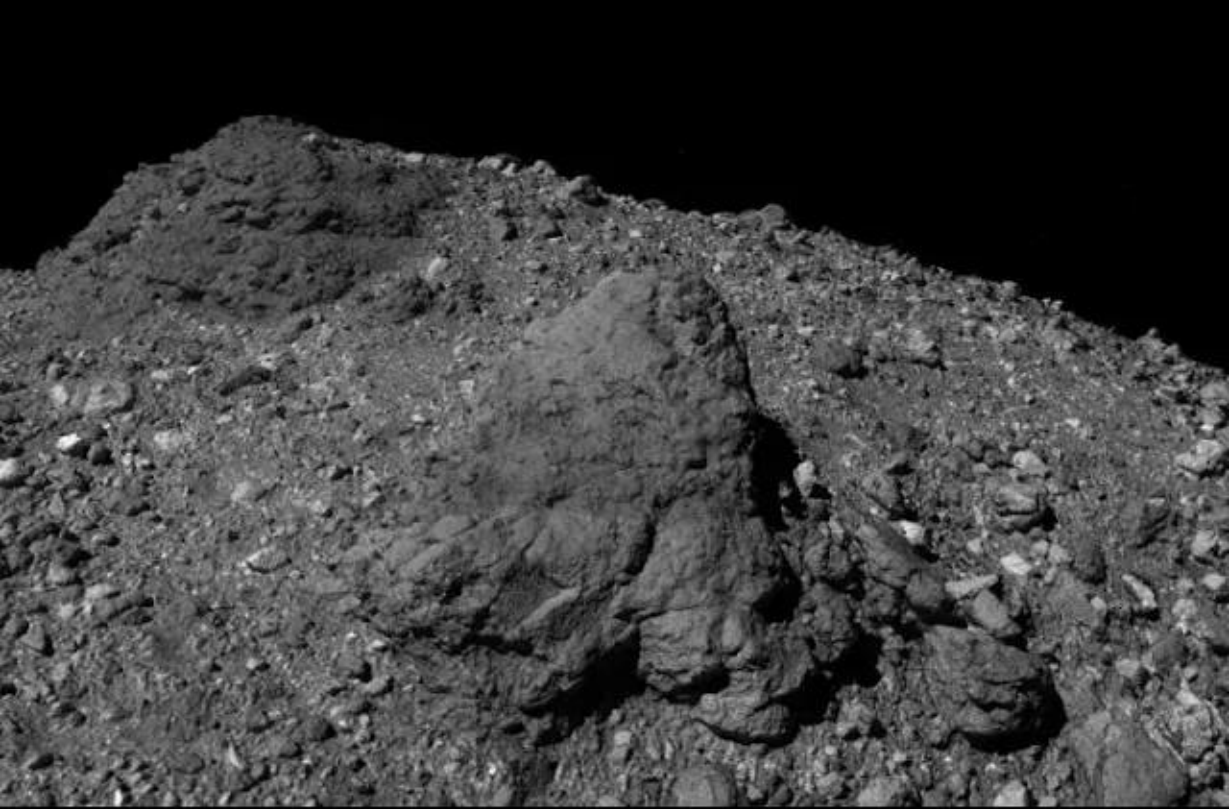

1
00:00:00,000 --> 00:00:02,135
(music throughout) After its discovery in 1999

2
00:00:02,135 --> 00:00:04,471
Our first hints of what asteroid Bennu looked like

3
00:00:04,471 --> 00:00:06,806
came from the Arecibo Observatory.

4
00:00:06,806 --> 00:00:11,111
Then, as the OSIRIS-REx spacecraft made its way to Bennu, the asteroid grew in detail

5
00:00:11,111 --> 00:00:18,718
from a few tiny pixels to a surprisingly rugged world, littered with giant boulders.

6
00:00:18,718 --> 00:00:23,390
OSIRIS-REx arrived at the asteroid on December 3, 2018, and began

7
00:00:23,390 --> 00:00:34,000
surveying the asteroid for the years leading up to the Touch-and-Go sample collection event

8
00:00:34,000 --> 00:00:38,071
The spacecraft discovered boulders the size of buildings,

9
00:00:38,071 --> 00:00:42,142
and imaged the surface down to 5 centimeter per pixel resolution.

10
00:00:42,142 --> 00:00:46,479
While observing Bennu, we made some unexpected discoveries.

11
00:00:46,479 --> 00:00:50,316
OSIRIS-REx spotted pieces of rocky ejecta bursting off Bennu and into space.

12
00:00:50,316 --> 00:00:56,790
The spacecraft was able to observe the entire lifecycle of a natural satellite ejecting off an object,

13
00:00:56,790 --> 00:01:00,660

entering into orbit, and returning back to the surface.

14
00:01:00,660 --> 00:01:04,664
OSIRIS-REx caught a glimpse of a black hole 30,000 light years away.

15
00:01:04,664 --> 00:01:09,736
The discovery was made by an instrument about the size of a shoebox called REXIS

16
00:01:09,736 --> 00:01:12,772
the Regolith X-Ray Imaging Spectrometer.

17
00:01:12,772 --> 00:01:19,646
It detected X-rays radiating from a point off the asteroid’s edge.

18
00:01:19,646 --> 00:01:24,684
OSIRIS-REx has imaged Bennu better than we have Earth and our own Moon.

19
00:01:24,684 --> 00:01:28,121
Using this extremely high-resolution data, we have been able to create

20
00:01:28,121 --> 00:01:30,623
stunning visualizations of the surface of the asteroid.

21
00:01:30,623 --> 00:01:36,362
We used imagery from the Nightingale sample site to created a 360/VR visualization of the rugged terrain.

22
00:01:36,362 --> 00:01:39,499
Using an extensive catalogue of surface imagery, OSIRIS-REx

23
00:01:39,499 --> 00:01:43,570
navigated itself autonomously down to the surface for sample collection.

24
00:01:43,570 --> 00:01:46,773
It used software called Natural Feature Tracking to match up landmarks

25
00:01:46,773 --> 00:01:52,545
with its catalogue to ensure it was on the right track.

26
00:01:52,545 --> 00:01:55,782
Approximately 200 million miles away from Earth,

27
00:01:55,782 --> 00:02:00,520
the spacecraft performed a series of burns to navigate itself to the rocky surface.

28
00:02:00,520 --> 00:02:03,923
At 6:08 pm eastern on October 20, 2020,

29
00:02:03,923 --> 00:02:10,230
OSIRIS-REx successfully tagged sample site Nightingale within one meter of its targeted location

30
00:02:10,230 --> 00:02:19,672
The onboard cameras captured incredible footage of the Touch-and-Go Sample Acquisition Mechanism (TAGS

31
00:02:19,672 --> 00:02:25,178
Imagery from SamCam showed rocks and dust overflowing from the TAGSAM head.

32
00:02:25,178 --> 00:02:27,680
The team is confident they’ve exceeded the mission requirement

33
00:02:27,680 --> 00:02:36,189
of collecting at least 60 grams of material, and on October 29th, 2020, they stowed the sample for return to Ear