

Interactive comment on “Determination of water-insoluble light absorbing matter in rainwater using polycarbonate membrane filters and photometric detection” by J. E. Engström and C. Leck

Anonymous Referee #1

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Summary. This paper describes a method for determining the amount of absorbing material in rainwater. The procedure described is careful and biases are quantified. Authors claim that this method has higher efficiency than that of previous work (Ogren). I don't think this work is highly innovative, but it is worth publishing because some method of quantifying carbon particles in wet deposition is needed.

I have some suggestions for clarifying the paper and further exploring uncertainties. I also have some small corrections.

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COMMENTS: General: The procedure assumes that soot mass is proportional to absorption. That is, the soot in rainwater must have the same absorption as the Printex soot. How reasonable is that assumption? This is critical and should be discussed.

Synthetic samples were used for most of the characterization. Later in the paper, authors discuss that the synthetic samples could have been more hydrophobic than the rainwater samples. Authors should comment on the validity of applying the findings to atmospheric samples.

Equation 2: There is an offset in optical depth: $OD=0.0228$ will read as zero. Why is that? This suggests that detection limit is about 2 ug/cm^2 (based on a rough estimate of absorption cross-section). Other factors affecting the detection limit should be discussed.

General: Some literature shows that optical depth is not exactly linear in loading. (e.g. Weingartner, 2003 although this study examined a different kind of filter.) Could this be a problem here and if not, why not?

Section 2.3: The loading on the filter, not the rain concentration is important for this calibration. This should be clarified.

Page 251: Loss in ambient samples is lower than loss in laboratory samples. Is this statistically significant? I miss the statistical test results.

Figure 1 is not very useful. It needs labels.

Figs 2 and 3 are not very instructive either. I do not feel that they contribute much to the paper discussion.

WRITING: Page 238 Line 10 "have" should be "has"

Page 238 Line 20 Place "the" before "primary"

Page 239 Line 1 "act as a cloud condensation nucleus" should be "act as cloud condensation nuclei"

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Page 240 Line 10 add "the" before "tunnel"

Page 240 Line 11 "weighting" should be "weighing"

Page 242 Line 9 I think NOC should be NCO, correct?

Page 242 Line 18 "passing" should be "passed"

Page 245 Line 18 "were" should be "was"

Page 245 Line 20 "were" should be "was"

Page 246 Line 5 "mentions" should be "mentioned"

Page 245 Line 7 "where" should be "were"

Page 248 Line 21 "ranch" should be "range"

Page 250 Line 23 "aimes" should be "aims"

Page 251 Line 2 "necessary" misspelled

Page 251 Line 6 "funnel" misspelled

Page 251 Line 12 "have" should be "has"

REFERENCES Weingartner, E., H. Saathof, M. Schnaiter, N. Streit, B. Bitnar, and U. Baltensperger (2003), Absorption of light by soot particles: determination of the absorption coefficient by means of aethalometers, *J. Aerosol Sci*, 34, 1445-1463.

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