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ACHIEVING PLANETARY SUSTAINABILITY THROUGH STUDENT-BUILT SATELLITE MISSIONS.

Abstract

Environmental sustainability is one of the key issues that mankind is currently facing here on Earth. However, as we look up to the stars, we realize that this issue is bigger than just our planet. Our efforts need to go far beyond addressing pollution here on Earth. Now, more than ever, we need to engage and focus on issues of planetary sustainability. As outlined in NASA's vision, our world needs more than just access to life supporting resources and renewable energy for economic growth. We need a multi-planetary society where people of Earth can access the resources of the solar system. However, we must achieve this without compromising the future generations. As humanity prepares to colonize the Moon or Mars, one thing we must take into consideration is the risk of contaminating these settlements with Earth-based plastics.

Over the last decades technological advances have progressed satellite capabilities beyond what was once imaginable. Nowadays, through NASA's educational programs such as CubeSat Launch Initiative, students are able to create research missions and develop solutions to real life problems. One such example are the students from the Wolfpack CubeSat Development Team who are currently working on a CubeSat mission to aid in NASA's sustainability initiative. Through a student-built satellite, they hope to find an innovative solution to the imminent problem of plastic pollution.

WolfSat-1 is a 1U CubeSat with an educational objective and a biological research mission to investigate the metabolism of Ideonella Sakaiensis in microgravity. This bacterium has the unique ability to digest polyethylene, a primary component of single-use plastics. This mission will examine survivability of the bacterium and whether the enzyme activity is affected by freefall in low Earth orbit. This investigation is vital to the future of space exploration. It will aid in understanding the responses of biological systems to spaceflight and contribute to the efforts of achieving planetary sustainability. Plastic pollution is one of the main environmental problems here on Earth, and it is of utmost importance that this be adequately managed in the space environment. WolfSat-1 aims to demonstrate a sustainable way to mitigate plastic waste the deep space environment and could provide insight into how to resolve this issue on Earth. If the Ideonella Sakaiensis can be shown to metabolize polyethylene in microgravity, then prolonged manned space missions have another means of recycling otherwise single use plastics.