EGU2020-11740
https://doi.org/10.5194/egusphere-egu2020-11740
EGU General Assembly 2020

Ohmic dissipation induced by Earth's nutation

Santiago Triana[1], Antony Trinh[2], Jeremy Rekier[1], and Veronique Dehant[1]
[1]Reference systems and planetology, Royal Observatory of Belgium, Brussels, Belgium
[2]Lunar & planetary laboratory, University of Arizona, Tucson, USA

Radio signals from distant quasars allow us to determine Earth's rotation variations with exquisite accuracy. These observations can be used to estimate the amplitudes, frequencies and damping constants associated with Earth's rotational modes, particularly the Free Core Nutation (FCN) and the Free Inner Core Nutation (FICN). These estimates suggest, however, fluid core viscosities many orders of magnitude higher than expected, or rms magnetic fields at the core-mantle boundary (CMB) incompatible with downward continuation of the observed surface field. Aiming at resolve this difficulty, we have developed a proof-of-concept model where we incorporate an approximate fluid-dynamical treatment of the core flow associated with the FCN and the FICN. We show that, at least for the FCN, no abnormally high viscosities or magnetic fields are required. The model might provide in fact a robust, independent estimate of the rms magnetic field strength in the fluid core. Additionally, the model illustrates the importance of considering inter-mode resonances involving inertial modes (i.e. Coriolis-restored) and the rotational normal modes.