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Strategies & Architectures as the Framework for Future Building Blocks in Space Exploration and Development (1)

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THE MOON NEEDS AN INTERNATIONAL LUNAR RESOURCES PROSPECTING CAMPAIGN

Abstract

Introduction. Lunar resources are pivotal in enabling a sustained human presence on the Moon and for developing a vibrant cislunar economy. However, there has been no coordinated effort to develop a prospecting campaign to quantify the nature, abundance, extractability, and overall reserve potential of these potentially game-changing resources. Fortunately, independent efforts can form a strong foundation for developing an ILRPC.

International Lunar Resource Prospecting Campaign (ILRPC). It is unlikely that one nation can mount a lunar resource prospecting campaign. Therefore, an international lunar resource prospecting initiative is the only way such a campaign to define and quantify lunar resources will be achieved. This approach will be compliant with the OST, as per Article I. The Artemis Accords could provide a foundation upon which to build the ILRPC. Enacting an ILRPC is critical for enabling a sustained human presence on the Moon that would go far beyond the camping trips of Apollo.

What and Where are Lunar Resources? Lunar resources can be broadly defined by three categories: regolith, volatile-bearing pyroclastic deposits, and polar volatiles. Regolith is available anywhere on the Moon, volatile-bearing pyroclastic deposits are predominantly on the central near side, and polar volatile deposits are in cold traps at the lunar poles.

Implementation of the ILRPC. Thirty years of lunar orbital data define the broad regions prospectors would need to explore for a particular resource. However, prospecting data are lacking, especially for polar volatiles, such as: grade, form, amount. composition, ease of extraction (e.g., geotechnical properties), size of the deposit, etc. By leveraging existing orbital data for planning a coordinated ILRPC, we would obtain information about lunar resources that has direct relevance for enabling human permanence

on the Moon. In doing so, this would also develop a vibrant cislunar economy that would also benefit society on Earth. Through international cooperation, scheduled and future missions can be integrated into a campaign to investigate these sites. Data thus collected will be used to down select sites for pilot plant production and tests. An ILRPC campaign has many benefits for human space exploration, commerce, and society here on Earth.