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ESA's ExoMars rover mission to search for signs of life on the red planet

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In the framework of its Aurora Exploration Program, in 2011 the European Space Agency (ESA) plans to launch the ExoMars mission.

ExoMars's scientific objectives are: 1) To search for signs of past and present life; 2) To identify surface hazards to future human missions; and 3) To characterise the shallow subsurface water/geochemical composition and vertical distribution profile.

ExoMars will deploy a high-mobility rover on the Martian surface, carrying a comprehensive suite of analytical instruments dedicated to exobiology, geochemistry, and environmental research: the Pasteur payload. Over its planned 6-month lifetime, the rover will travel a few tens of kilometres searching for traces of past and present signs of life. It will do this by collecting and analysing samples from within surface rocks, and from underground —down to 2-m depth. The very powerful combination of mobility with the capability to access locations where organic molecules are well preserved is unique to this mission. Provided an appropriate landing site can be targeted, ExoMars will have the right tools to try to answer the question of whether life ever arose on the red planet.

The ExoMars mission contains two other elements: a Mars orbiter and a Descent Module. The orbiter's main task will be to act as data relay satellite, although it will also carry a small scientific payload. The Descent Module's objective is to safely deliver to the Martian surface the ExoMars Rover. The rover, whose mass is presently estimated at 240 kg, will carry the Pasteur scientific payload. The Pasteur Payload is equipped with a multispectral, stereoscopic camera; an electromagnetic subsurface sounder to identify local water/ice deposits; a drill capable of reaching a depth of 2 m, and also of collecting specimens from within surface rocks; a sample preparation and distribution

unit, an optical microscope; an oxidation sensor; and a variety of instruments for the characterisation of organic substances and minerals.

Latitudinal bands between 10 and 45º, both N and S can be targeted for landing, ensuring that the mission is flexible enough to accommodate interesting new sites based on latest available data from on-going Mars orbital missions. Over its envisioned lifetime of 180 sols, the rover is designed to cover 10–20 km of ground track over typical Martian terrain. Operations beyond this period will depend mainly on the amount of dust deposited on the rover's solar panels.

This paper will report the latest developments in the preparation of this mission.