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Weekly cycle of NO_2 revisited

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Some years ago, we reported on a significant weekend reduction of NO_2 column densities derived from the Global Ozone Monitoring Experiment (GOME) over the industrialized areas of the US, Europe, and Japan. Meanwhile, several years of data from further instruments (SCIAMACHY, OMI, and GOME-2) are available with improved spatial resolution that allows to investigate tropospheric NO_2 levels on almost urban scale.

Here we present an update of the "weekend effect" from satellite observations of NO_2. In particular, we investigate regional and seasonal differences of the strength as well as the shape of the weekly cycle. These characteristics allow to draw conclusions on the contribution of different NO_x sources (mainly industry, power generation, and traffic), having different weekly (and possibly seasonal) patterns.

In addition, we estimate (regional and seasonal) tropospheric lifetimes (τ) of NO_2 from the change of the weekly cycle pattern downwind from source regions: The longer τ, the longer the NO_2 columns "remember" the (Sunday) reduction in the Monday (Tuesday...) levels.

Finally, we discuss the impact of the observed weekend reduction of NO_2 on tropospheric chemistry.