

Space4Life

Investigators

Name	Qualification	Institution
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Science Objectives

Protection from harmful cosmic and solar radiation is essential for any space mission outside Earth's magnetic field. TeamIndus and Team Space4Life propose together to use cyanobacteria, an extremophile, to examine its effectiveness as a radiation shield mechanism. Two radiation sensors are used to compare the radiation levels absorbed by the biomass and an aluminum shielding respectively for a comparative analysis. The success of this experiment will be a huge step in developing radiation protection techniques using biomass.

Specifications

Dimensions: 46 x 33 x 23 mm

Mass: 248 grams

Power: 1 W

Operating Voltage: 5 V

Operating Temperature: -40°C to +65°C

StorageTemperature: -40°C to +80°C

Data Interface: RS-485

Specimen: Chroococciopsis

Objective: Gamma radiation shielding

Mission Description

The main objective of the experiment is to do a comparative analysis of absorption of radiation by biomass and aluminium. The setup consists of chambers of biomass and aluminium exposed directly to radiation, with sensors behind to observe amount of radiation absorbed. Once the setup is sent into space, a model experiment will be

conducted on Earth under similar conditions with only radiation being the uncontrolled parameter. This will act as the control setup.

Once the conditions are suitable on the Moon, the cyanobacteria are activated with LED and heat to “awaken” them. The data collected by the sensors will be sent to the onboard computer and finally to the control room at TeamIndus facility for further analysis.

Mission Operations

The payload is located on the west above the Sorato Deck. Readings for the experiment will be taken once every hour for four hours on Day 3 (day of landing). The experiment will be done only on Day 3. It is unsuitable to carry out the experiment after Day 9. This is a passive experiment. The payload should be exposed to radiation from the Sun.

Heritage Experiments

Reference Mission	Reference Mission Specifics	Lab2Moon Payload Specifics
Cyanobacteria from Extreme Deserts to Space [D Billi et al, 2013]	Simulated conditions on Earth, to see observe effect of radiation on cyanobacteria	Performed on the Moon, under microgravity as well as low magnetic field, directly exposed to galactic cosmic rays, hence, more practical results.
NASA EXPOSE R2 Mission- BIOMEX	Experiments show Chroococcidiopsis is better than other living materials when exposed to radiation	For the first time, Chroococcidiopsis will be compared to metal shielding (non-living), thus determining the feasibility of using it as a shield.
ESA BIOPAN 6 Mission	Tested survivability of Cyanobacteria on the ISS, within Earth’s protective magnetic field	Tests survival, as well as shielding capacity outside Earth’s magnetic field, when exposed to galactic cosmic rays.

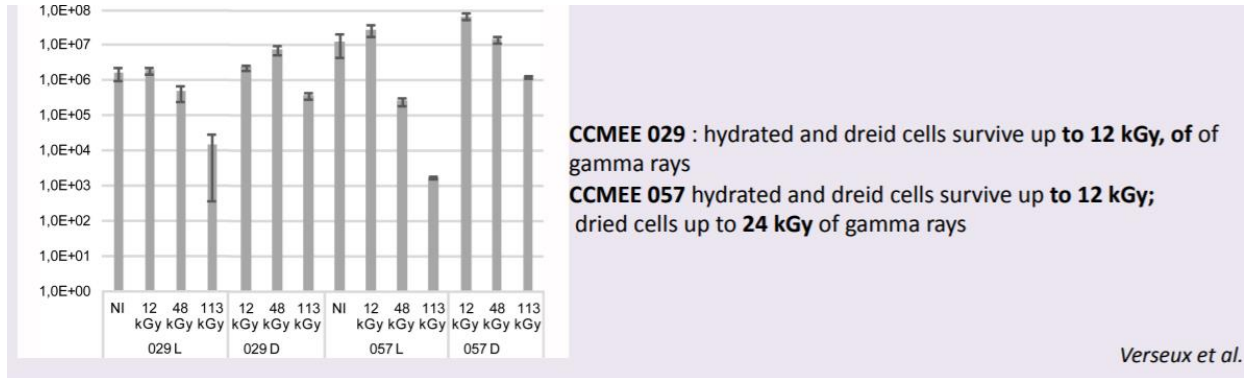


Figure 1: Figure 4: BIOS- Radiation comparative studies