

Interactive comment on “Comment on “Tropospheric temperature response to stratospheric ozone recovery in the 21st century” by Hu et al. (2011)” by M. Previdi and L. M. Polvani

Anonymous Referee #1

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In a recent study Hu et al. 2011 have argued that tropospheric and near surface temperature warming will be enhanced during the first part of the 21st century as a consequence of the recovery of the stratospheric ozone layer. They also determined that this enhancement would be most pronounced in the Northern Hemisphere. The results are based on an analysis of SRES A1B simulations of two groups of CMIP3 models, one with (GROUP1) and the other one without (GROUP2) ozone recovery prescribed. This commentary by Previdi and Polvani is one of two complementary comments (McLandress et al. 2011) on the paper by Hu et al. 2011. While McLandress et al 2011 analyzed a set of sensitivity experiments with a chemistry climate model that is coupled to an ocean model, Previdi and Polvani carried out a straightforward analysis

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of additional CMIP3 experiments in which CO₂ concentration increases 1% per year. They compared trends in near surface temperature between the ozone and no-ozone forcing groups of models both for the A1B scenario and the 1% /yr GHG increase forcing experiment. The authors illustrate that the maps of temperature difference between the two model groups are very similar for the A1B and the 1%CO₂ set of experiments although in the latter experiment ozone concentrations are kept fixed in both groups. Based on this result Previdi and Polvani conclude consistently with McLandress et al. that the Hu et al. findings are most likely incorrect and most likely result from a different response of the two groups of models to greenhouse gas forcing.

I suggest to publish this commentary quasi “as is”. Together with McLandress et al. they provide a strong case on why the results of Hu et al. 2011 are misleading and that the ensemble of opportunity provided by the CMIP3 model simulations cannot be used to identify potential effects of the recovery of the stratospheric ozone layer on Northern Hemisphere climate.

Below are a few suggestions for very minor technical changes:

1) The authors should change the term “IPCC-AR4 models” to “CMIP3 models”. The term IPCC-AR4 models is misleading. Although the model comparison project CMIP3 was initiated in preparation for IPCC AR4 the results of CMIP3 studies are also discussed in the AR5 assessment report. Thus, the proper term to use is CMIP3 model experiments (Meehl et al. 2007).

2) Note that A1B scenario experiments also include other forcings like tropospheric ozone increase, which warms the troposphere, and aerosol forcing. Most of the models that include ozone recovery also include tropospheric ozone changes, which can contribute to the enhanced warming found in the Hu et al results. Therefore, on page 2859, line1, I suggest to change “ can be attributed” to “can be attributed to a large degree” or something similar to take into account that there are still some differences between the left and right panels of Figure 1 which can be also related to other forcing

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factors.

3) Figure 1: I suggest putting the color bar horizontally below the maps. In this way the bar and the numbers can be made bigger and thus are readable.

Reference : Meehl G.A., C. Covey, T. Delworth, M. Latif, B. McAvaney, J.F.B. Mitchell, R.J. Stouffer and K.E. Taylor, 2007: THE WCRP CMIP3 Multimodel Dataset: A New Era in Climate Change Research, BAMS, 88, 1383-1394, DOI: 10.1175/BAMS-88-9-1383.

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