



SCIENCE



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1
00:00:09,270 --> 00:00:07,510
the great lakes of europa presented by

2
00:00:11,350 --> 00:00:09,280
science at nasa

3
00:00:13,749 --> 00:00:11,360
at first glance the icy surface of

4
00:00:16,070 --> 00:00:13,759
jupiter's moon europa appears to be a

5
00:00:17,830 --> 00:00:16,080
frozen wasteland a deep freeze where

6
00:00:18,870 --> 00:00:17,840
nothing changes and no life could

7
00:00:20,710 --> 00:00:18,880
survive

8
00:00:23,109 --> 00:00:20,720
but researchers have long known there's

9
00:00:26,310 --> 00:00:23,119
more to europa than meets the eye

10
00:00:29,029 --> 00:00:26,320
in the 1990s and early 2000s nasa's

11
00:00:30,550 --> 00:00:29,039
galileo probe swooped low over europa's

12
00:00:31,990 --> 00:00:30,560
icy landscape

13
00:00:34,709 --> 00:00:32,000

close-up pictures revealed a

14

00:00:36,470 --> 00:00:34,719

geologically young surface and unusual

15

00:00:38,470 --> 00:00:36,480

formations in the ice

16

00:00:40,790 --> 00:00:38,480

grooved ridges and crustal plates looked

17

00:00:42,470 --> 00:00:40,800

like they had broken apart and rafted

18

00:00:45,030 --> 00:00:42,480

into new positions floating on

19

00:00:46,790 --> 00:00:45,040

subsurface water or slush

20

00:00:48,869 --> 00:00:46,800

similar ice patterns are found in the

21

00:00:51,190 --> 00:00:48,879

earth's own arctic

22

00:00:53,590 --> 00:00:51,200

indeed it is now widely believed that

23

00:00:55,110 --> 00:00:53,600

europa harbors a vast ocean beneath its

24

00:00:56,790 --> 00:00:55,120

frozen exterior

25

00:00:58,389 --> 00:00:56,800

the ocean is deep enough to cover the

26

00:01:00,950 --> 00:00:58,399

whole surface of europa

27

00:01:03,029 --> 00:01:00,960

and according to some estimates contains

28

00:01:04,710 --> 00:01:03,039

more liquid water than all of earth's

29

00:01:07,190 --> 00:01:04,720

oceans combined

30

00:01:09,830 --> 00:01:07,200

however being so far from the sun

31

00:01:13,990 --> 00:01:09,840

europa's surface is completely frozen

32

00:01:15,910 --> 00:01:14,000

with a crust some tens of miles thick

33

00:01:17,990 --> 00:01:15,920

this begs the question could such a

34

00:01:19,350 --> 00:01:18,000

closed-off environment be a habitat for

35

00:01:21,030 --> 00:01:19,360

life

36

00:01:23,350 --> 00:01:21,040

new research just published in the

37

00:01:26,710 --> 00:01:23,360

journal nature suggests that europa

38

00:01:29,830 --> 00:01:26,720

might not be so closed off after all

39

00:01:32,069 --> 00:01:29,840

galileo's mission came to an end in 2003

40

00:01:33,910 --> 00:01:32,079

when the probe was plunged intentionally

41

00:01:35,749 --> 00:01:33,920

into jupiter's atmosphere but

42

00:01:37,749 --> 00:01:35,759

researchers continued to study the

43

00:01:39,270 --> 00:01:37,759

treasure trove of data galileo beamed

44

00:01:41,350 --> 00:01:39,280

back to earth

45

00:01:43,190 --> 00:01:41,360

a group led by brittany schmidt a

46

00:01:45,830 --> 00:01:43,200

postdoctoral fellow at the university of

47

00:01:48,149 --> 00:01:45,840

texas institute for geophysics focused

48

00:01:50,069 --> 00:01:48,159

on europa's chaos terrain

49

00:01:51,590 --> 00:01:50,079

circular bumpy features on europa's

50

00:01:53,270 --> 00:01:51,600

surface that had long intrigued

51
00:01:55,190 --> 00:01:53,280
researchers

52
00:01:57,510 --> 00:01:55,200
it turns out that similar terrains are

53
00:02:00,069 --> 00:01:57,520
found on earth on ice shelves and under

54
00:02:01,830 --> 00:02:00,079
glaciers overlaying volcanoes

55
00:02:03,670 --> 00:02:01,840
based on what is known of earth

56
00:02:05,830 --> 00:02:03,680
schmidt's team developed a four-step

57
00:02:07,510 --> 00:02:05,840
model to explain how europa's chaos

58
00:02:09,270 --> 00:02:07,520
features form

59
00:02:11,589 --> 00:02:09,280
i read the paper and immediately thought

60
00:02:13,750 --> 00:02:11,599
yes that's it that makes sense said

61
00:02:15,510 --> 00:02:13,760
robert pappalardo senior research

62
00:02:17,350 --> 00:02:15,520
scientist of the planetary science

63
00:02:19,589 --> 00:02:17,360

section at nasa's jet propulsion

64

00:02:20,869 --> 00:02:19,599

laboratory who did not participate in

65

00:02:23,030 --> 00:02:20,879

the study

66

00:02:25,830 --> 00:02:23,040

it's the only convincing model that fits

67

00:02:27,750 --> 00:02:25,840

the full range of observations

68

00:02:29,830 --> 00:02:27,760

according to the analysis one of the

69

00:02:32,229 --> 00:02:29,840

chaos terrains apparently overlies a

70

00:02:33,990 --> 00:02:32,239

body of liquid the area of the north

71

00:02:35,910 --> 00:02:34,000

american great lakes

72

00:02:37,270 --> 00:02:35,920

moreover the authors believe that ice

73

00:02:39,670 --> 00:02:37,280

shelves on top of the lake are

74

00:02:41,830 --> 00:02:39,680

collapsing providing a way to transfer

75

00:02:45,190 --> 00:02:41,840

nutrients and energy between the surface

76
00:02:46,710 --> 00:02:45,200
and europa's vast underground ocean

77
00:02:49,509 --> 00:02:46,720
we see evidence that even though

78
00:02:51,910 --> 00:02:49,519
europa's ice shelf is thick it can mix

79
00:02:54,710 --> 00:02:51,920
vigorously says schmidt that could make

80
00:02:56,470 --> 00:02:54,720
europa and its ocean more habitable

81
00:02:58,710 --> 00:02:56,480
given the number of chaos terrains on

82
00:03:00,550 --> 00:02:58,720
europa's surface many more such lakes

83
00:03:02,309 --> 00:03:00,560
might exist

84
00:03:04,390 --> 00:03:02,319
the data opens up some compelling

85
00:03:07,190 --> 00:03:04,400
possibilities agrees mary voitek

86
00:03:09,350 --> 00:03:07,200
director of nasa's astrobiology program

87
00:03:11,270 --> 00:03:09,360
however she cautions scientists

88
00:03:13,190 --> 00:03:11,280

worldwide will want to take a close look

89

00:03:15,030 --> 00:03:13,200

at this analysis and review the data

90

00:03:17,509 --> 00:03:15,040

before we can fully appreciate the

91

00:03:19,750 --> 00:03:17,519

implication of these results

92

00:03:22,309 --> 00:03:19,760

final proof might require a trip to

93

00:03:23,750 --> 00:03:22,319

europa by a spacecraft designed to probe

94

00:03:26,869 --> 00:03:23,760

the icy shell

95

00:03:31,430 --> 00:03:26,879

such a mission is being studied by nasa