



Sea ice reanalyses

5 June 2025



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How to monitor the Ocean?



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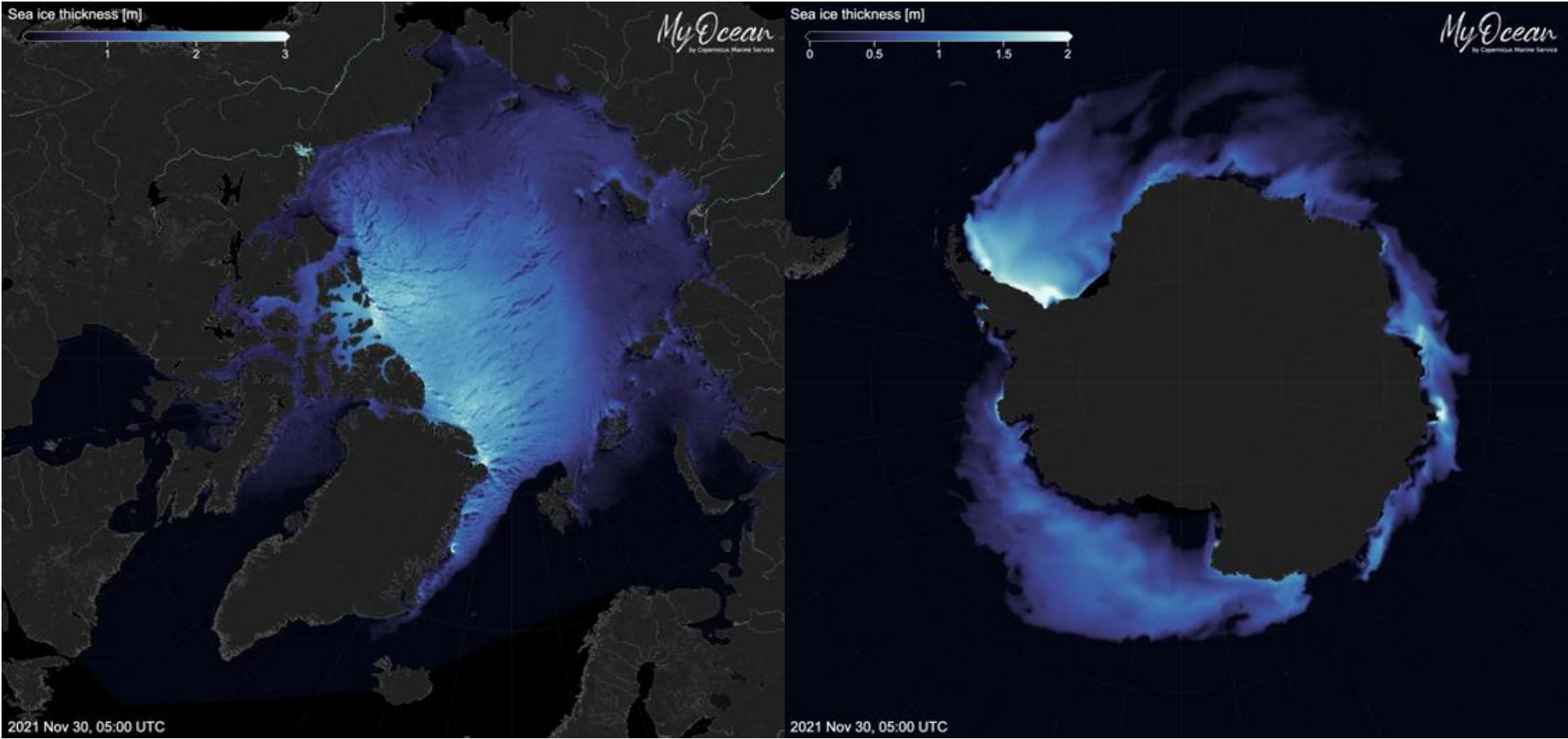


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The Nansen Center, Bergen, Norway



Context



<https://data.marine.copernicus.eu/-/38xnd12c6k>



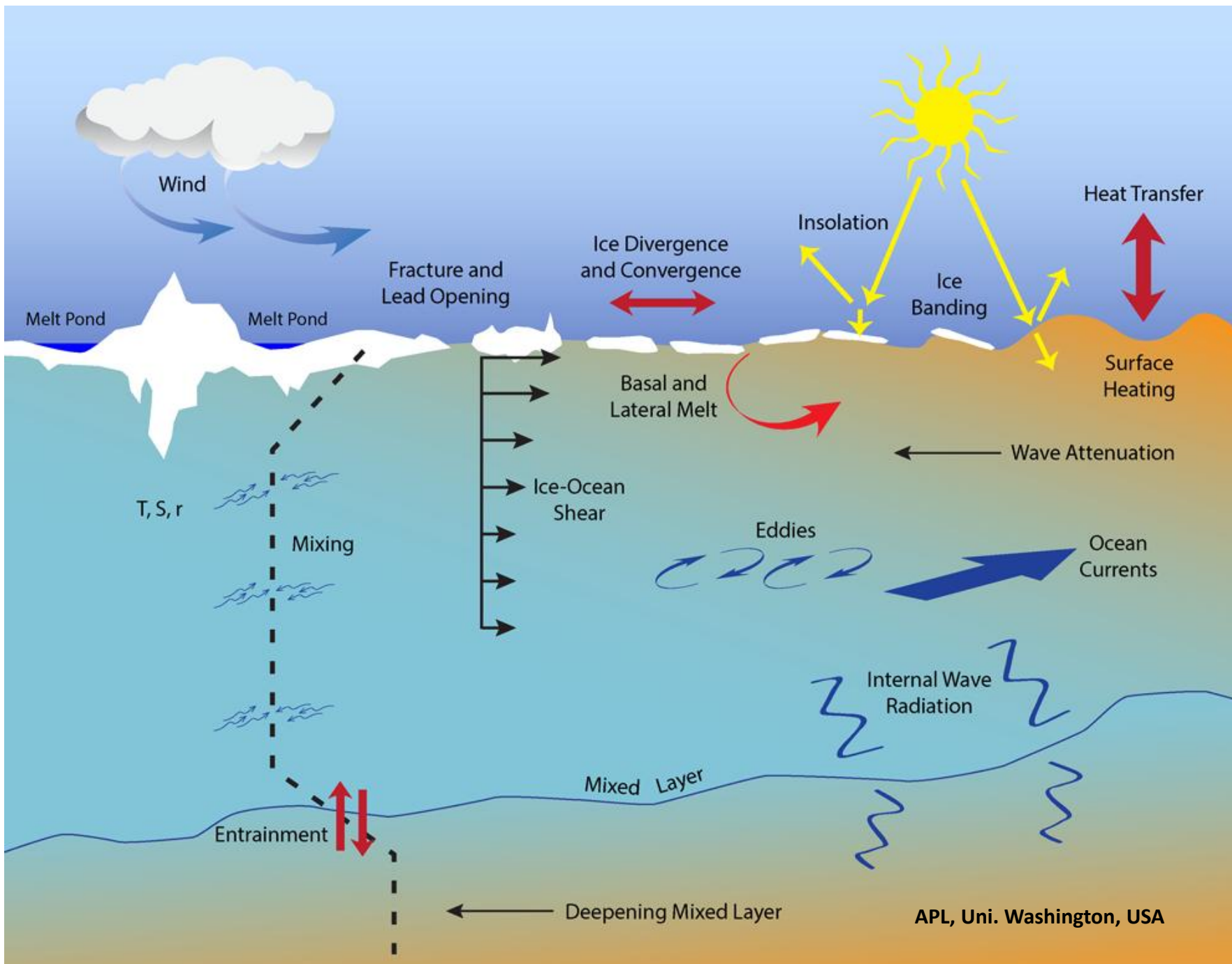
For scale...



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How do we know? Satellites

1978

1987

1992

2002

2010

Sea ice area concentrations



SMMR



SSM/I



AMSR-E



CIMR

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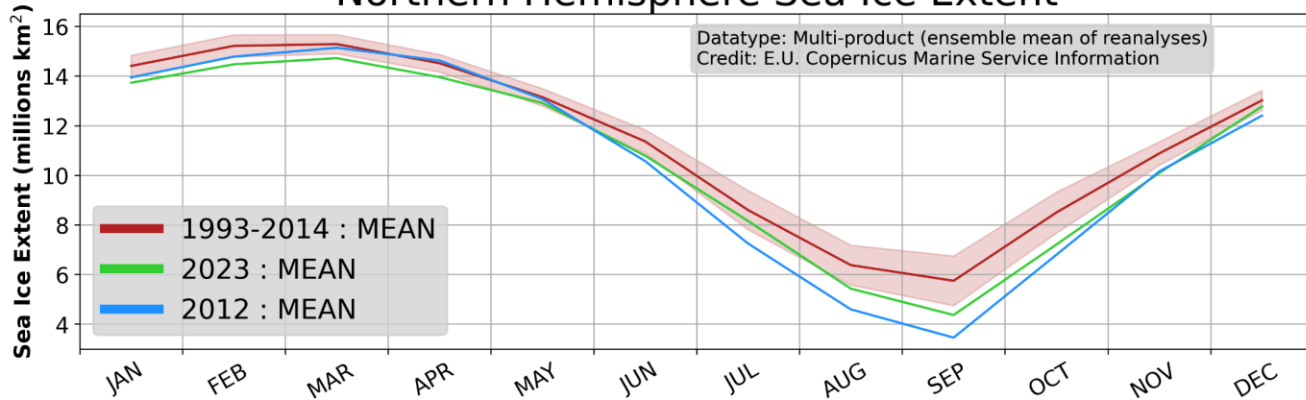


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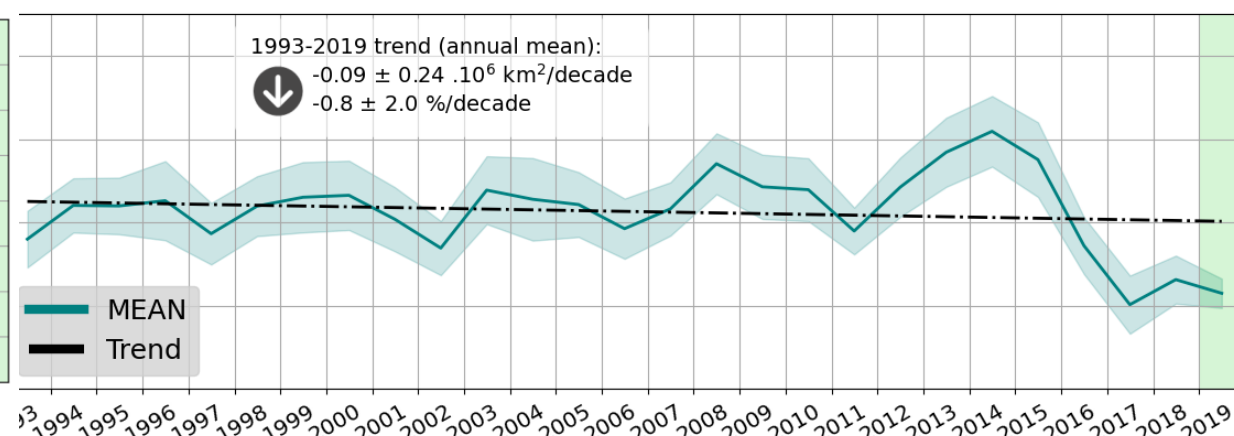
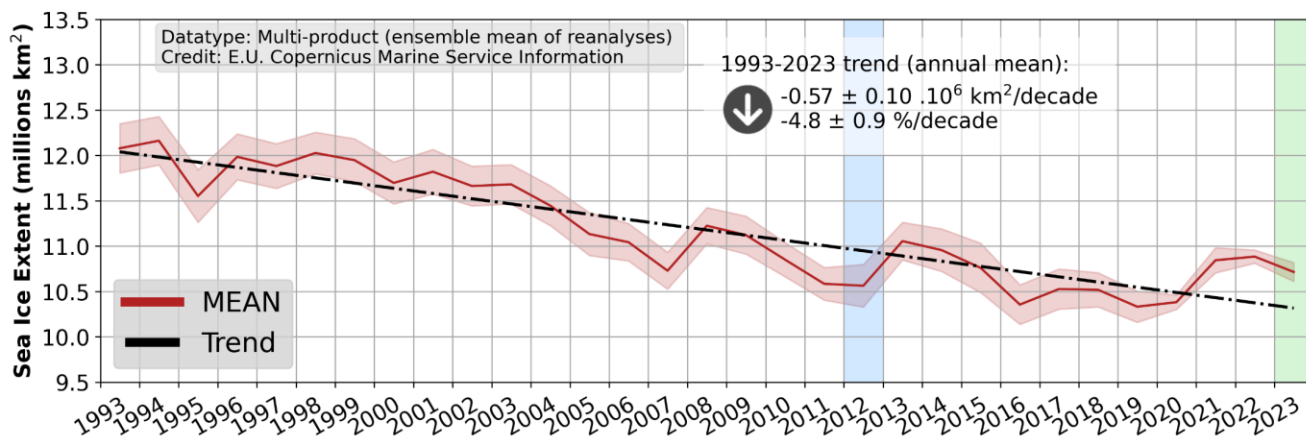
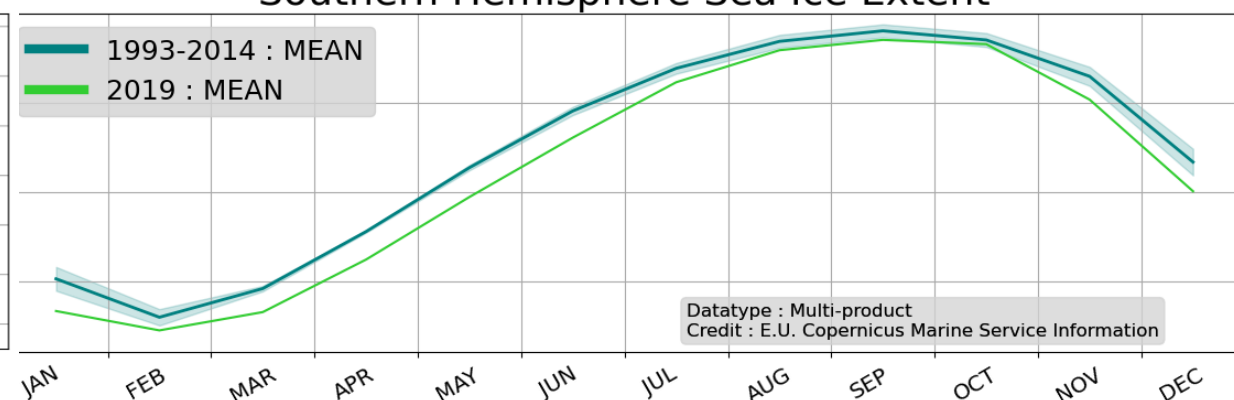
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Northern Hemisphere Sea Ice Extent



Southern Hemisphere Sea Ice Extent



a) Mean seasonal cycle for 1993-2014, 2012 and 2023

b) Interannual annual anomalies of Northern Hemisphere sea ice extent expressed in millions of km².

Time series are based on the multi-model ensemble mean of global reanalysis, e.g. the GREP data product GLOBAL_MULTIYEAR_PHY_ENS_001_031. Ensemble mean together with its spread (light shaded) are given. Details on the GREP product are given in the corresponding PUM for this OMI. The change of sea ice extent over the period 1993-2023 is expressed as trend in millions of square meters per decade, and in % per decade and linear trend is superimposed (dot-dashed line).

<https://marine.copernicus.eu/access-data/ocean-monitoring-indicators>

Satellites

1978

1987

1992

2002

2010

Sea ice concentrations

Sea ice drift

Sea ice Thickness

Sea ice Thickness

SMMR



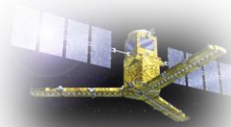
SSM/I



ENVISAT



SMOS



CryoSAT-2



Snow

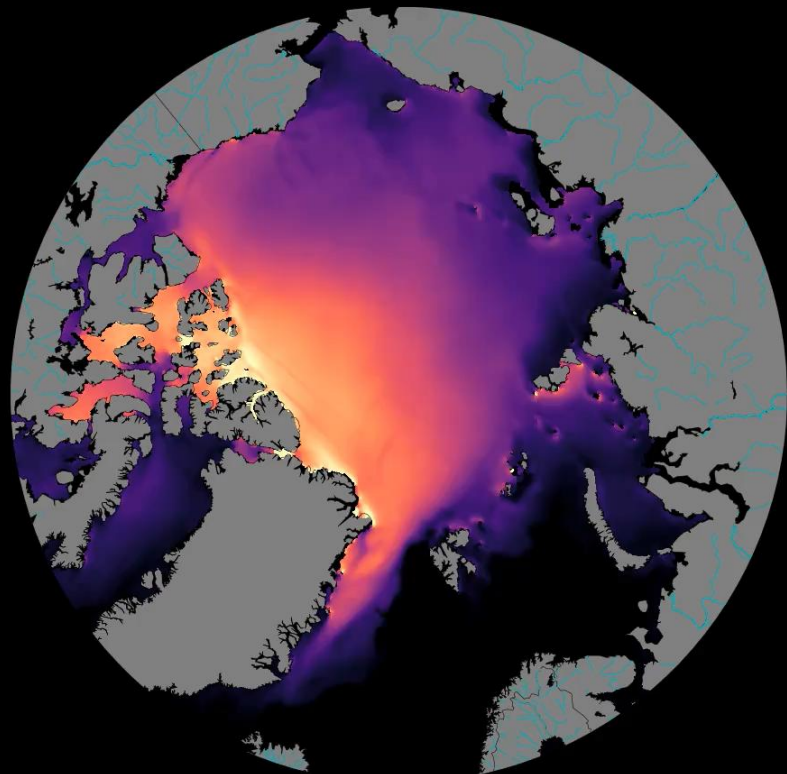
CIMR



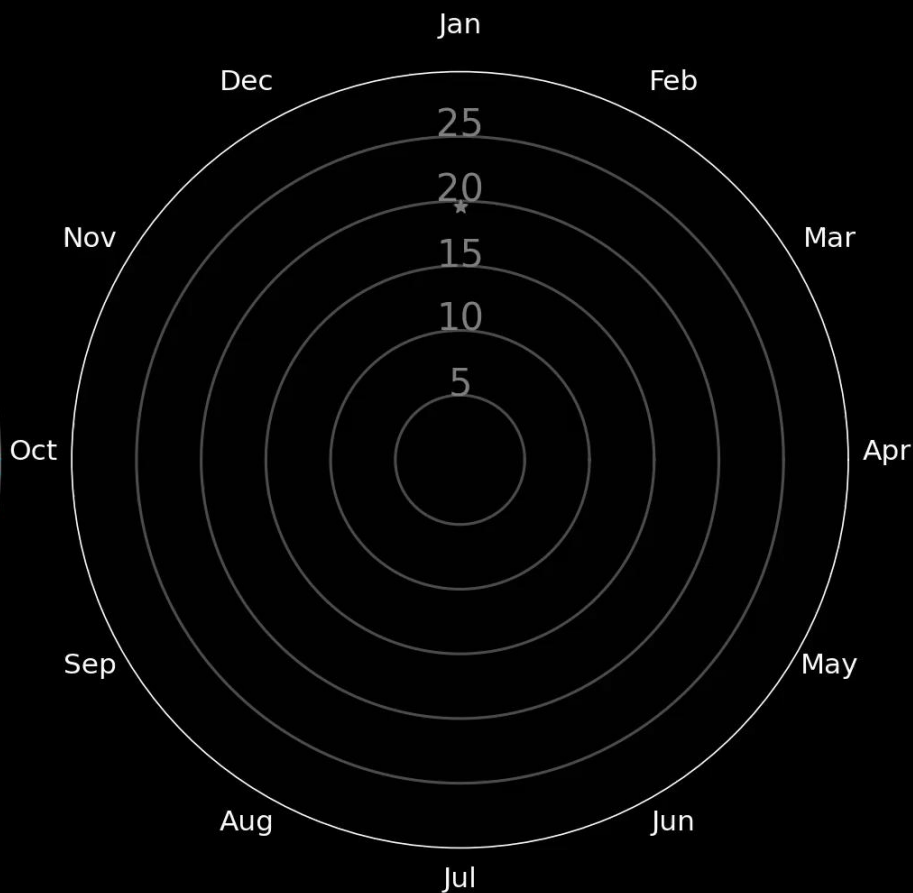
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Sea Ice Thickness (m)



Total Sea Ice Volume (1000 km³)



1992 01 01

SIT : 1.65 m
SIV : 19561 km³

NERSC
TOPAZ4 - TARDIS
Léo Edel



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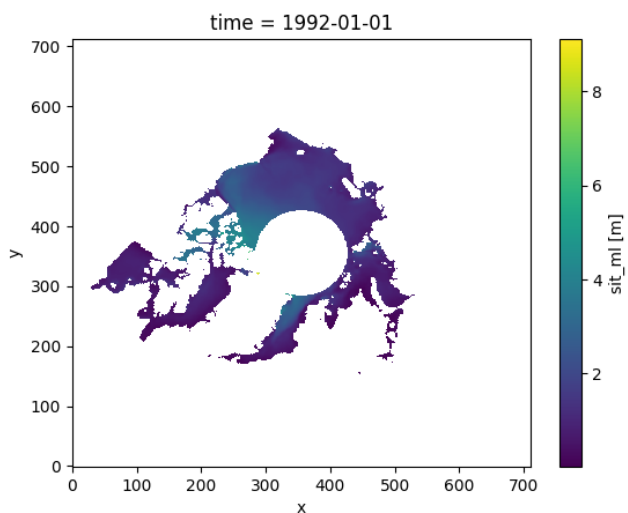
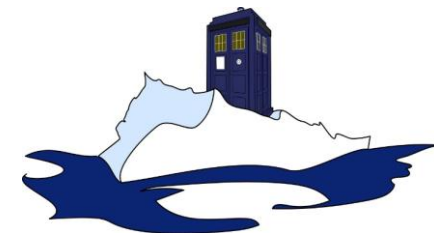
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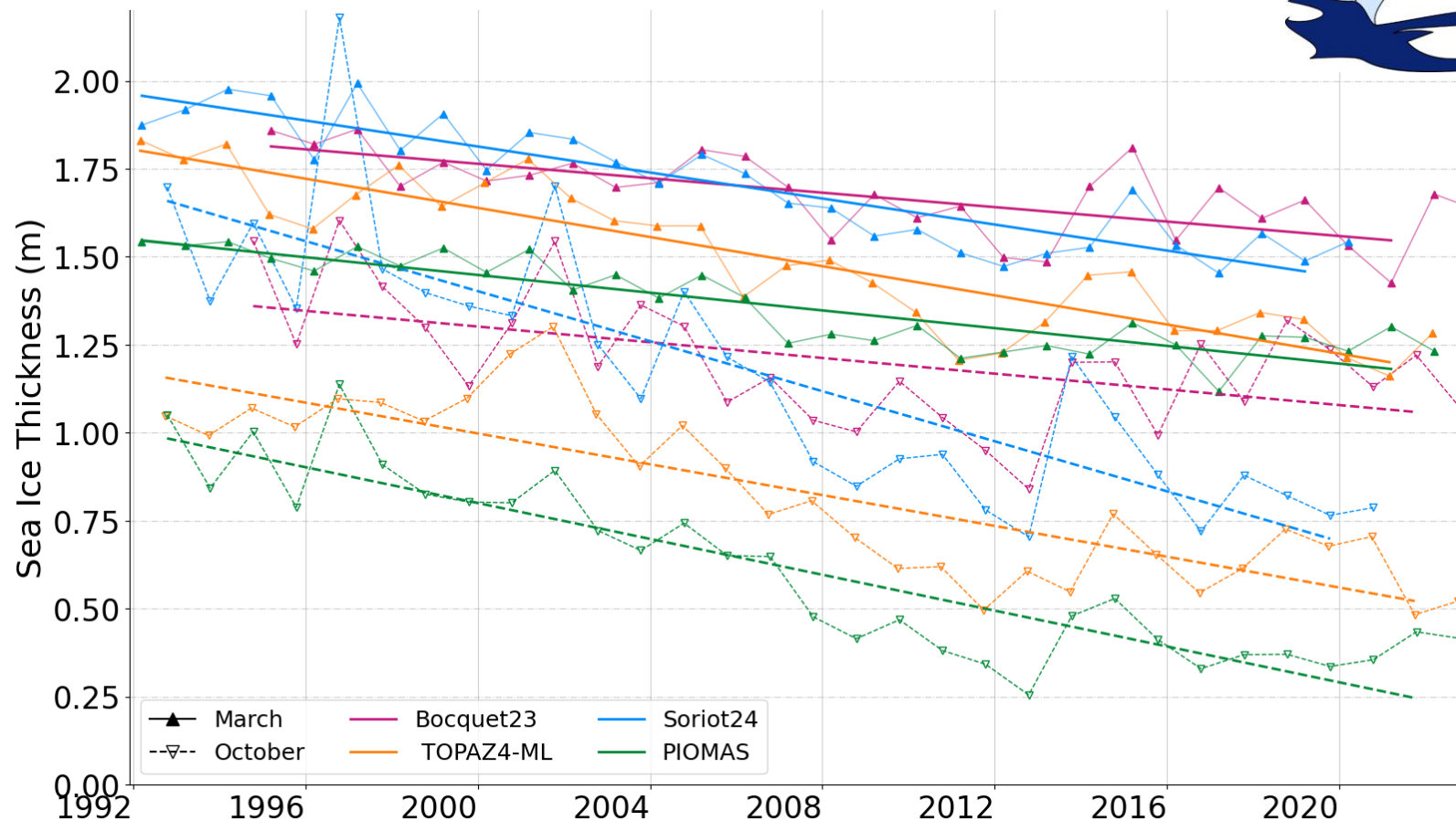
Sea ice thickness How much do we really know?



Monthly SIT from PIOMAS, Bocquet et al. (2023 - altimeters), Soriot et al. (2024 - PMW)



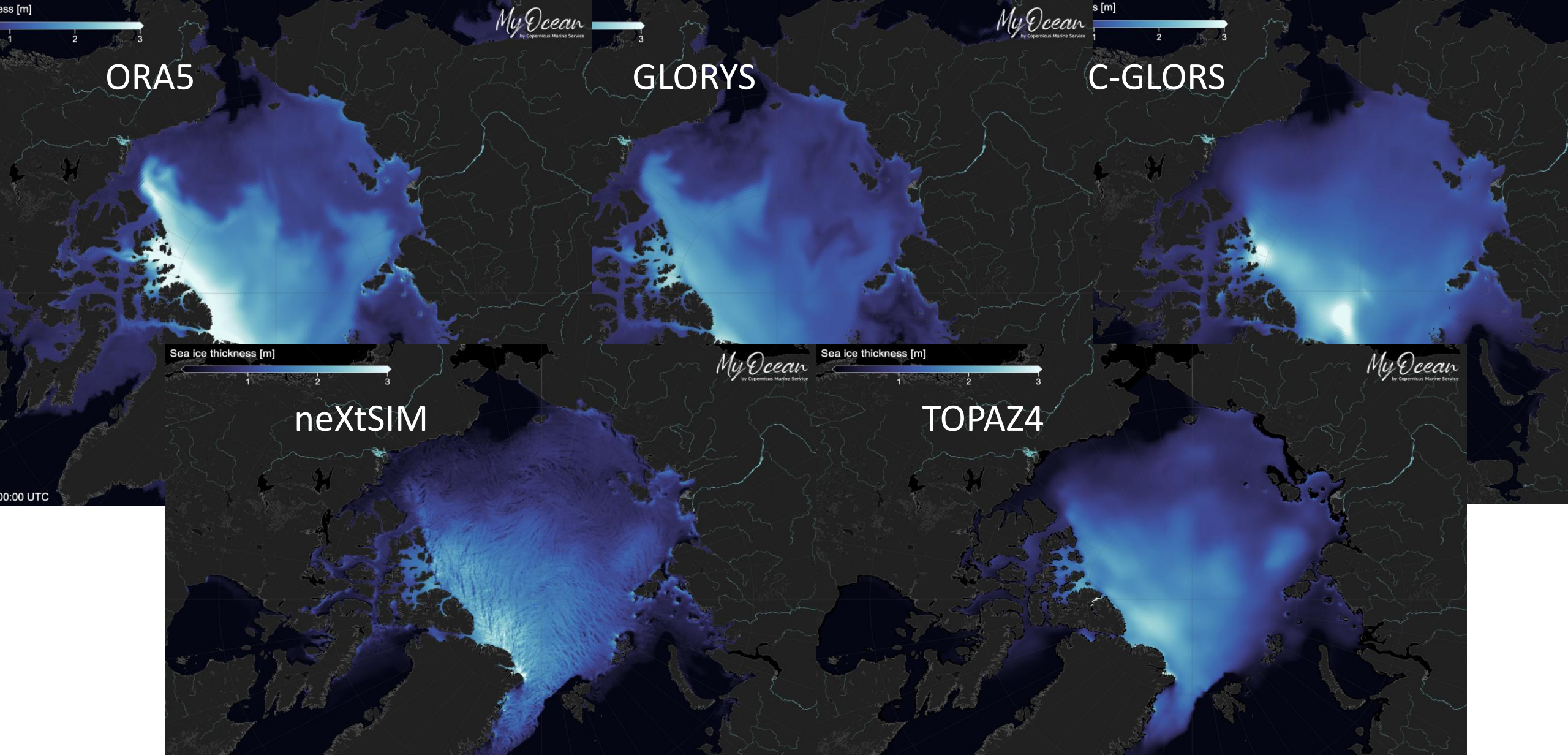
Edel et al. 2025





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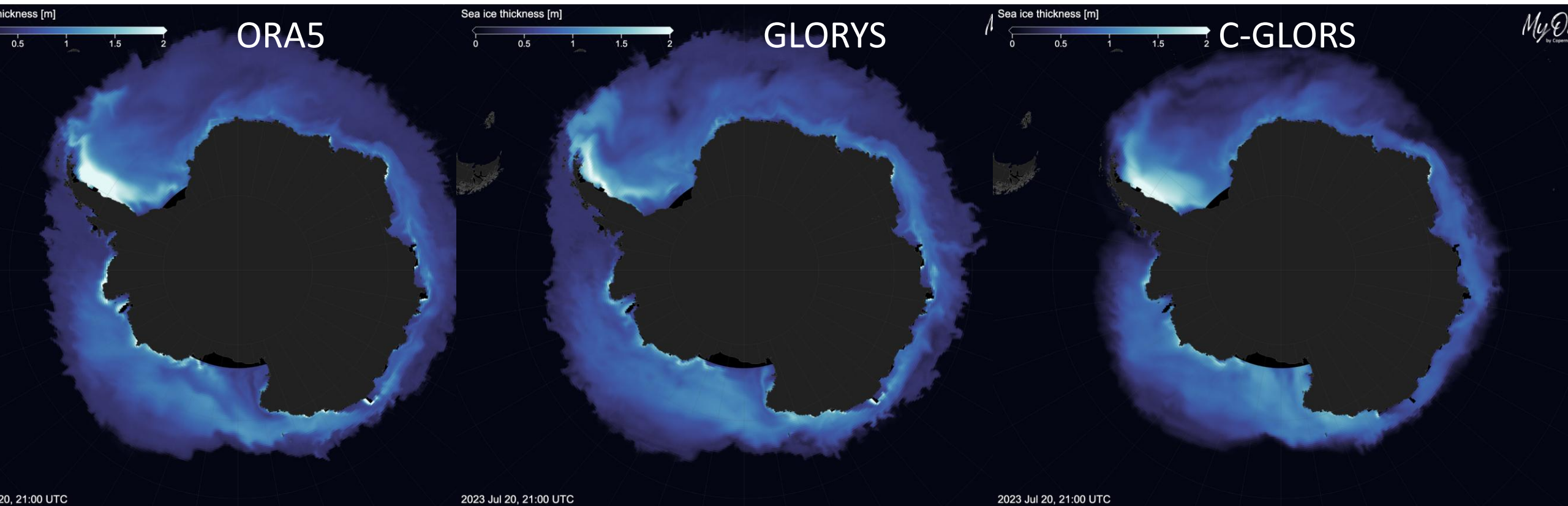
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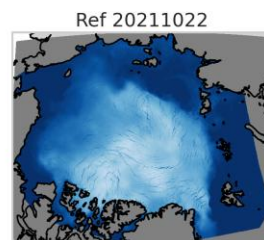
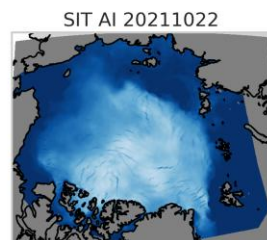
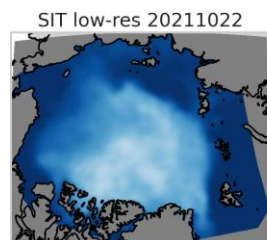
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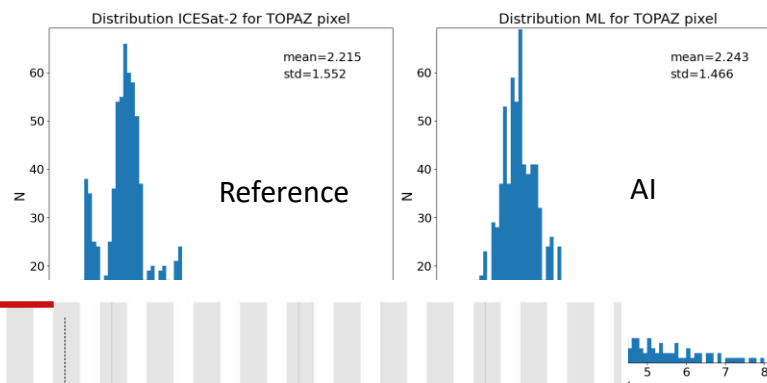
Use of AI in sea ice



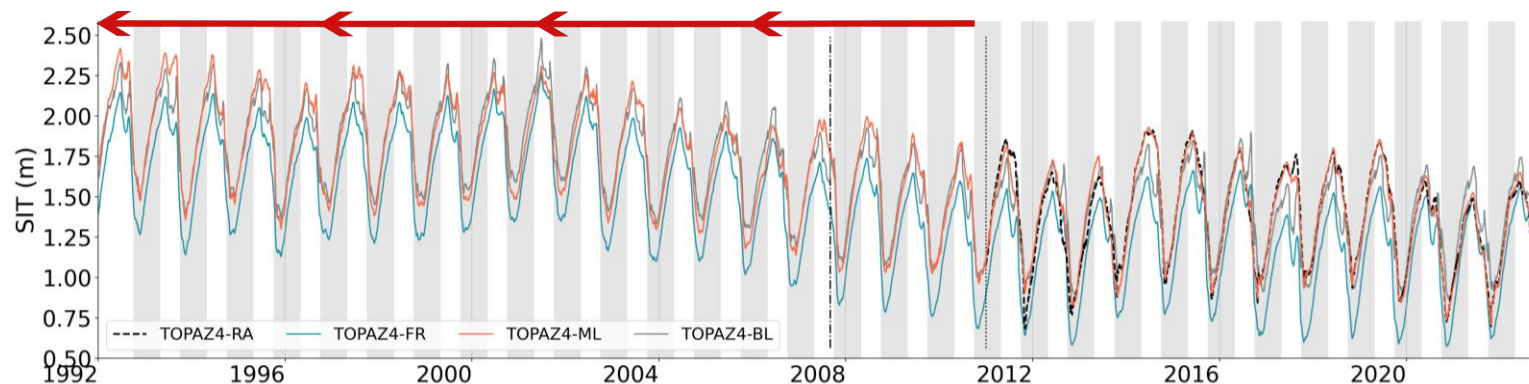
Enhance resolution



Sea ice thickness distribution

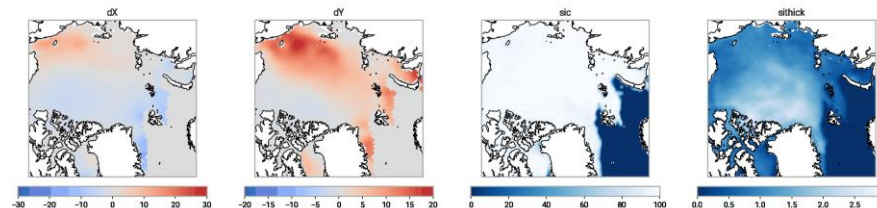


Go back in time

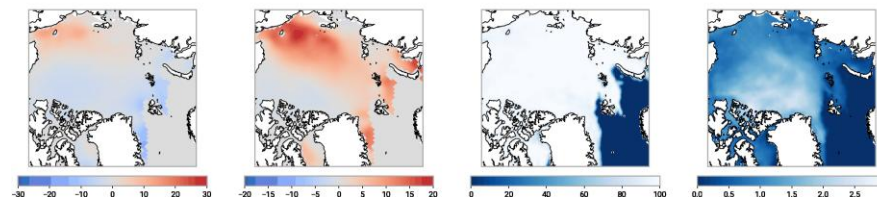


Make forecasts cheaper

Emulated



Independent





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Thank you for your attention!

