

The MMX Rover: objectives, science goals, and contributions to the MMX mission

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The Martian Moons eXploration (MMX) will carry the small (~25kg) rover, which is mainly contributed by the Centre National d'Etudes Spatiales (CNES) and the German Aerospace Center (DLR). The rover is designed as a scout, a demonstrator, and an in-situ science investigator, and will survive >100 days on the surface of Phobos. The primary objective of the rover is increasing the landing safety of the MMX mothership, which is planned to obtain >10 g of samples including at depth >2cm from each of two sampling sites. Scientific objectives of the rover include 1) understanding the physical properties and mechanical behaviors of Phobos regolith, 2) in-situ geological and geochemical survey of the roving area; 3) mineralogical study of the surface material at the landing/roving area; 4) understanding the thermal properties of the surface; and 5) studying the heterogeneity of the surface at various scales. The scientific payload of the rover consists of four instruments, such as the IR radiometer; miniRad, which is designed mainly to characterize the thermal properties of the regolith; NavCams, which is composed of two cameras in stereo and will observe the soil and landscape in front of the rover in color; RAX, which is a Raman spectrometer for characterizing the composition of the ground just below the rover; and WheelCams, which consists of two cameras looking at the interface between the wheel of the rover and the surface to characterize the behavior of regolith. The rover is in a significantly important position in multi-scale observations between the global observations of the MMX mothership and the very localized precise information obtained from the returned sample. The rover team is now composed of 39 Co-Is and 23 collaborators and is working together with all science sub teams (SST) of the MMX mission, especially the Surface Science and Geology SST (Science Sub Team).

Keywords: MMX, rover, Phobos, Mars, exploration