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Interactive comment on "Processing of biomass burning aerosol in the Eastern Mediterranean during summertime" *by* A. Bougiatioti et al.

Anonymous Referee #2

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The paper of Bougiatioti et al. describes the effect of wildfires on the chemical composition of aerosol at the remote background site of Crete. In the paper authors characterized five fire events in late summer 2012 when the fires originated from the Greek islands of Chios, Euboea, Andros, the Dalmatian coast and Sicily. Aerosol chemistry was measured by the Aerosol Chemical Speciation Monitor for organics, nitrate, sulfate, ammonium and chloride and with the aethalometer for black carbon. Organic aerosol was studied in more detail by positive matrix factorization analysis. The focus of the paper was in the atmospheric processing of biomass burning aerosol. That is a topical issue and therefore this paper discusses relevant subject. The paper is well written and clear, however, there are several important details missing in the paper that are listed in the comments later. I think this paper merits publication after addressing

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Interactive Discussion

Discussion Paper

all the issues listed below.

Specific comments

Page 25971, line 9; why was it mentioned that the aethalometer had seven wavelengths as the data from different wavelengths was not really discussed (only in supplements)

Page 25974, lines 21-22; How was the CE determined for sulfate (0.25), was it RIE instead of CE?

Page 25974, lines 24-25; How were absorption measurements converted to mass concentrations in aethalometer data?

Page 25975, lines 8-11; Why average OM:OC was used if the ratio was determined for each 30 min periods (Fig. 4)? Would that have changed Fig. SI-2.1?

Page 25975, lines 11-15; Any details about the SMPS measurements are not provided. What was the size range that compared with the ACSM (Fig. 2b)?

Page 25976, lines 8-10; Did you take into account the contribution of sea-salt to sulfate concentrations? Could that cause a part of the difference between ACSM and filter sulfate as they had different cut-off sizes (ACSM lenses vs. filter PM1)?

Page 25976, lines 19-20; Was there back-up filter for OC in order to subtract the gas-phase contribution of OC?

Page 25978, lines 14-16; Because the biomass burning cases were identified based on elevated BC concentrations, it would be good to present the contribution of biomass burning to BC concentration (Fig. SI-1.3.) in the manuscript, not in supplement.

Page 25980, line 28; To me the diurnal profile of OOA-BB in Fig. 5c looks pretty flat

Page 25981, lines 9-13; I didn't really understand the end of the sentence; how do you know that fragment $C_3H_5O^+$ was pronounced in your mass spectrum at m/z 57 when you do not have high resolution mass spectrometer?

Page 25982, lines1-2; many readers are probably not familiar with theta angle. It would be good to define range of theta angles that represent good, moderate and poor correlations and add the ranges in all the figures with theta angle

Page 25982, lines18-20; ..."separate PMF analysis for each event"... It wasn't explained clearly in the text why you decided to do PMF separately for each fire case. Would the results in Table 1 be different if you had used the 3-factor solution shown in Fig. 5? I'm just a bit worried if you had enough data points in each fire event for a valid PMF analysis? Any comment on that?

Page 25983, lines14-5; Did OOA increase during fire events? If not (especially in Sicily fire), how can you say that BBOA was eventually transformed to OOA? OOA can have several different sources other than biomass burning.

Technical corrections

Page 25996, Fig 3; It is difficult to see the episodes when the data is presented as dots. I suggest to use lines instead of dots

Page 25997, Fig 4c; BBOA (this study), OOA-BB (this study) and OOA (this study) are difficult to find, I suggest to change colors

Page 25998, Fig 5a; see comment for Fig. 3

Page 25999, Fig 6; it would be nice if x-axis could be divided between good, moderate and poor correlation with vertical lines (see earlier comment for Page 25982, lines1-2)

Supplementary information

Fig. SI-1.3; use same y-axis for both the BC concentrations

Fig. SI-4.1; this figure must be wrong. Both plots are the same and there is no seed or fpeak run shown.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 25969, 2013.