

Supplementary material

S1 – Seawater carbonate chemistry

- 5 **Table S1.1** Seawater carbonate chemistry conditions at start of incubations under moderate light conditions (530, 358, 244, 197 $\mu\text{mol photons m}^{-2} \text{s}^{-1}$) and during the dark. Total alkalinity (TA) and dissolved inorganic carbon (DIC) were measured, while the inorganic carbon speciation, including pH, partial pressure of carbon dioxide ($p\text{CO}_2$), carbon dioxide_{aq} ($\text{CO}_{2(\text{aq})}$), bicarbonate (HCO_3^-), carbonate (CO_3^{2-}) as well as the aragonite (Ω_{Arag}) and calcite (Ω_{Calc}) saturation state were calculated using R package Seacarb. Values are means \pm SD (n = 10).

Treatment [$\mu\text{mol photons m}^{-2} \text{s}^{-1}$]	TA [$\mu\text{mol kg}^{-1}$]	DIC [$\mu\text{mol kg}^{-1}$]	pH	$p\text{CO}_2$ [μatm]	$\text{CO}_{2(\text{aq})}$ [$\mu\text{mol kg}^{-1}$]	HCO_3^- [$\mu\text{mol kg}^{-1}$]	CO_3^{2-} [$\mu\text{mol kg}^{-1}$]	Ω_{Arag}	Ω_{Calc}
530	2,387 \pm 4	2,059 \pm 5	8.01 \pm 0.01	445 \pm 12	11.7 \pm 0.3	1,815 \pm 8	232 \pm 40	3.64 \pm 0.07	5.47 \pm 0.10
358	2,295 \pm 8	1,966 \pm 24	8.02 \pm 0.03	412 \pm 37	10.8 \pm 1.0	1,726 \pm 34	229 \pm 12	3.59 \pm 0.18	5.38 \pm 0.27
244	2,242 \pm 149	1,966 \pm 143	7.95 \pm 0.07	501 \pm 117	13.5 \pm 3.2	1,760 \pm 138	192 \pm 29	3.00 \pm 0.44	4.51 \pm 0.67
197	2,331 \pm 5	2,028 \pm 4	7.97 \pm 0.01	477 \pm 13	12.6 \pm 0.3	1,802 \pm 7	213 \pm 40	3.33 \pm 0.06	5.01 \pm 0.10
Dark	2,368 \pm 13	2,035 \pm 10	8.02 \pm 0.02	422 \pm 22	11.3 \pm 0.6	1,790 \pm 15	233 \pm 90	3.64 \pm 0.14	5.47 \pm 0.20

- 10 **Table S1.2** Total alkalinity (TA) at start of each incubation under high light conditions (1061, 959, 561 $\mu\text{mol photons m}^{-2} \text{s}^{-1}$) and during the dark. Values are means \pm SD (n = 8).

Treatment [$\mu\text{mol photons m}^{-2} \text{s}^{-1}$]	TA [$\mu\text{mol kg}^{-1}$]
1061	2,502 \pm 8
959	2,450 \pm 8
561	2,537 \pm 71
Dark	2,468 \pm 5

S2 – Statistics for depth – dependent abundances of *T. maxima*

S2.1 Sheltered reef

Table S2.1.1 ANOVA – sheltered reef

Summary.aov (Model1)					
	DF	Sum Sq	Mean Sq	F value	Pr (>F)
AbundanceReef1\$depth	5	2.848	0.570	35.6	9.63 e-12 ***
Residuals	30	0.480	0.016		
Significant codes <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 '.' 1					

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Table S2.1.2 Tukey Post-hoc test - sheltered reef

Tukey multiple comparisons of means
95% family-wise confidence level

Fit: aov(formula = Abundance_Reef1\$clams ~ Abundance_Reef1\$depth)
S` Abundance_Reef1\$depth`

	diff	lwr	upr	p adj
1.5 m – 0.5 m	0.0283	-0.0194	0.2504	0.9987
3 m – 0.5 m	0.4133	0.1912	0.6354	0.0000 ***
5 m – 0.5 m	-0.2183	-0.4405	0.0038	0.0562
8 m – 0.5 m	-0.3717	-0.5938	-0.1495	0.0000 ***
11 m – 0.5 m	-0.4117	-0.6338	-0.1895	0.0001 ***
3 m – 1.5 m	0.3850	0.1629	0.6071	0.0001 ***
5 m – 1.5 m	-0.2467	-0.4688	-0.0245	0.0227 *
8 m – 1.5 m	-0.4000	-0.6221	-0.1779	0.0000 ***
11 m – 1.5 m	-0.4400	-0.6621	-0.2179	0.0000 ***
5 m – 3 m	-0.6317	-0.8538	-0.4100	0.0000 ***
8 m – 3 m	-0.7850	-1.0071	-0.5629	0.0000 ***
11 m – 3 m	0.8250	0.6029	1.0471	0.0000 ***
8 m – 5 m	-0.1533	-0.3755	0.0688	0.3145
11 m – 5 m	0.1933	-0.0288	0.4155	0.1168
11 m – 8 m	0.0400	-0.1821	0.2621	0.9936

S2.2 Exposed reef

Table S2.2.1 ANOVA – exposed reef

Summary.aov (Model1)					
	DF	Sum Sq	Mean Sq	F value	Pr (>F)
Abundance_Reef2\$depth	5	0.018	0.004	3.813	0.027 *
Residuals	12	0.012	0.001		

Significant codes <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

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Table S2.2.2 Tukey Post-hoc test - exposed reef

Tukey multiple comparisons of means
95% family-wise confidence level

Fit: aov(formula = Abundance_Reef2\$clams ~ Abundance_Reef2\$depth)
\$ Abundance_Reef2\$depth

	diff	lwr	upr	p adj
1.5 m – 0.5 m	0.0000	0.0751	0.0973	0.9976
3 m – 0.5 m	0.0000	-0.0084	0.1640	0.0861
5 m – 0.5 m	0.0000	-0.0862	0.0862	1.0000
8 m – 0.5 m	0.0000	-0.0973	0.0751	0.9976
11 m – 0.5 m	0.0000	-0.1084	0.0640	0.9478
3 m – 1.5 m	0.0000	-0.0195	0.1529	0.1711
5 m – 1.5 m	0.0000	-0.0973	0.0751	0.9976
8 m – 1.5 m	0.0000	-0.1084	0.0640	0.9478
11 m – 1.5 m	0.0000	-0.1195	0.0529	0.7804
5 m – 3 m	0.0000	-0.1640	0.0084	0.0861
8 m – 3 m	0.0000	-0.1751	-0.0027	0.0420 *
11 m – 3 m	0.0000	0.0138	0.1862	0.0202 *
8 m – 5 m	0.0000	0.0973	0.0751	0.9976
11 m – 5 m	0.0000	0.0640	0.1084	0.9478
11 m – 8 m	0.0000	-0.0751	0.0973	0.9976

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S3 – Statistics for gross primary production (GPP) of *T. maxima* under 561, 959 and 1061 $\mu\text{mol quanta m}^{-2} \text{s}^{-1}$

Table S.3 ANOVA – Gross Primary Production (GPP) at three different light level

Summary.aov (Model1)					
	DF	Sum Sq	Mean Sq	F value	Pr (>F)
GPPStats\$PAR	1	2.734	2.734	4.982	0.039 *
Residuals	17	9.331	0.549		
Significant codes <0.001 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					