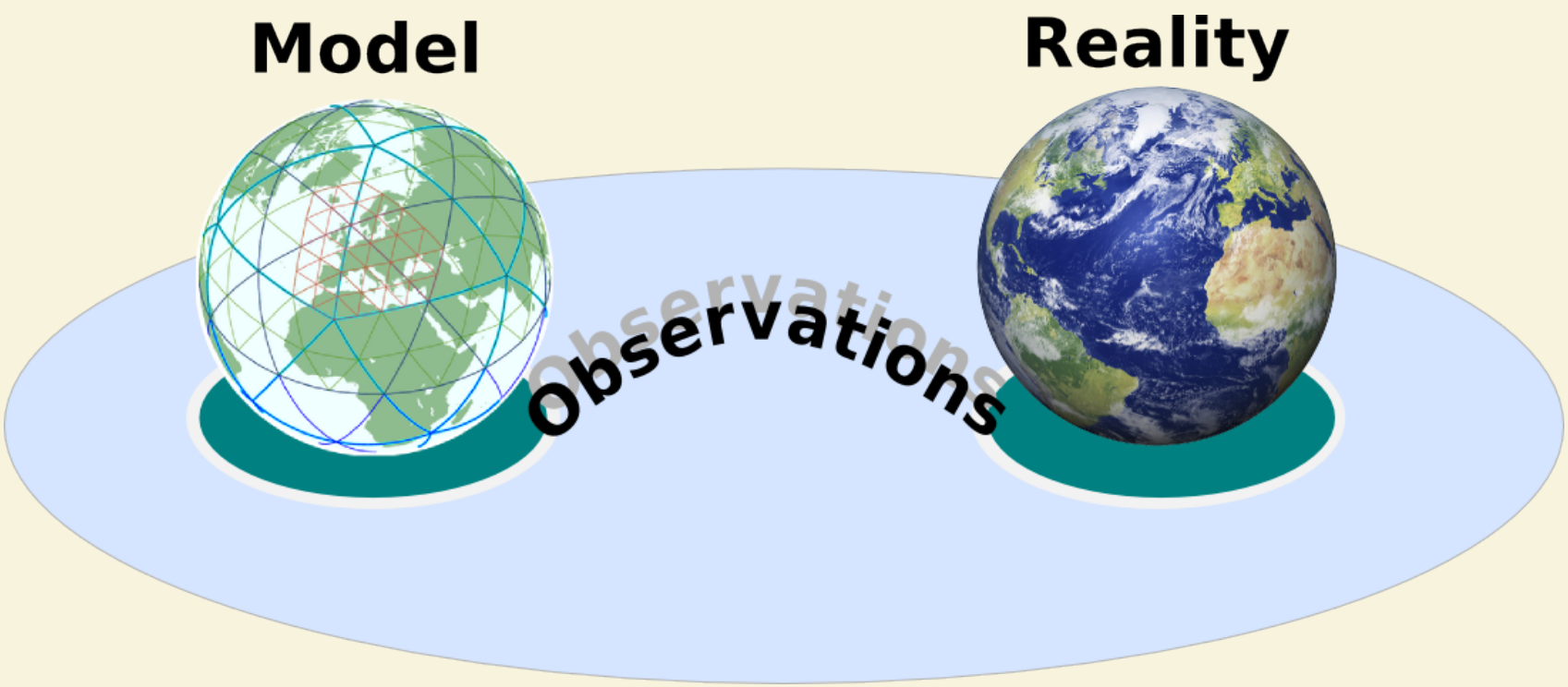
Sea ice from ESA CCI

Felix Bunzel, Dirk Notz

A conceptual view



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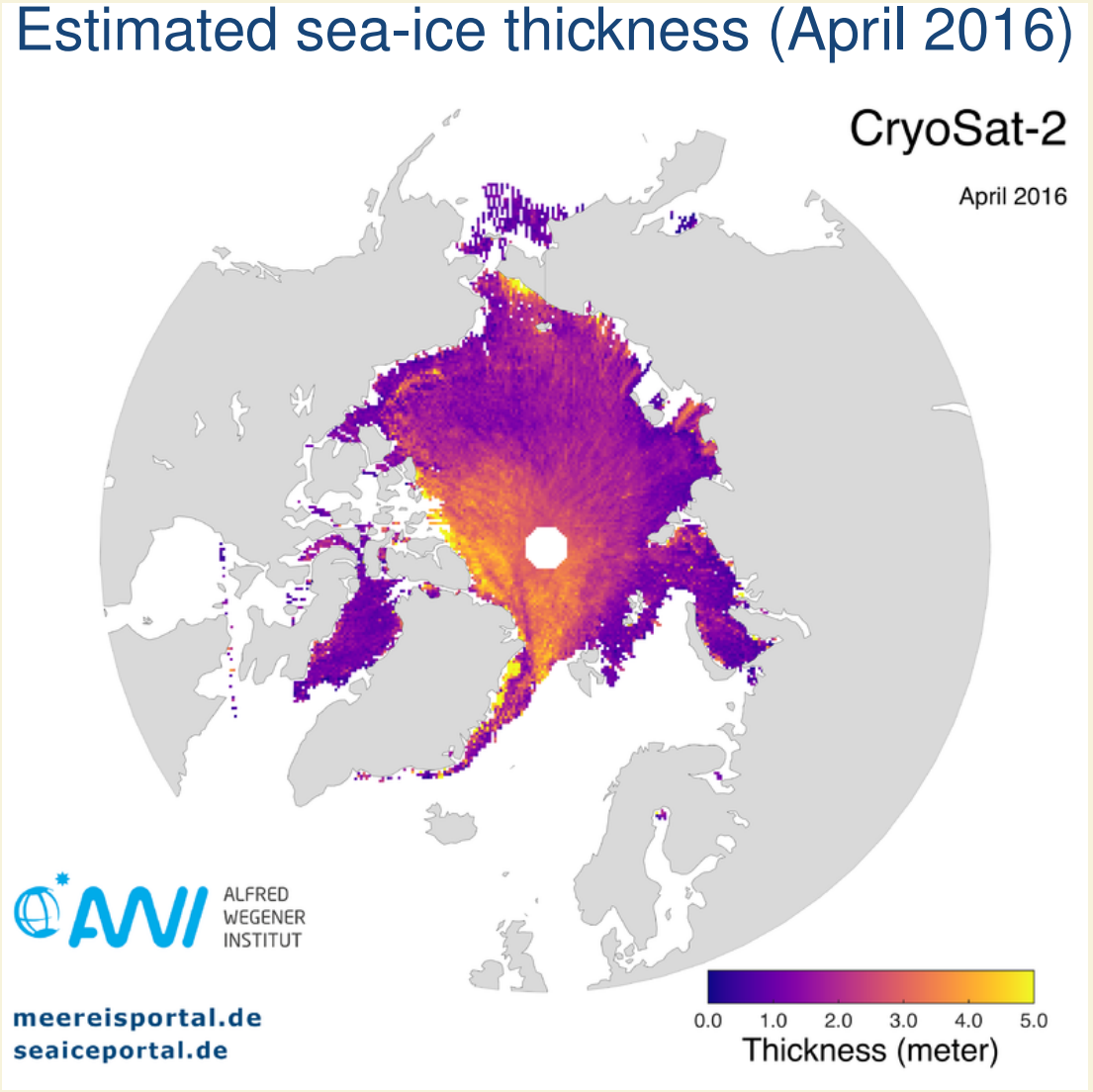
Overview

1. How can we use climate models to understand observational uncertainty?

2. How can we use observations to understand model errors?

How thick is Arctic sea ice?

Estimated sea-ice thickness (April 2016)



meereisportal.de, after Ricker et al., The Cryosphere, 2014

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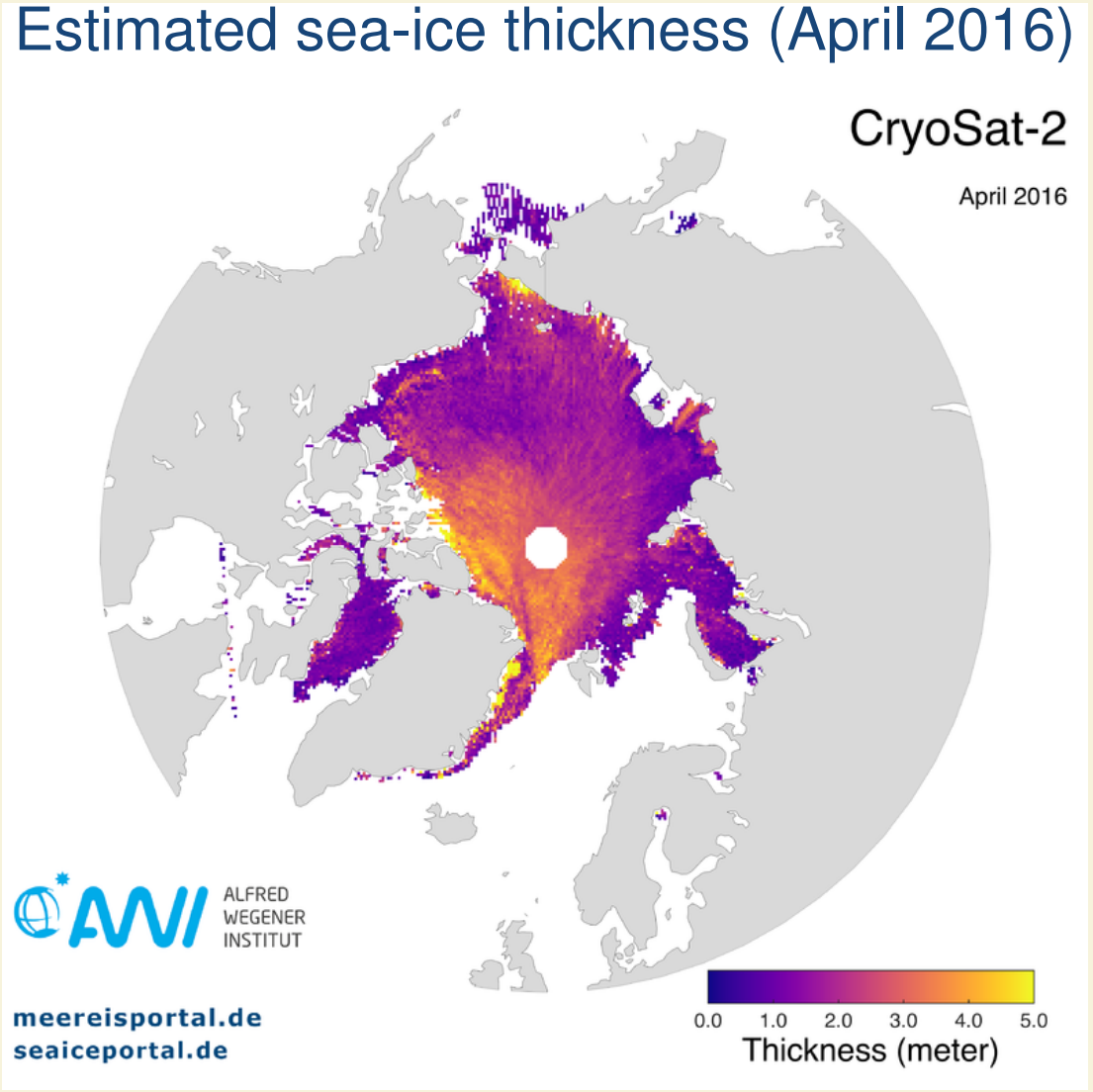

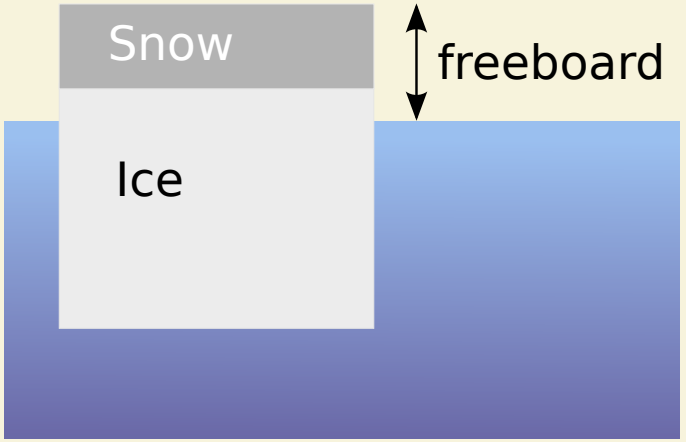

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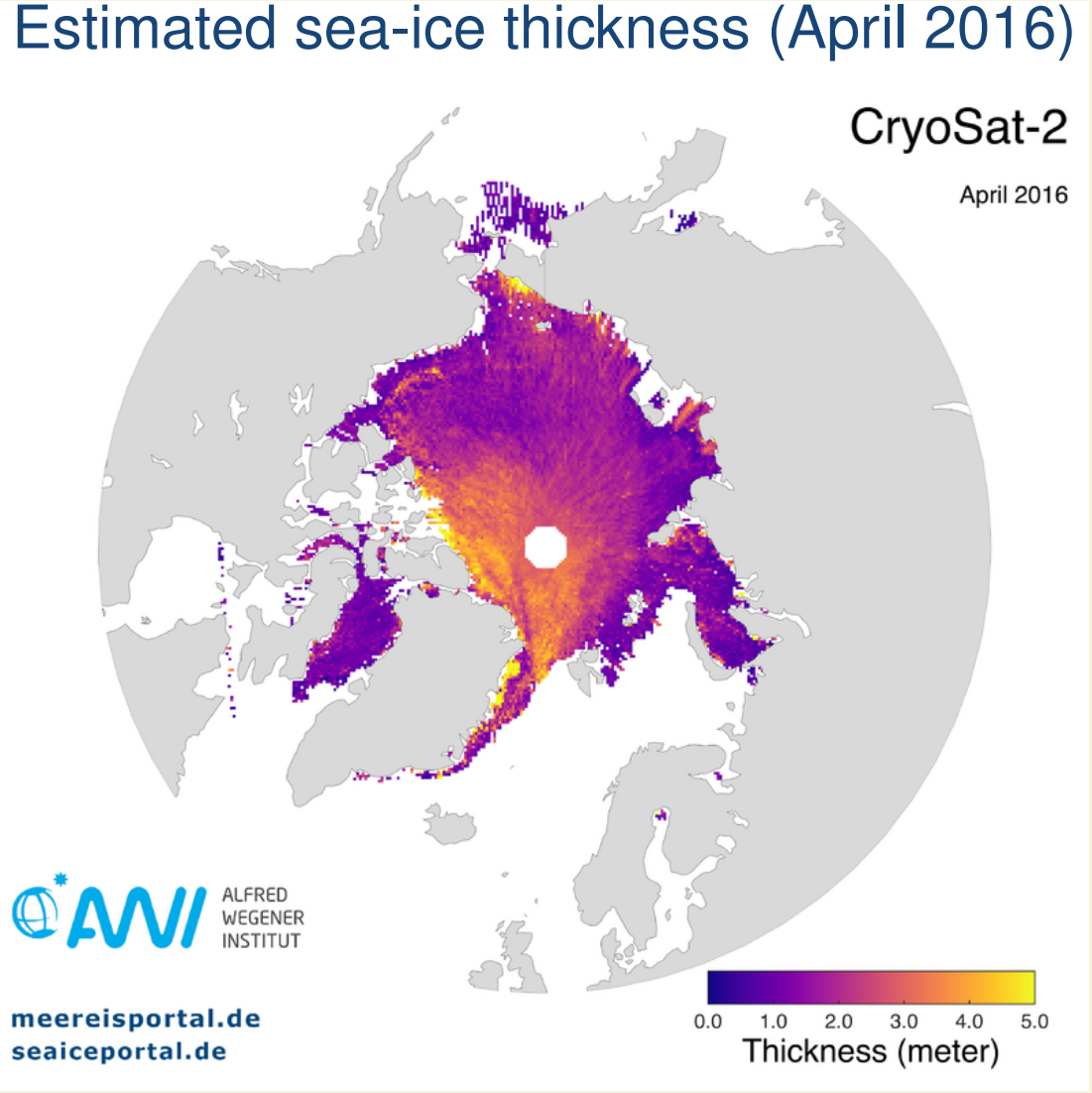

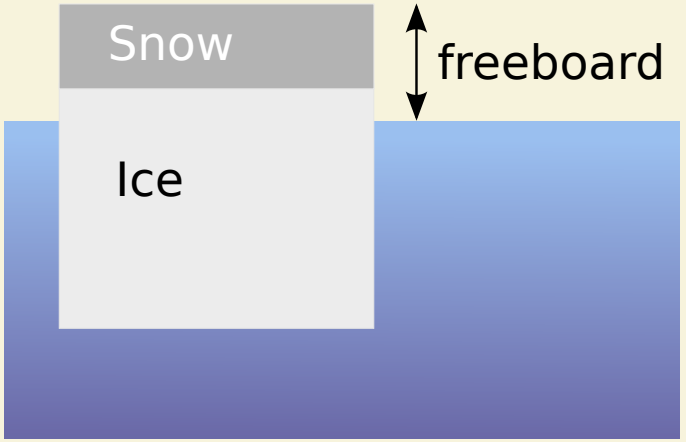

But: Snow thickness is unknown and based on climatology

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Approach

1. Carry out free simulation with Earth System Model

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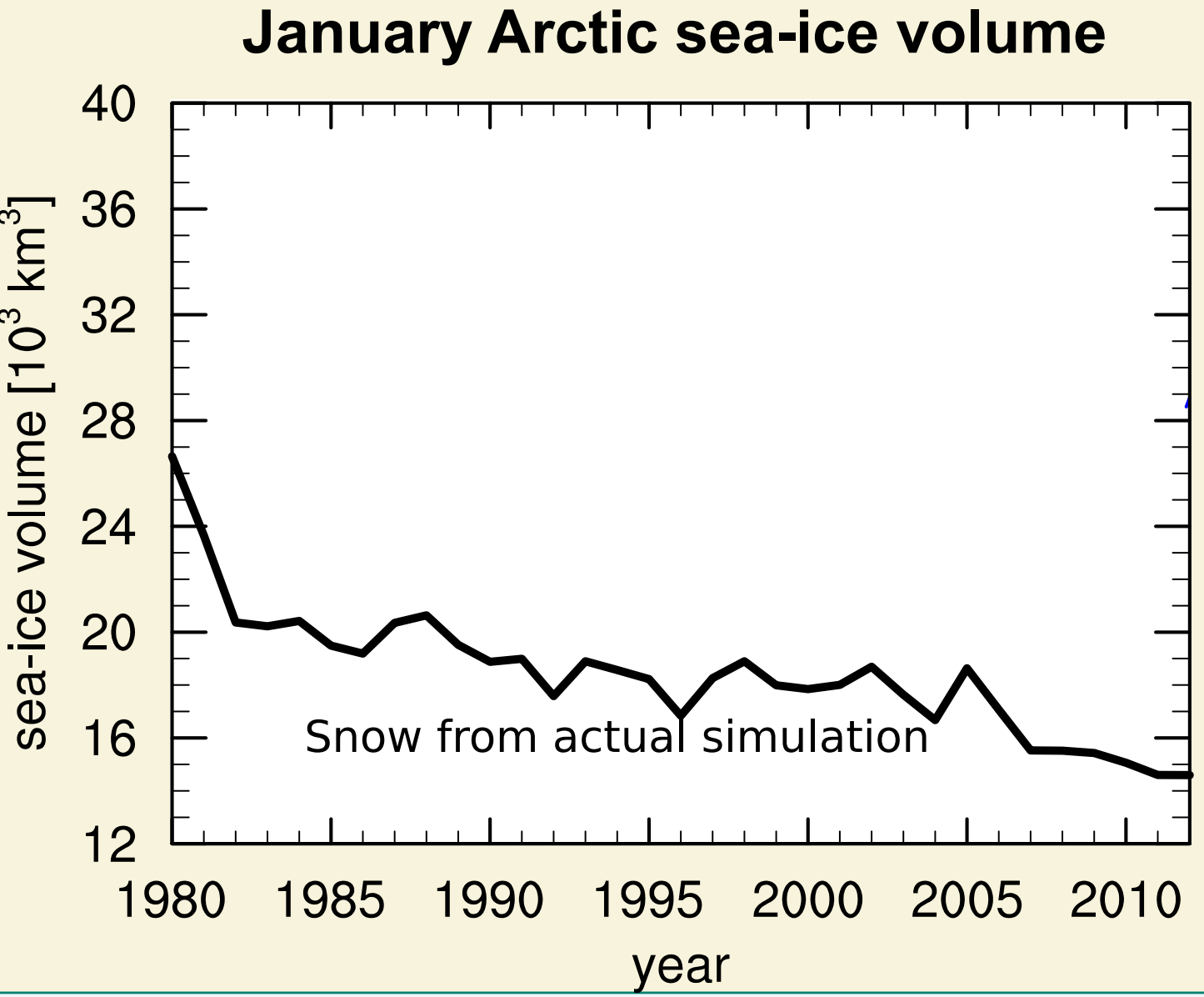
5. Compare ice thickness from 4.) with ice thickness from 1.)

Time series in January



Bunzel et al., in preparation

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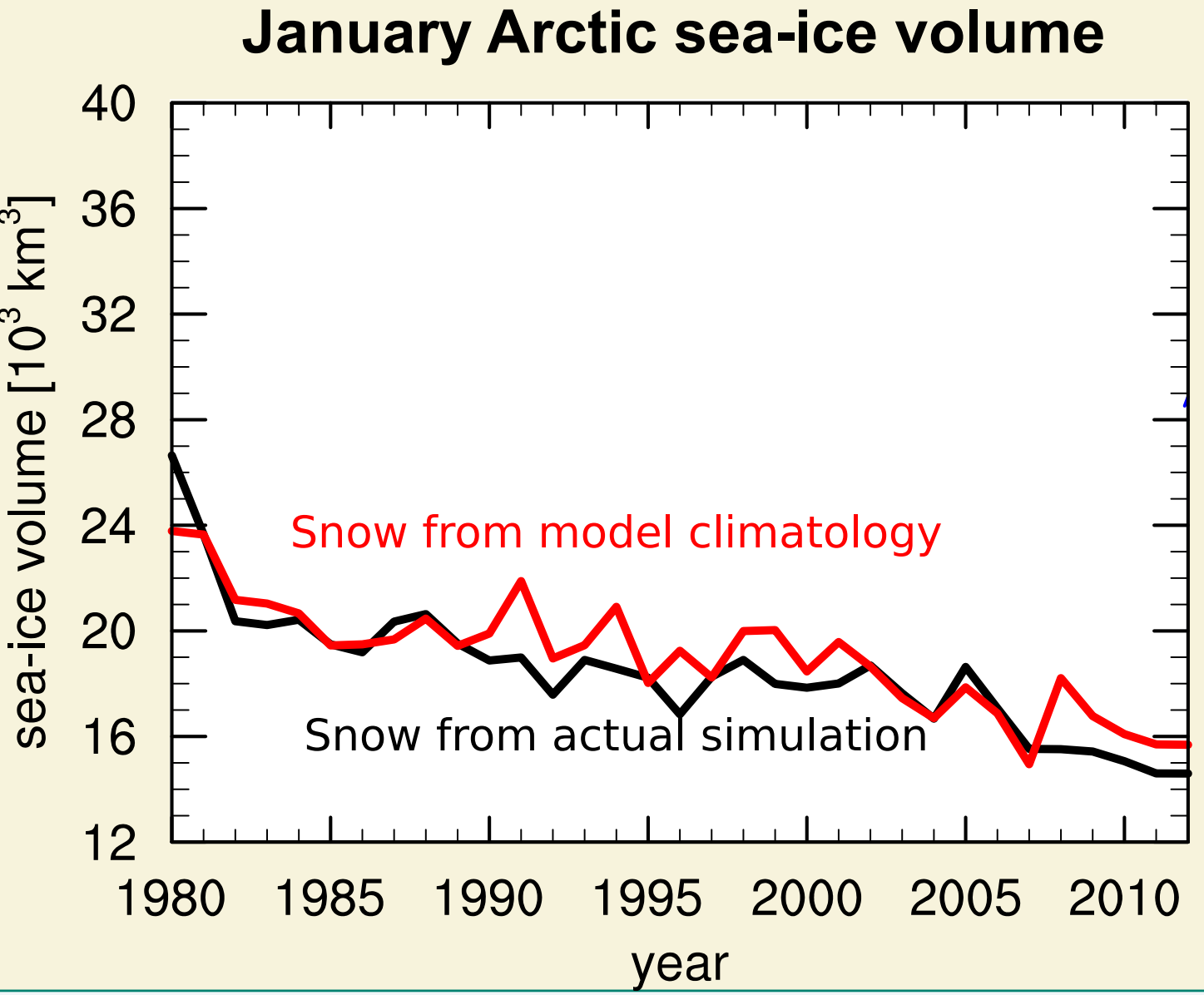

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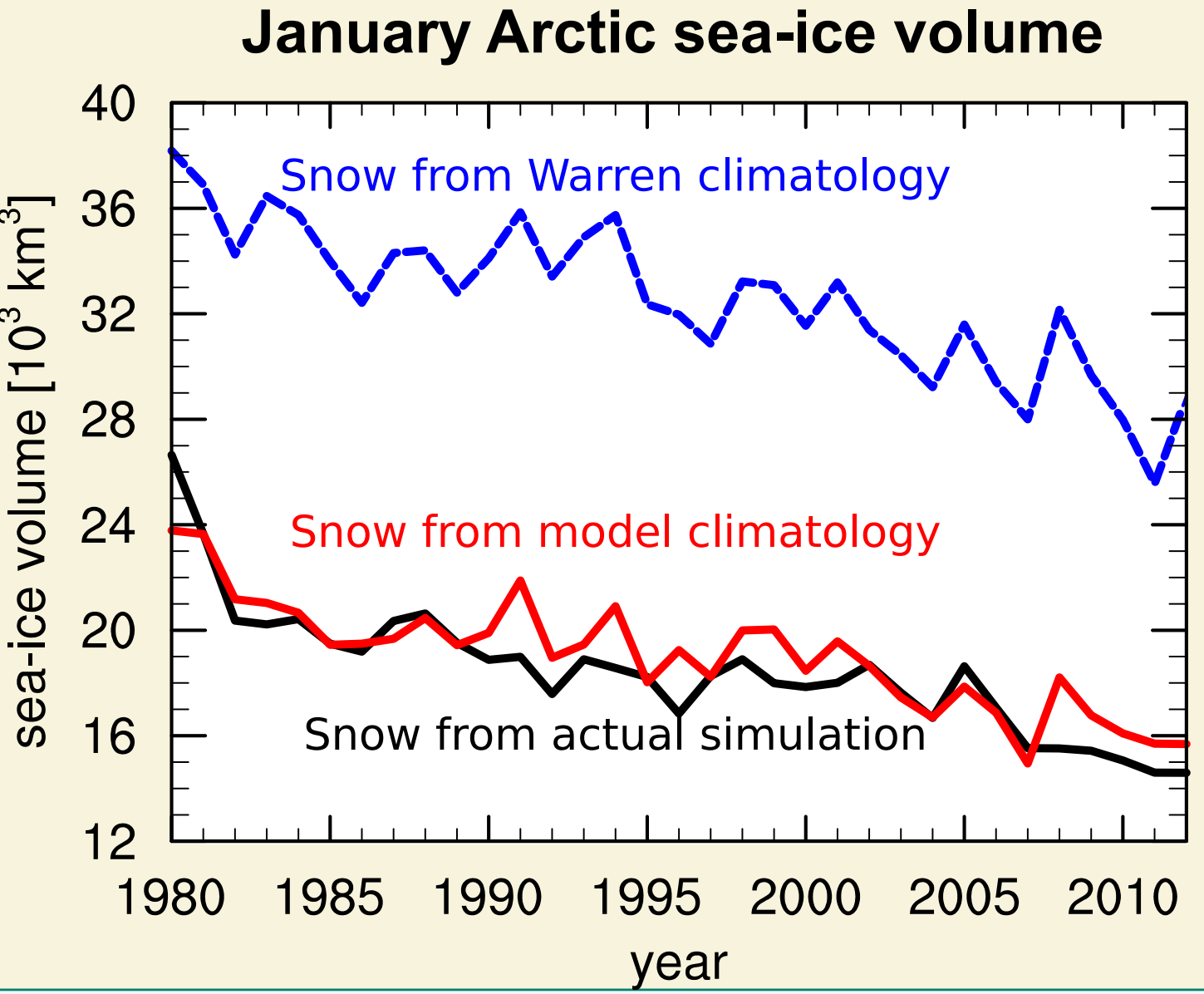
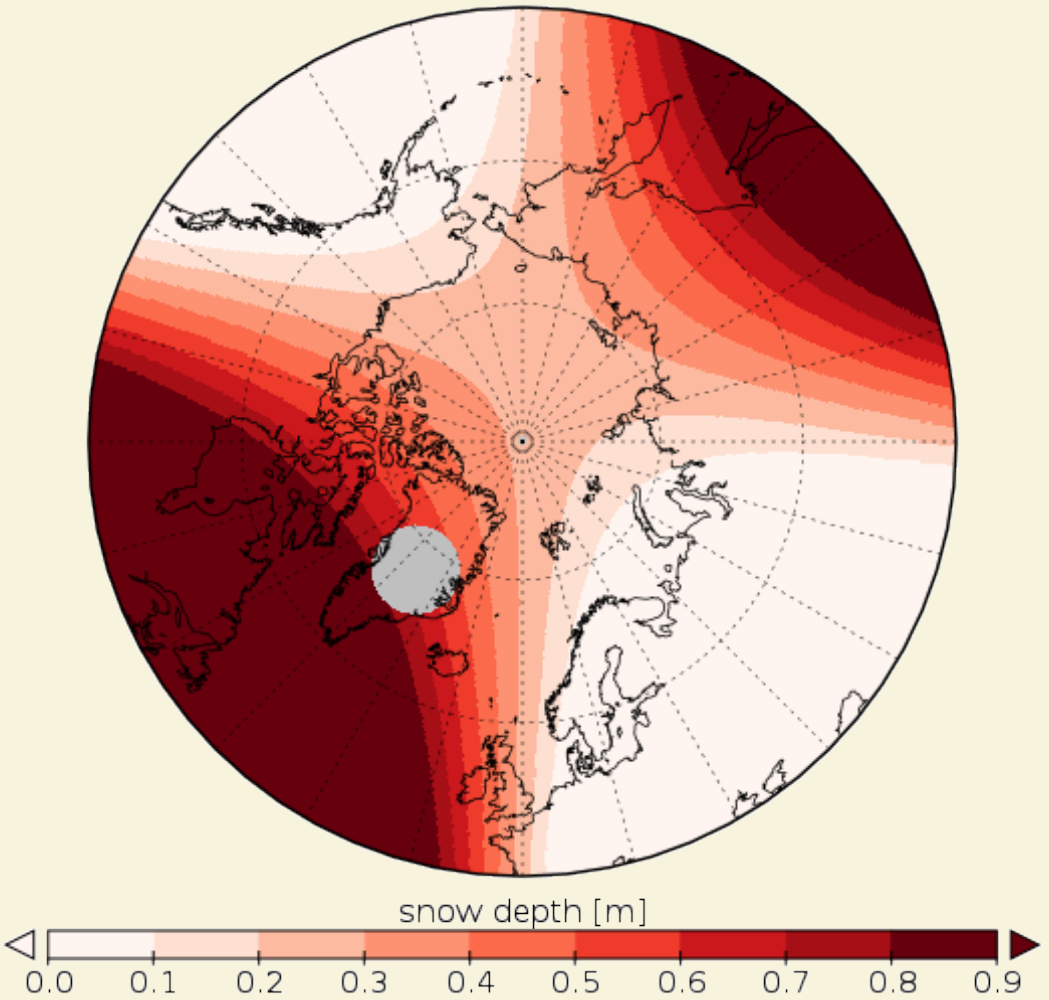


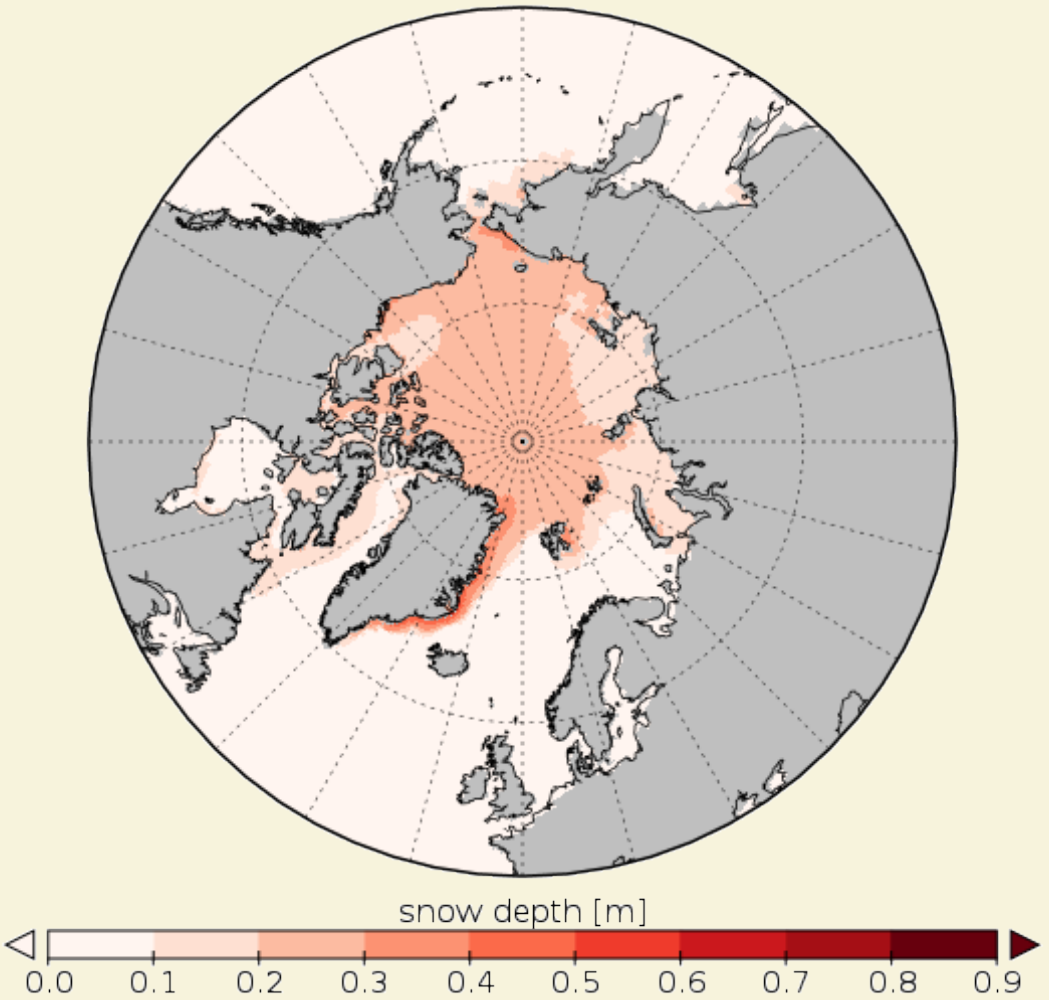
Bunzel et al., in preparation

Warren snow climatology January used by CCI SIT



Bunzel et al., in preparation

Snow climatology January in MPI-ESM



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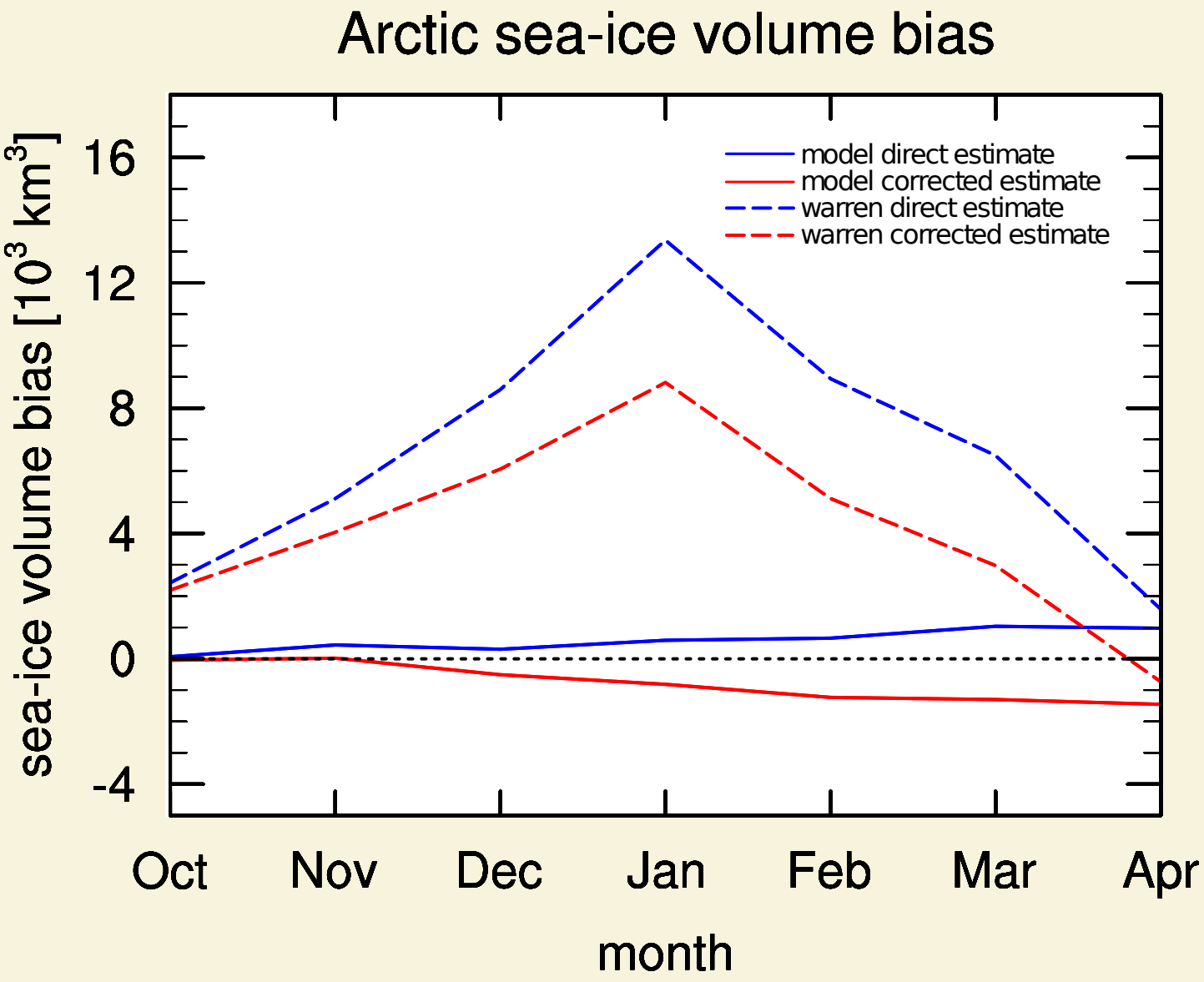
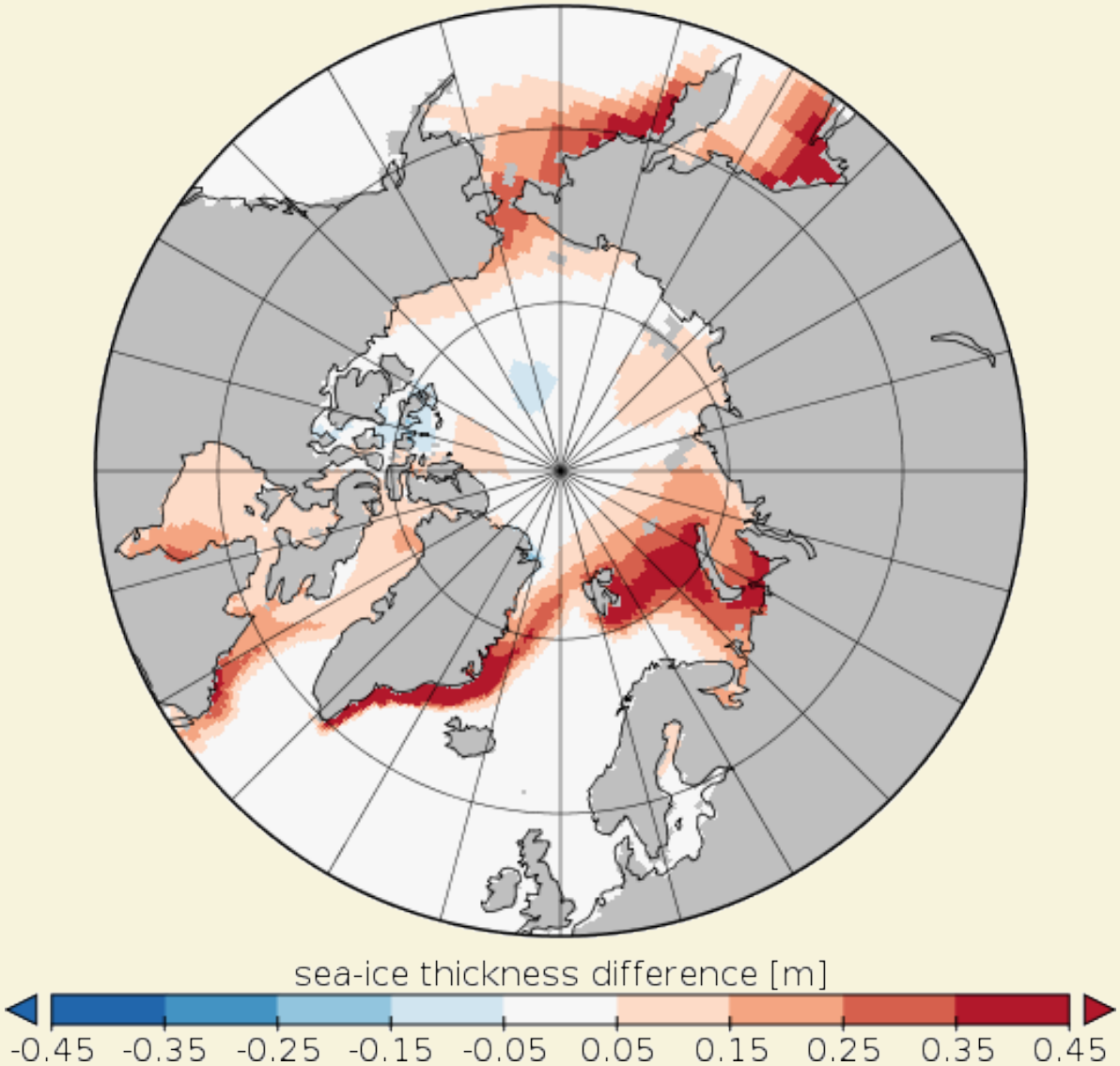
Mean bias



Bunzel et al., in preparation

Areal distribution of biases in April



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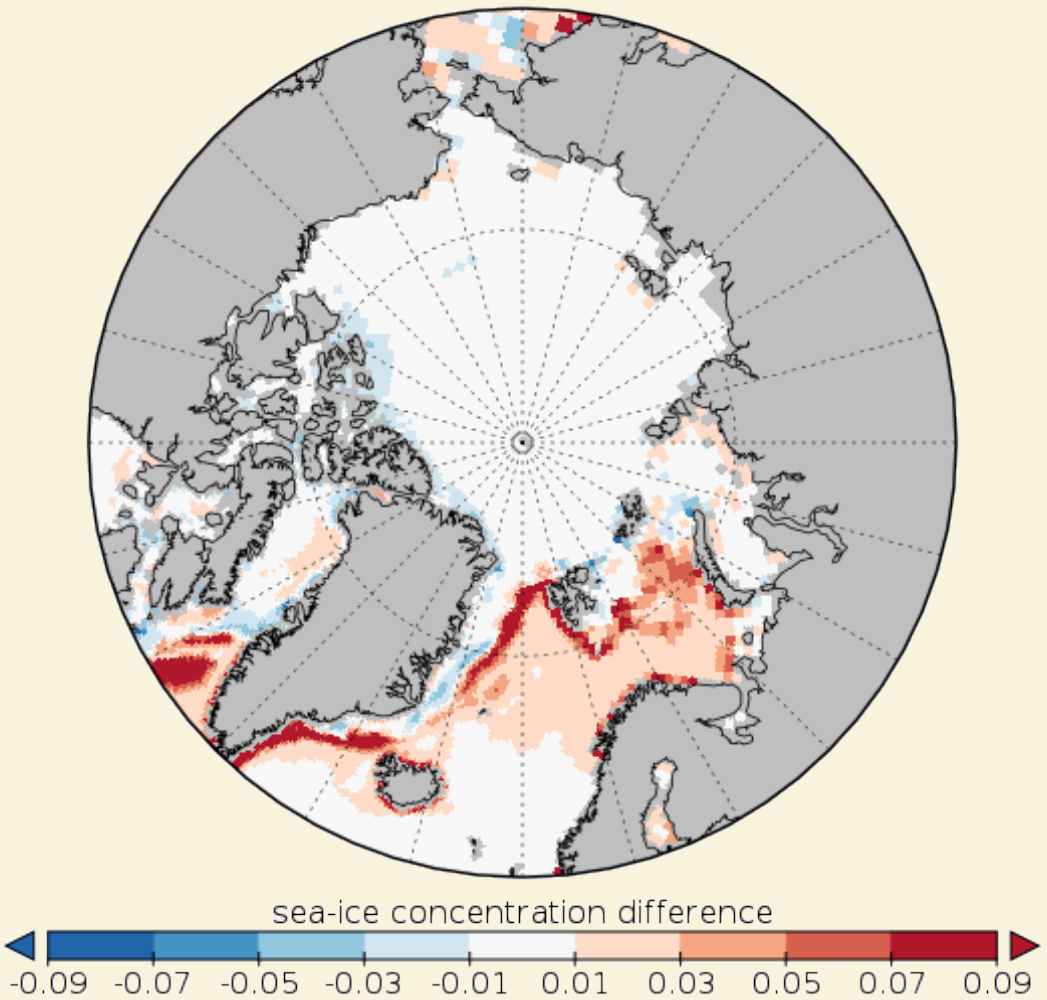
MPI-ESM 1.0 didn't like CCI SIC 1 in some regions



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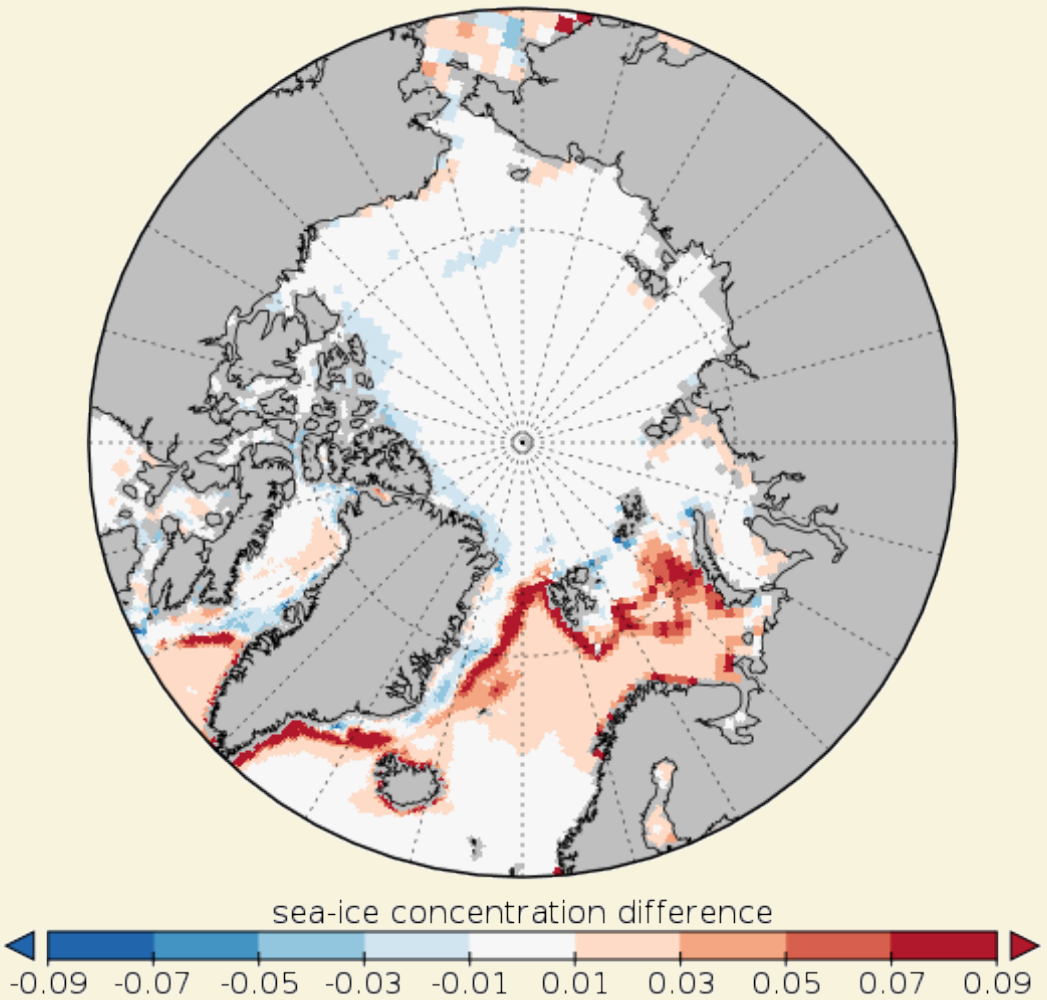

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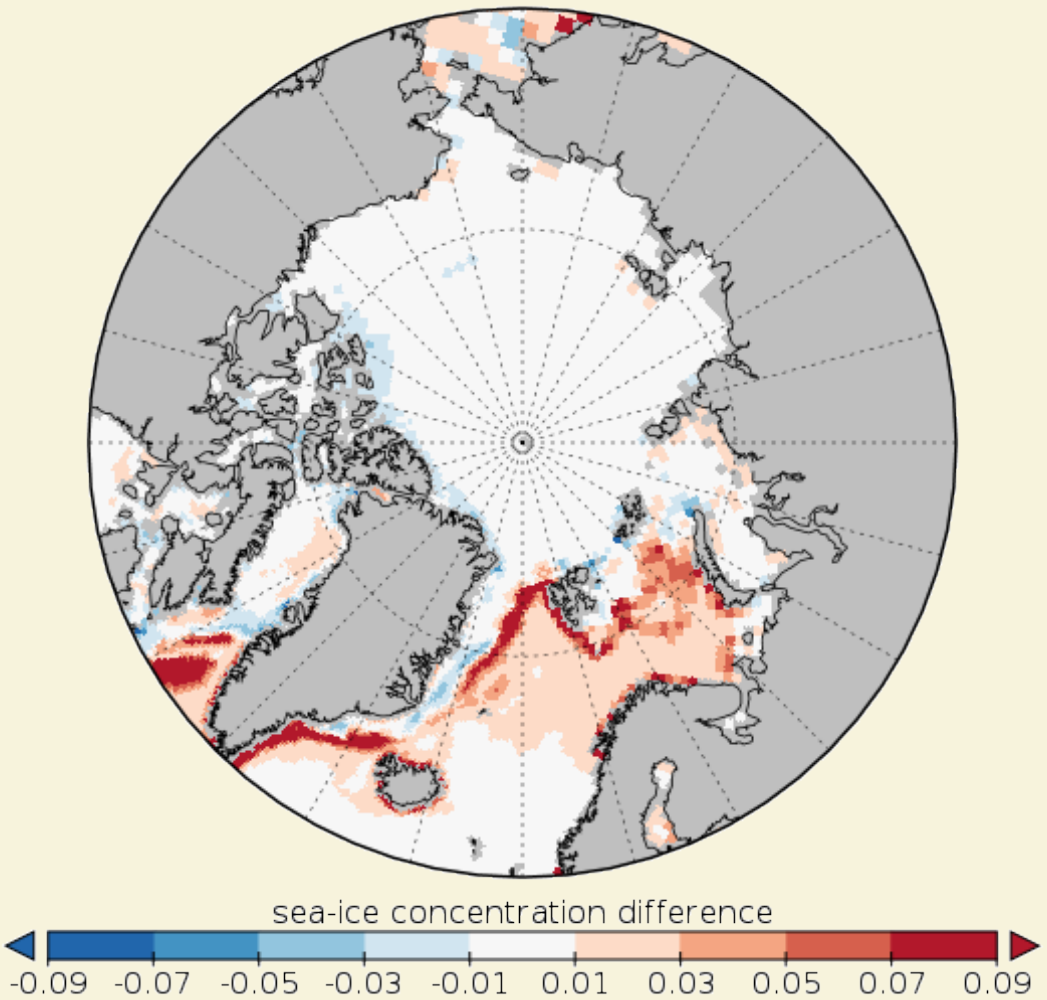

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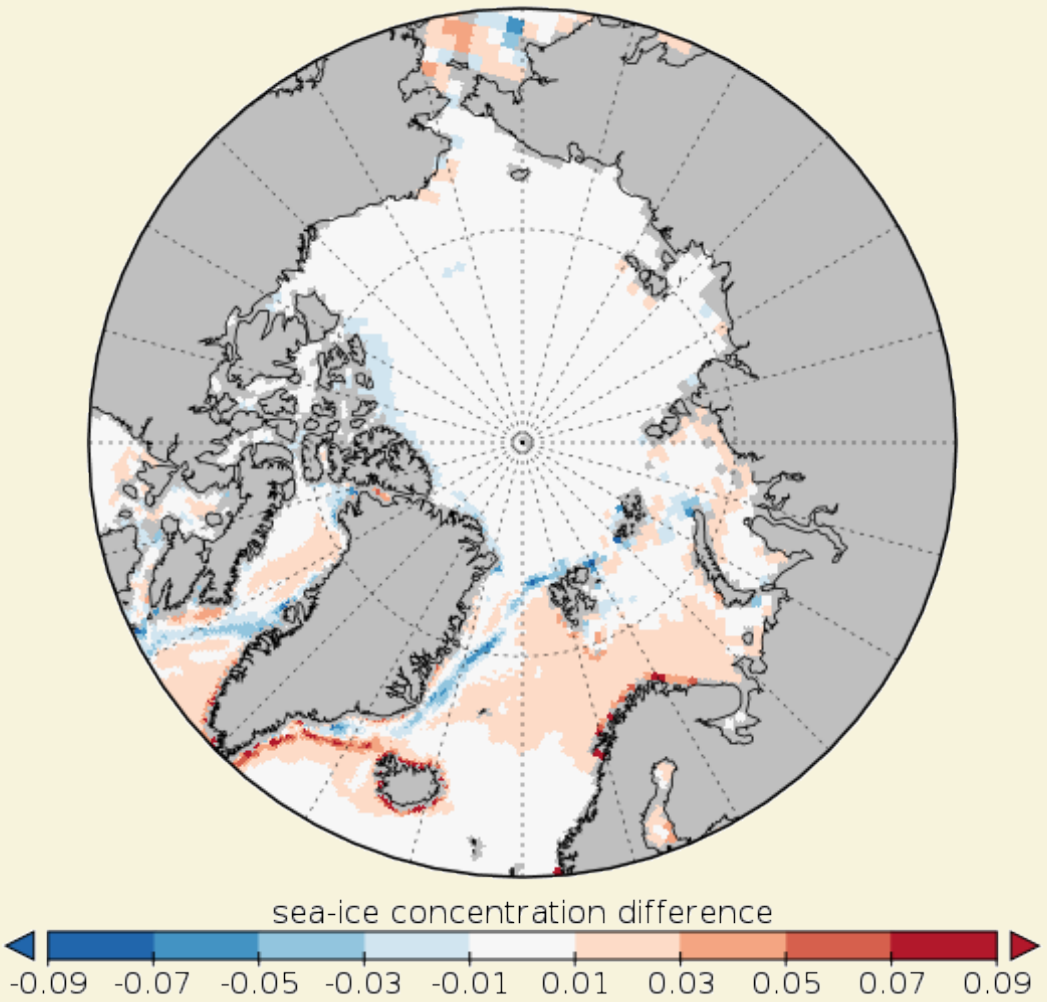

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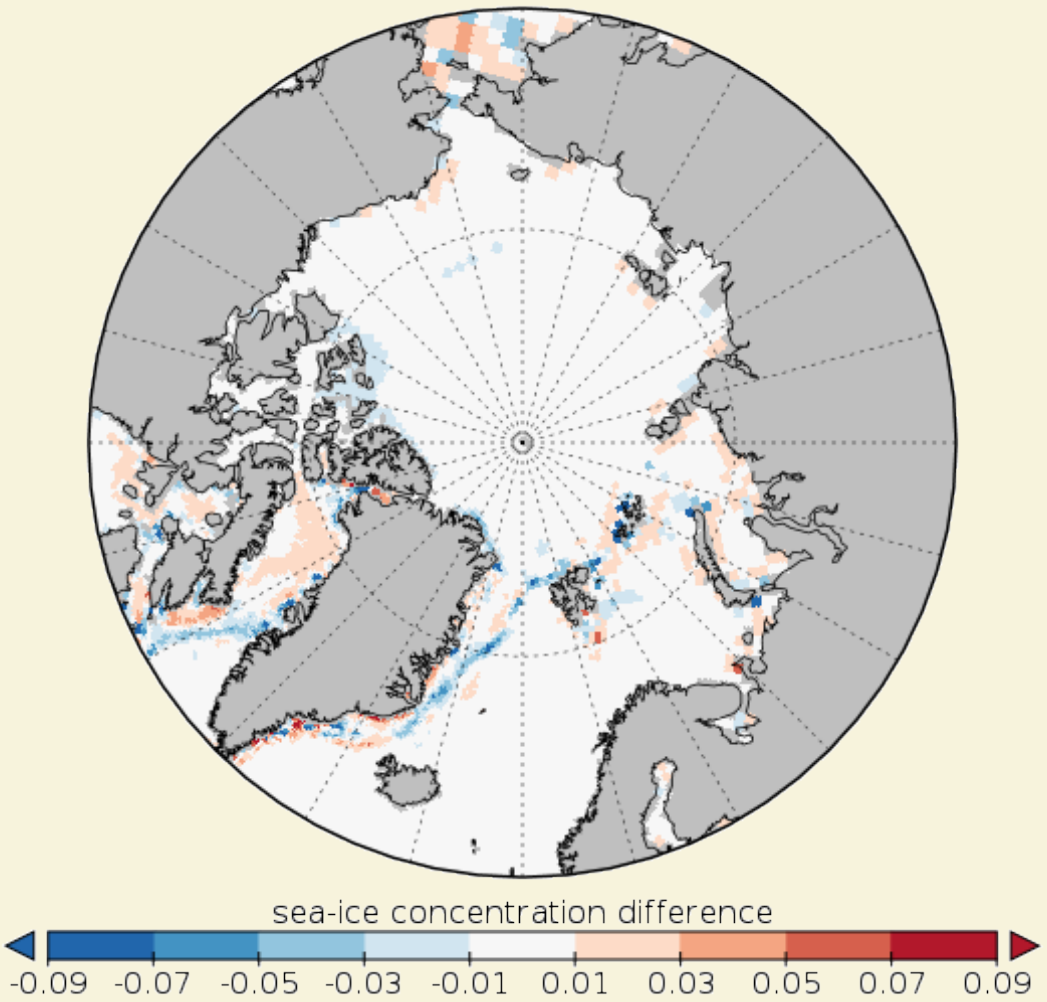
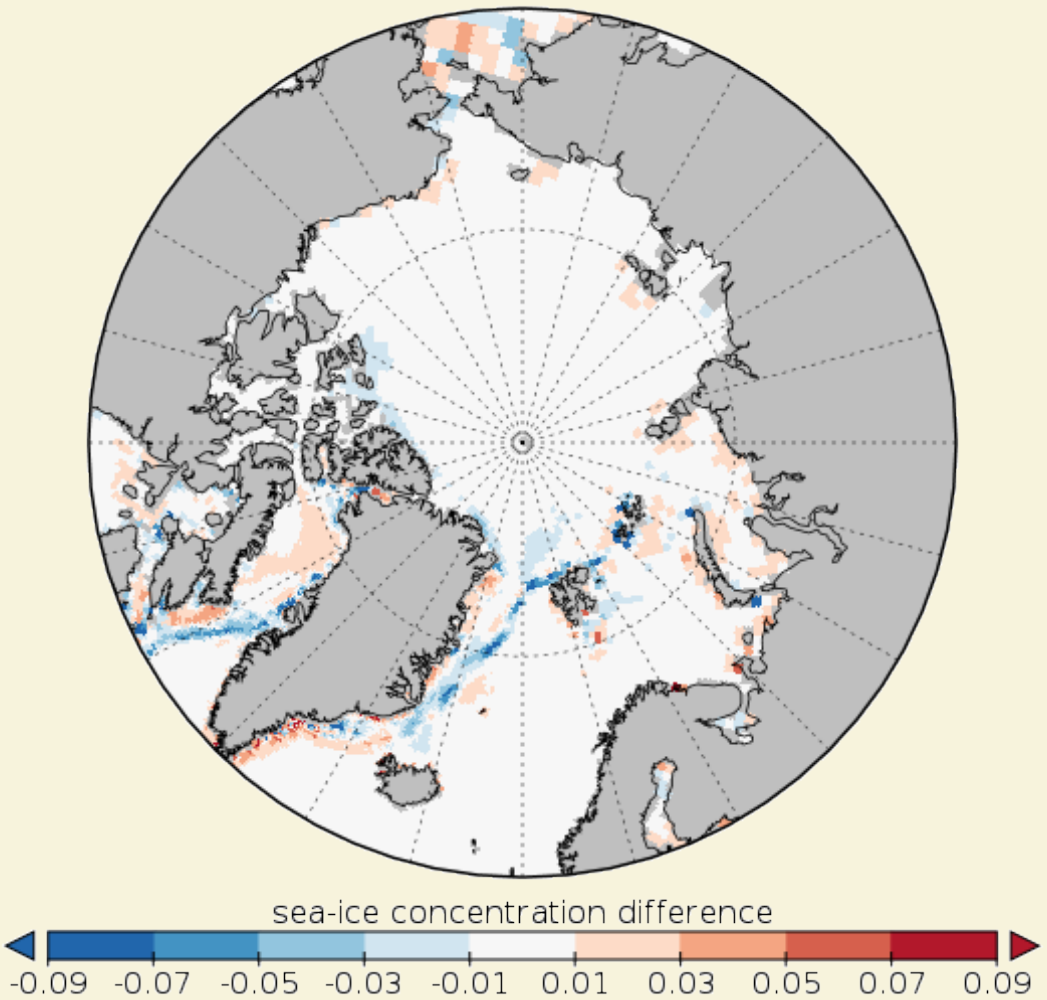
MPI-ESM 1.1 likes CCI SIC 2 even better



(CCI SIC 2 minus MPI-ESM 1.0 SIC March 2003-2008)

MPI-ESM 1.1 likes CCI SIC 2 even unfiltered



(unfiltered CCI SIC 2 - MPI-ESM 1.0 SIC March 2003-2006)

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- The combined analysis of models and observations in ESA CCI has opened new pathways to understand reality
- For sea ice, model analysis have identified possible shortcomings in ice-thickness products
- Models have also indicated possible shortcomings in ice-concentration products.
- On the other hand, the ice-concentration products have allowed us to identify issues with simulated water masses in our model