

COMPARATIVE STUDY OF TRI-DIURNAL ANISOTROPY OF COSMIC RAY INTENSITY ON DIFFERENT TYPES OF DAYS DURING 1992-94

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ABSTRACT : A comparative study of tri-diurnal anisotropy of Cosmic Ray intensity data has been performed for Deep River neutron monitoring station on geo magnetically 60 quietest days, 120 quiet days and all days during 1992-94. Histogrammic plots of percentage of occurrence of days for Phase (hrs) in a definite interval reveals that Phase is maximum in the interval of 0 to 2 hrs directions during the year 1992-93. Whereas it is maximum in the interval of 0 to 3 hrs directions for the year 1994. However, the value of peak relative to its neighbors is quite large in case of quietest days. The peak sharpening is equally noticeable in case of amplitude histograms as well. This bring out the fact that five most quietest days are better suited for study of daily variation on long term basis as well as short term basis. These results clearly indicate that the behaviour of Sixty quietest days are most suitable for anisotropic studies on long / short term basis. The time/spatial variation in the amplitude and phase of tri-diurnal anisotropy becomes more pronounced for sixty quietest days.

(Key word's : Cosmic rays/geomagnetically quiet days)

[1] INTRODUCTION

The study of diurnal anisotropy in CR intensity using pressure corrected neutron monitor data has been performed by many workers (Venkatesan & Badruddin, 1990; Kumar et al, 1992, 1993, 1999 and references there in). The studies have been performed on these data by earlier workers either for all days or/and for 60 Quietest days. In the present investigations an attempt has been made to have a comparative study of not only these two groups of days but also for 120 Quiet days for third harmonics of daily variation.

[2] ANALYSIS OF THE DATA

Solar daily variation has been studied in terms of helio-magnetic activity. A new concept of data analysis has been introduced for studying the long/short term daily variation in CR intensity recorded with neutron monitors. Fourier technique has been applied on different types of group of days chosen according to their different geomagnetic condition.

1. All days : This means all the 365/366 days in a year. Thus, these days are termed as AD. Of course ignoring the days with abrupt changes.

Quiet days : Those days on which the transient magnetic variation are regular and smooth are said to be magnetically quiet or Q days. The criteria is based upon Ap and Kp values. There are two types of days.

2. 60 Quiet days : According to solar geophysical data (SGD) lowest mean order number are the five quietest days in a month. Thus, 60 Q days in a year termed as; 60 QD.

3. 120 Quiet days : First ten quiet days in a month. Thus, 120 Q Days in a year; termed as 120 Quiet days.

The pressure corrected Deep River (Lat : 46.06°N; cutoff rigidity : 1.02 GV; Longitude : 282.5°E; Altitude : 145m) neutron monitor data for the year 1992 & 1994 has been fourier analysed after applying trend correction to obtain tri-diurnal anisotropy on 60 Quietest days, 120 Quiet days and all days in a year.

[3] RESULTS AND DISCUSSION

The percentage occurrence of days during the years 1992 for the amplitude (%) and phase (Hrs) of tri diurnal anisotropy of CR intensity for Deep River on (A) Five most quiet days (QD), (B) Ten quiet days and (C) all days have been plotted on histogram in figures 1 (A, B, C). Similar histograms have been plotted during the year 1994 from Fig. 2 (A, B, C). It is quite apparent from Fig. 1(A) that the peak of histogram is more sharper and scattering of the points away from the peak is not much larger for the five most quiet days in a month for the phase of tri-diurnal anisotropy of CR intensity. It also reveal that phase is maximum in the interval of 0 to 2 hrs. direction. The peak becomes broader as one goes to ten quiet days and furthermore broader for all days as shown in Fig. 1 (B & C). Similar conclusions are drawn from the plots of histograms for the phases above said three types of days during the year 1994, which reveals that the phase is maximum in the interval of 0 to 3 hrs. direction.

[4] CONCLUSIONS :

The comparative studies performed with different approaches lead to the same conclusions. However, this also brings out the fact that five most quiet days are better suited for study of daily variation of CR intensity on long term basis as well as short term basis (Richharia, 2001).

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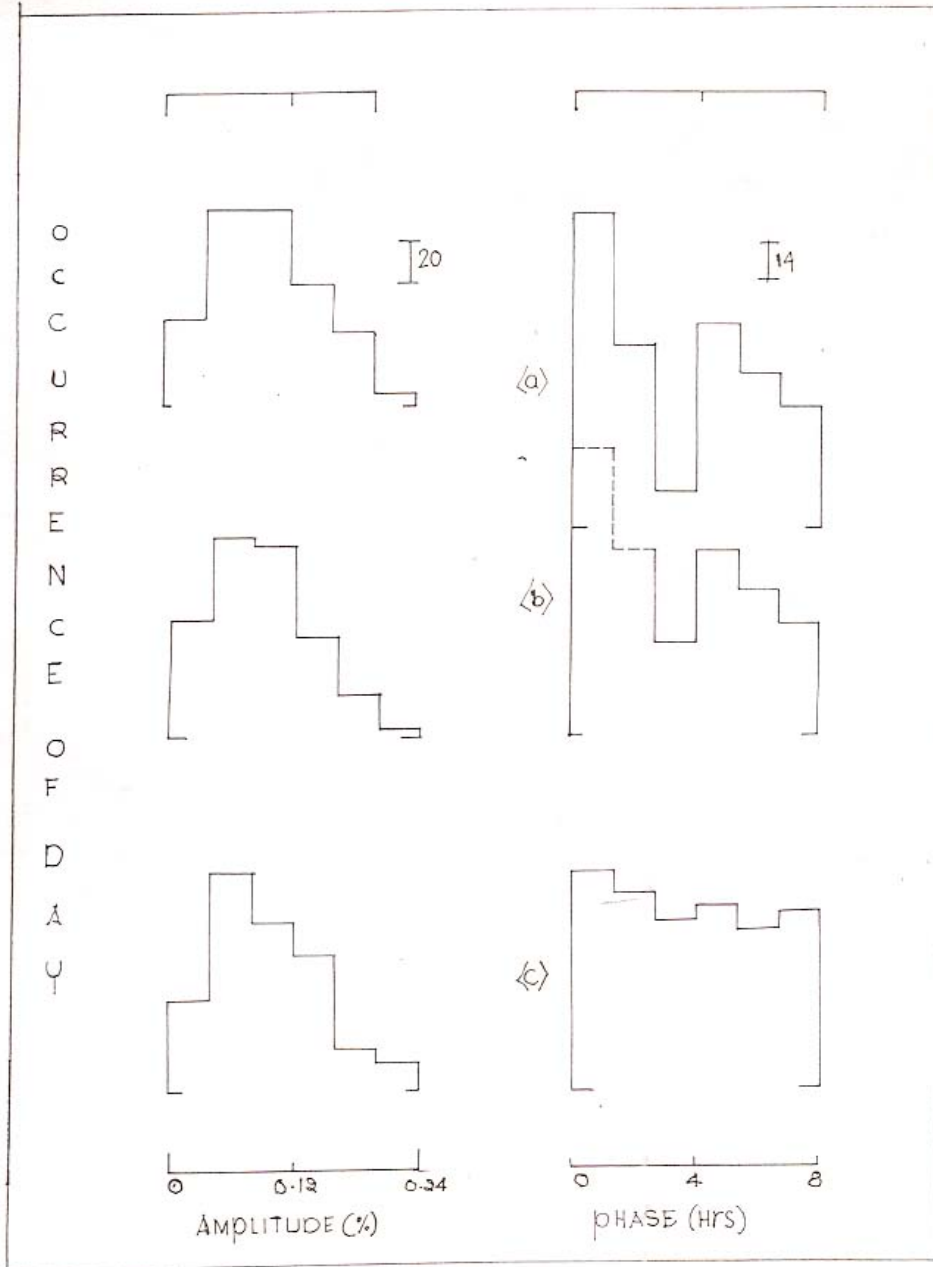


Fig.1 The Histogrammic Plots of (a) 60 quietest days (b) 120 quiet days and (c) All days for the Amplitude(%) and phase (Hrs.) of third harmonics of CR intensity at Deep River Neutron Monitoring Station during the year 1992.

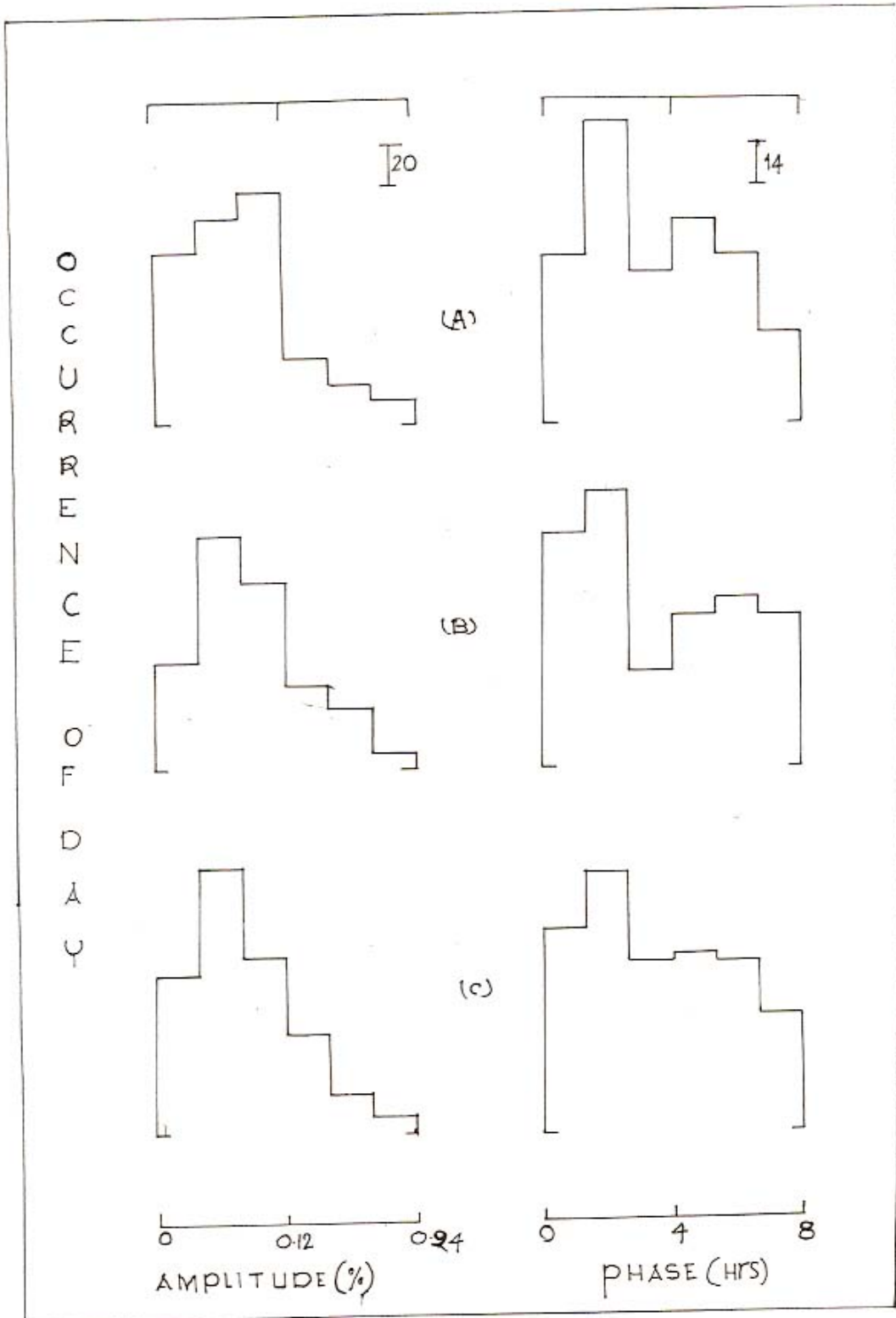


Fig.2 The Histogrammic Plots of (A) 60 quietest days (B) 120 quiet days and (C) All days for the Amplitude(%) and phase (Hrs.) of third harmonics of CR intensity at Deep River Neutron Monitoring Station during the year 1994.