

## Exploration of ion-adsorption rare-earth deposit using geochemical map

MAKOTO NAGASAWA AND YOSHIO TAKAHASHI

The University of Tokyo

Presenting Author: [m.nagasawa71358@eps.s.u-tokyo.ac.jp](mailto:m.nagasawa71358@eps.s.u-tokyo.ac.jp)

Ion-adsorption-type deposit (IAD) of rare earth elements (REEs), a secondary deposit mainly consisting of weathered granite, is important REE resources due to the following characteristics; (i) REE can be easily extracted by adding room-temperature electrolyte solution, (ii) Rich in heavy REEs (HREEs), which are economically more valuable than light REEs (LREEs). (iii) Radioactive elements such as uranium and thorium are not extracted. This type of deposit is practically exploited only in the south part of China. However, considering that the main factors controlling the formation process of IAD are its parent rock (acidic rock enriched with incompatible elements) and the degree of weathering (appropriate rainfall), it is quite natural to expect the presence of IAD at granitic rock body where the climate conditions are similar to that of China (e.g., Japan) for future exploration.

Here, we focused on typical geochemical characteristics for IAD samples; HREE enrichment and negatively large europium (Eu) anomaly in the chondrite-normalized REE patterns. All the data of geochemical map (Imai et al., 2004) were plotted in a diagram whose axes are chondrite-normalized  $La_N/Yb_N$  and  $Eu/Eu^*$  ( $= Eu_N/(Sm_N * Gd_N)^{1/2}$ ), which reflect the degree of HREE enrichment and Eu anomaly, respectively. There was generally a negative correlation between the two indicators, which can be explained by magmatic differentiation (More evolved rocks indicate negatively large Eu anomaly). However, some plots were deviated from the general trend, which might be resulted from geochemical characteristics of IAD (HREE-enriched, but showed negatively large Eu anomaly). We investigated granitic rock body in the area, and weathered granite samples collected indicated high value of total REE concentration ( $\sigma_{REE} = 3400$  ppm) and extraction rate ( $R_{ex} = 92\%$ ). Depth profile of REEs obtained by hand-auger sampling was typical for IAD, i.e., REE enrichment occurred below the REE-depleted surface layer.

Geochemical map is a map in which elemental distribution of upstream area is estimated by analyzing river sediment. Thus, its data are thought to reflect the elemental composition of provenance rocks. Low value of both  $La_N/Yb_N$  and  $Eu/Eu^*$  of river sediments in geochemical map data might be used as useful indices for IAD exploration.