Paper ID: 67709
student

25th IAA SYMPOSIUM ON HUMAN EXPLORATION OF THE SOLAR SYSTEM (A5)
Space Transportation Solutions for Deep Space Missions (4-D2.8)

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PROTECTION AGAINST RADIATION WITH THE USE OF FUNGI - MULTIPURPOSE USE OF MUSHROOMS

Abstract

One of our biggest obstacles with deep space missions is radiation. Solar radiation and galactic cosmic radiation can easily kill humans and that concern will also be relevant on an extraterrestrial base, but that issue can be resolved with using regolith to build shielding. Hydrogen, and hydrogen-rich materials, like water or polypropylene are excellent for protecting us against radiation but unfortunately that would be unfeasibly heavy to launch. Fungi seems to have been around for almost a billion year, these organisms were able to survive and evolve even when the radiation on Earth was higher than nowadays. There are researches on ionising radiation and how fungi cope with it, adapt with the help of melanin pigments and a recent study, by the Space Microbiology Research Group, indicates that Aspergillus niger spores are highly resistant against space radiation. A study found that microfungi started growing in Chernobyl 1 year after the nuclear catastrophe when the radiation level was still higher than normal. Paul Stamets is working with NASA on finding mushrooms that can turn regolith into fertile soil and mushrooms can provide protein for humans but if we could use it for protection against radiation, that would mean human exploration can go further away from Earth without the fear of developing cancer or any other lethal disease caused by charged particles, gamma and X-rays. At the International Space University MSS21's Space Medical Centre suggested the use of melanin to be used in external panels. This project aims to apply the findings of these researches in order to design a radiation shielding with the use of fungi and melanin, which then can be manufactured and used on manmade objects and habitats to withstand space radiation during their lifetime.