Table S1. Radiocarbon sample information for Figure 1.

Latitude (N)	Longitude (W)	Material Dated	Radiocarbon Age (^{14}C yr BP)	Radiocarbon age uncertainty (yr)	Calibrated Age (cal yr BP)	Calibrated ageuncertainty (2σ; yr)	Lab Number	Reference
64.3000	52.0667	Marine bivalve	9860	140	11240	460	I-8565	Weidick, 1976
64.2200	51.9500	Marine bivalve	9460	140	10680	420	I-8493	Weidick, 1976
64.3300	51.8800	Marine bivalve	9230	135	10360	410	I-8566	Weidick, 1976
64.1200	51.7000	Marine bivalve	9355	140	10580	420	I-8490	Weidick, 1976
64.4700	51.6800	Gyttja	9000	140	10090	420	K-2292	Fredskild, 1983
64.4000	51.6833	Gyttja	8960	190	10020	480	K-2750	Fredskild, 1983
64.2700	52.6700	Marne bivalve	8855	130	9850	350	I-8509	Weidick, 1976
64.7500	51.0500	Marine bivalve	8794	41	9280	170	UBA-15882	Larsen et al., 2014
64.7900	51.0100	Marine bivalve	8525	31	8940	190	UBA-16276	Larsen et al., 2014
64.5800	50.8000	Marine bivalve	8250	130	9090	360	I-8598	Weidick, 1976
64.7700	50.5800	Marine bivalve	8740	185	9840	410	K-2749	Fredskild, 1983
64.3300	50.4000	Marine bivalve	8785	120	9790	330	I-7665	Weidick, 1975
64.3300	50.4000	Marine bivalve	8810	120	9810	330	I-7666	Weidick, 1975
64.3000	50.1800	Humic acid	8797	48	9850	290	UBA-17023	Larsen et al., 2014; Kap01
64.3000	50.1800	Aquatic macrofossil	8450	160	9450	440	OS-138097	This study*; Kap01
64.4000	50.2000	Humic acid	9326	40	10520	140	UBA-17089	Larsen et al., 2014
64.2800	50.1100	Marine bivalve	9490	105	10170	340	Ua-3476	Weidick, 1972; Weidick et al., 2012
64.0100	49.6100	Aquatic macrofossil	7903	38	8790	190	UBA-17738	Larsen et al., 2014
63.9881	49.5107	Aquatic macrofossil	8210	40	9210	190	OS-138406	Lesnek et al., 2020; Deception Lake
64.7500	50.1500	Marine bivalve	7200	110	7890	260	I-8599	Weidick, 1976
64.7647	49.5880	Aquatic macrofossil	6560	45	7460	110	OS-138287	Lesnek et al., 2020; Caribou Lake
65.0589	50.3822	Aquatic macrofossil	4975	32	5730	130	AAR-23014	Levy et al., 2017
65.2968	50.2556	Terrestrial macrofossil	4666	48	5440	130	AAR-23032	Levy et al., 2017
65.2869	50.2406	Terrestrial macrofossil	4058	42	4610	190	AAR-23004	Levy et al., 2017
65.2764	50.2288	Terrestrial macrofossil	5127	45	5870	120	AAR-23017	Levy et al., 2017

Radiocarbon ages for terrestrial samples and are calibrated using CALIB 8.2 and the INTCAL20 dataset (Stuiver et al., 2020; Reimer et al., 2020).

Marine samples are calibrated using CALIB 8.2 and the MARINE20 database (ΔR=0; R = 550 years; Heaton et al., 2020). We added 400 years to older marine samples (I-samples) because they were originally reported with an assumed δ13C value of -25 per mille instead of 0 per mille.

*See Table S7 for sample details; this sample is from the same lake as sample UBA-17023 (Larsen et al., 2014).

Table S2. ^{10}Be sample information for Figure 1.

Sample ID	Latitude (N)	Longitude (W)	Elevation (m asl)	Pressure flag	Sample thickness (cm)	Density	Shielding	Erosion	^{10}Be concentration (atoms g-1)	^{10}Be conc. uncertainty	Be standard	Age ka BP (Lm)	Age unc.	Sample type	Reference
NU-1-10	64.1780	51.6740	126	std	2.6	2.65	0.995	0	51500	5400	07KNSTD	10.55	1.12	Boulder	Winsor et al., 2015
NU-3-10	64.1780	51.6730	144	std	1.9	2.65	0.996	0	58500	9200	07KNSTD	11.69	1.85	Boulder	Winsor et al., 2015
NU-7-2008	64.1780	51.6720	146	std	1.5	2.65	0.997	0	48500	5300	07KNSTD	9.62	1.06	Boulder	Winsor et al., 2015
NU-2-10	64.1780	51.6720	149	std	2.0	2.65	0.997	0	74600	12800	07KNSTD	*14.85*	*2.57*	Boulder	Winsor et al., 2015
NU-5-2008	64.1820	51.6570	333	std	2.0	2.65	0.998	0	59900	5200	07KNSTD	9.85	0.86	Boulder	Winsor et al., 2015
NU-4-2008	64.1830	51.6570	334	std	1.5	2.65	0.998	0	58100	3800	07KNSTD	9.51	0.63	Boulder	Winsor et al., 2015
NU-1-2008	64.1870	51.6460	419	std	2.5	2.65	1.000	0	71500	6000	07KNSTD	10.85	0.92	Boulder	Winsor et al., 2015
NU-2-2008	64.1860	51.6460	422	std	2.0	2.65	1.000	0	70400	6600	07KNSTD	10.60	1.00	Boulder	Winsor et al., 2015
NU-4-10	64.1870	51.6450	427	std	2.7	2.65	1.000	0	75300	16900	07KNSTD	11.36	2.57	Boulder	Winsor et al., 2015
NU-5-10	64.1870	51.6450	427	std	3.8	2.65	1.000	0	63200	9400	07KNSTD	9.60	1.44	Boulder	Winsor et al., 2015
											Mean (n=9)	**10.35 ± 0.81 (0.83)**			
BUK0876	64.3560	49.2981	1303	std	8	2.65	1.000	0	235617	6847	07KNSTD	*17.22*	*0.50*	Boulder	Larsen et al., 2014
BUK0879	64.3547	49.2941	1263	std	6	2.65	0.9996	0	127926	14106	07KNSTD	**9.47**	**1.05**	Boulder	Larsen et al., 2014
BUK0881	64.3244	49.5740	760	std	6	2.65	1.000	0	113230	14268	07KNSTD	*12.94*	*1.64*	Boulder	Larsen et al., 2014
BUK0883	64.1489	50.6039	816	std	2	2.65	0.9998	0	94366	2748	07KNSTD	9.89	0.29	Bedrock	Larsen et al., 2014
BUK0884	64.1487	50.6034	817	std	12	2.65	0.9998	0	91400	9959	07KNSTD	10.38	1.14	Boulder	Larsen et al., 2014
BUK0885	64.1495	50.6015	817	std	10	2.65	0.9998	0	105446	18667	07KNSTD	11.80	2.11	Boulder	Larsen et al., 2014
											Mean (n=3)	**10.63 ± 0.99 (1.01)**			
BUK0871	64.0478	49.5806	1212	std	8	2.65	1.000	0	157453	11761	07KNSTD	*12.36*	*0.93*	Boulder	Larsen et al., 2014
BUK0873	64.0477	49.5820	1210	std	10	2.65	1.000	0	335158	11729	07KNSTD	*26.94*	*0.95*	Bedrock	Larsen et al., 2014
BUK0874	64.0456	49.5783	1179	std	10	2.65	0.9998	0	121766	4469	07KNSTD	9.97	0.37	Boulder	Larsen et al., 2014
BUK0875	64.0456	49.5783	1179	std	8	2.65	0.9998	0	124633	5037	07KNSTD	10.05	0.41	Boulder	Larsen et al., 2014
											Mean (n=2)	**9.95 ± 0.06 (0.19)**			
BUK0816	63.9361	50.4359	1187	std	6	2.65	0.999	0	121710	11716	07KNSTD	9.58	0.93	Boulder	Larsen et al., 2014
BUK0818	63.9361	50.4359	1187	std	5	2.65	0.999	0	278459	6506	07KNSTD	*21.87*	*0.52*	Boulder	Larsen et al., 2014
BUK0814	63.9411	50.4407	1101	std	4	2.65	0.9996	0	110949	3688	07KNSTD	9.23	0.31	Boulder	Larsen et al., 2014
BUK0815	63.9411	50.4407	1101	std	1	2.65	0.9996	0	360531	8632	07KNSTD	*29.52*	*0.71*	Bedrock	Larsen et al., 2014
											Mean (n=2)	**9.35 ± 0.25 (0.30)**			
BUK0805	63.8169	51.4063	360	std	1	2.65	0.9999	0	87723	2836	07KNSTD	*13.94*	*0.45*	Bedrock	Larsen et al., 2014
BUK0802	63.8261	51.3957	250	std	2	2.65	0.9998	0	61708	3095	07KNSTD	11.01	0.56	Bedrock	Larsen et al., 2014
BUK0803	63.8262	51.3958	250	std	3	2.65	0.9998	0	57744	2795	07KNSTD	10.38	0.51	Boulder	Larsen et al., 2014
BUK0804	63.8273	51.3942	220	std	2	2.65	0.9994	0	73119	3782	07KNSTD	*13.48*	*0.70*	Bedrock	Larsen et al., 2014
BUK0801	63.8280	51.3958	182	std	3.5	2.65	0.9936	0	55141	3322	07KNSTD	10.74	0.65	Boulder	Larsen et al., 2014
											Mean (n=3)	**10.65 ± 0.32 (0.37)**			
BUK0806	63.2333	51.1211	110	std	4	2.65	0.9742	0	39750	4490	07KNSTD	8.52	0.97	Boulder	Larsen et al., 2014
BUK0807	63.8540	51.1215	105	std	1.5	2.65	0.9742	0	46548	2906	07KNSTD	9.86	0.62	Boulder	Larsen et al., 2014
BUK0809	63.8532	51.1219	82	std	2	2.65	0.9742	0	43858	2597	07KNSTD	9.56	0.57	Bedrock	Larsen et al., 2014
BUK0811	63.8535	51.1224	80	std	4	2.65	0.9742	0	43933	3754	07KNSTD	9.75	0.84	Bedrock	Larsen et al., 2014
											Mean (n=4)	**9.36 ± 0.61 (0.64)**			

Ages are calculated using version 3 of the exposure age calculator found at https://hess.ess.washington.edu/ (wrapper: 3.0, muons: 1A, consts: 3.0.3), which implements an updated treatment of muon-based production (Balco et al., 2008; Balco, 2017). All ages are calculated using 'Lm' scaling and a Baffin Bay production rate of 4.04 ± 0.07 atoms g^{-1} yr^{-1} (Young et al., 2013), and reported relative to ka BP (CE 1950). This value has been updated from the CRONUS v2 value of 3.96 ± 0.07 atoms g-1 yr-1; the calibration dataset is the same. All samples use a density of 2.65 g cm-3, standard air pressure 'std', and an effective attenuation length of 160 g cm^{-2}. ^{10}Be concentrations are reported relative to 07KNSTD with a reported ratio of 2.85 x 10^{-12} using a ^{10}Be half-life of 1.387 x 10^{6} years (Nishiizumi et al., 2007; Chmeleff et al., 2010). Numbers in parentheses are the age uncertainties that include the uncertainty in the ^{10}Be production-rate calibration dataset.

Table S3. ^{10}Be sample information

Sample	Latitude	Longitude	Elevation (m asl)	Thickness (cm)	Shielding	Quartz (g)	Carrier added (g)[a]	$^{10}Be/^{9}Be$ ratio[b]	± 1σ Uncertainty	Blank-corrected ^{10}Be concentration (atoms g^{-1})[c]	Blank-corrected ^{10}Be conc. uncertainty (atoms g^{-1})[c]	Age ka BP (Lm)	Age ka BP uncertainty	Age ka relative to year of sample collection (CE 2017)	Age ka uncertainty	AMS Facility
Deglacial erratics (Fig. 1)																
Caribou Lake																
17GRO-01	64.75141	-49.56120	748	1.5	1	30.0636	0.2208	1.4797E-13	4.7319E-15	77994	2755	8.66	0.31	8.73	0.31	PRIME
17GRO-02	64.75278	-49.55141	726	2	1	30.6487	0.2182	1.4906E-13	4.8063E-15	76160	2708	8.66	0.31	8.73	0.31	PRIME
17GRO-04	64.77811	-49.54660	856	2	1	29.8967	0.2188	1.7052E-13	5.4488E-15	89563	3162	9.07	0.32	9.14	0.32	PRIME
												Mean ± 1 S.D. (n=3)	**8.80 ± 0.24 (0.29)**			
Deception Lake																
17GRO-49	63.97643	-49.51587	931	2.5	1	30.8008	0.2199	2.1844E-13	5.9629E-15	111924	3486	*10.66*	*0.34*	*10.73*	*0.34*	PRIME
17GRO-51	63.97548	-49.51407	928	3	1	28.7113	0.2133	1.8645E-13	5.5434E-15	99409	3310	9.52	0.32	9.59	0.32	PRIME
One-way Lake																
17GRO-53	63.91561	-49.69950	900	3	1	30.9295	0.2207	3.2554E-13	8.3863E-15	166707	4970	*16.43*	*0.49*	*16.50*	*0.49*	PRIME
17GRO-54	63.90542	-49.67972	885	2	1	30.9295	0.2207	1.5684E-13	4.7246E-15	78459	2640	7.72	0.26	7.79	0.26	PRIME
Qamanarsuup Sermia																
Outboard erratics																
17GRO-46	64.45596	-49.45530	769	1.30	1	28.0742	0.1944	1.9777E-13	4.9100E-15	94977	2772	10.34	0.31	10.41	0.31	PRIME
17GRO-47	64.45605	-49.45560	763	2.04	1	30.1333	0.2017	1.9794E-13	4.7500E-15	91901	2617	10.12	0.29	10.19	0.29	PRIME
17GRO-48	64.45573	-49.45563	767	2.94	1	28.3832	0.2009	1.9139E-13	5.0500E-15	93953	2869	10.39	0.32	10.46	0.32	PRIME
												Mean ± 1 S.D. (n=3)	**10.29 ± 0.14 (0.23)**			
Moraine boulders																
17GRO-15	64.45831	-49.44410	751	3.02	1	19.7464	0.2003	1.4011E-13	4.6800E-15	98440	3634	*11.01*	*0.41*	*11.08*	*0.41*	PRIME
17GRO-16	64.45847	-49.44398	753	1.28	1	35.0774	0.2031	2.1211E-13	5.4300E-15	84198	2508	9.40	0.28	9.47	0.28	PRIME
17GRO-17	64.45937	-49.43946	783	1.39	1	22.8280	0.1996	1.4656E-13	5.0300E-15	88777	3350	9.51	0.36	9.58	0.36	PRIME
17GRO-18	64.45869	-49.43322	767	1.20	1	20.7362	0.1816	1.4575E-13	3.6438E-15	87519	2562	9.65	0.28	9.72	0.28	LLNL-CAMS
17GRO-19	64.45899	-49.43517	771	3.14	1	35.0537	0.2026	3.2930E-13	6.3100E-15	130625	3187	*14.63*	*0.36*	*14.70*	*0.36*	PRIME
17GRO-20	64.45869	-49.43216	769	3.20	1	35.1117	0.2027	2.6302E-13	6.0300E-15	104161	2863	*11.67*	*0.32*	*11.74*	*0.32*	PRIME
17GRO-28	64.46225	-49.42881	811	2.48	1	40.0369	0.2036	5.4682E-13	8.9400E-15	191011	4242	*20.34*	*0.45*	*20.41*	*0.45*	PRIME
17GRO-29	64.46424	-49.42605	817	1.19	1	38.4270	0.2036	2.4708E-13	6.3100E-15	89844	2666	9.36	0.28	9.43	0.28	PRIME
17GRO-31	64.46506	-49.42405	822	1.76	1	28.0196	0.1823	3.5771E-13	6.5878E-15	159706	3802	*16.72*	*0.40*	*16.79*	*0.40*	LLNL-CAMS
17GRO-32	64.46567	-49.42298	823	2.18	1	39.7783	0.2033	2.5143E-13	6.4600E-15	88192	2629	9.21	0.27	9.28	0.28	PRIME
17GRO-34	64.46509	-49.43287	835	2.13	1	35.0552	0.2018	2.2624E-13	5.7800E-15	89304	2656	9.33	0.28	9.40	0.28	PRIME
17GRO-35	64.46796	-49.43473	835	1.02	1	8.7955	0.1825	6.6728E-14	1.6682E-15	94602	2792	9.80	0.29	9.87	0.29	LLNL-CAMS
17GRO-36	64.46804	-49.43491	868	1.11	1	18.6680	0.1815	1.4305E-13	3.5763E-15	95356	2792	9.60	0.28	9.67	0.28	LLNL-CAMS
17GRO-37	64.46714	-49.43700	867	2.80	1	39.4030	0.2034	2.8144E-13	9.2100E-15	99725	3596	10.07	0.36	10.14	0.37	PRIME
17GRO-38	64.46686	-49.43781	861	1.40	1	15.7109	0.1827	1.1190E-13	1.8229E-15	88883	1985	8.91	0.20	8.98	0.20	LLNL-CAMS
17GRO-39	64.46519	-49.44123	810	1.28	1	10.0196	0.1838	7.3228E-14	1.4760E-15	91435	2328	9.59	0.24	9.66	0.25	LLNL-CAMS
17GRO-40	64.46251	-49.44231	769	2.20	1	41.8017	0.2038	2.5932E-13	6.5200E-15	86774	2545	9.51	0.28	9.58	0.28	PRIME
17GRO-41	64.46290	-49.44788	759	1.37	1	41.2628	0.2037	2.5931E-13	6.2800E-15	87861	2508	9.65	0.28	9.72	0.28	PRIME
17GRO-42	64.46244	-49.45117	757	2.71	0.999	40.0588	0.2035	2.6083E-13	6.1100E-15	90943	2535	10.13	0.28	10.20	0.28	PRIME
17GRO-44	64.46081	-49.44620	767	2.85	0.999	32.6832	0.2040	2.1244E-13	6.2900E-15	90979	3027	10.06	0.33	10.13	0.34	PRIME
17GRO-45	64.46078	-49.44607	766	2.56	0.999	39.6378	0.2042	2.3707E-13	6.1100E-15	83812	2505	9.24	0.28	9.31	0.28	PRIME
												Mean ± 1 S.D. (n=16)	**9.57 ± 0.33 (0.38)**			
Inboard erratics																
17GRO-25	64.46959	-49.42904	839	1.52	1	35.1290	0.1985	2.2934E-13	5.4200E-15	89925	2530	9.21	0.26	9.28	0.26	PRIME
17GRO-26	64.46943	-49.43203	857	1.61	1	30.0347	0.2002	2.0042E-13	4.7200E-15	92665	2603	9.35	0.27	9.42	0.27	PRIME
17GRO-27	64.46996	-49.43845	824	2.12	1	23.8896	0.2004	1.5356E-13	4.2900E-15	89261	2853	9.31	0.30	9.38	0.30	PRIME
												Mean ± 1 S.D. (n=3)	**9.29 ± 0.07 (0.18)**			
Kangiata Nunaata Sermia																
Deglacial landscape																
17GRO-05	64.28653	-49.48825	790	1.71	1	25.1512	0.1810	1.8669E-13	3.3605E-15	93272	2192	10.00	0.24	10.06	0.24	LLNL-CAMS
17GRO-06	64.28651	-49.48830	790	2.32	1	25.7869	0.1800	1.9697E-13	3.5454E-15	95460	2243	10.28	0.24	10.35	0.24	LLNL-CAMS
17GRO-07	64.28658	-49.48794	788	1.60	1	7.0405	0.1810	6.7698E-14	2.8127E-15	119635	5326	12.86	0.57	12.93	0.58	LLNL-CAMS
17GRO-61	64.28960	-49.80013	660	2.90	1	25.0166	0.2024	1.6780E-13	4.2580E-15	93966	2778	11.44	0.34	*11.51*	*0.34*	PRIME
17GRO-69	64.29240	-49.79993	685	1.49	1	25.0490	0.2024	1.6944E-13	4.3800E-15	94763	2841	11.15	0.34	*11.21*	*0.34*	PRIME
17GRO-70	64.29148	-49.79569	655	5.12	1	5.3244	0.1816	4.1336E-14	1.3512E-15	82228	3354	10.23	0.42	10.30	0.42	LLNL-CAMS
Kapisigdlit stade moraine																
17GRO-56	64.29505	-49.78128	774	1.87	1	10.6138	0.1832	7.8340E-14	3.0392E-15	93336	3904	10.16	0.43	10.22	0.43	LLNL-CAMS
17GRO-58	64.29417	-49.79294	693	2.79	1	13.6518	0.1840	1.0204E-13	2.7394E-15	95095	2932	11.22	0.35	*11.29*	*0.35*	LLNL-CAMS
17GRO-59	64.29485	-49.79568	694	2.22	1	30.3514	0.2030	1.9360E-13	5.9200E-15	89530	3061	10.50	0.36	10.57	0.36	PRIME
17GRO-62	64.29332	-49.80750	626	3.12	0.991	30.1856	0.2033	9.2021E-14	3.5900E-15	42742	1803	5.38	0.23	*5.45*	*0.23*	PRIME
17GRO-63	64.29415	-49.80329	669	3.04	1	12.4228	0.1831	5.5057E-14	1.1802E-15	56001	1474	6.73	0.18	*6.80*	*0.18*	LLNL-CAMS
17GRO-64	64.29420	-49.80260	671	1.89	1	30.1880	0.2038	1.4427E-13	4.8900E-15	87605	3264	10.46	0.39	10.53	0.39	PRIME
17GRO-66	64.29460	-49.79980	683	3.29	1	30.2354	0.2032	1.7729E-13	4.2600E-15	82366	2345	9.84	0.28	9.91	0.28	PRIME
												Mean ± 1 S.D. (n=4)	**10.24 ± 0.31 (0.36)**			
Inboard erratics																
17GRO-67	64.29749	-49.80284	662	2.42	1	25.0681	0.2029	1.5131E-13	4.0100E-15	84750	2590	10.25	0.31	10.32	0.32	PRIME
17GRO-68	64.29739	-49.80359	660	2.94	1	25.9659	0.2015	1.5715E-13	3.7800E-15	84396	2401	10.27	0.29	10.34	0.29	PRIME
Inboard of historical limit																
17GRO-08	64.28653	-49.48321	769	2.04	1	31.2019	0.1785	4.0130E-13	8.8803E-15	158742	4249	17.46	0.47	17.53	0.47	LLNL-CAMS
17GRO-09	64.28315	-49.47899	772	1.77	1	10.8469	0.1795	1.3729E-13	2.8457E-15	156733	4026	17.15	0.44	17.22	0.44	LLNL-CAMS
17GRO-10	64.28052	-49.47035	675	1.19	1	46.1370	0.1785	4.0805E-13	7.5388E-15	109163	2601	12.95	0.31	13.02	0.31	LLNL-CAMS
17GRO-11	64.28105	-49.46340	638	1.48	0.993	15.0238	0.1799	9.7428E-14	1.8696E-15	80569	1972	9.96	0.24	10.02	0.25	LLNL-CAMS
17GRO-12	64.28090	-49.45737	591	1.36	0.993	15.0822	0.1817	2.2111E-13	3.5500E-15	184334	4058	23.93	0.53	24.00	0.53	LLNL-CAMS
17GRO-13	64.28094	-49.45633	600	1.68	0.993	15.0463	0.1818	1.4108E-13	3.0518E-15	117860	3111	15.16	0.40	15.23	0.40	LLNL-CAMS
17GRO-14	64.28088	-49.45694	599	1.17	0.993	51.2658	0.1808	6.3280E-13	8.1963E-15	154381	3062	19.83	0.40	19.90	0.40	LLNL-CAMS
17GRO-71	64.28185	-49.45657	600	0.88	1	25.2632	0.1794	1.1010E-13	2.0479E-15	54215	1302	6.83	0.16	6.90	0.17	LLNL-CAMS
17GRO-72	64.22263	-49.58746	461	2.89	1	25.0590	0.1826	9.4590E-14	1.6493E-15	47598	1100	6.94	0.16	7.01	0.16	LLNL-CAMS
17GRO-73	64.22220	-49.58950	458	1.67	1	25.0650	0.1811	9.3106E-14	1.6945E-15	46618	1106	6.75	0.16	6.81	0.16	LLNL-CAMS
17GRO-74	64.22466	-49.58567	483	1.32	1	25.4747	0.1820	9.3715E-14	1.4880E-15	46234	1015	6.51	0.14	6.58	0.14	LLNL-CAMS
17GRO-75	64.22476	-49.58792	481	3.70	1	25.0880	0.1826	9.0714E-14	3.3972E-15	45588	1847	6.56	0.27	6.63	0.27	LLNL-CAMS

[a] Samples were spiked with LDEO carriers 6 or 7 with evaporation-corrected ^{9}Be concentrations ranging from 1028 to 1042 ppm, or a Buffalo carrier with a concentration of 1074 ppm (see Table S4).

[b] Ratios are not corrected for ^{10}Be detected in procedural blanks.

[c] Concentrations are blank corrected by subtracting the total number of ^{10}Be atoms in the process blank; see Table S4 for process blank values.

Sample thickness is a weighted average of nuemerous thickness measurements on individual rock fragments (typically >10) using digital calipers.

Ages are calculated using version 3 of the exposure age calculator found at https://hess.ess.washington.edu/ (wrapper: 3.0, muons: 1A, consts: 3.0.3), which implements an updated treatment of muon-based production (Balco et al., 2008; Balco, 2017). All ages are calculated using 'Lm' scaling and a Baffin Bay production rate of 4.04 ± 0.07 atoms g-1 yr-1 (Young et al., 2013a). This value has been updated from the CRONUS v2 value of 3.96 ± 0.07 atoms g-1 yr-1; the calibration dataset is the same. All samples use a density of 2.65 g cm-3, standard air pressure 'std', and an effective attenuation length of 160 g cm^{-2}. ^{10}Be concentrations are reported relative to 07KNSTD with a reported ratio of 2.85×10^{-12} using a ^{10}Be half-life of 1.387×10^{6} years (Nishiizumi et al., 2007; Chemeleff et al., 2010). Numbers in parentheses are the moraine age uncertainties that include the uncertainty in the ^{10}Be production-rate calibration dataset. Moraine ages with the production rate uncertainty must be used when comparing the Baffin Bay moraines to any independent record that is not on the Baffin Bay-Arctic ^{10}Be timescale.

Table S4. ^{10}Be data process blank

Sample ID	Carrier added (g)	Carrier concentration	$^{10}Be/^{9}Be$ ratio ± 1σ (10^{-16})	^{10}Be atoms	Samples applied to (Tables S3):
LDEO Carrier 6					
BLK2_2018Apr13	0.1791	1035.7	4.830 ± 1.157	***5990 ± 1437***	17GRO-07, -08, -09, -10, -14
BLK1_2018May14	0.2030	1036.8	4.500 ± 3.500	***6331 ± 4925***	17GRO-59, -62, -64, -66,
BLK1_2018May14	0.1832	1036.8	2.320 ± 0.698	***2942 ± 1031***	17GRO-58, -63
BLK2_2018May31	0.1817	1036.9	3.450 ± 1.090	***4350 ± 1376***	17GRO-11, -12, -13, -72, -74, -75
BLK_2018Jul6	0.2028	1037.4	3.100 ± 2.400	***4359 ± 3376***	17GRO-61, -67, -68, -69
BLK_2018Jul23	0.1827	1037.6	3.740 ± 1.322	***4738 ± 1677***	17GRO-56
BLK1_2019Jan28	0.1791	1041.2	4.700 ± 1.600	***5869 ± 1956***	17GRO-06, -06
BLK2_2019Jan28	0.1801	1041.2	4.000 ± 1.200	***5016 ± 1514***	17GRO-71, -73
BLK3_2019Jan28	0.2000	1041.2	6.700 ± 4.200	***9326 ± 5848***	17GRO-15, -17, -25, -26, -27, -46, -47, -48
LDEO Carrier 7					
BLK1_2019Mar13	0.1828	1028.3	21.010 ± 2.314	26399 ± 2935	
BLK2_2019Mar13	0.1830	1028.3	6.700 ± 4.200	15106 ± 2234	
			Mean ± 1 S.D. (n=2)	***20753 ± 7985***	17GRO-70
BLK1_2019Apr15	0.2022	1028.8	6.500 ± 2.700	***9038 ± 3757***	17GRO-16, -19, -20, -34
BLK2_2019Apr15	0.1825	1028.8	4.290 ± 2.100	***5378 ± 2636***	17GRO-18, -35, -36
BLK_2019Sep13	0.2040	1028.4	4.000 ± 2.000	***5609 ± 2806***	17GRO-28, -29, -32, -37, -40, -41, -42, -44, -45
BLK_2019Oct7	0.1835	1028.8	7.470 ± 1.465	***9430 ± 1854***	17GRO-31, -38, -39
Buffalo Carrier					
99_Blank	0.2176	1074	13.660 ± 2.540	***21332 ± 3979***	17GRO-01, -02, -04, -49, -51, -53, -54

All ^{10}Be concentrations are reported relative to 07KNSTD with a reported ratio of 2.85×10^{-12} using a ^{10}Be half-life of 1.387×10^{6} years (Nishiizumi et al., 2007; Chemeleff et al., 2010).

Table S5. ^{26}Al sample information

Sample	Quartz(g)	$^{26}Al/^{27}Al$ ratio	$^{26}Al/^{27}Al$ ratio uncertainty	Total ^{27}Al (mg)	^{26}Al conecentration (atoms g^{-1})	^{26}Al uncertainty (atoms g^{-1})	^{10}Be concentration (atoms g^{-1}); From Table S3	^{10}Be conc. uncertainty (atoms g^{-1}); From Table S3	$^{26}Al/^{10}Be$	$^{26}Al/^{10}Be$ unc.
17GRO-08	15.0285	4.5763E-13	1.6277E-14	1.5709 ± 0.0014	1065240	38006	158742	4249	6.71	0.24 (0.48)
17GRO-09	34.6949	1.0122E-12	1.9350E-14	1.7359 ± 0.0035	1128431	21620	156733	4026	7.20	0.14 (0.28)
17GRO-10	15.1387	3.3135E-13	1.1121E-14	1.5616 ± 0.0014	760447	25647	109163	2601	6.97	0.23 (0.46)
17GRO-11	15.0238	2.6506E-13	1.1792E-14	1.5191 ± 0.0104	595722	26652	80569	1972	7.39	0.33 (0.66)
17GRO-12	15.0822	5.0571E-13	1.5749E-14	1.6578 ± 0.0016	1238250	38666	184334	4058	6.72	0.21 (0.42)
17GRO-13	15.0463	3.0867E-13	1.2881E-14	1.5534 ± 0.0050	708831	29721	117860	3111	6.01	0.25 (0.50)
17GRO-14	15.0234	4.7365E-13	1.3539E-14	1.5177 ± 0.0041	1065557	30564	154381	3062	6.90	0.20 (0.40)
17GRO-71	25.2632	3.2964E-13	1.4670E-14	1.3700 ± 0.0021	398413	17757	54215	1302	7.35	0.33 (0.66)
17GRO-72	25.0590	2.4686E-13	9.3836E-15	1.5168 ± 0.0048	332019	12708	47598	1100	6.98	0.27 (0.54)
17GRO-73	25.0650	2.6232E-13	1.3220E-14	1.3941 ± 0.0021	325062	16412	46618	1106	6.97	0.35 (0.70)
17GRO-74	25.4747	2.4783E-13	9.7431E-15	1.5592 ± 0.0021	337103	13339	46234	1015	7.29	0.29 (0.58)
17GRO-75	25.0880	2.2256E-13	9.9319E-15	1.6241 ± 0.0025	320105	14378	45588	1847	7.02	0.32 (0.64)
Process blanks					*Blank atoms*	*Atoms uncertainty*	*Samples applied to*			
BLK2_2018May13	NA	1.0949E-15	6.4322E-16	1.5327 ± 0.0027	37456	22005	17GRO-08, -10, -11, -12, -13, -14, -72, -74, -75			
BLK2_2019Jan28	NA	3.9000E-16	3.9000E-16	1.7337 ± 0.0026	15092	15092	17GRO-71, -73			
BLK_2019Jun19	NA	1.7600E-15	5.9000E-16	1.7616 ± 0.0025	69204	23199	17GRO-09			

All samples were measured at PRIME.

Aluminum extraction for samples 17GRO-08, -09, -10, and -14 was completed independently of the beryllium extraction and therefore have different quartz weights than what is listed in Table S3.

We report the 1-sigma ratio uncertainty; 2-sigma uncertainty is in parentheses.

Table S6a. ***In situ*** **^{14}C sample extraction details**

Sample	Quartz (g)	Carbon yield (μgC)	Carbon yield unc. (μg C)	Diluted carbon mass (μg C)	Diluted carbon mass unc. (μg C)	F_m	F_m unc.	δ^{13}C (‰)	$^{14}C/C_{total}$	$^{14}C/C_{total\_unc}$	^{14}C concentration (atoms/g)	^{14}C concentration unc. (atoms/g)	Blank correction applied (#of atoms)	Blank correction unc. (#of atoms)	Age ka BP (Lm)	Age ka BP unc.	Age ka (Lm)	Age ka unc.	Measurement facility
17GRO-08	5.1644	21.75	0.25	21.75	0.25	0.8535	0.0100	-26.8	9.7542E-13	1.1429E-14	189794	8544	81094	6972	10.11	0.89	10.18	0.90	CEREGE
17GRO-09	5.1392	21.37	0.25	21.37	0.25	0.8246	0.0108	-27.9	9.4028E-13	1.2315E-14	184202	8127	81094	6972	9.46	0.78	9.53	0.79	CEREGE
17GRO-10	5.1049	20.59	0.24	20.59	0.24	0.8169	0.0084	-27.5	9.3226E-13	9.5862E-15	172735	7513	81094	6972	9.70	0.80	9.77	0.81	CEREGE
17GRO-11	5.1287	53.13	0.61	53.13	0.61	0.3009	0.0083	-15.3	3.5201E-13	9.7333E-15	166922	8716	81094	6972	9.80	0.98	9.87	0.99	CEREGE
17GRO-12	5.0083	49.15	0.56	49.15	0.56	0.2510	0.0032	-14.9	2.9383E-13	3.6906E-15	128534	5886	81094	6972	6.68	0.48	6.75	0.48	CEREGE
17GRO-13	5.1844	48.25	0.55	48.25	0.55	0.2603	0.0038	-14.6	3.0495E-13	4.4518E-15	125901	5872	85768	12070	6.49	0.46	6.56	0.46	CEREGE
17GRO-14	4.9156	57.24	0.66	789.71	9.04	0.0182	0.0002	-17.7	1.8419E-14	3.9852E-16	124587	9594	116894	37307	6.29	0.73	6.36	0.74	LLNL-CAMS
17GRO-71	5.1134	40.36	0.46	40.36	0.46	0.3236	0.0037	-16.5	3.7765E-13	4.3180E-15	134483	6084	81094	6972	6.99	0.50	7.06	0.50	CEREGE
17GRO-72	5.0072	25.52	0.29	57.09	0.70	0.1879	0.0026	-14.6	2.2013E-13	3.0460E-15	109666	5147	81094	6972	6.27	0.45	6.34	0.45	CEREGE
17GRO-73	5.1060	40.58	0.47	65.31	0.75	0.1716	0.0025	-14.1	2.0119E-13	2.9046E-15	113122	5254	81094	6972	6.52	0.47	6.59	0.47	CEREGE
17GRO-74	4.0181	51.69	0.59	794.46	9.10	0.0140	0.0002	-17.7	1.3525E-14	3.9920E-16	105002	10923	116894	37307	5.62	0.84	5.69	0.85	LLNL-CAMS
17GRO-75	4.9974	25.90	0.30	56.03	0.64	0.1935	0.0029	-22.1	2.2327E-13	3.3342E-15	109215	5122	81094	6972	6.12	0.43	6.19	0.43	CEREGE

^{14}C concentration uncertainty includes the raw measurement uncertainty and a 3.6% uncertainty propagated through to reflect the LDEO scatter in CRONUS-A measurements (updated from Lamp et al., 2019).

17GRO-14 and 17GRO-71 use an assumed δ^{13}C value of -17.7. Due to the large dilution factor, the δ^{13}C signal is dominated by the δ^{13}C of the dilution gas (Lamp et al., 2019).

Table S6b. ***In situ*** **^{14}C blank extraction details**

BLANK_11_28_17	NA	7.61	0.08	28.64	0.33	0.0442	0.0016	-24.7	5.0742E-14	1.8893E-15	72762	2835
BLANK_11-1-18	NA	8.84	0.09	30.32	0.35	0.0443	0.0024	-19.1	5.1435E-14	2.7865E-15	78139	4303
BLANK_5_13_19	NA	7.76	0.09	24.14	0.28	0.0616	0.0015	-25.3	7.0616E-14	1.7195E-15	85328	2334
BLANK_6_11_19	NA	9.22	0.11	25.52	0.29	0.1192	0.0020	-25.0	1.3673E-13	2.2941E-15	*174813*	*3582*
BLANK_9_10_19	NA	10.68	0.12	24.57	0.28	0.0631	0.0016	-31.2	7.1467E-14	1.8122E-15	88148	2480
BLANK_3_2_20	NA	8.34	0.09	24.00	0.30	0.0752	0.0017	-21.8	8.6812E-14	1.9625E-15	104464	2699

BLANK_11_28_17 was originally reported in Lamp et al (2019). All measurements were made at CEREGE.

Table S6c. ***In situ*** **^{14}C CRONUS-A extraction details - CEREGE**

CRONUSA_8_28_17	3.6111	27.14	0.31	45.11	0.52	0.9366	0.0073	-20.7	1.0841E-12	8.5048E-15	656388	9622
CRONUSA_5_13_19	3.5869	30.27	0.35	50.02	0.59	0.8503	0.0064	-19.5	9.8632E-13	7.4238E-15	666743	9956
CRONUSA_6_13_19	3.6944	30.27	0.35	30.27	0.35	1.4549	0.0064	-22.7	1.6767E-12	7.3757E-15	667536	7705
CRONUSA_9_12_19	3.5044	28.84	0.33	28.84	0.33	1.4084	0.0115	-21.1	1.6284E-12	1.3296E-14	647843	9101
CRONUSA_1_30_20	3.5527	29.12	0.24	50.00	0.60	0.8565	0.0075	-22.8	9.8675E-13	8.6406E-15	672150	10887
										Mean ± 1 S.D. (n=5)	***662132***	***9849***

CRONUSA_8_2_17 was originally reported in Lamp et al, 2019. All measurements were made at CEREGE.

Table S7. Traditional ^{14}C sample information for lakes in the KNS region

Lake Name	Core ID	Latitude (°N)	Longitide (°W)	Composite Depth (cm)	Lab number	Material dated	Fraction modern	$\delta^{13}C$ (‰)	Radiocarbon Age (^{14}C yr BP)	Radiocarbon age uncertainty (yr)	Calibrated Age (cal yr BP)	Calibrated age uncertainty (2σ; yr)
Kap01	17KAP-A4	64.30819	50.18853	197.0-198.0	OS-138397	Aquatic macrofossils	0.3493	-26.7	8450	160	9450	440
Goose Feather Lake	17GOOF-A3	64.45324	49.44373	79.0-80.0	OS-141199	Aquatic macrofossils	0.8948	-25.7	895	20	820	90
	17GOOF-A4	64.45324	49.44373	198.5-199.5	OS-141260	Sediment organic carbon	0.3945	-23.8	7470	35	8280	90
Marshall Lake	17MAR-A2	64.46361	49.43313	8.0	OS-141261	Aquatic macrofossils	0.9402	-18.8	495	20	520	20
	17MAR-C1	64.46361	49.43313	16.5-17.0	OS-144352	Aquatic macrofossils	0.8804	-22.5	1020	20	940	20
	17MAR-C1	64.46361	49.43313	48.0-49.0	OS-144353	Aquatic macrofossils	0.6541	-25.9	3410	20	3690	120
	17MAR-C1	64.46361	49.43313	83.5-84.0	OS-144354	Aquatic macrofossils	0.4550	-27.4	6330	30	7240	80
	17MAR-C1	64.46361	49.43313	104.5-105.5	OS-137548	Aquatic macrofossils	0.3770	-27.3	7840	150	8720	360

Radiocarbon ages are calibrated using CALIB 8.2 and the INTCAL20 dataset (Stuiver et al., 2020; Reimer et al., 2020).

All samples were measured at the National Ocean Sciences Accelerator Mass Spectrometry Facility (NOSAMS) at Woods Hole Oceanographic Institution.

Radiocarbon ages from Goose Feather Lake were previously reported in Lesnek et al (2020).

Table S8. $^{14}C/^{10}Be$ ratios

Sample	^{14}C concentration (atoms/g); from Table S6a	^{14}C concentration unc. (atoms/g); from Table S6a	^{10}Be concentration (atoms g^{-1}); from Table S3	^{10}Be conc. uncertainty (atoms g^{-1}); from Table S3	$^{14}C/^{10}Be$	$^{14}C/^{10}Be$ unc.	Minimum sample-specifi detectable burial (yrs)
17GRO-08	189794	8544	158742	4249	NA	NA	NA
17GRO-09	184202	8127	156733	4026	NA	NA	NA
17GRO-10	172735	7513	109163	2601	NA	NA	NA
17GRO-11	166922	8716	80569	1972	2.07	0.11 (0.22)	510
17GRO-12	128534	5886	184334	4058	NA	NA	NA
17GRO-13	125901	5872	117860	3111	NA	NA	NA
17GRO-14	124587	9594	154381	3062	NA	NA	NA
17GRO-71	134483	6084	54215	1302	2.48	0.11 (0.22)	520
17GRO-72	109666	5147	47598	1100	2.30	0.11 (0.22)	515
17GRO-73	113122	5254	46618	1106	2.43	0.11 (0.22)	515
17GRO-74	105002	10923	46234	1015	2.27	0.24 (0.48)	1150
17GRO-75	109215	5122	45588	1847	2.40	0.11 (0.22)	510

Ratios are not reported for samples that have inherited Be-10, which results in artificially low ratios.

We report the 1-sigma ratio uncertainty; 2-sigma uncertainty is in parentheses.

Minimum detectable burial is calculated using the sample-specific 1-sigma ratio uncertainty. Using the average ratio precision of all measurements (5.7%), we calculate a minimum burial detection limit of 625 years.

Table S9. Modeled erosion depths

Sample	Measured ^{10}Be concentration (atoms g^{-1})	Measured ^{10}Be conc. unc. (atoms g^{-1})	Measured ^{14}C concentration (atoms g^{-1})	Measured ^{14}C conc. unc. (atoms g^{-1})	Years of historical ice cover	10 ka total erosion depth-^{10}Be (cm)	10 ka total erosion depth-^{14}C (cm)	9 ka total erosion depth-^{10}Be (cm)	9 ka total erosion depth-^{14}C (cm)	8 ka total erosion depth-^{10}Be (cm)	8 ka total erosion depth-^{14}C (cm)	7.5 ka total erosion depth-^{10}Be (cm)	7.5 ka total erosion depth-^{14}C (cm)
17GRO-71	54215	1392	134483	6084	275	23.1 ± 0.9	14.4 ± 3.3	16.7 ± 1.1	10.4 ± 3.1	9.5 ± 1.1	5.7 ± 3.1	5.6 ± 1.1	3.0 ± 3.0
17GRO-72	47598	1199	109666	5147	245	23.2 ± 1.1	20.6 ± 3.4	16.7 ± 1.0	16.5 ± 3.4	9.5 ± 1.1	11.7 ± 3.4	5.6 ± 1.1	8.9 ± 3.3
17GRO-73	46618	1106	113122	5254	245	24.3 ± 1.2	18.1 ± 3.4	17.8 ± 1.2	14.1 ± 3.4	10.6 ± 1.2	9.3 ± 3.4	6.6 ± 1.2	6.6 ± 3.3
17GRO-74	46234	1015	105002	10923	245	26.2 ± 1.0	25.1 ± 8.1	19.8 ± 1.0	21.0 ± 8.1	12.6 ± 1.0	16.0 ± 8.1	8.7 ± 1.0	13.3 ± 7.9
17GRO-75	45588	1847	109215	5122	245	27.0 ± 2.3	22.1 ± 3.4	20.6 ± 2.3	18.0 ± 3.4	13.3 ± 2.3	13.2 ± 3.4	9.4 ± 2.3	10.3 ± 3.5
					Mean ± 1 S.D.	**24.8 ± 1.8**	*20.1 ± 4.1*	**18.3 ± 1.8**	*16.0 ± 4.0*	**11.1 ± 1.8**	*11.2 ± 3.9*	**7.2 ± 1.8**	*8.4 ± 3.9*