REFEREE COMMENTS:
Referee #1

MAIN COMMENTS TO THE AUTHOR(S)

1) Estimation of the results uncertainties. The authors estimate the sensitivity of the results on windows size (for Re and GEP). It would nice to estimate the range of results for different gap filling strategies (e.g. neural network) and finally express the annual budget of CO2 in the form NEE= -179±??? g CO2-C m-2 year-1 and similarly for CH4 flux (or at least discuss on the base of recent publications which consider such impact).

[Response]

We appreciate the comments of the referee. The major uncertainties in the annual estimates of GEP, R_e, NEE, and CH_4 fluxes arise from gap-filling. Therefore, the random uncertainties for GEP, R_e, NEE, and CH_4 fluxes were calculated using different window sizes for gap-filling. The fixed moving-window method was used. For example, the fitted curve was determined by the data between 60 days into past and 60 days into future when the window size is 120 days. Window sizes of 30, 45, 60, 75, 90, 120, 150, 180, and 365 days were selected for GEP, R_e, and NEE. The same selections of window sizes with three additions (210, 240, and 270 days) were applied for estimating the uncertainties in the CH_4 budget. However, when the window size was too small, a fitted curve could not be obtained for some periods (e.g. not enough variability in controlling variables or occurrence of data gaps due to weather conditions and power limitations). Any gaps caused by using window sizes too small for modelling GEP, R_e, and CH_4 fluxes were filled by values obtained using the smallest window sizes that successfully produced a fitted curve. The smallest window sizes that successfully produced valid fitted curves for GEP, R_e, and the CH_4 budget were 85, 30, and 195 days, respectively.

The average vale and uncertainty of annual GEP, R_e, and NEE using all combinations of window sizes were 413 $\pm$ 16, 234 $\pm$ 10, and 179 $\pm$ 19 g C m^{-2} $year^{-1}$, respectively. The annual values of GEP, R_e, and NEE from the combinations (90 days for GEP and 120 days for R_e) chosen in the manuscript are close to the averages from all combinations. The average value and uncertainty from all different window sizes for annual CH_4 budget is 17 ± 1 g C m^{-2} $year^{-1}$. Therefore, we decided to use a window size of 365 days for CH_4 fluxes to cover the full range of soil temperatures in a single function.

We did not consider additional methods (e.g. neural network approaches) for gap-filling due to limitations in resources. We argue that the method of estimating uncertainties in annual flux measurements by using different gap-filling window sizes should suffice and gives a good idea of the seasonally changing responses to the controls.

2) The gap filling of CH4 is based on regression of the flux against soil temperature. I suggest, to consider to fit parameters of Eq. 3 in the window similar to Re and GEP, not for whole year. The different environmental condition (water table level, vegetation development, temperature of deeper soil levels ect.) can result in different respond of CH4 flux for temperature. The estimation of the parameters in the window would allow to include these influences.

[Response]

As mentioned in the response to comment 1, a time-dependent calculation of the response curve was additionally added, and the results are presented in the revised manuscript.

3) The global warming potential (GWP) is the most common measure to asses a com- bined impact of CH4 and CO2 emission on climate. However, it assumes a pulse emission which is not a case for wetlands, thus the applicability of GWP to asses the role of these ecosystems in the Earth's global radiation budget can be questioned (e.g. Neubauer and Megonigal, 2015; Petrescu et al., 2015). The author could refer to this problem in discussion.

[Response]

Thank you very much for this valuable suggestion. We agree and add the following statement at the end of Sec. 4.5 (L 324):

"Using GWP to classify a study area as a net GHG source or sink is useful; however, the appropriateness of this method in computing the actual radiative forcing has been questioned (e.g. sustained step-change in CO_2 and CH_4 fluxes can not be evaluated) and alternative models were proposed (Frolking et al., 2007; Fuglestvedt et al., 2000; Neubauer and Megonigal, 2015; Petrescu et al., 2015; Smith & Wigley, 2000)."

SPECIFIC COMMENTS TO THE AUTHOR(S)

1) L 40 and in other places in text: "wetlands . . . sequester from -146 to -266 g CO2-C m-2 year-1" - negative sequestration means emission? It is easy to guess in this case, especially for those who are familiar with EC measurements, but in general it is not obvious, so one must be careful about a sings of the fluxes (for example nest in the text sequestration in GEP is positive). Please look through the text to clarify.

[Response]

Thank you very much for the suggestion. First, we removed the minus signs on L 40 as follows:

"Other wetlands around the world sequester from 146 to 266 g CO_2-C m^{-2} $year^{-1}$ (Lafleur et al., 2001; Pihlatie et al., 2010; Shurpali et al., 1995)."

Second, we clarified the sign convention and added the following explanation at the end of Sec. 3.3 (L 150):

"In this study, net fluxes of CO_2 and CH_4 toward the ecosystem surface are negative and net fluxes from the ecosystem surface to the stmosphere are positive. Therefore, negative NEE and F_m represent net CO_2 and CH_4 uptake, respectively."

2) L 265: "In June and July, the fitted curve stayed at 1 µmol m-2 s-1 because Ts,5cm remained above 15oC" – argumentation is not clear for me.

[Response]

Thank you very much for the suggestion. We rephrased the argumentation:

"In June and July, due to general warm condition (>15°C), R_e remained nearly constant at ~1 µmol m^{-2} s^{-1} (the fitted curve stayed in the plateau phase)."

3) L 271: "Two other controls on Re explored were air temperature (Ta) and WTH." Whereas role of WTH is already pointed above (L 268): "Another factor could be the WTH"

[Response]

Thank you very much for the suggestion. We modified the sentence as:

"Two other controls on R_e explored were air temperature (T_a) and WTH. The role of WTH was described above and T_a had have a similar impact on R_e as $T_{s,5cm}$ when ..."

4) L 324-326: Last two sentences in the paragraph seem to be loosely related to the previous.

[Response]

Thank you very much for the suggestion. We decided to delete the last two sentences from L 324 to L 326 for clarity.