Lunar Station Protection: Lunar Regolith Shielding

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ABSTRACT

This paper provides an evaluation the effectiveness of the in-situ resource, lunar regolith, to mitigate the effects of the lunar environment on lunar station and it's inhabitants. It includes a lunar environmental human life threat assessment, calculates regolith required for crew protection, and provides a regolith usage viability summary.

The Moon's environment consists of a combination of atmospheric, thermal, meteoroids, radiation, magnetic field, and gravitational field mechanisms. However, lunar regolith can only be used to shield a lunar station and it's inhabitants from the effects of the thermal, radiation, and meteoroid mechanisms. Based on the individual threat of each of these mechanisms on human life a lunar regolith barrier/shield of 1-2 meters would serve to provide adequate overall protection for a lunar crew within a lunar habitat. Since using such a lunar regolith barrier/shield instead of other types of shields provides several advantages along with a few consequences each must be addressed/considered prior to its use. All in all lunar regolith should be viewed as a viable and effective in-situ life support system resource, today due to its shielding properties, and in the future due to its O_2 generating and heat storage potential as well as its shielding properties.