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EBSD-measured crystal preferred orientations of Sanbagawa eclogites

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Electron backscattered diffraction maps and crystal preferred orientations of the two types of eclogites in the subduction-related high-pressure/low-temperature type Sanbagawa metamorphic belt, central Shikoku, Japan have been reported. Type 1 eclogite (garnet: 43%, omphacite: 35%, secondary actinolite: 7% and hornblende: 5% with minor quartz, muscovite and rutile), garnet-rich and dark green, have strong crystal preferred orientations in omphacite and rutile, weak but complex fabric pattern in garnet suggesting their deformation during peak eclogite facies stage. Type 2 eclogite (omphacite: 41%, garnet: 39%, retrograde hornblende: 11% with minor quartz, epidote/zoisite, rutile and titanite), omphacite-rich and light green, also show identical fabric to that of type I. Crystal preferred orientations (CPOs) of minerals in both types show that omphacite has the strongest CPO along [001]-axes and $\{011\}$-poles, suggesting intracrystaline flow along [001]$\{110\}$ and [001](100) slip systems representing subduction-related deformation rheology at mantle depth. Fabric preserved in rutile (stable at eclogite facies) is identical to omphacite with maxima along [001]-axes also indicate same deformation mechanism. Amphibolite facies minerals (e.g., hornblende and actinolite) exhibit similar CPOs to that of omphacite, indicating homotaxial crystal growth/recrystallization after the replacement of omphacite during late-stage retrogression. In both type eclogites the deformation was mainly accommodated in omphacite which developed L-type fabric, representing a constrictive stress regime. Based on jadeite content ($>$0.35 in type 1 and $<$0.3 in type 2) in the omphacite in both type eclogites there is no clear correlation for the development of L-type fabric in relation to the cation ordered-disordered structure despite of slightly different equilibration temperatures. Garnet, behaving as rigid body, exhibit complex CPO and do not show any clear plastic deformation.

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