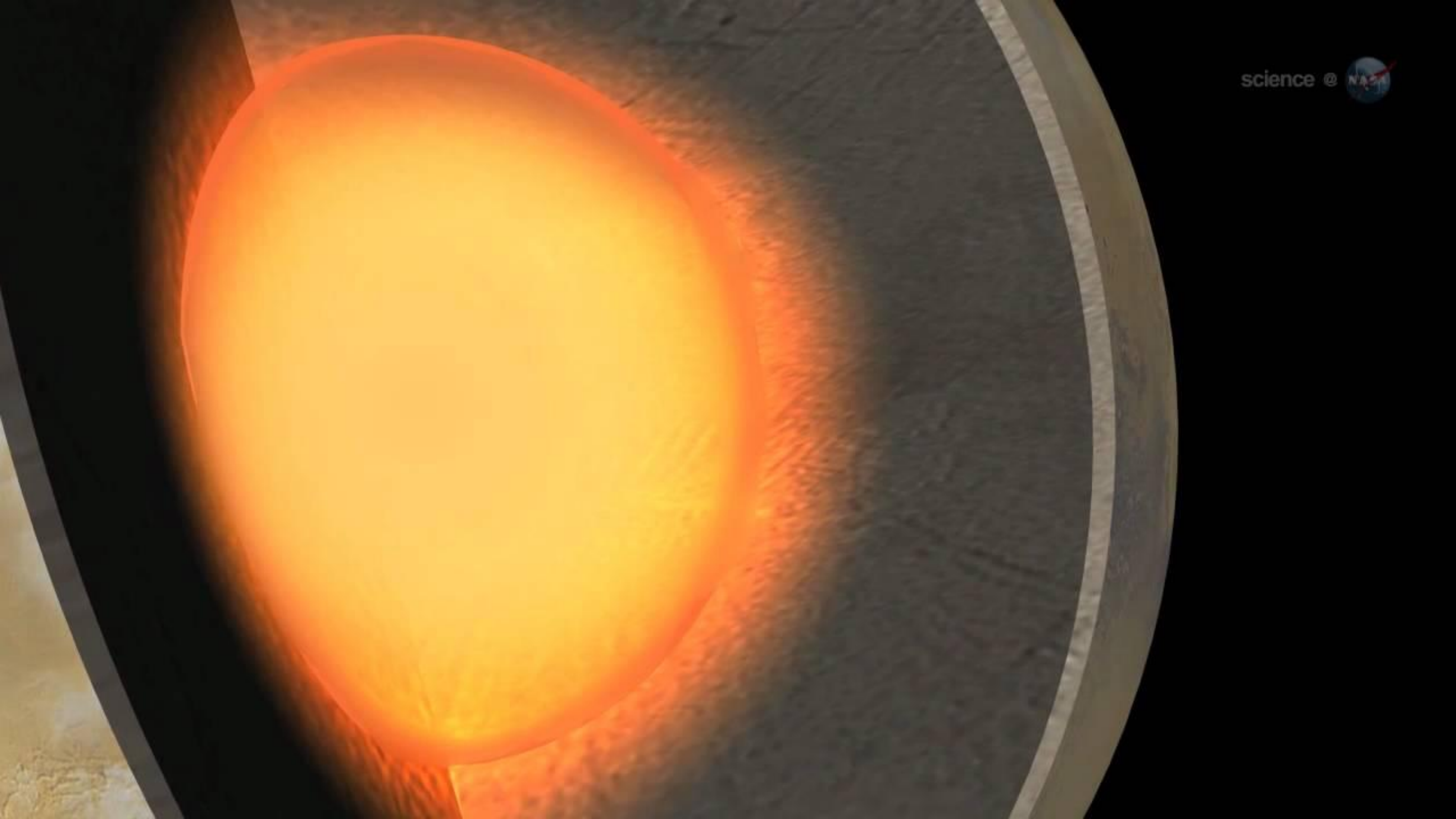
science @ NASA

1
00:00:09,830 --> 00:00:06,389
is vesta the smallest terrestrial planet

2
00:00:12,070 --> 00:00:09,840
presented by science at nasa

3
00:00:13,910 --> 00:00:12,080
nasa's dawn spacecraft spent the last

4
00:00:17,670 --> 00:00:13,920
four years voyaging to the asteroid

5
00:00:20,550 --> 00:00:17,680
vesta and may have found a planet

6
00:00:22,790 --> 00:00:20,560
vesta was discovered over 200 years ago

7
00:00:25,109 --> 00:00:22,800
but until dawn has been seen only as an

8
00:00:27,750 --> 00:00:25,119
indistinct blur and considered little

9
00:00:29,429 --> 00:00:27,760
more than a large rocky body

10
00:00:31,189 --> 00:00:29,439
now the spacecraft's instruments are

11
00:00:32,950 --> 00:00:31,199
revealing the true complexity of this

12
00:00:35,990 --> 00:00:32,960
ancient world

13
00:00:36,950 --> 00:00:36,000

we're seeing enormous mountains valleys

14
00:00:37,910 --> 00:00:36,960
hills

15
00:00:41,350 --> 00:00:37,920
cliffs

16
00:00:44,069 --> 00:00:41,360
troughs ridges craters of all sizes and

17
00:00:46,389 --> 00:00:44,079
planes says chris russell dawn principal

18
00:00:49,029 --> 00:00:46,399
investigator from ucla

19
00:00:51,029 --> 00:00:49,039
vesta is not a simple ball of rock

20
00:00:54,069 --> 00:00:51,039
this is a world with a rich geochemical

21
00:00:56,869 --> 00:00:54,079
history it has quite a story to tell

22
00:00:58,470 --> 00:00:56,879
in fact the asteroid is so complex that

23
00:01:00,150 --> 00:00:58,480
russell and members of his team are

24
00:01:01,590 --> 00:01:00,160
calling it the smallest terrestrial

25
00:01:04,149 --> 00:01:01,600
planet

26
00:01:05,830 --> 00:01:04,159
vesta has an iron core notes russell

27
00:01:07,990 --> 00:01:05,840
and its surface features indicate that

28
00:01:09,910 --> 00:01:08,000
the asteroid is differentiated like the

29
00:01:12,950 --> 00:01:09,920
terrestrial planets earth

30
00:01:14,789 --> 00:01:12,960
mercury mars and venus

31
00:01:16,870 --> 00:01:14,799
differentiation is what happens when the

32
00:01:19,270 --> 00:01:16,880
interior of an active planet gets hot

33
00:01:20,710 --> 00:01:19,280
enough to melt separating its materials

34
00:01:23,030 --> 00:01:20,720
into layers

35
00:01:25,109 --> 00:01:23,040
the light material floats to the top and

36
00:01:28,390 --> 00:01:25,119
the heavy elements such as iron and

37
00:01:30,310 --> 00:01:28,400
nickel sink to the center of the planet

38
00:01:32,230 --> 00:01:30,320

researchers believe this process also

39
00:01:35,030 --> 00:01:32,240
happened to vesta

40
00:01:37,350 --> 00:01:35,040
the story begins about 4.57 billion

41
00:01:38,950 --> 00:01:37,360
years ago when the planets of the solar

42
00:01:41,350 --> 00:01:38,960
system started forming from the

43
00:01:43,749 --> 00:01:41,360
primordial solar nebula

44
00:01:45,670 --> 00:01:43,759
as jupiter gathered itself together its

45
00:01:47,670 --> 00:01:45,680
powerful gravity stirred up the material

46
00:01:49,670 --> 00:01:47,680
in the asteroid belt so objects there

47
00:01:51,429 --> 00:01:49,680
could no longer coalesce

48
00:01:53,350 --> 00:01:51,439
vesta was in the process of growing into

49
00:01:55,350 --> 00:01:53,360
a full-fledged planet when jupiter

50
00:01:57,590 --> 00:01:55,360
interrupted the process

51
00:01:59,190 --> 00:01:57,600
although vesta's growth was stunted it

52
00:02:00,709 --> 00:01:59,200
is still differentiated like a true

53
00:02:02,230 --> 00:02:00,719
planet

54
00:02:04,310 --> 00:02:02,240
we believe that the solar system

55
00:02:06,230 --> 00:02:04,320
received an extra slug of radioactive

56
00:02:08,150 --> 00:02:06,240
aluminum and iron from a nearby

57
00:02:10,630 --> 00:02:08,160
supernova explosion at the time when

58
00:02:13,990 --> 00:02:10,640
vesta was forming explains russell

59
00:02:15,910 --> 00:02:14,000
these materials decay and give off heat

60
00:02:18,309 --> 00:02:15,920
as the asteroid was gathering material

61
00:02:20,869 --> 00:02:18,319
up into a ball of rock it was also

62
00:02:23,110 --> 00:02:20,879
trapping the heat inside itself

63
00:02:25,830 --> 00:02:23,120

as vesta's core melted lighter material

64
00:02:28,309 --> 00:02:25,840
rose to the surface forming volcanoes

65
00:02:30,390 --> 00:02:28,319
mountains and lava flows

66
00:02:31,990 --> 00:02:30,400
we think vesta had volcanoes and flowing

67
00:02:33,990 --> 00:02:32,000
lava at one time

68
00:02:36,630 --> 00:02:34,000
although we've not yet found any ancient

69
00:02:37,910 --> 00:02:36,640
volcanoes there says russell we're still

70
00:02:40,150 --> 00:02:37,920
looking

71
00:02:42,309 --> 00:02:40,160
vesta's planes seem similar to hawaii's

72
00:02:43,990 --> 00:02:42,319
surface which is basaltic lava

73
00:02:45,430 --> 00:02:44,000
solidified after flowing onto the

74
00:02:46,949 --> 00:02:45,440
surface

75
00:02:48,550 --> 00:02:46,959
vesta has so much in common with the

76
00:02:50,309 --> 00:02:48,560
terrestrial planets

77
00:02:52,710 --> 00:02:50,319
should it be formally reclassified from

78
00:02:53,990 --> 00:02:52,720
asteroid to dwarf planet

79
00:02:56,229 --> 00:02:54,000
that's up to the international

80
00:02:58,869 --> 00:02:56,239
astronomical union but at least on the

81
00:03:01,190 --> 00:02:58,879
inside vesta has characteristics similar

82
00:03:03,509 --> 00:03:01,200
to the terrestrial planets

83
00:03:05,110 --> 00:03:03,519
if anyone asks russell he knows how he

84
00:03:07,670 --> 00:03:05,120
would vote

85
00:03:08,550 --> 00:03:07,680
for more news about alien worlds big and