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Rheological behavior of glaucophane and lawsonite in experimentally deformed blueschists

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We performed a series of simple-shear deformation experiments on blueschist at 400–500°C and 1–2.5 GPa. Microstructures of samples deformed at 1–2 GPa are brittle, while they deformed at 2.5 GPa display ductile features. J-indices of glaucophane CPOs systematically decrease by increasing shear strain and confining pressure, and the angle to the shear direction is similar to that of a strain ellipsoid. These results, together with the variable orientations of recrystallized fine grains in a SAED image at 2 GPa, suggest that the brittle-ductile transition of glaucophane occurs at ∼2 GPa. On the other hand, lawsonite shows abundant fractures in the most specimens and a poor correlation among the J-index, shear strain, and confining pressure. The results demonstrate the predominant role of glaucophane on rheology of blueschist rather than lawsonite. Considering a strong fabric in the starting material and dry experimental condition, the brittle-ductile transition of glaucophane could occur at much shallower pressure than 2 GPa. Therefore our results indicate the dehydration embrittlement of subducting oceanic crust as an important factor in the origin of intermediate-depth earthquakes.