

Interactive comment on “In-cloud oxalate formation in the global troposphere: a 3-D modeling study” by S. Myriokefalitakis et al.

Anonymous Referee #1

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This manuscript uses a global 3-dimensional chemistry/ transport model TM4-ECPL to study the spatial and temporal distribution of oxalate. Oxalate has grown in importance as model, field, and lab studies suggest that aqueous-phase production may be an important source for its production. The authors present an interesting study and attempt to put some quantitative numbers on global tropospheric oxalate burden, net chemical production, importance of precursors, and also removal routes. They also compare model predictions to field measurements. The manuscript is well-written, especially the introduction. The work is original, and the manuscript will be of interest to the ACP audience. I recommend publication after my comments are addressed.

Specific Comments: Need more clarification on measurements. How were the measurements carried out in Section 5? References are provided, but it would be useful

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to also state what techniques were used for oxalate measurements (i.e. filter samplers followed by extraction and IC analysis?). Are these all surface/ship measurements, or some from aircraft? Figure 6: How did the authors arrive at the data points from the field measurements? Are these mean oxalate concentrations for the entire month of that respective field study? There are more data points than references listed, so this reader is uncertain how those points were obtained on the measurement side. And to make a fair comparison with the model output, were the measurements carried out for selected periods during each day or just during the daytime? If the latter applies, how would that alter the comparison? Is it possible to compare meteorological conditions between the model and measurements (e.g. typical LWC values)? More discussion of these factors will be helpful. Pg 506, line 11: Remove “all measurements” as not all measurements are shown here that are reported in the literature. Instead I suggest “Selected measurements”.

Figure 5-6: Can the authors compare (between model and obs) any parameters other than oxalate, such as oxalate:sulfate ratio in Fig. 3E? This would be a meaningful comparison to present.

Figure 6: Is there any relationship between the points with greatest disagreement and specific regions or season?

Page 501, line 5-6: The figure reported here certainly is high (50% of SOA is oxalate). I was surprised at the high value of this figure and I did not feel sufficient attention was given to it. For example, what are the other SOA components considered (e.g. is this figure an upper limit?)? What is the next abundant component?

In many areas I would prefer the authors provide some numbers in the text rather than just say “dominates” (Pg 501, line 9), or “predicts reasonably well” (Pg 503, line 15). Being quantitative in these and other areas would be more meaningful to the reader.

Technical Corrections: Pg 494, line 17-18: A number of issues in the writing, so re-write, and be sure at the minimum to spell methanesulfonate correctly.

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Pg 494, line 5: "follows"

Pg 494, line 12: "these"

Pg 498, line 15: "compound"

Pg 503, line 26: westward "of"

Pg 506, line 14: confidence "in"

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 485, 2011.