

Structural and petrological study of ultramafic rocks in Celestial seamount in Mariana Trench

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Celestial serpentinite seamount is one of seamounts in Mariana Trench and is located to the central part of Mariana Trench extending N-S direction at the depth of about 2,000~4,000m below sea level. IODP Expedition 366 cruise from December 8th, 2016 to February 7th, 2017 has obtained serpentinitized peridotite cores in Celestial serpentinite seamount. We have analyzed chemical compositions of minerals and crystallographic fabrics of olivine grains in fourteen serpentinitized peridotites obtained from Celestial seamounts. As a result, thirteen samples have coarse granular textures with olivine grain sizes between 1 and 5mm, with one sample showing a fine-grained texture with olivine grain sizes between 0.1 and 1mm. Chemical compositions of both olivine and spinel are in the range of Olivine-Spinel Mantle Array (OSMA) of Arai (1994), where Cr# in spinel is no more than 0.6, indicating little influence of water. With respect to olivine crystallographic fabrics, serpentinitized peridotites show three fabric types: [100] (010) type (A-type), [010] fiber type (AG-type) and [100] {0kl} type (D-type). Among them, D-type is developed under high stress and low water contents environment. D-type peridotites have coarse granular textures, indicating that the mantle below Celestial seamount could have been intensely deformed under low water contents environment. These features are quite compatible with those found in peridotites obtained by South Chamorro seamount.

Keywords: Mariana Trench, serpentinite seamount, peridotite