

Mars Science

Mars Exploration Program

Mars Sample Return

Two main science activities for MEP

- MSR Science Planning Group (MSPG) in a NASA and ESA partnership
- Mars Architecture Strategy Working group

NOTE ADDED BY JPL WEBMASTER: This content has not been approved or adopted by JPL or the California Institute of Technology. This document is being made available for information purposes only, and any views and opinions expressed herein do not necessarily state or reflect those of NASA, JPL, or the California Institute of Technology.



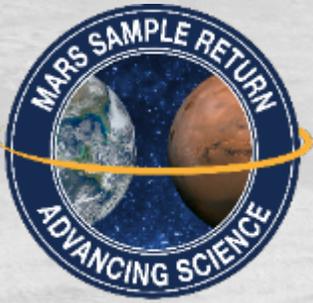
Michael Meyer
Chief Scientist

Mars Sample Return Science Planning

Guiding principle and challenge

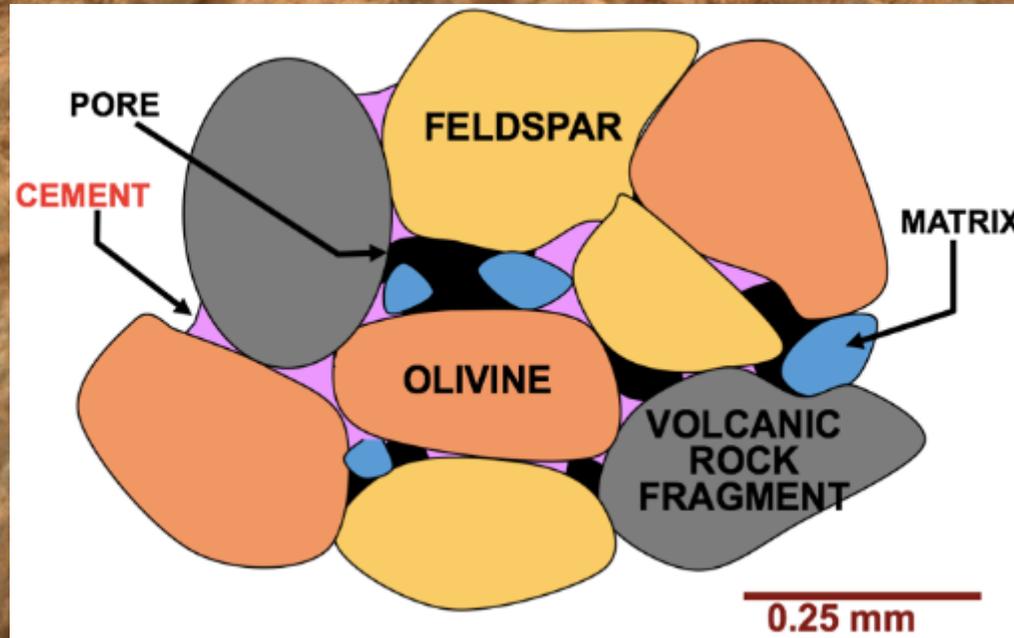
- Protect the Samples from Earth
- Protect the Earth from the Samples

... To achieve a quantum jump in our understanding of Mars



Microscopic spatial focus: new frontier

Select from macro-scale and measure at nano-scale



Volcanic Frag's (Provenance)

- source original rock type
- nature / history of mantle sources
- absolute ages

Feldspar (Provenance)

- parent rock
- ages / age history

Olivine/Pyrox. (Provenance)

- parent rock
- temp/pressure history

Cements (Diagenesis)

- cement "stratigraphy"
- fluid chemistry (e.g., pH, Eh)
- fluid sources / fluid histories

Organics

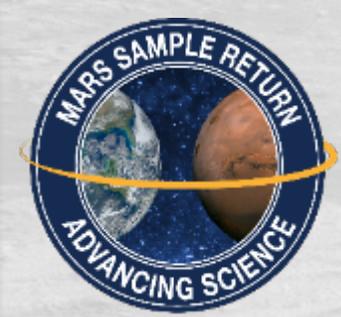
- characterize
- isotopes
- source

Matrix (Provenance & Diagenesis)

- parent rock type (formation modes)
- fluid chemistry / fluid interactions
- clay mineral origins and diagenesis

Scale matters - 250 microbes would fit onto the scale bar

Adapted from McLennan et al. (2018)



MSR Science Planning Group (MSPG)

MSPG established by NASA and ESA to help develop a stable foundation for international scientific cooperation for the purposes of returning and analyzing samples from Mars. Report completed Oct 2019

Products*

- Workshop - Science in Containment
- Workshop - Contamination Control
- Science Management Framework

Guiding Principles

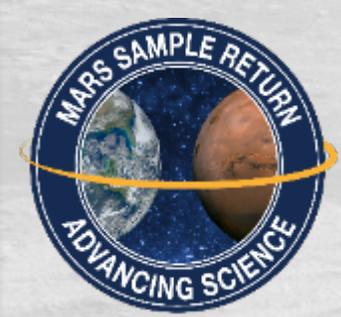
- Transparency
- Science maximization
- Accessibility/Opportunities for international scientists
- Return on investment for the agency partners
- One return canister: one collection

Steps Forward

- Science Management Plan
- Establish a science management structure - an MRSH Council
 - There are analogous major science management organizations (CERN, IODP)
- Expand on technical issues related to MSR



* <https://mepag.jpl.nasa.gov/reports.cfm?expand=mspg>



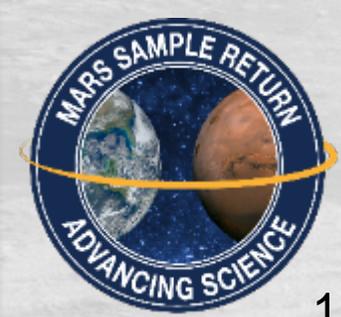
MSR Science Planning Group – Phase-2 (MSPG-2) Term of Reference (ToR)

MSPG-2 ToR establishes a group for international scientific cooperation for the purposes of returning and analyzing samples from Mars.

1. develop the MSR Science Management Plan, using the guidelines in the “Framework” document,
2. address the highest priority open technical planning questions identified in the 2019 MSPG workshop reports, and
3. delineate the options and decision points for managing samples returned from Mars, from landing on Earth through analyses in the Sample Receiving Facility (SRF) and other potential facilities.

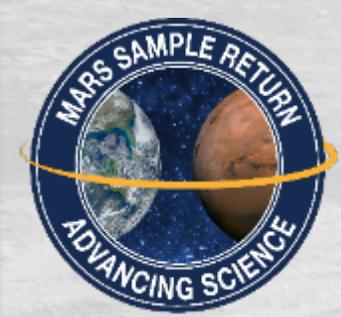
The MSPG-2 will recommend requirements intended to maximize the science return of the sample collection.

These planning activities will incorporate Curation and Planetary Protection.



MSR Science Planning Group – Phase-2 (MSPG-2) Assumptions

1. The scientific objectives of MSR are comprehensively described by iMOST (2019).
2. Facility plans include the following:
 - a. A biological containment and curation facility equivalent to a Bio-Safety Level 4 (BSL-4) Sample Receiving Facility (SRF) in the U.S. will provide sample containment until such time as the samples are transferred to another equivalently-rated facility or are deemed safe for use in laboratories without containment.
 - b. In addition to the biological containment and curation in the SRF, curation facility(s) without containment may exist in the U.S. or in Europe
 - c. Scientists will have access to samples in containment and eventually, if safe, access to samples transferred out of containment for analysis in their own laboratories.
3. The decision on where to locate the U.S. SRF, and as appropriate a potential European facility, will be determined at a later time.
4. Delineating specific laboratory research or instrumentation will not be part of this activity, although the scope of the needed measurements will be.
5. The *Framework for Mars Returned Sample Science Management*, will serve as the foundation for the Science Management Plan.



MSR Science Planning Group – Phase-2 (MSPG-2) Membership

The National Aeronautics and Space Administration (NASA) and European Space Agency (ESA) invite individuals to apply for membership to MSPG-2 to represent the interests of future sample scientists and the MSR partners.

MSPG-2 will consist of ~25 team members with experience in the organization and management of large-scale national and international collaborative scientific activities, involvement in one or more sample return planning and/or flight activities, and experience with sample-related scientific issues associated with sample containment and analyses.

- Application for membership will be in the form of a Letter of Application, accompanied by a current CV
- Participation in MSPG-2 is open to all qualified and interested individuals.

Please submit Letters of Application as PDFs to: esa-mspg2@esa.int

Responses to this invitation should be received by no later than by 4 May 2020

Notifications are targeted for approximately 29 May 2020.

Personnel who will have worked on MSPG-2 will be eligible to work on later aspects of MSR

For any questions, please contact:

Gerhard Kminek Gerhard.Kminek@esa.int or Michael Meyer michael.a.meyer@nasa.gov



Earth and Moon from Mars imaged by HiRISE 2016