

SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – Part 1 (3A)

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NASA MARS 2020 LANDED MISSION DEVELOPMENT

Abstract

In January of 2014, NASA received 58 proposals for science and exploration technology instruments for consideration as payloads aboard NASA's next mobile landed mission to Mars. This extraordinary scientific interest in the Mars 2020 Mission is a direct result of NASA's sustained and coordinated plan for the exploration of Mars, and ultimately, its search for life elsewhere in the universe. The Mars 2020 Mission would preserve the heritage and directly build upon NASA's most recent mobile mission at Mars, the Mars Science Laboratory-Curiosity rover which has been successfully exploring the surface of Mars since its landing in August 2012. The proposed follow-on mission to MSL, to be launched to Mars in the summer of 2020, would pursue the following threshold scientific objectives as quoted from NASA's competitive solicitation for scientific investigations for this mission:

Characterize the processes that formed and modified the geologic record within a field exploration area on Mars selected for evidence of an astrobiologically-relevant ancient environment and geologic diversity.

Perform the following astrobiologically-relevant investigations on the geologic materials at the landing site:

Determine the habitability of an ancient environment. Search for materials with high biosignature preservation potential. Search for potential evidence of past life using the observations regarding habitability and preservation as a guide.

Assemble a returnable cache of samples for possible future return to Earth.

Obtain samples that are scientifically selected, for which the field context is documented, that contain the most promising samples identified in Objective B and that represent the geologic diversity of the field site. Ensure compliance with future needs in the areas of planetary protection and engineering so that the cache could be returned in the future if NASA chooses to do so.

Contribute to the preparation for human exploration of Mars by making significant progress towards filling at least one major Strategic Knowledge Gap. The highest priority SKG measurements that are synergistic with Mars 2020 science objectives and compatible with the mission concept are (in priority order):

Demonstration of In-Situ Resource Utilization (ISRU) technologies. Characterization of atmospheric dust size and morphology. Conducting surface weather measurements to validate global atmospheric models.

The results of NASA's competitive procurement of investigations for this mission will be released in early summer of 2014. This paper will describe the proposed Mars 2020 Mission concept and will describe the scientific objectives, payload, technology planning and development efforts underway to enable meeting these proposed mission objectives.