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Interactive comment on "Optical and geometrical aerosol particle properties over the United Arab Emirates" *by* Maria Filioglou et al.

Anonymous Referee #3

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REVIEW

Optical and geometrical aerosol particle properties over the United Arab Emirates by Maria Filioglou et al.

GENERAL COMMENT

The paper deals with a relevant topic within the scope of Atmospheric Chemistry and Physics. The manuscript is well written and structured in a rather convenient way. Although the period covered is short, specially having in mind the gaps due to instrumental problems, the data set is very valuable having in mind the quality and variety of variables analyzed and the scarcity of atmospheric aerosol vertical profiling in the study area. Searching similarities and differences with North African mineral dust aerosols is

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worthy, and the authors do this combining remote sensing vertical profiling and some lab work on collected samples. The characterization provided is very comprehensive and at the same time presents results in a very concise way. The paper is appropriate for ACP but in the present stage it requires some revisions in aspects I detail in the following section.

PARTICULAR COMMENTS

There are some issues related to the analysis of the atmospheric vertical structure. Thus, the results on Free Troposphere, FT, and Boundary Layer, BL, are a little bit surprising. The depth of the FT is according to figure 4 is usually rather low, around 1 km, similar to that of BL, something that it is not coherent with the definition of FT. On the other hand, the authors must explain the procedure concerning the computation of the center of mass of FT and BL, justifying if they consider this as a geometrical variable or if it is computed having in mind the variability of density with height, otherwise the results can't be interpreted. Concerning the nighttime results for BL height it is rather surprising the range of values obtained, too high for representing the top of the stable boundary layer. So this part requires some discussion and explanation of the procedures applied.

Figure 5 describes the evolution of extensive and intensive aerosol variables. The problem is that the authors do not clarify the meaning of the backscatter and extinction coefficient presented in figure a and b. Are they average values?, in such case more info like standard deviation would be necessary. Are they representative values: max? This requires additional information.

On the other hand, Figure 5 uses rather raw scales and in order to support some of the discussions on how the different variables change and offers some typing insights it is necessary a better representation. In this sense, Figure 8 showing the relationships of pairs of intensive variables offer some insight on the typing comments offered by the authors, although the spread of data in the selected scatter plots hardly support some

statements linking particle depolarization with lidar ratio or Angström exponent with lidar ratio. Only the figure with the scatter plot of depolarization ratio versus Angström exponent presents some dependence between these variables. So the authors must improve the way they present their analyses of this intensive variables.

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