

Interhemispheric synchronization between the AO and the AAO

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Abstract

Teleconnections between lower and higher latitude regions are widely known in both the Northern and Southern Hemispheres. To broaden our view of these teleconnections, we searched a reanalysis dataset for evidence of a teleconnection between the Arctic Oscillation (AO) and the Antarctic Oscillation (AAO), two widely separated circumpolar phenomena. Statistical analysis of the Japanese 55-year reanalysis dataset showed significant in-phase synchronization between the AO and AAO, particularly in October and February, with a vertical structure extending from the troposphere to the stratosphere. This vertical structure may suggest a stratospheric control, and we did not find a significant signature indicating a tropical ocean control. We also observed decadal-scale modulation of the synchronicity. Observational evidence implies that the stratospheric meridional circulation may be responsible for AO–AAO synchronization. This paper was published in *GRL*, 45, DOI:10.1029/2018GL081002 by Tachibana et al., 2018.

Plain Language summary

The Arctic Oscillation (AO) and the Antarctic Oscillation (AAO) are dominant atmospheric variability patterns in the Northern and Southern hemispheres, respectively. Each is a pressure seesaw between the pole and the midlatitudes that remotely affects weather, climate, and environment around the world. We showed interhemispheric in-phase synchronization between the AO and AAO in October and February, and we also found decadal-scale variation of the synchronicity. Because the vertical structure of the AO–AAO synchronization extends from the troposphere to the stratosphere, stratospheric variations may be responsible for the synchronization. This finding of AO–AAO synchronization points the way to a better understanding of past, present, and future pole-to-pole climatic relationships and improvements in long-term weather forecasts.

Keywords: Arctic Oscillation, Antarctic Oscillation, sudden stratospheric warming

