1
00:00:00,934 --> 00:00:05,806
NASA’s OSIRIS-REx spacecraft is
heading to asteroid Bennu...

2
00:00:05,806 --> 00:00:10,811
and back. [music]

3
00:00:10,811 --> 00:00:14,481
[music]

4
00:00:14,481 --> 00:00:16,250
The OSIRIS-REx mission
goal is to study

5
00:00:16,250 --> 00:00:21,255
near-Earth asteroid Bennu and
return a sample to Earth. \h

6
00:00:21,255 --> 00:00:25,926
OSIRIS-REx’s launch window opens
September 8, 2016 from Space

7
00:00:25,926 --> 00:00:29,863
Launch Complex 41 at Cape
Canaveral, Florida.

8
00:00:29,863 --> 00:00:39,039
[dramatic music]
[rocket fires]

9
00:00:39,039 --> 00:00:42,376
The spacecraft, nestled
inside a Centaur upper stage,

10
00:00:42,376 --> 00:00:46,680
launches on an Atlas V
rocket with a single
solid rocket booster.

11

00:00:46,680 --> 00:01:00,794
[rocket stops firing]
[dramatic music continues]

12
00:01:00,794 --> 00:01:06,400
The rocket’s first
stage separates...

13
00:01:06,400 --> 00:01:10,571
and then the Centaur upper
stage fires.

14
00:01:10,571 --> 00:01:16,643
The fairings separate
from the rocket...

15
00:01:16,643 --> 00:01:23,016
and the OSIRIS-REx
spacecraft releases from
the Centaur upper stage.

16
00:01:23,016 --> 00:01:30,023
Angled toward the Sun, the
spacecraft deploys its solar
arrays.

17
00:01:30,023 --> 00:01:33,827
Now traveling over
25,000 miles per hour,

18
00:01:33,827 --> 00:01:39,166
OSIRIS-REx escapes Earth’s
gravity...

19
00:01:39,166 --> 00:01:41,735
and begins its cruise toward
asteroid Bennu.

20
00:01:41,735 --> 00:01:46,039
[softer, driving music]

21
00:01:46,039 --> 00:01:48,041
After 23 months, the
spacecraft arrives at

22
00:01:48,041 --> 00:01:53,280
asteroid Bennu in August, 2018.

23
00:01:53,280 --> 00:01:58,251
With its suite of observational
instruments, OSIRIS-REx orbits

24
00:01:58,251 --> 00:02:03,190
the asteroid... studying its
characteristics and mapping its

25
00:02:03,190 --> 00:02:08,962
surface. After four phases of
survey observations, OSIRIS-REx

26
00:02:08,962 --> 00:02:15,302
begins preparations to collect
the sample. In July 2020, after

27
00:02:15,302 --> 00:02:18,905
months of rehearsals and study,
the spacecraft approaches for

28
00:02:18,905 --> 00:02:23,744
sample collection. It slowly
descends to Bennu’s surface at

29
00:02:23,744 --> 00:02:28,215
less than a quarter mile per
hour. With an outstretched arm,

30
00:02:28,215 --> 00:02:32,853
OSIRIS-REx briefly touches the
surface. The touch-and-go sample

31

00:02:32,853 --> 00:02:36,857
acquisition mechanism, TAGSAM,
blows high-pressure nitrogen gas

32
00:02:36,857 --> 00:02:40,894
into the surface rocks and dust,
sending loose asteroid material

33
00:02:40,894 --> 00:02:42,796
up into the TAGSAM head.

34
00:02:42,796 --> 00:02:47,334
[dramatic rise and
fall in the music]

35
00:02:47,334 --> 00:02:52,105
OSIRIS-REx backs away
from Bennu... and stows the

36
00:02:52,105 --> 00:02:55,042
sample in a capsule for its
journey to Earth.

37
00:02:55,042 --> 00:03:02,282
[calm driving music continues]

38
00:03:02,282 --> 00:03:06,987
In March 2021, the window opens
for OSIRIS-REx to depart Bennu.

39
00:03:06,987 --> 00:03:09,556
[music drives harder]

40
00:03:09,556 --> 00:03:15,896
The spacecraft returns to Earth
September 24, 2023 and
jettisons the Sample Return

41
00:03:15,896 --> 00:03:20,067
Capsule. As the spacecraft

leaves Earth, the return capsule

42
00:03:20,067 --> 00:03:25,005
enters the Earth’s atmosphere at
over 27,000 miles per hour,

43
00:03:25,005 --> 00:03:27,007
protected by a heat shield.

44
00:03:27,007 --> 00:03:34,014
[intense friction of heat
shield against atmosphere]
[driving music continues]

45
00:03:34,014 --> 00:03:37,117
A couple miles above the
surface, a parachute deploys...

46
00:03:37,117 --> 00:03:45,025
[parachute deploys
and flutters in the wind]

47
00:03:45,025 --> 00:03:49,029
and the capsule lands
softly in the Utah desert.

48
00:03:49,029 --> 00:03:54,935
[soft thump] [dramatic
music climax]