漸新世のエチオピア洪水玄武岩から得られた古地磁気方向および岩石磁気特性

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Paleomagnetic directions and rock-magnetic properties from Oligocene Ethiopian flood basalts

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Paleomagnetic observations of continental flood basalts can provide much more complete and complex high-fidelity records for understanding features of the ancient Earth's magnetic field varying rapidly with time (e.g., Jarboe et al., 2011) as well as magnetostratigraphic contributions such as a stratigraphic correlation and dating.

We focus on the Oligocene Ethiopian flood basalts, in which there is a 2000 m-thick exposures of the flood basalts at Lima-Limo (LL) region (13.25 ^{o}N, 37.93 ^{o}E). In this studied region, only previous paleomagnetic investigation from a sparse sampling of Rochette et al. (1998) was carried out, and thus it has been required to resample the whole section to obtain a better detailed and precise paleomagnetic recording.

We sampled a successive of 93 lava flows and 5 acidic inter-layers for paleomgnetic measures with 11 flows for geochronology. And stratigraphic relationship between flows was well controlled by their altitudes.

The goal of this work is to restore time-variation of paleo-geomagnetic field in its direction and strength for the Oligocene. Here we report rock magnetic results with thermomagnetic (TM) analysis, magnetic hysteresis parameter measurements and isothermal remanent magnetization (IRM) acquisitions, and paleodirectional results, which newly revised from the report of SGEPSS 2013, for the LL lavas.

Results of TM analysis and IRM acquisition experiments as well as behavior of thermal demagnetizations of NRM shows that all the samples have magnetite as a dominant carrier of remanence. A majority of ferromagnetic phases has either single phase with a Curie temperature of magnetite or multiple phases with Curie temperatures of 200 - 400 ^{o}C and magnetite, while for a few cases, a higher Curie temperature phase of ˜620 ^{o}C besides magnetite is also observed. Resultant Day plot (Day et al., 1977) of the hysteresis parameters measured shows a magnetic grain size distribution with a diagonal elongated band within the pseudo single domain region bounded by Dunlop (2002).

In most of the paleomagnetic measurements, paleomagnetic directions of characteristic remanent magnetization (ChRM) are well isolated by an alternating field (AF) of ˜40 mT at least or by a temperature of 200 - 400 ^{o}C using both AF and TH demagnetization techniques, while rather AF demagnetization is more straightforward to separate ChRMs for several cases.

Our current magnetostratigraphic result appears to contain a succession of 3 magnetic chrons roughly as previous study (Rochette et al., 1998), but clearly reveals that there are further 4 reversals in the lower part of central normal chron at 1800 - 1950 m in altitude and also recognize possible 3 geomagnetic excursions in two reversed chrons.

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