



Long-term MAX-DOAS measurements of nitrogen dioxide and formaldehyde from the North-West Indo-Gangetic Plain

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The Indo-Gangetic plain (IGP) is a demographically important region of the world associated with large anthropogenic emissions of VOCs and other trace gases. Satellite observations have revealed an increasing trend in both nitrogen dioxide (NO_2) and formaldehyde (HCHO) vertical column densities over the IGP. While satellite data provides large spatial and temporal coverage, it needs to be validated using ground-based measurements. Differential Optical Absorption Spectroscopy (DOAS) technique provides an excellent way to compare the column densities retrieved from satellite and ground. Multi-Axis DOAS (MAX-DOAS) technique utilizes passive remote sensing using spectra of scattered sunlight.

We present the first multi-year (2013 - 2017) MAX-DOAS measurements of NO_2 and HCHO from Mohali, India; a regionally representative site located in the north-west Indo-Gangetic plain. NO_2 and HCHO column densities are compared with OMI satellite data. The retrieved NO_2 mixing ratio is also compared with the in situ measurements performed using a chemiluminescence based NO_2 trace level analyzer. While NO_2 measurements provide a measure of the direct emission from the anthropogenic sources, HCHO measurements provide information of both direct emission and photochemical sources, which further help in constraining the emission of non-methane VOCs. By analysing the seasonal patterns of these measurements for different years, we also estimate the varying strength of the sources of HCHO in different periods of the year.