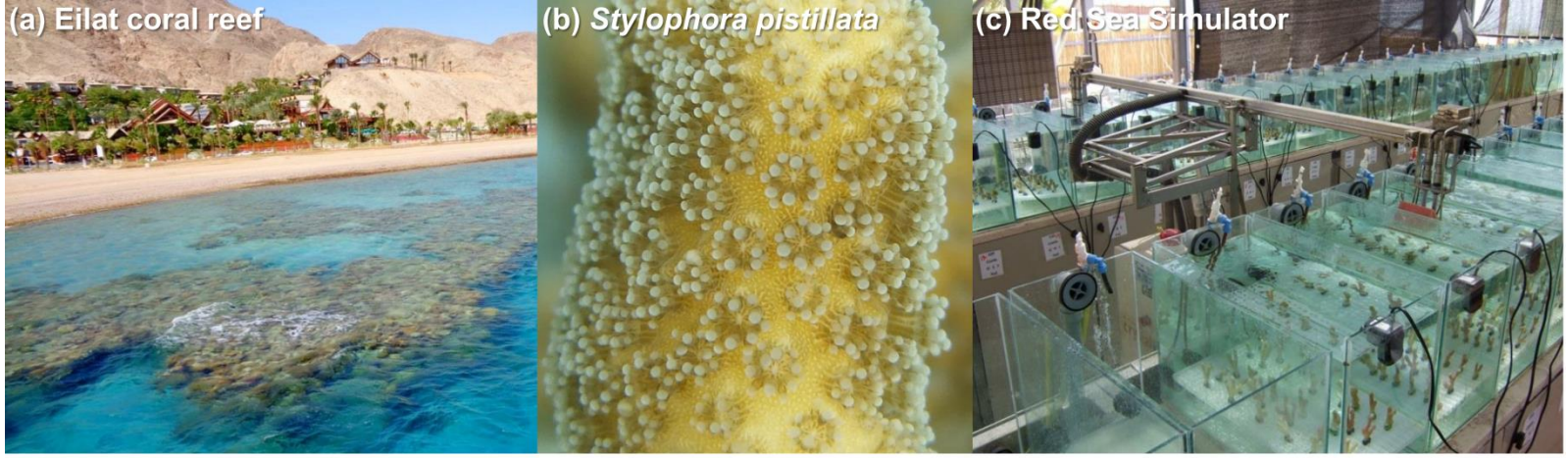
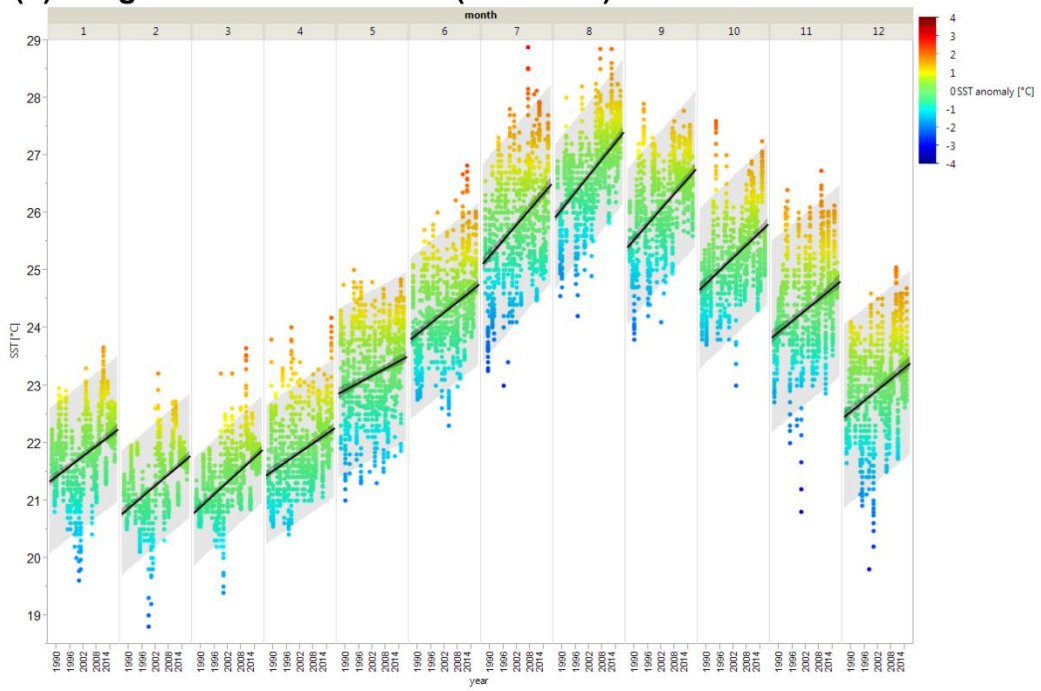


(d) Long-term SST in the GoA (Eilat area) 1988-2016



(e) Monthly warming rates 1988-2016 [°C/decade]

Jan	0.30±0.03
Feb	0.33±0.02
Mar	0.36±0.02
Apr	0.27±0.03
May	0.21±0.03
Jun	0.31±0.03
Jul	0.45±0.04
Aug	0.48±0.03
Sep	0.44±0.03
Oct	0.37±0.03
Nov	0.32±0.04
Dec	0.32±0.03

Figure S1. Experimental setup and long-term warming trends. (a) Typical fringing coral reefs in Eilat, Israel. (b) *Stylophora pistillata* fragments were acclimated and tested in the (c) Red Sea Simulator flow-through aquaria array. (d) Monthly long-term SST of the GoA, Eilat area (1988-2016). Linear regressions (black lines) with 95% confidence (dark grey shade) and prediction intervals (light grey shade) are outlined. Colouration indicates SST anomaly relative to the long-term average for each month. Data are derived from Fine *et al*. (2013) for 1988-2006 and from the National Monitoring Program at the Gulf of Eilat for 2007-2016. (e) Decadal warming rates for each month (mean±SE); all rates are significantly different from zero with $p<0.0001$ (Linear regression analysis).

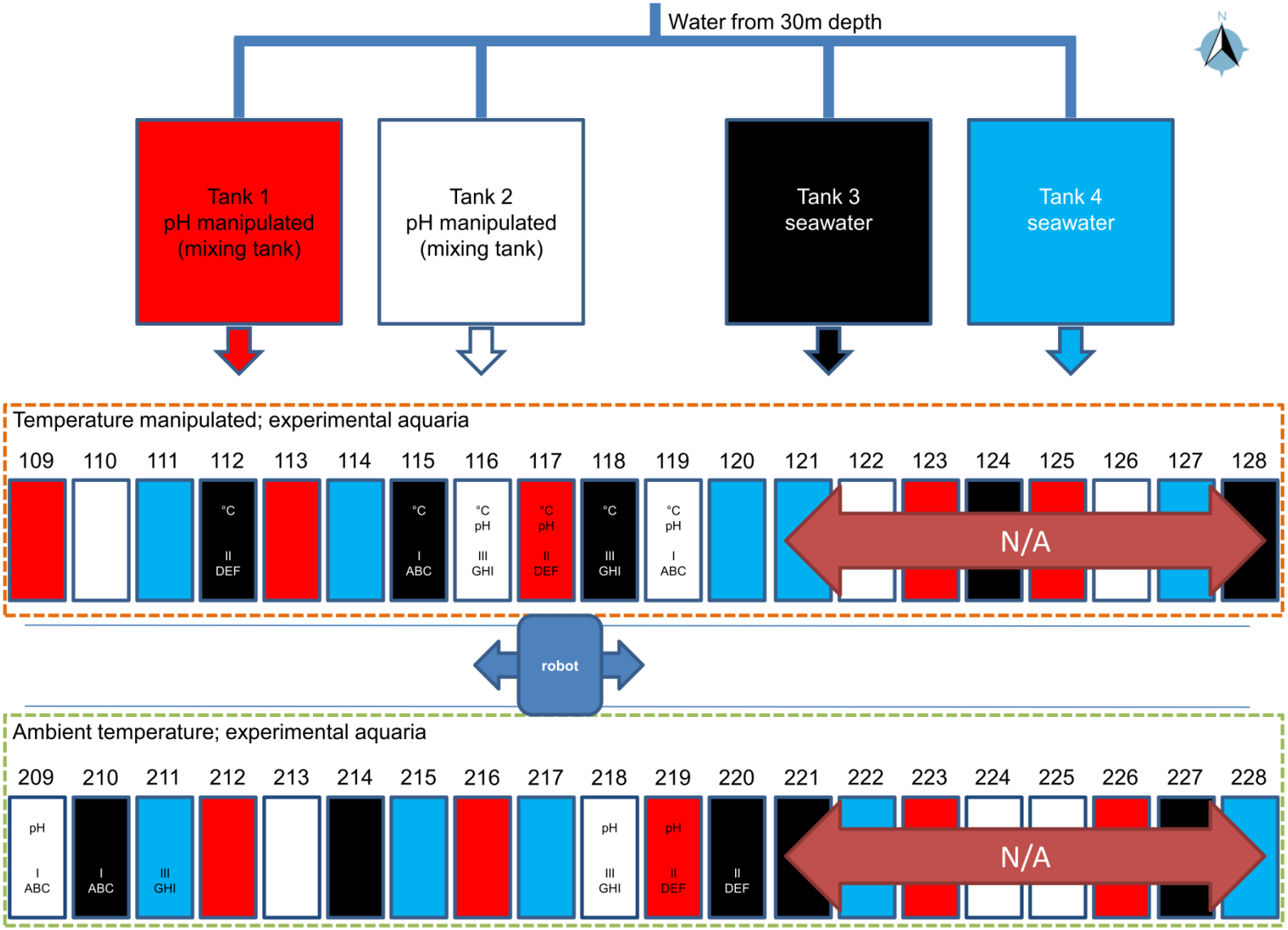
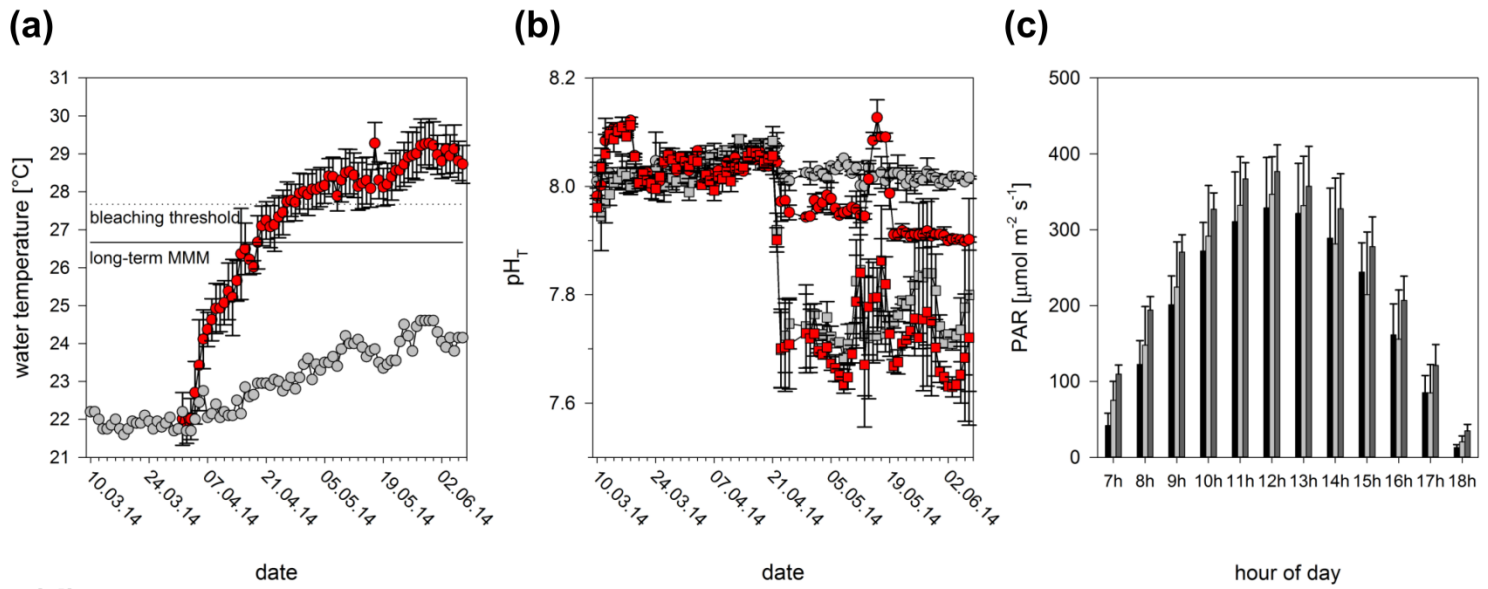


Figure S2. Schematic of the experimental layout in the IUI's Red Sea Simulator aquaria array. The whole system is a flow-through system with constant seawater influx, pH and temperature manipulation, and subsequent efflux (aquarium flow rate > 60L hour^{-1}). Similar colours indicate aquaria supplied with the same water from their respective reservoir tanks (1-4). The setup allows heating of #109-128. For the experiment only aquaria #109-120 and #209-220 were available and replicate triplets (I-ABC, II-DEF, III-GHI) and treatments were randomly assigned within the heated and the control aquarium line. Aquaria-specific treatments are indicated for elevated temperature (°C) and/or reduced pH (pH).



(d)

pH$_T$	SD	Temp [°C]	Time period	TA [µmol kg^{-1}]	SD	DIC [µmol kg^{-1}]	SD	pCO_2 [µatm]	SD	$CO_{2(aq)}$ [µmol kg^{-1}]	SD	HCO_3^- [µmol kg^{-1}]	SD	CO_3^{2-} [µmol kg^{-1}]	SD	Ω_{arag}	SD
8.02	0.00	23	27-29/04/14	2499.67	2.99	2183.93	1.21	466.77	3.19	13.54	0.09	1948.03	1.07	222.36	1.39	3.36	0.02
8.02	0.01	23	18-20/05/14	2501.21	1.45	2188.50	3.84	473.77	9.29	13.75	0.27	1954.23	6.35	220.51	2.88	3.33	0.04
8.01	0.00	24	05-07/06/14	2493.47	5.67	2176.00	8.32	479.63	7.92	13.56	0.22	1938.83	9.53	223.61	1.46	3.39	0.02
7.95	0.02	28	27-29/04/14	2498.58	6.53	2188.20	6.98	581.47	26.99	14.91	0.69	1952.37	13.34	220.90	7.52	3.41	0.12
8.00	0.09	28	18-20/05/14	2500.46	2.01	2160.73	61.22	526.23	131.95	13.49	3.38	1907.70	95.82	239.52	37.98	3.70	0.59
7.90	0.00	29	05-07/06/14	2489.17	10.55	2205.50	10.66	675.60	6.09	16.92	0.15	1984.27	10.2	204.28	0.45	3.17	0.01
7.74	0.02	23	27-29/04/14	2501.70	3.33	2338.70	13.60	999.17	59.75	28.99	1.73	2179.43	17.55	130.26	5.70	1.97	0.09
7.74	0.01	23	18-20/05/14	2503.68	3.17	2341.73	7.34	1005.1	29.82	29.16	0.87	2182.87	9.12	129.71	2.79	1.96	0.04
7.77	0.03	24	05-07/06/14	2496.89	0.43	2315.03	15.30	933.90	80.54	26.41	2.28	2147.23	22.15	141.38	9.08	2.15	0.14
7.73	0.01	28	27-29/04/14	2504.85	3.74	2322.30	5.15	1083.77	15.83	27.79	0.41	2150.83	5.85	143.69	1.43	2.22	0.02
7.74	0.08	28	18-20/05/14	2502.13	4.21	2312.20	41.80	1058.63	208.47	27.14	5.34	2136.90	58.59	148.16	22.12	2.29	0.34
7.69	0.03	29	05-07/06/14	2492.71	1.78	2324.37	15.23	1208.60	107.14	30.27	2.68	2158.43	21.94	135.68	9.35	2.10	0.15

Figure S3. Monitoring data of experimental setup. (a) Applied temperature profiles under ambient (grey) and elevated temperature (red; +5°C). (b) Applied seawater pH_{NBS} profiles at ambient pH 8.1 (circles) and reduced pH 7.8 (squares) for ambient and elevated temperature (grey vs. red). Values represent daily means across aquaria. Note that the slight offset of the measured pH values between both temperature treatments is probably the result of the pH shift due to temperature (since pH is adjusted in the main reservoir tank and does not account for later temperature manipulation in the aquaria; see Supplementary Methods). (c) Hourly daylight PAR levels for 30-day intervals (black: 10/04-08/05/14; light grey: 09/05-08/05/14; dark grey: 09/05-07/06/14; means±SD, N=30). (d) Carbonate chemistry of treatments over time. Values represent means±SD of three independent measurements from three consecutive days for time point 1 (27-29/04/14), 2 (18-20/05/14), and 3 (05-07/06/16), based on three technical replicates taken each day in the morning, noon, and afternoon.

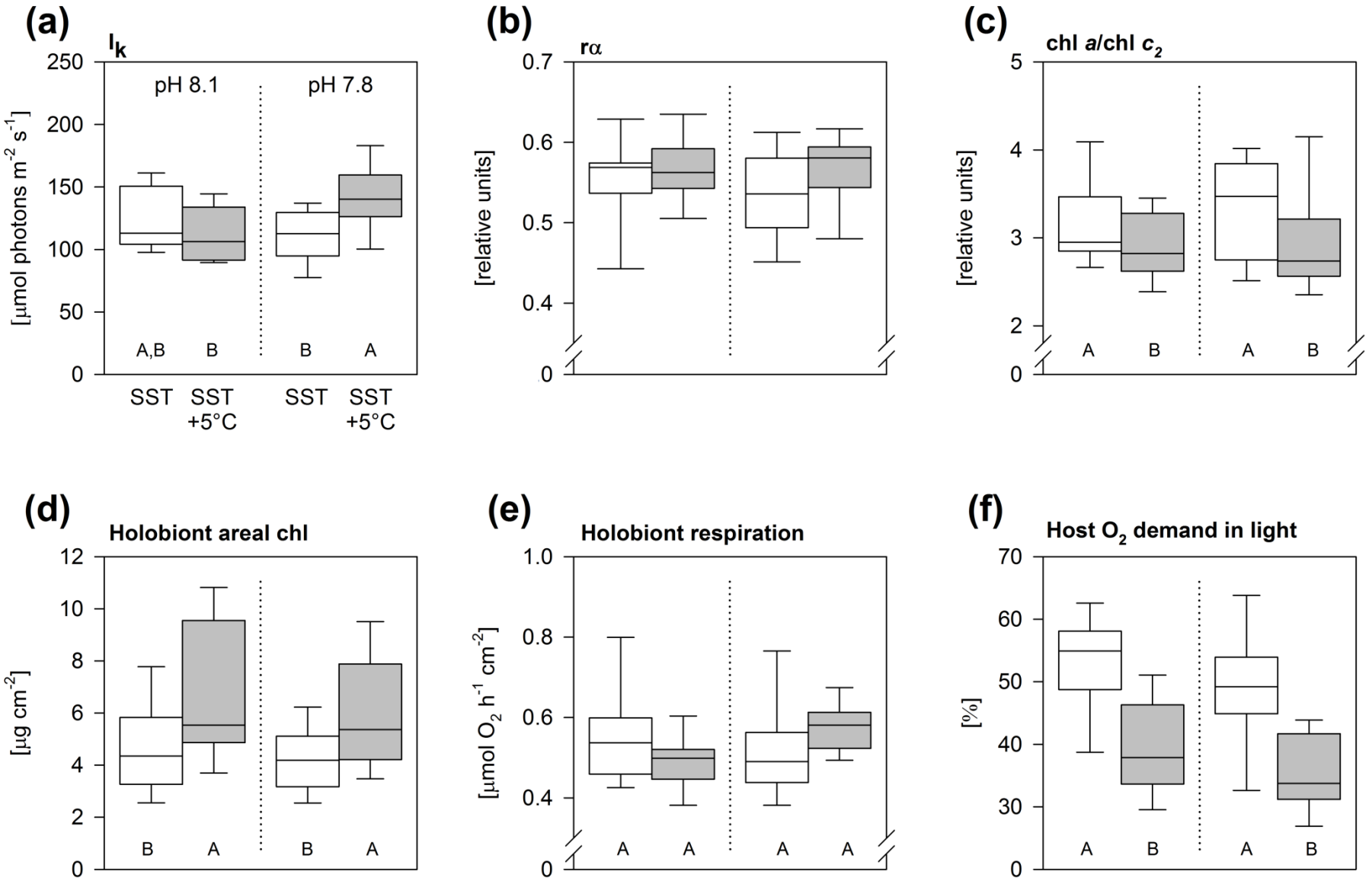


Figure S4. **Physiological variables of *Stylophora pistillata* under elevated temperature and reduced pH.** All graphs show treatment responses to ambient (white) or high temperatures (grey) under ambient pH (left side) or reduced pH conditions (right side) after 2 months. Boxplot depictions as described in Fig. 2. (a) Photosynthetic compensation points (I_k), (b) Relative initial slopes of rapid light curves (rα), (c) Symbiont chl a/chl c_2-ratios, (d) Holobiont areal total chl content, (e) Holobiont respiration, (f) Host O_2 demand in light (P_{gross}/R). Capital letters show significant treatment differences based on Tukey HSD *post hoc* results for significant interactive effects of pH and temperature (Table S1).