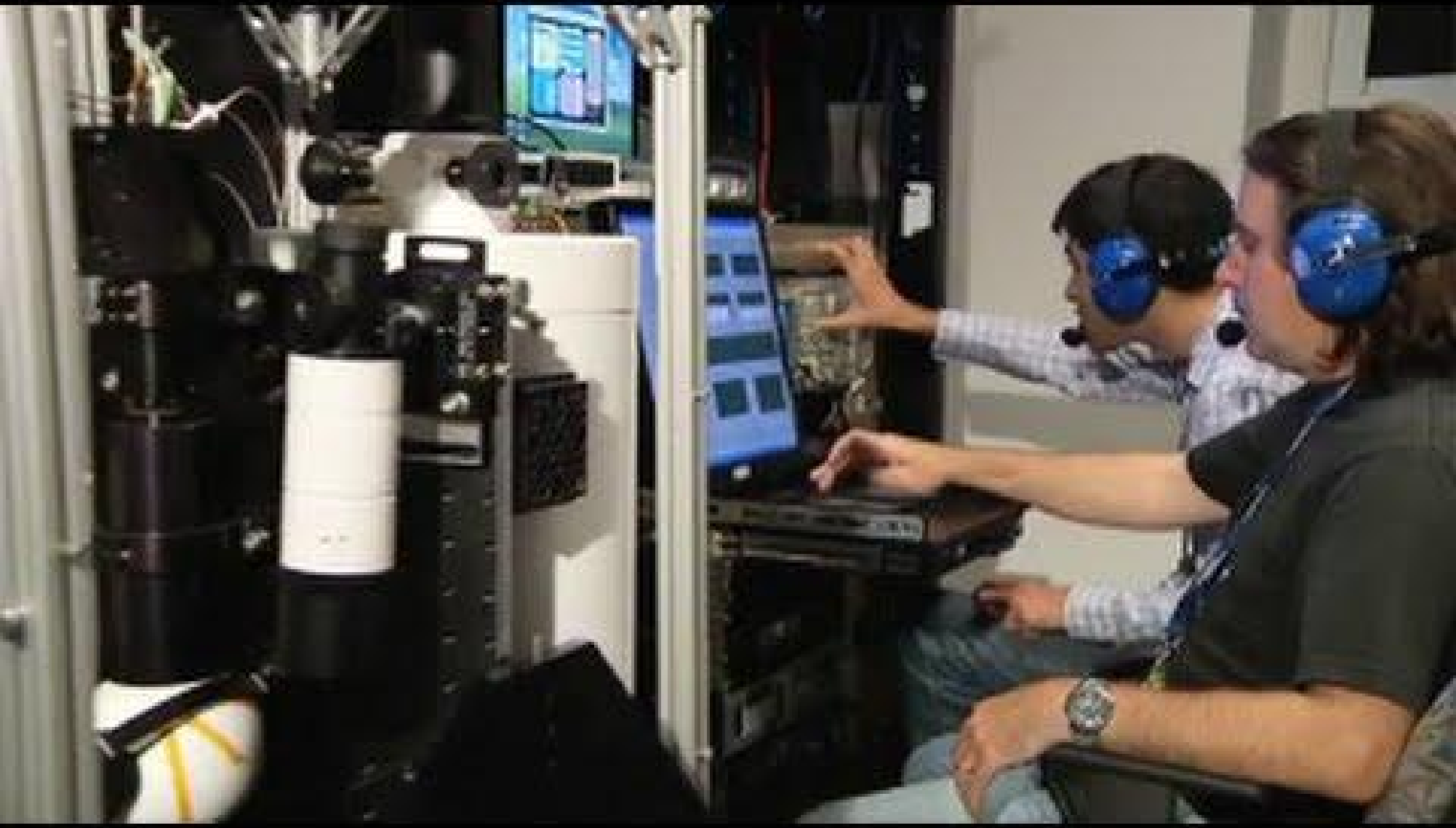

1
00:00:08,000 --> 00:00:03,990
Music

2
00:00:08,020 --> 00:00:12,010
Silence

3
00:00:12,030 --> 00:00:16,020
The ASCENDS acronym

4
00:00:16,040 --> 00:00:20,020
is the name of this mission for measuring carbon dioxide.

5
00:00:20,040 --> 00:00:24,070
One of the exciting things about this project is that you can actually

6
00:00:24,090 --> 00:00:28,070
watch trees eat and breathe.

7
00:00:28,090 --> 00:00:32,080
Of course, trees are breathing all the time, but they are only eating, meaning,

8
00:00:32,100 --> 00:00:36,080
performing photosynthesis when the sun is out. The main science

9
00:00:36,100 --> 00:00:40,090
is to measure how much carbon dioxide there is in the atmosphere,

10
00:00:40,110 --> 00:00:44,110
at this particular time on the Earth, how much is there total

11
00:00:44,130 --> 00:00:48,120
and where is it located. Turns out that when you burn

12
00:00:48,140 --> 00:00:52,120
materials, then a lot of carbon dioxide comes off. If you could see it,

13
00:00:52,140 --> 00:00:56,130

it would look like smoke and it stays, it is also a little heavier than the air,

14
00:00:56,150 --> 00:01:00,170
it stays in the lower part of the atmosphere. And that carbon dioxide

15
00:01:00,190 --> 00:01:04,210
has been tied into warming of the atmosphere.

16
00:01:04,230 --> 00:01:08,220
That is key interest to us on the planet.

17
00:01:08,240 --> 00:01:12,400
The great thing about a laser instrument is that is can make the measurement both

18
00:01:12,420 --> 00:01:16,410
in the daytime and the nighttime, because it is its own light source.

19
00:01:16,430 --> 00:01:20,410
It doesn't count on the sun being out to make these measurements.

20
00:01:20,430 --> 00:01:24,410
The way that we evolve the carbon dioxide instrument is we use a small gas cylinder.

21
00:01:24,430 --> 00:01:28,430
By doing that we can put a controlled amount of

22
00:01:28,450 --> 00:01:32,430
carbon dioxide in there, basically 100%, and it allows

23
00:01:32,450 --> 00:01:36,450
us to make that measurement, which we are ultimately going to measure

24
00:01:36,470 --> 00:01:40,470
from space. It allows us to make it in a controlled way not using air,

25
00:01:40,490 --> 00:01:44,480
but with a big absorption in a very small,

26
00:01:44,500 --> 00:01:48,490
physical footprint. So we can do the measurement on our lab bench.

27
00:01:48,510 --> 00:01:52,510
Then, the next step is we make measurements across the parking lot.

28
00:01:52,530 --> 00:01:56,520
We hang the target on the cell phone tower and then we direct our

29
00:01:56,540 --> 00:02:00,540
laser beam to that tower, the light hits the target, comes back to us,

30
00:02:00,560 --> 00:02:04,540
now we can measure all of the light in the column of air between our

31
00:02:04,560 --> 00:02:08,550
laboratory and the cell phone tower. The amount of data

32
00:02:08,570 --> 00:02:12,560
coming down from the carbon dioxide sounder is not an unwieldy amount.

33
00:02:12,580 --> 00:02:16,590
Again, we're interested in measuring ten-kilometer

34
00:02:16,610 --> 00:02:20,600
squares on the Earth averaged over a month, and then measuring how much

35
00:02:20,620 --> 00:02:24,640
carbon dioxide is there. So, typically our job here is to

36
00:02:24,660 --> 00:02:28,640
look at what is happening in the commercial field, what is happening

37
00:02:28,660 --> 00:02:32,660
elsewhere in the government, and try to leverage that to build a science

38
00:02:32,680 --> 00:02:36,670

instrument. You know, we are doing our best to make use of the resources

39
00:02:36,690 --> 00:02:40,690
that are there, but also we want to see what technologies are going to evolve

40
00:02:40,710 --> 00:02:44,720
without a lot of additional funding so that we can take advantage of its evolution.

41
00:02:44,740 --> 00:02:48,900
But now, we are talking about maybe making that measurement from Mars as well.

42
00:02:48,920 --> 00:02:52,920
The carbon dioxide instrument, you know, is probably one of the most exciting things

43
00:02:52,940 --> 00:02:56,920
that anybody could be working on at this time in history.

44
00:02:56,940 --> 00:03:00,930
We have this new technology, the fiber lasers to work on it.

45
00:03:00,950 --> 00:03:05,110
We have this incredible need to measure the health

46
00:03:05,130 --> 00:03:09,110
of the Earth over time. We have this great place NASA

47
00:03:09,130 --> 00:03:13,170
that is set up to bring the scientists and the technologists

48
00:03:13,190 --> 00:03:17,180
together to do that. It really just does not get much better than that.

49
00:03:17,200 --> 00:03:21,180
I mean everything has come together. There is great synergy there.

50
00:03:29,210 --> 00:03:25,210
Beep, Beep, Beep