SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – Part 1 (3A)

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EXOMARS 2016 MISSION DESIGN STATUS

Abstract

According to the long-term cooperation plan established by ESA and NASA in June 2009, the ExoMars project now consists of two missions. The first, ESA-led mission, launched in 2016, will comprise an Orbiter Module (OM), with scientific and data relay assets, and an Entry Descent and Landing Demonstrator Module (EDM). The second mission, NASA-led, launched in 2018, will place two Rovers on the surface, one of them provided by ESA. Both missions will use NASA launch vehicles. The ongoing Phase B2 contract, led by ThalesAlenia Space Italia, will be concluded with a Preliminary Design Review by December 2010, followed by the Implementation Phase beginning in the 2nd quarter of 2011. The first spacecraft will be launched in January 2016 by an Atlas V class launcher into a Type 2 transfer trajectory that will reach Mars on 19 October 2016. Three days before arrival at Mars the EDM will be separated from the Orbiter and coast to hyperbolic Entry, Descent and Landing (EDL) at a Meridiani Planum site. Throughout the atmospheric phase, which may occur during a Global Dust Storm, UHF telemetry to the Orbiter will be enabled. after landing. The EDM will demonstrate technologies scalable to future, larger Landers. Engineering sensors will be incorporated to document its performance. It will be designed to survive on the surface for about 8 sols.A set of science sensors will demonstrate limited surface operations, compatibly with the available resources. After separation, the Orbiter Module will perform Mars Orbit Insertion into an eccentric orbit, with 4-sidereal-day period, designed to allow EDM visibility all through the atmospheric flight. This orbit will be maintained for 2 periods after the capture, to provide further communication options on successive pericentre passes above the landing site. Thereafter, the OM will undertake manoeuvres to increase the orbit inclination to 74 and reduce the period to 1 sidereal day. Further reduction of the apocentre will be achieved in 6 to 9 months by aerobraking. Finally the orbit will be circularised by propulsion at an altitude around 400 km. The science mission will begin in May 2017 with primary objective of detecting atmospheric trace gases, characterising their spatial and temporal variation, and localising their sources, using instruments to be selected by an Announcement of Opportunity. The Orbiter Module will support data relay with the 2018 Rovers, reaching Mars in January 2019, as well as further data relay and science operations until 2022.