Petrophysical analyses of peridotite xenoliths from Oki-Dogo Island

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To attain independent petrophysical constrains, I studied the peridotite xenoliths obtained from the Oki-Dogo Island and compare with Ichinomegata peridotite xenoliths (NE Japan) to discuss about the structure of the uppermost mantle evolution in the back-arc side of the Japan arc. Oki-Dogo peridotite xenoliths are 5-10 cm in size and mainly spinel lherzolites with a few harzburgites. The peridotite xenoliths are granular texture. Large xenoliths more than 3 cm have foliations defined by compositional banding and arrangement of spinel grains and a lineation by spinel shapes. All spinel lhrezolites have spinel with a low Cr# and their mineral assemblages and high NiO content in olivine, suggesting that they are of residual origin. Mg# of silicate minerals are lower (e.g. down to Fo86) in some spinel lhrezolites than in typical upper mantle residual peridotites. This indicates that the Fe enrichment occurred in mantle rocks during the metasomatism. Crystal-preferred orientations (CPO) of olivine and 2 pyroxenes were analyzed using a Scanning Electron Microscope (SEM) and Electron Back Scattered Diffraction (EBSD) technique. Slip system was determined by kink bands of olivine, and olivine CPO data, indicating {0kl}[100] slip. Moreover, peridotites having low olivine Mg# tends to show [010]-fiber pattern. This suggests that deformation of peridotites occurred with the fields under the presence of melts. Thus, the uppermost mantle peridotites in SW Japan were deformed under a condition in which melts existed as a result of the asthenosphere upwelling of the back-arc spreading.