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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Contrasting sources and processes of particulate species in haze days with low and high relative humidity in winter time Beijing" *by* Ru-Jin Huang et al.

Anonymous Referee #3

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This paper focuses on discussing the secondary aerosol formation processes under different RH conditions mainly. It is valuable to understand the aerosol chemistry in Beijing, but I have a few serious concerns on current results and interpretation. See below:

(1) One concern is that the dataset used is relatively old (five years ago). It is therefore not very up-to-date to reflect the real processes in current atmosphere given the concentrations, compositions of PM1 as well as the precursors might have changed greatly in Beijing. The authors have to comment more on the implications of findings here.

(2) More details regarding the PMF analyses should be provided. It is not clear why 5-factor solution is optimal, considering that you use ACSM data which had very limited chemical resolution to identify tracer ions. And you used ME-2 technique, which on one hand is better to extract the real factors presenting in your data, but on the other hand, you may presume and artificially identify a factor that might not be real. Justification of the PMF results is essential and why and how the initial profiles of different factors were used are not clear. I feel that current information provided here is not enough.

(3) Calculation of ALWC by using ISORROPIA-II model had uncertainties as it only consider water uptake by inorganic species but organics is dominant your PM1, please comment on this, and discuss the influences on your results.

(4) A very serious concern is the large uncertainty of your interpretation. In order to make strong argument regarding the different chemical processes under different RH conditions. You have to eliminate the influences of other meteorological conditions (PBL, wind directions, speeds, and different air masses) on the concentrations, compositions and growth rates you investigated here. Otherwise, you cannot claim that the observed changes were solely due to chemistry. This reviewer see very little discussions regarding this point, and this make the results highly untrustworthy. For example, the calculation of growth rates, such rates is largely not due to chemistry but likely PBL variations, etc. In understand that the authors argue that during pollution period, there was low wind and mainly south/southeasterly wind mainly; this is too general and does not help resolve what I mention here.

(5) L199-L201: Table 1 does not provide wind directions as you said.

(6) Indeed, similar discussion had been published in a few references cited here, and it seems to be a bit superficial here, especially section 3.4. The authors need to add more discussions, and point out clearly what are the unique and novel findings here from other studies.

(7) Why you chose 50% RH as a cutting point for low- and high-RH conditions? How

about 60%, and how does this choice possibly influence your findings?

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