Geophysical Research Abstracts
Vol. 21, EGU2019-6540, 2019
EGU General Assembly 2019

Lattice-preferred orientation of amphibole, chlorite, and olivine found in hydrated mantle peridotites and implications for seismic anisotropy

Haemyeong Jung and Hyunsun Kang

Seoul National University, School of Earth and Environmental Sciences, Seoul, Korea, Republic Of (hjung@snu.ac.kr)

Understanding lattice-preferred orientations (LPOs) of olivine is important in the study of seismic anisotropy and mantle flow of the upper mantle in the earth. Although olivine is the major mineral of the upper mantle, both amphibole and chlorite in a deformed peridotite may develop LPO and thus affect the seismic anisotropy in water-rich environments. However, it is not known whether the coexistence of LPO of amphibole and chlorite contributes to seismic anisotropy constructively or destructively. Therefore, the LPOs of amphibole, chlorite, and olivine in hydrated mantle peridotites from Bjørkedalen, southwestern Norway, were examined. In this study, the hydrated mantle peridotites showed three types of the LPOs of olivine, classified as A type LPO, B type-like LPO, and mixed LPO between the two types. Most of the olivines showed weak LPOs but amphibole and chlorite showed strong LPOs. High water content in olivine (440–690 ppm H/Si) and numerous hydrous inclusions in olivine and orthopyroxene indicated that water induced the fabric change of olivine from A type to B type-like LPO. The seismic velocity and seismic anisotropy were calculated on the basis of the LPOs of the studied minerals. It is found that the LPOs of both amphibole and chlorite can contribute to a strong trench-parallel seismic anisotropy in the subduction zone constructively, depending on the dip angle of flow. The results suggest that the development of the LPO of amphibole and chlorite can contribute significantly to seismic anisotropy of the subduction zone.