Data Validation (DV) Report
for TESS ID 399860444
Sectors 26 - 26

This Data Validation Report was produced in the
TESS Science Processing Operations Center (SPOC) Pipeline
at NASA Ames Research Center

24-Jul-2020 23:42:57 Z

Contents

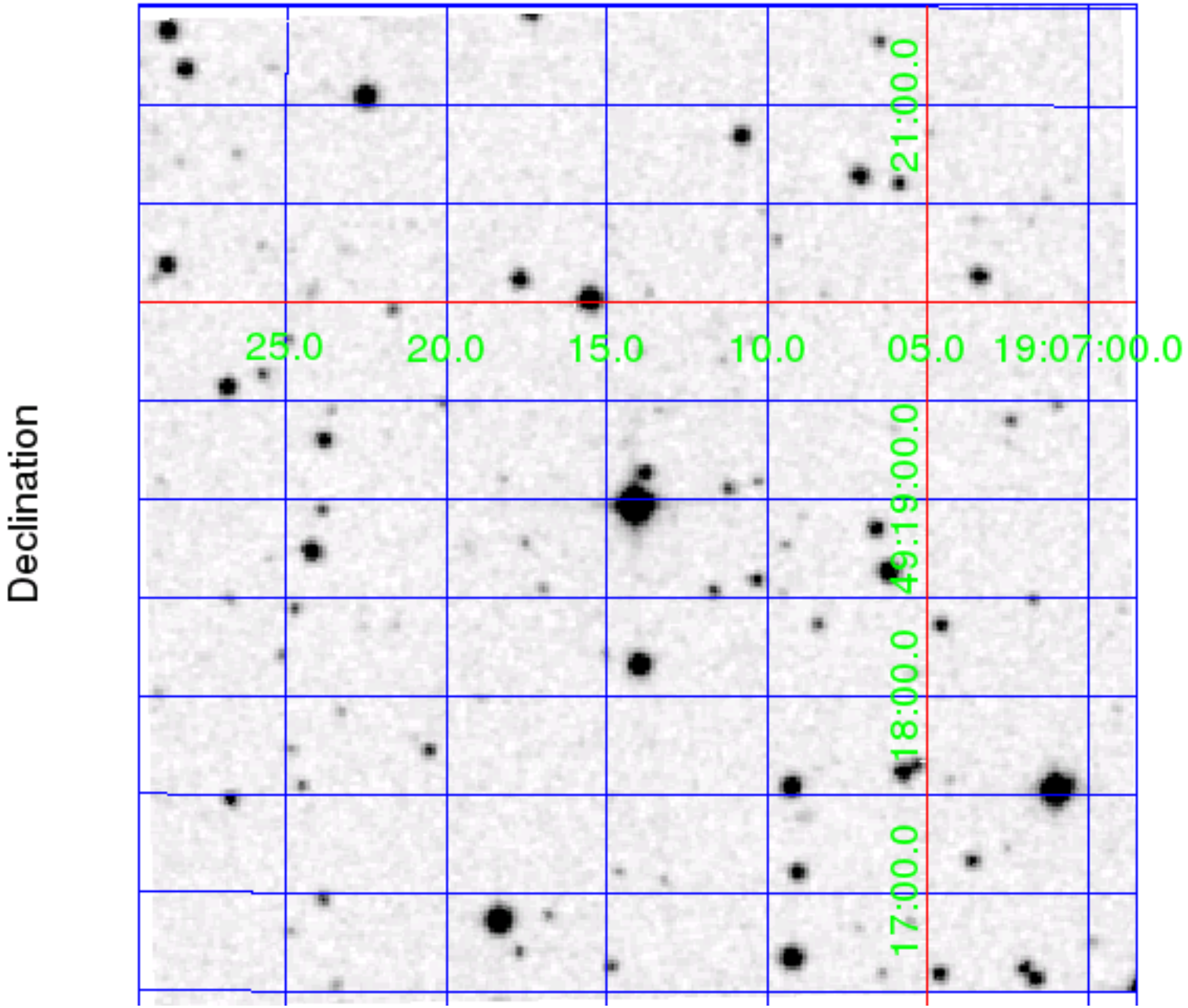
1 Summary

Target Properties	Value	Uncertainty	Units	Provenance
Catalog ID	399860444			
TOI ID	-			
TESS Name	-			
RA	286.80849132	0	degrees	TIC8
Dec	49.31641414	0	degrees	TIC8
Magnitude	10.854	0.0061		TIC8
Radius	1.016	0.040	Solar radii	TIC8
Effective Temperature	5854	102	Kelvin	TIC8
log(g)	4.448	0.070759	cm/sec^2	TIC8
[M/H]	-0.030	0.1	Solar metallicity	TIC8
Stellar Density	1.008	0.169	Solar density	TIC8-Derived
Limb Darkening Coefficient 1	0.54449			
Limb Darkening Coefficient 2	0.011592			
Limb Darkening Coefficient 3	0.28274			
Limb Darkening Coefficient 4	-0.18277			
Number of Planet Candidates	1			
TOI Model	csv-file-toi-catalog-07-16-20-edited.csv			
TESS Names Model	-			
External TCE Model	-			
Software Revision	spoc-5.0.3-20200718			
Date Report Generated	24-Jul-2020 23:42:57 Z			

Sector	Target Table	Camera/ CCD	Crowding Metric	Flux Fraction
26	254	2:1	0.9647	0.8677

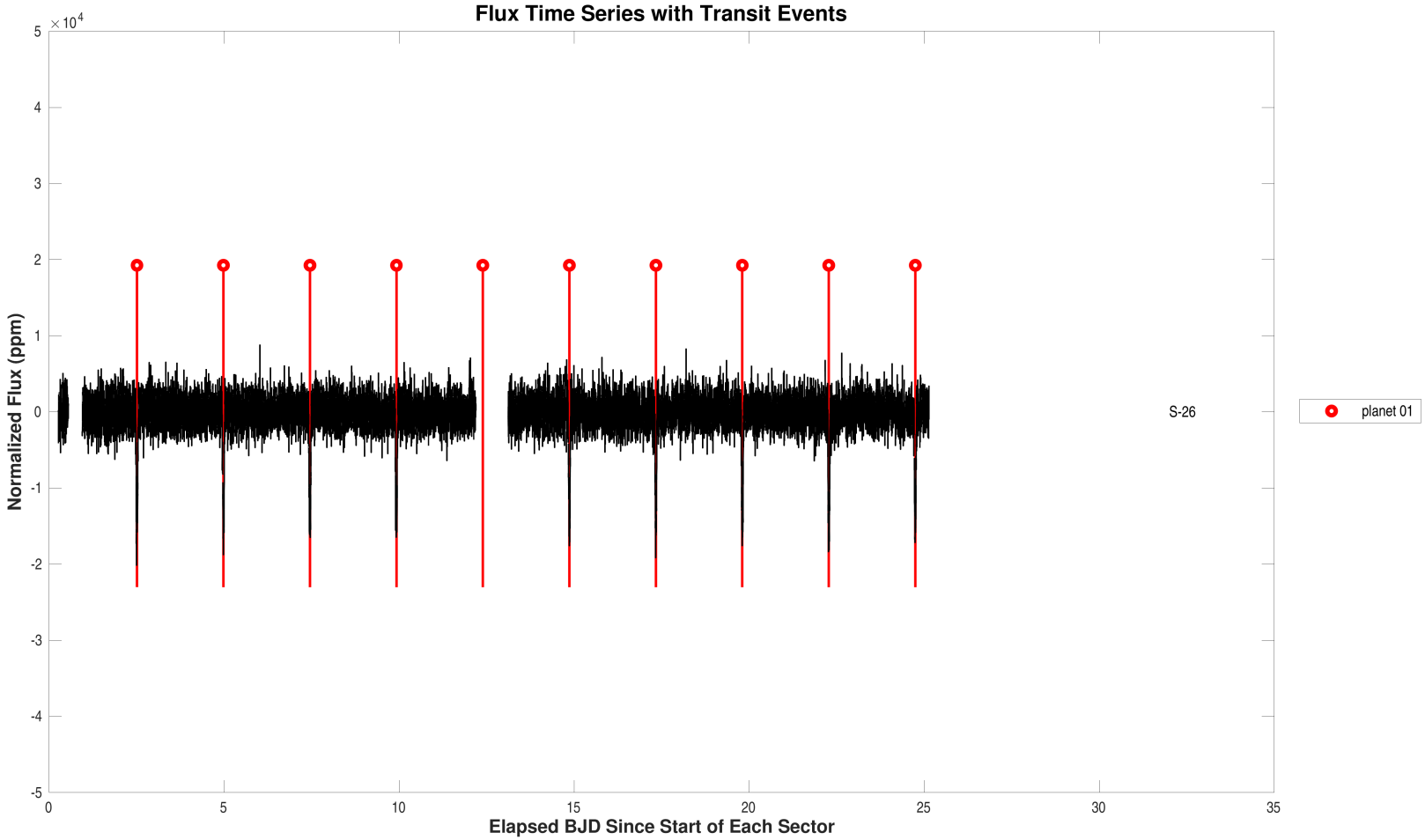
Planet Candidate	TOI ID	TESS Name	TOI Correlation	Period (days)	Period Ratio	Epoch (BTJD)	Semi-major Axis (AU)	Radius (Re)	Seff	Teq (K)	False Alarm	Suspected EB
1	-	-	-	2.471	1.00	2012.511	0.04	14.0	817.6	1364	0.00e+00	false

2 Survey Image

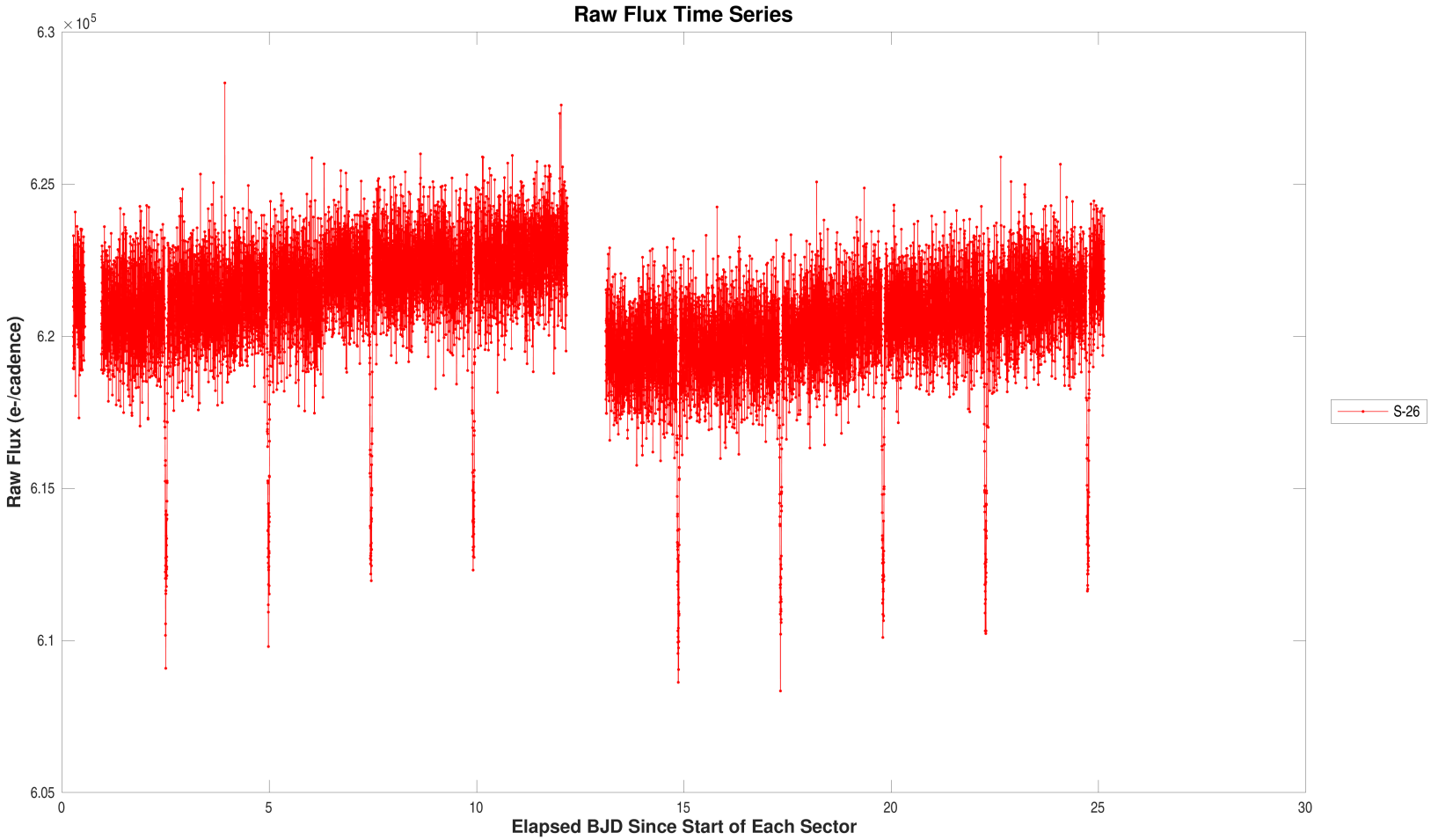


Digitized Sky Survey (DSS) red image. The 5' x 5' image is centered on the J2000 coordinates of target (399860444).

3 Flux Time Series



Summary plot of sector-stitched flux time series and transits for target 399860444, marked with DV fitted epoch/period (or TPS epoch/period if fit was not successful). Transits of identified planets are labeled with epoch BTJD and orbital period. For the data of sector 26, target table 254, start BJD is 2459010.
Open `./summary-plots/0000000399860444-00-flux-dv-fit-26-254.fig`



Summary plot of raw flux time series. For the data of sector 26, target table 254, start BJD is 2459010.
Open `./summary-plots/0000000399860444-00-raw-flux-26-254.fig`

4 Dashboards

Planet Candidate 1

<table>
<tr>
<td rowspan="2">Model Fitter</td>
<td colspan="2">Stellar Radius
1.0 ± 0.0 Solar units</td>
<td rowspan="2">Core Aperture Correlation Statistic
Value = 62.57
Significance = 100.00%
Halo Aperture Correlation Statistic
Value = 13.00
Significance = 100.00%
Core/Halo Ratio
Ratio = 4.81</td>
<td rowspan="2">Ghost Diagnostic Test</td>
</tr>
<tr>
<td colspan="2">Period = 2.5 ± 0.0 days
Depth = 14796 ± 169 ppm
Planet Radius = 14.0 ± 0.6 Earth radii
Semi-major Axis = 0.0 ± 0.0 AU
Effective Stellar Flux = 817.6 ± 107.6
Equilibrium Temperature = 1364 ± 45 Kelvin
Chi-squared/DoF = 0.8
SNR = 109.1</td>
</tr>
<tr>
<td rowspan="2">Eclipsing Binary Discrimination Test</td>
<td colspan="2">Odd-Even Depth Comparison Statistic
Value = 2.84e-01
Significance = 59.44%</td>
<td>Offsets Relative to Out of Transit Centroid
Source RA Offset = 4.03e-01 ± 2.50e+00 arcsec (0.16 σ)
Source Dec Offset = -4.02e-01 ± 2.51e+00 arcsec (-0.16 σ)
Source Offset Distance = 5.69e-01 ± 2.50e+00 arcsec (0.23 σ)
Offsets Relative to TIC Position
Source RA Offset = 3.65e-01 ± 2.50e+00 arcsec (0.15 σ)
Source Dec Offset = -9.12e-01 ± 2.51e+00 arcsec (-0.36 σ)
Source Offset Distance = 9.82e-01 ± 2.51e+00 arcsec (0.39 σ)</td>
<td>Difference Image Centroid Offsets</td>
</tr>
<tr>
<td>Shorter Period Comparison Statistic
Value = N/A
Significance = N/A</td>
<td>Longer Period Comparison Statistic
Value = N/A
Significance = N/A</td>
<td>False Alarm = 0.00e+00
Transit Count = 10
Max Multiple Event Statistic = 106.5</td>
<td>Bootstrap Test</td>
</tr>
</table>

Summary of model fitter results and validation test results for target 399860444, planet candidate 1. In general, green denotes that the candidate is likely a planet, while red denotes that the candidate is unlikely to be a planet. Cyan denotes that no data is available. The color of the Model Fitter block is: green, when the SNR of the fit is greater than or equal to 10; yellow, if the SNR is greater than or equal to 7.1 but less than 10; red, if the SNR is less than 7.1 or if the fitter failed. The color of the Ghost Diagnostic Test and Eclipsing Binary Discrimination Test blocks are: green, when the significance is within 2-sigma; yellow, when the significance is between 2- and 3-sigma; red when the significance is greater than 3-sigma. The color of the Difference Image Centroid Offsets block is: green, when the max offset distance sigma is less than or equal to 2; yellow, when the max sigma is between 2 and 3; red when the max sigma is greater than 3. The color of the Bootstrap Test block is green whenever the false alarm probability is less than 10^{-12}, low enough to limit the total number of false alarms from a four year mission to less than one. If the false alarm probability is greater than 10^{-12}, the color of the Bootstrap Test block is: green, when the false alarm probability is less than or equal to the CCDF of a Gaussian distribution at the observed maximum multiple event statistic; yellow when the false alarm probability is between 1 and 2 times that of a Gaussian distribution at the max multiple event statistic; and red when the false alarm probability is more than 2 times that of a Gaussian distribution at the max multiple event statistic.

5 Pixel Level Diagnostics

To reduce clutter, the catalog IDs in the difference images have been replaced by indices representing distance from the target star. The mapping between the indices and the catalog IDs is found in a table at the end of this section.

5.1 Planet Candidate 1

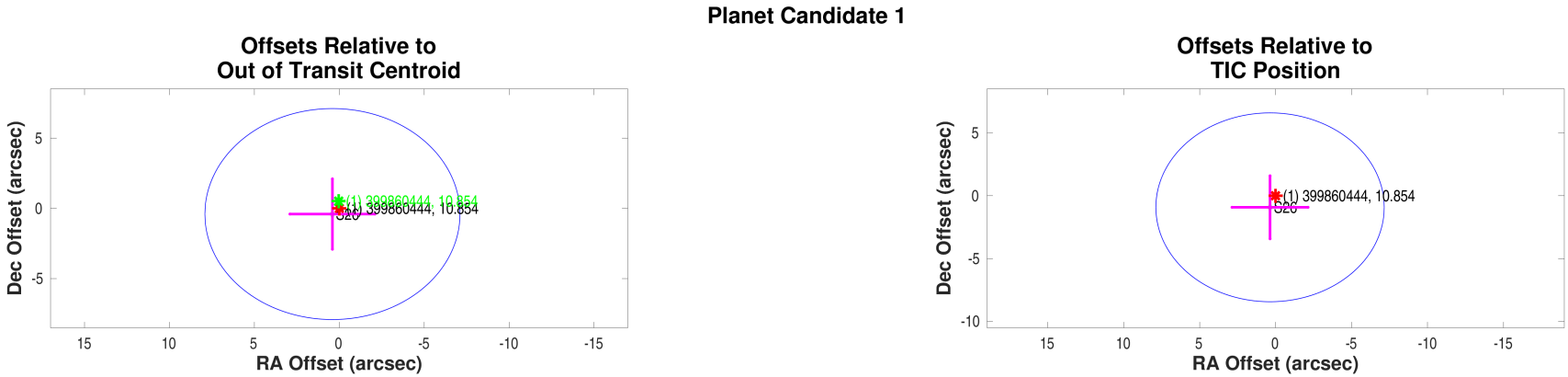
Multi-Sector Average PRF Fit of the Difference Images

Mean offset from the PRF fit to the out of transit image

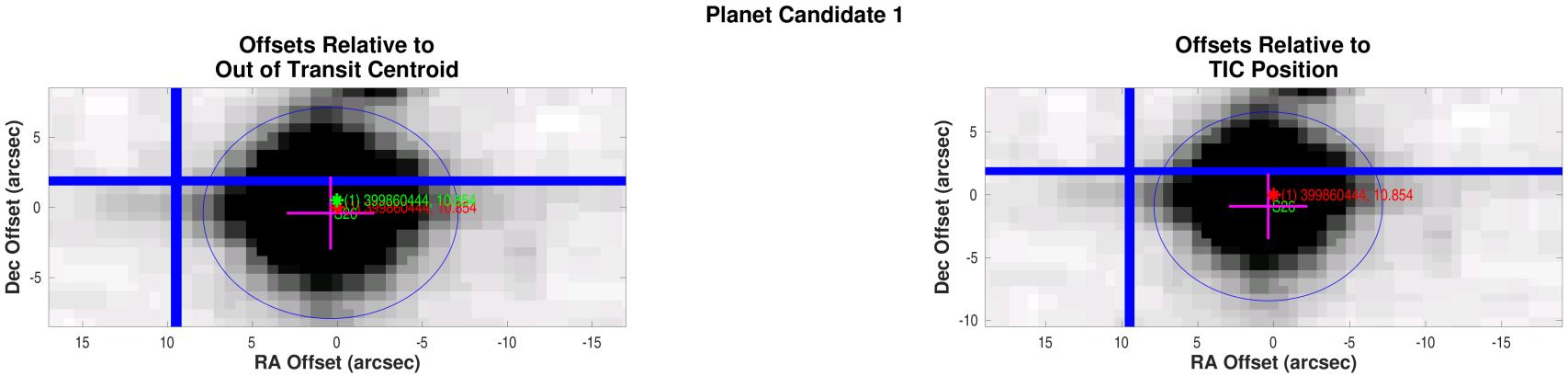
	RA	Dec	Units
Offset	$0.4032 \pm 2.50e+00$	$-0.4019 \pm 2.51e+00$	arcseconds
Offset/σ	0.16	−0.16	
Offset Distance	$0.5693 \pm 2.50e+00$		arcseconds
Offset Distance/σ	0.23		
3σ Radius	7.5119		arcseconds

Mean offset from the TIC RA and Dec

	RA	Dec	Units
Offset	$0.3648 \pm 2.50e+00$	$-0.9119 \pm 2.51e+00$	arcseconds
Offset/σ	0.15	−0.36	
Offset Distance	$0.9822 \pm 2.51e+00$		arcseconds
Offset Distance/σ	0.39		
3σ Radius	7.5154		arcseconds



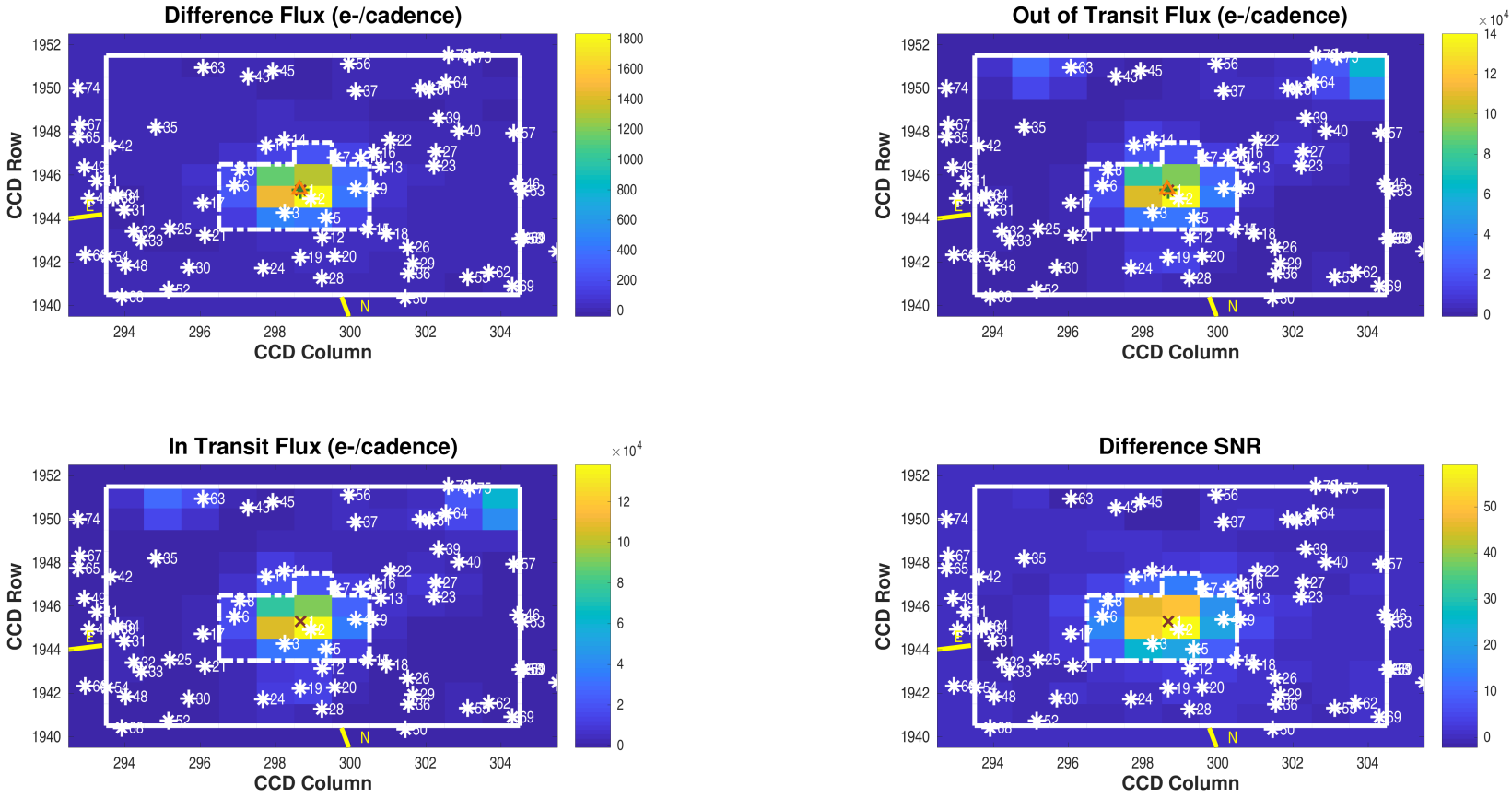
Difference image centroid offsets for target 399860444, planet candidate 1. Left: difference image PRF centroid offsets in RA and Dec with respect to the per sector out-of-transit centroids for the given target. Right: difference image PRF centroid offsets in RA and Dec with respect to the TC coordinates of the given target. Symbol key: green cross: per sector centroid offsets with 1-sigma error bars in RA and Dec; magenta cross: robust weighted mean offset over all sectors with 1-sigma error bars in RA and Dec; blue circle: 3-sigma radius of confusion for weighted mean offset; red asterisk: location of target star (out-of-transit centroid in left panel and TIC position in right panel); green asterisk: TIC location of target star with respect to out-of-transit centroid; blue asterisk: location of other TIC objects in the neighborhood. TIC ID and magnitude are noted in the text associated with each marked object. A constant error term of 2.5000 arcseconds has been added in quadrature to the computed uncertainty in the RA and Dec components of the robust mean offset.
Open `./planet-01/difference-image/0000000399860444-01-difference-image-centroid-offsets.fig`



Difference image centroid offsets for target 399860444, planet candidate 1, diplayed on survey image for given target. Left: difference image PRF centroid offsets in RA and Dec with respect to the per sector out-of-transit centroids for the given target. Right: difference image PRF centroid offsets in RA and Dec with respect to the TIC coordinates of the given target. Symbol key: green cross: per sector centroid offsets with 1-sigma error bars in RA and Dec; magenta cross: robust weighted mean offset over all sectors with 1-sigma error bars in RA and Dec; blue circle: 3-sigma radius of confusion for weighted mean offset; red asterisk: location of target star (out-of-transit centroid in left panel and TIC position in right panel); green asterisk: TIC location of target star with respect to out-of-transit centroid; blue asterisk: location of other TIC objects in the neighborhood. TIC ID and magnitude are noted in the text associated with each marked object. A constant error term of 2.5000 arcseconds has been added in quadrature to the computed uncertainty in the RA and Dec components of the robust mean offset.
Open `./planet-01/difference-image/00000003998604444-01-difference-image-centroid-offsets-survey.fig`

Difference Image Summary Metrics

Number of Difference Images	Number of Metrics	Number of Good Metrics	Fraction of Good Metrics	Quality Threshold
1	1	1	1.0000	0.70



Difference image for target 399860444, planet candidate 1, sector 26, target pixel table 254. Upper left: difference between mean flux out-of-transit and in-transit; upper right: mean out-of-transit flux; lower left: mean in-transit flux; lower right: difference between mean flux out-of-transit and in-transit after normalizing by the uncertainty in the difference for each pixel. The optimal aperture is outlined with a white dash-dotted line in each panel and the target mask is outlined with a solid white line. Symbol key: x: target position from TIC RA and Dec converted to CCD coordinates via motion polynomials; *: position of nearby TIC objects converted to CCD coordinates via motion polynomials; +: PRF-fit location of target from out-of-transit image; triangle: PRF-fit location of transit source from the difference image. Number of transits = 9; number of valid in-transit cadences = 245; number of in-transit cadence gaps = 6; number of valid out-of-transit cadences = 1021; number of out-of-transit cadence gaps = 13. Difference image quality metric = 1.00 (good).
Open `./planet-01/difference-image/0000000399860444-01-difference-image-26-254.fig`

PRF Fit of the Difference Image

Offset from the PRF fit to the out of transit image

	Row	Column	Units	RA	Dec	Units
Out of Transit Image Centroid	$1945.33 \pm 4.89e-05$	$298.67 \pm 4.79e-05$	pixels	$286.80852047 \pm 1.08e-06$	$49.31628167 \pm 1.05e-06$	degrees
Difference Image Centroid	$1945.34 \pm 8.07e-03$	$298.64 \pm 8.11e-03$	pixels	$286.80869229 \pm 4.60e-05$	$49.31617004 \pm 4.65e-05$	degrees
Offset	$0.0148 \pm 8.07e-03$	$-0.0240 \pm 8.11e-03$	pixels	$0.4032 \pm 1.08e-01$	$-0.4019 \pm 1.67e-01$	arcseconds
Offset/σ	1.84	−2.97		3.73	−2.40	
Offset Distance	$0.0282 \pm 8.17e-03$		pixels	$0.5693 \pm 1.44e-01$		arcseconds
Offset Distance/σ	3.46			3.97		

Offset from the TIC RA and Dec converted to pixels via motion polynomials

	Row	Column	Units	RA	Dec	Units
TIC Reference Centroid	$1945.30 \pm 1.76e-04$	$298.67 \pm 1.84e-04$	pixels	$286.80853685 \pm 0.00e+00$	$49.31642334 \pm 0.00e+00$	degrees
Difference Image Centroid	$1945.34 \pm 8.07e-03$	$298.64 \pm 8.11e-03$	pixels	$286.80869229 \pm 4.60e-05$	$49.31617004 \pm 4.65e-05$	degrees
Offset	$0.0394 \pm 8.07e-03$	$-0.0275 \pm 8.11e-03$	pixels	$0.3648 \pm 1.08e-01$	$-0.9119 \pm 1.67e-01$	arcseconds
Offset/σ	4.88	−3.39		3.38	−5.45	
Offset Distance	$0.0480 \pm 8.16e-03$		pixels	$0.9822 \pm 1.62e-01$		arcseconds
Offset Distance/σ	5.88			6.06		

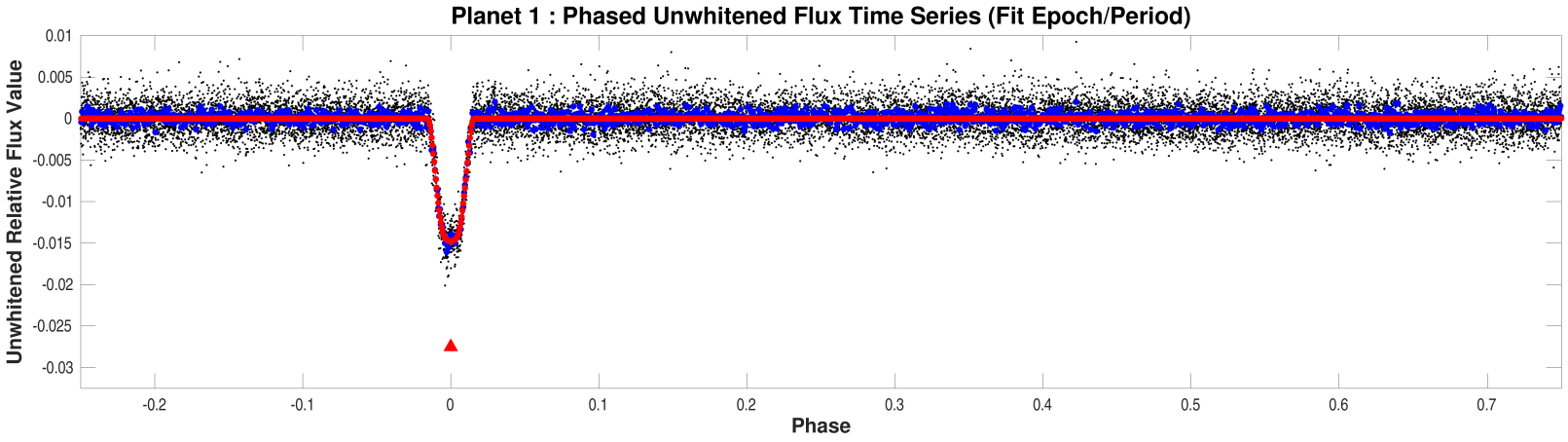
5.2 Difference Image TIC Key

Index	Catalog ID	Mag	RA (degrees)	Dec (degrees)	Distance (arcsec)
1	399860444	10.854	286.80853685	49.31642334	0.00
2	399860447	15.819	286.80701035	49.31888917	9.57
3	1717148497	19.500	286.81395528	49.32169195	22.84
4	399860445	17.323	286.79622936	49.31771891	29.26
5	1717148494	19.595	286.80525498	49.32433946	29.52
6	1717148470	18.669	286.82268283	49.31314209	35.24
7	399860434	17.263	286.79813115	49.30912519	35.87
8	1717148469	18.549	286.82022521	49.30930613	37.54
9	1717148474	18.704	286.79250533	49.31830195	38.23
10	399860436	16.633	286.79260792	49.30999857	43.96
11	1717148467	19.473	286.81236004	49.30380165	46.32
12	1717148495	19.050	286.80776439	49.32928726	46.35
13	1717148471	18.688	286.78894885	49.31300948	47.58
14	399860428	13.690	286.80789500	49.30294332	48.55
15	1717148499	19.375	286.79707465	49.32855230	51.28
16	1717148472	19.628	286.78925809	49.30895572	52.63
17	1717148446	19.729	286.83116048	49.31659410	53.10
18	1717148475	19.385	286.79333919	49.33028750	61.34
19	399860455	13.450	286.81427935	49.33370353	63.65
20	399860456	18.683	286.80662281	49.33456370	65.46
21	1717148451	18.289	286.83343537	49.32501416	66.11
22	1717148473	17.552	286.78464214	49.30632001	66.84
23	399860442	15.671	286.77713340	49.31435061	74.07
24	399860457	15.306	286.82343035	49.33533151	76.52
25	1717148449	19.768	286.84056788	49.32221468	78.01
26	1717148501	19.779	286.78977412	49.33452327	78.64
27	399860437	14.348	286.77553871	49.31071927	80.12
28	1717148498	19.384	286.81130998	49.33971672	84.11
29	399860461	17.609	286.79003219	49.33882613	91.60
30	1717148448	17.674	286.83975250	49.33281784	94.07
31	399860443	17.489	286.84902176	49.31595263	95.02
32	399860449	15.863	286.84879646	49.32179480	96.44
33	1717148447	19.111	286.84789827	49.32435231	96.68
34	1717148441	18.704	286.84919899	49.31192545	96.79
35	1717148404	17.018	286.83511708	49.29563492	97.43
36	1717148500	19.504	286.79180727	49.34125176	97.62
37	399860420	14.679	286.78804639	49.29257878	98.39
38	399860440	14.881	286.85041152	49.31251504	99.27

Index	Catalog ID	Mag	RA (degrees)	Dec (degrees)	Distance (arcsec)
39	1717148465	18.477	286.77213938	49.30218483	99.62
40	399860430	16.013	286.76871148	49.30616337	100.49
41	1717148440	17.522	286.85260646	49.30758163	108.21
42	1717148402	19.133	286.84662079	49.29896229	109.27
43	1717148462	18.332	286.81054456	49.28545781	111.58
44	1717148444	19.634	286.85575944	49.31180398	112.06
45	1717148461	19.270	286.80459358	49.28475258	114.39
46	1717148483	19.403	286.76016238	49.32159972	115.04
47	399860421	15.156	286.77354720	49.29388566	115.44
48	1717148456	18.192	286.85341785	49.33027896	116.54
49	1717148439	18.403	286.85424415	49.30366458	116.69
50	399860466	15.382	286.79462045	49.34756062	116.75
51	399860423	17.128	286.77166815	49.29451219	117.08
52	1717148458	19.516	286.84605362	49.33788292	117.13
53	1717148486	17.559	286.75968073	49.32357180	117.51
54	399860452	17.267	286.85674444	49.32738805	119.82
55	399860464	15.110	286.77910291	49.34408415	121.19
56	399860415	15.727	286.78729930	49.28535880	122.44
57	1717148478	18.024	286.75675828	49.30839466	124.90
58	1717148489	16.906	286.76419423	49.33579683	125.27
59	399860458	15.658	286.76354058	49.33576848	126.49
60	1717148443	18.468	286.86098890	49.30829894	126.52
61	1717148488	15.959	286.76345309	49.33575190	126.63
62	399860463	16.572	286.77404360	49.34347864	126.65
63	1717148395	18.376	286.81966230	49.28175396	127.51
64	1717148463	19.303	286.76742964	49.29316304	127.74
65	1717148438	19.047	286.85303983	49.29572332	128.30
66	399860451	15.227	286.86141269	49.32629519	129.08
67	1717148403	17.997	286.85158788	49.29258486	132.56
68	1717148457	19.272	286.85693663	49.33822377	138.06
69	1717148510	19.431	286.77000377	49.34776801	144.60
70	1717148487	19.710	286.75719055	49.34027953	147.97
71	399860468	13.616	286.84343611	49.35080772	148.43
72	399860416	16.723	286.76460120	49.28622623	149.83
73	399860418	16.555	286.86083153	49.29144279	152.15
74	399860412	16.782	286.84889450	49.28305879	152.96
75	1717148343	19.582	286.76010148	49.28742652	154.33
76	399860465	18.402	286.86026626	49.34599173	161.46

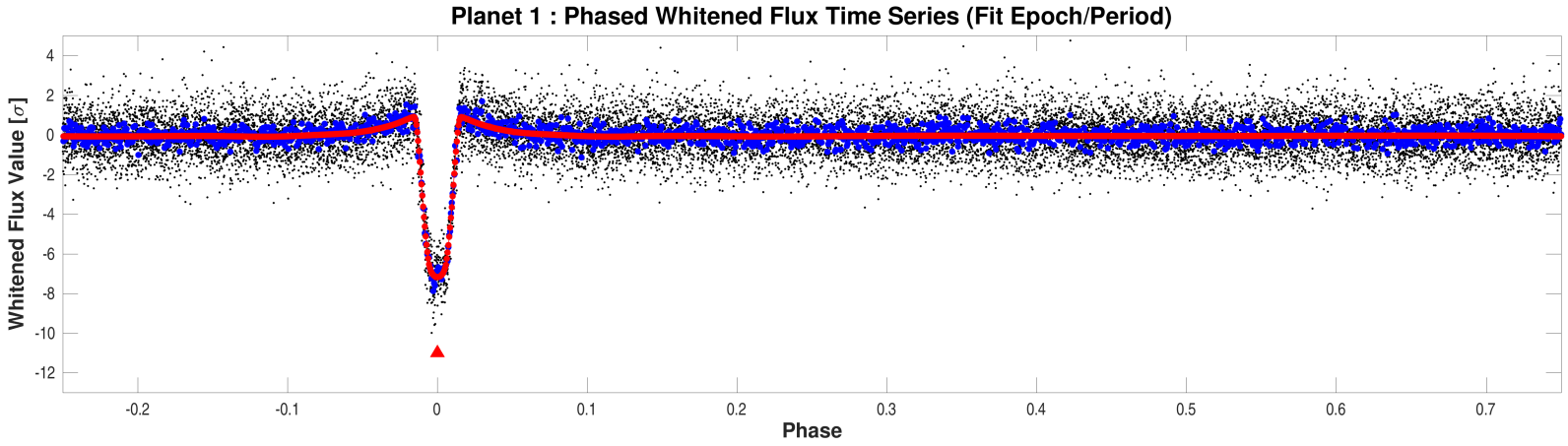
RA, Dec and Distances are corrected for proper motion. This table may not contain all of the objects shown.

6 Phased Light Curves

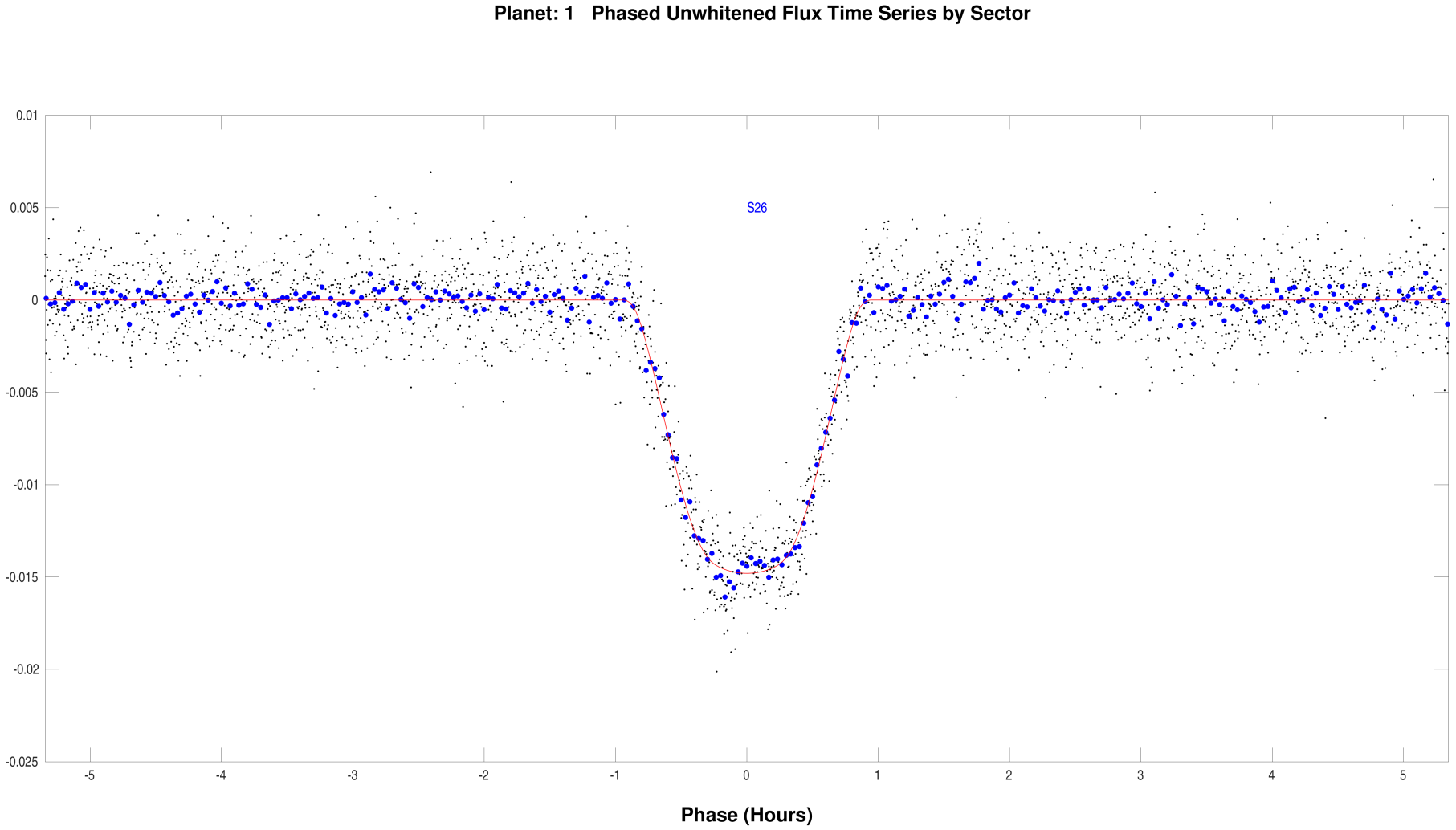


Phased unwhitened flux time series is plotted in black dots. When all transits fit completed with full or secondary convergence, the phase is determined with the fitted epoch and period; otherwise, the phase is determined with the TPS epoch and period. The values of the phased unwhitened flux time series averaged in one cadence wide bins are plotted in bigger blue dots. When all transits fit completes with full or secondary convergence, the averaged values of the phased unwhitened fitted model light curve are plotted in red dots. Transit event markers in different colors indicate the locations of the transits of all planet candidates. The transits of the same planet candidate are labeled with the markers of the same color, for example, blue markers for transits of plane candidate #1, red markers for transits of planet candidate #2, etc.

Open `./summary-plots/0000000399860444-01-phased-unwhitened-flux-time-series.fig`



Phased whitened flux time series is plotted in black dots. When all transits fit completed with full or secondary convergence, the phase is determined with the fitted epoch and period; otherwise, the phase is determined with the TPS epoch and period. The values of the phased whitened flux time series averaged in one cadence wide bins are plotted in bigger blue dots. When all transits fit completes with full or secondary convergence, the averaged values of the phased whitened fitted model light curve are plotted in red dots. Transit event markers in different colors indicate the locations of the transits of all planet candidates. The transits of the same planet candidate are labeled with the markers of the same color, for example, blue markers for transits of plane candidate #1, red markers for transits of planet candidate #2, etc.
Open `./summary-plots/0000000399860444-01-phased-whitened-flux-time-series.fig`



Phased unwhitened flux time series by sector for target 399860444, planet candidate 1. Period = 2.4706 days; transit epoch = 2012.5106 BTJD.
Open `./summary-plots/0000000399860444-01-phased-unwhitened-flux-time-series-by-sector.fig`

7 Planet Candidate 1

7.1 Model Fitter: All Transits

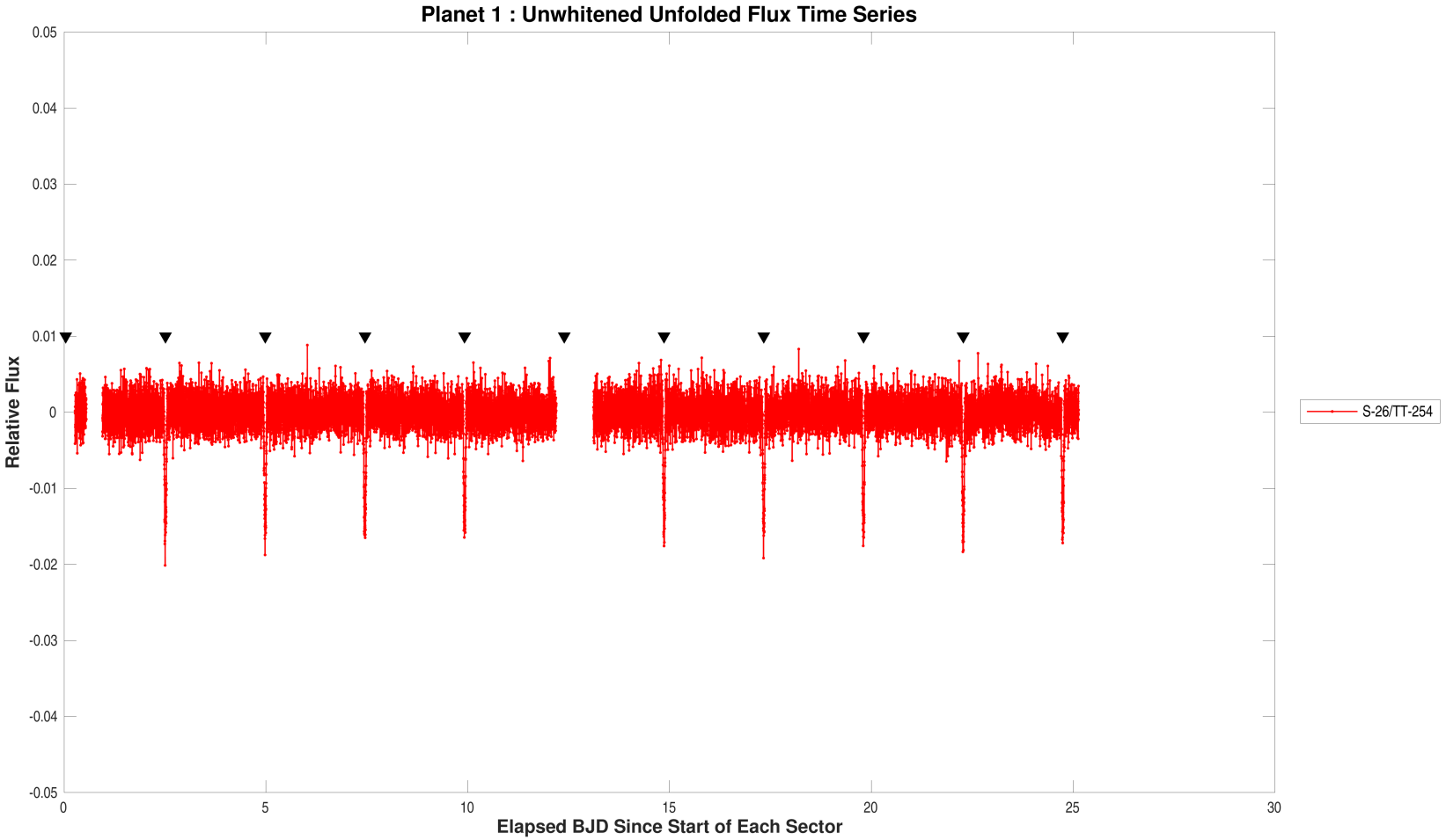
Model Characteristic	Name
Transit Model	mandel-agol_geometric_transit_model
Limb Darkening Model	claret_tess_nonlinear_limb_darkening_model

TCE Parameter	Value	Units
Trial Transit Pulse Duration	1.5	hours
Transit Epoch	2012.5107259	TJD
Orbital Period	2.4700303	days
Maximum SES	38.7	
Maximum MES	106.5	
Robust Statistic	104.1	
Chi Square Goodness of Fit Statistic (DoF)	1049.9 (393)	
Chi Square2 Statistic (DoF)	102.1 (955.6)	
Threshold for Desired PFA		

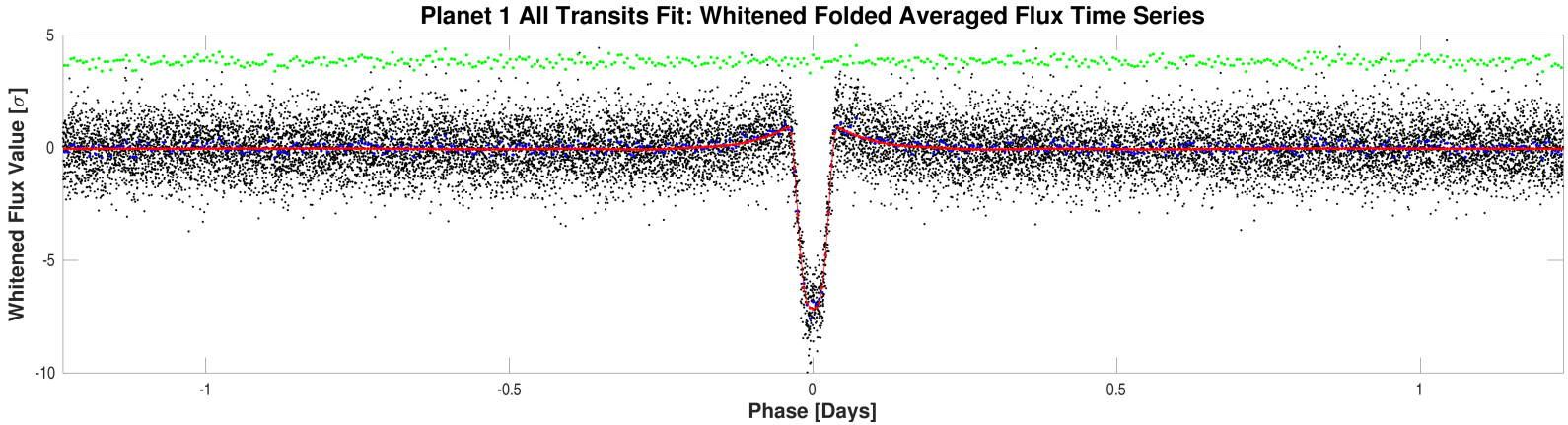
DoF: Degrees of Freedom

Parameter	Value	Uncertainty	Units
SNR	109.1		
Orbital Period	2.4705818	5.9471e-05	days
Transit Epoch	2012.5105762	3.2420e-04	BTJD
Impact Parameter	0.8415	7.5389e-03	
Planet Radius to Star Radius Ratio	0.1261376	1.0928e-03	
Semi-major Axis to Star Radius Ratio	7.9909	1.5280e-01	
Planet Radius	13.9925	5.6724e-01	Earth radii
Semi-major Axis	0.0365	2.2013e-03	AU
Effective Stellar Flux	817.5789	1.0759e+02	Goldilocks
Equilibrium Temperature	1364	4.4867e+01	Kelvin
Stellar Density	1.1231	6.4428e-02	Solar density
Transit Depth	14796	1.6914e+02	ppm
Transit Duration	1.7802	1.9929e-02	hours
Transit Ingress Duration	0.6101	3.8578e-02	hours
Eccentricity	0.0000	0.0000e+00	
Peri Longitude	0.0000	0.0000e+00	degrees
Model Chi Square Statistic (DoF)	2034.9 (2461.2)		
Model Chi Square Goodness of Fit Statistic (DoF)	277.7 (509)		
Model Chi Square2 Statistic (DoF)	3.8 (8)		

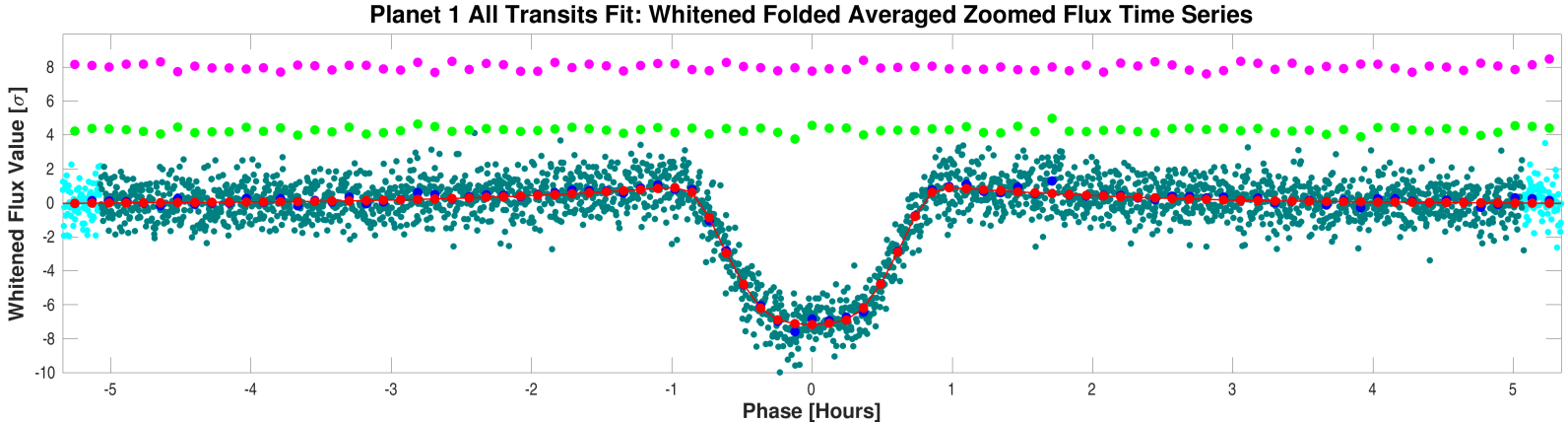
DoF: Degrees of Freedom



Flux time series for CatId 399860444, Planet candidate 1 in the unwhitened domain. For the data of Sector-26/TargetTableId-254, start BJD is 2459010. Transit event markers indicate the location of transits of the given planet candidate. All transits fit completed with full convergence.
Open `./planet-01/planet-search-and-model-fitting-results/all-transits-fit/0000000399860444-01-all-unwhitened-26-254.fig`



Folded flux time series for CatId 399860444, Planet candidate 1 in the whitened domain is plotted in black dots. Values are averaged into 1 cadence wide bins. The blue dots represent the averaged values of the folded flux time series; the red dots represent the averaged values of the folded model light curve of the all transits fit; the green dots are the averaged folded fit residuals, vertically offset for clarity. All transits fit completed with full convergence.
Open `./planet-01/planet-search-and-model-fitting-results/all-transits-fit/0000000399860444-01-all-whitened.fig`

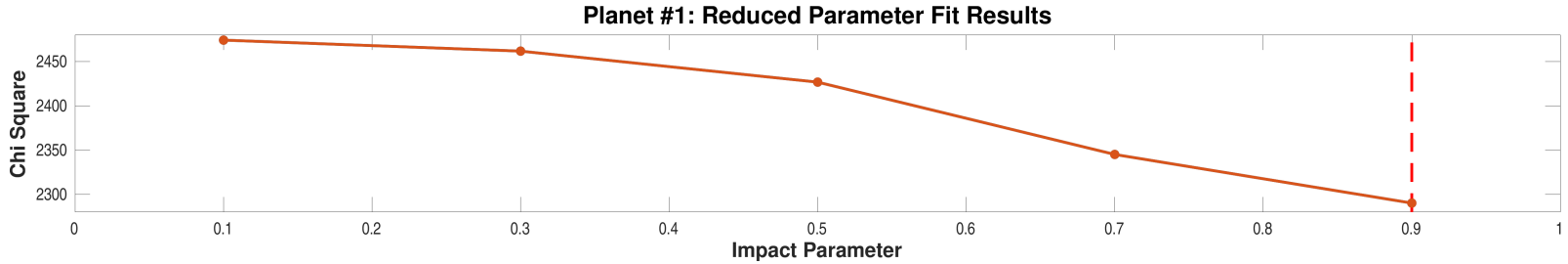


Folded flux time series for CatId 399860444, Planet candidate 1 in the whitened domain, zoomed on the transit. The flux data whose robust weights are larger/smaller than 0.1 are plotted in dark green/cyan dots, respectively. Values are averaged into 1 cadence wide bins. The blue dots represent the averaged values of the folded flux time series; the red dots represent the averaged values of the fitted model light curve of the all transits fit; the green dots are the averaged folded fit residuals, vertically offset for clarity. Magenta dots are the averaged values of the folded flux time series, with a phase shift of 0.5 relative to the blue dots, vertically offset for clarity. All transits fit completed with full convergence.
Open `./planet-01/planet-search-and-model-fitting-results/all-transits-fit/0000000399860444-01-all-whitened-zoomed.fig`

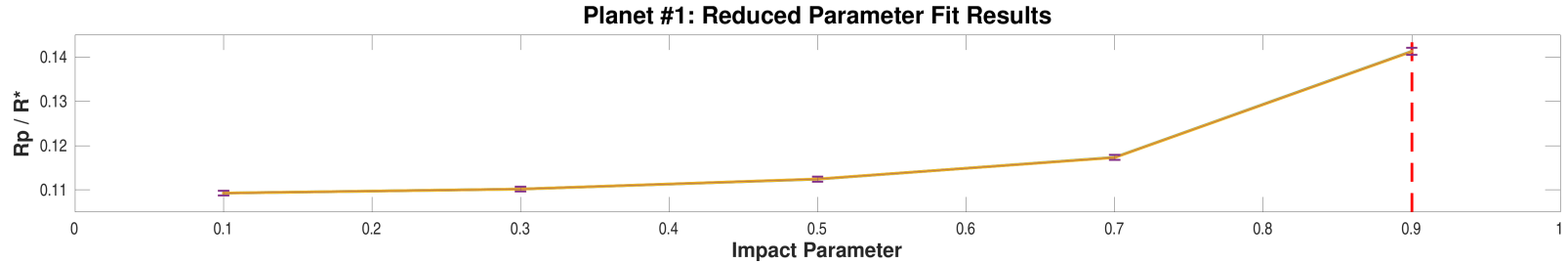
7.2 Model Fitter: Reduced Parameter Fit Results

Impact Parameter	SNR	Model Chi Square	Planet Radius to Star Radius	Uncert	Semi-major Axis to Star Radius	Uncert	Transit Depth (ppm)	Uncert	Transit Duration (hours)	Uncert
0.10	110.7	2474.1	0.1092787	5.3788e-04	14.3272	7.7547e-02	13882	1.3582e+02	1.4569	7.7948e-03
0.30	110.5	2461.7	0.1101904	5.4331e-04	13.7494	7.5787e-02	13908	1.3628e+02	1.4692	8.0005e-03
0.50	111.2	2426.7	0.1124404	5.5167e-04	12.5172	7.2043e-02	13996	1.3637e+02	1.5012	8.5265e-03
0.70	113.0	2345.0	0.1173484	5.6600e-04	10.3409	6.5545e-02	14222	1.3590e+02	1.5951	9.9439e-03
0.90	113.9	2290.1	0.1412920	8.1642e-04	7.1434	6.4324e-02	15628	1.5043e+02	1.8723	1.5890e-02

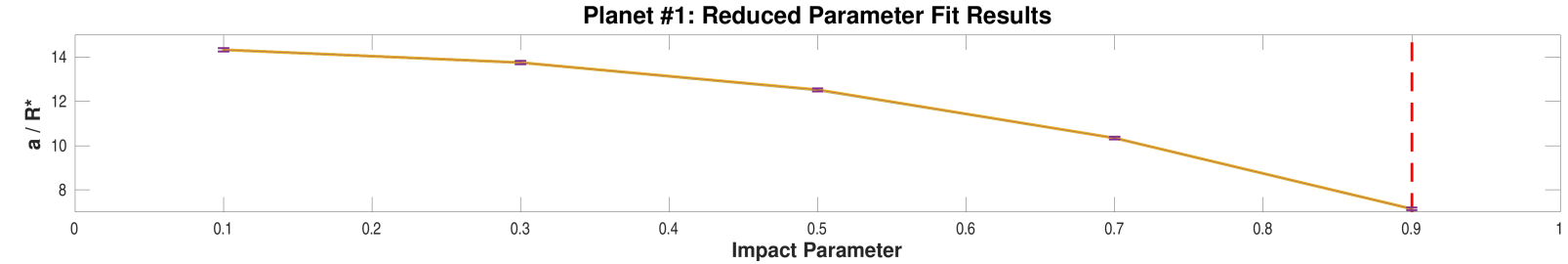
Highlighted row is the best reduced-parameter model fit.



Model chi squares of reduced parameter fits vs. impact parameter for CatId 399860444, Planet candidate 1. The fit result with the minimum chi square is marked with a dashed line in the plot.
Open `./planet-01/planet-search-and-model-fitting-results/reduced-parameter-fits/0000000399860444-01-reduced-fits-chi-square.fig`



Ratios of planet radius to star radius of reduced parameter fits vs. impact parameter for CatId 399860444, Planet candidate 1. The fit result with the minimum chi square is marked with a dashed line in the plot.
Open `./planet-01/planet-search-and-model-fitting-results/reduced-parameter-fits/0000000399860444-01-reduced-fits-rp-over-rstar.fig`



Ratios of semimajor axis to star radius of reduced parameter fits vs. impact parameter for CatId 399860444, Planet candidate 1. The fit result with the minimum chi square is marked with a dashed line in the plot.
Open `./planet-01/planet-search-and-model-fitting-results/reduced-parameter-fits/0000000399860444-01-reduced-fits-a-over-rstar.fig`

7.3 Model Fitter: Trapezoidal Fit Results

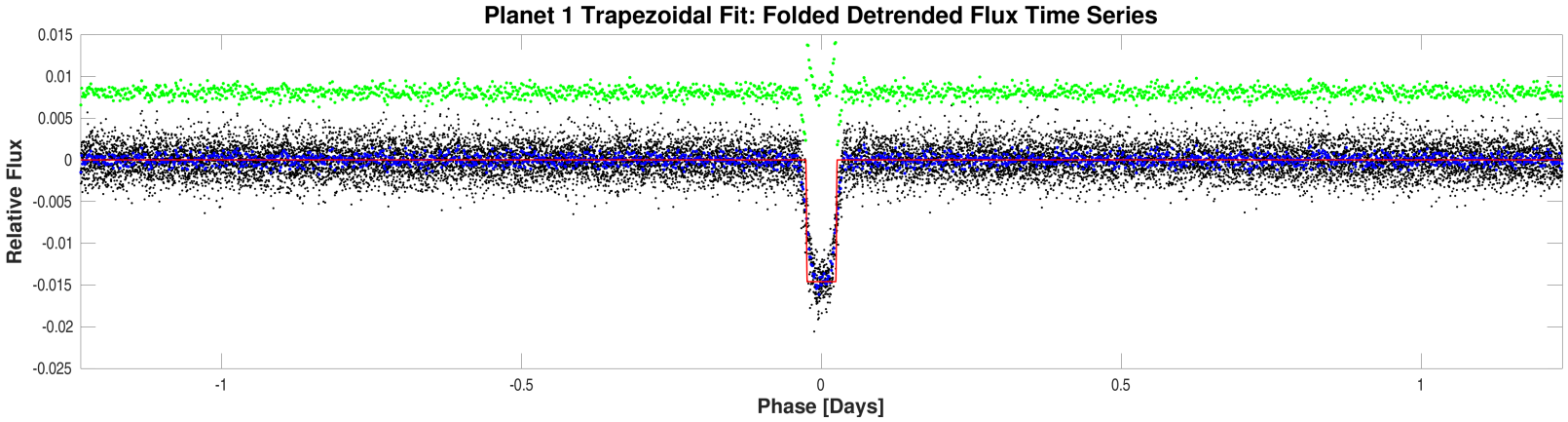
Model Characteristic	Name
Transit Model	trapezoidal_model
Limb Darkening Model	

TCE Parameter	Value	Units
Trial Transit Pulse Duration	1.5	hours
Transit Epoch	2012.5107259	TJD
Orbital Period	2.4700303	days
Maximum SES	38.7	
Maximum MES	106.5	
Robust Statistic	104.1	
Chi Square Goodness of Fit Statistic (DoF)	1049.9 (393)	
Chi Square2 Statistic (DoF)	102.1 (955.6)	
Threshold for Desired PFA		

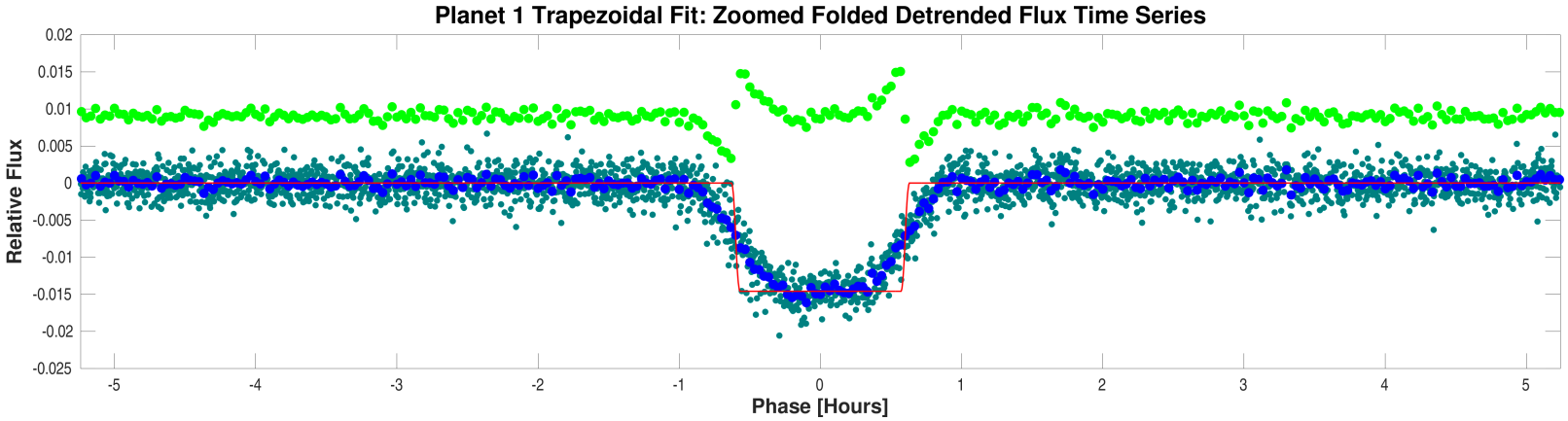
DoF: Degrees of Freedom

Parameter	Value	Uncertainty	Units
SNR	123.3		
Orbital Period	2.4700303		days
Transit Epoch	2012.5131357		BTJD
Transit Depth	14601		ppm
Transit Duration	1.7466		hours
Transit Ingress Duration	0.5462		hours
Model Chi Square Statistic (DoF)	17302.8 (3230)		

DoF: Degrees of Freedom



Folded detrended flux time series for CatId 399860444, Planet candidate 1 and folded trapezoidal model light curve.
Open `./planet-01/planet-search-and-model-fitting-results/trapezoidal-model-fit/0000000399860444-01-all-trapezoidal.fig`



Zoomed folded detrended flux time series for CatId 399860444, Planet candidate 1 and folded trapezoidal model light curve.
Open `./planet-01/planet-search-and-model-fitting-results/trapezoidal-model-fit/0000000399860444-01-all-trapezoidal-zoomed.fig`

7.4 Validation Tests

The Centroid Test and Eclipsing Binary Discrimination Test are chi-squared hypothesis tests. For these tests, a significance of 100% favors a planet, while 0% indicates an unlikely planet.

7.4.1 Weak Secondary Test

Result	Value	Uncertainty	Units	Statistic in Sigmas	Significance (%)
Orbital Period	2.47		days		
Transit Duration	1.5		hours		
Maximum MES	106.5				
Secondary Phase	0.78253		days		
Secondary MES	2.1				
Minimum Phase	0.84503		days		
Minimum MES	-2.9				
Median MES	0.1				
MAD MES	0.61212				
Robust Statistic	1.9				
Secondary Depth	257.4	1.1230e+02	ppm		
Geometric Albedo	1.0	4.3318e-01		-0.0895	53.56
Planet Effective Temperature	2088	2.3074e+02	Kelvin	3.0803	0.10

7.4.2 Eclipsing Binary Discrimination Test

Result	Value	Value in Sigmas	Significance (%)
Odd Even Transit Depth Comparison Statistic	2.8360e-01	0.5325	59.44

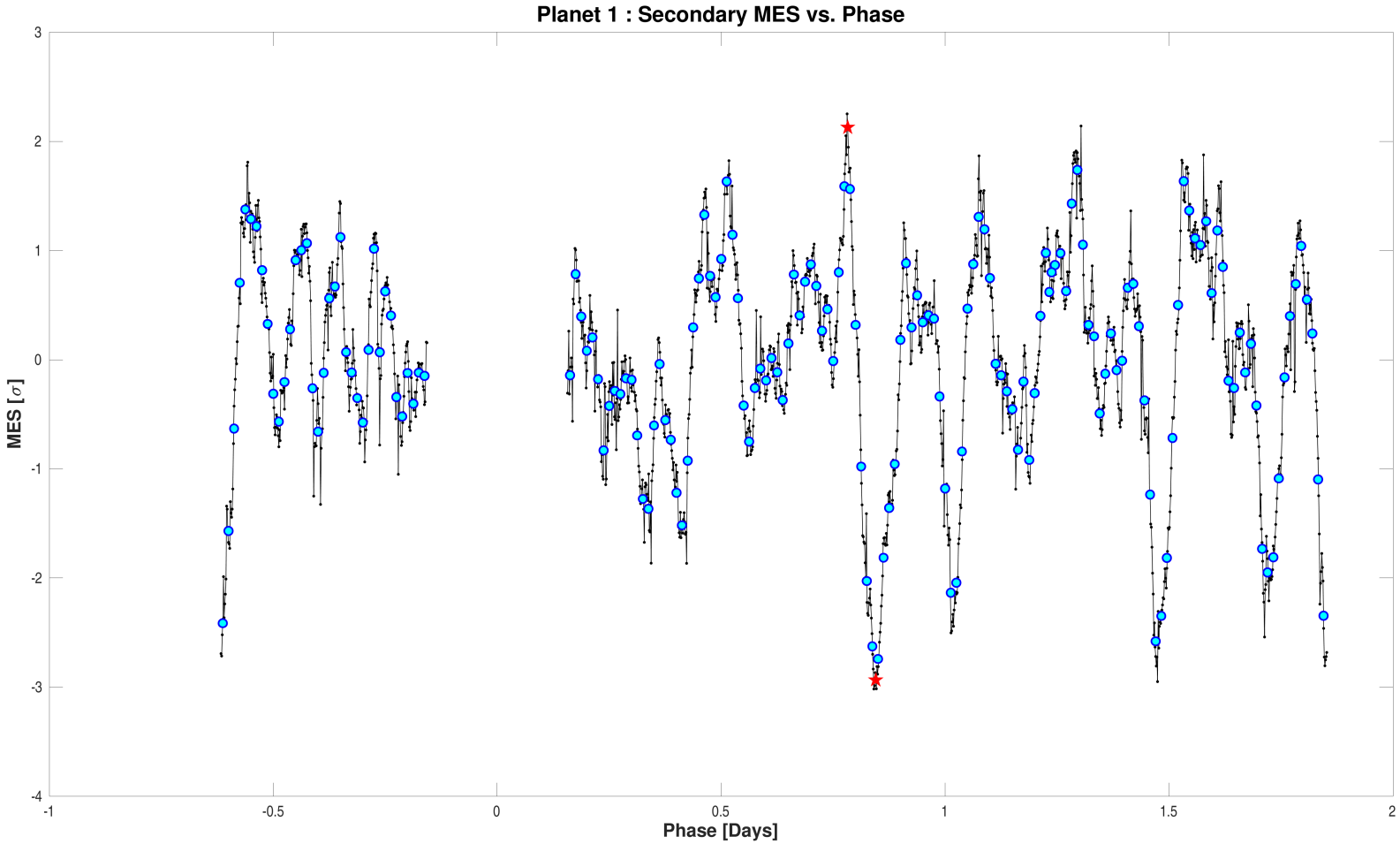
7.4.3 Bootstrap Test

Result	Value
False Alarm Probability	0.0000e+00
Bootstrap Threshold for Desired PFA	6.6
MES Mean	0.32
MES Standard Deviation	0.89
Transit Count	10

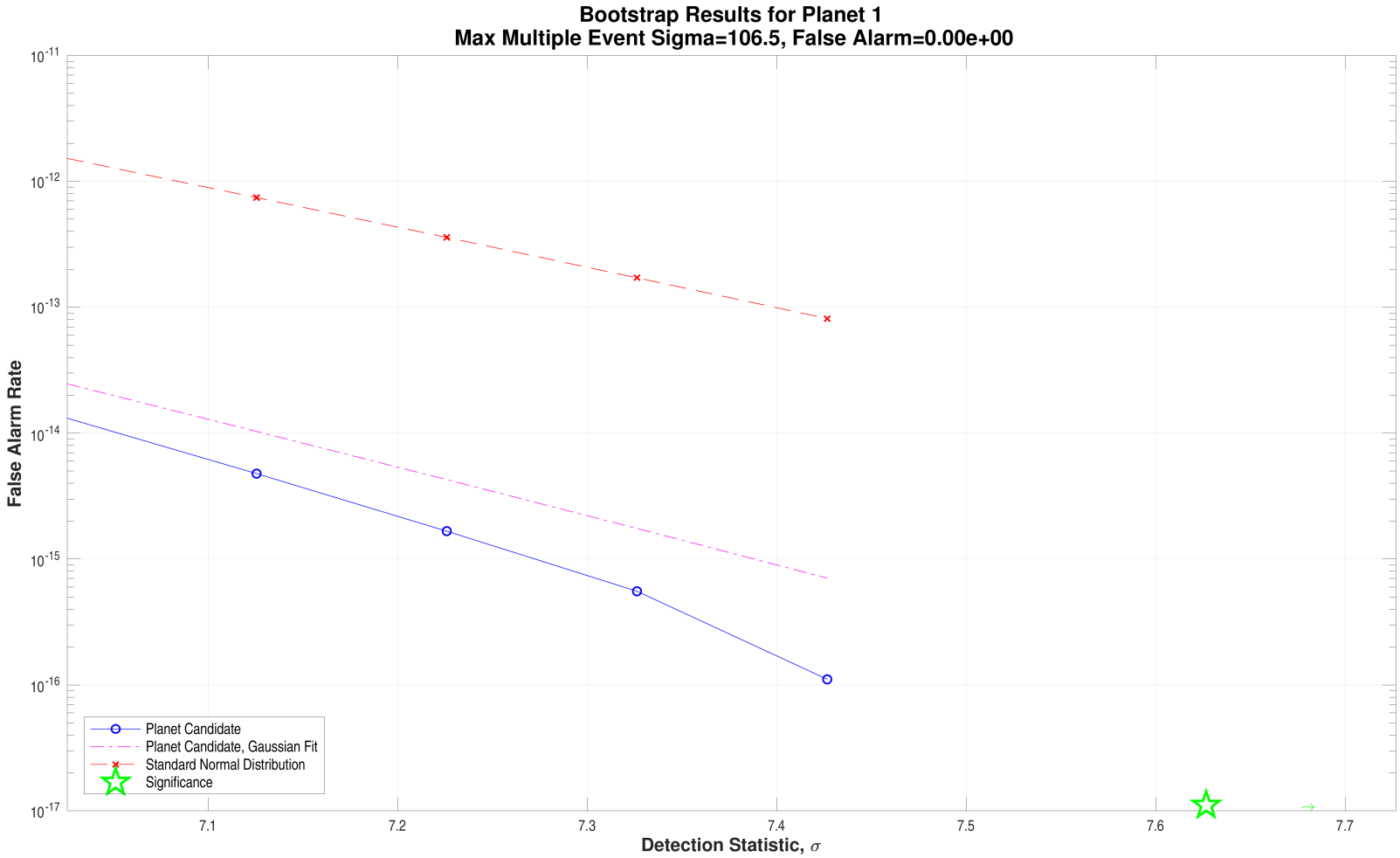
7.4.4 Ghost Diagnostic Test

Result	Value	Significance (%)
Maximum MES	106.5	
SNR	109.1	
Core Aperture Statistic	6.2568e+01	100.00
Halo Aperture Statistic	1.2997e+01	100.00
Ratio of Core/Halo Aperture Statistics	4.8139e+00	

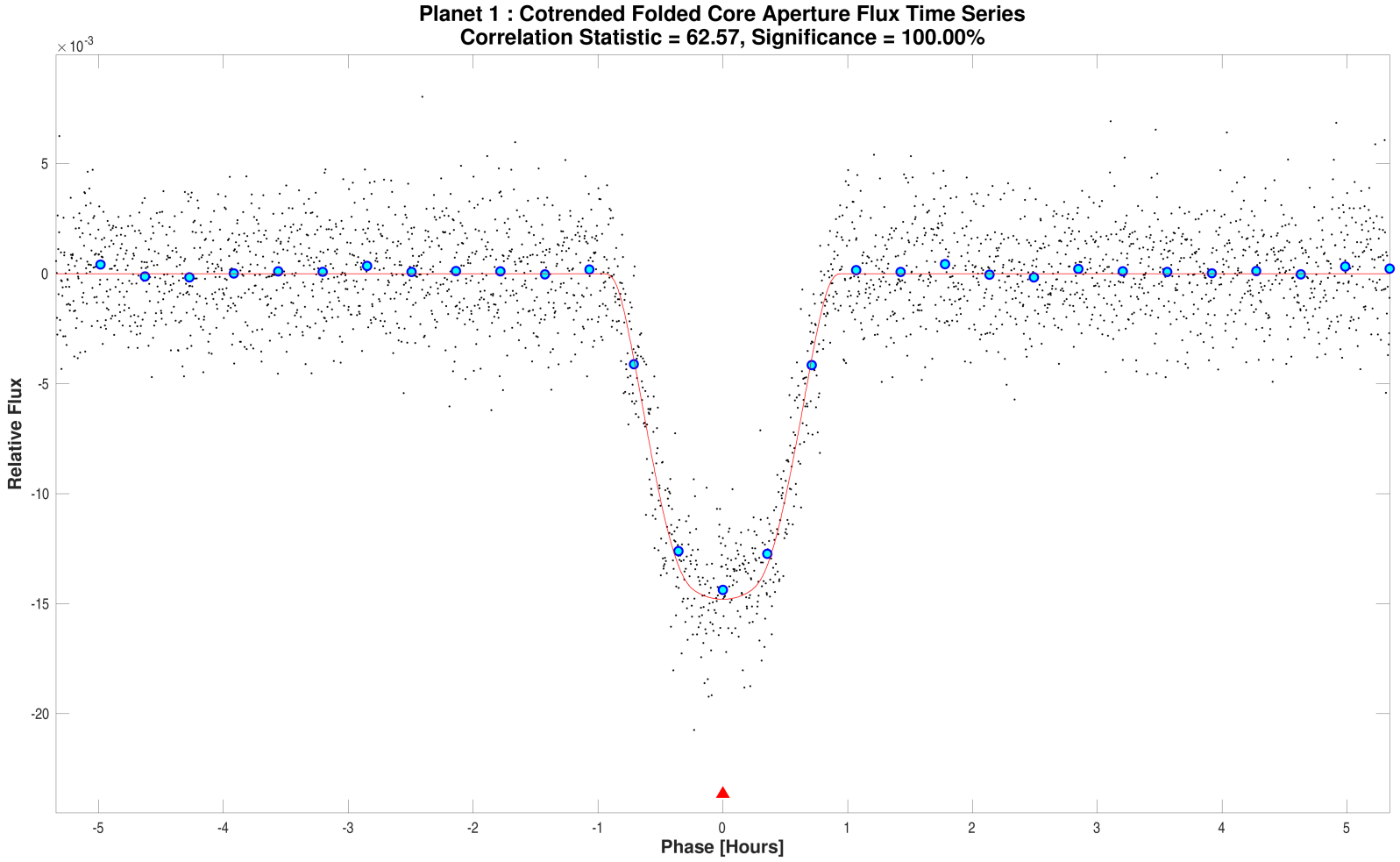
7.4.5 Validation Test Figures



The primary event has been set to zero and both the max and min of the resulting MES vs. Phase are marked with a red star. The best matched pulse duration in hours is 1.5. The maximum secondary MES and corresponding phase are 2.1287 and 0.78253 days respectively. The minimum secondary MES and corresponding phase are -2.9335 and 0.84503 days respectively.
Open `./planet-01/report-summary/0000000399860444-01-weak-secondary-diagnostic.fig`

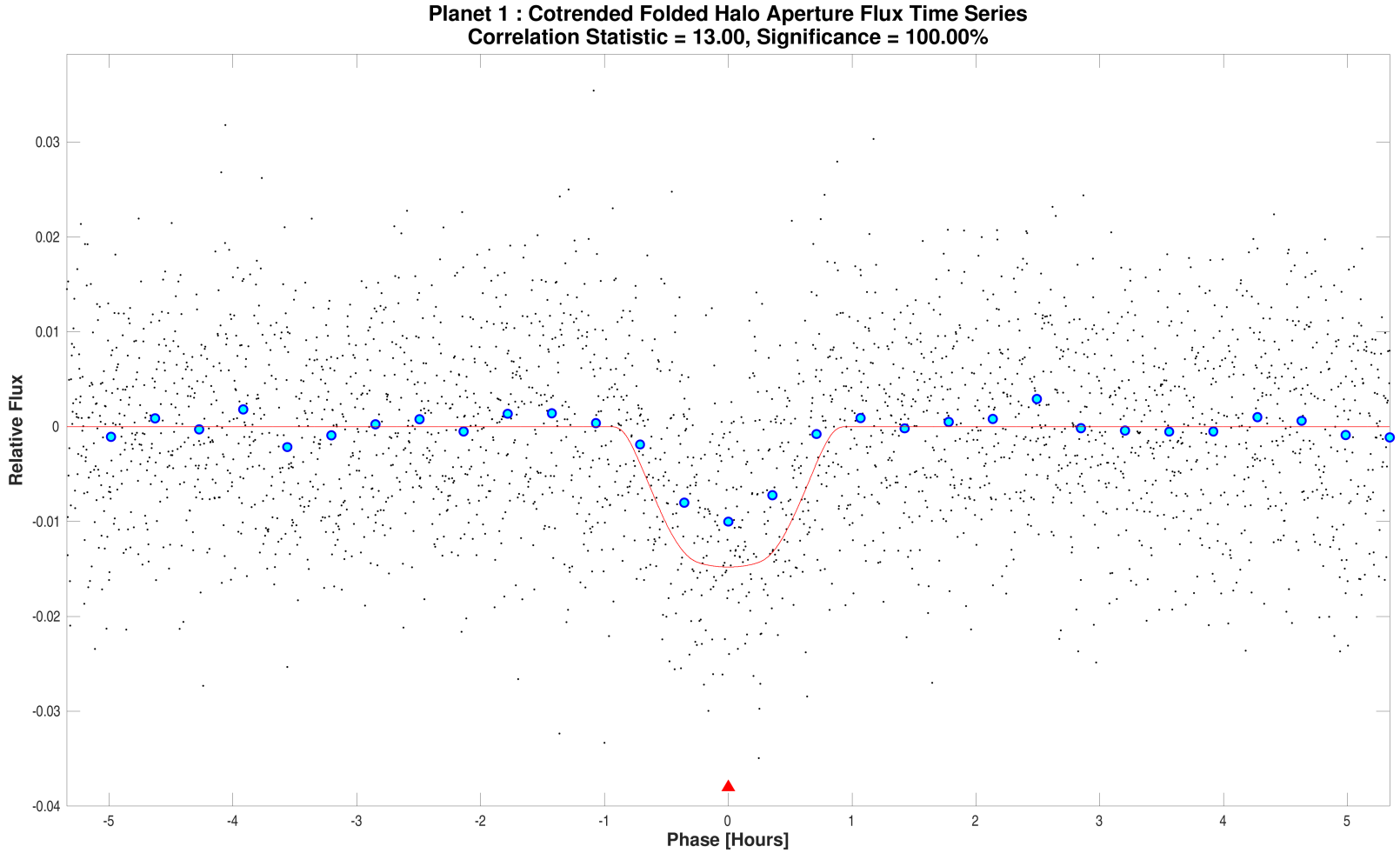


Bootstrap results for target 399860444, planet 1. Cumulative sum of the probabilities (derived from the histogram of counts) from upper tail to the search transit threshold; false alarm probability is indicated by the star. The Gaussian equivalent threshold for this false alarm probability is Inf. The threshold on this distribution that achieves the same false alarm rate as a 7.1 sigma threshold on a Gaussian distribution is 6.6163.
Open `./planet-01/bootstrap-results/0000000399860444-01-bootstrap-false-alarm.fig`



Optical ghost diagnostic core aperture flux time series for target 399860444, planet candidate 1. The unwhitened time series is phase folded at the orbital period associated with the planet candidate and centered on the epoch of the first transit. The time series was first cotrended against spacecraft engineering data, motion proxies, and/or cotrending basis vectors (CBVs) to remove systematic effects. Flux time series data represent the mean per pixel flux in the core or haloaperture; phase folded data points are shown in the figure with black dots. Binned and averaged phase folded flux values are marked with filled blue circles. The unwhitened transit model light curve is displayed in the figure with a red line. The value and significance of the core aperture correlation statistic are displayed in the figure title if the statistic was successfully computed.

Open `./planet-01/ghost-diagnostic-results/0000000399860444-01-core-unwhitened-cotrended-zoomed-model.fig`

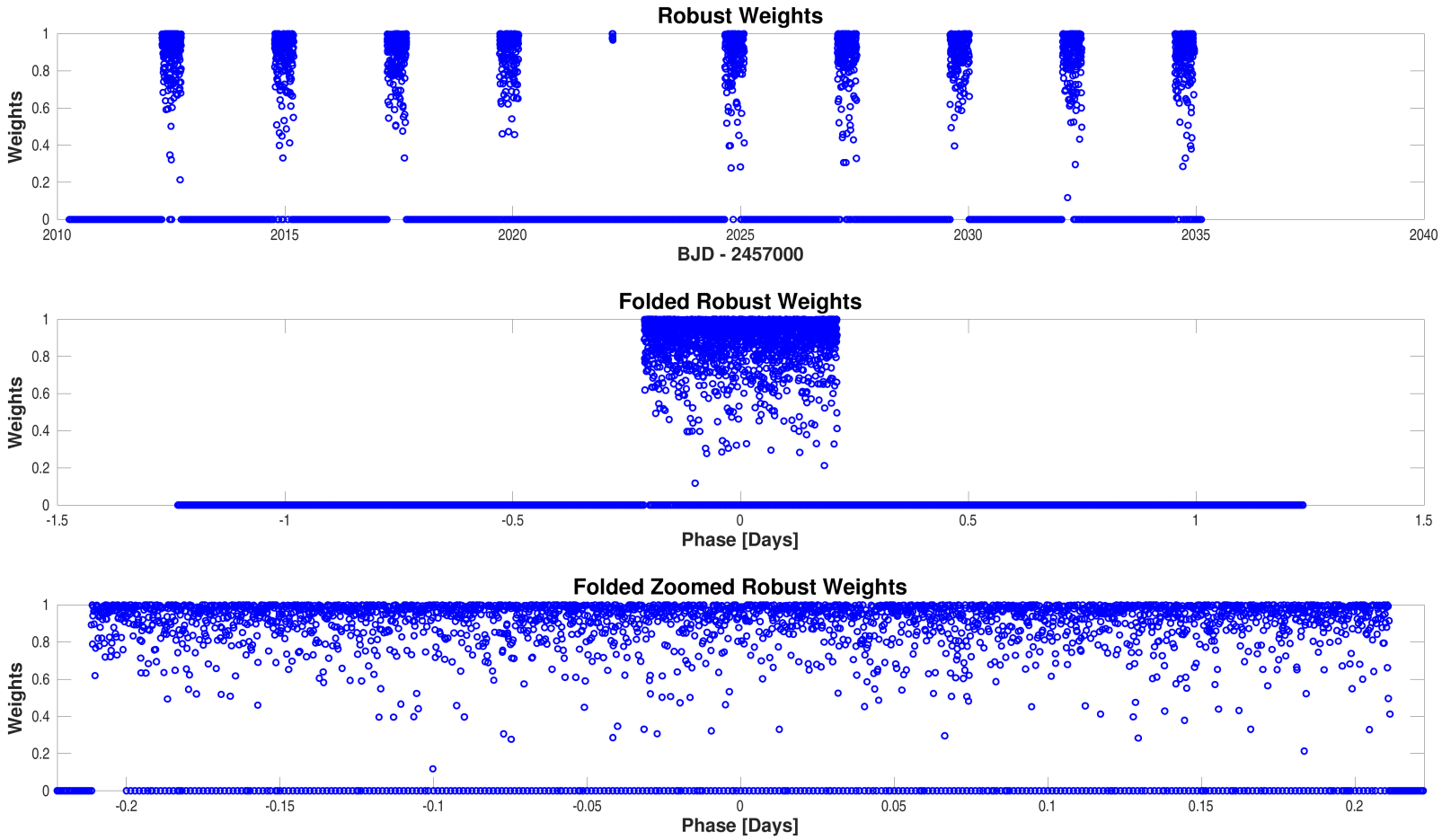


Optical ghost diagnostic halo aperture flux time series for target 399860444, planet candidate 1. The unwhitened time series is phase folded at the orbital period associated with the planet candidate and centered on the epoch of the first transit. The time series was first cotrended against spacecraft engineering data, motion proxies, and/or cotrending basis vectors (CBVs) to remove systematic effects. Flux time series data represent the mean per pixel flux in the core or haloaperture; phase folded data points are shown in the figure with black dots. Binned and averaged phase folded flux values are marked with filled blue circles. The unwhitened transit model light curve is displayed in the figure with a red line. The value and significance of the halo aperture correlation statistic are displayed in the figure title if the statistic was successfully computed.

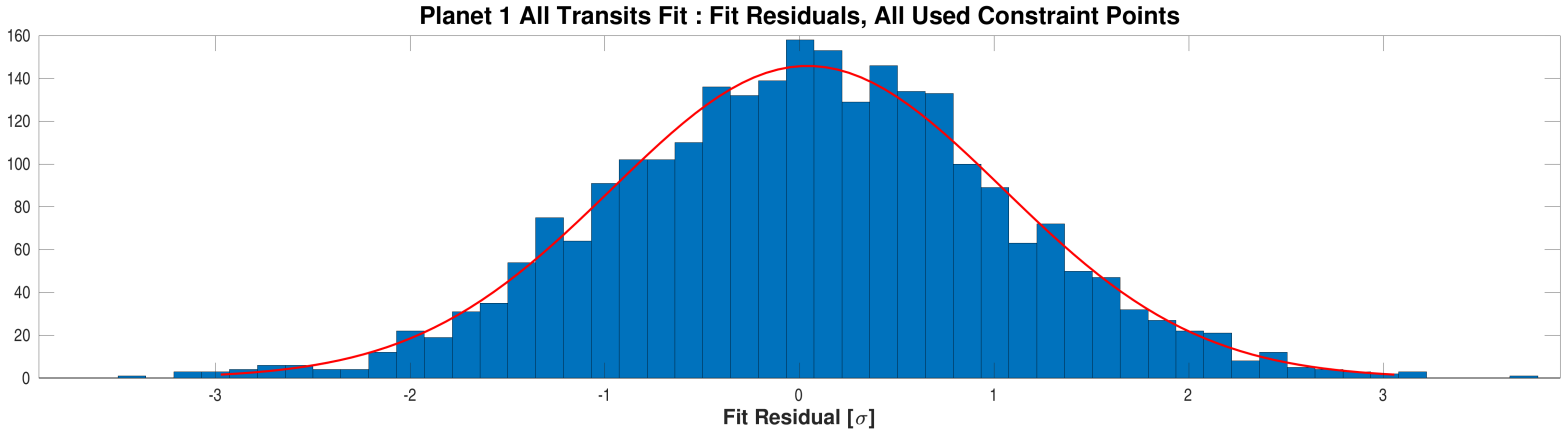
Open `./planet-01/ghost-diagnostic-results/0000000399860444-01-halo-unwhitened-cotrended-zoomed-model.fig`

Appendix A Planet Candidate 1

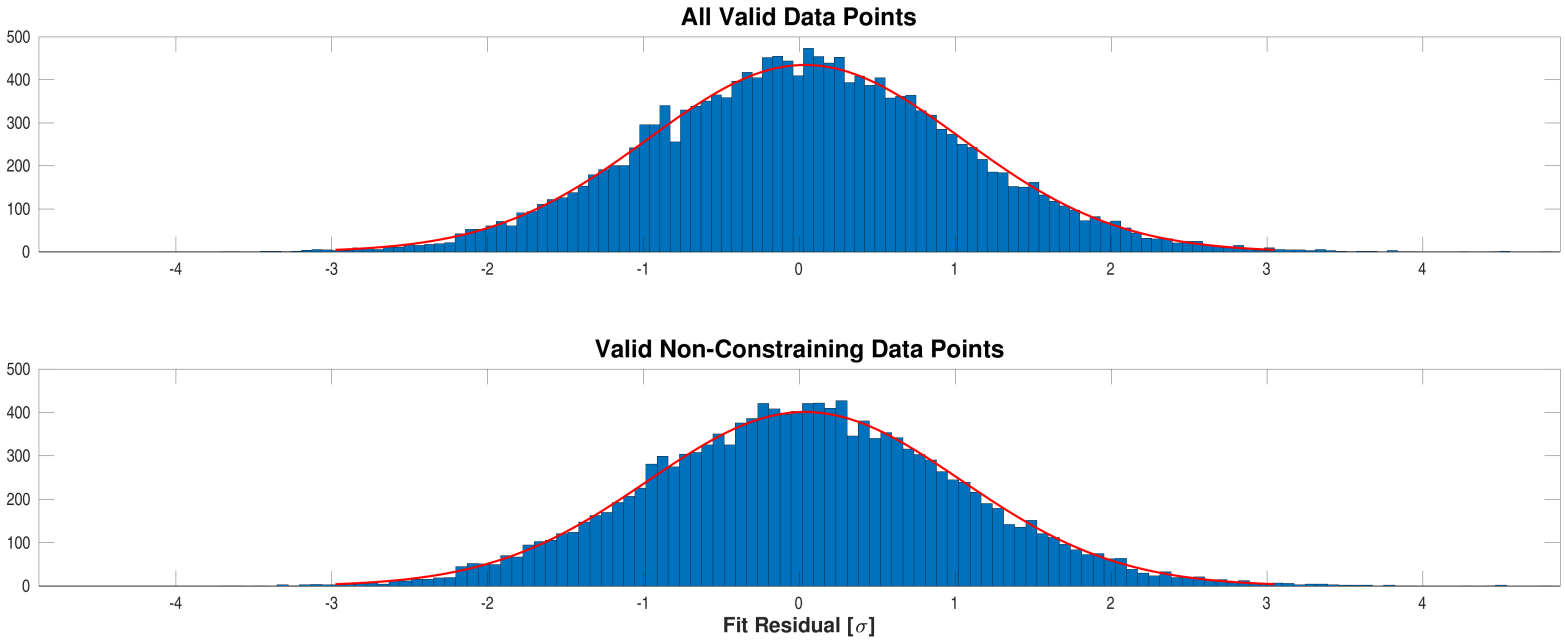
A.1 Model Fitter: All Transits



Robust weights distribution for CatId 399860444, Planet candidate 1. Top plot: all data points. Middle plot: all data points, folded per the fitted period and epoch. Bottom plot: all data points, folded and zoomed.
Open `./planet-01/planet-search-and-model-fitting-results/all-transits-fit/0000000399860444-01-all-robust-weights.fig`



Fit residuals distribution for CatId 399860444, Planet candidate 1. Only the valid data points used to constrain the fit are shown here. A Gaussian fit to the histogram is shown in red.
Open `./planet-01/planet-search-and-model-fitting-results/all-transits-fit/0000000399860444-01-all-histo-used.fig`

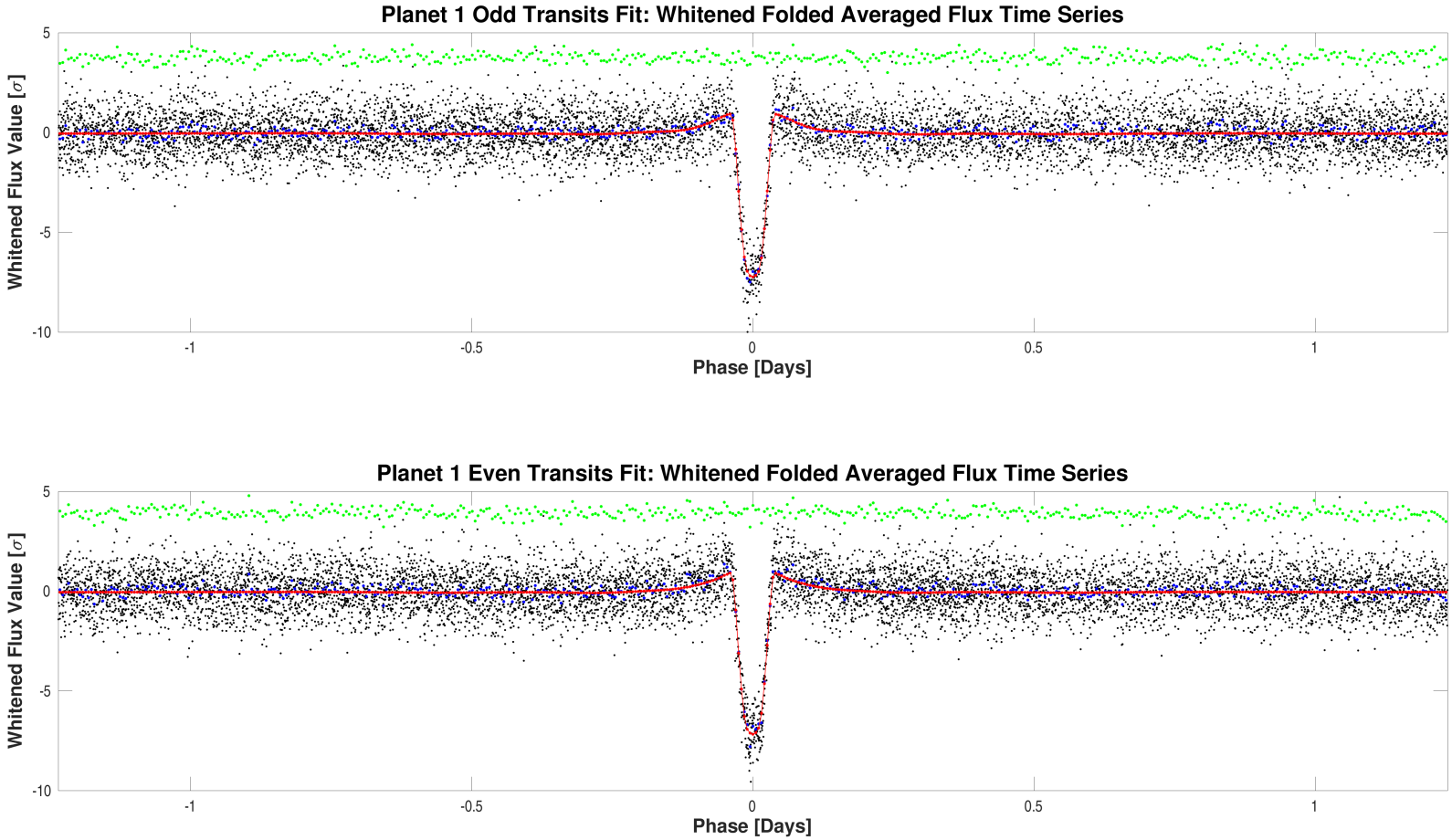


Fit residuals distribution for CatId 399860444, Planet candidate 1. Top plot: all valid data. Bottom plot: valid data not used to constrain fit (due to distance from a transit). Gaussian fits to the histograms are shown in red.
Open `./planet-01/planet-search-and-model-fitting-results/all-transits-fit/0000000399860444-01-all-histo-all-and-unused.fig`

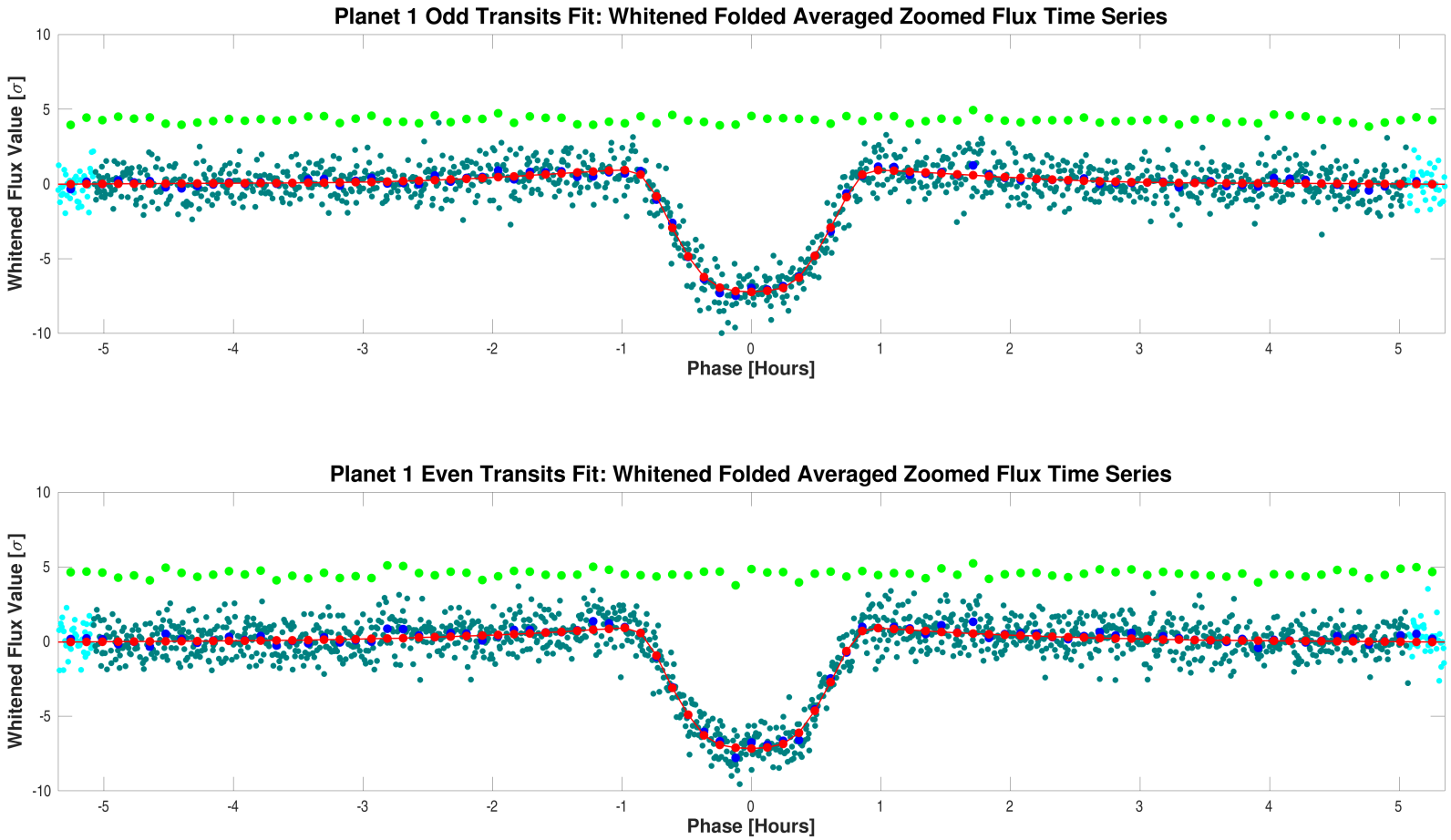
A.2 Model Fitter: Odd & Even Transits

Parameter	Odd Transits Value	Odd Transits Uncertainty	Even Transits Value	Even Transits Uncertainty	Units	Difference / Uncertainty
SNR	73.3		81.4			
Orbital Period	2.4706210	8.3240e-05	2.4705588	8.6352e-05	days	5.1795e-01
Transit Epoch	2012.5106082	4.2782e-04	2014.9811061	4.2051e-04	BTJD	1.3983e-01
Impact Parameter	0.8409	1.1279e-02	0.8418	1.0151e-02		6.2253e-02
Planet Radius to Star Radius Ratio	0.1265256	1.6391e-03	0.1258082	1.4662e-03		3.2621e-01
Semi-major Axis to Star Radius Ratio	7.9872	2.2675e-01	7.9924	2.0708e-01		1.6983e-02
Planet Radius	14.0356	5.8483e-01	13.9560	5.7613e-01	Earth radii	9.6939e-02
Semi-major Axis	0.0365	2.2013e-03	0.0365	2.2013e-03	AU	1.9629e-04
Effective Stellar Flux	817.5616	1.0759e+02	817.5890	1.0759e+02	Goldilocks	1.8015e-04
Equilibrium Temperature	1364	4.4867e+01	1364	4.4867e+01	Kelvin	1.8015e-04
Stellar Density	1.1215	9.5515e-02	1.1238	8.7343e-02	Solar density	1.7421e-02
Transit Depth	14896	2.5473e+02	14715	2.2612e+02	ppm	5.3254e-01
Transit Duration	1.7840	2.9598e-02	1.7777	2.7030e-02	hours	1.5742e-01
Transit Ingress Duration	0.6111	5.7510e-02	0.6090	5.1986e-02	hours	2.7360e-02
Eccentricity	0.0000	0.0000e+00	0.0000	0.0000e+00		
Peri Longitude	0.0000	0.0000e+00	0.0000	0.0000e+00	degrees	
Model Chi Square Statistic (DoF)	2033.4 (2456.1)		2033.4 (2456.1)			

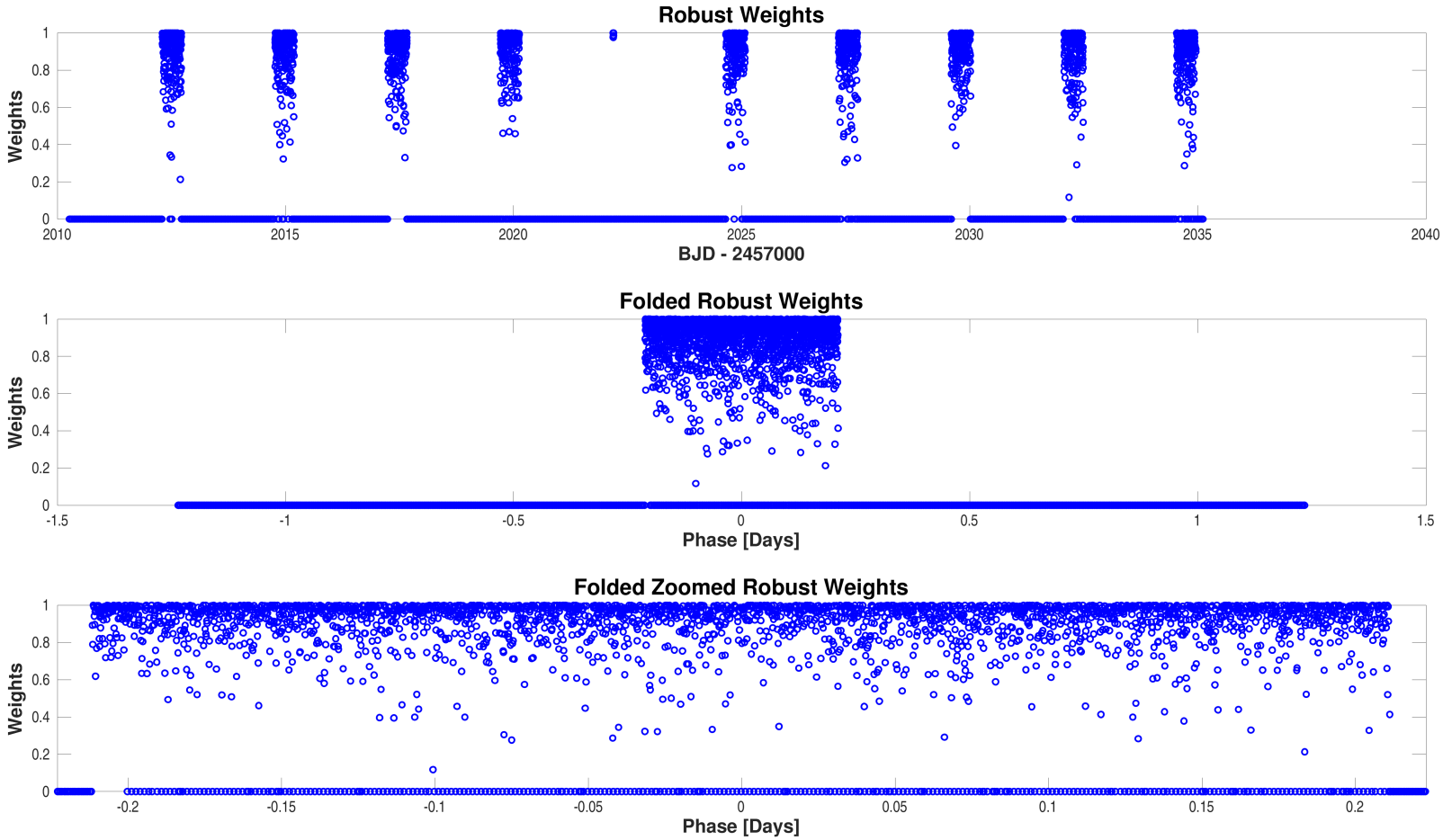
DoF: Degrees of Freedom



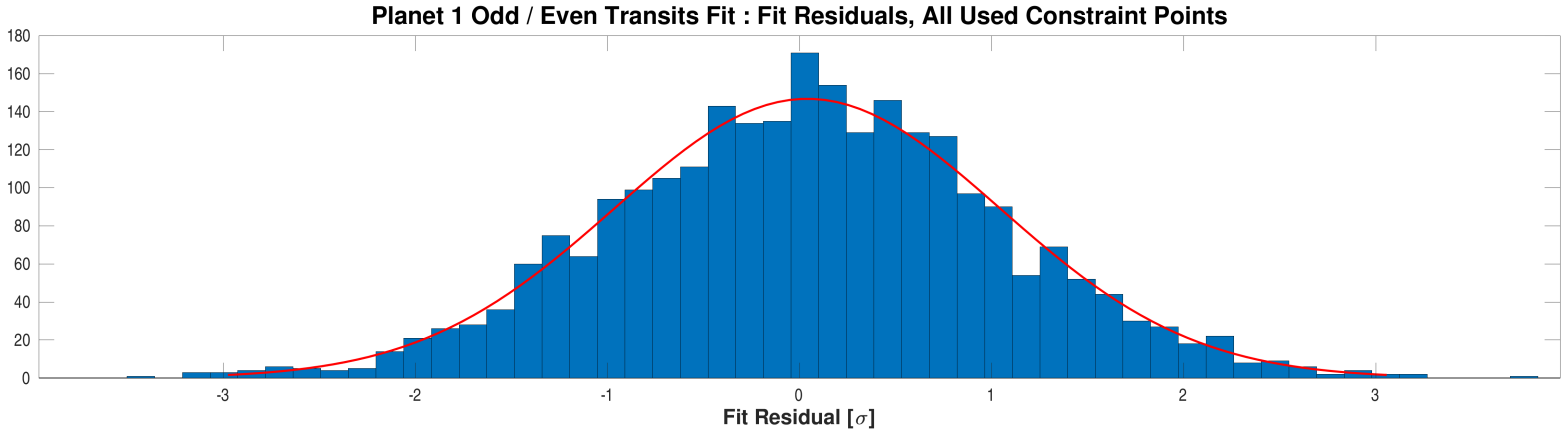
Folded flux time series for CatId 399860444, Planet candidate 1 in the whitened domain is plotted in black dots. Values are averaged into 1 cadence wide bins. The blue dots represent the averaged values of the folded flux time series; the red dots represent the averaged values of the folded model light curve of the odd/even transits fit; the green dots are the averaged folded fit residuals, vertically offset for clarity. Odd-even transits fit completed with full convergence.
Open `./planet-01/planet-search-and-model-fitting-results/odd-even-transits-fit/0000000399860444-01-odd-even-whitened.fig`



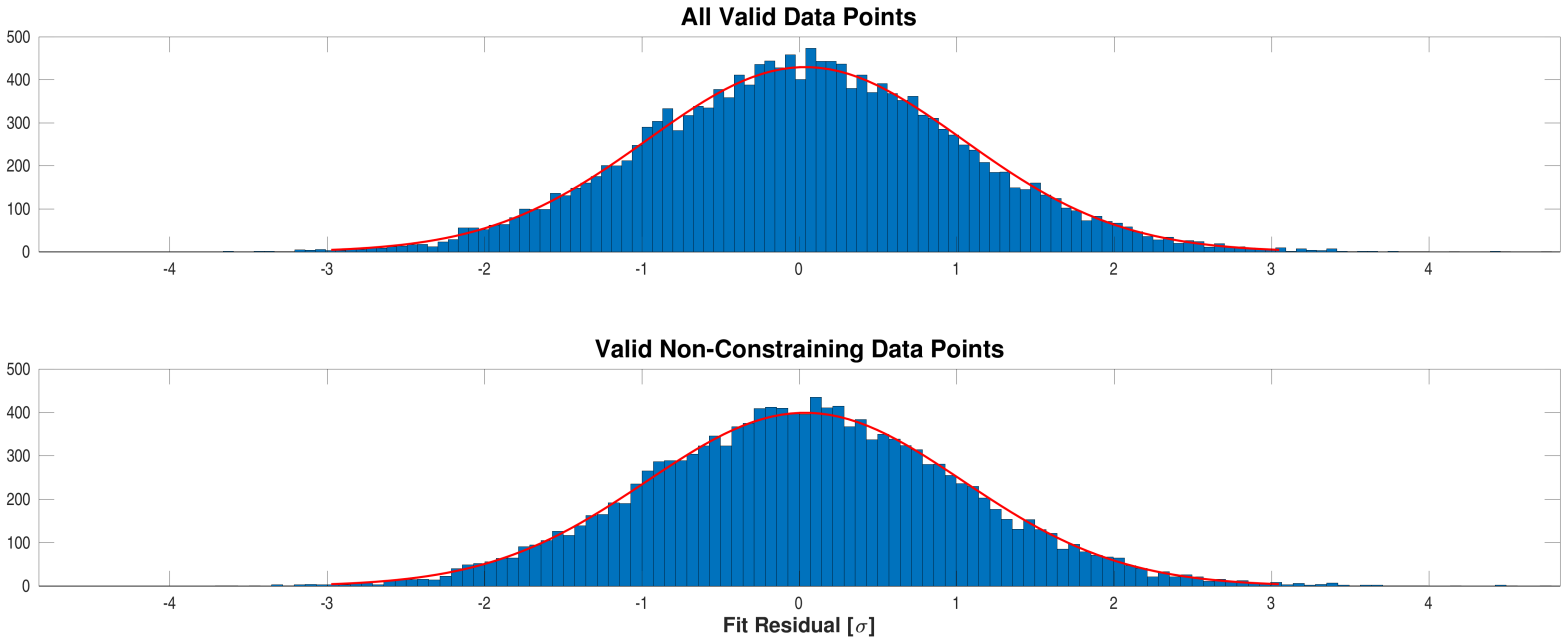
Folded flux time series for CatId 399860444, Planet candidate 1 in the whitened domain, zoomed on the transit. The flux data whose robust weights are larger/smaller than 0.1 are plotted in dark green/cyan dots, respectively. Values are averaged into 1 cadence wide bins. The blue dots represent the averaged values of the folded flux time series; the red dots represent the averaged values of the fitted model light curve of the odd/even transits fit; the green dots are the averaged folded fit residuals, vertically offset for clarity. Magenta dots are the averaged values of the folded flux time series, with a phase shift of 0.5 relative to the blue dots, vertically offset for clarity. Odd-even transits fit completed with full convergence.
Open `./planet-01/planet-search-and-model-fitting-results/odd-even-transits-fit/0000000399860444-01-odd-even-whitened-zoomed.fig`



Robust weights distribution for CatId 399860444, Planet candidate 1. Top plot: all data points. Middle plot: all data points, folded per the fitted period and epoch. Bottom plot: all data points, folded and zoomed.
Open `./planet-01/planet-search-and-model-fitting-results/odd-even-transits-fit/0000000399860444-01-odd-even-robust-weights.fig`

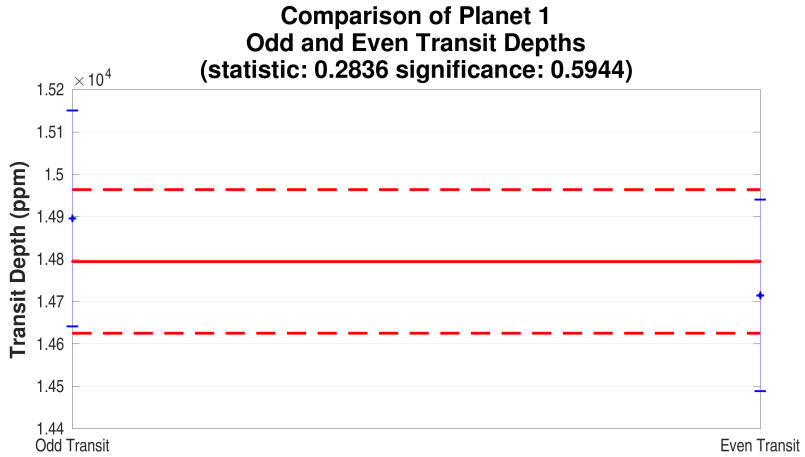


Fit residuals distribution for CatId 399860444, Planet candidate 1. Only the valid data points used to constrain the fit are shown here. A Gaussian fit to the histogram is shown in red.
Open `./planet-01/planet-search-and-model-fitting-results/odd-even-transits-fit/0000000399860444-01-odd-even-histo-used.fig`



Fit residuals distribution for CatId 399860444, Planet candidate 1. Top plot: all valid data. Bottom plot: valid data not used to constrain fit (due to distance from a transit). Gaussian fits to the histograms are shown in red.
Open `./planet-01/planet-search-and-model-fitting-results/odd-even-transits-fit/0000000399860444-01-odd-even-histo-all-and-unused.fig`

A.3 Eclipsing Binary Discrimination Test



Top-left: Diagnostic plot of Odd/Even Transit Depth Test for catId 399860444, planet 1. A significance level close to 1/0 favors a transiting planet/an eclipsing binary. Open `./planet-01/binary-discrimination-test-results/0000000399860444-01-eclipsing-binary-discrimination-tests.fig`

Appendix B Alerts

This target did not trigger any alerts.