# PhD project opportunity

## Using hyperspectral imaging of sediments to assess the responses of lakes to multiple stressors

We are recruiting a PhD student for a project using hyperspectral core imaging and subfossil indicator data to assess the question of **how have algal communities responded to multiple stressors over the last ~150 years across a network of Canadian lakes?** Through synthetic analyses of numerous paleoenvironmental and historical records, we have come to appreciate that the last ~150 years is a distinct period when human activities have been major agents of biological, chemical and physical change across the planet. However, a critical look at these studies also reveals considerable spatio-temporal variability. In order to generate a quantitative portrait of lake ecosystem dynamics in temperate and boreal ecozones, we are developing a network of time series based on sediment cores from eastern Canadian lakes. We will be implementing cutting-edge core scanning technologies that will provide us with high-resolution time series across the network. In addition, we will conduct complementary analyses of geochemistry and subfossil bioindicator assemblages, as well as perform radiometric dating on each of the cores, thus yielding the largest paleolimnological dataset of its kind.

The fully-funded PhD position will be carried out as part of an FRQNT project to examine cores from 40 eastern Canadian lakes that form a subset of the cross-Canada dataset being collected in the NSERC Canadian Lake Pulse Network (http://www.lakepulse.ca/), a collaborative project assessing the current and future states of Canadian lakes through the large-scale sampling of ~680 lakes, using various limnological, paleolimnological, genomic and microbiological approaches, as well as remote sensing and spatial modeling. The impacts of land use, climate and contaminants are being examined while developing innovative observational approaches to provide managers with new tools for lake stewardship.

The selected candidate will interact with other doctoral and postdoctoral researchers working on parallel aspects of the project, and will have an unparalleled opportunity to explore the development of new methodologies through access to the larger, pan-Canadian core and water quality database. This PhD project will also include unique fieldwork opportunities. The research will take place within the multidisciplinary research environment of the Department of Geography and the Centre for Northern Studies at Université Laval, and co-supervised by Dr. Rene Gregory-Eaves at McGill University. Interested candidates should send their CV and letter of interest to Dermot Antoniades via email (dermot.antoniades@cen.ulaval.ca).