

IAF SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
New Worlds - Non-Traditional Space Education and Outreach (7)

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ENABLING SPACE RESEARCH IN NON-TRADITIONAL GROUPS – THE CASE OF THE SPACE
BIOFILMS SPACEFLIGHT SAMPLES STUDIED AT UNIVERSIDAD DEL VALLE DE GUATEMALA
BY UNDERGRADUATE STUDENTS**Abstract**

Opportunities to launch experiments to the International Space Station (ISS) are highly competitive and limited compared to Earth-based research. Nevertheless, low-cost complementary studies may be performed with the spaceflight samples upon return and after the core analyses have been completed, by teams with little or no access to space assets. In addition to providing these groups with the opportunity to perform their own space sciences research, it increases the scientific output of the project via complementary studies at no cost to the funding agency, as these groups need to self-fund their investigations. This non-traditional paradigm was tested with the Space Biofilms project that included two experiments – one bacterial and the other fungal – performed on board the ISS. In these two cases, after the core (and funded) team completed their study's post-flight data acquisition, aliquots or a subset of samples were analyzed by an external team of undergraduate students. A call for proposals was opened to undergraduates at Universidad del Valle de Guatemala (UVG) for a chance at performing their thesis projects using Space Biofilm samples. Requirements for the projects included: *i*) research relevant to NASA, *ii*) use of techniques compatible with the samples, *iii*) budget of \$500 or less, and *iv*) feasibility (taking into account time, availability of equipment at UVG, and number of samples required). From this, one student has completed her thesis using bacterial samples cultured on ISS, and four other students are currently interrogating different aspects of fungal molds grown in space. We will present the overview of the Space Biofilms project as background, the process of training students on proposal writing, and of experiment design and performance. We will showcase the student-led projects and emphasize the way that they are maximizing sample usage by utilization of different sample subsets. A main lesson learned is the importance of having a faculty adviser at the student's university to directly supervise their activities, and having recurrent virtual meetings to ensure appropriate guidance. Providing undergraduate students with opportunities of hands-on spaceflight research can motivate them and provide early professional development training for their future careers, especially for students in developing countries, while enriching the body of knowledge of the effects of microgravity on living systems.

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