



MITE Program



J53 Lake sediments subactivity: Metal transport experiments

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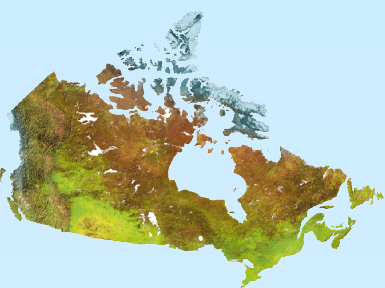
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Objectives/Implications

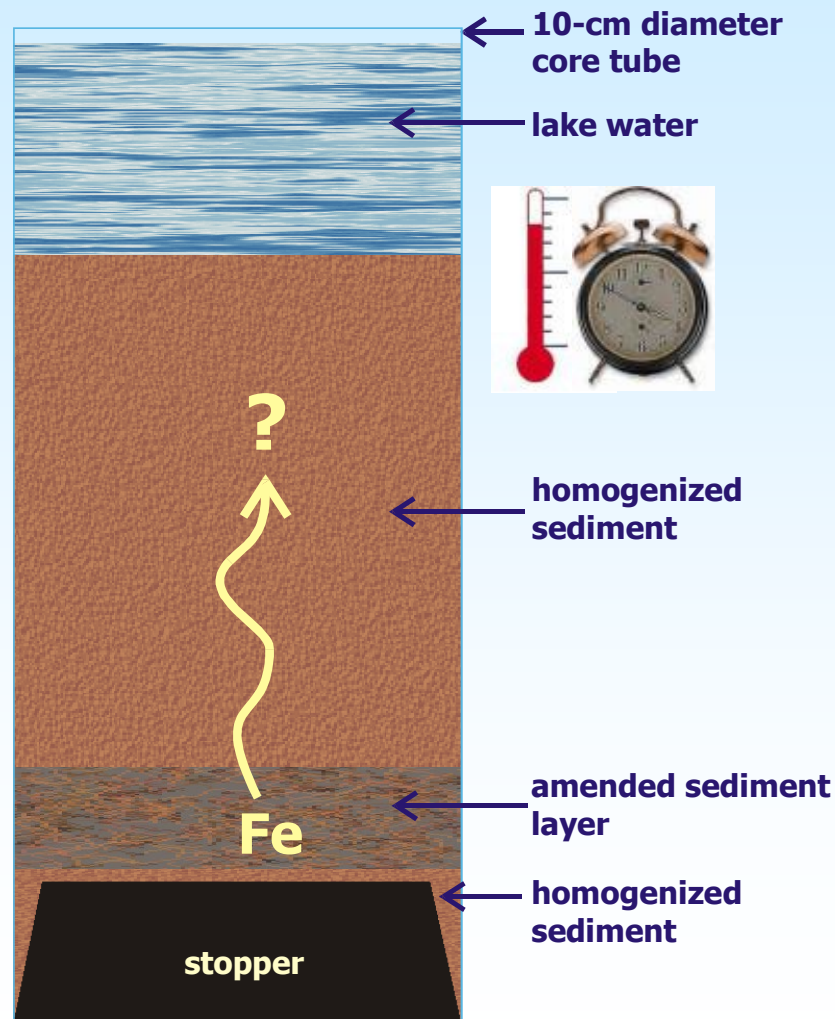
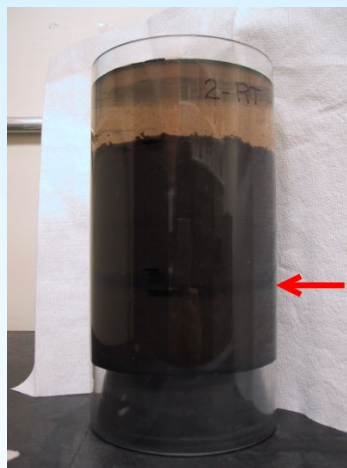
- examine the role of microbial activity on the distribution (or redistribution) of metals in lake sediments through column experiments
- test the hypothesis that bacterially mediated redox reactions redistribute metals within the sediment column under natural conditions
- implications are significant for interpretations of metal profiles in fresh water sediments as historical records of anthropogenic metal loading

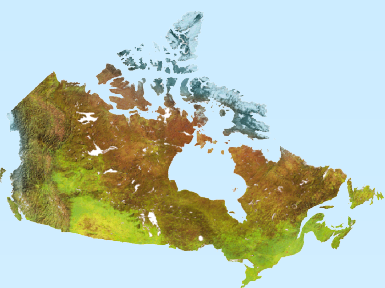




Experiment design

- tracer: ^{57}Fe (2.2% natural abundance)
- bulk sediment geochemistry
- pore water chemistry
- lake water chemistry
- enumerations of sulphate reducing and iron reducing bacteria
- toxicity testing

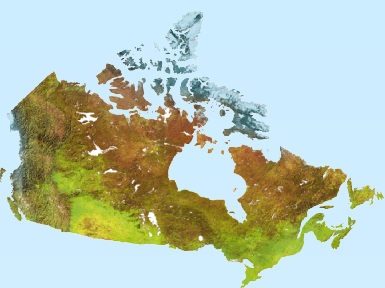




Highlights

- experimental design and procedures valid
- evidence of metal transport
 - sediments above the amended layer
 - pore water
 - lake water
- microbially-mediated metal transport





Presentations/Publications

Gould, W.D., Alpay, S., Smith, C.W., Lortie, L., Dutrizac, J., McGeer, J. and Skaff, M. 2003. Microbially mediated Fe mobility in natural lake sediments: Preliminary results from microcosm experiments. Metals in the Environment Research Network Annual Research Symposium, 25-26 February 2003, Ottawa, Ontario, Canada.

Gould, W.D., Alpay, S., Smith, C.W., Dutrizac, J., Skaff, M., and Rosa, F. 2004. Redistribution of metals in lake sediments by bacterially mediated oxidation-reduction reactions. Metals in the Environment Research Network Annual Research Symposium, 11-13 May 2004. Aylmer, Quebec, Canada.

Gould, W.D., Alpay, S., Smith, C.W., Lortie, L. Skaff, M., Dutrizac, J., and Pawlak, M. *in prep.* Remobilization of metals in lake sediments by microbially mediated oxidation-reduction reactions: evidence from ^{57}Fe tracer experiments.





Future considerations



- improve simulation of natural/actual in-situ conditions
 - seasonally shifting redoxcline
 - co-precipitation of other metal tracers during synthesis of ferrihydrite
 - mineral-rich versus organic-rich sediments
- real-time, high-resolution monitoring and analysis