Regularity of recent geomagnetic jerks estimated using wavelet analysis

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Regularity of a time series after a singularity represents the exponent of the function with time that fits the time variation after the singularity. This concept can be applied to represent the characteristics of a geomagnetic jerk that is a sudden variation of secular acceleration of the geomagnetic field components. Wavelet analysis has been applied to identify occurrence time of geomagnetic jerks and their regularities.

The regularity depends on the time variation of the geomagnetic field components at the surface of the dynamo region, i.e., core-mantle boundary (CMB), and also on the electrical conductivity of the mantle, especially its lower part. It has been attempted to use wavelet analysis of geomagnetic jerks to estimate the electrical conductivity of the lower mantle (Alexandrescu, M. et al., 1999), and also to discuss the electrical heterogeneity in the D" region (Shimizu and Utada, 2017, JpGU meetiing). Regularity of a jerk-like magnetic field variation due to geodynamo models has not been examined yet although Manabe and Takahashi (2018, JpGU meeting) were keen to identify magnetic field jerks in a geodynamo model by other method.

The regularity of geomagnetic jerk will become a quantity that should be reproduced by geodynamo modeling, especially that employ geodynamo assimilation to examine dynamical processes in the core and to forecast the future geomagnetic field. In this presentation, we are going to show regularity of recent geomagnetic jerks that occurred around 2003 and 2007 (e.g. Chulliat et al., 2010) and compared these with those occurred around 1969 and 1978. The regularity of recent jerks seems to be higher than the older ones, and this would represent that the dynamical process in the core that produced the recent and older geomagnetic jerks can be different from each other.