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Space Weather: Preparing for The Next Solar Maximum (PSW1)

SOME RESULTS OF GEOMAGNETIC STORM EVENTS OBSERVED AT THE BRAZILIAN SOUTHERN SPACE OBSERVATORY

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Space weather can be defined as the study of solar and interplanetary sources of geomagnetic storms. Coronal mass ejections (CMEs) are large plasma eruptions released from the Sun and they are one of the main solar-interplanetary structures causing the geomagnetic disturbances on Earth. Such events, also named (geomagnetic storms) are caused when there are changes in the plasma and magnetic field in the space that surrounds the Earth's magnetosphere. CME passages are known to be an important origin of such changes. The damage caused by geomagnetic storms are several, including loss of data from satellite, signal scintillation, interference on radar, telecommunications cable disruption, electricity grid disturbance and black-out electrical power. They are also responsible for the appearance of auroras. It is known that quantity of cosmic rays observed in each direction on Earth's surface is approximately unchanged on the

time when there are no transient solar-interplanetary events. During disturbed periods, CME may shield cosmic rays, allowing terrestrial detectors to identify some signatures on the same period. Sometimes, these signatures can be identified prior to the occurence of the disturbance using a cosmic ray network around the Earth. With this purpose, a prototype detector of high-energy cosmic rays > 50 GeV, muons, was installed in the Brazilian Southern Space Observatory - SSO/CRS/CIE/INPE – MCT in 2001. It was composed of 2 layers of 4 detectors (2x2x2) with temporal resolution of one hour. The detector was upgraded in 2005 to 56 detectors (2x4x7) and temporal resolution of one minute. The expansion enabled a decrease of error from 0.16% to 0.06% in the counting of muons. The purpose of this paper is to discuss the expansion and to present results of the study of some geomagnetic storm events combining geomagnetic Dst index data, muon count rate data and data from the ACE satellite.