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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Aerosol composition and variability in the Baltimore–Washington, DC region" *by* A. J. Beyersdorf et al.

Anonymous Referee #2

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Aerosol composition and variability in the Baltimore–Washington, DC region by Beyersdorf et al. describes the airborne in situ observation of aerosol extinction and bulk mass chemical composition made during the 2011 DISCOVER-AQ experiment. It discusses how the observed variability in the near-surface ambient extinction can be attributed to four factors – dry extinction, particle hygroscopicity, ambient humidity and single scattering albedo. The ultimate goal is to improve the understanding of the relationship between aerosol optical properties and aerosol loading for monitoring air quality.

The presentation of data is clear, the methods outlined satisfactorily, the analysis sound, and the goal well within the scope of the ACP. I recommend accepting with minor revision.

Page 23325, line 19. How do these altitude-limited AODs compare with the full-column AOD? The latter, available from DRAGON AERONET sites (Eck et al., 2014 ACP), is more relevant to satellite-based aerosol measurements and their variabilities (e.g., Munchak et al., 2013, AMT).

Page 23325, line 29. The molar ratio of 1.92 is inconsistent with the numbers in the previous sentence and the inference made in this sentence. If sulfate (96 g/mol) is 23% by mass and if ammonium (18 g/mol) is 10%, the ratio must be (23/96)/(10/18) = 0.43. If sulfate is almost completely neutralized as ammonium sulfate, the ratio must be $\sim$0.5 or lower.

Page 23331, line 5. "3 to 4 values" – why is this greater than the number of circuits given in Table 1?

Page 23332, line 29. The ambient extinction estimated from the monthly average dry extinction, shown in the right column of Figure 15, varies little. Does the calculation use the observed, pre-averaging RH, gamma and SSA? If so, is the result consistent with, for example, the top right panel of Figure 12 where the first two spirals of Flight 14, Site 4 saw similar dry extinctions but different (by $\sim$15%) ambient extinctions?

Page 23333, line 11. Replace the semicolon with a comma.

Page 23333, line 16. Replace "as such" with "as follows".

Figure 5. Caption. "left" in the last pair of parentheses should read "right".

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 23317, 2015.