

Supplementary Material

Differences of nitrogen transformation pathways and their functional microorganisms in water and sediment of a seasonally frozen lake, China

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Table S1 Statistics of metagenomic sequencing data

Sample group	Sample ID	Raw reads	Raw base (bp)	Clean reads	Clean base (bp)	Percentage of clean reads in raw reads	Contigs	ORFs
Surface water	WL1_W1	88463084	13357925684	86603048	12977682257	97.90	1109064	1434043
	WL2_W1	78632274	11873473374	73494128	10973832097	93.47	859268	844909
	WL3_W1	80743274	12192234374	78537414	11742672972	97.27	887651	1083819
	Average	82612877	12474544477	79544863	11898062442	96.21	951994	1120924
Bottom water	WL1_W2	77172888	11653106088	75122898	11302234577	97.34	853962	1253041
	WL2_W2	84972124	12830790724	83049544	12447104975	97.74	893387	989632
	WL3_W2	86767602	13101907902	83479316	12520177824	96.21	892756	1054616
	Average	82970871	12528601571	80550586	12089839125	97.10	880035	1099096
Surface sediment	WL1_S1	87604762	13228319062	85530096	12899367686	97.63	891803	1094650
	WL2_S1	92124520	13910802520	90236080	13596231557	97.95	1047678	1350735
	WL3_S1	89074522	13450252822	87145064	13138500504	97.83	1169215	1568126
	Average	89601268	13529791468	87637080	13211366582	97.80	1036232	1337837
Total		765555050	115598812550	743197588	111597804449	97.08	8604784	10673571

Table S2 Physical and chemical properties of water samples

Sample group	TN (mg/L)	NH ₄ ⁺ -N (mg/L)	NO ₃ ⁻ -N (mg/L)	NO ₂ ⁻ -N (mg/L)	DIN (mg/L)	TON (mg/L)	TOC (mg/L)	C/N	WT (°C)	pH	DO (mg/L)	ORP (mV)
Surface water	2.27 ±1.48a	0.82 ±0.29a	0.90 ±0.90a	0.03 ±0.02a	1.75 ±1.22a	0.52 ±0.26a	14.87 ±1.57a	12.66 ±4.87a	1.7 ±0.15b	8.24 ±0.03a	9.10 ±0.21a	-88.3 ±17.13a
Bottom water	2.84 ±1.55a	1.09 ±0.29a	1.09 ±1.09a	0.04 ±0.02a	2.22 ±1.27a	0.62 ±0.30a	16.53 ±1.33a	9.84 ±4.29a	5.0 ±1.84a	8.14 ±0.07a	5.50 ±1.60b	-71.0 ±24.29a

Note: Values are the means \pm standard error (SE; n = 3). The same letter in the same column indicates no significant difference, and different letter indicates a statistically significant difference at $P \leq 0.05$. TN, total nitrogen; $\text{NH}_4^+\text{-N}$, ammonium; $\text{NO}_3^-\text{-N}$, nitrate; $\text{NO}_2^-\text{-N}$, nitrite; DIN, dissolved inorganic nitrogen; TON, total organic nitrogen; TOC, total organic carbon; C/N, ratio of total organic carbon to total nitrogen; WT, water temperature; DO, dissolved oxygen; and ORP, oxidation-reduction potential.

Table S3 Physical and chemical properties of sediment samples

Sample group	TN (g/kg)	$\text{NH}_4^+\text{-N}$ (mg/kg)	$\text{NO}_3^-\text{-N}$ (mg/kg)	$\text{NO}_2^-\text{-N}$ (mg/kg)	DIN (mg/kg)	DON (mg/kg)	TOC (g/kg)	C/N
Surface	1.68	40.29	6.67	0.13	47.09	125.17	31.25	19.21
sediment	± 0.20	± 3.32	± 1.17	± 0.02	± 3.88	± 24.56	± 2.85	± 0.89

Note: Values are the means \pm standard error (SE; n = 3). TN, total nitrogen; $\text{NH}_4^+\text{-N}$, ammonium; $\text{NO}_3^-\text{-N}$, nitrate; $\text{NO}_2^-\text{-N}$, nitrite; DIN, dissolved inorganic nitrogen; DON, dissolved organic nitrogen; TOC, total organic carbon; and C/N, ratio of total organic carbon to total nitrogen.