



1  
00:00:00,000 --> 00:00:04,390  
(Music)

2  
00:00:04,410 --> 00:00:09,570  
Dr. Natalie Batalha: Kepler-10b orbits one of the 150,000 stars that the spacecraft is monitoring

3  
00:00:09,590 --> 00:00:12,610  
between the constellations of Cygnus and Lyra.

4  
00:00:12,630 --> 00:00:16,640  
We aim our mosaic of 42 detectors there, under the swan's wing,

5  
00:00:16,660 --> 00:00:19,700  
just above the plane of the Milky Way galaxy.

6  
00:00:19,720 --> 00:00:24,910  
The star itself is very similar to our own sun in temperature, mass and size, but older

7  
00:00:24,930 --> 00:00:30,480  
with an age of 11.9 billion years, compared to the 4-and-1/2 billion years of our own sun.

8  
00:00:30,500 --> 00:00:36,110  
It's a quiet star, slowly spinning with a weak magnetic field and few of the sun spots that

9  
00:00:36,130 --> 00:00:38,760  
characterize our own sun.

10  
00:00:38,780 --> 00:00:45,320  
The star's about 560 light years from our solar system and one of the brighter stars that Kepler is monitoring.

11  
00:00:45,340 --> 00:00:50,710  
It was the first we identified as potentially harboring a very small transiting planet.

12  
00:00:50,730 --> 00:00:55,520  
The transits of the planet were first seen in July of 2009.

13  
00:00:55,540 --> 00:01:02,220

560 light years. It occurred to me that when the light from this star began its journey toward Earth,

14

00:01:02,240 --> 00:01:08,580

European navigators were crossing the Atlantic Ocean for the first time in search of new horizons.

15

00:01:08,600 --> 00:01:14,730

Today, we're still exploring and our crow's nest is a space telescope called Kepler.

16

00:01:14,750 --> 00:01:21,620

One day, the oceans we cross will be the galaxy itself, but for now, we imagine the worlds we discover

17

00:01:21,640 --> 00:01:27,550

by putting all that we've learned from our observations and analyses into the fingers of artists.

18

00:01:27,570 --> 00:01:34,520

Here you see Kepler-10b as a scorched world, orbiting at a distance that's more than 20 times closer to its star

19

00:01:34,540 --> 00:01:37,240

than Mercury is to our own Sun.

20

00:01:37,260 --> 00:01:44,960

The daytime temperature's expected to be more than 2,500 degrees Fahrenheit, hotter than lava flows here on

21

00:01:44,980 --> 00:01:49,450

Intense radiation from the star has kept the planet from holding onto an atmosphere,

22

00:01:49,470 --> 00:01:57,110

but here we see flecks of silicates and iron that have boiled off a molten surface and are swept away by the star's

23

00:01:57,130 --> 00:02:02,520

much like a comet's tail when its orbit brings it close to the Sun.

24

00:02:02,540 --> 00:02:09,370

Many years ago, before Kepler, our team built a robotic telescope at Lick Observatory to learn to do transit photometry

25

00:02:09,390 --> 00:02:14,840

We called it the "Vulcan Telescope," named after the hypothetical planet that scientists in the 1800's

26  
00:02:14,860 --> 00:02:18,060  
thought might exist between the Sun and Mercury.

27  
00:02:18,080 --> 00:02:22,740  
A planet that might explain the small deviations in Mercury's orbit that were later explained

28  
00:02:22,760 --> 00:02:25,890  
with Einstein's theory of general relativity.

29  
00:02:25,910 --> 00:02:32,890  
Vulcan is the god of fire in Roman mythology, a name befitting of a world so close to the Sun.

30  
00:02:32,910 --> 00:02:38,850  
When I saw the artist's rendering of Kepler-10b for the first time, the thought that immediately came to my mind

31  
00:02:38,870 --> 00:02:41,330  
was that this is our planet Vulcan.