

Supplementary materials:

Table S1. Physic-chemical properties of sediment samples

Sampling Site	Location	Depth (m)	Sampling Time	Sample ID	Temp (°C)	Salinity	DO (mg/L)	pH	NO ₂ ⁻ (μM)	NO ₃ ⁻ (μM)	NH ₄ ⁺ (μM)
A3	119.84E 39.6183N	19	6/11/2018	A3611	10.36	32.63	8.44	8.03	0.04	0.19	0.49
			7/19/2018	A3719	15.82	32.38	5.47	7.82	0.2	1.45	0.59
			8/08/2018	A3808	23.11	32.01	4.85	7.85	1.07	0.63	0.71
			8/26/2018	A3826	25.02	30.55	6.4	8.06	1.04	0.83	0.13
A4	120.046E 39.5483N	23	6/11/2018	A4611	9.48	32.76	8.9	7.99	0.09	0.53	0.69
			7/19/2018	A4719	13.19	32.32	6.87	7.87	0.38	1.21	1.75
			8/08/2018	A4808	19.02	31.97	4.66	7.81	1.98	0.53	0.04
			8/26/2018	A4826	23.45	31.26	4.72	7.93	0.05	0.16	0.06
A5	120.252E 39.4783N	25	6/11/2018	A5611	9.38	32.73	9.16	7.99	0.13	1.12	0.47
			7/19/2018	A5719	12.7	32.32	6.78	7.89	0.22	1.53	0.38
			8/08/2018	A5808	16.74	31.99	4.57	7.80	0.03	0.18	0.13
			8/26/2018	A5826	21.97	31.66	4.21	7.88	0.41	5.62	0.05
A6	120.458E 39.4083N	22	6/11/2018	A6611	12.52	32.64	8.52	8.04	0.04	0.14	0.15
			7/19/2018	A6719	14.48	32.23	6.18	7.9	0.38	1.79	0.66
			8/08/2018	A6808	16.86	31.98	4.97	7.77	0.92	0.67	1.95
			8/26/2018	A6826	22.71	31.29	5.54	7.99	0.02	0.13	0.07
A7	120.551E 39.3765N	20	6/11/2018	A7611	14.72	32.56	8.39	8.05	0.05	0.17	0.37
			7/19/2018	A7719	16.72	32.04	6.03	7.93	0.37	2.34	0.43
			8/08/2018	A7808	18.39	31.98	4.76	7.8	1.2	0.69	2.02
			8/26/2018	A7826	22.17	31.55	5.18	7.94	0.48	2.2	0.07
<i>p</i> value	Time	0.87			0	0	0	0	0	0.24	0.04
	Site	0			0.89	0.97	0.99	0.99	0.89	0.16	0.92

Table S2. Expression of functional genes related to nitrogen metabolism

ID	functional genes	A3				A4				A5				A6				A7			
		Jun	Jul	Ear-Aug	Lat-Aug	Jun	Jul	Ear-Aug	Lat-Aug	Jun	Jul	Ear-Aug	Lat-Aug	Jun	Jul	Ear-Aug	Lat-Aug	Jun	Jul	Ear-Aug	Lat-Aug
K19338	nac	159.50*	34.75*	10.75*#	210.75*	171.75	147	8.75#	5.00#	9.09	11.92	6.33	19.34	10.42	12.75	9.83	6.67	9.5	11	6	11.08
K16326	yeiL	198.00*	178.00*	41.00*#	239.00*	188	168	45.00#	33.00#	57.34	42.67	18.33	88.34	45.67	50	77.33	33.67	49	35	31	54.33
K13599	ntrX	165.67*	146.67*	38.83*#	188.50*	123.83	105	40.50#	29.00#	55.67	39.5	15.83	81.67	47.5	47.17	75	37	49.7	28	29.67	49.5
K13598	ntrY	123.3	94.08	29.92#	129.75	160.92	132	22.25#	22.50#	23.92	41.42	32	21.17	83.42	650.58#	35.83	44.67	82.3	58	65.33	23.08
K07712	glnG, ntrC	60.67*	68.67*	1.33*#	75.00*	38.33	46.3	2.00#	1.00#	1.67	2	1.33	5.67	2	1.67	2	1	0.67	2	1.67	1
K07708	glnL, ntrB	60.67*	68.67*	1.33*#	75.00*	38.33	46.3	2.00#	1.00#	1.67	2	1.33	5.67	2	1.67	2	1	0.67	2	1.67	1
K05601	hcp	48	40.75	23.25	25.75	53.25	46	16.25	18.5	19.25	34.75	28	10.5	78.75	643.25#	30.5	43	78	50	62	14.75
K04752	glnK	28.5	31.5	21.5	4	35.5	38.5	15.5	18.5	19	34.5	27.5	9.5	76	642.50#	30	42	77.5	50	61	13
K04751	glnB	123.34*	137.84*	3.66*#	160.00*	84.66	99.2	4.00#	2.00#	5.84	5	3.16	12.34	4	3.34	5	2	3.34	4	3.34	2
K04488	iscU, nifU	123.34*	137.84*	3.66*#	160.00*	84.66	99.2	4.00#	2.00#	5.84	5	3.16	12.34	4	3.34	5	2	3.34	4	3.34	2
K03385	nrfA	123.34*	137.84*	3.66*#	160.00*	84.66	99.2	4.00#	2.00#	5.84	5	3.16	12.34	4	3.34	5	2	3.34	4	3.34	2
K02806	PTS-Ntr-EIIA, ptsN	2	0.5	1	10	8	6.5	0	0	2.5	1	0.5	1	0	0	1	0	2	0	0	0
K02575	NRT, narK, nrtP, nasA	62.67*	69.17*	2.33*#	85.00*	46.33	52.8	2.00#	1.00#	4.17	3	1.83	6.67	2	1.67	3	1	2.67	2	1.67	1
K02568	napB	152.2	157.67	53.83#	149	120.83	126	54.5	47.5	74.17	73.5	42.33	89.17	118	684.17#	102	77	125	76	87.67	58
K02567	napA	28.5	31.5	21.5	4	35.5	38.5	15.5	18.5	19	34.5	27.5	9.5	76	642.50#	30	42	77.5	50	61	13
K01915	glnA, GLUL	354	298.75	104.75	378.25	329.75	275	99.75	79.5	130.59	114.92	60.83	174.84	169.9	742.75#	182.8	112.67	177	112	122	118.58

K01725	cynS	62.67*	69.17*	2.33*#	85.00*	46.33	52.8	2.00#	1.00#	4.17	3	1.83	6.67	2	1.67	3	1	2.67	2	1.67	1
K01673	cynT, can	62.67*	69.17*	2.33*#	85.00*	46.33	52.8	2.00#	1.00#	4.17	3	1.83	6.67	2	1.67	3	1	2.67	2	1.67	1
K00926	arcC	151.84*	169.34*	25.16*#	164.00*	120.16	138	19.50#	20.50#	24.84	39.5	30.66	21.84	80	645.84#	35	44	80.8	54	64.34	15
K00459	ncd2, npd	62.67*	69.17*	2.33*#	85.00*	46.33	52.8	2.00#	1.00#	4.17	3	1.83	6.67	2	1.67	3	1	2.67	2	1.67	1
K00374	narI, narV	2	0.5	1	10	8	6.5	0	0	2.5	1	0.5	1	0	0	1	0	2	0	0	0
K00371	narH, narY, nxrB	149.17*	139.42*	40.08*#	166.75*	109.08	99.3	39.75#	29.00#	55.42	39.25	15.33	80.67	44.75	50.42	76.5	36	50.2	29	29.67	48.75
K00370	narG, narZ, nxrA;	149.17*	159.67*	64.83*#	209.00*	120.83	131	58.50#	55.50#	85.17	79.5	43.33	93.17	126	683.17	104	80	133	78	88.67	61
K00367	narB	90.17	105.67	34.83	149	81.83	97.3	21.5	27.5	34.17	45.5	30.33	21.17	87	646.17#	36	49	90.2	54	63.67	17
K00366	nirA	62.67	69.17	2.33	85	46.33	52.8	2	1	4.17	3	1.83	6.67	2	1.67	3	1	2.67	2	1.67	1
K00363	nirD	62.67*	69.17*	2.33*#	85.00*	46.33	52.8	2.00#	1.00#	4.17	3	1.83	6.67	2	1.67	3	1	2.67	2	1.67	1
K00362	nirB	62.67*	69.17*	2.33*#	85.00*	46.33	52.8	2.00#	1.00#	4.17	3	1.83	6.67	2	1.67	3	1	2.67	2	1.67	1
K00284	E1.4.7.1	3	2	3	0	3	2	0	0	0	0	0	0	0	4	2	0	1	1	1	1
K00266	gltD	3	2	3	0	3	2	0	0	0	0	0	0	0	4	2	0	1	1	1	1
K00265	gltB	60.67*	68.67*	1.33*#	75.00*	38.33	46.3	2.00#	1.00#	1.67	2	1.33	5.67	2	1.67	2	1	0.67	2	1.67	1
K00262	E1.4.1.4, gdhA	60.67*	68.67*	1.33*#	75.00*	38.33	46.3	2.00#	1.00#	1.67	2	1.33	5.67	2	1.67	2	1	0.67	2	1.67	1

* $p<0.05$, significant difference in expression of functional genes related to nitrogen metabolism between sampling sites.

$p<0.05$, significant difference in expression of functional genes related to nitrogen metabolism between sampling months in one specific site.

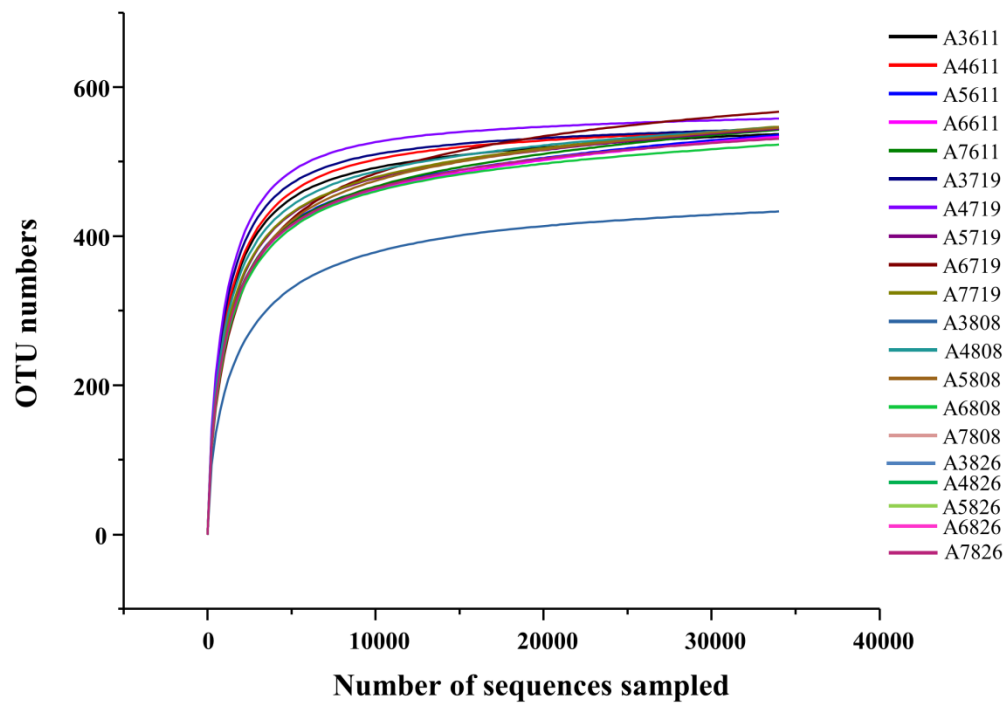


Figure S1. Rarefaction curves of 16S rRNA. The plot shows rarefaction curves from each sample normalized with 34070 sequences.

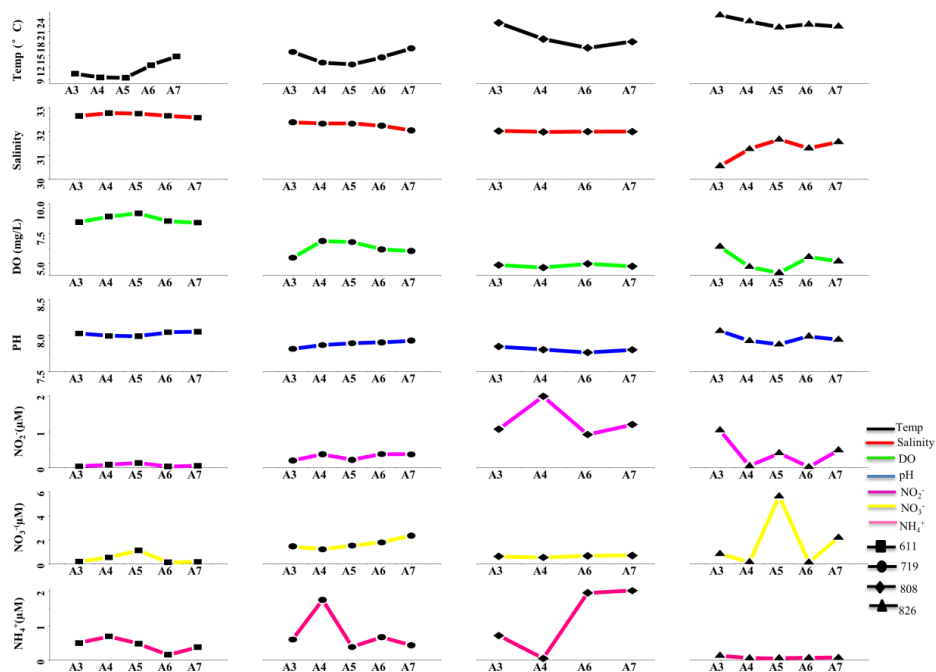


Figure S2. The vertical profile of biogeochemical parameters (temperature, salinity, pH, dissolved oxygen, ammonium, nitrate and nitrite) of each sediment sample in June(square), July(circle), early August (diamond) and late August (triangle). Different parameters were represented by different colors.