富士火山の火山噴出物から推定する過去2300年間の地磁気永年変化

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Paleomagnetic secular variation of last 2300 years inferred from volcanic products of Fuji volcano, Japan.

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Paleomagnetic secular variation (PSV) records in Japan has been presented by archaeomagnetic studies of old kilns and hearths (e.g. Hirooka,1977) and paleomagnetic studies of sediment cores (e.g. Ali et al.,1999). The paleomagnetic directions and intensities have changed incessantly, therefore utilized for dating tool of volcanic products (e.g. Miki,1999). However, the archaeomagnetic results are restricted to the last 1600 years, and PSV records from sediment cores are inconsistent. Here, we present paleomagnetic directions from volcanic products of last 2,300 years at Fuji volcano.

Fuji volcano is one of the largest, basaltic and active volcanos in Japan. Recent volcanologic studies have revealed the eruption ages in detail from historical records, tephrochronology by trench excavations, and ^{14}C datings. Takada et al., (2016) has been revised the geological map of Fuji volcano, the rock-stratigraphic units has been categorized 185 units during 17,000 B.C.E to C.E.1,707. Especially of last 2,300 years (Subashiri-d stage), the volcanic activity were newly determined using ^{14}C datings and stratigraphic relation with Iz-Kt (C.E.838) tephra (Yamamoto et al., 2005 ; Kobayashi et al., 2007). Those developments enable us collecting paleomagnetic direction data using those volcanic products, sufficiently. Paleomagnetic samples were collected from 35 units of lava flows, pyroclastic flows and pyroclastic cones of mostly known eruption ages. We selected carefully several sites from each volcanic product and collected 6 to 20 samples using an engine powered core picker. Samples were oriented by a sun compass to eliminate the influence of local magnetic anomalies. Magnetization of the samples are measured using a spinner magnetometer with alternating field demagnetization (AFD) and thermal demagnetization (ThD). Our criteria of paleomagnetic direction is a95 less than 5.0 degree and the total average is 2.0 degree.

As a result of our study, the paleomagnetic directions agree with archaeomagnetic secular variation during the last 1,600 years. The PSV curve can be extended further beyond C.E.400. A few lava flows show directions disagree with other flows. In the case of Norikawa lava flow (C.E.600), the paleomagnetic directions totally different from the PSV. We believe that it is due to wrong age assignments by stratigraphy in the geological map of Fuji volcano. One of the historical eruptions, Aokigaharamarubi lava flow (C.E.864-866) shows paleomagnetic directions shallower than archeomagnetic secular variation curve. It is, however, fit with the recent archaeomagnetic results of old kilns in mid 9th century, within a95 range (Hatakeyama and Kitahara, 2019). These results indicate that it is necessary to reconfigure the stratigraphy of Fuji volcano and also redraw the PSV curve. Our findings suggest that paleomagnetic method can improve eruption history of Fuji volcano, and the volcanic products can contribute to extend the Holocene PSV in Japan.