

Study of higher harmonics of unusually high and low amplitude events in CR intensity

M. L. Chauhan, S. K. Shrivastava, and R. Sullerey

Department of Physics, Government Model Science college, Jabalpur, (M.P.), India

ABSTRACT. High and Low Amplitude wave train events (HAE and LAE) for the period 1981-97 have been selected for which the diurnal amplitude remains unusually High or Low for continuously six or more days. The distribution of amplitude and phase for the three harmonics of HAE and LAE and the frequency of occurrence of amplitude and phase for different events have been derived. It has been found that there is a positive correlation between the amplitude and phase of First three harmonics of HAE and LAE with diurnal phase mostly around 210o, where as both the second and third harmonic phase is found to occur mostly in the first quadrant.

3 RESULT AND DISCUSSION

An attempt has been made to determine the origin of HAE and LAE in terms of various solar features observed over the solar disc during the period the occurrence of these events. Fig.1 shows the number of days in percentage associated with H- α solar flares and /or Active Prominences–Disappearing

1 INTRODUCTION

The systematic and significant departure in the amplitude of the diurnal anisotropy from the average values are known to occur in association with strong geomagnetic activity. The distinguishing feature of these systematic departure are the unusually high or low amplitude and usually, though not always, a shift in the phase to earlier hours ⁽¹⁾. The existence of the consecutive days having abnormally high or low diurnal amplitude has been reported by many workers ^(2,3). The extraterrestrial nature of the first three harmonics of galactic cosmic radiation has been established by number of investigators. However, a clear understanding of the relation between the first three harmonics during high and low amplitude events was not established ⁽⁴⁾. We have selected number of High amplitude events (HAE) and low amplitude events (LAE) for the complete solar cycle 21.

2 DATA ANALYSIS

The pressure corrected cosmic ray intensity data of ground based neutron monitoring stations have been used to derive the amplitude and phase of the first three harmonics for each day of the event and were distributed according to their frequency of occurrence.

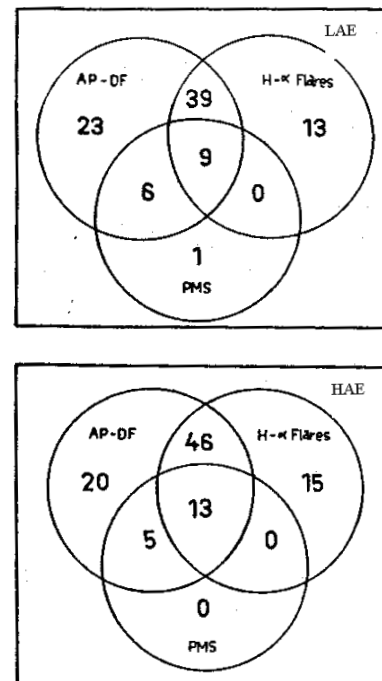


Fig. 1. Showing the number of days associated with AP-DF and/or H- α flares and/or PMS.

Filaments (AP-DF) and /or Principal Magnetic Storms (PMS). It has been found that majority of the days of HAE as well as LAE are ambiguously associated with H- α solar flares or active prominences–disappearing filaments, but the possibility of multiple sources or an interaction between

potential sources may contribute.

The amplitude and phase for all the three harmonics of HAE and LAE have been derived and the frequency of occurrence for both the amplitude and phase for different intervals were obtained. It has been observed that there is a positive correlation between the amplitude of first three harmonics of HAE with diurnal phase mostly around 210° , whereas the second and third harmonic phase is usually observed in the first quadrant.

Fig.2 shows the frequency distribution of the amplitude and phase of the daily variation of cosmic ray for LAE. The observed average amplitude and phase of all the three harmonics have been used to depict their frequency of occurrence.

In contrast, a very peculiar positive correlation between the amplitude of first three harmonics for LAE. However, a collimated occurrence of the diurnal phase in the direction of 210° with most of the diurnal amplitude lying between 0.1% and 0.2%. Similar to HAE, the phase of the second and third harmonics are found to occur mostly in the first quadrant.

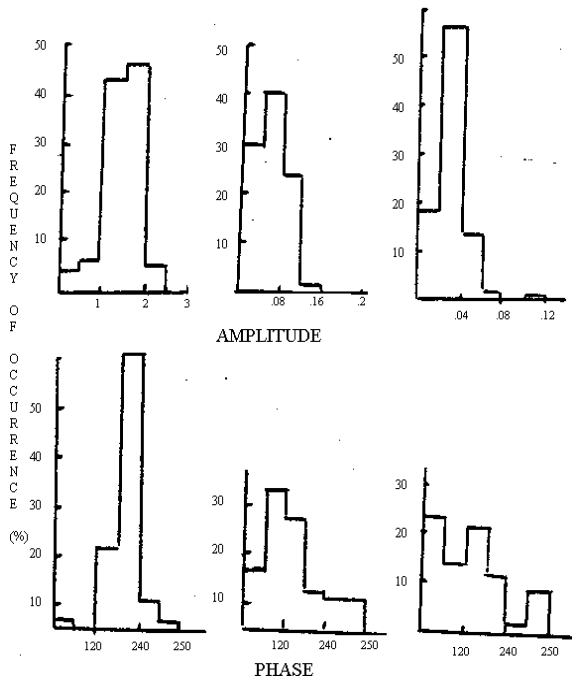


Fig. 2. Plots showing the histogram of amplitude and phase for first, second and third harmonic of daily variation.

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