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Establishing Polar Regional Climate Centres – Towards Implementing an Arctic PRCC-Network

A Perspective from Canada



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Chantale Côté
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Outline

- Canadian Context
 - Northern priorities
 - Users' needs analysis
- Reflection upon PRCC functions
 - Internal capacity analysis
- Considerations and proposal for a concept of operation
 - Existing projects, potential collaborations
 - Possible Canadian contributions

Canadian context (1/3)

• Canada's Northern Strategy

Priority areas:

- Arctic Sovereignty
 - Rules-based Arctic region where the rights of sovereign states are respected in accordance with international law and diplomacy
 - Working with international Arctic neighbours in areas such as search and rescue, icebreaker operations, fish and wildlife conservation, transportation, research, energy and environment
- Protecting environmental heritage
 - Ex. pollution prevention legislation, marine safety technologies, Northern Contaminants Program
- Promoting social and economic development
 - Ex. investing in critical infrastructure, skills training and education, better housing, and improved health care
- Improving and devolving Northern governance
 - Ex. Responsibility transfer, land claims



Canadian context (2/3)

Support vision and conclusions of previous discussions on PRCC (CLIPS in Polar regions, Russia 2008)

- PCOF

Ideally, a PCOF will be a regular international collaboration between climate and user representatives with interests in Polar Regions, to share currently available information, to respond to user requirements for climate information, (consensus based) products and services, and to engage in awareness and technical training of both climate providers and users

- Users Needs

Decision-makers in Polar Regions are known to need information on:

- Temperature
- Precipitation, both liquid and frozen
- Winds
- Sea ice (extent, thickness)
- Snow cover
- Freeze/Thaw periods and conditions

Canadian context (2/3)

Preliminary users' needs analysis – Marine sector in Canada

- Safe marine transportation (local communities, shipping, fishing, tourism) considered a key sector to service
- Canadian Ice Service conducted a series of informal discussions to survey the need of the Marine shipping industry
 - Several ice and weather forecast parameters are being sought for at different time scale (daily to multiannual)
 - *Break-up* and *freeze-up* remain the key ice parameters for marine transportation
 - *Ice strength* and *ice pressure* are as important, in some instances more important, than *ice thickness* and *ice type*
 - Increased predictability accuracy and resolution in time (sub-seasonal) and space (regional forecast) seem to be the core of the needs



Reflection upon PRCC functions (1/2)

- Generic functions of a RCC focuses on temperature and precipitation
 - Sea ice an additional key parameters
 - Potentially others (ex. wave climatology)
- Arctic is a unique (vast territory, harsh weather conditions) and fragile (rapidly changing ecosystem) environment
 - Consider supporting environmental and conservation objectives
- In the Canadian Arctic, close to half of the local people are aboriginal
 - Consider Aboriginal traditional knowledge to determine user needs and enhance products and services



Reflection upon PRCC functions (2/2)

WMO Survey on needs and capacities for a PRCC

- Fair interest among all surveyed countries to contribute to mandatory functions of a PRCC (> 75%)
- Among the 8 Arctic nations:
 - PRCC Mandatory Functions
 - Most countries already have products and services along the PRCC required functions (4/8 to 8/8)
 - The majority of the countries have expressed an interest to contribute to some of the mandatory functions of a PRCC (5/8 to 7/8).
 - Greater interest for *LRF*, *Operational activities* and *Operational data services*

PRCC Highly Recommended Functions

- Greater discrepancies in responses on existing products/services and interest to contribute to Highly recommended functions – prioritization discussion needed

PRCC functions : Canadian capacities

Mandatory functions	Canadian capacities over the Canadian Arctic		
I. Operational Activities for Long Range Forecasts (LRF)	Canada is a GPC, producing LRF Climate and Ice outlooks		
II. Operational Activities for Climate Monitoring	Expertise available but limited activities/resources in that field for the Arctic region		
III. Operational Data Services, to support operational LRF and Climate monitoring	Potential support from EC's Canadian partners (academic & governmental)		
IV. Training in the use of operational RCC products and services	Potential support from EC's Canadian partners (governmental)		
Highly recommended functions			
V. Climate prediction and climate projection * <i>* Suggestion : to clarify "Long Range Forecast" VS "Inter-annual to Decadal Climate Prediction" VS "Long term Climate Projections"</i>	Expertise available but limited activities/resources in that field for the Arctic region		
VI. Non-operational data services	Potential support from EC's Canadian partners (governmental)		
VII. Coordinating functions	Potential support from EC's Canadian partners (governmental)		
VIII. Training and capacity-building	Potential support from EC's Canadian partners (governmental)		
IX. Research and development	Existing capacities but concerns of potential duplication of actual international coordination efforts		
Additional functions for consideration			
a) Supporting environmental and conservation objectives	Potential support from EC's Canadian partners (governmental)		
b) Considering Aboriginal traditional knowledge (ATK) to determine user needs and enhance products and services	Inclusion of ATK is imbedded in some Canadians laws and treaties. Existing Expertise		
c) Conducting vulnerability assessments (to help identifying gaps and user needs)	Potential support from EC's Canadian partners (academic)		
d) Collecting long-term observational data to provide data for assimilation to improve forecast models	Potential support from EC's Canadian partners (governmental)		
	True capacities	Limited capacities	No capacities

Existing projects, potential collaborations (1/3)

- **The Polar Prediction Project (PPP) 2013-2022**

WMO initiative to enable a significant improvement in environmental prediction capabilities for the polar regions and beyond, by coordinating a period of intensive observing, modelling, verification, user-engagement and education activities



- **The Polar Climate Predictability Initiative (PCPI)**

WMO initiative which focuses not on prediction of the climate system, but instead on finding elements of the climate system that contribute to predictability



- **International Ice Charting Working Group (IICWG)**

Promotes cooperation between the world's ice centers on all matters concerning sea ice and icebergs. Several producing agencies from various countries disseminating from one global portal (Ice Logistic Portal)



- **The North American Ice Service (NAIS)**

International partnership between Canadian and the US aiming through teamwork and Innovation to deliver seamless ice information and services



Existing projects, potential collaborations (2/3)

• North American Climate Services Partnership (NACSP)

The NACSP is an innovative trilateral partnership between the U.S., Mexico and Canada. This partnership was established to respond to an increasing demand for accessible and timely scientific data and information in order to make informed decisions and build resilience in our communities (forecasting and modeling activities, sector-focused activities, regional pilot areas)

– North American Multi Model Ensemble (NMME)

Experimental multi-model seasonal forecasting system consisting of coupled models from US modeling centers including NOAA/NCEP, NOAA/GFDL, NCAR, NASA, and Canada's CMC. 7 months forecast (coupled modeling

North American Climate Services Partnership

Transboundary collaboration for enhancing resilience to climate variability and change

The North American Climate Services Partnership (NACSP) - an innovative trilateral partnership between the U.S., Mexico and Canada - was established to respond to an increasing demand for accessible and timely scientific data and information in order to make informed decisions and build resilience in our communities. Building from a strong foundation of existing continental-scale collaboration, the NACSP provides a platform for improving the development of products and services through international collaboration. Activities in the NACSP include enhancing prediction and modeling capabilities, strengthening products tailored for specific sectors, and responding to user needs in key regional settings.

NACSP Accomplishments for 2014 Include:

Fostered the development of key partnerships with users and stakeholders

- Engaged critical users during the North American Drought Monitor workshop
- Built awareness of NACSP opportunities in Mexico through participation in the Mexico National Climate Outlook Forum

Utilized state-of-the-art science and information by decision-makers

- Issued a 2014 North American Wildfire Assessments and Outlooks report
- Completed a pilot study on expanding the Vegetation Drought Response Index to Canada
- Advanced the ability to exchange precipitation data across borders

Identified gaps in service delivery and end-user input

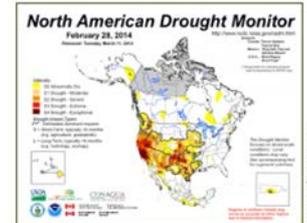
- Completed an assessment of a new bilateral climate outlook along the U.S. and Mexico border
- Completed a user assessment of the North American Ensemble Forecast System (NAEFS)

Implemented a place-based approach

- Convened a bilateral workshop on "Scenario Planning for Climate Adaptation" in the Rio Grande-Rio Bravo region
- Produced bilateral climate impact and outlook reports for the Rio Grande-Rio Bravo and the Great Lakes regional pilot areas

Shared best practices and lessons-learned

- Compared and assessed methodologies related to precipitation estimates
- Face-to-face meetings between U.S., Canadian, and Mexican scientists accelerated the development of the North American Seasonal Forecast



Top: A monthly North American Drought Monitor map, which began production in 2002. Bottom: Prototype regional climate impact and outlook report for U.S.-Mexico border, Rio Grande - Rio Bravo region.

Key NACSP goals for 2015

- Improving **seasonal forecast information for wildfire management** through an expansion of the North American Seasonal Fire Outlook
- Enhancing the **consistency of forecast information** across North America at different time scales
- Assessing **current trans-boundary products** to improve the usefulness of information shared
- Expanding collaborations across NACSP thematic areas, with a focus on strengthening the **link between wildfire and weather and climate forecast products**
- Expansion of **drought-related service activities in the Rio-Grand Bravo** transboundary pilot area



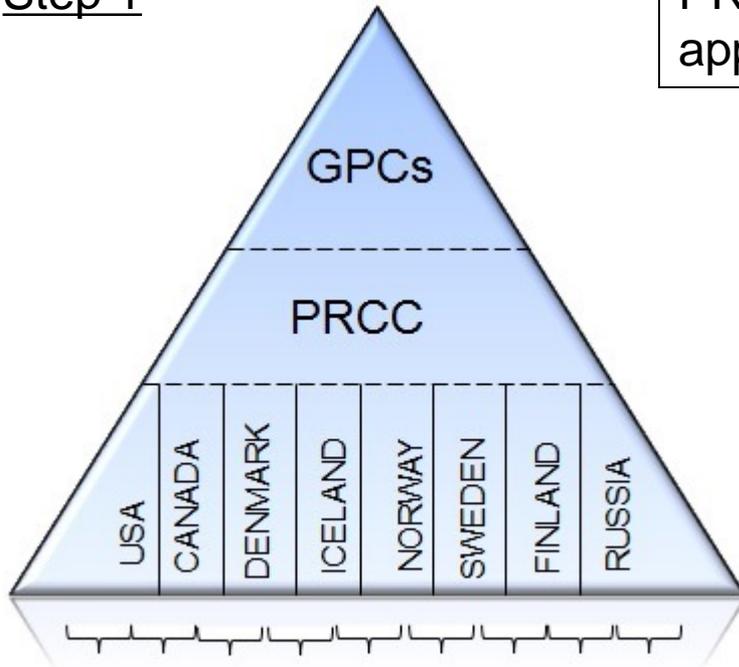
Concept of operation : Considerations

- Safe marine transportation a key activity sector to guide service delivery - common stake for all Arctic nations
- Size of the region and scarcity of observations are strong factors fostering establishment of collaborative approach
- Among all PRCC functions, LRF is the “low hanging fruit” from a Canadian perspective. Focussing on LRF development could be a PRCC foundation first step
- Production of operational international multi-model ensemble seasonal forecasts for sea ice seems a promising and interesting path to explore



Concept of operation : Proposed Pilot?

Step 1



PRCC establishment through a step-wise approach focussed on LRF functions

Global LRF

Downscaling methods
Regional LRF + PCOF

NCOFs

Explore development of seamless products with neighbouring countries

Step 2

PRCC maturing via gradual incorporation of other functions

Possible contribution from Canada

- Joining collaborative efforts to :
 - Coordinate biannual Regional Climate Outlook Forums (Polar RCOFs for summer and winter season)
 - Develop seamless LRF products and services (for climate and sea ice)
 - Seamless: space and time (week 2 to 3 months)
 - Based on an international operational multi-model

THANK YOU !!

