

Interactive comment on “A new experimental approach to study the hygroscopic and the optical properties of aerosols: application to ammonium sulfate particles” by C. Denjean et al.

Anonymous Referee #1

Received and published: 13 August 2013

General Comments The study reports on a new methodology to determine the size distribution and optical properties of aerosols as a function of relative humidity. Experiments were conducted in a chamber and measurements were done across a wide RH spectrum (0–100%). The test salt used was ammonium sulfate as there is an abundance of knowledge about this inorganic species. A key result is that hygroscopic growth is enhanced as a function of residence time of particles exposed to a specific RH, even to as low as 30%. The authors suggest this is due to adsorbed water layers on ammonium sulfate particle surfaces. The topic will be of interest to readers of this journal. The experimental methods seem sound. The writing has issues in various

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places and I encourage the authors to edit it more carefully. I find that the paper is publishable subject to minor revisions below.

General Comments: The implications section (Sect 6) reaches fairly lofty conclusions that I think should be toned down, especially lines 3-7 on Page 6954. It is quite narrow to view only the existence of ammonium sulfate in the atmosphere. There are numerous other species in ambient particles including hundreds, if not thousands, of organics that can complicate the entire picture. In general I think the paper could do with either a reduced version of Section 6 or to just omit it.

Technical Comments Page 6936, Line 13: reader does not know yet what the “two methods” are. Clarify.

Page 6938, Line 23-24: not necessarily. Several studies now show that there may not be a direct correspondence between the sub- and super-saturated regimes in terms of water-uptake behavior. See for instance Hersey et al. (2013):

Hersey, S. P., et al. (2013), Composition and hygroscopicity of the Los Angeles Aerosol: CalNex, J. Geophys. Res. Atmos., 118, doi:10.1002/jgrd.50307.

Page 6939, Line 25: change “particles” to “particle”

Page 6940, Line 8: change “GF” to “GFs”

Page 6940, Line 9: change “an” to “a”

Page 6940, Line 11: change “scatter” to “scatterer”

Page 6941, Line 17-18: “details” should be “detail”

Page 6945, Line 16: “was” should be “were”

Fig 6 caption, line 3: the “of” at the end of the line should be removed.

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