Paleointensity in latest Cretaceous and early Paleogene: application of Tsunakawa-Shaw method to basalts from Louisville Seamounts

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Information on long-term (~10^7 years and longer) paleointensity changes is important for understanding geodynamo activity, in particular for possible relation with core-mantle boundary conditions. Some studies have suggested stronger paleointensity during Cretaceous superchron and positive relation between paleointensity and polarity length, but these have been matters of debate. Paleointensity data in late Cretaceous and Paleogene is important for examining relation between paleointensity and polarity length; polarity lengths were longer than those in Neogene, and increase with age toward the Chretaceous superchon. Number of data for the old ages is not enough. Furthermore there is a possibility that part of available dataset may be biased by methods and materials used. Hence accumulation of data with various methods is still required.

IODP Expedition 330 occupied six sites on 5 seamounts along the northwestern part of the Louisville hotspot track. The age of the seamounts ranges between 50 and 74 Ma. Fresh basalts were recovered by drilling despite the old ages. From onboard examination of the rocks, it is considered that part of basalts erupted under subaerial or shallow submarine conditions and probably suffered high-temperature oxidation, in particular at Sites U1372 and U1373, suggesting that they are suitable for absolute paleointensity estimation.

We conducted paleointensity measurements using the Tsunakawa-Shaw method with low-temperature demagnetization (LTD) and double heating (DHT). Samples from which characteristic magnetization component was isolated by stepwise alternating-field demagnetization were subjected to the paleointensity experiments; samples with MAD of larger than 5 deg. were excluded. Paleointensity of 22.7 (+- 8.8) mirco T was obtained at Site U1372, the oldest seamount drilled (~74 Ma), as the mean of 20 lithological units (lava flows) that passed the selection criteria of Yamamoto and Tsunakawa (2005). Success rate was high at this site, partly because many lava flows of this site were estimated to be subareal and suffered high-temperature oxidation. The mean paleointensity is converted to virtual dipole moment (VDM) of 3.65 x10^{22} Am^2 based on a paleolatitude of 47 deg. S of the Louisville hotspot between 50 and 74 Ma from onboard paleomagnetic results. Measurements of basalts from other sites are in progress. The preliminary result of this study suggests that paleointensity of latest Cretaceous was not strong, about a half of the present field intensity and similar to the mean of the last 5 Ma by Yamamoto and Tsunakawa (2005).