Zinc sulfide in suspended matter from an oxic river (Seine, France)

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Several studies have underlined the importance of sulfide phases as trace element carrier in anoxic river and estuarine bottom sediments. Moreover, thermodynamic and kinetic studies in oxic waters have shown that the oxidation process of this reduced phase process may be relatively slow [1].

In the present study, Zn speciation was investigated in suspended particulate matter (SPM) in an oxic water column of the Seine River downstream of Paris, an urbanized watershed significantly impacted by Zn contamination [2].

First coordination shell around Zn was determined using Synchrotron-based Extended X-ray Absorption Fine Structure (EXAFS) spectroscopy at the Zn K-edge. Analysis of samples dried under pure nitrogen atmosphere indicated a dominant sulfur first coordination environment around Zn in the form of amorphous/poorly crystalline. In contrast, an oxygen first coordination environment around Zn was observed in the samples dried under ambient oxygenated atmosphere. The presence of ZnS solid phases in nitrogen-dried samples was confirmed by scanning electron microscopic observations coupled with energy dispersive x-ray spectroscopy analyses.

This study highlights the importance of preserving oxidation state for metal speciation studies, even in an oxic water column.

[1] Luther *et al*. (2005) *J. Nanopart. Res*. **7**, 389–407. [2] Priadi *et al*. *Environmental Science & Technology*, submitted.

The Longwood Igneous Complex of southern New Zealand: An intra-oceanic, subduction-related batholith

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The Longwood Igneous Complex (LIC), which is located in Southland, New Zealand, is a batholith-scale plutonic complex made up of troctolite, gabbro, gabbroic diorite, granite and basaltic dyke rocks ranging in age from Permian to Jurassic. Whole rock samples of the LIC have the trace element patterns of intra-ocaeanic, subduction-related magmas. Mineral chemistry and mineral phase relationships indicate emplacement depths of 15 to 25 km.

Ultramafic rocks and most of the gabbros of the LIC have petrographic and geochemical features indicating that they formed as cumulates. Few have direct compositional analogues among modern intra-oceanic volcanic rocks (e.g. [1, 2]). LIC intrusions represent crystal cumulates and mushes left over from the processes that generated the magmas that would have been erupted at the contemporaneous volcanic arc (c.f. [3]).

Across the LIC, there is a systematic change in the age of the intrusives from 254 Ma in the east to 142 Ma in the west. There is also a correlation between age of emplacement and Sr and Nd isotopic compositions, which together with inheritance in zircons dated by ion probe, suggests that crustal recycling became significant as the LIC subduction system evolved and matured. The LIC can therefore be used to estimate the composition of lower – middle crust assembled beneath an intra-oceanic arc over a 100 Ma time scale. LIC crust is on average andesitic and compositionally similar to bulk continental crust.

[1] Glazner *et al*. (2008) *Geology* **36**, 183–186. [2] Kent *et al*. (2010) *Nature Geoscience* **3**, doi: 10.038/NGEO924. [3] Bachmann & Bergantz (2008) *J. Petrology* **49**, 2277–2285.