

Interactive comment on “A novel method for calculating ambient aerosol liquid water contents based on measurements of a humidified nephelometer system” by Ye Kuang et al.

Anonymous Referee #2

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The paper, "A novel method for calculating ambient aerosol liquid water contents based on measurements of a humidified nephelometer system" describes a new technique to measure aerosol liquid water content (LWC). The method described has advantages over traditional methods (ie HTDMA) as it measures LWC of aerosols in real time. In addition, this three wavelength nephelometer system measures the entire size distribution at once without assuming a constant growth factor for the entire distribution, as is the case with previous nephelometer measurements. The LWC of aerosols has important implications for climate forcing and atmospheric chemistry and there is a need for a more accurate measurement to reduce uncertainties.

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In general there are large sections of this paper that should be omitted. The content does not support the conclusions of the paper. More importantly, these sections are sometimes confusing and will only distract the reader. This includes the paragraphs describing the relationship between scattering and aerosol volume, which the authors show to be correlated but not easily parameterized. The next section, which describes using the angstrom exponent and HBF to constrain the ratio between scattering and aerosol volume can also be summarized or omitted. The author's conclusion that large bias' will occur if using the "look up table" (fig 4) isn't necessary for the sake of the papers conclusions. More emphasis needs to be placed on what was done that produced usable results.

Finally, the authors describe the machine learning method, which improves the ability to predict the volume of aerosol in the dry state. During the Wangdu campaign (Fig 6), this method is able to reproduce the dry volume very well. My main concern is how applicable this method would be in a different type of environment. How difficult would it be to train the estimator to respond to different data sets and measurement conditions?

The next section describes parametrizing the relationship between $f(\text{RH})$ and humidified aerosol volume using the "look up table" shown in fig 8. I would recommend referring to both fig 8 and fig 4 as something other than a lookup table, which is not an appropriate description for this plot. This approach, once again seems limited by the specific environment. It would be nice if the authors showed results from a different less-polluted region.

The paper has multiple typographical and grammatical errors. Line 365 is a good example of the grammatical/typographical errors that are found throughout. Line 405 references a figure 20a, which doesn't exist. Prior to publication I would recommend careful editing for these errors as well as re-formatting to streamline the paper for only the most pertinent information.

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