

Author's response

The point-by-point responses to the reviewers have been uploaded in the replies to the reviewers and are hence not repeated here.

The manuscript has undergone changes throughout to respond to the reviewer comments. Notation has been changed (as requested by the reviewers), many parts have been moved to Appendices, Figures have been changed to be consistent with new notation, etc. Here is a list of major changes:

- Notation has been changed from C1, C12, Cly to X,X2,XT throughout
- All Figures, except Figure 1 and 4, have been changed with respect to new notation (the contents of the Figures remain the same)
- Extra references and text have been added to the Introduction
- Section 2: steady-state derivations have been moved to Appendix B and C.
- Extra paragraphs have been added to Section 3 to
 - provide a more detailed discussion of limiters
 - provide a discussion of advecting the sum instead of the individual species
- Section 4: Detailed description of CAM-SE namelist has been moved to a new Appendix (E)
- Section 5.2: A paragraph has been added to discuss the CAM-SE results
- Section 4 and 5: since CAM-SE namelist notation has been removed and replaced with simpler chemistry, coupling and transport time-steps, both section 4 and 5 have been altered to adapt to this change.

Due to the extensive rearrangements and addition of new text, a marked-up version of the manuscript is not provided. The changes have been made with the LaTeX file used for the discussion paper.