

## Enrichment of Rare Earth Elements in Weathered Granites of Northern Vietnam

Taihei Ohmura[1]; # Tetsuro Urabe[2]; Yasushi Watanabe[3]; Shunso Ishihara[4]; Manuel Ng Lai[5]

[1] Earth Science, Univ. of Tokyo; [2] Earth and Planetary Science, Univ. of Tokyo.; [3] IGR, AIST; [4] AIST; [5] Nuiphaovica

In a town of Dai Tu, Thai Nguyen prefecture in northern Vietnam, Tiberon Co, discovered a significant tungsten deposit as the result of the exploration from 1997. The ore of the Nui Phao deposit has a feature of skarn and greizen mineralization at the contact between Paleozoic sediments and two granitic bodies, that is, Da Lien Granite (DLG) and Nui Phao Granite (NPG). DLG is leucocratic granite in which muscovite and biotite are coexisting. NPG is coarse-grained biotite granite. The target of the present study is not the tungsten ore but the weathered crust of these two granites to examine the possibility of ion-adsorption type deposit develops in the weathering crust of granite. So, the author conducted the field work in August, 2007 and collected samples in order to investigate the potential of this weathering crust as the ion-adsorption type deposit. They are NPG, DLG, weathered NPG and weathered DLG taken from three outcrops and five cores that penetrated the Nui Phao tungsten deposit. The weathered sediments and tungsten ores were also collected for comparison.

Samples were analyzed by ICP-MS and XRD in order to inspect their element and mineral compositions. The element analysis presented an unexpected result. Though most of weathered DLG has only a low REE concentration that is equivalent or less than that of fresh DLG. On the contrary, weathered NPG has very high concentration which reaches nine time higher than that of fresh granite. Besides, the REE content shows so-called bird wing shape and the HREE content is comparable to that of the Longnan deposit, southern China. This is surprising because the weathering condition, vegetation, and other factors may not be different on DLG and NPG as they occur side by side in the area. Yet the resultant REE enrichment was vastly different.

The REE pattern of each depth shows positive anomaly of Ce in near the surface and negative anomaly in lower depths. REE concentrates at the bottom of the weathering crust where negative anomaly of Ce is shown. That is because REE except Ce becomes ions in rain water in upper depths. They are transported downwards and captured in lower depths. Therefore, it is concluded that the type of this deposit is an ion-adsorption type.

Moreover, the result of color analysis supports the tendency that the samples with high REE concentration has color of low saturation. This corresponds to fewer goethite ( $\text{FeO}[\text{OH}]$ ) observed in the XRD peak list. Montmorillonite and kaolin group minerals occur as weathered products at the shallower part of the weathered NPG but the former disappears at the base of weathered zone where REE enriches. Therefore, the REE may be adsorbed to the kaolin group mineral but the further study is needed to investigate the relation.