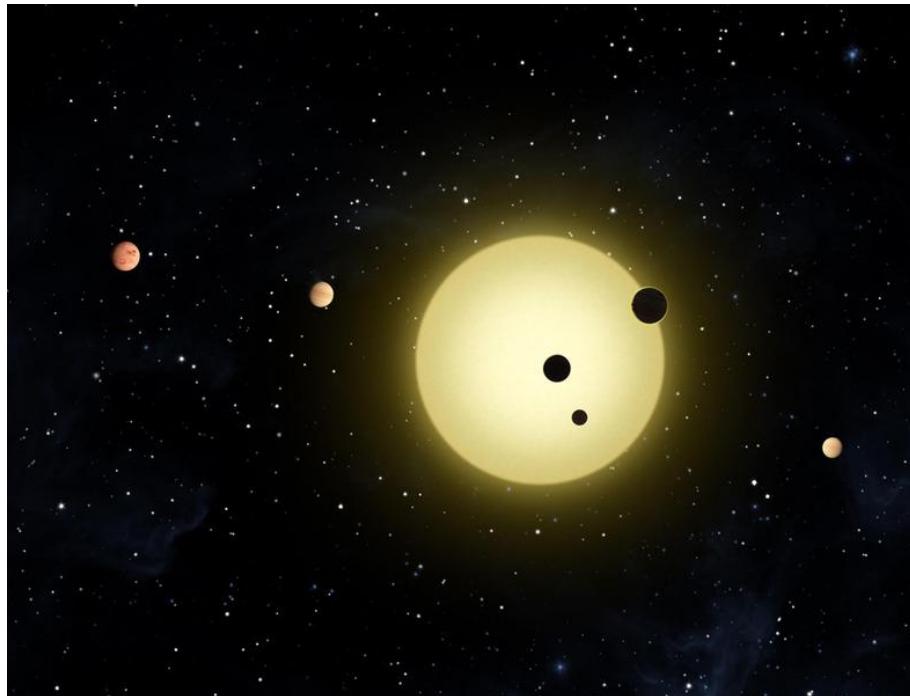


U.A.N.

Un anno di fotometria “Progetti futuri”



Antonio Marino



ExoClock a project to monitor
the ephemerides of transiting exoplanets by
the ARIEL Ephemerides Working Group



TESS Follow-up Observing
Program



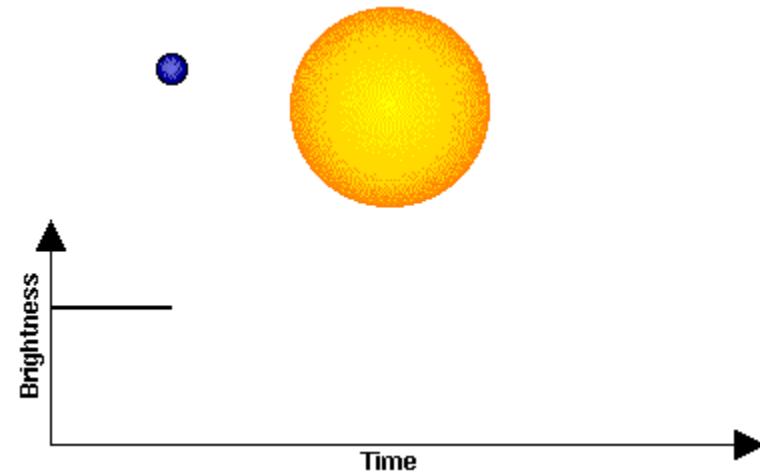
AAVSO The International
Variable Star Index



ExoClock a project to monitor
the ephemerides of transiting exoplanets by
the ARIEL Ephemerides Working Group



TESS Follow-up Observing
Program



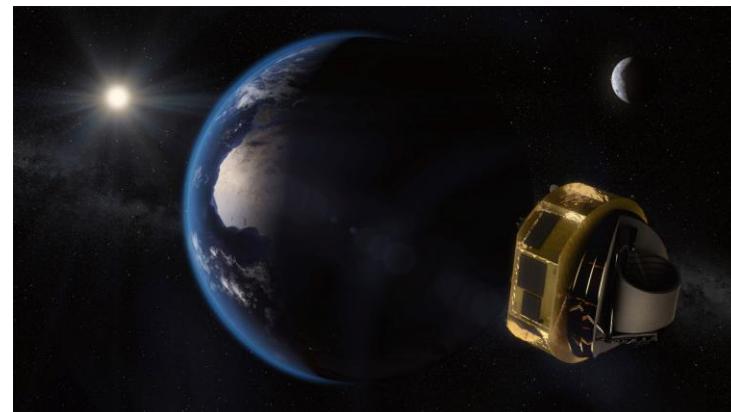


ExoClock

a project to monitor
the ephemerides of transiting exoplanets by
the ARIEL Ephemerides Working Group

ARIEL studierà di cosa sono fatti gli esopianeti, come si sono formati e come si sono evoluti, osservando un campione diversificato di circa 1000 pianeti extrasolari, simultaneamente nelle lunghezze d'onda del visibile e dell'infrarosso. È la prima missione dedicata alla misurazione della composizione chimica e delle strutture termiche di centinaia di esopianeti in transito, consentendo la scienza planetaria ben oltre i confini del Sistema Solare.

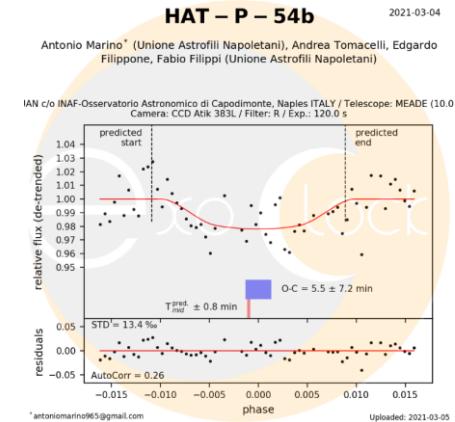
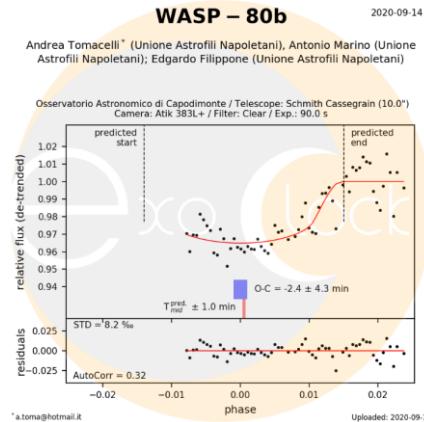
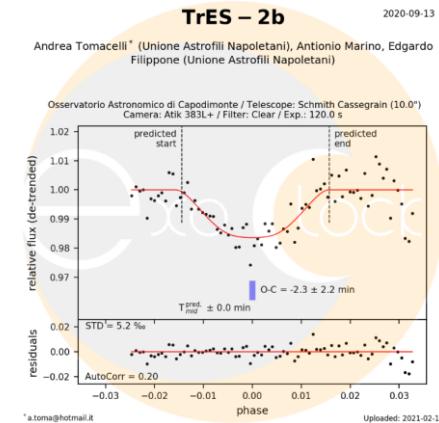
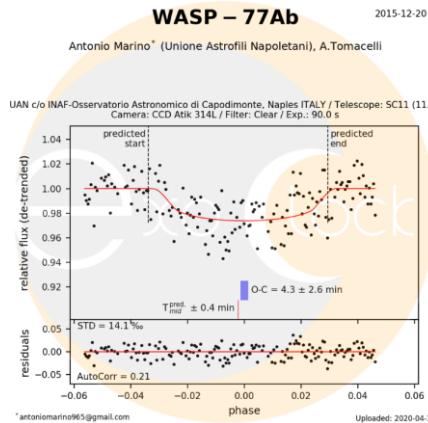
ARIEL sarà lanciato nel 2028
La missione durerà 4 anni





ExoClock

a project to monitor
the ephemerides of transiting exoplanets by
the ARIEL Ephemerides Working Group





ExoClock a project to monitor the ephemerides of transiting exoplanets by the ARIEL Ephemerides Working Group

ExoClock project: an open platform for monitoring the ephemerides of Ariel targets with contributions from the public

[Show affiliations](#) [Hide authors](#)

Kokori, Anastasia ; Tsiaras, Angelos ; Edwards, Billy ; Rocchetto, Marco ; Tinetti, Giovanna ; Wünsche, Anaël ; Paschalidis, Nikolaos ; Agnihotri, Vikrant Kumar ; Bachschmidt, Matthieu ; Bretton, Marc ; Caines, Hamish ; Calò, Mauro ; Casali, Roland ; Crow, Martin ; Dawes, Simon ; Deldem, Marc ; Deligeorgopoulos, Dimitrios ; Dymock, Roger ; Evans, Phil ; Falco, Carmelo Ferratiat, Stephane ; Fowler, Martin ; Futcher, Stephen ; Cuera, Pero ; Hurter, Francois ; Jones, Adrian ; Kang, Wonseok  ; Kim, Taewoo ; Lee, Richard ; Lopresti, Claudio ; Marino, Antonio ; Mallonn, Matthias ; Mortari, Fabio ; Morvan, Mario ; Mugnai, Lorenzo V.  ; Nastasi, Alessandro ; Perroud, Valere ; Pereira, Cedric ; Phillips, Mark ; Pinti, Pavel ; Pacz, Manfred ; Regembal, Francois ; Savage, John ; Sedita, Danilo ; Sioulas, Nick ; Strikis, Iakovos ; Thurston, Geoffrey  ; Tomacelli, Andrea  ; Tomatis, Alberto

The Ariel mission will observe spectroscopically around 1000 exoplanets to further characterise their atmospheres. For the mission to be as efficient as possible, a good knowledge of the planets' ephemerides is needed before its launch in 2028. While ephemerides for some planets are being refined on a per-case basis, an organised effort to collectively verify or update them when necessary does not exist. In this study, we introduce the ExoClock project, an open, integrated and interactive platform with the purpose of producing a confirmed list of ephemerides for the planets that will be observed by Ariel. The project has been developed in a manner to make the best use of all available resources: observations reported in the literature, observations from space instruments and, mainly, observations from ground-based telescopes, including both professional and amateur observatories. To facilitate inexperienced observers and at the same time achieve homogeneity in the results, we created data collection and validation protocols, educational material and easy to use interfaces, open to everyone. ExoClock was launched in September 2019 and now counts over 140 participants from more than 15 countries around the world. In this release, we report the results of observations obtained until the 15th of April 2020 for 120 Ariel candidate targets. In total, 632 observations were used to either verify or update the ephemerides of 84 planets. Additionally, we developed the Exoplanet Characterisation Catalogue (ECC), a catalogue built in a consistent way to assist the ephemeris refinement process. So far, the collaborative open framework of the ExoClock project has proven to be highly efficient in coordinating scientific efforts involving diverse audiences. Therefore, we believe that it is a paradigm that can be applied in the future for other research purposes, too.



ExoClock a project to monitor the ephemerides of transiting exoplanets by the ARIEL Ephemerides Working Group

DRAFT VERSION JUNE 1, 2021
Typeset using L^AT_EX **twocolumn** style in AASTEX63

ExoClock project II.

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ExoClock

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A. LIST OF PRIVATE OBSERVATORIES

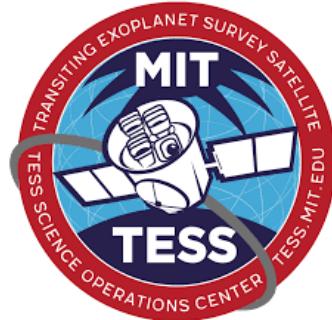
Table 1. List of private observatories.

Observer	Observatory
Vikrant Kumar Agnihotri	Cepheid Observatory, Rawatbhata, India
Claudio Arena	ObservatoryCT, Catania, Italy
David Bennett	Rickford Observatory
Paul Benni	Acton Sky Portal Observatory, USA
Leon Bewersdorff	Observatory Kipshoven, Germany
Mauro Calò	Cavallino Observatory, Tuscany, Italy
Fran Campos	Puig d'Agulles Observatory
Roland Casali	Alto2000 Observatory, Italy
Martin Valentine Crow	Burnham Observatory
Bruno Dauchet	St Veran Observatory
Marc Deldem	Les Barres Observatory, Lamanon, France
Dimitrios Deligeorgopoulos	Artemis Observatory, Evrytania, Greece
Phil Evans	El Sauce Observatory, Coquimbo, Chile
Nicolas Esseiva	Observatoire Saint Martin K27
Josep Gaitan	MAS MOIXA MPC C86 Observatory, Spain
Ferran Grau Horta	Observatori de Ca l'Ou, Sant Martí Sesgueioles, Spain
Pere Guerra	Observatori Astronòmic Albanyà, Spain
Francois Hurter	Albireo Observatory, Switzerland
Adrian Jones	164, Maidenhead, UK
Didier Laloum	Observatoire Privé du Mont (OPM) 40280 Saint-Pierre-du-Mont, France
František Lomoz	Sedlčany Observatory, Czech Republic
David Molina	Rivas Vaciamadrid
Thomas Mollier	Tomastro Observatory, Italy
Fabio Mortari	Hypatia Observatory, Italy
Nikolaos Paschalidis	Nunki Observatory, Skiathos, Greece
Valère Perroud	Observatoire de Duines, France
Mark Phillips	Forthimage
Jean-Bernard Pioppa	La Roque-Esclapon
Manfred Raetz	Herges-Hallenberg, Germany
François Regembal	HRT Observatory, Spain
Keith Rickard	Putland Observatory, UK
Mark Roberts	IMT3 Observatory, UK
Lionel Rousselot	Vierzon Observatory
Xesco Rubia	Stupa Observatory
Danilo Sedita	Osservatorio Sedita Castrofilippo, Italy
Nick Sioulas	NOAK Observatory, Greece
Vojtěch Školník	Broumov NM Observatory, Czech Republic
Dimitris Stournas	Gamiko Observatory, Greece
Andrea Tomacelli	Telescopio Remoto Colacevich c/o Osservatorio Astronomico di Capodimonte di Napoli
Alberto Tomasi	Alto Observatory, Italy
Martin Vrásták	LSO, Slovakia
David E Wright	Yorick Observatory
Martin Zíbar	Chlumčany Observatory

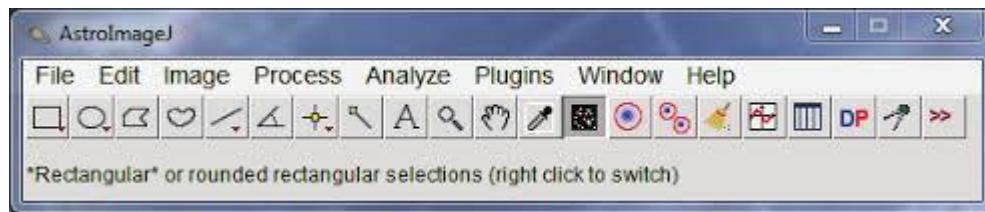


TESS

Follow-up Observing Program



TESS Follow-up Observing Program





TESS Follow-up Observing Program

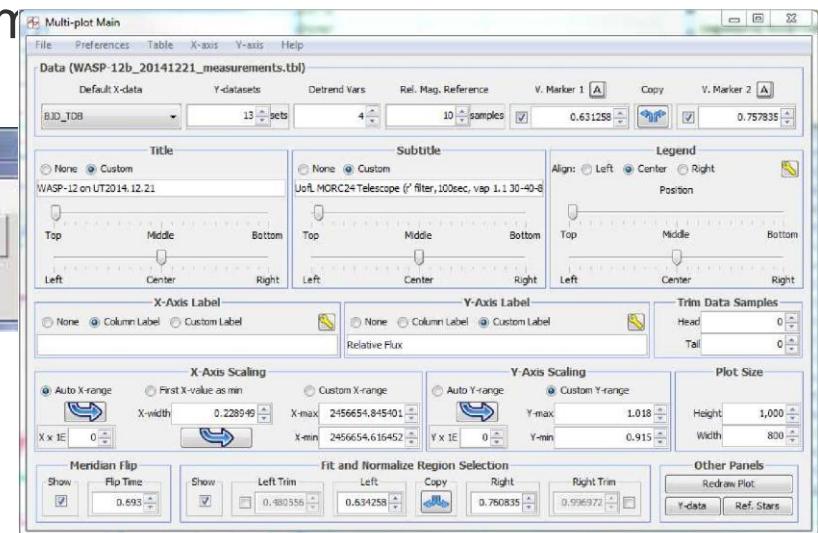
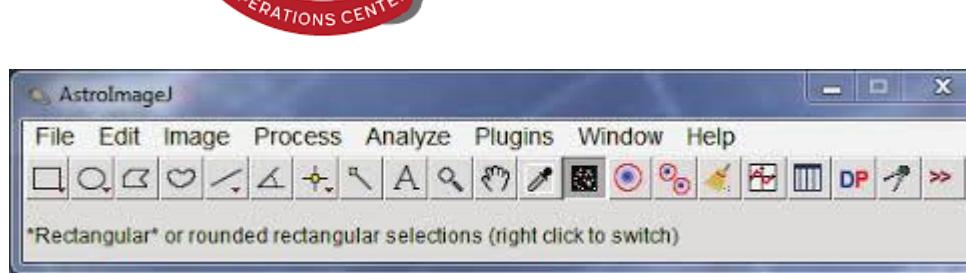
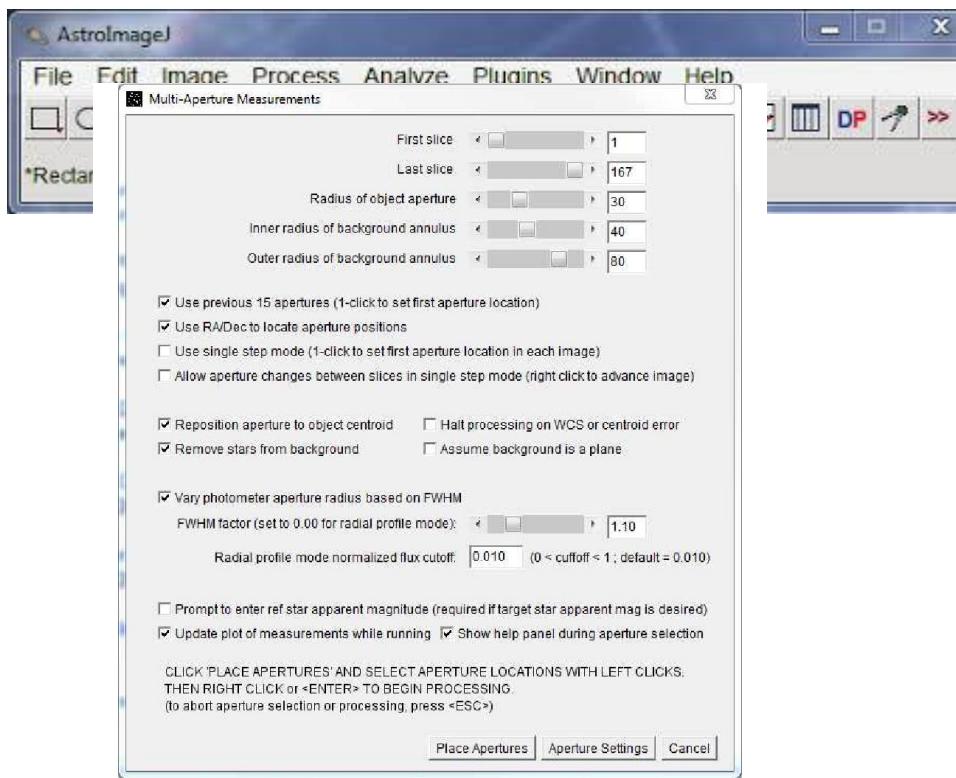


FIG. 5.—The AJ Multi-plot Main panel. The Multi-plot Main panel provides access to plotting controls that affect the overall plot. Important controls include the default x -axis dataset (usually a time dataset such as BJD_{TDB}), the title, legend, axis labels, plot size, and axis scaling settings. The bottom row provides



TESS Follow-up Observing Program

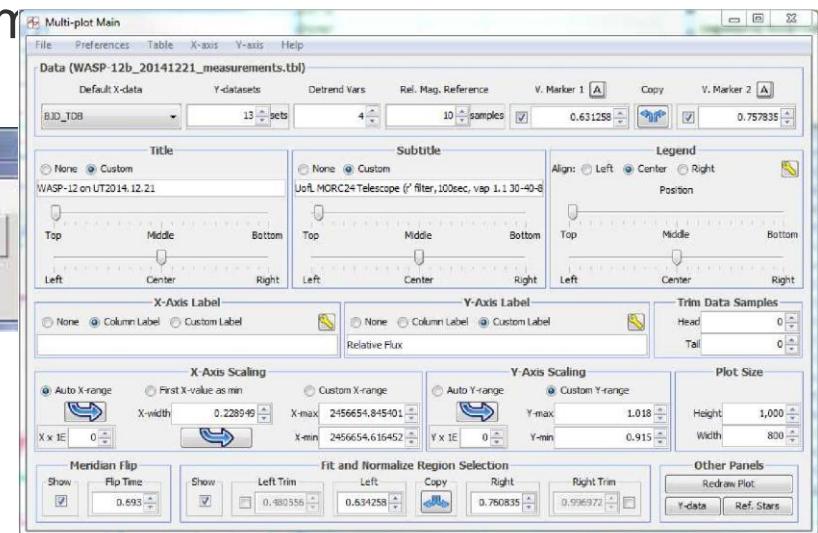


FIG. 5.—The AJ Multi-plot Main panel. The Multi-plot Main panel provides access to plotting controls that affect the overall plot. Important controls include the default x -axis dataset (usually a time dataset such as BJD_{TDB}), the title, legend, axis labels, plot size, and axis scaling settings. The bottom row provides



TESS Follow-up Observing Program

AstroImage

File Edit Image Process Analyze Plugins Window Help

Multi-Aperture Measurements

First slice: 1 Last slice: 167 Radius of object aperture: 10

Multi-plot V-data

Data Set	Row	Plot	Plot Scale	X-data	Input in Map	Y-data	Auto	Function	Y-squared	Color	Symbol	Units	Bin Size	Fit Mode	Fit Select	Trend Coefficient	Trend Dataset	Norm/Mag Ref	Out Ref	Page Ref	Scale	Bias Shift	Legend Type	Custom Legend	Data Set	
1	1	default	Y	rel_fn_T1	✓	none	✓	blue	dot	1	✓	green	0.001859	✓	green	0.001859	✓	green	✓	✓	✓	✓	✓	✓	✓	✓
2	2	default	Y	rel_fn_T1	✓	none	✓	red	dot	1	✓	green	-0.000181	✓	green	-0.000181	✓	green	✓	✓	✓	✓	✓	✓	✓	✓
3	3	default	Y	rel_fn_C2	✓	none	✓	dark green	dot	1	✓	green	-0.000181	✓	green	-0.000181	✓	green	✓	✓	✓	✓	✓	✓	✓	✓
4	4	default	Y	rel_fn_C3	✓	none	✓	magenta	×	1	✓	green	-0.000181	✓	green	-0.000181	✓	green	✓	✓	✓	✓	✓	✓	✓	✓
5	5	default	Y	rel_fn_T4	✓	none	✓	black	dot	1	✓	green	-0.000181	✓	green	-0.000181	✓	green	✓	✓	✓	✓	✓	✓	✓	✓
6	6	default	Y	rel_fn_C5	✓	none	✓	red	×	1	✓	green	-0.000181	✓	green	-0.000181	✓	green	✓	✓	✓	✓	✓	✓	✓	✓
7	7	default	Y	rel_fn_C6	✓	none	✓	purple	dot	1	✓	green	-0.000181	✓	green	-0.000181	✓	green	✓	✓	✓	✓	✓	✓	✓	✓
8	8	default	Y	rel_fn_C7	✓	none	✓	pink	dot	1	✓	green	-0.000181	✓	green	-0.000181	✓	green	✓	✓	✓	✓	✓	✓	✓	✓
9	9	default	Y	rel_fn_C8	✓	none	✓	light blue	dot	1	✓	green	-0.000181	✓	green	-0.000181	✓	green	✓	✓	✓	✓	✓	✓	✓	✓
10	10	default	Y	rel_fn_C9	✓	none	✓	brown	dot	1	✓	green	-0.000181	✓	green	-0.000181	✓	green	✓	✓	✓	✓	✓	✓	✓	✓
11	11	ATMAGS	Y	rel_fn_T1	✓	none	✓	red	dot	1	✓	green	-0.000181	✓	green	-0.000181	✓	green	✓	✓	✓	✓	✓	✓	✓	✓
12	12	Saturated	Y	rel_fn_T1	✓	none	✓	purple	dot	1	✓	green	-0.000181	✓	green	-0.000181	✓	green	✓	✓	✓	✓	✓	✓	✓	✓
13	13	SkyPixel_T1	Y	rel_fn_T1	✓	none	✓	yellow	dot	1	✓	green	-0.000181	✓	green	-0.000181	✓	green	✓	✓	✓	✓	✓	✓	✓	✓

Update plot or measurements while running Show help panel during aperture selection

CLICK 'PLACE APERTURES' AND SELECT APERTURE LOCATIONS WITH LEFT CLICKS. THEN RIGHT CLICK or <ENTER> TO BEGIN PROCESSING. (to abort aperture selection or processing, press <ESC>)

Place Apertures | Aperture Settings | Cancel

The Measurements set up panel. Multi-Aperture automates the task of performing differential photometry.

Multi-plot Main

Data (WASP-12b_20141221_measurements.tbl)

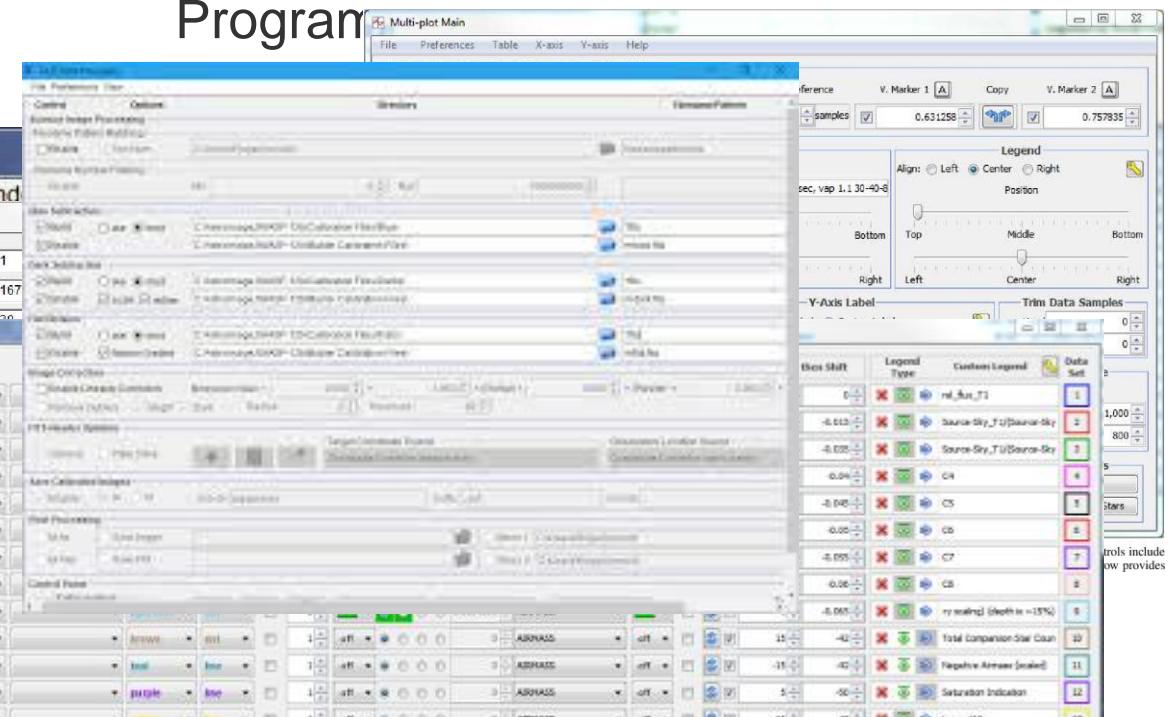
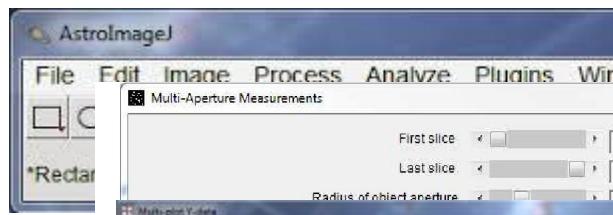
Default X-data Y-datasets Detrend Vars Rel. Mag. Reference V. Marker 1 A Copy V. Marker 2 B

Title: WASP-12b on UT2014.12.21 Subtitle: Soft MORC24 Telescope ('r' filter, 100sec, vap 1.1 30-40-8)

X-Axis Label Y-Axis Label Trim Data Samples

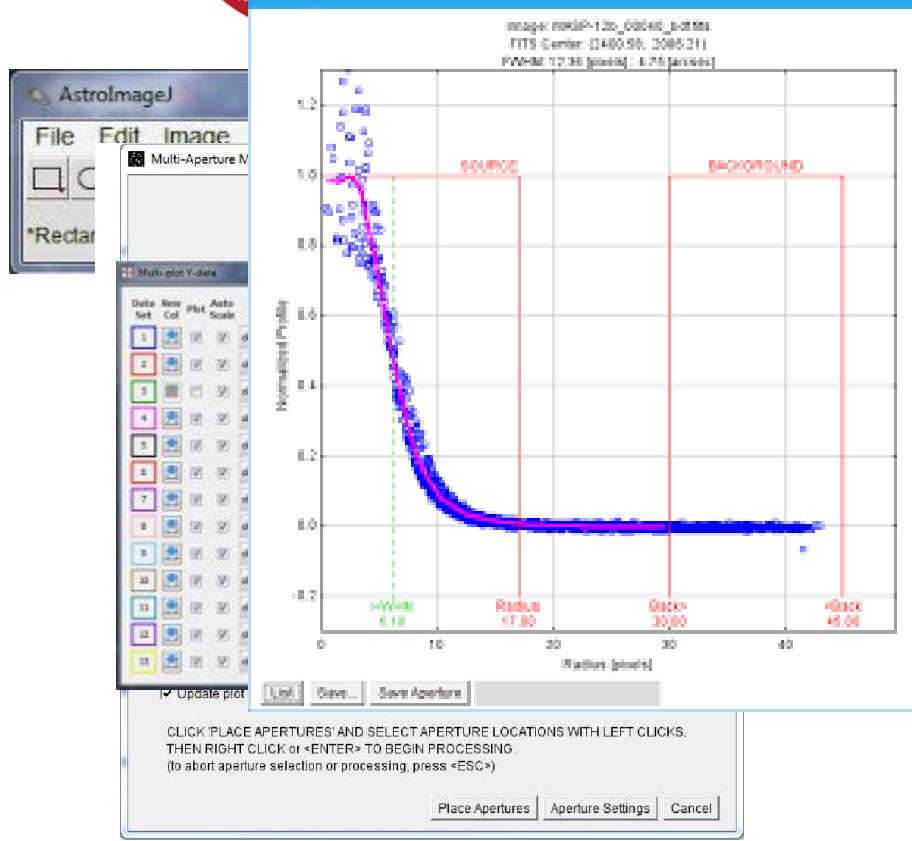
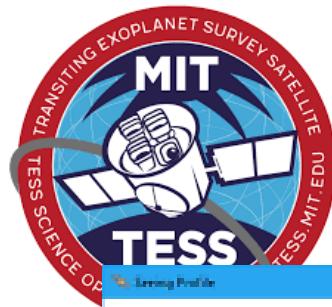
Legend: Align: Left Center Right Position: Top Middle Bottom

Tools include:
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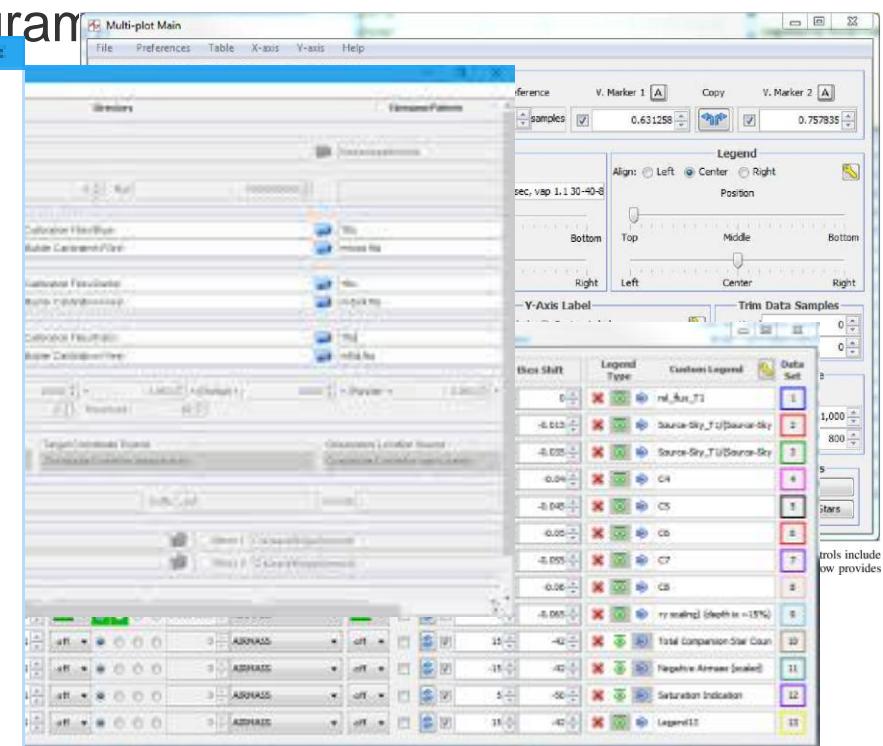


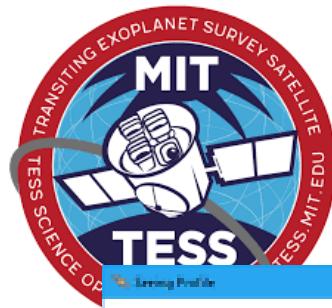
Update plot or measurements while running Show help panel during aperture selection
 CLICK 'PLACE APERTURES' AND SELECT APERTURE LOCATIONS WITH LEFT CLICKS.
 THEN RIGHT CLICK or <ENTER> TO BEGIN PROCESSING.
 (to abort aperture selection or processing, press <ESC>)

Measurements set up panel. Multi-Aperture automates the task of performing differential photometr



TESS Follow-up Observing Program





TESS Follow-up Observing Program

Multi-aperture Reference Star Settings

Select reference stars to include in tot_C_cnts and rel_flux calculations

Show Magnitudes Hide Magnitudes

Reference Star Selection

None All Set Cycle Enabled Stars Less One Cycle Individual Stars

Star	Magnitude
T1	9.453
C2	9.747
C3	10.568
C4	10.964
C5	11.697
C6	12.285
C7	12.792

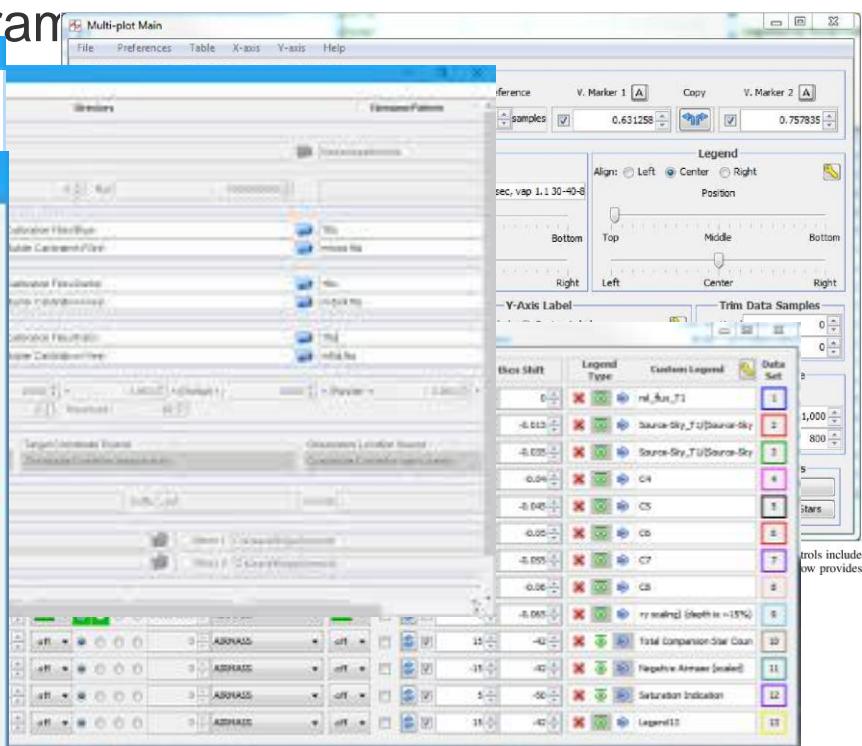
Green checkbox border - aperture peak count under linearity limit
Yellow checkbox border - aperture peak count over linearity limit
Red checkbox border - aperture peak count over saturation limit

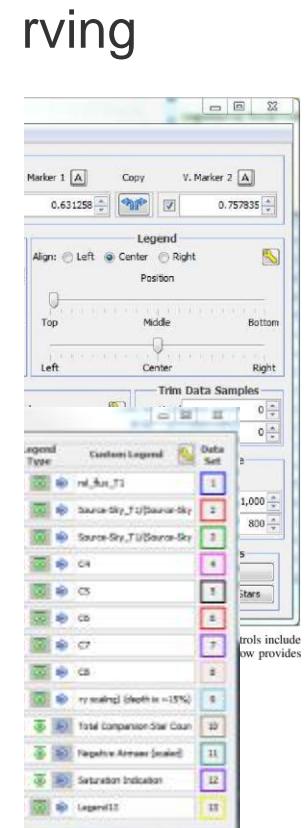
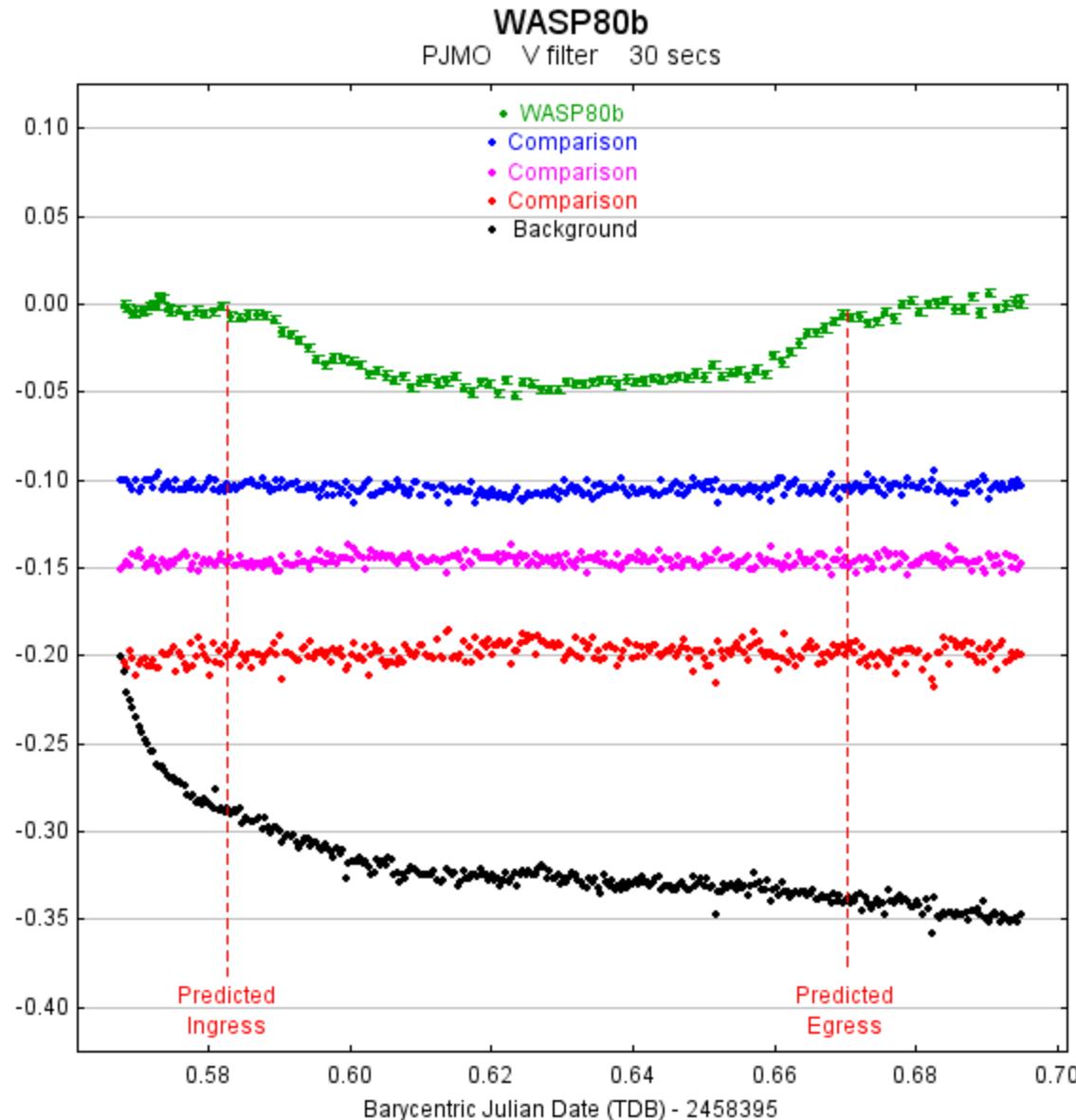
Save/Show Current Configuration

Save Table Save Apertures Send to Multi-aperture Show Apertures

THEN RIGHT CLICK or <ENTER> TO BEGIN PROCESSING.
(to abort aperture selection or processing, press <ESC>)

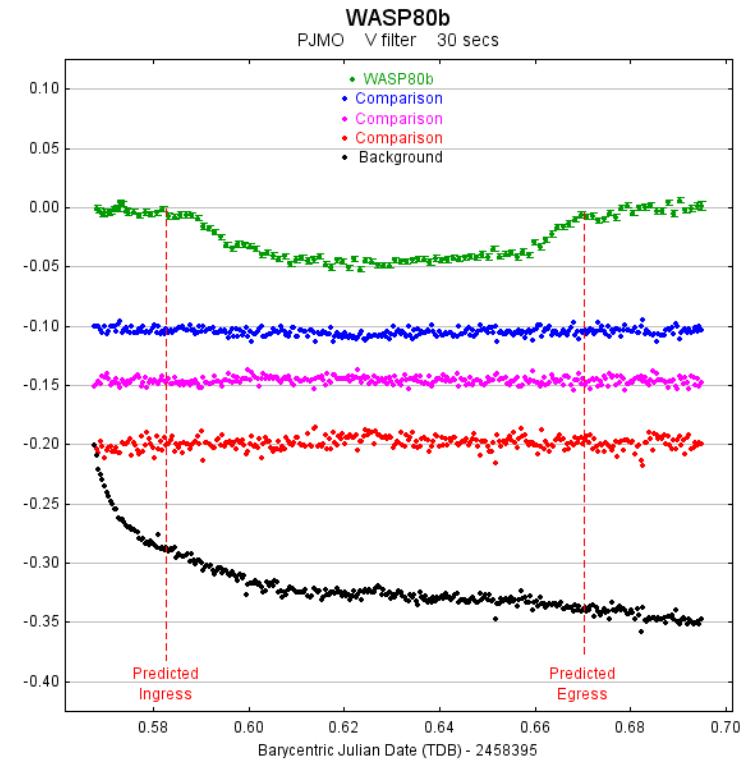
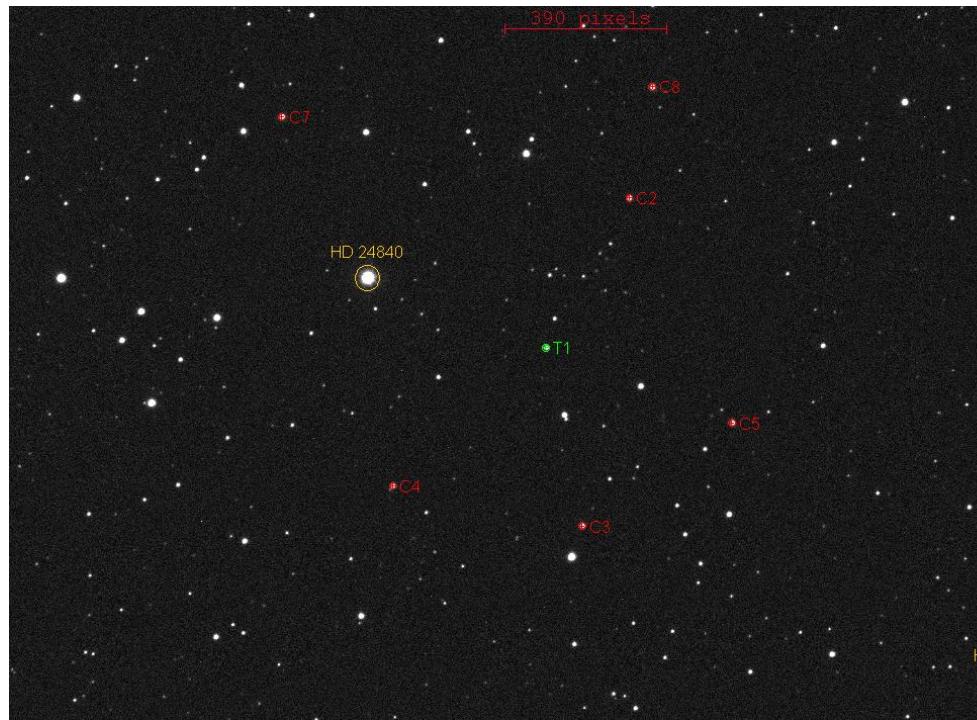
Place Apertures Aperture Settings Cancel

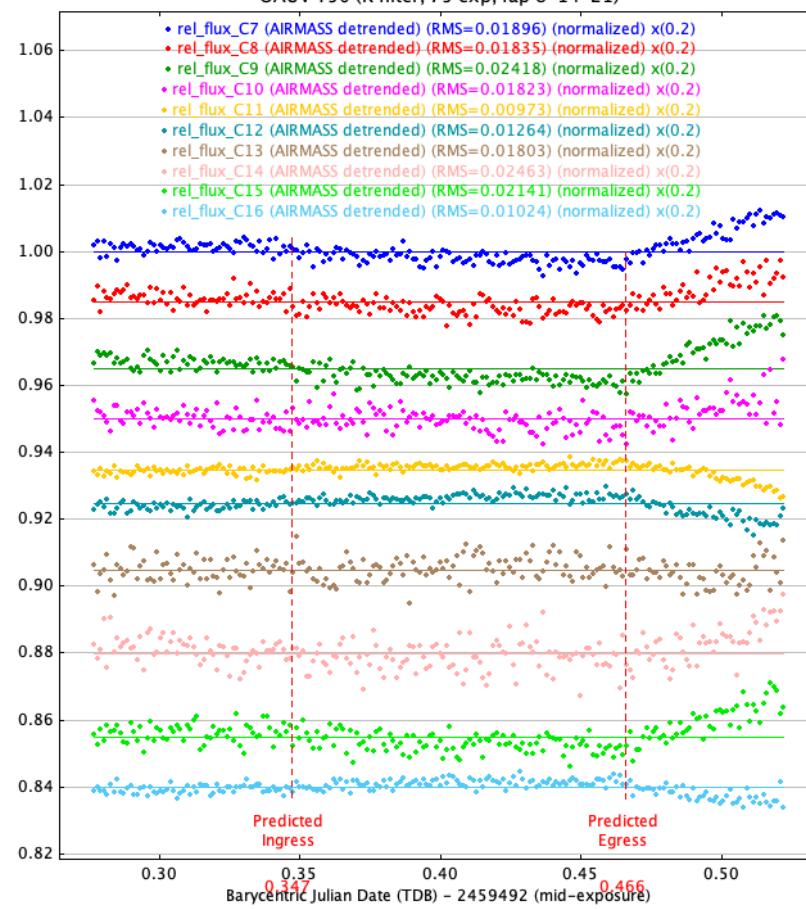




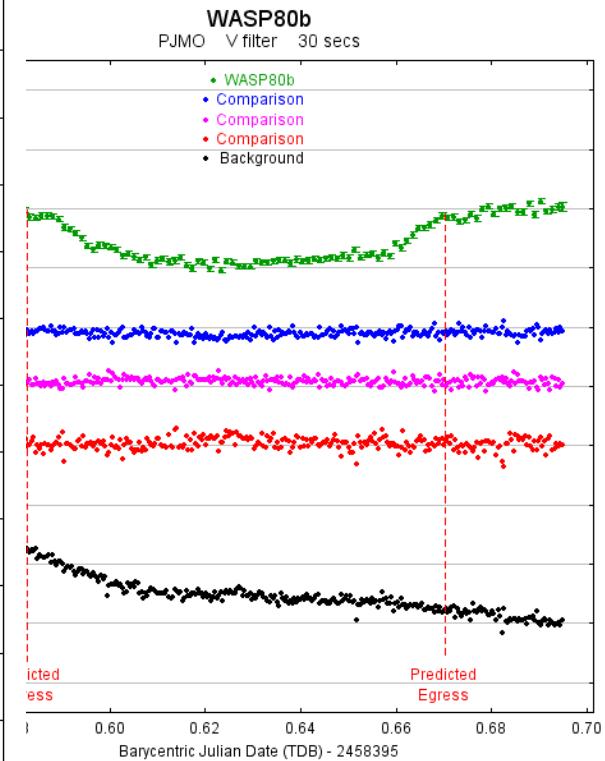


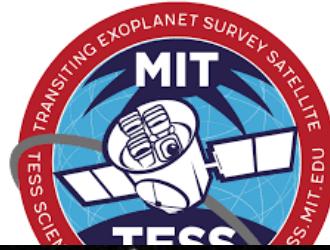
TESS Follow-up Observing Program





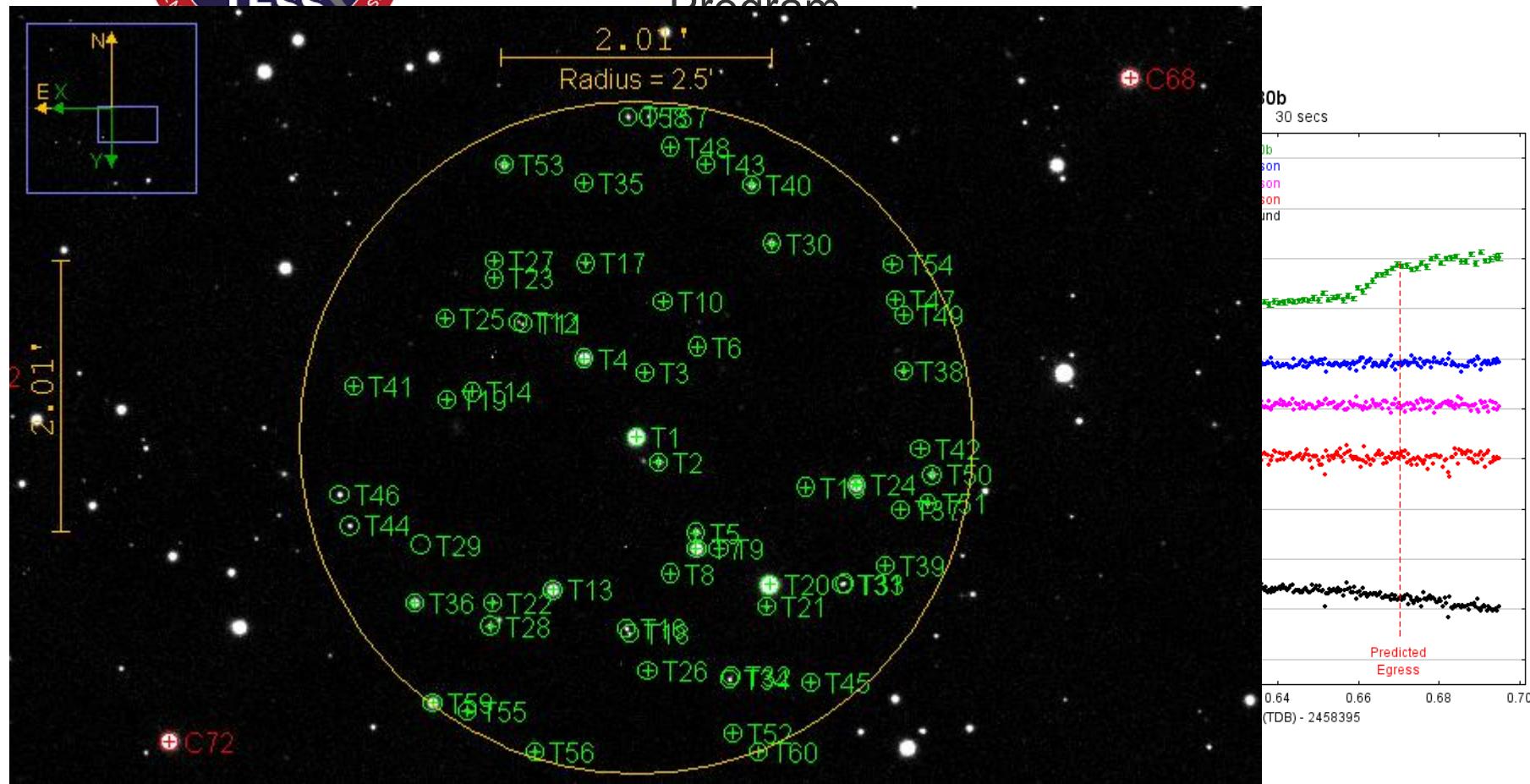
TESS Follow-up Observing





TESS Follow-up Observing

Program



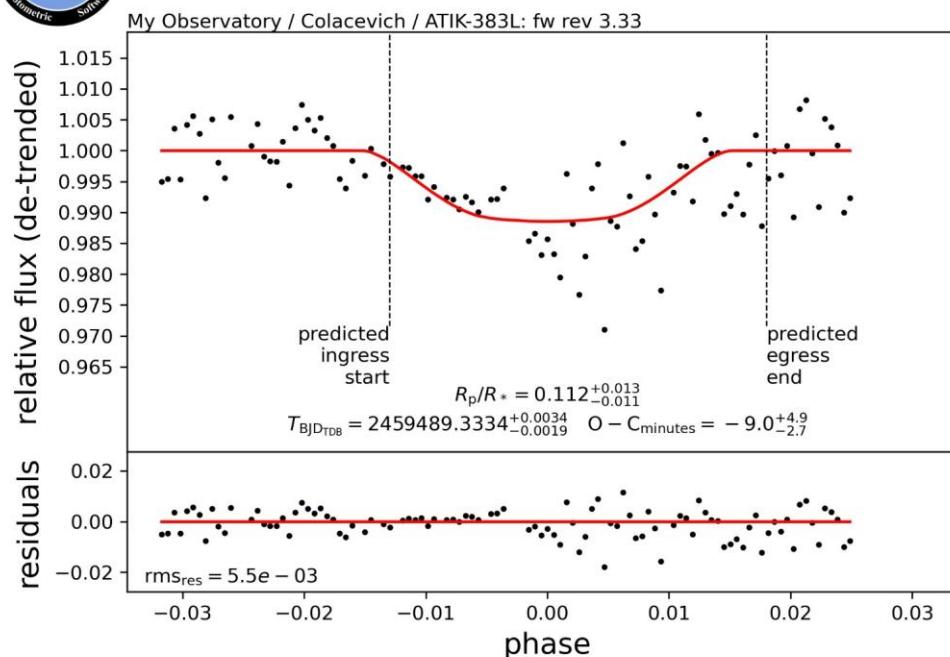


TESS Follow-up Observing Program



TrES – 2b

2021-10-01 18:0 (UT)
Dur: 3.4h / Exp: 90.0s
Filter: Rc



Fotometria di Asteroidi