

Temperate rocky worlds revealed by TESS

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Abstract

After a full year of operation, the MIT-led NASA space mission TESS has demonstrated ultra-precise photometric performances and has revealed several hundreds of new transiting planetary candidates. A fraction of them correspond to temperate rocky exoplanets and are intensively observed with high-precision radial velocity spectrographs in order to derive their masses and densities.

1. TESS space mission

The Transiting Exoplanet Survey Satellite (TESS) was successfully launched on April 2018. With four identical wide-field cameras TESS monitors 24 x 90 degrees strips of the sky every 27 days. TESS tiled most of the southern hemisphere sky during its first year of operation and revealed several hundreds of new transiting planetary candidates covering a wide space of parameters.

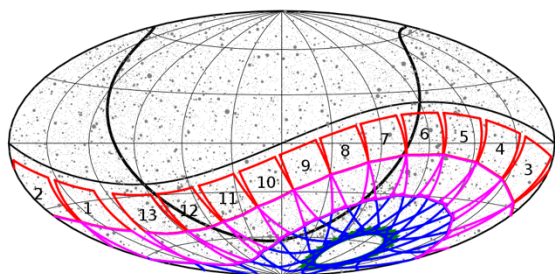


Fig. 1: Map of the TESS sectors for the first year of observation in celestial coordinates

2. Temperate rocky candidates

Among the TESS candidates, a small fraction corresponds to temperate rocky exoplanets with radii below 2 R_{Earth} and stellar irradiation less than 10 times the Earth. Most of them are orbiting M dwarfs. The expected extension of the mission will enable to significantly increase this population.

3. Ground-based follow-up for mass determination

Ground-based follow-up campaigns using high-precision spectrographs are underway to measure masses of TESS transiting planets. The new highly-stabilized and high-resolution spectrograph ESPRESSO, in operation at ESO/VLT since September 2018, represents a breakthrough in this field and allows a thorough exploration of the rocky world population with radii below 2 R_{Earth} detected by TESS. The near-infrared spectrograph NIRPS will soon join HARPS on the ESO 3.6-m telescope and play a crucial role in the monitoring and characterization of TESS exoplanets transiting M-dwarfs.