Solubility of scorodite and 6-line ferrihydrite with sorbed arsenic in the presence of *Shewanella* sp. CN32 and *Shewanella* sp. ANA-3 in a chemically defined growth medium containing various phosphate concentrations

E. REVESZ[1*], D. PAKTUNC[2], AND D. FORTIN[3]

1. Dept. Earth Sciences, University of Ottawa, Ottawa, Canada ereve067@uottawa.ca (* presenting author)
2. CANMET Mining and Mineral Sciences Laboratories and Dept. Earth Sciences, University of Ottawa, Ottawa, Canada Dogan.Paktunc@NRCan-RNCan.gc.ca
3. Dept. Earth Sciences, University of Ottawa, Ottawa, Canada, dfortin@uottawa.ca

Scorodite ($FeAsO_4 \cdot 2H_2O$) is a common As-rich mineral found in mining environments. In addition to its low solubility, it is relatively stable under oxidizing conditions, but its stability in the presence of known iron- and arsenic-reducing bacteria is poorly understood, especially under environmentally relevant conditions such as mine tailings. We investigated the reduction of synthetic scorodite in the presence of *Shewanella* sp. CN32, an iron and arsenic reducer, and *Shewanella* sp. ANA-3, a well-known arsenic reducer in a chemically defined medium containing various phosphate concentrations (15μM to 400 μM). The average initial rates of reaction found for arsenic reduction are 10.1 fmol/(cell·day) for ANA-3 and 5.4 fmol/(cell·day) for CN32 indicating that ANA-3 is a more efficient arsenate reducer than CN32. The concentration of dissolved Fe(II) is significantly lower than the concentration of dissolved As(III), and these concentrations are inversely related to the phosphate concentration. The solid phase post-reduction by-products were characterized by XRD, SEM, HRTEM and XAFS. Results so far for bacterial reduction of scorodite indicate that the residue is largely amorphous with domains that are rich in either iron or arsenic.

Preliminary results of reductive, bacterial assisted dissolution of 6-line ferrihydrite containing sorbed As in a chemically defined growth medium will also be discussed.

Sr-Nd-Pb isotope composition of Greenland river sediment constrains provenance of silt on the Eirik Drift

ALBERTO REYES[1*], ANDERS CARLSON[1], BRIAN BEARD[1], DAVID ULLMAN[1], ROBERT HATFIELD[2], AND JOSEPH STONER[2]

[1]University of Wisconsin-Madison, Geoscience, avreyes2@wisc.edu (* presenting author), acarlson@geology.wisc.edu, beardb@geology.wisc.edu, ullman@geology.wisc.edu

[2]Oregon State University, Earth Ocean and Atmospheric Sciences, rhatfield@coas.oregonstate.edu, jstoner@coas.oregonstate.edu

The Sr-Nd-Pb isotope composition of silt in the Eirik Drift off south Greenland can be used as a proxy for the presence/absence of ice on southern Greenland bedrock terranes. This approach requires characterization of different bedrock sources that can be compared with marine sediment core records. We present an updated dataset of Sr-Nd-Pb isotope composition for over 50 silt samples from rivers draining large subglacial basins under the Greenland Ice Sheet.

Distinct differences in the age and crustal evolution of major southern Greenland bedrock terranes are largely mirrored in the isotope composition of sediment in meltwater streams draining the ice sheet. Silt from rivers draining the Archean Block, the oldest south Greenland terrane, have the lowest $^{207}Pb/^{206}Pb$ and ε_{Nd}, and the highest $^{87}Sr/^{86}Sr$; in contrast, the young Paleogene volcanics of southeast Greenland and Iceland yield silt with the highest ε_{Nd} and lowest $^{87}Sr/^{86}Sr$. Silt from the Proterozoic Ketilidian Mobile Belt, in southernmost Greenland, is distinguished by very high $^{206}Pb/^{204}Pb$. Rivers draining the Nagsuggtoqidian Mobile Belt, comprising largely Archean rocks affected by Proterozoic metamorphism, have silt loads with relatively low ε_{Nd} and low $^{87}Sr/^{86}Sr$.

Suspended sediment discharged from the southern Greenland Ice Sheet during deglacial and interglacial intervals is transported via the Western Boundary Undercurrent to the Eirik Drift, where several long (>400 ka), well-dated marine sediment cores have been collected. The stream sediment isotope data presented here are used as end-members in a four-component mixing model, which allows us to determine the fractional contribution of silt from south Greenland bedrock terranes in the marine sedimentary record and, ultimately, to estimate the extent of the southern Greenland Ice Sheet during Pleistocene interglaciations.