


Minerva-Australis: Summary and Update

A futuristic landscape with a large, dark, textured planet in the foreground and a smaller, blue-tinted planet or moon in the sky. The sky is filled with stars and several bright, glowing blue light sources. The ground is a dark, rocky terrain with some low mountains in the distance.

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What is Minerva-Australis?

The TMT: “Totally My Telescope”

- Isaac Wittenmyer, age 10



- 4 x 0.7m telescopes with stabilized R~80,000 spectrograph
- Built for TESS follow-up and mass measurements
- 100% dedicated to this science, fully robotic ops
- 600 hours per year open to NOIRLab calls through at least 2023B

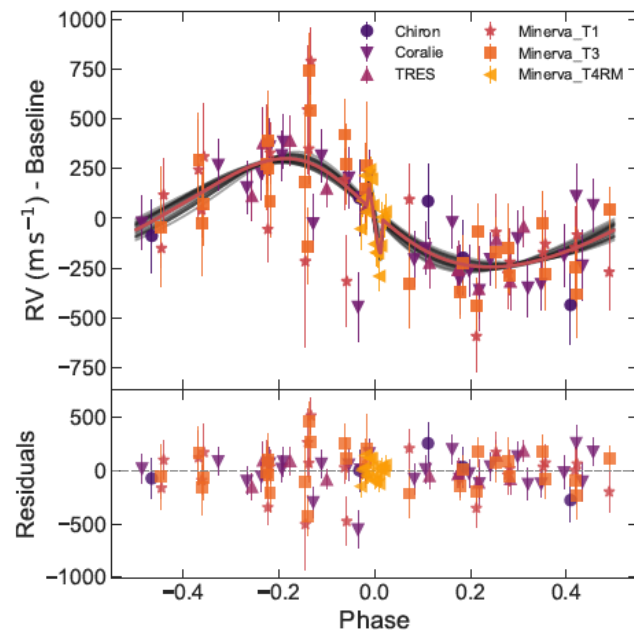


What we can do

RVs for $V < 11$ targets



- With enough photons, we can do 2-3 m/s. But the universe is cruel and our telescopes are small.
- We are running out of stars bright enough to get “good” RVs.
- Best-match science cases: Surveys and recon that can make use of ~ 5 m/s RVs, e.g. the TESS Grand Unified HJ Survey (Sam Yee) and the “Cargo Ship” FFI giant planets (Joey Rodriguez)
- TOI-778: Where angels fear to tread ($V_{\text{rot}} \sim 30$)



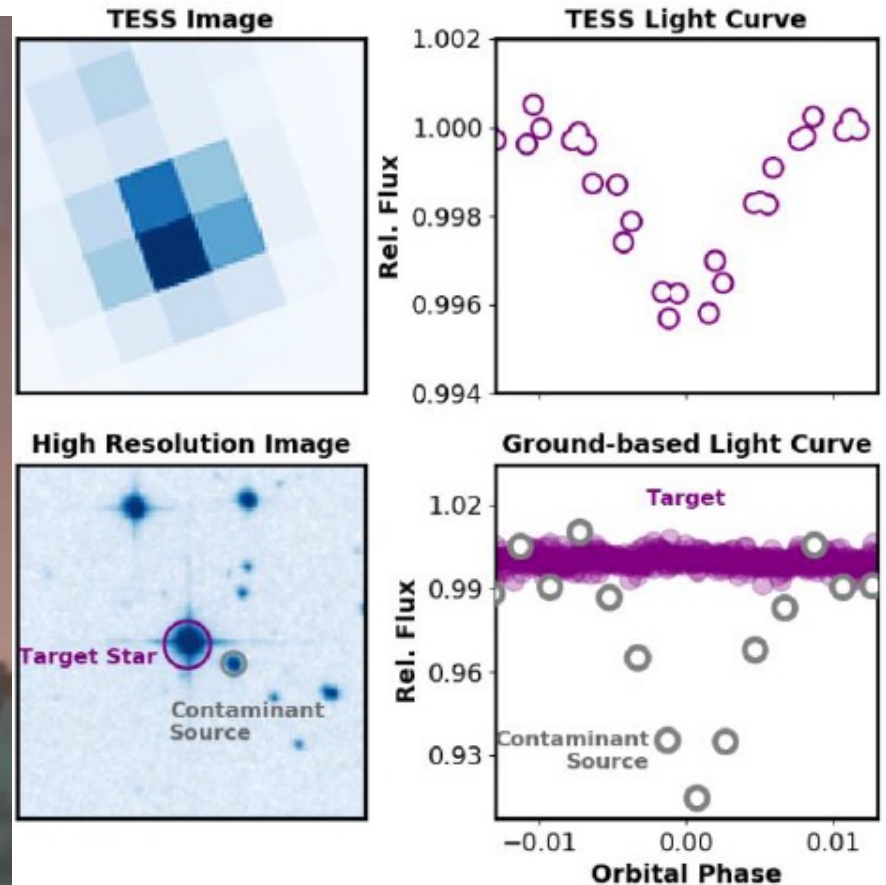
Clark+ 2023

Beyond masses

Adding photometric capability

TESS is finding loads of small planet candidates (good!)

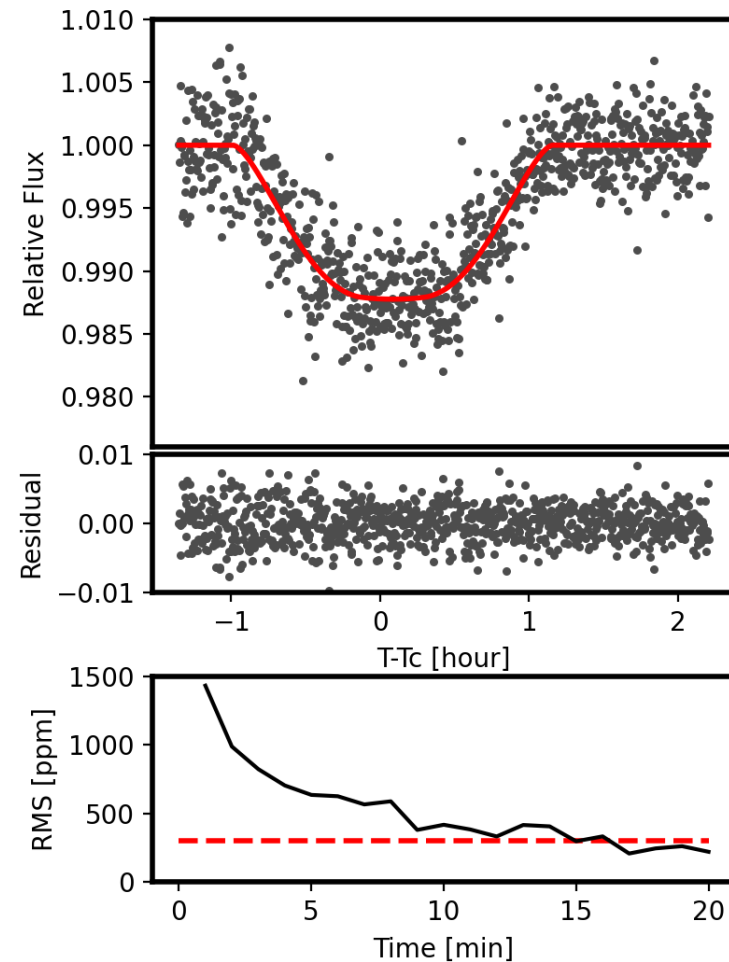
But they are difficult and expensive to



Proof it works!



- WASP-16b transit, single MINERVA telescope.
- Bins as white noise to <400 ppm in 15 min.
- So all 4 telescopes together could do 200 ppm.
- This is enough to validate rocky planet candidates $\sim 2 R_{\text{earth}}$.

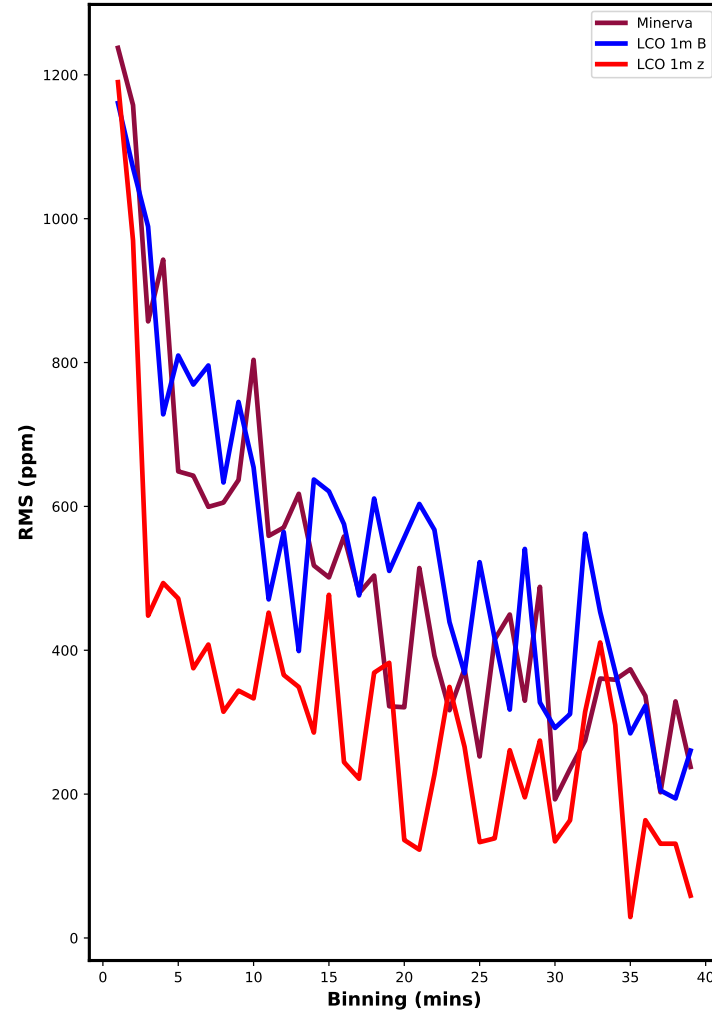
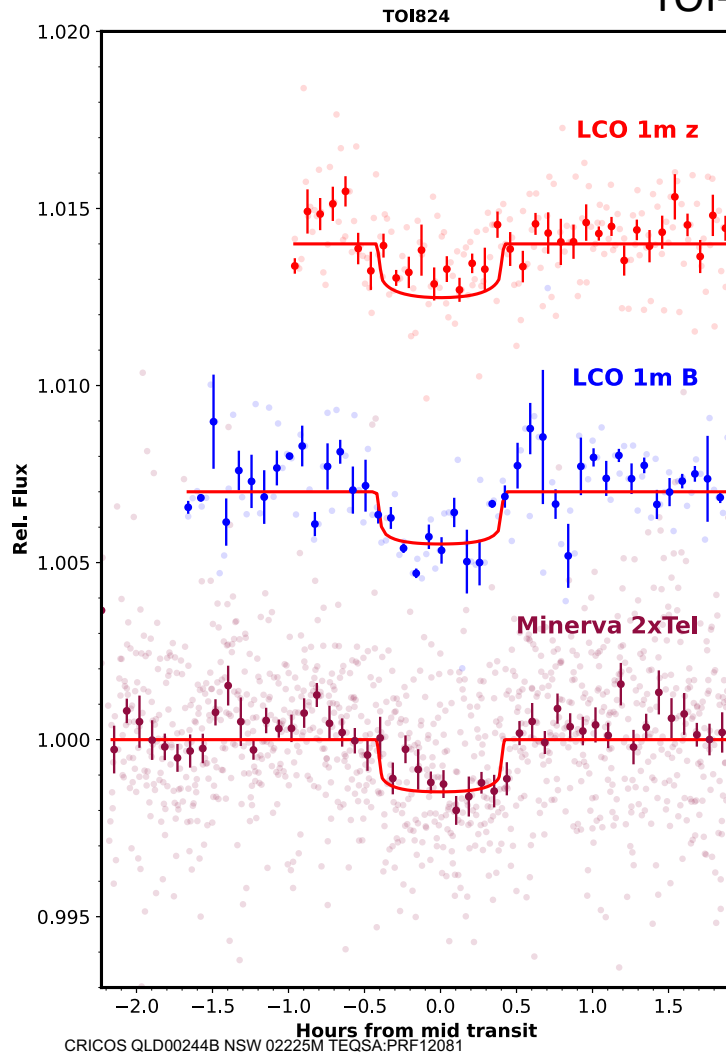


Two-telescope tests

We do as well as LCO 1-metre



TOI-824b, hot Neptune orbiting a K dwarf



Dream not of today



- I built my Minerva for TESS RV follow-up. 30+ planets so far!
- Advantage: Flexible scheduling
- (P)RV capacity best now for survey and recon.
- Photometric ability now available from 23A, multiple telescopes.