Department of Geology
Seminar Series

Insights into the sources and microbial cycling of organic compounds in contaminated systems

Location:
Science 408

Thursday,
December 2
1:00 pm

Dr. Greg Slater

School of Earth, Environment & Society, McMaster University

Understanding the sources and microbial cycling of organic compounds is a critical component of effectively managing, remediating and reclaiming contaminated sites.

Dr. Slater's research expertise includes:

- Stable Isotope Geochemistry
- Environmental and Organic Geochemistry
- Geobiology
- Contaminant Hydrogeology
- Biodegradation and Bioremediation,
- Astrobiology

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Dr. Greg Slater, School of Earth, Environment & Society, McMaster University

Title: Insights into the sources and microbial cycling of organic compounds in contaminated systems

Abstract

Understanding the sources and microbial cycling of organic compounds is a critical component of effectively being able to manage, remediate and reclaim contaminated sites. Determining the source of organic compounds enables development of management and mitigation strategies. While demonstrating the occurrence and extent of microbial biogeochemical cycling can confirm the effectiveness of remediation and reclamation efforts. This talk will highlight some of the work my group has done to develop and apply methods to address these questions, compound specific radiocarbon analysis (CSRA) and comprehensive gas chromatography (GCxGC).

The use of CSRA to directly identify microbial biodegradation (intrinsic bioremediation) is illustrated by my groups work to demonstrate the source and microbial biodegradation of petroleum hydrocarbons using our study of the Deepwater Horizon spill as a case study. Here we demonstrated that observed decreases in petroleum hydrocarbons in salt marsh sediments were related to biodegradation by in situ microbial communities using the petroleum hydrocarbons as a carbon source and not water washing, evaporation or erosion. Alternatively, CSRA can be used to investigate carbon sources driving other microbial transformations, such as redox cycling of iron that is resulting in the release of arsenic to groundwater in Bangladesh. In combination with characterization of sterol distributions, we showed that this process is likely driven by inputs of improperly contained sewage at two sites, and by plant inputs at two other sites. The final portion of the talk will present some of our work applying GCxGC to investigate the sources and cycling of petroleum hydrocarbons during reclamation of oil sands surface mining sites and tailings. In particular to identify the sources, temporal variations, and evidence of biodegradation of naphthenic acids.

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