

Dating of an East Antarctic ice core (GV7) by high resolution chemical stratigraphies

Supplementary Information

	Factor 1	Factor 2
Na ⁺	0,932818*	0,042949
Mg ²⁺	0,914067*	0,079863
Ca ²⁺	0,315526	-0,218724
MSA	0,245398	-0,349795
Cl ⁻	0,923317*	0,021686
NO ₃ ⁻	-0,311109	-0,677899*
nssSO ₄ ²⁻	0,013404	-0,806931*
Expl. Var.	2,814928	1,289574
Prp. Totl.	0,402133	0,184225

5 Table S1: Factor Loadings (Varimax normalized). Extraction: Principal components, the marked loadings are >.60

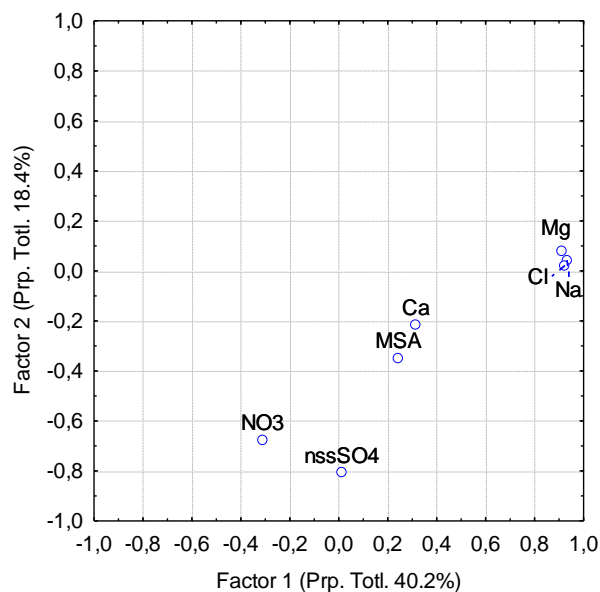
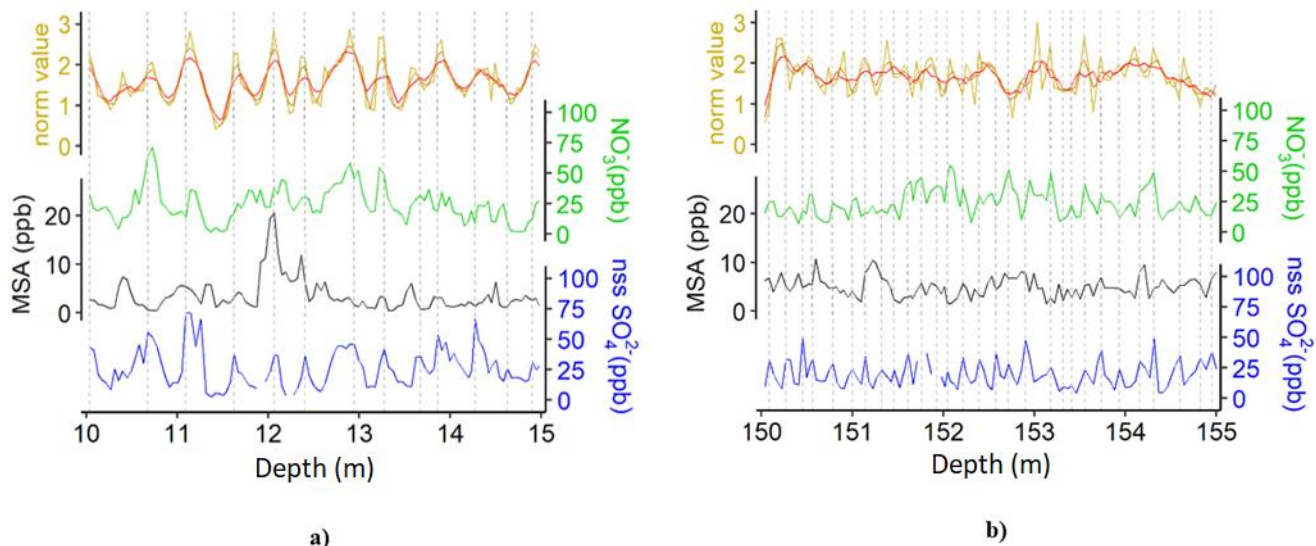
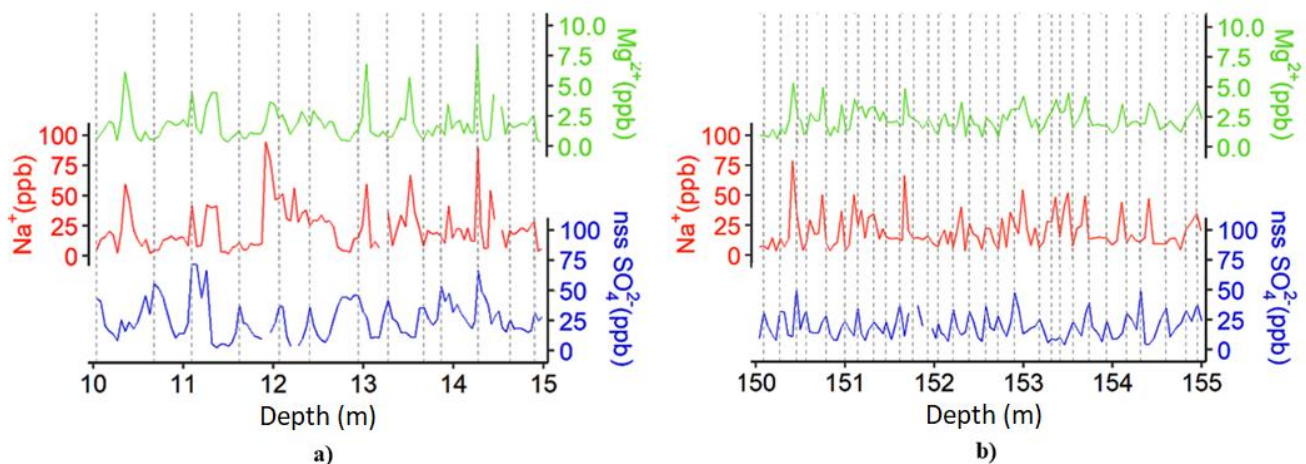


Figure S2: PCA factor loadings for sea-salt and non-sea salt ions' concentration in the core



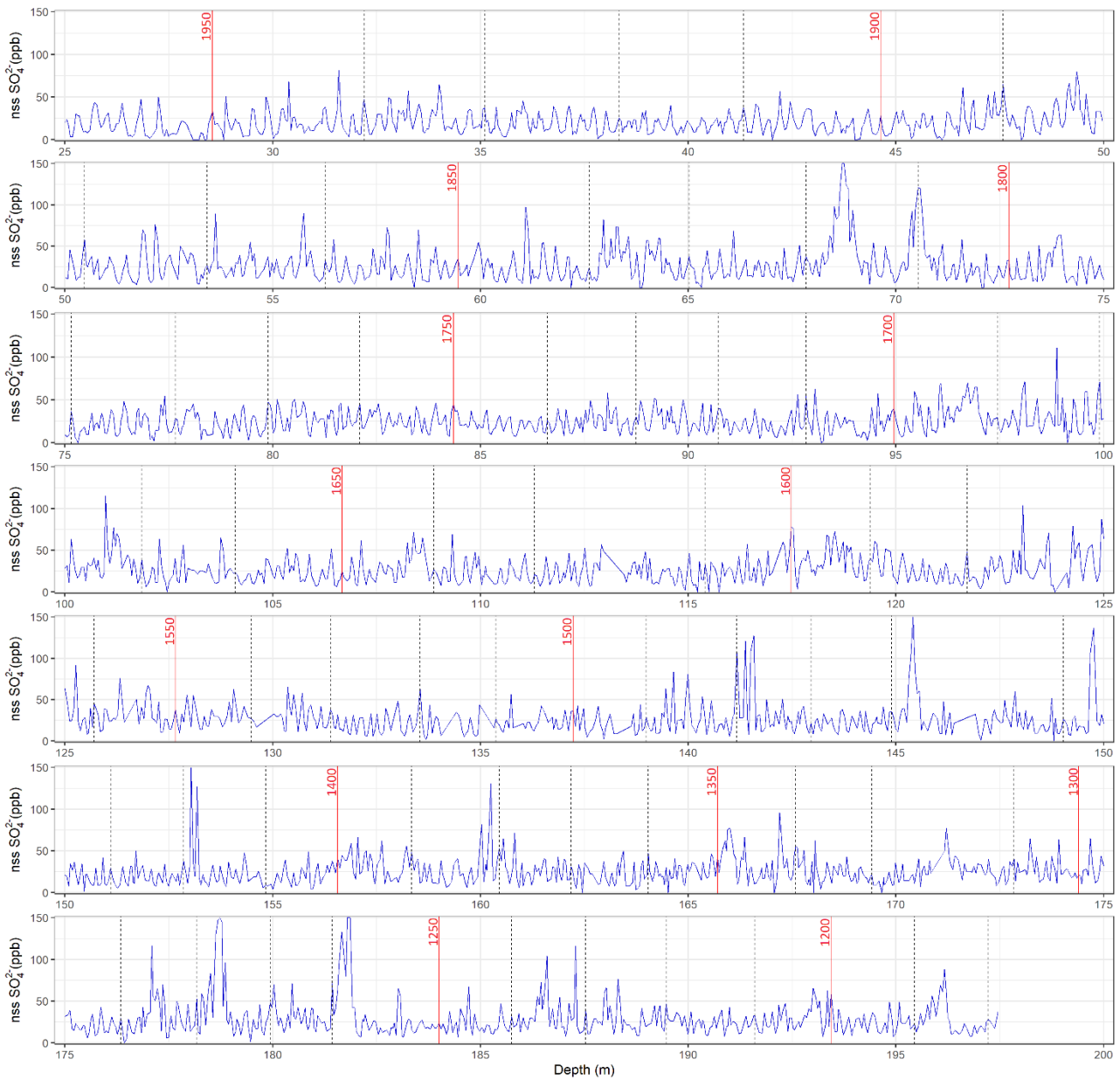
10 **Figure S3: Example in annual layering (10-15 m section of the GV7(B) ice core (a)). The different profiles shown are the sum of normalized values and their running average smoothing (orange hues), nssSO₄²⁻ (blue), MSA (grey) and NO₃⁻ (green). Dashed lines represent the final dating. An example of the normalized value for deeper depth of the core (150-155 m, (b)) is also reported as a comparison: the distinction between annual layers in the normalized values is less pronounced from a depth of approx. 100 m due to the slight lag between nssSO₄²⁻, MSA and NO₃⁻ described in the main text**



15 **Figure S4: Example in annual layer counting with different ions at higher (a) and lower (b) depth: nssSO₄²⁻ (blue), Na⁺ (red) and Mg²⁺ (lime green). Despite showing a similar pattern and having a clear winter maxima, Sodium and Magnesium were ultimately discarded due to their higher variability throughout the core and less pronounced seasonal variability compared to the profile of the nssSO₄²⁻**

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Figure S5: non-sea salt Sulphate stratigraphy and finalized dating of the GV7(B) ice core. Intervals of 10 and 50 years are marked in grey and red respectively. The year 1450 CE is not marked due to missing ice core section between 146.42m and 146.89 m depth. Other breakages are not highlighted. Values above 150ppb and negative values (the latter being due to the way nssSO_4^{2-} was calculated) are not displayed

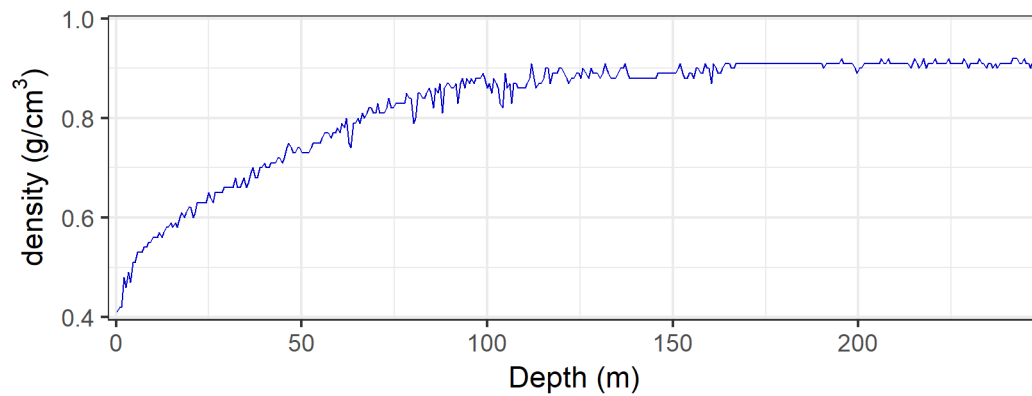


Figure S6: GV7(B) ice core density as calculated from the data log taken during the drilling operations in Antarctica.