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 1049 relatively uniformly distributed sources-comparable to the number of regularly observed S/X sources-constructed from more than 2 million observations. For sources overlapping with the S/X-band frame the median precision of the K-band CRF is 47 micro-arsec in right ascension, identical to the S/X-band frame, while the median precision in declination is 80 microarcsec for K-band and 59 microarcsec 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 dependent 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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