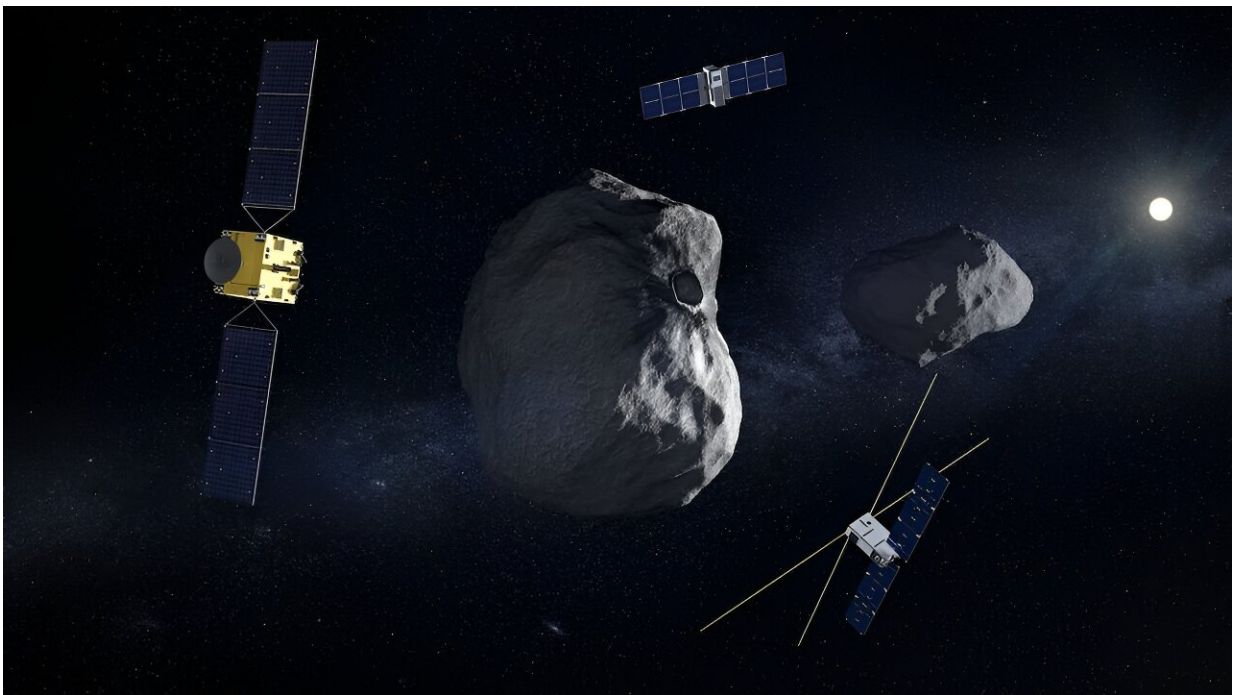


From the moon's south pole to an ice-covered ocean world, several exciting space missions are slated for launch in 2024

December 27 2023, by Ali M. Bramson



An artist's conception of the Hera mission to literally measure the impact of NASA's DART mission in 2022. Credit: [ESA](#)

The year 2023 proved to be an important one for space missions, with NASA's OSIRIS-REx mission [returning a sample from an asteroid](#) and India's Chandrayaan-3 mission [exploring the lunar south pole](#), and 2024

is shaping up to be another exciting year for space exploration.

Several new missions under NASA's [Artemis plan](#) and [Commercial Lunar Payload Services initiative](#) will target the moon.

The latter half of the year will feature several exciting launches, with the launch of the Martian moons eXploration [mission](#) in September, Europa Clipper and Hera in October and Artemis II and VIPER to the moon in November—if everything goes as planned.

[I'm a planetary scientist](#), and here are six of the [space missions](#) I'm most excited to follow in 2024.

1. Europa Clipper

NASA will launch [Europa Clipper](#), which will explore [one of Jupiter's largest moons, Europa](#). Europa is slightly smaller than Earth's moon, with a surface made of ice. Beneath its icy shell, Europa likely harbors a saltwater ocean, which scientists expect contains over twice as much water as all the [oceans here on Earth combined](#).

With Europa Clipper, scientists want to investigate whether Europa's ocean could be [a suitable habitat for extraterrestrial life](#).

The mission plans to do this by flying past Europa [nearly 50 times](#) to study the moon's icy shell, its surface's geology [and its subsurface ocean](#). The mission will also look for [active geysers](#) spewing out from Europa.

This mission will change the game for scientists hoping to understand ocean worlds like Europa.

The [launch window](#)—the period when the mission could launch and achieve its planned route—[opens Oct. 10, 2024](#), and lasts 21 days. The

spacecraft will [launch on a SpaceX Falcon Heavy rocket](#) and arrive at the Jupiter system in 2030.

2. Artemis II launch

The Artemis program, named after Apollo's twin sister in Greek mythology, is [NASA's plan to go back to the moon](#). It will send humans to the moon for the first time since 1972, including the [first woman and the first person of color](#). Artemis also includes plans for [a longer-term, sustained presence in space](#) that will prepare NASA for eventually sending people even farther—[to Mars](#).

Artemis II is the first crewed step in this plan, with four astronauts planned to be on board during the 10-day mission.

The mission builds upon [Artemis I](#), which sent an uncrewed [capsule](#) into orbit around the moon in late 2022.

Artemis II will put the astronauts into orbit around the moon before returning them home. It is currently planned for [launch as early as November 2024](#). But there is a chance it will get pushed back to 2025, depending on whether all the necessary gear, such as spacesuits and oxygen equipment, [is ready](#).

3. VIPER to search for water on the moon

[VIPER](#), which stands for Volatiles Investigating Polar Exploration Rover, is a robot the size of a golf cart that NASA will use to explore the moon's [south pole](#) in late 2024.

[Originally scheduled for launch in 2023](#), NASA pushed the mission back to complete more tests on the lander system, which [Astrobotic](#), a private

company, developed as part of the [Commercial Lunar Payload Services](#) program.

This robotic mission is designed to search for [volatiles](#), which are molecules that easily vaporize, like water and carbon dioxide, at lunar temperatures. These materials could provide resources for future human exploration on the moon.

The VIPER robot will rely on batteries, heat pipes and radiators throughout its [100-day mission](#), as it navigates everything from the extreme heat of lunar daylight—when temperatures can reach 224 degrees Fahrenheit (107 degrees Celsius)—to the moon's [frigid shadowed regions](#) that can reach a mind-boggling -400 F (-240 C).

VIPER's launch and delivery to the [lunar surface](#) is scheduled for [November 2024](#).

4. Lunar Trailblazer and PRIME-1 missions

NASA has recently invested in a class of small, low-cost planetary missions called [SIMPLEx](#), which stands for Small, Innovative Missions for PLanetary Exploration. These missions save costs by tagging along on other launches as what is called a rideshare, or secondary payload.

One example is the [Lunar Trailblazer](#). Like VIPER, Lunar Trailblazer will look for water on the moon.

But while VIPER will land on the moon's surface, studying a specific area near the south pole in detail, Lunar Trailblazer will orbit the moon, measuring the temperature of the surface and [mapping out the locations of water molecules](#) across the globe.

Currently, Lunar Trailblazer is on track [to be ready by early 2024](#).

However, because it is a secondary payload, Lunar Trailblazer's launch timing depends on the primary payload's launch readiness. The [PRIME-1](#) mission, [scheduled for a mid-2024 launch](#), is Lunar Trailblazer's ride.

PRIME-1 will drill into the moon—it's a test run for the kind of drill [that VIPER will use](#). But its launch date will likely depend on whether earlier launches go on time.

An earlier Commercial Lunar Payload Services mission with the [same landing partner](#) was [pushed back to February 2024 at the earliest](#), and further delays could push back PRIME-1 and Lunar Trailblazer.

5. JAXA's Martian moon eXploration mission

While Earth's [moon](#) has many visitors—big and small, robotic and crewed—planned for 2024, Mars' moons Phobos and Deimos will soon be getting a visitor as well. The Japanese Aerospace Exploration Agency, or JAXA, has a robotic mission in development called the [Martian moon eXploration, or MMX](#), planned for launch around September 2024.

The mission's main science objective is to determine the origin of Mars' moons. Scientists aren't sure whether Phobos and Deimos are [former asteroids that Mars captured into orbit with its gravity](#) or if they [formed out of debris](#) that was already in orbit around Mars.

The spacecraft will spend three years around Mars conducting [science operations](#) to observe Phobos and Deimos. MMX will also land on Phobos' surface and [collect a sample](#) before returning to Earth.

6. ESA's Hera mission

[Hera](#) is a mission by the European Space Agency to return to the Didymos-Dimorphos asteroid system that NASA's [DART mission](#) visited in 2022.

But DART didn't just visit these asteroids, it collided with one of them to test a [planetary defense](#) technique called "kinetic impact." DART hit Dimorphos with such force that [it actually changed its orbit](#).

The kinetic impact technique smashes something into an object in order to alter its path. This could prove useful if humanity ever finds a [potentially hazardous object](#) on a collision course with Earth and needs to redirect it.

Hera will launch in [October 2024](#), making its way in late 2026 to Didymos and Dimorphos, where it will study [physical properties of the asteroids](#).

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