European spacecraft on way to Jupiter and its icy moons

April 14 2023, by Marcia Dunn

In this image provided by the European Space Agency, an Ariane rocket carrying the robotic explorer Juice takes off from Europe's Spaceport in French Guiana, Friday, April 14, 2023. European spacecraft has blasted off on a quest to explore Jupiter and three of its ice-encrusted moons. Dubbed Juice, the robotic explorer set off on an eight-year journey Friday from French Guiana in South America, launching atop an Ariane rocket. Credit: ESA via AP

A European spacecraft rocketed away Friday on a decadelong quest to explore Jupiter and three of its icy moons that could hold buried oceans.

The journey began with a perfect morning liftoff by Europe's Ariane rocket from French Guiana on the coast of South America. But there were some tense minutes later as controllers awaited signals from the spacecraft.

When contact finally was confirmed close to an hour into the flight, Mission Control in Germany declared: "The spacecraft is alive!"

It will take the robotic explorer, dubbed Juice, eight years to reach Jupiter, where it will scope out not only the solar system's biggest planet but also Europa, Callisto and Ganymede. The three ice-encrusted moons are believed to harbor underground oceans, where sea life could exist.

Then in perhaps the most impressive feat of all, Juice will attempt to go into orbit around Ganymede: No spacecraft has ever orbited a moon other than our own.

With so many moons—at last count 95—astronomers consider Jupiter a mini solar system of its own, with missions like Juice long overdue.

"This is a mission that is answering questions of science that are burning to all of us," said European Space Agency's director general, Josef Aschbacher after the launch. "Of course, one of these questions is: Is there life out there?"

This photo provided by the European Space Agency shows an Ariane 5 rocket carrying the Jupiter Icy Moons Explorer, Juice, spacecraft lifting off from Europe's Spaceport in Kourou, French Guiana, Friday, April 14, 2023. Credit: ESA via AP

It can't find life, "but Juice will be identifying the habitability of these icy moons around Jupiter," he added.

The spacecraft is taking a long, roundabout route to Jupiter, covering 4 billion miles (6.6 billion kilometers)

It will swoop within 125 miles (200 kilometers) of Callisto and 250 miles (400 kilometers) of Europa and Ganymede, completing 35 flybys while circling Jupiter. Then it will hit the brakes to orbit Ganymede, the primary target of the 1.6 billion-euro mission (nearly $1.8 billion).

Ganymede is not only the solar system's largest moon—it surpasses Mercury—but has its own magnetic field with dazzling auroras at the poles.

Even more enticing, it's thought to have an underground ocean holding more water than Earth. Ditto for Europa and its reported geysers, and heavily cratered Callisto, a potential destination for humans given its distance from Jupiter's debilitating radiation belts, according to Carnegie Institution's Scott Sheppard, who's not involved with the Juice mission.


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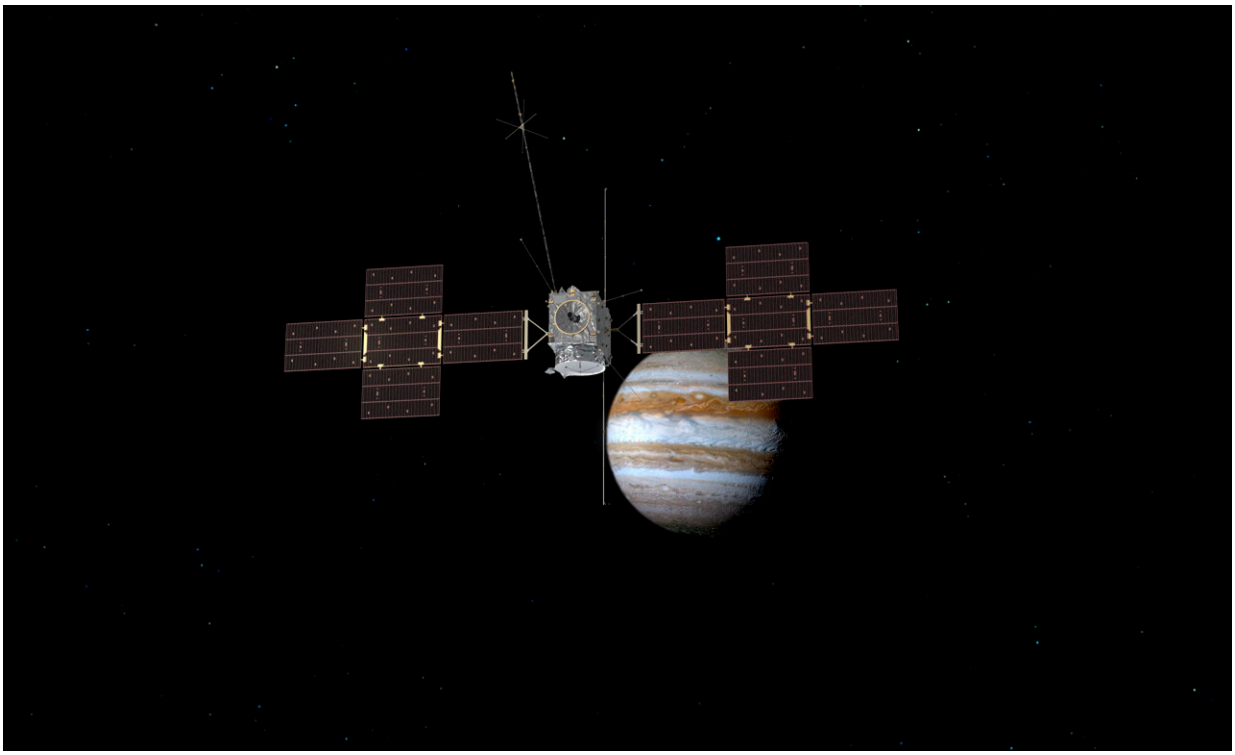
This photo provided by the European Space Agency shows an Ariane rocket carrying the Jupiter Icy Moons Explorer, Juice, spacecraft lifting off from Europe's Spaceport in Kourou, French Guiana, Friday, April 14, 2023. A European spacecraft rocketed away Friday on a decadelong quest to explore Jupiter and three of its icy moons that could have buried oceans. Credit: Manuel Pedoussaut/ESA via AP

"The ocean worlds in our solar system are the most likely to have possible life, so these large moons of Jupiter are prime candidates to search," said Sheppard, a moon hunter who's helped discover well over 100 in the outer solar system.

The spacecraft, about the size of a small bus, won't reach Jupiter until 2031, relying on gravity-assist flybys of Earth and our moon, as well as Venus.

"These things take time—and they change our world," said the Planetary Society's chief executive, Bill Nye. The California-based space advocacy group organized a virtual watch party for the launch.

Belgium's King Philippe and Prince Gabriel, and a pair of astronauts—France's Thomas Pesquet and Germany's Matthias Maurer—were among the spectators in French Guiana. Thursday's launch attempt was nixed by the threat of lightning.



This image provided by the European Space Agency depicts the Jupiter Icy Moons Explorer, Juice, spacecraft orbiting the gas giant. Credit: ESA/ATG Medialab via AP

Juice—short for Jupiter Icy Moons Explorer—will spend three years buzzing Callisto, Europa and Ganymede. The spacecraft will attempt to enter orbit around Ganymede in late 2034, circling the moon for nearly a year before flight controllers send it crashing down in 2035, later if enough fuel remains.

Europa is especially attractive to scientists hunting for signs of life beyond Earth. Juice will keep its Europa encounters to a minimum, however, because of the intense radiation there so close to Jupiter.

Juice's sensitive electronics are encased in lead to protect against

radiation. The 14,000-pound (6,350-kilogram) spacecraft also is wrapped with thermal blankets—temperatures near Jupiter hover around minus 380 degrees Fahrenheit (minus 230 degrees Celsius). And its solar panels stretch 88 feet (27 meters) tip to tip to soak in as much sunlight that far from the sun.

Late next year, NASA will send an even more heavily shielded spacecraft to Jupiter, the long-awaited Europa Clipper, which will beat Juice to Jupiter by more than a year because it will launch on SpaceX's mightier rocket. The two spacecraft will team up to study Europa like never before.

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This photo provided by the European Space Agency shows an Ariane 5 rocket carrying the Jupiter Icy Moons Explorer, Juice, spacecraft on a launch pad at Europe's Spaceport in Kourou, French Guiana, on Wednesday, April 12, 2023. Credit: Stephane Corvaja/ESA via AP

NASA has long dominated exploration at Jupiter, beginning with flybys in the 1970s by the twin Pioneers and then Voyagers. Only one spacecraft remains humming at Jupiter: NASA's Juno, which just logged its 50th orbit since 2016.

Europe provided nine of Juice's science instruments, with NASA supplying just one.

If Juice confirms underground oceans conducive to past or present life, project scientist Olivier Witasse said the next step will be to send drills to penetrate the icy crusts and maybe even a submarine.

"We have to be creative," he said. "We can still think it's science fiction, but sometimes the science fiction can join the reality."