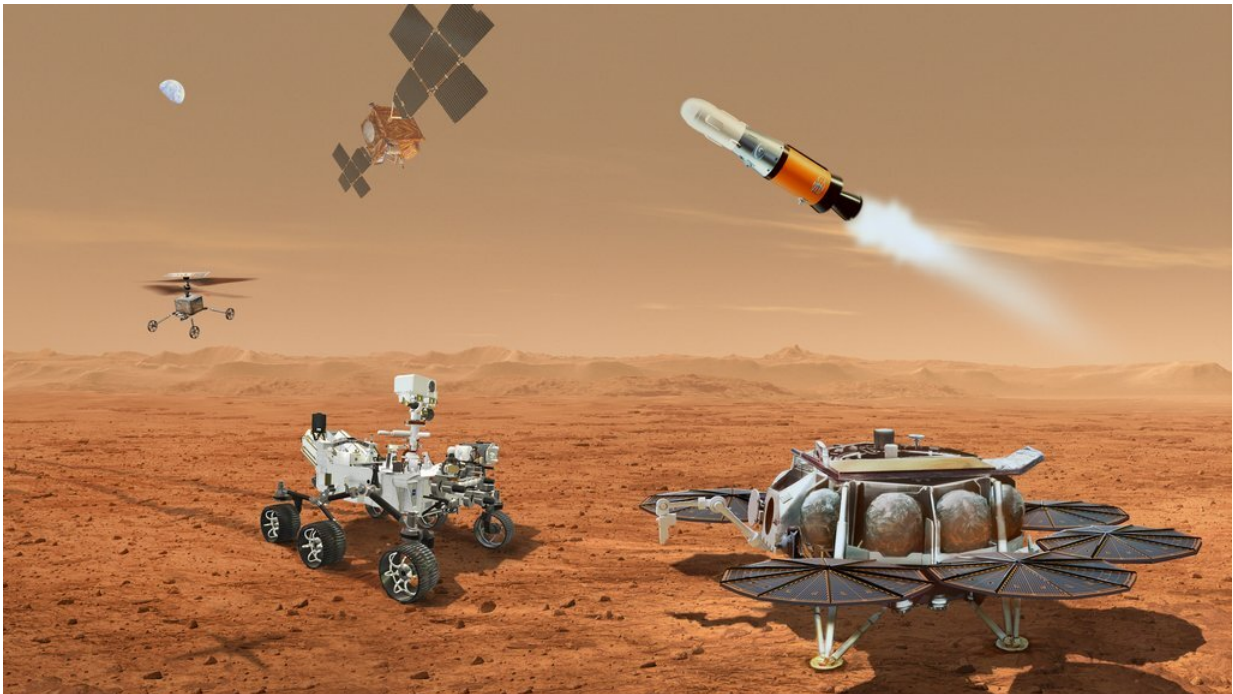


# NASA will inspire the world when it returns Mars samples to Earth in 2033

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This illustration shows a concept for multiple robots that would team up to ferry to Earth samples of rock and soil collected from the Martian surface by NASA's Mars Perseverance rover. Credit: NASA/JPL-Caltech

NASA has finished the system requirements review for its Mars Sample Return Program, which is nearing completion of the conceptual design phase. During this phase, the program team has evaluated and refined the architecture to return the scientifically selected samples, which are

currently in the collection process by NASA's Perseverance rover in the Red Planet's Jezero Crater.

The architecture for the campaign, which includes contributions from the European Space Agency (ESA), is expected to reduce the complexity of future [missions](#) and increase probability of success.

"The conceptual design phase is when every facet of a mission plan gets put under a microscope," said Thomas Zurbuchen, associate administrator for science at NASA Headquarters in Washington. "There are some significant and advantageous changes to the plan, which can be directly attributed to Perseverance's recent successes at Jezero and the amazing performance of our Mars helicopter."

This advanced mission architecture takes into consideration a recently updated analysis of Perseverance's expected longevity. Perseverance will be the primary means of transporting samples to NASA's Sample Retrieval Lander carrying the Mars Ascent Vehicle and ESA's Sample Transfer Arm.

As such, the Mars Sample Return campaign will no longer include the Sample Fetch Rover or its associated second lander. The Sample Retrieval Lander will include two sample recovery helicopters, based on the design of the Ingenuity helicopter, which has performed 29 flights at Mars and survived over a year beyond its original planned lifetime. The helicopters will provide a secondary capability to retrieve samples cached on the surface of Mars.

The ESA Earth Return Orbiter and its NASA-provided Capture, Containment, and Return System remain vital elements of the program architecture.

With planned launch dates for the Earth Return Orbiter and Sample

Retrieval Lander in fall 2027 and summer 2028, respectively, the samples are expected to arrive on Earth in 2033.

With its architecture solidified during this conceptual design phase, the program is expected to move into its preliminary design phase this October. In this phase, expected to last about 12 months, the program will complete technology development and create engineering prototypes of the major mission components.

This refined concept for the Mars Sample Return campaign was presented to the delegates from the 22 participating states of Europe's space exploration program, Terrae Novae, in May. At their next meeting in September, the states will consider the discontinuation of the development of the Sample Fetch Rover.

"ESA is continuing at full speed the development of both the Earth Return Orbiter that will make the historic round-trip from Earth to Mars and back again; and the Sample Transfer Arm that will robotically place the sample tubes aboard the Orbiting Sample Container before its launch from the surface of the Red Planet," said David Parker, ESA director of Human and Robotic Exploration.

The respective contributions to the campaign are contingent upon available funding from the U.S. and ESA participating states. More formalized agreements between the two agencies will be established in the next year.

"Working together on historic endeavors like Mars Sample Return not only provides invaluable data about our place in the universe but brings us closer together right here on Earth," said Zurbuchen.

The first step in the Mars Sample Return Campaign is already in progress. Since it landed at Jezero Crater Feb. 18, 2021, the

Perseverance rover has collected 11 scientifically compelling rock core samples and one atmospheric [sample](#).

Bringing Mars samples to Earth would allow scientists across the world to examine the specimens using sophisticated instruments too large and too complex to send to Mars and would enable future generations to study them. Curating the samples on Earth would also allow the science community to test new theories and models as they are developed, much as the Apollo samples returned from the moon have done for decades. This strategic NASA and ESA partnership will fulfill a solar system exploration goal, a high priority since the 1970s and in the last three National Academy of Sciences Planetary Science Decadal Surveys.

**More information:** Learn more about the Mars Sample Return Program at [mars.nasa.gov/msr/](https://mars.nasa.gov/msr/)

Provided by Jet Propulsion Laboratory

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