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Weekly cycle of NO_2 observed from space: Insights on NO_x emissions and chemistry

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Anthropogenic emissions of nitrogen oxides (NO_x:=NO+NO_2) show a distinct reduction over the weekend in many cities in the U.S. and Europe. This results in reduced levels of NO_x which are clearly visible in NO_2 column densities observed from space.

We investigate weekly cycles of NO_2 column densities from measurements of different satellite instruments (GOME 12, SCIAMACHY, OMI) over the last 15 years and possible changes of the weekly patterns with time. The relative reduction on the weekend allows conclusions on the contributions from different NO_x sources, e.g. traffic versus industry.

In addition, the observed weekly cycle allows conclusions on the NO_x lifetime τ, as Monday levels are also affected by the Sunday reductions, the longer τ the more. Thus, the weekly pattern contains also information on NO_x chemistry.