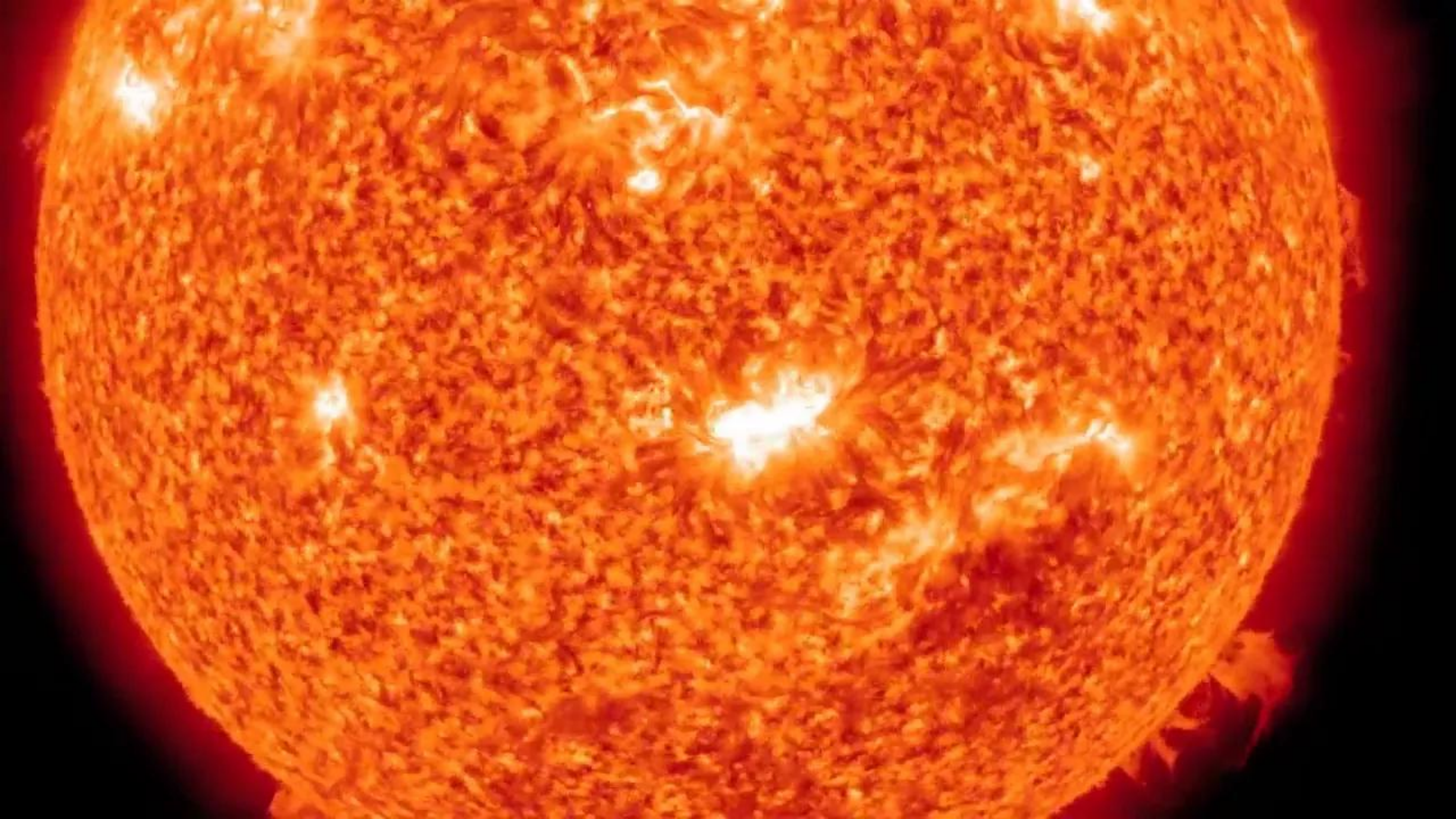

1
00:00:01,820 --> 00:00:12,940
[Music]

2
00:00:17,330 --> 00:00:15,499
solar flares may seem like faraway

3
00:00:19,370 --> 00:00:17,340
events but they can damage satellites

4
00:00:22,250 --> 00:00:19,380
and even ground-based technologies and

5
00:00:24,740 --> 00:00:22,260
power grids every 11 years as the Sun

6
00:00:26,630 --> 00:00:24,750
reaches its maximum activity they become

7
00:00:28,250 --> 00:00:26,640
bigger and more common and that

8
00:00:31,009 --> 00:00:28,260
increases the chances that one will

9
00:00:34,580 --> 00:00:31,019
significantly affect earth so what are

10
00:00:36,590 --> 00:00:34,590
these solar eruptions a solar flare is

11
00:00:39,139 --> 00:00:36,600
basically an explosion on the surface of

12
00:00:41,600 --> 00:00:39,149
the Sun ranging from minutes to hours in

13
00:00:43,430 --> 00:00:41,610

length large flares can release enough

14
00:00:45,700 --> 00:00:43,440
energy to power the entire United States

15
00:00:48,260 --> 00:00:45,710
for a million years

16
00:00:50,830 --> 00:00:48,270
flares happen when the powerful magnetic

17
00:00:53,389 --> 00:00:50,840
fields in and around the Sun reconnect

18
00:00:56,479 --> 00:00:53,399
they're usually associated with active

19
00:00:59,209 --> 00:00:56,489
regions often seen as sunspots where the

20
00:01:00,590 --> 00:00:59,219
magnetic fields are strongest flares are

21
00:01:03,200 --> 00:01:00,600
classified according to their strength

22
00:01:07,160 --> 00:01:03,210
the smallest ones are B Class followed

23
00:01:08,960 --> 00:01:07,170
by C M and X the largest similar to the

24
00:01:11,120 --> 00:01:08,970
Richter scale for earthquakes each

25
00:01:14,120 --> 00:01:11,130
letter represents a tenfold increase in

26
00:01:16,940 --> 00:01:14,130
energy output so an X is ten times an M

27
00:01:18,980 --> 00:01:16,950
and a hundred times a C within each

28
00:01:23,179 --> 00:01:18,990
letter class there's a finer scale from

29
00:01:25,490 --> 00:01:23,189
one to nine c-class flares are too weak

30
00:01:27,560 --> 00:01:25,500
to noticeably affect earth m-class

31
00:01:29,960 --> 00:01:27,570
flares can cause brief radio blackouts

32
00:01:31,870 --> 00:01:29,970
at the poles and minor radiation storms

33
00:01:34,490 --> 00:01:31,880
that might endanger astronauts

34
00:01:35,510 --> 00:01:34,500
it's the x-class flares that are the

35
00:01:37,370 --> 00:01:35,520
real juggernauts

36
00:01:38,960 --> 00:01:37,380
although X is the last letter there are

37
00:01:41,510 --> 00:01:38,970
flares more than ten times the power of

38
00:01:43,969 --> 00:01:41,520

an x one so x-class flares can go higher

39
00:01:46,789 --> 00:01:43,979
than nine the most powerful flare on

40
00:01:49,310 --> 00:01:46,799
record was in 2003 during the last solar

41
00:01:51,289 --> 00:01:49,320
maximum it was so powerful that it

42
00:01:53,690 --> 00:01:51,299
overloaded the sensors measuring it

43
00:01:56,649 --> 00:01:53,700
they cut out at x17 and the flare was

44
00:01:59,029 --> 00:01:56,659
later estimated to be about x45 a

45
00:02:00,859 --> 00:01:59,039
powerful x-class flare like that can

46
00:02:03,109 --> 00:02:00,869
create long-lasting radiation storms

47
00:02:04,880 --> 00:02:03,119
which can harm satellites and even get

48
00:02:08,270 --> 00:02:04,890
airline passengers flying near the polls

49
00:02:09,619 --> 00:02:08,280
small radiation doses X flares also have

50
00:02:11,449 --> 00:02:09,629
the potential to create global

51
00:02:15,410 --> 00:02:11,459
transmission problems and worldwide

52
00:02:17,960 --> 00:02:15,420
blackouts the seriousness of an x-class

53
00:02:20,960 --> 00:02:17,970
flare pointed at earth is why NASA and

54
00:02:23,509 --> 00:02:20,970
NOAA constantly monitor the Sun NASA's

55
00:02:25,430 --> 00:02:23,519
heliophysics fleet of spacecraft can now

56
00:02:27,890 --> 00:02:25,440
see the Sun from every side and in many

57
00:02:30,979 --> 00:02:27,900
different wavelengths this unprecedented

58
00:02:32,720 --> 00:02:30,989
coverage in abling scientists to predict

59
00:02:35,150 --> 00:02:32,730
and detect space weather events like

60
00:02:38,750 --> 00:02:35,160
flares and CMEs with ever greater

61
00:02:40,610 --> 00:02:38,760
accuracy with advanced warning

62
00:02:41,500 --> 00:02:40,620
governments and companies can take steps

63
00:02:43,460 --> 00:02:41,510

to protect their technological