

NASA shoots for the Moon, on its way to Mars

August 29 2022, by Lucie AUBOURG



NASA's SLS rocket and the Orion capsule on top of it, on August 26, 2022 at the Kennedy Space Center in Florida, prior to lift-off for NASA's Artemis 1 mission to the Moon.

NASA's most powerful rocket yet is set to blast off Monday on a

mission to take humans back to the Moon, but fueling the spacecraft gave the US space agency trouble hours before the launch.

Fifty years after astronauts last set foot on the moon during the Apollo 17 mission, the Artemis space program is to get underway with the launch of the uncrewed 322-foot (98-meter) Space Launch System (SLS) rocket at 8:33 am (1233 GMT) from the Kennedy Space Center in Florida.

Tens of thousands of people—including US Vice President Kamala Harris—are expected to gather along the beach to watch the launch, which has been decades in the making.

The goal of the flight, dubbed Artemis 1, is to test the SLS and the Orion crew capsule that sits atop the rocket.

Overnight operations to fill the rocket with more than three million liters of ultra-cold liquid hydrogen and oxygen were briefly delayed by a high risk of lightning, though it was a "go" after an hour.

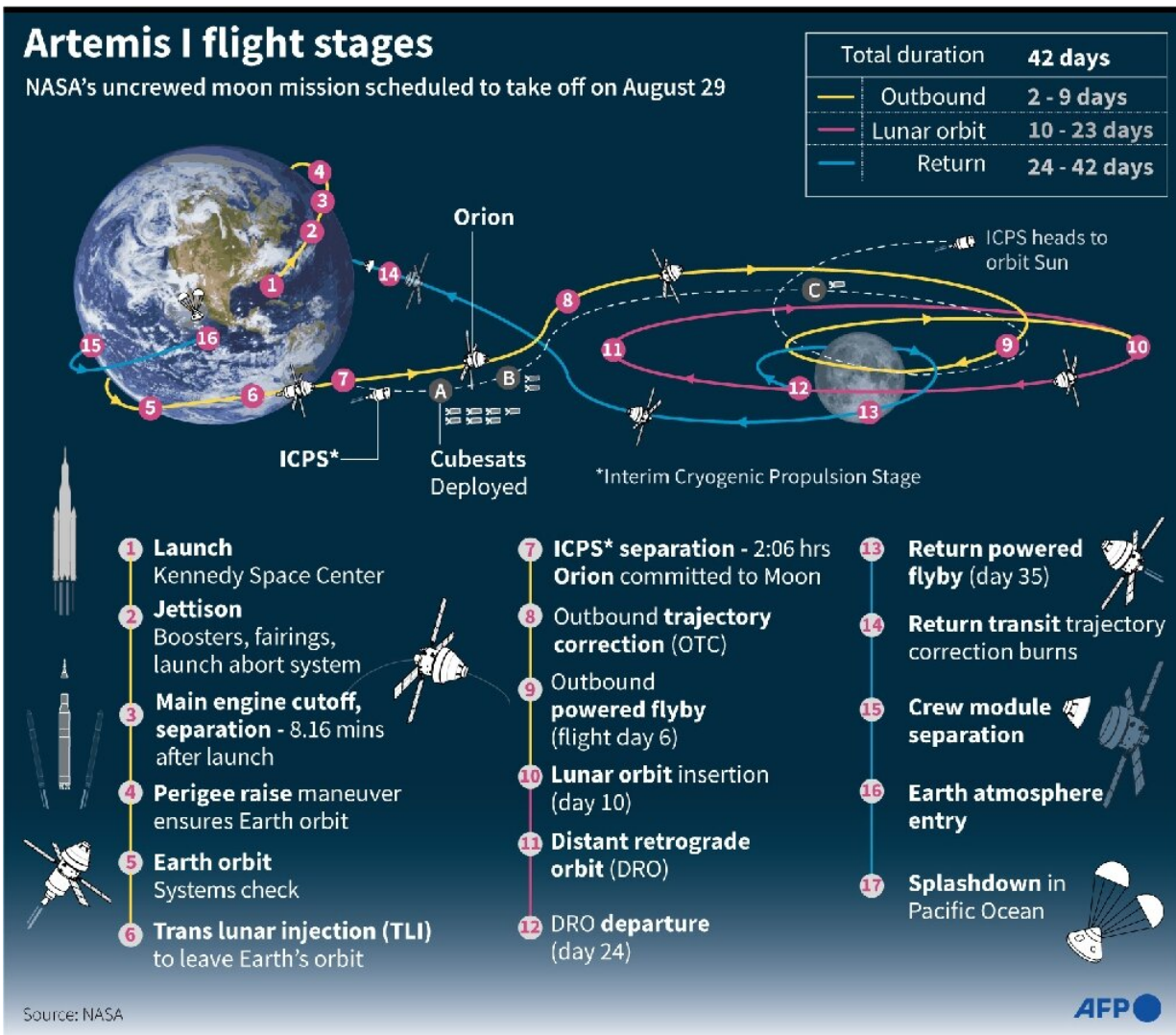
Around 03:00 am, another hiccup emerged: a potential leak was detected during the filling of the main stage with hydrogen, causing a pause.

After tests, the flow resumed.

"The leak is at an acceptable level and we have returned to fast fill operations," NASA's Exploration Ground Systems tweeted, adding that they would continue monitoring.

While liftoff is scheduled for 8:33 am, there is a two-hour window during which NASA has said there is an 80 percent chance of acceptable weather.

After the slight delays during fueling operations, NASA said it will determine a new launch time within that window.



Schematic outline of the NASA's Artemis I voyage planned for launch on August 29.

The massive orange-and-white rocket, which has been sitting on the space center's Launch Complex 39B for more than a week, will not be

able to take off in case of rains and storms.

The rocket's Orion capsule is set to orbit the Moon to see if the vessel is safe for people in the near future. At some point, Artemis aims to put a woman and a person of color on the Moon for the first time.

"This mission goes with a lot of hopes and dreams of a lot of people. And we now are the Artemis generation," NASA Administrator Bill Nelson said Saturday.

In another first, a woman—Charlie Blackwell-Thompson—will give the final green light for liftoff.

Women now account for 30 percent of the control room staff, compared to one for the Apollo 11 mission—the first time astronauts landed on the moon in 1969.

During the 42-day trip, the Orion capsule will orbit the Moon, coming within 60 miles (100 kilometers) at its closest approach, and then fire its engines to shoot out 40,000 miles—a record for a spacecraft rated to carry humans.

Extreme temperatures

Besides the weather, any kind of technical snafu could delay the liftoff at the last minute, NASA officials have said, stressing that this is a test flight.

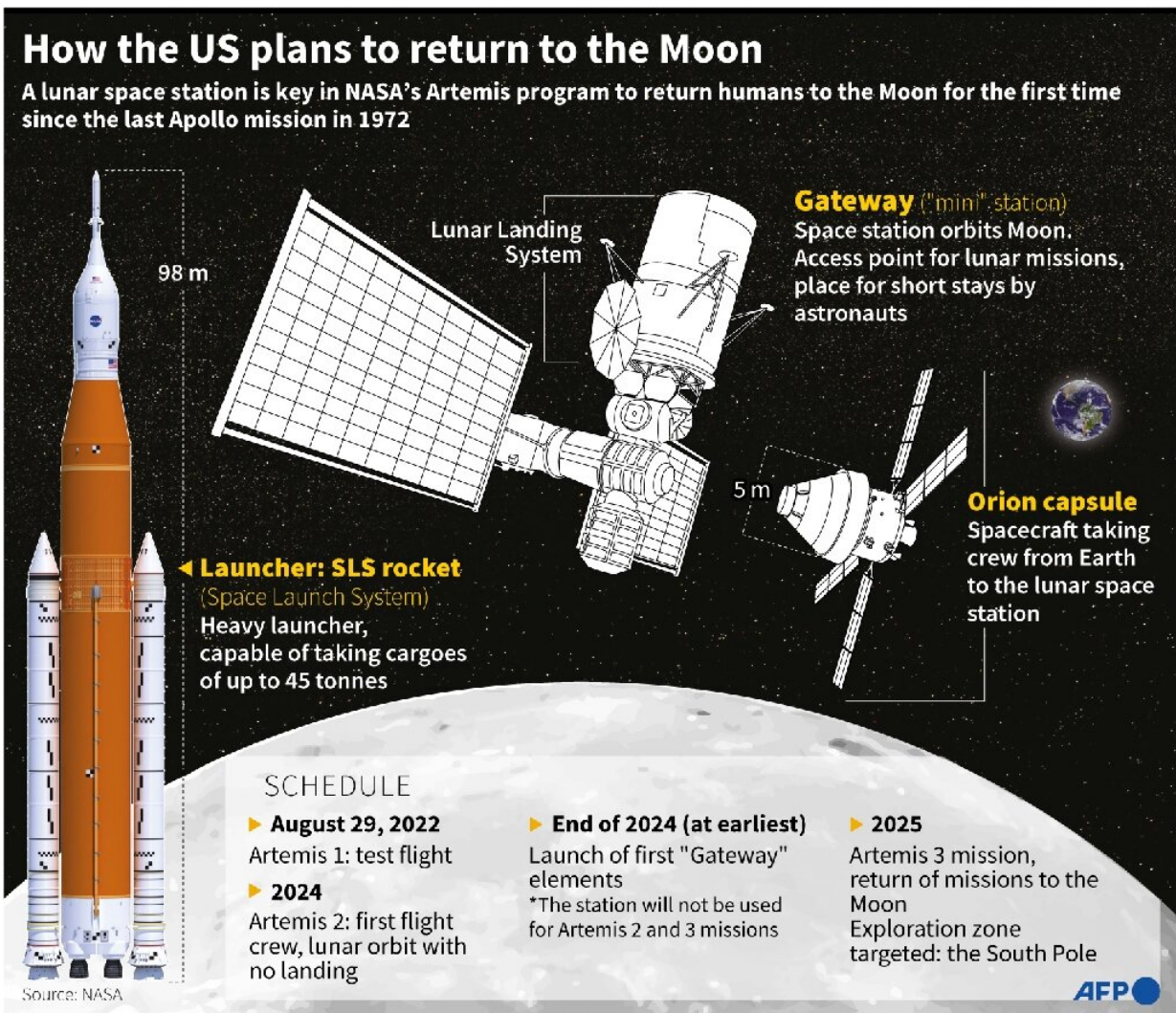
If the rocket is unable to take off on Monday, September 2 and 5 have been penciled in as alternative flight dates.

One of the primary objectives of the mission is to test the capsule's heat shield, which at 16 feet in diameter is the largest ever built.

On its return to the Earth's atmosphere, the heat shield will have to withstand a speed of 25,000 miles per hour and a temperature of 5,000 degrees Fahrenheit (2,760 degrees Celsius). That is half as hot as the Sun.

How the US plans to return to the Moon

A lunar space station is key in NASA's Artemis program to return humans to the Moon for the first time since the last Apollo mission in 1972



98 m

Launcher: SLS rocket
(Space Launch System)
Heavy launcher, capable of taking cargoes of up to 45 tonnes

Lunar Landing System

Gateway ("mini" station)
Space station orbits Moon. Access point for lunar missions, place for short stays by astronauts

5 m

Orion capsule
Spacecraft taking crew from Earth to the lunar space station

SCHEDULE

- ▶ **August 29, 2022**
Artemis 1: test flight
- ▶ **2024**
Artemis 2: first flight crew, lunar orbit with no landing
- ▶ **End of 2024 (at earliest)**
Launch of first "Gateway" elements
*The station will not be used for Artemis 2 and 3 missions
- ▶ **2025**
Artemis 3 mission, return of missions to the Moon
Exploration zone targeted: the South Pole

Source: NASA

AFP

Graphic on NASA's Artemis program to establish a mini-space station orbiting the Moon before landing on the surface in 2024.

Dummies fitted with sensors will take the place of real crew members, recording acceleration, vibration and radiation levels.

The craft will deploy small satellites to study the lunar surface.

A complete failure would be devastating for a program that is costing \$4.1 billion per launch and is already running years behind schedule.

Life on the Moon

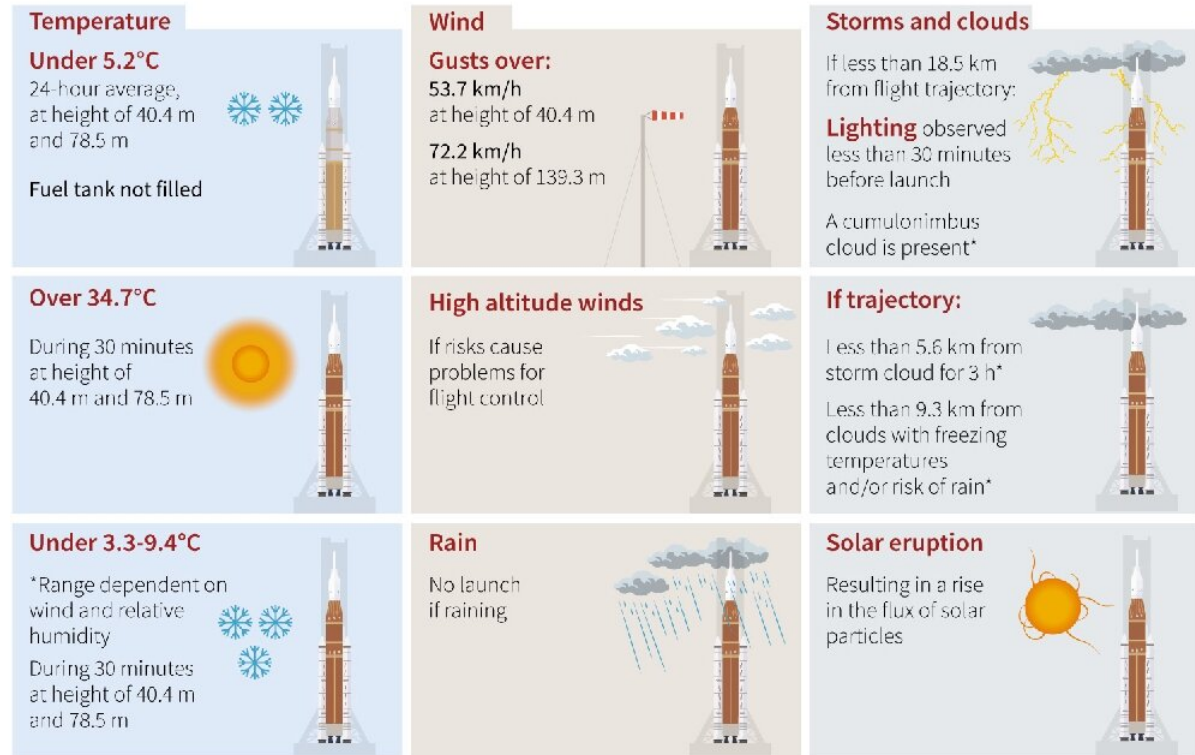
Monday's launch is "not a near-term sprint, but a long-term marathon to bring the solar system and beyond into our sphere," said Bhavya Lal, NASA associate administrator for technology, policy and strategy.

The next mission, Artemis 2, will take astronauts into orbit around the Moon without landing on its surface. The crew of Artemis 3 is to land on the Moon in 2025 at the earliest.

And since humans have already visited the Moon, Artemis has its sights set on another lofty goal—an eventual crewed mission to Mars.

Weather which could postpone the launch of Artemis

Launch cancelled if:



Source: NASA

*Unless certain criteria are met

AFP

Graphic of the various weather conditions which could force the cancellation of NASA's Artemis uncrewed mission to the moon scheduled for August 29.

The Artemis program is to establish a lasting human presence on the Moon with an orbiting space station known as Gateway and a base on the surface.

Gateway would serve as a staging and refueling station for a voyage to Mars that would take a minimum of several months.

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