IMPROVING THE ICRF IN THE SOUTHERN HEMISPHERE

A.L. FEY
U.S. Naval Observatory
3450 Massachusetts Avenue, NW
Washington, DC 20392-5420 USA
afey@usno.navy.mil

ABSTRACT. It is well known that the ICRF has a less than desirable density of sources on the sky, particularly in the southern hemisphere. To address concerns about the non-uniform distribution of ICRF sources and to monitor sources for structural variations, various observing programs have been initiated. In this paper, we concentrate primarily on two programs specifically aimed at improving the ICRF in the southern hemisphere. The U.S. Naval Observatory (USNO) currently has a joint program with the Australia Telescope National Facility (ATNF) for astrometry and imaging of southern hemisphere ICRF sources. Additionally, the IVS schedules regular CRF observations for the specific purpose of maintenance of the ICRF. In recent years, these CRF sessions have concentrated primarily on observations of sources in the southern hemisphere. Results to date of these dedicated observing programs are briefly described.

1. USNO/ATNF OBSERVING PROGRAM

The USNO currently has a joint program with the ATNF for astrometry and imaging of southern hemisphere ICRF sources. Geodetic and/or astronomical telescopes located in Australia, South Africa, Japan and Hawaii are used and scheduled on an ad-hoc basis. The goals of this joint program are to 1) image all southern hemisphere ICRF sources at least twice for structure monitoring and 2) search for new astrometric sources for densification of the ICRF in the southern hemisphere. The interested reader is referred to Ojha et al. (2004, AJ, 127, 3609) for a discussion of the imaging

2. IVS OBSERVING PROGRAM

The IVS schedules regular CRF observations for the specific purpose of maintenance of the ICRF. In recent years, these CRF sessions have concentrated primarily on observations of sources in the southern hemisphere. Of order 10 CRF sessions per year are scheduled and observed. Geodetic and/or astronomical telescopes located in Australia, South America, South Africa, Japan and Hawaii are used. IVS CRF observations concentrate primarily on 1) obtaining more accurate positions of existing ICRF sources by adding additional observations and 2) obtaining source position stability information from time series at useful time resolution. Sources chosen for CRF sessions consist mostly of ICRF Defining sources and those sources determined to be stable by the criteria of Feissel-Vernier (2003, A&A, 403, 105).

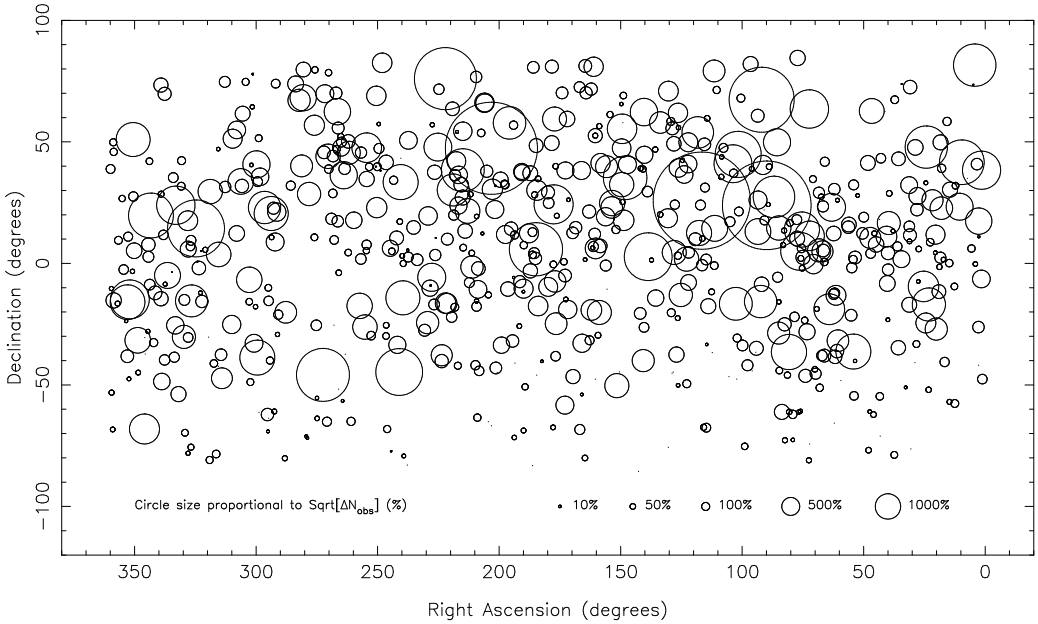

Figure 1: The percentage increase in the number of delay observations obtained for 650 ICRF-Ext.1 sources as of 2004 June 8 as a function of sky position. Circle size is linearly proportional to the square-root of the percentage increase. Note that results of observing programs in addition to the ones discussed here are also included. Sources new to the ICRF since ICRF-Ext.1 are not included.

3. OBSERVATIONAL RESULTS TO DATE

Positions for a total of 228 sources new to the ICRF have been obtained since the definition of the ICRF (see Fey et al. 2004, AJ, 127, 1791; Fey et al. 2004, AJ, 127, 3587). Seventy-seven of these sources are south of $\delta = 0°$ and 58 are south of $\delta = -30°$. The percentage increase in the number of observations per source obtained for ICRF-Ext.1 sources has increased for all but 7% of the sources. However, the percentage increase in the number of observations per source decreases for southern sources with far south sources having the smallest increase (see Figure 1). Additionally, the percentage of sources with no increase in the number of observations since ICRF-Ext.1 increases for southern sources with far south sources having the largest percentage of sources with no additional observations (see Table 1).

Table 1.

Declination Range	# Sources	Sources with no new observations since ICRF-Ext.1 (%)
$-90° < \delta < 90°$	650	7
$\delta < 0°$	270	13
$\delta < -40°$	108	25