THE MIYUN 232 MHZ GENERAL CATALOGUE:

A reliability and positional uncertainties study

B. PENG, W. YUAN, R. NAN AND Y. YAN
Beijing Astronomical Observatory, China

1. Reliability Study

A meter-wave sky survey of the region north of declination +30°, excluding only four fields straddling the Galactic plane (each 8° × 8° in angular size), has been conducted with the Miyun Synthesis Radio Telescope operating at 232 MHz. The reduced Miyun General Catalogue contains 34,426 radio sources in total. To distinguish which sources were not observed by other sky surveys, we first identify sources in the MGC with those in the 6C (151 MHz) catalogue, using a matching radius of 100 arcseconds. The remaining MGC objects were then matched with the B2/B3 (408 MHz), 4C (178 MHz), Texas (365 MHz, 1400 MHz) and 87GB (4.85 GHz) catalogues. 6850 MGC sources were found to lack any radio counterpart in these reference catalogues. It means 19.9% of sources listed in the MGC are probably new.

The "new" sources found were divided according to their flux densities into 5 classes, for each class, we denote the number of members by N_m and the subset of members not observed by others(here taking only the 6C and B2/B3 surveys) due to sky coverage limitation, N_{scl}. To be an indicator for source reliability, $R_{reli} = 1 - \frac{N_m - N_{scl}}{N_m}$ has been calculated for each class and listed in Table 1. The higher the R_{reli}, the higher the reliability.

2. Estimation of Positional Uncertainty

We assume that the positional errors of a point source are approximately proportional to its signal to noise ratio taking into account the declination dependence. This implies one measurement for N sources with the same flux density of S can be equivalent to N measurements for a source with this flux density. The apparent positional errors $\sigma_{app}(S)$ can be calculated by $\sigma_{app}(S) = \sqrt{\sum_{i=1}^{N} \frac{\triangle x_i^2(S)}{N-1}}$, where $\triangle x_i$ refers to a positional difference of

B.J. McLean et al. (eds.), New Horizons from Multi-Wavelength Sky Surveys, 91–92.

https://doi.org/10.1017/S0074180900128256 Published online by Cambridge University Press

TABLE 1. Reliability investigation results

Source class	Flux range	Source members		R_{reli}
	Jy	N_m	N_{scl}	%
CL1	$S \geq 1.5$	108	104	96
CL2	$1.5 > S \geq 1.0$	310	296	95
CL3	$1.0 > S \geq 0.5$	1631	1426	87
CL4	$0.5 > S \geq 0.3$	1923	1339	70
CL5	S <0.3	2878	1815	63

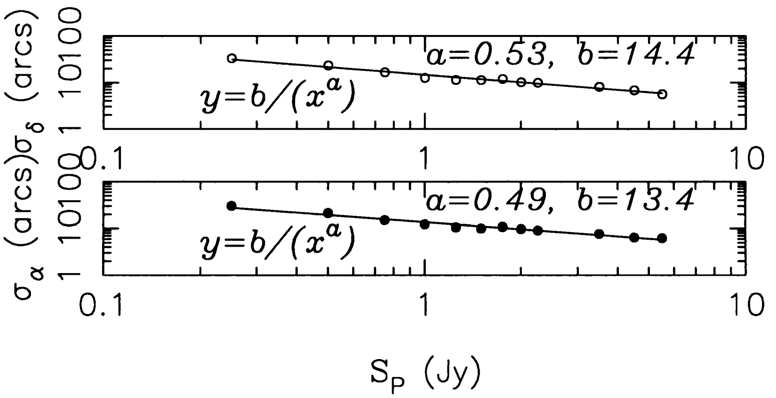

Figure 1. Resultant position errors of the MGC fitted by a least-squares method

a source between its measured position x_i and real(reference) position x_r. The positional uncertainty from a reference catalogue(the 6C, Baldwin *et al.* 1985; Hales *et al.* 1991) should be considered in calculating the true uncertainty.

Assuming that the sources have roughly the same flux densities when their relative flux errors are less than 10%, the positional errors in the MGC as a function of flux densities are plotted in logarithmic cooridinates as cycles, fitted by a least-squares straight line ($y = \frac{b}{S^a}$) in Figure 1. The results for α and δ in *arcsec* are $\sigma_\alpha = 13.4/S_P{}^{0.49}$, $\sigma_\delta = 14.4/S_P^{0.53} csc\delta$. The coefficients are all -0.98 for the best fits to the uncertainties.

References

Baldwin J.E., *et al.* 1985 Mon. Not. R. astron. Soc., 217, 717.
Hales, S.E.G., *et al.* 1991 Mon. Not. R. astron. Soc., 251, 46.