This manuscript studies the biospheric impacts of heatwave and drought on surface ozone over southwestern Europe, using well-established numerical models and methodologies. As chemical transport models cannot fully resolve the biosphere, omitting some relevant effects and processes is acceptable, provided that their potential impacts on the results and implications are well-discussed. This part is somewhat missing in this manuscript, and should be addressed.

Major issues:

Soil NO emission: Increasing evidence shows that the temperature dependence of soil NO emission is an important part of O_3 production, especially in rural and agricultural regions (Oikawa et al., 2015; Romer et al., 2018; Sha et al., 2021), which cover a significant portion of the studies domain. Since this study focus on heatwaves and droughts, which directly affect two of the main parameters of soil NO emission (soil temperature and moisture), soil NO probably plays a non-negligible role. For example, soil NO contribute to modelled ozone-temperature relationship at similar degree with BVOC emission and dry deposition (Porter and Heald, 2019). Most previous literature on similar topic do not directly explore the role of such effect, so it is understandable that the authors might not be aware of, and/or the modelling system cannot account for such effects. Yet with recent scientific discussion and development, this paper would benefit greatly from discussing the potential role of soil NO in O_3-heat and O_3-drought relationships, and how it might affect the conclusion of this paper.

Non-stomatal ozone uptake: Another relevant issue that might have been under the radar of most atmosphere-biosphere chemistry modelers is the importance of temperature- (e.g. in-canopy gas-phase ozonolysis) or water-dependency (e.g. soil, leaf cuticle) of non-stomatal uptake, which is especially frequently highlighted over the Mediterranean region (Fares et al., 2013, 2014; Finco et al., 2018; Gerosa et al., 2005, 2009). In addition, recent study has explicitly shown the importance of accounting for changes in various non-stomatal sinks during heat and drought (e.g. Wong et al., 2022). The EMEP dry deposition scheme does not account for most of these changes. Again this is methodologically acceptable given current state of dry deposition schemes within regional chemical transport models, but 1-2 extra paragraphs should be dedicated to discuss how these changes could affect the result and conclusion.

Minor issues:

L17: “favorable weather condition” for what? Please clarify.

L65 – 66: How exactly do droughts affect land ecosystems more than heatwaves? This need more clarification and references.

L 88: “Dry deposition velocity directly depends on the stomatal conductance…” Non-stomatal uptake is often as important as stomatal in the region of study. “Directly dependent “ is a bit too strong wording.

L102: I think the term “agricultural drought” is much less intuitive than simply saying “soil dryness”. But I will leave the decision to the authors.

L156 – 157: “ORCHIDEE is composed of three modules. SECHIBA simulates the water and energy cycle. STOMATE resolves the processes of the carbon cycle, allowing an interactive phenology…” ORCHIDEE is likely to provide better g_s than EMEP. Explain why it is not used.

L 251: How much does biomass burning vary with heat and drought in the domain of study? Would that affect the result and conclusion?

L 258: “…and the bulk non-stomatal conductance…” Need much more clarification about the non-stomatal parameterization. Would any part of the total non-stomatal conductance vary with relevant factors like humidity and LAI?

L 300: Explain the cluster approach in more detail.

L 333 – 334: “Even if such validation scores are close to those found in the scientific literature (e.g. Panthou et al., 2018), the temperature uncertainties significantly contribute to those of the O_3 simulated by CHIMERE.” Especially given a lot of the biospheric parameterizations has non-linear dependence on temperature. Elaborate and analyze the impact on your conclusion.

L 340 – 341: Is such LAI difference applied to the simulations? If not, this statement is confusing and need clarification.

Figure 5: Does the daily mean include only the daylight or all 24 hours? For all day (even daytime) average 1.5 – 2 cm s^{-1} looks really high comparing to observations over Mediterranean forests. This need a bit more explanation and exploration.

L 456 – 457: Please explain how $\gamma_{SWS_{fit}}$ performs the best since it is not obvious from Fig. 4.