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東南極セール・ロンダーネ山地，原生代後期の閃長岩マグマ過程
Late Proterozoic syenite magmatism in the Sor Rondane Mountains, East Antarctica

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Syenites and related intrusive rocks are important to understand the process of collision zone magmatism in Dronning Maud Land (DML), East Antarctica, because DML is situated within the continental collision orogen between the West and East Gondwana. The Sor Rondane Mountains (SRM) is located in the eastern part of DML. According to the previous results, the timing of continental collision is regarded as the late Proterozoic (650 to 600 Ma) on SRM. Post-collisional intrusive rocks, granite stocks, a syenite complex, lamprophyres and dolerites, intrude the metamorphic rocks during the extensional stages in the region of SRM. In this paper, we address the geochronological and geochemical studies of the syenite complex and lamprophyres, and then discuss the timing of intrusion and the origin and formation of syenite magma.

The syenite complex occurring in the Lunckeryggen, the central part of the Sor Rondane Mountains, consists of a layered syenite, melanosyenite dikes and quartz syenite dikes. The syenite complex and the Lunckeryggen granite that is K-feldspar-rich alkaline granite are coeval intrusive rocks. The boundary between them is not clear and shows mingling structure. The lamprophyre locally intrudes the granite as a syn-plutonic dike. The U-Pb zircon dating used for the SHRIMP-II installed at NIPR gives ages of 559.4 +/- 1.6 Ma, 550.0 +/- 1.7 Ma, 548.8 +/- 3.4 Ma for the layered syenite, the granite and the melanosyenite dike, respectively. The recalculated Pb-Pb age of the lamprophyre shows 557.5 +/- 4.8 Ma. Considering the field relationships and the zircon SHRIMP dating, the syenite complex, granite and lamprophyre would, therefore, intrude into this suture zone during the same magmatic stage. The dolerite dikes also intrude the same stage as the previously described intrusive rocks because of their mode of occurrence although the dolerite dikes have not been dated yet.

The syenite complex and the lamprophyre have significant character with high-K (K2O/Na2O>3), high-LREE/HREE ratios and relatively enriched Sr-Nd isotopic compositions. The chondrite-normalized REE patterns of clinopyroxenes from the melanocratic part of layered syenite and lamprophyre show the concaved upward between LREE and MREE with HREE depletion. Considering petrography, mineralogy and geochemistry, the syenite complex has been derived from the lamprophyre magma, and fractional crystallization and accumulation played an important role of formation of the layered structure. The dolerite shows geochemical features similar to those of the within plate basalts in terms of some discrimination diagrams. Moreover, the Sr-Nd isotopic compositions of the dolerites are slightly depleted rather than the lamprophyres.

The lamprophyre possessing primitive compositions includes phenocrysts of Mg- and Cr-rich phlogopite. The P-T conditions of the lamprophyre magma are estimated by the biotite-liquid equilibrium relations. The calculated P-T conditions for the formation of lamprophyre magma are up to 1150 ?C and 1.6 GPa that is equivalent to 60 km depth that corresponds to the spinel lherzorite facies. On the other hand, the dolerite would be produced by the partial melting of a garnet lherzolite because of its geochemical signatures such as Ce/Sm and Sm/Yb ratios. The dolerite magma would, therefore, be derived from a source mantle deeper than that of the lamprophyre magma. The geochemical studies including Sr-Nd isotopic compositions reveal that the lamprophyre magma is derived from the enriched mantle; probably is formed by interaction between the dolerite magma derived from athenospher mantle and the enriched lithospheric mantle.

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