NCAR

Atmospheric Chemistry Observations & Modeling Laboratory

SEMINAR

Changes in transport and mixing of polar ozone during sudden stratospheric warmings

Álvaro de la Cámara

Dep. Earth Physics and Astrophysics, and Institute of Geosciences (CSIC/UCM)
Universidad Complutense de Madrid

Understanding the impact of dynamical processes such as sudden stratospheric warmings (SSWs) on Arctic ozone is key to interpreting the observed interannual variability and better quantify polar ozone evolution. In the first part of this seminar, we will focus on quantifying the changes in the stratospheric circulation and the mixing properties of the flow during SSWs. Using 34 years of reanalysis data (ERA-Interim), and 240 years of output from the Whole Atmospheric Community Climate Model version 4 (WACCM4), we find: i) A weakened residual circulation and intensified isentropic mixing after the onset of SSWs that persist for more than two months in the lower stratosphere; ii) sufficiently deep SSWs (i.e. those followed by Polar-night Jet Oscillation events, or PJO) have a stronger and more persistent response in the meridional circulation and isentropic mixing; and iii) long after the strong wave forcing that drives the SSWs has declined, diffusive fluxes of potential vorticity (PV) remain anomalously high in the lower stratosphere delaying the recovery of the vortex.

In the second part of the seminar, we will explore how these alterations in the circulation affect Arctic ozone. The composite evolution of ozone displays positive mixing ratio anomalies up to 0.5 – 0.6 ppmv above 550 K (~50 hPa) around the central warming date and negative anomalies below (-0.2 to -0.3 ppmv), consistently in observations, reanalysis and model. We will show the fundamental role of irreversible mixing of ozone in delaying the recovery of climatological values, and contributing to maintain the ozone anomalies in the lower stratosphere over 2 to 3 months after the occurrence of SSWs.

Monday, August 20, 2018, 3:30 p.m

Refreshments 3:15 p.m
NCAR Foothills Laboratory
3450 Mitchell Lane, Boulder, CO 80301
FL-1022, Large Auditorium
Live webcast: http://ucarconnect.ucar.edu/live

For more information please contact Bonnie Slagel, bonnie@ucar.edu, phone 303-497-8318.