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Atmospheric Measurement Techniques Discussions

Interactive comment on "A new method to quantify mineral dust and other aerosol species from aircraft platforms using single particle mass spectrometry" *by* Karl D. Froyd et al.

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In this manuscript, the authors present a method for deriving size and composition resolved absolute particle concentrations from an aircraft based single-particle mass spectrometer by scaling particle classes to absolute concentrations measured by particle size spectrometers. Sulfate and organic concentrations in non-refractory aerosols are calculated with respect to lab generated standards. Whilst this approach is not new, the method offers enhanced temporal resolution of the measurement by placing single particle data into carefully selected size bins to enhance the particle number statistics. This is likely to be of interest to the community using aircraft based SPMS to measure

particles in low abundance, and has suitable content for a technical journal.

The benefit of the scaling method and of reduced size resolution are for correcting the total particle numbers are clear, but I do have some major concerns about particle detection bias that may skew the reported number fractions and therefore create large errors in the reported mass concentrations of compositional classes. This source of uncertainty needs to be discussed more thoroughly, particularly if the method is to be transferred to other aircraft based SPMS platforms. The current literature should be better referenced; particularly regarding the case for applying chemically resolved detection efficiencies in addition to size resolved scaling.

In my opinion, the manuscript will be worthy of publication once the potential instrument bias towards composition is more clearly discussed and it is made clear that these errors will be scaled into the absolute concentrations with the number fractions.

Please see the supplement for major and minor comments.

Please also note the supplement to this comment:
https://www.atmos-meas-tech-discuss.net/amt-2019-165/amt-2019-165-RC1-supplement.pdf

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