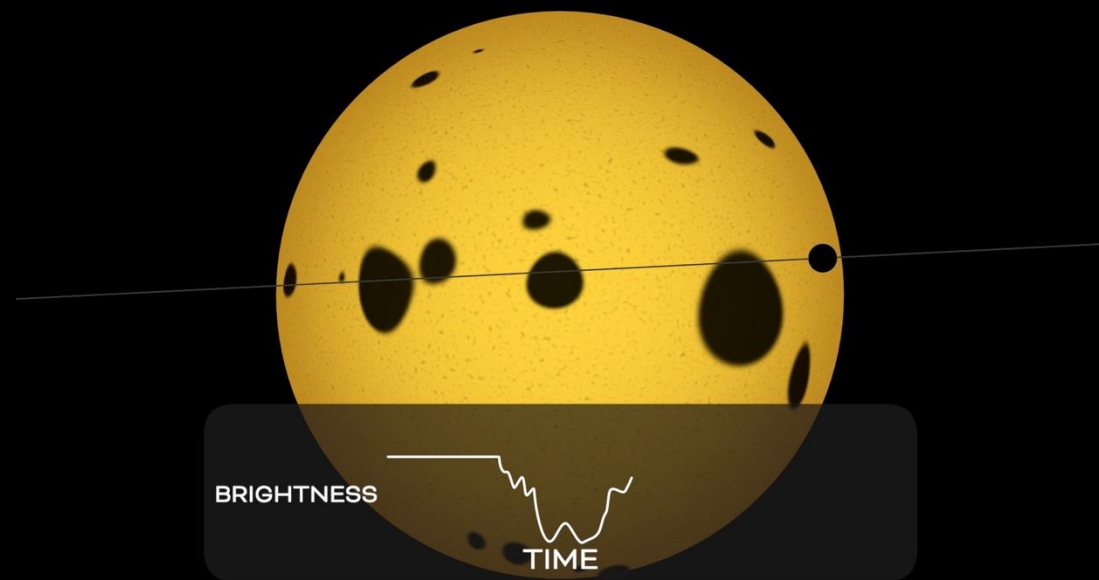


# Astronomers Map Stellar ‘Polka Dots’ Using NASA’s TESS, Kepler

Scientists have devised a new method for mapping the spottiness of distant stars by using observations from NASA missions of orbiting planets crossing their stars’ faces. The model builds on a technique researchers have used for decades to study star spots and uses data from NASA’s TESS and Kepler missions.

By improving astronomers’ understanding of spotty stars, the new model — called StarryStarryProcess — can help discover more about planetary atmospheres and potential habitability using data from telescopes like NASA’s upcoming Pandora mission.

Our Sun’s total number of star spots varies as it goes through its 11-year solar cycle. Scientists use them to determine and predict the progress of that cycle as well as outbreaks of solar activity that could affect us here on Earth. Improving our knowledge of stellar activity on other stars can help advance our understanding of the Sun.



This artist’s concept shows the light curve, or graph of brightness over time, for a star with an orbiting planet and several star spots. Watch the video on [YouTube](#). Credit: NASA’s Goddard Space Flight Center

Paper: <https://iopscience.iop.org/article/10.3847/1538-4357/adf6be>

Story: <https://science.nasa.gov/missions/teess/astronomers-map-stellar-polka-dots-using-nasas-teess-kepler>

- Asteroids can threaten Earth, communication satellites, and astronauts, although collisions are rare. They're most dangerous when we don't know about them, and even when identified, redirection efforts may fail if the objects are an unusual shape or made up of multiple pieces. Radar technology can only study asteroids close to Earth. TESS can monitor and capture observations on many objects at once out to large distances, determining their spin and refining their shape. By building a better picture of asteroids in general, we better prepare ourselves to address them if they become hazardous.
- TESS's large dataset is a prime resource for developing AI and machine learning models. TESS provides information on tens of millions of stars, so scientists use AI methods to help find extremely rare signals that point to interesting stars and planets. These methods of signal processing can be widely applied beyond TESS to find "needles in haystacks". For example, scientists at NASA Goddard are advancing new machine learning techniques to find asteroids in TESS data. Machine learning models like these have wide applications, including in industry.

# More About TESS



Artist's concept of the TESS spacecraft. Credit: NASA's Goddard Space Flight Center