
OSIRIS-REx
TECHNOLOGY
OLA

1
00:00:00,000 --> 00:00:03,470
[arcade game sounds,
lasers shooting]

2
00:00:03,470 --> 00:00:05,973
I grew up playing
video games about shooting

3
00:00:05,973 --> 00:00:09,676
lasers at asteroids,
and now it’s my job to shoot

4
00:00:09,676 --> 00:00:13,814
lasers at asteroids. It
never stops amazing me.

5
00:00:13,814 --> 00:00:20,687
[music]

6
00:00:20,687 --> 00:00:21,889
My name is Tim Haltigin
from the Canadian

7
00:00:21,889 --> 00:00:25,125
Space Agency, and I’m the
Canadian Mission Manager on

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00:00:25,125 --> 00:00:28,462
OSIRIS-REx. I’m responsible for
the overall operations of the

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00:00:28,462 --> 00:00:31,732
OLA instrument and also for
coordinating the contributions

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00:00:31,732 --> 00:00:35,469
of the Canadian Science Team. So
OSIRIS-REx is an international

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00:00:35,469 --> 00:00:38,972
collaboration led by NASA that
is a mission to go to an

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00:00:38,972 --> 00:00:42,342
asteroid named Bennu, capture a
sample of it, and bring it back

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00:00:42,342 --> 00:00:44,645
to Earth so we can understand a
little bit more what it’s made

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00:00:44,645 --> 00:00:47,881
of. Understanding the shape of
asteroid Bennu is going to be

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00:00:47,881 --> 00:00:51,952
absolutely fundamental to
understanding the geology and

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00:00:51,952 --> 00:00:54,988
putting it in context. The other
reason you really need to

17
00:00:54,988 --> 00:00:57,791
understand the topography
extremely well is that when

18
00:00:57,791 --> 00:01:00,427
we’re going in to take a sample,
it’s a very very fine

19
00:01:00,427 --> 00:01:03,163
measurement. And so if you’re
coming in, you’ve got the

20
00:01:03,163 --> 00:01:05,465
sampling head at the end of this
arm that has to come in

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00:01:05,465 --> 00:01:09,503
perfectly square to the surface.
If you don’t understand shape at

22
00:01:09,503 --> 00:01:12,706
sort of a 30-centimeter scale,
you’re not going to be able to

23
00:01:12,706 --> 00:01:17,411
collect a sample. So OLA, or the
OSIRIS-REx Laser Altimeter, is

24
00:01:17,411 --> 00:01:20,013
an instrument on the spacecraft
that has two lasers inside of

25
00:01:20,013 --> 00:01:23,183
it, and it acts sort of like a
3D scanner. OLA’s going to

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00:01:23,183 --> 00:01:26,620
create a three-dimensional map
of the entire asteroid Bennu at

27
00:01:26,620 --> 00:01:30,490
a resolution of about one point
every seven centimeters. This

28
00:01:30,490 --> 00:01:33,794
operates very similar to a
radar, however instead of using

29
00:01:33,794 --> 00:01:37,397
a radio wave, it uses light. And
so by measuring very accurately

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00:01:37,397 --> 00:01:40,934
how long it takes for that laser
pulse to go out, and bounce off

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00:01:40,934 --> 00:01:43,804
a surface, and come back, you
can measure a very accurate

32
00:01:43,804 --> 00:01:46,340
distance away from the
spacecraft. The reason we have

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00:01:46,340 --> 00:01:49,242
two different lasers is that we
have to measure the asteroid

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00:01:49,242 --> 00:01:52,079
from different distances away
from it. So the high-powered

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00:01:52,079 --> 00:01:55,749
laser, we can use from about
seven kilometers in to about one

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00:01:55,749 --> 00:01:58,385
kilometer away from the
asteroid. The low-energy laser

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00:01:58,385 --> 00:02:01,288
we can then use from one
kilometer and inwards. And so as

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00:02:01,288 --> 00:02:04,491
we get in closer and closer to
the asteroid, we can make a lot

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00:02:04,491 --> 00:02:06,994
higher-resolution maps and
understand the shape of certain

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00:02:06,994 --> 00:02:09,863
regions even better. The
Canadian Space Agency

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00:02:09,863 --> 00:02:13,300
contributed OLA to this mission
for a number of reasons. First

42
00:02:13,300 --> 00:02:16,703
is that it allows Canadian
scientists to have access to

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00:02:16,703 --> 00:02:19,239
astromaterials for the very
first time. So these are the

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00:02:19,239 --> 00:02:21,975
first samples that are coming
back on a sample return mission

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00:02:21,975 --> 00:02:25,412
that Canada is going to own a
portion of. The second reason is

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00:02:25,412 --> 00:02:28,115
that it really highlights the
expertise of Canadian scientists

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00:02:28,115 --> 00:02:31,151
and engineers, and so the
ability to contribute something

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00:02:31,151 --> 00:02:34,254
like this to a mission as
exciting as OSIRIS-REx really

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00:02:34,254 --> 00:02:37,391
means a lot to the Agency and to
Canada. If you ask anyone that’s

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00:02:37,391 --> 00:02:40,761
ever built a flight instrument
for space, they’ll tell you all

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00:02:40,761 --> 00:02:44,331
kinds of fun stories about the
challenges they've had doing it.

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00:02:44,331 --> 00:02:46,600
When you're building an
instrument, you have an original

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00:02:46,600 --> 00:02:50,303
design, you build a prototype,
and you test it. What you want

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00:02:50,303 --> 00:02:53,006
to do is something called "test
as you fly." Flying an

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00:02:53,006 --> 00:02:56,476
instrument in space, space is a
horrible place. So with flight

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00:02:56,476 --> 00:02:59,479
instruments, what you need to do
is put them on a table and shake

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00:02:59,479 --> 00:03:01,648
them really hard to make sure
they're going to be able to

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00:03:01,648 --> 00:03:04,685
survive the launch. You need to
bombard them with radiation to

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00:03:04,685 --> 00:03:07,320
make sure your electronics are
still going to work. You need to

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00:03:07,320 --> 00:03:10,257
put them in a chamber and
completely evacuate it to make

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00:03:10,257 --> 00:03:13,660
sure that everything still works
when you’re in a vacuum. In the

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00:03:13,660 --> 00:03:16,763
end ultimately what you have is
an extremely robust system that

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00:03:16,763 --> 00:03:18,799
you’re confident that when you
strap it to the side of the

64
00:03:18,799 --> 00:03:22,502
spacecraft, launch it, and fire
it in space, it’s going to work

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00:03:22,502 --> 00:03:27,340
beautifully. I am incredibly
excited to actually see what

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00:03:27,340 --> 00:03:30,110
this asteroid looks like. When
we get there and we see the

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00:03:30,110 --> 00:03:32,979
first images and generate that
first shape model, I think it’s

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00:03:32,979 --> 00:03:34,481
going to surprise everyone.