Latest Carboniferous mid-Panthalassan reef biota from the Kano-yama limestone in the Chichibu Accretionary Complex

*Kohei Tominaga[1], Ken-ichiro Hisada[2], Katsumi Ueno[3]

1. Doctoral Program in Earth Evolutionary Science, Graduate School of Life and Environmental Sciences, University of Tsukuba, 2. Graduate School of Life and Environmental Sciences, University of Tsukuba, 3. Faculty of Science, Fukuoka University

Reef building organisms in the mid-Panthalassan Akiyoshi limestone in Akiyoshi Accretionary Complex, southwest Japan are characterized by boreal element in the latest Carboniferous, and Nakazawa et al. (2011) discussed the climate change affected by Gondwana glaciation in the tropical and subtropical areas in mid-Panthalassa. The geographical distribution of these biota in the mid-Panthalassan ocean, however, has not been revealed. In this study, we report reef building biota of the Kano-yama limestone in the Jurassic Accretionary Complex and discuss spacial distribution of these organisms in mid-Panthalassa.

The Kano-yama limestone in the Kanto mountains belongs to the Hebiki Unit of the Jurassic Northern Chichibu Accretionary Complex (Kamikawa et al., 1997). Early Jurassic (Sinemurian–Pliensbachian) radiolarian fossils are reported from the shale matrix of the Hebiki Unit (Hisada & Kishida, 1987). The Kano-yama limestone yields Moscovian (late Carboniferous) to Wordian (middle Permian) fusuline fossils (e.g. Takaoka, 1977), and the studied sections in the Kanoyama limestone are dated here as Gzhelian (latest Carboniferous) based on the fusuline taxa such as *Daixina sokensis* and *"Pseudofusulina" kumoasoana*. A basalt block occurs at the vicinity of the southern boundary of the Kano-yama limestone, and the geochemical characteristics of the basalt block are similar to that of ocean island basalt.

The microfacies of the Kano-yama limestone is grouped as seven types; algal bafflestone (MF1), microbial bindstone (MF2), crinoidal packstone-rudstone (MF3), fusuline packstone (MF4), wackestone-mudstone (MF5), bioclastic grainstone (MF6), and oolitic grainstone (MF7). MF1 and MF2 contains calcareous algae, *Anthracoporella* and *Palaeoaplysina* in growth position, and they are encrusted by calcimicrobes such as *Archaeolithoporella* and *Tubiphytes*. Interstitial sediments are composed of bioclasts, lime-mud, and peroids, and open space filled by cements are also recognized. MF3–5 consists of bioclast grains with lime-mud matrix. In contrast, lime-mud is absent in MF 6 and MF7, which consists of well-sorted sand sized grains with open space filling cements.

The depositional environment of the Kano-yama limestone is estimated as back-reef environment because the limestone show no evidence of slope facies such as large intraclast supplied from reef edge or grading structure formed by turbidity current. MF1 and MF2 composed patchily distributed mounds in lagoon that is correspond to MF 3–5. MF6 and 7 is considered to be sand shoal in back-reef environment. *Anthrecoporella* and *Palaeoaplysina* in MF1 acted as buffler in the patch mounds, whareas *Archaeolithoporella* and *Tubiphytes* are the binder. The *Palaeoaplysina* and microencruster biota of the Kano-yama limestone are similar to that of the mid-Panthalassan Akiyoshi limestone in the Permian Accretionary Complex (Nakazawa et al., 2011).

The Kano-yama limestone has been drifted more than 5,000 km during the period of latest Carboniferous to Early Jurassic (300–190 Ma) based on reconstructed plate motion velocity of the Izanagi Plate (Müller et al., 2016; Matthews et al., 2016). On the other hand, Wordian to Wuchapingian (Middle to Late Permian; 260–270 Ma) time of accretionary age of the Permian Accretionary Complex show the drifting time of the Akiyoshi limestone to be only 40 million years. This short drifting time imply that these

limestones are nearer to the subduction zone than the Kano-yama limestone. Thus, the Kano-yama limestone was inferred to be located far from the Akiyoshi atoll. The reef builders in the Kano-yama limestone imply that the *Palaeoaplysina*-microencruster community have been distributed widely in the Panthalassan ocean during the glacial age in latest Carboniferous.

Keywords: Panthalassa, seamount, limestone, reef-builder, Carboniferous