

Mars 2020

Goal Lead: Jim Watzin, Mars Exploration Program Director

Deputy Goal Lead: George Tahu, Program Executive

Theme: General Science, Space and Technology

Overview

Goal Statement

- Seeking signs of life on Mars: Explore a habitable environment, search for potential bio signatures of past life, collect and document a cache of scientifically compelling samples for eventual return to Earth, and contribute to future human exploration of Mars. By August 5, 2020, NASA will launch the Mars 2020 rover. To enable this launch date, NASA will deliver the instrument payload for spacecraft integration by September 30, 2019.

Challenge

- The rover body and other major hardware (such as the cruise stage, aero shell, and heat shield) will be near-duplicates of the systems of the Mars Science Laboratory (MSL) and will take maximum advantage of engineering heritage. However, the new rover will carry more sophisticated, upgraded hardware and new instruments, such as the highly complex Sampling and Caching Subsystem.

Opportunity

- Mars 2020 will build upon many discoveries from the Mars Curiosity rover and the two Mars Exploration Rovers, Spirit and Opportunity, by taking the next key steps in our understanding of Mars' potential as a habitat for past or present life.
- The Mars 2020 rover will seek signs of past life on Mars, collect and store a set of samples for potential return to Earth in the future, and test new technology to benefit future robotic and human exploration of Mars.
- The mission will deploy new capabilities developed through investments by NASA's Exploration Research & Technology organization, Human Exploration and Operations Mission Directorate, and contributions from international partners.

Goal Structure & Strategies

The Mars 2020 mission will advance the scientific priorities detailed in the National Academies' Planetary Science Decadal Survey and support payload elements provided by the Human Exploration and Operations Mission Directorate and Exploration Research & Technology organization that are compatible with Science Mission Directorate priorities.

Activities to support these efforts in FY 2018-19 include the following:

- The Mars 2020 Project and contributing partners will complete the final design and fabrication phase of implementation (Phase C).
- The Project will complete the System Integration Review (SIR) and begin Assembly, Test, and Launch Operations (ATLO).
- The instrument payload will complete development and deliver flight hardware to spacecraft ATLO.
- The Sampling and Caching System will complete development of the flight model and deliver hardware for system integration and testing.

The Mars 2020 mission progress is reported regularly to the Science Mission Directorate Flight Program Review and the Agency Baseline Performance Review. Mission development is also assessed through standard NASA lifecycle reviews by the Mars 2020 Standing Review Board, as well as the Directorate and Agency Program Management Councils.

Mars 2020 Summary of Progress – FY18 Q1

- Proceeding with development work on schedule. Implementation efforts are focused on production, assembly, and testing of hardware, and flight software development and testing.
- Continued good progress on both development and testing of heritage subsystems and development of new elements (i.e., Sampling and Caching System (SCS) and instruments). Key areas of focused attention include actuators/SCS, Scanning Habitable Environments with Raman and Luminescence for Organics and Chemicals (SHERLOC) instrument, and Surface Operability. The Planetary Instrument for X-ray Lithochemistry (PIXL) and Mars Oxygen In-Situ Resource Utilization Experiment (MOXIE) instruments have made significant progress overcoming technical challenges.
- Critical Design Reviews (CDRs) successfully completed for Flight Software, Rover Motor Controller Assembly (RMCA), Surface Phase, and Mission System.
- Italian Space Agency (Agenzia Spaziale Italiana, or ASI) has signed international agreement for Italian laser retroreflector. All international agreements are now complete.
- Conducted Rover Operations and Science Team Training simulation and training exercise to prepare for planned observations, rover drives, instrument measurements, and sampling within a region of interest after landing.
- On track to proceed to System Integration Review (SIR) in February 2018.

Key Milestones

NASA follows an “alternative form,” or milestone-based, approach to reporting on its goals. Following are key quarterly milestones that NASA tracks in support of this goal:

Milestone Summary			
Key Milestone	Milestone Due Date	Milestone Status	Comments
Complete Mission System Critical Design Review (CDR)	FY 2018 Q1	Green	• Completed November 14-16, 2017.
Complete Project System Integration Review (SIR)	FY 2018 Q2	Green	• Scheduled for February 27-March 1, 2018.
Complete Key Decision Point D (KDP-D) and begin Assembly, Test, and Launch Operations (ATLO)	FY 2018 Q3	Green	• On track.
Deliver instrument payload Engineering Models for system integration and test	FY 2018 Q4	Green	• On track.
Deliver Cruise Stage and Descent Stage to ATLO	FY 2019 Q1	Green	• On track.
Deliver instrument payload Flight Models to ATLO	FY 2019 Q2	Green	• On track.
Complete instrument payload integration and test	FY 2019 Q3	Green	• On track.
Deliver Sampling and Caching System to ATLO	FY 2019 Q4	Green	• On track.

Data Accuracy and Reliability

- Verification and Validation:
 - NASA monitors and tracks its progress towards this goal using various Agency documents and reports, including Directorate Program Management Council (DPMC) materials, monthly reports from the project and contributing partners, and other program-internal documents.
- Data Source(s):
 - Emails, press releases, and program-internal documents indicating progress toward integration, test, and launch.
- Level of Accuracy Required for Intended Use:
 - Using the documents and reports referenced above, the Agency is able to accurately report at the end of each quarter on whether or not it has met its planned milestones.
- Data Limitations:
 - Materials may include export-controlled technical information or industrial partner proprietary information, which could not be released publically.
- How the Agency Compensates for Data Limitations:
 - NASA has not identified any data limitations that would preclude it from reporting accurate, reliable, and timely performance information.

Additional Information

Contributing Programs

NASA:

- Mars Exploration Program and Radioisotope Power System Program (Science Mission Directorate).
- Game Changing Development Program and Technology Demonstration Mission Program (Exploration Research & Technology organization).
- Launch Services Program and Advanced Exploration Systems Division (Human Exploration and Operations Directorate).

Other: Mars 2020 includes international contributions from Spain (INTA), France (CNES), Norway (FFI), and Italy (ASI):

- Spain's space agency, the Instituto Nacional de Técnica Aeroespacial (INTA), is providing the High Gain Antenna, the Mars Environmental Dynamics Analyzer (MEDA) instrument, and a calibration target for the SuperCam instrument.
- France's space agency, the Centre national d'études spatiales (CNES), is providing the mast unit for the SuperCam instrument.
- Norway's Forsvarets Forskning Institute (FFI) is providing the Radar Imager for Mars' Subsurface Experiment (RIMFAX) instrument.
- The Italian Space Agency (Agenzia Spaziale Italiana, or ASI) is providing a laser retroreflector.

Stakeholder Consultations

NASA provides quarterly updates on progress to the Office of Management and Budget and Office of Science and Technology Policy. NASA also consults regularly with the science community and experts from industry and academia, such as the Planetary Science Advisory Council.