

Multi-epoch VLBI images to study the ICRF-3 Defining Sources in the Southern Hemisphere

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Very long baseline interferometric (VLBI) observations of extragalactic radio sources at 2.3 and 8.4 GHz are used to construct and maintain a quasi-inertial reference frame known as the International Celestial Reference Frame (ICRF). Among the 3414 ICRF-2 sources, 295 sources of the highest astrometric quality are used to define the stability of the ICRF axes. Multi-epoch, high-resolution imaging is particularly important as these quasars or reference sources that make up the ICRF often show extended emission on milli-arcsecond (mas) scales, with jet structures appearing and disappearing on timescales of months to years. Reference sources with extended structures are poorly suited for high-accuracy reference-frame use unless the source structure and variability can be taken into account. In order to maintain the ICRF with the highest accuracy, these reference sources and in particular the defining sources should be monitored on a regular basis.

In the Southern Hemisphere due to the limited number of radio telescopes it is difficult to run dedicated imaging programmes of these extragalactic radio sources, to both monitor existing ICRF sources and to identify new potential candidate ICRF sources. An effort was required to identify an experiment that can be used to produce multi-epoch VLBI images of the ICRF defining sources below a declination of -30 degrees, in order to study the source morphology. We present such results from the Celestial Reference Frame Deep South (CRDS) geodetic/astrometric VLBI sessions where VLBI images of all 76 ICRF defining sources below a declination of -30 degrees were produced. We also present first VLBI images of new sources that were included in the observing schedule to study their suitability as reference frame sources for the next generation celestial reference frame, the ICRF-3.