Title:	Volatile organic compound measurements point to fog-induced biomass burning feedback to air quality in the megacity of Delhi
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Abstract:	We report the first ambient measurements of thirteen VOCs for investigations of emissions and air quality during fog and non-fog wintertime conditions at a tower site (28.57° N, 77.11° E, 220 m amsl) in the megacity of Delhi. Measurements of acetonitrile (biomass burning (BB) tracer), isoprene (biogenic emission tracer in daytime), toluene (a traffic exhaust tracer) and benzene (emitted from BB and traffic), together with soluble and reactive oxygenated VOCs such as methanol, acetone and acetaldehyde were performed during the winters of 2015–16 and 2016–17, using proton transfer reaction mass spectrometry. Remarkably, ambient VOC composition changes during fog were not governed by solubility. Acetaldehyde, toluene, sum of C8-aromatics (e.g. xylenes), sum of C9-aromatics (e.g. trimethyl benzenes) decreased by ≥30% (>95% confidence interval), whereas acetonitrile and benzene showed significant increases by 20% (>70% confidence interval), even after accounting for boundary layer dilution. During fog, the lower temperatures appeared to induce an emissions feedback from enhanced open BB within Delhi for warming, releasing both gaseous and aerosol pollutants with consequences for fog chemistry, sustenance and intensity. The potential feedback is important to consider for improving current emission parametrizations in models used for predicting air quality and fog in such atmospheric environments.
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