

***Interactive comment on “A New Method for Calculating Number Concentrations of Cloud Condensation Nuclei Based on Measurements of A Three-wavelength Humidified Nephelometer System” by J. Tao et al.***

**Summary:**

This work proposed a new method to estimate number concentrations of CCN based on the humidified nephelometer measurements. The advantages of this method are more convenient and cheaper than traditional measurements, and no other measurements are needed. The manuscript fits well to the scope of AMT. Thus I recommend it to be published after the following comments listed below have been adequately addressed.

**Comments:**

1. Lines 47-52: Please add some texts to evaluate each application. Also, I agree with another reviewer that one table should be added to summary the previous studies using aerosol optical properties to calculate  $N_{CCN}$ .
2. Lines 172-176: I guess that the authors want to claim that the uncertainty will be smaller when performing this method for shorter wavelength and lower supersaturation. Am I correct? Concerning only one supersaturation (0.07%) was test in this study, and the relative deviation is within 30%. Therefore, I am wondering that is it possible to perform this method to higher supersaturations to check when the uncertainty will be larger than 50%.
3. Lines 180-181: How to calculate the differences (150 nm and 100 nm)? Please explain.
4. Line 191: What are smaller CCN-active particles? Do you mean Aitken mode particles? I think the contribution of particles smaller than 100 nm to  $\sigma_{sp}$  is always negligible.
5. Lines 201-203: See comment 2. It seems that you claim 0.07% is the highest supersaturation that can be applied for this method. Why? Do you have results for other supersaturations?
6. Lines 206-208: Add references. Why do you think  $\kappa_f$  is always lower than  $\kappa_c$ ? Any explanations?
7. Lines 241-247 and Figure 5: How about the agreement between the retrieved and measured  $\kappa_c$ ?
8. Lines 248-251: The authors claim that this method can only be adopted when  $\dot{A}$  is lower than 1.5. Is this conclusion only based on this study or can be used in different environments?

9. I suggest the authors reorganize or recheck the text for each figure caption. More information should be included, such as gray background in Figure 2 and black & dashed lines in Figure 6.

10. Technical comments:

Title: Nuclei.

Line 36: also.

Line 110: please provide DMA type.

Lines 111 and 120: an electrostatic classifier.

Line 126: campaigns.

Line 133: there is no S in Eq. (1), please reformulate it.

Line 137: explain  $\kappa_f$ .

Line 152: indicates.

Line 234: 0.5 to 1.5

Lines 271-273: please add references.

Line 308: changes

There are still several grammar mistakes in the text, please carefully check.