



Science Results from Colorado Student Space Weather Experiment (CSSWE): Energetic Particle Distribution in Near Earth Environment

Xinlin Li

LASP/U. of Colorado, Aerospace Engineering Science, Boulder, United States (lix@lasp.colorado.edu)

The Colorado Student Space Weather Experiment (CSSWE) is a 3-unit (10cm x 10cm x 30cm) CubeSat mission funded by the National Science Foundation, launched into a low-Earth, polar orbit on 13 September 2012 as a secondary payload under NASA's Educational Launch of Nanosatellites (ELaNa) program. The science objectives of CSSWE are to investigate the relationship of the location, magnitude, and frequency of solar flares to the timing, duration, and energy spectrum of solar energetic particles reaching Earth, and to determine the precipitation loss and the evolution of the energy spectrum of trapped radiation belt electrons. CSSWE contains a single science payload, the Relativistic Electron and Proton Telescope integrated little experiment (REPTile), which is a miniaturization of the Relativistic Electron and Proton Telescope (REPT) built at the Laboratory for Atmospheric and Space Physics for NASA/Van Allen Probes mission, which consists of two identical spacecraft, launched 30 August 2012, that traverse the heart of the radiation belts in a low inclination orbit. CSSWE's REPTile is designed to measure the directional differential flux of protons ranging from 10 to 40 MeV and electrons from 0.5 to >3.3 MeV. The commissioning phase was completed and REPTile was activated on 4 October 2012. The data are very clean, far exceeding expectations! A number of engineering challenges had to be overcome to achieve such clean measurements under the mass and power limits of a CubeSat. The CSSWE is also an ideal class project, providing training for the next generation of engineers and scientists over the full life-cycle of a satellite project.