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

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Acpd-2005-0203: Impact of transatlantic transport episodes on summertime ozone in Europe

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Final respond to general comments of Ref#1

"However, the conclusions on the impact of long-range transport on ozone over Europe

have already been found by Li et al. (2002) and Auvray and Bey (2005) both using also the GEOS-CHEM model. Both studies present numbers that are very similar to the numbers presented here. In their conclusions the authors should focus more on findings that are really different in comparison to other existing studies, e.g. the characterisation of the different transport events with respect to the different transport pathways (WCB, zonal transport or transport via the Azores anticyclone). A discussion of the results with regard to the role of transport time, convection, chemistry, and the NAO index in 2000 would be delighting."

For the time being, impact of transatlantic pollution transport on European O_3 has been studied either on seasonal bases like in Li et al. (2002) or using single case studies based on intense observation campaigns. In our work we aim to provide a zoom up of the Li et al. (2002) and Auvray and Bey (2005) for a particular season namely, in summer, when O_3 import into Europe is supposed to be at a maximum. This work is however different from the one presented in Auvray and Bey (2005) as we intend to make a systematic analyse of every single episode in summer 2000 and to analyse their impact on the O_3 distribution over Europe using both model output and observations. We believed this is different from the manuscripts available at the moment, which very often cover a single transport event, which may not be representative of an entire season. To better emphasis that point, we now focus more on the impact of LRT events rather than on the transport pathways, which are well known and have been presented in previous studies. As suggested, we also discuss now the impact of the different episodes with respect to different path ways i.e. zonal transport versus transport within a cyclone.

"In addition, already existing studies on long-range transport between North America and Europe (other than Li et al 2002 and Auvray and Bey 2005) should be considered much more and should be compared to the findings here."

ACPD

5, S5539–S5542, 2005

The introduction has been rewritten to take into account a larger number of previous studies.

"A discussion with regard to other important ozone sources (not only stratosphere) like boreal forest fires would also be very delighting."

This is beyond the scope of the paper to discuss the relative contribution of biomass burning versus that of anthropogenic pollution. However, the year 2000 appears to be a year with relatively little fire events in North America compared to 2004, for example, so it is unlikely that this source would have a large impact on our study period.

Reply to the specific comments of Ref#1

"p. 6139, lines 16-20: What about the NO2 enhancements in the mid-Atlantic at around 40deg N and 60deg N seen in fig 5d?"

We do not have a clear answer for this question. On that day, the GOME enhancement mentioned by the Reviewer seems to be local rather than large scale implying, that the stratospheric contribution may not be to blame. One possible reason for the discrepancy could be related to clouds affecting the GOME retrieval, or an upper tropospheric enhancement from lightning that is not resolved by the model.

"p. 6141, lines 14-15: How did the pollution get to Iceland? And why did it accumulate there?"

The pollution was transported at the periphery of the Azore anticyclone, which was

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5, S5539–S5542, 2005

displaced to the north and located east of Nova Scotia/ Gulf of St. Lawrence at 45° W 45° N on July 29. Note that this episode is not discussed anymore in the revised manuscript.

"p. 6142, section 5.1: Figure 9 shows also the GEOS-CHEM stratospheric ozone contribution, but I miss a discussion of this contribution in the text."

A discussion has been included in the text: The model predicts a stratospheric contribution of about 5 ppb (11 %). Zanis et al., 2003 used observed ^{7}Be/^{10}Be ratio to derive an estimate of the contribution of stratospheric O_3 at JFJ, and found that on average over the summer 5 ppb (9 %) originates from the stratosphere, with values ranging from almost 8 ppb in June to less than 3 ppb in August. Even though the stratospheric contribution remains more or less constant in our model over the course of the summer, we find similar values, indicating that the simulated stratospheric contribution is likely to be reasonable for that season and period.

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5, S5539–S5542, 2005