

Timescale dependence of environmental controls on methane efflux in Poyang Lake, China

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This supporting information contains five tables.

Table S1 Values of environmental variables and their group assignments

Different groups	Environmental variables	Mean value
Group 1	ST (°C)	18.4
	SNC (% DW)	0.097
	WL (m)	12.3
	DOC (mg/L)	3.26
	SpH	6.7
	W NH_4^+ (mg/L)	0.3
	W NO_3^- (mg/L)	1.01
	S NH_4^+ (mg/kg)	17.62
	S NO_3^- (mg/kg)	1.97
	SOC (% DW)	0.9
	C/N ratio	9.3
	Wind speed (m/s)	2.3
Group 2	TN (mg/L)	1.94
	TP (mg/L)	0.12
	COD (mg/L)	2.81
	Chl <i>a</i> (mg/L)	5.5
Group 3	DO (mg/L)	6.87
	EC ($\mu\text{S}/\text{cm}$)	152.6
	WpH	6.8

Note: SOC, soil organic carbon; C/N, sediment C/N ratio; WL, water level; EC, water electrical conductivity; ST, sediment temperature; SNC, the sediment total nitrogen content; S NO_3^- , the sediment NO_3^- concentration; S NH_4^+ , sediment NH_4^+ concentration; DOC, water DOC content; W NH_4^+ , water NH_4^+ concentration ; W NO_3^- , water NO_3^- concentration; WpH, the pH of water; SpH, the pH of sediment; TN, total nitrogen concentration in the water; TP, total phosphorous content in the water; Chl *a*, chlorophyll *a* content in the water; COD, chemical oxygen demand in the water; DO, dissolved oxygen content in the water.

Table S2 Statistical evaluations of seasonal CH₄ effluxes including fixed and random effects using general linear model.

Efflux types	Different effects	Parameter	F-value	P-value
Non-average CH ₄ efflux	Fixed effect	Season	31.65	0
	Random effect	Site	0.65	0.55
Mean CH ₄ efflux	Fixed effect	Season	31.48	0
	Random effect	Site	0.65	0.56

Note: Non-average CH₄ efflux means that we don't average the three study sites prior to investigating seasonal variation in CH₄ efflux. Mean CH₄ efflux means that we average the three study sites prior to investigating seasonal variation in CH₄ efflux.

Table S3 Statistical evaluations of diel CH₄ effluxes including fixed and random effects using general linear model.

Time	Different effects	Parameter	F-value	P-value
24–25 July 2011	Fixed effect	2-hour	22.15	0
	Random effect	Site	1.44	0.26
5–6 September 2012	Fixed effect	2-hour	16.73	0
	Random effect	Site	0.33	0.72
13–14 January 2013	Fixed effect	2-hour	102.69	0
	Random effect	Site	0.92	0.45
14–15 January 2015	Fixed effect	2-hour	141.99	0
	Random effect	Site	1.35	0.28

Note: 2-hour means that we measured CH₄ efflux every 2 h from 8:00 am to 8:00 am the next day.

Table S4 Interactions among environmental variables

	ST	WL	SNO ₃ ⁻	SNC	WNO ₃ ⁻	TN	TP
WL	0.80**						
WNH ₄ ⁺	-0.60**	-0.34*					
TN	-0.52**	-0.45**			0.43**		
SNH ₄ ⁺		-0.55**					
C/N			0.48**				
WNO ₃ ⁻			0.32*				
SOC				0.87**			
COD						0.39*	0.31*

Note: ST, sediment temperature; WL, water level; SNO₃⁻, the sediment NO₃⁻ concentration; SNH₄⁺, sediment NH₄⁺ concentration; WNH₄⁺, water NH₄⁺ concentration; WNO₃⁻, water NO₃⁻ concentration; C/N, sediment C/N ratio; SOC, soil organic carbon; COD, chemical oxygen demand in the water; TN, total nitrogen concentration in the water; TP, total phosphorous content in the water; SNC, the sediment total nitrogen content.

Table S5 Multivariate regressions between seasonal CH₄ efflux and environmental factors at each individual site

Site	No.	Number of variables	Regression Equation	n	R ²	p
Site A	Group 1	12	EffluxCH ₄ = -8.32 + 0.57 ST + 63.12SNC	48	0.67	0.006
	Group1 + Group 2	16	EffluxCH ₄ = -13.27 + 0.59ST + 93.24SNC	43	0.71	0
	Group 1 + Group 2 + Group 3	19	EffluxCH ₄ = -4.05 + 0.58ST + 112.25SNC - 36.48TP - 0.75DO	19	0.88	0
Site B	Group 1	12	EffluxCH ₄ = -11.15 + 0.56ST + 63.14SNC	48	0.63	0.002
	Group1 + Group 2	16	EffluxCH ₄ = -10.45 + 0.58ST + 95.23SNC	43	0.75	0
	Group 1 + Group 2 + Group 3	19	EffluxCH ₄ = -3.68 + 0.57ST + 106.46SNC - 34.23TP - 0.72DO	19	0.91	0
Site C	Group 1	12	EffluxCH ₄ = -9.17 + 0.58 ST + 64.11SNC	48	0.66	0.008
	Group1 + Group 2	16	EffluxCH ₄ = -11.25 + 0.59ST + 94.37SNC	43	0.76	0
	Group 1 + Group 2 + Group 3	19	EffluxCH ₄ = -3.77 + 0.57ST + 107.15SNC - 34.23TP - 0.72DO	19	0.9	0

Note: Variables in group 1 included sediment temperature (ST), sediment total nitrogen content (SNC), water level, DOC content in the water, pH in the sediment, NH₄⁺ and NO₃⁻ concentrations in the water and in the sediment, sediment organic carbon content, the ratio of carbon and nitrogen, and the mean daily wind speed. Variables in group 2 included TN, TP, COD, and Chl *a* contents in the water. Variables in group 3 included DO content, conductivity, and pH in the water.