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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Sub-micron atmospheric aerosols in the surroundings of Marseille and Athens: physical characterization and new particle formation" *by* T. Petäjä et al.

Anonymous Referee #3

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This paper presents results and interpretations from measurements made at two sites to investigate new particle formation and growth. These are topics of current interest and appropriate for publication in this journal and I recommend publication after revision.

The data is new, however, the analysis employs a variety of methods developed previously. In some cases the paper is hard to follow since little background is given to describing these methods. Also, in my view some of the conclusions reached in this analysis are weak because no measurements were made of possible condensing gases or of the particle chemical composition. I do think the calculations and results for

the formation and growth rates are valid and interesting and are worthy of publication since it expands the growing literature on regions where this process occurs.

Interpretations relating to the hygroscopic measurements are not as clear, especially the use of growth factors (HTDMA) of 20 nm particles to investigate growth of newly formed particles. A number of implicit assumptions could also be addressed. First, can hygroscopic properties of 20 nm particles be interpreted as representative of the composition of the whole nucleation mode. Also, the results were really not surprising; under more polluted conditions a larger fraction of the nucleation mode was composed of the soluble fraction, most likely due to the influence from SO2, however, maybe I am missing something. The manuscript would be improved if the results and discussion in this section were sharpened. Maybe the focus should be only on the nucleation mode.

Some of the figures could be deleted or at least improved. Figure 2; why include the mean and geometric mean, neither can be resolved from the min and max. Fig. 3 caption, stating data variability as number of standard deviations instead of 95% CI would be more appropriate. Figure 4 is difficult to understand since there are 2 to 3 mode concentrations and corresponding diameters, yet they are plotted as a continuum. I do not think you mean modal concentrations and diameters. If so then I find this figure confusing. Clarification would be helpful. Figure 9 is not convincing that there is any difference between event days and non-event days based on the data plotted. I suggest deleting this graph and the associated paragraph in the text; it appears to be mostly speculation.

Soluble and insoluble fractions are an operational definition based on the TDMA method and use of a specific delineating growth factor (GF = 1.15). This point should be made very clear throughout the paper.

It is not clear to me how dNuc/dt or J3 is determined. Are both determined from the increase in concentration of particles less than 25 nm diameter?

Editorial Comments.

ACPD

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Pg 8610, line 7, change to through, line 26 change at to in

Pg 8613, line 13 change to trajectory , line 21 delete radiation, line 26 what is NTP

Pg 8614, line 19 change to to in

Pg 8615, line 9 change to than, line 19 change “arriving to”, to “to arriving”

Pg 8620, line 3, change above 30% in rural, to above 30% in this specific rural, line 26, I think it should be pointed out here that this is based on a composition assumption that was not measured.

Pg 8621 line 16, change a to the, line 27 change were in less hygroscopic and hydrophilic tail to were in the less hygroscopic (e.g., hydrophilic)Ĕ is this what you mean?

Pg 8622, line 5 delete that, line 12 change carried no valuable to provided no useful Ĕ

Pg 8623, line 17 change an to the, change A product to The product. Also define what is meant by global radiation, line 24 change conclude on to investigate.

Pg 8626 line 14, what does “is due lesser” mean, line 20 change were to was.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 8605, 2006.

ACPD

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Interactive Comment