

Strain path of rocks within the Cretaceous metamorphosed accretionary complex in Japan

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To clarify the deformation history of rocks within the metamorphosed accretionary complex, we carried out a strain analysis of the metamorphosed Jurassic Cretaceous accretionary complex in Japan. We studied the strain geometry and strain path of upper greenschist to lower amphibolite facies metamorphic rocks of contrasting lithologies (i.e., metapelite and metachert) from the low-grade and high-grade parts of the Cretaceous low-pressure/high-temperature Ryoke metamorphic belt. Strain analysis focused on deformed radiolarian fossils in the metachert and pebbles in the metapelite. The metachert records flattening strain, whereas the samples of metapelite record flattening (non-folded samples) and constrictional strain (folded samples). The samples that plot in the flattening field may record strain related mainly to the schistosity-forming deformation, whereas the samples that plot in the constriction field may record the total tectonic strain of both the schistosity-forming deformation and late-stage upright folding. The fold structures observed in the layered metachert are distinct from those in the metapelite; it is likely that they mainly formed during accretion. The preservation of primary fold structures in the metachert may reflect lower strain than that in the metapelites for the period during and after the main metamorphism event. On the other hand, in the low-grade part, all of the metapelites exhibit plane strain to general flattening strain. Combining our data with those for the high-grade metapelites reveals that the strain path of early bedding-normal compression resulting in flattening strain, while subsequent bedding-parallel compression generated the final prolate shapes of the pebbles. The strain path proposed here is markedly different from those described in previous studies, and is a fundamental factor in constraining the deformation history of rocks within the metamorphosed accretionary complex.