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TECHNICAL PROBE AND RUDIMENTARY ANALYSIS OF THE DIANA LUNAR BASE SITE

**Abstract**

The curiosity of a human mind and the resulting aspirations for the exploration of extra-terrestrial celestial objects has led to drastic research and technological advancements. Mankind prepares to extend its research onto the lunar surface and the idea of human exploration of the Moon is getting increasingly popular. To sustain life on the Moon, or any other hostile celestial object with an unfavorable environment, understanding the habitation and its design requirements is highly essential.

As the natural convention goes, the lunar surface would initially be observed and analyzed by robotic systems to identify and study a potential construction site for a habitable base. In order to erect permanent habitat on the moon, an essential rudimentary study of the site and surface must be performed to verify the economic and structural feasibility of the construction project. A failure in recognizing and evaluating the conceivable and existing characteristics of the lunar surface and the deep space environment can lead to a mission failure. This would damage the political credibility of the lunar project initiative, deferring its timeline by decades. Therefore, respective critical parameters pertaining to the lunar environment and surface such as radiation, soil composition, soil compaction, thermal variations at surface and sub-surface levels, availability of in-situ resources, parallel topographic advantages, etc., must be thoroughly investigated before selecting a potential base location. It is also pivotal to showcase the effects of lunar gravity on industrial scale infrastructure for in-situ resource prospecting and transportation, and construction of habitation.

This paper details out the necessary milestones that need to be reached before laying the foundation stone to permanent lunar infrastructure and is a literary effort to catalogue and evaluate the plurality of parameters that would help scientists and astronauts in defining a potential lunar base site, with its advantages, shortcomings, and potential alternatives. The paper also provides a comprehensive account of the relevant robotic technologies that shall be required to study the feasibility of a lunar base site before the onset of human exploration. The research and technology proposals established within the framework of this paper, essentially build upon the foundations of the DIANA lunar village project presented in the previous IAC 2022 held in Paris.