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Effects on Earth Orientation Parameters caused by different analysis options

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The Earth Orientation Parameters (EOP) are arguments of the time-dependent rotation matrices describing the difference in orientation between the Earth crust-fixed reference system, ITRS, and the space-fixed reference system, ICRS. Very Long Baseline Interferometry (VLBI) is the technique that connects the realizations of ITRS and ICRS in terms of orientation directly on the observation level. Many applications in spacecraft navigation, fundamental astronomy, astrometry, and geosciences depend on the provision of the Earth Orientation Parameters (EOP). Currently, under the IAG/IAU Joint Working Group on the Theory of Earth Rotation, activities are supported that foster the advance on the theory of Earth rotation. Some components of the Earth rotation, such as the Free Core Nutation (FCN), are not well predictable but rely entirely on empirical determination through VLBI. In our paper we step-by-step alternate different analysis options, such as a priori data and models, and quantify the resulting effects on the EOP. Our approach is purely empirical: we will alternate certain analysis options and assess the differences with respect to the reference solution that adheres to IERS Conventions (2010) and applies the parameterization that was used in our contribution to ITRF2014, the next realization of the ITRS. For demonstration we analyze current regular International VLBI Service for Geodesy and Astrometry (IVS) sessions: IVS-R1 and –R4. The IAG flagship component GGOS (Global Geodetic Observing System) aims to realize EOP with an accuracy of 1 mm, i.e. about 30 microarcseconds. This accuracy will be used as a threshold to interpret the significance of the effects.

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