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Atmospheric Measurement Techniques Discussions

Interactive comment on "Aerosol measurement methods to quantify spore emissions from fungi and cryptogamic covers in the Amazon" *by* Nina Löbs et al.

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This is the author's response to the comments of the Anonymous Reviewer #4; Submitted on 04 November 2019.

Referee comment: This manuscript presents experimental results from an interesting study examining the effect of environmental conditions on fungal spore release, using a novel approach based on both, controlled laboratory experiments and measurement of these bioaerosol species in the field under real-world conditions. Although the study

addressed only one type of fungi, the findings of the study are of interest not only to the bioaerosol community but the atmospheric aerosol community at large, as the characteristics of biological aerosol components are still poorly constrained, partly because of the immense variety of species but mainly because of the challenges in obtaining representative measurement results. Therefore, this manuscript is highly relevant to the advancement of understanding bioaerosol sources and characteristics, and should be published in AMT, upon consideration of a few comments listed below.

Author response: We would like to thank reviewer #4 for his/her positive evaluation of our manuscript and his/her very helpful suggestions.

Referee comment: Specific comments: 1. Page 8, Lines 3-9: The authors state that the lower night-time levels of fine mode particles might be due to scavenging by the forest canopy, off-setting the typical increase in concentrations during boundary layer development. However, the authors also mention biomass burning as a potential source of the fine mode particles, which could be produced at a higher rate during night-time smoldering burns. It would be interesting to see information about the burning activities in the area that might have impacted the sampling site, which could be added here, if available.

Author response: Measurements with a Multi Angle Absorption Photometer (MAAP; Thermo Scientific) revealed that during the reported period the concentrations of black carbon indeed were rather high, with values ranging between 0.9-1.3 μg m-3. We now included this information in the manuscript in the following way (page 8. Line 10-13): "The fine mode particle concentration N0.3-1 probably originated from biomass burning events, as simultaneous online measurements with an MAAP instrument (Thermo Scientific, MA, USA) revealed elevated values of black carbon ranging between 0.9 – 1.3 μg m-3. Biomass burning events generally occur at a higher frequency during the dry as compared to the wet season."

Referee comment: 2. Page 9, Lines 22-27: The authors mention detailed observation of the particles, including microscopic examination, but how about measurement of molecular markers, such as sugar alcohols (e.g., arabitol and mannitol), sterols (e.g., ergosterol), or others, as well as total protein – were any attempts made to do a more detailed chemical characterization of the observed particles?

Author response: This indeed is an excellent suggestion, which could be followed during later research. We added this idea to the discussion section (page 9, line 32 – page 10, line 2): "Additionally, the collected material can be used for a chemical characterization of the observed particles by analyzing molecular markers, like sugar alcohols (e.g., arabitol, mannitol), sterols (e.g., ergosterol) and others, as well as an assessment of the total protein content."

Referee comment: 3. Page 10, Lines 8-9: How does the fact that only coarse mode particles were emitted indicate that mainly basidiospores were released?

Author response: This sentence indeed might be somewhat unclear and thus was reformulated by us in the following way (page 10, line 13-15: "The measured particles covered a narrow size range (2.5 – 4 μm diameter) in the coarse mode, which conforms to the spore size of the investigated fungus, whereas fine mode particles seemed to be of minor importance."

Referee comment: 4. Page 10, Lines 21-24: Indeed, various environmental parameters may affect the release patterns of fungal spores, including solar radiation, although some studies (e.g., Liang et al., JAS, 66, 179–186, 2013) did not observe any relationship between ambient spore concentrations and solar radiation. As mentioned here, relative humidity is an important factor, specifically for fungal species utilizing wet spore

discharge mechanisms. This has been seen in other ambient measurements as well, such as those reported by Gosselin et al. (ACP, 16, 15165–15184, 2016), Liang et al. (JAS, 66, 179–186, 2013), or Zhang et al. (ERL, 5, 024010, 2010).

Author response: Thank you very much for pointing out this interesting literature. We now cite it as additional literature suggesting relative humidity as an important factor.

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