東南アジア地域に分布する大陸衝突型変成岩類の岩石学

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Abstract

The Southeast Asia is considered as the Permian-Triassic multiple-continental collision zone, where five blocks (South China, Indochina, Inthanon, Sibumasu and West Burma) and four boundaries are located. Recently, the metamorphic rocks, distributed in the boundary between the South China and Indochina blocks, are thought to be formed by continental collision (e.g., Osanai et al., 2008). Tectonic evolutions of other block boundaries are still obscure since the correct locations of boundaries are still discussed. This thesis reports petrological, geochemical and geochronological new data from two blocks boundaries such as the South China/Indochina boundary and the Inthanon/Sibumasu boundary. Especially, this study focused on the Cangshan Mountains in the South China/Indochina boundary and the Nujiang Zone possibly in the Inthanon/Sibumasu boundary.

The Cangshan Mountains is considered as the northern extension of the Trans Vietnam Orogenic Belt (TVOB; Osanai et al., 2008) that is thought to have formed by a continental collision between the south China and Indochina blocks in Permian-Triassic times. Metamorphic rocks in the Cangshan Mountains are characterized by medium-pressure (*P*) metamorphism, up to upper amphibolite facies (750–800 ºC and 10.5–12.5 kbar). Every metamorphic rock indicates medium-*P* field metamorphic gradient, hence, they might receive Barrovian-type metamorphism, which occur during continental collision. Moreover, the estimated pressure-temperature (*P-T)* path of the Cangshan Mountains is similar as the path from the Kham Duc complex in the Kontum Massif (in TVOB). The detrital zircons of the Cangshan Mountains show common age peak with the Kontum Massif. Furthermore, the Cangshan Mountains have extra hinterland that might be related with the Carboniferous magmatism. Based on the similarity of the *P-T* path and peaks of detrital zircon, the metamorphic rocks from the Cangshan Mountains could be formed same continental collision event. Meanwhile, Major and trace element compositions of these TVOB metamorphosed mafic rocks indicate an overall tholeiitic affinity, but suggest a wide array of tectonic settings for the precursor mafic magmas, including volcanic-arc basalt (VAB), mid-ocean ridge basalt (MORB) and within-plate basalt (WPB). Thus, the basis of the distributions of each type of mafic metamorphic rocks and their metamorphic grades, there were arc and oceanic crust between the South China Craton and the Indochina Craton.

The Inthanon/Sibumasu boundary (Nujiang Zone, Mogok Metamorphic Belt and Inthanon Zone) was not well revealed their distribution and tectonic evolution. The Nujiang Zone is located in the northern part of the Inthanon/Sibumasu boundary. The feature of metamorphism in this region is low-*P* metamorphism and associated large granite bodies. Based on detailed analysis of the garnet inclusion, medium-*P* metamorphic event, which prior to low-pressure (*P*) metamorphism, was newly found.

The assumed metamorphic condition at the medium-*P* metamorphic event is around 500 ºC and higher than 6 kbar. The metamorphic conditions of the low-*P* metamorphism are estimated at 700–780 ºC and 4–6 kbar from garnet-sillimanite-biotite gneiss, 750 ºC at 5 kbar from garnet-cordierite-biotite gneiss. This low-*P* metamorphic condition is also estimated from the Mogok Metamorphic Belt and the Inthanon Zone. According to the U-Th-Pb monazite age, this boundary is characterized by the Late Triassic event and the Cretaceous event. In addition, this age is also recognized in the rim age of zircon from the garnet-sillimanite-biotite gneiss. Therefore, the Late Triassic age and the Cretaceous age are related with medium-*P* metamorphism and low-*P* metamorphism, respectively. As geochemical features, through the Inthanon/Sibumasu boundaries shears appearance of MORB and VAB derived metamorphosed mafic rocks. This evidence might mean that oceanic crust and volcanic arc were distributed between the Inthanon block and the Sibumasu block.

Comparing the metamorphism and metamorphic age of both boundaries, the Late Triassic Inthanon and Sibumasu blocks collision is regard as one of the Permian-Triassic multiple continental collision event in Southeast Asia. In addition, based on the similar assemblages of inter-continental materials within the both boundaries, subduction of oceanic crust and volcanic arc forming were caused in each boundary as general subduction zone. This similarity might be common geological characters of Southeast Asia, where is one of the multiple continental collision zone.