Supplement of

Testing current estimates of the *in situ* cosmogenic ^{10}Be production rate in the north-western British Isles, with implications for ice sheet behaviour during Termination 1

Gordon R. M. Bromley et al.

Correspondence to: Gordon Bromley (gordon.bromley@universityofgalway.ie)

- Table S1
- Figure S1
- Table S2
- Figure S2
- Figure S3

Table S1. Radiocarbon samples and measurement data for core LBA18-11R, Loch Bad na h-Achlaise, as reported by Simms et al. (2022). Calibrated ages were calculated with OxCal 4.4 (version 177) and IntCal20 (Reimer et al., 2020). Dated material is described by the original authors as "masses of small plant fibers and fragments (length <1 cm; diameter <50 mm)" (Simms et al., 2022, p.4).

UCI AMS #	Sample ID, depth (cm)	Material	^{14}C age (yrs)	1σ (yrs)	Calibrated mean age (yrs)	1σ (yrs)	95% probability range (yrs)
208,389	LBA18-11R, 233	Plant fibres	8385	25	9411	52	9305–9484
208,390	LBA18-11R, 268	Plant fibres	9885	30	11,285	44	11,222–11,394
208,391	LBA18-11R, 310	Plant fibres	10,900	30	12,802	31	12,751–12,885
208,393	LBA18-11R, 337	Plant fibres	11,165	30	13,102	31	13,009–13,165
208,394	LBA18-11R, 400	Plant fibres	12,280	35	14,241	161	14,078–14786
208,396	LBA18-11R, 530	Plant fibres	13,185	45	15,826	82	15,669–15,988
208,397	LBA18-11R, 536	Plant fibres	13,240	50	15,898	88	15,722–16,071

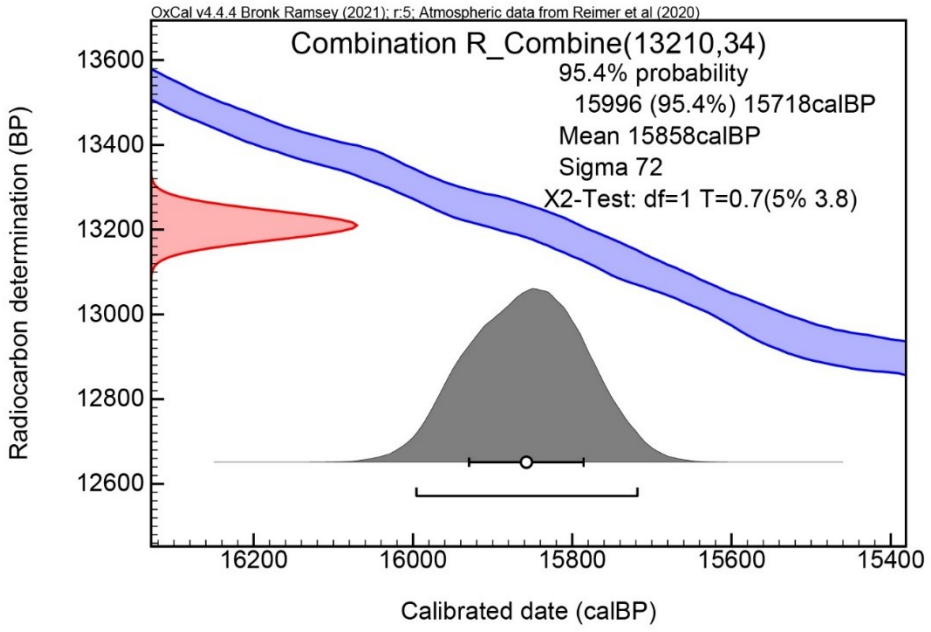

Figure S1. Samples 208396 and 208397 from core LBA18-11, combined using the 'R_Combine' function in OxCal 4.4 (version 177) and IntCal20 (Reimer et al., 2020), gives an average calibrated age of 15.9 ± 0.1 cal ka BP (95% range 15.7–16.0 cal ka BP). Adjusting for the 1950-present offset gives a minimum age of 15,932 ± 72 years (15.9 ± 0.1 cal ka) for the onset of ^{10}Be accumulation in all the Redpoint Peninsula samples.

Table S2. Apparent ^{10}Be surface-exposure ages calculated with each production rate and the three default scaling schemes employed in the UW online calculator (v.3). Italics denote outliers.

RANNOCH MOOR	St (ka)		Lm (ka)		LSDn (ka)	
ANT-24-01	16.1	0.3	16.1	0.3	16.0	0.3
ANT-24-02	16.4	0.3	16.4	0.3	16.3	0.3
ANT-24-03	16.2	0.3	16.2	0.3	16.1	0.3
ANT-24-06	16.4	0.4	16.3	0.4	16.3	0.4
ANT-24-07	15.9	0.4	15.9	0.4	15.8	0.4
ANT-24-08	*12.7*	*0.4*	*12.6*	*0.3*	*12.6*	*0.3*
ANT-24-09	*11.8*	*0.4*	*11.7*	*0.4*	*11.6*	*0.4*
ANT-24-10	15.7	0.4	15.7	0.4	15.4	0.4
ANT-24-11	15.8	0.5	15.7	0.5	15.5	0.5
ANT-24-12	16.3	0.4	16.3	0.4	16.00	0.4
ANT-24-13	15.8	0.4	15.8	0.4	15.5	0.3
MEAN ± 1σ	16.1	0.1	16.0	0.1	15.9	0.1
CHIRONICO	*St (ka)*		*Lm (ka)*		*LSDn (ka)*	
ANT-24-01	15.9	0.3	15.8	0.3	15.0	0.3
ANT-24-02	16.2	0.3	16.1	0.3	15.3	0.3
ANT-24-03	16.0	0.3	15.9	0.3	15.1	0.3
ANT-24-06	16.2	0.4	16.0	0.4	15.3	0.4
ANT-24-07	15.7	0.4	15.6	0.4	14.8	0.4
ANT-24-08	*12.5*	*0.3*	*12.4*	*0.3*	*11.8*	*0.3*
ANT-24-09	*11.6*	*0.4*	*11.5*	*0.4*	*10.8*	*0.4*
ANT-24-10	15.5	0.4	15.4	0.4	14.5	0.4
ANT-24-11	15.6	0.5	15.4	0.5	14.5	0.4
ANT-24-12	16.1	0.4	16.0	0.4	15.0	0.4
ANT-24-13	15.6	0.4	15.4	0.4	14.5	0.3
MEAN ± 1σ	15.9	0.1	15.7	0.1	14.9	0.1
GLOBAL	*St (ka)*		*Lm (ka)*		*LSDn (ka)*	
ANT-24-01	15.4	0.3	15.1	0.3	14.9	0.3
ANT-24-02	15.7	0.3	15.4	0.3	15.2	0.3
ANT-24-03	15.5	0.3	15.2	0.3	15.0	0.3
ANT-24-06	15.6	0.4	15.4	0.4	15.2	0.4
ANT-24-07	15.2	0.4	14.9	0.4	14.7	0.4
ANT-24-08	*12.1*	*0.3*	*11.9*	*0.3*	*11.7*	*0.3*
ANT-24-09	*11.2*	*0.4*	*11.0*	*0.4*	*10.8*	*0.7*
ANT-24-10	15.0	0.4	14.7	0.4	14.3	0.4
ANT-24-11	15.1	0.4	14.8	0.4	14.4	0.4
ANT-24-12	15.6	0.4	15.3	0.4	14.9	0.4
ANT-24-13	15.1	0.4	14.8	0.4	14.5	0.3
MEAN ± 1σ	15.3	0.1	15.1	0.1	14.8	0.1
NENA	*St (ka)*		*Lm (ka)*		*LSDn (ka)*	
ANT-24-01	15.6	0.3	15.6	0.3	14.7	0.3
ANT-24-02	15.9	0.3	15.9	0.3	15.0	0.3
ANT-24-03	15.7	0.3	15.7	0.3	14.7	0.3
ANT-24-06	15.9	0.4	15.9	0.4	14.9	0.4
ANT-24-07	15.4	0.4	15.4	0.4	14.5	0.4
ANT-24-08	*12.3*	*0.3*	*12.3*	*0.3*	*11.5*	*0.3*
ANT-24-09	*11.4*	*0.4*	*11.4*	*0.4*	*10.6*	*0.4*
ANT-24-10	15.2	0.4	15.2	0.4	14.1	0.4
ANT-24-11	15.3	0.4	15.3	0.4	14.2	0.4
ANT-24-12	15.8	0.4	15.8	0.4	14.7	0.4
ANT-24-13	15.3	0.4	15.4	0.4	14.2	0.3
MEAN ± 1σ	15.6	0.1	15.6	0.1	14.5	0.1

Table S2 continued.

MOUNT BILLINGEN	St (ka)		Lm (ka)		LSDn (ka)	
ANT-24-01	15.1	0.3	15.1	0.3	15.4	0.3
ANT-24-02	15.4	0.3	15.4	0.3	15.7	0.3
ANT-24-03	15.2	0.3	15.2	0.3	15.4	0.3
ANT-24-06	15.4	0.4	15.4	0.4	15.6	0.4
ANT-24-07	14.9	0.4	15.0	0.4	15.2	0.4
ANT-24-08	*11.9*	*0.3*	*11.9*	*0.3*	*12.1*	*0.3*
ANT-24-09	*10.8*	*0.4*	*10.8*	*0.4*	*10.8*	*0.4*
ANT-24-10	14.7	0.4	14.7	0.4	14.8	0.4
ANT-24-11	14.8	0.4	14.8	0.4	14.8	0.4
ANT-24-12	15.3	0.4	15.3	0.4	15.4	0.4
ANT-24-13	14.6	0.3	14.6	0.3	14.5	0.3
MEAN ± 1σ	15.1	0.1	15.1	0.1	15.2	0.1
WESTERN NORWAY	*St (ka)*		*Lm (ka)*		*LSDn (ka)*	
ANT-24-01	14.9	0.3	14.9	0.3	15.2	0.3
ANT-24-02	15.2	0.3	15.2	0.3	15.5	0.3
ANT-24-03	15.0	0.3	15.0	0.3	15.2	0.3
ANT-24-06	15.1	0.4	15.2	0.4	15.4	0.4
ANT-24-07	14.7	0.4	14.7	0.4	15.0	0.4
ANT-24-08	*11.7*	*0.3*	*11.7*	*0.3*	*11.9*	*0.3*
ANT-24-09	*10.9*	*0.4*	*10.9*	*0.4*	*11.0*	*0.4*
ANT-24-10	14.5	0.4	14.5	0.4	14.6	0.4
ANT-24-11	14.6	0.4	14.6	0.4	14.6	0.4
ANT-24-12	15.1	0.4	15.1	0.4	15.2	0.4
ANT-24-13	14.6	0.3	14.7	0.3	14.7	0.4
MEAN ± 1σ	14.9	0.1	14.9	0.1	15.0	0.1
ISLE OF SKYE & HIGHLANDS	*St (ka)*		*Lm (ka)*		*LSDn (ka)*	
ANT-24-01	14.9	0.3	14.9	0.3	14.9	0.3
ANT-24-02	15.2	0.3	15.2	0.3	15.2	0.3
ANT-24-03	15.0	0.3	15.0	0.3	15.0	0.3
ANT-24-06	15.2	0.4	15.2	0.4	15.1	0.4
ANT-24-07	14.8	0.4	14.8	0.4	14.7	0.4
ANT-24-08	*11.7*	*0.3*	*11.7*	*0.3*	*11.7*	*0.3*
ANT-24-09	*10.9*	*0.4*	*10.9*	*0.4*	*10.8*	*0.4*
ANT-24-10	14.5	0.4	14.5	0.4	14.3	0.4
ANT-24-11	14.6	0.4	14.6	0.4	14.4	0.4
ANT-24-12	15.1	0.4	15.1	0.4	14.9	0.4
ANT-24-13	14.7	0.4	14.7	0.3	14.5	0.3
MEAN ± 1σ	14.9	0.1	14.9	0.1	14.8	0.1
GLEN ROY	*St (ka)*		*Lm (ka)*		*LSDn (ka)*	
ANT-24-01	14.8	0.3	14.8	0.3	14.8	0.3
ANT-24-02	15.1	0.3	15.1	0.3	15.1	0.3
ANT-24-03	14.9	0.3	14.9	0.3	14.8	0.3
ANT-24-06	15.1	0.4	15.1	0.4	15.0	0.4
ANT-24-07	14.7	0.4	14.6	0.4	14.6	0.4
ANT-24-08	*11.7*	*0.3*	*11.7*	*0.3*	*11.6*	*0.3*
ANT-24-09	*10.8*	*0.4*	*10.8*	*0.4*	*10.6*	*0.4*
ANT-24-10	14.4	0.4	14.4	0.4	14.2	0.4
ANT-24-11	14.5	0.4	14.5	0.4	14.3	0.4
ANT-24-12	15.0	0.4	15.0	0.4	14.8	0.4
ANT-24-13	14.6	0.3	14.6	0.3	14.3	0.3
MEAN ± 1σ	14.8	0.1	14.8	0.1	14.6	0.1

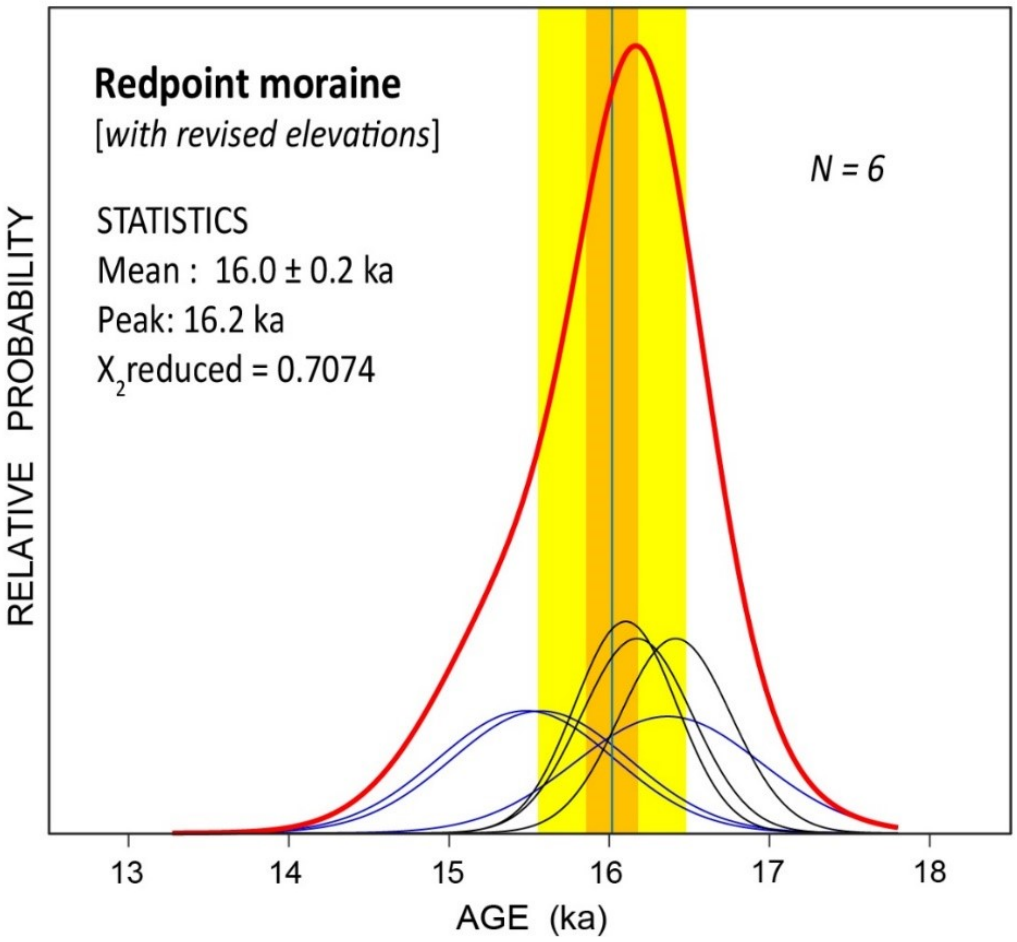

Figure S2. Normal kernal density plot and statistics for the Redpoint moraine, incorporating ^{10}Be exposure ages from this study and those recalculated from Ballantyne et al. (2009) with updated elevations. Mean age is reported with SEM [external] uncertainty. Thin black and blue curves are Gaussian approximations of individual ^{10}Be measurements made by this study and Ballantyne et al. (2009), respectively, while the thick red line is the summed probability for the entire population. Vertical blue line is the mean; vertical orange and yellow shading denote the SEM and external uncertainty (SEM propagated with 2.7% production rate uncertainty), respectively. The close agreement among the six ^{10}Be ages, constrained with the minimum-limiting ^{14}C control, suggests this is an accurate estimate of WRR moraine construction.

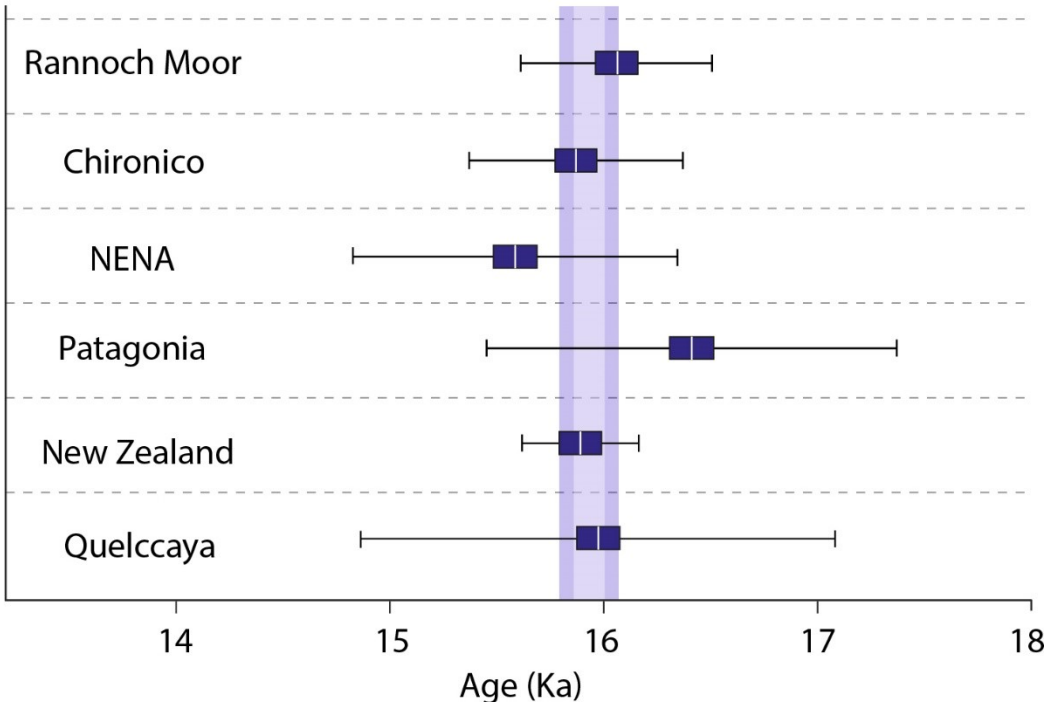

Figure S3. Redpoint ^{10}Be ages calculated with three Northern Hemisphere (Rannoch Moor: Putnam et al., 2019; Chironico: Claude et al., 2013; NENA: Balco et al., 2009) and three Southern Hemisphere (Patagonia: Kaplan et al., 2011; New Zealand: Putnam et al., 2010; Quelccaya: Kelly et al., 2015) production rate calibration datasets. All ages were calculated with the UW online calculator (v.3) and 'St' scaling. As in Fig. 8, blue boxes and vertical white stripes denote the standard error of the mean (SEM) and mean, respectively, while horizontal black whiskers are the external uncertainties (SEM propagated with production rate uncertainty). Light and dark vertical blue bands are the combined calibrated LB18-11 basal ^{14}C ages (adjusted for 1950-present offset) at 1σ and 95% confidence, respectively. Exposure ages calculated with these directly calibrated production rates fit agreeably with the minimum-limiting ^{14}C control.