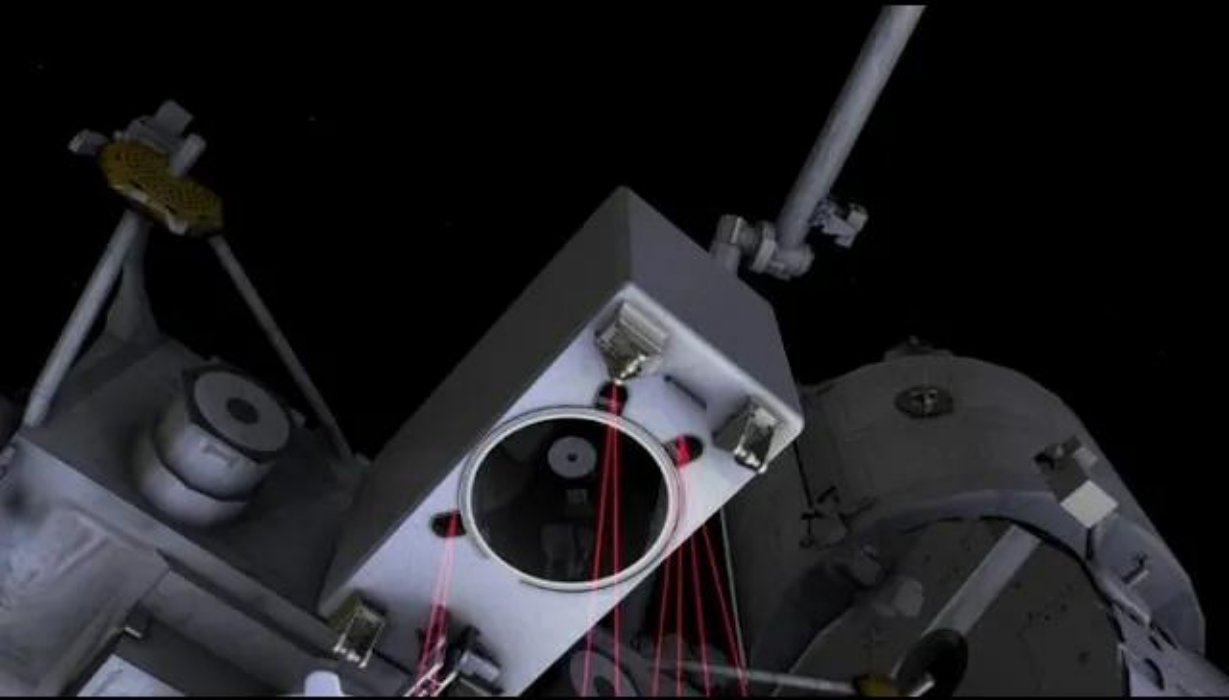

1
00:00:01,060 --> 00:00:03,250
Ralph Dubayah: So we often talk about the biomass of the forest.

2
00:00:03,270 --> 00:00:06,670
All that is how much do the trees weigh.

3
00:00:06,690 --> 00:00:08,770
If you know their biomass, how much they weigh,

4
00:00:08,790 --> 00:00:14,180
half of the biomass of the tree is carbon

5
00:00:14,200 --> 00:00:15,430
Well, my name is Ralph Dubayah.

6
00:00:15,450 --> 00:00:18,730
I'm the principal investigator of the GEDI mission

7
00:00:18,750 --> 00:00:23,830
and I'm a professor of geographical sciences at the University of Maryland.

8
00:00:23,850 --> 00:00:26,000
It's really critical that we understand

9
00:00:26,020 --> 00:00:29,400
what the current carbon content of forests is today.

10
00:00:29,420 --> 00:00:32,790
We need a good global map of where the carbon is.

11
00:00:32,810 --> 00:00:35,980
The reason we need that is because whenever we cut down trees,

12
00:00:36,000 --> 00:00:38,110
we're going to release carbon into the atmosphere

13
00:00:38,130 --> 00:00:41,610

and we don't know how much carbon we are releasing.

14
00:00:41,630 --> 00:00:43,780
GEDI will tell us how tall the trees are

15
00:00:43,800 --> 00:00:46,520
and by knowing how tall they are we will know how much they weigh;

16
00:00:46,540 --> 00:00:49,780
by knowing how much they weigh, we will know how much carbon

17
00:00:49,800 --> 00:00:53,590
is being lost into the atmosphere.

18
00:00:53,610 --> 00:00:55,120
Bryan Blair: So GEDI weighs about a thousand pounds

19
00:00:55,140 --> 00:00:58,020
and looks about like a refrigerator.

20
00:00:58,040 --> 00:01:01,740
So it has a telescope about 80 centimeters in diameter.

21
00:01:01,760 --> 00:01:06,560
It has three laser ports, and shoots out four laser beams

22
00:01:06,580 --> 00:01:10,410
that are then dithered, really quickly, in between shots.

23
00:01:10,430 --> 00:01:13,250
So it makes one laser look like two.

24
00:01:13,270 --> 00:01:14,780
So I'm the instrument scientist for GEDI,

25
00:01:14,800 --> 00:01:19,990
and that's sort of the translator between engineering and science.

26
00:01:20,010 --> 00:01:23,730
So Ralph and I, we've been working on GEDI for over 20 years,

27
00:01:23,750 --> 00:01:27,460
and trying to get the technology ready and the science ready,

28
00:01:27,480 --> 00:01:30,100
so we can fly a mission like this.

29
00:01:30,120 --> 00:01:33,130
It's been great to get to this point.

30
00:01:33,150 --> 00:01:35,200
OK, so GEDI is a laser altimeter,

31
00:01:35,220 --> 00:01:37,230
so it's an active optical instrument.

32
00:01:37,250 --> 00:01:40,940
We have lasers that emit pulses of light.

33
00:01:40,960 --> 00:01:43,940
They travel down to the Earth, they get reflected from the Earth,

34
00:01:43,960 --> 00:01:46,470
and then we receive the reflection.

35
00:01:46,490 --> 00:01:48,210
So we time how long it takes to get there,

36
00:01:48,230 --> 00:01:51,140
which allows us to measure the range to the surface.

37
00:01:51,160 --> 00:01:53,250
When the pulse of light hits the surface

38
00:01:53,270 --> 00:01:57,330

it gets distorted and stretched out by any structure that is there.

39
00:01:57,350 --> 00:01:59,980
Ralph: It looks almost like an echocardiogram.

40
00:02:00,000 --> 00:02:04,150
It's a distorted Gaussian waveform, technically speaking.

41
00:02:04,170 --> 00:02:06,360
And where the amplitude of that waveform is bigger

42
00:02:06,380 --> 00:02:08,140
is where there's more canopy stuff.

43
00:02:08,160 --> 00:02:10,210
There's more leaves and branches at a particular height.

44
00:02:10,230 --> 00:02:15,140
And where the amplitude is smaller, there's less canopy material.

45
00:02:15,160 --> 00:02:20,150
Bryan: The overall goal of GEDI is to systematically and consistently

46
00:02:20,170 --> 00:02:23,550
sample the vertical structure of the world's forests,

47
00:02:23,570 --> 00:02:29,180
so we can estimate from that structure, the carbon content of the forest.

48
00:02:29,200 --> 00:02:31,230
Ralph: Really, one of the coolest things about GEDI

49
00:02:31,250 --> 00:02:34,530
is that we're going to get upwards of 10 billion

50
00:02:34,550 --> 00:02:38,400
-- 10 billion -- estimates of how tall trees are.

51
00:02:38,420 --> 00:02:40,630
It's highly likely that trees on your block

52
00:02:40,650 --> 00:02:43,700
are going to be measured by GEDI and you'll be able to see how tall they are.

53
00:02:43,720 --> 00:02:46,430
We simply do not know how tall trees are globally.

54
00:02:46,450 --> 00:02:48,500
So this is really, really exciting and really cool.