

Table S1. Results of Two-way ANOVA for DOC

Parameter	Sum of Squares	Df	Mean Square	F-value	P-value
Temperature	25208307	11	2291664	119.0517	5.64E-29
Mixing ratios	7799015	4	1949754	101.2895	1.32E-21
Residual	846970	44	19249.32		
Total	33854292	59			

Table S2. Results of Two-way ANOVA for pH

Parameter	Sum of Squares	Df	Mean Square	F-value	P-value
Temperature	13.76357	11	1.251234	45.03136	2.79E-20
Mixing ratios	0.242983	4	0.060746	2.186216	0.086142
Residual	1.222577	44	0.027786		
Total	15.22913	59			

Table S3. Results of Two-way ANOVA for TAN

Parameter	Sum of Squares	Df	Mean Square	F-value	P-value
Temperature	1732593	11	157508.4	65.38784	1.5E-23
Mixing ratios	41929.64	4	10482.41	4.351654	0.004729
Residual	105988.7	44	2408.834		
Total	1880511	59			

Table S4. Results of Two-way ANOVA for FAN

Parameter	Sum of Squares	Df	Mean Square	F-value	P-value
Temperature	744145.3	11	67649.58	23.21904	8.55E-15
Mixing ratios	40856.43	4	10214.11	3.505739	0.014364
Residual	128195.7	44	2913.539		
Total	913197.5	59			

Table S5. Results of Two-way ANOVA for cumulative methane yield

Parameter	Sum of Squares	Df	Mean Square	F-value	P-value
Temperature	63066.14	13	4851.242	28.62172	4.01E-19
Mixing ratios	22921.4	4	5730.351	33.80835	6.77E-14
Residual	8813.748	52	169.4951		
Total	94801.3	69			

Table S6. Results of Two-way ANOVA for NCST

Parameter	Sum of Squares	Df	Mean Square	F-value	P-value
Temperature	240.0235	11	21.82032	11.17419	1.75E-09
Mixing ratios	141.085	4	35.27125	18.06243	7.65E-09
Residual	85.92064	44	1.952742		
Total	467.0291	59			

Table S7. Results of Two-way ANOVA for TS of sediment

Parameter	Sum of Squares	Df	Mean Square	F-value	P-value
Temperature	1.731228	11	0.157384	0.612302	0.808237
Mixing ratios	55.79998	4	13.95	54.27226	1.87E-16
Residual	11.30964	44	0.257037		
Total	68.84085	59			

Table S8. Results of Two-way ANOVA for ultimate methane yield

Parameter	Sum of Squares	Df	Mean Square	F-value	P-value
Temperature	6.669336	1	6.669336	0.051403	0.831755
Mixing ratios	5621.116	4	1405.279	10.83098	0.020225
Residual	518.9849	4	129.7462		
Total	6146.77	9			

Table S9. Results of Two-way ANOVA for maximum methane production rate

Parameter	Sum of Squares	Df	Mean Square	F-value	P-value
Temperature	24.70115	1	24.70115	8.807865	0.041234
Mixing ratios	25.1539	4	6.288475	2.242326	0.226694
Residual	11.21777	4	2.804443		
Total	61.07282	9			

Table S10. Results of Two-way ANOVA for lag phase

Parameter	Sum of Squares	Df	Mean Square	F-value	P-value
Temperature	5.256105	1	5.256105	1.050167	0.363395
Mixing ratios	80.57105	4	20.14276	4.024514	0.103065
Residual	20.02007	4	5.005017		
Total	105.8472	9			