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Deep-sea benthic communities and oxygen fluxes in the Arctic Fram Strait controlled by sea-ice cover and water depth

Ralf Hoffmann et al.

Correspondence to: Ralf Hoffmann (ralf.hoffmann@awi.de)

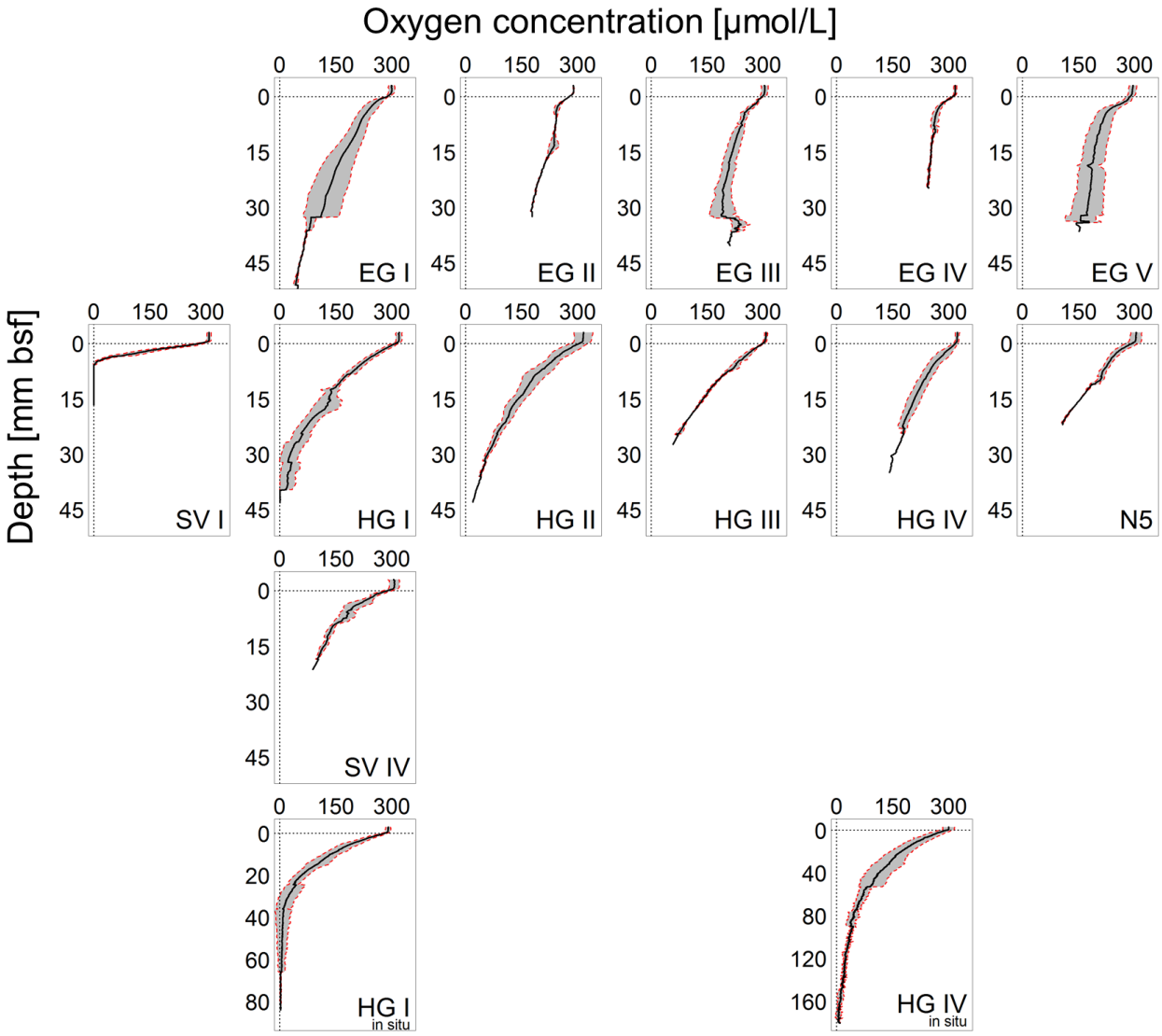

Figure S1. Oxygen profiles at each station. The first row shows the profiles from the EG area, while the second to fourth rows show the profiles from the WS area. Columns are in order of water depth, with the shallow stations on the left hand site. The black line in each profile represents the mean oxygen concentration; the grey area represents the standard deviation. Strong breaks in the profile, like in EG I, are explained by merging profiles of different lengths. For a better inter-comparison of the profiles, the depth scale in the unit millimetre below surface (bsf) is equal, with the exception of the in situ stations at HG I and HG IV.

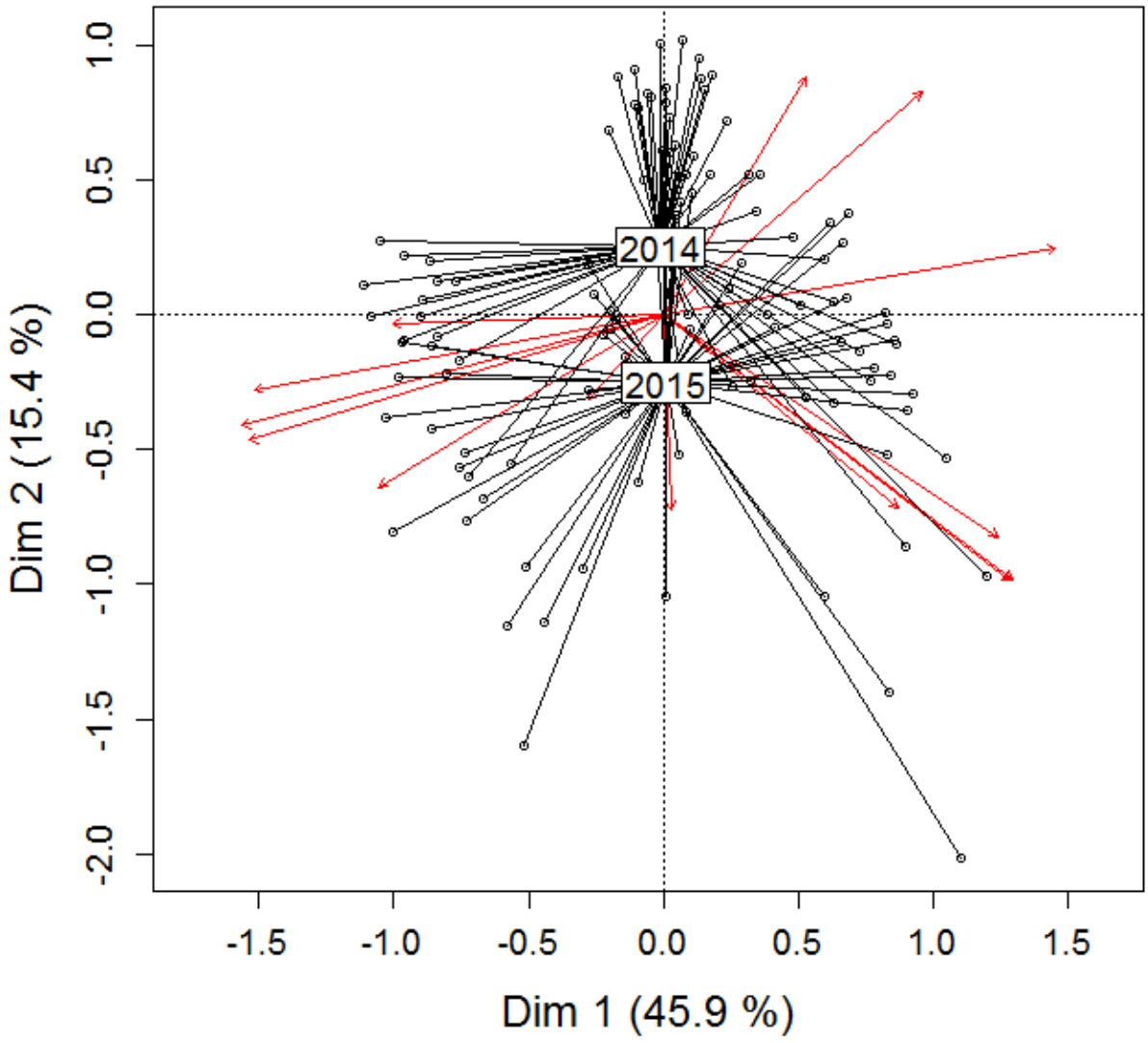

Figure S2. Visualisation of the comparison between the sampling years 2014 and 2015 using a PCA. Each dot refers to a sediment horizon at a certain station while red arrows indicate used parameters. The labels of the parameters were omitted, as they are not needed for the interpretation of the figure.

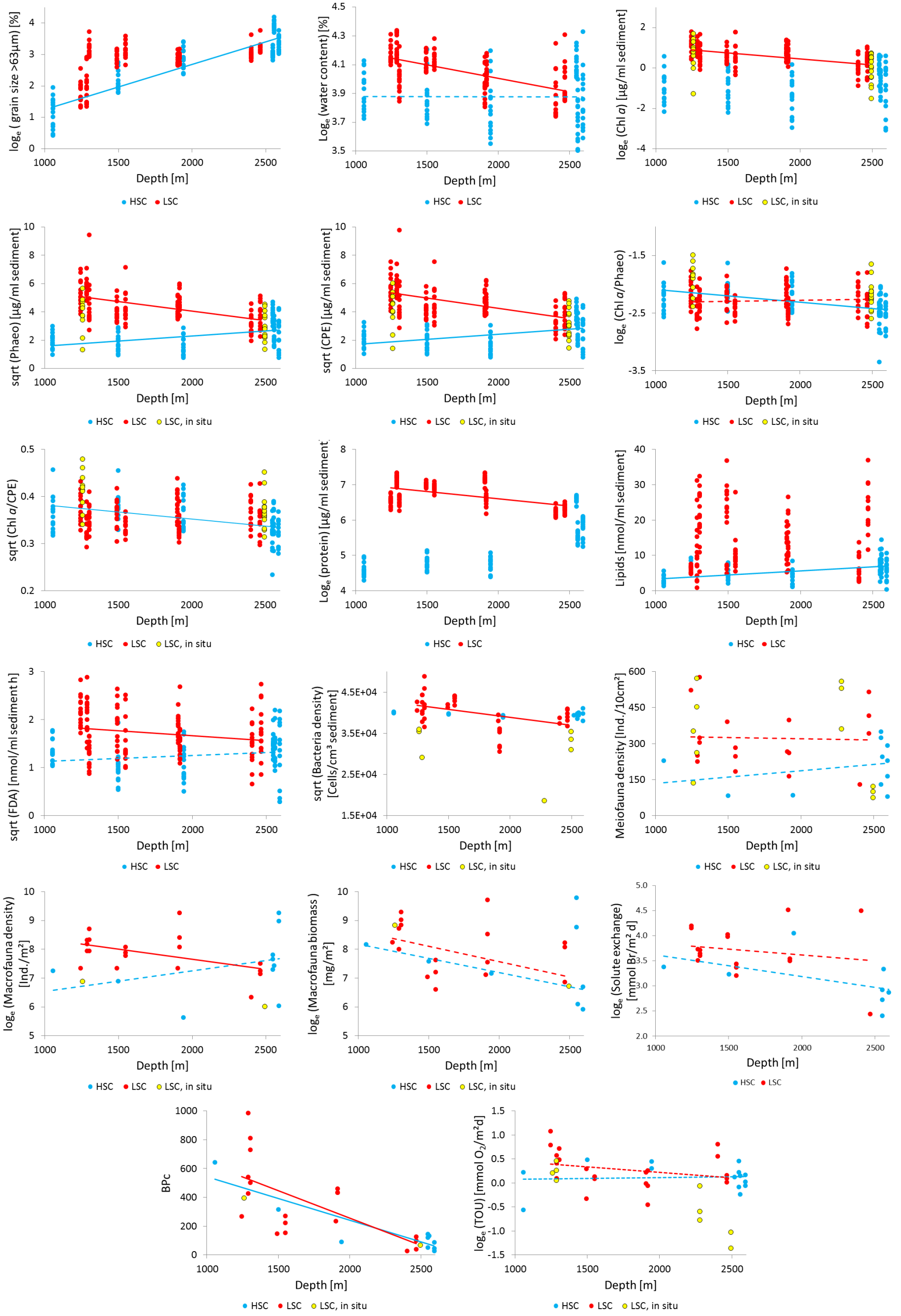

Figure S3. Parameters used in PCA (see Fig. 5) displayed as a function of water depth in the HSC and LSC categories. A continuous line indicates a significant correlation; a dashed line indicates that the residuals of the regression follow a Gaussian distribution, but the correlation is not significant. No regression line means that no regression could be calculated because assumptions for regression were violated, even with transformed data (for p-values of statistical analyses see Table S8).

Table S1. Number of samples for the analyses of different parameters.

Station name	Year	Number of available sediment cores	Number of DOU profiles	Number of sediment cores for bacterial subsampling	Number of sediment cores for meiofauna subsampling	Number of sediment cores for macrofauna sampling	Number of sediment cores for solute exchange determination
EG I	2014	2	4	1	1	1	2
EG II	2014	1	2	1	1	1	1
EG III	2014	2	4	1	1	1	2
EG IV	2015	3	6	3	3	3	3
	2015	1	4	3	3	3	3
EG V	2014	2	4	1	1	1	2
SV I	2015	3	6	-	-	-	-
HG I	2014	2	4	1	1	1	2
	2015	3	8	3	3	3	3
HG I Lander	2014	1	1	2	2	2	-
	2015	3	15	1	3	3	-
SV IV	2015	3	8	3	3	3	3
HG II	2014	2	3	1	1	1	2
	2015	3	6	3	3	3	3
HG III	2014	2	3	1	1	1	2
	2015	3	4	3	3	3	3
HG IV	2014	2	4	1	1	1	2
	2015	3	4	3	3	3	3
HG IV Lander	2014	2	11	3	3	3	-
	2015	3	7	1	3	3	-
N5	2015	3	8	3	3	3	3

Table S2. Results of Pearson correlation (Pearson R).

	Water depth	Sea ice coverage	Days with sea ice coverage	Grain size fraction >63µm	Median grain size	Water content	Chl a	Phaeo	CPE	Chl a/ CPE	Chl a/ Phaeo	TOC	Organic matter	Protein	Lipids	FDA	DOU	TOU	Bacteria density	Meio-fauna density	Macro-fauna biomass	Macro-fauna density	Solute exchange	BPc
Water depth	1.000																							
Sea ice coverage	0.264	1.000																						
Days with sea ice coverage	0.403	0.977	1.000																					
Grainsize fraction >63µm	0.614	0.036	0.122	1.000																				
Median grainsize	0.485	0.253	0.284	0.891	1.000																			
Water content	-0.301	-0.632	-0.610	-0.515	-0.589	1.000																		
Chl a	-0.680	-0.474	-0.498	-0.120	-0.238	0.132	1.000																	
Phaeo	-0.662	-0.621	-0.635	-0.120	-0.279	0.293	0.963	1.000																
CPE	-0.666	-0.610	-0.623	-0.119	-0.280	0.282	0.968	0.999	1.000															
Chl a/CPE	-0.711	-0.271	-0.366	-0.274	-0.218	-0.016	0.770	0.630	0.635	1.000														
Chl a/Phaeo	-0.691	-0.303	-0.386	-0.288	-0.236	0.047	0.743	0.607	0.613	0.989	1.000													
TOC	-0.405	-0.757	-0.735	-0.128	-0.319	0.437	0.689	0.788	0.780	0.331	0.354	1.000												
Organic matter	-0.115	-0.698	-0.640	-0.152	-0.324	0.579	0.246	0.406	0.395	-0.110	-0.103	0.679	1.000											
Protein	-0.543	-0.593	-0.580	-0.075	-0.259	0.193	0.953	0.950	0.953	0.640	0.624	0.831	0.459	1.000										
Lipids	-0.604	-0.620	-0.637	-0.021	-0.190	0.137	0.947	0.927	0.935	0.747	0.724	0.668	0.289	0.921	1.000									
FDA	-0.598	-0.345	-0.361	-0.062	-0.168	-0.028	0.975	0.898	0.905	0.768	0.736	0.651	0.165	0.938	0.902	1.000								
DOU	-0.757	-0.453	-0.492	-0.254	-0.406	0.269	0.857	0.882	0.893	0.580	0.572	0.620	0.260	0.796	0.839	0.774	1.000							
TOU	-0.681	-0.281	-0.325	-0.128	-0.225	-0.010	0.939	0.889	0.896	0.736	0.695	0.509	-0.024	0.829	0.872	0.920	0.842	1.000						
Bacteria density	0.385	0.291	0.286	0.008	0.121	0.116	-0.806	-0.669	-0.675	-0.821	-0.820	-0.519	-0.094	-0.791	-0.756	-0.866	-0.542	-0.689	1.000					
Meiofauna density	-0.606	-0.535	-0.542	-0.019	-0.166	0.114	0.970	0.942	0.948	0.724	0.700	0.700	0.284	0.935	0.963	0.949	0.836	0.887	-0.800	1.000				
Macrofauna biomass	-0.693	-0.396	-0.414	-0.158	-0.276	0.131	0.979	0.951	0.955	0.722	0.698	0.656	0.196	0.911	0.892	0.951	0.882	0.950	-0.767	0.946	1.000			
Macrofauna density	-0.417	-0.282	-0.292	0.083	-0.099	-0.021	0.771	0.784	0.785	0.390	0.315	0.469	0.343	0.751	0.720	0.740	0.733	0.726	-0.524	0.747	0.760	1.000		
Solute exchange	-0.200	-0.532	-0.611	-0.176	-0.200	0.234	0.116	0.158	0.140	0.334	0.329	0.302	0.192	0.146	0.193	0.058	-0.035	0.045	-0.162	0.095	0.044	-0.179	1.000	
BPc	-0.869	-0.341	-0.430	-0.274	-0.287	0.106	0.849	0.844	0.849	0.686	0.653	0.543	0.184	0.736	0.795	0.786	0.907	0.840	-0.562	0.834	0.881	0.697	0.059	1.000

Table S3. Annual sea-ice cover values (± standard deviation) and the annual percentages of days with sea-ice cover from 01.09.2001 until 31.08.2015. The sampling year of the stations is given in brackets. It refers to the location of the station, as this differs slightly between the sampling years.

Station	Parameter		Year														
			01.09.–31.12.2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	01.01.–31.08.2015
EG I	Sea-ice cover (%)	Mean	80	67	78	72	82	80	83	77	89	81	83	87	83	81	81
		SD	27	36	26	34	21	23	17	26	13	24	15	13	21	16	21
	% of days with sea-ice cover		93.4	84.9	95.6	85.2	99.5	98.6	99.2	97.8	99.7	95.9	99.5	100.0	98.9	100.0	98.0
EG II	Sea-ice cover (%)	Mean	77.2	66.1	76.2	68.8	80.0	77.7	83.4	77.3	88.8	78.9	81.0	86.2	81.9	85.7	81.6
		SD	30.3	35.7	26.1	33.7	21.9	24.1	15.3	23.1	11.8	24.2	16.0	13.2	20.5	13.2	20.1
	% of days with sea-ice cover		90.2	85.8	95.6	84.2	99.5	98.4	99.5	98.9	99.7	95.1	99.7	100.0	98.4	100.0	98.8
EG III	Sea-ice cover (%)	Mean	62.4	61.3	71.8	58.8	71.9	69.7	81.8	79.6	83.4	73.7	77.0	79.5	74.1	85.7	74.5
		SD	35.2	34.6	26.2	35.4	26.3	27.1	16.8	17.4	16.8	27.3	20.3	19.6	27.3	10.2	25.9
	% of days with sea-ice cover		85.2	84.7	94.2	82.0	97.3	96.7	99.5	99.7	99.7	94.0	98.6	99.2	92.9	100	94
EG IV	Sea-ice cover (%)	Mean	52.1	50.9	59.8	49.2	59.9	53.7	71.5	74.3	71.4	61.6	63.7	70.2	68.3	80.9	37.9
		SD	39.3	33.9	31.2	35.8	32.1	32.8	24.4	24.0	26.2	30.9	27.3	25.8	31.3	16.3	32.0
	% of days with sea-ice cover		75	84	90	77	92	91	99	98	99	93	95	99	87	100	89
EG V	Sea-ice cover (%)	Mean	41	38	44	28	44	33	53	59	60	40	41	52	55	71	38
		SD	37	33	31	31	32	31	28	29	33	31	29	31	34	22	32
	% of days with sea-ice cover		68.0	73.2	83.6	61.2	83.8	74.8	95.1	95.1	91.2	80.0	84.7	89.9	80.8	99.7	99.6
SV I	Sea-ice cover (%)	Mean	5	6	15	19	8	3	2	4	5	2	9	1	0	1	1
		SD	14	15	24	32	16	10	8	12	13	7	20	4	5	6	5
	% of days with sea-ice cover		15	19	35	31	25	10	8	14	14	7	25	5	3	4	7
HG I (2014)	Sea-ice cover (%)	Mean	0.0	0.2	2.4	2.0	0.0	0.0	0.1	3.9	0.3	0.1	0.5	0.7	1.0	2.5	0.2
		SD	0.0	2.6	8.9	8.5	0.0	0.0	2.0	11.7	2.4	1.5	3.7	4.5	7.0	9.6	3.3
	% of days with sea-ice cover		0.0	1.1	9.6	8.5	0.0	0.0	0.5	13.1	1.9	0.8	1.9	3.6	3.3	8.8	0.4
HG I (2015)	Sea-ice cover (%)	Mean	0	0	2	2	0	0	0	4	0	0	0	1	1	2	0
		SD	0	3	9	8	0	0	2	12	2	2	4	5	7	10	3
	% of days with sea-ice cover		0	1	10	8	0	0	1	13	2	1	2	4	3	9	0
HG I Lander (2014)	Sea-ice cover (%)	Mean	0.0	0.2	2.4	2.0	0.0	0.0	0.1	3.9	0.3	0.1	0.5	0.7	1.0	2.5	0.2
		SD	0.0	2.6	8.9	8.5	0.0	0.0	2.0	11.7	2.4	1.5	3.7	4.5	7.0	9.6	3.3
	% of days with sea-ice cover		0.0	1.1	9.6	8.5	0.0	0.0	0.5	13.1	1.9	0.8	1.9	3.6	3.3	8.8	0.4
HG I Lander (2015)	Sea-ice cover (%)	Mean	0	0	2	2	0	0	0	4	0	0	0	1	1	2	0
		SD	0	3	9	8	0	0	2	12	2	2	4	5	7	10	3
	% of days with sea-ice cover		0	1	10	8	0	0	1	13	2	1	2	4	3	9	0
SV IV	Sea-ice cover (%)	Mean	0	0	0	4	0	0	0	1	0	0	1	0	0	0	0
		SD	0	3	2	13	2	0	0	4	0	1	5	1	0	1	3
	% of days with sea-ice cover		0	1	2	11	1	0	0	3	0	0	2	1	0	0	0
HG II (2014)	Sea-ice cover (%)	Mean	0.0	0.7	4.3	1.6	0.1	0.1	0.4	6.4	1.5	0.3	1.0	3.9	2.9	7.8	0.3
		SD	0.0	4.8	12.9	7.2	2.3	2.2	3.2	14.5	7.8	3.2	5.6	13.5	11.8	16.5	3.5
	% of days with sea-ice cover		0.0	3.0	14.2	7.9	0.8	0.3	3.3	22.7	6.3	0.8	3.8	9.8	7.9	26.0	1.2
HG II (2015)	Sea-ice cover (%)	Mean	0	1	4	2	0	0	0	6	1	0	1	4	3	8	0
		SD	0	5	13	7	2	2	3	14	8	3	6	13	12	17	4
	% of days with sea-ice cover		0	3	14	8	1	0	3	23	6	1	4	10	8	26	1
HG III (2014)	Sea-ice cover (%)	Mean	0.2	0.9	5.0	1.6	0.3	0.1	0.8	7.4	1.8	0.5	1.9	5.3	3.9	9.5	0.2
		SD	1.3	5.7	14.8	7.5	3.4	2.4	5.2	15.8	8.5	4.5	9.5	16.9	14.2	18.1	3.3
	% of days with sea-ice cover		1.6	3.0	15.1	7.4	1.1	0.3	3.3	25.4	7.1	1.1	5.2	12.0	8.5	28.8	0.8

HG III (2015)	Sea-ice cover (%)	Mean	0	2	9	2	1	0	3	13	4	1	3	7	4	15	0
		SD	1	9	18	9	6	2	10	22	12	6	12	19	14	21	4
	% of days with sea-ice cover		2	7	25	10	5	0	12	33	17	2	10	16	12	44	2
HG IV (2014)	Sea-ice cover (%)	Mean	1.1	3.5	12.5	3.3	3.5	0.3	4.7	19.2	8.4	1.7	3.8	10.6	7.3	19.8	0.6
		SD	5.8	11.9	23.6	12.4	12.2	3.1	12.8	27.3	18.6	9.7	13.2	23.8	19.0	25.5	5.1
	% of days with sea-ice cover		5.7	11.0	30.7	8.7	11.2	1.1	17.5	42.1	23.6	4.4	13.4	21.9	17.3	50.1	3.3
HG IV (2015)	Sea-ice cover (%)	Mean	1	3	12	3	4	0	5	19	8	2	4	11	7	20	1
		SD	6	12	24	12	12	3	13	27	19	10	13	24	19	26	5
	% of days with sea-ice cover		6	11	31	9	11	1	18	42	24	4	13	22	17	50	3
HG IV Lander (2014)	Sea-ice cover (%)	Mean	1.1	3.5	12.5	3.3	3.5	0.3	4.7	19.2	8.4	1.7	3.8	10.6	7.3	19.8	0.6
		SD	5.8	11.9	23.6	12.4	12.2	3.1	12.8	27.3	18.6	9.7	13.2	23.8	19.0	25.5	5.1
	% of days with sea-ice cover		5.7	11.0	30.7	8.7	11.2	1.1	17.5	42.1	23.6	4.4	13.4	21.9	17.3	50.1	2.9
HG IV Lander (2015)	Sea-ice cover (%)	Mean	0	3	10	2	2	0	4	15	6	1	4	9	6	17	1
		SD	2	10	21	10	8	3	12	24	15	7	13	22	17	23	5
	% of days with sea-ice cover		4	8	28	10	7	0	15	37	20	2	12	18	14	47	2
N5	Sea-ice cover (%)	Mean	21	24	47	19	21	18	44	47	53	21	19	31	27	58	23
		SD	29	30	35	27	24	29	33	39	34	25	25	34	31	31	24
	% of days with sea-ice cover		50	56	85	46	65	40	78	71	87	64	54	63	58	91	67

Table S4. P-values of the Shapiro-Wilk test, Levene's test, Students t-test, Welch t-test and Wilcoxon signed rank sum test to identify differences between the EG and WS area

	Area of shapiro test	Shapiro test	Levene's test	Students t test	Welch t-test	Wilcoxon
Grain size fraction >63µm (%)	EG	1.32E-05				0.92
	WS	2.57E-05				
Median grain size (µm)	EG	2.08E-11				0.0003183
	WS	3.03E-02				
Water content (%)	EG	3.64E-03	0.6539	<2.2E-16		
	WS	1.94E-01				
Porosity	EG	8.37E-02	0.01228		7-931E-15	
	WS	4.58E-02				
Chl *a* (µg ml^{-1} $sediment^{-1}$)	EG	3.04E-06				<2.2E-16
	WS	6.49E-09				
Phaeo (µg ml^{-1} $sediment^{-1}$)	EG	2.55E-06				<2.2E-16
	WS	7.57E-11				
CPE (µg ml^{-1} $sediment^{-1}$)	EG	3.02E-06				<2.2E-16
	WS	1.33E-10				
Chl *a*/CPE (%)	EG	1.70E-02				0.5841
	WS	1.10E-06				
Chl *a*/Phaeo	EG	1.01E-03				0.4859
	WS	2.42E-08				
TOC (%)	EG	1.88E-03				<2.2E-16
	WS	6.36E-05				
Organic matter (%)	EG	1.10E-02				<2.2E-16
	WS	1.83E-07				
Protein (µg ml^{-1} $sediment^{-1}$)	EG	5.97E-07				<2.2E-16
	WS	8.04E-06				
Lipids (nmol ml^{-1} $sediment^{-1}$)	EG	9.72E-03				<2.2E-16
	WS	3.42E-11				
FDA (nmol ml^{-1} $sediment^{-1}$ h^{-1})	EG	2.19E-06				3.58E-10
	WS	2.49E-07				

Bacteria density (Cells $x10^9$ ml^{-1} $sediment^{-1}$)	EG	2.83E-01	0.1304		0.2325	
	WS	4.97E-01				
Meiofauna density (Ind. $10cm^{-2}$)	EG	1.48E-01	0.1303	0.01381		
	WS	1.84E-01				
Macrofauna density (ind. m^{-2})	EG	7.29E-01	0.08851	0.03386		
	WS	5.73E-03				
Macrofauna biomass (mg m^{-2})	EG	1.77E-01	0.1637	0.1109		
	WS	8.96E-06				
Solute exchnage (mmol Br m^{-2} d^{-1})	EG	1.07E-01	0.2965	0.3895		
	WS	1.06E-01				
BPc	EG	1.71E-02				0.8562
	WS	1.44E-07				
DOU (mmol O_2 m^{-2} d^{-1})	EG	3.23E-01	0.01516		0.0003012	
	WS	6.81E-05				
TOU (mmol O_2 m^{-2} d^{-1})	EG	9.44E-01	0.1639	0.5119		
	WS	1.66E-02				
DOU/TOU	EG	6.57E-01	0.7129	0.09116		
	WS	5.03E-01				

Table S5. Macrofauna density in individuals m^{-2}, values base on sediment core replicates.

Station	Year	Amphipoda	Anthozoa sp	Aplacophora	Bivalvia	Copepoda	Cumacea	Echinodermata	Gastropoda	Isopoda	Nematoda	Nemertea	Oligochaeta	Ostracoda	Polychaeta	Scaphopoda	Sipunculidae	Tanaidacea	Total density
EG I	2014	-	-	-	141.8	-	-	-	-	141.8	-	423.2	-	-	141.8	-	423.2	141.8	1413.6
EG II	2014	-	-	141.8	141.8	141.8	-	-	-	282.2	-	141.8	-	-	-	-	141.8	-	991.1
EG III	2014	-	-	-	-	-	141.8	-	-	-	-	-	-	-	141.8	-	-	-	283.6
EG IV	2015	-	-	-	-	-	-	-	-	-	-	-	-	-	423.3	-	-	-	423.3
EG IV	2015	-	-	-	-	656.4	141.8	-	-	-	141.8	-	-	-	1128.7	-	-	-	2068.7
EG IV	2015	-	-	-	141.8	116.9	-	-	-	-	282.2	-	-	-	141.8	-	-	-	682.8
EG V	2014	-	-	-	846.5	-	-	-	-	141.8	-	-	-	-	75.4	-	-	-	1063.7
HG I	2014	141.8	-	-	141.8	-	141.8	-	-	-	141.8	-	-	-	75.4	-	-	282.2	924.7
HG I	2015	-	-	-	564.3	1551.9	141.8	-	-	-	282.2	-	-	-	1269.8	-	141.8	141.8	4093.7
HG I	2015	-	-	-	282.2	846.5	-	-	-	-	564.3	-	141.8	-	846.5	-	-	141.8	2823.2
HG I	2015	-	-	-	564.3	493.8	-	-	141.8	141.8	987.6	-	-	-	987.6	141.8	-	141.8	3600.6
HG I Lander	2014	12.5	-	-	487.5	-	37.5	-	-	12.5	162.5	-	-	-	212.5	12.5	-	5	942.5
SV I	2015	-	-	-	-	79.7	-	-	-	-	395.3	-	-	-	313.8	-	-	-	788.9
SV I	2015	-	-	-	564.3	2116.3	-	141.8	-	-	2116.3	-	141.8	-	8747.2	-	-	-	13827.7
SV I	2015	-	-	-	-	-	-	-	-	-	-	-	141.8	-	75.4	-	-	-	217.3
HG II	2014	-	-	-	-	-	-	-	-	-	423.2	-	-	-	846.5	-	-	282.2	1551.9
HG II	2015	141.8	-	-	141.8	-	141.8	-	-	-	564.3	-	-	-	1551.9	-	-	141.8	2683.6
HG II	2015	-	-	-	141.8	-	-	-	-	141.8	141.8	-	-	-	1975.2	-	-	-	2400.7
HG II	2015	-	-	-	282.2	423.3	141.8	-	-	141.8	423.3	-	-	-	1551.9	-	-	282.2	3246.4
HG III	2014	-	-	-	141.8	-	141.8	-	-	-	141.8	141.8	-	-	75.4	141.8	-	141.8	926.1
HG III	2015	-	-	-	-	-	141.8	-	-	282.2	-	-	423.3	-	2398.4	-	-	-	3245.7
HG III	2015	141.8	-	-	282.2	2539.5	-	-	-	-	282.2	-	141.8	-	987.6	141.8	-	-	4517
HG III	2015	-	-	-	282.2	7759.6	-	-	141.8	-	141.8	-	141.8	-	75.4	-	141.8	-	8684.5
HG IV	2014	-	-	-	141.8	-	-	-	-	-	141.8	-	-	-	282.2	-	-	-	565.7

HG IV	2015	-	-	-	-	423.3	-	-	-	-	282.2	-	-	-	75.4	-	-	-	780.8
HG IV	2015	141.8	-	-	-	282.2	-	-	141.8	141.8	282.2	-	-	-	846.5	-	-	-	1836.4
HG IV	2015	-	-	-	-	423.3	-	-	-	-	423.3	-	-	-	423.3	-	-	-	1269.8
HG IV Lander	2014	16.7	8.3	-	41.7	-	41.7	-	8.3	16.7	58.3	25	-	8.3	191.7	-	-	-	416.7
SV IV	2015	141.8	-	-	282.2	352.8	141.8	-	-	-	75.4	-	-	141.8	2257.3	-	-	141.8	3535.1
SV IV	2015	141.8	-	-	141.8	-	-	-	-	282.2	846.5	-	-	-	1128.7	-	141.8	141.8	2824.7
SV IV	2015	-	-	-	564.3	2962.8	282.2	-	-	-	141.8	141.8	-	-	1834.9	-	141.8	-	6069.6
N5	2015	-	-	-	-	211.6	-	-	-	-	141.8	-	-	-	1128.7	-	-	-	1482.1
N5	2015	-	-	-	423.3	634.9	141.8	-	-	-	423.3	-	-	-	846.5	-	-	-	2469.7
N5	2015	-	-	-	564.3	282.2	-	-	-	-	564.3	-	-	-	564.3	-	-	141.8	2117
Portion on entire community (%)		1.0	0.01	0.2	8.6	26	2.1	0.2	0.5	2.0	12	1.0	1.3	0.2	40	0.5	1.3	2.5	

Table S6. Macrofauna biomass in mg blotted wet weight m^{-2}, values base on sediment core replicates.

Station	Year	Amphipoda	Anthozoa sp	Aplacophora	Bivalvia	Cumacea	Echinodermata	Gastropoda	Isopoda	Nematoda	Nemertea	Oligochaeta	Ophiuroidea	Ostracoda	Polychaeta	Porifera	Scaphopoda	Sipunculidae	Tanaidacea	Total biomass
EG I	2014	-	-	-	29.6	-	-	-	95.9	-	2662.2	-	-	-	173.5	-	-	561.5	1.4	3524.2
EG II	2014	-	-	141.1	29.6	-	-	-	976.3	-	752	-	-	-	-	-	-	69.1	-	1968.1
EG III	2014	-	-	-	-	1207.6	-	-	-	-	-	-	-	-	93.1	-	-	-	-	1300.7
EG IV	2015	-	-	-	-	-	-	-	-	-	-	-	-	-	117.1	-	-	-	-	117.1
EG IV	2015	-	-	-	-	773.1	-	-	-	-	-	-	-	-	38.1	-	-	-	-	811.2
EG IV	2015	-	-	-	103	-	-	-	-	-	-	-	-	-	268.1	-	-	-	-	371
EG V	2014	-	-	-	134	-	-	-	24	-	-	-	-	-	292	-	-	-	-	45
SV I	2015	-	-	-	-	-	-	-	-	-	-	-	-	-	11717	-	-	-	-	11717
SV I	2015	-	-	-	7234.8	-	5949.5	-	-	-	-	1324.8	-	-	36097.6	-	-	-	-	50606.7
SV I	2015	-	-	-	-	-	-	-	-	-	-	-	225.7	-	73560.9	-	-	-	-	73786.7
HG I	2014	1.4	-	-	1207.6	2198	-	-	-	2.8	-	-	-	-	237	-	-	-	173.5	3820.4
HG I	2015	-	-	-	681.4	-	-	-	-	-	-	-	-	-	1453.2	-	-	842.3	29.6	3006.5
HG I	2015	-	-	-	25204.6	-	-	-	-	-	-	626.4	-	-	9923.8	-	-	-	-	35754.8
HG I	2015	-	-	-	1540.6	-	-	112.9	747.7	-	-	-	-	-	3252	-	550.2	-	-	6203.4
HG I Lander	2014	1.6	-	-	3792.1	40.5	-	-	1.3	146.1	-	-	-	-	2576.5	-	344.1	-	26.8	6929
SVIV	2015	1090.6	-	-	2320.8	1134.3	-	-	-	94.5	40.9	-	-	-	6271.2	-	-	-	-	10952.3
SVIV	2015	141.1	-	-	-	-	-	-	117.1	-	-	-	-	-	7855.5	-	-	214.4	-	8328.2
SVIV	2015	-	-	-	2497.2	983.4	-	-	-	-	-	-	-	-	2608.6	-	-	829.6	-	6918.7
HG II	2014	-	-	-	-	-	-	-	-	26.8	-	-	-	-	1084.9	-	-	-	38.1	1149.8
HG II	2015	510.7	-	-	28.2	57.8	-	-	-	-	-	-	-	-	1467.3	-	-	-	-	2064.1
HG II	2015	-	-	-	-	-	-	-	135.4	-	-	-	-	-	1213.3	-	-	-	-	1348.8
HG II	2015	-	-	-	-	-	-	-	16.9	-	-	-	-	-	667.3	-	-	-	56.4	740.7
HG III	2014	-	-	-	32.4	323.1	-	-	-	1.4	397.8	-	-	-	419	-	40.9	-	32.4	1247.1
HG III	2015	-	-	-	-	36.7	-	-	536.1	-	-	409.1	-	-	931.2	-	-	-	-	1913.1
HG III	2015	409.1	-	-	77.6	-	-	-	-	-	-	1235.9	-	-	846.5	-	2497.2	-	-	5066.3
HG III	2015	-	-	-	-	-	-	273.7	-	180.6	-	-	-	-	380.9	12191	-	3493.2	-	16519.5
HG IV	2014	-	-	-	22.6	-	-	-	-	-	-	-	-	-	77.6	-	-	-	-	100.2
HG IV	2015	-	-	-	-	-	-	-	-	-	-	-	-	-	1410.8	2327.9	-	-	-	3738.7
HG IV	2015	-	-	-	-	-	-	719.5	-	-	-	-	-	-	114.3	126.3	-	-	-	960.1
HG IV	2015	-	-	-	-	-	-	-	-	-	-	-	-	-	244.1	2991	-	-	-	3235
HG IV Lander	2014	426.6	107.2	-	4.3	87.8	-	48.3	1.3	1.7	80.3	-	-	1.8	76.9	-	-	-	-	836
N5	2015	-	-	-	-	-	-	-	-	-	-	-	-	-	812.6	17089.4	-	-	-	17902.1
N5	2015	-	-	-	46.6	1100.5	-	-	-	-	-	-	-	-	134	5220.1	-	-	-	6501.1
N5	2015	-	-	-	40.9	-	-	-	-	-	-	-	-	-	56.4	-	-	-	-	97.3
Portion on entire community (%)		0.9	0.04	0.05	16	2.7	2.1	0.4	0.9	0.2	1.4	1.2	0.1	0.001	57	14	1.2	2.1	0.1	

Table S7. Meiofauna density in individuals 10 cm^{-2}, values base on sediment core replicates.

Station	Year	Cladocera	Cnidaria	Copepoda	Halacaroidea	Kinorhyncha	Nauplii	Nematoda	Oligochaeta	Ostracoda	Polychaeta	Porifera	Priapulida	Rotifera	Sipuncula	Tanaidacea	Tardigrada	Unidentified	Total density
EG I	2014	-	-	6.4	-	9.5	9.5	197.4	-	3.2	3.2	-	-	-	-	-	-	-	229.2
EG II	2014	-	-	9.5	-	-	-	63.7	-	9.5	-	-	-	-	-	-	-	-	82.8
EG III	2014	-	-	3.2	-	-	-	82.8	-	-	-	-	-	-	-	-	-	-	85.9
EG IV	2015	-	-	3.2	-	-	-	226.7	-	-	-	-	-	-	-	-	-	-	229.9
EG IV	2015	-	-	-	-	-	3.2	159.2	-	-	-	-	-	-	-	3.2	-	-	165.5
EG IV	2015	-	-	15.9	-	-	15.9	248.3	3.2	6.4	3.2	-	-	-	-	-	-	-	292.9
EG IV	2015	-	-	-	-	-	3.2	7.3	3.2	-	3.2	-	-	-	-	-	-	-	16.9
EG V	2014	-	-	9.5	-	-	15.9	21.8	-	3.2	3.2	3.2	-	-	-	-	-	-	56.9
SV I	2015	-	-	28.6	-	9.5	85.9	1142.8	12.7	47.7	20	-	-	6.4	-	-	-	-	1353.7
SV I	2015	-	3.2	11.9	-	6.4	73.2	671.7	20	20	35.2	-	-	-	3.2	-	31.8	-	876.4
SV I	2015	-	-	111.4	3.2	22.3	82.8	786.2	12.7	57.3	31.8	-	-	6.4	3.2	-	12.7	3.2	1133.2
HG I	2014	-	-	5.9	-	9.5	44.6	391.5	-	6.4	16	-	-	-	3.2	-	-	-	477.1
HG I	2015	-	-	3.2	-	-	20	2.5	-	-	3.2	-	-	-	-	-	-	-	28.9
HG I	2015	-	-	20	-	-	22.3	20	3.2	6.4	9.5	-	-	-	-	-	-	-	81.4
HG I Lander	2014	-	-	9.5	-	-	3.2	331.4	-	3.2	6.4	-	-	-	-	-	-	-	353.7
HG I Lander	2014	-	-	-	-	-	3.2	13.6	-	-	3.2	-	-	-	-	-	-	-	19.9
HG I Lander	2015	-	-	6.4	-	-	6.4	437	-	-	3.2	-	-	-	-	-	-	3.2	456.1
HG I Lander	2015	-	-	25.5	-	-	15.9	515.7	3.2	3.2	6.4	-	-	-	3.2	-	-	-	573
HG I Lander	2015	-	-	6.4	-	-	12.7	241.9	-	-	3.2	-	-	-	-	-	-	-	264.2
HGII	2014	-	-	9.5	-	-	9.5	366.6	-	3.2	-	-	3.2	-	-	-	-	-	392
HGII	2015	-	-	3.2	-	-	12.7	226.7	-	3.2	3.2	-	-	-	-	-	-	-	249
HGII	2015	-	-	3.2	-	-	3.2	168.8	-	-	3.2	-	-	-	-	6.4	-	-	184.7
HGII	2015	-	-	6.4	-	-	-	257.8	3.2	6.4	9.5	-	-	-	-	-	-	-	283.3
HGIII	2014	-	-	6.4	-	-	20	235.5	-	6.4	-	-	-	-	-	-	-	-	268.3
HGIII	2015	-	-	-	-	-	-	165.5	-	-	-	-	-	-	-	-	-	-	165.5
HGIII	2015	-	-	12.7	-	3.2	6.4	235.6	-	-	3.2	-	-	-	-	-	-	-	261
HGIII	2015	-	-	12.7	-	6.4	3.2	353.3	9.5	3.2	9.5	-	-	-	-	-	-	-	397.9
HGIV	2014	-	-	-	-	-	-	13.6	-	-	-	-	-	-	-	-	-	-	13.6
HGIV	2015	-	-	6.4	-	-	-	334.2	-	-	-	3.2	-	-	-	-	-	-	343.8
HGIV	2015	-	-	6.4	3.2	-	-	44.3	-	-	-	-	-	-	-	-	-	3.2	57
HGIV	2015	-	-	3.2	-	-	9.5	493.4	-	-	3.2	-	-	-	-	6.4	-	-	515.7
HG IV Lander	2014	-	-	-	-	-	-	76.4	-	-	-	-	-	-	-	-	-	-	76.4
HG IV Lander	2014	-	-	-	-	-	-	11.9	-	-	-	-	-	-	-	-	-	-	11.9
HG IV Lander	2014	-	-	3.2	-	-	-	114.6	-	3.2	3.2	-	-	-	-	-	-	-	124.1
HG IV Lander	2015	-	3.2	28.6	-	-	22.3	487.3	3.2	3.2	3.2	-	-	-	-	-	-	9.5	560.5
HG IV Lander	2015	-	-	9.5	-	-	6.4	52.9	-	-	-	-	-	-	-	-	-	9.5	78.4
HG IV Lander	2015	-	-	-	3.2	3.2	6.4	34.6	6.4	-	3.2	-	-	-	-	-	-	-	56.9
SV IV	2015	-	-	22.3	-	-	22.3	261.2	3.2	6.4	6.4	-	-	3.2	-	-	-	-	324.9
SV IV	2015	-	-	15.9	-	3.2	20	518.9	-	3.2	9.5	-	-	6.4	-	-	-	-	577.1
SV IV	2015	3.2	-	6.4	-	-	3.2	276.9	-	6.4	9.5	-	-	-	-	-	-	-	305.6
N5	2015	-	-	-	-	-	-	114.6	9.5	-	3.2	-	-	3.2	-	-	-	-	130.5

N5	2015	-	-	-	-	-	3.2	299.2	12.7	3.2	3.2	-	-	3.2	-	-	-	-	324.7
N5	2015	-	-	-	-	-	9.5	324.7	9.5	-	6.4	-	-	-	-	-	-	-	350.2
Portion on entire community (%)		0.02	0.05	3.4	0.1	0.6	4.5	86	0.9	1.7	1.8	0.05	0.02	0.2	0.1	0.1	0.3	0.2	

Table S8. Eigenvalue, explained proportion and species score of the PCA to explore if data from 2014 and 2015 differ. In dimension two, the species score of Year of Sampling is high and goes along with high Phaeo, CPE, and Organic matter values. This means, that on the second dimension, which explains only 15.4 % of the total variability in the dataset, the differences between the years are mostly explained by differences in the food supply, which in turn can be explained by the different sampling periods in 2014 and 2015 (see Table 1).

		Dim. 1	Dim. 2
Importance of components	Eigenvalue	6.4	2.2
	Proportion explained	45.9	15.4
Species scores	Year of sampling	0.03	-0.72
	Water depth	-1.56	<0.01
	Sea-ice cover	-1.54	0.11
	% of days with sea ice	-1.52	0.21
	Grain size >63µm	-1.06	-0.45
	Median grain size	-1	1
	TOC	1.46	0.42
	Organic matter	0.53	0.88
	Chl *a*	1.24	-0.82
	Phaeo	1.29	-0.99
	CPE	1.3	-0.98
	FDA	0.87	-0.71
	Protein	0.96	0.83
	Lipids	-0.28	-0.31

Table S9. P-values of Shapiro–Wilk test, p-value of the slope of the linear regression between water depth and a determined parameter within the HSC and LSC categories. If the p-value of the Shapiro–Wilk test is <0.05, the residuals over the slope of the linear regression did not follow the Gaussian distribution, a linear regression analysis is not allowed. Therefore, a significance test of the slope could not be performed (cases marked with an X). A p-value <0.05 of the linear regression between water depth and the parameter indicates a significant correlation with water depth. The table only shows parameters, for which at least in one sea-ice category the p-value of the Shapiro–Wilk test was >0.05. The abbreviation "Log_e" refers to a natural logarithmic transformation of the data and "Sqrt" refers to a square root transformation.

Parameter	Sea-ice category	Transformation	P-value of Shapiro–Wilk test	P-value of correlation water depth vs parameter
Grainsize fraction >63µm	HSC	Log_e	0.1335	$<2.2^{-16}$
	LSC	Log_e	6.08^{-5}	X
Median grain size	–	–	–	–
Water content	HSC	Log_e	0.2555	0.982
	LSC	Log_e	0.5499	8.03^{-16}
TOC	–	–	–	–
Organic matter	–	–	–	–
Chl *a*	HSC	Log_e	0.02738	X
	LSC	Log_e	0.8455	6.27^{-10}
Phaeo	HSC	Sqrt	0.4688	3.64^{-05}
	LSC	Sqrt	0.2599	4.53^{-11}
CPE	HSC	Sqrt	0.436	5.88^{-05}
	LSC	Sqrt	0.2966	4.16^{-11}
Chl *a*–Phaeo ratio	HSC	Log_e	0.1722	6.99^{-06}
	LSC	Log_e	0.1711	0.393
Chl *a*–CPE ratio	HSC	Sqrt	0.2957	5.01^{-06}
	LSC	Sqrt	5.681^{-3}	X
Lipid	HSC	–	0.2131	1.71^{-07}
	LSC	–	5.06^{-6}	X
Protein	HSC	Log_e	2.981^{-3}	X
	LSC	Log_e	0.1535	1.49^{-10}
FDA	HSC	Sqrt	0.273	0.09921
	LSC	Sqrt	0.1974	0.02761
Bacteria density	HSC	Sqrt	0.02426	X
	LSC	Sqrt	0.1301	4.695^{-3}
Meiofauna density	HSC	–	0.4126	0.3965
	LSC	–	0.4029	0.8904
Macrofauna density	HSC	Log_e	0.5036	0.3176
	LSC	Log_e	0.3221	0.03781
Macrofauna biomass	HSC	Log_e	0.2181	0.358
	LSC	Log_e	0.9267	0.0916

Bioirrigation	HSC	Log_e	0.2556	0.1884
	LSC	Log_e	0.4628	0.4846
BPc	HSC	–	0.8313	3.97^{-4}
	LSC	–	0.7673	2.60^{-3}
DOU	HSC	Log_e	0.3479	0.7941
	LSC	Log_e	0.219	3.45^{-6}
TOU	HSC	Log_e	0.6604	0.8043
	LSC	Log_e	0.5351	0.1999

Table S10. Results of the SIMPER analyses regarding sea-ice categories HSC and LSC. The table shows the three most contributing taxa to the within-group similarity and to the dissimilarity between the groups.

Meiofauna density				Macrofauna density				Macrofauna biomass			
HSC		LSC		HSC		LSC		HSC		LSC	
In-group similarity		In-group similarity		In-group similarity		In-group similarity		In-group similarity		In-group similarity	
Taxa	Contribution (%)	Taxa	Contribution (%)	Taxa	Contribution (%)	Taxa	Contribution [%]	Taxa	Contribution [%]	Taxa	Contribution [%]
Nematoda	80.9	Nematoda	77	Polychaeta	52.8	Polychaeta	44.6	Polychaeta	63.4	Polychaeta	76
Nauplii	5.3	Copepoda	8.9	Copepoda	17.2	Nematoda	22.7	Bivalvia	15.5	Bivalvia	8.9
Copepoda	4.5	Nauplii	6.6	Bivalvia	13.9	Bivalvia	10.3	Cumacea	11.8	Porifera	3.2
Dissimilarity between groups				Dissimilarity between groups				Dissimilarity between groups			
Taxa		Contribution (%)		Taxa		Contribution (%)		Taxa		Contribution (%)	
Nematoda		32.8		Copepoda		24.5		Polychaeta		22.2	
Nauplii		14		Polychaeta		14.6		Porifera		18.4	
Copepoda		13		Nematoda		13.5		Bivalvia		12.9	

Table S11. ANOSIM and SIMPER results of the meio- and macrofauna community within water depth categories. The table shows that significant differences in the meiofauna community are only found between the shallow station SV I (275 m) and all other stations. Within the macrofauna community differences were additionally found between 1000 m vs. 2000 m and 1000 m vs. 2500 m. The most contributing taxa regarding the within-group similarity within the water depth categories and the dissimilarity between the water depth categories are given in Table S10.

Meiofauna density												
ANOSIM	Global R		0.219									
	p-value		0.01									
	pairwise test	Depth category pairs	275-1000 m	275-1500 m	275-2000 m	275-2500 m	1000-1500 m	1000-2000 m	1000-2500 m	1500-2000 m	1500-2500 m	2000-2500 m
		R	0.921	1	0.856	0.908	0.13	0.11	0.152	-0.136	-0.06	-0.064
		p-value	0.008	0.018	0.018	0.002	0.148	0.176	0.074	0.873	0.631	0.685
SIMPER		Depth category	275 m		1000 m		1500 m		2000 m		2500 m	
		In-group similarity (%)	67.21		78.29		69.81		67.21		67.63	
		Depth category pairs	275-1000 m	275-1500 m	275-2000 m	275-2500 m	1000-1500 m	1000-2000 m	1000-2500 m	1500-2000 m	1500-2500 m	2000-2500 m
		Dissimilarity	40.66	54.77	55.71	56.07	27.54	29.99	32.66	28.52	31.41	30.91
Macrofauna density												
ANOSIM	Global R		0.2									
	p-value		0.008									
	pairwise test	Depth category pairs	275-1000 m	275-1500 m	275-2000 m	275-2500 m	1000-1500 m	1000-2000 m	1000-2500 m	1500-2000 m	1500-2500 m	2000-2500 m
		R	0.565	0.185	-0.097	0.328	-0.005	0.252	0.158	-0.044	0.159	0.238
		p-value	0.014	0.2	0.607	0.062	0.442	0.055	0.016	0.619	0.187	0.061
SIMPER			275 m		1000 m		1500 m		2000 m		2500 m	
		In-group similarity (%)	39		55.98		48.07		35.34		50.55	
		Depth category pairs	275-1000 m	275-1500 m	275-2000 m	275-2500 m	1000-1500 m	1000-2000 m	1000-2500 m	1500-2000 m	1500-2500 m	2000-2500 m
		Dissimilarity	61.49	66.71	59.61	59.88	45.97	55.61	51.95	58.86	55.52	58.69
Macrofauna biomass												
ANOSIM	Global R		0.2									
	p-value		0.008									
	pairwise test	Depth category pairs	275-1000 m	275-1500 m	275-2000 m	275-2500 m	1000-1500 m	1000-2000 m	1000-2500 m	1500-2000 m	1500-2500 m	2000-2500 m
		R	0.39	0.56	0.49	0.78	0.27	0.38	0.50	-0.09	0.16	0.12
		p-value	0.04	0.03	0.04	0.20	0.07	0.01	<0.01	0.76	0.18	0.14
SIMPER			275 m		1000 m		1500 m		2000 m		2500 m	
		In-group similarity (%)	52		41		35		23		33	
		Depth category pairs	275-1000 m	275-1500 m	275-2000 m	275-2500 m	1000-1500 m	1000-2000 m	1000-2500 m	1500-2000 m	1500-2500 m	2000-2500 m
		Dissimilarity	68	81	85	89	68	73	79	71	74	74

Table S12. Results of the two-way crossed PERMANOVA on standardised and fourth roots transformed macrofauna density and macrofauna biomass data based on a Bray Curtis similarity. The term "sp" includes the sea-ice categories HSC and LSC and the term "de" the water depth category levels 1000 m ,1500 m, 2000 m, and 2500 m.

	Source	df	SS	MS	Pseudo-F	P(perm)	perms
Macrofauna density	sp	1	113.59	113.59	3.2188	0.0075	9948
	de	3	168.28	56.093	1.5895	0.0568	9917
	sp x de	3	157.13	52.376	1.4841	0.0857	9903
	Res	21	741.09	35.29			
	Total	28	1132.2				
Macrofauna biomass	sp	1	3116.9	3116.9	3.7012	0.0511	4512
	de	3	7114.5	2371.5	2.8161	0.0584	9558
	sp x de	3	6421.1	2140.4	2.5416	0.0342	9905
	Res	3	2526.4	842.13			
	Total	10	19235				

Table S13. Results of the PERMANOVA pair-wise test on standardised and fourth roots transformed macrofauna density and macrofauna biomass data based on a Bray Curtis similarity.

	Groups	p-value	pperm	P(MC)	t-
Macrofauna density	1000 m-1500 m	0.4546	8260		0.989
	1000 m-2000 m	0.0116	9427		1.836
	1000 m-2500 m	0.0004	9952		2.446
	1500 m-2000 m	0.0192	2470		1.841
	1500 m-2500 m	0.0072	9924		2.139
	2000 m-2500 m	0.0424	9938		1.651
	LSC-HSC	0.0048	9949		2.055
Macrofauna biomass	1000 m-1500 m	0.3311	15	0.4804	1.0314
	1000 m-2000 m	0.1196	15	0.2451	1.7717
	1000 m-2500 m	0.0187	420	0.0464	2.2335
	1500 m-2000 m	No test			
	1500 m-2500 m	0.115	38	0.1266	1.9021
	2000 m-2500 m	0.1619	38	0.2902	1.291
	LSC-HSC	0.0515	4488	0.0787	1.9239