Surface distribution of the rare earth elements in the North Pacific and Bering Sea

YAYOI HONGO, HAJIME OBATA AND YOSHIYUKI NOZAKI

Ocean Research Institute, University of Tokyo, Japan, yayoi@ori.u-tokyo.ac.jp

We present new data sets of the rare earth elements (REEs) in the surface layer of the North Pacific Ocean and the Bering Sea.

Comparing the previous available data, it becomes clear that the surface distributions of Y and REEs in the North Pacific reflect the geochemical and hydrographical processes in the ocean.

The concentrations of dissolved Y and REEs (filtered with 0.04_m hollow fiber filter) decreased from high latitude (55°N) to the subtropical region (20°N), and from western North Pacific (148°E) to near the Hawaii islands (134°W). Greaves et al. (1999 and 2001)[1) 2)] have reported the same trend in the north Pacific at a latitude of 24°N. For the elevated REE concentrations at the high latitude of the western North pacific, three reasons are considered ; 1) aeolian dust input from the Asian continent, 2) lateral transport from the coastal region and 3) vigorous vertical mixing.

In the studied areas, several strong currents, such as the Kuroshio, Oyashio, North Pacific and North Equatorial Currents, govern the flow patterns in the upper layer. The Subarctic Pacific Water, Western North Pacific Central Water and Eastern North Pacific Central Water showed characteristic REE patterns. Variations of the REE pattern in the North Pacifc Ocean were resulted from the mixing of more than three water masses.

References

[1] M.J. Greaves, H.Elderfield, E.R.Sholkovitz, Marine Chemistry 68 (1999) 31-37.

[2] M.J. Greaves, H.Elderfield, E.R.Sholkovitz, Marine Chemistry 74(2001)319

Pb isotopic anomalies caused by selective uptake of ^{226}Ra in illite

K. HORIE[1], H. HIDAKA[1] AND F. GAUTHIER-LAFAYE[2]

[1]Department of Earth and Planetary Systems Science, Hiroshima University, Japan (kenjih@hiroshima-u.ac.jp) (Hidaka@hiroshima-u.ac.jp)

[2]Ecole et Observatoire des Sciences de la Terre, UMR7517-CNRS-ULP, France gauthier@illite.u-strasbg.fr

The study of adsorption/desorption behavior of radioactive elements in minerals provides useful information on treatment of radiowaste disposal. Some kinds of clay minerals such as smectite and montmorillonite show unique chemical properties to selectively uptake alkali and alkaline earth elements. We found isotopic evidence of selective uptake of ^{226}Ra in natural clay mineral studied from in-situ Pb isotopic measurements.

Sample used in this study were taken from peripheral sandstone of the Oklo uranium deposit, Republic of Gabon. It mainly consists of quartz and includes a number of fine calcite veins. Several illite grains about 100 µm size were found along the calcite veins. In-situ isotopic analyses of Pb and U and determination of elemental abundances of alkaline and alkaline earth elements were performed by a Sensitive High Resolution Ion MicroProbe (SHRIMP).

^{207}Pb/^{206}Pb ratios of illite are significantly lower (0.015-0.040) than those of quartz (0.12-0.20) and calcite (0.10-0.17), which cannot be explained simply from normal U decay. Figure 1 shows a correlation diagram between Ba contents and ^{207}Pb/^{206}Pb isotopic ratios in individual minerals. Because Ba has very similar chemical properties to Ra, it has often used as a geochemical substitute for Ra. Our result suggests that the low Pb isotopic ratios in illite were caused by selective uptake of ^{226}Ra. This is also supported from the laboratory experimental results of selective uptake of Ra in synthetic micas (Komarneni et al., 2001)

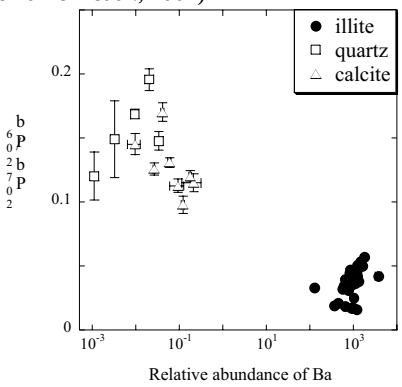

Figure 1: A diagram for Ba abundances and Pb isotopic ratios in individual minerals.

Reference

Komarneni S., Kozai N., & Paulus W.J. (2001) *Nature* **410**, 771.