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Atmospheric Measurement Techniques Discussions

Interactive comment on "On the parametrization of optical particle counter response including instrument-induced broadening of size spectra and a self-consistent evaluation of calibration measurements" *by* Adrian Walser et al.

Anonymous Referee #2

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In the submitted manuscript the authors introduce a new approach to model single particle light scattering instrument response by implementing a simple parametrization of the broadening effect, show a self-consistent way to evaluate calibration measurements, and outline how to obtain realistic uncertainty estimates for OPC size distributions.

Does the paper address relevant scientific questions within the scope of AMT? Yes, it does. In my opinion the scientific community have need of such an insight to the operation of this simple light scattering based measurement method, so that to better

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Discussion paper

understand and correctly interpret measured data from OPCs. Besides presenting the new model the authors introduce existing concepts for sizing and calibration evaluation and compare them using measured data for two commercial OPCs involved in the SALTRACE campaign aimed to investigate atmospheric aerosols. The presented information and methodology is especially useful for scientists performing and/or evaluating atmospheric measurements by instrumentation based on the OPC technique.

Does the paper present novel concepts, ideas, tools, or data? Yes, it does. The authors present a new methodology that is able to describe the broadening of the measured size distribution of ambient aerosols raised from the intrinsic nature of single particle light scattering instruments. The presented approach improve the accuracy of measured size distributions and gives an estimation on the uncertainties of OPC measurements.

Are substantial conclusions reached? Yes, they are. A new model has been developed, which help to improve the accuracy of size distribution measurements and help to give an estimate on the uncertainties of OPC measurements. The new method further correctly predicts the size-dependence of OPC counting efficiency. Besides presenting the new model the authors introduce existing concepts for sizing and calibration evaluation and compare them using measured data for two commercial OPCs involved in the SALTRACE campaign. The new method succeeds in modeling the measured histogram widths correctly.

Are the scientific methods and assumptions valid and clearly outlined? Yes, they are. The scientific methods and assumption are clearly described and supported by measured data as well.

Are the results sufficient to support the interpretations and conclusions? Yes, they are.

Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? Yes, it is.

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Do the authors give proper credit to related work and clearly indicate their own new/original contribution? Yes, they do. The submitted manuscript contains 47 references from 1908 (1763) to 2016 which covers the state of the art on the presented field. The authors own results are clearly separated in the text.

Does the title clearly reflect the contents of the paper? Yes, it does.

Does the abstract provide a concise and complete summary? Yes, it does.

Is the overall presentation well structured and clear? Yes, it is.

Is the language fluent and precise? Yes, it is.

Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Yes, they are.

Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? No, they shouldn't.

Are the number and quality of references appropriate? Yes, they are.

Is the amount and quality of supplementary material appropriate? Yes, it is.

My comments and questions to the authors are the following: The proposed method requires a lot of computations (modeling) and measurements which requires skilled persons, a well equipped laboratory and a considerable amount of working hours. As I understand, the data set obtained using this method is valid for that moment, and needs an update when the instrument response changes (e.g. degradation of laser power or contamination on the optics). Do you see a way for the automatization of the proposed methodology?

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2017-81, 2017.