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## ***Interactive comment on* “Particle water and pH in the Eastern Mediterranean: sources variability and implications for nutrients availability” by P. Nikolaou et al.**

### **Anonymous Referee #1**

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The authors present an analysis of submicron aerosol composition, CCN activity, and light scattering measurements made in the Eastern Mediterranean in 2012. They use the available data and modeling techniques to infer aerosol liquid water content and aerosol pH for the submicron aerosol fraction. Given the limitations of the dataset, specifically the absence of gas-phase NH<sub>3</sub> data for most of the measurement period, the analysis is consistent with the state of the art. daily PM<sub>10</sub> filter composition analysis was also performed and this information was used to calculate LWC and pH for PM<sub>10</sub>. I believe this manuscript is publishable in ACP after the following points are addressed directly in the revised manuscript.

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1) More discussion of the error introduced to the pH estimate by the absence of NH<sub>3</sub> (g) data is required. I will note that the "spot check" comparing the ISORROPIA predicted NH<sub>3</sub> (g) and the available measurements of NH<sub>3</sub> (g) mentioned at the end of section 2 is reassuring, but this discussion should be expanded and more technical information provided for the reader.

2) More information needs to be provided regarding the LWC and pH analysis for PM<sub>10</sub>, including a frank assessment of the error bars on the pH and LWC calculations for PM<sub>10</sub>. I did not see any of this mentioned in section 2, and PM<sub>10</sub> is mentioned only briefly at the beginning of section 3.4. The difference in available data and the level of analysis performed on the PM<sub>10</sub> vs. PM<sub>1</sub> needs to be discussed, especially since these datasets are discussed in conjunction in the later sections of the paper, and given the emphasis in the paper on bioavailability of mineral dust nutrients.

I will note that the analysis of submicron aerosol alone seems technically sound to me with minor revisions, and if necessary, this would make a fine standalone paper.

#### TABLE 1 -

The error bars on pH values listed here seem to be misleadingly small if the analysis itself introduces at least unit error to the pH estimates for submicron aerosol. How were they calculated for PM<sub>1</sub> and PM<sub>10</sub>?

#### FIGURES -

The time series presented in Figures 1 and 2 are not easily legible in the current format, these figures should be redesigned in order to have more meaning for the reader.

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 29523, 2015.

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