Response to RC2 comments

We thank the reviewer for their comments, and will respond to them herein.

Section 2.2.1 & 2.2.2: did you use (extrapolate) meteorological and ozone data at canopy height (ca. 20-25 m)? as you used the parameterization of the DO3SE model for sunlit leaves at the top canopy (Table 1).

We did not perform any extrapolation of the data to the canopy height, as insufficient data at the time of this work (e.g. canopy surface area) was available to reliably do this. As well as this, the CAMS O_3 lowermost profile layer covers the region above the boundary layer as well, so the O_3 concentrations can be considered as being representative of the canopy height. Proietti et al (2016) similarly did not scale their in-situ measured O_3 concentrations to canopy height, and still obtained results comparable to prior studies. Future iterations of this work will attempt to use satellite-derived canopy height datasets such as those derived from the GEDI instrument (Potapov et al, 2021). We will add this explanation to the final paper draft.

Table 1: mistake for Tmin for Mediterranean species (Deciduous Tmin = 0; Evergreen Tmin = 1). Explain why Tmax is set at 200°C.

We thank the reviewer for pointing this error out, and will adjust Table 1 in the final draft. According to Mills et al (2017), T_{max} = 200 °C for boreal vegetation to simulate the weak response to high temperatures of Norway spruce and birch trees growing under Northern European conditions (here, the stomatal response is instead restricted by high VPD values). Therefore, this T_{max} value should be treated as a forcing instead of a descriptive parameter. This explanation will also be added to the final paper draft.

L114: why an overestimation of 15% is observed in Southern Europe?

Since the original submission of this paper, Wagner et al (2021) published a more detailed comparison of CAMS and in-situ O_3. They found that while CAMS reproduces tropospheric O_3 within 10% of independent observations, a seasonal mean variability in biases exist over Northern midlatitudes, peaking at 15% in October.

Over Northern Europe, and to a lesser extent Southern Europe, it was found that the CAMS overestimation of surface O_3 was greater during nighttime than daytime hours. They propose that this indicates that nocturnal O_3 destruction processes in the boundary layer (e.g. NO_x titration) are not being correctly represented in the global model, which is known to have difficulties resolving subgrid processes.

We will update the final draft of this paper with the above explanation.

L167: what is the layer depth for SWC? Soil moisture is usually obtained for the upper 10-20 cm of soil, which resulted in a worst-case risk scenario, as the uppermost soil layers are expected to dry out more easily than deeper layers.

The ERA5 soil layer depths are as follows: Layer 1: 0-7cm, Layer 2: 7-28cm, Layer 3: 28-100cm, Layer 4: 100-289cm (Hersbach et al, 2020). By using only the first three layers, we take the mean soil water content between 0-1 m. We will add this detail to the final paper draft.

L195: which test did you use for trend analysis: Mann-Kendall test, Sen method?

We use the Wald test with a t-test distribution, assuming a null hypothesis that the gradient is zero. This information will be added to the final draft.

Figure 8: why some areas are missing (e.g., the UK, Southeastern Spain, Northwestern France)?

As stated in L140, the ESA-CCI dataset used to determine the vegetation type of each grid cell needed to be resampled to the ERA5 0.25° × 0.25° spatial grid using majority resampling (i.e. grid cells were assigned the most common ESA-CCI classification value). The forests in the regions mentioned by the reviewer are very fragmented, with many surrounded by much larger cropland or grassland. As a result, many grid cells in these areas were classified as not being forested, and were therefore were not analysed in this work.

In the future, we will ensure that forests in these regions are better represented. One way to do this would be to replace the ERA5 meteorological data with ERA5-Land (Muñoz-Sabater et al, 2021), which has a higher spatial resolution.

L235: do you mean "tropospheric" rather than "anthropogenic"? Surface ozone can be formed from biogenic VOCs.

We agree that "tropospheric" would be a better word to use here, and will correct this line as suggested in the final draft.

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