

Geomagnetic field variations and torsional oscillations in the outer core

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The causes of decadal geomagnetic field variations are reviewed. I focus on torsional oscillations, which are recently regarded as a promising candidate of the origin of decadal variations.

The geomagnetic field are observed with modern instruments over only a few hundred years, although the typical timescale of field variations is of the order of a thousand year. The variations over the recent few hundred years are considered to result from the flux rearrangement due to the core surface flow. In these variations, roughly two timescales are recognized; one is about a few hundred years, and the other is about a few decades. Braginsky (1970, 1984) proposed that flows which cause decadal variations are torsional oscillations. The idea has been revived recently (Zatman and Bloxham, 1997, 1998; Bloxham et al., 2000) by the analysis of decadal variations in terms of axially uniform zonal flow. Torsional oscillations are basically Alfvén modes in the outer core. I review these studies and properties of torsional oscillations.