



1
00:00:03,909 --> 00:00:02,070
ever since we've been pointing

2
00:00:05,590 --> 00:00:03,919
spacecraft at the sun

3
00:00:08,310 --> 00:00:05,600
two regions on our star have been

4
00:00:10,310 --> 00:00:08,320
missing from satellite images

5
00:00:12,549 --> 00:00:10,320
the sun's two poles have never been

6
00:00:14,150 --> 00:00:12,559
mapped because all the solar images

7
00:00:15,589 --> 00:00:14,160
we've built have remained in the

8
00:00:17,750 --> 00:00:15,599
ecliptic plane

9
00:00:19,830 --> 00:00:17,760
the swath of space roughly aligned with

10
00:00:21,109 --> 00:00:19,840
the sun's equator where all the planets

11
00:00:23,269 --> 00:00:21,119
orbit

12
00:00:25,990 --> 00:00:23,279
a new mission from the european space

13
00:00:27,990 --> 00:00:26,000

agency and nasa called solar orbiter

14

00:00:31,269 --> 00:00:28,000

aims to escape this plane and take the

15

00:00:33,270 --> 00:00:31,279

very first images of the poles

16

00:00:34,790 --> 00:00:33,280

the planets are all moving and circling

17

00:00:37,110 --> 00:00:34,800

the sun and so we already have some

18

00:00:38,869 --> 00:00:37,120

velocity going one way if we want to

19

00:00:40,549 --> 00:00:38,879

launch up out of the ecliptic it

20

00:00:43,270 --> 00:00:40,559

requires more energy

21

00:00:45,990 --> 00:00:43,280

to get outside the ecliptic plane solar

22

00:00:47,990 --> 00:00:46,000

orbiter uses earth's and venus's gravity

23

00:00:49,110 --> 00:00:48,000

to slingshot itself into a view of the

24

00:00:51,029 --> 00:00:49,120

poles

25

00:00:53,990 --> 00:00:51,039

the only other satellite to fly over the

26
00:00:56,150 --> 00:00:54,000
poles was ulysses which launched in 1990

27
00:00:58,150 --> 00:00:56,160
to study the solar atmosphere

28
00:01:00,549 --> 00:00:58,160
but solar orbiter will be the first

29
00:01:02,950 --> 00:01:00,559
mission to capture actual images of this

30
00:01:04,549 --> 00:01:02,960
hard to reach region

31
00:01:06,230 --> 00:01:04,559
scientists think the poles could be the

32
00:01:09,109 --> 00:01:06,240
missing piece to understanding what

33
00:01:11,830 --> 00:01:09,119
drives the sun's activity

34
00:01:15,270 --> 00:01:11,840
every 11 years the sun's magnetic field

35
00:01:17,749 --> 00:01:15,280
flips north becomes south and vice versa

36
00:01:20,469 --> 00:01:17,759
this mysterious process has direct

37
00:01:22,950 --> 00:01:20,479
effects on earth before the poles flip

38
00:01:25,109 --> 00:01:22,960

solar activity reaches its peak the

39

00:01:27,270 --> 00:01:25,119

number of eruptions increases sending

40

00:01:29,510 --> 00:01:27,280

powerful bursts of solar material that

41

00:01:32,630 --> 00:01:29,520

can potentially harm our astronauts and

42

00:01:35,350 --> 00:01:32,640

satellites we don't really have a good

43

00:01:37,590 --> 00:01:35,360

understanding of the global solar

44

00:01:40,149 --> 00:01:37,600

behavior another one of the missions

45

00:01:43,670 --> 00:01:40,159

goals is to monitor how these eruptions

46

00:01:46,469 --> 00:01:43,680

and solar material travel through space

47

00:01:48,550 --> 00:01:46,479

using a suite of 10 instruments solar

48

00:01:51,270 --> 00:01:48,560

orbiter observes an active region on the

49

00:01:52,950 --> 00:01:51,280

surface as it explodes and then also

50

00:01:54,710 --> 00:01:52,960

takes measurements as the escaping

51

00:01:56,149 --> 00:01:54,720

material passes directly by the

52

00:01:58,550 --> 00:01:56,159

spacecraft

53

00:02:01,429 --> 00:01:58,560

solar orbiter will give us a

54

00:02:02,310 --> 00:02:01,439

comprehensive full view of the entire

55

00:02:06,709 --> 00:02:02,320

sun

56

00:02:09,029 --> 00:02:06,719

the entire solar system at closest

57

00:02:11,589 --> 00:02:09,039

approach solar orbiter will be closer to

58

00:02:13,990 --> 00:02:11,599

the sun than mercury at a mere distance

59

00:02:15,589 --> 00:02:14,000

of 26 million miles away

60

00:02:17,750 --> 00:02:15,599

the ideal distance to get a

61

00:02:19,350 --> 00:02:17,760

comprehensive view of the sun and its

62

00:02:21,350 --> 00:02:19,360

surrounding atmosphere

63

00:02:23,190 --> 00:02:21,360

it will fly close to the sun every six

64
00:02:25,190 --> 00:02:23,200
months and endure temperatures more than

65
00:02:27,670 --> 00:02:25,200
900 degrees fahrenheit

66
00:02:30,150 --> 00:02:27,680
to survive the intense radiation a large

67
00:02:32,470 --> 00:02:30,160
titanium shield protects the instruments

68
00:02:34,150 --> 00:02:32,480
while a carefully orchestrated dance of

69
00:02:36,309 --> 00:02:34,160
opening and closing eye holes in the

70
00:02:37,910 --> 00:02:36,319
shield allows the instruments to peep

71
00:02:39,750 --> 00:02:37,920
out at the right time

72
00:02:42,229 --> 00:02:39,760
other instruments will directly measure

73
00:02:43,350 --> 00:02:42,239
solar material from behind the shadow of

74
00:02:45,430 --> 00:02:43,360
the shield

75
00:02:47,509 --> 00:02:45,440
all of these observations will tell us

76
00:02:48,550 --> 00:02:47,519
more about the sun than we've ever known

77
00:02:51,190 --> 00:02:48,560
before

78
00:02:52,949 --> 00:02:51,200
and by the end of the seven year mission

79
00:02:55,030 --> 00:02:52,959
we will have seen our star in a

80
00:02:58,710 --> 00:02:55,040
completely new way

81
00:03:00,070 --> 00:02:58,720
our understanding of the sun will change

82
00:03:02,630 --> 00:03:00,080
dramatically