DETAILED CHARACTERISTICS OF RADIATION BELT ELECTRONS REVEALED BY CSSWE/REPTILE MEASUREMENTS

Kun Zhang*[1,2], Xinlin Li [1,2], Quintin Schiller[3], David Gerhardt[2], Hong Zhao[1] and Robyn Millan[4]

(1) LASP, University of Colorado at Boulder, Boulder, CO, USA

(2) Department of Aerospace Engineering Sciences, University of Colorado at Boulder, Boulder, CO, USA

(3) Heliophysics Laboratory, NASA Goddard Space Flight Center, Greenbelt, MD, USA

(4) Department of Physics and Astronomy, Dartmouth College, Hanover, NH, USA

The outer radiation belt electrons are highly dynamic. We study the detailed characteristics of the relativistic electrons in the outer belt using measurements from the Colorado Student Space Weather Experiment (CSSWE) mission, a Low Earth Orbit (LEO) Cubesat, which transverses the radiation belt four times in one orbit (~1.5 hr) and has the advantage in measuring the dynamic activities of the electrons including their rapid precipitations. The Relativistic Electron and Proton Telescope integrated little experiment (REPTile) is the sole science instrument onboard and it provides electron and proton flux measurement with a time resolution of 6 sec. Here we focus on the measured electron response to the geomagnetic activities for different energies and show that there are abundant sub-MeV electrons in the inner belt and slot region which are further enhanced during active times while there are lack of >1.63 MeV electrons in these regions. We also show that the variation of the measured electron flux with the longitude at LEO is strongly dependent on the local magnetic field strength, which is far from a dipole approximation. In addition, a specific precipitation band, which happened on 19 Jan 2013, is investigated based on the conjunctive measurement of CSSWE and the Balloon Array for Radiation belt Relativistic Electron Losses (BARREL). The spatial and temporal extents of this precipitation band event are estimated and hence the net loss of the 0.58~1.63 MeV electrons (L=3.5~6) is estimated to account for 6.84% of the total electron content, which means that about 15 such precipitation bands could deplete the entire outer belt.