東南極 Lützow-Holm 岩体に産する高カリウム貫入岩におけるマグマ混合の痕跡

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Evidences of magma-mixing for post-metamorphic alkali ~ highly potassic dyke rocks intruded into metamorphic rocks on Lützow-Holm Complex, East Antarctica

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The Lützow-Holm Complex (LHC) of Dronning Maud Land, East Antarctica, is a metamorphic terrane within the East Antarctic Shield, situated to the west of Rayner Complex and to the east of the Yamato-Belgica Complex. Various kinds of metamorphic rocks with grade from upper amphibolite facies in the NE to granulite facies in the SW of the complex were found from coastal exposures of the Complex during Japanese Antarctic Research Expeditions (JARE) (*e.g.*, Hiroi *et al.*, 1991). Subsequent igneous rocks as granites and pegmatites that intruded during and after the peak metamorphism, were also recognized in the Complex. Mafic dyke rocks, which discordantly intruded into the surrounding gneisses are also found in the LHC. Some of them is potassium-rich mafic igneous rocks (*e.g.*, Shiraishi and Yoshida, 1987), which often emplaced at the matured crust as continental crust (Conticelli *et al.*, 2009; Ersoy *et al.*, 2010). They are evidences of igneous activities related to lower crust and mantle evolutions under the Complex (Murphy *et al.*, 2002;).

On Rundvågshetta, a coastal exposure of LHC, mesocratic to melanocratic rock dykes were found in some places, and one of the dyke ran 2 km from north to south as thin sheets with a few ten centimeters to half meter in thickness and dipping east steeply. The dykes partly cut pyroxene amphibolite dykes which emplaced right after the peak metamorphism (Ishikawa *et al.*, 1994), and were partly modified by the post-genetic pegmatitic activity. So, the dykes seem to be emplaced soon after the peak metamorphism. Almost of such dyke rocks 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, titanite, apatite and minor amount of plagioclase and quartz. Their abundances vary according to their occurrences; augite is occasionally absence in some rock specimens. Internal textures as mineral arranging and extension, especially biotite flakes, are parallel to the trend of the dyke intrusion. Based on their mineral assemblages, the dykes are regarded as minette, a kind of lamprophyre, with potassic (K_2O = 4.9~7.4 wt.%) and mafic to intermediate (MgO = 5.3~8.9 wt.%) compositions. They were enriched with incompatible elements; the enrichment is higher those of common alkali (not so potassic) mafic rocks.

In the dyke rocks on Rundvågshetta, augite-bearing rocks show relatively mafic compositions, and coexists with F-rich apatite; on the other hand, augite-free rocks have less mafic compositions, and is accompanied with apatite with Cl-rich core and F-rich margin. Compositional gap of the apatite grains is large and not transitional. Such occurrence indicates that, in the less mafic rocks, apatite was formed in Cl-rich circumstance first and enlarged in F-rich conditions. This suggests compositional progression from chlorine-rich to fluorine-rich in the less mafic condition during apatite crystallization. The less mafic rocks have relatively abundant Cl than the mafic rocks on the compositional characters of whole rock though they form a suite dyke rocks.

Dyke rocks of Rundvågshetta have compositional variations of Sr isotope ratios ($^{87}Sr/^{86}Sr$ = 0.7065~0.874) as well as other major and minor elements compositions; the augite-bearing rocks have low Sr isotope ratio, and augite-free rocks tend to show high Sr isotope ratios. Although the whole rock isotope ratios are arranged in a straight line on isochron diagram, they also define a hyperbola versus Sr contents. This relation indicates a possibility of two-components mixing (Faure, 1986). It is thought that the dyke rocks have generated after mingling of potassic-mafic magma into intermediate to felsic magma before emplacing into the host metamorphic terrane of LHC.

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