



Microstructures and seismic anisotropy of blueschist and eclogite from Ring Mountain and Jenner in California

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Seismic anisotropy has been observed in many subduction zones. During subduction of slab, the oceanic crust changes to blueschist and eclogite. Since minerals in blueschist are very anisotropic elastically, seismic properties in the subducting slab can be attributed to the lattice preferred orientation (LPO) of these minerals. We studied microstructures and seismic properties of blueschist and eclogite from Ring Mt. and Jenner in California. Blueschist samples are mainly composed of glaucophane, epidote and phengite. Eclogite samples are mostly composed of omphacite, glaucophane, epidote and garnet. We determined LPOs of minerals using SEM/EBSD and calculated seismic properties of minerals and whole rocks. LPOs of glaucophane showed [001] axes are aligned subparallel to lineation, and both (110) poles and [100] axes subnormal to foliation. Glaucophane in samples from Jenner, however, exhibited [001] axes forming a girdle subparallel to lineation. Seismic anisotropy of glaucophane was stronger in samples from Ring Mt. than those from Jenner. Epidote showed [001] axes are aligned subnormal to foliation and (110) and (010) poles subparallel to lineation. LPOs of phengite were characterized by a maximum of [001] axes normal to foliation, with (110) and (010) poles and [100] axes aligning in a girdle parallel to foliation. Phengite showed the strongest seismic anisotropy among major minerals. LPOs of omphacite showed [001] axes are aligned subparallel to lineation and [010] axes subnormal to foliation. Seismic anisotropy of omphacite were very weak. Blueschist from Ring Mt. showed stronger seismic anisotropy than those from Jenner. Especially, blueschist including abundant phengite showed very strong seismic anisotropy (AVP=30%, max.AVS=23%). Eclogite showed much weaker seismic anisotropy (AVP=7%, max.AVS=6%) than blueschist (AVP=12-30%, max.AVS=9-23%). Therefore, strong seismic anisotropy observed in subduction zone can be more affected by blueschist than eclogite.