

Supplementary Information for ‘Cosmogenic radionuclides reveal an extreme solar particle storm near a solar minimum 9125 years BP’

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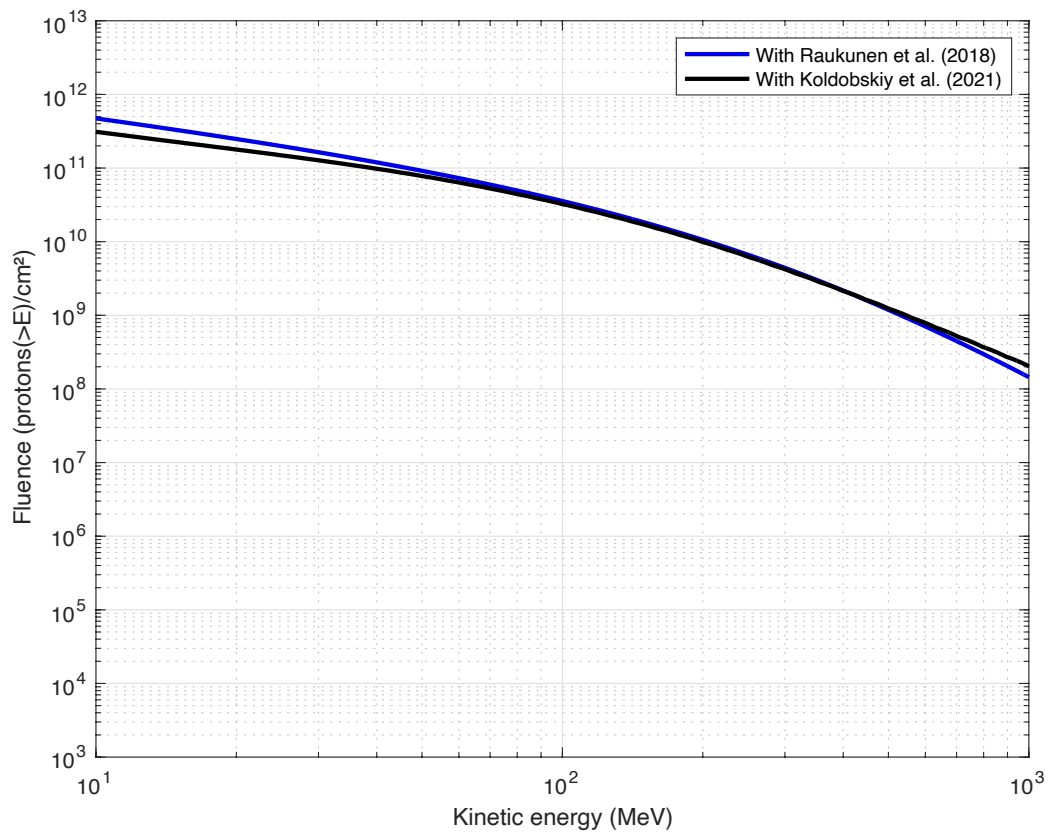
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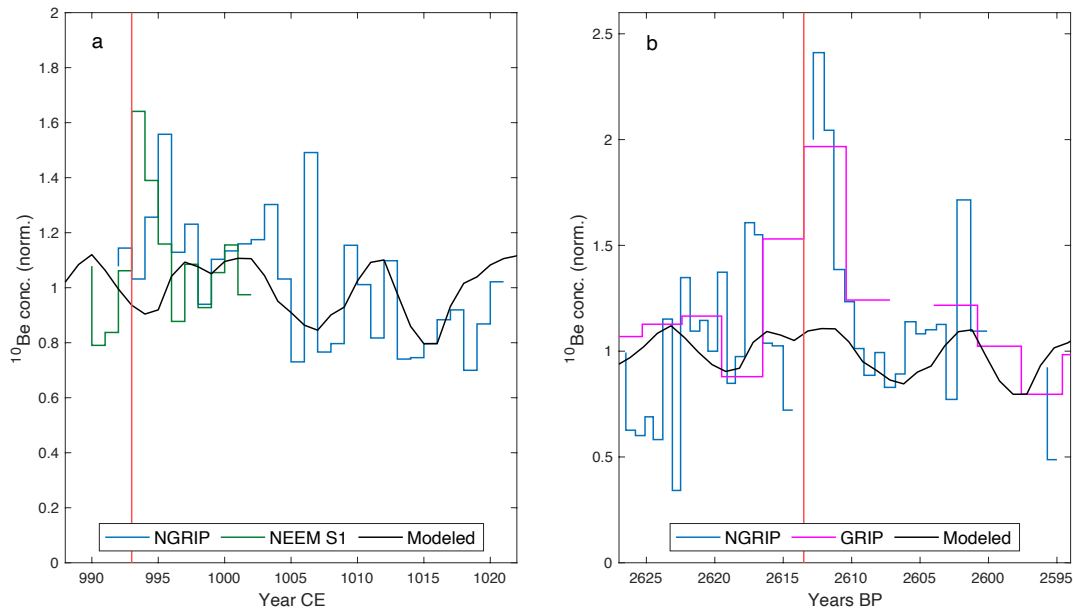
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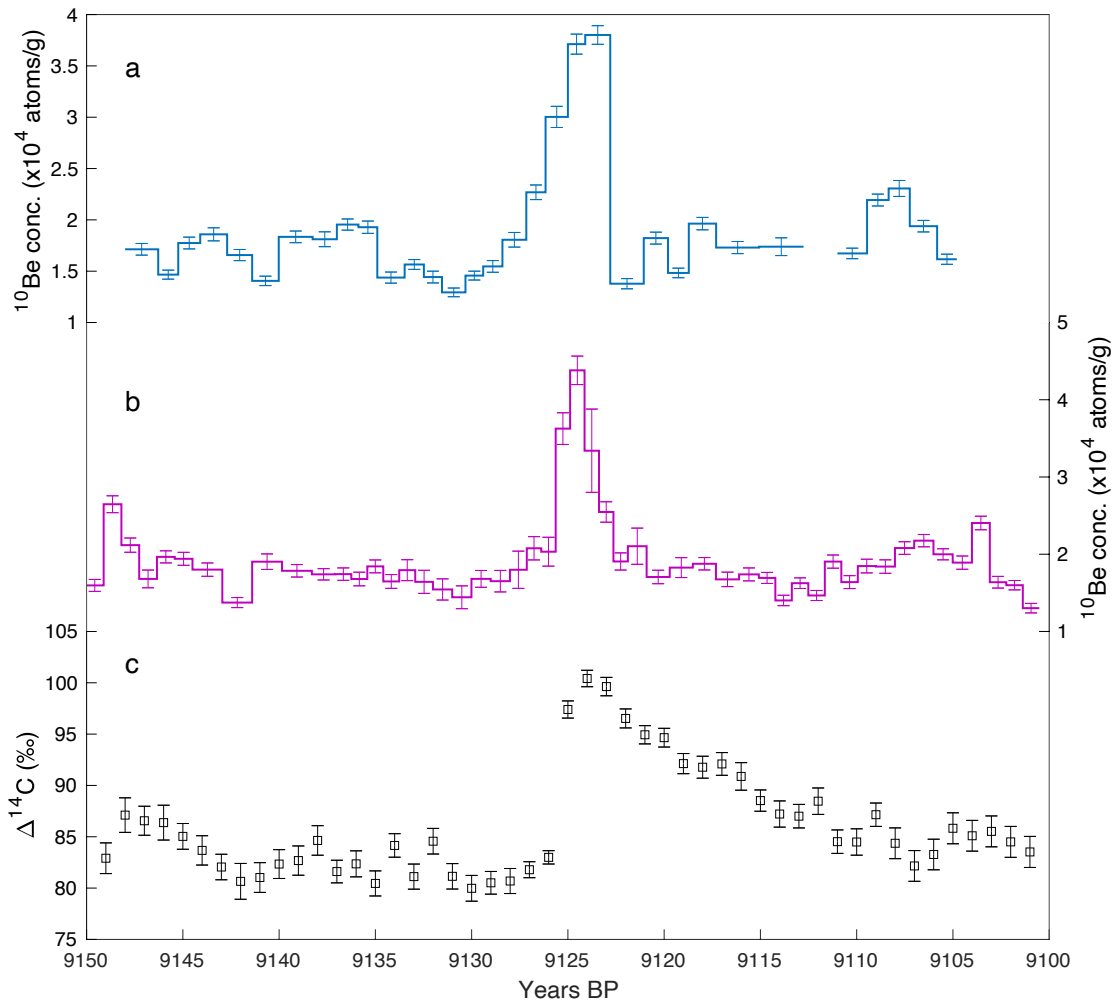
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Supplementary Figure 1. Fluence spectra reconstructions for the 9125 years BP event using the spectra of modern GLEs from Koldobskiy et al. (2021)¹, in black, and from Raukunen et al. (2018)², in blue.



Supplementary Figure 2. Attempt at identifying the relationship between the solar 11-year cycle and the occurrence of the solar energetic particle events of 993/4 CE³ and 2610 years BP⁴. Panel (a) shows the normalized ^{10}Be records from NGRIP (blue) and NEEM S1 (green) around the 993/4 CE event compared to the normalized ^{10}Be annual production rate modeled from neutron monitor data⁵ (period 1966-1994 CE). Panel (b) shows the same comparison to the average ^{10}Be data from ice cores from NGRIP (blue) and GRIP (magenta) for the 2610 years BP event with the normalized ^{10}Be annual production rate modeled from neutron monitor data⁵ (period 1961-1994). All records are normalized to their baseline (average ^{10}Be concentration excluding the peak). The red line indicates the estimated onset of the event.



Supplementary Figure 3. Comparison between ^{10}Be and radiocarbon records. The NGRIP ^{10}Be record is shown in panel a), the EGRIP ^{10}Be record in panel b). The error bar of each data point includes the measurement uncertainty. Panel c) shows the mean $\Delta^{14}\text{C}$ record from Brehm et al. (2021)⁶. The records show synchronous ^{10}Be and ^{14}C peaks after an adjustment of the GICC05 timescale by -54 years (± 6 years)⁷.

References

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