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Supplement of

The role of watershed characteristics, permafrost thaw, and wildfire on dissolved organic carbon biodegradability and water chemistry in Arctic headwater streams

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Table S1. Water chemistry analytes and their respective methods and instruments.

Variable	Method	Instrument
Soluble reactive orthophosphate ($\text{PO}_4^{3-}\text{-P}$)	Lachat QuickChem 10-115-01-1-Q	Lachat autoanalyzer
Nitrate ($\text{NO}_3^-\text{-N}$)	Lachat QuickChem 10-107-06-2-O	Lachat autoanalyzer
Ammonium ($\text{NH}_4^+\text{-N}$)	Lachat QuickChem 10-107-04-1-B	Lachat autoanalyzer
Dissolved Organic Carbon (DOC)	EPA 415.1 (Combustion)	Shimadzu TOC-V CHP
Total Dissolved Nitrogen (TDN)	Combustion with chemiluminescence	Antec 750
Total Dissolved Phosphorus (TDP)	EPA 365.2	Shimadzu UV-Spectrophotometer 1601120V
Base cations	ICP-OES	Perkin Elmer Optima 3000DV
Micronutrients	ICP-OES	Perkin Elmer Optima 3000DV
Metals	ICP-OES	Perkin Elmer Optima 3000DV
Anions	Ion Chromatography	Dionex IonPac AS14A
Alkalinity	Titration	Tim800 ABU900 Autoburette

Table S2. Summary of DOC metrics by site. The mean of each sampling (n) is reported with standard error (SE). ‘ - ’ indicates no SE due to sample size (n = 1).

Site ID	n	Initial DOC (uM)	SE	TDN (uM)	SE	BDOC Loss (uM)	SE	Total BDOC (% Loss)	SE	SUVA ₂₅₄	SE
1	5	219	10	126	3	40	4	17.5	1.3	1.88	0.03
2	5	300	22	129	4	52	10	19.5	1.7	2.36	0.09
3	1	1313	-	152	-	178	-	13.4	-	5.90	-
4	1	642	-	142	-	72	-	15.5	-	2.57	-
5	5	1354	138	153	6	100	37	7.1	1.8	4.55	0.10
6	5	984	55	158	12	70	24	6.7	2.1	4.66	0.19
7a	5	924	86	141	6	96	23	10.3	1.8	4.89	0.25
7b	4	979	65	147	3	112	27	11.1	1.8	4.82	0.40
8a	5	1185	103	148	4	131	24	11.5	2.9	5.17	0.49
8b	4	1208	73	155	1	115	18	9.4	1.4	5.27	0.48
9	1	331	-	134	-	95	-	28.8	-	2.60	-
10	1	388	-	170	-	157	-	40.1	-	2.07	-
11a	1	319	-	138	-	159	-	45.5	-	1.31	-
11b	1	268	-	139	-	112	-	39.5	-	2.09	-
12a	1	298	-	136	-	121	-	39.9	-	1.50	-
12b	1	267	-	129	-	93	-	34.8	-	1.62	-

Table S3. Summary of background water chemistry by site. The mean of each sampling (n) is reported with \pm standard error SE for those sites that had more than one sampling. Numbers in () represent sample size when different from the majority ‘n’.

Site	n	TSS	Alkalinity	TDN	NH ₄ ⁺	NO ₃ ⁻	TDP	PO ₄ ³⁻
1	37	1.03 \pm 0.19	305 \pm 9	14.1 \pm 0.3	0.72 \pm 0.13 (3)	5.87 \pm 0.22	0.03 \pm 0.01	0.07 \pm 0.03 (3)
2	37	0.47 \pm 0.11	314 \pm 13	16.7 \pm 0.5	0.61 \pm 0.05 (3)	5.28 \pm 0.31	0.01 \pm 0.00	0.04 \pm 0.01 (2)
3	1	2.05	411	50.3	0.16	-	0.24	0.11
4	1	0.00	420	25.1	0.11	4.27	-	0.04
5	42	0.72 \pm 0.17	699 \pm 48	37.7 \pm 0.7	0.33 \pm 0.11	0.49 \pm 0.11	0.23 \pm 0.01	0.10 \pm 0.01
6	41	2.03 \pm 0.61	364 \pm 28	53.1 \pm 0.7	0.47 \pm 0.15	0.01 \pm 0.01	0.45 \pm 0.01	0.17 \pm 0.04
7a	38	2.58 \pm 0.58	151 \pm 12	38.2 \pm 1.3	0.53 \pm 0.19	0.17 \pm 0.04	0.42 \pm 0.03	0.19 \pm 0.06
7b	3	0.67 \pm 0.67	113 \pm 21	31.5 \pm 1.9	0.22 \pm 0.09	0.00 \pm 0.0	0.34 \pm 0.03	0.16 \pm 0.05
8a	38	2.68 \pm 0.45	210 \pm 15	45.1 \pm 1.4	0.23 \pm 0.03	0.02 \pm 0.01	0.58 \pm 0.04	0.21 \pm 0.07
8b	3	4.92 \pm 1.42	203 \pm 87	43.0 \pm 7.0	0.41 \pm 0.21	0.37 \pm 0.22	0.52 \pm 0.12	0.21 \pm 0.06
9	1	0.20	2633	9.9	0.5	0.3	0.0	0.1
10	1	44.6	2114	7.8	0.6	2.5	-	0.1
11a	1	0.21	661	12.4	1.24	4.92	0.09	0.13
11b	1	119	802	11.7	0.55	4.72	0.11	0.11
12a	1	17.24	1402	14.1	0.56	5.00	0.04	0.11
12b	1	7.20	1381	12.5	0.97	4.98	0.04	0.09

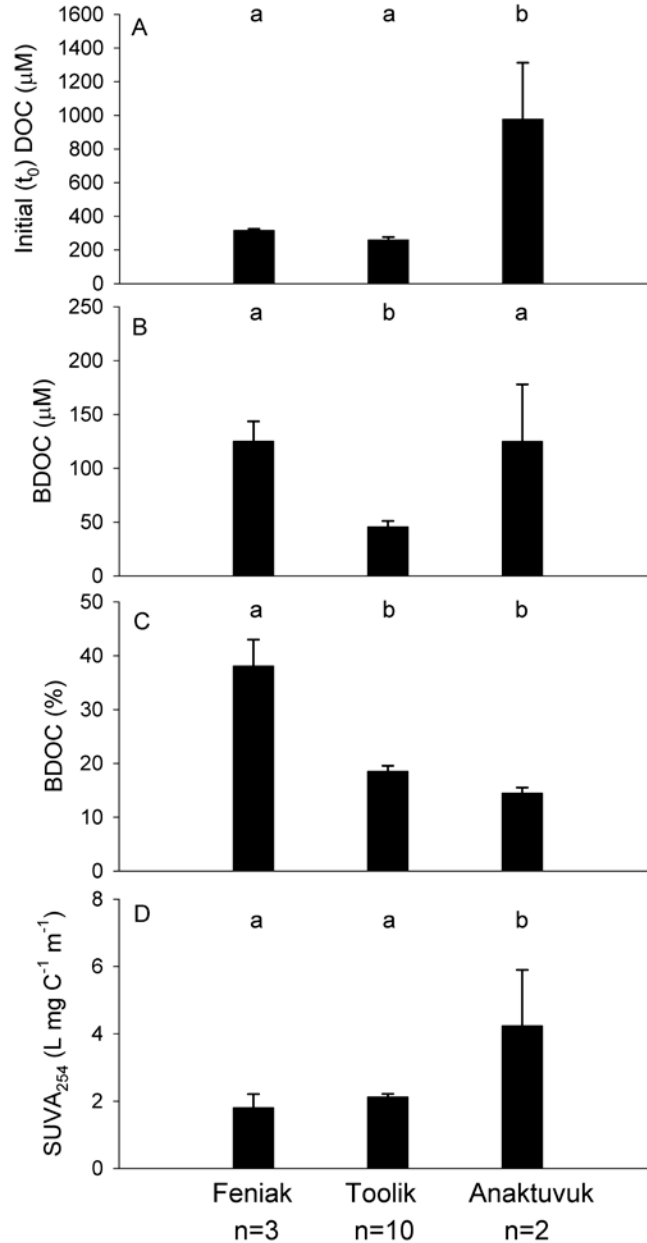


Figure S1. Comparison of reference sites of the three regions for stream DOC quantity (A); Biodegradability in terms of absolute loss (B) and percent loss (C) after 40 days; and SUVA₂₅₄ (D). Means and standard error are reported. Sample size (n) represents a sampling of a stream on a given day. The ‘Feniak’ group represents 3 stream reaches sampled one time in the Feniak region. The ‘Toolik’ group represents 2 stream reaches sampled 5 times over the season. The ‘Anaktuvuk’ group represents 2 reaches sampled once outside of the Anaktuvuk scar boundary. Different letters represent significant differences between regions, $\alpha = 0.05$.

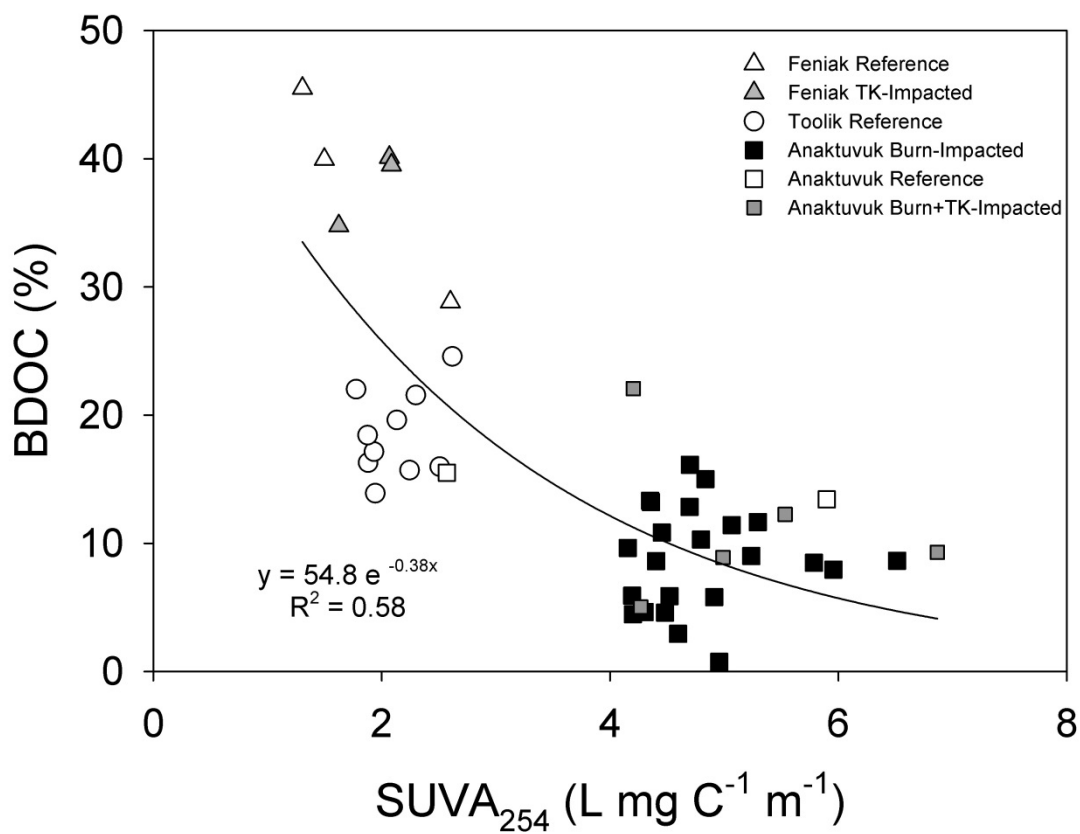


Figure S2. SUVA₂₅₄, (L mg C⁻¹ m⁻¹) versus BDOC 40-day loss (%) for streams grouped by area and disturbance type.