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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Weekly cycle of NO_2 by GOME measurements: A signature of anthropogenic sources" *by* S. Beirle et al.

S. Beirle et al.

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We thank H. Eskes for his positive assessment of this study and his constructive comments. He gave some helpful suggestions for technical correction and reformulated some sentences that we thankfully followed.

The major topics of the reviews (error analysis, seasonal dependency and lifetime estimation) are addressed in our AC General remarks.

Reply concerning specific aspects:

GOME NO2 retrieval We added a reference to Martin et al (2003).

Lightning From our study, we cannot exclude lightning as an additional offset. Also other sources of NOx like biomass burning or soil emissions lead to an additional offset. For the highly industrialized areas under consideration, however, these concurring

sources have only minor importance.

Stratospheric column We estimate the stratospheric column over the pacific in a band with almost no lightning activity. Any error due to an actual tropospheric burden is small compared to the high levels of NO2 in the regions under consideration. We assume the stratospheric column to be independent from longitude (our study is restricted to latitudes below 55°). This is widely rectified by our long year mean of tropospheric NO2 (fig. 1); however, in some regions (North Atlantic), we retrieved negative tropospheric NO2 VCDs, i.e. we overestimated the stratospheric column, by less than 1e15. If the area where we bias the stratosphere extents to northwestern Europe, our retrieved tropospheric NO2 column would be too low in this part, leading to an overestimation of the weekend effect. Nevertheless, for most places we can exclude an impact of systematic errors in the stratospheric estimation. The statistic variability of the stratospheric estimation is included in the error bars in Fig. 3.

GOME measurement time The GOME measurement time surely will affect our study. E.g. one might speculate that the quite low Monday values in Sao Paulo (Fig. 3 (5)) might be due to a later beginning of the working day activities. We stated that Weekly patterns of emissions differ regionally and seasonally and affect our study; the same holds for daily patterns of emissions.

Essen / Sheffield The Cloud Cover data shows no specifics for Essen or Sheffield on the regarding days.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 3451, 2003.