

1 **Supplementary data**

2 **Table S1.** Temporal dynamics of depth-integrated upper layer (0.3–10 m) phytoplankton: *Synechococcus*, picoeukaryotes I-III, nanoeukaryotes I-II,
 3 heterotrophic prokaryotes with high and low fluorescence signatures (HDNA HP, LDNA HP) and virus groups (V1-4) in the ambient water just outside the
 4 mesocosms.

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day	Syn (x 10 ⁴)	Pico I (x 10 ⁴)	Pico II (x 10 ³)	Pico III (x 10 ³)	Nano I (x 10 ²)	Nano II (x 10 ²)	HDNA	LDNA	V1 (x 10 ⁷)	V2 (x 10 ⁷)	V3 (x 10 ⁶)	V4 (x 10 ⁵)
							HP (x 10 ⁶)	HP (x 10 ⁶)				
-2	6.40	1.57	1.30	2.54	0.82	1.40	0.94	0.95	2.51	0.86	0.88	0.72
-1	6.00	1.88	0.94	2.24	0.62	0.98	0.95	1.06	4.29	0.83	0.79	0.73
0	6.59	3.36	1.13	2.50	0.68	0.84			3.12	0.90	1.25	
1	7.89	6.56	1.16	2.11	1.01	0.45	1.30	1.96	3.11	1.04	1.65	1.67
2	11.00	5.45	2.12	5.69	2.42	0.76	1.41	1.80	4.77	1.42	2.63	3.24
3	11.53	6.49	2.14	4.53	2.69	1.31	1.49	1.35	3.65	1.20	2.06	2.27
4	13.42	7.77	2.15	5.40	2.03	0.78	1.64	1.62	3.15	0.87	1.14	2.48
5	13.01	7.26	2.16	5.15	4.27	1.97	1.74	1.64	4.68	1.45	3.28	3.67
6	13.49	6.48	1.94	4.50	3.39	2.22	1.50	1.71	4.15	1.02	2.15	2.53
7	12.93	5.86	1.97	3.67	2.96	1.29	1.62	1.78				2.52
8	12.24	6.27	1.83	3.37	5.09	1.58			3.97	0.90	1.89	2.47
9	9.00	4.50	2.14	2.58	8.97	2.56	1.81	1.35	3.48	0.93	1.74	2.35
10	6.87	3.96	2.14	1.79	13.95	2.52	1.54	1.17	3.73	0.86	1.71	2.09
11	5.15	2.02	2.89	1.28	7.24	5.29	1.60	1.00	3.24	0.84	1.42	1.58
12	3.45	2.06	2.65	0.78	7.78	3.14	1.55	0.75	3.28	0.81	1.27	2.16
13	2.95	2.68	2.65	0.73	11.43	2.61	1.62	0.78	3.37	0.95	1.39	2.47
14	3.58	2.77	2.84	0.94	18.57	1.44	1.62	0.83	3.38	1.00	1.67	3.90

15	6.19	2.39	3.86	1.78	23.93	2.77	1.81	1.16	4.21	1.33	3.09	4.02
16	9.65	2.50	4.02	2.50	24.50	7.49	1.98	1.34	4.42	1.32	2.85	2.66
17	19.56	1.78	2.17	3.03	11.82	11.04	2.38	1.68	3.34	0.90	1.80	2.37
18	15.81	1.56	1.62	2.48	7.69	5.19	2.03	1.45	3.33	0.83	1.34	2.60
19	14.17	1.60	1.31	2.34	4.68	6.42	1.99	1.61	3.02	0.90	1.43	2.54
20	19.75	2.09	1.56	2.89	3.82	10.05	1.98	1.46	3.02	1.04	1.77	2.47
21	25.46	2.83	1.71	4.26	4.31	3.71	1.81	1.73	2.79	0.86	1.44	2.16
22	16.92	1.63	1.13	2.79	2.38	4.82	1.76	1.48	3.03	0.85	1.33	2.71
23	23.92	3.02	1.63	5.76	4.17	4.06	2.03	1.69	3.73	0.92	1.82	3.10
24	24.10	2.53	2.99	6.69	8.02	5.25	1.79	1.39	3.67	0.97	1.78	2.93
25	15.92	1.72	2.16	4.68	5.56	1.91	1.71	1.30	3.57	0.89	1.54	2.81
26	7.65	1.06	1.30	2.84	2.83	1.93	1.25	1.15	3.31	0.88	1.33	2.97
27	7.87	1.54	1.36	3.82	2.20	1.91	1.48	1.24	3.42	0.91	1.30	2.98
28	5.26	1.03	1.35	3.03	2.30	1.74	1.54	1.25	3.65	1.05	1.84	2.68
29	4.55	0.98	1.25	2.17	2.52	2.26						
30	6.42	1.86	1.53	3.05	2.77	1.01	1.52	1.13	3.64	1.15	1.77	2.24
31	3.41	0.56	1.16	1.21	3.69	1.40	1.11	1.07	3.58	1.19	1.61	2.08
33	3.63	0.71	1.12	1.27	4.17	1.46	1.00	1.08	4.48	1.06	1.40	3.56
35	6.05	2.80	3.64	4.92	7.10	1.50	1.39	1.20	4.65	1.60	2.94	
37	7.46	3.27	3.84	8.45	8.70	1.83						5.60
39	13.64	3.96	3.33	6.21	6.24	1.62	1.90	1.53	5.45	1.89	3.97	5.02

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1 **Table S2.** Viral lysis rates of the phytoplankton groups detected by flow cytometry in M1 (control) and M3 (high CO₂), as determined by dilution assays. Lysis
2 rates are calculated as total loss rates (from 30KDa dilutions) minus grazing rates (from 0.45 μm dilutions). Significant lysis is marked: p≤0.001***, p≤0.01**,
3 p ≤0.05*, p ≤0.1. A zero means no lysis was detected, no data denotes a failed experiment.

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Day	Mesocosm 1						Mesocosm 3					
	Syn	Pico I	Pico II	Pico III	Nano I	Nano II	Syn	Pico I	Pico II	Pico III	Nano I	Nano II
1				-0.09			0	-0.09	-0.03	0		-0.1
3	0	-0.09				-0.61		-0.11 *			-0.21	
6		0	-0.35						-0.43 ***		-0.76 *	
10	0	-0.02	0	0	0	-0.01		-0.21 ***	-0.12		-0.13	-0.02
13	0		0	0	-0.23 *	-0.45		-0.14 *	-0.55 ***		-0.19	-0.34
17	0				0		-0.12	-0.15 ***	-0.01		-0.08	0
20									0		-0.34	-1.05 ***
24		-0.06		0		0		-0.02	0		-0.35	
31	-0.01	-0.11	-0.02		0		-0.07	-0.11 *	-0.24 ***		-0.27	

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1 **Fig. S1.** Temporal dynamics of depth-integrated upper layer (0.3–17 m) of **a)** *Synechococcus*, **b)**
2 picophytoplankton I, **c)** picophytoplankton II, **d)** picophytoplankton III, **e)** nanophytoplankton I and
3 **f)** nanophytoplankton II.

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5 **Fig. S2.** Temporal dynamics of depth-integrated upper layer (0.3–17 m) of **a)** Total heterotrophic
6 prokaryotes, **b)** High DNA heterotrophic prokaryotes (HDNA HP), **c)** Low DNA heterotrophic
7 prokaryotes (LDNA HP), **d)** Sum of virus groups V1-V3, **e)** Virus group V3 and **f)** Virus group V4.

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9 **Fig. S3.** POC calculated from mean cell abundances assuming cells to be spherical and to contain 0.2
10 $\text{pg C } \mu\text{m}^{-3}$ (Waterbury et al., 1986), error bars show one standard deviation. **a)** Temporal dynamics
11 of Pico III **b)** Temporal dynamics of POC for Nano I and II.

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Fig.S01

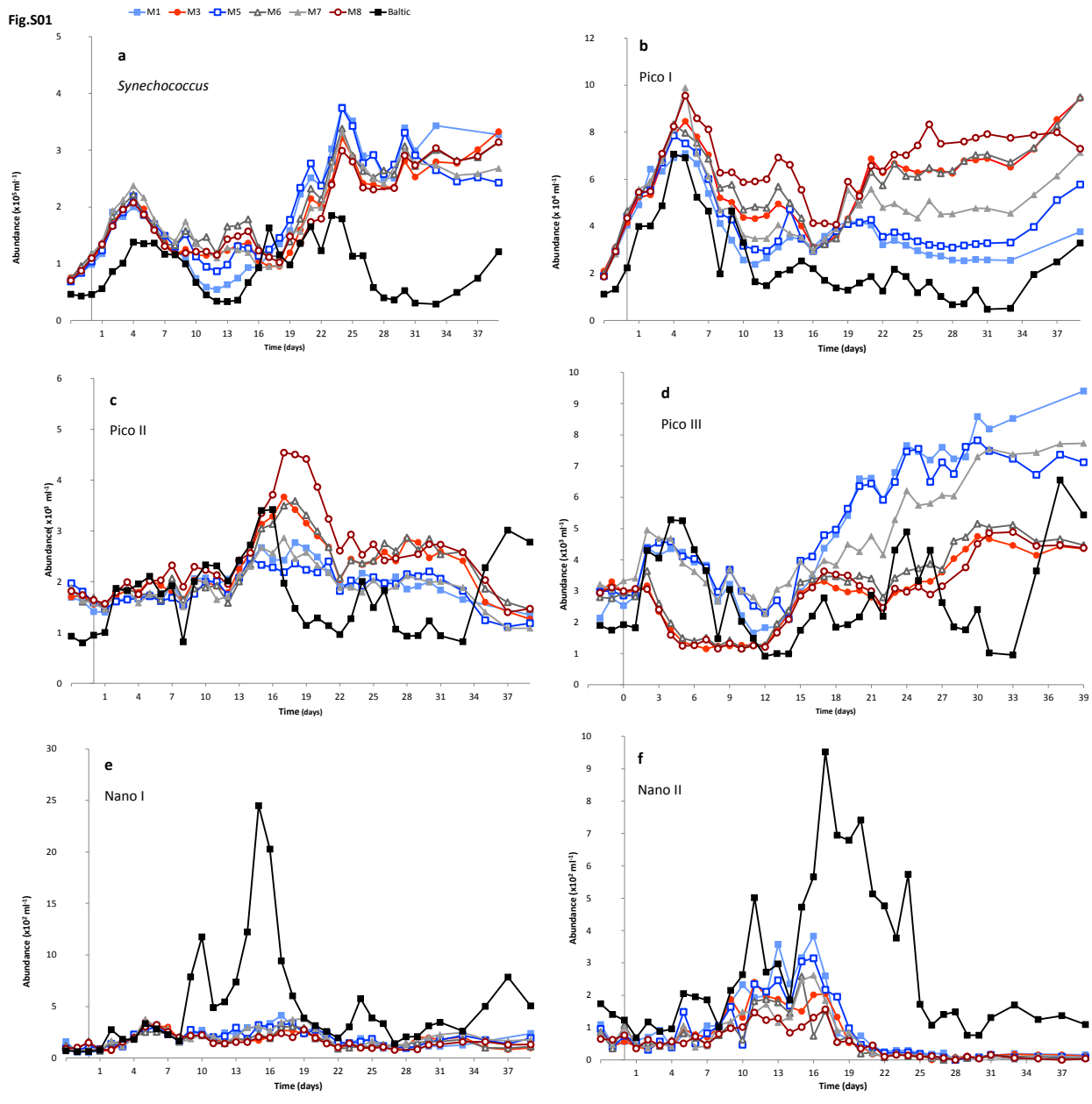


Fig.S02

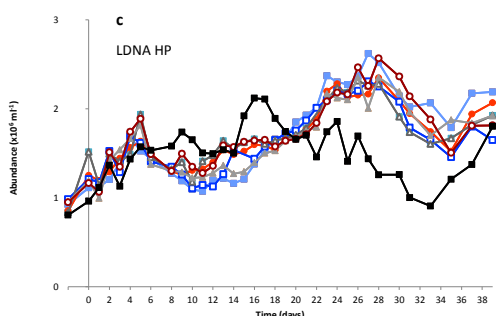
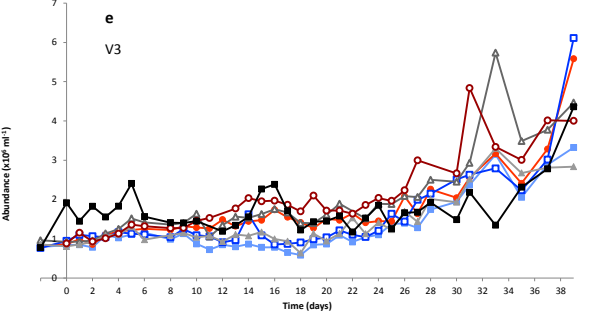
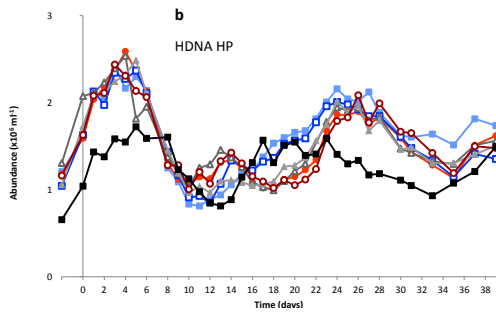
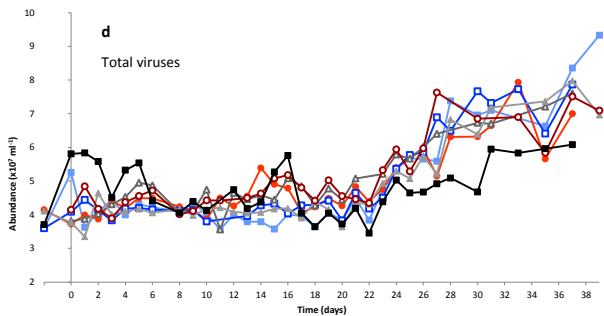
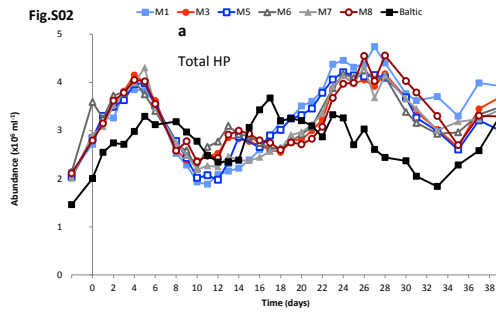


Fig.S03

