

M.Sc. Opportunities in Northern Hydrometeorology

The northern hydrometeorology group (<http://web.unbc.ca/~sdery>) at the University of Northern British Columbia (UNBC), in Prince George, British Columbia, Canada invites applications for openings for two fully-funded Masters of Science (M.Sc.) degree starting in May or September 2023.

Project 1 Description: The Nechako River is the second largest tributary to British Columbia's Fraser River and an important waterway for migrating and spawning salmon, the endangered white sturgeon, and many other aquatic species. Unlike other tributaries of the Fraser River, the Nechako River is highly regulated, with an inter-basin diversion and flow regulation affecting downstream water conditions. Concurrently, rising air temperatures and precipitation changes affect water availability across the Nechako Reservoir and watershed. The cumulative effects of water management and climate change not only affect Nechako River flows but also its water temperatures. This project's main objective is to quantify the individual roles of flow regulation, climate variability and climate change on water temperature trends for the main stem Nechako River during the past seven decades. A secondary goal is to augment the existing monitoring network of water temperature sensors across the Nechako Watershed to better capture spatio-temporal variability in water temperatures from headwater streams down to the main stem Nechako River near its confluence with the Fraser River for improved numerical simulations.

This project will employ long-term observed daily air temperature and flow records as input to the Air2Stream water temperature model to simulate the 1950-2022 water temperatures at seven or more river sites across the Nechako Watershed. These sites will be selected based on the availability of water temperature observations to calibrate and validate the Air2Stream simulations. A series of sensitivity simulations will then be undertaken to assess the impact of flow regulation, climate variability and change on water temperatures. Naturalized streamflow records for the main stem Nechako River and the original air temperature data will be used to assess flow regulation impacts on water temperatures. A set of idealized simulations will follow using climatological and detrended input forcings to assess the equilibrium water temperature states and the role of climate change, respectively.

Project 2 Description: Given the projected rises in air temperatures and decreases in summer flows, climate change may also exceed the influences of flow regulation on the Nechako River's water temperatures by 2100. This project aims to assess how projected future climate change (as inferred from the CMIP6 ensemble) may impact the thermal regimes of the Nechako River and its unregulated tributaries. The CMIP6 downscaled daily air temperature data and the routed streamflow from ongoing hydrological simulations will be used to run the Air2Stream water temperature model. This will provide a range of potential future water temperatures for the main stem Nechako River and its main tributaries. After the completion of the initial water temperature simulations, sensitivity simulations with the Air2Stream model will be launched to quantify the influence of landcover changes and flow regulation on the projected water temperature trends across the Nechako.

Application Process: We invite applications for these M.Sc. positions, with the preferred applicants having a comprehensive knowledge of cold regions hydrometeorology and climate, and excellent computational, FORTRAN and/or Matlab programming, R statistical data analysis and communication skills. Applicants with experience in implementing, calibrating and validating numerical models will be given preference for these projects. Successful candidates will also participate in field work related to the deployment of water temperature loggers across the Nechako watershed as well as in outreach activities

in communities within the Nechako watershed. UNBC is committed to equity, diversity, and equal opportunity; we strongly encourage applications from Indigenous Peoples, racialized minorities, diversely-abled/disabled people, women, and the LGBTQ2S+ community and other underrepresented and disadvantaged groups in science, technology, engineering, the arts and mathematics (STEAM).

Interested applicants are highly encouraged to contact Dr. Stephen Déry at sdery@unbc.ca with a cover letter highlighting research interests and experience relevant to this position, an up-to-date curriculum vitae, unofficial transcripts, and the names of at least two potential professional references. The deadline for submitting these documents is Friday 30 September 2022 (or until the position is filled). When submitting electronically your application documents, please insert in the subject line “Application for MSc Opportunity in Northern Hydrometeorology Project #” while specifying the appropriate project number you are applying for. The successful candidate will then be required to submit an application for entry to the Natural Resources and Environmental Studies (NRES) graduate program at the University of Northern British Columbia (UNBC). The start date for the M.Sc. positions is May or September 2023. Applicants whose first language is not English may need to submit evidence of English language proficiency prior to admission. Applicants must also have a minimum grade point average (GPA) of 3.0 out of 4.33 (equivalent to 69%) in their last 60 credit hours to enter the NRES graduate program. The successful candidate will receive a minimum of two years of financial support starting with the UNBC academic session in May or September 2023.