



## **Volatile organic compound mixing ratios and fluxes above Beijing and Delhi**

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Increased urbanisation together with rapid economic development has led to the growth of numerous megacities, especially in Asia. Air pollution has become a major public health concern in many of these cities and has gained significant public and political attention. Volatile organic compounds (VOCs) are emitted from both biogenic and anthropogenic sources such as fossil fuel and biomass combustion and the evaporation of petroleum products. These compounds are a large source of reactive carbon into the atmosphere and therefore play an important role in atmospheric chemistry through secondary organic aerosol (SOA) formation and facilitating the formation of tropospheric ozone. As well as their indirect impacts on human health via the formation of SOA and ozone, some VOCs, including benzene, directly affect human health adversely.

Here we report VOC mixing ratios and fluxes measured in two Asian megacities, Beijing and Delhi, with a combined population of 33 million. The cities both suffer from widely reported air problems with the world health organisation ranking both in the top 100 most polluted cities (by PM 2.5). VOC mixing ratios and fluxes were recorded in Beijing during two intensive field campaigns: November-December 2016 and May-June 2017. Measurements in Beijing were carried out as part of the Sources and Emissions of Air Pollutants in Beijing (AIRPOLL-Beijing) work package within the Air Pollution and Human Health in a Developing Megacity (APHH-Beijing) research programme. Measurements in Delhi were performed May-June 2018 and October-November 2018 as part of the Megacity Delhi atmospheric emission quantification, assessment and impacts (DelhiFlux) project within the APhH-Delhi research program. Both AIRPOLL-Beijing and DelhiFlux are large multi-institutional studies that aim to record the concentrations and identify the sources of urban air pollutants in developing megacities.

VOCs were measured using a Proton Transfer Reaction-Time of Flight-Mass Spectrometer (PTR-ToF-MS, Ionicon Analytik) in Beijing and a both a Proton Transfer Reaction- Quadrupole ion guide Time of Flight-Mass Spectrometer (PTR-QiToF-MS, Ionicon Analytik) and a PTR-ToF-MS at two sites in Delhi. Comparisons will be drawn between the fluxes and mixing ratios of VOCs recorded in Beijing, Delhi and previous measurements made in London together with a discussion of potential sources.