



STUDY OF INTERPRETATION OF SEMI-DIURNAL ANISOTROPY OF THE COSMIC RAY

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Abstract

The amplitude of the semi-diurnal anisotropy of LAE remains statistically constant for majority of the events, where as the phase has significantly shifted to later hours. However for HAE the amplitude of the semi-diurnal anisotropy has no significant trend, where as the phase has significantly shifts toward later hours for majority of the events.

Introduction

The semi-diurnal anisotropy of CR radiation gives important information about the conditions of the magnetic field in interplanetary space. Studies of the solar semi-diurnal variation have been made by many coworkers¹⁻⁵ to obtain information about solar modulation in various conditions of heliosphere.

Sabbah et al.⁶ find the semi-diurnal variation to be more prominent at equatorial locations. The energy dependence of the semi-diurnal components is a power law with a positive exponent.⁷ On a statistical scale the semi-diurnal anisotropy on a day to day basis is aligned perpendicular to the IMF direction thus showing anomalous behavior during 1992-1996. Belolapnikov et al. using 511 stations data from 70 neutron monitors during the period 1964-94 and assuming the exponential type of the rigidity dependence gave the best fit parameters for semi-diurnal anisotropy and suggested that the amplitude of anisotropy has the value of 0.28% at 100 GeV with a +ve exponent.

Experimental and Analysis Data

Using the long term plots of the cosmic ray intensity data as well as the amplitude observed from the cosmic rays pressure corrected hourly neutron monitor data using harmonic analysis the high amplitude wave train events (HAE) and low amplitude wave train events (LAE) have been selected on the basis of the following criteria.

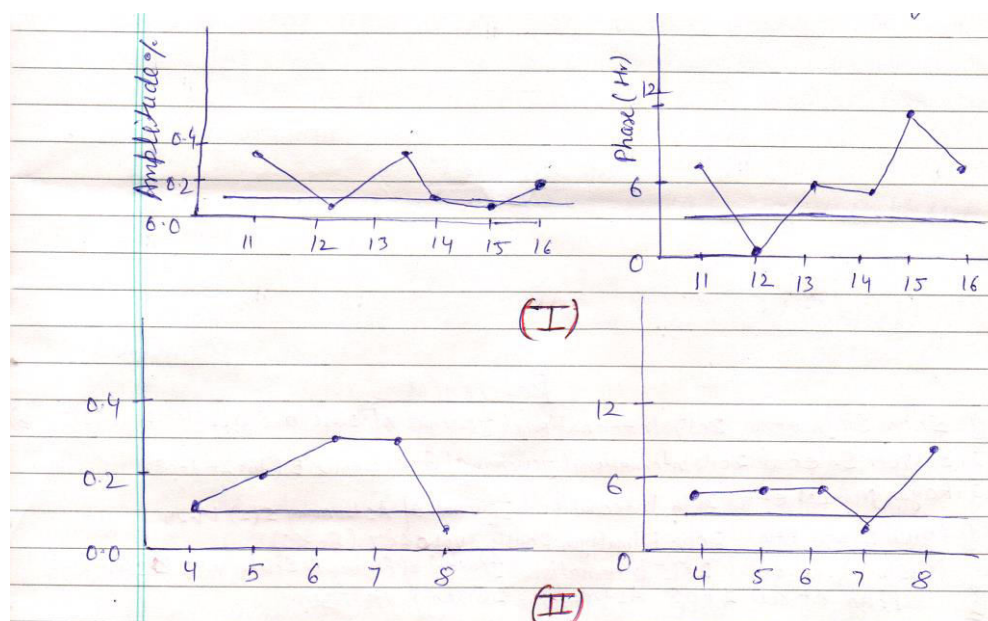
- (1) High amplitude wave train events of continuous days have been selected when the amplitude of diurnal anisotropy remains higher than 0.4% on each day of the event for at least 5 or more day.
- (2) Low amplitude wave train events of continuous days have been selected when the amplitude of diurnal anisotropy remains lower than 0.3% on each day of the events for at least five or more days.

- (3) In the selection of both types of events, special case has been taken i.e. if there occurred and pre-Forbush decrease or post-Forbush decrease before or after the events or the event is in recovery phase or declining phase are not considered.

Results and Discussion:

The amplitude and phase of the semi-diurnal anisotropy for the LAE of Sep. 11-16, 2005 of cosmic ray intensity are plotted in Fig. (I). The amplitude of the semi-diurnal anisotropy remain statically the same, where as the phase shifts towards later hours except for one day. The amplitude and phase of the semi-diurnal anisotropy of the LAE of Sep. 17-22, 2005 of cosmic ray intensity are plotted in Fig. (II). The amplitude of the semi-diurnal anisotropy remain statically the same where as the phase shifts towards later hours except for one day.

The amplitude and phase of the semi-diurnal anisotropy of cosmic ray intensity of the (HAE) for the period. The amplitude of the semi-diurnal anisotropy has no significant trend whereas the phase shifts toward later hour throughout the period of events (Oct. 2-7, 2006).



References

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