

***Interactive comment on “Mass-spectrometric identification of primary biological particle markers: indication for low abundance of primary biological material in the pristine submicron aerosol of Amazonia” by J. Schneider et al.***

**Anonymous Referee #2**

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Schneider et al. present the first attempt to use an Aerodyne AMS to quantify the contribution of primary biological particles to submicron OM. The method as presented is clear and concise, and the manuscript is well-written.

Aside from minor questions detailed below, my two general concerns with this manuscript (in this form) are that (1) the bulk of the text appears to be focused on the method, while only the most basic results are presented in the remaining portion and (2) the finding from the Chen 2009 already concluded that PBAP was a low fraction of OM. From the abstract and title, it seems that the authors are more focused on the

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findings rather than the method, but the length of interpretation and discussion does not really mirror that goal. I find at most one page on the contributions of each biological marker to the total OM with little discussion beyond the observation that most of the OM was likely secondary.

For publication, I would like to see the authors either retarget the title, abstract, and conclusions to make the goal of the paper (as is ) more clear. That is, developing a method to identify and quantify PBAPs in pristine conditions OR I would like to see a more thorough analysis and discussion of the results, with additional references if possible and appropriate. This would entail describing how the Chen 2009 study is complemented, and not repeated, by this one.

Detailed Comments:

Line 24: Here and throughout the authors refer to their value as "upper limits" on the PBAP contribution. However, I wonder how likely it is that some components are not captured by the key markers used and therefore the calculated values are simply "estimates" rather than "limits." Aside from the fact that 2/3 of the cell are carbohydrates or proteins, I wonder if the authors have any other more quantitative reason to believe they have a true upper limit.

Line 30: Where did this 20% come from? Is it from 7.5%+5.6% and rounded up to 20%? It's a bit difficult to follow since the preceding sentence says the method captures 2/3 of the contents, then an upper limit is introduced. If a rounding up was done, then it should be more explicit since 13.1% is not all that close to 20%.

Line 36: Is this (30%) the highest average number fraction reported, or is this a median value? Given that your results are in conflict with a number fraction this high, it would be better to provide the range of observed number fractions (and their environments), especially if the goal of this study is to refute the significant contribution of PBAPs to submicron aerosol previously reported. Further, the discussion mentions this 30% and claims it is not in agreement with the finding that 20% or less by pass was primary. Did

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any other studies find number fractions in agreement with the current study? If none in agreement are reported, the authors need a stronger case that their results are truly upper limits, and not estimates.

Line 60: It would be helpful to add some information regarding the potential role of the current study address how important PBAPs are to IN in the Amazon.

Line 73: Was number fraction of PBAPs measured and published? If so, it should be added to the discussion with a comparison to mass fraction. If not, please indicate when and from whom these results will be available. If they will never be available, then it should be mentioned that it was not measured, and it should be omitted as one of the research goals.

Line 76: What fraction of IN were PBAPs?

Line 197: Again, it is unclear whether an estimate or a limit was determined.

Section 2.2: What other measurements are available for this campaign? A reference is given for the campaign but it would be useful for readers to know whether other valuable information is available or not before searching for the cited work.

Line 253: The SF is introduced here, so it would be more fitting to provide equation 3.1 here in the methods, rather than in the Results. In fact, it is unclear that any of the text between lines 342 and 358 belong in the results section. It may fit better just before section 3.2

Lines 338-341: If a previous study has already shown secondary sources to dominate submicron OM, does that make the finding here redundant? The title implies the low abundance is a new finding. ... If the finding here is the same as a previously published work, both using AMS, then the focus of this paper should really be on the mass spectrometric method of identifying PBAPs since there is not a new conclusion being drawn here. Did the previous study leave unanswered questions that this study aims to address? That should be stated up front in the introduction.

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Line 404: The data for this spike event show no increase in the preceding or following measurements, and the two are quite similar to one another. Is there any possibility that the rain event contaminated the sampling conditions in any way? Since the authors have no good explanation for this spike, and since the bounding measurements are not evaluated, the authors should address whether this could be an artifact instead of a real "event."

Figure 3: Consider a log or split axis on the left to allow the detail of the majority of values to be seen.

Minor Issues:

Line 28: This is slightly awkward. Consider revising as, "Carbohydrates and proteins (amino acids) compose approximately two-thirds of the dry mass. . ."

Line 30: Add " in this campaign" or "measured here" or some other text to avoid generalizing the findings here to all other pristine cases.

Line 59: Insert a comma after "emissions"

Line 60: Insert a space between "such" and "important"

Lines 61-64: Slightly awkward, reword to be more direct. Split into two sentences to avoid a run-on.

Line 9: Remove plural on "spectrometers"

Line 132: Insert a space between "chains" and "as"

Line 194: Omit second period.

Line 384: Provide the confidence level of the significance test (95% is assumed otherwise).

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 19143, 2011.