

ASTROPHYSICS

Closer to Home

A new mission propels detailed investigations of exoplanets

NASA's Kepler mission has been a smash hit. It has discovered thousands of probable exoplanets—worlds orbiting stars other than the sun—more than 100 of which have already been vetted and confirmed. Many of those planets are among the most nearly Earth-size planets known: of the 25 smallest-diameter exoplanets discovered to date, all but one were spotted by Kepler. There is just one asterisk tacked to Kepler's immensely productive haul: the planets are hundreds or even thousands of light-years away, too distant to investigate in any detail.

Enter TESS, the Transiting Exoplanet Survey Satellite, which NASA has green-lit for a 2017 launch at a cost of \$200 million. TESS will survey a much larger swath of sky than its predecessor to uncover a new population of nearby exoplanets that scientists can scan with forthcoming telescopes. "Altogether we'll examine about half a million stars," says TESS principal investigator George R. Ricker, a Massachusetts Institute of Technology astrophysicist. Thousands of those stars are within 100 light-years of the solar system.

Like Kepler and the European CoRoT satellite before it, TESS will search for planetary transits: brief dimmings of starlight, occurring at regular intervals, that betray the shadowing presence of an unseen exoplanet. Ricker estimates that TESS may discover some 500 to 700 planets that are Earth-size or a few times larger, of which a handful will be potentially habitable.

Around the time that TESS compiles a list of nearby exoplanets at the end of its two-year baseline mission, astronomers may have a powerful new eye in the sky to examine the newfound worlds in detail. NASA's James Webb Space Telescope (JWST), currently slated to launch in 2018, should be able to tease out the signatures of certain molecules in the atmospheres of nearby planets. Ultimately, those kinds of chemical signatures could be used to infer the presence of extraterrestrial life on a planet. By simulating the observing power of the JWST trained on a nearby, possibly habitable planet, "we can almost see biogenic signatures, but not quite," Ricker says. "That could well take a next-generation space instrument to do that."

Regardless, if TESS can indeed locate hundreds of nearby planets, astronomers will have their hands full for the foreseeable future—finding out what those planets are like and what kinds of habitats they might support and, just maybe, flinging some future probe toward one enticing-looking world.

—John Matson



Artist's conception of TESS

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About Jason Gibson:
Jason has earned advanced degrees in Engineering and Physics, worked as a Rocket Scientist for NASA, and has a passion for teaching Science and Math!

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