Geophysical Research Abstracts
Vol. 15, EGU2013-9577-2, 2013
EGU General Assembly 2013

Quantifying near-surface water exchange to assess hydrometeorological models

Annie-Claude Parent, François Anctil, and Anne Morais

Chaire de recherche EDS en prévisions et actions hydrologiques, Department of Civil and Water Engineering, Université Laval, Quebec, QC G1V 0A6, Canada

Modelling water exchange from the lower atmosphere, crop and soil system using hydrometeorological models allows processing an actual evapotranspiration (ETa) which is a complex but critical value for numerous hydrological purposes e.g. hydrological modelling and crop irrigation. This poster presents a summary of the hydrometeorological research activity conducted by our research group. The first purpose of this research is to quantify ETa and drainage of a rainfed potato crop located in South-Eastern Canada. Then, the outputs of the hydrometeorological models under study are compared with the observed turbulent fluxes. Afterwards, the sensibility of the hydrometeorological models to different inputs is assessed for an environment under a changing climate. ETa was measured from micrometeorological instrumentation (CSAT3, Campbell SCI Inc.; Li7500, LiCor Inc.), and the eddy covariance techniques. Near surface soil heat flux and soil water content at different layers from 10 cm to 100 cm were also measured. Other parameters required by the hydrometeorological models were observed using meteorological standard instrumentation: shortwave and longwave solar radiation, wind speed, air temperature, atmospheric pressure and precipitation. The cumulative ETa during the growth season (123 days) was 331.5 mm, with a daily maximum of 6.5 mm at full coverage; precipitation was 350.6 mm which is rather small compared with the historical mean (563.3 mm). This experimentation allowed calculating crop coefficients that vary among the growth season for a rainfed potato crop. Land surface schemes as CLASS (Canadian Land Surface Scheme) and c-ISBA (a Canadian version of the model Interaction Sol-Biosphère-Atmosphère) are 1-D physical hydrometeorological models that produce turbulent fluxes (including ETa) for a given crop. The schemes performances were assessed for both energy and water balance, based on the resulting turbulent fluxes and the given observations. CLASS showed overestimating the turbulent fluxes (including ETa) so as the fluctuations in the soil flux which were higher than those measured. ETa and runoff were overestimated by c-ISBA while drainage was weaker, compared to CLASS. On the whole, CLASS showed better modelling drainage. Further works include: 1- comparing observations and results from CLASS to the French model SURFEX (Surface Externalisée), that uses the scheme ISBA, and 2- assessing the sensibility of CLASS to different meteorological inputs (i.e. 6 regional climate models) in producing a consistent ETa, in a context of climate changes.