

## ***Interactive comment on “Carbon dioxide and methane exchange of a patterned subarctic fen during two contrasting growing seasons” by Lauri Heiskanen et al.***

**Anonymous Referee #1**

Received and published: 27 November 2020

In brief, I found paper written very well, with a nice literature review, useful figures, tables, schemes and easy-to-understand English. Methods are state of the art. Basic tools of studying greenhouse gas exchange between atmosphere and ecosystems such as Eddy Covariance and chamber method were used in a proper way.

Finland wetlands are investigated on an incredible (best all over the world) level in terms of greenhouse gas fluxes with a lot of possibilities to compare results and to provide extrapolations. In this situation it is really hard to say something new about fluxes from these subarctic mires. In general, two years are not enough for reliable estimates of weather/climate induced effects on carbon fluxes. But I think authors did everything

C1

they can to generate new insights about carbon balance and its environmental controls. Therefore the paper definitely deserves publication.

I have several minor comments and suggestions to make paper text a bit more clear.

L. 104. Did you miss minus sign here (if you use micrometeorological sign convention)?

L. 122. Please add information, in what year(s) collars were installed on your sites. Did you notice any changes of plant communities inside “the oldest” collars? Sometimes vegetation inside the collars starts to degrade after several years after installation.

L. 126. Did you notice the diurnal dynamic of methane emission? Can it affect any results of methane flux linear modelling?

L. 300. Please add information how much data (in % of growing season length) was gap-filled in EC fluxes of carbon dioxide and methane.

L. 620. I think that you should mention that your C-balance estimate did not include dissolved and particulate carbon loss due to water flow. May be it is not that important for overall C-balance, but it is better to remind the reader about that. Probably you know papers, where information about dissolved organic carbon transport in Kaamanen fen is presented.

L. 620. Let me also ask, do you compare the methane budget for the whole Kaamanen fen based on chamber and EC data separately (using land cover map and footprint estimate)? Are they the same or there is a difference? It is important sometimes to check yourself about proper use of available methods. Potential gap between these estimates could show that we miss something important (for example ebullition in chamber flux data). It is just a recommendation of course, I understand that you have already presented enough good data.