Frost Impressions of ACCESS-S2 Antarctic Sea Ice Forecasts

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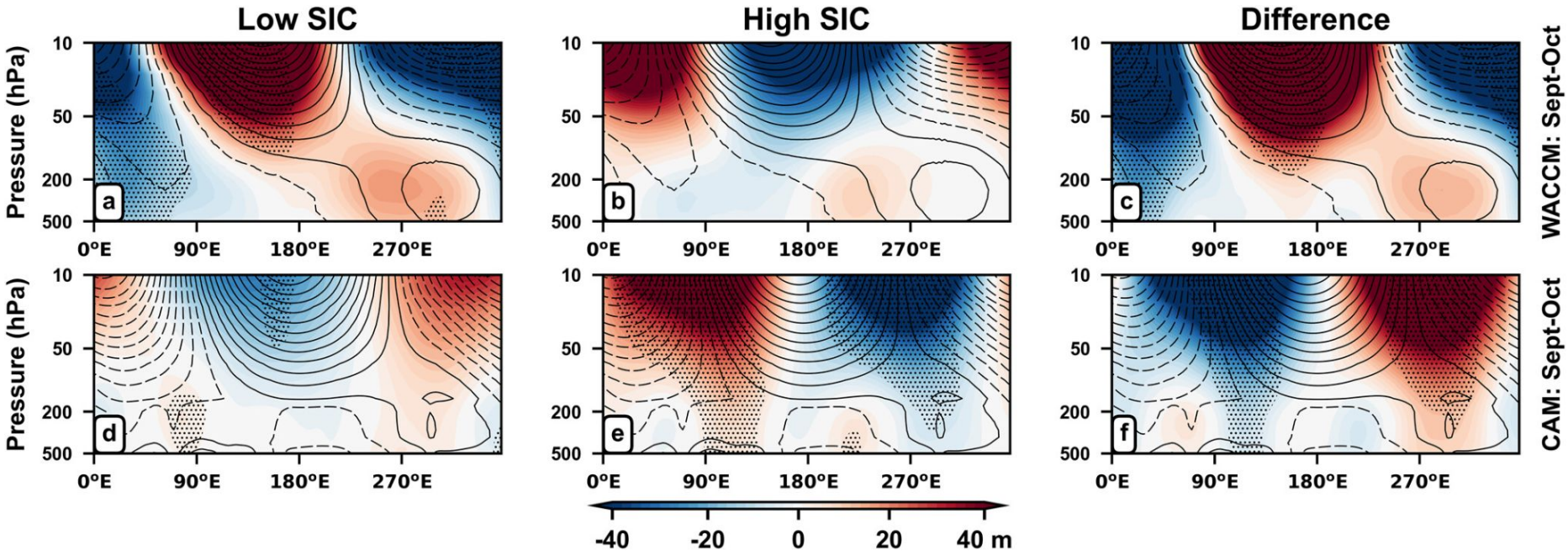
eliocamp.github.io/slides/access-pcwg

SAEF
Securing Antarctica's Environmental Future
Australian Research Council Special Research Initiative

Introduction


JUST ICE LEAGUE



SON eddy geopotential height averaged between 90°S and 60°S for years with low and high July average sea ice concentrations.

Rea, D., Elsbury, D., Butler, A. H., Sun, L., Peings, Y., & Magnusdottir, G. (2024). Interannual influence of Antarctic sea ice on Southern Hemisphere stratosphere-troposphere coupling. *Geophysical Research Letters*, 51, e2023GL107478. https://doi.org/10.1029/2023GL107478

ACCESS-S2

ACCESS-S2

Model:

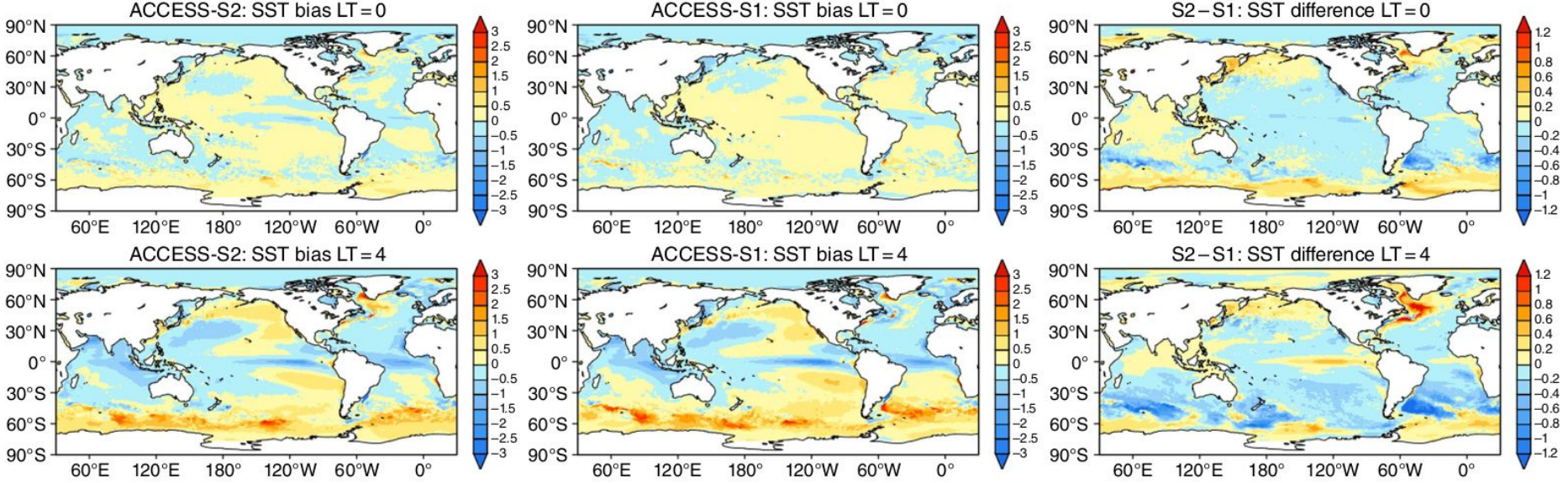
- Unified Model 8.6 atmosphere
- NEMO 3.4 ocean model
- CICE 3.1 sea ice model

Initial Conditions

- Atmosphere: nudged towards ERA-Interim.
- SST: strongly nudged at daily time scale to Reynolds OISSTv2.1 (before 2014) or GAMSSA away from sea ice regions.
- Sea ice concentration: No data assimilation.

Wedd Robin, et al (2022) ACCESS-S2: the upgraded Bureau of Meteorology multi-week to seasonal prediction system. *Journal of Southern Hemisphere Earth Systems Science* **72**, 218-242. https://doi.org/10.1071/ES22026

ACCESS-S2



SST biases for (left) ACCESS-S2, (middle) ACCESS-S1 and (right) their differences in (top) the first month of the forecast (0-month lead time) and (bottom) the fifth month of the forecast (4-month lead time). The SST biases are computed with respect to Reynolds OI SST data

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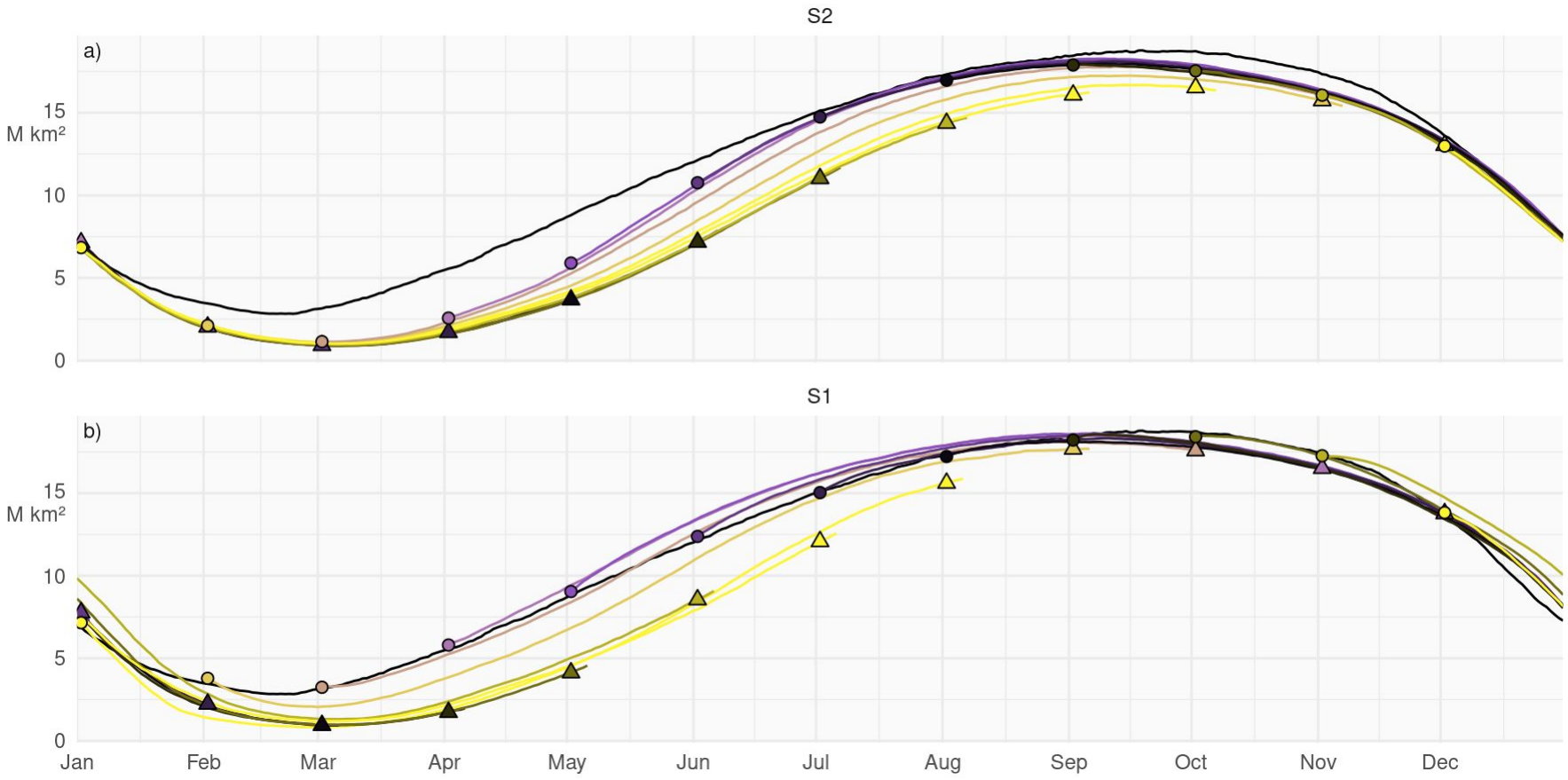
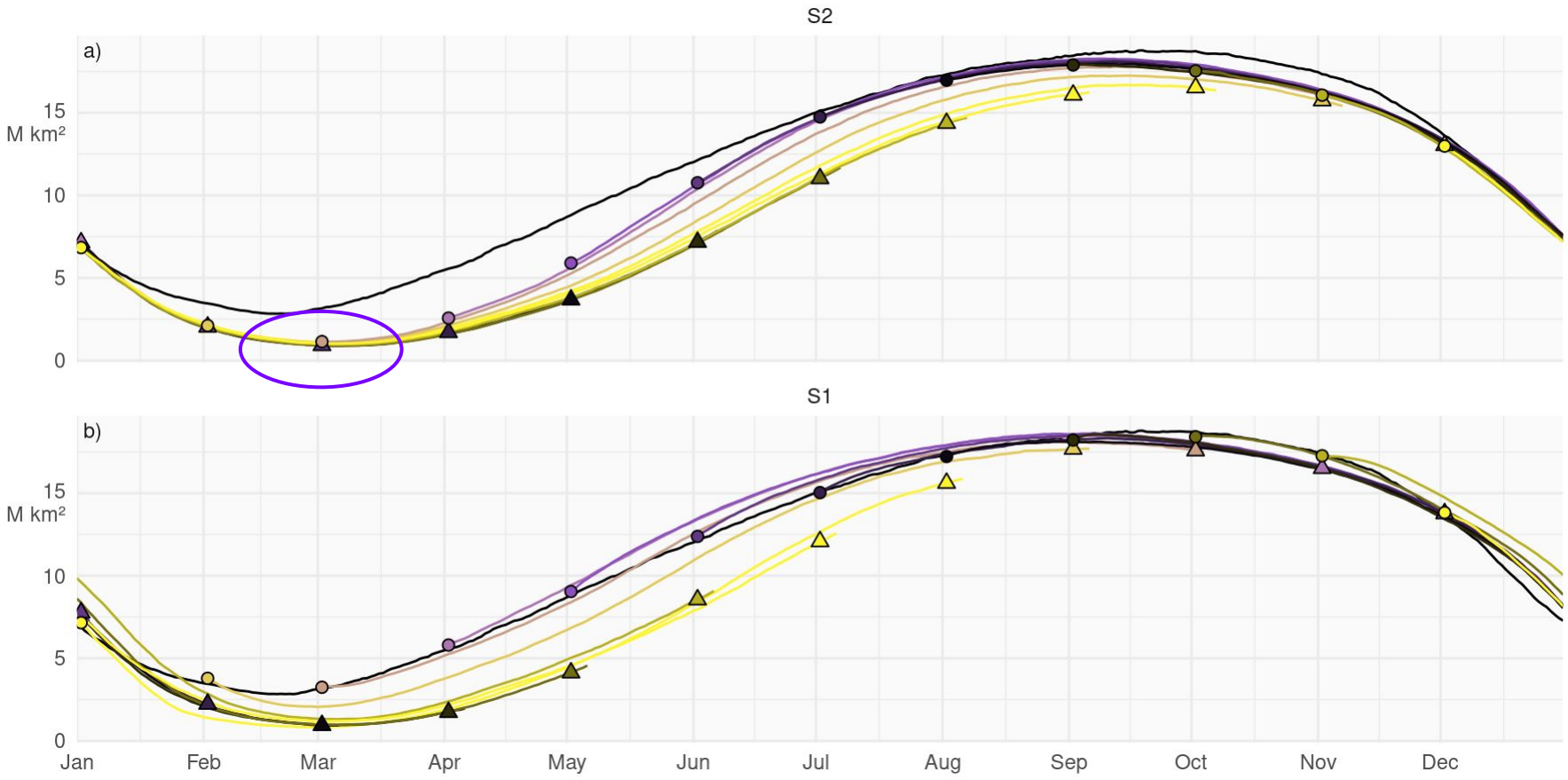
ACCESS-S2 (and S1) Hindcast Bias



Median sea ice extent for al hindcasts initialised the first of the month for S2 and S1 in colours representing the starting month. In black, observed median sea ice extent.



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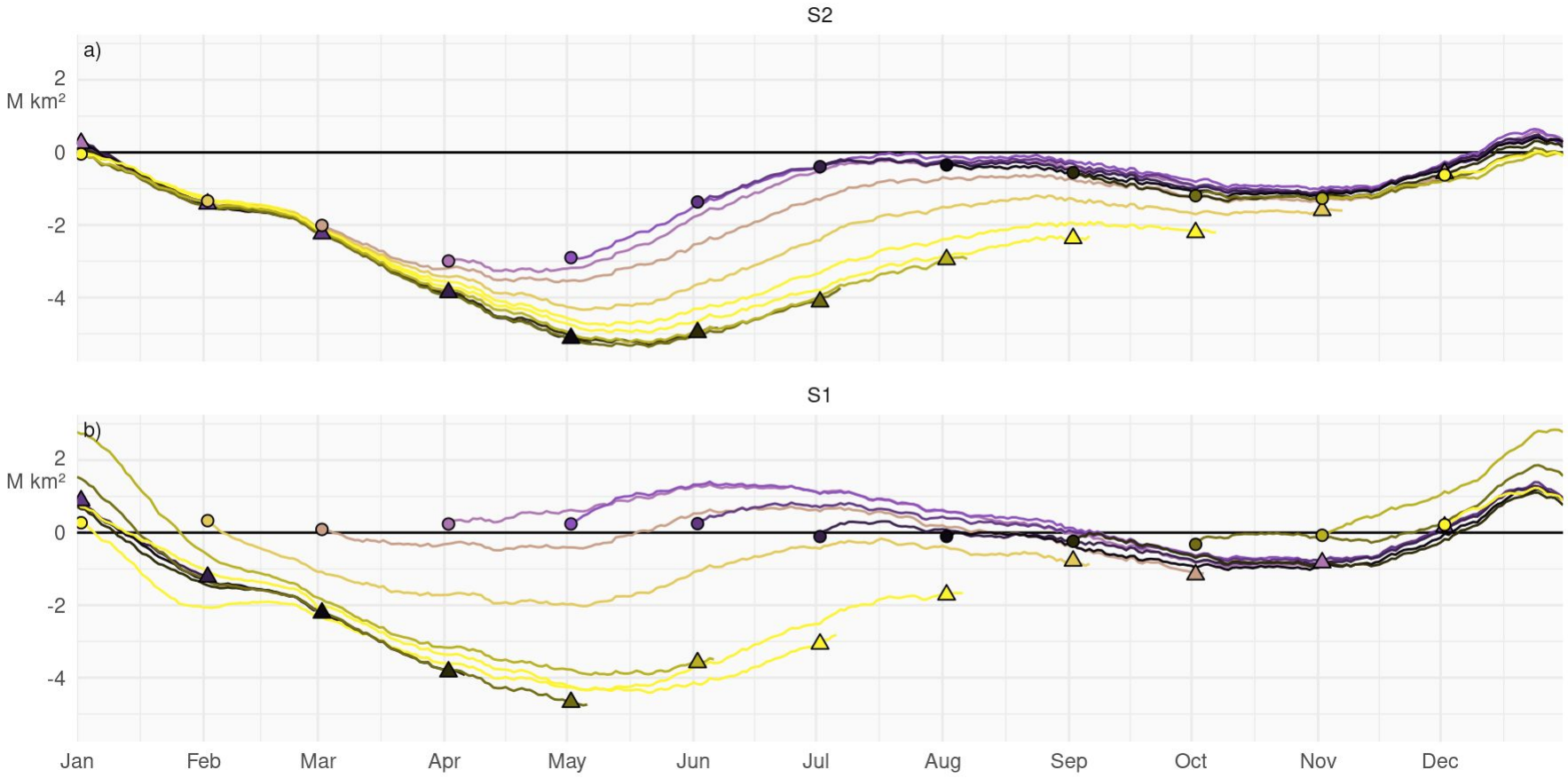
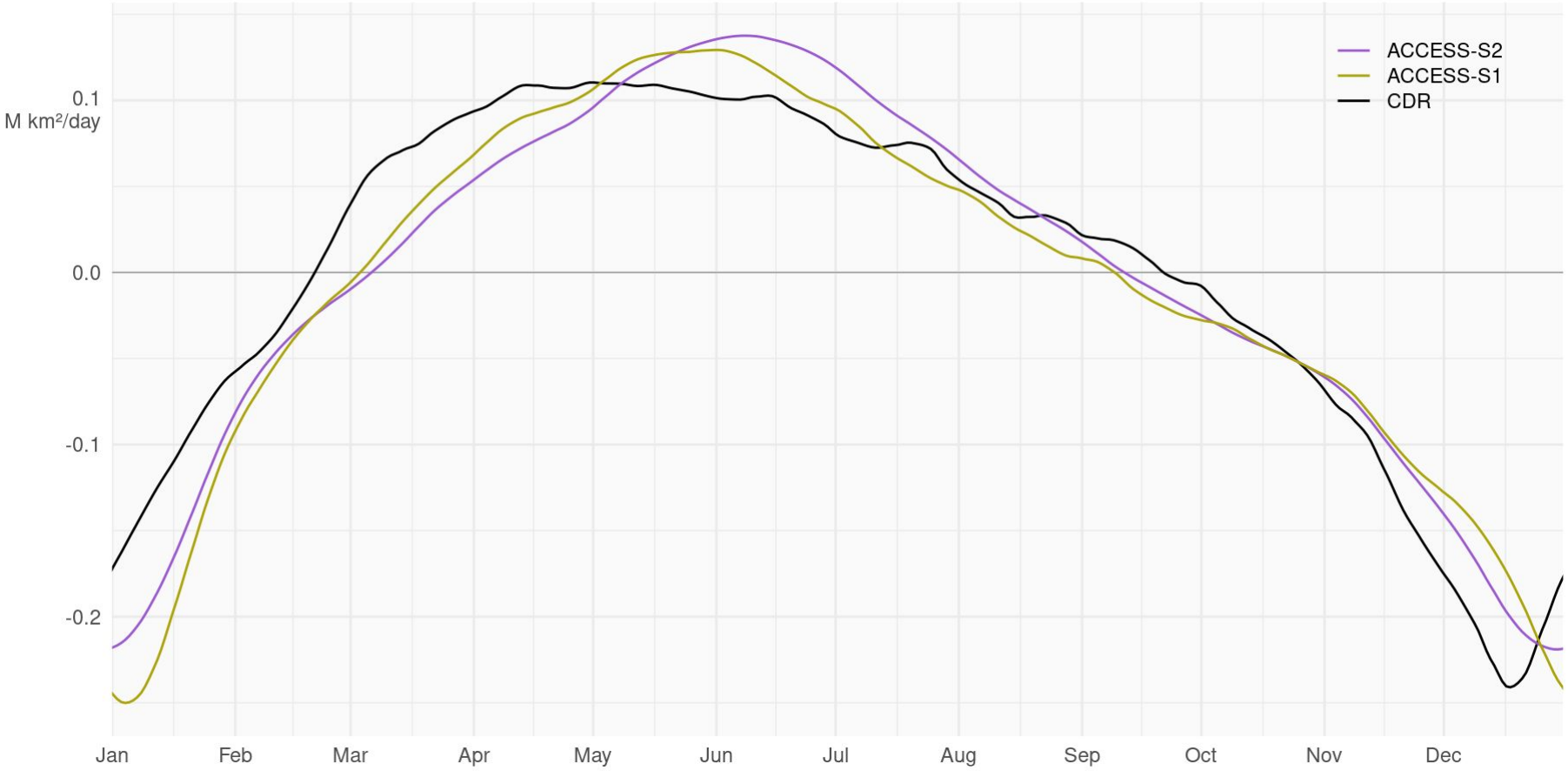
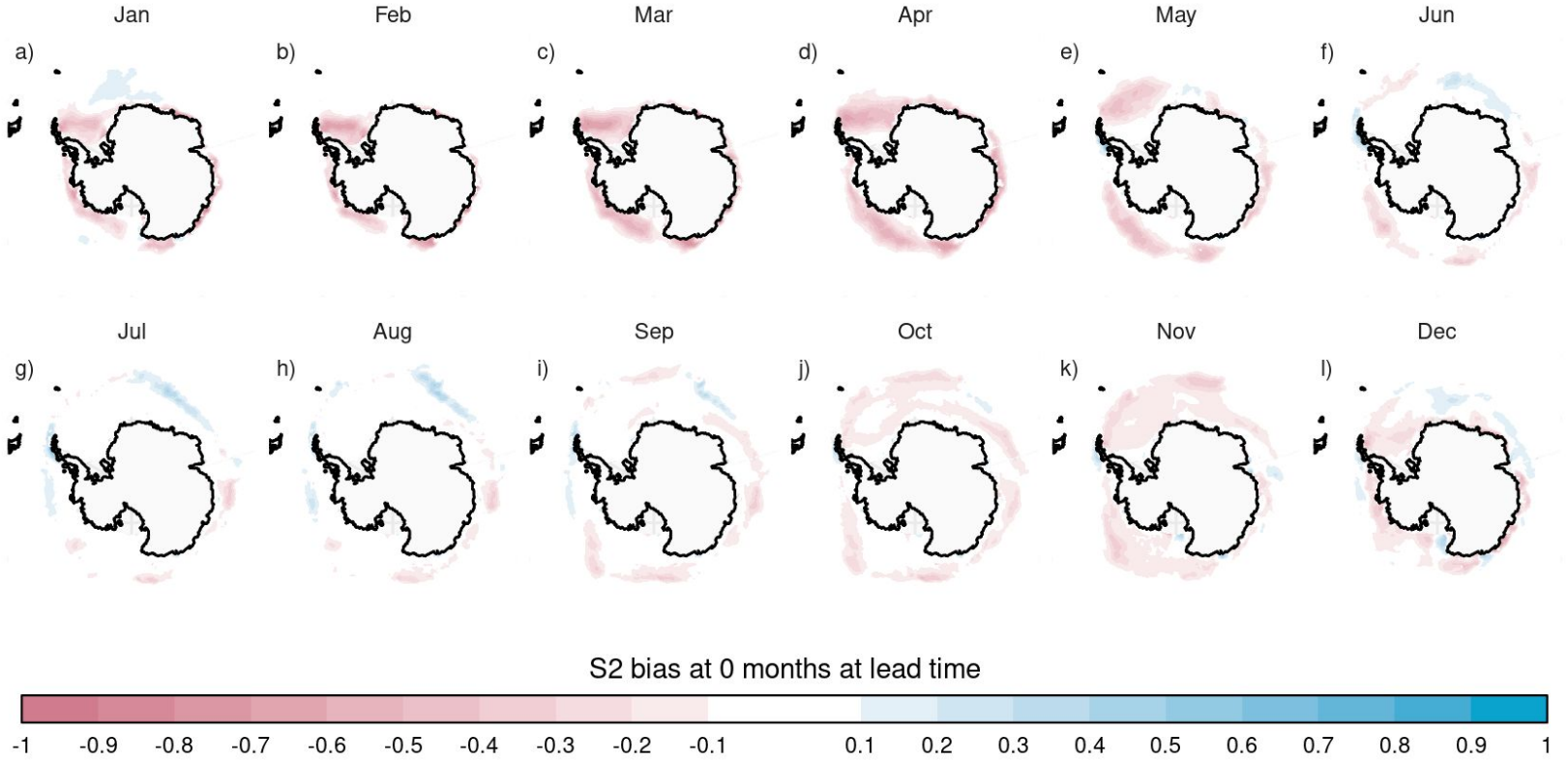


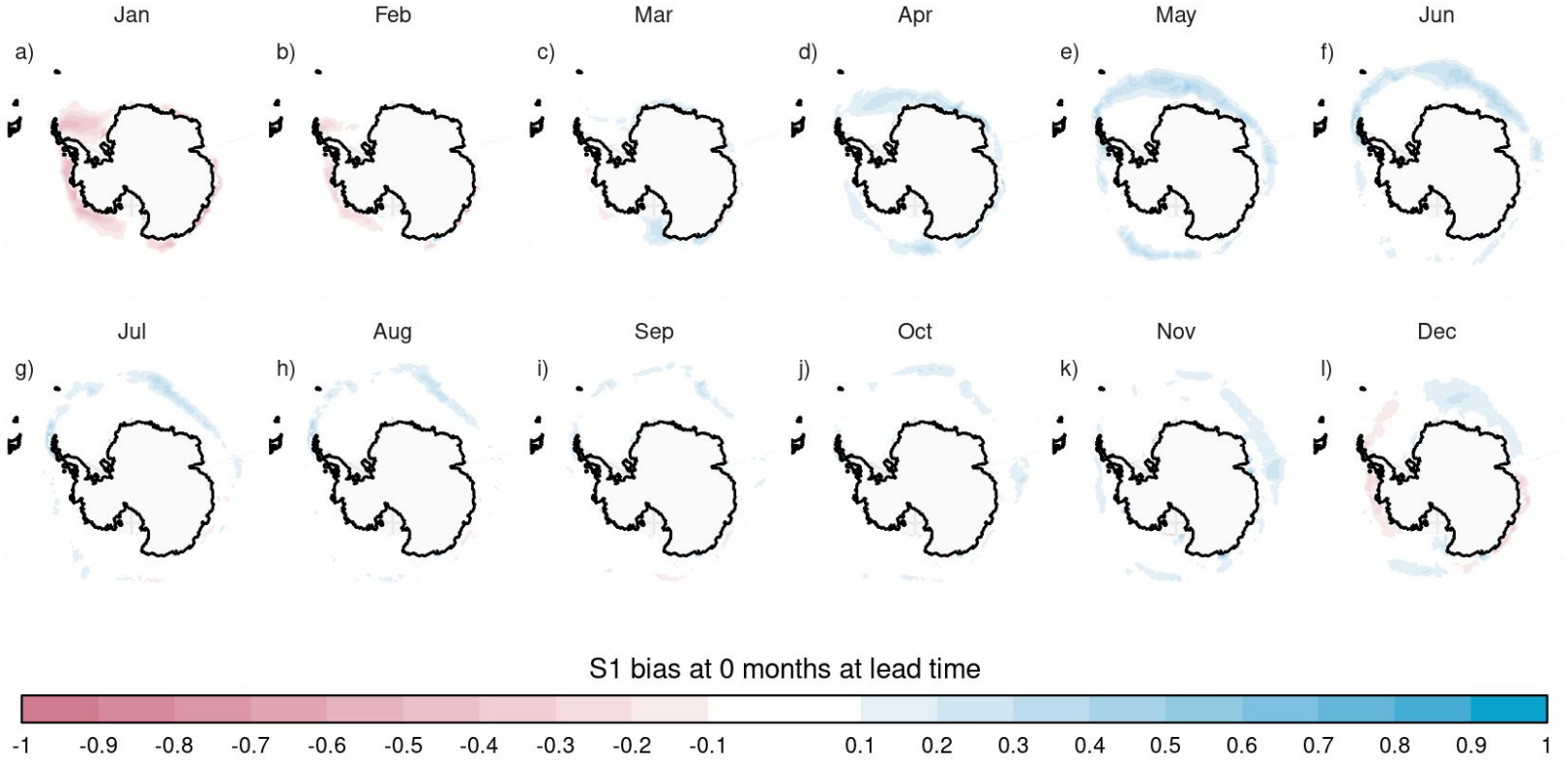
Median sea ice extent bias for al hindcasts initialised the first of the month for S2 and S1 in colours representing the starting month.



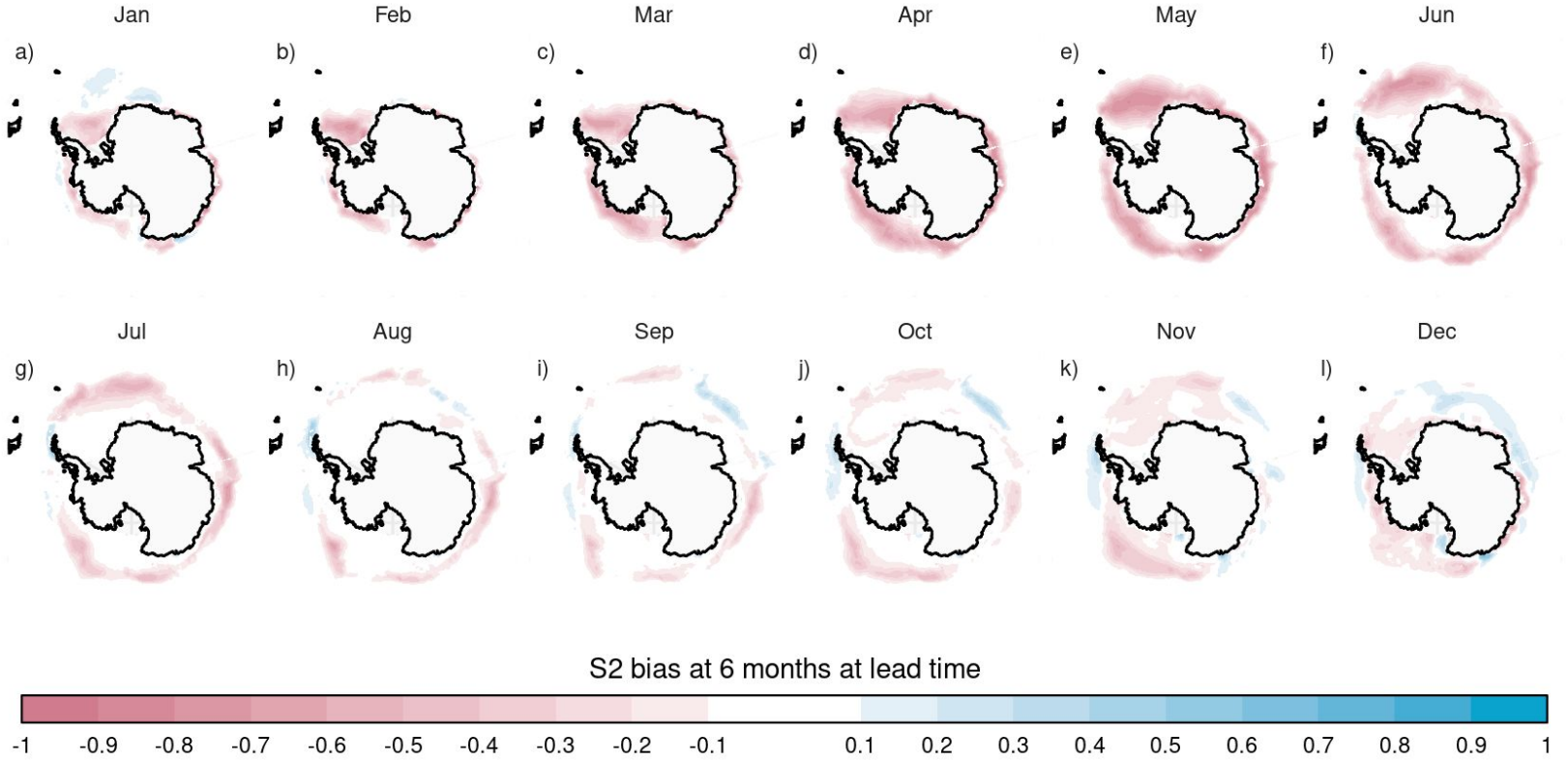
Median daily sea ice extent growth of forecasts and observations. Values are smoothed with a 2-degree loess smooth with a 30 day window.



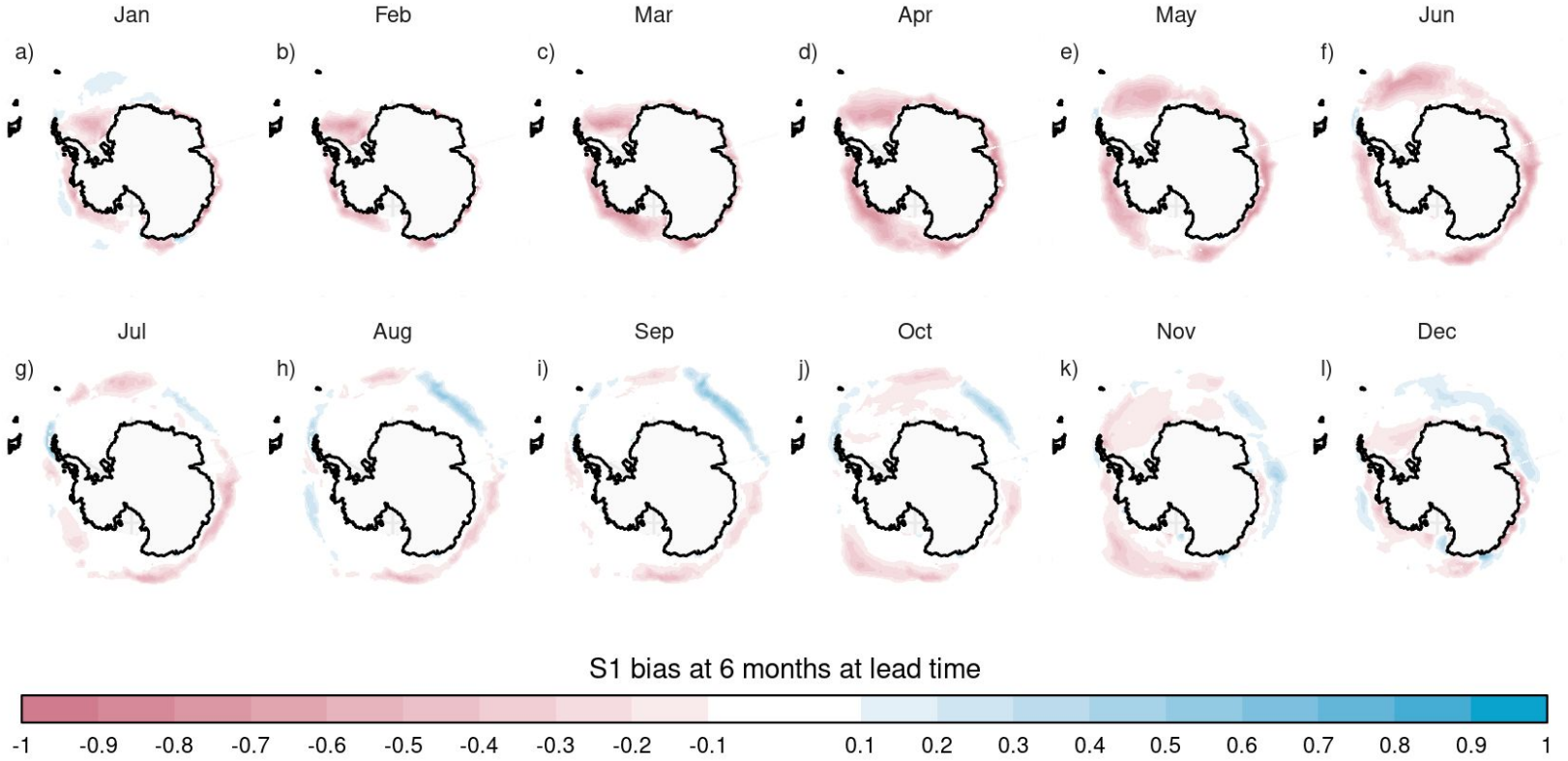
ACCESS-S2 zero lead sea ice concentration bias.



ACCESS-S1 zero lead sea ice concentration bias.



ACCESS-S2 6 month lead sea ice concentration bias.



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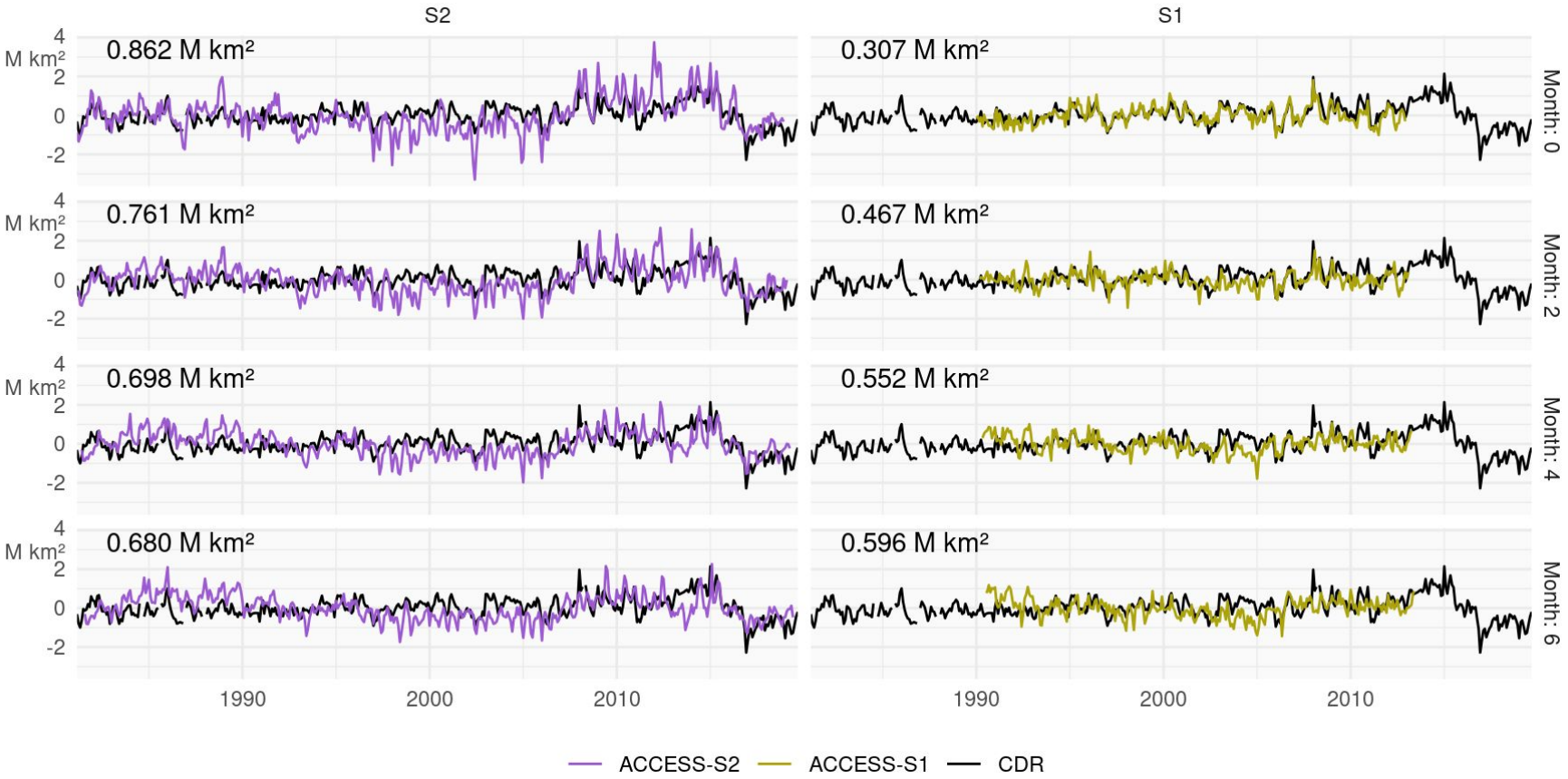
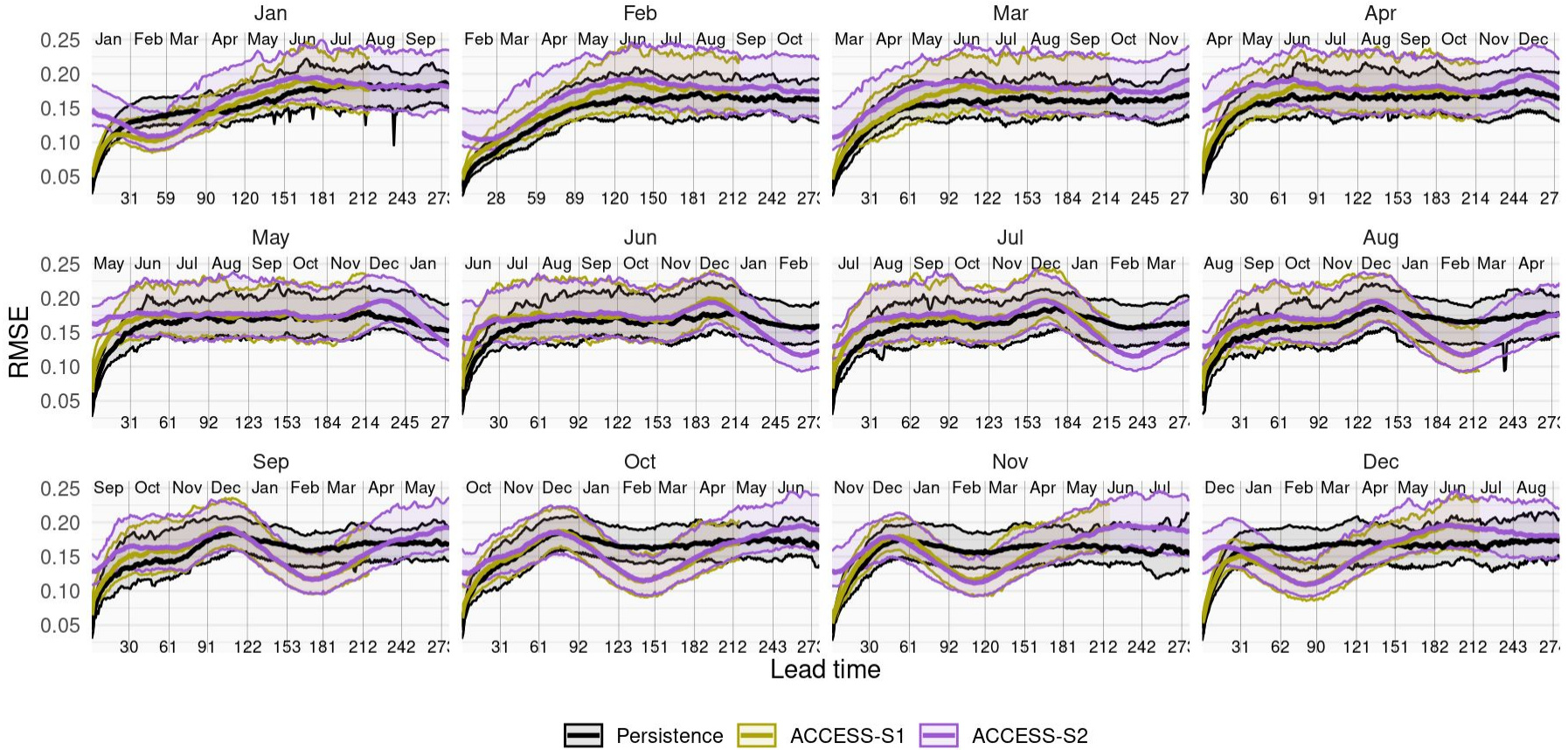
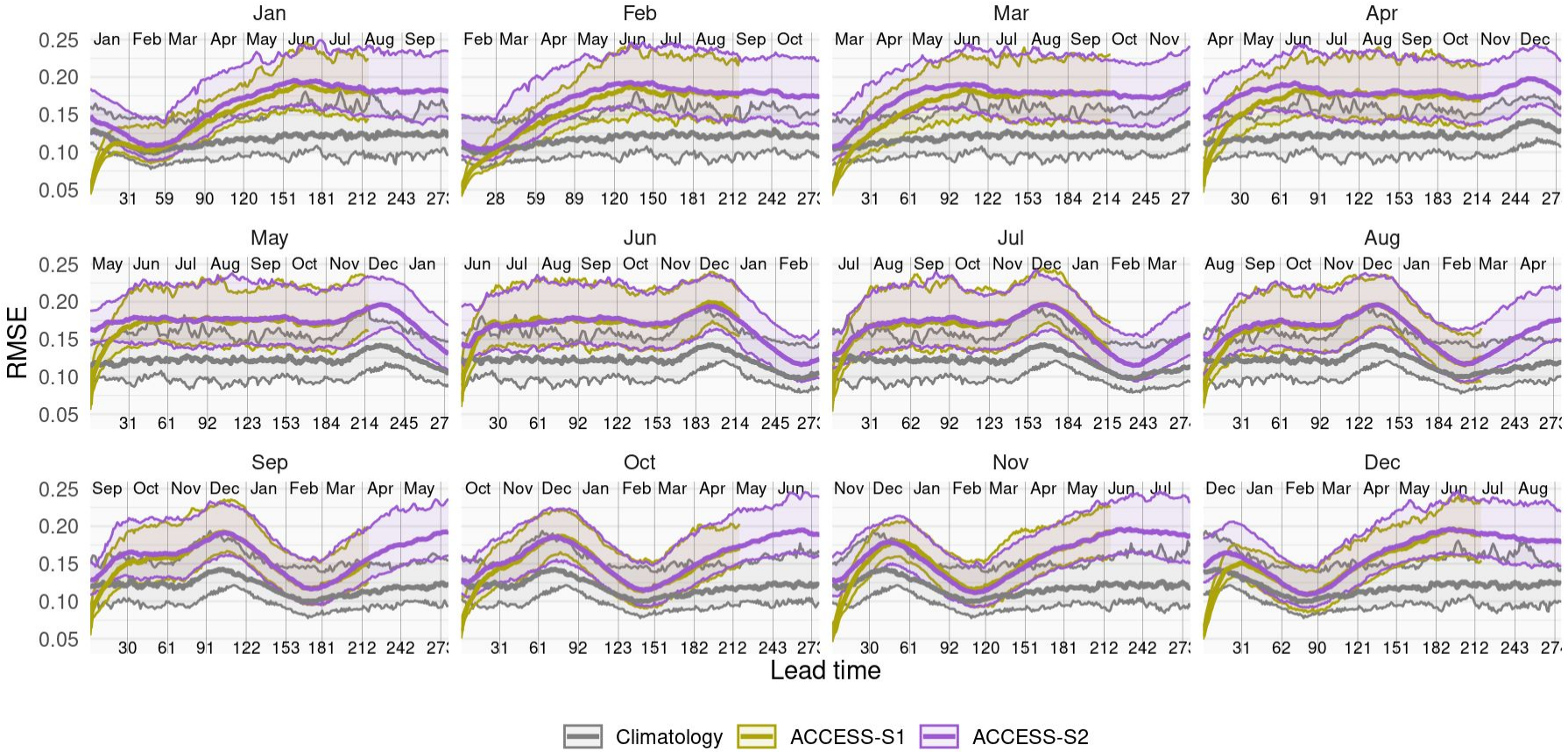
ACCESS-S2 (and S1) Hindcast Anomalies



Monthly mean sea ice extent anomalies for S2 and S1 and observations (black) at selected lead times. The number in the top left is the RMSE computed in the common period.



Median and 95% range of sea ice concentration anomalies RMSE for forecast initalised on each month.



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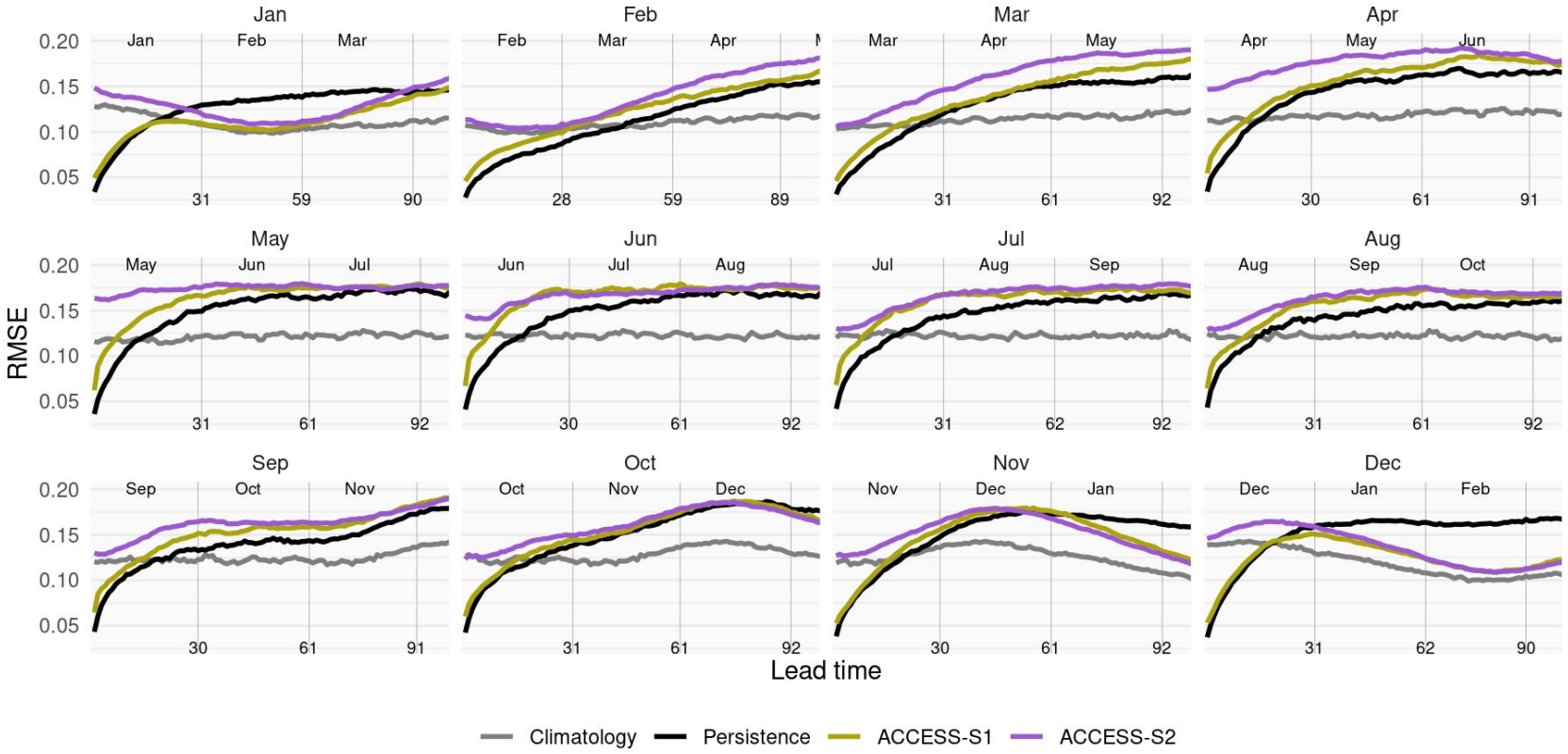

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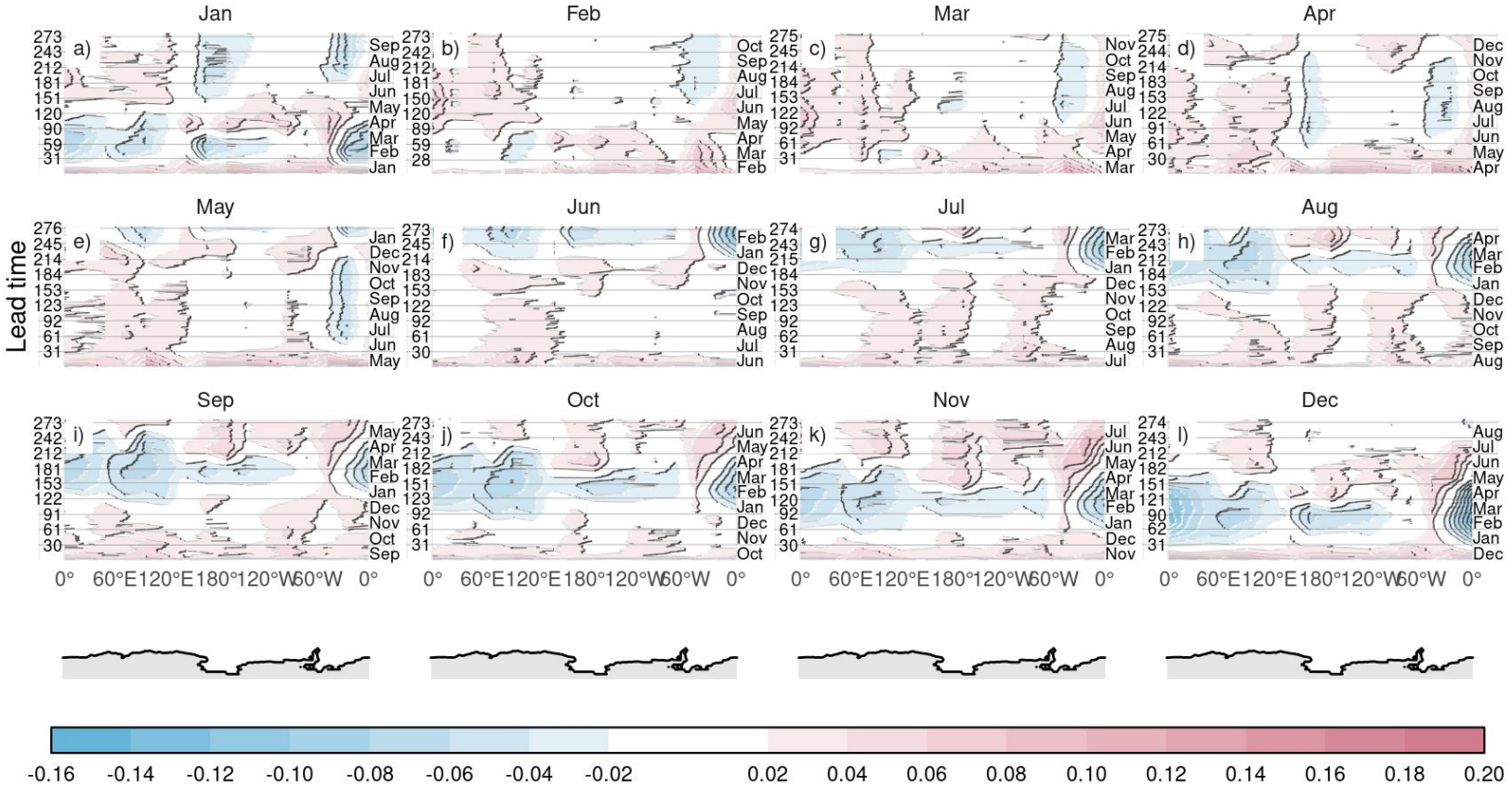

Median and 95% range of sea ice concentration forecast RMSE minus persistence RMSE computed at 15°-wide slices.

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