



1  
00:00:01,000 --> 00:00:06,920

In 2018, Hurricanes Florence and Michael made catastrophic landfalls over the United States.

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00:00:06,920 --> 00:00:10,380

They caused extreme flooding, record-breaking winds,

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00:00:10,380 --> 00:00:13,610

and storm surges that devastated communities.

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00:00:13,610 --> 00:00:18,040

Understanding how hurricanes behave is critical to saving lives.

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00:00:18,040 --> 00:00:21,360

How a hurricane forms, develops and dissipates

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00:00:21,360 --> 00:00:23,400

is a complex problem though;

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00:00:23,400 --> 00:00:27,280

it involves many different processes that are highly interconnected.

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00:00:27,280 --> 00:00:31,530

But from space and the air, NASA satellites and aircraft

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00:00:31,530 --> 00:00:37,380

can break down the underlying physics by monitoring each component of a hurricane.

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00:00:37,380 --> 00:00:40,750

There are key ingredients for hurricanes to form.

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00:00:40,750 --> 00:00:44,260

First, we need warm waters that provide fuel for the storms.

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00:00:44,260 --> 00:00:47,350

Water evaporates from the warm ocean

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00:00:47,350 --> 00:00:51,860

and creates humid air, which then rises and cools to form clouds and rain.

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00:00:51,860 --> 00:00:58,180

3D structures to look for inside storms are long rain bands and a near-circular eyewall.

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00:00:58,180 --> 00:01:01,500

The warmer the ocean, the stronger the storm can be,

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00:01:01,500 --> 00:01:03,080

which often means heavy rainfall

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00:01:03,080 --> 00:01:06,000

and extreme winds.

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00:01:06,000 --> 00:01:09,480

Understanding each component is just part of the puzzle.

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00:01:09,480 --> 00:01:15,620

The key is to figure out how they fit together and to do this, scientists step into the digital world.

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00:01:15,620 --> 00:01:18,990

This is a computer-generated model of a hurricane.

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00:01:18,990 --> 00:01:24,070

Inside this digital environment, the atmosphere is programmed to behave

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00:01:24,070 --> 00:01:28,440

as much as possible like the real world, governed by the laws of physics.

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00:01:28,440 --> 00:01:34,200

What makes this a valuable research tool is that scientists can put satellite observations

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00:01:34,200 --> 00:01:38,040

into this digital world to see how the entire system evolves.

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00:01:38,040 --> 00:01:43,220

The impact of a hurricane lasts long after the storm has dissipated.

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00:01:43,220 --> 00:01:47,820

Satellites and aircraft can also be used to monitor damage and recovery.

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00:01:47,820 --> 00:01:54,120

In 2017, Hurricane Maria caused the longest electric power blackout

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00:01:54,120 --> 00:01:56,090

in U.S. history in Puerto Rico.

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00:01:56,090 --> 00:01:59,990

Over the following year, satellite data helped first responders

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00:01:59,990 --> 00:02:02,780

monitor where and when power was restored.

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00:02:02,780 --> 00:02:08,300

And after Hurricane Maria, aircraft were used to map the island's recovering forests.

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00:02:08,300 --> 00:02:16,260

Satellites, aircraft, and computer models help us understand each stage of a hurricane including the aftermath.

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00:02:16,260 --> 00:02:21,100

As we learn more, not only will other agencies better forecast weather,