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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Comment on "Tropospheric temperature response to stratospheric ozone recovery in the 21st century" by Hu et al. (2011)" *by* C. McLandress et al.

Anonymous Referee #3

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This study presents a likely alternative to the conclusions of Hu et al 2011 on the impact of stratospheric ozone changes on tropospheric temperatures. They use experiments with a single model and find no impact of stratospheric ozone on tropospheric temperatures, unlike Hu et al who found a significant warming. They conclude that differences in climate sensitivity between two groups leads to the significant temperature impacts found by Hu et al 2011. I find the paper acceptable for publication subject to the following comments and minor revisions.

The authors argue that the difference in tropospheric warming between the two sets of CMIP3 models in Hu et al 2011 is due to different climate sensitivities of the models.

The overall tone of these statements is quite strong given the study does not directly analyse the CMIP3 models. An obvious way of checking this would be to determine the transient climate response from the 1%/yr increasing CO2 runs of the CMIP3 models used by Hu et al 2011, rather than relaying information from a Table in the IPCC 4th Assessment Report that does not include all models. A recent paper submitted to ACPD (Previdi and Polvani, Atmos. Chem. Phys. Discuss., 12, 2853-2861, 2011) does such an analysis and the discussion of climate sensitivity should refer to that study.

Commenting on one study which subselected models with analysis of a single model is rather limited as both are open to criticism. Could not results from other simulations (eg. CAM3 ozone and GHG experiments of Polvani, Previdi and Deser GRL, 2011) be included in this study? Similar to the collaboration of Kang et al, Science, 2011 who used both CAM3 and CMAM experiments.

Another possibility for differences between the two sets of CMIP3 models may be the inclusion of tropospheric ozone forcing in the models that include ozone changes. Presumably the CMIP3 models without ozone included neither stratospheric or tropospheric ozone changes. The additional of tropospheric ozone, a greenhouse gas, would likely lead to warming in the troposphere. Can the authors comment on this?

The number of figures seems a little excessive for a comment. One suggestion would be to summarise the timeseries figures in a table.

Minor comments: -the CMIP3 model simulations are variously referred to as IPCC-models or AR4-models. Suggest using CMIP3 models throughout.

-REF-B2-GHG could be interpreted as REF-B2 with GHG only. Suggest changing to REF-B2-minus-GHG

p32994, line 20: change ‘stratospheric cooling’ to ‘stratospheric depletion’ p32994, line 23-p32995, line 1: clarify that these studies are looking at the impact of ozone on

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the tropospheric circulation p32996, line 2-3: this statement needs backing up with a reference as to my knowledge it has not been shown that the impact of stratospheric ozone changes on tropospheric temperatures is limited to the Antarctic region. p32997: delete 'which is in fact opposite in sign to theirs' given the change is likely insignificant p32998: note here that other forcings are included (eg. aerosols) that may contribute to the differences

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 32993, 2011.

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Interactive Comment