Session: C28 Poster: W60A

Evaluation of whole atmosphere Community Climate Model simulations of winter 2004-2005 Arctic ozone

Matthias Brakebusch[†]; Cora Randall; Douglas Kinnison; Simone Tilmes; Michelle Santee
[†] University of Colorado, USA
Leading author: matthias.brakebusch@lasp.colorado.edu

The recovery of polar stratospheric ozone is influenced by the increasing burden of greenhouse gases throughout the atmosphere. Understanding this recovery is critical because ozone shields the Earth's lower atmosphere from harmful solar radiation, and it is a radiatively active gas itself. To accurately predict future changes in polar stratospheric ozone, robust simulations of polar ozone in coupled chemistry climate models are required. The work presented here evaluates Whole Atmosphere Community Climate Model (WACCM) polar stratospheric ozone simulations for the Arctic winter of 2004-2005. We use the Specified Dynamics version of WACCM (SD-WACCM), in which temperatures and winds are nudged to meteorological assimilation analysis results. Model simulations of ozone and related constituents for December 2004 through March 2005 compare well to observations from the Earth Observing System Microwave Limb Sounder (MLS) and Atmospheric Chemistry Experiment Fourier Transform Spectrometer (ACE-FTS). To quantify the relative contributions of chemistry and transport to the ozone variations, a pseudo-passive ozone tracer, for which the model ignores heterogeneous chemistry, is simulated. Subtraction of this passive ozone from both the observed and simulated, fully active ozone yields the inferred and simulated chemical ozone loss, respectively. Inferred ozone loss using this method is in good agreement with previous independent results for Arctic winter 2004-2005. Also, SD-WACCM ozone loss based on the passive ozone subtraction method is similar to that based on tracer-tracer correlations. This work thus supports the use of WACCM for calculating changes in Arctic stratospheric ozone.