Inception! Quantifing U-series disequilibria during the early stages of granite alteration

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Quantifying the balance between soil production from saprolite and regolith production from bedrock is crucial to assessing soil sustainability over human timescales, quantifying how landscapes evolve over millenia, and understanding weathering-related feedbacks in Earth's long-term climate evolution. Uranium-series isotopes have recently emerged as a tool for constraining rates of soil production from saprolite and regolith production from bedrock (e.g. [1-4]). To date, U-series work on weathering has focused mostly on samples in which the inception of weathering occurred at depth beneath a mantle of similarly weathered material. In this work, we focus on a bare rock ridge, using U-series isotopes to constrain weathering rates during the early stages of granite alteration. The goal is improved understanding of the pronounced dicotomy of bare and soil mantled rock on the slopes of the Sierra Nevada Batholith (California). Cores ~30cm long were drilled in a granitic ridge: one core was collected under a thin regolith cover, probably wind-blown material, in a small depression and shows evidences of relatively extensive weathering. This core is of special interest for addressing the role of a regolith cover in promoting weathering of the underlying bedrock. Another core was collected in nearby almost pristine bedrock but showing some evidences of weathering. Uranium and thorium isotope composition of samples taken along these cores will shed light on the mobility of chemical elements and the rates of granite weathering during the early stages of water-rock interaction.

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Contrasting mantle signatures along the Mid-Atlantic Ridge (10-50°N)

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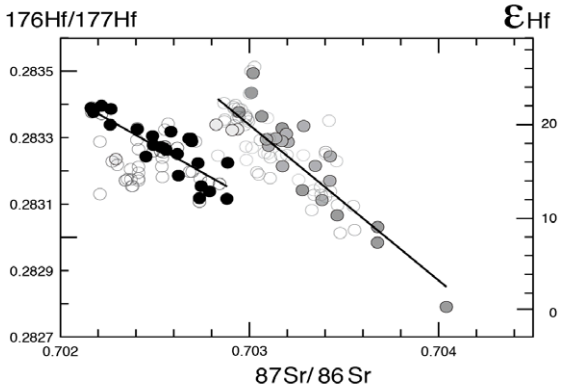
The description of mantle geochemical heterogeneities contributes to the understanding of time and length scales of mantle convection. Using trace element and Sr-Nd-Pb isotopic ratios, the geochemical structure of the northern mid-atlantic ridge between 10 and 50°N has long been described with major anomalous zones at the latitudes of 14°-15°N, 38-39°N and 42-43°N. New Hf isotopic data from basaltic samples along this 10-50°N section of the ridge (shown as solid symbols in figure below, open symbols indicate published values) combined with Sr or Nd isotopes reveal clear contrasting geochemical signatures of different sections of the ridge. It emphasizes the heterogeneous character of the depleted mantle source of MORB, as previously reported and discussed with Sr isotopes in [1] and brings a new perspective on the mantle dynamics in the region.



[1] Dosso *et al*. (1999), *Earth Planet. Sci. Lett*. **170**, 269-286.