Second Review on "Markedly different impacts of primary emissions and secondary aerosols formations on aerosol mixing states revealed by simultaneous measurements of CCNC, V/HTDMA and SP2" by Jiangchuan Tao et al.

The manuscript has improved significantly compared to the first version. Thanks a lot for the improvement!

However, there is still some work, which needs to be done, mainly in the discussion of the results in section 3. Here, a lot of text describes too many similar looking figures. It needs to be indicated, what is really new. Other detailed comments are given below.

Furthermore, this study claims to use for the first time all these measurements and methods in parallel. But, what is the outcome? Which methods are comparable? Are all of them needed? E.g., if one has to reduce to setup to 2 mixing state parameters, which would you recommend? Any other general conclusions regarding the methodology?

Since this is definitely a new approach, it should be discussed and interpreted in the conclusion. Please also indicates in the conclusions which findings are new or you assume them to be new. There are too many 'findings' listed and the reader does not know, what is important.

One general formal comment. The unit liter has the abbreviation 'l', not the capital 'L'. This should be corrected through the whole text.

The table with abbreviations also helps a lot. But could you please put it in an alphabetical order? This would be even better! And the term 'SA' is missing there. Maybe also indicate which parameters refer to certain diameters?!

Comments in detail:

Line number in the following mean the corresponding lines in the manuscript with tracked changes.

Line 158 – 160: please keep the old version to recognize the origin of the abbreviation.

Line 223 ff: Do you think that AMS measurements and PNSD experience similar losses? If you say, that they agree well, this is hypothetical to my impression.

Line 346: How did you choose e.g., the critical GF? Did you plot for each diameter the PDF? Other studies used a common GFc for all diameters, why do you think this is different here? Does this correspond to Figure 2c?

Line 361 and many other times: coating thickness of aerosols: it might be that I am a bit too picky here, but I think a coating thickness is always related to aerosol particles and not to aerosols (mixture of gas and particles), therefore I suggest to check the usage of the word 'aerosols'. I think in most cases it should be 'aerosol particles'.

Line 375, 425 and caption of Figure 1 and 3: The word 'compositions' should be 'components'. I do not see too much sense in 'mass concentrations of aerosol composition'

Figures 4 – 9: Similar parameters are plotted, but I personally think, there are too many figures. For some the particle diameter (200 nm) is given, for others not in the caption. Please add this information in the figure caption. Are all figures really necessary? It would be better to exclude one or two from the main paper or combine some of the results. The reader feels a bit overloaded with so many scatter dots.

Line 532 – 538: The sentence us too long and not understandable for me. Please avoid such long sentences with too much additional information in brackets.

Line 569: the word ‘compositions’ should be components, as written in the corresponding caption of Figure 8.

Line 633: better ‘components’ instead of ‘compositions’

Line 640: please use ‘components’ instead of ‘compositions’

Section 3, in particular 3.3 and 3.4 are too long and not well connected to other studies. What is really new in your study? Many correlations are obvious and well-known, here you should compare with literature. E.g., that SA increases the hygroscopicity of hydrophobic particles is not new. There are similar examples. I would strongly recommend to remove some of the figures and reduce the text. For the results indicate the well-known facts with references or remove them and highlight those results which are new or opposite to former findings.

Is it really necessary to jump always between NF and MF? This is very confusing for the reader. In between, the word ‘fraction’ is used and nobody knows, what you mean here, e.g. line 604. Please also state clearly which parameters are related to certain diameters or diameter ranges. This is not clear in the text.