
Headphones recommended

1
00:00:08,089 --> 00:00:05,570
on NASA's perseverance Mars Rover we

2
00:00:09,830 --> 00:00:08,099
have not one but two microphones and

3
00:00:11,990 --> 00:00:09,840
these microphones are the very first

4
00:00:14,270 --> 00:00:12,000
instruments of their kind ever to go to

5
00:00:16,430 --> 00:00:14,280
Mars I'm Nina Lanza and I'm a scientist

6
00:00:18,590 --> 00:00:16,440
at Los Alamos National Laboratory hi I'm

7
00:00:20,750 --> 00:00:18,600
Justin Mackey an Imaging scientist at

8
00:00:22,429 --> 00:00:20,760
NASA's jet propulsion Laboratory

9
00:00:24,410 --> 00:00:22,439
one of the microphones is mounted on the

10
00:00:26,630 --> 00:00:24,420
Mast and moves around as we point the

11
00:00:28,370 --> 00:00:26,640
cameras the other microphone is mounted

12
00:00:30,470 --> 00:00:28,380
to the Rover body and it stays fixed

13
00:00:32,330 --> 00:00:30,480

onto the port side of the Rover the two

14
00:00:34,729 --> 00:00:32,340
microphones that we sent were commercial

15
00:00:36,049 --> 00:00:34,739
off-the-shelf items so these are things

16
00:00:38,510 --> 00:00:36,059
that you could just buy on the internet

17
00:00:40,430 --> 00:00:38,520
and we put these on our Rover it gives

18
00:00:42,170 --> 00:00:40,440
us a new dimension for which we can

19
00:00:43,970 --> 00:00:42,180
explore Mars and learn about the Martian

20
00:00:46,069 --> 00:00:43,980
environment first we can just learn

21
00:00:48,650 --> 00:00:46,079
about the Atmosphere by understanding

22
00:00:50,930 --> 00:00:48,660
how sound propagates through it but we

23
00:00:53,689 --> 00:00:50,940
can also listen to the sounds of Rover

24
00:00:56,209 --> 00:00:53,699
analyzes on rocks and learn about the

25
00:00:57,709 --> 00:00:56,219
rock material properties from that and

26
00:00:59,630 --> 00:00:57,719
finally we can also listen to The Sounds

27
00:01:00,889 --> 00:00:59,640
the Rover makes to understand better the

28
00:01:02,569 --> 00:01:00,899
state of health of our instruments

29
00:01:05,570 --> 00:01:02,579
there's a difference between Mars and

30
00:01:10,070 --> 00:01:08,330
sounds on earth have very rich harmonics

31
00:01:13,550 --> 00:01:10,080
you can hear multiple frequencies it

32
00:01:16,310 --> 00:01:13,560
gives a really nice depth to the sound

33
00:01:17,870 --> 00:01:16,320
on Mars the atmosphere attenuates a lot

34
00:01:20,630 --> 00:01:17,880
of those higher frequencies so you tend

35
00:01:23,330 --> 00:01:20,640
to hear the lower frequencies and it's a

36
00:01:24,950 --> 00:01:23,340
much more isolated sound a little more

37
00:01:26,870 --> 00:01:24,960
muted than the sounds we hear on Earth

38
00:01:29,090 --> 00:01:26,880

we put together a list of some of the

39
00:01:31,249 --> 00:01:29,100
sounds we've recorded on Mars to date so

40
00:01:32,330 --> 00:01:31,259
let's take a listen this is the sound of

41
00:01:37,609 --> 00:01:32,340
wind on Mars

42
00:01:40,310 --> 00:01:37,619
[Music]

43
00:01:42,889 --> 00:01:40,320
for the first time we can hear the wind

44
00:01:44,450 --> 00:01:42,899
blowing across the surface of Mars to go

45
00:01:47,149 --> 00:01:44,460
along with all of the images that we've

46
00:01:49,190 --> 00:01:47,159
acquired of dust devils and dust storms

47
00:01:50,149 --> 00:01:49,200
over the many years of exploration on

48
00:01:51,889 --> 00:01:50,159
the surface

49
00:01:59,149 --> 00:01:51,899
this is the sound of the Rover driving

50
00:02:02,450 --> 00:02:00,410
sound might be a little bit weird

51
00:02:03,950 --> 00:02:02,460
because because I'm like a regular

52
00:02:06,170 --> 00:02:03,960
driving sound but that's because the

53
00:02:09,050 --> 00:02:06,180
Rover's wheels are made of metal so this

54
00:02:11,089 --> 00:02:09,060
metal is rolling over rocks and sand and

55
00:02:12,050 --> 00:02:11,099
it makes this really clanky squeaky

56
00:02:14,449 --> 00:02:12,060
sound

57
00:02:18,770 --> 00:02:14,459
next we have the super cam laser zapping

58
00:02:21,650 --> 00:02:20,390
we've taken a lot of pictures of rocks

59
00:02:23,690 --> 00:02:21,660
that have been Zapped by the super cam

60
00:02:25,369 --> 00:02:23,700
the little marks in the rocks and for

61
00:02:27,890 --> 00:02:25,379
the first time we can hear these laser

62
00:02:30,229 --> 00:02:27,900
shots when it zaps the rock it actually

63
00:02:32,210 --> 00:02:30,239

makes a sound we can listen to that

64
00:02:33,410 --> 00:02:32,220
sound and learn something about the

65
00:02:34,850 --> 00:02:33,420
properties of the rock that we're

66
00:02:36,890 --> 00:02:34,860
analyzing

67
00:02:40,009 --> 00:02:36,900
this is one of my absolute favorite

68
00:02:45,589 --> 00:02:40,019
sounds this is the sound of a helicopter

69
00:02:50,030 --> 00:02:47,390
we used this sound to actually

70
00:02:51,530 --> 00:02:50,040
understand the propagation of sound in

71
00:02:53,990 --> 00:02:51,540
general through the Martian atmosphere

72
00:02:55,910 --> 00:02:54,000
and it turns out that we were totally

73
00:02:57,830 --> 00:02:55,920
wrong with our models the Martian

74
00:03:00,110 --> 00:02:57,840
atmosphere can propagate sound a lot

75
00:03:02,089 --> 00:03:00,120
further than we thought it could

76
00:03:04,670 --> 00:03:02,099
we've all seen these beautiful images

77
00:03:06,710 --> 00:03:04,680
that we get from from Mars but having

78
00:03:09,770 --> 00:03:06,720
sound to be able to add to those images

79
00:03:12,500 --> 00:03:09,780
it makes me feel like I'm almost right