

Interactive comment on “Fine particle pH and gas-particle phase partitioning of inorganic species in Pasadena, California, during the 2010 CalNex campaign” by Hongyu Guo et al.

Anonymous Referee #2

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Review of Guo et al:

In this study, Guo et al compare predicted and measured pH from SIA to infer the variability often observed in the US and contrasted against the eastern Mediterranean.

The focus of the study is important and fine particulate nitrate is often, frustratingly, neglected in studies attempting to resolve air-quality perturbations. The scientific rigor is clear, as I would expect, and the paper is concise.

Before publication, however, one aspect of this area that could benefit from a brief discussion is the non-linear interplay between other factors that could be captured in a regional model that might benefit from this validation. Given the discussion that follows

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from the approach in section 4.2, this study would really value from such comparisons. For example, the competition between different sizes and role of dilution might deliver interesting insights into the value of these measurements. That in itself presents an interesting paradox given the complexity prescribed to aerosol composition and evolution. I appreciate some aspects of complexity, including LLPS, have been raised, but the general benefit a regional prediction would bring needs discussion or referencing. To decipher exposure to fine particle pH, or even assess impacts on aerosol-cloud interactions, for example, require this next step.

Section 4. The discussion on potential for evaporative loss is interesting. I find it odd that characterisation of this problem is not more apparent in the literature. Are there any studies that try to quantify this effect using controlled environments? One might consider some focus laboratory studies would add weight to these discussions. Also, if higher temperatures encourage semi-volatile loss, what is the interplay between propensities to form solids over maintaining equilibrium with the gas phase in these conditions?

Page 6, Line 21. The authors note that 'The likelihood for phase separation decreases at higher RH and only has a weak dependence on T (Schill and Tolbert, 2013; You and Bertram, 2015).' Is this strictly true? There are some studies that suggest partitioning across all ranges of sub-saturated humidity's: Zuend, A. and Seinfeld, J. H.: Modeling the gas-particle partitioning of secondary organic aerosol: the importance of liquid-liquid phase separation, *Atmos. Chem. Phys.*, 12, 3857-3882, doi:10.5194/acp-12-3857-2012, 2012.

Please check the resolution of all figures, I found them difficult to read at times.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, doi:10.5194/acp-2016-1158, 2017.

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