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Selecting highly-compact radio sources for the definition of the celestial reference frame

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Abstract. We discuss the issue of selecting highly-compact radio sources for the definition of the celestial reference frame.

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The intrinsic radio structure of the extragalactic sources is one of the limiting errors in the definition of the International Celestial Reference Frame (ICRF). Based on multi-epoch VLBI images obtained with the Very Long Baseline Array and other VLBI telescopes around the world between 1994 and 2005, we evaluate this effect for 560 ICRF sources (about 80 % of the current frame) and calculate a so-called ‘structure index’ to define the astrometric suitability of the sources.

The structure index ranges from 1 for the most compact sources to 4 for the most extended sources. The number of epochs for which the structure index is available for a given source varies from 1 for the least-observed sources to 20 for the intensively-observed sources. From this calculation, we identify a subset of 221 ICRF sources which have very good or good astrometric suitability (i.e., a structure index of either 1 or 2) at any of the available epochs.

We argue that these compact sources are potential candidates for defining the celestial frame with the highest accuracy when a future realization of the ICRF is made.