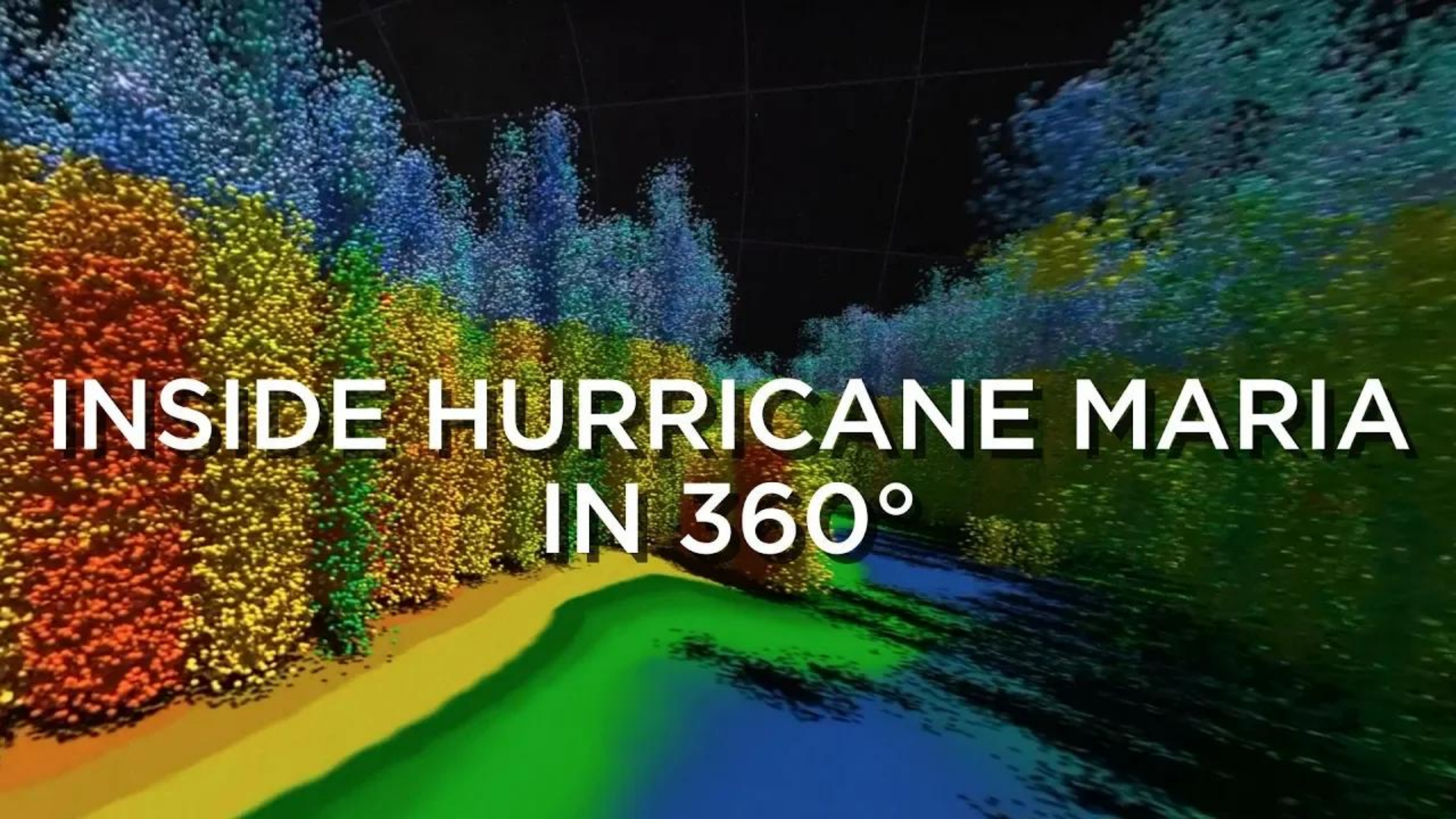
INSIDE HURRICANE MARIA
IN 360°

1
00:00:01,020 --> 00:00:04,870
Two days before Hurricane Maria devastated Puerto Rico

2
00:00:04,890 --> 00:00:09,070
a NASA satellite captured a 3-D view of the storm

3
00:00:09,090 --> 00:00:14,750
revealing the processes inside the hurricane that would fuel the storm’s intensification.

4
00:00:14,770 --> 00:00:18,980
NASA’s precipitation satellite has an advanced radar

5
00:00:19,000 --> 00:00:23,410
that measures both liquid and frozen water inside hurricanes.

6
00:00:23,430 --> 00:00:29,590
This satellite is called the Global Precipitation Measurement Core Observatory, or GPM.

7
00:00:29,610 --> 00:00:37,180
Now, for the first time, we can take you inside a hurricane in a 360-degree view of this data.

8
00:00:37,200 --> 00:00:41,560
You can look around by moving your device or clicking and dragging on the screen.

9
00:00:41,580 --> 00:00:48,790
We’re currently inside Hurricane Maria when it was a Category 1 hurricane in September 2017.

10
00:00:48,810 --> 00:00:53,660
This was a few days before it rapidly intensified to a Category 5 hurricane.

11
00:00:53,680 --> 00:00:59,660
Look down and you'll see a map showing where we are inside Hurricane Maria

12
00:00:59,680 --> 00:01:01,540
and what the colors are showing.

13
00:01:01,560 --> 00:01:04,160

The dots around you show areas of rainfall,

14
00:01:04,180 --> 00:01:09,120
where green and yellow show low rates and red and purple show high rates.

15
00:01:09,140 --> 00:01:15,900
The colored areas below the dots show how much rain makes it to the surface.

16
00:01:15,920 --> 00:01:22,910
Look up and you'll see blue and purple dots that show light and intense frozen precipitation.

17
00:01:22,930 --> 00:01:27,000
Right now we are traveling through a gap between rainbands.

18
00:01:27,020 --> 00:01:31,260
Now we'll collapse the clouds of dots into the actual data values,

19
00:01:31,280 --> 00:01:37,630
which are in millimeters of precipitation per hour.

20
00:01:37,650 --> 00:01:42,440
The rates in this storm vary from less than 0.5 millimeters per hour

21
00:01:42,460 --> 00:01:47,740
to over 150 millimeters per hour.

22
00:01:47,760 --> 00:01:57,580
It's these actual values that scientists use to figure out what's going on inside hurricanes.

23
00:01:57,600 --> 00:02:01,130
Next we'll turn the numbers into a representation

24
00:02:01,150 --> 00:02:07,170
that helps us to see other 3-D structures in the distance.

25
00:02:07,190 --> 00:02:12,090
Wider, red and purple ellipsoids show higher rainfall rates

26
00:02:12,110 --> 00:02:16,200
and spherical green and yellow ellipsoids show lower rainfall rates.

27
00:02:16,220 --> 00:02:24,780
Rising to 5 kilometers, you'll see a distinctive change to frozen precipitation, shown in blues and purples.

28
00:02:24,800 --> 00:02:29,660
This transition is the melting layer where falling snow and ice

29
00:02:29,680 --> 00:02:32,740
warm to the point that they melt into water drops.

30
00:02:32,760 --> 00:02:37,510
We are currently moving up a tall column of intense precipitation.

31
00:02:37,530 --> 00:02:39,980
Scientists call these hot towers.

32
00:02:40,000 --> 00:02:44,650
Lots of heat and energy are released in hot towers

33
00:02:44,670 --> 00:02:48,800
as rising water vapor condenses into precipitation.

34
00:02:48,820 --> 00:02:52,670
Most hot towers are between 10 and 15 kilometers high

35
00:02:52,690 --> 00:02:55,980
- roughly the altitude that commercial jets fly.

36
00:02:56,000 --> 00:03:00,640
Multiple hot towers are common in intensifying hurricanes.

37
00:03:00,660 --> 00:03:07,450
Here's another hot tower that's about 17 kilometers tall.

38
00:03:07,470 --> 00:03:09,660

Hot towers often appear near the eyewall,

39
00:03:09,680 --> 00:03:14,260
a ring of heavy wind and rainfall surrounding the center of the storm.

40
00:03:14,280 --> 00:03:19,060
We’re now in the eye of Hurricane Maria.

41
00:03:19,080 --> 00:03:23,980
At this stage of development, Maria’s eyewall is asymmetrical

42
00:03:24,000 --> 00:03:28,160
with heavier rain in the northern part colored in purple.

43
00:03:28,180 --> 00:03:31,580
This is common in storms impacted by environmental winds.

44
00:03:31,600 --> 00:03:42,520
A few days after this time, Maria’s eyewall intensified and became more symmetrical.

45
00:03:42,540 --> 00:03:48,010
While NASA's GPM satellite can detect big features like the shape of the eyewall,

46
00:03:48,030 --> 00:03:51,770
it can also measure tiny precipitation particles.

47
00:03:51,790 --> 00:03:58,390
These blue drops show the size and density of ice and water particles inside Hurricane Maria,

48
00:03:58,410 --> 00:04:02,490
which is also known as the drop size distribution.

49
00:04:02,510 --> 00:04:08,480
Big drops are colored in dark blue and small drops in light blue and white.

50
00:04:08,500 --> 00:04:14,150
Looking at drop sizes and rainfall rates provides a key part of the equation

51
00:04:14,170 --> 00:04:17,530
in understanding hurricane intensity.

52
00:04:17,550 --> 00:04:22,870
Factors such as temperature, humidity, wind speed, and clouds

53
00:04:22,890 --> 00:04:26,540
influence the size of the precipitation particles,

54
00:04:26,560 --> 00:04:31,000
which in turn affects how much rain falls and how a storm grows.

55
00:04:31,020 --> 00:04:36,700
These advanced satellite measurements are critical for improving forecasts

56
00:04:36,720 --> 00:04:41,370
of how these powerful storms may intensify and where they may go.