

Supplementary information for Sedimentary carbon stocks and microbial turnover in shallow coastal areas of the Baltic Sea

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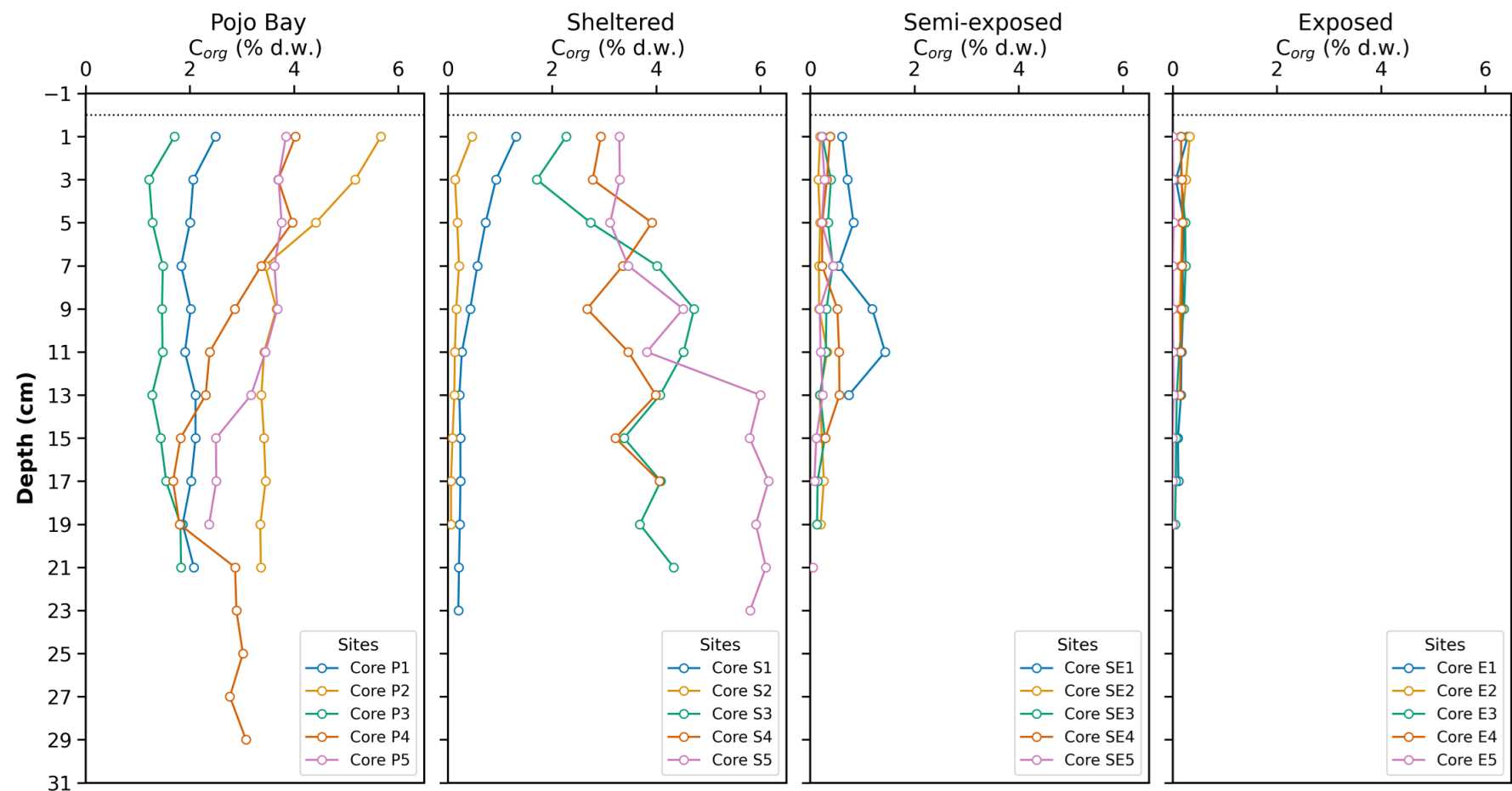


Figure S1. Depth profile of sediment C_{org} (% d.w.) (x-axis) for each site in four categories with y-axis represent the depth (cm) and each sites sediment core assigned a unique color in each category.

Table S1. Statistical analysis/tests comparing all four categories ('PB' as Pojo Bay, 'S' as Sheltered, 'SE' as Semi-exposed, and 'E' as exposed,) for significant difference and effect size (δ) using median values (n = number of sites) for measured sediments and porewaters parameters. n = 5 for all the categories for sediment except δ13C (‰) where n = 2 for Exposed category. For porewater concentrations, n is 4, 5, 5, 3 for PB, S, SE, E respectively.

Test	Statistic	C _{org} (% d.w.)	CN (mol)	ratio δ13C (‰)	DIC (mmol L ⁻¹)	CH ₄ (mmol L ⁻¹)	NH ₄ ⁺ (mmol L ⁻¹)	Fe ²⁺ (mmol L ⁻¹)	SO ₄ ²⁻ (mmol L ⁻¹)
Kruskal-Wallis	H	11	15.04	7.79	1.92	11.88	11.50	8.50	13.99
	p	0.01	0.00	0.05	0.59	0.01	0.01	0.04	0.00
Pair wise comparison	Post-hoc (holm) – p value								
	Cliff's delta (δ) effect size								
PB&S	p (<0.05)	0.67	0.40			0.29	0.58	0.66	0.35
	δ (0 to ±1)	-0.04	1	-0.44	-0.30	1.00	-0.40	-0.60	-1.00
PB&SE	p	0.48	0.11			0.05	0.58	1.00	0.02
	δ	1	0.84	-0.84	-0.20	1.00	0.60	-0.30	-1.00
PB&E	p	0.01	0.00			0.01	0.12	0.42	0.01
	δ	1	1	-1	-0.17	1.00	1.00	1.00	-1.00
S&SE	p	0.67	0.42			0.61	0.12	1.00	0.35
	δ	0.36	0.6	-0.36	0.44	0.52	1.00	0.28	-0.92
S&E	p	0.06	0.11			0.29	0.01	0.03	0.11
	δ	0.68	1	-0.8	0.60	0.87	1.00	1.00	-1.00
SE&E	p	0.48	0.40			0.61	0.58	0.11	0.40
	δ	1	0.84	-0.8	-0.07	0.73	0.87	1.00	-0.73

Table S2. Rank based correlation of two variables assessed along with normality. Significance was accepted if p < 0.05.

Variable pair (Var 1 vs Var 2)	n (sites)	Shapiro-Wilk p-value (Var 1)	Shapiro-Wilk p-value (Var 2)	Spearman/Pearson ρ	p-value
SWM(d) – C _{org} stock	20	0.00	0.10	-0.75	<0.001
SWM(d) – median D50	20	0.00	0.00	0.77	<0.001
Median flux vs C _{org} stock	17	0.00	0.39	0.74	0.001
Median fraction turnover vs 17 carbon stock (top 10cm)		0.00	0.39	0.61	0.009

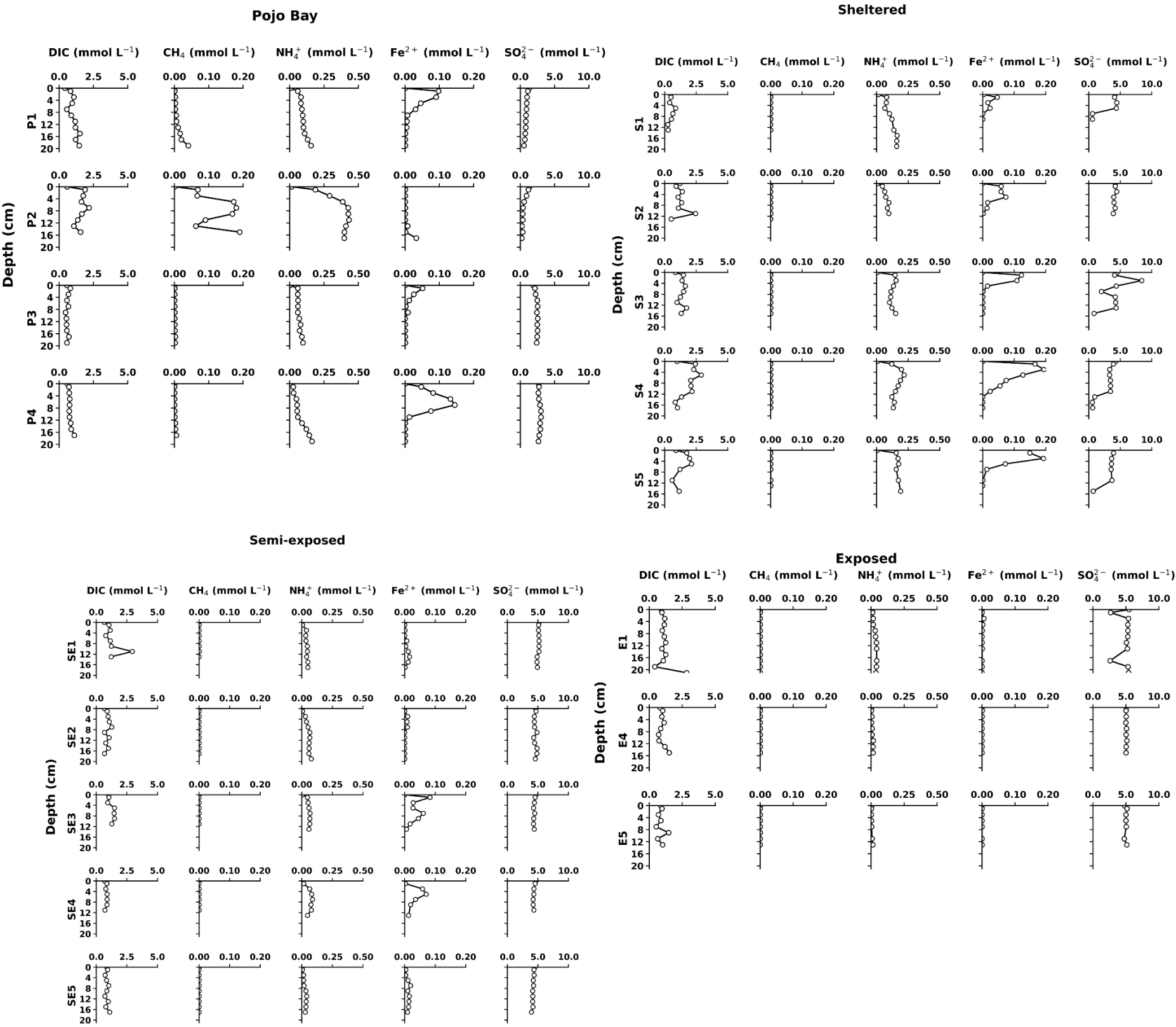


Figure S2. Depth porewater profiles shown for individual site from Pojo Bay, Sheltered, Semi-exposed, and Exposed sites. Y-axes represent the depth (cm) with site label. The concentration (mmol L⁻¹) of solute DIC, CH₄, NH₄⁺, Fe²⁺ and SO₄²⁻ as moving from left to right for respective sites. Solute-specific x-axis limits are kept constant across cores to facilitate comparison among categories.

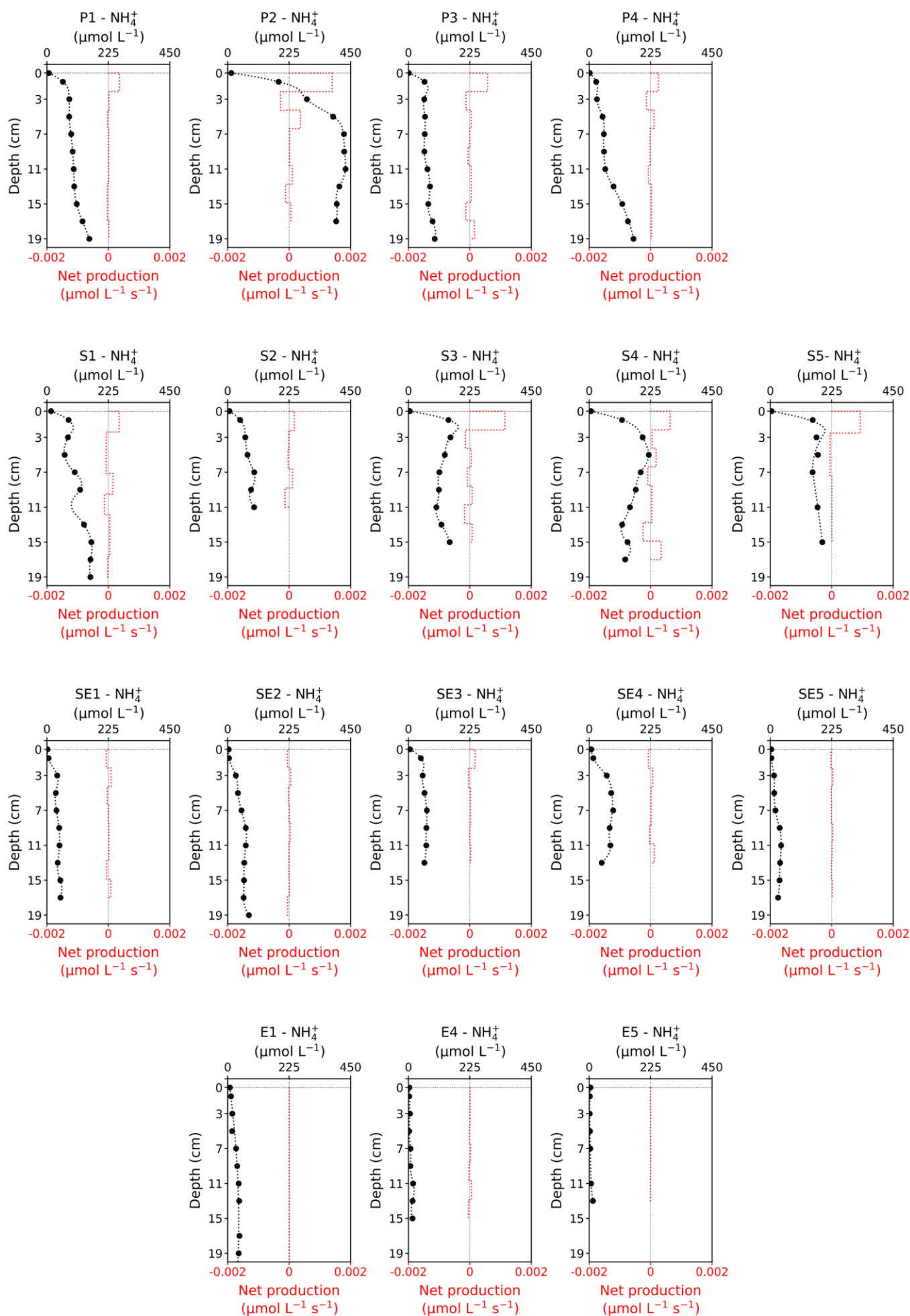


Figure S3. Depth profile of NH_4^+ concentration and modelled (PROFILE) net production for all porewater sampled sites. Black circles show measured NH_4^+ concentrations in porewater, and the black dotted line represents the fitted concentration profile. The red dotted step line shows the depth-distributed net production rate ($\mu\text{mol L}^{-1} \text{s}^{-1}$) estimated from the model. NH_4^+ concentration is plotted on the upper x-axis in $\mu\text{mol L}^{-1}$, depth is shown on the y-axis in cm, and net production is plotted on the lower x-axis in $\mu\text{mol L}^{-1} \text{s}^{-1}$.

Table S3. Carbon turnover expressed from the diffusive fluxes as fraction lost from the standing carbon stock (top 10 cm) lost on an annual basis from three datasets (DS1, DS2, & DS3).

Category	Site	C_{org} stock	DS1	DS2	DS3
		$\text{g C m}^{-2}(\text{top } 10\text{cm})$	fraction lost per year		
Pojo Bay	P1	836	1.41	2.67	3.07
Pojo Bay	P2	881	5.01	10.31	13.33
Pojo Bay	P3	785	0.82	2.94	5.13
Pojo Bay	P4	931	0.39	1.27	1.50
Sheltered	S1	1070	0.03	1.96	2.13
Sheltered	S2	300	-2.00	3.72	2.20
Sheltered	S3	1284	1.26	3.89	5.25
Sheltered	S4	1401	2.68	3.11	4.79
Sheltered	S5	1336	2.45	4.48	5.25

Semi-exposed	SE1	1247	0.50	0.25	0.19
Semi-exposed	SE2	276	1.39	0.73	-1.54
Semi-exposed	SE3	510	0.10	0.68	1.96
Semi-exposed	SE4	546	0.58	0.68	1.27
Semi-exposed	SE5	419	0.27	0.16	0.13
Exposed	E1	298	0.22	0.25	0.28
Exposed	E4	539	0.61	-0.02	-0.14
Exposed	E5	55	2.78	0.00	-0.09

Table S4. The two batches A and B data calculated for mean, SD (standard deviation), cut-off concentration from blank and relative standard deviation (RSD) from the standard measured concentration for both CH₄ and CO₂ for the analytical precision. The cut-off concentrations (CH₄ & CO₂) were calculated using mean+3*SD. Batch A reported to have high RSD (%) and most of the CH₄ concentration in the samples were below the cut-off (marked red). Even though, in the batch A, few blanks have contamination, the CO₂ concentrations measured were above the cut-off concentration.

Batch	Site	Site	Blank	Standard	CH ₄ (Blank)			CH ₄ (standard)	CO ₂ (Blank)			CO ₂ (standard)
	n		n	n	Mean (ppm)	SD	Cut-off concentration (ppm)	RSD (%)	Mean (ppm)	SD	Cut-off concentration (ppm)	RSD (%)
A	10	E1, E4, E5, SE1, SE2, 11 SE3, S1, S2, S3, S4	11		1.44	1.05	4.59	32.15	351.25	344.26	1384.02	31.72
B	7	S5, SE4, SE5, P1, P2, 8 P3, P4	8		0.51	0.2	1.13	1.78	0	0	0	2.65