1
00:00:08,110 --> 00:00:04,050
[silence]

2
00:00:16,190 --> 00:00:12,130
[music]

3
00:00:16,210 --> 00:00:20,230
sterile, gray, unchanging world. But while the moon has

4
00:00:20,250 --> 00:00:24,270
remained largely unchanged during human history, our own understanding of it has

5
00:00:24,290 --> 00:00:28,290
evolved dramatically. Thanks to new observations,

6
00:00:28,310 --> 00:00:32,310
we now have not only unprecedented views of its surface, but a whole

7
00:00:32,330 --> 00:00:36,320
new tour of the moon that shows how both it and other rocky planets in our solar

8
00:00:36,340 --> 00:00:40,370
system have been shaped over billions of years.

9
00:00:40,390 --> 00:00:44,440
We'll start with one of the largest impacts--Orientale Basin, a feature

10
00:00:44,460 --> 00:00:48,500
that's as wide as the distance from New York City to Cincinnati. Using new

11
00:00:48,520 --> 00:00:52,550
elevation measurements, we can clearly see the effects of what is likely the last

12
00:00:52,570 --> 00:00:56,590
giant impact event in lunar history, with its outer mountain rings

13
00:00:56,610 --> 00:01:00,620

rising many kilometers above the lowest points inside the crater.

14
00:01:00,640 --> 00:01:04,650
The interiors of some craters in the moon's polar regions, like Shackleton,

15
00:01:04,670 --> 00:01:08,670
haven't seen sunlight in over two billion years. However, new

16
00:01:08,690 --> 00:01:12,680
measurements have created our best-yet maps of these types of craters, allowing us to

17
00:01:12,700 --> 00:01:16,770
see deep into the shadows of this surprisingly young-looking impact crater

18
00:01:16,790 --> 00:01:20,840
in the south that's more than twice as deep as the Grand Canyon.

19
00:01:20,860 --> 00:01:24,900
Some impacts are invisible for other reasons. Although the ancient South Pole-Aitken Basin

20
00:01:24,920 --> 00:01:28,950
is difficult to see from orbit because it is so large,

21
00:01:28,970 --> 00:01:33,000
new LRO topography maps reveal the largest impact basin in the Earth-

22
00:01:33,020 --> 00:01:37,040
moon system, measuring several kilometers in depth and around 2500

23
00:01:37,060 --> 00:01:41,060
kilometers in diameter. Only the Hellas basin on Mars

24
00:01:41,080 --> 00:01:45,090
rivals it in size. One of the youngest

25
00:01:45,110 --> 00:01:49,100
large-scale impacts on the moon is the Tycho Crater. This fresh crater

26
00:01:49,120 --> 00:01:53,190
may have formed only 108 million years ago--when dinosaurs roamed the Earth.

27
00:01:53,210 --> 00:01:57,280
We now also have an extreme close-up view of the crater's

28
00:01:57,300 --> 00:02:01,340
central peak--revealing a mountain with sharp edges, building-sized

29
00:02:01,360 --> 00:02:05,400
rocks, and a central boulder about the size of a baseball stadium.

30
00:02:05,420 --> 00:02:09,440
[music]

31
00:02:09,460 --> 00:02:13,480
Narrator: The Aristarchus Plateau is another recent lunar formation that has

32
00:02:13,500 --> 00:02:17,520
long interested scientists and astronomers. The crater itself

33
00:02:17,540 --> 00:02:21,540
formed in the same era as the Tycho Crater, and what appear to be snaking river valleys

34
00:02:21,560 --> 00:02:25,560
were actually carved by ancient lava flows.

35
00:02:25,580 --> 00:02:29,570
[music]

36
00:02:29,590 --> 00:02:33,640
Narrator: Next, we arrive at Mare Serenitatis on the near side of the moon. In December

37
00:02:33,660 --> 00:02:37,720
of 1972, the crew of Apollo 17 landed in the Taurus Littrow

38
00:02:37,740 --> 00:02:41,790

valley, marking the last time humans have visited the surface of the

39
00:02:41,810 --> 00:02:45,850
moon. With images from LRO's narrow-angle

40
00:02:45,870 --> 00:02:49,900
camera, we can clearly see the evidence of that visit. In this

41
00:02:49,920 --> 00:02:53,940
image, you can easily see the base of the lunar lander, along with the lunar

42
00:02:53,960 --> 00:02:57,970
rover, parked far from the blast-off zone. You can also

43
00:02:57,990 --> 00:03:02,000
clearly see the astronaut trails and the wheeltracks left on the lunar surface.

44
00:03:02,020 --> 00:03:06,020
[music]

45
00:03:06,040 --> 00:03:10,100
Narrator: We now head to the far side of the moon--which cannot be seen from Earth. Our

46
00:03:10,120 --> 00:03:14,180
first stop is the Compton-Belkovich region, which shows evidence for young volcanic

47
00:03:14,200 --> 00:03:18,250
activity in the farside highlands. This feature is unique

48
00:03:18,270 --> 00:03:22,320
not only because it is isolated from other volcanoes in the area, but also

49
00:03:22,340 --> 00:03:26,380
because it is located nowhere near the maria, where volcanoes are usually found.

50
00:03:26,400 --> 00:03:30,430
Also, on the far side, we find

51
00:03:30,450 --> 00:03:34,470
the Jackson Crater--which like the Tycho Crater on the near side, has an

52
00:03:34,490 --> 00:03:38,500
extensive and complex ray system. In fact, this crater is often considered

53
00:03:38,520 --> 00:03:42,520
to be like a twin to Tycho. Finally, the

54
00:03:42,540 --> 00:03:46,540
Tsiolkovsky Crater stands out as an excellent example of a farside crater

55
00:03:46,560 --> 00:03:50,620
filled with a sea of ancient lava--known as a mare. It is

56
00:03:50,640 --> 00:03:54,700
particularly interesting to scientists and other observers because of its isolation

57
00:03:54,720 --> 00:03:58,780
from other similar craters--as well as its beautiful central peak.

58
00:03:58,800 --> 00:04:02,840
As we continue to study the moon, our understanding of it

59
00:04:02,860 --> 00:04:06,890
improves, giving us new insights not only into how it has evolved over

60
00:04:06,910 --> 00:04:10,930
time, but also how other rocky planets in our solar system have come to

61
00:04:10,950 --> 00:04:14,970
look the way they do. With new missions, new instruments,

62
00:04:14,990 --> 00:04:19,000
and new technologies, we will continue to improve our knowledge of the moon...

63
00:04:19,020 --> 00:04:23,010

...and better understand the history of our solar system.

64
00:04:23,030 --> 00:04:27,020
[music fades]

65
00:04:27,040 --> 00:04:31,090
[beeping]

66
00:04:31,110 --> 00:04:35,160
[beeping, silence]