

The change of chemical and Sr, Nd isotopic compositions of granitic rocks during weathering process.

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We analyzed changes of mineral, chemical and isotopic compositions of weathered granitic rocks from the Gozu granite, Kise garnite, Aji granite, Itoshima granite and Swara granite. Change of mineral composition of weathered granitic rocks is mainly characterized by alteration and decrease of plagioclase. Chemical composition of weathered granitic rocks is characterized by depletion of major and trace elements. In particular, CaO, Na₂O and Sr, which are partitioned into plagioclase, deplete extremely. Variation of FeO*, MnO and Cr is little. Rb/Sr and Sr isotopic ratios are enriched by weathering. Nd isotopic compositions are almost constant.

The dissolved ion compositions of ground waters are changed by its flow route and reactions with rocks. Among the various reaction process, the change of chemical composition of granitic rocks by weathering is important for discussion of chemical compositions of ground waters. Furthermore, it is indispensable for analysis of origin of dissolved components in ground waters and water - rock reaction process using hydrological tracers of Sr, Nd isotopes to understand change of isotopic compositions of rocks by weathering (Yuhara et al., 1999a, b).

We analyzed changes of mineral, chemical and isotopic compositions of weathered granitic rocks from the Gozu granite (medium grained massive biotite granite) in the Gozu mountain, Niigata Prefecture, Kise garnite (medium grained massive hornblende bearing biotite granodiorite) in the Ina mountain, Nagano Prefecture, Aji granite (fine grained massive biotite granite) in the Aji Peninsula, Kagawa Prefecture, Itoshima granite (medium grained foliated hornblende biotite tonalite) and Swara granite (coarse grained foliated biotite granite) in the Sefuri mountain, the Fukuoka and Saga Prefectures. The analyzed samples are fresh and weathered rocks collected from the same outcrop or close outcrops. These granitic rocks are mainly composed of quartz, plagioclase, K-feldspar, biotite and hornblende in some granitic rocks with accessory apatite, zircon, opaque minerals.

The alteration of plagioclase and chloritization of biotite in some extent are observed in fresh granitic rocks. Sericitization of plagioclase largely, alteration of K-feldspar partly and chloritization of biotite partly are observed in weathered granitic rocks while the complete sericitization, partial alteration, less chloritization in "masa". Some hornblende alter along cleavage, and degree of alteration of hornblende is low. Accordingly, change of mineral composition of weathered granitic rocks is mainly characterized by alteration and decrease of plagioclase. Chemical composition of weathered granitic rocks is characterized by depletion of major and trace elements. In particular, CaO, Na₂O and Sr, which are partitioned into plagioclase, deplete extremely. Variation of FeO*, MnO and Cr is little. Rb/Sr and Sr isotopic ratios are enriched by weathering. Nd isotopic compositions are almost constant. Enrichment of Rb/Sr ratio is caused by decrease of plagioclase having low Rb/Sr ratio. Radiometric ages of granitic rocks analyzed in this study are 116 - 83Ma (Rezanov et al., 1996; Yuhara et al., 1999b; Owada et al., 1999). These ages can turn up variation of Sr isotopic ratios of minerals, but can not turn up Nd isotopic ratios. This causes different results of Rb-Sr and Sm - Nd systems.