Geology, deformation, and metamorphism of high-grade Shimanto accretionary complex in Kerama Islands, Okinawa, Ryukyu arc

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The along-arc distribution of accretionary complexes in the Japanese Islands is extended to the Ryukyu arc. Kerama Islands is located at the southwestern edge of the Cretaceous to Paleogene Shimanto belt, 30 km away from Naha, Okinawa. Geology of Kerama Islands was reported until 1980s (Kashima and Takahashi, 1978; Kizaki and Yamamoto, 1985). Previous study shows that mineral composition of greenstone (epidote + actinolite) suggests high-*T* metamorphic condition and geochemical features of greenstone correspond to N-MORB (Chinen *et al.*, 2004). However, neither depositional age nor deformation structures of Kerama Islands has not been analyzed yet. In this study, we report lithology, deformation structure, depositional and metamorphic age, and peak paleotemperature of Kerama Islands to reconstruct formation history of accretionary complex. Implication of tectonic background in this area will be presented in “New perspectives on the geodynamics of East Asia” (S-IT29) session of this meeting.

In agreement with previous studies (Kashima and Takahashi, 1978; Kizaki and Yamamoto, 1985), our new geological map shows that the bedrock of Kerama Islands is made up of a pile of three lithological units, greenstone, metasandstone, and pelitic schist in ascending order. Metasandstone unit is characterized by massive metasandstone including psammitic schist layers. Dynamically recrystallized quartz grains are commonly observed under a microscope. Pelitic schist unit, which often consists of alternation of pelitic and psammitic schist, shows well-defined schistosity and overlies metasandstone unit with conformity boundary. Detailed observation of the contact between the top of greenstone unit and the bottom of sedimentary rock layer shows that the boundary records intrusion of basaltic lava, the protolith of the greenstone. In contrast, bottom of the greenstone unit is characterized by “conglomerate mylonite” originated from gravel sandstone, which records evidence of ductile shear deformation along an estimated thrust forming duplication of greenstone and metasediments.

Foliation of green, pelitic, and psammitic schists is parallel to bedding plane and dips SW in general. Stretching lineations and fibers of layer-parallel quartz veins on the foliation exhibit NW-SE trend. Axes of asymmetric folds observed in pelitic schist unit show NE-SW trend, suggesting top-to-SE shear. The fold axes are perpendicular to stretching lineations. High-angle normal faults branching from low-angle normal fault are found in pelitic schist unit. These deformation features are classified into three deformation stages: D1 (underthrusting), D2 (underplating) and D3 (exhumation), respectively.

U-Pb ages of detrital zircon grains obtained from metasandstone in Kerama Islands were carried out using LA- ICP-MS installed at the National Museum of Nature and Science. The youngest age of zircon is 104-110 Ma (early Cretaceous) and no zircon grains with late Cretaceous age is obtained.

We examined peak metamorphic temperature of pelitic schist and conglomerate mylonite. Raman spectra of carbonaceous materials in thin section of the samples are obtained using a Raman spectrometer with a 532 nm Nd-YAG laser (system installed at Nagoya University). The result shows that the bedrock of

Kerama Islands suffered 470-525˚C, which is consistent with the temperature range of metamorphic facies proposed in the greenstone.

The depositional age of the protolith of Kerama metamorphic rock is ˜100 Ma, corresponds to that of the northern part of the Shimanto belt. However, metamorphic temperature of the metamorphic rock in Kerama Islands is definitely higher than any reported temperatures in the Shimanto belt. Based on protolith age and metamorphic condition, Kerama metamorphic rock would be correlated to Sanbagawa belt in SW Japan (Itaya *et al.*, 2011; Aoya and Endo, 2017), Nagasaki metamorphic rock (Kouchi *et al.*, 2011), or Tananao schist belt in Taiwan (Chen *et al.*, 2016).

