

Celestial reference frame determined from very long baseline interferometry experiments conducted at K-band (24 GHz) over the past 10 years

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Abstract. The current third realization of the international celestial reference frame (ICRF3) was adopted in August 2018 and includes positions of extragalactic objects at three frequencies: 8.4 GHz, 24 GHz and 32 GHz. In this paper we present an update of the celestial reference frame (CRF) estimated from very long baseline interferometry measurements at K-band (24 GHz). The observations of the radio sources are conducted with the Very Long Baseline Array from the U.S. territory and the celestial frame is densified in the southern hemisphere with HartRAO – Hobart26m single baseline observations.

The dataset starts in May 2002 and currently consists of more than 120 24h observing sessions performed over the past 10 years. Since the publication of ICRF3, the additional observations of the sources during the last four years allow maintenance of the celestial reference frame and more than 200 additional radio sources ensure an expansion of the frame. We determine the updated K-CRF with two independent analysis software packages (VieVS and Calc/Solve) and describe the differences in the solution strategy. We compare the updated K-CRF to ICRF3 using the so-called vector spherical harmonics providing information about systematic differences between two astrometric catalogs.