1
00:00:00,030 --> 00:00:03,030
Jim Irons: The data from the Landsat Data Continuity Mission

2
00:00:03,050 --> 00:00:08,090
will be the best data that have ever been collected from a Landsat satellite.

3
00:00:08,110 --> 00:00:12,210
With increasing population, our land uses are changing at a rate

4
00:00:12,230 --> 00:00:16,230
that is unprecedented in human history. To manage and cope with

5
00:00:16,250 --> 00:00:20,270
these changes, we need to have the observations, the information, the data

6
00:00:20,290 --> 00:00:25,340
that allow us to understand what's going on on the surface of the earth where most of us live.

7
00:00:25,360 --> 00:00:29,280
Narrator: Landsat's been monitoring the surface of the earth since 1972,

8
00:00:29,300 --> 00:00:32,420
tracking resources like farms, forests, and water.

9
00:00:32,440 --> 00:00:36,530
And checking every continent, every season, every year.

10
00:00:36,550 --> 00:00:40,550
Well, we don't call it the "Data Continuity Mission" for nothing.

11
00:00:40,570 --> 00:00:44,570
Doug Morton: The Continuity of those observations is a really critical part

12
00:00:44,590 --> 00:00:48,650
of the ability to do the science we do on how climate change

13
00:00:48,670 --> 00:00:50,920

and how land use are transforming our planet.

14
00:00:50,940 --> 00:00:56,750
The Landsat program and the duration of the Landsat time series

15
00:00:56,770 --> 00:01:00,840
is the only record we have

16
00:01:00,860 --> 00:01:04,850
of these fundamental changes in land cover

17
00:01:04,870 --> 00:01:08,910
including melting glaciers, including loss of tropical forests,

18
00:01:08,930 --> 00:01:15,470
including the transformation from small-scale family agriculture to large agribusiness.

19
00:01:15,490 --> 00:01:21,150
Narrator: After launch, LDCM will become known as Landsat 8, since it's the 8th in the Landsat program.

20
00:01:21,170 --> 00:01:25,210
a partnership between NASA and the U.S. Geological Survey.

21
00:01:25,230 --> 00:01:27,560
NASA is responsible for building and launching a satellite

22
00:01:27,580 --> 00:01:33,300
and the Geological Survey is in charge of operations and receiving and archiving the data.

23
00:01:33,320 --> 00:01:38,680
LDCM carries two instruments, each covering a different past of the electromagnetic spectrum.

24
00:01:38,700 --> 00:01:41,440
Del Jenstrom: The OLI instrument monitors the Earth's surface

25
00:01:41,460 --> 00:01:46,490
in spectral wavelengths that you and I can see in, that's the visible wavelengths,

26
00:01:46,510 --> 00:01:49,500
and also in – just into the infrared regions,

27
00:01:49,520 --> 00:01:52,500
the near-infrared and shortwave-infrared regions.

28
00:01:52,520 --> 00:01:57,590
Narrator: The Operational Land Imager is used to track urban sprawl, forest loss and regrowth,

29
00:01:57,610 --> 00:02:03,500
changes in farm land, and the melting of glaciers.

30
00:02:03,520 --> 00:02:05,600
The Thermal Infrared Sensor instrument, TIRS,

31
00:02:05,620 --> 00:02:09,660
monitors the Earth in thermal bands which are –

32
00:02:09,680 --> 00:02:12,680
actually images temperature on the Earth's surface.

33
00:02:12,700 --> 00:02:17,760
Narrator: With TIRS, scientists are able to track how much water is used by crops on individual farm fields.

34
00:02:17,780 --> 00:02:21,810
And the new technology used in LDCM means that

35
00:02:21,830 --> 00:02:27,510
both TIRS and OLI will be much more sensitive than previous Landsat sensors.

36
00:02:27,530 --> 00:02:29,910
Jenstrom: The greatest improvement we've made in the LDCM satellite

37
00:02:29,930 --> 00:02:34,040
is that the sensors are what's called push-broom sensors

38
00:02:34,060 --> 00:02:38,050

and not what was called whisk-broom sensors.

39
00:02:38,070 --> 00:02:42,130
Push-broom sensors have thousands of detectors that just image the earth

40
00:02:42,150 --> 00:02:46,140
as the satellite passes over the surface of the Earth.

41
00:02:46,160 --> 00:02:50,140
The older Landsat satellites, Landsat 7, Landsat 5, use a whisk-broom technology

42
00:02:50,160 --> 00:02:57,180
which is many fewer detectors, scanning back-and-forth with a mechanical scanner.

43
00:02:57,200 --> 00:03:03,230
Irons: The advantage of the push-broom is each detector has a longer time

44
00:03:03,250 --> 00:03:06,410
to dwell on each picture element, or pixel

45
00:03:06,430 --> 00:03:10,600
on the surface of the Earth. As a consequence,

46
00:03:10,620 --> 00:03:15,910
it creates a sensor with a much higher sensitivity,

47
00:03:15,930 --> 00:03:20,610
expressed as signal-to-noise ratio.

48
00:03:20,630 --> 00:03:22,660
Voice over: T-minus 5

49
00:03:22,680 --> 00:03:29,070
4, 3, 2, 1, and Liftoff!

50
00:03:29,090 --> 00:03:30,860
Jenstrom: The LDCM observatory

51
00:03:30,880 --> 00:03:34,110
launches out of the Vandenburg Air Force Base in California

52
00:03:34,130 --> 00:03:38,260
and launches into what's called a polar orbit.

53
00:03:38,280 --> 00:03:44,440
And so it orbits over the north and south poles, taking imagery of the sunlit side of the Earth every time it passe

54
00:03:44,460 --> 00:03:47,130
Narrator: It takes about 100 minutes to loop around the poles.

55
00:03:47,150 --> 00:03:53,650
LDCM will make 14 orbits each day, and cover the whole globe every 16 days.

56
00:03:53,670 --> 00:03:56,160
Every time they pass over the US,

57
00:03:56,180 --> 00:03:59,160
Landsat satellites beam data to the USGS

58
00:03:59,180 --> 00:04:03,760
Earth Resources Observation and Science Center, or EROS, in South Dakota,

59
00:04:03,780 --> 00:04:07,220
one of several receiving stations around the world.

60
00:04:07,240 --> 00:04:11,220
Irons: This center operates the Landsat archive

61
00:04:11,240 --> 00:04:16,740
that contains all of the US held data from all of the Landsat satellites,

62
00:04:16,760 --> 00:04:19,280
and the LDCM data will become part of that archive.

63
00:04:19,300 --> 00:04:23,300

Narrator: All of the data in the Landsat archive can be obtained by anyone,

64
00:04:23,320 --> 00:04:26,980
at no cost. This freely available data

65
00:04:27,000 --> 00:04:31,580
has led to an incredible blossoming of science research and applications.

66
00:04:31,600 --> 00:04:35,620
Morton: My favorite part of the Landsat program

67
00:04:35,640 --> 00:04:38,670
is the opportunity to think big.

68
00:04:38,690 --> 00:04:42,220
With free and open access to data around the world,

69
00:04:42,240 --> 00:04:44,720
we're not limited as we once were

70
00:04:44,740 --> 00:04:50,720
in our ability to conceive of and analyze large data sets,

71
00:04:50,740 --> 00:04:56,030
to look at really large scale changes, over continents, over the globe.