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## Supplementary Figures

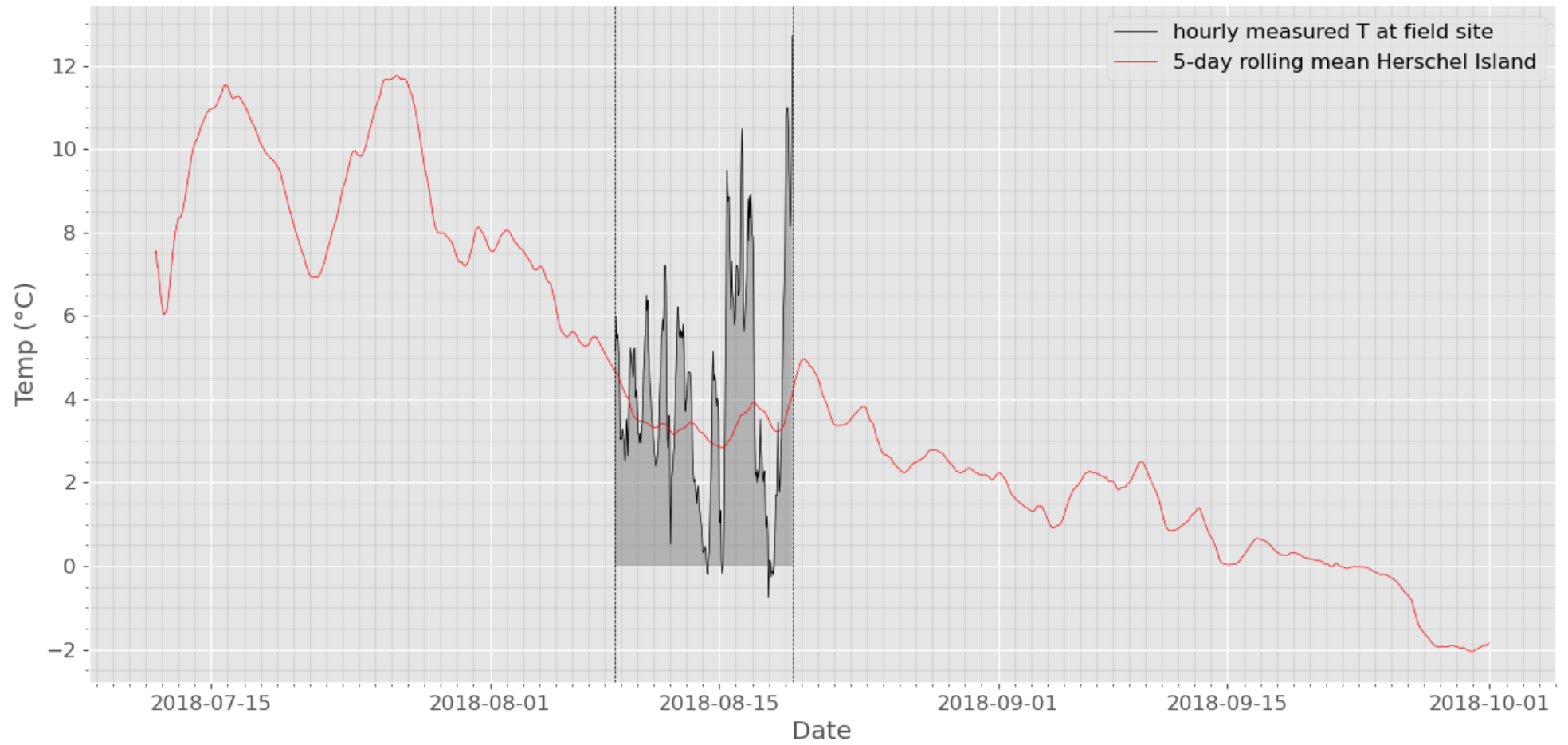


Figure S1. 5-day rolling mean temperature as measured on Herschel Island (July until October) in red and field site measured temperature (hourly) during the monitoring period.

## Supplementary Figures

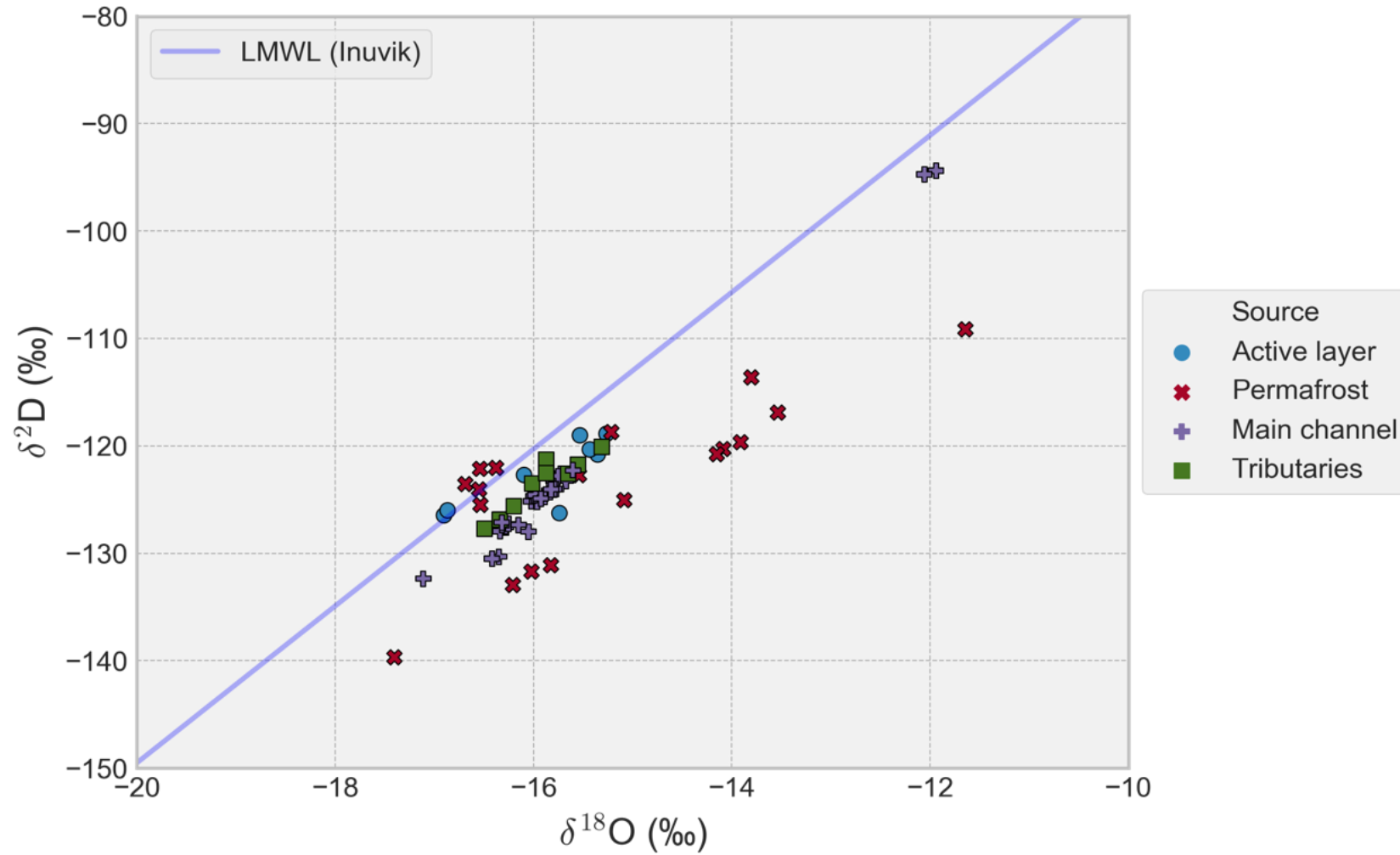


Figure S2. Summary of values of stable water isotopes with respect to the LMWL (Inuvik, Fritz et al., 2016).

## Supplementary Tables

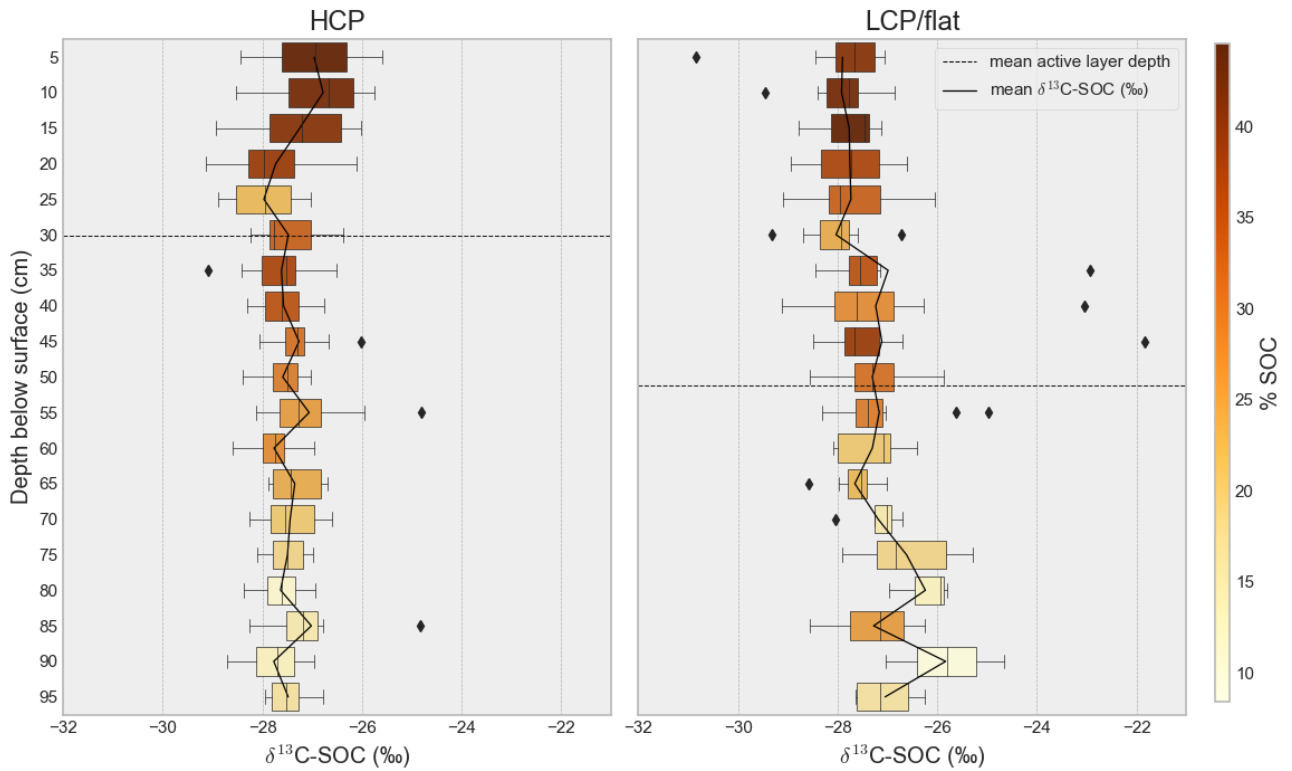


Figure S3. Mean soil SOC content (%) and  $\delta^{13}\text{C-SOC}$  (‰) results aggregated to 5 cm increments. Clearly visible is the difference in active layer depth between HCP (~30 cm) and LCP/flat (~52 cm) types. The HCP  $\delta^{13}\text{C-SOC}$  values show a more heterogeneous pattern over the depth of the active layer which might be attributable to increased drainage compared to LCP, which promotes preferential leaching, sorption and transport within the soil profile.

## Supplementary Tables

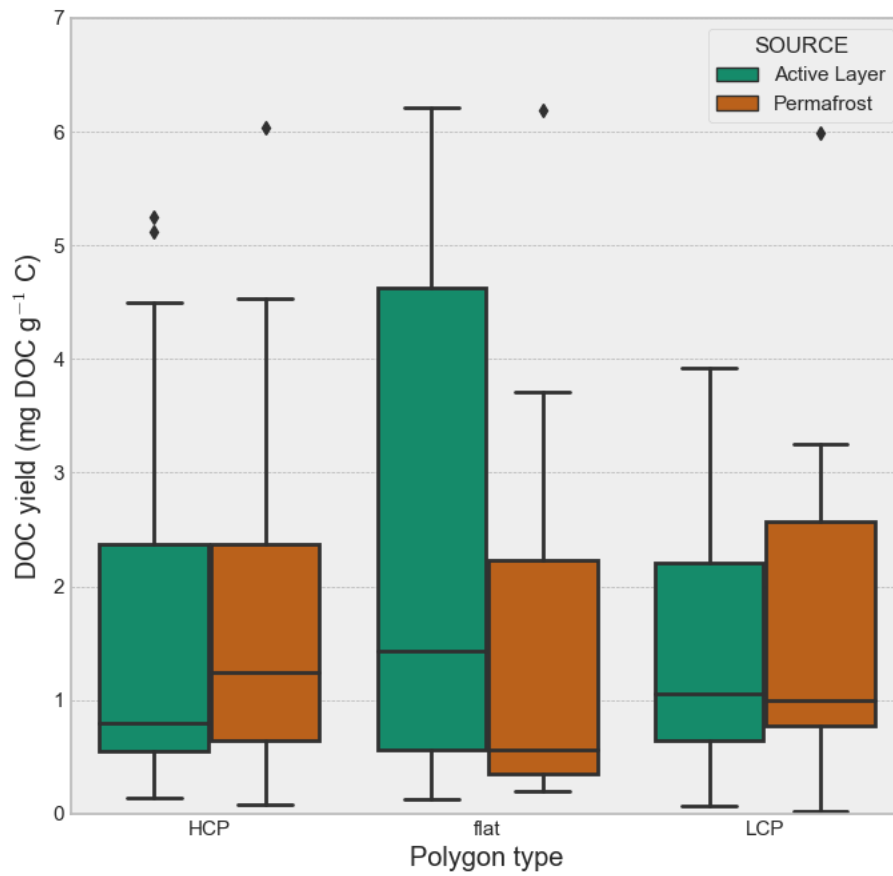


Figure S4. DOC yield per gram soil organic carbon for the three different polygon types and both thermal layers. We find that HCP active layer has a slightly lower mean than LCP active layer. Although not significant ( $p > 0.05$ ) we consider it plausible that this difference is caused by the difference in waterlogging conditions between HCP and LCP soils.

## Supplementary Tables

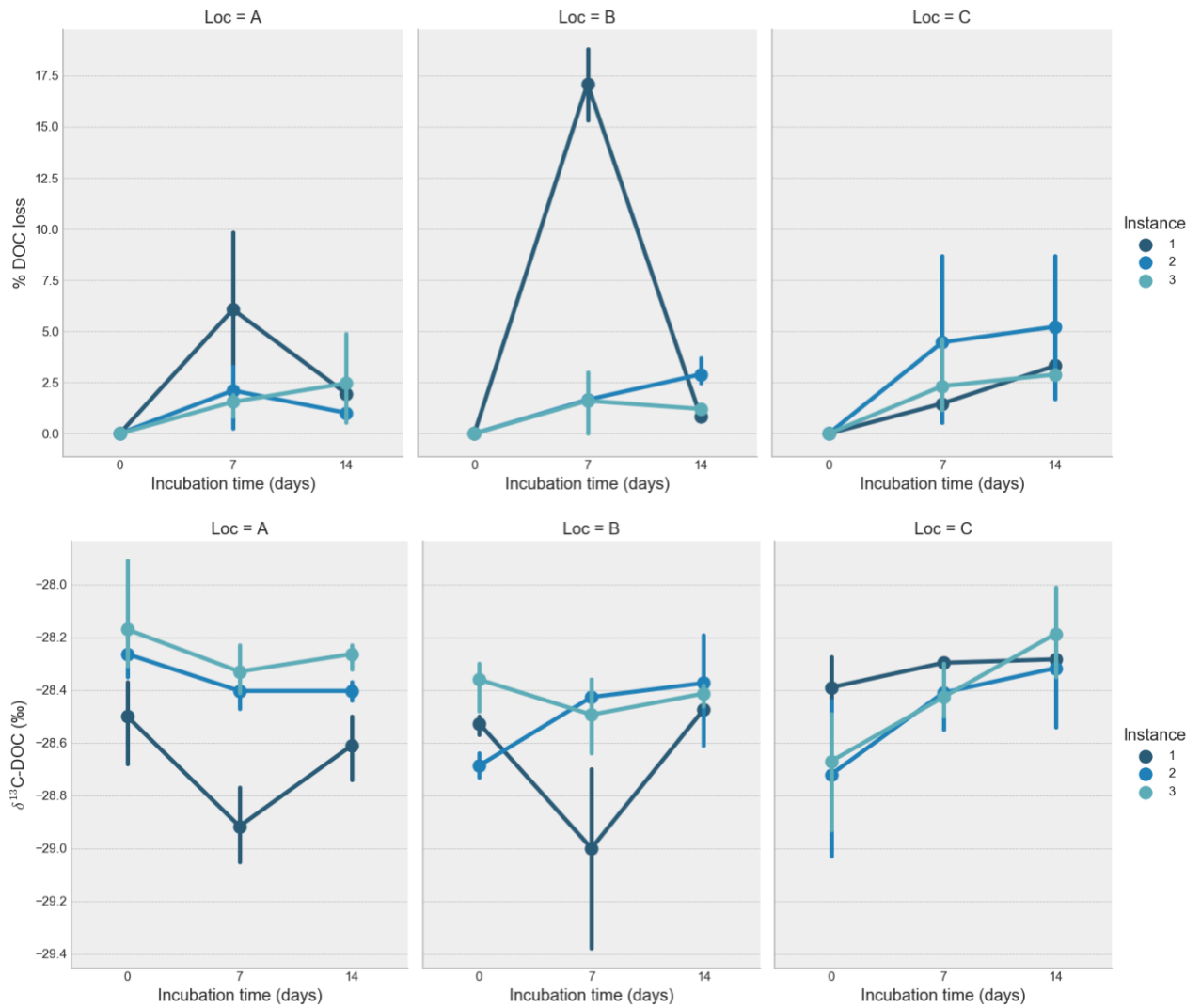


Figure S5. Tributaries incubation % DOC loss (with respect to t=0) plots for three locations (A, B,C) and three separate incubations (1:medium, 2:colder, 3:warmer sampling days) (top) and tributaries incubation  $\delta^{13}\text{C-DOC}$  for 3 locations (A, B, C) and 3 instances (1: medium, 2: colder, 3: warmer sampling days) (bottom)

## Supplementary Tables

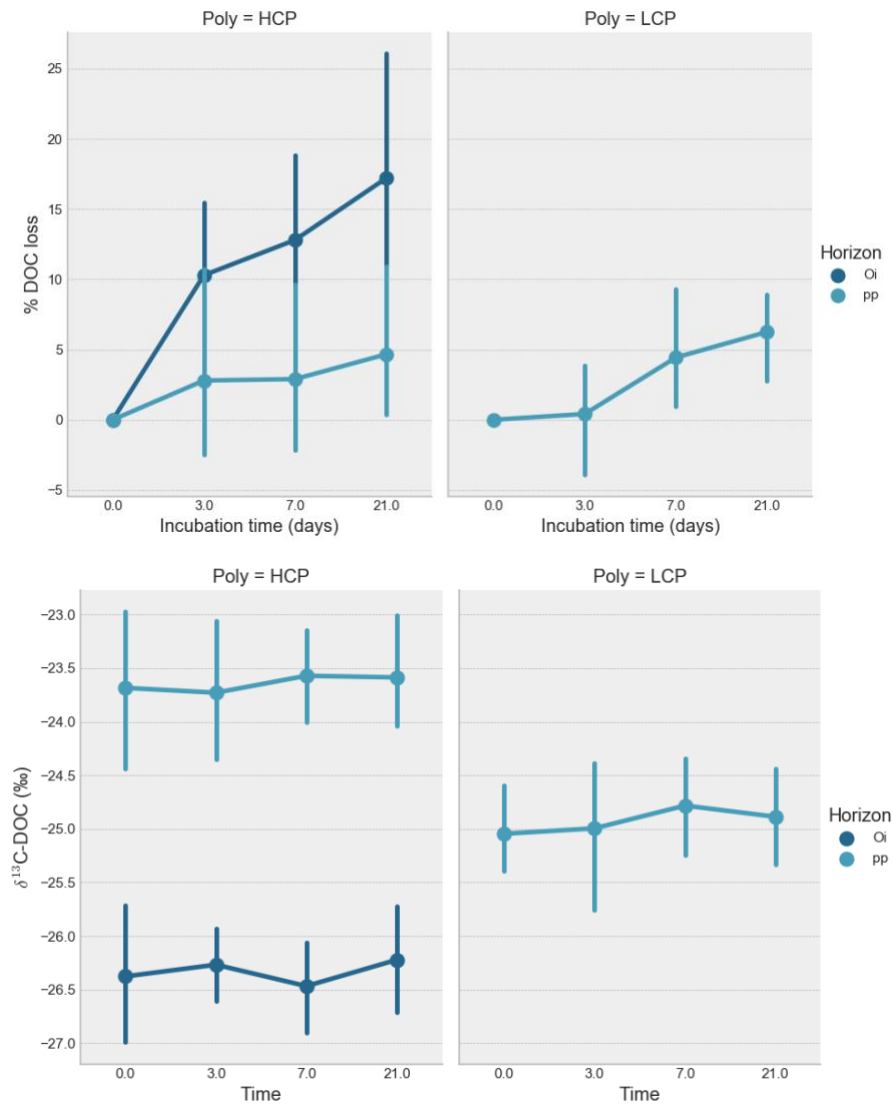


Figure S6. Porewater incubation % DOC loss (with respect to t=0) plots for 2 polygon types (HCP and LCP) (top) and porewater incubation  $\delta^{13}\text{C-DOC}$  (with respect to t=0) plots for 2 polygon types (HCP and LCP) (bottom)

## Supplementary Tables

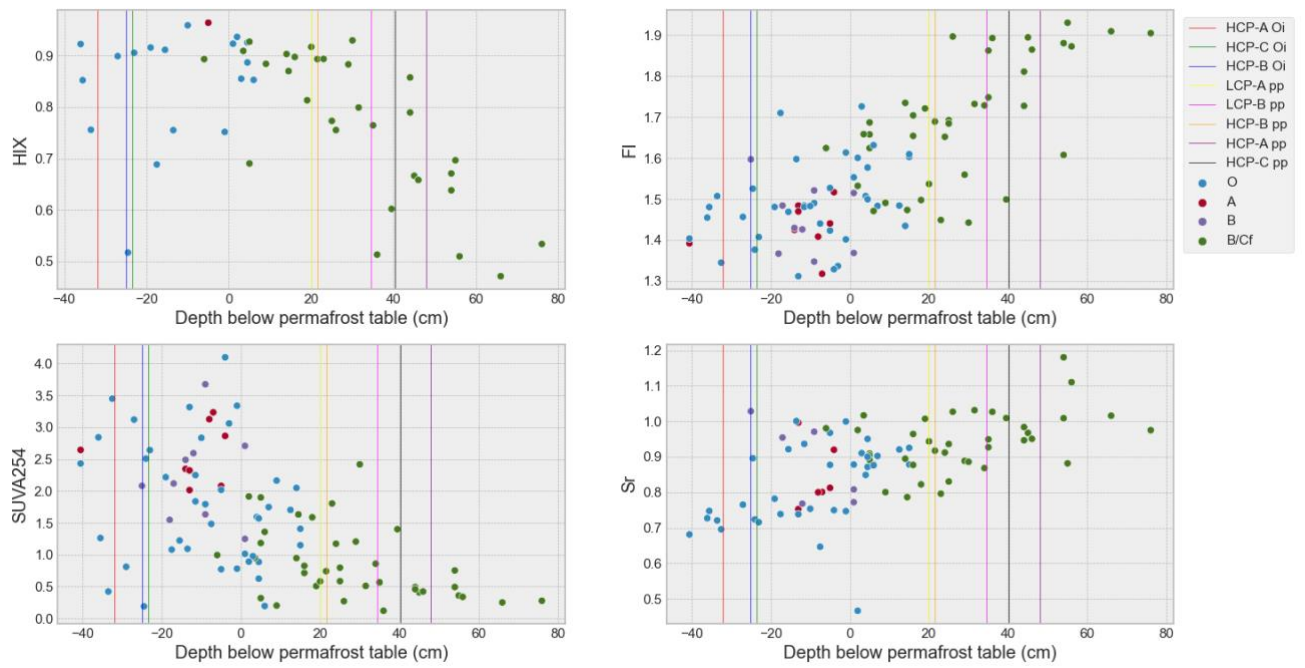


Figure S7. Shifts of HIX, FI, SUVA254 and Sr measured in porewater samples with depth respective to the permafrost table. Vertical lines show depths of incubated soil samples.



## Supplementary Tables

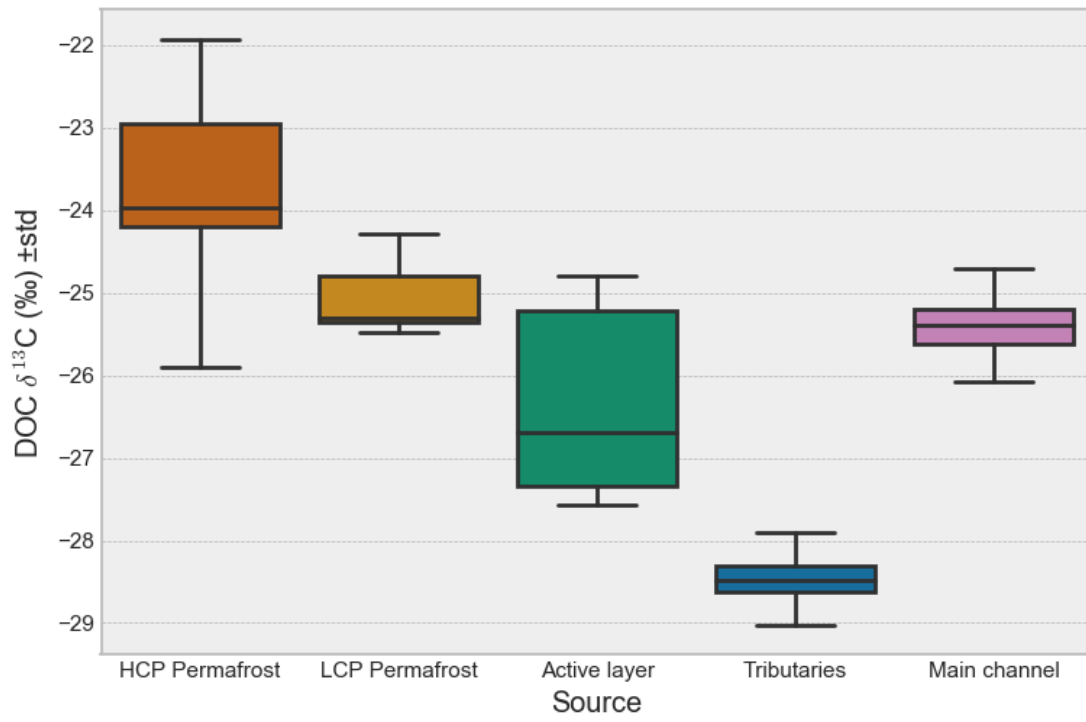


Figure S8.  $\delta^{13}\text{C}$ -DOC values per identified source.

# Supplementary Tables

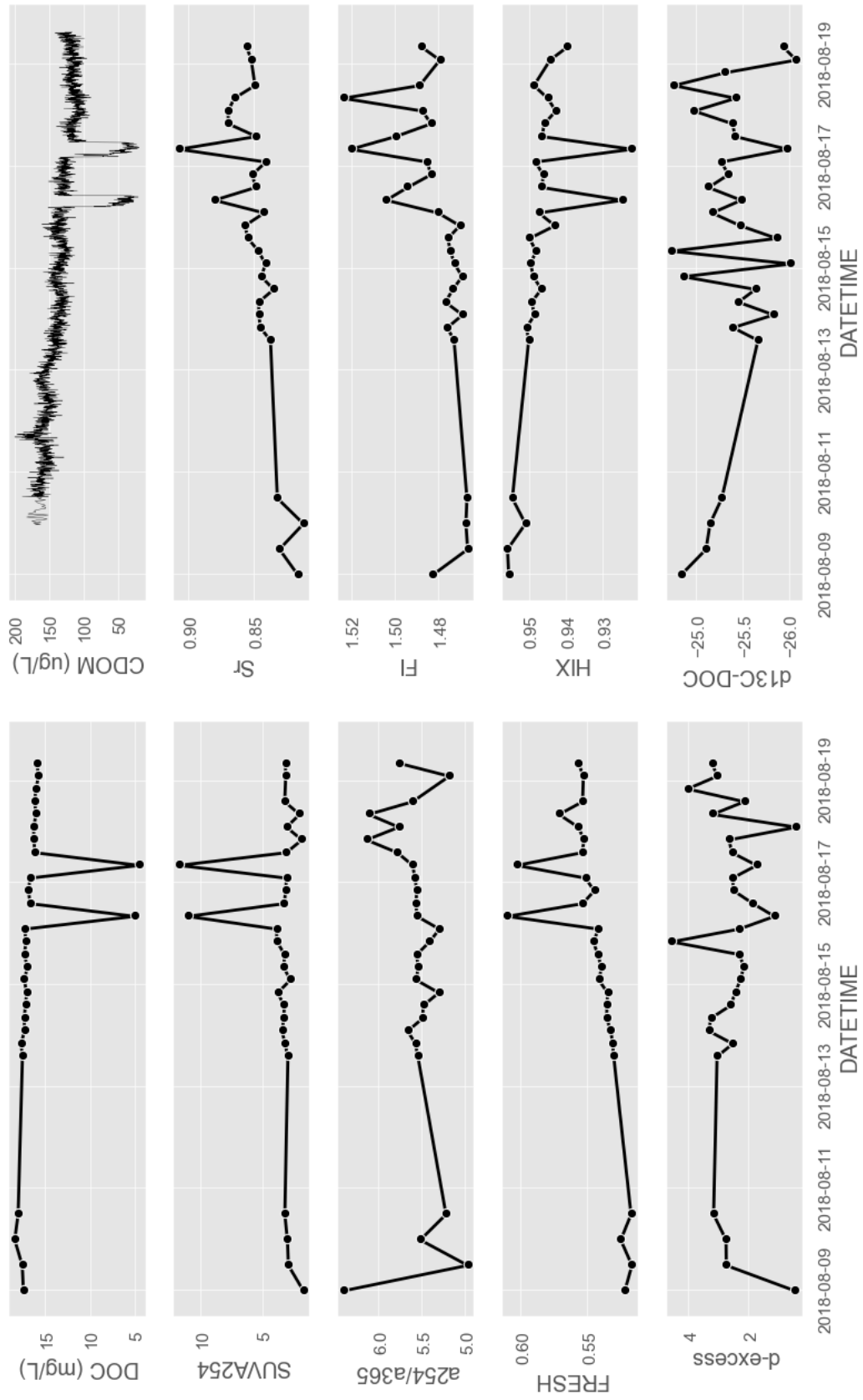


Figure S9. Fluctuations of optical and isotopic properties of stream water at the outlet.

## Supplementary Tables

Figures S10 and onward are not referenced in the text, yet they serve as extra information regarding this study.

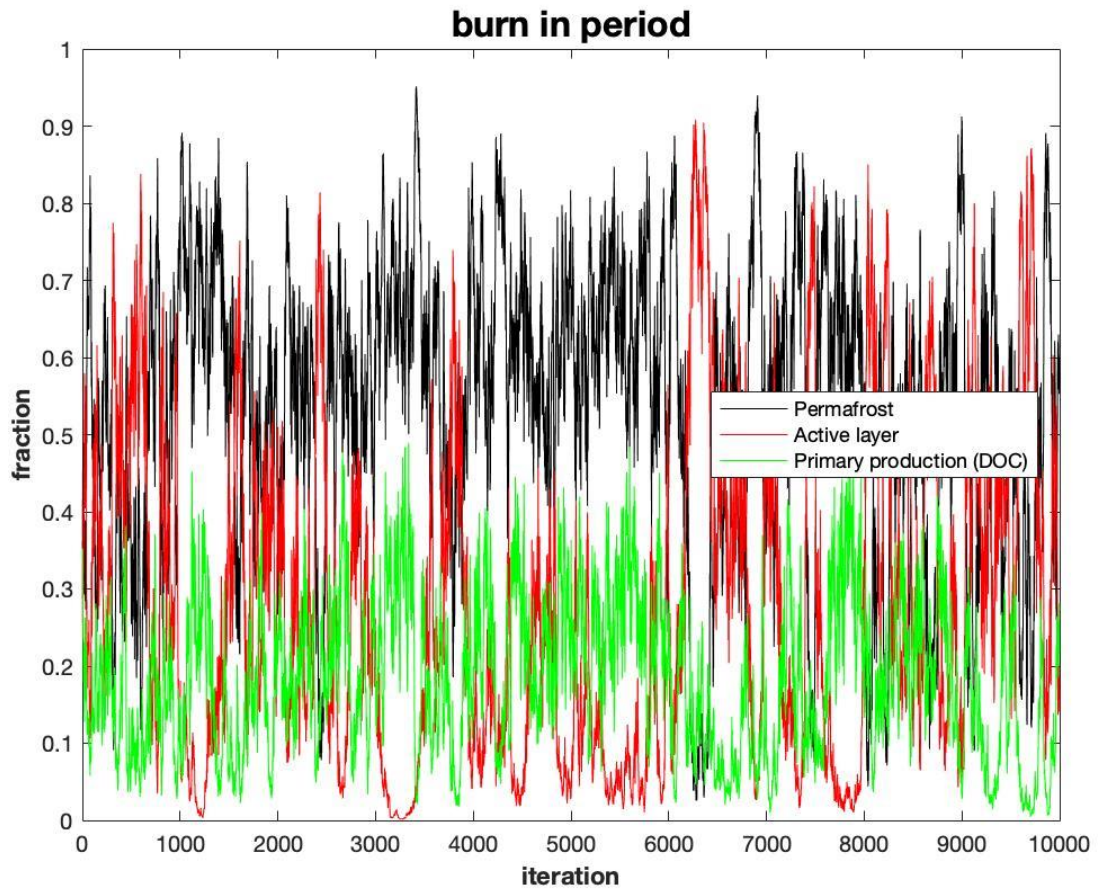


Figure S10. Fluctuations of model outcome over the Markov Chain Monte Carlo burn in periods.

## Supplementary Tables

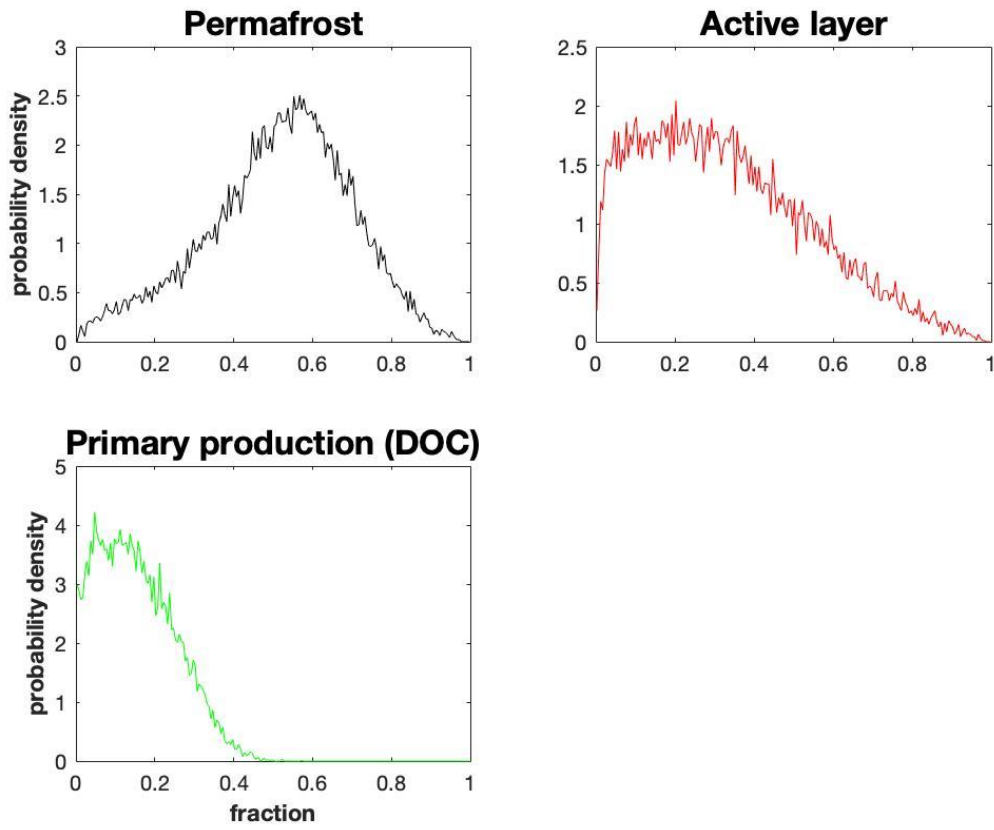


Figure S11. Probability distributions of source contribution at the catchment outlet using the endmember mixing model described in section 2.4.

# Supplementary Tables

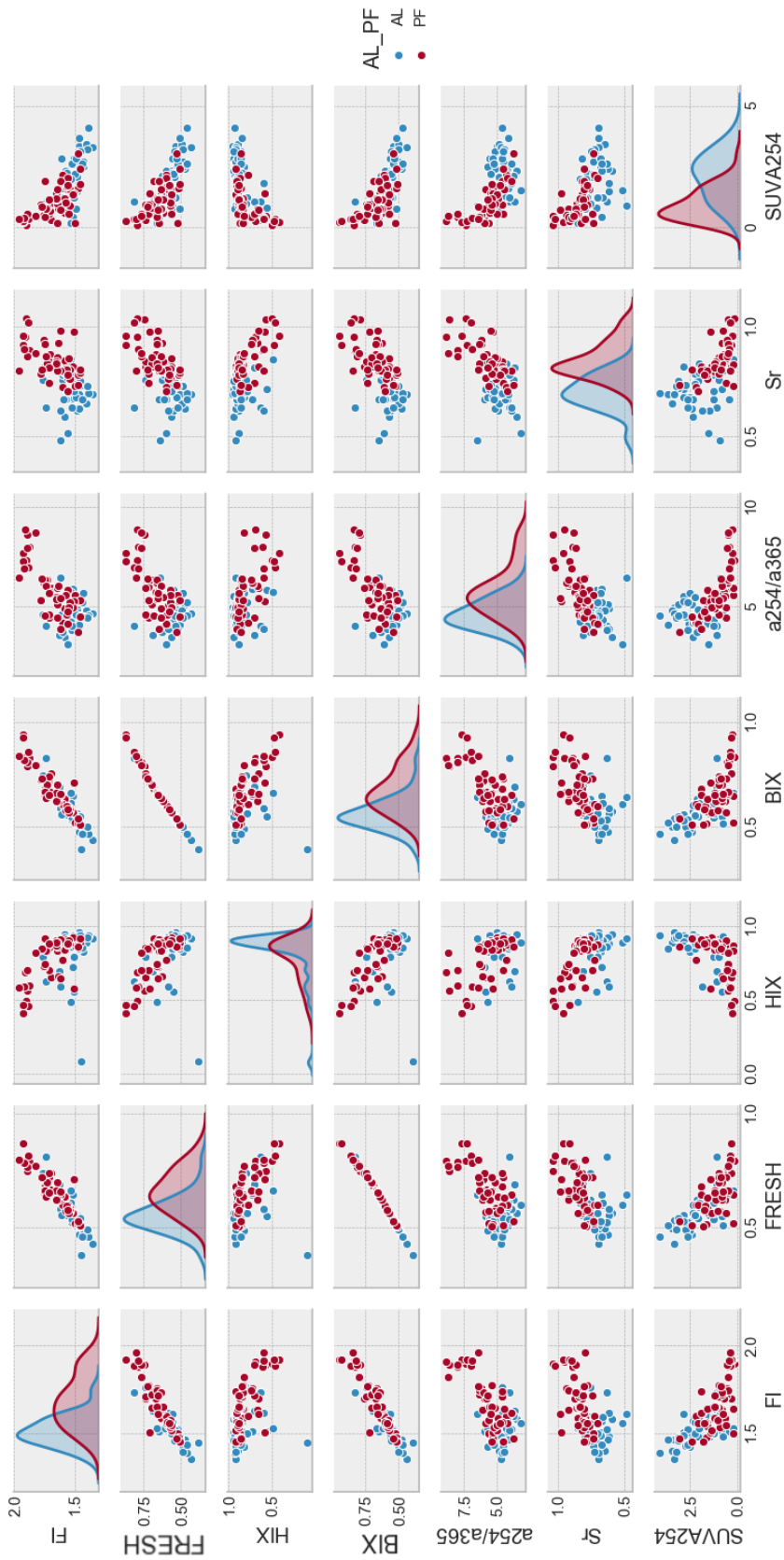


Figure S12. Pair-plot of spectral indices for the active layer (blue) and permafrost (red). Distributions and peak positions on the diagonal axis indicate differences between active layer and permafrost for each variable.

# Supplementary Tables

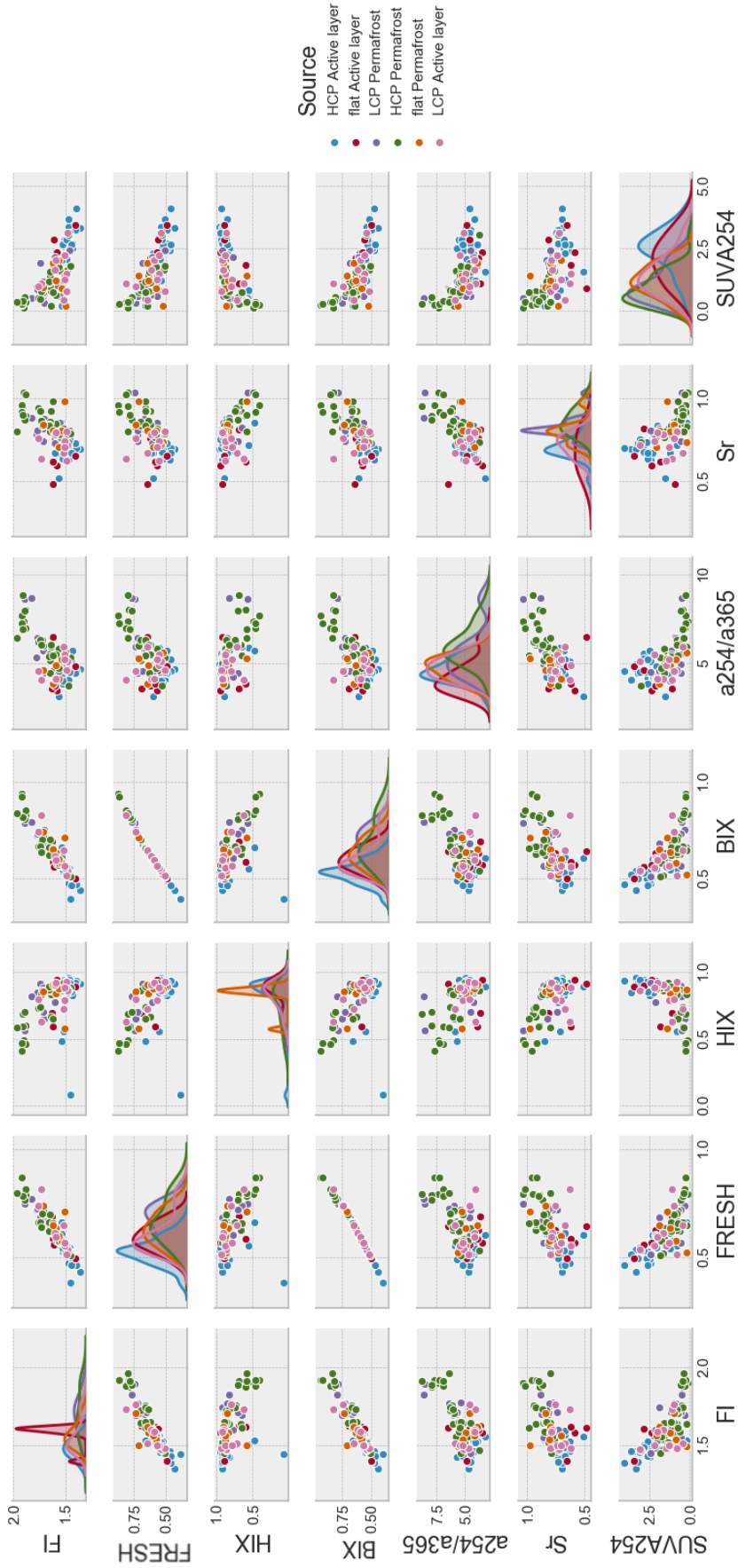


Figure S13. Pair-plot of spectral indices by classified source. Distributions and peak positions on the diagonal axis indicate differences between sources for each variable.

# Supplementary Tables

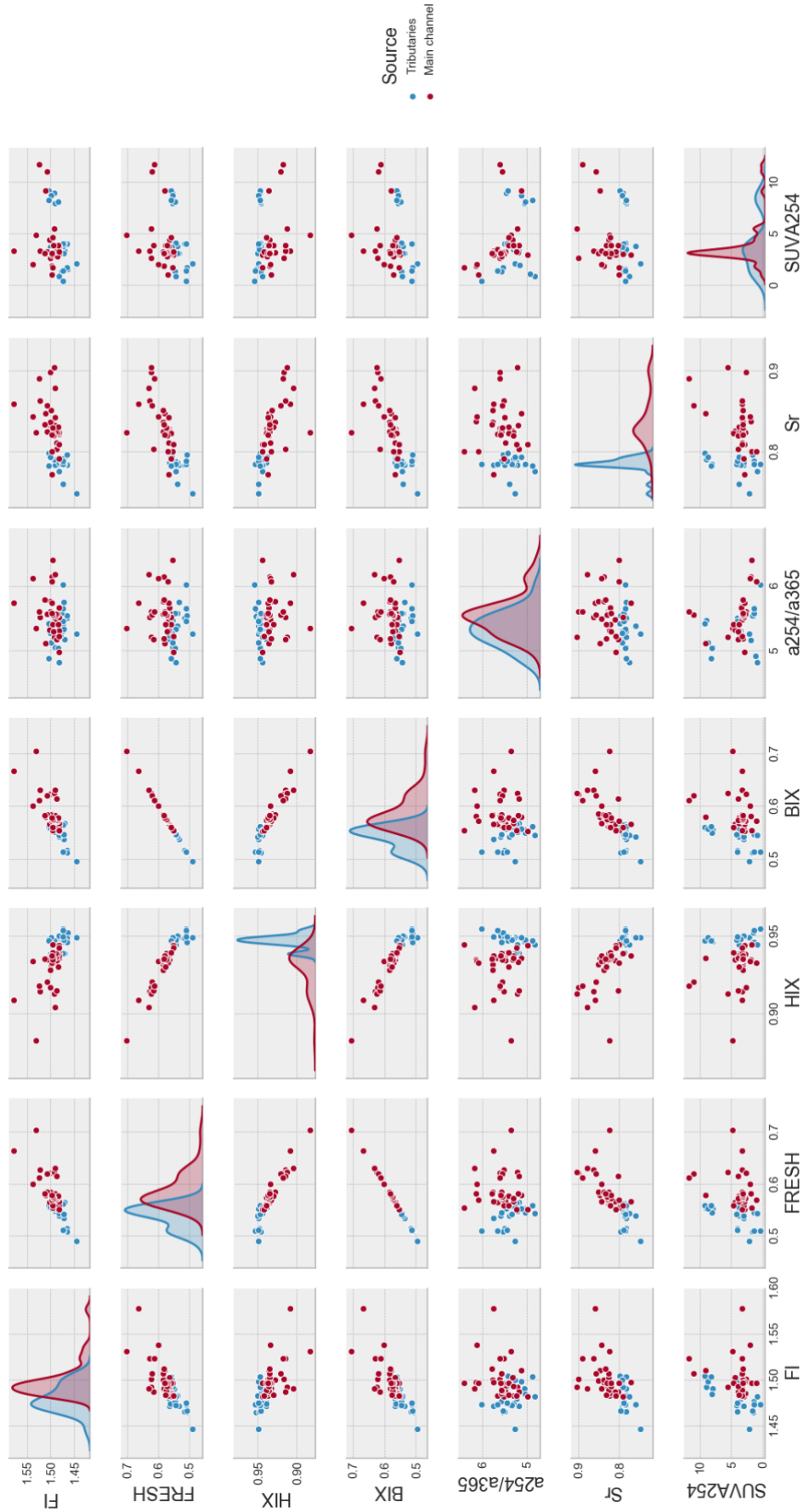


Figure S14. Pair-plot of spectral indices for tributaries (blue), and main channel (red). Distributions and peak positions on the diagonal axis indicate differences between sources for each variable.

Supplementary Tables

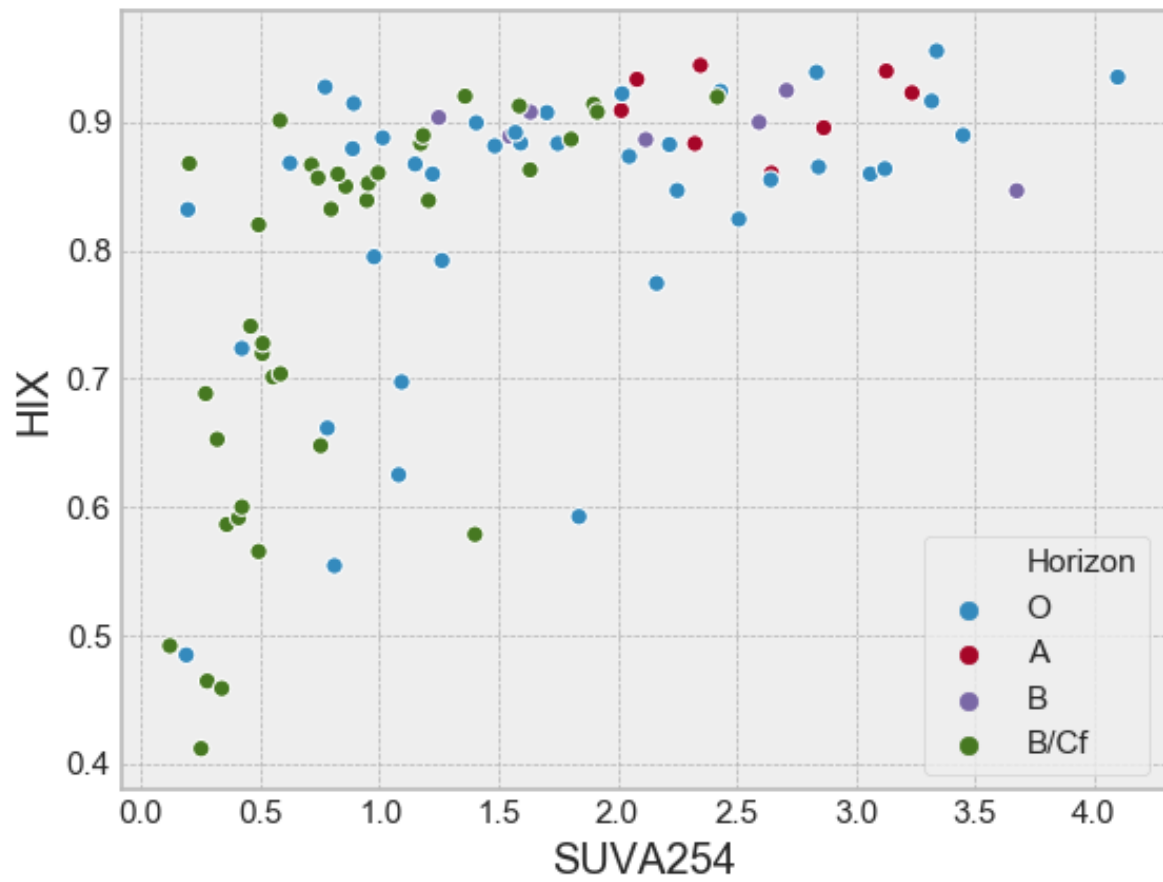


Figure S15. HIX vs SUVA254 for pore water samples.



## Supplementary Tables

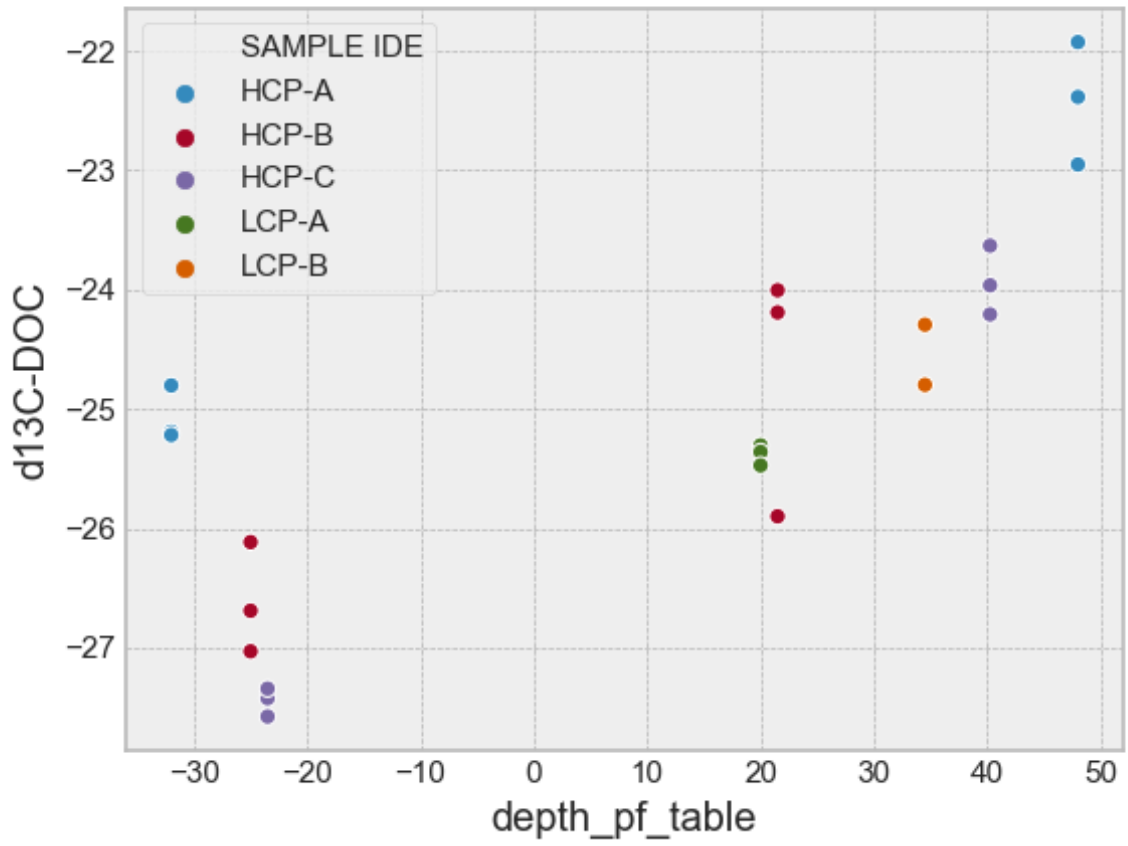


Figure S16. Values of  $\delta^{13}\text{C-DOC}$  at T=0 for the incubated pore water samples from 5 different sources.

# Supplementary Tables

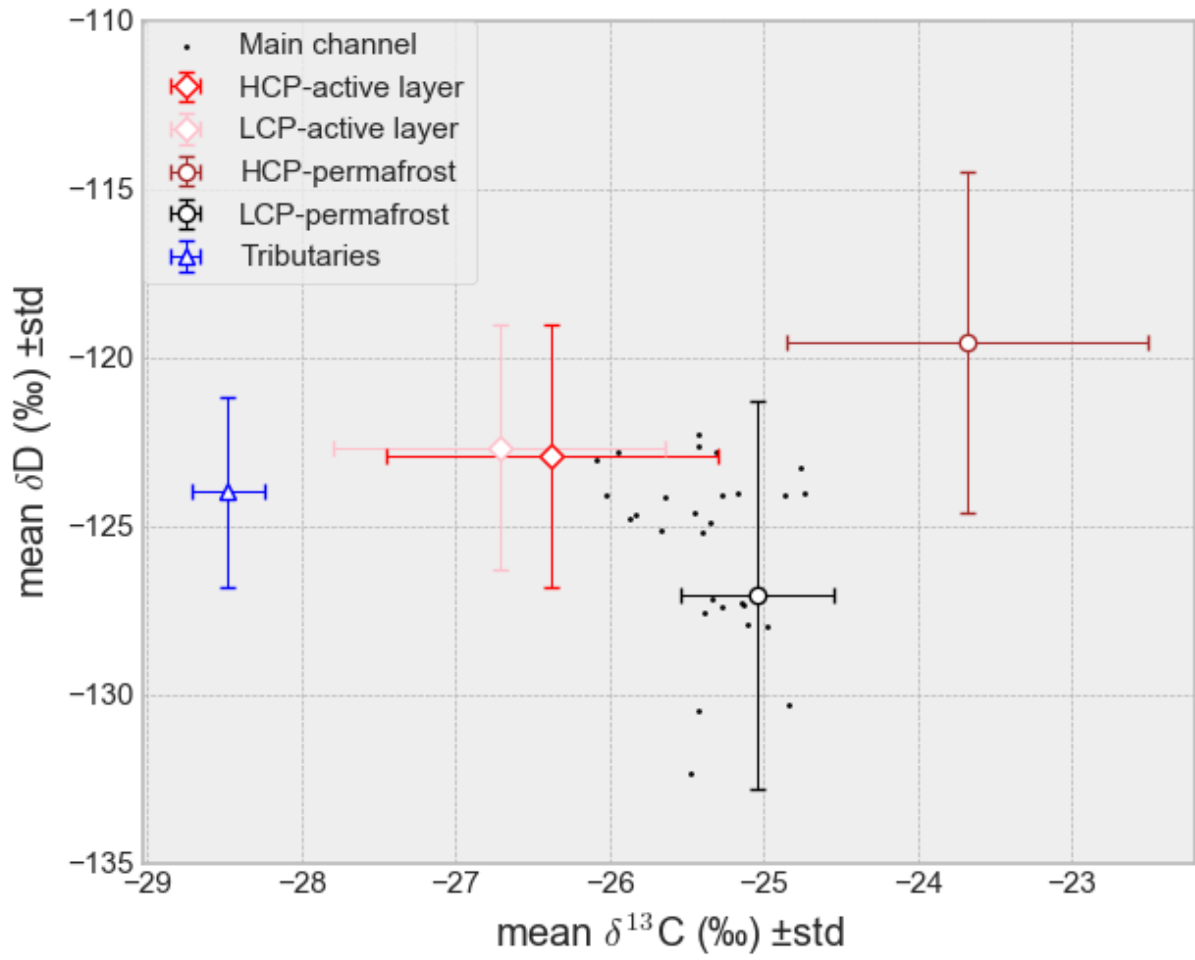


Figure S17. Location of sample sources in isotopic space.

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## Supplementary Tables

Table S1. Condensed weather statistics in Black Creek catchment during monitoring period.

<b>Date</b>	<b>P (mm)</b>	<b>T<sub>min</sub> (°C)</b>	<b>T<sub>max</sub> (°C)</b>	<b>T<sub>mean</sub> (°C)</b>	<b>Wind max (m/s)</b>	<b>Wind mean (m/s)</b>
2018-08-08	0.00	3.03	5.98	5.00	3.49	2.33
2018-08-09	0.00	2.52	5.23	3.87	6.51	3.55
2018-08-10	0.00	2.95	6.50	4.27	8.01	5.00
2018-08-11	0.30	2.40	7.21	4.24	10.07	5.46
2018-08-12	0.00	0.53	6.21	4.23	4.55	2.72
2018-08-13	1.60	0.61	4.65	2.65	7.70	5.46
2018-08-14	0.20	-0.21	5.15	2.22	11.12	7.77
2018-08-15	0.00	-0.18	9.49	4.77	5.95	2.80
2018-08-16	2.60	5.62	10.48	7.57	9.81	4.19
2018-08-17	1.30	0.74	7.96	2.94	15.06	8.90
2018-08-18	1.80	-0.75	6.65	1.83	5.49	2.82
2018-08-19	2.00	7.29	12.71	9.81	8.04	4.79





## Supplementary Tables

8/12/18 06:00	6.51	1016.67	0.13	38.98	6.74	86.61	10.67	93.69	60.58	151.01	-	-	-	-	-	-	-	-	-
8/12/18 09:00	6.14	1016.00	0.12	38.65	6.83	85.15	10.56	94.47	60.83	148.52	-	-	-	-	-	-	-	-	-
8/12/18 12:00	6.55	1015.33	0.12	34.69	6.92	87.05	10.69	94.33	60.89	149.79	-	-	-	-	-	-	-	-	-
8/12/18 15:00	7.78	1014.22	0.12	28.76	6.94	91.18	10.85	93.78	60.50	151.57	-	-	-	-	-	-	-	-	-
8/12/18 18:00	9.41	1012.17	0.12	27.44	6.93	94.91	10.83	93.89	60.69	157.39	-	-	-	-	-	-	-	-	-
8/12/18 21:00	10.19	1009.00	0.12	32.06	6.92	94.51	10.55	94.11	60.83	160.02	-	-	-	-	-	-	-	-	-
8/13/18 00:00	9.69	1005.89	0.12	36.01	6.89	90.50	10.20	94.14	60.75	157.98	-	-	-	-	-	-	-	-	-
8/13/18 03:00	8.52	1003.83	0.12	36.67	6.83	86.37	9.98	95.42	61.50	151.80	-	-	-	-	-	-	-	-	-
8/13/18 06:00	7.77	1002.94	0.12	31.73	6.78	83.98	9.88	95.81	61.81	147.69	-	-	-	-	-	-	-	-	-
8/13/18 09:00	7.26	1003.00	0.12	32.72	6.78	82.48	9.83	96.69	62.47	142.92	-	-	-	-	-	-	-	-	-
8/13/18 12:00	6.64	1004.00	0.12	36.01	6.78	83.46	10.10	97.31	62.86	141.34	-	-	-	-	-	-	-	-	-
8/13/18 15:00	6.32	1005.18	0.05	34.26	6.86	89.70	10.97	95.89	61.95	137.97	17.49	-25.67	0.61	0.33	-30.15	-16.02	0.06	-125.15	0.44
8/13/18 18:00	6.39	1006.75	0.12	34.69	6.92	91.39	11.17	94.75	61.17	140.52	-	-	-	-	-	-	-	-	-
8/13/18 21:00	6.22	1007.36	0.12	36.34	6.90	91.54	11.24	93.56	60.36	137.89	17.64	-25.40	0.02	0.28	-29.88	-15.97	0.04	-125.20	0.24
8/14/18 00:00	5.45	1009.47	0.11	20.85	6.80	88.84	11.15	94.14	60.75	135.59	-	-	-	-	-	-	-	-	-
8/14/18 03:00	4.39	1010.36	0.11	22.50	6.70	86.81	11.21	94.94	61.33	136.33	17.26	-25.84	0.39	0.29	-29.60	-16.00	0.09	-124.68	0.32
8/14/18 06:00	3.70	1011.00	0.11	21.84	6.73	86.04	11.32	94.94	61.19	134.26	-	-	-	-	-	-	-	-	-
8/14/18 09:00	3.13	1011.58	0.11	20.52	6.77	86.11	11.51	95.81	61.89	132.15	17.28	-25.46	0.74	0.37	-29.91	-15.98	0.01	-124.60	0.08
8/14/18 12:00	3.03	1011.61	0.11	20.19	6.93	89.48	11.99	95.00	61.31	129.17	-	-	-	-	-	-	-	-	-
8/14/18 15:00	4.03	1012.53	0.11	16.89	7.00	93.87	12.26	94.83	61.22	134.27	17.17	-25.64	1.91	0.50	-30.28	-15.84	0.02	-124.15	0.33
8/14/18 18:00	6.07	1013.08	0.04	20.50	6.99	98.42	12.22	95.51	61.68	136.82	-	-	-	-	-	-	-	-	-
8/14/18 21:00	6.85	1013.00	0.11	21.18	6.98	93.89	11.43	95.67	61.78	139.92	17.01	-24.86	0.40	0.28	-29.48	-15.81	0.01	-124.08	0.22
8/15/18 00:00	6.39	1012.47	0.11	21.84	6.95	91.09	11.20	96.44	62.28	139.10	-	-	-	-	-	-	-	-	-
8/15/18 03:00	5.53	1011.72	0.11	20.19	6.88	88.07	11.05	97.25	62.92	134.43	17.29	-26.02	0.67	0.24	-29.99	-15.79	0.03	-124.06	0.11
8/15/18 06:00	4.58	1010.56	0.11	20.52	6.76	85.99	11.06	97.08	62.72	129.84	-	-	-	-	-	-	-	-	-
8/15/18 09:00	3.86	1009.03	0.11	24.80	6.78	84.63	11.06	98.06	63.42	127.85	16.94	-24.73	0.48	0.26	-29.41	-15.77	0.04	-124.02	0.21
8/15/18 12:00	4.24	1006.89	0.12	28.43	6.91	87.01	11.24	97.58	63.00	128.99	-	-	-	-	-	-	-	-	-
8/15/18 15:00	6.18	1003.95	0.05	29.27	6.93	92.01	11.28	97.08	62.76	132.71	17.27	-25.87	0.14	0.26	-29.66	-15.89	0.06	-124.79	0.05

## Supplementary Tables

8/15/18 18:00	8.15	1000.64	0.11	20.19	6.92	94.04	10.94	97.83	63.17	137.94	-	-	-	-	-	-	-	-	
8/15/18 21:00	8.39	997.64	0.11	20.19	6.90	90.58	10.44	97.97	63.28	137.05	17.10	-25.48	0.92	0.31	-29.83	-17.11	0.06	-132.36	0.33
8/16/18 00:00	7.86	997.00	0.11	24.80	6.87	87.19	10.18	98.36	63.61	133.65	-	-	-	-	-	-	-	-	
8/16/18 03:00	7.40	996.92	0.11	22.50	6.84	84.74	10.01	98.56	63.69	136.13	17.22	-25.17	0.67	0.30	-29.62	-15.79	0.03	-124.02	0.19
8/16/18 06:00	7.17	995.94	0.19	115.79	6.88	86.01	10.13	3340.39	2170.89	116.27	-	-	-	-	-	-	-	-	
8/16/18 09:00	7.44	995.00	0.29	238.10	7.52	96.32	10.93	17339.64	11270.31	44.47	5.04	-25.48	24.34	0.72	-29.51	-11.94	0.01	-94.38	0.09
8/16/18 12:00	7.12	996.75	0.21	139.53	7.46	90.19	10.49	9844.50	6398.44	79.08	-	-	-	-	-	-	-	-	
8/16/18 15:00	7.21	998.14	0.12	33.38	6.91	85.44	10.14	179.19	116.14	127.69	16.62	-25.13	1.00	0.34	-30.88	-16.15	0.09	-127.36	1.52
8/16/18 18:00	7.26	998.69	0.13	48.21	6.89	86.89	10.31	121.06	78.33	128.18	-	-	-	-	-	-	-	-	
8/16/18 21:00	7.48	997.78	0.16	75.90	6.89	86.88	10.24	113.17	73.00	129.31	16.83	-25.35	0.72	0.42	-29.81	-15.93	0.02	-124.91	0.06
8/17/18 00:00	7.59	995.50	0.12	34.69	6.86	86.06	10.10	115.25	74.33	128.66	-	-	-	-	-	-	-	-	
8/17/18 03:00	7.52	995.06	0.12	38.32	6.85	84.47	9.92	109.67	70.75	126.01	16.64	-25.27	0.63	0.42	-30.08	-15.82	0.10	-124.05	0.41
8/17/18 06:00	6.70	999.36	0.22	153.04	7.02	86.18	10.28	4539.94	2950.42	104.71	-	-	-	-	-	-	-	-	
8/17/18 09:00	5.77	1002.47	0.36	312.60	7.57	94.79	11.33	16479.75	10711.47	44.92	4.51	-25.98	28.85	1.44	-27.90	-12.06	0.03	-94.72	0.15
8/17/18 12:00	5.45	1004.06	0.28	219.64	7.64	94.38	11.42	15132.47	9835.58	43.73	-	-	-	-	-	-	-	-	
8/17/18 15:00	5.78	1005.94	0.20	124.36	7.13	92.52	11.47	480.56	311.83	113.93	16.10	-25.42	1.71	0.43	-27.72	-15.60	0.13	-122.28	0.77
8/17/18 18:00	6.56	1008.32	0.19	111.31	7.00	92.81	11.31	164.59	106.51	118.13	-	-	-	-	-	-	-	-	
8/17/18 21:00	6.29	1010.81	0.17	87.77	6.97	90.66	11.15	153.50	99.36	118.00	16.22	-25.39	0.55	0.42	-27.41	-16.28	0.03	-127.59	0.07
8/18/18 00:00	5.53	1012.58	0.12	30.74	6.87	87.80	11.04	151.06	97.69	112.71	-	-	-	-	-	-	-	-	
8/18/18 03:00	4.40	1014.14	0.11	17.55	6.74	85.57	11.09	131.36	84.92	104.62	16.23	-24.98	1.11	0.40	-28.25	-16.05	0.08	-127.99	0.18
8/18/18 06:00	3.73	1015.00	0.11	23.16	6.75	84.43	11.14	120.36	77.78	107.61	-	-	-	-	-	-	-	-	
8/18/18 09:00	3.44	1016.00	0.11	21.18	6.85	84.30	11.22	116.92	75.75	109.49	15.99	-25.42	0.65	0.38	-28.64	-15.73	0.06	-122.61	0.58
8/18/18 12:00	3.71	1015.83	0.11	19.20	6.93	86.31	11.40	112.61	72.69	109.67	-	-	-	-	-	-	-	-	
8/18/18 15:00	5.01	1015.03	0.11	25.46	6.94	90.33	11.53	110.83	71.56	115.13	16.12	-24.76	0.55	0.36	-28.99	-15.68	0.06	-123.26	0.26
8/18/18 18:00	6.38	1014.95	0.12	27.59	6.94	92.08	11.35	109.46	70.76	117.85	-	-	-	-	-	-	-	-	
8/18/18 21:00	6.55	1015.00	0.11	22.17	6.92	90.97	11.17	107.67	69.42	115.97	16.00	-25.31	0.00	0.44	-29.16	-15.85	0.02	-122.78	0.12
8/19/18 00:00	6.50	1014.86	0.11	22.50	6.90	89.54	11.01	108.72	70.17	116.20	-	-	-	-	-	-	-	-	
8/19/18 03:00	6.66	1015.03	0.11	26.45	6.90	88.34	10.82	107.56	69.44	112.68	15.69	-26.08	0.72	0.37	-29.16	-15.76	0.05	-123.05	0.11





## Supplementary Tables

Table S3. Measured biogeochemical parameters of incubated soil samples from active layer and permafrost.

ID	Latitude	Longitude	DOC (mg/L)	$\delta^{13}\text{C}\text{-DOC}$ (‰)	$\delta^{13}\text{C}\text{-SOC}$ (‰)	Soil C:N	% SOC	T (days)	Layer	Type	Location	Aliquot
1	69.4643753	-139.0823216	59.60	-25.19	-27.09	18.29	40.67	0	Active Layer	HCP	A	1
2	69.4643753	-139.0823216	59.73	-24.80	-27.09	18.29	40.67	0	Active Layer	HCP	A	2
3	69.4643753	-139.0823216	62.59	-25.22	-27.09	18.29	40.67	0	Active Layer	HCP	A	3
4	69.4643753	-139.0823216	46.71	-25.59	-27.09	18.29	40.67	3	Active Layer	HCP	A	1
5	69.4643753	-139.0823216	49.68	-25.47	-27.09	18.29	40.67	3	Active Layer	HCP	A	2
6	69.4643753	-139.0823216	50.97	-25.91	-27.09	18.29	40.67	3	Active Layer	HCP	A	3
7	69.4643753	-139.0823216	44.08	-25.91	-27.09	18.29	40.67	7	Active Layer	HCP	A	1
8	69.4643753	-139.0823216	45.60	-25.58	-27.09	18.29	40.67	7	Active Layer	HCP	A	2
9	69.4643753	-139.0823216	46.96	-25.80	-27.09	18.29	40.67	7	Active Layer	HCP	A	3
10	69.4643753	-139.0823216	37.32	-25.56	-27.09	18.29	40.67	21	Active Layer	HCP	A	1
11	69.4643753	-139.0823216	39.11	-24.97	-27.09	18.29	40.67	21	Active Layer	HCP	A	2
12	69.4643753	-139.0823216	39.34	-25.43	-27.09	18.29	40.67	21	Active Layer	HCP	A	3
13	69.4643336	-139.0850596	80.35	-26.12	-26.18	52.33	45.54	0	Active Layer	HCP	B	1
14	69.4643336	-139.0850596	83.94	-26.69	-26.18	52.33	45.54	0	Active Layer	HCP	B	2
15	69.4643336	-139.0850596	90.58	-27.03	-26.18	52.33	45.54	0	Active Layer	HCP	B	3
16	69.4643336	-139.0850596	74.51	-26.17	-26.18	52.33	45.54	3	Active Layer	HCP	B	1
17	69.4643336	-139.0850596	77.72	-26.30	-26.18	52.33	45.54	3	Active Layer	HCP	B	2
18	69.4643336	-139.0850596	79.27	-26.21	-26.18	52.33	45.54	3	Active Layer	HCP	B	3
19	69.4643336	-139.0850596	78.96	-26.31	-26.18	52.33	45.54	7	Active Layer	HCP	B	1
20	69.4643336	-139.0850596	79.37	-26.12	-26.18	52.33	45.54	7	Active Layer	HCP	B	2
21	69.4643336	-139.0850596	80.06	-26.58	-26.18	52.33	45.54	7	Active Layer	HCP	B	3
22	69.4643336	-139.0850596	75.16	-26.35	-26.18	52.33	45.54	21	Active Layer	HCP	B	1
23	69.4643336	-139.0850596	76.10	-26.16	-26.18	52.33	45.54	21	Active Layer	HCP	B	2
24	69.4643336	-139.0850596	78.91	-26.27	-26.18	52.33	45.54	21	Active Layer	HCP	B	3
25	69.4646868	-139.0869958	81.28	-27.58	-28.16	42.92	48.33	0	Active Layer	HCP	C	1

## Supplementary Tables

26	69.4646868	-139.0869958	81.40	-27.42	-28.16	42.92	48.33	0	Active Layer	HCP	C	2
27	69.4646868	-139.0869958	85.98	-27.34	-28.16	42.92	48.33	0	Active Layer	HCP	C	3
28	69.4646868	-139.0869958	75.70	-26.75	-28.16	42.92	48.33	3	Active Layer	HCP	C	1
29	69.4646868	-139.0869958	82.60	-26.98	-28.16	42.92	48.33	3	Active Layer	HCP	C	2
30	69.4646868	-139.0869958	82.96	-27.01	-28.16	42.92	48.33	3	Active Layer	HCP	C	3
31	69.4646868	-139.0869958	74.54	-27.44	-28.16	42.92	48.33	7	Active Layer	HCP	C	1
32	69.4646868	-139.0869958	76.57	-27.07	-28.16	42.92	48.33	7	Active Layer	HCP	C	2
33	69.4646868	-139.0869958	79.27	-27.40	-28.16	42.92	48.33	7	Active Layer	HCP	C	3
34	69.4646868	-139.0869958	76.28	-27.24	-28.16	42.92	48.33	21	Active Layer	HCP	C	1
35	69.4646868	-139.0869958	77.61	-27.12	-28.16	42.92	48.33	21	Active Layer	HCP	C	2
36	69.4646868	-139.0869958	80.16	-26.89	-28.16	42.92	48.33	21	Active Layer	HCP	C	3
37	69.4643753	-139.0823216	259.42	-22.38	-24.82	17.00	9.35	0	Permafrost	HCP	A	1
38	69.4643753	-139.0823216	264.26	-22.95	-24.82	17.00	9.35	0	Permafrost	HCP	A	2
39	69.4643753	-139.0823216	266.61	-21.92	-24.82	17.00	9.35	0	Permafrost	HCP	A	3
40	69.4643753	-139.0823216	248.48	-22.72	-24.82	17.00	9.35	3	Permafrost	HCP	A	1
41	69.4643753	-139.0823216	255.53	-22.53	-24.82	17.00	9.35	3	Permafrost	HCP	A	2
42	69.4643753	-139.0823216	269.88	-22.57	-24.82	17.00	9.35	3	Permafrost	HCP	A	3
43	69.4643753	-139.0823216	263.06	-22.72	-24.82	17.00	9.35	7	Permafrost	HCP	A	1
44	69.4643753	-139.0823216	266.46	-22.61	-24.82	17.00	9.35	7	Permafrost	HCP	A	2
45	69.4643753	-139.0823216	289.52	-23.04	-24.82	17.00	9.35	7	Permafrost	HCP	A	3
46	69.4643753	-139.0823216	258.13	-22.48	-24.82	17.00	9.35	21	Permafrost	HCP	A	1
47	69.4643753	-139.0823216	266.99	-22.63	-24.82	17.00	9.35	21	Permafrost	HCP	A	2
48	69.4643753	-139.0823216	270.02	-22.42	-24.82	17.00	9.35	21	Permafrost	HCP	A	3
49	69.4652187	-139.0847762	105.16	-25.30	-27.60	25.12	46.57	0	Permafrost	LCP	A	1
50	69.4652187	-139.0847762	106.50	-25.36	-27.60	25.12	46.57	0	Permafrost	LCP	A	2
51	69.4652187	-139.0847762	109.62	-25.47	-27.60	25.12	46.57	0	Permafrost	LCP	A	3
52	69.4652187	-139.0847762	101.35	-25.55	-27.60	25.12	46.57	3	Permafrost	LCP	A	1
53	69.4652187	-139.0847762	105.37	-25.27	-27.60	25.12	46.57	3	Permafrost	LCP	A	2

## Supplementary Tables

54	69.4652187	-139.0847762	119.77	-26.47	-27.60	25.12	46.57	3	Permafrost	LCP	A	3
55	69.4652187	-139.0847762	102.88	-25.38	-27.60	25.12	46.57	7	Permafrost	LCP	A	1
56	69.4652187	-139.0847762	103.61	-25.54	-27.60	25.12	46.57	7	Permafrost	LCP	A	2
57	69.4652187	-139.0847762	103.96	-25.36	-27.60	25.12	46.57	7	Permafrost	LCP	A	3
58	69.4652187	-139.0847762	96.41	-25.40	-27.60	25.12	46.57	21	Permafrost	LCP	A	1
59	69.4652187	-139.0847762	98.96	-25.48	-27.60	25.12	46.57	21	Permafrost	LCP	A	2
60	69.4652187	-139.0847762	98.97	-25.29	-27.60	25.12	46.57	21	Permafrost	LCP	A	3
61	69.4643336	-139.0850596	258.32	-24.00	-26.47	18.86	19.76	0	Permafrost	HCP	B	1
62	69.4643336	-139.0850596	261.19	-24.19	-26.47	18.86	19.76	0	Permafrost	HCP	B	2
63	69.4643336	-139.0850596	329.76	-25.90	-26.47	18.86	19.76	0	Permafrost	HCP	B	3
64	69.4643336	-139.0850596	248.06	-24.44	-26.47	18.86	19.76	3	Permafrost	HCP	B	1
65	69.4643336	-139.0850596	263.23	-24.60	-26.47	18.86	19.76	3	Permafrost	HCP	B	2
66	69.4643336	-139.0850596	283.68	-25.06	-26.47	18.86	19.76	3	Permafrost	HCP	B	3
67	69.4643336	-139.0850596	242.01	-24.39	-26.47	18.86	19.76	7	Permafrost	HCP	B	1
68	69.4643336	-139.0850596	252.11	-24.25	-26.47	18.86	19.76	7	Permafrost	HCP	B	2
69	69.4643336	-139.0850596	253.15	-24.31	-26.47	18.86	19.76	7	Permafrost	HCP	B	3
70	69.4643336	-139.0850596	241.17	-24.32	-26.47	18.86	19.76	21	Permafrost	HCP	B	1
71	69.4643336	-139.0850596	250.20	-24.43	-26.47	18.86	19.76	21	Permafrost	HCP	B	2
72	69.4643336	-139.0850596	263.14	-24.49	-26.47	18.86	19.76	21	Permafrost	HCP	B	3
73	69.4653797	-139.0847363	188.67	-24.29	-25.63	18.42	9.05	0	Permafrost	LCP	B	1
74	69.4653797	-139.0847363	212.93	-24.80	-25.63	18.42	9.05	0	Permafrost	LCP	B	2
75	69.4653797	-139.0847363	192.87	-24.39	-25.63	18.42	9.05	3	Permafrost	LCP	B	1
76	69.4653797	-139.0847363	193.33	-23.99	-25.63	18.42	9.05	3	Permafrost	LCP	B	2
77	69.4653797	-139.0847363	201.11	-24.30	-25.63	18.42	9.05	3	Permafrost	LCP	B	3
78	69.4653797	-139.0847363	182.25	-24.13	-25.63	18.42	9.05	7	Permafrost	LCP	B	1
79	69.4653797	-139.0847363	191.42	-24.13	-25.63	18.42	9.05	7	Permafrost	LCP	B	2
80	69.4653797	-139.0847363	193.47	-24.16	-25.63	18.42	9.05	7	Permafrost	LCP	B	3
81	69.4653797	-139.0847363	186.21	-23.99	-25.63	18.42	9.05	21	Permafrost	LCP	B	1

## Supplementary Tables

82	69.4653797	-139.0847363	190.23	-24.19	-25.63	18.42	9.05	21	Permafrost	LCP	B	2
83	69.4653797	-139.0847363	191.90	-24.97	-25.63	18.42	9.05	21	Permafrost	LCP	B	3
84	69.4646868	-139.0869958	301.26	-23.63	-26.97	19.87	17.87	0	Permafrost	HCP	C	1
85	69.4646868	-139.0869958	301.27	-23.96	-26.97	19.87	17.87	0	Permafrost	HCP	C	2
86	69.4646868	-139.0869958	316.90	-24.21	-26.97	19.87	17.87	0	Permafrost	HCP	C	3
87	69.4646868	-139.0869958	305.18	-23.74	-26.97	19.87	17.87	3	Permafrost	HCP	C	1
88	69.4646868	-139.0869958	306.63	-24.17	-26.97	19.87	17.87	3	Permafrost	HCP	C	2
89	69.4646868	-139.0869958	297.33	-23.83	-26.97	19.87	17.87	7	Permafrost	HCP	C	1
90	69.4646868	-139.0869958	302.97	-23.31	-26.97	19.87	17.87	7	Permafrost	HCP	C	2
91	69.4646868	-139.0869958	304.04	-23.67	-26.97	19.87	17.87	7	Permafrost	HCP	C	3
92	69.4646868	-139.0869958	288.81	-23.85	-26.97	19.87	17.87	21	Permafrost	HCP	C	1
93	69.4646868	-139.0869958	292.69	-23.83	-26.97	19.87	17.87	21	Permafrost	HCP	C	2
94	69.4646868	-139.0869958	292.98	-23.82	-26.97	19.87	17.87	21	Permafrost	HCP	C	3

## Supplementary Tables

Table S4. Bulk porewater samples biogeochemical parameters.

ID	Latitude	Longitude	DOC (mg/L)	$\delta^{13}\text{C-SOC}$ (‰)	Soil C:N	% SOC	DOC yield (mg/gC)	DOC yield (mg/g soil)	DN (mg/L)	Layer	Type	Z <sub>min</sub> (cm)	Z <sub>max</sub> (cm)	Z <sub>average</sub> (cm)	Z <sub>AL</sub> (cm)
1	69.46312	-139.11214	54.65	-	-	25.56	0.16	0.16	1.88	Active Layer	HCP	0	4	2	31
2	69.461795	-139.11132	84.64	-	-	34.91	1.44	0.59	3.84	Active Layer	flat	0	10	5	26
3	69.464537	-139.12584	172.30	-27.61	16.12	9.49	5.99	0.57	15.25	Permafrost	LCP	90	100	95	41
4	69.470917	-139.09987	116.91	-27.40	19.54	23.08	7.08	0.29	2.99	Permafrost	HCP	22	31	26.5	14
5	69.470917	-139.09987	66.02	-27.62	21.25	28.70	0.30	0.15	6.09	Active Layer	HCP	0	26	13	14
6	69.470917	-139.09987	130.12	-27.37	16.41	15.18	-	-	8.30	Permafrost	HCP	31	40	35.5	14
7	69.469496	-139.09508	150.21	-27.84	17.65	10.76	6.21	0.12	7.09	Active Layer	flat	21	27	24	38
8	69.469496	-139.09508	237.73	-27.33	15.13	6.56	3.39	0.18	13.65	Permafrost	flat	38	45	41.5	38
9	69.468503	-139.09185	93.97	-	-	33.94	0.39	0.64	3.32	Active Layer	LCP	0	13	6.5	40
10	69.468503	-139.09185	52.00	-	-	18.44	0.85	0.14	1.36	Active Layer	LCP	20	25	22.5	40
11	69.468503	-139.09185	133.96	-27.82	14.34	14.48	0.87	0.17	5.64	Permafrost	LCP	40	50	45	40
12	69.468503	-139.09185	122.36	-28.31	16.67	12.61	2.07	0.32	5.82	Permafrost	LCP	50	60	55	40
13	69.461795	-139.11132	53.51	-	-	36.21	0.59	0.08	2.35	Active Layer	flat	10	15	12.5	26
14	69.468503	-139.09185	139.15	-27.98	15.31	8.88	2.05	0.19	7.84	Permafrost	LCP	60	70	65	40
15	69.468503	-139.09185	101.68	-25.52	15.90	2.62	16.79	0.07	8.27	Permafrost	LCP	70	80	75	40
16	69.470459	-139.08953	71.83	-28.44	14.85	34.86	-	-	2.13	Active Layer	LCP	5	15	10	39
17	69.470459	-139.08953	205.07	-27.86	17.61	14.50	0.75	0.26	11.86	Permafrost	LCP	39	50	44.5	39
18	69.470459	-139.08953	249.74	-27.19	16.28	8.90	2.83	0.40	16.29	Permafrost	LCP	50	60	55	39
19	69.464249	-139.10818	81.71	-28.30	19.19	4.38	5.25	0.04	2.77	Active Layer	HCP	18	24	21	33
20	69.464249	-139.10818	223.63	-28.42	18.00	10.39	4.54	0.24	4.76	Permafrost	HCP	30	40	35	33
21	69.463682	-139.10619	103.33	-28.05	19.21	33.83	2.68	0.24	3.37	Active Layer	LCP	16	25	20.5	28
22	69.463682	-139.10619	244.10	-27.96	17.43	24.36	0.85	0.35	11.04	Permafrost	LCP	29	40	34.5	28
23	69.461795	-139.11132	139.52	-	-	8.96	5.52	0.06	9.02	Active Layer	flat	15	21	18	26
24	69.464697	-139.10445	106.08	-28.94	33.23	40.60	0.14	1.99	4.22	Active Layer	HCP	1	12	6.5	47
25	69.464697	-139.10445	147.87	-28.01	17.64	32.23	0.66	0.64	4.86	Permafrost	HCP	47	55	51	47

## Supplementary Tables

26	69.46523	-139.10547	186.14	-28.51	21.33	4.73	27.06	0.07	8.64	Active Layer	HCP	20	26	23	32
27	69.46523	-139.10547	154.75	-27.95	20.44	15.76	1.42	0.14	10.89	Permafrost	HCP	30	40	35	32
28	69.462337	-139.10825	112.12	-28.70	20.23	8.04	1.10	0.06	5.60	Active Layer	flat	18	24	21	38
29	69.462337	-139.10825	129.90	-27.52	17.16	12.74	0.27	0.08	9.85	Permafrost	flat	38	45	41.5	38
30	69.465811	-139.1024	38.03	-27.76	17.65	32.21	0.40	0.11	1.71	Active Layer	HCP	21	26	23.5	23
31	69.465811	-139.1024	96.57	-28.31	16.11	12.11	1.80	0.06	6.93	Permafrost	HCP	35	47	41	23
32	69.466899	-139.09549	57.84	-27.14	15.49	3.03	7.12	0.03	1.94	Active Layer	HCP	14	24	19	30
33	69.466899	-139.09549	33.93	-26.43	14.99	17.52	0.76	0.10	1.79	Active Layer	HCP	16	24	20	30
34	69.461795	-139.11132	174.28	-28.44	17.77	16.86	0.20	0.01	13.94	Permafrost	flat	30	40	35	26
35	69.466899	-139.09549	58.77	-	-	6.84	1.73	0.04	2.85	Active Layer	HCP	25	31	28	30
36	69.466899	-139.09549	119.75	-26.67	18.51	23.31	0.52	0.34	6.36	Permafrost	HCP	40	50	45	30
37	69.468558	-139.10306	92.59	-27.49	34.31	39.86	0.15	0.57	3.38	Active Layer	HCP	4	12	8	32
38	69.468558	-139.10306	218.57	-28.01	19.97	12.84	2.29	0.20	6.69	Active Layer	HCP	11	17	14	32
39	69.468558	-139.10306	100.91	-28.09	18.85	25.65	1.19	0.22	10.17	Active Layer	HCP	17	21	19	32
40	69.468558	-139.10306	145.76	-27.22	16.41	24.82	1.32	0.39	7.97	Permafrost	HCP	30	40	35	32
41	69.468558	-139.10306	160.39	-27.35	15.59	16.87	0.90	0.25	8.06	Permafrost	HCP	40	43	41.5	32
42	69.468558	-139.10306	8.66	-	-	-	-	-	1.03	Permafrost	HCP	43	50	46.5	32
43	69.468558	-139.10306	9.04	-	-	-	-	-	1.05	Permafrost	HCP	50	60	55	32
44	69.469868	-139.08165	68.06	-27.02	17.77	19.96	0.43	0.09	3.87	Active Layer	HCP	22	26	24	29
45	69.461795	-139.11132	359.55	-27.53	20.17	21.54	0.56	0.49	26.00	Permafrost	flat	40	50	45	26
46	69.469868	-139.08165	196.64	-27.30	14.77	28.80	1.04	0.40	12.44	Permafrost	HCP	30	40	35	29
47	69.463653	-139.11571	96.00	-28.23	18.93	15.92	3.99	0.12	4.51	Active Layer	HCP	21	27	24	27
48	69.463653	-139.11571	180.95	-27.06	16.99	14.89	0.36	0.15	9.83	Permafrost	HCP	25	35	30	27
49	69.468184	-139.12182	205.07	-28.13	19.64	9.03	1.47	0.13	5.20	Active Layer	HCP	11	17	14	32
50	69.470544	-139.11677	12.12	-	-	-	-	-	1.10	Active Layer	flat	55	65	60	28
51	69.466899	-139.09549	65.71	-27.47	16.29	19.66	0.11	0.09	3.21	Permafrost	HCP	29	40	34.5	30
52	69.461795	-139.11132	69.70	-28.16	18.86	16.56	1.06	0.76	8.99	Permafrost	flat	50	60	55	26
53	69.461795	-139.11132	15.42	-28.58	20.12	-	-	1.56	1.50	Permafrost	flat	61	70	65.5	26

## Supplementary Tables

54	69.461143	-139.11857	71.87	-27.07	13.45	54.37	0.07	0.39	6.54	Active Layer	LCP	17	21	19	31
55	69.461143	-139.11857	137.13	-27.74	22.94	26.77	0.53	0.29	7.77	Permafrost	LCP	35	45	40	31
56	69.461838	-139.12411	162.31	-27.48	16.04	11.03	4.49	0.15	4.43	Active Layer	HCP	26	29	27.5	24
57	69.46312	-139.11214	153.46	-	-	32.83	1.73	0.32	3.35	Active Layer	HCP	4	9	6.5	31
58	69.461838	-139.12411	125.36	-27.89	18.01	15.15	1.41	0.05	7.60	Permafrost	HCP	25	35	30	24
59	69.464055	-139.07269	81.53	-26.62	16.86	6.82	3.73	0.08	1.99	Active Layer	flat	20	26	23	21
60	69.464055	-139.07269	88.75	-26.71	18.10	13.68	0.42	0.09	4.13	Permafrost	flat	27	35	31	21
61	69.464769	-139.08187	25.32	-	-	30.00	0.57	0.13	2.02	Active Layer	LCP	0	8	4	31
62	69.463537	-139.08477	118.05	-27.90	19.28	7.65	3.92	0.08	5.87	Active Layer	LCP	20	26	23	32
63	69.463537	-139.08477	263.08	-27.28	18.49	17.36	0.99	0.36	13.11	Permafrost	LCP	30	40	35	32
64	69.461369	-139.07776	261.68	-27.17	18.83	26.40	2.27	0.61	12.30	Active Layer	LCP	22	28	25	30
65	69.461369	-139.07776	63.82	-27.14	19.57	36.85	0.02	0.15	2.57	Permafrost	LCP	30	40	35	30
66	69.459965	-139.08298	112.18	-28.65	20.29	2.68	45.12	0.05	5.15	Active Layer	LCP	17	33	25	50
67	69.459965	-139.08298	115.74	-24.97	17.88	4.28	0.57	0.03	6.24	Permafrost	LCP	50	60	55	50
68	69.46312	-139.11214	95.22	-	-	20.07	3.30	0.14	3.64	Active Layer	HCP	15	24	19.5	31
69	69.462359	-139.08324	63.78	-	-	36.44	0.13	0.37	7.88	Active Layer	flat	0	7	3.5	36
70	69.462359	-139.08324	127.71	-	-	34.18	0.53	0.43	3.08	Active Layer	flat	6	14	10	36
71	69.462359	-139.08324	192.62	-	-	12.95	3.43	0.15	7.71	Active Layer	flat	20	29	24.5	36
72	69.462359	-139.08324	161.28	-27.84	19.92	29.22	0.43	0.17	6.83	Permafrost	flat	36	45	40.5	36
73	69.462359	-139.08324	162.53	-28.56	22.53	24.57	6.19	0.27	8.73	Permafrost	flat	45	55	50	36
74	69.462359	-139.08324	-	-	-	-	-	-	-	Permafrost	flat	55	65	60	36
75	69.46161	-139.09193	130.55	-28.27	17.95	3.90	11.09	0.07	5.60	Active Layer	flat	24	30	27	41
76	69.46161	-139.09193	170.95	-26.70	18.24	7.01	3.70	0.10	8.25	Permafrost	flat	40	50	45	41
77	69.463993	-139.09123	69.96	-27.61	18.97	14.43	0.91	0.10	2.47	Active Layer	LCP	27	33	30	35
78	69.463993	-139.09123	101.37	-27.55	18.97	27.45	0.81	0.26	4.15	Permafrost	LCP	32	40	36	35
79	69.46312	-139.11214	133.22	-27.91	17.07	23.83	0.11	0.14	5.83	Permafrost	HCP	25	35	30	31
80	69.464094	-139.09713	40.15	-27.82	15.09	34.29	0.39	0.15	5.12	Active Layer	LCP	0	12	6	25
81	69.464094	-139.09713	81.25	-	-	26.11	0.72	0.67	5.06	Active Layer	LCP	18	35	26.5	25



## Supplementary Tables

82	69.464094	-139.09713	139.69	-28.14	15.81	18.93	0.85	0.20	10.44	Permafrost	LCP	35	40	37.5	25
83	69.464094	-139.09713	74.16	-27.88	13.96	15.47	0.51	0.16	6.04	Permafrost	LCP	40	50	45	25
84	69.464094	-139.09713	14.57	-	-	-	-	-	2.01	Permafrost	LCP	50	60	55	25
85	69.463393	-139.10312	169.85	-29.14	25.55	6.62	5.12	0.11	5.59	Active Layer	HCP	17	23	20	19
86	69.463393	-139.10312	133.65	-	-	15.56	1.82	0.15	7.14	Permafrost	HCP	23	35	29	19
87	69.470015	-139.10556	280.65	-26.94	14.66	31.07	3.29	1.25	4.63	Active Layer	HCP	6	26	16	35
88	69.470015	-139.10556	109.52	-29.09	17.32	25.93	0.08	0.27	4.33	Permafrost	HCP	35	39	37	35
89	69.470778	-139.1099	69.77	-28.35	20.46	19.13	2.44	0.11	2.37	Active Layer	HCP	14	20	17	16
90	69.46312	-139.11214	166.32	-27.90	16.72	16.58	2.36	0.21	9.45	Permafrost	HCP	35	45	40	31
91	69.470778	-139.1099	96.90	-27.84	17.61	26.07	0.73	0.17	5.50	Permafrost	HCP	25	35	30	16
92	69.470544	-139.11677	169.54	-29.10	24.65	6.91	-	-	4.09	Active Layer	flat	21	25	23	28
93	69.470544	-139.11677	96.40	-29.31	24.71	9.94	0.74	0.07	7.06	Permafrost	flat	25	35	30	28
94	69.469604	-139.11749	91.18	-27.85	16.67	9.44	0.66	0.06	4.41	Active Layer	HCP	20	26	23	32
95	69.469604	-139.11749	164.43	-26.82	18.61	15.27	1.40	0.21	2.78	Active Layer	HCP	25	31	28	32
96	69.469604	-139.11749	71.54	-27.52	19.07	19.22	0.61	0.12	3.89	Permafrost	HCP	34	40	37	32
97	69.467569	-139.11932	45.09	-26.31	28.41	40.37	0.70	0.28	1.81	Active Layer	HCP	0	12	6	19
98	69.467569	-139.11932	50.97	-25.80	16.98	32.13	0.59	0.19	5.73	Active Layer	HCP	12	18	15	19
99	69.467569	-139.11932	109.63	-28.29	16.93	9.59	0.95	0.09	6.62	Active Layer	HCP	18	24	21	19
100	69.467569	-139.11932	88.25	-27.09	16.17	19.45	0.70	0.14	4.76	Active Layer	HCP	17	24	20.5	19
101	69.46312	-139.11214	256.75	-27.95	16.85	16.02	4.10	0.45	17.43	Permafrost	HCP	45	55	50	31
102	69.467569	-139.11932	169.74	-27.55	14.78	24.28	1.17	0.28	10.59	Permafrost	HCP	20	30	25	19
103	69.467569	-139.11932	116.04	-27.41	13.00	12.65	1.52	0.19	8.81	Permafrost	HCP	30	40	35	19
104	69.467569	-139.11932	379.06	-27.32	13.06	12.54	7.34	0.92	28.13	Permafrost	HCP	40	50	45	19
105	69.467569	-139.11932	185.97	-28.12	15.36	14.97	2.40	0.36	12.41	Permafrost	HCP	50	60	55	19
106	69.467569	-139.11932	168.87	-27.35	14.86	12.09	1.75	0.21	10.92	Permafrost	HCP	60	70	65	19
107	69.467569	-139.11932	151.15	-27.20	14.99	12.75	3.75	0.48	9.74	Permafrost	HCP	70	80	75	19
108	69.467569	-139.11932	244.57	-27.03	14.44	9.99	4.11	0.41	16.34	Permafrost	HCP	80	90	85	19
109	69.467569	-139.11932	260.38	-26.78	14.81	11.95	4.03	0.48	16.53	Permafrost	HCP	90	100	95	19

## Supplementary Tables

110	69.468184	-139.12182	78.87	-27.95	18.00	14.48	0.75	0.11	10.77	Active Layer	HCP	23	27	25	32
111	69.468184	-139.12182	199.47	-27.53	16.36	18.55	1.46	0.27	7.86	Permafrost	HCP	27	40	33.5	32
112	69.46312	-139.11214	193.68	-27.82	16.03	14.59	0.28	0.22	15.22	Permafrost	HCP	55	70	62.5	31
113	69.461047	-139.08672	96.58	-27.06	17.32	8.73	0.38	0.03	4.24	Active Layer	flat	18	24	21	25
114	69.461047	-139.08672	88.59	-26.04	16.34	5.68	0.28	0.02	4.66	Permafrost	flat	22	30	26	25
115	69.463085	-139.08719	124.81	-27.98	21.26	21.36	0.84	0.18	5.25	Active Layer	HCP	15	24	19.5	60
116	69.463085	-139.08719	181.20	-27.79	19.60	34.43	1.12	0.39	8.49	Permafrost	HCP	25	35	30	60
117	69.465535	-139.09234	47.70	-28.39	13.48	32.79	0.60	0.20	4.59	Active Layer	HCP	0	8	4	40
118	69.465535	-139.09234	30.64	-28.53	15.02	36.63	0.37	0.14	2.07	Active Layer	HCP	8	18	13	40
119	69.465535	-139.09234	83.63	-28.88	17.11	11.81	0.52	0.06	5.03	Active Layer	HCP	24	30	27	40
120	69.465535	-139.09234	72.49	-28.14	19.65	14.84	0.52	0.08	5.31	Permafrost	HCP	29	39	34	40
121	69.465535	-139.09234	114.82	-27.74	18.11	17.68	0.95	0.17	7.27	Permafrost	HCP	39	50	44.5	40
122	69.465535	-139.09234	145.01	-27.28	20.20	28.57	1.89	0.54	11.95	Permafrost	HCP	50	60	55	40
123	69.46312	-139.11214	148.68	-27.81	16.26	13.71	0.37	0.49	13.38	Permafrost	HCP	70	80	75	31
124	69.465535	-139.09234	199.59	-27.54	17.35	16.55	4.08	0.67	17.32	Permafrost	HCP	60	70	65	40
125	69.465535	-139.09234	269.77	-27.78	16.63	12.06	6.04	0.73	24.23	Permafrost	HCP	70	80	75	40
126	69.465535	-139.09234	201.64	-	-	-	-	-	-	Permafrost	HCP	80	90	85	40
127	69.465535	-139.09234	347.27	-27.95	16.65	16.73	0.65	0.11	18.08	Permafrost	HCP	90	100	95	40
128	69.465834	-139.08874	50.70	-27.04	15.83	14.65	0.50	0.07	2.73	Active Layer	HCP	19	25	22	30
129	69.465834	-139.08874	93.27	-26.51	16.02	11.70	0.70	0.08	4.89	Permafrost	HCP	30	40	35	30
130	69.465859	-139.126	41.62	-27.12	18.40	32.97	0.68	0.22	1.04	Active Layer	HCP	0	6	3	26
131	69.465859	-139.126	100.18	-27.47	15.24	29.69	0.80	0.24	3.94	Active Layer	HCP	6	15	10.5	26
132	69.465859	-139.126	104.37	-28.10	16.38	22.10	1.08	0.24	5.03	Permafrost	HCP	20	26	23	26
133	69.465859	-139.126	139.95	-28.08	13.88	26.70	0.63	0.17	8.87	Permafrost	HCP	26	40	33	26
134	69.46312	-139.11214	31.00	-27.57	14.78	-	-	0.68	3.30	Permafrost	HCP	80	90	85	31
135	69.465859	-139.126	27.97	-	-	-	-	-	2.72	Permafrost	HCP	40	50	45	26
136	69.465859	-139.126	31.98	-	-	-	-	-	-	Permafrost	HCP	50	60	55	26
137	69.464537	-139.12584	75.17	-30.84	18.34	34.26	1.57	0.54	4.26	Active Layer	LCP	0	11	5.5	41

## Supplementary Tables

138	69.464537	-139.12584	135.43	-28.94	15.38	32.72	2.13	0.70	2.41	Active Layer	LCP	11	25	18	41
139	69.464537	-139.12584	80.19	-	-	8.41	1.05	0.09	2.40	Active Layer	LCP	25	38	31.5	41
140	69.464537	-139.12584	95.30	-28.50	15.51	21.74	1.49	0.32	4.62	Active Layer	LCP	38	50	44	41
141	69.464537	-139.12584	148.43	-27.63	15.84	8.78	1.74	0.15	9.18	Permafrost	LCP	50	60	55	41
142	69.464537	-139.12584	211.28	-27.63	13.53	10.62	2.31	0.25	14.69	Permafrost	LCP	60	70	65	41
143	69.464537	-139.12584	228.31	-27.92	15.91	15.71	3.25	0.51	16.01	Permafrost	LCP	70	80	75	41
144	69.464537	-139.12584	176.69	-28.57	21.77	13.33	9.14	1.22	14.54	Permafrost	LCP	80	90	85	41
145	69.4646868	-139.087	-	-26.97	19.87	17.87	-	-	-	Permafrost	HCP	61	81.5	71.25	31
146	69.4653797	-139.08474	-	-25.63	18.42	9.05	-	-	-	Permafrost	LCP	49	58	53.5	19

## Supplementary Tables

Table S5. Incubated tributary stream water DOC and POC.

ID	Latitude	Longitude	Location	Instance	Aliquot	T-INC	DOC (mg/L)	$\delta^{13}\text{C}$ -DOC (‰)	POC (mg/L)	$\delta^{13}\text{C}$ -POC (‰)
1	69.47081	-139.0975317	A	1	1	0	31.70	-28.45	2.04	-35.92
2	69.47081	-139.0975317	A	1	2	0	32.40	-28.68	2.04	-35.92
3	69.47081	-139.0975317	A	1	3	0	32.50	-28.37	2.04	-35.92
4	69.47081	-139.0975317	A	1	1	7	31.60	-28.77	-	-
5	69.47081	-139.0975317	A	1	2	7	29.80	-28.93	-	-
6	69.47081	-139.0975317	A	1	3	7	29.30	-29.05	-	-
7	69.47081	-139.0975317	A	2	1	0	36.10	-28.17	1.76	-34.65
8	69.47081	-139.0975317	A	2	2	0	36.60	-28.27	1.76	-34.65
9	69.47081	-139.0975317	A	2	3	0	36.40	-28.35	1.76	-34.65
10	69.47081	-139.0975317	A	2	1	7	36.20	-28.47	-	-
11	69.47081	-139.0975317	A	2	2	7	35.40	-28.32	-	-
12	69.47081	-139.0975317	A	2	3	7	37.40	-28.42	-	-
13	69.46656167	-139.0730583	A	3	1	0	36.60	-27.91	0.69	-33.40
14	69.46656167	-139.0730583	A	3	2	0	36.90	-28.29	0.69	-33.40
15	69.46656167	-139.0730583	A	3	3	0	36.00	-28.31	0.69	-33.40
16	69.46656167	-139.0730583	A	3	1	7	37.30	-28.35	-	-
17	69.46656167	-139.0730583	A	3	2	7	36.20	-28.41	-	-
18	69.46656167	-139.0730583	A	3	3	7	36.30	-28.23	-	-
19	69.46469333	-139.12684	B	1	1	0	16.50	-28.51	1.80	-31.83
20	69.46469333	-139.12684	B	1	2	0	16.30	-28.50	1.80	-31.83
21	69.46469333	-139.12684	B	1	3	0	16.30	-28.57	1.80	-31.83
22	69.46469333	-139.12684	B	1	1	7	13.40	-28.92	-	-
23	69.46469333	-139.12684	B	1	2	7	13.80	-28.70	-	-
24	69.46469333	-139.12684	B	1	3	7	13.50	-29.38	-	-
25	69.46469333	-139.12684	B	2	1	0	16.20	-28.69	1.12	-30.41

## Supplementary Tables

26	69.46469333	-139.12684	B	2	2	0	15.90	-28.64	1.12	-30.41
27	69.46469333	-139.12684	B	2	3	0	16.30	-28.73	1.12	-30.41
28	69.46469333	-139.12684	B	2	1	7	15.90	-28.36	-	-
29	69.46469333	-139.12684	B	2	2	7	16.10	-28.48	-	-
30	69.46469333	-139.12684	B	2	3	7	16.60	-28.44	-	-
31	69.46655667	-139.07303	B	3	1	0	16.60	-28.30	1.54	-31.66
32	69.46655667	-139.07303	B	3	2	0	16.60	-28.48	1.54	-31.66
33	69.46655667	-139.07303	B	3	3	0	16.70	-28.30	1.54	-31.66
34	69.46655667	-139.07303	B	3	1	7	16.90	-28.36	-	-
35	69.46655667	-139.07303	B	3	2	7	16.60	-28.48	-	-
36	69.46655667	-139.07303	B	3	3	7	16.20	-28.64	-	-
37	69.46764167	-139.09871	C	1	1	0	18.00	-28.24	0.66	-35.05
38	69.46764167	-139.09871	C	1	2	0	18.00	-28.59	0.66	-35.05
39	69.46764167	-139.09871	C	1	3	0	18.30	-28.34	0.66	-35.05
40	69.46764167	-139.09871	C	1	1	7	17.90	-28.29	-	-
41	69.46764167	-139.09871	C	1	2	7	17.70	-28.30	-	-
42	69.46764167	-139.09871	C	1	3	7	17.90	-28.30	-	-
43	69.46765333	-139.0986583	C	2	1	0	17.80	-28.44	0.52	-30.44
44	69.46765333	-139.0986583	C	2	2	0	17.00	-28.69	0.52	-30.44
45	69.46765333	-139.0986583	C	2	3	0	16.10	-29.03	0.52	-30.44
46	69.46765333	-139.0986583	C	2	1	7	17.90	-28.55	-	-
47	69.46765333	-139.0986583	C	2	2	7	17.70	-28.38	-	-
48	69.46765333	-139.0986583	C	2	3	7	17.50	-28.30	-	-
49	69.46655167	-139.0730467	C	3	1	0	17.50	-28.93	0.34	-30.78
50	69.46655167	-139.0730467	C	3	2	0	17.30	-28.59	0.34	-30.78
51	69.46655167	-139.0730467	C	3	3	0	17.20	-28.49	0.34	-30.78
52	69.46655167	-139.0730467	C	3	1	7	17.70	-28.50	-	-
53	69.46655167	-139.0730467	C	3	2	7	17.50	-28.48	-	-

## Supplementary Tables

54	69.46655167	-139.0730467	C	3	3	7	18.00	-28.30	-	-
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## Supplementary Tables

Table S6. Spectral indices for which differences between various landscape classes were significant ( $p < 0.05$ ).

		HCP		LCP		Flat		Streams	
		Active layer	Permafrost	Active layer	Permafrost	Active layer	Permafrost	Tributaries	Main channel
HCP	Active layer	-							
	Permafrost	FI, FRESH, BIX, a254/a365, Sr, SUVA254	-						
LCP	Active layer	FI, FRESH, BIX, SUVA254	FI, FRESH, BIX, a254/a365, Sr, SUVA254	-					
	Permafrost	FI, FRESH, BIX, a254/a365, Sr, SUVA254		FI, a254/a365, Sr	-				
Flat	Active layer	FI	FI, FRESH, BIX, a254/a365, Sr, SUVA254	-	FI, a254/a365, SUVA254	-			
	Permafrost	FI, FRESH, BIX, Sr, SUVA254	FI, a254/a365	-	FI	SUVA254	-		
Streams	Tributaries	-	-	-	-	-	-	-	
	Main channel	-	-	-	-	-	-	FI, FRESH, HIX, BIX, a254/a365, Sr	-

## Supplementary Tables

Table S7. Sensitivity analysis of EMMA for permafrost tracer means.

Model	Source	$\delta^{13}\text{C-DOC}$ (‰ VPDB)	$a_{254}/a_{365}$	Sr	Source contribution					Percentage change				
					2.5th	median	97.5th	mean	std	2.5th	median	97.5th	mean	std
Original	Permafrost	-24.15 ±1.03‰	5.81 ±1.23	0.85 ±0.080	0.088	0.4908	0.843	0.487	0.19	0%	0%	0%	0%	0%
	Active layer	-26.40 ±1.07‰	4.55 ±0.84	0.71 ±0.084	0.013	0.276	0.784	0.308	0.21	0%	0%	0%	0%	0%
	Primary production	-28.48 ±1.00‰	5.40 ±0.23	0.78 ±0.020	0.009	0.1823	0.535	0.206	0.14	0%	0%	0%	0%	0%
$\delta^{13}\text{C-DOC}_{\text{pf}}$ +5% mean	Permafrost	-25.36 ±1.03‰	5.81 ±1.23	0.85 ±0.080	0.074	0.5357	0.887	0.516	0.22	-15%	9%	5%	6%	16%
	Active layer	-26.40 ±1.07‰	4.55 ±0.84	0.71 ±0.084	0.014	0.2801	0.793	0.316	0.22	12%	1%	1%	3%	5%
	Primary production	-28.48 ±1.00‰	5.40 ±0.23	0.78 ±0.020	0.008	0.1387	0.513	0.169	0.14	-10%	-24%	-4%	-18%	-5%
$\delta^{13}\text{C-DOC}_{\text{pf}}$ -5% mean	Permafrost	-22.94 ±1.03‰	5.81 ±1.23	0.85 ±0.080	0.068	0.4078	0.702	0.403	0.16	-23%	-17%	-17%	-17%	-17%
	Active layer	-26.40 ±1.07‰	4.55 ±0.84	0.71 ±0.084	0.013	0.3006	0.797	0.329	0.22	4%	9%	2%	7%	3%
	Primary production	-28.48 ±1.00‰	5.40 ±0.23	0.78 ±0.020	0.015	0.2554	0.608	0.269	0.16	73%	40%	14%	31%	13%
$a_{254}/a_{365}_{\text{pf}}$ +5% mean	Permafrost	-24.15 ±1.03‰	6.10 ±1.23	0.85 ±0.080	0.086	0.4772	0.825	0.471	0.19	-1%	-3%	-2%	-3%	0%
	Active layer	-26.40 ±1.07‰	4.55 ±0.84	0.71 ±0.084	0.014	0.2913	0.8	0.321	0.22	11%	6%	2%	4%	3%
	Primary production	-28.48 ±1.00‰	5.40 ±0.23	0.78 ±0.020	0.007	0.1846	0.563	0.208	0.15	-19%	1%	5%	1%	6%
$a_{254}/a_{365}_{\text{pf}}$ -5% mean	Permafrost	-24.15 ±1.03‰	5.52 ±1.23	0.85 ±0.080	0.06	0.4935	0.833	0.481	0.19	-31%	1%	-1%	-1%	3%
	Active layer	-26.40 ±1.07‰	4.55 ±0.84	0.71 ±0.084	0.016	0.2749	0.799	0.312	0.22	22%	0%	2%	1%	4%
	Primary production	-28.48 ±1.00‰	5.40 ±0.23	0.78 ±0.020	0.011	0.1839	0.543	0.207	0.15	28%	1%	2%	1%	2%
$\text{Sr}_{\text{pf}}$ +5% mean	Permafrost	-24.15 ±1.03‰	5.81 ±1.23	0.89 ±0.080	0.087	0.4897	0.839	0.482	0.19	-1%	0%	0%	-1%	1%
	Active layer	-26.40 ±1.07‰	4.55 ±0.84	0.71 ±0.084	0.016	0.269	0.782	0.304	0.21	26%	-3%	0%	-1%	0%
	Primary production	-28.48 ±1.00‰	5.40 ±0.23	0.78 ±0.020	0.011	0.1916	0.551	0.214	0.15	22%	5%	3%	4%	2%
$\text{Sr}_{\text{pf}}$ -5% mean	Permafrost	-24.15 ±1.03‰	5.81 ±1.23	0.81 ±0.080	0.063	0.4864	0.827	0.475	0.19	-29%	-1%	-2%	-2%	3%
	Active layer	-26.40 ±1.07‰	4.55 ±0.84	0.71 ±0.084	0.013	0.2753	0.812	0.312	0.22	-2%	0%	4%	1%	4%
	Primary production	-28.48 ±1.00‰	5.40 ±0.23	0.78 ±0.020	0.011	0.1904	0.555	0.214	0.15	26%	4%	4%	4%	3%



## Supplementary Tables

Table S8. Sensitivity analysis of EMMA for permafrost tracer standard deviations.

Model	Source	$\delta^{13}\text{C-DOC}$ (‰ VPDB)	$a_{254}/a_{365}$	Sr	Source contribution					Percentage change				
					2.5th.	median	97.5th	mean	std	2.5th.	median	97.5th	mean	std
Original	Permafrost	-24.15 ±1.03‰	5.81 ±1.23	0.85 ±0.080	0.088	0.491	0.843	0.487	0.186	0%	0%	0%	0%	0%
	Active layer	-26.40 ±1.07‰	4.55 ±0.84	0.71 ±0.084	0.013	0.276	0.784	0.308	0.209	0%	0%	0%	0%	0%
	Primary production	-28.48 ±1.00‰	5.40 ±0.23	0.78 ±0.020	0.009	0.182	0.535	0.206	0.143	0%	0%	0%	0%	0%
$\delta^{13}\text{C-DOC}_{\text{pf}}$ +5% std	Permafrost	-24.15 ±1.08‰	5.81 ±1.23	0.85 ±0.080	0.093	0.474	0.822	0.471	0.182	6%	-3%	-2%	-3%	-2%
	Active layer	-26.40 ±1.07‰	4.55 ±0.84	0.71 ±0.084	0.017	0.290	0.775	0.318	0.206	36%	5%	-1%	3%	-1%
	Primary production	-28.48 ±1.00‰	5.40 ±0.23	0.78 ±0.020	0.008	0.190	0.550	0.211	0.148	-7%	4%	3%	3%	3%
$\delta^{13}\text{C-DOC}_{\text{pf}}$ -5% std	Permafrost	-24.15 ±0.98‰	5.81 ±1.29	0.85 ±0.080	0.075	0.490	0.823	0.479	0.187	-14%	0%	-2%	-2%	0%
	Active layer	-26.40 ±1.07‰	4.55 ±0.84	0.71 ±0.084	0.015	0.276	0.795	0.310	0.214	15%	0%	1%	1%	2%
	Primary production	-28.48 ±1.00‰	5.40 ±0.23	0.78 ±0.020	0.010	0.189	0.541	0.211	0.145	12%	3%	1%	2%	1%
$a_{254}/a_{365}_{\text{pf}}$ +5% std	Permafrost	-24.15 ±1.03‰	5.81 ±1.23	0.85 ±0.080	0.075	0.480	0.830	0.473	0.189	-14%	-2%	-1%	-3%	2%
	Active layer	-26.40 ±1.07‰	4.55 ±0.84	0.71 ±0.084	0.012	0.291	0.800	0.320	0.214	-4%	6%	2%	4%	2%
	Primary production	-28.48 ±1.00‰	5.40 ±0.23	0.78 ±0.020	0.011	0.183	0.547	0.207	0.146	21%	0%	2%	1%	2%
$a_{254}/a_{365}_{\text{pf}}$ -5% std	Permafrost	-24.15 ±1.03‰	5.81 ±1.17	0.85 ±0.080	0.114	0.494	0.832	0.490	0.180	31%	1%	-1%	1%	-3%
	Active layer	-26.40 ±1.07‰	4.55 ±0.84	0.71 ±0.084	0.018	0.268	0.757	0.300	0.203	42%	-3%	-3%	-3%	-3%
	Primary production	-28.48 ±1.00‰	5.40 ±0.23	0.78 ±0.020	0.013	0.189	0.533	0.210	0.141	43%	4%	0%	2%	-2%
$\text{Sr}_{\text{pf}}$ +5% std	Permafrost	-24.15 ±1.03‰	5.81 ±1.23	0.85 ±0.084	0.086	0.485	0.824	0.477	0.184	-2%	-1%	-2%	-2%	-1%
	Active layer	-26.40 ±1.07‰	4.55 ±0.84	0.71 ±0.084	0.016	0.275	0.783	0.307	0.210	22%	0%	0%	0%	0%
	Primary production	-28.48 ±1.00‰	5.40 ±0.23	0.78 ±0.020	0.010	0.195	0.556	0.216	0.148	14%	7%	4%	5%	3%
$\text{Sr}_{\text{pf}}$ -5% std	Permafrost	-24.15 ±1.03‰	5.81 ±1.23	0.85 ±0.076	0.082	0.482	0.830	0.474	0.188	-7%	-2%	-2%	-3%	1%
	Active layer	-26.40 ±1.07‰	4.55 ±0.84	0.71 ±0.084	0.020	0.284	0.797	0.318	0.209	58%	3%	2%	3%	0%
	Primary production	-28.48 ±1.00‰	5.40 ±0.23	0.78 ±0.020	0.010	0.186	0.536	0.208	0.143	13%	2%	0%	1%	-1%

## Supplementary Tables

Table S9. Timeseries of tracer values at the catchment outlet and computed source fractions.

Datetime	$\delta^{13}\text{C-DOC}$ (‰ VPDB)	a254/a365	Sr	Permafrost	Active layer	Primary prod.
8/9/18 00:00	-24.84	6.41	0.80	0.65	0.20	0.14
8/9/18 12:00	-25.11	4.97	0.81	0.47	0.37	0.16
8/10/18 00:00	-25.15	5.52	0.79	0.52	0.30	0.18
8/10/18 12:00	-25.28	5.22	0.81	0.46	0.34	0.20
8/13/18 14:22	-25.67	5.55	0.83	0.43	0.33	0.24
8/13/18 20:22	-25.40	5.57	0.83	0.49	0.30	0.21
8/14/18 02:22	-25.84	5.66	0.82	0.42	0.31	0.27
8/14/18 08:22	-25.46	5.49	0.84	0.46	0.32	0.22
8/14/18 14:22	-25.64	5.48	0.81	0.44	0.32	0.24
8/14/18 20:22	-24.86	5.31	0.82	0.54	0.32	0.15
8/15/18 02:22	-26.02	5.56	0.82	0.37	0.32	0.30
8/15/18 08:22	-24.73	5.54	0.83	0.59	0.27	0.14
8/15/18 14:22	-25.87	5.56	0.83	0.40	0.31	0.29
8/15/18 20:22	-25.48	5.41	0.83	0.46	0.31	0.23
8/16/18 02:22	-25.17	5.30	0.82	0.49	0.34	0.17
8/16/18 08:22	-25.48	5.56	0.86	0.47	0.31	0.22
8/16/18 14:22	-25.13	5.57	0.83	0.52	0.31	0.18
8/16/18 20:22	-25.35	5.56	0.83	0.49	0.31	0.20
8/17/18 02:22	-25.27	5.58	0.82	0.50	0.32	0.19
8/17/18 08:22	-25.98	5.61	0.89	0.38	0.32	0.29
8/17/18 14:22	-25.42	5.78	0.83	0.50	0.28	0.21
8/17/18 20:22	-25.39	6.14	0.84	0.55	0.25	0.20
8/18/18 02:22	-24.98	5.77	0.85	0.56	0.28	0.16
8/18/18 08:22	-25.42	6.11	0.84	0.55	0.25	0.20
8/18/18 14:22	-24.76	5.61	0.83	0.58	0.27	0.15
8/19/18 02:22	-26.08	5.18	0.83	0.32	0.38	0.30
8/19/18 08:22	-25.94	5.76	0.84	0.41	0.30	0.29
<b>Mean</b>	-25.40	5.58	0.83	0.48	0.31	0.21
<b>Max.</b>	-24.73	6.41	0.89	0.65	0.38	0.30
<b>Min.</b>	-26.08	4.97	0.79	0.32	0.20	0.14

## Supplementary Tables