

Space Studies of the Earth-Moon System, Planets, and Small Bodies of the Solar System (B)
Science Enabled by a Lunar Outpost (B3.2)
Consider for oral presentation.

BIOLEX – THE BIOLOGY AND LUNAR EXPERIMENT AND THE LOGOS CUBES

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BIOLEX is a concept designed for in situ science on the Moon or in its orbit. As heritage of the polar and space experiment BIOMEX (Biology and Mars Experiment) on the ISS it is a more developed concept. Measurement operations on an exposure platform as well as within a micro-greenhouse device are part of this concept. The goal is to investigate the use of lunar resources as well as to analyse the stability of biomolecules as potential biosignatures serving as reference for future space exploration missions to Mars and the icy ocean moons in the outer solar system. Astrobiological exploration of the solar system is a priority research area such as emphasized by the European Astrobiology Roadmap (AstRoMap). It is focusing on several research topics, such as "Habitability" and on "Biomarkers for the detection of life". Therefore, "space platforms and laboratories", such as the EXPOSE setup installed outside the ISS, are essential to gain more knowledge on space- and planetary environments, which might be an essential basis for improvement of the robotic and human interplanetary exploration (Moon, Mars, Encedalus, Titan and Europa). In reference to these exposure platforms a new generation of hardware is needed to be installed in the lunar orbit or directly on the Moon. The BIOLEX is representing by its LOGOS (Lunar Organisms, Geo-microbiology and Organics Space Experiment) cubes such a concept combining the life detection topics with topics relevant to autonomous life supporting systems. A combination of a sample exposure device and a micro-habitat for plants and microorganisms could address a tremendous number of questions from astrobiology and life sciences. The main scientific objectives for the use of BIOLEX-LOGOS cubes are: (i) in situ measurements by spectroscopy methods (such as Raman, IR, UV/VIS-spectroscopy) for analysis of biosignatures and their stability what is relevant for support of future life detection missions on Mars and the icy moons in the outer solar system); (ii) in situ measurements of environmental conditions (radiation, pressure/vacuum, temperature, pH, humidity) in micro-modules or compartments in reference to planned micro-habitat experiments placed on the Moon or incorporated on an exposure facility in orbit; (iii) in situ measurements of microorganisms' activity in micro-modules / compartments in reference to planned micro-habitat experiments placed on the moon or incorporated in the exposure facility in orbit. In reference to these scientific ideas the Moon is an excellent platform to operate different space experiments which will be of relevance for astrobiology, life sciences and human space missions. BIOLEX tries to fulfil a large number of scientific investigations in reference to these disciplines. The lunar environment is much harsher compared to Mars; and tests on biomolecules in this environment could provide information on their stability and therefore on the value to be used as reference for future space missions to Mars or the icy ocean moons in the outer solar system. Resources of the Moon such as the regolith or the freely available radiation on the surface could be tested by using them in a micro-greenhouse. Within this greenhouse different filters could test the optimal spectra range of the radiation.