

1.022 Dependence of Simulated Tropospheric Ozone Trends on Uncertainties in U.S. Vehicle Emissions..

Presenting Author:

Sarah A Monks, CIRES/NOAA, sarah.monks@noaa.gov

Co-Authors:

T.B. Ryerson, NOAA, Boulder, CO, USA.

L.K. Emmons, NCAR, Boulder, CO, USA.

S. Tilmes, NCAR, Boulder, CO, USA.

B. Hassler, CIRES/NOAA, Boulder, CO, USA.

J-F. Lamarque, NCAR, Boulder, CO, USA.

Abstract:

Long-term surface observations show a rapid increase in background concentrations of ozone since the 1960s. Global chemistry-climate models have difficulties in reproducing the magnitude of this trend, overestimating the mid-century observed concentrations. This suggests that the impacts of ozone on climate and air quality throughout the second half of the 20th century may be misrepresented in current models. We use the MACCity emissions inventory constrained by ambient observations to examine the dependence of simulated long-term ozone trends on U.S. land transportation (vehicle) emissions of nitrogen oxides (NO_x), carbon monoxide (CO) and volatile organic compounds (VOCs). Sensitivity simulations are performed using the Community Earth System Model (CESM), where the U.S. MACCity vehicle emissions of either NO or CO, and co-emitted VOCs, are constrained to the observed NO:CO ratio between 1960-2010. We will present results from these sensitivity simulations showing that changes in the VOC and CO emissions lead to improved simulations of ozone in LA and over the U.S. However, we will also show that the impacts of these emission changes are limited outside of the U.S boundary layer.