

An All-Sky Survey at 74 MHz with 80 Arcsecond Resolution

Richard A. Perley

*National Radio Astronomy Observatory,
1003 Lopezville Road, Socorro, NM 87801 USA.
e-mail: rperley@nrao.edu*

ABSTRACT

The very low frequency portion of the electromagnetic spectrum, despite being the ‘birthplace’ of radio astronomy, and of radio astronomical interferometric techniques, has received little attention for many years, as most development in radio astronomy has been focussed on higher frequencies. In part, this situation has resulted from the special difficulties attending coherent interferometric imaging at low frequencies – especially those associated with removing the effects of the highly refractive ionosphere.

Yet the science rewards from high resolution, high sensitivity imaging in the low frequency radio spectrum are very high. Unique information on cluster halos and relics, on fossil radio sources, high redshift radio galaxies, normal galaxies, pulsars, SNRs, HII regions, the ISM, and extra-solar planets can be obtained only by observations at low radio frequencies.

The VLA has been outfitted at 74 MHz with a modest-efficiency feed system, allowing sensitive, sub-arcminute imaging of the radio sky. This system has also permitted development of methodologies for removal of the ionospheric phase screen in some situations, permitting full-beam imaging of the background sky.

A proposal to survey the entire sky visible from the VLA in its B-configuration has been submitted to the NRAO. As part of the development effort, about 6 days’ observing in B-configuration, covering 0.9 steradians, has been taken and reduced, giving 80 arcsecond resolution, and one-sigma brightness sensitivity of 100 mJy/beam. The proposed observing will provide a set of publicly-available images, and a catalog of nearly 100,000 objects.