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1
00:00:00,499 --> 00:00:02,468
[Music]

2
00:00:02,501 --> 00:00:03,936
[Josh Fisher] We're
interested in our ability

3
00:00:03,969 --> 00:00:06,005
to sustain
food production.

4
00:00:06,038 --> 00:00:08,374
We're interested in our
ecosystem health,

5
00:00:08,407 --> 00:00:10,376
and that's all
tied to water.

6
00:00:10,409 --> 00:00:13,946
How much water our plants, our
crops need, we want to know,

7
00:00:13,979 --> 00:00:18,484
and as water resources become
more uncertain, more variable,

8
00:00:18,517 --> 00:00:20,620
we need to really track
that really precisely.

9
00:00:20,653 --> 00:00:22,555
We can't just guess anymore.

10
00:00:22,588 --> 00:00:24,123
[Simon Hook] So, ECOSTRESS
is going to measure

11
00:00:24,156 --> 00:00:25,625

the surface temperature

12
00:00:25,658 --> 00:00:26,893
and then we're
going to use that surface

13
00:00:26,926 --> 00:00:28,161
temperature to be able to

14
00:00:28,194 --> 00:00:30,029
determine how much
water the plants

15
00:00:30,062 --> 00:00:32,198
that we're looking
at are using.

16
00:00:32,231 --> 00:00:32,965
[Kerry Cawse-Nicolson]
We'd like to show

17
00:00:32,998 --> 00:00:35,034
how we can use
ECOSTRESS data

18
00:00:35,067 --> 00:00:37,203
to optimize
agricultural water use.

19
00:00:37,603 --> 00:00:40,407
["ECOSTRESS"]

20
00:00:41,907 --> 00:00:44,177
[Hook] ECOSTRESS is an
instrument that's going to go

21
00:00:44,210 --> 00:00:46,179
on the International
Space Station.

22
00:00:46,212 --> 00:00:48,614
It stands for the
Ecosystem Spaceborne

23
00:00:48,647 --> 00:00:52,218
Thermal Radiometer
Experiment on Space Station.

24
00:00:52,251 --> 00:00:55,054
If focuses on how on how much
water plants use

25
00:00:55,087 --> 00:00:57,957
all over the planet, and how
much water plants need,

26
00:00:57,990 --> 00:01:01,127
and if there is stress, water
stress or heat stress,

27
00:01:01,160 --> 00:01:02,328
that plants are facing.

28
00:01:02,361 --> 00:01:04,330
[Hook] We can measure the
surface temperature of the Earth

29
00:01:04,363 --> 00:01:06,165
within a few tenths
of a degree,

30
00:01:06,198 --> 00:01:07,900
and then we can use
that information

31
00:01:07,933 --> 00:01:10,103
to look at objects on the
surface of the Earth.

32

00:01:10,136 --> 00:01:11,504
In this particular case,

33
00:01:11,537 --> 00:01:13,106
we're interested in
looking at plants.

34
00:01:13,139 --> 00:01:16,042
Plants, as they start
to suffer from

35
00:01:16,075 --> 00:01:19,579
heat or water stress, they begin
to heat up in a similar way

36
00:01:19,612 --> 00:01:21,514
to a human with a fever.

37
00:01:21,547 --> 00:01:23,049
We can pick up that stress

38
00:01:23,082 --> 00:01:25,551
before the plant is
visibly affected.

39
00:01:25,584 --> 00:01:28,488
There's this window where
water resource management

40
00:01:28,521 --> 00:01:32,959
and agricultural users can
actually allocate more water

41
00:01:32,992 --> 00:01:36,629
before they die, before the
damage is irreparable.

42
00:01:36,662 --> 00:01:37,597
[Hook] The Space
Station is going

43
00:01:37,630 --> 00:01:39,031
to fly over at
different times

44
00:01:39,064 --> 00:01:41,000
to be able to look
at how the stress

45
00:01:41,033 --> 00:01:42,168
is changing
through the day,

46
00:01:42,201 --> 00:01:46,105
and allow us to characterize
vegetation in ways

47
00:01:46,138 --> 00:01:49,108
that we've never been
able to characterize it before.

48
00:01:49,141 --> 00:01:51,577
The instrument itself
is looking down

49
00:01:51,610 --> 00:01:56,249
at the surface of the Earth and
uses a mirror that rotates

50
00:01:56,282 --> 00:01:58,017
to scan across the surface.

51
00:01:58,050 --> 00:02:00,419
This measurement's
being made in micro seconds,

52
00:02:00,452 --> 00:02:02,555
but it's enough time
for us to measure

53
00:02:02,588 --> 00:02:04,223
the energy that's
coming off it,

54
00:02:04,256 --> 00:02:07,226
and then translate that energy
into a temperature.

55
00:02:07,259 --> 00:02:08,995
[Fisher] The temperature
measurements from ECOSTRESS

56
00:02:09,028 --> 00:02:12,899
can detect volcanoes, we can
detect urban heat from cities.

57
00:02:12,932 --> 00:02:14,367
[Hook] So, although
we're focused

58
00:02:14,400 --> 00:02:16,502
primarily on looking at plants

59
00:02:16,535 --> 00:02:19,872
and making sure that we can
maximize the amount of food

60
00:02:19,905 --> 00:02:22,074
that we can get back for the
water that we use,

61
00:02:22,107 --> 00:02:25,344
the mission can be used
for many other purposes.

62
00:02:25,377 --> 00:02:27,747
What hasn't been
possible in the past

63

00:02:27,780 --> 00:02:29,382
is to make the
measurements as frequently

64
00:02:29,415 --> 00:02:32,451
as we need to make them
with sufficient detail,

65
00:02:32,484 --> 00:02:36,255
and it's that combination
that is so important.

66
00:02:36,288 --> 00:02:37,690
And really, that's
just a reflection

67
00:02:37,723 --> 00:02:39,458
of the improvements
in technology.

68
00:02:39,491 --> 00:02:43,529
Our ability to sustain
livelihoods, food production,

69
00:02:43,562 --> 00:02:45,531
ecosystems, and the
health of the planet