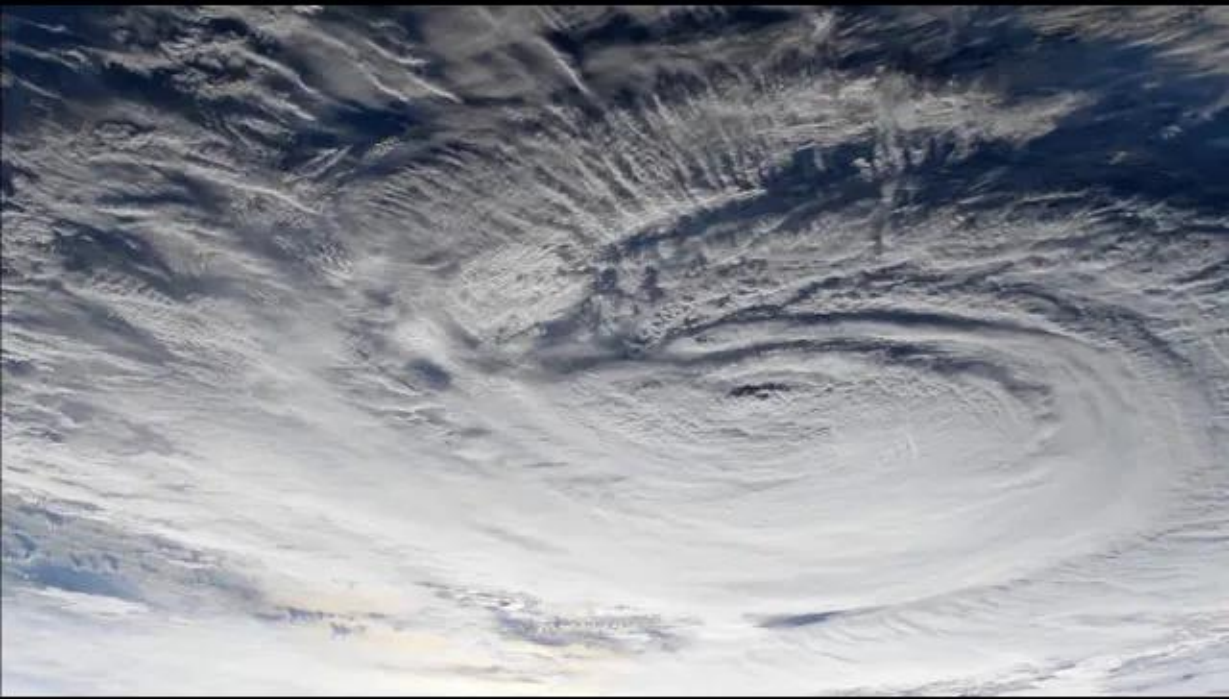

1
00:00:01,040 --> 00:00:05,020
[pulsing music plays]

2
00:00:05,040 --> 00:00:09,020
Norcross: A hurricane is mother nature's grandest, but most ferocious weather machine.

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00:00:09,040 --> 00:00:13,020
Sullivan: A hurricane is two different things. If you're looking at it from above

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00:00:13,040 --> 00:00:17,020
from the satellite down, a hurricane is a beautiful thing.

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00:00:17,040 --> 00:00:20,980
It's a massive coil of clouds that is rotating, spinning like a top.

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00:00:21,000 --> 00:00:25,020
Sims: When I look at images of hurricanes, I go through

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00:00:25,040 --> 00:00:29,020
so many emotions. As a scientist, as a meteorologist,

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00:00:29,040 --> 00:00:33,020
I'm like, "Wow, this is fascinating.

9
00:00:33,040 --> 00:00:36,980
You know, look at this beautiful storm.

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00:00:37,000 --> 00:00:40,980
[sound of waves and wind] But then the human side of me is saying,

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00:00:41,000 --> 00:00:44,980
"How can we make sure that people are evacuating, that people have somewhere to stay,

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00:00:45,000 --> 00:00:48,980
that they have the money to feed their families once they leave their homes?"

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00:00:49,000 --> 00:00:52,980

Sullivan: A hurricane on the ground

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00:00:53,000 --> 00:00:56,980
that's a completely different thing, because all of that rotation

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00:00:57,000 --> 00:01:00,980
you really feel as incredibly severe winds.

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00:01:01,000 --> 00:01:04,980
They can be up to 150 or more miles per hour.

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00:01:05,000 --> 00:01:08,980
You can have up to 40 inches of rain and the most deadly thing

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00:01:09,000 --> 00:01:12,980
is that the updraft from the hurricane is actually pulling ocean swell

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00:01:13,000 --> 00:01:16,980
up into it and so it creates a storm surge.

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00:01:17,000 --> 00:01:21,020
up to 40 feet high

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00:01:21,040 --> 00:01:25,020
DeMaria: And occasionally when the storms hit at a little higher latitude,

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00:01:25,040 --> 00:01:29,020
, they can also spawn tornadoes in their fringe.

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00:01:29,040 --> 00:01:33,020
So really the impacts are the wind, the storm surge, the heavy rainfall,

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00:01:33,040 --> 00:01:37,020
and then occasionally severe weather that forms when they move inland.

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00:01:37,040 --> 00:01:41,020
Sullivan: I feel like I got a deeper appreciation for hurricanes when I moved

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00:01:41,040 --> 00:01:45,020
to Galveston, Texas.That entire city,

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00:01:45,040 --> 00:01:49,020
it's almost like the ghosts of the 1900 hurricane … are still there

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00:01:49,040 --> 00:01:52,980
because you see evidence of that storm, that particular

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00:01:53,000 --> 00:01:56,980
famous storm that killed somewhere between 6,000 and 12,000 people.

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00:01:57,000 --> 00:02:01,020
And so that is a very present thing in the city

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00:02:01,040 --> 00:02:05,020
even to this day.

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00:02:05,040 --> 00:02:08,980
Kirschbaum: That was a category four storm that hit Galveston

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00:02:09,000 --> 00:02:13,020
on September 8th and there really was not a lot of information about

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00:02:13,040 --> 00:02:17,020
what was happening in the Caribbean before the storm made landfall.

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00:02:17,040 --> 00:02:20,980
Mandt: And the hurricane hit them totally unprepared

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00:02:21,000 --> 00:02:24,980
and thousands of people lost their lives.

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00:02:25,000 --> 00:02:29,020
Tremendous damage because it surprised everyone.

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00:02:29,040 --> 00:02:33,020

With the onsets of satellites, that will never happen.

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00:02:33,040 --> 00:02:37,020
Kim: The first leap forward would have been being able to see

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00:02:37,040 --> 00:02:41,020
the entire planet from space in the first place.

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00:02:41,040 --> 00:02:45,020
Prior to that, how would you know, for example, that a hurricane was coming?

42
00:02:45,040 --> 00:02:49,020
It would have been very difficult to know where it was coming, where it was going,

43
00:02:49,040 --> 00:02:53,020
how bad it was going to be.

44
00:02:53,040 --> 00:02:57,020
Mandt: So, that's one of the dramatic impacts, is satellite data … sort of like,

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00:02:57,040 --> 00:03:01,020
your eyes in the sky to make sure that mother nature never can surprise you.

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00:03:01,040 --> 00:03:05,020
Sims: When I was a child, I loved playing with magnifying glasses

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00:03:05,040 --> 00:03:09,020
because you can zoom in and see so many fine details. And that's what we can do

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00:03:09,040 --> 00:03:13,020
with the satellites that we have now, particularly the GOES-R series.

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00:03:13,040 --> 00:03:17,020
We're getting 60 times more data now than what we were in the previous series.

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00:03:17,040 --> 00:03:21,020
Sullivan: You know, the first satellites I worked with, the GOES-I through M,

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00:03:21,040 --> 00:03:24,980
which were great satellites, but taking a picture of a globe every 25 minutes

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00:03:25,000 --> 00:03:29,020
you know the hurricanes would be here. And then they're here and then they're here.

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00:03:29,040 --> 00:03:33,020
And it's not like you're losing track of them. But the difference between that

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00:03:33,040 --> 00:03:37,020
and being able to see, oh, it's swerving. It's curling. Oh, it's dying.

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00:03:37,040 --> 00:03:41,020
We take a full disc picture of the entire hemisphere

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00:03:41,040 --> 00:03:45,020
in five minutes. But we can also look at smaller areas.

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00:03:45,040 --> 00:03:49,020
And you can scan that once every 30 seconds. You get to see

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00:03:49,040 --> 00:03:53,020
as the hurricane eye wall was forming, you can see that actually forming in real time.

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00:03:53,040 --> 00:03:57,020
The Earth looks alive … it looks like a living thing.

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00:03:57,040 --> 00:04:01,020
[shimmering music]

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00:04:01,040 --> 00:04:05,020
Mandt: So the polar orbiting satellites complement the geostationary,

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00:04:05,040 --> 00:04:09,020
, since a geostationary like 24,000 miles up.

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00:04:09,040 --> 00:04:13,020

While they get great pictures, it's really hard to measure

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00:04:13,040 --> 00:04:17,020
what is the state of the atmosphere from that distance.

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00:04:17,040 --> 00:04:21,020
So the polar orbiting are basically flying at little over 500 miles up.

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00:04:21,040 --> 00:04:24,980
And when you're at that altitude you can sense

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00:04:25,000 --> 00:04:28,980
what's in the atmosphere to a lot higher resolution.

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00:04:29,000 --> 00:04:32,980
The JPSS satellite, is really, primary purpose

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00:04:33,000 --> 00:04:36,980
is to take measurements of the temperature and moisture of the atmosphere

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00:04:37,000 --> 00:04:40,980
to drive the weather forecast models.

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00:04:41,000 --> 00:04:44,980
Kim: Two things that people always want to know about hurricanes

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00:04:45,000 --> 00:04:48,980
are how strong is it, and where is it going to hit?

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00:04:49,000 --> 00:04:52,980
And microwave sounders can certainly help with both of those.

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00:04:53,000 --> 00:04:56,980
The ability to see through clouds becomes really important.

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00:04:57,000 --> 00:05:00,980
If you've ever seen a picture of a hurricane from space,

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00:05:01,000 --> 00:05:04,980
mostly what you're seeing is clouds.

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00:05:05,000 --> 00:05:08,980
And you can get a better weather forecast, a better prediction of how strong the hurricane is

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00:05:09,000 --> 00:05:12,980
and where it's going to hit, which direction it's going to go, if you could see through those clouds

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00:05:13,000 --> 00:05:16,980
and see the structure of the atmosphere; maybe even the ocean conditions underneath that.

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00:05:17,000 --> 00:05:20,980
And so microwave sensors allow you to do that kind of thing.

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00:05:21,000 --> 00:05:24,980
Mandt: As you've seen, when they do the

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00:05:25,000 --> 00:05:28,980
there's usually a cone of uncertainty they put in the path.

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00:05:29,000 --> 00:05:32,980
We don't know exactly where it's going, but for the next three days

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00:05:33,000 --> 00:05:36,980
or five days or seven days, here's the cone that it could go in.

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00:05:37,000 --> 00:05:40,980
But you don't want to over-warn, right?

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00:05:41,000 --> 00:05:44,980
You don't want to have the whole East Coast run in inland a hundred miles

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00:05:45,000 --> 00:05:48,980
because of a hurricane, potential hurricane.

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00:05:49,000 --> 00:05:52,980

You'd like that as precise as you can, so that only the people who are really going to be affected have to do so

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00:05:53,000 --> 00:05:56,980
The improved sensors that we've been flying

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00:05:57,000 --> 00:06:00,980
allow a better understanding of the core of that hurricane

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00:06:01,000 --> 00:06:04,980
and allow the forecasters to better predict precisely

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00:06:05,000 --> 00:06:08,980
where that hurricane is going to hit. And when they do that

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00:06:09,000 --> 00:06:12,980
then you can narrow and shrink that cone of uncertainty and give a better prediction.

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00:06:13,000 --> 00:06:16,980
DeMaria: We hope to continue to improve the ability to do track forecasting.

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00:06:17,000 --> 00:06:20,980
That's gotten so much better over the past couple of decades.

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00:06:21,000 --> 00:06:24,980
Our five-day forecast is about as accurate as our two-day forecast

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00:06:25,000 --> 00:06:28,980
was only about 20 years ago.

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00:06:29,000 --> 00:06:32,980
Porter: And increasingly, people are listening

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00:06:33,000 --> 00:06:36,980
to the forecast that they get from meteorologists. They have increased confidence,

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00:06:37,000 --> 00:06:40,980
, they see the improvement in forecasts as it relates to hurricanes over the last couple of decades.

101
00:06:41,000 --> 00:06:44,980
And when a hurricane watch or hurricane warning goes into effect