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FIVE-YEAR *WILKINSON MICROWAVE ANISOTROPY PROBE** OBSERVATIONS: SOURCE CATALOG

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ABSTRACT

We present the list of point sources found in the *Wilkinson Microwave Anisotropy Probe* (*WMAP*) five-year maps. The technique used in the first-year and three-year analyses now finds 390 point sources, and the five-year source catalog is complete for regions of the sky away from the Galactic plane to a 2 Jy limit, with SNR >4.7 in all bands in the least covered parts of the sky. The noise at high frequencies is still mainly radiometer noise, but at low frequencies the cosmic microwave background (CMB) anisotropy is the largest uncertainty. A separate search of CMB-free V–W maps finds 99 sources of which all but one can be identified with known radio sources. The sources seen by *WMAP* are not strongly polarized. Many of the *WMAP* sources show significant variability from year to year, with more than a 2:1 range between the minimum and maximum fluxes.

Key words: catalogs – cosmic microwave background – quasars: general – radio continuum: galaxies – surveys

1. INTRODUCTION

The *Wilkinson Microwave Anisotropy Probe* (*WMAP*; Bennett et al. 2003a) is a Medium-class Explorer (MIDEX) mission designed to study cosmology by producing full-sky maps of the cosmic microwave background (CMB) anisotropy. *WMAP* has measured the angular power spectrum of the CMB anisotropy over 10^3 different values of the spherical harmonic index ℓ. All of these data can be adequately fitted by a simple six parameter ΛCDM model, and this model can also fit other datasets (Spergel et al. 2007). A determination of the interference from foreground sources is an essential part of the analysis of CMB data (Nolta et al. 2009). The most important foreground at small angular scales is due to extragalactic flat-spectrum radio sources. Sources are found by searching the maps for bright spots that approximate the beam profile, but due to the limited angular resolution of *WMAP* it is possible to confuse positive CMB excursions with point sources. Nonetheless, *WMAP* provides the only all-sky survey of the millimeter-wave sky so its point source catalogs are valuable for the study of flat-spectrum radio sources. In addition, the *WMAP* point source catalog is used to mask out contaminated spots in the high Galactic latitude sky used for cosmological analyses. 208 point sources were found in a search of the first year of *WMAP* observations (Bennett et al. 2003b). A search for point sources in the three-year *WMAP* data found 323 sources (Hinshaw et al. 2007). In this paper we report on 390 point sources found in the *WMAP* five-year maps.

The signal-to-noise ratio on point sources found in *WMAP* depends on the the sensitivity in Janskies per pixel and the number of pixels that can be averaged to estimate the flux. Since *WMAP* was designed to give approximately equal sensitivity in each band, and the conversion factor from Janskies to Rayleigh–Jeans brightness temperature in Kelvins within a constant pixel size is determined by the illuminated area of the telescope, the sensitivity in Janskies per pixel is fairly constant. The Γ_{ff} factors tabulated by Hill et al. (2009) give the peak temperature expected for a 1 Jansky source as 262.7, 211.9, 219.6, 210.1, and 179.2 μK for the K through W bands of *WMAP*. But the number of pixels that can be averaged to estimate the flux is proportional to the wavelength squared, so the overall radiometer noise contribution to the point source flux uncertainty is approximately proportional to the frequency. *WMAP* actually illuminates different fractions of the primary mirror in different bands, and does not have exactly the same sensitivity in Kelvins per pixel in each band, so the actual radiometer noise contributions to point source flux estimates are 0.067, 0.11, 0.13, 0.23, and 0.40 Jy divided by the square root of the number of years of observations for sources on the ecliptic where the coverage is smallest. The anisotropy of the CMB itself is also a source of noise that does not integrate down with more years of observation. Using the point-source flux estimating filters on simulated noise-free CMB maps generated using the parameters in Spergel et al. (2007) gives 1σ flux noises of 0.27, 0.41, 0.36, 0.27, and 0.14 Jy in the K, Ka, Q, *V*, and

* *WMAP* is the result of a partnership between Princeton University and NASA's Goddard Space Flight Center. Scientific guidance is provided by the *WMAP* Science Team.

W bands (Chen & Wright 2008). This "CMB noise" term peaks where the beam size matches the first acoustic peak.

2. POINT SOURCES IN INDIVIDUAL BAND MAPS

Extragalactic point sources contaminate the *WMAP* anisotropy data and a few hundred of them are strong enough that they should be masked and discarded prior to undertaking any CMB analysis. In this section we describe a new direct search for sources in the five-year *WMAP* band maps. Based on this search, we update the source mask that was used in the five-year analysis.

In the three-year analysis, we produced a catalog of bright point sources in the *WMAP* sky maps, independent of their presence in external surveys. This process has been repeated with the five-year maps as follows. We filter the weighted maps, $N_{\rm obs}^{1/2} T$ ($N_{\rm obs}$ is the number of observations per pixel) in harmonic space by $b_l / \left(b_l^2 C_l^{\rm cmb} + C_l^{\rm noise}\right)$, (Tegmark & de Oliveira-Costa 1998; Refregier et al. 2000), where b_l is the transfer function of the *WMAP* beam response (Page et al. 2003; Jarosik et al. 2007; Hill et al. 2009), $C_l^{\rm cmb}$ is the CMB angular power spectrum, and $C_l^{\rm noise}$ is the noise power. Note that the CMB angular power spectrum used in this filtering has been updated to match the parameters from the *WMAP* three-year analysis, and that the importance of the noise power spectrum goes down as one over the number of years of data. Peaks that are $> 5\sigma$ in the filtered map in any band are fit in the unfiltered maps for all bands to a Gaussian profile plus a planar baseline. The Gaussian amplitude is converted to a source flux density using the conversion factors given in Hill et al. (2009). When a source is identified with $> 5\sigma$ confidence in any band, the flux densities for other bands are given if they are $> 2\sigma$ and the fit source width is within a factor of 2 of the true beam width. We cross-correlate detected sources with the GB6 (Gregory et al. 1996), PMN (Griffith et al. 1994), and Kühr et al. (1981) catalogs to identify 5 GHz counterparts. If a 5 GHz source is within 11′ of the *WMAP* source position (the *WMAP* source position uncertainty is 4′) we identify the *WMAP* source with the 5 GHz source and list the identification in Table 1. When more than one source lies within the cutoff radius the brightest one is assumed to be the *WMAP* counterpart.

The catalog of 390 sources obtained from the five-year maps is listed in Table 1. In the first-year catalog, source ID numbers were assigned on the basis of position (sorted by Galactic longitude). Now, rather than assigning new numbers to the newly detected sources, we follow Hinshaw et al. (2007) and recommend that *WMAP* sources be referred to by their coordinates, e.g., *WMAP* J0006−0622. For reference, we give the first-year source ID in Column 3 of Table 1. The 5 GHz IDs are given in the last column.

The three-year catalog contained 323 sources. Given the increased sensitivity in the five-year maps, the number of new sources detected is consistent with expectations based on differential source count models. At the same time, three sources from the first-year catalog are not present in the five-year list (numbers 15, 61, and 156). Source numbers 31, 96 and, 168 which were missing in the three-year list have been resurrected. Simulations of the first-year catalog suggested that it contained 5 ± 4 false detections, so the number of dropped first-year sources is consistent with expectations. Nine sources from the three-year catalog are missing from the five-year catalog: *WMAP* J0513−2015, 0734+5021, 1227+1124, 1231+1351, 1302+4856, 1309+1155, 1440+4958, 1556−7912, and 1648+4114. The sources J1227+1124 and J1231+1351 were spurious detections caused by sidelobes in the filtered maps around the strong source J1230+1223. The problem of strong source sidelobes is handled as follows in the five year analysis: after identification of each source with signal-to-noise ratio greater than 30 in a filtered map, the map is cleaned by subtracting the point-spread function scaled to the source peak. A total of six out of the 323 sources in the three-year catalog could not be identified with 5 GHz counterparts; now 17 out of the 390 sources in the five-year catalog do not have 5 GHz identifications. The strong source J1924−2914 is included in the five-year catalog but not in the previous catalogs because of a small change in the mask used to exclude Galactic plane and Magellanic cloud regions. Isolated mask regions with fewer than 500 contiguous HEALPix pixels at resolution 9 are no longer included in the mask (compare Figure 1 with the Kp0 mask in Figure 2 of Bennett et al. 2003b). The point source catalog mask shown in Figure 1 is available on the LAMBDA Web site, http://lambda.gsfc.nasa.gov.

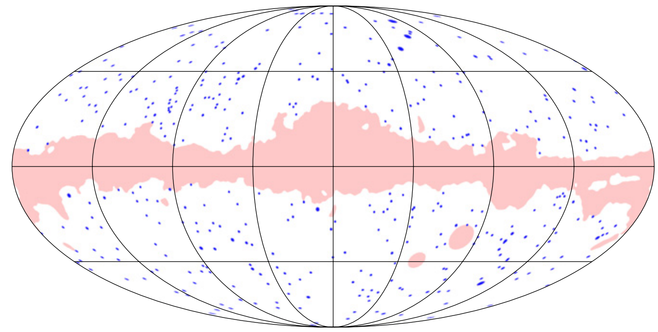

Figure 1. Map showing the location of the 390 point sources found by searching individual band maps. The shaded region shows the mask used to exclude extended foreground emission. The size of the plotted points indicates the flux of the source: the area of the dot scales like the maximum flux over the five *WMAP* bands plus 4 Jy. Galactic coordinates are plotted.

Trushkin (2003) has compiled multifrequency radio spectra and high resolution radio maps of the sources in the first-year *WMAP* catalog. Reliable identifications are claimed for 205 of the 208 first-year sources. Of the 203 sources with optical identifications, Trushkin (2003) finds 141 quasars, 42 galaxies, or active galactic nuclei, 19 BL Lac-type objects and one planetary nebula, IC418. 40% of the sources are identified as having flat and inverted radio spectra, 13% might have GHz-peaked spectra, 8% are classical power-law sources, and 7% have a classical low frequency power law combined with a flat or inverted spectrum component (like 3C84). Trushkin (2003) suggests that the *WMAP* source number 116 is likely to be spurious and, for source 61 no radio component was found. Indeed, source 61 is not present in either the three-year catalog or the five-year catalog. Giommi et al. (2007) observed the 23 objects in the first *WMAP* sample that were not reported as X-ray sources and detected all of these objects in the 0.3–10 keV band. They report a strong correlation between X-ray and microwave properties for these blazars.

The distribution of five-year sources on the sky is shown in Figure 1. A Kp0+LMC+SMC mask was used when finding point sources. This mask excluded 22% of the sky. The source counts in the 33 GHz band are shown in Figure 2. The scaling of the Toffolatti et al. (1998) model has decreased from 0.66 to 0.64. The slope of the *WMAP* source counts is quite close to the Euclidean $dN/dS \propto S^{-2.5}$ slope, while both the models (Toffolatti et al. 1998; de Zotti et al. 2005) and the more sensitive data (Mason et al. 2003; Cleary et al. 2005) show sub-Euclidean faint source counts.

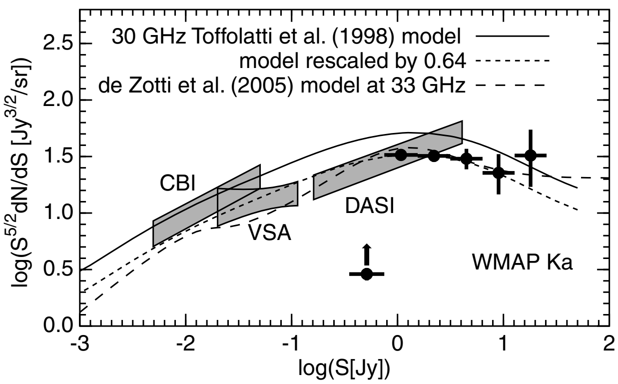

Figure 2. Differential source counts from the *WMAP* five-year catalog compared the Toffolatti et al. (1998) model, and to CBI counts at 31 GHz (Mason et al. 2003), 33 GHz VSA counts (Cleary et al. 2005), and DASI 31 GHz counts (Kovac et al. 2002). Models from Toffolatti et al. (1998) and de Zotti et al. (2005) are shown as well. Error bars for *WMAP* are statistical only. The *WMAP* catalog in the 0.35 to 0.75 Jy bin is quite incomplete, leading to the low data point with the upward arrow on the plot.

The spectral indices of the sources are clustered near a flat spectrum, $\alpha = 0$ in $F_\nu \propto \nu^\alpha$. A histogram of the measured α's is shown in Figure 3. The smooth curve is a Gaussian with a mean of $\langle\alpha\rangle = -0.09$ and $\sigma = 0.28$. This σ includes measurement errors and is thus an upper limit on the true dispersion of spectral indices. Assuming for simplicity that the underlying distributions of spectral indices is a Gaussian with standard deviation $\sigma_\circ$, then the intrinsic dispersion that gives χ^2 per degree of freedom equal to unity is $\sigma_\circ = 0.176$ and the weighted mean $\langle\alpha\rangle = -0.09$.

2.1. Analysis of Simulated Maps

The point-source analysis was repeated on simulated maps constructed with point sources, CMB fluctuations, and radiometer noise. 10^6 sources were sampled from a power law $N(> S)$ distribution at 30 GHz. This distribution was matched to the de Zotti et al. (2005) source count model. Spectral indices were then chosen from a Gaussian with mean -0.09 and standard deviation 0.176, and the fluxes were scaled to the five *WMAP* band centers. For each source, the appropriate temperature in each band was then added to a randomly chosen HEALPix pixel at resolution 11 (a total of 12×4^{11} pixels). These point source maps, one for each band, were then smoothed with the beam window function and converted to a resolution 9 map, and added to a simulated CMB plus radiometer noise maps. The point-source detection process was then applied to these simulated maps, yielding 363 point sources. Of these, only six were spurious. The recovered $N(> S)$ agreed with the simulation input for fluxes > 1 Jy, but fell well below the input at lower fluxes. Since sources with fluxes < 1 Jy are unlikely to be detected, the ones that are detected tend to have "benefited" from a positive noise or CMB fluctuation, leading to a bias at low fluxes (Eddington 1913). The mean ratio of the derived flux to the input flux in bands K–V is within 5% of unity for fluxes > 1 Jy, but then increases by 10%–20% or more for fluxes < 1 Jy. In the W band the measured flux is about 10% below the input flux for fluxes > 2 Jy, and rises to > 20% above the input flux for fluxes < 1 Jy. The bias in the W-band flux for high fluxes could be due to the Gaussian approximation used in flux fitting. The deviation of the mean measured spectral index from the input spectral index is about -0.02 for Q-band fluxes > 2 Jy, but rises to +0.04 at 1 Jy and is higher than +0.10 for fluxes less than 1 Jy. We conclude that the fluxes and spectral indices are

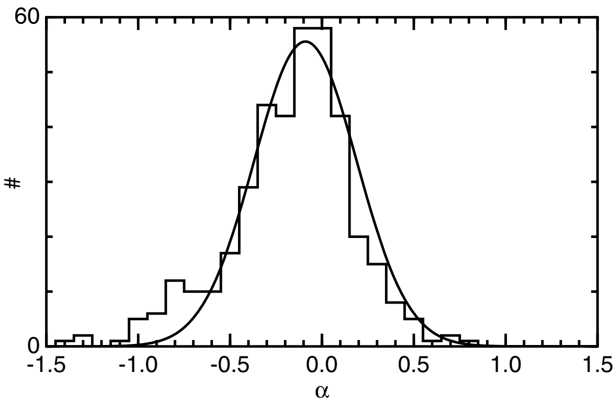

Figure 3. Histogram of the spectral indices of *WMAP* sources in the five-year maps. The smooth curve is a Gaussian with a mean of -0.09 and a standard deviation of 0.28, normalized to the total number of sources.

reliable for fluxes > 2 Jy, but small biases are present for fluxes $\lesssim$ 1 Jy. The source counts should be reliable for fluxes $\gtrsim$ 1 Jy.

3. POINT SOURCES IN CMB-FREE ILC MAPS

The number of sources detected by *WMAP* as a function of integration times varied as $N \propto t_{\rm int}^{0.4}$ between the one-year and the three-year catalogs, but slowed slightly to $\propto t_{\rm int}^{0.37}$ between the three-year and the five-year maps. This could be due to the "noise" from the CMB, which does not integrate down with increased observing time. An approach to circumvent this noise term has been developed by Chen & Wright (2008). It involves forming internal linear combination (ILC) maps from the *WMAP* bands, but unlike the normal ILC maps which preserve the CMB and suppress foregrounds, these ILC maps are designed to suppress the CMB. Applying this technique to the *WMAP* V and W bands alone, Chen & Wright (2008) found 31 sources in the one-year maps and 64 sources in the three-year maps. This gives $N \propto t_{\rm int}^{0.66}$ indicating that the ILC technique improves rapidly with increased observing time.

We have applied this ILC V–W technique to the five-year maps and there are 99 sources detected in the region with $|b| > 10°$. These are listed in Table 2. Among them, 64 are in the *WMAP* five-year source catalog, 17 can be identified with sources in NED based on continuity of spectral energy distributions, 17 are in complex Galactic emission regions, leaving only one source at $09^{\rm h}21^{\rm m}28^{\rm s}$, $+7°24'22''$ without any identification. The V–W technique can find sources sitting in negative peaks of the CMB where the standard flux finding technique returns an insignificant or even negative flux. V-band fluxes for these sources have been estimated by multiplying the value of the V–W map in mK, tabulated in Table 2, by the median conversion factor derived from the sources identified in Table 1. This factor is 6.28 Jy per mK. Of the 99 sources in Table 2, 12 are in the source list by Nie & Zhang (2007) using the cross-correlation detection method, eight are in the new detections of the nonblind catalog by López-Caniego et al. (2007), 27 are in the AT20G Bright Source Sample (Massardi et al. 2007), and 70 are in the CRATES catalog (Healey et al. 2007).

The number of sources found by the ILC V–W technique continues to increase fairly quickly with increased integration time, going like $t^{0.72}$ from one year to five years. For Euclidean source counts the expected scaling is $t^{0.75}$.

Table 1
WMAP Source Catalog

R.A. [hms]	Decl. [dm]	ID	K [Jy]	Ka [Jy]	Q [Jy]	V [Jy]	W [Jy]	α	5 GHz ID	
00 03 20	−47 52		...	0.7 ± 0.06	0.7 ± 0.09	0.4 ± 0.1	...	−0.7 ± 1	...	
00 06 06	−06 23	060	2.3 ± 0.06	2.3 ± 0.1	2.3 ± 0.1	2.0 ± 0.2	...	−0.1 ± 0.2	PMN J0006−0623	v
00 10 37	11 01		1.1 ± 0.07	1.2 ± 0.1	1.2 ± 0.1	1.0 ± 0.2	1.6 ± 0.5	0.1 ± 0.3	GB6 J0010+1058	V
00 12 53	−39 52	202	1.3 ± 0.04	1.3 ± 0.08	1.0 ± 0.09	1.3 ± 0.2	0.8 ± 0.2	−0.2 ± 0.2	PMN J0013−3954	
00 19 18	26 03		1.0 ± 0.06	0.7 ± 0.1	0.8 ± 0.1	0.5 ± 0.2	1.4 ± 0.3	0.0 ± 0.3	GB6 J0019+2602	
00 19 40	20 20		1.0 ± 0.06	1.1 ± 0.08	0.9 ± 0.09	1.3 ± 0.2	...	0.1 ± 0.3	GB6 J0019+2021	
00 25 22	−26 02		0.9 ± 0.05	0.7 ± 0.09	0.5 ± 0.08	...	...	−0.8 ± 0.6	PMN J0025−2602	a
00 26 07	−35 10		1.1 ± 0.07	1.1 ± 0.09	1.4 ± 0.1	1.0 ± 0.2	...	0.2 ± 0.3	PMN J0026−3512	v
00 29 34	05 54		1.1 ± 0.06	1.3 ± 0.09	1.0 ± 0.09	0.7 ± 0.2	...	−0.1 ± 0.3	GB6 J0029+0554B	a
00 38 14	−24 59		0.7 ± 0.06	0.8 ± 0.1	0.6 ± 0.1	1.1 ± 0.3	...	0.3 ± 0.5	PMN J0038−2459	
00 43 12	52 08		1.0 ± 0.04	0.6 ± 0.07	0.5 ± 0.08	0.5 ± 0.1	...	−1.0 ± 0.4	GB6 J0043+5203	
00 47 19	−25 14	062	1.1 ± 0.06	0.9 ± 0.1	1.1 ± 0.1	1.0 ± 0.2	0.9 ± 0.2	−0.1 ± 0.3	PMN J0047−2517	
00 49 50	−57 39	179	1.4 ± 0.05	1.4 ± 0.07	1.2 ± 0.07	1.2 ± 0.2	0.8 ± 0.3	−0.2 ± 0.2	PMN J0050−5738	v
00 50 48	−42 24		1.3 ± 0.03	1.3 ± 0.06	1.2 ± 0.06	0.7 ± 0.1	0.8 ± 0.2	−0.2 ± 0.2	PMN J0051−4226	v
00 50 49	−06 49		1.1 ± 0.06	1.1 ± 0.09	0.7 ± 0.1	1.3 ± 0.2	1.2 ± 0.5	−0.0 ± 0.3	PMN J0051−0650	
00 51 02	−09 27	077	1.0 ± 0.06	1.0 ± 0.08	0.8 ± 0.09	1.1 ± 0.2	...	−0.1 ± 0.3	PMN J0050−0928	
01 00 08	−56 54		0.5 ± 0.04	0.7 ± 0.08	0.8 ± 0.08	0.5 ± 0.1	...	0.3 ± 0.4	...	
01 06 43	−40 35	171	2.2 ± 0.04	2.4 ± 0.07	2.2 ± 0.09	2.0 ± 0.2	1.5 ± 0.3	−0.0 ± 0.1	PMN J0106−4034	V
01 08 30	13 19	079	1.4 ± 0.06	1.1 ± 0.1	0.8 ± 0.2	...	...	−0.8 ± 0.6	GB6 J0108+1319	
01 08 43	01 35	081	1.9 ± 0.06	1.9 ± 0.08	1.7 ± 0.1	1.5 ± 0.2	...	−0.1 ± 0.2	GB6 J0108+0135	a,V
01 15 21	−01 29		0.9 ± 0.05	1.2 ± 0.08	1.0 ± 0.09	1.1 ± 0.1	...	0.2 ± 0.3	PMN J0115−0127	
01 16 18	−11 37		1.3 ± 0.07	1.0 ± 0.1	1.0 ± 0.1	1.5 ± 0.3	...	−0.1 ± 0.4	PMN J0116−1136	
01 21 46	11 50		1.2 ± 0.05	1.1 ± 0.1	1.2 ± 0.1	0.6 ± 0.2	...	−0.3 ± 0.4	GB6 J0121+1149	
01 25 21	−00 10	086	1.1 ± 0.06	1.2 ± 0.09	1.1 ± 0.1	0.8 ± 0.2	...	−0.0 ± 0.3	PMN J0125−0005	a
01 32 36	−16 53	097	1.8 ± 0.05	1.8 ± 0.09	1.8 ± 0.1	1.6 ± 0.2	1.3 ± 0.3	−0.1 ± 0.2	PMN J0132−1654	
01 33 08	−52 00	168	0.8 ± 0.05	1.1 ± 0.08	0.7 ± 0.07	...	...	0.0 ± 0.4	PMN J0133−5159	
01 33 26	−36 27		0.6 ± 0.06	0.6 ± 0.1	...	...	...	−0.3 ± 1	PMN J0134−3629	a
01 37 01	47 53	080	3.8 ± 0.05	3.8 ± 0.09	3.6 ± 0.1	3.2 ± 0.2	1.8 ± 0.2	−0.2 ± 0.09	GB6 J0136+4751	V
01 37 37	−24 28		1.3 ± 0.06	1.3 ± 0.09	1.8 ± 0.1	1.4 ± 0.2	...	0.4 ± 0.3	PMN J0137−2430	V
01 49 10	05 53		1.0 ± 0.06	0.7 ± 0.09	0.8 ± 0.1	...	...	−0.4 ± 0.5	GB6 J0149+0555	
01 52 28	22 08		1.2 ± 0.09	1.3 ± 0.2	1.3 ± 0.1	1.4 ± 0.2	1.7 ± 0.5	0.2 ± 0.3	GB6 J0152+2206	
02 04 49	15 13	092	1.3 ± 0.06	1.3 ± 0.1	1.1 ± 0.1	1.6 ± 0.3	...	0.0 ± 0.3	GB6 J0204+1514	v
02 05 01	32 13	085	1.6 ± 0.07	1.5 ± 0.1	1.2 ± 0.1	0.7 ± 0.2	...	−0.5 ± 0.3	GB6 J0205+3212	
02 05 03	−17 04		0.7 ± 0.1	...	0.9 ± 0.2	0.8 ± 0.1	0.6 ± 0.3	0.0 ± 0.5	PMN J0204−1701	
02 10 51	−51 00	158	2.7 ± 0.05	2.7 ± 0.08	2.8 ± 0.09	2.7 ± 0.2	2.1 ± 0.4	0.0 ± 0.1	PMN J0210−5101	
02 18 27	01 38	096	1.3 ± 0.05	1.2 ± 0.08	0.8 ± 0.1	...	0.7 ± 0.3	−0.5 ± 0.3	...	v
02 20 57	35 58		1.2 ± 0.06	1.2 ± 0.09	0.9 ± 0.1	1.1 ± 0.2	1.3 ± 0.3	−0.1 ± 0.2	GB6 J0221+3556	
02 22 45	−34 40	137	1.0 ± 0.03	1.0 ± 0.05	...	0.7 ± 0.1	...	−0.2 ± 0.3	PMN J0222−3441	
02 23 10	43 03	084	1.8 ± 0.06	1.4 ± 0.1	1.4 ± 0.1	1.3 ± 0.3	1.2 ± 0.2	−0.4 ± 0.2	GB6 J0223+4259	a
02 31 37	13 20		1.3 ± 0.07	1.2 ± 0.08	1.2 ± 0.1	0.9 ± 0.2	...	−0.2 ± 0.3	GB6 J0231+1323	
02 31 39	−47 42		0.7 ± 0.05	0.9 ± 0.09	0.9 ± 0.07	1.2 ± 0.1	0.7 ± 0.2	0.3 ± 0.2	PMN J0231−4746	
02 37 58	28 48	093	3.8 ± 0.06	3.4 ± 0.1	3.5 ± 0.1	3.2 ± 0.3	2.1 ± 0.4	−0.2 ± 0.1	GB6 J0237+2848	V
02 38 48	16 37		1.5 ± 0.08	1.6 ± 0.1	1.6 ± 0.1	1.6 ± 0.3	...	0.1 ± 0.3	GB6 J0238+1637	v
02 41 18	−08 21		1.0 ± 0.06	0.7 ± 0.09	0.7 ± 0.1	...	...	−0.8 ± 0.5	PMN J0241−0815	v
02 45 18	−44 56		0.5 ± 0.05	0.7 ± 0.1	0.6 ± 0.09	0.7 ± 0.2	...	0.5 ± 0.5	PMN J0245−4459	
02 53 33	−54 42	155	2.4 ± 0.04	2.7 ± 0.07	2.5 ± 0.08	2.2 ± 0.1	1.8 ± 0.3	0.0 ± 0.1	PMN J0253−5441	V
02 59 31	−00 15		1.1 ± 0.06	1.4 ± 0.08	1.2 ± 0.08	0.8 ± 0.1	...	0.0 ± 0.3	PMN J0259−0020	
03 03 33	−62 12	162	1.4 ± 0.06	1.3 ± 0.1	1.4 ± 0.08	1.3 ± 0.1	1.0 ± 0.2	−0.1 ± 0.2	PMN J0303−6211	
03 08 26	04 05	102	1.3 ± 0.07	1.3 ± 0.1	1.2 ± 0.1	0.9 ± 0.3	...	−0.1 ± 0.4	GB6 J0308+0406	
03 09 16	10 28		1.1 ± 0.07	1.3 ± 0.1	1.3 ± 0.1	1.5 ± 0.2	1.5 ± 0.5	0.3 ± 0.3	GB6 J0309+1029	
03 09 50	−61 02	160	1.1 ± 0.05	1.2 ± 0.08	0.9 ± 0.07	0.9 ± 0.2	0.7 ± 0.3	−0.2 ± 0.3	PMN J0309−6058	
03 12 21	−76 45	174	1.0 ± 0.05	1.2 ± 0.08	1.1 ± 0.07	0.9 ± 0.1	0.8 ± 0.3	−0.0 ± 0.2	PMN J0311−7651	
03 12 50	01 31		0.9 ± 0.06	0.8 ± 0.2	0.9 ± 0.1	0.8 ± 0.2	...	0.0 ± 0.4	GB6 J0312+0132	
03 19 45	41 31	094	11.3 ± 0.06	8.9 ± 0.09	7.5 ± 0.1	5.6 ± 0.2	3.9 ± 0.4	−0.7 ± 0.04	GB6 J0319+4130	v
03 22 25	−37 11	138	18.5 ± 3.1	12.6 ± 2.0	10.6 ± 1.9	8.4 ± 2.5	...	−0.8 ± 0.2	1Jy 0320−37	b
03 25 14	22 25		0.8 ± 0.08	0.9 ± 0.1	1.1 ± 0.2	0.5 ± 0.2	...	0.1 ± 0.5	GB6 J0325+2223	
03 29 45	−23 54	123	1.2 ± 0.05	1.3 ± 0.07	1.2 ± 0.1	1.0 ± 0.1	0.9 ± 0.2	−0.0 ± 0.2	PMN J0329−2357	
03 34 20	−40 07	146	1.4 ± 0.05	1.5 ± 0.07	1.4 ± 0.07	1.4 ± 0.1	1.5 ± 0.4	0.0 ± 0.2	PMN J0334−4008	V
03 36 49	−12 57		1.0 ± 0.05	0.9 ± 0.07	1.1 ± 0.1	0.9 ± 0.1	0.7 ± 0.3	−0.1 ± 0.3	PMN J0336−1302	
03 39 24	−01 43	106	2.4 ± 0.07	2.3 ± 0.1	2.2 ± 0.1	1.7 ± 0.2	2.1 ± 0.3	−0.2 ± 0.1	PMN J0339−0146	v
03 40 29	−21 19		1.1 ± 0.05	1.1 ± 0.07	1.1 ± 0.09	1.2 ± 0.1	1.2 ± 0.2	0.1 ± 0.2	PMN J0340−2119	
03 48 51	−27 47	129	1.2 ± 0.03	1.0 ± 0.06	0.9 ± 0.07	1.5 ± 0.2	...	−0.2 ± 0.2	PMN J0348−2749	
03 58 47	10 29		1.2 ± 0.1	1.1 ± 0.2	...	...	...	−0.1 ± 1	GB6 J0358+1026	
04 03 57	−36 04	136	3.4 ± 0.05	3.8 ± 0.08	3.6 ± 0.08	3.4 ± 0.1	3.0 ± 0.3	0.0 ± 0.07	PMN J0403−3605	V
04 05 36	−13 04	114	2.0 ± 0.06	1.8 ± 0.09	1.7 ± 0.1	1.5 ± 0.2	...	−0.3 ± 0.2	PMN J0405−1308	v

Table 1
(Continued)

R.A. [hms]	Decl. [dm]	ID	K [Jy]	Ka [Jy]	Q [Jy]	V [Jy]	W [Jy]	α	5 GHz ID	
04 07 02	−38 25	141	1.1 ± 0.06	1.0 ± 0.1	0.9 ± 0.08	0.8 ± 0.1	...	−0.4 ± 0.3	PMN J0406−3826	
04 08 50	−75 06		0.8 ± 0.04	0.5 ± 0.06	0.3 ± 0.08	...	...	−1.4 ± 0.6	PMN J0408−7507	
04 11 23	76 54	082	1.0 ± 0.05	0.7 ± 0.1	0.7 ± 0.1	0.8 ± 0.2	0.8 ± 0.2	−0.3 ± 0.3	1Jy 0403+76	
04 16 32	−20 51		1.1 ± 0.05	1.1 ± 0.08	1.0 ± 0.08	0.8 ± 0.2	...	−0.1 ± 0.3	PMN J0416−2056	
04 23 16	−01 20	110	8.2 ± 0.06	8.3 ± 0.1	7.9 ± 0.1	7.1 ± 0.2	4.9 ± 0.4	−0.1 ± 0.05	PMN J0423−0120	V
04 23 50	02 18		1.2 ± 0.05	1.0 ± 0.08	0.7 ± 0.09	...	...	−0.8 ± 0.4	GB6 J0424+0226	
04 24 53	00 35	109	1.5 ± 0.08	1.6 ± 0.1	1.8 ± 0.1	1.3 ± 0.2	...	0.2 ± 0.3	GB6 J0424+0036	v
04 24 56	−37 57	140	1.5 ± 0.05	1.2 ± 0.1	1.2 ± 0.1	1.5 ± 0.2	...	−0.1 ± 0.2	PMN J0424−3756	V
04 28 27	−37 57		1.5 ± 0.05	1.4 ± 0.08	1.3 ± 0.07	1.3 ± 0.2	1.2 ± 0.4	−0.2 ± 0.2	PMN J0428−3756	a
04 33 13	05 21	108	2.4 ± 0.06	2.4 ± 0.1	2.3 ± 0.1	2.5 ± 0.3	2.4 ± 0.4	−0.0 ± 0.2	GB6 J0433+0521	v
04 40 16	−43 32	147	2.5 ± 0.06	2.3 ± 0.09	2.2 ± 0.08	1.7 ± 0.2	0.9 ± 0.2	−0.3 ± 0.1	PMN J0440−4332	v
04 42 45	−00 17		0.9 ± 0.06	0.8 ± 0.1	1.2 ± 0.2	0.8 ± 0.2	0.8 ± 0.3	0.0 ± 0.4	PMN J0442−0017	
04 49 18	−81 00	175	1.7 ± 0.05	1.8 ± 0.08	1.6 ± 0.09	1.6 ± 0.1	1.4 ± 0.2	−0.0 ± 0.1	PMN J0450−8100	v
04 53 19	−28 06	131	1.5 ± 0.06	1.5 ± 0.09	1.4 ± 0.08	1.2 ± 0.2	1.5 ± 0.4	−0.1 ± 0.2	PMN J0453−2807	
04 55 55	−46 17	151	3.9 ± 0.05	4.0 ± 0.09	4.0 ± 0.09	3.5 ± 0.2	2.7 ± 0.4	−0.0 ± 0.08	PMN J0455−4616	V
04 56 59	−23 22	128	2.4 ± 0.04	2.5 ± 0.07	2.4 ± 0.1	1.9 ± 0.2	1.9 ± 0.5	−0.1 ± 0.1	PMN J0457−2324	V
05 01 18	−01 59		1.1 ± 0.07	1.2 ± 0.1	1.1 ± 0.1	1.0 ± 0.3	...	−0.0 ± 0.4	PMN J0501−0159	
05 06 55	−61 08	154	2.1 ± 0.04	1.8 ± 0.06	1.6 ± 0.07	1.1 ± 0.1	0.8 ± 0.2	−0.5 ± 0.1	PMN J0506−6109	a,v
05 13 56	−21 55	127	1.1 ± 0.04	1.1 ± 0.06	0.9 ± 0.09	...	1.0 ± 0.3	−0.1 ± 0.3	PMN J0513−2159	v
05 15 20	−45 58		...	...	0.9 ± 0.1	1.1 ± 0.2	...	0.4 ± 1	PMN J0515−4556	a
05 19 21	−05 39	116	2.4 ± 0.06	1.8 ± 0.07	1.2 ± 0.09	0.8 ± 0.1	...	−1.0 ± 0.2	PMN J0520−0537	c
05 19 42	−45 46	150	6.8 ± 0.05	5.3 ± 0.08	4.4 ± 0.1	3.3 ± 0.2	2.2 ± 0.3	−0.7 ± 0.06	PMN J0519−4546	a
05 23 02	−36 27	139	4.2 ± 0.05	3.9 ± 0.08	3.8 ± 0.1	3.5 ± 0.2	2.6 ± 0.2	−0.2 ± 0.07	PMN J0522−3628	V
05 25 05	−23 37		0.7 ± 0.04	0.9 ± 0.06	0.7 ± 0.07	0.8 ± 0.2	...	0.1 ± 0.3	PMN J0525−2338	a
05 25 31	−48 26		0.9 ± 0.04	1.3 ± 0.07	1.3 ± 0.09	1.1 ± 0.1	0.8 ± 0.2	0.3 ± 0.2	PMN J0526−4830	a,v
05 27 34	−12 41	122	1.4 ± 0.05	1.6 ± 0.09	1.4 ± 0.1	1.2 ± 0.1	1.1 ± 0.3	−0.1 ± 0.2	PMN J0527−1241	
05 34 23	−61 07		0.5 ± 0.03	0.5 ± 0.05	0.6 ± 0.05	0.6 ± 0.09	...	0.0 ± 0.3	PMN J0534−6106	
05 38 52	−44 05	148	5.6 ± 0.05	5.9 ± 0.08	6.0 ± 0.09	5.4 ± 0.2	4.6 ± 0.3	0.0 ± 0.05	PMN J0538−4405	V
05 39 48	−28 44		0.6 ± 0.09	0.6 ± 0.08	0.6 ± 0.1	0.7 ± 0.1	...	0.2 ± 0.5	PMN J0539−2839	v
05 40 44	−54 15	152	1.4 ± 0.05	1.4 ± 0.07	1.4 ± 0.09	1.1 ± 0.1	...	−0.1 ± 0.2	PMN J0540−5418	v
05 42 28	49 51	095	1.7 ± 0.07	1.3 ± 0.1	1.3 ± 0.1	0.8 ± 0.1	...	−0.7 ± 0.3	GB6 J0542+4951	
05 50 39	−57 31	153	1.2 ± 0.04	1.0 ± 0.05	1.0 ± 0.08	0.9 ± 0.1	...	−0.3 ± 0.2	PMN J0550−5732	
05 55 59	39 42	100	3.0 ± 0.06	2.4 ± 0.09	1.7 ± 0.1	...	...	−0.8 ± 0.2	GB6 J0555+3948	
05 59 53	−45 28		0.7 ± 0.05	1.0 ± 0.07	0.9 ± 0.06	0.7 ± 0.1	...	0.4 ± 0.4	PMN J0559−4529	
06 07 00	67 23	091	1.2 ± 0.04	0.9 ± 0.05	0.7 ± 0.08	0.6 ± 0.2	...	−0.7 ± 0.3	GB6 J0607+6720	a
06 08 47	−22 20		1.1 ± 0.04	1.1 ± 0.06	0.9 ± 0.08	0.6 ± 0.1	0.5 ± 0.2	−0.3 ± 0.3	PMN J0608−2220	
06 09 37	−15 41	126	3.7 ± 0.05	3.3 ± 0.09	3.1 ± 0.1	2.2 ± 0.2	1.9 ± 0.5	−0.3 ± 0.1	PMN J0609−1542	V
06 21 02	−25 16		0.6 ± 0.06	0.5 ± 0.1	0.3 ± 0.1	...	...	−1.0 ± 1	PMN J0620−2515	
06 23 03	−64 36		0.9 ± 0.03	0.8 ± 0.05	0.8 ± 0.04	0.9 ± 0.06	0.9 ± 0.1	−0.1 ± 0.1	PMN J0623−6436	V
06 26 34	−35 23		0.7 ± 0.06	0.5 ± 0.1	...	...	...	−0.9 ± 2	PMN J0627−3529	
06 29 28	−19 58	130	1.5 ± 0.04	1.4 ± 0.07	1.4 ± 0.1	1.2 ± 0.2	1.1 ± 0.3	−0.2 ± 0.2	PMN J0629−1959	v
06 32 21	−69 28		0.4 ± 0.03	0.5 ± 0.04	0.4 ± 0.04	0.7 ± 0.1	0.6 ± 0.2	0.5 ± 0.3	...	
06 33 51	−22 18	135	0.5 ± 0.06	0.6 ± 0.07	0.7 ± 0.1	0.8 ± 0.2	0.9 ± 0.2	0.5 ± 0.4	PMN J0633−2223	v
06 34 38	−23 37		0.6 ± 0.05	0.7 ± 0.08	0.6 ± 0.08	0.6 ± 0.2	...	0.1 ± 0.5	PMN J0634−2335	
06 35 51	−75 17	167	4.3 ± 0.04	3.9 ± 0.06	3.6 ± 0.07	2.6 ± 0.1	2.5 ± 0.4	−0.3 ± 0.06	PMN J0635−7516	V
06 36 31	−20 31	134	1.1 ± 0.04	1.1 ± 0.06	1.0 ± 0.08	0.7 ± 0.1	...	−0.3 ± 0.3	PMN J0636−2041	a
06 39 39	73 27	087	0.8 ± 0.05	0.4 ± 0.1	0.8 ± 0.1	0.8 ± 0.1	1.0 ± 0.2	0.1 ± 0.3	GB6 J0639+7324	
06 46 30	44 49	099	2.9 ± 0.06	2.4 ± 0.1	2.1 ± 0.1	1.6 ± 0.2	1.3 ± 0.3	−0.5 ± 0.2	GB6 J0646+4451	v
07 20 05	−62 22		0.6 ± 0.04	0.7 ± 0.06	0.8 ± 0.05	0.5 ± 0.09	0.7 ± 0.3	0.2 ± 0.3	PMN J0719−6218	
07 20 36	04 03		0.9 ± 0.05	0.7 ± 0.08	0.6 ± 0.1	...	...	−0.6 ± 0.5	GB6 J0720+0404	
07 21 54	71 22		1.6 ± 0.04	1.8 ± 0.07	1.9 ± 0.08	1.8 ± 0.2	1.5 ± 0.2	0.2 ± 0.1	GB6 J0721+7120	V
07 25 52	−00 50		0.9 ± 0.1	1.2 ± 0.1	1.1 ± 0.1	1.0 ± 0.3	1.1 ± 0.2	0.1 ± 0.4	PMN J0725−0054	
07 27 09	67 49		0.6 ± 0.05	0.5 ± 0.08	0.6 ± 0.1	0.8 ± 0.3	...	−0.0 ± 0.5	GB6 J0728+6748	
07 38 13	17 43	113	1.3 ± 0.06	1.3 ± 0.1	1.0 ± 0.1	1.3 ± 0.3	...	−0.2 ± 0.3	GB6 J0738+1742	v
07 39 15	01 36	124	1.7 ± 0.06	1.9 ± 0.1	2.1 ± 0.1	2.3 ± 0.2	2.8 ± 1	0.3 ± 0.2	GB6 J0739+0136	V
07 41 18	31 11	107	1.2 ± 0.06	1.1 ± 0.1	0.8 ± 0.1	1.0 ± 0.3	...	−0.3 ± 0.4	GB6 J0741+3112	
07 43 49	−67 27	161	1.2 ± 0.04	0.9 ± 0.07	0.7 ± 0.08	0.7 ± 0.2	1.0 ± 0.2	−0.5 ± 0.2	PMN J0743−6726	
07 45 24	10 16	118	1.1 ± 0.06	0.8 ± 0.1	0.7 ± 0.1	1.0 ± 0.4	...	−0.5 ± 0.5	GB6 J0745+1011	
07 46 04	−00 45		1.1 ± 0.07	1.0 ± 0.1	0.8 ± 0.1	0.7 ± 0.1	...	−0.5 ± 0.4	PMN J0745−0044	
07 50 52	12 30	117	2.7 ± 0.06	2.6 ± 0.1	2.6 ± 0.1	2.1 ± 0.2	1.8 ± 0.3	−0.2 ± 0.1	GB6 J0750+1231	v
07 53 32	53 54		1.0 ± 0.06	1.0 ± 0.08	0.9 ± 0.09	0.9 ± 0.2	...	−0.2 ± 0.3	GB6 J0753+5353	a
07 57 03	09 57	120	1.3 ± 0.08	1.3 ± 0.1	1.5 ± 0.1	1.4 ± 0.3	...	0.2 ± 0.3	GB6 J0757+0956	v
08 05 43	61 33		0.7 ± 0.05	0.5 ± 0.06	0.7 ± 0.08	1.0 ± 0.3	...	0.0 ± 0.4	...	

Table 1
(Continued)

R.A. [hms]	Decl. [dm]	ID	K [Jy]	Ka [Jy]	Q [Jy]	V [Jy]	W [Jy]	α	5 GHz ID	
08 08 22	−07 50	133	1.3 ± 0.05	1.3 ± 0.08	1.2 ± 0.1	1.3 ± 0.2	0.9 ± 0.2	−0.1 ± 0.2	PMN J0808−0751	v
08 13 26	48 17		1.0 ± 0.06	1.0 ± 0.09	0.7 ± 0.1	0.7 ± 0.2	...	−0.4 ± 0.4	GB6 J0813+4813	
08 16 19	−24 25	145	0.8 ± 0.05	1.0 ± 0.06	1.1 ± 0.08	0.8 ± 0.2	...	0.3 ± 0.3	PMN J0816−2421	v
08 23 26	22 25		1.1 ± 0.06	1.2 ± 0.09	1.2 ± 0.1	0.6 ± 0.2	...	0.0 ± 0.4	GB6 J0823+2223	†
08 24 54	39 14		1.2 ± 0.07	1.0 ± 0.1	1.1 ± 0.1	1.1 ± 0.2	1.4 ± 0.7	−0.1 ± 0.3	GB6 J0824+3916	a
08 25 50	03 11	125	1.6 ± 0.06	1.9 ± 0.09	1.9 ± 0.1	1.6 ± 0.2	...	0.1 ± 0.2	GB6 J0825+0309	v
08 31 00	24 11	112	1.3 ± 0.08	1.3 ± 0.1	1.5 ± 0.2	1.5 ± 0.2	1.3 ± 0.3	0.2 ± 0.3	GB6 J0830+2410	v
08 34 51	55 33		0.9 ± 0.06	0.7 ± 0.08	0.5 ± 0.1	1.1 ± 0.4	0.7 ± 0.3	−0.4 ± 0.5	GB6 J0834+5534	
08 36 47	−20 15	144	2.8 ± 0.05	2.4 ± 0.09	2.3 ± 0.09	1.8 ± 0.2	0.8 ± 0.3	−0.4 ± 0.1	PMN J0836−2017	v
08 38 11	58 22		1.1 ± 0.04	1.1 ± 0.07	0.9 ± 0.09	1.0 ± 0.2	...	−0.2 ± 0.3	GB6 J0837+5825	a
08 40 42	13 12	121	1.9 ± 0.07	2.0 ± 0.1	1.8 ± 0.1	1.0 ± 0.2	...	−0.1 ± 0.2	GB6 J0840+1312	v
08 41 28	70 53	089	1.7 ± 0.04	1.7 ± 0.07	1.8 ± 0.09	1.5 ± 0.2	0.5 ± 0.2	−0.1 ± 0.2	GB6 J0841+7053	v
08 47 45	−07 04		0.9 ± 0.06	1.0 ± 0.09	1.0 ± 0.1	1.2 ± 0.3	...	0.2 ± 0.4	PMN J0847−0703	
08 54 47	20 06	115	3.8 ± 0.07	4.4 ± 0.1	4.1 ± 0.1	4.2 ± 0.2	3.5 ± 0.5	0.1 ± 0.1	GB6 J0854+2006	V
09 02 17	−14 13		1.2 ± 0.06	1.3 ± 0.08	1.2 ± 0.09	1.3 ± 0.1	...	0.1 ± 0.2	PMN J0902−1415	
09 07 58	−20 20		1.1 ± 0.05	1.0 ± 0.09	0.7 ± 0.1	1.0 ± 0.1	...	−0.3 ± 0.3	PMN J0907−2026	
09 09 16	01 19	132	2.1 ± 0.06	2.0 ± 0.1	1.9 ± 0.2	2.0 ± 0.2	...	−0.1 ± 0.2	GB6 J0909+0121	v
09 09 48	42 53		1.0 ± 0.07	1.1 ± 0.1	1.2 ± 0.1	0.9 ± 0.2	...	0.2 ± 0.4	GB6 J0909+4253	
09 14 41	02 48		1.4 ± 0.06	1.6 ± 0.1	1.4 ± 0.1	0.8 ± 0.4	1.4 ± 0.3	0.0 ± 0.2	GB6 J0914+0245	
09 18 10	−12 03	143	2.0 ± 0.07	1.0 ± 0.1	0.9 ± 0.2	0.9 ± 0.3	...	−1.3 ± 0.5	PMN J0918−1205	
09 20 40	44 41		1.3 ± 0.07	1.4 ± 0.1	1.4 ± 0.1	1.4 ± 0.2	0.6 ± 0.3	0.0 ± 0.3	GB6 J0920+4441	v
09 21 05	62 15		0.9 ± 0.05	0.8 ± 0.07	0.9 ± 0.1	...	...	−0.1 ± 0.5	GB6 J0921+6215	
09 21 39	−26 19		1.5 ± 0.05	1.4 ± 0.08	1.3 ± 0.1	1.2 ± 0.2	0.8 ± 0.3	−0.2 ± 0.2	PMN J0921−2618	v
09 27 05	39 01	105	6.7 ± 0.07	5.8 ± 0.1	5.5 ± 0.1	4.4 ± 0.2	2.8 ± 0.3	−0.4 ± 0.07	GB6 J0927+3902	v
09 48 53	40 38	104	1.3 ± 0.06	1.5 ± 0.1	1.3 ± 0.1	0.9 ± 0.2	1.0 ± 0.3	−0.1 ± 0.3	GB6 J0948+4039	v
09 55 47	69 35	088	1.3 ± 0.05	1.2 ± 0.07	1.0 ± 0.07	0.9 ± 0.1	1.3 ± 0.4	−0.3 ± 0.2	GB6 J0955+6940	
09 57 24	55 27		0.9 ± 0.05	0.9 ± 0.1	1.0 ± 0.1	0.8 ± 0.2	...	−0.0 ± 0.4	GB6 J0957+5522	a
09 58 08	47 22	098	1.6 ± 0.06	1.4 ± 0.09	1.4 ± 0.09	0.9 ± 0.1	...	−0.4 ± 0.2	GB6 J0958+4725	
09 59 25	65 30		0.9 ± 0.05	0.9 ± 0.06	0.7 ± 0.08	0.8 ± 0.1	0.8 ± 0.2	−0.2 ± 0.3	GB6 J0958+6534	v
10 14 01	23 06	119	1.1 ± 0.06	0.9 ± 0.1	0.7 ± 0.07	0.7 ± 0.2	...	−0.6 ± 0.3	...	
10 15 20	−45 11		1.1 ± 0.04	0.8 ± 0.06	0.7 ± 0.08	...	...	−0.8 ± 0.4	PMN J1014−4508	
10 17 37	35 51		0.9 ± 0.05	0.9 ± 0.08	0.8 ± 0.1	0.6 ± 0.2	0.9 ± 0.3	−0.1 ± 0.3	GB6 J1018+3550	
10 18 53	−31 32		0.9 ± 0.05	0.9 ± 0.07	0.7 ± 0.09	0.6 ± 0.2	...	−0.3 ± 0.4	PMN J1018−3123	
10 21 33	40 03		0.9 ± 0.04	0.9 ± 0.07	0.9 ± 0.08	...	...	−0.1 ± 0.4	GB6 J1022+4004	
10 32 33	41 18	103	0.9 ± 0.05	0.8 ± 0.09	0.7 ± 0.1	0.8 ± 0.2	0.8 ± 0.3	−0.2 ± 0.3	GB6 J1033+4115	v
10 37 22	−29 34		1.6 ± 0.06	1.6 ± 0.09	1.4 ± 0.1	1.6 ± 0.3	1.7 ± 0.3	0.0 ± 0.2	PMN J1037−2934	V
10 38 38	05 10	142	1.4 ± 0.06	1.5 ± 0.1	1.1 ± 0.2	1.1 ± 0.2	0.9 ± 0.3	−0.3 ± 0.3	GB6 J1038+0512	v
10 41 27	06 11		1.2 ± 0.07	1.4 ± 0.1	1.2 ± 0.1	1.1 ± 0.2	...	0.0 ± 0.3	GB6 J1041+0610	
10 41 38	−47 38	163	1.1 ± 0.05	...	0.5 ± 0.06	...	...	−1.3 ± 0.5	PMN J1041−4740	
10 43 01	24 07		0.8 ± 0.08	0.8 ± 0.1	0.8 ± 0.1	...	...	−0.0 ± 0.7	GB6 J1043+2408	
10 47 44	71 43	083	1.4 ± 0.06	1.4 ± 0.1	1.2 ± 0.1	1.3 ± 0.3	...	−0.1 ± 0.3	GB6 J1048+7143	V
10 47 56	−19 09		1.3 ± 0.06	1.1 ± 0.09	1.1 ± 0.2	1.2 ± 0.3	...	−0.3 ± 0.4	PMN J1048−1909	
10 53 29	81 09		0.9 ± 0.05	0.9 ± 0.07	...	...	...	−0.1 ± 0.6	...	
10 58 27	01 34	149	4.6 ± 0.06	4.4 ± 0.09	4.5 ± 0.1	4.4 ± 0.2	3.1 ± 0.9	−0.1 ± 0.08	GB6 J1058+0133	V
10 59 22	−80 03	176	2.1 ± 0.05	2.3 ± 0.07	2.2 ± 0.08	2.3 ± 0.2	1.4 ± 0.3	0.0 ± 0.1	PMN J1058−8003	V
11 02 13	−44 03		0.7 ± 0.04	0.8 ± 0.05	0.8 ± 0.1	0.8 ± 0.1	...	0.2 ± 0.3	PMN J1102−4404	
11 07 11	−44 46	166	1.5 ± 0.04	1.5 ± 0.05	1.2 ± 0.07	1.4 ± 0.2	0.9 ± 0.2	−0.3 ± 0.2	PMN J1107−4449	v
11 18 06	−46 33		1.0 ± 0.04	0.8 ± 0.07	0.7 ± 0.07	0.7 ± 0.3	...	−0.5 ± 0.3	PMN J1118−4634	
11 18 33	−12 33		1.0 ± 0.06	0.9 ± 0.07	0.8 ± 0.09	0.9 ± 0.2	...	−0.3 ± 0.3	PMN J1118−1232	a
11 18 46	12 40		0.9 ± 0.06	0.9 ± 0.1	0.7 ± 0.1	0.8 ± 0.2	...	−0.3 ± 0.5	GB6 J1118+1234	a
11 27 06	−18 58	159	1.5 ± 0.06	1.5 ± 0.1	1.4 ± 0.1	1.1 ± 0.2	1.3 ± 0.3	−0.1 ± 0.2	PMN J1127−1857	
11 30 12	−14 51	157	1.8 ± 0.06	1.7 ± 0.1	1.9 ± 0.1	1.3 ± 0.2	...	−0.1 ± 0.2	PMN J1130−1449	v
11 30 45	38 14	101	1.2 ± 0.06	1.0 ± 0.09	1.1 ± 0.1	0.8 ± 0.2	0.9 ± 0.3	−0.3 ± 0.3	GB6 J1130+3815	a
11 36 57	−74 16		0.8 ± 0.04	0.7 ± 0.07	0.5 ± 0.09	0.5 ± 0.2	...	−0.5 ± 0.5	PMN J1136−7415	
11 46 20	−48 42		0.7 ± 0.04	0.7 ± 0.06	0.5 ± 0.08	0.8 ± 0.1	...	0.0 ± 0.3	PMN J1145−4836	a
11 46 43	40 01		0.9 ± 0.06	1.0 ± 0.07	1.1 ± 0.07	0.4 ± 0.1	...	0.1 ± 0.3	GB6 J1146+3958	a
11 47 07	−38 11	169	2.1 ± 0.05	2.3 ± 0.09	2.2 ± 0.09	1.9 ± 0.2	1.1 ± 0.2	−0.1 ± 0.1	PMN J1147−3812	V
11 50 12	−79 27		1.2 ± 0.04	0.7 ± 0.06	0.6 ± 0.08	0.6 ± 0.1	...	−1.1 ± 0.3	PMN J1150−7918	
11 50 53	−00 24		0.8 ± 0.08	0.7 ± 0.1	0.7 ± 0.2	...	...	−0.2 ± 0.8	PMN J1150−0024	
11 53 15	49 32	090	2.1 ± 0.04	2.2 ± 0.07	2.2 ± 0.08	2.0 ± 0.2	1.2 ± 0.3	−0.0 ± 0.1	GB6 J1153+4931	a,v
11 55 02	81 04	078	1.2 ± 0.06	1.0 ± 0.1	0.9 ± 0.09	1.0 ± 0.2	1.1 ± 0.3	−0.2 ± 0.3	1Jy 1150+81	v
11 57 44	16 38		0.8 ± 0.05	1.1 ± 0.09	0.8 ± 0.09	0.8 ± 0.2	0.7 ± 0.3	0.0 ± 0.3	GB6 J1157+1639	
11 59 35	29 15	111	2.0 ± 0.05	2.2 ± 0.09	2.2 ± 0.1	2.0 ± 0.2	2.0 ± 0.4	0.0 ± 0.1	GB6 J1159+2914	v
12 03 30	48 08		0.8 ± 0.04	0.7 ± 0.06	0.6 ± 0.08	0.7 ± 0.3	0.6 ± 0.2	−0.3 ± 0.3	GB6 J1203+4803	a
12 09 02	−24 03	172	1.3 ± 0.06	1.0 ± 0.09	0.9 ± 0.09	...	...	−0.6 ± 0.4	PMN J1209−2406	

Table 1
(Continued)

R.A. [hms]	Decl. [dm]	ID	K [Jy]	Ka [Jy]	Q [Jy]	V [Jy]	W [Jy]	α	5 GHz ID	
12 15 56	−17 29	173	1.4 ± 0.06	1.2 ± 0.1	1.1 ± 0.1	0.8 ± 0.2	...	−0.4 ± 0.3	PMN J1215−1731	
12 18 53	48 30		0.7 ± 0.03	0.7 ± 0.05	0.7 ± 0.08	0.7 ± 0.1	0.6 ± 0.2	0.0 ± 0.3	GB6 J1219+4830	
12 19 21	05 49	164	2.7 ± 0.06	2.2 ± 0.1	2.0 ± 0.1	1.4 ± 0.2	2.0 ± 0.6	−0.5 ± 0.2	GB6 J1219+0549A	a
12 22 06	04 14		0.7 ± 0.07	0.7 ± 0.1	1.0 ± 0.2	...	...	0.4 ± 0.7	GB6 J1222+0413	
12 23 53	−83 06	178	0.8 ± 0.06	0.9 ± 0.06	0.8 ± 0.06	0.7 ± 0.1	0.8 ± 0.3	−0.1 ± 0.3	PMN J1224−8312	
12 29 06	02 03	170	20.0 ± 0.06	18.4 ± 0.1	16.8 ± 0.1	14.6 ± 0.2	10.5 ± 0.4	−0.3 ± 0.02	GB6 J1229+0202	V
12 30 51	12 23	165	19.7 ± 0.06	15.5 ± 0.09	13.3 ± 0.1	9.7 ± 0.2	6.2 ± 0.4	−0.7 ± 0.02	GB6 J1230+1223	v
12 39 25	07 28		1.0 ± 0.06	1.0 ± 0.1	0.9 ± 0.09	1.0 ± 0.2	...	−0.2 ± 0.3	GB6 J1239+0730	
12 46 53	−25 47	177	1.3 ± 0.06	1.4 ± 0.1	1.6 ± 0.1	1.5 ± 0.2	1.4 ± 0.5	0.2 ± 0.2	PMN J1246−2547	v
12 48 50	−46 00		0.8 ± 0.08	0.8 ± 0.1	0.9 ± 0.09	0.9 ± 0.2	1.4 ± 0.3	0.3 ± 0.3	PMN J1248−4559	v
12 54 50	11 42		0.9 ± 0.06	0.9 ± 0.08	0.8 ± 0.09	...	...	−0.2 ± 0.4	GB6 J1254+1141	
12 56 12	−05 47	181	17.1 ± 0.06	17.9 ± 0.1	18.2 ± 0.1	17.0 ± 0.2	13.3 ± 0.4	0.0 ± 0.02	PMN J1256−0547	V
12 58 09	−31 58	180	1.3 ± 0.05	1.1 ± 0.07	1.1 ± 0.1	0.5 ± 0.2	1.6 ± 0.5	−0.2 ± 0.3	PMN J1257−3154	v
12 58 26	32 26		0.7 ± 0.05	0.6 ± 0.09	0.8 ± 0.1	0.5 ± 0.2	0.5 ± 0.2	−0.1 ± 0.5	GB6 J1257+3229	a
12 58 54	−22 23		1.0 ± 0.06	0.8 ± 0.1	0.8 ± 0.1	0.7 ± 0.2	...	−0.3 ± 0.4	PMN J1258−2219	
12 59 27	51 41		0.6 ± 0.06	0.6 ± 0.09	0.6 ± 0.1	0.9 ± 0.2	1.0 ± 0.3	0.4 ± 0.4	GB6 J1259+5141	a
13 02 22	57 48		0.8 ± 0.05	0.7 ± 0.06	0.5 ± 0.09	0.6 ± 0.2	0.6 ± 0.2	−0.4 ± 0.4	GB6 J1302+5748	a
13 05 54	−49 30		1.1 ± 0.05	1.0 ± 0.08	0.8 ± 0.09	1.1 ± 0.2	1.0 ± 0.3	−0.1 ± 0.3	PMN J1305−4928	
13 10 38	32 22	052	2.5 ± 0.05	2.5 ± 0.09	2.3 ± 0.1	1.6 ± 0.2	...	−0.2 ± 0.1	GB6 J1310+3220	V
13 16 06	−33 37	182	1.7 ± 0.06	1.7 ± 0.09	1.9 ± 0.1	1.9 ± 0.2	1.6 ± 0.4	0.1 ± 0.2	PMN J1316−3339	v
13 24 32	−10 47		0.8 ± 0.08	0.8 ± 0.1	0.9 ± 0.1	1.2 ± 0.2	2.1 ± 0.6	0.5 ± 0.4	PMN J1324−1049	
13 27 35	22 13		0.9 ± 0.06	0.8 ± 0.08	0.7 ± 0.1	0.4 ± 0.2	...	−0.4 ± 0.5	GB6 J1327+2210	a,v
13 29 01	32 00	040	0.8 ± 0.04	0.6 ± 0.08	0.4 ± 0.07	0.4 ± 0.2	...	−0.9 ± 0.5	...	
13 30 53	25 02		1.1 ± 0.05	1.0 ± 0.07	0.9 ± 0.09	0.8 ± 0.1	0.7 ± 0.2	−0.4 ± 0.3	GB6 J1330+2509	a
13 31 17	30 30	026	2.2 ± 0.05	1.8 ± 0.09	1.4 ± 0.1	1.2 ± 0.2	...	−0.7 ± 0.2	GB6 J1331+3030	
13 32 52	02 00		1.4 ± 0.05	1.4 ± 0.09	1.3 ± 0.1	1.2 ± 0.2	1.2 ± 0.3	−0.1 ± 0.2	GB6 J1332+0200	
13 33 29	27 23		0.8 ± 0.06	0.9 ± 0.08	0.8 ± 0.08	0.7 ± 0.1	...	−0.1 ± 0.4	GB6 J1333+2725	a
13 36 50	−33 58	185	1.9 ± 0.06	1.5 ± 0.07	1.2 ± 0.09	1.1 ± 0.2	...	−0.7 ± 0.2	PMN J1336−3358	
13 37 40	−12 57	188	5.8 ± 0.06	6.0 ± 0.1	6.1 ± 0.1	5.7 ± 0.2	3.9 ± 0.3	0.0 ± 0.06	PMN J1337−1257	V
13 44 00	66 01		0.7 ± 0.07	0.4 ± 0.1	0.5 ± 0.1	0.2 ± 0.1	0.9 ± 0.2	−0.2 ± 0.4	GB6 J1344+6606	a
13 47 48	12 18		1.0 ± 0.06	1.1 ± 0.09	0.9 ± 0.1	0.9 ± 0.2	...	−0.0 ± 0.4	GB6 J1347+1217	
13 54 51	−10 41	197	1.6 ± 0.06	1.2 ± 0.1	1.2 ± 0.2	1.4 ± 0.3	0.7 ± 0.3	−0.4 ± 0.3	PMN J1354−1041	v
13 55 56	76 47		0.7 ± 0.06	0.8 ± 0.1	0.4 ± 0.1	...	...	−0.3 ± 0.8	...	d
13 56 53	−15 25		0.8 ± 0.08	0.9 ± 0.2	0.7 ± 0.2	0.8 ± 0.3	0.9 ± 0.3	0.0 ± 0.5	PMN J1357−1527	v
13 56 56	19 19	004	1.4 ± 0.06	1.6 ± 0.09	1.4 ± 0.1	1.4 ± 0.2	...	0.1 ± 0.2	GB6 J1357+1919	v
14 08 53	−07 49	203	1.1 ± 0.07	1.0 ± 0.1	1.0 ± 0.1	0.6 ± 0.2	...	−0.3 ± 0.4	1Jy 1406−076	
14 11 25	52 17		0.9 ± 0.05	0.3 ± 0.1	...	...	...	−2.8 ± 2	GB6 J1411+5212	
14 15 46	13 22		0.9 ± 0.06	1.0 ± 0.09	0.8 ± 0.09	1.1 ± 0.5	0.8 ± 0.3	0.1 ± 0.4	GB6 J1415+1320	
14 19 32	54 25		0.8 ± 0.06	0.8 ± 0.09	0.8 ± 0.08	1.3 ± 0.2	...	0.2 ± 0.4	GB6 J1419+5423	a,v
14 19 38	38 22	042	1.1 ± 0.04	1.2 ± 0.06	1.1 ± 0.06	1.3 ± 0.1	...	0.2 ± 0.2	GB6 J1419+3822	V
14 20 07	27 04		0.9 ± 0.06	1.1 ± 0.08	1.0 ± 0.07	0.8 ± 0.1	1.0 ± 0.2	0.1 ± 0.3	GB6 J1419+2706	a
14 27 28	−33 02	193	1.0 ± 0.06	1.4 ± 0.09	1.7 ± 0.1	1.5 ± 0.2	...	0.6 ± 0.3	PMN J1427−3306	
14 27 53	−42 06	191	3.1 ± 0.05	2.9 ± 0.08	2.8 ± 0.1	2.7 ± 0.2	1.9 ± 0.3	−0.2 ± 0.1	PMN J1427−4206	v
14 37 02	63 37		0.5 ± 0.06	...	...	0.7 ± 0.2	...	0.3 ± 0.7	GB6 J1436+6336	a
14 42 57	51 55		0.8 ± 0.05	0.9 ± 0.07	0.8 ± 0.08	0.9 ± 0.2	1.0 ± 0.3	0.1 ± 0.3	GB6 J1443+5201	
14 46 55	−16 21		1.0 ± 0.06	1.0 ± 0.09	0.8 ± 0.09	0.9 ± 0.1	...	−0.3 ± 0.3	...	
14 57 20	−35 36		0.8 ± 0.1	0.9 ± 0.1	1.0 ± 0.1	0.9 ± 0.2	1.0 ± 0.4	0.2 ± 0.4	PMN J1457−3538	
14 58 32	71 40	071	1.3 ± 0.07	1.2 ± 0.1	0.9 ± 0.09	...	0.6 ± 0.2	−0.6 ± 0.3	GB6 J1459+7140	v
15 04 32	10 30	006	1.6 ± 0.05	1.5 ± 0.09	1.3 ± 0.09	0.8 ± 0.1	...	−0.4 ± 0.2	GB6 J1504+1029	V
15 06 55	−16 44		1.4 ± 0.08	1.3 ± 0.2	1.0 ± 0.2	0.8 ± 0.2	...	−0.5 ± 0.4	PMN J1507−1652	a
15 10 38	−05 46		1.1 ± 0.07	1.1 ± 0.1	1.1 ± 0.1	0.8 ± 0.2	...	−0.1 ± 0.4	PMN J1510−0543	
15 12 46	−09 04	207	1.8 ± 0.06	1.7 ± 0.1	1.9 ± 0.1	1.9 ± 0.2	1.6 ± 0.4	0.0 ± 0.2	1Jy 1510−08	v
15 13 49	−10 00		1.3 ± 0.06	1.0 ± 0.1	0.9 ± 0.2	1.3 ± 0.3	...	−0.3 ± 0.4	...	
15 16 38	00 14	002	1.6 ± 0.06	1.8 ± 0.09	1.7 ± 0.1	1.5 ± 0.2	0.7 ± 0.3	0.0 ± 0.2	GB6 J1516+0015	
15 17 44	−24 21	205	2.0 ± 0.06	2.1 ± 0.1	2.1 ± 0.1	2.0 ± 0.2	2.3 ± 0.5	0.0 ± 0.2	PMN J1517−2422	
15 40 58	14 47		1.0 ± 0.06	0.8 ± 0.09	0.8 ± 0.1	0.8 ± 0.2	...	−0.4 ± 0.4	GB6 J1540+1447	
15 49 21	50 36		0.9 ± 0.06	0.8 ± 0.09	1.0 ± 0.1	0.7 ± 0.2	0.6 ± 0.3	−0.1 ± 0.4	GB6 J1549+5038	
15 49 32	02 36	005	2.7 ± 0.06	2.9 ± 0.1	2.4 ± 0.1	2.1 ± 0.2	2.2 ± 0.6	−0.2 ± 0.1	GB6 J1549+0237	V
15 50 39	05 26	007	2.5 ± 0.06	2.1 ± 0.09	1.9 ± 0.1	2.0 ± 0.2	1.4 ± 0.3	−0.4 ± 0.2	GB6 J1550+0527	
16 02 00	33 29		0.9 ± 0.04	0.8 ± 0.06	0.8 ± 0.06	0.5 ± 0.1	0.8 ± 0.3	−0.2 ± 0.3	GB6 J1602+3326	
16 04 34	57 18		0.7 ± 0.04	0.7 ± 0.07	0.8 ± 0.06	0.5 ± 0.1	0.6 ± 0.2	−0.1 ± 0.3	GB6 J1604+5714	a
16 08 52	10 27	009	2.0 ± 0.06	2.0 ± 0.1	1.9 ± 0.1	1.5 ± 0.2	1.1 ± 0.4	−0.2 ± 0.2	GB6 J1608+1029	V

Table 1
(Continued)

R.A. [hms]	Decl. [dm]	ID	K [Jy]	Ka [Jy]	Q [Jy]	V [Jy]	W [Jy]	α	5 GHz ID	
16 13 42	34 12	023	4.1 ± 0.05	3.7 ± 0.08	3.4 ± 0.08	2.8 ± 0.2	1.8 ± 0.3	−0.3 ± 0.08	GB6 J1613+3412	V
16 18 01	−77 16	183	2.4 ± 0.05	2.1 ± 0.07	1.9 ± 0.08	1.5 ± 0.2	0.9 ± 0.2	−0.4 ± 0.1	PMN J1617−7717	
16 23 25	−68 17		0.7 ± 0.04	0.6 ± 0.06	0.6 ± 0.07	...	...	−0.3 ± 0.4	PMN J1624−6809	
16 26 17	41 27		0.9 ± 0.05	0.8 ± 0.08	0.7 ± 0.08	0.7 ± 0.2	...	−0.3 ± 0.3	GB6 J1625+4134	a
16 33 20	82 26	076	1.3 ± 0.04	1.5 ± 0.07	1.5 ± 0.08	1.2 ± 0.1	0.7 ± 0.3	−0.0 ± 0.2	...	e
16 35 16	38 07	033	3.9 ± 0.05	4.3 ± 0.08	4.2 ± 0.08	3.8 ± 0.1	3.1 ± 0.3	0.1 ± 0.07	GB6 J1635+3808	V
16 37 31	47 13		0.9 ± 0.05	1.0 ± 0.08	1.0 ± 0.1	0.9 ± 0.1	...	0.0 ± 0.3	GB6 J1637+4717	
16 37 52	−77 14		1.4 ± 0.05	0.9 ± 0.09	0.8 ± 0.09	0.7 ± 0.1	...	−0.8 ± 0.3	PMN J1636−7713	
16 38 16	57 22	056	1.3 ± 0.04	1.3 ± 0.07	1.4 ± 0.08	1.7 ± 0.2	1.0 ± 0.3	0.1 ± 0.2	GB6 J1638+5720	
16 42 34	68 54	069	1.4 ± 0.05	1.5 ± 0.08	1.5 ± 0.09	1.7 ± 0.2	1.2 ± 0.2	0.0 ± 0.2	GB6 J1642+6856	a,V
16 42 55	39 48	035	6.5 ± 0.05	6.0 ± 0.08	5.5 ± 0.08	4.9 ± 0.2	3.9 ± 0.3	−0.3 ± 0.05	GB6 J1642+3948	V
16 51 07	04 58	010	1.6 ± 0.07	1.1 ± 0.1	1.0 ± 0.2	0.7 ± 0.1	...	−0.9 ± 0.4	GB6 J1651+0459	
16 54 10	39 39	036	1.2 ± 0.05	1.2 ± 0.08	0.9 ± 0.07	0.5 ± 0.2	...	−0.5 ± 0.3	GB6 J1653+3945	a
16 57 01	57 06		0.5 ± 0.06	0.6 ± 0.09	0.6 ± 0.1	0.7 ± 0.1	0.8 ± 0.2	0.4 ± 0.4	GB6 J1657+5705	
16 57 26	47 54		1.1 ± 0.04	0.9 ± 0.06	0.7 ± 0.06	...	...	−0.6 ± 0.3	...	f
16 58 05	07 42	013	1.4 ± 0.05	1.5 ± 0.07	1.4 ± 0.1	1.6 ± 0.2	1.6 ± 0.7	0.1 ± 0.2	GB6 J1658+0741	V
16 58 51	05 13		0.8 ± 0.06	0.6 ± 0.09	0.5 ± 0.09	0.4 ± 0.2	...	−0.8 ± 0.5	GB6 J1658+0515	
16 59 52	68 27		0.2 ± 0.06	0.5 ± 0.08	0.6 ± 0.08	0.7 ± 0.09	0.6 ± 0.1	0.5 ± 0.5	GB6 J1700+6830	
17 03 37	−62 14	198	1.7 ± 0.04	1.7 ± 0.07	1.7 ± 0.07	1.4 ± 0.1	...	−0.1 ± 0.2	PMN J1703−6212	v
17 07 37	01 48		0.8 ± 0.06	0.9 ± 0.1	0.7 ± 0.08	0.8 ± 0.2	...	−0.0 ± 0.4	GB6 J1707+0148	
17 15 50	68 39		0.6 ± 0.04	0.6 ± 0.06	0.6 ± 0.07	...	0.7 ± 0.2	0.1 ± 0.4	GB6 J1716+6836	
17 24 00	−65 00	196	2.3 ± 0.05	2.0 ± 0.08	1.6 ± 0.09	1.1 ± 0.2	1.2 ± 0.3	−0.6 ± 0.2	PMN J1723−6500	
17 27 23	45 30	043	0.9 ± 0.04	1.0 ± 0.08	0.8 ± 0.07	1.2 ± 0.2	1.1 ± 0.3	0.1 ± 0.3	GB6 J1727+4530	V
17 34 16	38 57	038	1.2 ± 0.05	1.3 ± 0.08	1.2 ± 0.09	1.3 ± 0.2	...	0.1 ± 0.2	GB6 J1734+3857	
17 36 12	−79 34	186	1.0 ± 0.04	1.1 ± 0.07	1.2 ± 0.07	0.9 ± 0.1	...	0.1 ± 0.2	PMN J1733−7935	
17 38 26	50 15		0.8 ± 0.04	0.5 ± 0.08	0.6 ± 0.08	0.5 ± 0.1	...	−0.5 ± 0.4	...	
17 40 11	47 40		0.8 ± 0.05	0.8 ± 0.06	0.9 ± 0.08	0.8 ± 0.2	...	0.1 ± 0.3	GB6 J1739+4738	
17 40 34	52 12	048	1.2 ± 0.04	1.2 ± 0.07	1.3 ± 0.1	1.2 ± 0.2	0.8 ± 0.3	−0.0 ± 0.2	GB6 J1740+5211	
17 48 55	70 06	068	0.6 ± 0.03	0.7 ± 0.06	0.8 ± 0.06	1.0 ± 0.1	0.7 ± 0.1	0.4 ± 0.2	GB6 J1748+7005	
17 53 24	44 08		0.7 ± 0.06	0.6 ± 0.1	0.8 ± 0.09	...	1.1 ± 0.3	0.3 ± 0.4	GB6 J1753+4410	
17 53 33	28 48	022	2.1 ± 0.05	1.9 ± 0.07	2.1 ± 0.08	2.2 ± 0.2	1.6 ± 0.7	−0.0 ± 0.1	GB6 J1753+2847	v
17 58 58	66 32	064	0.6 ± 0.02	0.6 ± 0.03	0.6 ± 0.05	0.4 ± 0.1	...	−0.1 ± 0.2	GB6 J1758+6638	a
17 59 50	38 52		0.9 ± 0.05	0.8 ± 0.07	0.7 ± 0.1	...	...	−0.4 ± 0.5	GB6 J1800+3848	a
18 00 27	78 27	072	1.8 ± 0.05	1.7 ± 0.07	1.6 ± 0.08	1.5 ± 0.2	0.9 ± 0.2	−0.3 ± 0.2	1Jy 1803+78	v
18 01 32	44 04		1.2 ± 0.04	1.4 ± 0.07	1.6 ± 0.1	1.5 ± 0.2	1.1 ± 0.2	0.2 ± 0.2	GB6 J1801+4404	v
18 03 00	−65 07	199	1.2 ± 0.05	1.1 ± 0.08	1.3 ± 0.09	1.1 ± 0.2	0.9 ± 0.2	−0.0 ± 0.2	PMN J1803−6507	v
18 06 47	69 49	067	1.4 ± 0.03	1.4 ± 0.06	1.2 ± 0.07	1.4 ± 0.1	1.2 ± 0.3	−0.1 ± 0.1	GB6 J1806+6949	v
18 08 32	56 58		0.6 ± 0.05	0.7 ± 0.06	0.8 ± 0.06	0.7 ± 0.09	...	0.3 ± 0.3	GB6 J1808+5709	a
18 19 57	−55 21		0.9 ± 0.07	0.5 ± 0.2	0.6 ± 0.1	...	...	−0.8 ± 0.8	PMN J1819−5521	
18 20 03	−63 43	200	1.7 ± 0.05	1.5 ± 0.08	1.2 ± 0.09	1.2 ± 0.2	1.2 ± 0.2	−0.3 ± 0.2	PMN J1819−6345	
18 24 09	56 50	053	1.5 ± 0.04	1.3 ± 0.07	1.3 ± 0.09	1.4 ± 0.2	0.8 ± 0.2	−0.3 ± 0.2	GB6 J1824+5650	
18 25 37	67 37		...	...	0.3 ± 0.09	0.6 ± 0.1	0.6 ± 0.1	0.7 ± 0.8	...	
18 29 42	48 45	046	2.8 ± 0.04	2.8 ± 0.07	2.6 ± 0.08	2.0 ± 0.1	1.3 ± 0.2	−0.2 ± 0.1	GB6 J1829+4844	v
18 32 41	68 44		...	...	0.4 ± 0.07	0.7 ± 0.06	0.7 ± 0.1	0.8 ± 0.8	GB6 J1832+6848	
18 34 21	−58 54		1.1 ± 0.04	1.1 ± 0.07	1.2 ± 0.08	0.9 ± 0.2	...	0.1 ± 0.3	PMN J1834−5856	
18 35 03	32 45		0.8 ± 0.05	0.8 ± 0.07	0.7 ± 0.07	0.5 ± 0.2	0.7 ± 0.2	−0.2 ± 0.3	GB6 J1835+3241	
18 37 23	−71 06	192	1.9 ± 0.04	1.7 ± 0.06	1.5 ± 0.06	1.2 ± 0.1	...	−0.4 ± 0.1	PMN J1837−7108	
18 40 49	79 46	073	1.3 ± 0.04	0.9 ± 0.08	0.7 ± 0.1	...	...	−1.0 ± 0.4	1Jy 1845+79	
18 42 52	68 08	066	1.1 ± 0.03	1.2 ± 0.05	1.2 ± 0.05	1.0 ± 0.08	0.6 ± 0.2	−0.0 ± 0.1	GB6 J1842+6809	a
18 48 40	32 23		0.7 ± 0.05	0.8 ± 0.1	0.5 ± 0.1	...	...	−0.3 ± 0.8	GB6 J1848+3219	
18 49 38	67 05	065	1.2 ± 0.04	1.4 ± 0.06	1.4 ± 0.05	1.2 ± 0.1	1.4 ± 0.2	0.1 ± 0.1	GB6 J1849+6705	a,V
18 50 45	28 23	028	1.5 ± 0.04	1.1 ± 0.07	0.9 ± 0.05	0.6 ± 0.1	...	−0.9 ± 0.2	GB6 J1850+2825	
19 02 53	31 53	034	1.3 ± 0.04	1.1 ± 0.06	0.8 ± 0.07	0.4 ± 0.2	...	−0.8 ± 0.3	GB6 J1902+3159	
19 15 56	−80 00		0.7 ± 0.04	0.4 ± 0.07	0.5 ± 0.07	...	...	−0.9 ± 0.5	PMN J1918−7957	
19 23 30	−21 05	008	2.3 ± 0.06	2.5 ± 0.1	2.5 ± 0.1	2.6 ± 0.2	2.0 ± 0.4	0.1 ± 0.1	PMN J1923−2104	v
19 24 51	−29 14		12.3 ± 0.06	12.0 ± 0.1	11.4 ± 0.1	10.9 ± 0.2	7.6 ± 0.4	−0.1 ± 0.03	PMN J1924−2914	
19 27 36	61 19	059	1.0 ± 0.04	1.0 ± 0.07	1.0 ± 0.08	0.7 ± 0.1	0.6 ± 0.2	−0.2 ± 0.3	GB6 J1927+6117	
19 27 42	73 57	070	3.5 ± 0.04	3.2 ± 0.06	2.8 ± 0.07	2.7 ± 0.1	1.3 ± 0.3	−0.3 ± 0.07	GB6 J1927+7357	V
19 37 07	−39 57		1.0 ± 0.07	1.3 ± 0.1	1.3 ± 0.1	1.4 ± 0.2	...	0.3 ± 0.3	PMN J1937−3957	V
19 38 15	−63 44		0.9 ± 0.05	0.7 ± 0.07	0.6 ± 0.08	...	...	−0.6 ± 0.4	PMN J1939−6342	a
19 39 24	−15 25		1.0 ± 0.07	1.0 ± 0.09	1.0 ± 0.09	0.6 ± 0.2	...	−0.1 ± 0.4	PMN J1939−1525	
19 51 28	67 49		0.7 ± 0.04	0.9 ± 0.05	0.7 ± 0.05	0.7 ± 0.08	0.7 ± 0.2	0.1 ± 0.2	GB6 J1951+6743	
19 52 19	02 33		0.8 ± 0.07	0.6 ± 0.09	0.6 ± 0.08	0.9 ± 0.2	...	−0.3 ± 0.5	GB6 J1952+0230	
19 55 46	51 39	051	0.8 ± 0.05	0.9 ± 0.1	0.8 ± 0.09	...	...	0.1 ± 0.4	GB6 J1955+5131	
19 58 02	−38 45	003	3.4 ± 0.06	3.5 ± 0.09	3.1 ± 0.1	2.7 ± 0.2	1.9 ± 0.5	−0.1 ± 0.1	PMN J1957−3845	v
20 00 58	−17 49	011	2.0 ± 0.07	1.9 ± 0.09	1.8 ± 0.1	1.8 ± 0.2	2.0 ± 0.8	−0.1 ± 0.2	PMN J2000−1748	V

Table 1
(Continued)

R.A. [hms]	Decl. [dm]	ID	K [Jy]	Ka [Jy]	Q [Jy]	V [Jy]	W [Jy]	α	5 GHz ID	
20 05 43	77 55		0.8 ± 0.05	0.7 ± 0.1	0.8 ± 0.1	0.8 ± 0.2	0.9 ± 0.2	0.0 ± 0.3	1Jy 2007+77	v
20 08 21	66 12		0.7 ± 0.03	0.5 ± 0.05	0.5 ± 0.05	0.6 ± 0.2	...	−0.5 ± 0.3	GB6 J2007+6607	
20 10 03	72 31		0.7 ± 0.06	0.6 ± 0.08	1.0 ± 0.07	1.0 ± 0.2	0.7 ± 0.2	0.4 ± 0.3	GB6 J2009+7229	
20 11 19	−15 47	014	1.6 ± 0.05	1.5 ± 0.1	1.5 ± 0.2	1.2 ± 0.3	...	−0.2 ± 0.3	PMN J2011−1546	
20 22 30	61 36	063	1.6 ± 0.05	1.4 ± 0.07	1.2 ± 0.07	0.7 ± 0.1	...	−0.5 ± 0.2	GB6 J2022+6137	
20 23 38	54 26		0.7 ± 0.07	0.9 ± 0.07	0.8 ± 0.08	0.8 ± 0.1	...	0.1 ± 0.4	GB6 J2023+5427	
20 24 31	17 12	031	0.9 ± 0.04	1.0 ± 0.08	0.9 ± 0.09	0.8 ± 0.1	0.8 ± 0.3	−0.1 ± 0.3	GB6 J2024+1718	a
20 34 54	−68 45	194	0.7 ± 0.05	0.8 ± 0.08	0.8 ± 0.08	0.8 ± 0.09	...	0.2 ± 0.3	PMN J2035−6846	
20 35 20	10 55		0.6 ± 0.06	1.1 ± 0.1	0.7 ± 0.1	0.9 ± 0.2	1.0 ± 0.3	0.3 ± 0.3	GB6 J2035+1055	
20 56 11	−47 16	208	2.2 ± 0.05	2.5 ± 0.08	2.4 ± 0.1	2.2 ± 0.2	1.7 ± 0.4	0.1 ± 0.1	PMN J2056−4714	V
21 01 37	03 44		1.2 ± 0.05	1.1 ± 0.08	1.0 ± 0.2	1.0 ± 0.2	0.9 ± 0.3	−0.2 ± 0.3	GB6 J2101+0341	v
21 09 31	−41 13	001	1.5 ± 0.06	1.6 ± 0.1	1.2 ± 0.1	1.1 ± 0.2	1.0 ± 0.3	−0.3 ± 0.2	PMN J2109−4110	
21 09 39	35 37	049	0.9 ± 0.06	0.7 ± 0.08	0.6 ± 0.07	0.8 ± 0.2	...	−0.4 ± 0.4	GB6 J2109+3532	a,v
21 23 42	05 36	027	2.2 ± 0.06	1.8 ± 0.1	1.8 ± 0.1	1.3 ± 0.2	...	−0.4 ± 0.2	GB6 J2123+0535	v
21 24 10	25 07		0.8 ± 0.06	0.6 ± 0.09	0.4 ± 0.08	0.5 ± 0.2	...	−0.9 ± 0.6	GB6 J2123+2504	
21 31 32	−12 07	017	2.7 ± 0.06	2.4 ± 0.1	2.4 ± 0.1	1.7 ± 0.2	1.6 ± 0.5	−0.3 ± 0.1	PMN J2131−1207	v
21 34 08	−01 54	020	2.0 ± 0.06	1.9 ± 0.1	1.7 ± 0.1	1.6 ± 0.2	1.5 ± 0.4	−0.2 ± 0.2	PMN J2134−0153	
21 36 37	00 41	025	4.4 ± 0.06	3.5 ± 0.1	3.0 ± 0.1	1.4 ± 0.2	1.4 ± 0.3	−0.7 ± 0.1	GB6 J2136+0041	
21 39 18	14 25	041	2.2 ± 0.05	2.0 ± 0.08	1.9 ± 0.09	1.3 ± 0.2	1.0 ± 0.2	−0.3 ± 0.2	GB6 J2139+1423	v
21 43 26	17 41	044	1.2 ± 0.05	1.3 ± 0.07	1.0 ± 0.09	0.8 ± 0.2	...	−0.1 ± 0.3	GB6 J2143+1743	
21 48 05	06 57	037	8.0 ± 0.06	7.7 ± 0.09	7.5 ± 0.1	6.5 ± 0.2	5.3 ± 0.5	−0.2 ± 0.05	GB6 J2148+0657	v
21 48 46	−77 58	184	1.6 ± 0.04	1.4 ± 0.07	1.2 ± 0.07	0.7 ± 0.1	...	−0.5 ± 0.2	PMN J2146−7755	
21 51 47	−30 27		1.3 ± 0.06	1.4 ± 0.1	1.4 ± 0.1	1.6 ± 0.2	...	0.2 ± 0.2	PMN J2151−3028	v
21 57 05	−69 42	190	3.6 ± 0.05	2.9 ± 0.08	2.6 ± 0.08	2.1 ± 0.2	1.5 ± 0.4	−0.6 ± 0.1	PMN J2157−6941	
21 58 07	−15 01	018	2.1 ± 0.07	1.8 ± 0.09	1.8 ± 0.1	1.4 ± 0.3	0.6 ± 0.3	−0.4 ± 0.2	PMN J2158−1501	
22 02 50	42 17	058	3.4 ± 0.05	3.5 ± 0.07	3.6 ± 0.07	3.3 ± 0.2	...	0.0 ± 0.08	GB6 J2202+4216	V
22 03 19	31 46	054	2.7 ± 0.05	2.4 ± 0.08	2.1 ± 0.1	1.7 ± 0.2	1.6 ± 0.4	−0.4 ± 0.1	GB6 J2203+3145	V
22 03 25	17 23	045	1.5 ± 0.06	1.6 ± 0.09	1.6 ± 0.1	1.5 ± 0.2	...	0.1 ± 0.2	GB6 J2203+1725	
22 06 13	−18 38	016	1.8 ± 0.06	1.6 ± 0.09	1.2 ± 0.1	1.1 ± 0.2	...	−0.5 ± 0.2	PMN J2206−1835	
22 07 12	−53 48		1.0 ± 0.05	0.8 ± 0.07	0.7 ± 0.1	0.4 ± 0.1	...	−0.6 ± 0.4	PMN J2207−5346	
22 11 37	23 52	050	1.3 ± 0.06	1.5 ± 0.09	1.4 ± 0.08	1.0 ± 0.1	1.1 ± 0.3	−0.1 ± 0.2	GB6 J2212+2355	v
22 12 59	−25 24		0.9 ± 0.07	0.7 ± 0.1	0.6 ± 0.1	0.8 ± 0.1	...	−0.2 ± 0.4	PMN J2213−2529	a
22 18 52	−03 35	030	2.3 ± 0.06	2.0 ± 0.1	1.9 ± 0.1	1.6 ± 0.2	...	−0.4 ± 0.2	PMN J2218−0335	v
22 25 38	21 19		0.8 ± 0.06	1.0 ± 0.09	0.9 ± 0.09	0.6 ± 0.2	0.6 ± 0.2	0.1 ± 0.4	GB6 J2225+2118	
22 25 46	−04 55	029	5.2 ± 0.06	4.9 ± 0.1	4.3 ± 0.1	4.1 ± 0.2	3.6 ± 0.7	−0.2 ± 0.08	PMN J2225−0457	V
22 29 42	−08 33	024	1.9 ± 0.07	2.3 ± 0.1	2.2 ± 0.1	2.9 ± 0.2	2.1 ± 0.5	0.3 ± 0.2	PMN J2229−0832	V
22 29 47	−20 50		0.9 ± 0.06	0.8 ± 0.09	0.9 ± 0.1	1.0 ± 0.2	1.0 ± 0.3	0.1 ± 0.3	PMN J2229−2049	
22 32 37	11 44	047	3.4 ± 0.06	4.0 ± 0.1	4.1 ± 0.1	4.5 ± 0.2	4.0 ± 0.3	0.2 ± 0.08	GB6 J2232+1143	V
22 35 13	−48 34	206	2.0 ± 0.05	2.2 ± 0.08	2.1 ± 0.1	2.0 ± 0.2	1.6 ± 0.4	0.1 ± 0.1	PMN J2235−4835	V
22 36 23	28 24	057	1.1 ± 0.07	1.2 ± 0.08	1.2 ± 0.1	1.2 ± 0.1	...	0.1 ± 0.3	GB6 J2236+2828	
22 39 33	−57 01	201	1.2 ± 0.04	1.4 ± 0.05	1.1 ± 0.07	0.9 ± 0.1	1.5 ± 0.7	−0.0 ± 0.2	PMN J2239−5701	
22 46 13	−12 08	021	1.8 ± 0.06	1.8 ± 0.1	1.7 ± 0.2	1.2 ± 0.3	...	−0.2 ± 0.3	PMN J2246−1206	V
22 54 00	16 08	055	7.4 ± 0.06	7.5 ± 0.1	7.5 ± 0.1	7.6 ± 0.2	7.2 ± 0.4	0.0 ± 0.04	GB6 J2253+1608	V
22 55 44	42 01		1.0 ± 0.04	0.7 ± 0.06	0.6 ± 0.08	...	...	−0.8 ± 0.4	GB6 J2255+4202	
22 56 29	−20 14	019	0.8 ± 0.05	0.7 ± 0.08	0.8 ± 0.09	0.5 ± 0.2	...	−0.3 ± 0.4	PMN J2256−2011	
22 58 06	−27 57	012	5.2 ± 0.06	5.2 ± 0.09	5.0 ± 0.1	4.4 ± 0.2	3.6 ± 0.4	−0.1 ± 0.07	PMN J2258−2758	V
23 02 44	−68 08		0.6 ± 0.07	0.5 ± 0.08	0.5 ± 0.1	...	...	−0.6 ± 0.8	PMN J2303−6807	a
23 15 49	−50 18	204	1.1 ± 0.04	1.1 ± 0.06	0.9 ± 0.1	0.9 ± 0.1	...	−0.3 ± 0.3	PMN J2315−5018	v
23 22 33	44 48		0.8 ± 0.03	0.9 ± 0.05	0.8 ± 0.07	0.6 ± 0.1	0.5 ± 0.3	−0.1 ± 0.3	GB6 J2322+4445	a
23 22 48	51 05		0.9 ± 0.05	0.8 ± 0.09	0.7 ± 0.08	0.5 ± 0.1	...	−0.4 ± 0.3	GB6 J2322+5057	a
23 27 38	09 37		0.8 ± 0.07	1.2 ± 0.1	1.1 ± 0.1	0.7 ± 0.2	...	0.3 ± 0.4	GB6 J2327+0940	a
23 29 04	−47 33		1.3 ± 0.04	1.0 ± 0.08	1.2 ± 0.1	0.8 ± 0.1	0.9 ± 0.2	−0.3 ± 0.2	PMN J2329−4730	v
23 30 22	33 48		0.8 ± 0.06	0.8 ± 0.09	0.7 ± 0.09	0.8 ± 0.2	...	0.0 ± 0.4	GB6 J2330+3348	a
23 30 44	10 56		1.0 ± 0.05	1.0 ± 0.08	0.9 ± 0.08	1.0 ± 0.2	...	−0.1 ± 0.3	GB6 J2330+1100	
23 31 22	−15 58	032	1.1 ± 0.07	0.9 ± 0.1	0.8 ± 0.2	0.8 ± 0.2	0.8 ± 0.4	−0.4 ± 0.4	PMN J2331−1556	
23 33 45	−23 40		0.9 ± 0.06	0.9 ± 0.08	1.0 ± 0.09	1.1 ± 0.3	0.7 ± 0.3	0.1 ± 0.3	PMN J2333−2343	a
23 34 10	07 34		1.1 ± 0.07	1.0 ± 0.08	1.0 ± 0.09	1.3 ± 0.2	...	−0.0 ± 0.3	GB6 J2334+0736	
23 34 58	−01 29		0.6 ± 0.06	1.1 ± 0.1	1.0 ± 0.1	0.7 ± 0.2	...	0.7 ± 0.5	PMN J2335−0131	
23 35 27	−52 43	195	1.2 ± 0.04	0.8 ± 0.05	0.7 ± 0.09	0.6 ± 0.1	...	−1.0 ± 0.3	PMN J2336−5236	a,v
23 46 46	09 29		1.2 ± 0.06	1.1 ± 0.07	0.8 ± 0.1	0.6 ± 0.2	...	−0.4 ± 0.4	GB6 J2346+0930	a
23 48 14	−49 31		0.7 ± 0.06	0.7 ± 0.07	0.7 ± 0.07	...	...	0.1 ± 0.5	...	
23 48 16	−16 30	039	1.8 ± 0.06	1.8 ± 0.1	1.9 ± 0.1	1.5 ± 0.2	1.0 ± 0.3	−0.1 ± 0.2	PMN J2348−1631	
23 49 32	38 46		0.8 ± 0.06	0.7 ± 0.1	...	...	...	−0.3 ± 1	GB6 J2349+3849	a
23 54 22	45 50	074	1.6 ± 0.05	1.2 ± 0.07	1.2 ± 0.1	1.1 ± 0.2	0.9 ± 0.2	−0.4 ± 0.2	GB6 J2354+4553	
23 54 59	81 52		0.8 ± 0.04	0.8 ± 0.1	0.7 ± 0.09	1.3 ± 0.2	...	0.1 ± 0.3	...	
23 56 11	49 53	075	0.9 ± 0.03	0.8 ± 0.05	0.6 ± 0.07	0.4 ± 0.1	...	−0.4 ± 0.3	GB6 J2355+4950	

Table 1
(Continued)

R.A. [hms]	Decl. [dm]	ID	K [Jy]	Ka [Jy]	Q [Jy]	V [Jy]	W [Jy]	α	5 GHz ID
23 57 51	−53 14	189	1.3 ± 0.04	1.1 ± 0.08	1.1 ± 0.1	1.1 ± 0.1	0.8 ± 0.3	−0.2 ± 0.2	PMN J2357−5311
23 58 04	−10 14		1.1 ± 0.06	1.3 ± 0.07	1.2 ± 0.08	1.2 ± 0.2	0.9 ± 0.4	0.1 ± 0.3	PMN J2358−1020
23 58 53	−60 50	187	1.9 ± 0.05	1.4 ± 0.07	1.2 ± 0.06	1.1 ± 0.1	…	−0.7 ± 0.2	PMN J2358−6054

Notes.
[a] Indicates the source has multiple possible identifications.
[b] Source J0322−3711 (Fornax A) is extended, and the fluxes listed were obtained by aperture photometry.
[c] Source J0519−0539 is a blend of the Lynds Bright Nebulae LBN 207.65-23.11 and LBN 207.29-22.66.
[d] Source J1356 + 7647 is outside of the declination range of the GB6 and PMN catalogs. Identified as QSO NVSSJ135755+764320 by S. A. Trushkin (2006, private communication).
[e] Source J1633 + 8226 is outside of the declination range of the GB6 and PMN catalogs. It was identified as NGC 6251 by Trushkin (2003).
[f] Source J1657 + 4754 is identified as QSO GB6J1658 + 4737 by S. A. Trushkin (2006, private communication). Offset from the *WMAP* position is 18.1 arcmin.
[v] Probable variable: $\chi^2 > 37.6$.
[V] Variable: $\chi^2 > 100$.

4. FLUX VARIABILITY OVER FIVE YEARS

An analysis of the variability of the *WMAP* point sources has been performed by forming fluxes from the individual year maps. It is possible to measure the variability of a source without any noise contribution from the CMB by subtracting the five-year average map from each individual year. The fit of a Gaussian beam plus planar baseline to this difference map then gives a ΔF_i for the ith year, and the flux for the ith year is then given by $F_i = \langle F \rangle + \Delta F_i$ where the five-year average flux is $\langle F \rangle$.

There are 25 data points for a source detected in all five bands, and fitting an arbitrary spectrum that is constant in time leaves 20 degrees of freedom. 137 of the 390 sources in Table 1 give $\chi^2 > 37.6$ relative to this fit and thus are variable at greater than 99% confidence. Sources with $\chi^2 > 37.6$ are flagged with a "v" in the notes column of Table 1. The 54 sources with $\chi^2 > 100$ have a "V" in the notes column. These are generally the brighter sources which have smaller relative flux errors, allowing a better detection of variability. The five band lightcurves for the 15 sources with $\chi^2 > 450$ are plotted in Figure 4. The median rms variability of the Q-band fluxes among the 25 brightest Q-band sources is 23%, after allowing for the flux variations due to radiometer noise.

It is clear from Figure 4 that most of the variability involves the entire spectrum of a source moving up and down together, at least on the one-year time resolution of this analysis. The full table of year-by-year and band-by-band fluxes for *WMAP* sources will be available on LAMBDA.

5. POLARIZATION

In general the *WMAP* detected point sources are not strongly polarized. Of the 390 sources in Table 3, only five have polarizations greater than 4σ in two or more bands. These sources are listed in Table 3. In order to assess the average polarization of the sources, the square of the polarized flux, evaluated as $Q^2 + U^2 - \sigma_Q^2 - \sigma_U^2$, was fit to the form $p^2 I^2$. This gave mean polarization percentages of $p = 2.9, 2.2, 1.9, < 3.4$, and $< 8.5\%$ in K, Ka, Q, V, and W. For the V and W bands 2σ upper limits on the mean polarization percentage are given.

6. EFFECT ON THE POWER SPECTRUM

Uncorrelated point sources contribute a power spectrum $C_\ell = \text{const}$ to the power spectrum. Since one has to divide by the beam function b_ℓ^2 and multiply by $\ell(\ell+1)/2\pi$ to put this on the usual angular power spectrum plot, point sources give a large contribution to the power spectrum at high ℓ. This can be estimated and removed from the cosmological signal in several different ways. The first technique puts an adjustable constant term in the model C_ℓ, while a second technique fits the difference between frequency bands to a constant C_ℓ. The CMB gives the same angular power spectrum in different bands, but the contribution of radio point sources is strongly frequency dependent:

$$C_\ell^{\mathbf{i},\mathrm{src}} = A\, g_i g_{i'} \left(\frac{\nu_i}{\nu_{\mathrm{Q}}}\right)^\beta \left(\frac{\nu_{i'}}{\nu_{\mathrm{Q}}}\right)^\beta w_\ell^{\mathbf{i}}, \quad (1)$$

where $C_\ell^{\mathbf{i},\mathrm{src}}$ is the point-source contribution to the observed cross-power spectrum between bands i and i', the factors g_i convert the result to thermodynamic temperature, $\nu_{\mathrm{Q}} \equiv 40.7$ GHz, and we assume a power-law frequency spectrum with index $\beta = \langle\alpha\rangle - 2$. The window function $w_\ell^{\mathbf{i}} = b_\ell^i b_\ell^{i'} p_\ell^2$ as in Hinshaw et al. (2007). A third technique computes the effect of unresolved point sources using a model for the counts of sources too faint to be in the catalog. This gives

$$C_\ell = \left(\frac{\partial B_\nu}{\partial T}\right)^{-2} \int_0^{S_{\mathrm{lim}}} S^2 \left(\frac{dN}{dS}\right) dS \quad (2)$$

for uncorrelated sources, where $\partial B_\nu/\partial T$ converts temperature into intensity, or equivalently the integral of $T d\Omega$ in the definition of $a_{\ell m}$ into flux. Thus the point-source contribution to an observed cross-power spectrum can be written

$$C_\ell^{\mathbf{i},\mathrm{src}} = \left(\frac{c^4}{4k^2(\nu_i \nu_{i'})^2}\right) g_i g_{i'} w_\ell^{\mathbf{i}} \int S_i S_{i'} dN \quad (3)$$

where the integral is over all unmasked sources.

If the wrong spectral index is used to convert the difference between power spectra at different frequencies into a point-source contribution, then there will be a systematic error in the cosmological parameters, primarily in the spectral index n_s. This effect can be estimated using a simple model for the correction to the 61 GHz C_ℓ derived from the difference between the 41 and 94 GHz spectra:

$$\Delta C_\ell^{\mathrm{V}} = \nu_V^\beta \frac{C_\ell^{\mathrm{Q}} - C_\ell^{\mathrm{W}}}{\nu_{\mathrm{Q}}^\beta - \nu_{\mathrm{W}}^\beta} \approx C_\ell^{\mathrm{V}}(\beta = -2)(1 + 0.59(\beta + 2) + \ldots). \quad (4)$$

Table 2
WMAP Point Source Catalog—Five-Year V–W Bands

R.A. [hms]	Decl. [dms]	*WMAP* ID	Type	Dist. [arcmin]	f_V[a] [Jy]	T_{V-W} [mK]	5 GHz ID	Identified /Masked[b]	Note[c]
00 06 19	−06 27 31	*WMAP* J0006−0623	G	4.1	1.7 ± 0.3	0.35	PMN J0006−0623	Y/Y	‡
00 18 49	73 24 34	. . .	QSO	5.0	0.9 ± 0.3	0.23	GB6 J0019+7327	Y/Y	‡
01 08 43	01 39 53	*WMAP* J0108+0135	QSO	5.0	1.8 ± 0.3	0.36	PMN J0108+0134	Y/Y	‡
01 36 55	47 50 27	*WMAP* J0137+4753	QSO	1.2	3.1 ± 0.3	0.56	GB6 J0136+4751	Y/Y	‡
02 10 57	−51 01 28	*WMAP* J0210−5100	QSO	1.8	2.7 ± 0.3	0.42	PMN J0210−5101	Y/Y	‡, ⋄
02 37 50	28 47 49	*WMAP* 0237+2848	QSO	0.6	2.8 ± 0.3	0.51	GB6 J0237+2848	Y/Y	‡
03 19 48	41 30 13	*WMAP* J0319+4131	G	0.5	5.6 ± 0.3	1.01	GB6 J0319+4130	Y/Y	‡, Per A
03 21 52	−37 08 24	*WMAP* J0322−3711	G	10.6	2.1 ± 0.3	0.48	1Jy 0320−37	Y/Y	‡, For A
03 34 19	−40 12 10	*WMAP* J0334−4007	QSO	3.9	1.6 ± 0.3	0.24	PMN J0334−4008	Y/Y	‡, ⋄
03 58 57	36 40 06	. . .	. . .	. . .	5.0	0.79	. . .	N / Y	In NGC 1499
04 02 37	36 17 10	. . .	. . .	. . .	6.2	0.99	. . .	N / Y	In NGC 1499
04 03 54	−36 04 48	*WMAP* J0403−3604	QSO	0.2	3.7 ± 0.3	0.47	PMN J0403−3605	Y/Y	‡, ⋄
04 23 17	−01 20 00	*WMAP* J0423−0120	QSO	0.6	7.1 ± 0.4	1.03	PMN J0423−0120	Y/Y	‡
04 25 02	−37 56 42	*WMAP* J0424−3757	QSO	3.9	1.5 ± 0.3	0.26	PMN J0424−3756	Y/Y	‡, ⋄
04 33 21	05 22 36	*WMAP* J0433+0521	G	2.8	2.2 ± 0.3	0.39	GB6 J0433+0521	Y/Y	‡
04 40 28	−43 34 55	*WMAP* J0440−4332	QSO	2.6	1.9 ± 0.3	0.33	PMN J0440−4332	Y/Y	‡, ⋄
04 49 14	11 22 22	. . .	G	1.8	1.9 ± 0.3	0.34	GB6 J0449+1121	Y/Y	∗, †, ‡
04 52 54	−69 18 56	. . .	H II	5.9	1.6 ± 0.3	0.20	PMN J0452−6922	Y / N	†, ‡, in LMC
04 55 43	−46 17 00	*WMAP* 0455−4617	QSO	1.7	3.4 ± 0.3	0.60	PMN J0455−4616	Y/Y	‡, ⋄
04 57 03	−66 25 20	. . .	H II	1.5	3.2 ± 0.3	0.38	PMN J0456−6624	Y/Y	†, in LMC
04 57 08	−23 24 28	*WMAP* J0456−2322	QSO	1.2	1.7 ± 0.3	0.27	PMN J0457−2324	Y/Y	‡, ⋄
05 17 52	−69 19 02	. . .	H II	6.8	1.0 ± 0.3	0.19	PMN J0518−6914	Y / N	†, ‡, in LMC
05 19 47	−45 48 21	*WMAP* J0519−4546	G	1.7	3.5 ± 0.3	0.63	1Jy 0518−45	Y/Y	‡, ⋄, Pic A
05 22 19	−68 00 24	. . .	H II	3.5	1.7 ± 0.3	0.18	PMN J0522−6757	Y / N	†, ‡, in LMC
05 23 09	−36 26 48	*WMAP* J0523−3627	G	2.3	3.4 ± 0.3	0.44	PMN J0522−3628	Y/Y	⋄
05 34 57	−67 33 47	. . .	H II	3.0	1.8 ± 0.3	0.21	PMN J0535−6734	Y / N	†, ‡, in LMC
05 35 17	−05 23 26	. . .	H II	0.1	290.9 ± 6.7	35.81	. . .	Y/Y	Ori A
05 38 28	−69 07 20	. . .	H II	3.1	26.3 ± 0.8	3.83	PMN J0538−6905	Y/Y	†, ‡, in LMC
05 38 42	−44 05 49	*WMAP* J0538−4405	QSO	1.6	5.6 ± 0.3	0.74	PMN J0538−4405	Y/Y	‡, ⋄
05 38 53	−03 01 16	. . .	. . .	. . .	1.9	0.31	. . .	N / N	in Ori
05 40 10	−03 08 51	. . .	. . .	. . .	2.0	0.32	. . .	N / N	in Ori
05 40 30	−02 39 03	. . .	. . .	. . .	2.6	0.41	. . .	N / N	in Ori
05 41 43	−01 53 49	. . .	H II	0.2	45.8 ± 1.2	5.78	PMN J0541−0154	Y/Y	‡, Ori B
06 07 58	−06 26 25	. . .	H II	4.5	7.0 ± 0.4	0.37	PMN J0607−0623	Y/Y	†, ∗, ‡
06 09 38	−15 41 35	*WMAP* J0609−1541	QSO	1.3	2.2 ± 0.3	0.37	PMN J0609−1542	Y/Y	‡, ⋄
06 35 36	−75 15 15	*WMAP* J0635−7517	QSO	1.2	2.5 ± 0.3	0.42	PMN J0635−7516	Y/Y	‡, ⋄
07 21 54	−37 30 36	. . .	. . .	. . .	1.6	0.25	. . .	N / N	in Gum
07 22 40	71 20 53	*WMAP* J0721+7122	QSO	3.7	1.9 ± 0.3	0.25	GB6 J0721+7120	Y/Y	‡
07 31 22	−48 09 24	. . .	. . .	. . .	1.7	0.26	. . .	N / N	in Gum
07 34 58	−48 49 11	. . .	. . .	. . .	2.1	0.33	. . .	N / N	in Gum
07 36 27	−49 50 52	. . .	. . .	. . .	1.5	0.24	. . .	N / N	in Gum
07 44 33	−50 33 49	. . .	. . .	. . .	1.6	0.25	. . .	N / N	in Gum
07 49 03	−50 39 05	. . .	. . .	. . .	1.6	0.26	. . .	N / N	in Gum
08 02 32	−50 41 25	. . .	. . .	. . .	1.6	0.26	. . .	N / N	in Gum
08 14 06	−52 52 02	. . .	. . .	. . .	1.6	0.25	. . .	N / N	in Gum
08 36 38	−20 15 52	*WMAP* J0836−2015	QSO	1.2	1.9 ± 0.3	0.39	PMN J0836−2017	Y/Y	‡, ⋄
08 41 21	70 55 29	*WMAP* J0841+7053	QSO	1.8	1.7 ± 0.3	0.31	GB6 J0841+7053	Y/Y	‡
08 54 58	20 06 06	*WMAP* J0854+2006	QSO	2.2	4.2 ± 0.3	0.61	GB6 J0854+2006	Y/Y	‡
09 09 12	01 23 37	*WMAP* J0909+0119	QSO	2.1	1.6 ± 0.3	0.44	GB6 J0909+0121	Y/Y	‡
09 21 28	07 24 22	. . .	. . .	. . .	2.3	0.36	. . .	N / N	. . .
09 27 05	39 03 46	*WMAP* J0927+3901	QSO	1.5	4.6 ± 0.3	0.72	GB6 J0927+3902	Y/Y	‡
10 58 31	01 33 44	*WMAP* J1058+0134	QSO	0.4	4.2 ± 0.3	0.80	GB6 J1058+0133	Y/Y	‡
10 59 09	−80 04 12	*WMAP* J1059−8003	QSO	1.1	2.3 ± 0.3	0.30	PMN J1058−8003	Y/Y	‡, ⋄
11 53 04	49 29 55	*WMAP* J1153+4932	G	3.5	2.1 ± 0.3	0.30	GB6 J1153+4931	Y/Y	. . .
11 59 41	29 19 49	*WMAP* J1159+2915	QSO	5.5	1.8 ± 0.3	0.33	GB6 J1159+2914	Y/Y	‡
12 29 08	02 03 06	*WMAP* J1229+0203	QSO	0.3	14.6 ± 0.5	2.32	PMN J1229+0203	Y/Y	‡
12 30 49	12 22 56	*WMAP* J1230+1223	G	0.5	9.6 ± 0.4	1.49	GB6 J1230+1223	Y/Y	Vir A
12 47 02	−25 46 32	*WMAP* J1246−2547	QSO	3.7	1.7 ± 0.3	0.33	PMN J1246−2547	Y/Y	‡, ⋄
12 56 12	−05 47 28	*WMAP* J1256−0547	QSO	0.2	16.9 ± 0.6	2.45	PMN J1256−0547	Y/Y	‡
13 10 47	32 24 25	*WMAP* J1310+3222	QSO	5.3	1.7 ± 0.3	0.28	GB6 J1310+3220	Y/Y	‡
13 15 59	−33 45 18	*WMAP* J1316−3337	QSO	6.6	1.9 ± 0.3	0.33	PMN J1316−3339	Y/Y	‡, ⋄
13 22 35	−44 38 25	. . .	. . .	. . .	2.2	0.34	. . .	N / Y	In Cen A vicinity
13 25 33	−42 59 25	. . .	G	2.0	25.6 ± 0.8	4.02	PMN J1325−4257[d]	Y/Y	†, ∗, ⋄, Cen A
13 37 41	−12 56 37	*WMAP* J1337−1257	QSO	0.8	6.0 ± 0.3	0.86	PMN J1337−1257	Y/Y	‡
14 27 53	−42 06 36	*WMAP* J1427−4206	QSO	0.7	2.7 ± 0.3	0.39	PMN J1427−4206	Y/Y	‡, ⋄

Table 2
(Continued)

R.A. [hms]	Decl. [dms]	*WMAP* ID	Type	Dist. [arcmin]	f_V[a] [Jy]	T_{V-W} [mK]	5 GHz ID	Identified /Masked[b]	Note[c]
15 18 04	−24 21 26	*WMAP* J1517−2421	G	5.1	1.8 ± 0.3	0.34	PMN J1517−2422	Y/Y	‡, ⋄
15 49 33	02 33 46	*WMAP* J1549+0236	QSO	3.4	2.1 ± 0.3	0.36	GB6 J1549+0237	Y/Y	‡
16 13 42	34 12 03	*WMAP* J1613+3412	QSO	0.8	2.9 ± 0.3	0.51	GB6 J1613+3412	Y/Y	‡
16 18 32	−77 12 31	*WMAP* J1618−7716	QSO	5.3	1.7 ± 0.3	0.25	PMN J1617−7717	Y/Y	‡, ⋄
16 20 18	−25 34 47	. . .	. . .	. . .	2.7	0.43	. . .	N / N	in Oph
16 20 51	−25 21 11	. . .	. . .	. . .	3.0	0.47	. . .	N / N	in Oph
16 28 38	−09 03 59	. . .	. . .	. . .	2.1	0.34	. . .	N / N	in Oph
16 35 05	38 08 11	*WMAP* J1635+3807	QSO	2.1	4.1 ± 0.3	0.56	GB6 J1635+3808	Y/Y	‡
16 38 26	57 18 39	*WMAP* J1638+5722	QSO	2.4	1.6 ± 0.3	0.26	GB6 J1638+5720	Y/Y	‡
16 42 26	68 55 54	*WMAP* J1642+6854	QSO	1.8	1.3 ± 0.3	0.31	GB6 J1642+6856	Y/Y	‡
16 42 56	39 48 44	*WMAP* J1642+3948	QSO	0.6	5.1 ± 0.3	0.78	GB6 J1642+3948	Y/Y	‡
17 20 32	−00 59 59	. . .	G	1.5	2.6 ± 0.3	0.43	PMN J1720−0058	Y/Y	†, ∗
17 33 01	−13 06 25	. . .	QSO	1.6	3.3 ± 0.3	0.51	PMN J1733−1304	Y/Y	∗, ‡
17 43 56	−03 48 42	. . .	QSO	1.6	4.5 ± 0.3	0.76	PMN J1743−0350	Y/Y	∗, ‡
17 51 38	09 40 23	. . .	QSO	1.9	3.6 ± 0.3	0.57	GB6 J1751+0938	Y/Y	†, ∗, ‡
17 53 44	28 47 37	*WMAP* J1753+2848	QSO	0.6	2.0 ± 0.3	0.27	GB6 J1753+2847	Y/Y	‡
18 06 49	69 50 36	*WMAP* J1806+6949	G	1.1	1.3 ± 0.3	0.23	GB6 J1806+6949	Y/Y	‡
18 29 37	48 46 45	*WMAP* J1829+4845	QSO	2.2	2.3 ± 0.3	0.28	GB6 J1829+4844	Y/Y	. . .
19 24 52	−29 14 15	. . .	QSO	0.3	10.1 ± 0.4	1.60	PMN J1924−2914	Y/Y	†, ∗, ‡, ⋄
19 27 42	73 56 34	*WMAP* J1927+7357	QSO	1.5	3.0 ± 0.3	0.45	GB6 J1927+7357	Y/Y	‡
19 57 55	−38 45 03	*WMAP* J1958−3845	QSO	0.9	2.9 ± 0.3	0.35	PMN J1957−3845	Y/Y	‡, ⋄
20 11 12	−15 47 51	*WMAP* J2011−1547	QSO	1.5	1.1 ± 0.3	0.32	PMN J2011−1546	Y/Y	‡, ⋄
20 56 01	−47 15 56	*WMAP* J2056−4716	QSO	2.8	2.6 ± 0.3	0.39	PMN J2056−4714	Y/Y	‡, ⋄
21 34 15	−01 59 35	*WMAP* J2134−0154	QSO	6.4	1.3 ± 0.3	0.38	PMN J2134−0153	Y/Y	‡
21 48 07	06 56 29	*WMAP* J2148+0657	QSO	1.2	6.5 ± 0.3	1.02	GB6 J2148+0657	Y/Y	‡
21 57 19	−69 41 42	*WMAP* J2157−6942	G	1.2	2.1 ± 0.3	0.41	PMN J2157−6941	Y/Y	⋄
22 02 47	42 17 37	*WMAP* J2202+4217	QSO	1.2	3.6 ± 0.3	0.39	GB6 J2202+4216	Y/Y	. . .
22 18 55	−03 30 48	*WMAP* J2218−0335	QSO	4.9	1.5 ± 0.3	0.35	PMN J2218−0335	Y/Y	‡
22 25 42	−04 57 56	*WMAP* J2225−0455	QSO	1.6	3.6 ± 0.3	0.68	PMN J2225−0457	Y/Y	‡
22 29 46	−08 31 23	*WMAP* J2229−0833	QSO	2.1	2.8 ± 0.3	0.41	PMN J2229−0832	Y/Y	‡
22 32 35	11 42 50	*WMAP* J2232+1144	QSO	1.1	4.2 ± 0.3	0.53	GB6 J2232+1143	Y/Y	. . .
22 35 21	−48 35 13	*WMAP* J2235−4834	QSO	1.5	2.1 ± 0.3	0.36	PMN J2235−4835	Y/Y	‡, ⋄
22 53 57	16 10 11	*WMAP* J2254+1608	QSO	1.3	8.0 ± 0.4	1.06	GB6 J2253+1608	Y/Y	‡
22 58 10	−27 59 31	*WMAP* J2258−2757	QSO	1.5	4.7 ± 0.3	0.75	PMN J2258−2758	Y/Y	‡, ⋄

Notes.
[a] The V-band fluxes of the identified sources are calculated as in Chen & Wright (2008); The fluxes of the unidentified sources are estimated by multiplying the V–W temperature in the filtered map with the median conversion factor from V–W temperatures to V-band fluxes of the identified sources and are given without an uncertainty.
[b] Three-year *WMAP* point source mask is considered here.
[c] † and ∗ indicate the new sources cross-detected in Nie & Zhang (2007) and López-Caniego et al. (2007). ‡ and ⋄ indicate the source is included in the CRATES catalog (Healey et al. 2007) and the AT20G BSS catalog (Massardi et al. 2007), respectively.
[d] Indicates the source has multiple possible 5 GHz identifications. The brightest one is given here.

Table 3
Significant Polarization Percentages

WMAP ID	K	Ka	Q
J0322−3711	8.5 ± 0.4	9.3 ± 1.2	8.1 ± 2.2
J0519−4546	5.7 ± 0.9	8.6 ± 2.0	. . .
J1229+0203	4.9 ± 0.3	4.4 ± 0.6	4.8 ± 0.8
J1230+1223	3.8 ± 04	4.8 ± 0.7	4.4 ± 1.0
J1256−0547	3.6 ± 0.4	3.1 ± 0.7	3.8 ± 0.8

Thus if β were really -2.09 instead of -2 then the correction to the 61 GHz power spectrum should be 5% smaller than that which would be estimated assuming $\beta = -2$. Huffenberger et al. (2006) found that decreasing the point-source correction by 44% changed the spectral index n_s by 0.018 so changing β from -2.0 to -2.09 would change n_s by 0.0022, or 0.15σ.

7. SUMMARY AND CONCLUSIONS

There are no other radio surveys that provide the wide coverage of *WMAP* at frequencies from 23–100 GHz. In addition, *WMAP* provides year-by-year fluxes to track the variability of bright millimeter-wave sources. We present catalogs of point sources found in the *WMAP* five-year dataset. Two different approaches have been used: the standard approach of looking for peaks in single band maps that have been convolved with a matched filter, and a new approach that constructs CMB-free internal linear combination maps. Using the 61 and 94 GHz data gives a catalog with somewhat lower sensitivity than the standard approach, but with better positional accuracy. The estimated contamination of the CMB angular power spectrum by unmasked point sources has been estimated, with results that are consistent with previous analyses and with the differences between angular power spectra in different bands (Nolta et al. 2009). Remaining uncertainties in the point-source correction

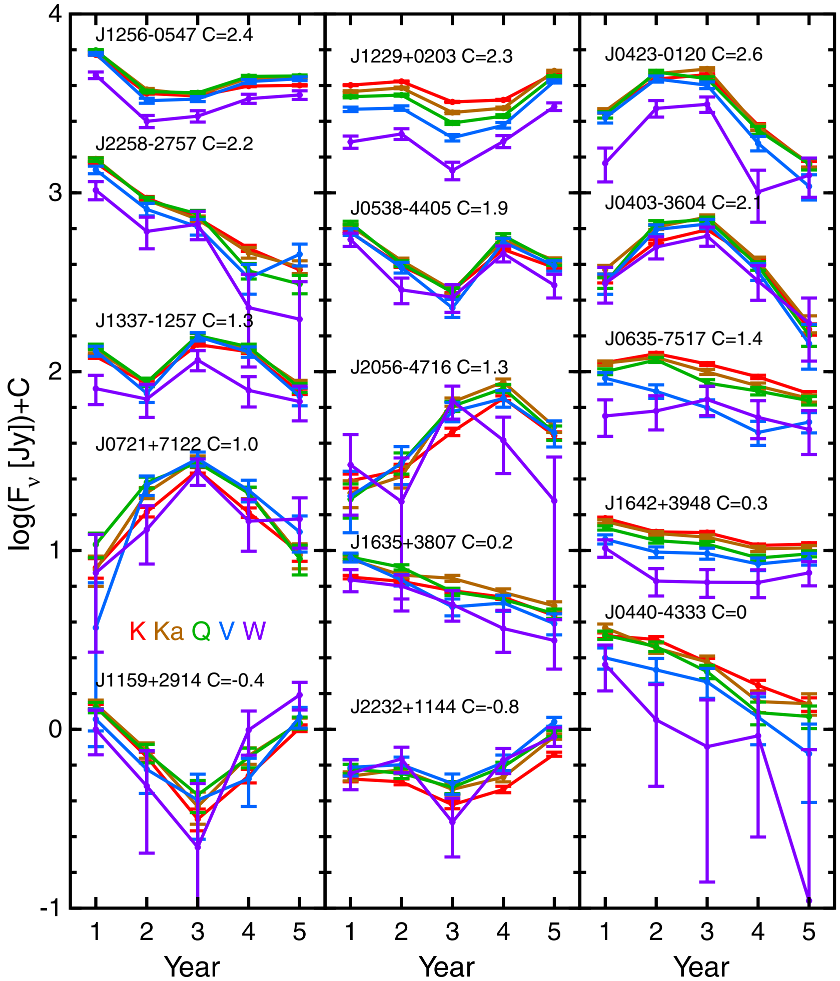

Figure 4. 15 sources with the highest χ^2 for a fit of a constant flux with an arbitrary spectrum. The 23 GHz data are plotted in red, the 33 GHz data are plotted in orange, the 41 GHz data are plotted in green, the 61 GHZ data are plotted in blue, and the 94 GHz data are plotted in purple.

contribute to the uncertainty of the cosmological parameters, with the biggest effect occurring for n_s.

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