



Supplement of

Sea-ice-associated algae and zooplankton fecal pellets fuel organic particle export in the seasonally ice-covered northwestern Labrador Sea

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Supplementary Tables and Figures

15 **Table S1 Sampling date and depth, fluxes, and bulk $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ of sinking particles from SB-500 (469 m) and SB-1000 (915 m) sediment traps. TPM, total particulate matter; POC, particulate organic carbon; PN, particulate nitrogen.**

Sample ID	Depth (m)	Date open (mm/dd/yyyy)	Date close (mm/dd/yyyy)	TPM (mg m ⁻² d ⁻¹)	POC (mg C m ⁻² d ⁻¹)	PN (mg N m ⁻² d ⁻¹)	C:N ratio	Bulk $\delta^{13}\text{C}$ (‰)	Bulk $\delta^{15}\text{N}$ (‰)
HB17-A3	469	11/16/2017	12/1/2017	981.6	19.3	2.8	6.9	-25.3	6.8
HB17-A4	469	12/1/2017	12/16/2017	1116.4	22.2	3.2	6.9	-25.3	6.8
HB17-A5	469	12/16/2017	1/1/2018	590.9	14.3	2.4	6.0	-24.7	7.5
HB17-A6	469	1/1/2018	1/16/2018	1006.9	12.9	1.8	7.2	-24.6	7.0
HB17-A7	469	1/16/2018	1/31/2018	602.8	10.6	1.5	7.0	-25.0	7.2
HB17-A8	469	1/31/2018	2/15/2018	785.0	15.1	1.9	7.9	-25.6	6.3
HB17-A9	469	2/15/2018	3/3/2018	448.5	10.5	1.5	7.1	NA	6.7
HB17-A10	469	3/3/2018	3/18/2018	178.6	5.7	0.9	6.3	-24.6	7.2
HB17-A11	469	3/18/2018	4/3/2018	379.4	7.9	1.2	6.7	NA	7.7
HB17-A12	469	4/3/2018	4/17/2018	294.5	7.3	1.0	7.8	-25.4	8.1
HB17-A13	469	4/17/2018	5/1/2018	383.8	8.6	1.3	6.8	NA	6.3
HB17-A14	469	5/1/2018	5/16/2018	132.1	4.6	0.7	7.1	-24.9	6.3
HB17-A15	469	5/16/2018	6/1/2018	284.7	12.5	1.9	6.6	-24.3	5.9
HB17-A16	469	6/1/2018	6/16/2018	85.9	4.3	0.6	6.8	-23.8	5.6
HB17-A17	469	6/16/2018	7/1/2018	139.3	5.3	0.9	6.0	-25.8	6.1
HB17-A18	469	7/1/2018	7/16/2018	167.2	4.4	0.7	6.6	-24.8	9.3
HB18-A1	915	8/3/2018	8/19/2018	242.8	8.4	1.3	6.4	NA	NA
HB18-A2	915	8/19/2018	9/3/2018	248.5	9.3	1.4	6.9	-25.9	NA
HB18-A3	915	9/3/2018	9/18/2018	586.6	16.3	2.3	7.0	-25.0	8.6
HB18-A4	915	9/18/2018	10/3/2018	1084.6	23.7	3.3	7.2	-25.2	6.0
HB18-A5	915	10/3/2018	10/19/2018	1435.9	30.4	4.2	7.2	-25.0	6.7
HB18-A6	915	10/19/2018	11/3/2018	718.9	18.8	2.8	6.7	-25.4	NA
HB18-A7	915	11/3/2018	11/18/2018	1180.7	25.2	3.8	6.6	-25.5	6.7

Sample ID	Depth (m)	Date open (mm/dd/yyyy)	Date close (mm/dd/yyyy)	TPM (mg m ⁻² d ⁻¹)	POC (mg C m ⁻² d ⁻¹)	PN (mg N m ⁻² d ⁻¹)	C:N ratio	Bulk δ ¹³ C (‰)	Bulk δ ¹⁵ N (‰)
HB18-A8	915	11/18/2018	12/3/2018	797.9	16.8	2.4	7.1	-25.1	NA
HB18-A9	915	12/3/2018	12/19/2018	282.2	9.9	1.5	6.5	-25.4	7.6
HB18-A10	915	12/19/2018	1/3/2019	209.6	5.2	0.8	6.4	-26.0	NA
HB18-A11	915	1/3/2019	1/19/2019	1029.1	22.9	3.6	6.3	-24.6	7.5
HB18-A12	915	1/19/2019	2/2/2019	222.9	5.9	1.0	6.1	-26.6	NA
HB18-A13	915	2/2/2019	2/16/2019	630.5	11.4	1.7	6.7	-25.1	6.9
HB18-A14	915	2/16/2019	3/3/2019	1711.2	24.5	3.6	6.8	-24.8	7.1
HB18-A15	915	3/3/2019	3/19/2019	2383.3	28.4	4.2	6.8	-24.5	7.8
HB18-A16	915	3/19/2019	4/3/2019	3017.3	32.0	4.3	7.5	-24.8	7.2
HB18-A17	915	4/3/2019	4/18/2019	883.9	13.4	1.9	7.0	-24.9	NA
HB18-A18	915	4/18/2019	5/3/2019	1360.2	19.3	2.8	6.8	-25.0	NA
HB18-A19	915	5/3/2019	5/19/2019	2241.3	28.4	4.2	6.8	-24.7	4.5
HB18-A20	915	5/19/2019	6/3/2019	2783.7	35.1	5.2	6.8	-24.9	5.3
HB18-A21	915	6/3/2019	6/18/2019	2036.5	28.4	4.1	6.9	-25.2	6.5

Table S2 $\delta^{13}\text{C}$ -AA values of sinking particles from SB-500 (469 m) and SB-1000 (915 m) sediment traps, and copepod and detritus samples.

Sample ID	Depth (m)	Date open (mm/dd/yyyy)	Date close (mm/dd/yyyy)	Phe (‰)	Thr (‰)	Ile (‰)	Leu (‰)	Val (‰)	Asx (‰)	Glx (‰)	Pro (‰)	Ala (‰)	Gly (‰)	Lys (‰)
HB17-C1	469	11/16/2017	12/1/2017	7.0	-2.6	10.9	12.7	17.0	13.6	17.0	17.6	16.1	6.1	11.5
HB17-C2	469	12/1/2017	12/16/2017	7.4	-1.0	NA	12.6	NA	13.1	16.8	16.7	16.3	6.9	8.8
HB17-C4	469	1/31/2018	3/3/2018	6.6	NA	14.6	13.8	18.3	13.7	17.0	17.8	18.2	8.1	4.5
HB17-C5	469	3/18/2018	4/3/2018	6.9	-3.4	12.1	12.4	15.1	12.7	16.4	17.7	16.5	6.6	8.6
HB17-C6	469	4/3/2018	5/1/2018	6.5	-4.0	13.7	12.8	17.7	13.1	16.8	17.1	17.0	6.6	6.5
HB17-C7	469	5/16/2018	6/1/2018	5.2	-2.4	9.5	8.3	13.4	10.8	14.7	10.8	13.2	4.5	-0.6
HB18-C1	915	8/3/2018	9/18/2018	6.5	-4.8	15.7	14.7	18.5	13.7	17.7	16.7	18.9	6.9	5.5
HB18-C2	915	9/18/2018	10/3/2018	6.7	-3.5	10.8	11.6	15.5	14.0	17.1	16.7	16.6	6.5	7.7
HB18-C3	915	10/19/2018	11/3/2018	6.0	-3.4	11.8	12.1	15.2	12.8	17.0	16.5	16.5	6.4	8.0
HB18-C4	915	11/18/2018	12/3/2018	6.7	-2.6	12.3	12.8	17.1	12.9	16.9	16.6	17.3	6.6	6.8
HB18-C5	915	1/3/2019	1/19/2019	7.4	-4.9	12.9	14.8	18.5	14.6	18.3	22.0	19.0	7.1	12.3
HB18-C6	915	2/16/2019	3/3/2019	8.0	-1.7	NA	12.7	9.2	13.4	17.2	16.2	17.2	6.8	8.9
HB18-C7	915	3/3/2019	3/19/2019	7.4	NA	NA	12.6	17.0	13.9	16.3	15.3	17.3	6.3	6.9
HB18-C8	915	3/19/2019	4/3/2019	6.8	NA	12.2	12.2	15.6	12.5	16.0	14.5	17.7	6.7	-1.8
HB18-C9	915	4/3/2019	4/18/2019	6.7	-4.1	NA	13.3	11.8	13.5	16.9	16.6	17.8	5.8	8.8
HB18-C11	915	5/3/2019	5/19/2019	6.8	NA	10.1	10.6	14.3	12.7	14.7	13.8	14.6	7.0	5.4
HB18-C12	915	5/19/2019	6/3/2019	5.9	NA	NA	8.5	13.8	11.6	14.6	12.7	15.0	5.3	8.2

Table S3 $\delta^{15}\text{N}$ -AA values of sinking particles from SB-500 (469 m) and SB-1000 (915 m) sediment traps, and copepod and detritus samples.

Sample ID	Depth (m)	Date open (mm/dd/yyyy)	Date close (mm/dd/yyyy)	Phe (‰)	Thr (‰)	Ile (‰)	Leu (‰)	Val (‰)	Asx (‰)	Glx (‰)	Pro (‰)	Ala (‰)	Gly (‰)	Lys (‰)
HB17-C1	469	11/16/2017	12/1/2017	7.0	-2.6	10.9	12.7	17.0	13.6	17.0	17.6	16.1	6.1	11.5
HB17-C2	469	12/1/2017	12/16/2017	7.4	-1.0	NA	12.6	NA	13.1	16.8	16.7	16.3	6.9	8.8
HB17-C4	469	1/31/2018	3/3/2018	6.6	NA	14.6	13.8	18.3	13.7	17.0	17.8	18.2	8.1	4.5
HB17-C5	469	3/18/2018	4/3/2018	6.9	-3.4	12.1	12.4	15.1	12.7	16.4	17.7	16.5	6.6	8.6
HB17-C6	469	4/3/2018	5/1/2018	6.5	-4.0	13.7	12.8	17.7	13.1	16.8	17.1	17.0	6.6	6.5
HB17-C7	469	5/16/2018	6/1/2018	5.2	-2.4	9.5	8.3	13.4	10.8	14.7	10.8	13.2	4.5	-0.6
HB18-C1	915	8/3/2018	9/18/2018	6.5	-4.8	15.7	14.7	18.5	13.7	17.7	16.7	18.9	6.9	5.5
HB18-C2	915	9/18/2018	10/3/2018	6.7	-3.5	10.8	11.6	15.5	14.0	17.1	16.7	16.6	6.5	7.7
HB18-C3	915	10/19/2018	11/3/2018	6.0	-3.4	11.8	12.1	15.2	12.8	17.0	16.5	16.5	6.4	8.0
HB18-C4	915	11/18/2018	12/3/2018	6.7	-2.6	12.3	12.8	17.1	12.9	16.9	16.6	17.3	6.6	6.8
HB18-C5	915	1/3/2019	1/19/2019	7.4	-4.9	12.9	14.8	18.5	14.6	18.3	22.0	19.0	7.1	12.3
HB18-C6	915	2/16/2019	3/3/2019	8.0	-1.7	NA	12.7	9.2	13.4	17.2	16.2	17.2	6.8	8.9
HB18-C7	915	3/3/2019	3/19/2019	7.4	NA	NA	12.6	17.0	13.9	16.3	15.3	17.3	6.3	6.9
HB18-C8	915	3/19/2019	4/3/2019	6.8	NA	12.2	12.2	15.6	12.5	16.0	14.5	17.7	6.7	-1.8
HB18-C9	915	4/3/2019	4/18/2019	6.7	-4.1	NA	13.3	11.8	13.5	16.9	16.6	17.8	5.8	8.8
HB18-C11	915	5/3/2019	5/19/2019	6.8	NA	10.1	10.6	14.3	12.7	14.7	13.8	14.6	7.0	5.4
HB18-C12	915	5/19/2019	6/3/2019	5.9	NA	NA	8.5	13.8	11.6	14.6	12.7	15.0	5.3	8.2
Detritus1	200	-	-	4.2	-2.2	8.2	6.1	13.0	9.4	13.3	9.3	11.7	3.4	2.6
Detritus2	200	-	-	5.8	1.9	7.6	5.4	13.3	8.5	11.8	7.8	11.5	6.3	3.5
Detritus3	200	-	-	7.1	3.0	9.8	7.2	14.9	9.8	13.1	9.3	12.4	7.1	4.8
Copepod1	200	-	-	4.3	-3.8	12.7	10.3	15.8	14.1	17.5	15.9	19.6	6.3	3.1
Copepod2	200	-	-	5.5	-4.5	13.8	11.3	17.0	14.7	17.9	16.3	19.4	6.3	4.0
Copepod3	200	-	-	5.4	-3.3	13.2	11.1	16.0	13.7	17.3	15.7	18.2	5.2	2.9

Table S4 Principal component analysis output for Fig. 6a.

Importance of components					
	PC1	PC2	PC3	PC4	PC5
Eigenvalue	2.49	1.07	0.95	0.48	0.00
Cumulative portion	0.50	0.71	0.90	1.00	1.00
Vector scores					
	PC1	PC2	PC3	PC4	PC5
Phe	0.21	0.84	-0.29	-0.33	0.24
Leu	-0.50	-0.17	-0.58	0.20	0.58
Thr	-0.43	0.11	0.71	-0.29	0.46
Ile	0.56	0.02	0.24	0.60	0.52
Val	0.45	-0.50	-0.13	-0.64	0.33
Sample scores					
Sample ID	PC1	PC2	PC3	PC4	Group
HB17-C2	-1.42	0.80	0.16	-1.06	SB-500
HB17-C5	-0.01	-1.25	-1.40	-1.01	SB-500
HB17-C6	-2.80	-0.99	1.02	-0.04	SB-500
HB17-C7	-1.35	1.32	-0.77	0.69	SB-500
HB18-C1	0.11	-1.86	-1.91	0.02	SB-1000
HB18-C2	-0.09	-1.25	-1.31	-1.79	SB-1000
HB18-C3	-1.75	-1.02	0.22	-0.99	SB-1000
HB18-C4	-2.72	-0.50	1.13	0.27	SB-1000
HB18-C5	-2.11	-0.59	-2.75	1.13	SB-1000
HB18-C6	-1.96	0.91	0.13	0.20	SB-1000
HB18-C7	-1.66	-1.11	1.29	-0.06	SB-1000
HB18-C8	-0.42	-0.55	-1.60	-0.10	SB-1000
HB18-C9	-1.04	-0.27	-0.15	-1.79	SB-1000
HB18-C12	-0.36	0.95	0.80	-0.40	SB-1000

Sample scores					
Sample ID	PC1	PC2	PC3	PC4	Group
ICEp1	-2.38	0.81	-0.47	1.00	Sea ice algae
ICEp2	-0.94	0.22	-1.87	0.78	Sea ice algae
ICEn1	-0.43	-2.97	-0.34	0.12	Sea ice algae
ICEn2	-0.85	-0.09	-0.30	-0.28	Sea ice algae
ICEn3	-0.28	-0.70	-1.53	0.59	Sea ice algae
ICEn1b	-2.03	-0.46	-0.40	-0.02	Sea ice algae
ICEn3b	-1.34	0.30	0.38	-0.34	Sea ice algae
ICEn2b	-1.36	0.57	0.48	-0.73	Sea ice algae
CF-Sp1	0.48	2.02	0.62	0.67	Sea ice algae
CF-Sm1	-0.38	-0.35	-0.02	0.70	Sea ice algae
SF-Sp1	-0.18	-0.57	-0.43	1.73	Sea ice algae
SF-Sm1	-0.73	0.54	-0.29	0.80	Sea ice algae
NS3L-0-N	0.45	-0.24	0.65	-0.07	Pelagic algae
NS3L-0.5-N	-0.13	0.42	0.33	-0.06	Pelagic algae
NS3L-1-N	0.35	0.02	0.13	0.30	Pelagic algae
NS3L-0-P	1.52	1.38	-0.67	-0.21	Pelagic algae
NS3L-0.5-P	1.24	0.21	0.32	-0.19	Pelagic algae
NS3L-1-P	0.71	0.95	0.14	0.72	Pelagic algae
1-15-1-N	-0.52	0.86	-0.03	-0.46	Pelagic algae
1-15-0.5-P	-1.09	0.44	1.37	-0.44	Pelagic algae
1-15-0-N	-0.19	0.67	-0.66	-0.29	Pelagic algae
1-15-1-P	2.03	1.66	-1.12	-1.41	Pelagic algae
CF1-Pp1	-0.55	1.59	0.96	-0.67	Pelagic algae
CF1-Pm1	-1.20	0.75	-0.51	-0.49	Pelagic algae
CF0-Pp1	0.00	1.36	0.25	0.43	Pelagic algae
CF0-Pm1	-0.85	1.22	0.39	-0.31	Pelagic algae
SF1-Pp1	0.11	0.01	0.10	0.71	Pelagic algae
SF1-Pm1	-1.10	-0.98	1.41	-0.48	Pelagic algae
SF0-Pp1	-1.78	-0.55	3.07	1.09	Pelagic algae
SF0-Pm1	1.15	-0.37	0.00	-0.04	Pelagic algae

Table S5 Linear discriminant analysis output for Fig. 6b.

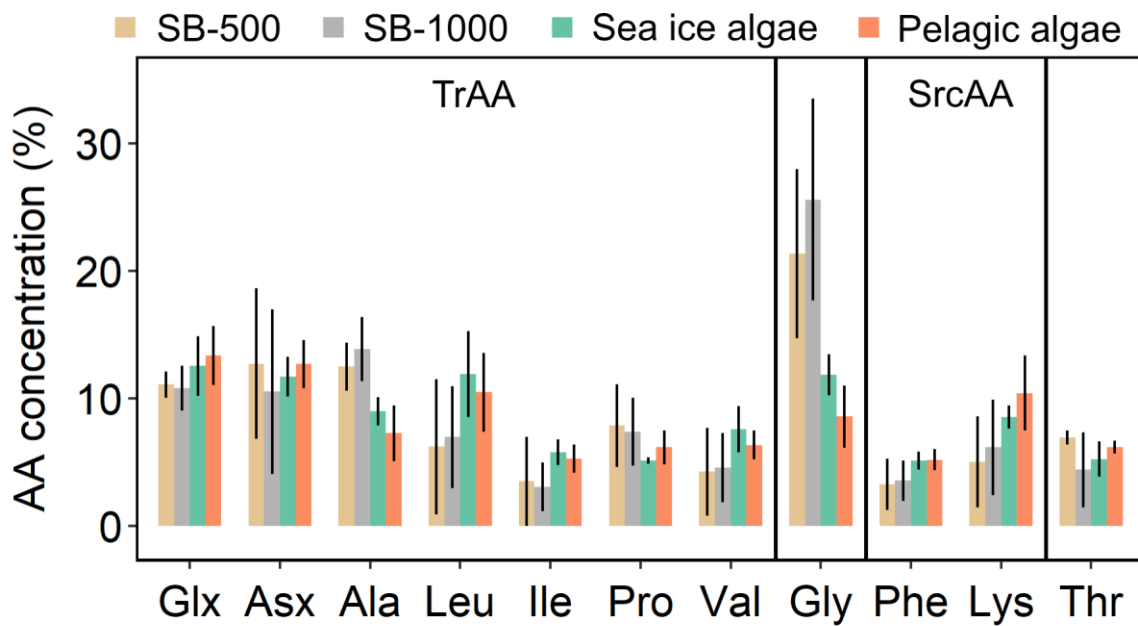
Coefficients of linear discriminants				
	LD1	LD2		
Phe	0.36	5.11		
Thr	0.63	4.08		
Ile	0.52	4.86		
Leu	-0.45	4.48		
Val	0.92	4.88		
Proportion of trace				
	LD1	LD2		
	0.92	0.20		
Posterior probabilities of the classifier samples				
Sample ID	Group	Predicted (% probability)		
		Bacteria	Sea ice algae	Pelagic algae
HB17-C2	SB-500	0.0	17.3	82.7
HB17-C5	SB-500	0.0	98.9	1.1
HB17-C6	SB-500	0.0	99.4	0.6
HB17-C7	SB-500	98.1	0.5	1.4
HB18-C1	SB-1000	0.0	99.9	0.1
HB18-C2	SB-1000	0.0	99.6	0.4
HB18-C3	SB-1000	0.0	99.2	0.8
HB18-C4	SB-1000	0.0	92.2	7.8
HB18-C5	SB-1000	0.0	100.0	0.0
HB18-C6	SB-1000	1.0	37.1	61.9
HB18-C7	SB-1000	0.1	29.3	70.6
HB18-C8	SB-1000	0.0	98.9	1.1
HB18-C9	SB-1000	0.0	87.2	12.8
HB18-C12	SB-1000	75.0	0.0	25.0

Table S6 Median proportions of phytoplankton, degraded OM and fecal pellets in sinking particles from SB-500 (469 m) and SB-1000 (915 m) sediment traps, copepods, and phytodetritus from a three end-member Bayesian mixing model based on Phe-normalized $\delta^{15}\text{N}$ of Ala and Thr.

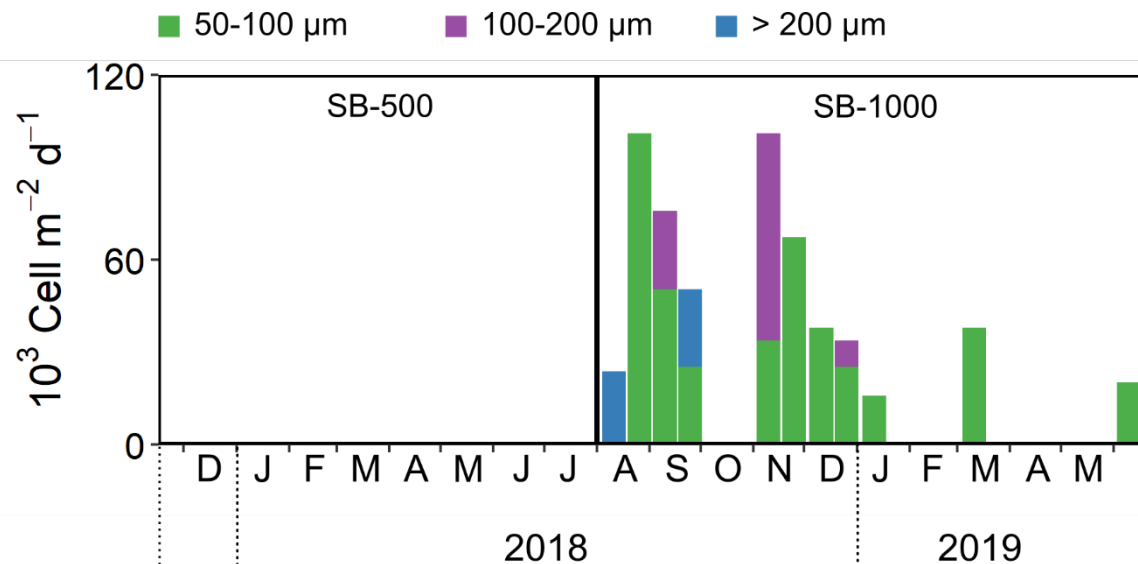
Sample ID	Depth (m)	Date open (yyyy-mm-dd)	Date close (mm/dd/yyyy)	Phytoplankton (%)	Degraded OM (%)	Fecal pellets (%)
HB17-C1	469	11/16/2017	12/1/2017	6%	2%	90%
HB17-C2	469	12/1/2017	12/16/2017	11%	3%	82%
HB17-C5	469	3/18/2018	4/3/2018	4%	1%	92%
HB17-C6	469	4/3/2018	5/1/2018	4%	1%	93%
HB17-C7	469	5/16/2018	6/1/2018	17%	3%	76%
HB18-C2	915	9/18/2018	10/3/2018	4%	1%	92%
HB18-C3	915	10/19/2018	11/3/2018	6%	2%	90%
HB18-C4	915	11/18/2018	12/3/2018	6%	2%	89%
HB18-C5	915	1/3/2019	1/19/2019	2%	1%	96%
HB18-C6	915	2/16/2019	3/3/2019	6%	2%	90%
HB18-C9	915	4/3/2019	4/18/2019	3%	1%	94%

40 **Table S7 Median proportions of phytoplankton, degraded OM, fecal pellets and zooplankton in sinking particles from SB-500 (469 m) and SB-1000 (915 m) sediment traps, copepods, and phytodetritus from a four end-member Bayesian mixing model based on Phe-normalized $\delta^{15}\text{N}$ of Ala and Thr.**

Sample ID	Depth (m)	Date open (yyyy-mm-dd)	Date close (mm/dd/yyyy)	Phytoplankton (%)	Degraded OM (%)	Fecal pellets (%)	Zooplankton (%)
HB17-C1	469	11/16/2017	12/1/2017	6%	1%	81%	7%
HB17-C2	469	12/1/2017	12/16/2017	14%	1%	70%	10%
HB17-C5	469	3/18/2018	4/3/2018	3%	1%	85%	7%
HB17-C6	469	4/3/2018	5/1/2018	3%	1%	82%	11%
HB17-C7	469	5/16/2018	6/1/2018	22%	1%	65%	8%
HB18-C2	915	9/18/2018	10/3/2018	3%	1%	83%	9%
HB18-C3	915	10/19/2018	11/3/2018	5%	1%	73%	17%
HB18-C4	915	11/18/2018	12/3/2018	5%	1%	70%	19%
HB18-C5	915	1/3/2019	1/19/2019	1%	0%	88%	8%
HB18-C6	915	2/16/2019	3/3/2019	6%	1%	81%	8%
HB18-C9	915	4/3/2019	4/18/2019	2%	1%	80%	15%
Detritus1	200	-	-	31%	1%	54%	10%
Detritus2	200	-	-	54%	1%	33%	10%
Detritus3	200	-	-	55%	1%	35%	8%
Copepod1	200	-	-	2%	1%	8%	87%
Copepod2	200	-	-	2%	1%	27%	69%
Copepod3	200	-	-	4%	1%	37%	56%



45 Figure S1 The AA molar composition of sinking particles from SB-500 and SB-1000 sediment traps, sea ice algae, and pelagic algae. Error bars represent ± 1 s.d. of averages of samples (n = 5-18).



50 Figure S2 The fecal pellet fluxes in sinking particles from SB-500 and SB-1000 sediment traps. Fecal pellets were not counted for the 2017-2018 cycle.