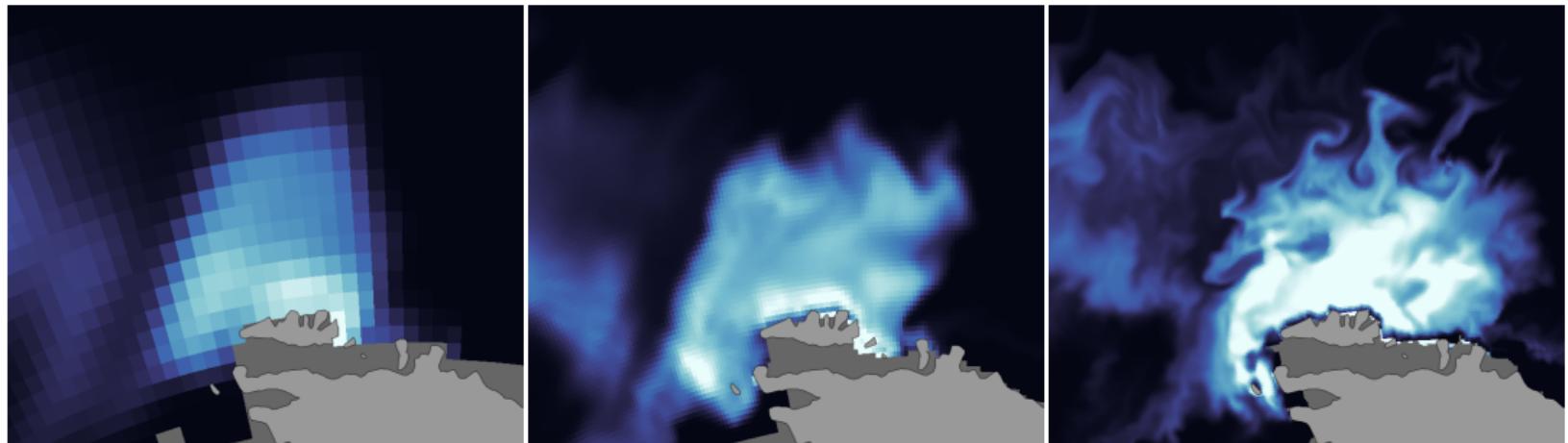


Sea ice in ACCESS-OM2

Andrew Kiss (ANU),

Paul Sandery (CSIRO), Petra Heil (AAD & AAPP, UTas), Will Hobbs (AAPP, UTas)



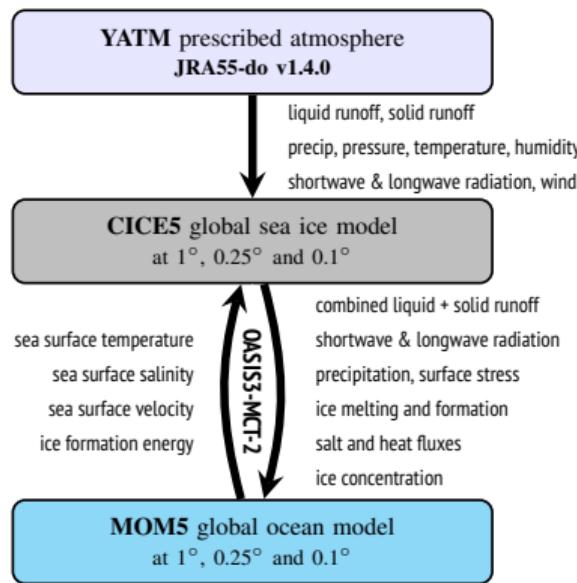
1°: ACCESS-OM2

0.25°: ACCESS-OM2-025

0.1°: ACCESS-OM2-01



ACCESS-OM2 model configuration and experiments



- ▶ **Atmospheric forcing: JRA55-do reanalysis**
- ▶ Sea ice and ocean are free-running (**no DA**)
- ▶ **CICE 5.1** sea ice with 5 thickness categories

Control experiments at 1°, 0.25° and 0.1°

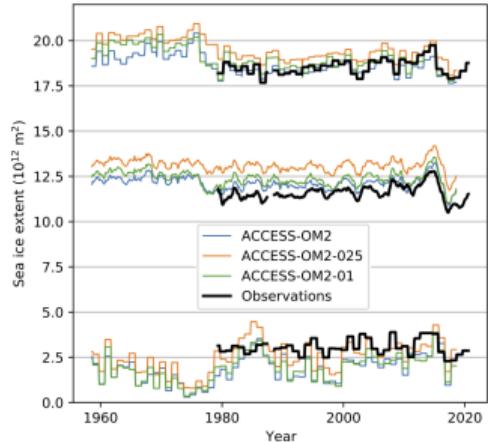
Multiple 61-year (1958-2018) cycles:

- ▶ **ACCESS-OM2:** 366 yr (Hakase Hayashida)
- ▶ **ACCESS-OM2-025:** 366 yr (Ryan Holmes)
- ▶ **ACCESS-OM2-01:** 183 yr

40 perturbation experiments (51 yr, mostly 1°)

- ▶ IR & vis ice albedo; snow patchiness
- ▶ ice-ocean heat transfer, drag, turning angle
- ▶ ice ridging scale
- ▶ ocean background vertical diffusivity

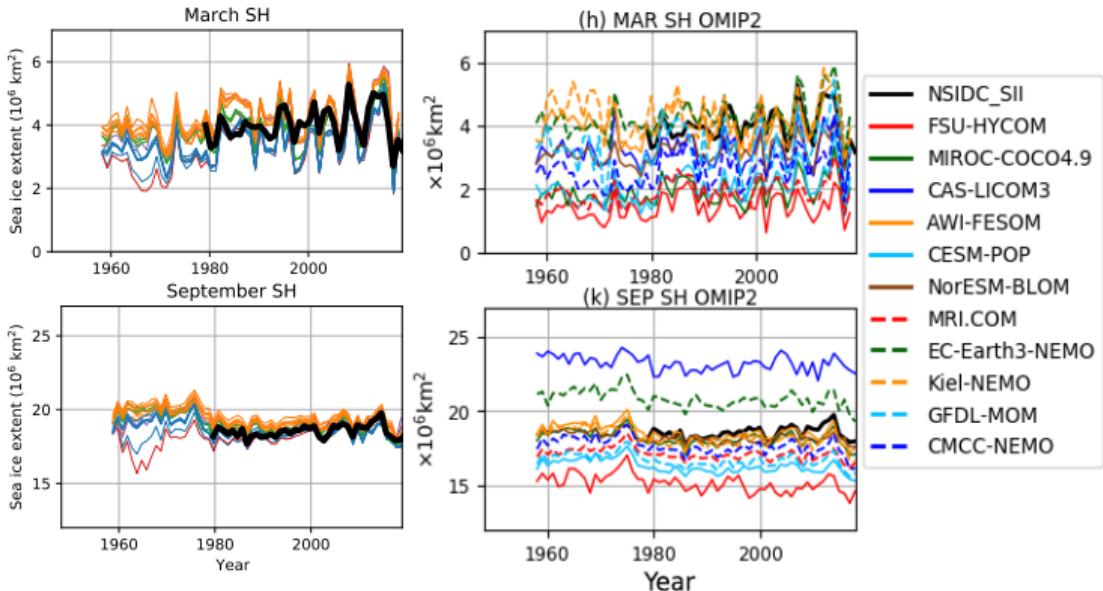
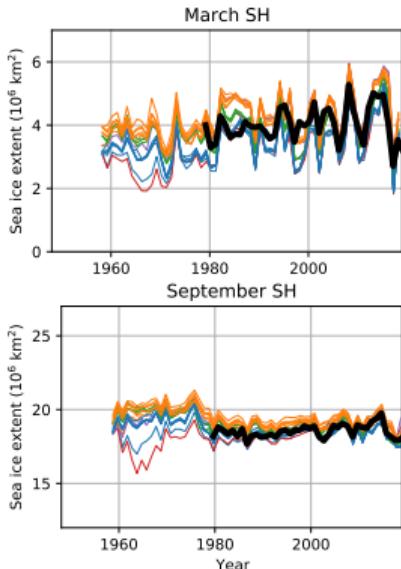
Antarctic sea ice extent



ACCESS-OM2

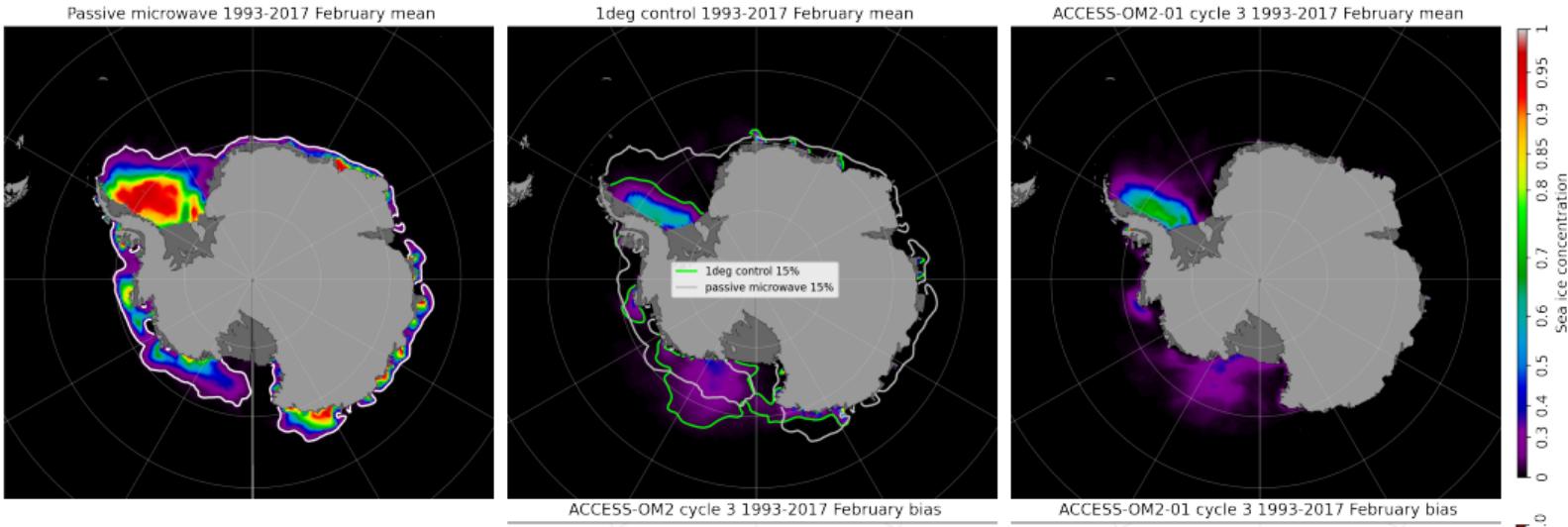
annual max, mean, min

- ACCESS-OM2
- ACCESS-OM2-025
- ACCESS-OM2-01
- ACCESS-OM2 v1
- ACCESS-OM2-025 v1
- ACCESS-OM2-01 v1
- NSIDC_SII obs



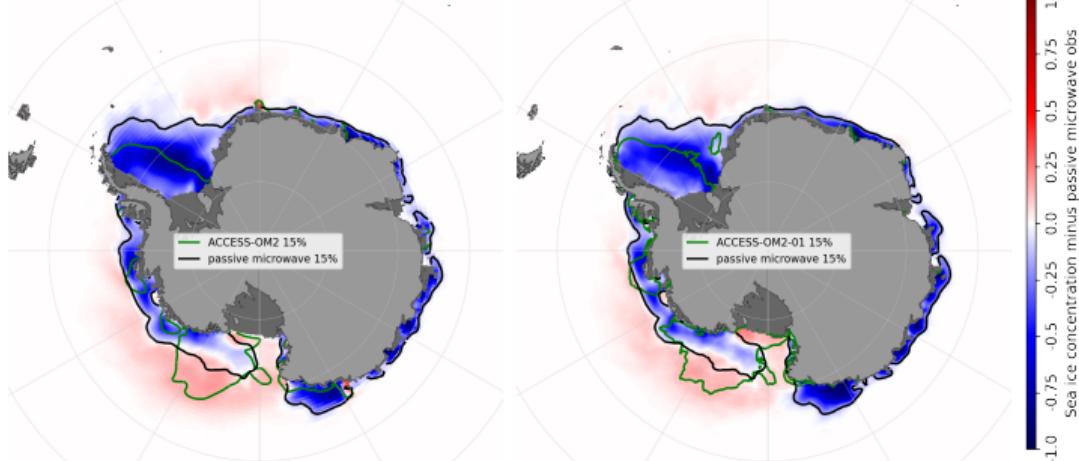
OMIP2 models with JRA55-do

(Tsujino et al., 2020)

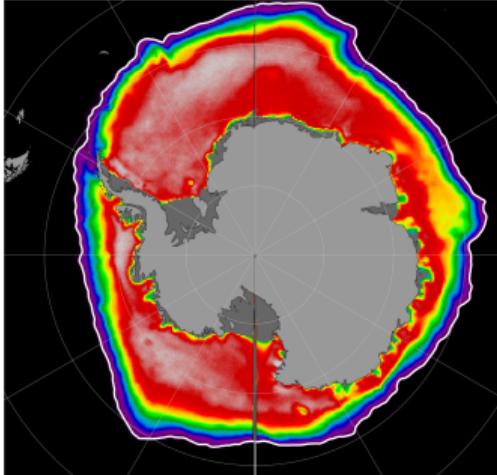


Feb 1993–2017 mean
sea ice concentration

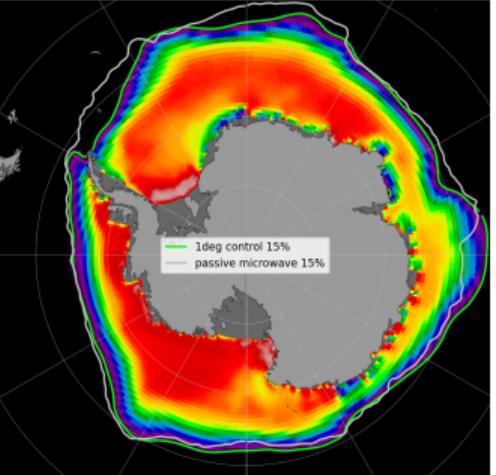
Strong negative bias in
both resolutions



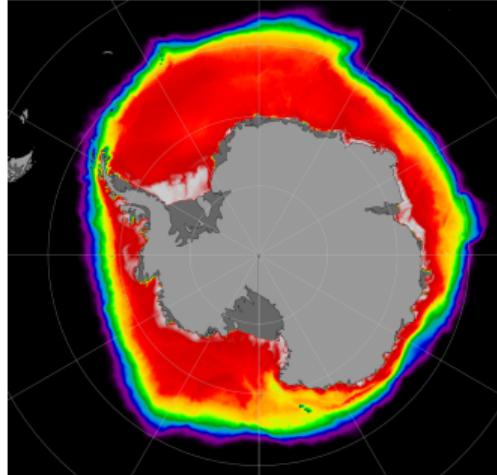
Passive microwave 1993-2017 September mean



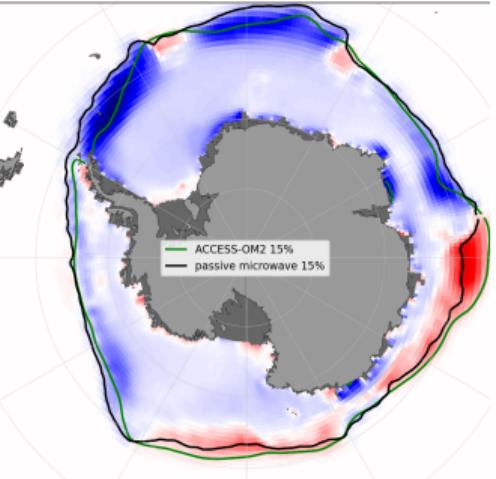
1deg control 1993-2017 September mean



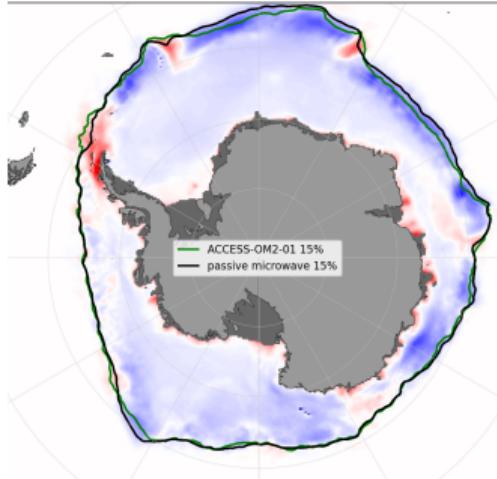
ACCESS-OM2-01 cycle 3 1993-2017 September mean



ACCESS-OM2 cycle 3 1993-2017 September bias



ACCESS-OM2-01 cycle 3 1993-2017 September bias

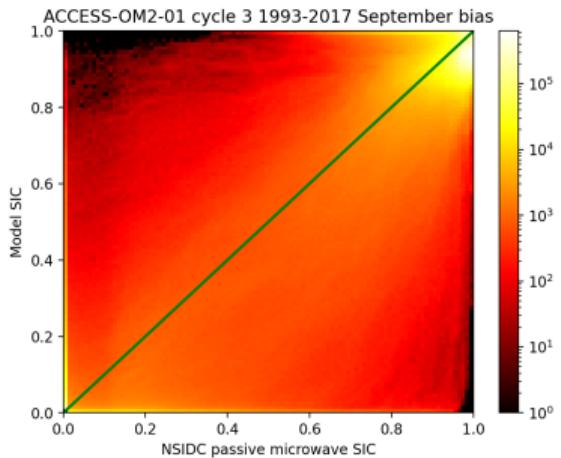
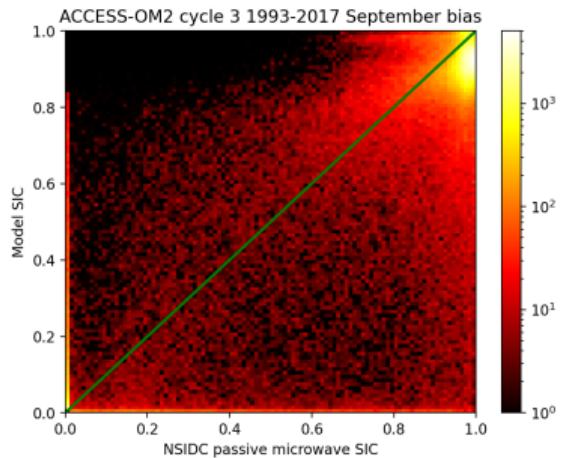
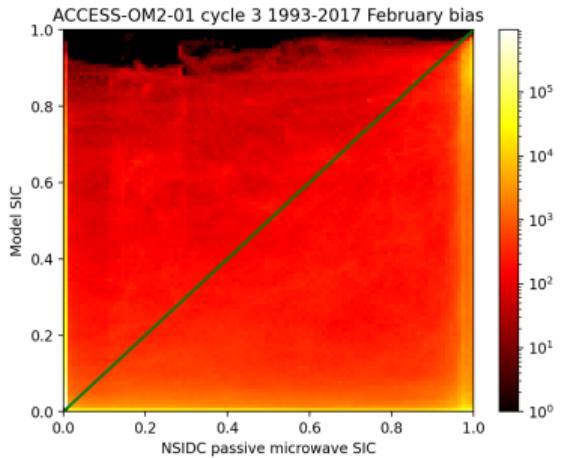
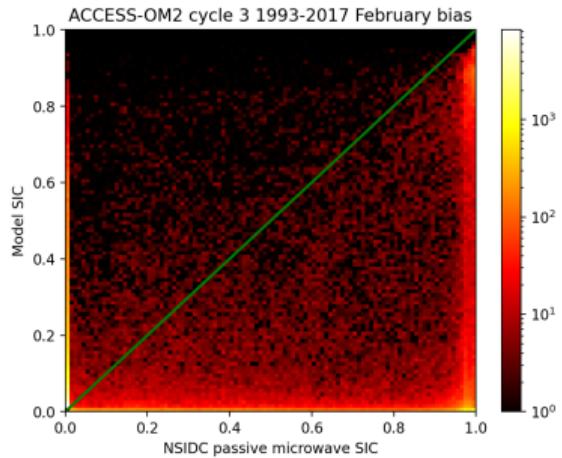


Sep 1993–2017 mean
sea ice concentration

Smaller bias, especially at
0.1°

Sea ice concentration

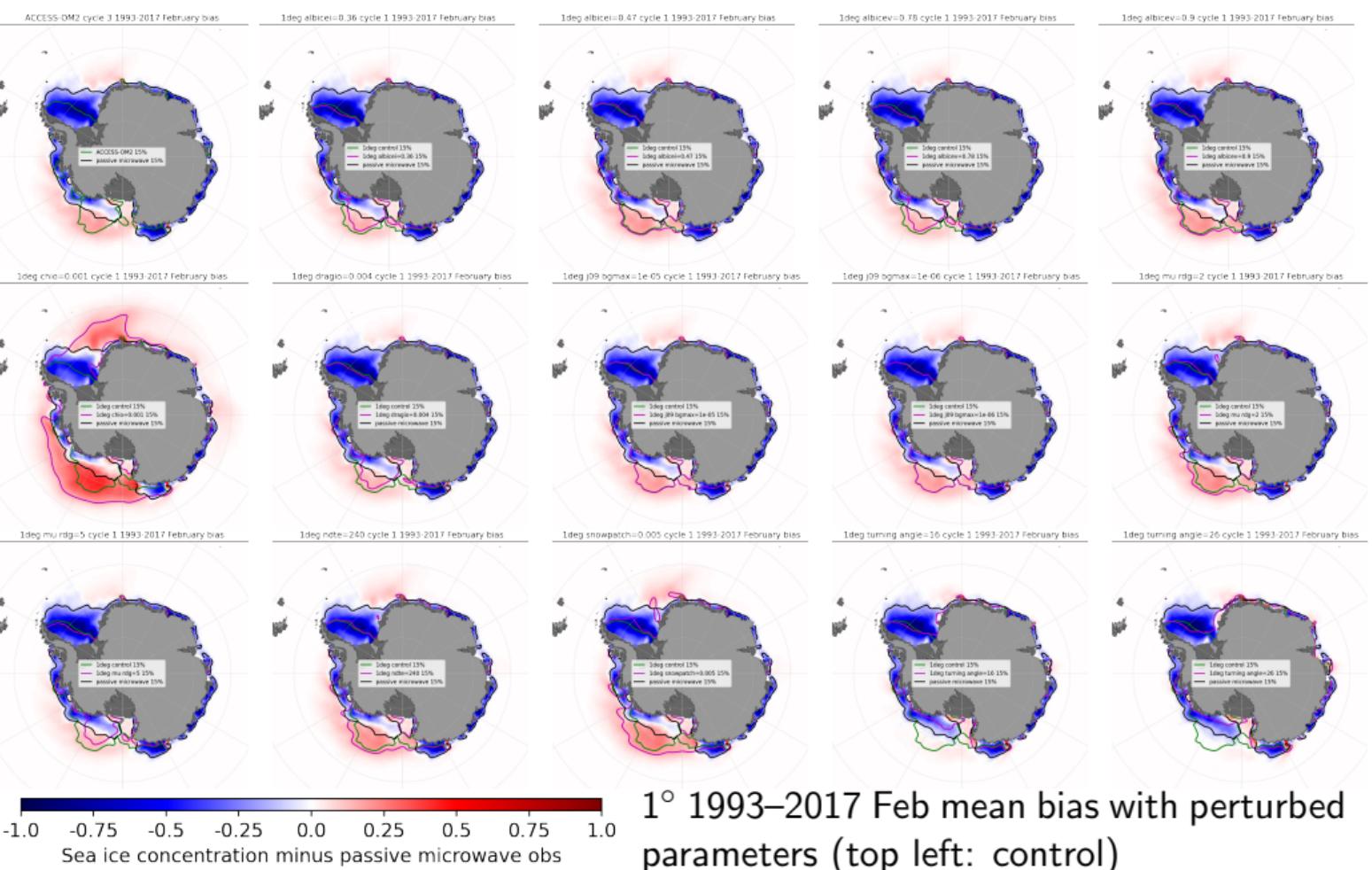
Sea ice concentration minus passive microwave obs

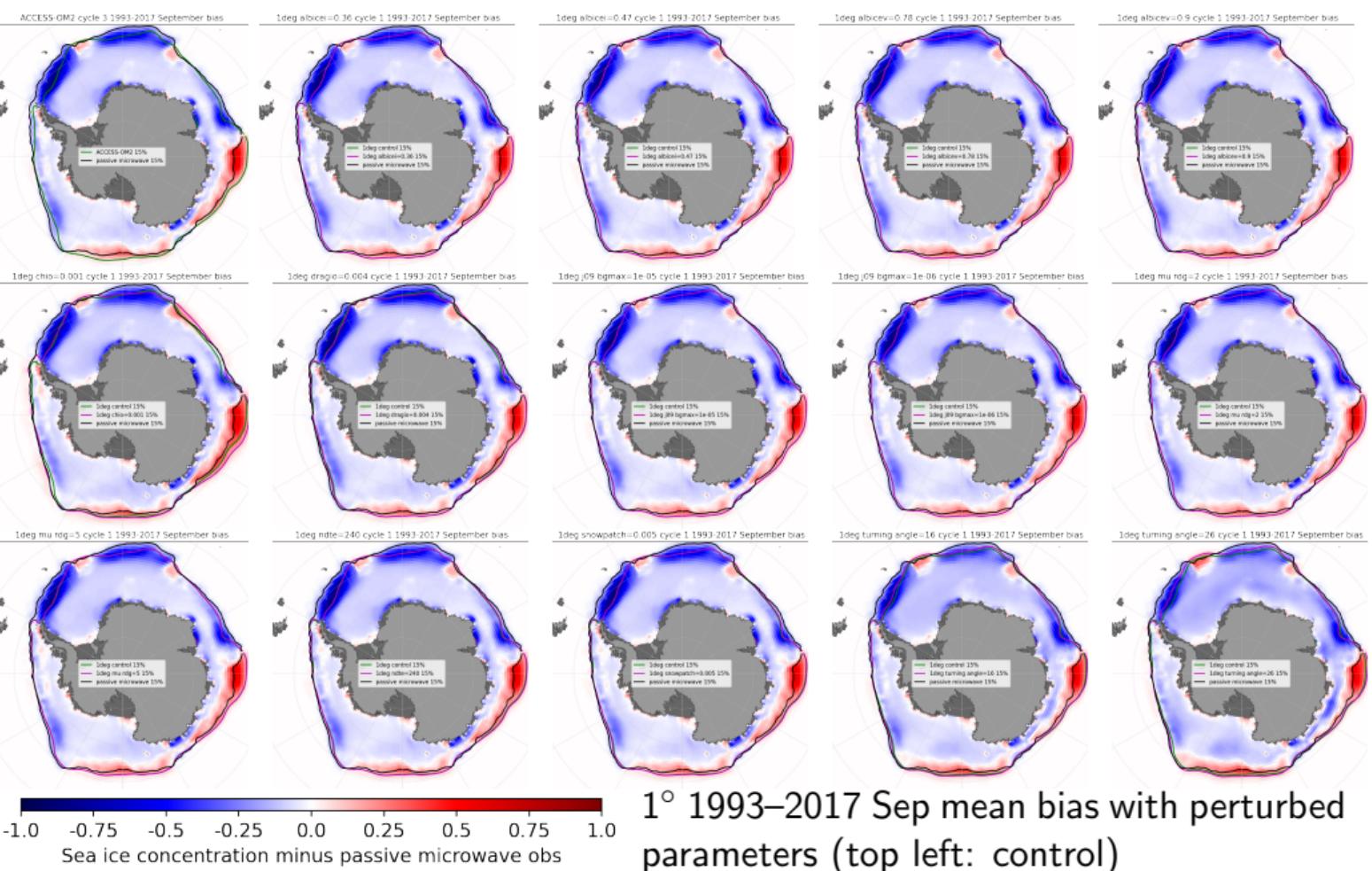


Bivariate histograms
monthly mean model
SIC vs obs SIC at
each grid cell for
1993–2017.

Model predicts pattern
of high SIC much
better in winter than
summer.

Marginal ice locations
not well predicted
(without DA).





Summary: Antarctic sea ice in ACCESS-OM2

- ▶ ACCESS-OM2 is closer to Antarctic SIC obs than most other OMIP2 models
- ▶ Model SIC is biased low at summer minimum (Feb) at all resolutions
- ▶ Model SIC is less biased at winter maximum (Sept), especially at 0.1°
- ▶ Monthly SIC pattern matches obs best at high concentrations in winter; marginal ice zone location/concentration not well reproduced (no DA)
- ▶ Biases are insensitive to parameters investigated to date; investigated parameters seem close to optimal in control configurations