Climate response to tropospheric ozone change since preindustrial times

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We assess climate response to global tropospheric ozone changes since preindustrial times (around the year 1850) using a chemistry coupled climate simulation. Chemistry and transport of tropospheric ozone and related species are simulated by the CHASER model which is based on the CCSR/NIES/FRCGC AGCM (Sudo et al, 2002).
For climate simulation in this study, CHASER is coupled with a simplified ocean model (mixed-layer ocean model).
We use the global emission inventory EDGAR/HYDE for precursor emissions in preindustrial times (1850) and present days (2000).
We evaluate equilibrium responses of climate to changes of tropospheric ozone from preindustrial times to present days as well as those of long-lived GHGs (LLGHGs); in this study, LLGHGs represents CO2, CH4, N2O, and CFCs.
In this study, global mean surface air temperature increases by 0.5 K as a equilibrium response to the specified tropospheric ozone increases from 1850 to 2000. This is equivalent to 22% of our estimated climate sensitivity to the LLGHGs increases in this study (2.3K).
Our simulation shows anomalously high temperature increases (1-1.5 K) over Middle East and US which appear to reflect the inhomogeneous distributions of radiative forcing from ozone changes.
Temperature increase due to tropospheric ozone increases is more significant in the upper troposphere in the low to midlatitudes.
In the stratosphere, there are large temperature decreases (cooling) of -0.5 or -1.0 K associated with reduction in long-wave radiation due to upper tropospheric ozone increases.