Geochemical study on charnockites in Rundvågshetta, Lützow–Holm Complex, Antarctica

Atsushi Kamei[1], Hikari Awata[1], Tomokazu Hokada[2,3], Sotaro Baba[4], Ippei Kitano[5] and Yoichi Motoyoshi[2,3]

[1] *Shimane University*
[2] *National Institute of Polar Research*
[3] *Department of Polar Science, The Graduate University for Advanvced Studies (SOKENDAI)*
[4] *University of the Ryukyus*
[1] *Kyushu University*

The Lützow–Holm Complex (LHC) of East Antarctica has been understood as an example of a progressive metamorphic region from amphibolite facies in the NE to granulite facies in the SW, which holds a considerable significance to the late Neoproterozoic–early Paleozoic collisional event of Gondwana (e.g., Hiroi et al., 1983; Shiraishi et al., 1989; Hiroi et al., 1991). Many workers have focused on the research on geodynamics during the formation of the supercontinent, but there were not many studies on the genesis of their original rocks.

Suda et al (2008) studied the geochemical features of the meta-basites in LHC and noted that the basalt protolith from the NE area has a volcanic arc type affinity, whereas those from the SW area mostly show MORB type signature. Moreover, their Nd model ages increase southwestwards from 1.0 to 2.9 Ga. On the other hand, more recent workers proposed the ancient magmatism of Pre-Gondwana blocks on the basis of geochemical and geochronological studies of orthogneisses that the LHC is composed of at least three Neoarchean (ca. 2.5 Ga), Paleoproterozoic (ca. 1.8 Ga), and Neoproterozoic (ca. 1.0 Ga) magmatic arcs (e.g., Tsunogae et al., 2016; Takahashi et al., 2018). Thus, it is considered that the LHC involved various magmatic arcs up to the final amalgamation of Gondwana.

In this study, we examined the geochemical features of charnockites with volcanic arc affinity in Rundvågshetta, southwestern LHC. The aim is to give constraint the style of igneous activity of the volcanic arc-type rocks. As a result, it was suggested a possibility that the charnokites were formed by three igneous activities: high-silica adakite, low-silica adakite, and continental-type adakite.

References

Hiroi, Y., Shraishi, K., Yanai, K. and Kizaki, K., Aluminum slicates in the Prince Olav and Sôya Coasts, East Antarctica. Memoirs of National Institute of Polar Research, Special issue, 28, 115-131, 1983.

Hiroi, Y., Shiraishi, K., Motoyoshi, Y. Late Proterozoic paired metamorphic complexes in East Antarctica, with special reference to the tectonic significance of ultramafic rocks. In: Thomson, M.R.A., Crame, J.A., Thomson, J.W. (Eds.), Geological Evolution of Antarctica. Cambridge University Press, Cambridge, 83-87, 1991

Shiraishi, K., Hiroi, Y., Motoyoshi, Y. 1:250,000 Geological Map of Lützow-Holm Bay. National Institute of Polar Research, Tokyo, Japan, 1989

Suda, Y., Kawano, Y., Yaxley, G., Korenaga, H., Hiroi, Y. Magmatic evolution and tectonic setting of metabasites from Lützow-Holm Complex, East Antarctica. Geological Society Special Publication, 308, 211-233, 2008.

Takahashi, K., Tsunogae, T, Santosh, M., Takamura Y.,Tsutsumi, Y., Paleoproterozoic (ca. 1.8 Ga) arc magmatism in the Lützow-Holm Complex, East Antarctica: Implications for crustal growth and terrane assembly in erstwhile Gondwana fragments. Journal of Asian Earth Sciences, 157, 245-268, 2018

Tsunogae, T., Yang, Q-Y., Santosh, M., Neoarchean–Early Paleoproterozoic and Early Neoproterozoic arc magmatismin the Lützow–HolmComplex, East Antarctica: Insights from petrology, geochemistry, zircon U–Pb geochronology and Lu–Hf isotopes. Lithos, 263, 239-256, 2016