

## **Influence of Solar Variability on Stratospheric Dynamics**

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It is shown that the North Annular Mode of the wintertime geopotential height anomalies between 10 hPa and 1000 hPa is influenced by solar cycle UV variability and that the effect is statistically significant. This evidence suggests that a mechanism of solar influence on climate operates through the excitation of this mode. The influence depends on the phase of the Quasi-Biennial Oscillation (QBO). In early winter for the west QBO and late winter for the east QBO, the solar changes affect the NAM in both the stratosphere and the troposphere almost equally. The results are compared with the earlier studies of the role of the QBO and solar UV changes on near-polar temperatures and geopotential heights.

To understand how solar variability can influence the NAM we develop a dynamic model truncated from the stratospheric wave-zonal flow interaction model of Holton and Mass (1976). The simplest version of our model consists of three ordinary differential equations controlled by two parameters: the initial amplitude of planetary waves and the vertical gradient of the zonal wind. The changes associated with seasonal variations and with the cyclic solar variability are introduced as periodic modulations of the zonal wind gradient. The major stratospheric response to these changes is seen through modulation of two basic states of the dynamic system.

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