Zelenchukskaya Radio Astronomical Observatory

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Abstract

This report briefly summarizes the observational activities at the Zelenchukskaya observatory during the year 2009.

1. General Information

Zelenchukskaya Radio Astronomical Observatory (ZcRAO) was founded by 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 the Republic Karachaevo-Cherkessiya (Northern Caucasia) about 70 km south of Cherkessk, near to the Zelenchukskaya site (not far from Radiotelescope RATAN-600). The geographic location of the observatory is shown on the IAA RAS Web site: $http://www.ipa.nw.ru/PAGE/koi8-r/DEPOBSERV/rus\_zel.htm$. The basic instruments of the observatory are a 32-m radio telescope and technical systems provided for the realization of VLBI observations (see Fig. 1).

Figure 1. Zelenchukskaya Observatory.

Table 1. Zelenchukskaya Observatory location and address.

Longitude	$41^\circ 34'$
Latitude	$43^\circ 47'$
Zelenchukskaya Observatory	
Republic Karachaevo-Cherkessia	
369140, Russia	
ipazel@mail.svkchr.ru	

2. Technical and Scientific Information

The technical parameters of the radiotelescope RT-32 and the ZcRAO equipment are presented in Table 2.

The data acquisition system VLBA-4 is equipped with recording terminals Mark 5B, Mark 5A, and RDR-1 (for the RADIOASTRON mission).

The permanent GPS receiver ASHTECH Z-X113 with an ASH 700936D_M antenna Dorne-Margolin/Choke Ring was installed at the observatory in 2006. Observed data are sent to BKG and IGS every hour.

Table 2. Technical parameters of the radio telescope.

Year of construction	2000
Mount	AZEL
Azimuth range	$\pm 270^\circ$ (from south)
Elevation range	from -5° to 95°
Maximum azimuth - velocity - tracking velocity - acceleration	 1.5 °/s 1.5 ′/s 0.2 $^\circ/s^2$
Maximum elevation - velocity - tracking velocity - acceleration	 0.8 °/s 1.0 ′/s 0.2 $^\circ/s^2$
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
Surface tolerance of main reflector	± 0.5 mm
Frequency capability	1.4–22 GHz
Axis offset	-11.5 ± 0.5 mm

3. Technical Staff

Andrei Dyakov — Observatory chief,
Dmitry Dzuba — FS, pointing system controls,
Anatoly Mishurinsky — front end and receiver support.

4. Current Status and Activities

ZcRAO participates in IVS and Russian Domestic VLBI observations. Table 3 summarizes the IVS VLBI sessions performed during 2009 at ZcRAO: in all 59 IVS sessions, including 13 IVS-R1, 38 IVS-R4, 1 EUROPE, 2 IVS-T2, 1 IYA09, and 4 VLBA sessions.

Table 3. List of IVS sessions observed at ZcRAO in 2009.

Month	IVS-R1	IVS-R4	VLBA	T2	EURO	IYA09
January	2	2	1			
February		3				
March	2	4				
April		4	1			
May	2	3				
June		3		1		
July	1	3	1			
August	1	2		1		
September	1	3			1	
October	1	3				
November	1	3				1
December	2	5	1			
Total	13	38	4	2	1	1

During 2009 the Zelenchukskaya observatory participated in VLBI observations of the QUASAR network: in 20 Ru-E sessions (24-hour sessions for EOP monitoring) and 28 Ru-U sessions (4 1-hour sessions for UT1 measurement); 17 of these were provided in e-VLBI mode. In April 2009, the first e-VLBI sessions were successfully carried out. Since September 2009 the Ru-U sessions for UT1 have been held in e-VLBI mode.

In 2009 the electronic part of the hydrogen maser CH1-80 was upgraded. A modernized hydrogen maser CH1-80M has been installed at Zelenchukskaya observatory.

Reflector alignment was performed at Zelenchukskaya RAO in 2009; the surface rms was 0.47 mm after that.

5. Outlook

Our plans for the coming year are the following:

- Participation in 34 IVS observing sessions: IVS-R4, IVS-T2, VLBA and EURO.
- Participation in weekly domestic observational sessions for obtaining Earth orientation parameters and in weekly 1-hour e-VLBI sessions for UT1 determination.
- Surveying the local geodetic network.
- GPS Javad receiver installation.
- Preparation for laser ranging system installation.
- Participation in EVN observations.