

## ***Interactive comment on “The influence of foreign vs. North American emissions on surface ozone in the US” by D. R. Reidmiller et al.***

**Anonymous Referee #1**

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This paper describes the impact of foreign and North American domestic emissions on surface O<sub>3</sub> levels in the United States. It is based on results taken from multi-model ensemble model runs undertaken in the framework of the Taskforce on Hemispheric Transport of Air Pollution. The paper is generally well written and takes advantage of the availability of results from many models. None of the results is really surprising. Rather, results from previous studies using individual models seem to be reproduced in the current paper, probably with a better estimate of the model uncertainty based on the spread between the different models. However, can this spread in the model results be taken as a measure of true uncertainty? The differences to the measurements of individual model results (and even of the multi-model mean) are quite large and I am wondering whether the model-measurement agreement really supports the model results sufficiently to trust the emission response estimates. A comparison of the number

C146

of exceedances of certain ozone thresholds is probably insufficient to confirm that the models are providing good estimates of the effect of emission reductions in various regions. Without proper validation of these modeling aspects, the study is a pure model exercise that is not really supported by any measurements. I would have liked to see attempts of using the observation data for identifying periods of foreign influence, for instance, rather than trusting fully the models. At least, a critical discussion of these issues is urgently needed before the paper can be published in ACP.

Other major comments:

1) I find the introduction somewhat unbalanced. It gives a little the impression that North America (or maybe even the U.S. only) is impacted by foreign emission sources but that the North American emissions are not as important for impacting other regions. I suggest a more balanced view on the role of North America as a receptor and source of ozone, the impact of which may be seen over other continents.

2) Page 7935, first line: Here, the ozone values are averaged over several sites and subsequently the number of exceedances of an ozone threshold of 75 ppb is determined. However, for an extreme value statistics such as counting days above a certain high value, this averaging procedure does not make much sense. The more values are averaged, the less likely is it that a certain (high) threshold will be exceeded. This is reflected in the results, I think, which indicate fewer exceedances for the areas than for individual stations. It would make much more sense to calculate the exceedances for each site individually and then average the number of cases with exceedances found at each station.

3) Fig. 3: The line and symbols for the year 2001 are not highlighted enough in this rather busy graph. Year 2001 should stick out more.

Minor points:

Page 7935, line 10:  $\sigma$  has not been previously defined, I think.

C147

An observational study of the impact of Asian versus North American influence that is probably worth citing is: COOPER, O. R., et al.: JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 110, D05S90, doi:10.1029/2004JD005183, 2005

Page 7937, line 11: Saying that summer is typically not a season of long-range transport is probably a too strong statement. Adding "from Asia to North America" would make this a correct statement.

Page 7937, line 21: the equation in this line is a bit awkward, since it mixes text with equation symbols. I would say "divided by" instead of "/"

Page 7946, line 4: "in most all regions": rewrite

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Interactive comment on Atmos. Chem. Phys. Discuss., 9, 7927, 2009.