An Investigation of Geomagnetic Storms and Associated Cosmic Ray Intensity During Solar Cycle 23

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Shocks driven by energetic coronal mass ejections (CME's) and other interplanetary (IP) transients are mainly responsible for initiating large and intense geomagnetic storms. Observational results indicate that galactic cosmic rays (CR) coming from deep surface interact with these abnormal solar and IP conditions and suffer modulation effects. The current solar cycle has provided a long list of these highly energetic events influencing the Earth's geomagnetic field up to a great extent. We have selected such intense geo-effective CME's occurred during recent solar cycle and studied their possible influence on cosmic ray intensity as well as on Earth' s geomagnetic field using the hourly values of IMF data obtained from the NSSD Center. Solar wind data obtained from various satellites are used in the studies which are available during the selected events period. The super neutron monitor data obtained from Kiel, Oulu and Huancayo stations, well distributed over different latitudes has been used in the present study. It is found that AP and AE indices show rise before the forward turnings of IMF and both the Dst index and cosmic ray intensity show a classic decrease. The analysis further indicates the significant role of the magnitudes of Bz component of IMF substantiating the earlier results. It is further inferred that the magnitude of these responses depends on BZ component of IMF being well correlated with solar maximum and minimum periods. Transient decrease in cosmic ray intensity with slow recovery is observed during the storm phase duration.