Supplements

Table S1. Carbonate chemistry parameters were measured and calculated from samples of seawater (SW) and sediment pore water (PW) for 4 pCO_2-levels after six months incubation. Total carbon (C_T), partial pressure of CO_2 (pCO_2) and saturation state of calcite (Ω_{calc}) were calculated from measured temperature, salinity, phosphate (PO_4^{3-}), silicate (Si), total alkalinity (A_T) and pH_{NBS}.

pCO_2-treatment (µatm)	Seawater measurements										Calculations from A_T and pH_{NBS}								
	T (°C)	S	PO_4^{3-} (µmol l^{-1})	Si (µmol l^{-1})	A_T (µmol kg^{-1})			pH_{NBS}			C_T (µmol kg^{-1})			pCO_2 (µatm)			Ω_{calc}		
					SW (0-2 cm)	SW (2-4 cm)	PW	SW (0-2 cm)	SW (2-4 cm)	PW	SW (0-2 cm)	SW (2-4 cm)	PW	SW (0-2 cm)	SW (2-4 cm)	PW	SW (0-2 cm)	SW (2-4 cm)	PW
430	16.7	15.2	0.16	138.09	2117.5	2450.1	3023.5	8.11	8.03	7.95	1987.9	2335.2	2918.3	393	563	845	3.00	2.93	3.08
907	16.6	15.2	0.16	138.92	2115.9	2450.1	2919.3	7.94	7.79	7.70	2036.7	2408.0	2900.1	599	1022	1504	2.12	1.76	1.74
1865	16.7	15.2	0.15	139.21	2102.8	2439.7	3127.8	7.59	7.54	7.49	2111.7	2463.9	3181.0	1421	1830	2666	0.97	1.03	1.17
3247	16.6	15.2	0.17	136.62	2116.1	2429.3	3440.6	7.45	7.41	7.38	2159.5	2491.6	3547.2	1980	2480	3804	0.72	0.76	1.01

Table S2. Mean percentage of size class proportions ± SD from <50 to >500 µm in 50 µm intervals of living *A. aomoriensis* of the measured replicates during six months incubation.

pCO_2-treatment	Incubation time (months)	Size class proportions (%)																					
		<50 µm		50-100 µm		100-150 µm		150-200 µm		200-250 µm		250-300 µm		300-350 µm		350-400 µm		400-450 µm		450-500 µm		>500 µm	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
430 µatm	0	5.7	1.47	10.2	3.38	23.5	6.62	30.2	3.19	19.4	2.17	7.3	3.34	2.1	0.35	1.1	0.52	0.4	0.33	0.1	0.11	0.0	0.08
	1	0.4	0.22	4.0	2.14	13.6	9.16	14.3	7.01	21.3	7.17	21.7	6.71	14.0	2.14	7.7	3.15	2.1	2.13	0.8	0.41	0.2	0.21
	2	1.4	0.61	2.6	0.68	3.1	0.29	12.7	5.79	21.7	3.94	28.6	1.48	18.4	4.06	8.4	3.11	2.2	1.53	0.5	0.56	0.3	0.30
	3	0.9	1.29	3.7	3.24	4.4	2.19	13.3	1.11	27.7	7.61	28.2	0.95	14.9	7.00	4.5	2.07	1.5	0.41	0.8	0.87	0.2	0.23
	4	1.7	1.13	5.3	2.78	13.0	11.93	18.8	6.42	22.4	12.46	22.7	9.26	10.5	0.80	3.6	0.89	0.5	0.36	0.7	0.53	0.6	0.18
	5	0.8	0.88	5.5	1.30	13.4	13.36	14.0	13.36	20.8	6.36	16.4	9.34	12.3	5.94	4.3	1.53	10.3	16.58	2.3	3.13	0.1	0.14
	6	0.3	0.36	1.2	1.21	2.7	0.33	18.5	0.45	26.4	0.70	28.9	0.73	15.2	0.49	4.9	0.18	1.0	0.70	0.7	0.28	0.3	0.42
907 µatm	0	4.1	1.76	8.2	1.81	24.0	1.47	31.8	2.07	21.7	3.72	6.2	0.97	2.5	0.92	0.7	0.27	0.7	0.45	0.2	0.32	0.0	0.00
	1	0.9	0.35	2.2	0.89	5.3	2.06	16.6	3.01	28.4	0.30	29.8	4.28	13.9	2.37	2.7	0.36	0.1	0.11	0.1	0.14	0.0	0.00
	2	2.1	1.24	4.7	2.10	4.0	2.38	11.7	8.03	11.4	6.89	16.5	3.55	20.9	4.26	17.9	9.69	7.1	5.55	2.2	1.98	1.4	1.22
	3	0.8	0.30	3.2	1.18	10.2	2.37	19.9	5.30	22.3	6.78	22.0	1.60	14.1	5.51	5.8	3.16	1.2	0.52	0.2	0.16	0.2	0.08
	4	4.1	0.73	8.5	2.60	5.4	1.13	9.3	1.51	22.1	4.37	29.2	2.71	13.2	5.64	3.6	1.47	1.7	0.44	1.7	0.55	1.1	0.47
	5	2.9	0.90	6.9	2.64	4.2	0.76	8.7	3.78	16.6	7.93	24.9	2.93	22.5	3.30	9.6	7.63	1.9	0.59	1.0	0.84	0.8	1.38
	6	0.6	0.08	4.1	1.75	5.1	0.29	8.7	2.61	19.0	2.78	31.5	1.71	24.1	0.87	4.6	0.77	0.9	0.52	0.7	0.51	0.8	0.69
1865 µatm	0	1.0	0.44	5.4	1.11	26.4	3.05	37.5	4.49	20.0	2.01	6.9	1.10	1.6	0.31	0.5	0.18	0.2	0.18	0.2	0.18	0.3	0.28
	1	1.0	0.99	3.5	1.30	2.1	1.30	4.9	1.78	9.8	4.25	26.9	2.49	46.2	7.46	5.0	3.86	0.0	0.00	0.0	0.00	0.7	1.14
	2	1.8	1.71	5.5	4.03	21.7	19.99	18.7	13.03	14.8	7.46	16.6	9.73	9.2	11.30	5.6	6.35	3.0	2.23	2.0	1.15	1.2	1.10
	3	5.2	1.05	17.8	11.47	22.3	5.21	22.2	5.21	14.6	1.58	7.6	0.95	4.6	1.14	2.4	0.43	1.5	0.28	0.7	0.15	1.0	0.54
	4	0.9	0.14	3.5	0.56	12.3	8.53	22.4	7.36	23.5	5.72	17.5	2.93	11.2	4.62	6.6	8.05	1.0	0.73	0.5	0.33	0.6	0.46
	5	2.7	1.24	5.8	1.80	3.6	2.05	15.4	3.55	11.0	6.80	11.5	3.89	14.5	3.05	17.8	9.71	11.7	8.09	4.6	4.29	1.4	1.28
	6	1.0	0.21	5.1	1.39	5.9	6.69	10.9	9.97	12.6	8.40	15.6	1.24	18.3	12.66	19.2	9.37	6.8	2.53	3.2	0.47	1.4	0.38
3247 µatm	0	0.6	0.50	4.4	0.82	27.3	1.24	34.0	2.28	21.3	1.14	8.5	1.77	2.9	0.92	0.7	0.30	0.2	0.25	0.1	0.06	0.0	0.00
	1	1.9	0.22	5.5	0.66	4.2	3.72	14.7	3.27	24.3	6.03	23.6	4.14	15.9	3.56	7.3	6.00	1.4	1.42	0.2	0.17	0.9	0.85
	2	2.0	1.05	3.6	1.81	5.6	4.52	21.2	5.91	27.2	3.37	19.9	6.04	11.9	2.07	4.0	1.18	1.7	1.49	2.0	0.42	0.9	0.77
	3	6.2	3.71	16.0	10.17	9.0	3.07	13.9	12.40	17.7	8.01	18.5	6.70	9.7	4.83	5.0	2.65	2.0	1.21	1.1	0.39	1.0	0.89
	4	2.1	0.57	6.6	1.88	6.3	1.03	15.5	3.95	23.9	11.78	20.3	1.49	11.2	4.55	6.5	4.64	3.8	3.20	2.3	1.47	1.5	1.24
	5	4.1	1.78	15.1	17.36	4.5	2.61	12.1	3.62	19.2	4.43	20.7	9.00	15.4	5.82	6.1	1.71	1.3	1.28	0.8	0.65	0.7	0.53
	6	1.5	0.54	5.6	2.17	1.3	0.37	8.0	2.08	21.2	0.92	27.6	3.33	20.6	5.69	9.9	0.98	3.5	1.53	0.7	0.62	0.1	0.19

Table S3. Mean population density ± SD of the measured replicates for living *A. aomoriensis* of the 4 testes pCO_2-levels during six months experimental time.

Living *A. aomoriensis* (ind. 10 cm^{-3})

Incubation time (months)	pCO_2-treatment 430 µatm		907 µatm		1865 µatm		3247 µatm	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
0	341.7	95.65	396.2	150.18	413.3	199.51	582.7	177.74
1	400.6	75.68	430.6	175.69	70.8	4.28	189.3	66.07
2	357.9	80.78	312.5	306.71	323.3	228.99	246.8	88.60
3	292.6	146.91	610.3	87.04	1378.4	22.78	517.9	348.52
4	231.0	65.79	335.3	111.58	659.2	242.68	448.8	23.16
5	196.6	161.10	250.9	47.68	338.4	396.68	601.6	308.96
6	241.3	28.82	232.7	31.61	483.2	102.28	264.6	30.22

Table S4. Test diameter (mean ± SD) of the measured replicates of living *A. aomoriensis* during six month incubation.

Living *A.aomoriensis*

Incubation time (months)	pCO_2-treatment 430 µatm Mean (µm)	SD	907 µatm Mean (µm)	SD	1865 µatm Mean (µm)	SD	3247 µatm Mean (µm)	SD
0	169	11.47	174	4.09	178	5.98	182	3.52
1	241	15.78	240	1.45	282	10.09	248	17.17
2	261	4.69	290	11.63	225	20.91	243	25.84
3	249	3.89	236	11.29	185	22.90	214	39.72
4	225	13.55	240	2.82	230	12.06	251	31.63
5	249	19.99	261	18.72	294	19.69	235	45.99
6	252	4.23	261	0.66	287	12.42	267	10.70

Table S5. Mean abundance ± SD of the measured replicates for dead *A. aomoriensis* of the 4 testes pCO_2-levels during six months experimental time.

Dead *A. aomoriensis* (tests 10 cm^{-3})

Incubation time (months)	pCO_2-treatment 430 µatm		907 µatm		1865 µatm		3247 µatm	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
0	24.3	14.05	39.9	42.43	27.0	4.96	60.7	38.45
1	50.0	4.60	51.9	10.86	41.0	12.92	54.6	21.65
2	71.7	87.81	68.8	42.52	36.6	12.72	57.6	12.99
3	128.5	3.25	128.2	48.24	37.8	19.06	54.1	4.85
4	161.3	68.71	187.7	35.80	30.7	5.35	66.4	17.43
5	102.6	19.76	203.8	12.07	121.2	27.57	35.9	9.87
6	76.9	9.30	139.1	14.41	152.9	25.57	32.2	9.30

Table S6. Test diameter (mean ± SD) of the measured replicates of dead *A. aomoriensis* during six month incubation.

Dead *A.aomoriensis*

Incubation time (months)	pCO_2-treatment 430 µatm Mean (µm)	SD	907 µatm Mean (µm)	SD	1865 µatm Mean (µm)	SD	3247 µatm Mean (µm)	SD
0	232	23.93	193	10.55	224	23.19	160	21.25
1	317	5.92	286	16.03	307	3.52	322	6.04
2	311	24.58	303	12.75	273	8.92	272	7.71
3	295	16.94	320	10.10	267	26.02	236	47.59
4	283	16.47	303	16.60	280	17.32	289	15.70
5	288	2.83	279	7.96	305	25.22	282	45.56
6	303	10.06	302	12.18	321	31.54	243	8.57

Table S7. Proportion of total organic content, mean $CaCO_3$ production and accumulation of monthly differences in weight (mean ± SD of replicate measurements) of living and dead *A. aomoriensis* during six months incubation time. Calculation of total carbonate production and accumulation rates refers to gram per area of 1 m^2 and year.

Total organic content

Number of specimens	Initial total weight (mg)	weight after combustion (mg)	Weight loss (mg)	Proportion of organic content (%)
100	0.723	0.692	0.031	**4.29**

Living fauna

Incubation time (months)	pCO_2-treatment 430 µatm Mean (µg)	SD	907 µatm Mean (µg)	SD	1865 µatm Mean (µg)	SD	3247 µatm Mean (µg)	SD	Number of replicates
0	From initial weight of 995 ± 361 µg 4.29% were subtracted to calculate the $CaCO_3$ (Table S8).								12
1	1685	498	1168	820	-344	79	109	167	3
2	1548	684	1790	1798	396	142	96	258	3
3	-20	889	1902	806	822	1573	839	1064	3
4	191	435	116	987	2199	566	1573	847	3
5	-221	698	496	83	1802	3086	1859	196	3
6	388	66	2144	267	2662	2896	839	171	3
Mean of monthly difference in weight	595	818	1269	821	1256	1153	886	728	

Total carbonate production

	(µg)	per year (µg)	(mg m^{-2} a^{-1})	(g m^{-2} a^{-1})
Total mean	1001	2003	474.08	**0.47**
SD	324			

Dead fauna

Incubation time (months)	pCO_2-treatment 430 µatm Mean (µg)	SD	907 µatm Mean (µg)	SD	1865 µatm Mean (µg)	SD	3247 µatm Mean (µg)	SD	Number of replicates
0	From initial weight of 182 ± 42 µg 4.29% were subtracted to calculate the $CaCO_3$ (Table S8).								12
1	352	22	272	57	351	253	522	30	3
2	699	598	568	252	122	96	294	125	3
3	527	635	1049	376	7	192	230	65	3
4	1015	426	862	906	70	105	322	135	3
5	707	260	1449	73	1239	563	75	16	3
6	722	279	1247	22	819	611	-10	58	3
Mean of monthly difference in weight	670	222	908	436	435	493	239	189	

Total carbonate accumulation

	(µg)	per year (µg)	(mg m^{-2} a^{-1})	(g m^{-2} a^{-1})
Total mean	563	1126	266.57	**0.27**
SD	290			

Table S8. $CaCO_3$ weight per individual/test of living and dead *A. aomoriensis* calculated from total weight and number of individuals for each replicate during six months investigation period. For living individuals, 4.29 % organic content was subtracted from total weight.

		Living *A. aomoriensis*					Dead *A. aomoriensis*		
pCO_2-treatment	Incubation time (months)	Total weight (µg)	organic weight (µg)	$CaCO_3$ weight (µg)	Number of individuals	$CaCO_3$ weight per individual (µg)	Total weight (µg)	Number of tests	$CaCO_3$ weight per test (µg)
430_0A	0	1111	48	1063	683	1.56	142	20	7.10
430_0B	0	698	30	668	404	1.65	168	61	2.75
430_0C	0	551	24	527	472	1.12	201	30	6.70
907_0A	0	913	39	874	543	1.61	192	134	1.43
907_0B	0	1213	52	1161	855	1.36	124	18	6.89
907_0C	0	581	25	556	410	1.36	162	28	5.79
1865_0A	0	958	41	917	728	1.26	199	42	4.74
1865_0B	0	821	35	786	288	2.73	275	48	5.73
1865_0C	0	1296	56	1240	870	1.43	135	33	4.09
3247_0A	0	1339	57	1282	850	1.51	200	41	4.88
3247_0B	0	1898	81	1817	1173	1.55	218	80	2.73
3247_0C	0	1092	47	1045	636	1.64	163	156	1.04
430_1A	1	2262	97	2165	640	3.38	555	71	7.82
430_1B	1	2835	122	2713	482	5.63	511	84	6.08
430_1C	1	3301	142	3159	706	4.48	535	73	7.33
907_1A	1	3082	132	2950	938	3.14	491	96	5.11
907_1B	1	2324	100	2224	620	3.59	483	78	6.19
907_1C	1	1372	59	1313	407	3.23	388	63	6.16
1865_1A	1	775	33	742	101	7.34	821	85	9.66
1865_1B	1	630	27	603	114	5.29	346	50	6.92
1865_1C	1	635	27	608	108	5.63	431	52	8.29
3247_1A	1	1351	58	1293	375	3.45	723	45	16.07
3247_1B	1	1020	44	976	178	5.48	719	101	7.12
3247_1C	1	1087	47	1040	311	3.35	669	103	6.50
430_2A	2	3360	144	3216	501	6.42	562	25	22.48
430_2B	2	1931	83	1848	449	4.12	510	39	13.08
430_2C	2	2680	115	2565	683	3.76	1571	263	5.97
907_2A	2	1430	61	1369	204	6.71	469	30	15.63
907_2B	2	2274	98	2176	208	10.46	824	141	5.84
907_2C	2	5023	215	4808	1014	4.74	956	143	6.69
1865_2A	2	1282	55	1227	162	7.57	399	78	5.12
1865_2B	2	1531	66	1465	856	1.71	304	44	6.91
1865_2C	2	1545	66	1479	457	3.24	208	45	4.62
3247_2A	2	1089	47	1042	475	2.19	609	109	5.59
3247_2B	2	898	39	859	222	3.87	459	70	6.56
3247_2C	2	1431	61	1370	429	3.19	360	84	4.29
430_3A	3	1233	53	1180	287	4.11	1224	192	6.38

430_3B	3	1821	78	1743	603	2.89	903	199	4.54
430_3C	3								
907_3A	3	2104	90	2014	788	2.56	928	133	6.98
907_3B	3	3754	161	3593	946	3.80	1112	176	6.32
907_3C	3	3220	138	3082	1051	2.93	1652	276	5.99
1865_3A	3								
1865_3B	3	2823	121	2702	2072	1.30	183	37	4.95
1865_3C	3	2870	123	2747	2121	1.30	384	78	4.92
3247_3A	3	1222	52	1170	591	1.98	434	85	5.11
3247_3B	3	1329	57	1272	384	3.31	462	88	5.25
3247_3C	3	3198	137	3061	1388	2.21	338	74	4.57
430_4A	4	1694	73	1621	423	3.83	1368	325	4.21
430_4B	4	784	34	750	394	1.90	712	127	5.61
430_4C	4	1238	53	1185	237	5.00	1511	284	5.32
907_4A	4	1972	85	1887	630	3.00	1507	247	6.10
907_4B	4								
907_4C	4	1509	65	1444	390	3.70	1625	324	5.02
1865_4A	4	3828	164	3664	674	5.44	180	43	4.19
1865_4B	4	2680	115	2565	932	2.75	372	56	6.64
1865_4C	4	3503	150	3353	1402	2.39	204	41	4.98
3247_4A	4	1669	72	1597	704	2.27	361	75	4.81
3247_4B	4	3301	142	3159	702	4.50	630	100	6.30
3247_4C	4	3077	132	2945	642	4.59	521	128	4.07
430_5A	5						875	158	5.54
430_5B	5	1007	43	964	460	2.10	635	125	5.08
430_5C	5	1418	61	1357	420	3.23	1155	185	6.24
907_5A	5	1458	63	1395	362	3.85	1712	318	5.38
907_5B	5	1596	68	1528	321	4.76	1610	289	5.57
907_5C	5	1618	69	1549	462	3.35	1571	323	4.86
1865_5A	5	6637	285	6352	1209	5.25	2068	206	10.04
1865_5B	5	852	37	815	118	6.91	1050	136	7.72
1865_5C	5	1276	55	1221	217	5.63	1144	211	5.42
3247_5A	5	3212	138	3074	845	3.64	242	70	3.46
3247_5B	5	2819	121	2698	1416	1.91	254	40	6.35
3247_5C	5	2915	125	2790	484	5.76	273	54	5.06
430_6A	6	1370	59	1311	398	3.29	561	107	5.24
430_6B	6	1273	55	1218	336	3.63	955	127	7.52
907_6A	6	1692	73	1619	388	4.17	1194	227	5.26
907_6B	6	1297	56	1241	320	3.88	1225	196	6.25
1865_6A	6	6849	294	6555	845	7.76	1868	260	7.18
1865_6C	6	2570	110	2460	625	3.94	1004	205	4.90
3247_6A	6	2042	88	1954	435	4.49	131	39	3.36
3247_6B	6	1789	77	1712	370	4.63	213	59	3.61

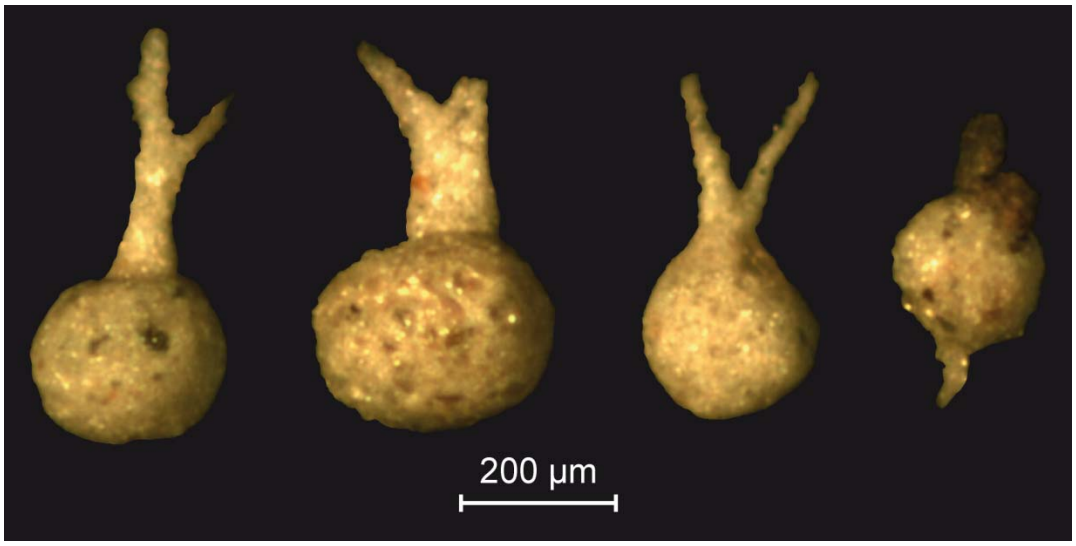

Fig. S1. Light micrograph images of the arenaceous species *Armorella sphaerica*.