



Revisiting satellite derived tropospheric NO₂ trends

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Nitrogen dioxide levels can be used as tracer of anthropogenic pollution as NO_x, the sum of NO and NO₂, is released during fossil fuel combustion. With its short atmospheric lifetime, atmospheric NO₂ can be easily linked to its sources. Using its structured absorption cross section in the blue spectral region, NO₂ amounts can be derived from measurements of backscattered solar radiation with the help of Differential Optical Absorption Spectroscopy measurements.

Satellite retrievals of tropospheric NO₂ became possible with the launch of the GOME instrument in 1995, and since then a series of instruments including SCIAMACHY, GOME-2 and OMI provide spectral data which can be used to quantify NO₂ columns in the troposphere. Using these observations, spatial distributions of NO₂, its sources and transport pathways as well as temporal changes have been investigated over the last years. In particular the latter have shown remarkable atmospheric developments with large reductions of NO₂ levels in many industrialised countries and dramatic increases in regions with growing economies, most notably in China but also in many other countries.

In this study, recent trends of satellite derived NO₂ columns are evaluated using data from all available instruments with a focus on the last years. Combination of data taken from the two GOME-2 instruments and OMI improves coverage and sensitivity, and also provides important constraints on the reliability of the satellite data set. As in previous studies, large changes in NO₂ columns are found in many regions, in particular over China where after two years of stagnating NO₂ levels an unexpected substantial reduction is observed for 2014.