



Comparison of satellite NO₂ results with mobile MAX-DOAS observations and CHIMERE model simulations for Paris

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Megacities are localized, heterogeneous and variable sources of various air pollutants, having great impact on air quality and ultimately on climate. Within the European project MEGAPOLI we characterise and quantify the pollution levels and emissions using spectroscopic observations from satellite and ground based instruments mounted on a car.

The mobile observations are conducted on circles with different radii around megacities.

From the satellite observations the link from local to regional and global scales can be made. Especially the impact of important sources like megacities on the surrounding areas and also over longer distances can be studied. The combination with the mobile measurements adds information about the heterogeneity within a satellite pixel and the diurnal cycle, which are not well captured from satellite observations.

The CHIMERE model is used to produce daily 3D fields of different trace gases, ozone and aerosols. We compare the CHIMERE model with mobile MAX-DOAS and OMI satellite observations.

The mobile measurements are also used for validation of the satellite observations. We compare the tropospheric NO₂ from OMI (TEMIS) with our mobile MAX-DOAS vertical column densities (VCDs).

In general good agreement of the spatial patterns was found between different data sets. However, the mobile MAX-DOAS measurements usually showed much finer details of the horizontal distributions than the satellite and model data. Also differences in the absolute values were found: The Chimere data are 17% lower and 45% lower than the mobile MAX-DOAS data in summer and winter, respectively. The satellite data are about 50 % lower than mobile MAX-DOAS.