

## ***Interactive comment on “Influence of particle phase state on the hygroscopic behavior of mixed organic–inorganic aerosols” by N. Hodas et al.***

### **Anonymous Referee #2**

Received and published: 25 February 2015

Review of the paper: “Influence of particle phase state on the hygroscopic behavior of mixed organic–inorganic aerosols”, by Hodas et al.

General comment: This nicely written paper presents indirect measurement of particle phase state for different mixed organic-inorganic aerosols at different relative humidities. This paper explores the extent to which phase separations and other complex phase behavior influence the partitioning of water to particle phase. The reported data have been measured with a DASH-SP, and the data are compared with theoretical values obtained by several models (from complex model such as AIOMFAC to very simple model). The discrepancies and agreements among the different RH and models are discussed. This paper contributes to a better understanding on the hygroscopic behavior of mixture of organic-inorganic for both experimentalists and modelers. For

C12392

experimentalist as for example, it underlines the effect of drying on the properties of aerosol, which could explain for example why instruments such as HTDMA are able to measure in a consistent way the hygroscopicity of inorganic aerosol, but still have difficulties to measure secondary organic aerosol hygroscopicities (see the different HTDMA intercomparison papers). And for modeler as it discusses the limitation of different simple modeling approaches usually used in global modeling. I recommend the publication of this paper.

Minor comments:

-O:C ratio is used in this paper (as in other papers) to provide a hint of the hygroscopicity of the aerosol. However, recent studies have shown that average carbon oxidation state, OSc, may be a better indicator of aerosol oxidation than O:C as O:C may not capture oxidative changes due to the breaking and forming of bonds (Kroll et al., 2009 and 2011). This could be mention, although, it is not the scope of this paper.

-The possible effect of fast drying is well discussed in the paper, however the effect of short residence time at the studied RH (only 4 seconds) is not too much discussed. How does the residence time at the measured RH could influence the presence of 1 or 2 liquid phases?

-in 2.1 Methods: The authors have used DASH-SP for this study. Is there a particular advantage compare to use a HTDMA?

-P32947: ... (with no water uptake on the timescale of the experiment). There the 4 seconds could be repeated as it is a very short time.

- In Section 3.2: The 3 different conditions described should have for reading simplicity the same name in figure 4. (Easier to go from text to figure).

-Table 1: The different organic densities used for the model could be added to table1.