

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

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EXOMARS ORBITER MODULE: LOOKING FOR TRACE GAS ON MARS AND PROVIDING DATA
RELAY SUPPORT FOR FUTURE MARS SURFACE ASSETS

Abstract

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The European Space Agency in a joint cooperation with NASA, will launch in 2016 the EXOMARS spacecraft composite to develop European landing technologies and provide a science orbiter with data-relay capability around Mars until end 2022. The spacecraft composite is composed of the Orbiter Module OM, provided by TAS-France, an entry descent and landing demonstrator module (EDM) provided by TAS-Italy, and a set of six scientific payloads to be selected by the JPL during 2010. Recent observations of the planet Mars have indicated detection of methane as well as temporal, perhaps spatial variability in the detected signal while current photochemical models cannot explain the presence of methane in the atmosphere of Mars nor its reported rapid variations in space and time. The triple scientific objectives that drive the selection of these six instruments for the Exomars 2016 mission are to detect trace gases in Mars atmosphere, to characterise their spatial and temporal variation, and to explore the source of the key trace gases (e.g. methane) on the surface. The launch is scheduled in January 2016 from Kennedy Space Center using an ATLAS V 421 launcher with a total launch mass of 4.4 tons. After release of the EDM on Mars, the OM will perform the Mars Orbit Insertion manoeuvre and then reduce its elliptic orbit by implementing the first European Aerobraking around Mars for about 6 to 9 months, to finally end on a circular orbit with an altitude in the range of 350km to 420km. In particular trace gases detection by sun occultation is promoted as first priority followed by quasi continuous limb to limb atmosphere scan and strategic surface high resolution imaging.

After the 2 years science phase the OM will also provide a data-relay function with a UHF proximity link for about four years to all future Mars surface assets including the Exomars Rover planned for launch in 2018. Thales Alenia Space will build the Orbiter bus on the basis of the existing Spacebus telecommunication platform to reduce costs and meet the Exomars challenging performance and schedule. The OHB company in Bremen will procure and assemble the Mechanical, Thermal and Propulsion subsystems. The system PDR is planned end of 2010 and the announcement of opportunities for science payloads was issued in January 2010.