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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Effects of relative humidity on aerosol light scattering in the Arctic" *by* P. Zieger et al.

Anonymous Referee #1

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Review of 'Effects of relative humidity on aerosol light scattering in the Arctic' by Zieger et al

Overview: This paper summarizes ∼3 months of measurements of aerosol optical and physical properties at Zeppelin station in the Arctic. While Zeppelin has had long term measurements of light scattering and absorption at low RH, the unique finding reported here is the measurement of hygroscopic growth f(RH) measured by two nephelometers. Using size distribution measurements, an assumed composition and Mie code they do achieve closure on the dry scattering measurements. Based on the success of this closure they derive estimates of g(RH) – the diameter change of the aerosol as a function of relative humidity. I like the discussion of the hysteresis index – I think that is quite clever and useful!

This paper is quite timely given the interest in the Arctic and the importance of aerosol optical properties to radiative forcing. I think the difficulty with this paper is in its introduction which should be expanded (described below) and the resulting confusion (to this reader) as the various parameterizations of hygroscopic growth are derived. Also, because these are the first f(RH) measurements in the Arctic I think it might be useful for the authors to include a table comparing the f(RH) results to other f(RH) results. There are a couple sentences at the end of section 5, but I think this should be expanded – there are a lot of f(RH) measurements out there. I don't think a lit review is necessary but putting the zeppelin f(RH) measurements in terms of polluted aerosol, dust and smoke as well as marine and free troposphere would be nice to see.

In the attached pdf, I list (in chronological order) a few mostly minor technical comments which should be addressed as well as editorial (e.g., word-smithing) suggestions. Apologies for not separating out the technical and editorial – I did it this way and then read the instructions. . ..

Please also note the supplement to this comment:
http://www.atmos-chem-phys-discuss.net/10/C149/2010/acpd-10-C149-2010-supplement.pdf

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 3659, 2010.