

Interactive comment on “Simultaneous leaf-level measurement of trace gas emissions and photosynthesis with a portable photosynthesis system” by Mj Riches et al.

Anonymous Referee #2

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General comments

Riches et al. present photosynthesis and trace gas (volatile organic compound, VOC) measurements made using a portable photosynthesis system (PPS) together with chemical ionisation mass spectrometry (CIMS) and offline analysis of sorbent tubes. PPS has been widely used to sample VOCs at well-defined photosynthetic conditions and this manuscript provides a useful characterisation of the LI-COR LI-6800 both in terms of CO₂ assimilation and measurement of VOCs. I have a number of minor concerns (listed below), with these points addressed I would recommend publication.

Specific comments

C1

Concentration is used throughout when referring to mol mol⁻¹, this should be mole fraction or mixing ratio.

Different units for emission factor are used when reporting results from the TOF-CIMS and sorbent tubes (moles and mass). It would be easier for the reader if the same units were used throughout.

Line 142. Brass fitting are often avoided when working with VOCs, why was a brass hose barb fitting used when all other fittings were stainless steel?

Line 147: Is the external pump placed up or downstream of the sorbent tube?

Line 165: The authors state that the impact of increased flow rates should be investigated for individual species. As a range of species were used in this study, was any effect observed?

Line 191: Most of the TD-GC/MS instrumental methodology is provided in the supplementary information which keeps the manuscript focused on the PPS system. On the whole I appreciate this but would like to see a make and model for the TD-GC/MS in the main text.

Line 209: The sampling protocol set out in section 2.4 focuses mainly on sampling to sorbent tubes. How did this differ for the CIMS?

Line 245: Did the authors observe any effect on photosynthesis or VOC emission when keeping a leaf in the chamber for long periods e.g. 8h?

Line 268: Does the use of external fans on the PPS impact the rest of the plant?

Line 310: Is there a temperature dependence in the trace gas background?

Line 365: “timely” is a vague term, could you estimate a time?

Line 403: What were the background decanal concentrations? Was this ambient air or was a VOC scrubber used as recommended in section 4?

C2

Line 361: The authors describe the observations made in section 5 as a case study rather than emissions ratios to be used in models. While this is true I think that if a more detailed description of the plants used was provided (e.g. growth conditions, developmental stage etc.) readers would be able to make more use of the data presented. Perhaps this could be added to the supplementary information.

Technical corrections

Figure 3: caption refers to “squares, left panel” but the figure shows pentagons

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