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Sujet/Subject: Great-Lakes Runoff Inter-comparison Project for Lake Ontario (GRIP-O)

Langue/language : Français/French

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Résumé/Abstract:

The project aims at comparing very different hydrologic models in their ability to simulate runoff to Lake Ontario: accurate predictions of the lake level and of the St. Lawrence River flow downstream of the lake require efficient tools for modelling the lake's direct runoff. It follows the GRIP-M project, which focused on Lake Michigan.

To this aim, very different models were calibrated and compared using the same observations, spatial framework and configuration settings. They range from conceptual models (Large-Basin Runoff Model-LBRM and GR4J-*modèle du Génie Rural à 4 paramètres Journalier*) to physical ones: MESH (*Modélisation Environnementale de la Surface et de l'Hydrologie*), Watflood, and GEM-Hydro (used at EC[1]). The lake Ontario watershed is challenging for hydrologic modelling because many of its tributaries have a regulated flow regime while one-fourth of its area remains ungauged.

Distributed models, despite leading to poorer performances than the lumped models, are still of much interest because they represent the processes and variable states everywhere inside a domain. Among physical models, GEM-Hydro (with the Soil, Vegetation and Snow scheme SVS) generally takes the lead. SVS is an experimental land surface scheme which aims at replacing ISBA (*Interaction Soil-Biosphère-Atmosphère*), which is used operationally by EC[1]. A comparison of streamflows simulated with the two Land Surface Schemes is made, and the benefit of a new snowmelt formulation for SVS is presented.

As part of this study, two different precipitation datasets were compared, namely the CAnadian Precipitation Analysis (CaPA) which only benefits from observations available in real-time, and the GHCN-D (Global Historical Climatology Network - Daily), a (dense) gridded dataset of gauge observations. The GHCN-D tends to lead to the best hydrologic performances, but CaPA generally allowed achieving very close performances even for areas where the density of rain gauges is very scarce.