Weathering impact of granitic waste rock piles at former uranium mines (Limousin, France)

A. KANZARI[1]*, M. GERARD[1,2], F. BOEKHOUT[3], L. GALOISY[1] AND M. DESCOSTES[4]

[1]IMPMC,UPMC, Paris France (*correspondence: aisha.kanzari@impmc.upmc.fr). [2]IRD, Paris France. [3]Geologisch-Paläontologisches Institut, Corrensstraße 24, 48149 Münster. [4]AREVA Mines, R&D Dpt, Paris la Défense, France.

Granitic waste rock is the world's 2nd most important waste material produced by uranium mining. Although waste rocks are not especially concentrated in uranium, the stability of those millions of tons of granitic waste rocks, piled in the landscape, might become questionable during long term weathering. Compared to massive granite, these rocks have a higher specific surface and are more reactive to chemical and mechanical alteration. Our study focuses on waste rock piles exposed to 50 y of weathering.

We use a multi-scale approach, associating field observations with mineralogical and geochemical investigations, to assess the impact of incipient weathering on U-migration in the waste rock piles and the surrounding environment.

The main results are comparable with a previous study on a smaller site [1] and show: 1) The occurrence of arenization processes enhanced by vegetation, with protosoil occurrence. 2) The formation of weathering products such as clay minerals, iron oxides and secondary phosphates especially concentrated in the clay fraction. 3) Re-concentration of uranium in the clay fraction. 4) Neoformation of micrometric U-phosphate minerals. 5) Increase in U concentration correlated to increases in clay fraction, iron oxides, phosphates and accessory minerals, which confirm the immobilization of U even in oxidizing conditions.

[1] F. Boekhout, M. Gérard, A. Kanzari, A. Michel, A. Déjeant, L. Galoisy, G. Calas and M. Descostes (2015), Appl. Geochem., 58, 123-135.