Supplementary Information
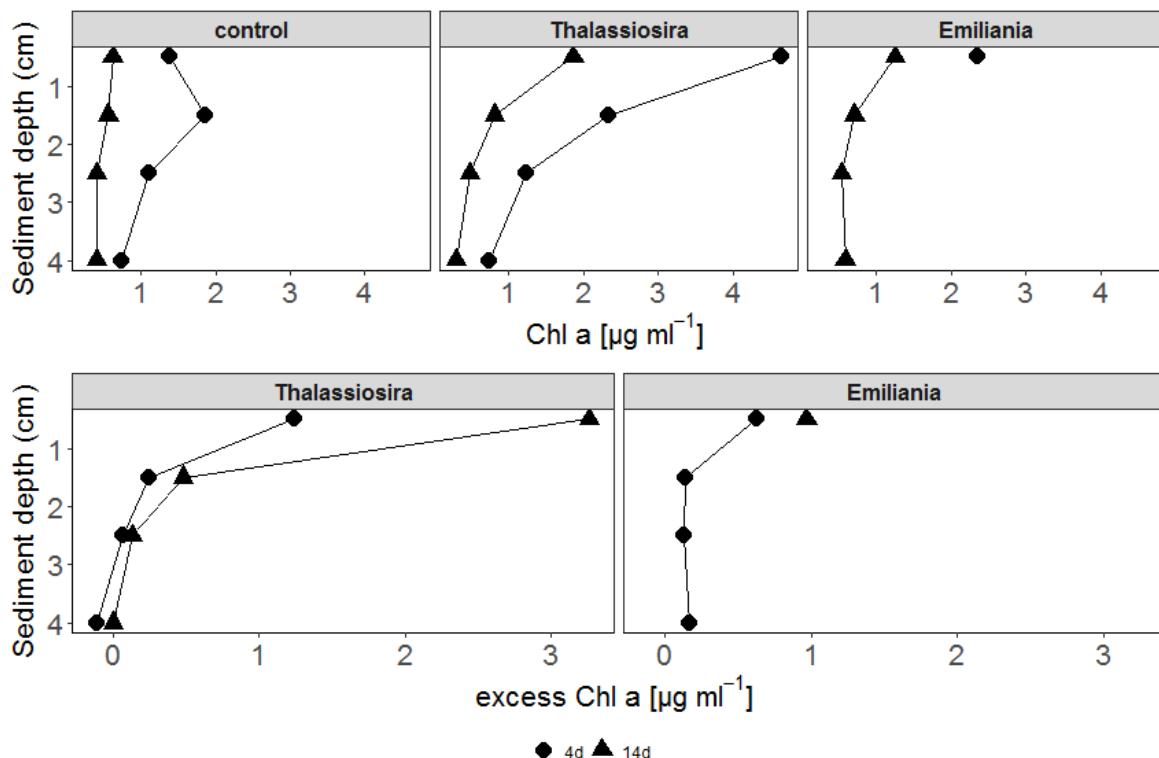
Figure S1: Chlorophyll-*a* concentration in the sediment (upper panel: absolute concentrations and lower panel: excess concentrations compared to control). In the 4 d *Emiliania* experiment, only the top cm of sediment could be retrieved and sampled.
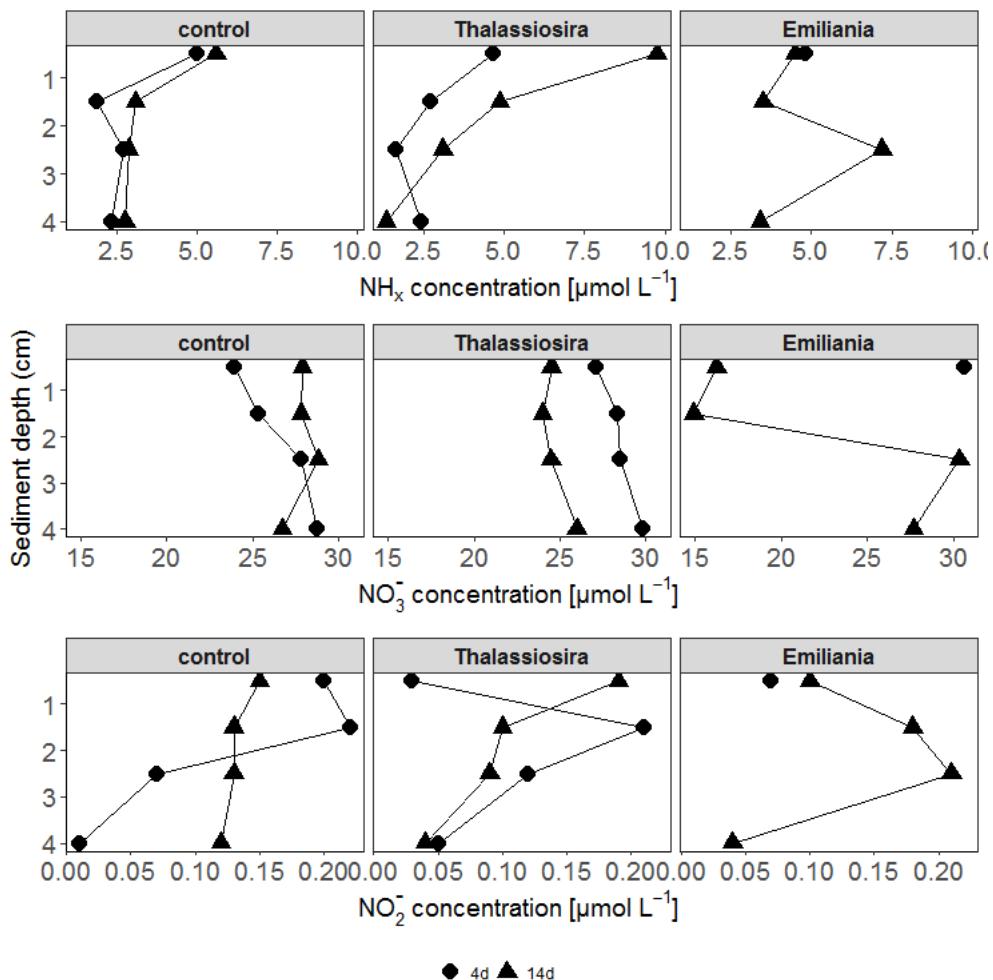
Figure S2: Concentrations of total NH$_x$, NO$_3^-$ and NO$_2^-$ in the pore water of all experiments. In the 4 d *Emiliania* experiment, only the top cm of sediment could be retrieved and sampled.
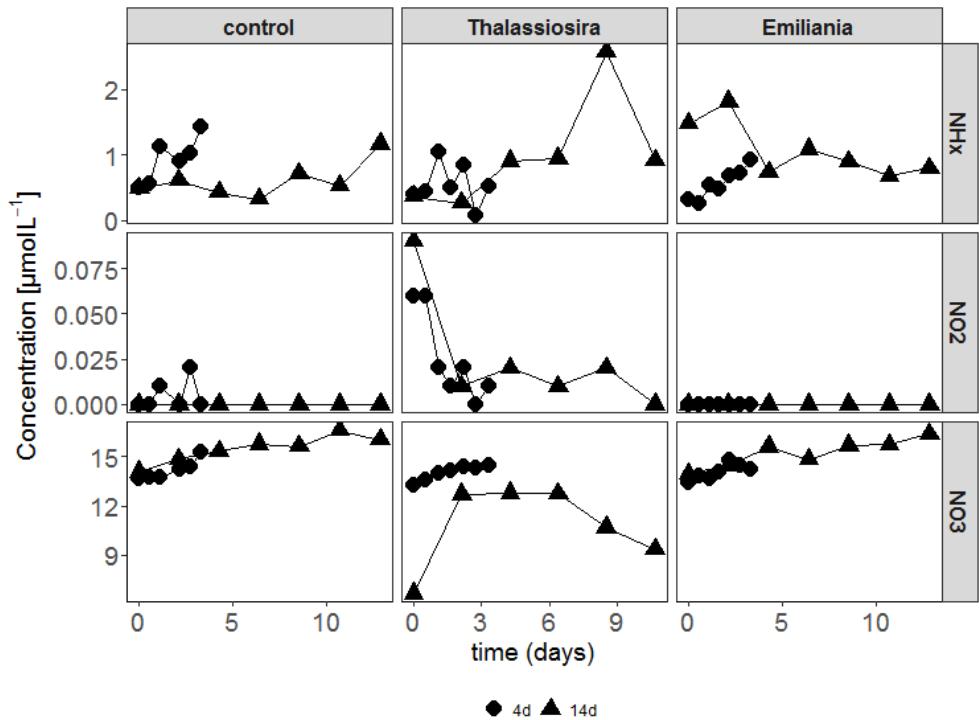
Figure S3: Concentrations of total NH$_x$, NO$_3^-$ and NO$_2^-$ in the overlying water of all experiments.
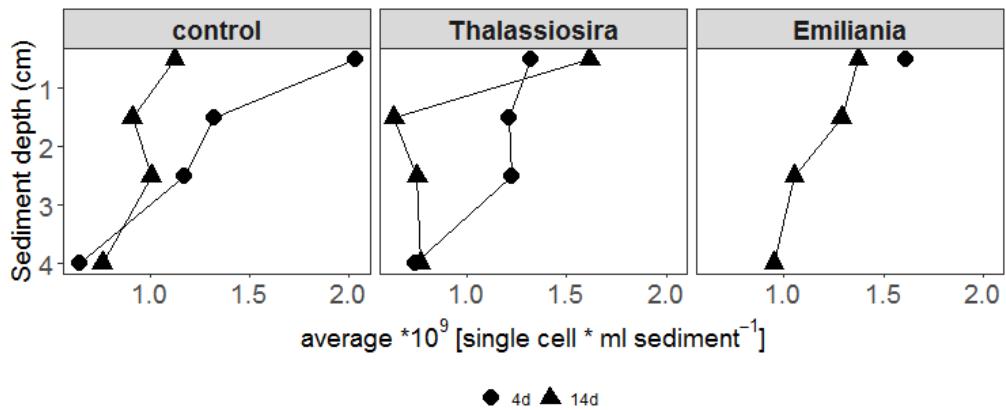
Figure S4: Microbial abundances in the sediment in the 4 d control, *Emiliania* and *Thalassiosira* experiments. In the 4 d *Emiliania* experiment, only the top cm of sediment could be retrieved and sampled.
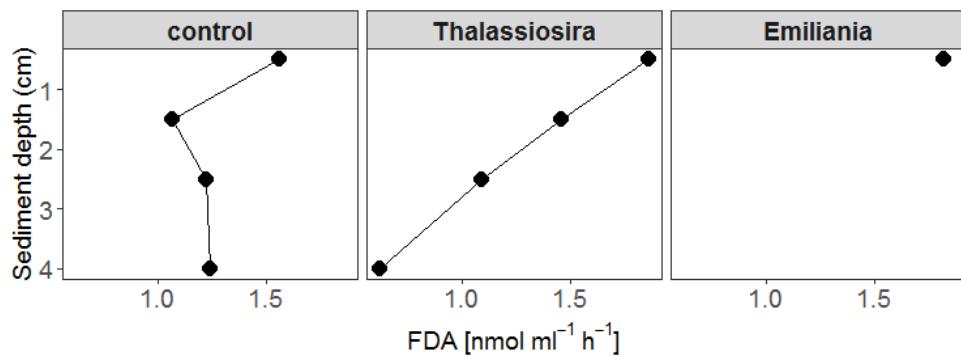
Figure S5: Bacterial esterase enzymatic activity (FDA) in the sediment in the 4 d control, *Emiliania* **and** *Thalassiosira* **experiments. In the 4 d** *Emiliania* **experiment, only the top cm of sediment could be retrieved and sampled.**
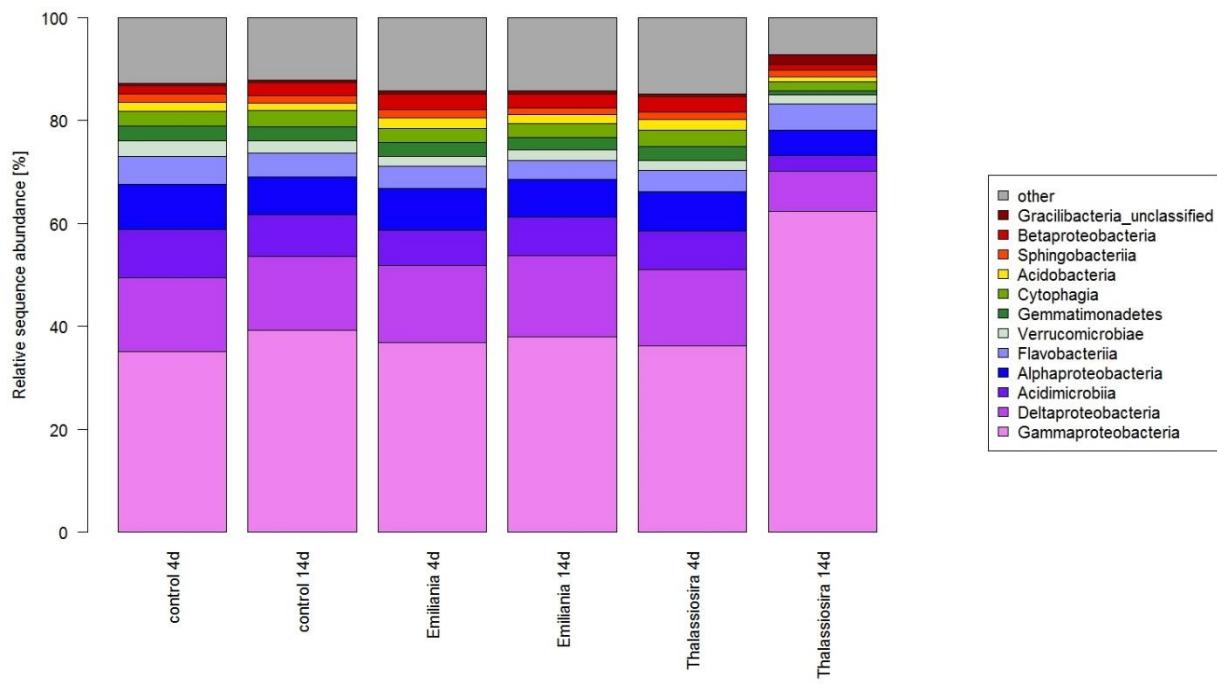
Figure S6: Dominant classes of the total bacterial community in the different experiments.
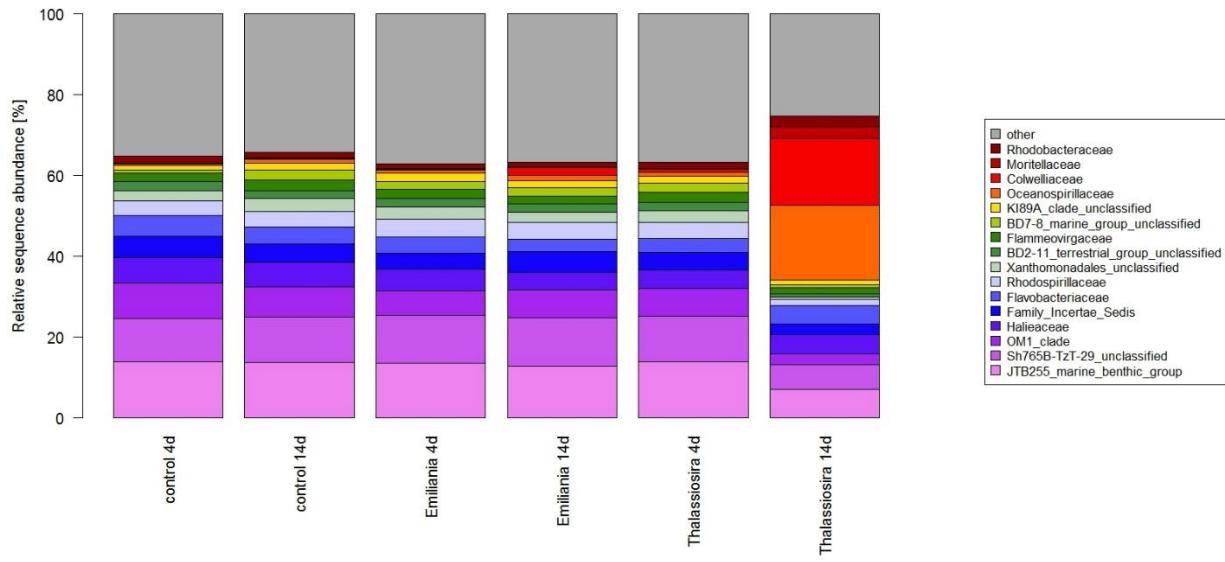
Figure S7: Dominant families of the total bacterial communities in the different experiments.
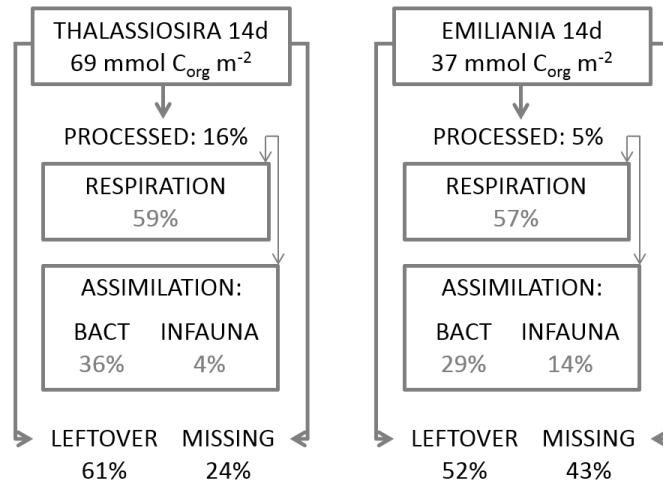
Figure S8: Carbon inventory of the 14 d experiments, divided over processed pools (Respiration as the summed DIC production in overlying water and pore water and assimilation by bacteria and infauna). Leftovers of the non-processed phytodetritus in the sediment and the missing carbon to close the budget are presented at the bottom. Respiration and assimilation given in grey numbers to represent percentages of the total processed pool.

Table S1: Observed numbers of bacterial OTUs (nOTU), chao1 richness estimates (chao1) and inverse Simpson indices (invSimpson) for the different experiments/treatments/samples.

	nOTU	chao1	invSimpson
control 4 d	863	1675	151
control 14 d	937	1948	162
Emiliania 4 d	989	2126	194
Emiliania **14 d**	1063	2360	208
Thalassiosira **4 d**	1010	2204	191
Thalassiosira **14 d**	726	1494	69

Table S2: Overview of measured ^{15}N-NO$_x^-$ accumulation in the overlying water, the calculated labelling fraction of pore water NH$_4^+$ and the algae-derived NO$_x^-$ accumulation in the overlying water.

	Thalassiosira **4 d**	*Emiliania* **4 d**	*Thalassiosira* **14 d**	*Emiliania* **14 d**
^{15}N-NO$_x^-$ accumulation [µmol m^{-2} d^{-1}]	0.56	0.00	0.38	0.35
Labelling fraction (^{15}N-NH$_4^+$/ total NH$_4^+$) in the pore water	0.14	0.04	0.47	0.18
Algae derived NO$_x^-$ accumulation [µmol m^{-2} d^{-1}]	4.00	0.00	0.74	2.11