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THE EXOMARS 2020 ROVER: AN OVERLOOK TO ITS DESIGN, TECHNOLOGY AND AMBITIOUS OBJECTIVES

Abstract

The ESA ExoMars program, an international cooperation with Roscosmos, NASA and other National Space Agencies, is finalizing the preparation of its second mission to Mars, the Rover and Surface Platform (RSP) mission, scheduled for launch in July 2020. The first mission, launched in 2016, has carried to Mars a demonstration lander and the Trace Gas Orbiter (TGO) that is currently analysing the planet atmosphere and will serve as data relay for the RSP mission. The 2020 lander will consist of an instrumented platform and a Rover, which will deploy and egress from it to perform at least 8 months of scientific operations on the martian surface.

ExoMars is a flagship mission of the ESA Exploration Programme and the Rover is the first if its kind for Europe. The scientific accomplishments, including environment characterization and search for past and present life, and the demonstration of key technologies, from EDL to locomotion, drilling, samples acquisition and automated operations, are important steps to be achieved to properly prepare the next planetary missions, on Mars and on the Moon.

This paper provides an overview of the characteristics and expected performances of the Rover, designed as a mobile scientific laboratory, capable to map the terrain, identify targets of interest, acquire soil samples from surface and subsurface down to 2 m depth, process and analyse them in situ, while moving with autonomous navigation capabilities and maintaining daily communication contacts with relay orbiters and ground control.

The challenging requirements set for this mission, for both technology demonstration and science, have led to the development of a 300 kg class Rover, with a peculiar compact design housing innovative solutions to allow the accommodation of a high density scientific payload (9 instruments) and of the needed support resources, from dedicated actuation mechanisms, to power generation/distribution, thermal control, data processing and communication systems.

The Rover Flight Model, built with the large participation of European Industries (Airbus, Thales, RUAG, OHB, Leonardo), is expected to be delivered for integration in the Spacecraft by December 2019. Launch preparation activities will take place in Baikonour, from April to July 2020.

An overview of the adopted model philosophy, to support the verification and qualification phase and ultimately the mission operations, is also provided.