The distribution of LILE and HFSE in the magmatic hydrothermal systems of mylonites on the example of the detachment-closed metamorphic block (Eastern Trans-Baikalian region, Russia)

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Among the mylonites of the Borschovochny detachment-related metamorphic block with the Early Cretaceous age, simultaneous sills of andesites and dacites are forming. Their intrusion is accompanied by a hydro-thermal change of mylonites. Three main types of metasomatic associations are defined: K (white mica + chlorite + quartz ± adularia), Na-Fe-Ca (chlorite + albite + hematite + epidote + calcite), and K-Ca (quartz + calcite + ankerite + muscovite ± chlorite).

For unchanged metasediment mylonites, the way LILE and HFSE are enriched cor-responds to the UK standard with only differences in Cs (7-15 ppm) and Rb (92-135 ppm) enrichment, and low content of Sr (24-133 ppm). Geochemical characteristics of andesites and dasites show their similarity to the volcanites from the island arcs and active continental margins.

Metasomatism stimulates the loss of the most LILE and HFSE. At the same time, Ti is added to the Na-Fe-Ca system (up to 0,8 – 2%) with maintaining the Zr, Hf, Nb Ta, and REE concentrations. It is noted that maximum microelements are removed in the K- and K-Ca systems due to Sr enrichment (150-490 ppm) and inert Ti behavior (to 0,1 – 0,9%). It is obviously demonstrated in geochemistry of the frontal and rare zones, where Th decreases from 2,9 to 0,1 ppm, Zr - from 74 to 3, ΣREE from 79 to 13, La/Yb from 6 to 1,5.

A main mechanism for the extraction of REE is assumed to be the monazite decay, which discovers reaction crown composed by xenotime and galenite when contacting with sulfides.

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Introducing PT-HPLC

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High-Performance Liquid Chromatography (HPLC) systems are superior in many respects to gravity-driven open columns commonly used in geochemistry, yet they suffer from several shortcomings that have hampered their adoption in isotope geochemistry (*e.g.* the liquid flow path often contains glass and/or metal parts which are easily corroded/dissolved, electronic controls and housing are often spatially associated with the HPLC unit, shortening the system lifespan [*e.g.* 1])

Here, we present a system developed at the Origins Lab. which addresses many of the shortcomings of commercially available HPLC systems: Pneumatic Teflon-HPLC (PT-HPLC) [2-4]. Development of this sytem was aided by technologic transfers from the semi-conductor industry and the availability of Teflon-manufactured parts. Its key features are:

1) fully automated elution schemes controlled through LabVIEW software interface, which enables for (i) fresh mixing of reagents for each elution step and (ii) gradient/ramp elutions, while removing the human error/non-reproducibility component, 2) temperature control of the system (up to 80°C) for enhanced chemical separations [5], 3) a modular design making the system adaptable to a variety of separation schemes by quick and inexpensive change of the resin type or column length, and 4) pneumatic actuation, allowing for the electronics to be isolated from the HPLC unit, increasing the lifespan of the system.

To test the PT-HPLC we performed a separation of all REE from each other in one column pass with unprecedented resolution. We used a 70 cm long column (ø=0.3 cm) filled with Ln-resin (25-50 μm resin bead size), a constant temperature of 70 ºC, a flow rate of ~0.5 mL/min and a HCl molarity ramp slowly increasing along a convex path from 0.10 M to 10 M HCl. More than 99% of each multi-isotopic REE was separated from its neighbors in one column pass.

This result demonstrates the effectiveness of our system and its great potential to tackle all outstanding geochemical problems that call for demanding separation schemes [6].

[1] Sivaraman *et al.* (2002) *J. Rad. Nucl. Chem.* **252**, 491-495. [2] Ireland *et al.* (2012) *LPSC* #2141. [3] Tissot *et al.* (2013) *LPSC* #2867. [4] Ireland *et al.* (*Submitted to Chem. Geol.*) [5] Pourmand *et al.* (2010) *Talanta* **81**, 741-753 [6] Tang *et al.* (2012) *EPSL* **359-360**, 248-263.

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