SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 2 (2B)

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THE EUROPEAN LUNAR LANDER: A HUMAN EXPLORATION PRECURSOR MISSION

Abstract

Introduction: ESA's Human Space Flight and Operations Directorate is continuing with preparations for its Lunar Lander project. The Lunar Lander is an unmanned precursor mission to future human exploration. This mission will enable the development of technologies, capabilities and scientific knowledge that will allow Europe to participate in future international exploration activities of the Moon and beyond. The primary objective of the mission is to demonstrate soft precision landing with hazard avoidance and once on the surface it provides an opportunity for payload operations and scientific measurements. The scientific objectives for the mission have been established to address the major unknowns for future exploration activities. The Lunar Lander is currently engaged in Phase B1 under the lead of the prime contractor Astrium GmbH (Bremen, Germany). Phase B1 includes mission definition, system & sub-system design and technology breadboarding activities, and shall be completed by mid 2012. Mission Architecture: The mission targets a launch in 2018 from Centre Spatial Guyanais, Kourou on a Soyuz launcher. The Lander will then be injected into a transfer orbit to the Moon by the Fregat upper stage and several weeks later will insert itself into a lunar polar orbit. The precision landing capability will then be applied to ensure a soft precise landing near the Lunar South Pole. The targeted landing sites are located at peaks where the high altitude relative to the surrounding topology, coupled with the slight inclination of the Moon's rotational axis, leads to extended periods of illumination. Hazards and Illumination: A key factor in ensuring a robust mission design is a complete understanding of the illumination duration at the anticipated landing sites, the areas of the sites and the extent of surface hazards such as boulders, slopes and craters. To this end work is ongoing to fully characterise these aspects of the Lunar surface in the areas around these peaks. Scientific investigations: The scientific objectives that have been defined for the mission emphasise a number of key areas: the integrated dusty plasma environment at the surface of the Moon and its effects on systems; lunar dust as a potential hazard to systems and human explorers;

potential resources which can be utilised in the future; and radiation as a potential hazard for human activities. Conclusions: We report on the status of the European Lunar Lander mission and the ongoing work on the system design, technology development, and characterisation of potential landing sites.