On the evaluation of the phengite K-Ar age of the Lawsonite blueschist: Examples from the Horokanai area in the Kamuikotan Belt and the Hakoishi-unit in the Kurosegawa Belt.

*Takao HIRAJIMA[1], Kosuke Naemura[2]

1. Kyoto University, 2. Iwate University

We carry out phengite K-Ar dating of four blueschists containing Lws, Pmp and Ep (Tpriple-point blueschist) in the Horokanai area of the Kamuikotan Belt and obtain two age clusters of 123-127 Ma and 105-109 Ma even for the same grade rocks. In order to evaluate the results, the chemical composition and the degree of chloritization of the phengite, and the grain size and K contents (wt.%) of the separated fractions were examined. Chemical compositions of phengites are Si=3.4-3.6 apfu (O=11) in all four samples, confirming that it was formed under LT/HP metamorphism. On the other hand, the phengite dated at 123-127 Ma was relatively coarse-grained (up to about 1 mm wide) and rare chloritized, and its composition was plotted on the line connecting the muscovite-celadonite join on the Si-Al diagram. In contrast, the phengite dated at 105-109 Ma was fine-grained (<10 μm) and markedly chloritized. On the Si-Al diagram, particles with Si=3.5-3.6 are plotted on the abovementioned line, whereas phengite with Si<3.5 deviates from the line and suggesting that it is mixed with chlorite. Grain size and K contents (wt.%) of the phengite fractions are ranging from 50 to 120 μm and 4.65/4.22wt% for samples dated to 123-127 Ma, and from 0.2 to 2 μm and 1.80/2.71wt% for samples dated to 105-109 Ma. As described above, the phengite fractions that exhibited 105-109 Ma had low mica purity and small grain size. These two factors suggest a rejuvenation of the phengite K-Ar age (Itaya et al., 2011). Sato et al. (2014) reported K-Ar ages for three phengite fractions isolated from two pelitic schists (OD28 and OD113) containing Lws, Na-amphibole and Na-pyroxene in the Kurosegawa Belt, Kyushu, as follows:
OD28: 299 Ma, 50-100 μm, 5.32wt%,
OD113: 280 Ma, 50-75 μm, 1.22wt%,
OD113: 245 Ma, 0.5-2 μm, 2.14wt%,
Based on the results of Sato et al. (2014) and Lu et al. (2022), that fraction size has a significant influence on the rejuvenation of phengite age rather than impurity of phengite.

Keywords: Phengite K-Ar age, Lawsonite blueschist, Reasons for age rejuvenation, Horokanai area, Hakoishi sub-unit