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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Hygroscopic behavior of individual $NaNO_3$ particles" *by* M.-J. Lee et al.

Anonymous Referee #1

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Lee et al. investigated the hygroscopic properties of individual NaNO3 particles. Specifically, they focused on the DRH and ERH of NaNO3 particles ranging in size from 2.5 to 4 micrometers. The main conclusion from the results is that NaNO3 particles do not homogeneously effloresce (i.e. homogeneously crystallize) for typical atmospheric relative humidities and time scales. In contrast, NaNO3 particles contaminated with unidentified heterogeneous nuclei or NaNO3 particles suspended on certain types of solid surfaces (such as Al foil or Ag foil) can effloresce heterogeneously at RH values above 20%. The researchers have carefully performed the measurements, but I do not recommend the paper for publication in ACP for the following reasons: 1) as pointed out by Lee et al., several authors have already shown that NaNO3 particles do not effloresce homogeneously under typical atmospheric RH conditions (see for example references [2] and [1]). 2) The heterogeneous results are not likely atmospherically relevant. Even though the authors observed heterogeneous nucleation in the laboratory,

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this doesn't mean that the same process will occur in the atmosphere. One suggestion for the authors is to carry out experiments using heterogeneous nuclei typically found in the atmosphere, such as mineral dust or soot particles. In the current manuscript, I don't see the connection between the heterogeneous results and the atmosphere.

References: 1. Gysel, M., E. Weingartner, and U. Baltensperger, Hygroscopicity of aerosol particles at low temperatures. 2. Theoretical and experimental hygroscopic properties of laboratory generated aerosols. Environmental Science & Technology, 2002. 36(1): p. 63-68. 2. Hoffman, R.C., A. Laskin, and B.J. Finlayson-Pitts, Sodium nitrate particles: physical and chemical properties during hydration and dehydration, and implications for aged sea salt aerosols. Journal of Aerosol Science, 2004. 35(7): p. 869-887.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 23203, 2011.