30 new positions in Computational Hydrology (PhD students and postdoctoral fellows)
University of Saskatchewan (USask) and University of Calgary (UCalgary), Canada

We are seeking multiple highly motivated PhD students and postdoctoral fellows across several new projects in computational hydrology coordinated by Prof. Martyn Clark (USask) and Prof. Alain Pietroniro (UCalgary). Successful candidates will be part of the new water group in the Department of Civil Engineering at UCalgary (schulich.ucalgary.ca/civil) or the Centre for Hydrology at USask (www.usask.ca/hydrology). Depending on the research topic, the successful candidates will also work with Raymond Spiteri, Andrew Ireson, Karl-Erich Lindenschmidt, and John Pomeroy (USask) and Tricia Stadnyk, Simon Papalexiou, Jennifer He and Qi Zhou (UCalgary). The successful candidates will work together as a team to improve our capability to simulate and predict hydrological processes across diverse temporal and spatial scales.

These are full-time 4-year positions (PhD students) and 2-year positions (postdoctoral fellows). Candidates at UCalgary will work at the University of Calgary campus (Calgary, Alberta); candidates at USask can select their primary work location with the Centre for Hydrology as either at the Canadian Centre for Water Forecasting and Prediction on the University of Saskatchewan campus (Saskatoon, Saskatchewan) or the Coldwater Laboratory in the Canadian Rockies (Canmore, Alberta). The focus of the work is flexible and can be tailored to suit the skills and interests of the successful candidates. Because of the computational focus of the work, a strong background in hydrological modelling, scientific software development, or high-performance computing is required. The desired qualifications and skills for PhD students and postdoctoral scholars are defined at the end of this announcement.

What you will do:

Broadly speaking, the work will focus on designing and implementing various water resources modelling and prediction tools, assessing and improving their performance across a range of hydrological environments using in-situ and remote sensing data, benchmarking observations from research basins, running large-domain simulations on supercomputers, and working with users to improve the value of modelling and prediction products for water resources planning and management. The successful candidates will have the opportunity to work on many different aspects of hydrological science, including cold regions processes, uncertainty quantification, isotope tracer modelling, stochastic modelling, and water quality prediction. The specific research focus will be determined based on the new hire's skills, interests, and career/learning goals. It is expected that the new hires will present their research findings at international conferences and publish them in international journals.

Research environment:

Our research groups build tools to simulate and predict hydrological processes on spatial scales from hillslopes to continents and time scales from seconds to centuries. Some of our example contributions include ensemble forcing data for large-domain hydrological models, multi-scale modular hydrological models, continental-domain network routing models, ensemble methods for data assimilation, and process-based methods for model benchmarking and model evaluation. Much of our model development work is targeted toward applications in ensemble streamflow forecasting, water security assessments, diagnostic evaluations of hydrological change, water quality modelling, and improving how hydrological processes are represented in Earth System models.

We are committed to providing a safe, positive, respectful, accessible, and non-discriminatory workplace for everyone by ensuring that the Equity, Diversity, Inclusion, Accessibility culture thrives within our research teams. The following principles shape our research environment: *Equity* – the research environment is most effective if each team member has the opportunity for intellectual and personal growth; *Diversity* – the research environment is most effective if it includes people with different backgrounds, perspectives, and world views; *Inclusion* – the research environment is most effective where all team members trust each other, support each other, and work together closely to help each other succeed; *Accessibility* – the research

environment supports programs, services, and products so they are accessible to people living with various abilities. We recognize that preferred scientific approaches may differ for individuals and institutions, and rigorous yet constructive dialog about such differences are both welcome and encouraged.

Desired qualifications and skills:

PhD students should have a recent MSc degree in hydrology, civil engineering, geography, environmental science, earth science, computer science, physics, or related discipline, and meet some of the following criteria:

- Demonstrated capability to complete high-quality research.
- Knowledge of hydrological and water resources modelling and forecasting.
- Experience handling large and heterogeneous geophysical datasets.
- Competence in data preparation/analysis/visualization with Python, R, or a similar scripting and visualization language.
- Competence in using Linux environments.
- Experience with high performance computing.
- Experience in programming with C/C++ or Fortran for model development & debugging.
- Experience in software engineering best practices such as unit testing, use of modern version control systems, such as git, use of profilers / debuggers, etc.
- Experience and dedication to open science.
- Ability to communicate clearly, concisely, and effectively in both spoken and written English.
- Sharp analytical abilities and problem-solving skills.
- Record of positive contributions in a team environment.
- Ability to multi-task and prioritize workload.
- Interest in science communication (e.g., blog posts, social media, and media interviews).

Postdoctoral scholars should have a recent Ph.D. degree (0-3 years of postdoctoral experience) in hydrology, civil engineering, geography, environmental science, earth science, computer science, data science, physics, or related discipline, and meet some of the following criteria:

- Demonstrated record of high-quality research and publication.
- In-depth knowledge of hydrological and water resources principles, modeling and forecasting.
- Experience handling large and heterogeneous geophysical datasets.
- Strong competence in data preparation/analysis/visualization with Python, R, or a similar scripting and visualization language.
- Competence in using Linux environments.
- Experience with high performance computing.
- Strong competence in programming with C/C++ or Fortran for model development & debugging.
- Competence in software engineering best practices such as unit testing, use of modern version control systems, such as git, use of profilers / debuggers, software development etc.
- Experience and dedication to open science.
- Ability to communicate clearly, concisely, and effectively in both spoken and written English.
- Sharp analytical abilities and problem-solving skills.
- Demonstrated leadership abilities and record of positive contributions in a team environment.
- Ability to work with minimal supervision, multi-task, and prioritize workload.
- Interest in mentoring junior team members.
- Interest in science communication (e.g., blog posts, social media, and media interviews).

How to apply:

If interested in these positions, please send a cover letter explaining your interests and experience in computational hydrology, your CV, and a list of three references to Joy Mitsogianni (joy.m@usask.ca) before 15 January 2023 with "*Computational Hydrology Positions*" on the subject line. Other material may be requested after applications are reviewed. The desired start date is during the period July-September 2023.

Background image: Lena River delta (from https://dancoecarto.com/4k-rivers)