

The following supplement accompanies the article

Influence of water-temperature variability on stony coral diversity in Florida Keys patch reefs

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SUPPLEMENT: DATA-PROCESSING DETAILS

Satellite-derived sea surface temperature (SST)

The Advanced Very High Resolution Radiometer (AVHRR) imagery obtained from NOAA polar orbiting satellites (i.e., NOAA-12, 14, 16, and 19) were collected by the High Resolution Picture Transmission antenna, at the Institute for Marine Remote Sensing (IMaRS) at the University of South Florida. SST was calculated using the multi-channel sea surface temperature algorithm developed by McClain et al. (1983) and updated calibration coefficients for each satellite sensor in orbit. Satellite imagery was mapped to a cylindrical equidistant projection and cloud filtered (Hu et al. 2009).

Degree Heating Weeks (DHWs)

AVHRR Pathfinder (version 5.0) nighttime-only SST data (interpolated to a 1-km spatial resolution) were used to create a gap-filled 1985–2006 climatology (Li, J. unpublished). A maximum monthly mean (MMM) climatology was derived by extracting all pixels in the climatology which corresponded to the warmest month, as defined in Liu et al. (2013). HotSpots are the difference between the AVHRR nighttime-only SST and the MMM (Goreau & Hayes 1994). DHWs are the sum of positive HotSpots $\geq 1^{\circ}\text{C}$ in a 12-week window. High-spatial resolutions (1-km²) AVHRR-derived DHWs are now accessible online via: <http://imars.usf.edu>, CRW-DSS tab.

STATION AND CORAL SPECIES COVER INFORMATION

Table S1: Station information. The time period for all CREMP surveys used for this research span from 1996-2010; surveys in Dry Tortugas are from 1999-2010. The station IDs, station codes, habitat types (P = patch, OS = offshore shallow, OD = offshore deep), and geographic coordinates for all stations used are presented. Highlighted with an asterisk are those for which SST and *in situ* water temperatures were analyzed. Map of station locations is shown in Fig. 1. Time period for SST span from 1995-2010.

Region	Station ID	Station Code	Habitat Type	LAT.	LON.	Depth (m)	<i>In situ</i> temp. dates
UK	Turtle *	TR	P	25.29	-80.22	8	(1995-2006)
	Porter Patch	PP	P	25.10	-80.32	5	
	Admiral *	AR	P	25.04	-80.39	2	(2002-2006)
	Carysfort Shallow *	CS	OS	25.22	-80.21	4	(1995-2006)
	Grecian Rocks *	GR	OS	25.11	-80.31	8	(1995-2005)
	Molasses Shallow *	MS	OS	25.01	-80.38	7	(1995-2002)
	Conch Shallow *	CS	OS	24.96	-80.46	7	(1998-2006)
	Carysfort Deep	CR	OD	25.22	-80.21	16	
	Molasses Deep	MD	OD	25.01	-80.38	15	
	Conch Deep *	CD	OD	24.95	-80.45	17	(1997-2007)
MK	West Turtle Shoal	WT	P	24.70	-80.97	7	
	Dustan Rocks	DR	P	24.69	-81.03	6	
	Alligator Shallow	AS	OS	24.85	-80.62	5	
	Tennessee Shallow *	TS	OS	24.75	-80.78	6	(1995-2006)
	Sombrero Shallow	SS	OS	24.63	-81.11	6	
	Alligator Deep *	AD	OD	24.85	-80.62	12	(1995-2006)
	Tennessee Deep	TD	OD	24.75	-80.76	14	
Sombrero Deep *	SD	OD	24.62	-81.11	16	(1995-2005)	
LK	West Washer Women	WW	P	24.55	-81.59	8	
	Western Head	WH	P	24.50	-81.81	11	
	Cliff Green	CG	P	24.50	-81.77	8	
	Smith Shoal *	SS	P	24.72	-81.92	8	(1998-2006)
	Jaap Reef *	JR	P	24.59	-81.58	3	(1995-2005)
	Looe Key Shallow *	LK	OS	24.55	-81.41	8	(1995-2006)
	Eastern Sambo Shallow	ES	OS	24.49	-81.66	3	
	Western Sambo Shallow	WSS	OS	24.48	-81.72	5	
	Rock Key Shallow	RS	OS	24.45	-81.86	5	
	Sand Key Shallow *	SK	OS	24.45	-81.86	7	(1995-2005)
	Looe Key Deep	LK	OD	24.45	-81.88	14	
	Eastern Sambo Deep	ED	OD	24.54	-81.42	15	
	Western Sambo Deep	WD	OD	24.49	-81.67	12	
	Rock Key Deep	RD	OD	24.48	-81.72	13	
Sand Key Deep	SD	OD	24.45	-81.88	11		
DT	Bird Key Reef	BK	OD	24.61	-82.87	13	
	Black Coral Rock *	BC	OD	24.70	-83.00	23	(2002-2006)
	White Shoal	WS	P	24.64	-82.90	8	

**ADDITIONAL RESULTS FOR TEMPERATURE &
STONY CORAL DIVERSITY ANALYSES**

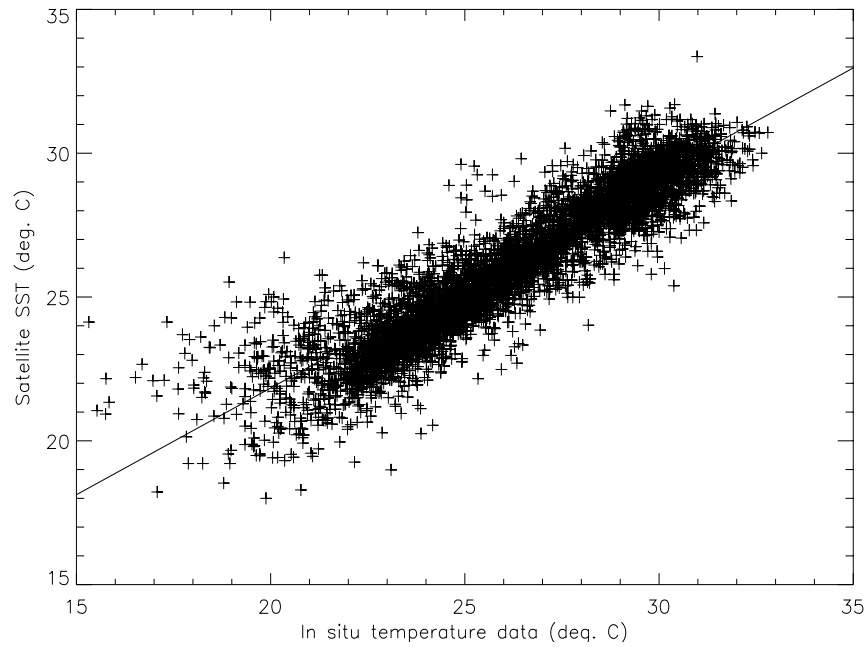


Fig. S1. Linear Pearson correlation between weekly means AVHRR sea surface temperatures (SST) and *in situ* thermograph temperatures in the Florida Keys. ($y = 0.78x + 5.70$; $r = 0.93$, $p < 0.05$, $n = 5457$)

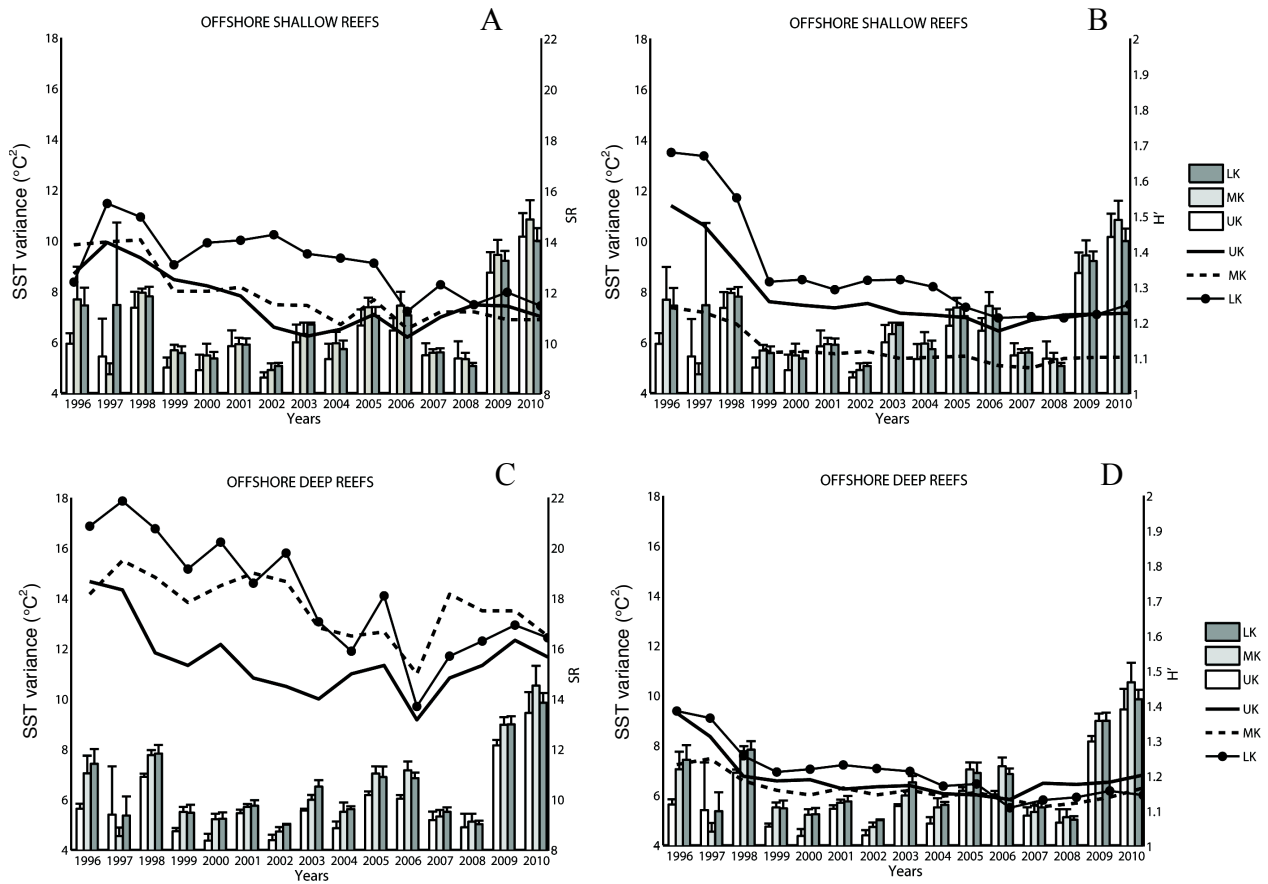


Fig. S2. Annual sea surface temperature variance means (SST; $^{\circ}\text{C}^2$ – represented in bars) with A) species richness (SR) annual means, and B) Shannon diversity index (H') annual means (represented by lines) for offshore shallow reefs and C) SR annual means, and D) H' annual means for offshore deep reefs in the Upper (UK), Middle (MK) and Lower Keys (LK). The error bars represent standard errors of the mean.

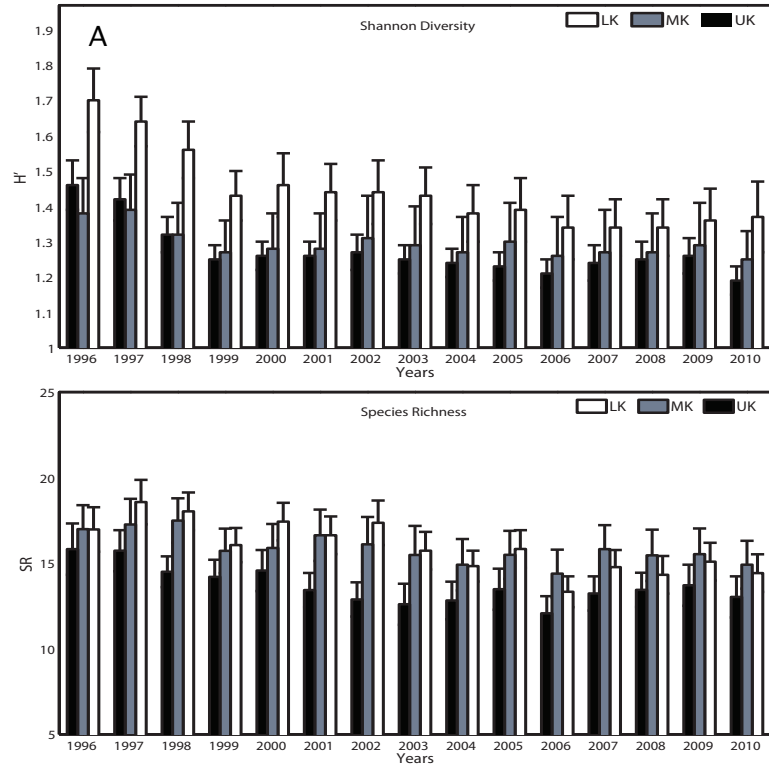


Fig. S3. Regional annual means for (A) Shannon diversity indices (H') and (B) species richness for the Upper Keys (UK), Middle Keys (MK) and Lower Keys (LK). The error bars represent standard errors of the mean.

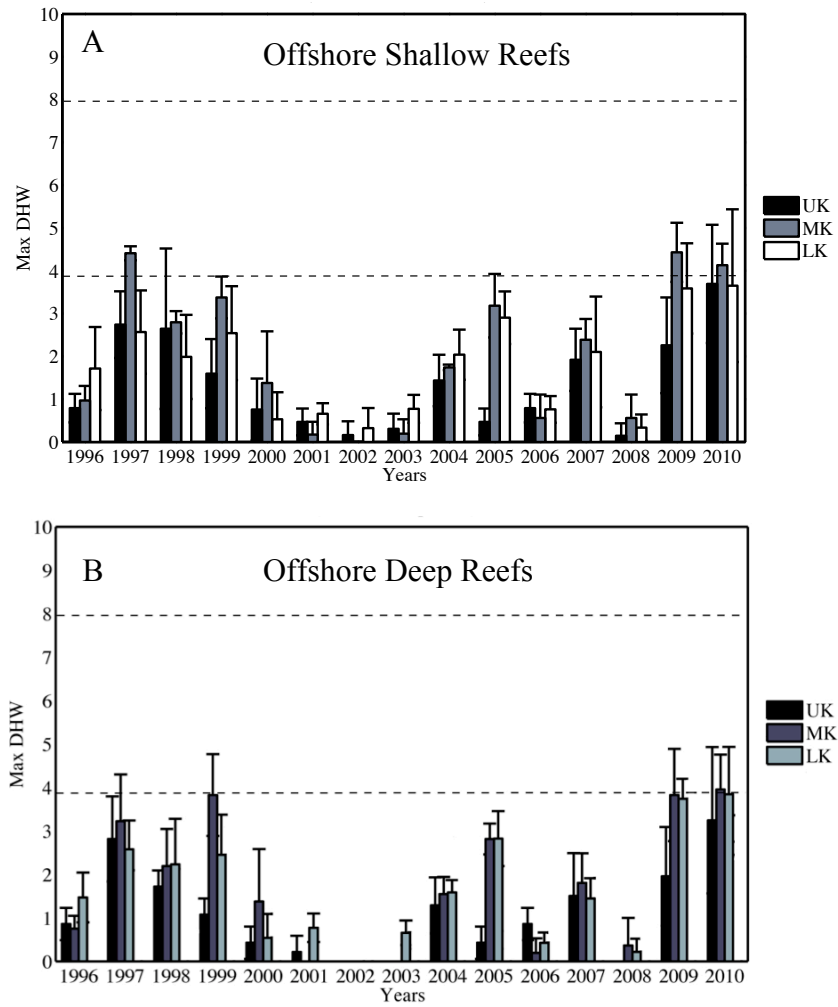


Fig. S4. Annual summer maximum-DHW (DHW_{max}) means for (A) offshore shallow and (B) offshore deep reefs in the Upper Keys (UK), Middle Keys (MK), Lower Keys (LK) during 1996-2010. The intermittent dashed lines represent DHWs thresholds (4 and 8 °C-weeks) above which significant coral bleaching and mortality are likely to occur. Error bars denote standard deviations.

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