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Title:	RTEI: A new high-resolution ( $0.1^\circ \times 0.1^\circ$ ) road transport emission inventory for India of 74 speciated NMVOCs, CO, NOx, NH <sub>3</sub> , CH <sub>4</sub> , CO <sub>2</sub> , PM <sub>2.5</sub> reveals massive overestimation of NOx and CO and missing nitromethane emissions by existing inventories
Authors:	Hakkim, Haseeb (/jspui/browse?type=author&value=Hakkim%2C+Haseeb) Kumar, Ashish (/jspui/browse?type=author&value=Kumar%2C+Ashish) Annadate, Saurabh (/jspui/browse?type=author&value=Annadate%2C+Saurabh) Sinha, Baerbel (/jspui/browse?type=author&value=Sinha%2C+Baerbel)
Keywords:	Air quality Acetaldehyde Emission inventory Road transport VOC India
Issue Date:	2021
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Citation:	Atmospheric Environment: X, 11, 100118.
Abstract:	21 of 30 most polluted cities for particulate matter (PM <sub>2.5</sub> ) are in India, yet the distribution, identity and emissions of volatile organic compounds (VOCs) from traffic, which are PM <sub>2.5</sub> and ozone precursors, remain unknown. Here, we measured emission factors (EFs) of 74 VOCs from a range of Indian vehicle-technology and fuel types. When combined with $0.1^\circ \times 0.1^\circ$ spatially resolved activity data for the year 2015, toluene ( $137 \pm 39$ Gg yr <sup>-1</sup> ), isopentane ( $111 \pm 38$ Ggyr <sup>-1</sup> ), and acetaldehyde ( $41 \pm 6$ Ggyr <sup>-1</sup> ) were top 3-VOC emissions. Petrol-2-wheelers and LPG-3-wheelers emitted the highest VOCs (EFs > 50 gVOC/L) and had highest secondary pollutant formation potential, so their replacement with electric vehicles would improve air quality. EDGARv4.3.2 and REASv2.1 emission inventories overestimated total road sector emitted VOCs due to obsolete EFs and activity data, in particular over-estimating ethene, propene, ethyl benzene, 2,2- dimethyl butane, CO, NOx while significantly under-estimating acetaldehyde. Nitromethane emissions were missing from previous inventories and with isocyanic acid and benzene contributed significantly to toxic emissions (summed total $\sim 41 \pm 4$ Ggyr <sup>-1</sup> ). Knowledge of key VOCs emitted from the world's third largest road-network provides critical new data for mitigating secondary pollutant formation over India and will enable more accurate modelling of atmospheric composition over South Asia.
Description:	Only IISER Mohali authors are available in the record.
URI:	<a href="https://doi.org/10.1016/j.aeaoa.2021.100118">https://doi.org/10.1016/j.aeaoa.2021.100118</a> ( <a href="https://doi.org/10.1016/j.aeaoa.2021.100118">https://doi.org/10.1016/j.aeaoa.2021.100118</a> ) <a href="http://hdl.handle.net/123456789/4353">http://hdl.handle.net/123456789/4353</a> ( <a href="http://hdl.handle.net/123456789/4353">http://hdl.handle.net/123456789/4353</a> )
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