Table S1. Physical and chemical properties in mesocosms. Control: 8, 10, 12; Treatment: 7, 9, 11.

| Mesocosm | Year | Month | Day | Hour | Minute | Salinity | Temp (°C) | DO (umol/kg) | $NO_2^-$ (umol/kg) | $NO_3^-$ (umol/kg) | $NH_4^+$ (umol/kg) | $PO_4^{3-}$ (umol/kg) | $Si(OH)_4$ (umol/kg) | TA (umol/kg) | $pH_{NBS}$ | $TCO_2$ (umol/kg) | $pCO_2$ (uatm) | $\Omega_{arag}$ | $HCO_3^-$ (umol/kg) | $CO_3^{2-}$ (umol/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | 2006 | 6 | 21 | 12 | 0 | 35.1 | 27.8 | 256.0 | 0.035 | 0.232 | 0.428 | 0.202 | 8.594 | 2019.5 | 8.06 | 1788.8 | 494 | 2.57 | 1615.6 | 160.2 |
| 8 | 2006 | 6 | 21 | 12 | 0 | 35.1 | 27.8 | 279.5 | 0.037 | 0.245 | 0.480 | 0.129 | 8.341 | 2102.2 | 8.28 | 1740.0 | 274 | 3.93 | 1487.9 | 244.8 |
| 9 | 2006 | 6 | 21 | 12 | 0 | 35.1 | 27.8 | 247.7 | 0.033 | 0.207 | 0.360 | 0.107 | 8.287 | 1947.8 | 7.93 | 1780.2 | 677 | 1.94 | 1641.7 | 120.7 |
| 10 | 2006 | 6 | 21 | 12 | 0 | 35.0 | 27.9 | 263.3 | 0.032 | 0.174 | 0.395 | 0.105 | 7.753 | 2111.7 | 8.19 | 1803.3 | 359 | 3.40 | 1582.2 | 211.7 |
| 11 | 2006 | 6 | 21 | 12 | 0 | 35.0 | 27.7 | 242.9 | 0.071 | 0.149 | 0.386 | 0.112 | 7.882 | 1965.0 | 7.87 | 1821.5 | 800 | 1.73 | 1692.5 | 107.7 |
| 12 | 2006 | 6 | 21 | 12 | 0 | 35.0 | 27.7 | 274.0 | 0.033 | 0.106 | 0.653 | 0.093 | 7.729 | 2107.3 | 8.23 | 1777.1 | 319 | 3.61 | 1543.6 | 225.1 |
| 7 | 2006 | 6 | 21 | 16 | 0 | 35.3 | 27.0 | 230.6 | 0.018 | 0.257 | 0.323 | 0.165 | 7.340 | 2075.0 | 7.97 | 1886.0 | 644 | 2.19 | 1731.8 | 136.9 |
| 8 | 2006 | 6 | 21 | 16 | 0 | 35.1 | 27.0 | 242.9 | 0.034 | 0.256 | 0.429 | 0.102 | 7.378 | 2120.2 | 8.20 | 1810.9 | 349 | 3.39 | 1589.2 | 212.3 |
| 9 | 2006 | 6 | 21 | 16 | 0 | 35.2 | 26.9 | 226.4 | 0.026 | 0.271 | 0.225 | 0.097 | 7.044 | 2007.9 | 7.82 | 1884.0 | 925 | 1.57 | 1761.0 | 98.0 |
| 10 | 2006 | 6 | 21 | 16 | 0 | 35.2 | 27.1 | 238.6 | 0.028 | 0.136 | 0.281 | 0.094 | 7.177 | 2175.4 | 8.15 | 1888.2 | 413 | 3.21 | 1676.4 | 200.7 |
| 11 | 2006 | 6 | 21 | 16 | 0 | 35.2 | 26.9 | 226.1 | 0.051 | 0.178 | 0.256 | 0.095 | 6.933 | 1992.8 | 7.79 | 1880.2 | 992 | 1.46 | 1761.9 | 91.5 |
| 12 | 2006 | 6 | 21 | 16 | 0 | 35.2 | 26.9 | 240.1 | 0.029 | 0.166 | 0.500 | 0.096 | 7.628 | 2151.5 | 8.18 | 1850.7 | 374 | 3.32 | 1632.5 | 208.2 |
| 7 | 2006 | 6 | 21 | 20 | 0 | 35.4 | 26.3 | 184.8 | 0.042 | 0.341 | 0.289 | 0.168 | 6.662 | 2072.8 | 7.78 | 1962.7 | 1053 | 1.47 | 1841.6 | 92.3 |
| 8 | 2006 | 6 | 21 | 20 | 0 | 35.2 | 26.3 | 177.5 | 0.068 | 0.479 | 0.486 | 0.132 | 6.894 | 2188.7 | 7.99 | 1988.1 | 643 | 2.35 | 1823.1 | 147.4 |
| 9 | 2006 | 6 | 21 | 20 | 0 | 35.2 | 26.3 | 187.3 | 0.056 | 0.348 | 0.225 | 0.133 | 7.132 | 2011.0 | 7.66 | 1943.6 | 1385 | 1.11 | 1836.2 | 69.4 |
| 10 | 2006 | 6 | 21 | 20 | 0 | 35.2 | 26.3 | 183.0 | 0.065 | 0.452 | 0.291 | 0.124 | 7.265 | 2167.8 | 8.00 | 1963.9 | 620 | 2.37 | 1798.1 | 148.8 |
| 11 | 2006 | 6 | 21 | 20 | 0 | 35.2 | 26.2 | 186.3 | 0.078 | 0.453 | 0.279 | 0.125 | 6.832 | 1997.6 | 7.62 | 1943.2 | 1519 | 1.01 | 1838.3 | 63.2 |
| 12 | 2006 | 6 | 21 | 20 | 0 | 35.2 | 26.2 | 178.4 | 0.060 | 0.533 | 0.563 | 0.136 | 7.434 | 2174.7 | 7.99 | 1975.6 | 639 | 2.32 | 1812.0 | 146.1 |
| 7 | 2006 | 6 | 22 | 0 | 0 | 35.4 | 26.0 | 186.3 | 0.021 | 0.220 | 0.244 | 0.134 | 5.985 | 2111.2 | 7.77 | 2004.8 | 1098 | 1.45 | 1883.2 | 91.4 |
| 8 | 2006 | 6 | 22 | 0 | 0 | 35.2 | 26.0 | 171.4 | 0.037 | 0.319 | 0.462 | 0.122 | 6.411 | 2219.0 | 7.92 | 2050.0 | 785 | 2.06 | 1898.9 | 129.5 |
| 9 | 2006 | 6 | 22 | 0 | 0 | 35.2 | 26.0 | 187.6 | 0.026 | 0.139 | 0.212 | 0.096 | 6.650 | 2039.0 | 7.63 | 1981.7 | 1510 | 1.04 | 1874.5 | 65.6 |
| 10 | 2006 | 6 | 22 | 0 | 0 | 35.2 | 25.9 | 182.4 | 0.035 | 0.195 | 0.247 | 0.097 | 7.069 | 2207.5 | 7.98 | 2012.8 | 665 | 2.29 | 1850.0 | 144.4 |
| 11 | 2006 | 6 | 22 | 0 | 0 | 35.2 | 25.9 | 187.0 | 0.054 | 0.338 | 0.223 | 0.101 | 6.637 | 2023.3 | 7.61 | 1972.7 | 1573 | 0.99 | 1867.0 | 62.2 |
| 12 | 2006 | 6 | 22 | 0 | 0 | 35.2 | 25.9 | 177.2 | 0.032 | 0.228 | 0.496 | 0.102 | 6.864 | 2209.5 | 7.94 | 2032.8 | 740 | 2.13 | 1878.6 | 133.7 |
| 7 | 2006 | 6 | 22 | 4 | 0 | 35.4 | 25.8 | 184.5 | 0.038 | 0.311 | 0.258 | 0.141 | 5.883 | 2086.5 | 7.71 | 2002.4 | 1261 | 1.26 | 1888.2 | 79.3 |
| 8 | 2006 | 6 | 22 | 4 | 0 | 35.3 | 25.8 | 170.8 | 0.054 | 0.410 | 0.452 | 0.115 | 6.881 | 2209.1 | 7.88 | 2058.0 | 865 | 1.88 | 1915.3 | 118.7 |
| 9 | 2006 | 6 | 22 | 4 | 0 | 35.3 | 25.8 | 187.0 | 0.039 | 0.381 | 0.222 | 0.109 | 6.453 | 2055.6 | 7.58 | 2014.0 | 1719 | 0.94 | 1907.2 | 59.2 |
| 10 | 2006 | 6 | 22 | 4 | 0 | 35.2 | 25.8 | 180.2 | 0.051 | 0.383 | 0.271 | 0.110 | 7.062 | 2194.0 | 7.94 | 2018.6 | 735 | 2.10 | 1865.9 | 132.4 |
| 11 | 2006 | 6 | 22 | 4 | 0 | 35.2 | 25.7 | 185.1 | 0.071 | 0.378 | 0.243 | 0.111 | 6.536 | 2031.5 | 7.56 | 1996.7 | 1784 | 0.89 | 1891.4 | 55.8 |
| 12 | 2006 | 6 | 22 | 4 | 0 | 35.3 | 25.7 | 175.6 | 0.066 | 0.542 | 0.654 | 0.102 | 7.232 | 2204.0 | 7.90 | 2045.3 | 819 | 1.95 | 1899.7 | 122.9 |
| 7 | 2006 | 6 | 22 | 8 | 0 | 35.4 | 26.0 | 218.4 | 0.038 | 0.369 | 0.315 | 0.134 | 7.216 | 2078.0 | 7.87 | 1935.2 | 835 | 1.75 | 1802.1 | 110.1 |
| 8 | 2006 | 6 | 22 | 8 | 0 | 35.2 | 26.0 | 224.2 | 0.050 | 0.421 | 0.394 | 0.118 | 7.445 | 2176.7 | 8.06 | 1944.7 | 528 | 2.64 | 1764.1 | 166.0 |
| 9 | 2006 | 6 | 22 | 8 | 0 | 35.3 | 26.0 | 219.9 | 0.036 | 0.343 | 0.245 | 0.112 | 7.206 | 2020.6 | 7.74 | 1927.6 | 1134 | 1.30 | 1814.4 | 81.9 |
| 10 | 2006 | 6 | 22 | 8 | 0 | 35.3 | 26.0 | 220.2 | 0.058 | 0.384 | 0.294 | 0.106 | 7.433 | 2172.7 | 8.04 | 1950.3 | 556 | 2.54 | 1775.0 | 160.0 |
| 11 | 2006 | 6 | 22 | 8 | 0 | 35.2 | 25.9 | 217.8 | 0.070 | 0.435 | 0.269 | 0.124 | 7.281 | 2010.3 | 7.70 | 1931.5 | 1248 | 1.19 | 1822.3 | 74.6 |
| 12 | 2006 | 6 | 22 | 8 | 0 | 35.2 | 25.9 | 225.1 | 0.049 | 0.421 | 0.485 | 0.129 | 7.131 | 2168.0 | 8.05 | 1942.3 | 540 | 2.57 | 1765.4 | 161.9 |
| 7 | 2006 | 6 | 22 | 12 | 0 | 35.3 | 27.7 | 253.8 | 0.017 | 0.248 | 0.359 | 0.133 | 7.591 | 2054.8 | 8.08 | 1810.8 | 474 | 2.71 | 1628.8 | 169.4 |
| 8 | 2006 | 6 | 22 | 12 | 0 | 35.3 | 27.6 | 272.2 | 0.030 | 0.251 | 0.488 | 0.111 | 8.009 | 2145.1 | 8.28 | 1777.6 | 279 | 4.00 | 1520.3 | 249.9 |
| 9 | 2006 | 6 | 22 | 12 | 0 | 35.2 | 27.7 | 249.9 | 0.018 | 0.121 | 0.319 | 0.112 | 7.483 | 1999.6 | 7.94 | 1825.1 | 676 | 2.03 | 1680.8 | 126.3 |
| 10 | 2006 | 6 | 22 | 12 | 0 | 35.2 | 27.8 | 260.3 | 0.034 | 0.121 | 0.347 | 0.089 | 7.520 | 2162.5 | 8.20 | 1842.2 | 357 | 3.55 | 1611.7 | 221.1 |
| 11 | 2006 | 6 | 22 | 12 | 0 | 35.2 | 27.5 | 241.6 | 0.060 | 0.111 | 0.322 | 0.104 | 7.274 | 1986.7 | 7.89 | 1834.3 | 766 | 1.81 | 1700.7 | 113.3 |
| 12 | 2006 | 6 | 22 | 12 | 0 | 35.2 | 27.6 | 269.7 | 0.025 | 0.161 | 0.528 | 0.122 | 7.592 | 2152.4 | 8.24 | 1810.2 | 316 | 3.76 | 1567.5 | 234.4 |

Table S2. Total alkalinity data and calculations of net ecosystem calcification (NEC). Control mesocosms: 8, 10, 12; Treatment mesocosms: 7, 9, 11.

1. Measured total alkalinity (umol $kg^{-1}$)

| Time: | 12:00 | 16:00 | 20:00 | 0:00 | 4:00 | 8:00 | 12:00 | Flowrate |
|---|---|---|---|---|---|---|---|---|
| Mesocosm | | | | | | | | (kg $m^{-2}$ $h^{-1}$) |
| 8 | 2102.2 | 2120.2 | 2188.7 | 2219.0 | 2209.1 | 2176.7 | 2145.1 | 498 |
| 10 | 2111.7 | 2175.4 | 2167.8 | 2207.5 | 2194.0 | 2172.7 | 2162.5 | 435 |
| 12 | 2107.3 | 2151.5 | 2174.7 | 2209.5 | 2204.0 | 2168.0 | 2152.4 | 425 |
| 7 | 2019.5 | 2075.0 | 2072.8 | 2111.2 | 2086.5 | 2078.0 | 2054.8 | 506 |
| 9 | 1947.8 | 2007.9 | 2011.0 | 2039.0 | 2055.6 | 2020.6 | 1999.6 | 470 |
| 11 | 1965.0 | 1992.8 | 1997.6 | 2023.3 | 2031.5 | 2010.3 | 1986.7 | 468 |
| Seawater input | | | | | | | | |
| Control (8, 10, 12) | 2163.2 | 2200.5 | 2185.9 | 2196.4 | 2215.9 | 2196.5 | 2197.0 | |
| Treatment (7) | 2045.2 | 2082.5 | 2067.9 | 2078.4 | 2097.9 | 2078.5 | 2079.0 | |
| (9) | 1980.8 | 2018.1 | 2003.6 | 2014.0 | 2033.5 | 2014.1 | 2014.6 | |
| (11) | 1980.0 | 2017.3 | 2002.7 | 2013.1 | 2032.6 | 2013.2 | 2013.8 | |

2. Observed rate of change in total alkalinity per $m^2$ per hour (mmol $m^{-2}$ $h^{-1}$), $dTA/dt=(TA_{t2}-TA_{t1})/4$ mol $kg^{-1}$ $m^{-2}$ $h^{-1}$ *500 L*1.023 kg/L

| Time interval: | | 12:00-16:00 | 16:00-20:00 | 20:00-00:00 | 00:00-04:00 | 04:00-08:00 | 08:00-12:00 |
|---|---|---|---|---|---|---|---|
| Mesocosm | | | | | | | |
| 8 | - | 2.3 | 8.8 | 3.9 | -1.3 | -4.1 | -4.0 |
| 10 | - | 8.1 | -1.0 | 5.1 | -1.7 | -2.7 | -1.3 |
| 12 | - | 5.7 | 3.0 | 4.4 | -0.7 | -4.6 | -2.0 |
| 7 | - | 7.1 | -0.3 | 4.9 | -3.2 | -1.1 | -3.0 |
| 9 | - | 7.7 | 0.4 | 3.6 | 2.1 | -4.5 | -2.7 |
| 11 | - | 3.6 | 0.6 | 3.3 | 1.1 | -2.7 | -3.0 |

3. Calculated total input of total alkalinity per hour (mmol $m^{-2}$ $h^{-1}$), $F_{inTA} = (TA_{in\ t2} + TA_{in\ t1})/2$ mol $kg^{-1}$ * Flowrate kg $m^{-2}$ $h^{-1}$

| Time interval: | | 12:00-16:00 | 16:00-20:00 | 20:00-00:00 | 00:00-04:00 | 04:00-08:00 | 08:00-12:00 |
|---|---|---|---|---|---|---|---|
| Mesocosm | | | | | | | |
| 8 | - | 1087.5 | 1093.2 | 1092.1 | 1099.6 | 1099.6 | 1094.9 |
| 10 | - | 949.1 | 954.1 | 953.2 | 959.7 | 959.7 | 955.6 |
| 12 | - | 926.7 | 931.6 | 930.7 | 937.0 | 937.1 | 933.1 |
| 7 | - | 1045.1 | 1050.9 | 1049.8 | 1057.4 | 1057.4 | 1052.6 |
| 9 | - | 940.6 | 946.0 | 945.0 | 952.0 | 952.0 | 947.6 |
| 11 | - | 935.8 | 941.2 | 940.2 | 947.2 | 947.2 | 942.8 |

4. Calculated total output of total alkalinity per hour (mmol $m^{-2}$ $h^{-1}$), $F_{outTA} = (TA_{t2} + TA_{t1})/2$ mol $kg^{-1}$ * Flowrate kg $m^{-2}$ $h^{-1}$

| Time interval: | | 12:00-16:00 | 16:00-20:00 | 20:00-00:00 | 00:00-04:00 | 04:00-08:00 | 08:00-12:00 |
|---|---|---|---|---|---|---|---|
| Mesocosm | | | | | | | |
| 8 | - | 1052.3 | 1073.8 | 1098.4 | 1103.5 | 1093.0 | 1077.0 |
| 10 | - | 932.5 | 944.7 | 951.6 | 957.4 | 949.8 | 942.9 |
| 12 | - | 904.5 | 918.8 | 931.1 | 937.3 | 928.5 | 917.5 |
| 7 | - | 1036.7 | 1050.2 | 1059.4 | 1062.8 | 1054.4 | 1046.4 |
| 9 | - | 930.4 | 945.3 | 952.6 | 963.1 | 958.8 | 945.6 |
| 11 | - | 926.6 | 934.2 | 941.4 | 949.3 | 946.3 | 935.8 |

5. Calculated NEC (mmol $m^{-2}$ $h^{-1}$), $NEC=(F_{inTA} - F_{outTA} - dTA/dt)/2$

| Time interval: | | 12:00-16:00 | 16:00-20:00 | 20:00-00:00 | 00:00-04:00 | 04:00-08:00 | 08:00-12:00 |
|---|---|---|---|---|---|---|---|
| Mesocosm | | | | | | | |
| 8 | - | 16.5 | 5.3 | -5.1 | -1.3 | 5.4 | 11.0 |
| 10 | - | 4.3 | 5.2 | -1.8 | 2.0 | 6.3 | 7.0 |
| 12 | - | 8.3 | 4.9 | -2.4 | 0.2 | 6.6 | 8.8 |
| 7 | - | 0.7 | 0.5 | -7.2 | -1.1 | 2.0 | 4.6 |
| 9 | - | 1.2 | 0.1 | -5.6 | -6.6 | -1.1 | 2.3 |
| 11 | - | 2.8 | 3.2 | -2.2 | -1.6 | 1.8 | 5.0 |

6. Average NEC

| | | | | | | |
|---|---|---|---|---|---|---|
| Control | 9.7 | 5.1 | -3.1 | 0.3 | 6.1 | 8.9 |
| Std | 6.2 | 0.2 | 1.8 | 1.7 | 0.6 | 2.0 |
| Treatment | 1.6 | 1.3 | -5.0 | -3.1 | 0.9 | 4.0 |
| Std | 1.1 | 1.7 | 2.5 | 3.0 | 1.8 | 1.4 |