

This paper by Skeeter et al. looked at vegetation and environmental conditions influencing greenhouse gas exchange in a drained lake basin in the Western Canadian Arctic. I enjoyed the opportunity to review this paper and I thank the authors for what is a well written paper overall (but with some tweaks needed). Given the lack of studies outside of the Barrow Peninsula, is a worthy addition to the literature.

I will add however, I apologise, I am not an expert on the eddy covariance data cleaning, gap-filling and analyses and I am therefore unable to comment fully on those sections.

Introduction: I find this section well written if rather short. I think a little more context could be given for the reader. You could include more information from non-DLB work but still relevant arctic tundra literature.

Line 54: NEE should be ER – GPP.

Line 85: Can you include somewhere the dominant species found in each vegetation class. It would be interesting and useful to know what sort of sedge dominated the sedge class – is it *Carex aquatilis* or *Eriophorum angustifolium* for example?

Line 100: Completely an aside but COOL!

Section 2.3: I would remove any mention of N<sub>2</sub>O – you don't present the data, so it is unnecessary.

Line 150: Can you be more explicit with how many collars were used? 2 per site – 10 sites total? I know the main focus of this paper is not the collars, but I'm not sure if a replicate of 2 per vegetation type over an 11-day period is very representative.

Line 152: How soon after installation were the collars fluxed for the first time?

Line 154: Why not use a clear chamber so you could get GPP then cover with a dark sleeve in order to get ER?

Section 2.4 (and subsequently Appendix A): Unfortunately, I do not have the expertise in these methods so I do not feel comfortable commenting on it in a reviewer context.

Section 3: I think it would be better to separate this section out into Results and Discussion rather than combine them. As it stands, it's quite hard to follow.

Line 241: You only mentioned thaw depth twice? Why not measure it on each day chambers were used?

Section 3.1: I think this section needs an overhaul unfortunately. Many of the sentences do not make sense in their current format. For example: Lines 254-257: '*NEE was greater than (ie. less*

*carbon uptake) 255 EC observations of from four wetter, sedge dominated DTLB, where peak season NEE was -2.5 g C-CO<sub>2</sub> m<sup>-2</sup> d<sup>-1</sup>, ER (1.5 g C-CO<sub>2</sub> m<sup>-2</sup> d<sup>-1</sup>) was lower than at Illisarvik while GPP (4.0 g C-CO<sub>2</sub> m<sup>-2</sup> d<sup>-1</sup>) was slightly higher (Zona et al., 2010).'*

I also think it might be useful to separate the EC results and the chamber results into subsections. By referring your measured values to other studies in the results, it makes it hard to follow for the reader.

Further, by combining the results, there is a lack of discussing the results (for example, it feels like only section 3.4 is really doing this). It sadly reads as a lot of results statements and then suddenly we are at the conclusion.

Line 273: Why compare methane to ER here?

Line 286: Although discrepancies do occur between upscaling chamber measurements and EC measurements – some studies have done it successfully and I think it would be good to include here as a caveat;

- Budischev et al. 2014: Evaluation of a plot-scale methane emission model using eddy covariance observations and footprint modelling. *Biogeosciences* 11. 4651-4664
- Zhang et al. 2012: Upscaling methane fluxes from closed chambers to eddy covariance based on a permafrost integrated model. *Global Change Biology*, 18, 1428-1440.
- Davidson et al. 2017. Upscaling CH<sub>4</sub> fluxes using high-resolution imagery in Arctic Tundra Ecosystems. *Remote Sensing*, 9, 1227; doi:10.3390/rs9121227
- Sachs et al. 2010 Environmental controls on CH<sub>4</sub> emissions from polygonal tundra on the microsite scale in the Lena river delta, Siberia. *Global Change Biology*, 16, 3096-3110

I think more discussion of the results in the context of other GHG literature from other tundra ecosites would be useful. Although this study is focused on drained lake basins, the results are comparable to wet-sedge dominated tundra landscapes. I feel this would be a good addition and strengthen what is already a useful paper.

Figure 2a: Could you change the colour of the T<sub>a</sub> line? Red on orange is difficult to read.

Figure 3: I will leave this up to the author's discretion, but I wonder if this figure (and in fact, all figures) would benefit from having a plain white background. I find all the lines distracting. Especially when other lines are being used to annotate.

Figure 4c: Please use another three colours for Shrub. It is confusing that they are the same colour as VPD on the left-hand panel.

Figure 4 and 5: I think these figures would benefit from having a title for each panel – it was not clear to me initially the difference between Figure 5a and b. I think just putting VWC above left hand panel and  $T_s$  above right hand panel, this would make it much clearer.

Tables: Caption should go above the Tables.

I think a table including the dominant vegetation species for each class would be super useful for the reader.