One Year of On-Orbit Performance of the Colorado Student Space Weather Experiment (CSSWE)

Scott E. Palo[(1)], David Gerhardt[(1)], Xinlin Li[(1,2)], Lauren Blum[(1,2)], Quintin Schiller[(1,2)], and Rick Kohnert[(2)]
(1) Department of Aerospace Engineering Sciences, University of Colorado, Boulder CO, 80309
(2) Laboratory for Atmospheric and Space Physics, University of Colorado, Boulder CO, 80309

The Colorado Student Space Weather Experiment is a 3-unit (10cm x 10cm x 30cm) CubeSat funded by the National Science Foundation and constructed at the University of Colorado (CU). The CSSWE science instrument, the Relativistic Electron and Proton Telescope integrated little experiment (REPTile), provides directional differential flux measurements of 0.5 to >3.3 MeV electrons and 9 to 40 MeV protons. Though a collaboration of 60+ multidisciplinary graduate and undergraduate students working with CU professors and engineers at the Laboratory for Atmospheric and Space Physics (LASP), CSSWE was designed, built, tested, and delivered in 3 years. On September 13, 2012, CSSWE was inserted to a 477 x 780 km, 65° orbit as a secondary payload on an Atlas V through the NASA Educational Launch of Nanosatellites (ELaNa) program.

The first successful contact with CSSWE was made within a few hours of launch. CSSWE then completed a 20 day system commissioning phase which validated the performance of the communications, power, and attitude control systems. This was immediately followed by an accelerated 24 hour REPTile commissioning period in time for a geomagnetic storm. The high quality, low noise science data return from REPTile is complementary to the NASA Van Allen Probes mission, which launched two weeks prior to CSSWE. On September 13, 2013, CSSWE completed one year of on-orbit operations.

In this talk we will discuss the issues encountered with designing and operating a cubesat in orbit. Data from the mission will be presented and discussed in the larger context of ionospheric and magnetospheric physics.