Supplement of Biogeosciences, 15, 1425–1445, 2018
https://doi.org/10.5194/bg-15-1425-2018-supplement

Biogeosciences
Open Access

Supplement of

Effect of temperature rise and ocean acidification on growth of calcifying tubeworm shells (*Spirorbis spirorbis*): an in situ benthocosm approach

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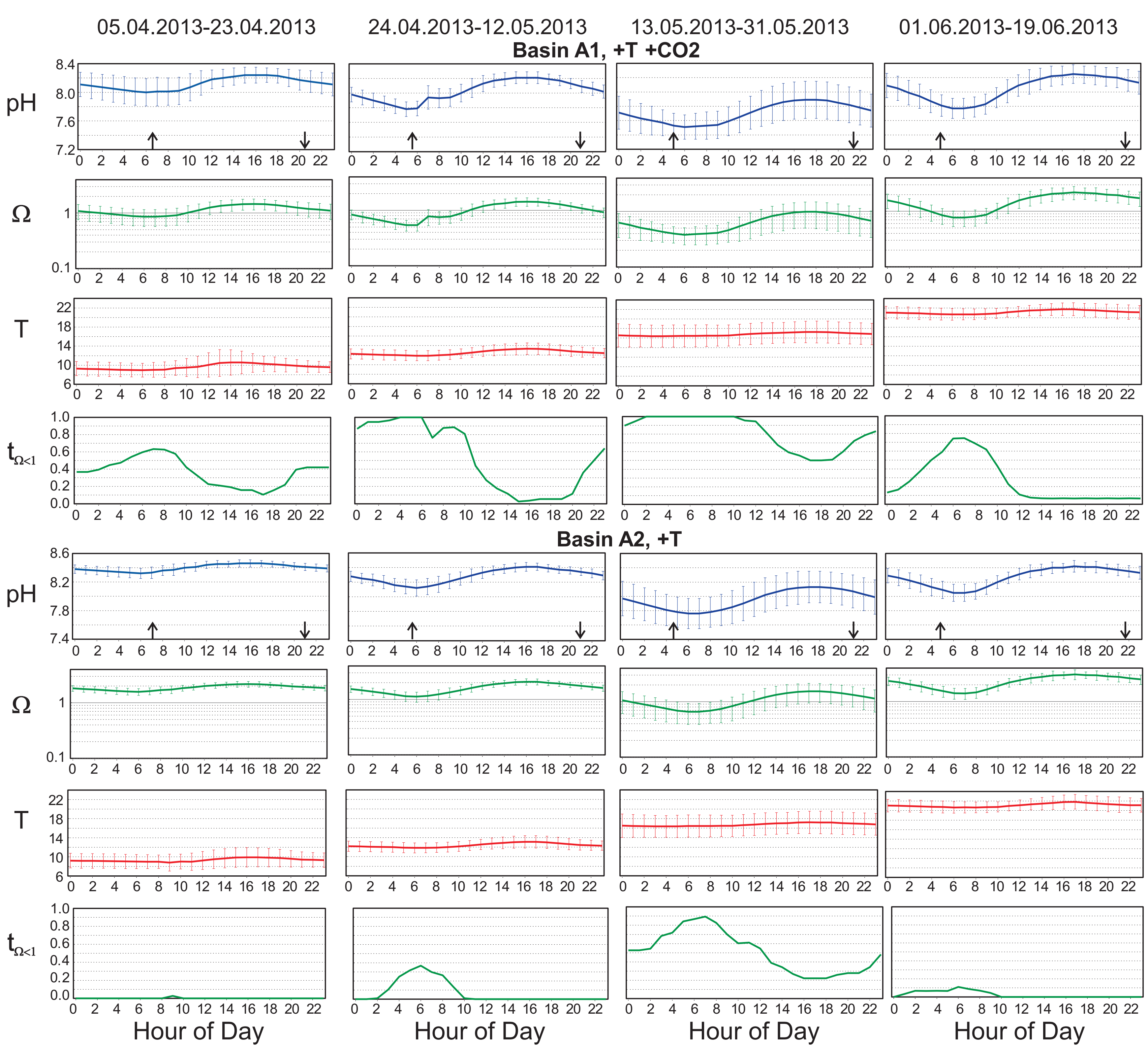


Figure S1: Examples of mean diurnal cycles of pH, saturation (Ω), temperature and percent of experimental time when basins were undersaturated with respect to aragonite and Mg-calcite ($t_{\Omega<1}$). Shown are basins A1 and A2 during 4 sub-periods of the spring experiment. Plotted values are averages of 24 one-hour bins (see Methods section). Error bars (±1 standard deviation) represent day-to-day variability for a given hour. Arrows in pH diagrams indicate approximate time of sunrise and sunset.

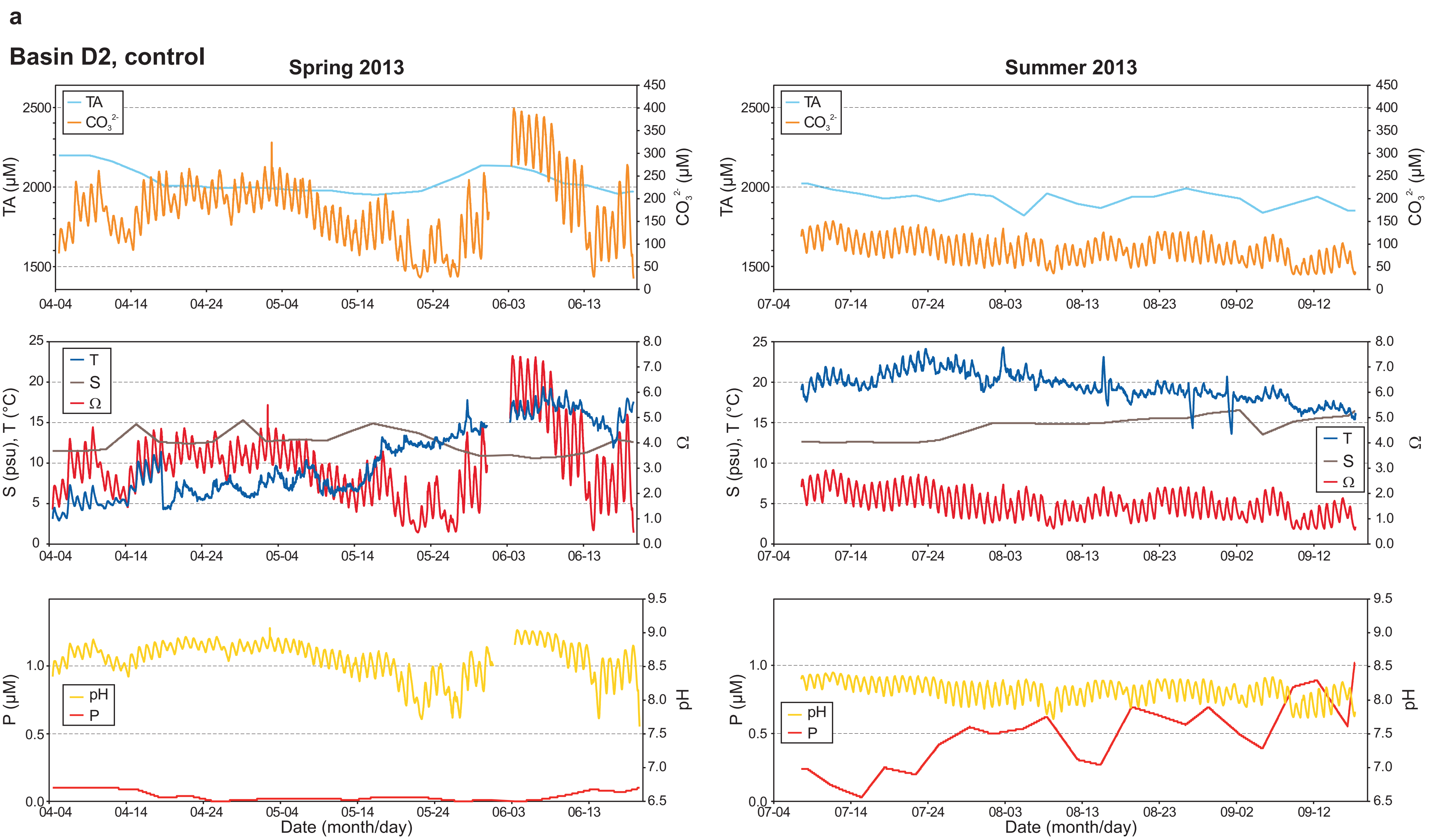
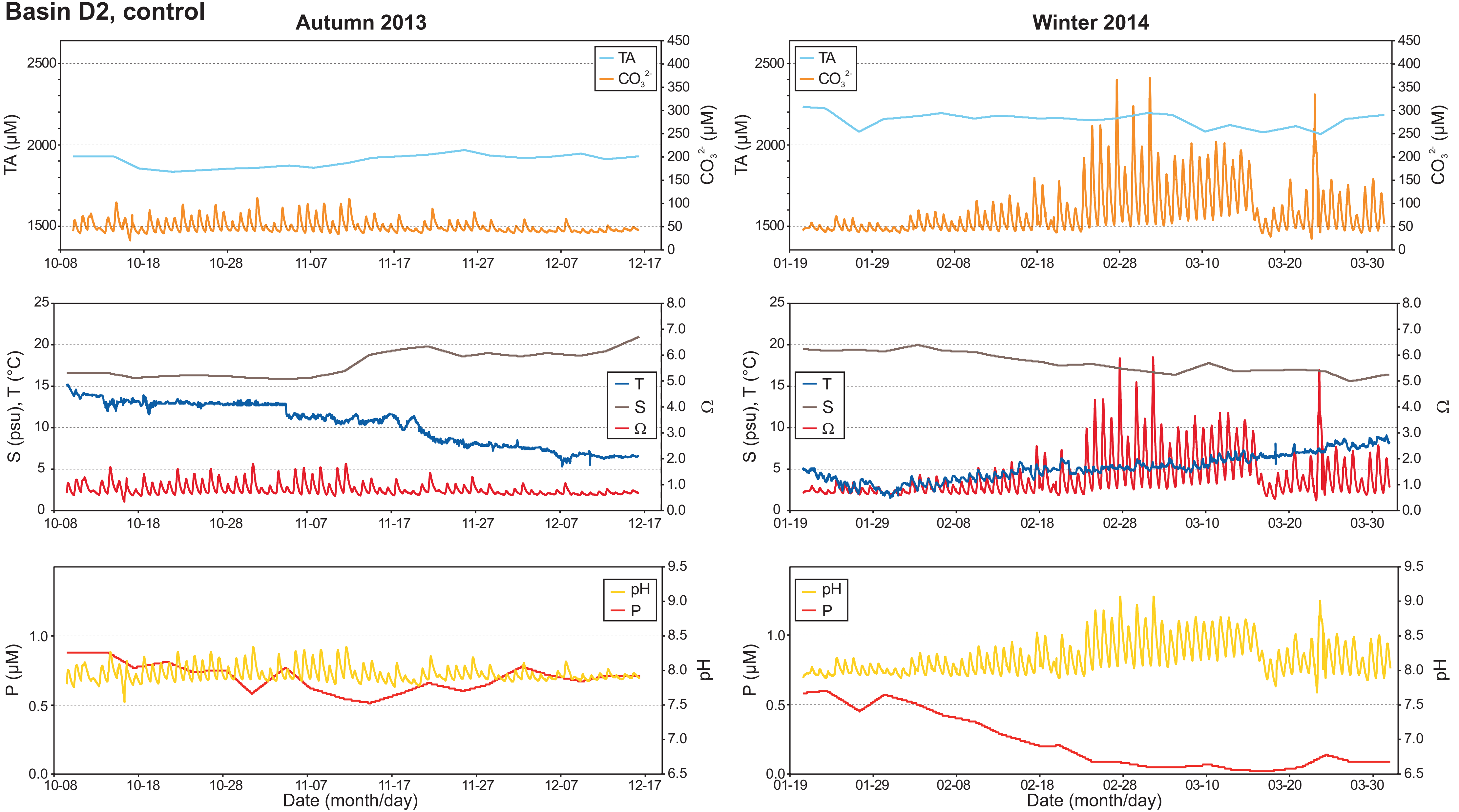


Figure S2: Example for records of the measured parameters. Total alkalinity (TA), salinity (S) and P concentration (P) were measured every three days. Temperature (T) and pH were measured every two hours. CO_3^{2-} concentration and saturation state with respect to Mg-calcite and aragonite (Ω) were calculated from the measured parameters. (a) spring and summer experiments, (b) autumn and winter experiments.

b

Basin D2, control



experiment	Spring					
basin	A1	B2	C1	D2	E1	F2
n	17	21	23	21	20	20
mean growth (mm)	1.04	2.13	1.64	1.94	1.80	2.29
weight/tube (mg)	0.12	0.62	0.36	0.78	0.43	0.88
weight/tube (mg/mm)	0.12	0.29	0.22	0.40	0.24	0.38
saturation (Ω)	1.05	1.93	1.78	3.06	1.68	3.22
experiment	**Summer**					
basin	B1	B2	D1	D2	F1	F2
n	6	20	3	20	10	20
mean growth (mm)	2.20	3.26	3.78	3.29	3.01	3.13
weight/tube (mg)	0.36	0.59	0.28	0.55	0.23	0.59
weight/tube (mg/mm)	0.16	0.18	0.07	0.17	0.08	0.19
saturation (Ω)	1.13	1.54	1.23	1.58	1.20	*1.56*[a]
experiment	**Autumn**					
basin	A1	B2	C1	D2	E1	F2
n	20	20	20	20	20	20
mean growth (mm)	4.07	3.97	4.27	3.79	4.81	5.37
weight/tube (mg)	1.18	1.41	1.59	1.52	1.23	2.05
weight/tube (mg/mm)	0.29	0.36	0.37	0.40	0.26	0.38
saturation (Ω)	0.58	0.69	0.64	0.83	*0.61*[a]	*0.76*[a]

Table S1: Sample weights and saturation.

Average weights of newly grown tube segments from spring, summer and autumn experiments. n: number of specimens measured in each basin. Mean growth: average length of newly grown tube segments of the weighed specimens from a basin. Weight/tube: Average weight per tube segment and average weight per millimeter of tube segment for a basin. Samples are from control and +CO_2+T treatments in spring and autumn. In the summer experiment control and +CO_2 treatments were used, because no material was recovered from the +CO_2+T treatment. Saturation values are basin averages from Table 1. a: no saturation data available for this basin, treatment average is shown.

	+T +CO_2	+T	+CO_2	control	+T +CO_2	+T	+CO_2	control	+T +CO_2	+T	+CO_2	control
Spring	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2	F1	F2
Count	19	3	41	176	110	8	51	143	40	61	45	127
Initial Diameter (mm)	2.34±0.30	2.13±0.12	2.64±0.40	2.50±0.47	2.65±0.43	2.63±0.38	2.34±0.42	2.23±0.43	2.35±0.46	2.20±0.47	2.62±0.42	2.63±0.35
Final Diameter (mm)	2.40±0.28	1.96±0.48	2.82±0.45	2.71±0.45	2.84±0.41	2.94±0.51	2.58±0.37	2.41±0.44	2.57±0.41	2.61±0.40	2.87±0.46	2.87±0.40
Growth (mm)	1.16±0.50	1.66±0.17	1.88±0.72	1.74±0.84	1.06±0.66	1.55±0.93	1.94±0.78	1.71±0.75	0.84±0.88	2.48±0.88	1.58±0.81	1.84±0.72
Summer	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2	F1	F2
Count	0	0	6	100	0	0	3	75	0	0	10	76
Initial Diameter (mm)	no data	no data	0.37±1.06	0.75±0.37	no data	no data	0.18±0.07	0.67±0.41	no data	no data	0.33±0.21	0.59±0.48
Final Diameter (mm)	no data	no data	1.54±0.58	1.73±0.24	no data	no data	1.46±0.12	1.61±0.21	no data	no data	1.27±0.67	1.67±0.28
Growth (mm)	no data	no data	2.45±1.66	3.47±0.95	no data	no data	3.88±0.44	3.13±0.82	no data	no data	2.95±0.56	3.40±1.16
Autumn-small	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2	F1	F2
Count	50	41	48	54	51	40	48	63	47	32	40	73
Initial Diameter (mm)	0.71±0.19	0.73±0.20	0.65±0.16	0.75±0.21	0.73±0.20	0.53±0.15	0.63±0.21	0.57±0.17	0.62±0.22	0.53±0.23	0.60±0.21	0.76±0.21
Final Diameter (mm)	2.29±0.30	2.35±0.23	2.10±0.23	2.09±0.26	2.36±0.25	2.20±0.23	2.08±0.26	1.96±0.26	2.19±0.31	2.12±0.24	2.27±0.26	2.20±0.36
Growth (mm)	5.29±0.91	5.30±0.74	4.55±0.50	4.55±0.83	5.24±0.86	5.63±0.80	4.49±0.57	4.45±0.79	4.90±0.73	5.16±0.70	5.15±0.52	4.90±0.90
Autumn-big	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2	F1	F2
Count	1	16	8	19	5	12	6	9	9	9	3	12
Initial Diameter (mm)	1.79	1.96±0.26	1.80±0.20	1.81±0.25	1.63±0.17	1.82±0.20	1.95±0.17	1.79±0.23	2.17±0.33	1.92±0.24	1.95±0.25	1.94±0.29
Final Diameter (mm)	2.54	2.75±0.12	2.82±0.25	2.66±0.23	2.72±0.33	2.71±0.20	2.90±0.28	2.66±0.21	2.96±0.31	2.80±0.23	2.96±0.29	3.11±0.45
Growth (mm)	3.05	3.48±0.95	4.16±0.46	3.43±0.74	4.11±1.28	3.72±0.64	4.10±0.52	3.58±0.70	3.90±1.06	3.83±0.77	4.39±0.83	4.78±1.04
Winter	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2	F1	F2
Count	101	39	100	103	31	78	67	76	73	89	95	140
Initial Diameter (mm)	1.85±0.43	2.46±0.46	1.95±0.38	2.27±0.48	2.46±0.55	1.96±0.56	2.12±0.45	1.91±0.60	2.15±0.53	2.34±0.58	2.12±0.58	1.85±0.59
Final Diameter (mm)	2.88±0.40	3.16±0.42	2.77±0.38	2.80±0.47	3.08±0.56	2.83±0.43	2.83±0.44	2.77±0.54	2.85±0.40	2.92±0.51	2.72±0.52	2.69±0.54
Growth (mm)	4.21±0.94	3.22±1.08	3.57±0.64	2.92±0.67	2.78±0.87	3.78±1.08	3.02±0.90	3.97±0.75	3.18±0.80	3.15±1.02	3.14±0.79	3.89±0.79

Table S2: Specimen counts and median values ± 1 standard deviation of measured size parameters of *S. spirobis*.