Microbial arsenic transformation associated with soda lake in Khovsgol, Mongolia

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Soda lakes are extreme habitats characterized by high pH, high salt content, and elevated concentrations of trace elements from volcanic origin. To gain insight regarding the role of microorganisms in the geochemical cycling of arsenic (As), we characterized the bacterial community associated with a soda lake in northern Mongolia. Geochemical analysis of the salt evaporites present in lakeshore soils showed elevated concentrations of Se, As, phosphate and nitrate (pH >8.5). Microbial populations present in the same samples were investigated using molecular methods (16S rRNA and functional genes involved in As transformation) and culturing approaches to isolate relevant organisms involved in As transformation. Bacterial 16S rRNA gene sequences recovered from soda lake sediments and soils were affiliated with halophilic alkaliphiles, including *Bacillus* and *Halomonas* spp. Dissimilatory arsenate reductase genes (*arrA*) were detected, and formed a distinct phylogenetic clade suggesting the presence of unique arsenate-reducing bacterial populations. Pure cultures of *Alkaliphilus*- and *Halomonas*-related organisms were obtained and both showed capabilities for As transformation. The *Halomonas*-related isolate contains a gene similar to anaerobic arsenite oxidase (*arxA*) recently identified in the haloalkaliphilic, arsenite-oxidizing *Alkalilimnicola ehrlichii* strain MLHE-1. These results demonstrate that indigenous microorganisms associated with soda lake environments are capable of As cycling and contribute to the speciation and mobility of As *in situ*.

A new depleted mantle end-member revealed by high resolution sampling along the Mid-Atlantic Ridge

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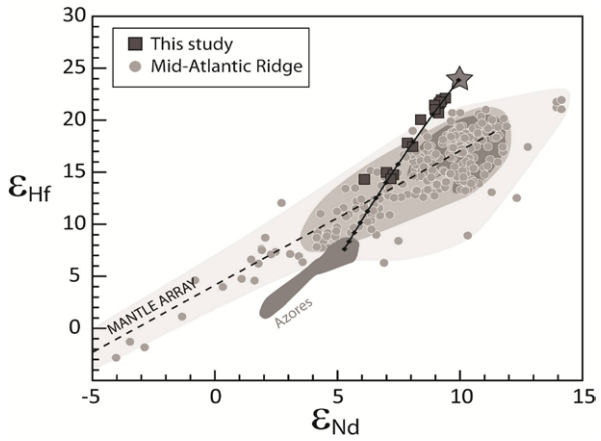
New samples from the center of Lucky Strike segment along the Mid-Atlantic Ridge define an atypical correlation, significantly different from the mantle array. This trend is characterized by radiogenic values of $^{177}Hf/^{176}Hf$ for a given $^{143}Nd/^{144}Nd$. Similar anomalous $^{177}Hf/^{176}Hf$ data have already been reported along Mohns and Knipovich ridge [1], and near Ascension Island [2]. In order to explain this atypical signature, these studies have proposed respectively: a disequilibrium melting during garnet breakdown and an anomalous mantle source created by an ancient melting event with residual garnet. Based on our new sampling, we propose a simple petrogenetic model for Lucky Strike basalts. This model allows us to reconsider the two hypotheses for Hf isotopes anomalous values. It reveals an unusual refractory component in the mantle near the Azores.



[1] Blichert-Toft *et al*. (2005), *Geochemistry Geophysics Geosystems,* **6**(1), Q01E19. [2] Paulick *et al*. (2010), *Earth and Planetary Science Letters* **296**, 299–310.