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Supplement of

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

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The data from the eCO_2 and Ambient arrays at BIFoR were compared to data generated using the Copernicus Atmosphere Monitoring Service (CAMS) dataset to check for correspondence with regional air quality trends. In particular, the CAMS products for ground level PM_{10} and PM_1 were used to create the same metric PM_{10}-PM_1 used as the proxy for bioaerosols in this paper. Comparison is also generated between the eCO_2 and Ambient PM_{10}-PM_1 measurements and the aerosol optical depth (aod) parameters from CAMS (Benedetti, Morcrette et al. 2009, Morcrette, Boucher et al. 2009). Figures are produced using the openair package with R (Carslaw and Ropkins 2012).

The correlation plot of the measured PM_{10}-PM_1 in the Ambient and eCO_2 arrays and CAMS products are given in Figure S1. The scatter plots of the measured PM_{10}-PM_1 from the Ambient array is compared to the CAMS PM_{10}-PM_1 product and the total aod, aod attributed to dust aerosol, aod attributed to sea salt aerosol and aod attributed to sulphate aerosol, are given in Figures S2 to S6, respectively. The scatter plots of the measured PM_{10}-PM_1 from the eCO_2 array is compared to the CAMS PM_{10}-PM_1 product and the total aod, aod attributed to dust aerosol, aod attributed to sea salt aerosol and aod attributed to sulphate aerosol, are given in Figures S7 to S11, respectively.

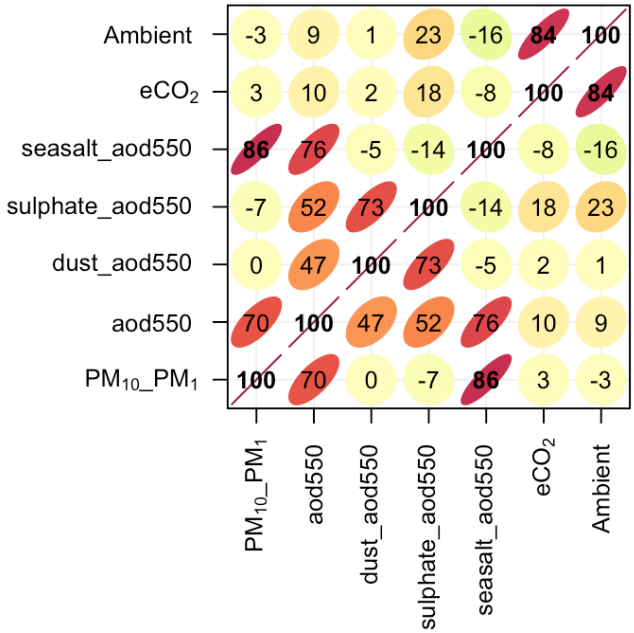

Figure S1. Correlation plot of measured PM10 – PM1 in the BIFoR forest and reconstructed PM properties from CAMS global reanalysis. Values are the Pearson correlation measuring the strength of the linear relationship between each pair of variables. 'Ambient' and 'eCO2' represent the PM_{10}-PM_1 mass concentrations ($\mu g/m^3$) measured in the BIFoR forest. 'PM10_PM1' is the PM_{10}-PM_1 mass concentration from the CAMS global reanalysis ($\mu g/m^3$). 'aod550', 'dust_aod550', 'sulphate_aod550', and 'seasalt_aod550' are the 550 nm aerosol optical depths for total optical depth, and optical depth attributed to dust, sulphate and seasalt PM, respectively. The Pearson correlation values are multiplied by 100 to aid ease of reading.

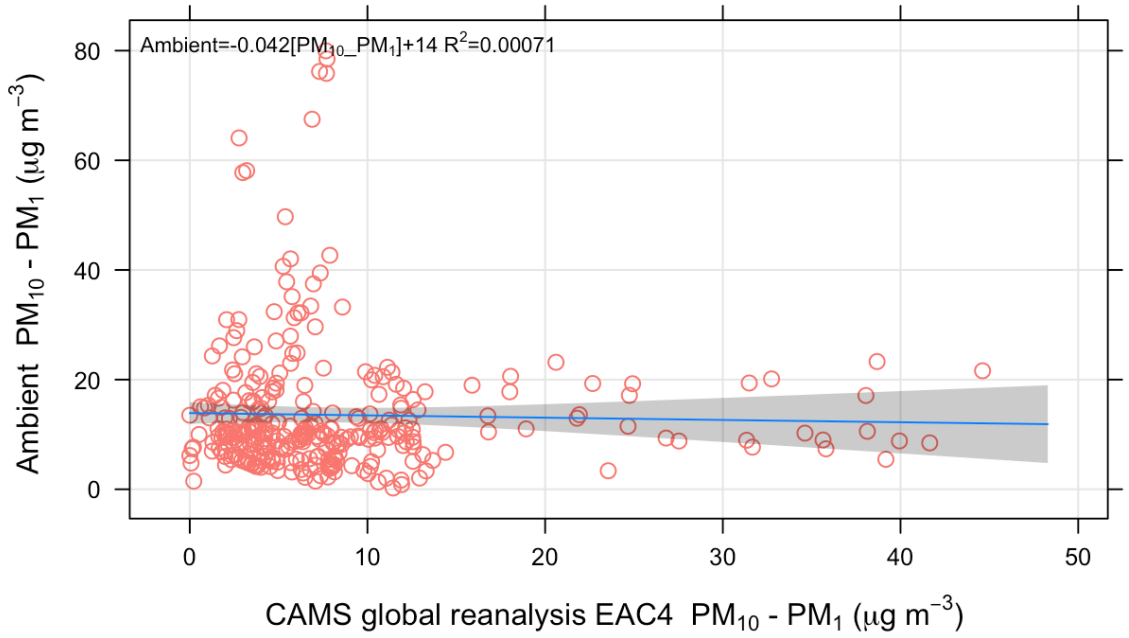

Figure S2. Scatterplot of measured PM_{10}-PM_1 in the Ambient treatment ring versus the CAMS global reanalysis measure of PM_{10}-PM_1.

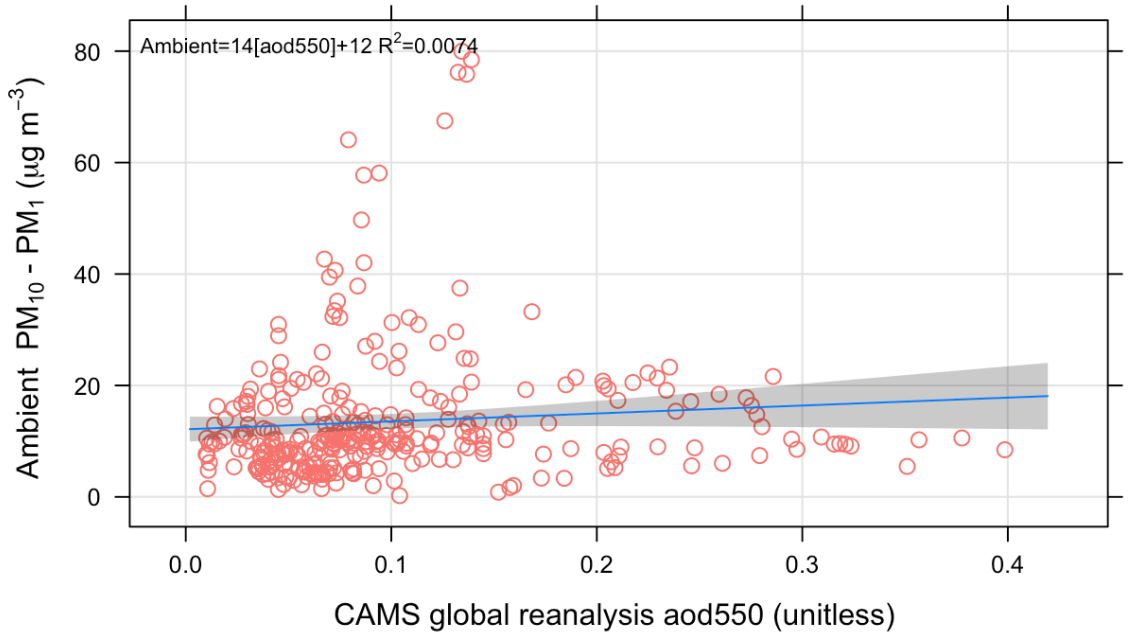

Figure S3. Scatterplot of measured PM_{10}-PM_1 in the Ambient treatment ring versus the CAMS global reanalysis measure of total aerosol optical depth (AOD) at 550 nm.

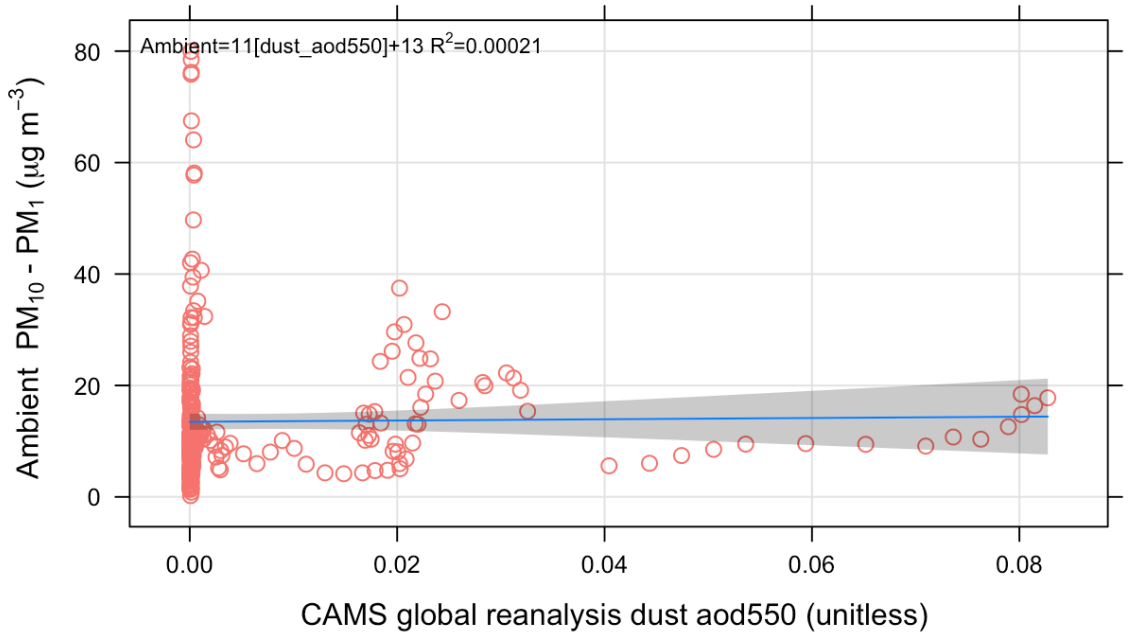

Figure S4. Scatterplot of measured PM_{10}-PM_1 in the Ambient treatment ring versus the CAMS global reanalysis measure of aerosol optical depth (AOD) at 550 nm attributed to dust aerosol.

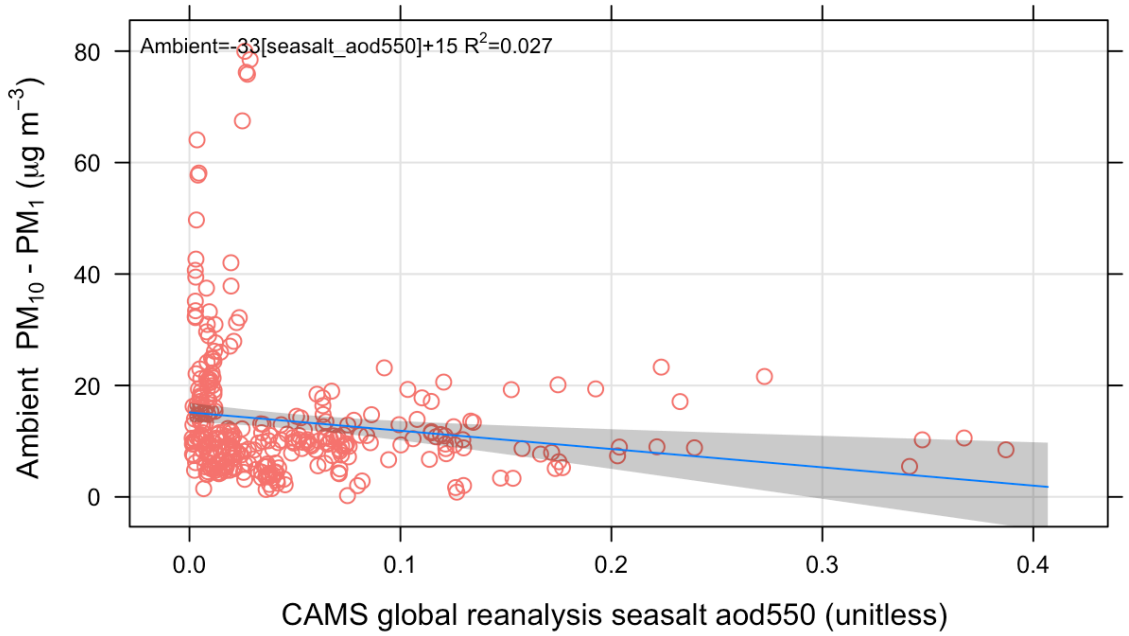

Figure S5. Scatterplot of measured PM_{10}-PM_1 in the Ambient treatment ring versus the CAMS global reanalysis measure of aerosol optical depth (AOD) at 550 nm attributed to seasalt aerosol.

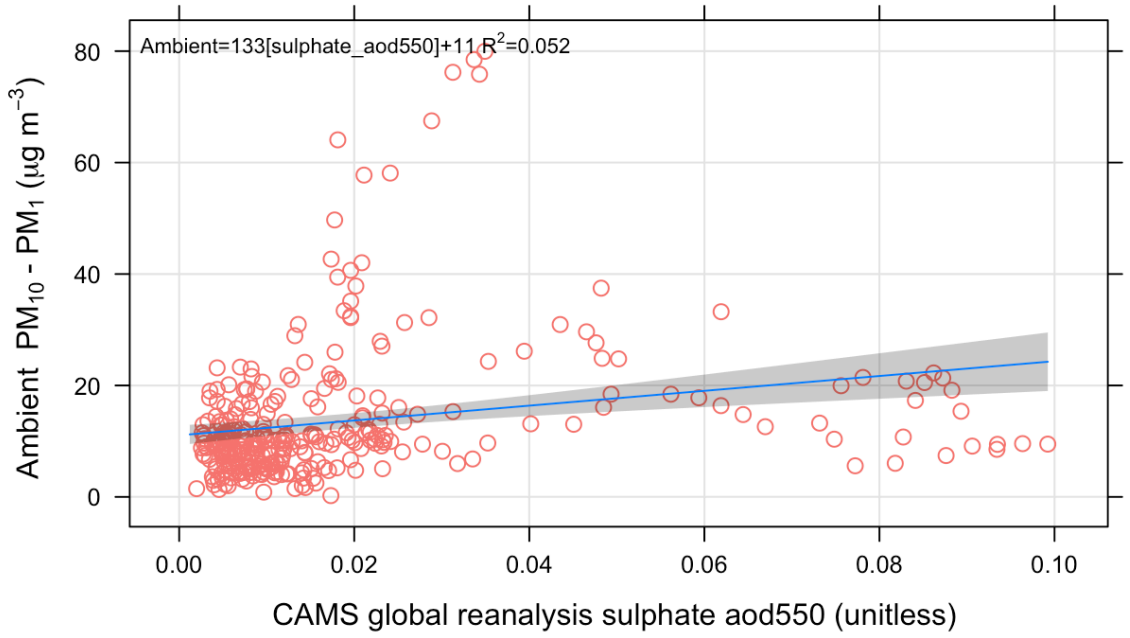

Figure S6. Scatterplot of measured PM_{10}-PM_1 in the Ambient treatment ring versus the CAMS global reanalysis measure of aerosol optical depth (AOD) at 550 nm attributed to sulphate aerosol.

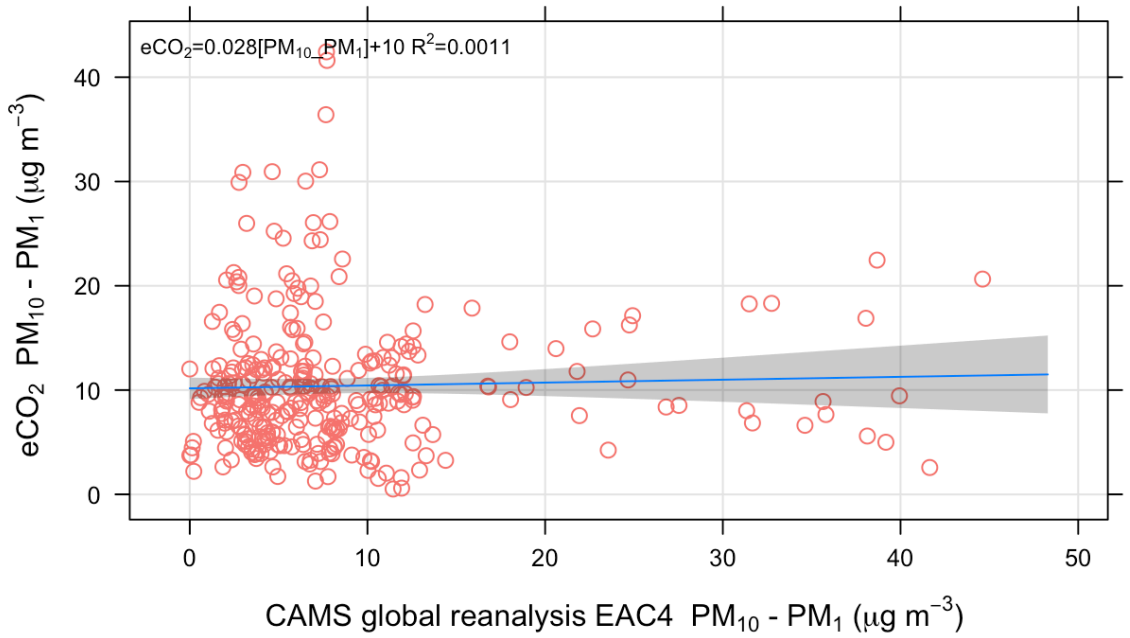

Figure S7. Scatterplot of measured PM_{10}-PM_1 in the eCO_2 treatment ring versus the CAMS global reanalysis measure of PM_{10}-PM_1.

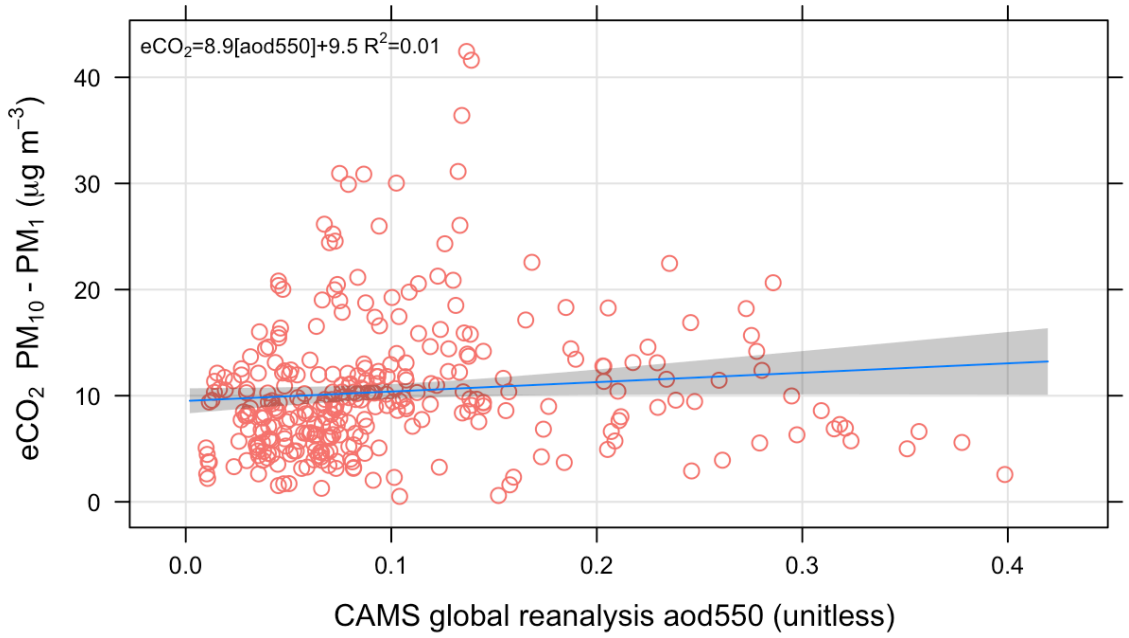

Figure S8. Scatterplot of measured PM_{10}-PM_1 in the eCO_2 treatment ring versus the CAMS global reanalysis measure of total aerosol optical depth (AOD) at 550 nm.

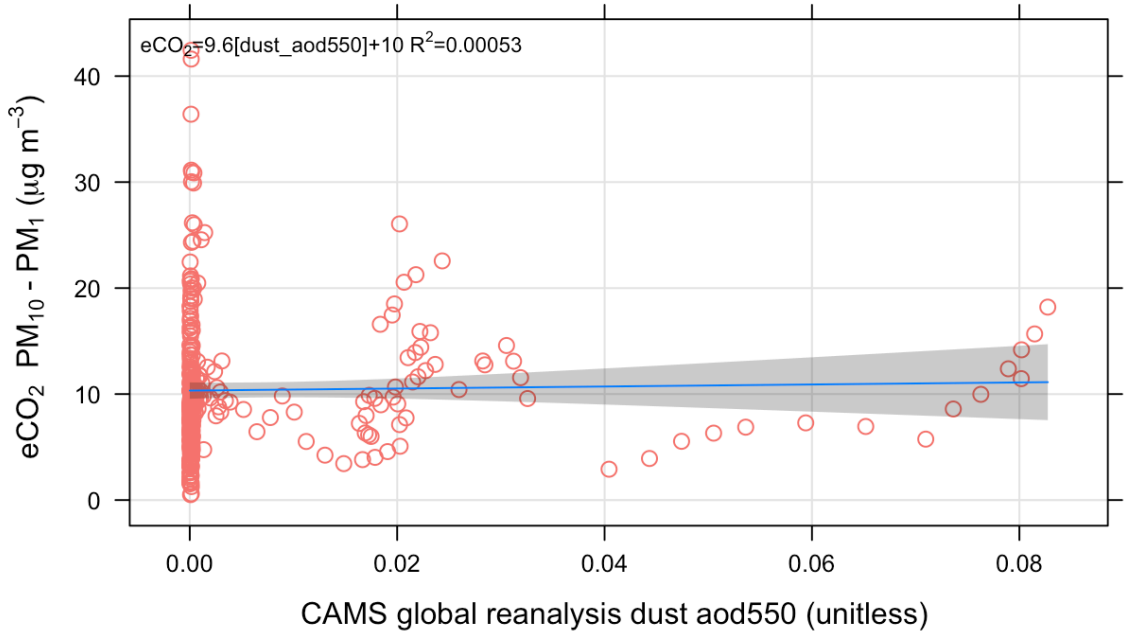

Figure S9. Scatterplot of measured PM_{10}-PM_1 in the eCO_2 treatment ring versus the CAMS global reanalysis measure of aerosol optical depth (AOD) at 550 nm attributed to dust aerosol.

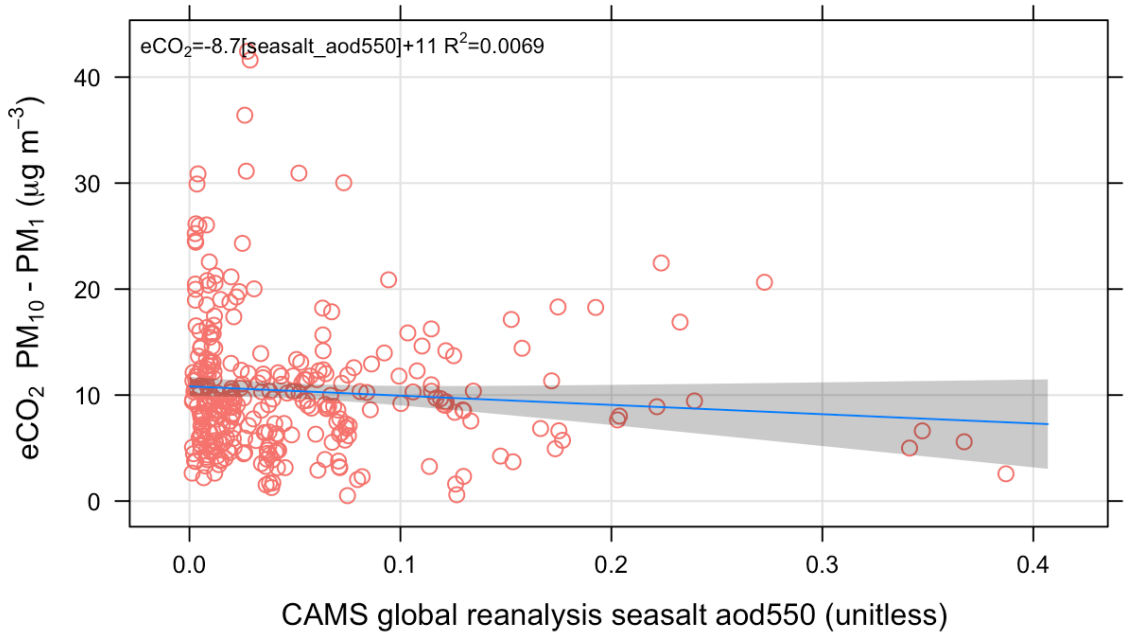

Figure S10. Scatterplot of measured PM_{10}-PM_1 in the eCO_2 treatment ring versus the CAMS global reanalysis measure of aerosol optical depth (AOD) at 550 nm attributed to seasalt aerosol.

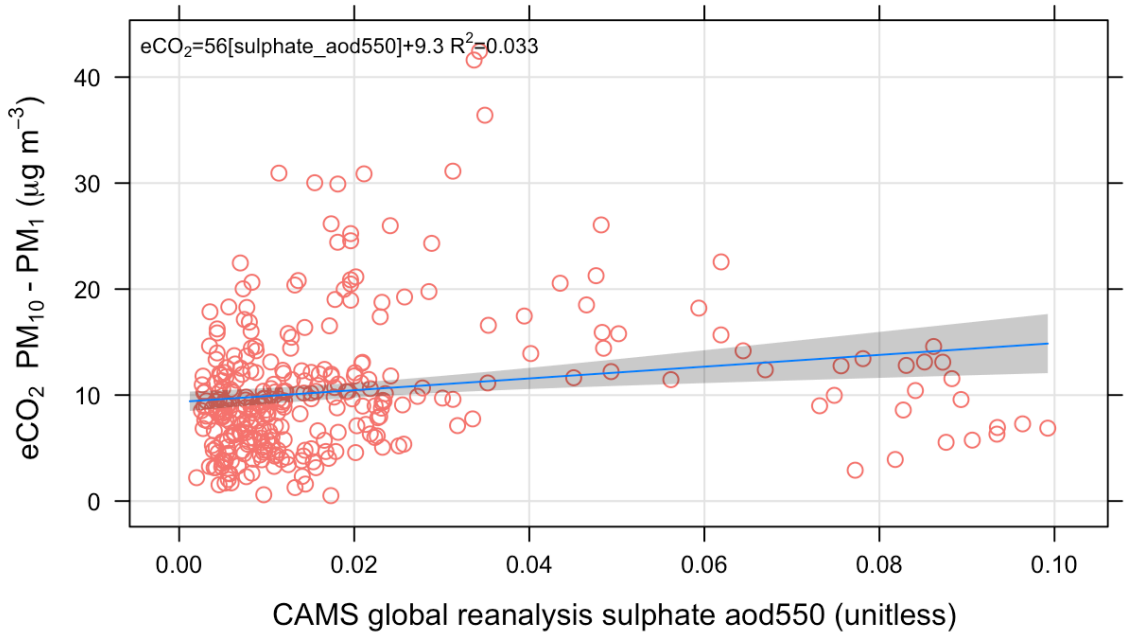

Figure S11. Scatterplot of measured PM_{10}-PM_1 in the eCO_2 treatment ring versus the CAMS global reanalysis measure of aerosol optical depth (AOD) at 550 nm attributed to sulphate aerosol.

References

Benedetti, A., et al. (2009). "Aerosol analysis and forecast in the European centre for medium-range weather forecasts integrated forecast system: 2. Data assimilation." Journal of Geophysical Research: Atmospheres **114**(D13).

Carslaw, D. C. and K. Ropkins (2012). "Openair—an R package for air quality data analysis." Environmental Modelling & Software **27**: 52-61.

Morcrette, J. J., et al. (2009). "Aerosol analysis and forecast in the European Centre for medium-range weather forecasts integrated forecast system: Forward modeling." Journal of Geophysical Research: Atmospheres **114**(D6).