SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – missions current and future (3A)

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THE ESA MARS ROBOTIC EXPLORATION PREPARATION PROGRAM: STATUS AND PERSPECTIVES

Abstract

The MREP-2 programme (Mars Robotic Exploration Preparation-2) was subscribed at the 2012 ESA Council at Ministerial level with the objective to reinforce Europe's position in Mars robotic exploration and prepare for future missions to Mars or its moons, following ExoMars. The general approach is to consider the Mars Sample Return (MSR) mission as a long-term objective and to progress step-by-step towards this objective through MSR-related technology developments, which are validated during intermediate missions. This paper describes the status and perspectives of this program.

Several mission feasibility studies have been performed by ESA in the frame of MREP, that include a Mars Sample Return Orbiter (MSRO), a Mars Precision Lander (MPL), a Mars landers network (INSPIRE) and a Sample return from Phobos (PHOOTPRINT). The latter has been more recently studied as an ESA-Roscosmos mission, by a joint team of experts from ESA, Lavochkin and IKI, at the ESA Concurrent Engineering Facility. This joint mission will be further subject to an industrial phase A study in 2015 and 2016. In parallel to feasibility studies, MREP-2 conducts a Technology Development Plan (TDP), the objective of which is to raise the maturity level of technologies required to implement the MREP-2 candidate missions. These technologies encompass diverse fields such as Mars surface mobility, entry-descent-and-landing, rendezvous in Mars orbit, sampling, biosealing (required for safely returning a sample from Mars) and sample return capsules to the Earth. Also Long Term enabling technologies are developed, such as Novel Power Systems (NPS) and high thrust propulsion engines.