[Summary]
Overall warming is happening in Antarctica, but it is being hidden by the cooling impact of stratospheric ozone depletion, known as the Antarctic ozone hole. This means that amplified polar warming predicted to be happening by climate models as a result of rising greenhouse gas concentrations is occurring in the south, as well as the north, but the observed warming is half that predicted. One possible explanation is that the climate models underestimate the impact of the vast and deep Southern Ocean that is slow to warm.

[Details]
A research team from the Department of Geography and Byrd Polar and Climate Research Center at The Ohio State University investigated station temperature records across Antarctica and the Southern Ocean, which collectively are available only for the past 60 years. From 1957 to 2016, there is widespread warming across most of the Southern Hemisphere mid-latitudes, but changes in Antarctica are inconsistent. Antarctic climate is dominated by the Southern Annular Mode (SAM) that describes the westerly winds around 60 °S, which can lead to cooler/warmer temperatures over the continent depending on the location and strength of the winds. After removing the influence of the SAM from station records, a uniform warming pattern emerges (see Figure a). Then, temperature change over Antarctica from climate models (see black line in Figure b) was compared to observations (see red line in Figure b), both with SAM influence removed, and it was found that the models are overpredicting the warming. The cause of this major discrepancy is under investigation.

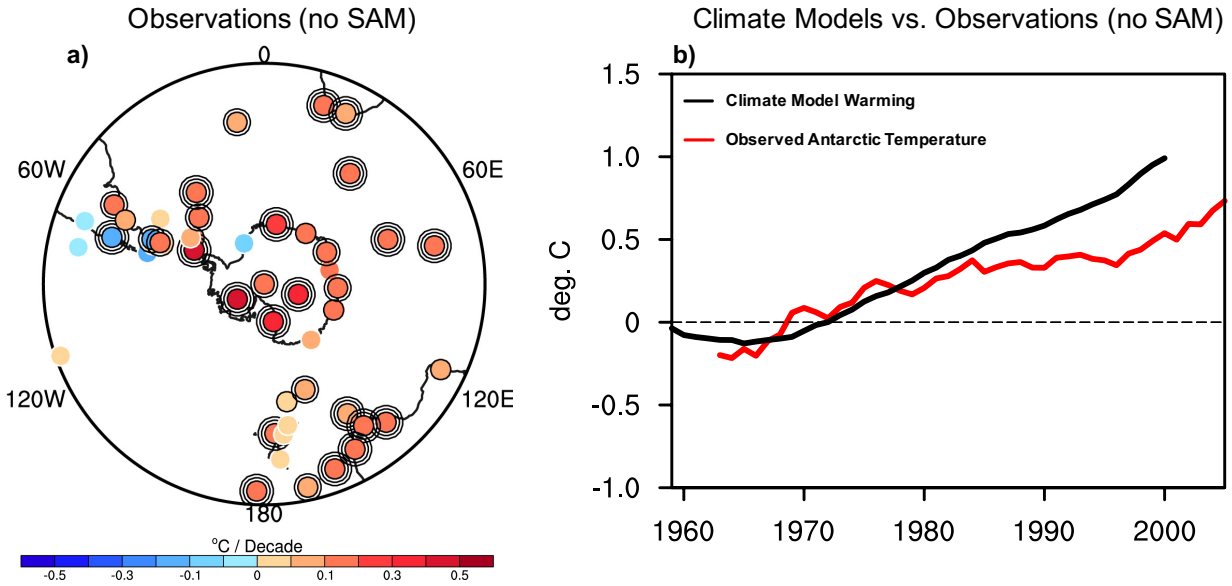

Figure. a) Observed temperature trends without SAM at stations across mid- and high-latitude Southern Hemisphere for 1957-2016. b) Temperature change over Antarctica from climate models in comparison to that observed, both without SAM. (From Jones et al., 2019)

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