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Rainfall distribution effect on flow at a watershed scale

Sadik Ahmed and Ioannis Tsanis
McMaster University, Civil Engineering, Hamilton, Canada (tsanis@mcmaster.ca)

The potential impact of climate change and increase of urbanization on flood line delineation criteria and detention pond storage volume is investigated at the watershed scale. This is being achieved by performing uncertainty analysis on regulatory and 100 year flood lines in response to projected climate change at two watersheds, and assessing the climate change impact on storage design value of a proposed detention pond. The studied watersheds are the Spencer Creek (160.4 km2) and Ancaster Creek (8.4 km2) watersheds that are located in Southern Ontario, Canada. The effect of rainfall distribution of the flow simulated by the HEC-HMS hydrologic model was calibrated with an observed storm event on March 2010 by using the Nash and Sutcliffe coefficient. The NARCCAP climate simulation was used as input to the hydrologic model for future flow simulation. The calibrated models were used to simulate flows for a future storm event of 184 mm in 24 hours, projected by the climate model RCM3-GFDL. Cases of hypothetical precipitation distribution that are distributed from 2 to 24 hours are used. Results show that in case of Spencer Creek watershed, there is no significant effect of precipitation distribution on the simulated flows. Results also show that there is a significant effect of rainfall distribution in the case of the Ancaster Creek watershed, which is an urban watershed. This study also aims to propose a temporal distribution of design storm for the mentioned watersheds for future flow simulation.