

Theme 3 Overview

Charles Lin

McGill University

(currently at Environment Canada)

Theme 3

- Assess and reduce uncertainties in the prediction of drought and its structure
- Progress in 2008
 - Precipitation and other atmospheric parameters
 - Soil moisture and runoff generation
 - Groundwater

Precipitation and other atmospheric parameters

- Hanesiak
 - CRCM/CLASS, CRCM/force-restore: precipitation and temperature
 - CLASS version produces better results
- Stewart
 - Operational seasonal prediction of summer precipitation anomalies
 - poor skill as individual major events are missed
- Leighton
 - CRCM: precipitation, cloud anomalies and SPI
 - satellite data are used for model verification
- Pietroniro
 - South Saskatchewan River Basin: evaluated different precipitation products; sensitivity of hydrograph simulated by WATFLOOD to precipitation
- Szeto
 - Different RCMs: simulation of 1999-2004 drought
- Strong
 - Quantification of micro-scale drylines and mesoscale moisture gradients across varying land covers
- Lin
 - HFP2 seasonal forecast (AGCM3/CLASS): 500 mb height, SAT and precipitation
 - model has difficulty in seasonal forecast of drought events

Soil moisture and runoff generation

- Hanesiak
 - Hydrological and climatological data from the Burntwood river watershed have been collected and examined
 - Data are used to calibrate and validate WATFLOOD and VIC
- Pomeroy
 - CRHM in two model configurations is used to simulate the climate normal period 1961-1990, as well as the drought period 1999-2005
- Pietroniro
 - MEC/MESH: South Saskatchewan River Basin, soil moisture, runoff, groundwater, evapotranspiration and snow processes
- Lin
 - VIC in stand-alone mode: 56-year (1950-2005) daily soil moisture data set <http://www.meteo.mcgill.ca/~leiwon/vic/prairies/>; non-contributing areas are treated in runoff generation resulting in improved hydrograph simulation (with Pomeroy)
 - A real time drought monitoring and short term prediction scheme has also been implemented
 - CLASS will be set up in a stand-alone mode over the Prairies (with Aaron Berg of the Guelph University)

Groundwater

- Hayashi
 - VSMB: groundwater recharge model, improvements in evaporation and snowmelt
 - Data collected from West Nose Creek watershed are used
- Woodbury
 - gCLASS: continued development of groundwater model that couples flows in saturated and unsaturated zones
 - Evaluated soil moisture and temperature simulated by gCLASS using data from the BOREAS Saskatchewan site (with Van der Kemp)
 - Preparatory work to run gCLASS and CLASS over the Prairies (with Lin and Snelgrove)
- Snelgrove
 - Collaborating with Woodbury and US colleagues: coupled land surface and groundwater scheme (ParFlow)

Outlook for 2009

- Focus on forecast evaluation of 1999-2005 drought on different time scales
 - Forecast skill for different parameters on up to seasonal time scale
 - Improvements: soil moisture and snowpack initialization, runoff and groundwater treatment
- Modelling
 - Consolidation of different modelling methodologies
 - MEC/MESH/CLASS as integrator?

Questions

- What are the most important hydrological processes for the Prairies, and at what scales?
- What are the most uncertain issues in prediction at daily, weekly and seasonal time scales over the Prairies?