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Testing the Free Core Nutation period

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Currently, accurate observations of Celestial Pole Offsets (CPO) can only be obtained by the Very Long Baseline Interferometry (VLBI) technique. The CPO contain the free core nutation (FCN), trends and harmonics caused by deficiencies of the IAU 2006/2000A precession–nutation model and by geophysical excitations, as well as the noise of observations. FCN is a free mode of the Earth and, in principle, cannot be modeled. It can only be measured. In the Sub-Working Group 3 "Numerical solutions and validation" of the IAU/IAG Joint Working Group on Theory of Earth rotation it was suggested that the model for the FCN needs to be improved. The accurate estimation of the free core nutation (FCN) period of about 430 days is a challenging prospect. But, is there any evidence that the period of the FCN varies with time? In 2000 it was unknown whether or not it did. If so, then this would complicate making a model of it. In this study, we tested different FCN periods using several subsets of the observed nutations derived from VLBI analysis with the purpose of finding optimum configuration that provide the lowest residuals. That is why a large quantity of empirical FCN models were also estimated and tested with different sliding window lengths displaced by different time spans. This analysis could bring us significantly closer to meet the accuracy goals pursued by the Global Geodetic Observing System (GGOS) of the International Association of Geodesy (IAG), i.e. 1 mm accuracy and 0.1 mm/year stability on global scales in terms of the ITRF defining parameters.