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Origin of hydrated peridotites associated with ultra high-pressure eclogites in Hispaniola, northern edge of Caribbean Plate

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Southwest-directed subduction of the Atlantic oceanic plate produced late Cretaceous Greater Antilles arc and accretionary prisms along the northern edge of Carribbean plate before colliding with North American Plate. A variety of HP to UHP rocks, including glaucophane schists and lawsonite-bearing eclogites, occur in the accretionary prism in association with partially to totally hydrated peridotites. We examined these peridotites in Dominican Republic from the west of Puerto Plata to Samana peninsula including the weakly hydrated Grt-bearing peridotites in Rio San Juan Complex, which have been reported by Abbott et al. (2004). Possible sources include ophiolitic cumulates hydrated on the sea-floor, abyssal peridotites exposed on the sea floor and hydrated peridotites in the wedge mantle.

Weakly hydrated peridotites (<5%H_2O) near San Francisco de Macoris contain primary Grt, Ol, Opx and Cpx with minor serpentine and amphibole. They are low in Cr (<1200 ppm), Ni (<700 ppm) and Ir-group PGE (<1.0 ppb Ir, 0.7 ppb Ru, 1.0 ppb Os), suggesting that they are cumulates of mafic melt. On the other hand, volumetrically dominant serpentinites (>10 %H_2O) has the assemblage of antigorite+talc+oxides with no primary silicate minerals. Secondary Ol and Opx are common with talc and brucite in the samples from the northern Rio San Juan Complex. Some porphyroblasts (~ 2mm) of enstatite contain brucite inclusions. Serpentinites from different locations all show high MgO (35-40 wt%), Cr (>2600 ppm), Ni (2100-3000 ppm) and Ir-group PGE, such as Ir (2.9-6.2 ppb) and Ru (6.0-12.0 ppb). They are low in CaO (< 0.8wt%), Al_2O_3 (< 3 wt%) and TiO_2 (<0.07 wt%). PGE show a negatively sloped PM-normalized patterns with low Pt-group PGE, suggesting their origin from a refractory mantle. This is further supported by the depletion of incompatible lithophile elements. Large volume of these peridotites relative to eclogites and the close spatial relationships between the two suggest that they were mantle peridotites once exposed on the sea floor on the slow-spreading Atlantic oceanic plate, subducted to a depth of > 100 km before the exhumation. Partial to total hydration of the peridotites likely contributed to the exhumation of eclogites.