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Atmospheric
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Discussions

Interactive comment on "Technical Note: New methodology for measuring viscosities in small volumes characteristic of environmental chamber particle samples" *by* L. Renbaum-Wolff et al.

Anonymous Referee #2

Received and published: 5 December 2012

The authors present a Technical Note about a new method to measure viscosities in small sample volumes. The major outcome of their work is a calibration line that relates the viscosity to the average speed of beads imbedded in particles of the sample material. The technique might particularly be useful for the analysis of the reaction products of environmental chamber studies on SOA formation. ACP is a journal where many of such SOA formation and growth studies have been published in the past – so in my opinion the present article clearly fits into the scope of the journal.

The authors describe their technique in a clear and concise manner, also highlighting the limitations of the method. I only have a few minor comments that the authors might

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consider before the final publication of their work:

1) In Sect. 3.7, you mention that the technique “currently” suffers from fairly poor accuracy. Do you already have any suggestions on how to improve its accuracy? Are the limitations due to fact that you only resolve the 2D projected path of the beads and that you only consider an average of the location dependent speeds of the beads?

2) How large are the error bars of the mean bead speeds for the standard compounds plotted in Fig. 6a? For a deposited droplet of a given compound, you have traced the paths of 3 – 10 beads over 50 – 100 frames to obtain a mean bead speed. Do you have performed this analysis for several deposited droplets of the same compound – and if so, how large is the scatter of the deduced mean bead speeds from these individual measurements?

3) I would suggest moving Figure S1 into the main manuscript text. I found it interesting to see these data – it also gives some idea about the spread in the results for the mean bead speeds from repeated measurements with the same compound (see comment above).

4) In Sect. 3.7, I found it slightly confusing that you first described it as a limitation/disadvantage that the technique is only applicable to viscosities from 0.001 to 1000 Pa s, i.e., relatively fluid particles (page 27034, line 12), only later clarifying that this is nonetheless “a very wide viscosity range compared to existing microviscometry techniques” (line 20). To get a better idea of this wide range, you could add a reference to Fig. 1 in Koop et al. (2011), which in my opinion is very illustrative as it shows the viscosities of familiar substances as a comparison.

Technical comments:

- Page 27049, Fig. 5: Please also use the notation “wt%” in the figure caption, i.e., “. . . gas flow rate for ∼ 100 wt% glycerol and 85 wt% glycerol.”

- Supplemental information, page 3, line 2: “. . . are given in Table S4.” Also missing full

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stop at the end of line 7.

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