Interactive comment on "How does soil water availability control phytotoxic O$_3$ dose to montane pines? Modelling and experimental study from two contrasting climatic regions in Europe" by Svetlana Bičárová et al.

Anonymous Referee #2

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While providing some interesting insight into the ozone pollution climate at two mountainous sites across Europe and the respective ozone uptake of two tree species and their associated physiological characteristics , unfortunately this study is flawed with respect to its methodology and general focus and therefore not publishable in the current form. A major revision is necessary, after which the study could be submitted to another, lower impact journal. The high scientific standards of ACP – especially with respect to relevance and novelty - cannot be met with this study. The reasoning behind this rejection is listed in the following.

Introduction not very comprehensive (effects of ozone on tree physiology could be better described) and in parts imprecise (for example discussion about choice of y-threshold); it lacks some key information, e.g. purpose of risk assessments? Why are you interested in a comparison between AOT40 and POD (because you don't discuss the difference between different ozone metrics, readers won't see the point of introducing different metrics)? Why are you interested in doing a precise risk assessment of ozone effects on the two pine species, when you don't show flux-response (visible injury) relationships in the end? Who will be interested in your study, and why? Also, what are the known problems with response parameter "visible injury" as compared to growth increment? And the introduction doesn't really explain why you concentrated on those two mountain regions and those two tree species. In fact, the benefit of including the French site in the study is not clear, also because of the questionable quality of the ozone data as compared to the Slovakian site.

The "study area" chapter needs a revision: What is the link between the several Slovakian and one French site? Why only one site in France but several in Slovakia? The combination of the these two provenances is not clear (Pinus cembra only occurs in one Slovakian site, and only sparsely; Pinus mugo does not occur in the French site at all) and sounds very "random";

The methods chapter needs a thorough revision as it is fundamentally flawed in its current form! The DO3SE parameterisation is key to the study and the respective table should be provided in main text; is the parameterisation really the same for both Pinus species at both sites (apart from canopy height and root depth)? This is very questionable and needs some proper scientific discussion and proof based on measurements. The main parameters I would question in this respect are the gmax and fphen – I would be very surprised if they were the same at both locations and for both species. For this, you will have to show (in a figure) and statistically analyse the physiological (gsto) measurements you did – which raises the problem that they were only done in Slovakia and not in France. Without respective measurements in France, this study

can't be published. Why don't you show flux-response (visible injury) relationships in the paper? This would have been the natural final result readers might expect from this study. Also, the choice of threshold (Y = 0 vs. Y = 1) has to be statistically explained. This is chapter lacks key references to DO3SE too.

Ozone and meteorological data: You describe how you derive hourly data from measurements done with passive samplers at the French site, but did you also actually cross-calibrate the passive samplers with the active samplers before exposure? This needs to be explained. Also, how many measurements were made with the passive samplers? When were the passive samplers replaced, how long was their exposure time? And how far is the meteorological site in France away from the ozone sampling site? The C1 site is not referred to in this chapter, but C2 is mentioned twice. A typo?

Soil water potential: Another problem with the French site, as SWP was not measured there. Which approach did you use for the DO3SE modelling at that site (you don't explicitly describe this) and how did you validate the modelled SWP? This is another strong argument for excluding the French site altogether.

Results: Figure 3b seems to be wrong: The uptake of ozone starts to be limited above a certain VPD, here 0.6 kPa. So the grey area shown in that figure shows the non-effective uptake, which is in exact contrary to what you write. Flux- and concentration (why do you otherwise include AOT40 in your study?) response relationships using the visible injury data would have been expected at the end of this study/paper.

Discussion: In parts very thin, specifically with respect to the influence of SWP on ozone flux given the suggested SWP focus provided in title of paper! There are a multitude of key publications in this field the study results should be compared to. Also, no discussion of AOT40 vs. POD, which presumably is partly based on the omission of showing dose-response relationships.

Please do a general spelling and language test – there are typos, punctuation and grammatical errors and in general the writing is sub-standard, often not precise enough

Some specific comments: L 36-37: "based only on measured O3 concentration does not take into account environmental factors affecting responses of vegetation" – what kind of response? Not precise enough, a frequent problem in the manuscript L. 41: add more recent DO3SE literature, such as Emberson et al., 2007, Büker et al, 2012, L. 45: There is an updated version of Karlsson et al. 2007 available that should be cited in addition: Büker et al, 2015 L 55: "The most sensitive conifers are Pinus species" – sensitive in terms of what? Foliar injury? There are a lot of broad-leaf tree species that are very sensitive too – please be more precise L 55/56: "however different visible O3 injury response may be expected under natural conditions" –What do you mean exactly? L 62: Please rephrase objective 1: What exactly do you mean by assessing metrics? L 90: "Visible leaf injury on particularly sensitive species is one of the O3 air pollution symptoms" – please give reference Table 1: There is no tree vegetation at site D? Why then include it, as this is a paper focussing on forest trees? L 103: DO3SE model needs references mentioned in this chapter, even if they have been listed before L 105: What is the "relevant" growing season? This is not specified for the French site earlier; do both locations really have the same growing season? L. 108: "Passage rate" – please refer, this is not a scientific term L 117/120: Please check latest updates on CLs on ICP Vegetation website L 117: "An innovative species-specific…" - this sentence needs much more detail; for example, explain why a POD0 rather than POD1 was used L 247: "Soil moisture can have.." – this is content that should be included in discussion, not results section.