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P-T paths of tectonic blocks in the Kamuikotan metamorphic rocks, Etanbetsu-Horokanai district, Hokkaido

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The Kamuikontan metamorphic rocks are known as typical high-P/T type metamorphic rocks formed at convergent plate boundaries at Cretaceous, northern Japan. On these rocks, a number of studies were conducted in 1980s, but since then few studies have been conducted and their tectonics has not been fully interpreted. In the study area, Etanbetsu-Horokanai district, the Kamuikontan rocks are characterized by the paragenesis of lawsonite and glaucophane, and suffered the highest pressure metamorphism (Sakakibara and Ota, 1994) in the Kamuikotan rocks. In this area, while accretionary sediments suffered a high-P/T type metamorphism (prograde rocks), epidote-amphibolite and epidote-garnet amphibolites indicating medium pressure type metamorphism also occur as tectonic blocks, which later suffered the same high-P/T type metamorphism as the sediments did (retrograde rocks, Ishizuka and Imaizumi, 1980; Ishizuka et al., 1983). It is inferred that amphibolite originated from layered gabrro, which is somewhat similar to the Horokanai ophiolite. Further, although blueschist which originated from basalt is classified as prograde rocks by these authors, the amphibolite and blueschist could have been derived from the same oceanic crust, as discussed below. If so, a series of ophiolitic rocks was brought to the subduction channel by tectonic erosion, where the formation of the Kamuikotan rocks proceeded.

We have analyzed mineral assemblages in these rocks (tectonic blocks), and conducted micro-chemical analyses of compositional zoning in amphiboles from these rocks with an EPMA. Among two blueschist samples collected from the Etanbetsu pass, amphiboles from one sample (falling rocks) show a zoning where actinolite core (Al(IV)=0.17-0.33, Na(B)=0.38-0.43) is overgrown by glaucophane rim (Al(IV)=0.003-0.024, Na(B)=1.81-1.86), while ones from the other sample (outcrop rocks) almost uniformely show a composition of winchite. On the other hand, amphiboles in an epidote-amphibolite sample from the Horokanai pass have a zoning where actinolite-actinolitic hornblende core (Al(IV)=0.33-0.71, Na(B)=0.09-0.40) is overgrown by thin glaucophane rim (Al(IV)=0.009-0.079, Na(B)=1.39-1.85). Accordingly, amphiboles in the amphibolite and blueschist have a similar zoning, and thus these rocks could have been derived from the same ophiolitic rocks. For epidote constituting these amphibolite and blueschist, an interesting observation is that some epidote grains were severely fractured often forming microboudins, while the other grains show idiomorphic shape, and not fractured at all. Hence, there may be a possibility that epidote grains were formed at two distinct stages. It is anticipated that the relation between P-T path and deformation stage will be inferred in the future by analyzing pistasite component of epidote.

Keywords: Kamuikotann metamorphic rocks, high-P/T type metamorphism, tectonic blocks, tectonic erosion, compositional zoning in amphibole, pressure-temperature paths