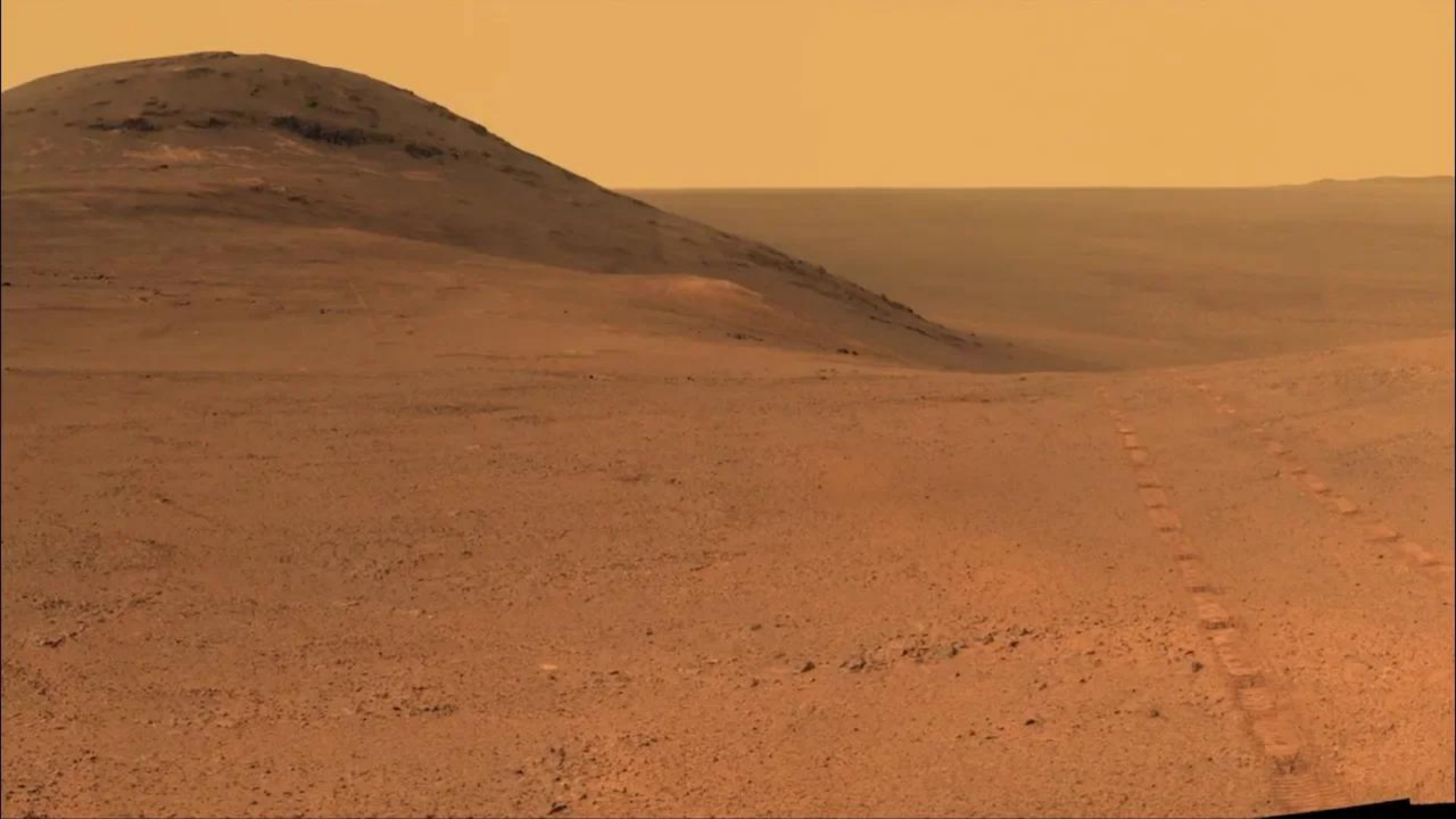

1
00:00:00,420 --> 00:00:02,060
- We have positive confirmation
of a safe landing.

2
00:00:02,635 --> 00:00:03,636
- We're seeing it on the LCP.

3
00:00:03,669 --> 00:00:05,705
[wild celebration]

4
00:00:05,738 --> 00:00:07,006
[indistinct chatter]

5
00:00:07,039 --> 00:00:08,408
[wild celebration]

6
00:00:12,411 --> 00:00:14,047
[John Callas] Opportunity
hit a hole-in-one

7
00:00:14,080 --> 00:00:15,248
when she landed.

8
00:00:15,281 --> 00:00:17,917
The airbag system rolled
into this small crater

9
00:00:17,950 --> 00:00:19,585
called Eagle crater.

10
00:00:19,618 --> 00:00:22,255
And when the rover first
turned on its cameras,

11
00:00:22,288 --> 00:00:24,390
it saw that the rim of
this small crater

12

00:00:24,423 --> 00:00:26,626
was lined with
exposed bedrock.

13
00:00:26,659 --> 00:00:27,994
[Steve Squyres] So, we
took out our microscope

14
00:00:28,027 --> 00:00:29,529
for the first time
and we took a picture

15
00:00:29,562 --> 00:00:31,731
and the surface of
Mars at that location

16
00:00:31,764 --> 00:00:33,699
is littered with an
uncountable number

17
00:00:33,732 --> 00:00:35,134
of little round things...

18
00:00:35,167 --> 00:00:37,136
[Abigail Fraeman] ...that were
called blueberries because they

19
00:00:37,169 --> 00:00:39,005
looked like blueberries
in a muffin.

20
00:00:39,038 --> 00:00:41,908
What we discovered was that
those are features

21
00:00:41,941 --> 00:00:43,109
that form in water

22
00:00:43,142 --> 00:00:45,244
and they were a really

definitive sign

23
00:00:45,277 --> 00:00:48,181
that there had been liquid water
on the surface of Mars

24
00:00:48,214 --> 00:00:50,516
some time in the past.

25
00:00:50,549 --> 00:00:51,884
[Callas] You know, after
we left Eagle crater

26
00:00:51,917 --> 00:00:53,686
we went to Endurance crater

27
00:00:53,719 --> 00:00:56,389
and that's the crater
we drove down in.

28
00:00:56,422 --> 00:00:58,491
And there we did the what
the geologists call

29
00:00:58,524 --> 00:01:00,960
an in sequence
stratigraphic section,

30
00:01:00,993 --> 00:01:03,096
which is essentially
reading the chapters

31
00:01:03,129 --> 00:01:05,298
of the Martian history
book in reverse order.

32
00:01:05,331 --> 00:01:07,600
[Matt Golombek] That rover
became a stratigrapher.

33
00:01:07,633 --> 00:01:10,203
First time we had a
stratigrapher on Mars.

34
00:01:10,236 --> 00:01:11,871
[laughs]

35
00:01:12,705 --> 00:01:16,342
We knew we wanted to go
after Endurance to Victoria.

36
00:01:16,375 --> 00:01:17,677
[Callas] We put the
pedal to the metal,

37
00:01:17,710 --> 00:01:18,478
and we started
heading there,

38
00:01:18,511 --> 00:01:20,246
tens of kilometers away.

39
00:01:20,279 --> 00:01:23,416
We had to literally
surf across these dunes

40
00:01:23,449 --> 00:01:25,251
of windblown material,

41
00:01:25,284 --> 00:01:27,954
and the rover got
stuck in one of those.

42
00:01:27,987 --> 00:01:30,289
We had to get the rover unstuck.

43
00:01:30,322 --> 00:01:32,592
What we found is the
best way to get it out

44
00:01:32,625 --> 00:01:35,761
is just to put it in
reverse and gun it. [Laughs]

45
00:01:35,794 --> 00:01:37,296
The rover eventually
popped out.

46
00:01:37,329 --> 00:01:39,398
And, so we changed
our driving strategy.

47
00:01:39,431 --> 00:01:43,569
So we recognized these
ripples as hazards.

48
00:01:43,602 --> 00:01:46,973
We get to this giant half-mile
diameter crater--

49
00:01:47,006 --> 00:01:49,509
Victoria crater--and
we want to figure out,

50
00:01:49,542 --> 00:01:51,310
"Gee, how can we go
into this thing?"

51
00:01:51,343 --> 00:01:53,346
[Golombek] All of a sudden, we
got HiRISE images.

52
00:01:53,379 --> 00:01:56,115
We could see the
rover in the image.

53
00:01:56,148 --> 00:01:58,017
[Squyres] That was the very
first image that we got

54
00:01:58,050 --> 00:02:01,687
from space showing
one of our rovers.

55
00:02:01,720 --> 00:02:05,124
[Golombek] We spent a year
scouting the edge of that crater

56
00:02:05,157 --> 00:02:06,959
to decide where we
wanted to go in

57
00:02:06,992 --> 00:02:09,862
to get the best
stratigraphic section.

58
00:02:09,895 --> 00:02:12,532
[Callas] We found a place to go
in, and we drove down in

59
00:02:12,565 --> 00:02:16,369
and we spent about a year
inside Victoria crater.

60
00:02:16,402 --> 00:02:18,237
[Heather Justice] The science
team was really excited about

61
00:02:18,270 --> 00:02:22,408
the idea of driving to Endeavor
Crater...over 20 km away.

62
00:02:22,441 --> 00:02:23,676
This is a long drive to do.

63
00:02:23,709 --> 00:02:25,745
It was gonna take
multiple years,

64
00:02:25,778 --> 00:02:27,914
but they decided
to do it anyways.

65
00:02:27,947 --> 00:02:29,248
[Callas] There were
too many of these

66
00:02:29,281 --> 00:02:30,650
dangerous ripples
in our way,

67
00:02:30,683 --> 00:02:34,220
and we actually had to take
this circuitous route that at

68
00:02:34,253 --> 00:02:38,357
times took us away from the
crater only to then cut back and

69
00:02:38,390 --> 00:02:40,092
then approach it more directly.

70
00:02:40,125 --> 00:02:41,827
[Justice] And then we pull up
to Endeavor crater and

71
00:02:41,860 --> 00:02:44,830
all of a sudden there's all
these new things to look at.

72
00:02:44,863 --> 00:02:46,899
[Fraeman] We first discovered
the Homestake vein.

73
00:02:46,932 --> 00:02:50,670
It was this very, very bright
linear feature.

74

00:02:50,703 --> 00:02:53,239
It turns out that it was
a big gypsum vein,

75
00:02:53,272 --> 00:02:56,108
and we see these gypsum
veins now all over.

76
00:02:56,141 --> 00:02:57,777
So, it was our first
taste of what is

77
00:02:57,810 --> 00:03:00,379
a really important
process on Mars.

78
00:03:00,412 --> 00:03:04,050
[Justice] We were driving to a
valley and along the way there

79
00:03:04,083 --> 00:03:05,551
we realized that right
about the point where

80
00:03:05,584 --> 00:03:06,886
we were about to
get to this valley,

81
00:03:06,919 --> 00:03:08,888
that was when we were gonna
cross the marathon mark.

82
00:03:08,921 --> 00:03:10,790
So we said, "well, that's cool,
we're just going to name this

83
00:03:10,823 --> 00:03:12,858
valley after that, call it
Marathon Valley."

84

00:03:12,891 --> 00:03:15,528
That was when we reached the
distance of a marathon,

85
00:03:15,561 --> 00:03:18,631
26.2 miles, on another planet.

86
00:03:18,664 --> 00:03:21,067
We continued driving
through some slopes down,

87
00:03:21,100 --> 00:03:23,769
a little bit on the interior
of the crater rim

88
00:03:23,802 --> 00:03:25,538
until we came back out so
that we could continue

89
00:03:25,571 --> 00:03:27,907
onto the next valley,
Perseverance Valley...

90
00:03:27,940 --> 00:03:29,942
[Golombek] ...where the
rover was exploring

91
00:03:29,975 --> 00:03:32,378
when we lost contact.

92
00:03:32,411 --> 00:03:34,247
[Fraeman] We said, "We're
gonna operate this vehicle

93
00:03:34,280 --> 00:03:36,249
until the day where we can't,"

94
00:03:36,282 --> 00:03:37,416
and that's exactly
what we did,

95
00:03:37,449 --> 00:03:39,318
and I'm really proud.

96
00:03:39,351 --> 00:03:41,320
[Callas] We've set a
foundation that will serve

97
00:03:41,353 --> 00:03:43,990
as the basis for
future exploration.

98
00:03:45,491 --> 00:03:48,694
[Opportunity 2004-2019]

99
00:03:48,727 --> 00:03:50,162
[NASA / Jet Propulsion
Laboratory