



OSIRIS-REx Spacecraft Arrives at Asteroid Bennu

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OSIRIS-REx (Origins, Spectral Interpretation, Resource Identification, Security-Regolith Explorer) mission has arrived at asteroid Bennu after a two-year journey.

- OSIRIS-REx was launched from Cape Canaveral, Florida on September 8, 2016.
- The OSIRIS-REx mission is not the first to ever visit an asteroid and attempt a sample return — **Japan has done (Hayabusa Mission) it before and Europe (Rosetta Mission) has managed to land on a comet.**

Mission

- The Mission aims to study asteroid Bennu, **collect a sample and return it to Earth in 2023.**
- The mission will spend 2.5 years, mapping its surface and studying its composition.
- In mid-2020, scientists will direct Osiris-Rex to drop down to the asteroid and grab at least 60g of regolith, or "topsoil".
- This will be packed away in a sterile capsule to be returned home in 2023.

Mission Objective

The OSIRIS-REx name is an acronym of the mission objectives, which are:

- **Origins:** Return and analyze a pristine carbon-rich asteroid sample
- **Spectral Interpretation:** Provide ground truth or direct observations for telescopic data of the entire asteroid population
- **Resource Identification:** Map the chemistry and mineralogy of a primitive carbon-rich asteroid
- **Security:** Measure the effect of sunlight on the orbit of a small asteroid, known as the Yarkovsky effect—the slight push created when the asteroid absorbs sunlight and re-emits that energy as heat
- **Regolith Explorer:** Document the regolith (layer of loose, outer material) at the sampling site at scales down to the sub-centimeter

Significance of Mission

- **Origins of the Solar System**

- In order to understand the origin and evolution of the solar system.
- Bennu may have molecules of carbon and water, both of which are necessary for life.
- As Earth formed, and afterward, objects like Bennu delivered these materials to our planet. By studying Bennu, we can better understand how life originated on earth.

- **Protecting Earth**

- Bennu is one of the most potentially hazardous asteroids currently known to Earth. Bennu has a 1-in-2,700 chance of impacting earth during one of its close approaches to Earth in the late 22nd century.
- Close observations by OSIRIS-REx will help get more information about Bennu's journey and help scientists working on safeguarding our planet against hazardous asteroids.

- **Mining, LaunchPad, and Future Explorations**

- The mission will help to explore the possibility of using asteroids as refueling stations for spacecraft on the way to farther-flung destinations.
- Asteroids might also help astronauts restock their supplies. For example, Bennu likely has water bound in clay minerals, which could perhaps one day be harvested for providing water to astronauts.
- Asteroids contain a range of valuable minerals, there is a possibility of mining asteroids in the future.

About Bennu

- The asteroid was discovered by the **Lincoln Near-Earth Asteroid Research (LINEAR)** survey on September 11, 1999.
- It was originally named as **1999 RQ36**.
- The name Bennu comes from an Egyptian deity related to the Sun, often depicted as a gray heron.
- Bennu is a 500-meter wide asteroid in an elliptical orbit around the sun. It is a **carbonaceous asteroid** composition including a large amount of carbon.

Why Bennu?

- **It's close to Earth**

- Bennu's orbit is close in proximity to Earth's, even crossing it. The asteroid makes its closest approach to Earth every 6 years.
- It also circles the Sun nearly in the same plane as Earth, which makes it simple to launch the spacecraft out of Earth's plane and into Bennu's plane.

- **It's the right size**

- Small asteroids, with diameters of 200 meters or less, spin very fast. This rapid spinning makes it difficult for a spacecraft to match an asteroid's velocity and collect samples.
- Bennu's size makes it approachable and makes landing possible.