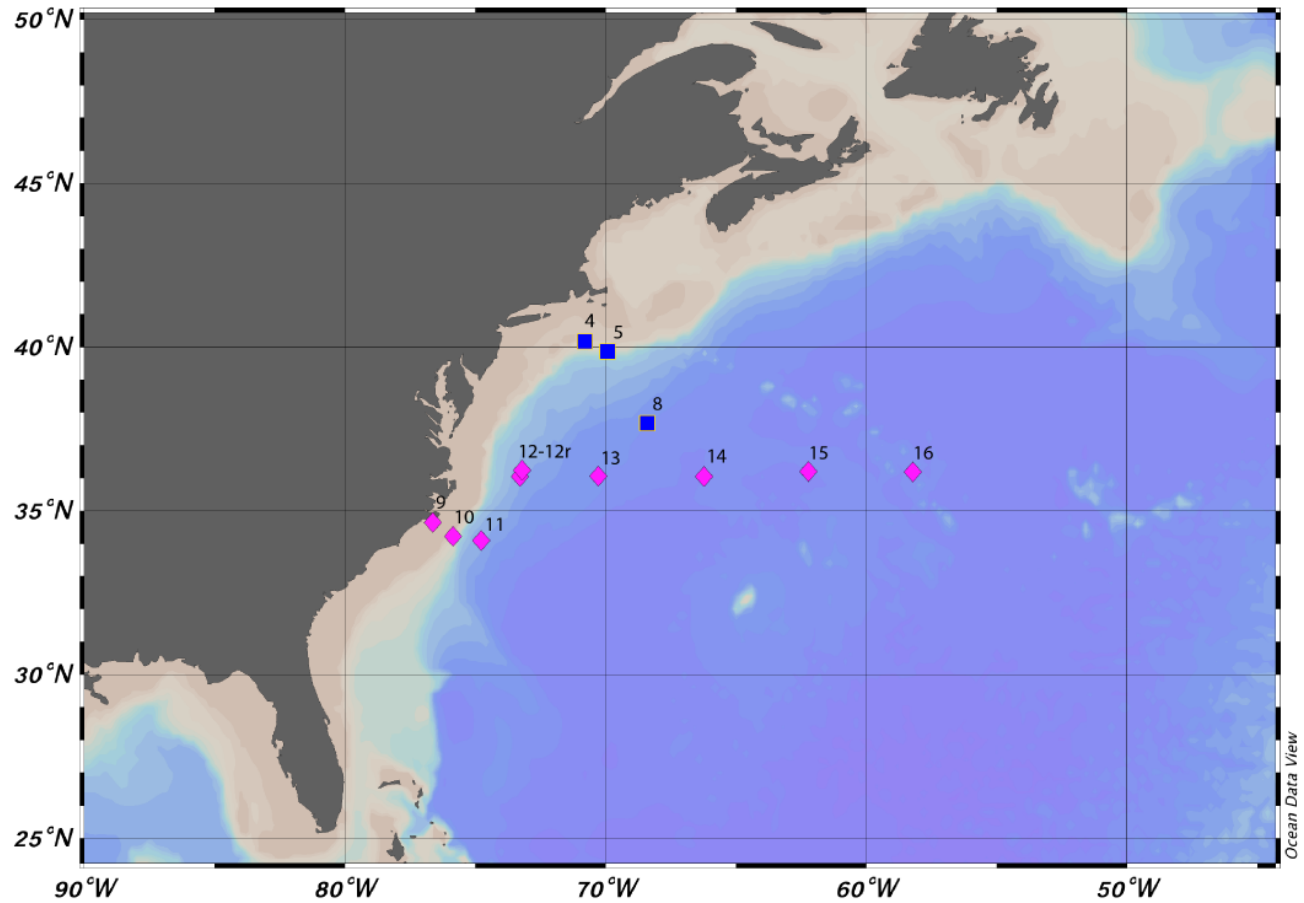
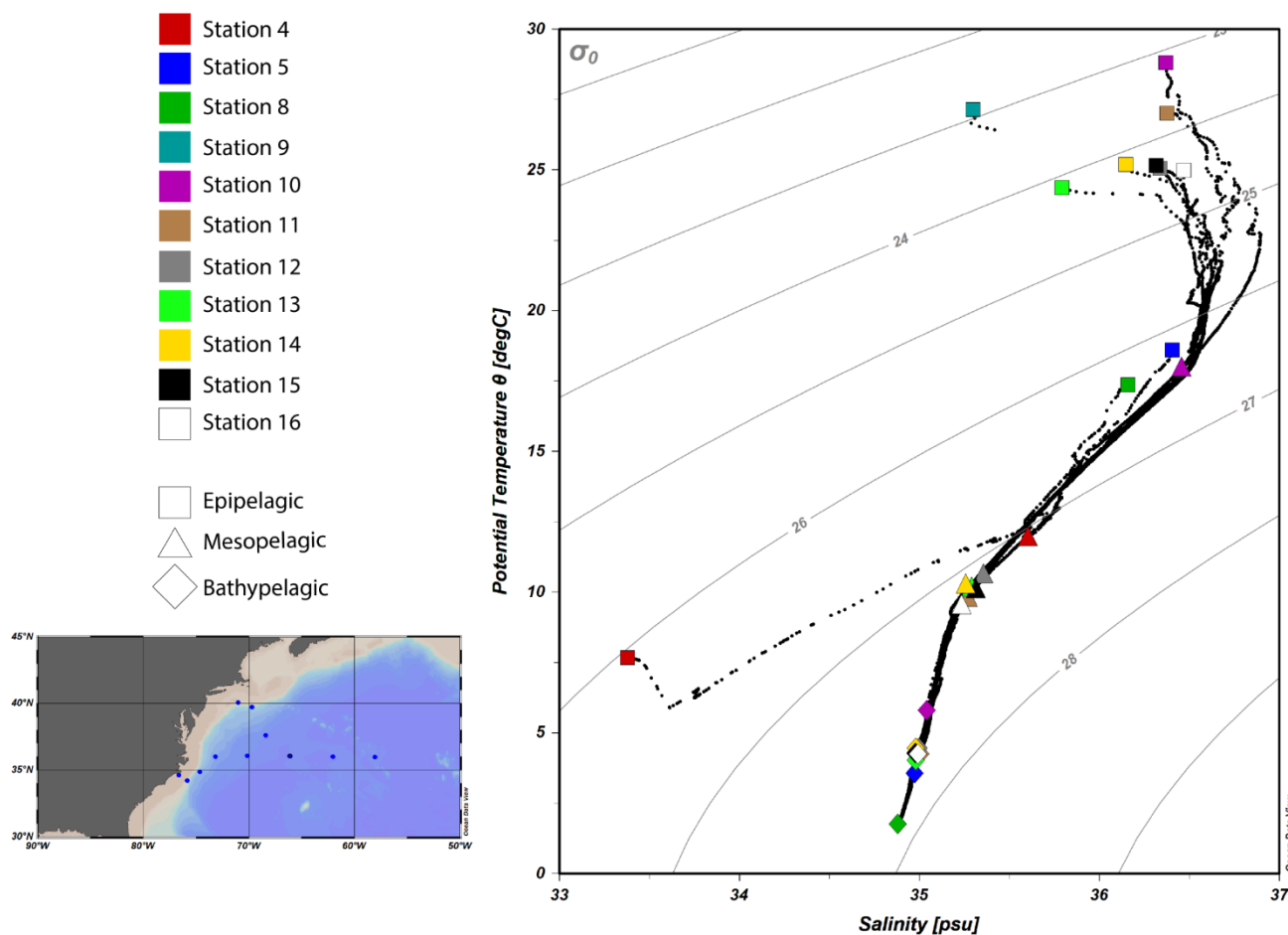


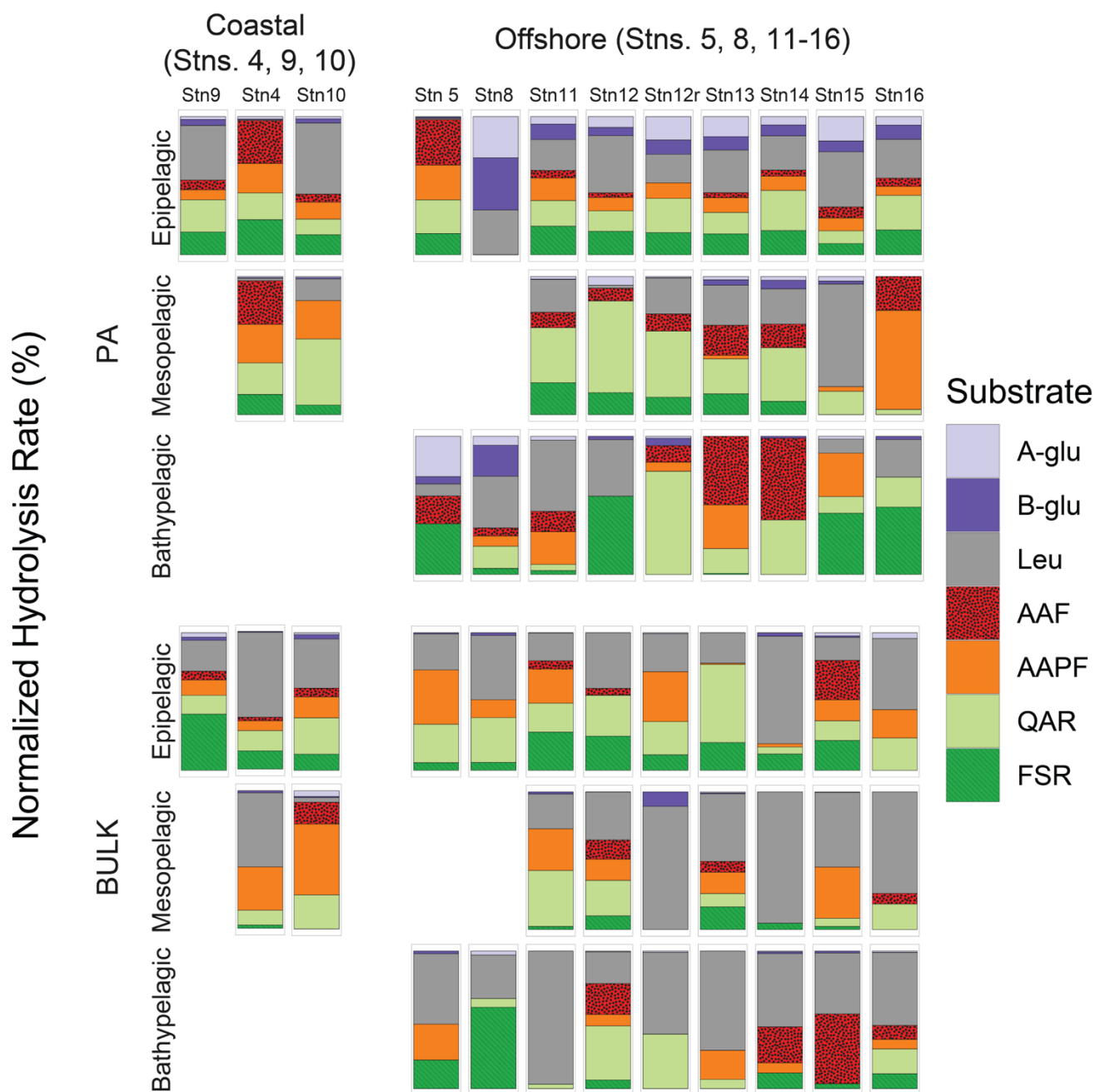
Supplementary Material



Supplementary Figure 1. Cruise stations aboard the *R/V Endeavor* during Spring 2015 (blue squares) and Spring 2016 (pink diamonds). Station locations are separated into coastal (Stns. 4, 9, and 10) and offshore (Stns. 5, 8, and 11–16).

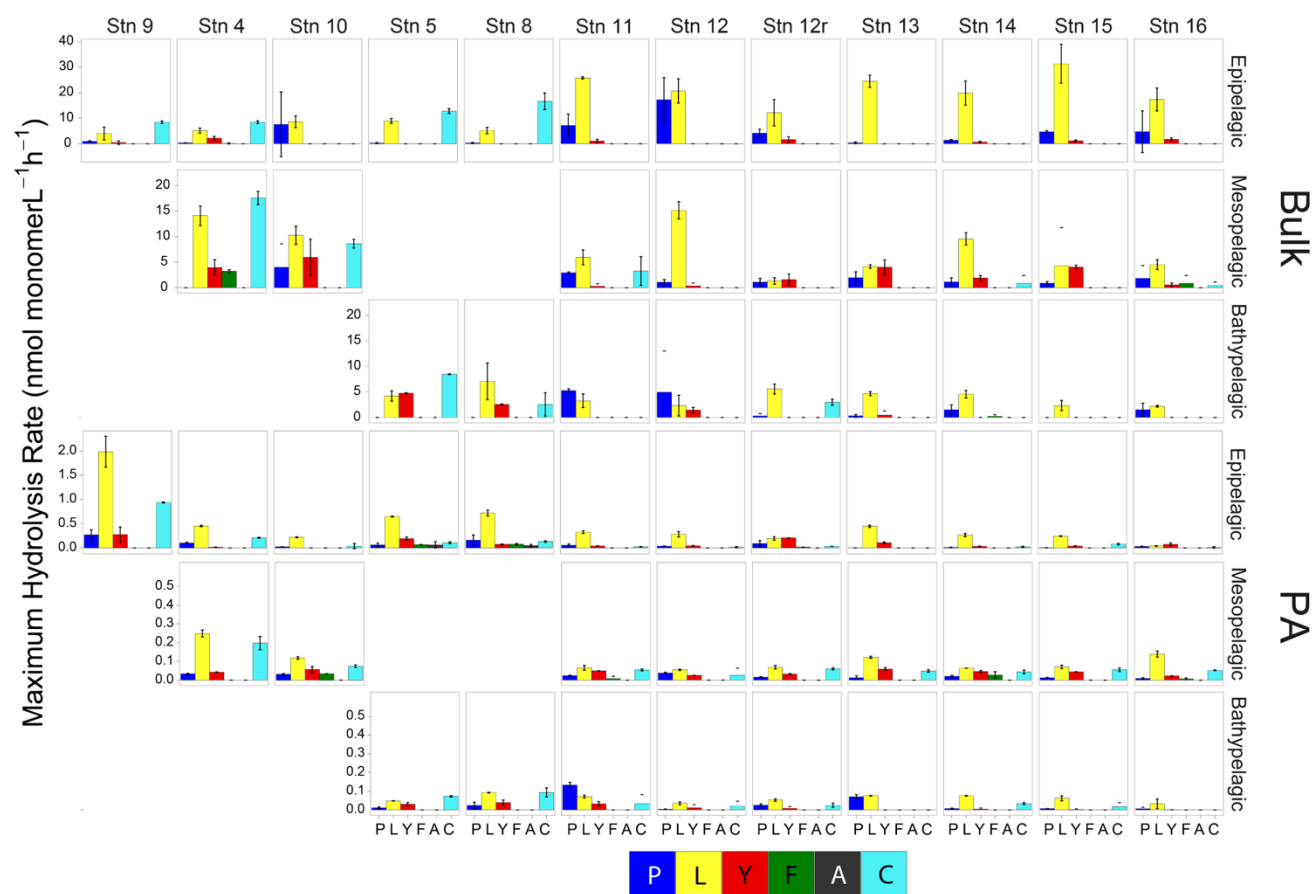


Supplementary Figure 2. Temperature/Salinity (T/S) diagram of water collected at the different stations. Stations are denoted by color and depths are differentiated by shape.

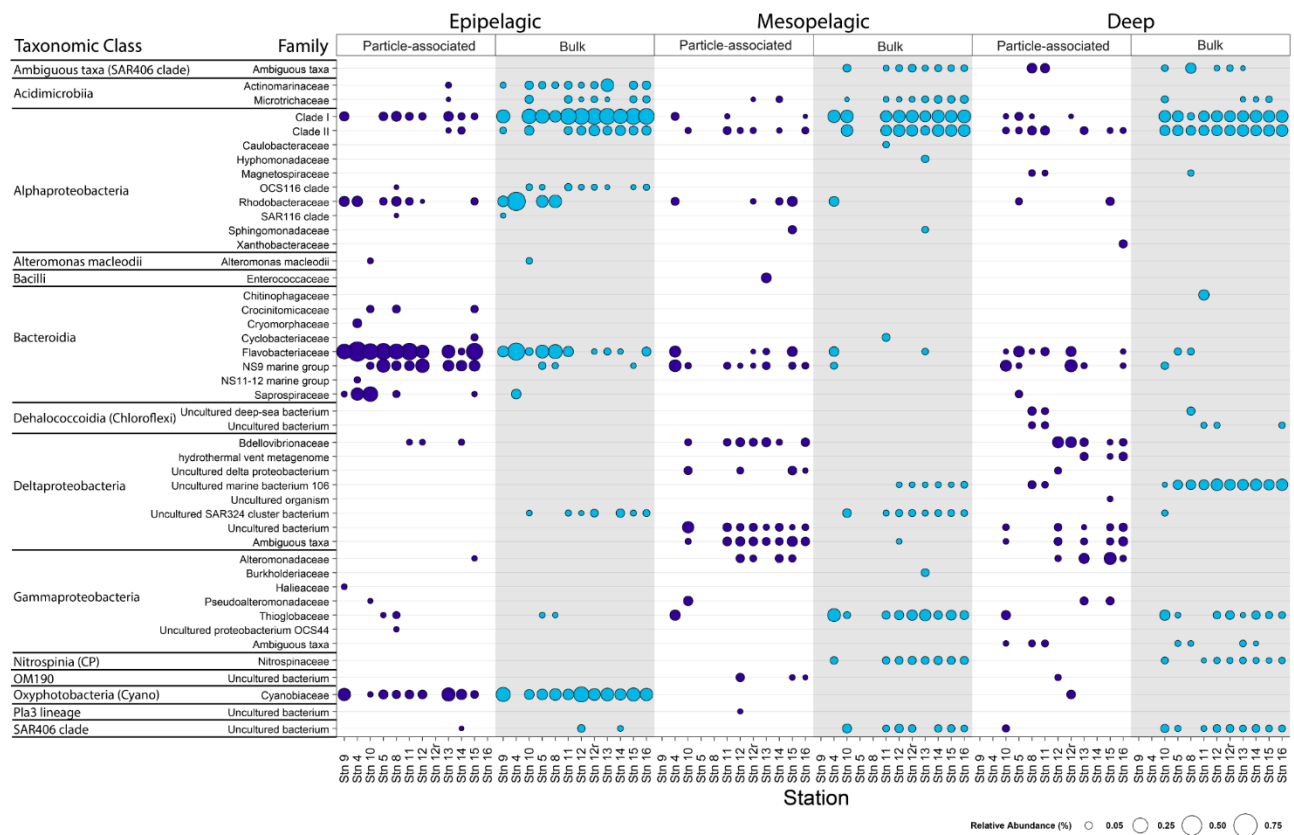


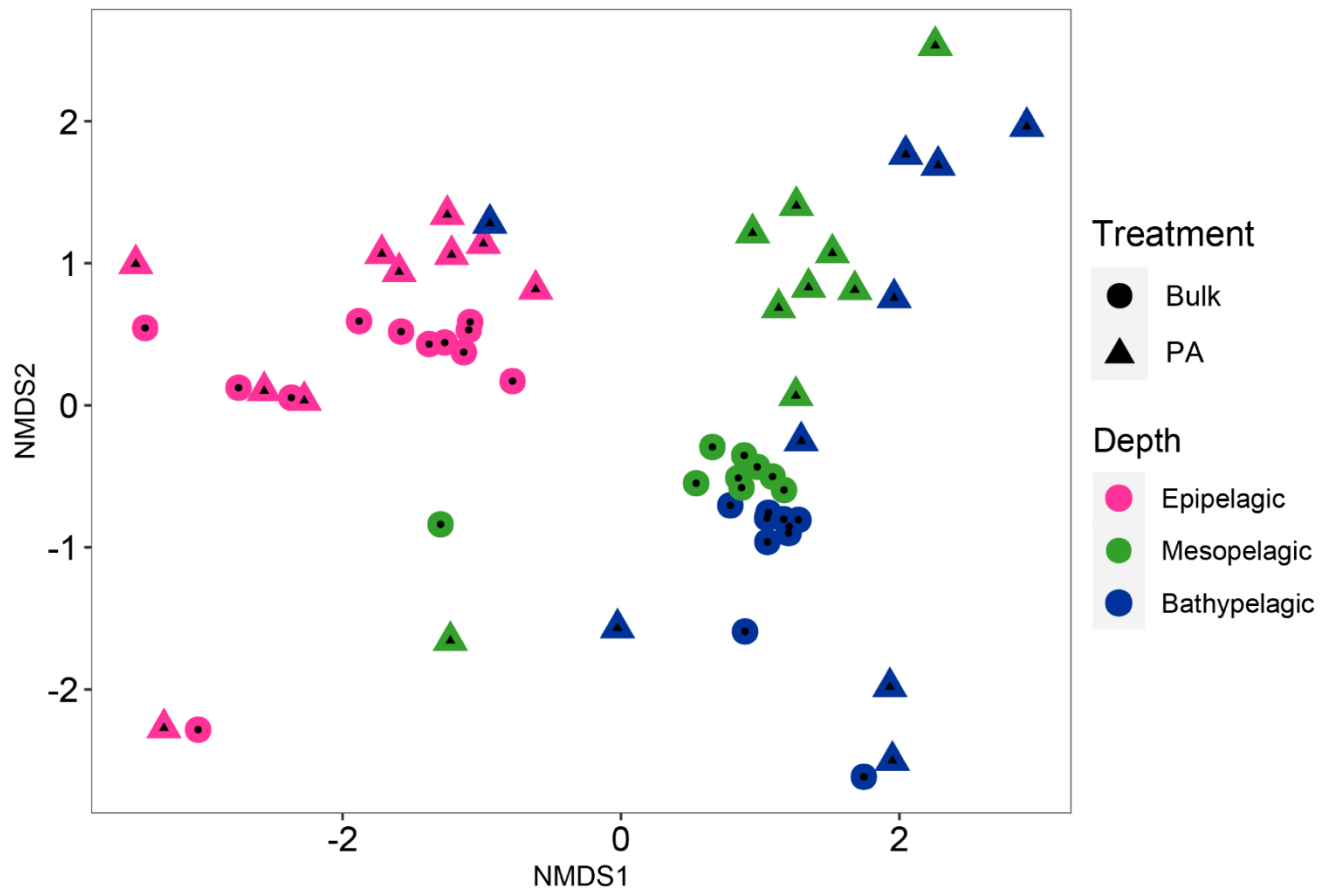
Supplementary Figure 3. Normalized hydrolysis rate for glucosidase and peptidase enzymatic activities. All activities are normalized to 100 percent for each station/depth. A-glu = alpha-glucosidase; B-glu = beta-glucosidase; Leu = leucine aminopeptidase; AAF = alanine-alanine-

phenylalanine-chymotrypsin; AAPF = alanine-alanine-proline-phenylalanine-chymotrypsin; QAR = glutamine-alanine-arginine-trypsin; FSR = phenylalanine-serine-arginine-trypsin.

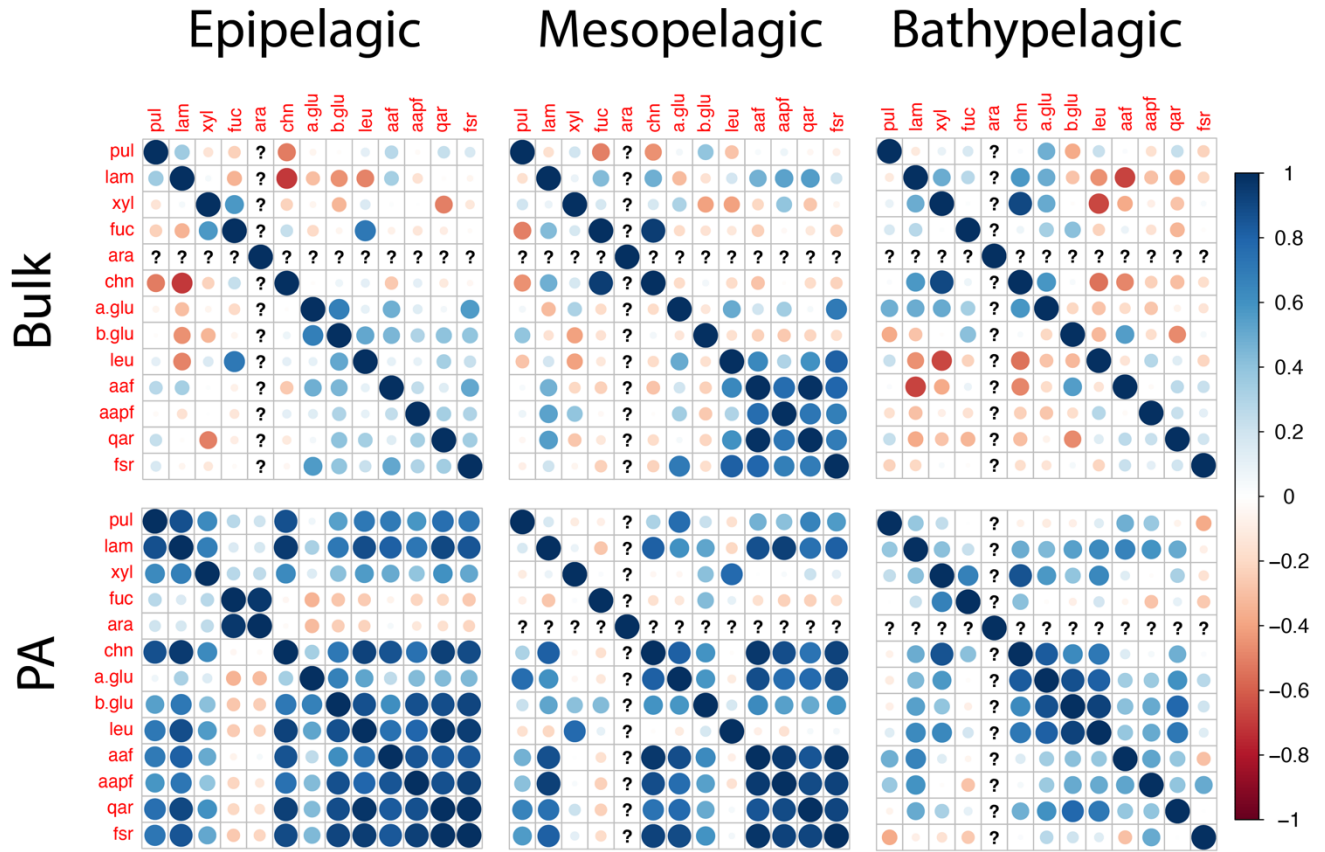


Supplementary Figure 4. Polysaccharide hydrolase activities for particle-associated (PA) and for unfiltered, bulk water samples at each station and depth. Note the difference in y-axis between each depth and between bulk and PA samples. P = pullulan; L = laminarin; X = xylan; F = fucoidan; A = arabinogalactan; C = chondroitin sulfate.





Supplementary Figure 6. Non-metric multidimensional scaling (NMDS) of the overall community composition based on the Bray-Curtis dissimilarity index. PA data are represented by triangles; bulk data are represented by circles. Surface depths are pink; mesopelagic depths are green; bathypelagic depths are blue.



Supplementary Figure 7. Correlation plot displaying the Pearson correlation between enzymatic activity measurements for bulk and PA samples, separated by depth. Blue denotes positive correlation while red denotes negative correlations. The size of the circle as well as the shade of the color emphasizes the extent of correlations between different enzymatic activities. ? denotes that no activities were measured for that given substrate (i.e., arabinogalactan in many cases).

Table S1. Environmental data for collected water.

Stn	Depth (m)	Salinity (psu)	Temperature (°C)	Oxygen (ml/L)	Chl-a (mg/m ³)
4	2.2	33.3857	7.6468	7.296	0.8601
	199	35.5938	11.9835	4.6928	0.3459
5	2.1	36.4112	18.6171	5.0852	2.2231
	1977	34.9561	3.6719	5.7977	0.3893
8	5	36.1638	17.402	5.0827	0.9072
	4574	34.8784	2.1989	5.6156	0.2754
9	2	35.3048	27.1239	4.8648	0.8386
10	90	36.3611	28.8302	4.4845	0.1527
	300	36.4495	17.9508	3.4173	0.1276
	530	35.06	6.5279	4.4404	0.135
11	72	36.6829	22.6814	4.8057	0.5293
	842	35.2743	9.8646	3.3127	0.1219
	1500	35.0037	4.4031	5.7138	0.1224
12	95	36.6338	20.9448	5.0276	0.3592
	850	35.348	10.6375	3.2011	0.1404
	1500	35.0011	4.5326	5.6738	0.1625
12r	131	36.5974	20.3848	4.8807	0.4828
	850	35.3004	10.2813	3.1107	0.1534
	1500	34.9985	4.5172	5.668	0.1518
13	95	36.5552	21.2651	4.9503	0.4823
	645	35.289	10.1261	3.128	0.1383
	1500	34.9802	4.1762	5.7922	0.1309
14	99	36.6399	20.9943	4.6907	0.1551
	900	35.2726	10.3001	2.9282	0.1377
	1500	34.9983	4.6176	5.6288	0.1266
15	82	36.6226	22.4731	4.6885	0.6715
	840	35.2915	10.1439	3.1939	0.1537
	1500	34.9848	4.4244	5.7504	0.1558
16	112	36.5632	20.0673	4.906	0.3634
	875	35.2301	9.5831	3.229	0.167
	1500	34.9956	4.5207	5.727	0.1691

Table S2. Incubation data for experimental setup.

Stn	Depth (m)	Water filtered (L) FLA samples	Water filtered (L) -MCA samples	Water filtered (L) -MUF samples	In situ temperature (C)	GF setup incubation temperature (C)	Subsampling incubation temperature (C)
4	2.2	4.7	4.5	7.8	7.7	4	8.5
	199	9.9	10.4	8.8	12	4	14
5	2.1	4.2	8.3	3.8	18.5	21	21
	1977	18	18.4	15.9	3.7	4	4
8	5	6.5	2.4	5.5	16.6	21	21
	4574	10.9	7.2	8.4	2.2	4	4
9	2	3	2.2	2.2	28.6	21	21
10	90	15.1	15.3	16	27	21	21
	300	17.7	19.2	19.4	18	21	16
	530	18.9	17.7	17	8	4	8
11	72	15.1	11.7	14	23	21	21
	842	17.7	17.6	18	10	21	12
	1500	11.7	13.8	15.2	4.9	4	4
12	95	17	16.9	15.7	20.6	21	21
	850	17.1	16.1	16.1	10	21	12
	1500	15.6	16.3	17.3	4.5	4	4
12r	131	14.4	16.7	15.1	20.3	21	21
	850	18.4	19.1	17.9	10.1	21	12
	1500	15.4	17.9	17.8	4.5	4	4
13	95	12.4	13.2	13.5	21	21	21
	645	14.4	18.4	19	10.2	21	12
	1500	17.1	16.7	18.2	4.2	4	4
14	99	15.8	14.2	14.5	21.3	21	21
	900	17.7	19.5	19.7	10.1	21	12
	1500	17	18	18.6	4.7	4	4
15	82	14.6	14.8	13	23.2	21	21
	840	17.2	17.3	17.2	10.1	21	12
	1500	19.1	19.4	20	4.4	4	4
16	112	15.7	16.1	16.9	20.1	21	21
	875	18	16.7	17.2	9.8	21	12
	1500	18.9	19.1	18.4	4.5	4	4