**Table S1**. Seawater Carbonate chemistry parameters in the media used for the dilution and within the incubation bottles from the four experimental treatments on the final sampling day. Directly measured values were marked by asterisks (\*) and values without an asterisk were calculated using CO2sys at the corresponding incubation temperature. Errors are standard deviations around the mean of the triplicate values in each treatment.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Treatment | | pHtotal | DIC\*  µmol kg-1 | TA\*  µmol kg-1 | *p*CO2  ppm | | [HCO3-]  µmol kg-1 | [CO32-]  µmol kg-1 | | ΩCa |
| Control | Medium | 8.051 | 2167 | 2315 | | 403 | 2034 | 113 | 2.8 | |
| Bottle | 8.103±0.020 | 2138±12 | 2306±7 | 350±7 | | 1995±10 | 125±2 | | 3.0±0.1 |
| High CO2 | Medium | 7.784 | 2257 | 2315 | 788 | | 2153 | 65 | 1.6 | |
| Bottle | 7.818±0.015 | 2234±27 | 2302±28 | 721±27 | | 2129±25 | 69±3 | 1.7±0.2 | |
| High Temperature | Medium | 8.062 | 2137 | 2315 | 396 | | 1987 | 133 | 3.2 | |
| Bottle | 8.114±0.007 | 2105±9 | 2305±10 | 343±6 | | 1943±9 | 147±3 | 3.6±0.1 | |
| Combined | Medium | 7.802 | 2233 | 2315 | 768 | | 2121 | 78 | 1.9 | |
| Bottle | 7.831±0.021 | 2216±21 | 2308±16 | 712±41 | | 2103±22 | 83±4 | 2.0±0.2 | |

**Table S2.** Two-way ANOVA results. “\*” indicates F(1,7) and “\*\*” indicates F(1,6) due to loss of samples.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Parameter | Environmental Driver | Sum of Squares (SS) | Degree of Freedom (DF) | F(1,8) | P | Significance  at 0.05 level |
| Diatom abundance | CO2 | 1.390×106 | 1 | 146.4 | <0.0001 | Yes |
| T | 7.363×106 | 1 | 0.7753 | 0.4043 | No |
| Interaction | 5.936×106 | 1 | 0.6250 | 0.4520 | No |
| Dinoflagellate abundance | CO2 | 50700 | 1 | 2.881 | 0.1281 | No |
| T | 149633 | 1 | 8.502 | 0.0194 | Yes |
| Interaction | 1.092×106 | 1 | 62.05 | <0.0001 | Yes |
| Diatoms vs. dinoflagellates | CO2 | 46591 | 1 | 6.012 | 0.0398 | Yes |
| T | 41994 | 1 | 5.419 | 0.0483 | Yes |
| Interaction | 85350 | 1 | 11.01 | 0.0106 | Yes |
| Centric diatom abundance | CO2 | 1.409×108 | 1 | 16.59 | 0.0804 | No |
| T | 2.374×107 | 1 | 2.796 | 0.1330 | No |
| Interaction | 3.400×107 | 1 | 4.004 | 0.0804 | No |
| Pennate diatom abundance | CO2 | 6.468×108 | 1 | 375.8 | <0.0001 | Yes |
| T | 5.782×107 | 1 | 33.59 | 0.0004 | Yes |
| Interaction | 1.164×107 | 1 | 6.764 | 0.0316 | Yes |
| Centric vs. pennate | CO2 | 59.79 | 1 | 26.48 | 0.0009 | Yes |
| T | 53.76 | 1 | 23.81 | 0.0012 | Yes |
| Interaction | 51.72 | 1 | 22.91 | 0.0014 | Yes |
| POC concentration | CO2 | 54108 | 1 | 10.89\* | 0.013 | Yes |
| T | 4010 | 1 | 0.8071\* | 0.3988 | No |
| Interaction | 1214 | 1 | 0.2443\* | 0.6363 | No |
| BSi concentration | CO2 | 195.7 | 1 | 42.68 | 0.0002 | Yes |
| T | 201.5 | 1 | 43.93 | 0.0002 | Yes |
| Interaction | 15.48 | 1 | 3.375 | 0.1035 | No |
| N:P | CO2 | 101.5 | 1 | 8.774\*\* | 0.0252 | Yes |
| T | 34.36 | 1 | 2.971\*\* | 0.1355 | No |
| Interaction | 6.610 | 1 | 0.5715\*\* | 0.4783 | No |
| C:N | CO2 | 1.477 | 1 | 0.3174\* | 0.5886 | No |
| T | 11.17 | 1 | 2.401\* | 0.1598 | No |
| Interaction | 1.011 | 1 | 0.2173\* | 0.6536 | No |
| C:P | CO2 | 6998 | 1 | 4.081\* | 0.0831 | No |
| T | 13131 | 1 | 7.657\* | 0.0278 | Yes |
| Interaction | 9727 | 1 | 5.672\* | 0.0488 | Yes |
| C:BSi | CO2 | 569.1 | 1 | 31.40\* | 0.0005 | Yes |
| T | 260.3 | 1 | 14.36\* | 0.0053 | Yes |
| Interaction | 81.57 | 1 | 4.509\* | 0.0665 | No |
| Sinking rate | CO2 | 0.01060 | 1 | 10.65 | 0.0115 | Yes |
| T | 0.004096 | 1 | 4.115 | 0.0770 | No |
| Interaction | 0.002843 | 1 | 2.856 | 0.1295 | No |
| Percentage of micro-plankton Chl-a biomass | CO2 | 224.6 | 1 | 18.09 | 0.0028 | Yes |
| T | 328 | 1 | 26.41 | 0.0009 | Yes |
| Interaction | 68.79 | 1 | 5.540 | 0.0464 | Yes |
| Percentage of nano-plankton Chl-a biomass | CO2 | 205.6 | 1 | 30.19 | 0.0006 | Yes |
| T | 254.4 | 1 | 37.36 | 0.0003 | Yes |
| Interaction | 59.99 | 1 | 8.812 | 0.0179 | Yes |
| Percentage of pico-plankton Chl-a biomass | CO2 | 0.1913 | 1 | 0.2697 | 0.6176 | No |
| T | 5.633 | 1 | 7.941 | 0.0226 | Yes |
| Interaction | 0.5773 | 1 | 0.8138 | 0.3933 | No |