

# NASA DISCOVERS EARTH-SIZED EXOPLANET IN HABITABLE ZONE

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A view of the exoplanet TOI 700 d. | Photo Credit: [NASA](#)

Researchers have discovered an Earth-sized planet that lies in its star's habitable zone — the range of distances from a star where conditions may be just right to allow the presence of liquid water on the surface. The planet was discovered using NASA's Transiting Exoplanet Survey Satellite (TESS), the first Earth-sized planet that has been discovered since the satellite was launched in April 2018.

The star lies in the TESS continuous viewing zone in the Southern Ecliptic Hemisphere.

Emily Gilbert from the University of Chicago in Illinois and others discovered a small, cool M dwarf star (TOI 700) located just over 100 light-years away in the southern constellation Dorado. Ms. Gilbert, a graduate student at the University of Chicago, reported the discovery on January 6 at a meeting of the American Astronomical Society in Honolulu, Hawaii. The authors have [posted a reprint](#) at Arxiv on January 7.

The star is roughly 40% of the Sun's mass and size and about half its surface temperature. "TOI-700 is a quiet star, with no detectable flares in the optical TESS data, making it an optimal target for habitability studies of planets orbiting M dwarfs," the authors write in the preprint.

Three have been found orbiting the star. The innermost planet is almost the size of the Earth and completes an orbit in 10 days. The middle planet is 2.6 times the size of the Earth and completes an orbit in 16 days. The third outer planet — TOI 700 d — is about 1.2 times the size of Earth and takes 37 days to complete one orbit. It receives from its star 86% of the energy that the Sun provides to Earth and so considered to be in the habitable zone of the star. All the three planets are thought to be tidally locked to the star. As a result, they rotate only once per orbit such that one side is constantly facing the star.

While the approximate mass of the star has been calculated, the Earth-like planet's mass has not been measured yet. Knowing the mass of the planet will allow scientists to calculate the density and hence deduce if it is rocky or made of gas like in the case of Neptune.

Researchers had earlier misclassified the star in the TESS database as being similar to the Sun. As a result, the planets were supposed to be hotter and bigger than they actually were. This mistake was later corrected.

"When we corrected the star's parameters, the sizes of its planets dropped, and we realized the outermost one was about the size of Earth and in the habitable zone," Ms. Gilbert was quoted as saying in a NASA release. "Additionally, in 11 months of data we saw no flares from the star, which improves the chances TOI 700 d is habitable and makes it easier to model its atmospheric and surface conditions."

"TESS will return to the Southern Hemisphere observe TOI-700 for an additional 11 sectors in TESS's extended mission, which is scheduled to begin in July 2020. This will enable studies for additional evidence of transit timing variations, place further constraints on planet parameters, and searches for additional planets in the system," the authors write.

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