Badary Radio Astronomical Observatory 2014 IVS Annual Report

Sergey Smolentsev, Valery Olifirov, Dmitry Ivanov

Abstract This report provides information about the Badary network station: general information, facilities, staff, present status, activities during 2014, and outlook.

1 General Information

The Badary Radio Astronomical Observatory (Figure 1) was founded by the Institute of Applied Astronomy (IAA) as one of three stations of the Russian VLBI network QUASAR. The sponsoring organization of the project is the Russian Academy of Sciences (RAS). The Badary Radio Astronomical Observatory is situated in the Republic Buryatia (East Siberia) about 130 km east of Baikal Lake (see Table 1). The geographic location of the observatory is shown on the IAA RAS Web site (http://www.ipa.nw.ru/PAGE/rusipa.htm). The basic instruments of the observatory are a 32-m radio telescope equipped with special technical systems for VLBI observations and a 13.2-m VGOS antenna. The observatory is also equipped with co-location instruments such as GPS/GLONASS/Galileo receivers, a "DORIS" beacon, and an SLR system. In 2014 a WVR was installed.

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Table 1 Badary Observatory location and address.

Longitude	$102^\circ 14'$
Latitude	$51^\circ 46'$
Republic Buryatia	
671021, Russia	
oper@badary.ipa.stbur.ru	

2 Technical Staff

Table 2 Staff related to VLBI operations at Badary.

Valery Olifirov	observatory chief
Alex Maklakov	chief engineer, FS, pointing system control
Roman Kuptsov	engineer
Andrey Mikhailov	FS, pointing system control

3 Component Description

3.1 Technical and Scientific Information

Characteristics of the radio telescope are presented in Table 3.

3.2 Co-location of VLBI, GPS/GLONASS, DORIS, and SLR System

Badary observatory is equipped with the Javad GPS/GLONASS/Galileo receiver, The SLR system "Sazhen-TM" (Figure 3), "DORIS" beacon, and

Fig. 1 Badary observatory.

Table 3 Technical parameters of the radio telescope.

Year of construction	2005
Mount	AZEL
Azimuth range	$\pm 270^\circ$ (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	3.7 ± 2.0 mm

automatic meteorological station WXT-510 are in operation (Figure 2).

4 Current Status and Activities during 2014

Badary observatory participates in IVS and domestic VLBI observing programs. During 2014, Badary station participated in 49 24-hour IVS sessions — 25 IVS-R4, two IVS-T2, two EUROPE, five R&D, and 15 IVS-CONT.

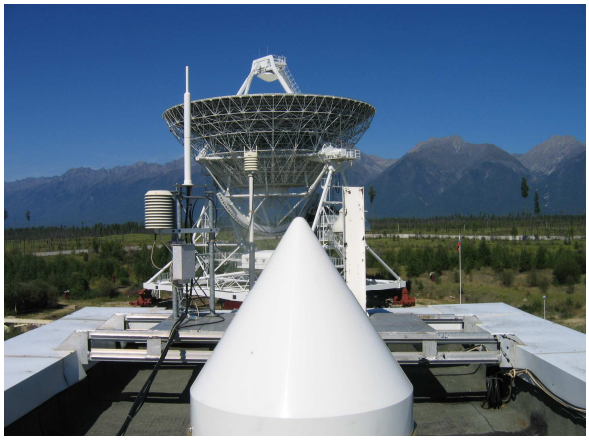

Fig. 2 Javad GPS/GLONASS/Galileo receiver and“DORIS” beacon at the Badary observatory.

Badary participated in 48 24-hour sessions in the framework of the domestic Ru-E program for determination of all Earth orientation parameters and in 361 one-hour Ru-U sessions for obtaining Universal Time using e-VLBI data transfer. e-VLBI data transfer is used for Badary observation data for Ru-E sessions too.

Finally, the installation of the 13.2-m antenna system and all necessary equipment is finished. RT-13 (Figure 4) saw “first light” (Figure 5).

In 2014 a WVR was installed and successfully worked (Figure 6).

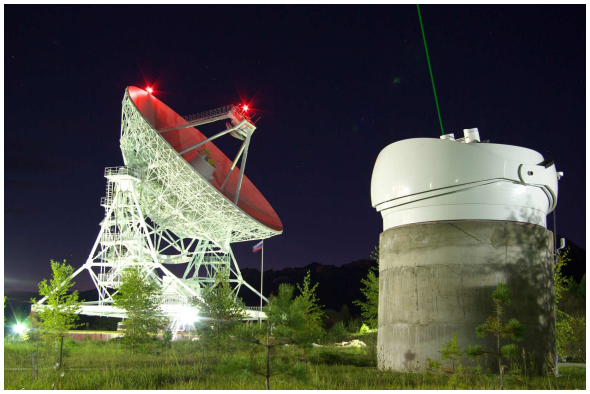

Fig. 3 "Sazhen-TM" SLR system at Badary observatory observed 2,803 passes of LAGEOS, GLONASS et al. and obtained 22,834 normal points during 2014.

Fig. 4 RT-13 antenna at Badary observatory.

5 Future Plans

Our plans for the coming year are the following:

- To participate in IVS sessions,

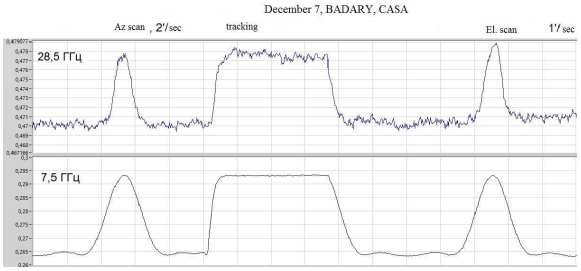

Fig. 5 "First light" of RT-13 antenna at Badary observatory.

Fig. 6 WVR at Badary observatory.

- To carry out domestic observing programs for obtaining Universal Time daily and for obtaining Earth orientation parameters with e-VLBI data transfer weekly,
- To carry out SLR observations of geodetic and navigation satellites,
- To participate in EVN and RADIOASTRON observing sessions,
- To continue geodetic monitoring of the RT-32 parameters,
- To perform WVR measurements on a regular basis,
- To comission RT-13,
- To begin regular observations with RT-13 in 2015.

References

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