

Leaching behavior of uranium and thorium(III): a natural analogue approach for alluvial placer deposits

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In order to understand the leaching behavior of uranium and thorium from Japanese sedimentary rocks under surface oxic environment, alluvial placer deposits from the Naegi district, Gifu Prefecture, were carefully investigated. The deposits are embedded in alluvial sediments developed in the granite area in association with some pegmatite and hydrothermal vein type deposits.

The chemical composition of the placer deposits is enriched in Ti, Zr, Ce, La, Th, U, Hf and W, and depleted in K, Na, Ca, Rb, Li, Sr, Cs and Al, as compared with that of granite. The results are consistent with the weatherability or stability of the constituent minerals under Earth's surface condition. The uranium- and thorium-bearing minerals in the placer deposits have great persistence for weathering, but a part of uranium was leached away on the basis of the analysis of Th/U ratios.

In some ferugsonite grains, altered zone of 50 nm in depth was found at the surface, where Th are enriched, and U and Y are depleted as compared with the fresh center. Assuming that the alluvial placer was emplaced around 10000 years in the condition, the rate of alteration can be estimated at about 0.005 nm per year.