



1
00:00:09,669 --> 00:00:06,230
what exploded over russia

2
00:00:11,430 --> 00:00:09,679
presented by science at nasa

3
00:00:13,910 --> 00:00:11,440
when the sun rose over russia's ural

4
00:00:15,749 --> 00:00:13,920
mountains on friday february 15th

5
00:00:17,109 --> 00:00:15,759
many residents of nearby chelyabinsk

6
00:00:18,550 --> 00:00:17,119
already knew that a space rock was

7
00:00:21,029 --> 00:00:18,560
coming

8
00:00:24,710 --> 00:00:21,039
later that day an asteroid named 2012

9
00:00:26,790 --> 00:00:24,720
da14 would pass by earth only 17 200

10
00:00:29,029 --> 00:00:26,800
miles above indonesia

11
00:00:31,349 --> 00:00:29,039
there was no danger of a collision nasa

12
00:00:33,110 --> 00:00:31,359
assured the public

13
00:00:35,270 --> 00:00:33,120

maybe that's why when the morning sky

14

00:00:36,709 --> 00:00:35,280

lit up with a second sun and a shockwave

15

00:00:42,709 --> 00:00:36,719

shattered windows in hundreds of

16

00:00:46,709 --> 00:00:44,630

only a few people picking themselves off

17

00:00:48,470 --> 00:00:46,719

the ground figured it out right away

18

00:00:49,830 --> 00:00:48,480

this was not a crashing plane or a

19

00:00:52,150 --> 00:00:49,840

rocket attack

20

00:00:54,790 --> 00:00:52,160

it was a meteor strike the most powerful

21

00:00:56,229 --> 00:00:54,800

since the tunguska event of 1908 says

22

00:00:58,950 --> 00:00:56,239

bill cook of nasa's meteoroid

23

00:01:00,950 --> 00:00:58,960

environment office in a one in a million

24

00:01:03,110 --> 00:01:00,960

coincidence that still has nasa experts

25

00:01:06,149 --> 00:01:03,120

shaking their heads a small asteroid

26
00:01:08,070 --> 00:01:06,159
completely unrelated to 2012 da14 struck

27
00:01:09,350 --> 00:01:08,080
earth only hours before the publicized

28
00:01:12,390 --> 00:01:09,360
event

29
00:01:15,109 --> 00:01:12,400
incredible to see them happening on the

30
00:01:18,070 --> 00:01:15,119
same day says paul chodes of nasa's near

31
00:01:19,590 --> 00:01:18,080
earth object program at jpl

32
00:01:20,870 --> 00:01:19,600
researchers have since pieced together

33
00:01:22,710 --> 00:01:20,880
what happened

34
00:01:24,789 --> 00:01:22,720
the most telling information came from a

35
00:01:26,630 --> 00:01:24,799
network of infrasound sensors operated

36
00:01:27,990 --> 00:01:26,640
by the comprehensive test ban treaty

37
00:01:29,670 --> 00:01:28,000
organization

38
00:01:31,749 --> 00:01:29,680

their purpose is to monitor nuclear

39

00:01:33,429 --> 00:01:31,759

explosions

40

00:01:35,590 --> 00:01:33,439

infrasound is a type of very low

41

00:01:37,510 --> 00:01:35,600

frequency sound wave that only elephants

42

00:01:38,870 --> 00:01:37,520

homing pigeons and a few other animals

43

00:01:40,469 --> 00:01:38,880

can hear

44

00:01:42,069 --> 00:01:40,479

it turns out that meteors entering

45

00:01:43,670 --> 00:01:42,079

earth's atmosphere cause ripples of

46

00:01:44,950 --> 00:01:43,680

infrasound to spread through the air of

47

00:01:47,270 --> 00:01:44,960

our planet

48

00:01:48,950 --> 00:01:47,280

by analyzing infrasound records it is

49

00:01:51,109 --> 00:01:48,960

possible to learn how long a meteor was

50

00:01:53,590 --> 00:01:51,119

in the air which direction it traveled

51
00:01:55,429 --> 00:01:53,600
and how much energy it unleashed

52
00:01:57,030 --> 00:01:55,439
the russian meteor's infrasound signal

53
00:01:59,350 --> 00:01:57,040
was detected by multiple stations

54
00:02:01,749 --> 00:01:59,360
including one in alaska more than 6 500

55
00:02:03,429 --> 00:02:01,759
kilometers from chelyabinsk

56
00:02:06,149 --> 00:02:03,439
western ontario professor of physics

57
00:02:08,229 --> 00:02:06,159
peter brown analyzed the data

58
00:02:10,309 --> 00:02:08,239
the asteroid was about 17 meters in

59
00:02:12,790 --> 00:02:10,319
diameter and weighed approximately 10

60
00:02:15,030 --> 00:02:12,800
000 metric tons he reports

61
00:02:17,350 --> 00:02:15,040
it struck earth's atmosphere at 40 000

62
00:02:20,309 --> 00:02:17,360
miles per hour and broke apart about 12

63
00:02:22,229 --> 00:02:20,319

to 15 miles above earth's surface

64

00:02:25,750 --> 00:02:22,239

the energy of the resulting explosion

65

00:02:27,910 --> 00:02:25,760

exceeded 470 kilotons of tnt

66

00:02:30,949 --> 00:02:27,920

for comparison the first atomic bombs

67

00:02:32,869 --> 00:02:30,959

produced only 15 to 20 kilotons

68

00:02:35,350 --> 00:02:32,879

based on the trajectory of the fireball

69

00:02:36,949 --> 00:02:35,360

analysts have also plotted its orbit

70

00:02:39,190 --> 00:02:36,959

it originally came from the asteroid

71

00:02:40,790 --> 00:02:39,200

belt about 2.5 times farther from the

72

00:02:42,150 --> 00:02:40,800

sun than earth says cook

73

00:02:45,270 --> 00:02:42,160

comparing the orbit of the russian

74

00:02:46,710 --> 00:02:45,280

meteor to that of 2012 da14 nasa orbit

75

00:02:48,710 --> 00:02:46,720

analysts have shown that there is no

76

00:02:51,030 --> 00:02:48,720

connection between the two these are

77

00:02:52,790 --> 00:02:51,040

independent objects cook says the fact

78

00:02:54,790 --> 00:02:52,800

that they reached earth on the same day

79

00:02:57,190 --> 00:02:54,800

one just a little closer than the other

80

00:02:58,710 --> 00:02:57,200

appears to be a complete coincidence

81

00:03:00,229 --> 00:02:58,720

infrasound records confirm that the

82

00:03:02,470 --> 00:03:00,239

meteor entered the atmosphere at a

83

00:03:04,229 --> 00:03:02,480

shallow angle of about 20 degrees and

84

00:03:05,589 --> 00:03:04,239

lasted more than 30 seconds before it

85

00:03:07,670 --> 00:03:05,599

exploded

86

00:03:09,509 --> 00:03:07,680

the loud report which was heard and felt

87

00:03:12,229 --> 00:03:09,519

for hundreds of miles marked the

88

00:03:13,910 --> 00:03:12,239

beginning of a scientific scavenger hunt

89

00:03:15,350 --> 00:03:13,920

thousands of fragments of the meteor are

90

00:03:17,430 --> 00:03:15,360

now scattered across the ural

91

00:03:19,350 --> 00:03:17,440

countryside and a small fraction have

92

00:03:21,670 --> 00:03:19,360

already been found

93

00:03:23,350 --> 00:03:21,680

preliminary reports mainly communicated

94

00:03:25,350 --> 00:03:23,360

through the media suggest that the

95

00:03:27,750 --> 00:03:25,360

asteroid was made mostly of stone with a

96

00:03:29,430 --> 00:03:27,760

bit of iron in other words a typical

97

00:03:30,869 --> 00:03:29,440

asteroid from beyond the orbit of mars

98

00:03:33,430 --> 00:03:30,879

says cook

99

00:03:35,110 --> 00:03:33,440

there are millions more just like it

100

00:03:37,750 --> 00:03:35,120

and that is something to think about as

101

00:03:39,270 --> 00:03:37,760

the cleanup intelligence continues