Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2020-260-SC1, 2020
© Author(s) 2020. This work is distributed under
the Creative Commons Attribution 4.0 License.

Interactive comment on "Combined effects of ozone and drought stress on the emission of biogenic volatile organic compounds from *Quercus robur* L." *by* Arianna Peron et al.

Valerio Ferracci

v.ferracci@cranfield.ac.uk

Received and published: 17 September 2020

This paper offers a valuable contribution to evaluating the effects on the BVOC emissions from Q. robur of two of the main sources of environmental stress (ozone and drought) which are expected to become more frequent in mid-latitudes in the coming decades. As the authors describe in the Introduction, isoprene emissions have been reported to increase under moderate drought and then decrease as the drought becomes severe. This behaviour is typically ascribed to a decrease in stomatal conductance at the onset of drought, which in turn increases leaf temperature driving higher isoprene emissions. As the the drought becomes severe, a shortage of carbon substrate leads

to a reduction in isoprene synthesis and emissions.

Keeping this conceptual mechanism in mind, it is interesting how the isoprene emissions reported in Fig 3 (drought stress data only) seem only to decrease steadily, without peaking under moderate drought as reported in the literature*. From the leaf temperature values reported in Table 1 it seems clear that leaf temperature in the DS experiments remained relatively constant (within the indicated standard deviations), whereas stomatal conductance decreased rapidly as SWP decreased. Could the authors comment on this result, and how the DS results in the manuscript might fit (or not!) within the hypothesis of leaf temperature increases (from stomatal closure) driving an increase in isoprene under moderate drought?

*to expand on the context given in the introduction (lines 57-60), it might be worth mentioning how this behaviour has been observed in mature trees in real forests, as described in the references below:

Potosnak, M. J., LeStourgeon, L., Pallardy, S. G., Hosman, K. P., Gu, L., Karl, T., et al. (2014). Observed and modeled ecosystem isoprene fluxes from an oakâĂŘdominated temperate forest and the influence of drought stress. Atmospheric Environment, 84, 314–322. https://doi.org/10.1016/j.atmosenv.2013.11.055

Seco, R., Karl, T., Guenther, A., Hosman, K. P., Pallardy, S. G., Gu, L., et al. (2015). EcosystemâĂŘscale volatile organic compound fluxes during an extreme drought in a broadleaf temperate forest of the Missouri Ozarks (Central USA). Global Change Biology, 21(10), 3657–3674. https://doi.org/10.1111/gcb.12980 (already in the reference list)

Ferracci, V., Bolas, C. G., Freshwater, R. A., Staniaszek, Z., King, T., Jaars, K., et al., (2020). Continuous Isoprene Measurements in a UK Temperate Forest for a Whole Growing Season: Effects of Drought Stress During the 2018 Heatwave. Geophysical Research Letters, 47(15). https://doi.org/10.1029/2020GL088885

Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2020-260, 2020.