

IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
On Track - Undergraduate Space Education (3)

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THE DEBRISAT PROJECT - IMPACTING STUDENTS AND THE FUTURE OF SPACE
EXPLORATION

Abstract

This paper presents the impact the DebrisSat project has and continues to have on the students at the University of Florida through discovery, design and development, industrial collaboration, and experience.

The DebrisSat project is a collaborative effort between NASA, the Air Force Space and Missile Systems Center, The Aerospace Corporation, and the University of Florida. The project was conceived to provide NASA and the DoD with an updated dataset to improve existing satellite break-up models. In order to update the existing break-up model, a 50 kg class test article representative of satellites found in low Earth orbits was designed with the aid of subject matter experts. The test article, referred to as DebrisSat, was fabricated using modern components and materials, and subjected to a laboratory hypervelocity impact (HVI) test to emulate a catastrophic on-orbit collision. Following the laboratory HVI test, all components from within the HVI test chamber were collected and sent to the University of Florida where teams of students have developed unique systems, procedures, and data storage tools to extract, characterize, and catalogue individual fragments. The project is fully managed and operated by student teams in a tiered hierarchy to leverage experience levels.

Now entering year eight, the DebrisSat project have involved over 120 undergraduate students (and several graduate students) to collect over 227,000 fragments for characterization and categorization. Direct impacts of the project include student conducted projects and research encouraging integrative approaches and systematic approaches; technical writing and professional presentation through conference participation and publication; post-graduation opportunities for continued research, supporting personal motivation for continued education; and ultimately the knowledge that collected data will be an integral part for future space missions.

The magnitude of effort and continuous progress of the DebrisSat project is entirely dependent on student motivation, engagement, acquisition and application of fundamental knowledge, and a common goal. While individual characteristics of each fragment are key to the growing DebrisSat dataset, input of this valuable information is the responsibility of a series of student operators. From the careful extraction of the fragment to the verification of the inputted data, students are entrusted with the long-term outcome of the project.

In this paper, the DebrisSat project's impact on former and current students is described, how this impact is quantified, how the lessons learned enable program alterations for future students, and how the changes made to the DebrisSat process are developed for an ever-changing cycle of students.