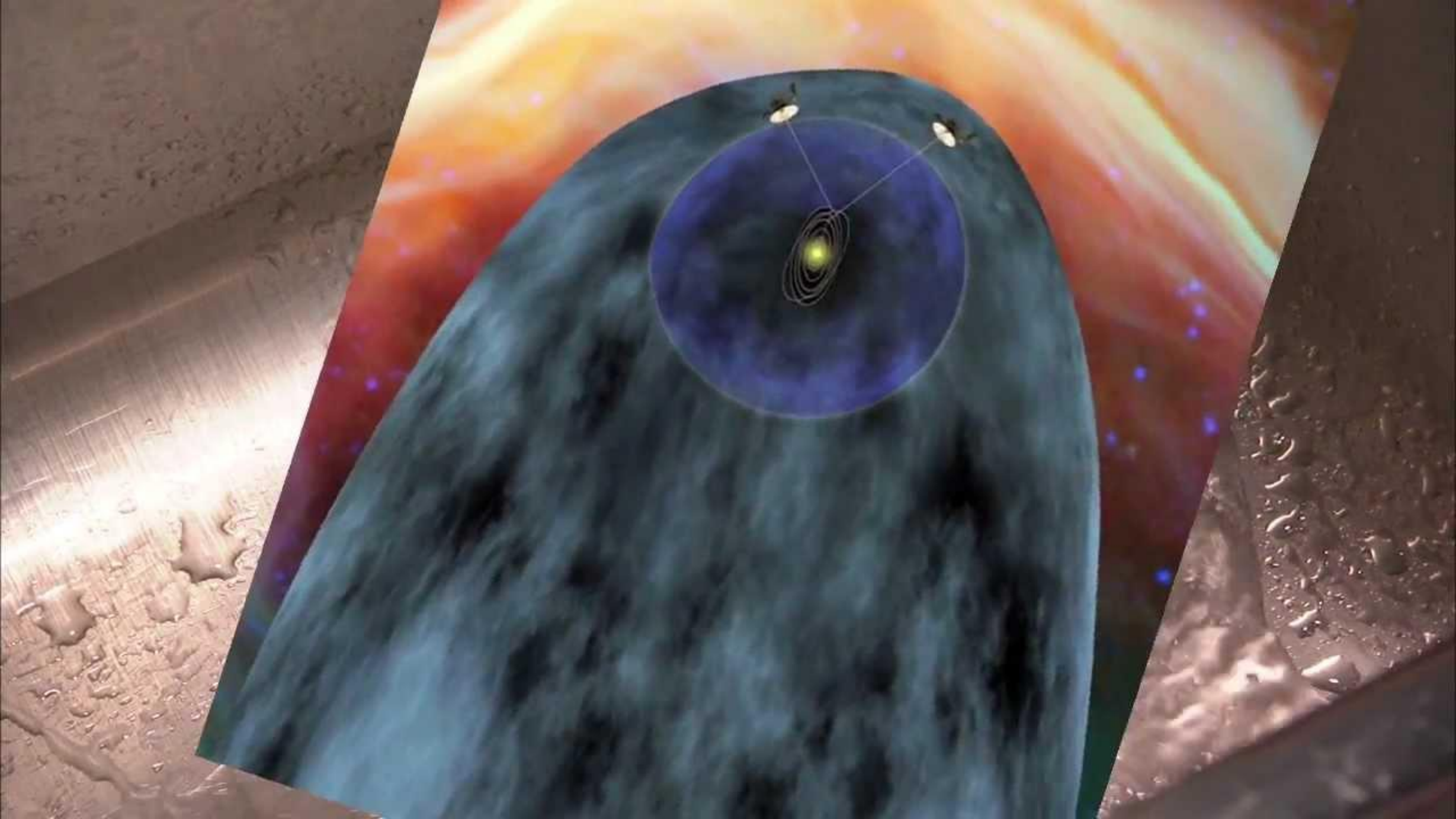

1
00:00:07,039 --> 00:00:04,999
this is a book Voyager mission control

2
00:00:13,039 --> 00:00:07,049
area this is where we talk to our

3
00:00:18,859 --> 00:00:16,140
tonight we're going to be getting the

4
00:00:22,080 --> 00:00:18,869
data back from a magnetometer roll

5
00:00:23,760 --> 00:00:22,090
calibration maneuver and that maneuver

6
00:00:26,429 --> 00:00:23,770
actually happened on the Voyager 1

7
00:00:27,870 --> 00:00:26,439
spacecraft more than 16 hours ago but

8
00:00:30,179 --> 00:00:27,880
the data is finally making it back to

9
00:00:33,150 --> 00:00:30,189
the earth what we're doing is a roll

10
00:00:35,130 --> 00:00:33,160
about this high gain antenna and so if

11
00:00:37,139 --> 00:00:35,140
if the high gain antenna here is pointed

12
00:00:40,950 --> 00:00:37,149
out toward the earth we're gonna be

13
00:00:43,770 --> 00:00:40,960

rolling the spacecraft along that I gain

14
00:00:47,280 --> 00:00:43,780
antenna that roll is done so that we can

15
00:00:49,800 --> 00:00:47,290
calibrate the instrument so that when we

16
00:00:51,120 --> 00:00:49,810
take data we know what magnetic field

17
00:00:52,319 --> 00:00:51,130
belongs to the Sun and what what

18
00:00:56,460 --> 00:00:52,329
component belongs to the actual

19
00:00:58,620 --> 00:00:56,470
spacecraft Voyager 1 is now 120 times as

20
00:01:01,350 --> 00:00:58,630
far from the Sun as the earth is that

21
00:01:04,229 --> 00:01:01,360
means it's 11 billion miles out and

22
00:01:06,420 --> 00:01:04,239
Voyager 2 is 9 billion miles out there

23
00:01:07,920 --> 00:01:06,430
very near the edge of the bubble the Sun

24
00:01:10,050 --> 00:01:07,930
creates around itself called the

25
00:01:12,780 --> 00:01:10,060
heliosphere we're getting very close to

26
00:01:14,460 --> 00:01:12,790
the boundary we don't know how close

27
00:01:17,039 --> 00:01:14,470
because no spacecraft has ever been

28
00:01:19,170 --> 00:01:17,049
there before but it could be another few

29
00:01:20,820 --> 00:01:19,180
months it could be another few years but

30
00:01:24,090 --> 00:01:20,830
it's probably not much longer than that

31
00:01:26,850 --> 00:01:24,100
we travel a billion miles every three

32
00:01:28,500 --> 00:01:26,860
years you can't see the bubble the Sun

33
00:01:31,080 --> 00:01:28,510
creates around itself because it's

34
00:01:33,510 --> 00:01:31,090
invisible but we can see an analogue of

35
00:01:36,510 --> 00:01:33,520
it in a sink if we turn the water on

36
00:01:38,789 --> 00:01:36,520
very fast and look at the bottom of the

37
00:01:40,950 --> 00:01:38,799
sink we see that near where the water

38
00:01:43,350 --> 00:01:40,960

hits the bottom the sink it's flowing

39
00:01:46,250 --> 00:01:43,360
very fast radially outward in all

40
00:01:49,410 --> 00:01:46,260
directions and getting thinner until it

41
00:01:51,690 --> 00:01:49,420
slows down in this thick region and

42
00:01:54,450 --> 00:01:51,700
turns around and flows down the drain

43
00:01:56,460 --> 00:01:54,460
the two Voyager spacecraft are both in

44
00:01:58,469 --> 00:01:56,470
this thick region in our heliosphere

45
00:01:59,999 --> 00:01:58,479
where the wind is slowed down and is

46
00:02:02,160 --> 00:02:00,009
training to go down the tail of the

47
00:02:03,950 --> 00:02:02,170
heliosphere and eventually within the

48
00:02:06,450 --> 00:02:03,960
hopefully not too many more years

49
00:02:09,029 --> 00:02:06,460
Voyager 1 will leave this thick region

50
00:02:11,520 --> 00:02:09,039
and enter interstellar space it's really

51
00:02:14,190 --> 00:02:11,530
remarkable we have a 20 watt transmitter

52
00:02:16,770 --> 00:02:14,200
on the spacecraft transmitting over 11

53
00:02:19,589 --> 00:02:16,780
billion miles away and so it comes in

54
00:02:21,760 --> 00:02:19,599
very slowly but every bit left that

55
00:02:23,650 --> 00:02:21,770
spacecraft over 16 hours