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Supplement of

Elemental stoichiometry of particulate organic matter across the Atlantic Ocean

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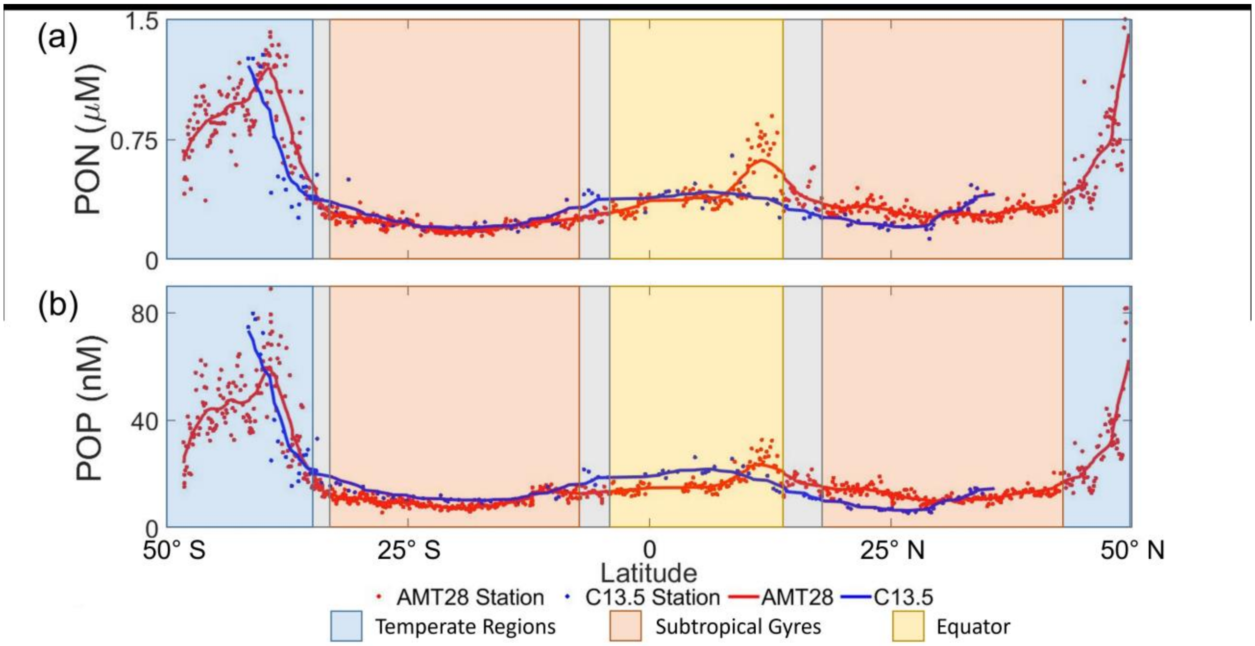

Figure S1. PON and POP. (a) *Averaged surface PON* concentrations plotted according to latitude, (b) *Averaged surface POP* concentrations plotted according to latitude. The trend lines represent moving average of samples for AMT28 (red) and C13.5 (blue) transects. Background colors indicate broad oceanographic regions separated by latitude (blue = Temperate, red = Subtropical, yellow = Equatorial upwelling regions, grey = transition regions).

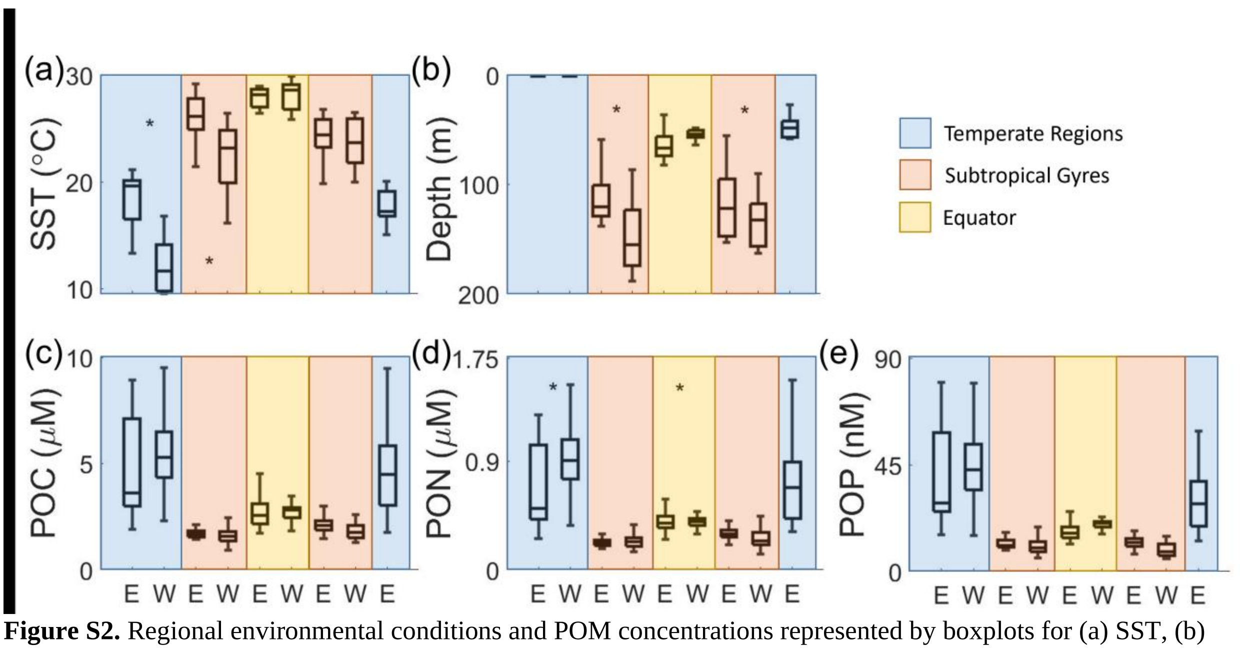

Figure S2. Regional environmental conditions and POM concentrations represented by boxplots for (a) SST, (b) nutricline depth (c) surface POC, (d) surface PON, and (e) surface POP. Significant zonal (east-west) differences are denoted with * above plot based on Tukey posthoc significant difference test ($p = 0.05$). For all boxplots, the central black bar of the box represents the median value. The whiskers signify the range (min, max) of values excluding outliers.

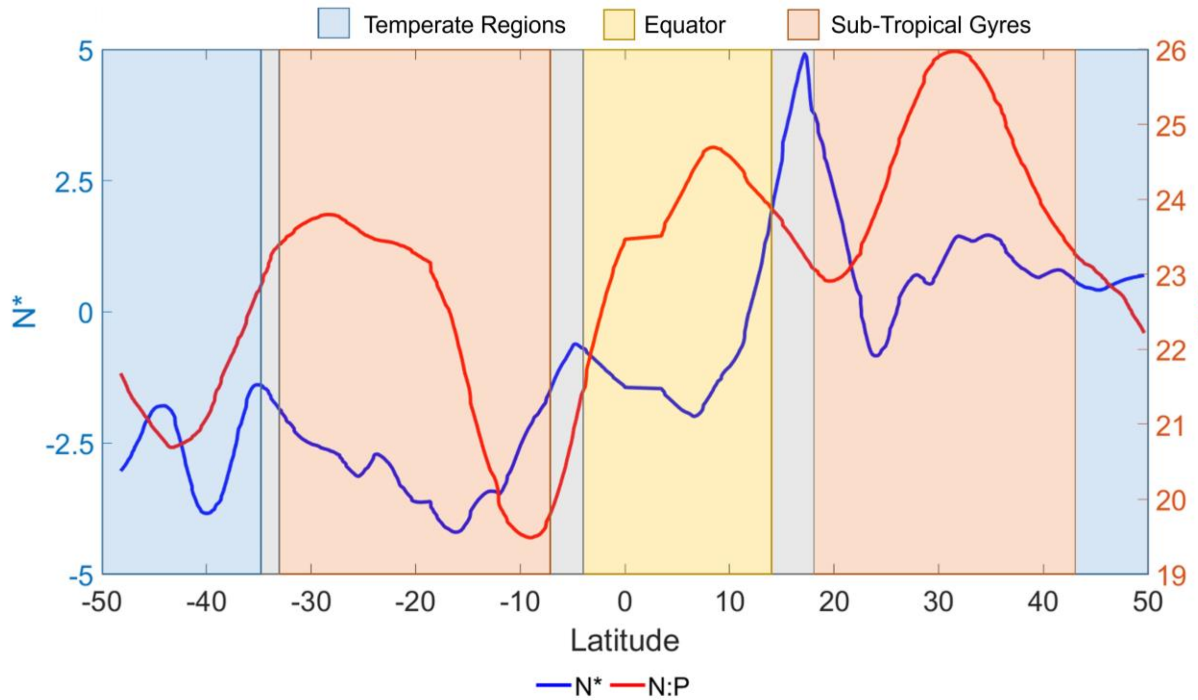

Figure S3. The relationship between N* at 200 m and POM N:P. Blue line represents N* at 200 m, red line represents POM N:P. Background colors indicate broad oceanographic regions separated by latitude (blue = Temperate, red = Subtropical, yellow = Equatorial upwelling regions, grey = transition regions).

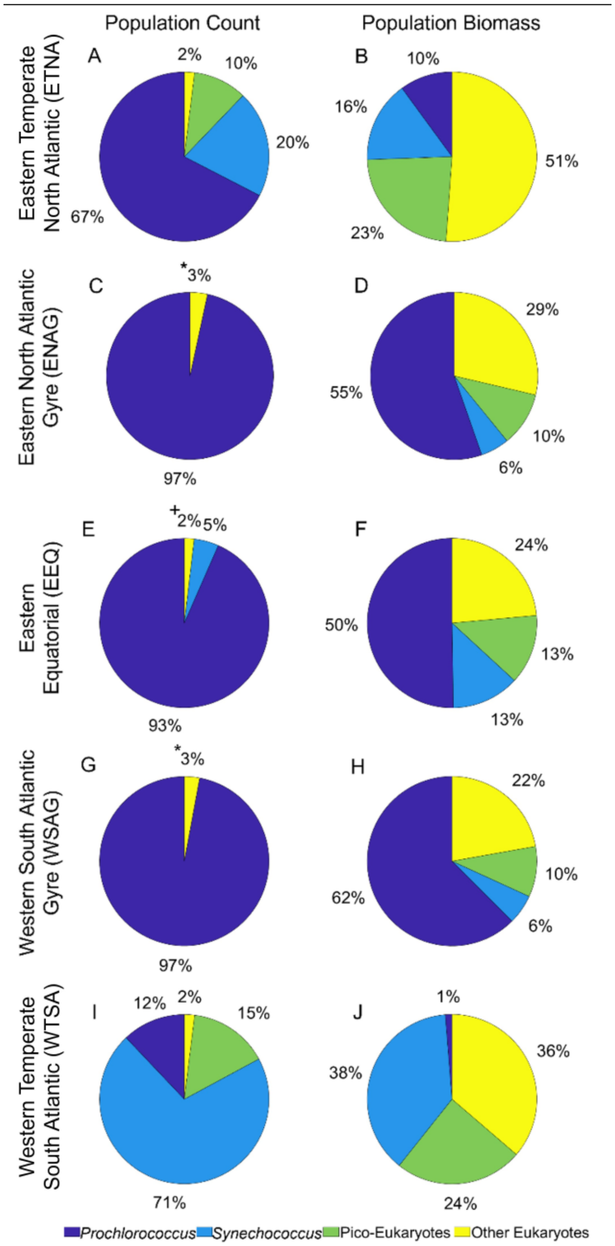

Figure S4. Photoautotroph community composition (left) and corresponding biomass (right) separated by region. (a) Community composition of photoautotrophs in the Eastern Temperate North Atlantic. (b) Biomass based on the community composition in the Eastern Temperate North Atlantic. (c) Community composition of photoautotrophs in the Eastern North Atlantic Gyre. (d) Biomass based on the community composition in the Eastern North Atlantic Gyre. (e) Community composition of photoautotrophs in the Eastern Equatorial. (f) Biomass based on the community composition in the Eastern Equatorial. (g) Community composition of photoautotrophs in the Western South Atlantic Gyre. (h) Biomass based on the community composition in the Western South Atlantic Gyre. (i) Community composition of photoautotrophs in the Western Temperate South Atlantic. (j) Biomass based on the community composition in the Western Temperate South Atlantic. Dark blue represents *Prochlorococcus*, light blue represents *Synechococcus*, green represents Pico-eukaryotes, and yellow represents eukaryotes excluding Pico-eukaryotes. An asterisk next to the yellow percentage, indicates the combination of *Synechococcus*, Pico-Eukaryotes, and other Eukaryotes. A plus mark next to the yellow percentage, indicates the combination of Pico-Eukaryotes and other Eukaryotes.

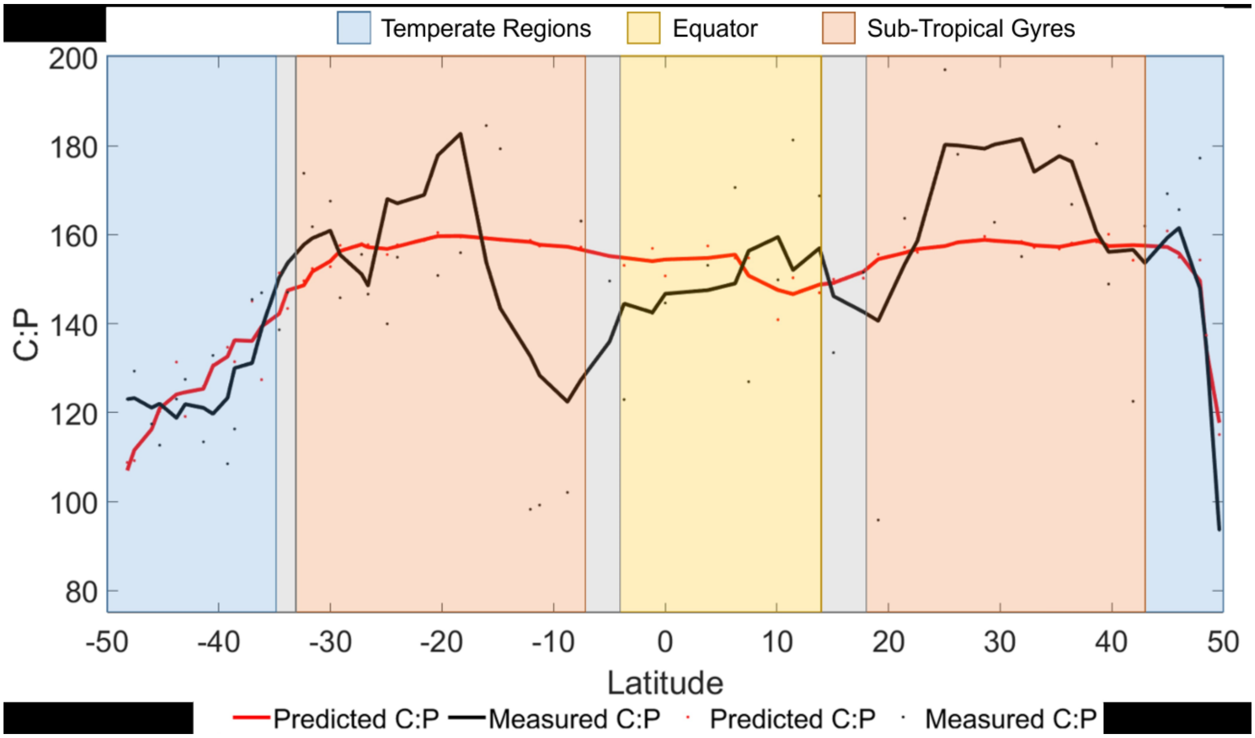

Figure S5. In-situ C:P compared to C:P predicted by fractional biomass (n = 63). Trend lines represent a moving average of samples for in-situ C:P (black) and predicted C:P (red). Background colors indicate broad oceanographic regions separated by latitude (blue = Temperate, red = Subtropical, yellow = Equatorial upwelling regions, grey = transition regions).

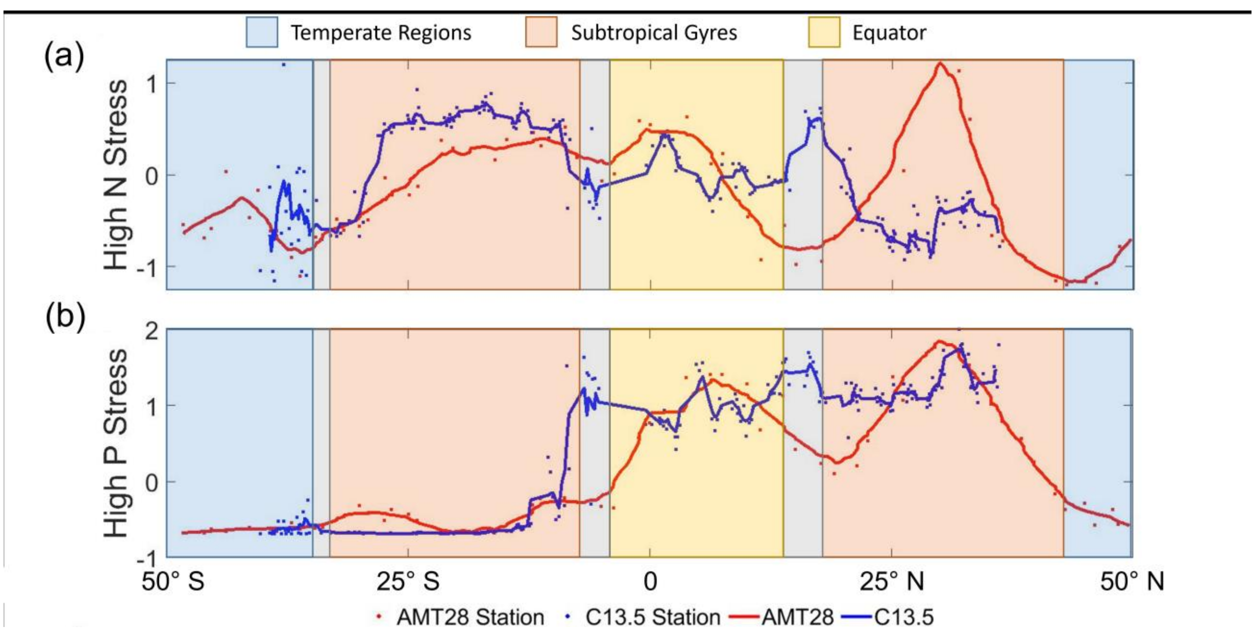

Figure S6. (a) *Averaged surface high nitrogen gene stress* plotted according to latitude, (b) *Averaged surface high phosphorus gene stress* plotted according to latitude The trend lines represent moving average of samples for AMT28 (red) and C13.5 (blue) transects. Background colors indicate broad oceanographic regions separated by latitude (blue = Temperate, red = Subtropical, yellow = Equatorial upwelling regions, grey = transition regions).

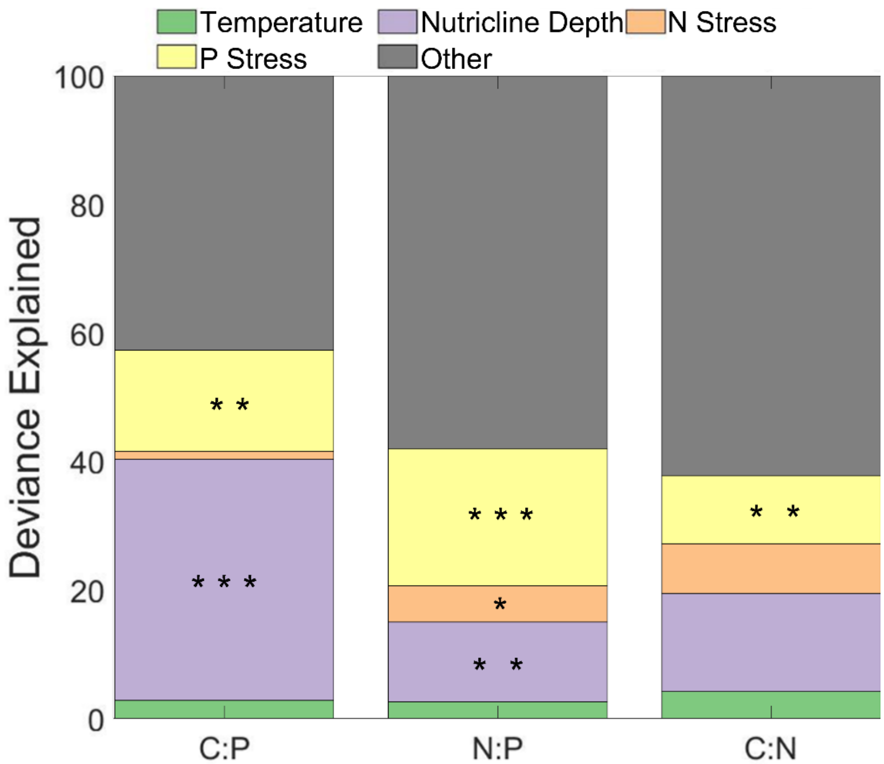

Figure S7. Influence of environmental factors influence on stoichiometry in the Eastern half of the Atlantic Ocean. Stars indicate significance of smooth terms used within GAM. *** = $p<0.001$, ** = $p<0.01$, * = $p<0.05$. Green represents the influence of temperature, purple represents the influence of nutricline depth, orange represents the nitrogen stress, yellow represents the phosphorus stress, and grey represents remaining factors of influence on the variability of C:N:P. N and P stress are reflective of the nutrient gene index, which is quantified by calculating the frequency of the nutrient acquisition genes within *Prochlorococcus* single-copy core genes. The frequency is attributed to the genetic adaptation for overcoming nutrient stress type and severity.

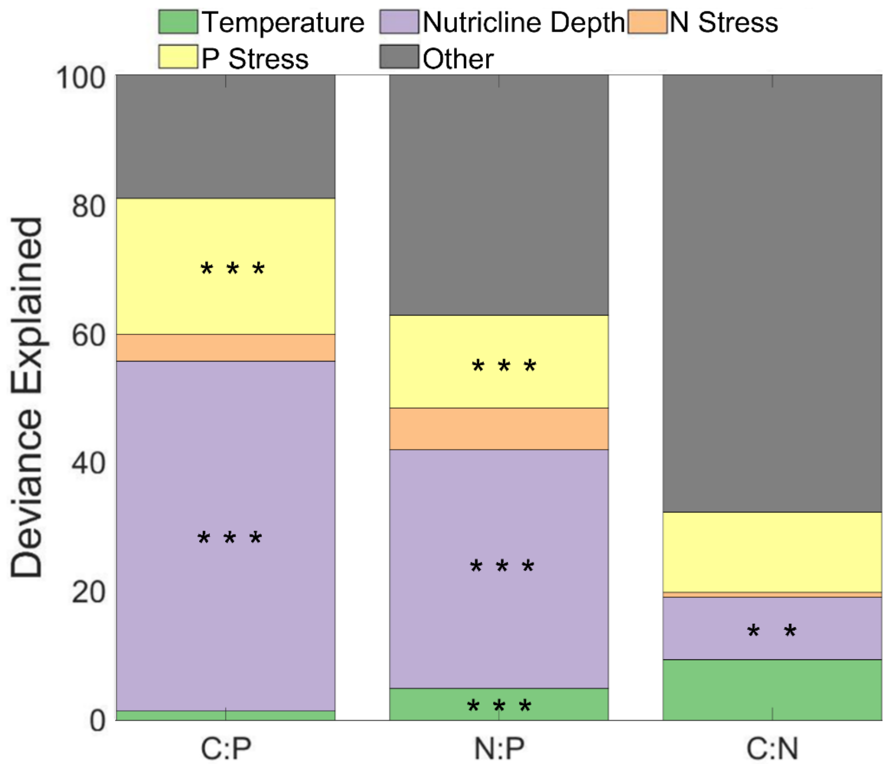

Figure S8. Influence of environmental factors influence on stoichiometry in the Western half of the Atlantic Ocean. Stars indicate significance of smooth terms used within GAM. *** = p<0.001, ** = p<0.01, * = p<0.05. Green represents the influence of temperature, purple represents the influence of nutricline depth, orange represents the nitrogen stress, yellow represents the phosphorus stress, and grey represents remaining factors of influence on the variability of C:N:P. N and P stress are reflective of the nutrient gene index, which is quantified by calculating the frequency of the nutrient acquisition genes within *Prochlorococcus* single-copy core genes. The frequency is attributed to the genetic adaptation for overcoming nutrient stress type and severity.

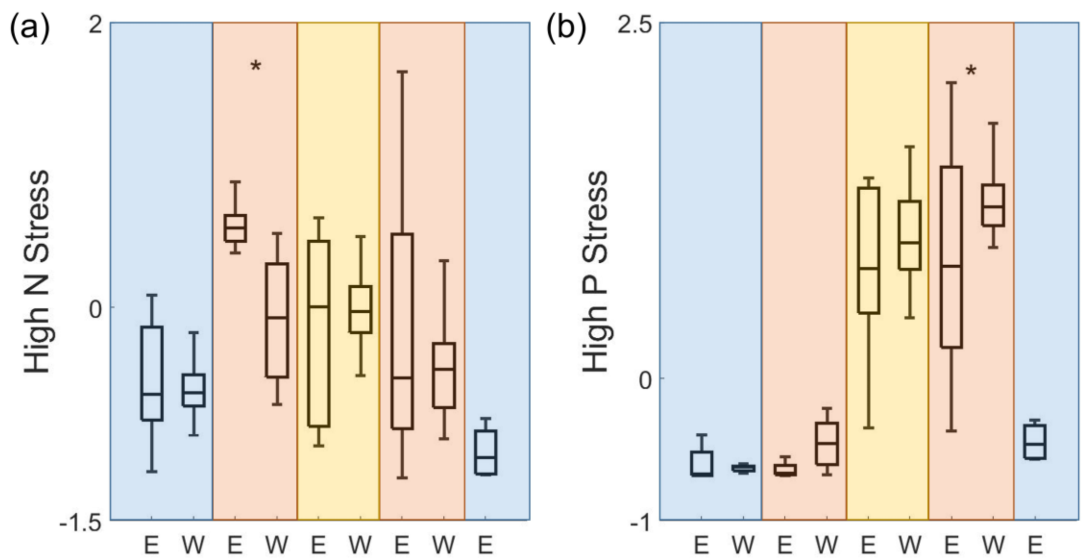

Figure S9. Nitrogen and Phosphorus gene stress represented by boxplots for (a) High Nitrogen gene stress, (b) high phosphorus gene stress. Significant zonal (east-west) differences are denoted with * above plot based on Tukey posthoc significant difference test (p = 0.05). For all boxplots, a central black bar of the boxes represent the median value. The whiskers signify the range (min, max) of values excluding outliers.

Table S1: Averaged values within separate regions.

	SST	Nutricline Depth	POC	PON	POP	C:N	C:P	N:P
E: T	17.7±0.2	47.3±1.5	5.3±0.4	0.756±0.5	32.0±2.3	6.8±0.09	158.4±3.2	23.5±0.6
E: NAG	24.3±0.1	116.2±2.4	2.1±0.03	0.303±0.004	12.4±0.2	7.0±0.04	173.9±2.1	24.8±0.3
W: NAG	23.6±0.4	134.5±4.6	1.9±0.09	0.261±0.01	9.2±0.5	7.2±0.1	207.9±5.5	29.2±0.7
E: EQ	27.8±0.08	63.2±1.2	2.8±0.09	0.433±0.01	17.4±0.4	6.6±0.06	161.1±2.3	24.5±0.3
W: EQ	28.1±0.3	55.5±1.2	2.7±0.08	0.398±0.02	19.9±0.6	6.8±0.2	135.5±2.6	20.1±0.6
E: SAG	26.0±0.4	114.1±3.1	1.7±0.04	0.236±0.01	11.8±0.4	7.6±0.2	148.2±2.9	20.1±0.7
W: SAG	22.3±0.2	149.6±1.8	1.6±0.02	0.236±0.003	10.5±0.2	7.0±0.04	159.5±2.0	22.9±0.2
E: SO	18.3±0.6	4.1±3.2	4.6±0.5	0.656±0.08	39.0±5.2	7.2±0.2	121.6±3.3	17.1±0.4
W: SO	12.1±0.2	15.5±2.8	5.4±0.1	0.918±0.02	44.1±1.2	6.0±0.04	126.7±2.0	21.4±0.3

Table S2: Percent of contribution to General Additive Models. E and W designations are for East and West respectively.

	C:P	N:P	C:N	C:P East	N:P East	C:N East	C:P West	N:P West	C:N West
Temperature	9.89	3.83	12.94	2.82	2.60	4.18	1.42	4.92	9.41
Nutricline Depth	31.31	24.60	11.23	37.53	12.43	15.30	54.22	36.96	9.64
N Stress	4.76	7.24	3.28	1.25	5.60	7.73	4.18	6.52	0.77
P Stress	21.22	20.67	2.06	15.71	21.39	10.60	21.02	14.33	12.44
Other	32.82	43.66	70.49	42.70	57.99	62.20	19.17	37.27	67.75

Table S3: Correlation values of in situ C:N:P in relationship to predictive C:N:P generated by General Additive Model. Full indicates the entire transect, SPG is sub-polar gyre, NAG is North Atlantic Gyre, EQ is equatorial, SAG is South Atlantic Gyre, and SO is Southern Ocean**.** Highlighted rows are the seasons in situ samples were collected. Significant r values are marked in bold ($p < 0.05$).

AMT

	r values						p values					
	C:N Full	C:N SPG	C:N NAG	C:N EQ	C:N SAG	C:N SO	C:N Full	C:N SPG	C:N NAG	C:N EQ	C:N SAG	C:N SO
Winter	0.1214	0.6287	-0.3271	-0.2399	0.1597	-0.0877	0.3685	0.3713	0.2537	0.4526	0.5547	0.7977
Spring	0.2427	0.6711	-0.4388	-0.3463	0.2453	0.0018	0.0689	0.3289	0.1165	0.2701	0.3598	0.9958
Summer	**0.4921**	-0.2957	-0.0825	0.0870	0.2865	0.2438	1.01E-04	0.7043	0.7792	0.7881	0.2821	0.4700
Fall	**0.3280**	**-0.9722**	-0.2536	-0.1260	0.2631	-0.1012	0.0127	0.0278	0.3817	0.6964	0.3249	0.7672
	C:P Full	C:P SPG	C:P NAG	C:P EQ	C:P SAG	C:P SO	C:P Full	C:P SPG	C:P NAG	C:P EQ	C:P SAG	C:P SO
Winter	**0.6122**	0.6286	**0.5943**	0.5551	0.4719	0.5999	4.19E-07	0.3714	0.0250	0.0610	0.0649	0.0511
Spring	**0.5590**	0.6308	0.4112	0.5721	0.4293	0.5875	6.21E-06	0.3692	0.1441	0.0519	0.0970	0.0574
Summer	**0.6185**	0.6163	0.6425	**0.5910**	0.4260	0.5000	2.94E-07	0.3837	0.0132	0.0430	0.0999	0.1173
Fall	**0.5867**	0.7042	**0.5328**	**0.5882**	0.4367	0.4728	1.62E-06	0.2958	0.0498	0.0443	0.0908	0.1420
	N:P Full	N:P SPG	N:P NAG	N:P EQ	N:P SAG	N:P SO	N:P Full	N:P SPG	N:P NAG	N:P EQ	N:P SAG	N:P SO
Winter	**0.3935**	0.3523	**0.5995**	0.4670	0.4170	0.3304	2.50E-03	0.6477	0.0235	0.1259	0.1081	0.3210
Spring	**0.3815**	0.3644	0.4656	0.4967	0.4467	0.3256	3.40E-03	0.6356	0.0933	0.1004	0.0683	0.3286
Summer	**0.3934**	0.1647	**0.5955**	0.5677	0.4795	-0.2506	3.50E-03	0.8353	0.0246	0.0542	0.0602	0.4573
Fall	**0.3276**	-0.2155	**0.5541**	0.4884	0.4742	-0.3022	1.29E-02	0.7845	0.0398	0.1071	0.0635	0.3665

C13

	r values						p values					
	C:N Full	C:N SPG	C:N NAG	C:N EQ	C:N SAG	C:N SO	C:N Full	C:N SPG	C:N NAG	C:N EQ	C:N SAG	C:N SO
Winter	**0.3605**	-	0.0549	0.0669	**0.5567**	0.1190	6.04E-04	-	0.8131	0.7615	9.37E-04	0.7431
Spring	**0.3710**	-	0.2623	0.0340	**0.5028**	0.5545	4.04E-04	-	0.2507	0.8778	0.0034	0.0767
Summer	**0.3193**	-	-0.0132	-0.0250	**0.4832**	**0.6151**	2.60E-03	-	0.9546	0.9098	0.0051	0.0440
Fall	**0.3370**	-	0.2029	0.3241	**0.5109**	0.1498	1.40E-03	-	0.3778	0.1314	0.0028	0.6603
	C:P Full	C:P SPG	C:P NAG	C:P EQ	C:P SAG	C:P SO	C:P Full	C:P SPG	C:P NAG	C:P EQ	C:P SAG	C:P SO
Winter	**0.8763**	-	0.4684	**0.7432**	0.3485	**0.0087**	1.06E-28	-	0.0322	4.85E-05	0.0506	9.80E-01
Spring	**0.8333**	-	0.3227	0.4101	**0.3962**	-0.0631	1.35E-23	-	0.1537	0.0519	0.0248	0.8539
Summer	**0.7561**	-	**0.4940**	**0.7614**	**0.4649**	**-0.0487**	2.52E-17	-	0.0228	2.45E-05	0.0073	8.87E-01
Fall	**0.8680**	-	**0.4983**	**0.5896**	-0.0159	-0.1223	1.41E-27	-	0.0215	0.0031	0.9312	0.7202
	N:P Full	N:P SPG	N:P NAG	N:P EQ	N:P SAG	N:P SO	N:P Full	N:P SPG	N:P NAG	N:P EQ	N:P SAG	N:P SO
Winter	**0.8116**	-	0.4119	**0.4384**	0.3076	**0.6788**	1.15E-21	-	0.0635	0.0364	0.0868	0.0216
Spring	**0.7775**	-	0.0990	0.3800	0.2540	**0.7154**	8.35E-19	-	0.6694	0.0737	0.1607	0.0133
Summer	**0.6589**	-	0.3700	**0.4908**	0.1053	**0.7209**	3.98E-12	-	0.0988	0.0174	0.5664	0.0123
Fall	**0.7941**	-	0.3122	0.3719	0.2975	**0.6386**	4.51E-20	-	0.1682	0.0806	0.0982	0.0345