



1995



1997



1999



2001

Mars Near Opposition
Hubble Space Telescope



2007



2005



2003

1
00:00:13,320 --> 00:00:15,000
NASA'S HUBBLE SPACE TELESCOPE

2
00:00:15,000 --> 00:00:17,400
HAS GIVEN US A GLIMPSE OF THE FARAWAY COSMOS...

3
00:00:18,000 --> 00:00:20,000
BUT IT HAS ALSO HELPED US BETTER UNDERSTAND

4
00:00:20,500 --> 00:00:22,500
OUR OWN NEIGHBORHOOD IN THE UNIVERSE:

5
00:00:22,800 --> 00:00:23,789
OUR SOLAR SYSTEM.

6
00:00:24,500 --> 00:00:26,400
Heidi Hammel/Planetary Astronomer/AURA: Hubble
wasn't designed to look at objects

7
00:00:26,500 --> 00:00:29,500
in our solar system but after it was launched,

8
00:00:29,800 --> 00:00:33,900
astronomers realized that with just a little bit of modification to the software,

9
00:00:34,200 --> 00:00:36,400
it could look at solar system objects.

10
00:00:37,000 --> 00:00:39,400
The telescope has to track their motion

11
00:00:39,500 --> 00:00:41,000
to keep the picture stable.

12
00:00:41,300 --> 00:00:44,400
That was done and there's been no turning back....

13

00:00:44,640 --> 00:00:47,000

Because Hubble's been up so many years now,

14

00:00:47,300 --> 00:00:51,000

it's actually given us a window into things like...

15

00:00:51,289 --> 00:00:56,000

how planets' atmospheres actually
change, evolve... over time.

16

00:00:56,400 --> 00:00:59,500

HUBBLE'S ABILITY TO CATCH DRAMATIC CHANGES
ON PLANETS

17

00:00:59,500 --> 00:01:03,000

CAME INTO FULL FOCUS DURING ITS EARLY DAYS,

18

00:01:03,000 --> 00:01:06,000

WHEN IT WAS AT THE RIGHT PLACE
AT THE RIGHT TIME

19

00:01:07,000 --> 00:01:10,000

TO CAPTURE A ONCE-IN-A LIFETIME COSMIC COLLISION.

20

00:01:11,500 --> 00:01:15,000

NEARLY TWO DOZEN FRAGMENTS
OF THE DOOMED COMET SHOEMAKER-LEVY 9

21

00:01:15,400 --> 00:01:17,500

PLOWED INTO THE GIANT PLANET JUPITER...

22

00:01:18,000 --> 00:01:21,000

WITH MIND-BOGGLING RESULTS.

23

00:01:21,000 --> 00:01:22,580

Max Mutchler/Research Instrument Scientist/STSCI:
Just beautiful timing. You can't script that, right?

24

00:01:23,000 --> 00:01:26,000

I mean, the timing worked out
such that Hubble was in position.

25

00:01:26,200 --> 00:01:30,000

I think we can thank that event for kind of, you know,

26

00:01:30,200 --> 00:01:32,700

being the bell-weather moment for the Hubble mission.

27

00:01:33,990 --> 00:01:36,800

WHILE HUBBLE DOESN'T ACTUALLY TRAVEL TO
OTHER PLANETS,

28

00:01:37,000 --> 00:01:40,000

IT'S BEEN THE ADVANCED SCOUT FOR INTERPLANETARY MISSIONS.

29

00:01:40,400 --> 00:01:43,500

DAWN IS A SPACECRAFT DESIGNED TO TAKE A CLOSE-UP LOOK

30

00:01:43,800 --> 00:01:47,500

AT AN ASTEROID AND A DWARF PLANET BETWEEN MARS AND JUPITER....

31

00:01:48,000 --> 00:01:50,240

AND LOOK FOR CLUES AS TO HOW OUR OWN EARTH

32

00:01:50,240 --> 00:01:52,450

WAS FORMED FROM SMALLER SPACE DEBRIS.

33

00:01:53,300 --> 00:01:56,399

Robert Mase/Project Manager - Dawn/JPL: Vesta
and Ceres were both discovered more than 200

34

00:01:56,399 --> 00:02:01,000

years ago and for most of that time, they were
just faint lights in the sky.

35

00:02:01,200 --> 00:02:06,680

But more recently, Hubble has brought these faint lights into view as small worlds.

36
00:02:06,680 --> 00:02:09,590
Mark Showalter/Sr. Research Scientist/SETI:
It's actually been able to detect objects

37
00:02:09,590 --> 00:02:12,500
that were too small to be detected by the
Voyager spacecraft

38
00:02:12,600 --> 00:02:15,000
when it flew by Uranus and Neptune...

39
00:02:15,000 --> 00:02:18,000
We're talking about objects
that are... maybe 8 miles across.

40
00:02:19,640 --> 00:02:20,800
BUT LOOKING FOR OBJECTS THAT TINY

41
00:02:21,200 --> 00:02:23,000
WHEN YOU'RE MILLIONS OF MILES AWAY

42
00:02:23,000 --> 00:02:24,699
IS NOT AN EASY TASK.

43
00:02:25,200 --> 00:02:26,800
It's kind of a needle in a haystack problem.

44
00:02:27,000 --> 00:02:28,930
Could any of these little blips be a real moon?

45
00:02:28,930 --> 00:02:31,500
Robert Mase: We've used the Hubble images
for a number of years

46
00:02:31,700 --> 00:02:33,200
to help us plan our mission

47
00:02:33,500 --> 00:02:35,000

and to be able to understand

48

00:02:35,200 --> 00:02:38,000

how the Dawn mission can accomplish all of its goals

49

00:02:38,260 --> 00:02:40,500

to understand better how these bodies formed

50

00:02:40,500 --> 00:02:41,400

and what they're made of.

51

00:02:41,700 --> 00:02:44,300

Alan Stern/Principal Investigator – New Horizons: By spotting all the small moons of Pluto

52

00:02:44,500 --> 00:02:46,000

that we know about, all four of them,

53

00:02:46,200 --> 00:02:47,800

Hubble has opened up a new world

54

00:02:48,000 --> 00:02:50,400

in terms of observations that we want to make,

55

00:02:50,400 --> 00:02:52,000

objects in the system that we want to study.

56

00:02:53,419 --> 00:02:57,000

THE NEW HORIZONS MISSION THAT PASSED PLUTO
IN JULY OF 2015

57

00:02:57,100 --> 00:03:00,700

CREDITS HUBBLE WITH CONTRIBUTING TO THE SUCCESS OF THE FLYBY.

58

00:03:01,000 --> 00:03:04,300

Alan Stern: If it wasn't for Hubble, we
would almost be going in blind,

59

00:03:04,400 --> 00:03:06,340
compared to the knowledge that we actually have.

60
00:03:06,500 --> 00:03:10,370
Hammel: Here's some of those beautiful
Mars images from the Hubble Space Telescope

61
00:03:10,370 --> 00:03:13,000
showing you the atmosphere

62
00:03:13,500 --> 00:03:15,000
and how it changes with time.

63
00:03:15,800 --> 00:03:18,000
HUBBLE'S LONGEVITY OVER 25 YEARS

64
00:03:18,500 --> 00:03:20,500
GIVES THE TELESCOPE A HUGE ADVANTAGE

65
00:03:20,800 --> 00:03:24,000
IN MONITORING LONG-TERM CHANGES IN THE SOLAR SYSTEM.

66
00:03:24,130 --> 00:03:27,000
Heidi Hammel: Planetary missions are great,

67
00:03:27,000 --> 00:03:29,800
but they're usually only brief snapshots of those planets

68
00:03:30,000 --> 00:03:31,800
and also really very close-up....

69
00:03:32,000 --> 00:03:34,000
Hubble actually can see the planet

70
00:03:34,100 --> 00:03:36,000
before, during, and after...

71
00:03:36,200 --> 00:03:38,800

And so it allows us to take that mission data

72

00:03:39,000 --> 00:03:41,200

and put it in that broad context.

73

00:03:42,290 --> 00:03:45,800

AND HAVING THAT BROADER PICTURE ALLOWS US
TO SEE THE EXCITEMENT

74

00:03:45,900 --> 00:03:49,000

OF A SOMETIMES UNPREDICTABLY DYNAMIC SOLAR SYSTEM.

75

00:03:49,200 --> 00:03:52,000

THIS SWEEPING VISION OF OUR PLANETARY SIBLINGS

76

00:03:52,000 --> 00:03:54,000

ALSO GIVE US BETTER INSIGHT

77

00:03:54,000 --> 00:03:57,000

OF OUR OWN SMALL, BLUE WORLD.