Supplementary Material

Kiesel et al., 2020 Benthic Ecosystem Functioning Arctic Ocean

1. Supplementary Figures

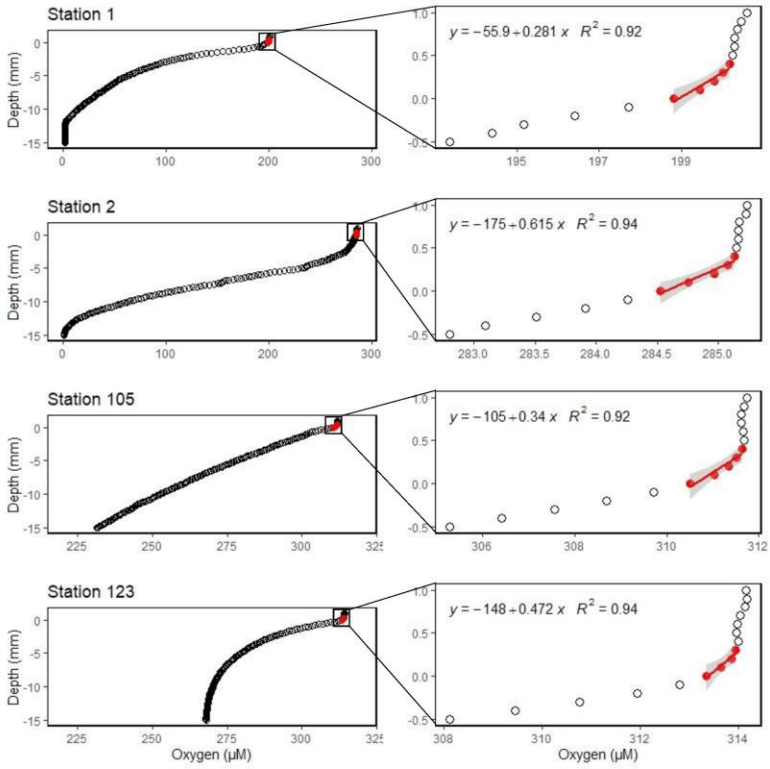

Figure S1: Four examples of oxygen microprofiles obtained during PS94 are shown (panels left hand side). Oxygen penetration depth on the shelf was typically between 1 - 1.5 cm. In the deep sea, the microprofiles never reached anoxic sediments. The right hand side of the graph shows the linear regression of oxygen decline within the diffusive boundary layer. The latter was used to derive DOU rates (Station 1 (shelf) = 0.36 mmol m^{-2} d^{-1}; Station 2 (shelf) = 0.16 mmol m^{-2} d^{-1}; Station 105 (deep sea) = 0.29 mmol m^{-2} d^{-1}; Station 123 (deep sea) = 0.21 mmol m^{-2} d^{-1}).

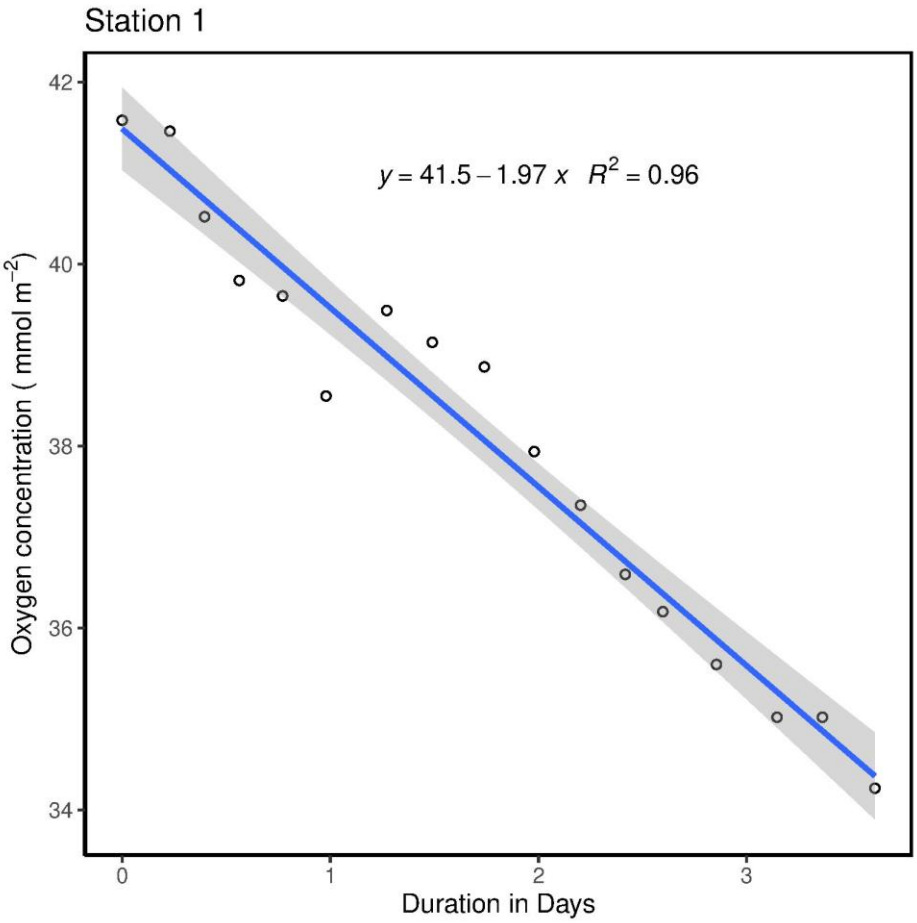

Figure S2: Example of a time series showing oxygen consumption over incubation time in one of the sediment cores at Station 1. The slope of the linear regression was used to derive TOU rates (1.97 mmol m^{-2} d^{-1}). The median TOU within the three control cores (BWU Station 1 = 0.29 mmol m^{-2} d^{-1}) of the same station was finally subtracted from TOU (TOU_{sed} = 1.68 mmol m^{-2} d^{-1}).

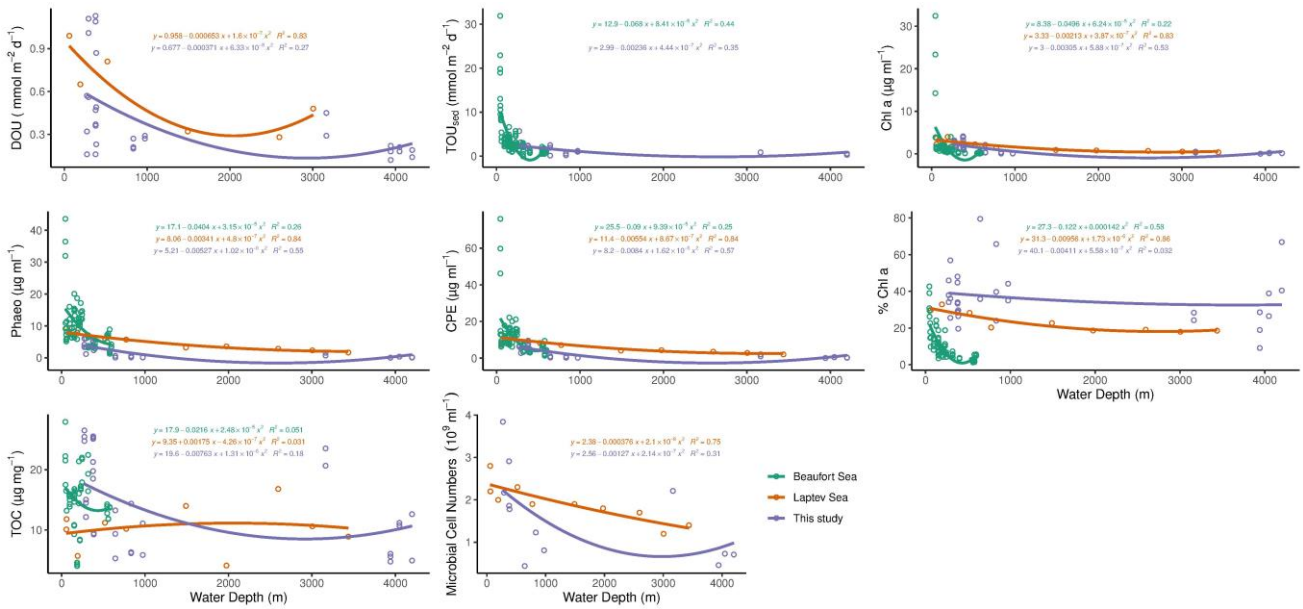

Figure S3: Relationship of DOU, TOU, microbial cell numbers and environmental parameters with water depth. In the following the p-values for the correlation statistics are given: 1) DOU: Laptev p = 0.07, PS94 p = 0.017; 2) TOU_{sed}: Beaufort p < 0.0005, PS94 p = 0.02; 3) Chl a: Laptev p = 0.002, Beaufort p < 0.0005, PS94 p = 0.53; 4) Phaeo: Laptev p = 0.002, Beaufort p < 0.0005, PS94 p < 0.0005; 5) CPE: Laptev p = 0.002, Beaufort p < 0.0005, PS94 p < 0.0005; 6) % Chl a: Laptev p = 0.001, Beaufort p < 0.0005, PS94 p = 0.63; 7) TOC: Laptev p = 0.89, Beaufort p = 0.31, PS94 p = 0.06; 8) Microbial cell numbers: Laptev p = 0.08, PS94 p = 0.19.

2. Supplementary Tables

Table S1: Summary table of stations and parameters sampled in the Laptev and Beaufort Sea.

*1 = https://doi.org/10.1594/PANGAEA.892280; *2 = https://doi.org/10.1594/PANGAEA.863150; *3 = https://doi.org/10.1594/PANGAEA.892279; *4 = https://doi.org/10.1594/PANGAEA.892286; *5 = https://doi.org/10.1594/PANGAEA.908091

Station	Date	Latitude	Longitude	Depth	Habitat	Region	Sampled parameters at all stations	PANGAEA doi
PS80/302-1	2012-08-30	77.415	133.553	57	shelf	Laptev Sea	Chlorophyll pigments	*1
PS80/309-1	2012-09-01	77.526	114.46	60	shelf	Laptev Sea		
PS80/310-1	2012-09-01	77.254	118.555	193	shelf	Laptev Sea		
PS80/312-1	2012-09-01	77.406	118.2	520	shelf	Laptev Sea	TOC	*2
PS80/299-1	2012-08-29	78.139	133.343	774	deep sea	Laptev Sea		
PS80/313-1	2012-09-01	77.689	118.583	1490	deep sea	Laptev Sea		
PS80/296-1	2012-08-29	78.389	133.195	1976	deep sea	Laptev Sea	Microbial cell numbers	*3
PS80/318-1	2012-09-02	78.667	118.747	2596	deep sea	Laptev Sea		
PS80/320-1	2012-09-02	79.17	119.789	3005	deep sea	Laptev Sea		
PS80/292-1	2012-08-28	79.65	130.604	3437	deep sea	Laptev Sea	DOU	*4
Malina_110	2009-08-06	71.696	126.477	400	shelf	Beaufort Sea		
Malina_140	2009-08-07	71.285	127.783	154	shelf	Beaufort Sea		
Malina_260	2009-08-04	71.269	130.613	60	shelf	Beaufort Sea		
Malina_390	2009-07-31	70.178	133.569	47	shelf	Beaufort Sea		
ANet2009_408	2009-10-13	71.286	127.782	152	shelf	Beaufort Sea		
CFL9_416	2008-07-10	71.289	127.761	158	shelf	Beaufort Sea		
CFL9_434	2008-06-30	70.177	133.537	45	shelf	Beaufort Sea		
CFL9_435	2008-07-02	71.072	133.876	318	shelf	Beaufort Sea	Chlorophyll pigments	*5
ANet2009_437	2009-10-14	71.779	126.477	320	shelf	Beaufort Sea		
Malina_680	2009-08-10	69.611	138.235	125	shelf	Beaufort Sea		
Malina_690	2009-08-01	69.486	137.942	55	shelf	Beaufort Sea		
CFL9_1116	2008-06-14	70.042	126.277	230	shelf	Beaufort Sea		
CFL9_1200	2008-06-27	71.532	124.297	207	shelf	Beaufort Sea	TOC	*5
CFL9_1216	2008-06-23	70.615	127.616	151	shelf	Beaufort Sea		
CFL9_9002	2008-07-07	74.298	125.376	219	shelf	Beaufort Sea		
CFL8_1020A	2008-07-27	71.028	127.088	245	shelf	Beaufort Sea		
CFL9_D34	2008-07-13	71.070	121.823	186	shelf	Beaufort Sea		

CFL9_DB01	2008-06-19	69.827	123.604	95	shelf	Beaufort Sea	TOU	*5
CFL9_FB03	2008-06-16	69.968	125.862	97	shelf	Beaufort Sea		
CFL10A_405	2008-07-21	70.707	122.939	596	deep sea	Beaufort Sea		
ANet2009_405	2009-10-16	70.665	122.996	559	deep sea	Beaufort Sea		
CFL9_405B	2008-06-10	70.667	123.010	546	deep sea	Beaufort Sea		
Malina_345	2009-08-16	71.382	132.652	577	deep sea	Beaufort Sea		
Malina_235	2009-08-22	71.764	130.766	576	deep sea	Beaufort Sea		

Table S2: Results of partitioning the variation in DOU and TOU across shelf and deep-sea stations sampled during *Polarstern* expedition PS94. None of these models were significant; for significant models, see Table 3 in main text.

		DOU	**TOU**
model 3	overall model	n.s.	n.s.
	CPE	n.s.	n.s.
	TOC	n.s.	n.s.
	AODC	n.s.	n.s.
	bwt	n.s.	n.s.
	total covariation	-	-
model 4	overall model	n.s.	n.s.
	Chl a	n.s.	n.s.
	TOC	n.s.	n.s.
	AODC	n.s.	n.s.
	bwt	n.s.	n.s.
	total covariation	-	-
model 5	overall model	n.s.	n.s.
	% Chl a	n.s.	n.s.
	TOC	n.s.	n.s.
	AODC	n.s.	n.s.
	bwt	n.s.	n.s.
	total covariation	-	-
model 6	overall model	n.s.	n.s.
	% Chl a	n.s.	n.s.

TOC	n.s.	n.s.
AODC	n.s.	n.s.
total covariation	-	-