**Biogeosciences
Discussions**

Interactive
Comment

Interactive comment on "Measurements of hydrocarbon emissions from a boreal fen using the REA technique" *by* S. Haapanala et al.

S. Haapanala et al.

The authors wish to thank the anonymous referee for valuable comments and suggestions to improve the manuscript. We have answered each of the specific comments below. Whenever the referee is cited, the text has been written inside quotation marks.

"I found that the beginning of the introduction is a bit muddle. There are a lot of ideas which are not related one another. Either the authors developed entirely their idea before addressing the other one, or the authors use more linking adverbs."

"p.1647-1648 : instead of only quoting other authors who performed the same kind of measurements, it would also be interesting to details the conditions and orders of magnitude they found for their measurements."

"p. 1648 : the presentation of the paper objectives is too fast : the authors should also describe the period of the year, the duration of the measurements."

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We have tried to improve our introduction according to these suggestions.

"p.1648 : what is the height of the measurements?"

The measurement height was 3 m. This can be found in the page 1650, line 11.

"p. 1649, line 7 : " Gaman et al. 2001 ". The year for the reference is different than that of p.1655."

Reference should be "Gaman et al. 2004". This will be corrected in the manuscript.

"p.1649, line 16 : is the correction you mention included with the acquisition software or do you correct after having recorded the data? What does it consist in (there are many 3-D head correction)? "

Head correction is performed by the anemometer itself, online. It corrects for small deformation of the flow field caused by the anemometer structure. Further details of the correction algorithm may be asked from the manufacturer, Metek GmbH.

"Then a running mean filter is applied to the wind component. What is the effect of this filter to the system? Does it induce a delay for the selection system? "

Running means are used only to determine valve switching thresholds. Statistics calculation does not induce any delay. Instantaneous wind velocity readings are used for the valve switching.

"What is the rate of rejected air during the selection period with a threshold of 0.5sw?"

The amount of air drawn through valves divides into three almost equal portions when a sampling threshold (deadband) of 0.5sw is used.

"How long does it take to drain out the bags into the canister. I don't understand why it is necessary to fill in the tedlar bags before the canisters?"

It takes about one minute to drain out one bag into the canister. Tedlar bags are used because that way it is easy to maintain a constant sampling rate throughout the whole

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sampling period (30 minutes). This will be clarified in the manuscript.

"When does start the next cycle of selection? Is it an automatic system? I would like to see a schematic of the functioning for the whole system. The authors should detail a little more their system so that it gains more confidence and reliability."

This is not an automated system. User must start and stop each sampling period manually as well as drain the sample air from the bags into canisters after one period. We usually started a new sampling period at the full hours.

"p. 1650, line 17: "... within one week of ..." : is it a constraint that measurements are analyzed quickly? Do the C2-C6 substances evolve rapidly? What are the constraints for these species?"

These compounds degrade in time. However, previous work has shown that they preserve in the stainless steel canisters well for longer than one week (e.g. Zielinska et al., 1996 and references therein). This will be added to the manuscript.

"p.1651, 1st §, What is the accuracy of the instruments used? "

We made four methane analyses from each sample. Average standard deviation was about 0.005 ppm and average concentration was about 1.95 ppm. This leads to relative standard deviation of 0.25% which can be used as a precision estimate. Accuracy was guaranteed by calibrating the chromatograph before analyzing a set of samples using standard gas with methane concentration of about 1.84 ppm. This will be added to the manuscript.

"p.1651, last § : It's not clear to me how many measurements were performed per day. And why didn't you measure fluxes for longer periods."

Number of measurements varied from 3 to 13 per day. A fundamental reason for the small amount of measurements is that high quality chemical analysis of VOC samples is very time-consuming (about 3 hours of chemical analysis per each half-hour sample) and therefore very expensive. Unfortunately we didn't have resources for more

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intensive measurements.

"p. 1651 : why the measurements which were carried out on the 14th of April are not included in the data analysis? It does not worth to present them in this case."

These measurements were conducted before the growing season and they indicate negligible emissions. They are mentioned to show that the plants really don't produce these substances early in the spring, before beginning of the actual growing season. This will be clarified in the manuscript.

"p.1651, line 19 : " ... Utö and Pallas" : Where are these places? You didn't mention them before. What is a parallel analysis in another place, to my opinion, it doesn't mean anything? Is it the same period? Is it the same dataset? This seems to be rather confused and do not tend to give confidence in the results and uncertainties."

This large dataset of parallel analyses is used only for the estimation of the precision of chemical analysis of C2-C6 compounds. This will be clarified in the manuscript.

"p. 1651, what is the interest to have the flux detection limit if we don't know the instrument sensitivity to the concentration measurements?"

Concentration detection limits will be added to Table 1, in addition to flux detection limits. However, flux detection limits are derived from the concentration uncertainties.

"p.1651, line 26: on fig. 3, you only show time series for one day. Why don't you want to show the whole period? You don't have long series of measurements so it would be more interesting to see the whole period. In addition, after that, you give the mean methane emission for the whole period so we would like to see how look the fluxes for this period."

We will add the data of the whole period to the manuscript.

"p. 1652, line 2 : I wouldn't compare these results with unpublished data without giving more details on how they were collected. This would appear more convincing to

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validate your measurements."

More details on the measurements as well as reference to some preliminary data will be given in the manuscript.

"p.1652, line 9 : " these fluxes are in the same ..." : again, in addition to quoting Janson and De serves (1998) and Janson et al. (1999), you could give the values they obtained for their measurements."

Values will be added to the manuscript.

"p.1653 , line 9 : Can you give the correlation coefficient you obtained between the linear fit and the data."

Correlation coefficient between the measurement data and CLxCT is 0.85. R2 -value of the linear fit is 0.70. These will be added to the manuscript.

"p. 1654, last section : This section is really too short. You don't present the meteorological data, you don't present the model (is it that of Guenther, 1997 or something derived from it) and give details on how it works and you propose a conclusion without developing the subject. Nothing is validated and we should take it for granted."

Growing season emission was calculated using Guenther algorithm, equations 2 to 4. This will be clarified and the meteorological data will be shown.

"p. 1654 : "Significant fluxes of methane and isoprene ..." Again, I would have liked to see them for the whole period. It would have been more reliable to better validate your data and say something about it in the conclusion. The conclusion is as short as the paper and don't highlight the measurements importance."

The data of the whole period will be shown and conclusions will be improved.

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Interactive comment on Biogeosciences Discussions, 2, 1645, 2005.

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