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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Overview of the 2010 Carbonaceous Aerosols and Radiative Effects Study (CARES)" *by* R.A. Zaveri et al.

Anonymous Referee #1

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This rather long and tedious paper presents an overview of the CARES measurement program. The paper is well written and organized, but little science is conveyed. The paper does provide detailed explanations of the instrumentation, measurement sites, aircraft sampling strategies and research objectives of the overall mission, along with some preliminary results, however, as of yet the scientific results appear mainly to be work in progress. It does make sense to have a manuscript that can be referred to by future CARES papers to provide the boiler plate descriptions for this mission, however, I suggest the paper be resubmitted when some detailed results can be included. Undoubtedly it is a chicken and egg problem, but in its current form this paper is seems to be more of a report that should be available on some web site rather than a scientific contribution.

Specific Comments

Page 1303 line 23. The Zhang et al. 2007 reference refers solely to AMS data, which does not include refractory components of submicron particles. One should be careful on making statements on the organic mass fraction based on these types of data. One could say, carbonaceous compounds may constitute up to 90 % of the dry non-refractory submicron particle mass

Page 1319, line 10. Add references?

Page 1320, line 3, change wit to with.

Comparisons are made between the aircraft and ground sites for both gas and particle components. Were any measurements made prior/during/after the mission to assess the agreement (precision) of these paired instruments.

No discussion is given assessing the quantitative accuracy of the AMS data. Why not compare to predicted mass from the measured size distributions, as often done by other investigators to get a rough idea on the data quality.

Figure 11. It makes sense that the contour scales for the APS are much lower than the SMPS due higher number concentrations associated with small particle sizes. However, can the authors comment on the comparison between these two instruments in their size overlap region?

Page 1331, line 28, it is stated the APS measures up to 20 μm. Is it possible to sample particles that size. Maybe a few words are need on how inlet and sampling losses are handled and what, in practice, is the real upper size limit. Along these lines, is it even reasonable to plot up to 10um in Fig 11, and is the drop-off in the size APS size distributions at about 5um due to no particles in the atmosphere or just sampling limitations? Sampling efficiencies of large particles are again an issue in the optical section (4.4.1). It is unclear how much of the results, such as most surface area associated with particles smaller than 5um diameter, is due to sampling.

Page 1337, edit line 23 (starts with Comprehensive analyses. . .)

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 1299, 2012.