

Variation in magnetic properties of serpentinized peridotites from Yokoniwa Rise, Central Indian Ridge

FUJII, Masakazu^{1*} ; OKINO, Kyoko¹ ; SATO, Hiroshi² ; NAKAMURA, Kentaro³ ; YAMAZAKI, Toshitsugu¹

¹AORI, UTokyo, ²Senshu University, ³UTokyo

Serpentinization of ultramafic rocks through hydrothermal alteration changes the physical, rheological, chemical, and magnetic properties of the oceanic lithosphere. Recent discovery of widespread exposures of serpentinized mantle materials on the seafloor in a slow-spreading environment renewed interest for this alteration process. However, we have limited understanding of the serpentinization mechanism because of the lack of data measured from seafloor rocks. Since magnetite is a direct product of serpentinization process, magnetic properties of serpentinized peridotites can be a good indicator to understand the process. We collected 30 peridotite samples of different degrees of serpentinization from the seafloor on the non-transform-offset massif called as the Yokoniwa Rise in the Central Indian Ridge. These 30 samples yielded a wide range (17-100%) of serpentinization degrees and provide us a good data set to evaluate the relationship between serpentinization and magnetic properties. The measured range of magnetic parameters are as follow; natural remanent magnetization (0.2-8.4 A/m), magnetic susceptibility (0.002-0.087 SI), and magnetite amount (0.1-5.5 wt%). The amount of magnetite varies nonlinearly, likely exponentially, as a function of serpentinization degree. Remarkable increase of magnetite amount occurs in samples with high degree of serpentinization (>70%), indicating larger production of magnetite during the late stage of serpentinization process. The results provide key constraints on the serpentinization mechanism, and insights on the potential of serpentinized mantle to contribute to marine magnetic anomalies.

Keywords: serpentinized peridotite, upper mantle, rock magnetics, slow spreading ridge