

Disentangling Interannual Stratospheric Transport Variability Impacts on Surface Trace Gas Concentrations

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The interannual variability of zonal mean stratospheric transport affects surface concentrations of a number of trace gases that are predominantly destroyed or produced in the stratosphere. The zonal mean stratospheric transport controls the amount of loss or production of these trace gases within the stratosphere as well as the transport of chemically altered air into the troposphere. Stratospheric transport is known to vary on interannual time scales due to the QBO, ENSO, SSWs, decadal variability and long-term trends. The interaction between these different modes of interannual variability complicates the interpretation of each mode and how it impacts stratospheric transport and trace gas concentrations. In this study we use long-term stratospheric and surface trace gas and meteorological measurements as well as reanalysis and chemistry-climate model output to try to disentangle the interactions and impacts of the different modes of variability on stratospheric transport, stratosphere-to-troposphere exchange and surface trace gas concentrations.

Key words: stratospheric transport, QBO, ENSO, trace gases