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Petrology and geochronology of metamorphic rocks in the Hanhohiyin Mountains, the northwestern part of Mongolia.

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Mongolia is situated in the Central Asian Orogenic Belt (e.g. Mossakovsky et al., 1993), which extends between the Siberian craton, Baltica craton, North China craton and Tarim craton. It is composed of subduction-accretion complexes and developed from c. 1000 Ma to c. 250 Ma (Windley et al., 2007). Metamorphic rocks are partly distributed in the western part of Mongolia. Metamorphic history would be a key for understanding the tectonic evolution of this area, however detailed study on metamorphic rocks has not been well-documented, including geochronology.

Recent fieldwork of the Japan-Mongolia Joint Geological Research has identified several occurrences of high-grade metamorphic rocks in the Mongol-Altai Mountains and Hanhohiyin Mountains (e.g. Nakano et al., 2010). In this study, we report petrology and monazite U-Th-Pb EPMA ages on metamorphic rocks occurring in the Hanhohiyin Mountains.

Hanhohiyin Mountains is located in the northwestern part of Mongolia. The mountains are mainly composed of marble, meta-quartzite and pelitic gneisses intercalating with lenticular garnet-amphibolite, garnet-orthopyroxene gneiss and so on.

Pelitic gneiss is mainly composed of quartz, plagioclase (An=31), garnet (Alm68Sps8Prp20Grs4), biotite (XMg=0.53) and sillimanite. Kyanite occurs only as inclusions in garnet and plagioclase, which indicates that kyanite is prograde relic. Most minerals have almost homogeneous chemical composition. Metamorphic condition for quartz+plagioclase+garnet+biotite+sillimanite assemblage is estimated as 650-700 degree of Celsius and 5.5-6 kbar based on the garnet-biotite thermometer and the GASP barometer. Monazite grains in pelitic gneiss show slight chemical heterogeneity and occur in matrix and as inclusions in the major constitute minerals. The monazites yield 500-510 Ma which would be interpreted as the timing of metamorphism within the sillimanite stability field.

In the Central Asian Orogenic Belt, at least two distinct age clusters are recognized: 250-300 Ma and 480-510 Ma. Ca. 500 Ma ages have been recognized at the marginal region of the Siberia Craton including the Hanhohiyin Mountains. This suggests that the Hanhohiyin Mountains would record the early stage event related to the formation of the Asia continent.

References

- Mossakovsky et al. (1993) Central Asian fold belt: geodynamic evolution and history of formation. *Geotectonics*, 6, 3-33.
Nakano et al. (2010) Metamorphic rocks from the Mongol-Altai: A first report of Japan-Mongolia Joint Geological Research (2009-2013). *Journal of Geological Society of Japan*, 116, XI-XII.
Windley et al. (2007) Tectonic models for accretion of the Central Asian Orogenic Belt. *Journal of the Geological Society*, London, 164, 31-47.

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