

***Interactive comment on* “Significant contribution of organics to aerosol liquid water content in winter in Beijing, China” by Xiaoi Jin et al.**

Anonymous Referee #2

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This study uses two methods (by measuring aerosol hygroscopic growth factor and particle number size distribution and by thermodynamic equilibrium modeling in combination of measured aerosol chemical species) to estimate the aerosol liquid water content ALWC from a field campaign in winter Beijing and argues that organics contribute significantly to the total ALWC and further that organics-ALWC plays a role in the formation of secondary aerosols through multiphase reactions at the initial haze stage. I have a major comment that may change the conclusion of this study. There could be inconsistency in phase states between the two methods of ALWC. Here, thermodynamic modeling assumes that the aerosol particles are in a stable thermodynamic state. But the measurements of hygroscopic growth factor increase the RH to 90% that effectively leads to a metastable thermodynamic state for the sampled aerosol particles. My

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question is: if the authors repeat ALWC calculations of thermodynamic models assuming a metastable state, whether the results would change? For example, whether the underestimates in ALWC by ISORROPIA would disappear? I feel that this point should be clarified in this study since it is one of the major arguments of this manuscript and since this point also affects the other argument made in this study: whether organics-ALWC plays a role in the formation of secondary aerosols through multiphase reactions at the initial haze stage. Minor and grammatical comments: Line 78: can the authors elaborate on what is the direct method to measured ALWC? Line 79: why the direct measurements of ALWC is especially difficult under high RH conditions? It seems to me that such measurements under low RH conditions are more difficult. Line 94: is should be was. Line 160: show should be showed. Line 215: I would be surprised if $n_{\text{H}_2\text{SO}_4}$ were larger than 0. Would it be? Eq. 8: where is $n_{\text{NH}_4\text{Cl}}$? Line 295: ammonium is also an important component of secondary aerosols.

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