PLANNING FOR MARS SAMPLE RETURN SCIENCE: STATUS UPDATE
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Introduction: The NASA & ESA Mars Sample Return (MSR) Campaign is intended to return scientifically selected samples that have been collected from the Jezero Crater region of Mars by NASA’s Mars 2020 (M2020) Perseverance Rover. M2020 placed a First Depot of samples in Jezero Crater in early 2023 \cite{1} and continues to augment its onboard sample collection for potential delivery to Earth as early as 2033. There is much planning required in preparation for the terrestrial “ground-based” portion of the MSR Campaign, currently described as the Sample Receiving Project (SRP). The SRP will be a partnership between NASA and ESA, and is also intrinsically a partnership between science, curation, and planetary protection to characterize and protect the samples and to maximize their scientific value. The SRP is currently in the planning/pre-project phase. As this planning progresses, we aim to provide opportunities for participation in community workshops, membership on planning groups and committees, as well as other pathways to keep the science community engaged in this process.

Proposed Scientific Objectives for SRP: The proposed scientific objectives for SRP have recently been drafted by the MSR Joint Science Office (JSO), which serves as the Project Science office for SRP, and discussed, modified and endorsed by the MSR Campaign Science Group (MCSG). This has resulted in a list of four primary science objectives (along with 17 sub-objectives, not listed here).
1. Reconstruct the formation and alteration history of the returned samples to transform our understanding of the geological processes and environments of Mars.
2. Determine the astrobiological significance of the martian geological record represented by the samples.
3. Provide new insights into planetary-scale formation and evolution in the inner Solar System.
4. Identify and characterize potential risks and opportunities for future human missions.

Guiding Principles for Scientific Participation: The Joint Science Management Plan for MSR has several guiding principles that are meant to optimize the MSR science return and to ensure that the international science community remains engaged throughout the planning and analysis phase of MSR, including:
- Transparency: Access to samples must be fair and processes must be as transparent as possible
- Science Maximization: Management and sample-related processes must optimize the scientific productivity of the samples
- Accessibility: International scientists must have multiple opportunities to participate throughout the MSR process
- One Collection: The returned samples should be managed as a single collection even if housed in separate facilities
- Return on Investment: Agencies providing the investments required to execute the MSR campaign should receive demonstrable benefits for enabling the samples’ delivery to Earth.

Status Updates: There are several recent, ongoing, or upcoming science planning activities related to MSR science planning. Status updates on these recent activities will be provided via this presentation and include:
- Recent activities and discussions by the MSR Campaign Science Group (MCSG).
- Findings of the SRF Contamination Panel Phase 1 (SCP-1), which has been tasked with recommending contamination limits for the Sample Receiving Facility.
- Acquisition of analogue samples and planning for research activities.
- Planning for the upcoming Measurement Definition Team (MDT), which will describe the measurements needed to accomplish the MSR scientific objectives.
- Reports of the Gas and Rock sample teams who have been tasked with questions related to extraction of the samples from their sample tubes.

References:
\cite{1} Czaja A. D. et al (2023) Meteorit Planet Sci. \url{https://doi.org/10.1111/maps.13981}.
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