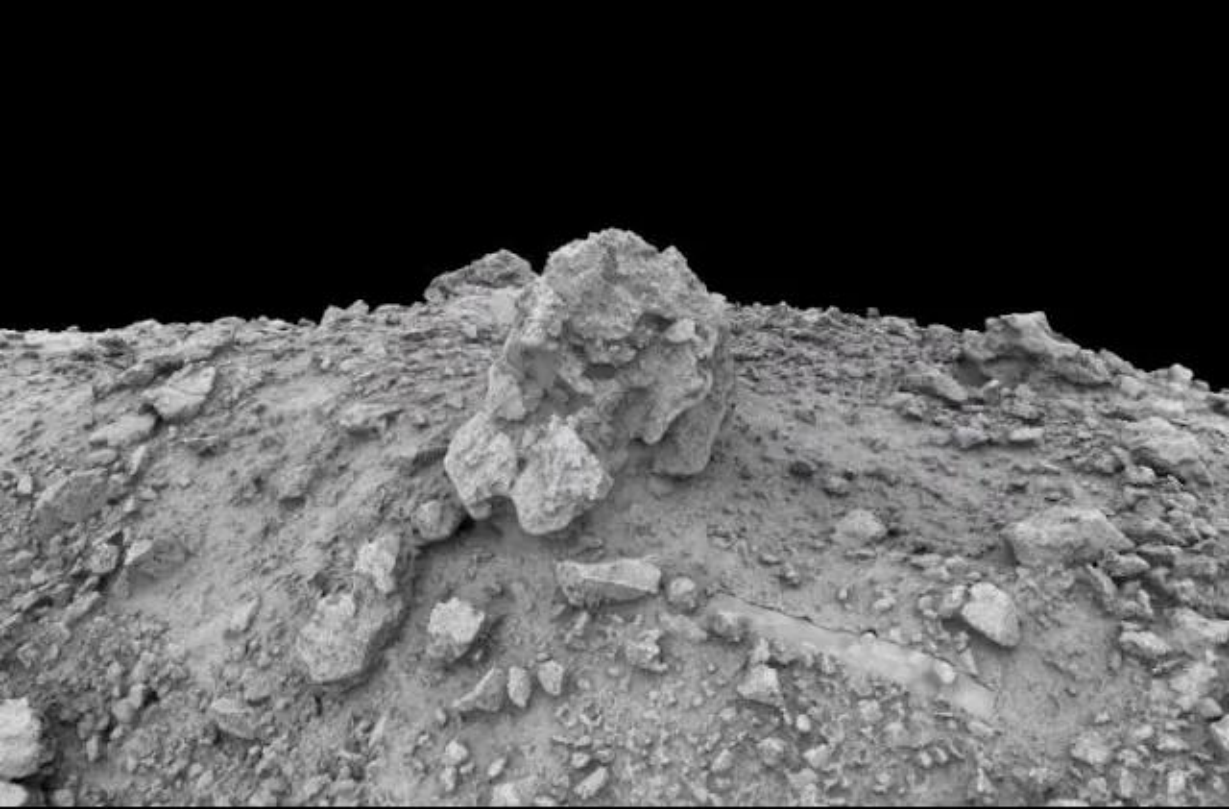

1
00:00:00,166 --> 00:00:01,067
■■■

2
00:00:01,067 --> 00:00:03,003
[Elkins] What makes data visualization a bit different from

3
00:00:03,003 --> 00:00:05,538
other types of animation is that some component

4
00:00:05,538 --> 00:00:07,140
of the visual, some aspect of the visual,

5
00:00:07,140 --> 00:00:09,609
is directly based on some type of science data.

6
00:00:09,609 --> 00:00:11,711
So in the case of the “Tour of Asteroid Bennu,”

7
00:00:11,711 --> 00:00:15,648
the OSIRIS-REx trajectory is actually based on mission data.

8
00:00:15,648 --> 00:00:19,819
The model itself, the asteroid model, that is real LIDAR data

9
00:00:19,819 --> 00:00:22,088
that was collected from the OSIRIS-REx spacecraft.

10
00:00:22,088 --> 00:00:24,257
The imagery that you’re seeing wrapped to the surface of Bennu,

11
00:00:24,257 --> 00:00:27,394
that is actual satellite imagery taken by the spacecraft.

12
00:00:27,394 --> 00:00:29,896
And so that’s kind of the difference between visualization and animation,

13
00:00:29,896 --> 00:00:32,265

is – we're showing the real data, this is the real asteroid.

14
00:00:32,265 --> 00:00:34,934
And so if we zoom all the way in on a boulder, that's the real boulder,

15
00:00:34,934 --> 00:00:37,871
that's what it looked like from the perspective of the spacecraft.

16
00:00:37,871 --> 00:00:42,008
I'm Kel Elkins, and I was the lead data visualizer on the "Tour of Asteroid Bennu."

17
00:00:42,208 --> 00:00:46,346
I'm Dan Gallagher, I was the producer and writer on the "Tour of Asteroid Bennu."

18
00:00:46,346 --> 00:00:49,716
"Tour of Asteroid Bennu" was inspired by an earlier video

19
00:00:49,716 --> 00:00:53,219
that was also made by NASA's Scientific Visualization Studio,

20
00:00:53,219 --> 00:00:55,422
and that video was called "Tour of the Moon."

21
00:00:55,422 --> 00:01:00,593
The visualizer, Ernie Wright, used elevation data and high-resolution imagery

22
00:01:00,593 --> 00:01:03,963
from a NASA spacecraft called the Lunar Reconnaissance Orbiter.

23
00:01:03,963 --> 00:01:07,500
And he was able to fly the camera very close to the lunar surface,

24
00:01:07,500 --> 00:01:11,204
and show the actual textures, shadows, highlights,

25
00:01:11,204 --> 00:01:13,073
in just the way that they would appear if you were

26
00:01:13,073 --> 00:01:15,041
hovering close to the surface of the Moon.

27
00:01:15,041 --> 00:01:16,709
[Elkins] So we kind of borrowed some of those techniques

28
00:01:16,709 --> 00:01:18,478
for the “Tour of Asteroid Bennu,”

29
00:01:18,478 --> 00:01:21,281
really using lighting as a way to help viewers understand

30
00:01:21,281 --> 00:01:23,650
the shape of Bennu and the shape of

31
00:01:23,650 --> 00:01:25,952
these different geological features we were zooming in on.

32
00:01:25,952 --> 00:01:29,622
Which just – it really helped the visualization come to life.

33
00:01:30,490 --> 00:01:32,926
[Gallagher] So a good example of how we use LIDAR

34
00:01:32,926 --> 00:01:34,427
comes about halfway through the video

35
00:01:34,427 --> 00:01:37,664
where we take viewers to a boulder called the Gargoyle.

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00:01:37,664 --> 00:01:41,434
Now, the Gargoyle has a very complex, amorphous shape

37
00:01:41,434 --> 00:01:44,204
and it looks really different when you see it

38
00:01:44,204 --> 00:01:47,173

from different angles in two-dimensional photographs.

39
00:01:47,173 --> 00:01:50,643
But when we finally got a good 3D model of the Gargoyle,

40
00:01:50,643 --> 00:01:54,781
Kel was able to put a virtual camera down near the surface of Bennu,

41
00:01:54,781 --> 00:01:57,484
and rotate it around the boulder in a way that

42
00:01:57,484 --> 00:02:00,086
we never could with two-dimensional imagery.

43
00:02:00,086 --> 00:02:01,921
[Elkins] So something really cool about working on this

44
00:02:01,921 --> 00:02:04,190
particular visualization, and actually all the visualizations

45
00:02:04,190 --> 00:02:06,626
we made for the OSIRIS-REx mission, was,

46
00:02:06,626 --> 00:02:09,195
as the spacecraft got closer and closer to

47
00:02:09,195 --> 00:02:11,331
the asteroid on its way there, and as it spent more time

48
00:02:11,331 --> 00:02:13,933
studying the asteroid, the models got better and better.

49
00:02:13,933 --> 00:02:16,302
The data that was collected was getting better and better.

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00:02:16,302 --> 00:02:18,571
So some of our early visualization tests we had this

51
00:02:18,571 --> 00:02:21,307
relatively low-poly model of the asteroid, and we could only

52
00:02:21,307 --> 00:02:23,543
push in so far with the camera – you can't push in too far

53
00:02:23,543 --> 00:02:25,612
because then you just see, you know, individual polygons.

54
00:02:25,612 --> 00:02:27,914
But as we got further and further along we ended up

55
00:02:27,914 --> 00:02:29,883
with five-centimeter-resolution tiles,

56
00:02:29,883 --> 00:02:32,519
and you can push all the way in to individual boulders.

57
00:02:32,519 --> 00:02:34,287
And that's just the nature of how these science missions work:

58
00:02:34,287 --> 00:02:36,890
the more time you spend with something the more data (you) collect,

59
00:02:36,890 --> 00:02:38,525
the better the models get.

60
00:02:38,525 --> 00:02:40,760
[Gallagher] Missions like OSIRIS-REx take us to

61
00:02:40,760 --> 00:02:42,462
places that we haven't been before,

62
00:02:42,462 --> 00:02:45,965
literally new worlds that we've never experienced,

63
00:02:45,965 --> 00:02:49,102

but they show us those places in ways that

64
00:02:49,102 --> 00:02:51,871
can’t always be easily seen.

65
00:02:51,871 --> 00:02:56,509
“Tour of Asteroid Bennu” gives us a way not only to show the public

66
00:02:56,509 --> 00:03:00,713
what these places are like, but it almost gives us a remote presence.

67
00:03:00,713 --> 00:03:04,417
It allows viewers, and even scientists on the mission,