

Interactive
Comment

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

Anonymous Referee #2

Received and published: 18 October 2010

This paper provides optical and physicochemical properties during two regional scale aerosol transport events in which smoke plumes were advected from Northern California to Southern British Columbia. Ground-based sunphotometry and lidar techniques are used along with satellite imagery and meteorological data to describe the geographical extent of the episode, the smoke plume subsidence and the corresponding optical properties. High altitude chemistry observations are additionally used demonstrating potential synergies arising from such a suite of measurements. 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.

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Beyond the numerous ground-based data, satellite observations from CALIPSO are additionally used providing depolarization ratios, which were found to be of the same order with ground-based retrievals. 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. Considering the experimental and processing procedures, these are appropriately described. The results are fairly compared with other studies. Finally, the authors gave the appropriate credit to previous works on the topic, with few exceptions.

I recommend publication after the authors consider the following comments:

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.

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.

Page 21052, section 2.1: Please provide the range of incomplete overlap of the ground-based lidar.

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).

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

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