

# NASA chasing down asteroid to scoop up, bring back samples

September 6 2016, by Marcia Dunn

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This artist's rendering made available by NASA on Tuesday, Sept. 6, 2016 shows the Origins Spectral Interpretation Resource Identification Security - Regolith Explorer (OSIRIS-REx) spacecraft contacting the asteroid Bennu with the Touch-And-Go Sample Arm Mechanism. The mission, planned for launch on Thursday, Sept. 8, 2016, aims to return a sample of Bennu's surface to Earth for study as well as return detailed information about the asteroid and its trajectory. (NASA/Goddard Space Flight Center via AP)

NASA is going after an asteroid this week like never before.

It's launching a spacecraft to the exotic black rock named Bennu, vacuuming up handfuls of gravel from the surface, and then in a grand finale, delivering the pay dirt all the way back to Earth.

The mission will take seven years, from Thursday night's planned liftoff from Cape Canaveral to the return of the asteroid samples in 2023, and cover an incredible 4 billion miles (6 ½ billion kilometers) through space.

It promises to be the biggest cosmic bounty since the Apollo moon rocks, hand-picked and delivered by astronauts in the late 1960s and early 1970s.

NASA has already brought back comet dust and specks of solar wind. And Japan already did it at an asteroid a decade ago, and is en route to a second space rock encounter. But we're talking tiny grains in these cases.

NASA's robotic asteroid hunter, Osiris-Rex, is designed to scoop up pebbles and rock the size of gravel—anywhere from one to four or five handfuls.

"We are going out to explore an unknown world," said principal scientist Dante Lauretta of the University of Arizona at Tucson. "We're going to map it in great detail. It will be the most well characterized asteroid in our solar system by the time we're through with it."

Thanks to observations from the Hubble and Spitzer space telescopes, scientists already know the roundish Bennu (BEN'-oo) is about 1,600 feet (487 meters) across at its bulging middle and the color of coal, indicative of carbon richness. It's believed to have formed 4.5 billion years ago, a remnant of the solar system's building blocks. As such, it may still hold clues as to the origin of life on Earth and, possibly, elsewhere in the solar system.

The name Bennu comes from the heron of Egyptian mythology. Osiris was an Egyptian god; Osiris-Rex is an acronym for origins, spectral interpretation, resource identification, security-regolith explorer.

There's also a practical side to the more than \$800 million mission: planetary defense.



This May 21, 2016 photo provided by NASA shows the OSIRIS-REx spacecraft inside a servicing facility at Kennedy Space Center in Florida after arriving from Lockheed Martin's facility near Denver. Its mission, planned for launch on Thursday, Sept. 8, 2016, aims to return a sample of the asteroid Bennu to Earth for study as well as return detailed information about the asteroid and its trajectory. (Dimitri Gerondidakis/NASA via AP)

Bennu is one of many near-Earth asteroids that occasionally cross paths with our planet. The more scientists know about these potentially

hazardous rocks, the better the chance of tracking them and, worst comes to worst, bracing for them.

Bennu wouldn't obliterate Earth or wipe out life, just carve out a huge crater. Lauretta said the odds of a direct hit by Bennu are low—less than one-tenth of 1 percent—and not until about 150 years from now.

"So I like to say, 'Don't run out and buy asteroid insurance tonight, you're not going to need it,' " Lauretta said.

You can, however, mark your calendars for the Osiris-Rex flight plan:

—Thursday: Launch of Osiris-Rex spacecraft atop an unmanned Atlas V rocket from Cape Canaveral Air Force Station. Forecasters on Tuesday said good weather was expected for Thursday's 7:05 p.m. EDT launch. NASA has until mid-October to send the SUV-size spacecraft on its way. With its twin solar wings, it resembles a boxy bird.

—Sept. 22, 2017: Osiris-Rex swings by Earth for a gravity assist toward Bennu, putting it in the same orbital plane. Onboard cameras will snap and send pictures of the home planet. The spacecraft will come within 10,000 miles (16,100 kilometers) to 17,000 miles (27,400 kilometers) of Earth.

—August 2018: Osiris-Rex arrives at Bennu. The spacecraft will fly in formation with the asteroid, as well as orbit it from an altitude of less than a half mile—roughly 700 meters—in search of the best real estate for the sample grab. Lauretta said it will be the smallest body ever orbited by a spacecraft.

—July 2020: Osiris-Rex goes for the cosmic gold, flying close to the surface and reaching out with its 10-foot (3-meter) robotic arm. It will fire nitrogen gas to stir up the surface, and like a vacuum, suck in the

loosened dirt and gravel. Scientists want at least 2 ounces (60 grams). If they get less, they'll try again. In all, the spacecraft can try three times to gather samples before it runs out of nitrogen gas. Testing on Earth has yielded as much as 14 to 18 ounces (400 to 500 grams).

—March 2021: Osiris-Rex leaves Bennu and heads back to Earth. This is when the asteroid and our planet are best aligned in space for the trip home. The samples will come back in the same kind of container as the comet dust from NASA's Stardust mission in 2006. "The big prize," as NASA program scientist Jeff Grossman calls it, will be free of contamination. Incoming chunks of asteroids are altered as they plunge through the atmosphere and smash into Earth, and it's impossible to know where these pieces come from.

—Sept. 24, 2023: Finally free of Osiris-Rex, which will continue to orbit the sun, the sample container re-enters the atmosphere at more than 27,000 mph (43,450 kph). Parachutes will slow the descent as the container comes in for a touchdown at Utah Test and Training Range, west of Salt Lake City. The container will end up at Johnson Space Center in Houston, its final destination.

"It really is a great adventure ... we are bringing back scientific treasure," Lauretta said.

**More information:** NASA: [www.nasa.gov/osiris-rex](http://www.nasa.gov/osiris-rex)

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