



Supplement of

Subseasonal forecast improvements from sea ice concentration data assimilation in the Antarctic

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Detrended SIE ACC (1992-2017)

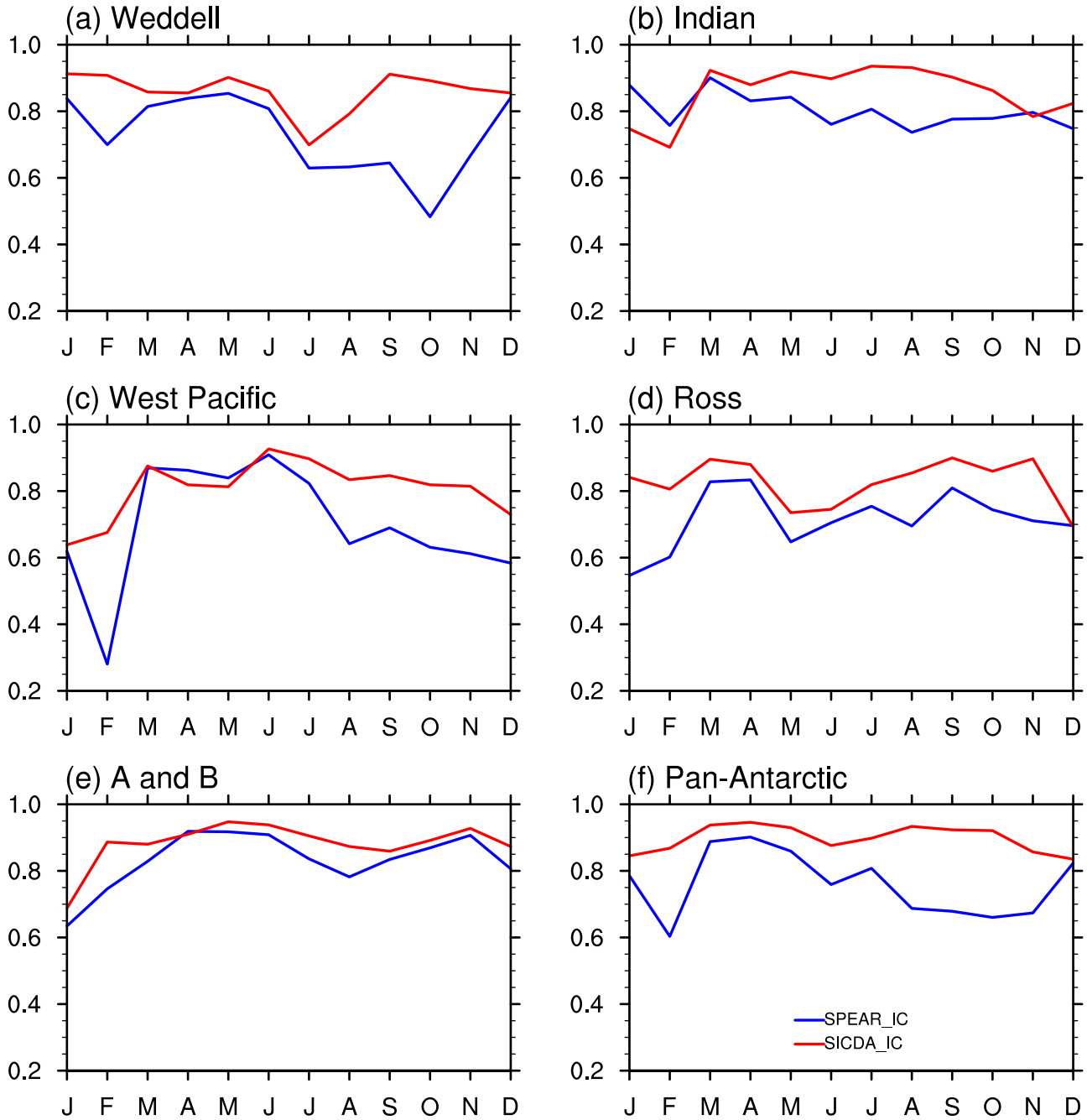


Figure S1. Detrended ACC of regional SIE from SPEAR_IC (blue) and SICDA_IC (red). The detrended ACC values are calculated against the NSIDC SIC observations using monthly SIE from 1992 to 2017.

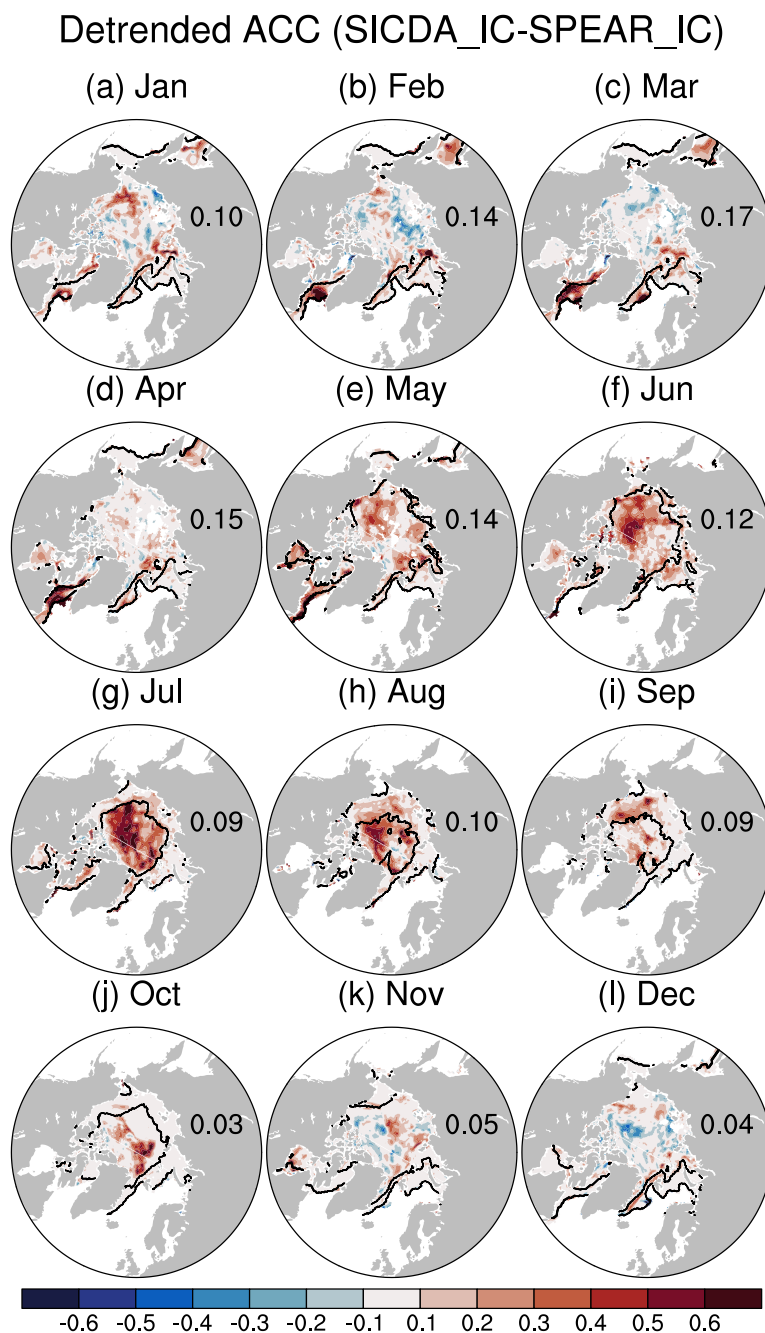


Figure S2. The detrended SIC ACC difference between the two ICs (SICDA_IC - SPEAR_IC) in the Arctic. The ACC The black lines on each map represent the 10% SIC interannual variability zone. The numbers on each map are the area-weighted average of the ACC difference within the 10% SIC variability zone.

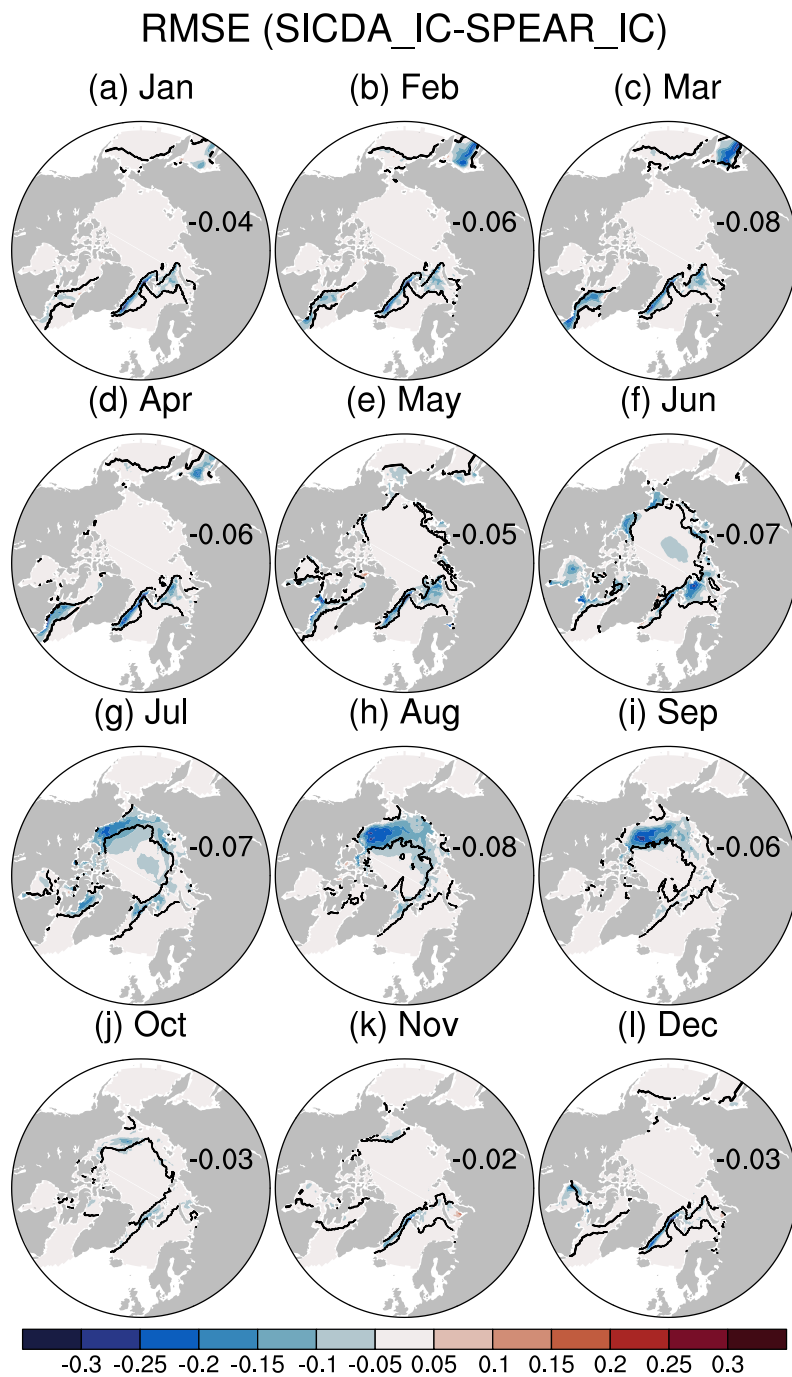


Figure S3. The SIC RMSE difference between the two ICs (SICDA_IC - SPEAR_IC) in the Arctic. The black lines on each map represent the 10% SIC interannual variability zone. The numbers on each map are the area-weighted average of the RMSE difference within the 10% SIC variability zone.

Climatology of SIV (10^6km^3 ; 1992-2017)

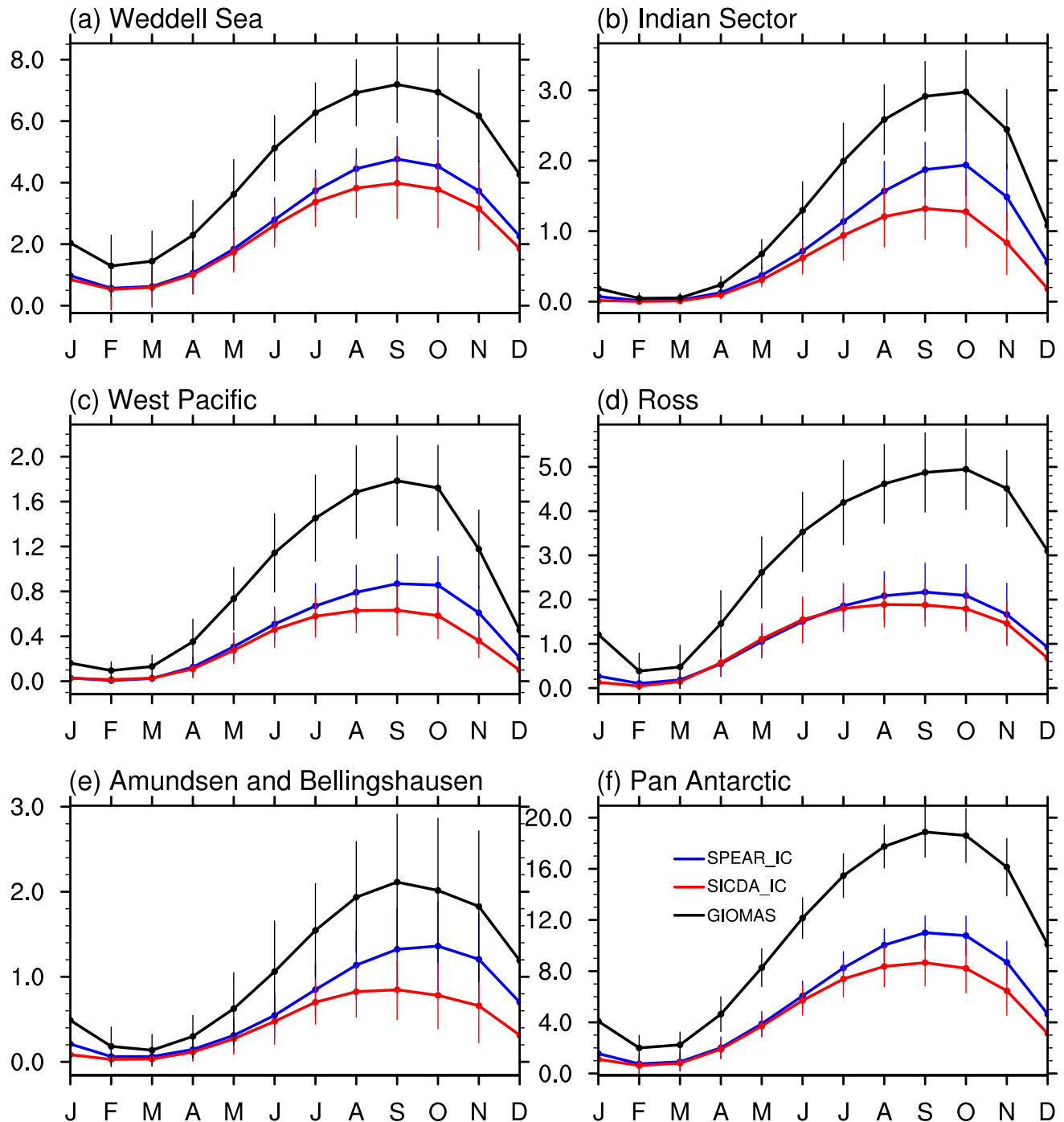


Figure S4. The 26-year (1992–2017) mean seasonal cycle of Antarctic SIV for SPEAR_IC (blue), SICDA_IC (red), and GIOMAS (black). Each error bar represents two standard deviations of regional SIE calculated over the years.

Climatology of SIV (1992-2017)

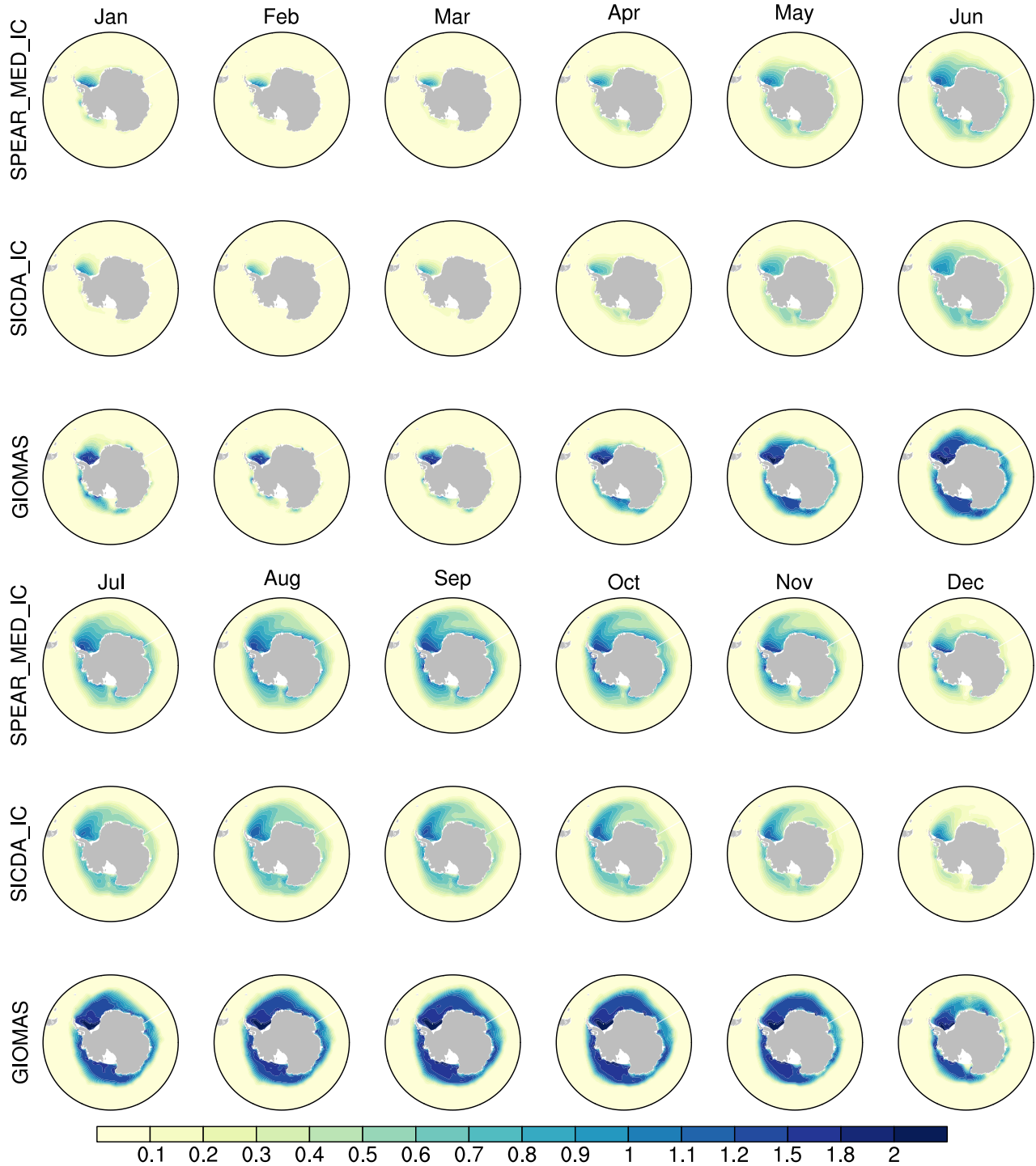


Figure S5. The 26-year (1992–2017) mean Antarctic SIV for SPEAR_IC, SICDA_IC, and GIOMAS.

Detrended ACC (SICDA_MED - SPEAR_MED)

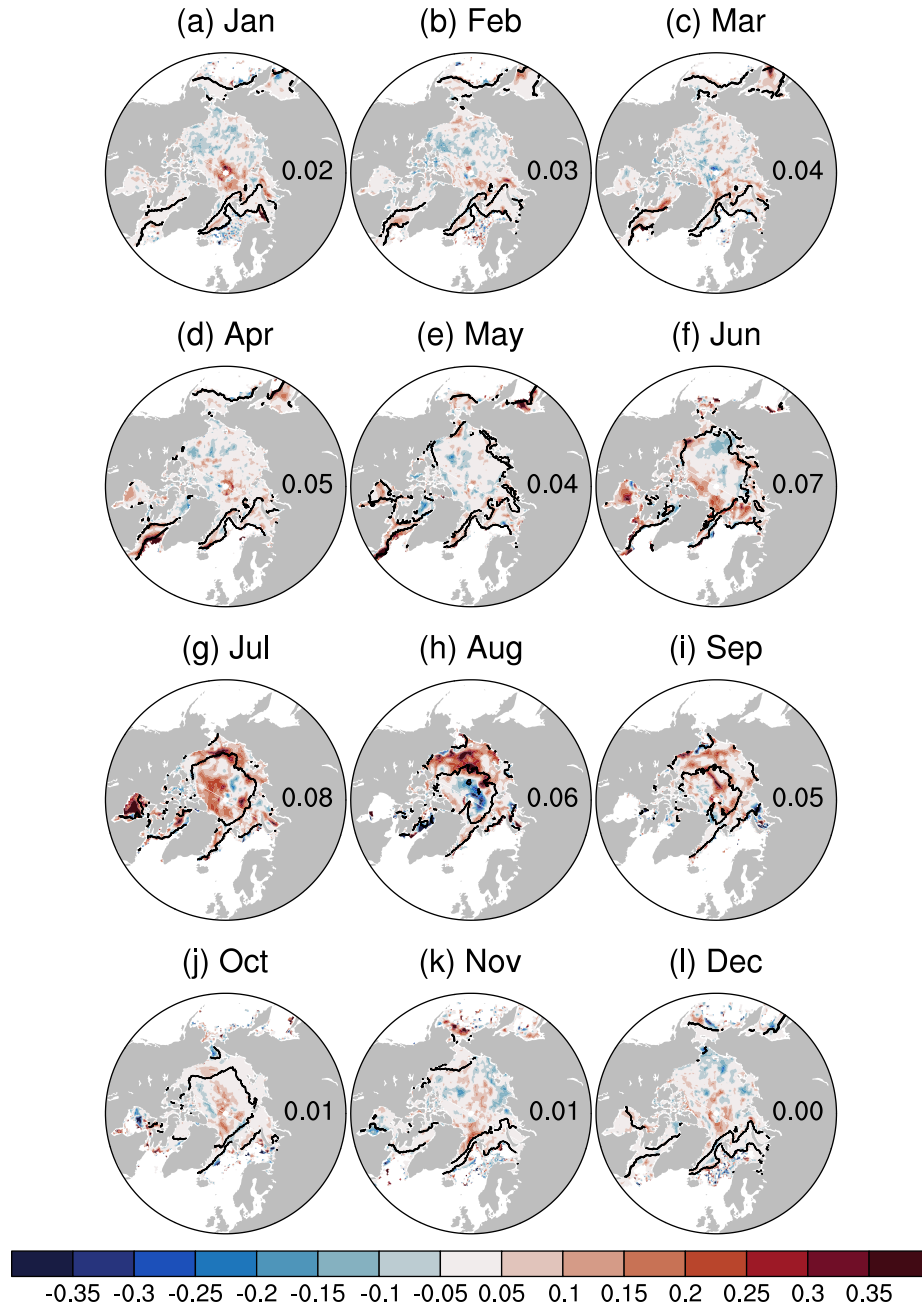


Figure S6. 45-forecast-day mean of the detrended SIC Anomaly Correlation Coefficient (ACC) difference between the two reforecast experiments (SICDA - SPEAR). The black lines on each map represent the 10% SIC interannual variability zone calculated based on observations. The numbers on each map are the area-weighted average of the ACC difference within the 10% SIC variability zone.

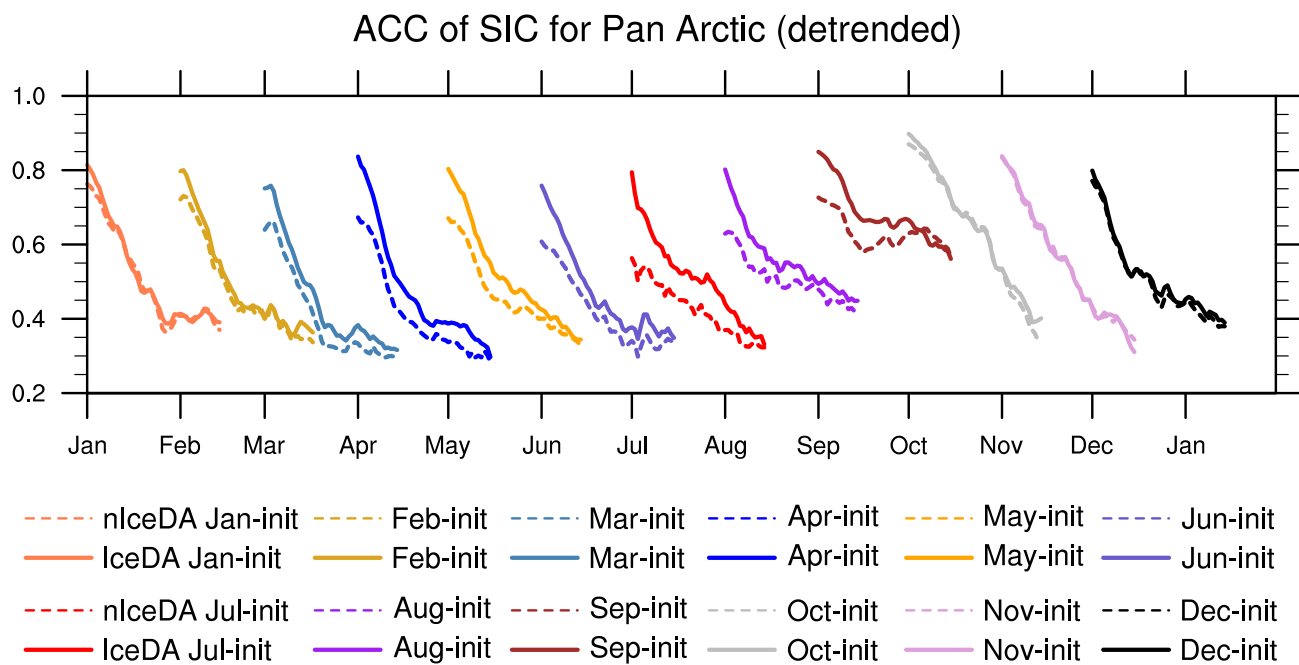
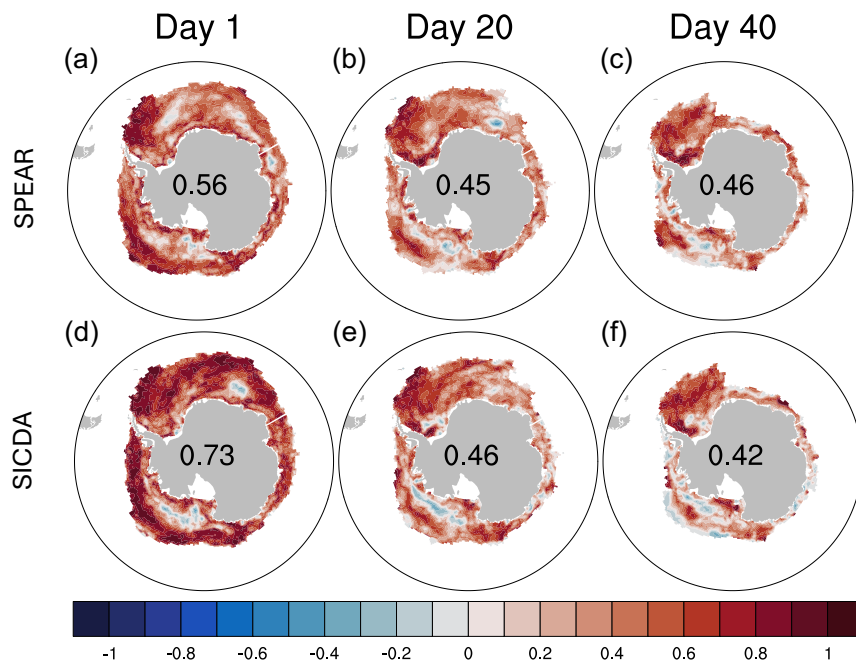


Figure S7. Detrended ACC of SIC averaged over the Arctic ice variability zone as a function of forecasting days from the 12-initialization months for SPEAR (dashed lines) and SICDA (solid lines).

Detrended SIC ACC from Dec-initialized Reforecasts (1992–2017)



SIC Bias from Dec-initialized Reforecasts (1992–2017)

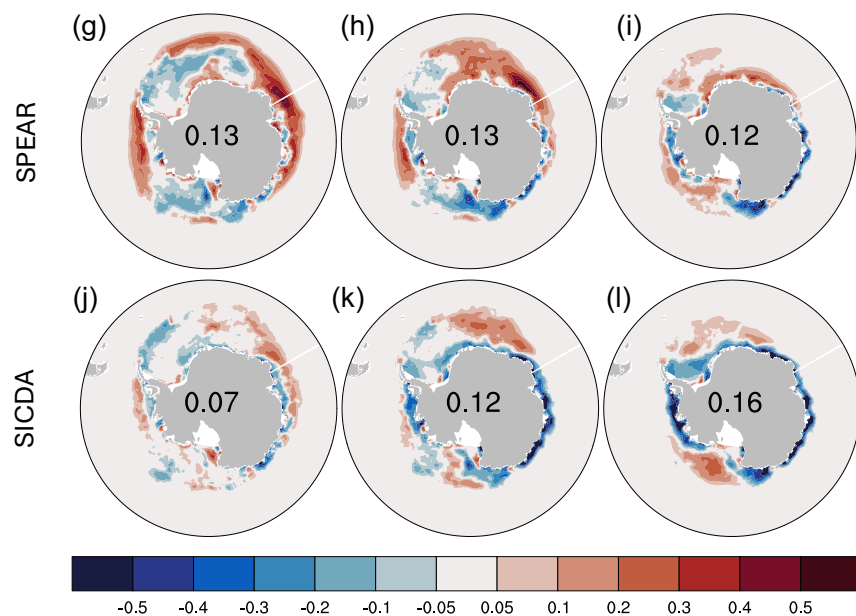
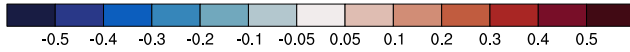
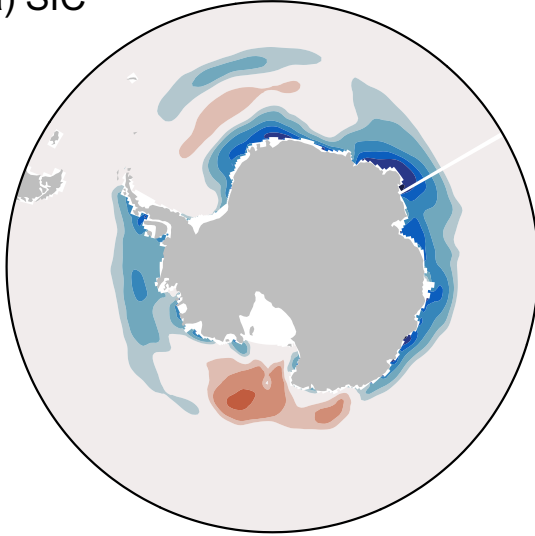


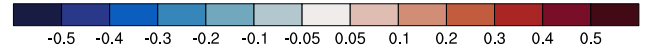
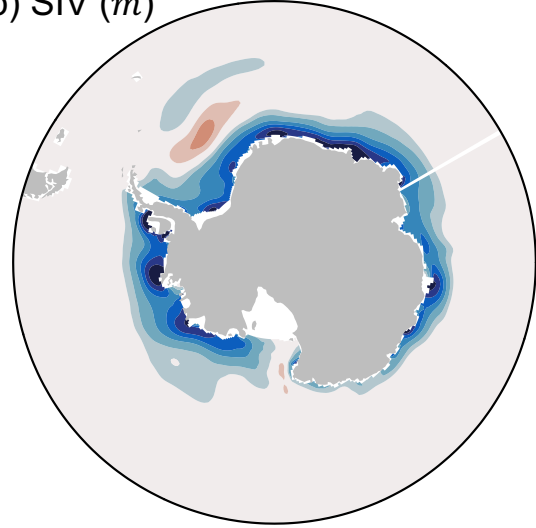
Figure S8. SIC detrended ACC, and bias on the forecast days of 1, 20, and 40 from the December-initialized reforecast experiments for SPEAR and SICDA. The skills are calculated using daily data from 1992–2017.

December Monthly Mean States from Dec-initialized Reforecasts (SICDA – SPEAR)

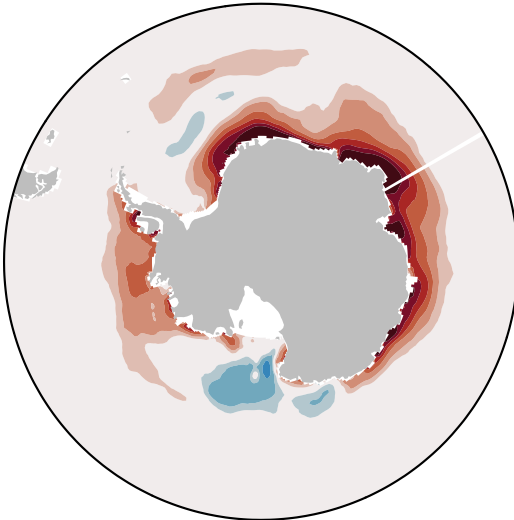
(a) SIC



(b) SIV (*m*)



(c) SW (W/m^2)



(d) SST ($^{\circ}C$)

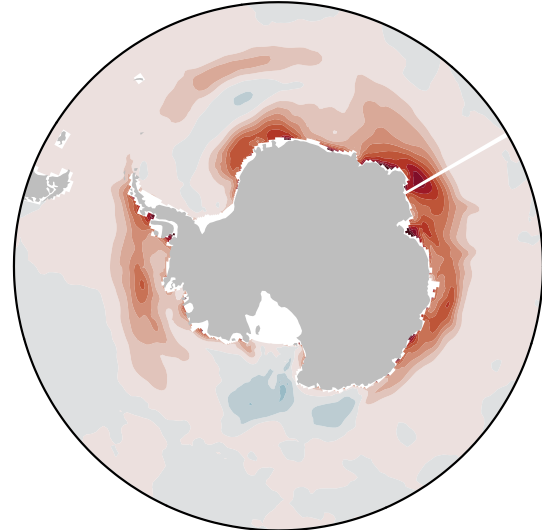


Figure S9. The difference of December monthly mean states between the December-initialized reforecast experiments from SICDA and SPEAR (SICDA – SPEAR) (a) SIC, (b) SIV, (c) SW, and (d) SST.