Seismic properties and microstructures of peridotites xenoliths derived from Oki-Dogo

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A dense network of seismic stations has been developed across the Japan arc, so that the presence of seismic anisotropy below SW Japan has been investigated in the mantle wedge. To attain independent petrophysical constrains, we studied the peridotite xenoliths obtained from the Oki-Dogo Island and discuss about the structure of the uppermost mantle below the back-arc region of SW Japan arc. The peridotite xenoliths are 5-10cm in size. They are mainly lherzolites with a few hartzburgites. Large xenoliths more than 3cm have foliations defined by compositional banding and arrangement of spinel grains and a lineation by spinel shapes. Thick sections were made in XZ plane normal to the foliation and parallel to the lineation. The mineralogical composition is ol+opx+cpx+sp and most of them are spinel lherzolites. Crystal-preferred orientations (CPO) of olivine and pyroxene were analyzed using a Scanning Electron Microscope (SEM) and Electron Back Scattered Diffraction (EBSD) technique. 150-250 olivine grains were measured in each sample. Slip system was determined by kink bands of olivine, and olivine CPO data, indicating {0kl}[100] slip. Seismic properties of xenoliths were calculated using this CPO data and single crystal elastic constants. The fastest P wave propagates parallel to the [100] axes, while the slowest one propagates normal to the [100] axes. The polarization plane of the fastest S wave is parallel to the [100] axes. These results show the presence of seismic anisotropies with the uppermost mantle blow the SW Japan.