

# Zelenchukskaya Radio Astronomical Observatory 2014 IVS Annual Report

Sergey Smolentsev, Andrei Dyakov, Dmitry Ivanov

**Abstract** This report summarizes information on activities at the Zelenchukskaya Radio Astronomical Observatory in 2014. The report 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 and a 13.2-m VGOS antenna. The observatory is also equipped with co-location instruments such as GPS/GLONASS/Galileo receivers and an SLR system. In 2014 a WVR was installed.

---

Institute of Applied Astronomy of RAS

Network Station Zelenchukskaya

IVS 2014 Annual Report

**Table 1** Zelenchukskaya Observatory location and address.

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

## 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 RT-32 are presented in Table 3.

### 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). During 2014 “Sazhen-TM” SLR system at Zelenchukskaya observatory observed 1,767 passes of LAGEOS,



**Fig. 1** Zelenchukskaya 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 $-5^\circ$ to $95^\circ$
Maximum azimuth	
- velocity	$0.83^\circ/\text{s}$
- tracking velocity	$2.5'/\text{s}$
- acceleration	$12.0''/\text{s}^2$
Maximum elevation	
- velocity	$0.5^\circ/\text{s}$
- tracking velocity	$0.8'/\text{s}$
- acceleration	$12.0''/\text{s}^2$
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	$3.7 \pm 2.0$ mm

normal points. The technical parameters of the system are presented in Table 3.



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

In 2014 a WVR was installed at Zelenchukskaya, and it successfully works.

GLONASS, and other satellites and obtained 8,768



**Fig. 3** “Sazhen-TM” SLR system at Zelenchukskaya observatory.



**Fig. 4** 13.2 m at Zelenchukskaya observatory.

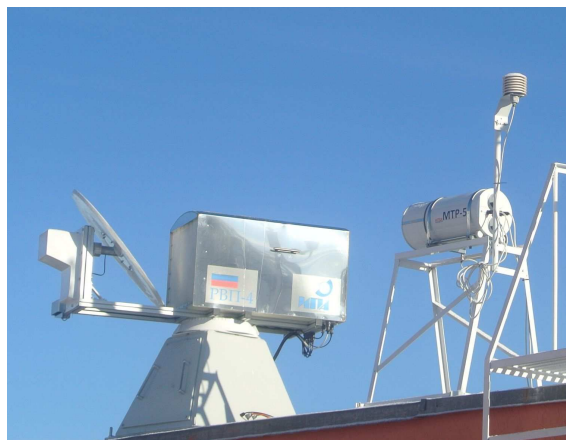
#### 4 Current Status and Activities during 2014

Zelenchukskaya observatory participates in IVS and domestic VLBI observational programs. During 2014 Zelenchukskaya station participated in 50 24-hour IVS sessions — 25 IVS-R4 sessions, three IVS-T2 sessions, two EUROPE, five R&D, and 15 IVS-CONT sessions.

Zelenchukskaya participated in 48 24-hour sessions in the framework of the domestic Ru-E program for determination of all Earth orientation parameters and in 364 one-hour Ru-U sessions for obtaining Universal Time using e-VLBI real time data transfer. e-VLBI data transfer is used for Zelenchukskaya observational data for the Ru-E 24-hour sessions, too.

Mounting of the 13.2-m antenna on its pedestal (Figure 4) is finished.

In 2014 a WVR was installed and successfully worked (Figure 5).



**Fig. 5** WVR at Zelenchukskaya observatory.

- 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 perform regular WVR observations,
- To install receiver and other equipment of RT-13 and commission RT-13 in 2015.

#### 5 Future Plans

Our plans for the coming year are the following:

- To participate in IVS sessions,
- To carry out domestic observational programs for obtaining Universal Time daily and for obtaining Earth orientation parameters weekly with e-VLBI data transfer,

#### 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.