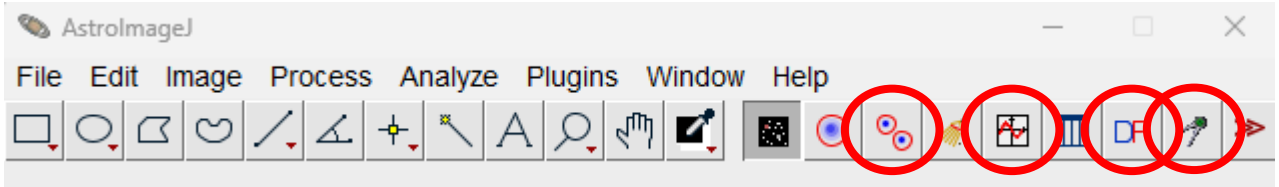
AstroImageJ Toolbar

- Provides access to Astronomy Tools (and underlying ImageJ tools)
- Data Processor (DP; data calibration)
- Multi-Aperture (MA; differential photometry)
- Multi-Plot and lightcurve fitting (MP; plotting facility)
- Coordinate Converter (CC; time format and coordinate conversion)



Data Processor (Image Calibration)

- Create master calibration files
- Bias subtract
- Dark Subtract
- Flat field
- Update FITS headers
- Plate Solve
- Save calibrated files
- Optional run photometry and plotting
- Run in realtime mode while observing to monitor live lightcurve

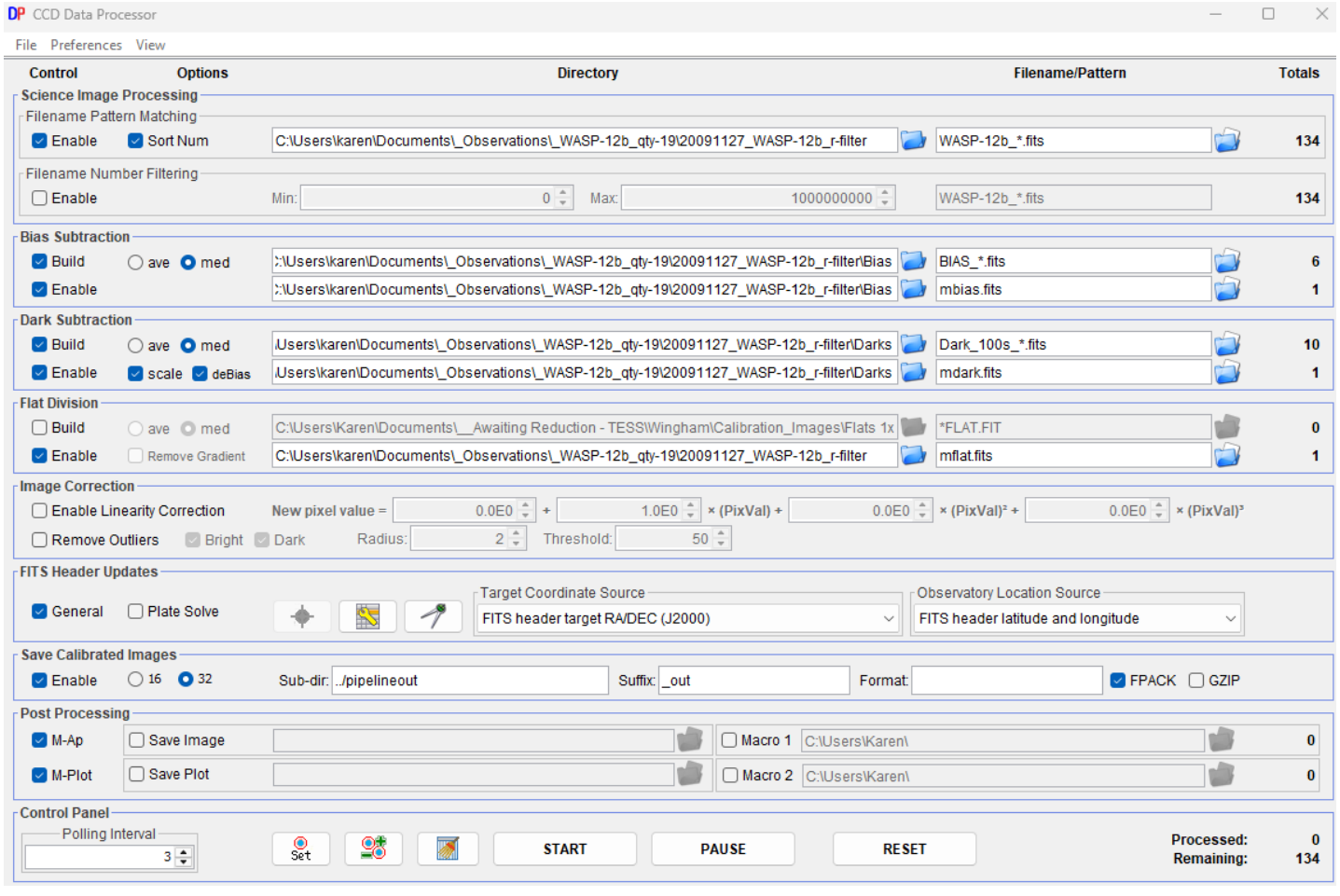
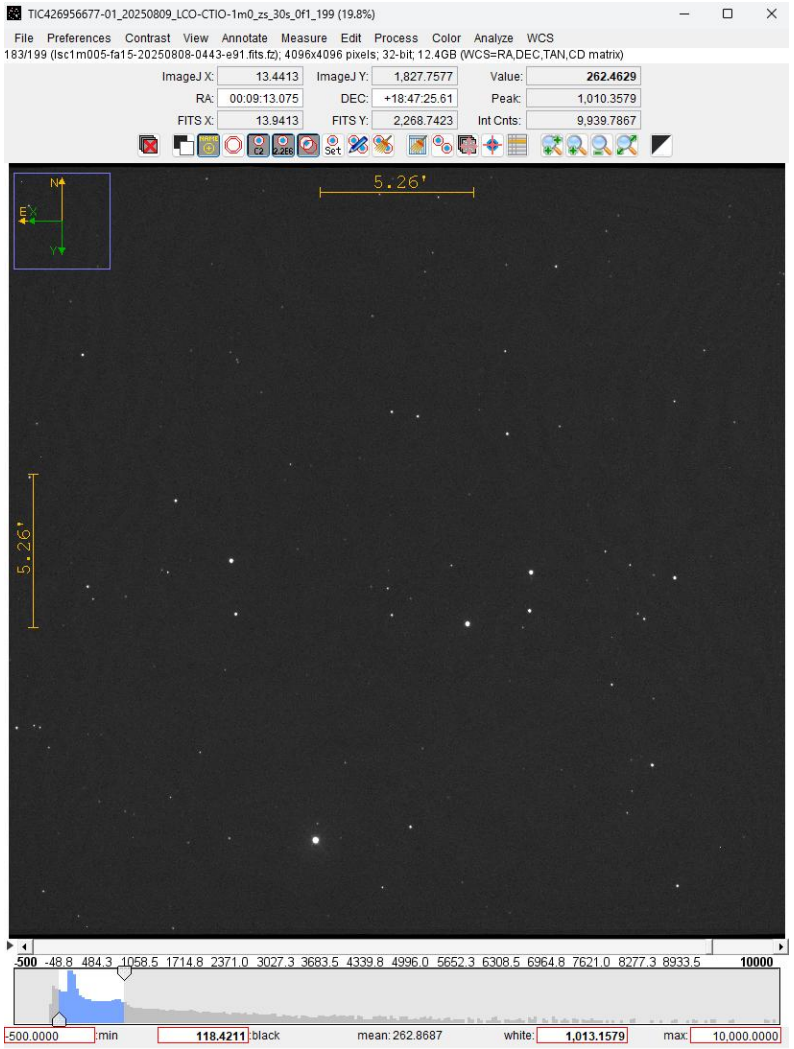


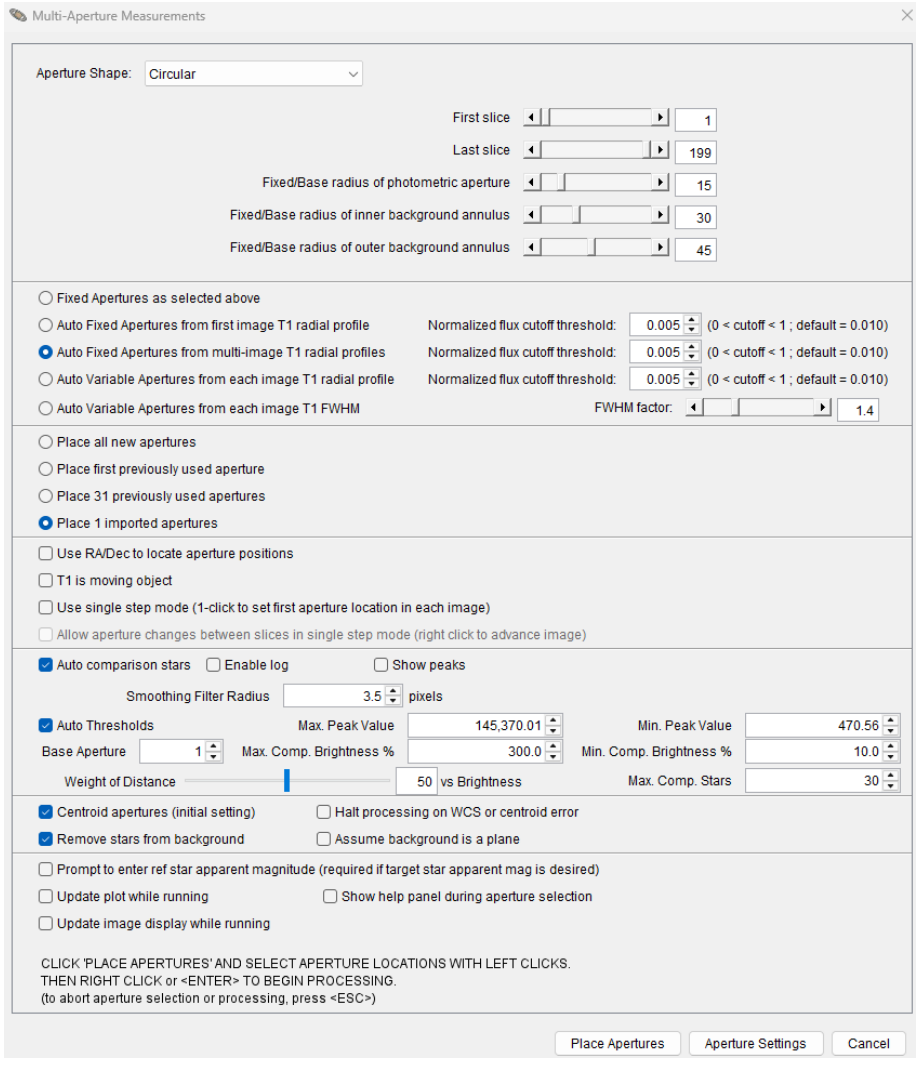
Image Stack Display

- Zoom and pan image with mouse
- Adjust contrast
- Scroll through stack
- Photometer at mouse pointer
- X, Y, East, North, indicators
- Access to all AIJ settings and tools
    - Icons for common settings and tools
    - Menus for all others



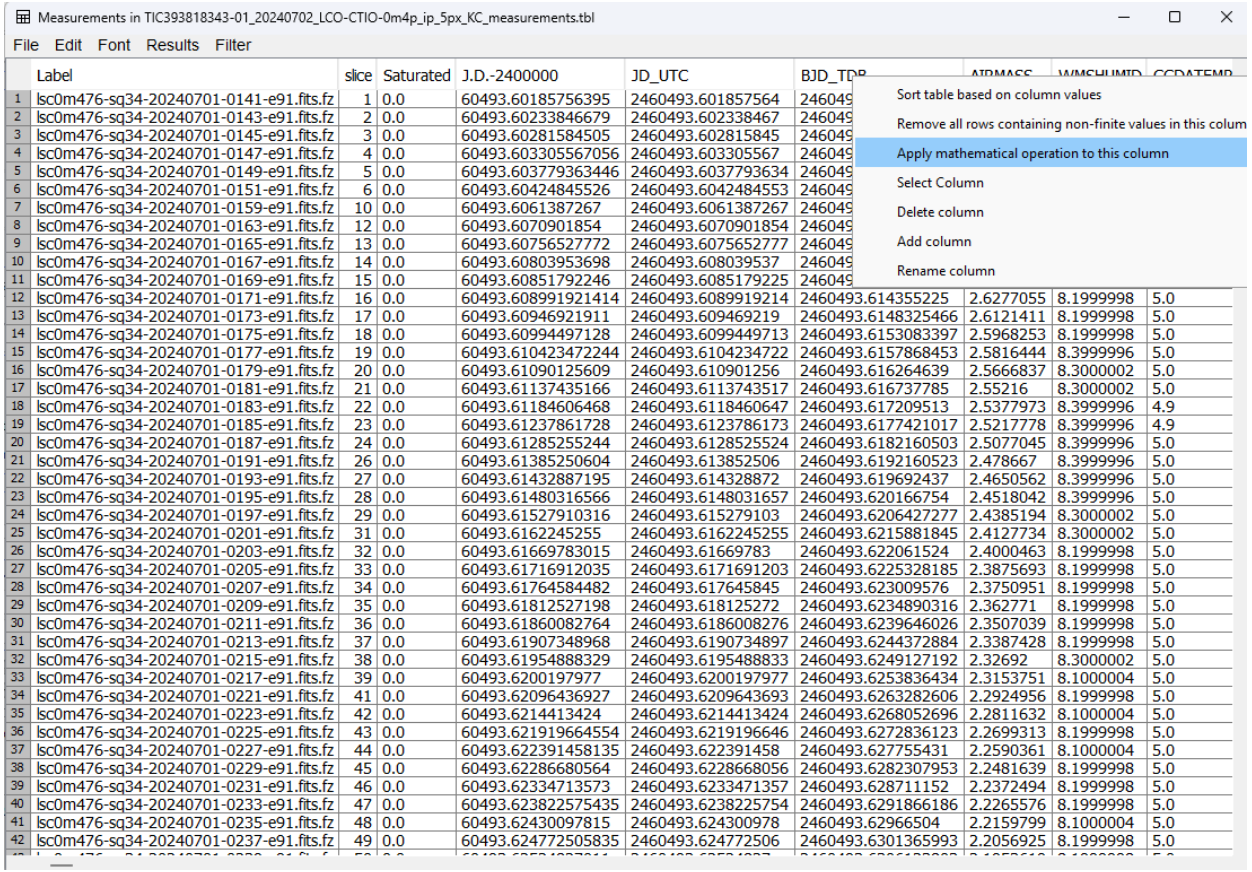
Multi-Aperture

- Select aperture shape
- Select aperture size and size mode
- Select new or saved aperture mode
- Select aperture tracking modes
- Set up auto comp star mode
- Select runtime display options
- Select “Place Apertures” to interactively add, remove, or move apertures in image stack



Measurements Table Display

- Contains all data from multi-aperture run
- Interactive with plotted data
- Searchable
- Sortable
- Editable



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2	lsc0m476-sq34-20240701-0143-e91.fits.fz	2	0.0	60493.60233846679	2460493.602338467	246049			
3	lsc0m476-sq34-20240701-0145-e91.fits.fz	3	0.0	60493.60281584505	2460493.602815845	246049			
4	lsc0m476-sq34-20240701-0147-e91.fits.fz	4	0.0	60493.603305567056	2460493.603305567	246049			
5	lsc0m476-sq34-20240701-0149-e91.fits.fz	5	0.0	60493.603779363446	2460493.6037793634	246049			
6	lsc0m476-sq34-20240701-0151-e91.fits.fz	6	0.0	60493.60424845526	2460493.6042484553	246049			
7	lsc0m476-sq34-20240701-0159-e91.fits.fz	10	0.0	60493.6061387267	2460493.6061387267	246049			
8	lsc0m476-sq34-20240701-0163-e91.fits.fz	12	0.0	60493.6070901854	2460493.6070901854	246049			
9	lsc0m476-sq34-20240701-0165-e91.fits.fz	13	0.0	60493.60756527772	2460493.6075652777	246049			
10	lsc0m476-sq34-20240701-0167-e91.fits.fz	14	0.0	60493.60803953698	2460493.608039537	246049			
11	lsc0m476-sq34-20240701-0169-e91.fits.fz	15	0.0	60493.60851792246	2460493.6085179225	246049			
12	lsc0m476-sq34-20240701-0171-e91.fits.fz	16	0.0	60493.608991921414	2460493.6089919214	2460493.614355225	2.6277055	8.1999998	5.0
13	lsc0m476-sq34-20240701-0173-e91.fits.fz	17	0.0	60493.60946921911	2460493.609469219	2460493.6148325466	2.6121411	8.1999998	5.0
14	lsc0m476-sq34-20240701-0175-e91.fits.fz	18	0.0	60493.60994497128	2460493.6099449713	2460493.6153083397	2.5968253	8.1999998	5.0
15	lsc0m476-sq34-20240701-0177-e91.fits.fz	19	0.0	60493.610423472244	2460493.6104234722	2460493.6157868453	2.5816444	8.3999996	5.0
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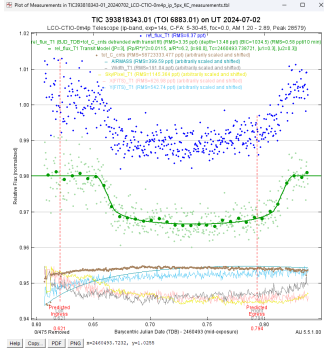
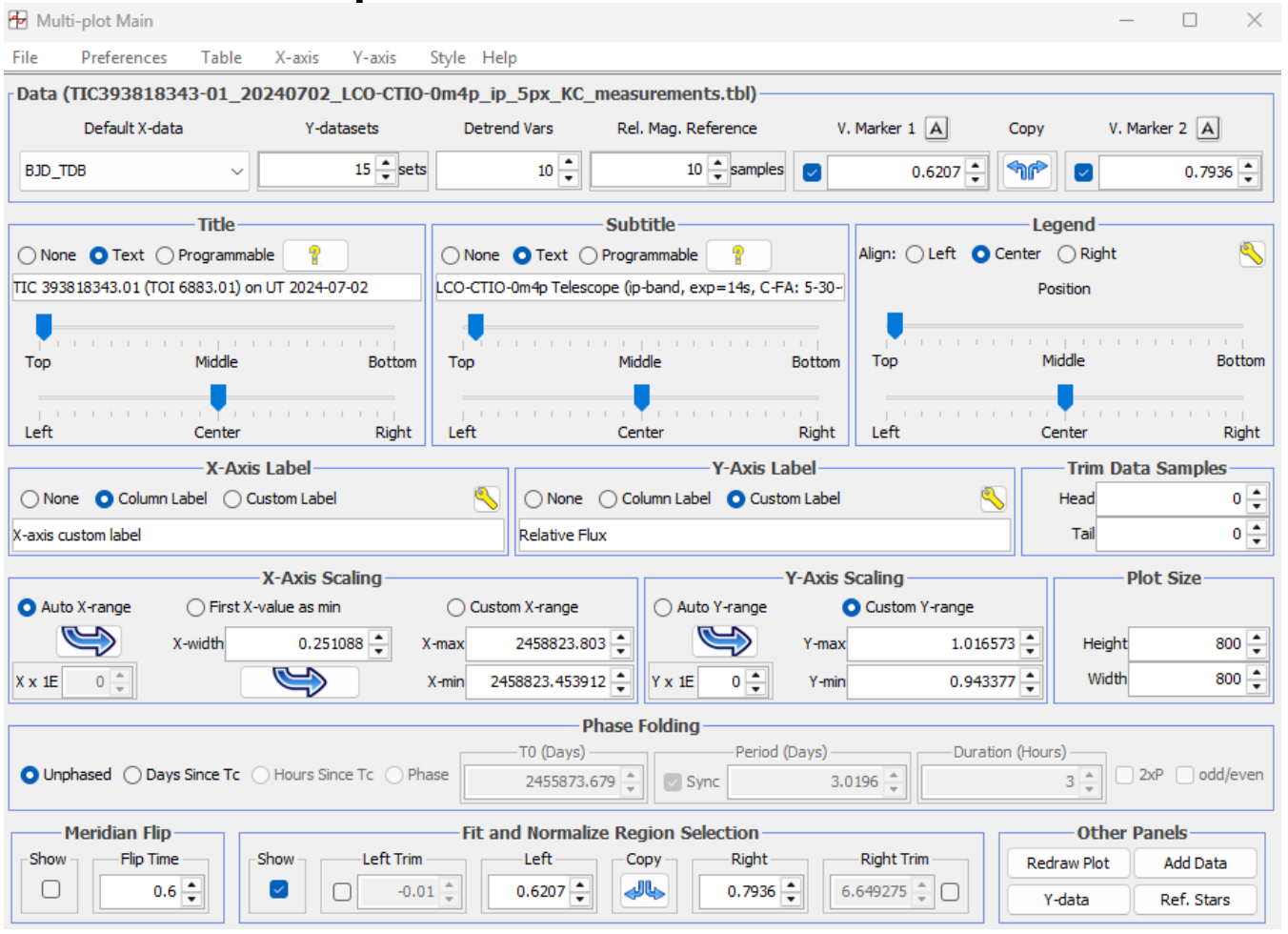
17	lsc0m476-sq34-20240701-0181-e91.fits.fz	21	0.0	60493.61137435166	2460493.6113743517	2460493.616737785	2.55216	8.3000002	5.0
18	lsc0m476-sq34-20240701-0183-e91.fits.fz	22	0.0	60493.61184606468	2460493.6118460647	2460493.617209513	2.5377973	8.3999996	4.9
19	lsc0m476-sq34-20240701-0185-e91.fits.fz	23	0.0	60493.61237861728	2460493.6123786173	2460493.6177421017	2.5217778	8.3999996	4.9
20	lsc0m476-sq34-20240701-0187-e91.fits.fz	24	0.0	60493.61285255244	2460493.6128525524	2460493.6182160503	2.5077045	8.3999996	5.0
21	lsc0m476-sq34-20240701-0191-e91.fits.fz	26	0.0	60493.61385250604	2460493.613852506	2460493.6192160523	2.478667	8.3999996	5.0
22	lsc0m476-sq34-20240701-0193-e91.fits.fz	27	0.0	60493.61432887195	2460493.614328872	2460493.619692437	2.4650562	8.3999996	5.0
23	lsc0m476-sq34-20240701-0195-e91.fits.fz	28	0.0	60493.61480316566	2460493.6148031657	2460493.620166754	2.4518042	8.3999996	5.0
24	lsc0m476-sq34-20240701-0197-e91.fits.fz	29	0.0	60493.61527910316	2460493.615279103	2460493.6206427277	2.4385194	8.3000002	5.0
25	lsc0m476-sq34-20240701-0201-e91.fits.fz	31	0.0	60493.6162245255	2460493.6162245255	2460493.6215881845	2.4127734	8.3000002	5.0
26	lsc0m476-sq34-20240701-0203-e91.fits.fz	32	0.0	60493.61669783015	2460493.61669783	2460493.622061524	2.4000463	8.1999998	5.0
27	lsc0m476-sq34-20240701-0205-e91.fits.fz	33	0.0	60493.61716912035	2460493.6171691203	2460493.6225328185	2.3875693	8.1999998	5.0
28	lsc0m476-sq34-20240701-0207-e91.fits.fz	34	0.0	60493.61764584482	2460493.617645845	2460493.623009576	2.3750951	8.1999998	5.0
29	lsc0m476-sq34-20240701-0209-e91.fits.fz	35	0.0	60493.61812527198	2460493.618125272	2460493.6234890316	2.362771	8.1999998	5.0
30	lsc0m476-sq34-20240701-0211-e91.fits.fz	36	0.0	60493.61860082764	2460493.6186008276	2460493.6239646026	2.3507039	8.1999998	5.0
31	lsc0m476-sq34-20240701-0213-e91.fits.fz	37	0.0	60493.61907348968	2460493.6190734897	2460493.6244372884	2.3387428	8.1999998	5.0
32	lsc0m476-sq34-20240701-0215-e91.fits.fz	38	0.0	60493.61954888329	2460493.6195488833	2460493.6249127192	2.32692	8.3000002	5.0
33	lsc0m476-sq34-20240701-0217-e91.fits.fz	39	0.0	60493.6200197977	2460493.6200197977	2460493.6253836434	2.3153751	8.1000004	5.0
34	lsc0m476-sq34-20240701-0221-e91.fits.fz	41	0.0	60493.62096436927	2460493.6209643693	2460493.6263282606	2.2924956	8.1999998	5.0
35	lsc0m476-sq34-20240701-0223-e91.fits.fz	42	0.0	60493.6214413424	2460493.6214413424	2460493.6268052696	2.2811632	8.1000004	5.0
36	lsc0m476-sq34-20240701-0225-e91.fits.fz	43	0.0	60493.621919664554	2460493.6219196646	2460493.6272836123	2.2699313	8.1999998	5.0
37	lsc0m476-sq34-20240701-0227-e91.fits.fz	44	0.0	60493.622391458135	2460493.622391458	2460493.627755431	2.2590361	8.1000004	5.0
38	lsc0m476-sq34-20240701-0229-e91.fits.fz	45	0.0	60493.62286680564	2460493.6228668056	2460493.6282307953	2.2481639	8.1999998	5.0
39	lsc0m476-sq34-20240701-0231-e91.fits.fz	46	0.0	60493.62334713573	2460493.6233471357	2460493.628711152	2.2372494	8.1999998	5.0
40	lsc0m476-sq34-20240701-0233-e91.fits.fz	47	0.0	60493.623822575435	2460493.6238225754	2460493.6291866186	2.2265576	8.1999998	5.0
41	lsc0m476-sq34-20240701-0235-e91.fits.fz	48	0.0	60493.62430097815	2460493.624300978	2460493.62966504	2.2159799	8.1000004	5.0
42	lsc0m476-sq34-20240701-0237-e91.fits.fz	49	0.0	60493.624772505835	2460493.624772506	2460493.6301365993	2.2056925	8.1999998	5.0

Multi-plot Main

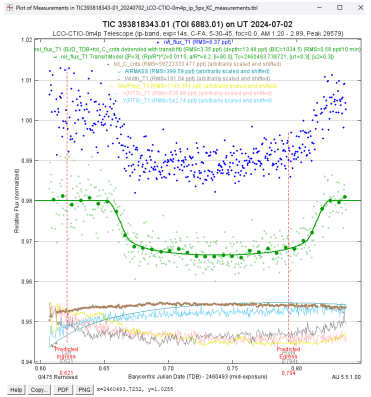
- Controls related to overall plot
- Titling
- Axis labeling
- Axis Scaling
- Legend
- Plot size





Multi-plot Y-data

- Controls related to individual plotted datasets
- Color, symbol shape
- Fitting mode
- Data averaging and binning

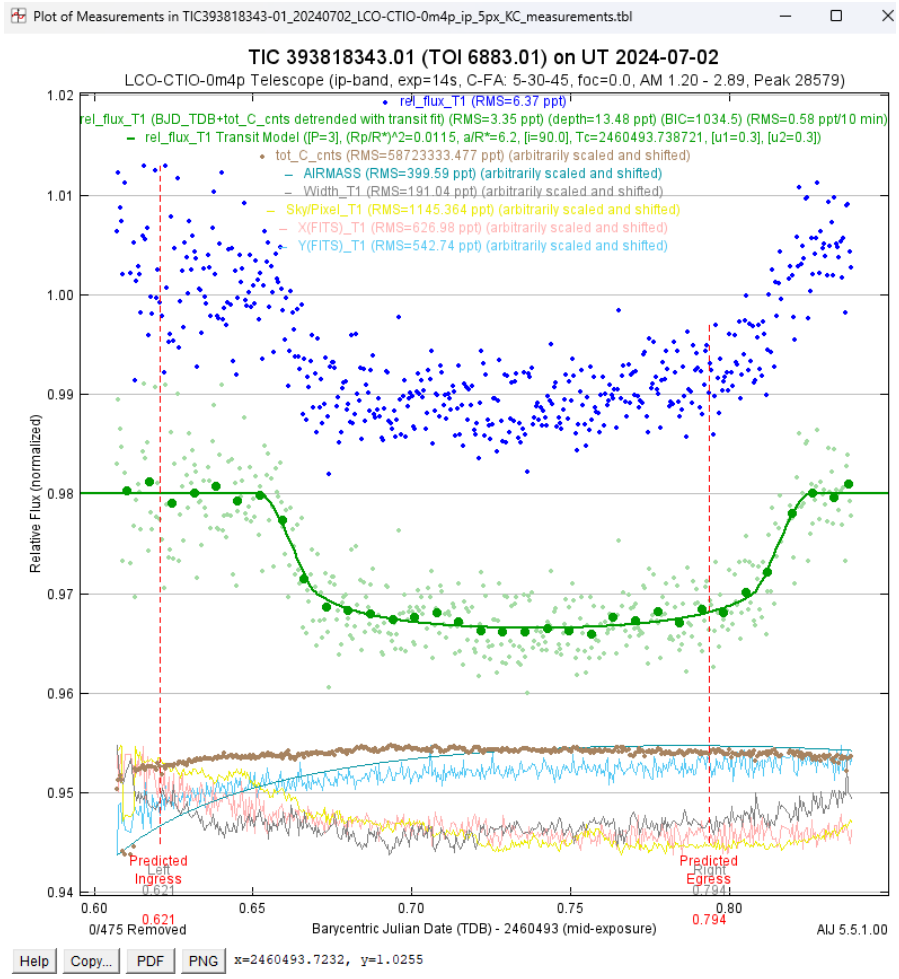


Multi-plot Y-data

Data Set	New Col	Plot	Auto Scale	X-data	Input in Mag	Y-data	Func-tion	Y-operand	Show Error	Color	Symbol	Lines	Input Average	Spline Smooth	Fit Mode	Trend Select	Trend Coefficient	Trend Dataset	Norm/ Mag Ref	Out Mag	Page Rel	Scale	then Shift	Out Bin Err	BinSize (min)
1		☑	☑	default	☐	rel_flux_T1	☐		☐	blue	dot	☐	1	☐			0.0000023			☐	☐	1	0	☐	5
2		☐	☑	default	☐	rel_flux_T1	☐		☐	red	box	☐	5	☐			0			☐	☐	1	-0.008	☐	5
3		☑	☑	default	☐	rel_flux_T1	☐		☐	dark gre...	dot	☐	1	☐			-0.000000	tot_C_cnts		☐	☐	1	-0.02	☑	10
4		☐	☑	default	☐	rel_flux_C2	☐		☐	magenta	X	☐	1	☐	off		-0.0001225			☐	☐	1	-0.04	☐	5
5		☐	☑	default	☐	rel_flux_C3	☐		☐	black	X	☐	1	☐	off		0.0000094			☐	☐	1	-0.045	☐	5
6		☐	☑	default	☐	rel_flux_C4	☐		☐	red	X	☐	1	☐	off		-0.0000517			☐	☐	1	-0.05	☐	5
7		☐	☑	default	☐	rel_flux_C5	☐		☐	purple	X	☐	1	☐	off		-0.0015111			☐	☐	1	-0.055	☐	5
8		☐	☑	default	☐	rel_flux_C6	☐		☐	light blue	X	☐	1	☐	off		0.0000020			☐	☐	1	-0.06	☐	5
9		☐	☑	default	☐	rel_flux_C7	☐		☐	dark gre...	X	☐	1	☐	off		0.0000997			☐	☐	1	-0.065	☐	5
10		☑	☑	default	☐	tot_C_cnts	☐		☐	brown	dot	☐	1	☐	off		0		off	☐	☑	15	-42	☐	5
11		☑	☑	default	☐	AIRMASS	☐		☐	teal	line	☐	1	☐	off		0		off	☐	☑	-15	-42	☐	5
12		☑	☑	default	☐	Width_T1	☐		☐	gray	line	☐	1	☐	off		0		off	☐	☑	15	-42	☐	5
13		☑	☑	default	☐	Sky/Pixel_T1	☐		☐	yellow	line	☐	1	☐	off		0		off	☐	☑	15	-42	☐	5
14		☑	☑	default	☐	X(FITS)_T1	☐		☐	pink	line	☐	1	☐	off		0		off	☐	☑	15	-42	☐	5
15		☑	☑	default	☐	Y(FITS)_T1	☐		☐	light blue	line	☐	1	☐	off		0		off	☐	☑	15	-42	☐	5

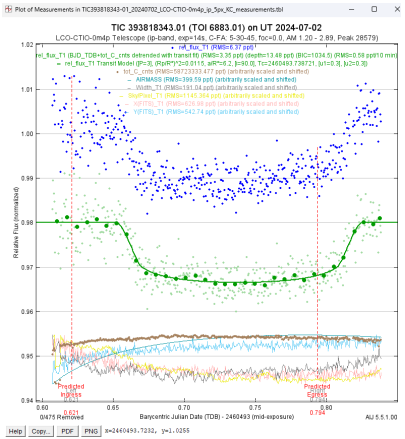
Plot Window

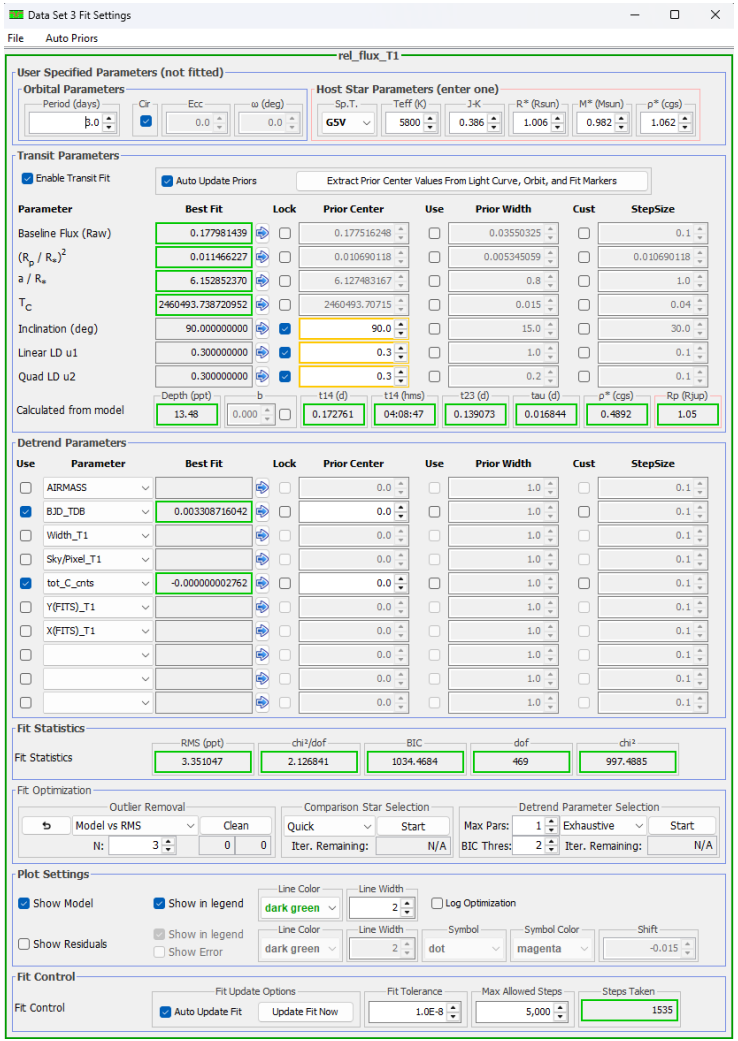
- Displays plotted dataset(s)
- Is interactive with mouse and data table
- Zoom and pan with mouse



Lightcurve Fitting Panel

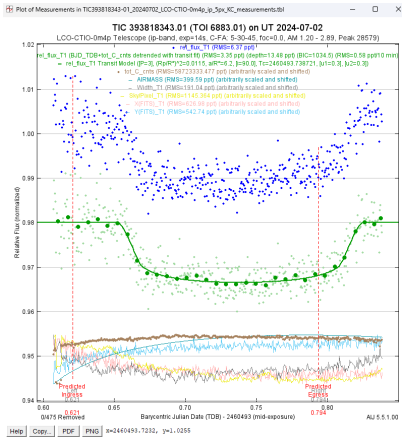
- Set up initial fitting parameters
- View fitted values
- Manually select detrending
- Auto remove bad data points (“clean”)
- Auto optimize comparison stars
- Auto optimize detrending

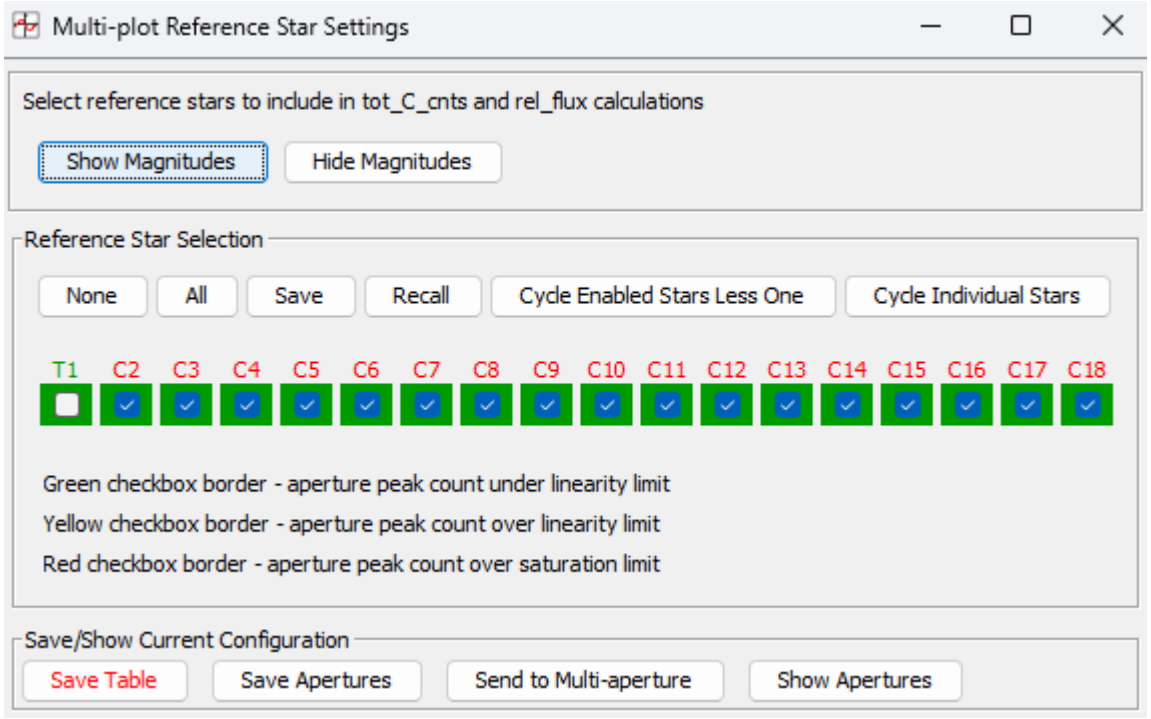




Reference Star Panel

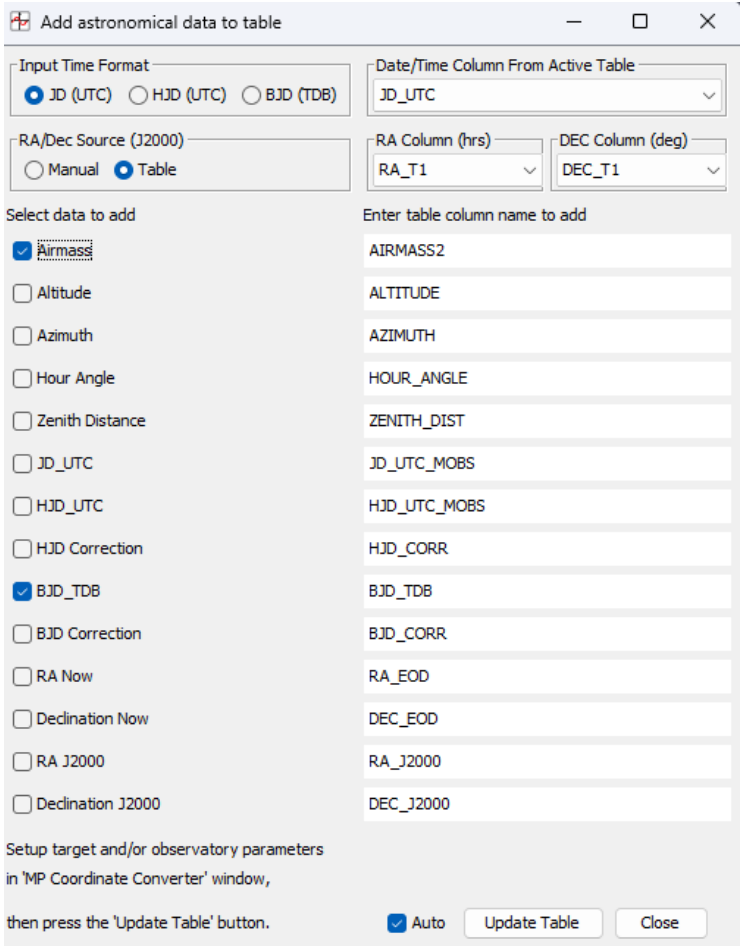
- Interactively change comparison stars
- Add comp star magnitude data (optional)





Add Astronomical Data Panel

- Add calculated data to measurements table
- Examples are BJD_TDB, airmass, etc.
- Optionally runs automatically at end of each Multi-Aperture run



Coordinate Converter Panel

- Convert between time formats
- Convert between coordinate formats
- Calculates observability parameters
- Includes leap second calculations
- Manual control or automatic control from:
    - Data Processor
    - Add Data panel