Title:	Nocturnal Atmospheric Oxidative Processes in the Indo-Gangetic Plain and Their Variation During the COVID-19 Lockdowns
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Abstract:	This study investigates selected secondary atmospheric responses to the widely reported emission change attributed to COVID-19 lockdowns in the highly polluted Indo-Gangetic Plain (IGP) using ground-based measurements of trace gases and particulate matter. We used a chemical box-model to show that production of nighttime oxidant, NO3, was affected mainly by emission decrease (average nighttime production rates 1.2, 0.8 and 1.5 ppbv hr−1 before, during and relaxation of lockdown restrictions, respectively), while NO3 sinks were sensitive to both emission reduction and seasonal variations. We have also shown that the maximum potential mixing ratio of nitryl chloride, a photolytic chlorine radical source which has not been previously considered in the IGP, is as high as 5.5 ppbv at this inland site, resulting from strong nitrate radical production and a potentially large particulate chloride mass. This analysis suggests that air quality measurement campaigns and modeling explicitly consider heterogeneous nitrogen oxide and halogen chemistry.
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