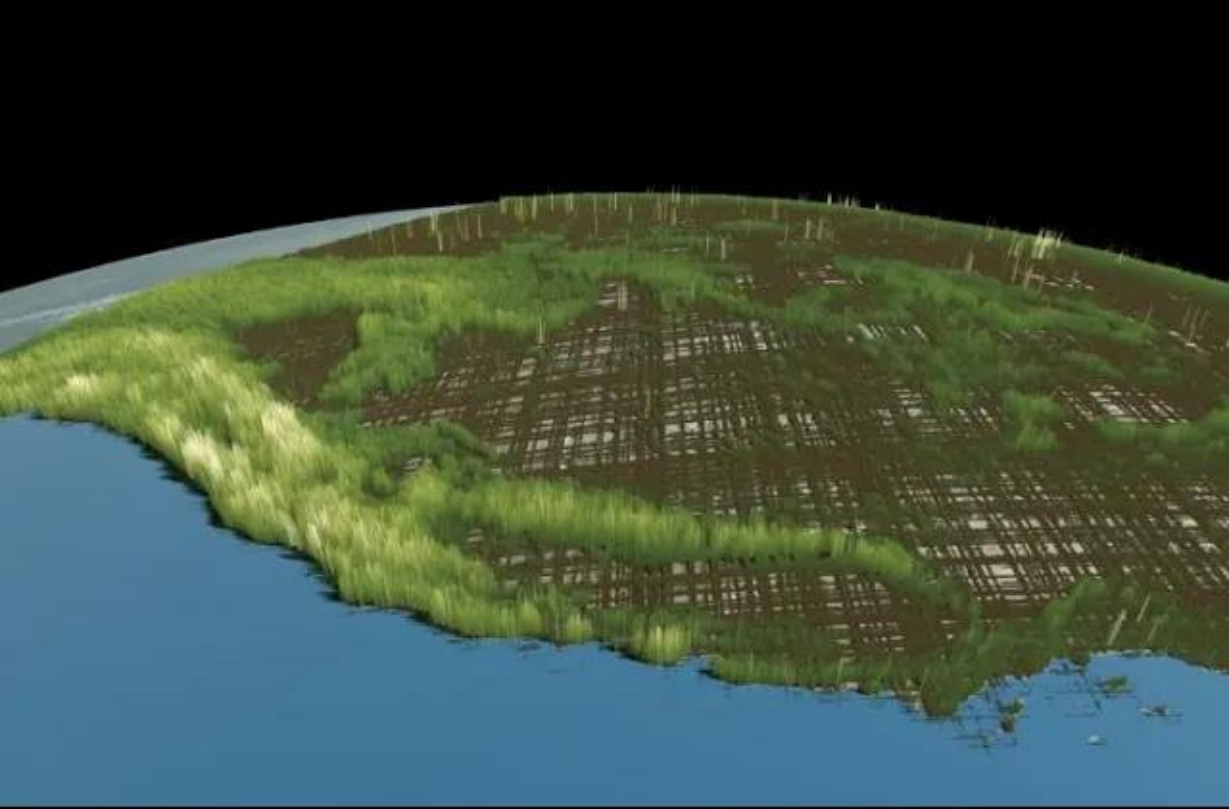

1
00:00:01,666 --> 00:00:04,433
[rythmic music begins]  Narrator:
The White House recently called upon the USDA's

2
00:00:04,433 --> 00:00:08,933
Forest Service and the Bureau of Land
Management to produce the first ever

3
00:00:08,933 --> 00:00:12,300
national inventory of mature
and old growth forests.

4
00:00:14,600 --> 00:00:17,600
After a year’s work,
the first stage is complete,

5
00:00:18,166 --> 00:00:21,683
and thanks to observations
from high above, scientists will soon

6
00:00:21,683 --> 00:00:25,766
be able to view, measure and understand
our forests like never before.

7
00:00:27,650 --> 00:00:30,983
NASA's GEDI instrument on board
the International Space Station

8
00:00:31,366 --> 00:00:34,316
helps estimate tree height and biomass,

9
00:00:34,316 --> 00:00:37,316
adding a new dimension to the study.

10
00:00:38,516 --> 00:00:41,183
Palmer: The Forest Service has been studying

11
00:00:41,183 --> 00:00:44,150
old growth forests going back

almost 100 years.

12
00:00:44,150 --> 00:00:47,150
Others before us have been studying
in much longer.

13
00:00:47,783 --> 00:00:50,783
Many of these forests have been managed

14
00:00:50,900 --> 00:00:56,016
for millennia by native peoples who have
deep connections to these forests.

15
00:00:56,100 --> 00:00:59,100
But we still have a tremendous amount
to learn.

16
00:00:59,633 --> 00:01:02,933
We have data
that's been measured on the ground

17
00:01:02,933 --> 00:01:05,866
that tells us a tremendous amount
about what's out there.

18
00:01:05,866 --> 00:01:10,133
But a ground inventory is necessarily
going to have gaps in it.

19
00:01:10,316 --> 00:01:14,300
We can measure one plot
for every 6000 acres of forest.

20
00:01:14,633 --> 00:01:19,433
What remote sensing data does
is it really allows us

21
00:01:19,433 --> 00:01:23,633
to fill in those spatial gaps,
but also the temporal gaps.

22
00:01:24,466 --> 00:01:27,800
We know that
with the frequency of disturbances

23
00:01:27,800 --> 00:01:32,300
that are happening on our landscape now,
we need more rapid information.

24
00:01:33,000 --> 00:01:37,650
So, for example, with the
NASA GEDI sensor that we're using in this

25
00:01:37,816 --> 00:01:41,416
particular study,
we're working with the NASA scientists

26
00:01:41,416 --> 00:01:45,316
to identify that relationship
with those ground-measured

27
00:01:45,316 --> 00:01:48,316
information we know about forests.

28
00:01:48,800 --> 00:01:52,200
Narrator: Ground surveys collect
detailed information about forest types

29
00:01:52,200 --> 00:01:55,966
and health, and tree ring data,
provide a window back in time.

30
00:01:56,566 --> 00:01:58,100
Pederson: Today, we're in a

31
00:01:59,266 --> 00:02:02,266
marginally documented old growth forest.

32
00:02:03,116 --> 00:02:07,616

It's on Forest Service land
in the Tionesta National Forest.

33
00:02:08,216 --> 00:02:12,383
And this is home to the oldest
documented eastern hemlock.

34
00:02:13,283 --> 00:02:17,400
And we're putting in plot today
and then going to try to core

35
00:02:17,400 --> 00:02:20,400
some more older trees
so we can get about five to

36
00:02:20,483 --> 00:02:23,483
maybe six centuries of history.

37
00:02:23,966 --> 00:02:27,183
Looks like it's got a density of rings
and a release.

38
00:02:28,616 --> 00:02:31,350
Old growth forests are quite often
where we go

39
00:02:31,350 --> 00:02:34,516
to get those long histories
where we can learn about

40
00:02:35,550 --> 00:02:39,016
frost events
and droughts and insect outbreaks

41
00:02:39,016 --> 00:02:43,516
and any kind of important ecological,
climatological, and even sometimes

42
00:02:43,516 --> 00:02:48,383
cultural events that happen,

they’re stored in the trunks of these trees.

43
00:02:48,750 --> 00:02:52,216
And the oldest trees have the best stories
because they can go farther

44
00:02:52,216 --> 00:02:52,950
back in time.

45
00:02:54,416 --> 00:02:55,200
Narrator: These living

46
00:02:55,200 --> 00:02:59,700
time capsules and their ecosystems
help clean our air and drinking water

47
00:02:59,933 --> 00:03:02,966
and provide spaces
for recreation and wildlife.

48
00:03:04,166 --> 00:03:07,733
They also help absorb
more than 10% of our annual greenhouse

49
00:03:07,733 --> 00:03:12,350
gas emissions. While younger vegetation
accumulates carbon more rapidly,

50
00:03:12,833 --> 00:03:16,950
old growth forests contain more biomass
overall and store more carbon,

51
00:03:17,333 --> 00:03:20,333
another variable
that can be estimated from space.

52
00:03:20,900 --> 00:03:25,050
In addition to GEDI, observations
from NASA's ICESat-2 satellite

53
00:03:25,250 --> 00:03:29,266
and several field campaigns, have helped
measure our ever changing forests.

54
00:03:30,383 --> 00:03:32,216
Pederson: You know the precision of lidar

55
00:03:32,216 --> 00:03:36,833
now from a space station,
how you can beam the lidar

56
00:03:36,833 --> 00:03:40,750
system down
and in 30 meter radius plots.

57
00:03:40,766 --> 00:03:45,166
you can pull in all this information
about the height of the canopy,

58
00:03:45,466 --> 00:03:49,283
the changes in the canopy over space,
and density of the forest.

59
00:03:49,850 --> 00:03:52,316
The precision of these beams
now from outer space

60
00:03:52,316 --> 00:03:55,666
to get detailed information about a forest

61
00:03:55,666 --> 00:03:57,450
is truly astounding.

62
00:03:58,666 --> 00:04:01,700
These ecosystems are so complex.

63
00:04:01,700 --> 00:04:04,350
From the treetop to the bedrock. Right?

64
00:04:04,350 --> 00:04:09,350
We're still learning so much about
what's underground, what's in the soil,

65
00:04:09,350 --> 00:04:13,200
this live dynamic system
and what we can't see.

66
00:04:13,400 --> 00:04:18,600
The old growth forests have a function
of time that as a human, we can't fathom.

67
00:04:18,883 --> 00:04:23,300
From a Western science perspective,
we do not understand.