

Launch of Orion a step to NASA's return to human spaceflight

The first human-rated US spacecraft since the space shuttle took an unmanned trial run.

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CAPE CANAVERAL, FLORIDA

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A crowd of thousands on Florida's 'Space Coast' watched the world's largest rocket launch the new Orion capsule on its first trip to space. NASA's replacement for the space shuttle, Orion could one day carry people to an asteroid and even to Mars. Today, however, it flew without a crew on a trial run that should send it around Earth twice, reaching a peak altitude of 5,800 kilometres (15 times higher than the International Space Station) — farther than any human-rated spacecraft has gone in 40 years. The capsule is due to splash down in the Pacific Ocean about four-and-a-half hours after its launch, which took place Friday, a day late after wind, a wayward boat and a fuel valve glitch prevented a first launch attempt on Thursday. Orion finally lifted off from Cape Canaveral Air Force Station this morning at 7:05 am local time.

"We haven't had this feeling in a while, since the end of the shuttle program," Orion flight director Mike Sarafin of the Johnson Space Center in Houston said Wednesday before the liftoff. "We're launching an American spacecraft from American soil and beginning something new and exploring deep space." Since the last space shuttle landed in 2011, US astronauts have hitched rides to space with the Russians, but NASA is hoping Orion will begin carrying crews by 2021. Sarafin noted that all the flight controllers in mission control for the test flight are veterans of the shuttle program. "There is a little bit of a sense of getting the band back together."

Orion has been in the works since 2005 and was originally envisioned by the Bush administration to fly astronauts back to the moon. The program suffered funding shortfalls and delays and was almost scrapped by President Obama before being redefined as a "multipurpose crew vehicle." The 3.3-meter-tall and five-meter-wide cone is designed to carry two to six astronauts for up to 21 days.

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Today's roughly \$370-million test flight paves the way for a possible first crewed flight that would send astronauts to orbit the moon. A follow-on mission would carry people to an asteroid that a robotic mission will have lassoed in and brought close to the moon's orbit. Eventually, the capsule could take crews to Mars — if it connects to another space habitat for the long journey. No firm dates or plans exist, however, for those future human flights, so the ultimate destiny of Orion is up in the air. "I don't want people to get focused on the destination," NASA administrator Charles Bolden said here on Wednesday. "This is a journey." He stressed that the capsule would have capabilities beyond any previous American spaceship and called Friday's flight "history in the making."

The main goal of Orion's first launch is to test its heat shield, which is an adapted version of the same material that protected the somewhat smaller Apollo capsules on the way back from the moon. Orion's shield must keep the capsule intact as it flies through the scorching 2,200-degree-Celsius flames that arise during reentry into Earth's atmosphere. The test flight will also run the spacecraft's computers and navigation systems through their paces, test the parachutes and make sure the capsule can withstand the intense radiation of the Van Allen radiation belts around Earth, which it must pass through on the way to its high-Earth orbit.

For this debut launch, Orion flew atop a Delta IV Heavy rocket built by the Boeing–Lockheed Martin company called United Launch Alliance. Eventually, Orion is designed to ride on the Space Launch System, NASA's next-generation rocket under development, which will be the most powerful ever built. That booster, planned to debut in 2018, will pack 8.4 million pounds of thrust (compared to the Delta IV Heavy's roughly two million pounds).



Clara Moskowitz/Scientific American

The Orion capsule lifts off on a Delta IV Heavy rocket on 5 December.

After Orion lands in the Pacific Ocean, a US Navy team will find the capsule and tow it aboard a navy transport ship to San Diego. From there it will ride a truck back to Florida, where it should arrive a few days before Christmas. The recovery operation is similar to one used to return the Apollo moon capsules from their water landings in the 1960s and 1970s. "We did have some folks from Apollo that have been assisting us," said Jeff Angermeier, the recovery mission manager. "We have sought their guidance on how they did things during Apollo, and one gentlemen was with us on practice runs and I believe he's also out on the ship with us at this moment."

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