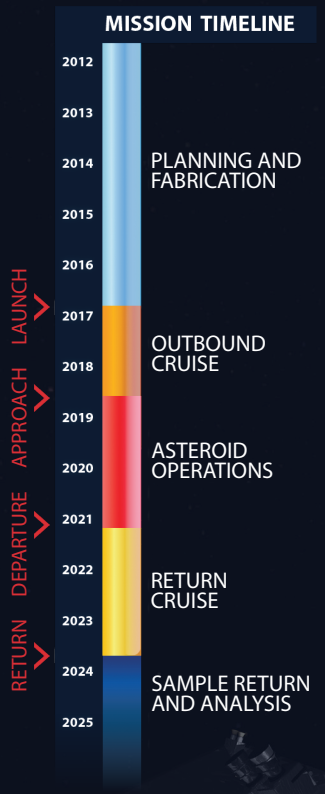
# TIMELINE




The spacecraft will operate at asteroid Bennu for over 400 days.

This 14-year mission will return a sample which scientists will study for decades with ever more capable instruments and new techniques.

# JOIN IN THE MISSION!

OSIRIS-REx offers many opportunities for the public to engage in the mission. From the *Target Asteroids!* citizen science project to internships and exhibits, the science and technology of the mission inspires everyone to learn more about OSIRIS-REx, NASA and space exploration! Activities and programs can be found on the OSIRIS-REx website AsteroidMission.org.

***Send your name to Bennu (and back) at Planetary.org/Bennu***


# MISSION PARTNERS

Scientists, engineers, business managers, communicators, and students work together to create a successful deep-space mission.

THE UNIVERSITY OF ARIZONA
Lunar and Planetary Laboratory

NASA GODDARD JSC KSC MSFC ARC LaRC JPL

LOCKHEED MARTIN

ASU ARIZONA STATE UNIVERSITY

CSA ASC

cnes

KINETX AEROSPACE

MIT

ULA

# WATCH 321SCIENCE

Watch *OSIRIS-REx Presents 321Science* to find out about asteroid-related topics and the OSIRIS-REx mission and engage in planetary science and Solar System exploration. The *321Science* team includes communicators, artists, scientists, engineers, students and the public. Look for the premiere of a new video each month in 2014 at:


youtube.com/OSIRISREx

**FOR MORE INFORMATION VISIT OSIRIS-REX AT:**

**AsteroidMission.org**

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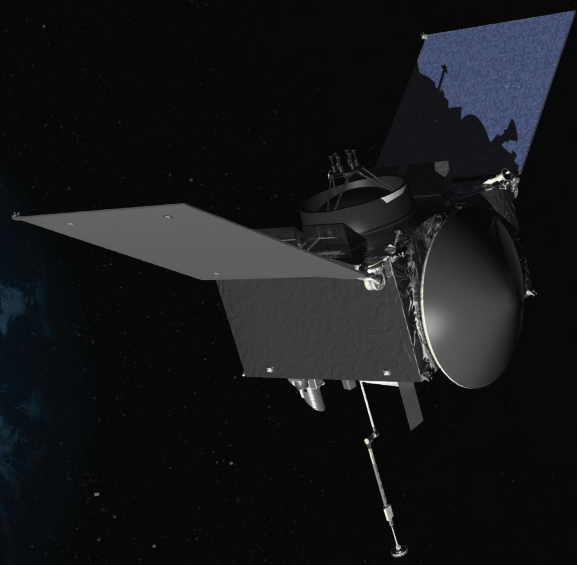
Principal Investigator blog DSLauretta.com

# OSIRIS-REx™

## ASTEROID SAMPLE RETURN MISSION



EXPLORING OUR PAST

SECURING OUR FUTURE

OSIRIS-REx
ASTEROID SAMPLE RETURN MISSION

# SCIENCE OBJECTIVES DEFINE THE MISSION

Exploring asteroid Bennu will help scientists answer fundamental questions about our Solar System:

*How did the Solar System form?*
*What was the proto-planetary disk made of?*
*Are building blocks of life found on asteroids?*
*How can we avoid asteroid impacts with Earth?*

O – Origins
Return and analyze a sample of this pristine carbon-rich asteroid in an amount sufficient to study the nature, history, and distribution of its minerals and organic material.

SI - Spectral Interpretation
Characterize the global properties of this primitive carbonaceous asteroid to allow for direct comparison with ground-based telescopic data for all asteroids.

RI - Resource Identification
Map the global properties, chemistry, and mineralogy of this primitive carbonaceous asteroid to characterize its geologic and dynamic history and provide context for the returned samples.

S - Security
Measure the Yarkovsky effect on this potentially hazardous asteroid and constrain the asteroid properties that contribute to this effect.

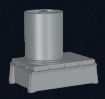
REx - Regolith Explorer
Document the texture, morphology, geochemistry, and spectral properties of the regolith (surface material) at the sampling site at scales down to the sub-centimeter.

# SPACECRAFT FAST FACTS

- 2 meters (6.6 feet) per side
- 8.5 $m^2$ (91 $ft^2$) of solar panels
- 5 instruments and TAGSAM
- Sample Return Capsule for return to Earth

The spacecraft carries several instruments to collect the data key to achieving the science objectives of the mission.

OSIRIS-REx Camera Suite (OCAMS)
Long-range acquisition, global mapping, sample site imaging and documentation



OSIRIS-REx Thermal Emission Spectrometer (OTES)
Mineral and thermal emission spectral maps and local spectral information of candidate sample sites

OSIRIS-REx Visible and IR (OVIRS)
Mineral and organic spectral maps and local spectral information of candidate sample sites in near-infrared

OSIRIS-REx Laser Altimeter (OLA)
Ranging data, global topographic mapping, and local topographic mapping of candidate sample sites

Regolith X-ray Imaging Spectrometer (REXIS)
Soft X-ray elemental abundance mapping, sample site documentation

The Touch-And-Go Sample Acquisition Mechanism (TAGSAM) will obtain between 60 grams (2.1 ounces) and up to 2 kilograms (4.4 pounds) of sample.

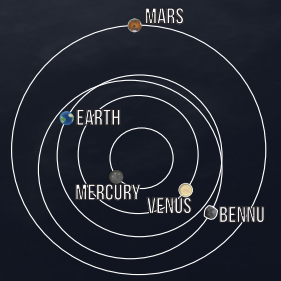
The Sample Return Capsule will touchdown in the Utah desert in 2023.

# ASTEROID FAST FACTS

The spacecraft will travel from the Earth to asteroid Bennu and back. Scientists selected this asteroid because it is a carbon- and volatile-rich object, representative of the early Solar System. It may also pose an impact threat to Earth and may provide answers to fundamental questions about our Solar System.

- Near-Earth asteroid
- About 500 meter (1/3 mile) diameter
- 4.3 hour rotation period
- 436.6 day orbit of the Sun at 27.8 km/s (62,120 mph)
- Collection of material into an oblate shape like a spinning top
- Possible source of carbon compounds and water
- Potential hazard to Earth (in late 22nd century)

Using the world's most powerful radio telescope, the Arecibo Planetary Radar System in Puerto Rico, scientists created a shape model of the asteroid.




*This drawing shows the orbits of the four inner planets and the asteroid (looking from above the Solar System) as it will be on March 4, 2021 – when the sample begins its return to Earth.*