1
00:00:00,000 --> 00:00:02,000
Music.

2
00:00:02,000 --> 00:00:06,000
Child: Ever wonder what the wind has done for you lately?

3
00:00:06,000 --> 00:00:08,000
Well it might be more than you think.

4
00:00:08,000 --> 00:00:13,000
Wind measurements help us make better weather forecasts and track dangerous storms.

5
00:00:13,000 --> 00:00:16,000
We can learn how currents affect coastal nutrients,

6
00:00:16,000 --> 00:00:21,000
and even begin to understand how the atmosphere works and responds to changing climate conditions.

7
00:00:21,000 --> 00:00:24,000
But how do you measure the wind at sea?

8
00:00:24,000 --> 00:00:28,000
Luckily, we can get a little help from the ocean itself.

9
00:00:28,000 --> 00:00:32,000
Wherever the air meets the water, the wind raises waves on the surface.

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00:00:32,000 --> 00:00:34,000
The stronger the wind, the larger the waves

11
00:00:34,000 --> 00:00:37,000
and their direction and speed also tell us about the wind driving them.

12
00:00:37,000 --> 00:00:40,000
And the best part? We can see them from space!

13
00:00:40,000 --> 00:00:42,000

At least, if we know how to look.

14
00:00:42,000 --> 00:00:45,000
That's where scatterometry comes in.

15
00:00:45,000 --> 00:00:48,000
Scatterometry is a technique for measuring the size and shape of objects

16
00:00:48,000 --> 00:00:52,000
by watching how light waves reflect, or scatter, off of them.

17
00:00:52,000 --> 00:00:56,000
Looking at the Earth from space, a scatterometer uses radar to send pulses of light

18
00:00:56,000 --> 00:00:59,000
down to the surface and measures how much bounces back.

19
00:00:59,000 --> 00:01:04,000
To study ocean winds, we use a very specific kind of light: microwaves.

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00:01:04,000 --> 00:01:07,000
Microwaves have wavelengths between 1 millimeter and 1 meter.

21
00:01:07,000 --> 00:01:13,000
And (in case you were wondering) microwave ovens work because those light waves are exactly the right size

22
00:01:13,000 --> 00:01:16,000
to agitate the water molecules in your food, heating it up.

23
00:01:16,000 --> 00:01:20,000
They're also exactly the right size to tell us about wind-driven ocean waves.

24
00:01:20,000 --> 00:01:24,000
The spacing between the waves and the wavelength of the radar are similar,

25
00:01:24,000 --> 00:01:28,000
which causes a resonance effect and makes it easy to measure!

26
00:01:28,000 --> 00:01:31,000
If the ocean is calm and there aren't any waves, most of the light will bounce right off of it

27
00:01:31,000 --> 00:01:35,000
and none of it will be reflected backwards where the spacecraft can measure it.

28
00:01:35,000 --> 00:01:38,000
As the wind rises, though, the waves get taller,

29
00:01:38,000 --> 00:01:42,000
and some of it will bounce back in a pattern that's picked up by the detector.

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00:01:42,000 --> 00:01:45,000
That pattern depends on the height and orientation of the waves,

31
00:01:45,000 --> 00:01:50,000
so we can use it to figure out the wind speed and direction that caused the waves in the first place.

32
00:01:50,000 --> 00:01:56,000
RapidScat is a scatterometer that will be installed on the International Space Station later this year.

33
00:01:56,000 --> 00:02:02,000
Hitching a ride with a SpaceX Dragon mission and sharing power, communications, and a stable platform with

34
00:02:02,000 --> 00:02:05,000
this plucky instrument has a knack for making the most of any situation.

35
00:02:05,000 --> 00:02:09,000
And this partnership opens some pretty exciting prospects!

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00:02:09,000 --> 00:02:13,000
Other scatterometers pass over a point on the surface at roughly the same time every day.

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00:02:13,000 --> 00:02:16,000
ISS travels in a completely different orbit,

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00:02:16,000 --> 00:02:20,000

which means that RapidScat will be able to measure the wind at different times.

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00:02:20,000 --> 00:02:23,000
That's really important when you're trying to understand how heating from the Sun

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00:02:23,000 --> 00:02:26,000
can affect winds and cloud formation from hour to hour,

41
00:02:26,000 --> 00:02:32,000
and it also means we can more accurately track tropical storms that might develop into dangerous hurricanes.

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00:02:32,000 --> 00:02:36,000
Even better, RapidScat's path will cross those of the other scatterometers,

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00:02:36,000 --> 00:02:39,000
allowing for careful calibration of all the instruments,

44
00:02:39,000 --> 00:02:42,000
so we know we're comparing apples to apples when we put it all together.

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00:02:42,000 --> 00:02:47,000
not least of which is what's going on in the atmosphere.