SOLAR PARTICLE EVENT ANALYSIS USING THE STANDARD RADIATION ENVIRONMENT MONITORS: APPLYING THE NEUTRON MONITOR'S EXPERIENCE

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Space weather is an environmental concept that refers to the dynamic conditions in the space contiguous to Earth, but also at interplanetary and interstellar space scale. A wide variety of physical phenomena influences space weather. This includes solar events as coronal mass ejections (CMEs) and solar flares (SFs), populations of galactic (GCRs) and solar (SCRs) cosmic rays, geomagnetic storms, ionospheric disturbances and geomagnetically induced currents at Earth's surface. The Standard Radiation Environment Monitor (SREM) is a particle detector developed by ESA for satellite applications with the main purpose to provide radiation hazard alarms to the host spacecraft. Currently, SREM units are in operation onboard of PROBA-I, INTEGRAL, ROSETTA, GIOVE-B, HERSCHEL and PLANCK satellites. SREM units have been constructed within a radiation hardening concept and therefore are able to register extreme solar particle events (SPEs). Large SPEs are registered at Earth, by ground based detectors as neutron monitors (NMs), in the form of Ground Level Enhancements (GLEs). Over the past few years the cosmic ray community succeeded in formulating an accurate GLE Alert, which operates in real-time mode. In this work, a projection of the SREM registered SPEs to the ground based GLEs was attempted. This led to the validation of the satellite measurements, as all of the investigated events were registered both is space and on Earth. Furthermore, a feasibility study of a radiation alarm deduced by SREM measurements was implemented for the event of January 20, 2005 (GLE69). This event was chosen as a case study due to the fact that at the time of the SPE two satellites carrying SREM units, namely: INTEGRAL and ROSETTA, were at almost 1 AU distance and had minor angular distribution ($<6^o$) with respect to the Sun-Earth line. Taking advantage of the NM experience, the steps of the GLE Alert algorithm were put into practice on SREM measurements. The outcome was that SREM units did register the outgoing SPE on-time and that these could serve as indicators of radiation hazards, leading to succesful alarms.