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MAX-DOAS measurements of formaldehyde in the Po-Valley

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Abstract. During the first measurement campaign of the EU FORMAT project in summer 2002 near Milan, northern Italy, ground-based scattered light differential optical absorption spectroscopy (DOAS) measurements were performed using a new multi-axis instrument. From the data set of this four week measurement period, the detailed analysis results of three days, 12–14 August, are presented exemplary. Slant column densities for formaldehyde (HCHO) and the oxygen dimer (O₄) have been retrieved, employing fitting windows from 335 nm to 357 nm and 350 nm to 360 nm respectively. In order to convert slant into vertical columns radiative transfer calculations were performed using aerosol parameters derived from the actual O₄ measurements. By analysing the measurements from different viewing directions (zenith, 4x off-axis) vertical profile information, and in particular mixing ratios for the boundary layer have been derived for the first time for HCHO with a multi-axis DOAS (MAX-DOAS) instrument. HCHO vertical columns are in the range of 5 to 20·10¹⁵ molec/cm² with an relative error of about 15%. This corresponds to HCHO mixing ratios in the boundary layer of 0.7 ppb to 4.2 ppb, which is in excellent agreement with simultaneous measurements from both a Hantzsch in-situ and a long-path DOAS instrument operated at the same place.

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