



Megacity Trends in NO₂ from Space and Surface Measurements in the Greater London Area

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Megacities are increasingly important in terms of human health, climate, and regional air quality, owing to their high population densities and concentrated emission sources. Nitrogen dioxide (NO₂) is an important tropospheric air pollutant that has anthropogenic and natural sources, in large part dominated by fossil fuel combustion from industry and vehicles in urban areas. NO₂ plays an important role in the formation of ozone and the oxidizing capacity of the atmosphere. With this work data from an extensive set of surface-level monitoring stations, as well as from four satellites, were used to investigate the sensitivity of satellites to capture NO₂ trends on an urban scale.

Data from over 100 NO₂ monitoring sites in and around the Greater London megacity area were examined for trends during the 1996 to 2010 period. NO₂ data from the GOME, SCIAMACHY, GOME2, and OMI satellite instruments were also analyzed for trends. Monitoring data were filtered by increasingly limiting filters to facilitate comparison with satellite data, including year, date, and overpass time corresponding to available satellite data. Data and trends were also investigated for seasonal patterns and weekday versus weekend trends. Classification of monitoring sites were taken into account, to see if satellite data were more representative of e.g. roadside or urban background monitoring site data. Spatial patterns in the data were analyzed and compared to spatial distributions of emission inventory data.