

***Interactive comment on* “Chemical sensing of plant stress at the ecosystem scale” by T. Karl et al.**

T. Holst (Referee)

thomas.holst@nateko.lu.se

Received and published: 25 July 2008

The paper presents fluxes of MeSa and MT obtained during a measurement campaign in a walnut orchard. It is well written and provides valuable information for the readers of Biogeosciences because the authors imply that MeSA could be a significant part of the VOC emission and therefore contribute to the 'missing VOC budget'. Furthermore, the authors found increased fluxes of MeSA related to stress conditions (chilling, water shortage) for the vegetation, providing a warning signal before the vegetation actually gets damaged.

Although the paper is well written and provides sufficient information on the methods used, however, I would recommend some minor improvements.

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Chapter 2 (Methods): I would prefer to start with the field site description (2.4) as 2.1 to 2.3 refer to measurement heights or vegetation species that should already be given in the site description. Could you add some information about the detection limit of the GC-MS?

Some basic information (tree height, set-up for 'environmental data' used for analysis) about the measurement site is missing. A web link is given, but contains only limited information (e.g. mostly information about the number and heights of turbulence measurements). For example, no information about the canopy height is given in the paper, which would be necessary to interpret the measurement heights of the profiles (i.e. Fig 2 a,b). It was not clear to me, if the height scale in Fig. 2 c,d was the same as in Fig. 2 a,b or not (repeat the height scale on the right). Furthermore, the colour scale in Fig. 2a might show temporal behaviour of the concentration, but hardly resolves vertical differences.

You give a very short introduction to other systems run at the site (2.4), and data from this instrumentation is used during analysis (i.e. radiation (profiles), air, leaf & soil temperature, wind vector profiles, ...), but it is not clear to me what is based on measurements and what is modelled or estimated. This is crucial as you use this data to calculate the MeSA and MT fluxes and needs to be clarified.

Chapter 2.5 (flux calculation): As the site was equipped with several EC-systems for measuring the H₂O & CO₂ fluxes directly, profiles for CO₂ and H₂O concentration might be available as well. Therefore, it could be useful to test the scheme for calculating the VOC fluxes by calculating fluxes for H₂O and CO₂ as well and compare to measured values to validate the transport model.

Chapter 3 (results): In the results section, I have several comments based on Fig 3. First, it refers to soil temperature instead of VPD. Furthermore, I rather would refer to a volumetric water content (VWC) instead of RH_{soil} (if I assume it is TDR-data) as it is commonly used. In this context, you are talking about 'drought stress'

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with 'drought' usually understood as a long period of water shortage. If possible, you should add some information to compare the status of the water supply with (i.e. wilting point). Please, provide an information about the corresponding height of the mixing ratio shown in Fig. 3b. Would it be useful to add radiation data, i.e. PAR, to the panel?

R^2 given in the text (p.2390, l.3) does not correspond to R^2 given in Fig.4c. In l. 17 (p.2390) it should read 'deltaT' and '(17)' should be replaced by a reference (p.2391, l.20).

Interactive comment on Biogeosciences Discuss., 5, 2381, 2008.

BGD

5, S1213–S1215, 2008

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