

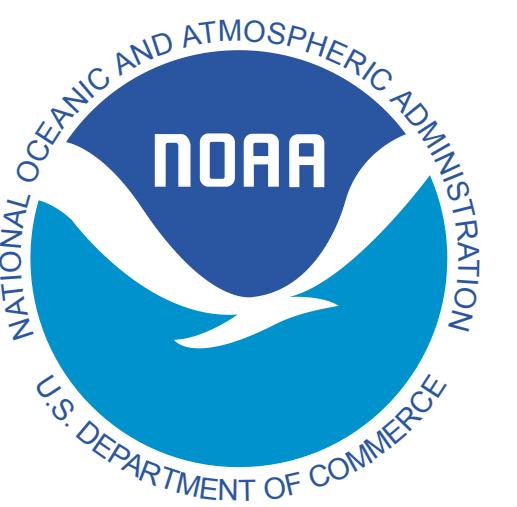
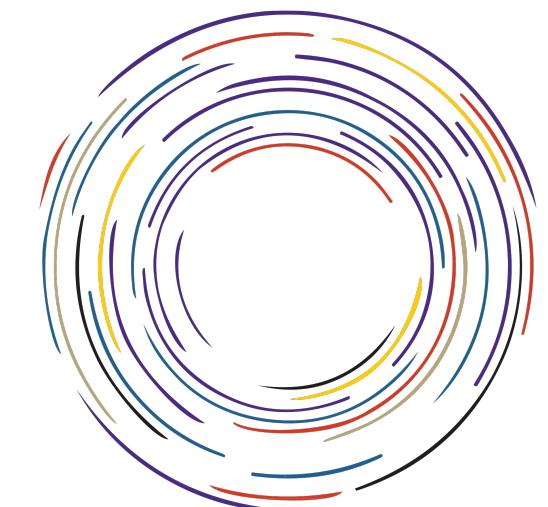
Can we forecast the Bering Sea cold pool?

Regional downscaling with NMME

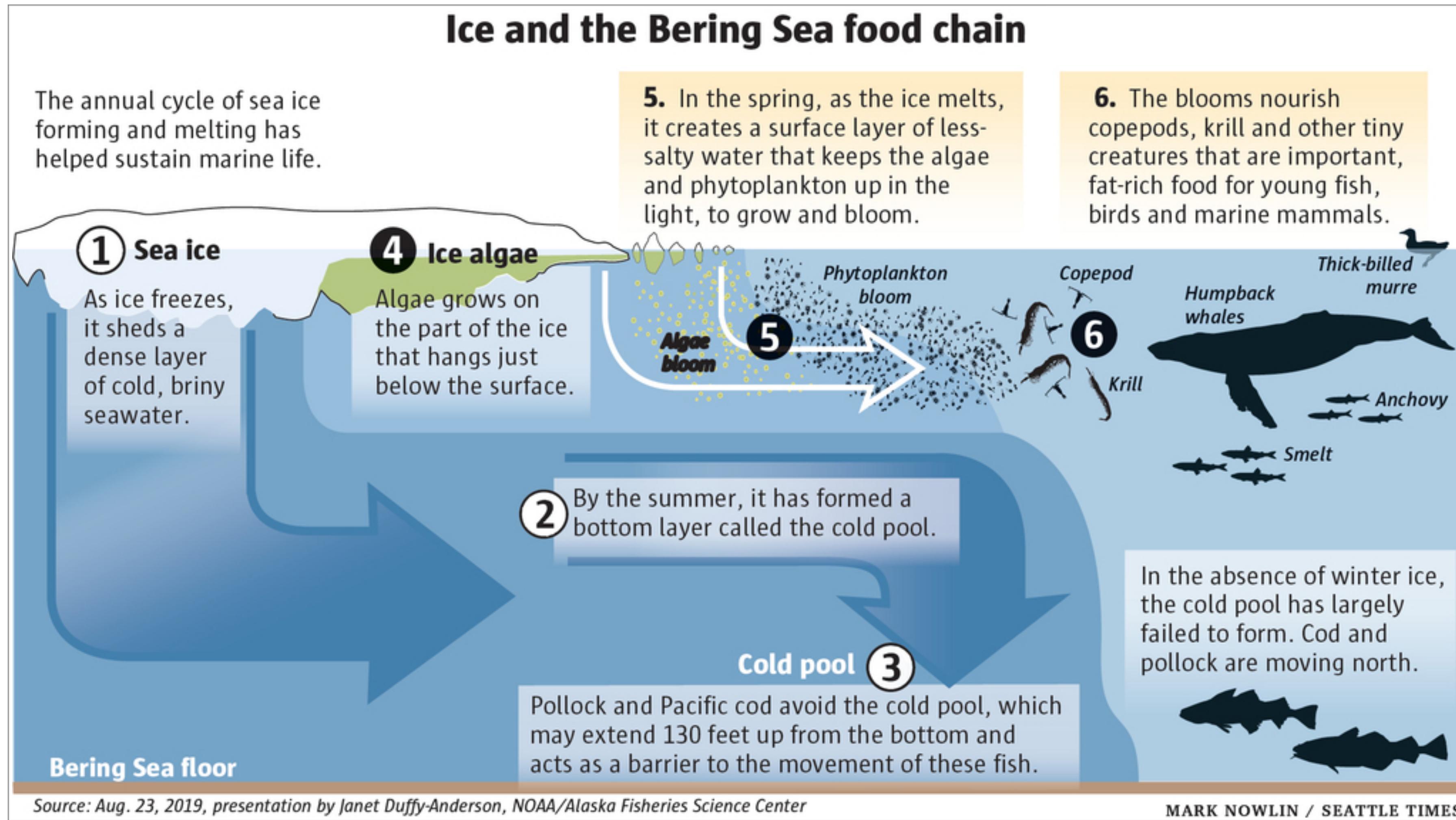
BERING SEASONS WORKSHOP, MARCH 9-11, 2021

***Kelly Kearney^{1,2}, Mike Alexander⁴, Kerim Aydin², Wei Cheng^{1,3}, Al Hermann^{1,3},
Gaelle Hervieux⁴, Ivonne Ortiz^{1,2}***

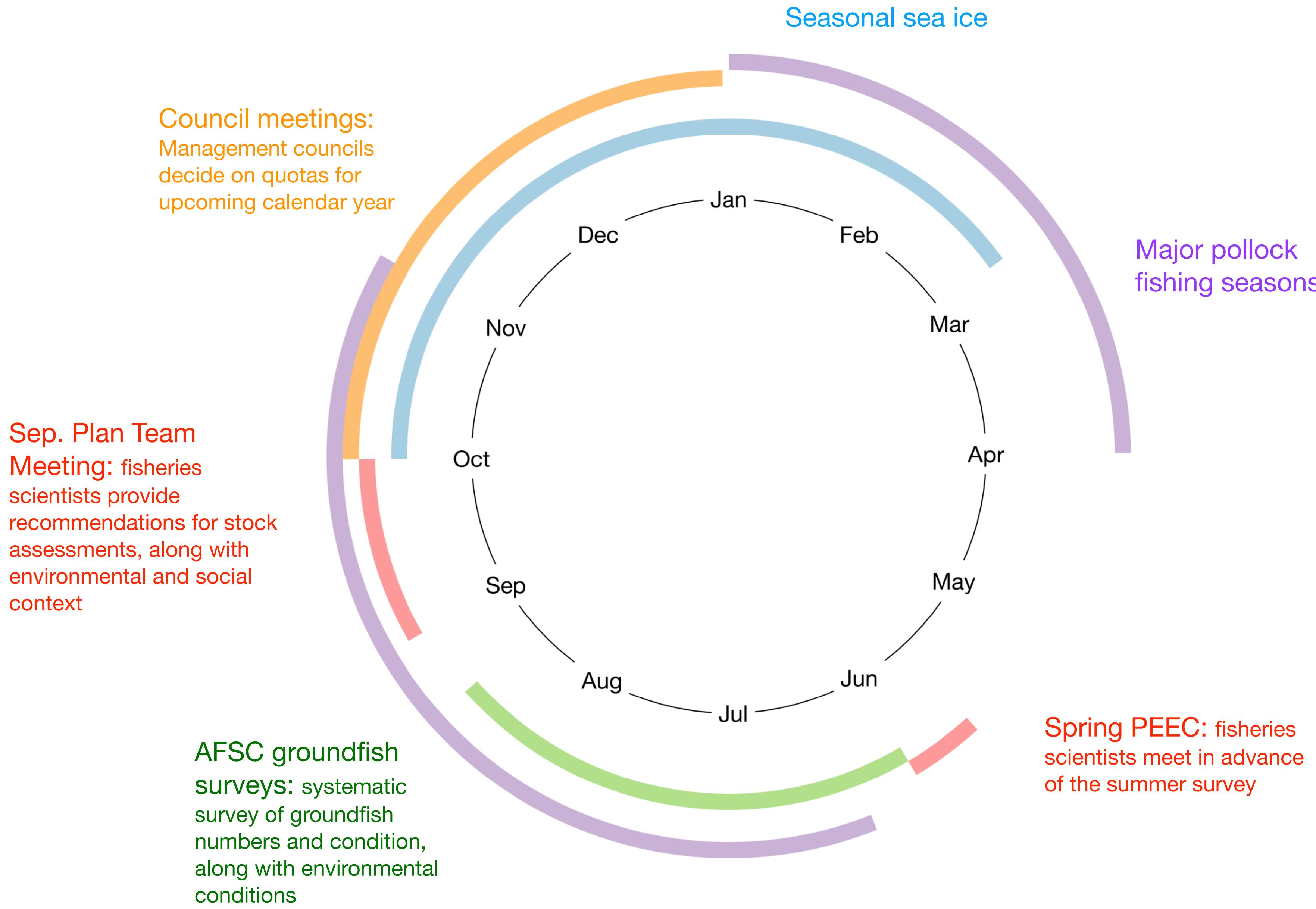
¹*University of Washington, CICOES / ²NOAA AFSC / ³NOAA PMEL / ⁴NOAA ESRL*



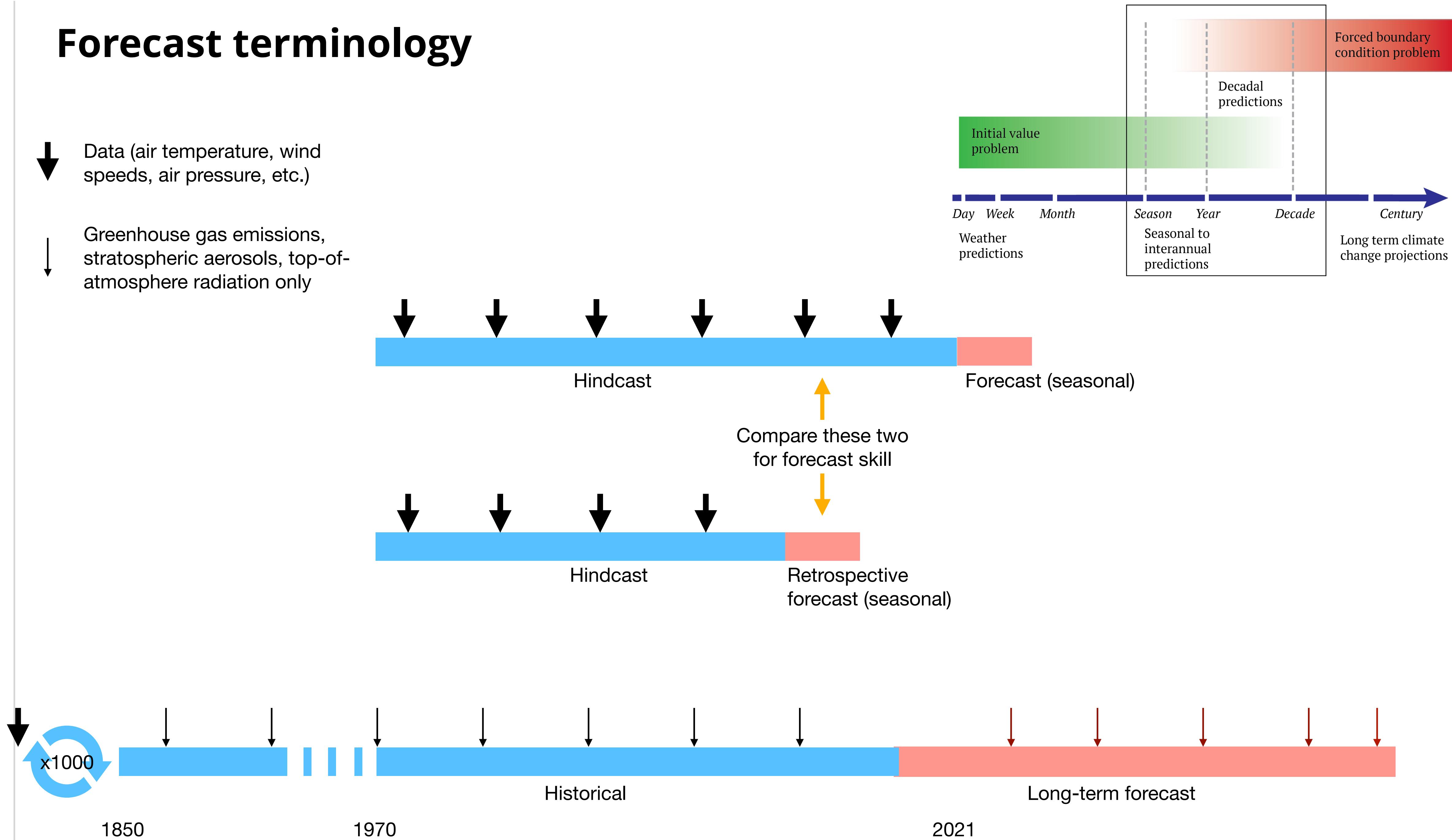
What is the Bering Sea cold pool, and why forecast it?



What is the Bering Sea cold pool, and why forecast it?

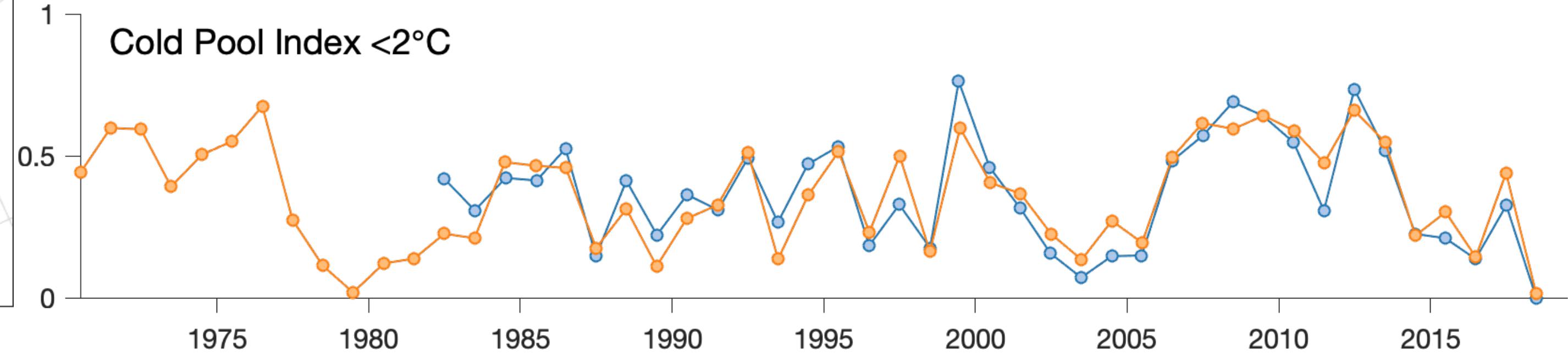
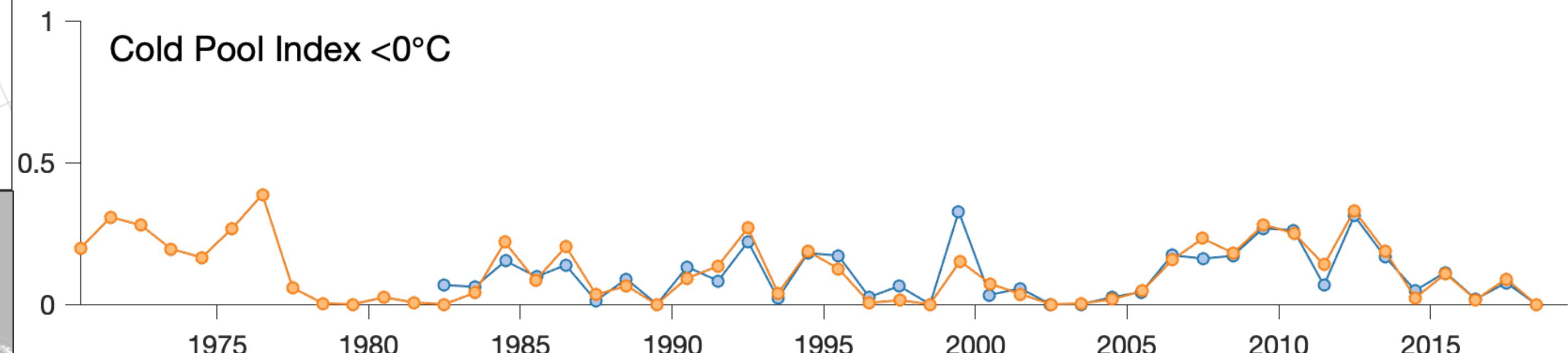
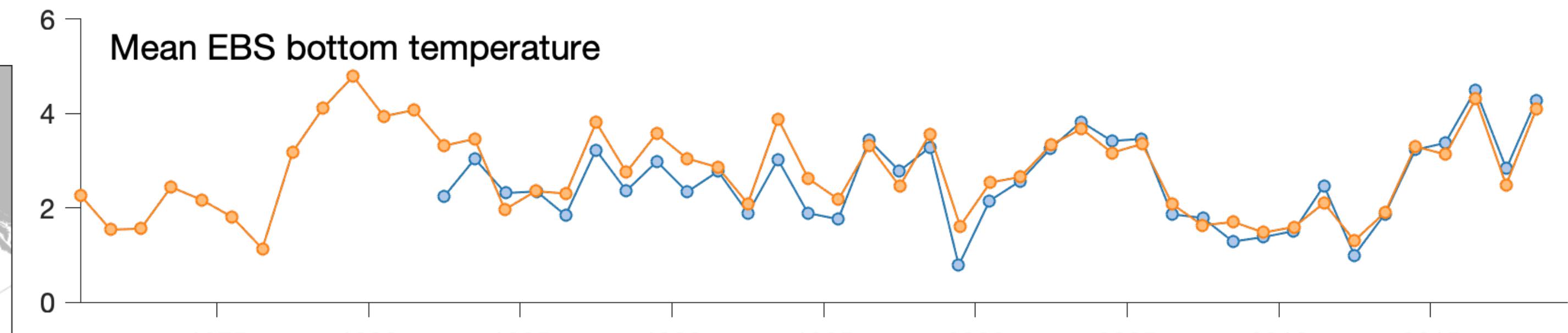
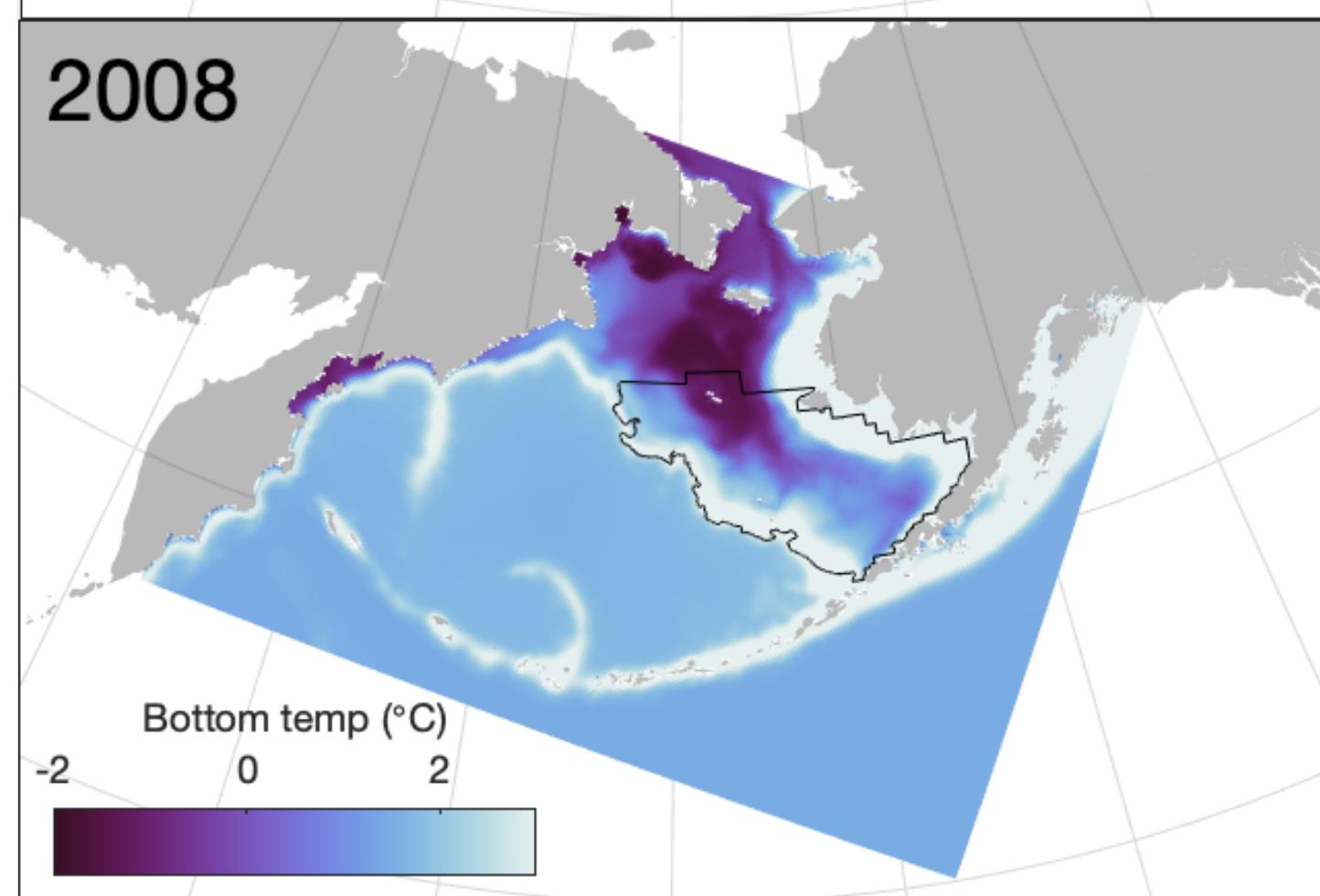
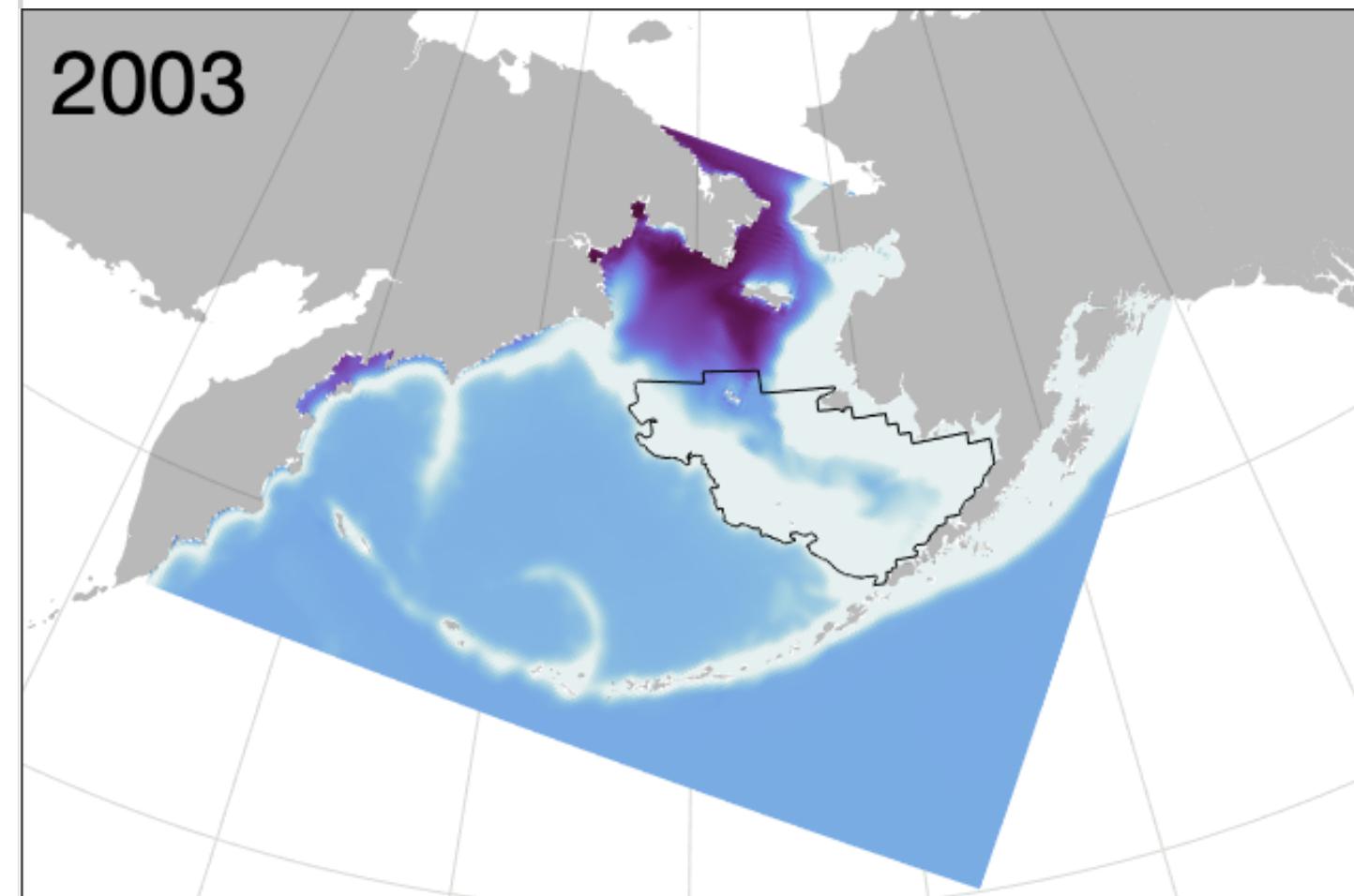


Forecast terminology



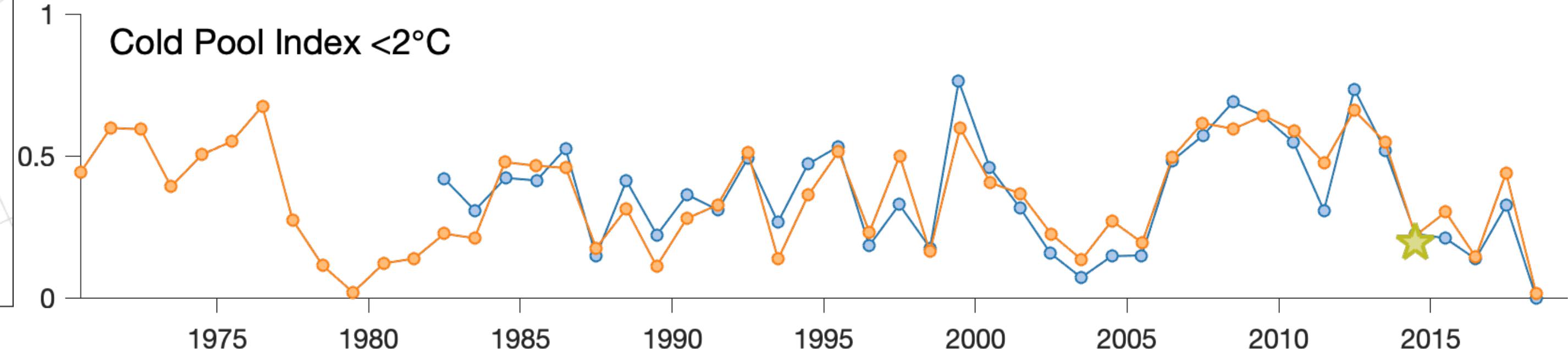
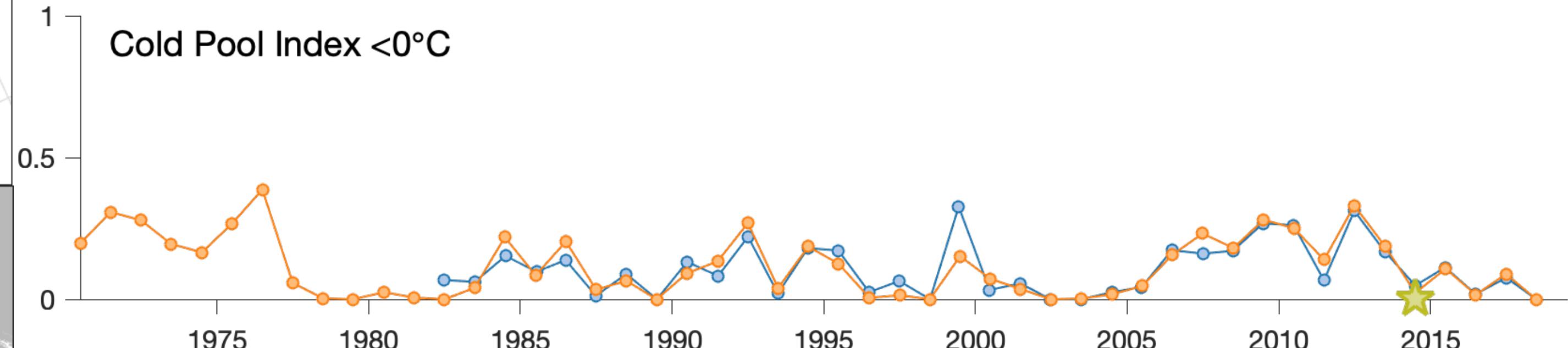
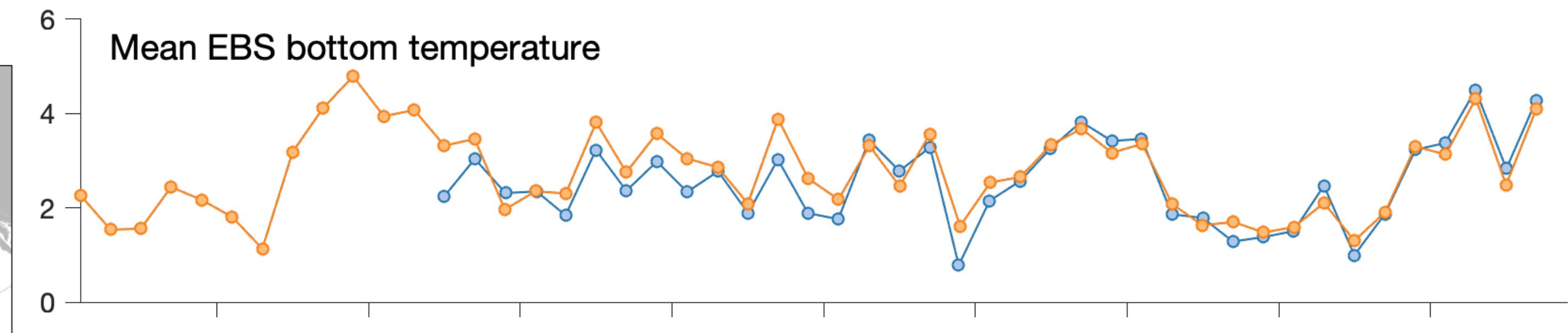
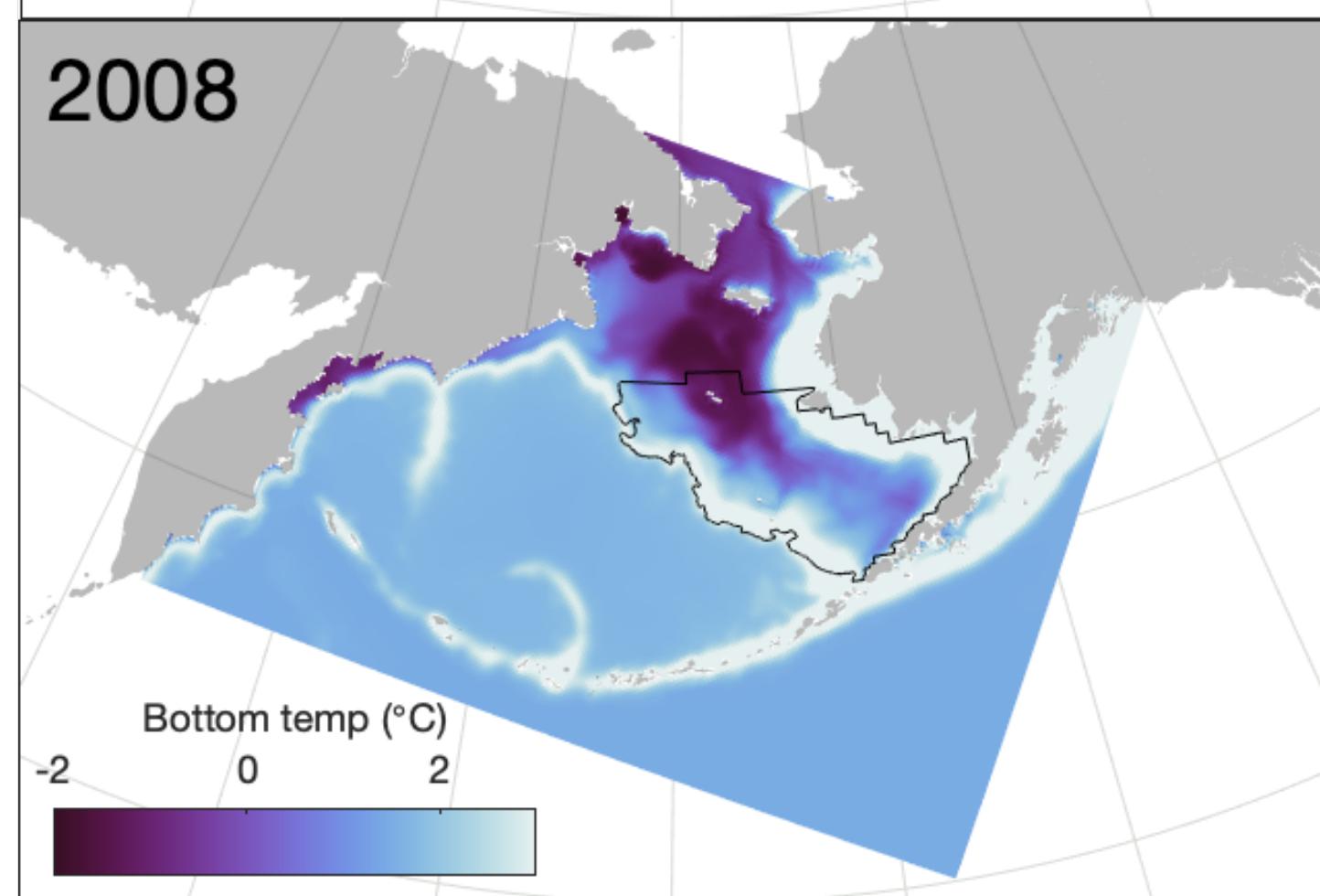
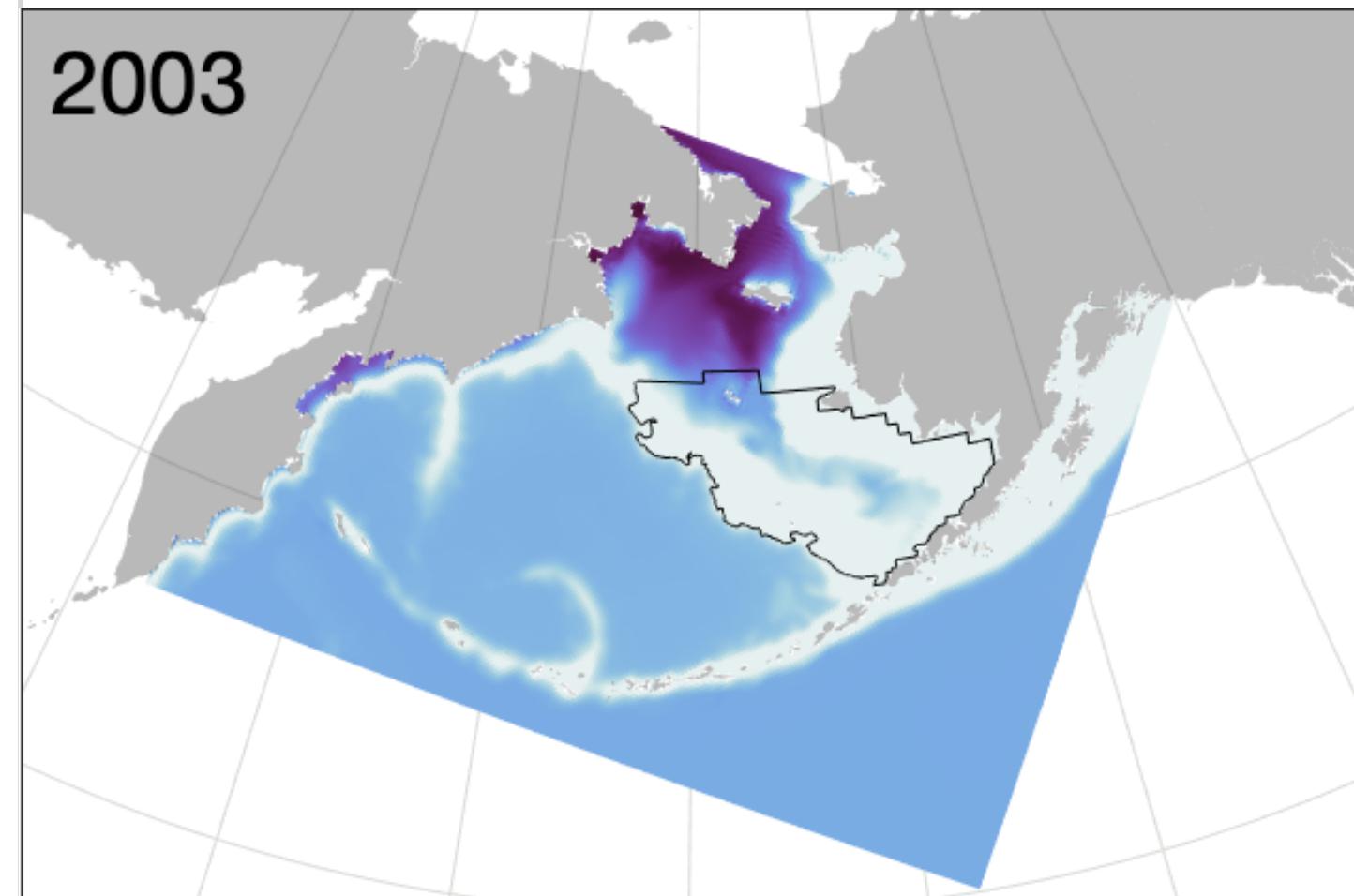
Simulating the cold pool with ROMS Bering10K

Groundfish survey
Bering10K model



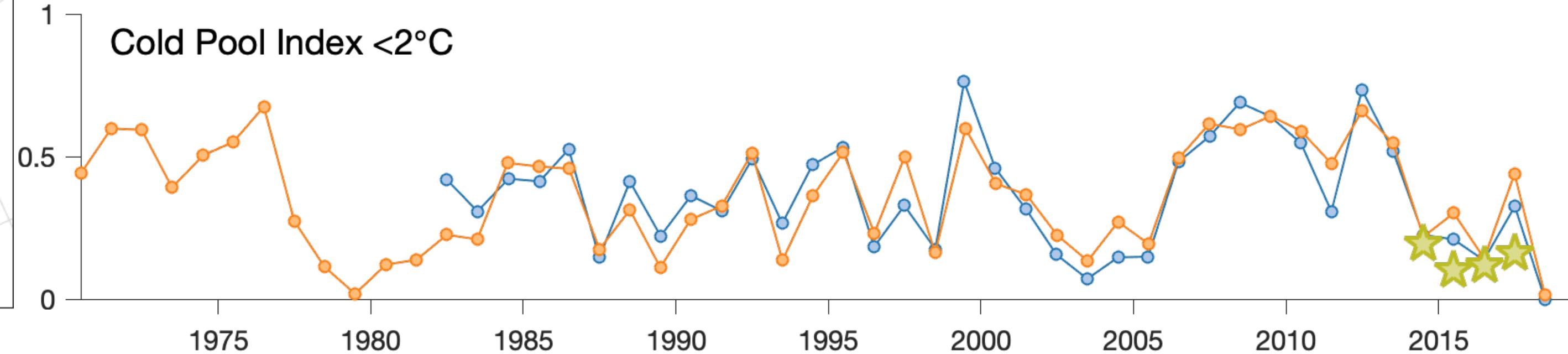
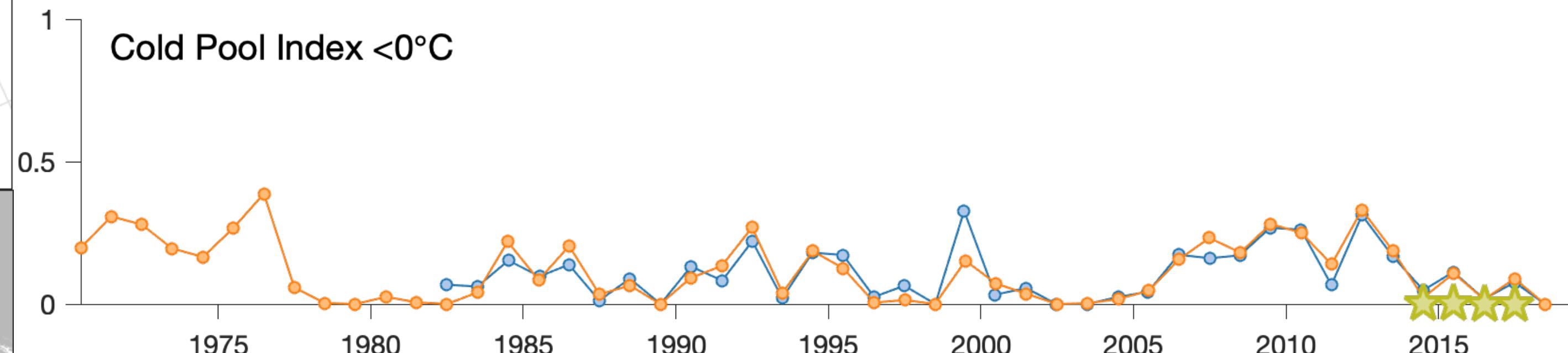
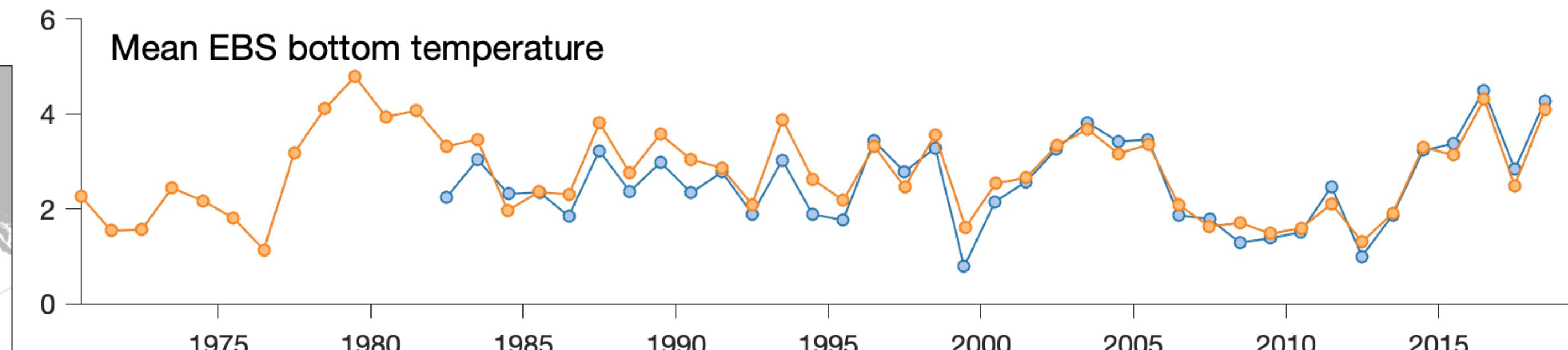
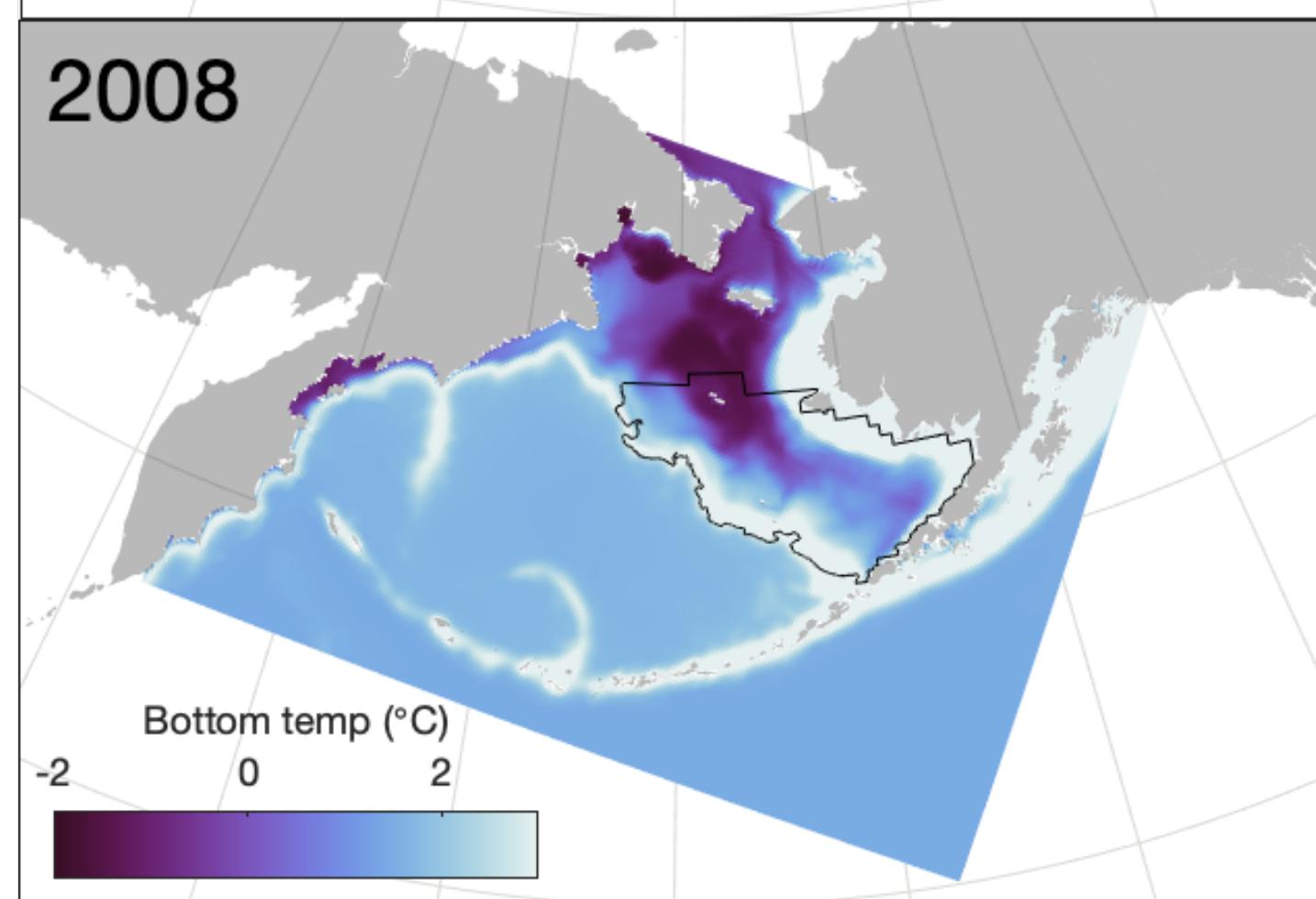
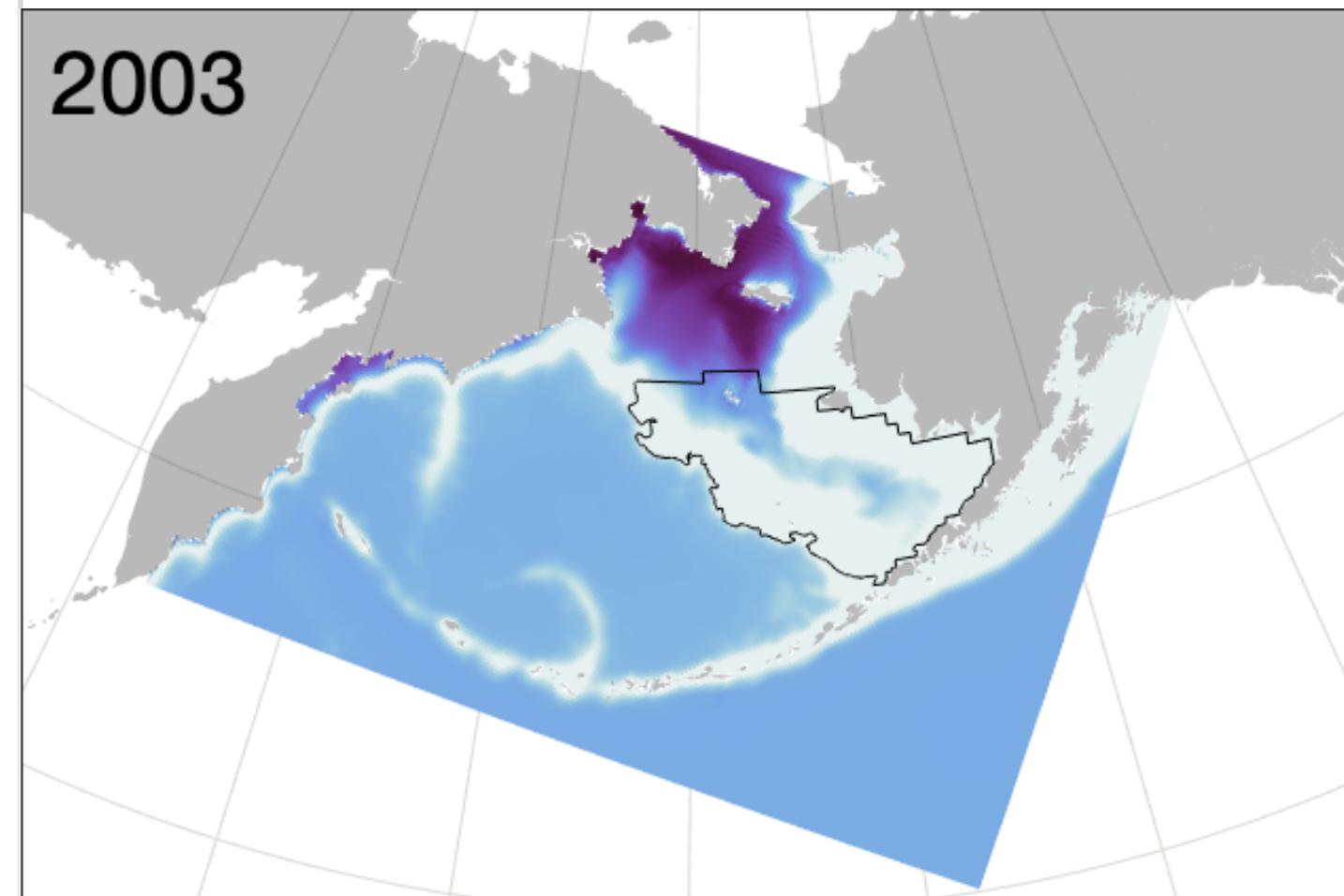
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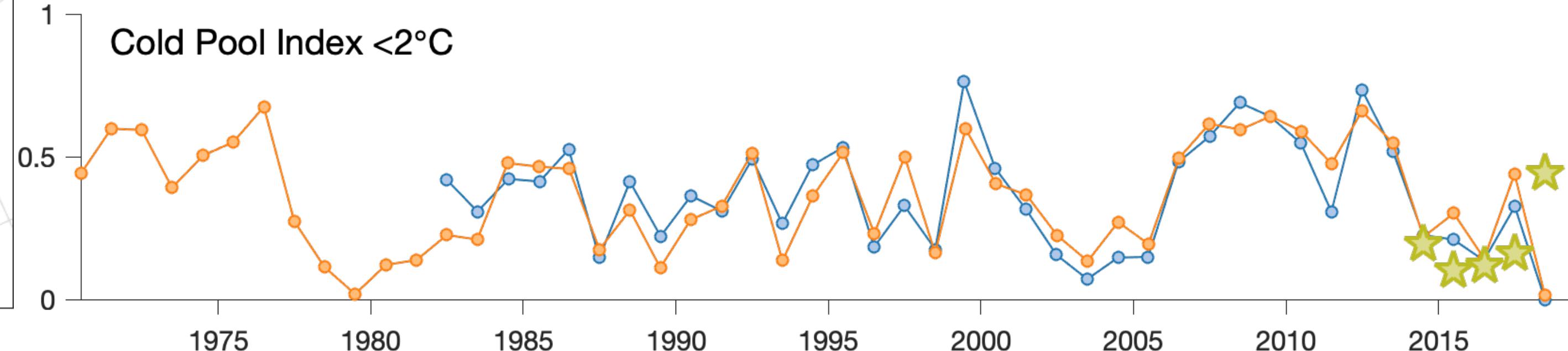
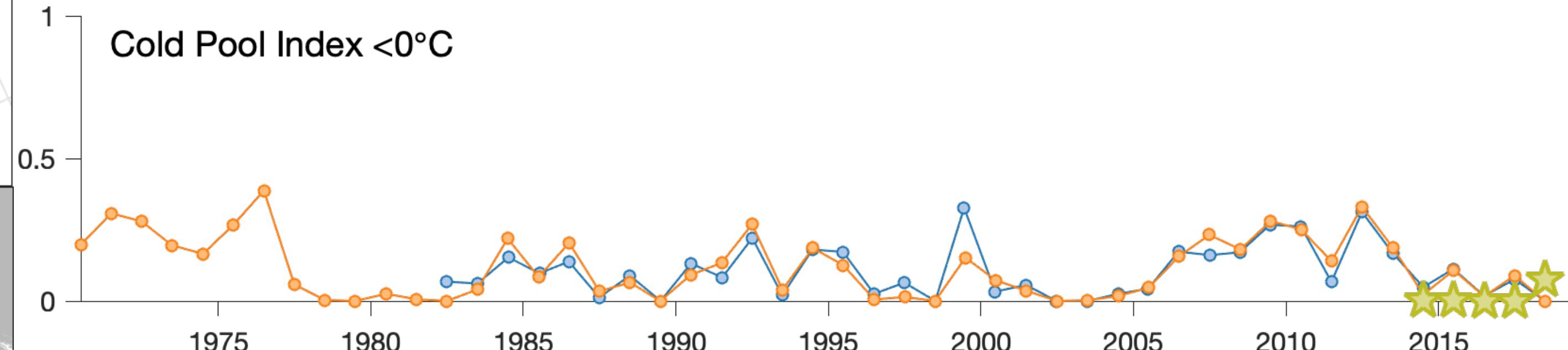
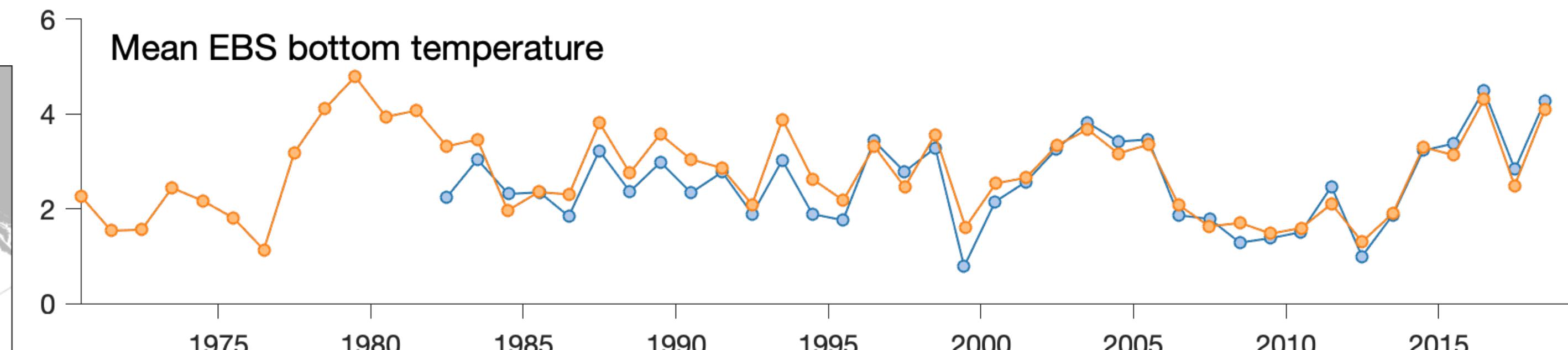
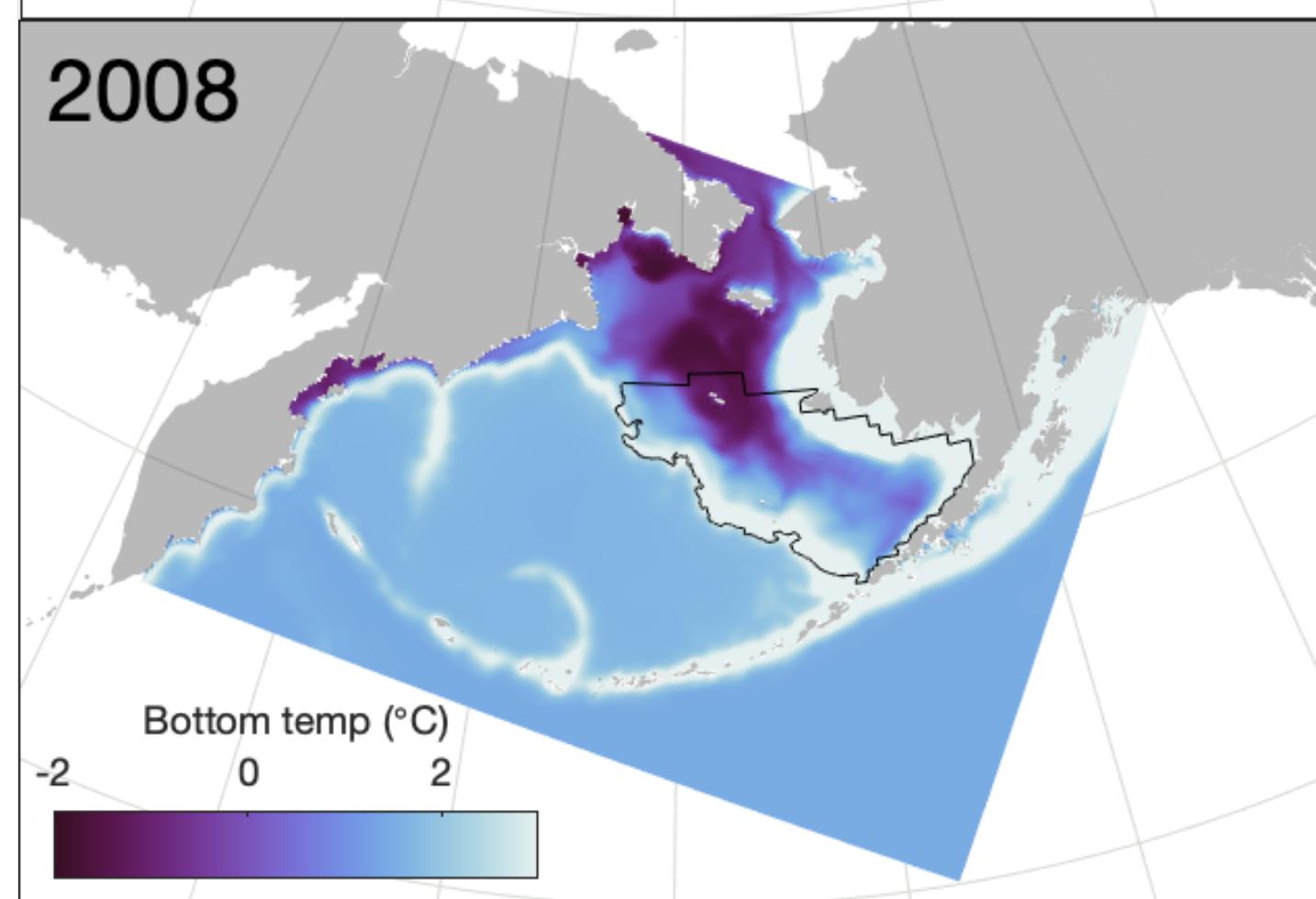
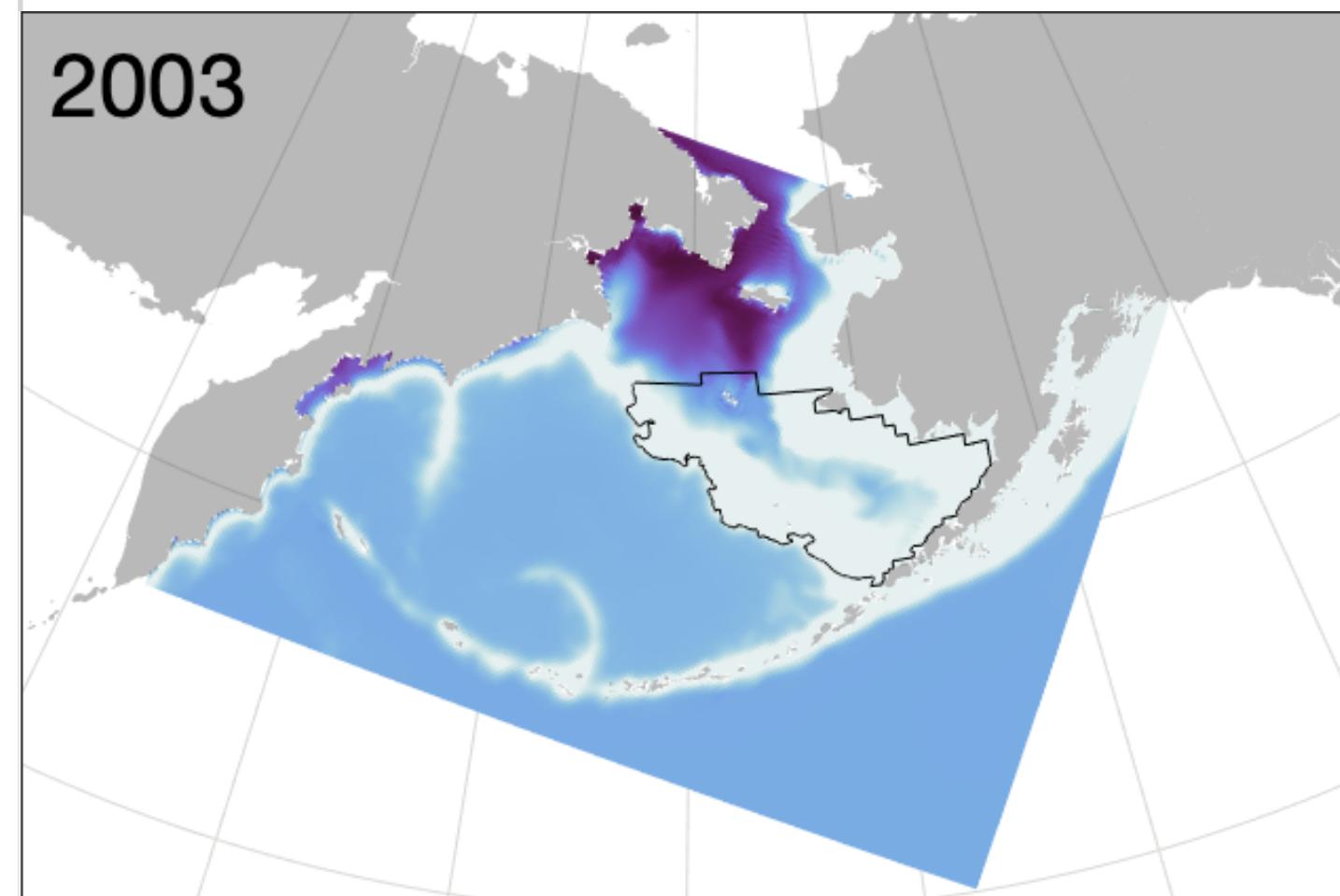
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The Plan

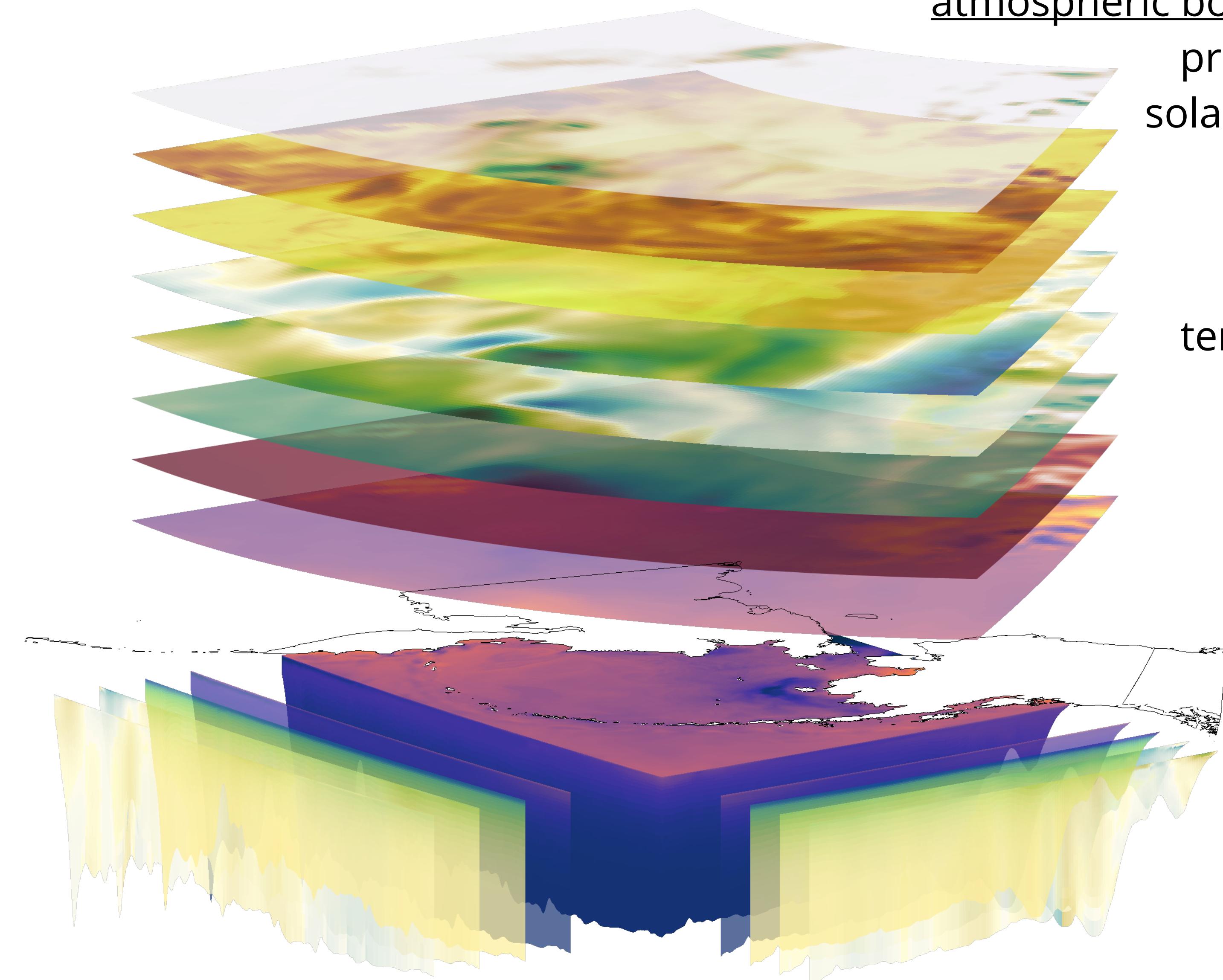
Downscale the 9-month seasonal re-forecasts from the North American Multi-model Ensemble (NMME) and quantify the skill of our regional model in capturing interannual variability of the cold pool.

1981-2010

2 initialization
dates per year
Oct. and Apr.

3 ensemble
members per
initialization

A slight problem with the plan...



The new plan

Downscale the 9-month seasonal re-forecasts from CFSv2 and CanCM4 and quantify the skill of our regional model in capturing interannual variability of the cold pool.

1981-2010

12 initialization
dates per year

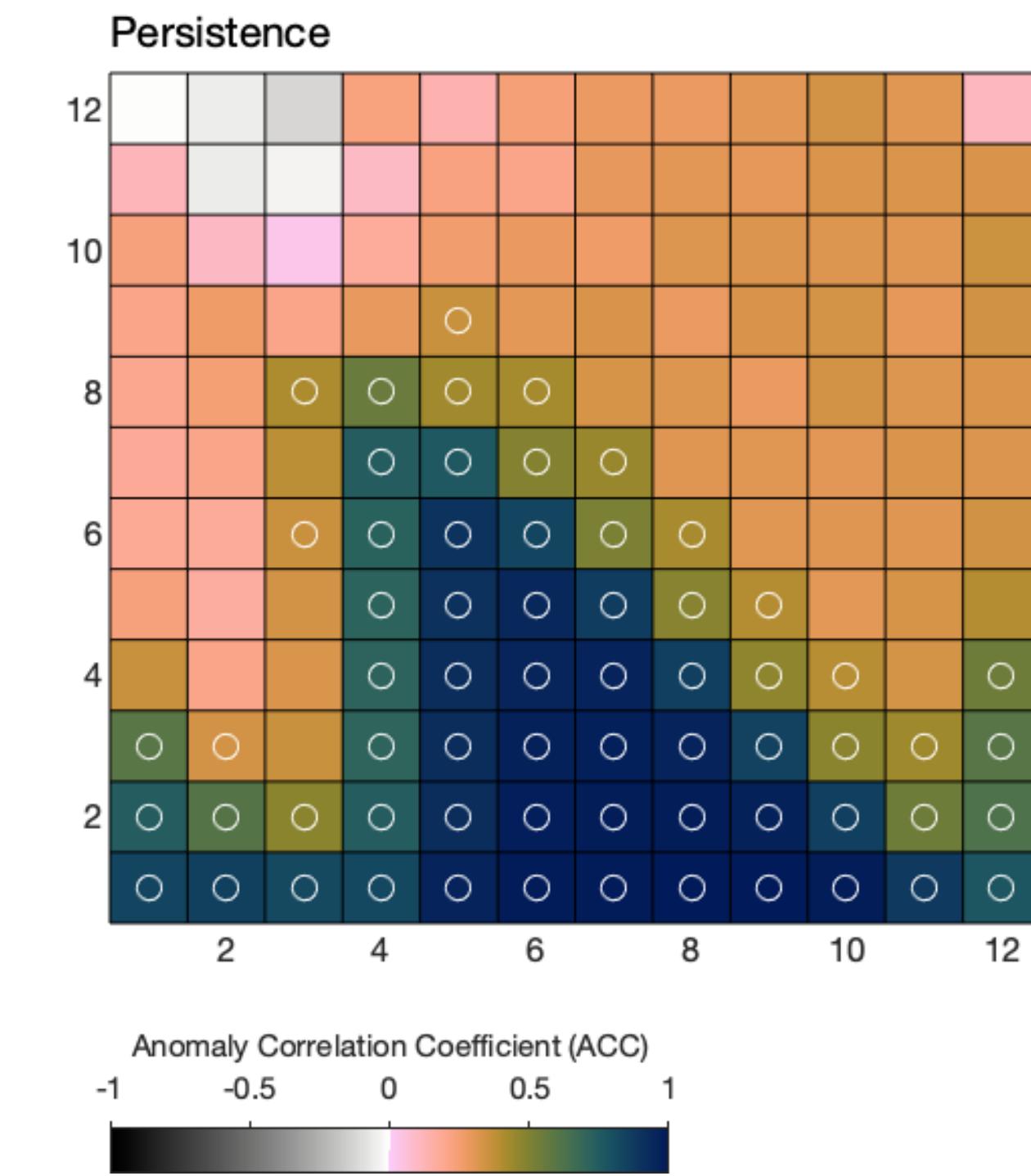
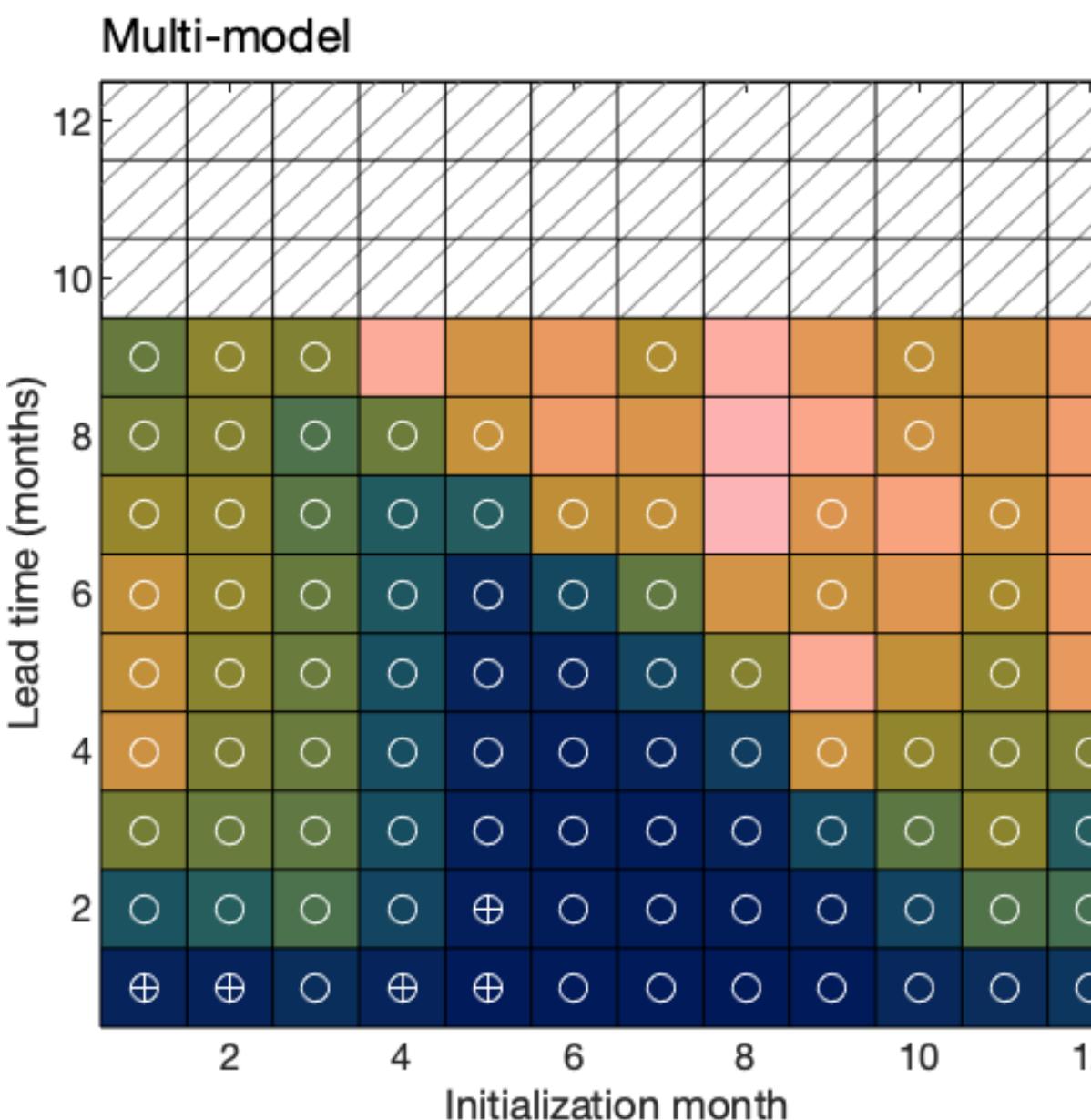
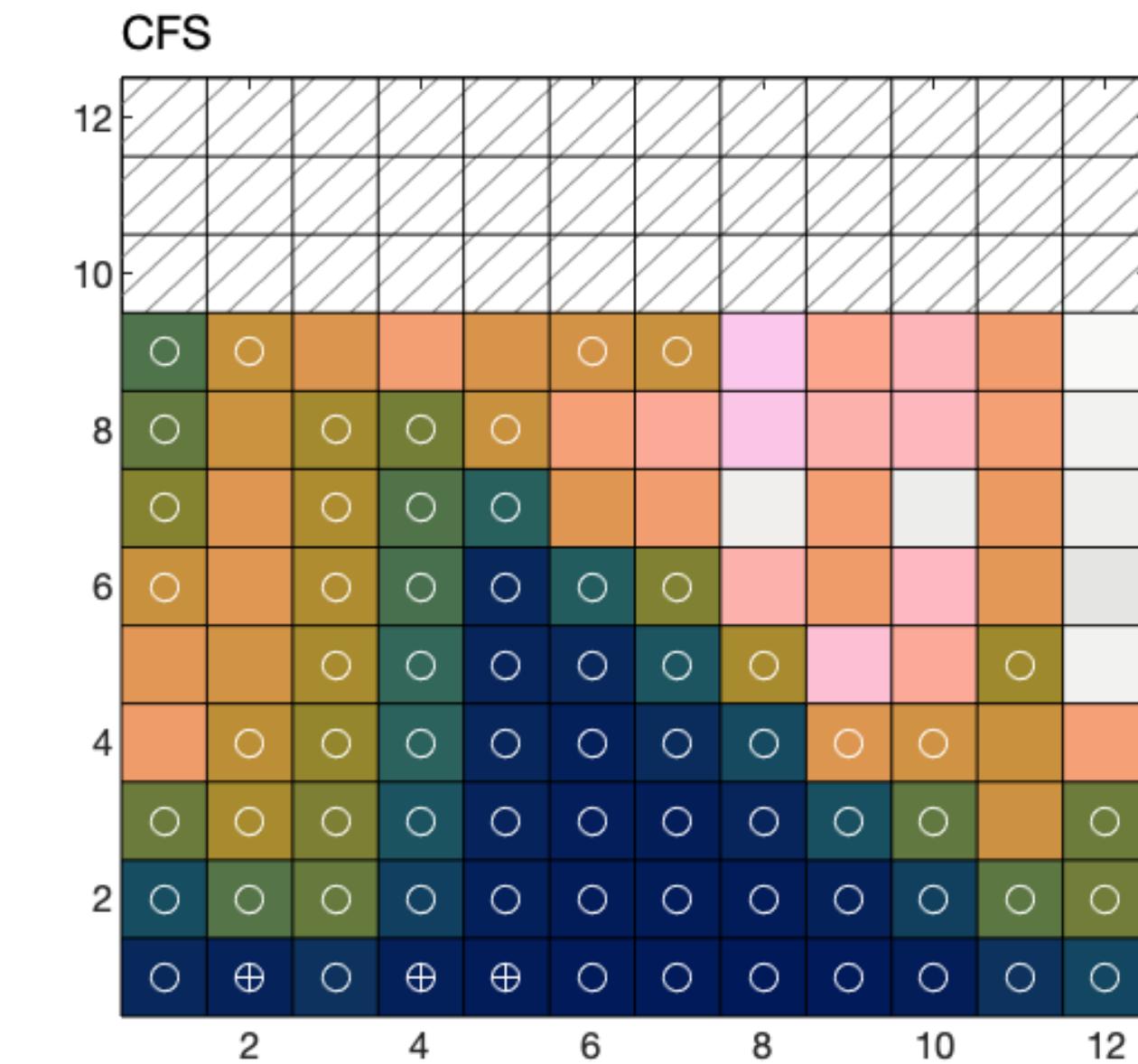
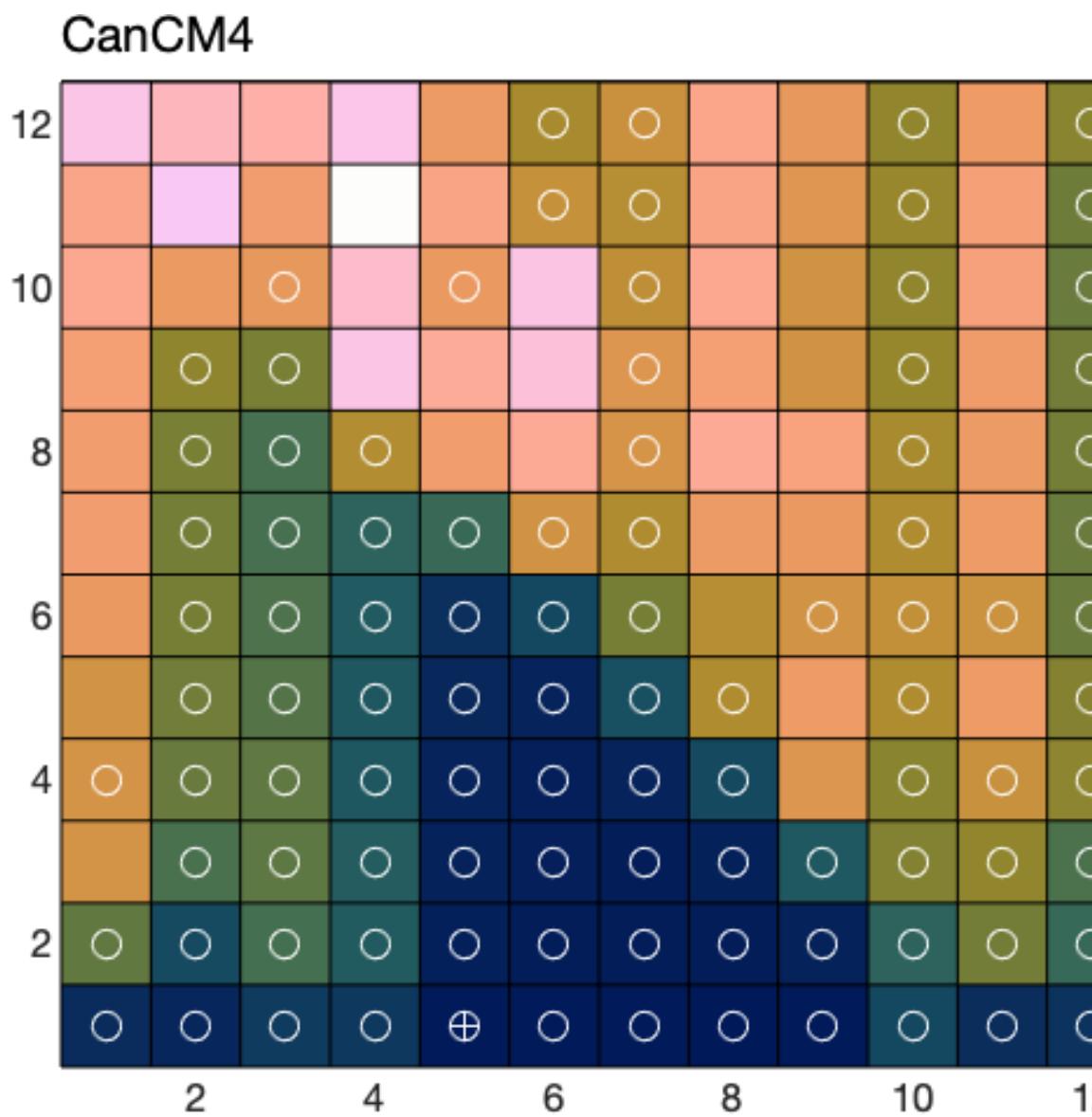
3 ensemble
members per
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How well do we forecast the cold pool?

Forecasts initialized before or during the ice season have low skill

Forecasts initialized after ice retreat do very well...

... but not significantly better than a simple persistence forecast



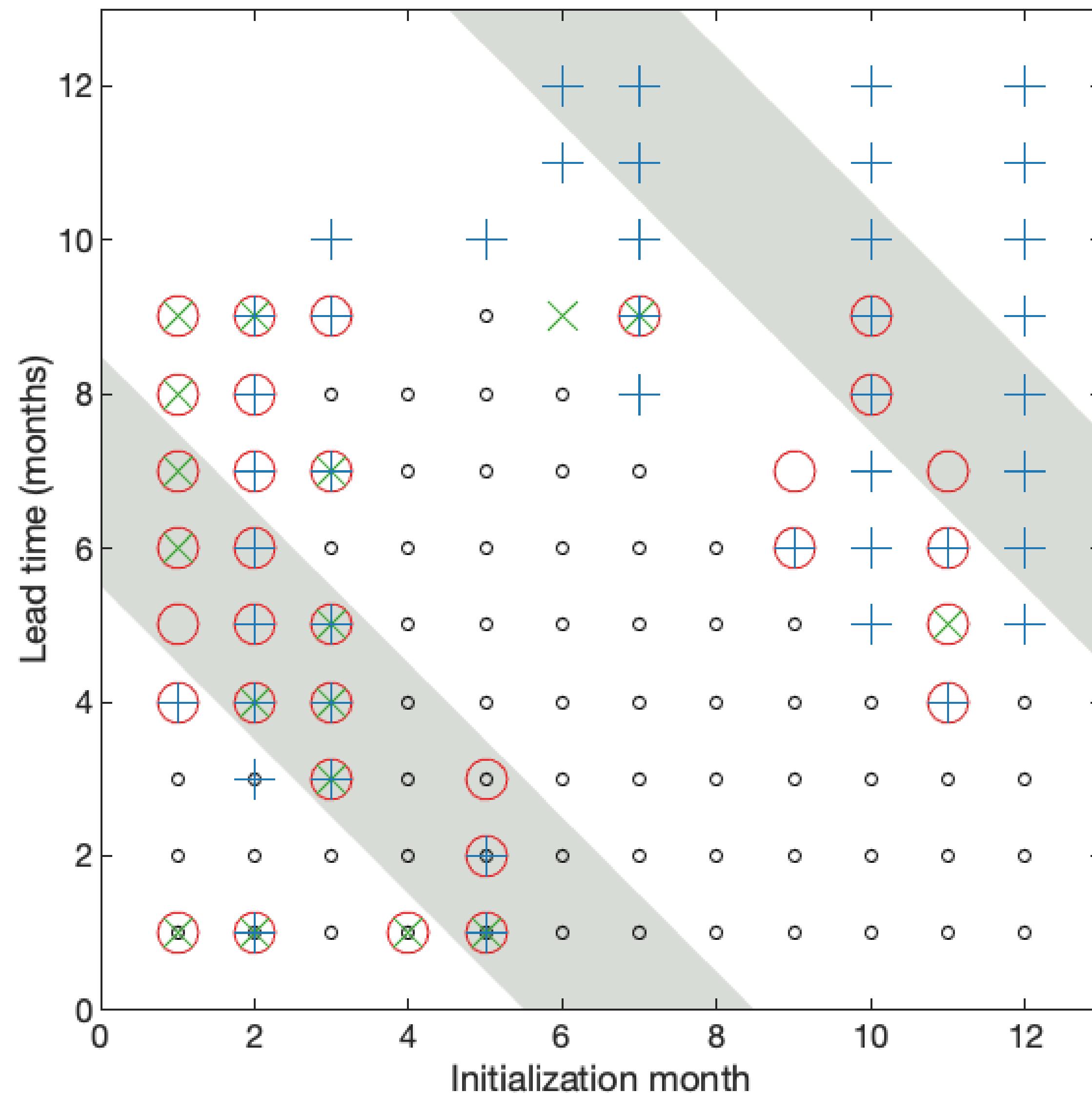
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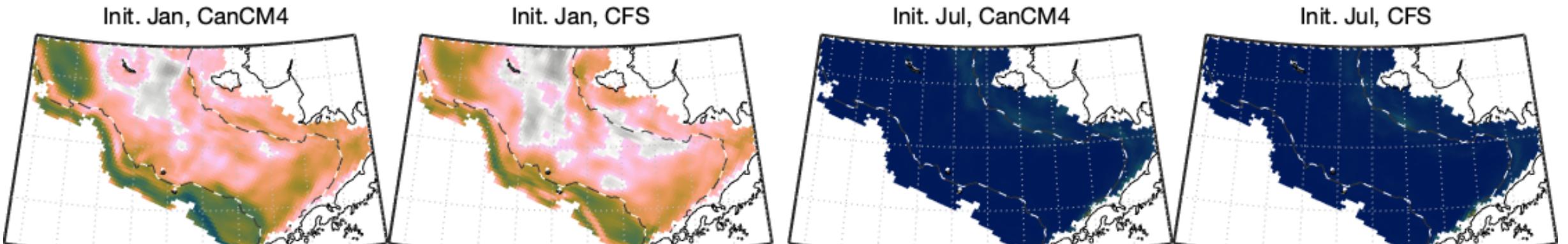
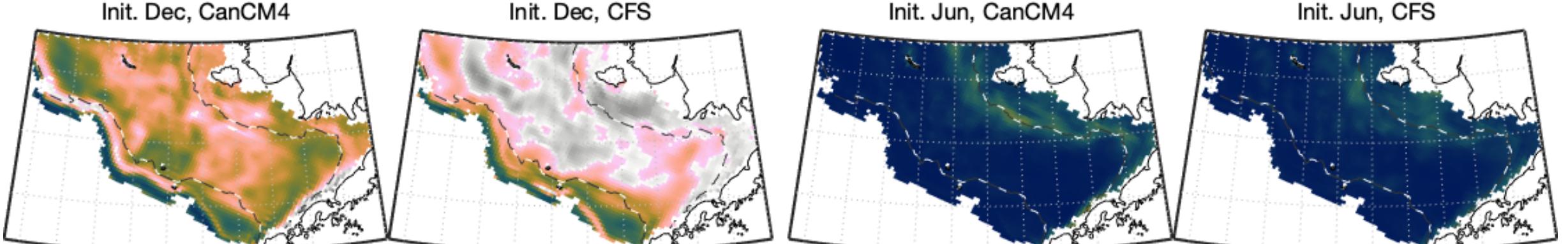
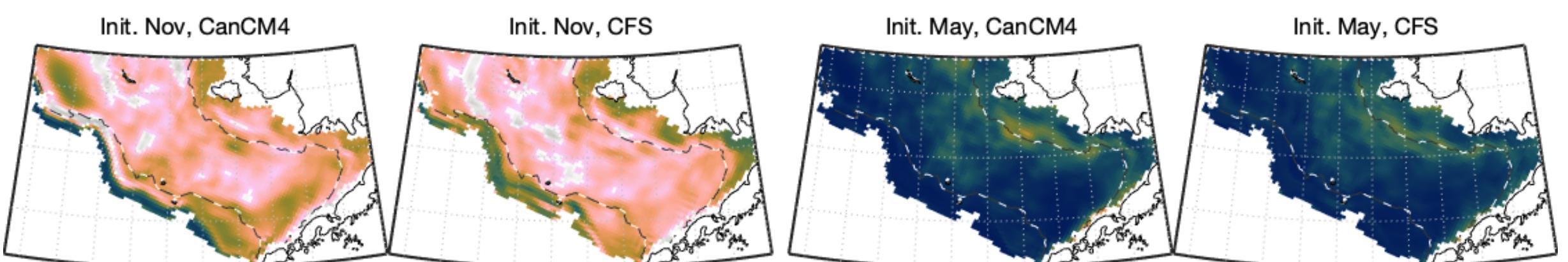
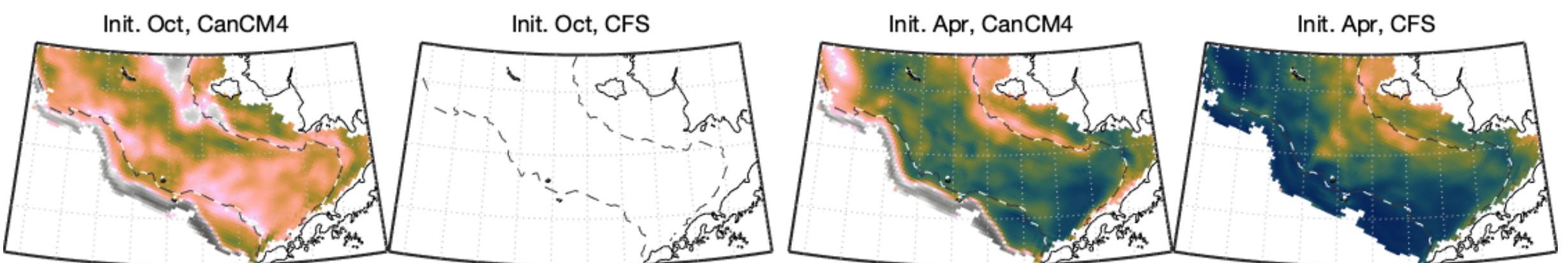
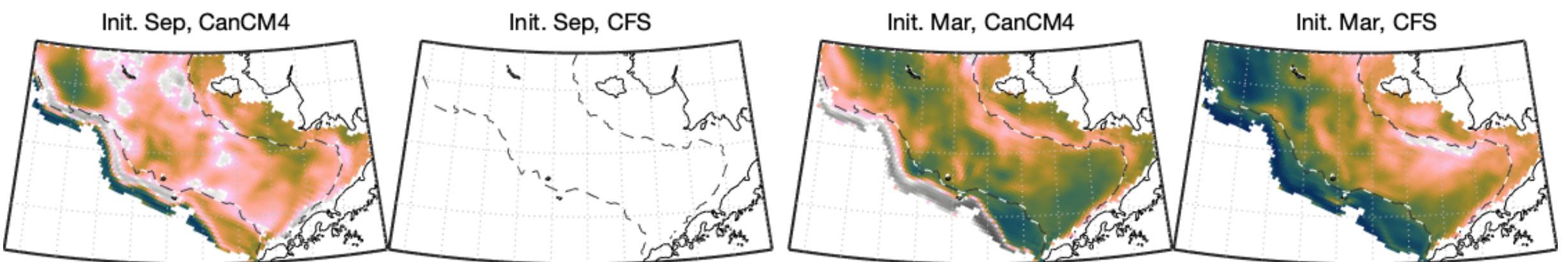
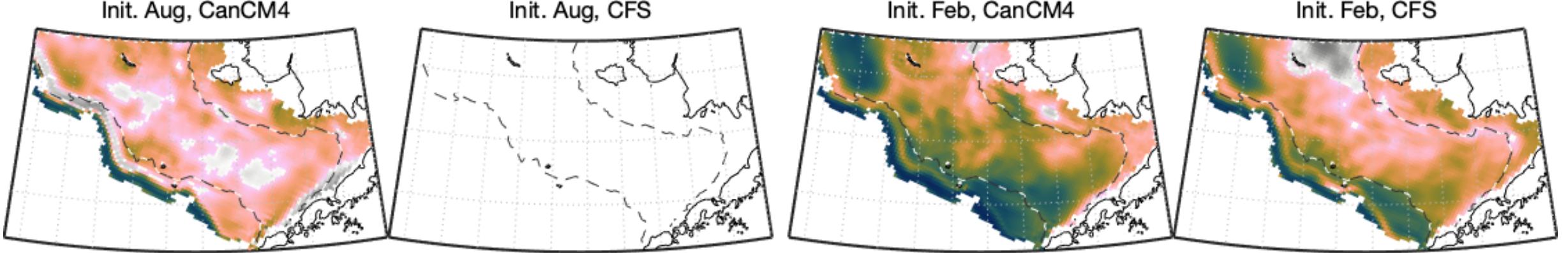
Forecasts initialized after ice retreat do very well...

... but not significantly better than a simple persistence forecast

- persistence better than climatology
- multi-model mean better than persistence
- + CanCM4 better than persistence
- X CFS better than persistence



How well do we forecast the cold pool?



Conclusions

01

Only a small subset of the current suite of NMME models archive variables necessary for dynamic downscaling... but the next generation looks promising!

02

Seasonal dynamic forecasting can predict summer bottom temperatures 3-4 months in advance, but lack of ice/wind predictability limits longer forecast skill.

03

Persistence forecasts show nearly equivalent skill in predicting summer bottom temperatures over the 3-4 month range.

2020 pilot operational framework

