

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

**S. Haapanala et al.**

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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.

“p. 1650, line 9: Tedlar-bags were used for sampling "thus avoiding potentially contaminating pumps" in the sampling system. However, potentially contaminating pumps were then used to transfer the air sample from the bags to stainless steel canisters. Your reasoning is not entirely consistent here. If there was no other reason for using Tedlar-bags, then it seems to me it would have been better to use the canisters directly, thus eliminating a potentially contaminating extra step in the sampling process.”

Tedlar bags are used as the primary sampling reservoirs because that way it is possible and rather easy to maintain constant sampling flow throughout the measurement period. Pressure inside the bags is almost equal to the ambient pressure all the time.

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If we sampled directly into solid bottles, the pressure in the bottles would increase thus requiring more and more pumping pressure. This will be clarified in the manuscript.

“p. 1651, line 5-6: You report that data for soil temperatures and water table height were recorded continuously. Yet you do not attempt to use the data. Was there any correlation between methane or isoprene emission and soil temperatures, or to water table height? Was the water table height steady over the season?”

Water table depth varied about 20 cm during the measurements, depending on the weather conditions. Methane emission was not clearly dependent on the water table depth or soil temperatures. Isoprene emission is mostly dependent on the actual temperature and light conditions on the plants. Water table depth has only long term influence to the vegetation and hence isoprene flux.

“What percent of the fen consisted of elevated hummocks and how much of the area could be classified as flarks? What bearing do you think this had on your results? How representative is this particular fen for boreal wetlands?”

Siikaneva fen has rather even surface topography and there are no clear hummocks and hollows (flarks) present. Better description of the measurement are will be added to the manuscript.

“p. 1651, line 13-14: Measurements performed on 14 April 2005 "are not included in the data analysis". If the measurements are not included, then why are they mentioned? Was there no information to be gained from those measurements?”

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 18-21: Uncertainties were obtained by parallel analysis "at Utö and Pallas". And: "In Table 1...precision of the chemical analysis...are shown". How do

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these two sentences relate? The uncertainty obtained from parallel samples reflects the precision of the combined sampling and analytical steps, not the precision of the chemical analysis. Where do the standard deviations given in Table 1 come from? From the parallel samples taken at Utö and Pallas? That would mean that the SD values do not relate to the concentration values given in Table 1. It's not clear. Further, you do not give any information on the number of parallel samples. Nor do you give the average concentrations of the parallel samples. Is the sampling and analytical uncertainty best described as absolute numbers, or is it concentration dependent and best described as a percentage deviation?"

It is true that uncertainty obtained from parallel samples depends on the whole sampling and analyze chain. However, we believe that sampling steps and chemical analysis are so similar in both REA measurements and background concentration measurements that same statistical values can be used. The SD number given is based on the dataset obtained from 223 pairs of canister samples taken at background stations Utö (an island south of Finland) and Pallas (remote site in the Northern Finland) in 2004. Concentrations at these stations are quite similar than those in Siikaneva. Absolute numbers best describe the analytical uncertainty.

"p. 1651, line 24-25: Here you mention the April measurements again, but only to exclude them. Don't they suggest that the flux of isoprene is zero prior to the growing season?"

That's right and this will be written clearly in the manuscript.

"p. 1652, line 7: You state: "This might be due to the small data set and rather inaccurate methane flux detection". Why is the data set for methane too small, which I assume means smaller than the data set for isoprene? And, why is the methane flux detection inaccurate? Is your methane data often below the detection limit? Then, you should report it here. Is the sampling and analytical precision too poor?"

We had some problems with the gas chromatograph used for the methane analyses.

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That's why the dataset of methane fluxes is somewhat smaller than for the other compounds. In addition, relative precision for the methane analyses with our instrument is not very good. This will be clarified in the manuscript.

“p. 1653, line 11-12: You state: "This agrees well with the results of...". Your comparison looks to be incorrect. When comparing your results with earlier results reported in the literature, you are comparing REA results for the total fen area with results for chamber experiments on flark environments, not for the entire fen area. You need to consider the proportions of flark and hummock environments on Siikaneva fen before making a comparison.”

We indeed compare our results with those reported by Janson and De Serves at the flark environment. We consider conditions at Siikaneva to be close to flark rather than hummocks. This will be clarified in the manuscript.

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

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