

Interactive comment on “Scaling and balancing carbon dioxide fluxes in a heterogeneous tundra ecosystem of the Lena River Delta” by Norman Rößger et al.

Anonymous Referee #2

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The paper "Scaling and balancing carbon dioxide fluxes in a heterogeneous tundra ecosystem of the Lena River Delta" introduces new experimental results in estimation of carbon fluxes of tundra ecosystems in Lena river delta (Russia). It is known that the large areas of Northern Eurasia near the Arctic cycle are still very poorly investigated in respect of both spatial and temporal variability of GHG exchange and contribution of different plant communities into global atmospheric GHG budget. It makes the results of the study very interesting for scientists working in ecology, biogeochemistry and micrometeorology. The paper is well written. It contains detailed descriptions of experimental site, design of field experiments, developed model algorithms. Discussion chapter includes close examination of obtained results. Before publishing however

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several points of the paper should be clarified.

1. The chapter 2.3 "flux processing" has not information about procedure or method that has been used for gap filling. The percentage of gaps in flux time series is not quantified.
2. The LAI ranges of different vegetation classes should be indicated in chapter describing the surface and vegetation structure. Information about surface topography should be also presented.
3. Figure 2 illustrates the vegetation map of the flood plain on Samoylov Island and shows the tower location. The tower is situated close to the boundary between bushes and sedges. They have different height and, probably, different density. It can be expected that the air flow disturbances at the boundary between these vegetation types can influence the wind and turbulence patterns at tower location and as a result the measured fluxes taking into account the height of eddy covariance equipment installation (2.8 m).
4. The photos of Samoylov Island, that can be found in Internet, show a very nice landscape and, at the same time, a non-uniform surface topography of the study area. Did you estimate the possible effects of non-uniform surface topography on measured fluxes? I guess the possible uncertainties in flux estimation due to complex topography should be discussed in the paper.

Specific comments. Page 8 line 3 " The mean air temperatures during the measurement periods in 2014 and 2015 ..." I guess the periods of flux measurements have to be indicated in the paragraph... e.g. from June to October 2014 and from June to September 2015.

Page 11 Line 8-10 "While the entire temperature sensitivity of NEE is manifested through changes in TER, the effect of temperature on the biochemical reactions in GPP is neglected (Haraguchi and Yamada, 2011)." I'm not sure that it is a very good

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assumption for accurate NEE parameterization. It is well known that GPP is strictly depended on temperature and the influence of air temperature changes on GPP rate is actually comparable with effect of temperature changes on TER.

Page 11 line 19 ... direct and diffuse solar radiation ...

Page 14 line 1 ... seasonal and interannual carbon flux variability

Page 14 line 20-22 "However, it is possible that mosses did not fully photosynthesize throughout the growing season due to their tendency to lower their photosynthetic capacity under high irradiance ". What is the reason of such effect? May be it is the result of moss overheating and deficiency of internal water content?

Page 14 line 22-23 What is it, "sun angle"? Do you mean sun elevation ?

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