IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Astrobiology and Exploration (6)

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CHARACTERIZATION OF GALDIERIA SULPHURARIA'S UNDER ATMOSPHERIC RADIATION EXPOSURE

Abstract

Space exploration has allowed us to go beyond the limits of our knowledge and to defy the unknown. For centuries the man has dreamt of leaving the Earth. The first step was taken in 1957 with Sputnik I and, later, in 1961 with Jurij Gagarin's first flight in orbit around our planet. Since then, more than 500 astronauts have travelled into space. Nevertheless, the fulfilment of more ambitious projects, as the expansion of human civilization beyond the Earth's boundaries, requires the overcome of various challenges, aiming to the protection of man from the numerous hostilities of space and other planets. In this context the ALTHAIR project is inserted (ch**A**racterization of *Ga**L**dieria sulphuraria*'s under a**T**mosp**H**eric r**A**diat**I**on exposu**R**e). The main purpose is to determine the ability of extremophile organisms to withstand space conditions and their ability to shield radiation. The first results of the project have been acquired both in the laboratory activities and biological, chemical and physical analysis of samples that have been sent to above 30 km in altitude using probe balloons with a glider for sample recovery. The current launches lasted 2 hours, with samples of microalgae placed in the form of pellets and in culture medium and equipped with sensors for gamma radiation, protons and alpha particles; however, other launches have already been planned to last between 8 hours and a few months, with higher altitudes reached. The results of the physical analyses were then compared to the current techniques used to protect humans against cosmic radiation, using g/cm^2 as a unit of comparison; this shows lesser shielding rate than aluminium (more precisely 40% of the latter). Biological laboratory analyses, on the other hand, aim to determine the effects of the radiation on photosynthetic activity, production of ROS, monitoring of growth and metabolic activity, characterisation of cellular damage. In addition, their use in the space sector can have numerous applications, such as production of O_2 from CO_2, food, biofuel, recovery of precious and rare metals from electronic wastes, possible strengthening of the shielding layer in current spacesuits. The contribution of extremophile organisms, to the path of science in the understanding of the universe, will allow to reach surprising levels of answer to numerous questions including, for example, the capacity of the development of life on other planets, while opening up new perspectives for its research.