

# ***Interactive comment on “Isoprenoid emission response to changing light conditions of English oak, European beech and Norway spruce” by Ylva van Meeningen et al.***

## **Anonymous Referee #1**

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### General comments:

This work is a nice study, which could add with no doubt one piece to this complicated puzzle of BVOC emission modeling improvement. However, there are still some inconsistencies and incoherence in the MS which make, at some points, its reading and understanding confusing. I recommend some major revisions of the MS (in its structure and interpretation, especially in the discussion part) before acceptance for publication.

Here are some leads which could help the authors.

The experimental strategy:

- Some important information in the sample strategy is missing (see also ‘specific com-

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ments'), but briefly: we would like to understand better why these 3 species were selected? Why this kind of oak? How the two English oaks were selected; the 4 Norway spruces? How 'different' were they ... if they were? Were there genetically different? Why 'only' in July?

- Above all, why only the lowest (shaded) branches were sampled? I wonder how a light dependence behavior can be extrapolate from samples taken only from shaded branches, which, by definition, do not adapt very much to light? How could be sure that, some of the surprising discrepancies observed in the results, are not coming from the fact that shaded branches can present quite variable results?

- What about the weather conditions before the measurements? This can be of importance in the 'story' of the different replicate, and to understand some differences.

- In the last part of the MS, additional data from a (another?) 3 year experiment is mentioned: in addition to be not the right place to refer to this(these?) study(ies?), the reader cannot understand why all these data are not merged into one dataset?

The MS structure:

- Quite a lot of interesting points given in the 'discussion' section should be given in the 'results' one (see 'specific comments')

- The large discrepancies between the tree replicates is not enough highlighted in the 'results' section, especially for the Early spruce 2 which behaved very differently than other spruce replicates

- Why focusing/structuring the MS on  $\alpha$ -pinene, camphene, 3-carene, limonene, eucalyptol? The reason that they were all produced by these species is not enough relevant; let's consider that a non  $\alpha$ -pinene emitter were additionally studied, no focus would have been made on this - very - important MT! I'd rather be curious to learn about the total(MT), or the main compound emitted by each species.

- In the 'discussion' section, the MS wobbles constantly between 'compound division

point of view' and 'species division point of view': although I do not share the authors belief made for instance page 10 (I9-10) of a possible convergence of a light behavior for a same compound for different species (see further specific comments below), the authors has to decide: or they structure their MS on the compound basis or on the species dependency basis.

- Too many conclusions given in the discussion sound incoherent/inconsistent with what is discussed previously (see specific comments)

Specific comments:

- L27, p4: how the 'anticipated average daily temperature' was obtained?
- Section 3.5 title: could be shorter: 'Photosynthesis and stomatal conductance'
- L6, p8: why  $p > 0.6$ ?
- L18-19 p8 are not at the right place; it could be in the introduction of the discussion.
- L21-24, p8: rather at the end of the introduction/in the presentation of the strategy and objectives.
- Transition between I29 and I30 p8 is weird.
- Don't 'understand I6-7, p9 + the discussion is not on the same level (species effect) than just before (compound effect)
- I cannot figure out how a compound is going to be identically controlled by environmental conditions whatever the species. If so, it would make no sense to consider 'de novo' or 'pool' or 'de novo + pool' MT groups (cf. conclusion3-5 p9).
- L7-9, p9: I don't understand the last part of this sentence
- L9-11, p9: is a comparison between so different emitters than oak/beech and Norway spruce relevant?
- L12-21 p9 is more a 'result presentation' than a discussion; the early spruce 2 results

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from Early spruce 2 are indeed different from the other; however the number of samples (n=13) is not that much different from the early spruce 1 (n=14) or oak 1 (n=15) and cannot explain all these differences.

- Section from line 22 p9 has to be rewritten and better restructured : it starts from the strategy justification, jumps to camphene emission from different emitters (which was also discussed lines 1-5 of the same page 9), then to night emission (thus to the existence of storage structure) . . .

- Sentence l 3-5 p10 : I don't understand this sentence, since de novo emitting species ARE already considered as having a storage pool in emission models . . .

- L5-7 p10: few remarks:

- o There is not so 'many' emission models available

- o I don't see the link between the growing condition adaptations considered in some emission models and the experimental results presented in this study

- o considering a compound division will not improve the plant functional division; it may (?) improve the emission model

- L9-10 p10: for decades, studies on BVOC emission variations showed that this 'promising idea' is not a good track to consider:  $\alpha$ -pinene can be L-dependent for some emitter, but L-independent for other ones; I don't see how this would converge.

- section 4.2, p10: I think many results are here clearly presented in this 'discussion' section but should rather be added in the 'results' section which mainly (only?) presents light dependence results and not raw emissions (i.e., the main compounds measured, the ER values, their relative contribution, . . .)

- L22-23, p10: I'm getting confused: were these results obtained over a 3 year study?

- L24, p10: I'm not a native English speaker, but I would rather say something like 'the low variation in the emission pattern' rather than 'the low emission pattern variation'

- L27, p10: why considering now 'total emission' in a discussion section which states earlier that 'looking at emission patterns of separate compound would improve ...'; I cannot see the guiding thread of the discussion.
- L28-29 p10: I don't understand: even if some large differences exist between emission rates (ER) from different leaves, a light dependence (or not) can be study for each leave, whatever the absolute values of their emissions
- L 30-31, p10: stress and injury are different things + SQT are not the only compounds related to stress or injury
- L33, p10: what is 'the study' carried out in 2013?
- L1-2 p11: emission rates (ER) and standardized emissions (ER\*) are not the same thing; top canopy ER are always 'much higher' than in the shaded canopy ER, but ER\* are, or are not different. In this study only ER\* were measured (30°, 1000 PAR).
- L6-7, p11: I don't understand the sentence
- L13, p11: a mysterious 3 year study is again mentioned; if these additional data are of importance they should be used and presented SINCE the beginning of the manuscript, not at this point of the 'discussion'.
- L18, p11: this conclusion seems incoherent with the points mentioned just before
- L19-22, p11: choosing shaded branches makes indeed the light dependency study over a large range of PAR not easy (possible?);
- L25, p11: another (last) mention of a 2014 study

#### Technical corrections

- Figures 1-3: please use colors rather than grey scales and above all, used the same color (or grey) for each compound in all the figures, otherwise it is quite difficult to follow
- Figure4: choose a color (or grey) for each tree or group of trees; or no color at all, but

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not only 2 only different greys/colors for 4 different emitters

- I would not mind if the Appendice were a Table; in any case its presentation should be improved (e.g.: it is hard to understand which values correspond to which category '0' and '500' for oak 1, ...)

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