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WEISS-SAT1:A STUDENT DEVELOPED MICROLAB FOR SPACE BASED RESEARCH

Abstract

Abstract The Weiss CubeSat Development Team (WCDT) was established in August 2015 with nine students ages 10-12 years old. The mission of the WCDT – with the tagline "Let's Go Space"- is very simple: to design, build, test, and fly a CubeSat into space, and to do so within three years. WeissSat-1, the premier project of the Weiss CubeSat Development Team, is a 1.3kg 1U CubeSat, a platform based on the NearSpace Launch Inc. 1U FastBus Structure. WeissSat-1 will validate a novel lab-on-a-chip system and test the survivability of extremophile bacteria in orbit. It will collect and transmit sensor data, demonstrating a live/dead fluorescent dye staining approach. A unique microfluidics lab will be used to assess the viability of aerobic and anaerobic bacteria that have been thawed after being entrapped in water ice. Students will integrate a Micro Fluorescent Activated Cell Sorter (mfACS) developed by NYRAD, Inc. into the WeissSat-1 to analyze the ability of these bacteria to live in the space environment. If these extremophile bacteria can survive in space, it may have ramifications for the possibility that bacteria may have transferred between planetary bodies over the life of the solar system. The major mission for WeissSat-1 is to incrementally accomplish numerous intermediate scientific goals and to fly a Low Earth Orbit 1U CubeSat while maximizing student involvement and collaboration. After being selected by NASA's CubeSat Launch Initiative program, WeissSat-1 has been scheduled for launch into Low Earth Orbit in mid-2018.

This project demonstrates the benefit and the importance of engaging and involving students into space-based scientific research within the academic pipeline. Elementary and middle school students can offer new perspectives and can develop innovative solutions. This project also shows that even relatively young students can accomplish extraordinary feats if given the right environment, proper exposure, and guidance. Within three years students have built and tested ground, tethered, and high altitude balloonsat emulator payloads. They regularly call on the US Congress and exhibit and speak at professional aerospace meetings such as the American Institute of Aeronautics and Astronautics and the Missileers and Space Range Pioneers.

This paper will describe the technology and results of the WeissSat-1 CubeSat mission. This work will additionally present unique perspectives of the member's involvement of the middle school student team and will capture their feedback and recommendations to improve the CubeSat mission life cycle process for young students.