



*Supplement of*

## **Sedimentary blue carbon dynamics based on chronosequential observations in a tropical restored mangrove forest**

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*In situ* water column profiles of temperature (°C), salinity, dissolved oxygen saturation (DO, %) were acquired at every sampling station using an AAQ-RINKO water quality profiler (JFE-Advantech, Japan) prior to water sampling. pH of water was measured using a hand-held pH meter (HORIBA). Niskin sampler was used for collection of water samples from subsurface depth (5 L, General Oceanics, USA). Water samples were pre-filtered through a 200µm sieve attached to a plastic funnel and collected into polypropylene containers and kept on ice until further treatment. A known volume of water sample (~2 L) was filtered onto a pre-weighed and pre-combusted (450°C, 3h) 47mm glass fiber filters (Whatman GF/F, pore size 0.7µm) for particulate organic carbon (POC) and isotope analyses. DOC samples were further filtered through single-use disc filters (ADVANTEC, hydrophilic PTFE of 0.45 µm pore size) attached to 50 mL glass syringe and collected in amber vials (teflon-lined caps). DOC samples were preserved after addition of 2M HCl until pH decreased to 2.

Table S1. Endmember values used for Bayesian mixing model. POM: particulate organic matter. MPB and green leaf data are taken from Ray et al., (2018) and Nordhaus et al., (2017), respectively. RA: *Rhizophora apiculata*

<b>Endmember</b>	<b>δ<sup>13</sup>C ‰</b>	<b>OC:TN</b>
Marine POM	-22.8±0.5	7.41±1.2
River POM	-25.5±0.5	6.76±0.7
Green leaf (RA)	-28.5±0.26	30.30±1.3
Microphytobenthos	-20.9±05	8.82±2
<b>Sediment</b>		
Bare sediment	-25.07±0.6	21.9±3.1
Pioneer mangrove	-25.1±1.4	13.3±2.8
Young mangrove	-26.9±0.8	19.8±0.6
Adult mangrove	-27.9±0.8	12.6±5.8
Mature mangrove	-28.9±0.8	17.4±7.1

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26 Table S2. Surface water carbon and other parameters at selected sampling points of the Aklan  
27 River.

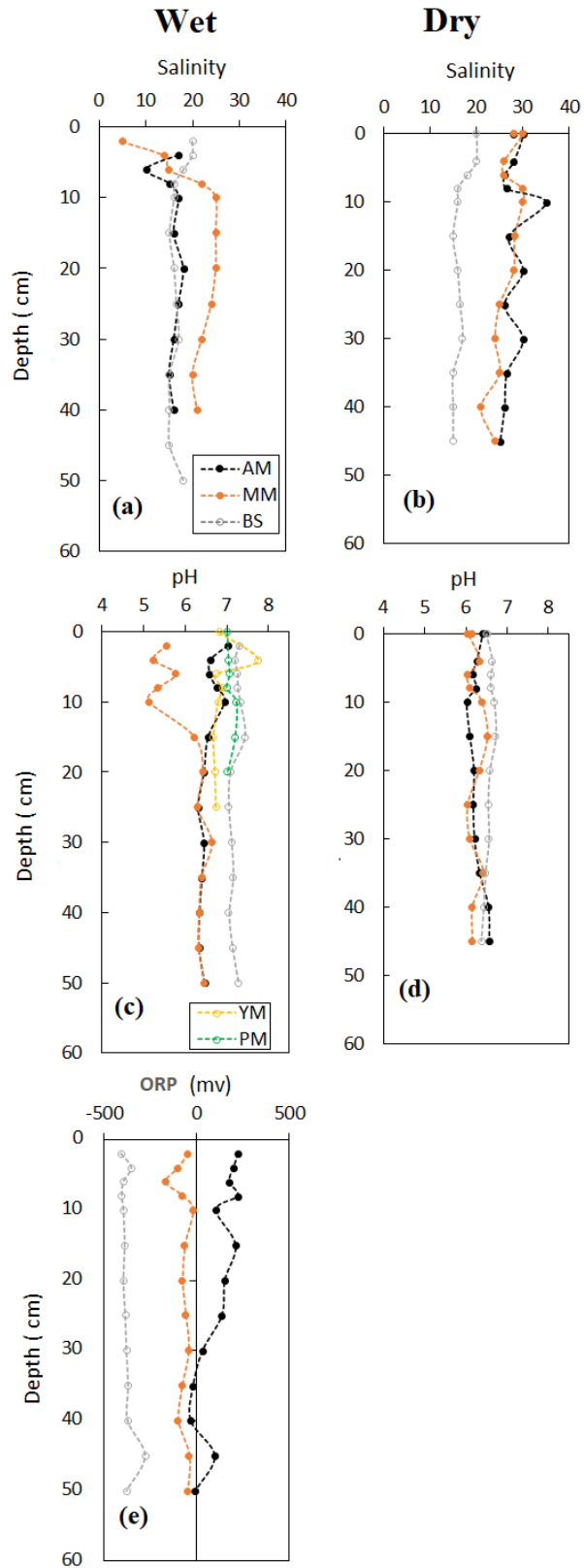
Location	Latitude	Longitude	Neap Tide	T <sub>w</sub> (°C)	Salinity	pH	DO %	POC (μmol/L)	POC:PN atomic	DOC (μmol/L)	δ <sup>13</sup> C <sub>POC</sub> ‰
Upstream	11.7234N	122.3767E	Ebb	31	0	7.63	89	20.3	6.76	90.3	-25.9
Channel	11.7200N	122.3942E	Flood	28.7	25	8.05	105	23.0	8.22	81.1	-23.7
Offshore	11.7135N	122.4067E	Flood	27.4	33	8.11	101	10.2	7.40	86.5	-22.8

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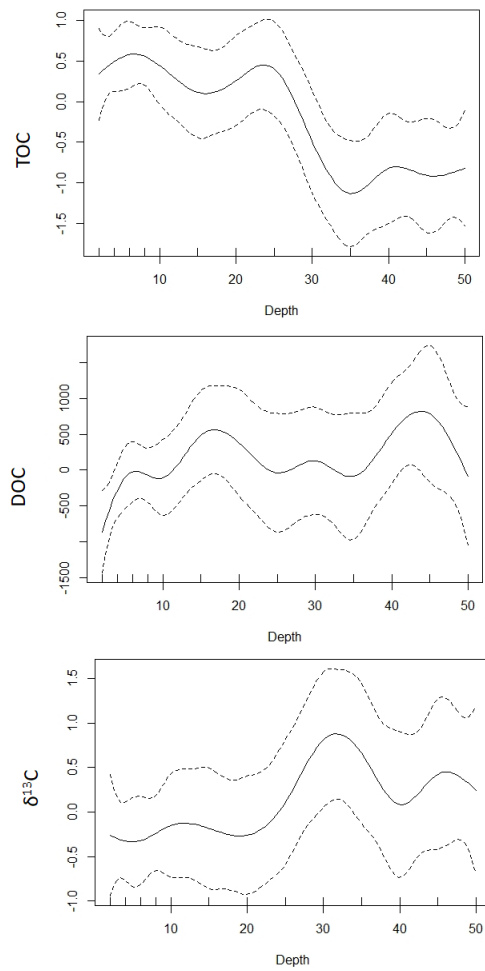


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33 Fig. S1. Vertical profiles of sedimentary physicochemical properties during dry and wet season

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38 Fig. S2. Distribution of each carbon parameter based on general additive model (GAM) for TOC,  
39 DOC and  $\delta^{13}\text{C}$  with smooth term of depth. Solid and dashed lines represent Mean and SD,  
40 respectively.

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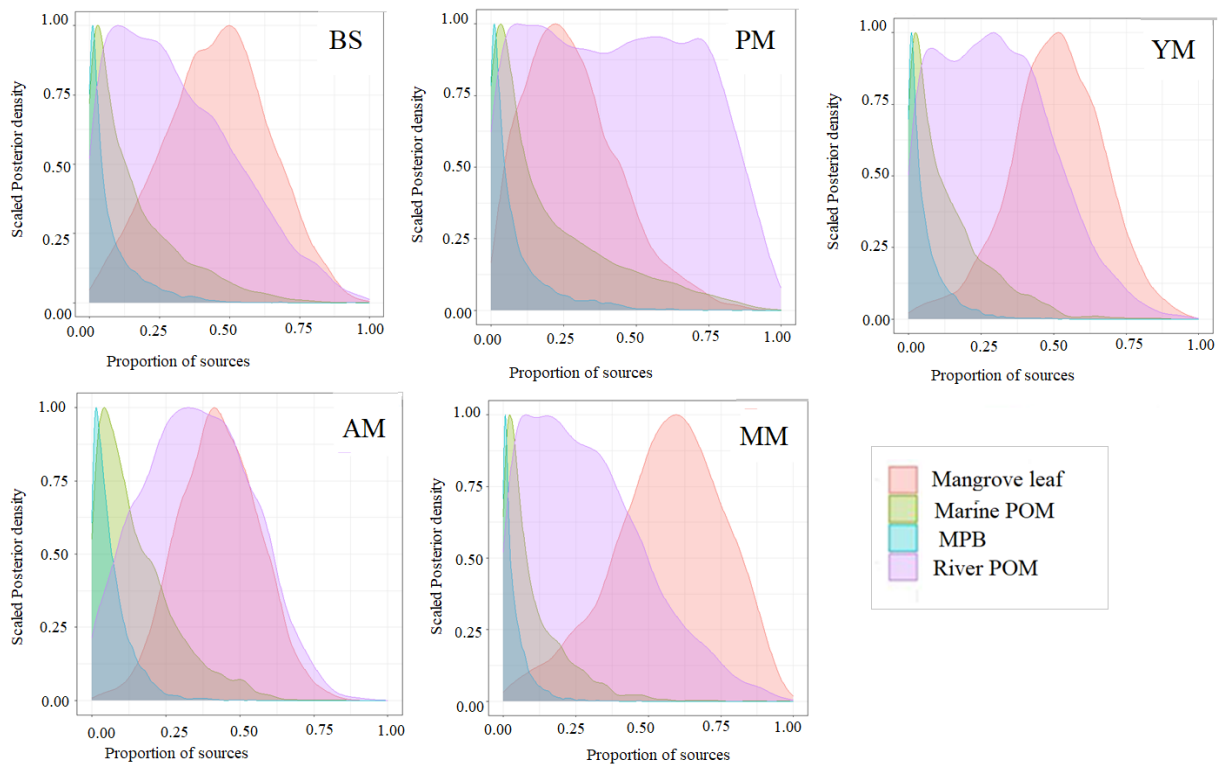
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51 Fig. S3 Source apportionment of sedimentary organic matter at different mangrove stages by  
 52 applying bayesian mixing model with  $\delta^{13}\text{C}$  and OC:TN. This is a density plot against proportion  
 53 of sources. Here, the total area in each curve exceeds 1.0 since this is Scaled-Density adjusted for  
 54 a maximum peak of 1.0. MixSIAR outputs the Scaled-Density instead of original density. The  
 55 Scaled-Density shows a same visual pattern as original density plot.

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