Atmos. Chem. Phys. Discuss.,
doi:10.5194/acp-2015-928-RC1, 2016

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Understanding the Optical Properties of Ambient Sub- and Supermicron Particulate Matter: Results from the CARES 2010 Field Study in Northern California" *by* Christopher D. Cappa et al.

Anonymous Referee #2

Received and published: 5 February 2016

This paper describes measurements of absorption, scattering, and extinction for PM1, PM2.5, and PM10 particles at two field sites near Sacramento, California. The authors use these measurements to conclude that supermicron particles contribute approximately half of scattering, and are composed of varying amounts of dust and sea salt. Photochemical processing does not have a consistent effect on submicron aerosol scattering, partly due to transport. The authors propose relationships between other intensive aerosol properties.

This is a well-written paper, although the discussion is long and could possibly ben-

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Discussion paper

efit from some condensing. I recommend publication after the following issues are addressed.

Major comments:

1. The introduction is short and does not summarize existing knowledge about the composition and optical properties of supermicron aerosol. A previous study from the CARES campaign has already reported the unexpectedly large contribution of coarse mode aerosol to radiative forcing (Kassianov et al., 2012). This paper and other relevant results (possibly including Malm et al., 1994; Dubovik et al., 2002; Hand et al., 2002; Malm et al., 2007; Eck et al., 2010) should be described and cited in an expanded introduction.

2. Lines 156-157: "Data during the first week of the campaign (June 3-12) are especially noisy due to instrumental problems." What caused the noise and were the measurements still accurate?

3. Section 2.2: What were the specific differences between the T0 and T1 site? Were the HR-AMS instruments operated by the same research group? Do the different OOA mass factors represent true aerosol composition differences between the sites?

4. Section 3.1: Besides Kassianov e tal. (2012), what have prior studies of supermicron aerosol extinction under relatively clean conditions observed?

Minor comments:

Line 129: Give model and manufacturer for SMPS.

Line 176: What is the part number of the NOx chemiluminescence instrument?

Typographic corrections:

Line 32: "... but the there is some"

Line 79: Use SI units.

Lines 99,125, 203, 205: Remove comma after June

Line 157: This is a very long week.

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