



Key words: Trappist-1, ultracool dwarf, planets, habitable zone

<p>ESOCast Episode 96: Ultracool Dwarf and the Seven Planets</p>	
<p>00:00 [Visual starts] [Narrator] 1. Astronomers have discovered seven Earth-sized planets orbiting a tiny nearby star. At least three of the planets could harbour oceans of water, making them possible homes for life.</p>	<p>Computer animation TRAPPIST-1 system</p>
<p>00:21 2. ESOCast intro</p>	<p>New ESOCast introduction</p>
<p>00:28 [Narrator] 3. Just 40 light-years from Earth lies TRAPPIST-1. It's a small, dim red star known as an ultracool dwarf, only slightly bigger than Jupiter.</p> <p>In early 2016, astronomers using the small robotic TRAPPIST telescope found the first planets orbiting the star. With follow-up observations, a total of seven worlds have now been identified in the system.</p>	<p>Computer animation travel from the Earth to TRAPPIST-1</p> <p>TRAPPIST telescope at La Silla</p>

<p>01:03 [Narrator] 4. Astronomers discovered and learned about the planets orbiting TRAPPIST-1 by studying tiny, regular dips in the star's brightness. These are caused by the planets passing in front of it and blocking some of its light.</p> <p>Observations were made using telescopes around the world and in space, including ESO's Very Large Telescope in Chile and NASA's Spitzer Space Telescope.</p> <p>The results? The discovery of an amazingly rich planetary system with seven planets having similar sizes and temperatures to the Earth. And at least the innermost six are probably made of rock.</p> <p>Although the planets orbits are very close to their parent star, its low energy output means that the illumination levels they receive are similar to Venus, Earth and Mars.</p>	<p>Computer animation TRAPPIST-1 system</p> <p>Computer animation of transit</p> <p>Aerial view of Paranal Observatory</p> <p>Computer animation TRAPPIST-1 system</p>
<p>02:02 [Narrator] 5. Climate models suggest the innermost three would be too hot for liquid water to exist on anything more than a small fraction of their surfaces. And the most distant and coolest planet is expected to be an icy world.</p> <p>However, three planets in the system, TRAPPIST-1e, f and g, represent the holy grail for planet-hunting astronomers, as they orbit in the star's habitable zone. Excitingly, this could mean they harbour oceans of water on their surfaces.</p>	<p>Computer animation TRAPPIST-1 system</p>

<p>02:39 [Narrator] 6. This new discovery makes the system a top target for future investigation.</p> <p>With the next generation of telescopes, such as ESO's European Extremely Large Telescope and the NASA/ESA James Webb Space Telescope, astronomers could observe signs of water in the atmospheres of these planets.</p> <p>The presence of life also leaves unique chemical signals in a planet's atmosphere, which could possibly be detected on these nearby worlds.</p>	<p>Computer animation TRAPPIST-1 system</p> <p>Computer animations of the European Extremely Large Telescope and the NASA/ESA James Webb Space Telescope</p> <p>Computer animation of exoplanet surface</p> <p>Computer animation atmosphere of an exoplanet</p>
<p>03:14 [Narrator] 7. Dwarf stars like TRAPPIST-1 are very common in our galaxy, with most expected to host Earth-sized planets.</p> <p>The search for life may find success in a system just like this one.</p>	<p>Computer animation TRAPPIST-1 system</p>
<p>03:31 [Outro]</p>	<p><i>Produced by ESO, the European Southern Observatory. Reaching new heights in Astronomy.</i></p>