

***Interactive comment on “The effect of model spatial resolution on Secondary Organic Aerosol predictions: a case study at Whistler, BC, Canada” by C. D. Wainwright et al.***

**Anonymous Referee #2**

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The manuscript is well written with a clear and concise objective to examine the effect of model resolution on SOA concentrations over the US/Canada with a focus on Whistler. I have some comments regarding expanding the scope of the article and a couple minor comments.

General comments:

1. Nonvolatile POA: The implication of this study is that finer resolution improves the performance of traditional (semivolatile SOA) models since it captures hotspots but GEOS-Chem lacks a semivolatile POA treatment such as that used in Robinson et al. (2007 Science). What about locations where “POA” is dominant? Since GEOS-

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Chem treats POA as nonvolatile, is there not an inherent assumption that the model is not representing very near-source processes including partitioning? How does the assumption of nonvolatile POA influence your choice of model resolution? Is there an intermediate resolution (spatial and temporal) at which nonvolatile POA is an appropriate treatment?

2. Global Budgets: I would be interested to see this work expanded to include the effect of resolution on global budgets. A significant fraction of SOA in GEOS-Chem eventually evaporates at coarse resolution, and previous budget analysis with GEOS-Chem has focused on net SOA production. Does capturing hotspots lead to an increase in net production or does it eventually evaporate? What is the effect of resolution on global aerosol lifetime where wet deposition dominates over dry deposition?

3. Ground network evaluation: Given that the authors have simulated the entire US with the 3 different resolutions, it could be evaluated against US ground based observations. When compared to organic aerosol from IMPROVE or CSN networks, does the finer resolution show better performance?

Minor comment:

1. One month of spin-up seems short for a global model. What was the state of the model at the start of the spin-up period?

2. I agree with the previous reviewer about replacing some of the online references with journal articles (such as Barkley et al 2011 JGR)

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