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Canada

ACF - 5: Verification of the FMA2020 season
ACF - 5: Seasonal forecast for the JJA2020 season

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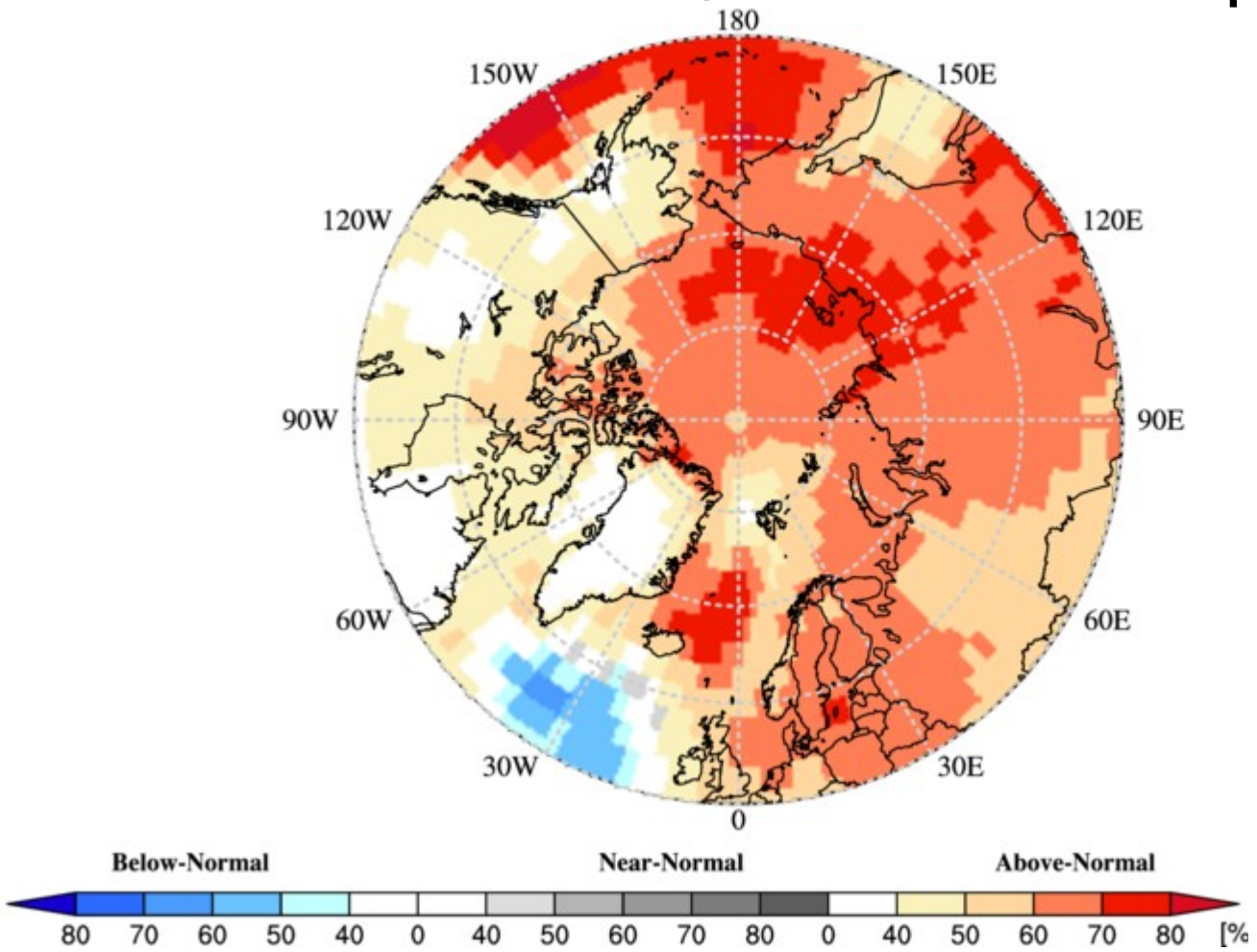
WMO

sonal forecast over the Arctic, Feb-March-April 2

A reminder

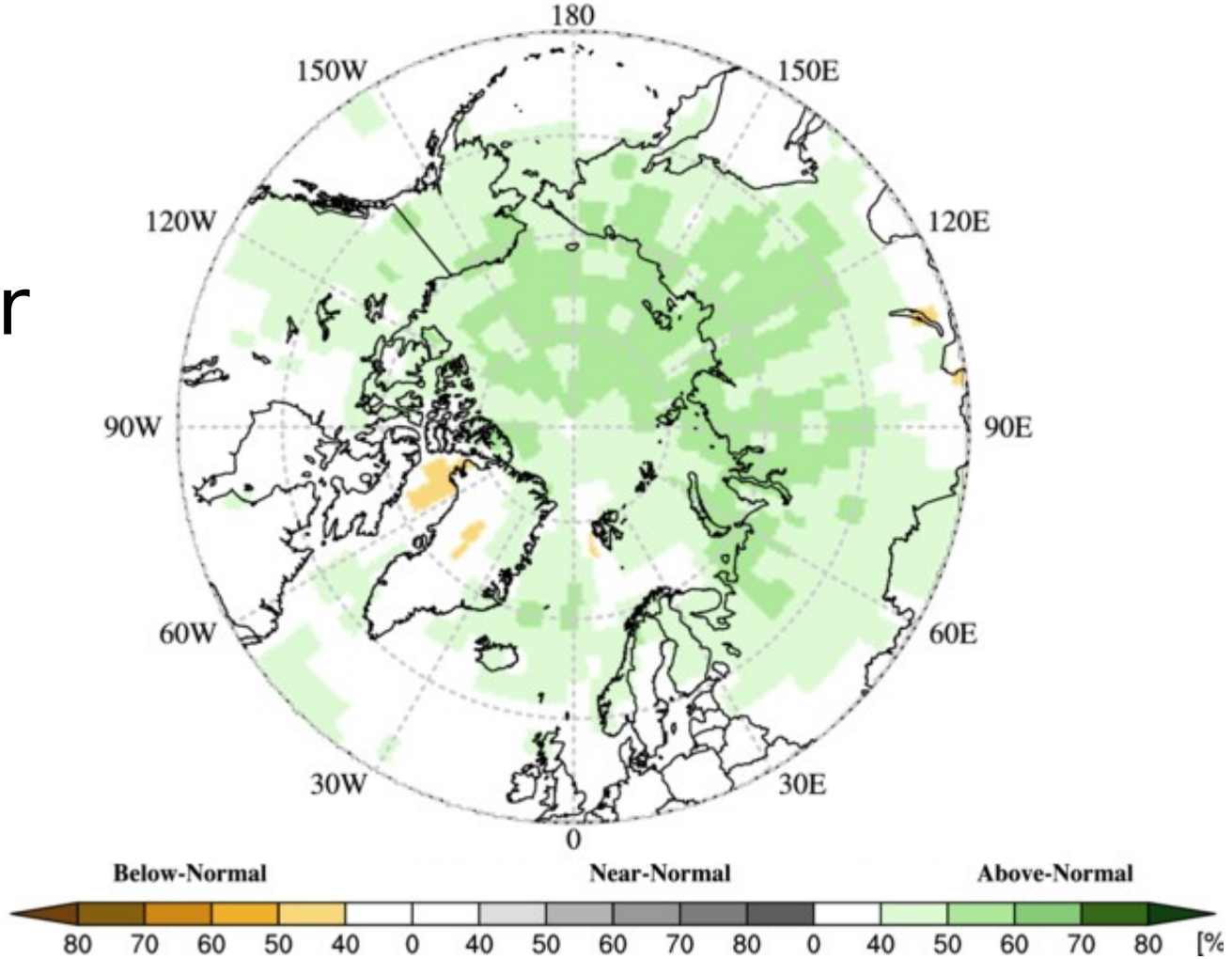


Considering multi-model ensemble forecast and a limited model skill over the Arctic:

Temperature: there is probability of 40% or more that temperatures will be above normal over the Alaska and W. Canada and over most of the continental Canadian Arctic. Same above normal probabilities, but with higher confidence, was forecasted for European, Atlantic, W

sonal forecast over the Arctic, Feb-March-April 2

A reminder



Considering multi-model ensemble forecast and a limited model skill over the Arctic:

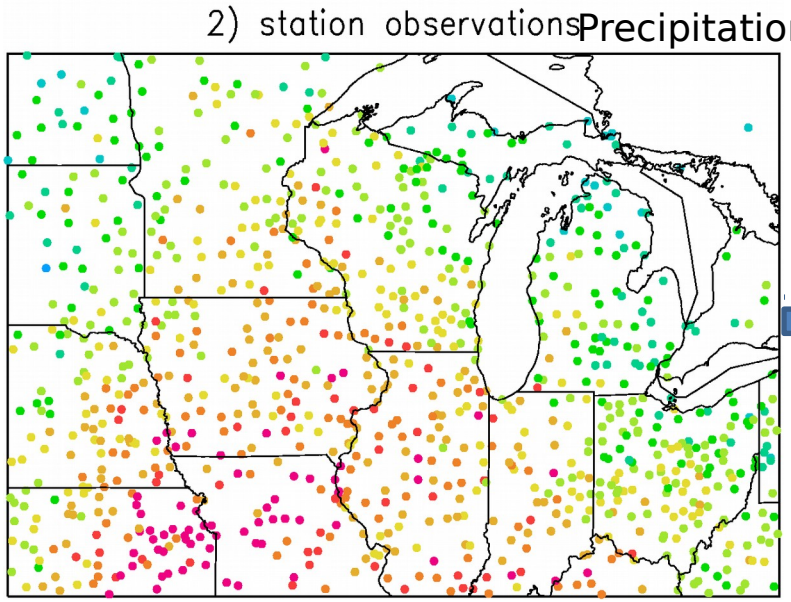
Precipitation: Mostly equal chances were expected over eastern Canada and and some parts of Atlantic region (mostly Greenland). Over other Arctic regions, above normal precipitation probabilities were expected with ~40% chance

How do we verify seasonal forecasts?

- We need observations!

- Unfortunately we can not measure temperature or precipitation on every single point over the globe.

- This is why we use statistical techniques to interpolate measured variables over the regions where we can measure. The results is called **the re-analysis**

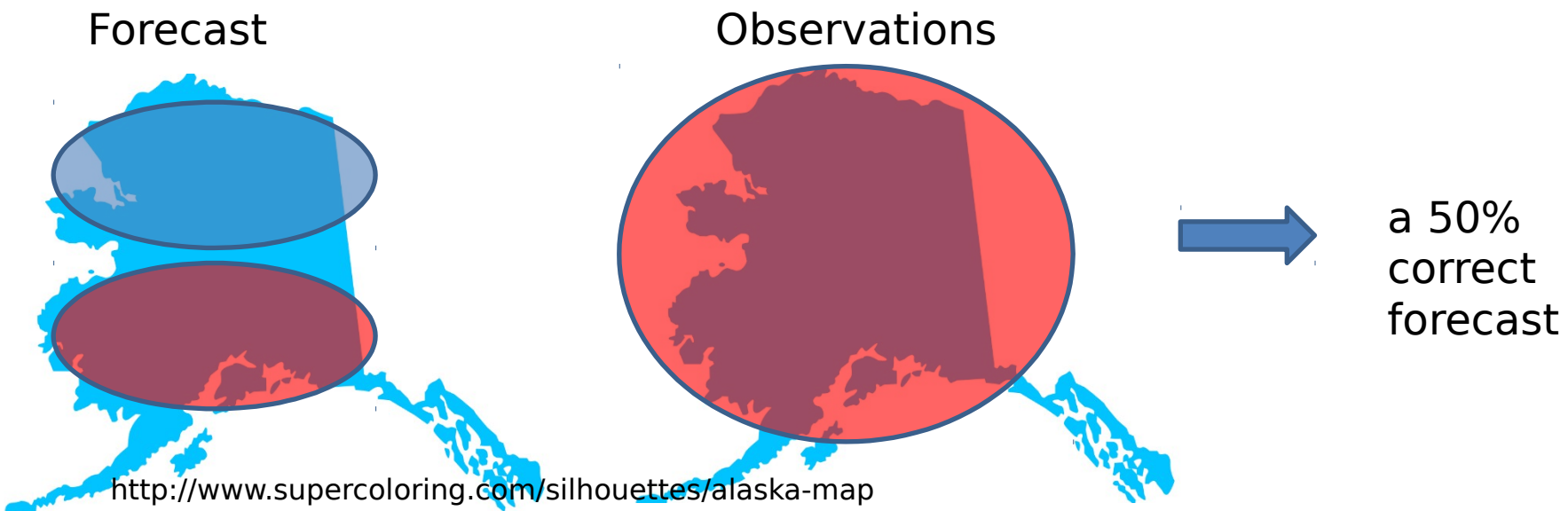


https://dilorenz.github.io/downscaling2/ProbApp/

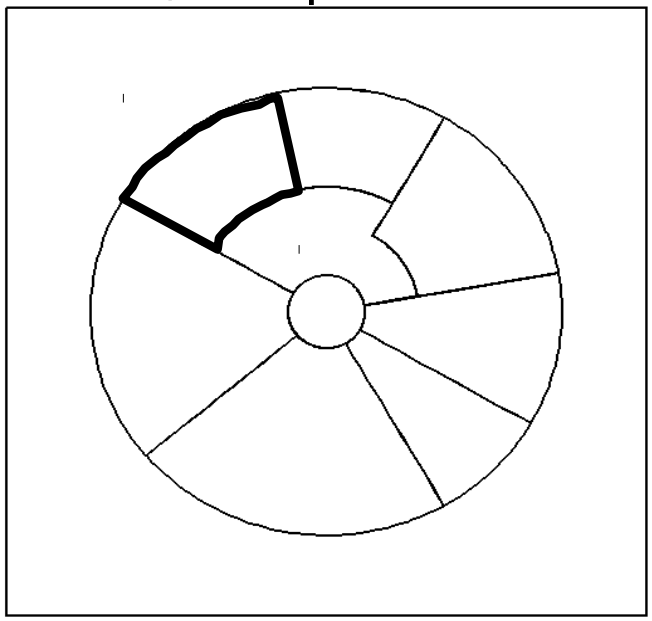
How do we verify seasonal forecasts?

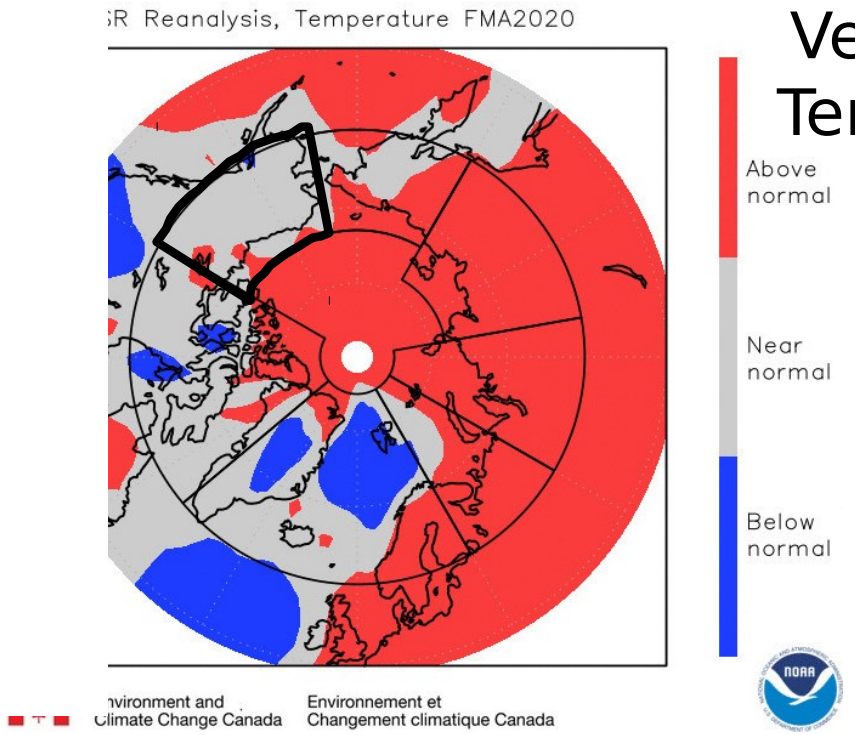
- We need some metric, some number to quantify the verification result
- We call this metric a score

- For the verification over the Arctic we will use a subjective score: a percentage of the correct forecast over a selected region in the Arctic.



Forecast, temp FMA 2020

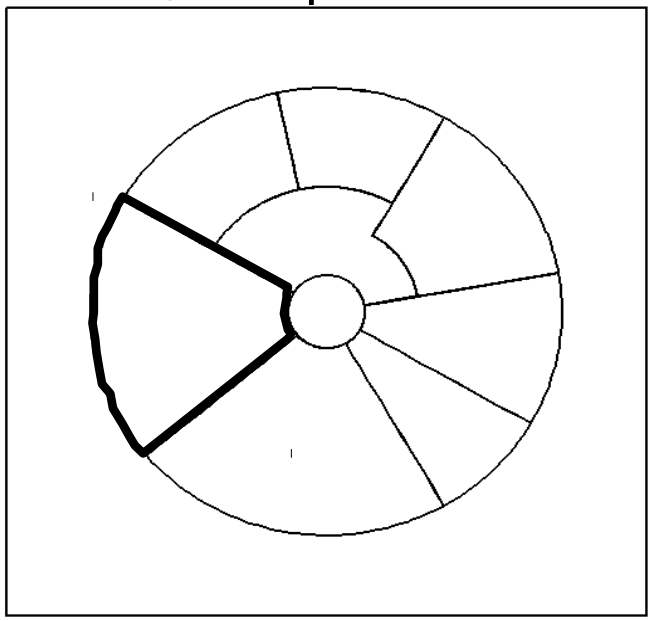


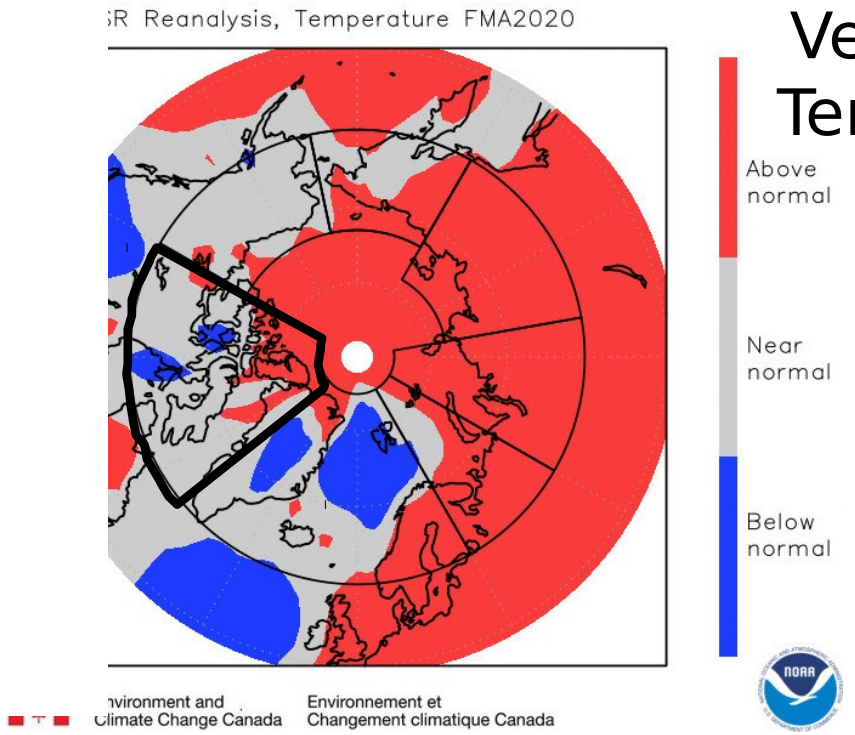


Verification Temperatur

Verif:	Forecast	CFS Reanalysis	Subj. Result
Alaska, W. Can	**Above normal**	**Near normal**	**miss**
E. Canada			
N. Atlantic			
European			
W. Siberia			
E. Siberia			
Chukchi			

Forecast, temp FMA 2020

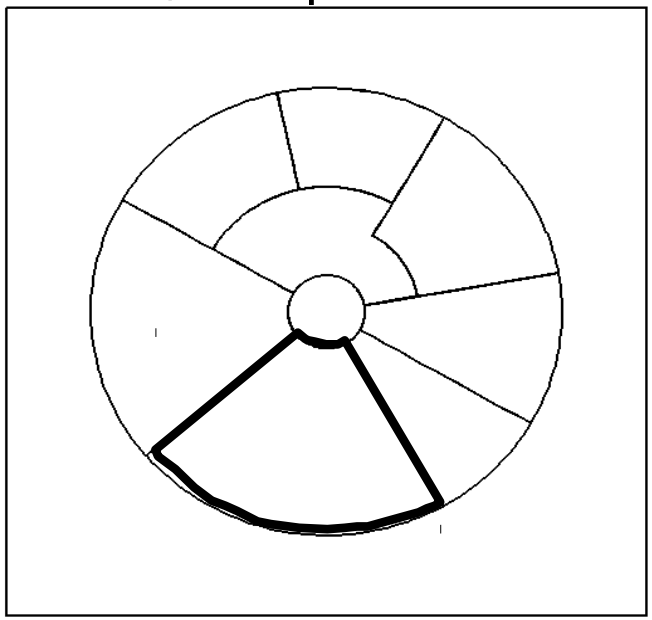


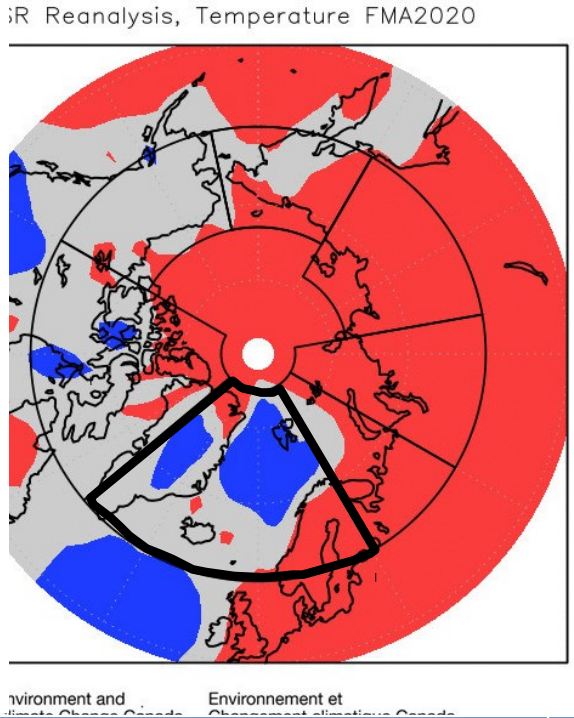


Verification Temperatur

Verif:	Forecast	CFS Reanalysis	Subj. Result
Alaska, W. Can	Above normal	Near normal	miss
E. Canada	**Mostly above normal**	**Mostly near normal**	**miss**
N. Atlantic			
European			
W. Siberia			
E. Siberia			
Chukchi			

Forecast, temp FMA 2020

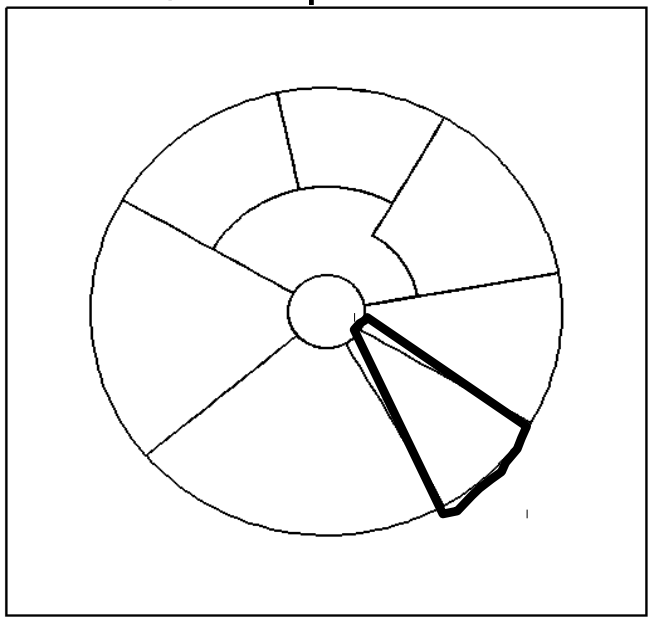


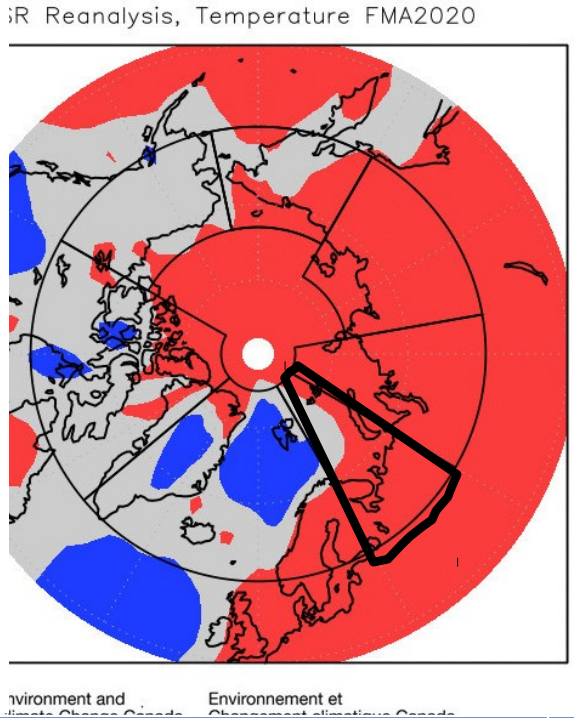


Verification Temperatur

Verif:	Forecast	CFS Reanalysis	Subj. Result
Alaska, W. Can	Above normal	Near normal	miss
E. Canada	Mostly above normal	Mostly near normal	miss
N. Atlantic	**Equal chance over east, above normal over Scand. and Island**	**Above over Scandinavia, near norm over Island**	**30% hit, 70miss**
European			
W. Siberia			
E. Siberia			
Chukchi			

Forecast, temp FMA 2020





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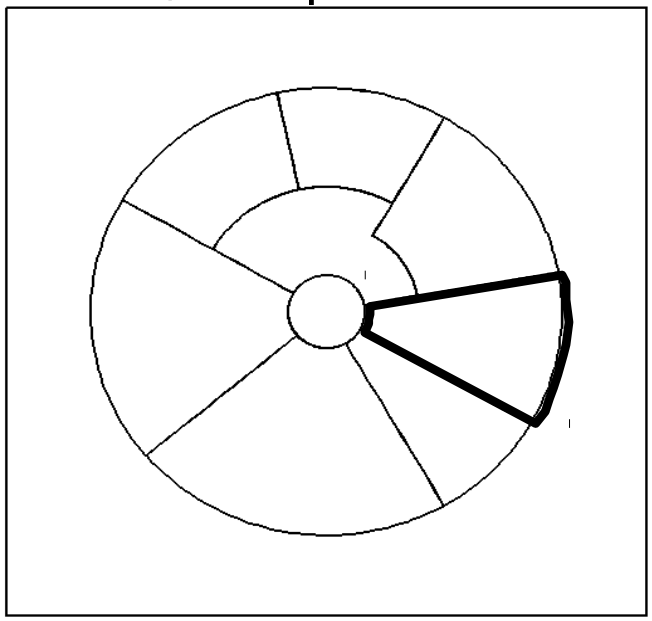
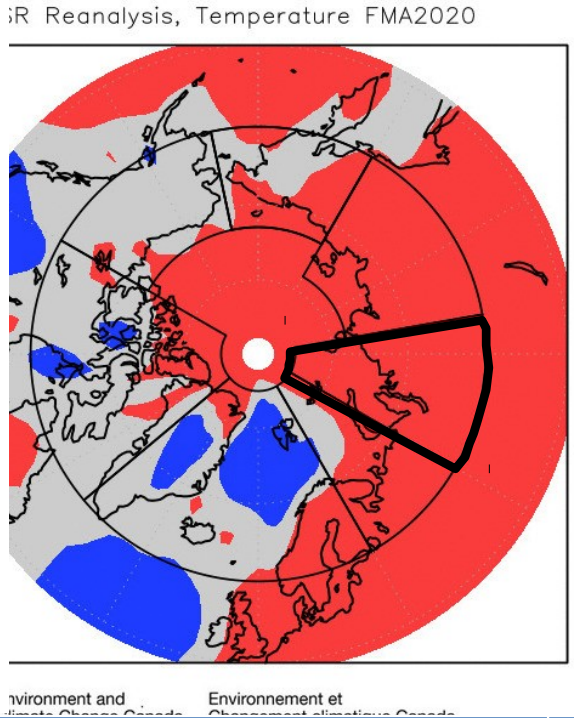
European	**Above normal**	**Above normal**	**hit**
W. Siberia			
E. Siberia			
Chukchi			

Forecast, temp FMA 2020





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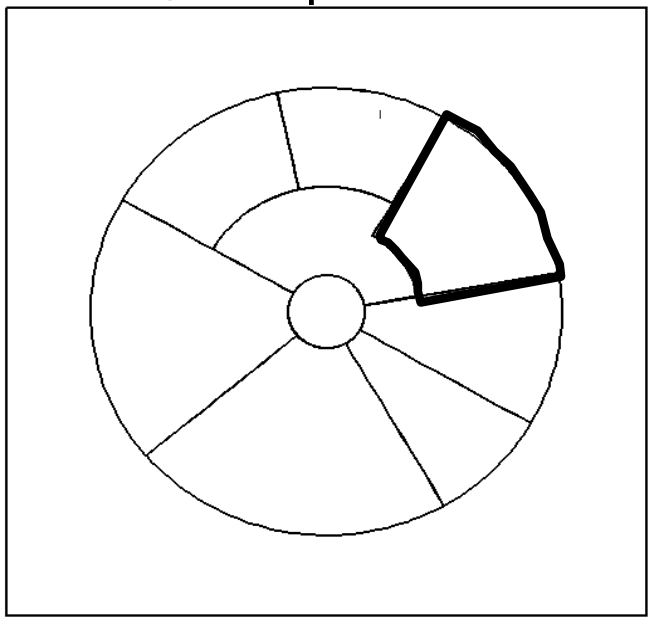
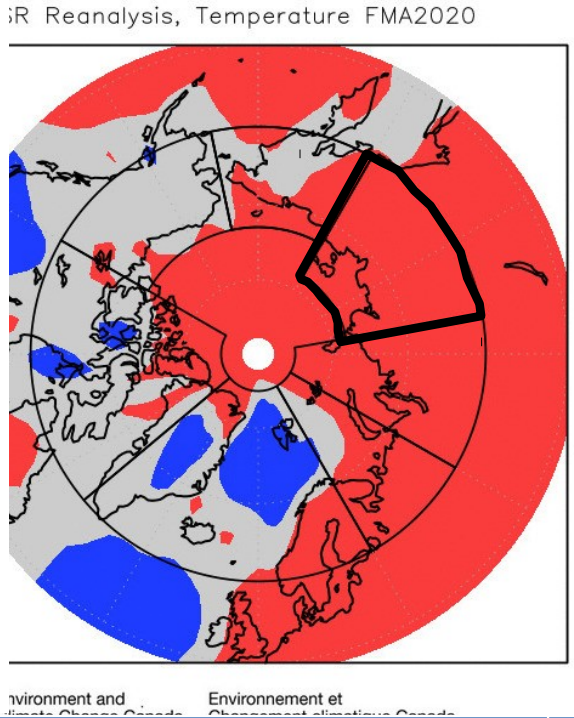
European	Above normal	Above normal	hit
W. Siberia	**Above normal**	**Above normal**	**hit**
E. Siberia			
Chukchi			

Forecast, temp FMA 2020





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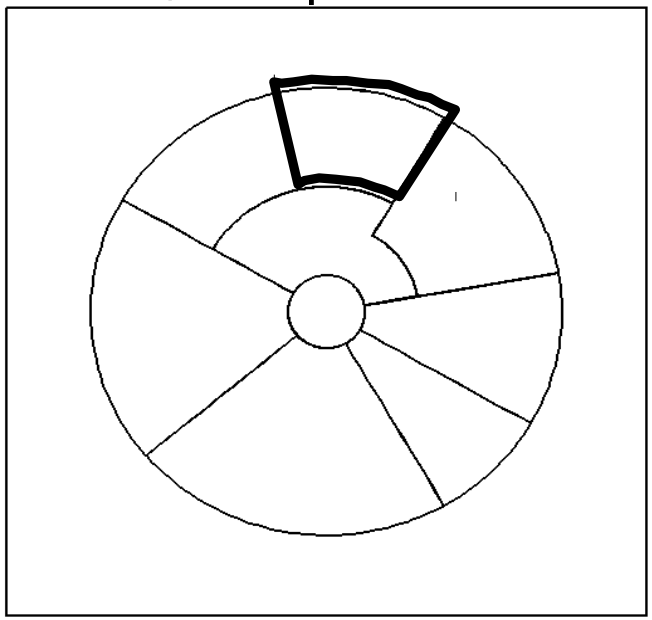
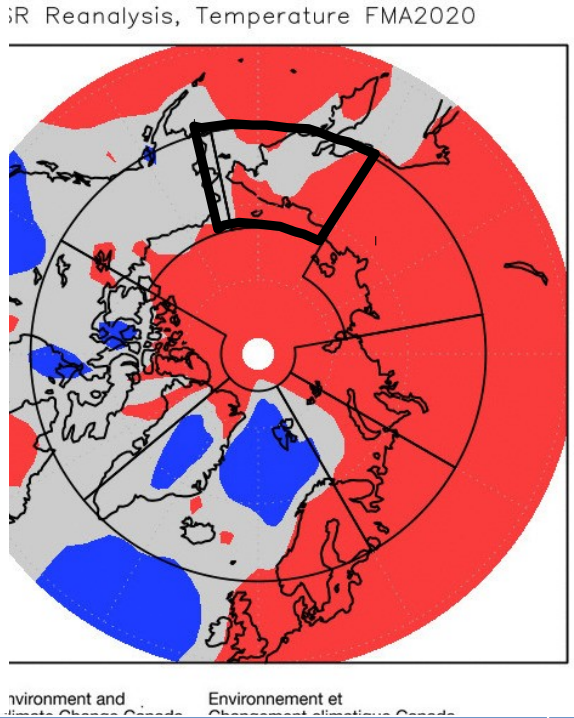
European	Above normal	Above normal	hit
W. Siberia	Above normal	Above normal	hit
E. Siberia	**Above normal**	**Above normal**	**hit**
Chukchi			

Forecast, temp FMA 2020





Verification Temperatur

Verif:	Forecast	CFS Reanalysis	Subj. Result
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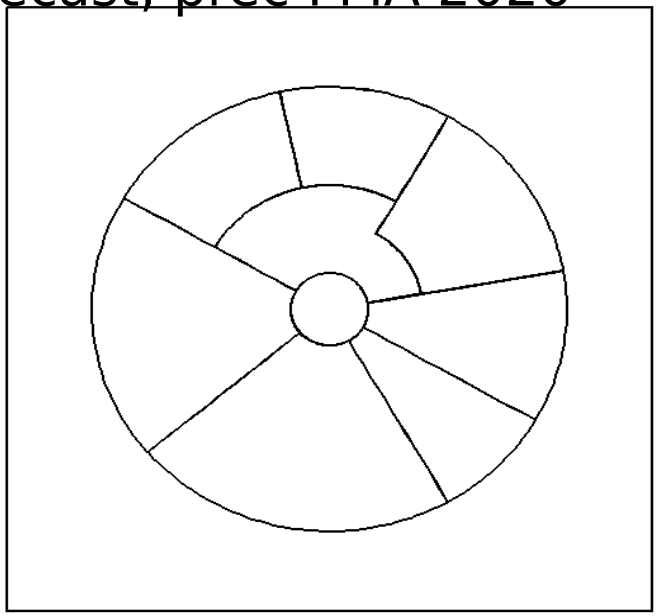
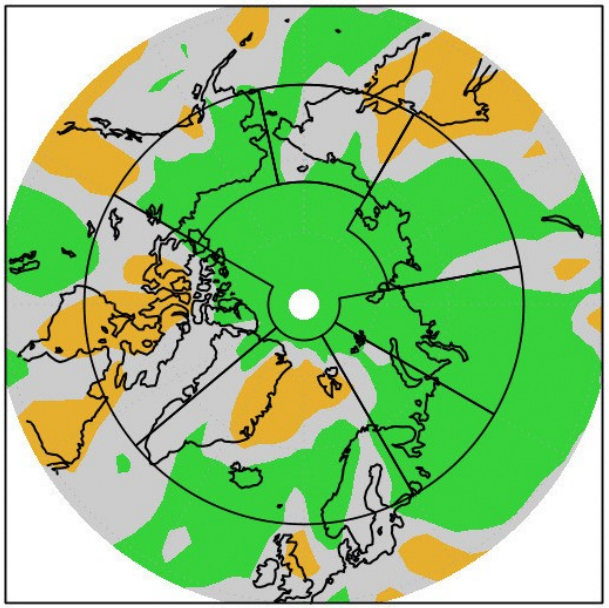
E. Canada	Mostly above normal	Mostly near normal	miss
N. Atlantic	Equal chance over east, above normal over Scand. and Island	Above over Scandinavia, near norm over Island	30% hit, 70miss
European	Above normal	Above normal	hit
W. Siberia	Above normal	Above normal	hit
E. Siberia	Above normal	Above normal	hit
Chukchi	**Above normal**	**Above normal, near normal**	**50% hit/miss**

Forecast, prec FMA 2020



CFSR Reanalysis, Precipitation FMA2020



Verification Precipitation

Above normal

Near normal

Below normal

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Verif:	Forecast FMA	CFS Reanalysis	Subj. Result
Alaska, W. Can	Mostly above	Mostly above	80% hit
E. Canada	Mostly Indecisive	Near normal in the south and west, below in the center	%
N. Atlantic	Indecisive, above normal	Above over Island and W and E Scandinavia.	mostly hit where decisive
European	Above	Above	hit
W. Siberia	Above	Above	hit
E. Siberia	Above	Above	hit
Chukchi	Above	Mostly near normal	Mostly miss

Overall result, subjective verification

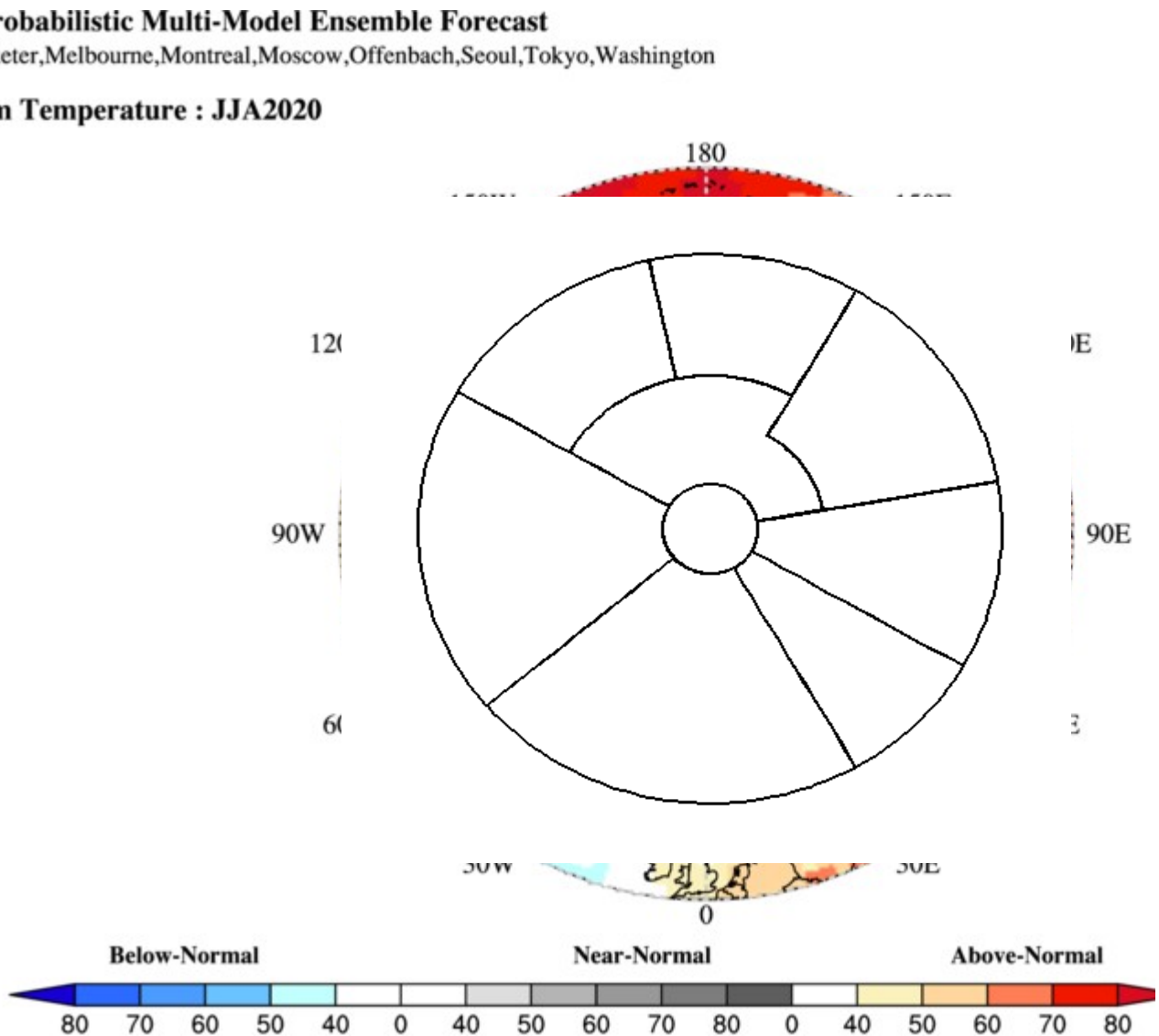
- **Temperature**: In the regions where forecast was decisive the subjective score was 50-60%. This is a good score considering that everything below or equal 33% is considered worse than a pure chance.

- **Precipitation**: In the regions where forecast was decisive, the subjective score is ~70%. Very good precipitation forecast for FMA2020!!!
- Precipitation forecasts are usually not this skilful over the Arctic, the chance was on our side this time!!

Actual (real time)seasonal forecasts over the Arctic JJA-2020

- temperature
- precipitation

Temperature outlook over the Arctic: Jun-July-August 2020

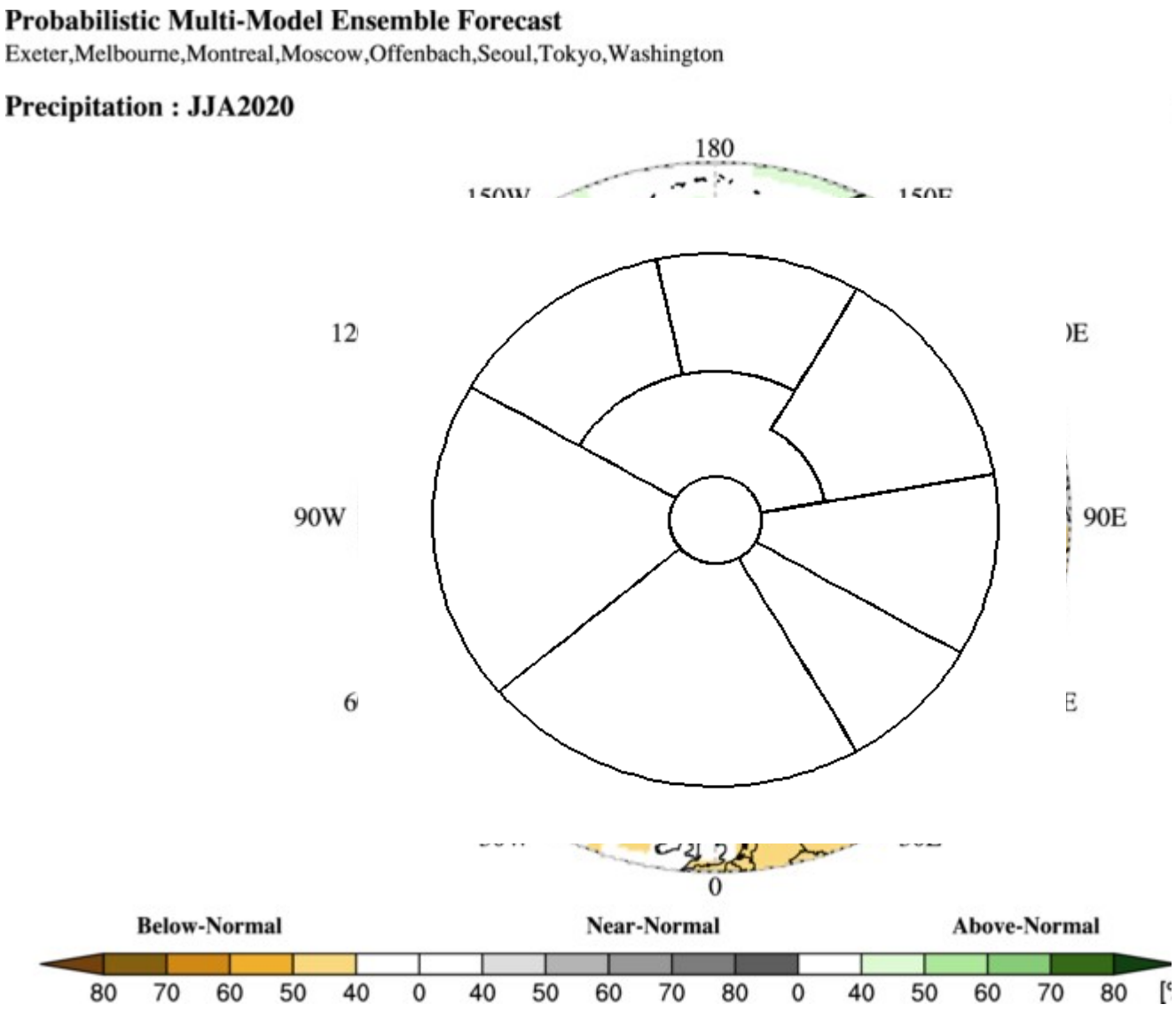


1. Alaska W. Canada
2. Eastern Canadian Arctic
3. N. Atlantic region
4. European region
5. West Siberia
6. East Siberia
7. Chukchi

- The redder the color does not mean it is warmer.

- It means we have more confidence in the above normal forecast over that region.

Precipitation outlook over the Arctic: Jun-July-August 2020



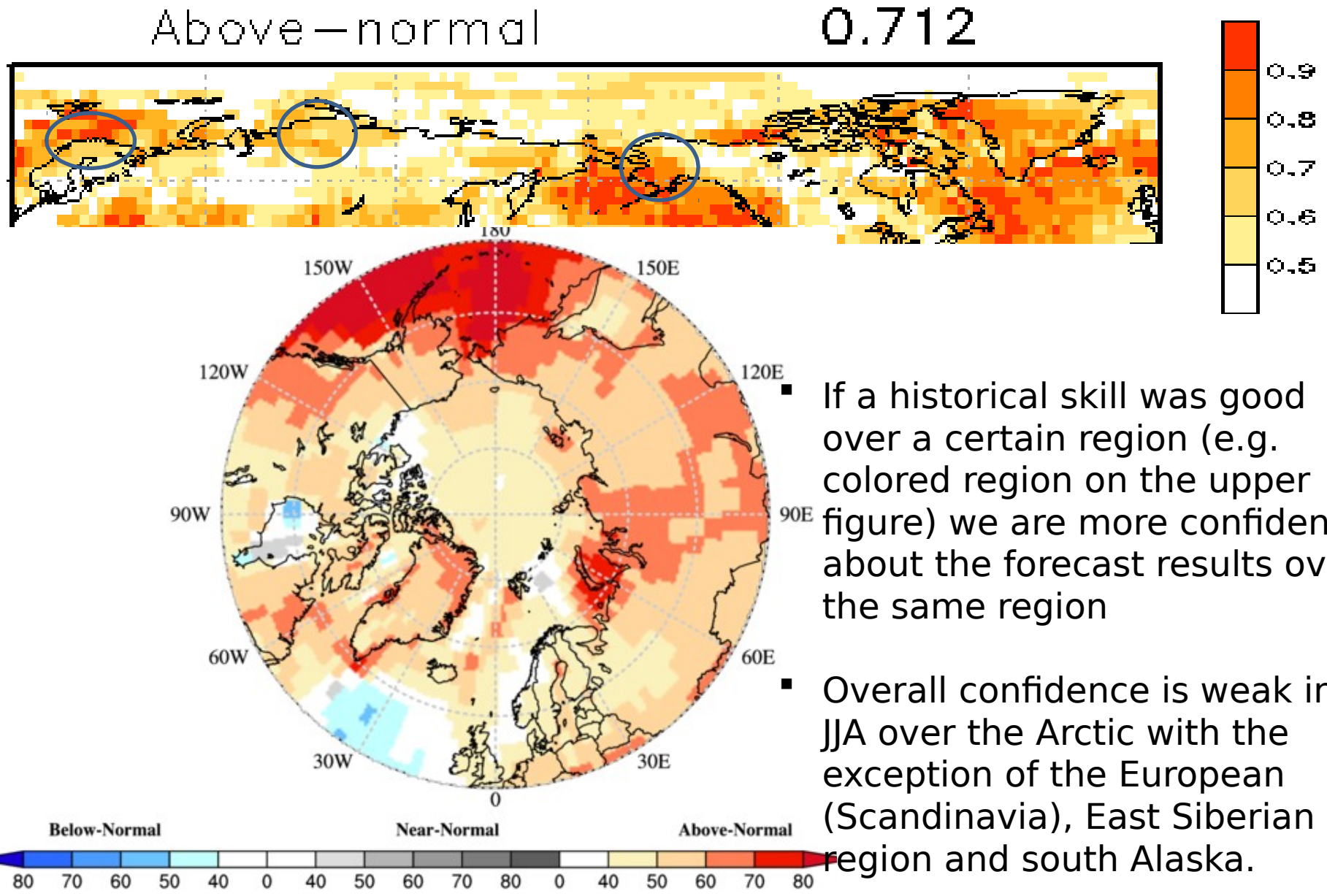
1. Alaska W. Canada
2. Eastern Canadian Arctic
3. N. Atlantic region
4. European region
5. West Siberia
6. East Siberia
7. Chukchi

- The greener the color does not mean it will precipitate more.

- It means we have more confidence in the above normal precipitation forecast over that

scussing historical skill over the Arctic, Temperature

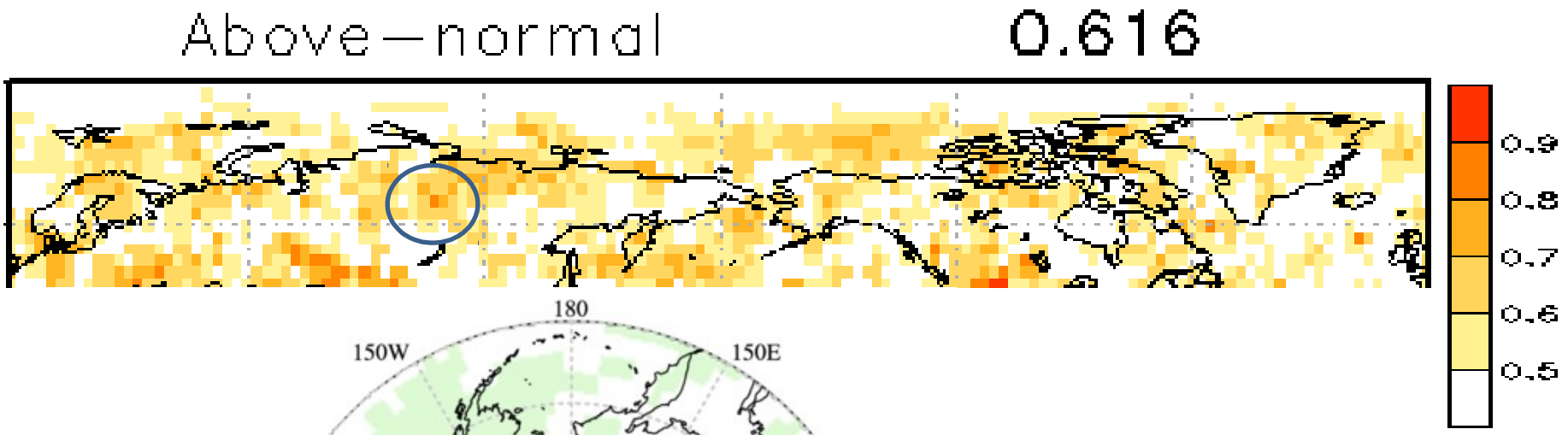
(confidence with respect to the historical skill)

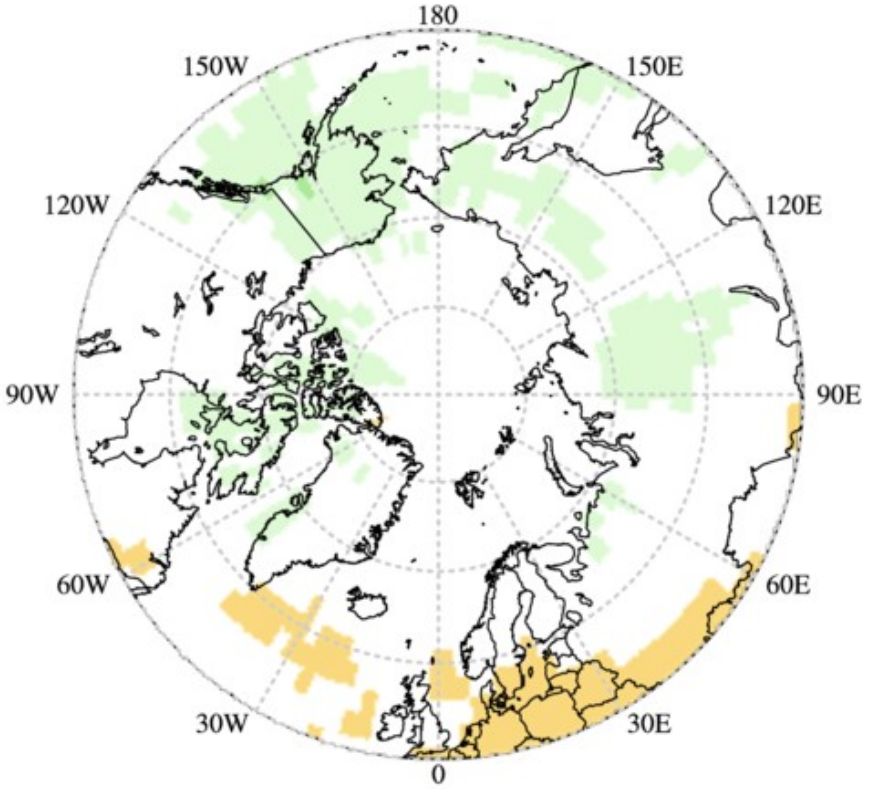


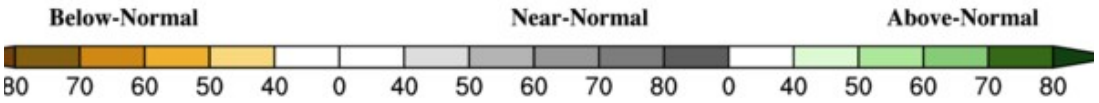
- If a historical skill was good over a certain region (e.g. colored region on the upper figure) we are more confident about the forecast results over the same region
- Overall confidence is weak in JJA over the Arctic with the exception of the European (Scandinavia), East Siberian region and south Alaska.

scussing historical skill over the Arctic, Precipitation

(confidence with respect to the historical skill)







- We don’t have a very high confidence in precipitation skill over the Arctic in JJA.

Conclusions

- We use Multi Model Ensemble (MME) approach to calculate seasonal forecast.
- We use probabilistic approach to communicate seasonal forecast results.
- For evaluation over the Arctic we use a combination of observations and model results called re-analysis.
- FMA2020 MME temperature forecast over the Arctic region was 50-60% correct, which is generally good result and much higher than a pure chance (i.e. 33%).
- We expect above normal temperatures over all Arctic regions in JJA2020.
- We expect above normal precipitation over the Alaskan Arctic, Chukchi, East Siberian and west Siberian region. Other Arctic regions mostly have equal chances for precipitation except

Thank you!