Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2018-1297-RC2, 2019

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Classification of aerosol population type and cloud condensation nuclei properties in a coastal California littoral environment using an unsupervised cluster model" *by* Samuel A. Atwood et al.

Anonymous Referee #2

Received and published: 7 February 2019

Results of a measurement study during the CalWater-2015 campaign are presented for aerosol size distributions and cloud condensation nuclei. The authors performed a cluster analysis to analyze the data according to air mass type. The identified several aerosol population types that experienced impacts from both marine and terrestrial sources. They also identified populations that were affected by different aging or cloud processing. The paper is useful to the community for identifying differences in aerosol properties associated with terrestrial and marine influences, including different influences within marine air masses associated with varying degrees of cloud processing

and removal by precipitation. The paper is well organized and well written and I recommend its publication after addressing minor comments below.

Page 1/13: Include the season when the study occurred after so the readers can place the rest of the abstract in context.

Page 1/22: Replace "region" with "regions"

Page 1/33: The abstract could be a bit stronger if there was a statement or description of the larger implications or purpose of the study.

Page 2/4: Please spell out "ACAPEX"

Page 2/19: What do the authors mean here by "distribution-averaged" kappa?

Page 2/22-25: This sentence is a little unclear. Wouldn't organic aerosol necessarily be influenced by organic material?

Page 2/28-30: This sentence is along the lines of what would help the abstract be stronger.

Page 2/31: Later in this paragraph a couple of dates are given regarding previous work. It would help to provide the overall dates of the study here to put those into context.

Page 3/1: What kind of data?

Page 3/6: "outside those periods"- see earlier comment on providing the dates of the study earlier, perhaps at the beginning of this paragraph.

Page 3/6: Again, a larger implication statement here would help motivate the work. Perhaps move the lines 28-30 on page 2 to here.

Page 3/13: Is this 5 m above the roof? So total height above ground is?

Page 4/4: I assume these are all number median diameters and number geometric standard deviations?

Page 4/9: I'm not sure what the authors mean by smallest fitted mode's dN/dlogDp. At what size? Do they mean this corresponds to the value of dN/dlogDp at the smallest mode's median diameter?

Page 4/17: Include "contamination" between "local" and "mode"

Page 4/26: Again, what is meant by "distribution-averaged"?

Page 5/7: Refer to figures as Fig. 2a and Fig. 2b.

Page 5/10: It would help to move these references to after the descriptions of the figure, so "Fig. 2c" to line 11 and Figure 2d to line 12.

Page 5/14: Change "Fig. 2(e&f) to "Fig. 2e and Fig 2f., respectively).

Page 6/7: Was this done using the fit lines shown in Figure 2?

Page 6/17: Please include what "i" and "j" refer to.

Page 7/19: Add "number" after "best-fit"

Page 7/22: Please move the figure part (a,b, etc.) before the thing in the figures, so "(a) aerosol and (b) meteorological. . ."

Page 7/23: Add "number" before "size distributions"

Page 7/31: Is the normalized size distribution the average of lognormals or the all size distributions averaged and then fit?

Page 10/3: This sentence is somewhat unclear- I think the authors mean that ". . .Fig. 3 indicated that the size distributions associated with the T1 cluster grew. . .", not that that T1 cluster grew.

Page 11/2: Add "(2018)" after "Phillips et al."

Page 11/4: Same comment as for line 2.

Page 11/30: Add "(2010)" after "Kammermann et al."

Page 12/20: What RH is considered "dry" here?

Page 12/24: This is true, but super-micron particles also are typically associated with lower mass scattering efficiencies.

Page 14/9: Check the website provided for data repository. I assume this will be updated upon final submission.

Page 20/ 22: Table 1 caption: Add "percentage of observations" to the caption list and remove the "Best-fit size distribution. . ." sentence.

Page 20/26: Table 2 caption: Include "number" for "best-fit number size distribution". The caption could be expanded to include something about the cluster types (what 'M' and 'T' mean), different modes and describe "a,b,c" (form of equation)

Page 27: Figure 7: State in the caption what the colors represent.

Page 28: Figure 8: The title of this figure reads "dry", although these are clearly a function of relative humidity? Supplemental

References, Line 36-27; 47: Check reference

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