Title:	Tropospheric ozone over the Indian subcontinent from 2000 to 2015: Data set and simulation using GEOS-Chem chemical transport model
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Abstract:	The Indian subcontinent (IS) is a region of increasing economic growth, urbanization, and consequently, anthropogenic emissions, altering tropospheric ozone (O3) over the region with impacts on the lives and health of 1.3 billion people. We have developed a comprehensive data set of the tropospheric O3 for 16 years (2000–2015) for the region between 50-115°E and 0–45°N, focusing on the IS. The data set included available balloon-borne, aircraft, and satellite-based measurements. We used a global three-dimensional chemical transport model, GEOS-Chem, at a 2° × 2.5° resolution to calculate daily tropospheric O3 over the region. The simulated O3 abundances in the boundary layer and lower, mid, and upper troposphere were compared with ozonesonde, aircraft, and satellite observations. The statistical analyses indicate that the model simulated boundary layer and lower, mid, and upper tropospheric O3 column abundances reasonably well with a mean bias ~1–3 DU in comparison to observations, but within the uncertainties of the observations. The model reproduced the vertical profiles of O3 and CO with a bias of less than 20% over different regions in the IS. The simulated tropospheric column NO2 was higher by a factor of ~1.5 compared to satellite observations. The model reproduced the regional difference in seasonal variations of tropospheric column O3 as observed by the Ozone Monitoring Instrument. We conclude that the CO emissions from the IS are underestimated while those of NOx are overestimated, both by around 20–30%.
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