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BALLOONSAT AS A PLATFORM FOR DEPLOYING THE NEUTRON COUNTER

Abstract

BalloonSat is an adaptable platform to host sensors for both experiments and testing. The BalloonSat program is a NASA Space Grant funded ballooning opportunity for students. The platform is adaptable to lift up to 5 kg payloads to more than 30 km and a flight time of 2 to 4 hours. At the University of Alabama in Huntsville, the BalloonSat platform is used for outreach, research, demonstrations, and to test subcomponents of the CubeSat satellite, currently under development. At UAH, one BalloonSat payload is hosting the neutron counter instrument. Research is underway in determining the effects of cosmic rays in the atmosphere, especially focusing on neutron radiation. An instrument which measures low energy neutrons can be deployed to measure the intensity of the radiation. Though cosmic rays are more intense at higher altitude, this low energy neutron radiation should be most intense from 15 km to 20km in altitude, as neutron energy is moderated by water vapor in the atmosphere. The BalloonSat is a platform which can sustain this 15 km to 20 km for the duration of an experiment. The BalloonSat may have an advantage over other testing platforms, considering the platform hardware is low mass. High energy neutrons can be emitted from nearly any hardware absorbing cosmic rays. With a lower hardware mass, there will be less local interaction with cosmic rays, and the counter will register neutrons from the environment. The measurements from the BalloonSat experiment will be compared to those made by the Deep Space Test Bed, a 2000kg balloon flown by NASA. Research using the BalloonSat demonstrates the effectiveness of the platform as a versatile and low cost test platform for atmospheric and high altitude research and testing. I will introduce the scientific concept of the research and present the development of the BalloonSat as a platform hosting the neutron counter. I will show testing of the custom BalloonSat hardware, introduce the calibration results, and present the measurements of flights into the target environment. I will present the effectiveness of the platform to complete the research objective.