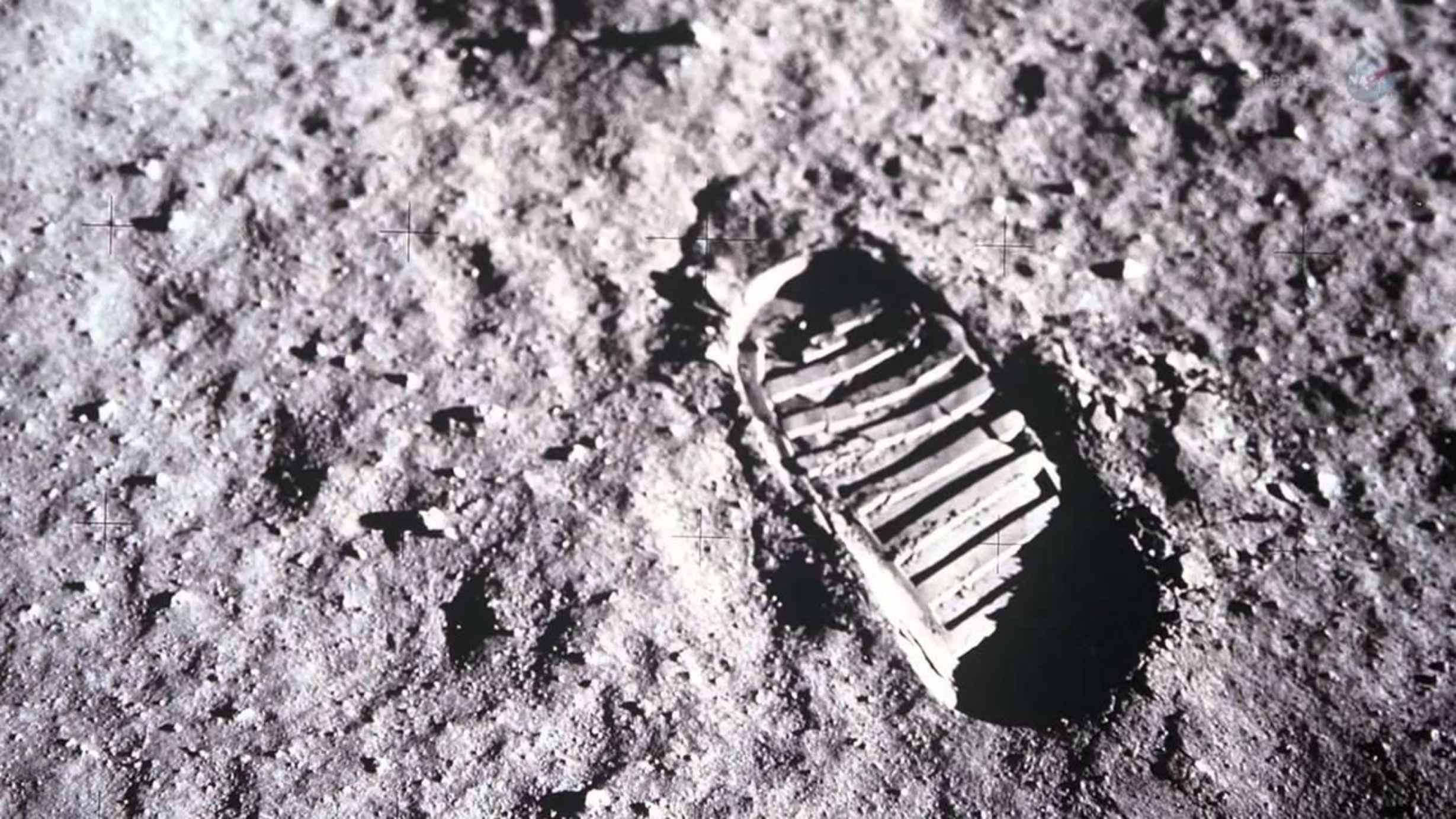

1
00:00:10,230 --> 00:00:06,950
the 2012 transit of venus

2
00:00:12,310 --> 00:00:10,240
presented by science at nasa

3
00:00:14,629 --> 00:00:12,320
one little black spot on the sun sure

4
00:00:17,670 --> 00:00:14,639
can cause a lot of fuss

5
00:00:19,990 --> 00:00:17,680
twice every 120 years venus passes

6
00:00:21,830 --> 00:00:20,000
directly in front of the sun

7
00:00:23,830 --> 00:00:21,840
the circular spot the planet makes on

8
00:00:25,509 --> 00:00:23,840
the solar disk is not much bigger than

9
00:00:27,269 --> 00:00:25,519
an ordinary sunspot

10
00:00:29,509 --> 00:00:27,279
but every time it happens it is a

11
00:00:31,750 --> 00:00:29,519
worldwide sensation

12
00:00:32,950 --> 00:00:31,760
the next transit of venus is on june 5th

13
00:00:34,790 --> 00:00:32,960

2012

14
00:00:36,870 --> 00:00:34,800
and for the first time since the 19th

15
00:00:38,549 --> 00:00:36,880
century the event will be visible across

16
00:00:40,549 --> 00:00:38,559
all of north america

17
00:00:43,590 --> 00:00:40,559
the nearly seven hour transit begins at

18
00:00:45,830 --> 00:00:43,600
309 pm pacific daylight time

19
00:00:47,990 --> 00:00:45,840
observers on seven continents even a

20
00:00:49,029 --> 00:00:48,000
sliver of antarctica will be able to see

21
00:00:56,150 --> 00:00:49,039
it

22
00:01:00,389 --> 00:00:56,160
op for creative photographers

23
00:01:02,069 --> 00:01:00,399
observing tip do not stare at the sun

24
00:01:04,710 --> 00:01:02,079
venus covers too little of the solar

25
00:01:06,550 --> 00:01:04,720
disk to block the blinding glare

26
00:01:08,550 --> 00:01:06,560
instead use some type of protection

27
00:01:10,469 --> 00:01:08,560
technique or solar filter

28
00:01:12,070 --> 00:01:10,479
a number 14 welder's glass is a good

29
00:01:14,390 --> 00:01:12,080
choice

30
00:01:16,390 --> 00:01:14,400
for some observers the view provides an

31
00:01:18,469 --> 00:01:16,400
unsettling sense of scale

32
00:01:19,910 --> 00:01:18,479
venus seems so small and fragile against

33
00:01:22,870 --> 00:01:19,920
the solar disk

34
00:01:24,630 --> 00:01:22,880
our own planet is equally minuscule

35
00:01:26,469 --> 00:01:24,640
others say it looks like a black hole

36
00:01:28,469 --> 00:01:26,479
punched in the surface of the sun

37
00:01:30,550 --> 00:01:28,479
very strange

38
00:01:32,550 --> 00:01:30,560

transits of venus first gained worldwide

39
00:01:34,550 --> 00:01:32,560
attention in the 18th century when one

40
00:01:36,630 --> 00:01:34,560
of the biggest mysteries of science was

41
00:01:38,789 --> 00:01:36,640
the size of the solar system

42
00:01:40,469 --> 00:01:38,799
it might seem amazing today but

43
00:01:42,950 --> 00:01:40,479
astronomers didn't know the absolute

44
00:01:44,710 --> 00:01:42,960
distance between any two planets

45
00:01:46,950 --> 00:01:44,720
how many miles would you have to travel

46
00:01:49,190 --> 00:01:46,960
to reach another world

47
00:01:51,590 --> 00:01:49,200
the answer was as mysterious then as the

48
00:01:53,350 --> 00:01:51,600
nature of dark energy is now

49
00:01:55,429 --> 00:01:53,360
venus was the key according to

50
00:01:57,350 --> 00:01:55,439
astronomer sir edmund haley

51
00:02:00,069 --> 00:01:57,360
he realized that by observing transits

52
00:02:01,830 --> 00:02:00,079
from widely spaced locations on earth it

53
00:02:04,069 --> 00:02:01,840
should be possible to triangulate the

54
00:02:06,389 --> 00:02:04,079
distance to venus

55
00:02:08,309 --> 00:02:06,399
the idea galvanized scientists who set

56
00:02:11,670 --> 00:02:08,319
off on expeditions around the world to

57
00:02:13,589 --> 00:02:11,680
view a pair of transits in the 1760s

58
00:02:15,110 --> 00:02:13,599
the great explorer james cook himself

59
00:02:17,750 --> 00:02:15,120
was dispatched to observe one from

60
00:02:20,949 --> 00:02:17,760
tahiti a place as alien to 18th century

61
00:02:22,710 --> 00:02:20,959
europeans as the moon or mars

62
00:02:24,869 --> 00:02:22,720
historians have called the international

63
00:02:25,910 --> 00:02:24,879

effort the apollo program of the 18th

64
00:02:28,309 --> 00:02:25,920
century

65
00:02:30,150 --> 00:02:28,319
in retrospect it falls into the category

66
00:02:31,589 --> 00:02:30,160
of things that only sounded like a good

67
00:02:34,229 --> 00:02:31,599
idea

68
00:02:36,390 --> 00:02:34,239
bad weather primitive optics and the

69
00:02:38,070 --> 00:02:36,400
natural fuzziness of venus's atmosphere

70
00:02:39,750 --> 00:02:38,080
prevented observers from gathering the

71
00:02:41,589 --> 00:02:39,760
data they needed

72
00:02:43,589 --> 00:02:41,599
the distance to venus was not measured

73
00:02:46,150 --> 00:02:43,599
with high precision until two centuries

74
00:02:48,470 --> 00:02:46,160
later when astronomers of the 1960s

75
00:02:50,229 --> 00:02:48,480
pinged the planet with radar

76
00:02:51,670 --> 00:02:50,239
this year's transit is the second of an

77
00:02:54,390 --> 00:02:51,680
eight-year pair

78
00:02:56,229 --> 00:02:54,400
anticipation was high in june 2004 as

79
00:02:57,910 --> 00:02:56,239
venus approached the sun

80
00:02:59,830 --> 00:02:57,920
no one alive at the time had seen a

81
00:03:01,509 --> 00:02:59,840
transit of venus with their own eyes and

82
00:03:03,270 --> 00:03:01,519
the hand-drawn sketches and grainy

83
00:03:04,790 --> 00:03:03,280
photos of the previous centuries

84
00:03:06,390 --> 00:03:04,800
scarcely prepared them for what was

85
00:03:08,229 --> 00:03:06,400
about to happen

86
00:03:10,630 --> 00:03:08,239
modern solar telescopes captured an

87
00:03:12,869 --> 00:03:10,640
unprecedented view of venus's atmosphere

88
00:03:14,390 --> 00:03:12,879

backlit by solar fire

89
00:03:16,630 --> 00:03:14,400
they saw venus transiting the sun's

90
00:03:18,149 --> 00:03:16,640
ghostly corona and gliding past magnetic

91
00:03:19,830 --> 00:03:18,159
filaments big enough to swallow the

92
00:03:22,149 --> 00:03:19,840
whole planet

93
00:03:24,149 --> 00:03:22,159
one photographer even caught a spaceship

94
00:03:27,509 --> 00:03:24,159
the international space station

95
00:03:29,830 --> 00:03:27,519
transiting the sun alongside venus

96
00:03:32,470 --> 00:03:29,840
2012 should be even better as cameras

97
00:03:34,390 --> 00:03:32,480
and solar telescopes have improved

98
00:03:37,430 --> 00:03:34,400
moreover nasa's solar dynamics

99
00:03:39,589 --> 00:03:37,440
observatory is going to be watching too

100
00:03:41,509 --> 00:03:39,599
sdo will produce hubble quality images

101
00:03:43,830 --> 00:03:41,519
of this rare event

102
00:03:46,949 --> 00:03:43,840
apparently one little black dot really

103
00:03:49,670 --> 00:03:46,959
is worth all the fuss for more observing