東南極 Lützow-Holm 岩体に産するアルカリ～高カリウム苦鉄質貫入岩の産状と組成 ～LHC における post-metamorphic igneous activity の傾向と地殻との関係について～

宮本知治[1]、角替敏昭[2]、D.J.Dunkley[3]、加藤睦実[4]
[1] *九州大学,*
[2] *筑波大学,* [3]*Curtin University,* [4] *千葉大学*

Occurrence and compositions of post-metamorphic alkali ~ highly potassic mafic dykes intruded into metamorphic rocks on Lützow-Holm Complex, East Antarctica ~ a relation between chemical composition of post-metamorphic igneous activity and degree of crustal maturing in the LHC~

Tomoharu Miyamoto[1], Toshiaki Tsunogae[2], Daniel J. Dunkley[3] and Mutsumi Kato[4]
[1]*Kyushu University,*
[2]*University of Tsukuba,* [3]*Curtin University,* [4]*Chiba University*

The Lützow-Holm Complex (LHC) of Dronning Maud Land, East Antarctica, is a high grade metamorphic terrane within the East Antarctic Shield, situated to the west of Rayner Complex and to the east of the Yamato-Belgica Complex. Japanese Antarctic Research Expeditions (JARE) have carried out detailed surveys of its geology and tectonics for many coastal exposures, and have identified various kinds of metamorphic rocks with metamorphic grade from upper amphibolite facies in the NE to granulite facies in the SW of the complex (Hiroi *et al.*, 1991). Subsequent igneous rocks as granites and pegmatites that intruded during and after the peak metamorphism, were also recognized. Some mafic dyke rocks, which discordantly intruded the surrounding gneisses in the LHC are also evidences of such igneous activities.

Almost of such mafic dykes are holocrystaline and aphyric, and grain size is mostly between 0.1 and 2 mm. They consist dominantly of alkali-feldspar and subsequent biotite, augite, hornblende, titanite, apatite and minor amount of plagioclase and quartz: these mineral abundances vary according to their occurrences, and alkali-feldspar, apatite and quartz are commonly included in the dykes by all means more or less, and others are occasionally absence in some rock specimens. Minerals, especially biotite flakes, are commonly aligned to parallel to boundary between the dykes and the host gneisses. Dykes in Rundvågshetta were partly cut pyroxene amphibolite dykes which emplaced right after the peak metamorphism, and partly modified by the post-genetic pegmatitic activity. So, the mafic dykes seem to be emplaced soon after the peak metamorphism.

Whole rock composition of mafic dyke rocks are different in the 5 outcrops each; the K_2O content reaches 3.4 ~ 8.6 wt.%, and the MgO contents range from 5.4 to 9.4 wt.%. Mafic rocks in Niban-Iwa show low K_2O compositions (3.42 ~ 3.82 wt.%), and regarded as common alkali basalt, on the other hand those in Skallevikshalsen and Rundvågshetta show high K_2O compositions (6.2~8.6wt.%). Such potassic to ultrapotassic mafic dyke rocks were corresponed to minette, a kind of lamprophyre, considering after adding features of mineral assemblages. The alkali~potassic to ultrapotassic mafic rocks were enriched with incompatible elements; the enrichment of incompatibility for the ultrapotassic mafic rocks is higher those of alkali (not so potassic) mafic rocks. This suggest origin of such ultrapotassic mafic rocks are related lower degree of melting of enriched lithospheric mantle than alkali basaltic rocks.

Potassium-rich mafic igneous rocks often emplaced at the matured crust as continental crust. The igneous rocks formed in a thick crust tend to be more potassic in a geological complex (e.g., Conticelli *et al.*, 2009; Ersoy *et al.*, 2010). Such rocks contain more incompatible elements, too. In LHC, preliminary reported SHRIMP U-Pb ages become older from NE-LHC to SW-LHC and tend to become the oldest around Skallevikshalsen and Rundvågshetta (Shiraishi *et al.*, 2008; D.J.Dunkley, personal communication). For the metamorphic constituted of LHC, Sr isotope ratios at the metamorphism become higher from NE-LHC to SW-LHC. It is thought that the compositional characteristic of post-metamorphic ultrapotassic mafic dyke rocks reflects the situation of matured crust of LHC at the time of emplacements.

References

Conticelli, S., Guarnieri, L., Farinelli, A., Mattei, M., Avanzinelli, R., Bianchini, G., Boari, E., Tommasini, S., Tiepolo, M., Prelević, D., Venturelli, G. (2009): Lithos, 107, 68–92.

Ersoy, E. Y., Helvacı, C. and Palmer, M. R. (2010): Journal of Volcanology and Geothermal Research, 198, 112-128.

Hiroi, Y., Shiraishi, K. and Motoyoshi, Y. (1991): In Thomson, Crame, and Thomson (eds) *Geological Evolution of Antarctica*. Cambridge University Press, 83-87.

Shiraishi, K. and Yoshida, M. (1987): Antarctic Geological Map series Sheet 25 Botnneset, NIPR.