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Prediction and measurements of space weather conditions and impacts on space missions (3)

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REM-RED SOUNDING ROCKET EXPERIMENT TO MEASURE THE COSMIC RADIATION

Abstract

The cosmic radiation field is not well known up to the altitude of the lower orbiting spacecrafts. Since the frequency of manned space flights is increasing faster nowadays than before the importance of cosmic radiation and dosimetric measurements with advanced instruments and techniques is increasing. We have performed several cosmic radiation measurements up to the typical altitudes of the stratospheric balloons (CoCoRAD and TECHDOSE BEXUS missions). However the radiation field should be studied at higher altitudes too for a detailed understanding of the cosmic radiation. There are several ways to measure the cosmic radiation, however not easy to apply them to a sounding rocket. The easiest way is to use Geiger-Müller (GM) counters to quantify the radiation level and estimate its direction dependence. The REM-RED (GM Sounding Rocket Experiment to Measure the Cosmic Radiation and Estimate its Dose Contribution) experiment is planned to perform measurements with active radiation instruments (GM counters) in order to quantify the cosmic radiation field from the Earth's surface up to the maximum altitude of the REXUS rocket (around 100 km). A typical REXUS vehicle consists of a one-stage rocket,

an Improved Orion motor, and the payload. This rocket gives approximately three minutes of spaceflight with a payload mass of up to 95 kg, including the service and recovery systems. The present paper addresses the technical implementation of the REM-RED cosmic radiation sounding rocket experiment in order to fulfil the hard requirements of a REXUS sounding rocket launch and to develop a high reliable, mass-weight cosmic radiation measurement platform for future sounding rocket experiments.