Meteoric beryllium-10 fluxes from soil inventory measurements in the East River watershed, Colorado, USA

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Supplementary Information

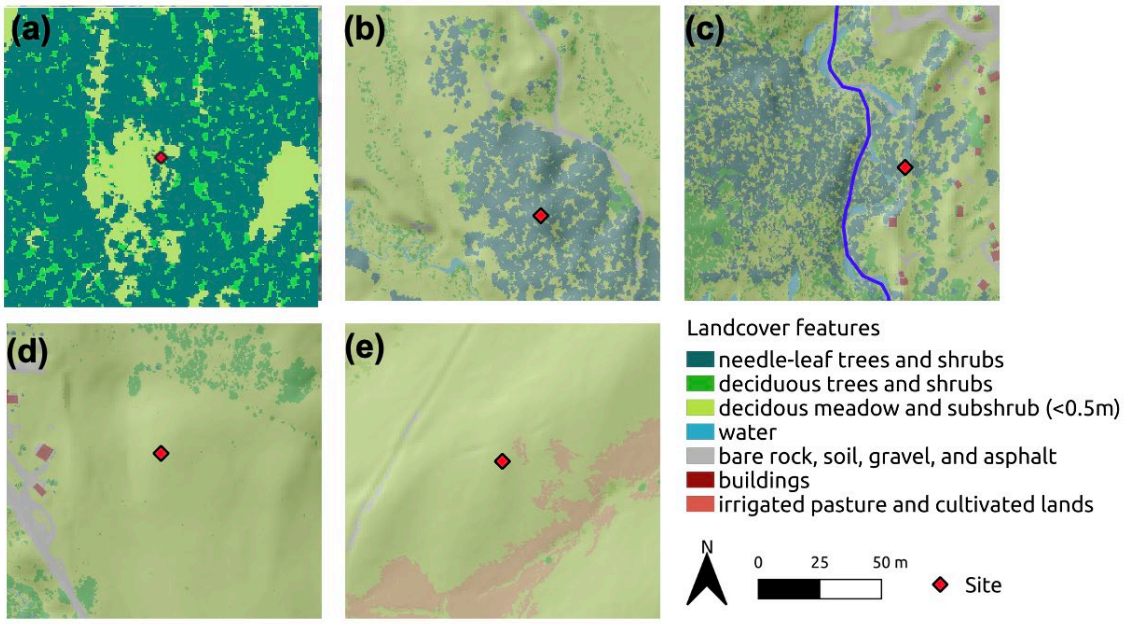

Figure S1. Land cover classifications for calibration sites. a) Copper Creek; b) Washington Gulch North; c) Gothic; d) Washington Gulch South; e) East River terminal.

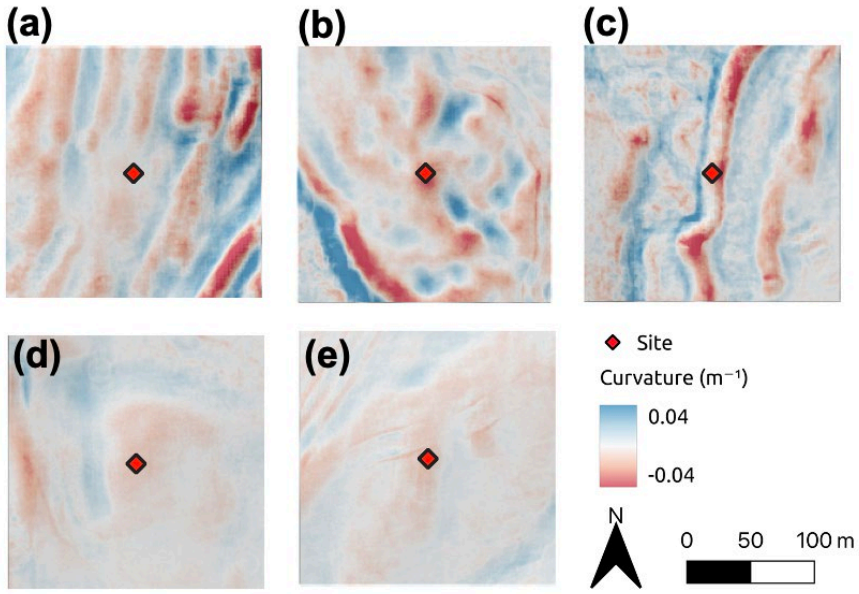

Figure S2. Topographic curvature for (a) Copper Creek, (b) Washington Gulch North, (c) Gothic, (d) Washington Gulch South, and (e) East River Terminal moraines.

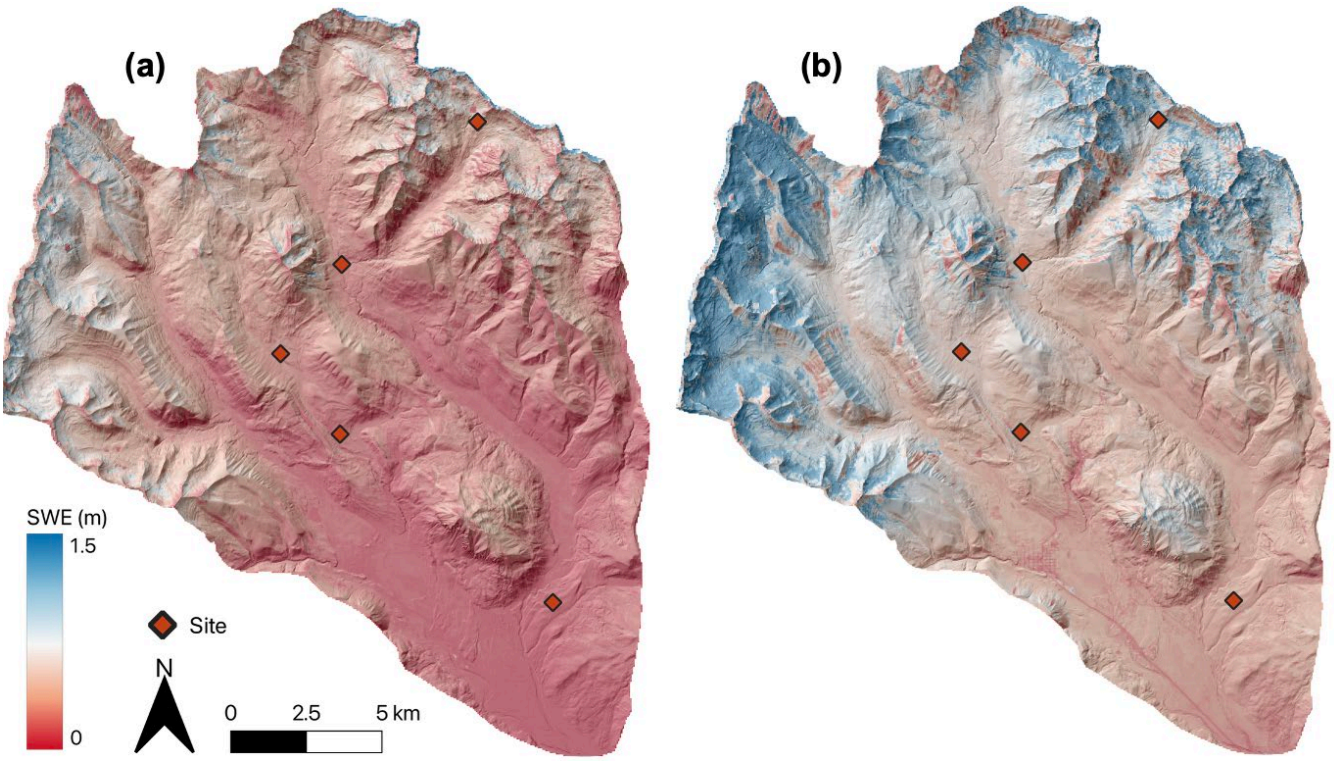

Figure S3. Snow water equivalent (SWE) maps at 50 m resolution for the East River watershed, obtained from the NASA Earthdata portal. Panels show SWE on (a) March 31, 2018, and (b) April 7, 2019 (NASA Earthdata Search https://search.earthdata.nasa.gov, DOI: 10.5067/M4TUH28NHL4Z).

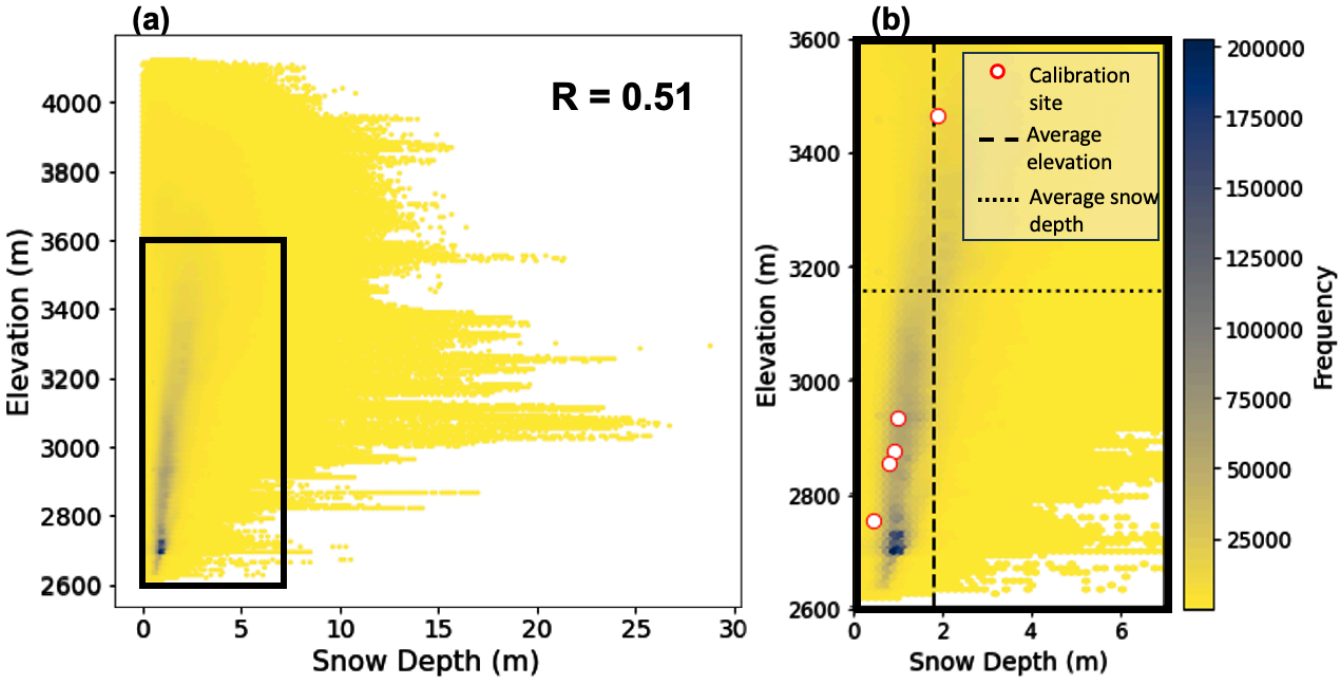

Figure S4. Hexbin frequency distribution plots of elevation versus snow depths versus elevation. (b) Close-up view focusing on the region captured by the calibration point (2600 m and 3600 m). This inset highlights specific data points, marked with black markers and dashed and dotted lines representing the mean snow depth and elevation, respectively.

Table S1. Erosion-sensitivity of fluxes to erosion rates.

		Meteoric ^{10}Be flux (atoms cm^{-2} yr^{-1}) at given erosion rates (mm yr^{-1})			
Site	F_{met} (atoms cm^{-2} yr^{-1})	[a]0 mm yr^{-1}	0.016 mm yr^{-1}	0.023 mm yr^{-1}	0.036 mm yr^{-1}
Gothic moraine	1.60x10^6	1.61 x 10^6	2.44 x 10^6	2.81 x 10^6	3.48 x 10^6
Copper Creek moraine	3.79x10^6	3.81 x 10^6	4.64 x 10^6	5.01 x 10^6	5.68 x 10^6
WG north moraine	1.91x10^6	1.92 x 10^6	3.28 x 10^6	3.88 x 10^6	4.99 x 10^6
WG south moraine	1.72x10^6	1.73 x 10^6	2.57 x 10^6	2.94x 10^6	3.62 x 10^6
East River terminal moraine	1.12x10^6	1.13 x 10^6	2.50 x 10^6	3.10 x 10^6	4.23 x 10^6

[a]Assumes no erosion and represents the inheritance-corrected flux plus $^{10}Be_{met}$ loss due to radioactive decay.

Table S2. Soil pH measurements.

Washington Gulch North

SAMPLE ID	Depth	pH 1	pH 2	Average pH	1σ sd
ER_S2_pit_1_0-10	0-10	5.18	5.18	5.18	0.00
ER_S2_pit_1_10-20	10-20	5.23	5.22	5.23	0.01
ER_S2_pit_1_20-30	20-30	5.61	5.63	5.62	0.01
ER_S2_pit_1_30-40	20-40	5.69	5.7	5.70	0.01
ER_S2_pit_1_40-55	40-55	5.63	5.65	5.64	0.01
ER_S2_pit_1_55-75	55-75	5.85	5.83	5.84	0.01
ER_S2_pit_1_75-95	75-95	6.07	6.1	6.09	0.02
				Depth average pH = 5.61 ± 0.32	

Copper Creek

SAMPLE ID	Depth	pH 1	pH 2	Average pH	1σ sd
ER_CCT_pit_1_0-10	0-10	4.35	4.32	4.34	0.02
ER_CCT_pit_1_10-20	10-20	4.41	4.39	4.40	0.01
ER_CCT_pit_1_20-30	20-30	4.67	4.64	4.66	0.02
ER_CCT_pit_1_30-40	30-40	4.66	4.69	4.68	0.02
ER_CCT_pit_1_40-50	40-50	4.73	4.72	4.73	0.01
ER_CCT_pit_1_50-60	50-60	5.39	5.38	5.39	0.01
				Depth average pH = 4.70 ± 0.37	

East River Terminal

SAMPLE ID	Depth	pH 1	pH 2	Average pH	1σ sd
ER_BCTM_pit_1_0-10	0-10	5.36	5.4	5.38	0.03
ER_BCTM_pit_1_10-20	10-20	6.23	6.27	6.25	0.03
ER_BCTM_pit_1_20-30	20-30	6.33	6.34	6.34	0.01
ER_BCTM_pit_1_30-50	30-50	6.51	6.54	6.53	0.02
ER_BCTM_pit_1_50-80	50-80	7.05	7.09	7.07	0.03
				Depth average pH = 6.31 ± 0.61	

Washington Gulch South

SAMPLE ID	Depth	pH 1	pH 2	Average pH	1σ sd
ER_AM_pit_1__0_10	0-10	6.15	6.2	6.18	0.04
ER_AM_pit_1_10-20	10-20	6.05	6.1	6.08	0.04
ER_AM_pit_1_20-30	20-30	6.02	5.99	6.01	0.02
ER_AM_pit_1_30-40	30-40	5.65	5.66	5.66	0.01
ER_AM_pit_1_40-55	40-55	5.64	5.61	5.63	0.02
ER_AM_pit_1_55-65	55-65	5.82	5.83	5.83	0.01
ER_AM_pit_1_65-85	65-85	5.86	5.86	5.86	0.00
				Depth average pH = 5.89 ± 0.21	

Gothic

SAMPLE ID	Depth	pH 1	pH 2	Average pH	1σ sd
ER_GM_pit_1_0-15	0-15	5.08	5.07	5.08	0.01
ER_GM_pit_1_15-30	15-30	5.05	5.04	5.05	0.01
ER_GM_pit_1_30-45	30-45	5.01	5.01	5.01	0.00
ER_GM_pit_1_45-65	45-65	5.81	5.82	5.82	0.01
ER_GM_pit_1_65-85	65-85	5.81	5.82	5.82	0.01
ER_GM_pit_1_85-105	85-105	6.61	6.64	6.63	0.02
ER_GM_pit_1_105-125	105-125	6.42	6.47	6.45	0.04
ER_GM_pit_1_125-145	1125-145	6.35	6.36	6.36	0.01
				Depth average pH = 5.77 ± 0.67	

Table S3. SWE measurements across the four dates used to generate the mean SWE (2018-2019) metric.

Site	March 31, 2018 (m)	April 7, 2019 (m)	Average SWE (m)
Copper Creek Moraine	0.41	0.87	0.64

Washington Gulch North	0.19	0.49	0.34
Gothic Moraine	0.19	0.47	0.33
Washington Gulch South	0.16	0.46	0.31
East River Terminal Moraine	0.04	0.36	0.19