

1 **Relative terrestrial exposure ages inferred from meteoric ^{10}Be and NO_3^-**
2 **concentrations in soils along the Shackleton Glacier, Antarctica**

3 Melisa A. Diaz^{1,2}, Lee B. Corbett³, Paul R. Bierman³, Byron J. Adams⁴, Diana H. Wall⁵, Ian D. Hogg^{6,7}, Noah Fierer⁸, W.
4 Berry Lyons^{1,2}

5 ¹School of Earth Sciences, The Ohio State University, Columbus, OH, 43210, USA

6 ²Byrd Polar and Climate Research Center, The Ohio State University, Columbus, OH, 43210, USA

7 ³Department of Geology, University of Vermont, Burlington, VT, 05405, USA

8 ⁴Department of Biology, Evolutionary Ecology Laboratories, and Monte L. Bean Museum, Brigham Young University,
9 Provo, UT, 84602, USA

10 ⁵Department of Biology and School of Global Environmental Sustainability, Colorado State University, Fort Collins, CO,
11 80523, USA

12 ⁶Canadian High Arctic Research Station, Polar Knowledge Canada, Cambridge Bay, NU, X0B0C0, Canada

13 ⁷School of Science, University of Waikato, Hamilton, 3216, New Zealand

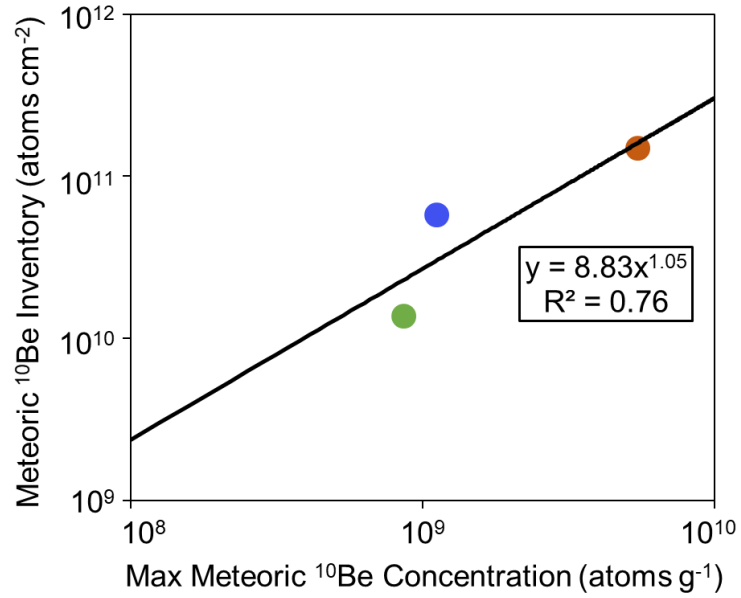
14 ⁸Department of Ecology and Evolutionary Biology and Cooperative Institute for Research in Environmental Science,
15 University of Colorado Boulder, Boulder, CO, 80309, USA

16 *Correspondence to:* Melisa A. Diaz (diaz.237@osu.edu)

17 **Supplementary materials:**

18

19 **Figure S1:** Relationship between the measured maximum (or surface) meteoric ^{10}Be concentration and the calculated
20 inventory (Eq. 2). This relationship is used to infer ^{10}Be inventories given a maximum or surface concentration (Graly et al.,
21 2010).
22



23

24
25

Table S1: Soil grain size distribution of surface samples and depth profiles from Roberts Massif, Bennett Platform, and Thanksgiving Valley.

Sample Name	% Gravel (>2 mm)	% Sand (63-425 µm)	% Silt (<63 µm)
AV2-1	15.0	80.5	4.5
AV2-8	11.1	87.9	1.0
BP2-1, 0-5	34.0	61.4	4.6
BP2-1, 5-10	33.6	54.5	11.9
BP2-1, 10-15	37.8	46.2	16.0
BP2-8	15.6	83.2	1.1
MF2-1	32.1	65.8	2.1
MF2-4	34.4	64.8	0.8
MH2-1	36.0	62.0	2.1
MH2-8	31.6	67.3	1.1
MSP2-1	64.7	35.2	0.1
MSP2-4	33.6	66.1	0.3
MSP4-1	37.4	61.2	1.4
MW4-1	27.8	67.3	4.9
NP2-5	56.4	38.3	5.3
RM2-1, 0-5	13.2	69.3	17.5
RM2-1, 5-10	8.0	84.4	7.5
RM2-1, 10-15	7.5	80.8	11.7
RM2-8	24.9	68.5	6.7
SH3-2	15.7	77.3	7.0
SH3-8	4.7	92.2	3.2
TGV2-1, 0-5	27.7	71.6	0.7
TGV2-1, 5-10	32.4	66.7	0.9
TGV2-1, 10-15	44.1	54.7	1.2
TGV2-1, 15-20	29.3	69.3	1.4
TGV2-1, 20-25	21.6	76.8	1.6
TGV2-1, 25-30	52.2	45.1	2.7
TGV2-8	21.2	78.6	0.2
TN3-1	32.4	64.7	2.8
TN3-5	52.6	42.4	5.0

26

27

28 **Table S2:** NO₃⁻ concentrations and estimate of ¹⁰Be concentration from linear relationship between NO₃⁻ and ¹⁰Be.

Location	Depth (cm)	NO ₃ ⁻ (10 ⁵ µg kg ⁻¹)	¹⁰ Be estimate (10 ⁹ atoms g ⁻¹)
Augustana	0	7.77	1.83
Augustana	5	12.2	1.97
Augustana	10	13.4	2.00
Schroeder	0	75.5	3.70
Schroeder	5	16.1	3.26
Schroeder	10	41.6	3.52
Franke	0	0.041	0.78
Franke	5	0.014	0.65
Franke	10	0.010	0.62
Franke	15	0.011	0.63
Roberts	0	6.94	4.57
Roberts	5	149	5.52
Roberts	10	30.7	5.01
Bennett	0	5.57	0.90
Bennett	5	39.8	0.34
Bennett	10	121	0.19
Thanksgiving	0	0.077	0.86
Thanksgiving	5	0.071	0.85
Thanksgiving	10	0.025	0.72
Thanksgiving	15	0.033	0.75
Thanksgiving	20	0.028	0.73
Thanksgiving	25	0.031	0.74
Heekin	0	18.0	2.10
Heekin	5	27.4	2.25
Heekin	10	18.8	2.11

29