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Comparative study of high-speed solar wind stream and effect of qubit and disturbed events on cosmic ray intensity with coronal mass ejection for the ascending phase of cycles 23 and 24

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Abstract
The present paper deals the comparative study of high-speed solar wind stream and effect of qubit and disturbed events on cosmic ray intensity with coronal mass ejection for the ascending phase of cycles 23 and 24. It involves the study of the relationship between various solar phenomena and geomagnetic activity. Also a variation of the intensity of the cosmic ray is a part of these studies. In this work we have studied the effect of cool and turbulent events and high-speed solar wind stream (HSSWS) events on cosmic ray intensity in association with corn mass ejection (CME) for the ascending phase of the solar cycle 23 and 24. Events are defined by the EAP index. Quiet events are those for which Ap <7 days is continuous for 5 days and disturbing events for which Ap ≥ 7 is for consecutive ≥ 5 days. The first day of these events is called the commencement day of that event. From the above definition of cool and turbulent events, the list of cool and turbulent events has been selected for the period 1996–2002 (the ascending phase of cycle 23) and the period 2008-2013 (ascending phase of solar cycle 24). In further interpretation, cycle 23 and cycle 24 refer to the respective ascending cycles.

Keywords: geo-effectiveness, solar observatory, solar phenomena, solar physics, solar radiance

1. Introduction

In the initial phase of studies in solar physics, solar radiance was considered a solar agent for changes in the intensity and geo-effectiveness of cosmic rays. After the recognition of the occurrence of coronal mass ejections in 1971, using the Seventh Orbiter Solar Observatory (OSO-7), we found that CME has an incidental link with solar activity. The CME is a massive explosion of solar corona with an extremely high speed. Many solar phenomena (CME, solar flare and so on), solar indices (sunspot number, solar flux solar wind velocity etc.) and a counter effect of these solar phenomena (magnetic clouds, geomagnetic storms, high speed motion wind flux) Event in form. Etc.) is studied. Geomagnetic disturbance index can be a good proxy for app interplenary situations. In fact, it has been demonstrated that the ape index is correlated with the average fluctuations in the amplitude of the interplanetary magnetic field, which in turn is related to the tectonic component of the convection – diffusion theory. As already known, the geomagnetic ape index is highly correlated with solar wind velocity. Therefore, lower AP values indicate significantly interplanetary medium as well as lower solar wind speeds.
Garrett *et al.*, 1974 [1], nevertheless, we believe that cosmic ray variability is a phenomenon of large spatial extent, while the ape index is a local effect limited to solar plasma variability near Earth's local interplanetary space. Tiwari *et al.*, 2005 [2]. The intensity of the cosmic ray and their effect on the geo-effectiveness are examined as scatter plots, as a correlation curve histogram etc., Mishra *et al.*, 2011 [3] reported CRI of various types of halo CME And correlated analysis between IMF reported. Synder *et al.* 1963 [4] studied the velocity of solar wind and its correlation with cosmic ray variations and solar geomagnetic activity. They found that various solar processes affecting the interplanetary medium modify CRI on short-term and long-term basis, along with changes in the geomagnetic field. Bieber Evanson (1997) [5] reported a close relationship between the occurrence of CME and the geomagnetic conditions of Earth disturbances. Solar wind currents with solar flare origin are found to be one of the factors responsible for the cosmic ray transient decrease in CRI. Srivastava and Shukla 1994 [6]; Srivastava 2008 [7] studied the relation of ICME with geomagnetic activity for the period 1996-2002 and found a + correlation between the speed of AP and ICME. Thus ICME produces geomagnetic activity by increasing the app and decreasing the Dst index. Various investigators based on solar wind speeds reported that the catastrophically generated HSSWS are related to significant increases in the level of geomagnetic activity Moon *et al.*, 2002 [8]. Srivastava *et al.*, 2011 [9] studied the effect of ICME between 1996–2007 and found that ICME is produced. Short-term transient decrease in CRI and increase in geomagnetic field variations. In this work we have included a new approach in this direction. We have studied the effect of HSSWS, cool and turbulent events with halo coronal mass ejections on cosmic rays for the period 1996–2002 covering the ascending phase of solar cycle 23 and 2008–2013 that descending to solar cycle 24 vovers the stage.

2. Data and Method of Analysis

In this work, CME observations are taken from LASCO / SOHO, EIT / SOHO and GEOS satellites. CMEs that have a span angle = 360° are considered to be full halo CMEs. Quiet and turbulent events are defined in the context of the app index. A value of AP index ≤6 for 5 consecutive days is called a quiet day. In this context, the first day is the beginning of a quiet event. Similarly, the value of the AP

index ≥ 7 being continuous for 5 days is called the disturbed day. In this context, the first day is the day of the beginning of the turbulent event.
We have extracted the 55th events for cycle 23 and 123 cool events for solar cycle 24 of which 14 events for cycle 23 and 31 events for cycle 24 are associated with CME. There are 113 disturbing events for cycle 23 and 43 events for cycle 24 of which 44 programs for cycle 23 and 15 events for cycle 24 are associated with CME. For HSSWS also 22 programs are received for both cycles 23 and 24. Out of which 3 programs for cycle 23 and 4 programs for cycle 24 are connected to CME.
Daily values of allu (0.78 cm) neutron monitor data have been taken for analysis. The present study was examined through superposed epoch analysis. Changes in the intensity of the cosmic ray are made at longer intervals (5 days before and 10 days after the event).

3. Result and Discussions

Various solar phenomena such as solar flare and solar wind were seen to separate the intensity of the cosmic ray Garde *et al.* 1983 [10]; Srivastava and Shukla 1994 [6]. After the recognition of CME in 1971, it is the main factor influencing the intensity of cosmic ray on a long-term basis in Srivastava 2007 [11].
Several researchers also studied the combined effect of CME with different categories of solar flares and solar flares. It was suggested that Jothe and Srivastava 2011 [12] stated that a strong solar flare alone is capable of producing FD. Cosmic ray modulation of the solar wind plasma stream with high velocity Mishra et al. tested as an important factor in. The effect of cool turbulent and HSSWS events on the intensity of cosmic rays has been observed in 1990.
To observe the average behavior of the intensity of cosmic rays during the period (23-2002) ascending cycle 23 and (2008–2013) the ascending phase of solar cycle 24 for calm disturbed and HSSWS events from -5 to +18 days. Chronic analysis has been done. Plotted in the figure as the percentage deviation of data from the owl neutron monitor station. Zero days correspond to the day of onset of the respective event. Fig. 1 shows the variation of CRI for the quiet event in association with cycles 23, 24 and CME. Fig. 2 shows such changes with the day of onset for the perturbation event for cycle 23, together with 24 and CME. Fig. 3 shows the variation of CRI for HSSWS events for cycles 23, 24 and inattentiveness with CME.

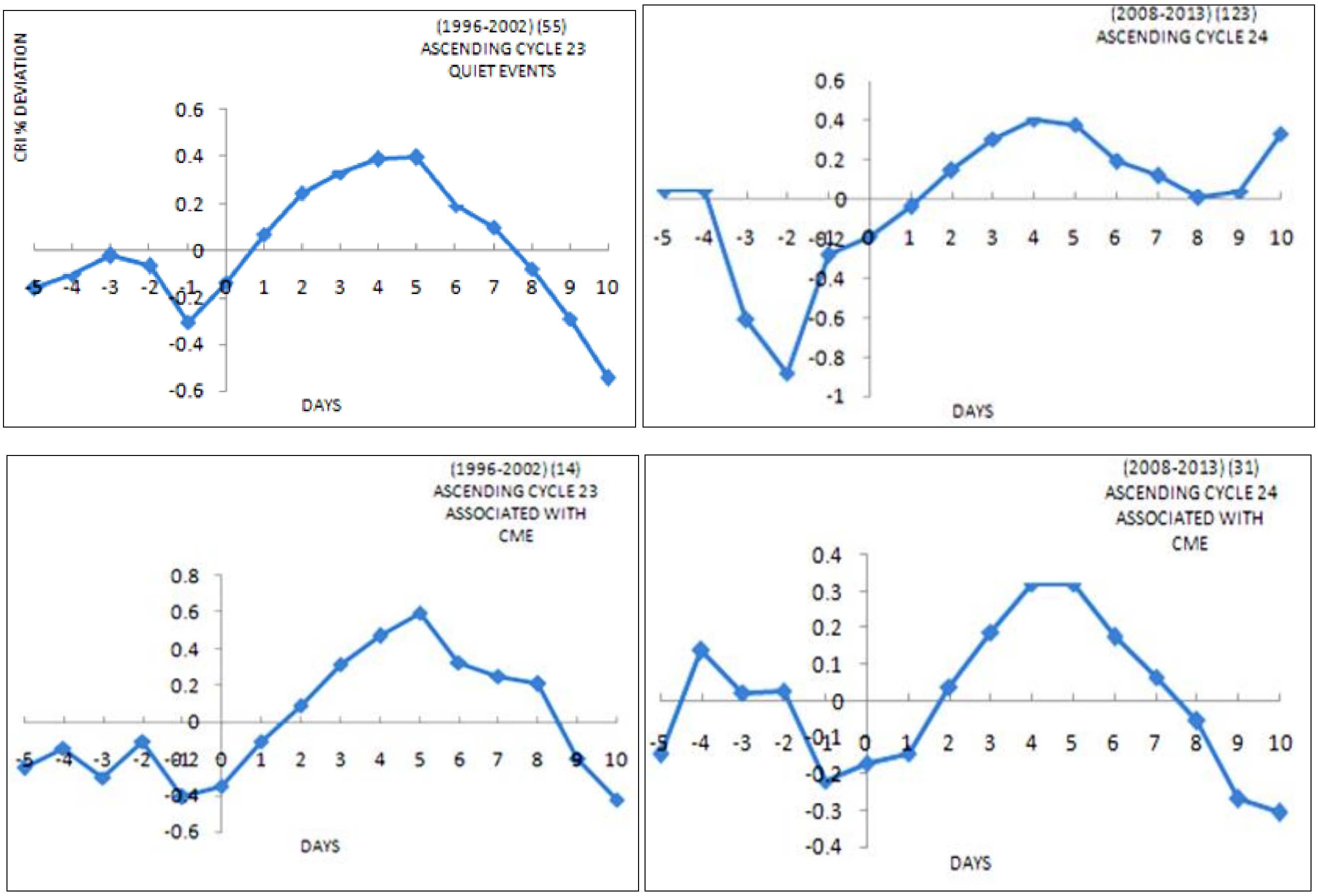

Fig 1: Shows chree analysis of CRI for quiet event for cycle 23, 24 and in association with CME. Zero epoch day corresponds to the onset day of repective event.

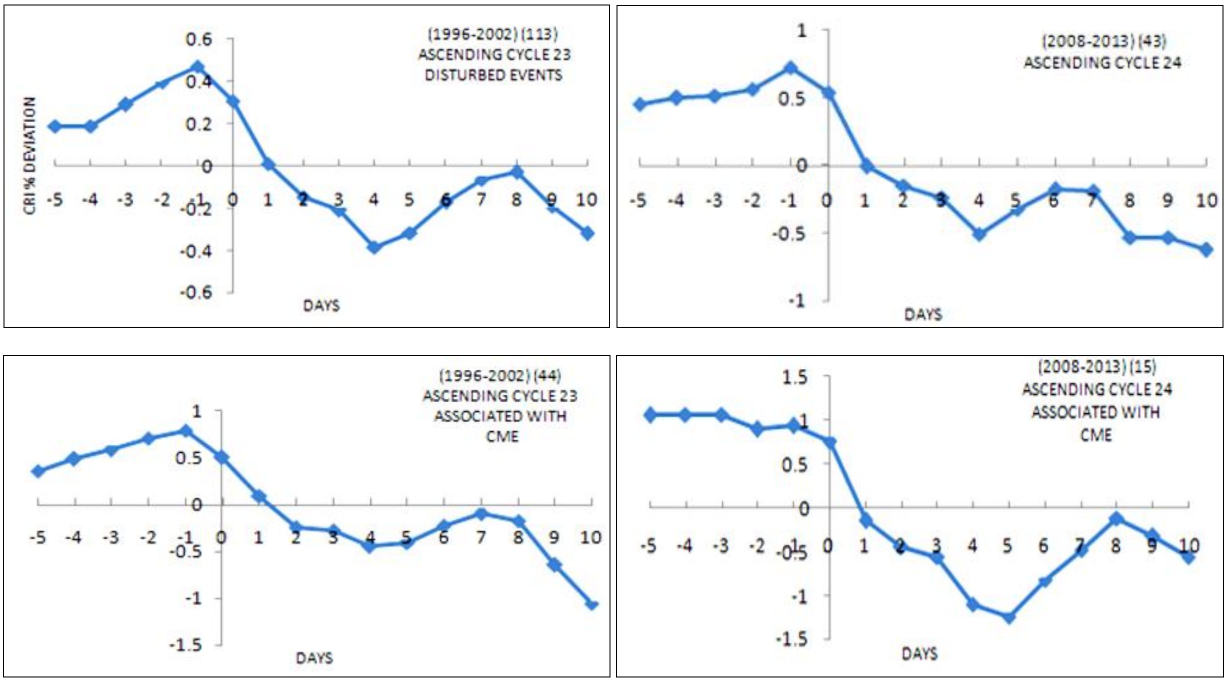

Fig 2: Shows chree analysis of CRI for disturbed event for cycle 23, 24 and in association with CME. Zero epoch day corresponds to the onset day of repective event.

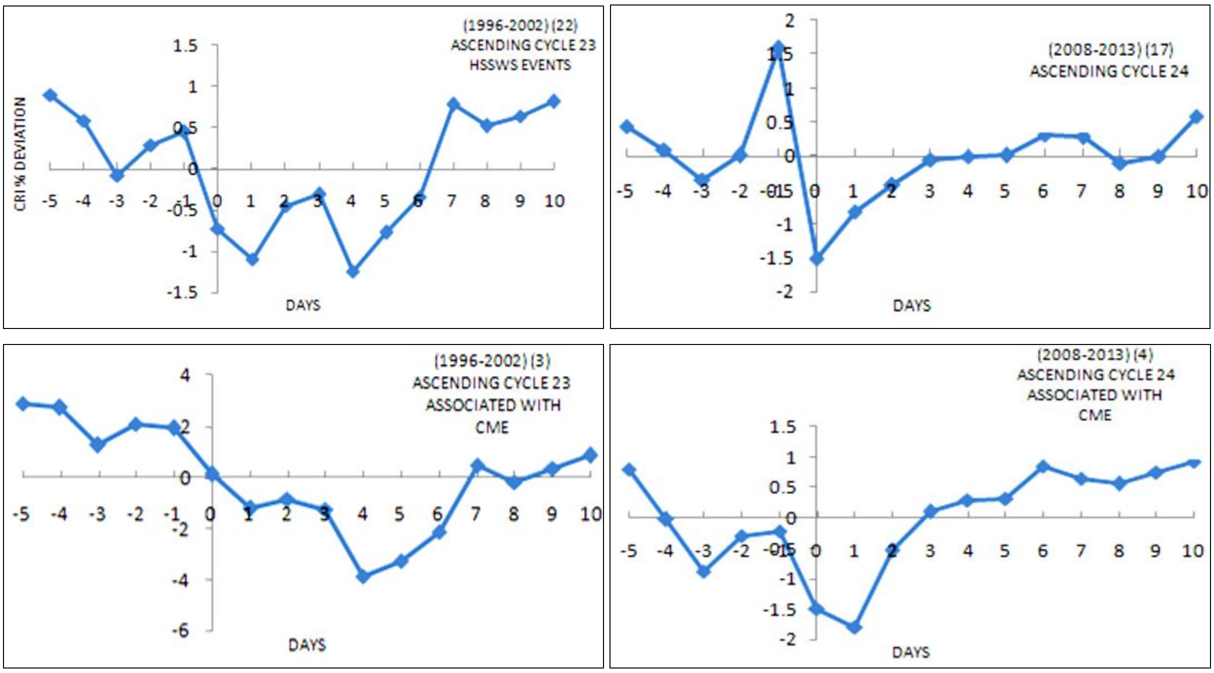

Fig 3: Shows chree analysis of CRI for HSSWS events for cycle 23, 24 and in association with CME. Zero epoch day corresponds to the onset day of repective event.

The result of our analysis suggests that HSSWS events combined with CME show a greater effect on CRI than quiet or turbulent events.

Quiet events are shown to have maximum depression for cycle 24 and minimum depression for cycle 24 in association with CME. Maximum depression is achieved 2 days before onset and minimum depression 1 day before onset. In each case for quiet events the minimum depression with CME is achieved 1 day before the day of onset.

Annoying events show maximum depression 5 days after onset with CME for cycle 24. In all other situations, maximum depression is achieved 4-5 days after onset.

The maximum depression for HSSWS events is attained since the beginning of day 4 for cycle 23 with CME at the beginning. We have obtained two depression points in each case except cycle 24. Peak depression called FD is obtained for cycle 24.

It is worth noting that the area of the graph with positive values for turbulent events has a negative value for quiet events i.e. quiet and turbulent events are reversible phenomena.

4. Conclusion

The association of CME shows maximum variation in the incidence of HSSWS while quiet events indicate minimal variation indicating that CME promotes HSSWS more effectively. Thus it is concluded that the solar wind velocity which is the deciding parameter for HSSWS is mainly associated with the CME .Geomagnetic Ap index used to define the cool and turbulent events that are associated with CME Is associated with the secondary level. Also among the quiet and turbulent events, the latter shows an effective variation in CRI. Therefore CME supports distressed conditions better than calm conditions.

5. Acknowledgement
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