

Supplementary Materials

Table S1. The 2θ , interlayer spacing (d) and crystal size (CS) of different experimental groups in the experiment.

Times	Control	M	LAA	LMB	LAA+M	LMB+M	Original LAA	Original LMB
2θ (°)	29.578	29.493	29.488	29.477	29.475	29.468	26.691	26.662
d (nm)	0.097	0.094	0.094	0.093	0.093	0.093	0.110	0.111
CS (nm)	51.6	57.8	42	43.4	41.5	46.3	29.4	13.5

Table S2. The release and accumulation rates (r) of P in sediments cores during the experiment.

Experiment Group	NH ₄ Cl-P	BD-SRP	BD-ORP	NaOH-SRP	NaOH-ORP	HCl-SRP	HCl-ORP	Res-P
Control	-42%	-23%	-43%	45%	2%	22%	146%	0%
M	-48%	1%	-67%	10%	42%	10%	61%	-2%
LAA	-34%	-28%	-41%	22%	13%	5%	-29%	-10%
LMC	-31%	-49%	-31%	12%	98%	21%	544%	-10%
LAA+M	-32%	-32%	-16%	28%	93%	-1%	7%	-6%
LMC+M	-16%	-31%	3%	5%	23%	24%	-43%	5%

Table S3. The fast-release and sedimentation rates (R_1) of different P forms in sediments cores during the experiment.

Experiment Group	NH ₄ Cl-P	BD-SRP	BD-ORP	NaOH-SRP	NaOH-ORP	HCl-SRP	HCl-ORP	Res-P	
30-day	Control	1%	14%	7%	2%	-2%	1%	-4%	1%
	M	0.1%	7%	33%	5%	2%	2%	-3%	12%
	LAA	-1%	-6%	31%	-2%	-16%	3%	-4%	-5%
	LMB	-1%	-12%	-4%	-8%	-13%	-7%	15%	5%
	LAA+M	-1%	-7%	-13%	-7%	-5%	12%	10%	-1%
	LMB+M	-1%	-9%	-1%	-14%	2%	11%	8%	-19%
60-day	Control	5%	13%	11%	23%	129%	7%	-28%	16%
	M	0.2%	-4%	-3%	-7%	29%	-1%	5%	7%
	LAA	0.5%	-1%	5%	1%	-3%	-1%	-0.4%	-11%
	LMB	1%	0.1%	-8%	-41%	-10%	30%	1%	21%
	LAA+M	-0.3%	-5%	-0.1%	-10%	-68%	12%	4%	-2%
	LMB+M	-1%	2%	-5%	-5%	-8%	10%	3%	-1%

Table S4. The flow-release and sedimentation rates (R_2) of different P forms in sediments cores during the experiment.

Experiment Group	NH ₄ Cl-P	BD-SRP	BD-ORP	NaOH-SRP	NaOH-ORP	HCl-SRP	HCl-ORP	Res-P	
30-day	Control	1%	14%	28%	-26%	1%	9%	-14%	6%
	M	1%	11%	41%	-7%	-9%	10%	-8%	12%
	LAA	-1%	-2%	26%	-18%	-36%	6%	-1%	9%
	LMB	-1%	-1%	-3%	-23%	-33%	-14%	17%	9%
	LAA+M	-0.4%	-5%	8%	-35%	32%	12%	4%	-3%
	LMB+M	-2%	-26%	24%	-2%	9%	4%	24%	-9%
60-day	Control	7%	-5%	55%	62%	-37%	4%	-8%	3%
	M	1%	-22%	25%	2%	30%	-4%	9%	8%
	LAA	1%	-15%	18%	-26%	24%	6%	2%	-8%
	LMB	-0.1%	-5%	1%	-25%	14%	38%	2%	15%
	LAA+M	-0.3%	-5%	-0.1%	-10%	-68%	12%	4%	-2%
	LMB+M	-1%	2%	-5%	-5%	-8%	10%	3%	-1%

Table S5. The increase or decrease rates of different P forms in the sediment cores of different treatment groups relative to the control group during the experiment.

Experiment Group	NH ₄ Cl-P	BD-SRP	BD-ORP	NaOH-SRP	NaOH-ORP	HCl-SRP	HCl-ORP	Res-P	
30-day	Control	-8%	-15%	8%	5%	12%	-4%	-38%	-2%
	M	20%	-9%	15%	4%	15%	-26%	46%	-17%
	LAA	36%	-36%	29%	-8%	40%	-7%	-109%	-8%
	LMB	28%	4%	23%	6%	13%	-25%	-161%	-13%
	LAA+M	20%	-15%	4%	-1%	27%	-10%	-169%	0%
	LMB+M	-8%	-15%	8%	5%	12%	-4%	-38%	-2%
60-day	Control	0.3%	-40%	49%	24%	15%	10%	-225%	5%
	M	8%	8%	-2%	14%	4%	-8%	-67%	-3%
	LAA	21%	16%	6%	15%	-6%	-3%	-479%	5%
	LMB	14%	16%	-15%	8%	-31%	-1%	-378%	-6%
	LAA+M	-19%	-12%	-74%	25%	16%	-12%	-220%	-3%
	LMB+M	0.3%	-40%	49%	24%	15%	10%	-225%	5%

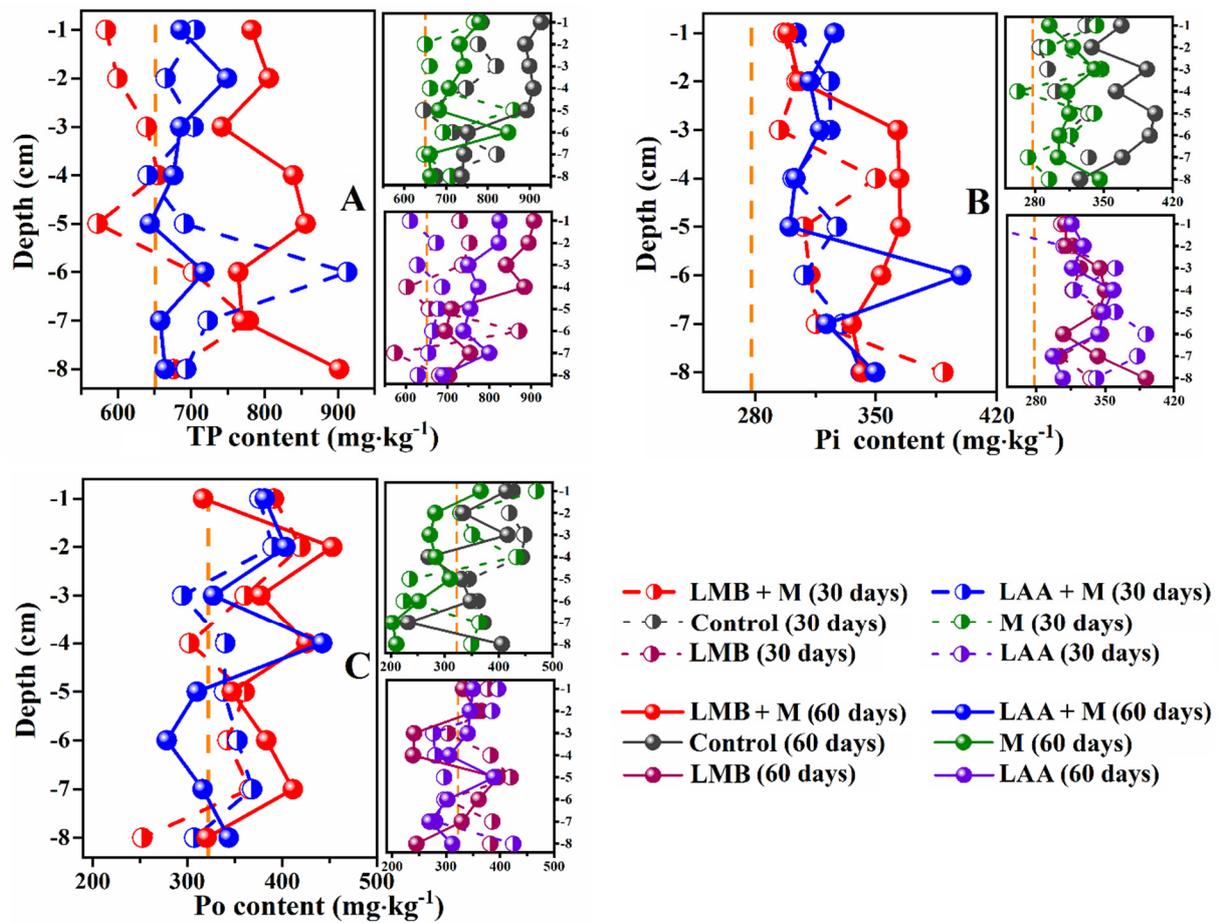


Figure S1. Vertical distribution of P content in the sediments of the different treatments during the experiment. (A), (B), and (C) represent the content changes of TP, Pi, and Po in the sediments, and each graph consists of three distinct subgraphs. The left subgraphs represent LAA+M and LMB+M groups, respectively. The upper right subgraphs represent control and M groups, respectively. The lower right subgraphs represent LAA and LMB groups, respectively. All data are three replicates.

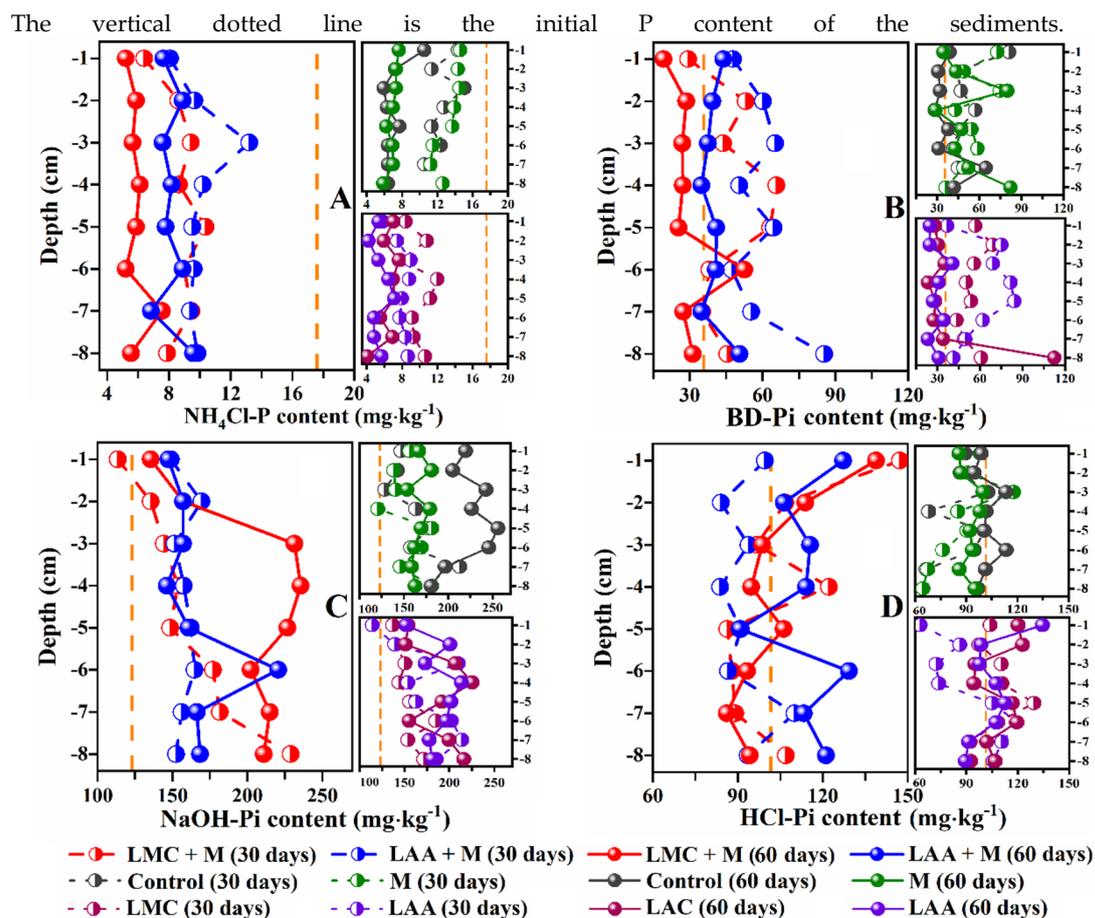


Figure S2. Vertical distribution of P content in sediments of different treatments during the experiment. (A), (B), (C), and (D) represent the changes in the content of inorganic $\text{NH}_4\text{Cl-P}$, BD-Pi, NaOH-Pi and HCl-Pi in the sediments, respectively. Each graph consists of three distinct subgraphs. The left subgraphs represent LAA+M and LMB+M groups, respectively. The upper right subgraphs represent control and M groups, respectively. The lower right subgraphs represent LAA and LMB groups, respectively. All data are triplicates. The vertical dashed line is the initial P content of the sediments.

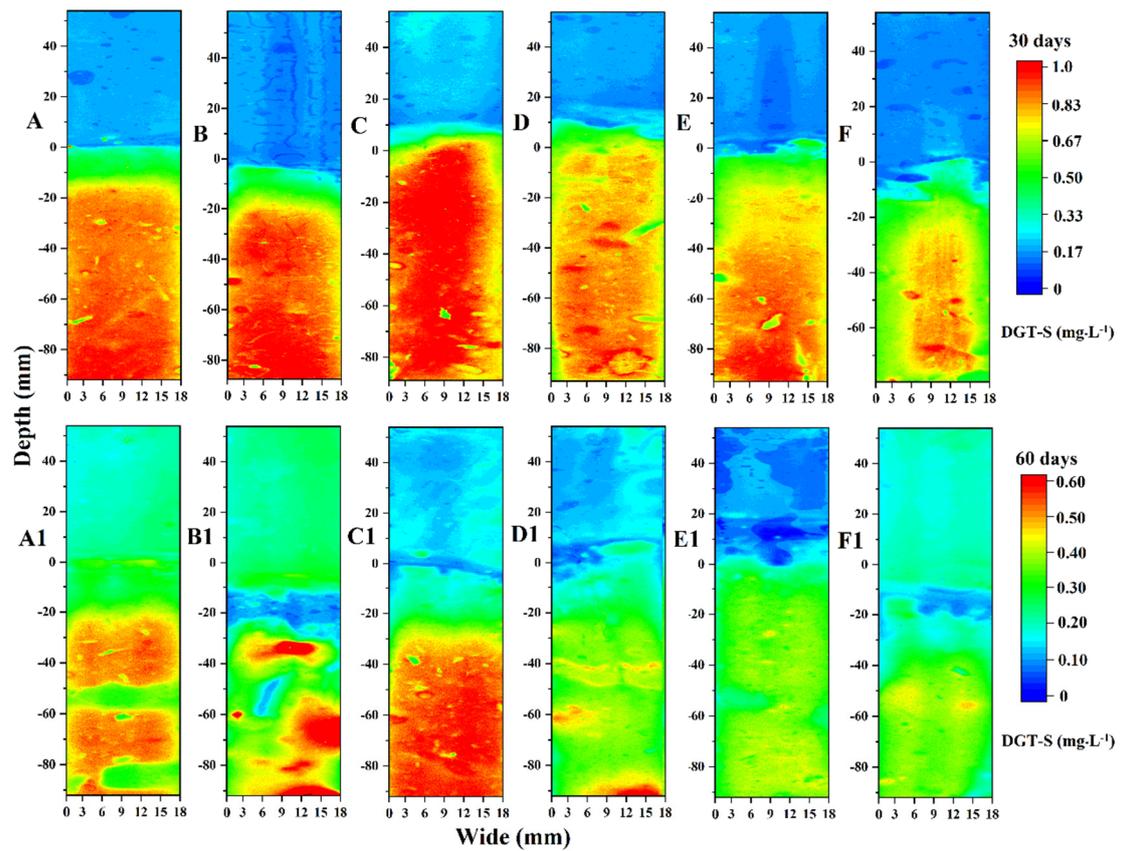


Figure S3. Vertical variation of DGT-labile S in sediments during the experiment. (A), (B), (C), (D), (E), and (F) are the changes of DGT-labile S in the sediments of the Control, M, LAA, LMB, LAA+M and LMB+M repaired on the 30-day, respectively. (A1), (B1), (C1), (D1), (E1), and (F1) are the changes of DGT-labile S in the sediments of the Control, M, LAA, LMB, LAA+M and LMB+M repaired on the 60-day, respectively.

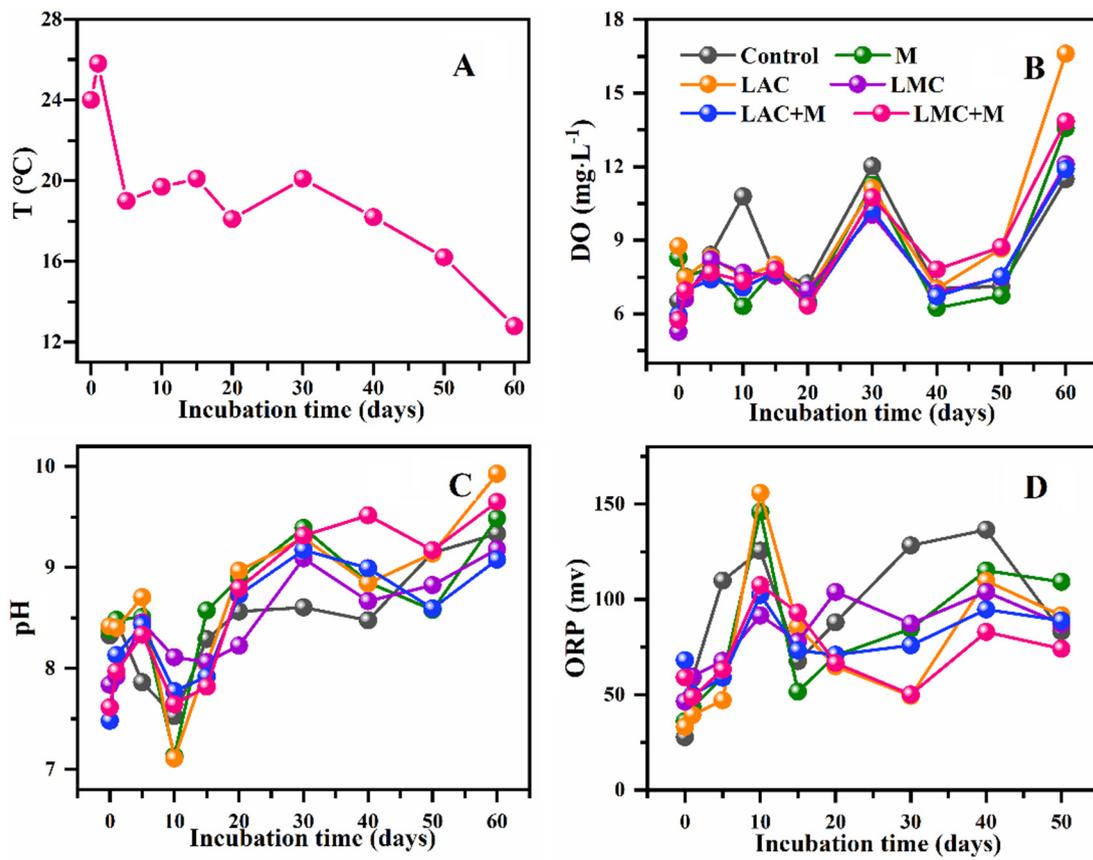


Figure S4. Water quality parameters. (A), (B), (C) and (D) respectively represent the overlying water temperature (T), dissolved oxygen (DO), pH and redox potential (ORP) changes during the experiment.