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Volatile organic compound mixing ratios above Beijing in November and December 2016

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Volatile organic compounds (VOCs) are emitted into the atmosphere from vegetation and anthropogenic sources such as fossil fuel combustion, biomass burning and the evaporation of petroleum products. These compounds play an important role in the chemistry of the lower atmosphere through secondary organic aerosol (SOA) formation and facilitating the formation of tropospheric ozone. As well as their indirect impact on human health via the formation of ozone and SOA, some VOCs, including benzene, directly affect human health adversely.

Here we report VOC mixing ratios measured in Beijing during a 5 week intensive field campaign from the 7th November to the 10th December 2016. This work was carried out as part of the Sources and Emissions of Air Pollutants in Beijing (AIRPOLL-Beijing) work project within the Air Pollution and Human Health in a Developing Megacity (APHH-Beijing) research programme. APHH is a large multi-institutional study which aims to record the concentrations and identify the sources of urban air pollutants in Beijing, determine exposure, understand their effects on human health, and to identify solutions.

VOC mixing ratios were recorded using a Proton Transfer Reaction-Time of Flight-Mass Spectrometer (PTR-ToF-MS, Ionicon Analytik) and a Selected Ion Flow Tube-Mass Spectrometer (SIFT-MS, SYFT Technologies). During the measurement period Beijing was subject to multiple pollution events that alternated with periods of relatively good air quality, allowing the VOCs within the polluted air masses to be identified and quantified. VOCs were sampled at 102 m with additional gradient measurements made at 3, 15, 32 and 64 m providing a vertical profile of VOC mixing ratios. Mixing ratios of methanol, acetonitrile, acetaldehyde, acetone, isoprene and aromatics species will be reported together with a discussion of potential sources. Comparisons will then be drawn with other large cities.