MSc opportunity

Integrated surface water and groundwater modelling of Canada's Interior Plains under climate change

September 2026 start date

Project Description:

The Canadian Prairies are experiencing the most rapidly changing climate in southern Canada, and predicting how rivers, lakes and groundwater will respond is necessary to manage water resources and maintain dependent ecosystems. A unique challenge in the Prairies is that thick glacial sediments control how precipitation is partitioned between surface runoff to wetlands and streams, and subsurface storage as soil moisture and groundwater. In-turn, soil moisture supports vegetation (through evapotranspiration) and dynamically responds to variation in climate. Representing the terrestrial water cycle is complex, but sophisticated models are emerging that help understand these linked processes, which can support decisions about freshwater resources in the future.

The objective of this research project is to investigate the terrestrial water cycle of the Nelson River Basin, with a focus on the exchange between surface water and groundwater. Research activities will include fine-tuning a basin-scale model developed in HydroGeoSphere as part of the Canada One Water initiative, then examining the integrated hydrologic system under climate scenarios. Outcomes from this project will contribute to the definition of environmental indicators for groundwater quantity, which is a goal of research partners at Natural Resources Canada.

Experience:

- BSc in geoscience (Earth Science, Geology, Environmental) or engineering (Water Resources, Civil, Environmental, Geological).
- Proficiency in hydrology and hydrogeology.

- Exposure to the use of hydrologic models and associated data requirements. Prior experience in using models (especially HydroGeoSphere) would be an asset.
- Well-developed communication and interpersonal skills to create presentations, written publications and interact with research partners.

Working Environment:

The position is based in the Watershed Science & Modelling Laboratory (WSML) in the Department of Earth and Atmospheric Sciences at the University of Alberta. The WSML is equipped with Windows-based high performance computing systems, with over 500 cores that allow processing of large-scale models through a user-friendly scheme by applying Parallel Processing system.

The candidate will be co-supervised by Dr. Monireh Faramarzi and Dr. Brian Smerdon and collaborate with research partners at the Geological Survey of Canada and Aquanty Inc.

The MSc project is supported with a research scholarship of $31,500CAD per year for two years.

Please contact Brian Smerdon at brian.smerdon@ualberta.ca for more information about this opportunity. If you would like to apply for the position, please include your CV and a brief note about how your background makes you a suitable candidate.

Our research team strives to create an environment where everyone feels valued, barriers to success are removed, and thriving connections are fostered. We welcome applications from all qualified persons. We encourage women, First Nations, Métis and Inuit persons, members of visible minority groups, persons with disabilities, persons of any sexual orientation or gender identity and expression, and all those who may contribute to the further diversification of ideas and the University to apply.