SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – Science, Instruments and Technologies (3B)

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EXOMARS MISSION 2016 PLANETARY PROTECTION IMPLEMENTATION

Abstract

The ExoMars 2016 mission is an ESA lead mission scheduled for a 2016 launch by a Roscosmos supplied Proton–M/Breeze–M rocket. The system consists of a Trace Gas Orbiter (TGO) which accommodate scientific instruments and an Entry Descent and Landing Demonstrator Module (EDM) that will land in a non-special region of Mars. Thales Alenia Space Italy (TAS-I) is the ExoMars Industrial Prime Contractor and it is responsible of the Planetary Protection Implementation to ESA. Landing on Mars requires the implementation of a stringent Planetary Protection plan to ensure the level of bioburden contamination brought on Mars surface will comply with COSPAR regulation. The project has been categorized by ESA as COSPAR Planetary Protection Category III for the Orbiter and Planetary Protection Category IVa for the EDM. Planetary Protection requirements are applied according to the mission category. The implementation of the planetary protection requirements for ExoMars comprises restrictions on impact probabilities for flight hardware not intended to directly contact Mars and biological contamination control for the other parts of the spacecraft. On these elements specific levels of maximun bioburden contamination were allocated to fulfill the PP requirements. The way to be compliant with the allocated values assigned at the bioburden controlled elements was to apply bioburden reduction (sterilization by Dry Heat Microbial reduction) and/or cleaning processes to these flight H/W elements, work in bioburden controlled environments and implement a well-defined recontamination prevention plan during the AIT/ AIV, tests campaign and launch site activities until the launch. As the DHMR process could change the material properties and the required functions of the equipments/subsystems comprising materials or combination of them, qualification tests campaign were performed to evaluate their compatibility with the DHMR at the beginning of the project. Planetary Protection activities have begun with the start of flight system manufacturing and assembly. The S-CDR has been successfully closed in October 2014 and the proto-flight model is now under environmental test campaign in TAS test facilities. This paper describes the PP constraints induced by the PP Category assigned to the Mission and provides a summary of all the activities performed and planned until the launch to implement the Planetary Protection approach set since the beginning of the project to the ExoMars 2016 Mission.