We would like to thank the reviewer for the constructive comments. They allowed us to substantially improve the manuscript. We have taken them all into account and made accordingly major revisions to the MS. Please find below the detailed responses on how we have addressed the concerns.

"The authors also state, that their soil temperature sensor malfunctioned for the first year and that the soil temperature had to be modelled for the whole year. This modelled soil temperature was then used to model the ecosystem respiration, which was used to gap fill the eddy covariance data for the carbon balance. In a publication focusing on the carbon balance the major variables needed should only be gap filled over a short period, not a whole year (50% of the duration of this study)."
"As a possible solution for their soil temperature modelling problem, I suggest that the authors try to use the air temperature to calculate the ecosystem respiration for both years as many other studies do."

> We agree with the reviewer that this was not an optimal solution even though we modelled the soil temperature using air temperature and showed that the model performance was good. Therefore, instead of using the soil temperature model, we changed the temperature used in gap-filling model from soil temperature to air temperature as the reviewer suggested. This had only a minor effect on the results.

"the authors use a fixed value for the sensitivity of the ecosystem respiration and state that it describes the temperature response of the soil respiration. In a highly dynamic grassland, the changes in the respiration of the above ground biomass should not be missed. Thus, sensitivity parameter should be based nighttime NEE data using a moving time window to account for these changes."

> This is a very valid point. We have adjusted our model so that the E_0 parameter is determined within the same moving window as R_0.
>
> While revising the manuscript, we performed gap-filling several times with varying settings and ended up having the best performance by fitting E_0 to the data with the same window as R_0. Furthermore, we decided to remove the effective phytomass index (PI) from the light response fitting to increase the accuracy of the fits during the wintertime. Due to the occasional negative fluxes and fairly high positive fluxes, the gap-filling of wintertime data was more accurate without PI. In addition to these changes, we re-considered and improved the uncertainty analysis. As a result of this change, the field proved to be a carbon sink in both years. We modified the method description and the discussion of results accordingly.

"Although the results are interesting, the large differences between the years (like the number and heights of harvests/cuts, the type of fertilization, the amount of precipitation, the progression since seeding and the reseeding of a different species composition) hinder the authors to draw specific conclusions as to what the changes are related to. In this regard, I am not sure if comparing the years makes sense."
"I recommend rejecting this publication and let the authors recalculate the data and rewrite the manuscript with a different angle as the problems mentioned will likely not be solved in one major revision and result in a different publication."

The referee is correct with this statement that the data only cover two years and that this hinders us from properly evaluating the interannual variation. We agree that such analysis would definitely need more data and possibly some help from modelling to interpret the effect of different factors contributing to the variation. Thus, we have modified the manuscript so as not to highlight the differences between the years. In practice, we removed the research question about the year-to-year differences. Instead, we raised a question addressing the characteristics of the CO_2 exchange dynamics and the overall annual carbon balance. As a consequence of this angle change, the discussion was adjusted in the revised MS.

Although, at this stage, we are not able to comprehensively study the interannual differences and drivers, this study is important and very timely as this kind of agricultural studies are scarce in the boreal region. Furthermore, there is an urgent need to quantify the GHG fluxes and budgets of agriculture in order to further develop sustainable management actions to decrease the various negative environmental impacts of current agricultural practices. It is not self-evident that for example the so-called climate-smart practices, which are proven to sequester carbon in temperate regions, are as beneficial in the boreal region, where the climate as well as the cultivated species and varieties are different. Thus, the present analysis can serve as a valuable baseline for further studies and more detailed analyses on the interannual changes and effects of improved farming practices.