1
00:00:00,840 --> 00:00:05,720
[Music]

2
00:00:06,680 --> 00:00:10,960
[Volcano rumbling]

3
00:00:12,880 --> 00:00:15,940
>>The
world's a very changing place, and the onus

4
00:00:15,949 --> 00:00:20,250
is on us to make sure that we're preserving
the planet as we move forward.

5
00:00:20,250 --> 00:00:24,830
We want to make sure that we're using our
technologies to understand processes on the

6
00:00:24,830 --> 00:00:28,320
planet that are rapidly changing.

7
00:00:30,580 --> 00:00:35,120
>>HyspIRI is a proposed Earth-orbiting mission
which will look at different Earth ecosystems,

8
00:00:35,120 --> 00:00:36,800
including reefs and volcanoes.

9
00:00:37,680 --> 00:00:41,660
The first part is, you build an instrument,
you get it tested in a lab, make sure it all

10
00:00:41,670 --> 00:00:46,730
works, then you put it in an airplane, ultimately
to prove out that this concept is worthy of

11
00:00:46,730 --> 00:00:47,880
being on a satellite mission.

12
00:00:47,880 --> 00:00:52,579
>>If we can get as close to space as possible,
that's the best way to simulate a satellite

13
00:00:52,580 --> 00:00:54,540
and its data.

14
00:00:56,200 --> 00:00:59,540
[Music]

15
00:01:10,960 --> 00:01:15,080
[Background noise]

16
00:01:19,260 --> 00:01:22,020
[Air hissing]

17
00:01:24,240 --> 00:01:26,860
>>We
have the AVIRIS instrument, the Airborne Visible

18
00:01:26,869 --> 00:01:31,749
Infrared Imaging Spectrometer, and we also
have the MASTER, which is the MODIS-ASTER

19
00:01:31,749 --> 00:01:33,090
Simulator.

20
00:01:33,090 --> 00:01:38,560
The AVIRIS instrument is measuring the solar-reflected
spectrum, so the light that's coming down

21
00:01:38,560 --> 00:01:43,229
from the sun, hitting the surface of the earth
or the surface of the water, and then bouncing

22
00:01:43,229 --> 00:01:48,999
back up, and then the MASTER instrument is
actually measuring emitted heat, or thermal

23
00:01:48,999 --> 00:01:50,159
infrared data.

24
00:01:50,160 --> 00:01:55,820
The two data sets together simulate the HyspIRI
satellite payload.

25
00:01:59,140 --> 00:02:01,140
[Music]

26
00:02:01,780 --> 00:02:08,600
>>What we're doing in Hawaii is studying the
volcanoes and the coral reefs around the islands.

27
00:02:11,980 --> 00:02:13,980
[Water bubbling]

28
00:02:16,640 --> 00:02:21,400
>>They say that all kids are interested in volcanoes
and dinosaurs, so I guess in some respects,

29
00:02:21,409 --> 00:02:23,360
I never really grew up.

30
00:02:23,360 --> 00:02:26,810
What appeals to me about them now, is it's
one phenomenon that has almost an immediate

31
00:02:26,810 --> 00:02:32,390
impact on the people living nearby the volcanoes,
it has an impact on the environment, both

32
00:02:32,390 --> 00:02:33,599
on a regional and global scale.

33
00:02:33,599 --> 00:02:38,180
The lessons we learn here with our aircraft
mission, with our processing the data with

34
00:02:38,180 --> 00:02:42,920
our ground measurements will all be used to
develop techniques so we'll be ready for the

35
00:02:42,920 --> 00:02:47,370
launch of the HyspIRI mission, and as soon
as the data hits the ground we can then put

36
00:02:47,370 --> 00:02:51,440
it into the models and improve forecasts from
day one essentially.

37
00:02:54,090 --> 00:02:55,620
>>Coral reefs are important ecosystems.

38
00:02:55,629 --> 00:03:00,879
In terms of biodiversity they represent the
most biodiverse ecosystem within the ocean.

39
00:03:00,879 --> 00:03:05,140
By comparison, they are very similar to what
we know about rainforests on land.

40
00:03:05,140 --> 00:03:09,060
In fact, many people refer to them as rainforests
of the sea.

41
00:03:09,060 --> 00:03:14,700
We need to know how these important ecosystems
respond to climate and population now, before

42
00:03:14,700 --> 00:03:16,170
it becomes too late.

43
00:03:16,170 --> 00:03:20,030
The ER-2 is able to fly at 65,000 feet.

44
00:03:20,030 --> 00:03:22,490
That's above 99% of the Earth's atmosphere.

45
00:03:22,490 --> 00:03:28,439
It can easily collect data that we think would
be useful and built in to a future satellite

46
00:03:28,440 --> 00:03:30,080
sensor.

47
00:03:30,800 --> 00:03:34,200
[Background airfield noise]

48
00:03:35,360 --> 00:03:39,140
>>This morning, we're ready for takeoff at about
8:45.

49
00:03:39,150 --> 00:03:45,379
The plan is to fly over the Big Island, over
the volcanoes, and then on the way back, fly

50
00:03:45,379 --> 00:03:48,329
a coral reef line over Molokai.

51
00:03:48,329 --> 00:03:52,230
There's people in the field at the volcanoes
and coral reefs so they'll be taking measurements

52
00:03:52,230 --> 00:03:56,660
on the ground to correlate the data obtained
from the ER-2 airplane.

53
00:03:58,880 --> 00:04:02,360
[Background airfield noise]

54
00:04:04,080 --> 00:04:08,660
>>Typical morning, we'll start out prepping
the aircraft, installing panels, setting fuel

55
00:04:08,670 --> 00:04:12,989
counters, installing the experimenters' instruments.

56
00:04:12,989 --> 00:04:18,209
>>We check out the autopilot, the radios, some
of the warning systems in the airplane, the

57
00:04:18,209 --> 00:04:23,420
navigation systems, and then we get it ready
for the mobile pilot to show up.

58
00:04:24,790 --> 00:04:29,440
>>The ER-2 is a very unique aircraft, we can
get a very wide swath with these super high-tech

59
00:04:29,440 --> 00:04:32,680
instruments, a lot of which are going to end
up on satellites, we're kind of the last step

60
00:04:32,680 --> 00:04:38,560
in development on some of our Earth science
satellites, where we actually take it up to

61
00:04:38,560 --> 00:04:42,470
extreme altitudes and cold soak it, and put
it in an extreme environment, because once

62
00:04:42,470 --> 00:04:44,840
we launch it into space, there's no repairing.

63
00:04:46,780 --> 00:04:50,680
It might be kind of strange seeing another
pilot set up the airplane for the pilot actually

64
00:04:50,680 --> 00:04:54,449
flying, but we fly so high that there are
a lot of special considerations we have for

65
00:04:54,449 --> 00:04:55,449
flying.

66

00:04:55,449 --> 00:04:58,341
The hardest thing is we have to wear a space suit when we fly, a full pressure suit, so

67
00:04:58,341 --> 00:05:01,250
Dean's in there starting to get dressed in his pressure suit right now, once he's in

68
00:05:01,250 --> 00:05:05,020
that suit, he can't do a whole lot of moving, because he gets too warm and the heat builds

69
00:05:05,020 --> 00:05:09,020
up, so he has technicians getting him dressed, they'll drive him out here, they'll walk him

70
00:05:09,020 --> 00:05:11,840
up to the airplane, and he'll hop in.

71
00:05:11,840 --> 00:05:16,340
This will all be set up basically for engine start and takeoff.

72
00:05:18,500 --> 00:05:23,960
>>When he taxis out, we follow right behind him, and he'll taxi onto the runway, where

73
00:05:23,961 --> 00:05:25,430
he will prepare to launch.

74
00:05:25,430 --> 00:05:31,600
Then we get out to the aircraft, remove pogo blocks, do final checks on the aircraft, remove

75
00:05:31,600 --> 00:05:37,180
our emergency start system pin, safety gear, clear the aircraft, and then as soon as he

76
00:05:37,180 --> 00:05:42,300
takes off, we'll follow behind in the truck

to recover our pogos.

77
00:05:45,500 --> 00:05:50,460
[ER-2 taking off]

78
00:05:51,940 --> 00:05:54,700
>>I've been working aircraft a long time.

79
00:05:54,710 --> 00:05:57,470
This aircraft is different in a lot of respects.

80
00:05:57,470 --> 00:05:58,470
It's something unique.