

## POSSIBLE NONLINEARITIES IN THE ATMOSPHERIC CIRCULATION RESPONSE TO ANTHROPOGENIC FORCING

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We use both modelled and observed daily geopotential height data to examine the phase space structure of the Northern Hemisphere atmospheric circulation, concentrating particularly on the first principal component, known as the Arctic Oscillation index. We find the PDF of this variable to be unimodal throughout the troposphere, and generally unskewed. However, we find significant skewness in the stratosphere both in observations and a model, which we suggest may be explained physically by a limit on the symmetry of the vortex. This explanation implies that the stratospheric polar vortex may respond nonlinearly to anthropogenic forcing, which tends to strengthen it. We test this hypothesis by looking for changes in the shape of the PDF of this index in observations over the past 40 years.