

## ***Interactive comment on “Fluvial organic carbon fluxes from oil palm plantations on tropical peatland” by Sarah Cook et al.***

**Sarah Cook et al.**

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We are grateful to Reviewer 2 for their constructive comments regarding our manuscript. Our initial responses to these comments are included below which will be incorporated into the final manuscript, along with a full overview of all changes made.

Major points

### 1. Validity of the assumption of RE

Reviewer 2: The authors assume that meteorology, soil properties, and topology are similar among the plantations because they are located close to each other, and apply the same value of RE to all the plantations (P9 L15-18). However, bulk density was 1.8

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times higher in Sebungan than in Sabaju (Table 1) possibly it is significantly different. The higher bulk density shows lower soil porosity, suggesting that different water storage and RE between SA and SE. Please add more discussion about the validity of the assumption of RE.

Authors response: The reviewer raises an important point regarding our runoff assumption for all sites. We acknowledge that this is a limitation. However, without additional data (i.e. hydraulic conductivity values) it is hard to assume the water storage potential of these different plantations. Thus, for simplicity we assumed a uniform runoff for all sites and believe that is adequate for addressing our main research aim. An additional sentence will be added into the text to acknowledge the simplicity of this assumption, as suggested by Reviewer 2.

### 2. Temporal variation of discharge

Reviewer 2: The authors mentioned that the temporal variation of discharge is larger than that of the DOC concentration so that the temporal change in DOC flux is strongly influenced by discharge compared with DOC concentration. I agree with this opinion. However, the author did not show the temporal variations in discharge through the temporal variations in TOC concentration was shown. Thus, I would like to recommend to show the temporal variations of discharge, too.

Authors response: A new figure will be added which will show the mean TOC concentrations across all sites alongside the mean discharge values for the different channels. We hope that this will help the visualisation of the relatively stable TOC concentrations in contrast to fluctuating discharge values.

Minor points

Reviewer 2: P3 L27-28: I don't know a paper that land compaction by heavy machine increase peat decomposition. But I know the opposite results, for example \* Melling et al. (2005) Soil CO<sub>2</sub> flux from three ecosystems in tropical peatland of Sarawak,

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Malaysia. *Tellus*, 37B, 1445-1453. \* Othman et al. (2011) Best management practices for oil palm cultivation on peat: Ground water-table maintenance in relation to peat subsidence and estimation of CO<sub>2</sub> emissions at Sessang, Sarawak. *Journal of Oil Palm Research*, 23, 1078-1086.

Authors response: A recent paper by Tonks et al. (2017) closely links the degree of decomposition to the physical properties of peat namely bulk density, shear strength and porosity. This reference will be added to the manuscript to reinforce the points raised by Reviewer 2.

Reviewer 2: P14 L1: Is this calculated RE the mean or median of Monte Carlo simulation shown in Fig. S4?

Author response: This is the mean calculated RE, and will be specified in the text.

Reviewer 2: P14 L6: Probably, "and" after 49.6 mg l<sup>-1</sup> is not necessary.

Authors response: This will be omitted.

Reviewer 2: Table 3 & Fig. 7: Please explain what is SA 3.1, 3.3, and 3.6.

Authors response: These are individual sample sites within the Sabaju 3 plantation. This will be clarified in Table 3 and Fig. 7 captions.

Reviewer 2: Fig. 3: It seems that there is no relationship between the rainfall pattern and the temporal variations in water table depth, which is not common, possibly because the rainfall is monthly data whereas water table depth is weekly data. Please check whether there is the relationship between rainfall and water table depth, and improve the figure if the water table depth is influenced by the rainfall. If there is no relationship, please discuss why.

Authors response: The correlation between these two variables will be checked and will be subsequently discussed within the manuscript.

Reviewer 2: Supporting information: Please explain what is SA 1.4 to SA 4.4

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Author response: A sentence will be added to explain what these codes relate to within the Supplementary Material.

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