

Table S1: Overview of the samples analyzed with microscopy, (*) samples located in the mixed layer (see Table 1).

Station	Microscopic counts Sampling depths (m)
R-2	20*; 60*; 80*; 100*; 125; 150; 200; 250; 300
A3-1	20*; 40*; 60*; 100*; 150*; 300
A3-2	10*; 20*; 40*; 80*; 125*; 150*; 160*; 175; 200; 275; 300
F-L	10*; 20*; 35*; 60; 65; 80; 100; 160; 180; 200; 250; 300
E-1	20*; 81*; 100*; 124; 150; 180; 250; 300
E-3	20*; 40*; 70; 125; 150; 180; 300
E-5	20*; 40*; 80; 100; 125; 150; 200; 250; 300

Table S2: List of the thirteen pigments associated to their phytoplankton taxonomic groups and their associated size groups.

Pigments	Phytoplankton taxa	Corresponding phytoplankton size-groups
Chlorophyll b	Chlorophyceae	Pico-nanoplankton
Lutein	Chlorophyceae	Pico-nanoplankton
Neoxanthin	Chlorophyceae	Pico-nanoplankton
Violaxanthin	Chlorophyceae/chrysophyceae	Pico-nanoplankton
Alloxanthin	Cryptophyceae	Pico-nanoplankton
Zeaxanthin	Cyanobacteria/ Synechococcus	Pico-nanoplankton
Diatoxanthin	Diatoms	Microplankton -
Fucoxanthin	Diatoms	Microplankton -
Diadinoxanthin	Dinoflagellates	Microplankton -
Peridinin	Dinoflagellates	Microplankton -
19'-Butanoyloxyfucoxanthin	Pelagophyceae	Pico-nanoplankton
Prasinoxanthin	Prasinophyceae	Pico-nanoplankton
19'-Hexanoyloxyfucoxanthin	Prymnesiophyceae	Pico-nanoplankton

Table S3: Mean integrated abundance and biomass of genuses and corresponding morphospecies identified by microscopy in the mixed layer (ML) of each station.

Genus	morphospecies	Mean integrated abundance (cell.L ⁻¹)							Mean integrated biomass (ngC.L ⁻¹)						
		R-2	A3-1	A3-2	F-L	E-1	E-3	E-5	R-2	A3-1	A3-2	F-L	E-1	E-3	E-5
Dinoflagellates															
<i>Amphidinium</i> spp.	8	57	22	211	235	38	49	44	36	19	192	47	9	11	8
<i>Ceratium pentagonum</i>	2	2	2	10	12	8	10	78	16	33	149	37	94	37	225
<i>Phalacroma</i> spp.	6	<1	<1	1	3	2	4	10	<1	1	2	1	1	1	3
<i>Gonyaulax</i> sp.	1	<1		3	3			12	2		11	3		11	32
<i>Gymnodinium</i> spp.	>10	69	103	898	490	184	257	529	94	141	1310	156	203	94	154
<i>Gyrodinium</i> spp.	3	73	29	457	352	30	88	142	490	217	3661	617	151	176	229
<i>Karlodinium</i> sp.	1		8							6			1		
<i>Noctiluca</i> sp.	1	<1		1				5	1		<1		2		1
<i>Oxytoxum</i> sp.	1														
<i>Podolampas</i> sp.	1	<1							1						
<i>Polykrikos</i> sp.	1		<1		7	<1		<1		<1		2			<1
<i>Prorocentrum</i> spp.	4				32							35			
<i>Protoperidinium depressum</i>	1	1	3	24	10	6	4	5	19	62	525	48	82	24	22
<i>Protoperidinium</i> spp.	10	32	66	422	458	136	138	251	122	304	2086	234	396	170	255
<i>Scrapsiella</i> sp.	1			7	29		7	3			3	3		1	
<i>Warnowia</i> sp.	1	14	4	11		3	2		17	6	18		<1	1	
Ciliates															
<u>Aloricates</u>															
<i>Frontonia</i> spp.	2	7	7	2		3		1	8	6	2		4		<1
<i>Laboea strobila</i>	1	8	<1	5	34		6	59	33	4	34	48	32	9	77
<i>Leegaardiella</i> spp.	2	4	7	16		28		6	42	37	89		28		7
<i>Lohmaniella</i> sp.	1	11	2	17	19	13	53	10	7	1	8	2	3	6	1
<i>Myrionecta</i> spp.	2	5	19	29	30	38	12	12	3	11	17	4	15	2	1
<i>Rimostrombidium</i> sp.	1	3	2	8		12	1	11	3	2	9		4	<1	2
<i>Strombidium</i> spp.	4	22	2	40		15	90	23	125	10	209		56	117	24
<i>Strombidium acutum</i>	1	<1	2	17	7	2	31	9	<1	<1	3			1	
<i>Strombidium elongatum</i>	1		2							1					
<i>Strombidium</i> spp.	2	17	2	85	36	35	115	72	145	13	507	48	87	173	87
<i>Strombidium sulcatum</i>	1	<1	<1	2	6	14	11		1	1	1	1	5	2	
<i>Tontonia</i> spp.	2	3	1	22		10	12	3	8	2	52		3	7	1
<i>Unidentified aloricates</i>	5		3					1		7					1
<u>Loricates</u>															
<i>Acanthostonella norvegica</i>	1	5		1	45	21	69	211	5		2	12	15	22	53
<i>Amphorides laackmanni</i>	1	1	<1				5	2	4	1				5	2
<i>Codonellopsis gaussi</i>	1														
<i>Codonellopsis pusilla</i>	1		4		27					4		6	<1		

<i>Codonellopsis soyai</i>	1	45		5	12	11	25	88	21		4	2	8	5	12
<i>Cymatocyli antarctica</i>	1		2							10					
<i>Cymatocyli calyciformis</i>	1		<1	<1		<1	<1	60		7	12		26	3	252
<i>Cymatocyli kerguelensis</i>	1	13		47	22	11	17	44	41		225	23	20	20	40
<i>Cymatocyli parvas</i>	1	6	8	32	14	8	5	7	17	30	127	12	22	5	6
<i>Laadenaniella naviculaefera</i>	1														
<i>Salpingella</i> sp.	1		1	4		9		6		5	21		6		7
<i>Tintinnid</i> sp.	1	18	7	1	13	33	1	3	4	2	<1	1	4	<1	<1

Table S4: List of higher taxonomic groups, number of OTUs and number of sequences recovered by tag pyrosequencing at each station.

Higher taxonomic affiliation	No. of OTUs	No. of sequences					
		R-2	A3-2	F-L	E-1	E-3	E-5
Dinoflagellates							
<i>Amphidinium</i> spp.	4	9	22	17	16	30	0
<i>Azadinium</i> sp.	1	7	1	2	8	7	0
<i>Blastodinium</i> spp.	2	0	0	4	2	16	0
<i>Brachidinium</i> sp.	1	0	0	0	1	1	0
<i>Dinoflagellates</i> spp.	6	155	12	99	129	77	1
<i>Gymnodinium</i> spp.	12	174	42	85	195	231	3
<i>Gyrodinium</i> spp.	9	291	1005	266	134	307	1341
<i>Herdmania</i> sp.	1	0	1	32	1	6	0
<i>Heterocapsa</i> spp.	2	2	0	0	0	0	0
<i>Karlodinium</i> spp.	9	38	31	83	58	195	2
<i>Lessardia</i> sp.	1	0	5	5	2	22	0
<i>Pentapharsodinium</i> spp.	6	6	30	19	21	52	0
<i>Peridinium</i> sp.	1	0	4	8	9	11	0
<i>Pfiesteriaceae</i> sp.	1	1	0	0	1	1	0
<i>Phalacrocoma</i> sp.	1	0	0	1	0	0	0
<i>Prorocentrum</i> spp.	5	4	4	13	7	7	1
<i>Protoperidinium</i> sp.	1	0	0	19	0	3	0
<i>Stoeckeria</i> sp.	1	0	0	3	1	2	0
<i>Symbiodinium</i> sp.	1	0	0	0	0	1	4
<i>Takayama</i> sp.	1	1	0	0	0	0	0
<i>Warnowia</i> spp.	6	114	23	77	93	248	5
<i>Woloszynskia</i> sp.	1	0	0	0	0	1	0
Ciliates							
<u>Aloricate</u>							
<i>Colpodea</i> sp.	1	0	0	2	2	2	1
<i>Cyclotrichia</i> sp.	1	2	0	0	0	0	0
<i>Scuticociliatia</i> sp.	1	0	0	0	1	4	0
<i>Cryptocaryon</i> sp.	1	0	0	1	0	1	0
<i>Choreotrichia</i> spp.	6	9	4	5	3	5	0
<i>Strobilidiidae</i> spp.	2	45	1	4	6	8	0
<i>Laboea</i> sp.	1	9	1	0	12	8	1
<i>Strombidiidae</i> spp.	6	95	12	54	75	42	0
<u>Loricata</u>							
<i>Salpingella</i> spp.	2	0	0	0	1	0	0
<i>Cymatocylis calyciformis</i> spp.	1	16	1	4	8	0	0
MALV		176	19	70	108	70	2
MALV-1	28	369	237	192	226	178	307
MALV-2	68	129	89	84	160	118	61
MALV-3	8	32	12	11	20	18	0
MALV-5	2	0	3	3	0	0	0