EarthChem – A geochemistry data network

KERSTIN LEHNERT[1], DOUGLAS WALKER[2], AND BAERBEL SARBAS[3]

[1]Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY, 10964, USA (lehnert@ldeo.colmbia.edu)
[2]University of Kansas, Lawrence, KS, 66045, USA (jdwalker@ku.edu)
[3]Max-Planck-Institut fuer Chemie, Mainz, Germany (sarbas@mpch-mainz.mpg.de)

EarthChem is a collaborative effort to create an advanced and integrated network of geochemical data collections, to make a greatly expanded range and number of data collections discoverable and accessible for the broad Earth Science community through a single portal ('One-stop-Shop for Geochemical Data'), and facilitate the analysis and integration of geochemical data with other geological, geochronological, geophysical, and geodetic information, and incorporate new legacy and future data. Current partners of the EarthChem project include SedDB, PaleoStrat, EarthRef, MetPetDB, CZEN (Critical Zone Experiment Network), MexDB (Mexican Volcanic database), the IODP US, the USGS, and GEON. EarthChem focuses on three areas:

1. Operation of a data portal ('One-stop-shop for geochemical data') that provides search capabilities across federated databases and tools for data quality assessment, data analysis, and visualization including plotting methods and an information-rich map interface. As part of the portal development, EarthChem has created an XML schema for geochemical data that allows all partner databases to communicate their data in a common format.

2. Expansion of available digital data collections for geochemistry. EarthChem is building tools to facilitate data submission from users, and contribution of focused projects, and compiles new critical datasets as identified by the community. Over the past year, a new data collection for the Petrology of the Deep Lithosphere has been created. A new geochronological data collection is being developed to provide a home for EarthTime and GeoEarthScope geochronology data.

3. EarthChem addresses user concerns, and responds to broad scientific and educational needs. EarthChem hosts workshops, holds exhibits, and works with scientific societies to address community issues related to data management and data use such as citation of original data contributors/authors versus citation of databases or standards for reporting data and analytical metadata in publications. Examples include: (a) Implementation of a 'Data Usage Index' on the EarthChem portal to track the number of times that data from a specific publication has been downloaded by users of the EarthChem portal. Ensuring credit to the author(s) of original data publications is fundamental for the broad geochemical community to support digital data collections. (b) Through several community workshops, EarthChem has defined recommendations for the reporting of analytical and sample information in geochemistry data publications.

Lithium isotope systematics in the Strengbach catchment (Vosges, France)

E. LEMARCHAND [1], F. CHABAUX[1], N. VIGIER[2], R. MILLOT[3] AND M.C. PIERRET[1]

[1]CGS-CNRS/ULP, UMR 7517, 1 rue Blessig, 67084 Strasbourg Cedex, France
[2]CRPG-CNRS, 15 rue N-D des pauvres, 54501 Vandoeuvre-les-Nancy Cedex, France
[3]BRGM, 3 avenue Claude-Guillemin, 45060 Orléans Cedex 2, France

Lithium isotopic compositions of rocks, soils and continental waters are proposed to be proxies of continental weathering processes, but the reason of isotopic fractionation is not entirely known. The aim of this study is to better constrain Li isotope fractionation processes during weathering by studying variations of Li concentrations and isotopic compositions at the scale of a small granitic watershed (Strengbach catchment, Vosges, France, http://ohge.u-strasbg.fr). Samples of precipitations, spring and stream waters and soil solutions have been collected during 2 years for Li concentration and isotopic measurements. Some of the principal results are compiled below:

- Based on the Li concentrations and isotopic compositions of rainwaters, soil solutions, spring and stream waters, it can be shown that the Li isotopic composition of the waters collected at the outlet of the Strengbach catchment results from mixing between two different fluxes: a "deep" one corresponding to rock weathering and a surface one, more significant at high discharge, corresponding to waters that interacted with soils. Due to solid/solution interactions, the δ^7Li of these two fluxes are significantly variable.

- At low discharge, δ^7Li of spring and stream waters increases with decreasing altitude. This should signify that waters sampled at the bottom of the catchment drained less weathered rocks than at the top. Isotopic signatures of the weathering flux seem to depend of the weathering degree of the drained rocks.

- Isotopic ratios (δ^7Li) display also a great range of variations in soil solutions. In the first horizons of soil, [Li] and δ^7Li in solution results from the combination of vegetation recycling and Li release from mineral. At the opposite, in deeper horizons, Li concentration and isotopic composition of soil solutions are driven by adsorption and/or coprecipitation processes.

This study particularly shows the interest of lithium isotopes to trace water circulations at the scale of a little catchment.