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Fabric analyses of glaucophane and lawsonite in low-grade blueschist from Diablo Range, California

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Deformational microstructures of glaucophane and lawsonite in a lawsonite blueschist from New Idria serpentinite body, Diablo Range are studied to understand rheological behaviors of subducting oceanic crust. Glaucophane deforms by recovery and dynamic recrystallization possibly accommodated by dislocation creep, based on developments of crystal-preferred orientations (CPOs), small grain size and irregular or curved grain boundary. Euhedral or subhedral grains with angular or straight grain boundary of lawsonite suggest its deformation mechanism as rigid body rotation. Both minerals in glaucophane-rich layer (GR) show stronger CPOs, higher aspect ratios and lower angle to foliation (stronger shape-preferred orientation, SPOs) than those in lawsonite-rich area (LR), denoting that strain is mainly localized into the GR. In addition, stronger fabrics are observed in the GR rather than in the LR on the basis of fabric analyses (M=0.20, J=18.0 for glaucophane and M=0.21, J=9.6 for lawsonite in the GR, and M=0.18, J=16.0 for glaucophane and M=0.15, J=7.8 for lawsonite in the LR). All results of this study therefore indicate that rheological behaviors of subducting oceanic crust are mainly controlled by glaucophane rather than lawsonite.

Keywords: relative contrast, glaucophane, lawsonite, blueschist, subducting oceanic crust