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O/OREOS Sat: *Organism/Organic Exposure to Orbital Stresses*

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Abstract

The goal of the O/OREOS Sat project is to demonstrate the viability of low-cost spaceflight science experiments on miniaturized satellites (with a mass of ~ 5 kg), also called nanosatellites. The O/OREOS spacecraft will expose biological organisms and organic specimens directly to the space environment, utilizing *in-situ* detection technologies to investigate the stability of organic molecules in space and to monitor the survival, adaptation, and biological evolution of life.

Astrobiology: This experiment monitors the stability of chemical building blocks of life in our Solar System and beyond. Four types of organic molecules will be housed in four local "microenvironments" on the satellite, mimicking interplanetary space, lunar, martian, and other planetary conditions. Using its custom-designed *in-situ* spectro-meter, O/OREOS Sat will record daily changes in ultraviolet and visible light absorption spectra of these compounds, revealing the consequences of their exposure to space ionizing radiation and solar UV and visible light.

Space biology: This experiment characterizes the potential of life to survive and adapt beyond Earth. Four strains of dormant, dried microorganism will be rehydrated and grown three times over the 6-month course of the mission. By measuring absorption and color change O/OREOS Sat will determine quantitatively the effects of combined exposure to ionizing space radiation and microgravity and assess the survival, growth, and metabolism of biological organisms in space.

Launching in February 2010 from Kodiak Island, Alaska, O/OREOS Sat will conduct its experiments over a period of 6 months in 650-kilometers altitude above the surface of the Earth.

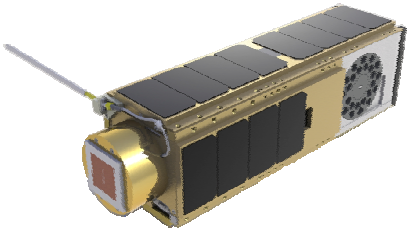

Figure 1. OREOS Sat

Upon completion of its mission, university students will operate O/OREOS Sat for educational purposes.

Following on the highly successful GeneSat and upcoming PharmaSat Missions, NASA Ames' Small Spacecraft Division is developing the first triple-cube satellite with two completely independent, interchangeable biological-and-chemical science payloads: O/OREOS Sat.

We report on how O/OREOS Sat will address evolutionary questions, human exploration challenges, and planetary protection issues while investigating the evolution of large (bio)molecules in a variety of astrobiologically relevant space environments.