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Atmospheric Measurement Techniques Discussions

Interactive comment on "Optimized method for black carbon analysis in ice and snow using the Single Particle Soot Photometer" *by* I. A. Wendl et al.

Anonymous Referee #2

Received and published: 25 April 2014

This manuscript presents a detailed investigation into the suitability of three different nebulizer types for aerosolization of snow and ice samples prior to introduction into a single particle soot photometer (SP2). The manuscript also investigates the suitability of different black carbon standards for calibration of the nebulizer/SP2 setup and considers the treatment of fresh samples and sample storage conditions.

This study provides a thorough investigation of the three nebulizers chosen. These include a collision nebulizer, an ultrasonic nebulizer, and a jet nebulizer (which has not previously been thoroughly investigated for this purpose). It also presents a clear and detailed theoretical description of nebulizer efficiency that will help future investigators

choose the most suitable setup for their work.

Since calibration of nebulizer efficiency with an external standard is quite common, the detailed discussion of how the choice of standard impacts the uncertainty in the calibration is very useful. The investigation and discussion of different sample treatment and storage methods will also prove very useful in designing future experiments.

This manuscript makes a valuable contribution to the literature and the material seems well suited to this journal.

Specific comments:

Manuscript:

It would be very helpful if the experimental section contained some description of the snow and ice core samples used.

Page 5 lines 15-17: It would be helpful here to include more information on how the SP2 was calibrated for larger particle sizes since this is not as straightforward as calibration at smaller sizes is. It would also be helpful to report the precise range over which the SP2 calibration was done.

Page 7 lines 29-30: "Repeated measurements of the same sample varied within 15% standard deviation of the mean . . ." This meaning here is not clear, did you mean varied within 15% of one standard deviation or something else?

Page 8 lines 22-23: "It may be necessary to choose different SP2 calibration for the aqueous BC standard and e.g. an ice core sample." This meaning of this sentence is unclear

Page 10 lines 15-17: "This restricts the choice of calibration materials to BC-types for which the SP2 sensitivity is known, whereas it is not necessary that the SP2 sensitivity is equal for the sample and the standard." This is a somewhat unclear. The supplemental material gives a nice explanation of how the SP2 sensitivity to each of the standard

and sample can introduce uncertainty into the measurement, but the explanation here in the manuscript is somewhat confusing. Do you mean that ideally one would choose a calibration material for which the SP2 sensitivity is known, but that it is not necessary for the sensitivity to the sample and standard be the same (although this may add some uncertainty to the measurement)?

Supplemental Material:

Page 24 line 5: D on the bottom right-hand side of the equation should be DBC

Page 24 line 12: DBC on the right-hand side of the equation should be DPSL

Page 24 line 14: The first instance of DBC on the right-hand side of the equation should be DPSL

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 3075, 2014.