

Interactive comment on “Carbon dioxide emissions from an *Acacia* plantation on peatland in Sumatra, Indonesia” by J. Jauhainen et al.

Anonymous Referee #1

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Given the large area impacted and carbon density of tropical peatlands, understanding the fate of the carbon storage is important from both land-use change perspective and global climate policy. This study systematically samples a range of plantation ages and positions relative to trees in order to determine the contribution of tree root respiration and peat oxidation to CO₂ emissions. The authors then discuss the relative importance of water table and temperature for controlling variation in peat oxidation rates. My major suggestion is to conduct a more thorough investigation of temperature relationships within the data set as most of the discussion of temperature currently presented in the manuscript is based on literature values.

The authors state in the discussion that no relationship between temperature and CO₂ emission was observed. Firstly, this should be stated in results. However, they go on to

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discuss that conversion of peat swamp forest to plantation alters temperature regime of the peat and that as the canopy develops temperature regime is again shifted due to shading. Given the study design, they can explore this directly, but do not present this analysis in the paper. For example, I believe that a multiple regression between average CO₂ emission furthest from trees (oxidation) with both soil temperature and water table will show that both are significantly related to CO₂ emissions. This will add strong evidence for the arguments made in the discussion and greatly improve the study.

A few minor comments: For Section 3.4: Regression equations could be on a figure or in a table and not in the text.

Is there any relationship between temperature and CO₂ flux – instead of just taking the literature value and Q₁₀?

Section 4.1: Where is the data for tree removal? Results? What is the variability in respiration rates near the trees or how does root density vary near trees? Does the 30 cm chamber diameter capture this variability in root density?

Water table and CO₂ flux: I would also suggest that the relationship between WT and respiration is not a linear one – respiration rate will fall either at higher or very low water contents/water table – some literature from drained northern peatlands could support this idea.

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