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Multi-Frequency Monitoring of a Sample of Extragalactic Radio Sources

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Abstract. The preliminary results of monitoring of simultaneous spectra of a sample of extragalactic sources are given.[1] Eight sets of observations were done at the RATAN-600 radio telescope in 1995-1996 at six frequencies (0.96, 2.3, 3.9, 7.7, 11.2, and 22 GHz). The light curves as well as the variability parameters are given.

1. Observations and Data Reduction

This paper presents the preliminary results of a two-year monitoring program at five-six frequencies. The total number of monitored sources was 66 of different kind of objects from the extragalactic "zoo" (QSO, RG, CSO, BL Lac, Lens and etc.) and different kind of spectra (flat, GPS, CSS) on Declination range from -24° to +44°. During 1995-1996 six-eight sets of observations were done for most objects from the list.

The observations were done by transit mode at the North sector of the RATAN-600 radio telescope at 2.7 cm, 3.9 cm, 7.6 cm, 13 cm, and 31 cm (at some sets we used 1.38 cm receiver too). Usually each source was observed 5-8 times per set. Scans of all of the sources were corrected for baseline and Gaussians were fit to the response. The accuracy of flux densities were determined as the "standard error" from the N observations of each source during a set.

The calibration sources listed in the next Table were used to convert the response to janskys:

Table 1. Adopted Calibrator Sources Flux Densities.

Name	$S_{1.38}$	$S_{2.7}$	$S_{3.9}$	$S_{7.6}$	S_{13}	S_{31}
1245−197	0.63	1.24	1.75	3	4	6.3
0624−058	1.15	2.76	4.16	8.11	12.8	24.1
0518+165	1.15	2.28	2.91	4.04	6.38	10.1
1328+307	2.49	4.22	5.53	8.57	11.5	17.2
0134+329	1.24	2.5	3.63	6.88	10.9	21.9
2105+420	5.5	6.02	6.33	5	2.6	-

Notes: NAME: name of the source;$S_{1.38}, S_{2.7}, S_{3.9}, S_{7.6}, S_{13}, S_{31}$: fluxes on corresponding wavelength in Jy.

For the RATAN-600 radio telescope the antenna gain depends upon source declination (i. e. elevation above the horizon) as well as upon wavelength, and its behavior was determined by measuring antenna temperatures at all wavelengths of sources of known flux density spanning a wide range of declination (see Table above). On the next Figure 1 one can see typical calibration curve at λ=2.7 cm.

[1]Figures 2, 3, 4 and Table 2 are available electronically via anonymous *ftp* on site *big1.sao.ru* in directory */data/ratan/variability_paper*.

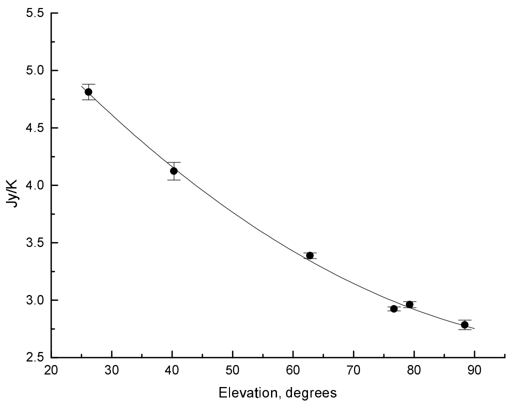

Figure 1. Typical calibration curve of antenna at λ=2.7 cm.

These data were found to be well described by gain curves of the form,

$g = a - b \cdot H + c \cdot H^2$,

where H is the elevation of the source above the horizon. The fitted values of a, b and c were determined for each sets and each wavelengths.

2. Results

For the time being the main results of this work are available only in the form of light curves and variability parameters (see Figure 2 and Table 2). In some cases the error bars on the light curves are greater than might be expected from the system sensitivity (antenna + receiver). More accurate inspection of data has shown that it is because of intraday variability (IDV). As an example on Figure 3 one can see the light curves at three wavelengths ($\lambda = 2.7$ cm, 7.6, and 13 cm) for the PKS 0528+134. On the next Figure 4 are plotted the $\lambda = 13$ cm data for "nonvariable" sources along with the PKS 0528+134 data from December, 1996 set. During 5–10 days the flux density from this source decreased ≈ 2 times. All available data are not yet analyzed for the IDV purpose too.

We expect "to tie" these data to other waveband data as well as to VLBI observations.

Because of lack of space Figures 2–4 and Table 2 with all data (flux densities and their errors, light curves, derived variability parameters) are available electronically via *ftp* on site *big1.sao.ru* in directory */data/ratan/variability_paper*.

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