Table S1. Measured dissolved inorganic carbon (DIC) and total alkalinity (TA), and calculated pCO_2 (mean ± SE) in the cultures of *Phaeodactylum tricornutum*, *Rhodomonas* sp. and *Emiliania huxleyi*.

Species	Treatment			DIC (μmol kg^{-1})	TA (μmol kg^{-1})	pCO_2 (μatm)
P. tricornutum [a]	12°C	Low CO_2	N:P = 10:1	2476 ± 12	2505 ± 7.0	1479 ± 97
			N:P = 24:1	2425 ± 16	2551 ± 0.7	728 ± 78
			N:P = 63:1	2404 ± 18	2533 ± 5.6	714 ± 72
		High CO_2	N:P = 10:1	2634 ± 17	2502 ± 0.4	4032 ± 353
			N:P = 24:1	2628 ± 28	2534 ± 1.4	3300 ± 558
			N:P = 63:1	2629 ± 5.2	2520 ± 3.3	3542 ± 159
	18°C	Low CO_2	N:P = 10:1	2392 ± 11	2462 ± 0.5	1289 ± 103
			N:P = 24:1	2273 ± 9.7	2535 ± 7.4	435 ± 21
			N:P = 63:1	2421 ± 22	2512 ± 2.3	1167 ± 160
		High CO_2	N:P = 10:1	2564 ± 8.2	2466 ± 3.9	4045 ± 204
			N:P = 24:1	2594 ± 8.1	2545 ± 2.1	3059 ± 128
			N:P = 63:1	2551 ± 23	2540 ± 2.4	2401 ± 346
	24°C	Low CO_2	N:P = 10:1	2350 ± 15	2464 ± 1.8	1217 ± 110
			N:P = 24:1	2280 ± 32	2494 ± 1.1	704 ± 103
			N:P = 63:1	2330 ± 10	2470 ± 0.6	1015 ± 59
		High CO_2	N:P = 10:1	2521 ± 2.5	2480 ± 0.4	3473 ± 86
			N:P = 24:1	2514 ± 0.04	2503 ± 0.8	2865 ± 20
			N:P = 63:1	2557 ± 14	2497 ± 3.5	3928 ± 335
Rhodomonas sp. [a]	12°C	Low CO_2	N:P = 10:1	2181 ± 6.5	2289 ± 0.2	725 ± 20
			N:P = 24:1	2238 ± 16	2345 ± 2.6	745 ± 100
			N:P = 63:1	2255 ± 14	2317 ± 1.7	1012 ± 111
		High CO_2	N:P = 10:1	2368 ± 7.3	2298 ± 2.0	2726 ± 138
			N:P = 24:1	2418 ± 2.7	2349 ± 5.0	2724 ± 58

			N:P = 63:1	2420 ± 14	2313 ± 2.0	3420 ± 315
	18°C	Low CO_2	N:P = 10:1	2211 ± 15	2287 ± 0.3	1138 ± 136
			N:P = 24:1	2255 ± 8.0	2342 ± 2.1	1073 ± 70
			N:P = 63:1	2209 ± 7.7	2311 ± 1.5	945 ± 61
		High CO_2	N:P = 10:1	2387	2285 ± 2.3	4028
			N:P = 24:1	2423 ± 17	2347 ± 1.7	3489 ± 414
			N:P = 63:1	2388 ± 2.5	2310 ± 1.1	3486 ± 74
	24°C	Low CO_2	N:P = 10:1	2188 ± 7.4	2302 ± 0.5	1083 ± 56
			N:P = 24:1	2201 ± 17	2306 ± 3.2	1160 ± 109
			N:P = 63:1	2189 ± 12	2288 ± 4.6	1210 ± 126
		High CO_2	N:P = 10:1	2383 ± 15	2297 ± 1.3	4395 ± 347
			N:P = 24:1	2398 ± 8.4	2318 ± 5.1	4259 ± 95
			N:P = 63:1	2408 ± 3.4	2306 ± 2.2	4814 ± 138
E. huxleyi [b]	12 °C	Low pCO_2	N:P = 10:1	1302 ± 54	1269 ± 57	1509 ± 35
			N:P = 24:1	1328 ± 18	1292 ± 27	1564 ± 149
			N:P = 63:1	1374 ± 25	1349 ± 24	1412 ± 21
		High pCO_2	N:P = 10:1	1956 ± 46	1962 ± 50	1357 ± 14
			N:P = 24:1	2042 ± 17	2053 ± 17	1357 ± 76
			N:P = 63:1	1829 ± 22	1801 ± 49	1041 ± 191
	18 °C	Low pCO_2	N:P = 10:1	763 ± 15	793 ± 4	552 ± 118
			N:P = 24:1	885 ± 6	922 ± 12	567 ± 84
			N:P = 63:1	1065 ± 3	1108 ± 8	633 ± 44
		High pCO_2	N:P = 10:1	1415 ± 154	1454 ± 121	1113 ± 489
			N:P = 24:1	1278 ± 13	1196 ± 18	2944 ± 330
			N:P = 63:1	1613 ± 35	1620 ± 32	1507 ± 332
	24 °C	Low pCO_2	N:P = 10:1	785 ± 13	808 ± 10	845 ± 256

	N:P = 24:1	809 ± 10	682 ± 11	-
	N:P = 63:1	1243 ± 16	1231 ± 10	1734 ± 163
High pCO_2	N:P = 10:1	1266 ± 22	1240 ± 20	2079 ± 406
	N:P = 24:1	1596 ± 63	1691 ± 36	1163 ± 190
	N:P = 63:1	1616 ± 27	1550 ± 34	3295 ± 171

[a] Data for *Phaeodactylum tricornutum* and *Rhodomonas* sp. are modified after Bi et al. (2017). [b] Data for *Emiliania huxleyi* are from Bi et al. (2018).

Table S2. Results of Akaike information criterion corrected (AICc) in the generalized linear mixed models (GLMMs) testing for the effects of temperature, N:P supply ratios and pCO_2 on carbon-normalized and per-cell contents of brassicasterol/epi-brassicasterol (brassi./epi-brassi./POC and brassi./epi-brassi./cell; μg mg C^{-1} and pg $cell^{-1}$) in *Phaeodactylum tricornutum*, *Rhodomonas* sp. and *Emiliania huxleyi*, and carbon-normalized and per-cell contents of C_{37} - C_{39} total alkenones (alkenones/POC and alkenones/cell), per-cell contents of C_{37} alkenones (C_{37}/Cell), C_{38} alkenones (C_{38}/Cell), C_{38} ethyl ketones (C_{38} Et/Cell) and C_{38} methyl ketones (C_{38} Me/Cell), C_{37}/C_{38} alkenone ratios, and C_{38} Et/C_{38} Me (C_{38} Et/Me) in *E. huxleyi*.

Species	Response variable	Effect builder	AICc
P. tricornutum	Brassi./epi-brassi./POC	Main, two way and three way	271
		Main, two way	248
		Main	**207**
	Brassi./epi-brassi./cell	Main, two way and three way	63
		Main, two way	39
		Main	**-21**
Rhodomonas sp.	Brassi./epi-brassi./POC	Main, two way and three way	197
		Main, two way	194
		Main	**191**
	Brassi./epi-brassi./cell	Main, two way and three way	94
		Main, two way	66
		Main	**5**
E. huxleyi	Brassi./epi-brassi./POC	Main, two way and three way	272
		Main, two way	248
		Main	**200**
	Brassi./epi-brassi./cell	Main, two way and three way	116
		Main, two way	89
		Main	**31**
	Alkenones/POC	Main, two way and three way	575

	Main, two way	558
	Main	**534**
Alkenones/Cell	Main, two way and three way	109
	Main, two way	82
	Main	**26**
C_{37}/Cell	Main, two way and three way	105
	Main, two way	77
	Main	**22**
C_{38}/Cell	Main, two way and three way	115
	Main, two way	88
	Main	**32**
C_{38} Et/Cell	Main, two way and three way	125
	Main, two way	98
	Main	**42**
C_{38} Me/Cell	Main, two way and three way	100
	Main, two way	73
	Main	**15**
C_{37}/C_{38} alkenone ratios	Main, two way and three way	79
	Main, two way	50
	Main	**-13**
C_{38} Et/Me	Main, two way and three way	83
	Main, two way	55
	Main	**-5**

The selected models are shown in bold.

Table S3. Brassicasterol contents (each μg mg C^{-1} and pg $cell^{-1}$; mean ± SE) in *Phaeodactylum tricornutum*, *Rhodomonas* sp. and *Emiliania huxleyi* as a function of temperature, N:P supply ratios and pCO_2.

Treatment			*P. tricornutum*		*Rhodomonas* sp.		*E. huxleyi*	
			μg mg C^{-1}	pg $cell^{-1}$	μg mg C^{-1}	pg $cell^{-1}$	μg mg C^{-1}	pg $cell^{-1}$
12 °C	Low pCO_2	N:P = 10:1	8.00 ± 1.59	0.06 ± 0.01	4.02 ± 0.18	0.37 ± 0.02	6.08 ± 0.69	0.11 ± 0.01
		N:P = 24:1	8.34 ± 0.10	0.05 ± 0.002	4.49 ± 0.42	0.48 ± 0.11	6.24 ± 0.44	0.11 ± 0.01
		N:P = 63:1	6.33 ± 0.30	0.06 ± 0.01	4.31 ± 0.34	0.50 ± 0.10	3.99 ± 1.66	0.08 ± 0.04
	High pCO_2	N:P = 10:1	6.51 ± 0.29	0.05 ± 0.002	3.96 ± 0.28	0.50 ± 0.12	5.46 ± 0.55	0.08 ± 0.01
		N:P = 24:1	6.40 ± 0.18	0.06 ± 0.002	4.30 ± 0.04	0.29 ± 0.06	5.28 ± 0.51	0.11 ± 0.01
		N:P = 63:1	6.36 ± 0.78	0.08 ± 0.02	3.64 ± 0.52	0.51 ± 0.18	4.77 ± 0.38	0.11 ± 0.01
18 °C	Low pCO_2	N:P = 10:1	8.53 ± 0.11	0.08 ± 0.002	4.47 ± 0.80	0.41 ± 0.06	5.73 ± 0.16	0.04 ± 0.001
		N:P = 24:1	7.43 ± 0.94	0.05 ± 0.01	4.91 ± 0.13	0.32 ± 0.03	7.19 ± 0.21	0.08 ± 0.01
		N:P = 63:1	7.42 ± 0.82	0.11 ± 0.02	4.01 ± 0.23	0.48 ± 0.05	4.85 ± 0.44	0.15 ± 0.03
	High pCO_2	N:P = 10:1	9.29 ± 0.44	0.08 ± 0.003	4.95 ± 0.12	0.51 ± 0.10	6.33 ± 0.70	0.04 ± 0.01
		N:P = 24:1	8.26 ± 0.52	0.08 ± 0.01	1.91 ± 0.34	0.32 ± 0.16	7.70 ± 0.92	0.14 ± 0.01
		N:P = 63:1	7.35 ± 0.64	0.10 ± 0.01	4.61 ± 0.69	0.59 ± 0.17	4.17 ± 0.35	0.13 ± 0.05
24 °C	Low pCO_2	N:P = 10:1	6.31 ± 0.75	0.05 ± 0.01	3.36 ± 0.16	0.25 ± 0.04	7.54 ± 0.24	0.06 ± 0.003
		N:P = 24:1	6.36 ± 0.91	0.07 ± 0.02	9.56 ± 0.55	0.29 ± 0.03	7.15 ± 0.56	0.07 ± 0.002
		N:P = 63:1	7.47 ± 0.44	0.13 ± 0.01	4.79 ± 0.40	0.54 ± 0.16	4.25 ± 0.43	0.09 ± 0.01
	High pCO_2	N:P = 10:1	7.66 ± 0.17	0.07 ± 0.01	4.44 ± 0.44	0.38 ± 0.03	6.83 ± 0.46	0.05 ± 0.003
		N:P = 24:1	8.88 ± 2.10	0.11 ± 0.004	4.10 ± 0.39	0.32 ± 0.06	7.85 ± 0.31	0.19 ± 0.02
		N:P = 63:1	7.90 ± 0.40	0.09 ± 0.01	2.94 ± 0.08	0.42 ± 0.03	4.03 ± 0.30	0.12 ± 0.02

Table S4. Alkenone contents (each μg mg C^{-1} and pg $cell^{-1}$; mean ± SE) in *Emiliania huxleyi* as a function of temperature, N:P supply ratios and pCO_2.

Treatment			$C_{37:4}$ Me		$C_{37:3}$ Me		$C_{37:2}$ Me		$C_{38:3}$ Et		$C_{38:3}$ Me	
			μg mg C^{-1}	pg $cell^{-1}$	μg mg C^{-1}	pg $cell^{-1}$	μg mg C^{-1}	pg $cell^{-1}$	μg mg C^{-1}	pg $cell^{-1}$	μg mg C^{-1}	pg $cell^{-1}$
12 ºC	Low pCO_2	N:P = 10:1	5.10 ± 0.61	0.09 ± 0.01	52.6 ± 9.17	0.91 ± 0.12	13.3 ± 2.63	0.23 ± 0.03	22.5 ± 3.95	0.39 ± 0.05	16.2 ± 3.21	0.28 ± 0.04
		N:P = 24:1	4.90 ± 0.38	0.09 ± 0.01	43.3 ± 3.67	0.79 ± 0.09	10.5 ± 0.83	0.19 ± 0.02	21.1 ± 1.95	0.39 ± 0.05	13.6 ± 1.47	0.25 ± 0.03
		N:P = 63:1	7.17 ± 1.22	0.15 ± 0.05	56.9 ± 3.28	0.80 ± 0.42	18.7 ± 0.31	0.26 ± 0.13	24.3 ± 2.20	0.51 ± 0.15	19.3 ± 1.28	0.40 ± 0.11
	High pCO_2	N:P = 10:1	5.38 ± 0.25	0.08 ± 0.01	40.9 ± 7.59	0.61 ± 0.11	11.0 ± 3.32	0.16 ± 0.05	18.0 ± 3.28	0.27 ± 0.05	16.5 ± 3.34	0.25 ± 0.05
		N:P = 24:1	4.05 ± 0.19	0.09 ± 0.01	39.5 ± 1.67	0.86 ± 0.07	11.3 ± 0.46	0.24 ± 0.02	18.8 ± 1.04	0.41 ± 0.03	14.3 ± 0.68	0.31 ± 0.03
		N:P = 63:1	6.15 ± 0.63	0.14 ± 0.02	49.7 ± 6.17	1.13 ± 0.16	19.8 ± 4.47	0.45 ± 0.11	18.4 ± 1.79	0.42 ± 0.05	18.1 ± 2.35	0.41 ± 0.05
18 ºC	Low pCO_2	N:P = 10:1	1.01 ± 0.06	0.01 ± 0.001	41.1 ± 8.74	0.30 ± 0.08	25.3 ± 6.89	0.18 ± 0.06	10.7 ± 2.25	0.08 ± 0.02	13.2 ± 3.02	0.09 ± 0.03
		N:P = 24:1	0.90 ± 0.07	0.01 ± 0.002	39.0 ± 3.39	0.45 ± 0.09	25.5 ± 2.14	0.30 ± 0.06	14.3 ± 1.07	0.17 ± 0.03	10.8 ± 0.88	0.13 ± 0.02
		N:P = 63:1	1.10 ± 0.15	0.03 ± 0.01	36.9 ± 8.36	1.15 ± 0.38	22.8 ± 9.16	0.72 ± 0.30	10.4 ± 2.95	0.33 ± 0.12	9.72 ± 2.41	0.31 ± 0.10
	High pCO_2	N:P = 10:1	1.58 ± 0.34	0.01 ± 0.00	51.8 ± 2.14	0.35 ± 0.07	27.3 ± 2.51	0.19 ± 0.06	14.1 ± 0.43	0.10 ± 0.02	16.4 ± 0.58	0.11 ± 0.03
		N:P = 24:1	0.72 ± 0.16	0.01 ± 0.002	28.7 ± 2.65	0.51 ± 0.04	14.7 ± 1.55	0.26 ± 0.01	14.4 ± 0.90	0.25 ± 0.01	8.06 ± 0.70	0.14 ± 0.01
		N:P = 63:1	0.97 ± 0.09	0.03 ± 0.01	38.0 ± 11.2	0.93 ± 0.10	30.8 ± 13.3	0.69 ± 0.21	11.4 ± 3.37	0.28 ± 0.03	10.8 ± 3.34	0.26 ± 0.03
24 ºC	Low pCO_2	N:P = 10:1	0 ± 0	0 ± 0	18.7 ± 1.22	0.15 ± 0.01	78.3 ± 9.84	0.62 ± 0.09	3.90 ± 0.24	0.03 ± 0.003	3.91 ± 0.21	0.03 ± 0.003
		N:P = 24:1	0 ± 0	0 ± 0	17.4 ± 2.55	0.16 ± 0.01	60.6 ± 19.4	0.56 ± 0.15	5.50 ± 0.78	0.05 ± 0.004	2.51 ± 0.39	0.02 ± 0.002
		N:P = 63:1	0 ± 0	0 ± 0	12.8 ± 3.66	0.26 ± 0.05	41.7 ± 13.8	0.85 ± 0.17	3.05 ± 1.02	0.06 ± 0.02	1.69 ± 0.48	0.03 ± 0.01
	High pCO_2	N:P = 10:1	0 ± 0	0 ± 0	20.2 ± 5.41	0.15 ± 0.03	47.8 ± 13.0	0.69 ± 0.31	3.26 ± 0.50	0.04 ± 0.01	3.01 ± 0.39	0.03 ± 0.01
		N:P = 24:1	0 ± 0	0 ± 0	15.7 ± 1.41	0.37 ± 0.05	76.1 ± 9.40	1.82 ± 0.31	5.36 ± 0.38	0.13 ± 0.01	2.65 ± 0.31	0.06 ± 0.01
		N:P = 63:1	0 ± 0	0 ± 0	20.2 ± 3.18	0.56 ± 0.04	53.0 ± 1.03	1.96 ± 0.21	5.32 ± 0.90	0.15 ± 0.01	2.91 ± 0.46	0.08 ± 0.01

	Mean per-cell content				
	$C_{37:4}$ Me	$C_{37:3}$ Me	$C_{37:2}$ Me	$C_{38:3}$ Et	$C_{38:3}$ Me
All treatment	0 – 0.15	0.15 – 1.15	0.16 – 1.96	0.03 – 0.51	0.02 – 0.41

Table S4. Continued.

Treatment			$C_{38:2}$ Et		$C_{38:2}$ Me		$C_{39:3}$ Et*		$C_{39:2}$ Et*	
			μg mg C^{-1}	pg cell^{-1}	μg mg C^{-1}	pg cell^{-1}	μg mg C^{-1}	pg cell^{-1}	μg mg C^{-1}	pg cell^{-1}
12 °C	Low pCO_2	N:P = 10:1	13.4 ± 2.85	0.23 ± 0.04	4.08 ± 1.01	0.07 ± 0.01	3.81 ± 0.82	0.07 ± 0.01	2.29 ± 0.53	0.04 ± 0.01
		N:P = 24:1	10.9 ± 0.63	0.20 ± 0.02	3.27 ± 0.50	0.06 ± 0.01	3.29 ± 0.33	0.06 ± 0.01	1.88 ± 0.19	0.03 ± 0.005
		N:P = 63:1	16.3 ± 0.43	0.33 ± 0.06	5.71 ± 0.01	0.12 ± 0.02	4.50 ± 0.21	0.09 ± 0.02	3.28 ± 0.05	0.07 ± 0.01
	High pCO_2	N:P = 10:1	10.6 ± 3.72	0.16 ± 0.05	4.10 ± 1.28	0.06 ± 0.02	3.84 ± 0.96	0.06 ± 0.01	2.37 ± 0.78	0.04 ± 0.01
		N:P = 24:1	12.1 ± 0.30	0.27 ± 0.03	3.81 ± 0.12	0.08 ± 0.01	3.60 ± 0.19	0.08 ± 0.01	2.33 ± 0.07	0.05 ± 0.01
		N:P = 63:1	16.4 ± 4.37	0.37 ± 0.10	6.42 ± 1.34	0.15 ± 0.03	3.77 ± 0.64	0.09 ± 0.01	3.37 ± 0.86	0.08 ± 0.02
18 °C	Low pCO_2	N:P = 10:1	16.5 ± 4.73	0.12 ± 0.04	7.89 ± 2.21	0.06 ± 0.02	1.95 ± 0.49	0.01 ± 0.004	3.06 ± 0.93	0.02 ± 0.01
		N:P = 24:1	20.3 ± 1.70	0.23 ± 0.05	6.66 ± 0.47	0.08 ± 0.01	2.03 ± 0.19	0.02 ± 0.005	3.08 ± 0.27	0.04 ± 0.01
		N:P = 63:1	15.0 ± 6.30	0.48 ± 0.21	5.85 ± 2.29	0.19 ± 0.08	1.50 ± 0.42	0.05 ± 0.02	2.48 ± 1.01	0.08 ± 0.03
	High pCO_2	N:P = 10:1	18.1 ± 2.53	0.13 ± 0.05	8.85 ± 1.18	0.06 ± 0.02	2.54 ± 0.27	0.02 ± 0.01	3.49 ± 0.63	0.03 ± 0.01
		N:P = 24:1	13.5 ± 1.64	0.24 ± 0.02	3.94 ± 0.37	0.07 ± 0.003	1.99 ± 0.09	0.04 ± 0.001	2.07 ± 0.23	0.04 ± 0.003
		N:P = 63:1	21.5 ± 9.85	0.47 ± 0.16	8.24 ± 3.62	0.18 ± 0.06	1.75 ± 0.59	0.04 ± 0.01	3.68 ± 1.66	0.08 ± 0.03
24 °C	Low pCO_2	N:P = 10:1	40.2 ± 5.94	0.32 ± 0.05	15.0 ± 1.88	0.12 ± 0.02	0.25 ± 0.13	0.002 ± 0.001	4.49 ± 0.63	0.04 ± 0.01
		N:P = 24:1	41.3 ± 14.1	0.38 ± 0.11	7.14 ± 2.07	0.07 ± 0.02	0.23 ± 0.11	0.002 ± 0.001	2.87 ± 0.83	0.03 ± 0.01
		N:P = 63:1	23.3 ± 8.87	0.46 ± 0.12	4.87 ± 1.71	0.10 ± 0.02	0 ± 0	0 ± 0	1.68 ± 0.68	0.03 ± 0.01
	High pCO_2	N:P = 10:1	25.3 ± 8.55	0.39 ± 0.19	9.00 ± 2.73	0.12 ± 0.05	0.17 ± 0.17	0.002 ± 0.001	2.75 ± 0.88	0.04 ± 0.02
		N:P = 24:1	51.0 ± 5.79	1.22 ± 0.19	9.59 ± 1.15	0.23 ± 0.04	0 ± 0	0 ± 0	4.21 ± 0.48	0.10 ± 0.02
		N:P = 63:1	41.2 ± 11.7	1.10 ± 0.12	8.84 ± 2.21	0.24 ± 0.03	0.11 ± 0.11	0.002 ± 0.002	3.24 ± 0.91	0.09 ± 0.01

	Mean per-cell content			
	$C_{38:2}$ Et	$C_{38:2}$ Me	$C_{39:3}$ Et*	$C_{39:2}$ Et*
All treatment	0.12 - 1.22	0.06 - 0.24	0 - 0.09	0.02 - 0.10

* Tentatively identified due to low molecular ion abundance.

Table S4. Continued.

Treatment			Total alkenones		C_{37}/C_{38}	C_{38} Et/Me	$U^{K'}_{37}$
			μg mg C^{-1}	pg $cell^{-1}$			
12 ºC	Low pCO_2	N:P = 10:1	133.2 ± 24.8	2.29 ± 0.31	1.27 ± 0.02	1.79 ± 0.04	0.20 ± 0.003
		N:P = 24:1	112.7 ± 9.69	2.06 ± 0.24	1.20 ± 0.01	1.92 ± 0.08	0.20 ± 0.004
		N:P = 63:1	156.2 ± 7.51	3.24 ± 0.80	1.34 ± 0.08	1.55 ± 0.07	0.24 ± 0.01
	High pCO_2	N:P = 10:1	112.8 ± 24.0	1.68 ± 0.34	1.20 ± 0.09	1.37 ± 0.05	0.20 ± 0.03
		N:P = 24:1	109.9 ± 4.17	2.38 ± 0.22	1.12 ± 0.01	1.71 ± 0.03	0.22 ± 0.003
		N:P = 63:1	142.1 ± 21.4	3.24 ± 0.53	1.29 ± 0.04	1.41 ± 0.05	0.28 ± 0.03
18 ºC	Low pCO_2	N:P = 10:1	120.7 ± 29.3	0.85 ± 0.25	1.41 ± 0.04	1.28 ± 0.02	0.37 ± 0.02
		N:P = 24:1	122.6 ± 10.1	1.42 ± 0.28	1.26 ± 0.01	1.98 ± 0.04	0.40 ± 0.005
		N:P = 63:1	105.7 ± 32.1	3.33 ± 1.22	1.58 ± 0.15	1.53 ± 0.17	0.34 ± 0.08
	High pCO_2	N:P = 10:1	144.1 ± 7.07	0.99 ± 0.27	1.42 ± 0.10	1.28 ± 0.03	0.35 ± 0.03
		N:P = 24:1	88.1 ± 6.21	1.55 ± 0.04	1.10 ± 0.05	2.34 ± 0.17	0.34 ± 0.02
		N:P = 63:1	127.0 ± 47.0	2.96 ± 0.60	1.41 ± 0.09	1.65 ± 0.10	0.41 ± 0.06
24 ºC	Low pCO_2	N:P = 10:1	164.7 ± 20.0	1.30 ± 0.19	1.55 ± 0.03	2.31 ± 0.12	0.80 ± 0.01
		N:P = 24:1	137.6 ± 39.2	1.27 ± 0.30	1.40 ± 0.04	4.72 ± 0.37	0.76 ± 0.04
		N:P = 63:1	89.1 ± 29.9	1.80 ± 0.38	1.73 ± 0.10	3.90 ± 0.21	0.76 ± 0.02
	High pCO_2	N:P = 10:1	138.3 ± 35.9	0.85 ± 0.14	1.52 ± 0.09	2.54 ± 0.22	0.79 ± 0.04
		N:P = 24:1	164.6 ± 18.8	3.93 ± 0.63	1.34 ± 0.01	4.62 ± 0.09	0.83 ± 0.01
		N:P = 63:1	117.2 ± 3.17	4.19 ± 0.39	1.60 ± 0.03	3.89 ± 0.19	0.77 ± 0.02

	% of total alkenones			
	C_{37} Me	C_{38} Et	C_{38} Me	C_{39} Et
All treatments	48 – 65%	18 – 35%	6.6 – 19%	0 – 5.9%

Table S5. Dim1 and Dim2 loadings for each variable in PCA (Fig. 3) testing the responses of carbon-normalized contents of the major sterol component (brassicasterol/epi-brassicasterol), C_{37}-C_{39} total alkenones and total fatty acids (TFAs) (μg mg C^{-1}) in *Phaeodactylum tricornutum*, *Rhodomonas* sp. and *Emiliania huxleyi* to changes in temperature, N:P molar ratios and pCO_2.

Variables	PC1	PC2
% of variance	26.4	17.7
Temperature	-0.320	0.493
pCO_2	0.185	0.151
N:P supply ratio	0.668	0.559
Brassicasterol/epi-brassicasterol (*P. tricornutum*)	-0.024	-0.420
Brassicasterol/epi-brassicasterol (*Rhodomonas* sp.)	-0.402	0.393
Brassicasterol/epi-brassicasterol (*E. huxleyi*)	-0.833	-0.040
Alkenones (*E. huxleyi*)	-0.292	0.317
TFAs (*P. tricornutum*)	0.608	0.426
TFAs (*Rhodomonas* sp.)	0.819	-0.104
TFAs (*E. huxleyi*)	0.279	-0.753