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EXOMARS ROVER & SURFACE PLATFORM MISSION: APPROACHING THE LAUNCH CAMPAIGN

Abstract

The ExoMars program is the first step of the European Space Agency's Aurora Exploration Programme and it is developed in a broad ESA and Roscosmos co-operation, with a contribution from NASA in the Mars proximity Communications. It addresses the scientific question of whether life ever existed on Mars and will demonstrate key technologies for entry, descent, landing, drilling and roving on the Martian surface.

The whole ExoMars Program is composed by two missions, both to be launched by a Roscosmos supplied Proton-M/Breeze-M rocket.

The first mission, named ExoMars 2016, left off from the Baikonur Launch site on March 14th, 2016. The Entry Descent Module (Schiaparelli) separated from the Trace Gas Orbiter (TGO) on October 16th, 2017, costing for 3 days before reaching the EIP and unsuccessfully landing on the Mars surface on October 19th, 2017. In the same day, The TGO was successfully injected into its planned elliptical Mars Orbit and it is now in its final Science Orbit around Mars, having completed its Aerobraking phase, fully engaged in its science operations and ready to support the 2020 mission as Data Relay System.

The second mission, named Rover Surface Platform (RSP), is scheduled for July 25th August 13th, 2020 launch opportunities to Mars.

The RSP Spacecraft Composite is composed of a Carrier Module (CM) and a Descent Module (DM), whose Landing Platform (LP) is housing 12 Scientific Instruments and a Rover, with its 9 Science Payloads After a cruise of about 8 months, in March 2021 the Descent Module will be separated from the Carrier, enter into the planet's atmosphere and subsequently deliver the Landing Platform and the Rover on the Mars surface. After Rover egress, the Surface Platform will initiate its scientific mission which consists in a complete environmental characterization of the landing site, while the Rover will explore the surface, for an expected duration of 218 Martian days (approx. 230 Earth days). During the exploration, the Rover will use the TGO-2016 and NASA Relay Orbiters for the communications with Earth.

This paper intends to present the up-to-date RSP Spacecraft Composite Flight Model development status focusing on the complex Functional/Environmental verification of the whole integrated Spacecraft and its Modules through the complex multilateral process implemented on the various Models (Avionics Test Bench, Structural Model, FM/PFM Models) such to be ready to start the Launch Campaign in April 2020.