Li et al. presented long-term measurements of chemical compositions for submicrometer particles in Beijing, used these measurement data to calculate aerosol liquid water (ALW), and discussed in feedback between ALW and aerosol chemical compositions. A novel aspect of this work is that the contribution of organics to ALW and the effect of chemical composition on hygroscopicity of organics were considered. This work could largely improve our understanding of formation and physiochemical properties of aerosol particles in Beijing. I would recommend it for final publication after the following comments are addressed.

Scientific comments:

Line 82-84: It is stated here that calculated ALW agreed well with measured ALW, as reported by previous work. However, no references are cited (the work by Zhang et al. (2007) only mentioned aerosol composition measurement, I presume). Proper references should be cited here, and preferably more quantitative results reported by previous work should be illustrated to support this statement.

My second comment is related to the first one. I agree that in principle it is better to use composition-dependent hygroscopicity, instead of fixed hygroscopicity, to calculate ALW associated with organic particles. However, it is not very clear to which extent the new approach would improve the agreement between measured and calculated ALW? Do the authors have access to measured ALW during some of these periods? A comparison between measurements and calculations using fixed and composition-dependent hygroscopicity should make this work more convincing.

Line 99: Please consider moving Figure S1 to the manuscript.

Line 194-195: please consider providing a figure which shows the frequency distribution of kappa values for organics.

Line 196-199: although kappa values calculated using different methods can be found in Fig. S2 and Table S2, it would be more convenient for readers if average values calculated using different methods can be stated in the main text.

Line 211: change “semi-volatile species” to “semi-volatile species (usually more oxidized)”, because it seems to be non-apparent linkage between volatility and O:C ratios, at least for people who are not experts in organic particles.

Line 312: As Fig. S6 summarizes the concept proposed in this work, it may be worthy

moving it to the main text.

Technical comments:

Line 33: the perspective paper by Wu et al. (2018) should also be cited here.

The paper is very fluent; however, there are small grammatical errors which can be corrected. Perhaps the manuscript needs professional editing by a native speaker. Below I list some of the errors as examples:

Line 24: change “T” to “temperature (T)”.

Line 24: change “…concentration. Among which…” to “…concentration, among which…”

Line 48: change “rising” to “rises”.

Line 49: “transition” is a noun, please change it to a verb such as “change”

Line 74: change “specific” to “Specific”.

References:

Wu, Z., Chen, J., Wang, Y., Zhu, Y., Liu, Y., Yao, B., Zhang, Y., and Hu, M.: Interactions between water vapor and atmospheric aerosols have key roles in air quality and climate change, Natl. Sci. Rev., 5, 452-454, 2018.