**Reviewer 1:**

This paper is a descriptive characterization of fine particle water-soluble organic carbon (WSOC) measured in Los Angeles over an extended time period and includes large biomass burning events that periodically influenced the data set. It is essentially a companion to another a paper under review in ACPD (Hersey et al, ACPD 11, 5867- 5933, 2011), which focused on mass spectrometer measurements of aerosol chemistry during the same period.
I would not characterize this paper as making a substantial contribution to scientific progress; it does not present new methods with regard to measurements or data interpretation. However, it does provide a useful description of an air quality parameter of interest (WSOC) in the Los Angeles basin, a region where characterizing and understanding the sources and processing of air pollutants are important for health and climate forcing reasons. This paper, along with the companion Hersey PACO paper also provide results that may be useful to other recent air quality studies performed in LA. The paper is long, but well written and organized and the results worthy of being archived in a published document. I recommend publication.

Response: We thank reviewer 1 for their assessment of the quality of this work. No changes are requested by this reviewer.

**Reviewer 2:**

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.

Response to 1 and 2: We appreciate these helpful suggestions for making the paper more concise. We have since re-organized the manuscript. The contents of section 3.7 have been shortened substantially and incorporated into section 3.5. Therefore, section 3.7 has been eliminated. The discussion of oxidation of aged smoke has become more concentrated in the process.

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?

Response to 3 and 4.: Both sea breeze development and boundary layer deepening are a result of the same underlying mechanism - solar heating of the land surface – and therefore follow similar diurnal cycles which can cause diurnal cycles in pollutant concentrations. However, deepening of the boundary layer starts in the morning hours, as soon as solar heating of the land surface begins. If this deepening was a dominant process on non-fire days, concentration decreases would be observed from the late morning hours onward. However, in the diurnal average, the data indicate a substantial increase of absolute concentrations until 3 pm (see, for example, organics in Fig. 4), indicating that other effects such as pollutant transport dominate over dilution by a deepening boundary layer, at least initially. Continuing boundary layer deepening may play a role in the afternoon decrease of concentrations, however, it does not explain why the concentration drop is this sudden and this late in the day. Blumenthal et al. (1978) show the importance of sea breeze fronts in bringing in cleaner air, which undercuts the warmer air on land and displaces pollution into elevated layers. The timing and steepness of the afternoon concentration decrease in our data can be explained very well by an incoming sea breeze front. Blumenthal et al. (1978) also mention that a deepening boundary layer in the morning hours can be a mechanism to re-entrain elevated pollution layers (from the previous day) into the mixed layer, i.e. boundary layer deepening may dilute a shallow surface layer, but not necessarily with clean air. We therefore believe sea breeze fronts to be the dominant factor leading to the concentration decreases in the afternoons; this does not preclude the importance of boundary layer deepening and continued work will examine this issue. On fire days, boundary layer deepening may play a role in mid-morning concentration decreases and we have incorporated this into our discussion of diurnal WSOC behavior on fire days.

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?

Response: This is an intriguing idea. The Station Fire did indeed create pyrocumuli, and the formation of organics in those clouds is plausible. It is beyond the scope of our study to investigate the frequency, properties and dynamic development of the pyrocumuli caused by the Station Fire. However, if liquid phase processes in pyrocumuli played a major role, it is likely that they would also produce sulfate. We did not observe elevated sulfate concentrations during the fire in Pasadena (pg. 12868, lines 12-15). We therefore assume that pyrocumulus liquid phase processes did not have a large impact on aerosol chemistry at our measurement site. We do not discuss mechanisms of nitrate formation in fires in this study, however, Gao et al. (2003) Reid et al. (2005) and Peltier et al. (2007) report observations of high nitrate concentrations in smoke plumes.

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

Response: We agree and have replaced the word “significant” throughout the manuscript when used without reference to statistical significance.