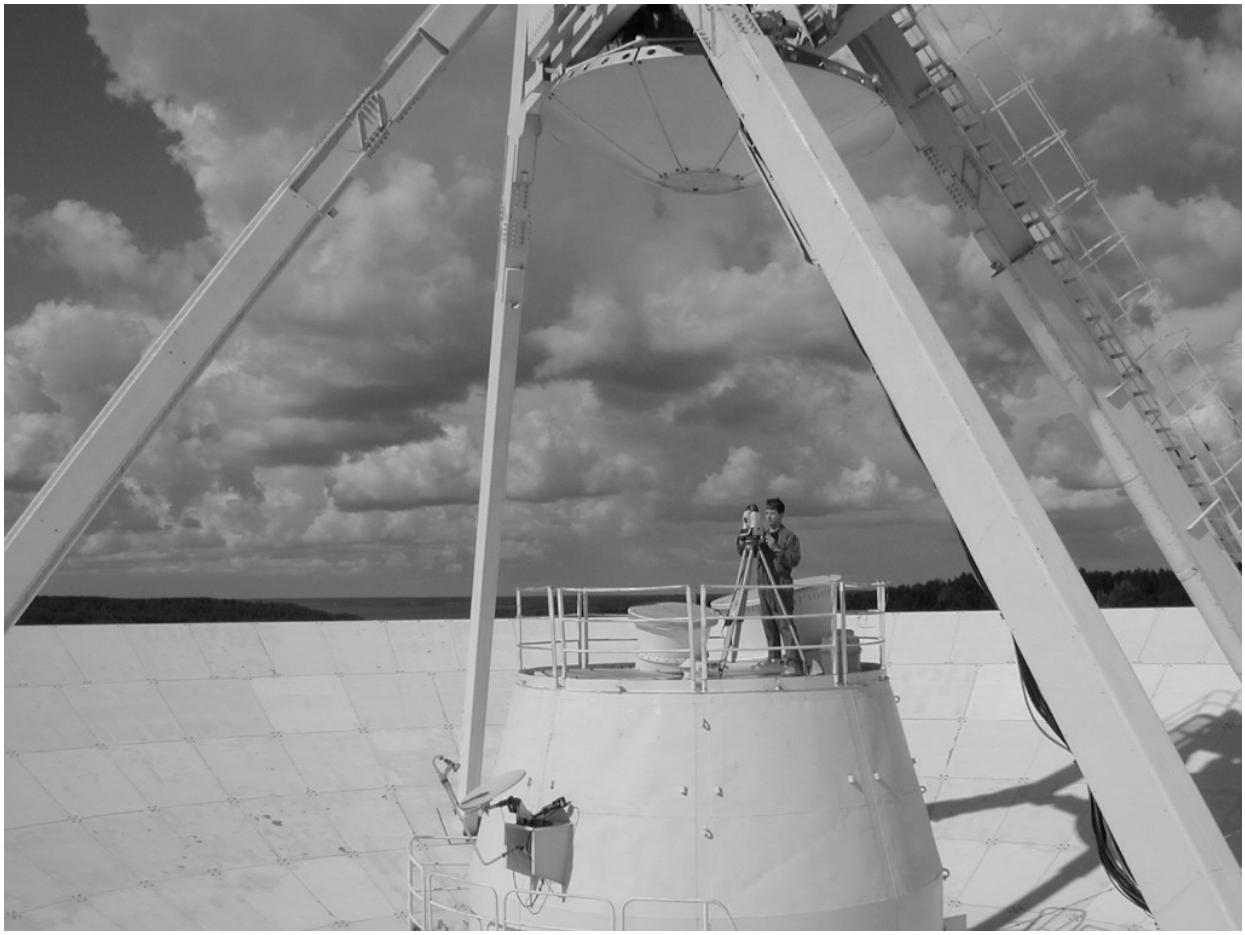

Figure 1. Geodetic control of the radio telescope surface.

The radio telescope is equipped with 5 low-noise cooled receivers with HEMT amplifiers for wavelengths 1.35, 3.5, 6.0, 13 and 18/21 cm for observations in the left and right circular polarizations. The parameters of the LCP X band receiver were improved. The latest results of

measurements of radio telescope parameters carried out in 2003 are presented in Table 2.

Table 2. Parameters of the radio telescope RTF-32 at SvRAO.

Band	Pol	Frequency range, MHz	T_{rec}, K	T_{sys}, K	SEFD
X	R	8180–8880	15	40	250
	L	8180–8680	13	38	240
S	R	2150–2500	42	80	600

4. Collocation with GPS

A permanent GPS receiver was installed at Svetloe in 1996. Svetloe observatory participated in several regional and global geodetic GPS projects, and is an EPN station from 1996, and an IGS station from 2003.

The local geodetic network (LGN) was established at SvRAO in 1994 (see IVS 2000 Annual Report). In 1995–1998 several local surveys were performed at Svetloe. In result, GPS marker is tied to the LGN with the accuracy about 2 mm. However, we still cannot provide an accurate survey involving the VLBI radio antenna. In December 2003 a leveling sessions was carried out to check LGN markers stability.

5. Outlook

Our plans for the coming year are the following.

- Recording terminal Mark 5A will be put into operation.
- Installation of Canadian S2 DAS in cooperation with NRCan and start in the IVS E3 observing program.
- Participation in 39 IVS R4, T2, EURO and E3 observing sessions.
- Geodetic survey for accurate tie between the radio telescope and the SVTL GPS marker.

References

[1] Finkelstein, A. M., A. V. Ipatov, S. G. Smolentsev, V. G. Grachev, I. A. Rahimov, Z. M. Malkin, 2003: Highly Accurate Determination of the Coordinates and the Earth's Rotation Parameters Involving the Svetloe VLBI Observatory. Astronomy Letters, 2003, **29**, No 10, 667–673.

[2] Finkelstein, A., V. Gratchev, A. Ipatov, Z. Malkin, I. Rahimov, E. Skurikhina, S. Smolentsev Some results of the first year of participation of the Svetloe observatory in IVS observing programs. To be presented at the Third IVS General Meeting Abstracts, Ottawa, Canada, Feb 9–11, 2004.