

## **Mars Sample Return: curation activities and planning.**

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Curation of extra-terrestrial samples is a multifaceted process that aims to balance the conservation of a collection with its efficient use. Therefore, a robust curation plan will maximize the science conducted in the first years after sample return while ensuring a representative collection remains available to enable science for decades.

The Mars Sample Return (MSR) campaign, initiated in 2020 with the launch of the Perseverance Rover, represents an international collaboration between the United States National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA) for the purpose of bringing Martian geological samples back to Earth for scientific investigations. This ambitious undertaking marks the first instance of sample return from another planet and the first return classified as Restricted since Apollo 14. The Restricted classification requires rigorous 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 and are in the formulation phase of the joint NASA/ESA Sample Receiving Project (SRP). After the sample arrive on earth and are transported to the Sample Receiving Facility, initial characterization begins. The aim on initial characterization is to generate a robust catalogue, which is a mandatory element to the allocation process. Sample requests for scientific research accomplished in the first years after sample return will be openly competed and jointly selected by ESA and NASA; this includes allocations for objective science completed within the SRP (first planned AO nominally in 2026) as well as opportunity science outside of the SRP. Proposals from a consortium of institutions proposing a coordinated analysis plan will be encouraged, to ensure efficiency and accountability.

While the Martian samples are expected to be back as soon as 2033, preparatory activities for protocols, hardware and infrastructure are underway. NASA and ESA have selected several working groups from the scientific community to advise on: 1) measurements to be conducted on the samples, 2) appropriate contamination control parameters, and 3) necessary requirements for handling and analysing the collection. Several curation and engineering teams in the United States and in Europe, coordinated by the NASA/ESA Joint Curation Office (JCO), are in close interaction with the NASA/ESA Joint Science Office and are working on developing hardware and strategies for the Sample Receiving Facility. The JCO is developing a curation plan following guidelines from the NASA NPR 7100.5 [1] (pending validation by NASA and ESA upcoming agreements).

The JCO is also considering long-term curation of the collection, separate from the SRP as part of their planning. It is expected that long-term curation might not require high-containment, and that while only one Sample Receiving Facility is planned, there might be several MSR curation facilities.

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

### **References**

[1] [https://nodis3.gsfc.nasa.gov/displayDir.cfm?Internal\\_ID=N\\_PR\\_7100\\_0005\\_&page\\_name=main&search\\_term=7100.5](https://nodis3.gsfc.nasa.gov/displayDir.cfm?Internal_ID=N_PR_7100_0005_&page_name=main&search_term=7100.5)