Multifrequency study of GHz-peaked spectrum sources and candidates with the RATAN-600 radio telescope

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ABSTRACT

Context. Gigahertz peaked spectrum (GPS) radio sources are a class of extragalactic radio sources characterized by a spectral peak in the gigahertz domain. They are a mixed class of quasars and galaxies. A large proportion of the sources studied in the literature have only few data points in the radio domain, and the determination of variability and shape of the simultaneous spectra is inadequate. Sources currently included in the GPS source lists are very heterogeneous.

Aims. We present the observational results from 12 observing campaigns (carried out between 2006 and 2010) at the RATAN-600 radio telescope to obtain the simultaneous radio spectra, which is valuable and necessary to derive genuine GPS sources from flat-spectrum radio sources caught in a flaring state when their spectra are temporarily inverted. The sample contains both quasar- and galaxy-type GPS (122 sources) identified in the literature.

Methods. The observations were carried out at six frequencies (1.1, 2.3, 4.8, 7.7, 11.2 and 21.7 GHz). The flux densities were measured at several epochs. A six-frequency broadband radio spectrum was obtained by observing simultaneously with an accuracy of up to a minute at 1.4, 2.7, 3.9, 6.25, 13, and 30 cm.

Results. The original GPS source samples were highly contaminated. Finally, we selected 29% GPS source candidates within the sample. We found some difference in spectral properties between GPS galaxies and quasars within the sample. The GPS galaxies demonstrate a steeper spectral index in the optically thin part of the spectra. There are only relatively few (17) sources whose radio spectra strictly agree with the spectra of homogeneous self-absorbed synchrotron sources. The narrowest radio spectra are found in both ultra-high- z ($z \geq 1.8$) and low- z ($0.02 \leq z \leq 0.7$, $FWHM \sim 0.9$) convex spectrum radio sources. The majority of quasars within this sample should be considered as flat-spectrum radio sources with a temporarily inverted spectrum, and not as genuine GPS sources. The number of truly convex-spectrum sources remains low, and the lists of GPS sources should accordingly be revised.

Key words. galaxies: active – galaxies: general – radio continuum: galaxies

1. Introduction

Gigahertz peaked spectrum (GPS) radio sources are a class of extragalactic radio sources characterized by a spectral peak in the gigahertz domain (Spoelstra et al. 1985; O’Dea et al. 1991; O’Dea 1998). They are a mixed class of quasars and galaxies. The mechanism that produces the absorption in the optically thick part in these compact luminous objects is still somewhat unclear. It is commonly believed to be due to synchrotron self-absorption caused by the high density of synchrotron-emitting electrons in the radio source (Snellen et al. 1998), but free-free absorption (FFA) has also been suggested to be able to produce the turnover at GHz frequencies as well as the peak frequency vs. size – anticorrelation observed in many of these sources (Bicknell et al. 1997).

The GPS sources are powerful ($\log P_{1.4} \geq 25 \text{ WHz}^{-1}$), compact ($\leq 1 \text{ kpc}$), and have a convex radio spectrum that peaks between 500 MHz and 10 GHz (in the observer frame). These radio sources make up a significant fraction of the bright (centimeter-wavelength-selected) radio source population ($\sim 10\%$) but they are not well understood. It has been suggested that they are young radio sources ($\leq 10^4 \text{ yr}$) that evolve into large radio sources (Fanti et al. 1995; Readhead et al. 1996; O’Dea et al. 1991), and studying them would then provide us with important information on early stages of radio source evolution.

Alternatively, GPS sources may be compact because a particularly dense environment prevents them from growing larger (O’Dea 1990; Gopal-Krishna & Wiita 1991). Baum et al. (1990) detected faint emission around a GPS source candidate and suggested that the activity could be recurrent: retriggered jets have just started to grow while the relics of earlier jets and lobes are fading away. Whatever is the case, studying GPS sources can help us to understand the origin and nature of active galactic nuclei.

Stanghellini et al. (1990) noticed that the shape of the spectrum distinguishes GPS sources from “normal” compact radio sources. First of all, it has very steep spectral indices, both at the high and at the low frequencies (less than -0.8 , and for $S \sim \nu^\alpha$). GPS sources have a lower variability in the total flux density and small fractional polarization when compared to flat-spectrum radio sources (Pearson & Readhead 1988; O’Dea 1990). Usually the low level of polarization for GPS sources (Rudnick & Jones 1982; Pearson & Readhead 1988; O’Dea 1990) and the high Faraday rotation measure (Rudnick & Jones 1982) are connected with a dense environment around GPS (Stanghellini et al. 1990).

A large proportion of quasar-type GPS sources are really not genuine GPS sources, but flat-spectrum radio sources caught in a flaring state when their spectra are temporarily inverted (Tornainen et al. 2005). Most of the remaining genuine GPS sources of mostly quasars exhibit fair variability. The

inclusion of blazars and other variable flat-spectrum sources contaminates the GPS source lists and easily leads to an incorrect interpretation of the source properties. The best tool for revealing true GPS-type spectra are long-term observations carried out simultaneously at several frequencies. A large proportion of the sources studied in the literature have only few data points in the radio domain, and the determination of variability and shape of the simultaneous spectra is inadequate. Sources currently included in the GPS source lists are very heterogeneous. It was shown (Tornikoski et al. 2009) that long time-series are more important than very dense sampling, and that even three to five years of data may not be enough for revealing the “typical behaviour” of a source. With short data sets incorrect conclusions are easily drawn about the variability, the shape of the continuum spectrum, the SED (spectral energy distribution), the detection probability at high frequencies, and so on. This leads to misinterpretation of source types and subtypes in samples severely contaminated by incorrectly classified sources.

In this paper we present observational results from 12 observing campaigns (carried out between 2006 and 2010) at the RATAN-600 radio telescope to obtain the simultaneous radio spectra, which are valuable and necessary to derive genuine GPS sources from flat-spectrum radio sources that were caught in a flaring state when their spectra are temporarily inverted. The sample contains both quasar- and galaxy-type GPS (122 sources) identified in the literature. The observations were carried out at six frequencies (1.1, 2.3, 4.8, 7.7, 11.2, and 21.7 GHz).

2. Sample and observations

We have collected a sample of both quasar- and galaxy-type GPS sources identified in the literature. A large proportion of the sources have only few data points in radio, some of the sources have not been monitored for a long time and the determination of the variability and the shape of the simultaneous spectra is inadequate. The sample contains 76 quasar-type and 29 galaxy-type GPS sources and candidates from the literature. The remaining 17 sources were not identified in the optical domain. The list of 122 sources and their characteristics are presented in Table 2.

The observations of GPS sources and candidates were carried out at the RATAN-600 during 12 observing campaigns: July and October 2006, March and April 2007, September 2007, April and June 2008, November and October 2008, April, October and November 2009, January, April, May, and July 2010. The list of observations contains sources accessible either only to the northern sector (declination range from -40° to $+49^\circ$) or only to the southern sector (declination range from $+49^\circ$ to $+84^\circ$) of RATAN-600 (total number of sources is 122). The northern and southern sector of the antenna were used. The mode of the meridian instrument was used – the passage of a source through a fixed beam in the upper culmination for objects accessible to the northern sector and in the lower transit for objects accessible to the southern sector. Every source was observed from 3 to 15 times to increase the reliability of results and because of weather conditions.

We processed our observations using modules of the FADPS (Flexible Astronomical Data Processing System) standard reduction package by Verkhodanov (1997) in a Linux environment; this is a reduction system for data from the broadband continuum radiometers of the RATAN-600 secondary mirror. Scans of all sources were corrected for baseline slope when fitted to a Gaussian response. The accuracy of the antenna temperature of each source was determined as the standard error of the mean from N observations of a set, taking into account the Student

factor. Details on observation and analysis technique are given by Mingaliev et al. (2001, 2007). The errors of the antenna temperature depend not only on the receiver noise, but also on the atmospheric fluctuations on the scale of the main beam, on the accuracy of antenna surface setting for the actual source observation and on the accuracy of the feed cabin positioning (the cabin with secondary mirror and receivers). The total fractional error in the flux densities is the quadratic sum of the total calibration error and the error in the antenna temperature measurement:

$$\left(\frac{\sigma_t}{S_\nu}\right)^2 = \left(\frac{\sigma_c}{g_\nu(e)}\right)^2 + \left(\frac{\sigma_m}{T_{\text{ant}, \nu}}\right)^2, \quad (1)$$

where

- σ_t – total standard error;
- σ_c – standard error of calibration;
- σ_m – standard error of $T_{\text{ant}, \nu}$ measurement;
- S_ν – flux density;
- $g_\nu(e) = 1/f_\nu(e)$ – elevation calibration function;
- $T_{\text{ant}, \nu}$ – antenna temperature.

The following twelve flux density calibrators were applied to obtain the calibration curve for the northern and southern sector of RATAN-600: J0137+33 (3C48), J0240–23, J0410+76, J0521+16 (3C138), J0542+49 (3C147), J0627–05 (3C161), J1154–35, J1331+30 (3C286), J1347+12, J1411+52 (3C295), J1459+71 (3C309.1), and J2107+42 (NGC7027) (excluding 31 cm calibration). The sources J0240–23, J1154–35 and J0521+16 are the traditional RATAN-600 flux density calibrators at low elevations, and the source J0410+76 – at high declination. Measurements of some calibrators were corrected on angular size and linear polarization, following the data in Ott et al. (1994) and Tabara & Inoue (1980), respectively. The calibration curves (Fig. 1) essentially represent observing-run averages of the combined dependence of the atmospheric-extinction instability and the effective area on the elevation h at the corresponding wavelengths (in the presence of real aberrations owing to the transverse distance of the primary feeds from the electrical axis of the antenna).

3. Flux densities and radio continuum spectra

The flux densities of 122 sources for several epochs with available RATAN-600 observations are given in Table 2.

Column 1 – source name [hhmmss+ddmmss] from the NVSS catalogue;

Col. 2 – optical identifications and redshifts. Information about the optical identification and redshift was taken from the NASA/IPAC Extragalactic database (NED). The abbreviations used are “Q” for quasars, “G” for galaxies, “–” for radio sources with no identification.

Column 3 – RATAN-600 spectrum classification: max = spectrum with maximum in the RATAN-600 frequency range; max^1 = possible spectrum with a maximum in low frequencies not accessible to RATAN-600; max^2 = variable spectrum with maximum of $Var_{\Delta S} > 2.5$ at 21–4.8 GHz; f = flat spectrum ($0 \geq \alpha \geq -0.5$); ris = rising spectrum ($\alpha > 0$); s = steep spectrum (spectral index $\alpha \leq -0.5$); c = complex spectrum (one or more minima);

Col. 4 – observation epochs at RATAN-600 [yyyy.mm];

Col. 5–15 – flux densities and their uncertainties for the corresponding frequencies, including the uncertainty in the source’s antenna temperature and the calibration curve.

Fig. 1. Flux density calibration factor g_v versus *focus*; where *focus* is the distance from antenna to the secondary mirror compared to the radius of RATAN-600 (it depends on the antenna elevation) at all wavelengths for the northern sector. All data shown for 9 calibrators were averaged during one observational set in 2007.

Table 1. Proposed source classes of the sample.

Proposed class	N sources	Spectral type
<i>max</i>	48	maximum at cm range
<i>max</i> ¹	8	flat plateau at low frequencies
<i>max</i> ²	13	variable with maximum ($Var \geq 25\%$)
<i>ris</i>	14	$\alpha \geq 0$
<i>f</i>	18	$0 \geq \alpha \geq -0.5$
<i>c</i>	9	two or more minima
<i>s</i>	10	$\alpha \leq -0.5$
Total number	122	

Averaged instantaneous spectra at several epochs are shown in Fig. 5. Almost all sources have complete data at all frequencies. Absence of data for some sources at some frequencies is a result of data exclusion because of the following reasons: partial resolution of a source at some frequencies, a source is too weak to be measured reliably, a strong influence of man-made interferences (usually at 31 and 13 cm), strong interferences from the geostationary satellites at 2.7 cm (in declinations between -10° and 0°). Nevertheless, in some cases the data were not excluded in spite of the increase in errors. The values of the standard error of fluxes are: 5–10% for 11.2, 7.7 and 4.8 GHz, 7–20% for 2.3, 1.0 and 21.7 GHz.

We found that 69 sources have a convex spectral shape. But 13 sources of them show considerable variability – the variability index $Var_{\Delta S} > 25\%$ at 21.7–4.8 GHz. The obtained proposed spectral classes for sources under investigation are presented in Table 1. Therefore less than half of the sources of the sample closely follow the typical shape of a GPS source spectrum. The shape of the spectra remained clearly convex for only a fraction of sources of the sample. Most of the sources are variable flat-spectrum sources with the inverted spectral shape only during flares.

We summarise the variability and spectral properties of the objects with spectral maximum (Table 3). Table 3 lists all the 69 sources for which a spectral maximum could be defined. Column (1) is the name of source; (2) optical classification; (3) indication of GPS and candidates; (4) redshift; (5) is the peak frequency [MHz] in the observer frame; (6) and (7) are the spectral indices of optically thick α_{below} and thin α_{above} parts of spectra and their estimated RMS error; (8) is the value of FWHM in decades of frequency; (9)–(12) is the value of Var_S at 4.8, 7.7, 11.2 and 21.7 GHz. The spectral index α is used to describe the slope of a spectrum. It can be calculated by

$$\alpha = \frac{\log S_2 - \log S_1}{\log \nu_2 - \log \nu_1}, \quad (2)$$

where S_1 is the flux density at the frequency ν_1 , and S_2 the flux density at the frequency ν_2 . Thus, we define the spectral index α such that $S \propto \nu^\alpha$. The peak frequency and FWHM parameters of spectra were determined from the fit of the source spectra in the log–log scale with a parabolic function:

$$\log S_\nu = a(\log \nu)^2 + b \log \nu + c, \quad (3)$$

here S_ν is a flux density at frequency ν ; a , b and c are the coefficients determined using the least-squares method. This method allows us to easily find the peak parameters. The spectral indices α_{below} and α_{above} were determined by fitting high- and low-frequency region of the spectra with a liner function in the log-log scale. Where a more accurate measurement of low-frequency spectral index and peak frequency was necessary, we used measurements of other authors at the frequencies 74, 80, 151, 178, 232, 318, 325, 365, and 408 MHz (Cohen et al. 2007; Pauliny-Toth et al. 1978; Stanghellini et al. 1998; Wright & Otrupcek 1990; Zhang et al. 1997; Kuehr et al. 1981; Rengelink et al. 1997; Douglas et al. 1996; Large et al. 1981).

4. Spectral properties of GPS galaxies and quasars

4.1. Spectral index

Assuming the generally accepted criteria of radio spectra for a homogeneous self-absorbed synchrotron (Shklovskii 1960) source, only 17 objects of our sample were reliably selected as GPS sources (see Table 3). We used the following criteria: the spectral index of optically thick α_{below} and thin α_{above} parts of spectra are respectively 0.5 and -0.7 ; the variability index does not exceed 25%; the full width at half-maximum does not exceed 1.2 frequency decades.

Additionally, we accepted also some other sources as GPS candidates. In these cases we allowed a slight deviation from the criteria of radio spectra for a homogeneous self-absorbed synchrotron source (value of spectral index and FWHM). These 19 sources will be observed also in the future: J0003+21, J0555+39, J0642+67, J0646+44, J0650+60, J0745+00, J1122+27, J1146+24, J1357+43, J1412+13, J1445+09, J1511+05, J1526+66, J1623+66, J1735+50, J2024+17, J2136+00, J2139+14, and J2151+05.

The value of the variability index exceeds 25% at one or several frequencies for 13 sources with a spectral maximum (J0403+26, J0530+13, J0927+39, J1357+76, J1522+27, J1855+37, J1957+38, J2022+61, J2123+05, J2129+15, J2212+23, J2325+03, and J2330+33). It is possible that these objects are variable radio sources with a flat spectrum. Most of them have been classified as blazar-type radio sources, see for example, Massaro et al. (2009). However, these sources are interesting as quasar-type GPS sources (only two of them are galaxies).

Table 2. The flux densities of GPS sources and candidates for several epochs (RATAN-600 observations 2006–2010).

NVSS name	Type, z	sp	Data, yyyy.mm	$S_{21.7 \text{ GHz}}, \sigma$ (Jy)	$S_{11.2 \text{ GHz}}, \sigma$ (Jy)	$S_{7.7 \text{ GHz}}, \sigma$ (Jy)	$S_{4.8 \text{ GHz}}, \sigma$ (Jy)	$S_{2.3 \text{ GHz}}, \sigma$ (Jy)	$S_{1 \text{ GHz}}, \sigma$ (Jy)
000319+212944	QSO 0.45	max	2006.07	0.089 ± 0.024	0.146 ± 0.011	0.213 ± 0.091	0.251 ± 0.012	0.198 ± 0.018	0.138 ± 0.039
			2007.03	0.079 ± 0.018	0.129 ± 0.013	0.184 ± 0.019	0.229 ± 0.014	0.161 ± 0.026	0.209 ± 0.043
			2007.09	0.042 ± 0.014	0.139 ± 0.005	0.210 ± 0.008	0.247 ± 0.012	0.167 ± 0.020	0.097 ± 0.017
			2008.04	0.057 ± 0.012	0.131 ± 0.013	0.187 ± 0.022	0.229 ± 0.013	0.209 ± 0.045	0.110 ± 0.028
			2010.04	0.089 ± 0.015	0.115 ± 0.007	0.169 ± 0.015	0.226 ± 0.008	0.175 ± 0.023	
			2010.05	0.075 ± 0.025	0.114 ± 0.013	0.154 ± 0.017	0.223 ± 0.008	0.201 ± 0.072	
000520+052410	QSO 1.89	max	2006.07	0.085 ± 0.027	0.146 ± 0.016	0.194 ± 0.006	0.197 ± 0.011	0.264 ± 0.030	0.222 ± 0.049
			2007.03	0.082 ± 0.015	0.135 ± 0.016	0.168 ± 0.012	0.173 ± 0.009	0.211 ± 0.047	0.191 ± 0.061
			2007.09	0.062 ± 0.014	0.139 ± 0.005	0.153 ± 0.006	0.195 ± 0.010	0.161 ± 0.015	0.117 ± 0.014
			2008.04	0.078 ± 0.012	0.127 ± 0.011	0.149 ± 0.022	0.175 ± 0.006	0.228 ± 0.059	
003732+080812	– –	max	2006.07	0.200 ± 0.057	0.249 ± 0.024	0.274 ± 0.063	0.295 ± 0.011	0.260 ± 0.089	0.163 ± 0.043
			2007.03	0.117 ± 0.021	0.227 ± 0.014	0.254 ± 0.022	0.271 ± 0.016	0.223 ± 0.022	0.206 ± 0.033
			2007.09	0.125 ± 0.021	0.248 ± 0.008	0.263 ± 0.011	0.300 ± 0.012	0.178 ± 0.022	0.070 ± 0.010
			2008.04	0.103 ± 0.015	0.234 ± 0.017	0.263 ± 0.018	0.266 ± 0.009	0.177 ± 0.051	0.082 ± 0.031
			2010.04	0.136 ± 0.021	0.207 ± 0.010	0.275 ± 0.014	0.270 ± 0.014	0.190 ± 0.011	
			2010.05	0.153 ± 0.034	0.205 ± 0.019	0.269 ± 0.017	0.275 ± 0.014	0.226 ± 0.047	
004204+232001	QSO 1.43	f	2006.07	0.465 ± 0.079	0.684 ± 0.029	0.752 ± 0.054	0.896 ± 0.040	1.021 ± 0.073	0.916 ± 0.108
			2007.03	0.401 ± 0.017	0.630 ± 0.024	0.707 ± 0.036	0.835 ± 0.044	0.962 ± 0.085	0.990 ± 0.099
			2007.09	0.343 ± 0.012	0.603 ± 0.017	0.702 ± 0.022	0.838 ± 0.037	0.903 ± 0.040	0.930 ± 0.054
			2008.04	0.304 ± 0.011	0.535 ± 0.022	0.626 ± 0.028	0.776 ± 0.028	0.948 ± 0.070	1.118 ± 0.069
011137+390628	G 0.67	max	2006.07	0.268 ± 0.082	0.719 ± 0.033	0.918 ± 0.132	1.275 ± 0.074	0.878 ± 0.153	0.383 ± 0.111
			2007.03	0.269 ± 0.018	0.715 ± 0.048	1.054 ± 0.062	1.321 ± 0.083	0.913 ± 0.099	0.547 ± 0.168
			2007.06	0.230 ± 0.017	0.538 ± 0.021	0.792 ± 0.038	0.929 ± 0.061	0.584 ± 0.038	0.339 ± 0.083
			2007.09	0.227 ± 0.028	0.718 ± 0.023	1.104 ± 0.038	1.351 ± 0.076	0.856 ± 0.040	0.255 ± 0.051
			2008.04	0.281 ± 0.013	0.709 ± 0.025	1.062 ± 0.042	1.330 ± 0.052	0.817 ± 0.068	0.312 ± 0.040
			2008.11	0.285 ± 0.015	0.693 ± 0.023	1.032 ± 0.045	1.208 ± 0.068	0.745 ± 0.082	0.432 ± 0.078
			2010.04	0.293 ± 0.013	0.700 ± 0.020	1.030 ± 0.043	1.343 ± 0.065	0.670 ± 0.074	
			2010.05	0.247 ± 0.052	0.676 ± 0.050	1.029 ± 0.064	1.325 ± 0.060	0.530 ± 0.088	
011633+242214	– –	f	2006.07	0.147 ± 0.020	0.175 ± 0.012	0.158 ± 0.035	0.169 ± 0.010	0.292 ± 0.053	0.304 ± 0.055
			2007.03	0.116 ± 0.014	0.172 ± 0.011	0.180 ± 0.016	0.156 ± 0.009	0.222 ± 0.045	0.289 ± 0.047
			2007.09	0.136 ± 0.009	0.121 ± 0.004	0.142 ± 0.005	0.238 ± 0.012	0.289 ± 0.017	0.221 ± 0.018
			2008.04	0.081 ± 0.008	0.128 ± 0.011	0.133 ± 0.011	0.213 ± 0.013	0.284 ± 0.033	0.263 ± 0.021
			2010.01	0.120 ± 0.028	0.169 ± 0.032	0.191 ± 0.035	0.278 ± 0.027	0.478 ± 0.106	
020346+113445	QSO 3.64	max	2006.07	0.389 ± 0.050	0.575 ± 0.035	0.750 ± 0.090	0.925 ± 0.039	1.071 ± 0.057	0.761 ± 0.096
			2007.03	0.389 ± 0.018	0.522 ± 0.032	0.580 ± 0.033	0.787 ± 0.036	1.002 ± 0.073	0.973 ± 0.087
			2007.09	0.428 ± 0.018	0.611 ± 0.015	0.705 ± 0.019	0.821 ± 0.029	1.008 ± 0.038	0.837 ± 0.045
			2008.04	0.328 ± 0.017	0.588 ± 0.026	0.675 ± 0.030	0.783 ± 0.024	1.009 ± 0.055	0.810 ± 0.047
			2010.04	0.358 ± 0.025	0.502 ± 0.015	0.624 ± 0.024	0.775 ± 0.019	1.008 ± 0.097	
			2010.05	0.316 ± 0.051	0.511 ± 0.021	0.631 ± 0.027	0.788 ± 0.032	0.833 ± 0.132	0.714 ± 0.231
020713+841119	– –	ris	2006.10	0.103 ± 0.008	0.122 ± 0.011	0.104 ± 0.009	0.096 ± 0.008	0.134 ± 0.031	0.212 ± 0.041
			2007.04	0.142 ± 0.016	0.114 ± 0.016	0.102 ± 0.009	0.100 ± 0.015	0.129 ± 0.016	0.104 ± 0.014
			2007.09	0.146 ± 0.035	0.125 ± 0.004	0.114 ± 0.007	0.098 ± 0.009	0.113 ± 0.009	0.093 ± 0.011
			2008.06	0.291 ± 0.036	0.249 ± 0.026	0.209 ± 0.012	0.164 ± 0.025	0.206 ± 0.040	0.096 ± 0.032
021010–221336	G 1.49	max ¹	2006.07		0.193 ± 0.029	0.332 ± 0.084	0.509 ± 0.015	0.966 ± 0.085	0.837 ± 0.062
			2007.03	0.082 ± 0.023	0.161 ± 0.038	0.280 ± 0.017	0.498 ± 0.022	0.884 ± 0.105	1.029 ± 0.090
			2007.09	0.062 ± 0.028	0.158 ± 0.004	0.276 ± 0.009	0.523 ± 0.016	0.871 ± 0.042	0.862 ± 0.042
			2008.04	0.069 ± 0.025	0.165 ± 0.015	0.250 ± 0.023	0.459 ± 0.021	0.880 ± 0.050	0.807 ± 0.040
021748+014449	QSO 1.72	ris	2006.07	1.311 ± 0.238	1.110 ± 0.074	1.004 ± 0.121	0.861 ± 0.032	0.680 ± 0.168	0.495 ± 0.192
			2007.03	1.508 ± 0.030	1.439 ± 0.057	1.229 ± 0.094	0.992 ± 0.051	0.688 ± 0.065	0.472 ± 0.086
			2007.09	1.229 ± 0.024	1.240 ± 0.028	1.161 ± 0.027	1.000 ± 0.038	0.700 ± 0.026	0.562 ± 0.034
			2008.04	1.505 ± 0.020	1.576 ± 0.056	1.558 ± 0.077	1.323 ± 0.062	0.844 ± 0.058	0.700 ± 0.054
022105+355615	G 0.68	f	2006.07	0.962 ± 0.088	1.376 ± 0.063	1.491 ± 0.080	1.501 ± 0.084	1.711 ± 0.084	1.851 ± 0.079
			2007.03	1.065 ± 0.022	1.494 ± 0.059	1.627 ± 0.079	1.678 ± 0.101	1.917 ± 0.134	2.094 ± 0.181
			2007.09	1.006 ± 0.017	1.377 ± 0.043	1.588 ± 0.053	1.613 ± 0.087	1.819 ± 0.082	1.860 ± 0.067
			2008.04	1.097 ± 0.018	1.455 ± 0.048	1.650 ± 0.077	1.696 ± 0.065	1.886 ± 0.105	1.754 ± 0.094
024104–081520	G 0.08	c	2006.07	1.068 ± 0.091	1.198 ± 0.038	1.356 ± 0.177	1.324 ± 0.052	0.998 ± 0.032	1.140 ± 0.272
			2007.03	0.998 ± 0.034	1.069 ± 0.160	1.042 ± 0.049	1.033 ± 0.063	0.997 ± 0.089	1.345 ± 0.100
			2007.09	1.135 ± 0.037	1.083 ± 0.031	1.071 ± 0.022	0.953 ± 0.069	0.870 ± 0.031	0.976 ± 0.037
			2008.04	1.020 ± 0.031	0.960 ± 0.097	0.910 ± 0.095	0.860 ± 0.037	0.940 ± 0.084	1.018 ± 0.071
025134+431515	QSO 1.31	max	2010.01	0.938 ± 0.032	0.984 ± 0.076	1.105 ± 0.030	0.932 ± 0.050	0.529 ± 0.040	
			2006.07	0.510 ± 0.083	0.905 ± 0.062	1.103 ± 0.131	1.170 ± 0.072	1.354 ± 0.138	1.130 ± 0.030
			2007.03	0.413 ± 0.021	0.800 ± 0.083	1.020 ± 0.055	1.143 ± 0.076	1.344 ± 0.105	1.430 ± 0.188
			2007.09	0.538 ± 0.019	0.925 ± 0.028	1.084 ± 0.037	1.161 ± 0.072	1.201 ± 0.056	1.053 ± 0.052
			2008.04	0.456 ± 0.014	0.887 ± 0.026	1.122 ± 0.050	1.106 ± 0.064	1.189 ± 0.058	0.961 ± 0.054
031857+162832	QSO 0.91	s	2009.04	0.553 ± 0.019	0.861 ± 0.037	1.054 ± 0.041	1.052 ± 0.069	1.083 ± 0.116	
			2006.07	0.464 ± 0.035	1.096 ± 0.046	1.749 ± 0.178	2.963 ± 0.123	5.906 ± 0.261	9.110 ± 0.342
			2007.03	0.367 ± 0.016	1.066 ± 0.046	1.675 ± 0.131	2.818 ± 0.137	5.804 ± 0.344	9.322 ± 0.470

Table 2. continued.

NVSS name	Type, z	sp	Data, yyyy.mm	$S_{21.7 \text{ GHz}, \sigma}$ (Jy)	$S_{11.2 \text{ GHz}, \sigma}$ (Jy)	$S_{7.7 \text{ GHz}, \sigma}$ (Jy)	$S_{4.8 \text{ GHz}, \sigma}$ (Jy)	$S_{2.3 \text{ GHz}, \sigma}$ (Jy)	$S_{1 \text{ GHz}, \sigma}$ (Jy)
032915+351008	– 0.50	f	2007.09	0.469 ± 0.012	1.142 ± 0.029	1.702 ± 0.048	2.905 ± 0.111	5.744 ± 0.224	8.705 ± 0.305
			2008.04	0.419 ± 0.011	1.055 ± 0.030	1.608 ± 0.060	2.738 ± 0.078	5.833 ± 0.231	9.088 ± 0.330
			2006.07	0.554 ± 0.070	0.557 ± 0.033	0.477 ± 0.077	0.565 ± 0.034	0.664 ± 0.074	0.742 ± 0.145
			2007.03	0.664 ± 0.018	0.772 ± 0.035	0.698 ± 0.043	0.582 ± 0.036	0.714 ± 0.070	0.758 ± 0.092
			2007.09	0.626 ± 0.018	0.795 ± 0.025	0.836 ± 0.028	0.702 ± 0.039	0.520 ± 0.028	0.445 ± 0.031
033413–400825	QSO 1.45	c	2008.04	0.683 ± 0.017	0.696 ± 0.033	0.691 ± 0.037	0.678 ± 0.040	0.577 ± 0.042	0.661 ± 0.067
			2006.07		0.569 ± 0.030	0.588 ± 0.147	0.538 ± 0.033	0.576 ± 0.063	1.362 ± 0.105
			2007.03	0.242 ± 0.043	0.421 ± 0.042	0.459 ± 0.032	0.414 ± 0.026	0.437 ± 0.038	0.926 ± 0.089
			2007.09	0.394 ± 0.061	0.406 ± 0.008	0.397 ± 0.009	0.362 ± 0.033	0.477 ± 0.029	1.075 ± 0.038
			2008.04	0.945 ± 0.049	0.820 ± 0.064	0.563 ± 0.055	0.370 ± 0.016	0.432 ± 0.073	0.957 ± 0.035
035721+231953	– –	c	2010.01	1.863 ± 0.049	2.688 ± 0.070	2.735 ± 0.052	2.327 ± 0.084	1.298 ± 0.210	
			2006.07	0.188 ± 0.054	0.235 ± 0.028	0.268 ± 0.054	0.217 ± 0.011	0.206 ± 0.022	0.221 ± 0.045
			2007.03	0.140 ± 0.016	0.174 ± 0.016	0.154 ± 0.011	0.137 ± 0.009	0.189 ± 0.023	0.301 ± 0.046
			2007.06	0.114 ± 0.022	0.093 ± 0.004	0.091 ± 0.006	0.096 ± 0.006	0.117 ± 0.016	0.255 ± 0.111
			2007.09	0.101 ± 0.014	0.099 ± 0.004	0.116 ± 0.006	0.130 ± 0.009	0.140 ± 0.013	0.202 ± 0.017
040305+260001	QSO 2.12	max ²	2008.04	0.237 ± 0.011	0.243 ± 0.015	0.198 ± 0.019	0.194 ± 0.009	0.172 ± 0.023	0.142 ± 0.051
			2006.07	0.721 ± 0.103	1.151 ± 0.065	1.250 ± 0.092	1.221 ± 0.063	1.030 ± 0.084	0.775 ± 0.179
			2007.03	0.620 ± 0.019	1.198 ± 0.057	1.343 ± 0.067	1.370 ± 0.080	1.183 ± 0.082	0.863 ± 0.096
			2007.09	0.781 ± 0.014	1.285 ± 0.037	1.515 ± 0.047	1.617 ± 0.077	1.188 ± 0.053	0.760 ± 0.034
			2008.04	0.997 ± 0.017	1.489 ± 0.049	1.616 ± 0.067	1.708 ± 0.058	1.175 ± 0.074	0.880 ± 0.049
			2008.11	1.326 ± 0.020	1.870 ± 0.057	2.017 ± 0.082	2.071 ± 0.078	1.324 ± 0.066	0.713 ± 0.048
			2010.04	1.150 ± 0.022	1.970 ± 0.056	2.201 ± 0.088	2.413 ± 0.083	1.546 ± 0.070	
042805+325952	QSO 0.48	max	2010.05	0.977 ± 0.167	1.866 ± 0.109	2.095 ± 0.104	2.247 ± 0.116	1.296 ± 0.230	1.045 ± 0.226
			2006.07	0.242 ± 0.024	0.446 ± 0.024	0.456 ± 0.066	0.502 ± 0.028	0.385 ± 0.031	0.274 ± 0.031
			2007.03	0.191 ± 0.012	0.455 ± 0.021	0.528 ± 0.028	0.511 ± 0.030	0.400 ± 0.046	0.279 ± 0.086
			2007.09	0.202 ± 0.010	0.418 ± 0.013	0.521 ± 0.017	0.506 ± 0.026	0.295 ± 0.018	0.168 ± 0.025
			2008.04	0.202 ± 0.010	0.434 ± 0.015	0.496 ± 0.022	0.504 ± 0.021	0.260 ± 0.021	0.131 ± 0.021
			2010.04	0.187 ± 0.023	0.388 ± 0.014	0.465 ± 0.020	0.468 ± 0.017	0.173 ± 0.012	
045703–232452	QSO 1.00	ris	2010.05	0.174 ± 0.051	0.366 ± 0.022	0.440 ± 0.020	0.484 ± 0.023	0.271 ± 0.047	
			2006.07	3.790 ± 0.307	3.643 ± 0.185	3.363 ± 0.415	3.100 ± 0.126	2.151 ± 0.265	1.676 ± 0.135
			2007.03	3.811 ± 0.046	3.895 ± 0.131	3.851 ± 0.202	3.752 ± 0.151	3.138 ± 0.127	1.998 ± 0.135
			2007.09	2.966 ± 0.030	2.940 ± 0.053	3.363 ± 0.054	3.408 ± 0.099	3.014 ± 0.069	2.684 ± 0.088
050321+020304	QSO 0.58	max	2008.04	2.007 ± 0.028	2.115 ± 0.052	2.382 ± 0.064	2.752 ± 0.128	2.817 ± 0.134	2.208 ± 0.076
			2006.07	0.573 ± 0.093	1.006 ± 0.037	1.419 ± 0.342	1.847 ± 0.067	2.311 ± 0.129	2.099 ± 0.074
			2007.03	0.428 ± 0.024	0.929 ± 0.039	1.183 ± 0.052	1.658 ± 0.071	2.344 ± 0.121	1.977 ± 0.118
			2007.09	0.618 ± 0.024	1.027 ± 0.024	1.357 ± 0.032	1.755 ± 0.063	2.351 ± 0.073	2.104 ± 0.075
			2008.04	0.530 ± 0.020	0.950 ± 0.026	1.254 ± 0.042	1.698 ± 0.060	2.299 ± 0.116	1.913 ± 0.071
			2008.11	0.555 ± 0.019	0.912 ± 0.036	1.261 ± 0.035	1.758 ± 0.042	2.391 ± 0.148	1.761 ± 0.116
			2010.04	0.530 ± 0.018	0.851 ± 0.021	1.185 ± 0.032	1.658 ± 0.065	2.295 ± 0.115	
051002+180041	QSO 0.42	ris	2010.05	0.476 ± 0.083	0.871 ± 0.034	1.182 ± 0.041	1.592 ± 0.053	1.907 ± 0.311	1.431 ± 0.194
			2006.07	1.026 ± 0.123	0.887 ± 0.061	0.745 ± 0.115	0.557 ± 0.050	0.509 ± 0.055	0.569 ± 0.084
			2007.03	0.619 ± 0.020	0.792 ± 0.035	0.660 ± 0.039	0.571 ± 0.033	0.583 ± 0.053	0.618 ± 0.100
			2007.09	0.667 ± 0.019	0.755 ± 0.020	0.658 ± 0.019	0.538 ± 0.034	0.452 ± 0.022	0.611 ± 0.031
			2008.04	0.866 ± 0.015	0.942 ± 0.033	0.790 ± 0.055	0.625 ± 0.043	0.516 ± 0.044	0.639 ± 0.030
			2009.04	0.884 ± 0.033	0.951 ± 0.042	0.868 ± 0.048	0.679 ± 0.052	0.438 ± 0.048	
051910+084857	– –	c	2010.01	0.475 ± 0.041	0.565 ± 0.032	0.529 ± 0.030	0.521 ± 0.034	0.497 ± 0.099	
			2006.07	0.272 ± 0.070	0.243 ± 0.048		0.240 ± 0.015	0.317 ± 0.031	0.278 ± 0.079
			2007.03	0.243 ± 0.026	0.220 ± 0.046	0.167 ± 0.050	0.201 ± 0.021	0.298 ± 0.066	0.458 ± 0.056
			2007.09	0.501 ± 0.025	0.295 ± 0.009	0.202 ± 0.012	0.209 ± 0.022	0.266 ± 0.017	0.196 ± 0.018
053007–250329	QSO 2.81	max	2008.04	0.565 ± 0.026	0.368 ± 0.024	0.280 ± 0.037	0.215 ± 0.024	0.285 ± 0.022	0.289 ± 0.044
			2006.07	0.309 ± 0.052	0.474 ± 0.060	0.648 ± 0.108	0.930 ± 0.048	1.204 ± 0.143	0.663 ± 0.136
			2007.03	0.264 ± 0.035	0.509 ± 0.043	0.688 ± 0.027	0.911 ± 0.086	1.104 ± 0.115	0.919 ± 0.151
			2007.09	0.363 ± 0.048	0.564 ± 0.013	0.807 ± 0.016	1.011 ± 0.057	1.298 ± 0.035	0.948 ± 0.103
053056+133155	QSO 2.06	max ²	2008.04	0.321 ± 0.025	0.579 ± 0.019	0.750 ± 0.052	0.945 ± 0.050	1.125 ± 0.117	0.872 ± 0.094
			2006.07	3.268 ± 0.183	3.317 ± 0.499	3.264 ± 0.175	2.722 ± 0.138	1.800 ± 0.144	1.579 ± 0.239
			2007.03	3.529 ± 0.056	3.572 ± 0.262	3.755 ± 0.307	3.475 ± 0.205	2.752 ± 0.331	1.840 ± 0.104
			2007.09	4.091 ± 0.050	4.117 ± 0.102	3.627 ± 0.098	3.325 ± 0.172	2.284 ± 0.085	1.898 ± 0.070
			2008.04	2.767 ± 0.033	3.487 ± 0.153	3.696 ± 0.140	3.635 ± 0.128	3.245 ± 0.198	1.715 ± 0.077
054138–054149	QSO 0.84	ris	2009.04	1.941 ± 0.075	2.749 ± 0.137	3.169 ± 0.175	3.536 ± 0.219	3.523 ± 0.171	
			2006.07	1.899 ± 0.295	1.691 ± 0.631	1.513 ± 0.337	1.355 ± 0.054	1.022 ± 0.049	1.272 ± 0.103
			2007.03	1.595 ± 0.037	1.418 ± 0.105	1.398 ± 0.057	1.121 ± 0.055	1.154 ± 0.082	1.173 ± 0.183
			2007.09	1.935 ± 0.028	1.898 ± 0.056	1.910 ± 0.039	1.791 ± 0.065	1.063 ± 0.039	1.179 ± 0.043
			2008.04	1.163 ± 0.018	1.473 ± 0.199	1.423 ± 0.075	1.385 ± 0.062	1.349 ± 0.088	1.095 ± 0.057
055530+394849	QSO 2.37	max	2009.04	0.768 ± 0.089		1.066 ± 0.052	1.287 ± 0.036	0.975 ± 0.082	
			2006.07	2.299 ± 0.176	3.719 ± 0.153	4.251 ± 0.259	4.821 ± 0.282	3.075 ± 0.142	0.940 ± 0.142
			2007.03	2.787 ± 0.045	4.015 ± 0.154	4.742 ± 0.238	4.937 ± 0.304	3.125 ± 0.200	1.123 ± 0.106
			2007.09	2.450 ± 0.034	3.911 ± 0.122	4.816 ± 0.163	4.749 ± 0.451	2.972 ± 0.132	0.957 ± 0.051

Table 2. continued.

NVSS name	Type, z	sp	Data, yyyy.mm	$S_{21.7 \text{ GHz}, \sigma}$ (Jy)	$S_{11.2 \text{ GHz}, \sigma}$ (Jy)	$S_{7.7 \text{ GHz}, \sigma}$ (Jy)	$S_{4.8 \text{ GHz}, \sigma}$ (Jy)	$S_{2.3 \text{ GHz}, \sigma}$ (Jy)	$S_{1 \text{ GHz}, \sigma}$ (Jy)
			2008.04	2.635 ± 0.031	4.114 ± 0.125	5.084 ± 0.200	5.131 ± 0.207	3.054 ± 0.141	0.937 ± 0.048
			2008.11	2.507 ± 0.030	4.205 ± 0.137	4.957 ± 0.341	4.373 ± 0.245	2.625 ± 0.147	0.979 ± 0.081
			2009.04	2.760 ± 0.162	4.620 ± 0.150	5.224 ± 0.220	5.163 ± 0.271	3.116 ± 0.465	
			2009.10	3.109 ± 0.043	4.554 ± 0.095	5.194 ± 0.111	5.090 ± 0.129	2.886 ± 0.263	
			2009.11	2.739 ± 0.042	4.661 ± 0.138	5.210 ± 0.300	4.379 ± 0.205	2.957 ± 0.138	
			2010.04	2.739 ± 0.069	4.431 ± 0.131	5.107 ± 0.205	5.102 ± 0.209	2.461 ± 0.133	
061024+780136	–	c	2006.10	0.081 ± 0.012	0.095 ± 0.008	0.090 ± 0.010	0.097 ± 0.007	0.115 ± 0.019	0.186 ± 0.032
	–		2007.04	0.076 ± 0.015	0.083 ± 0.011	0.086 ± 0.009	0.100 ± 0.011	0.171 ± 0.017	0.287 ± 0.048
			2007.09	0.078 ± 0.019	0.068 ± 0.005	0.068 ± 0.005	0.091 ± 0.006	0.113 ± 0.018	0.160 ± 0.022
			2008.06	0.080 ± 0.011	0.067 ± 0.009	0.070 ± 0.012	0.071 ± 0.012	0.133 ± 0.021	0.178 ± 0.017
062518+444001	QSO	c	2006.07	0.203 ± 0.058	0.158 ± 0.032	–	0.156 ± 0.012	0.182 ± 0.040	
	–		2007.03	0.142 ± 0.019	0.193 ± 0.033	0.208 ± 0.029	0.225 ± 0.022	0.249 ± 0.022	
			2007.09	0.131 ± 0.014	0.199 ± 0.007	0.215 ± 0.010	0.179 ± 0.016	0.199 ± 0.021	0.322 ± 0.066
			2008.04	0.282 ± 0.019	0.328 ± 0.026	0.380 ± 0.022	0.275 ± 0.018	0.298 ± 0.078	0.381 ± 0.094
063802+593322	–	ris	2006.10	0.721 ± 0.060	0.778 ± 0.026	0.667 ± 0.020	0.561 ± 0.033	0.389 ± 0.086	0.366 ± 0.090
	–		2007.04	0.756 ± 0.047	0.650 ± 0.039	0.629 ± 0.059	0.572 ± 0.027	0.381 ± 0.051	0.287 ± 0.072
			2007.09	1.051 ± 0.138	0.712 ± 0.018	0.759 ± 0.033	0.611 ± 0.020	0.335 ± 0.037	0.217 ± 0.046
			2008.06	0.660 ± 0.073	0.626 ± 0.029	0.678 ± 0.034	0.631 ± 0.039	0.451 ± 0.029	0.225 ± 0.042
064204+675835	–	max	2006.10	0.227 ± 0.037	0.287 ± 0.025	0.305 ± 0.032	0.345 ± 0.019	0.361 ± 0.061	0.329 ± 0.088
	–		2007.04	0.127 ± 0.026	0.228 ± 0.010	0.275 ± 0.030	0.345 ± 0.016	0.361 ± 0.036	0.264 ± 0.039
			2007.09	0.148 ± 0.052	0.241 ± 0.011	0.278 ± 0.016	0.365 ± 0.015	0.263 ± 0.035	0.118 ± 0.029
			2008.06	0.153 ± 0.028	0.219 ± 0.022	0.272 ± 0.028	0.377 ± 0.013	0.327 ± 0.056	0.169 ± 0.043
064632+445116	QSO	max	2006.07	2.489 ± 0.155	3.624 ± 0.162	4.281 ± 0.296	2.852 ± 0.172	1.202 ± 0.079	0.726 ± 0.081
	3.40		2007.03	2.527 ± 0.042	3.590 ± 0.142	3.661 ± 0.189	2.844 ± 0.182	1.253 ± 0.079	0.876 ± 0.221
			2007.09	2.722 ± 0.041	3.988 ± 0.116	4.413 ± 0.134	2.893 ± 0.159	1.245 ± 0.057	0.396 ± 0.051
			2007.11	2.467 ± 0.031	3.895 ± 0.114	4.385 ± 0.115	2.882 ± 0.160	1.203 ± 0.055	0.365 ± 0.040
			2008.04	2.899 ± 0.032	4.019 ± 0.117	4.506 ± 0.159	2.920 ± 0.128	1.306 ± 0.084	0.580 ± 0.066
			2009.04	2.875 ± 0.092	3.962 ± 0.115	4.306 ± 0.156	3.054 ± 0.133	1.547 ± 0.313	
			2009.10	2.712 ± 0.031	3.580 ± 0.075	3.623 ± 0.099	2.977 ± 0.086	1.241 ± 0.237	
			2009.11	2.871 ± 0.039	4.062 ± 0.110	4.499 ± 0.178	2.718 ± 0.118	1.464 ± 0.070	
			2010.01	2.872 ± 0.024	3.918 ± 0.081	3.937 ± 0.081	3.335 ± 0.058	1.528 ± 0.259	
065031+600144	QSO	max	2006.10	0.741 ± 0.067	0.959 ± 0.035	1.053 ± 0.082	1.145 ± 0.041	0.883 ± 0.079	0.511 ± 0.123
	0.46		2007.04	0.686 ± 0.043	0.771 ± 0.033	1.015 ± 0.070	1.130 ± 0.058	0.849 ± 0.045	0.490 ± 0.043
			2007.09	0.867 ± 0.121	0.867 ± 0.021	1.054 ± 0.045	1.182 ± 0.036	0.760 ± 0.052	0.392 ± 0.035
			2008.06	0.636 ± 0.053	0.752 ± 0.039	0.976 ± 0.036	1.133 ± 0.063	0.891 ± 0.075	0.338 ± 0.026
065510+410010	G	max	2006.07	0.262 ± 0.052	0.352 ± 0.020	0.381 ± 0.053	0.350 ± 0.022	0.264 ± 0.027	
	0.02		2007.03	0.323 ± 0.015	0.449 ± 0.020	0.417 ± 0.026	0.360 ± 0.022	0.319 ± 0.036	
			2007.06	0.285 ± 0.013	0.311 ± 0.012	0.298 ± 0.014	0.267 ± 0.019	0.207 ± 0.016	
			2007.09	0.290 ± 0.009	0.422 ± 0.013	0.446 ± 0.016	0.397 ± 0.024	0.271 ± 0.017	0.244 ± 0.057
			2007.11	0.278 ± 0.009	0.417 ± 0.013	0.448 ± 0.013	0.403 ± 0.022	0.277 ± 0.023	0.183 ± 0.056
			2008.04	0.272 ± 0.010	0.417 ± 0.014	0.490 ± 0.022	0.447 ± 0.020	0.309 ± 0.041	0.239 ± 0.053
071424+353439	QSO	s	2006.07	0.183 ± 0.028	0.300 ± 0.025	0.392 ± 0.067	0.596 ± 0.034	1.019 ± 0.071	1.335 ± 0.170
	1.62		2007.03	0.156 ± 0.014	0.297 ± 0.027	0.413 ± 0.026	0.599 ± 0.036	1.063 ± 0.079	1.415 ± 0.102
			2007.09	0.200 ± 0.012	0.276 ± 0.009	0.396 ± 0.014	0.577 ± 0.030	1.016 ± 0.051	1.405 ± 0.070
			2008.04	0.174 ± 0.016	0.296 ± 0.011	0.381 ± 0.021	0.566 ± 0.025	0.947 ± 0.064	1.431 ± 0.083
072201+372228	QSO	max ¹	2006.07	0.111 ± 0.047	0.142 ± 0.010		0.182 ± 0.013	0.196 ± 0.052	0.174 ± 0.034
	1.63		2007.03	0.064 ± 0.014	0.131 ± 0.020	0.163 ± 0.014	0.176 ± 0.011	0.233 ± 0.034	0.377 ± 0.058
			2007.06	0.054 ± 0.016	0.086 ± 0.004	0.106 ± 0.007	0.125 ± 0.009	0.140 ± 0.017	0.169 ± 0.042
			2007.09	0.056 ± 0.011	0.108 ± 0.004	0.148 ± 0.007	0.179 ± 0.013	0.176 ± 0.009	0.144 ± 0.033
			2007.11	0.056 ± 0.005	0.114 ± 0.005	0.136 ± 0.005	0.175 ± 0.009	0.201 ± 0.015	0.223 ± 0.042
			2008.04	0.089 ± 0.010	0.120 ± 0.009	0.144 ± 0.009	0.169 ± 0.008	0.232 ± 0.026	0.236 ± 0.075
074110+311200	QSO	max	2006.07	0.952 ± 0.108	1.460 ± 0.071	1.647 ± 0.252	1.754 ± 0.091	1.878 ± 0.129	1.922 ± 0.363
	0.63		2007.03	0.950 ± 0.025	1.532 ± 0.119	1.751 ± 0.121	1.804 ± 0.108	1.823 ± 0.127	1.701 ± 0.242
			2007.09	1.035 ± 0.021	1.546 ± 0.048	1.915 ± 0.062	1.881 ± 0.098	1.880 ± 0.085	1.860 ± 0.091
			2008.04	0.935 ± 0.019	1.470 ± 0.047	1.772 ± 0.071	2.030 ± 0.086	1.864 ± 0.105	1.689 ± 0.092
			2009.04	0.670 ± 0.100	1.310 ± 0.045	1.579 ± 0.091	1.919 ± 0.119	2.092 ± 0.403	
074421–062935	–	s	2006.07	0.468 ± 0.106		1.440 ± 0.141	2.762 ± 0.107	5.614 ± 0.235	9.601 ± 0.406
	–		2007.03	0.441 ± 0.022		1.707 ± 0.071	2.899 ± 0.123	5.966 ± 0.246	0.247 ± 0.455
			2007.09	0.561 ± 0.040		1.890 ± 0.038	2.921 ± 0.108	6.018 ± 0.158	0.234 ± 0.360
			2008.04	0.490 ± 0.023		1.766 ± 0.047	3.000 ± 0.198	6.064 ± 0.246	9.883 ± 0.331
074533+101112	G	max	2006.07	1.000 ± 0.189	1.639 ± 0.058	2.204 ± 0.080	3.137 ± 0.137	3.732 ± 0.173	2.625 ± 0.232
	2.62		2007.03	1.005 ± 0.032	1.637 ± 0.054	2.131 ± 0.098	3.033 ± 0.203	3.841 ± 0.240	2.831 ± 0.233
			2007.09	1.160 ± 0.031	1.799 ± 0.043	2.140 ± 0.055	2.984 ± 0.234	3.686 ± 0.129	2.620 ± 0.101
			2008.04	0.977 ± 0.027	1.665 ± 0.050	2.115 ± 0.113	2.943 ± 0.139	3.719 ± 0.152	2.310 ± 0.089
			2010.04	0.808 ± 0.029	1.643 ± 0.040	2.161 ± 0.066	2.790 ± 0.076	3.951 ± 0.132	
			2010.05	0.753 ± 0.165	1.603 ± 0.116	2.139 ± 0.100	2.733 ± 0.092	3.081 ± 0.515	2.304 ± 0.526
074554–004417	QSO	max	2006.07	0.927 ± 0.010	1.363 ± 0.176		1.852 ± 0.116	1.180 ± 0.138	0.473 ± 0.098

Table 2. continued.

NVSS name	Type, z	sp	Data, yyyy.mm	$S_{21.7 \text{ GHz}, \sigma}$ (Jy)	$S_{11.2 \text{ GHz}, \sigma}$ (Jy)	$S_{7.7 \text{ GHz}, \sigma}$ (Jy)	$S_{4.8 \text{ GHz}, \sigma}$ (Jy)	$S_{2.3 \text{ GHz}, \sigma}$ (Jy)	$S_{1 \text{ GHz}, \sigma}$ (Jy)
	0.99		2007.03	1.150 ± 0.030	1.450 ± 0.065	1.730 ± 0.091	1.837 ± 0.090	1.224 ± 0.091	0.633 ± 0.091
			2007.09	1.092 ± 0.023	1.683 ± 0.036	1.831 ± 0.041	1.887 ± 0.055	1.203 ± 0.049	0.650 ± 0.063
			2008.04	1.111 ± 0.021	1.682 ± 0.058	1.920 ± 0.061	1.919 ± 0.078	1.206 ± 0.067	0.518 ± 0.041
			2010.04	0.905 ± 0.047	1.419 ± 0.034	1.743 ± 0.061	1.853 ± 0.063	1.219 ± 0.046	
			2010.05	1.069 ± 0.086	1.408 ± 0.158	1.747 ± 0.100	1.729 ± 0.109	0.909 ± 0.195	
090040–280820	QSO	max	2006.07	0.777 ± 0.133	1.186 ± 0.068	1.551 ± 0.111	2.014 ± 0.093	1.883 ± 0.127	1.490 ± 0.081
	2.15		2007.03	0.506 ± 0.027	1.012 ± 0.045	1.409 ± 0.065	1.897 ± 0.072	1.751 ± 0.067	1.557 ± 0.096
			2007.09	0.611 ± 0.027	1.067 ± 0.020	1.535 ± 0.026	1.726 ± 0.042	1.895 ± 0.041	1.496 ± 0.049
			2008.04	0.547 ± 0.023	0.907 ± 0.026	1.243 ± 0.048	1.706 ± 0.062	2.012 ± 0.067	1.584 ± 0.152
090527+485049	QSO	max	2006.07		0.288 ± 0.014		0.616 ± 0.038	0.630 ± 0.068	0.403 ± 0.143
	2.69		2007.03		0.234 ± 0.024	0.351 ± 0.033	0.559 ± 0.031	0.575 ± 0.033	0.607 ± 0.063
			2007.09		0.260 ± 0.009	0.370 ± 0.019	0.563 ± 0.023	0.551 ± 0.044	0.402 ± 0.130
			2008.04	0.206 ± 0.090	0.236 ± 0.036	0.323 ± 0.042	0.511 ± 0.046	0.514 ± 0.080	0.345 ± 0.073
092703+390220	QSO	max ²	2006.07	6.983 ± 0.520	0.450 ± 0.544	1.317 ± 0.325	9.981 ± 0.580	4.813 ± 0.236	2.145 ± 0.162
	0.70		2007.03	2.485 ± 0.041	1.445 ± 0.449	2.163 ± 0.600	0.652 ± 0.651	5.085 ± 0.326	2.255 ± 0.171
			2007.09	7.425 ± 0.099	0.607 ± 0.333	1.846 ± 0.399	0.188 ± 0.542	5.043 ± 0.222	2.148 ± 0.130
			2008.04	8.329 ± 0.096	1.577 ± 0.352	2.744 ± 0.498	1.096 ± 0.437	5.035 ± 0.239	2.271 ± 0.097
			2008.11	7.244 ± 0.087	0.928 ± 0.367	2.247 ± 0.470	9.525 ± 0.444	4.552 ± 0.238	2.312 ± 0.071
			2009.04	8.083 ± 0.326	1.434 ± 0.351	1.706 ± 0.713	0.956 ± 0.537	4.801 ± 0.245	
			2009.10	8.173 ± 0.058	1.544 ± 0.274	2.474 ± 0.289	0.776 ± 0.202	5.044 ± 0.224	
			2009.11	8.314 ± 0.125	1.549 ± 0.401	2.342 ± 0.518	9.490 ± 0.420	5.269 ± 0.246	
			2010.01	8.130 ± 0.061	2.036 ± 0.246	2.643 ± 0.249	1.682 ± 0.211	5.184 ± 0.247	
101603+051303	QSO	c	2006.07	0.389 ± 0.080	0.402 ± 0.020	0.462 ± 0.032	0.428 ± 0.016	0.509 ± 0.050	0.626 ± 0.083
	1.71		2007.03	0.461 ± 0.016	0.448 ± 0.022	0.386 ± 0.020	0.394 ± 0.016	0.444 ± 0.045	0.496 ± 0.050
			2007.09	0.638 ± 0.015	0.646 ± 0.015	0.577 ± 0.015	0.519 ± 0.025	0.424 ± 0.015	0.476 ± 0.027
			2008.04	0.742 ± 0.013	0.832 ± 0.025	0.773 ± 0.028	0.651 ± 0.026	0.568 ± 0.046	0.516 ± 0.030
104423+805439	QSO	max	2006.10	0.777 ± 0.018	1.315 ± 0.050	1.448 ± 0.048	1.477 ± 0.049	1.079 ± 0.050	0.735 ± 0.089
	1.26		2007.04	1.169 ± 0.027	1.524 ± 0.039	1.488 ± 0.081	1.533 ± 0.067	1.093 ± 0.050	0.739 ± 0.065
			2007.09	1.200 ± 0.028	1.368 ± 0.032	1.466 ± 0.068	1.464 ± 0.051	1.071 ± 0.049	0.764 ± 0.038
			2008.06	1.297 ± 0.021	1.270 ± 0.037	1.341 ± 0.046	1.401 ± 0.056	1.117 ± 0.057	0.710 ± 0.049
104552+062436	QSO	c	2006.07	0.289 ± 0.062	0.266 ± 0.018		0.252 ± 0.010	0.256 ± 0.034	0.304 ± 0.033
	1.51		2007.03	0.240 ± 0.013	0.267 ± 0.016	0.228 ± 0.011	0.239 ± 0.010	0.313 ± 0.026	0.313 ± 0.031
			2007.06	0.175 ± 0.017	0.196 ± 0.007	0.166 ± 0.007	0.173 ± 0.007	0.176 ± 0.016	0.246 ± 0.048
			2007.09	0.248 ± 0.010	0.282 ± 0.007	0.225 ± 0.007	0.226 ± 0.011	0.264 ± 0.021	0.280 ± 0.029
			2008.04	0.282 ± 0.010	0.292 ± 0.013	0.248 ± 0.017	0.229 ± 0.012	0.236 ± 0.029	0.217 ± 0.022
110323+220337	–	max	2006.07	0.125 ± 0.034	0.272 ± 0.015	0.467 ± 0.156	0.551 ± 0.024	0.682 ± 0.061	0.443 ± 0.114
	–		2007.03	0.085 ± 0.011	0.256 ± 0.012	0.368 ± 0.018	0.554 ± 0.028	0.698 ± 0.051	0.483 ± 0.055
			2007.06	0.095 ± 0.015	0.204 ± 0.008	0.255 ± 0.013	0.392 ± 0.020	0.427 ± 0.028	0.398 ± 0.031
			2007.09	0.107 ± 0.005	0.262 ± 0.007	0.368 ± 0.012	0.540 ± 0.025	0.623 ± 0.029	0.294 ± 0.032
			2008.04	0.114 ± 0.012	0.265 ± 0.013	0.372 ± 0.017	0.562 ± 0.019	0.653 ± 0.048	0.366 ± 0.017
			2010.04	0.129 ± 0.016	0.272 ± 0.011	0.385 ± 0.015	0.560 ± 0.018	0.681 ± 0.033	
112125–055356	QSO	f	2006.07	0.432 ± 0.099		0.429 ± 0.053	0.476 ± 0.016	0.692 ± 0.086	0.972 ± 0.086
	1.30		2007.03	0.342 ± 0.024		0.336 ± 0.023	0.491 ± 0.021	0.746 ± 0.062	1.069 ± 0.093
			2007.06	0.412 ± 0.033	0.295 ± 0.092	0.313 ± 0.010	0.390 ± 0.012	0.478 ± 0.025	0.752 ± 0.033
			2007.09	0.394 ± 0.024		0.471 ± 0.011	0.595 ± 0.022	0.729 ± 0.033	0.887 ± 0.039
			2007.11	0.326 ± 0.012		0.461 ± 0.009	0.569 ± 0.015	0.724 ± 0.031	0.935 ± 0.050
			2008.04	0.455 ± 0.021	0.513 ± 0.069	0.463 ± 0.029	0.630 ± 0.022	0.845 ± 0.061	0.879 ± 0.045
112256–274248	–	max ¹	2006.07		0.185 ± 0.031		0.439 ± 0.013	0.742 ± 0.089	0.854 ± 0.066
	0.65		2007.03	0.075 ± 0.022	0.155 ± 0.016	0.241 ± 0.020	0.408 ± 0.017	0.711 ± 0.040	0.630 ± 0.059
			2007.09	0.066 ± 0.028	0.107 ± 0.005	0.226 ± 0.007	0.407 ± 0.018	0.611 ± 0.026	0.591 ± 0.039
			2008.04	0.088 ± 0.018	0.116 ± 0.010	0.208 ± 0.017	0.401 ± 0.010	0.666 ± 0.056	0.548 ± 0.019
114608–244732	QSO	max	2006.07	0.667 ± 0.096	1.111 ± 0.054	1.225 ± 0.054	1.589 ± 0.049	1.569 ± 0.076	1.129 ± 0.069
	1.94		2007.03	0.667 ± 0.032	1.117 ± 0.062	1.411 ± 0.064	1.696 ± 0.066	1.673 ± 0.074	1.046 ± 0.075
			2007.09	0.814 ± 0.037	1.124 ± 0.021	1.471 ± 0.024	1.641 ± 0.055	1.504 ± 0.036	1.006 ± 0.040
			2008.04	0.628 ± 0.020	1.112 ± 0.027	1.395 ± 0.040	1.660 ± 0.031	1.623 ± 0.098	1.067 ± 0.103
114722+350107	G	f	2006.07	0.180 ± 0.076	0.229 ± 0.020		0.252 ± 0.018	0.325 ± 0.073	0.671 ± 0.082
	0.06		2007.03	0.180 ± 0.017	0.224 ± 0.018	0.235 ± 0.020	0.248 ± 0.017	0.336 ± 0.063	0.408 ± 0.123
			2007.09	0.163 ± 0.023	0.207 ± 0.007	0.236 ± 0.011	0.236 ± 0.023	0.277 ± 0.032	0.309 ± 0.040
			2008.04	0.214 ± 0.011	0.245 ± 0.017	0.241 ± 0.018	0.255 ± 0.022	0.323 ± 0.064	0.385 ± 0.059
122758+363511	QSO	max ¹	2006.07	0.111 ± 0.022	0.230 ± 0.015	0.468 ± 0.140	0.770 ± 0.044	1.673 ± 0.085	2.012 ± 0.135
	1.97		2007.03	0.045 ± 0.011	0.237 ± 0.014	0.418 ± 0.021	0.789 ± 0.047	1.753 ± 0.117	1.969 ± 0.093
			2007.09	0.077 ± 0.011	0.205 ± 0.007	0.395 ± 0.014	0.753 ± 0.040	1.675 ± 0.075	2.105 ± 0.078
			2008.04	0.064 ± 0.006	0.228 ± 0.009	0.410 ± 0.017	0.795 ± 0.031	1.687 ± 0.088	1.846 ± 0.070
			2010.04		0.228 ± 0.009	0.388 ± 0.019	0.761 ± 0.029	1.475 ± 0.080	
132650+571206	G	f	2006.10	0.103 ± 0.055	0.151 ± 0.017	0.182 ± 0.019	0.241 ± 0.009	0.390 ± 0.042	0.554 ± 0.052
	–		2007.04	0.111 ± 0.039	0.150 ± 0.007	0.185 ± 0.014	0.247 ± 0.022	0.415 ± 0.041	0.611 ± 0.081
			2007.09	0.128 ± 0.076	0.130 ± 0.006	0.153 ± 0.010	0.244 ± 0.012	0.378 ± 0.028	0.480 ± 0.035

Table 2. continued.

NVSS name	Type, z	sp	Data, yyyy.mm	$S_{21.7 \text{ GHz}, \sigma}$ (Jy)	$S_{11.2 \text{ GHz}, \sigma}$ (Jy)	$S_{7.7 \text{ GHz}, \sigma}$ (Jy)	$S_{4.8 \text{ GHz}, \sigma}$ (Jy)	$S_{2.3 \text{ GHz}, \sigma}$ (Jy)	$S_{1 \text{ GHz}, \sigma}$ (Jy)
133521+454238	QSO 2.45	max	2008.06	0.128 ± 0.052	0.151 ± 0.019	0.188 ± 0.028	0.239 ± 0.015	0.414 ± 0.031	0.566 ± 0.054
			2006.07	0.296 ± 0.097	0.636 ± 0.036	0.918 ± 0.062	0.857 ± 0.052	0.496 ± 0.056	0.390 ± 0.026
			2007.03	0.349 ± 0.017	0.662 ± 0.030	0.802 ± 0.043	0.867 ± 0.055	0.566 ± 0.058	0.299 ± 0.063
			2007.09	0.326 ± 0.017	0.638 ± 0.020	0.844 ± 0.028	0.856 ± 0.049	0.393 ± 0.019	0.278 ± 0.079
133739–125724	QSO 0.54	ris	2008.04	0.370 ± 0.021	0.775 ± 0.031	1.023 ± 0.049	0.875 ± 0.054	0.503 ± 0.035	0.368 ± 0.034
			2006.07	3.721 ± 1.097	3.696 ± 0.282	3.789 ± 0.273	3.357 ± 0.161	1.914 ± 0.241	1.666 ± 0.255
			2007.03	4.917 ± 0.064	4.261 ± 0.196	3.967 ± 0.134	3.312 ± 0.211	2.215 ± 0.183	1.755 ± 0.104
			2007.09	8.063 ± 0.066	6.033 ± 0.118	5.293 ± 0.096	4.265 ± 0.270	2.623 ± 0.064	1.621 ± 0.073
135740+435359	G 0.65	max ¹	2008.04	7.406 ± 0.067	6.636 ± 0.225	6.051 ± 0.253	4.950 ± 0.375	2.830 ± 0.240	1.808 ± 0.062
			2009.04	7.033 ± 0.184	6.422 ± 0.175	5.427 ± 0.202	4.704 ± 0.188	2.919 ± 0.269	
			2006.07		0.245 ± 0.036	0.401 ± 0.142	0.508 ± 0.032	0.693 ± 0.073	0.583 ± 0.073
			2007.03	0.110 ± 0.018	0.263 ± 0.031	0.370 ± 0.024	0.503 ± 0.033	0.769 ± 0.098	0.755 ± 0.109
135755+764321	QSO –	max ²	2007.09	0.091 ± 0.020	0.247 ± 0.009	0.326 ± 0.013	0.470 ± 0.029	0.590 ± 0.030	0.633 ± 0.096
			2008.04	0.205 ± 0.022	0.260 ± 0.031	0.425 ± 0.032	0.497 ± 0.037	0.751 ± 0.075	0.684 ± 0.054
			2006.10	0.846 ± 0.170	0.892 ± 0.041	0.863 ± 0.036	0.818 ± 0.040	0.663 ± 0.039	0.618 ± 0.054
			2007.04	1.295 ± 0.031	1.434 ± 0.100	1.359 ± 0.078	1.274 ± 0.058	0.974 ± 0.071	0.699 ± 0.035
140700+282714	G 0.08	max	2007.09	1.432 ± 0.030	1.565 ± 0.039	1.594 ± 0.073	1.408 ± 0.048	1.070 ± 0.053	0.690 ± 0.042
			2008.06	1.055 ± 0.018	1.151 ± 0.053	1.228 ± 0.044	1.184 ± 0.049	1.118 ± 0.073	0.899 ± 0.050
			2006.07	0.335 ± 0.040	1.244 ± 0.076	2.034 ± 0.137	2.480 ± 0.133	1.472 ± 0.081	0.532 ± 0.060
			2007.03	0.262 ± 0.017	1.205 ± 0.053	1.992 ± 0.098	2.551 ± 0.141	1.486 ± 0.109	0.606 ± 0.054
141236+133438	– –	max	2007.09	0.330 ± 0.022	1.115 ± 0.034	1.883 ± 0.060	2.494 ± 0.122	1.421 ± 0.067	0.624 ± 0.035
			2008.04	0.283 ± 0.011	1.110 ± 0.035	1.837 ± 0.075	2.574 ± 0.083	1.479 ± 0.082	0.493 ± 0.024
			2008.11	0.253 ± 0.012	1.007 ± 0.031	1.677 ± 0.066	2.364 ± 0.102	1.453 ± 0.089	0.624 ± 0.110
			2010.01	0.183 ± 0.028	0.934 ± 0.048	1.692 ± 0.093	2.353 ± 0.071	1.373 ± 0.215	
142438+225600	G 0.34	max	2010.04	0.189 ± 0.025	0.948 ± 0.030	1.639 ± 0.068	2.508 ± 0.084	1.375 ± 0.066	
			2010.05	0.221 ± 0.056	0.915 ± 0.053	1.616 ± 0.077	2.477 ± 0.087	1.344 ± 0.145	0.845 ± 0.389
			2006.07	0.144 ± 0.052	0.243 ± 0.019	0.296 ± 0.025	0.353 ± 0.014	0.339 ± 0.043	0.313 ± 0.033
			2007.03	0.090 ± 0.018	0.239 ± 0.025	0.284 ± 0.016	0.338 ± 0.017	0.346 ± 0.058	0.266 ± 0.062
143009+104327	QSO 1.71	max	2007.09	0.124 ± 0.013	0.247 ± 0.007	0.275 ± 0.009	0.346 ± 0.016	0.327 ± 0.025	0.162 ± 0.038
			2008.04	0.118 ± 0.011	0.241 ± 0.013	0.299 ± 0.016	0.349 ± 0.018	0.259 ± 0.060	0.078 ± 0.017
			2006.07	0.231 ± 0.032	0.364 ± 0.016	0.465 ± 0.079	0.670 ± 0.033	0.552 ± 0.110	0.429 ± 0.050
			2007.03	0.120 ± 0.026	0.292 ± 0.059	0.465 ± 0.034	0.633 ± 0.038	0.593 ± 0.063	0.275 ± 0.070
143539–041348	G 0.15	s	2007.09	0.124 ± 0.020	0.384 ± 0.012	0.506 ± 0.017	0.687 ± 0.043	0.488 ± 0.028	0.208 ± 0.080
			2008.04	0.151 ± 0.011	0.399 ± 0.018	0.528 ± 0.022	0.694 ± 0.033	0.537 ± 0.073	0.153 ± 0.038
			2006.07	0.375 ± 0.135	0.597 ± 0.031	0.773 ± 0.077	0.813 ± 0.039	0.655 ± 0.039	0.245 ± 0.044
			2007.03	0.306 ± 0.015	0.612 ± 0.024	0.715 ± 0.033	0.827 ± 0.036	0.623 ± 0.051	0.272 ± 0.061
144516+095836	QSO 3.53	max ¹	2007.09	0.348 ± 0.017	0.572 ± 0.014	0.649 ± 0.018	0.799 ± 0.035	0.570 ± 0.028	0.198 ± 0.054
			2008.04	0.278 ± 0.015	0.602 ± 0.022	0.719 ± 0.028	0.833 ± 0.021	0.684 ± 0.063	0.213 ± 0.025
			2008.11	0.439 ± 0.020	0.643 ± 0.034	0.735 ± 0.065	0.899 ± 0.059	0.581 ± 0.046	0.302 ± 0.074
			2010.04	0.458 ± 0.011	0.788 ± 0.021	0.945 ± 0.031	0.993 ± 0.027	0.630 ± 0.028	
144719–340916	G 0.85	s	2010.05	0.499 ± 0.070	0.776 ± 0.029	0.941 ± 0.036	0.982 ± 0.027	0.623 ± 0.094	0.400 ± 0.089
			2006.07				0.223 ± 0.011	0.477 ± 0.064	0.622 ± 0.039
			2007.03	0.076 ± 0.025		0.151 ± 0.014	0.207 ± 0.014	0.471 ± 0.071	0.647 ± 0.075
			2007.09	0.045 ± 0.023		0.112 ± 0.006	0.252 ± 0.015	0.495 ± 0.015	0.719 ± 0.037
145738+074954	QSO 1.84	f	2008.04	0.043 ± 0.015		0.160 ± 0.026	0.294 ± 0.016	0.533 ± 0.096	0.579 ± 0.051
			2006.07	0.211 ± 0.068	0.459 ± 0.032	0.681 ± 0.121	1.010 ± 0.042	1.892 ± 0.094	2.624 ± 0.141
			2007.03	0.216 ± 0.022	0.453 ± 0.075	0.625 ± 0.039	0.978 ± 0.055	1.805 ± 0.122	2.583 ± 0.137
			2007.09	0.273 ± 0.028	0.481 ± 0.013	0.646 ± 0.017	0.982 ± 0.049	1.771 ± 0.063	2.654 ± 0.098
150506+032630	QSO 0.41	c	2008.04	0.291 ± 0.021	0.488 ± 0.038	0.676 ± 0.026	0.981 ± 0.030	1.872 ± 0.106	2.502 ± 0.092
			2006.07		0.125 ± 0.043	0.221 ± 0.055	0.292 ± 0.020	0.577 ± 0.105	1.035 ± 0.070
			2007.03	0.097 ± 0.032	0.102 ± 0.029	0.208 ± 0.024	0.263 ± 0.019	0.499 ± 0.040	0.907 ± 0.086
			2007.09		0.076 ± 0.005	0.172 ± 0.009	0.303 ± 0.046	0.613 ± 0.026	1.085 ± 0.066
150603–091912	G 1.49	s	2008.04	0.067 ± 0.025	0.111 ± 0.018	0.156 ± 0.023	0.280 ± 0.014	0.585 ± 0.067	0.972 ± 0.049
			2006.07		0.081 ± 0.011		0.094 ± 0.012	0.167 ± 0.041	0.281 ± 0.042
			2007.03	0.049 ± 0.018	0.080 ± 0.018	0.104 ± 0.010	0.091 ± 0.008	0.201 ± 0.056	0.261 ± 0.096
			2007.09	0.058 ± 0.015	0.068 ± 0.004	0.078 ± 0.006	0.095 ± 0.006	0.120 ± 0.009	0.148 ± 0.008
151141+051809	G 0.08	max	2008.04	0.066 ± 0.018	0.066 ± 0.010	0.071 ± 0.013	0.083 ± 0.007	0.156 ± 0.035	0.143 ± 0.020
			2006.07	0.484 ± 0.111	0.633 ± 0.041	0.765 ± 0.127	0.750 ± 0.036	0.609 ± 0.039	0.563 ± 0.079
			2007.03	0.398 ± 0.032	0.556 ± 0.127	0.579 ± 0.038	0.604 ± 0.054	0.601 ± 0.075	0.534 ± 0.248
			2007.09	0.416 ± 0.042	0.512 ± 0.014	0.547 ± 0.017	0.594 ± 0.029	0.445 ± 0.026	
151141+051809	G 0.08	max	2008.04	0.518 ± 0.025	0.562 ± 0.031	0.544 ± 0.029	0.463 ± 0.021	0.425 ± 0.041	0.525 ± 0.033
			2006.07		0.282 ± 0.036	0.437 ± 0.020	0.437 ± 0.020	0.968 ± 0.083	1.558 ± 0.100
			2007.03	0.106 ± 0.025	0.180 ± 0.077	0.253 ± 0.031	0.430 ± 0.022	0.949 ± 0.060	1.657 ± 0.121
			2007.09	0.117 ± 0.034		0.257 ± 0.012	0.438 ± 0.024	0.921 ± 0.037	1.522 ± 0.059
151141+051809	G 0.08	max	2008.04	0.070 ± 0.018	0.178 ± 0.046	0.261 ± 0.037	0.439 ± 0.017	0.985 ± 0.086	1.511 ± 0.051
			2006.07	0.368 ± 0.079	0.701 ± 0.035	0.955 ± 0.034	0.629 ± 0.021	0.303 ± 0.062	
151141+051809	G 0.08	max	2007.03	0.487 ± 0.021	0.699 ± 0.096	0.694 ± 0.031	0.604 ± 0.028	0.270 ± 0.014	

Table 2. continued.

NVSS name	Type, z	sp	Data, yyyy.mm	$S_{21.7 \text{ GHz}, \sigma}$ (Jy)	$S_{11.2 \text{ GHz}, \sigma}$ (Jy)	$S_{7.7 \text{ GHz}, \sigma}$ (Jy)	$S_{4.8 \text{ GHz}, \sigma}$ (Jy)	$S_{2.3 \text{ GHz}, \sigma}$ (Jy)	$S_{1 \text{ GHz}, \sigma}$ (Jy)
152237–273010	QSO	max ²	2007.09	0.397 ± 0.021	0.699 ± 0.016	0.696 ± 0.018	0.617 ± 0.024	0.198 ± 0.010	
			2008.04	0.434 ± 0.014	0.678 ± 0.022	0.743 ± 0.026	0.626 ± 0.022	0.255 ± 0.033	
			2010.04	0.365 ± 0.028	0.628 ± 0.014	0.721 ± 0.027	0.642 ± 0.014	0.210 ± 0.028	
			2010.05	0.381 ± 0.091	0.626 ± 0.028	0.750 ± 0.035	0.635 ± 0.028	0.299 ± 0.079	
			2006.07	0.850 ± 0.198	1.067 ± 0.068	1.057 ± 0.104	1.031 ± 0.049	0.844 ± 0.092	0.614 ± 0.081
152642+665055	QSO	max	2007.03	1.382 ± 0.028	1.725 ± 0.058	1.833 ± 0.079	1.706 ± 0.074	1.257 ± 0.094	0.653 ± 0.055
			2007.09	1.024 ± 0.048	1.396 ± 0.026	1.647 ± 0.026	1.686 ± 0.137	1.321 ± 0.033	0.904 ± 0.066
			2008.04	1.224 ± 0.036	1.414 ± 0.040	1.491 ± 0.080	1.333 ± 0.067	0.838 ± 0.116	0.558 ± 0.023
			2010.04	0.902 ± 0.024	1.073 ± 0.020	1.175 ± 0.043	1.134 ± 0.024	0.831 ± 0.067	
			2010.05	0.786 ± 0.289	1.105 ± 0.063	1.224 ± 0.132	1.237 ± 0.039		0.550 ± 0.190
154812–121331	G	s	2006.10	0.180 ± 0.041	0.269 ± 0.023	0.343 ± 0.016	0.394 ± 0.015	0.345 ± 0.071	0.250 ± 0.064
			2007.04	0.115 ± 0.026	0.238 ± 0.026	0.351 ± 0.050	0.400 ± 0.034	0.356 ± 0.075	0.394 ± 0.081
			2007.09	0.226 ± 0.052	0.254 ± 0.010	0.342 ± 0.019	0.389 ± 0.015	0.225 ± 0.034	0.106 ± 0.025
			2008.06	0.143 ± 0.032	0.277 ± 0.025	0.398 ± 0.038	0.424 ± 0.032	0.326 ± 0.033	0.188 ± 0.038
155613–062237	G	s	2006.07	0.184 ± 0.044	0.329 ± 0.038	0.500 ± 0.058	0.870 ± 0.025	1.828 ± 0.078	3.406 ± 0.138
			2007.03	0.069 ± 0.019	0.285 ± 0.031	0.448 ± 0.022	0.841 ± 0.029	1.913 ± 0.084	3.581 ± 0.181
			2007.09	0.125 ± 0.015	0.286 ± 0.008	0.469 ± 0.010	0.903 ± 0.142	1.830 ± 0.049	3.434 ± 0.113
			2008.04	0.096 ± 0.010	0.306 ± 0.015	0.492 ± 0.019	0.840 ± 0.016	1.897 ± 0.066	3.307 ± 0.110
160207+332653	G	f	2006.07	0.087 ± 0.035			0.480 ± 0.019	0.958 ± 0.086	1.588 ± 0.189
			2007.03	0.059 ± 0.022		0.238 ± 0.023	0.427 ± 0.019	0.892 ± 0.080	1.639 ± 0.095
			2007.09	0.123 ± 0.032		0.249 ± 0.010	0.445 ± 0.022	0.891 ± 0.033	1.674 ± 0.084
			2008.04	0.090 ± 0.023		0.255 ± 0.025	0.423 ± 0.009	0.935 ± 0.076	1.582 ± 0.058
160341+110549	G	f	2006.07	0.759 ± 0.089	1.089 ± 0.058	1.161 ± 0.040	1.617 ± 0.086	2.171 ± 0.133	2.779 ± 0.353
			2007.03	0.724 ± 0.021	1.133 ± 0.060	1.384 ± 0.068	1.661 ± 0.104	2.304 ± 0.168	2.554 ± 0.153
			2007.09	0.646 ± 0.018	0.964 ± 0.030	1.206 ± 0.040	1.544 ± 0.083	2.197 ± 0.099	2.438 ± 0.129
			2008.04	0.666 ± 0.020	1.001 ± 0.034	1.270 ± 0.052	1.586 ± 0.063	2.078 ± 0.131	2.643 ± 0.083
160401–222341	QSO	f	2006.07	0.210 ± 0.038	0.150 ± 0.032		0.132 ± 0.010	0.148 ± 0.038	0.197 ± 0.043
			2007.03	0.118 ± 0.029	0.228 ± 0.067	0.237 ± 0.026	0.236 ± 0.022	0.299 ± 0.020	0.308 ± 0.068
			2007.09	0.160 ± 0.025	0.174 ± 0.008	0.202 ± 0.009	0.163 ± 0.008	0.135 ± 0.022	0.115 ± 0.037
			2008.04	0.180 ± 0.017	0.231 ± 0.016	0.214 ± 0.014	0.192 ± 0.007	0.166 ± 0.028	0.173 ± 0.020
160608+312447	G	max	2006.07		0.188 ± 0.055		0.421 ± 0.018	0.711 ± 0.091	0.993 ± 0.151
			2007.03			0.189 ± 0.025	0.235 ± 0.019	0.341 ± 0.058	0.501 ± 0.150
			2007.09		0.196 ± 0.007	0.267 ± 0.009	0.382 ± 0.042	0.703 ± 0.022	0.645 ± 0.059
			2008.04	0.152 ± 0.033	0.189 ± 0.040	0.268 ± 0.035	0.427 ± 0.019	0.722 ± 0.101	0.784 ± 0.034
161637+045933	QSO	max	2006.07	0.313 ± 0.080	0.531 ± 0.052	0.627 ± 0.090	0.792 ± 0.042	0.837 ± 0.082	0.414 ± 0.033
			2007.03	0.279 ± 0.027	0.536 ± 0.028	0.677 ± 0.055	0.799 ± 0.059	0.860 ± 0.095	0.407 ± 0.036
			2007.09	0.256 ± 0.019	0.518 ± 0.016	0.626 ± 0.021	0.807 ± 0.043	0.825 ± 0.040	0.610 ± 0.123
			2008.04	0.250 ± 0.011	0.517 ± 0.023	0.639 ± 0.032	0.816 ± 0.028	0.857 ± 0.061	0.434 ± 0.026
			2010.04	0.245 ± 0.022	0.473 ± 0.015	0.600 ± 0.025	0.789 ± 0.028	0.743 ± 0.038	
			2010.05	0.227 ± 0.041	0.466 ± 0.031	0.591 ± 0.034	0.773 ± 0.034	0.793 ± 0.144	0.607 ± 0.138
162304+662401	QSO	max	2006.07	0.413 ± 0.093	0.648 ± 0.030	0.757 ± 0.080	0.869 ± 0.034	0.575 ± 0.044	0.338 ± 0.066
			2007.03	0.253 ± 0.016	0.653 ± 0.037	0.736 ± 0.032	0.829 ± 0.049	0.664 ± 0.054	0.333 ± 0.045
			2007.09	0.241 ± 0.021	0.680 ± 0.015	0.737 ± 0.018	0.818 ± 0.028	0.456 ± 0.023	0.375 ± 0.021
			2008.04	0.294 ± 0.020	0.674 ± 0.024	0.805 ± 0.034	0.856 ± 0.021	0.603 ± 0.070	0.287 ± 0.027
164558+633011	QSO	max	2006.10	0.154 ± 0.025	0.201 ± 0.016	0.218 ± 0.019	0.226 ± 0.012	0.212 ± 0.035	0.126 ± 0.030
			2007.04	0.134 ± 0.025	0.175 ± 0.014	0.197 ± 0.014	0.229 ± 0.031	0.235 ± 0.045	0.174 ± 0.057
			2007.09	0.152 ± 0.043	0.189 ± 0.007	0.195 ± 0.011	0.224 ± 0.009	0.178 ± 0.026	0.103 ± 0.023
			2008.06	0.106 ± 0.025	0.180 ± 0.016	0.216 ± 0.020	0.226 ± 0.021	0.175 ± 0.024	0.101 ± 0.024
			2010.01	0.212 ± 0.065	0.286 ± 0.056	0.316 ± 0.059	0.310 ± 0.035	0.322 ± 0.083	
171701+191740	QSO	f	2006.10	0.288 ± 0.033	0.323 ± 0.025	0.330 ± 0.024	0.321 ± 0.013	0.326 ± 0.053	0.329 ± 0.047
			2007.04	0.342 ± 0.032	0.344 ± 0.018	0.371 ± 0.029	0.375 ± 0.036	0.342 ± 0.028	0.361 ± 0.063
			2007.09	0.414 ± 0.052	0.361 ± 0.011	0.372 ± 0.018	0.368 ± 0.014	0.321 ± 0.027	0.341 ± 0.046
			2008.06	0.404 ± 0.033	0.391 ± 0.030	0.419 ± 0.032	0.393 ± 0.028	0.325 ± 0.022	0.350 ± 0.035
173458+092657	G	max	2006.07	0.122 ± 0.018	0.178 ± 0.010	0.218 ± 0.020	0.222 ± 0.009	0.260 ± 0.026	0.292 ± 0.042
			2007.03	0.087 ± 0.010	0.190 ± 0.010	0.196 ± 0.014	0.213 ± 0.011	0.244 ± 0.032	0.282 ± 0.028
			2007.09	0.102 ± 0.010	0.183 ± 0.005	0.205 ± 0.007	0.238 ± 0.012	0.233 ± 0.011	0.217 ± 0.021
			2008.04	0.087 ± 0.011	0.162 ± 0.009	0.182 ± 0.013	0.219 ± 0.008	0.225 ± 0.028	0.152 ± 0.013
			2010.04	0.131 ± 0.009	0.144 ± 0.007	0.172 ± 0.009	0.179 ± 0.005	0.181 ± 0.018	
173549+504911	G	max	2010.05	0.135 ± 0.012	0.152 ± 0.016	0.160 ± 0.013	0.184 ± 0.009	0.244 ± 0.063	
			2006.07	0.233 ± 0.033	0.404 ± 0.023	0.609 ± 0.054	0.923 ± 0.033	1.104 ± 0.060	0.676 ± 0.065
			2007.03	0.162 ± 0.013	0.403 ± 0.018	0.565 ± 0.024	0.897 ± 0.037	1.278 ± 0.070	0.778 ± 0.054
			2007.09	0.136 ± 0.011	0.430 ± 0.011	0.580 ± 0.016	0.980 ± 0.122	1.140 ± 0.040	0.675 ± 0.049
			2008.04	0.130 ± 0.008	0.414 ± 0.014	0.606 ± 0.021	0.893 ± 0.022	1.213 ± 0.056	0.770 ± 0.037
173549+504911	G	max	2010.05	0.214 ± 0.034	0.431 ± 0.017	0.638 ± 0.028	0.924 ± 0.026	1.091 ± 0.162	0.748 ± 0.112
			2006.10	0.565 ± 0.124	0.864 ± 0.053	0.882 ± 0.063	0.895 ± 0.027	0.511 ± 0.060	0.438 ± 0.050
			2007.04	0.460 ± 0.086	0.787 ± 0.070	0.926 ± 0.069	0.905 ± 0.047	0.514 ± 0.082	0.469 ± 0.117
173549+504911	G	max	2007.09	0.541 ± 0.149	0.847 ± 0.017	0.903 ± 0.036	0.894 ± 0.025	0.456 ± 0.033	0.429 ± 0.058

Table 2. continued.

NVSS name	Type, z	sp	Data, yyyy.mm	$S_{21.7 \text{ GHz}, \sigma}$ (Jy)	$S_{11.2 \text{ GHz}, \sigma}$ (Jy)	$S_{7.7 \text{ GHz}, \sigma}$ (Jy)	$S_{4.8 \text{ GHz}, \sigma}$ (Jy)	$S_{2.3 \text{ GHz}, \sigma}$ (Jy)	$S_{1 \text{ GHz}, \sigma}$ (Jy)
175301+275059	G 0.86	max ¹	2008.06	0.448 ± 0.145	0.726 ± 0.061	0.791 ± 0.089	0.877 ± 0.056	0.488 ± 0.049	0.412 ± 0.056
			2006.07		0.085 ± 0.017	0.170 ± 0.004	0.270 ± 0.014	0.483 ± 0.026	0.593 ± 0.077
			2007.03	0.050 ± 0.014	0.116 ± 0.018	0.163 ± 0.018	0.260 ± 0.015	0.521 ± 0.057	0.766 ± 0.082
			2007.09	0.036 ± 0.011	0.092 ± 0.004	0.137 ± 0.005	0.276 ± 0.014	0.530 ± 0.025	0.562 ± 0.024
180024+384831	QSO 2.09	max	2008.04	0.033 ± 0.008	0.089 ± 0.011	0.139 ± 0.011	0.267 ± 0.009	0.516 ± 0.042	0.529 ± 0.029
			2006.07	0.877 ± 0.114	1.196 ± 0.050	1.072 ± 0.100	0.852 ± 0.050	0.481 ± 0.062	0.344 ± 0.050
			2007.03	0.733 ± 0.019	1.169 ± 0.050	1.159 ± 0.059	0.896 ± 0.055	0.440 ± 0.045	0.511 ± 0.112
			2007.06	0.721 ± 0.014	0.865 ± 0.034	0.831 ± 0.040	0.638 ± 0.042	0.287 ± 0.020	0.358 ± 0.038
			2007.09	0.785 ± 0.016	1.072 ± 0.034	1.073 ± 0.036	0.854 ± 0.048	0.441 ± 0.025	0.422 ± 0.054
			2008.04	0.792 ± 0.015	1.100 ± 0.035	1.091 ± 0.049	0.840 ± 0.035	0.382 ± 0.033	0.322 ± 0.033
			2010.04	0.756 ± 0.025	1.069 ± 0.033	1.017 ± 0.043	0.798 ± 0.032	0.362 ± 0.030	
180045+782804	QSO 0.68	ris	2010.05	0.778 ± 0.041	1.054 ± 0.059	1.042 ± 0.047	0.809 ± 0.037	0.427 ± 0.043	0.791 ± 0.163
			2006.10	1.754 ± 0.352	1.896 ± 0.166	1.887 ± 0.131	2.050 ± 0.101	1.980 ± 0.117	2.010 ± 0.162
			2007.04	2.554 ± 0.051	2.588 ± 0.084	2.324 ± 0.113	2.285 ± 0.127	1.863 ± 0.082	2.567 ± 0.369
			2007.09	3.089 ± 0.048	2.965 ± 0.071	2.799 ± 0.129	2.370 ± 0.081	1.828 ± 0.075	1.615 ± 0.079
181143+170456	QSO –	f	2008.06	3.939 ± 0.049	3.233 ± 0.226	2.979 ± 0.172	2.747 ± 0.168	2.098 ± 0.262	1.985 ± 0.196
			2006.07	0.332 ± 0.075	0.382 ± 0.018	0.389 ± 0.064	0.351 ± 0.018	0.382 ± 0.073	0.334 ± 0.062
			2007.03	0.268 ± 0.018	0.385 ± 0.041	0.360 ± 0.021	0.343 ± 0.022	0.332 ± 0.054	0.392 ± 0.069
			2007.06	0.245 ± 0.017	0.280 ± 0.010	0.263 ± 0.012	0.264 ± 0.012	0.271 ± 0.020	0.336 ± 0.018
			2007.09	0.231 ± 0.019	0.334 ± 0.010	0.334 ± 0.011	0.351 ± 0.020	0.337 ± 0.018	0.423 ± 0.030
			2007.11	0.174 ± 0.007	0.281 ± 0.008	0.296 ± 0.008	0.318 ± 0.012	0.307 ± 0.016	0.382 ± 0.041
182632+270807	– –	s	2008.04	0.168 ± 0.013	0.230 ± 0.011	0.240 ± 0.017	0.261 ± 0.009	0.284 ± 0.042	0.265 ± 0.026
			2006.07		0.057 ± 0.016	0.079 ± 0.016	0.108 ± 0.006	0.241 ± 0.033	0.446 ± 0.049
			2007.03	0.024 ± 0.012	0.067 ± 0.020	0.080 ± 0.006	0.103 ± 0.006	0.255 ± 0.024	0.371 ± 0.058
			2007.06	0.013 ± 0.009	0.021 ± 0.003	0.033 ± 0.003	0.082 ± 0.005	0.185 ± 0.014	0.330 ± 0.013
			2007.09		0.019 ± 0.002	0.038 ± 0.003	0.117 ± 0.008	0.256 ± 0.019	0.354 ± 0.024
			2007.11	0.020 ± 0.008	0.034 ± 0.002	0.050 ± 0.003	0.108 ± 0.005	0.227 ± 0.017	0.343 ± 0.036
184057+390046	QSO 3.10	f	2008.04	0.024 ± 0.008	0.036 ± 0.005	0.058 ± 0.010	0.114 ± 0.006	0.241 ± 0.025	0.315 ± 0.018
			2006.07	0.304 ± 0.072	0.293 ± 0.019	0.279 ± 0.058	0.217 ± 0.019	0.289 ± 0.045	0.196 ± 0.018
			2007.03	0.205 ± 0.017	0.229 ± 0.015	0.241 ± 0.019	0.242 ± 0.017	0.253 ± 0.049	0.358 ± 0.028
			2007.06	0.118 ± 0.014	0.175 ± 0.008	0.189 ± 0.010	0.179 ± 0.012	0.185 ± 0.020	0.235 ± 0.022
			2007.09	0.149 ± 0.009	0.208 ± 0.007	0.220 ± 0.009	0.239 ± 0.013	0.180 ± 0.017	
184535+354116	G 0.76	max	2008.04	0.126 ± 0.012	0.194 ± 0.013	0.216 ± 0.021	0.223 ± 0.012	0.209 ± 0.038	0.174 ± 0.050
			2006.07	0.161 ± 0.031	0.426 ± 0.022	0.658 ± 0.061	0.851 ± 0.048	1.030 ± 0.107	0.723 ± 0.117
			2007.03	0.147 ± 0.021	0.384 ± 0.050	0.596 ± 0.035	0.825 ± 0.051	1.053 ± 0.080	0.669 ± 0.168
			2007.06	0.113 ± 0.010	0.302 ± 0.012	0.427 ± 0.021	0.594 ± 0.037	0.696 ± 0.046	0.599 ± 0.029
			2007.09	0.180 ± 0.026	0.380 ± 0.013	0.593 ± 0.021	0.827 ± 0.046	1.013 ± 0.048	0.518 ± 0.032
185027+282512	QSO 2.56	max	2008.04	0.129 ± 0.011	0.395 ± 0.016	0.583 ± 0.028	0.839 ± 0.036	1.037 ± 0.069	0.408 ± 0.047
			2006.07	1.000 ± 0.114	1.558 ± 0.069	1.467 ± 0.197	1.172 ± 0.059	0.395 ± 0.048	0.229 ± 0.046
			2007.03	0.711 ± 0.020	1.473 ± 0.063	1.548 ± 0.080	1.112 ± 0.065	0.356 ± 0.040	0.259 ± 0.055
			2007.09	0.786 ± 0.022	1.467 ± 0.044	1.575 ± 0.050	1.118 ± 0.056	0.258 ± 0.028	0.189 ± 0.042
185228+485547	QSO 1.25	f	2008.04	0.799 ± 0.020	1.396 ± 0.047	1.459 ± 0.058	1.115 ± 0.035	0.383 ± 0.082	0.248 ± 0.060
			2006.07		0.423 ± 0.020	0.393 ± 0.041	0.410 ± 0.023	0.371 ± 0.056	0.356 ± 0.053
			2007.03		0.287 ± 0.022	0.324 ± 0.046	0.377 ± 0.045	0.461 ± 0.101	0.403 ± 0.098
			2007.09	0.540 ± 0.295	0.366 ± 0.028	0.309 ± 0.017	0.322 ± 0.020	0.430 ± 0.049	0.202 ± 0.046
185527+374256	QSO 1.12	max ²	2008.04	0.240 ± 0.107	0.219 ± 0.050	0.232 ± 0.045	0.293 ± 0.056	0.319 ± 0.019	0.157 ± 0.061
			2006.07	0.135 ± 0.012	0.164 ± 0.013	0.240 ± 0.030	0.356 ± 0.020	0.267 ± 0.033	0.224 ± 0.018
			2007.03	0.091 ± 0.013	0.155 ± 0.020	0.227 ± 0.016	0.349 ± 0.022	0.347 ± 0.053	0.543 ± 0.077
			2007.06	0.102 ± 0.008	0.116 ± 0.005	0.171 ± 0.009	0.253 ± 0.016	0.178 ± 0.013	0.254 ± 0.020
			2007.09	0.068 ± 0.011	0.145 ± 0.005	0.217 ± 0.008	0.352 ± 0.019	0.295 ± 0.014	0.229 ± 0.030
193926–152543	QSO 1.66	ris	2008.04	0.079 ± 0.008	0.147 ± 0.012	0.233 ± 0.013	0.351 ± 0.014	0.247 ± 0.030	0.282 ± 0.052
			2006.07	0.876 ± 0.069	0.628 ± 0.025	0.521 ± 0.059	0.463 ± 0.013	0.484 ± 0.042	0.490 ± 0.043
			2007.03	0.931 ± 0.025	0.819 ± 0.045	0.593 ± 0.034	0.457 ± 0.020	0.399 ± 0.057	0.329 ± 0.066
			2007.06	1.019 ± 0.030	0.637 ± 0.018	0.474 ± 0.014	0.393 ± 0.010	0.301 ± 0.017	0.292 ± 0.037
			2007.09	1.316 ± 0.021	0.934 ± 0.018	0.745 ± 0.014	0.577 ± 0.023	0.365 ± 0.021	0.321 ± 0.024
195759–384506	QSO 0.63	max ²	2008.04	0.816 ± 0.016	0.925 ± 0.027	0.839 ± 0.028	0.668 ± 0.017	0.546 ± 0.038	0.325 ± 0.033
			2006.07	2.104 ± 0.221	3.940 ± 0.185	4.200 ± 0.200	4.122 ± 0.165	3.250 ± 0.174	2.054 ± 0.093
			2007.03	2.073 ± 0.043	3.159 ± 0.077	3.547 ± 0.123	3.729 ± 0.120	3.265 ± 0.150	1.995 ± 0.118
			2007.09	1.846 ± 0.058	2.750 ± 0.048	3.325 ± 0.050	3.014 ± 0.125	2.842 ± 0.061	1.682 ± 0.052
			2008.04	1.309 ± 0.028	2.491 ± 0.115	2.815 ± 0.104	3.010 ± 0.070	2.643 ± 0.095	1.834 ± 0.065
200324–325145	QSO 3.77	max	2008.11	1.196 ± 0.025	1.925 ± 0.089	2.192 ± 0.085	2.372 ± 0.103	2.137 ± 0.115	1.582 ± 0.059
			2006.07	0.492 ± 0.059	0.558 ± 0.021	0.641 ± 0.094	0.771 ± 0.032	0.700 ± 0.049	0.577 ± 0.055
			2007.03	0.329 ± 0.030	0.576 ± 0.027	0.636 ± 0.022	0.763 ± 0.032	0.711 ± 0.116	0.487 ± 0.124
			2007.09	0.336 ± 0.031	0.569 ± 0.010	0.702 ± 0.012	0.807 ± 0.031	0.801 ± 0.022	0.611 ± 0.024
200530+775243	QSO 0.34	ris	2008.04	0.316 ± 0.041	0.556 ± 0.022	0.651 ± 0.040	0.825 ± 0.020	0.717 ± 0.076	0.487 ± 0.027
			2006.10	0.697 ± 0.016	0.947 ± 0.035	0.923 ± 0.038	0.955 ± 0.033	0.849 ± 0.047	0.856 ± 0.078
			2007.04	0.935 ± 0.029	1.020 ± 0.037	1.038 ± 0.077	0.929 ± 0.054	0.856 ± 0.070	0.850 ± 0.088

Table 2. continued.

NVSS name	Type, z	sp	Data, yyyy.mm	$S_{21.7 \text{ GHz}, \sigma}$ (Jy)	$S_{11.2 \text{ GHz}, \sigma}$ (Jy)	$S_{7.7 \text{ GHz}, \sigma}$ (Jy)	$S_{4.8 \text{ GHz}, \sigma}$ (Jy)	$S_{2.3 \text{ GHz}, \sigma}$ (Jy)	$S_{1 \text{ GHz}, \sigma}$ (Jy)
201115–154640	QSO 1.18	ris	2007.09	1.245 ± 0.028	1.163 ± 0.028	1.011 ± 0.047	0.846 ± 0.029	0.732 ± 0.037	0.750 ± 0.062
			2008.06	1.130 ± 0.020	1.142 ± 0.052	1.138 ± 0.060	1.059 ± 0.050	0.956 ± 0.083	0.749 ± 0.064
			2006.07	2.729 ± 0.134	2.177 ± 0.086	1.932 ± 0.091	1.288 ± 0.038	0.675 ± 0.044	0.568 ± 0.068
			2007.03	2.185 ± 0.040	2.238 ± 0.080	1.974 ± 0.070	1.385 ± 0.061	0.695 ± 0.101	0.573 ± 0.091
			2007.09	2.597 ± 0.043	2.427 ± 0.046	2.243 ± 0.040	1.407 ± 0.082	0.676 ± 0.036	0.665 ± 0.062
202135+051505	– –	max	2008.04	2.160 ± 0.031	2.306 ± 0.054	2.158 ± 0.052	1.491 ± 0.037	0.722 ± 0.079	0.610 ± 0.066
			2006.07	0.177 ± 0.022	0.321 ± 0.011	0.406 ± 0.015	0.476 ± 0.016	0.460 ± 0.031	0.265 ± 0.035
			2007.03	0.165 ± 0.027	0.328 ± 0.034	0.362 ± 0.043	0.456 ± 0.027	0.498 ± 0.082	0.484 ± 0.028
			2007.09	0.213 ± 0.013	0.371 ± 0.009	0.404 ± 0.011	0.493 ± 0.016	0.438 ± 0.022	0.219 ± 0.019
			2008.04	0.136 ± 0.013	0.338 ± 0.016	0.429 ± 0.019	0.480 ± 0.016	0.422 ± 0.059	0.173 ± 0.018
202206+613658	G 0.23	max ²	2006.10	2.074 ± 0.039	2.780 ± 0.070	3.017 ± 0.110	2.949 ± 0.086	2.112 ± 0.114	1.842 ± 0.102
			2007.04	1.552 ± 0.039	2.301 ± 0.063	2.952 ± 0.203	2.856 ± 0.108	2.058 ± 0.101	1.923 ± 0.131
			2007.09	3.153 ± 0.139	2.820 ± 0.069	3.136 ± 0.133	3.141 ± 0.093	2.083 ± 0.080	1.812 ± 0.081
			2008.06	1.981 ± 0.048	2.398 ± 0.119	3.056 ± 0.146	3.017 ± 0.098	2.083 ± 0.091	2.004 ± 0.097
			2006.07	0.407 ± 0.078	0.563 ± 0.052	0.680 ± 0.123	0.581 ± 0.031	0.458 ± 0.091	0.323 ± 0.031
202456+171813	QSO 1.05	max	2007.03	0.243 ± 0.018	0.515 ± 0.046	0.572 ± 0.030	0.554 ± 0.030	0.510 ± 0.084	0.340 ± 0.029
			2007.09	0.226 ± 0.020	0.552 ± 0.016	0.611 ± 0.020	0.594 ± 0.028	0.389 ± 0.029	0.295 ± 0.026
			2008.04	0.294 ± 0.020	0.584 ± 0.016	0.614 ± 0.025	0.606 ± 0.039	0.429 ± 0.068	0.263 ± 0.033
			2006.07	0.898 ± 0.092	0.960 ± 0.042	1.043 ± 0.129	0.934 ± 0.032	0.543 ± 0.050	0.502 ± 0.065
			2007.03	0.615 ± 0.029	0.791 ± 0.083	0.805 ± 0.061	0.839 ± 0.046	0.624 ± 0.065	0.496 ± 0.147
210138+034132	QSO 1.01	max	2007.09	0.854 ± 0.019	0.871 ± 0.020	0.822 ± 0.021	0.920 ± 0.033	0.681 ± 0.027	0.542 ± 0.056
			2008.04	0.592 ± 0.015	0.798 ± 0.023	0.848 ± 0.031	0.845 ± 0.026	0.764 ± 0.066	0.422 ± 0.032
			2010.04	0.702 ± 0.050	0.656 ± 0.037	0.701 ± 0.024	0.657 ± 0.017	0.681 ± 0.022	
			2006.07	0.419 ± 0.046	0.481 ± 0.021	0.477 ± 0.116	0.509 ± 0.027	0.482 ± 0.038	0.519 ± 0.075
			2007.03	0.247 ± 0.020	0.454 ± 0.022	0.464 ± 0.038	0.514 ± 0.032	0.580 ± 0.040	0.635 ± 0.099
211458+283257	QSO 2.35	max	2007.09	0.362 ± 0.022	0.485 ± 0.015	0.602 ± 0.021	0.608 ± 0.039	0.528 ± 0.047	0.336 ± 0.037
			2008.04	0.235 ± 0.014	0.444 ± 0.024	0.506 ± 0.035	0.604 ± 0.036	0.558 ± 0.065	0.422 ± 0.062
			2006.07	1.749 ± 0.199	2.117 ± 0.097	2.509 ± 0.083	2.620 ± 0.095	2.820 ± 0.109	2.636 ± 0.136
			2007.03	1.160 ± 0.027	1.790 ± 0.067	2.014 ± 0.090	2.364 ± 0.113	2.687 ± 0.139	2.732 ± 0.203
			2007.06	0.814 ± 0.026	1.215 ± 0.038	1.379 ± 0.050	1.685 ± 0.059	1.975 ± 0.096	2.671 ± 0.103
212344+053522	QSO 1.94	max ²	2007.09	1.250 ± 0.030	1.721 ± 0.039	1.880 ± 0.046	2.157 ± 0.082	2.334 ± 0.081	2.314 ± 0.085
			2008.04	1.490 ± 0.027	1.776 ± 0.079	1.938 ± 0.063	2.006 ± 0.096	2.089 ± 0.182	2.197 ± 0.093
			2009.04	1.510 ± 0.067	1.876 ± 0.049	2.052 ± 0.065	2.162 ± 0.051	2.054 ± 0.189	
			2009.10	1.376 ± 0.036	1.833 ± 0.066	2.116 ± 0.056	2.198 ± 0.043	2.040 ± 0.158	
			2006.07	1.090 ± 0.249	1.479 ± 0.051	1.494 ± 0.036	1.463 ± 0.044	0.875 ± 0.070	0.370 ± 0.069
212912–153841	QSO 3.27	max ²	2007.03	0.913 ± 0.035	1.399 ± 0.078	1.478 ± 0.056	1.424 ± 0.063	0.933 ± 0.100	0.519 ± 0.106
			2007.09	0.931 ± 0.043	1.485 ± 0.029	1.648 ± 0.030	1.483 ± 0.062	0.883 ± 0.041	0.443 ± 0.100
			2008.04	0.688 ± 0.036	1.255 ± 0.056	1.587 ± 0.085	1.541 ± 0.115	0.931 ± 0.196	0.410 ± 0.059
			2010.04	0.574 ± 0.058	0.980 ± 0.025	1.375 ± 0.041	1.542 ± 0.024	0.899 ± 0.033	
			2006.07	0.597 ± 0.176	0.523 ± 0.020	0.733 ± 0.031	0.911 ± 0.029	1.346 ± 0.084	1.409 ± 0.186
212921–182123	– –	max ¹	2007.03	0.362 ± 0.053	0.525 ± 0.043	0.669 ± 0.019	0.890 ± 0.039	1.197 ± 0.119	1.376 ± 0.211
			2007.09	0.281 ± 0.030	0.558 ± 0.012	0.711 ± 0.014	0.938 ± 0.050	1.345 ± 0.033	1.287 ± 0.063
			2008.04	0.336 ± 0.022	0.526 ± 0.029	0.700 ± 0.033	0.913 ± 0.022	1.309 ± 0.072	1.361 ± 0.058
			2006.07	3.145 ± 0.428	3.382 ± 0.157	3.998 ± 0.107	4.019 ± 0.150	3.004 ± 0.081	2.309 ± 0.079
			2007.03	2.096 ± 0.042	2.875 ± 0.194	3.219 ± 0.193	3.501 ± 0.181	2.958 ± 0.166	2.420 ± 0.152
213135–120704	QSO 0.50	max	2007.09	2.501 ± 0.052	2.959 ± 0.058	3.396 ± 0.063	3.529 ± 0.125	3.040 ± 0.075	2.485 ± 0.083
			2008.04	2.282 ± 0.031	2.798 ± 0.079	3.251 ± 0.071	3.401 ± 0.242	2.875 ± 0.097	2.010 ± 0.078
			2009.04	2.141 ± 0.238	2.592 ± 0.176	2.889 ± 0.221	3.117 ± 0.126	2.571 ± 0.297	
			2009.10	1.620 ± 0.049	2.263 ± 0.077	2.702 ± 0.125	3.100 ± 0.153	2.827 ± 0.229	
			2006.07	5.721 ± 0.092	7.103 ± 0.202	8.952 ± 0.250	9.827 ± 0.297	6.852 ± 0.303	2.700 ± 0.133
213638+004154	QSO 1.93	max	2007.03	5.492 ± 0.080	7.181 ± 0.217	8.741 ± 0.315	9.572 ± 1.078	6.352 ± 0.799	2.333 ± 0.367
			2007.09	5.617 ± 0.060	7.720 ± 0.165	8.690 ± 0.192	0.007 ± 0.306	6.945 ± 0.206	2.653 ± 0.103
			2008.04	5.518 ± 0.060	7.412 ± 0.204	8.900 ± 0.399	9.578 ± 0.250	6.505 ± 0.295	2.397 ± 0.110
			2008.11	5.610 ± 0.058	7.421 ± 0.212	8.923 ± 0.340	0.165 ± 0.200	6.863 ± 0.387	2.188 ± 0.103
			2009.04	4.927 ± 0.267	7.326 ± 0.465	8.452 ± 0.364	9.455 ± 0.200	6.204 ± 0.636	
213901+142336	QSO 2.43	max	2009.10	5.168 ± 0.077	7.320 ± 0.190	8.824 ± 0.188	9.726 ± 2.098	6.367 ± 0.117	
			2006.07	1.698 ± 0.263	2.398 ± 0.092	2.628 ± 0.096	2.655 ± 0.105	1.783 ± 0.078	1.208 ± 0.126
			2007.03	1.238 ± 0.027	2.219 ± 0.103	2.544 ± 0.115	2.446 ± 0.125	1.639 ± 0.105	1.293 ± 0.135
			2007.09	1.872 ± 0.030	2.573 ± 0.065	2.794 ± 0.076	2.594 ± 0.096	1.660 ± 0.071	1.007 ± 0.048
			2008.04	2.103 ± 0.032	2.642 ± 0.073	2.801 ± 0.095	2.563 ± 0.102	1.659 ± 0.100	0.919 ± 0.057
215137+055213	G 0.74	max	2009.04	1.919 ± 0.276	2.681 ± 0.101	3.034 ± 0.127	2.925 ± 0.078	1.727 ± 0.084	
			2009.10	2.050 ± 0.066	2.686 ± 0.051	3.137 ± 0.075	2.884 ± 0.049	1.905 ± 0.030	
			2006.07	0.404 ± 0.054	0.569 ± 0.032	0.721 ± 0.041	0.876 ± 0.033	0.929 ± 0.052	0.715 ± 0.069
			2007.03	0.294 ± 0.021	0.537 ± 0.021	0.649 ± 0.035	0.811 ± 0.040	0.910 ± 0.060	0.733 ± 0.098
			2007.09	0.334 ± 0.019	0.565 ± 0.013	0.640 ± 0.016	0.826 ± 0.034	0.851 ± 0.030	0.621 ± 0.027
			2008.04	0.285 ± 0.018	0.516 ± 0.015	0.644 ± 0.028	0.793 ± 0.024	0.880 ± 0.066	0.534 ± 0.043
			2010.04	0.289 ± 0.030	0.477 ± 0.012	0.653 ± 0.031	0.761 ± 0.017	0.864 ± 0.060	

Table 2. continued.

NVSS name	Type, z	sp	Data, yyyy.mm	$S_{21.7 \text{ GHz}, \sigma}$ (Jy)	$S_{11.2 \text{ GHz}, \sigma}$ (Jy)	$S_{7.7 \text{ GHz}, \sigma}$ (Jy)	$S_{4.8 \text{ GHz}, \sigma}$ (Jy)	$S_{2.3 \text{ GHz}, \sigma}$ (Jy)	$S_{1 \text{ GHz}, \sigma}$ (Jy)
215550–113948	–	s	2006.07	0.196 ± 0.042		0.248 ± 0.036	0.285 ± 0.018	0.503 ± 0.072	0.574 ± 0.085
			2007.03	0.102 ± 0.027	0.183 ± 0.040	0.202 ± 0.017	0.265 ± 0.019	0.455 ± 0.070	0.762 ± 0.086
			2007.09	0.132 ± 0.030	0.156 ± 0.006	0.196 ± 0.008	0.292 ± 0.011	0.459 ± 0.030	0.702 ± 0.025
			2008.04	0.096 ± 0.025	0.138 ± 0.024	0.189 ± 0.016	0.276 ± 0.026	0.505 ± 0.048	0.610 ± 0.102
220330+100742	G 1.01	max	2006.07	0.086 ± 0.033	0.177 ± 0.034	0.208 ± 0.024	0.309 ± 0.017	0.269 ± 0.113	0.270 ± 0.062
			2007.03	0.064 ± 0.025	0.173 ± 0.034	0.230 ± 0.035	0.310 ± 0.027	0.261 ± 0.062	0.347 ± 0.089
			2007.09	0.131 ± 0.018	0.179 ± 0.006	0.227 ± 0.010	0.316 ± 0.016	0.282 ± 0.016	0.218 ± 0.019
			2008.04	0.069 ± 0.017	0.168 ± 0.015	0.255 ± 0.029	0.302 ± 0.011	0.219 ± 0.041	0.229 ± 0.039
			2010.04	0.117 ± 0.005	0.181 ± 0.007	0.247 ± 0.020	0.311 ± 0.012	0.151 ± 0.020	
220752+165215	QSO 1.64	f	2006.07	0.163 ± 0.021	0.200 ± 0.013	0.232 ± 0.086	0.251 ± 0.013	0.255 ± 0.046	0.207 ± 0.084
			2007.03	0.179 ± 0.022	0.200 ± 0.032	0.193 ± 0.032	0.219 ± 0.013	0.234 ± 0.035	0.328 ± 0.045
			2007.09	0.174 ± 0.016	0.196 ± 0.007	0.178 ± 0.007	0.209 ± 0.012	0.189 ± 0.016	0.214 ± 0.022
			2008.04	0.165 ± 0.019	0.217 ± 0.021	0.213 ± 0.023	0.191 ± 0.019	0.235 ± 0.036	0.183 ± 0.067
221206+235540	QSO 1.13	max ²	2006.07	1.549 ± 0.143	2.050 ± 0.079	2.107 ± 0.099	1.805 ± 0.085	1.053 ± 0.069	0.544 ± 0.079
			2007.03	0.670 ± 0.022	0.937 ± 0.039	1.129 ± 0.096	1.054 ± 0.085	0.766 ± 0.111	0.457 ± 0.119
			2007.09	0.980 ± 0.027	1.218 ± 0.035	1.322 ± 0.041	1.116 ± 0.069	0.832 ± 0.039	0.570 ± 0.062
			2008.04	0.596 ± 0.018	1.087 ± 0.052	1.121 ± 0.054	1.155 ± 0.047	0.870 ± 0.050	0.503 ± 0.028
			2009.04	0.429 ± 0.057	0.709 ± 0.137	0.857 ± 0.121	0.950 ± 0.036	0.716 ± 0.123	
			2009.10	0.666 ± 0.036	0.935 ± 0.031	1.009 ± 0.050	0.920 ± 0.025	0.841 ± 0.122	
			2009.11	0.585 ± 0.017	0.837 ± 0.046	0.872 ± 0.051	0.840 ± 0.039	0.612 ± 0.071	
			2010.05	0.220 ± 0.037	0.736 ± 0.034	0.868 ± 0.071	0.891 ± 0.048	0.355 ± 0.077	
221237+015251	G 1.12	s	2006.07	0.331 ± 0.004	0.500 ± 0.027	0.736 ± 0.268	1.169 ± 0.046	2.202 ± 0.095	3.509 ± 0.163
			2007.03	0.210 ± 0.029	0.440 ± 0.082	0.649 ± 0.045	1.036 ± 0.068	2.066 ± 0.137	3.546 ± 0.171
			2007.09	0.234 ± 0.025	0.517 ± 0.012	0.676 ± 0.019	1.106 ± 0.053	2.134 ± 0.065	3.403 ± 0.121
			2008.04	0.217 ± 0.023	0.461 ± 0.021	0.729 ± 0.027	1.090 ± 0.075	2.098 ± 0.133	3.344 ± 0.133
223834+124250	QSO –	max	2006.07	0.357 ± 0.045	0.384 ± 0.018	0.387 ± 0.052	0.369 ± 0.015	0.310 ± 0.052	0.236 ± 0.037
			2007.03	0.285 ± 0.015	0.372 ± 0.019	0.366 ± 0.017	0.342 ± 0.015	0.344 ± 0.036	0.370 ± 0.072
			2007.09	0.346 ± 0.021	0.414 ± 0.011	0.368 ± 0.011	0.384 ± 0.022	0.272 ± 0.020	0.208 ± 0.025
			2008.04	0.214 ± 0.019	0.359 ± 0.014	0.330 ± 0.025	0.340 ± 0.018	0.287 ± 0.059	0.147 ± 0.029
			2010.04	0.281 ± 0.017	0.242 ± 0.014	0.267 ± 0.017	0.276 ± 0.013	0.253 ± 0.019	
			2010.05	0.152 ± 0.041	0.232 ± 0.027	0.250 ± 0.013	0.262 ± 0.027		
225641–201140	QSO –	ris	2006.07	1.041 ± 0.193	0.950 ± 0.077	0.927 ± 0.211	0.940 ± 0.042	0.741 ± 0.096	0.605 ± 0.079
			2007.03	1.098 ± 0.039	1.065 ± 0.102	1.031 ± 0.059	0.990 ± 0.044	0.880 ± 0.113	0.640 ± 0.059
			2007.09	1.471 ± 0.032	1.168 ± 0.023	1.188 ± 0.024	1.054 ± 0.053	0.783 ± 0.026	0.566 ± 0.028
			2008.04	1.256 ± 0.019	1.143 ± 0.041	1.145 ± 0.056	1.115 ± 0.056	0.841 ± 0.080	0.592 ± 0.066
225717+024317	QSO 2.08	ris	2006.07	0.424 ± 0.189	0.371 ± 0.032	0.296 ± 0.092	0.285 ± 0.013	0.259 ± 0.051	0.172 ± 0.059
			2007.03	0.265 ± 0.022	0.311 ± 0.029	0.295 ± 0.034	0.251 ± 0.014	0.245 ± 0.053	0.208 ± 0.027
			2007.09	0.352 ± 0.014	0.356 ± 0.008	0.316 ± 0.009	0.249 ± 0.011	0.196 ± 0.016	0.205 ± 0.017
			2008.04	0.347 ± 0.016	0.340 ± 0.015	0.301 ± 0.020	0.216 ± 0.008	0.232 ± 0.038	0.133 ± 0.056
225805–275821	QSO 0.93	ris	2006.07	1.930 ± 0.363	1.936 ± 0.071	2.026 ± 0.101	1.937 ± 0.073	1.139 ± 0.083	1.061 ± 0.141
			2007.03	2.102 ± 0.043	2.040 ± 0.086	1.976 ± 0.088	1.714 ± 0.076	1.189 ± 0.142	0.888 ± 0.058
			2007.09	2.683 ± 0.054	2.271 ± 0.041	2.262 ± 0.036	1.689 ± 0.059	1.131 ± 0.034	1.060 ± 0.032
			2008.04	3.091 ± 0.045	2.828 ± 0.083	2.603 ± 0.098	2.023 ± 0.051	1.033 ± 0.093	0.890 ± 0.064
232044+051350	QSO 0.62	f	2006.07	0.541 ± 0.088	0.545 ± 0.026	0.555 ± 0.072	0.682 ± 0.026	0.649 ± 0.089	0.686 ± 0.103
			2007.03	0.437 ± 0.021	0.571 ± 0.058	0.571 ± 0.033	0.572 ± 0.029	0.615 ± 0.060	0.812 ± 0.055
			2007.09	0.448 ± 0.022	0.556 ± 0.015	0.577 ± 0.016	0.592 ± 0.026	0.590 ± 0.029	0.781 ± 0.037
			2008.04	0.399 ± 0.023	0.430 ± 0.015	0.474 ± 0.024	0.520 ± 0.048	0.427 ± 0.037	0.344 ± 0.030
232510–034446	G 1.51	max ²	2006.07			0.307 ± 0.044	0.592 ± 0.031	1.069 ± 0.234	1.156 ± 0.087
			2007.03	0.161 ± 0.030	0.179 ± 0.030	0.304 ± 0.036	0.531 ± 0.064	1.034 ± 0.172	0.839 ± 0.119
			2007.09	0.079 ± 0.029	0.161 ± 0.021	0.325 ± 0.011	0.595 ± 0.027	1.132 ± 0.041	1.237 ± 0.064
			2008.04	0.077 ± 0.017	0.258 ± 0.074	0.351 ± 0.029	0.559 ± 0.011	1.029 ± 0.089	1.016 ± 0.041
233013+334836	QSO 1.81	max ²	2006.07	0.215 ± 0.006	0.382 ± 0.026	0.432 ± 0.061	0.482 ± 0.029	0.439 ± 0.037	0.366 ± 0.087
			2007.03	0.248 ± 0.019	0.404 ± 0.027	0.476 ± 0.029	0.496 ± 0.029	0.502 ± 0.050	0.523 ± 0.066
			2007.09	0.336 ± 0.014	0.402 ± 0.013	0.482 ± 0.017	0.528 ± 0.028	0.461 ± 0.029	0.278 ± 0.037
			2008.04	0.287 ± 0.018	0.478 ± 0.019	0.530 ± 0.031	0.576 ± 0.025	0.473 ± 0.074	0.184 ± 0.045
			2010.04	0.281 ± 0.032	0.450 ± 0.018	0.560 ± 0.031	0.646 ± 0.024	0.491 ± 0.035	
			2010.05	0.239 ± 0.029	0.448 ± 0.035	0.563 ± 0.034	0.658 ± 0.027	0.521 ± 0.084	
235622+815252	QSO 1.34	ris	2006.10	0.574 ± 0.016	0.703 ± 0.019	0.585 ± 0.025	0.503 ± 0.026	0.439 ± 0.053	0.643 ± 0.101
			2007.04	0.970 ± 0.035	1.067 ± 0.052	0.876 ± 0.044	0.723 ± 0.045	0.545 ± 0.057	0.624 ± 0.029
			2007.09	1.040 ± 0.053	0.993 ± 0.024	0.817 ± 0.038	0.723 ± 0.030	0.555 ± 0.037	0.404 ± 0.078
			2008.06	0.859 ± 0.063	0.621 ± 0.051	0.519 ± 0.042	0.476 ± 0.032	0.432 ± 0.045	0.408 ± 0.056

Notes. Column designation: Col. (1) NVSS source name (J2000); Col. (2) optical class and redshift (NASA/IPAC NED); Col. (3) type of RATAN-600 spectra; Col. (4) observation epochs at RATAN-600 [yyyy.mm]; Cols. (5–10) flux densities and their uncertainties for the corresponding frequencies, including the uncertainty in the source’s antenna temperature and the calibration curve.

When we analysed this subsample of 36 sources with GPS-type spectra, there are statistical differences (0.05 significance level) in the high- and low-frequency spectral index distribution between the subgroups (galaxies, quasars, and unidentified radio sources). For galaxies, the average spectral index of the optically thin part is equal to -0.93 ± 0.08 , which is considerably less than the average spectral index for quasars, -0.68 ± 0.05 (the difference is about 0.25). For unidentified sources it is -0.79 ± 0.09 . This can mean that the electron energy distribution for GPS galaxies is steeper than for GPS quasars. In this distribution the index for GPS galaxies differs by 0.5. This difference is unexpectedly large. Some papers (O'Dea et al. 1991; de Vries et al. 1997) note that there is no difference between spectral properties of GPS galaxies and quasars. This result can be caused by the selection effect and demands additional testing with a larger sample of candidates.

The mean value of the low-frequency spectral index is 0.87 ± 0.12 for galaxies, 0.73 ± 0.07 for quasars and 0.62 ± 0.10 for unidentified radio sources. The mean low-frequency spectral index for all sources with convex spectra is 0.75 ± 0.05 , which is close to the value 0.8 presented by O'Dea et al. (1991).

The quasars have a spectral peak at higher frequencies (mean value about 5 GHz) than the galaxies (mean value about 3 GHz) in the RATAN-600 observer's frame. Stanghellini et al. (1998) noticed that also in the rest frame quasars have a higher turnover frequency. Based on the assumption that the turnover is caused by synchrotron self-absorption, this finding suggests that the GPS quasars are more compact than the galaxies. de Vries et al. (1997) and Snellen (1997) found this effect using a bright heterogeneous and a fainter sample, respectively.

4.2. Variability

We studied the variability of objects in optically thin parts of spectrum. GPS quasars show on average a stronger variability ($10.4 \pm 1.9\%$) than GPS galaxies ($5.9 \pm 3.4\%$). It seems that there is a correlation between the variability index at the frequency 11.2 GHz and the high-frequency spectral index (probability 99.5%). The variability index was calculated as in Aller et al. (1992):

$$Var_S = \frac{(S_i - \sigma_i)_{\max} - (S_i + \sigma_i)_{\min}}{(S_i - \sigma_i)_{\max} + (S_i + \sigma_i)_{\min}}, \quad (4)$$

where $S_{\max}$ and $S_{\min}$ are the maximum and minimum value of the flux density at all observation epochs; $\sigma_{S_{\max}}$ and $\sigma_{S_{\min}}$ are their RMS errors. This modification prevents one from overestimating Var_S when there are observations with large uncertainties in the dataset. The negative value of Var_S corresponds to the case where the estimated error is greater than the observed scatter of the data. The high-frequency variability index versus the spectral index for galaxies (G), quasars (Q), and unidentified radio sources (R) is presented in Fig. 2 which shows all 69 sources that are presented in the Table 3.

One of the main results presented in some earlier papers (Tornaiainen et al. 2005; Tornikoski et al. 2009, 2001; Aller et al. 2002) is that low variability is, in fact, quite rare among GPS sources identified in the literature. In our sample quasars maintain a relatively constant spectral shape ($\sim 20\%$ of total number of quasars in the sample).

4.3. Width of the spectra (FWHM)

The width of the continuum spectrum of GPS sources has been studied by O'Dea et al. (1991) and Edwards & Tingay (2004). O'Dea et al. (1991) noted that the narrowest reasonable

Fig. 2. High-frequency variability index vs. the spectral index for galaxies (G), quasars (Q), and unidentified radio sources (R).

Fig. 3. Histogram of the FWHM (in decades of frequency) obtained from a least-squares fit to the radio spectrum of sources with a convex spectrum.

spectrum, assuming a homogeneous self-absorbed synchrotron source with a power law electron energy distribution, would be 0.77 if the spectral index below the peak is assumed to be $+0.8$. But observational data demonstrate that the median value in the sample is equal to 1.2. There are only relatively few sources with narrow spectra in our sample (Fig. 3). The FWHM value exceeds a limit of 1.2 for many of them. Figure 3 shows the FWHM distribution of all 69 objects for which this value was determined.

Thus, we also found a lack of sources with narrower spectra. Sources with very narrow FWHM may be selected even if they are hard to find in surveys at discrete radio frequencies (O'Dea et al. 1991). Bright sources such as these with narrow spectra could not be missed in the survey at the frequencies 1.4, 2.7 and 5 GHz, at least most of them. The presence of multiple components with peak at different frequencies will increase the value of FWHM. If some of these components have very narrow spectra, they can remain hidden within the overall spectrum (Snellen et al. 1998).

The relation “redshift–peak frequency–FWHM” for sources with $FWHM \leq 1.3$ is shown in Fig. 4. The value limit 1.3 corresponds to sources with inexact convex spectral shape (undetermined spectral shape because of uncertain flux densities or limited frequency range). The peak frequency is presented in the source frame $f_{\text{source}} = f_{\text{obs}} \cdot (1 + z)$. As is obvious in Fig. 4, there

Table 3. Parameters of radio spectra for the sources with spectral maximum (RATAN-600 observations 2006–2010).

NVSS name	Type	Indication	z	$f r_{\text{peak/obs}}$ (MHz)	α_{below} σ	α_{above} σ	$FWHM$	$Var_{S_{4800}}$ (%)	$Var_{S_{7700}}$ (%)	$Var_{S_{11200}}$ (%)	$Var_{S_{21700}}$ (%)
000319+212944	QSO	gps	0.45	3336.8	0.365 ± 0.015	-0.896 ± 0.009	1.1	1.7	-16.4	3.7	22.1
000520+052410	QSO		1.89	2007.3	0.091 ± 0.035	-0.592 ± 0.005	1.8	3.3	6.6	-0.9	-13.3
020346+113445	QSO		3.64	2560.2	0.519 ± 0.008	-0.539 ± 0.003	1.7	5.4	3.6	7.0	5.5
025134+431515	QSO		1.31	2047.9	0.474 ± 0.011	-0.397 ± 0.005	1.8	2.9	-0.1	0.7	10.2
040305+260001	QSO		2.12	5083.5	0.456 ± 0.007	-0.613 ± 0.014	1.2	28.9	22.3	22.3	34.2
042805+325952	QSO	gps	0.48	5105.9	0.583 ± 0.010	-0.865 ± 0.007	1.1	-0.3	4.1	5.6	-1.5
050321+020304	QSO		0.58	2250.0	0.551 ± 0.011	-0.781 ± 0.003	1.6	3.9	-6.3	6.9	13.5
053007-250329	QSO		2.81	2090.8	0.292 ± 0.013	-0.736 ± 0.004	1.6	-2.2	2.2	2.3	2.4
053056+133155	QSO		2.06	8113.9	0.316 ± 0.005	-0.170 ± 0.020	1.8	10.2	1.5	16.3	33.4
055530+394849	QSO	gps	2.37	6605.3	0.959 ± 0.005	-0.610 ± 0.004	1.0	2.8	5.2	7.7	10.6
064632+445116	QSO	gps	3.40	10263.2	1.026 ± 0.004	-0.517 ± 0.004	1.0	7.2	7.7	4.8	9.0
065031+600144	QSO	gps	0.46	5935.9	0.612 ± 0.006	-0.316 ± 0.008	1.1	-1.7	-0.0	7.7	3.9
072201+372228	QSO		1.63	2264.4	0.356 ± 0.020	-0.560 ± 0.006	1.7	11.5	13.8	18.3	-4.6
074110+311200	QSO		0.63	2526.9	0.299 ± 0.009	-0.492 ± 0.005	1.6	2.6	5.2	5.0	13.6
074554-004417	QSO	gps	0.99	6253.6	0.784 ± 0.006	-0.536 ± 0.005	1.1	4.4	2.3	4.1	8.0
090040-280820	QSO		2.15	2427.8	0.704 ± 0.004	-0.525 ± 0.005	1.5	5.7	6.8	10.5	9.3
090527+485049	QSO		2.69	2350.3	0.305 ± 0.016	-0.768 ± 0.009	1.6	1.8	-3.8	14.5	-43.4
092703+390220	QSO		0.70	7934.9	0.828 ± 0.003	-0.746 ± 0.022	0.9	7.3	2.5	3.4	53.0
104423+805439	QSO		1.26	6650.7	0.393 ± 0.004	-0.238 ± 0.008	1.5	4.4	12.7	20.5	23.1
114608-244732	QSO	gps	1.94	3673.8	0.864 ± 0.014	-0.578 ± 0.004	1.1	-0.2	6.1	0.2	9.0
122758+363511	QSO	gps	1.97	1117.1	1.550 ± 0.011	-1.081 ± 0.007	1.0	4.7	-9.9	2.4	22.1
133521+454238	QSO	gps	2.45	5408.9	0.722 ± 0.012	-0.924 ± 0.008	1.0	0.3	7.0	5.0	1.7
135755+764321	QSO		-	8650.8	0.254 ± 0.006	-0.200 ± 0.032	2.2	22.6	28.1	31.9	42.1
143009+104327	QSO	gps	1.71	5224.2	0.737 ± 0.007	-0.707 ± 0.010	1.1	7.3	15.6	13.3	18.8
144516+095836	QSO	gps	3.53	587.1	0.584 ± 0.019	-0.763 ± 0.003	1.4	-3.6	-7.9	-7.9	-1.6
152237-273010	QSO		1.29	6516.6	0.488 ± 0.009	-0.322 ± 0.014	1.3	20.3	25.1	31.1	33.6
152642+665055	QSO	gps	3.02	3963.5	0.418 ± 0.036	-0.626 ± 0.008	1.2	0.9	1.6	3.6	16.7
161637+045933	QSO	gps	3.22	4628.0	0.623 ± 0.006	-0.941 ± 0.010	1.0	2.5	0.1	-0.9	10.0
162304+662401	QSO	gps	0.20	5188.2	0.467 ± 0.011	-0.413 ± 0.014	1.2	8.2	11.0	9.7	5.9
180024+384831	QSO		2.09	17597.6	0.493 ± 0.007	-0.437 ± 0.008	1.8	10.6	11.6	12.1	11.8
185027+282512	QSO	gps	2.56	9840.5	0.967 ± 0.007	-0.880 ± 0.011	1.1	-2.4	3.6	5.3	9.5
185527+374256	QSO		1.12	2286.9	0.150 ± 0.019	-0.888 ± 0.007	1.7	10.8	7.8	10.8	29.8
195759-384506	QSO		0.63	4400.1	0.349 ± 0.008	-0.634 ± 0.017	1.2	23.0	27.4	30.1	21.3
200324-325145	QSO		3.77	3485.5	0.395 ± 0.010	-0.538 ± 0.005	1.4	2.7	4.4	2.5	17.1
202456+171813	QSO	gps	1.05	4949.1	0.430 ± 0.004	-0.720 ± 0.012	1.1	7.4	-3.9	3.3	14.3
210138+034132	QSO		1.01	6863.8	0.338 ± 0.005	-0.167 ± 0.009	1.7	14.4	11.5	13.9	15.0
211458+283257	QSO		2.35	2767.4	0.100 ± 0.015	-0.394 ± 0.007	1.9	3.0	10.2	6.5	19.9
212344+053522	QSO		1.94	1905.4	0.042 ± 0.011	-0.367 ± 0.006	2.1	18.2	25.8	23.4	29.7
212912-153841	QSO		3.27	5782.3	0.716 ± 0.005	-0.710 ± 0.014	1.1	-0.6	6.6	18.3	30.5
212921-182123	QSO		0.68	956.5	0.110 ± 0.016	-0.572 ± 0.004	1.7	-2.2	0.2	1.2	15.2
213135-120704	QSO		0.50	4375.1	0.228 ± 0.005	-0.294 ± 0.005	1.8	8.6	15.8	15.9	23.8
213638+004154	QSO	gps	1.93	6311.3	0.982 ± 0.010	-0.381 ± 0.002	1.1	1.5	-0.6	1.6	4.0
213901+142336	QSO	gps	2.43	6919.4	0.544 ± 0.004	-0.422 ± 0.007	1.2	6.8	7.0	6.6	24.1
221206+235540	QSO		1.13	5929.5	0.526 ± 0.011	-0.582 ± 0.028	1.2	32.3	34.5	39.9	69.0
223834+124250	QSO		-	5795.1	0.246 ± 0.008	-0.213 ± 0.013	2.0	11.0	12.2	21.8	23.3
233013+334836	QSO		1.81	4397.5	0.528 ± 0.019	-0.470 ± 0.006	1.2	10.5	5.2	12.5	27.0
011137+390628	G	gps	0.67	4230.9	0.766 ± 0.015	-1.052 ± 0.006	1.0	12.6	12.4	10.1	4.7
021010-221336	G	gps	1.49	1654.5	1.958 ± 0.016	-1.163 ± 0.004	1.1	2.8	-3.3	0.6	-11.6
065510+410010	G		0.02	6105.4	0.301 ± 0.007	-0.425 ± 0.006	1.4	19.9	19.8	13.9	13.0
074533+101112	G		2.62	2293.5	0.480 ± 0.005	-0.758 ± 0.003	1.6	2.9	-2.3	1.0	10.3
135740+435359	G	gps	0.65	1640.2	0.619 ± 0.015	-0.728 ± 0.006	1.5	4.2	7.4	-9.6	24.2
140700+282714	G	gps	0.08	3854.9	0.930 ± 0.008	-1.533 ± 0.009	0.9	1.3	5.6	9.3	16.5
142438+225600	G	gps	0.34	3711.9	0.743 ± 0.024	-0.987 ± 0.008	1.0	-0.8	-3.5	4.0	15.1
151141+051809	G	gps	0.08	8136.1	0.974 ± 0.011	-0.625 ± 0.006	0.9	0.1	11.9	0.8	8.5
160608+312447	G	gps	4.56	3537.2	0.906 ± 0.030	-0.713 ± 0.004	1.1	3.2	-0.2	1.0	-7.1
173458+092657	G	gps	0.74	2436.0	0.660 ± 0.009	-1.104 ± 0.006	1.1	-3.2	1.6	-0.2	18.3
173549+504911	G	gps	0.84	5668.4	0.695 ± 0.025	-0.557 ± 0.008	1.1	-4.1	-1.3	1.5	-14.6
175301+275059	G	gps	0.86	677.6	-	-0.899 ± 0.006	1.2	-0.4	7.7	-2.0	-2.1
184535+354116	G	gps	0.76	2705.8	0.620 ± 0.014	-1.132 ± 0.007	1.2	12.0	14.2	12.6	11.2
202206+613658	G		0.23	5580.4	0.316 ± 0.005	-0.342 ± 0.013	1.9	1.3	-0.2	8.0	30.8

Table 3. continued.

NVSS name	Type	Indication	z	$f r_{\text{peak/obs}}$ (MHz)	α_{below} σ	α_{above} σ	$FWHM$	$Var_{S_{4800}}$ (%)	$Var_{S_{7700}}$ (%)	$Var_{S_{11200}}$ (%)	$Var_{S_{21700}}$ (%)
215137+055213	G	gps	0.74	3145.2	0.682 ± 0.018	-0.639 ± 0.004	1.4	5.6	1.7	4.6	7.1
220330+100742	G		1.01	2823.2	0.186 ± 0.010	-1.009 ± 0.012	1.4	3.9	-1.3	-0.8	16.0
232510-034446	G		1.51	1221.5	0.848 ± 0.025	-1.124 ± 0.006	1.1	-0.4	-2.6	0.2	28.1
003732+080812	–	gps	–	5151.8	0.524 ± 0.013	-0.697 ± 0.008	1.0	3.5	-1.9	0.0	9.3
064204+675835	–	gps	–	4220.3	0.976 ± 0.025	-0.526 ± 0.007	1.2	0.3	-4.7	4.3	10.6
110323+220337	–	gps	–	2684.1	0.618 ± 0.015	-1.051 ± 0.006	1.1	15.8	7.4	9.7	7.6
112256-274248	–	gps	0.65	1042.8	–	-1.041 ± 0.005	1.3	2.9	-2.3	16.2	-6.2
141236+133438	–	gps	–	3178.1	0.383 ± 0.025	-0.731 ± 0.008	1.3	-2.2	-0.1	-1.1	-8.0
202135+051505	–	gps	–	3579.0	0.574 ± 0.022	-0.683 ± 0.006	1.2	1.6	0.6	4.4	14.6

Notes. Column designation: Col. (1) NVSS source name (J2000); Col. (2) optical class (NASA/IPAC NED); Col. (3) indication of GPS and candidates; Col. (4) redshift (NASA/IPAC NED); Col. (5) peak frequency [MHz] in the observer frame; Cols. (6, 7) spectral indices of optically thick α_{below} and thin α_{above} parts of spectra and their estimated RMS error; Col. (8) value of FWHM in decades of frequency; Cols. (9–12) value of Var_S at 4800, 7700, 11 200 and 21 700 MHz (the negative value of Var_S corresponds to the case if the estimated error is greater than the observed scatter of the data).

Fig. 4. Relation “redshift – peak frequency – FWHM” for sources with $FWHM \leq 1.3$. The value limit 1.3 corresponds to the part of sources with inexact convex spectrum shapes because of uncertain flux densities.

are two areas with narrower spectra: $z \geq 1.8$ ($FWHM \leq 1$) and $0.02 \leq z \leq 0.7$ (the narrowest spectra $FWHM \sim 0.9$). The first area corresponds to GPS quasars that have statistically higher value of redshift, the second area corresponds to GPS galaxies. But by far the most distant GPS source candidate is the galaxy J1606+31 at $z = 4.56$ and with a $FWHM$ value 1.1. Additionally, it is necessary to take into account that some GPS source candidates are flat-spectrum radio sources that were included in the sample when they were classified using very sparse data sets.

5. Discussion

O’Dea (1990) found that approximately half of all ultra-high- z quasars are GPS sources, and likewise half of the GPS quasars are found at ultra-high redshifts. There is a difference in the distribution of redshifts between GPS galaxies and quasars (Snellen 1997; Stanghellini et al. 1998). This may be an indication that a different physical mechanism may play an important role in forming spectral shape in GPS galaxies and quasars.

From VLBI data¹, among the detected candidates of GPS galaxies a symmetric structure occurs more often than for GPS quasars. The GPS galaxies statistically demonstrate a symmetric radio morphology (up to hundreds pc) and GPS quasars exhibit a core-jet or complex morphology (from a few pc)

(Stanghellini et al. 1997). GPS quasars tend to have the turnover at a higher frequency than galaxies, both in the observed and the rest frame (Snellen 1997; Stanghellini et al. 1998). It has been suggested in Stanghellini (2003) and Snellen et al. (1998) that the GPS quasars and GPS galaxies do not belong to the same population seen from different angles, but that they form two different populations with similar observed shapes of the radio spectra. Variability studies of GPS sources and candidates also indicate that GPS galaxies are less variable than quasar-type GPS sources (e.g. Tornaiainen et al. 2005; Tornaiainen et al. 2007). A clear division between high-frequency peaking (HFP) galaxies and quasars was found by Orienti et al. (2006).

The main result of the monitoring is that the mean value of the γ index of the electron energy spectrum ($dN(E) = kE^{-\gamma}dE$) is 0.5 higher for galaxies (i.e. their energy spectra are steeper) than for quasars. Within the framework of a common model of GPS sources, this fact can be interpreted in the following ways: a) a flatter spectral index for GPS quasars associated with the presence of a flat-spectrum component; b) the observed sample of galaxies (their proper age) is older than the quasar sample (the proper age of quasars); the steepening of their energy spectra is related to additional (in comparison to quasars) age losses of energy for radiation (Kardashev 1962); c) the proper ages of quasar and galaxy samples are approximately identical, but the observed difference in γ is related to the fact that the galaxies in the observed sample were born later than quasars at small z , i.e. there is a cosmological difference in the electron energy spectra.

Of the sample of 122 sources presented in this paper, 56 were found to peak in the cm-domain (see Table 1) and not show very strong variability ($Var_S \leq 25\%$). These sources seem to adhere to the convex GPS-type spectrum. On the other hand, as can be seen from Fig. 5, many of the remaining 56 GPS-type sources also exhibit some variability at least in some of the observing frequencies, so it cannot completely be ruled out that in some of those cases the convex spectral shapes are still somewhat temporary, caused by flares (disturbances propagating in the jets and with the self-absorption turnover frequency changing with time). It is also worth noting that even though most of the data sets presented in this paper span several years, some of them are as short as approximately two years. As has been shown in variability studies of blazars (Hovatta et al. 2007, 2008), cm-waveband variability time scales can sometimes be considerably long, with strong outbursts occurring once every

¹ <http://lacerta.gsfc.nasa.gov/vlbi/images>

Fig. 5. Averaged instantaneous spectra of sources in the sample at several epochs (2006–2010).

Fig. 5. continued.

Fig. 5. continued.

Fig. 5. continued.

Fig. 5. continued.

Fig. 5. continued.

four to six years and typically lasting for several years. Thus it is highly possible that after an even longer monitoring period some of these sources would also turn out to be variable, blazar-like sources instead of showing GPS-type spectra at all times.

Bai & Lee (2005) argued that the GPS quasars (GPSQs) are special blazars – blazars in a dense and dusty gas environment, suggesting that the relativistic jets in GPSQs are oriented at small angle to the line of sight. It is the surrounding dense gas and dust that makes GPSQs show non-blazar properties. On the other hand, some results by Stanghellini (2003) support the view that most of the GPS quasars are like the flat-spectrum radio sources, where a single homogeneous component dominates the radio emission and forms the convex spectrum.

When we constrained our GPS candidate sample even more to include only those sources that have steep, narrow spectra resembling that of a homogenous self-absorbed synchrotron source, we ended up with only 36 sources. Considering the number of sources belonging to the two subtypes in our initial sample, galaxies are over-represented in this final list of GPS sources. This finding also supports the suggestion that compared to quasars, galaxies are more likely to consistently show properties typically associated with GPS-sources over several observing epochs.

6. Conclusions

We have presented the observational results from 12 observing sets (carried out between 2006 and 2010) at the RATAN-600 radio telescope to obtain simultaneous radio spectra, which is valuable and necessary to distinguish genuine GPS sources from flat-spectrum radio sources caught in a flaring state when their spectra are temporarily inverted. The sample contains both quasar- and galaxy-type GPS (122 sources) identified in the literature.

Flux densities at all frequencies were measured at several epochs practically instantaneously – over a period of a few minutes. The observations are result of a long-term programme of “Investigation of radio spectra and variability of GPS sources” (Metsahovi Radio Observatory and SAO RAS). Assuming the generally accepted criteria of radio spectra for homogeneous self-absorbed synchrotron sources, only 17 (14%) objects of our sample were selected as genuine GPS sources. For future work we allowed some slight deviation from the spectral criteria for these sources and chose 19 more GPS candidates. Thus, as a result of monitoring, we have formed a list of 36 (29%) GPS candidates. This agrees well with previous results (Torniiainen et al. 2005, 2007; Tornikoski et al. 2009). Obviously the original samples are highly contaminated. This work confirms that the genuine quasar-type GPS sources seem to be very rare.

Some differences were found between the spectral properties of the GPS galaxies and quasars in the sample. The GPS galaxies show a steeper spectral index in the optically thin

part of the spectra (-0.93 ± 0.08 and -0.68 ± 0.05). There are only relatively few sources with narrow spectra in the sample (≤ 1.2 decades of frequency). The narrowest radio spectra correspond to both ultra-high- z ($z \geq 1.8$) and low- z ($0.02 \leq z \leq 0.7$, $FWHM \sim 0.9$) convex-spectrum radio sources. But the most distant GPS source candidate is the galaxy J1606+31 at $z = 4.56$ and a value of $FWHM = 1.1$. The majority of quasars turned out to be variable flat-spectrum radio sources with temporarily inverted spectra and should now be excluded from the GPS candidate lists.

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References

- Aller, M. F., Aller, H. D., & Hughes, P. A. 1992, *ApJ*, 399, 16
Aller, M. F., Aller, H. D., Hughes, P. A., & Plotkin, R. M. 2002, in *Proc. of the 6th EVN Symposium*, eds. E. Ros, R. W. Porcas, A. P. Lobanov, & J. A. Zensus, 135
Bai, J. M., & Lee, M. G. 2005, *J. Korean Astron. Soc.*, 38, 125
Baum, S. A., O’Dea, C. P., Murphy, D. W., & de Bruyn, A. G. 1990, *A&A*, 232, 19
Bicknell, G. V., Dopita, M. A., & O’Dea, C. P. 1997, *AJ*, 485, 112
Cohen, A. S., Lane, W. M., Cotton, W. D., et al. 2007, *AJ*, 134, 1245
de Vries, W. H., Barthel, P. D., & O’Dea, C. P. 1997, *A&A*, 321, 105
Douglas, J. N., Bash, F. N., Bozayan, F. A., Torrence, G. V., & Wolfe, C. 1996, *AJ*, 111, 1945
Edwards, P. G., & Tingay, S. J. 2004, *A&A*, 424, 91
Fanti, C., Fanti, R., Dallacasa, D., et al. 1995, *A&A*, 302, 317
Gopal-Krishna, & Wiita, P. J. 1991, *ApJ*, 373, 325
Hovatta, T., Tornikoski, M., Lainela, M., et al. 2007, *A&A*, 469, 899
Hovatta, T., Lehto, H. J., & Tornikoski, M. 2008, *A&A*, 488, 897
Kardashev, N. S. 1962, *Soviet Astron.*, 6, 317
Kuehr, H., Witzel, A., Pauliny-Toth, I. I. K., & Nauber, U. 1981, *A&AS*, 45, 367
Large, M. I., Mills, B. Y., Little, A. G., Crawford, D. F., & Sutton, J. M. 1981, *MNRAS*, 194, 693
Massaro, E., Giommi, P., Leto, C., et al. 2009, *A&A*, 495, 691
Mingaliev, M. G., Sotnikova, Y. V., Bursov, N. N., Kardashev, N. S., & Larionov, M. G. 2007, *AZh*, 51, 343
Mingaliev, M. G., Stolyarov, V. A., Davies, R. D., et al. 2001, *A&A*, 370, 78
O’Dea, C. P. 1990, *MNRAS*, 245, 20
O’Dea, C. P. 1998, *PASP*, 110, 493
O’Dea, C. P., Baum, S. A., & Stanghellini, C. 1991, *ApJ*, 380, 66
Orienti, M., Dallacasa, D., Tinti, S., & Stanghellini, C. 2006, *A&A*, 450, 959
Ott, M., Witzel, A., Quirrenbach, A., et al. 1994, *A&A*, 284, 331
Pauliny-Toth, I. I. K., Witzel, A., Preuss, E., et al. 1978, *AJ*, 83, 451
Pearson, T. J., & Readhead, A. C. S. 1988, *ApJ*, 328, 114
Readhead, A. C. S., Taylor, G. B., Xu, W., et al. 1996, *ApJ*, 460, 612
Rengelink, R. B., Tang, Y., de Bruyn, A. G., et al. 1997, *A&AS*, 124, 259
Rudnick, L., & Jones, T. W. 1982, *ApJ*, 255, 39
Shklovskii, I. S. 1960, *AZh*, 37, 945
Snellen, I. A. G. 1997, Ph.D. Thesis, University of Notre Dame, USA
Snellen, I. A. G., Schilizzi, R. T., de Bruyn, A. G., et al. 1998, *A&AS*, 131, 435
Spoelstra, T. A. T., Patnaik, A. R., & Gopal-Krishna. 1985, *A&A*, 152, 38
Stanghellini, C. 2003, *PASA*, 20, 118
Stanghellini, C., Baum, S. A., O’Dea, C. P., & Morris, G. B. 1990, *A&A*, 233, 379
Stanghellini, C., O’Dea, C. P., Baum, S. A., et al. 1997, *A&A*, 325, 943
Stanghellini, C., O’Dea, C. P., Dallacasa, D., et al. 1998, *A&AS*, 131, 303
Tabara, H., & Inoue, M. 1980, *A&AS*, 39, 379
Torniiainen, I., Tornikoski, M., Lähteenmäki, A., et al. 2007, *A&A*, 469, 451
Torniiainen, I., Tornikoski, M., Teräsanta, H., Aller, M. F., & Aller, H. D. 2005, *A&A*, 435, 839
Tornikoski, M., Jussila, I., Johansson, P., Lainela, M., & Valtaoja, E. 2001, *AJ*, 121, 1306
Tornikoski, M., Torniiainen, I., Lähteenmäki, A., et al. 2009, *Astron. Nachr.*, 330, 128
Verkhodanov, O. V. 1997, *Astronomical Data Analysis Software and Systems VI*, ASP Conf. Ser., 125, 46
Wright, A., & Otrupcek, R. 1990, in *PKS Catalog*
Zhang, X., Zheng, Y., Chen, H., et al. 1997, *A&AS*, 121, 59