



# OSIRIS-REx Mission: NASA

## Why in News

Recently, [NASA's OSIRIS-REx spacecraft](#) briefly touched down on the surface of **asteroid Benu** to collect rock and dust samples.

## Key Points

### ▪ About OSIRIS-REx Mission:

- It is the **United States' first asteroid sample return mission**, aiming to collect and carry a pristine, unaltered sample from an asteroid back to earth for scientific study.
- The **OSIRIS-REx** (Origins, Spectral Interpretation, Resource Identification, Security, Regolith Explorer) **spacecraft was launched in 2016** for the journey **to Benu**.
- The mission is essentially a **seven-year-long voyage** and will conclude when at least 60 grams of samples are delivered back to the Earth (in 2023).
- As per the [National Aeronautics and Space Administration \(NASA\)](#), the mission promises to bring the **largest amount of extraterrestrial material back to the Earth since the Apollo era**.
  - Apollo was the NASA program that resulted in American astronauts' making a total of 11 space flights and walking on the moon (1968-72).
- The spacecraft **contains five instruments** meant to explore Benu including cameras, a spectrometer and a laser altimeter.
- Recently, the **spacecraft's robotic arm called the Touch-And-Go Sample Acquisition Mechanism (TAGSAM)**, made an attempt to "TAG" the asteroid at a sample site and collected a sample.
- The departure window for the mission will open up in 2021, after which it will take over two years to reach back to Earth.

### ▪ Asteroid Benu:

- Benu is **an ancient asteroid**, currently **more than 200 million miles from Earth**.
- Benu **offers scientists a window into the early solar system** as it was first taking shape billions of years ago and tossing ingredients that could have helped seed life on Earth.
  - Significantly, Benu hasn't undergone drastic changes since its formation over billions of years ago and therefore it contains chemicals and rocks dating back to the birth of the solar system. It is also relatively close to the Earth.
- So far, it is known that **this asteroid is a B-type asteroid**, implying that it contains **significant amounts of carbon** and various other minerals.
  - Because of its high carbon content, it reflects about 4% of the light that hits it, which is very low when compared with a planet like Venus, which reflects about 65% of the light that hits it. Earth reflects about 30%.
- Around **20-40% of Benu's interior is empty space** and scientists believe that **it was formed in the first 10 million years of the solar system's formation**, implying that it

- is **roughly 4.5 billion years old**.
- As per high-resolution photographs taken by the spacecraft, the surface of the asteroid is **covered in massive boulders**, making it more difficult to collect samples from its surface.
  - There is a slight possibility that Bennu, which is classified as a **Near Earth Object (NEO)**, **might strike the Earth** in the next century, between the years 2175 and 2199.
    - NEOs are comets and asteroids nudged by the gravitational attraction of nearby planets into orbits which allows them to enter the Earth's neighbourhood.
  - The asteroid was **discovered** by a team from the NASA-funded Lincoln Near-Earth Asteroid Research team in 1999.

## Asteroids

- These are **rocky objects that orbit the Sun, much smaller than planets**. They are **also called minor planets**.
- According to NASA, 9,94,383 is the count of known asteroids, the **remnants from the formation of the solar system over 4.6 billion years ago**.
- Asteroids are **divided into three classes**.
  - First, those found in the **main asteroid belt** between Mars and Jupiter, which is estimated to contain somewhere between 1.1-1.9 million asteroids.
  - The second group is that of **trojans**, which are asteroids that share an orbit with a larger planet.
    - NASA reports the presence of Jupiter, Neptune and Mars trojans. In 2011, they reported an Earth trojan as well.
  - The third classification is **Near-Earth Asteroids (NEA)**, which have orbits that pass close by the Earth. Those that cross the Earth's orbit are called **Earth-crossers**.
    - More than 10,000 such asteroids are known, out of which over 1,400 are classified as **potentially hazardous asteroids (PHAs)**.
    - PHAs are currently defined based on parameters that measure the asteroid's potential to make threatening close approaches to the Earth.
    - Specifically, all asteroids with an Earth Minimum Orbit Intersection Distance (MOID) of 0.05 au or less and an absolute magnitude (H) of 22.0 or less are considered PHAs.

[Source: IE](#)

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