

Interactive comment on “Effects of management thinning on CO₂ exchange by a plantation oak woodland in south-eastern England” by M. Wilkinson et al.

Anonymous Referee #2

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Review of “Effects of management thinning on CO₂ exchange by a plantation oak woodland in south-eastern England” submitted to Biogeosciences.

This manuscript attempts to quantify effects of thinning on CO₂ exchange in deciduous forest canopy by analyzing one eddy-covariance tower with different wind directions. The authors argue that the effects of thinning on the carbon balance were not significant. The subject of this study will be of interest to scientific community because previous studies on impacts of thinning on carbon balance have been done in coniferous forests.

However, I cannot confirm that the conclusions of this manuscript were drawn correctly

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because only one tower is located at the border between thinned and un-thinned sectors, which makes us difficult to test statistical significance and to properly interpret physical implications. Sufficient data and thorough investigation are needed more. I will not bring up specific issues and please consider major concerns below for giving more solid evidences to this study.

1. It is misleading to discuss to differences of climatic conditions such as downward solar radiation, air temperature, wind and humidity between thinned and un-thinned sectors. For example, downward solar radiation should be same at these two sectors because the un-thinned and thinned sector are not hundreds kilometer away. Thinning management cannot make impacts on downward solar radiation! People may want to know changes in albedo and outgoing longwave radiation, and so net radiation more. But I am not quite sure physical meanings of radiative fluxes from radiometer close to the boundary of the thinned and un-thinned sectors.

2. The first issue is going to another issue. The different solar radiation between the two sectors indicates that solar radiation has been sampled on different time between thinned and un-thinned sectors. Let me show one example. 1) Flat and homogeneous surface without any disturbance like thinning. 2) Air temperature was higher on the first day than the second day because of different synoptic condition. 3) Main wind comes from the east on the first day but from the west on the second day. 4) If we compare air temperature between the east and west sectors, air temperature in the east sector is higher than the west sector. 5) Absolutely, thinning does not make this difference. We need clear discrimination on these kinds of different from thinning effects but I am quite sure if one tower measurement can resolve this issue. 3. The first and second issues are moving to another issue. The authors said that data retrieval rate is only 30%, indicating that 70% missing data are filled by the marginal distribution sampling (MDS). MDS is looking for the observed NEE values of similar climatic conditions. Therefore, if more than 2/3 data are missed, MDS feel difficulties in finding the similar climatic conditions and will extend the time windows to find the similar climatic conditions. In

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this case, we expect that uncertainties in the gap-filled data increase dramatically. Furthermore, the gap-filled data strongly depends on climatic conditions which is related to the second issue above. How can the authors quantify these uncertainties and their impacts on data interpretation for the thinned and un-thinned sectors?

4. All interpretations of the authors are not based on solid statistical test. All figures and tables do not have any statistical test results (e.g., p value). For example, Figure 6 shows light response curves before and after the thinning management. But this figure only shows fitted curves without any error range and p-value. In addition to uncertainties in the measurements itself and data processing, it is difficult to say any difference or similarity with strong confidence.

5. With the current experimental design, it is impossible to quantify changes in radiative fluxes, soil temperature and soil moisture, which are critical information on the thinning effects on carbon cycle.

6. How can we separate disturbance by caterpillar from thinning management?

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