Supporting Information

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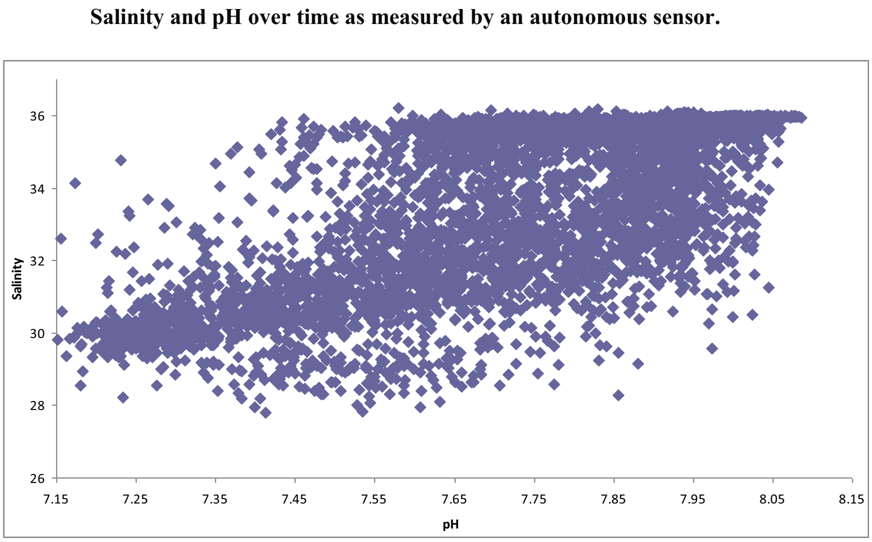

Fig. S1. Salinity and pH over time as measured by an autonomous sensor. Salinity and pH were measured at 15-min time intervals for a period of 3 mo (August–October 2010) for a total of over 5,500 data points at a single spring. Salinity is plotted against pH. As depicted, 93% of data points fall above a salinity of 30, and salinity never drops below 27 at the center of discharge. The lower salinity conditions are during low tide in the rainy season and the conditions do not prevail for more than 1 h. We acknowledge that natural environments are complex and the potential for multiple confounding stressors is high, particularly with respect to lower salinity at our field site. Whereas previous studies suggest that many coral species are able to withstand osmotic stress with limited harmful effects when exposed to lower than ambient salinities (*Discussion* and references in ref. 1), a recent study by Inoue et al. (2) indicates a significant decrease in coral calcification as salinities drop below 30, a condition occasionally seen for short time intervals at our field site. However, the data from ref. 2 reveal that the impact of lower salinity on coral calcification is due to the salinity impact on saturation state, whereas salinity itself does not directly impact calcification (2). Monitoring at our site using an autonomous pH/salinity sensor over a 3-mo period indicates that the salinity at these springs drops below 30 only 7% of the time; the duration of these excursion are short (<1 h) during very low tide events. By only including data from springs that have salinities consistently higher than 27 and a majority of the time higher than 30, we have attempted to control for the impact of salinity on coral distribution found at Puerto Morelos. Our confidence that other confounding variables do not impact coral calcification at our site is supported by the identical sensitivity of calcification rate to reduction in aragonite saturation (Ω_{arag}) at our field site is the agreement between our results and those reported for a laboratory study of the same species *Porites astreoides* by de Putron et al. (3) (Fig. 3). Because only Ω_{arag} was varied in the experimental corals (temperature, salinity, and light were all constant), the calcification response reflects the impact of Ω_{arag} alone on *P. astreoides* calcification, suggesting that this is also the case in the field samples. This comparison provides strong support for our conclusion that declining calcification in our field corals is a result of declining Ω_{arag}, not other confounding factors.

1. Crook ED, Potts D, Rebolledo-Vieyra M, Hernandez L, Paytan A (2011) Calcifying coral abundance near low pH springs: Implications for future ocean acidification. *Coral Reefs* 31(1): 239–245.
2. Inoue M, et al. (2012) Estimate of calcification responses to thermal and freshening stresses based on culture experiments with symbiotic and aposymbiotic primary polyps of a coral, Acropora digitifera. *Global Planet Change* 92–93:1–7.
3. de Putron SJ, McCorkle DC, Cohen AL, Dillon AB (2011) The impact of seawater saturation state and bicarbonate ion concentration on calcification by new recruits of two Atlantic corals. *Coral Reefs* 30:321–328.

Table S1. Variability of pH and saturation state by site, from discrete water samples

Site/coral ID	Salinity	Temp, °C	DIC ± 6 $\mu mol \cdot kg^{-1}$	TA ± 7 $\mu mol \cdot kg^{-1}$	pH	Ω_{arag}
Ojo A/center 01	33.8	28.7	2,559	2,601	7.41	1.22
Ojo A/center 02	33.9	27.8	2,409	2,533	7.63	1.85
Ojo A/center 03	34.2	28.2	2,483	2,609	7.63	1.90
Ojo B/center 04	32.6	27.3	2,492	2,518	7.30	0.77
Ojo B/center 05	33.1	27.6	2,900	2,997	7.56	1.82
Ojo B/center 06	31.1	27.4	2,904	2,999	7.57	1.82
Ojo C/center 07	32.7	27.5	3,169	3,096	7.20	0.81
Ojo A/control 01	35.1	29.2	2,052	2,399	8.04	4.03
Ojo A/control 02	35.3	29.4	2,056	2,404	8.04	4.03
Ojo A/control 03	35.3	29.4	2,050	2,406	8.05	4.12
Ojo B/control 04	34.8	28.8	2,069	2,398	8.02	3.83
Ojo B/control 06	35.4	28.8	2,083	2,392	8.00	3.60
Ojo B/control 07	35.3	28.2	2,076	2,387	8.00	3.60
Ojo C/control 05	34.9	28.6	2,020	2,388	8.09	4.24

Water samples for measurement of dissolved inorganic carbon (DIC) and total alkalinity (TA) were obtained for each coral core at the time of sampling (March 2011). In situ temperature and salinity were obtained with a hand-held YSI-63 (YSI). For the discrete measurements, pH and Ω_{arag} were calculated in CO_2 Sys (ref. 1, for more detail see ref. 2). Ca^{2+} values for each site were also obtained in the event that high Ca^{2+} concentrations required correction factors in the calculation of Ω_{arag} (due to high Ca^{2+} in the limestone bedrock, e.g., ref. 2); however, Ca^{2+} concentrations did not vary from ambient ocean values. "Center" indicates the core was obtained within the area of influence of the discharging water: seven center and seven control cores were obtained.

1. Pierrot D, Lewis E, Wallace DWR (2006) MS Excel Program Developed for CO2 System Calculations. ORNL/CDIAC-105a Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory (US Department of Energy, Washington, DC).
2. Crook ED, Potts D, Rebolledo-Vieyra M, Hernandez L, Paytan A (2011) Calcifying coral abundance near low pH springs: Implications for future ocean acidification. *Coral Reefs* 31(1): 239–245.