

A major update of the International GLE Database: Correction for the variable GCR background

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The main detector to provide data to study highly energetic (above ~400 MeV) solar particles is the network of ground-based neutron monitors (NMs). Solar events recorded on the ground are called ground-level enhancements (GLEs). All GLE-related data from the NM network are collected in the International GLE Database (IGLED, <https://gle.oulu.fi>), which provides formal NM count-rate increases above the constant pre-increase level which is due to galactic cosmic rays (GCR). However, the basic formal assumption that the GCR background level remains constant throughout a GLE event is often violated. We have carefully revised the IGLED and provided a new data set of detrended NM count-rate increases that accounts for the variable GCR background. This had led to a significant revision of the corresponding integral omnidirectional fluences of solar particles reconstructed from the GLE data. The database of the detrended NM count rate is revised for most GLE events since 1956. Integral omnidirectional fluences were re-assessed for 58 GLE events and parametrised for 52 reasonably strong events by applying the modified Ellison-Ramaty spectral shape. This forms the basis for more precise studies of parameters of SEP events and thus for solar and space physics.

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