Responses of microbial community and functional properties to water level fluctuations in a seasonal lake

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Study meaning

Lake water level fluctuations (WLFs) has an significant effect on nitrogen cycle at land-water interface[1]. Poyang Lake is a typical seasonal lake where low-lying areas (shallow-lakes, SL) be inundated for all year, while mudflats (MD) be inundated for only a few weeks during wet season[2]. In this study, we compared the bacterial communities and metabolic functioning between SL and MD. Our results are shown in the figure and table below, which would enriche our knowledge of WLFs impacts on seasonal lakes ecosystem.

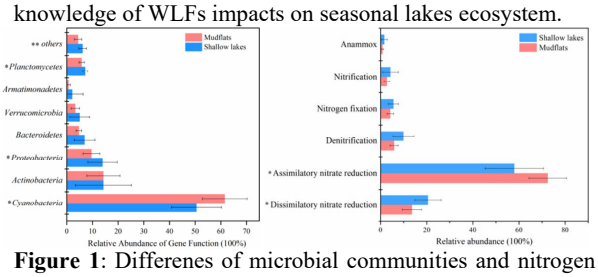

Figure 1: Differenes of microbial communities and nitrogen cycling pathways in SL and MD. "*" indicates $p<0.05$ level.

	Turb	TP	TN	NO_3^-	NH_4^+	DOC
Shallow-lakes						
Dissimilatory nitrate	-0.700	0.103	0.900*	0.700*	0.051	0.800*
Assimilatory nitrate	0.900*	-0.359	-0.800*	-0.600	-0.205	-0.900*
Denitrification	-0.700*	0.103	0.900*	0.700*	0.051	0.800*
Nitrification	-0.700*	0.564	0.600	0.200	0.205	0.500
Anammox	0.900*	-0.821	-0.500	-0.100	-0.359	-0.600
Mudflats						
Dissimilatory nitrate	-0.392	-0.186	0.566*	0.601*	-0.239	-0.084*
Assimilatory nitrate	0.883*	0.193	-0.538	-0.622*	0.604*	0.112
Denitrification	-0.590*	-0.285	0.601*	0.664*	-0.298	-0.077
Nitrification	-0.580*	0.091	0.413	-0.336	0.004	0.028
Anammox	0.287	-0.612*	0.070	0.238	-0.421	-0.392

Table 1: Relationship of nitrogen metabolism and factors.

Discussion of Results

Assimilatory pathway can reduce of NO_3^- to NO_2^- and then to NH_4^+ in sediment, and the changes of soil from dry to wet could cause a large amount of this mineralized nitrogen rapidly released at land-water interface in a short time[3]. MD experienced the process of soil from dry to wet under the WFLs, while SL was not. Compared to SL, in MD through nitrogen assimilation pathway, more mineralized nitrogen released from sedimdent, and this nitrogen can be used by *Cyanobacteria* for its growth.

[1] Wan et al (2018) *Chinese Geogr Sci* **3**, 456-469.[2] Liang et al (2016) *Environ Earth Sci* **3**, 255.[3] Ye et al (2019) *Sci Total Environ* **659**, 302-313.