Teleconnection drivers for Antarctic atmospheric rivers in E3SMv2 and CESM2

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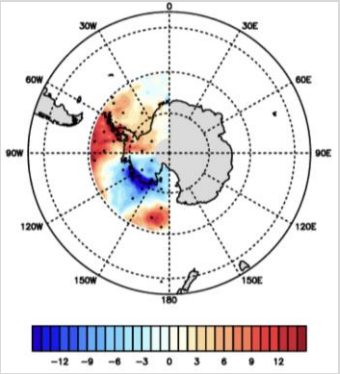
Objective:

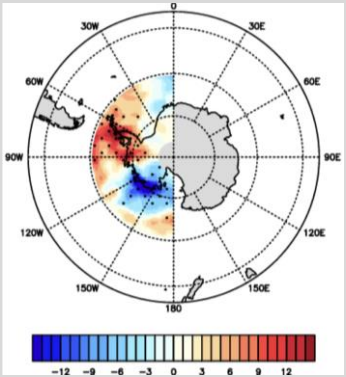
Teleconnections and modes of variability can be used as source of predictability for Antarctic ARs. The Pacific South American Mode 2, (PSA2), and the Indian Ocean Dipole (IOD) in phase with ENSO, are good candidates. (Shields et al., 2022, GRL, Shields et al., in prep).

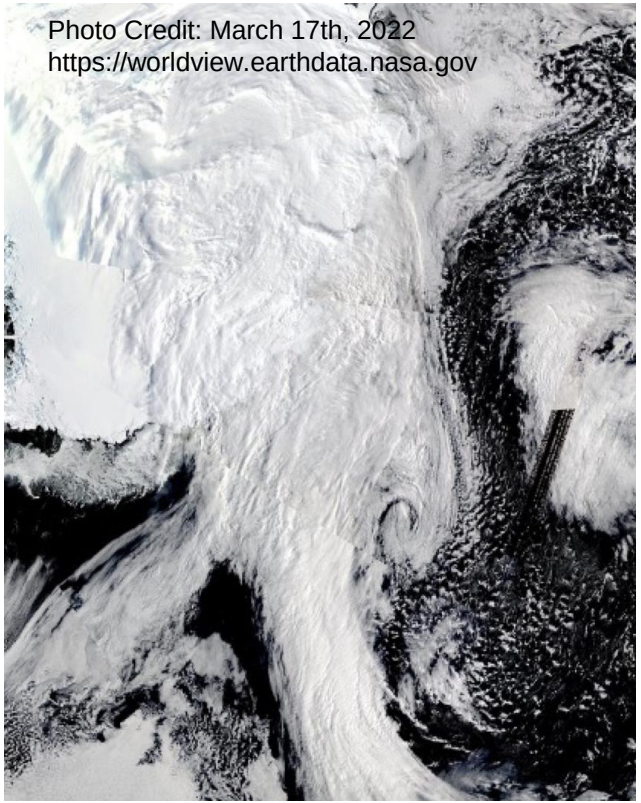
E3SMv2



AR precipitation (cm/year) regressed onto the PSA2 pattern for historical simulations. Both models perform well and similar to reanalysis. Significance is stippled at 95% level.

CESM2





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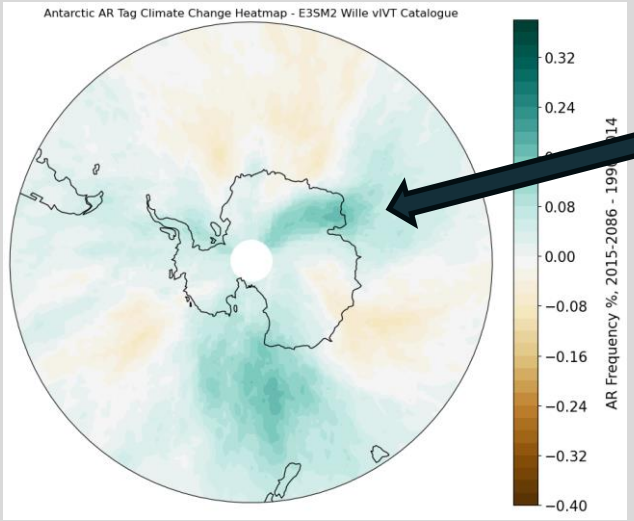
Impact:

As we move into a future warmer world, understanding the mechanics and teleconnections of Antarctic ARs will help with their predictability and assessment of impacts on ice sheet, ice shelves, and sea ice.



- E3SMv2 climate change (SSP370 – Historical) projects an uptick in AR frequency the Indian Ocean sector east of Dronning Maud Land,
- E3SMv2 has far fewer ARs compared to CESM2 in Dronning Maud and west, in the Atlantic sector
- Some of these differences are attributable to PSL biases.