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Supporting Information:

Spectral Characterization of Dissolved Organic Matter in Seawater and Sediment Pore Water From the Arctic Fjords (West Svalbard) in Summer

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Supporting information: Table S1-S4 and Figures S1–S7.

Table S1. Original site names during 2016 R/V cruise with Helmer Hanssen.

Site	Original name
S1	HH16-1181-CTD
S2	HH16-1183-CTD
S3	HH16-1186-CTD
S4	HH16-1188-CTD
S5	HH16-1191-CTD
S6	HH16-1207-CTD
S7	HH16-1211-CTD
S8	HH16-1221-CTD
S9	HH16-1228-CTD
P3	HH16-1205-GC-MF
P4	HH16-1210-GC-MF
P5	HH16-1213-GC-MF
P7	HH16-1219-GC-MF

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Table S2. Summary of water chemistry and the DOM parameters for seawater in the West Svalbard fjords.

Item		S1	S2	S3	S4	S5	S6	S7	S8	S9
	Unit	n = 4	n = 4	n = 6	n = 10	n = 5	n = 5	n = 6	n = 7	n = 5
Longitude	^{0}E	15.3621	15.3099	15.3194	15.3479	15.2824	16.3541	15.6846	15.8500	1602634
Latitude	^{0}N	78.8036	78.7613	78.6998	78.6655	78.6435	77.8237	77.7969	76.9754	76.9835
Water Depth	m	36	65	75	95	100	69	86	195	109
Temperature	℃	6.5±2.9	3.7±4.3	3.6±3.7	3.2±3.8	3.5±3.7	3.1±1.9	3.4±1.7	3.5±1.2	2.4±1.8
Salinity	psu	29.0±7.3	33.1±2.4	33.5±1.4	32.6±4.6	33.2±2.1	33.1±1.4	33.3±1.0	33.9±0.9	32.2±4.0
Chlorinity	mM	260±176	508±31	518±26	503±62	475±40	526±19	521±16	531±11	433±175
Alkalinity	mM	1.7±0.2	2.6±0.2	2.8±0.0	2.7±0.2	2.4±0.0	2.8±0.0	2.8±0.0	2.8±0.0	2.3±0.9
PO_4^{3-}	uM	0.3±0.4	0.4±0.3	0.4±0.4	0.3±0.3	0.3±0.3	0.4±0.2	0.5±0.3	0.2±0.3	b.d.l.
a_{254}	m^{-1}	5.4±2.7	9.9±3.7	7.5±3.7	3.6±3.9	7.1±4.5	5.0±1.3	6.1±0.9	4.9±2.1	5.5±3.1
a_{320}	m^{-1}	0.00±0.00	0.38±0.73	0.11±0.23	0.04±0.08	0.03±0.07	0.16±0.28	0.33±0.58	0.03±0.07	0.13±0.29
FI		1.7±0.4	1.4±0.1	1.4±0.1	1.5±0.2	1.5±0.1	1.4±0.1	1.5±0.1	1.2±0.1	1.3±0.4
BIX		1.0±0.1	0.9±0.1	0.9±0.1	0.9±0.1	0.9±0.1	0.9±0.2	1.0±0.1	0.9±0.2	0.8±0.3
HIX		0.4±0.1	0.7±0.2	0.7±0.3	0.6±0.2	0.7±0.2	0.7±0.2	0.7±0.2	0.9±0.5	0.7±0.3
$B_{280/310}$	RU	1.8±0.1	1.8±0.1	1.8±0.1	1.8±0.1	1.8±0.1	1.7±0.1	1.8±0.1	2.4±1.0	1.7±0.7
$T_{280/340}$	RU	0.37±0.07	0.23±0.10	0.30±0.13	0.36±0.14	0.34±0.20	0.21±0.06	0.36±0.11	0.50±0.37	0.32±0.18
$M_{315/400}$	RU	0.05±0.01	0.07±0.03	0.09±0.05	0.12±0.05	0.09±0.03	0.07±0.02	0.11±0.04	0.16±0.13	0.09±0.06
$A_{260/420}$	RU	0.09±0.01	0.10±0.03	0.12±0.06	0.17±0.06	0.15±0.04	0.13±0.05	0.18±0.06	0.27±0.21	0.15±0.10
$C_{350/450}$	RU	0.03±0.01	0.03±0.01	0.05±0.02	0.06±0.02	0.05±0.01	0.04±0.02	0.07±0.02	0.10±0.09	0.05±0.04
$B_{280/310}$	%	77.0±1.7	80.8±4.2	77.3±6.6	72.9±6.1	75.3±7.2	79.2±4.6	71.9±5.8	72.4±6.2	67.2±23.4
$T_{280/340}$	%	15.4±1.7	10.0±3.1	12.2±3.4	13.8±3.4	13.2±5.8	9.7±2.2	14.1±3.3	13.6±3.5	11.7±4.4
$M_{315/400}$	%	2.3±0.4	3.0±1.0	3.5±1.5	4.5±1.5	3.6±0.8	3.3±0.8	4.2±1.1	4.3±1.2	3.4±1.4
$A_{260/420}$	%	4.0±0.6	4.6±1.0	5.1±1.5	6.6±1.7	6.0±1.0	6.0±2.0	7.2±1.8	7.0±2.0	5.4±2.2
$C_{350/450}$	%	1.3±0.3	1.5±0.3	1.9±0.6	2.2±0.8	1.9±0.5	1.8±0.6	2.6±0.8	2.7±1.1	1.9±0.9

Note: b.d. means “below detection”.

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Table S3. Summary of the water chemistry and the DOM parameters for pore waters in the West Svalbard fjords.

Item	Unit	P3 n = 11	P4 n = 6	P5 n = 9	P7 n = 6
Longitude	^{0}E	15.2852	16.3536	15.6889	15.8496
Latitude	^{0}N	78.3469	77.8261	77.7961	76.9770
Water Depth	m	260	69	86	195
Core Length	mbsf	4.65	2.03	3.55	1.60
Salinity	psu	34.8±0.5	33.8±0.5	34.2±0	31.4±2.4
Chlorinity	mM	551±9	530±8	541±3	487±41
Alkalinity	mM	13.9±8.8	3.1±1.6	11.4±4.5	11.9±3.0
PO_4^{3-}	uM	102.5±79.4	6.0±5.8	11.0±6.5	36.2±24.1
a_{254}	m^{-1}	59.6±35.7	90.4±12.4	57.8±10.8	59.0±13.3
a_{320}	m^{-1}	22.0±15.7	72.1±21.0	32.9±12.4	35.3±14.3
FI		1.5±0.1	1.5±0.0	1.5±0.2	1.5±0.0
BIX		0.8±0.1	0.9±0.1	0.8±0.0	0.9±0.0
HIX		3.1±1.8	3.5±1.5	3.2±1.3	1.4±0.5
$B_{280/310}$	RU	7.8±4.5	8.1±1.5	6.0±1.0	6.3±1.1
$T_{280/340}$	RU	2.5±1.7	1.4±0.3	2.2±1.0	2.4±1.1
$M_{315/400}$	RU	2.7±2.3	1.7±0.5	1.8±0.7	1.2±0.4
$A_{260/420}$	RU	5.4±4.8	4.1±1.8	4.8±1.8	2.3±0.7
$C_{350/450}$	RU	2.0±1.7	1.0±0.3	1.3±0.5	0.8±0.2
$B_{280/310}$	%	44.7±13.4	50.2±11.2	38.3±8.3	48.5±4.5
$T_{280/340}$	%	13.4±5.7	8.9±1.6	13.8±5.1	18.3±5.5
$M_{315/400}$	%	11.2±4.5	10.2±2.0	11.1±2.6	9.5±2.5
$A_{260/420}$	%	22.1±9.2	24.9±8.9	29.1±7.4	17.7±3.6
$C_{350/450}$	%	8.6±3.4	5.9±1.3	7.7±1.9	6.1±1.1

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Table S4. Comparison of first-order production rate constant k (m^{-1}) with depth (Eq. 2) for DOM, PO_4^{3-}, and alkalinity in the pore waters from the high Arctic ($p < 0.05$).

	Core length mbsf	$M_{315/400}$ RU	$A_{260/420}$ RU	$C_{350/450}$ RU	$B_{280/310}$ RU	$T_{280/340}$ RU	a_{254} m^{-1}	a_{320} m^{-1}	PO_4^{3-} uM	Alkalinity mM	R^2
Svalbard fjords											
P3	4.4	0.1	0.2	0.06	0.4	0.6	0.01	0.002	0.001	0.004	0.8-1.0
P4	1.2	0.1	0.2	0.005	–	–	–	–	–	0.4	0.7-1.0
P5	3.0	0.0007	0.0005	0.0004	–	–	–	–	–	0.001	0.8-1.0
P7	1.6	0.0003	0.0004	0.0004	–	–	–	–	–	0.0002	0.2-0.6
Chukchi Sea†		$C_{320/410}$	$C_{265/422}$	$C_{275(370)/452}$	$C_{280/308}$	–					
S1	6.8	0.0001	0.0001	0.0001	0.0003	–	0.0001	0.0001	0.00003	0.0001	0.3-0.9
S2	3.5	0.0002	0.1	–	6	–	6	6	–	0.0001	0.4-1.0
S3	4.9	2	2	3	1	–	0.0004	–	–	0.2	0.1-1.0
S4	10.5	0.005	3	–	11	–	1	2	–	0.001	0.7-1.0

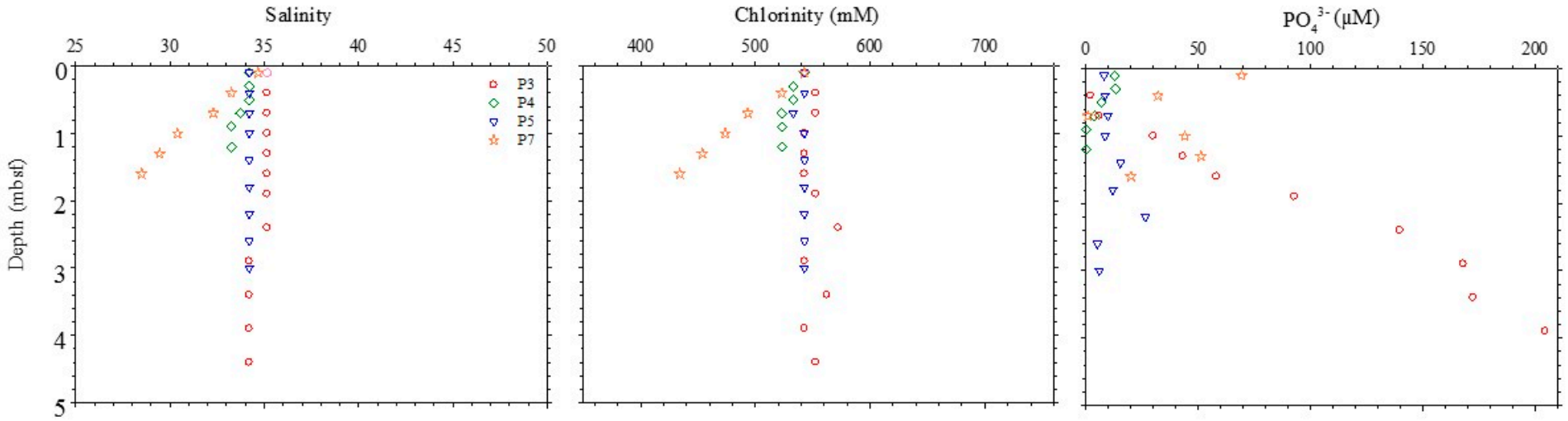

Figure S1. Downcore profile of salinity, Cl^-, and PO_4^{3-} in the pore waters from the west Svalbard fjords.

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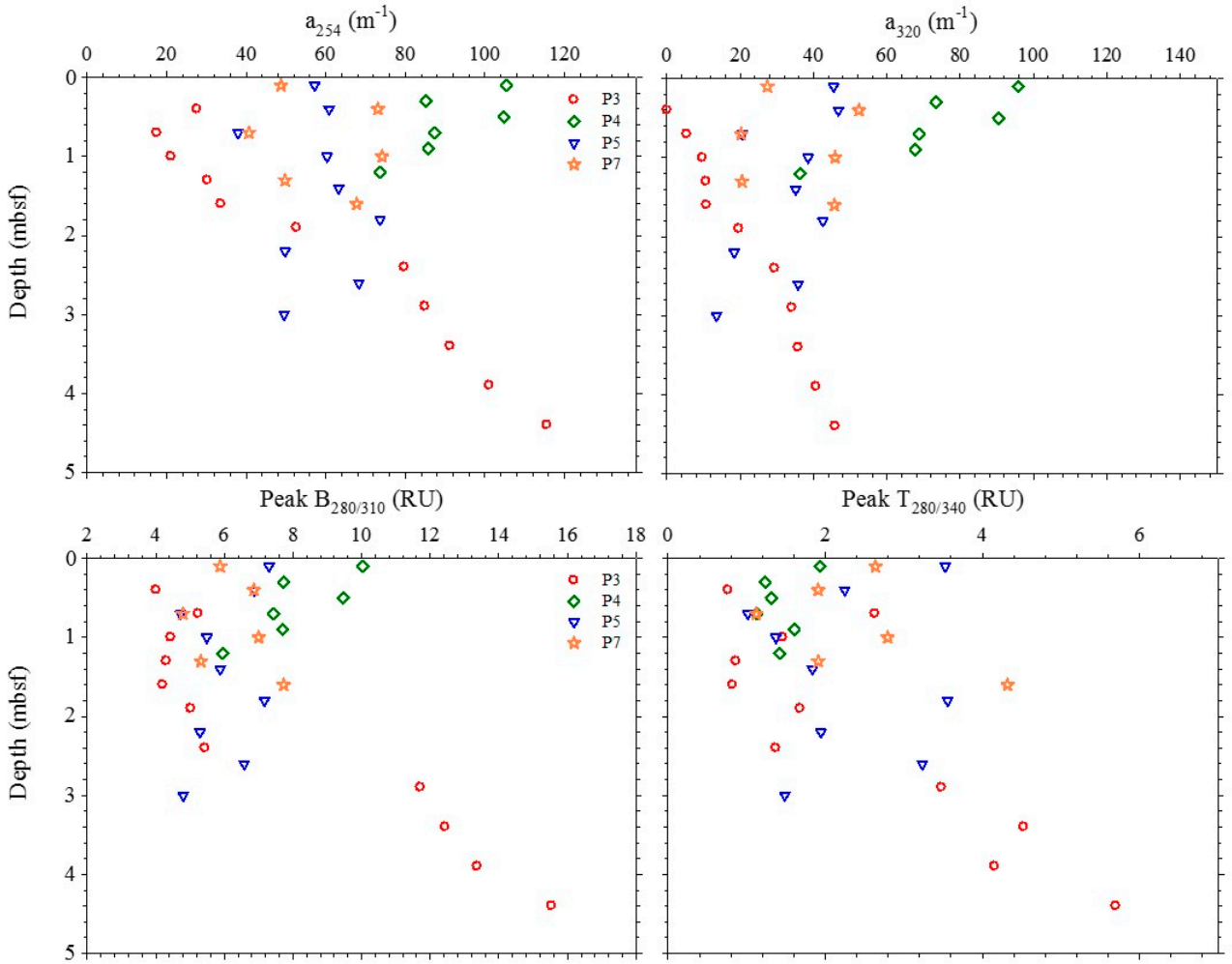

Figure S2. Downcore profile of absorption coefficients and protein-like peaks in pore waters from the west Svalbard fjords.

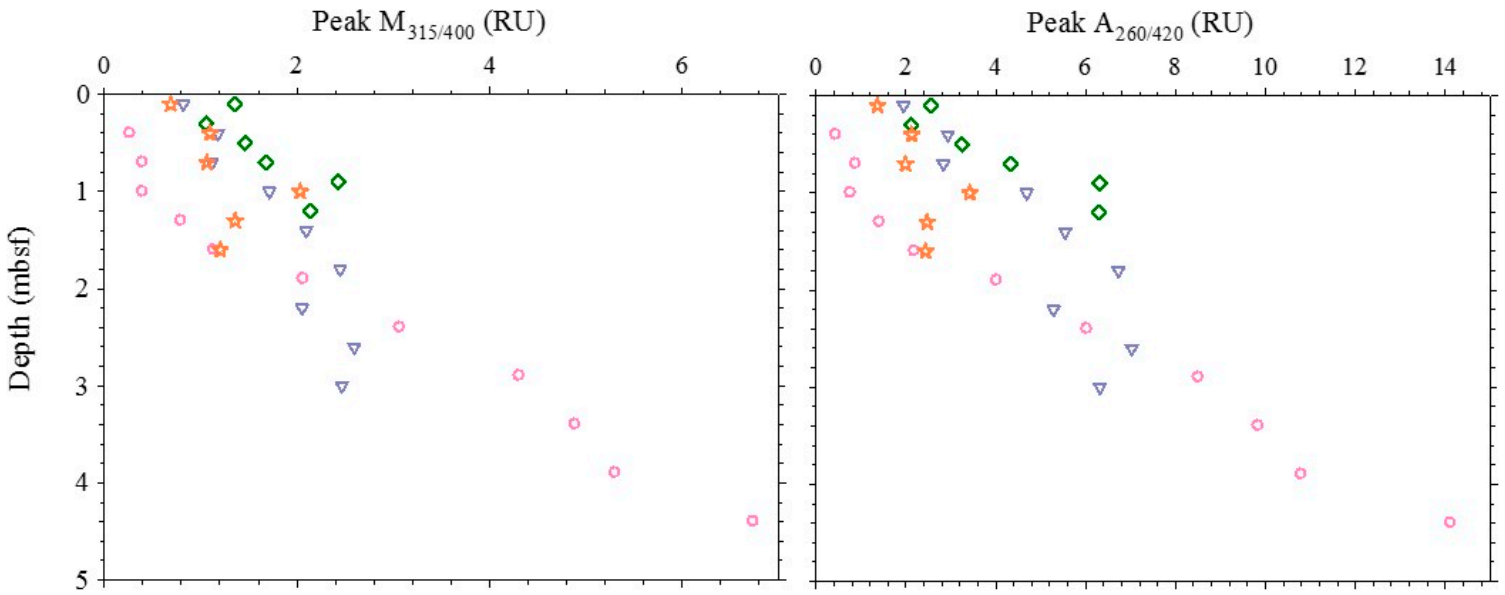

Figure S3. Examples of increasing downcore profile of the humic-like FDOM in pore waters from the west Svalbard fjords.

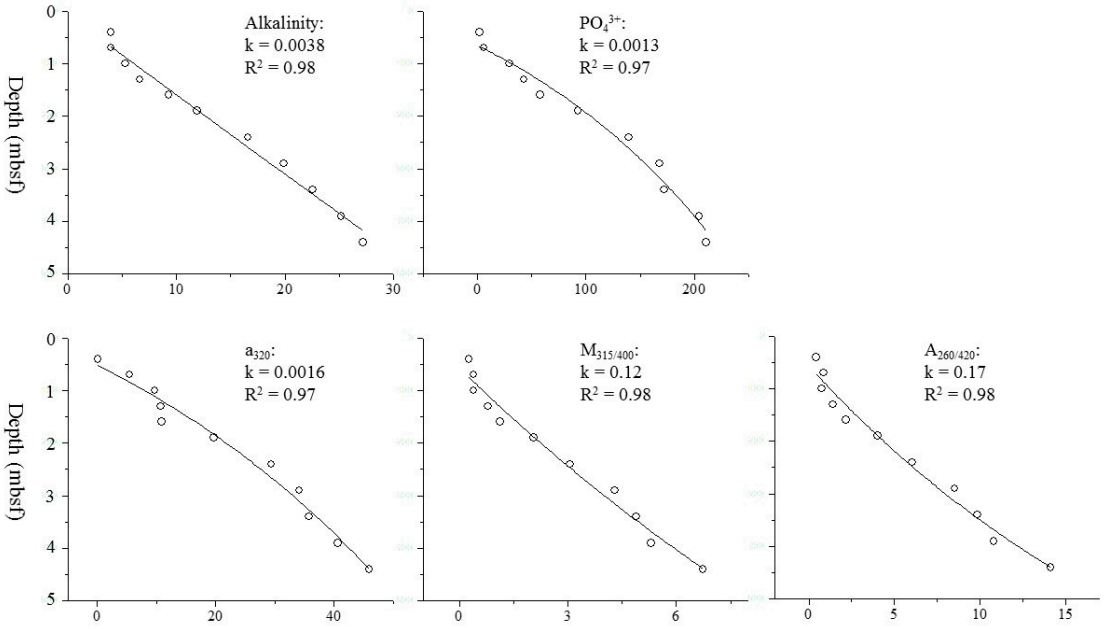

Figure S4. Examples of first order production ($C_d = a \times e^{(k \times d)} + b$) of nutrient, FDOM, and alkalinity ($p < 0.05$) with depth at site P3 for pore waters from the Svalbard Figure 4. k unit: m^{-1}.

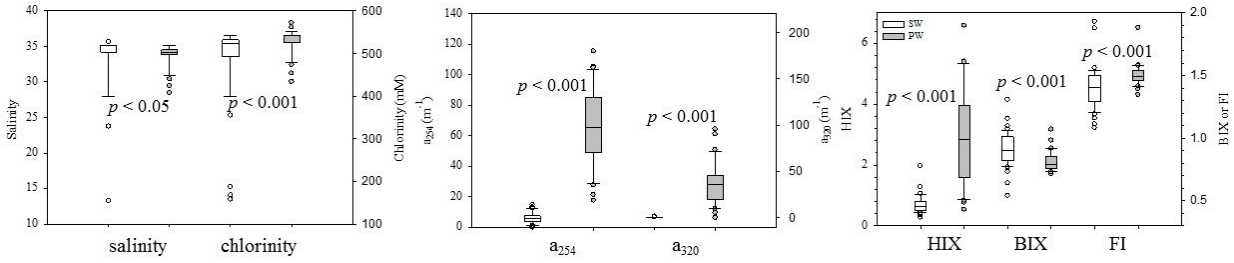

Figure. S5. Comparison of water chemistry and DOM parameters between surface and pore waters from the Svalbard fjords. *P*-values show beside each pair denote that they are significantly different when $p < 0.05$.

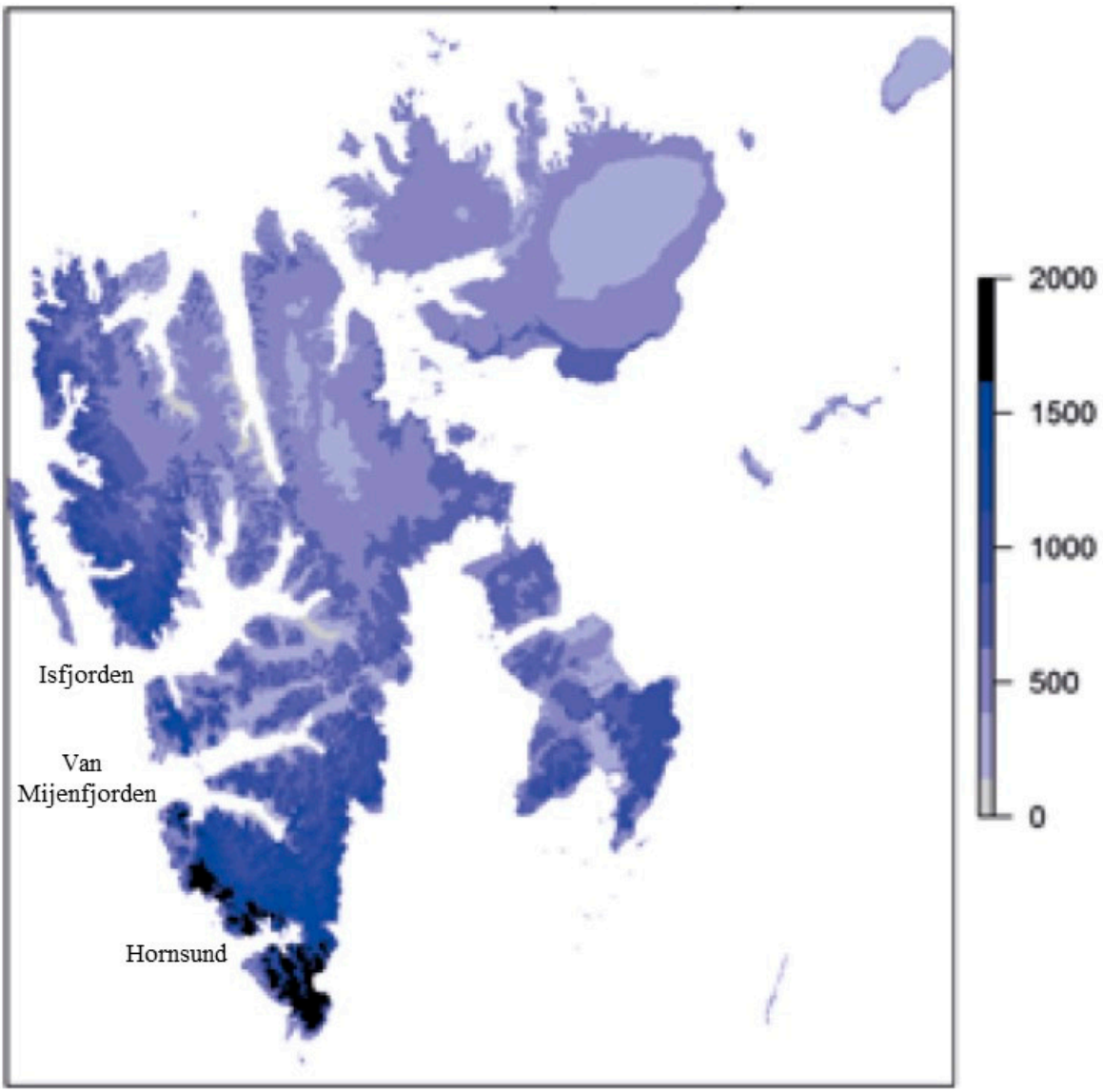

Figure 6. Estimated annual runoff (unit: mm yr^{-1}) in Svalbard. **From** http://www.miljodirektoratet.no/M1242, page 86.

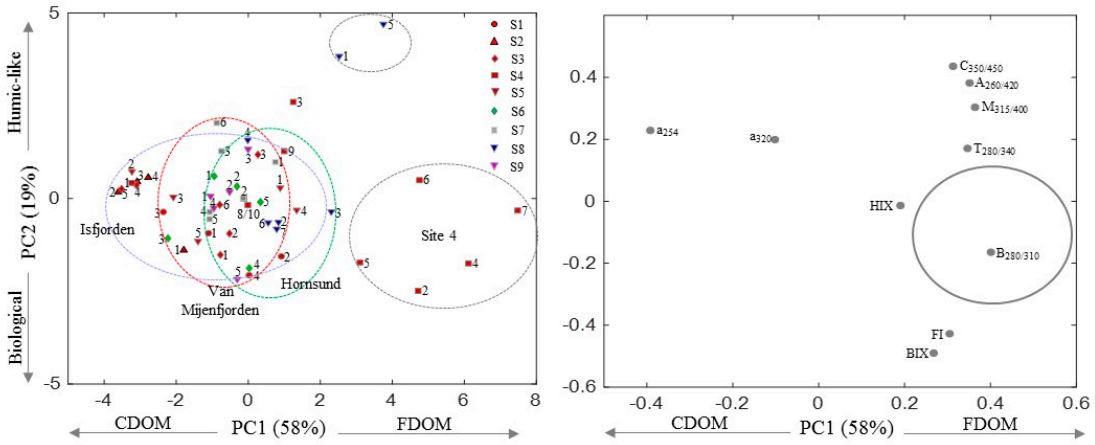

Figure S7. The principal component analysis (PCA) based on the optical parameters for the seawater (S) from the West Svalbard Fjord of the Arctic Ocean. The numbers beside the symbols are ordered with an increasing depth at each site.

Reference

Chen, M.; Kim, J.-H.; Nam, S.-I.; Niessen, F.; Hong, W.-L.; Kang, M.-H.; Hur, J. Production of fluorescent dissolved organic matter in Arctic Ocean sediments. *Scientific Reports* **2016,** *6*, 39213.