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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Californian wildfire plumes over Southwestern British Columbia: *lidar*, sunphotometry, and mountaintop chemistry observations" *by* I. McKendry et al.

I. McKendry et al.

IAN@GEOG.UBC.CA

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General Response: We are grateful for the constructive and careful reviews by the two referees. Not only were they positively disposed to our work, but they were consistent with respect to what was required to improve the paper. On that basis, we have made significant revisions to the text as well as to figures. We have attempted to address all general and specific comments made and feel that the paper is much stronger as result. Below are the key reviewers' key comments (numbered) with our response.

Anonymous Referee #2 1. Although the data from the different platforms are of great

importance and well-presented, there is a key point missing, which is the actual links between the data and how they combine... Again, the CALIPSO data provided here are not really compared with the ground-based retrievals in terms of relative differences. This would be very useful since CALIPSO's retrievals are not adequately validated so far. Nevertheless, the reported properties are of great importance for smoke characterization and merit publication.

We agree that the validation of CALIPSO retrievals with our suite of data would be a worthwhile pursuit. However, we continue to work on algorithms to refine our depolarization products and in particular to remove artifacts. Once achieved we hope to be able to move beyond the more qualitative comparison provided herein.

2. First of all they should provide the minimum distance between the ground-based instrument and the satellite overpass. Additionally, I strongly recommend the authors to overplot the CALIPSO overpass on Fig. 2.

Below are the calculated distances. a. Date – 04/25/2008 ..... Dist. = 70km ESE b. Date – 07/01/2008 ..... Dist. = 470km NW c. Date – 08/04/2008 ..... Dist. = 43km WNW By providing the distances above in the text and putting improved plots of the overpass in Figure 6 we hope that this obviates the need to repeat the overpasses in Figure2.

3. Second, the authors should provide inversion results from their CIMEL measurements. SSA retrievals will probably point that the aged smoke plumes reported here are less absorbing than fresh smoke particles. Such results are of great importance for the modeling community, especially for radiative transfer calculations.

With respect to the SSA, we added a sentence which indicated that there were no Dubovik retrievals which satisfied the SSA (Level 2.0) criterion of AOD(440 nm) > 0.4. Consequently we could not provide the requested inversions results for these cases. However, Dr. O'Neill made several amendments to this section as well as providing an improved Figure 4.

4. Page 21052, section 2.1: Please provide the range of incomplete overlap of the groundbased lidar.

Section 2.1 is meant to be only a brief overview of the technical specs of the CORALNet lidar relevant to the data being presented here and the conclusions that were drawn from these observations. It was felt that to expand it further would draw focus away from the observations and colnclusions that are the focus of this paper. As these phenomena (long-range transport of dust and smoke) occur at altitudes far exceeding the range of incomplete overlap, a description of this aspect of the system would be unnecessary.

5. Page 21053, line 5: The lidar ratio of 30 sr is not representative for smoke particles. Raman lidar measurements in Europe during biomass burning episodes revealed lidar ratios for smoke ranging between 40 and 80 sr (see for example, Balis et al., 2003; Amiridis et al., 2009).

Changing the S ratio to be 40-80 (which we believe is for 532nm not 1064nm) would only slightly change the magnitude of the data plotted, particularly if the value chosen is 40 instead of 30. As the change is rather arbitrary, the actual dynamics of the lidar plot would be preserved which is the essence of the paper.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 21047, 2010.