

SPACE EXPLORATION SYMPOSIUM (A3)  
Mars Exploration – Part 2 (3B)

Author: Dr. Francesco Mura

Thales Alenia Space Italia, Italy, francesco.mura@thalesaleniaspace.com

Mrs. Antonella Ferri

Thales Alenia Space Italia, Italy, antonella.ferri@thalesaleniaspace.com

Dr. Maria Antonietta Perino

Thales Alenia Space Italia, Italy, mariaantonietta.perino@thalesaleniaspace.com

Mr. Pascal Rideau

Thales Alenia Space France, France, Pascal.Rideau@thalesaleniaspace.com

Mr. Rolando Gelmi

Selex ES, Italy, rolando.gelmi@selex-es.com

Mr. Francesco Cacciatore

Deimos Space S.L., Spain, francesco.cacciatore@deimos-space.com

Mr. Denis Rebuffat

European Space Agency (ESA/ESTEC), The Netherlands, denis.rebuffat@esa.int

Mr. Jonan Larranaga

Aurora Technology B.V., The Netherlands, jonan.larranaga@esa.int

PHOOTPRINT

**Abstract**

Phootprint is a candidate mission of the Mars Robotic Exploration Preparation Programme (MREP). The current pre-phase A study is funded by the ESA General Study Programme (GSP).

The Phootprint mission will return a sample from the Mars moon Phobos. It will be launched by Ariane 5 into direct escape to Mars. The nominal launch date to be considered is 2024, with 2026 as a backup. The S/C Composite is made of:

- A Propulsion Module (PM), in charge of performing all maneuvers from launcher separation to injection in near-Phobos orbit
- A Landing Module (LM) carrying the Earth Return Vehicle (ERV), the Earth Re-entry Capsule (ERC), and all equipment necessary to perform the operations around and on Phobos, including landing and sampling; the near Phobos maneuvers will be performed by means of the Propulsion system implemented in the ERV
- An Earth Return Vehicle (ERV) performing the Mars escape, the transfer back to Earth and the ERC release few hours before re-entry
- An Earth Re-entry Capsule (ERC); at Earth arrival the ERC will be released a few hours before re-entry and will perform a high speed re-entry. It will then perform a parachute-free, hard landing and be recovered and transported to the Sample Receiving Facility (SRF)

The mission carries a payload complement in order to support the general characterization of Phobos and to support the selection and analysis of a safe and suitable sampling site. The obtained information is vitally important to place the collected sample material into a global context.

This paper will present the results of the pre-phase A project performed by Thales Alenia Space Italia under European Space Agency contract; the study has been started in September 2013 and is planned to finish in May 2014.