A warming pulse in the Antarctic continent changed the landscape during the Middle Ages.

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Supplementary materials

Table S1. Results of the ^{14}C dating of the organic mat within ice and sediment. The calibrated ages are reported as ranges with a 2 σ error (95.4%), (cal. yr BP relative to AD 1950).

Sample	**Code**	**Conventional age (cal yr BP)**	**$\delta^{13}C$ (‰)**	**Fraction Modern Carbon**	**Calibrated age** (cal. yr BP)	Additional Info
D1b	Beta-**681328**	1180± 30	-25.7	0.8634	956-1178	Mosses

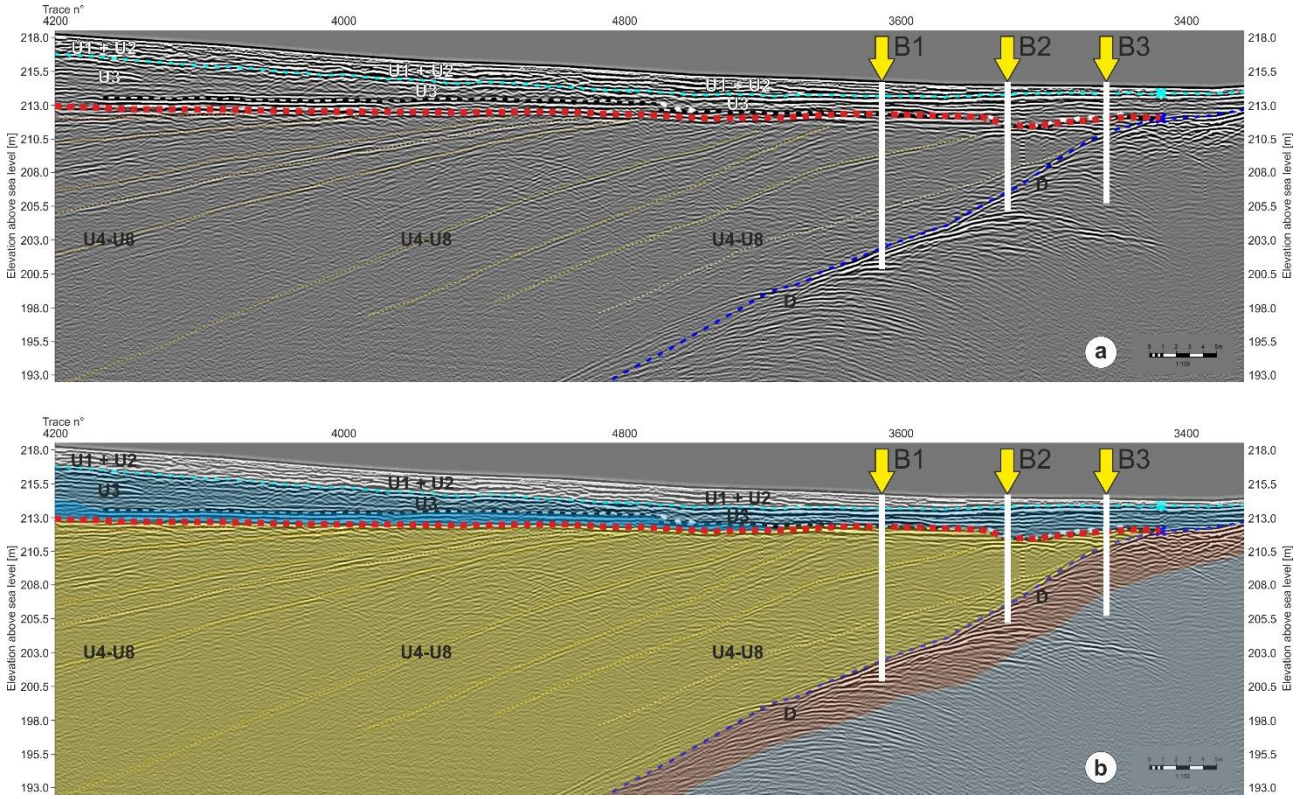

Fig. S1. Example of GPR units interpretation: a) line drawing; b) visual units interpretation. Letters and labels mark the same stratigraphic units as interpreted in the boreholes. Red dotted line highlights the unconformity between sub-horizontal (above) and dipping (below) ice reflectors, while all the other lines mark glacial and stratigraphic units. Location of borehole B1, B2 and B3 is also reported. See text for details. Main glaciological units are: a) U1, U2: firn; b) U3: ice with bubbles; U4: layered ice with bubbles; U5: clean ice; U6: layered ice with local clasts; U7, U8: clean layered ice with vertical tubules. D: frozen basal till;

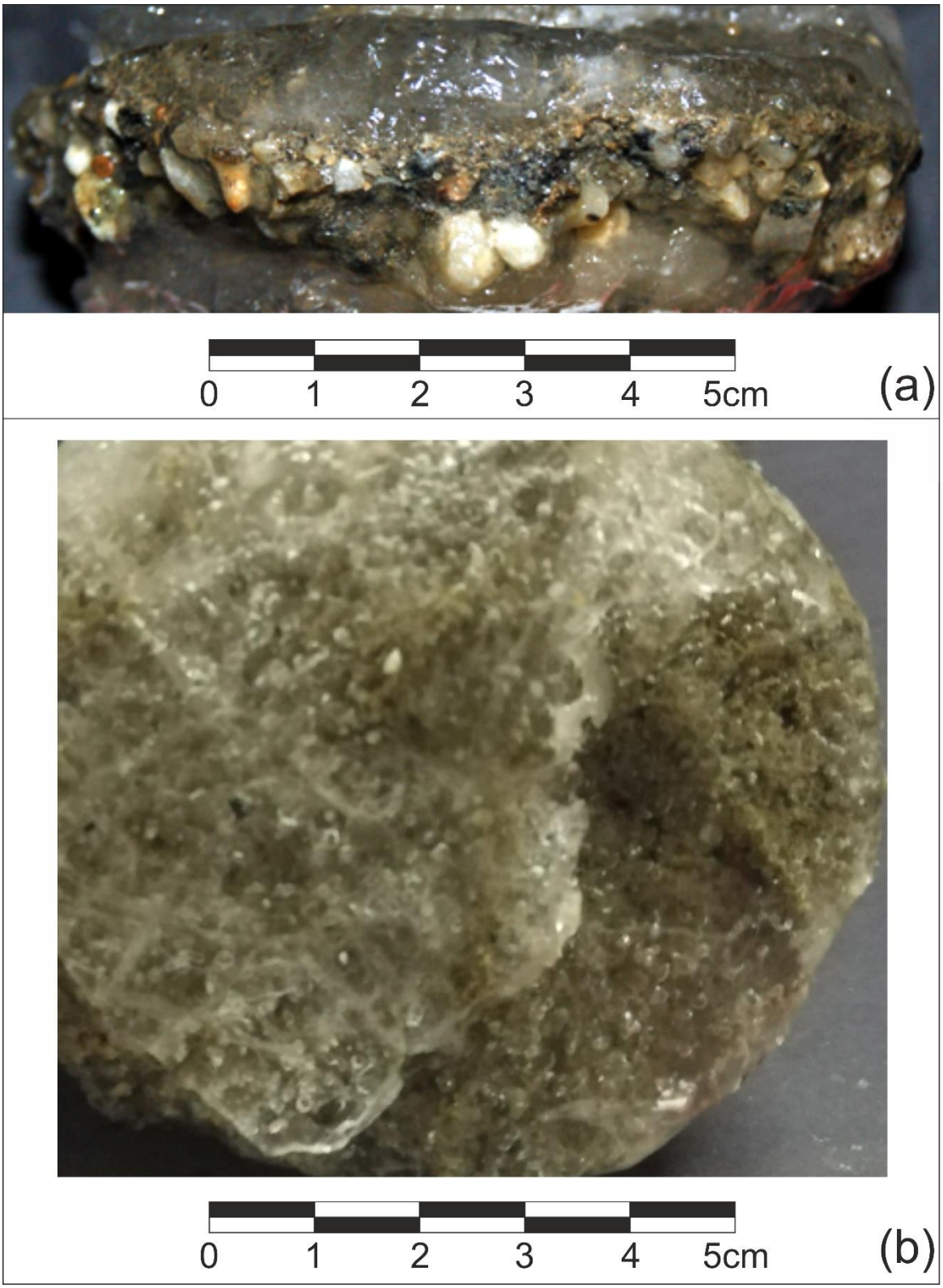

Fig. S2. Photograph of the graded sediment level found at B1 along the glacial unconformity: (a) frontal view of the lower gravel layer and the sand on the upper part; b) planar view of the upper part (sandy layer).

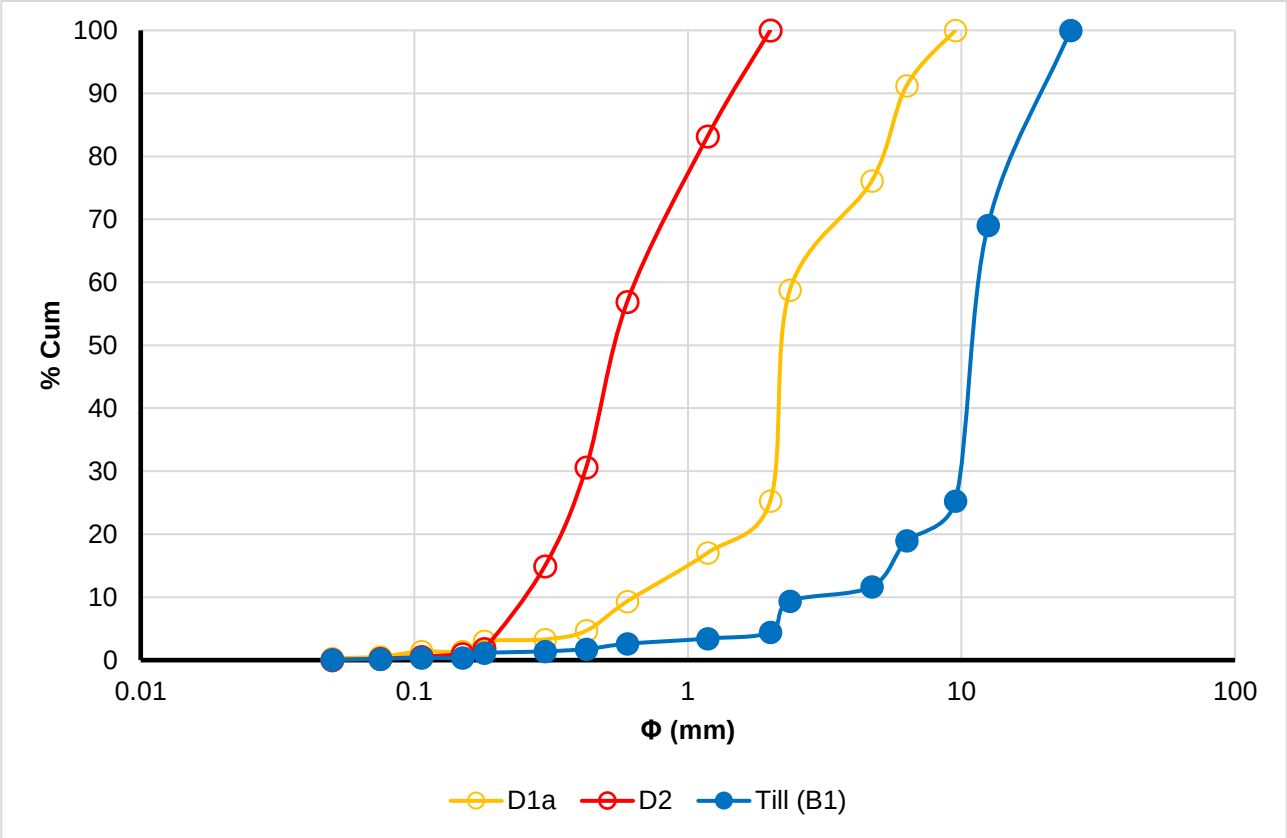

Fig. S3. Grain size distribution of the samples D1a (glacial unconformity in B1), D2 (channel in B2) and the frozen till at the bottom of the borehole B1, for comparison.

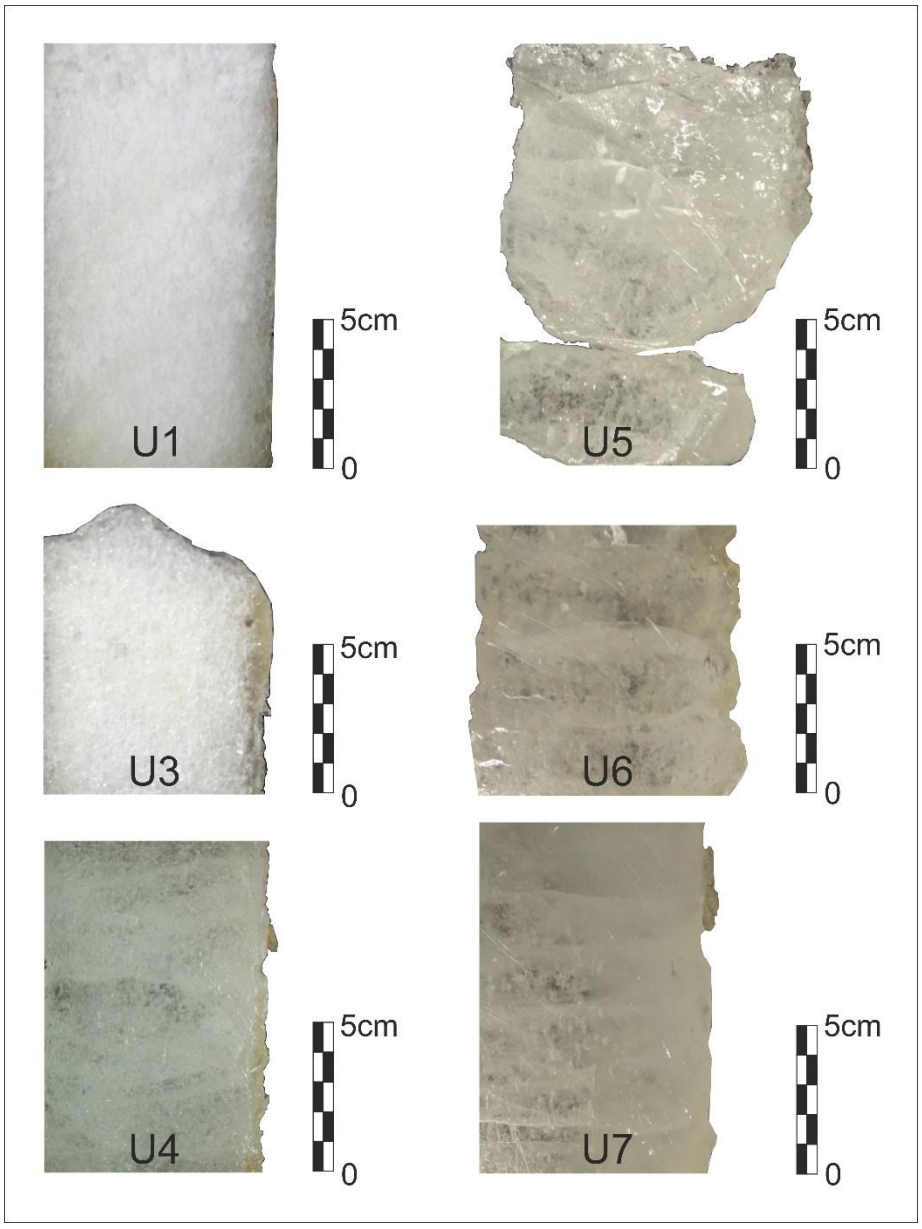

Fig. S4. Photographs of the ice core samples representing the main glacial units (U1, U3, U4, U5, U6 and U7).

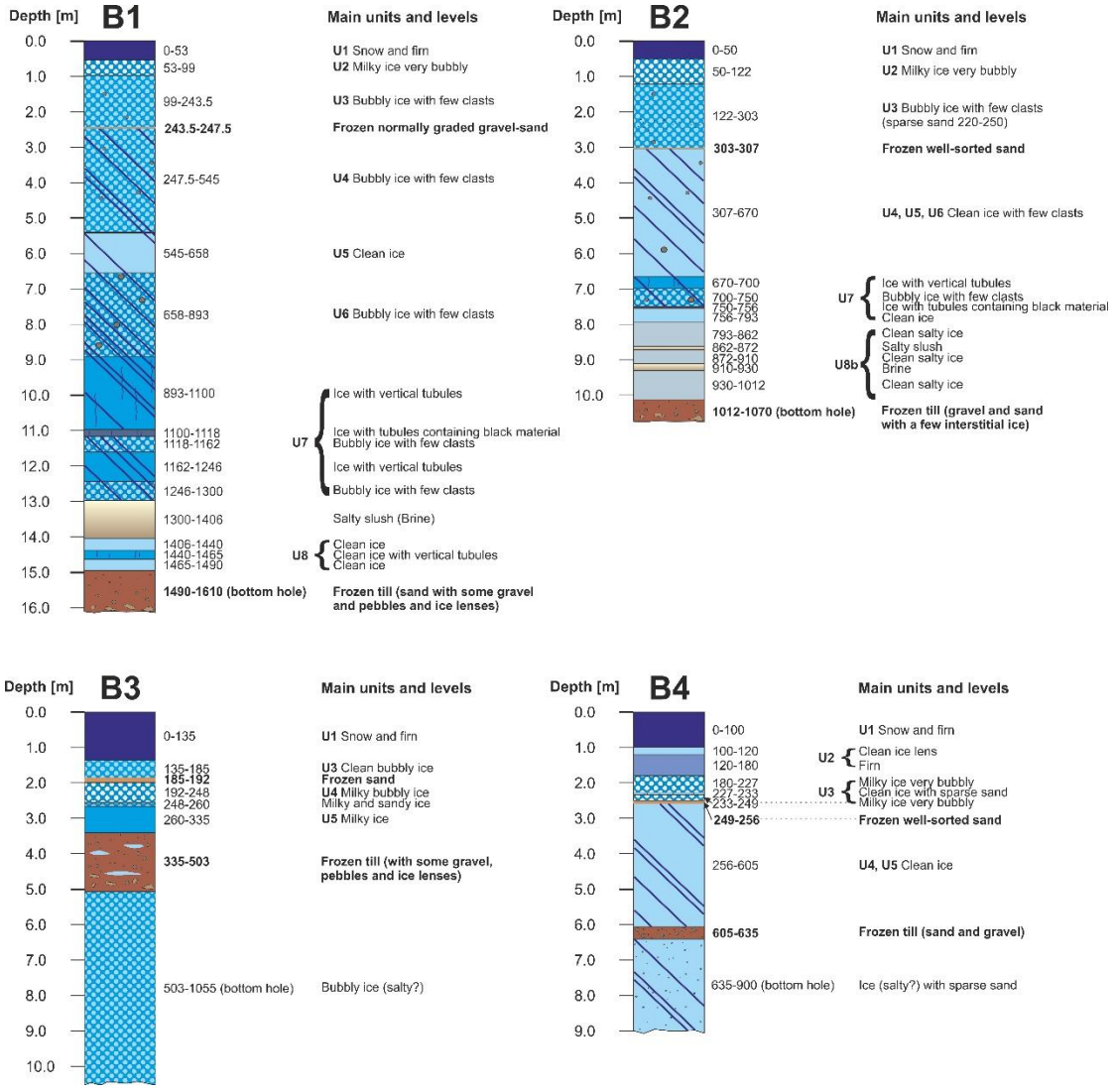

Fig. S5. Detailed stratigraphy and units description of boreholes B1, B2, B3 and B4.

Fig. S6. Details of the two moss species embedded in the ice core: A) *Bryum pseudotriquetrum* (13 mm long); B) *Pohlia nutans* (10 mm long). Note: the scale is in cm, but the pictures are enlarged respectively 5.4 and 7.8 times.

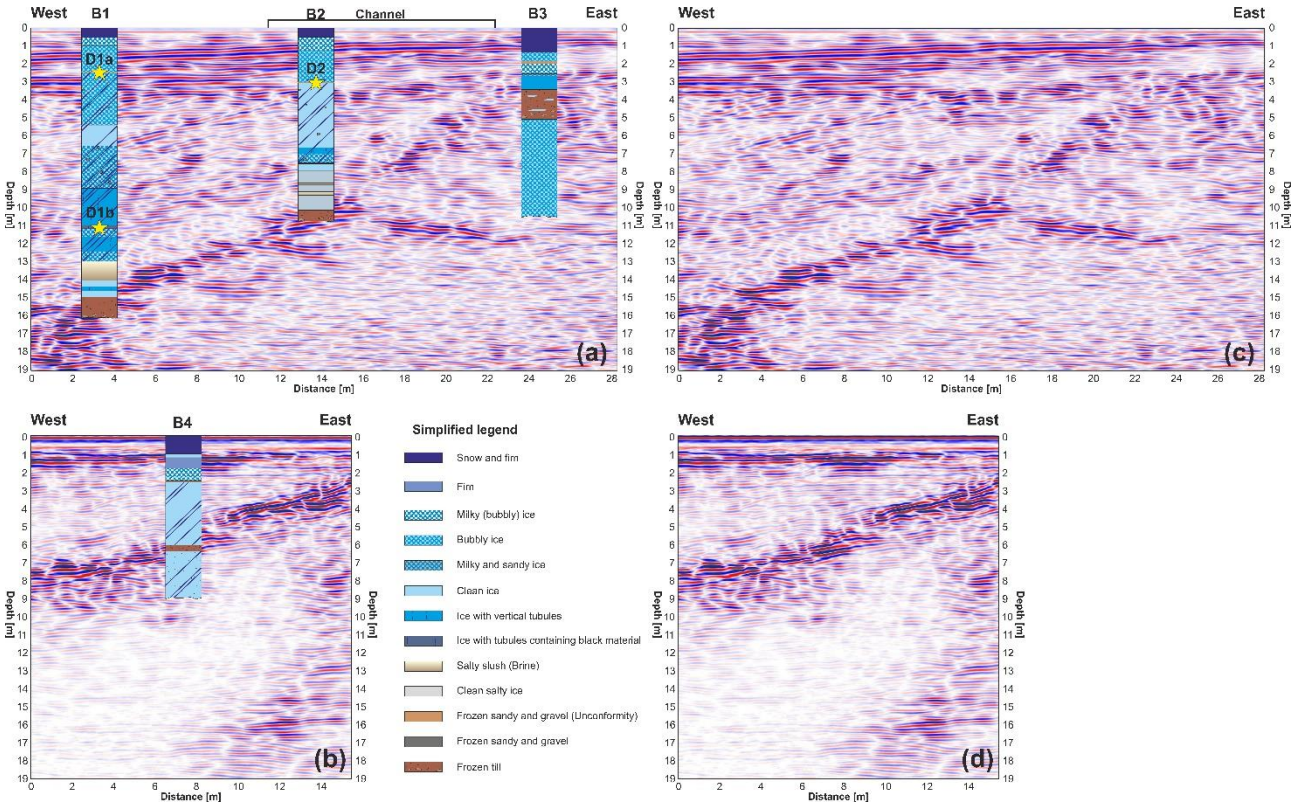

Fig. S7 Same GPR data as in Fig. 4 but uninterpreted, with (a, b) and without (c, d) the borehole stratigraphy.

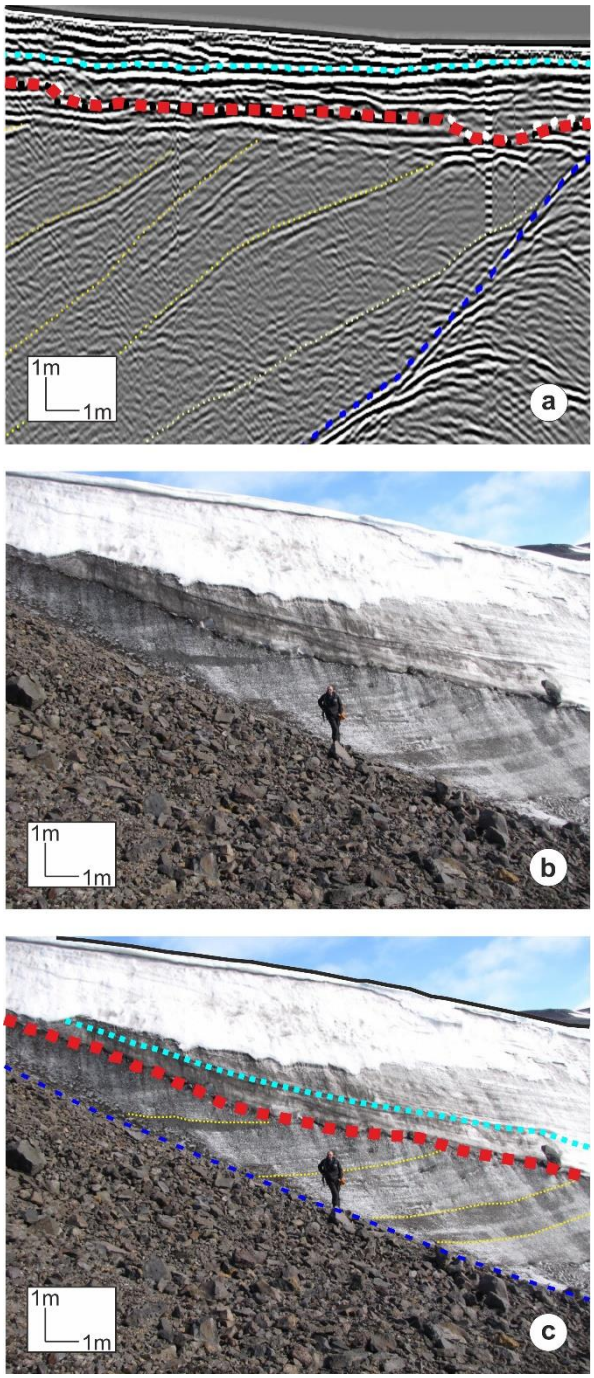

Fig. S8. Example of interpreted GPR profile in the study area (a) and an uninterpreted (b) and interpreted (c) photograph showing similar structures. In both a) and c) the different colors dotted and dashed lines mark the following structures: light blue = contact between snow-firn and ice; red = unconformity (erosion surface); blue = glacier bottom; yellow = some layers within the ice. Photograph was taken in 2011 on James Ross Island (Antarctic Peninsula) at the margin of Davies Dome (Courtesy: Bethan Davies, AntarcticGlaciers.org).