Conglomeratic sandstone-derived mylonite discovered from a highly metamorphosed Cretaceous accretionary complex

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The Kerama formation in the Kerama Islands, the Ryukyu Arc, located at the southwestern end of the Shimanto Belt, has a maximum temperature of 470-530˚C. Presence of greenstones intruded into the clastic rocks is considered to record 100-90 Ma ridge subduction along the Ryukyu Arc (Yamamoto et al., this meeting). In the Kerama formation, foliation of greenstone, sandstone, and pelitic phyllite is parallel to bedding plane and dips SW in general. Stretching mineral lineations and fibers of layer-parallel quartz veins on the foliation exhibit NW–SE trend. Axes of asymmetric folds observed in pelitic phyllite show NE–SW trend, suggesting top-to-SE thrusting shear. Fold axes are perpendicular to stretching lineations. High-angle normal faults branching from low-angle normal fault are found in pelitic phyllite. These deformation features are classified into three deformation stages: D_1 (underthrusting), D_2 (underplating) and D_3 (exhumation), respectively.

Strongly deformed rocks of D_2 stage originated from conglomeratic sandstone occur in the Kerama Formation. The deformed rocks show myronitic texture with shear bands of fine-grained quartz, and such rocks have not reported from other areas of the Shimanto Belt. Here we call it conglomeratic sandstone mylonite.

We performed SEM-EBSD analysis of the crystallographic preferred orientation of recrystallized quartz in the conglomeratic sandstone mylonite. The EBSD patterns of most of the samples show random fabric, but some shows a type II crossed girdle fabric. The deformation temperature was estimated as 530˚C according to the thermometer of Faleiros et al. (2017), and differential stress was estimated to be 27 MPa by the piezometer of Cross et al. (2016). These values are consistent with flow law of quartz (Hirth et al., 2001).

In the Shimanto Belt in Kyushu, Palazzin et al. (2016) reported that plastic deformation of quartz begins at about 300˚C. Considering the temperature conditions, the strength of the subduction plate boundary may be primarily controlled by plastic deformation of quartz at temperatures of ˜300-530˚C.

