

# Atmospheric variability and surface temperatures

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This paper investigates the impact that the four principal patterns of Southern Hemisphere (SH) atmospheric circulation variability have on Antarctic surface air temperature (SAT): 1) the southern baroclinic annular mode (BAM), associated with variations in extratropical storm amplitude; 2) the Southern Annular Mode (SAM), associated with meridional shifts in the mid-latitude jet; and 3) the two Pacific-South American patterns (PSA1 and PSA2), wave trains originating in the tropical Pacific that extend across the SH extratropics.

The use of 35 years of daily observations and reanalysis data affords a sufficiently large sample size to assess the signatures in both the mean and variability of daily SAT anomalies.

The BAM exerts the weakest influence on Antarctic SAT, albeit is still important over select regions. Consistent with previous studies, the SAM is shown to influence SAT across most of the continent throughout the year. Regionally, both PSA patterns can exert a greater impact on SAT than the SAM, but also have a significantly weaker influence during summer, reflecting the seasonality of the SH response to ENSO. The broad-scale climate linkages identified here provide benchmarks for interpreting the Antarctic climate response to future changes in tropical sea surface temperatures, ozone recovery and greenhouse gas increases.

**More information:** Gareth J. Marshall et al. The signatures of large-scale patterns of atmospheric variability in Antarctic surface temperatures, *Journal of Geophysical Research: Atmospheres* (2016).

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