



# The Transiting Exoplanet Survey Satellite (TESS) Mission

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# Outline

Warmup: [video](#) of April 18, 2018, launch

Background: TESS's relationship to its predecessor (Kepler and K2)— observing transits to detect exoplanets

About TESS: the satellite and its mission; its orbit; progress so far

TESS Follow-up Program

Wrap-up

# *The Kepler Mission*

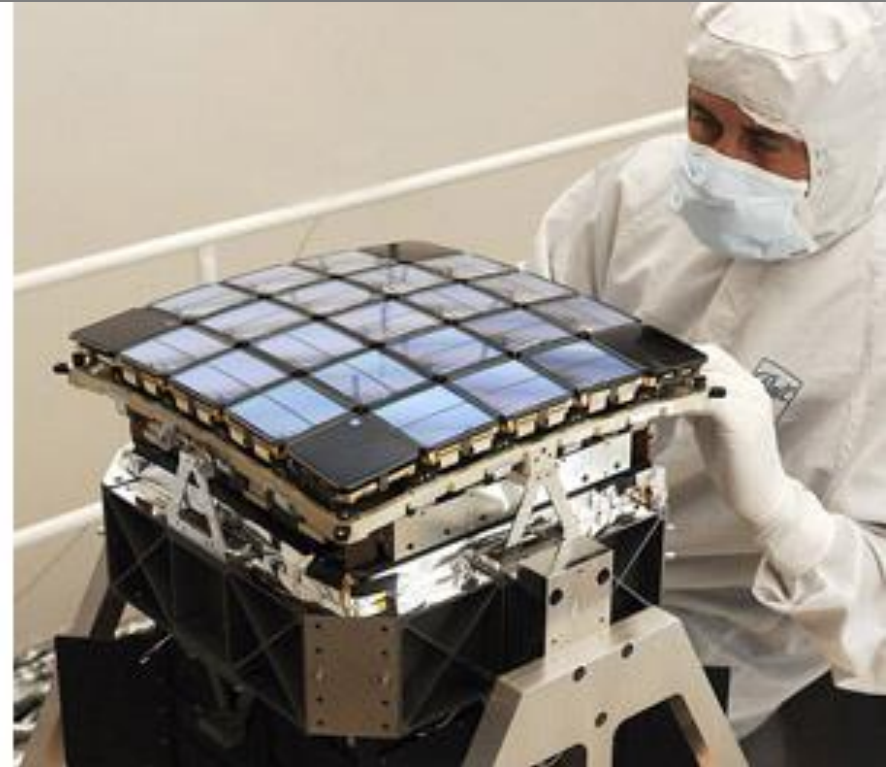
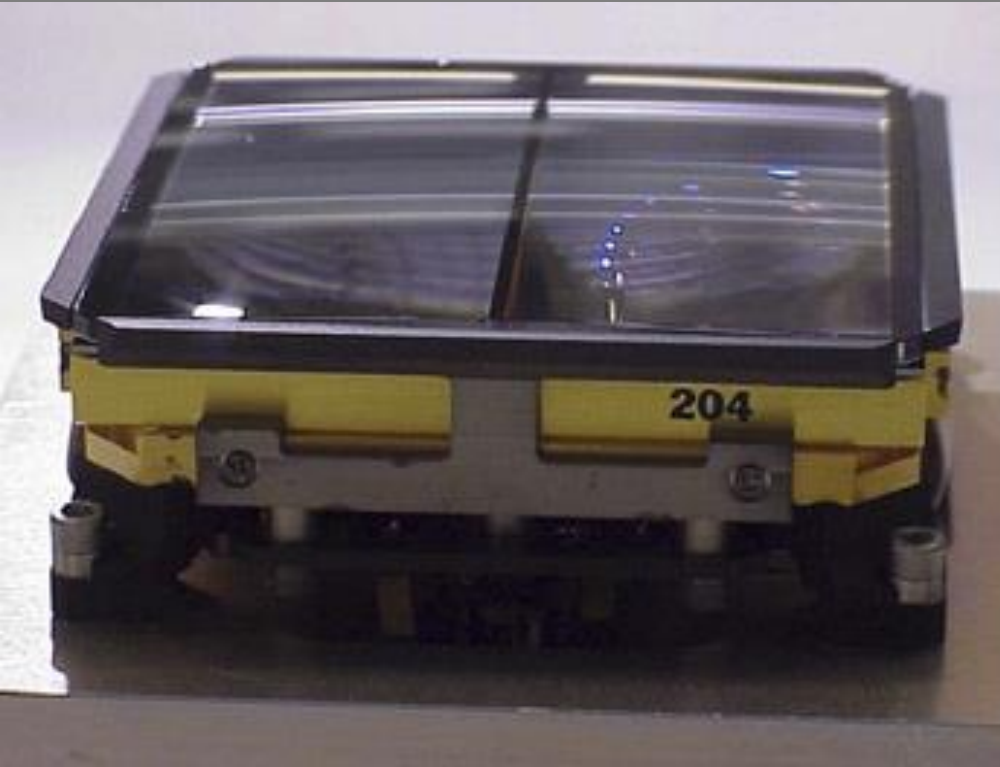


NASA Discovery Mission # 10 “Are there other planets, orbiting other stars, with characteristics similar to Earth?”

“The Kepler mission will challenge thousands of stars to a staring contest, you know, like the ones you used to have with your siblings when you were younger, and that you have with the cat every once in awhile?”

— Davin Flateau, 365 Days of Astronomy podcast, March 1, 2009

# Kepler CCD Array

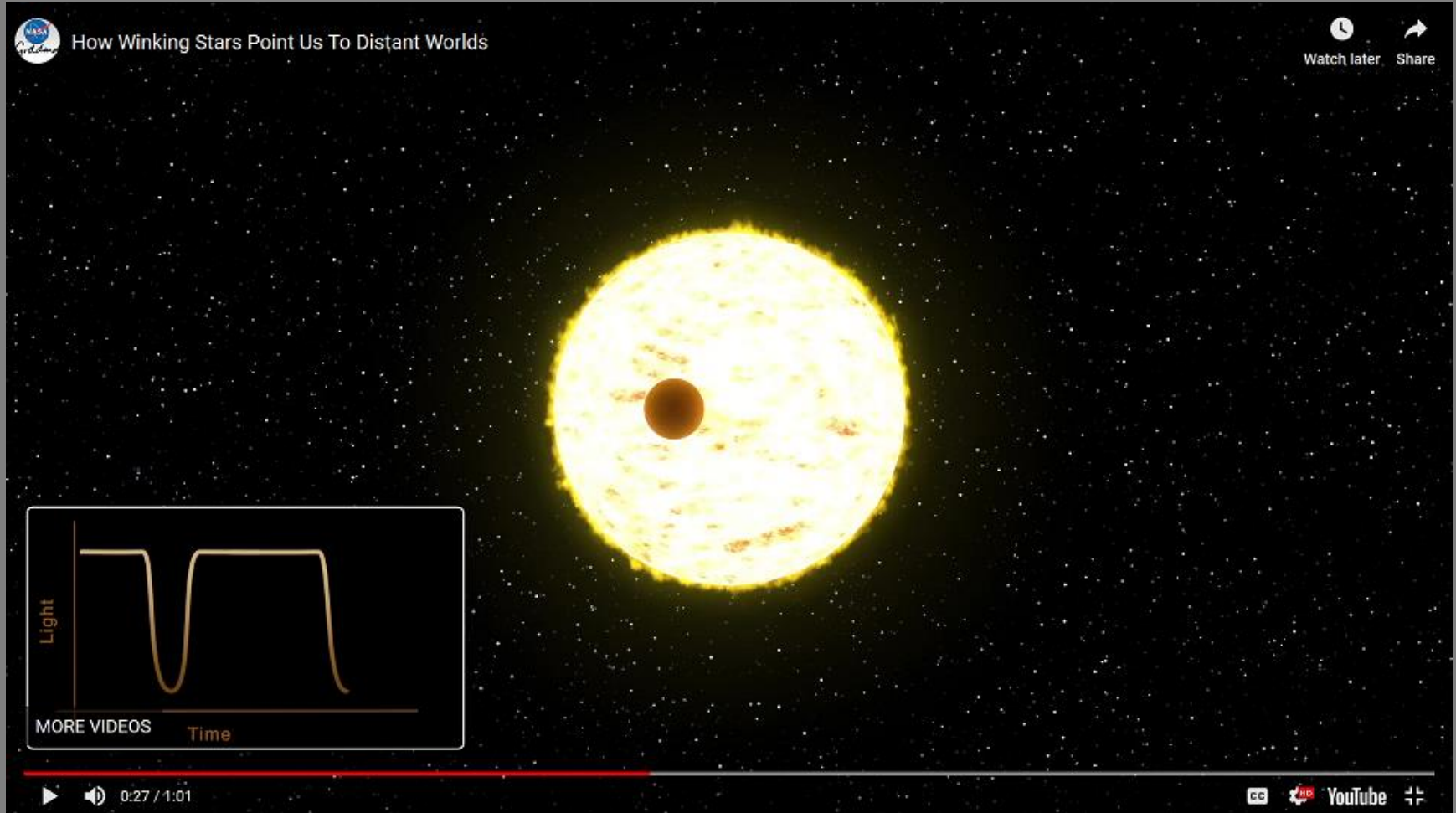


24 pairs of CCD elements, each 2,200 by 1,024 pixels, for 95 megapixels total —30 pixels for each target star

Covers 15-degree wide field of view in Cygnus and Lyra

Square arrangement can turn 90 degrees each quarter

# Detecting Planets by Transits



The image shows a YouTube video player interface. The video content features a large, bright yellow star with a smaller, dark brown planet passing in front of it, creating a transit. The background is a dark space filled with numerous small white stars. In the bottom-left corner of the video frame, there is an inset graph with a white border. The vertical axis is labeled 'Light' and the horizontal axis is labeled 'Time'. The graph shows a flat line at a high level, which then drops sharply to a lower level, stays flat for a short duration, and then rises sharply back to the original high level. Below the graph, the text 'MORE VIDEOS' is visible. The video player's control bar at the bottom includes a play button, a volume icon, a progress bar showing '0:27 / 1:01', and the YouTube logo.

NASA  
How Winking Stars Point Us To Distant Worlds

Watch later Share

Light

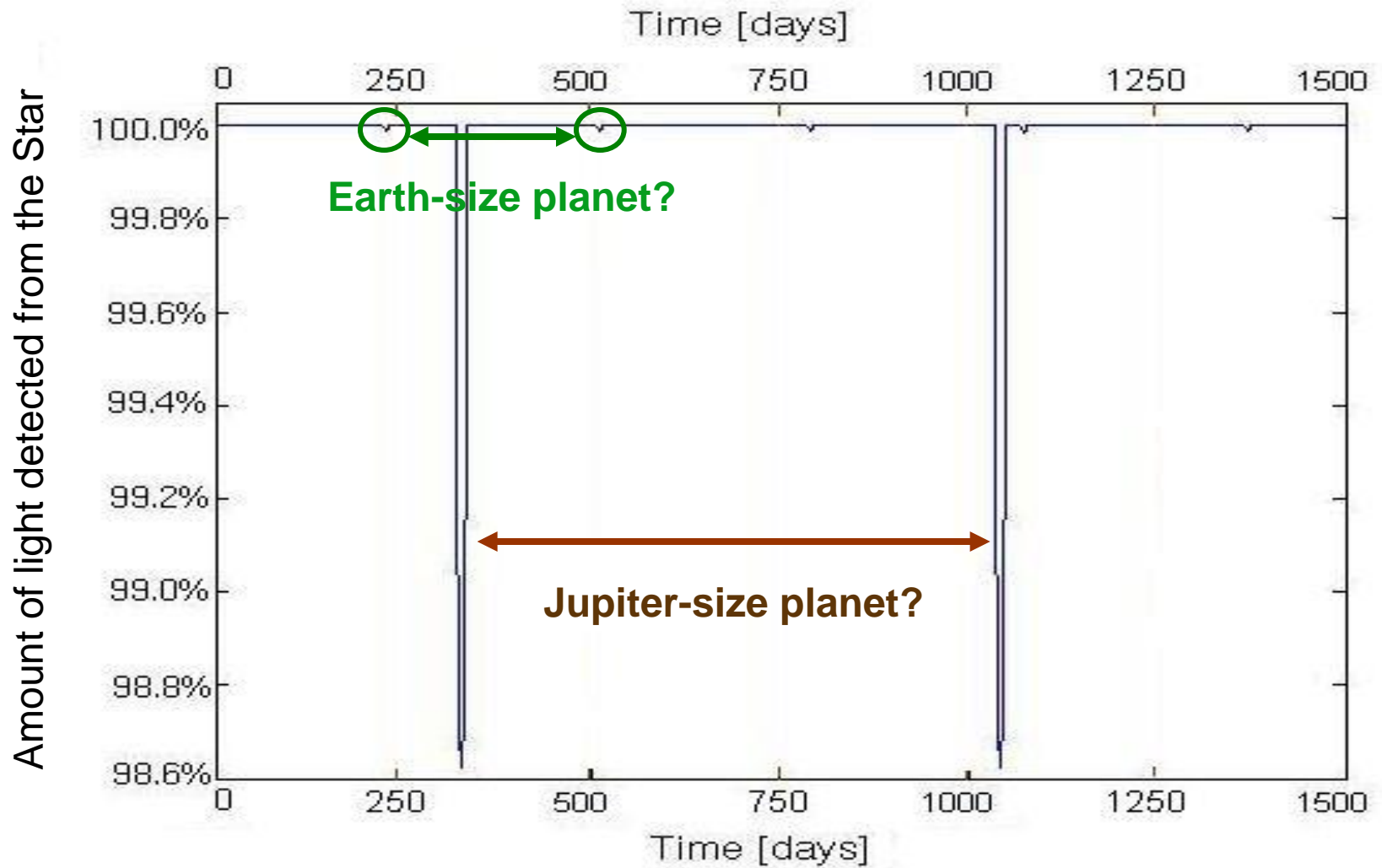
Time

MORE VIDEOS

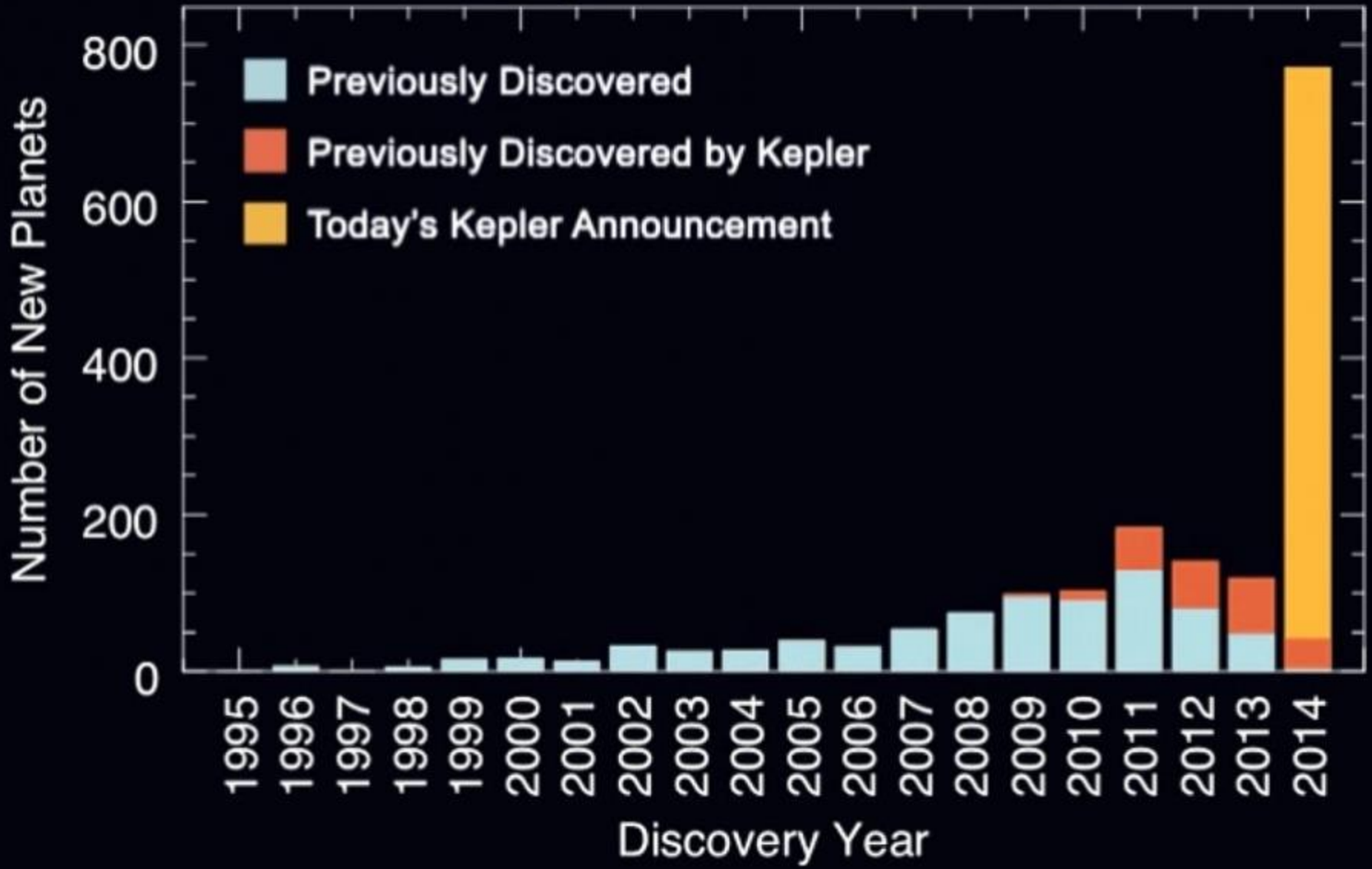
0:27 / 1:01

YouTube

Source NASA [video](#)

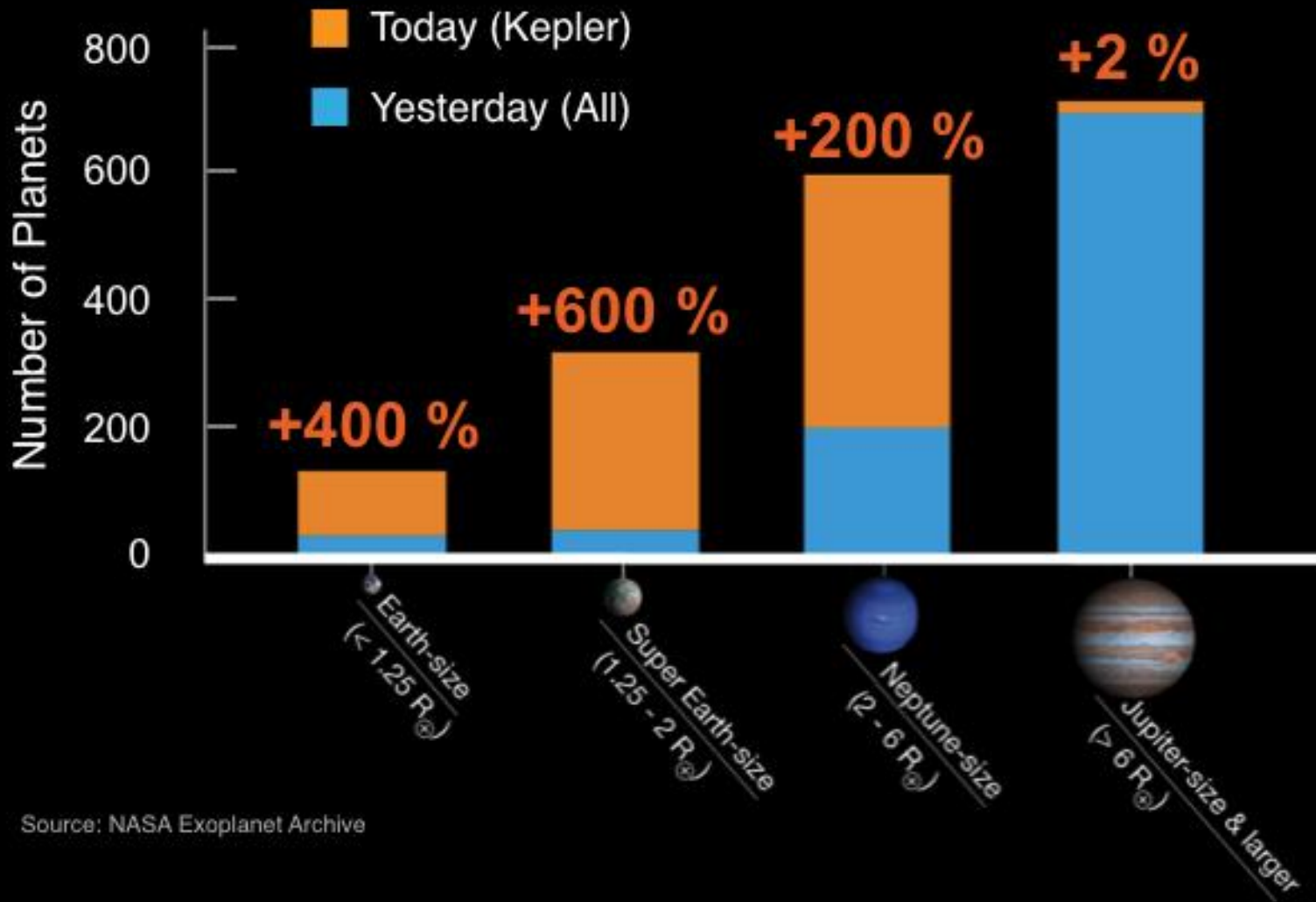


# Exoplanet Discoveries



# Sizes of Known Exoplanets

As of February 26, 2014



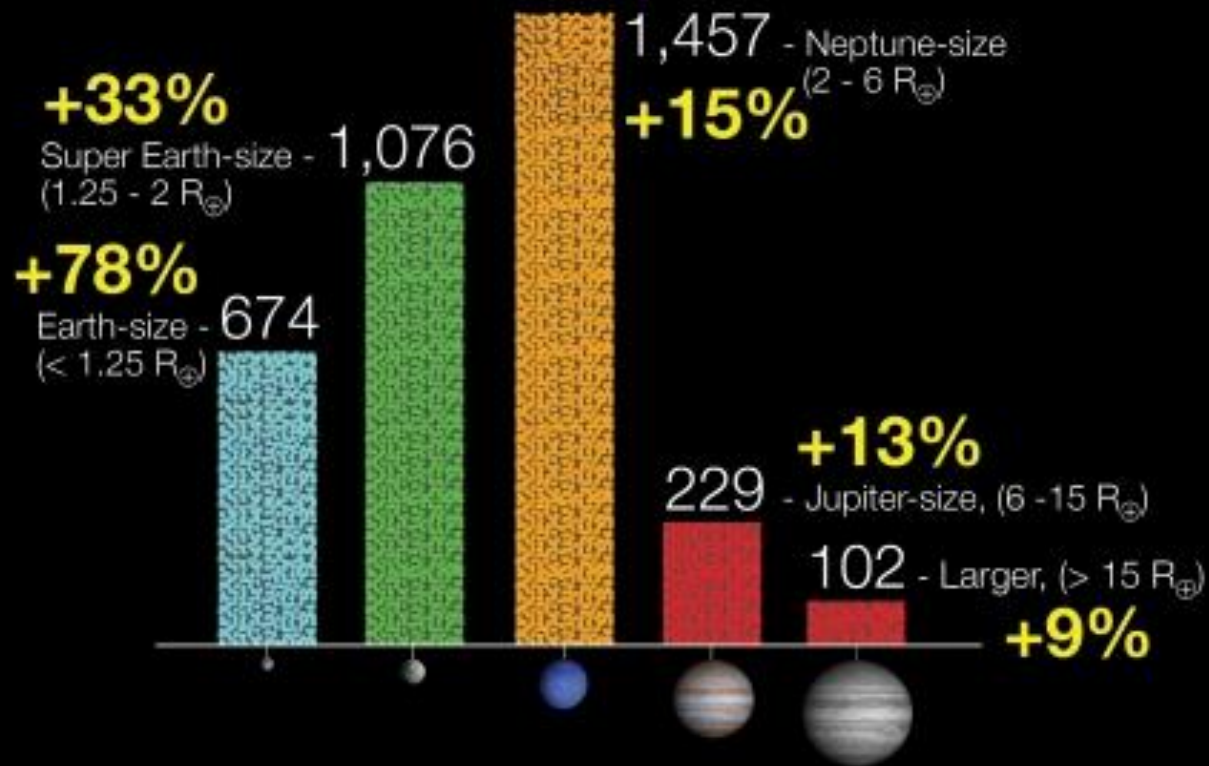
Source: NASA Exoplanet Archive



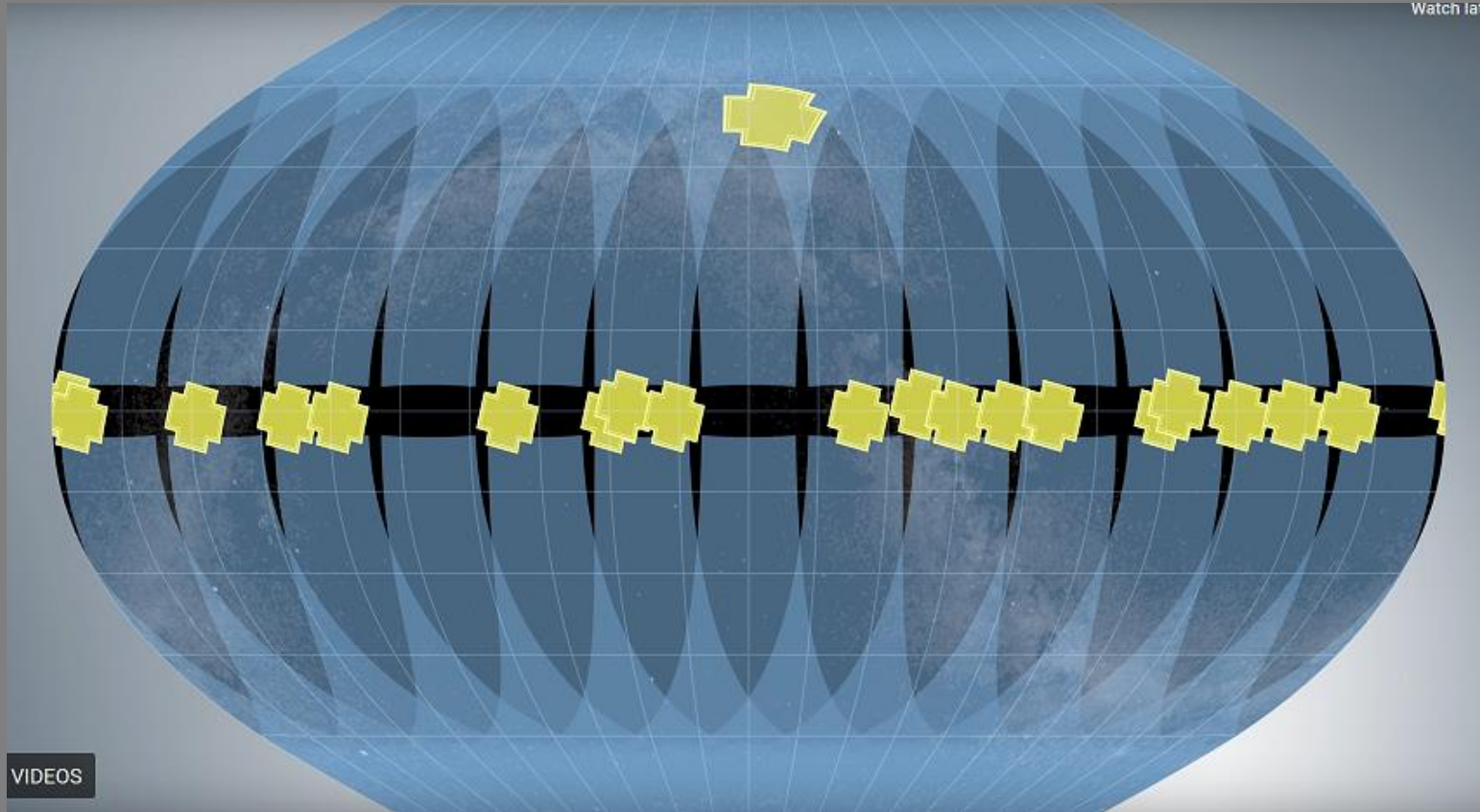
# Candidate Planet Sizes

## Sizes of Planet Candidates

Totals as of November, 2013

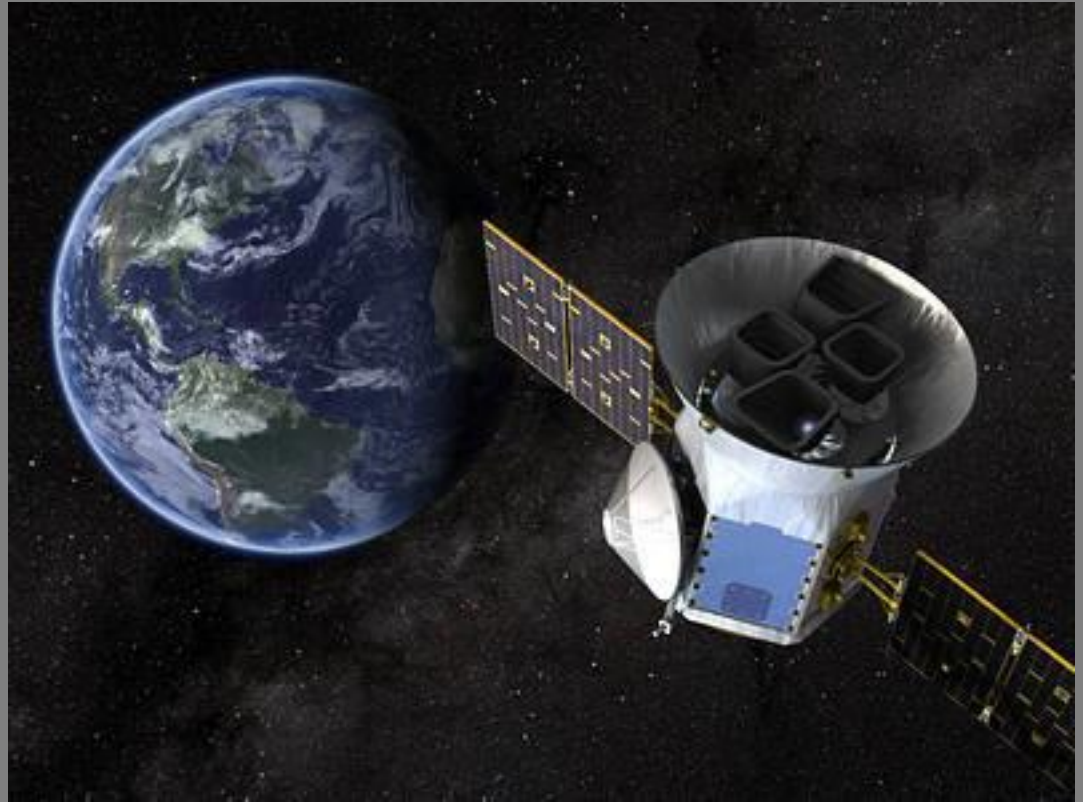


# *TESS to Cover 350 Times More of the Sky Than Kepler and K2*

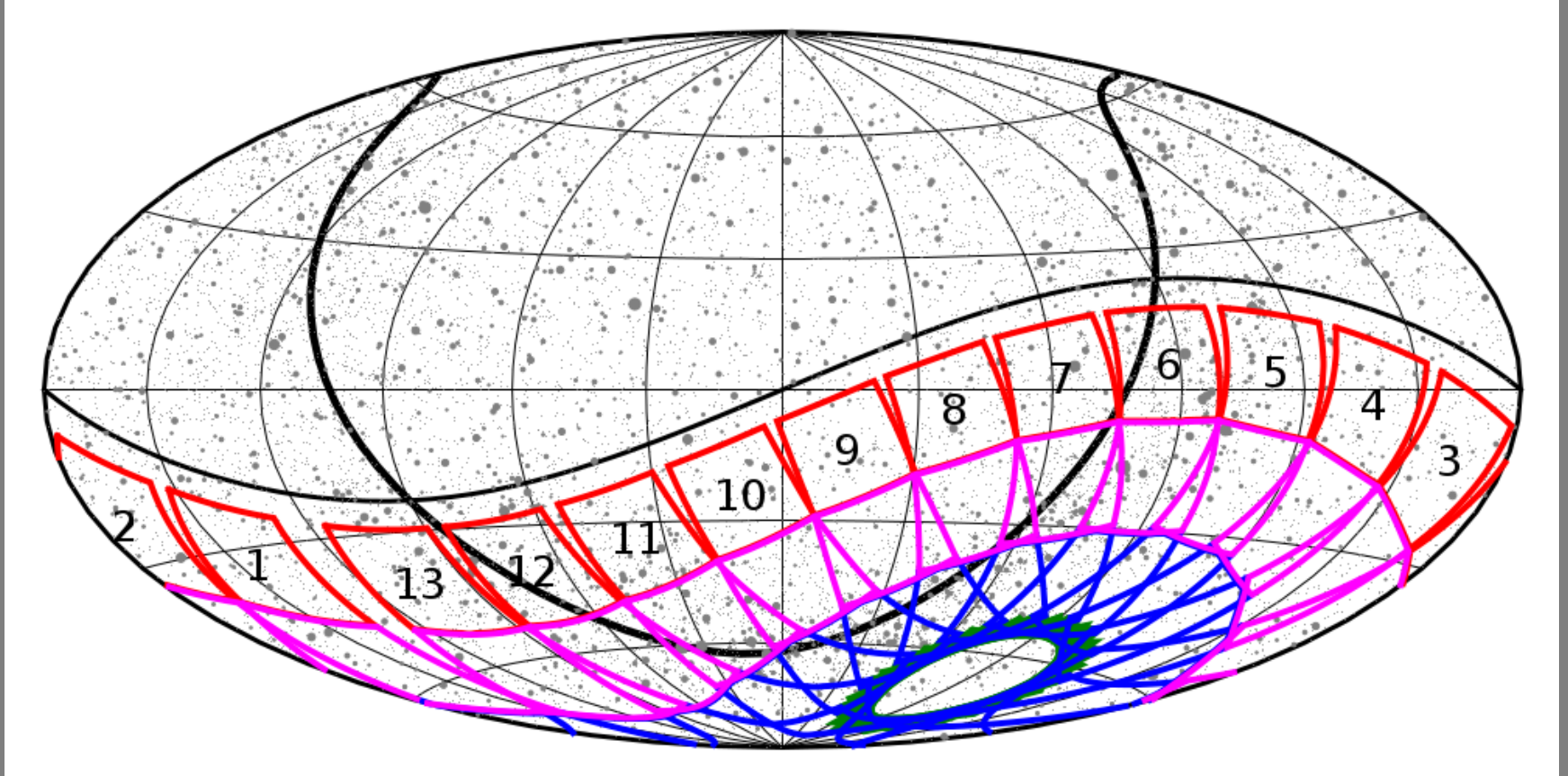


Source: NASA [video](#)

# *TESS Satellite With Its Four Cameras*

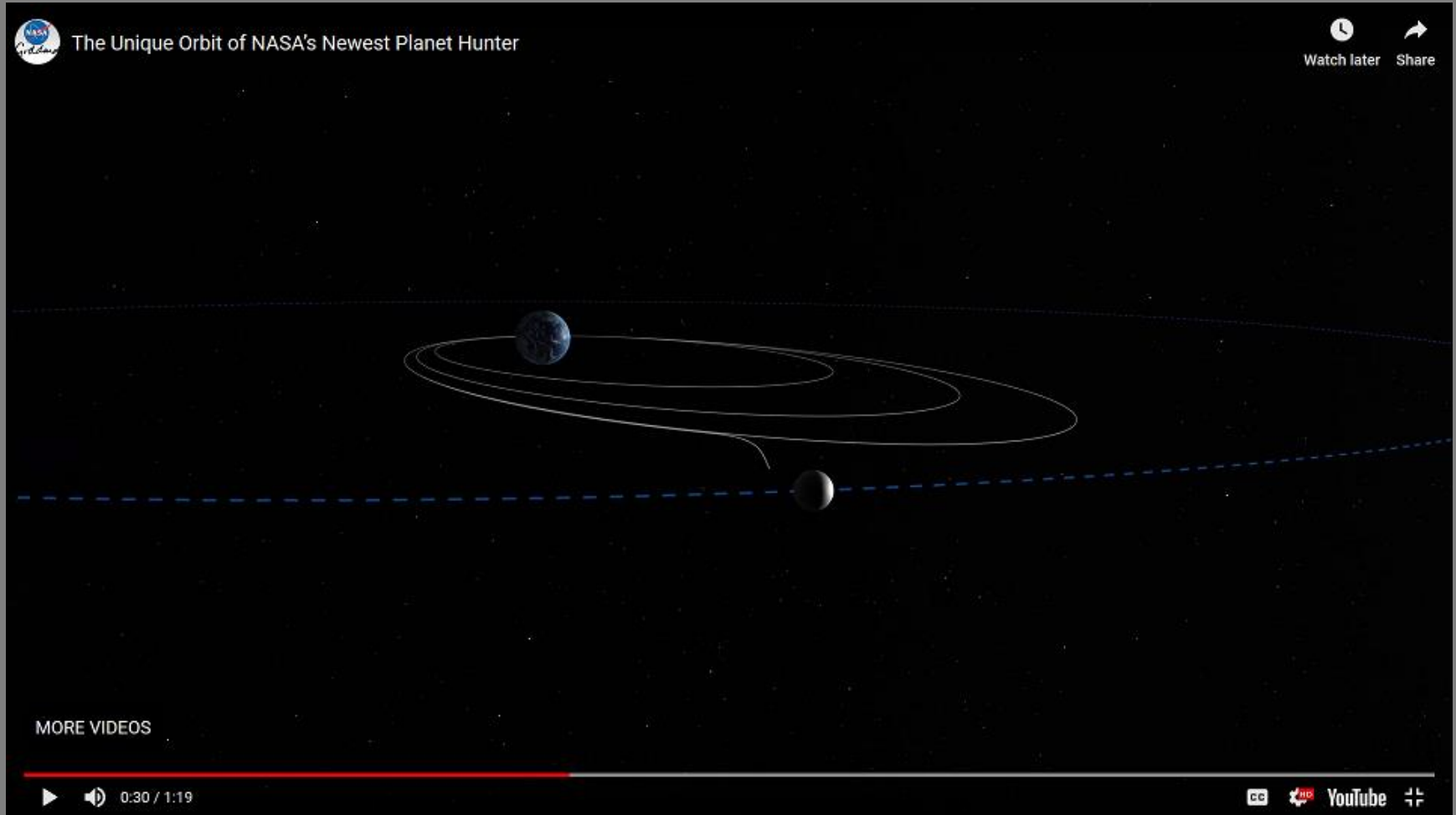


# Map of TESS Sectors Covered in the First Year



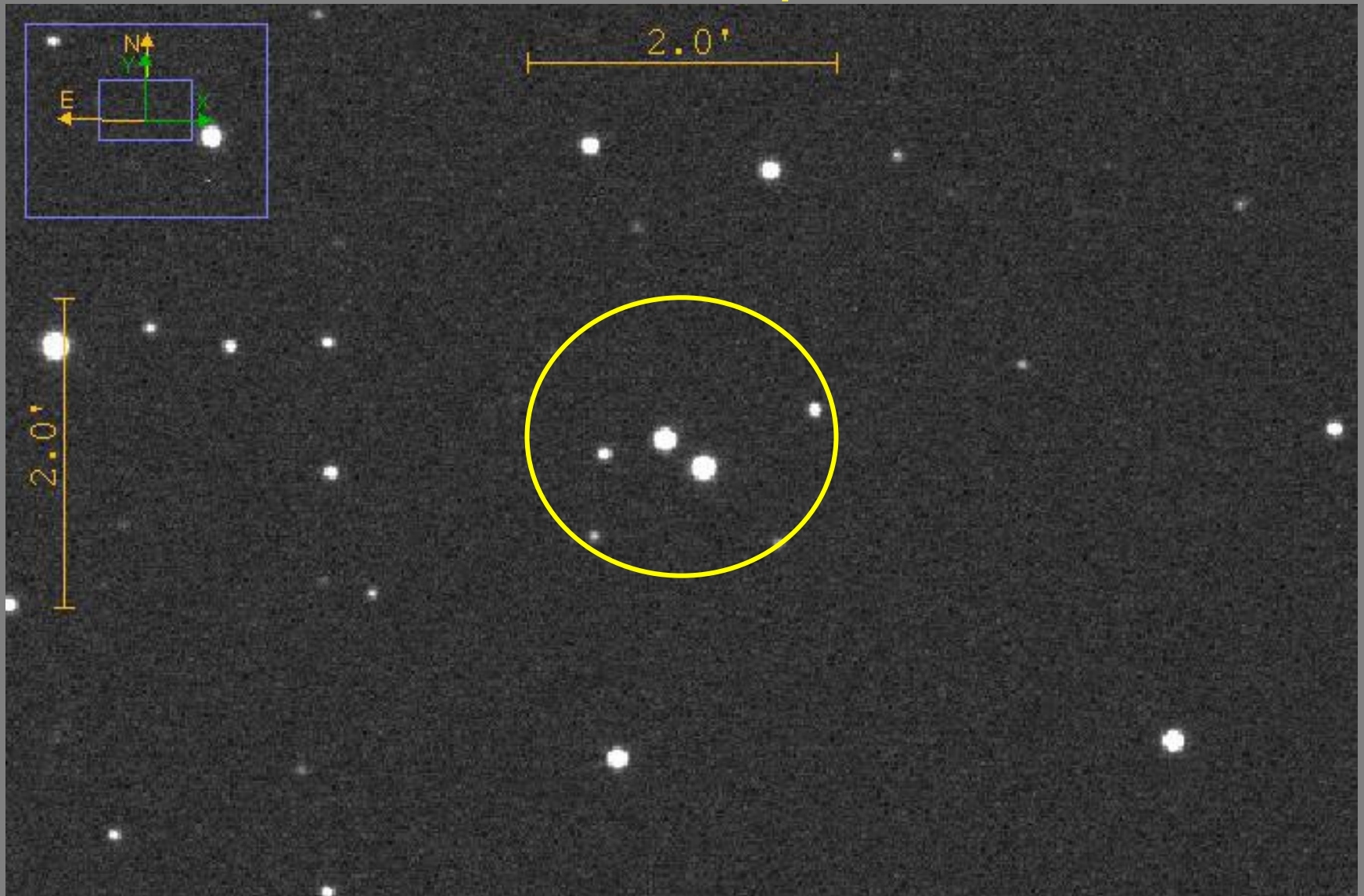
Source: MIT TESS Website [image](#)

# *TESS Orbit and How It Got There*



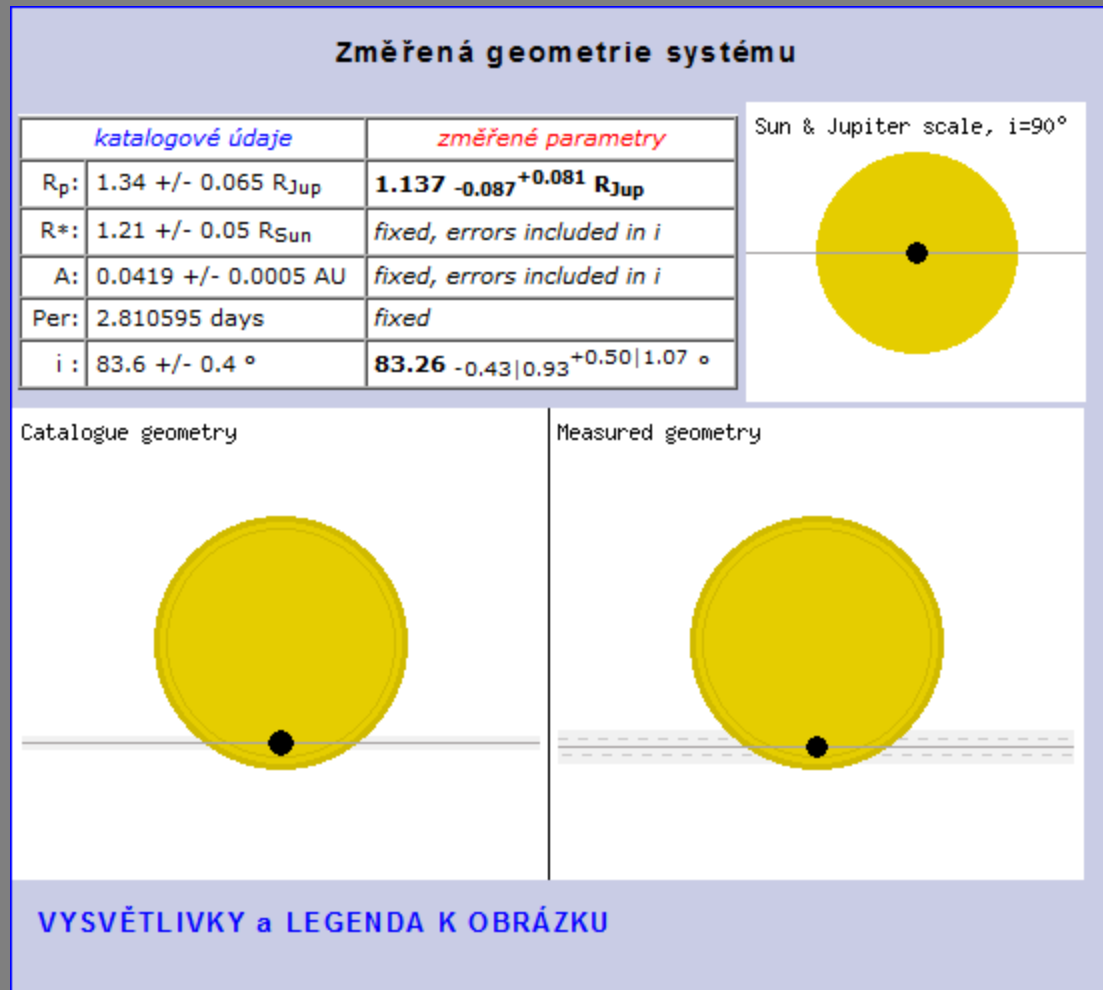
Source: NASA [video](#)

# *Blending of Stars in Typical TESS Photometric Aperture*

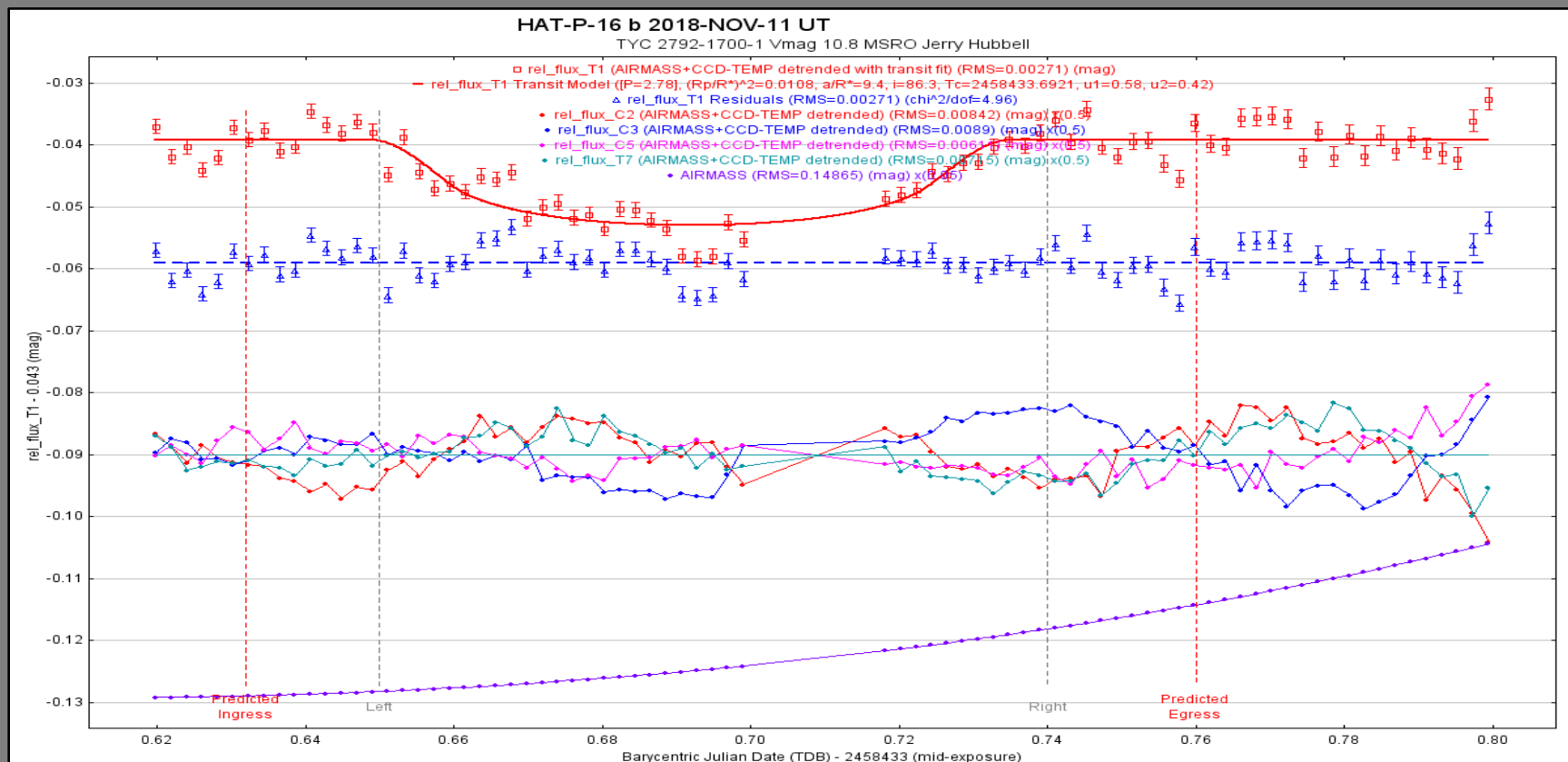


Source: Dennis Conti: [2018 NEIAC Presentation](#)

# Follow-Up Photometry of Transits Helps Determine Parameters of the Exoplanet System



# Sample Exoplanet Transit Observation From the Mark Slade Remote Observatory



Observation by Jerry Hubbell



# Wrap-Up



Source NASA video <https://youtu.be/RnhKBdDanFw>

# Resources

NASA TESS Mission website: <https://www.nasa.gov/tess-transiting-exoplanet-survey-satellite>

MIT TESS Website: <https://tess.mit.edu/>

Barbara Mikulski Archive for Space Telescopes (MAST) repository for TESS data: <https://archive.stsci.edu/tess/index.html#searchtools> (data alerts page lists data currently available <https://archive.stsci.edu/prepds/tess-data-alerts/index.html>)

TESS Follow-up Program presentation by Dennis Conti at 2018 NEIAC: <http://astrodennis.com/NEAIC2018TESSpresentation.pdf>

Dennis Conti's website on amateur exoplanet observing: <http://astrodennis.com/>