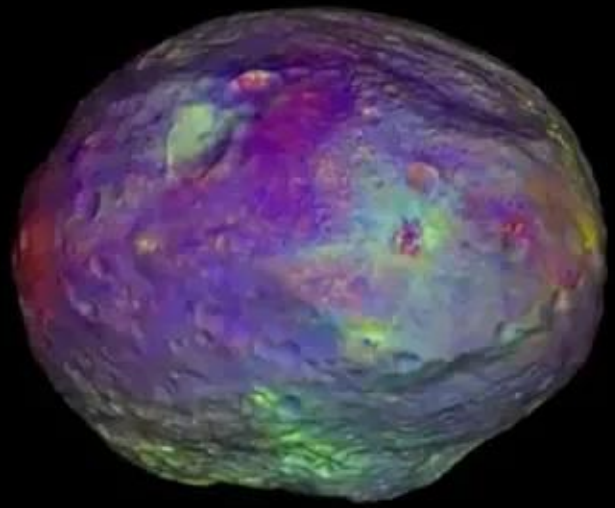
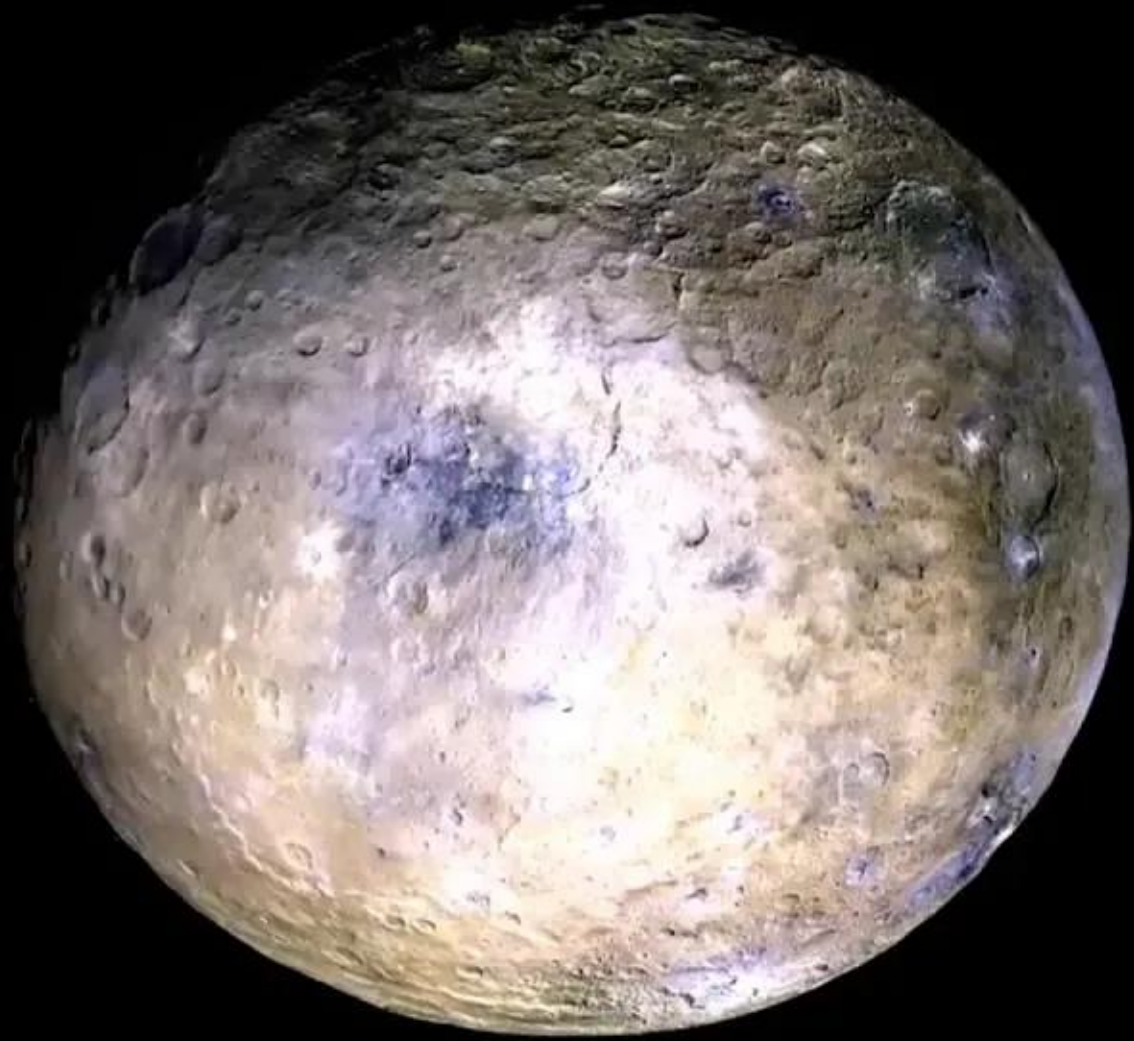
Enhanced color highlights mineral variations



Vesta

Credit: NASA / JPL-Caltech / MPS / DLR / IDA / PSI



Ceres

Credit: NASA / JPL-Caltech / UCLA / MPS / DLR / IDA

1
00:00:00,266 --> 00:00:01,434
[Music]

2
00:00:01,468 --> 00:00:02,568
[Title: Dusk for Dawn NASA
Mission to the Asteroid Belt]

3
00:00:02,601 --> 00:00:03,169
[Marc Rayman] You know,
when you work

4
00:00:03,202 --> 00:00:05,505
on a mission this long

5
00:00:05,538 --> 00:00:07,574
it feels like a part of you.

6
00:00:08,007 --> 00:00:11,144
I've been a space enthusiast
since I was four years old.

7
00:00:12,211 --> 00:00:14,947
Getting to work on a
mission like this is...

8
00:00:14,980 --> 00:00:16,850
...it's a dream come true.

9
00:00:17,817 --> 00:00:22,288
To me, Dawn is truly Earth's
first interplanetary spaceship.

10
00:00:23,889 --> 00:00:27,727
No other spacecraft has
gone to a distant body,

11
00:00:27,760 --> 00:00:29,462
gone into orbit around it,

12
00:00:29,495 --> 00:00:31,064
maneuvered there,

13
00:00:31,097 --> 00:00:33,032
then broken out of orbit,

14
00:00:33,065 --> 00:00:34,967
traveled elsewhere in
the solar system

15
00:00:35,000 --> 00:00:38,638
to another alien world and
going into orbit around it.

16
00:00:39,405 --> 00:00:41,340
And it does that
with ion propulsion

17
00:00:41,373 --> 00:00:43,910
which I first heard of
on a Star Trek episode.

18
00:00:44,743 --> 00:00:46,145
We've turned ion propulsion

19
00:00:46,178 --> 00:00:48,748
from science fiction
into science fact.

20
00:00:49,615 --> 00:00:50,816
[Carol Raymond] The Dawn mission

21
00:00:50,850 --> 00:00:54,187
really is a journey back to the
beginning of the solar system.

22
00:00:54,220 --> 00:00:55,488
That's why we call it Dawn.

23
00:00:56,989 --> 00:00:59,092
We chose two time capsules

24
00:00:59,125 --> 00:01:01,027
from the beginning
of the solar system,

25
00:01:01,060 --> 00:01:02,128
Vesta and Ceres,

26
00:01:02,161 --> 00:01:03,629
which are the most massive

27
00:01:03,662 --> 00:01:06,899
and largest bodies in
the main asteroid belt.

28
00:01:06,932 --> 00:01:09,902
They both formed very early when
the solar system was forming

29
00:01:09,935 --> 00:01:12,105
out of the protoplanetary disk

30
00:01:12,138 --> 00:01:15,108
and yet they ended up in these
two very different states.

31
00:01:16,242 --> 00:01:20,613
Vesta is a dry, rocky body that
looks a lot like our moon.

32
00:01:22,515 --> 00:01:25,451
Whereas Ceres had a lot of
water and it looks much more

33
00:01:25,484 --> 00:01:28,321
like the icy moons of the
outer solar system.

34
00:01:29,488 --> 00:01:31,891
[Rayman] And it seems like
what determined their

35
00:01:31,924 --> 00:01:36,262
eventual fate was the location
where they started.

36
00:01:36,295 --> 00:01:38,431
And we now believe
that Ceres formed

37
00:01:38,464 --> 00:01:41,701
much farther from the
sun than it is now.

38
00:01:42,234 --> 00:01:45,805
[Raymond] When Dawn found the
bright material on Ceres,

39
00:01:45,838 --> 00:01:49,075
what we saw was
completely mind blowing.

40
00:01:49,108 --> 00:01:51,744
It was made of
sodium carbonate.

41
00:01:52,211 --> 00:01:55,982
Sodium carbonate is not
common in the solar system

42
00:01:56,015 --> 00:01:59,986
but we see it coming
out of the plumes of Enceladus,

43
00:02:00,019 --> 00:02:03,189
we see it in lakes on Earth,

44
00:02:03,222 --> 00:02:05,258
and here it was on
the surface of Ceres.

45
00:02:09,028 --> 00:02:11,397
[Rayman] The mission will end
when Dawn runs out of

46
00:02:11,430 --> 00:02:14,200
the conventional chemical
propellant that it uses

47
00:02:14,233 --> 00:02:17,871
to orient itself in the
zero gravity of space.

48
00:02:19,104 --> 00:02:22,642
Dawn will become this inert
celestial monument

49
00:02:22,675 --> 00:02:26,346
in orbit around the dwarf
planet that it unveiled.

50
00:02:29,281 --> 00:02:32,818
Dawn serves a lasting
reminder that the passion

51
00:02:32,851 --> 00:02:35,021
for bold adventures

52
00:02:35,054 --> 00:02:40,426
and our noble aspirations to
reach out into the cosmos

53
00:02:40,459 --> 00:02:43,329
take us far far
beyond the confines

54

00:02:43,362 --> 00:02:46,166
of our humble home
here on planet Earth.

55
00:02:48,734 --> 00:02:51,270
[Text] The Dawn spacecraft has
operated for 11 years,

56
00:02:51,303 --> 00:02:54,607
three years longer than
originally planned.

57
00:02:54,640 --> 00:02:57,677
[Text] When its hydrazine fuel
runs out in late 2018,

58
00:02:57,710 --> 00:03:01,381
the spacecraft will no longer
communicate with Earth.

59
00:03:01,714 --> 00:03:03,482
[LOGO: NASA / Jet
Propulsion Laboratory