
science @ NASA

1
00:00:06,869 --> 00:00:04,630
[Music]

2
00:00:09,589 --> 00:00:06,879
bright explosion on the moon presented

3
00:00:11,589 --> 00:00:09,599
by science at nasa

4
00:00:13,110 --> 00:00:11,599
for the past eight years nasa

5
00:00:15,509 --> 00:00:13,120
astronomers have been monitoring the

6
00:00:17,990 --> 00:00:15,519
moon for signs of explosions caused by

7
00:00:19,910 --> 00:00:18,000
meteoroids hitting the lunar surface

8
00:00:22,790 --> 00:00:19,920
lunar meteor showers have turned out to

9
00:00:25,349 --> 00:00:22,800
be more common than anyone expected with

10
00:00:26,790 --> 00:00:25,359
hundreds of detectable impacts occurring

11
00:00:28,790 --> 00:00:26,800
every year

12
00:00:31,109 --> 00:00:28,800
they've just seen the biggest explosion

13
00:00:35,030 --> 00:00:31,119

in the history of the program

14
00:00:37,190 --> 00:00:35,040
on march 17 2013 an object about the

15
00:00:39,910 --> 00:00:37,200
size of a small boulder hit the lunar

16
00:00:42,389 --> 00:00:39,920
surface in mari imbrium says bill cook

17
00:00:44,709 --> 00:00:42,399
of nasa's meteoroid environment office

18
00:00:46,470 --> 00:00:44,719
it exploded in a flash nearly 10 times

19
00:00:48,069 --> 00:00:46,480
as bright as anything we've ever seen

20
00:00:49,830 --> 00:00:48,079
before

21
00:00:52,150 --> 00:00:49,840
anyone looking at the moon at the moment

22
00:00:54,150 --> 00:00:52,160
of impact could have seen the explosion

23
00:00:56,549 --> 00:00:54,160
no telescope required

24
00:00:59,670 --> 00:00:56,559
for about one second the impact site was

25
00:01:01,910 --> 00:00:59,680
glowing like a fourth magnitude star

26
00:01:04,070 --> 00:01:01,920
ron suggs an analyst at the marshall

27
00:01:06,550 --> 00:01:04,080
space flight center was the first to

28
00:01:08,390 --> 00:01:06,560
notice the impact in a digital video

29
00:01:11,190 --> 00:01:08,400
recorded by one of the monitoring

30
00:01:13,270 --> 00:01:11,200
program's 14-inch telescopes

31
00:01:15,429 --> 00:01:13,280
it jumped right out at me it was so

32
00:01:18,149 --> 00:01:15,439
bright he recalls

33
00:01:20,710 --> 00:01:18,159
the 40 kilogram meteoroid measuring 0.3

34
00:01:24,310 --> 00:01:20,720
to 0.4 meters wide hit the moon

35
00:01:26,469 --> 00:01:24,320
traveling 56 000 miles per hour the

36
00:01:29,190 --> 00:01:26,479
resulting explosion packed as much punch

37
00:01:30,950 --> 00:01:29,200
as five tons of tnt

38
00:01:33,590 --> 00:01:30,960

cook believes the lunar impact might

39
00:01:36,069 --> 00:01:33,600
have been part of a much larger event

40
00:01:38,390 --> 00:01:36,079
on the night of march 17th nasa and

41
00:01:40,870 --> 00:01:38,400
university of western ontario all sky

42
00:01:42,950 --> 00:01:40,880
cameras picked up an unusual number of

43
00:01:44,310 --> 00:01:42,960
deep penetrating meteors right here on

44
00:01:45,990 --> 00:01:44,320
earth he says

45
00:01:48,230 --> 00:01:46,000
these fireballs were traveling along

46
00:01:50,310 --> 00:01:48,240
nearly identical orbits between earth

47
00:01:51,910 --> 00:01:50,320
and the asteroid belt

48
00:01:53,990 --> 00:01:51,920
this means earth and the moon were

49
00:01:55,190 --> 00:01:54,000
pelted by meteoroids at about the same

50
00:01:57,109 --> 00:01:55,200
time

51
00:01:59,030 --> 00:01:57,119
my working hypothesis is that the two

52
00:02:01,270 --> 00:01:59,040
events are related and that this

53
00:02:03,749 --> 00:02:01,280
constitutes a short duration cluster of

54
00:02:05,910 --> 00:02:03,759
material encountered by the earth moon

55
00:02:07,590 --> 00:02:05,920
system says cook

56
00:02:09,669 --> 00:02:07,600
one of the goals of the lunar monitoring

57
00:02:11,670 --> 00:02:09,679
program is to identify new streams of

58
00:02:13,830 --> 00:02:11,680
space debris that pose a potential

59
00:02:16,150 --> 00:02:13,840
threat to the earth moon system

60
00:02:17,830 --> 00:02:16,160
the march 17th event seems to be a good

61
00:02:19,270 --> 00:02:17,840
candidate

62
00:02:20,630 --> 00:02:19,280
controllers of nasa's lunar

63
00:02:22,949 --> 00:02:20,640

reconnaissance orbiter have been

64
00:02:25,110 --> 00:02:22,959
notified of the strike the crater could

65
00:02:27,589 --> 00:02:25,120
be as wide as 20 meters which would make

66
00:02:29,830 --> 00:02:27,599
it an easy target for lro the next time

67
00:02:30,949 --> 00:02:29,840
the spacecraft passes over the impact

68
00:02:32,949 --> 00:02:30,959
site

69
00:02:34,309 --> 00:02:32,959
comparing the size of the crater to the

70
00:02:36,390 --> 00:02:34,319
brightness of the flash would give

71
00:02:38,790 --> 00:02:36,400
researchers a valuable ground truth

72
00:02:40,390 --> 00:02:38,800
measurement to validate lunar impact

73
00:02:42,470 --> 00:02:40,400
models

74
00:02:44,710 --> 00:02:42,480
unlike earth which has an atmosphere to

75
00:02:47,509 --> 00:02:44,720
protect it the moon is airless and

76
00:02:49,430 --> 00:02:47,519
exposed lunar meteors crash into the

77
00:02:51,110 --> 00:02:49,440
ground with fair frequency

78
00:02:54,309 --> 00:02:51,120
since the monitoring program began in

79
00:02:56,869 --> 00:02:54,319
2005 nasa's lunar impact team has

80
00:02:58,869 --> 00:02:56,879
detected more than 300 strikes

81
00:03:01,350 --> 00:02:58,879
most orders of magnitude fainter than

82
00:03:03,830 --> 00:03:01,360
the march 17th event

83
00:03:05,670 --> 00:03:03,840
statistically speaking more than half of

84
00:03:08,149 --> 00:03:05,680
all lunar meteors come from known

85
00:03:09,509 --> 00:03:08,159
meteoroid streams such as the perseids

86
00:03:11,990 --> 00:03:09,519
and leonids

87
00:03:14,229 --> 00:03:12,000
the rest are sporadic meteors random

88
00:03:16,710 --> 00:03:14,239

bits of comet and asteroid debris of

89
00:03:19,190 --> 00:03:16,720
unknown parentage

90
00:03:21,190 --> 00:03:19,200
u.s space exploration policy eventually

91
00:03:22,790 --> 00:03:21,200
calls for extended astronaut stays on

92
00:03:25,110 --> 00:03:22,800
the lunar surface

93
00:03:27,270 --> 00:03:25,120
identifying the sources of lunar meteors

94
00:03:29,670 --> 00:03:27,280
and measuring their impact rates gives

95
00:03:31,350 --> 00:03:29,680
future lunar explorers an idea of what

96
00:03:34,710 --> 00:03:31,360
to expect

97
00:03:36,710 --> 00:03:34,720
is it safe to go on a moonwalk or not

98
00:03:38,630 --> 00:03:36,720
the middle of march might be a good time

99
00:03:40,390 --> 00:03:38,640
to stay inside

100
00:03:42,470 --> 00:03:40,400
we'll be keeping an eye out for signs of

101
00:03:44,309 --> 00:03:42,480
a repeat performance next year when the

102
00:03:46,869 --> 00:03:44,319
earth moon system passes through the

103
00:03:49,750 --> 00:03:46,879
same region of space says cook

104
00:03:51,830 --> 00:03:49,760
meanwhile our analysis of the march 17th

105
00:03:54,309 --> 00:03:51,840
event continues

106
00:03:57,030 --> 00:03:54,319
for updates about explosions on the moon

107
00:03:58,949 --> 00:03:57,040
and elsewhere in the cosmos stay tuned