Geosci. Model Dev. Discuss.,
doi:10.5194/gmd-2016-175-RC1, 2016

Geoscientific Model Development Discussions

Interactive comment on "The Framework for 0-D Atmospheric Modeling (F0AM) v3.1" *by* G. M. Wolfe et al.

Anonymous Referee #1

Received and published: 15 July 2016

This manuscript introduces the Framework for 0-D Atmospheric Modeling (F0AM) v3.1, a MATLAB-based platform that emphasizes accessibility and flexibility. This framework has already proven to be a useful tool implemented in previous studies, and with the modifications and added functionality detailed in the manuscript, I anticipate an increase in use and development from the atmospheric modeling community. In general, the manuscript is well written and well organized, and I recommend publication after the authors address the minor points listed below.

Specific comments/recommendations:

(1) Page 2 line 24: The authors mention the model predecessors (CAFE and UWCM), but do not differentiate the previous 0-D model (UWCM) from F0AM. At the end of this paragraph, it would be useful to briefly state the major additions or modifications that

are later described in detail.

Also, at this point or elsewhere, it would be good to reference good agreement between the UWCM and DSMACC found by Anderson et al. (2016), which could serve as further F0AM validation.

(2) Page 3 line 13: Before explaining the special option of constraining total NOX, it should be stated that the framework allows for constraining the model to concentrations of any individual chemical species specified within the chosen chemical mechanism. This may be obvious, but if the goal is to encourage use amongst those who are not familiar with modeling, it would be worthwhile to state.

Also at this point, it could be explained that observations can be used to constrain a species throughout a model step, to initialize concentrations at the beginning of each model step, or to initialize the first model step only. While the examples applications illustrate this, it might good to highlight that aspect of F0AM's flexibility here.

(3) Page 4 line 21: Two of the three F0AM photolysis methods (MCM and hybrid) are compared to TUV. My understanding is that TUV may differ from the bottom-up method (due to choices in cross section and quantum yields) and bottom-up method may differ from the hybrid method (due to interpolation across the lookup tables). In this case, for completeness, the authors should mention how bottom-up compares to TUV.

(4) Page 7 line 22: is total NOx constrained, or are NO and NO2 individually constrained?

(5) Page 7 line 26 "Chemistry is MCMv3.3.1. . ." –> "The chemical mechanism employed is MCMv3.3.1. . .", or similar phrasing

(6) Page 8 line 24: "There are significant discrepancies." –> "There are significant discrepancies at other times throughout the day", or similar additional phrasing.

(7) Page 9 line 16: "minor issues. . ." –> "minor discrepancies. . ." In other words, this analysis shows that there are differences between mechanisms, but without compari-

son to observations, no mechanism(s) can be considered more “correct”.

(8) Page 10 line 4: “between the community” –> “with the community”

(9) Figure 7: x axis label –> HO2 production rates (ppt s-1)

References:

Anderson, D. C. et al. A pervasive role for biomass burning in tropical high ozone/low water structures. Nat. Commun. 7:10267 doi: 10.1038/ncomms10267 (2016).

Interactive comment on Geosci. Model Dev. Discuss., doi:10.5194/gmd-2016-175, 2016.