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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A subsiding regional forest fire aerosol layer at Whistler, BC: implications for interpretation of mountaintop chemistry observations" *by* I. G. Mc Kendry et al.

Anonymous Referee #1

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The paper presents the physico-chemical and optical characteristics of the smoke plume injected in continental North America by the intense forest fires of 30th of August 2009. Sunphotometric, lidar, mountaintop chemistry observations and in-situ PM data are synergistically used along with detailed meteorological analysis to describe the episode and the smoke plume subsidence. The study indeed highlights the importance of lidar remote sensing methods in the interpretation of mountaintop chemical measurements. I believe that the reported properties are of great importance and merit publication. Considering the experimental and processing procedures, these are appropriately described. The title reflects the content of the paper and the abstract pro-

vides a concise and complete summary. The paper is well structured and the language is used appropriately. 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 (minor) comments: Page 20305, line 12: Please mention here that smoke particles alter additionally their absorbing properties with ageing (reference: Amiridis, V., D. S. Balis, E. Giannakaki, A. Stohl, S. Kazadzis, M. E. Koukouli, and P. Zanis, Optical characteristics of biomass burning aerosols over Southeastern Europe determined from UV-Raman lidar measurements, Atmospheric Chemistry and Physics, 9, 2431-2440, 2009). Page 20307, paragraph 2.2: Please give references related with the lidar system (e.g. hardware description, vertical profile retrieval algorithms etc). The authors should mention here the height of full overlap for the lidar system and the elevation of the lidar station. To be comparable, Figure 5 (a) and (b) panels should be plotted in respect to heights referring above sea level. Actually, I have several comments on the discussion here: 1. According to the authors' findings, PM concentrations correlate with smoke layers detected by lidar and ceilometer at heights equal to the PM station elevation (Whistler peak). Following the work of Münkel et al., (2007) (reference: Münkel C., N. Eresmaa, J. Räsänen, A. Karppinen, Retrieval of mixing height and dust concentration with lidar ceilometer, Boundary-Layer Meteorology (2007) 124:117–128), I suggest that the authors should correlate all the available coincident data of the lidar and ceilometer optical properties at Whistler peak elevations and the PM concentrations to justify their assumption. 2. The Aeronet AOD timeseries should be presented in this plot, since the AERONET station is nearby the lidar station. 3. Please mention in the Figure the exact optical properties presented using lidar or ceilometer. I assume that a backscatter ratio is presented for the lidar and the backscatter coefficient for the ceilometer? 4. The authors should comment on the ceilometer's limitations to detect the complete smoke layer. As it is obvious from Fig. 5(b), ceilometer's beam is more likely attenuated by the lower smoke layer and cannot detect particles at higher altitudes.

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Interactive comment on Atmos. Chem. Phys. Discuss., 10, 20303, 2010.

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Interactive Comment