**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) | |