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NANOSATELLITE PROPOSAL FOR MONITORING THE SOUTH ATLANTIC MAGNETIC
ANOMALY (SAMA) AND PLASMASPHERIC HISS OVER THE INTERTROPICAL ZONE OF SOUTH
AMERICA IN INTERPLANETARY SHOCKS

Abstract

In satellite missions, there are several space weather phenomena that help or harm their life cycle. One of them is the Plasmaspheric Hiss (PH), which benefits satellite orbiting in Radiation Belts by cleaning energetic particles. Otherwise, the South Atlantic Magnetic Anomaly (SAMA) damages the missions that pass through its region; due to the agglomeration of high-energy particles, which decreases the useful life of electronic components. Both phenomena evolve mainly with respect to solar activity, the geomagnetic storm being the most critical. For it causes the disappearance of the hiss and the increased ion flux in the SAMA region. The main objective of this proposal is to monitor the disappearance of the Plasmaspheric Hiss and the increase of electrons in the SAMA region due to interplanetary collisions caused by a geomagnetic storm using two CubeSats: CHASQUI A and B. The first 3U CubeSat to study the PH phenomena, CHASQUI-A, has a highly elliptical orbit (perigee altitude ~ 560 km, apogee altitude ~ 25480 km, inclination $\sim 10.1^\circ$, period ~ 9.68 h). It has an external mechanical structure (boom), which is a Hybrid Magnetometer (HMAG), that works simultaneously as a search coil and fluxgate. The main characteristic of HMAG is its bandwidth, 100 to 2kHz, which allows us to obtain the 3 geomagnetic field components to determine the Power Spectral Density (PSD) in a spectrogram. The second 1U CubeSat to study the SAMA region, CHASQUI-B, has a Repeating Ground Trace orbit (altitude ~ 560 km, inclination $\sim 98^\circ$, the longitude of first ascending node -50.5° , number of revs to repeat 107, period ~ 2.03 h). Its main instrument is a 3-axis Fluxgate Magnetometer (FMAG) XEN-1210 FGM, based on hall effect. FMAG measures the 3 geomagnetic fields with a resolution of 15 nT and field range of ± 63 mT. The measurement result is a map of the Total Intensity of the Geomagnetic Field at an altitude of 560 km over South America.