



1
00:00:10,470 --> 00:00:06,789
rethinking an alien world

2
00:00:13,110 --> 00:00:10,480
presented by science at nasa

3
00:00:16,230 --> 00:00:13,120
40 light years from earth a rocky world

4
00:00:18,870 --> 00:00:16,240
named 55 cancri e circles perilously

5
00:00:21,830 --> 00:00:18,880
close to a stellar inferno

6
00:00:24,470 --> 00:00:21,840
completing one orbit in only 18 hours

7
00:00:26,790 --> 00:00:24,480
the alien planet is 26 times closer to

8
00:00:27,750 --> 00:00:26,800
its parent star than mercury is to the

9
00:00:29,990 --> 00:00:27,760
sun

10
00:00:32,150 --> 00:00:30,000
if earth were in the same position the

11
00:00:35,190 --> 00:00:32,160
soil beneath our feet would heat up to

12
00:00:37,350 --> 00:00:35,200
about 3 200 degrees fahrenheit

13
00:00:39,910 --> 00:00:37,360

researchers have long thought that 55

14

00:00:41,190 --> 00:00:39,920

cancer e must be a wasteland of parched

15

00:00:43,350 --> 00:00:41,200

rock

16

00:00:45,590 --> 00:00:43,360

now they're thinking again

17

00:00:48,470 --> 00:00:45,600

new observations by nasa's spitzer space

18

00:00:50,630 --> 00:00:48,480

telescope suggest that 55 cancer e may

19

00:00:52,389 --> 00:00:50,640

be wetter and weirder than anyone

20

00:00:53,790 --> 00:00:52,399

imagined

21

00:00:56,950 --> 00:00:53,800

spitzer recently measured the

22

00:00:58,950 --> 00:00:56,960

extraordinarily small amount of light 55

23

00:01:00,549 --> 00:00:58,960

cancer e blocks when it crosses in front

24

00:01:03,189 --> 00:01:00,559

of its star

25

00:01:04,630 --> 00:01:03,199

these transits occur every 18 hours

26

00:01:06,550 --> 00:01:04,640

giving researchers repeated

27

00:01:08,469 --> 00:01:06,560

opportunities to gather the data they

28

00:01:11,670 --> 00:01:08,479

need to estimate the width

29

00:01:14,230 --> 00:01:11,680

volume and density of the planet

30

00:01:17,510 --> 00:01:14,240

according to the new observations 55

31

00:01:20,469 --> 00:01:17,520

cancri e has a mass 7.8 times and a

32

00:01:23,030 --> 00:01:20,479

radius just over twice that of earth

33

00:01:25,590 --> 00:01:23,040

those properties place 55 canker e in

34

00:01:28,230 --> 00:01:25,600

the super earth class of exoplanets

35

00:01:30,069 --> 00:01:28,240

a few dozen of which have been found

36

00:01:32,310 --> 00:01:30,079

only a handful of known super earths

37

00:01:33,749 --> 00:01:32,320

however cross the face of their stars as

38

00:01:36,710 --> 00:01:33,759

viewed from our vantage point in the

39

00:01:38,870 --> 00:01:36,720
cosmos so 55 canker e is better

40

00:01:42,389 --> 00:01:38,880
understood than most

41

00:01:44,550 --> 00:01:42,399
when 55 cancri e was discovered in 2004

42

00:01:46,469 --> 00:01:44,560
initial estimates of its size and mass

43

00:01:47,990 --> 00:01:46,479
were consistent with a dense planet of

44

00:01:50,389 --> 00:01:48,000
solid rock

45

00:01:52,550 --> 00:01:50,399
spitzer data suggests otherwise

46

00:01:54,950 --> 00:01:52,560
about a fifth of the planet's mass must

47

00:01:56,630 --> 00:01:54,960
be made of light elements and compounds

48

00:01:58,630 --> 00:01:56,640
including water

49

00:02:00,789 --> 00:01:58,640
given the intense heat and high pressure

50

00:02:02,789 --> 00:02:00,799
these materials likely experience

51
00:02:06,230 --> 00:02:02,799
researchers think the compounds likely

52
00:02:09,029 --> 00:02:06,240
exist in a supercritical fluid state

53
00:02:10,790 --> 00:02:09,039
a supercritical fluid is a high pressure

54
00:02:13,190 --> 00:02:10,800
high temperature state of matter best

55
00:02:14,949 --> 00:02:13,200
described as a liquid-like gas and a

56
00:02:16,949 --> 00:02:14,959
marvelous solvent

57
00:02:19,350 --> 00:02:16,959
water becomes supercritical in some

58
00:02:21,990 --> 00:02:19,360
steam turbines and it tends to dissolve

59
00:02:24,309 --> 00:02:22,000
the tips of the turbine blades

60
00:02:26,630 --> 00:02:24,319
supercritical carbon dioxide is used to

61
00:02:29,270 --> 00:02:26,640
remove caffeine from coffee beans and

62
00:02:31,350 --> 00:02:29,280
sometimes to dry clean clothes

63
00:02:33,190 --> 00:02:31,360

liquid-fueled rocket propellant is also

64

00:02:34,949 --> 00:02:33,200

supercritical when it emerges from the

65

00:02:37,830 --> 00:02:34,959

tail of a spaceship

66

00:02:40,790 --> 00:02:37,840

on 55 canker e this stuff may be

67

00:02:42,390 --> 00:02:40,800

literally oozing or is it steaming out

68

00:02:44,390 --> 00:02:42,400

of the rocks

69

00:02:45,910 --> 00:02:44,400

with supercritical solvents rising from

70

00:02:47,990 --> 00:02:45,920

the planet's surface

71

00:02:50,949 --> 00:02:48,000

a star of terrifying proportions filling

72

00:02:53,430 --> 00:02:50,959

much of the daytime sky and whole years

73

00:02:57,030 --> 00:02:53,440

rushing by in a matter of hours

74

00:02:59,190 --> 00:02:57,040

55 cancri e teaches a valuable lesson

75

00:03:00,229 --> 00:02:59,200

just because a planet is similar in size

76

00:03:03,270 --> 00:03:00,239

to earth

77

00:03:06,070 --> 00:03:03,280

does not mean the planet is like earth

78

00:03:08,630 --> 00:03:06,080

it's something to rethink about