Influence of atmospheric deposition on biogeochemical cycles in an oligotrophic ocean system

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Supplementary information

Figures legends

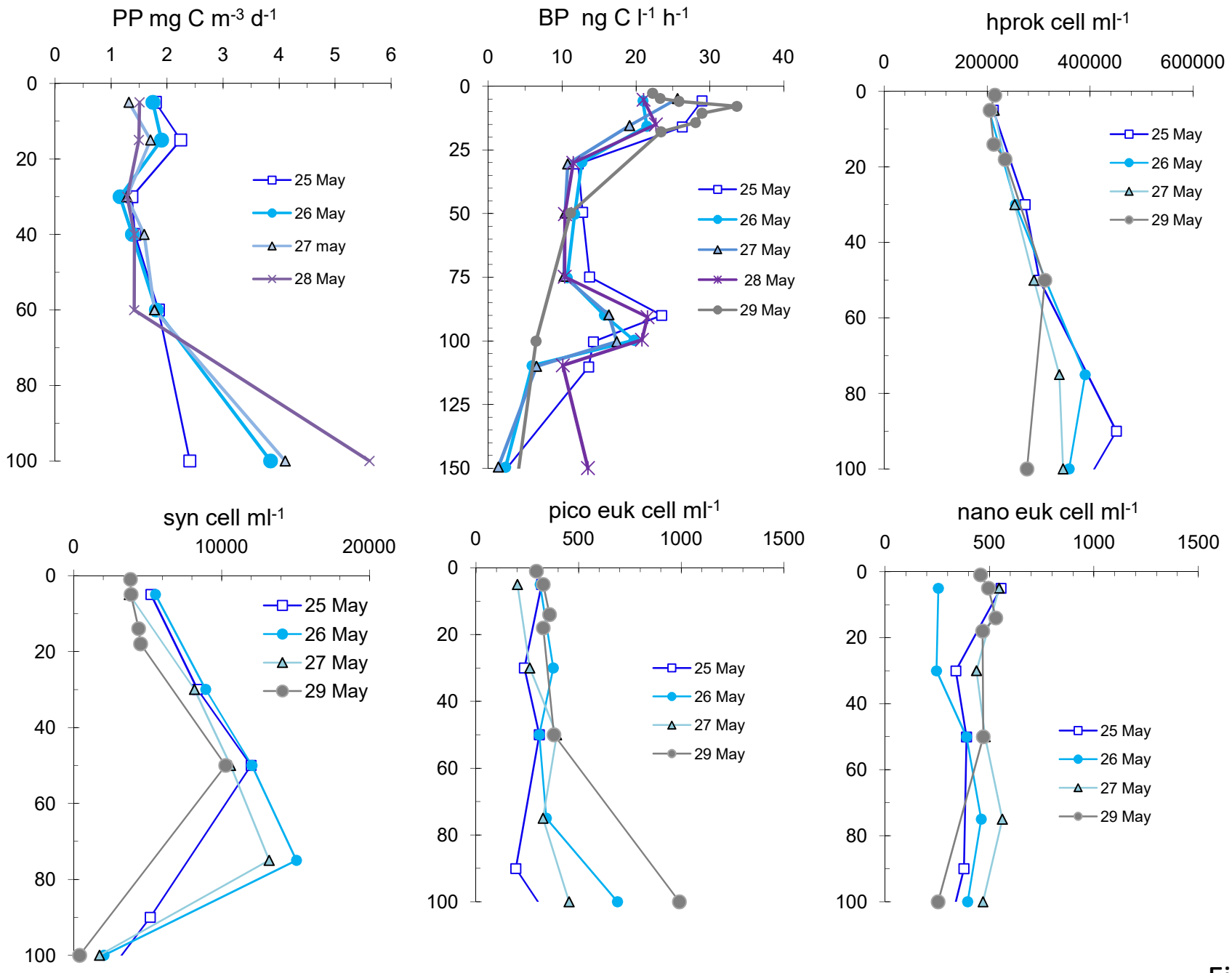
Figure S1: Vertical distribution of heterotrophic prokaryotic production (BP), particulate primary production (PP), and abundances of heterotrophic prokaryotes (hprok), *Synechococcus*-like cells (syn), eukaryotic picophytoplankton (pico euk) and nanophytoplankton (nano euk) at the ION site. Casts numbered the date of their sampling before (blue profiles) and after (grey profiles) the rain sampled onboard.

Figure S2: Vertical distribution of heterotrophic prokaryotic production (BP), particulate primary production (PP), and in vivo fluorescence profiles at FAST site. Stations numbered in days before (blue profiles) and after (grey profiles) the rain event.

Figure S3. Vertical distribution of abundances for heterotrophic prokaryotes (hprok), heterotrophic nanoflagellates (HNF), *Synechococcus*-like cells (syn), *Prochlorococcus* (proc), eukaryotic picophytoplankton (pico euk) and nanophytoplankton (nano euk) at FAST site. Stations numbered in days before (blue profiles) and after (grey profiles) the rain event sampled on board.

Table S1: NO3 ranges within the surface mixed layer (ML) and the base of the nitrate depleted layer below (NDLb) and advective fluxes when measurable. FAST stations are chronologically indexed in days before (negative index) and after (positive index) the occurrence of the rain event. na: not available because under LWCC detection limits. From comparison of concentrations, we identified four groups of stations: group 1: poor nitrates in ML and NDLb (< 50 nM); weak differences (< 15 nM); group 2: moderate nitrates in ML and NDLb (50 nM <NO3< 80 nM); weak differences (< 20 nM); group 3: high nitrate in ML and NDLb (NO3 > 80 nM); weak positive differences (< 20 nM) and group 4:high nitrate in ML and moderate to high in NDLb, large positive differences (> 20 nM). MLD: mixed layer depth. sd of fluxes were estimated using propagation of errors on $NO3_{ML}$, $NO3_{NDLb}$ and dMLD/dt.

				NO3 in ML			NO3 in NDLb			difference	Flux SML to NDLb µmol N m^{-2} d^{-1}		
	Date, local time	MLD m	base NDLb m	Mean nM	sd nM	n	Mean nM	sd nM	n	nM	Mean	sd	Station group
ST 1	12/05/2017 12:26	21	52	na			na				na		na
ST2	13/05/2017 07:40	21	60	na			na				na		na
ST3	14/05/2017 12:05	11	73	na			na				na		na
ST4	15/05/2017 07:09	15	55	na			na				na		na
ST5	16/05/2017 04:04	9	66	29	na	1	17	8	2	13	na		1
ST TYR 17 May	17/05/2017 09:36	9	69	14	0	2	19	6	4	-5	na		1
ST6	22/05/2017 05:48	18	71	9	na	1	9	0	2	0	na		1
ST7	23/05/2017 21:11	18	79	9	na	1	9	0	2	0	na		1
ST ION 25 May	25/05/2017 05:28	14	86	14	5	2	14	6	6	0	na		1
ST ION 27 May	27/05/2017 08:24	18	93	127	31	6	103	12	2	24	45	52	4
ST ION 29 May	29/05/2017 09:19	16	88	92	17	6	67	na	1	25	-25	21	4
ST8	30/05/2017 04:48	14	79	60	na	1	68	12	3	-8	na		2
ST9	01/06/2017 21:15	7	72	117	na	1	106	15	2	11	na		3
ST FAST -2.3	02/06/2017 19:16	9	80	79	4	3	74	15	3	6	0	0	2
ST FAST -1.5	03/06/2017 15:30	13	78	59	3	2	46	5	5	13	62	34	2
ST FAST -0.25	04/06/2017 20:57	12	77	56	4	3	54	14	3	2	-2	9	2
ST FAST +024	05/06/2017 08:54	16	77	93	15	5	51	7	3	42	337	173	4
ST FAST +0.53	05/06/2017 15:50	16	82	70	5	4	50	na	1	20	0	69	4
ST FAST +1.05	06/06/2017 04:23	19	85	39	3	4	45	9	2	-6	-34	46	1
ST FAST +2.11	07/06/2017 05:38	15	59	9	0	3	19	3	2	-10	38	15	1
ST10	08/06/2017 06:55	19	62	120	na	1	58	15	3	62	na		4
ST FAST +3.8	08/06/2017 22:09	17	73	135	7	3	116	22	3	20	22	28	4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0 20 40 60 80 100
25 May
26 May
27 may
28 May
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0 25 50 75 100 125 150
25 May
26 May
27 May
28 May
29 May
hprok cell ml-1
0 200000 400000 600000
0 20 40 60 80 100
25 May
26 May
27 May
29 May
syn cell ml-1
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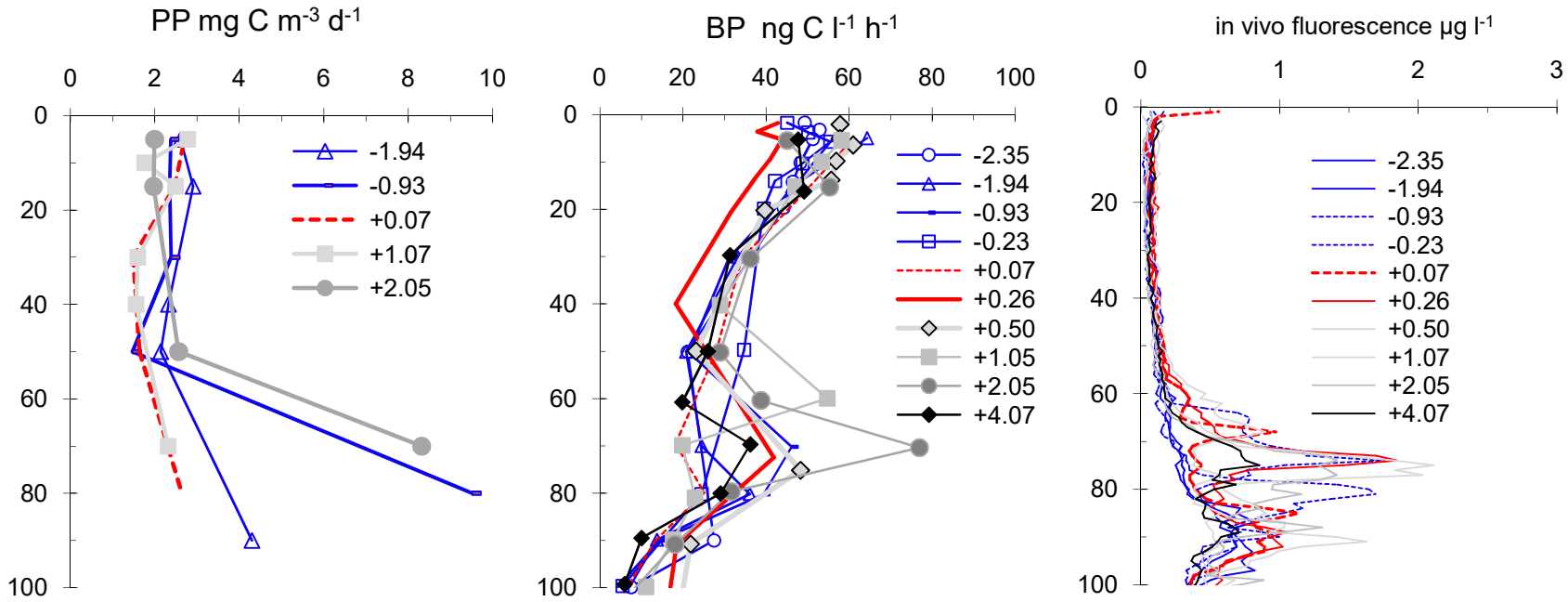
0 20 40 60 80 100
25 May
26 May
27 May
29 May
pico euk cell ml-1
0 500 1000 1500
0 20 40 60 80 100
25 May
26 May
27 May
29 May
nano euk cell ml-1
0 500 1000 1500
0 20 40 60 80 100
25 May
26 May
27 May
29 May

Fig. S1


PP mg C m-3 d-1
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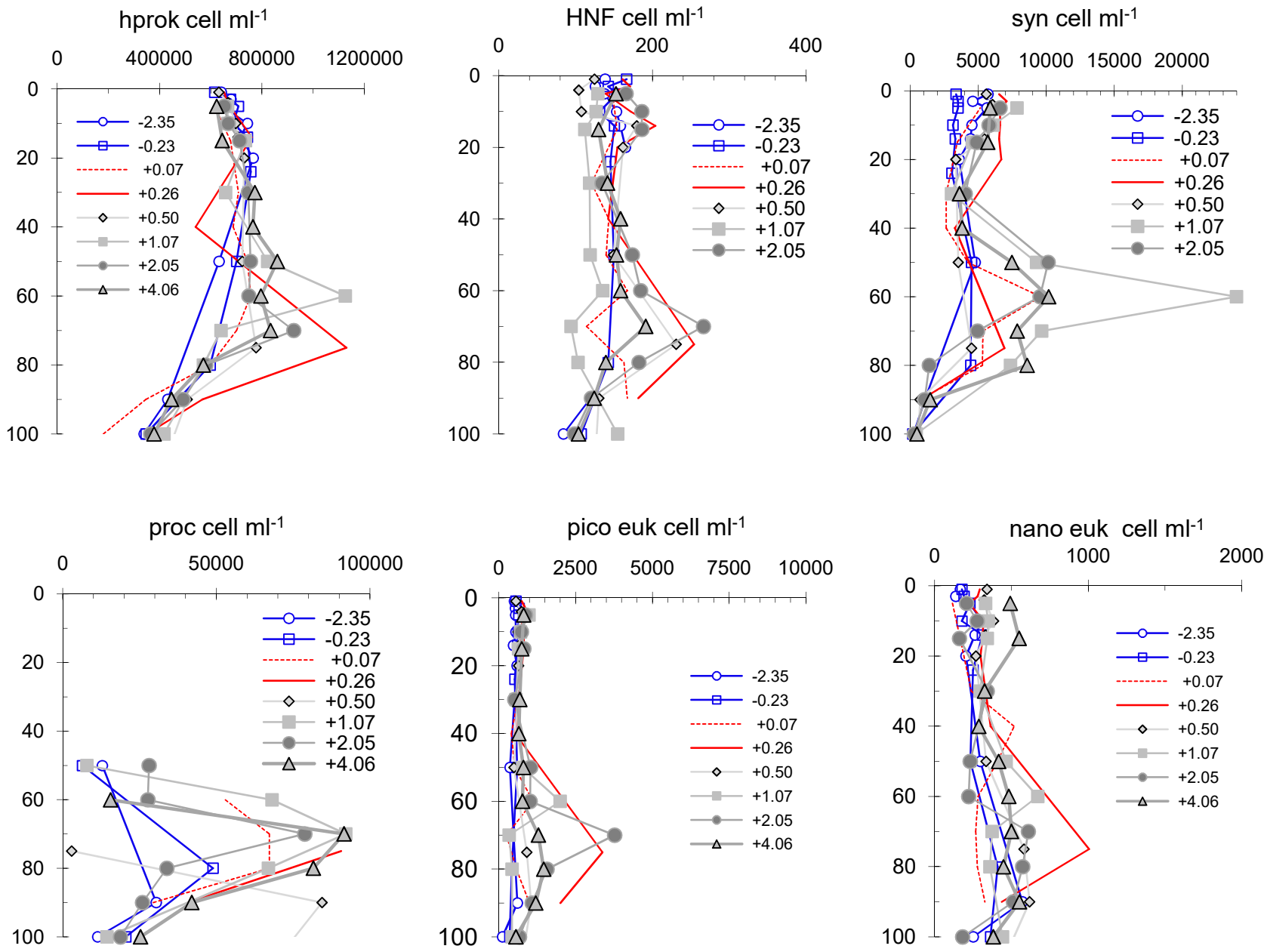
2
4
6
8
10
0
20
40
60
80
100
-1.94
-0.93
+0.07
+1.07
+2.05
BP ng C l-1 h-1
0
20
40
60
80
100
0
20
40
60
80
100
-2.35
-1.94
-0.93
-0.23
+0.07
+0.26
+0.50
+1.05
+2.05
+4.07
in vivo fluorescence µg l-1
0
1
2
3
0
20
40
60
80
100
-2.35
-1.94
-0.93
-0.23
+0.07
+0.26
+0.50
+1.07
+2.05
+4.07

Fig. S2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1200000
HNF cell ml-1
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400
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10000
15000
20000
proc cell ml-1
0
50000
100000
pico euk cell ml-1
0
2500
5000
7500
10000
nano euk cell ml-1
0
1000
2000
0
20
40
60
80
100
-2.35
-0.23
+0.07
+0.26
+0.50
+1.07
+2.05
+4.06

Fig. S3