# Structural geology of Hidaka Metamorphic Belt in the Mt.Nozuka and Mt.Rakko area, Hokkaido,JAPAN -Growth process and mechanism of the Cenozoic continental crust-

*Moeko Kanno[1], Tsuyoshi Toyoshima[2], Hayato Ueda[2]

1. Graduate school of Science and Technology, Environmental Science and Technology,Earth science, 2. Niigata University, Faculty of Science,Department Geology

Hidaka metamorphic belt (HMB) of the southwestern part of Hidaka belt, Hokkaido, northern Japan, was regarded as an island¬−arc type crustal slab formed by prograde metamorphism up to granulite-facies and voluminous partial melting during early Eocene (e.g. Osanai et al., 1992). However, Shimura et al. (2015) and Takahashi et al. (2017, 2018) recently proposed that HMB consists of two different metamorphic belts formed during 40–30 and 19 Ma respectively and there is the former on the latter. Shimura et al. (2018) also showed 40–30 Ma metamorphic rocks suffered 19 Ma metamorphism. Moreover, Jahn et al. (2014) reported granites were generated during 45–46 and 37 Ma in the northern part of Hidaka belt. From these new zircon ages, the necessary of reconstruction of tectonics of HMB was drawn.

We carried out structural analysis and zircon U–Pb geochronology of the Hidaka metamorphic and plutonic rocks from the Niobetsu River and Menasyunbetsu River regions, in order to discuss tectonics of HMB.

In the study area, HMB consists mainly of S-Type tonalite (Grt tonalite and Grt-Bt tonalite), I-Type tonalite (Hbl-Bt tonalite), Niobetsu complex (Owada et al., 2004), amphibolite and pelitic and psammitic gneisses. Niobetsu complex, consists of gabbro and diorite. Metamorphic inclusions are observed in S-Type tonalite and Niobetsu complex. Metamorphic rocks in the study area are of zones III and IV (Osanai et al., 1992). Metamorphic inclusions are also of zones III and IV. Most of the rocks align along a NW–SE trend except for N–S trending Niobetsu complex.

Newly obtained zircon U-Pb ages reveal three magmatic stages, two in Eocene at about 45 Ma (S-type tonalite), and about 33 Ma (I-type tonalite), and one in Miocene at about 19 Ma (diorite of Niobetsu complex) in HMB of the study area. Because these plutonic rocks are accompanied by migmatites and metamorphic inclusions, it is possible that three stages of magmatism went with metamorphism and HMB was formed by three stages of metamorphism.

Asymmetrical magmatic flow structure like S-C-C' fabric of mylonite is observed in margins of Niobetsu complex, indicating a normal sense of shear. The asymmetrical structure suggests that Niobetsu complex intrusion and magmatic flow occurred under extensional conditions.

In the study area, three stages of mylonitization are recognized: Dm1, Dm2, and Dm3 stages. Dm1, Dm2, and Dm3 mylonitizations were caused by dextral to dextral-normal sense, dextral to dextral-reverse sense, and dextral−sense of shear respectively. Mineral lineation in Dm1 mylonite plunges gently toward the southeast. Dm3 mylonitization is concentrated in rocks near the Hidaka Main Thrust.

Dm1 mylonitization showing dextral to dextral-normal sense of shear occurred under dextral transtensional conditions. In the northern− central parts of HMB, mylonitization of basal−lower S-type tonalites occurred under dextral transpressional conditions (Toyoshima et al., 1997). Basal−lower S-type tonalites in the northern and central parts of HMB are the products of 19 Ma magmatism (Kemp et al., 2007), while S-type tonalites in the study area are the products of 45 Ma magmatism. Therefore, it is possible that the dextral transtension and dextral transpression occurred during different deformation stages. Another possibility is when the dextral transtension and dextral transpression occurred during the

 

same deformation stage (Dm1). In this possibility, Dm1-mylonitizaton caused pivotal movement, rotation of shear plane, and the difference in type of fault between the northern–central and southern parts.

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