ELECTRICAL CONDUCTIVITY IN THE EARTH'S MANTLE INFERRED FROM OBSERVATORY AND SATELLITE DATA

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Electromagnetic induction studies of the electrical conductivity of the Earth's mantle using observatory data have a long tradition. Recently, the surface observations have been complemented by very accurate measurements of the Earth's magnetic field provided by low-altitude satellites: Ørsted, CHAMP, and SACC, with further substantial improvement expected from the upcoming multisatellite mission SWARM. However, separation of rapid changes of the external magnetic field and its induced counterpart from the main field, as well as the inevitable tradeoff between spatial and temporal resolution of satellite data, introduce new challenges to the geomagnetic community.
In this contribution I present results of inversions recovering the 1D conductivity structure of the Earth using the timedomain method, and aiming at the deepest parts of the Earth's mantle. Seven years long time series of nightside, midlatitude measurements by the CHAMP satellite, and corresponding dataset from the Intermagnet observatory network are processed and interpreted first separately, then jointly.
The results suggest rather low conductivities in the lowermost mantle, ranging from 1 to 10 S/m. Given the simple geometry of the external equatorial ring current, this can be explained by lack of interconnection of the highly conductive postperovskite in the longitudinal direction.

EM induction, electrical conductivity

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