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00:00:11,980 --> 00:00:03,980

Intro music.

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00:00:12,000 --> 00:00:15,980

22 thousand miles away from Earth, the GOES satellites

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00:00:16,000 --> 00:00:19,980

keep a watchful eye on our planet at all times, sending real-time

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00:00:20,000 --> 00:00:23,980

data to help predict weather days in advance.

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00:00:24,000 --> 00:00:27,980

At the same time, a set of instruments carried on board GOES, monitor our sun

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00:00:28,000 --> 00:00:31,980

and provide critical data for space weather prediction.

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00:00:32,000 --> 00:00:35,980

You may then ask yourself 'Why do that? Why do we care?'

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00:00:36,000 --> 00:00:39,980

Andre Dress: When you think of space weather and they talk about

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00:00:40,000 --> 00:00:43,990

things like solar wind, It's not the wind that you breath,

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00:00:44,010 --> 00:00:47,990

this is radiation that's coming off of the sun;

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00:00:48,010 --> 00:00:51,990

Protons, electrons that come streaming off of the sun towards the Earth and they get

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00:00:52,010 --> 00:00:55,990

caught in the Earth's magnetic field. They get mirrored down to the poles, you see

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00:00:56,010 --> 00:00:59,990

the aurora borealis and they heat the Earth's environment and then it cools...

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00:01:00,010 --> 00:01:03,990

...and so that heating and that cooling certainly has an impact on Earth-

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00:01:04,010 --> 00:01:07,990

based weather. Paul Richards: You may not know it but you can have a solar storm

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00:01:08,010 --> 00:01:11,990

and all of a sudden you are pumping gas with your credit

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00:01:12,010 --> 00:01:15,990

card and it's not working in the machine. That could be from a disruption of communication

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00:01:16,010 --> 00:01:19,990

satellites from solar weather. So, the solar weather affects you

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00:01:20,010 --> 00:01:23,990

everyday down here as well, not only just astronauts...it affects

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00:01:24,010 --> 00:01:27,990

people on Earth. Narrator: In fact, space weather data is so

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00:01:28,010 --> 00:01:31,990

important for our everyday life here on Earth, that there are people who actually

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00:01:32,010 --> 00:01:35,990

monitor that data 24 hours a day, three hundred

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sixty five days a year. Howard Singer: Hello, I am Howard Singer, chief scientist at

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NOAA's space weather prediction center here in Boulder, CO. We study

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the space environment and provide information about what's going on in

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00:01:48,010 --> 00:01:51,990
space and on the Earth that's influenced by our sun.

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00:01:52,010 --> 00:01:55,990
The antennas that you see behind me are used to capture data

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00:01:56,010 --> 00:01:59,990
from the Geosynchronous satellites; the GOES satellites; that are over 22

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00:02:00,010 --> 00:02:03,990
thousand miles above us here in Boulder. Bob Rutledge: This is manned

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00:02:04,010 --> 00:02:07,990
24/7, 365. Space weather can happen in any time

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00:02:08,010 --> 00:02:11,990
The forecasters assimilate all this data to develop both

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00:02:12,010 --> 00:02:15,990
probabilistic forecast for the next 24 hours. The forecasters can also issue

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00:02:16,010 --> 00:02:19,990
alerts and warnings in real time. Janet Green: The people that use our

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00:02:20,010 --> 00:02:24,000
data are the power companies because space weather can actually

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00:02:24,020 --> 00:02:28,000
cause problems for the power grid and black outs.

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00:02:28,020 --> 00:02:32,000
NASA uses our data to let the astronauts know to go to a safer place.

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00:02:32,020 --> 00:02:36,000
Paul Richards: Typically it has to be clear to go out on a spacewalk because you

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00:02:36,020 --> 00:02:40,000

do subject yourself to even higher radiation because you are not shielded

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00:02:40,020 --> 00:02:44,000

by either the shuttle or the space station. Janet Green: Also GPS users

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00:02:44,020 --> 00:02:48,000

use our data because space weather can increase errors in GPS

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00:02:48,020 --> 00:02:52,000

We can do things like warn planes that if they fly in

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00:02:52,020 --> 00:02:56,000

a certain latitude, they will lose communications.

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00:02:56,020 --> 00:03:00,000

Or we can let satellite operators know that radiation levels are high

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00:03:00,020 --> 00:03:04,000

and they can operate their instrument in a way that can make them less susceptible

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00:03:04,020 --> 00:03:08,000

Rodney Viereck: All of these new customers; these new technologies, now depend on

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00:03:08,020 --> 00:03:12,000

space weather in order to protect their systems.

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00:03:12,020 --> 00:03:16,000

Narrator: Other satellites, such as Stereo, SOHO,

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00:03:16,020 --> 00:03:20,000

and SDO are dedicated to help scientists study the sun.

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00:03:20,020 --> 00:03:24,000

Space weather forecasters use that data as well to create

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different models. So why then, would a weather satellite like GOES

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00:03:28,020 --> 00:03:32,000
need to also look at the sun? Paul Richards: SOHO, Stereo,

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00:03:32,020 --> 00:03:36,000
SDO going up, they are all NASA experimental satellites looking

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00:03:36,020 --> 00:03:40,000
for scientific data. GOES is actually

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00:03:40,020 --> 00:03:44,000
operated by NOAA. We develop it here at NASA and they

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00:03:44,020 --> 00:03:48,000
are operational satellites. Janet Green: So that means that there are always two

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00:03:48,020 --> 00:03:52,000
satellites running at all times and should one of those fails,

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00:03:52,020 --> 00:03:56,000
there is even a 3rd satellite up there in storage, waiting to be turned on,

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00:03:56,020 --> 00:04:00,000
so we will never miss some space weather

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00:04:00,020 --> 00:04:04,010
event that's going on. Launch Countdown Announcer: Zero and lift off

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00:04:04,030 --> 00:04:08,010
Narrator: On March 4th, 2010 NASA launched

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00:04:08,030 --> 00:04:12,010
the last satellite in the GOES N-O-P series.

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00:04:12,030 --> 00:04:16,010
GOES-P, now GOES-15, will ensure continuity of service

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00:04:16,030 --> 00:04:20,010

and delivery of real-time data to help predict space and

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00:04:20,030 --> 00:04:24,010

Earth-based weather more accurately.

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00:04:24,030 --> 00:04:28,010

Paul Richards: We are actually working on the replacement of those, GOES-R series,

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00:04:28,030 --> 00:04:32,010

and they are going to be lasting for 5 years of storage and 15

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00:04:32,030 --> 00:04:36,010

years on orbit.