Data Validation (DV) Report
for TESS ID 21744120
Sectors 25 - 26

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

02-Aug-2020 11:36:37 Z

Contents

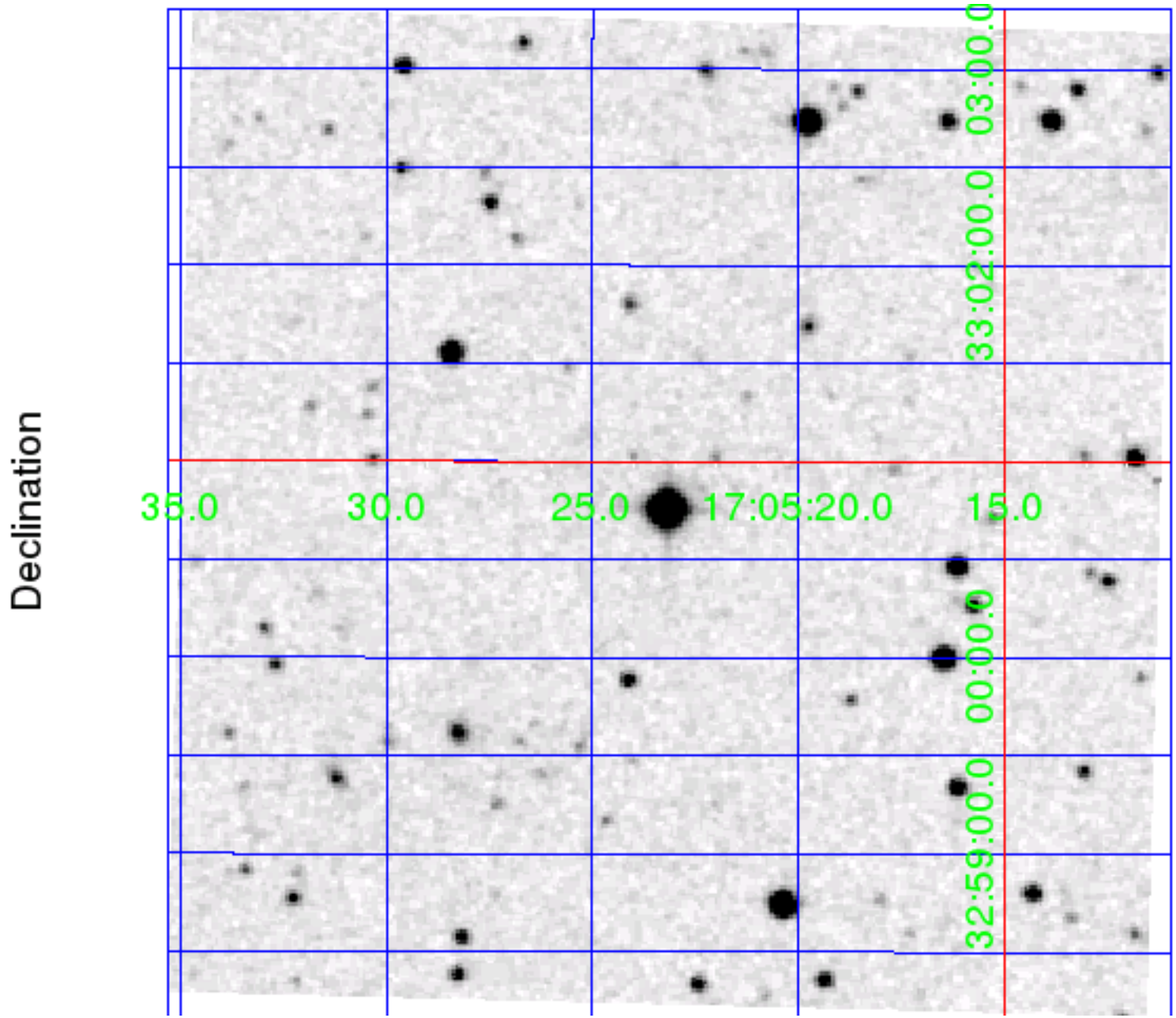
1 Summary

Target Properties	Value	Uncertainty	Units	Provenance
Catalog ID	21744120			
TOI ID	-			
TESS Name	-			
RA	256.34644827	0	degrees	TIC8
Dec	33.01248310	0	degrees	TIC8
Magnitude	11.733	0.0061		TIC8
Radius	0.740	0.050	Solar radii	TIC8
Effective Temperature	4790	118	Kelvin	TIC8
log(g)	4.588	0.08845	cm/sec^2	TIC8
[M/H]	0.140	0.08	Solar metallicity	TIC8
Stellar Density	1.907	0.409	Solar density	TIC8-Derived
Limb Darkening Coefficient 1	0.71199			
Limb Darkening Coefficient 2	-0.64061			
Limb Darkening Coefficient 3	1.1483			
Limb Darkening Coefficient 4	-0.47206			
Number of Planet Candidates	1			
TOI Model	csv-file-toi-catalog-07-29-20-edited.csv			
TESS Names Model	-			
External TCE Model	-			
Software Revision	spoc-5.0.5-20200728			
Date Report Generated	02-Aug-2020 11:36:37 Z			

Sector	Target Table	Camera/ CCD	Crowding Metric	Flux Fraction
25	245	1:1	0.9973	0.7783
26	254	1:2	0.9979	0.7974

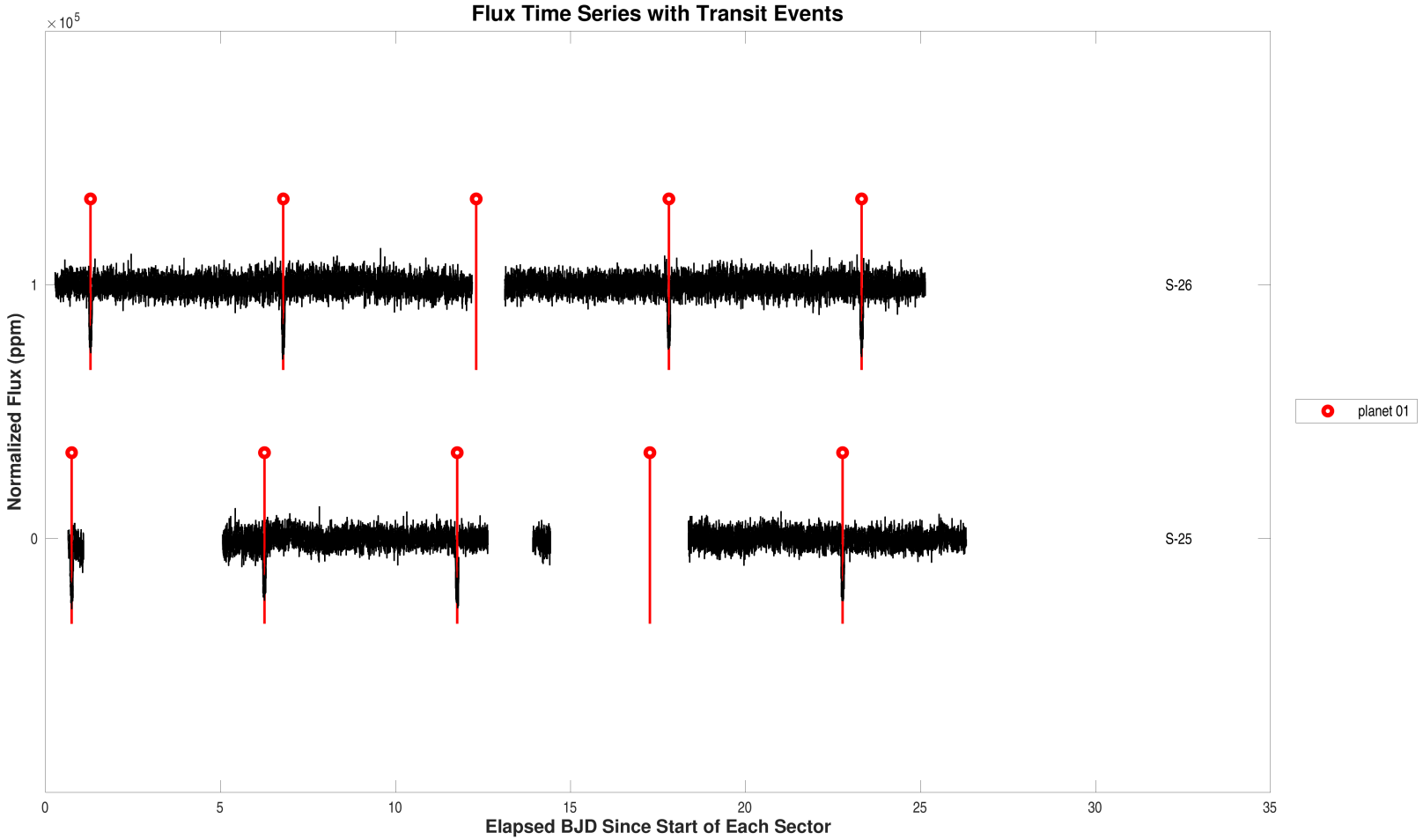
Planet Candidate	TOI ID	TESS Name	TOI Correlation	Period (days)	Period Ratio	Epoch (BTJD)	Semi-major Axis (AU)	Radius (Re)	Seff	Teq (K)	False Alarm	Suspected EB
1	-	-	-	5.508	1.00	1983.745	0.06	10.7	82.2	768	0.00e+00	false

2 Survey Image

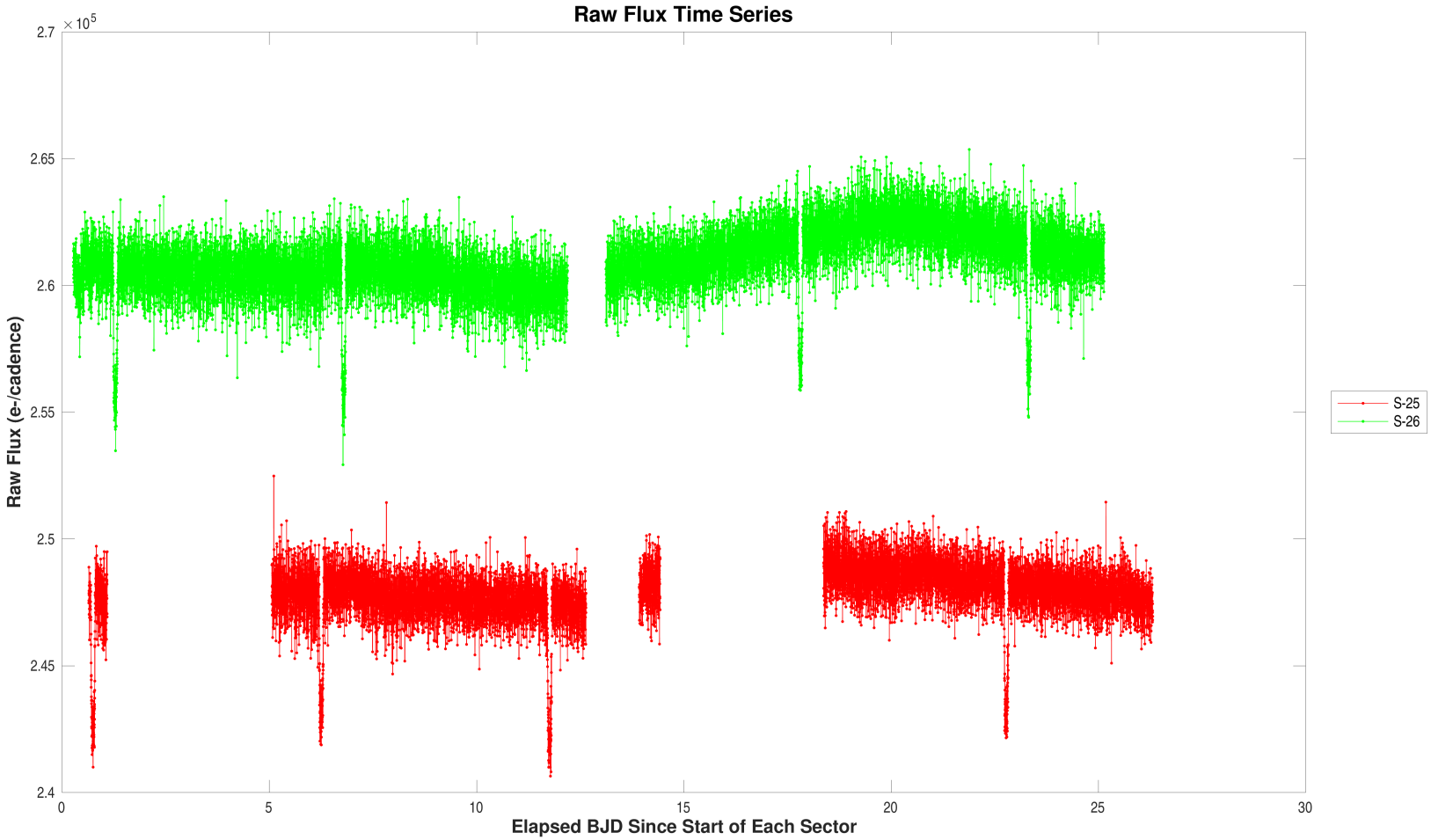


Digitized Sky Survey (DSS) red image. The 5' x 5' image is centered on the J2000 coordinates of target (21744120).

3 Flux Time Series



Summary plot of sector-stitched flux time series and transits for target 21744120, 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 25, target table 245, start BJD is 2458983 and the vertical offset is 0 ppm. For the data of sector 26, target table 254, start BJD is 2459010 and the vertical offset is 100000 ppm.
Open `./summary-plots/000000021744120-00-flux-dv-fit-25-245.fig`



Summary plot of raw flux time series. For the data of sector 25, target table 245, start BJD is 2458983 and the vertical offset is 0 electrons/cadence. For the data of sector 26, target table 254, start BJD is 2459010 and the vertical offset is 13000 electrons/cadence.
Open `./summary-plots/0000000021744120-00-raw-flux-25-245.fig`

4 Dashboards

Planet Candidate 1

<table>
<tr><td rowspan="2">Model Fitter</td><td colspan="2">Stellar Radius
0.7 ± 0.0 Solar units</td><td rowspan="2">Core Aperture Correlation Statistic
Value = 76.68
Significance = 100.00%
Halo Aperture Correlation Statistic
Value = 14.83
Significance = 100.00%
Core/Halo Ratio
Ratio = 5.17</td><td rowspan="2">Ghost Diagnostic Test</td></tr>
<tr><td colspan="2">Period = 5.5 ± 0.0 days
Depth = 21585 ± 194 ppm
Planet Radius = 10.7 ± 0.7 Earth radii
Semi-major Axis = 0.1 ± 0.0 AU
Effective Stellar Flux = 82.2 ± 14.3
Equilibrium Temperature = 768 ± 33 Kelvin
Chi-squared/DoF = 0.9
SNR = 116.2</td></tr>
<tr><td rowspan="2">Eclipsing Binary Discrimination Test</td><td colspan="2">Odd-Even Depth Comparison Statistic
Value = 1.55e+00
Significance = 21.28%</td><td>Offsets Relative to Out of Transit Centroid
Source RA Offset = 9.83e-02 ± 2.50e+00 arcsec (0.04 σ)
Source Dec Offset = -3.15e-01 ± 2.51e+00 arcsec (-0.13 σ)
Source Offset Distance = 3.30e-01 ± 2.51e+00 arcsec (0.13 σ)
Offsets Relative to TIC Position
Source RA Offset = 2.68e-02 ± 2.52e+00 arcsec (0.01 σ)
Source Dec Offset = -1.65e-01 ± 2.51e+00 arcsec (-0.07 σ)
Source Offset Distance = 1.67e-01 ± 2.51e+00 arcsec (0.07 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 = 113.0</td><td>Bootstrap Test</td></tr>
</table>

Summary of model fitter results and validation test results for target 21744120, 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

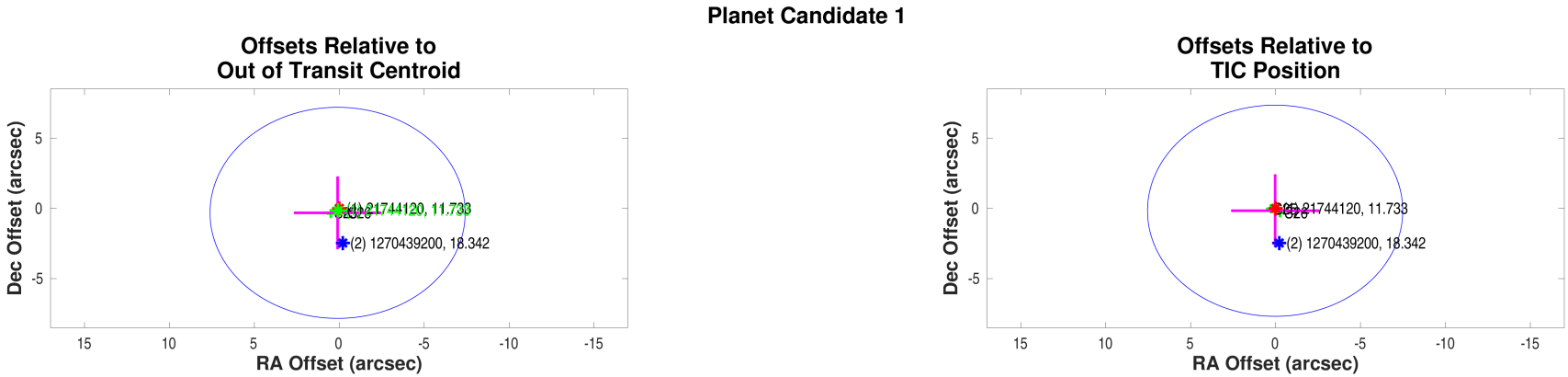
Multi-Sector Average PRF Fit of the Difference Images

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

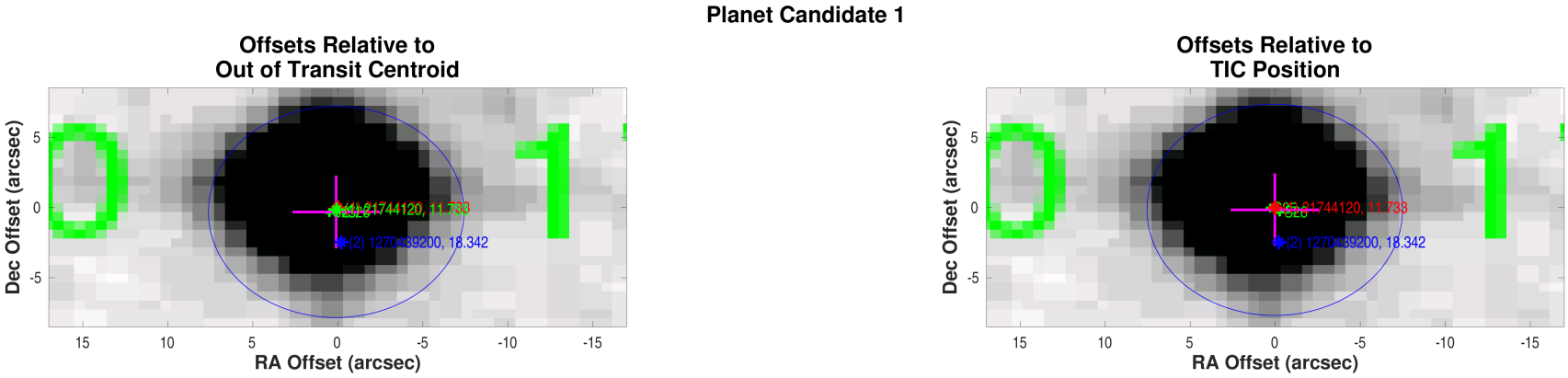
	RA	Dec	Units
Offset	$0.0983 \pm 2.50e+00$	$-0.3153 \pm 2.51e+00$	arcseconds
Offset/σ	0.04	-0.13	
Offset Distance	$0.3303 \pm 2.51e+00$		arcseconds
Offset Distance/σ	0.13		
3σ Radius	7.5156		arcseconds

Mean offset from the TIC RA and Dec

	RA	Dec	Units
Offset	$0.0268 \pm 2.52e+00$	$-0.1652 \pm 2.51e+00$	arcseconds
Offset/σ	0.01	-0.07	
Offset Distance	$0.1674 \pm 2.51e+00$		arcseconds
Offset Distance/σ	0.07		
3σ Radius	7.5180		arcseconds



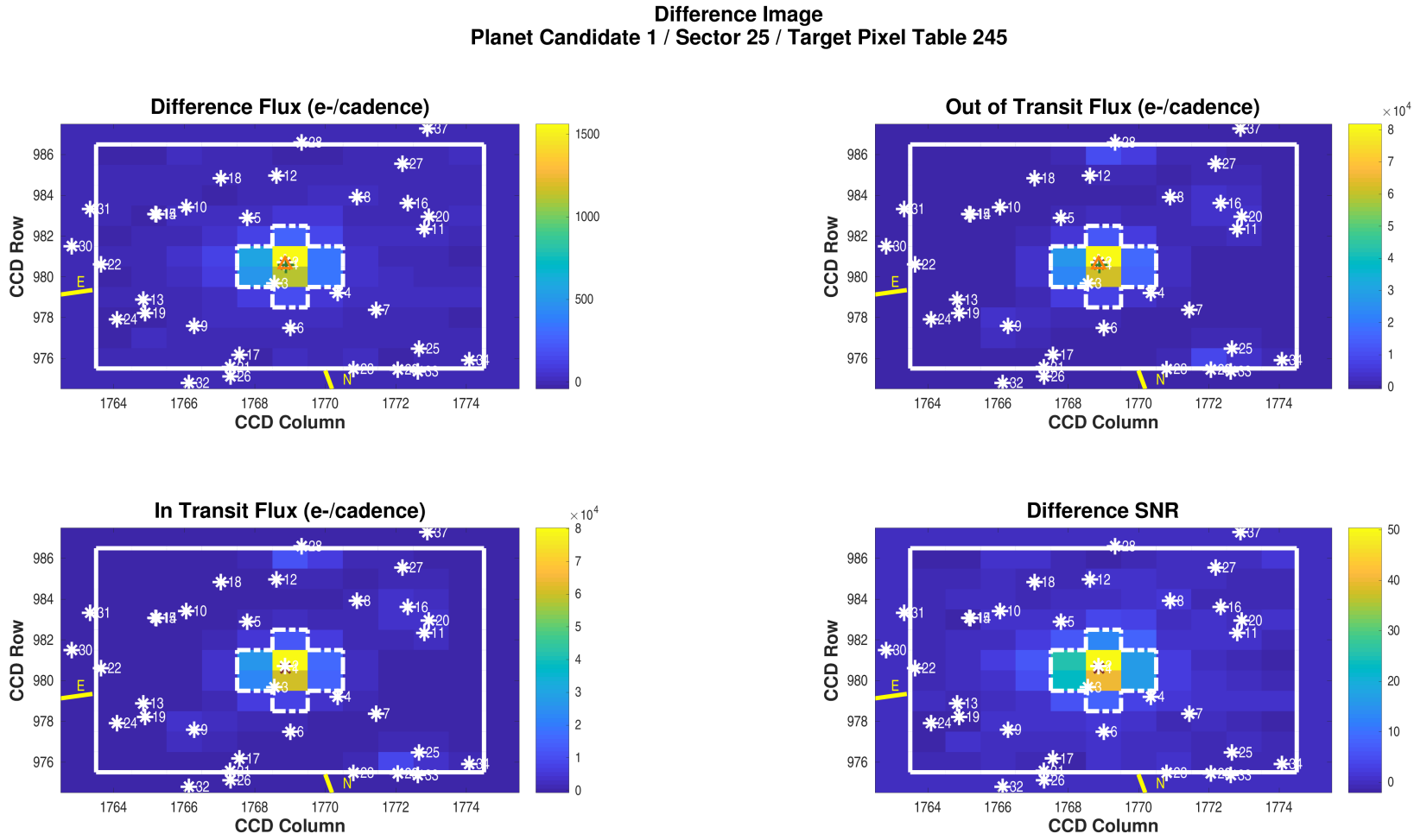
Difference image centroid offsets for target 21744120, planet candidate 1. Left: difference image PRF centroid offsets in RA and Dec with respect to the per sector out-of-transit centroids for the given target. Right: difference image PRF centroid offsets in RA and Dec with respect to the TC coordinates 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/0000000021744120-01-difference-image-centroid-offsets.fig`



Difference image centroid offsets for target 21744120, 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/0000000021744120-01-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
2	2	2	1.0000	0.70



Difference image for target 21744120, planet candidate 1, sector 25, target pixel table 245. 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 = 3; number of valid in-transit cadences = 171; number of in-transit cadence gaps = 1; number of valid out-of-transit cadences = 494; number of out-of-transit cadence gaps = 6. Difference image quality metric = 1.00 (good).
Open `./planet-01/difference-image/0000000021744120-01-difference-image-25-245.fig`

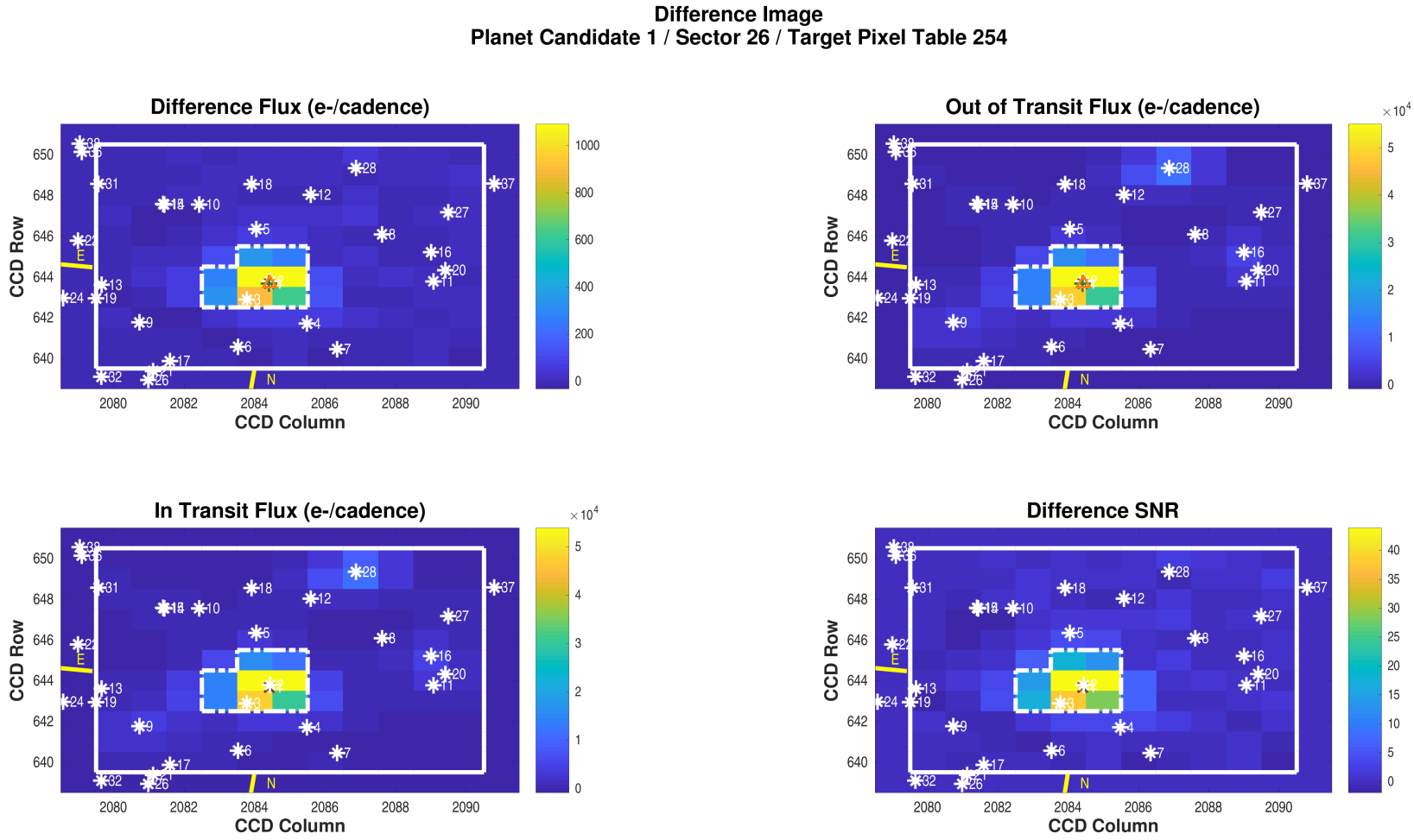
PRF Fit of the Difference Image

Offset from the PRF fit to the out of transit image

	Row	Column	Units	RA	Dec	Units
Out of Transit Image Centroid	$980.59 \pm 1.03e-04$	$1768.88 \pm 1.20e-04$	pixels	$256.34628419 \pm 9.35e-07$	$33.01236790 \pm 9.06e-07$	degrees
Difference Image Centroid	$980.60 \pm 1.06e-02$	$1768.86 \pm 1.20e-02$	pixels	$256.34644875 \pm 6.65e-05$	$33.01226773 \pm 6.29e-05$	degrees
Offset	$0.0117 \pm 1.06e-02$	$-0.0269 \pm 1.20e-02$	pixels	$0.4968 \pm 2.01e-01$	$-0.3606 \pm 2.26e-01$	arcseconds
Offset/σ	1.10	−2.25		2.47	−1.59	
Offset Distance	$0.0293 \pm 1.21e-02$		pixels	$0.6139 \pm 2.24e-01$		arcseconds
Offset Distance/σ	2.43			2.73		

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

	Row	Column	Units	RA	Dec	Units
TIC Reference Centroid	$980.60 \pm 1.14e-04$	$1768.87 \pm 1.17e-04$	pixels	$256.34635317 \pm 0.00e+00$	$33.01227518 \pm 0.00e+00$	degrees
Difference Image Centroid	$980.60 \pm 1.06e-02$	$1768.86 \pm 1.20e-02$	pixels	$256.34644875 \pm 6.65e-05$	$33.01226773 \pm 6.29e-05$	degrees
Offset	$-0.0018 \pm 1.06e-02$	$-0.0137 \pm 1.20e-02$	pixels	$0.2886 \pm 2.01e-01$	$-0.0268 \pm 2.26e-01$	arcseconds
Offset/σ	−0.17	−1.15		1.44	−0.12	
Offset Distance	$0.0139 \pm 1.18e-02$		pixels	$0.2898 \pm 2.04e-01$		arcseconds
Offset Distance/σ	1.17			1.42		



Difference image for target 21744120, 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 = 4; number of valid in-transit cadences = 228; number of in-transit cadence gaps = 2; number of valid out-of-transit cadences = 651; number of out-of-transit cadence gaps = 14. Difference image quality metric = 1.00 (good).
Open `./planet-01/difference-image/0000000021744120-01-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	$643.66 \pm 1.15e-04$	$2084.41 \pm 1.25e-04$	pixels	$256.34637900 \pm 1.51e-06$	$33.01226131 \pm 1.38e-06$	degrees
Difference Image Centroid	$643.68 \pm 1.14e-02$	$2084.43 \pm 1.22e-02$	pixels	$256.34626637 \pm 6.97e-05$	$33.01218726 \pm 6.52e-05$	degrees
Offset	$0.0105 \pm 1.14e-02$	$0.0190 \pm 1.22e-02$	pixels	$-0.3400 \pm 2.11e-01$	$-0.2666 \pm 2.35e-01$	arcseconds
Offset/σ	0.93	1.55		-1.61	-1.14	
Offset Distance	$0.0217 \pm 1.21e-02$		pixels	$0.4321 \pm 2.25e-01$		arcseconds
Offset Distance/σ	1.79			1.92		

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

	Row	Column	Units	RA	Dec	Units
TIC Reference Centroid	$643.66 \pm 2.11e-04$	$2084.41 \pm 2.32e-04$	pixels	$256.34635283 \pm 0.00e+00$	$33.01227445 \pm 0.00e+00$	degrees
Difference Image Centroid	$643.68 \pm 1.14e-02$	$2084.43 \pm 1.22e-02$	pixels	$256.34626637 \pm 6.97e-05$	$33.01218726 \pm 6.52e-05$	degrees
Offset	$0.0136 \pm 1.14e-02$	$0.0151 \pm 1.22e-02$	pixels	$-0.2610 \pm 2.11e-01$	$-0.3139 \pm 2.35e-01$	arcseconds
Offset/σ	1.19	1.24		-1.24	-1.34	
Offset Distance	$0.0203 \pm 1.19e-02$		pixels	$0.4082 \pm 2.30e-01$		arcseconds
Offset Distance/σ	1.70			1.77		

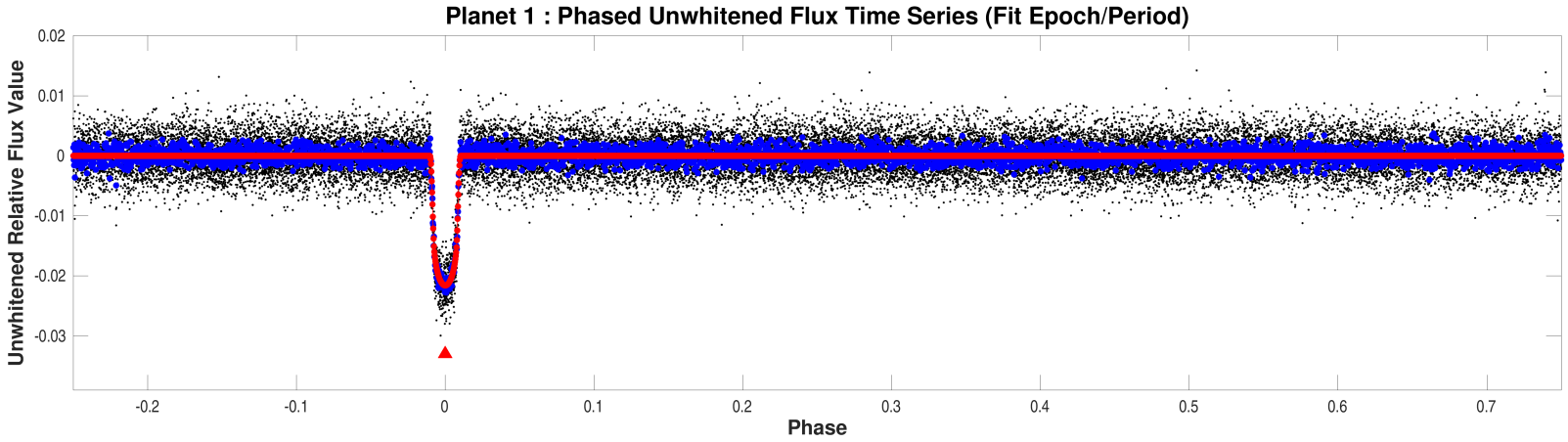
5.2 Difference Image TIC Key

Index	Catalog ID	Mag	RA (degrees)	Dec (degrees)	Distance (arcsec)
1	21744120	11.733	256.34635300	33.01227482	0.00
2	1270439200	18.342	256.34628351	33.01158921	2.48
3	1270439199	19.850	256.34985123	33.01705812	20.20
4	21744119	19.206	256.33840996	33.02201295	42.47
5	21744132	17.451	256.35034042	32.99797145	52.88
6	21741342	18.629	256.34999000	33.02993000	64.50
7	21741341	18.265	256.33223700	33.02810300	71.15
8	1270439188	18.849	256.32779346	32.99627313	80.36
9	21744116	14.895	256.36828883	33.02584784	82.30
10	1270439191	20.468	256.36126132	32.99280659	83.29
11	21741333	15.558	256.31719812	33.00759342	89.61
12	1270439187	19.950	256.34171529	32.98744452	90.48
13	1270439192	18.813	256.37615146	33.01672132	91.37
14	10000546159	17.368	256.36749300	32.99369000	92.46
15	21744133	18.454	256.36768700	32.99358700	93.13
16	21741330	14.772	256.31852370	32.99982885	95.21
17	1270439204	19.462	256.36168604	33.03543587	95.37
18	1270439183	19.194	256.35255442	32.98610688	96.05
19	1270439201	19.498	256.37675482	33.02049564	96.43
20	21741331	17.327	256.31542111	33.00429958	97.69
21	21744113	16.855	256.36435373	33.03852075	109.00
22	1270439193	20.017	256.38173727	33.00546854	109.59
23	1270439292	20.632	256.34083169	33.04356609	113.87
24	1270439197	19.801	256.38262539	33.02118809	114.10
25	1270439293	20.364	256.32679056	33.04035202	117.07
26	21744112	18.417	256.36494492	33.04107373	117.89
27	21741324	15.973	256.31667268	32.98873840	123.32
28	21741318	13.520	256.33448127	32.97917493	124.43
29	21741347	13.910	256.33235826	33.04532835	126.27
30	1270439190	18.586	256.38601734	32.99937050	128.43
31	21744134	18.286	256.37983400	32.98978400	129.50
32	21744111	18.023	256.37339776	33.04136326	132.78
33	1270439294	19.893	256.32864323	33.04654489	134.46
34	21741346	16.995	256.31798664	33.04535868	146.69
35	1270439202	18.973	256.38065614	33.04464336	155.89
36	1270439173	19.946	256.38379926	32.98164522	157.92
37	21741319	16.819	256.30937437	32.97991816	161.34
38	21744137	17.074	256.38441286	32.97944536	164.83

Index	Catalog ID	Mag	RA (degrees)	Dec (degrees)	Distance (arcsec)
39	21741348	15.725	256.30755537	33.04547922	167.35
40	1270439203	19.986	256.38767222	33.04560245	173.07

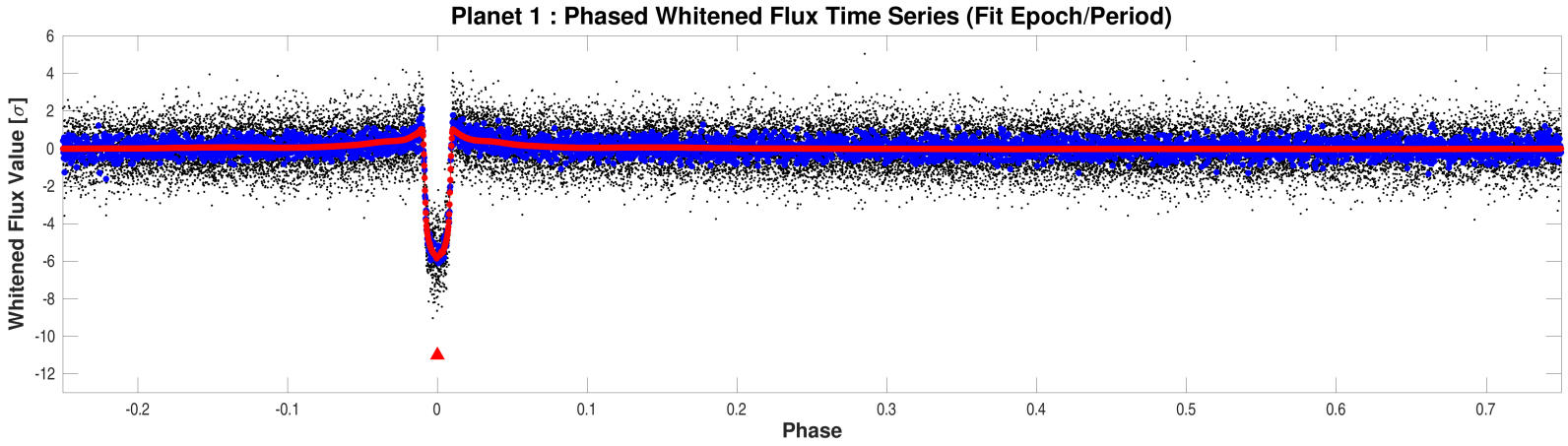
RA, Dec and Distances are corrected for proper motion. This table may not contain all of the objects shown.

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/000000021744120-01-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/00000000217441 20-01-phased-whitened-flux-time-series.fig`

Phased unwhitened flux time series by sector for target 21744120, planet candidate 1. Period = 5.5081 days; transit epoch = 1983.745 BTJD.
Open `./summary-plots/0000000021744120-01-phased-unwhitened-flux-time-series-by-sector.fig`

7 Planet Candidate 1

7.1 Model Fitter: All Transits

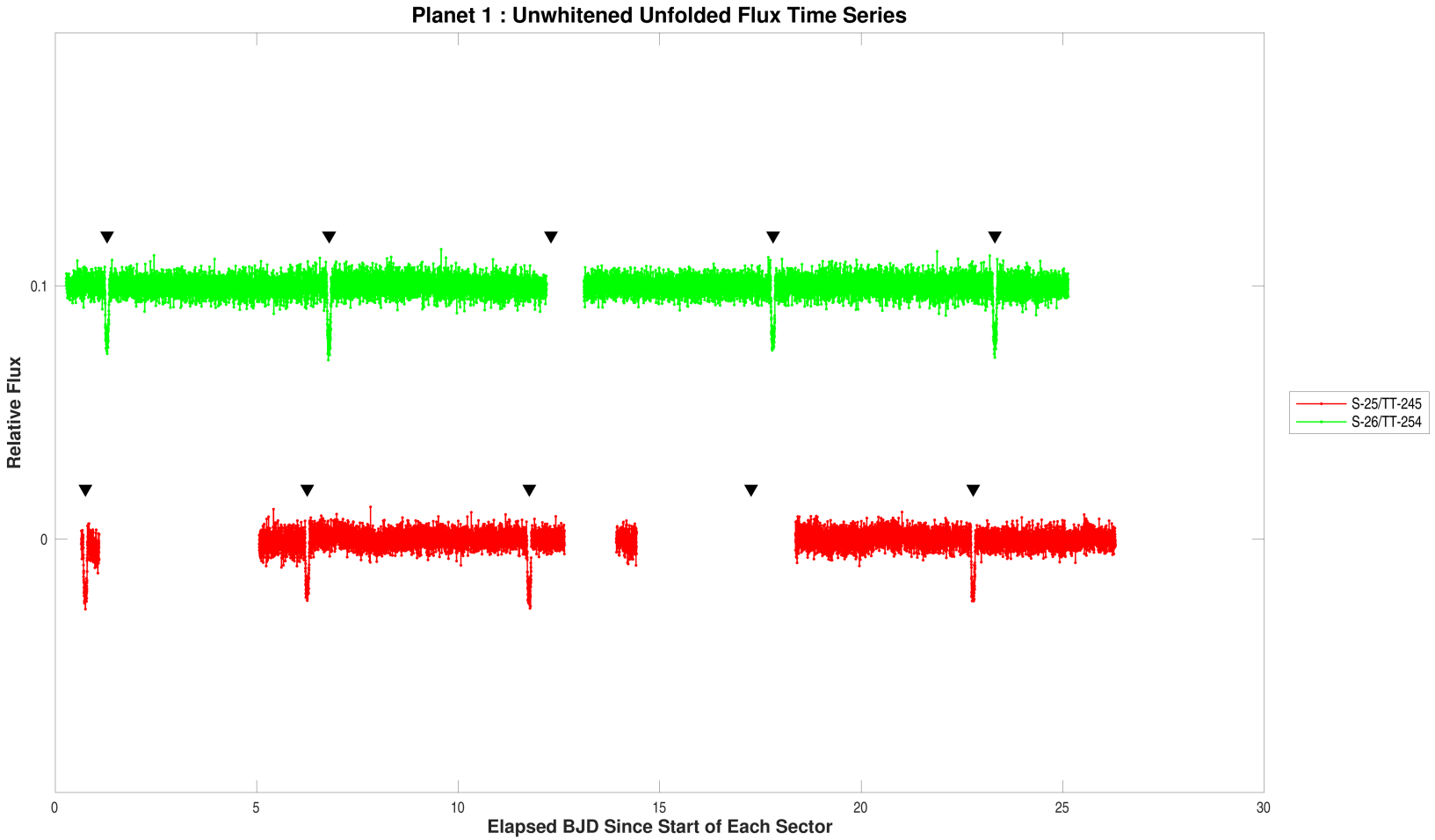
Model Characteristic	Name
Transit Model	mandel-agol_geometric_transit_model
Limb Darkening Model	claret_tess_nonlinear_limb_darkening_model

TCE Parameter	Value	Units
Trial Transit Pulse Duration	2.5	hours
Transit Epoch	1983.7412947	TJD
Orbital Period	5.5083308	days
Maximum SES	48.0	
Maximum MES	113.0	
Robust Statistic	106.4	
Chi Square Goodness of Fit Statistic (DoF)	1518.5 (593)	
Chi Square2 Statistic (DoF)	642.9 (984.2)	
Threshold for Desired PFA		

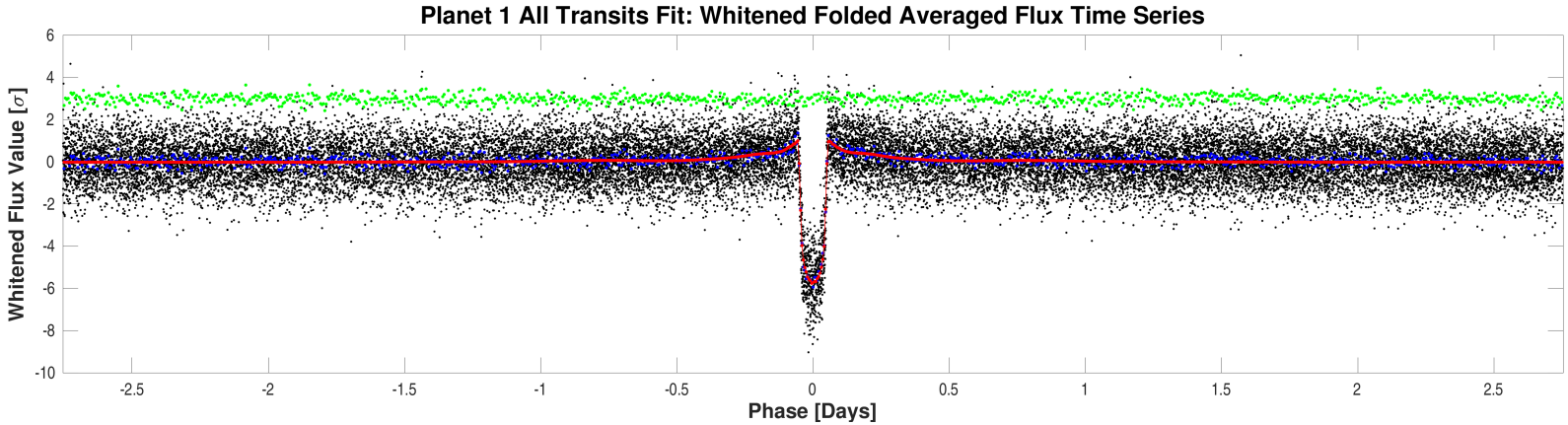
DoF: Degrees of Freedom

Parameter	Value	Uncertainty	Units
SNR	116.2		
Orbital Period	5.5080682	7.1658e-05	days
Transit Epoch	1983.7450145	3.8474e-04	BTJD
Impact Parameter	0.0161	3.1879e+00	
Planet Radius to Star Radius Ratio	0.1328001	1.8962e-03	
Semi-major Axis to Star Radius Ratio	18.0655	9.1661e-01	
Planet Radius	10.7300	7.3620e-01	Earth radii
Semi-major Axis	0.0560	4.5570e-03	AU
Effective Stellar Flux	82.2407	1.4265e+01	Goldilocks
Equilibrium Temperature	768	3.3305e+01	Kelvin
Stellar Density	2.6109	3.9742e-01	Solar density
Transit Depth	21585	1.9381e+02	ppm
Transit Duration	2.6400	3.4437e-02	hours
Transit Ingress Duration	0.3098	3.6191e-02	hours
Eccentricity	0.0000	0.0000e+00	
Peri Longitude	0.0000	0.0000e+00	degrees
Model Chi Square Statistic (DoF)	2617.3 (3006.4)		
Model Chi Square Goodness of Fit Statistic (DoF)	420.3 (660)		
Model Chi Square2 Statistic (DoF)	14.5 (7)		

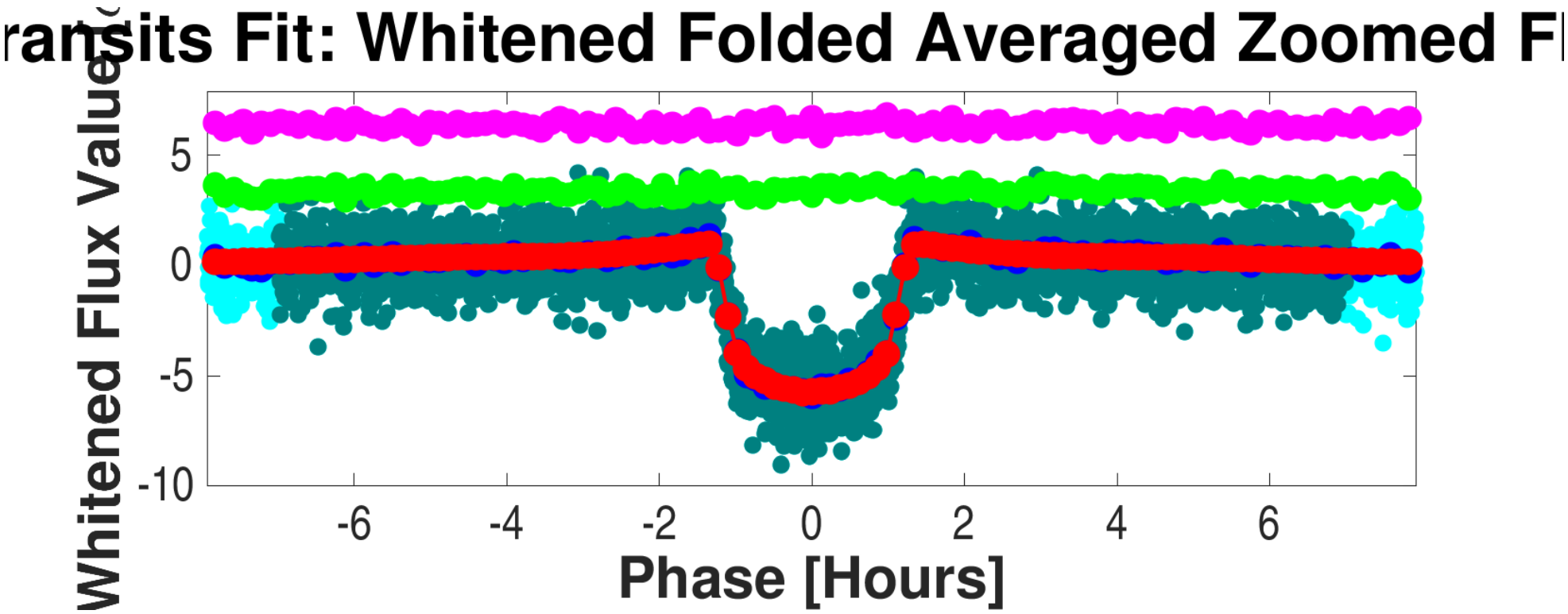
DoF: Degrees of Freedom



Flux time series for CatId 21744120, Planet candidate 1 in the unwhitened domain. For the data of Sector-25/TargetTableId-245, start BJD is 2458983 and the vertical offset is 0. For the data of Sector-26/TargetTableId-254, start BJD is 2459010 and the vertical offset is 0.1. 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/0000000021744120-01-all-unwhitened-25-245.fig`



Folded flux time series for CatId 21744120, 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/0000000021744120-01-all-whitened.fig`



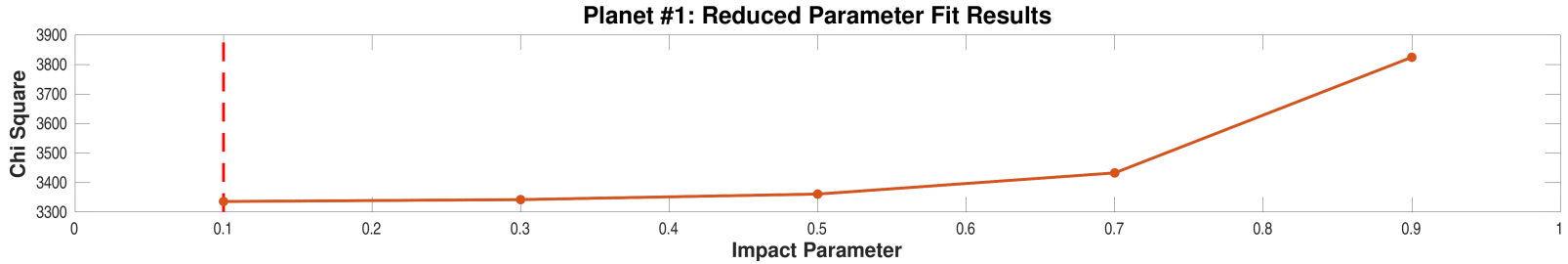
Folded flux time series for CatId 21744120, Planet candidate 1 in the whitened domain, zoomed on the transit. The flux data whose robust weights are larger/smaller than 0.1 are plotted in dark green/cyan dots, respectively. Values are averaged into 1 cadence wide bins. The blue dots represent the averaged 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/0000000021744120-01-all-whitened-zoomed.fig`

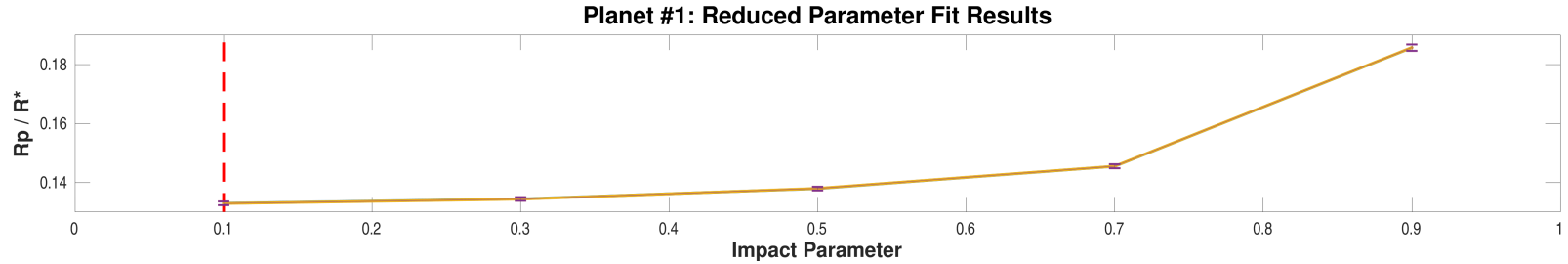
7.2 Model Fitter: Reduced Parameter Fit Results

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	120.1	3335.8	0.1329453	5.8551e-04	17.9941	8.5757e-02	21579	1.8870e+02	2.6408	1.2428e-02
0.30	120.7	3342.1	0.1344291	5.9191e-04	17.2726	8.4874e-02	21600	1.8876e+02	2.6674	1.2930e-02
0.50	120.6	3360.9	0.1379647	6.1431e-04	15.7477	8.3563e-02	21667	1.9123e+02	2.7348	1.4285e-02
0.70	118.8	3432.5	0.1455030	6.8136e-04	13.1715	8.4049e-02	21863	2.0200e+02	2.9031	1.8140e-02
0.90	117.2	3824.3	0.1856981	1.0950e-03	9.9594	9.7276e-02	23726	2.3766e+02	3.2781	2.9668e-02

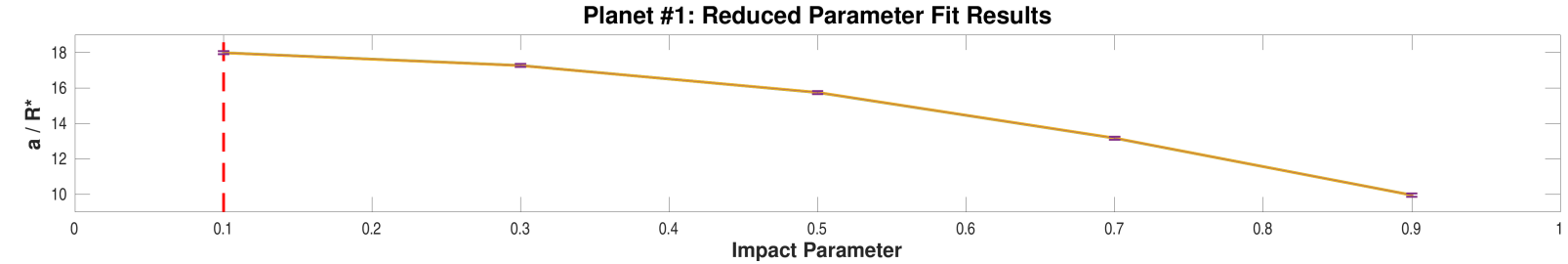
Highlighted row is the best reduced-parameter model fit.



Model chi squares of reduced parameter fits vs. impact parameter for CatId 21744120, 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/0000000021744120-01-reduced-fits-chi-square.fig`



Ratios of planet radius to star radius of reduced parameter fits vs. impact parameter for CatId 21744120, 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/0000000021744120-01-reduced-fits-rp-over-rstar.fig`



Ratios of semimajor axis to star radius of reduced parameter fits vs. impact parameter for CatId 21744120, 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/0000000021744120-01-reduced-fits-a-over-rstar.fig`

7.3 Model Fitter: Trapezoidal Fit Results

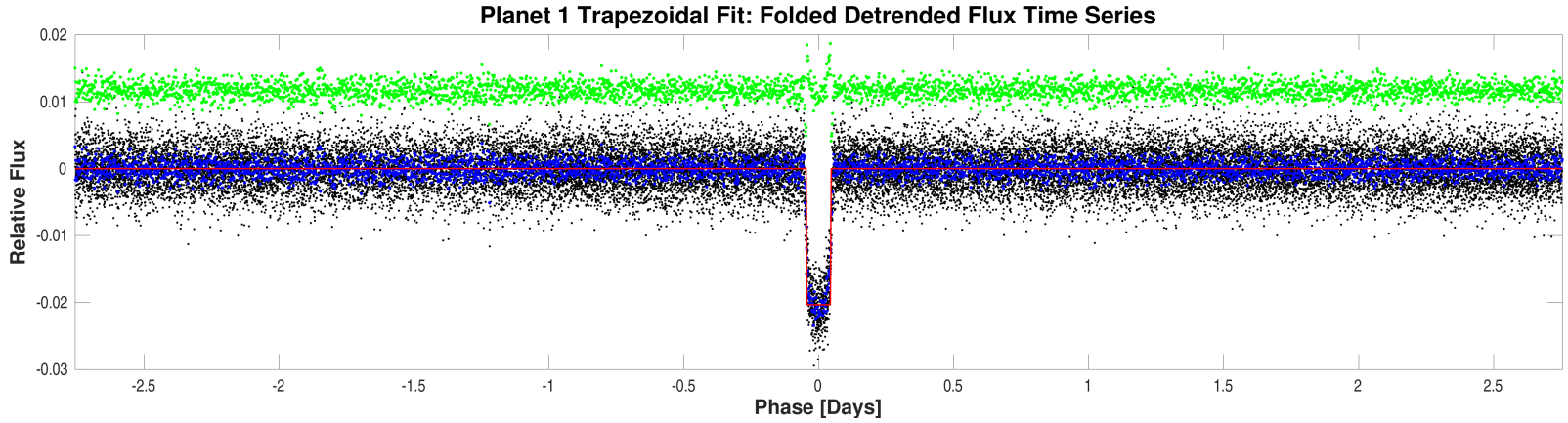
Model Characteristic	Name
Transit Model	trapezoidal_model
Limb Darkening Model	

TCE Parameter	Value	Units
Trial Transit Pulse Duration	2.5	hours
Transit Epoch	1983.7412947	TJD
Orbital Period	5.5083308	days
Maximum SES	48.0	
Maximum MES	113.0	
Robust Statistic	106.4	
Chi Square Goodness of Fit Statistic (DoF)	1518.5 (593)	
Chi Square2 Statistic (DoF)	642.9 (984.2)	
Threshold for Desired PFA		

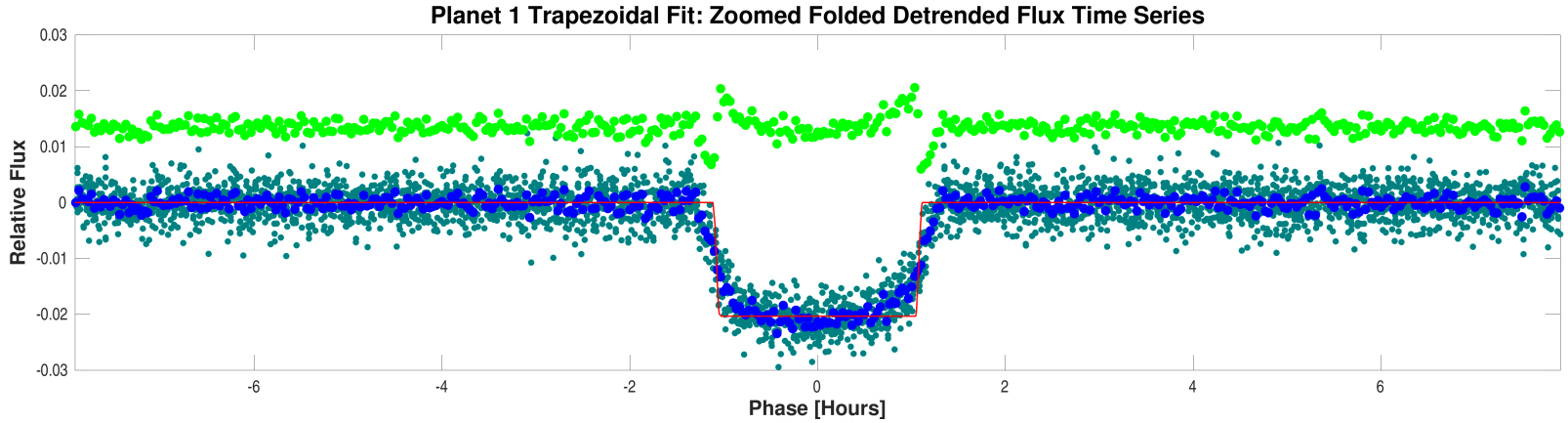
DoF: Degrees of Freedom

Parameter	Value	Uncertainty	Units
SNR	146.0		
Orbital Period	5.5083308		days
Transit Epoch	1983.7437896		BTJD
Transit Depth	20345		ppm
Transit Duration	2.6360		hours
Transit Ingress Duration	0.4795		hours
Model Chi Square Statistic (DoF)	29660.7 (4659)		

DoF: Degrees of Freedom



Folded detrended flux time series for CatId 21744120, Planet candidate 1 and folded trapezoidal model light curve.
Open `./planet-01/planet-search-and-model-fitting-results/trapezoidal-model-fit/0000000021744120-01-all-trapezoidal.fig`



Zoomed folded detrended flux time series for CatId 21744120, Planet candidate 1 and folded trapezoidal model light curve.
Open `./planet-01/planet-search-and-model-fitting-results/trapezoidal-model-fit/0000000021744120-01-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	5.5083		days		
Transit Duration	2.5		hours		
Maximum MES	113.0				
Secondary Phase	3.5972		days		
Secondary MES	1.8				
Minimum Phase	1.5819		days		
Minimum MES	-3.3				
Median MES	0.0				
MAD MES	0.67933				
Robust Statistic	1.3				
Secondary Depth	273.1	2.0530e+02	ppm		
Geometric Albedo	4.1	3.1392e+00		0.9873	16.18
Planet Effective Temperature	1690	3.2050e+02	Kelvin	2.8603	0.21

7.4.2 Eclipsing Binary Discrimination Test

Result	Value	Value in Sigmas	Significance (%)
Odd Even Transit Depth Comparison Statistic	1.5522e+00	1.2459	21.28

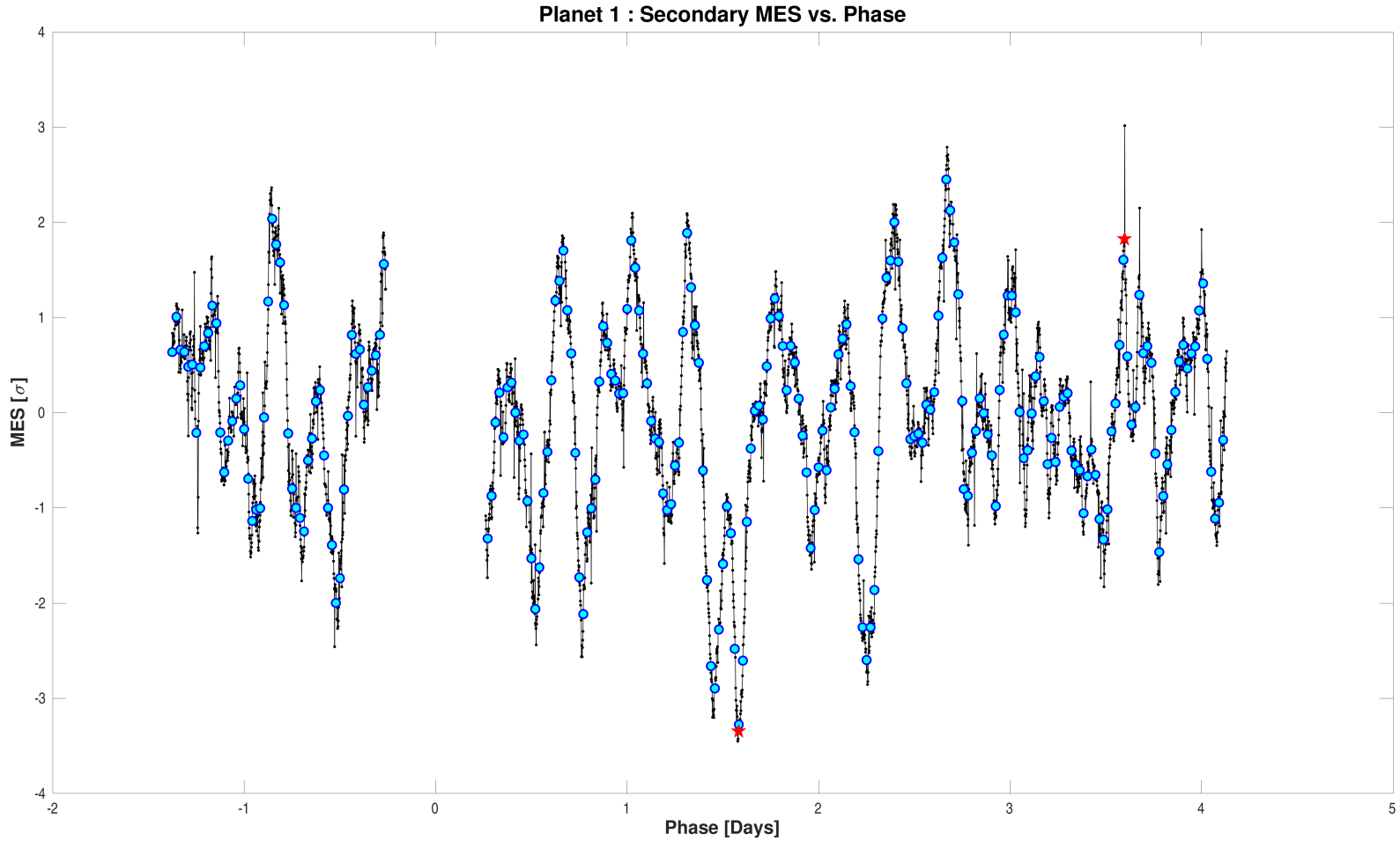
7.4.3 Bootstrap Test

Result	Value
False Alarm Probability	0.0000e+00
Bootstrap Threshold for Desired PFA	7.5
MES Mean	-0.41
MES Standard Deviation	1.11
Transit Count	10

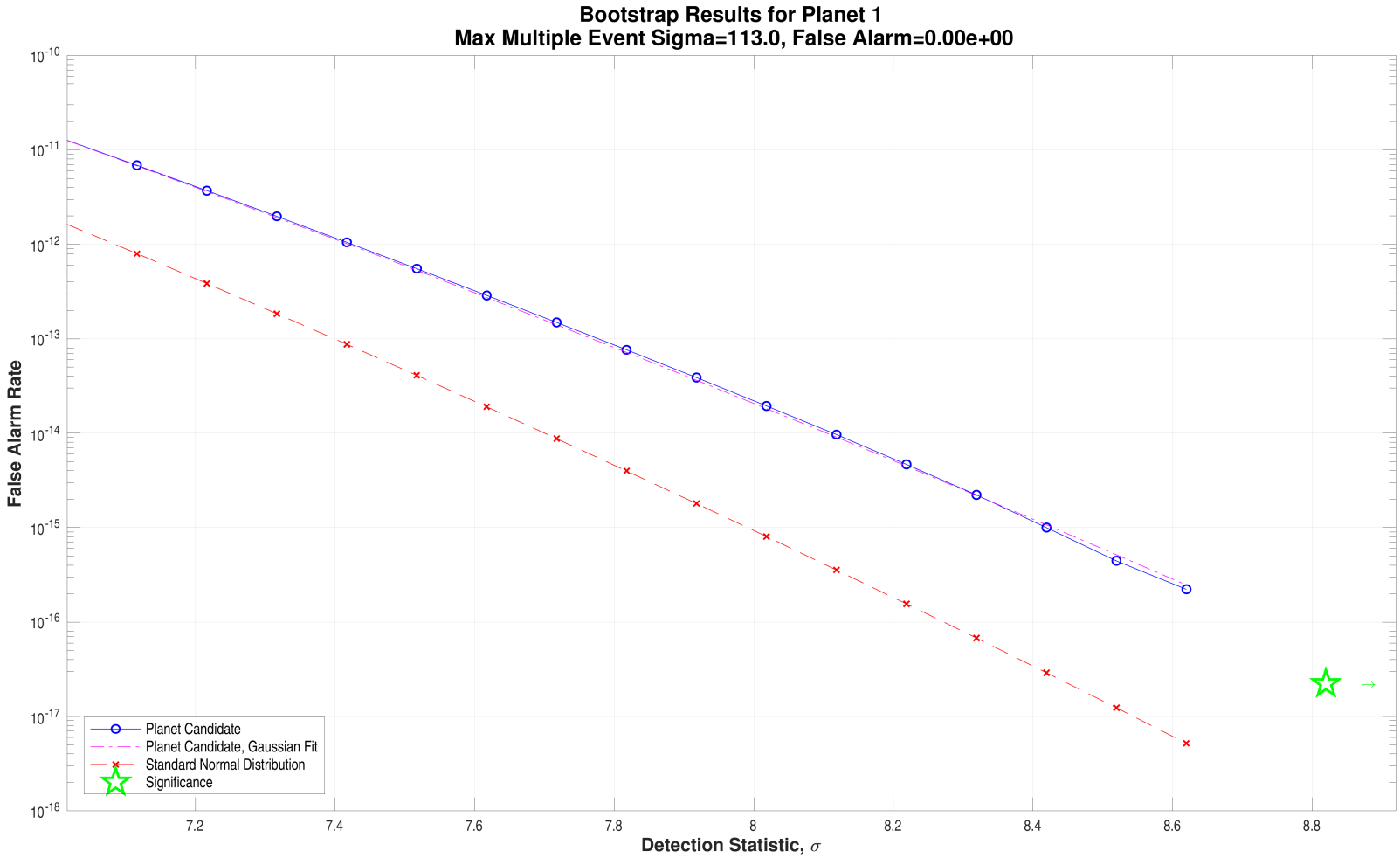
7.4.4 Ghost Diagnostic Test

Result	Value	Significance (%)
Maximum MES	113.0	
SNR	116.2	
Core Aperture Statistic	7.6676e+01	100.00
Halo Aperture Statistic	1.4829e+01	100.00
Ratio of Core/Halo Aperture Statistics	5.1707e+00	

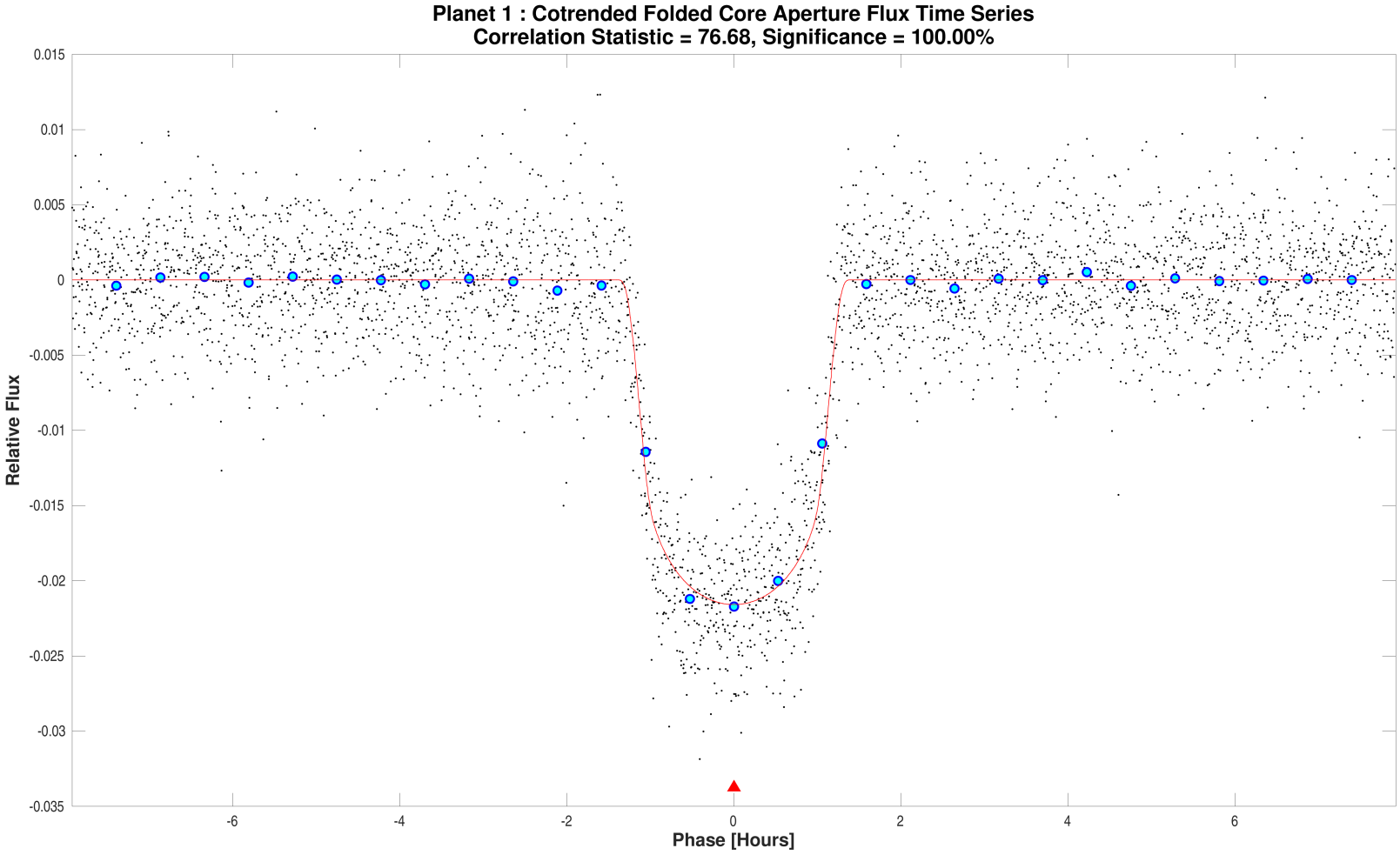
7.4.5 Validation Test Figures



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 2.5. The maximum secondary MES and corresponding phase are 1.828 and 3.5972 days respectively. The minimum secondary MES and corresponding phase are -3.3444 and 1.5819 days respectively.
Open `./planet-01/report-summary/0000000021744120-01-weak-secondary-diagnostic.fig`

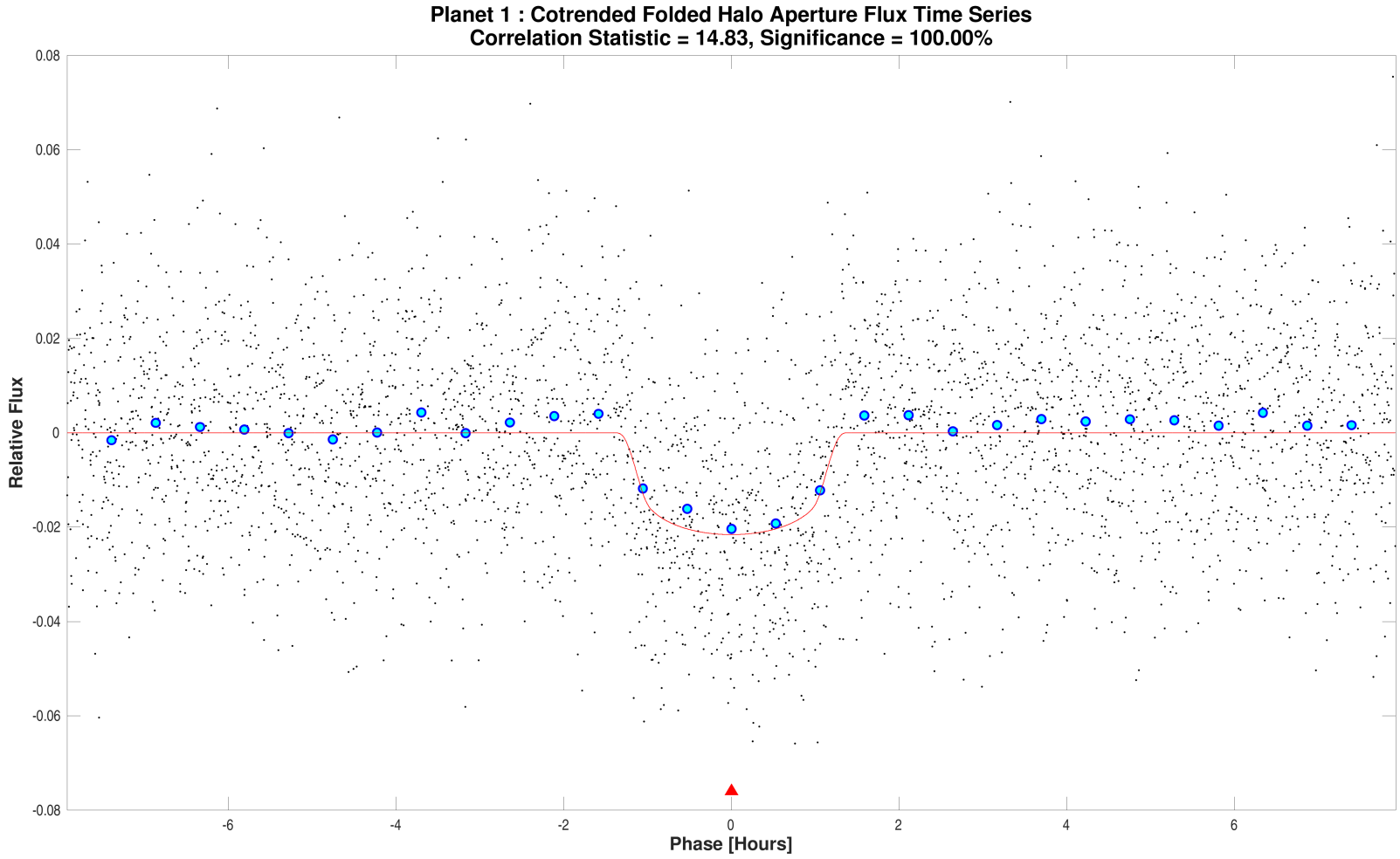


Bootstrap results for target 21744120, planet 1. Cumulative sum of the probabilities (derived from the histogram of counts) from upper tail to the search transit threshold; false alarm probability is indicated by the star. The Gaussian equivalent threshold for this false alarm probability is Inf. The threshold on this distribution that achieves the same false alarm rate as a 7.1 sigma threshold on a Gaussian distribution is 7.5027.
Open `./planet-01/bootstrap-results/00000000021744120-01-bootstrap-false-alarm.fig`



Optical ghost diagnostic core aperture flux time series for target 21744120, 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/0000000021744120-01-core-unwhitened-cotrended-zoomed-model.fig`

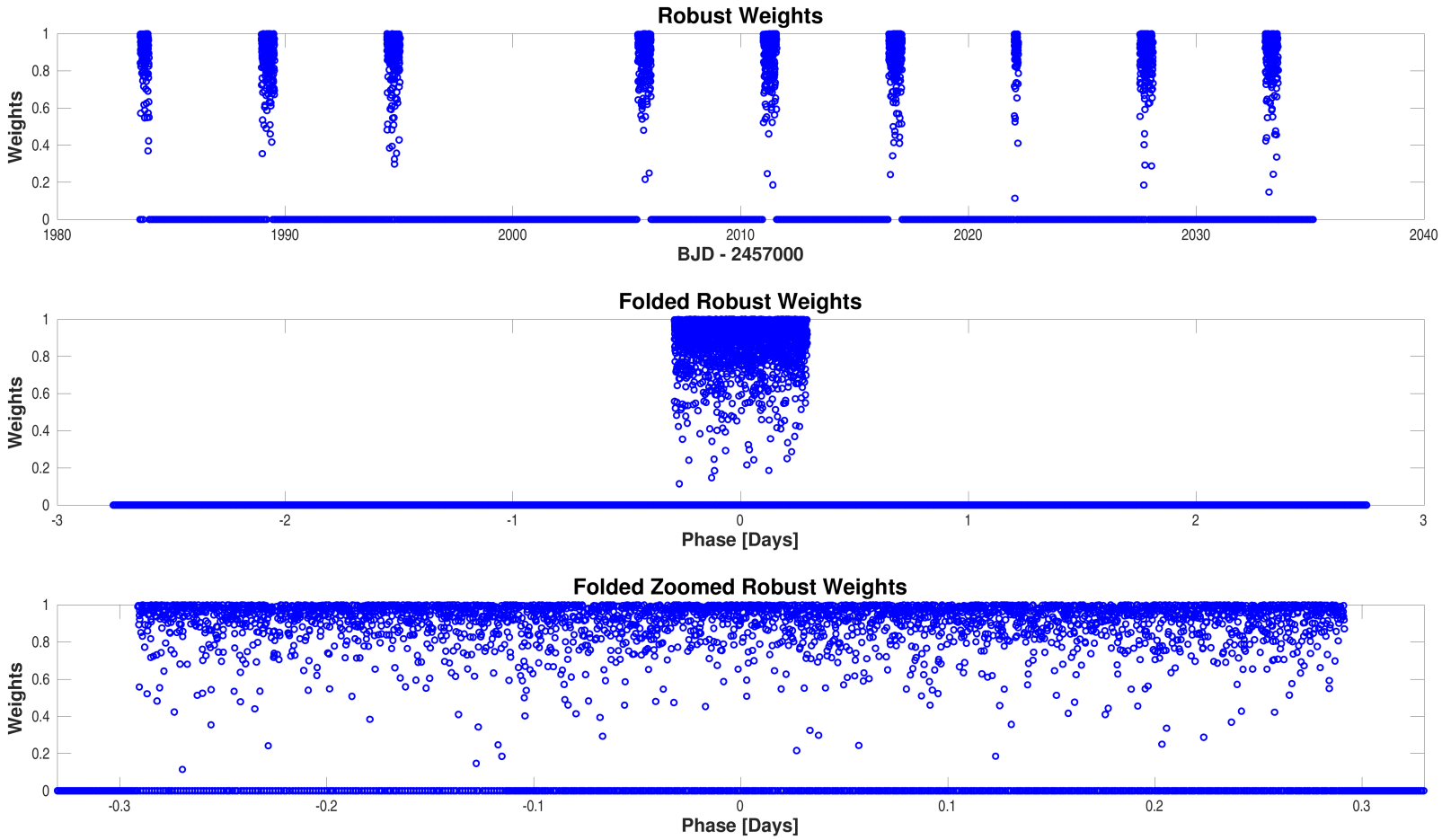


Optical ghost diagnostic halo aperture flux time series for target 21744120, planet candidate 1. The unwhitened time series is phase folded at the orbital period associated with the planet candidate and centered on the epoch of the first transit. The time series was first cotrended against spacecraft 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.

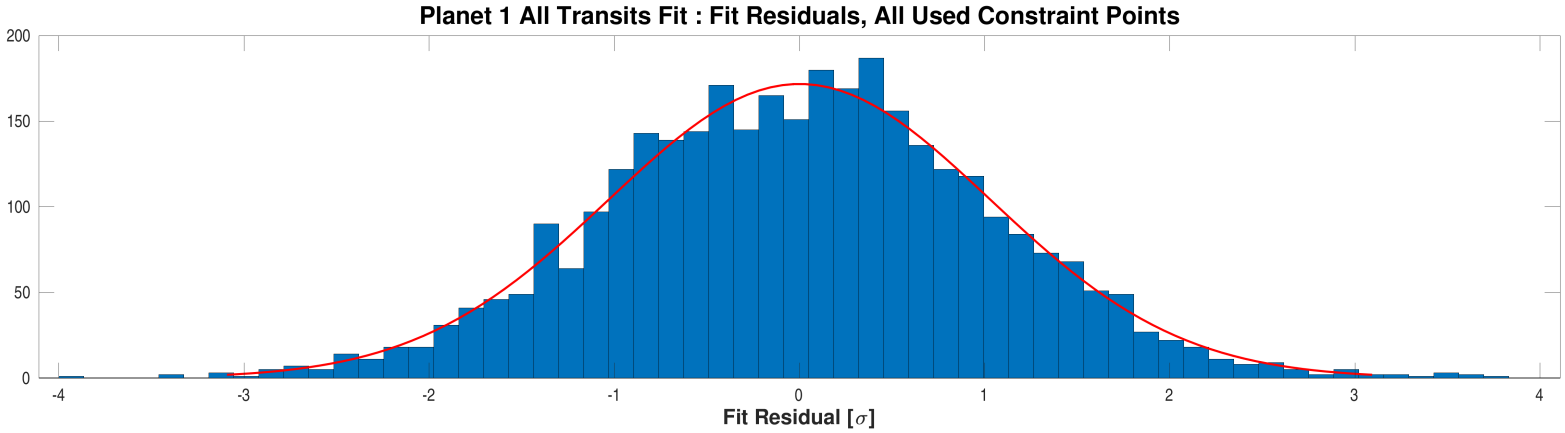
Open `./planet-01/ghost-diagnostic-results/0000000021744120-01-halo-unwhitened-cotrended-zoomed-model.fig`

Appendix A Planet Candidate 1

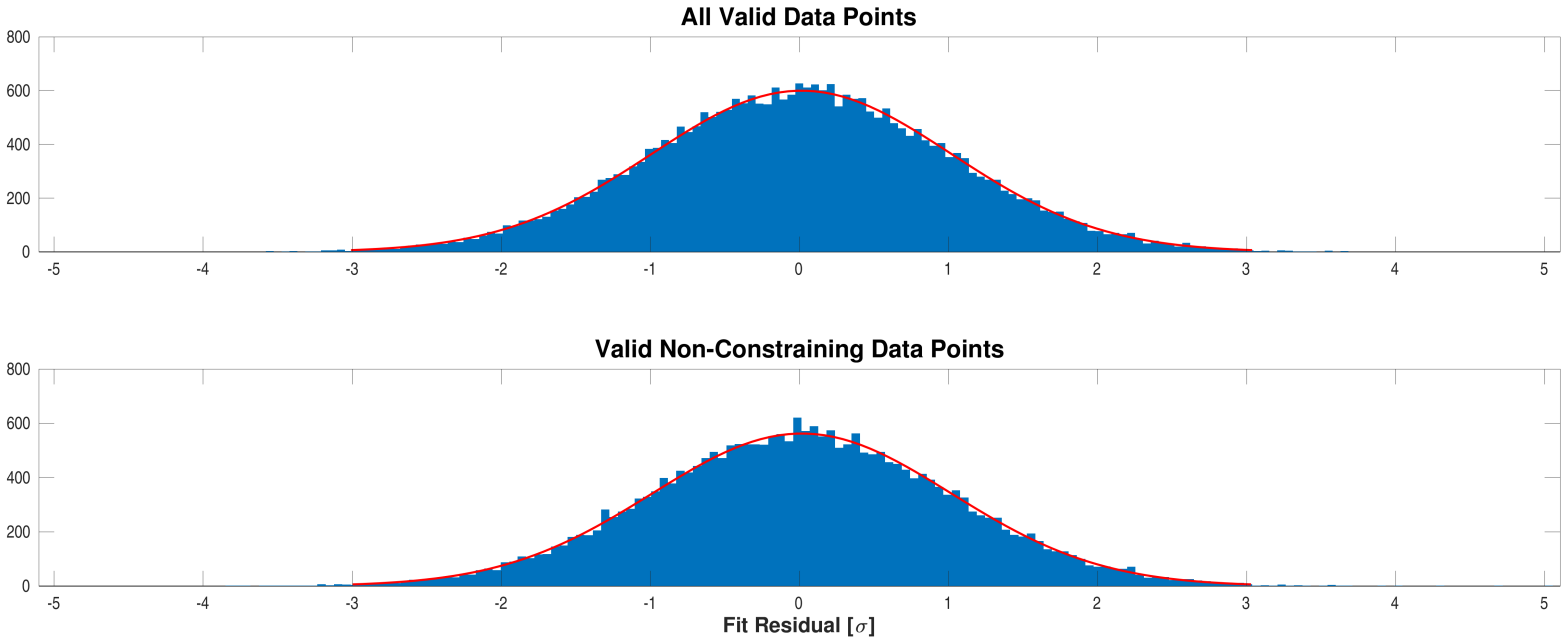
A.1 Model Fitter: All Transits



Robust weights distribution for CatId 21744120, 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/0000000021744120-01-all-robust-weights.fig`



Fit residuals distribution for CatId 21744120, 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/0000000021744120-01-all-histo-used.fig`

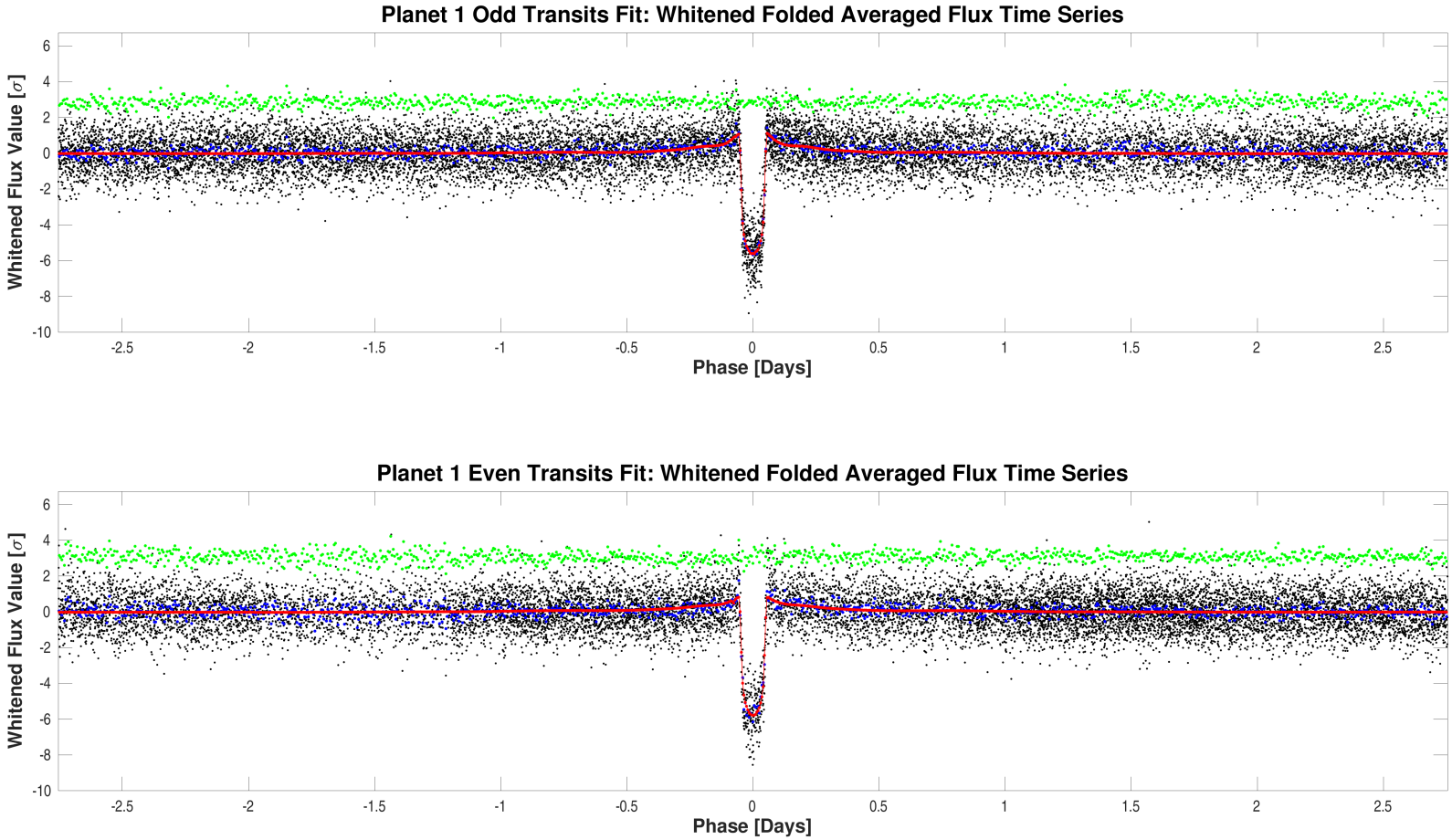


Fit residuals distribution for CatId 21744120, Planet candidate 1. Top plot: all valid data. Bottom plot: valid data not used to constrain fit (due to distance from a transit). Gaussian fits to the histograms are shown in red.
Open `./planet-01/planet-search-and-model-fitting-results/all-transits-fit/0000000021744120-01-all-histo-all-and-unused.fig`

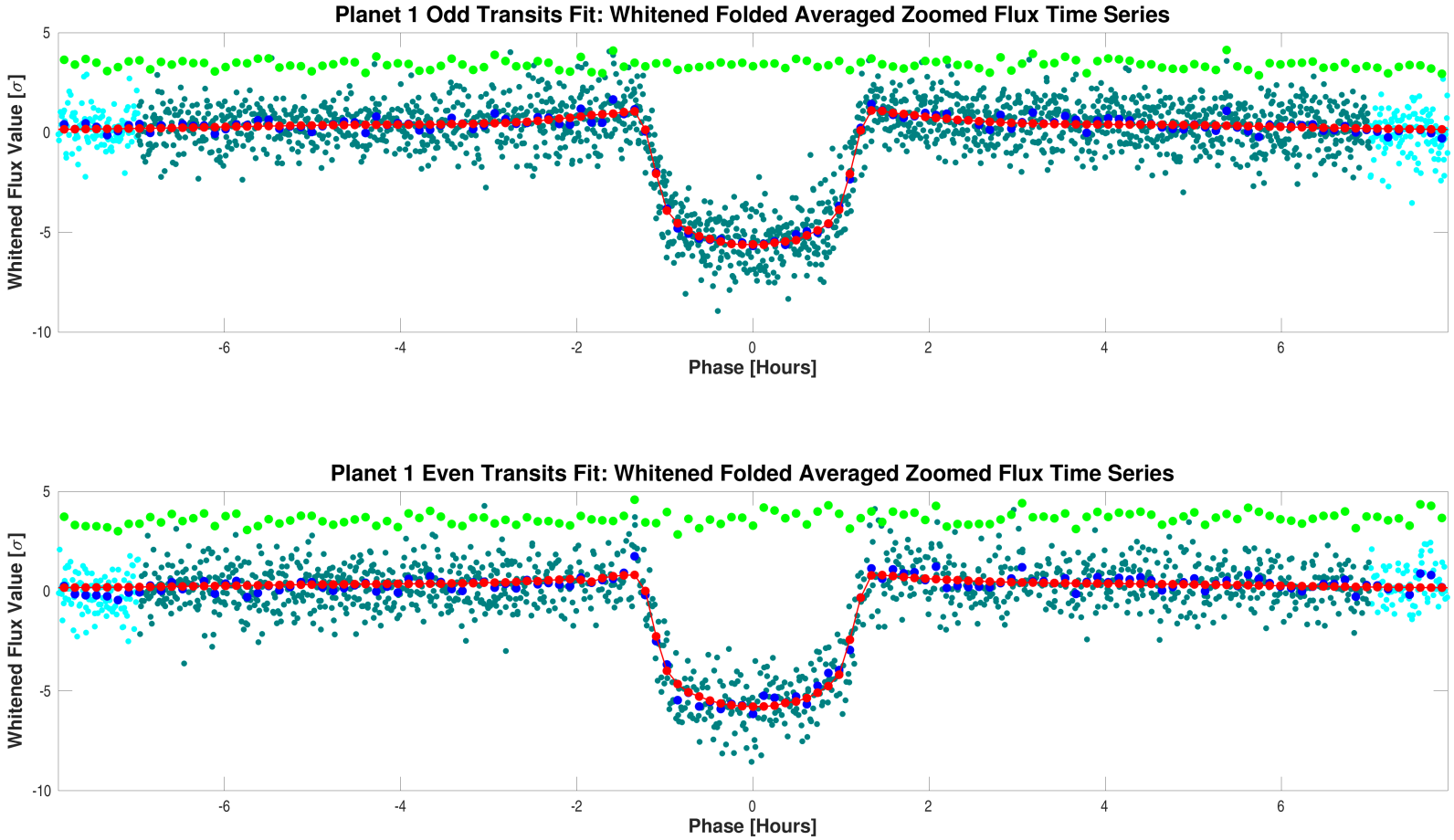
A.2 Model Fitter: Odd & Even Transits

Parameter	Odd Transits Value	Odd Transits Uncertainty	Even Transits Value	Even Transits Uncertainty	Units	Difference / ‖Uncertainty‖
SNR	90.2		71.4			
Orbital Period	5.5079787	9.6359e-05	5.5081765	1.1156e-04	days	1.3416e+00
Transit Epoch	1983.7451905	4.7461e-04	1989.2528280	5.7750e-04	BTJD	5.7620e-01
Impact Parameter	0.0386	1.6471e+00	0.0100	8.8660e+00		3.1665e-03
Planet Radius to Star Radius Ratio	0.1332949	2.3657e-03	0.1317303	3.2146e-03		3.9200e-01
Semi-major Axis to Star Radius Ratio	18.1363	1.1375e+00	18.0938	1.5795e+00		2.1817e-02
Planet Radius	10.7700	7.4761e-01	10.6435	7.6004e-01	Earth radii	1.1858e-01
Semi-major Axis	0.0560	4.5570e-03	0.0561	4.5571e-03	AU	2.0819e-04
Effective Stellar Flux	82.2424	1.4265e+01	82.2385	1.4264e+01	Goldilocks	1.9518e-04
Equilibrium Temperature	768	3.3305e+01	768	3.3304e+01	Kelvin	1.9518e-04
Stellar Density	2.6418	4.9706e-01	2.6231	6.8694e-01	Solar density	2.2057e-02
Transit Depth	21739	2.5102e+02	21240	3.1191e+02	ppm	1.2459e+00
Transit Duration	2.6295	4.2750e-02	2.6336	5.8385e-02	hours	5.5949e-02
Transit Ingress Duration	0.3100	4.4752e-02	0.3068	6.1662e-02	hours	4.0989e-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)	2615.3 (3002.5)		2615.3 (3002.5)			

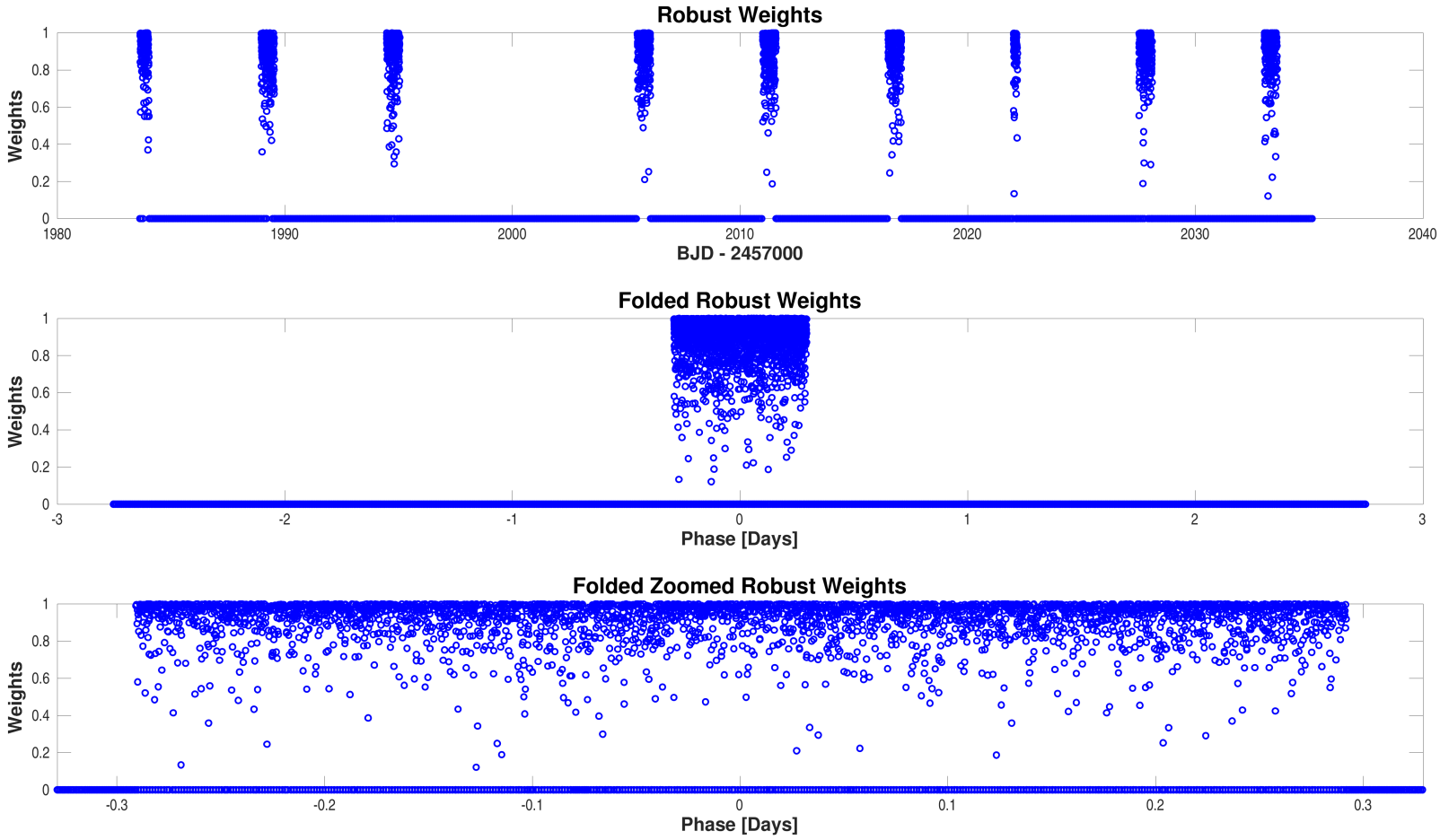
DoF: Degrees of Freedom



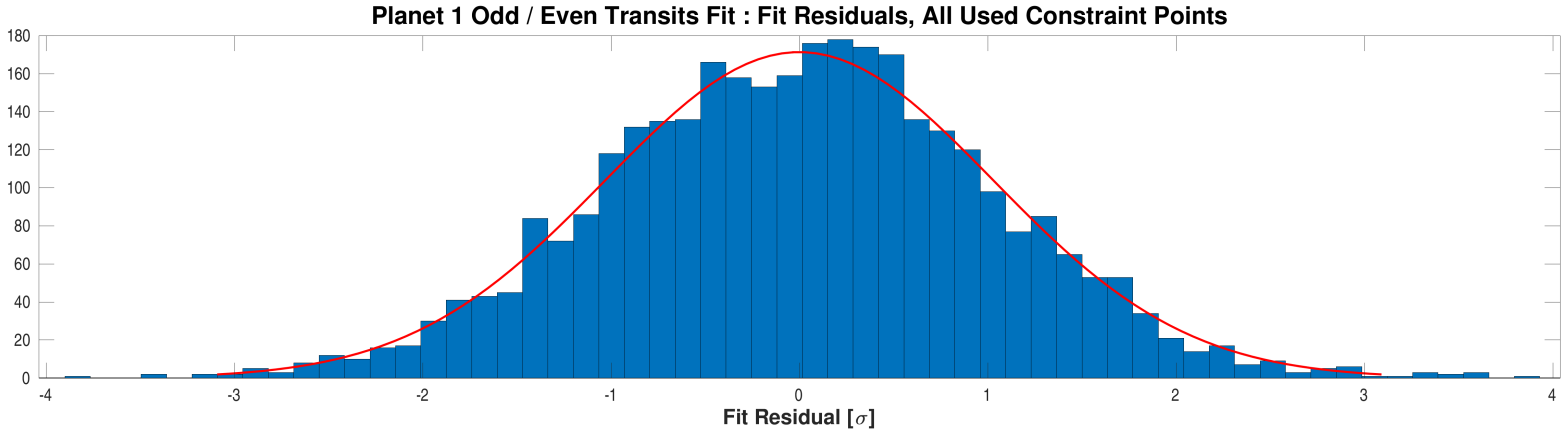
Folded flux time series for CatId 21744120, Planet candidate 1 in the whitened domain is plotted in black dots. Values are averaged into 1 cadence wide bins. The blue dots represent the averaged values of the folded flux time series; the red dots represent the averaged values of the folded model light 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/0000000021744120-01-odd-even-whitened.fig`



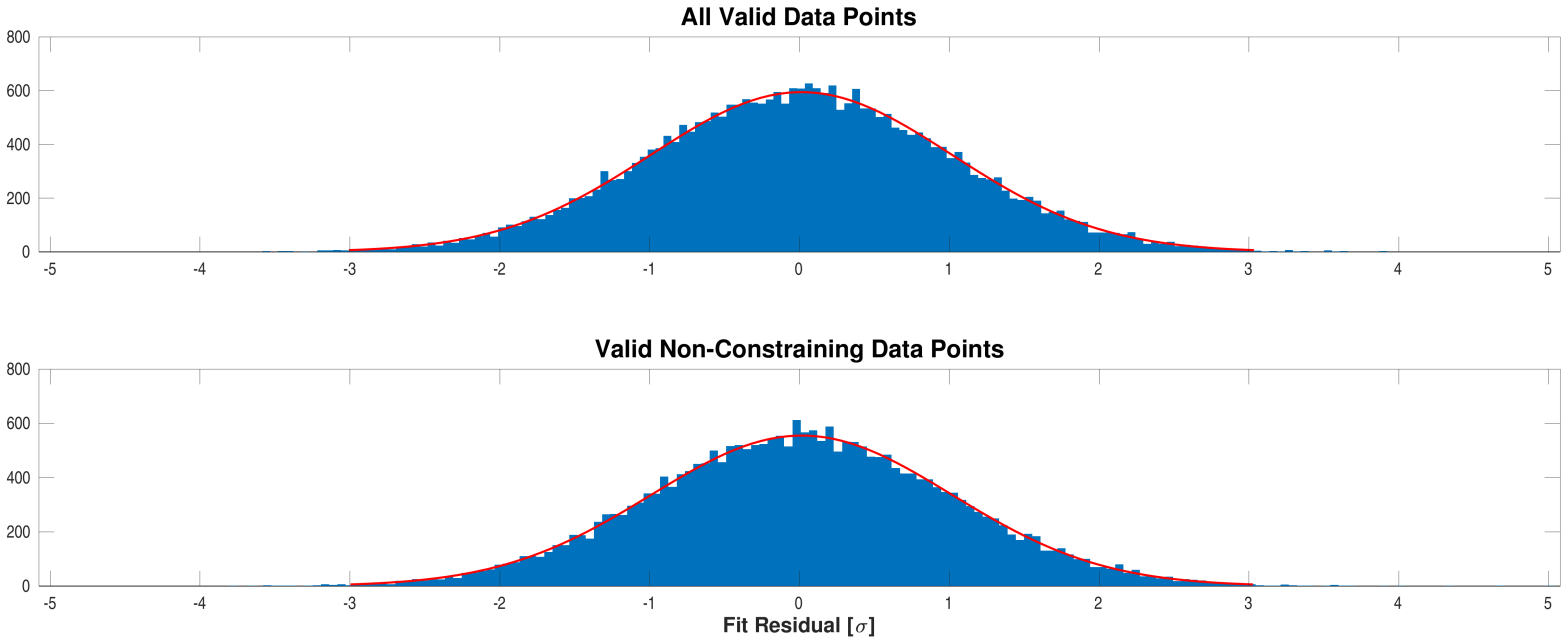
Folded flux time series for CatId 21744120, Planet candidate 1 in the whitened domain, zoomed on the transit. The flux data whose robust weights are larger/smaller than 0.1 are plotted in dark green/cyan dots, respectively. Values are averaged into 1 cadence wide bins. The blue dots represent the averaged 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/000000021744120-01-odd-even-whitened-zoomed.fig`



Robust weights distribution for CatId 21744120, 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/000000021744120-01-odd-even-robust-weights.fig`

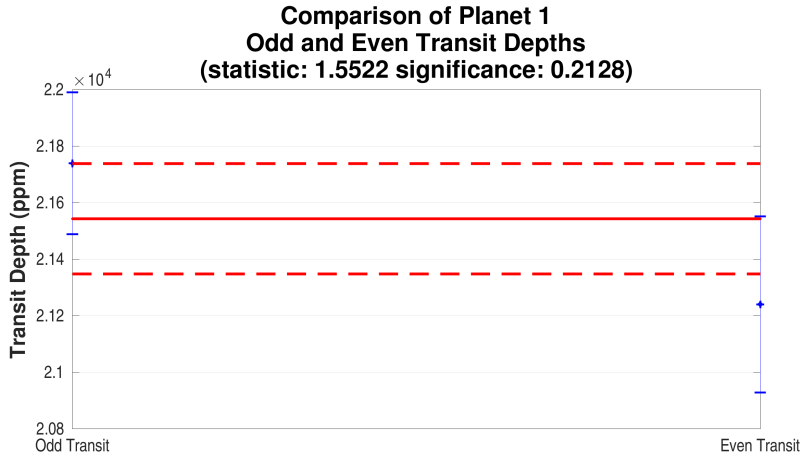


Fit residuals distribution for CatId 21744120, Planet candidate 1. Only the valid data points used to constrain the fit are shown here. A Gaussian fit to the histogram is shown in red.
Open `./planet-01/planet-search-and-model-fitting-results/odd-even-transits-fit/000000021744120-01-odd-even-histo-used.fig`



Fit residuals distribution for CatId 21744120, 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/000000021744120-01-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 21744120, planet 1. A significance level close to 1/0 favors a transiting planet/an eclipsing binary. Open `./planet-01/binary-discrimination-test-results/000000021744120-01-eclipsing-binary-discrimination-tests.fig`

Appendix B Alerts

This target did not trigger any alerts.