

5.092 Regional tropospheric ozone pollution over the Indian Subcontinent and transport pathways as observed by a chemical transport model.

Early Career Scientist

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Abstract:

The Indian subcontinent is home to roughly one fourth of the world's population. It is a region of major economic growth and urbanization, with the consequent increase in anthropogenic emissions. Tropospheric ozone, a product of photochemical activity, is an important climate gas and an air pollutant. Therefore, it is important to understand the distribution of and the impact of emissions on, tropospheric ozone over the Indian subcontinent. We have examined ozone abundances in the boundary layer, and mid and upper troposphere over the Indian subcontinent. The work focuses on the export and import of tropospheric ozone, out of and into the Indian subcontinent using GEOS-Chem, a global three-dimensional chemical transport model (www.geos-chem.org) in a $2^\circ \times 2.5^\circ$ resolution. The model simulations are evaluated against in situ and satellite-based observations. The evaluation result showed that the model simulated boundary layer, mid-troposphere, and upper troposphere ozone reasonably well. While the model was able to simulate surface ozone abundances only at remote locations, the seasonal variation was captured at all the locations. The impact of emission (particularly NO_x) on tropospheric ozone is evaluated for a period of 15 years (2000-2014), when emissions were increasing rapidly. The modeling runs were conducted with emissions reduced by 20% and 50% to study the sensitivity of ozone abundances on various regions to future emissions due to potential mitigation efforts. Our initial results show that transport from the Indo-Gangetic Plain greatly influence ozone over Bangladesh and Central India. Pollutants from Central India greatly influence the southern peninsular India. Sri Lanka neither influences the rest of the subcontinent, nor is it influenced by the subcontinent.