

## ***Interactive comment on* “Distribution and cycling of terrigenous dissolved organic carbon in peatland-draining rivers and coastal waters of Sarawak, Borneo” by Patrick Martin et al.**

### **Anonymous Referee #1**

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Martin et al. present a concise empirical study on the spatial and temporal cycling of DOC in peatland draining rivers, Sarawak. Of particular interest are the results of the photo-degradation experiments and the fate of the riverine DOC component. The manuscript is well written and the study makes a valuable contribution to the scientific knowledge database. I have a few minor comments:

Page 5 Ln 30: acidification was chosen to preserve the DOC samples, however, this has been shown to reduce DOC concentrations (Kaplan.1994: <https://doi.org/10.4319/lo.1994.39.6.1470>) as well as alter spectral properties (Tfaily et al. 2011: doi:10.1016/j.aca.2011.08.037). I just wondered why cold storage was not

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considered?

Page 6 Ln 2: Mentions that freezing did not affect the DOC results, how as this assessed? Is there any evidence that could be added (maybe to supplementary material to support?)

Page 8 Ln 9: were the quartz bottles overfilled with the water and then capped to eliminate headspace and therefore eliminate atmospheric exchange during the photo-degradation experiment? If so it would be good to include this information in the methods and also how the quartz bottles were prepared e.g. combusted? I wondered if there was any sign of bacterial growth in the water samples during the experiment (just out of curiosity).

Page 9 Ln 14: is there any way to include some information about the total distances travelled during the different campaigns (maybe on figure 1, by including a scale bar) or the distance between sampling stations to be added into the supplementary material? How was the distance between the sampling points decided?

Page 9 Ln 16: Was there any seasonal variability in salinity i.e. did you see a drop during the wet season due to greater freshwater input? Did you observe any salinity induced flocculation in the DOC samples which may have complicated analysis?

Page 11 Ln 26: Was there any evidence of photo-bleaching?

Page 13 Ln 14: Was any POC data taken? Would have been interesting to see if there was any change in the DOC:POC ratio during the photo-degradation experiment, but as stated POC to DOC turnover is unlikely to have been captured within the experiments time frame.

Page 13 Ln 24: Do you have any information on the extent of oil palm plantation coverage in this region/ the % of land likely to be covered by disturbed peatlands?

Page 13 Ln 27: Another reference that might be good to add is Materic et al. (2017) (<https://doi.org/10.1038/s41598-017-16256-x>) who observed differences in the compo-

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sition of organic compounds between forest and disturbed peatlands (some data is from Sarawak).

Page 14 Ln 9: I wonder if the lower DOC concentrations observed at the end of the drier season could be a reflection of the interaction between the hydrology and photo-degradation i.e. during the dry season flow conditions will be low which could lead to longer residence times leading to greater UV exposure and thus DOC degradation. Again, just a thought.

Page 14 Ln 20: considering how photo liable the DOC is could this not have produced molecular level changes complicating its identification with respect to terrestrial sources, especially in samples collected further downstream which have been exposed to greater periods of light exposure? So maybe the terrigenous signal identified in the samples is even stronger? Just a thought.

Page 16 Ln 16: If the majority of the landscape is oil palm plantation I guess the drainage channels/ continuous yearly peat drainage could be ensuring that there is a continuous and direct flow of water (and thus DOC) into the river system, topping up the supply. Maybe this could also explain why there are higher DOC concentrations above the mixing line?

Page 16 Ln 19: As the majority of Rajang catchment is draining disturbed landcover (i.e. oil palm plantation) this could be contributing to an increased nutrient input from the pesticides and fertilisers and thus cause eutrophication to some degree and contribute to the DOC pool (even though I see that the chlorophyll is low). However, the sampling campaigns are designed to show us a 'snap-shot' of the spatial variability of the stream network across different seasons, so perhaps it is hard to rule out autochthonous DOC sources completely? Maybe there could be a lag response?

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