Lithium isotope geochemistry in a polar desert, McMurdo Dry Valleys, Antarctica

R.A. WITHEROW[1]*, G.M. HENDERSON[2] AND W.B. LYONS[1]

[1]Byrd Polar Research Center and the School of Earth Sciences, The Ohio St. Univ., Columbus, OH 43210, USA (*correspondence: witherow.9@osu.edu) (lyons.142@osu.edu)

[2]Department of Earth Sciences, University of Oxford, Oxford OX1 3PR, UK (gideonh@earth.ox.ac.uk)

The McMurdo Dry Valleys (~78ºS) is home to several closed basin lakes fed almost exclusively by glacial meltwater streams. The chemistry of these lakes is reflective of the composition of precipitation, chemical weathering/dissolution of salts in streams, evaporation/sublimation of an ice cover, and groundwater interactions [1]. The conservative nature of lithium makes lithium isotopes useful in elucidating the relative contribution of these sources.

The results indicate that snow in the accumulation zone of Dry Valley glaciers reflects low Li concentration precipitation and extremely low δ^7Li values (+0.82 to +2.92‰). The streams are a two component mixture of glacial snow and the dissolution of marine derived salts on the valley floor. The δ^7Li values of most lakes indicates that the lithium comes from stream water and it is not lost during sublimation and subsequent precipitation of minerals. Lake Vanda is unique in that is has undergone significant chemical evolution and the associated mineral precipitation may have resulted in isotopic fractionation. This high degree of chemical evolution may be evidenced by the isptopically heavier values than other terminal lakes in the Great Basin, USA [2]. Don Juan Pond is a hypersaline brine fed by groundwater and is supersaturated with respect to numerous evaporite minerals. These brines are unlike other waters in the McMurdo Dry Valleys and is not characterized by two-component mixing of glacial melt and seawater. The δ^7Li value (+22.06‰) of Don Juan Pond is more a result of low temperature interactions within a high rock to water environment. The results indicate that Dry Valley lakes, with the exception of Don Juan Pond, are highly influenced by the dissolution of marine salts by glacial meltwater.

[1] Green *et al*. (1988) *Geochinica et Cosmochimica Acta* **52**, 1265-1274. [2] Tomascak *et al.* (2003) *Geochinica et Cosmochimica Acta* **67**, 601-611.

Contribution of through diffusion method to the understanding of iodide behaviour towards Tournemire argillite

C. WITTEBROODT[1,2]*, S. SAVOYE[1] AND P. GOUZE[2]

[1]IRSN-SARG-LR2S, BP17-92262 Fontenay-Aux-Roses, France (*correspondence: charles.wittebroodt@irsn.fr)

[2]MSE, Université de Montpellier 2, 34095 Montpellier cedex 5, France

Among the radio-nuclides that could migrate from a radioactive waste repository to the geosphere, ^{129}I poses a clear risk due to its high mobility in geomedia and its very long half-life of $1.6.10^7$ years. For this reason, we study iodide migration through the Tournemire argillite for a better understanding of its behaviour, especially since an affinity of this anion for argillite was highlighted from batch experiments. This process could indeed postpone its exit from argillaceous rocks. At first, in-diffusion experiments confirmed the uptake of iodide, extent of which was a function of initial iodide concentrations. Secondly, results obtained from out-diffusion indicated that only was available for out-diffusion less than half of initially-injected iodide, suggesting an irreversible uptake phenomenon [1, 2].

In the present study, through diffusion experiments were carried out to verify whether the particular iodide behaviour highlighted from a transient diffusive method (in- and out-diffusion) can be also observed from a steady-state one.

[1] Savoye *et al.* (2006) *Radiochim. Acta* **94**, 699-704. [2] Wittebroodt *et al*. (accepted) *Phys. Chem. Earth*.