

The Changing Cold Regions Network: Workshop on Extreme Weather and Hydrology *“Lessons Learned from the Western Canadian Floods of 2013 and Others”*

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CCRN: Changing Cold Regions Network

This Network aims to understand, diagnose and predict interactions amongst the cryospheric, ecological, hydrological, and climatic components of the changing Earth system at multiple scales with a geographic focus on Western Canada's rapidly changing cold interior.

The Network

- Funded for 5 years under the NSERC Climate Change and Atmospheric Research (CCAR) Initiative
- Leveraging \$24 million in-kind support
- 36 Canadian researchers
 - Additional researchers continuing to join Network
- 15 international collaborators (Australia, China, France, Germany, UK, USA)
- Linked to GEWEX, CLiC, GEO, NCAR, NASA, and more

Canadian Institutional Partners

- Canadian Universities
 - University of Saskatchewan
 - University of Calgary
 - University of Manitoba
 - University of British Columbia
 - Wilfrid Laurier University
 - McMaster University
 - University of Guelph
 - Université du Québec à Montréal
- Federal Government Partners
 - Environment Canada
 - Natural Resources Canada
 - Agriculture and Agri-Food Canada
 - Parks Canada
- Provincial and Territorial Government Agencies
 - Saskatchewan Water Security Agency
 - Government of Northwest Territories
 - Yukon Environment
 - Alberta Environment and Sustainable Resource Development
 - Government of Manitoba

CCRN Research Programme

- Focused on Canada's western interior cold regions, including the Mackenzie and Saskatchewan River Basins



Water, Ecosystem, Cryosphere, and Climate (WECC) Observatories

- A network of WECC Observatories combine meteorological, hydrological, ecosystem, and cryospheric observations with multi-scale coupled models from the surface to the atmosphere.
- Observatories contain long-term legacy data sets, including hydro-meteorological variables, remote sensing observations, LiDAR topography, and soils, geology, and vegetation characterization







Changing Cold Regions Network Study Domain

Water, Ecosystem, Cryosphere and Climate Observatories

- ◻ **Western Cordillera**
 - 1: Columbia Icefield, AB
 - 2: Marmot Creek Research Basin, AB
 - 3: Wapta Icefield/Peyto Glacier, AB
 - 4: Lake O'Hara, BC
 - 5: Wolf Creek Research Basin, YT
 - 6: Brintnell-Bologna Icefield, NWT
- ◻ **Boreal Forest**
 - 7: Boreal Ecosystem Research and Monitoring Sites (BERMS), White Gull Creek, SK
- **Prairie**
 - 8: St. Denis National Wildlife Area, SK
 - 9: Kenaston/Brightwater Creek Mesonet Site, SK
 - 10: West Nose Creek, AB
- △ **Sub-Arctic Lowlands**
 - 11: Trail Valley Creek, NWT
 - 12: Havikpak Creek, NWT
 - 13: Scotty Creek, NWT
 - 14: Baker Creek, NWT

Ecoregions and Landcover

	Glaciers		Northwestern Forested Mountains
	Tundra		Marine West Coast Forest
	Taiga		Great Plains
	Hudson Plains		North American Deserts
	Boreal Forest		

0 250 500 km

Source Data: The North American Environmental Atlas & the National Hydro Network Database
Projection: UTM Zone 11; NAD 1983
Created by: Chris DeBeer

CCRN Research: Thematic Approach

- A. Observed Earth System Change in Cold Regions - inventory and statistical evaluation
- B. Improved Understanding and Diagnosis of Local Scale Change
- C. Upscaling for improved Atmospheric Modelling and River Basin Scale Prediction
- D. Analysis and Prediction of Regional and Large Scale Variability and Change
- E. User Community Outreach and Engagement

The Future

- Over the next five years, CCRN will:
 - Improve our understanding of recent Earth system change in the cold interior of western and northern Canada (CCAR Theme 3)
 - Advance water, weather, climate and environmental prediction (CCAR Theme 2)
 - Improve our understanding of Earth system processes and their representation in hydrological, atmospheric and ecological models (CCAR Theme 1)
 - Enhance our capability for water management
 - Train the next generation of Earth System Scientists
 - Provide high quality datasets for change assessment and model verification

CCRN List of Participants

Network Co-Investigators and Collaborators

- V. Arora (EC)
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- P. Bartlett (EC)
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International Advisory

Committee

- Eric Kasischke (U Maryland)
- Don Cline (NOAA)
- Richard Harding (UK Centre Ecology and Hydrology)
- Larry Hinzman (U Alaska)