

Neutron Monitors and cosmic-ray data for solar modulation studies: systematic uncertainties and modulation level time series

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Particles count rates at given Earth location and altitude result from the convolution of (i) the interstellar (IS) cosmic-ray fluxes outside the solar cavity, (ii) the time-dependent modulation of IS into Top-of-Atmosphere (TOA) fluxes, (iii) the rigidity cut-off (or geomagnetic transmission function) and grammage at the counter location, (iv) the atmosphere response to incoming TOA cosmic rays (shower development), and (v) the counter response to the various particles/energies in the shower. Count rates from neutron monitors or muon counters are therefore a proxy to solar activity. We present here how the uncertainties on the above ingredients impact count rate calculations, and how they translate into variation/uncertainties on the level of solar modulation (Maurin et al. 2015, AdSpR 55, 363). We then use an improved determination of the IS fluxes to compare solar modulation levels obtained from GCR data and from NMs.

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