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Supplement of

Flux variations and vertical distributions of microzooplankton (Radiolaria) in the western Arctic Ocean: environmental indices in a warming Arctic

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Table S1
Radiolarian counts of living and dead specimens (45µm-1 mm) in plankton tows at Station 32

Sample depth unterval (m)		0-100	100-250	250-500	500-1000	0-100	100-250	250-500	1000-500-
		Live	Live	Live	Live	Dead	Dead	Dead	Dead
Order	Spumellaria								
Family	Actinommidae								
	<i>Actinomma boreale</i>	0	8	1	0	0	2	8	40
	<i>Actinomma leptodermum leptodermum</i>	1	27	18	20	1	1	3	19
	<i>Actinomma</i> morphogroup A	0	0	0	0	0	0	0	3
	<i>Actinomma leptodermum longispina</i>	0	0	0	0	0	0	0	2
	<i>Actinomma leptodermum longispinum</i> juvenile	0	0	0	0	0	0	0	1
	<i>Actinommidae</i> spp. juvenile forms	8	49	13	12	2	15	9	30
	<i>Actinomma turidae</i>	0	0	0	0	0	0	0	0
	<i>Actinomma</i> morphogroup B	0	0	0	1	0	0	0	1
	<i>Actinomma</i> morphogroup B juvenile	0	2	0	0	0	0	0	0
	<i>Arachnosphaera dichotoma</i>	0	0	0	0	0	1	0	0
Family	Spongodiscidae								
	<i>Spongotrochus glacialis</i>	2	14	8	2	0	0	1	0
	<i>Stylodictya</i> sp.	0	0	0	3	0	0	0	5
	Spumellarida indet.	1	3	0	2	0	0	0	9
Order	Entactinaria								
	<i>Cleveiplegma boreale</i>	0	0	0	0	0	0	0	1
	<i>Joergensenium</i> sp. A	0	139	17	4	0	18	50	21
	<i>Joergensenium</i> sp. B	0	0	0	0	0	0	0	0
Order	Nassellaria								
Family	Sethophormididae								
	<i>Enneaphormis rotula/enneastrum</i>	0	0	0	2	0	2	0	2
	<i>Protoscenium simplex</i>	0	1	1	1	0	3	0	2
Family	Plagiacanthidae								
	<i>Ceratocyrtis histicosus</i>	0	1	17	1	0	0	6	2
	<i>Ceratocyrtis galeus</i>	0	0	0	6	0	0	1	0
	<i>Cladoscenium tricolpium?</i>	0	0	0	0	0	0	0	0
	<i>Lophophaena clevei</i>	0	4	1	4	0	3	2	2
	<i>Phormacantha hystrix</i>	0	3	0	0	0	1	2	1
	<i>Plectacantha oikiskos</i>	0	0	0	0	0	0	0	1
	<i>Pseudodictyophimus gracilipes clevei</i>	2	83	30	23	0	18	15	32
	<i>Pseudodictyophimus gracilipes gracilipes</i>	0	3	8	20	0	2	5	26
	<i>Pseudodictyophimus</i> spp. juvenile forms	0	0	1	5	0	0	1	0
	<i>Pseudodictyophimus gracilipes bicornis</i>	0	0	0	8	0	0	4	18
	<i>Pseudodictyophimus gracilipes multispinus</i>	0	1	0	0	0	1	0	0
	<i>Pseudodictyophimus plathycephalus</i>	0	1	2	17	0	0	3	14
	<i>Tetraplecta pinigera</i>	0	0	0	0	0	0	0	1
	<i>Tripodiscium gephyristes</i>	0	2	0	3	0	7	3	9
	Plagiacanthidae gen. et sp. in det.	0	2	16	73	0	0	2	4
Family	Eucyrtidiidae								
	<i>Artostrobus annulatus</i>	0	0	2	21	0	1	0	3
	<i>Artostrobus joergenseni</i>	0	0	1	3	0	0	0	0
	<i>Cycladophora davisiana</i>	0	0	12	94	0	0	0	2
	<i>Lithocampe platycephala/furcaspiculata</i>	0	0	0	0	0	1	0	1
	<i>Sethoconus tabulatus</i>	0	7	11	0	0	0	2	5
Family	Cannobotryidae								
	<i>Amphimelissa setosa</i>	885	229	17	91	215	578	210	259
	<i>Amphimelissa setosa</i> juvenile	357	69	4	22	163	136	56	124
	Nassellarida indet.	1	5	6	17	0	0	8	21
	Phaeodaria								
	<i>Lirella melo</i>	0	1	14	7	0	0	1	3
	<i>Protocystis harstoni</i>	0	0	15	0	0	0	5	1
	Total Radiolaria	1257	654	215	462	381	790	397	665

Table S2
Radiolarian counts of living and dead specimens (45µm-1 mm) in plankton tows at Station 56

Sample depth interval (m)		0-100	250	100-250	500	250-1000	500-1000	0-100	250	100-250	500	250-1000	500-1000
		Live	Live	Live	Live	Live	Live	Dead	Dead	Dead	Dead	Dead	Dead
Order	Spumellaria												
Family	Actinommidae												
	<i>Actinomma boreale</i>	1	18	9	0	1	3	38	153				
	<i>Actinomma leptodermum leptodermum</i>	158	102	61	11	44	1	18	60				
	<i>Actinomma</i> morphogroup A	0	0	0	0	0	0	0	1				
	<i>Actinomma leptodermum longispina</i>	0	0	2	0	0	0	1	0				
	<i>Actinomma leptodermum longispinum</i> juvenile	0	0	0	0	0	0	0	0				
	<i>Actinommidae</i> spp. juvenile forms	1106	448	82	74	14	26	80	156				
	<i>Actinomma turidae</i>	0	0	1	8	0	0	1	0				
	<i>Actinomma</i> morphogroup B	0	1	0	0	0	0	1	0				
	<i>Actinomma</i> morphogroup B juvenile	0	19	3	0	0	0	1	0				
	<i>Arachnosphaera dichotoma</i>	0	0	6	3	0	0	3	3				
Family	Spongodiscidae												
	<i>Spongotrochus glacialis</i>	28	32	9	5	0	0	0	0				
	<i>Stylodictya</i> sp.	0	0	1	0	0	0	0	0				
	Spumellarida indet.	1	10	3	5	0	2	4	4				
Order	Entactinaria												
	<i>Cleveiplegma boreale</i>	0	1	2	0	0	0	1	0				
	<i>Joergensenium</i> sp. A	0	337	67	2	4	23	385	215				
	<i>Joergensenium</i> sp. B	0	0	0	0	0	0	0	1				
Order	Nassellaria												
Family	Sethophormididae												
	<i>Enneaphormis rotula/enneastrum</i>	0	2	14	4	0	1	10	5				
	<i>Protoscenium simplex</i>	0	14	8	0	0	18	19	15				
Family	Plagiacanthidae												
	<i>Ceratocyrtis histricosus</i>	0	4	39	0	0	0	10	4				
	<i>Ceratocyrtis galeus</i>	0	0	28	0	0	0	3	8				
	<i>Cladoscenium tricolpium?</i>	0	0	2	1	0	0	2	2				
	<i>Lophophaena clevei</i>	0	33	23	16	1	1	13	24				
	<i>Phormacantha hystrix</i>	8	24	0	1	4	5	8	11				
	<i>Plectacantha oikiskos</i>	1	0	3	0	0	0	3	1				
	<i>Pseudodictyophimus gracilipes clevei</i>	45	276	124	78	2	64	162	114				
	<i>Pseudodictyophimus gracilipes gracilipes</i>	5	9	26	32	0	1	25	54				
	<i>Pseudodictyophimus</i> spp. juvenile forms	2	9	18	20	0	0	9	11				
	<i>Pseudodictyophimus gracilipes bicornis</i>	0	0	8	13	0	0	12	27				
	<i>Pseudodictyophimus gracilipes multispinus</i>	0	2	0	0	0	2	3	0				
	<i>Pseudodictyophimus plathycephalus</i>	0	7	25	70	0	0	35	40				
	<i>Tetraplecta pinigera</i>	0	0	0	0	0	0	1	1				
	<i>Tripodiscium gephyristes</i>	0	10	60	5	0	2	31	24				
	Plagiacanthidae gen. et sp. in det.	0	0	184	212	0	0	13	39				
Family	Eucyrtidiidae												
	<i>Artostrobus annulatus</i>	0	0	3	41	0	0	1	22				
	<i>Artostrobus joergenseni</i>	0	1	17	1	0	0	1	0				
	<i>Cycladophora davisiana</i>	1	7	112	285	1	1	11	24				
	<i>Lithocampe platycephala/furcaspiculata</i>	0	1	2	0	0	0	0	1				
	<i>Sethoconus tabulatus</i>	0	13	11	0	1	1	54	11				
Family	Cannobotryidae												
	<i>Amphimelissa setosa</i>	454	1558	11	10	2415	5026	4085	1883				
	<i>Amphimelissa setosa</i> juvenile	138	183	4	3	181	526	521	417				
	Nassellarida indet.	19	30	98	44	3	8	48	45				
	Phaeodaria												
	<i>Lirella melo</i>	1	3	57	90	0	0	4	2				
	<i>Protocystis harstoni</i>	0	2	2	0	0	0	10	3				
	Total Radiolaria	1968	3156	1125	1034	2671	5711	5627	3381				

Table S5
 Summary information of previous sediment trap studies in the North Pacific Ocean

Station	Latitude	Longitude	Area	Water Depth (m)	Mooring depth (m)	Sampled Duration	Mean of total radiolaria flux (specimens m ⁻² day ⁻¹)	Reference
M4	53°01'N	145°30'E	Okhotsk Sea	1756	300 (upper)	7 Aug. 1998 - 7 June. 2000	383	Okazaki et al. (2003)
					1550 (lower)		2448	
M6	49°30'N	146°28'E	Okhotsk Sea	804	300 (upper)	7 Aug. 1998 - 7 June. 2000	418	Okazaki et al. (2003)
					700 (lower)		798	
AB	53.5°N	177°W	Bering Sea	3788	3200	7 Aug. 1990 - 3 Aug. 2000	8216	Ikenoue et al. (2012) a
						15 Aug. 2002 - 6 July. 2005		
SA	49°N	174°W	Cetral North Pacific	5406	4800	9 Aug. 1990 - 6 July. 2005	6336	Ikenoue et al. (2012) a
50N	50°01'N	165°02'E	North western North Pacific	5570	3260	1 Dec. 1997 - 18 May 2000	4340	Okazaki et al. (2005)
K2	47°N	160°E	North western North Pacific	5280	4810	20 Mar. 2005 - 20 May. 2006	2462	Ikenoue et al. (2010)
KNOT	43°58'N	155°03'E	North western North Pacific	5370	2957	1 Dec. 1997 - 14 May 2000	5833	Okazaki et al. (2005)
40N	40°00'N	165°00'E	North western North Pacific	5483	2986	1 Dec. 1997 - 30 Jan. 2000	10002	Okazaki et al. (2005)

Table S6

Polycystine radiolarian species by family in the Arctic Ocean modified after Bjørklund and Kruglikova, 2003

	Northwind Abyssal Plain (This study)	South western Canada Basin (This study)	Norwegian Sea	Fram Strait	Nan-Amu- Mak Basins	Canada Basin	Barents Sea	Kara Sea	Laptev Sea	Chukchi Sea
Class Polycystina										
Order Spumellaria										
Family Actinommididae	9	7	16	3	5	4	2	1	3	2
Family Litheliidae	1	0	4	4	1	0	1	1	1	1
Family Pyloniidae	0	0	1	1	1	0	1	1	0	0
Family Strebloniidae	0	0	1	1	1	0	1	1	0	0
Family Spongodiscidae	2	2	3	2	1	1	2	2	0	2
Order Entactinaria	3	3	2	1	0	0	0	0	0	?
Order Nassellaria										
Family Sethophormididae	3	2	2	1	1	2	0	0	0	3
Family Plagiacanthidae	17	14	19	14	7	5	11	2	5	19
Family Eucyrtidiidae	8	5	14	13	5	5	1	2	4	12
Family Cannobotryidae	1	1	2	2	2	1	1	1	1	1
Total number of species	44	34	64	42	24	18	20	11	14	40

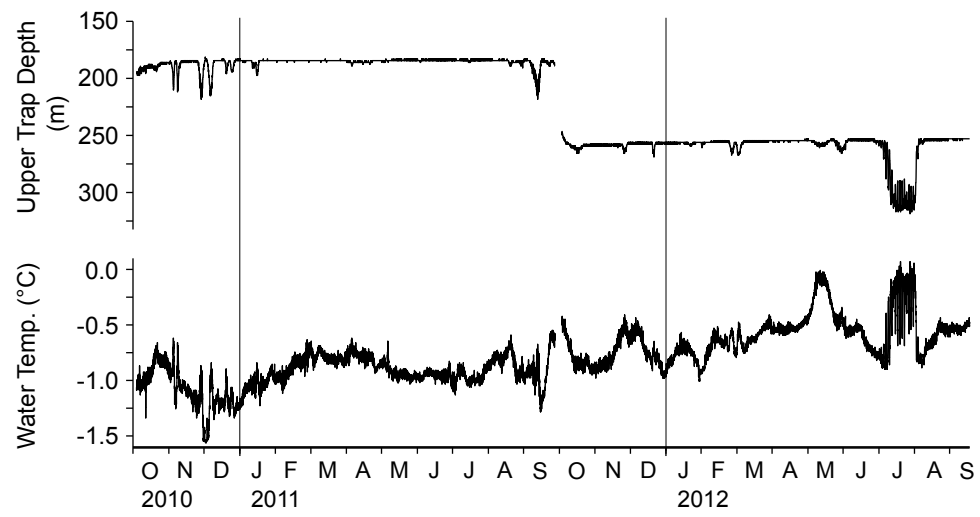


Fig. S1