

Biogeosciences Discuss., author comment AC3
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Reply on RC2

Aileen B. Baird et al.

Author comment on "Mass concentration measurements of autumn bioaerosol using low-cost sensors in a mature temperate woodland free-air carbon dioxide enrichment (FACE) experiment: investigating the role of meteorology and carbon dioxide levels" by Aileen B. Baird et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-162-AC3>, 2021

Thank you to all the reviewers for your comments and feedback on "Mass concentrations of autumn bioaerosol in a mature temperate woodland Free Air Carbon Dioxide Enrichment (FACE) experiment: investigating the role of meteorology and carbon dioxide levels". In addition to our earlier response to RC1, we address each of the comments in turn below.

Regarding the 2nd review, we respond to your comments in turn below. Regarding the introduction, to the best of our knowledge low-cost optical particle counters have not been used in a forested environment or a FACE experiment before, so this study is a novel method. You also ask about the hypothesized mechanism by which fungal bioaerosol would increase. We believe we have listed the appropriate literature for this topic, however we will include a clarifying sentence on line 77, explicitly stating the link between fungal sporocarp production, spore production, and airborne fungal bioaerosol concentrations: "All of these demonstrated changes in fungal phenology, sporocarp production, and sporulation suggest that bioaerosol concentrations are also likely to change under eCO₂. Even if these findings are fungal species-specific, they have potentially wide-ranging effects for forested habitats."

You note that readers may be unfamiliar with macro-fungal survey methodology, we will add an appropriate reference to improve clarity e.g. (Van Norman et al., 2008)

Regarding assumptions made about particle density and refractive index, the values used are typical for instrumentation of this type, a reference to studies using the same assumptions will be added here. Implications of the assumptions will also be assessed.

We researched the literature for bioaerosol concentrations and believe we have referenced the relevant papers (lines 53 to 59), however it is challenging to make a direct comparison between bioaerosol concentrations measured in different forests because of the use of varying methodologies. As we described above, we hope that future studies will do direct instrumentation comparisons in the same location and measurement period in order to investigate this question further.

We appreciate your comments regarding ambiguity of the statistical methods used. We will clarify the methodology used and the rationale for using it in the text and figure legends.

You ask about the RH being described as "high" on line 256, and we think this sentence is adequately clear, as the specific RH results are stated within the same sentence.

Regarding the figure edits, we will address these along with the other technical issues listed.

Regarding the line 296, the use of "events" refers to periods of time with high PM recorded, presumed as high sporulation events, which is described on line 294, we will clarify the two sentences to: "Peaks in bioaerosol concentration (presumed high sporulation events) are visible in red, with some events being replicated across both eCO₂ treatment and control (e.g. the SW quadrant event in A5 and A6), and other high PM events only occurring in a single array (e.g. the SE quadrant event in A4). By detecting high PM events in a single array at a distinct time shows that the OPCs can detect differences between the BIFoR FACE arrays."

Finally, you suggest adding the statistical significance values into the conclusion, and query the bioaerosol decrease at lower temperatures. Good idea. The relationship

between temperature and PM values is described in lines 308 – 311 and Figure 6. We will summarise this information and put in conclusions.