

**PLANNING FOR MARS SAMPLE RETURN (MSR) SAMPLE SCIENCE INVESTIGATIONS: PROPOSED PROCESSES AND TIMELINE.** T. Haltigin<sup>1</sup>, D. Beaty<sup>2</sup>, B. Carrier<sup>2</sup>, M. Meyer<sup>3</sup>, E. Sefton-Nash<sup>4</sup>, M. Grady<sup>5</sup>, and D. Bass<sup>2</sup> on behalf of the MSR Science Planning Group (MSPG). <sup>1</sup>Canadian Space Agency (6767 Route de l'Aéroport, St. Hubert, QC, CANADA, J3Y 8Y9; timothy.haltigin@canada.ca), <sup>2</sup>Jet Propulsion Laboratory, California Institute of Technology, <sup>3</sup>NASA Headquarters, <sup>4</sup>European Space Agency, <sup>5</sup>Open University, UK.

**Introduction:** Mars Sample Return (MSR) has long been identified as a high priority of the international planetary exploration community. Analysis of returned samples would be expected to advance our fundamental understanding of Mars's history and evolution, and to provide clues about its past and present habitability.

NASA and the European Space Agency (ESA) signed a joint Statement of Intent in 2018 to further define roles & responsibilities for leading respective elements of the potential MSR flight campaign [1]. Contributions from other international agencies are also being considered.

Should MSR come to fruition as an international endeavor, one of the key challenges will be to develop a science program that would give all partners fair opportunity to participate in the scientific discovery process. To that end, NASA and ESA jointly chartered the MSR Science Planning Group (MSPG) to help develop an overarching science management strategy that would ensure fair and competitive balance for all international stakeholders. In this presentation, we will report on the proposed Science Management Framework developed by the MSPG [2].

**MSPG Science Management Guiding Principles:**

In developing the Framework, the MSPG relied upon five cornerstone tenets to guide its deliberations:

(i) *Transparency:* access to samples must be fair and the processes defining sample access must be as transparent as possible;

(ii) *Science maximization:* science management and sample-related processes must optimize the scientific productivity of the samples via careful selection of science investigations and consideration of sample preservation;

(iii) *Accessibility:* international scientists must have multiple opportunities to participate throughout the MSR process in a variety of capacities;

(iv) *Return on investment:* agencies providing the investments required to execute the MSR campaign should receive demonstrable benefits for enabling the samples' return;

(v) *One Return Canister / One Collection:* the returned samples should be managed as a single collection even if the samples are physically housed in different facilities, and sample ownership should not be pro-rated according to investment.

**Science Framework Overview:** The Framework represents a first step towards developing the Science Management Plan that would guide the overall MSR scientific program. Here, we developed an overarching strategy detailing the high level structures, decision-making bodies, and processes required to implement the program, and highlighted near-term actions that can be taken following confirmation of the MSR campaign.

The Framework is organized into three categories of activities through which the science community can participate in the MSR process:

(i) *Management and management planning:* beginning in 2020, these are entities and processes involved in the oversight of returned sample science, and offer guidance for operational functions such as curation and planetary protection;

(ii) *Planning for facilities:* also recommended for start in 2020, these groups provide scientific considerations contributing to the design and functional requirements of the facilities associated with MSR;

(iii) *Returned sample science processes:* beginning in 2026, these bodies define, provide sample access for, and execute the critical science investigations meeting the driving objectives of the MSR campaign.

**For Scientists Who Are Interested in Getting Involved in MSR:** The Framework document describes two elements that are important for planning considerations of scientists who want to get involved in MSR: (1) the description of a number of processes that would need scientists involved, and; (2) a (draft) master timeline.

Some of these processes begin with planning committees that may be formed as early as 2020, even though it is not currently envisioned that the samples could make it to Earth any earlier than 2031. The processes that specifically lead to the competition(s) that result in the granting of access to the samples to individual scientists are expected to begin in approximately 2026.

We encourage interested scientists to consider these dates as they develop their individual and group plans moving forward. Additionally, we further encourage the community to review the full Framework document [2], hosted on the MEPAG website, and provide any feedback to the authors.

**Summary and Conclusion:** Collectively, the components outlined in the previous sections represent a proposed implementation of the MSR science program that would allow members of the scientific community to be active participants throughout the process. Perhaps most importantly, the Framework also provides a guide by which an internationally-coordinated effort can simultaneously address the needs of scientists and agency managers, all while enabling potentially historic scientific discoveries.

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**References:** [1] [https://mepag.jpl.nasa.gov/announcements/04-26%20NASA-ESA%20SOI%20\(Signed\).pdf](https://mepag.jpl.nasa.gov/announcements/04-26%20NASA-ESA%20SOI%20(Signed).pdf) [2] [https://mepag.jpl.nasa.gov/reports/MSPG\\_ScienceManagementReport\\_Final.pdf](https://mepag.jpl.nasa.gov/reports/MSPG_ScienceManagementReport_Final.pdf)

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