

The K-band (24 GHz) Celestial Reference Frame: Current Status and Roadmap

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Abstract

The current K-band (24 GHz) celestial reference frame (CRF) consists of 1038 relatively uniformly distributed sources—comparable to the number of regularly observed *S/X* sources—constructed from just more than 2 million observations (of which 99.5% are from VLBA sessions supported through the USNO’s 50% timeshare allocation), a much smaller number compared to the 17.6 million observations used to realise the frame at the lower frequencies. For sources overlapping with the *S/X*-band frame the median precision of the K-band CRF is $47 \mu\text{as}$ in right ascension, comparable to the $46 \mu\text{as}$ of the *S/X*-band frame, while the median precision in declination is $80 \mu\text{as}$ for K-band and $58 \mu\text{as}$ for *S/X*-band. Looking to the future, the K-band CRF collaboration is developing a roadmap to continually improve the quality of our observations. In order to improve the accuracy of the K-band CRF we are pursuing: (1) improved sensitivity through higher data rates (4 to 8 Gbps) and larger apertures (e.g. the addition of the 40m Yebes telescope in Spain and 50m LMT in Mexico); (2) improved analysis e.g. improved ionospheric calibrations, elevation-dependant weighting, and source structure corrections) and (3) improved geometry by extending our network e.g. the recently started collaborations with Yebes, Spain and the Korean VLBI Network which are expected to improve declination accuracy. We will present the details of such improvements and an estimate of the impact of each improvement.

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