

Structural development of backarc basin peridotites outcropped in the southern Mariana Trench

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N-S striking left-lateral faulting may have caused approximately 20 km of displacement along each of two fault zones in the southern Mariana fore arc. We examined an eastward-facing slope of one of the fault zones (named West Santa Rosa Bank fault) from 6469 m to 5957 m depth using submersible Shinkai6500 (YK06-12 Dive #973) with the research vessel (R/V) Yokosuka in 2006. This dive recovered a lithological assemblage of residual but still partly fertile harzburgite, residual harzburgite and dunite having mylonitic, porphyroclastic and coarse granular textures. The spinel compositions are comparable with those of Mariana Trough back-arc peridotites, suggesting that the backarc basin mantle is exposed along the West Santa Rosa Bank fault. Crystal-preferred orientations of olivine within these peridotites show a distinct [100](010) pattern with the fabric intensity decreasing from coarse granular to mylonites, which are similar to those in typical lithospheric mantle like that exposed in Oman ophiolite. These observations suggest that they were derived from the overriding lithospheric mantle extended from backarc peridotite above a subducting slab, which now outcrops along the West Santa Rosa Bank fault zone. Comparing with peridotites dredged from the upper level of the slope, these peridotites may result from intra-plate deformation of the overriding plate in association with a subducting slab tear inferred by bathymetric and seismic studies.