UNIVERSITY OF ALBERTA
Renewable Resources
Faculty of Agricultural, Life & Environmental Sciences

SWAMP LABORATORY

751 General Services Building
Edmonton, Alberta, Canada T6G 2H1
www.rr.ualberta.ca
rrchair@ales.ualberta.ca
Tel: 780.492.4413
Fax: 780.492.4323

PhD research in Analytical Geochemistry

The SWAMP (**S**oil, **W**ater, **A**ir, **M**anure, and **P**eat) lab is a world class, metal-free analytical facility in the Department of Renewable Resources at the University of Alberta, specially designed to measure metal concentrations at ultra trace levels (https://swamp.ualberta.ca/). The SWAMP facility performs the routine size-based separation of dissolved trace elements into distinct colloidal species using asymmetrical flow field-flow fractionation (AF4), with online multi-element characterization using an iCAP-Qc quadrupole ICP-MS. Absorbance and fluorescence detectors are coupled to the AF4 system for the characterization of dissolved organic matter. A G-SPLITT fractionation system is also available to isolate colloids while avoiding filtration artefacts. The SWAMP facility also houses an Element 2 XR sector field ICP-MS instrument for the quantification of challenging elements and Pb isotopes. Access to SEM and TEM imaging with EDS/X to characterize elemental composition at the micro/nanoscale is also available.

The SWAMP lab is currently seeking a highly motivated graduate student to undertake PhD research related to the development and application of methods to separate and characterize dissolved trace element species over a range of sizes. The ideal candidate will have graduate-level research experience in chemistry, geochemistry, or biogeochemistry, with a strong background in analytical chemistry and an interest in natural colloidal systems. Fieldwork experience and familiarity with AF4 or ICP-MS are also assets, but not required. Benefits of undertaking PhD research in the SWAMP include supervision and training by globally recognized experts in ultraclean sampling and analysis methods, geochemistry, and AF4-ICPMS. Analytical methods will be developed and applied to better understand the sources and cycling of dissolved trace element species in the Lower Athabasca River (LAR).

The LAR has received global attention due to its proximity to mining and upgrading operations in the Canadian Bituminous Sands. High-quality scientific investigation is therefore needed to trace the source of trace elements in the LAR; however, distinguishing between natural and anthropogenic inputs is not straightforward. Myriad natural sources also contribute to the 125-km stretch of the LAR near to industrial operations, such as tributaries containing high concentrations of iron and organic matter. Cutting-edge analytical methods and ultraclean metal-free sampling and analysis conditions are therefore required to measure trace element speciation at low natural background concentrations. Although the context of the PhD project will be the LAR, the development and application of analytical methods will be a primary focus.

To apply for this position, please send a letter of application, CV, and the names of two references to Ms. Karen Lund (klund@ualberta.ca). For further information about the project, please contact Dr. Chad W. Cuss (cuss@ualberta.ca).