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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Impact of a large wildfire on water-soluble organic aerosol in a major urban area: the 2009 Station Fire in Los Angeles County" *by* A. Wonaschütz et al.

Anonymous Referee #2

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This paper compares summertime Pasadena, CA organic aerosol measurements made during wildfire and non-wildfire impact periods. WSOC and AMS measurements are used to quantify the impact of the fire on air quality and assess the importance of various sources to organic concentrations, including primary emissions from biomass burning and secondary formation. The impact of the fire on the site was substantial. Clear evidence is provided for photochemistry in the plume leading to increased ozone and increased m/z 44/43 and 44/57 in the late morning on fire days. The demonstration of this phenomenon makes this paper worthy of publication. The paper is generally well written, but later sections need to be shortened or eliminated. I recommend this paper for publication after the following are addressed.

1. One of the most interesting things in this paper is the evidence for oxidation in the plume (for example stated in page 12863 line 20). The paper would be stronger if all this evidence were pulled together and discussed in one place, rather than spread out in different sections. Ozone in Fig 2 has a shoulder, indicating late morning production on fire days but not non-fire days. At the same time, m/z 44 remains elevated while m/z 43 decreases, suggesting SOA formation in the plume and m/z 44/43 and 44/57 peak at this time. (Does nitrate also peak at this time?) As the day progresses, m/z 60 decreases and m/z 44/43 increases (Fig. 6). This should all be pulled together to make one argument, rather than having several separate sections to describe the different ways of looking at the data. This will make the argument more clear and the paper will be shorter.

2. Section 3.7.1 is not particularly insightful. It is generally well understood that meteorology and transport have a large effect on concentrations. Some interesting points are made in section 3.7.2, most notably the point about sulfate and the point about ozone and SOA formation in aged smoke. These points are better moved to other sections of the paper and this reviewer suggests section 3.7 be eliminated.

3. page 12862 line 20 and page 12862 line 2 - decreased concentrations in the afternoon could also occur due to the increasing mixing height.

4. page 12869 line 27 - does the continuing sea breeze really bring clean air to Pasadena in the afternoon? Or do the concentrations decrease because the mixing height increases? Do enhanced WSOC/organic ratios noted here suggest continued photochemistry?

5. The possibility that organics were formed through multiphase processes is discounted in one sentence at the end of the paper, by saying this must not be an important process because relative humidities were low. But water is a major product of combustion. Did these fires generate pyrocumulus? Is water likely to condense in the plume aloft? How is the high nitrate formed?

6. The word "significant" should only be used to indicate statistical significance.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 12849, 2011.