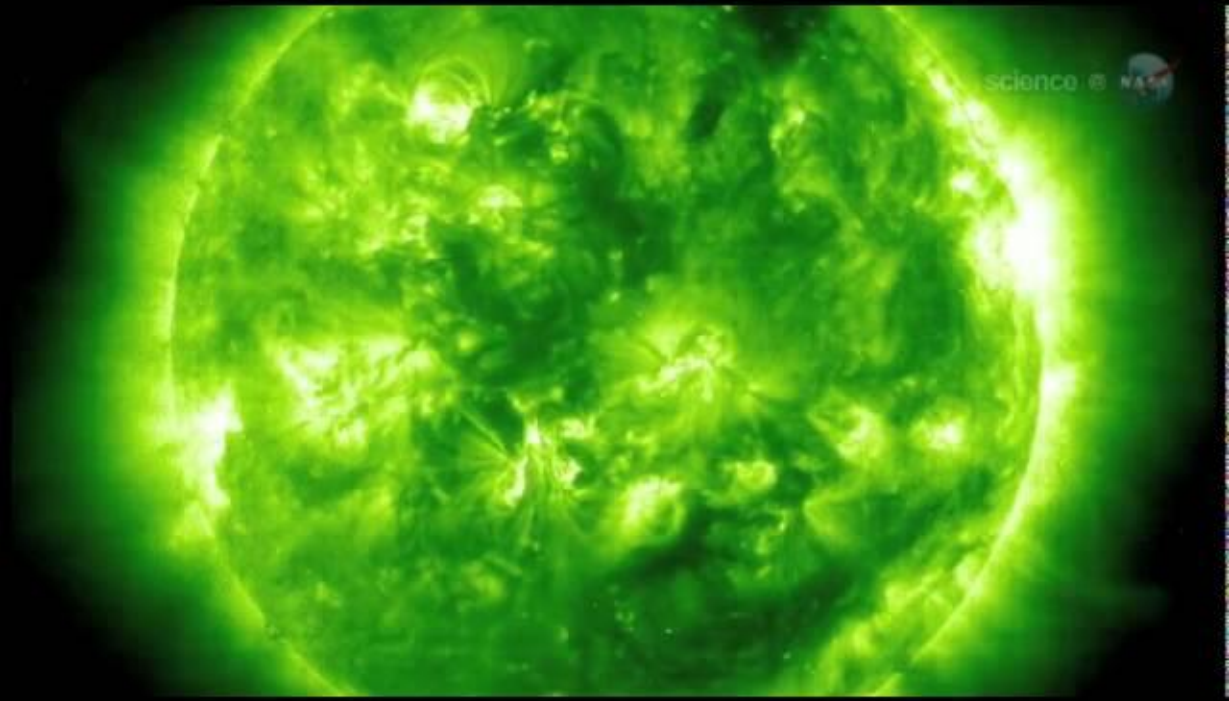
science @ NASA

1
00:00:09,350 --> 00:00:06,470
the secret lives of solar flares brought

2
00:00:12,310 --> 00:00:09,360
to you by science at nasa

3
00:00:14,310 --> 00:00:12,320
152 years ago a man in england named

4
00:00:15,350 --> 00:00:14,320
richard carrington discovered solar

5
00:00:17,990 --> 00:00:15,360
flares

6
00:00:20,310 --> 00:00:18,000
it happened at 11 18 a.m on the

7
00:00:22,630 --> 00:00:20,320
cloudless morning of thursday september

8
00:00:25,750 --> 00:00:22,640
1st 1859

9
00:00:27,910 --> 00:00:25,760
just as usual on every sunny day the 33

10
00:00:30,230 --> 00:00:27,920
year old solar astronomer was busy in

11
00:00:32,389 --> 00:00:30,240
his private observatory projecting an

12
00:00:34,310 --> 00:00:32,399
image of the sun onto a screen and

13
00:00:36,389 --> 00:00:34,320

sketching what he saw

14
00:00:38,069 --> 00:00:36,399
on that particular morning he traced the

15
00:00:39,510 --> 00:00:38,079
outlines of an enormous group of

16
00:00:42,069 --> 00:00:39,520
sunspots

17
00:00:43,910 --> 00:00:42,079
suddenly before his eyes two brilliant

18
00:00:46,389 --> 00:00:43,920
beads of white light appeared over the

19
00:00:49,110 --> 00:00:46,399
sunspots they were so bright he could

20
00:00:51,590 --> 00:00:49,120
barely stand to look at the screen

21
00:00:53,750 --> 00:00:51,600
carrington cried out but by the time a

22
00:00:56,310 --> 00:00:53,760
witness arrived minutes later the first

23
00:00:58,950 --> 00:00:56,320
solar flare anyone had ever seen was

24
00:01:01,189 --> 00:00:58,960
over it would not be the last

25
00:01:03,349 --> 00:01:01,199
since then astronomers have recorded

26
00:01:05,189 --> 00:01:03,359
thousands of strong flares using

27
00:01:07,750 --> 00:01:05,199
instruments ranging from the simplest

28
00:01:09,910 --> 00:01:07,760
telescopes in backyard observatories to

29
00:01:12,950 --> 00:01:09,920
the most complex spectrometers on

30
00:01:15,109 --> 00:01:12,960
advanced spacecraft possibly no other

31
00:01:16,469 --> 00:01:15,119
phenomenon in astronomy has been studied

32
00:01:18,630 --> 00:01:16,479
as much

33
00:01:20,469 --> 00:01:18,640
after all that scrutiny you might

34
00:01:22,070 --> 00:01:20,479
suppose that everything about solar

35
00:01:23,429 --> 00:01:22,080
flares would be known

36
00:01:25,590 --> 00:01:23,439
far from it

37
00:01:28,390 --> 00:01:25,600
last week researchers announced that

38
00:01:30,710 --> 00:01:28,400

solar flares have been keeping a secret

39
00:01:32,789 --> 00:01:30,720
and it's a big one

40
00:01:34,550 --> 00:01:32,799
we've just learned that some flares are

41
00:01:36,550 --> 00:01:34,560
many times stronger than previously

42
00:01:39,109 --> 00:01:36,560
thought says university of colorado

43
00:01:41,910 --> 00:01:39,119
physicist tom woods who led the research

44
00:01:44,550 --> 00:01:41,920
team solar flares were already the

45
00:01:46,630 --> 00:01:44,560
biggest explosions in the solar system

46
00:01:48,149 --> 00:01:46,640
and this discovery makes them even

47
00:01:50,469 --> 00:01:48,159
bigger

48
00:01:53,270 --> 00:01:50,479
nasa's solar dynamics observatory

49
00:01:54,389 --> 00:01:53,280
launched in february 2010 revealed the

50
00:01:57,429 --> 00:01:54,399
secret

51
00:01:59,510 --> 00:01:57,439
about one in seven flares experiences a

52
00:02:01,830 --> 00:01:59,520
sort of aftershock

53
00:02:04,469 --> 00:02:01,840
90 minutes or so after the flare dies

54
00:02:07,270 --> 00:02:04,479
down it springs to life again producing

55
00:02:08,630 --> 00:02:07,280
an extra surge of extreme ultraviolet

56
00:02:11,190 --> 00:02:08,640
radiation

57
00:02:12,150 --> 00:02:11,200
we call it the late phase flare says

58
00:02:14,390 --> 00:02:12,160
woods

59
00:02:16,790 --> 00:02:14,400
the energy in the late phase can exceed

60
00:02:19,350 --> 00:02:16,800
the energy of the primary flare by as

61
00:02:21,589 --> 00:02:19,360
much as a factor of four

62
00:02:22,390 --> 00:02:21,599
the extra energy has a big effect on

63
00:02:24,550 --> 00:02:22,400

earth

64
00:02:26,390 --> 00:02:24,560
extreme ultraviolet wavelengths are

65
00:02:29,270 --> 00:02:26,400
particularly good at heating and

66
00:02:31,110 --> 00:02:29,280
ionizing earth's upper atmosphere

67
00:02:34,150 --> 00:02:31,120
when our planet's atmosphere is heated

68
00:02:36,309 --> 00:02:34,160
by extreme uv radiation it puffs up

69
00:02:37,589 --> 00:02:36,319
accelerating the decay of low orbiting

70
00:02:40,070 --> 00:02:37,599
satellites

71
00:02:43,030 --> 00:02:40,080
furthermore the ionizing action of

72
00:02:46,630 --> 00:02:43,040
extreme uv can bend radio signals and

73
00:02:48,949 --> 00:02:46,640
disrupt the normal operation of gps

74
00:02:51,110 --> 00:02:48,959
sdo was able to make the discovery

75
00:02:53,509 --> 00:02:51,120
because of its unique ability to monitor

76
00:02:56,790 --> 00:02:53,519
the sun's extreme uv output in high

77
00:02:57,750 --> 00:02:56,800
resolution 24 hours a day seven days a

78
00:03:00,229 --> 00:02:57,760
week

79
00:03:03,509 --> 00:03:00,239
with that kind of scrutiny it's tough to

80
00:03:04,630 --> 00:03:03,519
keep a secret even one that's 152 years

81
00:03:07,350 --> 00:03:04,640
old