Atmos. Chem. Phys. Discuss., 13, C4381–C4383, 2013
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Atmospheric Chemistry and Physics Discussions

ACPD
13, C4381–C4383, 2013

Interactive Comment

Interactive comment on "Burning of olive tree branches: a major organic aerosol source in the Mediterranean" *by* E. Kostenidou et al.

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Received and published: 1 July 2013

The manuscript reports on observations of olive-tree burning in the field and laboratory, as well as oxidation/aging experiments of olive tree burning smoke. The type of analysis itself is not unique and has been applied to different samples of biomass. However, the results are unique in a sense that they focus on burning of olive tree branches, which is important for air quality considerations in the Mediterranean region. To put the results in perspective, the authors provide estimates of the annual emission factors of different species from burning of olive-tree branches; these estimates drive the message home that in certain seasons in the area, air quality is strongly by this agricultural practice. The manuscript is well written and presentation of the data is clear. I

recommend publication of the manuscript with only a few minor clarifications:

1. *Page 7229:Sect. 2.2.6 Why were there both Teflon and quartz filters collected?*

The Teflon filters were used for $PM_{2.5}$ gravimetric analysis. They were weighted before and after sampling to obtain the $PM_{2.5}$ mass concentration. This allowed us to calculate the levoglucosan to $PM_{2.5}$ concentration ratio. Quartz filters are quite sensitive and easily break when they are handled with tweezers in order to be weighted. This introduces large uncertainties in the PM mass measurements. On the other hand, the quartz filters were used to measure the OC and EC and also to obtain larger aerosol samples by using the high volume sampler. This is now explained in the SI.

2. *Page 7232: line 18: indicate which other BB-OA sources were the data on FTIR functional groups compared with.*

The BBOA FTIR sources compared with otBB-OA are BBOA measured in Mexico City, Paseo de Cortez and Houston (as explained in the caption of Figure 1). We added this detail in the text of the revised paper.

3. *Page 7233: line 15: Does HR analysis of the spectra indicates dominance of $CxHy^+$ fragments or $CxHyOz^+$ fragments at typical hydrocarbon fragments?*

The contribution of the CxHy family species was generally higher for the typical hydrocarbon fragments. For example at m/z's 41, 43, 55, 57 and 69 the hydrocarbon contribution was 94%, 51%, 71%, 71% and 78% respectively with the remainder contributed by the oxygenated compounds. We added this information to the corresponding section. In addition, we have replaced the unit mass resolution chamber mass spectrum in Figure 2 with the corresponding high resolution spectrum in order to show the contributions of the different families (CH, CHO, CHN, etc) at each m/z.

4. *Page 7233: line 24: it's indicated that during expt 2, 'probably' contribution of flam-*

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ing phase of the fire was higher. Couldn't some of the gas phase measurements (CO or CO_2) and BC data be used to indicate with certainty how different the flaming/smoldering phases of each expt where? This is an area in the paper that I see a gap in. A better characterization of the fire condition will help putting the results into context. For example on P. 7234, it's mentioned that fresh otBBOA spectra were similar despite differences in the experimental conditions. A better characterization of the different burns will clarify what is and what is not a significant factor for controlling otBBOA chemical characteristics.

During experiment 2 the flaming contributed more compared to the smoldering phase. This is supported by the higher NO and acetonitrile emissions in comparison with the other experiments. Lobert et al. (1990) showed that during the flaming phase NO_x and acetonitrile concentrations were as much as ten times higher than during the smoldering phase. We updated the corresponding text, including the above evidence.

The conditions for the chamber experiments are shown in Table 1. Their differences are related to the age of the branches, whether they were dry or not and if there was any additional matter burned (e.g. in experiment 4, plastic was burned together with the olive tree branches). The branches for the first and third experiment were dry (this information was not in Table 1, so now we added it). We revised the manuscript explaining better the corresponding differences.

5. *Page 7233: line 27: how different was the contribution of larger fragments to total OA in different experiments?*

The contribution of the larger fragments (i.e. 101-200) did not vary much and ranged from 16 to 20%. The average contribution was 18%. We added this information in the manuscript.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 7223, 2013.