SEARCHING FOR TRACES OF LIFE WITH THE EXOMARS ROVER: CHEMICAL BIOSIGNATURES.

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The first ExoMars mission was launched on 14 March 2016 and arrived at the red planet on 19 October 2016. It included two elements: 1) the Trace Gas Orbiter (TGO) to study atmospheric trace gases and subsurface water with the goal to acquire information on possible on-going biological or hydrothermal rock alteration processes; and 2) Schiaparelli, a European Entry, Descent, and Landing (EDL) demonstrator to prove technologies for controlled landing and perform measurements during descent and on the martian surface. TGO is performing well and will soon start a one-year aerobreaking phase to reach its science orbit from where it will also provide data communication services for surface missions, nominally until end 2022. Unfortunately the lander was lost during the last minute of the EDL sequence.

The second ExoMars mission is scheduled to launch on 24 July 2020. It will deliver to the martian surface a 310-kg mass rover and an instrumented landed platform having nominal mission durations of 218 sols and one Earth year, respectively.

The rover will explore the landing site's geological environment and conduct a search for signs of life. A drill will allow the rover to collect samples from outcrops and at depth, reaching down to 2 m below the surface. Such depth range has never been probed on Mars before. ExoMars' subsurface sampling capability will provide the best chance yet to access and analyse well-preserved sedimentary deposits, possibly containing molecular biosignatures.

The rover's Pasteur payload includes: panoramic instruments (wide-angle and high-resolution cameras, an infrared spectrometer, a ground-penetrating radar, and a neutron detector); a subsurface drill to acquire samples; contact instruments for studying rocks and collected material (a close-up imager and an infrared spectrometer in the drill head); a Sample Preparation and Distribution System (SPDS); and the analytical laboratory, the latter including a visual and infrared imaging spectrometer, a Raman spectrometer, and a Laser-Desorption, Thermal-Volatilisation, Derivatisation, Gas Chromatograph Mass Spectrometer (LD + Der-TV GCMS). The very powerful combination of mobility with the ability to access subsurface locations is unique to this mission.

After the Rover will have egressed, the Platform will carry out scientific environmental measurements at the landing site.

This presentation will discuss the ExoMars rover and the strategy to search for biosignatures with a focus on chemical ones.