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Interactive comment on “The Finokalia Aerosol Measurement Experiment – 2008 (FAME-08): an overview” by M. Pikridas et al.

Anonymous Referee #1

Received and published: 10 May 2010

Overall Comments:

This paper outlines the detailed particle- and gas-phase measurements made during a month long field study that took place at Finokalia, on the island of Crete, Greece. The authors clearly outline that the purpose of this field study was to characterize the physical and chemical properties of aged aerosol and to investigate new particle formation. The suite of measurements included: (1) aerosol and air ion size distributions; (2) size-resolved chemical composition; (3) organic aerosol thermal volatility; (4) water uptake and (5) particle optical properties (i.e., light scattering and absorption). This paper is very well written and provides a clear overview of all the measurements made and some of the overall trends observed. For example, the authors indicate that sulfates accounted for $\sim 50\%$ of the PM1 mass and organics accounted for 26%

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of the PM1 mass. Interestingly, 80% of the PM1 organic aerosol mass fraction was found to be water soluble at this location. The objectives of this study are important to the aerosol community and this overview paper should certainly be published in Atmospheric Chemistry and Physics once the following minor and technical comments outlined below are addressed by the authors. A number of detailed studies will certainly follow this overview and thus provides a central manuscript for the details of the field study design and procedures.

Minor Comments:

1.) Page 6648, Line 3:

The authors cite the study by Lee et al. (2010) here and at a number of other places in the text. It is not appropriate for the authors to cite a manuscript that is in preparation. It is suggested that the authors instead outline the details of the CE analysis or cite a reference that is published in the literature.

2.) Page 6652, Lines 19-22 and Table 2 (aerosol acidity by Q-AMS):

The authors report aerosol acidity of PM1 as the ratio of the AMS measured ammonium to sulfate (in molar equivalents). Have the authors taken into account the recent findings by Farmer et al. (2010, PNAS)? More specifically, Farmer et al. showed that organosulfates and organic nitrates need to be accounted for in the ammonium balance and in the evaluations of aerosol acidity. Farmer et al. (2010) showed that organic nitrates appeared as NOx^+ ions in the HR-TOFAMS, which are typically dominated by inorganic nitrate. Additionally, Farmer et al. (2010) showed that organosulfates fragment similarly to inorganic sulfate. Basically, the AMS nitrate and sulfate from the standard AMS analysis software cannot be considered entirely inorganic species. Likely the presence of these compounds in PM1 make it difficult to accurately predict a measure of aerosol acidity due to the harsh operating conditions employed in AMS techniques. Thus, I think the authors need to caution readers on the meaning of their reported aerosol acidity. Does this really mean anything now? Should we even report

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this value using AMS data?

Reference information:

Farmer, D. K., Matsunaga, A., Docherty, K. S., Surratt, J. D., Seinfeld, J. H., Ziemann, P. J., and Jimenez, J. L.: Response of an aerosol mass spectrometer to organonitrates and organosulfates and implications for atmospheric chemistry, Proc. Natl. Acad. Sci. U.S.A., 107, 6670-6675, 2010.

3.) Page 6656, Lines 11-15:

Can the authors really say that HOA was converted to OOA in the 6-36 h of transport from source areas to Crete? It is my understanding of PMF analyses, that HOA and OOA from one location doesn't mean the same thing at another location. Basically, not all HOA and OOA values reported from PMF analysis of AMS data are created equal. Thus, I think the authors may be stretching the meaning of these data. Basically, can the authors really use HOA and OOA values to imply aerosol aging? Is there a better measure that can be used instead of values produced from PMF analyses?

Technical Comments:

1.) Page 6653, Line 24:

Remove the "." after "Q-AMS"

2.) Page 6654, Line 3:

Remove the "s" in the word "organics"

3.) Table 2:

Can the authors fix the first column's (i.e., variable) formatting? The words have large spaces between them.

4.) Figure 3:

Please make this bigger as it is hard to read the values in the current size.

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5.) Figure 5:

Can the authors make Figure 5 easier to read (i.e., bigger and clearer lines)?

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