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Extending the ICRF to higher radio frequencies: Initial global astrometric results

Astrometric observations of distant active galactic nuclei (AGN) have been used to construct quasi-intertial global reference frames, most notably the International Celestial Reference Frame (ICRF) which now forms the basis for all astrometry including deep space navigation. The ICRF frame was defined using X- (8.4 GHz) and S-band (2.3 GHz) observations over the past 20+ years. There are several motivations for extending this work to higher radio frequencies, namely, to construct a more stable frame based on more compact sources, to provide calibrators for phase referencing, and to support spacecraft navigation at higher frequencies.

As a first step toward these goals, in 2002, we began a series of survey observations using the Very Long Baseline Array (VLBA) of ten radio telescopes at K-band (24 GHz) and Q-band (43 GHz). Each session covers the full 24 hours of right ascension and covers declinations down to the VLBA's southern limit (approx. -30 deg). Preliminary analysis of the first session produced a full sky catalog of 65 sources with formal position uncertainties of about 0.5 mas. Group delay residuals were an excellent 15 psec WRMS. We will present evidence from on an external comparison to the S/X-band ICRF that shows zonal errors at several times the level of the formal precision. We expect these errors to be reduced as futher sessions are added to the analysis thereby strengthening the observation geometry.

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