

Séminaire vendredi le 09 janvier 2015 11:00h / Seminar Friday January 9th 2015 11:00h

Sujet/Subject : Severe precipitation: modeling, verification, and operational application

Langue/language : Anglais / English

Conférencier/Lecturer: Zuohao Cao (Env. Canada, Toronto, Ontario)

Résumé/Abstract :

Severe precipitation is often convective in nature and associated with mesoscale phenomena, and it is therefore difficult to predict in terms of the precipitation amount, location, and timing. The low operational accuracy and forecast skill for severe precipitation, in contrast with its high social and economic impacts, motivate the severe precipitation research with the focus on, but not limited to, numerical modeling, verification, and operational application.

The numerical simulations have been conducted using the the coupled atmospheric-hydrological model to examine the severe rainfall and flash flooding event occurred in May 2000 over southern Ontario. This event caused more than 2300 illness and 7 people death in the Walkerton area because severe rainfall resulted in flash flooding and contamination of the drinking water system. The results show that the simulated 48-h peak rainfall accumulation successfully captures the observed peak value, and that there is a systematic improvement in terms of the accuracies and skills when the model resolution is increased. This work also offers an independent verification method for rainfall forecast over a basin using information of simulated streamflow from the coupled atmospheric-hydrological modeling.

The ability to deliver timely public weather warnings for heavy precipitation depends on early detection and accurate prediction. Heavy precipitation is very often organized in a form of very narrow, quasi two-dimensional bands associated with slantwise convection. These bands are mostly under-detected by numerical weather prediction (NWP) models because no scheme for slantwise convection has been incorporated into operational NWP models. An approach has been developed to predict slantwise convection induced by conditional symmetric instability (CSI) through integrating three elements of instability, moisture variability, and lifting conditions into one single index. The operational index products have been delivered to the Storm Prediction Centres and the Canadian Meteorological Aviation Centre, helping Environment Canada's meteorologists deliver timely public weather warnings. For example, the products were successfully used in March 2010

when meteorologists were able to deliver advance warnings to Albertans of a major snowstorm coming in from British Columbia.