



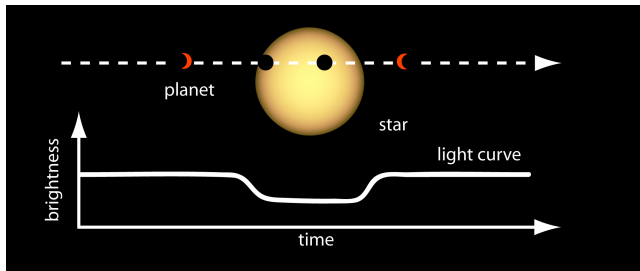
Credit: S. Hildner, M. Daudemolle, and P. Aniol



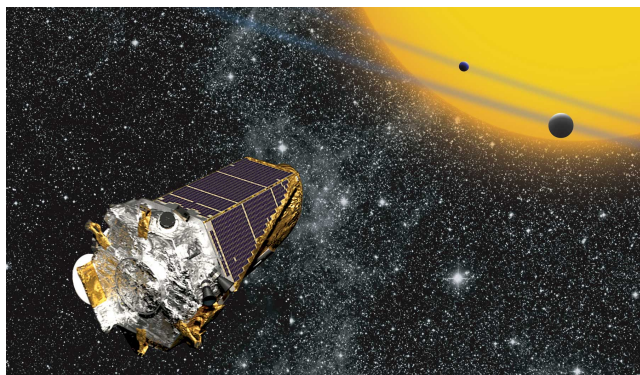
Credit: Rick Fienberg, TravelQuest International and Wilderness Travel



ECLIPSES IN OTHER PLANETARY SYSTEMS



As an exoplanet passes in front of a star, it blocks some of the starlight in a mini-eclipse.



NASA's Kepler mission has discovered over 2,000 exoplanets using the transit method since its launch in 2009.

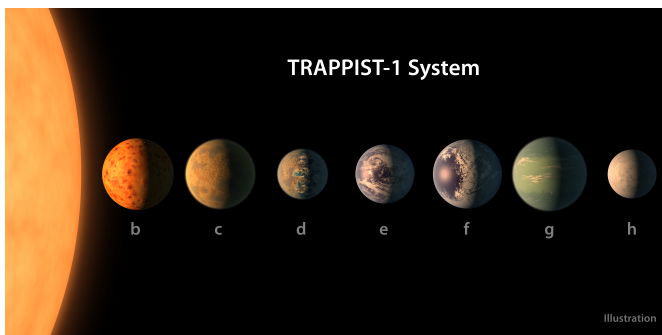
NASA's Spitzer Space Telescope recently discovered seven Earth-size planets around the nearby TRAPPIST-1 star 40 light-years away by combining transit data with other observations from ground-based telescopes. Scientists were able to determine the size, mass, and distance from the star for these planets, and were able to show that three of them are firmly in the habitable zone, where the temperature allows for the possibility of liquid water on the surface.

The Search for Exoplanets

It may surprise you to learn that NASA observes eclipses, of a sort, in planetary systems outside our own! When a planet around a distant star passes between that star and Earth, it blocks out a tiny bit of light, resulting in a mini-eclipse. This event, called a transit, can be observed all the way from Earth.

Transits are one of the ways scientists search for exoplanets, and in fact, most exoplanets known today were discovered using this method. Observing a transit requires that the planet's orbit around its star passes through our line of sight to the star. It also favors large planets orbiting close to their stars, as this configuration is more likely to yield a transit and it causes the largest and most noticeable drops in light.

Several NASA missions have observed exoplanet transits, including Kepler, the Spitzer Space Telescope, and the Hubble Space Telescope. For more information on NASA's search for exoplanets, go to: exoplanets.nasa.gov



An Artist's illustration of the seven Earth-sized worlds of the Trappist-1 system



NASA's Future Plans for Studying Transits

NASA has several plans for using transits to study exoplanets in the future. The upcoming Transiting Exoplanet Survey Satellite (TESS) planned for launch in 2018 will specifically search for transiting exoplanets around nearby bright stars. It plans to monitor 200,000 nearby stars for planets.



Artist's illustration of NASA's Transiting Exoplanet Survey Satellite (TESS)

Exploring exoplanets is one of the primary science goals of the James Webb Space Telescope, launching in 2018. Webb will study many phases in the history of our universe, including the formation of solar systems capable of supporting life on planets similar to Earth, as well as the evolution of our own solar system. It is targeted to launch from French Guiana aboard an Ariane 5 rocket in 2018. Webb is an international project led by NASA with its partners, ESA (European Space Agency) and the Canadian Space Agency.

The exquisite sensitivity of Webb will allow scientists to look for chemical fingerprints in exoplanet atmospheres and search for possible life-bearing environments containing oxygen, methane, and water.



The primary mirror of the James Webb Space Telescope during testing at NASA's Goddard Space Flight Center



ADDITIONAL RESOURCES:

NASA Exoplanets Program: exoplanets.nasa.gov

NASA Eclipse Transit Page: eclipse2017.nasa.gov/transits-and-occultations

Eclipse 2017 Home Page: eclipse2017.nasa.gov