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Structural and petrological features of peridotites derived from the southern Mariana Trench

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Structural and petrological studies have been carried out on serpentinized peridotites derived from the landward trench slope of the southern Mariana Trench, where is the deepest ocean in the world. Peridotite samples were collected from five points of West area: (KH03-3-D7, KH03-3-D8, KH98-1-D3, 6K#1094, 6K#1095).
The samples showed dominantly coarse granular and elongated textures. The olivine-spinel compositions within most of samples are in the olivine?spinel mantle array, indicating that they are residual peridotites. Spinel compositions have dominantly high-Cr# (>0.6), whereas very low-Cr# (about 0.2) is reported at the shallower depth (Yanagida et al., 2007). High-Cr# peridotites appear to be of forearc origin that affected by slab dehydration. In contrast, low-Cr# peridotites appear to be of backarc origin that outcropped by tectonic erosion or fracture zone.
Olivine CPOs show dominantly [100] slip, and fabric intensities (J-index) are generally low. Low-J -index peridotite tends to show high-Cr#.
Peridotites derived from West area contain few pyroxenes whereas peridotites derived from East area (Michibayashi et al., 2009) contain pyroxenes, suggesting that they were serpentinized at high temperature. Moreover antigorite, which is serpentine mineral at high temperature, occurs within the peridotites derived from the most western section (6K#1095). These suggest that the western most section near the Challenger Deep are the areas where intense tectonic erosion is being taken place and that there might be fresh peridotites.