

**The signal of solar storms embedded in cosmogenic radionuclides:  
Detectability and uncertainties**

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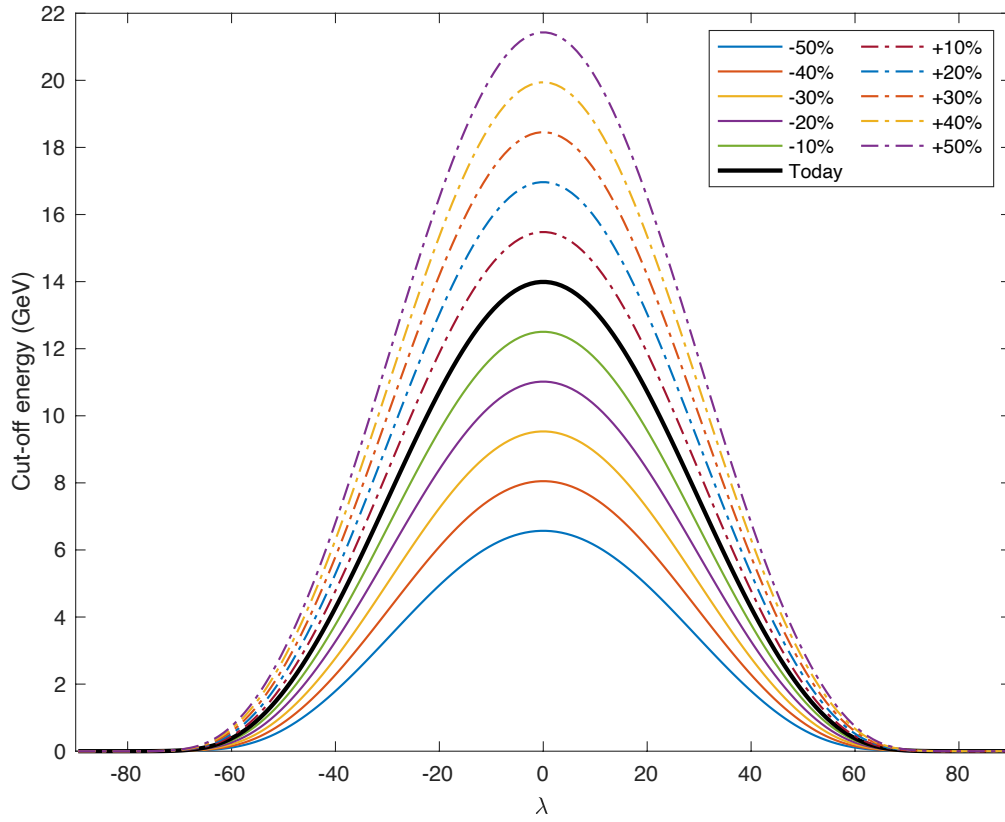
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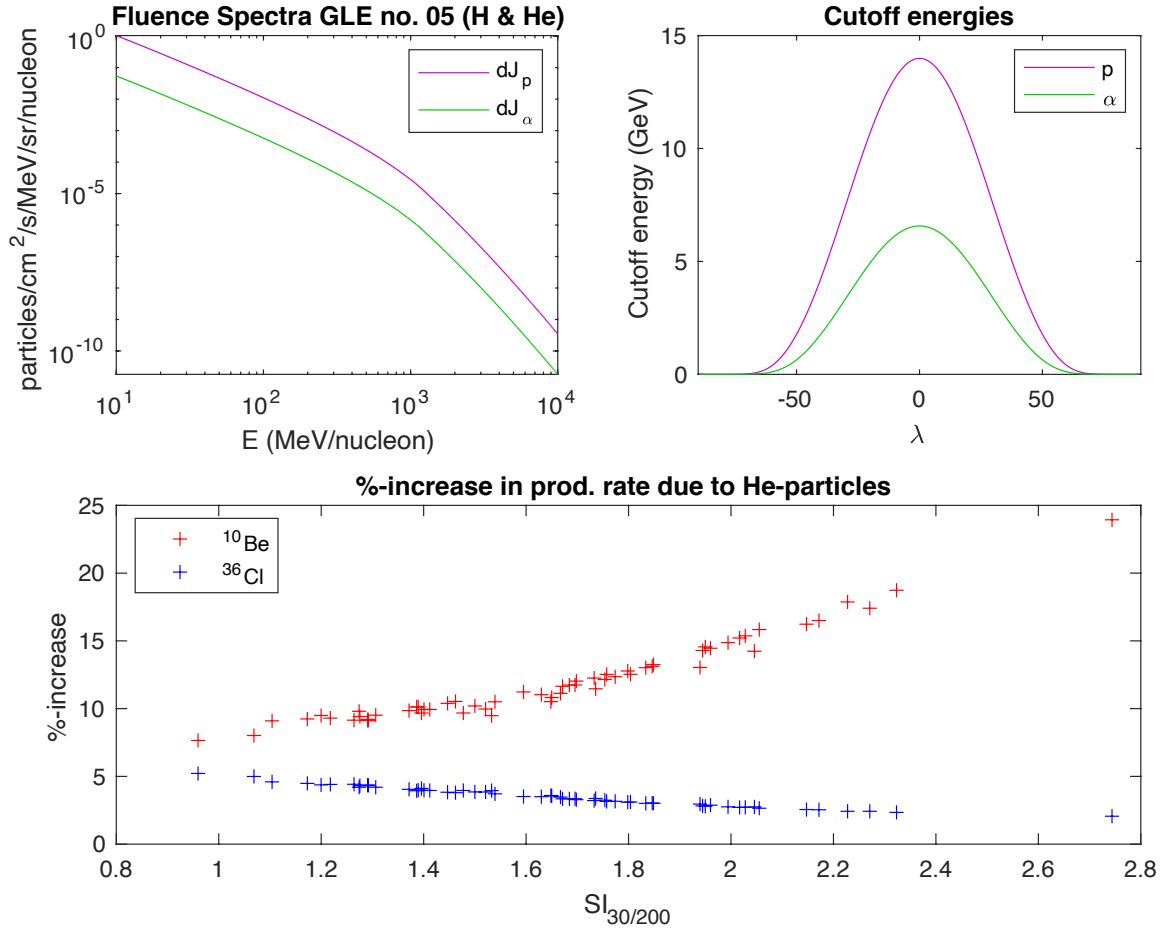
**Contents of this file**

Figures S1 to S2

Tables S1



**Figure S1.** Cut-off energies for vertically incident protons according to Equation 4.



**Figure S2.** Top-left: Differential fluence spectra for protons for GLE no. 05 in magenta (derived from Raukunen et al. 2018) and extrapolated He-particle differential spectrum in green using a H/He abundance ratio of 19.2 (see text). Top-right: Cutoff-energy as a function of latitude for protons (magenta) and He-particles (green) for today's dipole moment. Bottom: Potential contribution (in percentage increase) of He-particles to the global production rate increase in <sup>10</sup>Be (red) and <sup>36</sup>Cl (blue) caused by the 59 GLEs studied here.

Ice core	$\sigma$	$A_{peak}$	$\int_{peak}$	$A/\int$
<i>NEEM</i>	0.17	1.71	2.53	0.68
<i>NGRIP</i>	0.2	1.65	3.30	0.50
<i>Tunu</i>	0.25	1.23	2.01	0.61
<i>WAIS</i>	0.17	1.46	3.22	0.45
<i>Dome F</i>	0.24	0.89	2.01	0.44
Average	0.2	1.4	2.6 (3*)	0.54

**Table S1.** Summary of the standard deviation ( $\sigma$ ), peak amplitude ( $A_{peak}$ ) and time-integrated peak factor ( $\int_{peak}$ ) of the five  $^{10}\text{Be}$  records plotted in Fig. 6. The data are found in Sigl et al. (2015) and Miyake et al. (2015).