

# Comparison Stars and Photometry for TrES-3b

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## The mid-transit time for TrES-3b was determined after elimination of inconsistent comp stars.



Figure 1: Starfield depicting TrES-3b (circled in red) and 9 comp stars identified by the AAVSO VSP (labeled with V magnitude \* 10). Image scale is 0.569 arcsec/pixel.

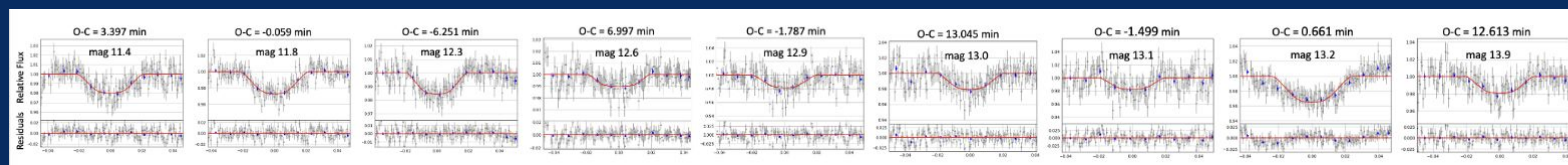


Figure 2: Light curves produced by EXOTIC for each of 9 comp stars, labeled with O-C mid-transit time and (unique) comp star magnitude.

Comp Star	EXOTIC O-C (min)	Source Extractor O-C (min)	O-C Discrepancy (min)
114	3.40	0.10	3.30
118	-0.06	-0.03	0.03
123	-6.25	-1.47	4.78
126	7.00	8.59	1.59
129	-1.79	-1.89	0.10
130	13.04	2.29	10.75
131	-1.50	-1.59	0.09
132	0.66	-2.09	2.75
139	12.61	4.84	7.77

Table 1: O-C mid-transit times produced with each comp star using EXOTIC and source extractor photometry and O-C discrepancies.

Comp Star	B-V Color Difference	Comp Star	Reason for Elimination
114	0.25	114	Color differences
118	-0.13	118	Best Comp
123	-0.02	123	O-C discrepancy
126	0.19	126	Nearby star, color differences
129	0.22	129	Color differences
130	0.12	130	O-C discrepancy
131	0.14	131	Nearby star
132	0.23	132	Color differences
139	0.13	139	O-C discrepancy, proximity to target

Table 2: B-V color difference from target for each comp star.

Table 3: Reason for eliminating each problematic comp star.

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### References

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### Introduction

- Time-series images of TrES-3b taken from the Las Cumbres Observatory (LCO) Global Telescope Network were reduced with the Exoplanet Transit Interpretation Code (EXOTIC)
- The images were reduced using the comp stars identified by the AAVSO Variable Star Plotter circled in Figure 1, all of which produced visually clean light curves (shown in Figure 2) with mid-transit times varying by nearly 20 minutes

### Source Extractor

- Some comp stars were eliminated because of the inconsistencies in results between EXOTIC and source extractor photometry shown in Table 1
- Remaining mid-transit times varied by 9 minutes for EXOTIC and 11 minutes for source extractor

### Nearby Stars

- Comp stars whose apertures contained other stars were eliminated
- Remaining mid-transit times varied by 5 minutes for EXOTIC and 2 minutes for source extractor

### Color Differences

- Comp stars with B-V color difference from target greater than 0.15 were eliminated (see Table 2)

### Results

- The wide range of mid-transit times calculated with different comp stars highlights the importance and the difficulty of selecting comp stars
- The most reliable comp star was identified by considering consistency of results across photometric techniques, proximity to other stars, and color difference from target (see Table 3)