Geophysical Research Abstracts, Vol. 9, 11396, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-11396

Sensitivity of the hydrological cycle to physical parameterizations in the Canadian Regional Climate Model

B. Music (1), and D. Caya (2)

(1) Canadian Network for Regional Climate Modeling, UQÀM, Montréal, Québec, Canada;
(2) Consortium Ouranos, Montréal, Québec, Canada

Water cycle over a given region is governed by many complex multi-scale interactions and feedbacks and their representation in climate models can vary in complexity. In order to understand which of the key processes required better representation, evaluation and validation of all components of the simulated water cycle are required. Adequate assessing of simulated hydrological cycle over a given region is not trivial because observations for various water cycle components are seldom available at regional scale. In this study, a comprehensive validation method of the water budget components over a river basin is presented. In addition, the sensitivity of the hydrological cycle in the Canadian Regional Climate Model (CRCM) to a more realistic representation of the land surface processes, as well as radiation, cloud cover and atmospheric boundary layer mixing is investigated. The changes to the physical parameterisations are assessed by evaluating the CRCM hydrological cycle over several North American River basins differing in their location, size and topography. The first part of the evaluation looks at the basin annual means. The second part consists in the analysis and validation of the annual cycle of all water budget components. Finally, the third part is directed toward the spatial distribution of the annual mean precipitation, evapotranspiration and runoff. Results indicate a strong response of the CRCM evapotranspiration and precipitation biases to the physical parameterisation changes. Noticeable improvement was obtained in the simulated annual cycles of precipitation, evapotranspiration, moisture flux convergence and terrestrial water storage tendency when more sophisticated physical parameterisations are used. Some improvements are also observed for the simulated spatial distribution of precipitation and evapotranspiration. The simulated runoff is less sensitive to changes in the CRCM physical

parameterisations.