

Interactive comment on “Case studies of ozone transport between North America and Europe in summer 2000” by G. Guerova et al.

Anonymous Referee #3

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This review is a revised version of that written on July 11, 2005. Since the manuscript was changed it is not guaranteed that the new version of the report is complete. However, there is not sufficient time to read the entire manuscript again with full attention.

The study attempts to assess some of the general patterns of trans-Atlantic transport and its impact on the European atmosphere, based on a comparison of measurements and modelling for the summer of 2000. Although a period of three months appears to be rather short (especially in view of the earlier title!) the results obtained look reasonable and confirm the findings of earlier case studies. The manuscript should be published after some modification.

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Specific comments:

1. The very ambitious title of the first version of the manuscript was changed to reflect better what has been achieved. However, I think it is too modest now. The manuscript aims at more than just another series of case studies. It should reflect the key purpose and that a complete summer was analysed which is a substantial achievement.

2. P. 6131, lines 10 and 11: The number of references should be extended. A few more papers on observations of trans-Atlantic transport to Europe have been published in recent years focussing on the issues of the manuscript, such as:

A. Stohl et al., A backward modelling study of intercontinental pollution transport using aircraft measurements, *J. Geophys. Res.* 108 (2003) 4370, doi: 10.1029/2002JD002862,

T. Trickl et al., Intercontinental transport and its influence on the ozone concentrations over central Europe: Three case studies, *J. Geophys. Res.* 108 (2003), 8530, doi: 10.1029/2002JD002735,

H. Huntrieser et.al, Intercontinental air pollution transport from North America to Europe: Experimental evidence from airborne measurements and surface observations, *J. Geophys Res.* 110 (2005) D01305, doi: 10.1029/2004JD005045.

Some of the findings of the earlier work should be discussed wherever suitable in the text.

3. P. 6131, line 20: “Li et al. recently investigated”: There are many publications on the pollution export from North America. Please, rephrase this sentence to make clear that Li et al. are not the first in this field.

4. P. 6131, line 23: There is experimental work on the export in a midlatitude cyclone:

O. R. Cooper et al., Trace gas signatures of the airstreams within North Atlantic cyclones: Case studies from the North Atlantic Regional Experiment (NARE '97) aircraft

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intensive, J. Geophys. Res. 106 (2001) 5437-5456.

5. P. 6131, lines 24-25: “4 events per month in summer 2000”: I could not find anything on this interesting result in the manuscript. Two cases of ozone import from the midwest are described by Trickl et al. (see above).

6. P. 6136-6137: The text suggests (“the model overestimates”, “underestimates”) that the satellite data are highly accurate which is not the case. Suggestion: "The model yields higher/lower concentrations than...". The intercomparison with the MOZAIC data is more meaningful.

7. P. 6138, lines 3-4: The statement “the Azores anticyclone is present only to the south of the North Atlantic.” is not very clear, in part trivial! It might be a good idea to start with the second part of the following sentence, e.g., “Key parameters that drive the pollution transport from North America to Europe are the position and the strength of the Azores anticyclone. In 2000, this anticyclone was shifted more to the south which lead to....”

8. P. 6142, line 15: Another important paper on this subject is:

G.-J. Roelofs et al., Intercomparison of tropospheric ozone models: Ozone transport in a complex tropopause folding event, J. Geophys. Res. 108 (2003) 8529, doi: 10.1029/2003JD003462.

It also presents another typical case of trans-Atlantic transport (see remark 2).

9. P. 6142: The almost missing correlation with the ozone peaks at JFJ is disappointing. I strongly suggest to add graphs of other tracers better suitable to visualize the influence of the long-range transport than ozone. Ozone, because of its high values related to other sources, is not the best choice. If possible, also chemical correlations indicative of aged air masses should be discussed.

It is obvious that an intercomparison with data from mountain stations requires a careful analysis of the advection conditions. There is a host of literature on the Alpine wind

system. The influence of the local wind system on the data registered at the mountain-top stations was an issue, e.g., for the data selection during the TOR subproject of EUROTRAC in the early 1990s. I did not examine if the work by Li et al. cited is the most adequate choice, but I suggest a closer look at the relevant literature. The statements about Foehn events and fronts are misleading since they have nothing to do with trans-Atlantic transport. The respective time periods and can be easily excluded by a simple analysis.

Residual Comments on Style:

1. Still, several of the figures must be revised. In the printed version the text is far too small!
2. P. 6130, line 13: “during the summer 2000” differs in style from that chosen in the title and in the title of Sec. 4.1.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 6127, 2005.

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