Thank you 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”. We address each of your comments in turn below.

Firstly, you highlight correctly that the optical particle counters (OPCs) do not explicitly discriminate between bioaerosols and other aerosol compositions. It is correct that the OPCs cannot discriminate between particle types (as stated in section 2.2 of the paper). However, we believe that due to the location of the study site (a woodland in a rural location), the field measurements dates in peak fungal activity, and the low hygroscopicity of the particles we measured, it is very likely we are detecting a predominantly biological source. You suggest there will be a notable amount of sand particles or plant debris present. We include plant debris in our definition of bioaerosols, as stated in the abstract, although it is likely that fungal spores will dominate the bioaerosol fraction due to the timing of the experimental duration. For the measurement period of the experiment, it is unlikely there are any great intrusions of sand particulates. The UK does experience desert dust inclusions, especially in the Spring but less so in the autumn. During the field campaign period, comparison with the outputs from CAMS global reanalysis (EAC4) https://www.ecmwf.int/en/forecasts/dataset/cams-global-reanalysis Dust aerosol optical depth at 550 nm data product shows no correlation with the measured OPC PM10-PM1 data from this paper. We agree that it would be advantageous to have aerosol chemical composition measurements in addition to aerosol size measurements, but practical constraints made that impossible in this field campaign. We hope that future field campaigns will allow for more extensive equipment payloads to be utilized.

The OPCs used are only capable of measuring particles up to 10 µm in size, and therefore some larger fungal spores and pollen particles are not capable of being detected. We explicitly highlight this limitation on line 437 of the present manuscript. However, many common woodland spore species are smaller than 10 µm, including the species listed on lines 126-130 of the paper, as well as several species of airborne spores shown to be extremely common across the UK including Cladosporium, Ganoderma, and Aspergillus (Sadyś et al., 2016).

We aim to show that the benefits of the low-cost OPC outweigh some of the negatives (such as the limited size range) because they enable more studies to be undertaken on forest bioaerosols. We recognise that low-cost OPCs are not sufficient to classify and categorise bioaerosol unambiguously (as stated on line 151), but we believe we have shown that — with due caution not to over-interpret the data — OPC data can yield meaningful data addressing significant science questions. We note that this is the first study on bioaerosols (or aerosols) in any of the current or previous forest FACE experiments.

You note the importance of the relationship between RH and particle counts. We have discussed this extensively in the paper in sections 2.2, 3.1, and in the first two paragraphs of the discussion, including citing the relevant literature on hygroscopic corrections of data from OPCs. One signature of bioaerosols is their low hygroscopicity, which is observed in this study. In the conclusions we note that additional work in characterising the kappa values required for bioaerosols would be useful future work.

We describe the instrument set-up in Section 2.3, including the OPC specifications, experimental duration, and the height at which the instruments were installed.

Regarding high-resolution wind measurements and spore dispersion; this is a good idea but was beyond the scope of this paper. High-resolution 3D observations, from which the turbulence kinetic energy can be calculated, are available around the edge of the present site. However, a high density of equipment would be required to obtain spatially representative 3D velocity measurements in each study array. We hope that future field campaigns will allow for more extensive equipment payloads to be utilized, for example, to investigate the response of spore concentrations to gusts. Because of the difficulties inherent in interpreting 3D velocities near forest floors—i.e. those most relevant to woodland fungi— in this study, we do not rely on the high-resolution measurements from around the edge of the site.

Regarding the effects of eCO_2 on bioaerosol concentrations, we have discussed the possible direct and indirect effects in the final two paragraphs of the discussion (section 4) including changing fungi speciation, changing habitat and fungal substrates. This discussion includes prior work on the effect of CO_2 on fungi. This is the first study on aerosols or bioaerosols in a forest FACE experiment, and we hope the greater accessibility of low-cost sensors will enable more bioaerosol studies in FACE experiments in the future, providing further evidence on the direct and indirect effects of eCO_2. We believe this paper is an important first step to being able to understand the role of the changing CO_2 levels upon atmospheric bioaerosol concentrations.

70% of measurements occurred during low, and low-medium wind speed conditions (less than 3 m s^{-1}), whereby the model demonstrated that mixing between arrays is highly unlikely. Even at these lower wind speeds, the effects of eCO_2 discussed elsewhere in the paper still apply- whereby high concentration events are suppressed by eCO_2, but lower background concentrations are the same between eCO_2 treatment and control.