

ExoMars: ESA's Mission to Search for Signs of Life on the Red Planet

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Establishing whether life ever existed, or is still active on Mars today, is one of the outstanding scientific questions of our time. In order to timely address this important goal, within the framework of its Aurora Exploration Programme, the European Space Agency (ESA) plans to launch the ExoMars mission in 2013.

ExoMars will deploy a Rover carrying a comprehensive suite of analytical instruments dedicated to exobiology research: the Pasteur payload. The Rover will travel several kilometres searching for traces of past and present signs of life. It will do this by collecting and analysing samples from within rock outcrops and from the subsurface, down to a depth of 2 m. The very powerful combination of mobility and access to subsurface locations, where organic molecules may be well-preserved, is unique to this mission.

The ExoMars Rover mission will be complemented by the Humboldt instruments on the Lander, dedicated to environment and geophysics investigations.

ExoMars will rely on a heavy launcher (Ariane 5 or Proton M) to send a Composite, consisting of

a Carrier and the Descent Module, onto Mars. The Composite will settle into a Mars parking orbit, from where (when conditions are appropriate) the Descent Module will be released. Upon entering the Martian atmosphere, a heat shield will break the initial descent, followed by parachutes, and a liquid propulsion system. From a height of ~10 m, the Lander will be dropped onto the ground. Vented airbags will cushion the final impact, without bounces. The latter is a new European technology to be developed for this mission. The Rover will be deployed and operated for a nominal 180 sols. The Lander will also have a nominal lifetime of 180 sols. Mission extensions will be possible provided the surface elements are in good health. Latitudinal bands between -5° and 45° can be targeted for landing, ensuring that the mission is flexible enough to accommodate interesting new sites based on latest available information from on-going Mars orbital missions. The mission's data relay capability will be provided by a NASA orbiter; however, ESA will evaluate the possibility to use the ExoMars Carrier as a data relay orbiter.

This paper will briefly describe the mission's science content and current level of definition.