

Supplementary material

Sedimentary blue carbon dynamics based on chrono-sequential observation 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

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25 collected in amber vials (teflon-lined caps). DOC samples were preserved after addition of 2M
26 HCl until pH decreased to 2.

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

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Endmember	$\delta^{13}\text{C}$ ‰	OC:TN
Marine POM	-22.8±0.5	7.41±1.2
River POM	-25.5±0.5	6.76±0.7
Green leaf (<i>RA</i>)	-28.5±0.26	30.30±1.3
Microphytobenthos	-20.9±0.5	8.82±2
Sediment		
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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 60 Table S2. The coefficient in each parameter based on the generalized additive model (GAM) for
 61 TOC, DOC and $\delta^{13}\text{C}$. The values in parentheses mean standard error SE. AM: adult mangrove,
 62 MM: mature mangrove, PM: pioneer mangrove, YM: young mangrove. Bare sediment or BS was
 63 set as reference level.
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Sampling site	Mangrove leaf (%)	Marine POM (%)	MPB (%)	River POM (%)
Bare sediment	51±22	43±18	32±5	75±6
Pioneer mangrove	54±14	56±23	28±16	80±13
Young mangrove	73±10	36±15	17±8	59±14
Adult mangrove	62±9	38±14	17±7	61±11
Mature mangrove	82±9	29±13	13±6	61±17

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 74 Table S3. Contribution (%) of endmember sources to sediment organic matter. POM: Particulate
 75 Organic Matter, MPB: Microphytobenthos

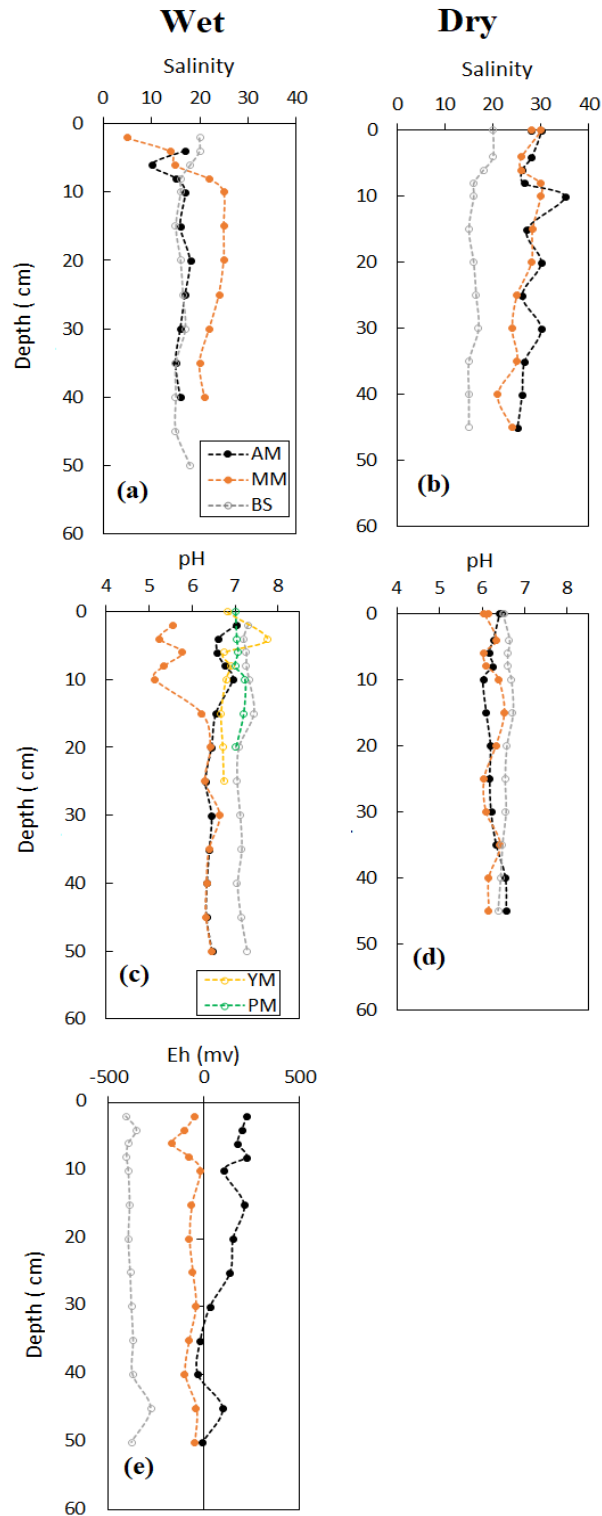
Parameters	TOC		DOC		$\delta^{13}\text{C}$	
	Coefficients	(SE)	Coefficients	(SE)	Coefficients	(SE)
Intercept	0.6315	(0.202)	1517.2	212.6	-26.64	0.25
Dry	-0.0221	(0.211)	-184.6	250.2	0.59	0.25
Wet	-0.4375	(0.202)	376.1	282	0.05	0.24
AM	1.1068	(0.247)	-1263	314.1	1.39	0.30
MM	2.0744	(0.247)	-278.9	261.4	-2.39	0.29
PM	0.0038	(0.259)	-298.2	325.4	1.25	0.31
YM	-0.0259	(0.249)	113.6	303.6	-0.66	0.29

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 84 Table S4. Surface water carbon and other parameters at selected sampling points of the Aklan
 85 River.

Location	Latitude	Longitude	Neap Tide	T _w (°C)	Salinity	pH	DO %	POC (μmol/L)	POC:PN atomic	DOC (μmol/L)	$\delta^{13}\text{C}_{\text{POC}}$ ‰
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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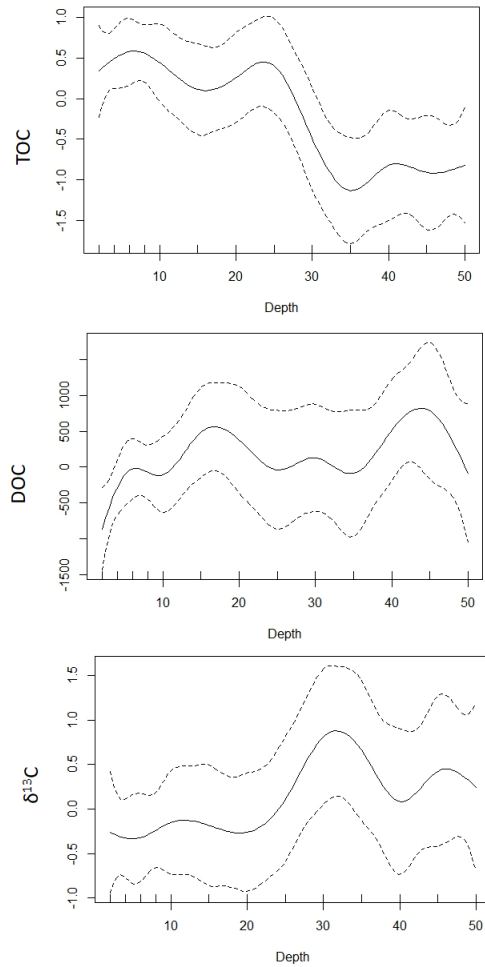
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91 Fig. S1. Vertical profiles of sedimentary physicochemical properties during dry and wet season

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96 Fig. S2. Distribution of each carbon parameter based on general additive model (GAM) for TOC,

97 DOC and $\delta^{13}\text{C}$ with smooth term of depth

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