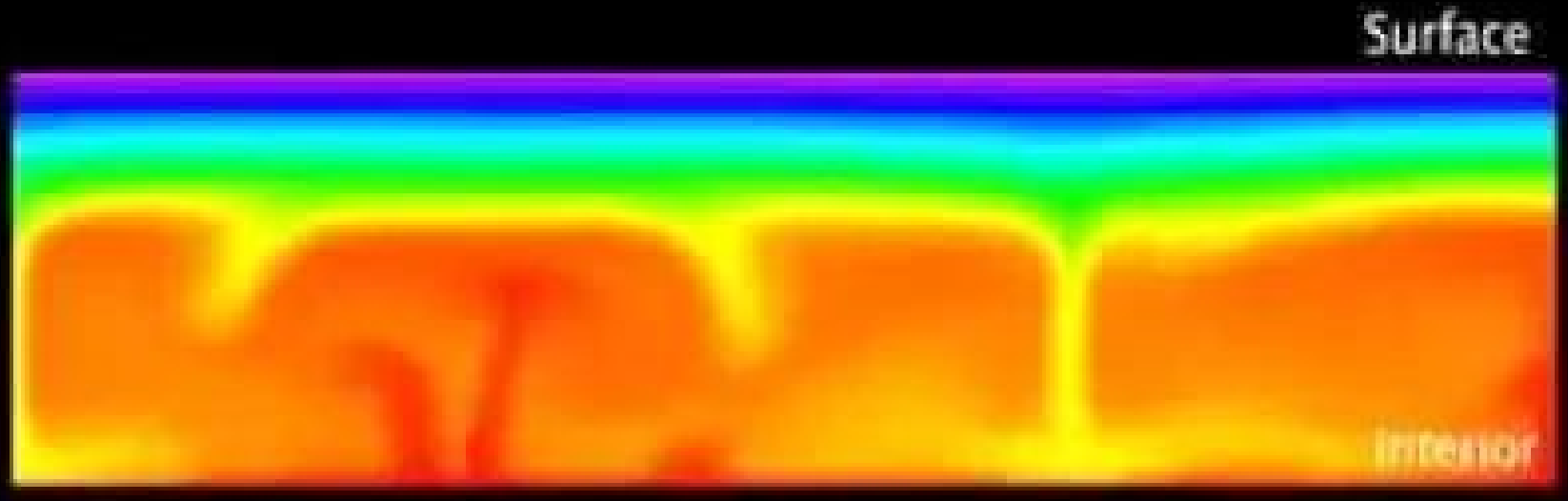
Surface
interior

1
00:00:09,160 --> 00:00:06,650
in a solar system full of amazing

2
00:00:12,589 --> 00:00:09,170
planets and moons Jupiter's moon Europa

3
00:00:15,350 --> 00:00:12,599
stands out sandwiched between it's icy

4
00:00:19,420 --> 00:00:15,360
skin and mantle there's an ocean twice

5
00:00:22,310 --> 00:00:19,430
the volume of all of Earth's oceans

6
00:00:25,279 --> 00:00:22,320
everywhere on earth where there's water

7
00:00:26,990 --> 00:00:25,289
there's life the search for life in our

8
00:00:29,040 --> 00:00:27,000
solar system is essentially the search

9
00:00:32,100 --> 00:00:29,050
for liquid water

10
00:00:35,160 --> 00:00:32,110
the biggest deal about europa is that it

11
00:00:37,670 --> 00:00:35,170
may be the most promising place off of

12
00:00:41,070 --> 00:00:37,680
the earth for life in our solar system

13
00:00:43,140 --> 00:00:41,080

the Galileo spacecraft returned images

14
00:00:46,500 --> 00:00:43,150
of Europa that revealed a strange

15
00:00:49,350 --> 00:00:46,510
variety of icy structures some created

16
00:00:56,720 --> 00:00:49,360
by blobs of warmer ice that rise through

17
00:01:00,299 --> 00:00:56,730
colder ice Europa generates heat inside

18
00:01:03,689 --> 00:01:00,309
how it flexes as it's tugged by

19
00:01:06,030 --> 00:01:03,699
Jupiter's gravity just like the Earth's

20
00:01:08,850 --> 00:01:06,040
oceans have tides because they're pulled

21
00:01:11,430 --> 00:01:08,860
by the moon's gravity Europa should have

22
00:01:14,340 --> 00:01:11,440
a tide because it's pulled by Jupiter's

23
00:01:16,350 --> 00:01:14,350
gravity and you rope as it orbits gets a

24
00:01:16,830 --> 00:01:16,360
little closer and a little farther from

25
00:01:21,750 --> 00:01:16,840
Jupiter

26
00:01:24,899 --> 00:01:21,760
be stretched out more when it's farther

27
00:01:27,630 --> 00:01:24,909
from Jupiter it would contract more it's

28
00:01:30,480 --> 00:01:27,640
kind of like bending a paperclip if you

29
00:01:33,090 --> 00:01:30,490
bend a paperclip back and forth that

30
00:01:35,099 --> 00:01:33,100
generates just a little bit of heat

31
00:01:37,620 --> 00:01:35,109
could touch you to it it can feel it

32
00:01:40,169 --> 00:01:37,630
that paperclips heat it up so in a

33
00:01:42,419 --> 00:01:40,179
similar way this flexing of Europa as it

34
00:01:45,660 --> 00:01:42,429
orbits around Jupiter is generating heat

35
00:01:47,760 --> 00:01:45,670
and keeping that ocean going it may even

36
00:01:50,399 --> 00:01:47,770
be hot enough that if the mantle

37
00:01:53,039 --> 00:01:50,409
encounters water it might create black

38
00:01:55,889 --> 00:01:53,049

smokers like we see on Earth's ocean

39
00:01:59,010 --> 00:01:55,899
floor an environment in which primitive

40
00:02:02,130 --> 00:01:59,020
organisms might be able to survive I

41
00:02:04,739 --> 00:02:02,140
would certainly say that Europa has the

42
00:02:07,859 --> 00:02:04,749
most potential within our solar system

43
00:02:10,499 --> 00:02:07,869
for life outside the earth other icy

44
00:02:12,300 --> 00:02:10,509
satellites are candidates Mars is a

45
00:02:13,440 --> 00:02:12,310
candidate - and you might get a

46
00:02:16,140 --> 00:02:13,450
different opinion from a different

47
00:02:17,940 --> 00:02:16,150
scientists but based on what I

48
00:02:21,559 --> 00:02:17,950
understand about the icy satellites

49
00:02:24,210 --> 00:02:21,569
Europa seems very promising for

50
00:02:26,970 --> 00:02:24,220
microbial life today

51
00:02:29,880 --> 00:02:26,980
new research is bringing scientists

52
00:02:31,860 --> 00:02:29,890
closer to understanding Europa inside

53
00:02:34,650 --> 00:02:31,870
this tiny lab at NASA's Jet Propulsion

54
00:02:36,720 --> 00:02:34,660
Laboratory scientists are creating a

55
00:02:40,200 --> 00:02:36,730
database to try to answer big questions

56
00:02:42,630 --> 00:02:40,210
about Europa and other icy moons well

57
00:02:44,970 --> 00:02:42,640
the purpose of this lab is to perform

58
00:02:48,060 --> 00:02:44,980
experiments that are relevant to Europa

59
00:02:50,700 --> 00:02:48,070
and to other icy satellites understand

60
00:02:54,210 --> 00:02:50,710
things like how much heating is there

61
00:02:58,050 --> 00:02:54,220
when the ice is squeezed and flexed or

62
00:02:59,850 --> 00:02:58,060
if there is a flow of slushy icy stuff

63
00:03:03,420 --> 00:02:59,860

that comes out onto the surface of

64
00:03:07,040 --> 00:03:03,430
Europa or tighten or Enceladus and

65
00:03:10,730 --> 00:03:07,050
Saturn what are the characteristics of

66
00:03:14,790 --> 00:03:10,740
ices when they're slushy like that and

67
00:03:17,910 --> 00:03:14,800
might erupt on to the surface we don't

68
00:03:20,160 --> 00:03:17,920
know if life is really unique to earth

69
00:03:22,320 --> 00:03:20,170
very rare in the cosmos or is it very

70
00:03:24,960 --> 00:03:22,330
common in the cosmos if we went

71
00:03:28,680 --> 00:03:24,970
someplace like Europa and found evidence

72
00:03:30,840 --> 00:03:28,690
for life today in another ocean it would

73
00:03:33,800 --> 00:03:30,850
say that maybe wherever there's an ocean

74
00:03:36,390 --> 00:03:33,810
or a warm salty ocean there's life and