



1
00:00:00,499 --> 00:00:04,437
[■]

2
00:00:04,470 --> 00:00:06,939
A World Unveiled
Cassini at Titan

3
00:00:08,741 --> 00:00:11,711
From Voyager, Titan
was so unusual.

4
00:00:11,744 --> 00:00:15,248
All we could see from Voyager
is this hazy world.

5
00:00:15,281 --> 00:00:17,450
We couldn't see through
to the surface.

6
00:00:17,483 --> 00:00:20,253
And that's why we
had to go back

7
00:00:20,286 --> 00:00:23,589
with Cassini carrying
the Huygens probe

8
00:00:23,622 --> 00:00:26,993
to try to see what does the
surface of Titan look like.

9
00:00:27,026 --> 00:00:31,130
So the Huygens probe
parachuted through in 2005.

10
00:00:31,163 --> 00:00:35,101
And we landed on the surface.
And we saw an amazing world.

11

00:00:35,134 --> 00:00:39,539

It was incredible how
Earthlike Titan appeared.

12

00:00:39,572 --> 00:00:41,374

It had river channels.

13

00:00:41,407 --> 00:00:42,442

It had lakes.

14

00:00:42,475 --> 00:00:44,310

It had sand dunes.

15

00:00:44,343 --> 00:00:47,814

The only difference is,
it's very cold on Titan.

16

00:00:47,847 --> 00:00:50,616

And the liquid that flows
through Titan's rivers

17

00:00:50,649 --> 00:00:52,285

is methane instead of water.

18

00:00:52,318 --> 00:00:56,322

The Cassini-Huygens mission
has been one of the greatest

19

00:00:56,355 --> 00:00:59,525

voyages of discovery in
the history of science.

20

00:00:59,558 --> 00:01:02,962

We have learned and
discovered more things

21

00:01:02,995 --> 00:01:06,966

about a previously unknown
dynamic system--

22

00:01:06,999 --> 00:01:10,269

a system that's a billion miles
from us: the Saturn system--

23

00:01:10,302 --> 00:01:12,238

than we ever could
have imagined.

24

00:01:12,271 --> 00:01:16,142

One of the pinnacles of that has
been the discoveries on Titan.

25

00:01:16,175 --> 00:01:20,646

Titan has turned out to be
a very complex world.

26

00:01:20,679 --> 00:01:23,749

It has geology. It has
methane rain.

27

00:01:23,782 --> 00:01:28,020

It has lakes and seas. It has
dunes of organic molecules.

28

00:01:28,053 --> 00:01:32,225

And it has a lot more secrets
that it's still hiding from us.

29

00:01:33,926 --> 00:01:39,599

I think that really what makes
people so excited about Titan

30

00:01:39,632 --> 00:01:46,772

is this combination of
familiarity and alienness.

31

00:01:46,805 --> 00:01:50,476

We had 126 close flybys

32

00:01:50,509 --> 00:01:53,446
with a spacecraft with
a dozen instruments

33
00:01:53,479 --> 00:01:55,748
that in each of those flybys
are all taking data

34
00:01:55,781 --> 00:01:57,750
about different
aspects of Titan.

35
00:01:57,783 --> 00:02:01,087
Not only was Titan fascinating
in its own right:

36
00:02:01,120 --> 00:02:03,823
a moon the size of
the planet Mercury,

37
00:02:03,856 --> 00:02:06,225
it was also Cassini's gas tank.

38
00:02:06,258 --> 00:02:08,961
It allowed us to change
the shape and orientation

39
00:02:08,994 --> 00:02:11,264
of the orbit to explore
the poles of Saturn,

40
00:02:11,297 --> 00:02:14,300
the rings, and all
of the icy moons

41
00:02:14,333 --> 00:02:16,202
by carrying a lot less fuel

42
00:02:16,235 --> 00:02:18,638
than we would have

to have carried otherwise.

43

00:02:18,671 --> 00:02:22,241

It gave us the energy to go
all the way across the rings

44

00:02:22,274 --> 00:02:25,945

and fly between the gap between
the rings and the planet.

45

00:02:27,379 --> 00:02:29,415

Because of these flybys of Titan

46

00:02:29,448 --> 00:02:32,451

using Titan as a
gravitational slingshot.

47

00:02:32,484 --> 00:02:35,254

And so many of the other
remarkable discoveries

48

00:02:35,287 --> 00:02:37,523

that have been
made by Cassini--

49

00:02:37,556 --> 00:02:40,960

for example, mapping
the composition of

50

00:02:40,993 --> 00:02:44,497

the plume of Enceladus,
would not have been possible

51

00:02:44,530 --> 00:02:46,232

without Titan there.

52

00:02:46,265 --> 00:02:48,334

We could not have
gotten to these places

53

00:02:48,367 --> 00:02:51,637

without using Titan.

54

00:02:51,670 --> 00:02:54,373

And so I think Titan

has really been

55

00:02:54,406 --> 00:02:56,375

a particularly special

place to explore

56

00:02:56,408 --> 00:02:58,611

just because of all the

complexity in the system

57

00:02:58,644 --> 00:03:01,948

and the puzzles that

it has given us.

58

00:03:01,981 --> 00:03:04,951

[■]

59

00:03:07,052 --> 00:03:08,955

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