Joined CanSIPS-CFSv2 Seasonal Forecast: The White Space

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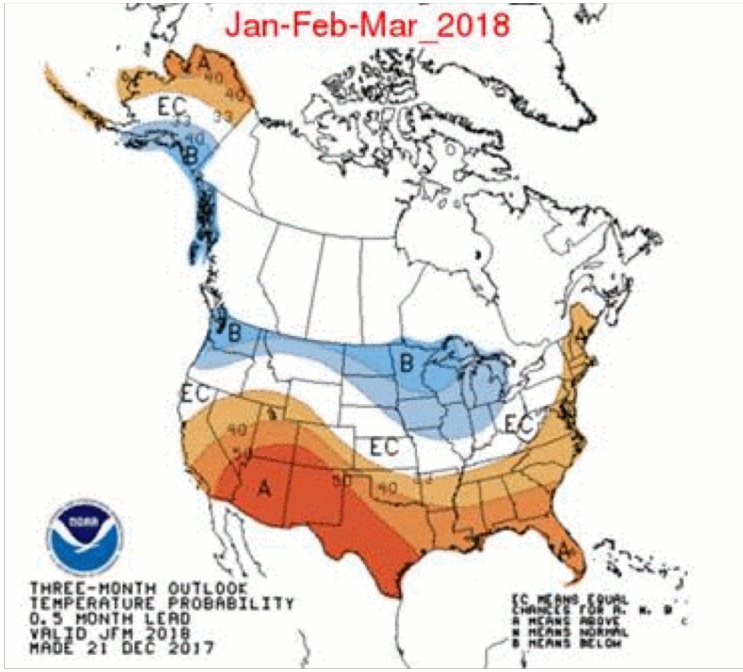
Plan

- Introduction: the white space issue and the goals of the CanSIPS-CFSv2 forecasts.
- Motivation for the lead 0 forecasts.
- Experimental setup of the CanSIPS-CFSv2 real time forecasts.
- Products of the joined CanSIPS-CFSv2 system.
- Website and clients.
- Future work.

Introduction

- Joined CanSIPS-CFSv2 seasonal forecast or “The White Space Project” is a united effort of Environment and Climate Change Canada (ECCC) and National Oceanic and Atmospheric Administration (NOAA) to deliver a geographically unified seasonal forecast over the North American continent.

Temperature: JFM 2018 lead 0



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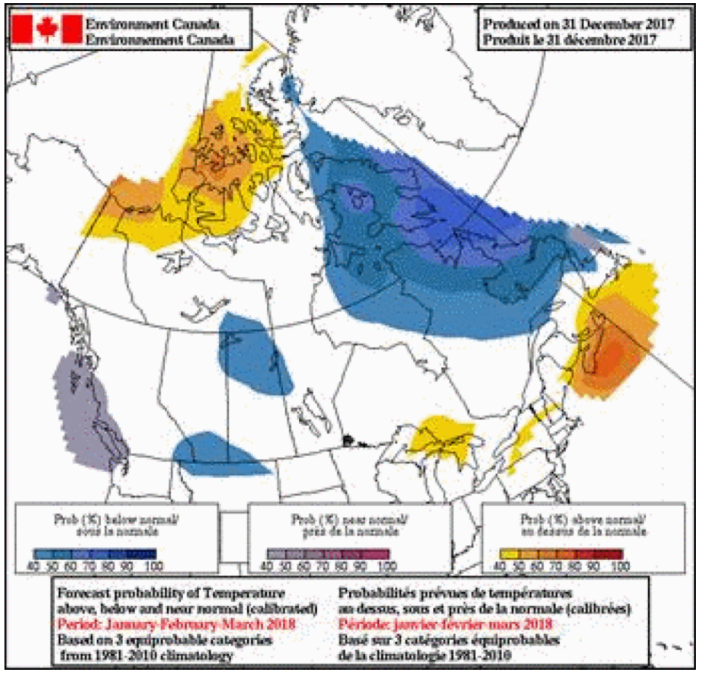
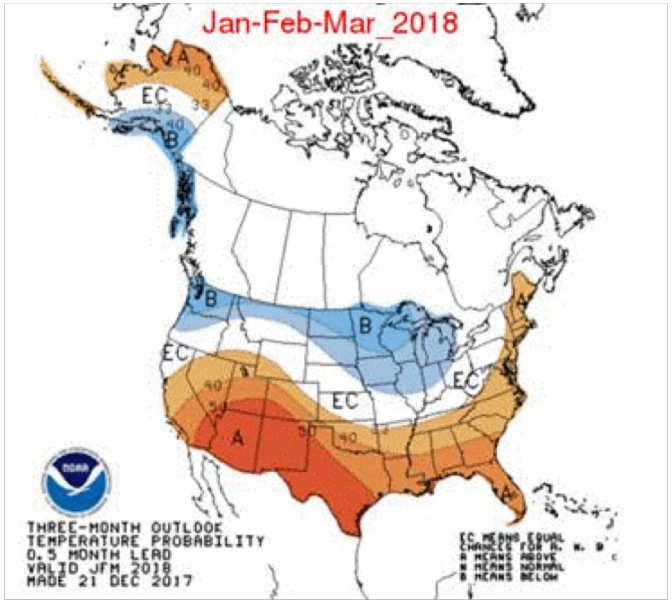
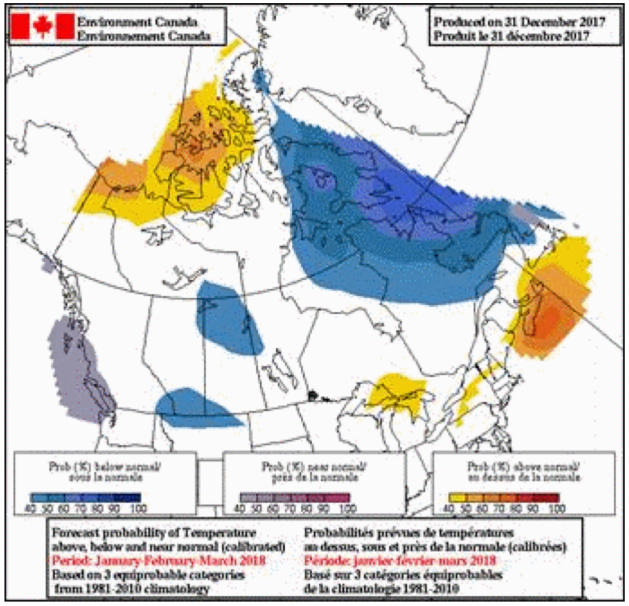


Introduction: the goals

- **The principal goal** of this project is: using the combined CanSIPS and CFSV2 forecasts for the benefit of the mutual projects that the US and Canada have in the vicinity of their borders. As an example for such a project would be a hydrology monitoring over the Great Lakes managed by the International Joint Commission, where the two countries have an agreement on the water quality.
- **Another significant goal**: improvement of the seasonal forecasts stemming from the multi-model approach. Both countries may well benefit from this approach with more skillful seasonal forecasts over the North American continent. Multi-model seasonal forecasting has been recognized to have better results, comparing to the single-model forecasting technique.

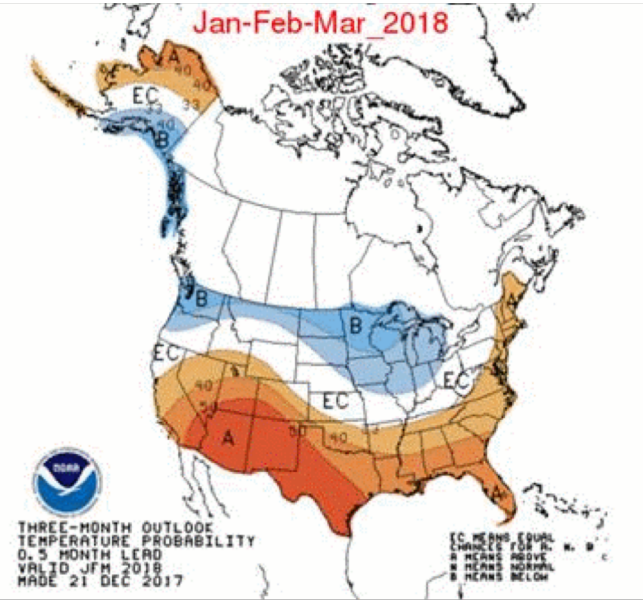




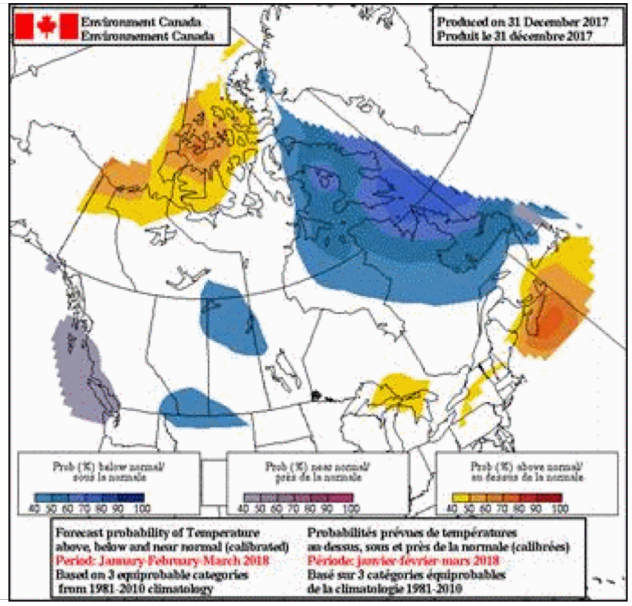
Introduction: the goals

- Unified seasonal forecast over North America is already available with NMME but for longer leads 1-6.
- Being the operational centers, both NOAA and ECCC can guarantee to provide the lead zero seasonal forecast.
- Joined CanSIPS-CFSv2 can also be seen as a “lead 0 – complement” to the NMME forecasts.

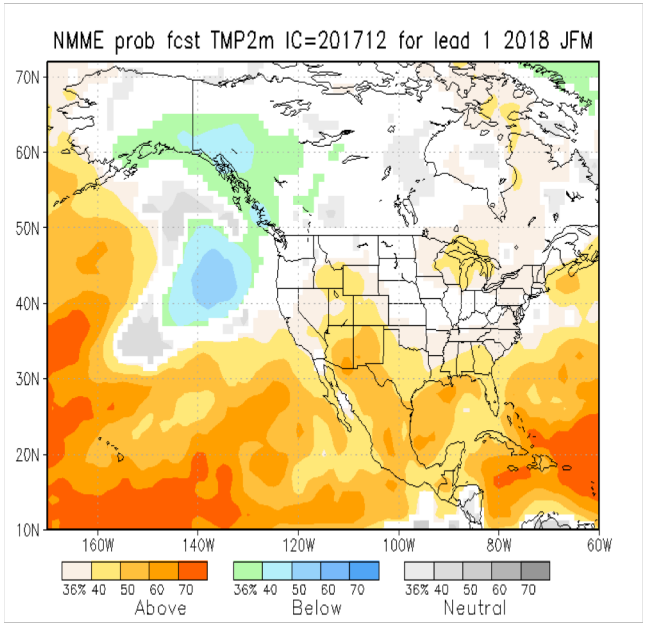
JFM 2018 lead 0



JFM 2018 lead 0



JFM 2018 lead 1

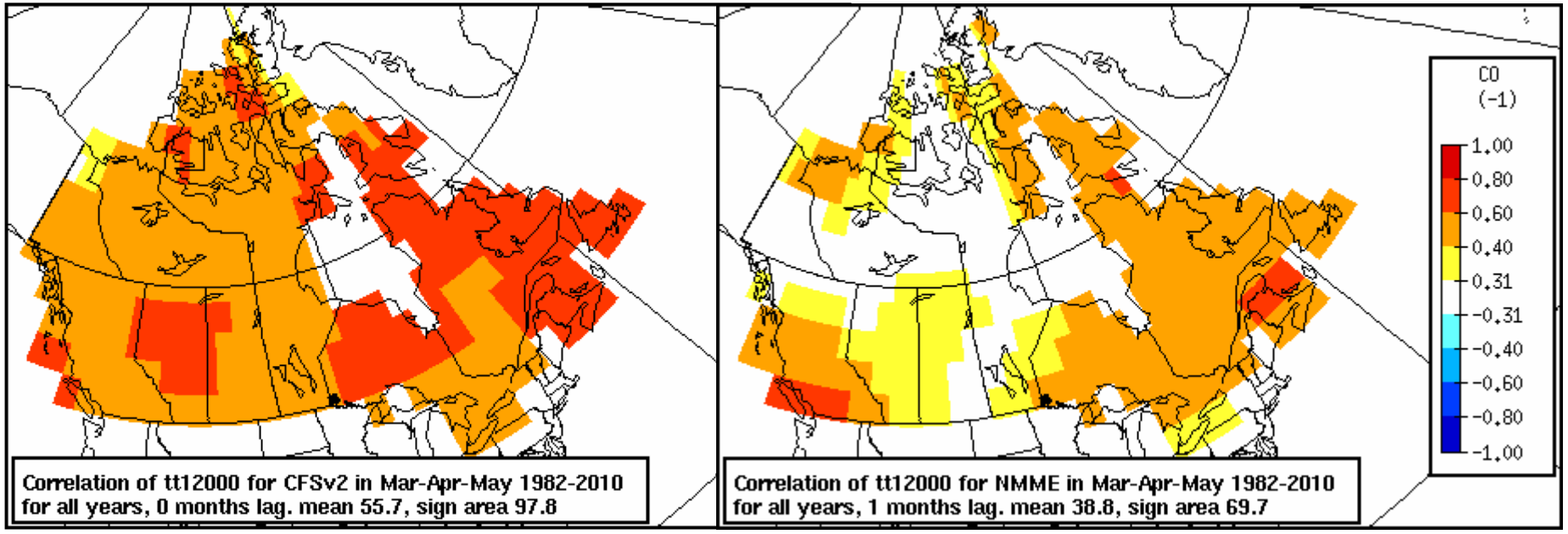


Motivation, lead 0 forecast

- Both ECCC and CPC are operational centers and can provide lead 0 forecast every month.
- Temporal correlation for MAM 1982-2010. Temperature vs ERA Interim.

CFSv2 lead 0

NMME lead 1



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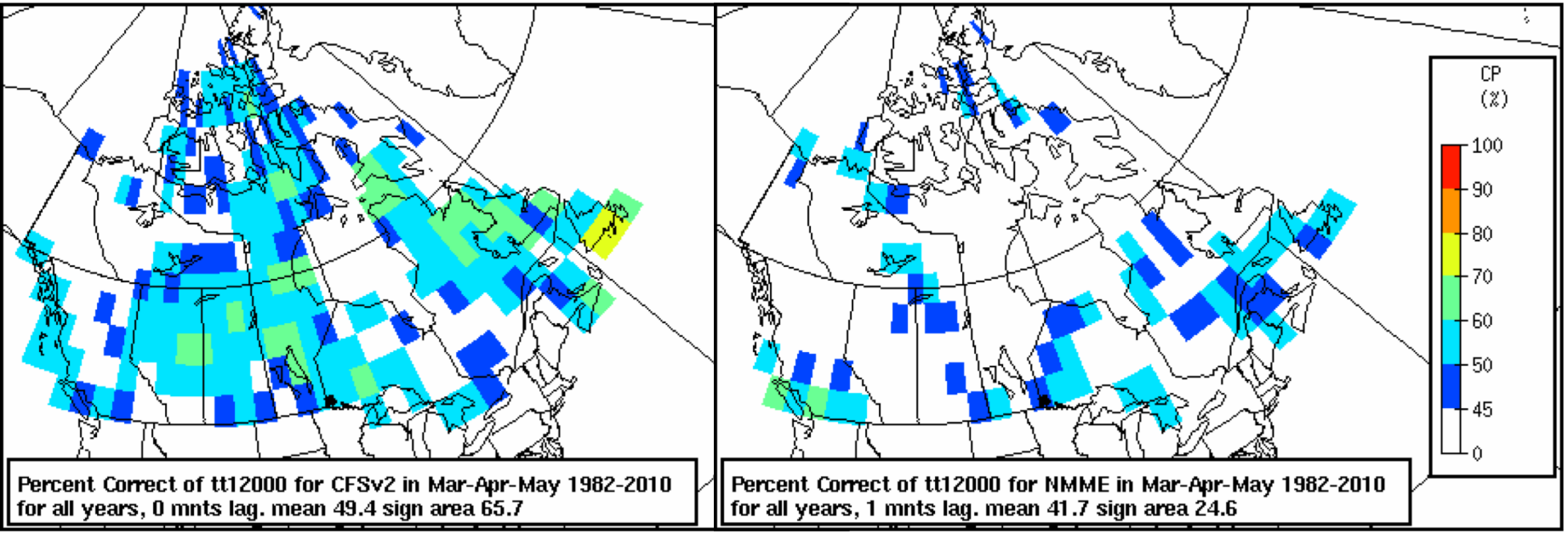
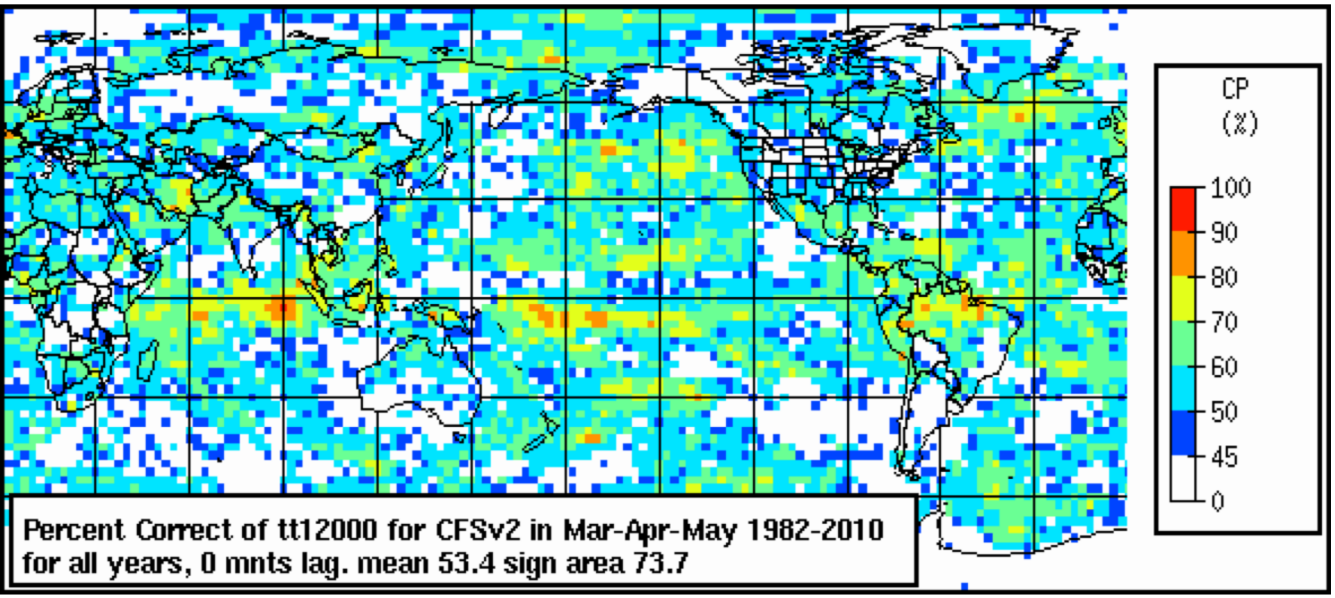
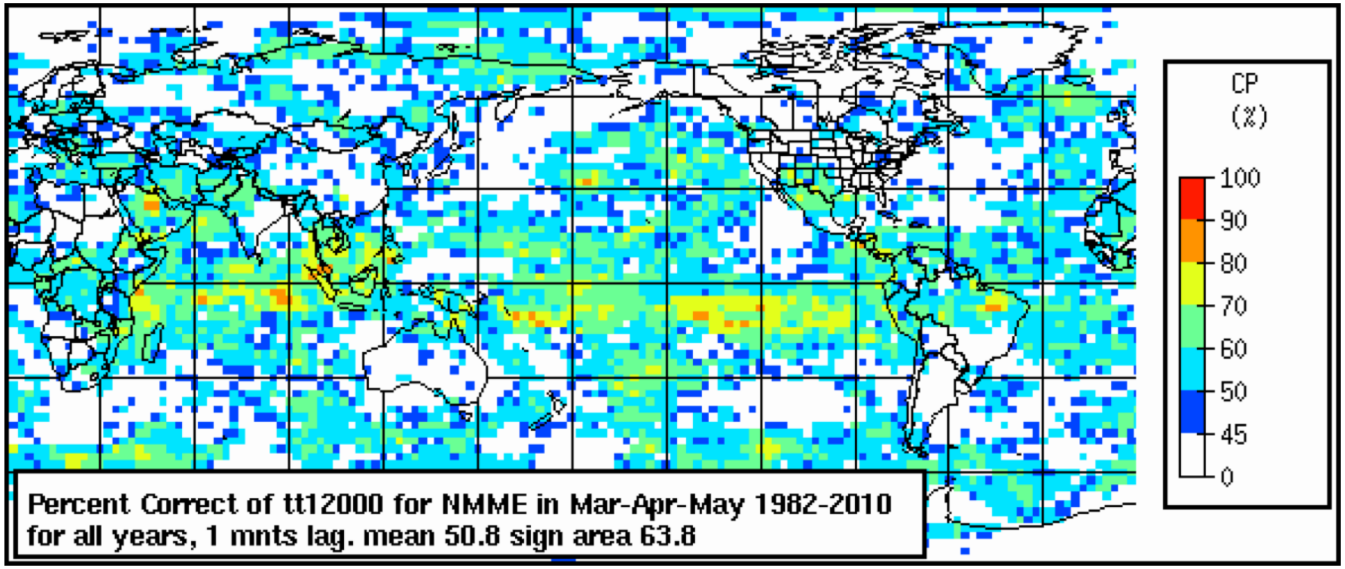


Motivation, lead 0 forecast

CFSv2 lead 0



NMME lead 1



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Motivation, lead 0 forecast

- Wang et al. 2010
- Averaged SST temporal correlation versus lead time for CFSv2.

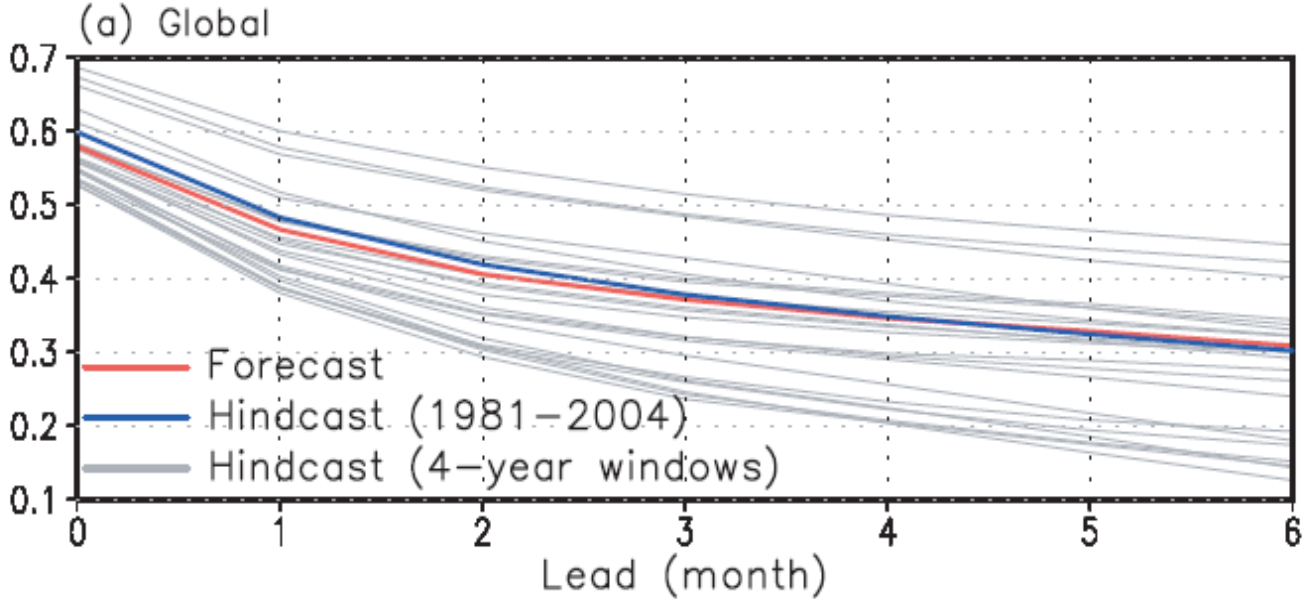


FIG. 4. Averaged SST temporal correlation for (a) the entire globe and (b) the Niño-3.4 region. Red curves are for 2005–08 forecasts, blues curves for 1981–2004 hindcasts, and gray curves are for 4-yr windows of the hindcasts.

Experimental Setup

- Different way of initialisation:
  - CanSIPS -> burst initialisation
  - CFSv2 -> lagged initial conditions

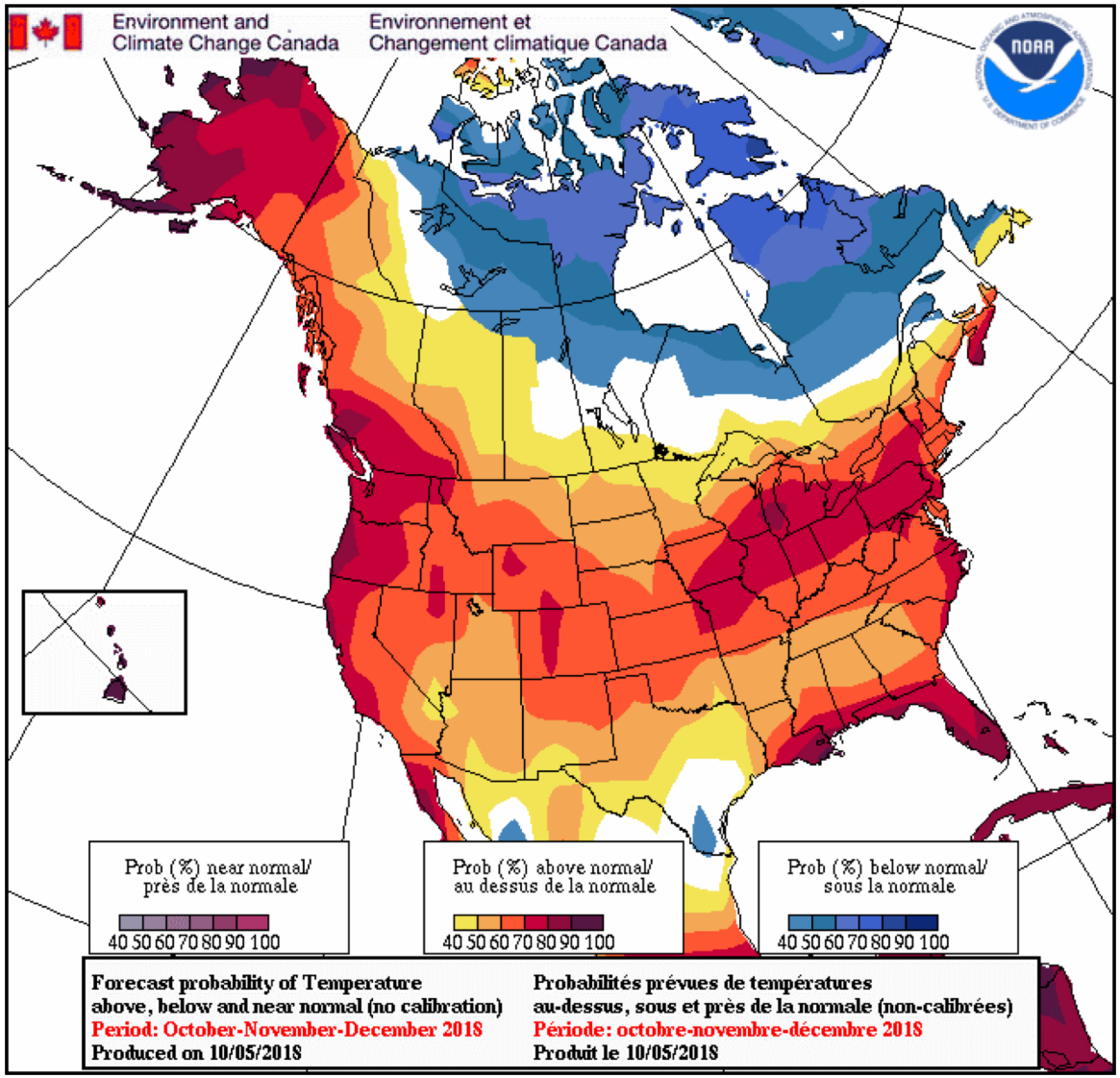
- At the end of the each calendar month:
  - 20 ensemble members for CanSIPS (10 for CanCM3 and 10 for CanCM4)
  - 20 ensemble members for CFSv2 (each member at 4h, CFSv2 encompass 5 days)

- Hindcasts:
  - 20 members for CanSIPS , 1981-2010
  - 20 members for CFSv2, 1891-2010 (four members produced every 5 days for 30 years, 10-30 days)

- The ensemble forecast
  - 40 ensemble members with equal weight .
  - At the end of each calendar month we issue forecasts for lead 0 and lead 1.

Joined CanSIPS-CFSv2

Temperature probabilistic forecast for OND2018, lead 0



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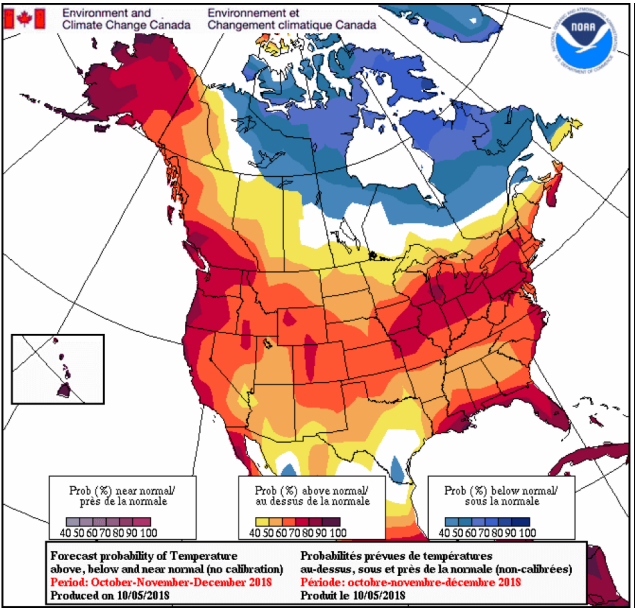
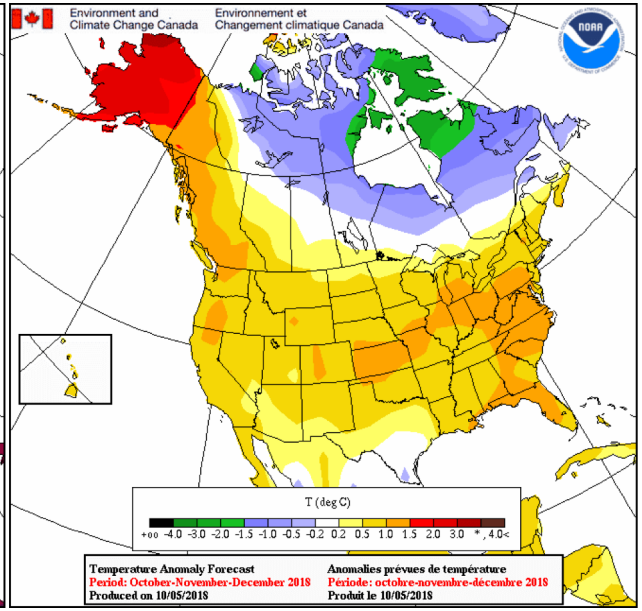
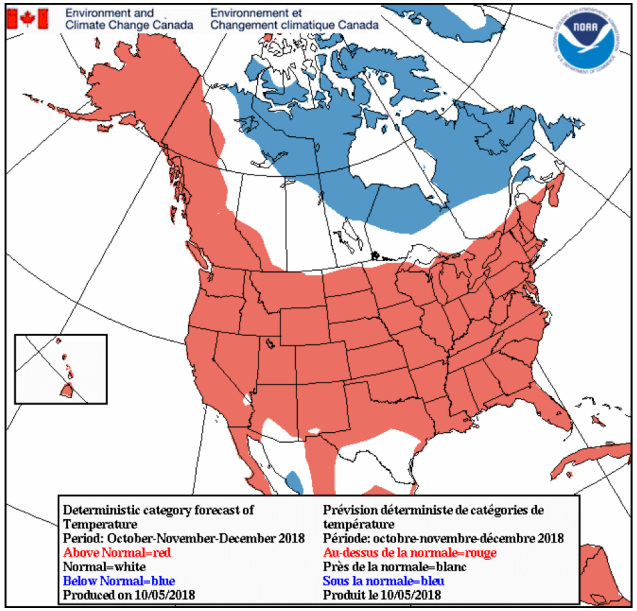


Temperature anomaly forecast for OND2018, lead 0

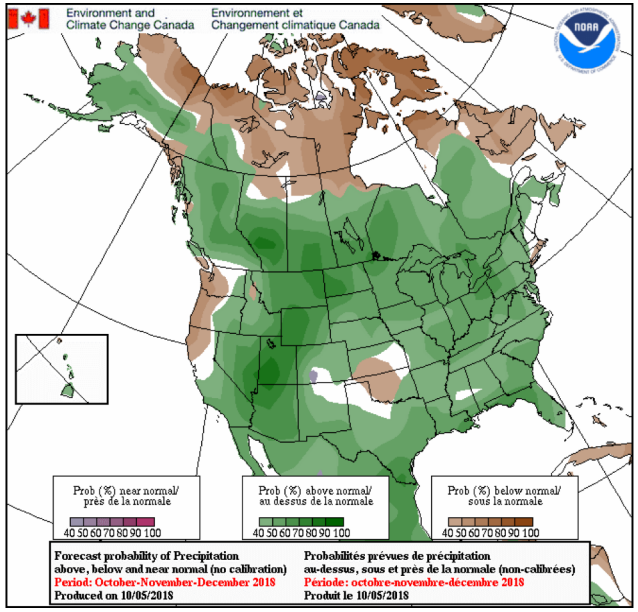


Temperature deterministic forecast for OND2018, lead 0

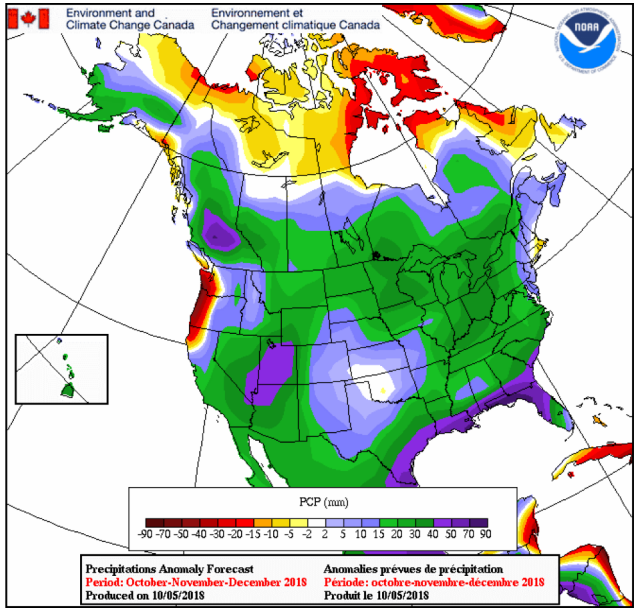


Joined CanSIPS-CFSv2

Precipitation probabilistic forecast for OND2018, lead 0



Precipitation anomaly forecast for OND2018, lead 0



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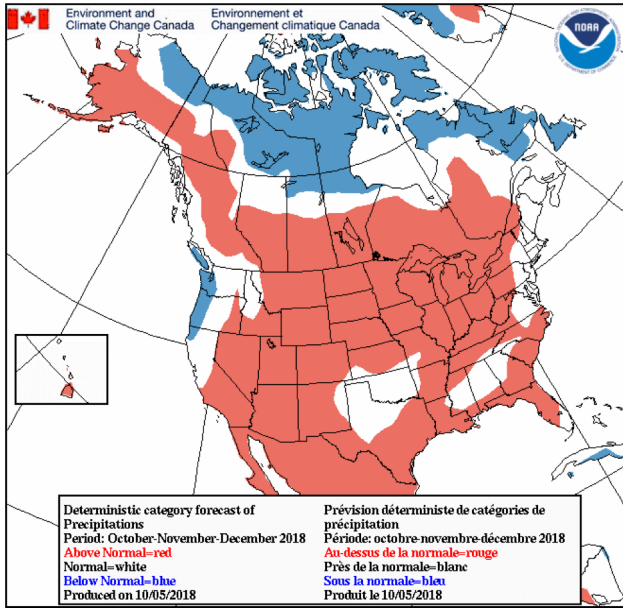
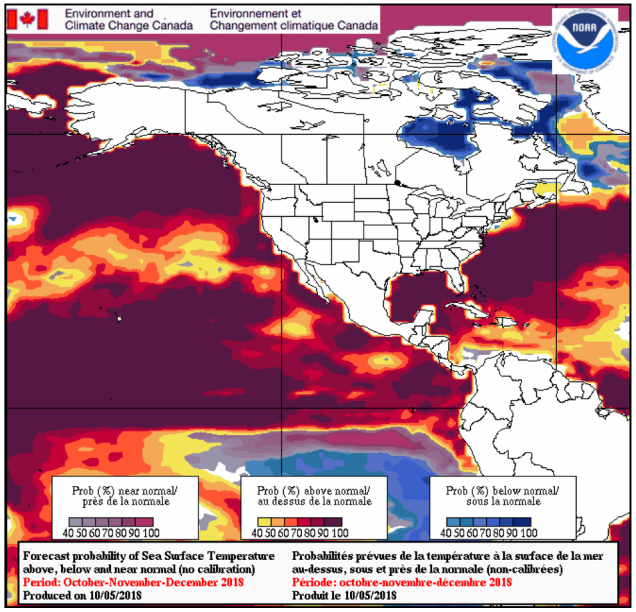
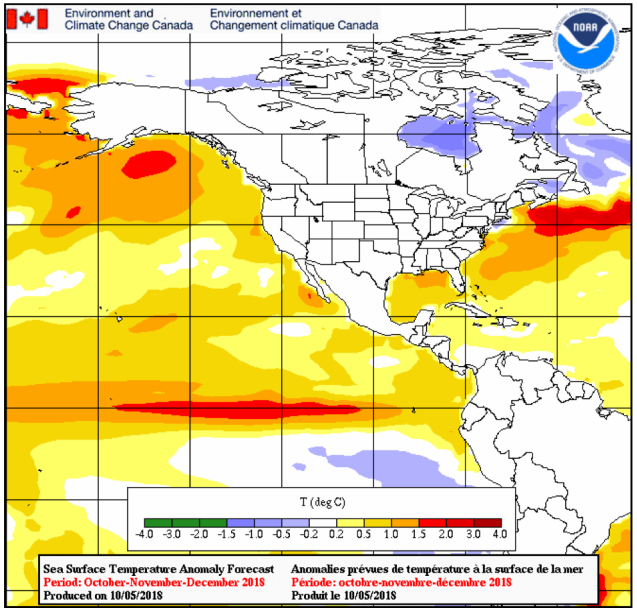


Joined CanSIPS-CFSv2

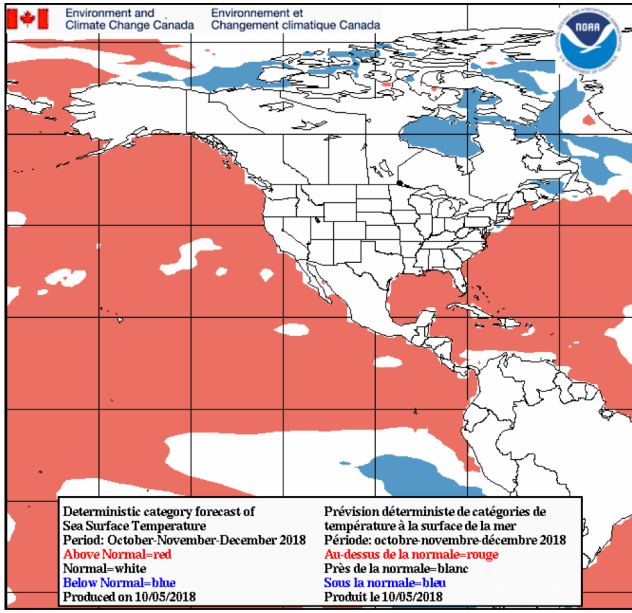
Sea-Surface Temperature probabilistic forecast for OND2018, lead 0



SST anomaly forecast for OND2018, lead 0



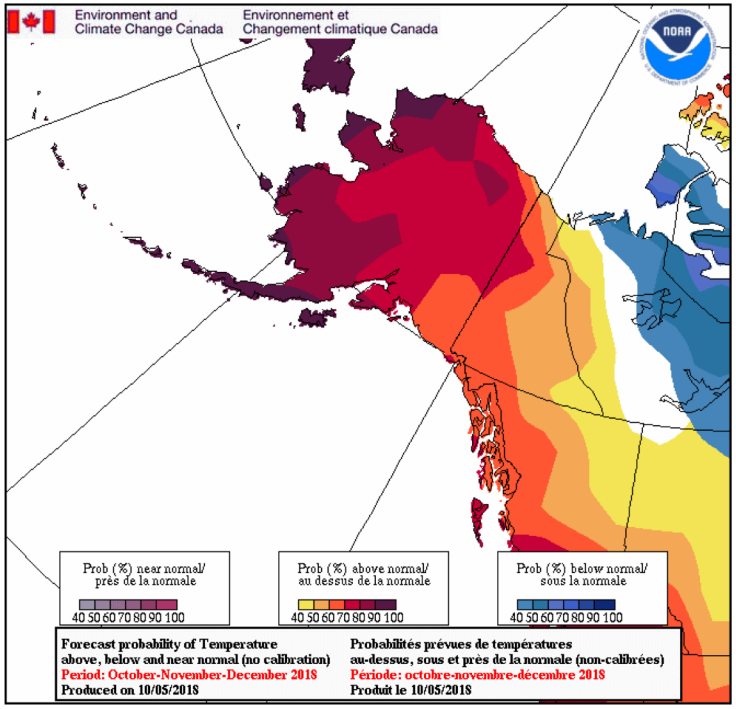
SST deterministic forecast for OND2018, lead 0



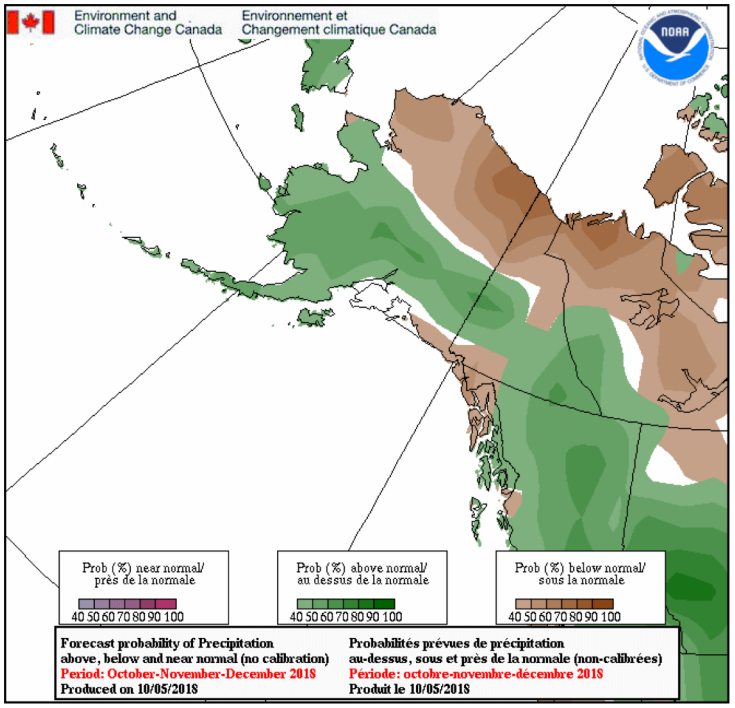
Joined CanSIPS-CFSv2

- Our first client: Alaska and Northwestern Canada quarterly climate impacts and outlook.

Temperature probabilistic forecast for OND2018, lead 0



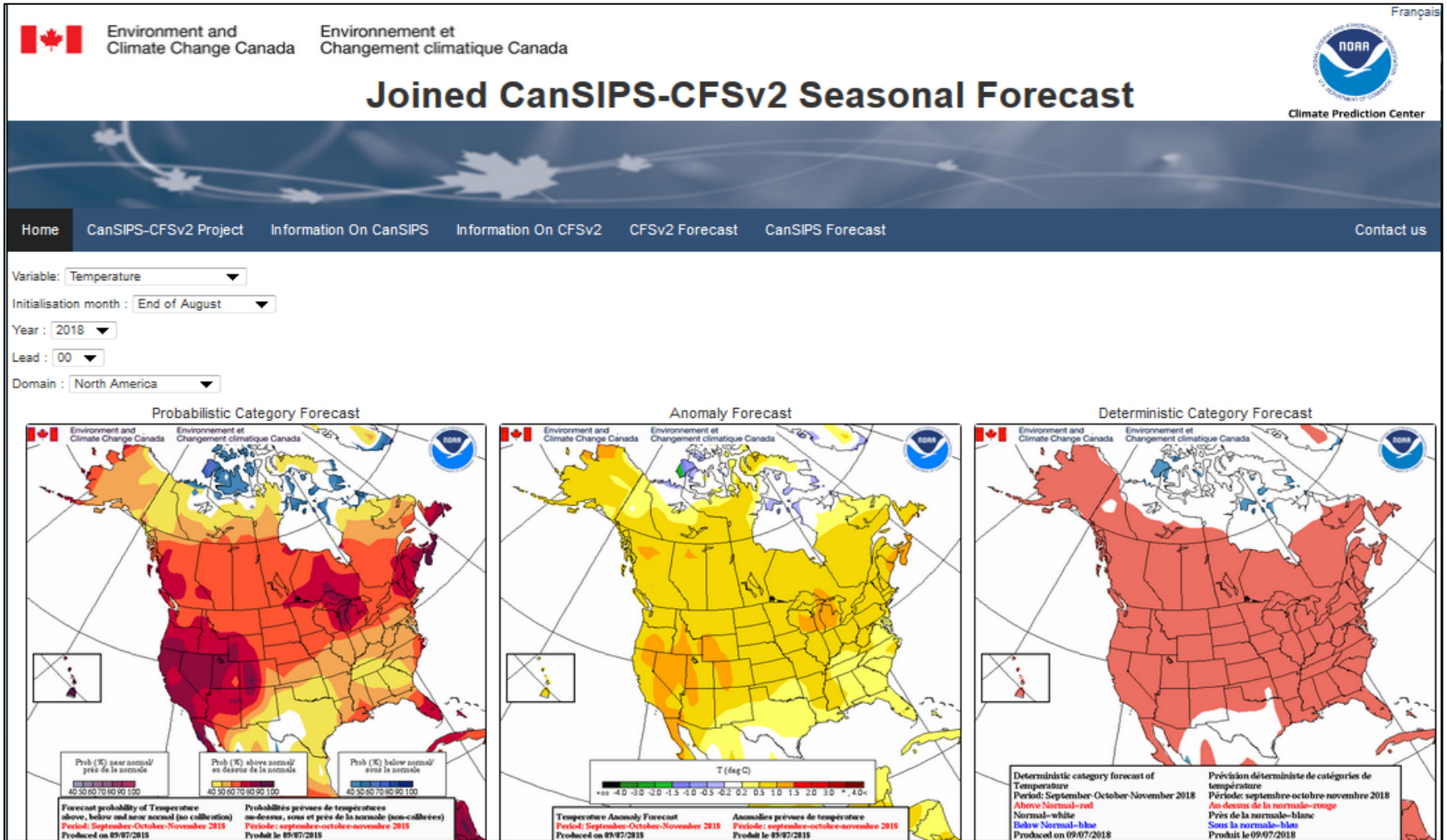
Precipitation probabilistic forecast for OND2018, lead 0



Web Site

http://collaboration.cmc.ec.gc.ca/cmc/saison/Joined_CanSIPS_CFSv2/site_web/#t/9/2018/m123//of

Username: wmouser
Password: globale98



Future work

1. Calibration of the seasonal forecasts, we need to calibrate our forecasts to account for the imperfection the seasonal forecasting system possess in all seasons.
2. Including sea ice in our forecasts. This is very important for the US and Canada and we will try to incorporate this variable into our prediction system.
3. Verification of the past forecast.

First Client:

Alaska and Northwestern Canada quarterly climate impacts and outlook: June 2018