Biogeosciences Discussions

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Comment on bg-2020-469

Anonymous Referee #3

Referee comment on "Bioaerosols in the Amazon rain forest: temporal variations and vertical profiles of Eukarya, Bacteria, and Archaea" by Maria Prass et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2020-469-RC3, 2021

The manuscript by Prass and colleagues investigates the altitude distribution of bioaerosols in the Amazon rain forest. In summary, there are several strengths to this study: 1. bacteria, archaea, and eukarya were enumerated using fluorescent microscopy and FISH, 2. the site is an undisturbed forest environment, 3. collection was done at several different heights. There are also several weaknesses to this study: 1. only one week of data collection, 2. only one site of collection, 3. only one time/day of bioaerosol collection for FISH analysis, 4. Only one analytical technique (FISH) used to identify particles as bacteria, archaea, or eukarya.

While FISH is a laborious technique and it has been used before on some aerosols to distinguish bacterial species from each other, it has not been used for atmospheric bioaerosols and not to distinguish bacteria, archaea, or eukarya from each other. In particular, the ability to observe and enumerate assemblages of different composition (for example, assemblages that consist of only bacteria or assemblages that consist of eukarya and bacteria) is a clear strength of this technique. Figure 4H is a beautiful example.

The determination of absolute and relative numbers of bacteria, archaea, or eukarya at different heights in the Amazon rain forest is by itself another important result. However, it is clearly limited by the fact that collection was restricted to a one-time seven-day period and that the results were not compared with any other analytical technique. Because FISH was not used before to determine concentrations of bacteria, archaea, or eukarya at different heights at other sites, the results cannot be compared with other studies that used different techniques.

Of course, it is impossible to change the study itself at this point. It is the opinion of this reviewer that some improvements to the manuscript itself can make this an important and interesting contribution. The main recommendation is to more clearly acknowledge the limitations I listed above. In particular, the authors should not state at the same time that their data provide “unprecedented insights” and are “highly consistent with … previous

studies”. The authors should instead acknowledge that the absence of an independent verification using other techniques, such as sequence-based techniques or qPCR, and the absence of similar studies performed at other sites during other season limits the ability to compare their results and verify the accuracy of their results.