Atmos. Chem. Phys. Discuss., 4, S2208–S2210, 2004
www.atmos-chem-phys.org/acpd/4/S2208/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "A transboundary transport episode of nitrogen dioxide as observed from GOME and its impact in the Alpine region" *by* D. Schaub et al.

Anonymous Referee #1

Received and published: 23 October 2004

The authors were very brave to investigate situations including lots of cloud cover where satellites usually have big problems to assess the pollutant column concentrations. Overall the procedure and especially the final results are convincing. The pathway starting with emissions in Germany being transported above a cloud deck and thus becoming observable by satellites and finally strongly influencing concentrations in Switzerland was convincingly described. However some of the following points should be addressed in the final paper.

Some difficulties arise for the reader in the structure of the paper. First the general procedure of the data analysis is explained. After that the example is discussed. However some parts of the procedure one understands only having read the details of the

example. Parts of the general procedure are not independent of the chosen example.

The NO2 lifetime needs some more discussion concerning the differences between daytime and nighttime chemistry.

The authors relate the emissions of NOx mostly to NO2. In most cases it is true that most of the NOx can be found as NO2 after not too long time. However in winter when the ozone concentration are low and the NOx cocncentrations are high, it is not sure that nearly all emitted gets converted to NO. This should be discussed by the authors.

On page 5110: Trajectory takes up pollution when the trajectory reaches near ground level (50 hPa). In winter time, 50 hPa or around 500 meters are very high. Most of the time most of the pollution is kept below the lowest 100-300 meters. How do the results change if more realistically only the trajectories starting really near the ground are taken into account?

On page 5111: This is one of the main concerns for the procedure in general and for the example shown. What is the basis of the assumption that CTHeff is constant across all pixels. Is there any evidence that this is true for the example shown. Is there data on the heights of the cloud deck for the discussed case study.

On page 5111: The altitude of the model at the locations of the stations should be given. Possible influence of altitude differences between reality and model should be discussed.

On page 5112: The method errors should also include : the use of 50 meters for the trajectory start and for the final comparison with ground based data at the end. The assumption of a constant CTHeff should be dicussed here. The role of night time chemistry concerning the life time is not discussed. In point (iv) it should be mentioned that NOx emissions can also be high on highways outside of the population centers.

On page 5113: Are live cams the only information on the CTH? Live cams in the Alps might not be representative for regions away from the mountainous terrain. At page

ACPD

4, S2208–S2210, 2004

5113 it is not clear yet why there is the assumption that NO2 is highest between 4000 and 6000 masl. This becomes more clear later after the analysis of the trajectories.

On page 5114: In contrast to the procedure desribed on page 5110, here trajectories are considered even 100 hPa from the ground. In reality, even 50 hPa seems really high.

On page 5115: Weiss et al. is a very gray citation and should be omitted

On page 5117: it should be discussed if the correlations of CTHeff and Gome NO2 include also an offset. In any case, some examples should be shown as scatterplots because correlation coefficients might be misleading sometimes.

Minor comments.

- A large amount of very grey literature is used. Most of them should probably be removed. - Page 5108 : chemiluminescence should be named more precise as ozone chemiluminescence. - Also particulate nitrate can contribute to the conventionally measured NO2.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 5103, 2004.