Study of Super-Intense Geomagnetic Storms and Cosmic Ray Intensity Variation during Solar Cycle 23

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This work investigates the role played by solar and interplanetary parameters on highly perturbed geomagnetic conditions as well as the cosmic ray intensity variations during these highly intense geomagnetic activities. It has been reported that interplanetary transients are large scale structures containing plasma and magnetic field expelled from the active regions of solar atmosphere. These are the fast magnetized plasmoids moving away from the Sun in to interplanetary space. As they come to interplanetary medium the interplanetary magnetic field drape around them. This field line draping was thought as possible cause of the characteristic eastward deflection and giving rise to geomagnetic activities. 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. In this paper a systematic study has been performed to analyze the variation of geomagnetic field and Cosmic ray intensity with main emphasis on their solar and interplanetary drivers. We have selected the events occurred during solar cycle 23, Selecting the intense geomagnetic storms with D_{st} index $\geq$ -300 nT. The neutron monitor data of three stations Oulu (Rc = 0.77 GV), Climax (Rc = 2.97 GV) and Huancayo (Rc = 13.01 GV) well distributed over different latitudes and hourly values of IMF parameters derived from satellite observations near Earth IP medium from OMNI Data base provided by NSSDC is used. It is found that A_P and A_E indices show rise before the forward turnings of IMF, while the D_{st} index shows a classic storm time decrease. The analysis indicates that the magnitude of all the responses depends on B_Z component of IMF being well correlated with solar maximum and minimum periods. Transient decrease in CR I with slow recovery is observed during the storm phase duration.