Spatial distribution of regularity of local geomagnetic jerks and electrical conductivity at the bottom of the mantle

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Geomagnetic jerk, abrupt change of geomagnetic secular acceleration, is considered to have the shortest time-scale among the observed geomagnetic main field variations. Geomagnetic jerks are observed around 1969, 1978, and some other years, and they have been analyzed to estimate or to discuss the electrical conductivity in the mantle (e.g. Backus, 1983; Alexandrescu et al., 1999; Nagao et al., 2003; Pinheiro and Jackson, 2008). For example, Alexandrescu et al. (1999) applied wavelet analysis to the observed magnetic field components to identify geomagnetic jerks and their regularity. The observed regularity at geomagnetic stations were used to estimate the regularity of magnetic field variation at the core-mantle boundary and the electrical conductivity of the lower mantle.

Geomagnetic jerks were observed around 2003 and 2007 but the signature of them are strong only in the south Atlantic region (e.g. Chulliat et al., 2010). We showed in a previous work that the regularity of the local geomagnetic jerk around 2007 at Mbour (MBO, Senegal) is significantly higher than that of the global geomagnetic jerks, and suggested that the local geomagnetic jerk can be generated due to the combined effect of toroidal magnetic field variation at the CMB and the electrical heterogeneity at the bottom of the mantle. In this presentation, we show the spatial distribution of the regularity of local geomagnetic jerks and discuss electrical conductivity heterogeneity in the deep mantle.

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