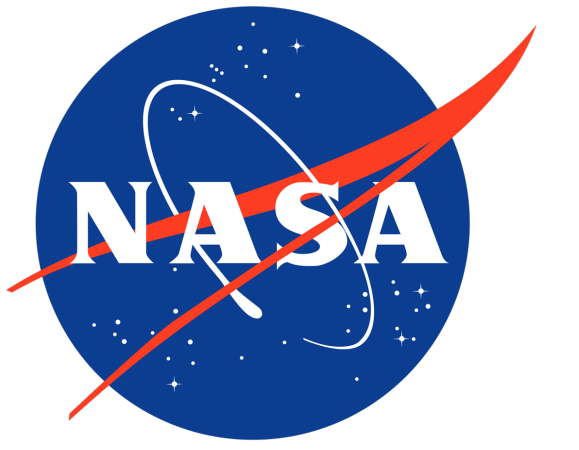


The Good, the Bad and the Ugly: Simulated and observed Antarctic Sea Ice



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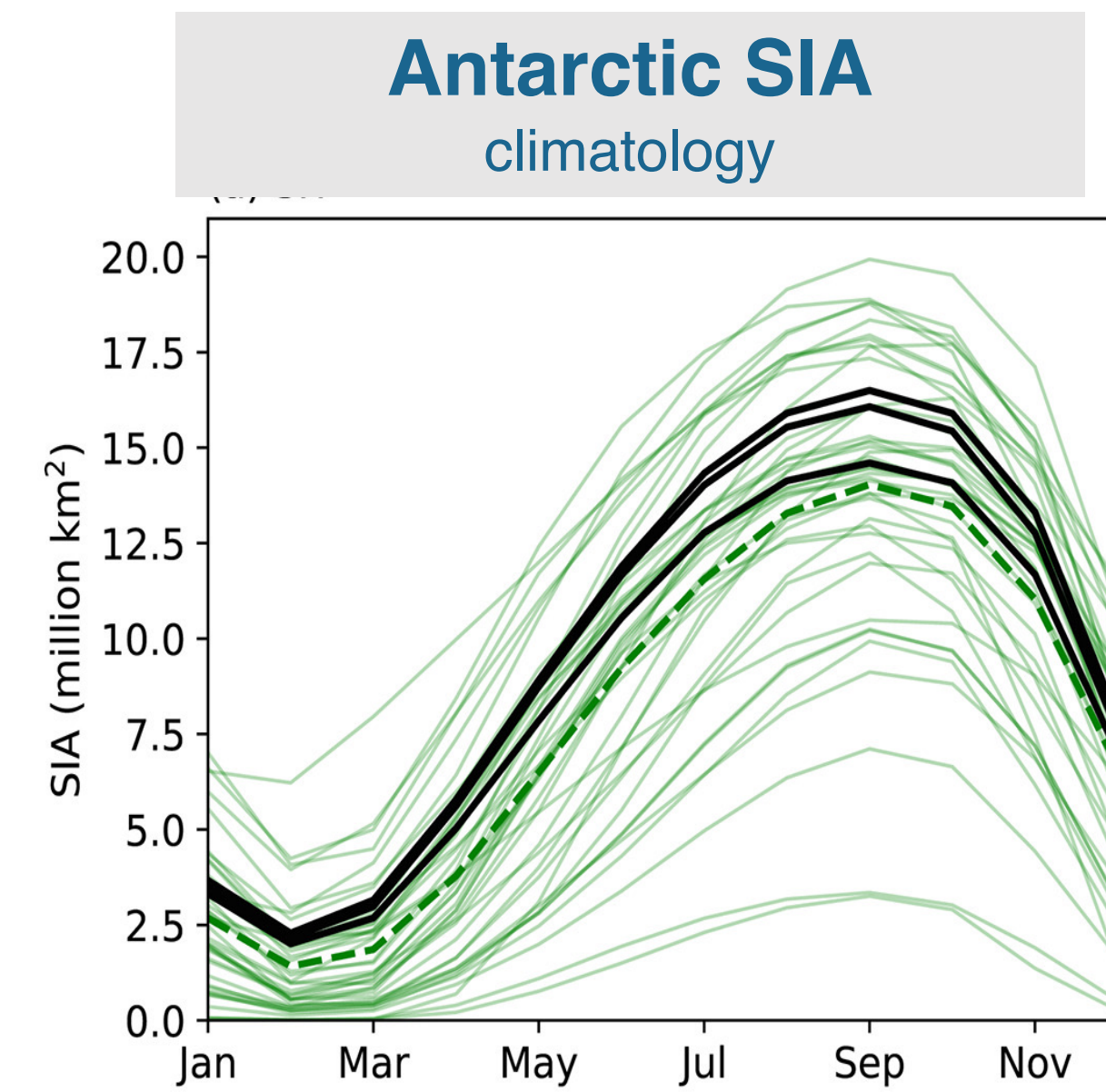
KEY INSIGHTS

Some models capture mean and variability in Antarctic Sea Ice, and relationships with atmospheric conditions (winds, SLP) reasonably well

Long term trends are problematic, particularly in the Ross Sea in austral fall
 Intermodel spread remains quite large

Significant low-frequency variability in models and reconstructed SIE that cannot be resolved by the (short) satellite record
 Recent annual changes EXTREME

THE GOOD



Some climate models reasonably capture observed SH Sea Ice Area (SIA) climatology

Models can capture regional and seasonal sea ice mean and variability

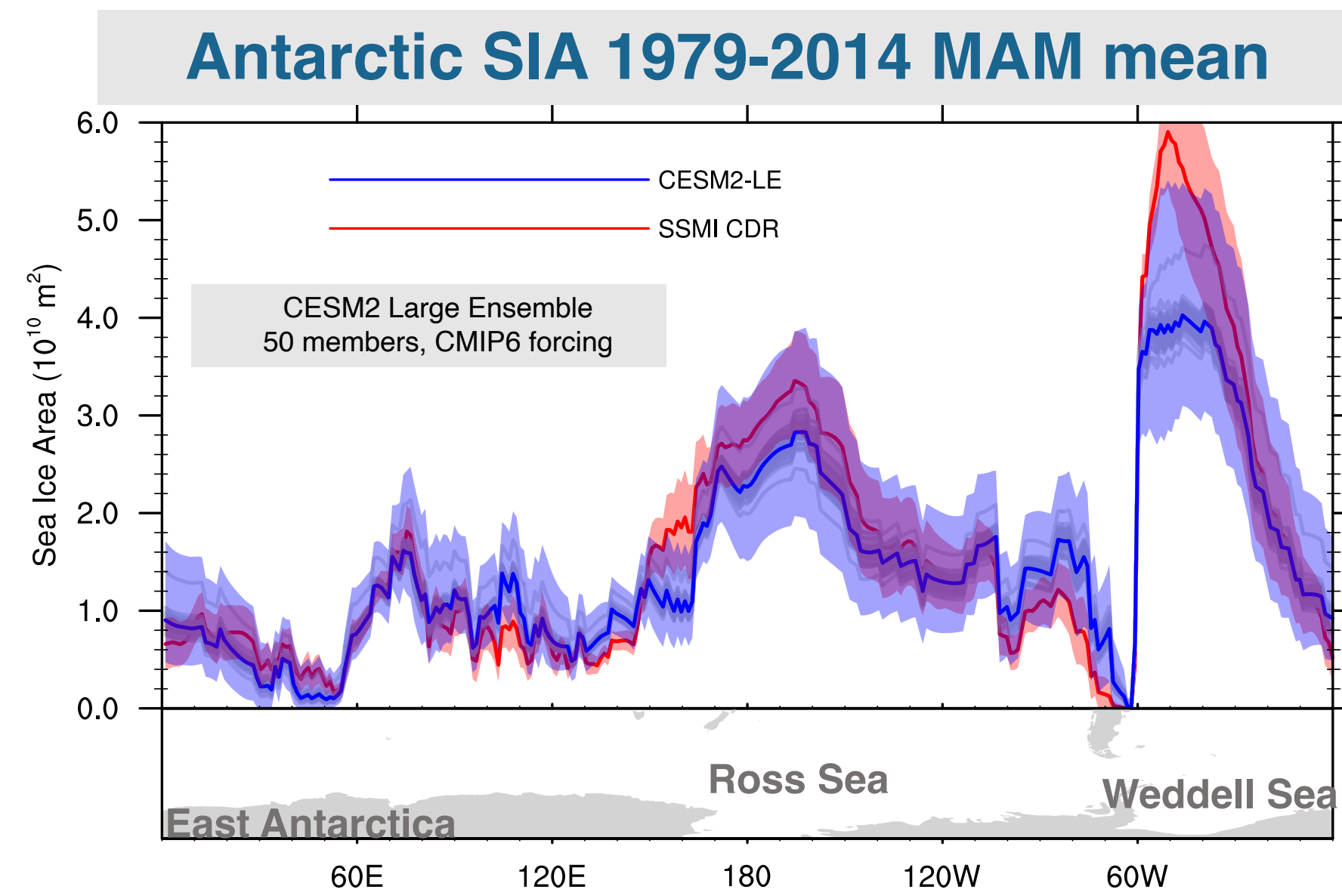
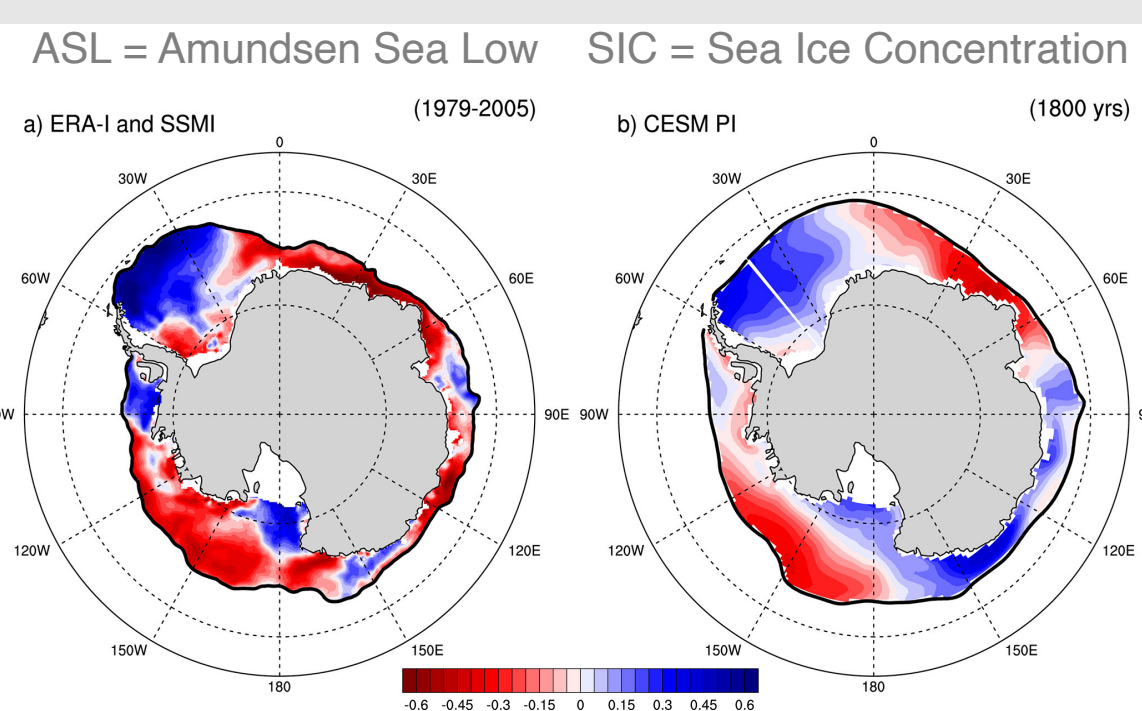


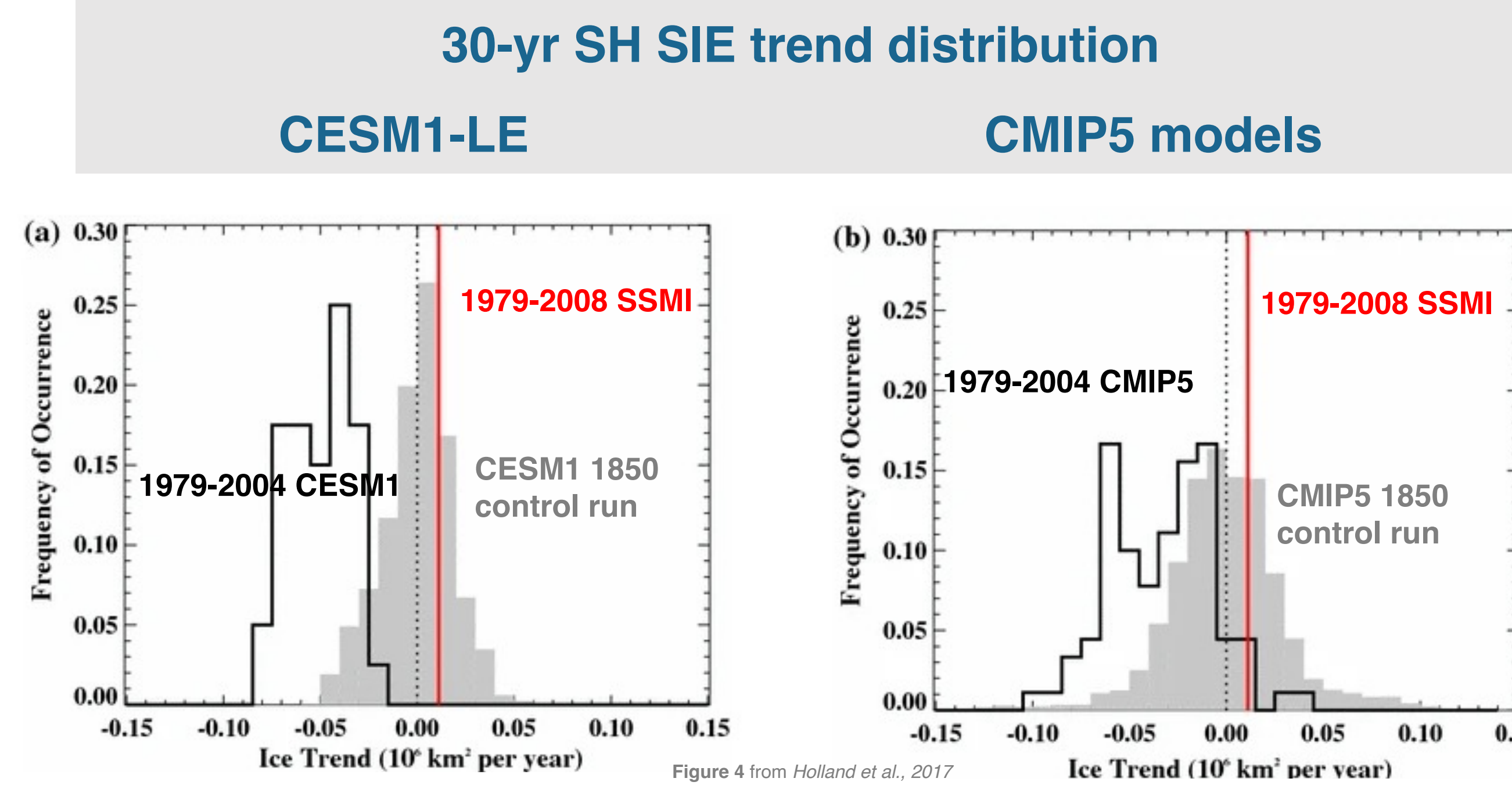
Figure 2. March-April-May (MAM) Community Earth System Model version 2 (CESM2) large ensemble mean (blue line), individual simulations (grey) and range of (mean±1 std; blue shading) and SSMI CDR mean (red) and mean ± 1 std (red shading).

ASL-SIC correlations

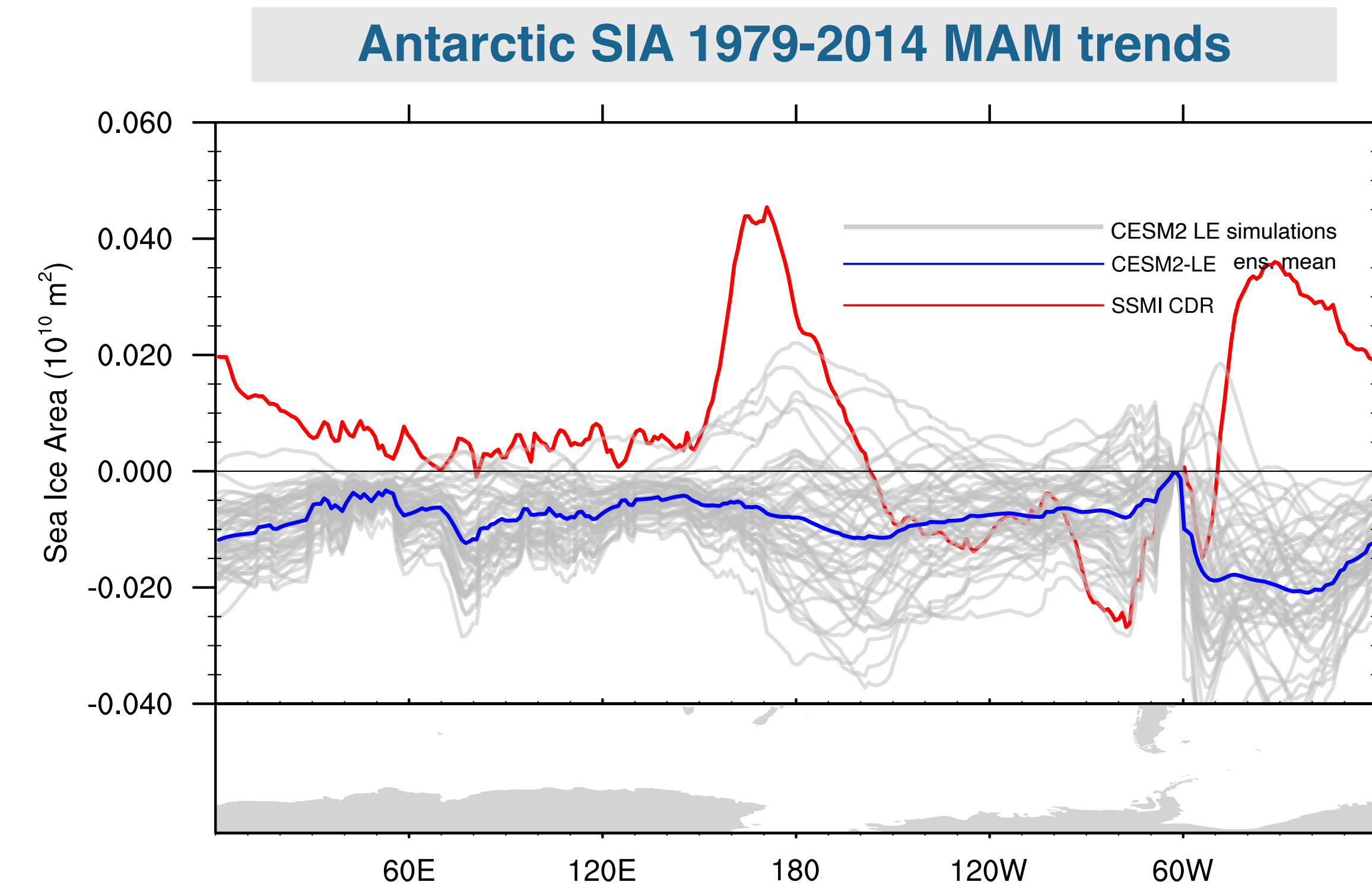


Interannual relationships between SICs and sea level pressure, winds are also captured

THE BAD



Climate models generally DO NOT capture observed SH SIE trends



Climate models DO NOT capture all regional & seasonal trends

These do not include recent extreme changes

THE UGLY

Significant low-frequency variability

Observationally based SH SIE reconstruction

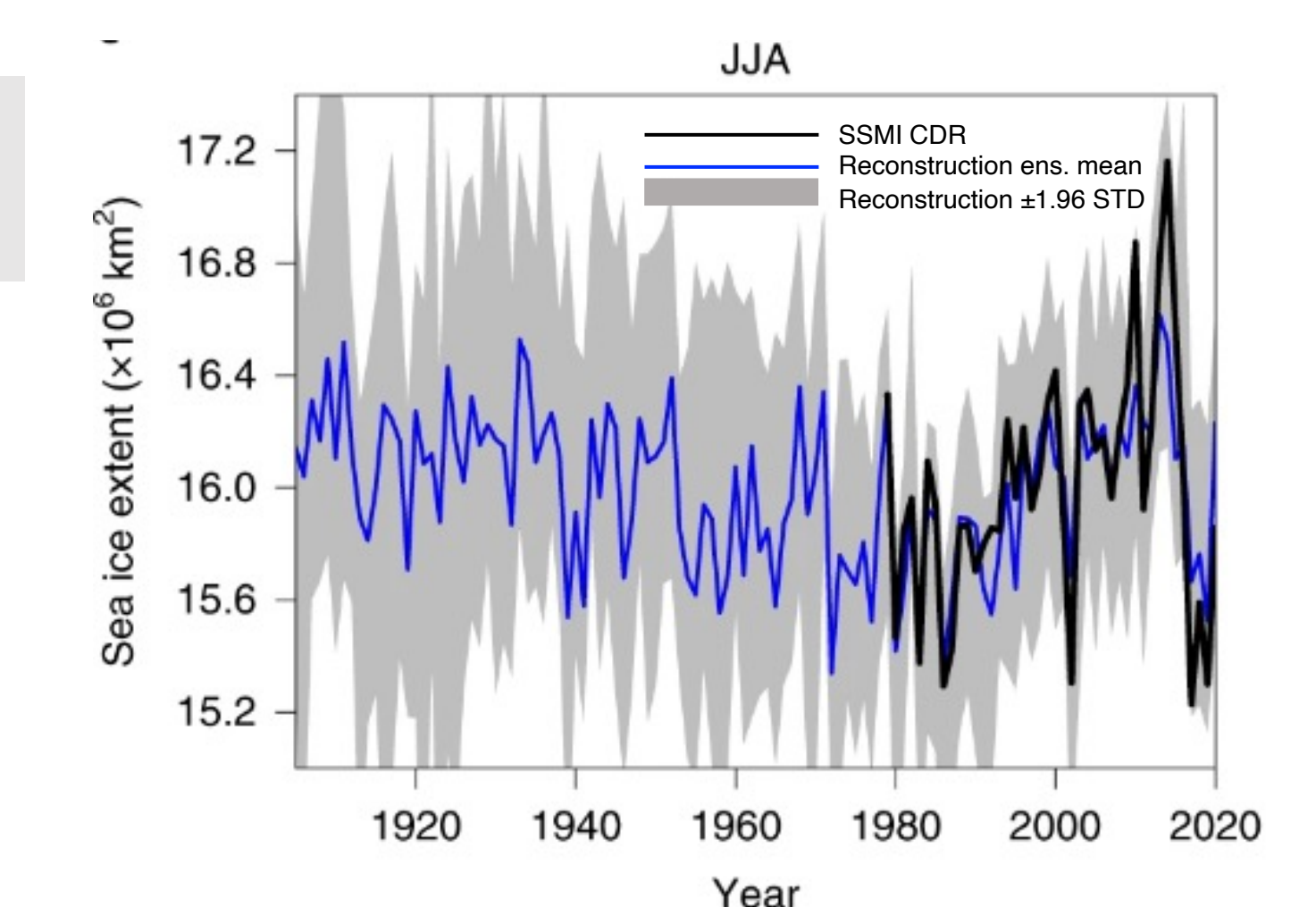
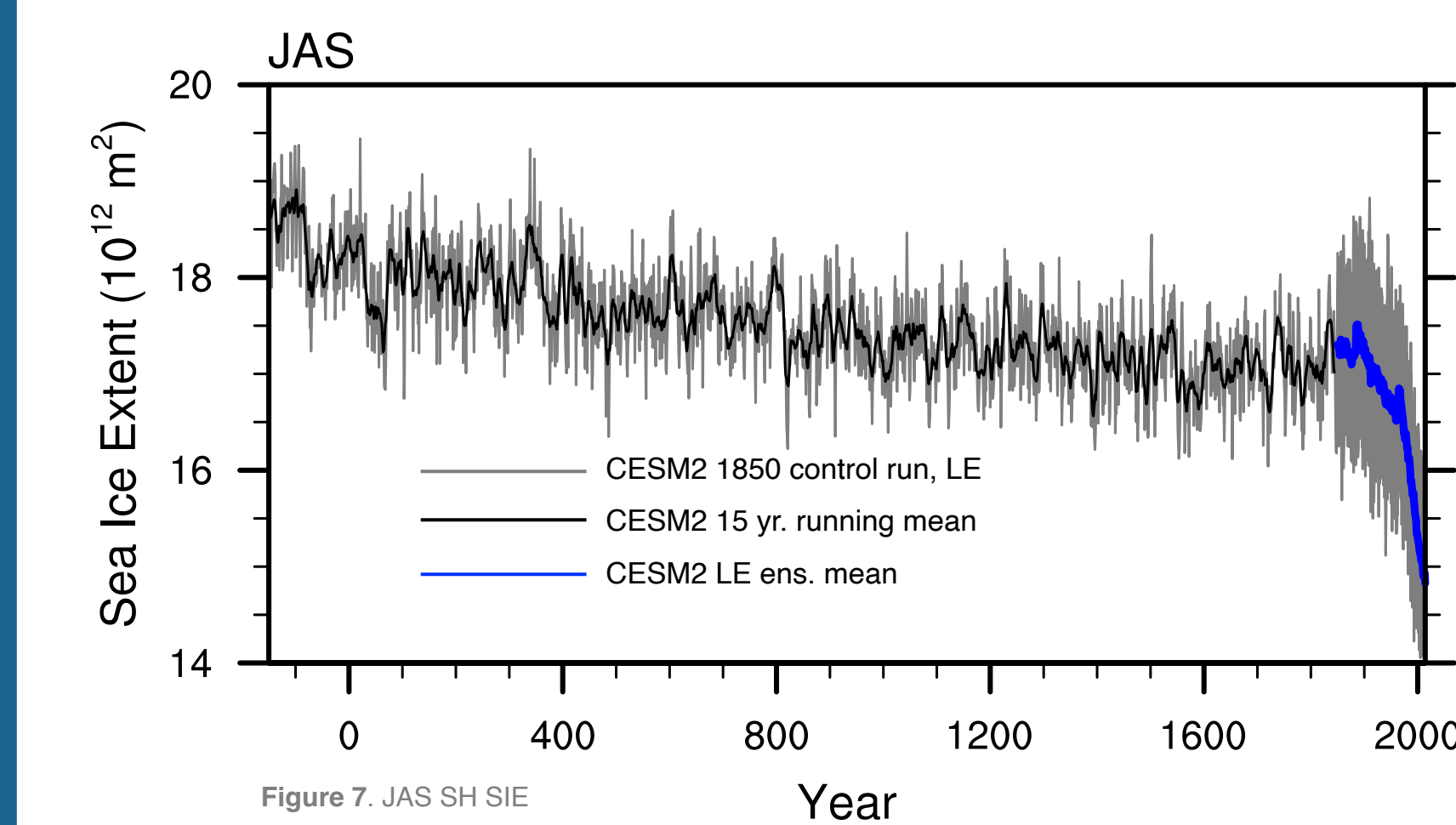


Figure 6 from Fogt et al., 2022: Antarctic JJA total sea ice extent, 1955-2020 for SSMI CDR observations (black line) and ensemble mean reconstruction (blue line). Grey shading approximates the reconstruction uncertainty as the greater of 1.96 times the standard deviation of the ensemble members or 1.96 times the standard deviation of the residuals of an individual best-fit reconstruction ensemble member.

Significant multidecadal variability



CESM2 1850 Control run
 Significant (95%) variance at 6, 20, 75, 100- yrs

Satellite record is not long enough to resolve multi-decadal variabilities

Recent Extreme changes in SIE
 SH SIE
 August SIE 1-yr changes (CESM2 LE, 1850-2100)

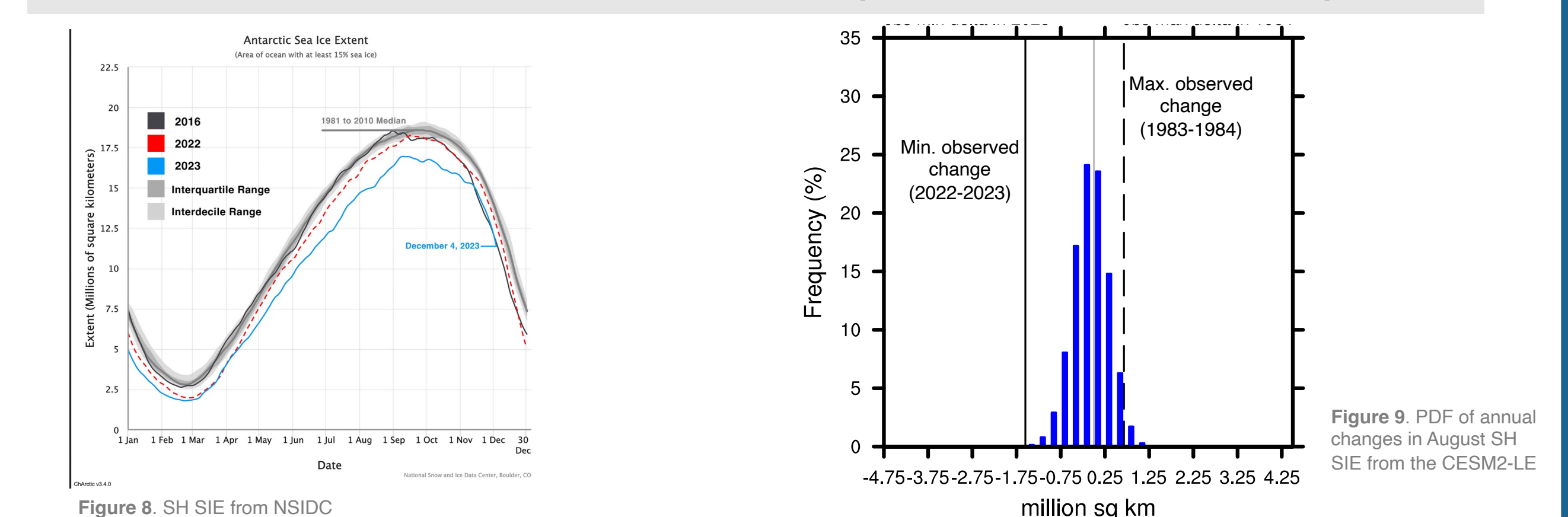


Figure 9. PDF of annual changes in August SH SIE from the CESM2-LE.

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