

Data Validation (DV) Report
for TESS ID 365733349
Sectors 58 - 58
Cadence: TARGET (2.0-min)

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

30-Nov-2022 00:07:45 Z

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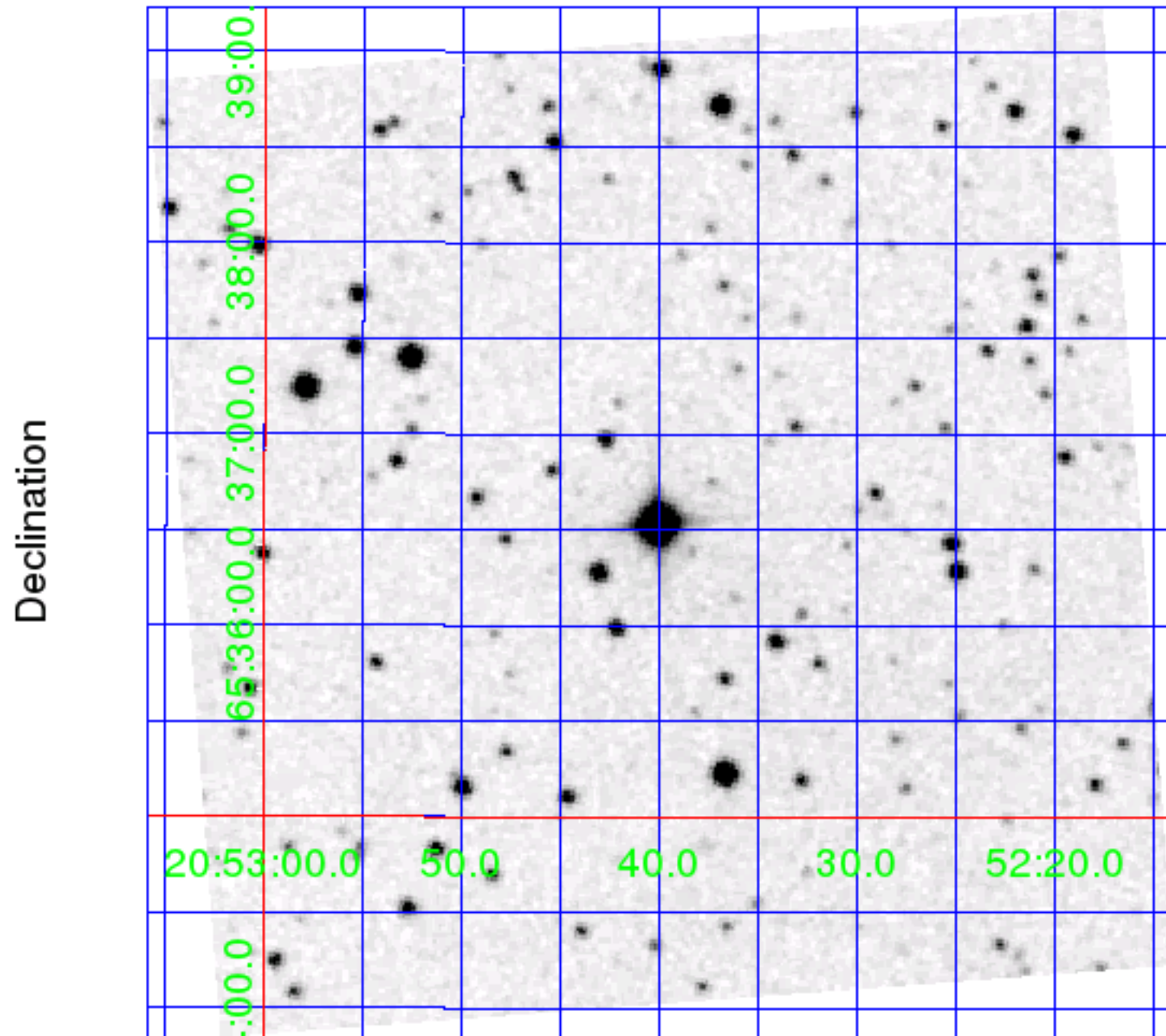
1Summary

Target Properties	Value	Uncertainty	Units	Provenance
Catalog ID	365733349			
TOI ID	1288			
TESS Name	-			
RA	313.16657848	0	degrees	TIC8.2
Dec	65.60907873	0	degrees	TIC8.2
Magnitude	9.9312	0.0061		TIC8.2
Radius	0.923	0.048	Solar radii	TIC8.2
Effective Temperature	6180	362	Kelvin	TIC8.2
log(g)	4.580	0.10678	cm/sec ²	TIC8.2
[M/H]	0.000	0	Solar metallicity	Solar
Stellar Density	1.500	0.377	Solar density	TIC8.2-Derived
Limb Darkening Coefficient 1	0.48382			
Limb Darkening Coefficient 2	0.25772			
Limb Darkening Coefficient 3	-0.073052			
Limb Darkening Coefficient 4	-0.037012			
Number of Planet Candidates	1			
TOI Model	csv-file-toi-catalog-11-28-22.csv			
TESS Names Model	-			
External TCE Model	-			
Software Revision	spoc-5.0.77-20221025			
Date Report Generated	30-Nov-2022 00:07:45 Z			

Sector	Target Table	Camera/ CCD	Crowding Metric	Flux Fraction
58	378	3:4	0.9678	0.9066

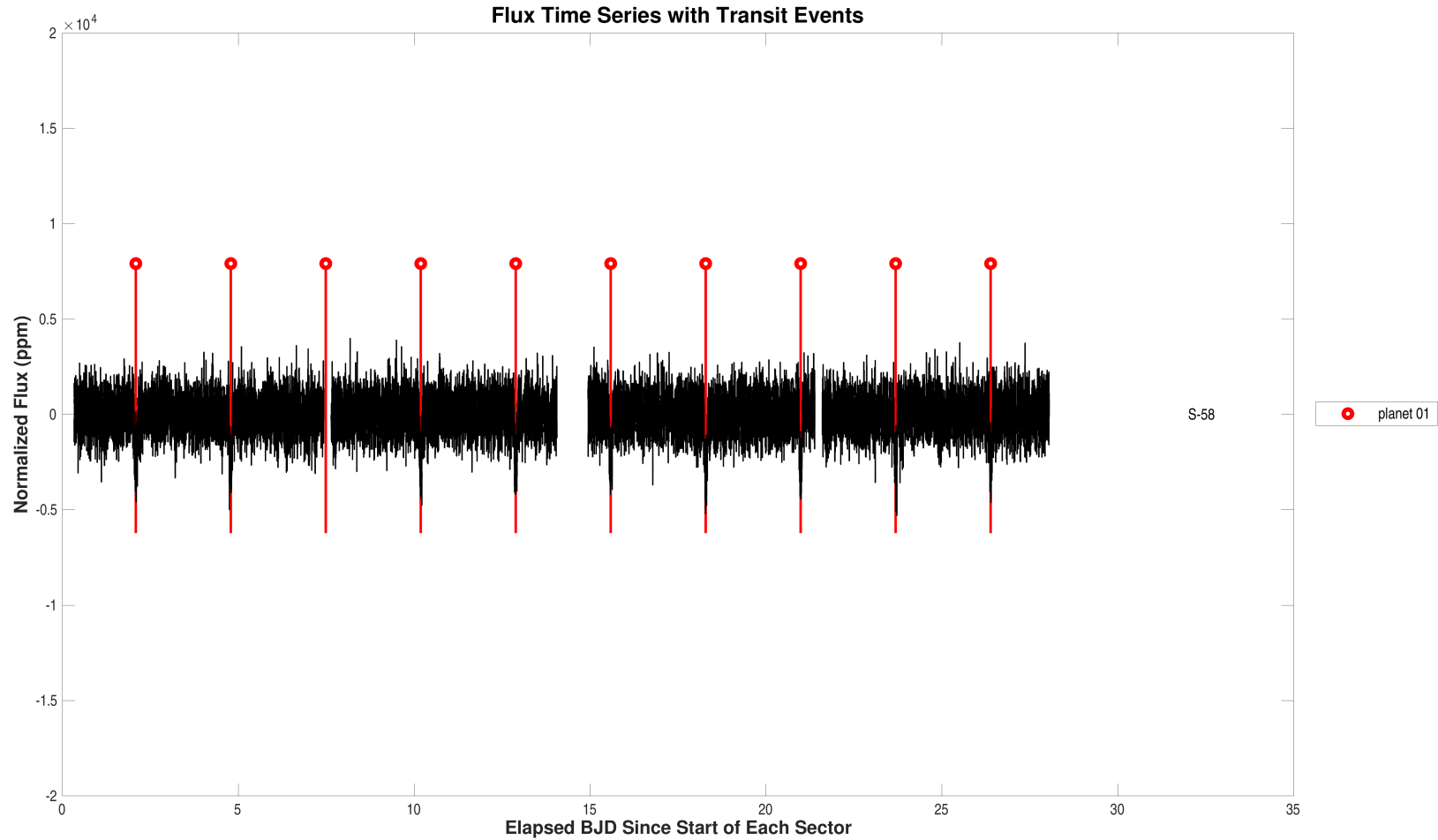
Planet Candidate	TOI ID	TESS Name	TOI Correlation	Period (days)	Period Ratio	Epoch (BTJD)	Semi-major Axis (AU)	Radius (Re)	Seff	Teq (K)	False Alarm	Suspected EB
1	1288.01	-	0.98	2.700	1.00	2884.086	0.04	5.0	691.9	1308	3.15e-288	false

2 Survey Image

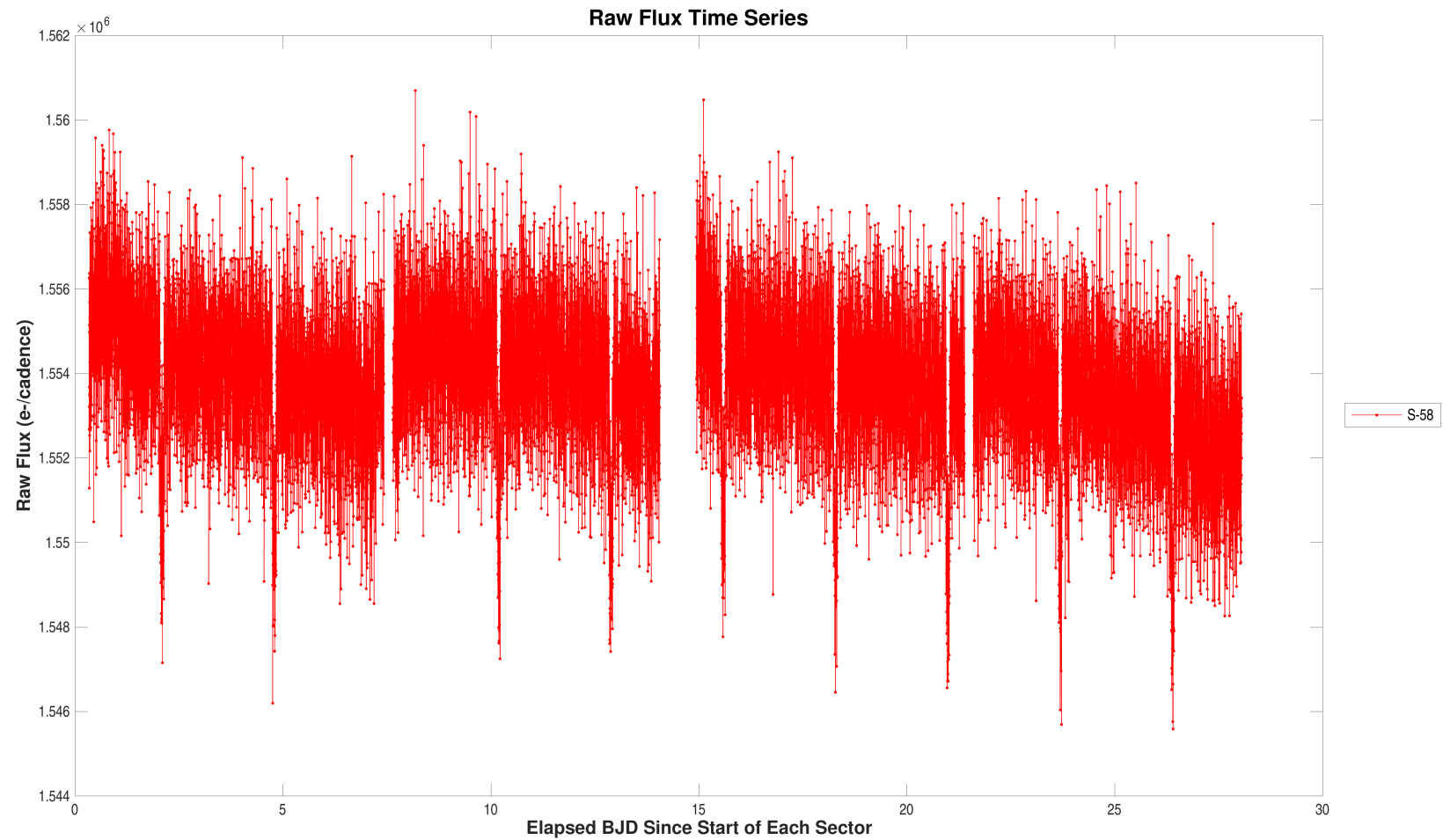


Digitized Sky Survey (DSS) red image. The 5' x 5' image is centered on the J2000 coordinates of target (365733349).

3 Flux Time Series



Summary plot of sector-stitched flux time series and transits for target 365733349, 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 58, target table 378, start BJD is 2459882. Open `./summary-plots/0000000365733349-00-flux-dv-fit-58-378.fig`



Summary plot of raw flux time series. For the data of sector 58, target table 378, start BJD is 2459882.

Open `./summary-plots/0000000365733349-00-raw-flux-58-378.fig`

4 Dashboards

Planet Candidate 1

Model Fitter	Stellar Radius 0.9 ± 0.0 Solar units		Core Aperture Correlation Statistic Value = 32.28 Significance = 100.00%	Ghost Diagnostic Test
	Period = 2.7 ± 0.0 days Depth = 2538 ± 51 ppm Planet Radius = 5.0 ± 0.3 Earth radii Semi-major Axis = 0.0 ± 0.0 AU Effective Stellar Flux = 691.9 ± 199.3 Equilibrium Temperature = 1308 ± 94 Kelvin Chi-squared/DoF = 0.8 SNR = 50.4		Halo Aperture Correlation Statistic Value = 3.27 Significance = 99.95% Core/Halo Ratio Ratio = 9.88	
Eclipsing Binary Discrimination Test	Odd-Even Depth Comparison Statistic Value = 3.69e-02 Significance = 84.76%		Offsets Relative to Out of Transit Centroid Source RA Offset = $-7.73\text{e-}01 \pm 2.50\text{e+}00$ arcsec (-0.31σ) Source Dec Offset = $1.20\text{e-}01 \pm 2.52\text{e+}00$ arcsec (0.05σ) Source Offset Distance = $7.82\text{e-}01 \pm 2.50\text{e+}00$ arcsec (0.31σ) Offsets Relative to TIC Position Source RA Offset = $-4.45\text{e-}02 \pm 2.50\text{e+}00$ arcsec (-0.02σ) Source Dec Offset = $9.42\text{e-}01 \pm 2.52\text{e+}00$ arcsec (0.37σ) Source Offset Distance = $9.43\text{e-}01 \pm 2.52\text{e+}00$ arcsec (0.37σ)	Difference Image Centroid Offsets
	Shorter Period Comparison Statistic Value = N/A Significance = N/A	Longer Period Comparison Statistic Value = N/A Significance = N/A	False Alarm = 3.15e-288 Transit Count = 10 Max Multiple Event Statistic = 33.1	Bootstrap Test

Summary of model fitter results and validation test results for target 365733349, 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

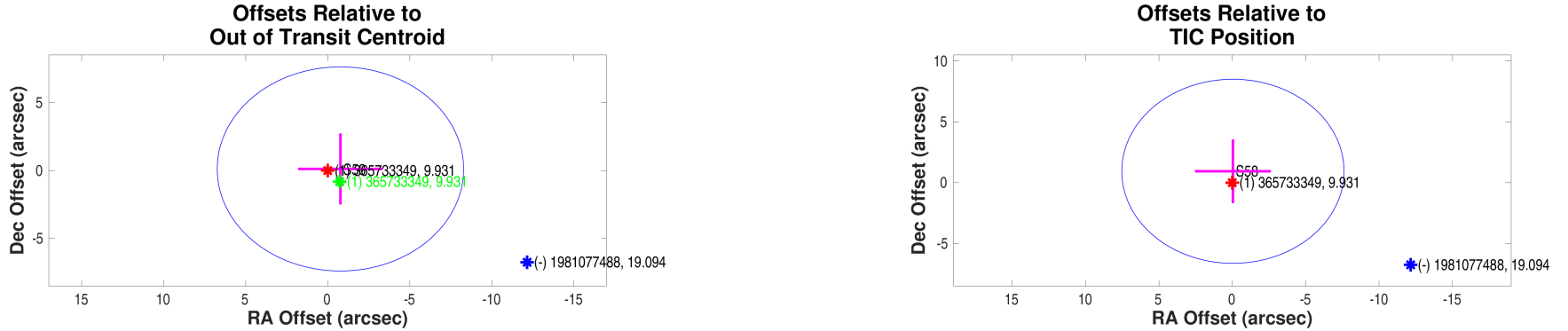
Mean offset from the PRF fit to the out of transit image

	RA	Dec	Units
Offset	$-0.7729 \pm 2.50e+00$	$0.1199 \pm 2.52e+00$	arcseconds
Offset/ σ	-0.31	0.05	
Offset Distance	$0.7821 \pm 2.50e+00$		arcseconds
Offset Distance/ σ	0.31		
3σ Radius	7.5129		arcseconds

Mean offset from the TIC RA and Dec

	RA	Dec	Units
Offset	$-0.0445 \pm 2.50e+00$	$0.9419 \pm 2.52e+00$	arcseconds
Offset/ σ	-0.02	0.37	
Offset Distance	$0.9429 \pm 2.52e+00$		arcseconds
Offset Distance/ σ	0.37		
3σ Radius	7.5718		arcseconds

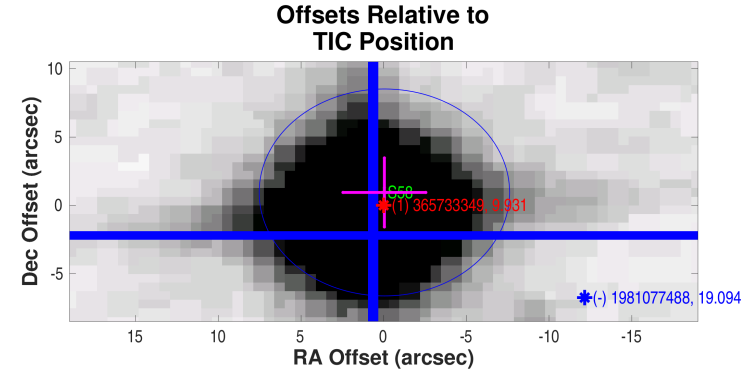
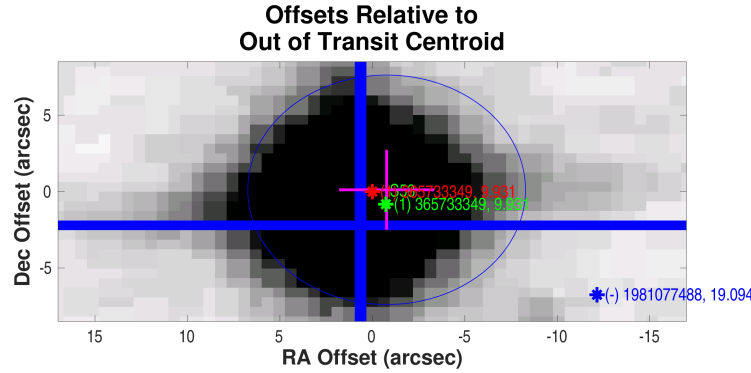
Planet Candidate 1



Difference image centroid offsets for target 365733349, 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/0000000365733349-01-difference-image-centroid-offsets.fig`

Planet Candidate 1



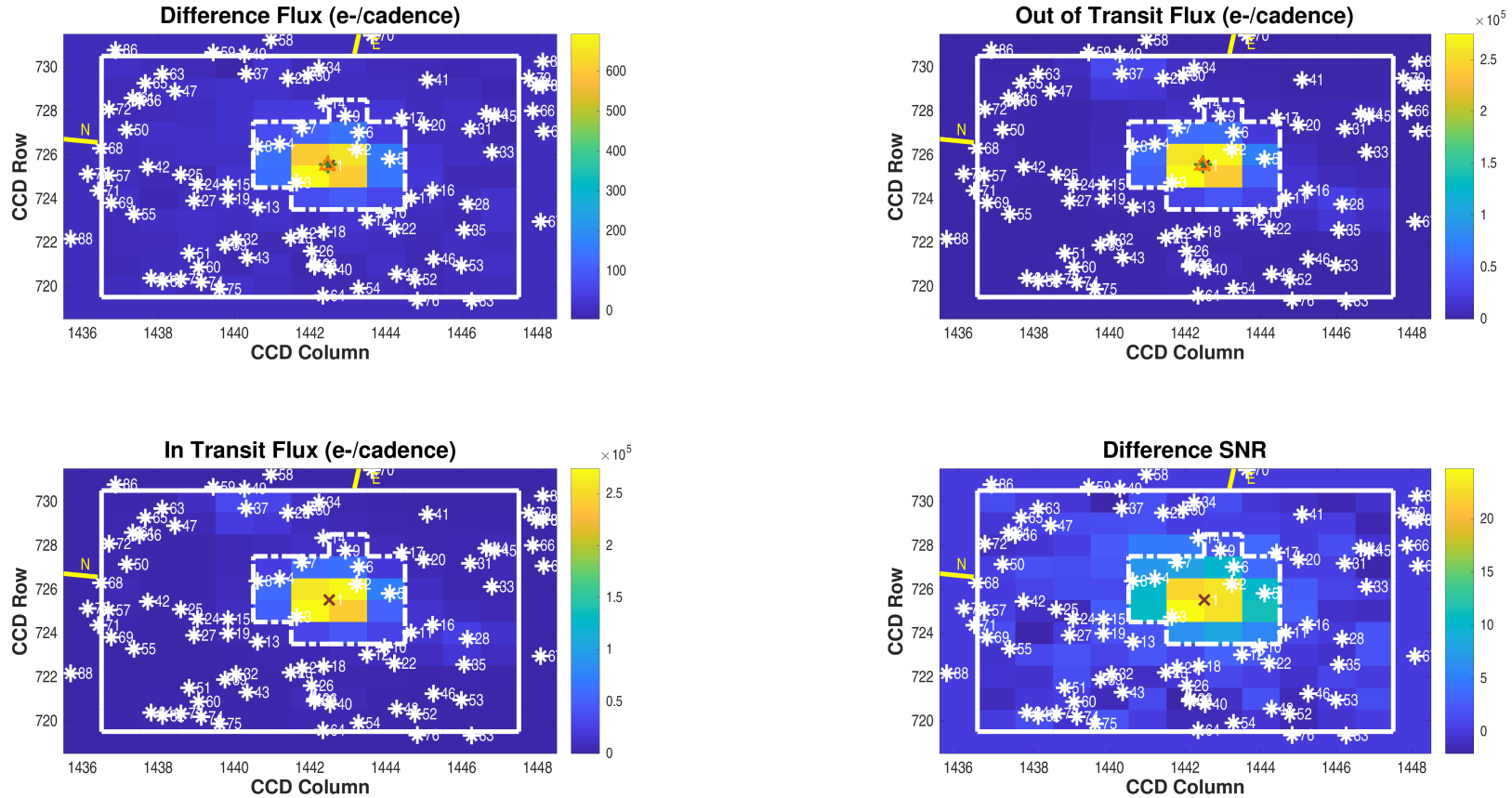
Difference image centroid offsets for target 365733349, planet candidate 1, displayed on survey image for given target. Left: difference image PRF centroid offsets in RA and Dec with respect to the per sector out-of-transit centroids for the given target. Right: difference image PRF centroid offsets 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/0000000365733349-01-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
Planet Candidate 1 / Sector 58 / Target Pixel Table 378



Difference image for target 365733349, planet candidate 1, sector 58, target pixel table 378. 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 = 537; number of in-transit cadence gaps = 1; number of valid out-of-transit cadences = 1375; number of out-of-transit cadence gaps = 1. Difference image quality metric = 1.00 (good).

Open `./planet-01/difference-image/0000000365733349-01-difference-image-58-378.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	$725.55 \pm 2.09e - 05$	$1442.47 \pm 2.21e - 05$	pixels	$313.16773364 \pm 5.96e - 07$	$65.60887128 \pm 6.13e - 07$	degrees
Difference Image Centroid	$725.51 \pm 1.62e - 02$	$1442.46 \pm 1.69e - 02$	pixels	$313.16721377 \pm 9.29e - 05$	$65.60890458 \pm 9.64e - 05$	degrees
Offset	$-0.0368 \pm 1.62e - 02$	$-0.0109 \pm 1.69e - 02$	pixels	$-0.7729 \pm 1.38e - 01$	$0.1199 \pm 3.47e - 01$	arcseconds
Offset/ σ	-2.27	-0.64		-5.59	0.35	
Offset Distance	$0.0384 \pm 1.63e - 02$		pixels	$0.7821 \pm 1.49e - 01$		arcseconds
Offset Distance/ σ	2.36			5.26		

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

	Row	Column	Units	RA	Dec	Units
TIC Reference Centroid	$725.51 \pm 1.02e - 04$	$1442.50 \pm 1.05e - 04$	pixels	$313.16724370 \pm 0.00e + 00$	$65.60864295 \pm 0.00e + 00$	degrees
Difference Image Centroid	$725.51 \pm 1.62e - 02$	$1442.46 \pm 1.69e - 02$	pixels	$313.16721377 \pm 9.29e - 05$	$65.60890458 \pm 9.64e - 05$	degrees
Offset	$0.0058 \pm 1.62e - 02$	$-0.0468 \pm 1.69e - 02$	pixels	$-0.0445 \pm 1.38e - 01$	$0.9419 \pm 3.47e - 01$	arcseconds
Offset/ σ	0.36	-2.76		-0.32	2.71	
Offset Distance	$0.0472 \pm 1.69e - 02$		pixels	$0.9429 \pm 3.47e - 01$		arcseconds
Offset Distance/ σ	2.79			2.72		

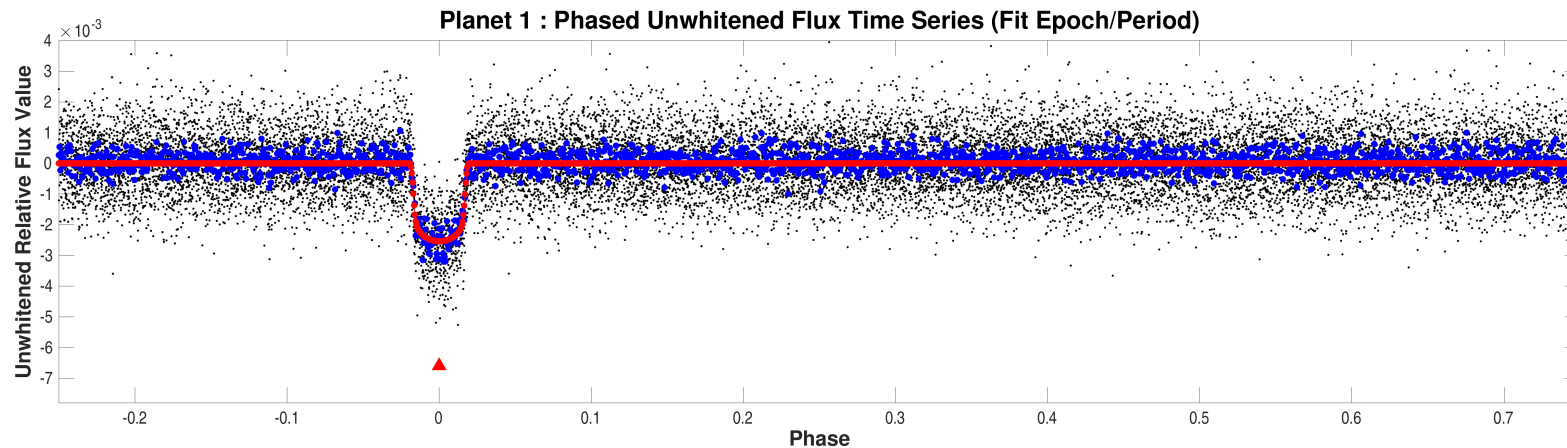
5.2 Difference Image TIC Key

Index	Catalog ID	Mag	RA (degrees)	Dec (degrees)	Distance (arcsec)
1	365733349	9.931	313.16724370	65.60864295	0.00
2	365733341	14.336	313.17865301	65.60517322	21.07
3	1981077487	18.419	313.15474745	65.61280270	23.86
4	365733354	15.491	313.17735265	65.61652488	32.11
5	365733337	15.200	313.17492692	65.60008475	32.86
6	365733342	18.678	313.18930638	65.60543806	34.77
7	365733351	16.687	313.18848254	65.61382398	36.67
8	1981077489	18.634	313.17451830	65.61967393	41.16
9	365733345	17.081	313.19847184	65.60791263	46.50
10	365733336	15.371	313.14167932	65.59908350	51.27
11	365733332	16.535	313.15220334	65.59570382	51.67
12	365733338	17.769	313.13594372	65.60136112	53.41
13	365733358	16.854	313.13721886	65.61766411	55.20
14	365733350	15.955	313.20494214	65.61154141	57.01
15	365595240	17.970	313.14929572	65.62268057	57.15
16	1981077481	18.641	313.15831261	65.59284432	58.40
17	1981077484	18.577	313.20070673	65.59968021	59.30
18	1981077752	18.440	313.12621036	65.60726299	61.21
19	365733361	18.465	313.14055574	65.62223096	62.98
20	1981077483	18.550	313.19772770	65.59626706	63.55
21	1981077750	18.461	313.12397383	65.61036313	64.63
22	365595262	17.045	313.13240493	65.59711254	66.38
23	365595249	16.644	313.12040490	65.61185658	70.59
24	1981077753	18.576	313.14754119	65.62712053	72.68
25	365733370	17.458	313.15245190	65.62987341	79.53
26	365595253	17.868	313.11364565	65.60837313	79.69
27	365733366	18.251	313.13730800	65.62707500	79.90
28	365733324	12.894	313.15187817	65.58733700	80.03
29	365733356	16.730	313.21812924	65.61749694	82.09
30	365733352	15.946	313.22123307	65.61463776	83.12
31	365733326	16.844	313.19824134	65.58942080	83.14
32	365595245	18.572	313.11615383	65.61972068	85.79
33	365733321	15.801	313.18526038	65.58549456	87.53
34	1981077491	18.529	313.22641223	65.61331785	89.56
35	365733323	16.323	313.13586804	65.58696789	90.91
36	1981077207	18.076	313.10567551	65.60744111	91.63
37	365733363	12.745	313.21838209	65.62367218	93.31
38	365595254	15.333	313.10435709	65.60744330	93.59
39	365595242	17.077	313.11202718	65.62113446	93.60
40	365595258	14.773	313.10338941	65.60508418	95.79
41	365733335	16.486	313.22560207	65.59721938	96.01

Index	Catalog ID	Mag	RA (degrees)	Dec (degrees)	Distance (arcsec)
42	365733376	18.100	313.15525183	65.63490785	96.22
43	365733357	17.550	313.10564135	65.61749225	96.97
44	365733325	18.835	313.20845737	65.58756432	97.53
45	365733322	14.733	313.20738779	65.58629038	100.19
46	365595269	17.819	313.11619385	65.59045811	100.23
47	1981077497	18.395	313.20338574	65.63343760	104.19
48	1981077208	18.794	313.10475869	65.59528985	104.60
49	365733364	14.689	313.23030433	65.62456118	109.88
50	365733381	17.995	313.17678073	65.63918192	110.85
51	1981077758	18.313	313.10483041	65.62606396	112.00
52	1981077200	18.032	313.10254150	65.59246000	112.46
53	365595280	17.886	313.11398344	65.58620082	113.12
54	365595261	17.636	313.09370068	65.60035597	113.33
55	365595229	18.590	313.12541200	65.63535300	114.51
56	365733380	17.516	313.19545045	65.63828078	114.64
57	1981077765	18.136	313.14755077	65.64032714	117.76
58	365733360	12.799	313.24063554	65.62116959	118.06
59	365733368	14.984	313.22952800	65.62916148	118.45
60	365595238	16.579	313.09690809	65.62423268	118.68
61	365733382	16.469	313.19668520	65.63934432	118.88
62	365733312	16.567	313.20108373	65.57868941	118.99
63	1981077498	17.941	313.21319720	65.63583786	119.38
64	1981077216	17.787	313.08704867	65.60527431	119.84
65	1981077499	18.045	313.20655255	65.63800151	120.77
66	365733316	15.602	313.21303114	65.58092655	120.79
67	365733309	17.243	313.14570024	65.57616359	121.23
68	365733386	18.160	313.16383024	65.64229418	121.25
69	365595225	17.721	313.13100125	65.63902350	121.92
70	365733344	16.019	313.24957136	65.60669416	122.60
71	365733384	16.885	313.13770933	65.64127872	125.43
72	365733387	15.564	313.18836481	65.64240983	125.55
73	1981077766	18.757	313.14729498	65.64339511	128.57
74	1981077215	17.519	313.08779193	65.62334232	129.43
75	365595243	17.506	313.08468128	65.62047330	129.92
76	365595267	17.590	313.08986947	65.59142110	130.67

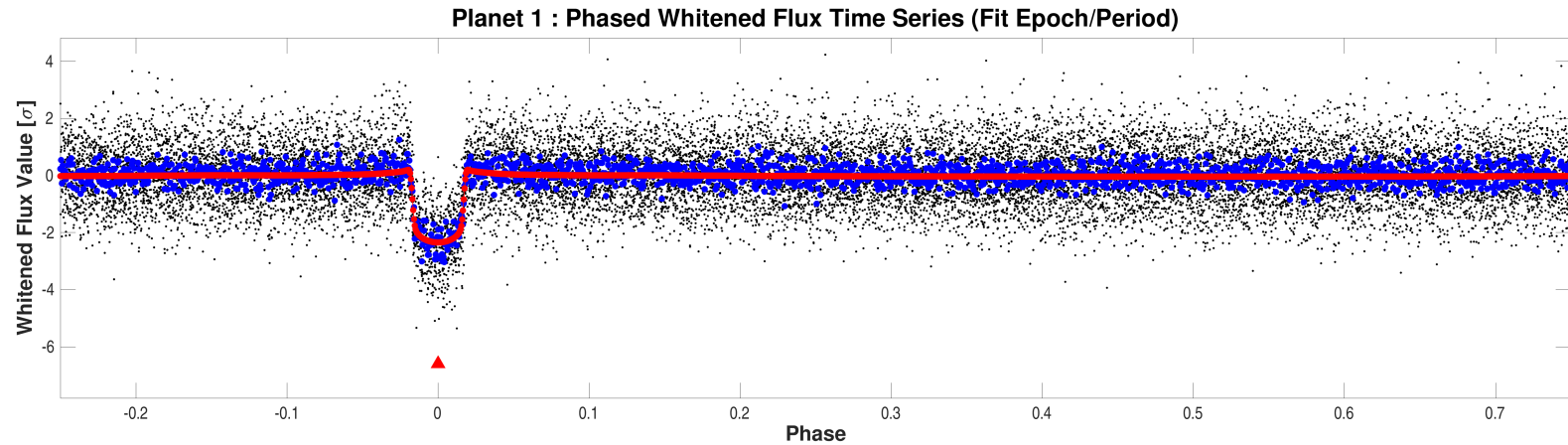
RA, Dec and Distances are corrected for proper motion. This table may not contain all of the objects shown.

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.

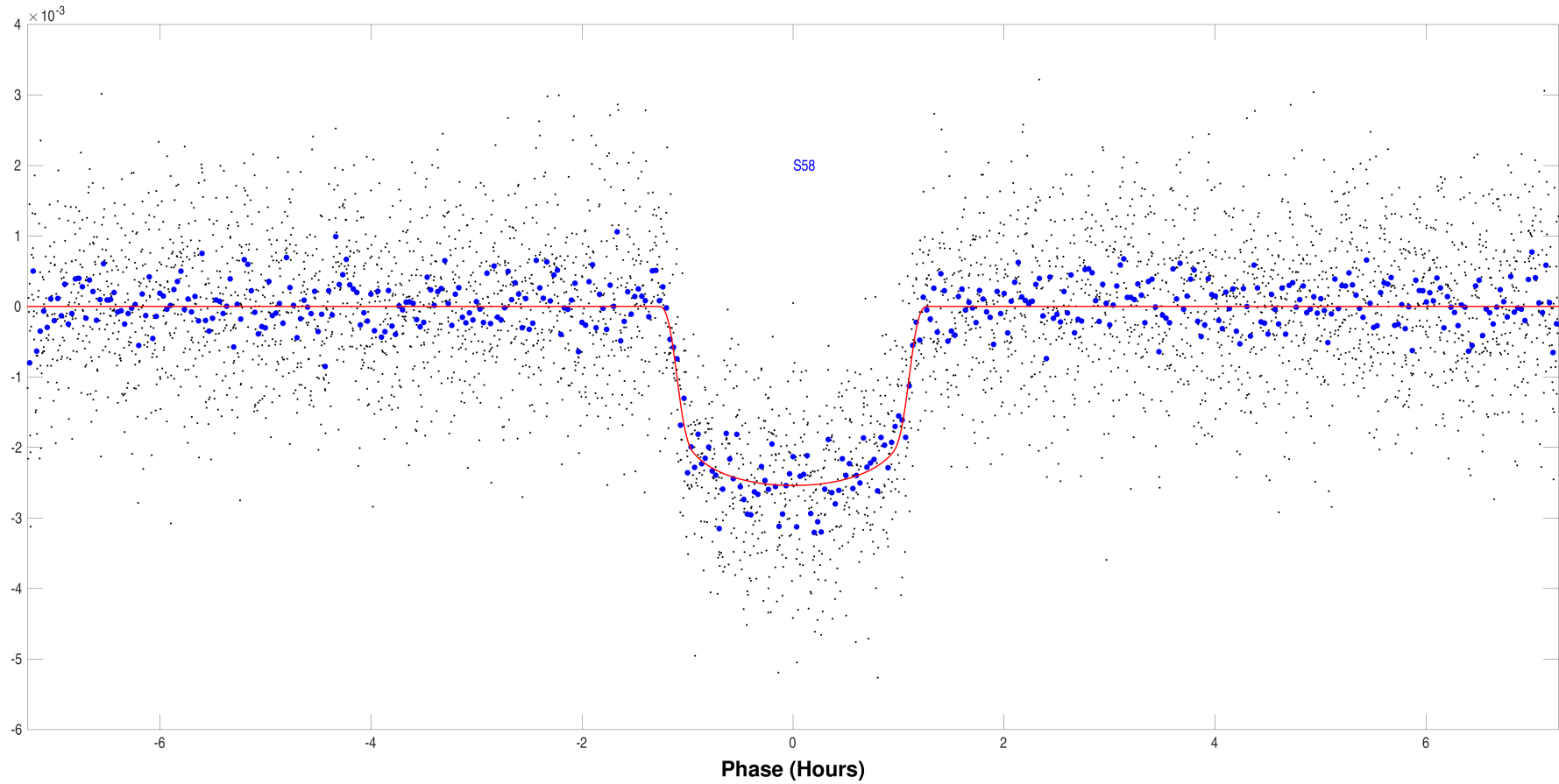
Open `./summary-plots/0000000365733349-01-phased-unwhitened-flux-time-series.fig`



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/0000000365733349-01-phased-whitened-flux-time-series.fig`

Planet: 1 Phased Unwhitened Flux Time Series by Sector



Phased unwhitened flux time series by sector in year 5 for target 365733349, planet candidate 1. Period = 2.6998 days; transit epoch = 2884.0855 BTJD.
 Open `./summary-plots/0000000365733349-01-phased-unwhitened-flux-time-series-by-sector-05.fig`

7 Planet Candidate 1

7.1 Model Fitter: All Transits

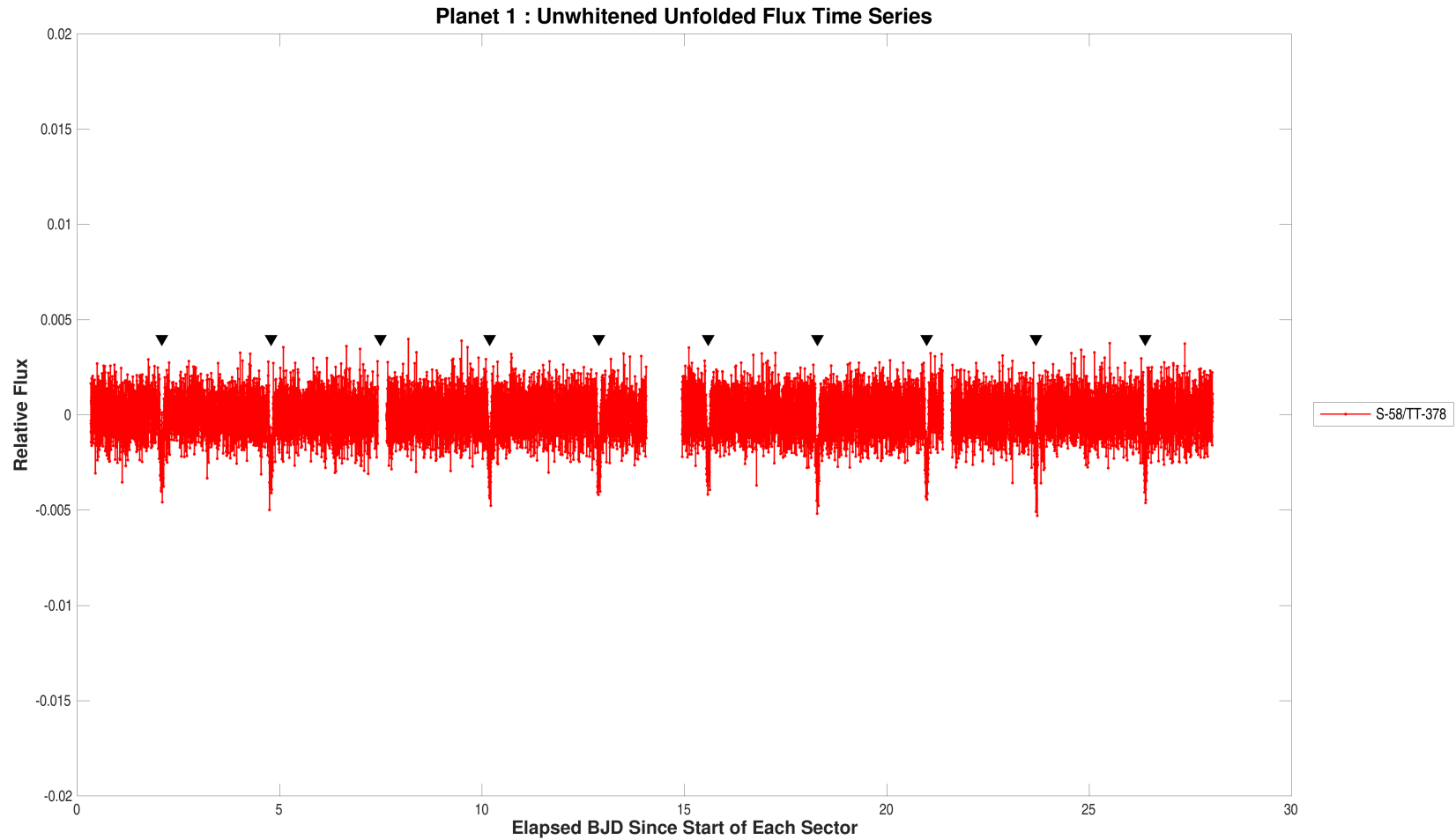
Model Characteristic	Name
Transit Model	mandel-agol_geometric_transit_model
Limb Darkening Model	claret_tess_nonlinear_limb_darkening_model

TCE Parameter	Value	Units
Trial Transit Pulse Duration	2.5	hours
Transit Epoch	2884.0839451	TJD
Orbital Period	2.6999989	days
Maximum SES	12.5	
Maximum MES	33.1	
Robust Statistic	50.7	
Chi Square Goodness of Fit Statistic (DoF)	750.7 (673)	
Chi Square2 Statistic (DoF)	24.7 (242.3)	
Threshold for Desired PFA		

DoF: Degrees of Freedom

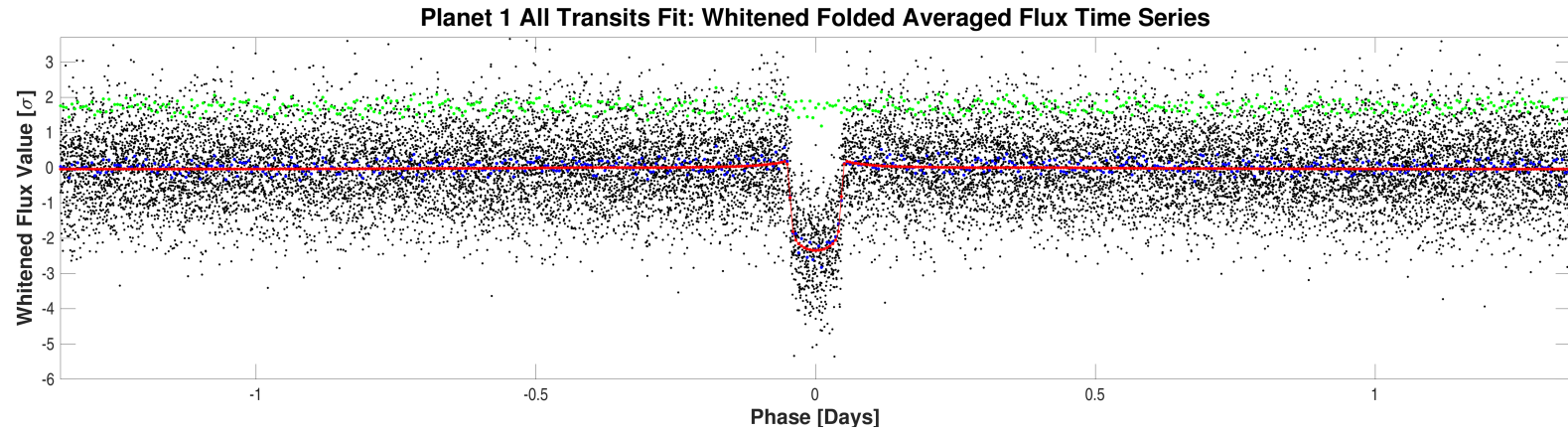
Parameter	Value	Uncertainty	Units
SNR	50.4		
Orbital Period	2.6997691	1.4348e-04	days
Transit Epoch	2884.0855158	8.0329e-04	BTJD
Impact Parameter	0.6660	1.3801e-01	
Planet Radius to Star Radius Ratio	0.0491693	1.4410e-03	
Semi-major Axis to Star Radius Ratio	6.9624	1.1186e+00	
Planet Radius	4.9565	2.9675e-01	Earth radii
Semi-major Axis	0.0401	3.5732e-03	AU
Effective Stellar Flux	691.8960	1.9931e+02	Goldilocks
Equilibrium Temperature	1308	9.4201e+01	Kelvin
Stellar Density	0.6221	2.9983e-01	Solar density
Transit Depth	2538	5.1371e+01	ppm
Transit Duration	2.4181	6.7288e-02	hours
Transit Ingress Duration	0.1976	7.0887e-02	hours
Eccentricity	0.0000	0.0000e+00	
Peri Longitude	0.0000	0.0000e+00	degrees
Model Chi Square Statistic (DoF)	2806.6 (3398.4)		
Model Chi Square Goodness of Fit Statistic (DoF)	402.6 (681)		
Model Chi Square2 Statistic (DoF)	3.9 (8)		

DoF: Degrees of Freedom



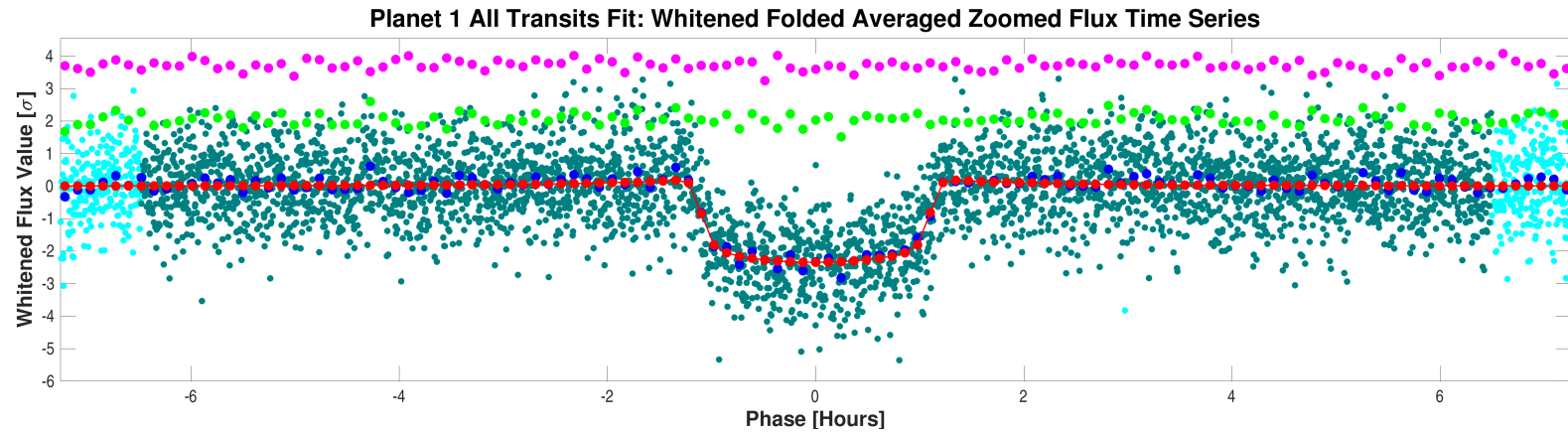
Flux time series for CatId 365733349, Planet candidate 1 in the unwhitened domain. For the data of Sector-58/TargetTableId-378, start BJD is 2459882. Transit event markers indicate the location of transits of the given planet candidate. All transits fit completed with full convergence.

Open `./planet-01/planet-search-and-model-fitting-results/all-transits-fit/0000000365733349-01-all-unwhitened-58-378.fig`



Folded flux time series for CatId 365733349, Planet candidate 1 in the whitenened 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/0000000365733349-01-all-whitenened.fig`



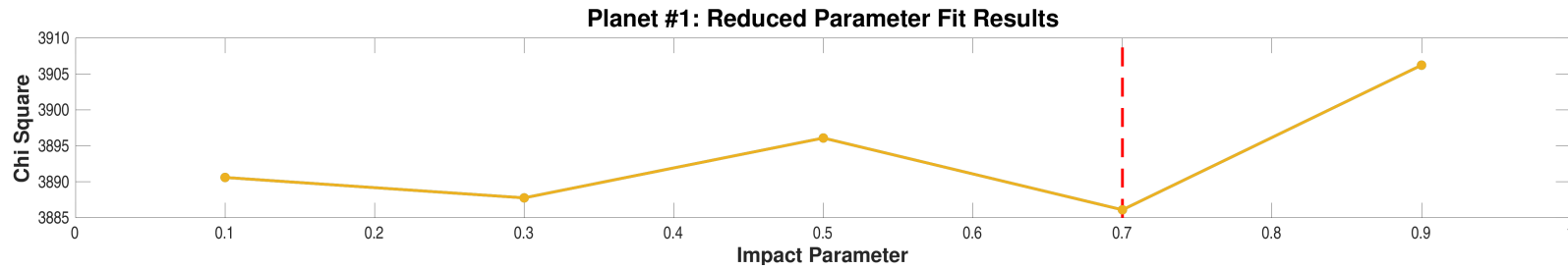
Folded flux time series for CatId 365733349, Planet candidate 1 in the whitenened domain, zoomed on the transit. The flux data whose robust weights are larger/smaller than 0.1 are plotted in dark green/cyan dots, respectively. Values are averaged into 1 cadence wide bins. The blue dots represent the 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/0000000365733349-01-all-whitenened-zoomed.fig`

7.2 Model Fitter: Reduced Parameter Fit Results

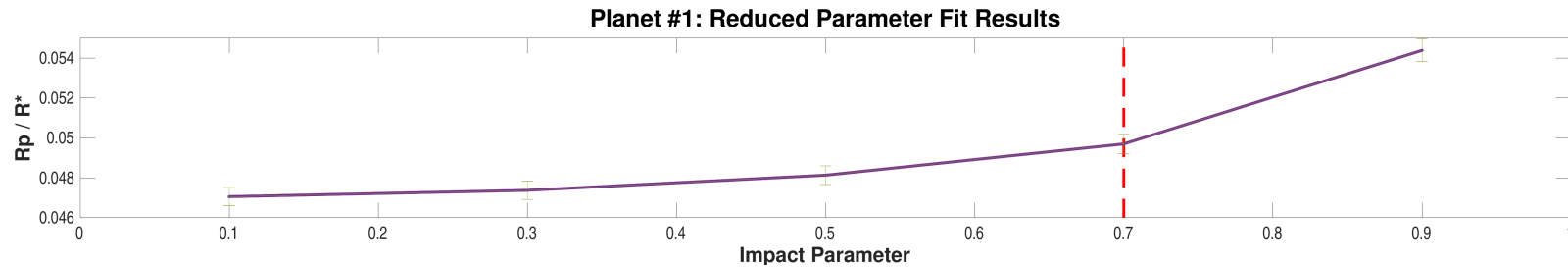
Impact Parameter	SNR	Model Chi Square	Planet Radius to Star Radius	Uncert	Semi-major Axis to Star Radius	Uncert	Transit Depth (ppm)	Uncert	Transit Duration (hours)	Uncert
0.10	53.1	3890.6	0.0470547	4.5506e-04	9.2260	7.5116e-02	2548	4.9035e+01	2.3351	1.8937e-02
0.30	53.1	3887.8	0.0473727	4.5805e-04	8.8477	7.2688e-02	2549	4.9028e+01	2.3456	1.9203e-02
0.50	53.1	3896.1	0.0481300	4.6692e-04	8.0484	6.8368e-02	2551	4.9228e+01	2.3704	2.0091e-02
0.70	53.1	3886.1	0.0496953	4.8465e-04	6.6749	6.2265e-02	2557	4.9582e+01	2.4360	2.2754e-02
0.90	52.6	3906.2	0.0543844	5.6610e-04	4.2744	5.8033e-02	2620	5.3984e+01	2.7193	3.7551e-02

Highlighted row is the best reduced-parameter model fit.



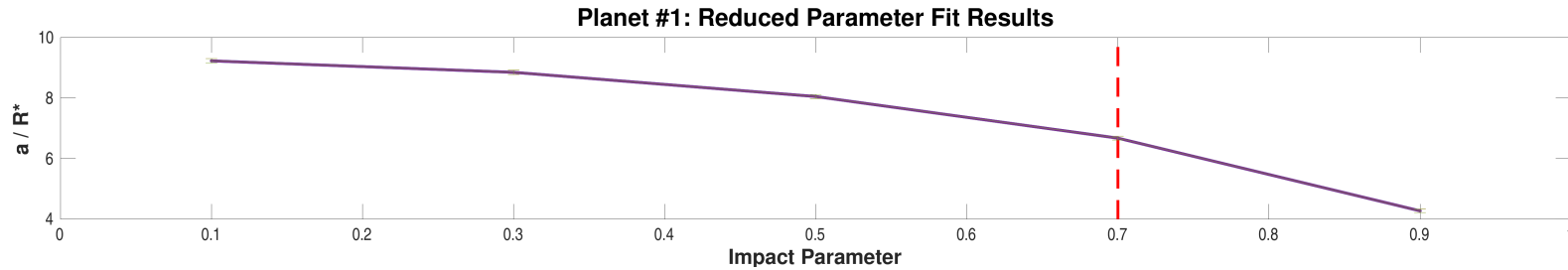
Model chi squares of reduced parameter fits vs. impact parameter for CatId 365733349, Planet candidate 1. The fit result with the minimum chi square is marked with a dashed line in the plot.

Open `./planet-01/planet-search-and-model-fitting-results/reduced-parameter-fits/0000000365733349-01-reduced-fits-chi-square.fig`



Ratios of planet radius to star radius of reduced parameter fits vs. impact parameter for CatId 365733349, 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/0000000365733349-01-reduced-fits-rp-over-rstar.fig`



Ratios of semimajor axis to star radius of reduced parameter fits vs. impact parameter for CatId 365733349, 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/0000000365733349-01-reduced-fits-a-over-rstar.fig`

7.3 Model Fitter: Trapezoidal Fit Results

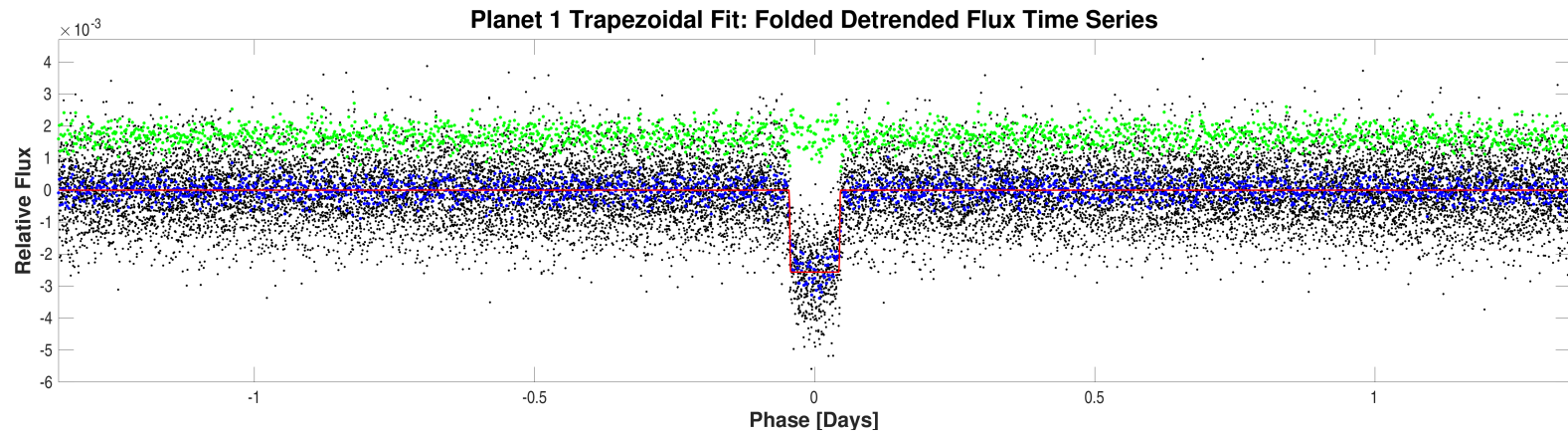
Model Characteristic	Name
Transit Model	trapezoidal_model
Limb Darkening Model	

TCE Parameter	Value	Units
Trial Transit Pulse Duration	2.5	hours
Transit Epoch	2884.0839451	TJD
Orbital Period	2.6999989	days
Maximum SES	12.5	
Maximum MES	33.1	
Robust Statistic	50.7	
Chi Square Goodness of Fit Statistic (DoF)	750.7 (673)	
Chi Square2 Statistic (DoF)	24.7 (242.3)	
Threshold for Desired PFA		

DoF: Degrees of Freedom

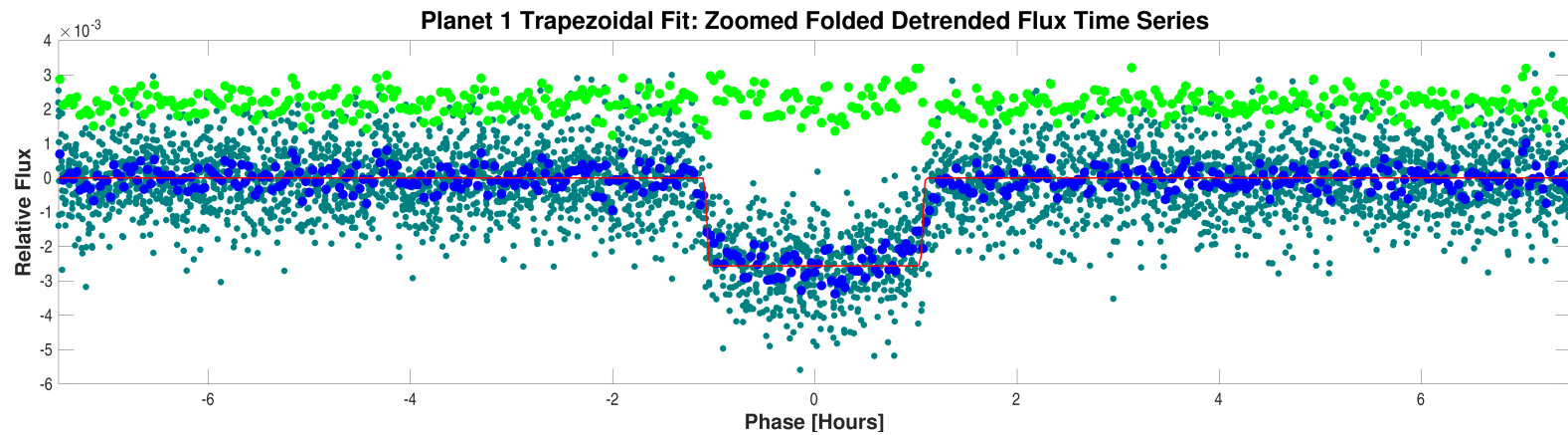
Parameter	Value	Uncertainty	Units
SNR	62.1		
Orbital Period	2.6999989		days
Transit Epoch	2884.0844001		BTJD
Transit Depth	2560		ppm
Transit Duration	2.4932		hours
Transit Ingress Duration	0.3567		hours
Model Chi Square Statistic (DoF)	20139.6 (5823)		

DoF: Degrees of Freedom



Folded detrended flux time series for CatId 365733349, Planet candidate 1 and folded trapezoidal model light curve.

Open `./planet-01/planet-search-and-model-fitting-results/trapezoidal-model-fit/0000000365733349-01-all-trapezoidal.fig`



Zoomed folded detrended flux time series for CatId 365733349, Planet candidate 1 and folded trapezoidal model light curve.

Open `./planet-01/planet-search-and-model-fitting-results/trapezoidal-model-fit/0000000365733349-01-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	2.7		days		
Transit Duration	2.5		hours		
Maximum MES	33.1				
Secondary Phase	1.7472		days		
Secondary MES	1.7				
Minimum Phase	0.57639		days		
Minimum MES	-2.0				
Median MES	-0.2				
MAD MES	0.54583				
Robust Statistic	1.1				
Secondary Depth	48.7	4.4193e+01	ppm		
Geometric Albedo	1.8	1.6240e+00		0.4656	32.08
Planet Effective Temperature	2328	5.4663e+02	Kelvin	1.8390	3.30

7.4.2 Eclipsing Binary Discrimination Test

Result	Value	Value in Sigmas	Significance (%)
Odd Even Transit Depth Comparison Statistic	3.6936e-02	0.1922	84.76

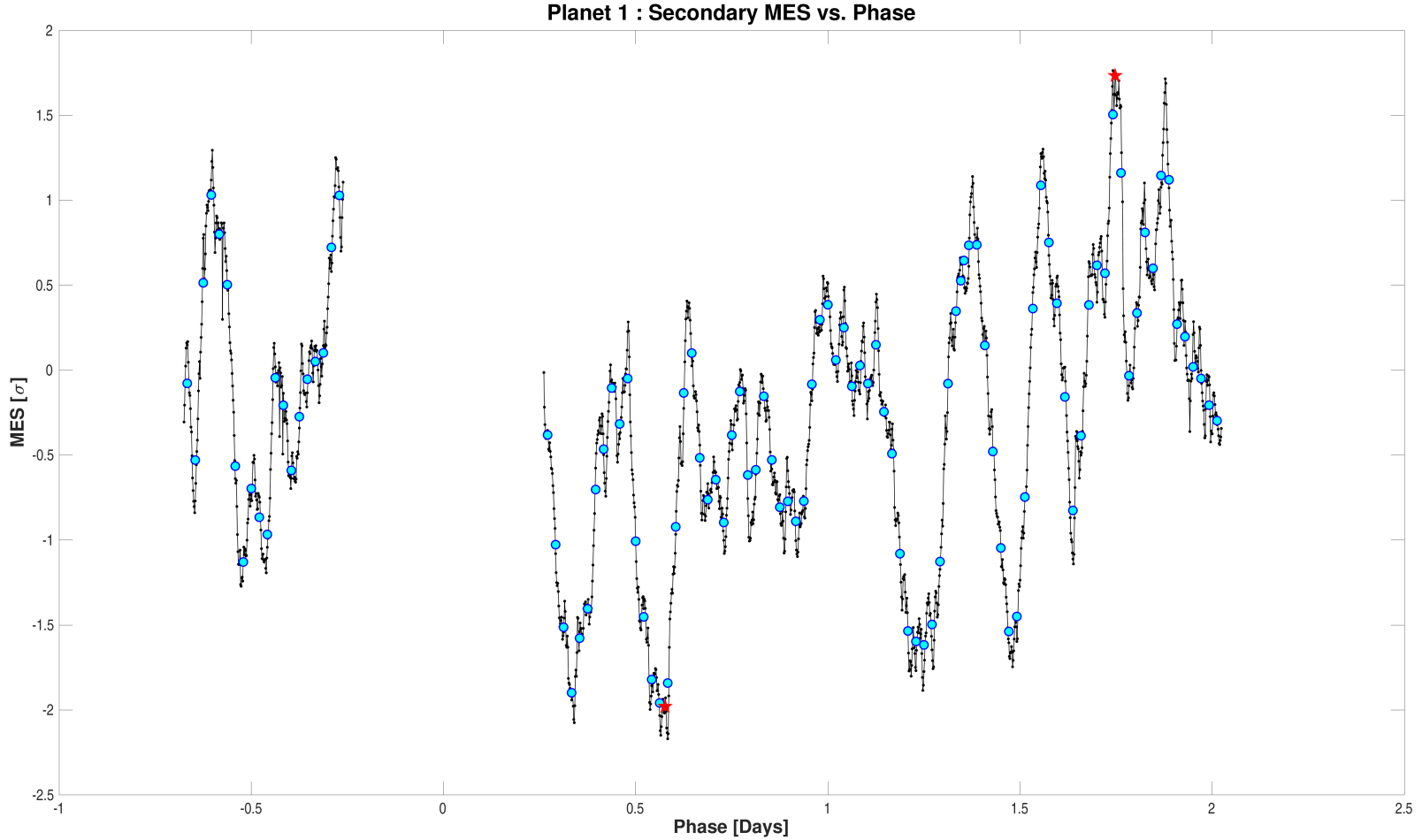
7.4.3 Bootstrap Test

Result	Value
False Alarm Probability	3.1514e-288
Bootstrap Threshold for Desired PFA	6.5
MES Mean	-0.01
MES Standard Deviation	0.91
Transit Count	10

7.4.4 Ghost Diagnostic Test

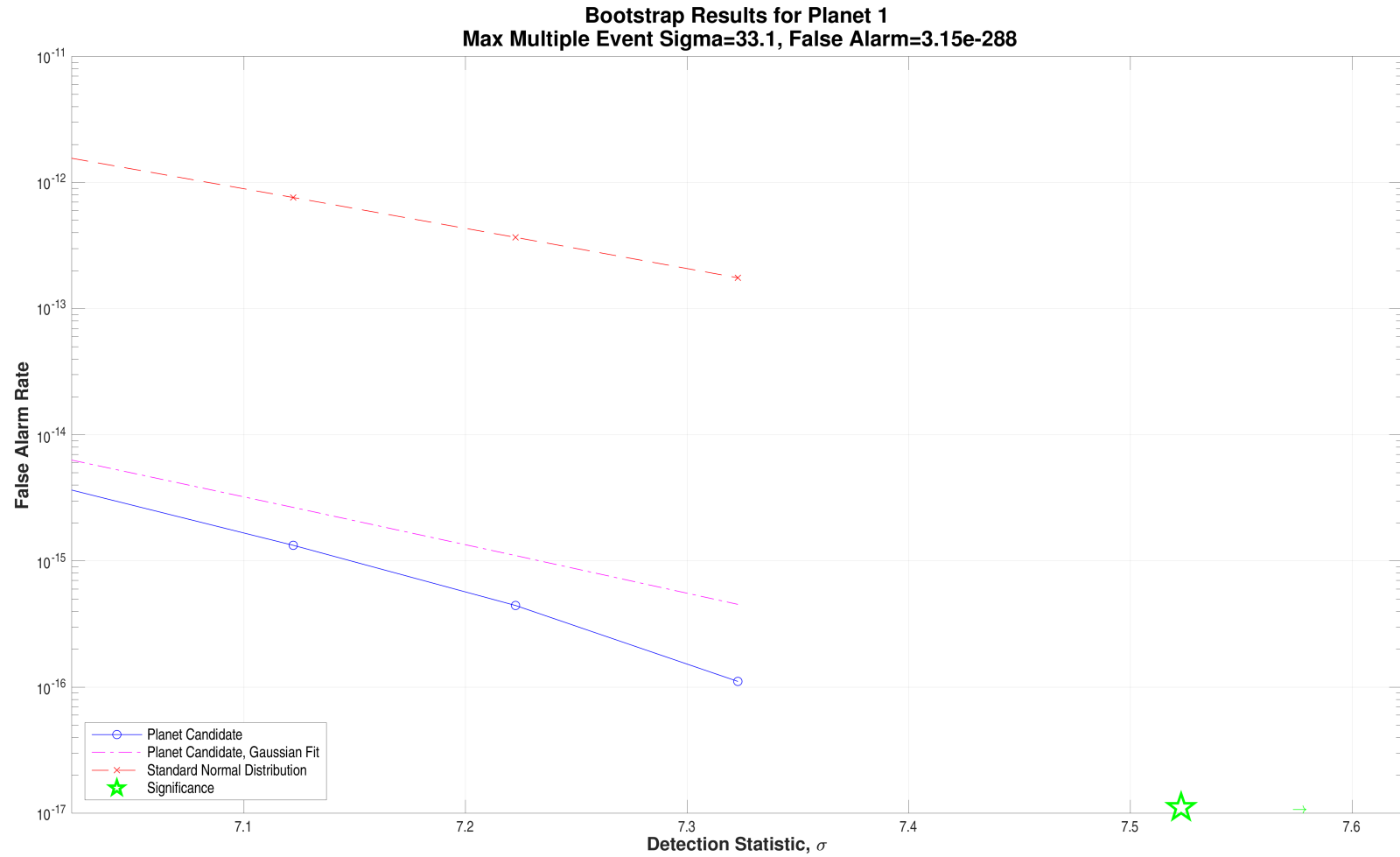
Result	Value	Significance (%)
Maximum MES	33.1	
SNR	50.4	
Core Aperture Statistic	3.2279e+01	100.00
Halo Aperture Statistic	3.2661e+00	99.95
Ratio of Core/Halo Aperture Statistics	9.8830e+00	

7.4.5 Validation Test Figures



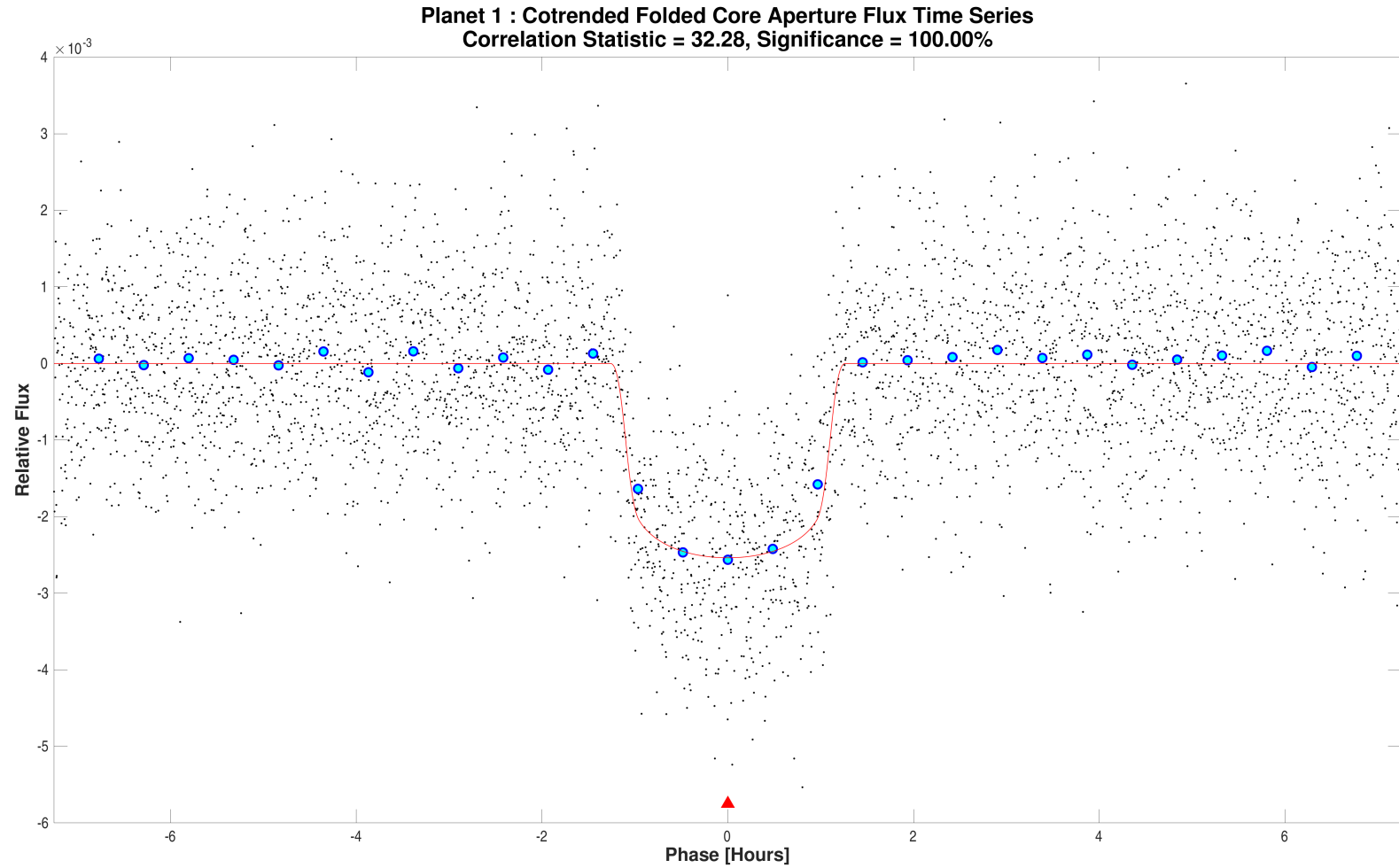
The primary event has been set to zero and both the max and min of the resulting MES vs. Phase are marked with a red star. The best matched pulse duration in hours is 2.5. The maximum secondary MES and corresponding phase are 1.7342 and 1.7472 days respectively. The minimum secondary MES and corresponding phase are -1.9792 and 0.57639 days respectively.

Open `./planet-01/report-summary/0000000365733349-01-weak-secondary-diagnostic.fig`



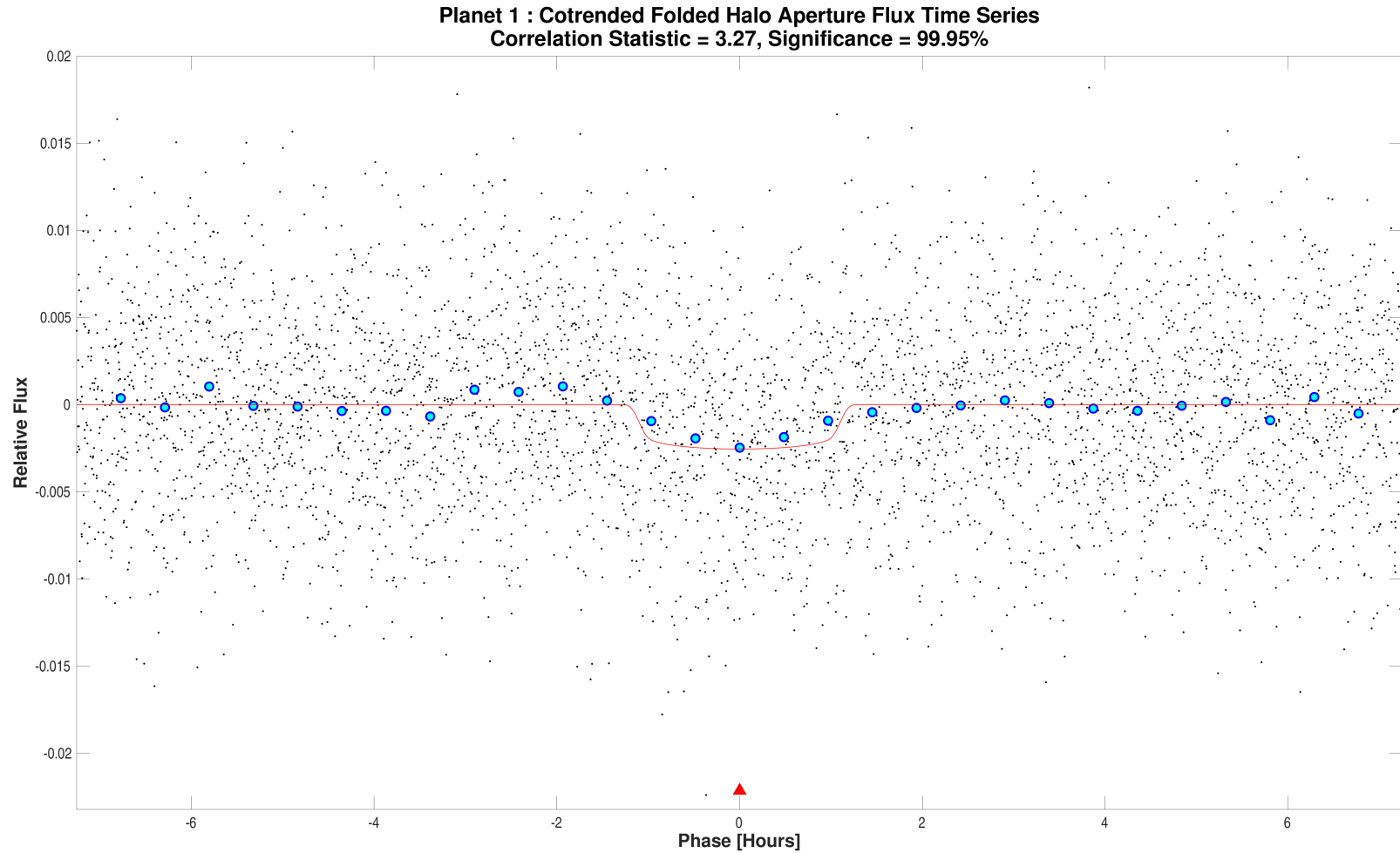
Bootstrap results for target 365733349, planet 1. Cumulative sum of the probabilities (derived from the histogram of counts) from upper tail to the search transit threshold; false alarm probability is indicated by the star. The Gaussian equivalent threshold for this false alarm probability is 36.2625. The threshold on this distribution that achieves the same false alarm rate as a 7.1 sigma threshold on a Gaussian distribution is 6.4599.

Open `./planet-01/bootstrap-results/0000000365733349-01-bootstrap-false-alarm.fig`



Optical ghost diagnostic core aperture flux time series for target 365733349, 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/0000000365733349-01-core-unwhitened-cotrended-zoomed-model.fig`

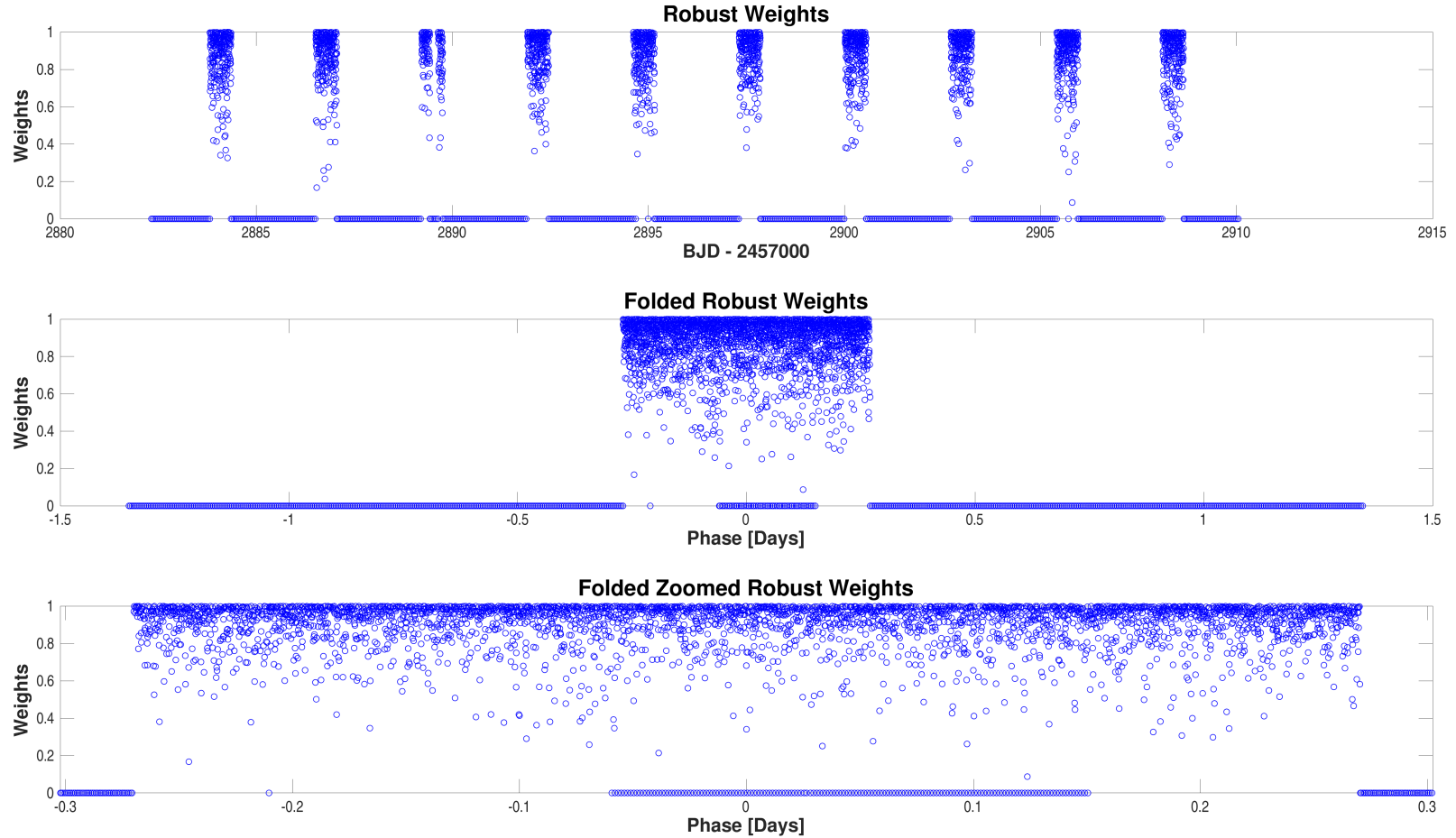


Optical ghost diagnostic halo aperture flux time series for target 365733349, planet candidate 1. The unwhitened time series is phase folded at the orbital period associated with the planet candidate and centered on the epoch of the first transit. The time series was first cotrended against spacecraft 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/0000000365733349-01-halo-unwhitened-cotrended-zoomed-model.fig`

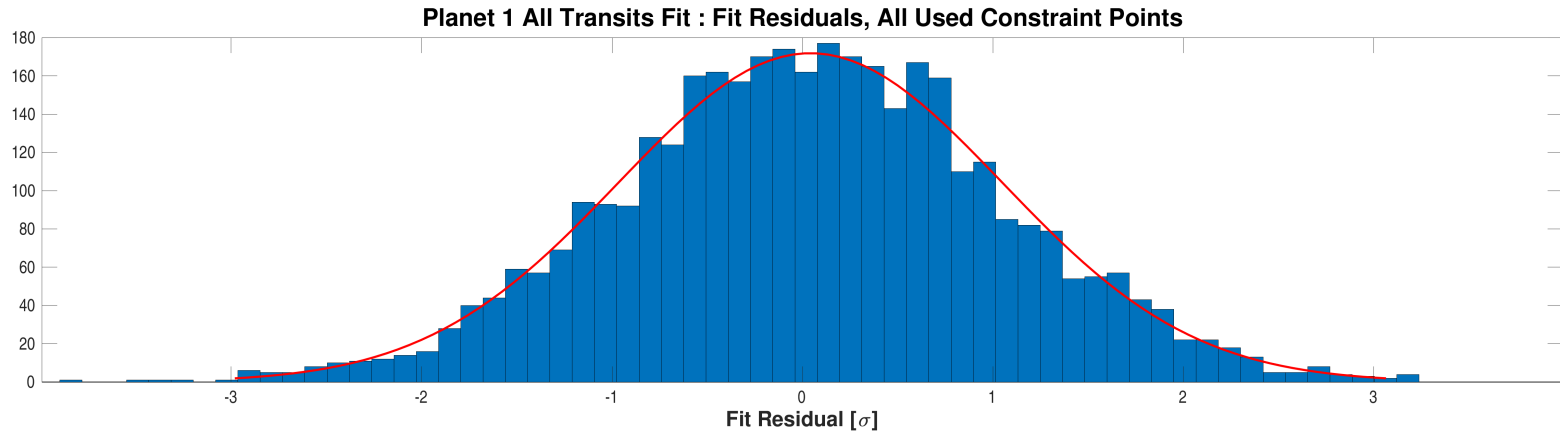
Appendix A Planet Candidate 1

A.1 Model Fitter: All Transits



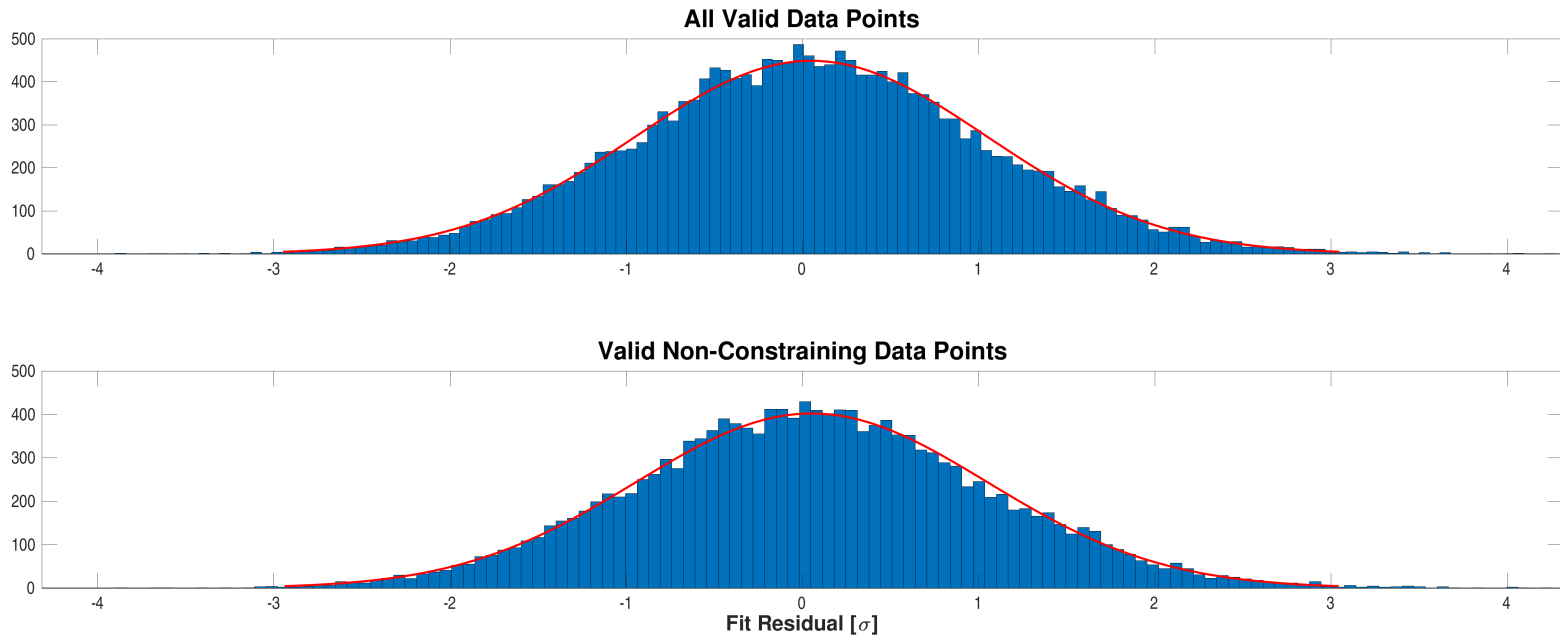
Robust weights distribution for CatId 365733349, Planet candidate 1. Top plot: all data points. Middle plot: all data points, folded per the fitted period and epoch. Bottom plot: all data points, folded and zoomed.

Open `./planet-01/planet-search-and-model-fitting-results/all-transits-fit/0000000365733349-01-all-robust-weights.fig`



Fit residuals distribution for CatId 365733349, 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/0000000365733349-01-all-histo-used.fig`



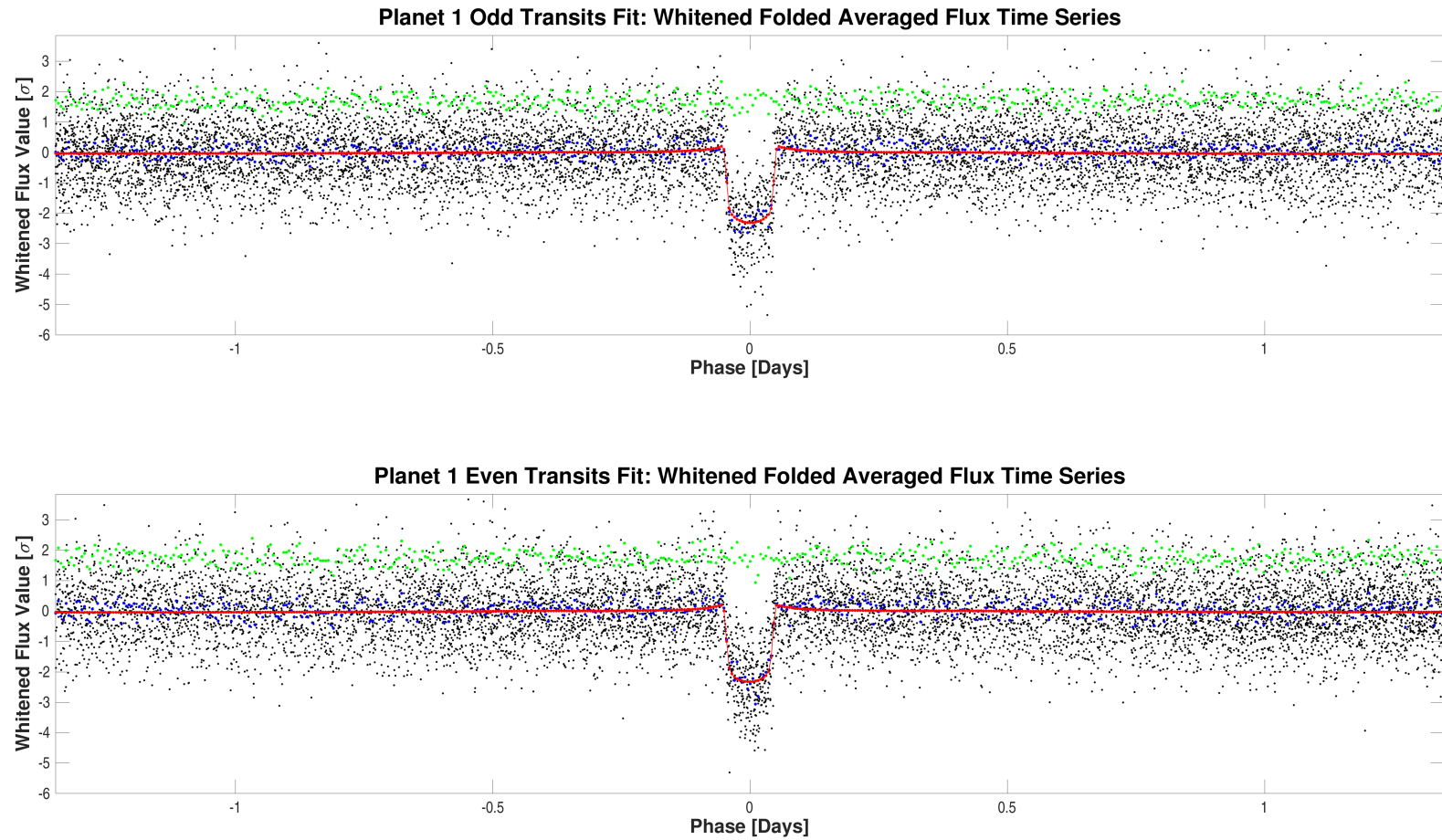
Fit residuals distribution for CatId 365733349, Planet candidate 1. Top plot: all valid data. Bottom plot: valid data not used to constrain fit (due to distance from a transit). Gaussian fits to the histograms are shown in red.

Open `./planet-01/planet-search-and-model-fitting-results/all-transits-fit/0000000365733349-01-all-histo-all-and-unused.fig`

A.2 Model Fitter: Odd & Even Transits

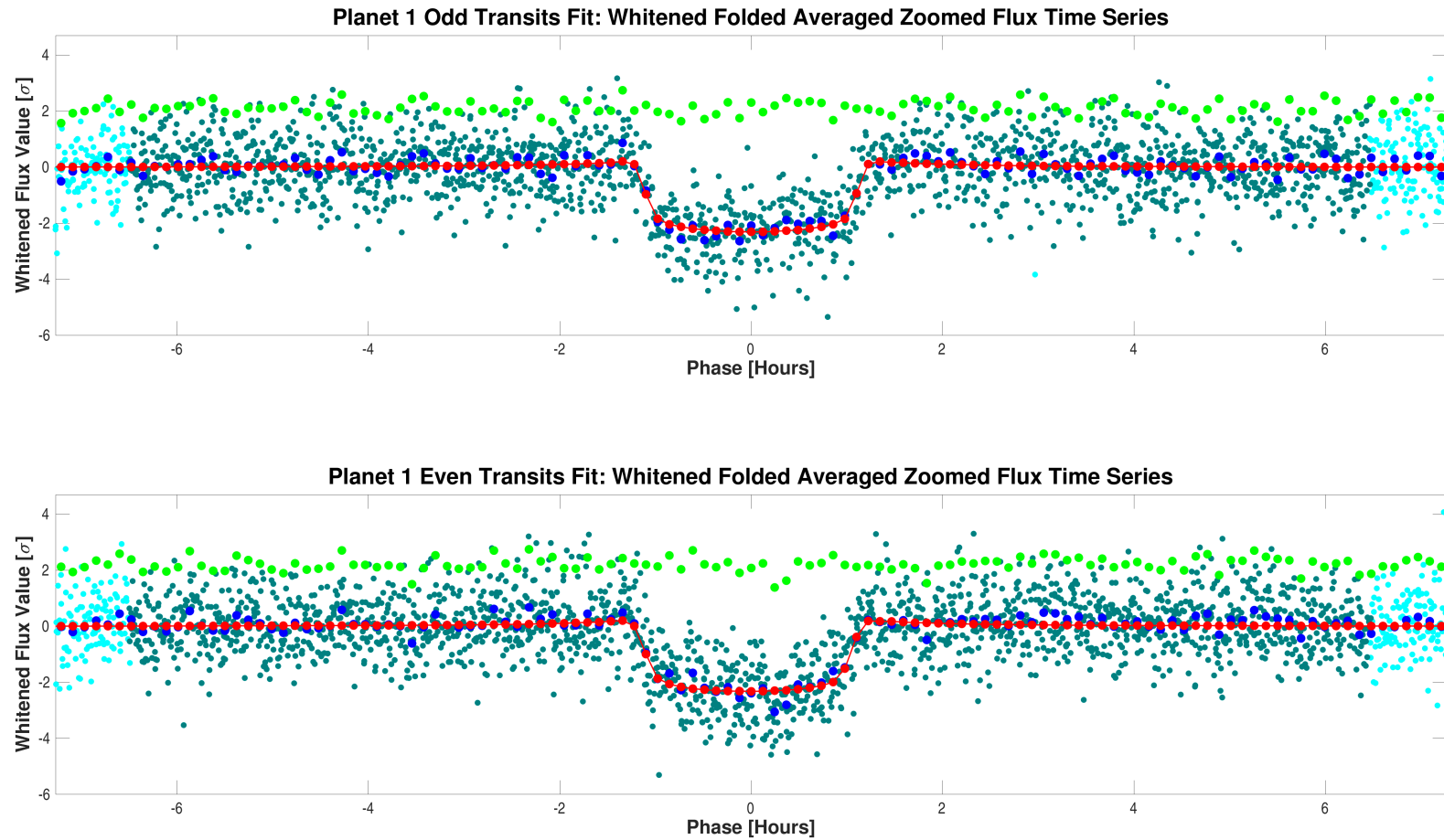
Parameter	Odd Transits Value	Odd Transits Uncertainty	Even Transits Value	Even Transits Uncertainty	Units	$\frac{\text{Difference}}{\ \text{Uncertainty}\ }$
SNR	33.3		37.2			
Orbital Period	2.6995817	2.0376e-04	2.6999488	1.9898e-04	days	1.2891e+00
Transit Epoch	2884.0871700	1.0885e-03	2886.7838424	9.8887e-04	BTJD	2.1058e+00
Impact Parameter	0.6118	2.9267e-01	0.6706	1.8577e-01		1.6943e-01
Planet Radius to Star Radius Ratio	0.0486495	2.4247e-03	0.0493463	1.9798e-03		2.2262e-01
Semi-major Axis to Star Radius Ratio	7.2919	2.0359e+00	7.0142	1.5443e+00		1.0869e-01
Planet Radius	4.9041	3.5396e-01	4.9743	3.2752e-01	Earth radii	1.4566e-01
Semi-major Axis	0.0401	3.5730e-03	0.0401	3.5734e-03	AU	7.1997e-04
Effective Stellar Flux	691.9601	1.9933e+02	691.8346	1.9929e+02	Goldilocks	4.4508e-04
Equilibrium Temperature	1308	9.4203e+01	1308	9.4199e+01	Kelvin	4.4508e-04
Stellar Density	0.7148	5.9868e-01	0.6360	4.2008e-01	Solar density	1.0771e-01
Transit Depth	2532	7.7425e+01	2552	7.0180e+01	ppm	1.9219e-01
Transit Duration	2.4228	1.0423e-01	2.3897	9.1983e-02	hours	2.3767e-01
Transit Ingress Duration	0.1758	1.0912e-01	0.1980	9.7321e-02	hours	1.5165e-01
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)	2809.4 (3395.1)		2809.4 (3395.1)			

DoF: Degrees of Freedom



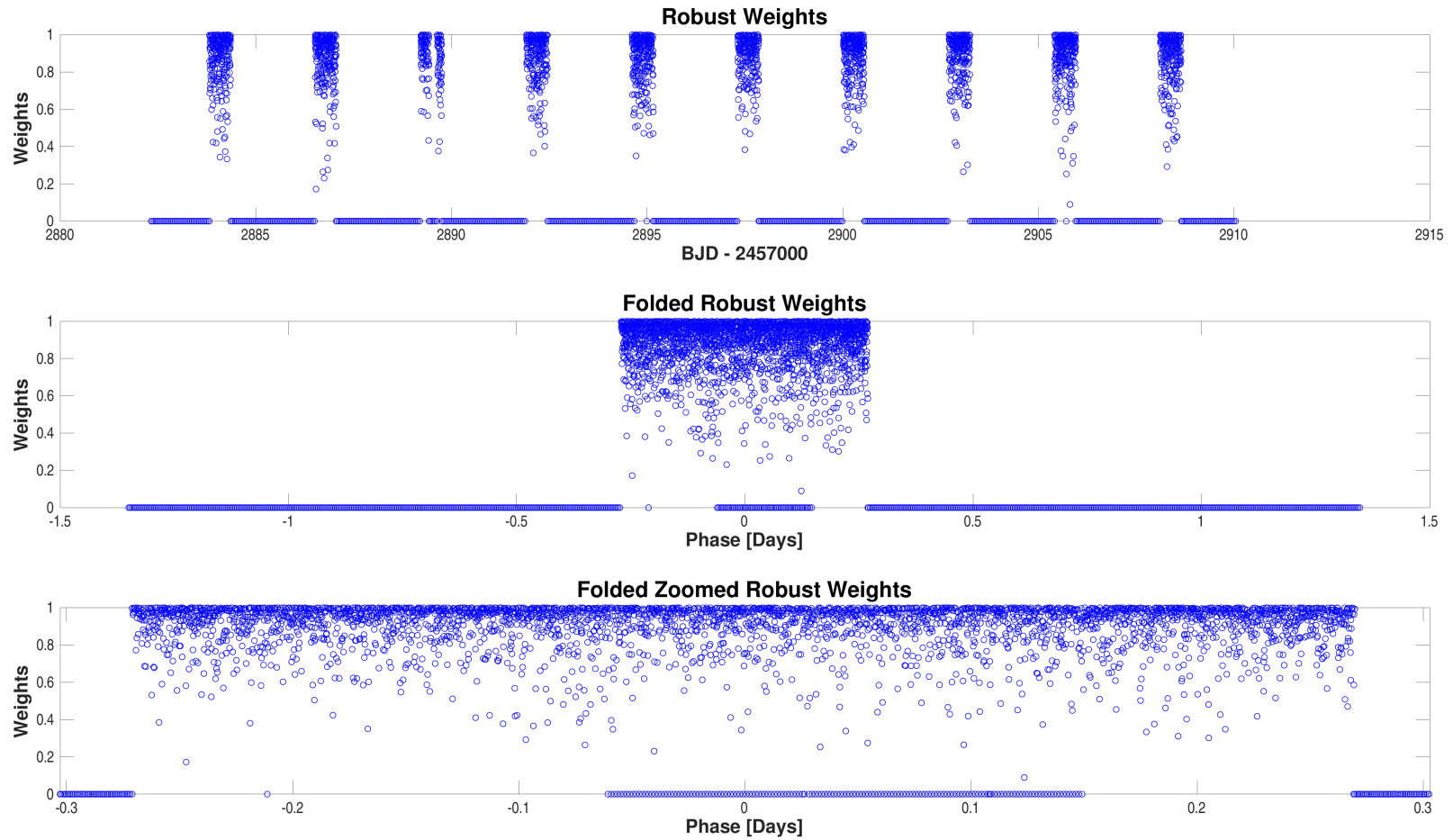
Folded flux time series for CatId 365733349, Planet candidate 1 in the whitened domain is plotted in black dots. Values are averaged into 1 cadence wide bins. The blue dots represent the averaged values of the folded flux time series; the red dots represent the averaged values of the folded model light 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/0000000365733349-01-odd-even-whitened.fig`



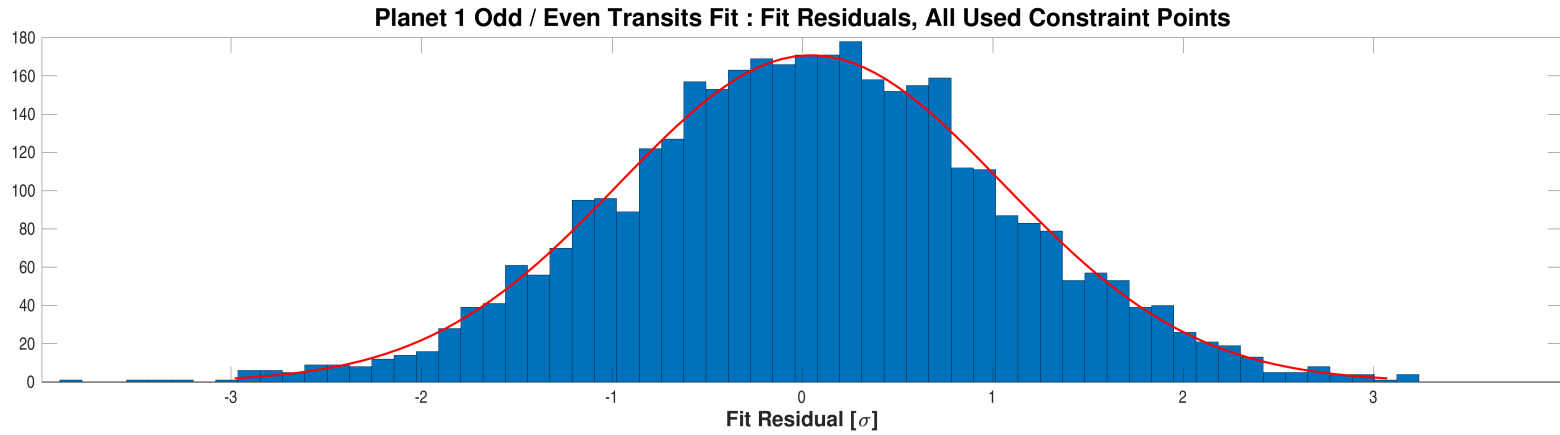
Folded flux time series for CatId 365733349, Planet candidate 1 in the whitened domain, zoomed on the transit. The flux data whose robust weights are larger/smaller than 0.1 are plotted in dark green/cyan dots, respectively. Values are averaged into 1 cadence wide bins. The blue dots represent the averaged 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/0000000365733349-01-odd-even-whitened-zoomed.fig`



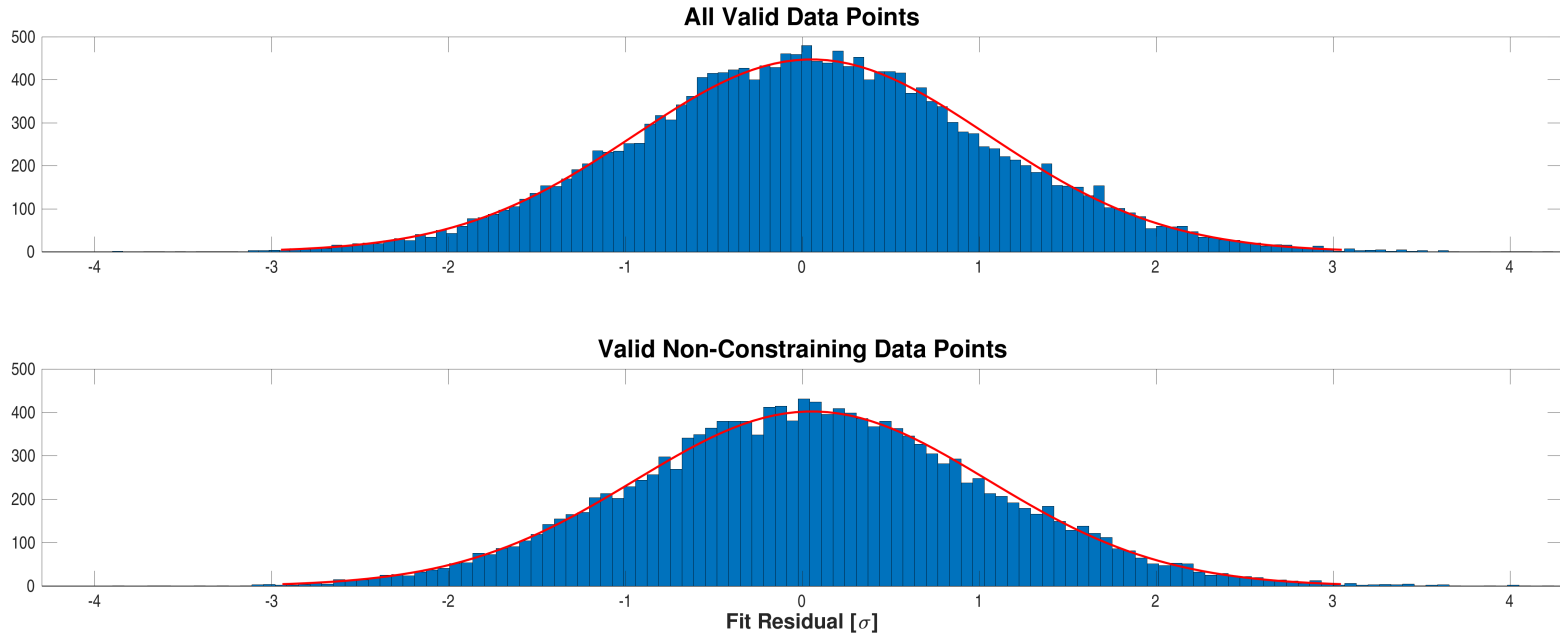
Robust weights distribution for CatId 365733349, Planet candidate 1. Top plot: all data points. Middle plot: all data points, folded per the fitted period and epoch. Bottom plot: all data points, folded and zoomed.

Open `./planet-01/planet-search-and-model-fitting-results/odd-even-transits-fit/0000000365733349-01-odd-even-robust-weights.fig`



Fit residuals distribution for CatId 365733349, 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.

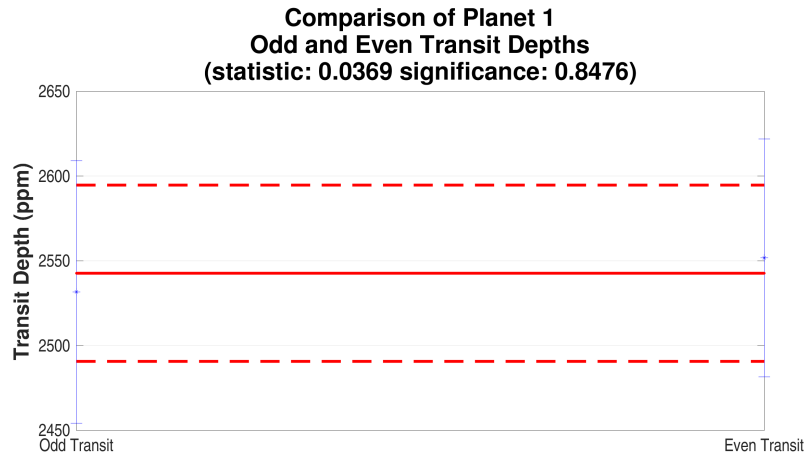
Open `./planet-01/planet-search-and-model-fitting-results/odd-even-transits-fit/0000000365733349-01-odd-even-histo-used.fig`



Fit residuals distribution for CatId 365733349, 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/0000000365733349-01-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 365733349, planet 1. A significance level close to 1/0 favors a transiting planet/an eclipsing binary. Open `./planet-01/binary-discrimination-test-results/0000000365733349-01-eclipsing-binary-discrimination-tests.fig`

Appendix B Alerts

This target did not trigger any alerts.