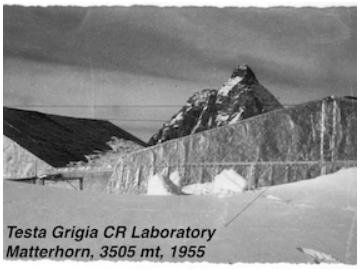

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Application of a full chain analysis using neutron monitor data for space weather studies

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An important topic in the field of space weather is the precise assessment of the impact of solar energetic particles on atmospheric processes and air crew exposure, specifically during eruptive events on the Sun. For this purpose an adequate information about solar energetic particle (SEP) specrum is necessary. Since SEP possess an essential isotropic part, specifically during the event onset, the angular characteristics should be also derived with good precision. This can be achieved using neutron monitor (NM) data during a special class of SEP events –the ground level enhancements (GLEs). A precise analysis of SEP spectral and angular characteristics using NM data requires realistic modeling of propagation of those particles in the Earth's magnetosphere and atmosphere. On the basis of the method representing a sequence of consecutive steps, namely a detailed computation of the SEP assymptotic cones of acceptance, NM rigidity cut-offs and application of a neutron monitor yield function and convenient optimization procedure, we derive the rigidity spectra and anisotropy characteristics of several major GLEs. For the computation we use newly computed yield function of the standard sea-level 6NM64 neutron monitor for primary proton and alpha CR nuclei as well as 6NM64 yield function at altitudes of 3000 m and 5000 m above the sea level. We derive the SEP spectra and pitch angle distributions in their dynamical development throughout the events. Subsequently on the basis of the derived spectra and angular characteristics and previously computed yield functions we calculate the ion production rate and effective dose during the GLEs. Several examples are shown. The derived results are compared with the previously obtained and are discussed.

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