Graduate opportunities – Interactions between fire and permafrost on peatland hydrology and biogeochemistry.

The Taiga Plains Research Network (http://taigaplains.ca/) is looking for a number of motivated graduate students (MSc or PhD) to work on complementary projects on the interaction between wildfire and permafrost on peatland hydrology, soil thermal regimes and biogeochemistry. Permafrost thaw is currently affecting large areas of peatlands in boreal western Canada, a region which also experienced an exceptional fire season in 2014 – which is in agreement with projections of future fire regimes. In order to improve our understanding of the influence of peatlands on water resources, water quality and climate change feedback mechanisms through greenhouse gases, it is thus important to consider interactions between fire and permafrost thaw. The following positions are currently available at University of Alberta, Edmonton, Canada, supervised by Dr. David Olefeldt at the department of Renewable Resources:

http://www.rr.ualberta.ca/

http://www.rr.ualberta.ca/StaffProfiles/AcademicStaff/Olefeldt.aspx

1. Effects of fire on permafrost stability in peatlands – a chronosequence approach

Project description: Both hydrology and carbon cycling in boreal peatlands is strongly affected by permafrost conditions. It is known from peat archives that peatland fires, common in western Canada, has the potential to trigger permafrost thaw – but it is not known which mechanisms that are responsible, what time frames that are involved or what the resulting rates of thaw are (both vertical and lateral). These questions may be addressed though a chronosequence approach, where permafrost conditions and soil thermal regimes in several nearby peatland sites are studied – but where sites differ in their time since fire (1 - >50 years). There is potential to combine field work with GIS approaches. Field work will be carried out in the vicinity of Fort Simpson, in the Northwest Territories.

Qualifications: BSc or MSc in physical geography or related field. Willingness to work in remote locations. Driver's license. GIS experience an advantage.

2. Carbon cycling in permafrost peatlands after fire

Project description: I am seeking a motivated student with interests in soil science and greenhouse gas exchange between land and atmosphere. Work will focus on soil respiration, with work done both in field and lab experiments, and potentially linked to isotope work. The central question is whether wildfire triggers the mineralization and release of carbon previously stored inert in frozen peat layers. Field work would be located in recently burned peatlands in southern Northwest Territories.

Qualifications: BSc or MSc in biology, physical geography or related field. Willingness to work in remote locations.

3. Export and fate of terrestrial DOC in peatland catchments.

Project description: Export of dissolved organic carbon (DOC) from peatlands is an important component of terrestrial ecosystem carbon balances. Exported DOC is also a main source of energy in downstream aquatic ecosystems, where it may be mineralized and released to the atmosphere as greenhouse gases. Both fire and permafrost thaw may affect both the quantity and quality of DOC exported from peatlands (including export of black carbon associated with soil combustion during fire), with cascading effects on downstream aquatic carbon cycling. Research will be conducted in the southern Northwest Territories, in streams and lakes of a peatland region with discontinuous permafrost and several recent fires.

Qualifications: BSc or MSc in biology, chemistry, physical geography or related field. Willingness to work in remote locations. Driver's license.

How to apply: Please send a letter of interest to olefeldt@ualberta.ca. Include resume describing your skills end education, transcripts and names of three referees.

Funding is available through a combination of stipends and TAships, and there is funding for research and conference travel. Starting dates are flexible, either January, May or September 2015.