Geochemistry and intrusive ages of Proterozoic dyke swarms from Mt. Riiser-Larsen in the Napier complex, East Antarctica

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Proterozoic dykes, mainly tholeiites with minor alkaline rocks, cut the Archaean granulite of Napier Complex in East Antarctica. In Mt. Riiser-Larsen, the dyke swarms are classified into four groups on the basis of field occurrence, petrography and geochemical characteristics of major, trace and Rb-Sr and Sm-Nd isotope elements. These results suggest the dykes to be classified into at least four generative groups in this area. Rb-Sr and Sm-Nd whole-rock isochrons of two groups among other groups define ca. 1.2Ga and ca. 1.9Ga.

Proterozoic dykes, mainly tholeiites with minor alkaline rocks, cut the Archaean granulite of the Napier Complex in East Antarctica. Intrusive ages of these dikes were reported to be ca. 2.4Ga, ca. 2.2Ga, ca. 1.8Ga and 1.4 to 1.2Ga (Sheraton et al., 1987; Lanyon et al., 1993).

In Mt. Riiser-Larsen, the dyke swarms occur, and are classified into four groups on the basis of field occurrence, petrography and geochemical characteristics of major, trace and Rb-Sr and Sm-Nd isotope elements. These dykes usually have the vertical or steep dips, but show different strikes from each group. They display doleritic textures. The mineral associations of the alkaline groups (A and B) are clinopyroxene + plagioclase +- biotite +- K-feldspar +- apatite +- ilmenite +- magnetite, while those of the tholeiite groups (C-D and E) are clinopyroxene + plagioclase +- ilmenite +- magnetite. The alkaline groups have the higher concentrations of incompatible elements (Ba, Sr, Nb, P, Ti and LREE) than those of the tholeiite groups. The Zr/Nb ratios are different between A and B in alkaline group, though these ratios of C-D and E in tholeiite group are similar to each other. On the N-MORB normalized trace elements variation diagram, most of tholeiites are characterized by negative anomaly of Nb and P. E is distinct from C-D in tholeiite group, namely it shows the flat figure of chondrite normalized REE pattern and the higher Sm/Nd ratio, which are rather similar to N-MORB. D is more enriched in incompatible elements than C, however the normalized diagrams and isotope characteristics are indistinct from other groups. On the other hand, the ratio of 87Rb/86Sr vs. 87Sr/86Sr and 147Sm/144Nd vs. 143Nd/144Nd clearly divides the dikes into four groups. These results suggest the dykes in this area to be classified into at least four groups in origin. Rb-Sr and Sm-Nd whole-rock isochrons of A and C-D define ca. 1.2Ga and ca. 1.9Ga, respectively.

The study of Proterozoic dyke swarms provides information of the formation and emplacement of Precambrian shield and the origin of their heterogeneous mantle source.