6.031 Vertical distributions of NO2, SO2, HCHO and aerosols derived from MAX-DOAS observations from 2011 to 2014 in Wuxi, China, and application to the validation of satellite and model data.

Early Career Scientist

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Abstract:

The air pollution in Yangtze River delta (YRD), the largest economic region in China, threatens the health of the habitants in this region. Understanding the vertical distributions of the aerosols and the precursor trace gases in the boundary layer is very important to identify the dominating sources. However so far, there are few studies to reveal the vertical distributions from long-term field measurements. Recently some studies use satellite instruments and chemical transport models to identify and quantify the emissions of the pollutants in this region. However there are only few studies to verify their results and quantify the associated uncertainties. From 2011 to 2014 a MAX-DOAS instrument operated in Wuxi, China (belonging to YRD) is used to characterize the vertical

distributions of aerosols, NO_2, SO_2 and HCHO using our own profile retrieval algorithm. The data are used to characterize the seasonal, diurnal, and weekly variations of the species and to investigate the correlations between the different species. The vertical distributionsderived from MAX-DOAS are also used to validate tropospheric NO_2, SO_2 and HCHO data from OMI and GOME-2. We find that the a-priori profiles in the satellite AMF calculations and the cloud shielding effect are the dominant error sources. MAX-DOAS results are also compared to hourly, daily and monthly averaged data from IMAGES, CHIMERE and Lotos-Euros models. Here considerable differences of the vertical distributions and diurnal cycles are found. The consistency depends strongly on the emission inventory used in the model simulations.