Environment Canada Environnement Canada

Canada

Collaborative activities between EC and other Québec organizations (key projects on extremes and hazards)

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Universities partners and organization (Québec)

McGill UQÀM INRS Un versité d'avant-garde UBC a place of mind

Centre for Water Resources Management GEOTOP CENTRE ESCER POUR L'ÉTUDE ET LA SIMULATION DU CLIMAT À L'ÉCHELLE RÉGIONALE

Québec Ministère des Transports OURANOS

Funding support from (Canadian & Québec)

NSERC CRSNG Développement économique, Innovation et Exportation Québec Fonds de recherche sur la nature et les technologies Québec

Canadian Foundation for Climate and Atmospheric Sciences (CFCAS) Fondation canadienne pour les sciences du climat et de l'atmosphère (FCSCA) IDRC CRDI CENTRE DE RECHERCHES POUR LE DÉVELOPPEMENT INTERNATIONAL

External partners (Europe & US)

ENSEMBLES NARCCAP CILSS

NSERC-Special Research Opportunity (2007-2010)

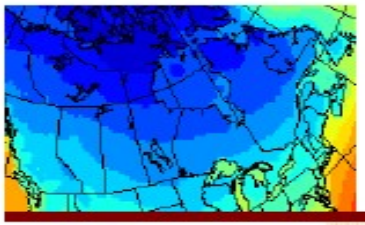
MDEIE (2009-2012)

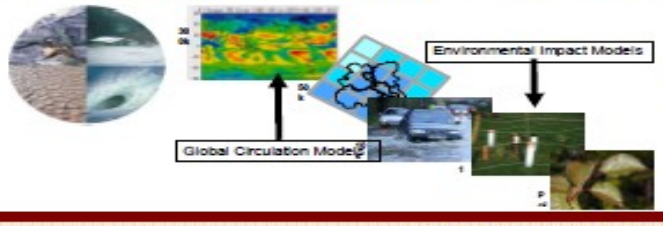
Développement économique, Innovation et Exportation Québec

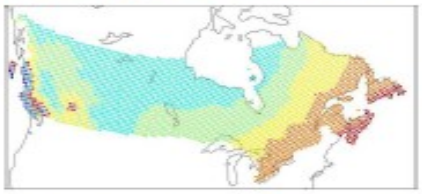
International collaborative projects with European and US program or project

WORKSHOP

Probabilistic assessment of regional changes in climate variability and extremes







16-17 March 2011
McGill New Residence Hall
Montreal, Quebec

The main objective of the workshop is to present the results of the 3-year research project funded by the Natural Sciences and Engineering research Council (NSERC) - Special Research Opportunity Program. This collaborative research work was carried out by research teams from McGill University, *Institut National de la Recherche Scientifique – Centre Eau Terre Environnement*, *Université du Québec à Montréal*, University of British Columbia, and Environment Canada in collaboration with partners from the European ENSEMBLES and the American NARCCAP projects. The research project consists of three main components:

I. The development and application of statistical downscaling methods in order to generate (multisite, multivariate) climate information.
II. Development and evaluation of future high-resolution climate information on extremes from Regional Climate Model (RCM). Applying statistical downscaling methods from GCM to RCM resolutions and compare with RCM outputs.
III. Generate high-resolution probabilistic climate change scenarios including extremes and variability with assessments of their associated uncertainties.

ALL ARE WELCOME TO ATTEND

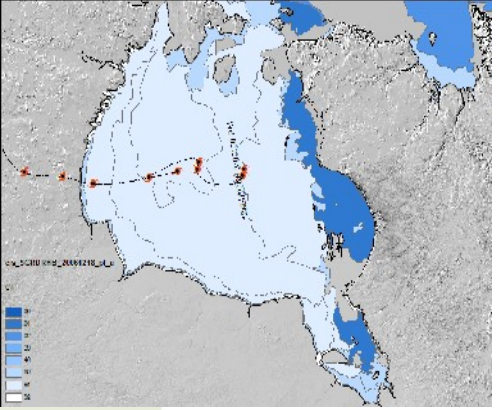
(FREE) REGISTRATION IS REQUIRED
Please send the registration form before March 9th to:
caroline.hebraud@mail.mcgill.ca or brace@mcgill.ca

FOR INFORMATION: 514-398-7833

New Residence Hall
3625 Park Avenue
Montreal, Quebec, H2X 3P8
Metro Place des arts

Environnement Canada

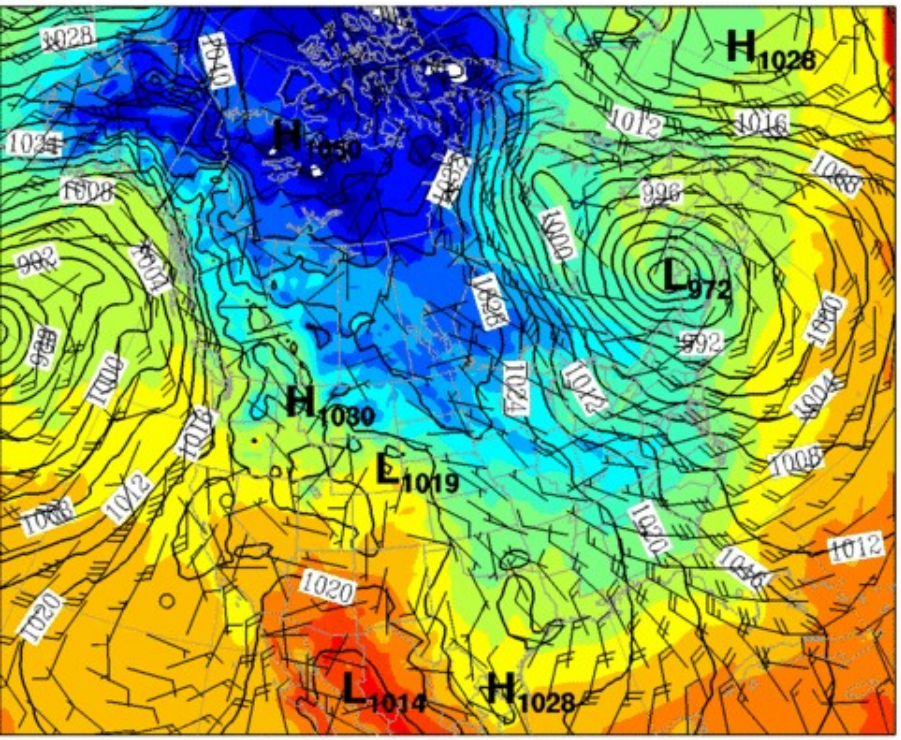
NARCCAP

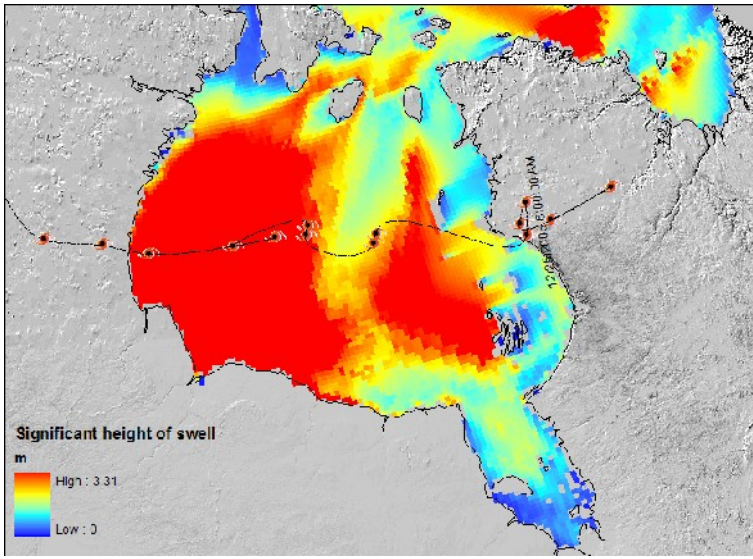


Vulnerability and adaptation study of the marine infrastructures in Nunavik (i.e. Hudson Bay area) to climate change (2009-2013, on-going project)

Québec
Ministère des Transports

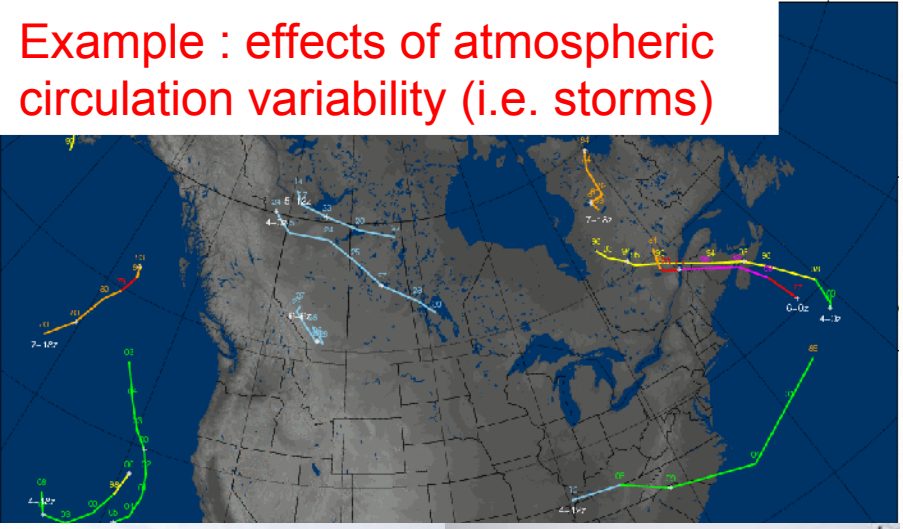
Collaborative project with EC (S&T and MSC), Ouranos, U.Laval, UQAR, DFO, INRS-ETE and UQÀM



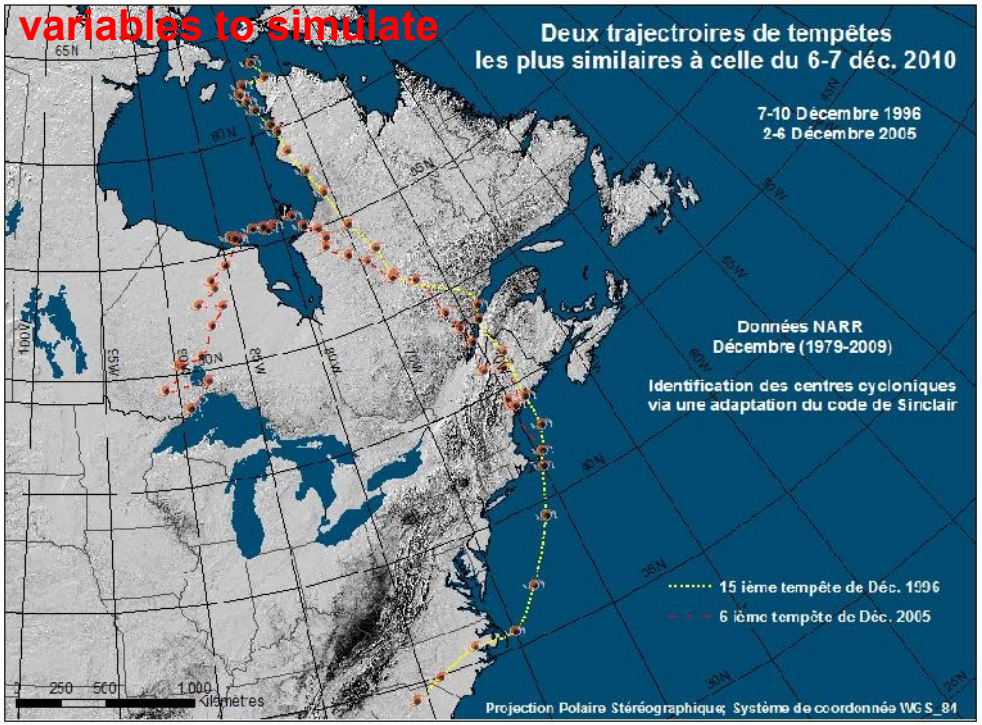


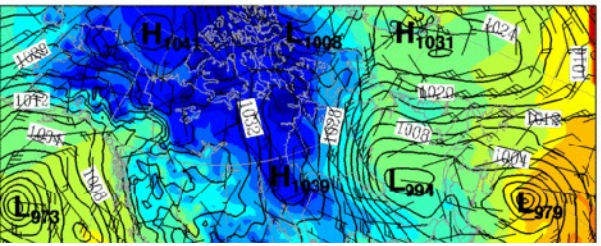
Canada

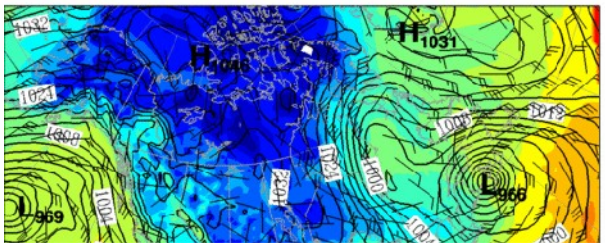
Example : effects of atmospheric circulation variability (i.e. storms)

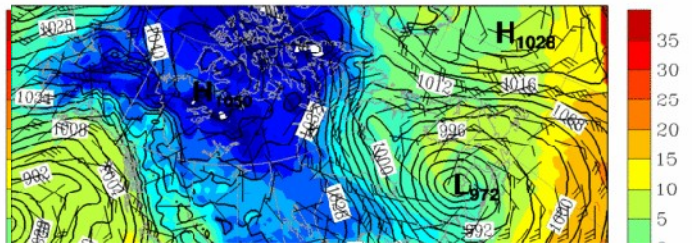


Complexity of system & combination of key variables to simulate









HYDRO-METEOROLOGICAL HAZARD IS THE KEY ISSUE NOT PURELY EXTREME WEATHER, I.E. IMPACTS SIDE NEEDS TO DRIVE THE FOLLOWING INVESTIGATION & SIMULATION ASPECT (FORECAST & PROJECTION) I.E. COMBINATION OF KEY VARIABLES WHICH DRIVE THIS HIGH IMPACT EVENT

Issues related to predictability of downscaling approaches for extremes and climate variability

Predictability of RCMs (ex.):

- ✓ Boundary conditions (AOGCM): improvement of skill during the time but still a limitation for certain variables, certain teleconnection indices, and mode of internal climate variability (ex. atmospheric-oceanic coupling in Arctic and sub-Arctic regions)
- ✓ Physical parameterization: regular improvement, but still a limitation when those are same or holds from driving AOGCMs (ex. ocean-ice regional climate model and coupling with RCM, as a majority of RCMs is atmospheric only)
- ✓ Complex systems as storm track (synoptic scale) or meteorological hazards: quite good improvement but again depend on oceanic processes resolved at the regional scale (ex. storms and their links with storm surge oceanic waves, and sea state)

BUT as suggested in recent study of Deser at al. (2010): "The dominant source of uncertainty in the simulated climate response at middle and high latitudes is internal atmospheric variability associated with the annular modes of circulation variability. …Uncertainties (i.e. limitation of predictability) in the forced response are generally larger for sea level pressure than precipitation, and smallest for air temperature."

DATA ACCESS & INTEGRATION: http://loki.qc.ec.gc.ca/DAI/

Part of the Canadian Climate Change Scenario Network (CCCSN, http://cccsn.ca/) Québec node

Recent published papers from Naveed Khaliq (links between EC-AIRS and CRCMD network (UQÀM)

Mladjic B, Sushama L, Khaliq MN, Laprise R, Caya D, Roy R. 2010. Canadian Regional Climate Model projected changes to the frequency and magnitude of extreme precipitation over Canada. *Journal of Climate*, doi: 10.1175/2010JCLI3937.1.

Sushama L, Khaliq MN, Laprise R, Caya D, Roy R. 2010b. Assessment of climate change impacts on Canadian water resources using regional climate model projections. Proceedings of the International Perspective on Water Resources and the Environment (IPWE) 2011 conference, Singapore.

Sushama L, Khaliq MN, Laprise R. 2010a. Dry spell characteristics over Canada in a changing climate as simulated by the Canadian RCM. *Global and Planetary Change* **74**(1): 1–14.

Khaliq MN, Gachon P. 2010. Pacific Decadal Oscillation climate variability and temporal pattern of winter flows in northwestern North America. *Journal of Hydrometeorology* **11**: 917–933.

Khaliq MN, Ouarda TBMJ, Gachon P. 2009b. Identification of temporal trends in annual and seasonal low flows occurring in Canadian rivers: the effect of short- and long-term persistence. *Journal of Hydrology* **369**: 183–197.

Khaliq MN, Ouarda TBMJ, Gachon P, Sushama L, St-Hilaire A. 2009a. Identification of hydrological trends in the presence of serial and cross correlations: review of selected methods and their application to annual flow regimes of Canadian rivers. *Journal of Hydrology* **368**: 117–130.

More information about projects and publications: http://loki.qc.ec.gc.ca/GAC

Acknowledgement to my colleagues and partners

- McGill/GEC3 : Prs VTV Nguyen & Gail Chmura
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- UBC: Pr. W. Hsieh
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- EC (MSC): S. Gagnon, A. Cotnoir, J. Lacroix & G. Deaudelin
- EC (NHRC): B. Bonsal (DRI)
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