

Runoff modelling within the Canadian Regional Climate Model (CRCM): analysis over the Quebec/Labrador watersheds

BILJANA MUSIC¹, ANNE FRIGON¹, MICHEL SLIVITZKY¹, ANDRE MUSY¹, DANIEL CAYA¹ & RENE ROY^{2,1}

¹ *Ouranos, Consortium sur la climatologie régionale et l'adaptation aux changements climatiques, 550 Sherbrooke Street West, 19th Floor, Montréal, Québec H3A 1B9, Canada*
music.biljana@ouranos.ca

² *Hydro-Québec (IREQ), 1800 montée L. Boulet, Varennes, Québec J3X 1S1, Canada*

Abstract This study focuses on evaluation of the hydrological performance of the Canadian Regional Climate Model (CRCM) coupled to the Canadian Land Surface Scheme (CLASS). The CRCM's ability to adequately simulate annual mean runoff over 21 small watersheds in the Quebec/Labrador peninsula is assessed over the period 1961–1999. Since runoff is a spatial and temporal integrator of weather events, it represents a very useful variable for climate model validation, especially in areas where conventional surface weather observations are scarce. In addition, the sensitivity of simulated runoff to domain size and lateral boundary conditions is investigated. Results of the analysis indicate that CRCM tends to systematically underestimate observed annual mean runoff over most of the investigated watersheds. It was found that choice of simulation domain has a considerable effect on the simulated hydrological regime at the watershed scale. Different re-analyses used as driving data have less influence than domain size. However it may be important (larger than CRCM's internal variability) when simulations are performed over a relatively small domain.

Key words runoff; watershed; land-surface processes; internal variability; Canadian RCM; CLASS