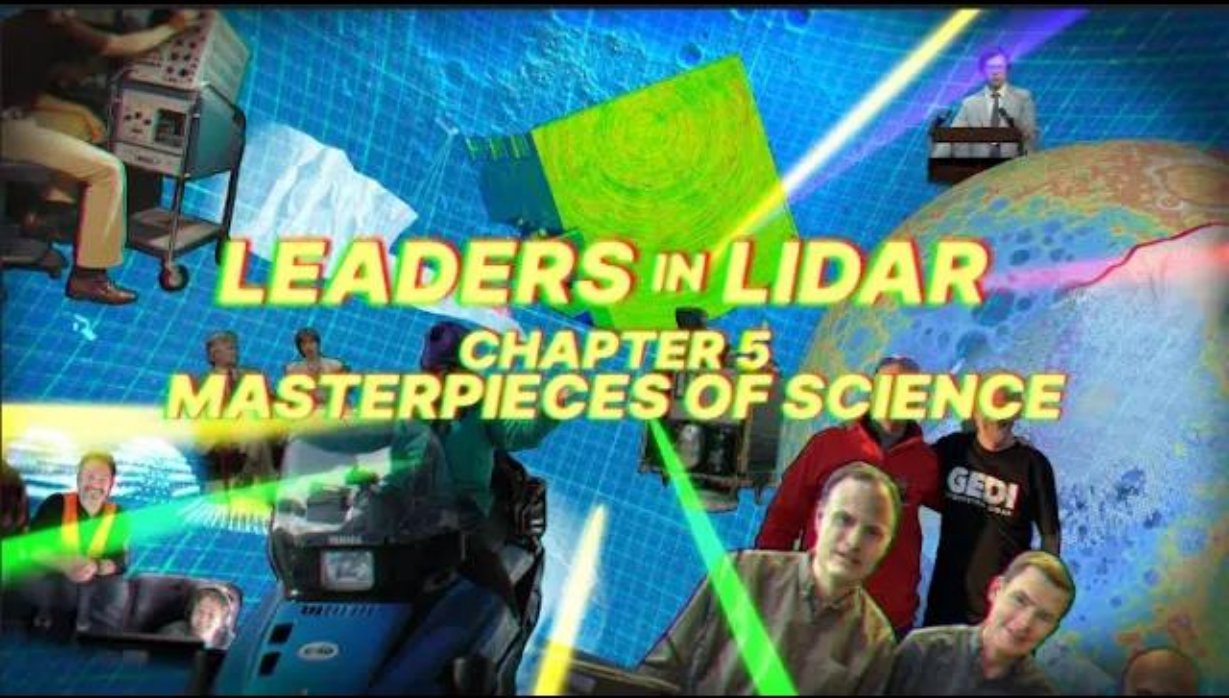
LEADERS IN LIDAR
CHAPTER 5
MASTERPIECES OF SCIENCE
GEDI

1
00:00:01,300 --> 00:00:04,233
Goddard has really played a lead role in the world

2
00:00:04,233 --> 00:00:09,000
in moving lidar from airborne
and ground-based missions into space.

3
00:00:09,433 --> 00:00:12,133
I mean, the future is in the hands
of the creative people,

4
00:00:12,366 --> 00:00:15,133
here and elsewhere, in industry,
that can just take this

5
00:00:15,133 --> 00:00:16,300
and run with it.

6
00:00:16,300 --> 00:00:22,200
[music]

7
00:00:22,200 --> 00:00:24,433
We've revolutionized how
we look at our own world,

8
00:00:24,433 --> 00:00:26,366
and the future is wide open.

9
00:00:26,366 --> 00:00:29,533
Winds, aerosols, trace gases.

10
00:00:30,000 --> 00:00:33,366
I've been spending a lot of time
and most of the past decade

11
00:00:33,366 --> 00:00:36,700
working on a lidar
to measure atmospheric CO2.

12
00:00:37,033 --> 00:00:40,100
We've been flying that fairly
regularly on aircraft.

13
00:00:41,366 --> 00:00:43,866
We've got this remarkable dataset

14
00:00:43,866 --> 00:00:48,300
that really proves, I think, our approach really works well.

15
00:00:48,300 --> 00:00:50,833
There's many other gases that are very important, you know,

16
00:00:50,833 --> 00:00:54,800
particularly with global warming, that lasers can help us monitor.

17
00:00:58,533 --> 00:00:59,933
Over all these years, we've

18
00:00:59,933 --> 00:01:01,933
developed these different techniques and

19
00:01:01,933 --> 00:01:03,933
lasers and detectors and put all

20
00:01:03,933 --> 00:01:05,300
those together into a

21
00:01:05,300 --> 00:01:08,000
recent system that we've
just started working on:

22
00:01:08,000 --> 00:01:09,733
the Hazard Detection Lidar.

23
00:01:10,000 --> 00:01:12,033
Essentially a really precise,

24
00:01:12,033 --> 00:01:16,666
really fast lidar that helps
land safely on a planet.

25
00:01:16,733 --> 00:01:20,400
You want to make millions of
measurements in a second.

26
00:01:20,400 --> 00:01:24,266
You have to process
and produce those data in real time.

27
00:01:25,733 --> 00:01:29,800
This technique is giving us
better understanding of where we live,

28
00:01:29,800 --> 00:01:34,866
where we want to live, where we want to
explore, in ways that are fundamental.

29
00:01:34,866 --> 00:01:38,400
So I look at it as: it's a measurement engineering success

30
00:01:38,400 --> 00:01:42,200
story, and masterpieces of engineering
often lead to masterpieces of science.

31
00:01:42,200 --> 00:01:47,166
With MOLA-2 being on
MGS being the most--

32
00:01:47,166 --> 00:01:52,966
--the ones I look back on most, ok, as being
absolutely--it really shook me up as well.

33
00:01:52,966 --> 00:01:55,300
And I think they shook up
the community as well.

34

00:01:55,300 --> 00:01:58,033
What you could do with a laser altimeter.

35
00:01:58,033 --> 00:01:58,733
And I'm amazed,

36
00:01:58,733 --> 00:02:01,433
I'm amazed at how much
knowledge can be gleaned

37
00:02:01,433 --> 00:02:04,466
from this simple, relatively
simple measurement.

38
00:02:04,466 --> 00:02:06,300
Just measuring, you know, time of flight.

39
00:02:06,300 --> 00:02:09,266
So you cannot just built just one lidar.

40
00:02:09,266 --> 00:02:14,800
You need a sustained team
who's been building lidar

41
00:02:14,800 --> 00:02:19,900
for some time so you can pass on the
lessons learned and so forth.

42
00:02:20,700 --> 00:02:23,200
To see that rocket go up

43
00:02:23,600 --> 00:02:26,366
with the thing that we had worked on
for so long

44
00:02:26,366 --> 00:02:28,500
finally become a reality.

45
00:02:28,500 --> 00:02:30,533

I had my family with me.

46
00:02:30,533 --> 00:02:33,333
Many of the other scientists
had their family.

47
00:02:34,100 --> 00:02:36,733
The reason many of us
also bring our family there is

48
00:02:36,733 --> 00:02:41,266
because of the sacrifices our families
had to make to make this a reality

49
00:02:41,600 --> 00:02:45,466
because of the long nights and being away
and the amount of effort

50
00:02:45,466 --> 00:02:46,533
we had to put in.

51
00:02:46,533 --> 00:02:50,066
There's a lot of special pieces
that that need to go into it

52
00:02:50,066 --> 00:02:52,966
and a lot of experience
that is built through decades of doing.

53
00:02:53,533 --> 00:02:56,933
Across Goddard, they bring in new people to learn

54
00:02:56,933 --> 00:03:00,500
through mentorship and learn
by doing on these projects.

55
00:03:01,000 --> 00:03:05,800
What I love about NASA, and in particular
Goddard is still this way,

56
00:03:05,800 --> 00:03:08,666
but it is really a meritocracy, meaning

57
00:03:08,900 --> 00:03:12,366
it didn't matter
what school you went to,

58
00:03:12,766 --> 00:03:17,000
what--actually what degree
you had at some level, right?

59
00:03:17,000 --> 00:03:18,600
That just got you in the door.

60
00:03:18,600 --> 00:03:24,433
But how you progressed through
NASA is really based on what you did.

61
00:03:24,633 --> 00:03:28,166
I never suffered
from being--I

62
00:03:28,200 --> 00:03:31,933
never was not promoted
or I never was was told

63
00:03:31,933 --> 00:03:35,466
I was doing a bad job or
anything like that because I was a woman.

64
00:03:35,600 --> 00:03:38,500
I think Goddard has been a fantastic place to work.

65
00:03:38,700 --> 00:03:41,166
When you get to
work on something

66
00:03:41,166 --> 00:03:43,100
new and exciting

67
00:03:43,100 --> 00:03:44,933
that is privileged.

68
00:03:44,933 --> 00:03:46,133
It's a privilege.

69
00:03:46,133 --> 00:03:49,033
Getting good people to work with you,

70
00:03:49,033 --> 00:03:50,966
knowing what risks to take.

71
00:03:51,133 --> 00:03:54,100
Those are key factors
in success of all these things.

72
00:03:54,300 --> 00:03:57,633
It's working with the scientists.

73
00:03:57,633 --> 00:03:59,133
You're in the same team,

74
00:03:59,133 --> 00:04:00,466
you're in the same room,

75
00:04:00,466 --> 00:04:01,833
you're in the same meetings.

76
00:04:01,833 --> 00:04:03,833
You're down the hall from each other.

77
00:04:03,833 --> 00:04:06,166
You're in the same organizations.

78
00:04:06,933 --> 00:04:09,300
Our successes of the past

79
00:04:09,900 --> 00:04:12,466
are due to some very simple things.

80
00:04:12,600 --> 00:04:14,933
That is that Goddard

81
00:04:16,400 --> 00:04:18,300
is as a center,

82
00:04:18,633 --> 00:04:19,966
a people

83
00:04:20,600 --> 00:04:22,333
with an incredible dedication

84
00:04:22,900 --> 00:04:23,866
and devotion