

## **$^{40}\text{Ar}$ - $^{39}\text{Ar}$ age analyses of some intruded rocks from Mt. Riiser-Larsen in the Napier Complex**

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Japanese Antarctic Research Expeditions collected dyke samples from Mt. Riiser-Larsen in the Napier Complex, East Antarctica. A Rb-Sr age of one sample is 1233Ma (Suzuki et al.,2000), which is same age as Amundsen dyke (1190 Ma; Sheraton and Black, 1981). The paleomagnetic studies and  $^{40}\text{Ar}$ - $^{39}\text{Ar}$  studies have been also performed on these samples (Ishikawa et al., 2000, Takigami et al., 1998, 2002). At this presentation, we will report these  $^{40}\text{Ar}$ - $^{39}\text{Ar}$  results including the recent results.

Allmost  $^{40}\text{Ar}$ - $^{39}\text{Ar}$  age spectra indicate the features of excess Ar and stire-case patterns derived by metamorphism. Ages of lower temperature fractions are above 3000Ma which may represent excess Ar, derived from host old rocks (about 4000Ma) of Napier Complex. Then, we could not obtain meaningfull ages except minimum ages at 900C fraction. These minimum ages are about 765-1100 Ma and younger than Rb-Sr age of 1233 Ma. Accordingly, these ages may represent the metamorphic ages.

These dykes are metadolerite and clasified into four types from the geological observations and chemical compositions (Ishizuka and Suzuki, 1999). Moreover, they have two different striking directions. We want to summarize relations of minimum ages, rock types and striking directions.

### **References**

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## **Reconstruction of rare earth element abundances in ancient seawater**

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### **Objective**

Many studies on rare earth elements (REEs) in the present-day seawater have been reported. However, REE abundances in ancient seawater have not been reconstructed successfully yet. In this study, we determined REE partition coefficients between calcite and aqueous solution. Furthermore, REE abundances in Permian seawater were estimated using the partition coefficients and data of Permian limestone samples.

### **Experimental system**

REE partitioning experiments between calcite and aqueous solution were carried out using a constant addition system similar to Zhong and Mucci (1995). Calcite-supersaturated solution (input solution) prepared previously was pumped into the reactor by peristaltic pump at a constant rate. Calcite overgrew on seed calcite crystals in the reactor. In the reactor, seed calcite crystals and reacting solution were well mixed by bubbling  $\text{CO}_2 + \text{N}_2$  gas and a magnetic stirrer chip. The cation compositions in the input solution were as follows: Ca: 0.2 mol/l, Na: 0.05 mol/l and individual REE: 10ppb (Pr, Sm, Tb, Ho and Tm: 20ppb).

### **Results and Discussion**

REE partition coefficients between calcite and aqueous solution are given by the following equation (Zhong and Mucci (1995);  $K_d(\text{REE}) = (X_{\text{REE}}/X_{\text{Ca}})_{\text{calcite}} / ([\text{REE}]/[\text{Ca}])_{\text{solution}}$  where X and brackets denote molar fractions and molar concentrations, respectively. Absolute  $\log K_d(\text{REE})$  values in eight experimental runs range between 2.5 and 3.5, but their patterns are fairly parallel. Moreover,  $\log K_d(\text{REE})$  patterns corrected for  $\text{REECO}_3^+(\text{aq})$  show convex tetrad effect variations and Y fractionation from heavy REEs. These features are commonly seen in empirical estimates by the pairs of marine limestones and present-day seawaters. REE abundances in Permian seawater were estimated using  $K_d(\text{REE})$  and data of Japanese seamount-type Permian limestone samples. In the estimation,  $K_d(\text{REE})$  was corrected to present-day seawater condition. The estimated REE abundance patterns for Permian seawaters show the same characteristics as those for present-day seawaters.

### **Reference**

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