Supplementary Figures

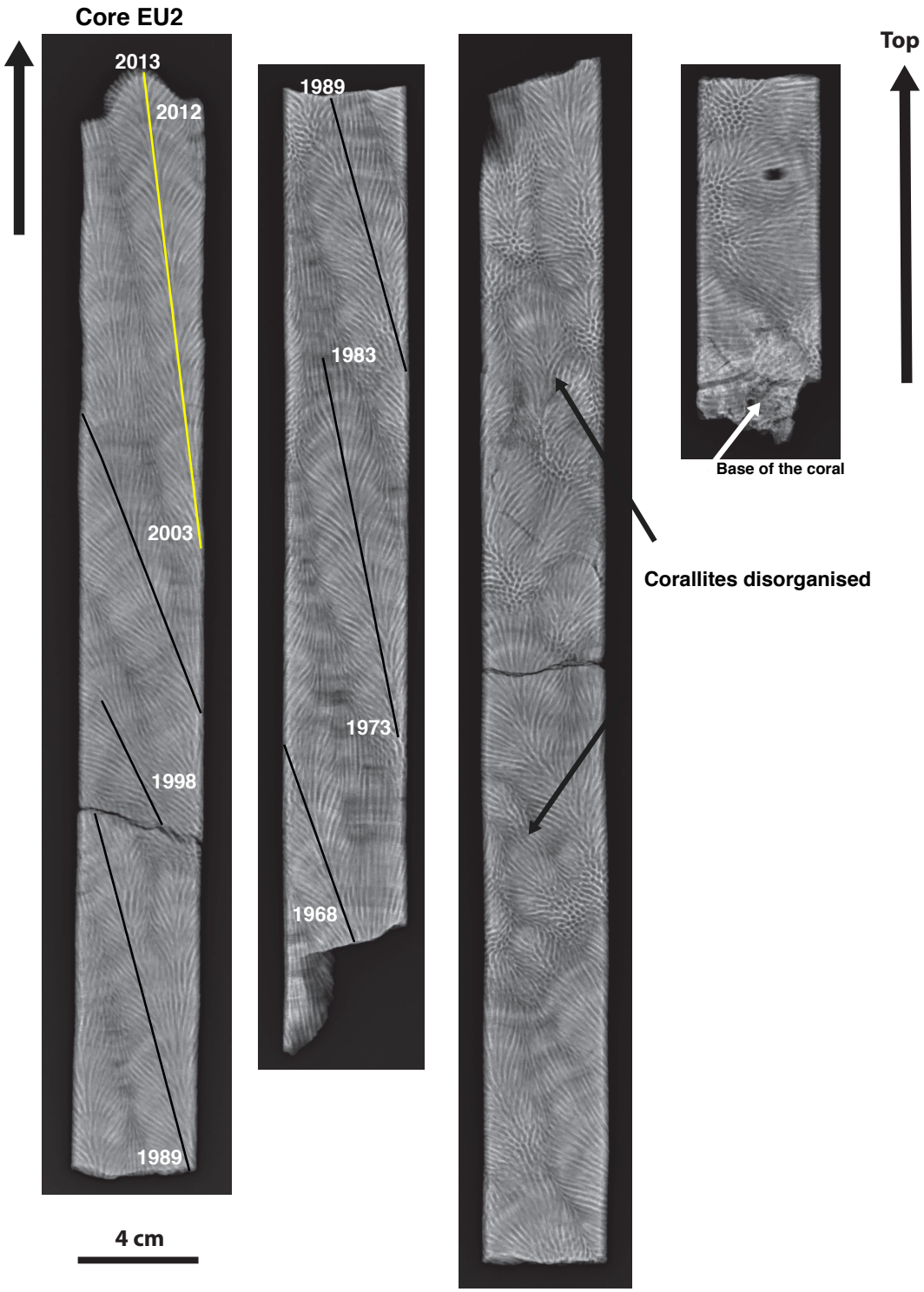

Figure S1 - X-ray of core EU2 with sampling tracks indicated. Coral growth parameters were measured up to 1968, while geochemical proxies were measured between 2003 and 2013 (yellow line).

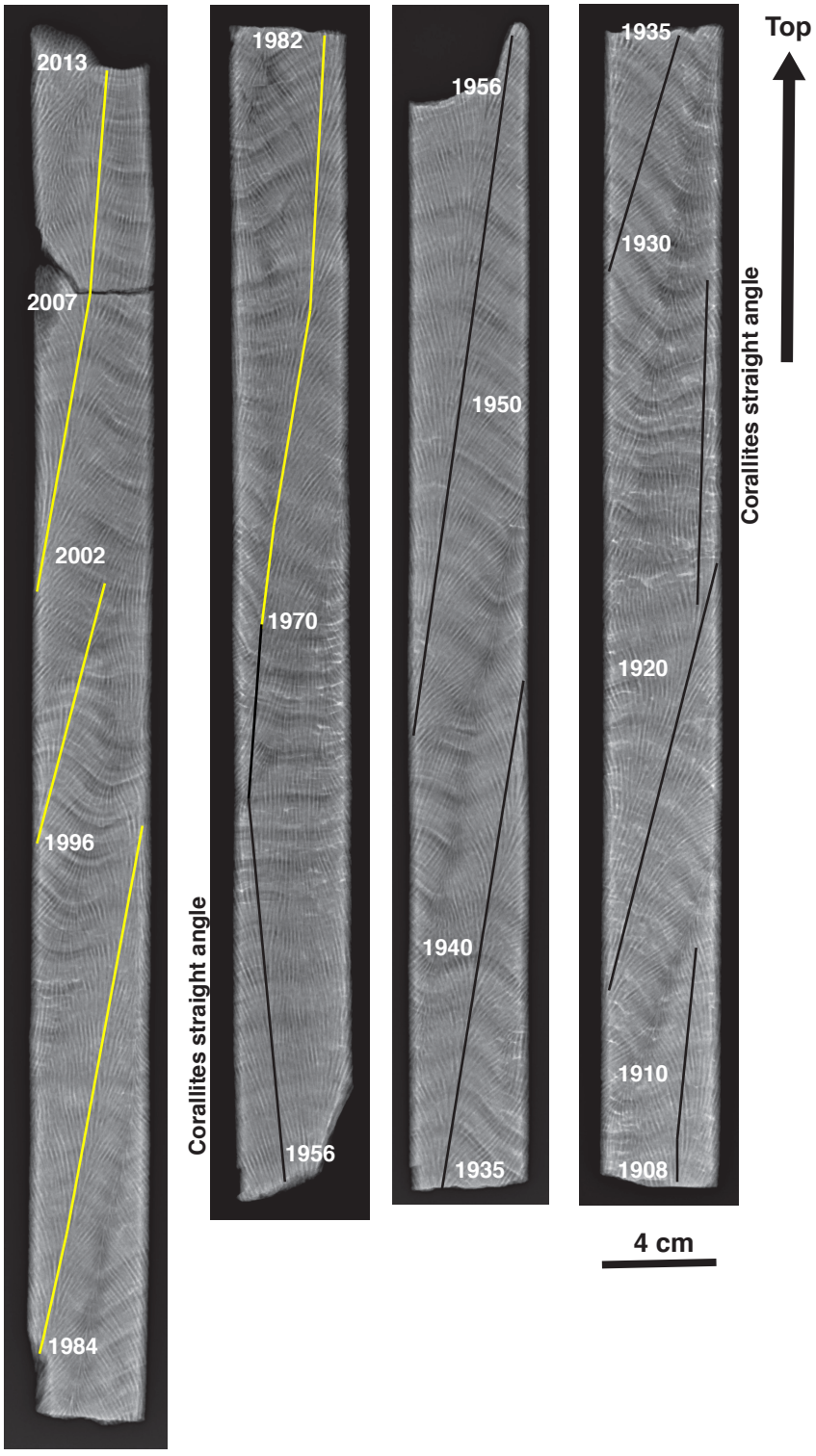

Figure S2 - X-ray of core EU3 with sampling tracks indicated. Coral growth parameters were measured up to 1911, while geochemical proxies were analysed between 1970 and 2013 (yellow line).

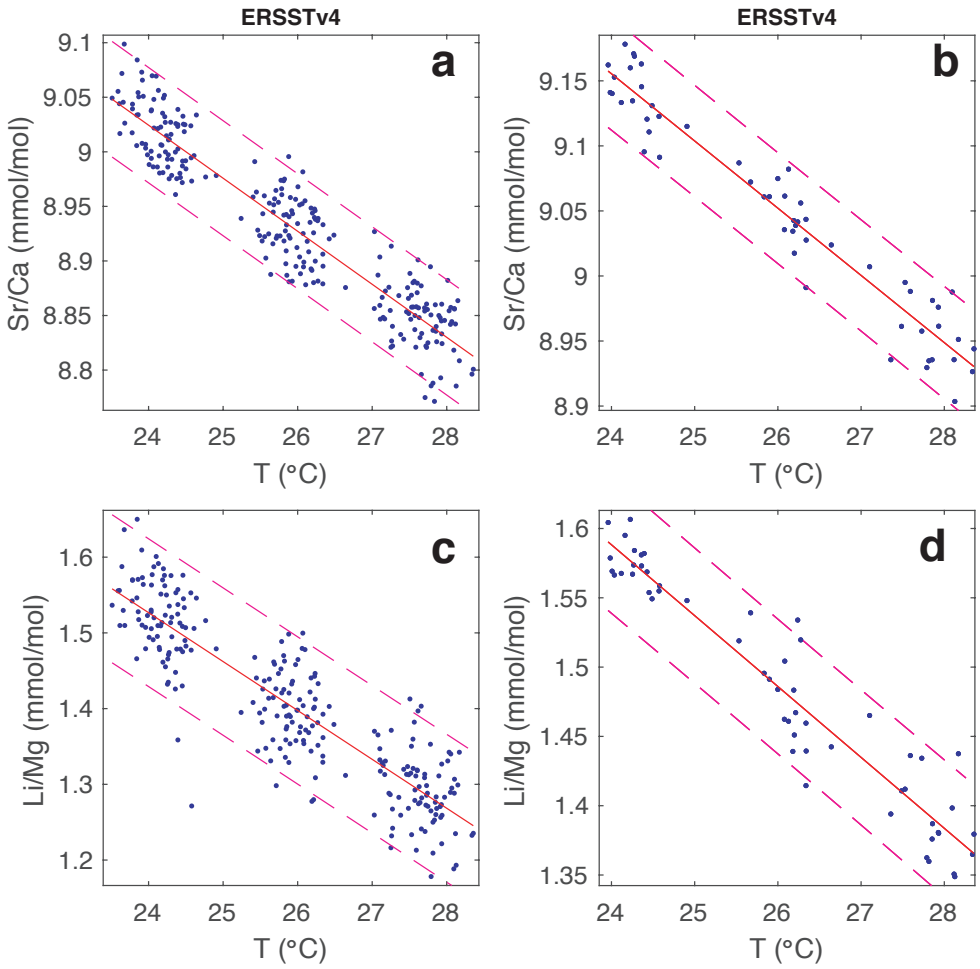

Figure S3 - Linear regressions of trace element (TE)/Ca proxies with ERSSTv4 for core EU3 (a,c) and EU2 (b,d). The TE/Ca records were calibrated using the respective linear regression equations of the bimonthly correlations obtained for each of the core records from the two sites. The 95% confidence intervals of the regressions are indicated. Regression equations are provided in Table 2.

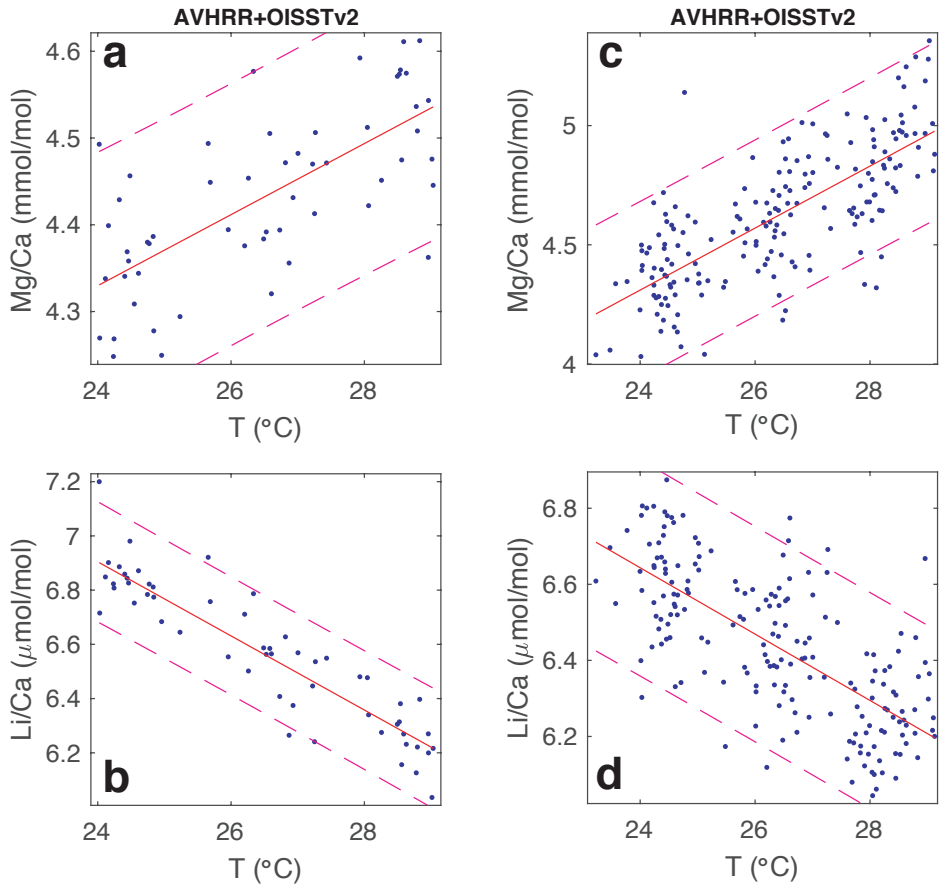

Figure S4 - Linear regressions of Mg/Ca and Li/Ca with AVHRR-OI SSTv2 for core EU2 (a,b) between 2003-2012 and EU3 (c,d) between 1981 and 2012. The TE/Ca records were calibrated using the respective linear regression equations of the bimonthly correlations obtained for each of the core records from the two sites. The 95% confidence intervals of the regressions are indicated. Regression equations are provided in Supplementary Table 1.

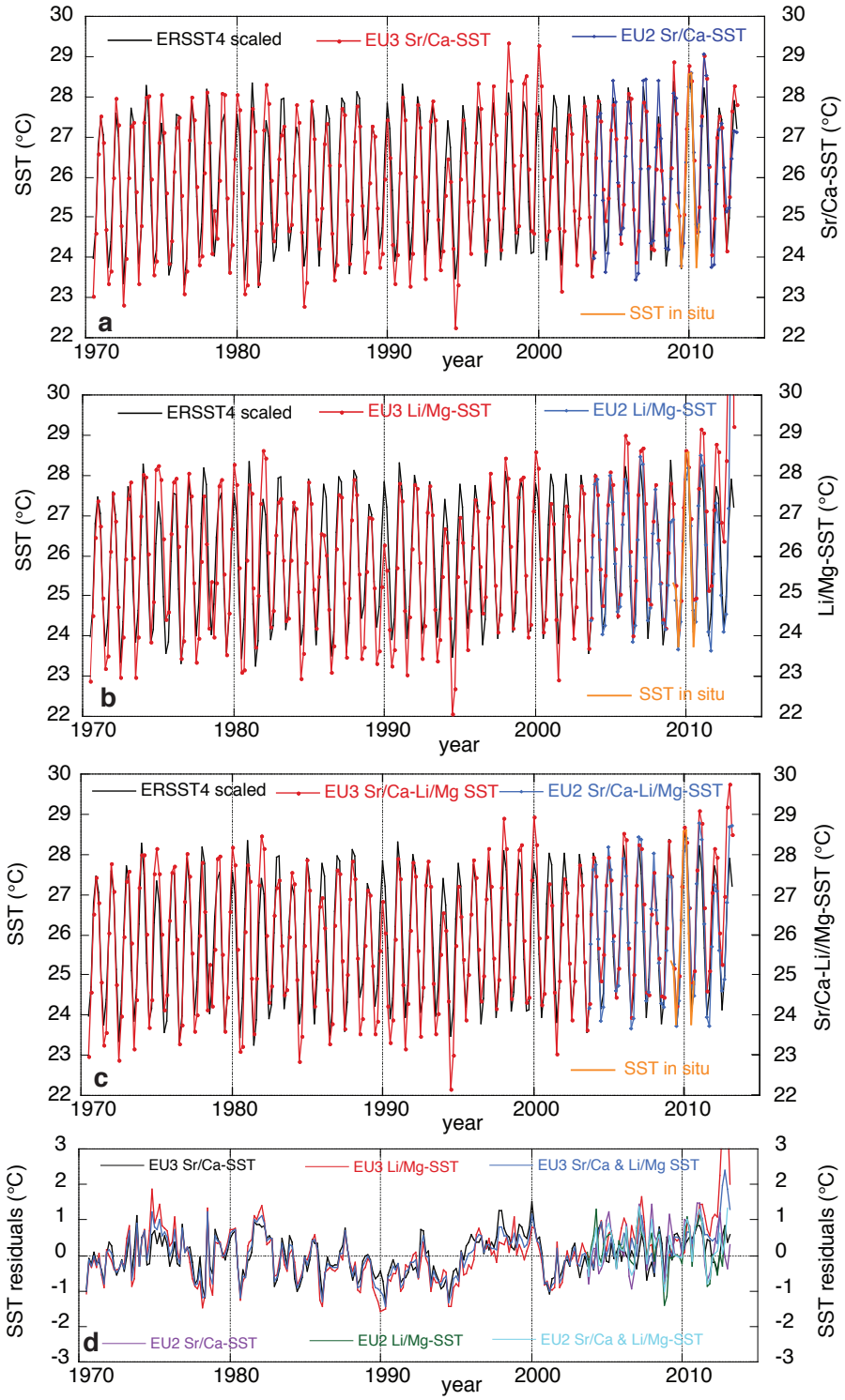

Figure S5 - Absolute SST reconstructions for cores EU2 (blue) and EU3 (red) with SST residuals based on the calibration period 1981 to 2013 for a) Sr/Ca-SST, b) Li/Mg-SST and c) their combination in comparison to ERSSTv4 (black) scaled to *in situ* SST (orange; 2009-2010).

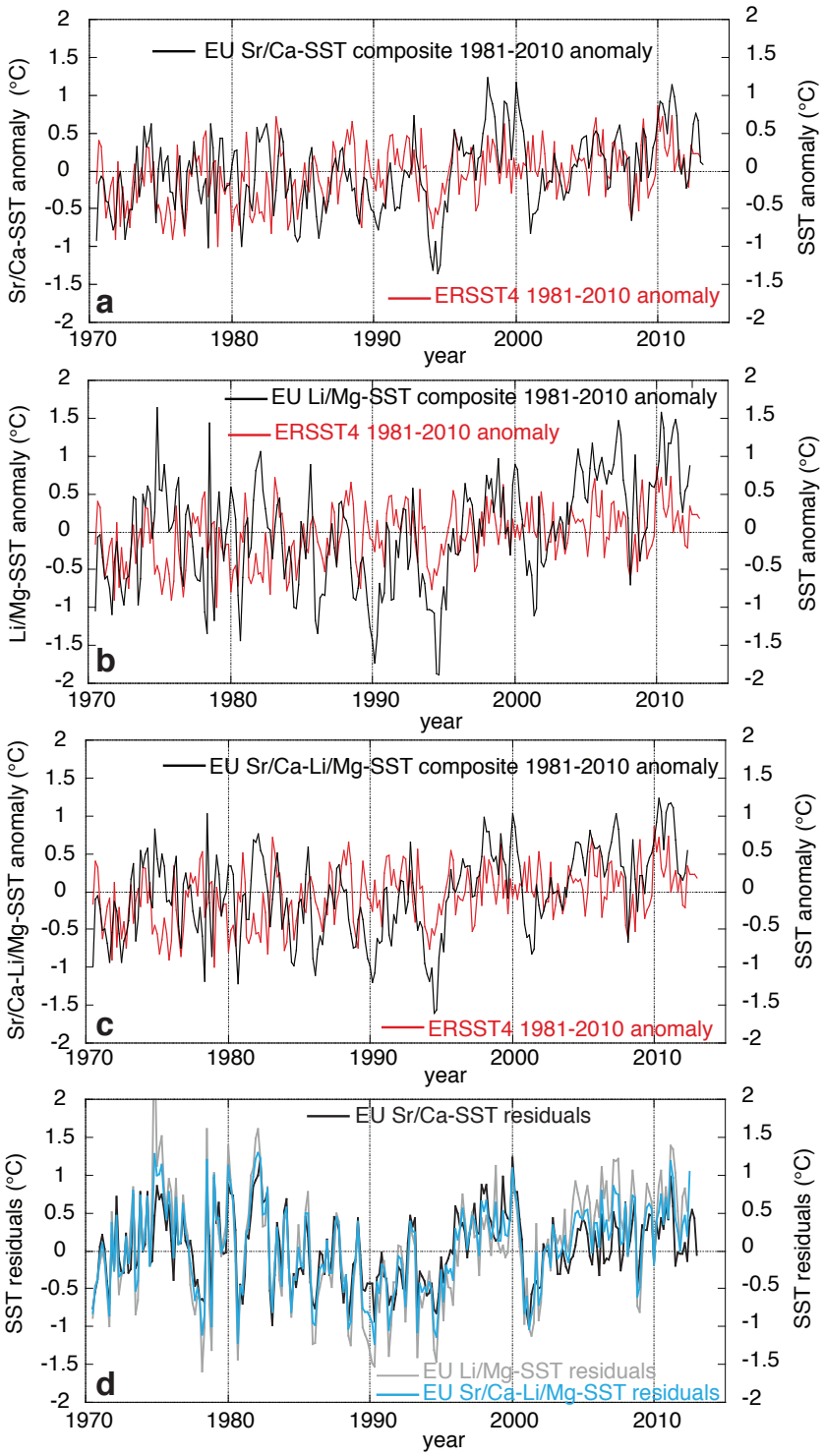

Figure S6 - SST anomaly reconstructions with SST residuals to ERSSTv4 for a) EU composite Sr/Ca, b) EU composite Li/Mg and 3) EU composite Sr/Ca and Li/Mg-SST combined. Anomalies were calculated relative to the 1981 to 2010 average bimonthly seasonal cycle.

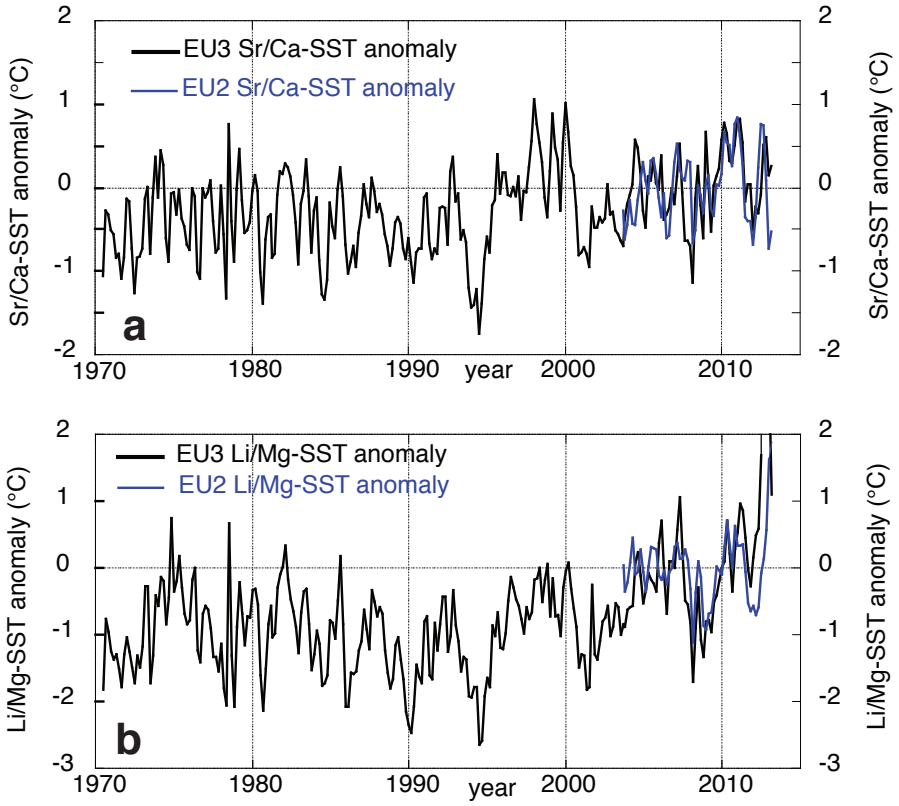

Figure S7 – SST anomaly reconstructions for a) EU3 and EU2 Sr/Ca and b) EU3 and EU2 Li/Mg. Anomalies were calculated relative to the 2003 to 2013 average bimonthly seasonal cycle where both cores overlap.

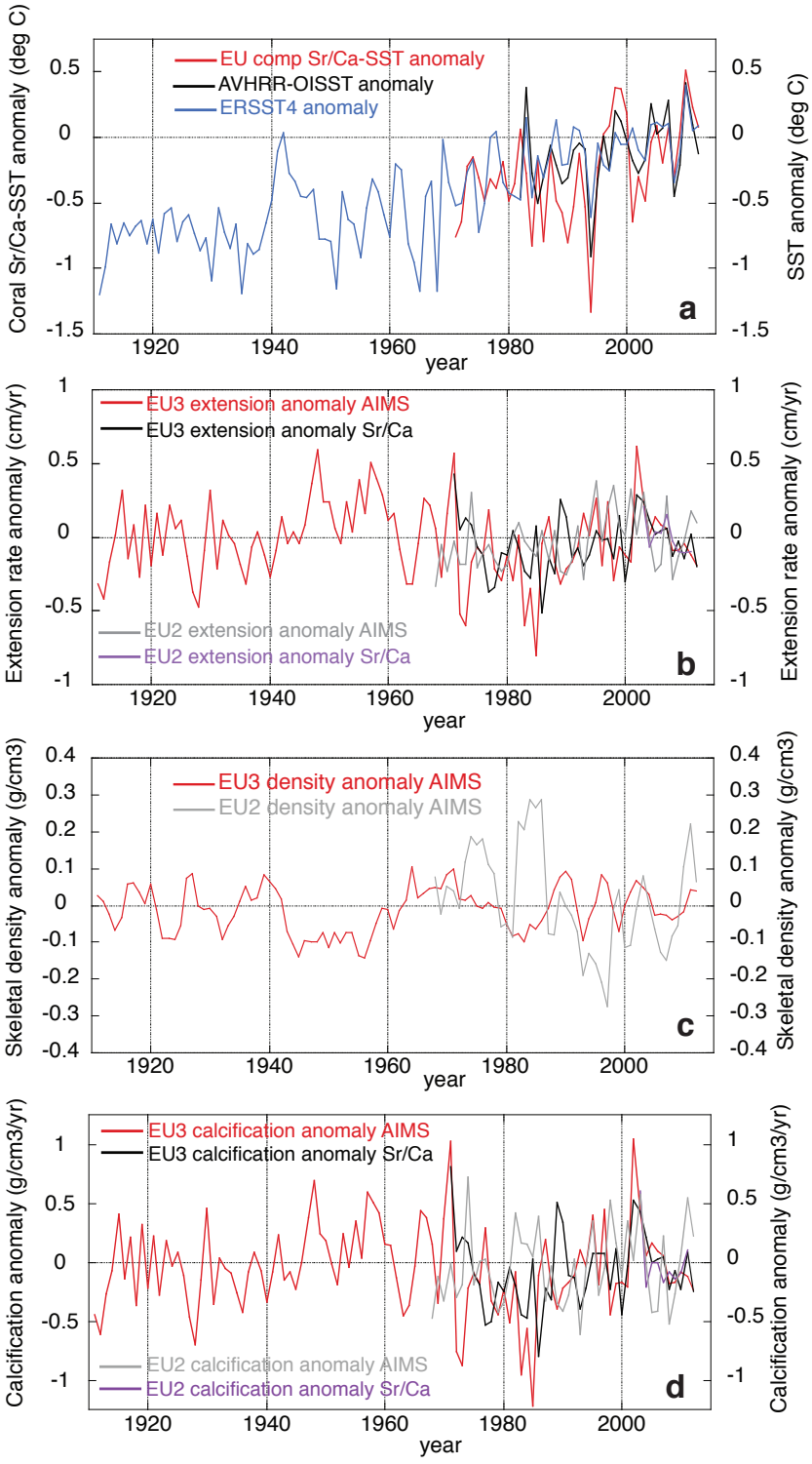

Figure S8 - Mean annual coral growth parameters of cores EU2 and EU3 compared to coral composite Sr/Ca-SST reconstruction, AVHRR-OISSTv2 and ERSSTv4. a) SST time series, b) linear extension rate, c) skeletal density and d) calcification rate.

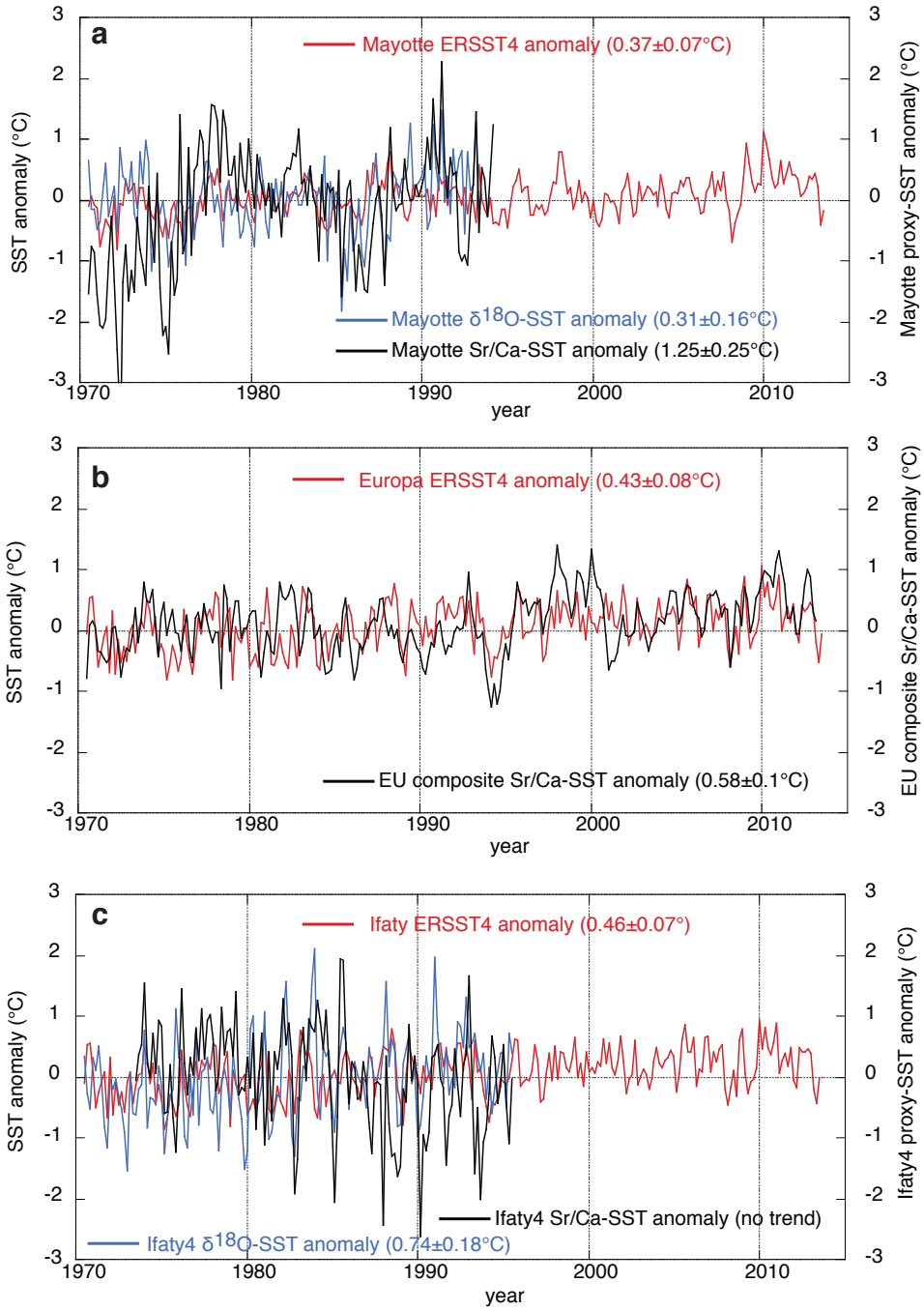

Figure S9 - Regional comparison of Mozambique Channel ERSSTv4 anomalies (red line) and coral proxy-derived SST anomalies (Sr/Ca= black line; $d^{18}O$= blue line) between 1970 and 2013 for a) Mayotte Island, Comoros b) Europa and c) Ifaty Reef, southwest Madagascar. Anomalies calculated relative to 1973-1993 period. Linear warming trends indicated in brackets for ERSSTv4 (1970-2013) and proxy-SST for individual record length. Proxy data taken from Zinke et al. (2004, 2008).

core	proxy	slope	Conf. interval	intercept	Conf. interval	r^2	r^2 adj.	SSE	RMSE	DF
EU2	Sr/Ca vs Li/Mg	0.964	0.079	-7.244	0.720	0.91	0.91	0.040	0.027	54
	Sr/Ca vs. Mg/Ca	-1.028	0.236	13.735	2.138	0.60	0.60	0.354	0.081	54
	Sr/Ca vs. Li/Ca	2.730	0.381	-18.155	3.452	0.82	0.82	0.924	0.130	54
	Li/Mg vs Mg/Ca	-1.089	0.217	6.040	0.322	0.67	0.66	0.299	0.074	54
	Li/Mg vs Li/Ca	2.803	0.324	2.393	0.480	0.87	0.87	0.665	0.111	54
	Li/Ca vs Mg/Ca	-1.341	0.530	12.481	2.356	0.34	0.32	3.429	0.252	54
EU3	Sr/Ca vs Li/Mg	1.350	0.047	-10.658	0.419	0.92	0.92	0.286	0.033	259
	Sr/Ca vs. Mg/Ca	-3.117	0.213	32.424	1.909	0.76	0.76	5.931	0.151	259
	Sr/Ca vs. Li/Ca	1.730	0.239	-9.053	2.136	0.41	0.41	7.429	0.169	259
	Li/Mg vs Mg/Ca	-2.355	0.125	7.891	0.176	0.84	0.84	4.027	0.124	259
	Li/Mg vs Li/Ca	1.233	0.172	4.668	0.242	0.40	0.40	7.564	0.171	259
	Li/Ca vs Mg/Ca	-0.259	0.085	7.588	0.392	0.03	0.03	12.25	0.217	259

Table S1 - Linear optimal least squares regression equations for core EU2 and EU3 trace element ratios. Conf. interval= 95% confidence interval of the regression slopes and intercepts; r^2 adj.= r^2 adjusted; SSE= Standard Error; RMSE= Root Mean Square Error; DF= degrees of freedom.