

***Interactive comment on* “Technical Note:  
Chemistry-climate model SOCOL: version 2.0 with  
improved transport and chemistry/microphysics  
schemes” by M. Schraner et al.**

**M. Schraner et al.**

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1. Concerning the reviewer’s suggestion to slightly shorten the paper, we argue as follows: In vs1.3 (advection of additional short-lived tracers) the unrealistically high Cly concentrations in the upper stratosphere mentioned in the introduction of our paper (page 11105, lines 22-24) and by Eyring et al. 2007 (page 19) disappear. This shows that these deficiencies were directly related to an artificial accumulation of Cly by chemical species that were not transported (e.g. ClO and HOCl). To our minds, this is an important result which should not be folded into the discussion of vs1.4 (family based mass fixing).

2. We fully agree that the simple concept of restricting ozone mass fixing to 40°S to

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40°N cannot completely eliminate artificial mass loss / mass accumulation in ozone by the mass fixer and that there are seasons and regions as the high latitudes during break-down of the vortex where the method even leads to an increase of the local transport error (as mentioned on page 11122, lines 7-11). As the reviewer mentions the need for restricting ozone mass fixing to a certain geographical region underlines a very significant drawback of semi-Lagrangian schemes. We have added a corresponding sentence to the manuscript (page 11122, line 11). We agree that it would be worthwhile to perform similar methods as for ozone also for water vapour, methane, nitrous oxide, and CFCs, but we have not carried out respective modifications to the model yet.

3. To our opinion E39/C should not be omitted in Fig. 12 as this model was also part of the CCMVal intercomparison. Further, if E39/C was omitted, would one then not also have to remove MRI, the third model in the CCMVal intercomparison using a semi-Lagrangian scheme? This model also shows relatively low  $\text{Cly}$ , but higher concentrations than ULAQ using a flux-form Eulerian scheme. However, we have replaced Fig. 12 by a new figure where all CCMs are plotted individually rather than being simply represented by a grey area. E39/C and MRI are marked by dashed lines in this plot. From the new figure it is now evident that E39/C is also an outlier and that vs2.0 still lies at the lower bound of the other CCMs. Lines 20-23 on page 11126 have been modified.

4. Struthers et al. (2008, manuscript in preparation for GRL) analyzed the age of air in SOCOL. Indeed stratospheric air in the model is between 1 and 2.5 years younger than derived from measurements. Thus the reviewer is completely right that low  $\text{Cly}$  in the Southern high latitudes is partly caused by too young air. We added this on page 11126 at line 23.

5. Right, 'vs2.2' should always be 'vs2.0'.

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 11103, 2008.