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Neutron monitor counting rates at different cut off Rigidity from Galactic Cosmic rays

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Neutron monitor have recorded the flux of high energy cosmic rays from more than half century .Cosmic rays counts from the ground based neutron monitor at different cut off rigidity show intensity changes, which are anti correlated with sunspot numbers. They also lose energy as they propagate towards the Earth and experience various types of modulations due to different solar activity . In this work, we study the first three harmonics of cosmic ray intensity on geo-magnetically quiet days over the period 1960-2010 for three Northern Hemisphere (Oulu,Thule,Apatity) and three Southern Hemisphere (Kerguelen,Mcmurdo,Sanae) neutron monitoring stations located at different cut off rigidity. The amplitude of first harmonic remains high for low cutoff rigidity as compared to high cutoff rigidity on quiet days. The diurnal amplitude significantly decreases during solar activity minimum years. The diurnal time of maximum significantly shifts to an earlier time as compared to the co rotational direction having different cutoff rigidities. The time of maximum for first harmonic significantly shifts towards later hours and for second harmonic it shifts towards earlier hours at low cutoff rigidity station as compared to the high cut off rigidity station on quiet days. The amplitude of second/third harmonics shows a good positive correlation with solar wind velocity, while the others (i.e. amplitude and phase) have no significant correlation on quiet days. This work examines the record of 6 long running neutron monitors to evaluate cosmic rays fluxes during the recent extraordinary solar minima in a long-term context

Collaboration

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