Table I. Annual layer thickness determined as the mean thickness value of all layers identified in each analysed section, and the standard deviation (SD) of each set of annual layers. Modelled annual layer thickness given with model error attached. The estimated age for each sample depth is presented as estimated by the age–depth model.

Depth analysed (m)	LA ICP-MS ± SD (mm)	Discrete sampling ± SD (mm)	CFA ± SD (mm)	Model ± error (mm)	Estimated age (ka BP)
447–451	N/A	N/A	57.0 ± 8.8	57.0 ± 1.9	5.0
454	Variable	57.0 ± 10.0	N/A	51.2 ± 1.9	5.5
456	6.7 ± 0.6	55.0 ± 1.3	N/A	49.8 ± 1.9	5.6
458	26.1 ± 2.3	70.0 ± 2.8	N/A	49.4 ± 1.9	5.6
694	2.9 ± 0.1	N/A	N/A	3.0 ± 0.2	27.1
695	3.6 ± 0.1	N/A	N/A	3.1 ± 0.2	27.4
696	4.0 ± 0.2	N/A	N/A	3.1 ± 0.2	27.7
702	3.1 ± 0.1	2.6 ± 0.1	N/A	2.8 ± 0.1	29.7
704	6.1 ± 0.2	N/A	N/A	2.9 ± 0.1	30.4
706	5.1 ± 0.2	6.0 ± 2.3	N/A	2.8 ± 0.1	31.1

CFA = continuous flow analysis, LA ICP-MS = laser ablation inductively-coupled plasma mass spectrometry, N/A = depth not analysed.

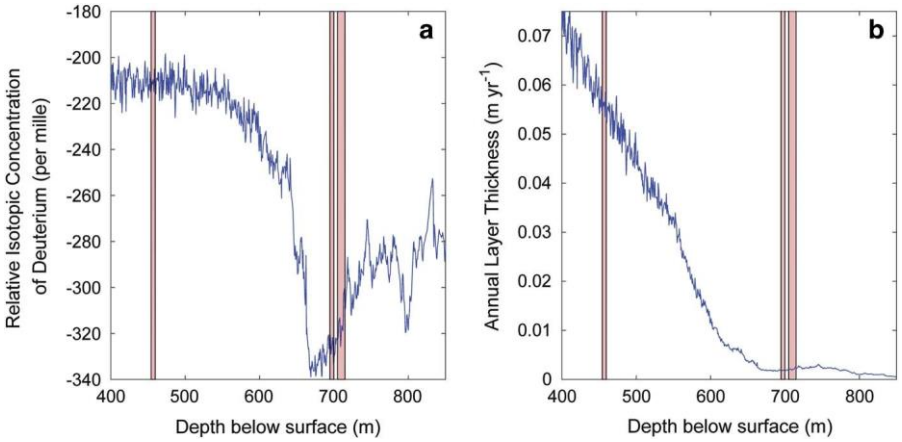

Fig. 1. Berkner Island ice core sampled sections of ice (pink bands) across the a. isotopic and b. modelled annual layer thickness profiles.

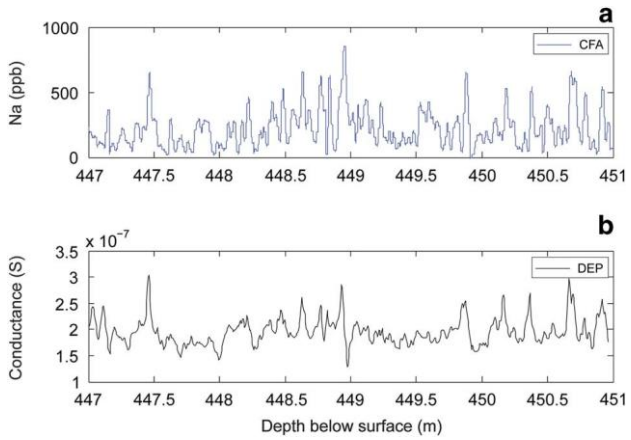

Fig. 2. A 4 m section analysed by a. continuous flow analysis (CFA) and b. dielectric profiling (DEP).

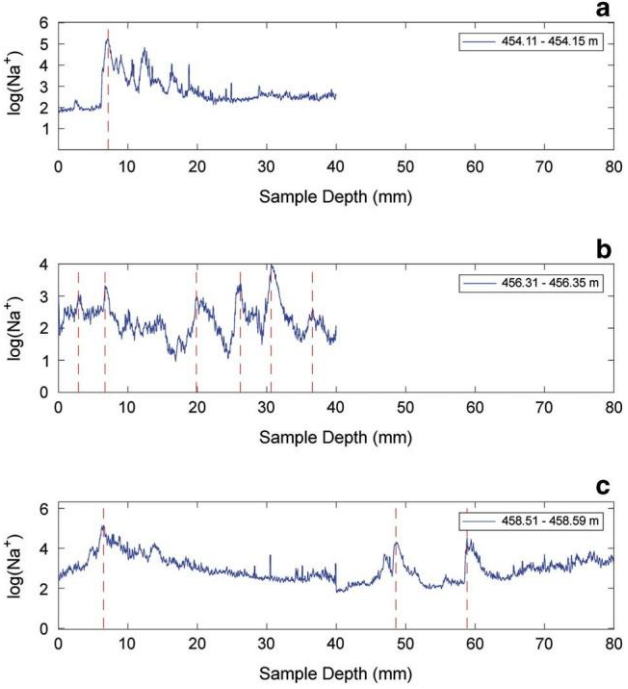

Fig. 3. The LA ICP-MS profiles for three sections of the ice core from 454–459 m. Semi-logarithmic plots show the log (Na^+) on a common depth scale with red dashed lines delineating a seasonal peak.

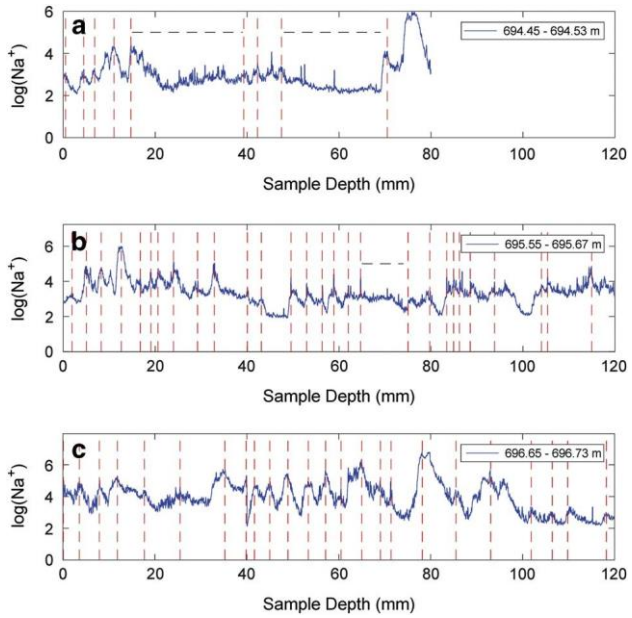

Fig. 4. The LA ICP-MS profiles for three sections of the ice core from 694–697 m. Semi-logarithmic plots show the log (Na^+) on a common depth scale with red dashed lines delineating a seasonal peak. Black dashed lines indicate where no annual layers are discernible.

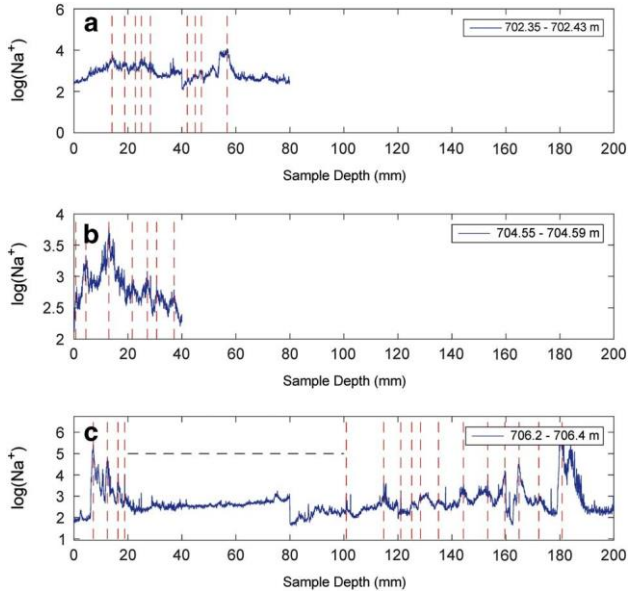

Fig. 5. The LA ICP-MS profiles for three sections of the ice core from 702–707 m. Semi-logarithmic plots show the log (Na^+) on a common depth scale with red dashed lines delineating a seasonal peak.

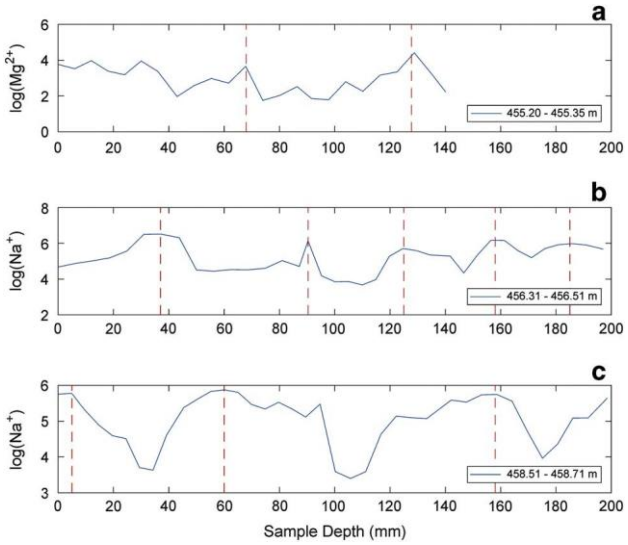

Fig. 6. Three sections of the ice core originating from 455–459 m analysed by ion chromatography and displayed as semi-logarithmic plots of element concentration with red dashed lines indicating annual peaks.

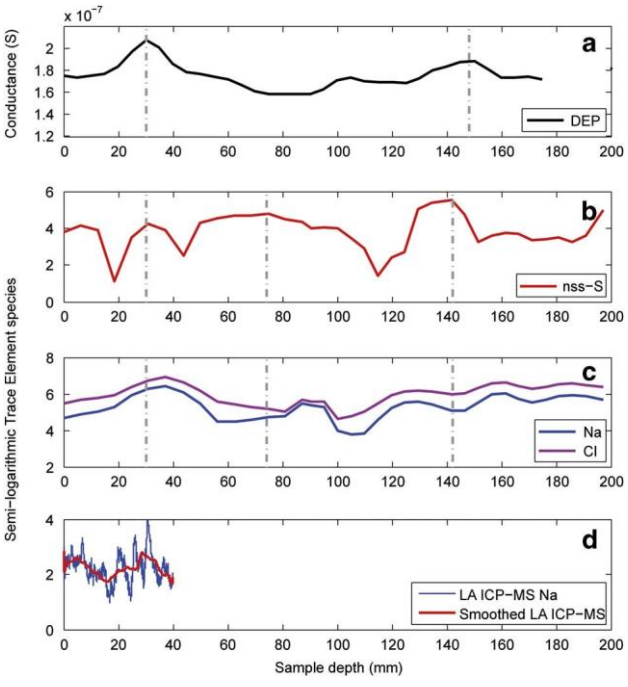

Fig. 7. Comparison of parallel sections of the ice core from 456.31–456.51 m for a. dielectric profiling (DEP) data, b. nss-S profile analysed by discrete sampling, c. sodium and chloride profiles analysed by discrete sampling and d. ice analysed by LA ICP-MS with the profile smoothed to the same resolution used in the discrete sampling technique. Annual layers are indicated by grey lines.

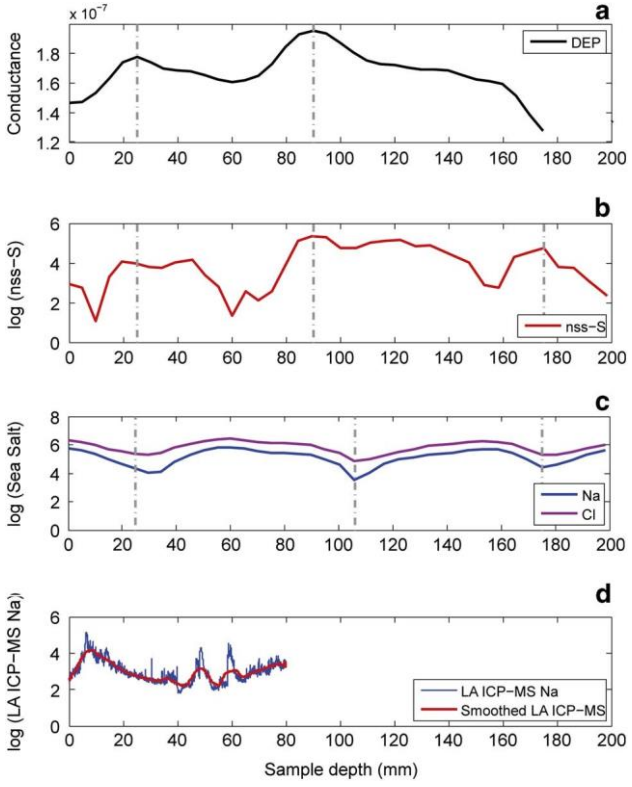

Fig. 8. Comparison of parallel sections of the ice core from 458.51–458.71 m for a. dielectric profiling (DEP) data, b. nss-S profile analysed by discrete sampling (red), c. sodium and chloride profiles analysed by discrete sampling and *c.* ice analysed by LA ICP-MS with the profile smoothed to the same resolution used in the discrete sampling technique (red). Annual layers are indicated by grey lines.

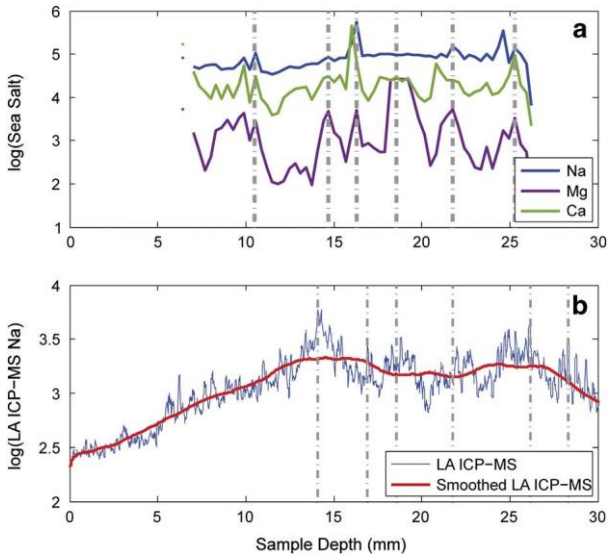

Fig. 9. Comparison of parallel sections of the ice core from 703.2–703.22 m for a. ice analysed by discrete sampling technique and b. ice analysed via LA ICP-MS with a smoothed profile (red). Black dashed lines indicate where no annual layers are discernible.

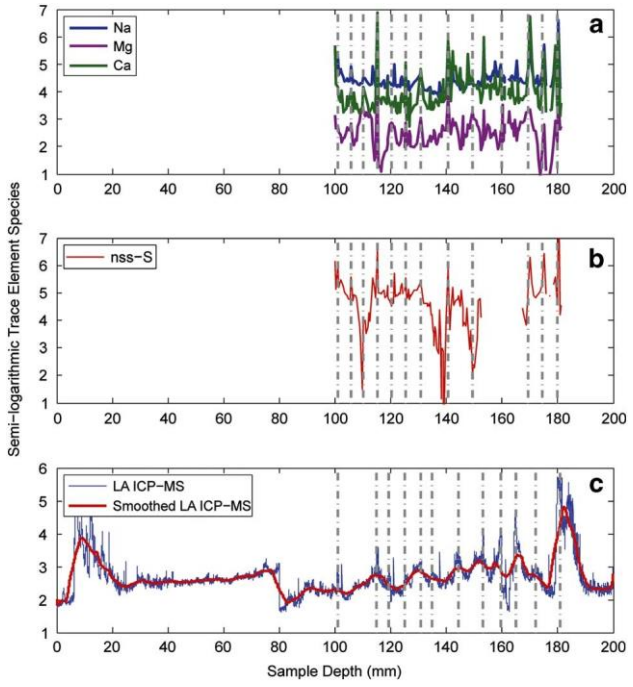

Fig. 10. Comparison of parallel sections of the ice core from 706.3–706.38 m for a. ice analysed by discrete sampling technique and b. the nss-S profile from the discrete sampling technique and c. ice analysed via LA ICP-MS with a smoothed profile (red). Black dashed lines indicate where no annual layers are discernible.