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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Source attribution of aerosol size distributions and model evaluation using Whistler Mountain measurements and GEOS-Chem-TOMAS simulations" *by* S. D. D'Andrea et al.

Anonymous Referee #1

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This paper evaluates aerosol size distributions predicted by GEOS-Chem-TOMAS using data from Whistler Peak. It suggests simplified free tropospheric and boundary layer filtering techniques to improve comparisons between the model and observations. This work has important implications in future simulations and prediction of remote and free tropospheric aerosol loading globally. The manuscript is well organized and written. Please see specific comments below.

Page 24807, Line 15 and Line 20. need "e.g." before Boucher et al.,

Page 24808, Lines 5. This description is a bit simplistic with regards measurement of free tropospheric air at mountain sites. For example, synoptic weather types have influence, as described in Collaud Coen et al. (2011). http://www.atmos-chem-phys.net/11/5931/2011/acp-11-5931-2011.pdf

Page 24809, Line 19. Lat and Long repeated here.

Page 24810, Line 2. "Whistler Peak often resides in the lower FT" requires a citation or analysis. Please see comment above and Collaud Coen et al. (2011) analysis as an example of the complexities of defining free troposphere and boundary layer influence at mountain sites.

Page 24811, Line 25. Again, further analysis or references are needed to justify statement that Whistler Peak is only influenced by the boundary layer in the summer.

Page 24814. In reference to the threshold temperature, did you consider calculating potential temperature? It may be a more robust measurement of B.L. influence. I am concerned this method is a simplistic fit to this specific dataset and may not apply to other years considering interannual variability. Also, this may not simply be tuned to other sites (due to complexity or lack of upslope flow). As shown in Table 3, a wide range of temperature provides very similar results (R^2 and m). You may also want to calculate water vapor (using temp and RH data) and use this a proxy.

Page 24816. The reasoning for considering CN to be an indicator of B.L. requires further description, given the frequency of new particle formation observed at Whistler.

Page 24821, line 15. Yes, temperature was a better proxy than "others proxies used previously" in your study. But the only other one tried was CN. Please see the other suggestions above for other proxies.

Page 24822, line 22. These conclusions regarding the impact of BVOC on SOA production at Whistler should be more carefully stated given that only 2 days of back-trajectories are provided within this paper.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 24805, 2015.