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# Experimental study on the crystal preferred orientation of glaucophane and epidote in epidote blueschist and implications for seismic anisotropy in subduction zones

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To understand deformation microstructures and seismic anisotropies of the subducting slab, deformation experiments of epidote blueschist were conducted in simple shear by using a modified Griggs apparatus. Deformation experiments were performed under the pressure (0.9–1.5 GPa), temperature (400–500 $^{o}$C), shear strain (0.6–4.5) and shear strain rate ($3.4\times10^{-5}$–$1.8\times10^{-4}$ $s^{-1}$). Crystal preferred orientations (CPOs) of minerals were determined by SEM/EBSD technique. The experimental results showed that CPO of glaucophane at the low shear strain ($\gamma \leq 1$) is characterized as the [001] axes aligned subparallel to the shear direction and the (010) poles aligned subnormal to the shear plane (type-1). At the high shear strain of $\gamma > 2$, however, the [001] axes of glaucophane were aligned subparallel to the shear direction and the [100] axes were aligned subnormal to the shear plane (type-2). CPOs of epidote in the deformed samples under low shear strain ($\gamma < 2$) showed mostly non-systematic fabric. However, the (010) poles of epidote at the intermediate shear strain ($2 < \gamma < 4$) were aligned subparallel to the shear direction and the [100] axes were aligned subnormal to the shear plane. On the other hand, at the high shear strain of $\gamma > 4$, the (010) poles of epidote were aligned subnormal to the shear plane and the [001] axes were aligned subparallel to the shear direction. Type-1 CPO of glaucophane was hardly reported in natural blueschists previously, but this glaucophane CPO could be possible to influence the trench-normal seismic anisotropy observed in the fore-arc region of some subduction zones. On the other hand, type-2 CPO of glaucophane, which has often been reported in natural blueschists, can cause the trench-parallel seismic anisotropy at the top of the subducting slab and at the slab-mantle interface.