Fabric development on chemically heterogeneous mantle beneath the Gakkel Ridge in Arctic ocean

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Gakkel ridge is ultraslow-spreading ridge (6-13 mm/year in full spreading rate) which extends for 1,800 km across the Eurasian basin of the Arctic Ocean (Coakley and Cochran, 1998 and other references). Based on results from bathymetry and rock sampling, Michael et al. (2003) revealed three distinct regimes with different abundance of rock types on the Gakkel Ridge: a western volcanic zone, sparsely magmatic zone on central zone and an eastern volcanic zone. The sparsely magmatic zone is characterized by abrupt morphological changes with no volcanic ridges and large exposures of mantle peridotite. Previous geochemical study proposed that osmium isotopic results of some refractory peridotites have 2 billion years-old, implying the long-term preservation of refractory peridotites in the asthenospheric mantle (Liu et al., 2008) and the heterogeneous mantle existed beneath the Gakkel Ridge is the consequence of ancient melting, combined with subsequent melt percolation and entrapment. (D’ Errico et al., 2016). However, an olivine fabric in such heterogeneous mantle has not yet been studied in detail. Here, we present the detailed rock descriptions, analyses of mineral fabrics, and geochemical analyses of the minerals in the 14 deformed peridotite samples recovered from two dredge sites (PS59-235 and PS66-238) on the sparsely magmatic zone of Gakkel Ridge.

Keywords: olivine fabric, rare-earth element, mylonite, peridotite, heterogeneous mantle, Gakkel Ridge

