

19th IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND
DEVELOPMENT (D3)

Systems and Infrastructures to Implement Sustainable Space Development and Settlement - Technologies
(2B)

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DESIGN OF 3D PRINTED WALLS FOR EXTRATERRESTRIAL ENVIRONMENTS IN TERMS OF
RADIATION SHIELDING AND THERMAL ISOLATION.

Abstract

Establishing a human settlement on the moon or on any other celestial body will suppose a great challenge in terms of protection against radiation and thermal insulation, given the extreme environmental conditions derived from an environment with not dense enough atmosphere in order to mitigate these effects. It is certain that modules and materials capable of dealing with these inconveniences will have to be initially transported from the Earth. But given the limitations of space in current spacecrafts and landers, the excessive cost that it would entail and the great dependence on the earth that would result in the long term, it is clear that it will be necessary to take advantage of the resources present in the extraterrestrial environments. In this sense, a very notorious role will be played by regoliths and 3D printing technologies, that will allow us to build protective walls and enclosures integrated in the habitat structure itself or by surrounding it. Thus, in this paper different designs and geometric configurations are proposed and discussed, focusing on parameters and conditions such as: density, composition, thickness of the printed layers, number of layers and number of air chambers between them.