# Sulfide oxidation, acidification and deoxgenation by reaction of resuspended sulfidic benthic sediments.

DIANE FYFE, RICHARD BUSH, EDWARD BURTON AND LEIGH SULLIVAN

Centre for Acid Sulfate Soil Research, Southern Cross University, Australia (dfyfe@scu.edu.au)

Black, gel-like, benthic sediments with high acid volatile sulfur (AVS) concentrations (1-6% dry mass) are common in waterways affected by acid sulphate leachate. These sediments are often called monosulfidic black ooze (MBO). Floodwater re-suspension of MBO has been implicated in massive fish kills associated with severe deoxygenation and acidification of coastal lowland rivers. This study examines changes to sediment and water chemistry during laboratory experiments designed to simulate flood-induced sediment re-suspension events. Re-suspension of MBO in water decreased dissolved oxygen from 7.70 mg.L-1 to 0.86 mg.L-1 within 1-2 minutes. The oxidation of the acid volatile sulfur fraction in the MBO resulted in the rapid formation of elemental sulfur. pH remained near-neutral during this oxidation step. It was 4 days until the elemental sulfur began to oxidise, causing acidification (pH <3.5). Metal concentrations within the MBO material were within sediment quality guidelines. However, the oxidation of AVS and acidification of the MBO material mobilised metals to the water column at concentrations greatly exceeding the recommended water quality guidelines. The current sediment quality guidelines for metals can be a poor estimate of the environmental risk, particularly as show here for sediments that contain elevated acid volatile sulfur contents.

---

# Fe, Co and Ni in Ureilites: Metal-silicate equilibration in the UPB

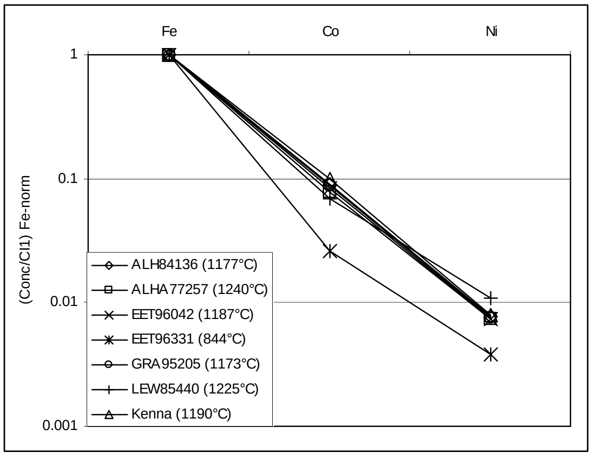
A.D. GABRIEL AND A. PACK

Universität Göttingen, Geowissenschaftliches Zentrum, Goldschmidtstrasse 1, 37077 Göttingen (apack@uni-goettingen.de)

Ureilites are coarse-grained olivine- and pigeonite-bearing achondrites with carbon-rich material occuring along grain bounderies [1]. It is suggested that Ureilites represent asteroidal mantle restites [2].

In this study we present Fe, Co and Ni concentration data of olivine from eight Ureilites with different Fe-contents, ranging from 8 to 22% *fa*. Measurements have been conducted by means of LA-ICP MS at the University of Göttingen.

Starting from a CI1 composition we calculated a model core compositions for each Ureilite. With the equations taken from Seifert *et. al* [3], we calculated the Co and Ni content of olivine that equilibrated with metal of the model core composition at temperatures ranging from 1000°C to 1500°C. These data are compared to measured Ureilite olivine compositions. Our data give olivine-metal equlibration temperature of about 1185°C. Exceptions are LEW85440 and ALHA77257 which show a higher equilibration temperatures of ~1230°C. EET96331, which is very low in Co and Ni compared to Ureilite olivine with similar Fe-content, gives a significantly lower equilibration temperature of ~800°C.



Ureilite olivines seem to have been equilibrated with a metal with a composition similar to the core of the UPB. Except for EET96331, equilibration temperatures range from 1173 to 1240°C, which is broadly in agreement with olivine-pigeonite thermometer data published by Singletary *et al.* [4]. The Fe-, Co- and Ni-composition of the Ureilite olivine has been established during metamorphism. This has implications for future Fe-Ni-isotope relative age dating, which is in progress.

[1] Goodrich, C.A., (1992) *Meteoritics* **7** 327
[2] Warren, P.H., *et al.* (2006) *GCA* **70** 2104
[3] Seifert, S., *et al.* (1987) *GCA* **52** 603
[4] Singletary, S.J., *et al.* (2003) *Meteoritics* **38** 95