IAU Colloquium 164: Radio Emission from Galactic and Extragalactic Compact Sources
ASP Conference Series, Vol. 144, 1998
J. A. Zensus, G. B. Taylor, & J. M. Wrobel (eds.)

Variable Radio Sources in the GB6 Catalog

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Abstract. We report the results of a study of the long term and short term radio variability at 4.85 GHz of sources in the GB6 catalog.

1. Summary

Before it's sudden collapse in 1988, the Green Bank 91m telescope was used for two surveys of the Northern Hemisphere ($0^o < \delta < 75^o$) in 1986 and 1987 at 4.85 GHz. The 87GB Catalog of Radio Sources (Gregory & Condon 1991) was produced from the 1987 survey. In 1994 we published the 1986 survey images and combined (1986+1987) images (Condon et al. 1994). The new more sensitive GB6 catalog of 75,162 sources was produced from the combined images.

The 1986 and 1987 surveys were used in a study of radio source variability. Long term (1 yr.) variability was derived from a comparison of the source flux densities measured in the two epochs. Short term variability ($\geq$ 1 day) was derived from repeated observations within each 1 month long observing epoch.

A total of 1432 sources were found to exhibit long term variability ($\geq 23\%$) at a level of $\geq 4\sigma$. The distribution of the variables in galactic coordinates is shown in Figure 1. The survey borders are shown by the solid lines. In general the distribution appears isotropic in galactic coordinates which implies that the majority of the variables are extragalactic. There appears to be a small excess of variables in the galactic plane towards the local Cygnus arm, presumably due to nearby radio stars.

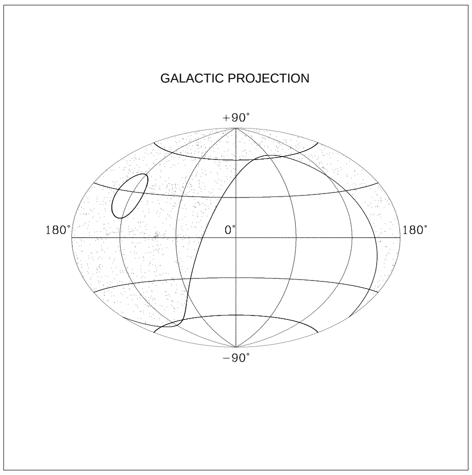

Figure 1. Galactic distribution of the 1432 long term variables.

At present short term variability information is available for 365 of the sources found to exhibit long term variability and 91 of these were found to exhibit significant short term variability. Figure 2 shows the short term variability information derived for 4 sources. For each source the individual flux density measurements are shown as a function of the day number in the particular observing epoch. The figure illustrates the high degree of short term variability seen in some sources which is more characteristic of a radio star than an extragalactic source. These are not known radio stars according to Wendker's latest (1995) catalog of radio continuum emission from stars.

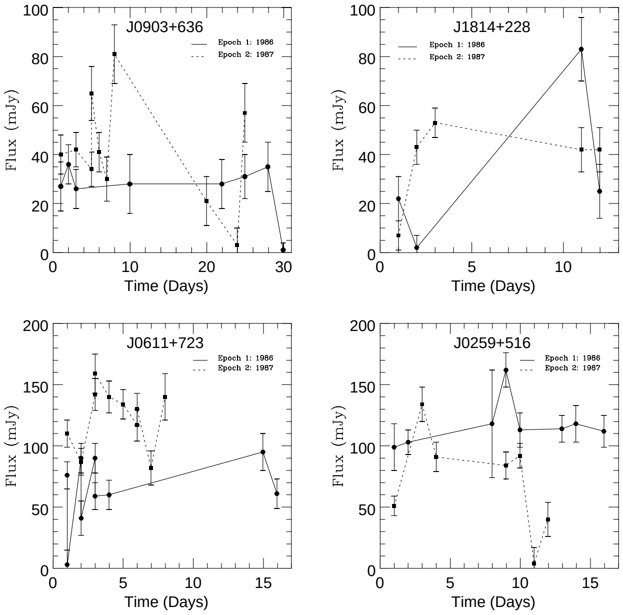

Figure 2. Sample short term variability information. The solid line connects individual measurements from the 1986 epoch and the dashed line for the 1987 epoch.

We have embarked on a program of follow-up studies of the new variables using existing data bases together with higher resolution multi-epoch radio observations. We anticipate that the new catalog of variables will also yield useful statistical information for testing unified beam models.

Acknowledgments. This research was supported in part by a grant from the Natural Science and Engineering Research Council of Canada. The National Radio Astronomy Observatory is a facility of the National Science Foundation, operated under a cooperative agreement by Associated Universities, Inc.

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