

HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)
Human Lunar Exploration (1)

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BEING SELENE'S GUEST: ANALYSIS OF THE LUNAR ENVIRONMENT AND ITS IMPACT ON
BASE LOCATION SELECTION

Abstract

In the frame of ESA's Micro-Ecological Life Support System Alternative (MELiSSA) project the German Aerospace Center's Institute of Space Systems Department of System Analysis Space Segment (SARA) conducts an investigation about the concept design of a greenhouse module for space systems and the various possible alternatives to realize such a system. As part of this investigation a review of existing data about the lunar environment has been conducted, along with a trade of selected and likely locations for lunar outposts, e.g. the Whipple crater at the lunar north pole or the Shackleton crater at the lunar south pole. Part of the analysis and trade have been issues regarding lunar illumination and so-called peaks of eternal light, which represent a valuable asset regarding power generation and thermal conditions, radiation, temperature and accessibility of the locations, referring to local topography and latitude position. The results show that the latter favours equatorial regions, which however do not support current scientific interest in the polar regions of the moon. Comparison and trade of candidate sites situated at the pole, reveal the connection ridge between Shackleton and Sverdrup at the south pole to be the most favourable location, due to lenient conditions regarding temperature and temperature history over time as well as illumination (and thus potential for power generation with solar cells). This paper reports in the course of this analysis and the need for more precise data regarding e.g. radiation at the lunar surface and other open issues necessary to be closed for the implementation of any plan for permanently inhabiting the moon or setting up autonomous systems for robotic exploration.