



## **Mars Simulations in Support of Planetary Exploration**

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The objective of international future planetary exploration programs is to implement a long-term plan for the robotic and human exploration of solar system bodies. Mars has been a central object of interest in the context of extraterrestrial life. Laboratory support for those initiatives can be achieved by preparing simulation chambers where either macro or micro-scale effects on target materials can be monitored in detail. The ultimate goal is to build a framework of laboratory data that can be used to interpret current and future observations and in situ measurements. The availability of simulation chambers where space conditions can be reproduced is also essential to design and test new generation instrumentation for space application.

The ESTEC Mars Simulation Chamber (MSC) is operated in collaboration between ESTEC laboratories and Leiden University. Several additional chambers have been developed to perform simulations supporting planetary missions, with particular emphasis on Mars environmental conditions. At present the chambers have been used to recreate aspects of the Martian surface environment. Scientific projects, engineering experiments, and related sensor-level tests may all be supported with this equipment and the associated systems of the Mechanical Systems Laboratory of ESTEC. We discuss the experimental research program that includes the investigation of organic molecules subjected to simulated Martian conditions as well as hardware testing. Atmospheric simulation chambers in combination with a Deuterium and Xenon lamps were used to acquire data on the effects of UV photo-processing, atmospheric condi-

tions and the presence/absence of oxidising agents on prebiotic molecules. Mars simulations that include instrument testing, measurements on planetary analogue and can address planetary protection issues are a vital tool in support of planetary exploration.