INFERENCE OF STRONG MAGNETIC FIELDS INSIDE THE EARTH'S CORE FROM THE DETECTION OF TORSIONAL WAVES WITH A 6-YEAR PERIOD

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Fromgeomagnetic observations recordedabove the Earth's surface, downwardcontinuation of a potentialmagneticfieldgivesr.m.s. radialfield values of the order 0.3 mTat the core--mantleboundary (CMB). Furtherassumptions are needed to infer the fieldsustaining the geodynamoinside the conductingEarth'score, whichstrengthcannotbedirectlyprobed.A few mTisfound by applyingscalinglawsderivedfromeither force balance or power dissipation arguments in numerical simulations. Nutation data and theoryindicate 7 mTat the innercoreboundary (ICB) to account for the dissipation in the Earth'score.Recently, the magnetostrophic balance applied to quasi-geostrophiccore flow modelsindicated as well a few mTinside the core.However, a 60-year signal found in the length-of-day variation (lod) has been associatedwithtorsionalwavescarried by a muchweakerinternalfield, of amplitude similar to thatobtainedat the CMB.Instead, wefind in the presentstudy a 6-yearperiodtorsional oscillation thatpredictswellboththe phase and the amplitude of the 6-year lod signal detected over the second half of the twentiethcentury. Triggeredevery 6 yearsat the ICB, the wavespropagateoutwardsthrough the Earth'score in a few years time. It suggests a large internalmagneticfieldstrengththatreconcileswithpreviousestimatesfromgeodynamo simulations, and supports the idea of a gravitationalcouplingbetween the innercore and the mantle.

Dynamics of the core ; SV Inversion, LOD

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