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Brief communication: Stream microbes preferentially respire young carbon within the ancient glacier dissolved organic carbon pool

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Sect. S1 Description of C_3 and C_4 Vegetation

Plants can be divided into two main groups based on photosynthetic pathway (e.g., Hobbie and Werner, 2003; Langdale., 2011 and references there in). The C_3 photosynthetic pathway produces a 3-carbon acid as a result of carbon fixation using the Calvin cycle, whereas C_4 plants produce a 4-carbon containing compound following the Hatch-Slack pathway (Hobbie and Werner., 2003). C_3 plants make up the majority (~95% of biomass) of the world's plants and comprise trees, shrubs, and flowering plants. C_3 plants are typically found in moist, temperate to cold climates (Still et al., 2003). C_4 plants (~5% of biomass) are typically found in hot, dry regions and include most tropical species of grass and agricultural crops like maize and sugar cane (Still et al., 2003). The C_4 photosynthetic pathway is a more recent (~30 Mya) adaptation to conserving water and reducing photorespiration in hot, arid climes (Langdale., 2011). Differences in photorespiration pathways between C_3 and C_4 plants result in variances in isotopic fractionation (i.e., differences in ^{13}C:^{12}C ratios), meaning that the contribution of carbon from the two plant groups can be distinguished in environmental samples, including of dissolved organic carbon (e.g., Khon., 2010; Drake et al., 2020). C_4 plants ($\delta^{13}C$ -14 to -10 ‰; Cerling et al., 1993, 1997) are enriched in ^{13}C in comparison to C_3 plants ($\delta^{13}C$ −37 to −20 ‰; Khon., 2010).

Table S1. Number of formulae and relative abundance (RA) weighted mass, H/C and O/C ratio, nominal oxidation state of carbon (NOSC; Riedel et al., 2012), and modified aromaticity index (AI_{mod}; Koch and Dittmar 2016), together with the percent RA of each compound and heteroatom class

	Eagle Glacier	Herbert Glacier	Mendenhall Glacier	Mendenhall Supraglacial
Formulae (#)	15,537	18,793	17,709	16,077
Mass (Da)	495.1	544.4	510.2	493.9
H/C	1.27	1.27	1.26	1.32
O/C	0.46	0.48	0.48	0.45
NOSC	-0.3	-0.27	-0.25	-0.37
AI_{mod}	0.24	0.22	0.23	0.21
Highly Unsaturated and Phenolic (% RA)	68.7	73.0	70.6	58.4
Aliphatics (% RA)	22.6	21.0	21.5	34.2
Polyphenolic (% RA)	7.0	5.3	6.6	5.9
Condensed Aromatic (%RA)	1.7	0.6	1.1	1.4
CHO (% RA)	79.5	75.5	75.9	74.6
CHON (% RA)	16.7	19.2	18.6	15.4
CHOS (% RA)	3.8	5.3	5.4	9
CHONS (% RA)	0	0	0.1	1

Table S2: Quantities of CO_2 produced during respiratory carbon recovery bioincubations

	Eagle Glacier Outflow	Herbert Glacier Outflow	Mendenhall Glacier Outflow	Mendenhall Supraglacial Stream
CO_2 (mg C)	0.3	0.3	0.3	0.2

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