

Heterogeneous excess argon in metabasic rocks and amphibolites from the Ogcheon belt, Korea

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The Ogcheon metamorphic belt has been discussed as a possible eastward extension of the Dabie-Sulu belt, the suture zone in northern China together with Imjingang belt in Korea using some geochronological data of metabasic rocks and amphibolites. However, K-Ar and $^{40}\text{Ar}/^{39}\text{Ar}$ ages of amphibole separates from the rocks are so variable from Early Triassic to Neoproterozoic, requiring the more sophisticated age dating technique to reveal tectono-metamorphic evolution of the belt. We carried out $^{40}\text{Ar}/^{39}\text{Ar}$ analyses of amphiboles by laser probe step heating and spot dating techniques using single mineral grain from the metabasic rocks and amphibolites to examine the previous geochronological data.

The metabasic rocks occur as forming lenses or layers in the metasedimentary rocks. The lens and layer types of rocks have the same assemblage of amphibole + plagioclase + epidote + titanite + quartz with minor allanite and zircon. The former occurs in the psammitic rocks, and contain extremely coarse-grained amphiboles (0.5 - 2 cm), which are random in orientation. The latter is concordantly intercalated in the psammitic and hematite-bearing siliceous rocks. Amphiboles occur in parallel to main foliation of rocks and have some variable in grain size (0.5 - 5 mm). Amphibolites are composed of the foliated and unfoliated types. Both have amphibole, plagioclase and quartz with minor epidote, biotite, chlorite, calcite, apatite, titanite and Fe-Ti oxide. Microprobe analyses indicated that amphiboles are higher in Si p.f.u value ($0 = 23$) in the layered metabasic rocks and foliated amphibolites (6.70 - 7.80) than the lens type metabasic rocks and non-foliated amphibolite (6.4 - 6.8), showing that the deformed rocks have amphibole with higher Si values.

$^{40}\text{Ar}/^{39}\text{Ar}$ age spectra and $^{37}\text{ArCa}/^{39}\text{ArK}$ ratios of single amphibole are quite disturbed and variable. However, there is a tendency that the layer types are younger than the lens types in the same outcrop and the former has the amphiboles with high Si value than the latter. The spot dating revealed the heterogeneous age distribution (145 - 1200 Ma) in a single grain from the lens type metabasic rock. These data clearly indicate that amphiboles have been incorporated by heterogeneous excess argon during the metamorphism of mafic igneous rocks. This suggests that the previous argument using the amphibole $^{40}\text{Ar}/^{39}\text{Ar}$ data was wrong because the data are geologically meaningless.