

Intensity-inclination correlation on long-term secular variation records and its relevance to persistent non-dipole components

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It is well known that persistent non-dipole components occur in the time-averaged field. At least within the last few million years, they are dominated by the quadrupole term, and this component changes its sign in accordance with the reversals of the main dipole field. On marine sediment cores, they are observed as inclination anomaly (δI), which is defined as observed inclination minus the expected inclination from GAD. In low latitudes, δI is negative in Brunhes and positive in Matuyama in general, but there may be significant spacial variations as suggested by records from the North Fiji Basin (Elmaleh et al., 2001). We reported intriguing correlation between intensity and inclination of long-term secular variations, in-phase in Brunhes but anti-phase in Matuyama, from sediment cores in the western equatorial Pacific where δI is large, and proposed a model that strength of GAD fluctuates with ~ 100 kyr periodicity, whereas persistent non-dipole components do not (Yamazaki and Oda, 2002). We are currently inquiring extent of such correlation in the Pacific, and have found in-phase correlation in the Gauss Chron from a sediment core in the central equatorial Pacific. In the central North Pacific, on the other hand, only paleointensity showed ~ 100 kyr variation during Brunhes, which is predicted from our model because δI is small in the North Pacific. We expect that further studies on intensity-inclination correlation, which drew little attention previously, may provide a key for better understanding the behavior and origin of persistent non-dipole components. Technically, improvement of inter-core correlation benefited by the recent progress in relative paleointensity studies has enabled to detect small long-term fluctuations of inclination.