房総半島のブルン松山地球磁場逆転境界の熱消磁による極性判定；FORC解析による磁性鉱物同定と加熱による磁性鉱物変化の検出

小田 啓邦 [1]; 中里 裕臣 [2]; 佐藤 哲郎 [3]; 七山 太 [3]
[1] 産総研・地質情報; [2] 農研機構; [3] 産総研

Primary remanent magnetization during Matuyama-Brunhes reversal from Boso Peninsula: Change of magnetic minerals detected by FORC

Hirokuni Oda[1]; Hiroomi Nakazato[2]; Tetsuro Sato[3]; Futoshi Nanayama[3]
[1] IGG, GSJ, AIST; [2] NARO; [3] AIST

We report magnetostratigraphy from an outcrop in Boso Peninsula, which is considered to record Matuyama-Brunhes polarity transition. The outcrop is ˜4m height, facing west and situated along a roadside in Terasaki, Chiba Prefecture, Japan. The sediment mainly consists of massive silt of Kokumoto Formation, Kazusa Group. The outcrop shows several tephra layers including TNTT (Byk-E) residing close to Matuyama-Brunhes polarity transition (e.g. Suganuma et al., 2015; Okada et al., 2017).

In order to identify the polarity of primary remanent magnetization recorded, we have taken 55 paleomagnetic drill cores at intervals of 1-10 cm. Progressive alternating field demagnetization (PAFD) was conducted on all sub-samples taken from the drill cores. The higher coercivity (>20 mT) magnetization component has mostly positive inclination (normal polarity) and shows a swing to negative inclination (reversed polarity) at 76-91 cm below TNTT. Progressive thermal demagnetization shows sharp drop in remanent magnetization by heating up to 175 degC. By heating above 175 degC, magnetization decreases gradually up to 300˜350 degC and becomes unstable above 300˜350 degC. According to the experimental protocol proposed by Okada et al. (2017), ThD followed by AFD was conducted in order to extract primary remanent magnetization hidden by the secondary magnetization both in vacuum and in air. The extraction of primary remanent magnetization was only partially successful, however, the polarity boundary could be located within +-50cm from the tephra layer Byk-E.

FORC analyses on bulk samples and principle component analyses (PCA; Lascu et al., 2015; Harrison et al., 2018) show at least three components. The three components are considered to be dominated by multidomain magnetite, single domain/vortex state (PSD) magnetite, or greigite with coercivities higher than magnetite (up to 200˜300 mT). Volcanic ash layer shows highest proportion of multi-domain magnetite. In order to understand the difficulty of thermal demagnetization, we heated a bulk sediment sample up to 400 degC in air and monitored using FORC diagrams with PCA. The results show a decrease of greigite component during heating accompanied by a sudden decrease at 350 degC. By heating from 350 degC to 400 degC, significant amount of low coercivity (0˜30mT) magnetic mineral was formed.