



Multi-parametric Effect of Solar Activity on Cosmic Rays

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The long-term modulation of cosmic ray intensity (CRI) by different solar activity (SA) parameters and an inverse correlation between an individual SA parameter and CRI is well known. Earlier, it has been suggested that the concept of multi-parametric modulation of CRI may play

an important role in the study of long-term modulation of CRI. In the present study, we have tried to investigate the combined effect of a set of two SA parameters in the long-term modulation of CRI. For this purpose, we have used a new statistical technique called “Running multiple correlation method”, based on the “Running cross correlation method”. The

running multiple correlation functions among different sets of two SA parameters (e.g., sunspot numbers and solar flux, sunspot number and coronal index, sunspot numbers and grouped solar flares, etc.) and CRI have been correlated separately. It is found that the strength of multiple correlation (among two SA parameters and CRI) and cross correlation (between individual SA parameter and CRI) is almost similar throughout the period

of investigation (1955–2005). It is also found that the multiple correlations among various SA parameters and CRI is stronger during ascending and descending phases of the solar cycles and it becomes weaker during maxima and minima of the solar cycles, which is in accordance with the linear relationship between SA parameters and CRI. The values of multiple

correlation functions among different sets of SA parameters and CRI fall well within the 95% confidence interval. In the view of odd–even hypothesis of solar cycles, the strange behaviour of present cycle 23 (odd cycle), as this is characterized by many peculiarities with double peaks and many quiet periods (Gnevyshev gaps) interrupted the solar activity (for

example April 2001, October–November 2003 and January 2005), leads us to speculate that the solar cycle 24 (even cycle) might be of exceptional nature.

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