

Free core nutation: New large disturbance and connection evidence with geomagnetic jerks

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Abstract

© 2016, Academy of Sciences of the Czech Republic. All rights reserved. Variations in free core nutation (FCN) are connected with various processes in the Earth's fluid core and core-mantle coupling, which are also largely responsible for the geomagnetic field variations, particularly the geomagnetic jerks (GMJs). A previous study (Malkin, 2013) revealed that the epochs of the observed extremes in the FCN amplitude and phase variations are close to the GMJ epochs. In this paper, a new evidence of this connection was found. The large FCN amplitude and phase disturbance occurred at the epoch close to the newly revealed GMJ 2011. This event occurred to be the second large change in the FCN amplitude and phase after the 1999 disturbance that is also associated with the GMJ 1999. Moreover, the long-time FCN phase drift had changed suddenly in 1998–1999, immediately before the GMJ 1999, and seemed to change again at the epoch immediately preceding the GMJ 2011. The FCN amplitude showed a general long-time decrease before GMJ 1999, and it subsequently grew until GMJ 2011, and then seemed to decrease again. A smaller FCN change can be observed at the epoch around 2013, which is also suspected as the GMJ epoch. The latter confirms the suggestion that a rapid change in the FCN amplitude and/or phase can be used as an evidence of the GMJ that is not clearly detected from the geomagnetic observations.

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Keywords

Earth's rotation, Free core nutation, Geomagnetic jerks