

How does stratospheric polar vortex variability affect surface weather?

Mark P. Baldwin¹

¹ *University of Exeter, Exeter, UK*

Stratospheric variability and change has substantial effects on surface weather and climate, especially on the Annular Modes, with shifts in the jet streams, storm tracks, precipitation, and likelihood of blocking events. Despite unambiguous observations of this phenomenon, as well as numerical simulations, a clear physical explanation of this downward coupling has been elusive. I will discuss recent advances in our understanding—how pressure changes (movement of mass) in the stratosphere affects surface pressure. However, movement of mass in the stratosphere is not sufficient to fully explain the magnitude of observed surface changes—surface effects are larger than would be expected theoretically, and are larger than at the tropopause. This “tropospheric amplification” is easily quantified, and appears to be caused by stratospheric mechanical forcing near the tropopause, which has a direct effect on baroclinic eddies and storm tracks. The tropospheric amplification mainly comes from enhanced movement of mass in the Atlantic and Pacific storm tracks.