

Seasonal Variation of scaling factor for Newark's Neutron Monitor

The intensity of energetic charged particles (cosmic rays) in the inner solar system is observed to vary with time over a variety of time scales. The sun is the ultimate cause of these variations, Galactic cosmic rays are present continuously and dominate the average intensity above about 200 MeV. They are 'modulated' by the sun and have their lowest intensity during high solar activity. The physical agent causing changes in the Galactic cosmic ray intensity is the solar wind entrained magnetic field.

Neutron Monitors (NM) are ground-based detectors designed to measure the number of high energy charged particles striking the Earth's atmosphere. The Newark NM has been operating for several decades, and consists of nine proportional counter tubes, six filled with BF₃ gas and three filled with He₃ gas. Vaisanen et al (2023) recently reported a one percent yearly variation on the scaling factor of the Newark NM data with respect to multiple NM stations.

In this study, we investigate the environmental conditions that could contribute to the observed seasonal variations. In particular we estimate the temperature dependence of the two types of tubes from six years of data. We compare our results with simulation calculations, and previous determinations. We discuss the current temperature correction applied to the Newark NM data. We open the discussion to possible atmospheric effects.