4.085 Ozone trend analysis from 1980-2015: Models vs Observations.

Early Career Scientist

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Abstract:

Ozone (O_3), a secondary pollutant, is one of the main oxidant species in the atmosphere, affecting ecosystems and human health. Its secondary nature and the non-linear dependence of its production on nitrogen oxides (NO_X) and volatile organic compounds (VOC) concentrations challenges the accuracy of chemistry - transport model (CTM) simulations but also the definition of emission control strategies to reduce its concentrations in the troposphere. Thus, while for primary pollutants emissions reductions have been shown efficient to reduce pollutant levels for ozone concentrations the picture remains unclear.
Weather conditions and anthropogenic activities are shown to affect tropospheric ozone long-term and seasonal variability. Moreover, the air quality improvement strategies of the last decades also affect the ozone trends and seasonality by affecting its precursors. For this study the well documented TM4-ECPL model, with an analytical chemical scheme, is used to simulate the global ozone concentrations and the temporal and spatial trends of the past 35 years (1980-2015). The model is validated against near surface measurements from a vast collection of monitoring stations and independent studies, and against ozonesonde measurements where available.
Decanal changes in southern hemisphere surface ozone seasonality are calculated to be impacted by changes in the downward flux of stratospheric ozone. The importance of stratospheric ozone for the surface ozone seasonality changes in the southern

hemisphere is also investigated based on multi- year ozonesondes from several, mostly remote, sites.