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Pan-Arctic Regional
Climate Outlook
Forum

PARCOF-3

consensus statement

Eivind Støylen and collaborators
Rovaniemi, 09. May 2019



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Background - or - Why?

- PARCOF is an activity relating to the Arctic Regional Climate Centre (ArcRCC)
- ArcRCC must fulfill a set of mandatory functions to reach designation as a WMO Regional Climate Centre
- An activity under the Long Range Forecasting function is to produce a consensus statement on regional or sub-regional forecasts
- **Consensus involves** “A collaborative process which involves discussion with experts in the region (e.g. through **Regional Climate Outlook Forums**)”*

*From the Manual on the GDPFS, Part II, new APPENDIX II-11 (as of EC-LXI 2009)



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What?

Product: consensus statement on regional or sub-regional forecast.

Element: 2-m mean temperature, total precipitation

Output type: report

Forecast period: a climatologically significant period (from one month to one year)

Update frequency: at least once per year (to be defined by the region)

This according to WMO technical regulations.

How do we adapt this for the Arctic region and the ArcRCC?



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Adapt contents to ArcRCC

Sea ice!

Not part of “mandatory variables” but is high priority for us

Not only outlook for next season; but rather

- seasonal summary for previous season
- verification of forecast for previous season, and
- forecast / outlook for upcoming season

Consensus statement document for each PARCOF (twice yearly)

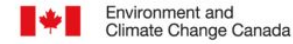
mid-january online update for late winter outlook



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How? (or who)



First Session of the Pan-Arctic Regional Climate Outlook Forum (PARCOF-1)
Ottawa, Canada, May 2018

Consensus Statement for the Arctic Summer 2018 Season Outlook



em. Indigenous Peoples and communities,
d direct impacts. For example, temperature
ermafrost and coastal erosion. To meet the
has been made towards the establishment of
ArcRCC-Network is based on the World
contributions from all the Arctic Council member
is a flagship activity of the ArcRCC-Network,
concept supported by WMO and its partners

From PARCOF-1 Ottawa, Canada, from 15 to 16 May, 2018,
hosted by the Environment and Climate Change Canada (ECCC) and co-sponsored by WMO



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The process

- a) Draft Material for seasonal summeries and outlooks are prepared by the responsible node
- b) Drafts are distributed among nodes for input
- c) Iterations ensue online and during telecons towards the PARCOF
- d) Document is presented at PARCOF for discussion and to get input from users. Details on data sources, methodology etc. shown in dedicated presentations
- e) Final version published on web site



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WMO launches Arctic Regional Climate Centre Network

Tags: [Climate](#) [Weather](#) [Forecast](#) [Environment](#) [Polar](#) [Cryosphere](#)

18 Published 18 May 2018

Press Release Number: 18052018

First ever Pan-Arctic Regional Climate Outlook Forum provides predictions for summer season

A new [Pan-Arctic Climate Outlook Forum](#) has met for the first time to provide predictions for the forthcoming summer season as part of an international drive to improve weather, climate and sea ice forecasts in a region undergoing rapid environmental change.

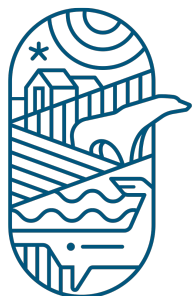
Surface temperatures are expected to continue to be above average for June, July and August 2018, whilst sea ice is forecast to be below normal for most of the Arctic, according to the outlook.

Latest WMO News

Reports to Arctic Council confirm rapid warming, ocean acidification

7 May 2019

Climate change cited in landmark report on “nature’s dangerous



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Environment and
Climate Change Canada



WORLD
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ORGANIZATION



Russian Federal Service
for Hydrometeorology
and Environmental Monitoring



Norwegian
Meteorological
Institute

Third Session of the Pan-Arctic Regional Climate Outlook Forum (PARCOF-3), Rovaniemi, Finland, May 2019

Consensus Statement for the Arctic Summer 2019 Season Outlook

To meet climate adaptation and decision-making needs in the Arctic, substantial progress has been made towards the establishment of an Arctic Regional Climate Centre Network (ArcRCC-Network). The ArcRCC-Network is based on the World Meteorological Organization (WMO) RCC concept with active contributions from all the Arctic Council member countries. The Pan-Arctic Regional Climate Outlook Forum (PARCOF) is a flagship activity of the ArcRCC-Network to create a forum to meet directly with Arctic users of climate information, and follows the well-known Regional Climate Outlook Forum (RCOF) concept supported by WMO and its partners around the world. The ArcRCC is now in the second year of its demonstration phase.



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Summary

A meridional atmospheric circulation (north-south) in the Arctic between November 2018 and January 2019, followed by an increase in storminess in parts of the Arctic between February and April 2019 were the main drivers of this past season's temperature, precipitation and sea ice anomalies. Above normal temperatures forecast for all Arctic regions between June and August 2019 will continue to have implications for precipitation and sea ice over that time period.

Temperature: The winter 2019 (NDJ: November 2018, December 2018, January 2019) average surface air temperature was above normal for most of the Arctic domain, with eastern Siberia experiencing its second warmest NDJ on record. During February, March and April (FMA) 2019, the temperatures were above normal, with the exception of the eastern Canadian Arctic where temperatures were below normal. Above normal temperatures are expected to continue in all the Arctic regions between June and August 2019.

Precipitation: Siberia saw their driest NDJ in the 70-year record. The southern portion of the Canadian Arctic saw their driest FMA in the 70-year record, while northeastern Siberia and a portion of the Arctic Ocean saw their wettest FMA on record. Between June and August 2019, mostly below normal precipitation is expected, with the exception of central and southern regions of the Alaskan Arctic and Chukchi regions where above normal precipitation is forecast.

Sea ice: The Northern Hemisphere March 2019 maximum sea ice extent was the 7th lowest on record. There were large regional differences observed in sea ice conditions between the Canadian and Eurasian Arctic during winter 2019. The thermal and wind patterns during winter 2018-2019 led to extreme low ice extent in the Bering Sea, while the predominance of northerly winds in the Barents Sea region since January 2019 led to close to normal ice extent in the northern part of this area. Predicted above normal temperatures for the Arctic region will contribute to below to near normal sea ice conditions for the majority of the Arctic, with the exception of Greenland, the Canadian Arctic, and eastern Siberian Sea, where near normal ice conditions are forecast.



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Temperature Summary of November 2018 to April 2019 conditions:

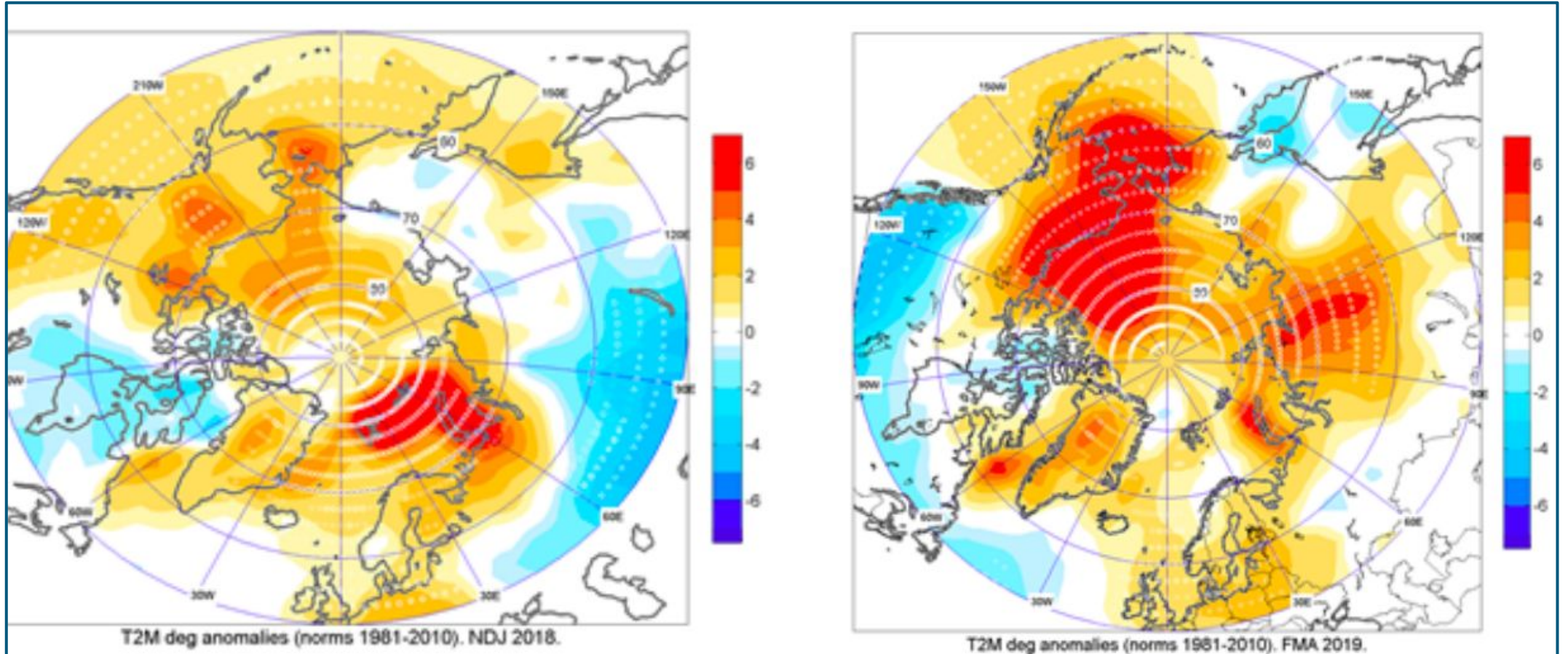


Figure 1: Left: November, December, and January 2018-2019, and Right: February, March, and April 2019 temperature anomaly based on the 1981-2010 reference period from Hydrometcenter Moscow/NCEP/NCAR Reanalysis.



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Verification of the previous seasonal forecast February, March, April 2019:

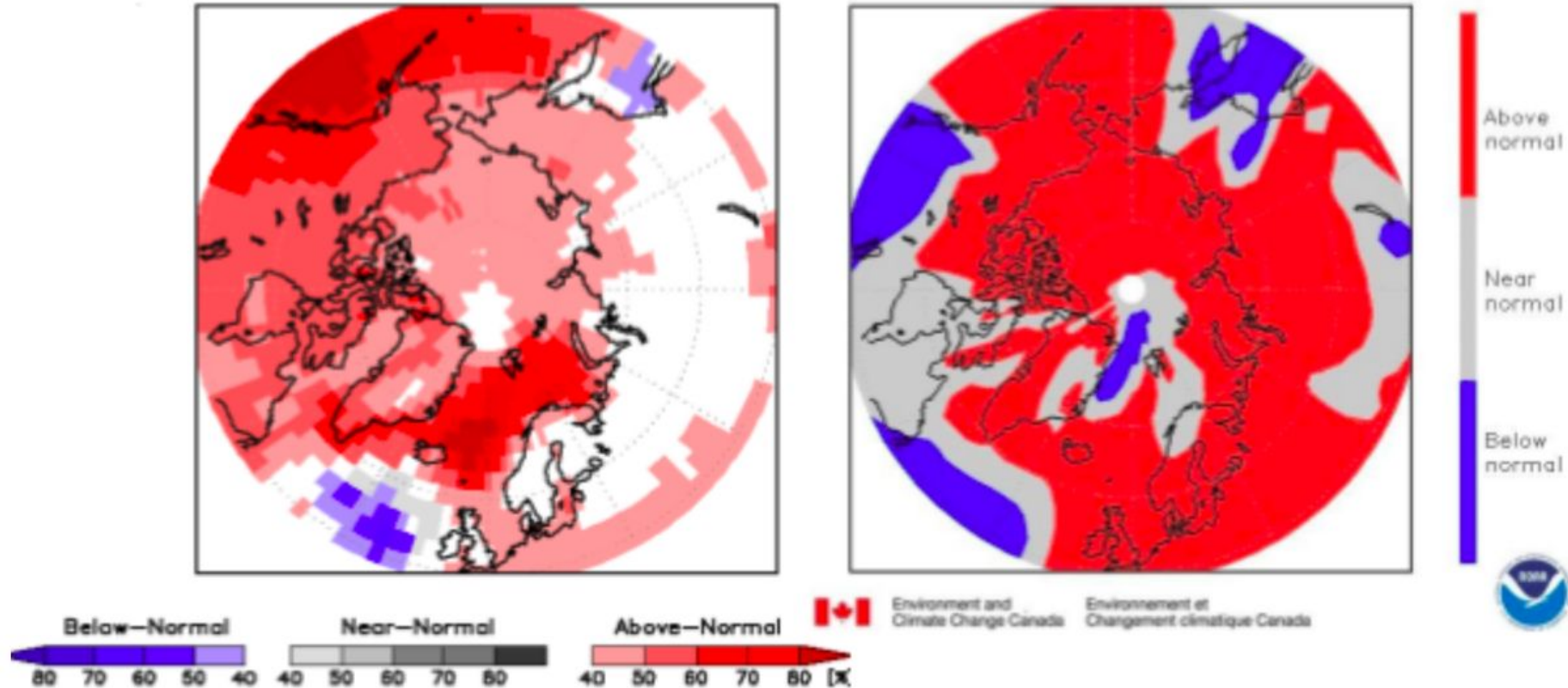


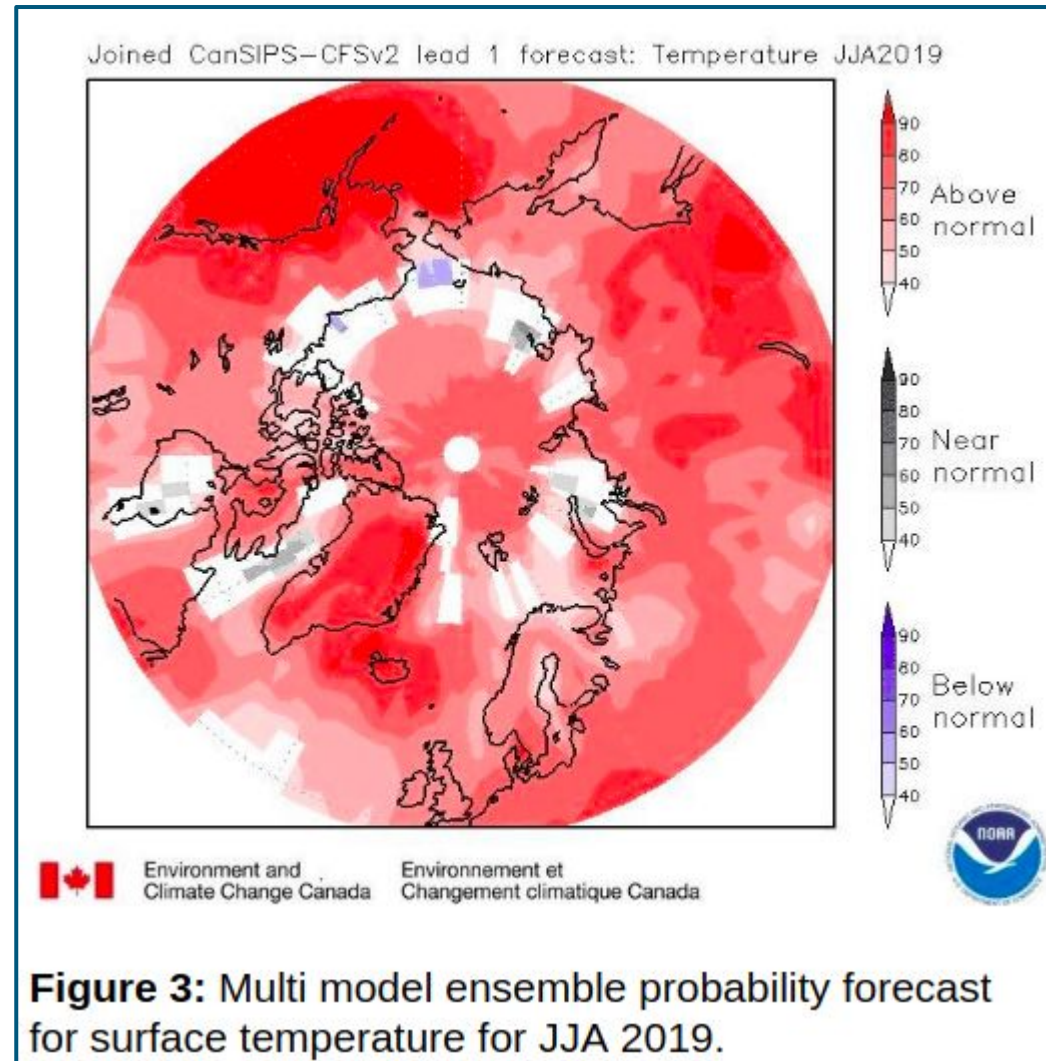
Figure 2: Left: Surface Air Temperature Outlook for February, March and April 2019. Multimodel ensemble (MME) probability forecast of three categories (below normal, near normal and above normal) (www.wmolc.org). Right: NCAR (National Center for Atmospheric Research) Climate forecast System Reanalysis (CFSR) for air Temperature, February, March and April 2019.



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Outlook for Summer 2019:





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Precipitation

Summary of November 2018 to April 2019 conditions:

Siberia saw their driest NDJ in the 70-year record (Figure 4, left). The southern portion of the Canadian Arctic saw their driest FMA in the 70-year record, while northeastern Siberia and a portion of the Arctic Ocean saw their wettest FMA on record (Figure 4, right).

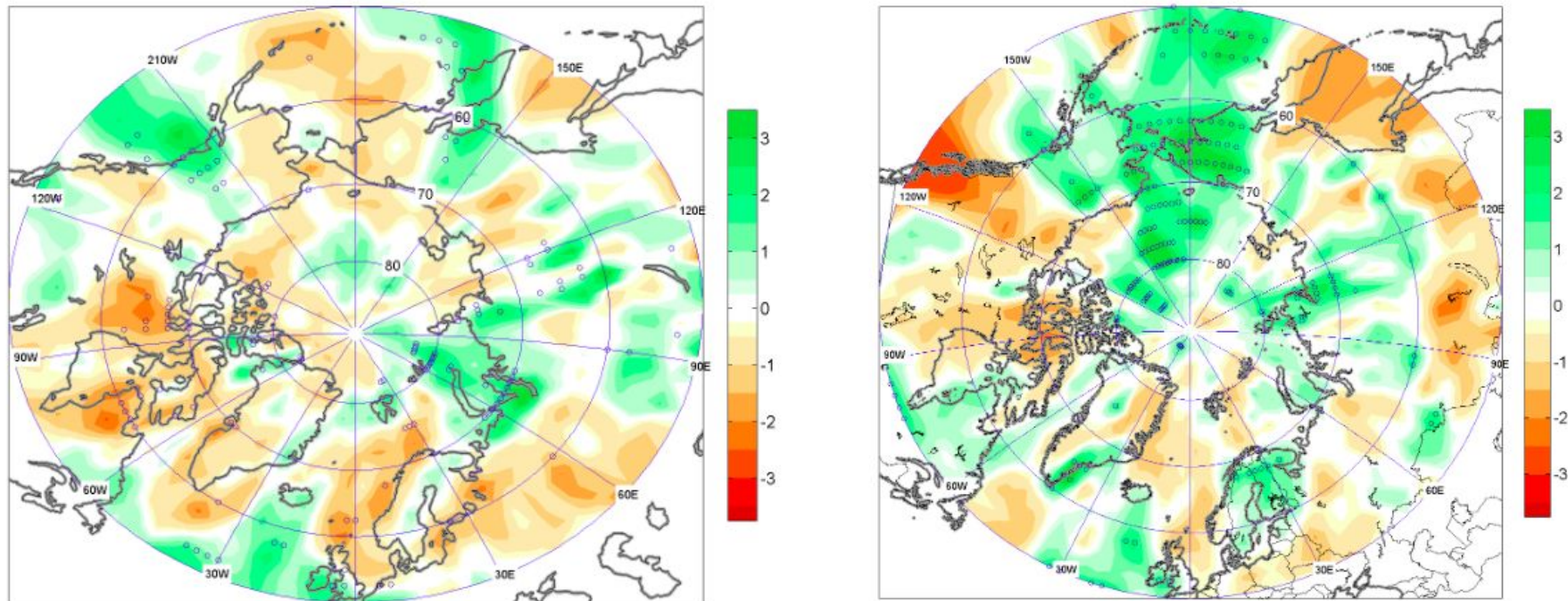


Figure 4: Left: November, December and January 2018-2019, and Right: February, March and April precipitation anomaly based on the 1981-2010 reference period from Hydrometcenter Moscow/NCEP/NCAR Reanalysis



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Verification of the previous seasonal forecast FMA 2019

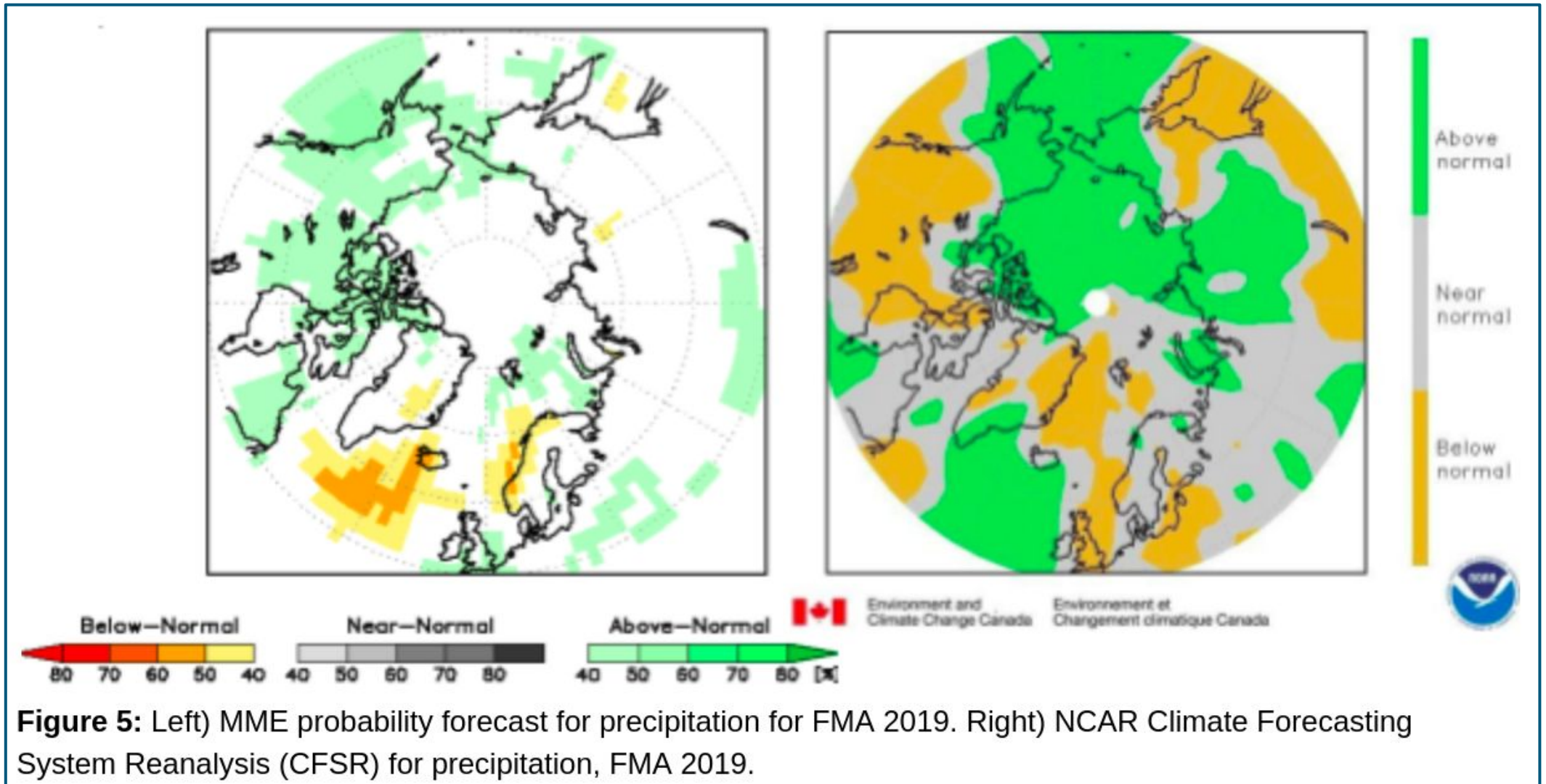


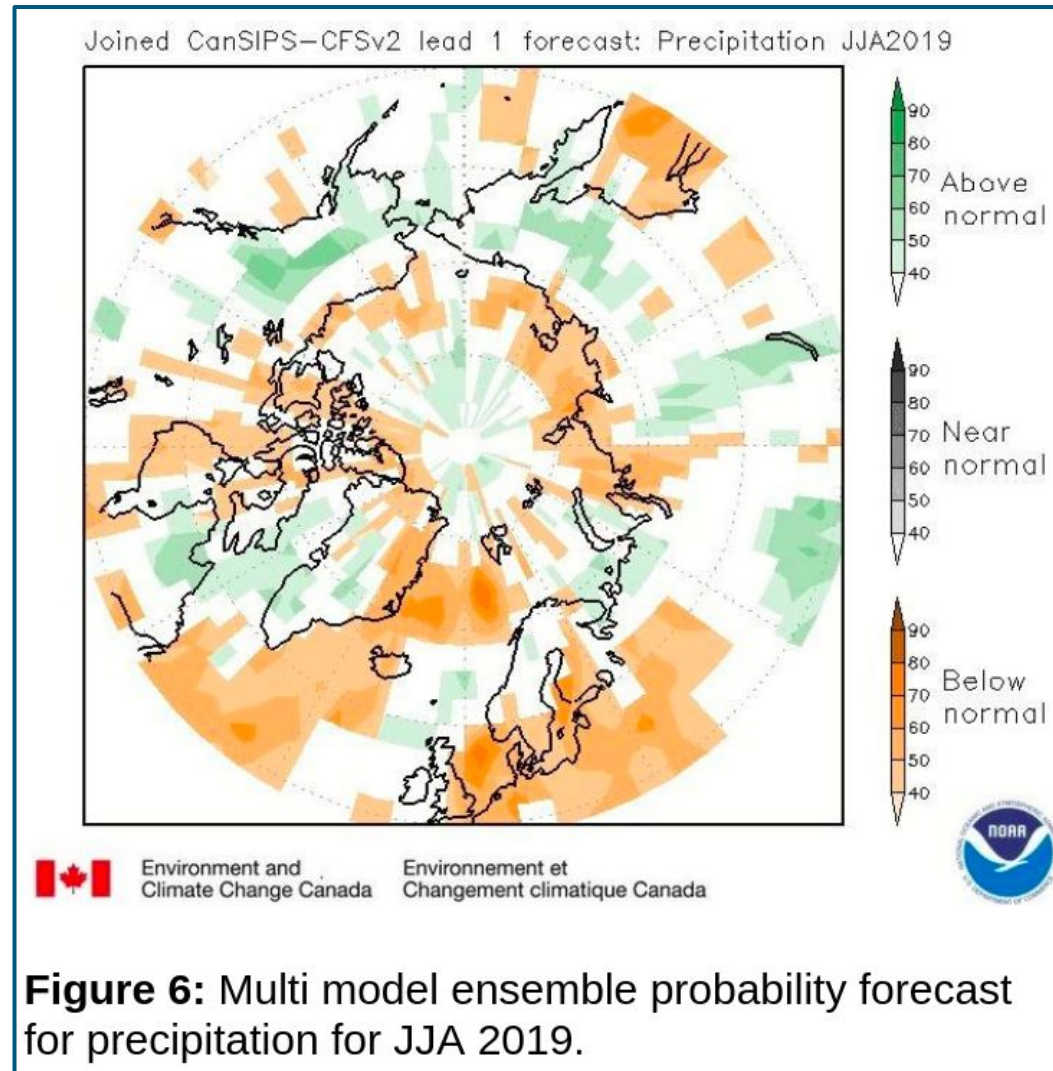
Figure 5: Left) MME probability forecast for precipitation for FMA 2019. Right) NCAR Climate Forecasting System Reanalysis (CFSR) for precipitation, FMA 2019.



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Precipitation Outlook for Summer 2019:





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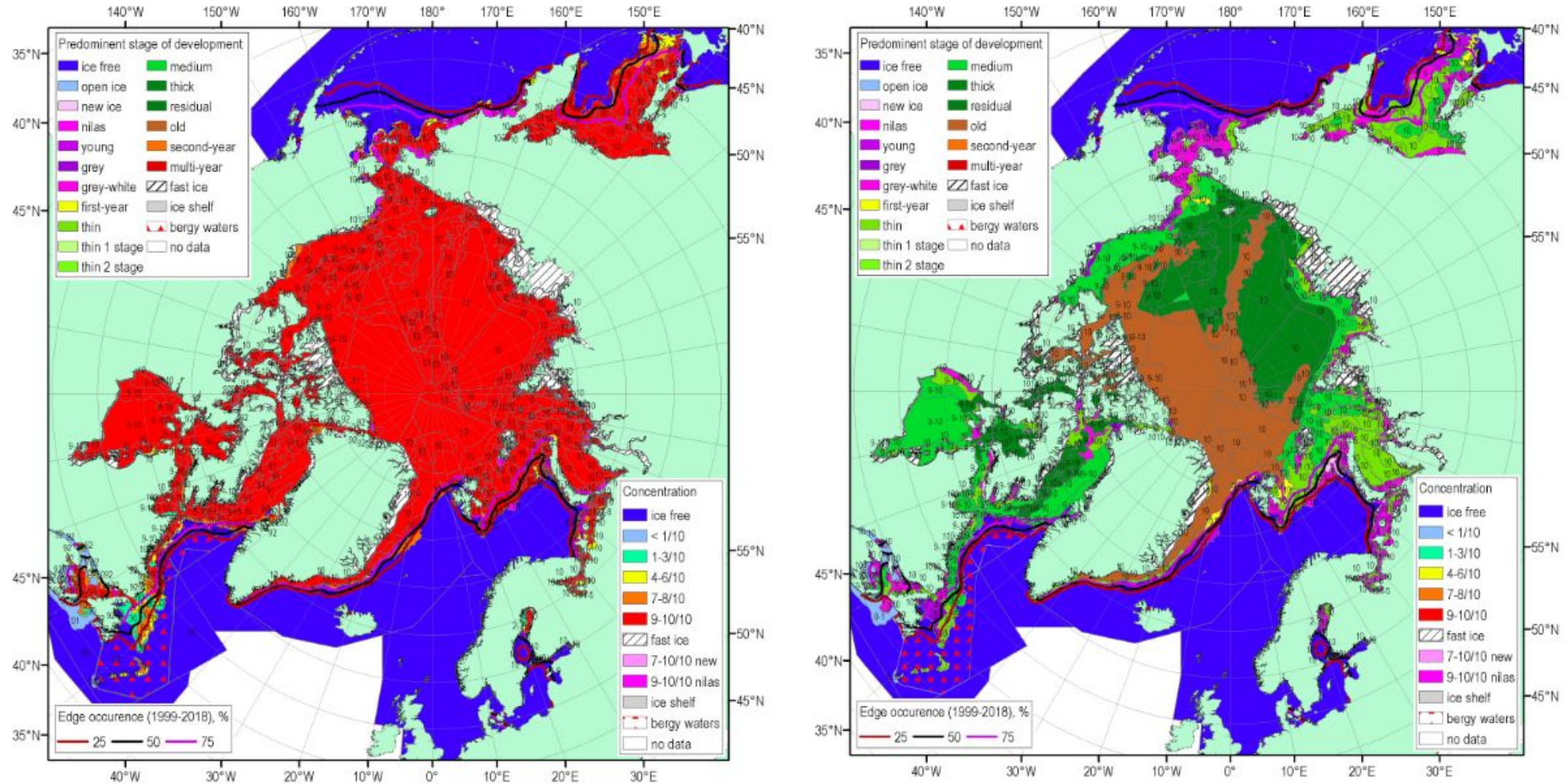
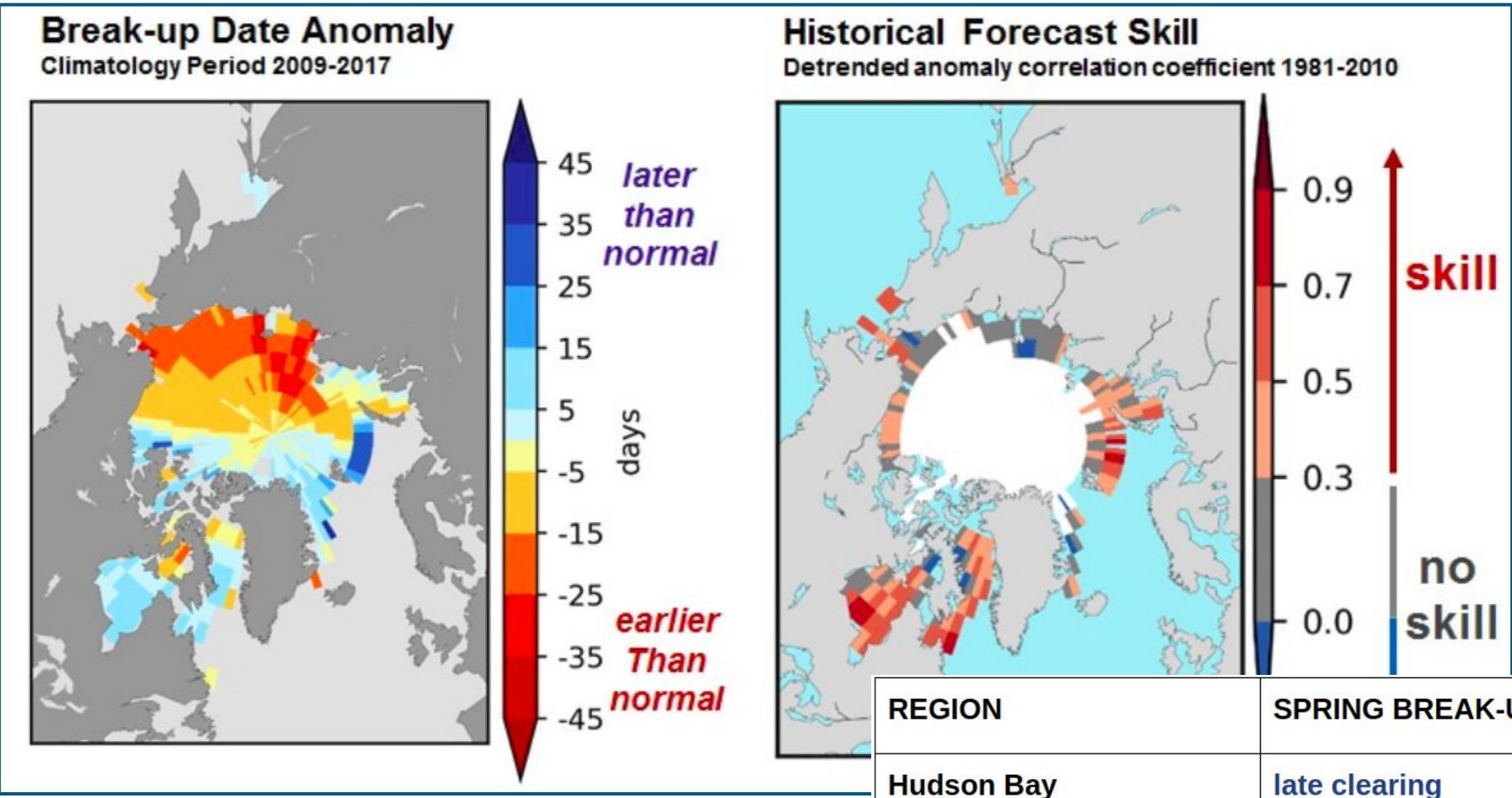


Figure 7: Blended AARI/CIS/NIC ice chart for 19-22 March 2019. Left: total concentration, right: predominant stage of development



Outlook for Spring break-up 2019:

Figure 8: Forecast for the 2019 spring break-up where break-up is defined as the date when the ice concentration drops below 50%. Left: anomaly (difference from normal) based on the 2009-2017 period and right: the historical skill defined as the detrended anomaly correlation coefficient based on the 1981-2010 period.

REGION	SPRING BREAK-UP	CONFIDENCE
Hudson Bay	late clearing	[moderate to high confidence]
Baffin Bay	late clearing	[moderate to high confidence]
Barents Sea	late clearing	[moderate to high confidence]
Southern Beaufort Sea	early clearing	[moderate confidence]

September 2019 Sea Ice Extent

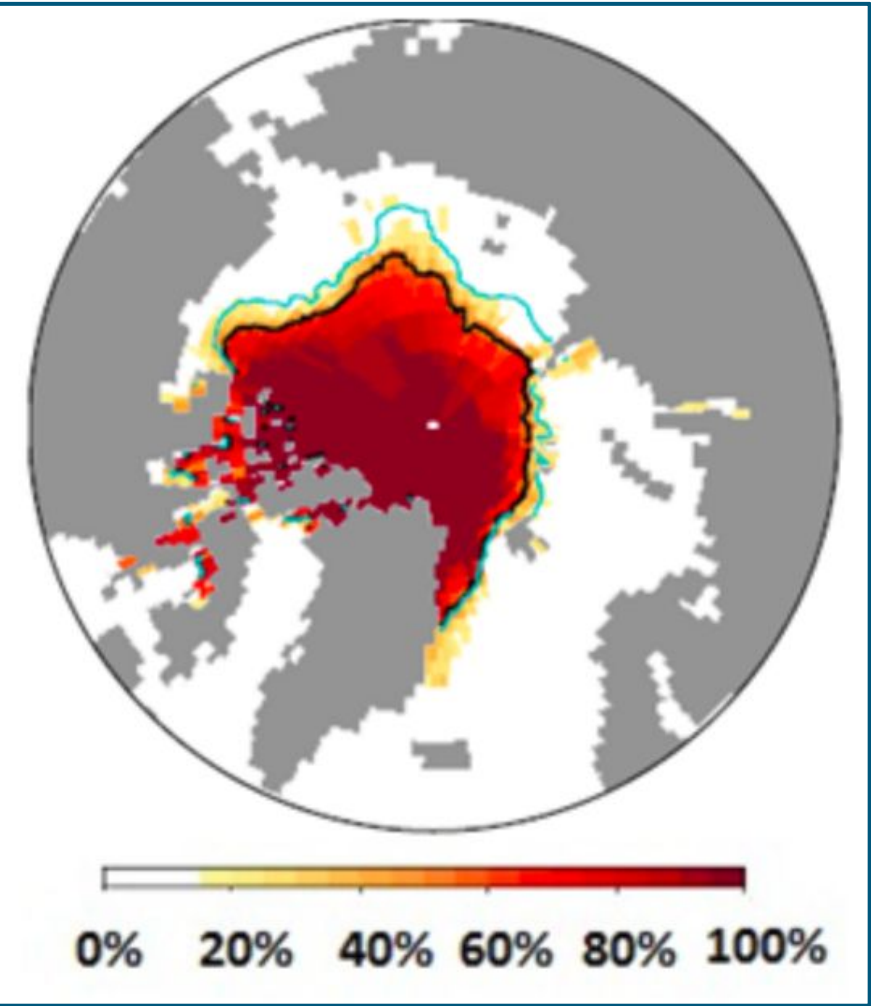


Figure 9. September 2019 probability of sea ice at concentrations greater than 15% from CanSIPS (ECCC). Ensemble mean ice extent from CanSIPS (black) and observed mean ice extent 2009-2017 (green).

REGION	SEA ICE EXTENT	CONFIDENCE
Chukchi Sea	below to near normal	[moderate agreement]
East Siberian Sea	below to near normal	[low agreement]
Laptev Sea	below to near normal	[low agreement]
Kara Sea	below to near normal	[moderate agreement]
Barents Sea	below normal	[moderate agreement]
Greenland Sea	near to above normal	[low agreement]
Canadian Arctic Archipelago	near normal	[low agreement]
Beaufort Sea	below to near normal	[good agreement]



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Key shipping regions

Beaufort Sea: Although there is less multi-year ice in the Beaufort Sea than normal this winter, it is expected that some multi-year ice will persist near the Alaska coast into late summer which could impact shipping. In the Eastern Beaufort there is a possibility (low risk) that multi-year ice could drift south of Banks Island as in September 2018, restricting ship traffic through Amundsen Gulf.

Northwest Passage (NWP): A return to normal concentrations of multi-year ice along the southern route of the NWP could delay melt and the start of the shipping season compared to the last 10 years. The presence of multi-year ice is expected to be a hazard throughout the shipping season. Along the northern route of the NWP, concentrations of multi-year ice are the 7th highest since 1980 and are expected to keep the route closed this season.

Svalbard: The ice extent around Svalbard is expected to be below normal throughout the summer season.

Northern Sea Route (NSR):

Sea ice in the northern Barents Sea is expected to clear later than normal (compared to last 10-years) and may restrict fishing and tourist vessel activities in this region until July 2019. Easy ice conditions for navigation are expected for the western part of the NSR (Kara and western Laptev Seas) through the summer 2019 season. Near normal ice extent expected in the eastern Laptev and western Eastern Siberian Seas (ESS) may lead to increased icebreaker support or higher ice class ships required for safe navigation in this region, particularly along the northern navigation routes. There is also a risk of multi-year ice along the northern routes; similar to 2018 a strip of sea ice in the central ESS could persist through late summer 2019. Very easy ice conditions for navigation will dominate the Chukchi Sea area.



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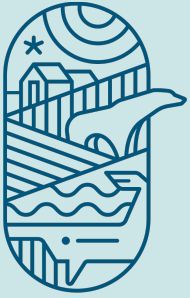
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Background and Contributors

This Arctic seasonal climate outlook was prepared for PARCOF-3. Contents and graphics were prepared in partnership with the Russian, United States, Canadian, Norwegian, Danish, Finnish, Swedish, and Icelandic meteorological agencies and contributions of the Expert Team on Sea Ice, an expert team of the Joint WMO/IOC Technical Commission on Oceanography and Marine Meteorology, the Global Cryosphere Watch and the International Ice Charting Working Group.

The temperature and precipitation forecasts are based on a multi-model ensemble (MME) approach using computer-generated climate predictions from a number of WMO designated GPC-LRFs. The multi-model ensemble approach is a methodology reputed as providing the most reliable objective forecasts. The sea ice consensus statement is based on experimental model forecasts from 4 WMO Global Producing Centers of Long-Range Forecasts (GPC-LRFs) and statistical/heuristic forecasts from the Canadian, Norwegian, Russian and US national ice services. A multi-model ensemble for sea ice from the GPC-LRFs centres that will form the basis for future ArcRCC Consensus Statements is under development. Outlooks for key shipping areas that describe the summer sea ice conditions were provided by national ice services and were based on forecaster experience and statistical methods.

The ArcRCC is in demonstration phase to seek designation as a WMO RCC-Network, and products are in development and are experimental. For more information, please visit www.arctic-rcc.org.



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Thank you