

17 January 2026

Dear Dr. Steven Bouillon and all the editors,

Biogeosciences

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We are sincerely grateful for the opportunity to resubmit our revised manuscript entitled

“Estimation of Particulate Organic Carbon Export to the Ocean from Lateral Degradations of Tropical Peatland Coasts”

for further consideration in *Biogeosciences*.

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We would like to express our deepest appreciation to you for the careful and thorough reading of our manuscript and for the time, effort, and insightful guidance you have kindly provided throughout the review process. We are also very grateful to the reviewers for their detailed and constructive comments in the earlier rounds of review, which gave us clear directions on how to improve the manuscript and greatly helped us enhance both the scientific quality and clarity of our work.

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In this revision, we have carefully addressed all of your additional comments and suggestions. We are particularly thankful for your specific and actionable feedback, and we have incorporated all of your suggestions into the revised version. A detailed, point-by-point response is provided below.

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We sincerely appreciate your continued consideration and the time you have devoted to helping us improve this study. We hope that the revised version now meets the journal’s standards and expectations, and we remain fully open to any further suggestions that could enhance the manuscript.

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With our deepest gratitude and best regards,

Hiroki Kagawa

on behalf of all co-authors

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My point-by-point responses are as follows:

35 **Associate editor decision1.**

Introduction: the estimates of global carbon stocks in tropical peatlands refer to literature from some time ago, there are several studies with updated estimates. See for example:

Dargie et al. (2017); <https://www.nature.com/articles/nature21048>

Ribeiro et al. (2020), <https://doi.org/10.1111/gcb.15408>

40 **I would recommend including some more recent estimates and references.**

Response1.

We thank you for suggesting these specific references. We have added the suggested papers to the reference list in the revised manuscript. Specifically, lines 34–44 have been revised accordingly.

Associate editor decision2.

45 **In response to one of the review comments, you have now replaced 'cumulative OC content' and 'carbon stock' with the term 'soil organic carbon density' - but this is in my interpretation ambiguous and not appropriate.**

Carbon density is a term regularly used in the literature but refers to a quantity of carbon per unit of volume, whereas you use it to describe a quantity per unit of surface area (i.e. a stock), which will make things more confusing.

50 **You mention also in your RC2-Response6 that you would change "carbon concentration" to "carbon content per unit volume" - but this is exactly what the definition of carbon density is.**

Hence, please use correct terminology. Figure 18 for example represents carbon stocks and not carbon densities.

This also needs to be corrected in Table 1, where you mention SOCD is the carbon stock as a function of depth. Stocks are expressed per unit of surface area, densities are expressed per unit of volume; hence this definition is confusing.

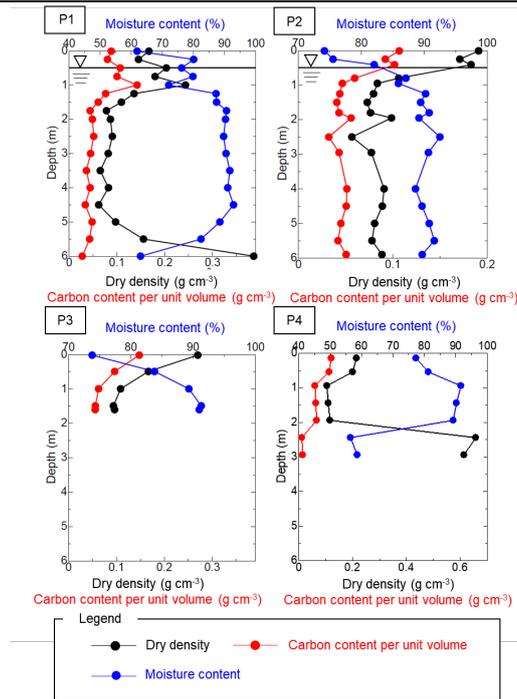
Check throughout the text, Tables (e.g. Table 5 and 6), and Figures where the term SOCD is currently used.

55 **Response2.**

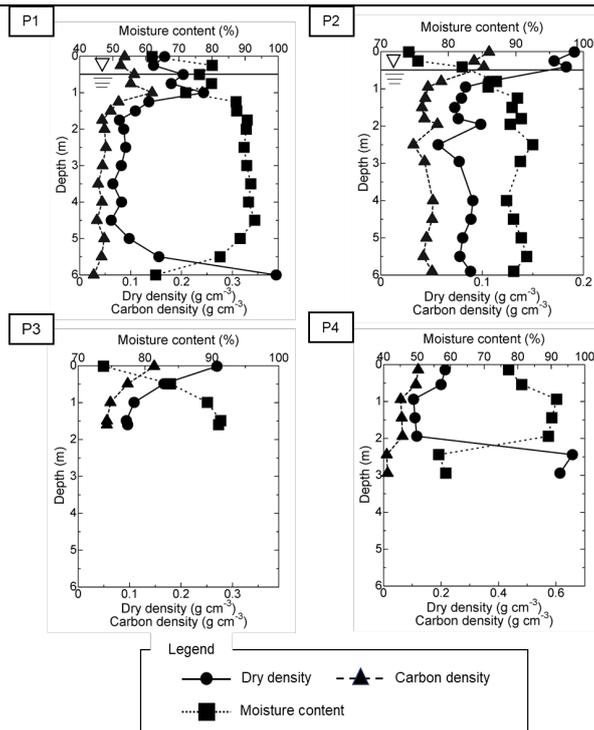
We thank the editor for this important comment, which helped us correct the terminology used in the manuscript. As you correctly pointed out, in the previously revised Figure 17 (now Figure 16), we have replaced the term “Carbon content per unit volume” with “Carbon density,” and in Figure 18 (now Figure 17), we have replaced “SOCD” with “Carbon stocks.” The corresponding text in the main manuscript, as well as the relevant figure labels and captions, has been revised accordingly.

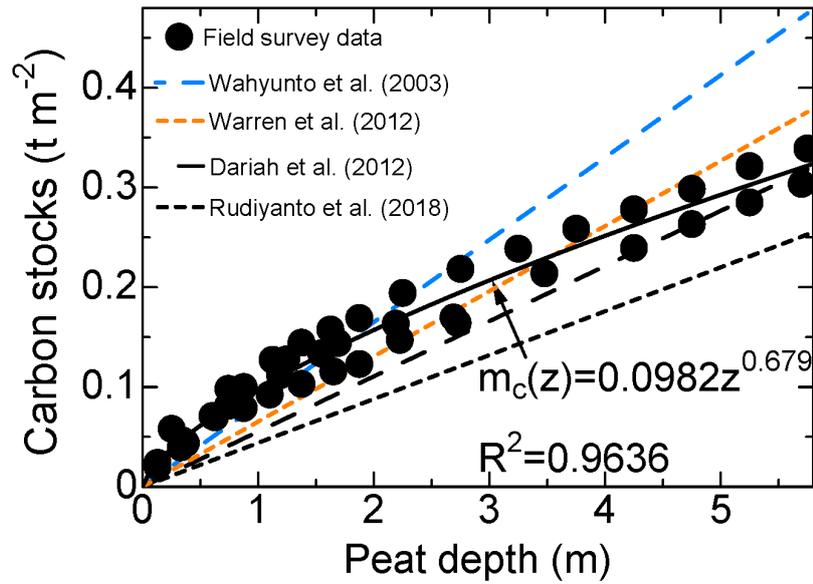
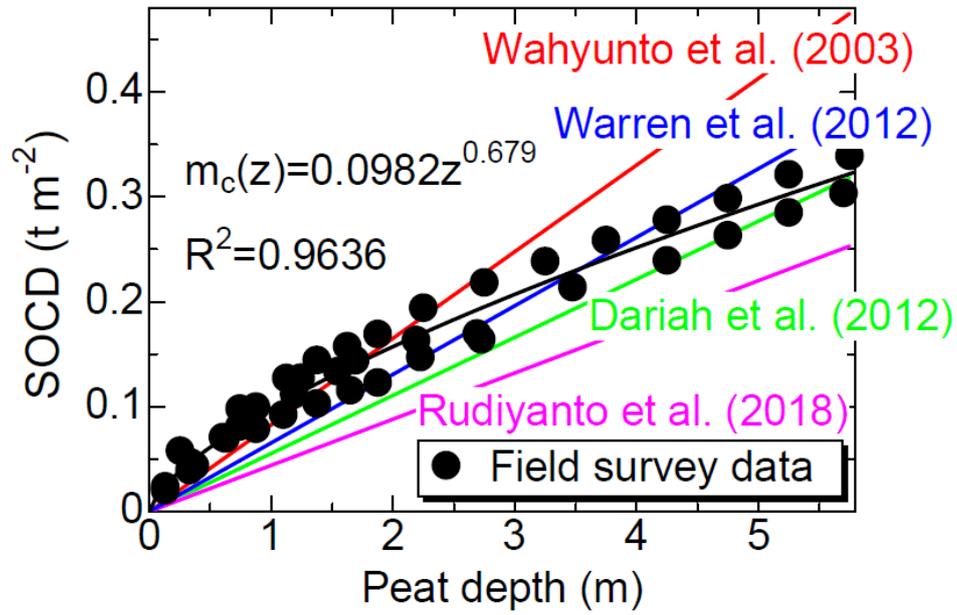
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3rd Major revision Figure 17



Minor revision Figure 16





Regarding Table 1, I feel that adding units for each of the parameters or terms would clarify things a lot.

Response3.

Thank you for your valuable comment. Following your suggestion, we have updated Table 1 by adding an additional column indicating the units for each variable. Specifically, the revised table is shown below.

3 rd Major revision Table 1			
Abbreviation		Term	Brief Description
PMM		Peat mass movement	The abbreviation for the term "peat mass movement," which refers to a phenomenon where the ground suddenly collapses and causes landslides due to heavy rainfall or other factors. The areas affected by landslides are characterised by cracks in the surface and peat layers, known as surface tears, which are secondary features located at the head of the landslide zone.
V_{PMM}		Peat mass movement volume	The volume of peat exported to the ocean as a result of a peat mass movement (PMM) event. The loss of the peat volume by a PMM event.
A_{LS}		Landslide-affected area	An area affected by a PMM event, including regions where surface tears, a secondary feature of the collapse, are present.
h_1		Elevation before landslide	The elevation before being affected by a PMM event.
h_2		Elevation after landslide	The elevation after being affected by a PMM event.
V_{PMMs}		Peat mass movements volume	The total volume of peat exported to the ocean as a result of peat mass movement (PMM) events.
V_{CE}		Coastal erosion volume	The total volume of peat exported to the ocean as a result of coastal erosion.
A_{CE}		Coastal erosion area	The area lost as a result of coastal erosion.
h		Elevation of ground before lateral degradation	The elevation before being affected by lateral degradations.
h_B		Thickness of the clay base layer	The thickness of the clay layer, which forms the base layer of peatland coasts.
d_{PMM}		Depth of affected by landslide	The average decline of the elevation by a PMM event, synonymous with V_{PMM}/A_{LS} in this study.
h_{DTM}		Elevation of DTM	The elevation of the ground before coastal erosion and PMMs, specifically the DTM elevation, which is derived from the DEMNAS data.
h_{UAV}		Elevation of DSM from UAV photogrammetry	The elevation of the DSM obtained from UAV photogrammetry, with tree height removed.
z		Peat layer depth from the surface ground	The depth of the peat layer from the surface of the ground in peatland coasts.
$m_c(z)$		Soil Organic Carbon Density (SOCD)	Carbon stocks as a function of peat depth in peatland coasts.
ρ_d		Dry density of peat	Dry density as a function of peat depth in peatland coasts.
α_c		Organic carbon content of peat	Organic carbon as a function of peat depth in peatland coasts.
M_{PMM}		Mass of POC due to PMM	The mass of particulate organic carbon (POC) exported to the ocean as a result of a PMM event.
M_{PMMs}		Mass of POC due to PMMs	The mass of particulate organic carbon (POC) exported to the ocean as a result of PMM events.
M_{CE}		Mass of POC due to coastal erosion	The mass of particulate organic carbon (POC) exported to the ocean as a result of coastal erosion.
l		Coastline distance	Coastline distance in the region of interest for each period.
q_{POC}		Specific POC export to ocean due to PMMs	The particulate organic carbon (POC) from the displacement of peat mass caused by PMMs.
J_{POC}		Specific annual POC export to ocean due to coastal erosion	The particulate organic carbon (POC) fluxes to the ocean due to coastal erosion.
V_{PMM}/A_{LS}		Depth of affected by landslide	The average decline of the elevation by a PMM event, synonymous with d_{PMM} in this study.

Minor revision Table 1			
Abbreviation	Units	Term	Brief Description
PMM	-	Peat mass movement	The abbreviation for the term "peat mass movement," which refers to a phenomenon where the ground suddenly collapses and causes landslides due to heavy rainfall or other factors. The areas affected by landslides are characterised by cracks in the surface and peat layers, known as surface tears, which are secondary features located at the head of the landslide zone.
V_{PMM}	m^3	Peat mass movement volume	The volume of peat exported to the ocean as a result of a peat mass movement (PMM) event. The loss of the peat volume by a PMM event.
A_{LS}	m^2	Landslide-affected area	An area affected by a PMM event, including regions where surface tears, a secondary feature of the collapse, are present.
h_1	m	Elevation before landslide	The elevation before being affected by a PMM event.
h_2	m	Elevation after landslide	The elevation after being affected by a PMM event.
V_{PMMs}	m^3	Peat mass movements volume	The total volume of peat exported to the ocean as a result of peat mass movement (PMM) events.
V_{CE}	m^3	Coastal erosion volume	The total volume of peat exported to the ocean as a result of coastal erosion.
A_{CE}	m^2	Coastal erosion area	The area lost as a result of coastal erosion.
h	m	Elevation of ground before lateral degradation	The elevation before being affected by lateral degradations.
h_B	m	Thickness of the clay base layer	The thickness of the clay layer, which forms the base layer of peatland coasts.
d_{PMM}	m	Depth of affected by landslide	The average decline of the elevation by a PMM event, synonymous with V_{PMM}/A_{LS} in this study.
h_{DTM}	m	Elevation of DTM	The elevation of the ground before coastal erosion and PMMs, specifically the DTM elevation, which is derived from the DEMNAS data.
h_{UAV}	m	Elevation of DSM from UAV photogrammetry	The elevation of the DSM obtained from UAV photogrammetry, with tree height removed.
z	m	Peat layer depth from the surface ground	The depth of the peat layer from the surface of the ground in peatland coasts.
$m_c(z)$	$t\ m^{-2}$	Carbon stocks	Carbon stocks as a function of peat depth in peatland coasts.
ρ_d	$t\ m^{-3}$	Dry density of peat	Dry density as a function of peat depth in peatland coasts.
α_c	-	Organic carbon content of peat	Organic carbon as a function of peat depth in peatland coasts.
M_{PMM}	tC	Mass of POC due to PMM	The mass of particulate organic carbon (POC) exported to the ocean as a result of a PMM event.
M_{PMMs}	tC	Mass of POC due to PMMs	The mass of particulate organic carbon (POC) exported to the ocean as a result of PMM events.
M_{CE}	tC	Mass of POC due to coastal erosion	The mass of particulate organic carbon (POC) exported to the ocean as a result of coastal erosion.
l	m	Coastline distance	Coastline distance in the region of interest for each period.
q_{POC}	$tC\ m^{-1}$	Specific POC export to ocean due to PMMs	The particulate organic carbon (POC) from the displacement of peat mass caused by PMMs.
J_{POC}	$tC\ m^{-1}\ yr^{-1}$	Specific annual POC export to ocean due to coastal erosion	The particulate organic carbon (POC) fluxes to the ocean due to coastal erosion.
V_{PMM}/A_{LS}	m	Depth of affected by landslide	The average decline of the elevation by a PMM event, synonymous with d_{PMM} in this study.

Associate editor decision4.

Reconsider whether all Figures are really necessary in the main text. Figure 14 is a good example: while these data are relevant as background information, they are only briefly referred to (L499) and not really discussed further. These can be moved towards the supplementary information.

75 **Response4.**

Thank you for your comment. As you suggested, Figure 14 can be moved to the appendix without any issues. Therefore, we have relocated it to Appendix J.

Associate editor decision5.

85 **Figure 7: A figure without a black background would be more suitable. Please also make this Figure more accessible**
80 **in terms of color use. See guidelines here:**

<https://www.biogeosciences.net/submission.html#figurestables>

The color gradient used in Figure 7 renders it difficult or impossible to read for people with color vision deficiencies. The link on the BG website provides some links to resources that can resolve this.

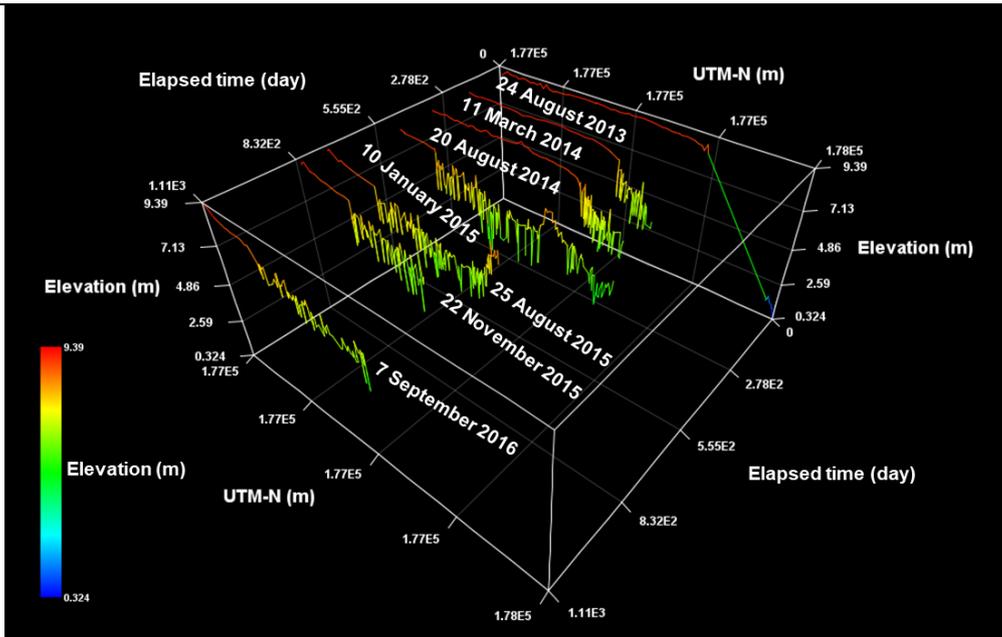
Response5.

85 We thank the editor for this helpful comment. In response, we changed the background from black to white and revised the
colour scheme to be more accessible for readers with colour vision deficiencies. The original and revised versions of the figure
are shown below.

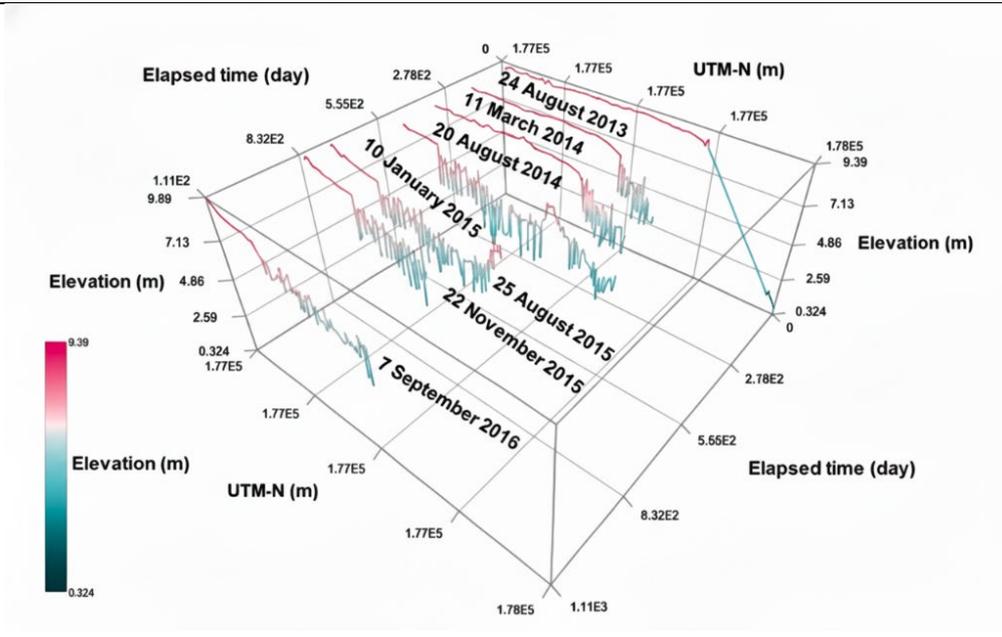
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3rd Major revision Figure 7



Minor revision Figure 7

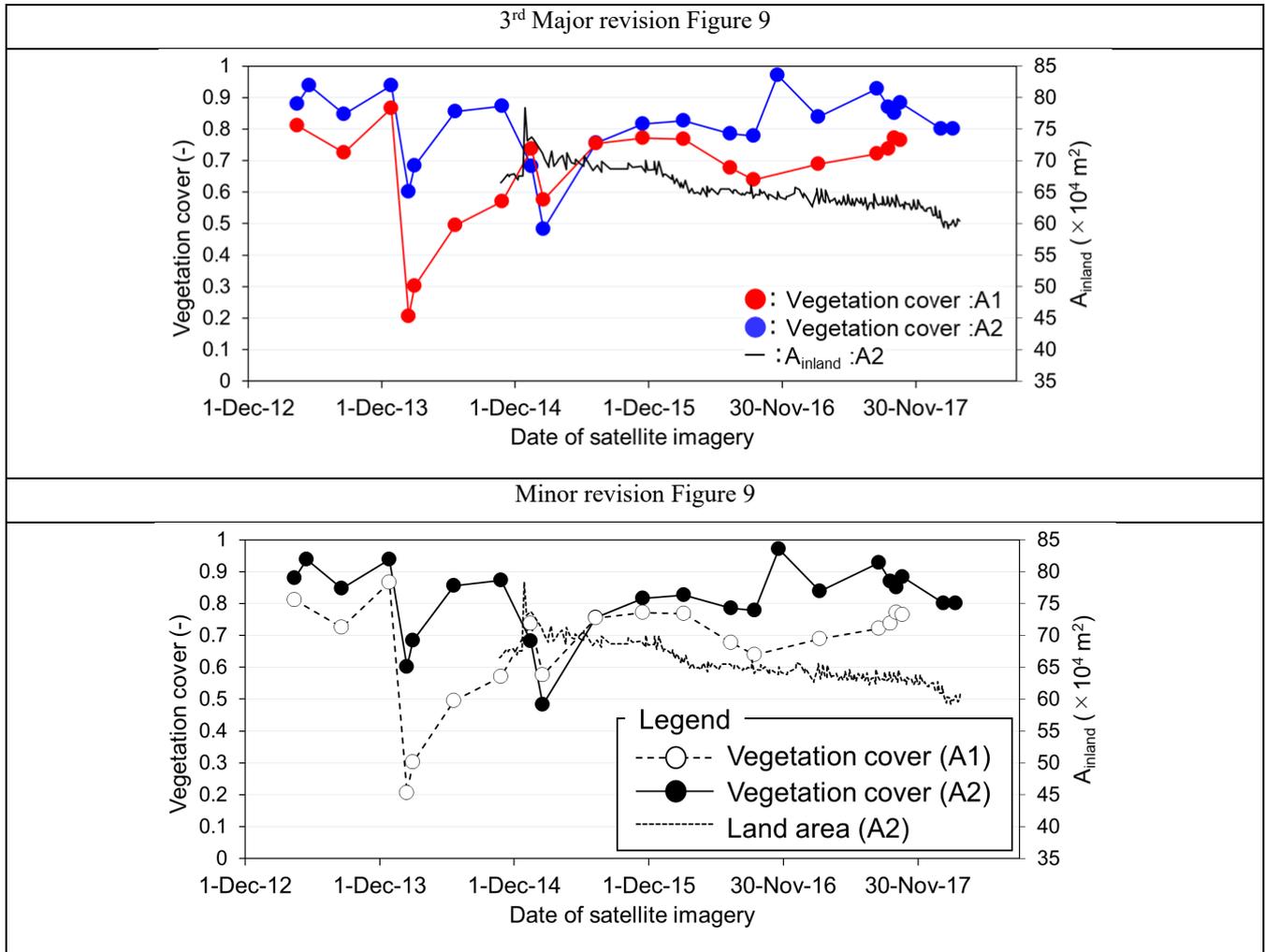


Associate editor decision6.

Figure 9: readability would be improved by replacing the red & blue with e.g. open and closed symbols, and/or using different line types for the A1 and A2 data series.

Response6.

105 We thank the editor for this helpful comment. In response, we have modified the symbols and line types so that the different series can be distinguished more clearly. The original and revised versions of the figure are shown below.

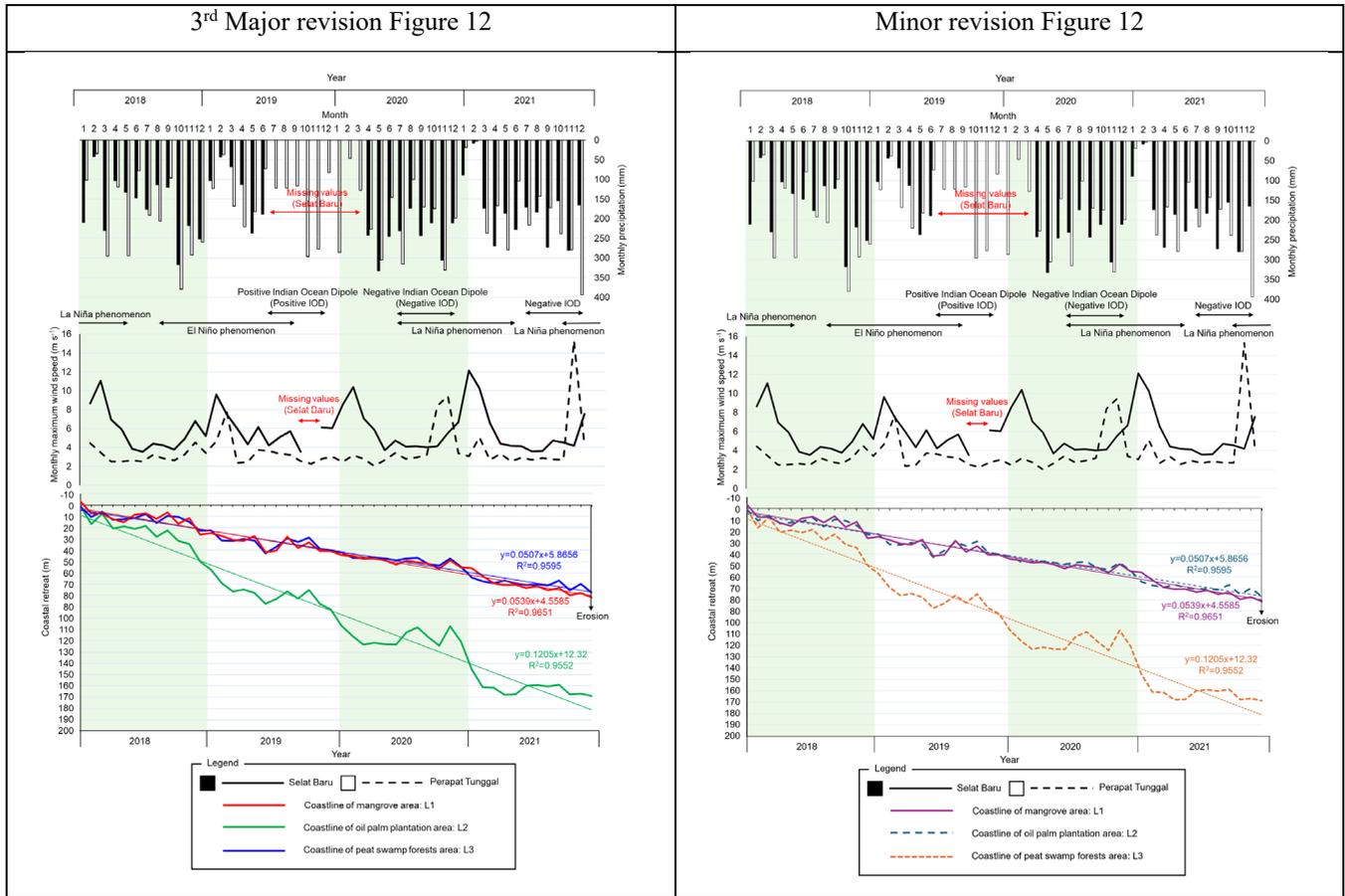


Associate editor decision 7.

110 **Figure 12:** here too, see suggestions on improving accessibility by using alternative colors and/or different line types, in particular for the lower panel of this Figure.

Response 7.

We thank the editor for this helpful comment. In response, we have also changed the line styles and colours in this figure. The original and revised versions of the figure are shown below.



115 Associate editor decision 8.

Figure 17, 18, 20, F2, F3, I1: same suggestions as above, please review accessibility of this Figure in terms of color use and consider alternative ways to improve.

Response8.

We thank the editor for this specific comment on the figure. In response, we have similarly modified the markers, line styles, and colour scheme in this figure.
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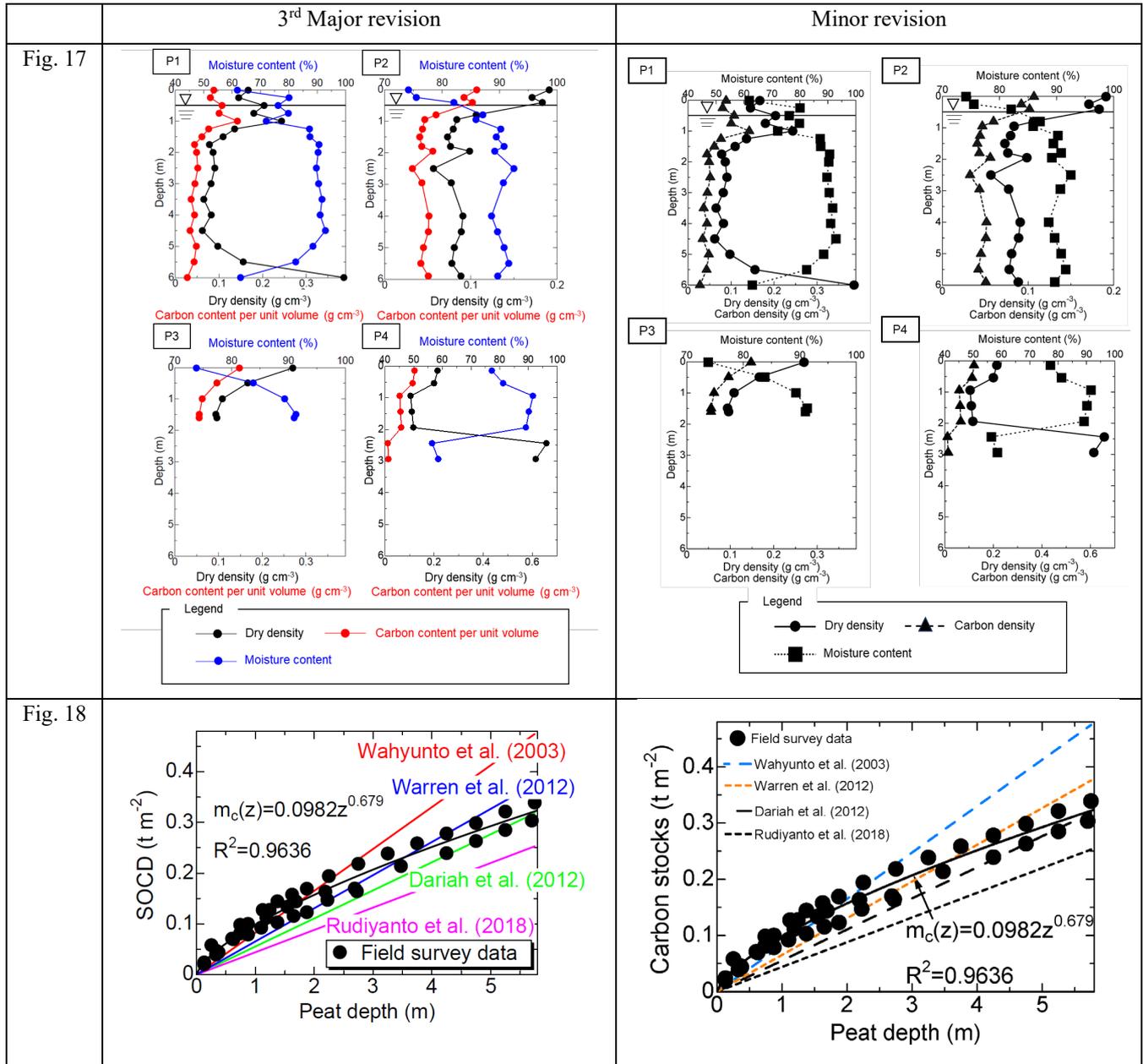


Fig. 20

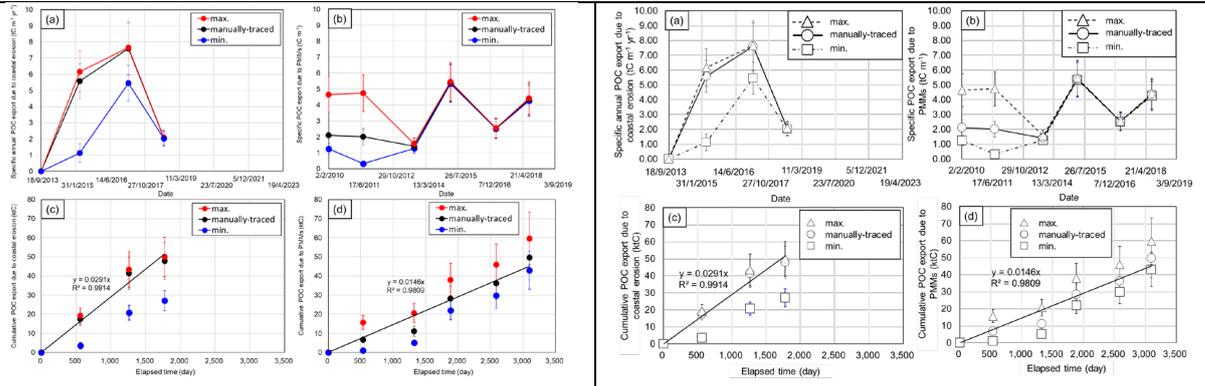


Fig. F2

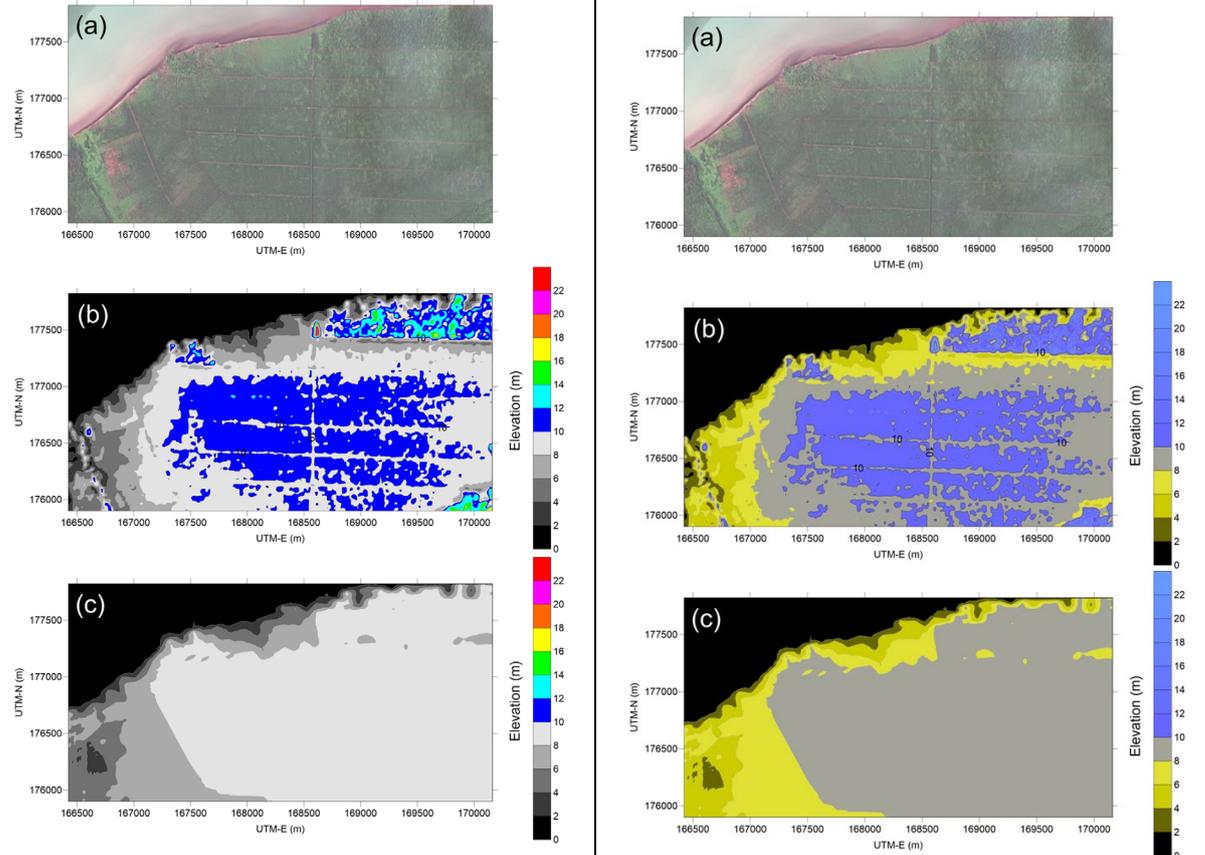


Fig. F3

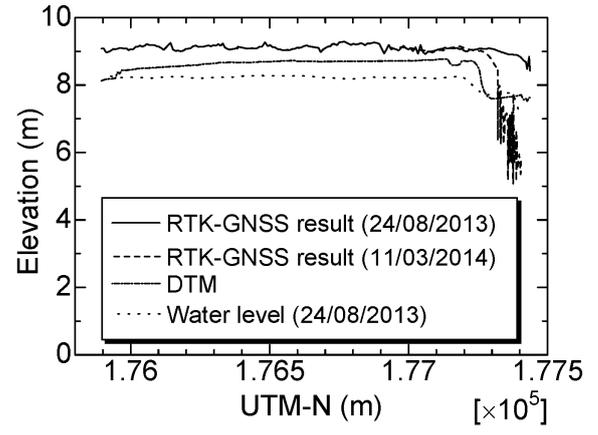
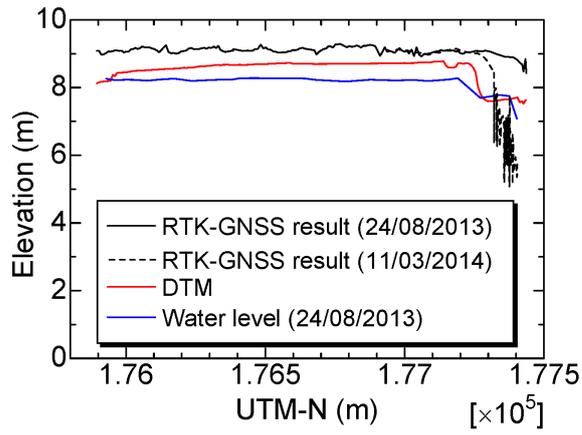


Fig. I1

