Université du Québec à Trois-Rivières

Environment and Climate Change Canada
Environnement et Changement climatique Canada

University of Saskatchewan

Postdoctoral position: Developing a multi-layer snow model to improve winter greenhouse gas fluxes simulation and impacts of short-lived climate pollutants in CLASSIC and CanESM

Project Background

The Canadian Land Surface Scheme Including Biogeochemical Cycles (CLASSIC) is a process-based ecosystem and land surface model designed for use at scales ranging from site-level to global. CLASSIC is the land surface component of the Canadian Earth System Model (CanESM) used for climate projections. CLASSIC currently simulates the snowpack as a single homogenous layer, which limits the further improvements in snow-related processes in the CanESM model. Introducing a multi-layer snowpack into CLASSIC would enable a better representation of snowpack processes that are affected by vertical gradients of energy, temperature and moisture. For example, the single layer model does not represent well tundra snowpacks, which are typically comprised of a dense wind slab layer overlaying a less-dense depth hoar layer. A proper representation of Arctic snowpack structure is needed to better simulate the amount of greenhouse gases (GHGs) released during winter in the Arctic. The simulation of absorption of solar radiation by soot in snow in the current version of CanESM is also very simple and needs to be improved to better account for impacts of short-lived climate pollutants (SCLPs) on snow. This project aims to implement a multi-layer snowpack representation in CLASSIC to address these issues and validate it at key observation sites. The improved snowpack will be refined using off-line simulations prior to being applied in CanESM.

Supervision and Environment

The project is hosted at Université du Québec à Trois-Rivières (UQTR) under the supervision of Prof. Christophe Kinnard in collaboration with Dr. Libo Wang (Environment and Climate Change Canada) and Prof. John Pomeroy (University of Saskatchewan)

Required Qualifications

- PhD in hydrology, climate science, cryosphere science, or a related field
- Strong programming skills (Fortran, Python, C++)
- Solid understanding of snow physics and surface energy balance
- Demonstrated autonomy and collaborative skills

Terms

- Duration: 1.5 years (with possible extension)
- Salary: $60,000 CAD/year
- Additional funding available for Canadian citizens/permanent residents
- Travel support provided

Application

Please send a single PDF including a Cover letter, CV and contact information for two referees

Email: christophe.kinnard@uqtr.ca Deadline: 21 November 2025 (open until filled)