

Interactive comment on “Partitioning CO₂ net ecosystem exchange fluxes on the microsite scale in the Lena River Delta, Siberia” by Tim Eckhardt et al.

Anonymous Referee #3

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The manuscript by Eckhardt et al., reports one growing season of CO₂ flux data, not only NEE but its components GPP, RA, and RH, and their controlling factors in Lena Delta, Russia. It is extremely difficult to measure flux in such a remote area like Siberia and the result of this study will be highly valuable to flux community. Especially, measurement of in situ RA and RH is very rare especially in the Arctic region and this will be of great interest to readers of Biogeosciences. The manuscript is generally in good shape but several aspects should be addressed for the publication.

Comments: - Paragraph starting #78, warming effects on flux components are described in this paragraph but warming is not one of the main topics of this manuscript,

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e.g. warming manipulation experiment. Thus, it does not seem appropriate for introduction but rather for discussion that the results of this study imply xyz in the warming scenario. - Line #82-4, if GEP is less sensitive to temperature than Reco, carbon sink capacity will not be affected much by temperature instead of being reduced. Or carbon storage will be reduced because of a larger amount of C emission than C uptake. Please rephrase it. - Paragraph starting #186, continuous regrowth of plants implies living roots and remaining RA in the measured RH. In addition, if some roots are dying after aboveground plant biomass is removed, can they add nutrients to soils and overestimate RH? It is written that there was no significant increase in RH, but continuous and slow decay of remaining roots may affect RH. Also, was there any difference in the plant regrowth rate between the center and the rim? If so, will they affect the results? - Paragraphs starting #227, when modeling fluxes (Reco, RH, and GPP), some constants (Q_{10} , α) were adopted from EC data. One of the purposes of this research is to capture flux signals in microsite scale which EC cannot capture, and using constants from EC data that contain a mixture of polygon centers and rims may decrease model fit. Have you tried estimating Q_{10} and α with chamber flux data? It seems plausible to estimate those values considering the number of data points. - Line #308-44, what are the average values of NEE, Reco, GPP, and RH at the two microsites and how much are those differences? These will be more important than the highest and the lowest values, which took about half of this section space. - Line #325, RH seems correlated with Reco, but no seasonal trend in RH was observed? At least RH in the center seems to have seasonality in Figure 5. - Results of environmental controls on each flux component is not described. Please add which environmental factors did or did not affect flux components, which is one of the main objectives of this study. - Paragraph starting #431, when discussing magnitude of fluxes and their explanatory factors, be more specific if the difference is between Arctic ecosystems and other ecosystems in the lower latitudes, or between this study site and other sites in the Arctic. - Line #454, $NEE \rightarrow Reco$? The following sentences are describing Reco and RH. In the separate paragraph, the combined effects of GPP and Reco/RH can be described for NEE. -

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Environmental controls on RA is not discussed.

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