41st STUDENT CONFERENCE (E2)
Student Team Competition (3)

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EFFICIENT SPACE WEATHER PROFILING USING A MICROSATELLITE

Abstract

Space Weather profiling is modelling the concept of changing environmental conditions in near-Earth space. Solar Activity, Inconsistent variations in radiation level, total electron count, water vapour profiles are some of the parameters measured using the on board devices. The module consists of a Geiger Muller Tube/counter, a Radiometric IR camera and GPS Receiver. The Geiger Muller Tube takes radiation readings when there is ionizing radiation incident on its mica window. The radiation reading is in the form of dose rates. The second device i.e. the Radiometric IR Camera takes a thermal image of the temperature fluctuations because of this ionizing radiation. The data from these two devices are then plotted onto the same map to give 3D Predictive Model of radiation which can then be extrapolated depending on our purpose. The GPS receiver takes in the signal from the GPS satellite which passes through the atmospheric limb path and it's bending takes place due to the various factors like change in pressure, temperature, water vapour, TEC. The angle of bend can be measured to obtain the profile of these factors causing the bend by using Abel transforms and other mathematical models. The data collected from the first two devices when used to generate a predictive 3D time and position variant model, can be used for subsequent prediction of radiation at any point in the atmosphere for given time-frame. Since, additionally the model gives us insight into other phenomena linked to these elements of space-weather. The third device, on-board i.e. the GPS receiver enables us to plot different profile on scintillations, total electron count, and other space-weather parameters.The data on space weather profiling that we get from this module can be used to predict future fluctuations and variations in Earth's atmospheric systems which arise due to the space weather elements. Additionally the data can give us valuable insight into newly discovered phenomena (TGFs etc), and thus aid human understanding of the same.