

Interactive comment on “Sensitivity studies of oxidative changes in the troposphere in 2100 using the GISS GCM” by J. L. Grenfell et al.

J. L. Grenfell et al.

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The authors thank Dr Savage for his constructive comments.

Abstract —

We now mention in the abstract that this study builds on the TAR study, by incorporating online lightning, by investigating the effect of changing SSTs and sea ice, and by running multiannually.

Section 3 —

The top boundary discussion is now moved to the model description (section 2, parag. 1).

We now include in the conclusions (penultimate paragraph):

What impact could our crude stratosphere have on the results? Estimating this is diffi-

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cult because the way in which the Brewer-Dobson (BD) circulation in the stratosphere responds to increased GHGs can vary critically (i.e. the circulation may strengthen or weaken) depending on subtle changes in refractive index and amplitude of planetary waves (PWs). Also there are feedbacks between wave activity, temperature and ozone loss at high latitudes. A weakened BD circulation for example (with less PW forcing) would imply less stratospheric-tropospheric exchange hence less downward transport of ozone and NO_x.

Section 4 — We use a mass-weighting approach to calculate OH, as we now state in section 4.1 paragraph 1.

Table 4 is new and shows calculated mean OH values in the control run, as discussed in Lawrence et al. 2001. Our values compare well with that study, as we now state.

Section 4.6.1 —

The requested NO_x lightning changes in ppbv are now included at the very end of section 4.6.

In the conclusions we now discuss the improvement of running for 8 years (instead of 1 year as in the TAR study) in terms of our internal model variability.

Technical corrections —

section 4.6.1, "Temperature (and clouds)..." - yes, we meant Celsius here, not Kelvin here (changed)

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