New research positions in the Global Water Futures program

The Global Water Futures (GWF) program is the largest university-led climate and freshwater research program in the world. GWF currently has several new employment opportunities to advance mechanistic model simulations of hydrological processes across Canada and the world. Current opportunities include the science coordinator for the Core Modelling Team, two research scientists, eight postdoctoral scholars, four PhD students, and one model improvement specialist.

USask's Peyto Glacier Research Site in Banff, AB

Successful candidates will have the opportunity to work for the largest water modelling project ever conducted in Canada, with global scope, working with GWF Director John Pomeroy, GWF Core Modelling Co-leads Al Pietroniro and Martyn Clark, and other faculty across the GWF partner universities. Even though these are primarily modelling positions, researchers will be encouraged to become involved in field studies in well-instrumented research basins that are located in the spectacular landscapes of western Canada. Work locations include the Canmore Coldwater Laboratory in the Canadian Rocky Mountains and Innovation Place on the University of Saskatchewan campus in Saskatoon; one post will at the Université de Québec a Montréal. Further positions will be posted for deployment at other GWF partner universities.

Currently, the GWF network involves more than 356 stakeholders/ users, 157 researchers from 15 Canadian universities and 538 research personnel associated with 39 pan-Canada projects, and core teams including modelling and forecasting, computer science, knowledge mobilization, data and technical teams. Additional information is available at: https://www.globalwaterfutures.ca/

Positions:

- **Science coordinator for core modelling**. The incumbent will be responsible for coordinating activities of the GWF Core Modelling and Forecasting Team of close to 50 personnel including theme leads, faculty supervisors, and research personnel (students, postdoctoral fellows, research associates, and research scientists) situated at universities across Canada. Responsibilities include: organising various team and sub-team meetings, tracking model code development and review, assist the co-leads in developing draft reports on the Core Modelling and Forecasting Team and PWPI progress, oversee development and maintenance of a website, develop brief documents and brochures to promote core team activities, and organize outreach and science events, including workshops and symposia for the Core Modelling and Forecasting Team. The incumbent will report to the GWF Core Modelling and Forecasting Team co-leads Al Pietroniro and Martyn Clark.

- **Research scientists**. Two research scientist positions are available to accelerate progress on continental-domain hydrological prediction capabilities. The first research scientist position is on next-generation hydrological prediction capabilities, focusing on advanced modelling of snow and permafrost processes. The second research scientist is on new capabilities for continental-domain hydrological prediction, focussing on advancing model representations of coupled thermodynamic and hydrological processes in rivers and lakes. In addition to conducting their own research, it is expected that the incumbents will have a managerial role within GWF to supervise postdoctoral scholars, including managing collaborative approaches to the development, review, and testing of new modelling capabilities. The incumbents will report to Prof. Martyn Clark; work locations include the Canmore Coldwater Laboratory in the Rocky Mountains and Innovation Place on the University of Saskatchewan, Saskatoon campus.

- **Postdoctoral scholars in Planetary Water Prediction**. Seven postdoctoral scholar positions are available to advance capabilities in planetary water prediction. These positions form the core of the new GWF Planetary Water Prediction Initiative (PWPI), to advance the computational infrastructure (datasets, modeling capabilities) necessary to produce simulations and predictions of hydrological risks across the globe. The PWPI initiative will be focused around two inter-related research pillars: in one pillar, we will build the computational infrastructure (models, data) to enable state-of-the-art hydrological simulations anywhere on the planet. In the second pillar, the incumbents will develop regional models in key regions to address pressing societal needs (Arctic, Himalaya, Andes, central Asia). The regional models will be constructed as cut-outs from the global-scale fabric; the global instantiations will used as a baseline to systematically evaluate the benefits of more detailed regional information and user engagement. The incumbents will work with GWF Director John Pomeroy along with GWF core modelling co-leads Al Pietroniro and Martyn Clark; work locations include the Canmore Coldwater Laboratory in the Canadian Rocky Mountains and Innovation Place on the University of Saskatchewan, Saskatoon campus.

- **Postdoctoral scholar in convection-permitting climate modelling**. One postdoctoral position is available to examine precipitation distribution across Canada using high-resolution convection permitting climate modelling with the Global Multiscale Environmental Model (GEM). Simulations will be conducted during approximately 20 years over specific regions of Canada

where extreme flooding events cause substantial damage. A first focus will be given to the eastern slopes of the Canada Rockies, in particular, near Banff and Calgary, Alberta. The outcome will directly be used to drive hydrological models to study accumulated snowpack, phase of the precipitation and timing. The position will be in the research group of Prof. Julie Thériault at the Department of Earth and Atmospheric sciences and the ESCER centre at the Université de Québec a Montréal (UQAM), located downtown Montréal, Québec, and will be working in close collaboration with other core modelling members across Canada.

- **PhD students in computational hydrology**. Four PhD positions are available in the general area of computational hydrology, to build tools to simulate and predict hydrologic processes. The research can span spatial scales from hillslopes to continents and time scales from seconds to centuries. Some potential contributions include ensemble forcing data for large-domain hydrological models, multi-scale hydrological models, continental-domain network routing models, ensemble methods for data assimilation, and process-based methods for model benchmarking and model evaluation. Model development work is targeted toward applications in streamflow forecasting, water security assessments, and improving the representation of hydrological processes in Earth System models. Successful candidates will become experts in process-based hydrological modelling, gaining the understanding and tools that are necessary to develop and apply models across a broad range of landscapes. The PhD students will be supervised by Prof. Martyn Clark and enrolled in the University of Saskatchewan; work locations include the Canmore Coldwater Laboratory in the Canadian Rocky Mountains and Innovation Place on the University of Saskatchewan, Saskatoon campus.

- **Model improvement specialist**. The incumbent will co-lead the development and management of state-of-the-art hydrological prediction software, working with researchers and engineers at the University of Saskatchewan and Environment and Climate Change Canada to further develop the hydrological-land-surface-scheme MESH and its supporting software toolkit. Duties will also involve providing support for the model in several ways; including providing individual support to researchers, organizing seminars/workshops, and improving documentation. The incumbent will report to Dr. Bruce Davison; the work location will be on Innovation Place on the University of Saskatchewan, Saskatoon campus.

USask PhD Candidate Caroline Aubry-Wake at the Marmot Creek Research Site in Kananaskis, AB

Expectations: The applicants should have experience and expertise with developing and applying complex process-based models, the use and analysis of big data, and comprehensive model evaluation. Applicants should have a background in physical hydrology, hydrometeorology, or water resources engineering. The applicants should also have experience with software configuration management (e.g. git, svn), experience with effective model testing protocols, experience with programming in multiple programming/scripting languages, experience with creating effective documentation, and experience with parallel computing. Successful applicants will be comfortable working in a team environment and highly engaged in collaborative model development activities. They will be expected to publish regularly in peer-reviewed international journals and present their work at international science meetings.

Duration: These are term positions up until August 31, 2023, commencing as soon as possible.

Application Procedure: To be considered for this opportunity, please submit the following documents via email:
- a statement of purpose (3-5 pages) that details relevant academic excellence, research abilities, communication, interpersonal and leadership qualities
- an updated curriculum vitae (max. 10 pages)
- evidence of previous research productivity as demonstrated by authorship of refereed journal publications and conference presentations/publications
- names of three referees

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Prospective candidates are encouraged to visit the following websites for details:
- Global Institute for Water Security: http://water.usask.ca/
- Global Water Futures: http://gwf.usask.ca/

The USask is located in Saskatoon, Saskatchewan, a city with a diverse and thriving economic base, a vibrant arts community and a full range of leisure opportunities. The University, a member of the U15 group comprising Canada's leading research-intensive universities, has a reputation for excellence in teaching, research and scholarly activities and offers a full range of undergraduate, graduate, and professional programs to a student population of over 23,000. Information about the University, and the City of Saskatoon can be found at www.usask.ca, http://tourismsaskatoon.com and http://www.downtownsaskatoon.com.

We thank all applicants for their interest; however, only candidates selected for an interview will be contacted.

Closing date: Open until all positions are successfully filled; review to begin by January 31, 2020

The University of Saskatchewan is strongly committed to a diverse and inclusive workplace that empowers all employees to reach their full potential. All members of the university community share a responsibility for developing and maintaining an environment in which differences are valued and inclusiveness is practiced. The university welcomes applications from those who will contribute to the diversity of our community. All qualified candidates are encouraged to apply; however, Canadian citizens and permanent residents will be given priority.

Researchers (l-r) Phani Adapa (USask), Joe Shea (UNBC), John Pomeroy (Usask), and on the Athabasca Glacier Research Site in Jasper, AB