Influence of bacterial cell bodies and organic polymers on the secondary mineral formation (green-rust *vs* magnetite) from γ-FeOOH bioreduction

F. JORAND[1]*, A. ZEGEYE[1,2] AND B. LARTIGES[3]

[1]LCPME UMR 7564 CNRS - Nancy University, 405, rue de Vandœuvre, F-54600 Villers-lès-Nancy, France (*correspondence: jorand@lcpme.cnrs-nancy.fr)
[2]present address : School of Civil Engineering and Geosciences, Newcastle University, NE1 7RU Newcastle upon Tyne, UK
[3]LEM UMR 7569 CNRS - Nancy University, 15 avenue du Charmois, F-54500 Vandœuvre-lès-Nancy, France

Iron oxide reduction by *Shewanella* spp. bacteria is well-known to produce Fe^{II} bearing minerals in anaerobic conditions. However, the parameters controlling the nature of "biogenic" minerals, especially the mixed Fe^{II}-Fe^{III} minerals green-rust (GR) and magnetite (M), are not fully identified to date.

Thus, when lepidocrocite (γ-FeOOH) serves as electron acceptor, a high cell concentration is required for GR biomineralization whereas a lower concentration leads to the exclusive formation of M [1]. When the assay containing the lower cell concentration is completed by autoclaved cells, GR is formed instead of M as exclusive secondary mineral. This result reveals that the mineralization process is not governed by active cells but more likely by cells bodies or bacterial polymers. In order to assess the role of polymeric materials, during M and GR biomineralization, assays were run in presence of different non-biodegradable polymers bearing either carboxylic or amide groups. At a given concentration, the carboxylic-bearing polymer exerts the same effect as the autoclaved cells, that is to say it impairs the formation of M and leads to the GR formation. In contrast, the amide-bearing polymer did not influence the nature of secondary mineral, even at high concentrations where it only decreases the bioreduction rate.

Therefore, the polymeric material, as well as cell bodies of *Shewanella* cells, constrain more likely the nature of the secondary Fe^{II}-bearing mineral formed during γ-FeOOH bioreduction. These results give new and important insights for the understanding of "biogenic" GR formation. Implications in Fe^{II}-bearing mineral formation from natural biofilm materials will be discussed from other experimental results.

[1] Zegeye, Ruby, Jorand (2007) *Geomicrobiol. J.* **24**:51.

Characteristics of the mantle wedge beneath the Patagonian plateau from a lithium perspective

A.-L. JOURDAN[1]*, B. KAESER[1], A. KALT[1] AND R. KILIAN[2]

[1]Institut de Géologie et Hydrogéologie, Université de Neuchâtel, CP 158, CH-2009 Neuchâtel, Switzerland (*correspondence:Anne-Lise.Jourdan@unine.ch)
[2]Lehrstuhl für Geologie, Universität Trier, Germany

Mantle xenoliths are a window into the mantle underneath a volcanic zone and deliver therefore important information about mantle composition and processes to the surface. However, only few active volcanic arcs are known for having brought to the surface samples of the mantle wedge. Although our geochemical understanding of crustal recycling in the mantle via subduction zones has been recently improved by investigations on Li compositions, the behaviour of Li during processes involving hydrous fluid transport and interaction with mantle minerals at the slab-mantle wedge interface remains unclear.

In order to retrace the missing link between subducted altered oceanic mantle and arc lavas, we aimed to determine the Li concentration and isotope characteristics of peridotites xenoliths from the Cerro del Fraile Volcanic Field (Patagonia), which represent fragments of a mantle wedge once modified by a subduction component. Investigations have focused on *in situ* measurements of Li concentrations and isotope ratios by Secondary Ion Mass Spectrometry of co-existing minerals, as well as trace element and REE concentrations.

Preliminary results show a large variability within grains. Li concentration range from 1.0 to 1.8 ppm in olivines, with values up to 3.8 ppm found in dunite, and from 0.9 to 4.2 ppm in clinopyroxenes. The lowest concentrations were found at the rim. Li isotope ratios range from -18.5‰ to 21.3‰ in olivines and between -26.1‰ and +8.1‰ in cpx. The core is generally represented by a plateau of light isotopic composition, and the rim by a peak of higher δ^7Li values. The Li behaviour observed in parallel from concentrations and isotopic compositions is characteristic of diffusive fractionation of Li isotopes, within mineral phases.

Further investigations would help us to better constrain the data by comparison with results similarly obtained from a rift context (Marsabit, Kenya) and from a stable continental root (Pali Aike, Patagonia), in order to ultimately create a comprehensive dataset on Li element and isotope systematic in different geodynamic situations.