Resistance to simulated extraterrestrial conditions (space and Mars) of the first colonizing lichens collected from a Mars analogue volcanic area (Lanzarote)

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Abstract

The main goal of the **BIOSIGN (Biosignatures and Habitable Niches 14-ILSRA_Prop-0019)** experiment is to support and prepare future planetary exploration missions to Mars, Enceladus, Europa and/or Titan by conducting exposure experiments on the ISS. To maximize the scientific output, the outcome of **BIOSIGN** will be connected to the results obtained on ground from recent and up-coming planetary analogue field studies and planetary simulation facilities. The principal objectives are related to: 1) analyses of the survival capacity of selected organisms and micro-fossils from planetary/Mars analogue field sites (in reference to design and results of the precursor experiments LIFE [1] and BIOMEX [2] in space; 2) analyses of a new set of biomolecules (other than previously tested in BIOMEX) on their stability as well as on their products and mechanisms of degradation; and 3) evaluation by the obtained results, of the habitability of present and past Mars. Data obtained by this experiment will allow an efficient characterization of real biosignatures [3] which could be detected on Mars or nearby the geysers and fountains next to the cracks of the icy moons in the solar system. Furthermore, these results will significantly enlarge our knowledge about niches on other planets, which might form habitats even under extreme extraterrestrial conditions or preserve bio-molecules by protecting them from harmful environmental conditions such

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as UV-radiation, ionizing radiation, low atmospheric pressure to vacuum, total desiccation and extreme temperature regimes. Additionally, the studies on the stability of biomolecules will help to answer the question of what are suitable and promising biomolecules to focus on in the search of life. Our contribution is based on the planned guidelines of BIOSIGN and is focussed on the research of environmental and habitability aspects. Here we will show the first results of the survival capacity we have obtained with organisms selected from potential analogue Mars sites, such as the lichens species *Stereocaulon vesubianum*, one of the first colonizers on Teide's volcano and at Lanzarote (Canary Islands) after exposure to space- and Mars simulated conditions at the planetary simulation chamber PASC of CAB-INTA [4].

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