

## Ultradepleted olivine and spinel sands in Challenger Deep, Mariana Trench

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Peridotite has been studied extensively as a clue to understand the uppermost mantle structure. Abyssal peridotite is known to be exposed to the plate spreading axes such as mid-ocean ridges and the plate convergence margin such as trenches. Many studies have had interested in peridotites outcropped at the landside slope in the southern Mariana Trench. Challenger Deep (10,911 m depth) of Mariana Trench is the deepest in the Earth. However, it is difficult even today to sample rocks exposed at deeper slopes than 7,000 m depth due to technical problem. In 2008, JAMSTEC (Japan Agency for Marine-Earth Science and Technology) sampled a sediment core at 10,350 m in Challenger Deep by ABISMO (Automatic Bottom Inspection and Sediment Mobile). Mafic minerals such as olivine and spinel have been identified in this core. They may be derived from peridotites that could be exposed at deeper slopes than 7,000 m below the sea surface. Therefore, these mafic minerals may give us an opportunity to explore mantle peridotite at the bottom of Challenger Deep. We have chosen relatively coarse mineral grains from this core. These grains were analysed their chemical compositions by EPMA (Electron Probe Micro Analyzer). As a result, olivine, spinel, pyroxene, plagioclase, quartz and magnetite were identified. The olivine CaO are less than 0.07 wt%. Moreover, assuming that both spinel and olivine grains were derived from the same peridotites, spinel Cr# and olivine Mg# indicated that the peridotite could be in the mantle origin. The spinel Cr# are highly depleted up to 0.8, suggesting their origin from the forearc mantle. Olivine Mg# in the sediment core have been compared with those in peridotites occurred at the landside slope. It shows that olivine Mg# increase toward deeper slopes from 3,500 m depth. As a result, it suggests that these olivine and spinel grains could be derived from peridotites exposed at the deeper slopes than 7,000 m depth, possibly at very bottom of Challenger Deep, where unknown peridotites could have been highly depleted.

Keywords: Challenger Deep, olivine sand, spinel sand, forearc, boninite