

# ***Interactive comment on “Ion concentrations of PM<sub>10–2.5</sub> and PM<sub>2.5</sub> aerosols over the eastern Mediterranean region: seasonal variation and source identification” by H. Kouyoumdjian and N. A. Saliba***

## **Anonymous Referee #1**

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### General Comment:

The paper describe the levels and inorganic ion composition of fine (PM 2.5) and coarse (PM 2.5–10) aerosols at one of the busiest business areas of Beirut, Lebanon. The paper present valuable information regarding the chemical composition of aerosols in this area (information which is currently very limited for this part of the globe), but provides only basic interpretation of the data. The paper is written in a clear way and its topic falls within the scope of ACP. However, I believe that in order to meet also

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the ACP standards, a more thorough interpretation of the data is needed, including correlating the presented chemical data with meteorological data.

Specific comments:

1. In the introduction, give some information on the typical wind directions at the sampling site during the different seasons, and specify if there are any important local sources that might effect the PM in these directions.
2. In section 2.2.1 you write that out of the five filters collected each month (one filter every 6 days) only one filter was taken for anion analysis and one for cation analysis. This means the there was at least 6 days difference between the collection of these two filters. Have you considered the effect of differences in meteorological conditions during the two sampling times and the possible artifact this may introduce to their interpretations of the data? It is clear that at this stage the sampling can not be redone, but the authors should mention in the paper why they chose to do it this way and comment on the problems it may rise.
3. Why only two filters a month were used for ion analysis? Were the other three used only for total PM? Do the authors have any estimation of how well does one filter represent a whole month?
4. FTIR analysis: line 14 - How did you press the filters against the ATR to ensure even and repeatable readings? Since this method has not been widely used for aerosol analysis, you might want to add few more details on how it was done.
5. The numbers in Table 1 and in figure 2 don't agree with each other. Based on the data from the table the "other species" contribution is 74 percent and 63 percent for the fine and coarse PM (compare to 67 percent and 56 percent values given in figure 2).
6. Figure 2 does not seem to contribute much new information to what is shown in table 1. You might want to consider adding two columns of the amount of unidentified species (fine and coarse PM) in the table and omit figure 2.

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7. Increase in PM during dust storms (Section 3.1, line 23) - can you be more quantitative? By how much has it increased? What was the dust storms contribution to the fine PM.

8. In general, in several point in the paper you mention significant effect of dust storms on the PM composition. However, no specific analysis of such storm events is provided, such as dates and back trajectories or other meteorological data to support the origin of such dust. Furthermore, basic mineralogical information regarding the dominant composition of the rocks in the local area and of the Saharan and Arabian dust would also be beneficial to the data interpretation.

9. In the coarse particles there is very large amount of Cl<sup>-</sup>, any ideas in what form is it present? (Not enough of any of the measured inorganic cations to neutralize the Cl<sup>-</sup> charge).

10. Section 3.2.1, end of line 14: Any explanation to the high Ca<sup>2+</sup> levels measured in this site compare to the other eastern Mediterranean sites?

11. Figure 4: 1) Need to increase the font sizes. 2) The dates of the data points for the fine and coarse particles in this figure don't overlap, wasn't the ionic analysis done on the same filters for the fine and coarse particles?

12. Section 3.3, line 10 - show on the figure when were these dust storms or give in the text their dates.

Technical corrections:

1. In section 2.1 would have changed the order of the two paragraphs. Starting with the general information on the location of the sampling site and than discuss the sampling procedure.

2. Section 3.2.1, Lines 15-20: is it necessary to give so many references to a commonly used assumption?

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3. Section 3.2.1, end of line 22: instead of "so the attribution to" change to "thus attributed to". In the next sentence (line 23), take out the word "Other".
4. Figure 3 - Better to name the Y axis "absorbance" rather than "intensity" and to give a reference bar for demonstrating the absorbance magnitude.
5. Section 3.2.2, line 10: better to use "supported" instead of "confirmed".
6. Section 3.2.2, line 15: add "in the form of" between "were" and "water soluble".
7. Section 3.3, line 5 - move the "in the coarse mode particles" to line 3 after "it is apparent that".

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Interactive comment on Atmos. Chem. Phys. Discuss., 5, 13053, 2005.

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