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SENSITIVITY OF THE WORLD-WIDE NEUTRON MONITOR NETWORK TO SOLAR NEUTRONS: A REVISITED APPROACH

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Observations of intense sporadic solar-neutron events provide a unique opportunity to study energetic processes of particle acceleration during solar flares. Such neutrons are produced in nuclear reactions of high-energy (from several hundred MeV/nuc to several GeV/nuc) particles in the solar atmosphere and surface. The existing neutron monitor (NM) network provides a continuous record of cosmic ray intensity over several solar cycles but can also serve as a suitable detector for solar neutrons.
Here we revise the sensitivity of the world wide neutron monitor network to solar neutrons using a newly computed yield function for solar neutrons. The yield function was computed using a Monte-Carlo simulation of the neutron-induced atmospheric cascade and updated information about the NM detection efficiency. The simulation was performed with the PLANETOCOSMICS code, which incorporates the full complexity of the atmospheric cascade development, namely secondary particle propagation and attenuation in the Earth's atmosphere.
Subsequently a technique based on the modelled NM response to solar neutrons is applied in order to estimate the sensitivity of world wide neutron monitor network to solar neutrons. The results are widely discussed in application of the solar neutron event

Collaboration

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