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Neutron Monitor Atmospheric Pressure Correction Method Based on Galactic Cosmic Rays tracing and MCNP Simulations of Cascade Showers

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Nuclear spallations accompanying Galactic Cosmic Ray (GCR) propagation through the atmosphere forms a so-called "cascade shower" by means of production of secondary protons, photons, neutrons, muons, pions and other energetic particles. World-wide Neutron Monitor (NM) network has been deployed for the ground-based monitoring of energetic protons and neutrons precipitations. Real time data from 36 NMs (including Calgary NM) are collecting in the Neutron Monitor Database (NMDB) [http://www.nmdb.eu]. However, each monitor has its own detection efficiency, which depends on NM location, design, operational and atmospheric parameters, so NM counting rates must be normalized. We developed and implemented a numerical technique which allows NM count rates estimation based on the spectrum of primary GCR, NM location, its internal design, and atmospheric parameters. Primary GCR are tracing to the top of atmosphere using our in-home computational tool [Kouznetsov, 2013]. The background proton and neutron particle fluxes are computed at Calgary NM location based on MCNP6 simulations and MSIS-E-90 Atmosphere Model [http://omniweb.gsfc.nasa.gov/vitmo/msis_vitmo.html]. Results obtained for Calgary NM improve standard atmospheric pressure correction procedure and can be used to normalize counting rates for the world-wide NM network.

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