

Relationship between peak metamorphic condition and geological structure in the upper sequence of Hidaka Metamorphic Belt

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The relationship between peak metamorphic condition with Raman Spectra in Carbonaceous Material (RSCM) thermometry (Beysacc et al., 2002, Rahl et al., 2005), illite crystallinity (Mukoyoshi, et al., 2007) and geological structure in upper stream of Satsunai River, where belongs to upper sequence of Hidaka Metamorphic Belt (HMB) is reported in this study. In this study area, pelitic and psammitic metasediments, solely turbidite of Nakanogawa Group, underwent greenschist to amphibolite facies metamorphism during prograde metamorphism. These metasediments are divided into four metamorphic zones on the basis of mineral assemblages and peak metamorphism (zone Ia to IIb). Very low to low-grade metasediments in zone Ia and Ib are composed of muscovite and chlorite as metamorphic minerals, and the temperature estimations using illite crystallinity and RSCM thermometry (Aoya et al., 2010) range between 200 to 400°C. With increasing metamorphic temperature, metasediments in zone IIa and IIb are mainly composed of biotite and muscovite, and with rare cordierite porphyroblast and andalusite which are mostly altered to muscovite in pelitic layer. The temperature estimations using RSCM thermometry range between 400 to 600°C.

Ms-Chl metasediments in zone Ia and Ib show only NE-SW to N-S striking bedding planes, whereas, Ms-Bt metasediments in zone IIa and IIb show not only bedding plane but also biotite schistosity with increasing metamorphic condition, which is slightly oblique to the bedding planes. These regional biotite schistosity and bedding planes are regionally folded with nearly upright tight folds having N-S to NE-SW trending fold axis. Mylonite and cataclasite zones, which cut the regional schistosity and bedding planes partly developed in this study area.

On the basis of regional geological structure and temperature estimation, we attempted to compare the geothermal gradient and cross section of geological map. In zone IIa and IIb, estimated geothermal gradient by peak metamorphism progressively increase at 39~47°C / km ($R_2 = 0.8\sim0.9$), respectively. These data show relatively higher geothermal gradient than that of previous studies (Osanai et al., 2007). In addition, low-grade metasediments in zone Ia and Ib show the discordant temperature

trend. These data suggest that low-grade metasediments modified the geological structure after peak metamorphism. Detailed relationship between peak metamorphism and tectonic evolution of upper sequence of HMB is going to discuss in poster session.

References

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