About the inner core relative rotation velocity

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Abstract

Since the detection of the Earth's inner core super-rotation relative to the mantle [1] many papers about the rotation velocity estimation have been published. Some of these estimations are based on the analysis of seismic waves (for example, [2, 3]), others [4] are based on the measurements of mantle fluctuation. The estimations of the rotation velocity differ a lot from each other: one turn in 100 to 900 years. In some papers (for example [4]) the existence of relative rotation of the inner core is doubted.

Earlier the authors of this paper offered a model for an explanation of long-term variations of day length [5]. The model is based on two factors: gravitational interaction of the mantle with the inner core and super rotation of the core relative to the mantle. The inner core and the mantle rotate non-uniformly, alternately exchanging the moment of momentum. Sometimes the inner core rotates faster relative to the mantle, sometimes it rotates slower. The amplitude of these fluctuations is comparable to the average velocity of relative rotation, and the fluctuations period is about 130 years. Therefore estimations of relative rotation velocity should depend on the time interval, when observed data was obtained. The present model explains a wide range of results [1-3]. In particular, it is shown that relative rotation of the inner core is not detected in [4] because the observed time interval corresponds to the fluctuations phase with the minimum relative rotation velocity.

References

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