Title:	Influence of post-harvest crop residue fires on surface ozone mixing ratios in the N.W. IGP analyzed using 2 years of continuous in situ trace gas measurements
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Abstract:	O3, CO, and NOx affect air quality and tropospheric chemistry but factors that control them in the densely populated N.W. Indo-Gangetic Plain (IGP) are poorly understood. This work presents the first simultaneous 2 year long in situ data set acquired from August 2011 to September 2013 at a N.W. IGP site (30.667°N, 76.729°E; 310 m asl). We investigate the impact of emissions and meteorology on the diel and seasonal variability of O3, CO, and NOx. Regional post-harvest crop residue fires contribute majorly to an enhancement of 19 ppb in hourly averaged ozone concentrations under similar meteorological conditions in summer and 7 ppb under conditions of lower radiation during the post monsoon. d[O3]/dt (from sunrise to daytime O3 maxima) was highest during periods influenced by post-harvest fires in post monsoon season (9.2 ppb h−1) and lowest during monsoon season (4.1 ppb h−1). Analysis of air mass clusters revealed that enhanced chemical formation of O3 and not transport was the driver of the summertime and post monsoon ambient O3 maxima. Despite having high daytime NOx (>12 ppb) and CO (>440 ppb) in winter, average daytime O3 was less than 40 ppb due to reduced photochemistry and fog. Average daytime O3 during the monsoon was less than 45 ppb due to washout of precursors and suppressed photochemistry due to cloud cover. The 8 h ambient air quality O3 standard was violated on 451 days in the period August 2011–September 2013. The results show that substantial mitigation efforts are required to reduce regional O3 pollution in the N.W. IGP.
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