Paper ID: 88974
student

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Interactive Presentations - IAF SPACE EXPLORATION SYMPOSIUM (IP)

Author: Ms. Molly Balfe
ILEWG "EuroMoonMars", The Netherlands

AN IN DEPTH ANALYSIS INTO LIFE FACILITATING OPPORTUNITIES OF IMPORTANT LUNAR REGIONS IN THE INTEREST OF FUTURE LUNAR HABITATION

Abstract

Developing a lunar base may be a necessary stepping-stone to the growth of space exploration capabilities. The Moon's environment has many exciting scientific advantages. The natural lack of atmosphere has two primary advantages; an increased exit velocity for space flight and clear observational opportunities. The mineral content of the lunar surface is of interest to space exploitation, they may be used in building and life support of a habitat. To build a lunar habitat extensive research must be conducted of lunar topography, mineral distribution and environmental conditions around its globe. From these considerations, an optimal lunar habitat location can be concluded.

In the current "race to space", space agencies around the globe are working hard to develop lunar outposts. EuroMoonMars ILEWG/LUNEX missions maintain the goal of "establishing a playbook" for lunar life. These analogue missions facilitate ground-based qualitative research using realistic lunar habitat environments and processes. An aim of EuroMoonMars is for these research findings to be utilized on future manned outposts on the Moon, Mars and beyond. Analysis of orbital satellite data and native sample extraction may further aid to adapt this "playbook" to locations of interest in lunar base development.

The primary regions of interest in current research are the equatorial region and the North and South Pole of the Moon. Each region carries its own advantages and disadvantages to facilitating life. An example being the Pole's desirable access to ice water, which is a key life sustaining and sustainability asset. The potential versus risk in each region must be weighed heavily in deciding a location.

An aim of this research is to compile an in-depth analysis of the topography, mineral distribution and environmental conditions of the lunar regions; North Pole, South Pole and equatorial (near-side then far-side). Certain criteria, known to be desirable in maintaining lunar life, will be measured and compared region-to-region with the goal of concluding a clear optimal location(s). Important criteria to note will be a region's accessibility to life sustaining minerals (water, oxygen), other useful in-situ minerals, near-constant solar power, maintainable temperature fluctuation, geological processes of scientific interest, and sites that assist space flight or space observation. Measuring the possibility of each region's ability to meet these criteria, then comparing their abilities with respect to each other, can extract potential locations for a lunar base site to be prioritized in future missions.