

Rock-magnetic study of fresh dunite in the Horoman peridotite complex, Hokkaido, Japan

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Magnetic anomalies observed on Earth are originated from remanent/induced magnetizations of the crust and probably those of the uppermost lithospheric mantle. For the lithospheric mantle, rock-magnetic data were mostly reported from serpentinized peridotites although some data were available for fresh mantle xenoliths from a few volcanoes. Since fresh peridotite samples are relatively scarce, the original magnetic properties of peridotite are not well studied. Rock-magnetic studies on fresh peridotites are required to characterize magnetization of the lithospheric mantle. In the present study, we report rock magnetic properties of fresh dunite samples and discuss the possibility of a source of magnetic anomaly on Earth and the other planets. The samples used in this study are collected from spinel-rich dunite-wehrlite (SDW) suite, mainly composed of clinopyroxene-bearing dunite, in the Horoman peridotite complex, Hokkaido, Japan (Takahashi, 1991). Fresh dunite samples were collected from a 20 m wide outcrop of SDW suite. Minute magnetite inclusions, which show elongated rod-like shapes, were observed in olivine grains under the microscope. It should be noted that the elongated magnetite inclusions are not associated with serpentinization. Densities of the samples mostly ranged in 3250-3350 kg/m³, which correspond to typical values of fresh peridotite. A diagram of natural remanent magnetization (NRM) versus susceptibility shows that the data of the samples are clearly different from the data reported from serpentinized peridotites. Several samples have NRM values of 1-20 A/m, which are comparable to NRM values of volcanic rocks. A dunite layer of such strong NRM could be a potential source of magnetic anomalies.

Keywords: magnetization, dunite, Horoman peridotite complex