

Interactive comment on “Summer fluxes of methane and carbon dioxide from a pond and floating mat in a continental Canadian peatland” by M. Burger et al.

Anonymous Referee #1

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This manuscript makes an important contribution to the literature on carbon dioxide and methane fluxes from small ponds, which play a significant role carbon-rich and spatially complex peatlands. Throughout the text, the authors do a good job of situating their study within the wider literature on this topic. The chamber methods are robust and well described. However, I am confused about the presentation of the results from the CO₂ gradient method. The authors describe that “the gradient method provided similar CO₂ fluxes in July and September . . .” but later that, “in July, however, the daytime CO₂ fluxes obtained by the gradient method were 14-fold higher than the respective CO₂ fluxes measured with the floating chambers”. It is unclear to me whether the authors were comparing the gradient CO₂ fluxes in both July and September (and

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if so, why should they be similar?) or whether they are comparing to the chamber measurements. In my opinion, the authors might add another sentence or two in the methods text to justify why they used the gradient technique, and why fluxes calculated by this method can differ from surface chamber measurements. The authors do detail these mechanisms later on in the discussion, but they might be better motivated if presented earlier in the text.

There are many figures associated with this manuscript, and it sometimes becomes difficult to digest all of the information presented within them. I believe that Figure 9 might be eliminated and that the information within it can be added to the other information in Tables 1 and 2 that detail relationships between environmental drivers and CO₂ and CH₄ flux. Furthermore, Figure 2 might be added to the Supplementary Material, since it is not thoroughly discussed within the results or discussion. In Figure 6, it's unclear which four locations are depicted within each panel, and this information is not in the Methods section of the main text. It's also unclear where the sediment/water interface is located in Figure 6, and how deep the water is at each location. This information would be valuable for interpreting the discussion surrounding Figure 6 at the end of page 12. Also, I assume that these data from the peepers and not the Vaisala probes, but it would be good to indicate this within the figure caption.

Minor points: Table S1: Reference error in the caption

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