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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Comprehensive airborne characterization of aerosol from a major bovine source" *by* A. Sorooshian et al.

Anonymous Referee #2

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General Comments

The manuscript describes properties of aerosols downwind of a bovine source in California, based on aircraft measurements in 2007. The extensive data set of the aerosol properties is thoroughly explained. The finding of the substantial presence of particulate amines in the plumes is especially important. The analyses on the inorganic composition, particle size distribution, mixing state, light scattering properties, hygroscopic growth and CCN activity of aerosols in the plumes also provide valuable insights. On the other hand, a part of the explanations and discussion in the manuscript is not very easy to follow, and it may need to be revised. This is mainly because too much information is given in some of the figures, and because the characteristics of aerosols are in some places explained without references to the corresponding figures/tables. Aside

from the presentation issue above, this manuscript provides highly valuable information and is worthy of publication in ACP. Some more specific comments are listed below.

Specific Comments

Page 10428, lines 10-11 and page 10429, lines 2-3: In Figs. 7 and 8, the locations considered to be in plume are not clear. Addition of guides to eye (e.g., plume area or wind direction) in the figures might be helpful for readers to understand that nitrate, ammonium and total organics in the plume were higher than those in the background valley aerosol.

Page 10429, 2nd paragraph: Although authors explained that one of the characteristic peak of amine is at m/z 73 (Sect. 2.2), m/z 74 instead of m/z 73 is discussed in this paragraph. While the points of m/z 58 are tagged in Fig. 11, they are not explained.

Page 10433, lines 26-28: The relationship between the hydrophobic organics and the retardation of droplet growth is reported as a major finding, as the authors describe it both in the abstract and the conclusion section. However, it is very difficult for readers to find a tendency from the color coding in Fig. 18. The evidence of the tendency should be presented in a clearer manner (e.g., correlation coefficients, or x-y plots without color coding).

Page 10437, lines 9-11: Is this statement based on the results presented in Figs. 7, 8, and 10? If so, these figures should be referred to in the text. Further, in Figs. 7 and 8, it is not clear that ethylamine and diethylamine concentrations decreased as a function of plume age. The data points indicating the decreasing trend may need to be explained more specifically.

Page 10439, lines 4-6: Most readers may not know that the m/z 57:44 ratio of 0.07 suggests that the aerosol was highly oxygenated. More explanation, for example on the m/z 57:44 ratios of HOA and OOA, may be necessary.

Page 10439, lines 18-23: It is explained that lower organic acid contributions are likely

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not a result of less photochemical processing. However, if the aqueous phase processing includes photochemical reactions, it can be said that photochemical processing is less when the aqueous phase processes are prevented.

Page 10440, lines 10-13: Fig. 5 should be referred to in the sentence.

Page 10440, lines 24-26: Figures corresponding to this explanation should be referred to in the sentence.

Page 10441-10443, Sect. 4.5: The size ranges of aerosol particles in the closure study are not explained. If the closure is for particles with dry mobility diameters between 150 and 200 nm (Sect. 2.3), how are the data with different representation of particle diameters (e.g., vacuum aerodynamic diameter versus mobility diameter) compared? What are the assumptions of this closure for the externally-mixed aerosols observed (Fig. 12)?

Page 10441, Eq. 2: Are the dimensions of the both sides of the equation the same?

Page, 10443, 7-9: It is an unexpected result that the normalized CCN activation ratio at 0.25% SS was much higher than those at 0.35% and 0.4-0.6% SS. An explanation to this point is necessary.

Page, 10444, Sect. 4.7: One of the advantages in using κ may be that this parameter for each component is additive. The κ values for the organic fraction are worth calculating based on the growth factors presented in Sect. 4.5.

Captions of Figs. 7-8: The concentration of ethylamine is presented in the figures but it is not explained in the captions. Marker sizes are not explained, either.

Technical correction

Fig. 11 caption: The letter "b" in the second line should be capitalized.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 10415, 2008.

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Interactive Comment