Contribution ID: **48** Type: **Poster**

Application of the verified neutron monitor yield function for GLE analysis

Friday 16 July 2021 19:18 (12 minutes)

Systematic studies of solar energetic particles (SEPs) provide a basis to understand their acceleration and propagation in the interplanetary space. During solar eruptive processes, such as solar flares and/or coronal mass ejections solar ions can be accelerated to high energy. In the majority of cases, the maximum energy of the accelerated solar ions is several tens of MeV/nucleon, but sometimes it exceeds 100 MeV/nucleon and can even reach GeV/nucleon range. In this case, the energy is sufficiently high to initiate an atmospheric cascade in the Earth's atmosphere, whose secondary particles can reach the ground, being eventually registered by ground-based detectors, specifically neutron monitors. This particular class of events is known as ground-level enhancements (GLEs). Several methods for analyses of GLEs, using neutron monitor data were developed over the years. Here, we present a method for assessment of the spectral and angular features of the GLEs using data from the world-wide neutron monitor (NM) network, namely by modeling the global NM network response with the new verified yield function. The method is based on consecutive steps, specifically detailed computations of asymptotic acceptance cones and geomagnetic cut-off rigidity for each station used in the analysis and optimization of the global NM network response over experimental and modeled count rate increase. The method is compared with other methods, including in-situ measurements of SEPs. A very good agreement between our method and space-borne measurements performed by PAMELA space probe, specifically the derived fluence of solar protons during GLE 71 was achieved, confirming verification of the method.

Keywords

ground level enhancement, neutron monitor, data analysis

Collaboration

other Collaboration

Subcategory

Experimental Methods & Instrumentation

Primary author: MISHEV, Alexander (University of Oulu)

Co-authors: Prof. USOSKIN, Ilya (University of Oulu); Dr KOLDOBSKY, Sergey (University of Oulu); Dr KOVALTSOV„ Gennady (Ioffe Physical-Technical Institute); Dr KOCHAROV, Leon (University of Oulu)

Presenter: MISHEV, Alexander (University of Oulu)

Session Classification: Discussion

Track Classification: Scientific Field: SH | Solar & Heliospheric