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Biogeosciences Discussions

Interactive comment on "Monoterpene and sesquiterpene emissions from *Quercus coccifera* exhibit interacting responses to light and temperature" *by* M. Staudt and L. Lhoutellier

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General comments

The study of Staudt and Lhoutellier presents laboratory results on the interacting responses to light and temperature as the major controls over BVOC emission. Starting from an extensive introduction to the literature, the experimental setup is well justified, the experiments are well designed, executed and discussed. The experiments meet good laboratory standards especially for the analytical part. Thanks to their clever sampling and advanced analytical techniques, the authors were able to see more than 50 volatile compounds and to separate effects of light and temperature also on emission

of oxygenated MTs, sesquiterpenes and green leave compounds, which are much less studied because so difficult to sample and to analyze. The coefficients for temperature and light responses derived from the experiments were applied to simulated field data to show that interactive effects have important implications for emission estimates.

I have no doubt that the manuscript of Staudt and Lhoutellier will be of high interest to the readers of Biogeoscience as it represents a key contribution to improve our knowledge of biological and environmental drivers of BVOC emissions, as required for understanding ozone and particle formation in the atmosphere.

However, the authors should provide some proof that results are not biased by interactions between variations in light exposure and the temperatures observed at the target place, i.e. the leaf surface. Measuring temperature in chamber air does not really convince in a study on T+L controls. It is well known and mentioned several times also by the authors in introduction and discussion: it is the leaf temperature and not the air temperature controlling the overall emission; exposure to 150 vs. 1000 PPFD may easily create a relevant temperature difference between chamber air and leaf surface at higher radiation levels, as pointed out correctly by referee1 (T. Duhl). I would not exclude that the temperature of chamber air was very close to the temperature of the leaf surface or leaf mesophyll, considering the high flushing rate of 5 air changes per minute and the fact that mixing was further supported by a fan, but this must be shown! If not, the related discussion and conclusion should be modified accordingly.

The plant enclosure and exposure system is homemade and requires some more detail description, in case the authors could not provide a published reference of their experimental setup. E.g., dimension of the chamber, how was the flushing done, did the chamber work in (what) overpressure? Does the PPFD exposure measured outside the chamber represent the factual leaf exposure to photon flux density and spectrum? How was variation of temperature exposure done?

Wording in general is fluent and understandable but sometimes the sentences are

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much too long, e.g. more than 12 lines in last para of p.5693

Specific comments (I tried to list below only minor comments and typos in addition to those highlighted already by T. Duhl)

P5699-Measurements of photosynthesis: the CI-301 is not in stock anymore at CID - was it running in differential mode? Be more specific. A pity the authors did not measure H2O and transpiration/ stomatal conductance - would be most informative in the context of T/light response curves

P5699-L16: replace “after of a pulse” by “after a pulse”

P5700-BVOC emission measurements: It is not clear which samples were analysed by GC-FID and GC-MS and why

P5701-L24: terminal shoot of the upper tree crown is misleading: a 3 years old sapling of Kermes Oak I would call a sapling and not a tree

P5702-L3: The responses to temperature WERE measured

P5702-L4: how was this done, the exposure temperature in 5degC increments between 20 and 50degC? Heating up the water jacket? The twig in the chamber was at 50°C and the rest of sapling outside at 20°C? This would be a relevant experimental condition and needs to be mentioned

P5703-L7 –“At the end”- of what? Of one day/one response curve?

P5705-L19- tended to saturate at lower light levels: I think it is relevant that this happened at 37°C at 3 time higher emission levels compared to 30°C. At 37°C and 1000PPFD one observes about 2300ng of MThc emissions in the light response curve of Fig. 1 and around 800 ng in the temperature response curve in Fig. 2 – such difference is striking and should be discussed

P5706-L11: I do not see this big difference in Fig. 2, until 35deg I see increase to about 800 vs 1000ng, obviously not significant

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P5706-15- equal emission rates at both temperatures: not clear, Fig. 2 shows something different: under 1000 PPFD I see ca 1000 ng at 35C and lower emissions of ca 700ng at 40C

P5724 Fig.1 caption: replace traingles with triangles I guess

P5727-caption Fig. 3: the coefficients of T and light responses are important for eventual users of the results, maybe better to present in a separate table

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