OSIRIS-REx: Asteroid Sample Return Mission

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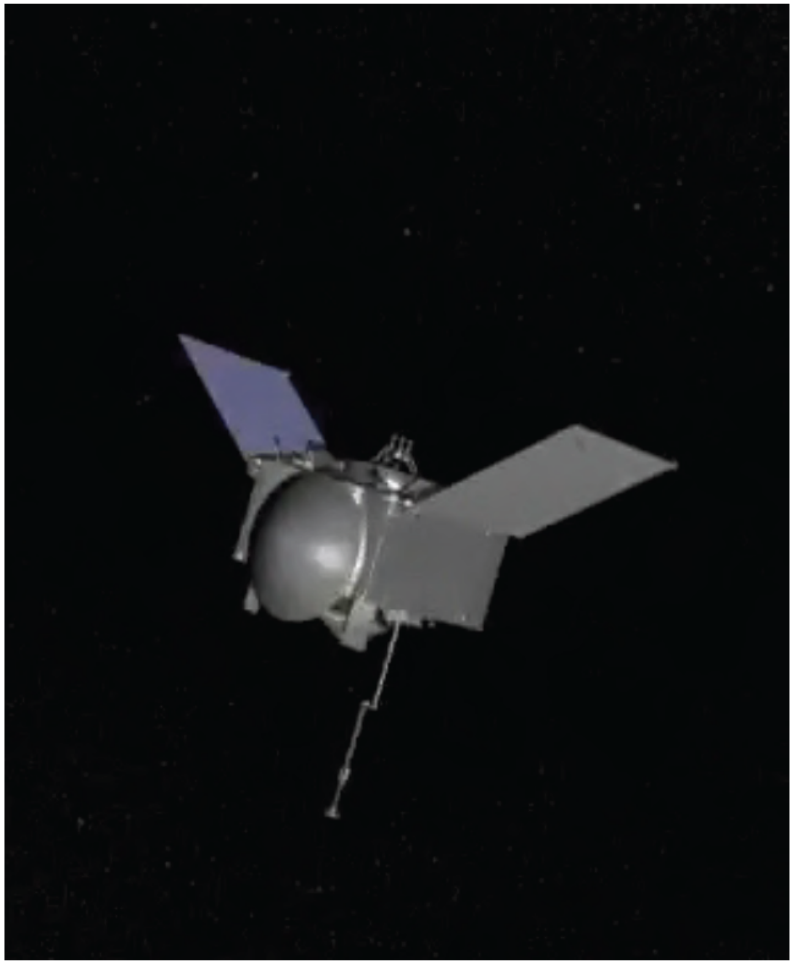
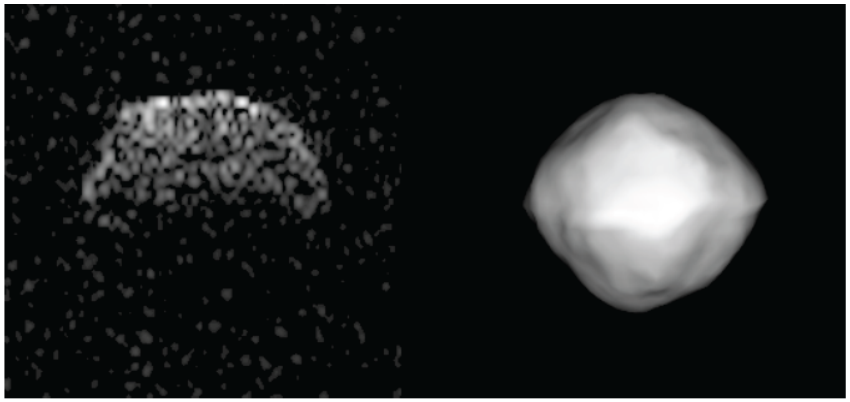
OSIRIS-REx Team Member

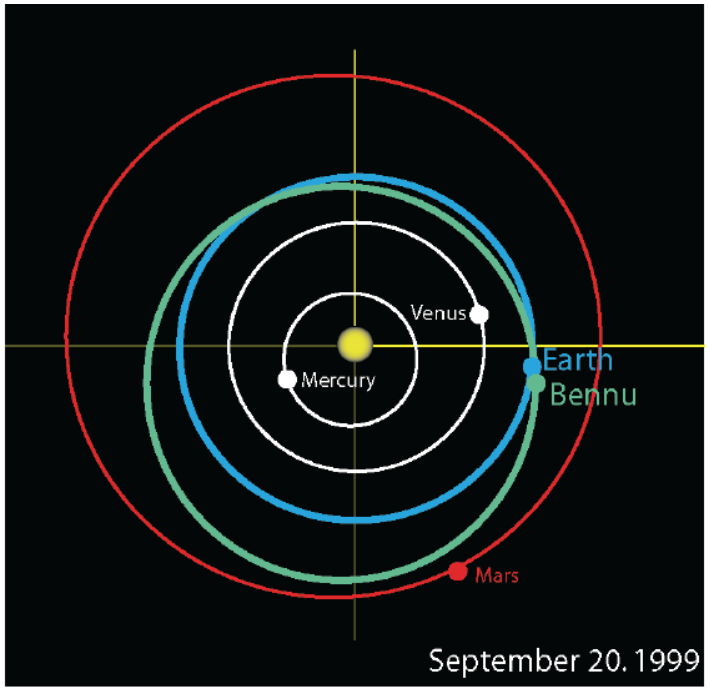
OSIRIS-REx Defined



- **O**rigins
  - Return and analyze a sample of pristine carbonaceous asteroid regolith
- **S**pectral **I**nterpretation
  - Provide ground truth for telescopic data of the entire asteroid population
- **R**esource **I**dentification
  - Map the chemistry and mineralogy of a primitive carbonaceous asteroid
- **S**ecurity
  - Measure the Yarkovsky effect on a potentially hazardous asteroid
- **R**egolith **Ex**plorer
  - Document the regolith at the sampling site at scales down to the sub-cm

OSIRIS-REx Target: Asteroid (101955) Bennu





- Images used to construct a geologically detailed three-dimensional model and define the rotation state
  - **Size =** 492-m (±20 m, mean diameter)
  - **Shape =** spheroidal "spinning top"
  - **Rotation state =** 4.3 hr period, 180° obliquity
- Radar also probed the near-surface bulk density and structure

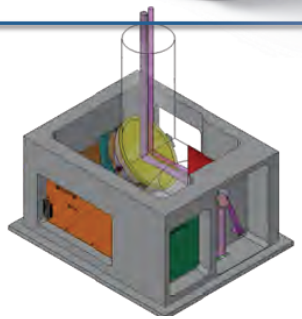
OSIRIS-REx Payloads (1/2)

OCAMS (UA)

SamCam images the sample site, documents sample acquisition, and images TAGSAM to evaluate sampling success

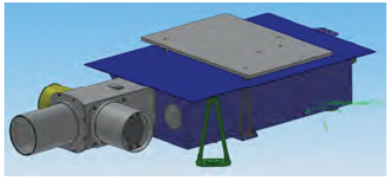
MapCam provides landmark-tracking OpNav, performs filter photometry, maps the surface, and images the sample site

PolyCam acquires Bennu from >500K-km range, performs star-field OpNav, and performs high-resolution imaging of the surface



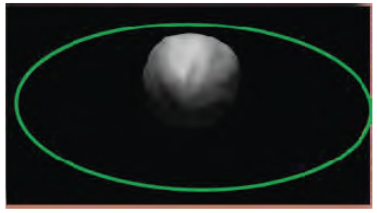
OLA (CSA) provides ranging data out to 7 km and maps the asteroid shape and surface topography

OSIRIS-REx Payloads (2/2)



OVIRS (GSFC) maps the reflectance albedo and spectral properties from 0.4 – 4.3 µm

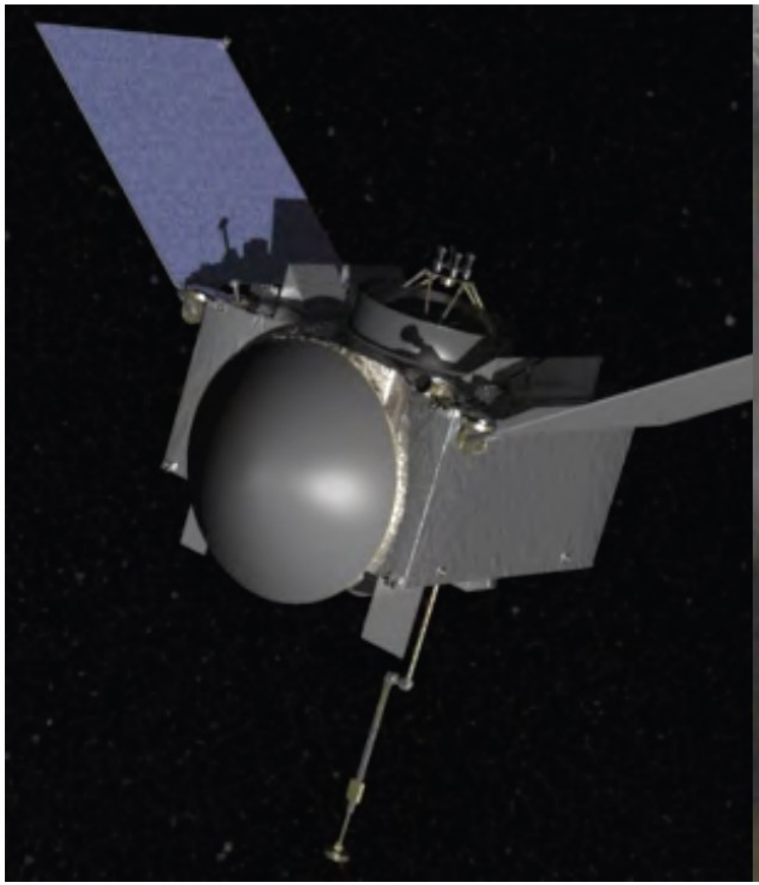
OTES (ASU) maps the thermal flux and spectral properties from 4 – 50 µm

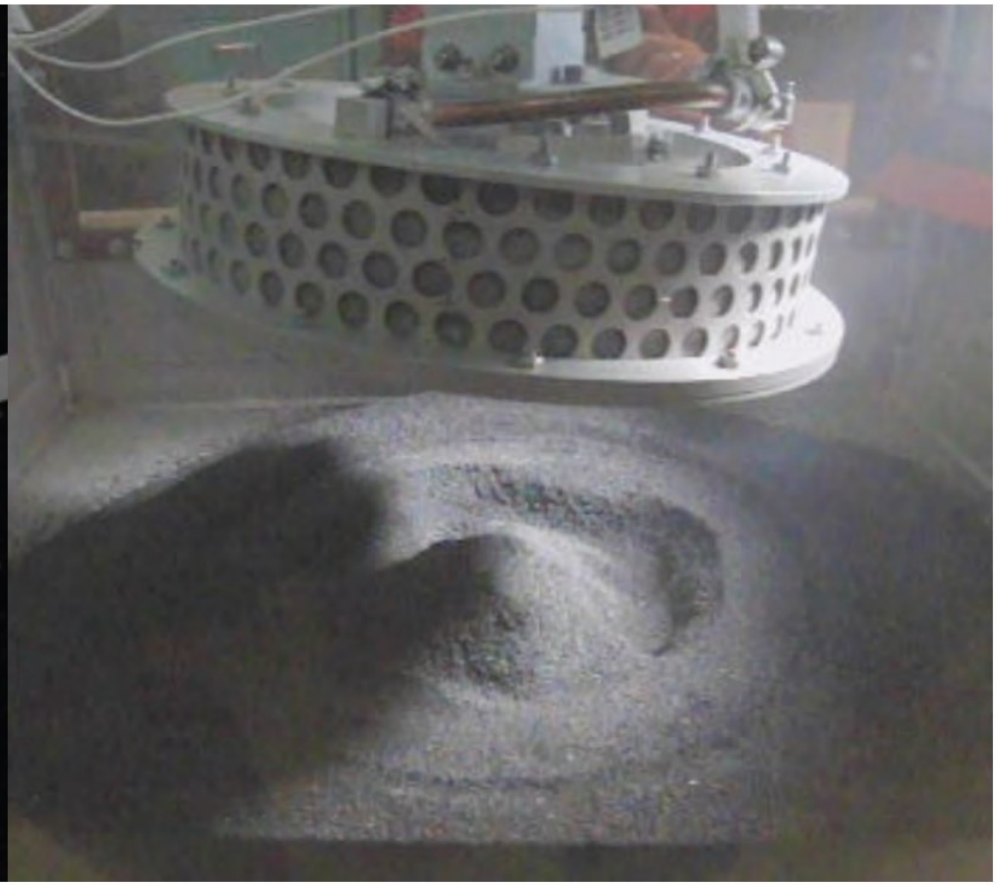


Radio Science (CU) reveals the mass, gravity field, internal structure, and surface acceleration distribution

REXIS (MIT) is a Student Collaboration Experiment that trains the next generation of scientists and engineers and maps the elemental abundances of the asteroid surface

SAMPLE COLLECTION SYSTEM: TAGSAM



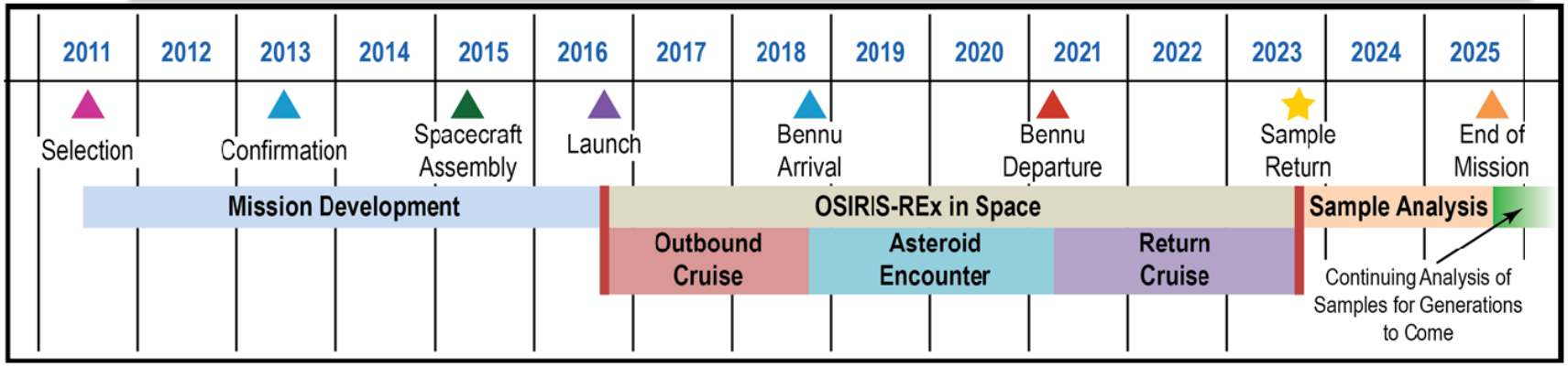


Successful launch of OSIRIS-REx Last week!

Credit: NASA & OSIRIS-REx

Cape Canaveral, FL
ULA's Atlas V rocket
September 8, 2016 ~7:05 pm EDT

OSIRIS-REx Timeline



- Selection: May 25, 2011
- Confirmation: April, 2013
- Spacecraft Assembly: February, 2015
- Launch: September, 2016
- Bennu Arrival: August, 2018
- Bennu Departure: March, 2021
- Sample Return: September, 2023
- End of Mission: September, 2025