Zelenchukskaya Radio Astronomical Observatory 2013 IVS Annual Report

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Abstract This report summarizes information on activities at the Zelenchukskaya Radio Astronomical Observatory in 2013. During the previous year a number of changes were carried out at the observatory to improve some technical parameters and to upgrade some units to required status. The report also provides an overview of current geodetic VLBI activities and gives an outlook for the next year.

1 General Information

Zelenchukskaya 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 Zelenchukskaya Radio Astronomical Observatory is situated in Karachaevo-Cherkesskaya Republic (the North Caucasus) about 70 km south of Cherkessk, near Zelenchukskaya village (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, GPS/GLONASS/Galileo receivers, and an SLR system.

Institute of Applied Astronomy of RAS

Network Station Zelenchukskaya

Table 1 Zelenchukskaya Observatory location and address.

Longitude	41°34′
Latitude	43°47′
Karachaevo-Cherkesskaya Republic	
369140, Russia	
ipazel@mail.svkchr.ru	

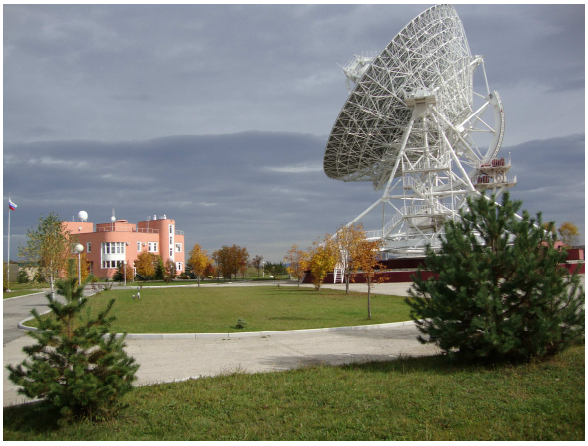

Fig. 1 Zelenchukskaya observatory.

2 Technical Staff

Table 2 Staff related to VLBI operations at Zelenchukskaya.

Andrei Dyakov	observatory chief
Dmitry Dzuba	FS, pointing system control
Anatoly Mishurinsky	front end and receiver support
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.

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	$0.83\ ^\circ$/s
- tracking velocity	$2.5\ '$/s
- acceleration	$12.0\ '/s^2$
Maximum elevation	
- velocity	$0.5\ ^\circ$/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

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

The Javad GPS/GLONASS/Galileo receiver with meteo station WXT-510 is in operation (Figure 2). The SLR system "Sazhen-TM" (Figure 3) at Zelenchukskaya observatory joined the ILRS in March 2012. The technical parameters of the system are presented in Table 3.

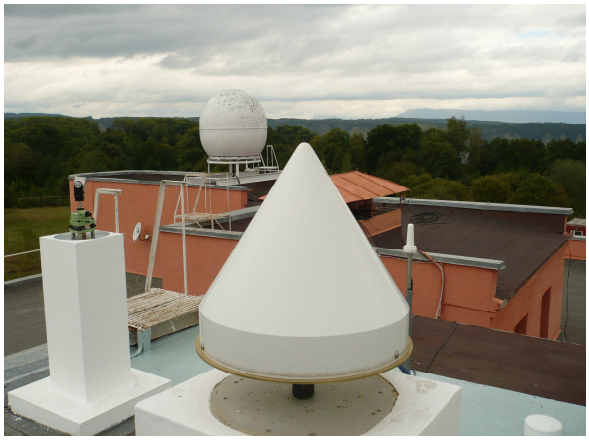

Fig. 2 Javad GPS/GLONASS/Galileo receiver at the Zelenchukskaya observatory.

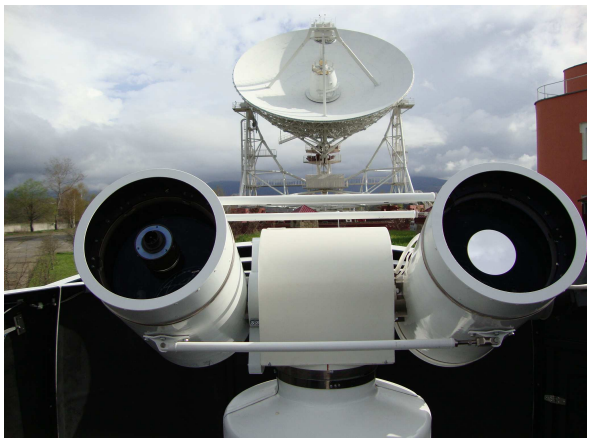

Fig. 3 "Sazhen-TM" SLR system at Zelenchukskaya observatory observed 744 passes of Lageos, GLONASS et al. and obtained 1278 normal dots.

4 Current Status and Activities during 2013

Zelenchukskaya observatory participates in IVS and domestic VLBI observational programs. During 2013 Zelenchukskaya station participated in 31 diurnal IVS sessions — 25 IVS-R4 sessions, two IVS-T2 sessions, and four EURO sessions.

Zelenchukskaya participated in 48 diurnal sessions in the frame of the domestic Ru-E program for determination of all Earth orientation parameters and in 349 one-hour Ru-U sessions for obtaining Universal Time using e-VLBI data transfer. Since April 2013, we have

used e-VLBI data transfer for Zelenchukskaya observational data for the Ru-E 24-hour sessions.

Finally, an antenna tower for the 13.2-m dish was built.

Fig. 4 Antenna tower for the 13.2-m dish and RT-32 at Zelenchukskaya observatory.

5 Future Plans

Our plans for the coming year are the following:

- To participate in IVS observations including the CONT14 IVS campaign,
- To carry out domestic observational programs for obtaining Universal Time daily and for obtaining Earth orientation parameters weekly with e-VLBI data transfer,
- To carry out SLR observations of geodetic and navigation satellites,
- To participate in EVN and RADIOASTRON observational sessions,
- To continue geodetic monitoring of the RT-32 parameters,
- To install a WVR, and
- To finish VLBI2010 antenna installation in 2014.

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.