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Preparing for Mars Sample Return: Curation and Science Updates.

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The Mars Sample Return (MSR) campaign, initiated in 2020 with the launch of the Perseverance Rover, is an international partnership between NASA and ESA to return Martian geological samples to Earth for scientific investigation in the early 2030s. This ambitious mission is the first to return samples from another planet, and the first since Apollo 14 to be classified as restricted. This classification leads to backward planetary protection requirements (BPP), which impacts how samples can be curated and analysed.

NASA and ESA have agreed to jointly proceed on science and curation. Sample requests for scientific research accomplished in the first years after sample return will be openly competed and jointly selected by ESA and NASA. Curation, with the initial aim of creating a catalogue to enable meaningful allocations for maximizing science return [1], will be undertaken jointly by both Agencies. A sample safety assessment protocol needs to be established to fulfil BPP requirements. These inherently intertwined major activities require specialized infrastructure. NASA has tasked the Johnson Space Center with implementing the US portion of a Sample Receiving Project, which will, among other tasks, scope, design and build a Sample Receiving Facility in the US. The SRF is not intended to be the long-term curation facility for Martian samples, with a nominal utilisation period of 2-5 years. ESA is developing a Double-Wall Isolator for the SRF, as a core technology enabling sample handling under clean and biocontained conditions. Both agencies are collaborating on multiple R&D activities.

A key driver for the SRF is the instrumentation that is required to be utilised under biocontainment. An open and competitive Announcement of Opportunity is planned for Q2 2023 to assemble a Measurement Definition Team. This team would be tasked with describing the measurements needed to achieve curation, sample safety assessment and part of the objective-driven science, building on the work of previous science committees ([2], MCSG).

Latest updates on curation, science and R&D planning will be shared, with an emphasis on synergies between curation and the science community.

[1] McCubbin F.M. et al (2019) *Spa.Sci.Rev.* 215:48

[2] MSR Science Planning Group 2 (MSPG2): https://www.liebertpub.com/toc/ast/0/ja