The following supplement accompanies the article

Reefs shift from net accretion to net erosion along a natural environmental gradient

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Supplement 1. Additional tables and figures

Table S1. The mean, min, and max for total alkalinity, pH, dissolved inorganic carbon, and pCO_2 at each block

	Distance from shore (m)	**TA Mean**	**Min**	**Max**	**pH Mean**	**Min**	**Max**	**DIC Mean**	**Min**	**Max**	**pCO_2 Mean**	**Min**	**Max**
1	0.67	2165.28	2095.47	2222.46	7.85	7.70	8.03	1962.93	1831.92	2075.01	658.21	383.34	975.33
2	1.10	2163.19	2113.80	2227.00	7.85	7.69	8.02	1961.63	1834.68	2074.01	658.52	395.77	996.26
3	3.10	2165.79	2089.75	2257.98	7.84	7.70	8.02	1968.44	1810.13	2074.89	675.79	390.79	977.94
4	5.80	2162.67	2101.46	2221.84	7.86	7.72	8.03	1959.19	1812.66	2067.66	650.87	377.19	925.28
5	8.20	2160.20	2092.45	2217.20	7.86	7.71	8.03	1956.83	1806.26	2073.59	650.54	378.85	951.15
6	10.00	2162.44	2088.65	2249.94	7.85	7.72	8.01	1961.16	1810.32	2063.16	655.33	392.98	932.32
7	12.60	2153.50	2077.01	2215.51	7.87	7.75	8.00	1945.46	1805.26	2037.73	623.31	402.03	842.97
8	15.70	2148.80	2075.69	2216.86	7.88	7.79	7.99	1934.68	1816.87	2011.11	594.41	422.67	755.96
9	17.20	2151.65	2085.82	2219.42	7.88	7.79	7.98	1940.73	1834.68	2017.91	603.99	433.50	749.74
10	19.60	2146.80	2069.79	2219.24	7.87	7.78	7.97	1938.05	1822.68	2007.47	608.75	444.06	772.08
11	23.70	2144.53	2047.65	2226.42	7.87	7.78	7.97	1936.70	1802.80	2013.38	609.36	442.48	773.40
12	24.80	2149.03	2053.58	2220.95	7.88	7.79	7.99	1937.61	1800.69	2018.77	600.94	418.94	749.22
13	26.10	2153.33	2050.84	2224.86	7.89	7.82	7.98	1938.42	1800.55	1997.31	588.57	431.89	697.11
14	26.70	2159.52	2053.77	2221.09	7.89	7.81	7.98	1940.97	1802.36	2000.49	579.44	432.34	709.40
15	26.90	2161.51	2079.12	2222.29	7.89	7.83	7.98	1942.22	1818.32	2003.07	576.89	427.54	678.45
16	27.70	2170.00	2109.46	2234.96	7.89	7.83	7.95	1950.99	1876.65	2009.64	579.44	483.75	673.61
17	28.80	2166.87	2116.02	2222.18	7.89	7.83	7.94	1947.64	1877.44	2002.80	576.77	497.79	676.40
18	29.50	2174.30	2126.05	2232.07	7.90	7.85	7.95	1950.49	1892.00	2000.87	565.53	498.45	650.80
19	29.80	2190.64	2139.22	2294.06	7.90	7.84	7.95	1966.69	1897.06	2078.80	573.38	498.68	664.07
20	31.60	2182.22	2138.47	2239.22	7.91	7.86	7.94	1954.90	1903.00	1998.34	558.39	504.33	628.52
21	32.40	2187.85	2149.13	2236.12	7.90	7.83	7.94	1964.11	1910.03	2006.13	573.09	511.54	678.21

Table S2. Parameters and methods used to measure environmental data. LoD is level of detection

Parameter	Method	Instrument	LoD
Nitrate	Armstrong et al (1967); Grasshoff et al. (1999)	Seal Analytical AA3 HR Nutrient Autoanalyzer	0.04 µmol/l
Nitrite	Armstrong et al (1967); Grasshoff et al. (1999)	Seal Analytical AA3 HR Nutrient Autoanalyzer	0.01 µmol/l
Ammonium	Kérouel and Aminot (1997)	Seal Analytical AA3 HR Nutrient Autoanalyzer	0.02 µmol/l
Phosphate	Murphy and Riley (1962)	Seal Analytical AA3 HR Nutrient Autoanalyzer	0.02 µmol/l
Chlorophyll *a*	Arar and Collins (1997); Welschmeyer (1994)	Turner Designs 10AU Benchtop and Field Fluorometer	0.025 µg/l
Temperature	Guadayol et al. (2014)	Sonde 600XLM, YSI Incorporates	N/A
Total Alkalinity	Dickson et al. (2007) SOP 3b	Mettler T50 autotitrator	N/A
pH	Dickson et al. (2007) SOP 6b	MolecularDevicesSpectraMax M2	N/A

Table S3. Model selection of raw data with all carbonate chemistry parameters

	k	**–log($\mathcal{L}$)**	**AICc**	**ΔAIC**	**R^2**	**Rank**
pH	4	–34.17	75.84	0.00	0.48	1
pCO_2	4	–35.19	77.89	2.04	0.42	2
DIC	4	–38.22	83.94	8.10	0.22	3
TA	4	–38.38	84.26	8.41	0.21	4
Depth	3	–40.01	84.73	8.88	0.06	5
Distance	3	–40.40	85.50	9.66	0.02	6
Temperature	4	–40.03	87.56	11.71	0.07	7
Resource Availability	6	–40.03	94.34	18.50	0.09	8
Full Model	18	–12.23	364.46	288.62	0.98	9

Table S4. Model selection of residual data with all carbonate chemistry parameters

	k	**–log($\mathcal{L}$)**	**AICc**	**ΔAIC**	**R^2**	**Rank**
pH	4	–30.46	68.42	0.00	0.64	1
TA	4	–32.05	71.60	3.17	0.58	2
pCO_2	4	–32.31	72.13	3.70	0.57	3
DIC	4	–35.27	78.04	9.62	0.42	4
Depth	3	–40.01	84.73	16.30	0.06	5
Distance	3	–40.40	85.50	17.08	0.02	6
Temperature	4	–40.42	88.33	19.91	0.03	7
Resource Availability	6	–38.91	92.11	23.68	0.18	8
Full Model	18	–12.23	364.46	296.04	0.98	9

Table S5. List of parameters and parameter ranges across all sampling days and sites

Parameter	**Range**
Mean Temperature Anomaly	–0.0064–0.008
Chlorophyll *a* (μg L^{-1})	0.019– 1.36
DIN:DIP	14.56– 173.75
pH_T	7.69– 8.032
Distance (m)	0.67– 32.4
Depth (m)	0.12–4.52

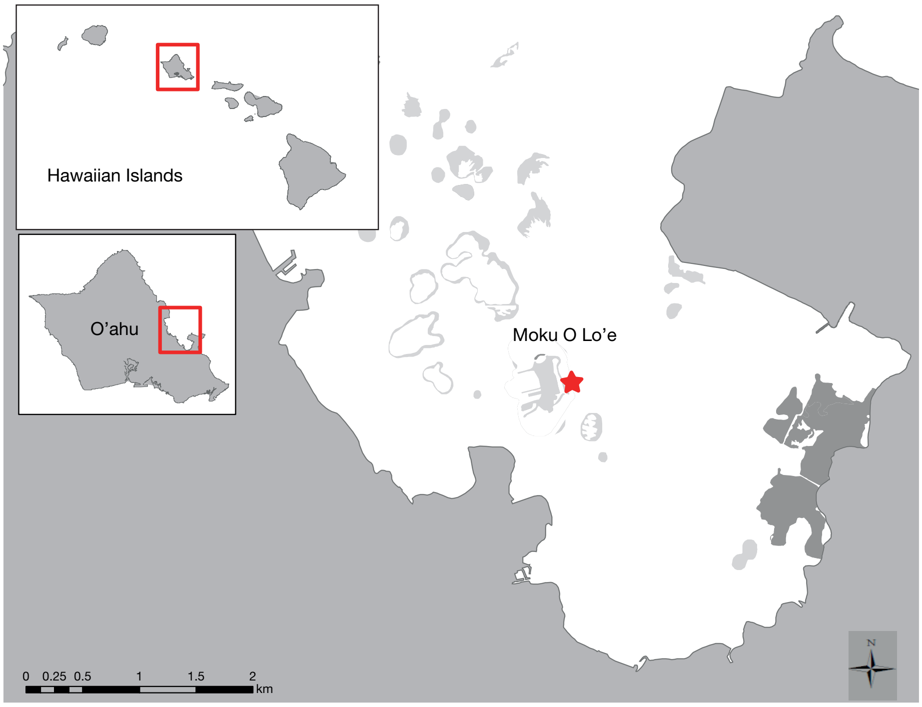

Fig. S1. Map of Kāne‘ohe Bay. Red star represents the location of the study site. Insets on upper left are the Main Hawaiian Islands and the island of O’ahu

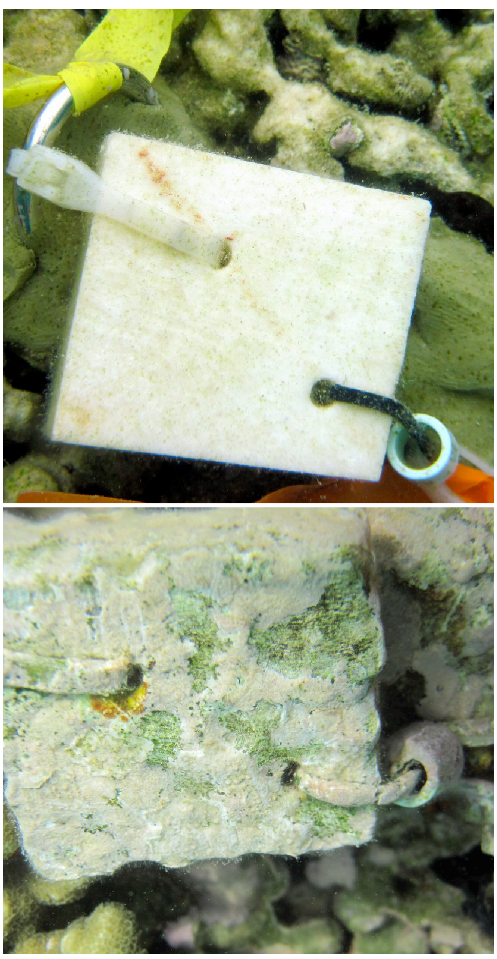

Fig. S2. Experimental blocks. Images of experimental blocks attached to substrate immediately after deployment (top) and one year later (bottom)

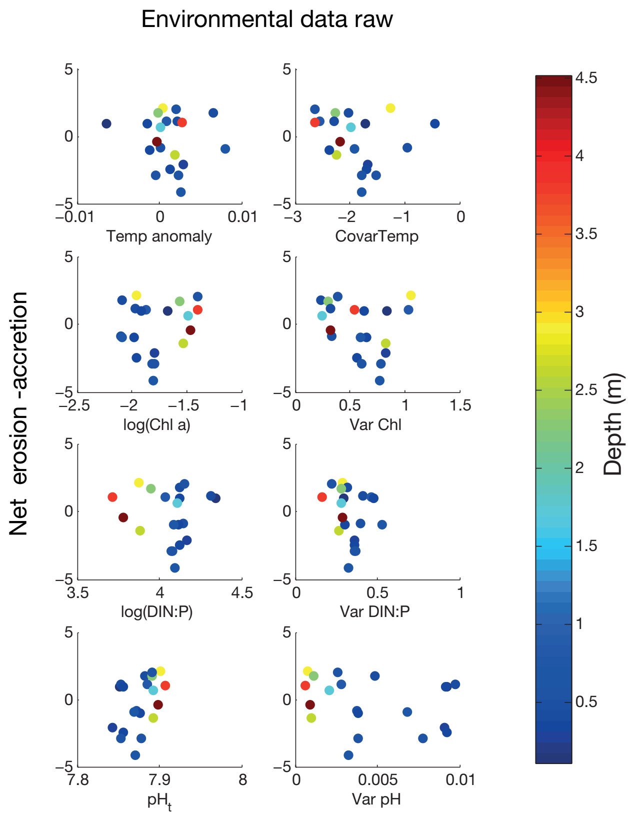

Fig. S3. Net accretion and erosion (square-root transformed) versus raw environmental data. All positive values on the y-axis are net accretion and all negative values are net erosion

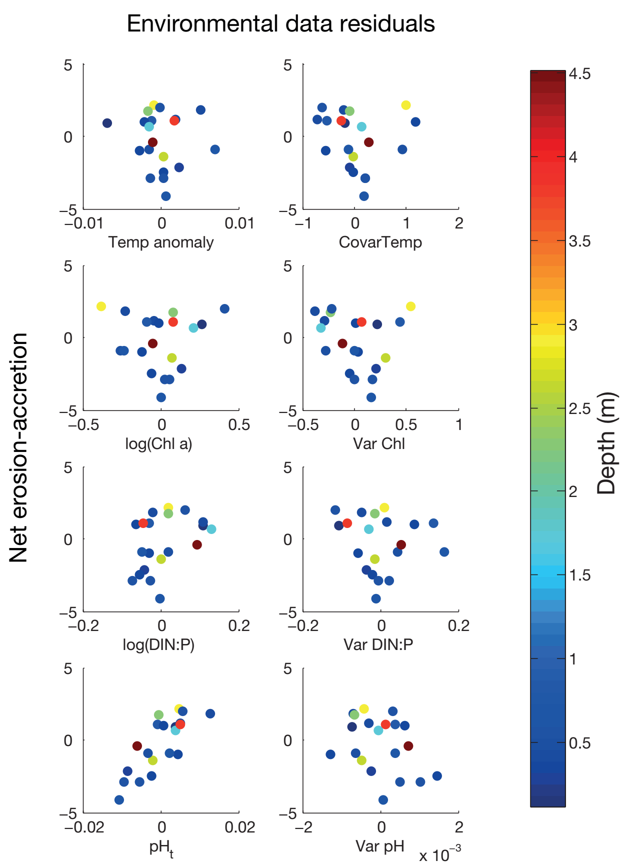

Fig. S4. Net accretion and erosion (square-root transformed) versus residual environmental data. All positive values on the y-axis are net accretion and all negative values are net erosion

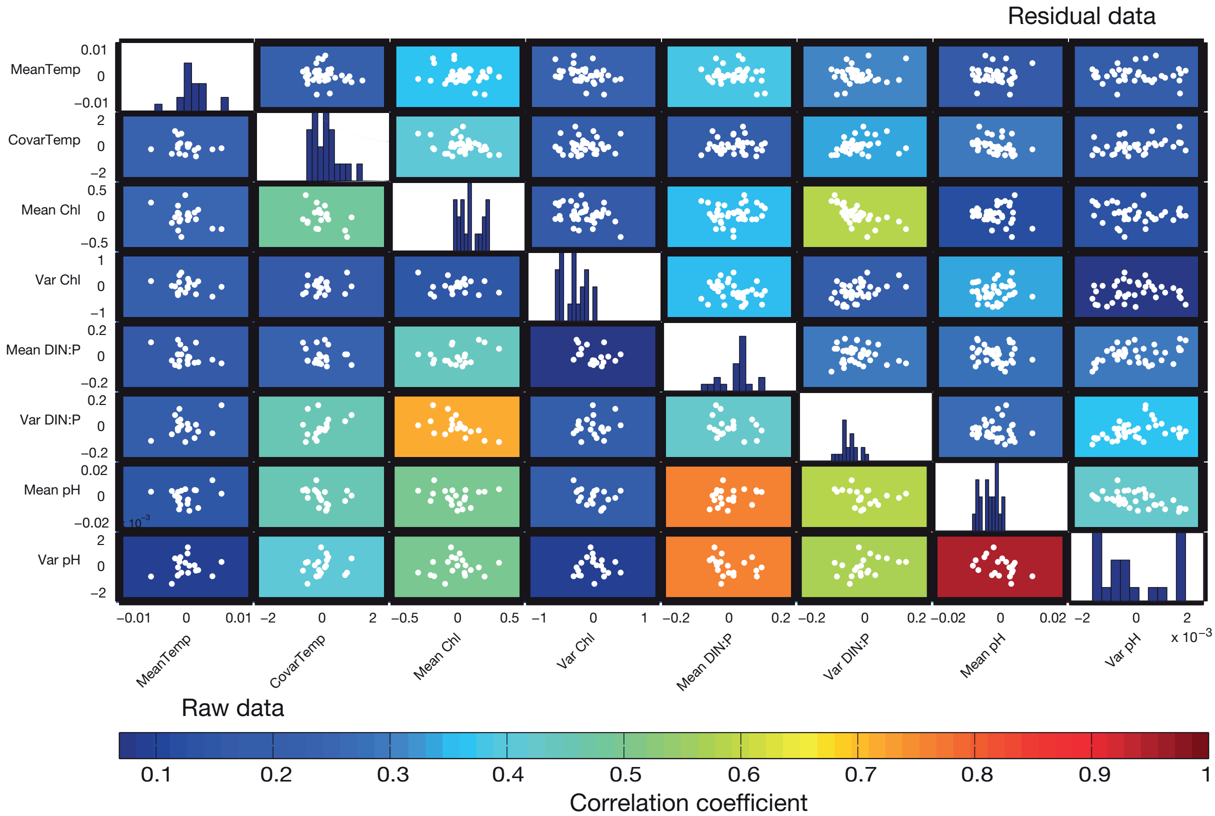

Fig. S5. Matrix of correlation coefficients for environmental data. Blue background is low correlation and red background is highly correlated. Subplots below the white line (bottom left) are for the non-manipulated raw environmental data and subplots above the white line (top right) are correlation coefficients of residuals from a multiple regression for each parameter against distance from shore and depth. The 1:1 line shows a histogram of each parameter and the white dots within each color are scatter plots of each corresponding parameter

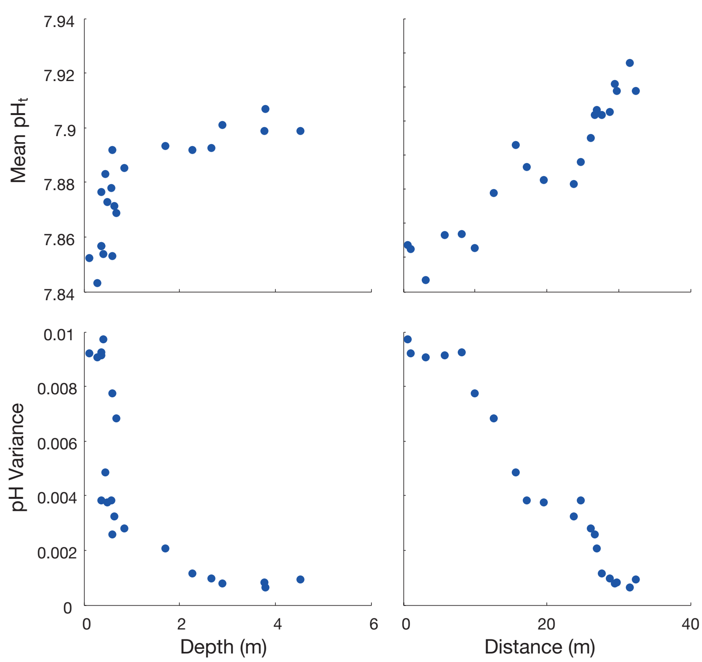

Fig. S6. pH mean (top) and variance (bottom) for each site versus depth (left) and distance from shore (right) across the transect

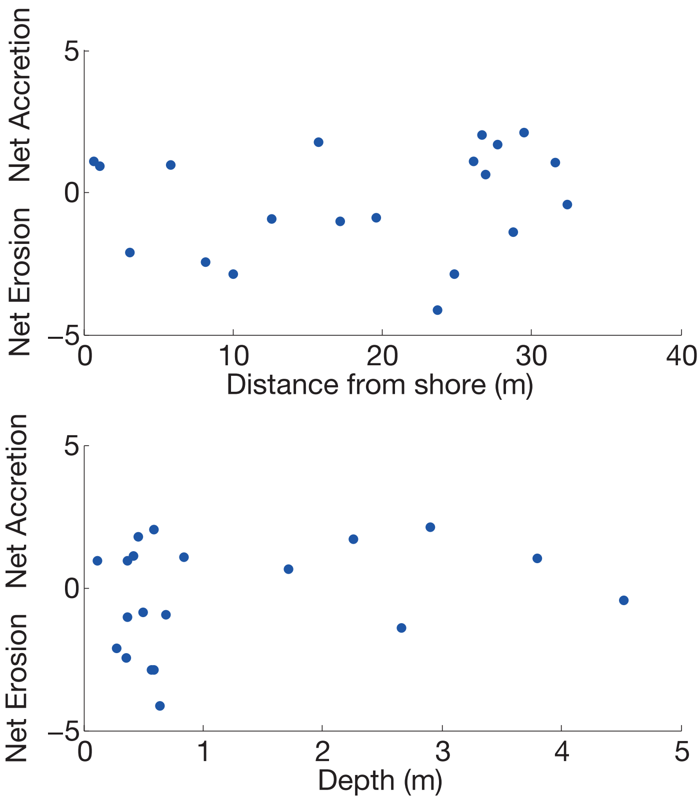

Fig. S7. Net accretion and erosion (square-root transformed) versus distance from shore (top) and depth (bottom). All positive values on the y-axis are net accretion and all negative values are net erosion. There is no significant relationship between net accretion-erosion and distance from shore or depth

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