Atmos. Chem. Phys. Discuss., 9, C5899–C5901, 2009
www.atmos-chem-phys-discuss.net/9/C5899/2009/


Atmospheric Chemistry and Physics Discussions

# *Interactive comment on* "Objective assessment of ozone in chemistry-climate model simulations" *by* A. Yu. Karpechko et al.

**TJR Reichler (Referee)**

thomas.reichler@utah.edu

Received and published: 14 October 2009

This paper investigates the ability of twelve coupled chemistry climate models to simulate the climatology and trends of ozone that were observed over the past decades. Several ozone reference data sets are used to determine the individual model's errors in four different diagnostics. For each model, the outcomes from the four diagnostics are combined into one index of overall performance, which can be used to provide guidance about the reliability of future ozone projections. The idea is that models that reproduce the observed distribution of ozone well are also likely to simulate future trends well. The study finds substantial differences amongst the models in simulating past ozone climatologies and trends, and the multi-model mean performs overall better than any individual model. The paper also documents the uncertainties in the different



observation based ozone data sets that were used as a reference. The paper is very thorough in its analysis, for example by testing the robustness with respect to variations in the reference data, ensemble members, and definitions of the performance metric. Finally, the paper also compares its findings with results from earlier attempts of coupled chemistry climate model grading. Model grading is a new and still somewhat controversial topic and there is no single commonly accepted ways in how to best do the grading. Therefore it is important to put forward different ideas and to discuss and compare their results. This is why the present paper is significant: it represents a new attempt to grade chemistry models directly from their performance in simulating ozone, which is of course the quantity that is of most interest to the ozone community. The proposed way of grading complements nicely alternative approaches of process oriented model evaluation. The paper is also very timely since it puts the results of the upcoming WMO ozone report and CCMVal-2 report into perspective. Overall, I find the paper very interesting, well written, of excellent technical quality, and ready for publication, perhaps after a few minor revisions as detailed below.

Minor comments:

19354/14: Could you explain better what you mean with first round of CCMVal? Not everybody is familiar with this project.

19357/8: Maybe it should be made clear that only zonal mean ozone fields are used.

19358/15-16: This is unclear. What is meant with "... combined with the sampling errors by root mean squares"?

19362/15: When I first read this I was confused. Maybe you should better explain what exactly is done, i.e., that different model rankings are investigated.

19363/8: Again, it seems this paragraph could be improved by explaining better the methodology.

19364/21: I am having a hard time to see from Figure 11b the zero grades in the total

ozone climatology. Can this be shown clearer?

19367/14-17: I do not understand the logic here. The ranking of individual models is sensitive to the chosen metric. But you found quite some good correspondence between your results and Eyring et al. (2006, 2008). So, maybe the simplified ozone diagnostics is not a good metric. But this does not necessarily mean that the multi-model mean is the best estimate of future ozone.

Typos:

19354/24: vs. 1.0 –> V1.0

19364/23: in a contrast –> in contrast

---

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 19351, 2009.