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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Direct ecosystem fluxes of volatile organic compounds from oil palms in South-East Asia" *by* P. K. Misztal et al.

Anonymous Referee #2

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General comments:

The manuscript 'Direct ecosystem fluxes of volatile organic compounds from oil palms in South-East Asia' presents novel results important for the understanding of the changes in air composition due to oil palm monoculture plantations in the tropical regions. The methods are written extremely well and the use of the Supplements to give technical data processing details is exemplary, setting the standard to transparency in the data post processing. Too often the data processing is only vaguely mentioned, even though everyone who has done it knows that it is a crucial step in the analysis that affects the results. The authors present in detail the results of the dataset of fluxes and volume mixing ratios of over 10 compounds – a task that is difficult to do in a straight forward and readable way. Nevertheless, the detailed description of the results on each

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mass will be very useful for the field of atmospheric chemistry and I recommend that this manuscript is published in ACP after minor revisions.

Specific comments

The comments refer to the ACPD numbering. Page 12673: The authors state in the introduction that the flux results are presented in much more detail than it the previous papers published of the campaign data. However, the 2 most overlapping manuscripts have not yet been published. Please mention what the results that are presented here for the first time?

As mentioned before, the methodology is presented in excellent detail, this level of transparency should become a land mark for others to achieve.

3 Results: This part has been rearranged by the authors on the way and has been left as somewhat fragmented and confusing. Please find the energy to revise it so that is it as easy to follow as the first part of the manuscript, below detailed requests.

Titling and grouping of the results is confusing. Section under 3.2 is called 'Fluxes of dominant VOCs' but it is the flux and volume mixing ratio results of each mass, including 3.2.5 on m/z 75 that was not included in the 25 min flux measurement sequence, but VMRs from 5 min scan once an hour. I suggest grouping 3.2.2-3.2.12 under the title 'Characterization of abundant VOCs', that perhaps should have be numbered 3.3?

I suggest moving combining 3.2.3 'Methyl vinyl ketone (MVK) and methacrolein (MARC) (m/z+ 71)' with 3.4.2 'MVK + MARC deposition'. Please, also move rest of the paragraph from line 25 page 12696 to methods.

Page 12682, line 15: did the isoprene account for nearly half of the selected or all (selected + scanned) VOCs daytime and one third over the entire period? Please clarify to text.

Page 12688, line paragraph Methanol: The authors state that methanol (m/z 33) is deposited, especially during midday. This may not be the case; instead the deposition

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at m/z 33 is likely due to a measurement artefact. Methanol and isotope of oxygen give a signal at the same mass 33 Th and their fluxes cannot be distinguished from each other with a quadruple PTR-MS. Read and reference Müller et al, 2010 for a PTR-ToF-MS flux analysis on m/z 33. The amount of oxygen, as well as its' the O18O+ isotope and O2H+, is in turn related to the ion distribution and amount of water vapour in the system. A high water flux can result, in addition to the WPL correctable flux artefact, in an oxygen artefact as well as an artefact flux for any VOC whose signal is humidity dependant. Please read and site Ruuskanen et al., 2011. Elevation in water content leads to lowering of O2+ in the ion source and the reaction chamber and heavy midday transpiration (upward water flux) could lead to an observation of deposition on m/z 33.

The authors discuss the PTR-MS results based on GC-MS analysis. However, it is not clear if some comparison measurements with GC-MS samples were done during the campaign, or if the comparison is based on literature. An example: Page 12690, lines 6-9. Please clarify.

3.2.9 Acetone: The authors appear to get confused in comparing concentrations and fluxes of acetone. The footprint of the concentration can be much larger than the flux footprint so it would only be natural that if the oil palm is not the only source of acetone to the air the local concentration does not follow the local emissions.

Page 12691, lines 19-22: The sentence is confusing; please state what is at odds?

3.2.11 Hexanals: The chapter starts with an intro to why hexanals are emitted and continues with only VMR discussion. Please add discussion on your results.

Page 12694, line 13: Please clarify the first two sentences. What is meant by change of default values even with changes in sign?

Page 12696, line 3: Could the better model fit to oil palm than tropical forest emission also be due to better fit of monoculture of oil palm vs large variety of plant species with different emission potentials of tropical forest?

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I recommend combining the Results and Discussion sections.

Section 4.1: Repetition of already discussed results. The differences of oil palm and rainforest are discussed already and will be examined in detail in MacKenzie et al., The atmospheric chemistry of trace gases and particulate matter emitted by different land uses in borneo. invited submission, June 2011.

Section 4.2: Move to methods, e.g. under 2.2 or to its own section.

Technical corrections:

Table 2: Consider changing Methanol to Methanol and O2. Change “Acetal-dehyde” to “Acetaldehyde”

Table 3: change latter “**” to “***” in the footnote.

Figure 5: Why are the average diurnal values sometimes outside the standard deviation? E.g. MVK+MARC positive average flux at in the late afternoon and negative std. Please check the figure.

Reference:

Ruuskanen, T.M., M. Müller, R. Schnitzhofer, T. Karl, M. Graus, I. Bamberger, L. Hörtnagl, F. Brilli, G. Wohlfahrt, and A. Hansel: Eddy covariance VOC emission and deposition fluxes above grassland using PTR-TOF. Atmos. Chem. Phys., 11, 611–625, 2011.

Müller, M., Graus, M., Ruuskanen, T. M., Schnitzhofer, R., Bamberger, I., Kaser, L., Titzmann, T., Hörtnagl, L., Wohlfahrt, G., Karl, T., and Hansel, A.: First eddy covariance flux measurements by PTR-TOF, Atmos. Meas. Tech., 3, 387–395, doi:10.5194/amt-3-387-2010, 2010.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 12671, 2011.