

HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)
Joint Session on Going To and Beyond the Earth-Moon System: Human Missions to Mars, Libration
Points and NEO's (4-D2.8)

Author: Mr. Volker Maiwald
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), Germany

Mr. Emilien Marchand
Delft University of Technology (TU Delft), The Netherlands, France

SESAME OPENS: A PRECURSOR TO HUMAN ASTEROID MISSIONS

Abstract

A common path for human spaceflight is currently often envisioned to lead to Near Earth Asteroids (NEA) within the next decades. While the goal is clear this is not so true for the targets. Just as unmanned probes investigated the lunar surface before humans ever set foot on our natural satellite, it is advisable – considering the current lack of knowledge about NEAs even mandatory – to send an unmanned mission ahead to conduct measurements in preparation of a human mission. Just as with the moon more than one target area should be investigated, i.e. more than one target asteroid. While many designs for the actual human mission already exist, scenarios for a precursor mission are scarcer. In this paper we present a feasible design for a multi-rendezvous mission to targets suitable for human missions, able to reach up to 7 asteroids with one launch. We will propose a system that will be able to measure various properties of each asteroid, e.g. chemical composition and topography and describe it on a subsystem level, providing mass and power budgets for the whole system. The results show that a spacecraft of about 1600 kg launch mass and utilizing solar electric propulsion can fly a 7 target mission within 10 years. With a sensitivity analysis we will show the robustness of the design and generally establish the feasibility of such a mission.