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Title:	Season-wise analyses of VOCs, hydroxyl radicals and ozone formation chemistry over north-west India reveal isoprene and acetaldehyde as the most potent ozone precursors throughout the year
Authors:	Kumar, Vinod (/jspui/browse?type=author&value=Kumar%2C+Vinod) Sinha, Vinayak (/jspui/browse?type=author&value=Sinha%2C+Vinayak)
Keywords:	Ozone pollution Isoprene VOC Hydroxyl radical OH reactivity India
Issue Date:	2021
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Citation:	Chemosphere, 283, 131184.
Abstract:	<p>The north-west Indo-Gangetic Plain is the agricultural cereal-basket of India owing to its prolific wheat and rice production. Surface ozone pollution is of growing concern over it, yet no detailed year-round in-situ measurements of its most reactive precursors, particularly the volatile organic compounds (VOCs) are available from this region. Here, using the first year-long continuous measurements of 23 major VOCs, ozone, NO_x, CO and their atmospheric oxidation products from a regionally representative site in north-west India, we evaluated speciated OH reactivities (OHR), ozone formation potential (OFP) and ozone production regimes (OPR) across all seasons. The average seasonal OHR ranged from 14 s⁻¹ (winter) to 21.5 s⁻¹ (summer). We provide the first estimate of OH radical mixing ratios varying between 0.06 and 0.37 ppt in different seasons for the peak daytime hours in this region. Recycling via HO₂+NO was the most important pathway contributing to >85% of the OH production throughout the year. Contrary to satellite derived proxies and chemical transport models which predict NO_x sensitive OPR, we show it to be strongly sensitive to both VOCs and NO_x (>90% days in a year). Remarkably for densely populated regions, isoprene and acetaldehyde collectively accounted for ~30–50% of the total OFP in all seasons. Biogenic emissions of isoprene (reaching 12.9 mg/m²/h) and high acetaldehyde from anthropogenic and photochemical sources were observed for all seasons. Monitoring and control of isoprene and acetaldehyde are therefore urgently required for efforts focused on mitigating surface ozone pollution in this demographically important region of the world.</p>
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URI:	https://doi.org/10.1016/j.chemosphere.2021.131184 (https://doi.org/10.1016/j.chemosphere.2021.131184) http://hdl.handle.net/123456789/4379 (http://hdl.handle.net/123456789/4379)
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