

Supporting Information

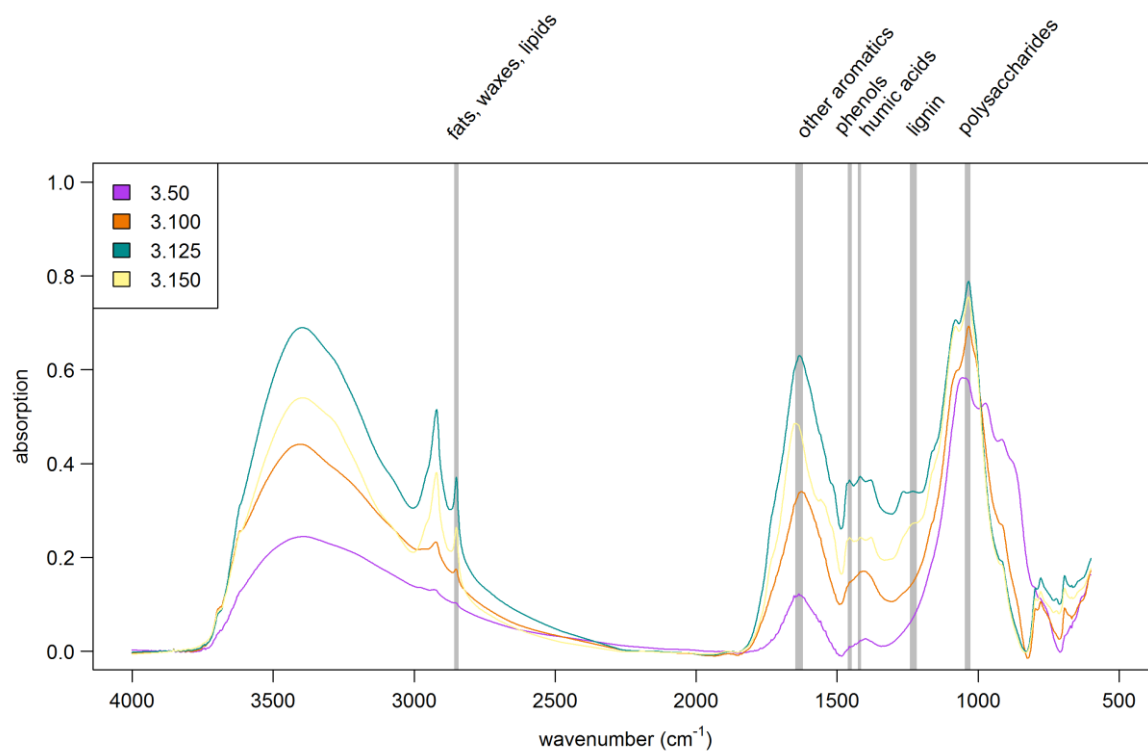


Figure S1: FTIR spectra of samples from transect 3.

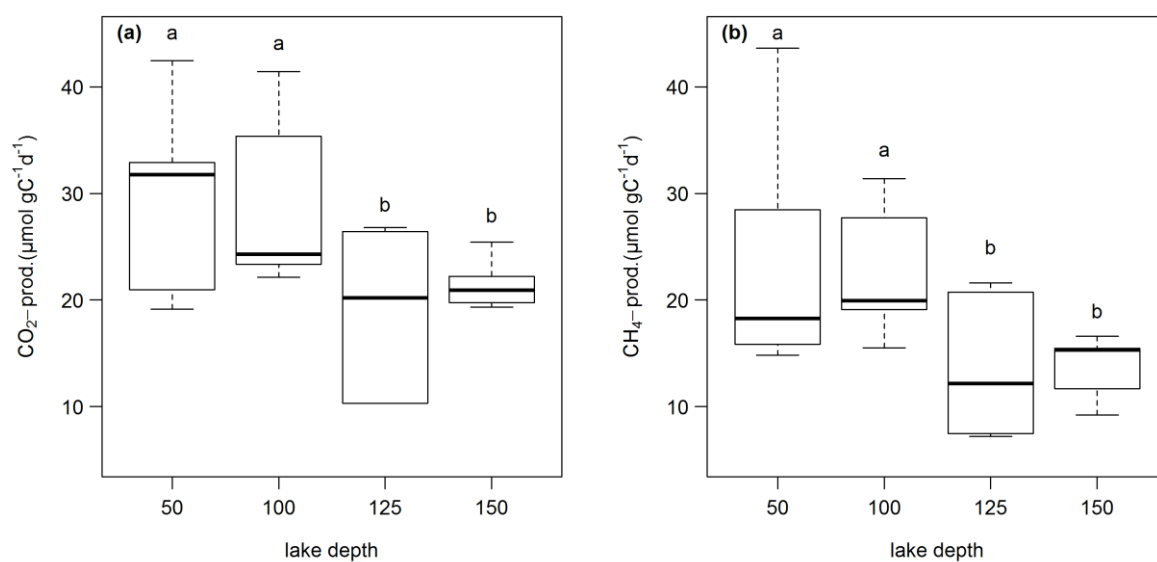


Figure S2: CO₂ (a) and CH₄ (b) production rates in the upper 5 cm of the sediment vs. lake depth. $n=12$. Different letters denote significant differences between groups.

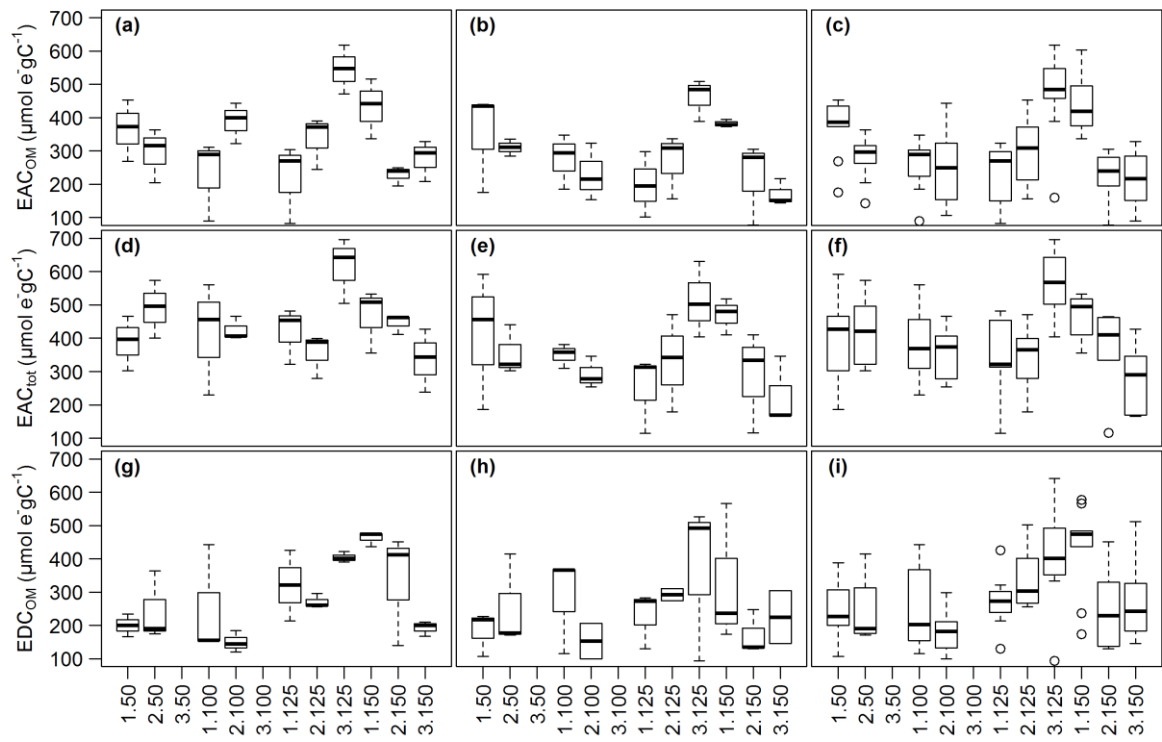


Figure S3: Spatio-temporal variability of EAC_{OM} (a, b, c), EAC_{tot} (d, e, f) and EDC_{OM} (g, h, i) in the incubation experiment at the beginning (a, d, g, $n = 3$), and the end (b, e, h, $n = 3$) of the experiment as well as average values for the whole experiment (c, f, i, $n = 6$).

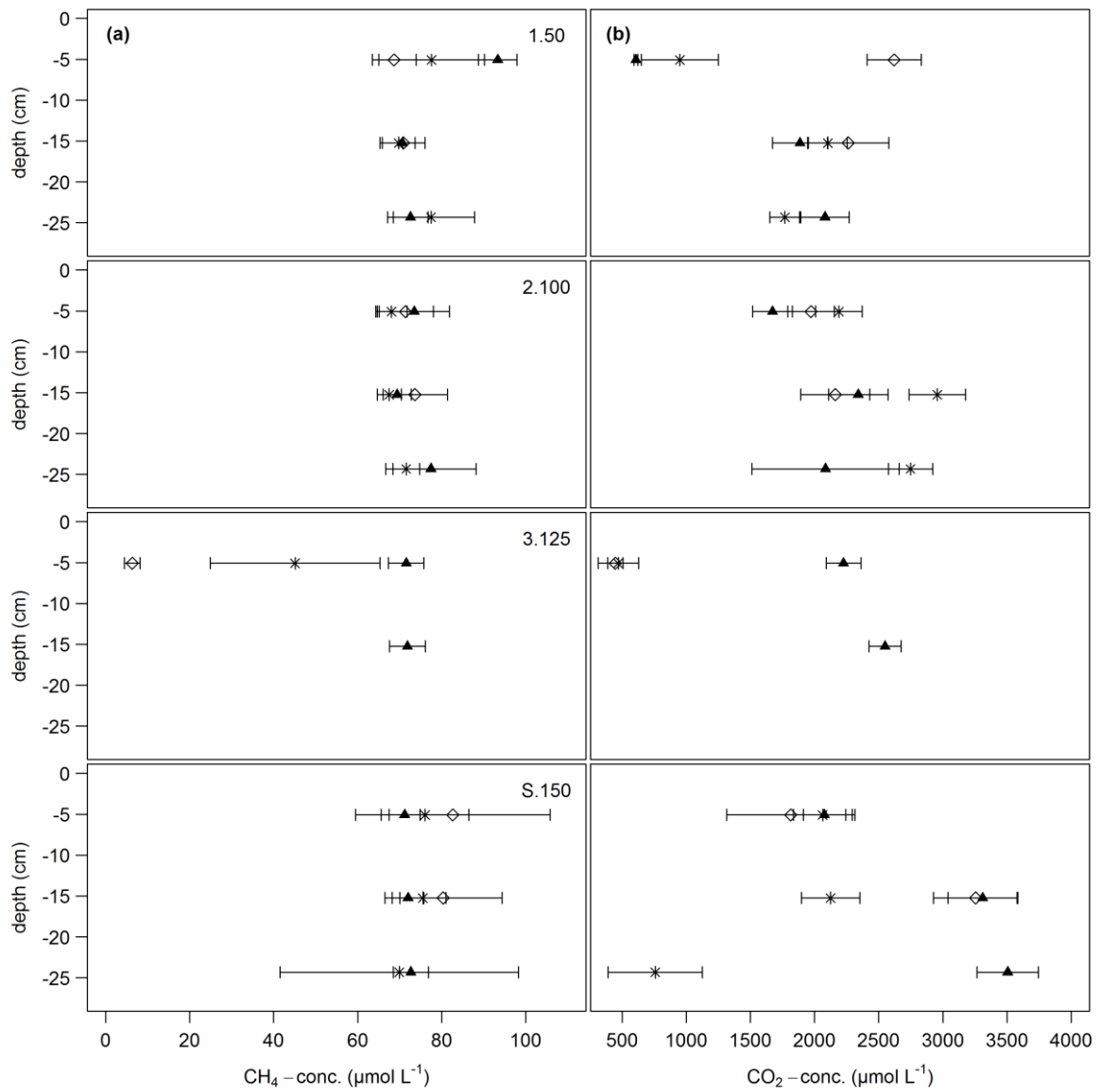


Figure S4: Depth profile of CH_4 (a) and CO_2 (b) concentration in the sediment of the mesocosms. Different symbols denote three replicates at each site. Values are means over sampling period \pm SD. $n = 2-10$

15 **Table S1:** Spearman's rank correlation coefficients and significance levels for all measured parameters. *Italic numbers denote no significant correlations.*

	CH ₄ production		CO ₂ production		Q ₁₀ (CH ₄)		acetoclastic methanog.		EDC		EAC _{OM}		CH ₄ flux		CO ₂ flux	
	<i>p</i>	<i>rho</i>	<i>p</i>	<i>rho</i>	<i>p</i>	<i>rho</i>	<i>p</i>	<i>rho</i>	<i>p</i>	<i>rho</i>	<i>p</i>	<i>rho</i>	<i>p</i>	<i>rho</i>	<i>p</i>	<i>rho</i>
aromatics	0.001	-0.669	0.002	-0.641	0.034	-0.821							<i>0.132</i>	<i>-0.595</i>	<i>0.197</i>	<i>-0.524</i>
fats, waxes, lipids	0.000	-0.700	0.000	-0.736	0.034	-0.821			0.001	0.565			0.015	-0.833	<i>0.428</i>	<i>-0.333</i>
humic acids	0.003	-0.618	0.001	-0.653	0.034	-0.821							0.015	-0.833	<i>0.389</i>	<i>-0.357</i>
lignin	0.003	-0.606	0.003	-0.610	0.034	-0.821							0.021	-0.786	<i>0.352</i>	<i>-0.381</i>
phenols	0.003	-0.606	0.001	-0.667	0.034	-0.821							0.015	-0.833	<i>0.389</i>	<i>-0.357</i>
C	<i>0.194</i>	<i>-0.287</i>	<i>0.327</i>	<i>-0.219</i>									<i>0.058</i>	<i>-0.714</i>	<i>0.665</i>	<i>-0.190</i>
C/N	<i>0.356</i>	<i>-0.206</i>	<i>0.378</i>	<i>-0.197</i>			0.013	0.447					0.007	-0.881	<i>0.428</i>	<i>-0.333</i>
H₂ concentration	0.000	0.450	0.000	0.515							<i>0.157</i>	<i>-0.285</i>				
acetate concentration	<i>0.492</i>	<i>0.248</i>	<i>0.191</i>	<i>0.455</i>							0.002	-0.387				
hydrogenotrophic acetoclastic											0.031	0.426				
EAC_{OM}	<i>0.946</i>	<i>0.030</i>	<i>0.470</i>	<i>-0.261</i>							<i>0.748</i>	<i>0.042</i>				
EAC_{inorg}	<i>0.204</i>	<i>-0.442</i>	<i>1.000</i>	<i>0.006</i>												
EAC_{tot}	<i>0.191</i>	<i>-0.455</i>	<i>0.470</i>	<i>-0.261</i>												
EDC	0.031	-0.697	0.039	-0.673												
EAC/EDC	<i>0.247</i>	<i>0.406</i>	<i>0.407</i>	<i>0.297</i>												
EEC	<i>0.166</i>	<i>-0.479</i>	<i>0.054</i>	<i>-0.636</i>												
S (%)	0.019	-0.577	<i>0.087</i>	<i>-0.441</i>												
clay													0.023	0.648	0.037	0.605
silt													<i>0.101</i>	<i>0.497</i>	<i>0.340</i>	<i>0.302</i>
sand													0.023	-0.648	0.037	-0.605
CH₄ stock change													<i>0.163</i>	<i>-0.222</i>	<i>0.714</i>	<i>-0.064</i>
CO₂ stock change													<i>0.762</i>	<i>-0.049</i>	<i>0.776</i>	<i>0.050</i>