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Geo effectiveness of halo CMEs and their association with cosmic ray intensity variations

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The Coronal Mass Ejections generally occur in large numbers during the period of high solar activity carry large amount of 1025 J and 1013 kg of plasma into interplanetary medium]. The fast CMEs coming from the Sun into interplanetary space are the solar coronal features that contain high magnetic field having the capability to produce interplanetary disturbances. CMEs travelling at different speeds tend to merge into what are known as complex ejecta, which are seen in interplanetary medium during times of high solar activity. In our studies, it is observed that halo CMEs produce large enhancement in geomagnetic activity particularly during the high solar activity periods. We studied the relationship between Coronal Mass Ejections and cosmic ray intensity variation for the period of 1996 to 2011, covering the solar cycle 23 and ascending phase of recent solar cycle 24. To carry out the study; we have taken the entire halo CMEs data of LASCO. The cosmic ray data used in this analysis are taken from Kiel neutron monitors. We observed a negative and high correlation between occurrence rates of low latitude CMEs with cosmic rays. $A > 0$ and $A < 0$ epochs of solar magnetic cycle also show negative and good correlation between occurrence rates of CMEs and cosmic rays. However, correlation is found higher for $A < 0$ epochs in comparison to $A > 0$ epochs. We have also done three analysis to derive the effect of Halo CMEs on cosmic ray intensity. Halo CMEs produce large transient decreases in cosmic ray intensity on short-term basis.

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