**Table S3.** **Carbonate chemistry parameters for experiments conducted on Palmyra Atoll from 2009-2012.**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Treatment | Species | n | Salinity | AT(µM kg-1) | CT(µM kg-1) | pHSW | pCO2 (µatm) | HCO3-(µM kg-1) | CO32-(µM kg-1) | ΩCa | ΩAr |
| **2009 Experiments** |  |  |  |  |  |  |  |  |  |  |
| Ambient air | Control | 3 | 34.8(0.1) | 2221(10) | 1994(4) | 7.99 (0.02) | 440 (17) | 1817 (4) | 163 (5) | 3.9(0.1) | 2.5(0.1)  |
| High pCO2 | Control | 3 | 34.8(0.1) | 2236(5) | 2140(9) | 7.67 (0.03) | 1014 (75) | 2019(11)  | 88(5) | 2.1 (0.1) | 1.4(0.1) |
| **2010 Experiments** |  |  |  |  |  |  |  |  |  |  |
| Ambient air | Control | 2 | 34.9 (0.1) | 2013(24) | 1876(16) | 7.81 (0.02) | 647 (20) | 1752(12)  | 103(5) | 2.5(0.1) | 1.6(0.1) |
|  | *A. spicifera* | 3 | 34.8 (0.01) | 2132(32) | 1984(29) | 7.82 (0.01) | 659(17) | 1850(27)  | 113(4) | 2.7(0.1) | 1.8(0.1) |
|  | *C. serrulata* | 3 | 34.7 (0.1) | 2205(30) | 1951(9) | 8.04 (0.05) | 380(42) | 1758(18)  | 180(18) | 4.3(0.4) | 2.8(0.3) |
|  | *G. rugosa* | 3 | 34.7 (0.01) | 2148(39) | 1977(54) | 7.88 (0.06) | 589(86) | 1831(61)  | 127(13) | 3.0(0.3) | 2.0(0.2) |
|  | *H. taenicola* | 3 | 34.8 (0.03) | 1563(85) | 1507(104) | 7.56(0.25) | 1330 (815) | 1405(102)  | 59(22) | 1.4(0.5) | 0.9(0.3) |
| High pCO2 | Control | 2 | 34.8 (0.1) | 2058(3) | 1994(11) | 7.59 (0.05) | 1158 (129) | 1889 (14)  | 67 (7) | 1.6 (0.2) | 1.0(0.1) |
|  | *A. spicifera* | 3 | 34.8 (0.01) | 2224(20) | 2237(28) | 7.34 (0.14) | 2530 (906) | 2109 (11)  | 47 (12) | 1.1(0.3) | 0.7 (0.2) |
|  | *C. serrulata* | 3 | 34.8 (0.02) | 2215(33) | 2072(42) | 7.78(0.12) | 818 (222) | 1931 (62)  | 115(30) | 2.8 (0.7) | 1.8 (0.5) |
|  | *G. rugosa* | 3 | 34.8 (0.04) | 2514(143) | 2485(113) | 7.46(0.17) | 2215 (899) | 2342 (109)  | 71 (22) | 1.7 (0.5) | 1.1(0.3) |
|  | *H. taenicola* | 3 | 34.8 (0.04) | 1759(91) | 1733(82) | 7.45 (0.04) | 1365 (72) | 1646(78)  | 44(6) | 1.0 (0.1) | 0.7(0.1) |
| **2011 Experiments** |  |  |  |  |  |  |  |  |  |  |
| Ambient air | Control | 2 | 35.1 (0.1) | 2256(6) | 1952(2) | 8.12 (0.01) | 306 (4) | 1729 (1)  | 213(3) | 5.1 (0.1) | 3.3(0.04) |
|  | *C. serrulata* | 4 | 35.2 (0.04) | 2128(22) | 1899(44) | 7.99(0.08) | 443(109) | 1723(59)  | 161(20) | 3.9(0.5) | 2.5(0.3) |
|  | *D. bartayresiana* | 4 | 35.1 (0.05) | 2107(38) | 1821(51) | 8.12 (0.03) | 296(33) | 1616(57)  | 195(9) | 4.7(0.2) | 3.0(0.1) |
|  | *H. pannosa* | 3 | 35.2 (0.1) | 2178(18) | 1677(100) | 8.42 (0.15) | 157(76) | 1320(168)  | 342(71) | 8.2(1.7) | 5.3(1.1) |
|  | *D. marginata* | 4 | 35.1 (0.03) | 1974(105) | 1593(151) | 8.30 (0.10) | 186(64) | 1341(173)  | 246(26) | 5.9(0.6) | 3.8(0.4) |
|  | *H. opuntia* | 4 | 35.1 (0.1) | 595(68) | 596(53) | 7.22 (0.24) | 1116(470) | 546(51)  | 13(7) | 0.3(0.2) | 0.2(0.1) |
|  | *Lithophyllum* sp. | 4 | 35.0 (0.01) | 1995(50) | 1798(38) | 7.95 (0.02) | 433(13) | 1647(29)  | 137(9) | 3.3(0.2) | 2.1(0.1) |
| High pCO2 | Control | 2 | 34.8 (0.1) | 2255(7) | 2103(3) | 7.82 (0.01) | 700(12) | 1961(1)  | 119(2) | 2.9 (0.1) | 1.9(0.04) |
|  | *C. serrulata* | 4 | 35.2 (0.1) | 2125(31) | 2023(53) | 7.66(0.16) | 1197(362) | 1890(73)  | 94(33) | 2.2(0.8) | 1.5(0.5) |
|  | *D. bartayresiana* | 3 | 35.2 (0.02) | 2128(34) | 1903(40) | 7.99(0.06) | 431(62) | 1731 (50)  | 159(18) | 3.8 (0.4) | 2.5(0.3) |
|  | *H. pannosa* | 4 | 35.1 (0.03) | 2159(37) | 1731(135) | 8.24 (0.29) | 520(418) | 1420(218)  | 294(98) | 7.0(2.3) | 4.6(1.5) |
|  | *D. marginata* | 4 | 35.1 (0.04) | 1735(100) | 1385(153) | 8.30 (0.14) | 181(77) | 1165(178)  | 214(33) | 5.1(0.8) | 3.3(0.5) |
|  | *H. opuntia* | 4 | 35.0 (0.03) | 818(131) | 870(151) | 7.02 (0.14) | 2178(816) | 791(132)  | 8(2) | 0.2(0.05) | 0.1(0.03) |
|  | *Lithophyllum* sp. | 4 | 35.2 (0.04) | 2104(38) | 2021(22) | 7.63 (0.08) | 1108(228) | 1907(19)  | 79(12) | 1.9(0.3) | 1.2(0.2) |
| **2012 Experiments** |  |  |  |  |  |  |  |  |  |
| Ambient air | Control | 4 | 35.0 (0.1) | 2262(10) | 1957(1) | 8.12(0.01) | 316(11) | 1733 (5)  | 214 (6) | 5.1 (0.2) | 3.3 (0.1) |
|  | *A. amadelpha* | 2 | 35.2 (0.2) | 2124(58) | 1922(19) | 7.94 (0.08) | 486 (90) | 1762 (4)  | 144(26) | 3.4(0.6) | 2.2 (0.4) |
|  | *H. taenicola* | 2 | 35.0 (0.04) | 1889(139) | 1665(36) | 8.00 (0.21) | 400 (183) | 1499 (24)  | 152 (66) | 3.6 (1.6) | 2.4(1.0) |
| High pCO2 | Control | 4 | 34.8 (0.1) | 2264(1) | 2161(7) | 7.69 (0.02) | 1002 (41) | 2036 (9)  | 92 (3) | 2.2 (0.1) | 1.4(0.1) |
|  | *A. amadelpha* | 2 | 35.0 (0.1) | 2267(13) | 2134(9) | 7.77 (0.01) | 799 (12) | 1999 (7)  | 109 (2) | 2.6 (0.1) | 1.7 (0.03) |
|  | *H. taenicola* | 2 | 34.9 (0.1) | 1573(444) | 1570(329) | 7.29 (0.46) | 2314(1573) | 1445 (336)  | 50(43) | 1.2 (1.0) | 0.8 (0.7) |