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

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General comments: This paper describes Relaxed Eddy Accumulation flux measurements of significant methane and isoprene emissions from a boreal fen. There are few isoprene measurements from this ecosystem and some of the basic processes controlling canopy scale variations in isoprene emissions are still not well known. In addition, the authors report negligible fluxes of other hydrocarbon and halogenated compounds. There are few (or none) data on canopy scale fluxes of many of these compounds and this paper would be the first attempt to describe these fluxes. These are interesting and original data and the paper is on a topic that should be of interest to readers of Biogeosciences. However, the paper could be improved with some additional analyses.

Specific comments: The isoprene emission factor estimates could be a valuable contribution to the existing literature- but will be difficult to incorporate into regional/global

models if the source is not well characterized. The paper would be considerably improved by the addition of 1) enclosure measurements on the dominant vegetation (e.g. sphagnum mosses and sedges) and 2) an estimate of the relative abundance of the dominant vegetation in the flux footprint. Without this information, it will be difficult to extrapolate the estimated emission factors to areas other than the measurement site.

The authors provide some discussion of the processes that control variations in isoprene emissions but they could improve the impact of this paper by going a little further with their analyses. For example, they could examine whether the temperature and light of the past days(s) explains any of the observed deviations from the instantaneous CTxCL (as has been suggested by various investigators). In addition, they suggest that solar angle might explain some of the differences but then do not provide any evidence of whether or not this is the case. A scatter-plot of the emission deviation versus solar angle would be useful to see if there is a pattern. Finally, the authors compare the above canopy fluxes with the Guenther et al. 1993 leaf-scale light response algorithms. They should instead use a canopy model to simulate these variations (and also to get the "correction factor" for estimating the normalized emission factor).

There are very few (or none) observations of fluxes of some of the C2-C6 hydrocarbons and halogenated compounds examined during this study. The observations reported in this paper will be important if they can constrain fluxes of these compounds. However, this requires a robust estimate of the lower detection limit of the flux system. The lower detection limits given in table 1 seems optimistic. The only error considered is from the concentration measurements. This may be the most significant error component for compounds with a substantial flux (e.g. for isoprene) but what about other potential sources of error? For example, there are errors associated with assumptions required for the REA approach. There are also mechanical limitations (e.g., what if the valves do not switch exactly when they are suppose to), interferences, contaminated lines or losses, etc. While I recognize that it is difficult to quantify some of these errors, they should at least be discussed in the paper.

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