

Paleozoic multiple thermal events in the Altai Range, Mongolia

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Altai Mountains are mainly situated in western Mongolia and northwestern China where correspond to heart of the Central Asian Orogenic Belt. The orogenic belt is the largest and longest-lived accretionary and collisional orogen on Earth, from the Ediacaran to the Permian. Therefore, study of Altai Mountains may provide some constraints on the growth of continent during the Paleozoic period.

The Altai Mountains are composed mainly of Paleozoic sedimentary and metamorphic rocks that were intruded by voluminous granitic intrusions. The metamorphic rocks that are focused in this study are in thrust contact with surrounding sedimentary rocks. Two metamorphic age clusters have been identified by our widespread monazite U-Th-Pb EMP dating; c. 350 Ma and 260 Ma. Samples containing normal-zoned garnet yield an age of c. 350 Ma or 260 Ma. However, samples containing garnet that shows discontinuous zoning in Ca have two monazite ages (i.e. c. 350 Ma and 260 Ma). The younger monazite grains are observed in the matrix and in garnet rim. Therefore, based on the metamorphic ages, there are three rock types; 1) rocks metamorphosed at 350 Ma, 2) at 260 Ma, and 3) both at 350 Ma and 260 Ma. Detrital zircon U-Pb ages from all three rock types show similar features each other, which are also consistent with the zircon ages in surrounding accretionary prism.

The 350 Ma metamorphic event that is well-preserved in the rocks from the western Altai Range, has been considered to be related with arc setting and burial of accretionary prism. The metamorphic pressure-temperature gradient and prograde metamorphic trajectory are various may due to the effect of ridge subduction during this period. The 260 Ma metamorphism mostly observed in rocks from the eastern Altai Range is characterized by hairpin-shaped anticlockwise pressure-temperature path. Considering the metamorphic age (c. 260 Ma) and the youngest age of the surrounding accretionary prism (Carboniferous), the event is final activation event in the Central Asian Orogenic Belt that may relate with closure of ocean and continental collision tectonics. During the presentation, we will discuss on the metamorphism and the ages.

キーワード : metamorphic rocks, Altai Range, Mongolia

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