Geophysical Research Abstracts
Vol. 20, EGU2018-11419-3, 2018
EGU General Assembly 2018

A Community Hydrological Modelling Framework for Global Water Futures.

Alain Pietroniro (1), John Pomeroy (2), Howard Wheater (3), Vincent Fortin (4), Bruce Davison (1), Kevin Shook (2), and Saman Razavi (4)

(1) National Hydrological Service, Meteorological Service of Canada, Saskatoon, SK, Canada (al.pietroniro@usask.ca), (2) Centre for Hydrology, University of Saskatchewan, Saskatoon, SK, Canada, (3) Global Institute for Water Security, University of Saskatchewan, SK, Canada, (4) Atmospheric Science and Technology Division, Environment and Climate Change Canada, Dorval, QC, Canada

Globally , climate warming and human actions are altering precipitation patterns, reducing snow levels, accelerating glacier melting, intensifying floods, and increasing risk of droughts, while pollution from population growth and industrialization is degrading water systems. Practitioners are, more than ever, starting to understand that given such unprecedented change, historical patterns of water availability are not necessarily a reliable guide for the future. Practitioners are increasingly looking at robust modelling systems to help answer societal questions around water futures. However, in many cases the existing modelling systems are not sufficient to truly address the important questions. The problem is particularly acute in places like Canada where there are extremely large and complex basins, limited forcing data, complex landscapes and hydrological processes that are either poorly represented, or not represented at all in most hydrology and land-surface modelling systems. As part of the Global Water Futures programme, we have developed a framework that to deliver new modeling tools, in conjunction with new monitoring systems, for Canada and the other cold regions of the world. This framework is derived from a series of successful hydrology modelling programs, starting with the Mackenzie GEWEX study that began in the mid 1990s and continuing with the Global Water Futures project. The framework we have been developing has consistently focused on blending bottom-up and top-down approaches to achieve, as best as is possible, scale-independence in the parametrizations, and sufficient granularity in the forcing and initial conditions while maintaining a computationally efficient framework. We are currently evaluating a series of models at the experimental catchment scale at numerous sites across Canada, while simultaneously applying large scale hydrology-land-surface systems in both forecasting and continuous simulation mode. These open-source p hydrological models and land-surface schemes can resolve the coupled energy and water budget of the land surface at multiple scales, including features pertinent to cold regions such as lakes, wetlands, snow, frozen ground and glaciers.