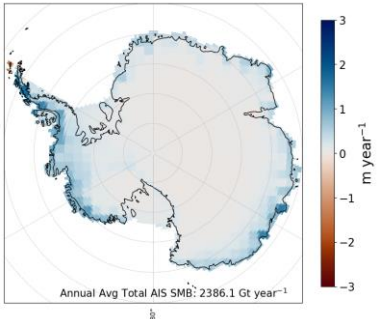
The State of Polar Climate IN E3SM

Stephen Price, Los Alamos National Laboratory | E3SM and FAnSSIE

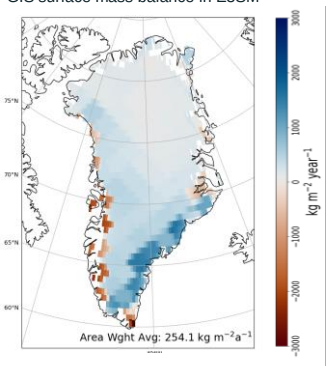
Freshwater Flux from Ice Sheets

Atmospheric Forcing

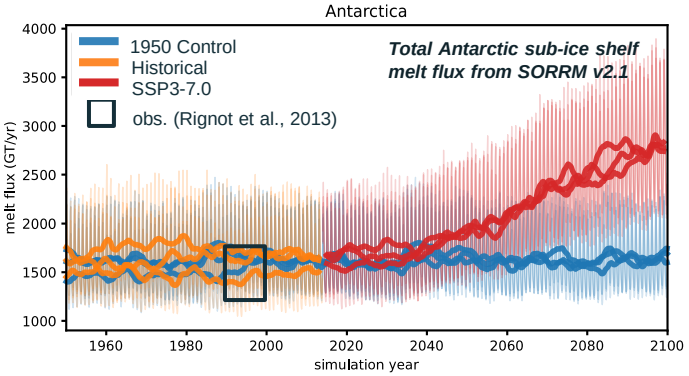
AIS surface mass balance in E3SM

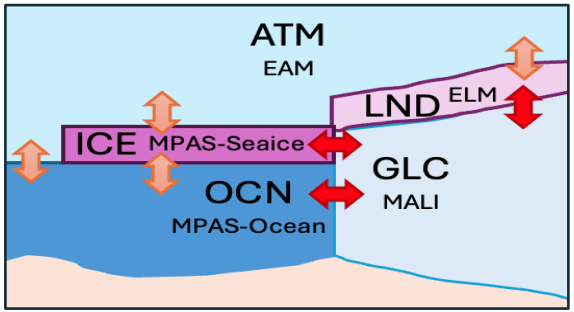


GIS surface mass balance in E3SM

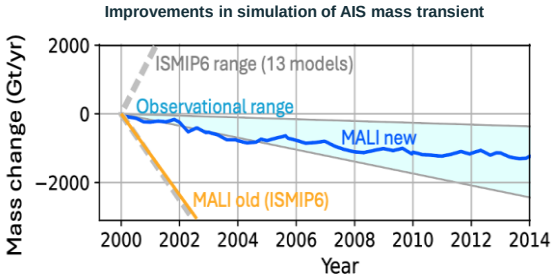


Ocean Forcing

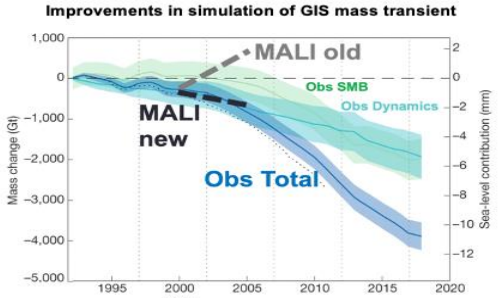




Ice Sheet Response



(above & below, modified from IMBIE Team)



Modified from IMBIE Team

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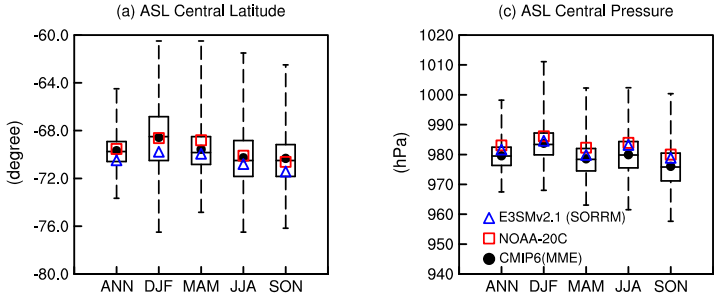
Polar Atmospheric Climate & Teleconnections

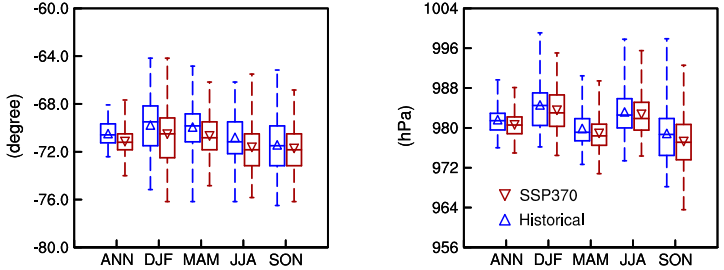
The position and strength of the Amundsen Sea Low (ASL), which is strongly influenced by teleconnections to the tropical Pacific, is a primary control on the access of relatively warm and dense Circumpolar Deep Water to continental shelves in the Amundsen Sea Embayment. Thus, tropical-polar teleconnections are also a strong control on ice shelf melting and ice sheet mass loss in these sectors of the West Antarctic Ice sheet.

E3SMv2.1 SORRM reasonably simulates the mean intensity and location of the ASL during 1950-2014



E3SMv2.1 SORRM (**blue**), CMIP6 multi-model ensembles (MME, 42 historical r1i1p1f1, **black** dot) and NOAA-20C reanalysis (**red** rectangle). Box and Whiskers show 25th, 75th , minimum, maximum of CMIP6 MME during the 1951-2014 period.

A deepening of ASL along with poleward shifting in response to the SSP370 forcing scenario was observed in E3SMv2.1 SORRM, especially in austral winter (DJF) and spring (SON)



Comparison of present-day (Historical, 1951-2010) and future climate (SSP370, 2041-2100) simulations from E3SMv2.1 SORRM. Box and Whiskers show 25th, 75th , minimum, maximum of EAMv2.1 SORRM simulations.

Analysis & Figs. from S. Zhang (PNNL) and W. Lin (BNL)