

Interactive comment on “Impacts of a decadal drainage disturbance on surface–atmosphere fluxes of carbon dioxide in a permafrost ecosystem” by F. Kittler et al.

Anonymous Referee #1

Received and published: 25 May 2016

This manuscript examined effects of drainage on ecosystem CO₂ exchange in tussock tundra ecosystem in Siberia. The research, which was conducted in an understudied and remote region of Siberia, has high relevance for understanding feedbacks from permafrost ecosystems to climate. The quality of the study and the analysis/presentation of results were strong, and the manuscript was well written. I have no major concerns about this publication, but I have suggested a number of minor edits and clarifications:

Line 16: clarify if you mean ‘net CO₂ uptake’ or GPP

Line 22: it wasn’t clear until I read the paper, what you meant by ‘intensified’ – may want to clarify

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Line 30: I suggest updating to Hugelius (2014) and updated permafrost C numbers

Line 55: I don't think you mean methanotrophic here, which can occur under aerobic and anaerobic conditions. Change to methanogenic, if that's what you meant.

Line 60: There are quite a few long-term studies from Toolik e.g., Mack et al (2004), Sistla et al (2013)

Line 116: I'm confused by 'during the first nine months' since the measurements only occur during the growing season.

Line 128: change 'data are collected' to data 'were'. Throughout methods, change to past tense.

Methods: Are missing a lot of information about gapfilling and partitioning the fluxes. But then I see this information is in the Discussion, which is a distraction from the discussion section and gap in the Methods. Most of that text in Section 4.3 should be moved to the Methods, the remaining could go in the Supplement.

Line 160: Change 'presented' to 'present'

Line 180: not sure what is meant by 'missing release'

Methods: Add in information about statistical design and analysis.

Line 207: I suggest to change 'evolving' to 'greening' or 'changing'

Line 215: change 'higher cumulative' to 'higher net cumulative'

Line 255-266: Given that there was only one historical year of data from the disturbed site, and given the level of inter-annual variability, I don't think the data support such a strong statement. I would change 'demonstrates' to 'suggests' and 'strongly rebounded' to 'may have rebounded'

Figures 7–9: Would be easier to see trends if you changed the line style for either the decadal or recent data so that one set is solid line and the other is dashed.

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Line 190: ANOVA not mentioned in methods; as noted above, need to add in a statistical analysis section to the methods.

Lines 306-307: How was the effect of soil temperature, moisture, etc. analyzed?

Line 317: manuscript doesn't present organic matter decomposition results. Change to 'decomposition of soil organic matter' to 'ecosystem respiration'

Lines 323-33: The APEX peatland drainage experiment (Alaska) has been running since ~2005. Some of these pubs aren't long-term but they are water drainage studies in the permafrost regions, and their results may inform your discussion: Turetsky (2008, APEX), McConnell et al (2013, APEX), Natali et al. (2015, not APEX).

Lie 343: Change 'annual' to 'growing season'

Lines 378-379: Any long-term changes in snow depth? Or winter soil temps?

Line 485: What do you mean exactly by adaptations?

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