

5.151 Regional differences in stratospheric intrusions over the USA investigated using the NASA MERRA-2 reanalysis.

Early Career Scientist

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Abstract:

Stratospheric intrusions (SI) – the introduction of ozone-rich stratospheric air into the troposphere – have been linked with surface ozone air quality exceedences, especially at the high elevations in the western USA in springtime. However, the impact of SIs in the remaining seasons and over the rest of the USA is less clear. This study investigates the atmospheric dynamics that generate SIs over the western USA and the different mechanisms through which SIs may influence atmospheric chemistry and surface air quality over the eastern USA.

The spatiotemporal variability of SIs over the continental US is explored using NASA's Modern-Era Retrospective Analysis for Research and Applications Version-2 (MERRA-2) reanalysis dataset and other Goddard Earth Observing System Model, Version 5 (GEOS-5) model products. Both upper-level and lower-level dynamical features are examined on seasonal timescales and linked to the assimilated MERRA-2 ozone throughout the troposphere and lower stratosphere. By focusing on the major modes of variability that influence the weather patterns in the USA, namely the Pacific North American (PNA) pattern, Arctic Oscillation (AO) and the North Atlantic Oscillation (NAO), predicative patterns in the meteorological fields that are associated with SIs are identified for their regional effects.