Data Validation (DV) Report
for TESS ID 424865156
Sectors 14 - 15

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

25-Oct-2019 22:17:02 Z

Contents

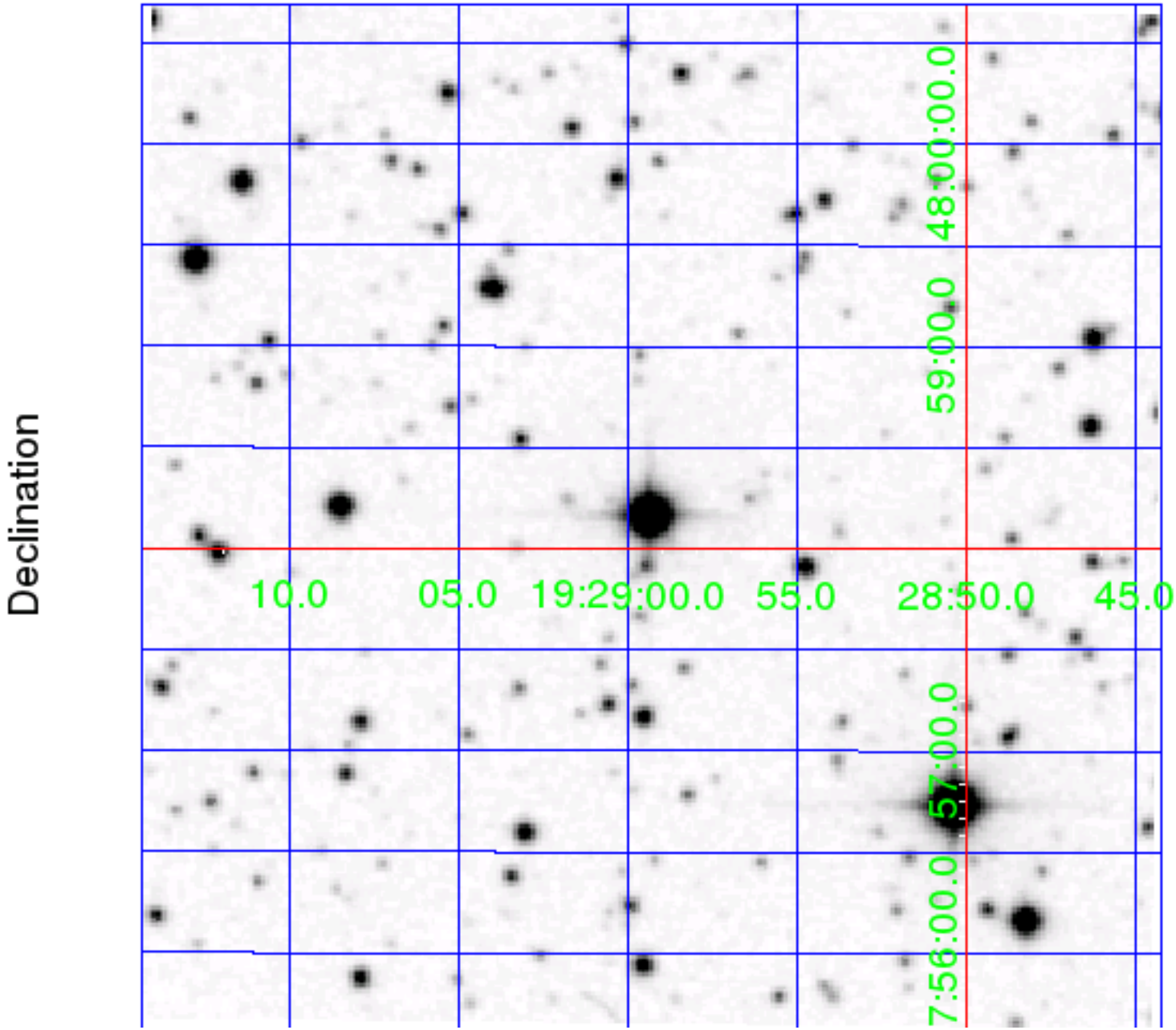
1 Summary

Target Properties	Value	Uncertainty	Units	Provenance
Catalog ID	424865156			
TOI ID	1265			
TESS Name	-			
RA	292.24730755	0	degrees	TIC8
Dec	47.96950451	0	degrees	TIC8
Magnitude	10.0274	0.0061		TIC8
Radius	1.994	0.081	Solar radii	TIC8
Effective Temperature	6532	109	Kelvin	TIC8
log(g)	3.968	0.081665	cm/sec^2	TIC8
[M/H]	0.233	0.026069	Solar metallicity	TIC8
Stellar Density	0.170	0.033	Solar density	TIC8-Derived
Limb Darkening Coefficient 1	0.49393			
Limb Darkening Coefficient 2	0.41387			
Limb Darkening Coefficient 3	-0.40448			
Limb Darkening Coefficient 4	0.12175			
Number of Planet Candidates	1			
TOI Model	toi-plus-2019-10-18_edited-2.csv			
TESS Names Model	-			
External TCE Model	-			
Software Revision	spoc-4.0.11-20191024			
Date Report Generated	25-Oct-2019 22:17:02 Z			

Sector	Target Table	Camera/ CCD	Crowding Metric	Flux Fraction
14	167	2:4	0.9917	0.8478
15	169	2:3	0.9852	0.8493

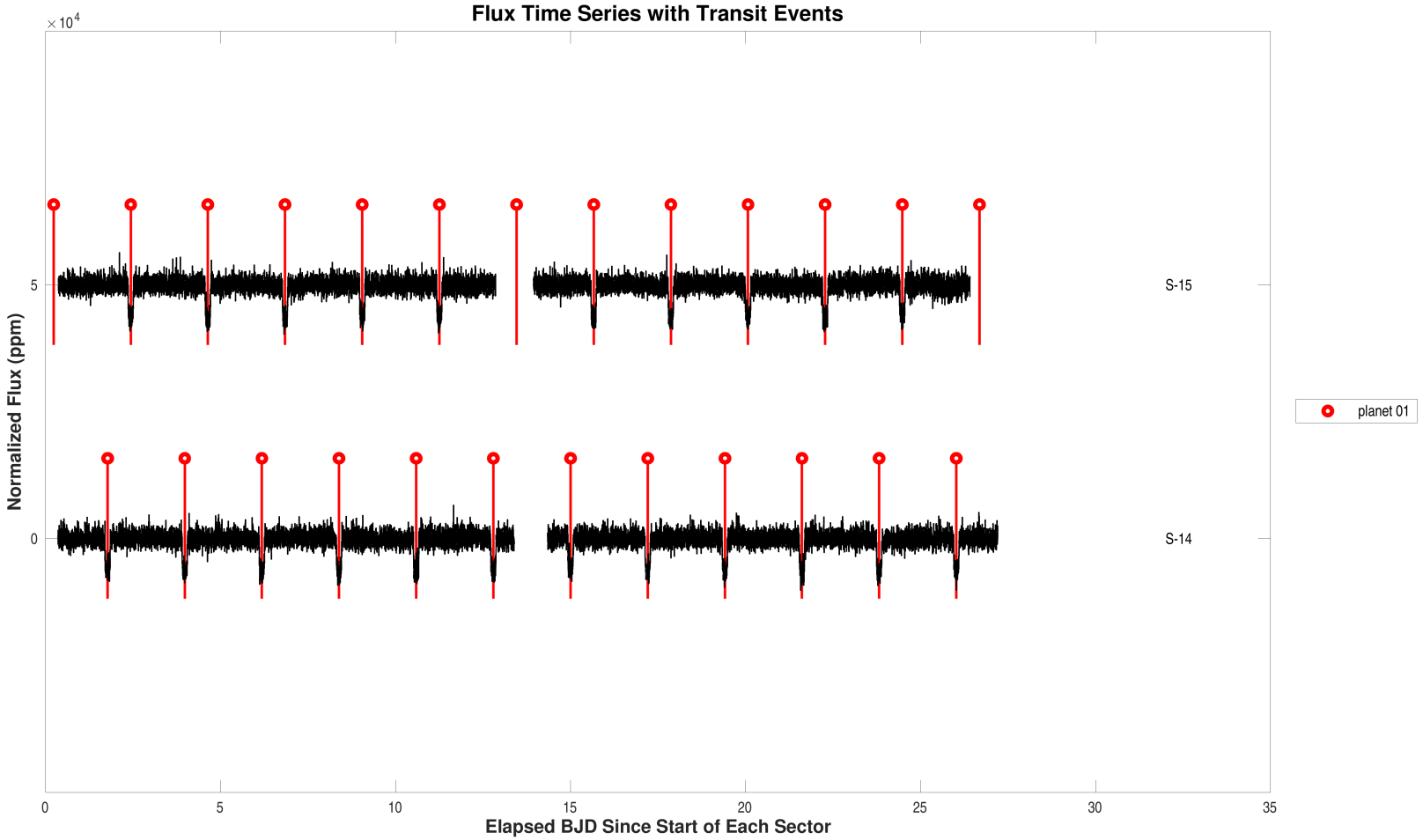
Planet Candidate	TOI ID	TESS Name	TOI Correlation	Period (days)	Period Ratio	Epoch (BTJD)	Semi-major Axis (AU)	Radius (Re)	Seff	Teq (K)	False Alarm	Suspected EB
1	1265.01	-	1.00	2.205	1.00	1684.772	0.04	16.7	4831.1	2126	0.00e+00	false

2 Survey Image

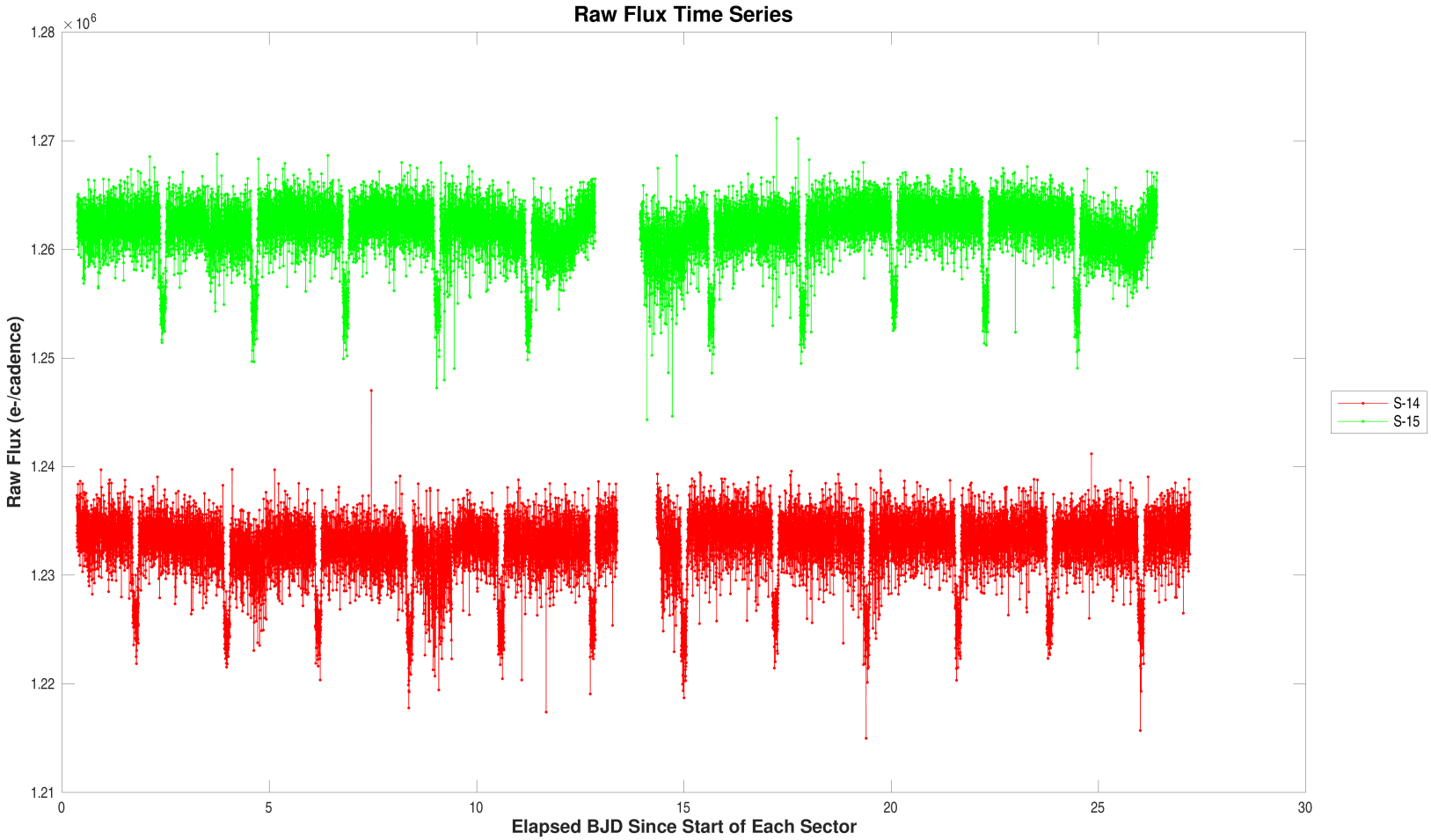


Digitized Sky Survey (DSS) red image. The 5' x 5' image is centered on the J2000 coordinates of target (424865156).

3 Flux Time Series



Summary plot of sector-stitched flux time series and transits for target 424865156, 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 14, target table 167, start BJD is 2458683 and the vertical offset is 0 ppm. For the data of sector 15, target table 169, start BJD is 2458711 and the vertical offset is 50000 ppm.
Open `./summary-plots/0000000424865156-00-flux-dv-fit-14-167.fig`



Summary plot of raw flux time series. For the data of sector 14, target table 167, start BJD is 2458683 and the vertical offset is 0 electrons/cadence. For the data of sector 15, target table 169, start BJD is 2458711 and the vertical offset is 29000 electrons/cadence.
Open `./summary-plots/0000000424865156-00-raw-flux-14-167.fig`

4 Dashboards

Planet Candidate 1

<table>
<tr><td rowspan="2">Model Fitter</td><td colspan="2">Stellar Radius
2.0 ± 0.1 Solar units</td><td rowspan="2">Core Aperture Correlation Statistic
Value = 111.38
Significance = 100.00%
Halo Aperture Correlation Statistic
Value = 22.57
Significance = 100.00%
Core/Halo Ratio
Ratio = 4.93</td><td rowspan="2">Ghost Diagnostic Test</td></tr>
<tr><td colspan="2">Period = 2.2 ± 0.0 days
Depth = 6493 ± 36 ppm
Planet Radius = 16.7 ± 0.7 Earth radii
Semi-major Axis = 0.0 ± 0.0 AU
Effective Stellar Flux = 4831.1 ± 698.9
Equilibrium Temperature = 2126 ± 77 Kelvin
Chi-squared/DoF = 0.8
SNR = 182.2</td></tr>
<tr><td rowspan="2">Eclipsing Binary Discrimination Test</td><td colspan="2">Odd-Even Depth Comparison Statistic
Value = 3.12e-01
Significance = 57.64%</td><td>Offsets Relative to Out of Transit Centroid
Source RA Offset = 2.92e-01 ± 2.50e+00 arcsec (0.12 σ)
Source Dec Offset = -8.61e-02 ± 2.59e+00 arcsec (-0.03 σ)
Source Offset Distance = 3.04e-01 ± 2.51e+00 arcsec (0.12 σ)
Offsets Relative to TIC Position
Source RA Offset = 1.99e-01 ± 2.59e+00 arcsec (0.08 σ)
Source Dec Offset = 5.52e-01 ± 2.50e+00 arcsec (0.22 σ)
Source Offset Distance = 5.86e-01 ± 2.51e+00 arcsec (0.23 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 = 24
Max Multiple Event Statistic = 172.8</td><td>Bootstrap Test</td></tr>
</table>

Summary of model fitter results and validation test results for target 424865156, 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

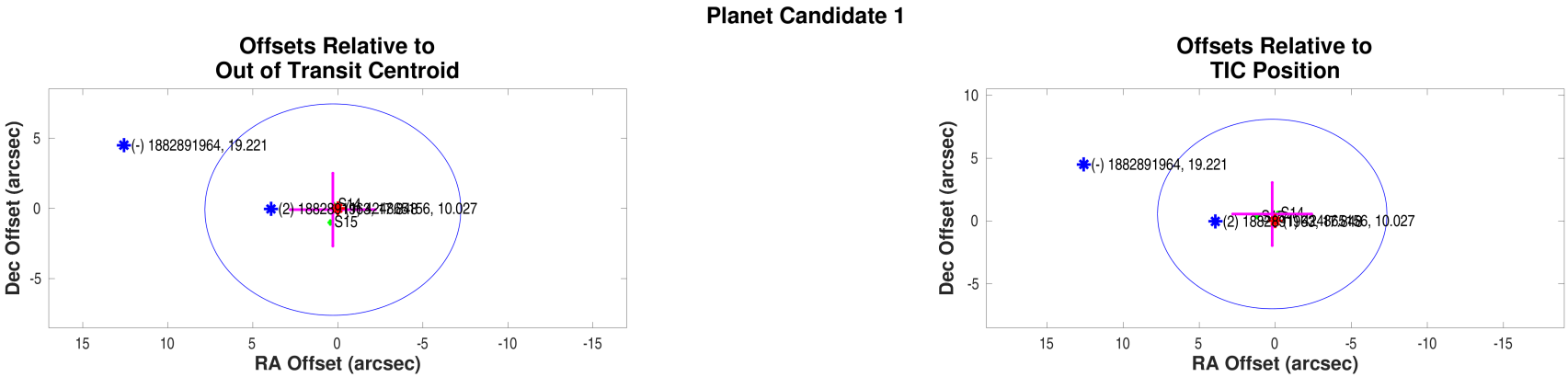
Multi-Sector Average PRF Fit of the Difference Images

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

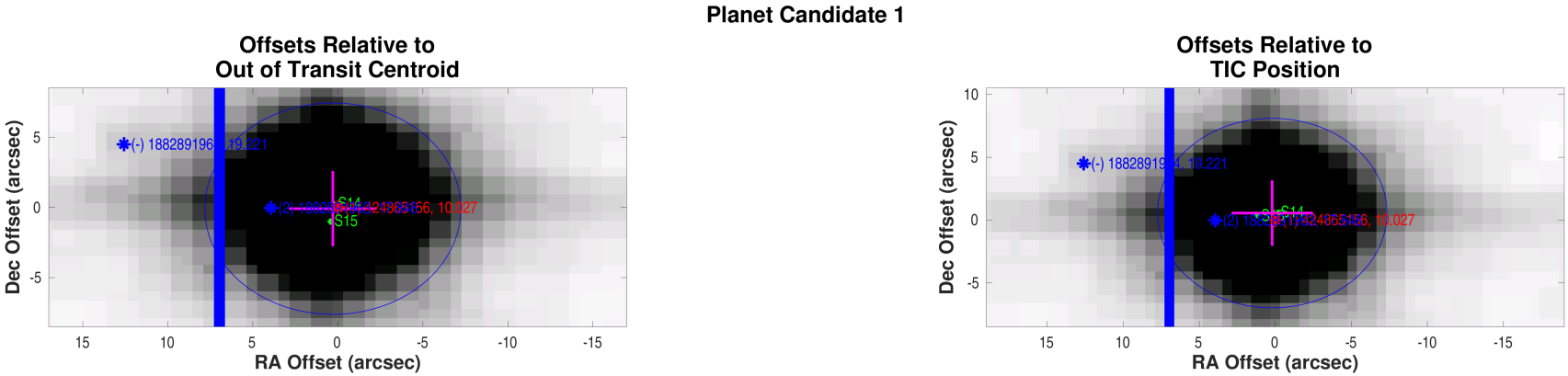
	RA	Dec	Units
Offset	$0.2921 \pm 2.50e+00$	$-0.0861 \pm 2.59e+00$	arcseconds
Offset/σ	0.12	−0.03	
Offset Distance	$0.3045 \pm 2.51e+00$		arcseconds
Offset Distance/σ	0.12		
3σ Radius	7.5284		arcseconds

Mean offset from the TIC RA and Dec

	RA	Dec	Units
Offset	$0.1987 \pm 2.59e+00$	$0.5516 \pm 2.50e+00$	arcseconds
Offset/σ	0.08	0.22	
Offset Distance	$0.5863 \pm 2.51e+00$		arcseconds
Offset Distance/σ	0.23		
3σ Radius	7.5418		arcseconds



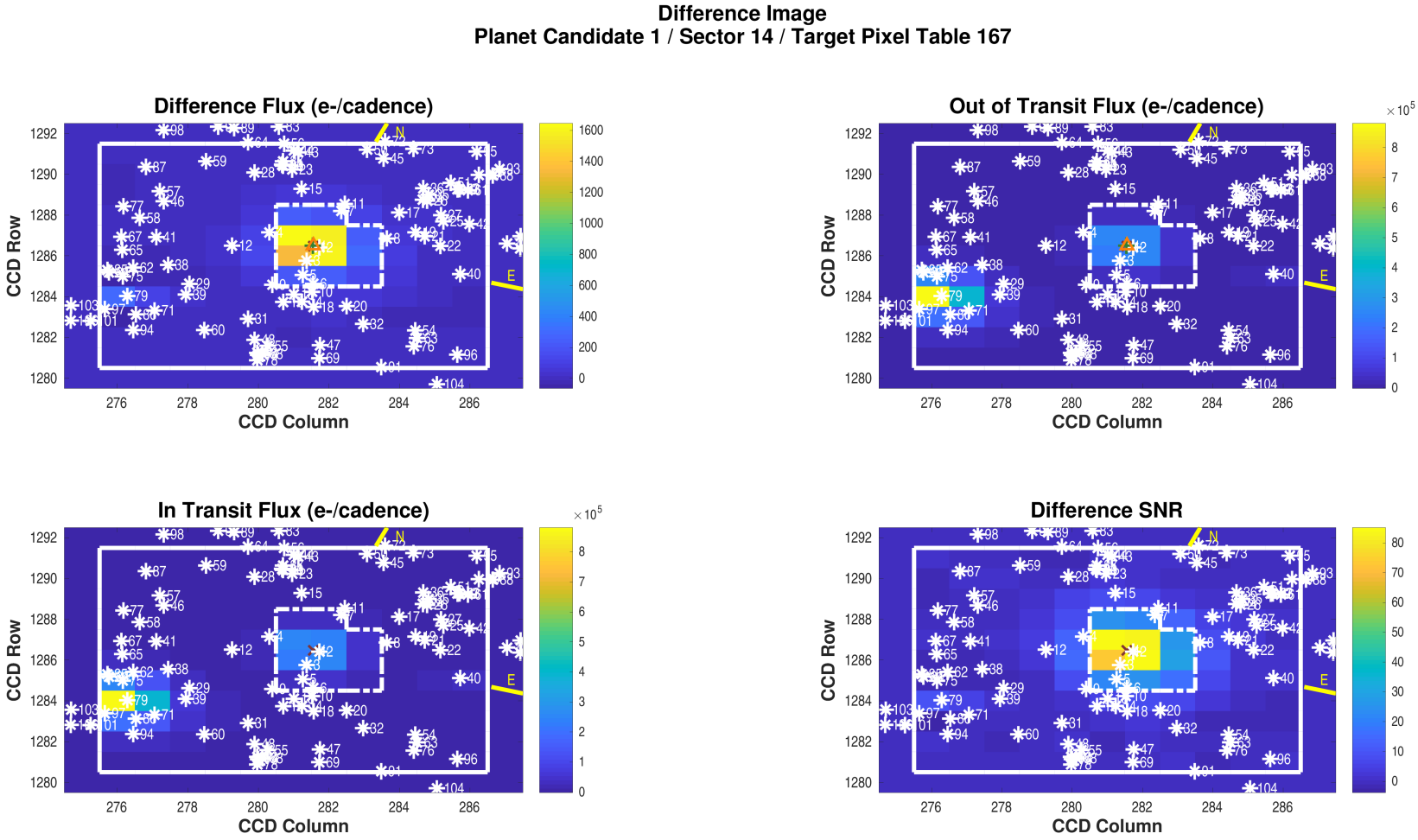
Difference image centroid offsets for target 424865156, planet candidate 1. Left: difference image PRF centroid offsets in RA and Dec with respect to the per sector out-of-transit centroids for the given target. Right: difference image PRF centroid offsets in RA and Dec with respect to the TC coordinates 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; 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/0000000424865156-01-difference-image-centroid-offsets.fig`



Difference image centroid offsets for target 424865156, 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; 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/0000000424865156-01-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 424865156, planet candidate 1, sector 14, target pixel table 167. 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 = 12; number of valid in-transit cadences = 1160; number of in-transit cadence gaps = 5; number of valid out-of-transit cadences = 2899; number of out-of-transit cadence gaps = 17. Difference image quality metric = 0.99 (good).
Open `./planet-01/difference-image/0000000424865156-01-difference-image-14-167.fig`

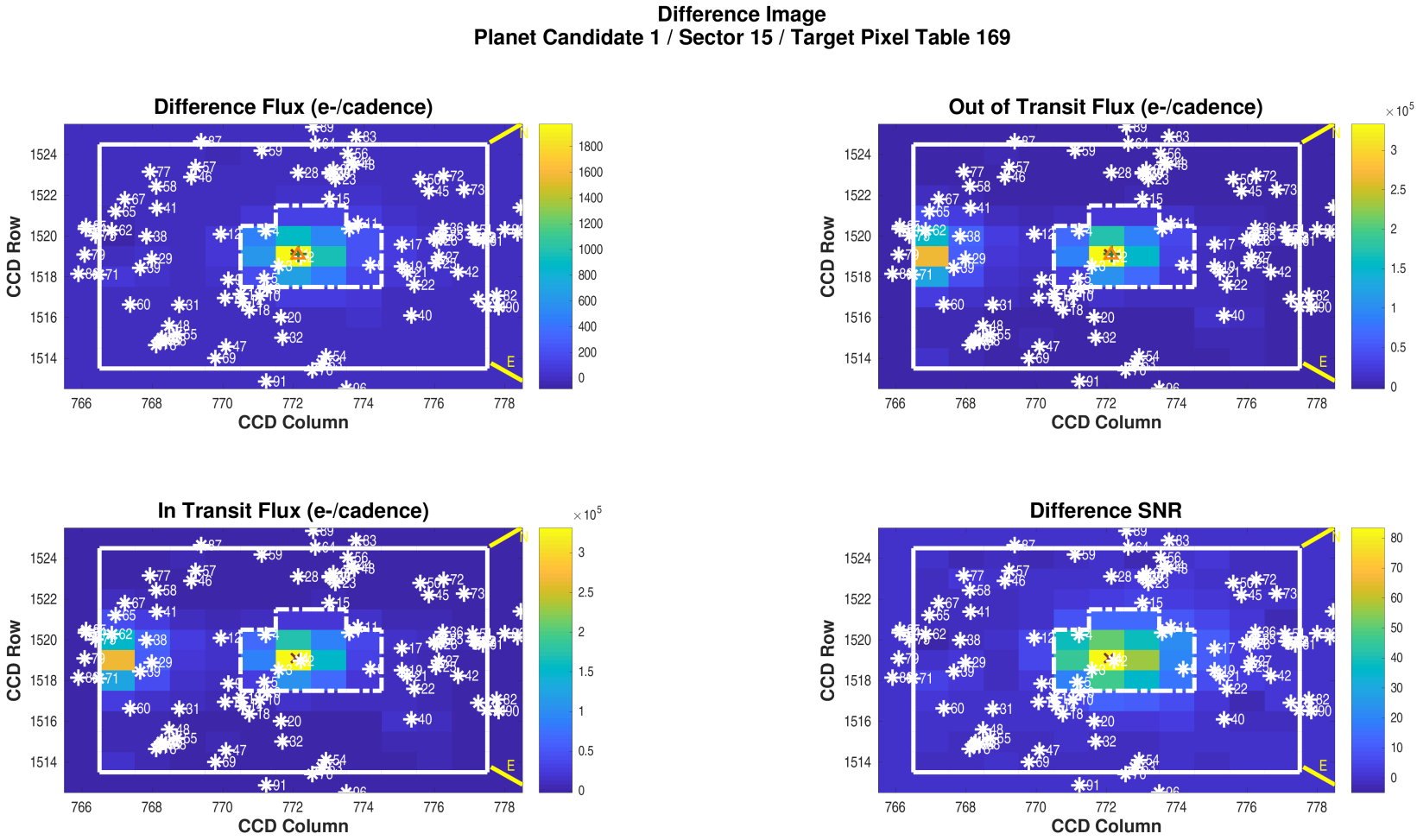
PRF Fit of the Difference Image

Offset from the PRF fit to the out of transit image

	Row	Column	Units	RA	Dec	Units
Out of Transit Image Centroid	$1286.50 \pm 1.34e-05$	$281.54 \pm 1.23e-05$	pixels	$292.24699565 \pm 7.04e-07$	$47.96964740 \pm 7.23e-07$	degrees
Difference Image Centroid	$1286.51 \pm 3.98e-03$	$281.56 \pm 3.65e-03$	pixels	$292.24709399 \pm 2.05e-05$	$47.96972569 \pm 2.31e-05$	degrees
Offset	$0.0089 \pm 3.98e-03$	$0.0150 \pm 3.65e-03$	pixels	$0.2370 \pm 4.95e-02$	$0.2818 \pm 8.33e-02$	arcseconds
Offset/σ	2.24	4.13		4.79	3.38	
Offset Distance	$0.0175 \pm 3.85e-03$		pixels	$0.3683 \pm 7.24e-02$		arcseconds
Offset Distance/σ	4.54			5.09		

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

	Row	Column	Units	RA	Dec	Units
TIC Reference Centroid	$1286.48 \pm 1.25e-04$	$281.56 \pm 1.23e-04$	pixels	$292.24715904 \pm 0.00e+00$	$47.96955298 \pm 0.00e+00$	degrees
Difference Image Centroid	$1286.51 \pm 3.98e-03$	$281.56 \pm 3.65e-03$	pixels	$292.24709399 \pm 2.05e-05$	$47.96972569 \pm 2.31e-05$	degrees
Offset	$0.0305 \pm 3.99e-03$	$0.0027 \pm 3.65e-03$	pixels	$-0.1568 \pm 4.94e-02$	$0.6218 \pm 8.33e-02$	arcseconds
Offset/σ	7.66	0.74		−3.17	7.47	
Offset Distance	$0.0306 \pm 4.00e-03$		pixels	$0.6412 \pm 8.12e-02$		arcseconds
Offset Distance/σ	7.65			7.90		



Difference image for target 424865156, planet candidate 1, sector 15, target pixel table 169. 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 = 10; number of valid in-transit cadences = 958; number of in-transit cadence gaps = 14; number of valid out-of-transit cadences = 2403; number of out-of-transit cadence gaps = 26. Difference image quality metric = 1.00 (good).
Open `./planet-01/difference-image/0000000424865156-01-difference-image-15-169.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	$1519.13 \pm 2.03e-05$	$772.15 \pm 1.95e-05$	pixels	$292.24746531 \pm 7.12e-07$	$47.96993702 \pm 7.00e-07$	degrees
Difference Image Centroid	$1519.08 \pm 6.27e-03$	$772.13 \pm 6.13e-03$	pixels	$292.24764970 \pm 3.41e-05$	$47.96965759 \pm 3.66e-05$	degrees
Offset	$-0.0497 \pm 6.27e-03$	$-0.0194 \pm 6.13e-03$	pixels	$0.4444 \pm 8.23e-02$	$-1.0060 \pm 1.32e-01$	arcseconds
Offset/σ	-7.93	-3.18		5.40	-7.63	
Offset Distance	$0.0534 \pm 6.44e-03$		pixels	$1.0998 \pm 1.25e-01$		arcseconds
Offset Distance/σ	8.30			8.77		

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

	Row	Column	Units	RA	Dec	Units
TIC Reference Centroid	$1519.10 \pm 1.23e-04$	$772.07 \pm 1.21e-04$	pixels	$292.24715847 \pm 0.00e+00$	$47.96955316 \pm 0.00e+00$	degrees
Difference Image Centroid	$1519.08 \pm 6.27e-03$	$772.13 \pm 6.13e-03$	pixels	$292.24764970 \pm 3.41e-05$	$47.96965759 \pm 3.66e-05$	degrees
Offset	$-0.0266 \pm 6.27e-03$	$0.0540 \pm 6.13e-03$	pixels	$1.1840 \pm 8.23e-02$	$0.3759 \pm 1.32e-01$	arcseconds
Offset/σ	-4.25	8.82		14.39	2.85	
Offset Distance	$0.0602 \pm 5.93e-03$		pixels	$1.2422 \pm 8.75e-02$		arcseconds
Offset Distance/σ	10.16			14.20		

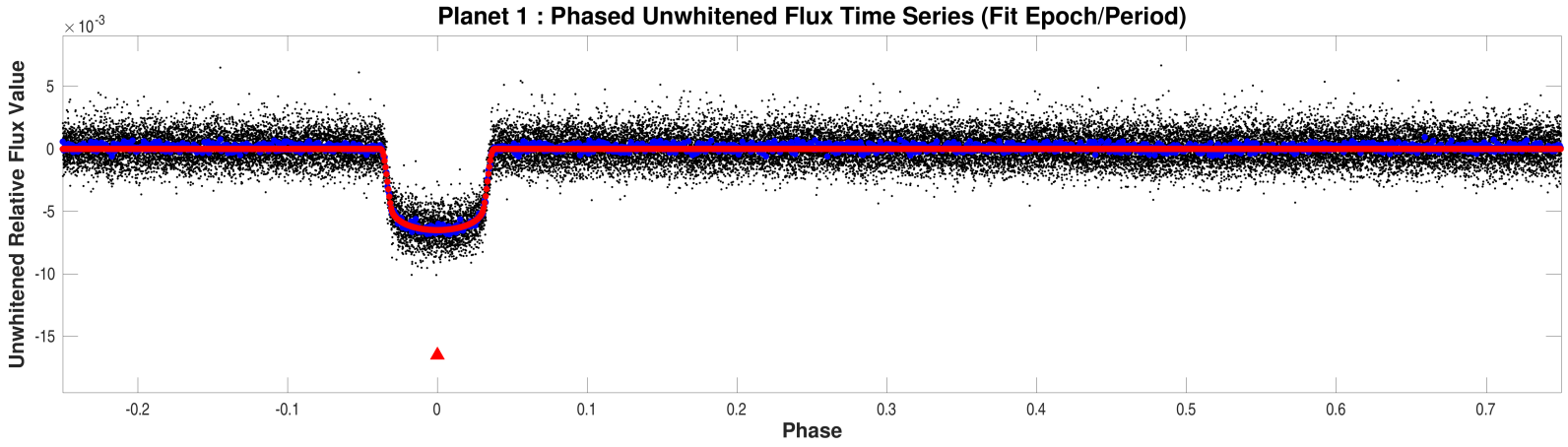
5.2 Difference Image TIC Key

Index	Catalog ID	Mag	RA (degrees)	Dec (degrees)	Distance (arcsec)
1	424865156	10.027	292.24715876	47.96955307	0.00
2	1882891963	17.848	292.24879027	47.96954354	3.93
3	424865161	16.155	292.24765101	47.96527125	15.46
4	1882891968	18.310	292.23500113	47.97081518	29.65
5	424865163	18.235	292.24880114	47.96121084	30.29
6	424865165	18.385	292.25245015	47.95942265	38.64
7	1882892015	18.759	292.24875127	47.98058897	39.91
8	424865153	15.930	292.26323270	47.97570150	44.62
9	63203906	17.514	292.24305900	47.95690156	46.61
10	1882891960	17.917	292.25330590	47.95720672	46.85
11	1882892012	17.873	292.24859312	47.98264985	47.28
12	424865162	14.481	292.22812216	47.96521020	48.47
13	424865168	17.612	292.24943690	47.95548224	50.95
14	424865170	16.016	292.25235618	47.95395812	57.52
15	424865145	17.686	292.23639857	47.98436402	59.29
16	424865172	14.795	292.24801755	47.95284720	60.18
17	1882892013	18.663	292.26252483	47.98335081	61.96
18	63203944	18.328	292.25579920	47.95316660	62.56
19	1882891987	18.607	292.26911562	47.97895151	62.81
20	424865169	17.718	292.26339937	47.95524652	64.69
21	424865151	17.024	292.27178340	47.97838815	67.34
22	1882891986	18.851	292.27681308	47.97663818	75.89
23	1882891973	18.441	292.23150878	47.98900088	79.53
24	424865140	14.389	292.26622840	47.98813324	81.16
25	1882891991	18.106	292.27401980	47.98342671	81.77
26	1882892020	15.113	292.26738438	47.98809118	82.65
27	424865144	16.808	292.27266222	47.98497824	82.84
28	1882891972	18.822	292.22311849	47.98611432	83.14
29	424865173	17.365	292.22356563	47.95255744	83.53
30	1882891976	17.829	292.22886249	47.98948910	84.24
31	424865180	16.238	292.24213194	47.94635815	84.38
32	424865176	17.488	292.26971856	47.95136526	85.11
33	424865139	17.529	292.22863200	47.98968500	85.13
34	1882891977	18.823	292.22845314	47.98976246	85.59
35	1882892018	18.473	292.26689979	47.98977820	86.98
36	1882892021	17.805	292.26472396	47.99121035	88.72
37	424865136	17.319	292.22821369	47.99071060	88.81
38	1882891953	18.649	292.21594905	47.95643615	88.82

Index	Catalog ID	Mag	RA (degrees)	Dec (degrees)	Distance (arcsec)
39	424865177	16.742	292.22424628	47.94943133	91.09
40	424865155	13.037	292.28537915	47.97020687	92.15
41	1882891958	18.944	292.20927829	47.96326249	94.07
42	1882891990	18.714	292.28050805	47.98414759	96.03
43	1882892025	17.793	292.23048903	47.99397916	96.68
44	424865131	16.295	292.22922645	47.99418765	98.66
45	424865125	15.180	292.25126565	47.99702286	99.39
46	1882892381	18.324	292.20599879	47.97330855	100.12
47	424865182	14.621	292.26263044	47.94326170	101.73
48	1882891945	18.391	292.24660848	47.94111124	102.40
49	1882892019	18.198	292.27287049	47.99281862	104.19
50	424865122	17.418	292.24620530	47.99850268	104.24
51	424865130	16.382	292.27036252	47.99419302	104.86
52	424865132	17.359	292.27319690	47.99297236	105.10
53	1882892022	17.801	292.27332559	47.99299153	105.34
54	424865174	15.368	292.28280274	47.95251074	105.57
55	424865185	18.174	292.25052106	47.94018421	106.04
56	424865128	15.553	292.22597460	47.99548884	106.42
57	1882892388	17.823	292.20370645	47.97581029	107.13
58	63203916	17.215	292.20273156	47.96752082	107.33
59	424865143	16.712	292.21026412	47.98645490	107.75
60	1882891947	18.100	292.23351627	47.94094185	108.12
61	1882891995	19.006	292.27540791	47.99316558	108.91
62	424865171	17.387	292.20819455	47.95376263	109.78
63	1882891930	18.535	292.28427941	47.95052482	112.68
64	1882892395	18.424	292.21737188	47.99385124	113.16
65	63203907	17.109	292.20318333	47.95795206	113.92
66	1882891915	18.703	292.24905876	47.93776700	114.52
67	63203912	17.574	292.20112144	47.96144060	114.74
68	1882891916	18.998	292.25047032	47.93772757	114.85
69	424865186	16.353	292.26426585	47.93976352	114.90
70	1882891989	18.681	292.29201422	47.98100120	115.70
71	424865183	18.279	292.21919061	47.94342248	115.73
72	424865114	17.121	292.24922657	48.00173884	115.98
73	424865116	15.961	292.25688121	48.00127614	116.58
74	424865187	16.654	292.24955281	47.93719020	116.65
75	1882891950	18.725	292.20697814	47.95085625	117.94
76	424865178	15.975	292.28465580	47.94817575	118.71

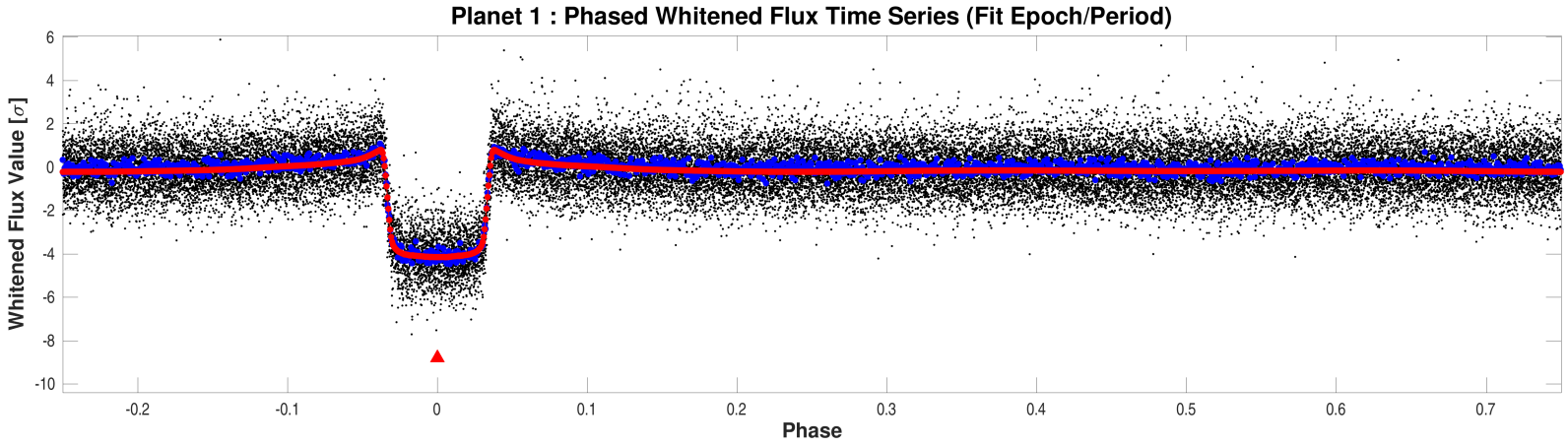
RA, Dec and Distances are corrected for proper motion. This table may not contain all of the objects shown.

6 Phased Light Curves

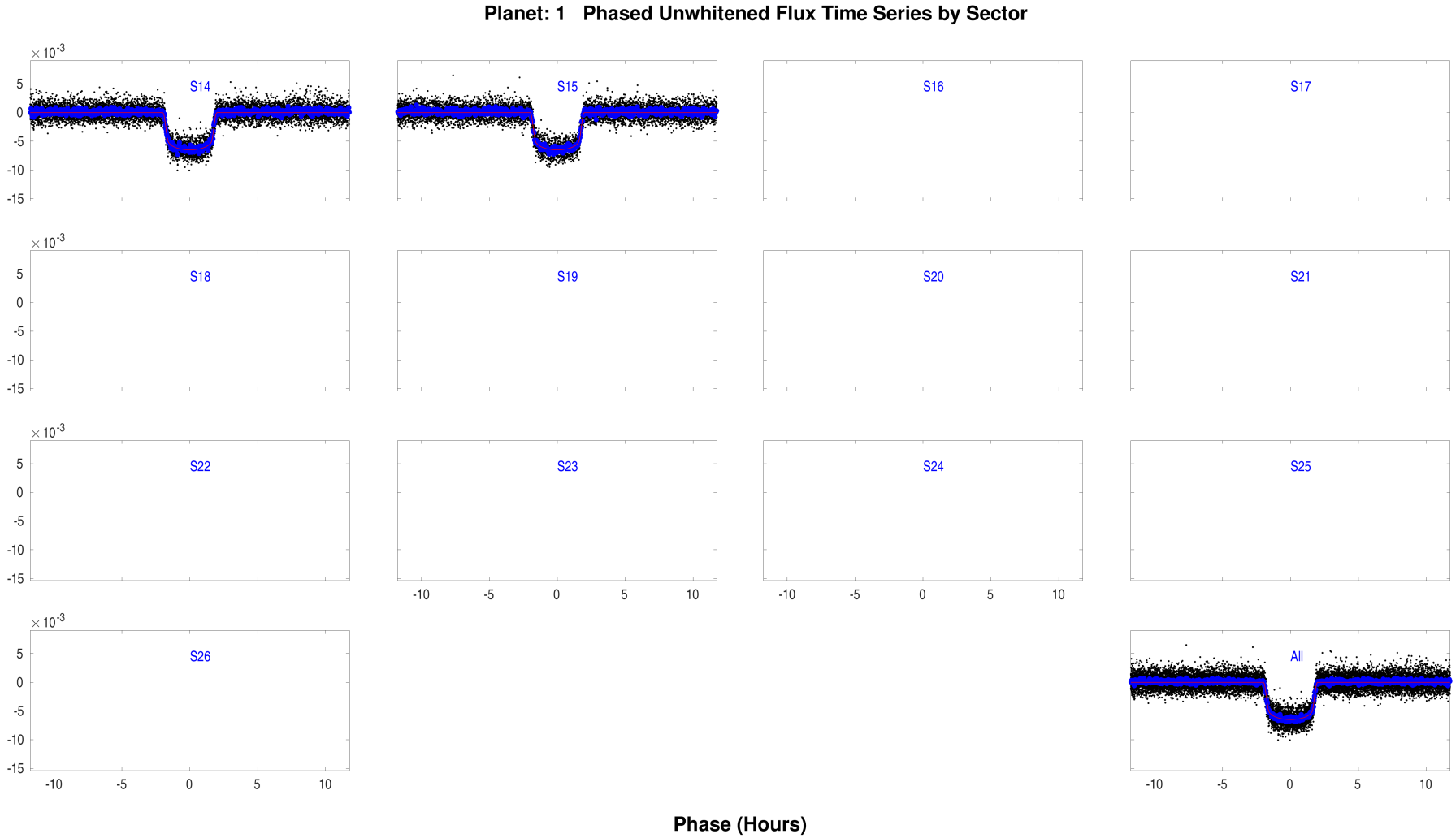


Phased unwhitened flux time series is plotted in black dots. When all transits fit completed with full or secondary convergence, the phase is determined with the fitted epoch and period; otherwise, the phase is determined with the TPS epoch and period. The values of the phased unwhitened flux time series 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/0000000424865156-01-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/0000000424865156-01-phased-whitened-flux-time-series.fig`



Phased unwhitened flux time series by sector for target 424865156, planet candidate 1. Period = 2.2048 days; transit epoch = 1684.7721 BTJD.
Open `./summary-plots/0000000424865156-01-phased-unwhitened-flux-time-series-by-sector.fig`

7 Planet Candidate 1

7.1 Model Fitter: All Transits

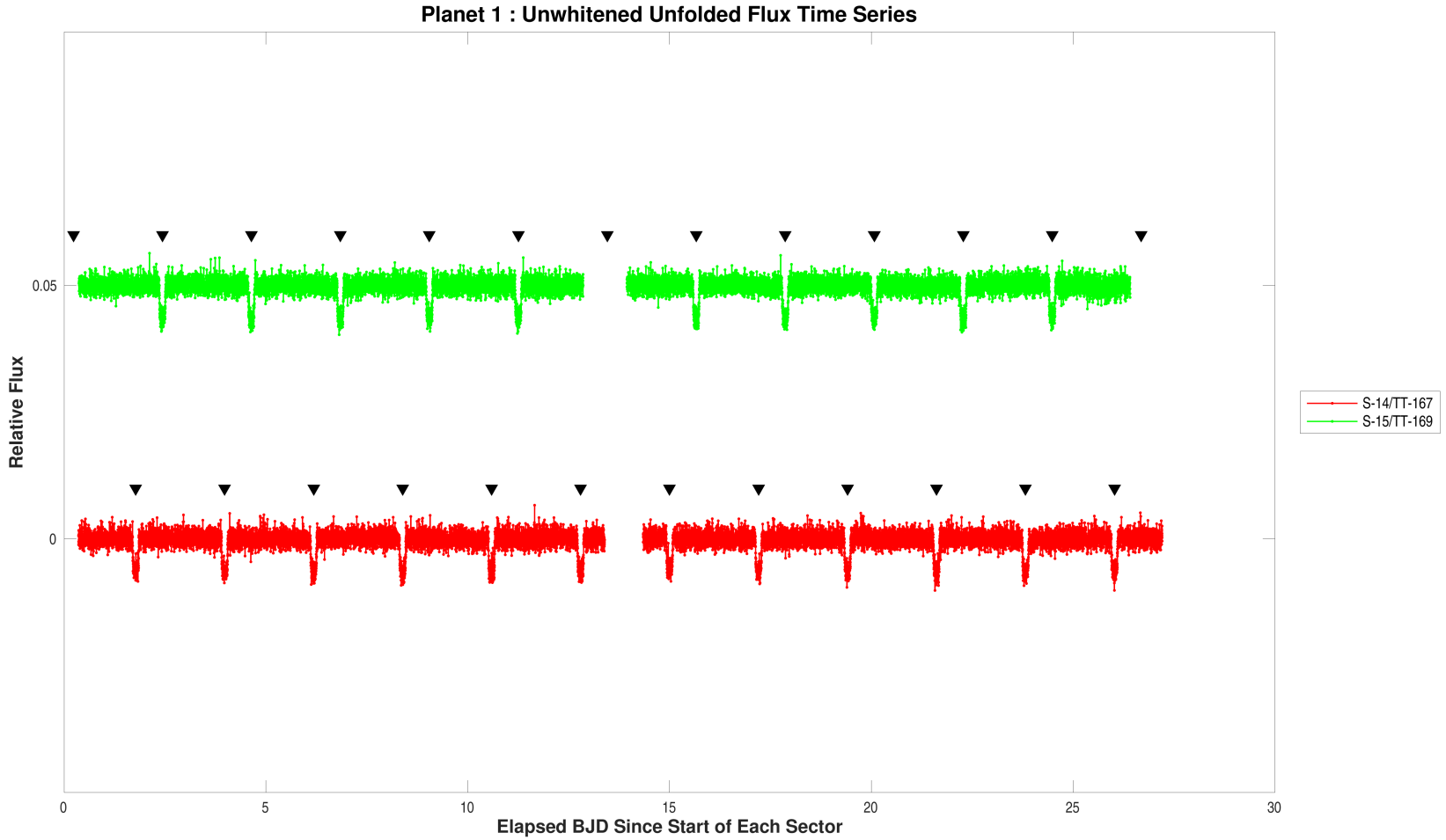
Model Characteristic	Name
Transit Model	mandel-agol_geometric_transit_model
Limb Darkening Model	claret_tess_nonlinear_limb_darkening_model

TCE Parameter	Value	Units
Trial Transit Pulse Duration	3.5	hours
Transit Epoch	1684.7678133	TJD
Orbital Period	2.2049482	days
Maximum SES	44.1	
Maximum MES	172.8	
Robust Statistic	174.5	
Chi Square Goodness of Fit Statistic (DoF)	3063.9 (2168)	
Chi Square2 Statistic (DoF)	818.3 (2608.7)	
Threshold for Desired PFA		

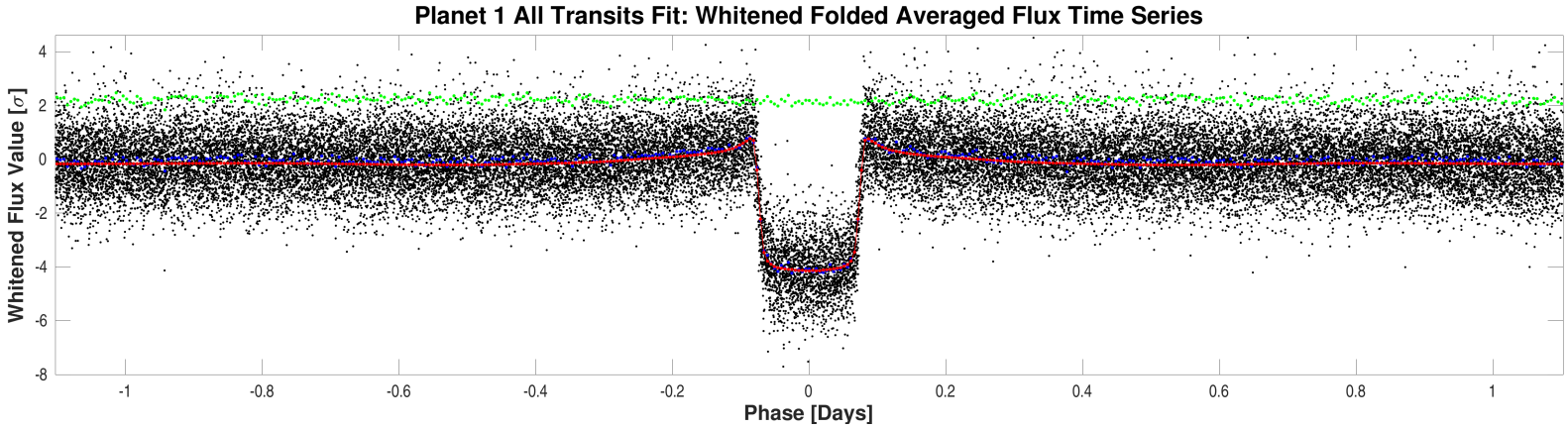
DoF: Degrees of Freedom

Parameter	Value	Uncertainty	Units
SNR	182.2		
Orbital Period	2.2047544	2.2223e-05	days
Transit Epoch	1684.7721215	2.8467e-04	BTJD
Impact Parameter	0.4280	5.6551e-02	
Planet Radius to Star Radius Ratio	0.0765714	4.1828e-04	
Semi-major Axis to Star Radius Ratio	4.3082	1.2051e-01	
Planet Radius	16.6647	6.8532e-01	Earth radii
Semi-major Axis	0.0366	2.5027e-03	AU
Effective Stellar Flux	4831.0695	6.9885e+02	Goldilocks
Equilibrium Temperature	2126	7.6898e+01	Kelvin
Stellar Density	0.2210	1.8546e-02	Solar density
Transit Depth	6493	3.5695e+01	ppm
Transit Duration	3.9164	2.1945e-02	hours
Transit Ingress Duration	0.3408	2.1894e-02	hours
Eccentricity	0.0000	0.0000e+00	
Peri Longitude	0.0000	0.0000e+00	degrees
Model Chi Square Statistic (DoF)	10117.6 (12330.8)		
Model Chi Square Goodness of Fit Statistic (DoF)	1510.3 (2656)		
Model Chi Square2 Statistic (DoF)	15.4 (21)		

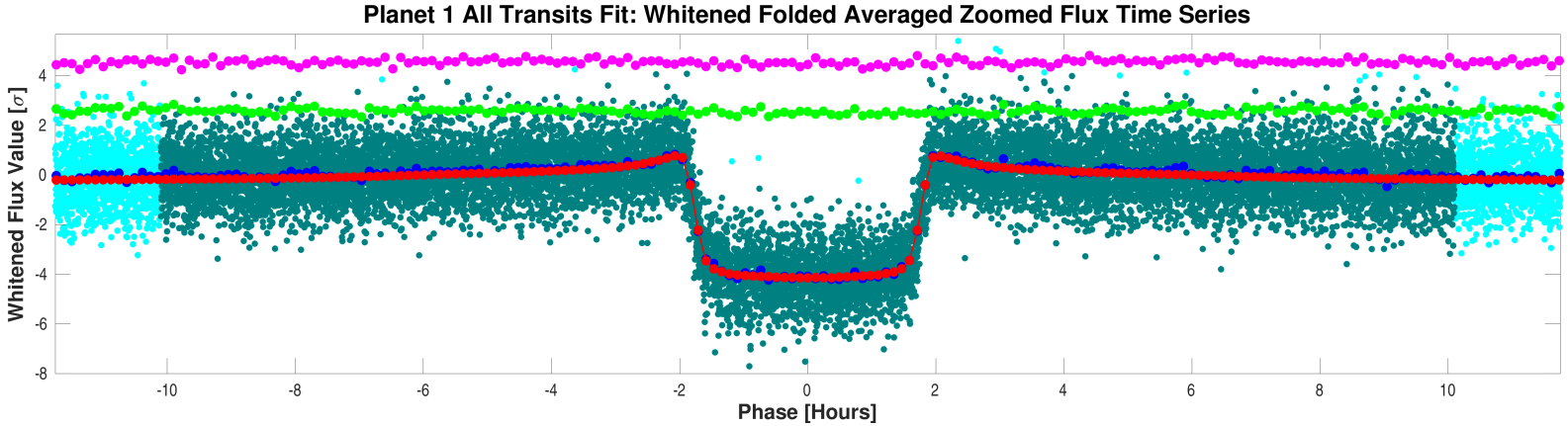
DoF: Degrees of Freedom



Flux time series for CatId 424865156, Planet candidate 1 in the unwhitened domain. For the data of Sector-14/TargetTableId-167, start BJD is 2458683 and the vertical offset is 0. For the data of Sector-15/TargetTableId-169, start BJD is 2458711 and the vertical offset is 0.05. 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/0000000424865156-01-all-unwhitened-14-167.fig`



Folded flux time series for CatId 424865156, 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/0000000424865156-01-all-whitened.fig`

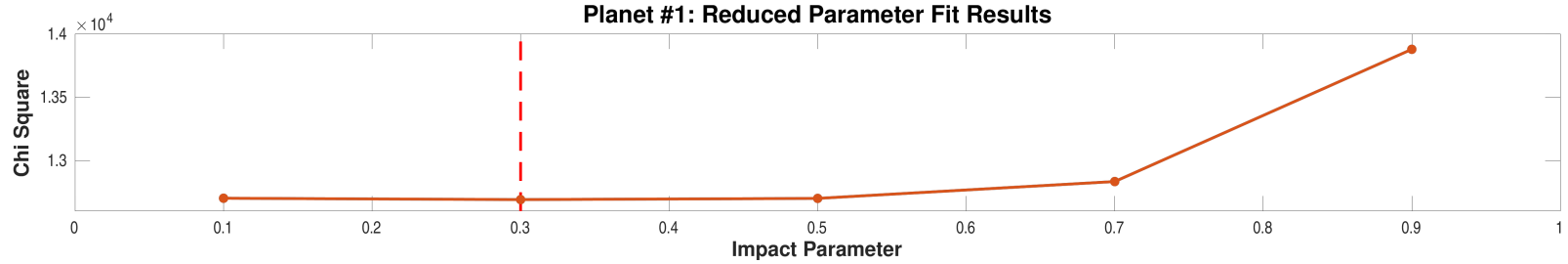


Folded flux time series for CatId 424865156, Planet candidate 1 in the whitened domain, zoomed on the transit. The flux data whose robust weights are larger/smaller than 0.1 are plotted in dark green/cyan dots, respectively. Values are averaged into 1 cadence wide bins. The blue dots represent the averaged 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/0000000424865156-01-all-whitened-zoomed.fig`

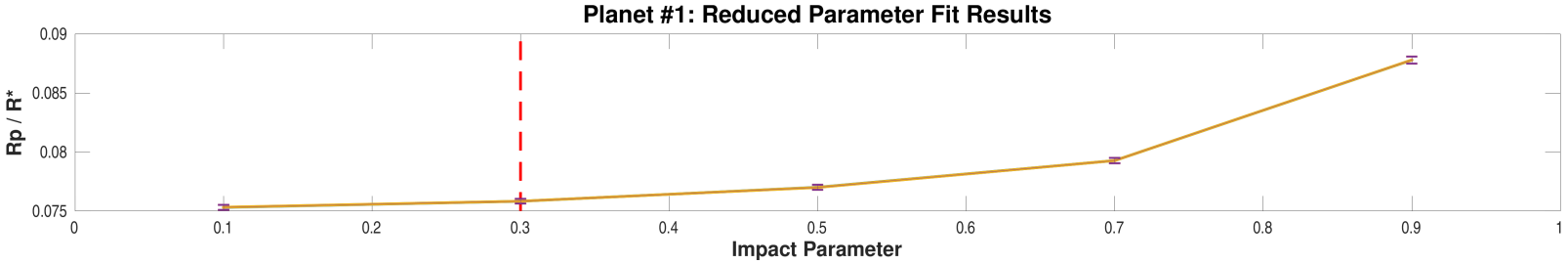
7.2 Model Fitter: Reduced Parameter Fit Results

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	188.9	12701.4	0.0753127	2.0613e-04	4.7183	9.2979e-03	6464	3.5191e+01	3.8564	7.6749e-03
0.30	189.5	12690.8	0.0758334	2.0713e-04	4.5331	9.1864e-03	6472	3.5158e+01	3.8815	7.9722e-03
0.50	189.9	12700.3	0.0770131	2.1090e-04	4.1387	8.9520e-03	6485	3.5315e+01	3.9467	8.7320e-03
0.70	188.9	12833.3	0.0792779	2.2158e-04	3.4705	8.7804e-03	6491	3.6041e+01	4.1112	1.0888e-02
0.90	179.0	13878.5	0.0877900	3.0128e-04	2.3575	9.9007e-03	6835	4.5808e+01	4.7871	2.2999e-02

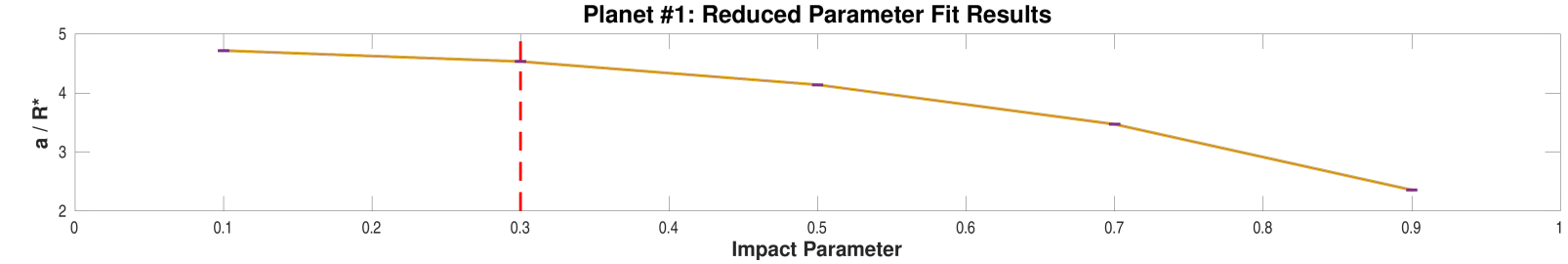
Highlighted row is the best reduced-parameter model fit.



Model chi squares of reduced parameter fits vs. impact parameter for CatId 424865156, 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/0000000424865156-01-reduced-fits-chi-square.fig`



Ratios of planet radius to star radius of reduced parameter fits vs. impact parameter for CatId 424865156, 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/0000000424865156-01-reduced-fits-rp-over-rstar.fig`



Ratios of semimajor axis to star radius of reduced parameter fits vs. impact parameter for CatId 424865156, 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/0000000424865156-01-reduced-fits-a-over-rstar.fig`

7.3 Model Fitter: Trapezoidal Fit Results

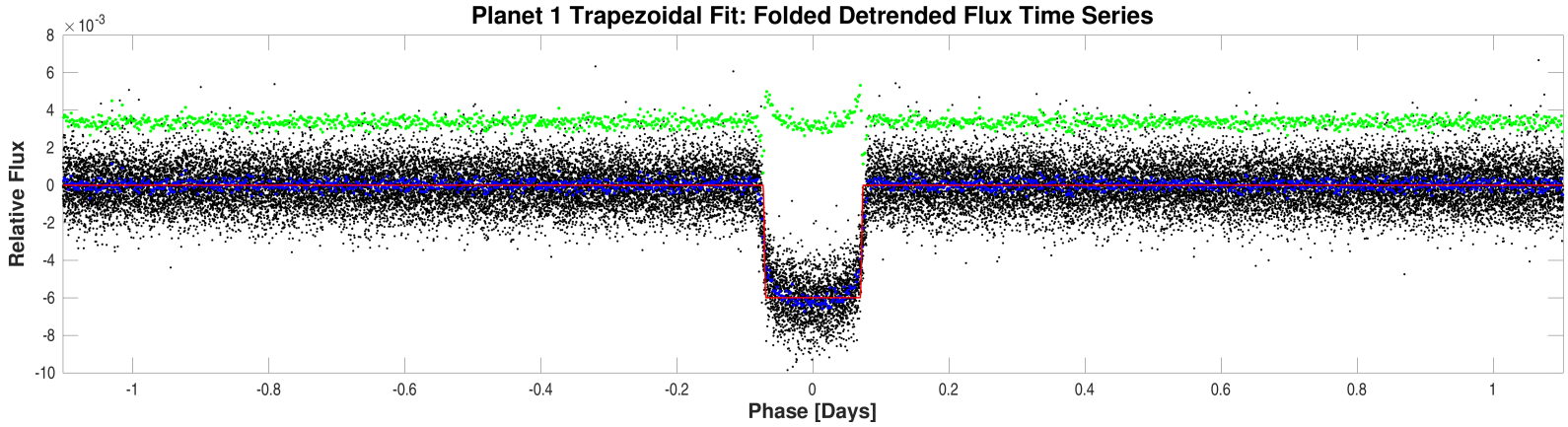
Model Characteristic	Name
Transit Model	trapezoidal_model
Limb Darkening Model	

TCE Parameter	Value	Units
Trial Transit Pulse Duration	3.5	hours
Transit Epoch	1684.7678133	TJD
Orbital Period	2.2049482	days
Maximum SES	44.1	
Maximum MES	172.8	
Robust Statistic	174.5	
Chi Square Goodness of Fit Statistic (DoF)	3063.9 (2168)	
Chi Square2 Statistic (DoF)	818.3 (2608.7)	
Threshold for Desired PFA		

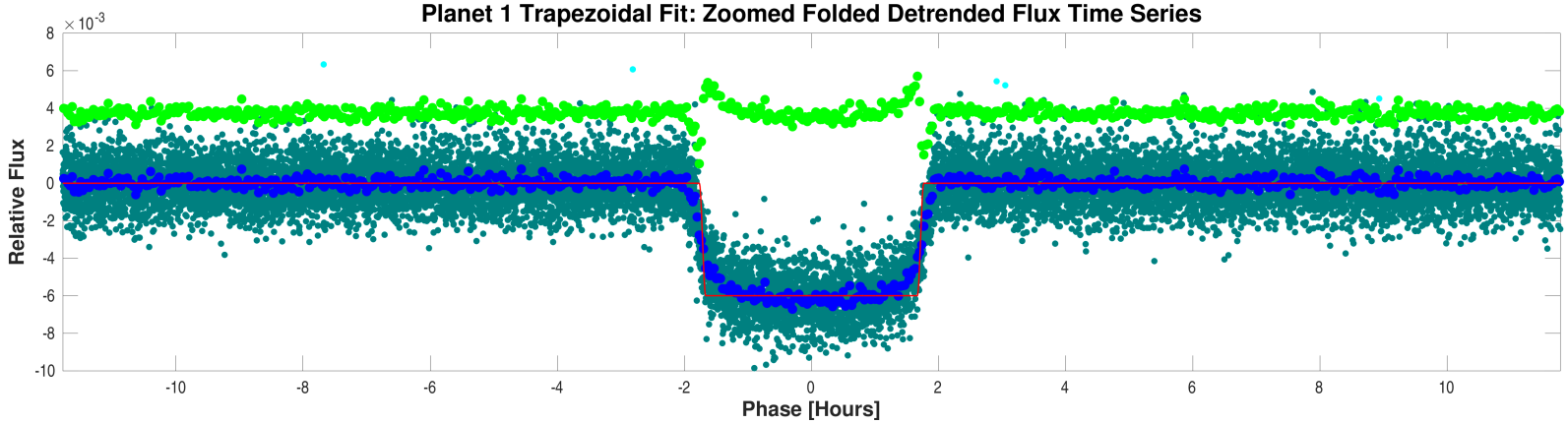
DoF: Degrees of Freedom

Parameter	Value	Uncertainty	Units
SNR	246.7		
Orbital Period	2.2049482		days
Transit Epoch	1684.7699223		BTJD
Transit Depth	5997		ppm
Transit Duration	3.9271		hours
Transit Ingress Duration	0.4961		hours
Model Chi Square Statistic (DoF)	38617.2 (17880)		

DoF: Degrees of Freedom



Folded detrended flux time series for CatId 424865156, Planet candidate 1 and folded trapezoidal model light curve.
Open `./planet-01/planet-search-and-model-fitting-results/trapezoidal-model-fit/0000000424865156-01-all-trapezoidal.fig`



Zoomed folded detrended flux time series for CatId 424865156, Planet candidate 1 and folded trapezoidal model light curve.
Open `./planet-01/planet-search-and-model-fitting-results/trapezoidal-model-fit/0000000424865156-01-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	2.2049		days		
Transit Duration	3.5		hours		
Maximum MES	172.8				
Secondary Phase	1.098		days		
Secondary MES	1.9				
Minimum Phase	-0.44861		days		
Minimum MES	-2.9				
Median MES	-0.1				
MAD MES	0.63006				
Robust Statistic	7.2				
Secondary Depth	744.0	9.6181e+01	ppm		
Geometric Albedo	2.0	3.6085e-01		2.7100	0.34
Planet Effective Temperature	3899	1.4226e+02	Kelvin	10.9599	0.00

7.4.2 Eclipsing Binary Discrimination Test

Result	Value	Value in Sigmas	Significance (%)
Odd Even Transit Depth Comparison Statistic	3.1205e-01	0.5586	57.64

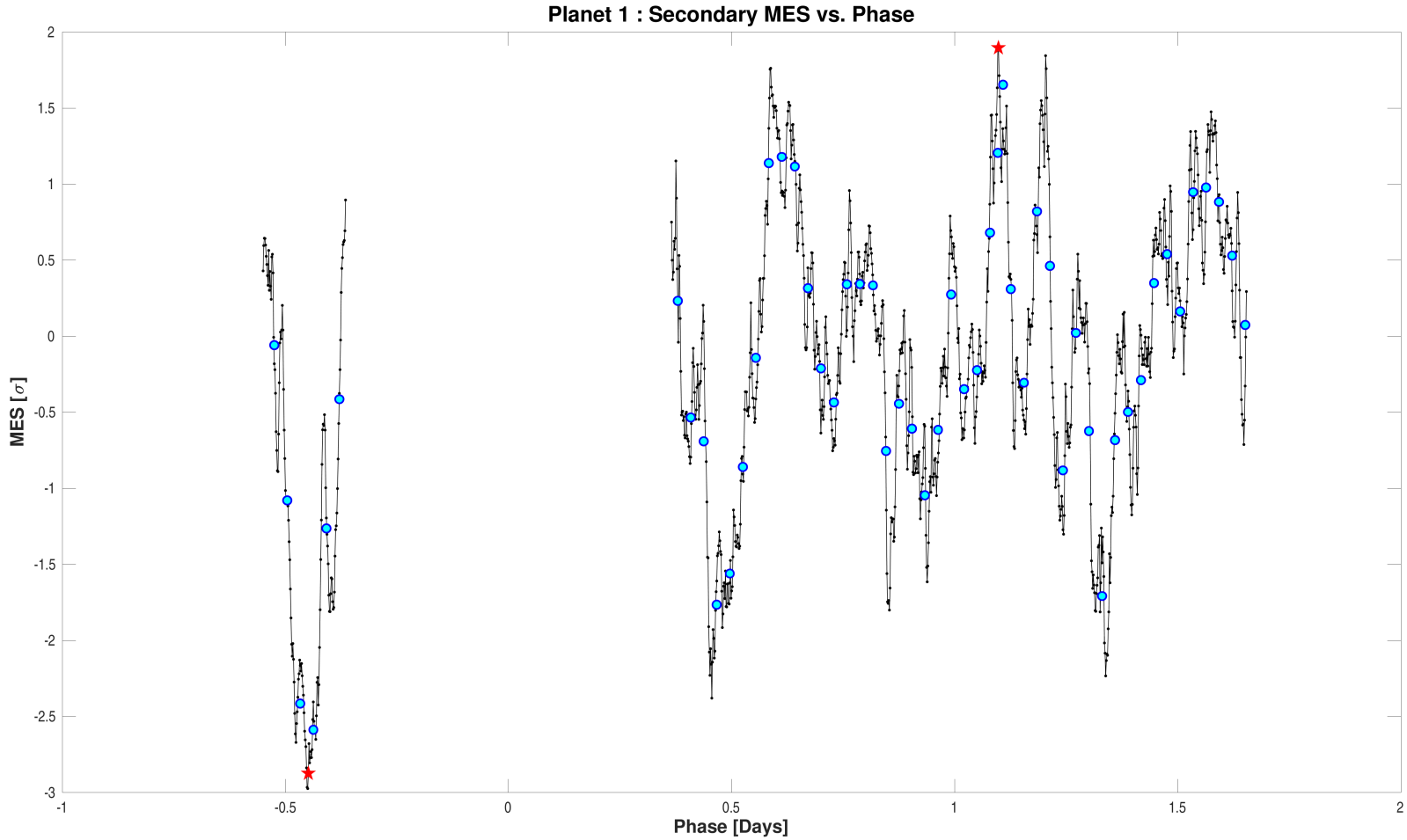
7.4.3 Bootstrap Test

Result	Value
False Alarm Probability	0.0000e+00
Bootstrap Threshold for Desired PFA	7.8
MES Mean	-0.28
MES Standard Deviation	1.14
Transit Count	24

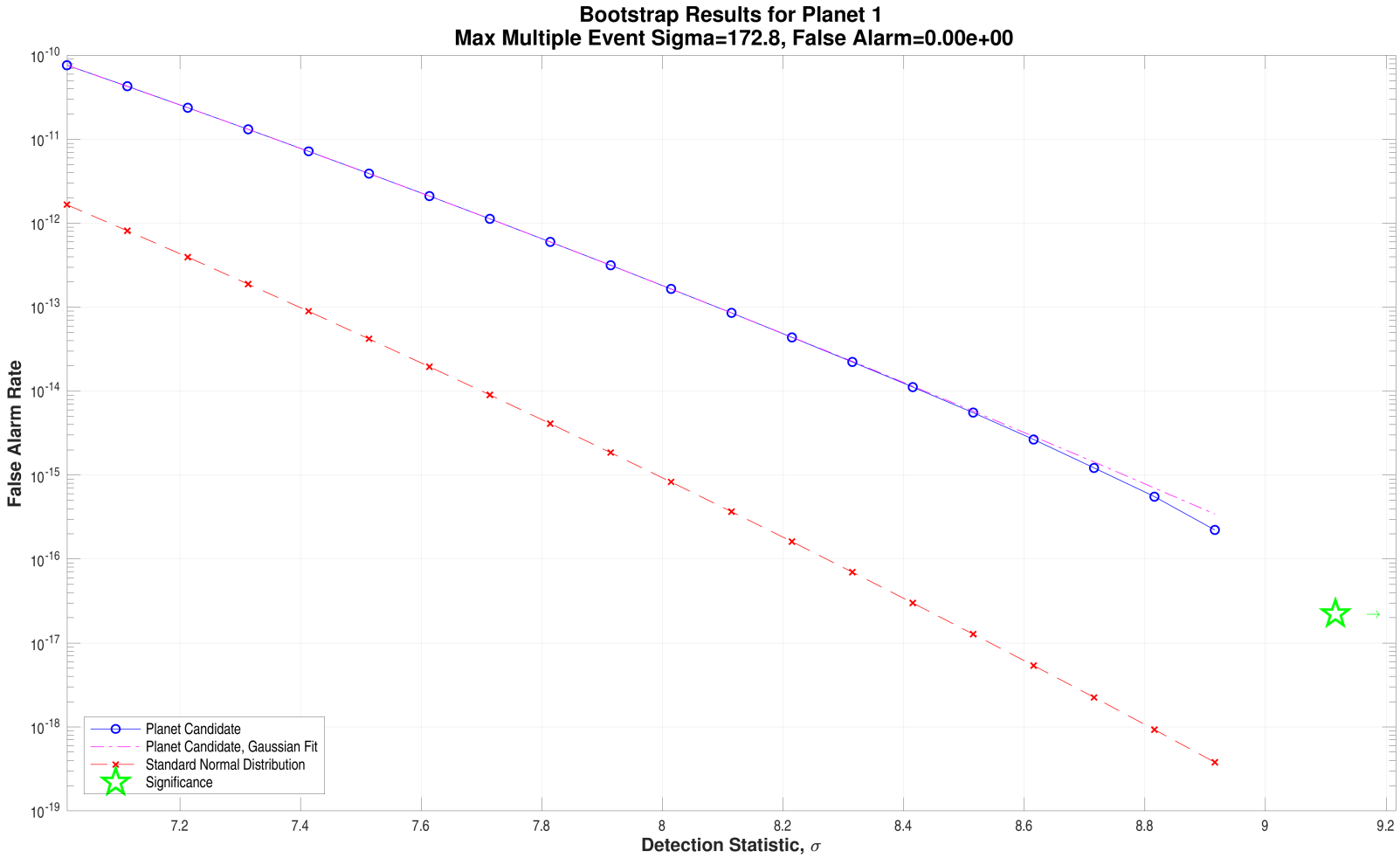
7.4.4 Ghost Diagnostic Test

Result	Value	Significance (%)
Maximum MES	172.8	
SNR	182.2	
Core Aperture Statistic	1.1138e+02	100.00
Halo Aperture Statistic	2.2573e+01	100.00
Ratio of Core/Halo Aperture Statistics	4.9344e+00	

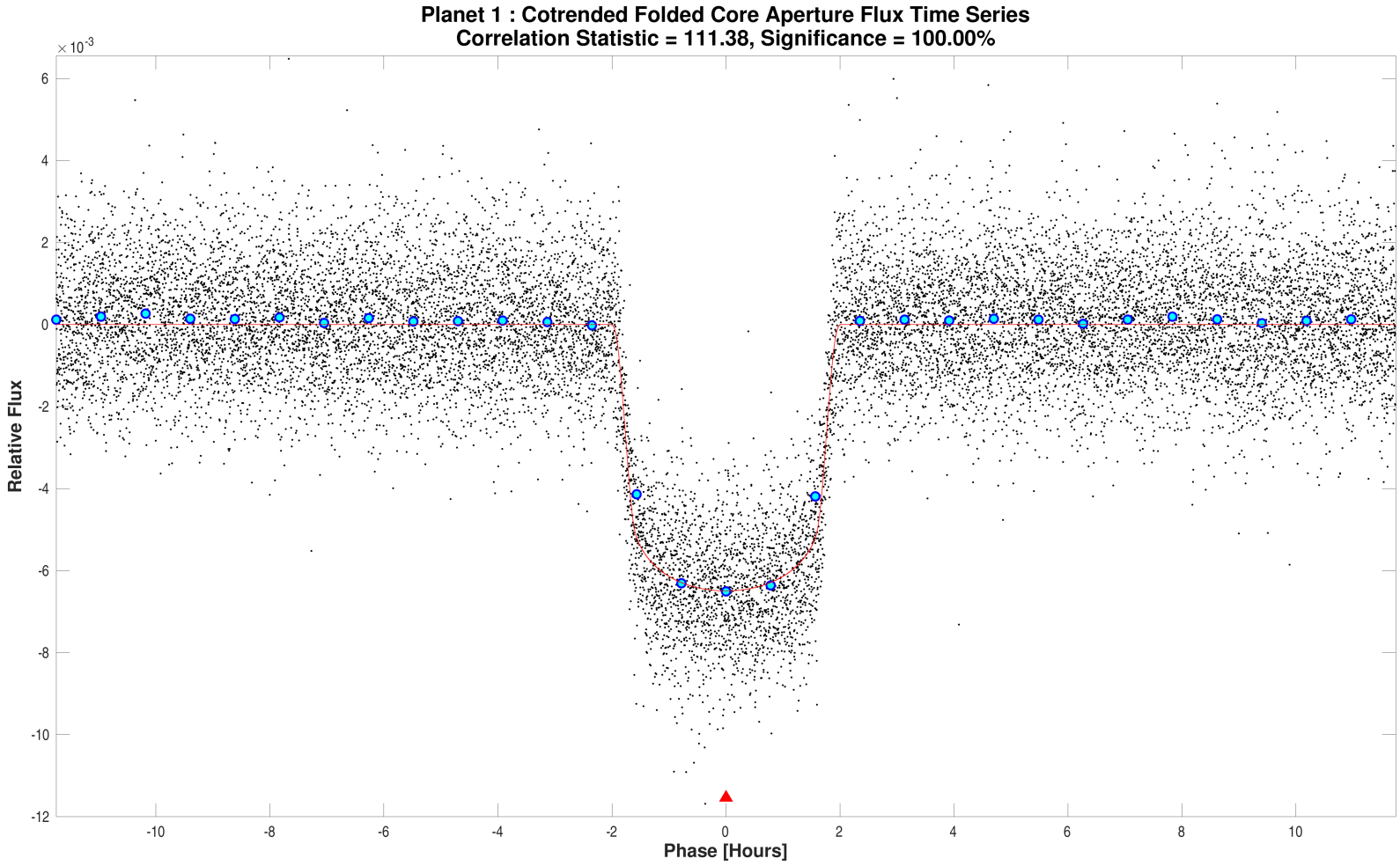
7.4.5 Validation Test Figures



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 3.5. The maximum secondary MES and corresponding phase are 1.8968 and 1.098 days respectively. The minimum secondary MES and corresponding phase are -2.8739 and -0.44861 days respectively.
Open `./planet-01/report-summary/0000000424865156-01-weak-secondary-diagnostic.fig`

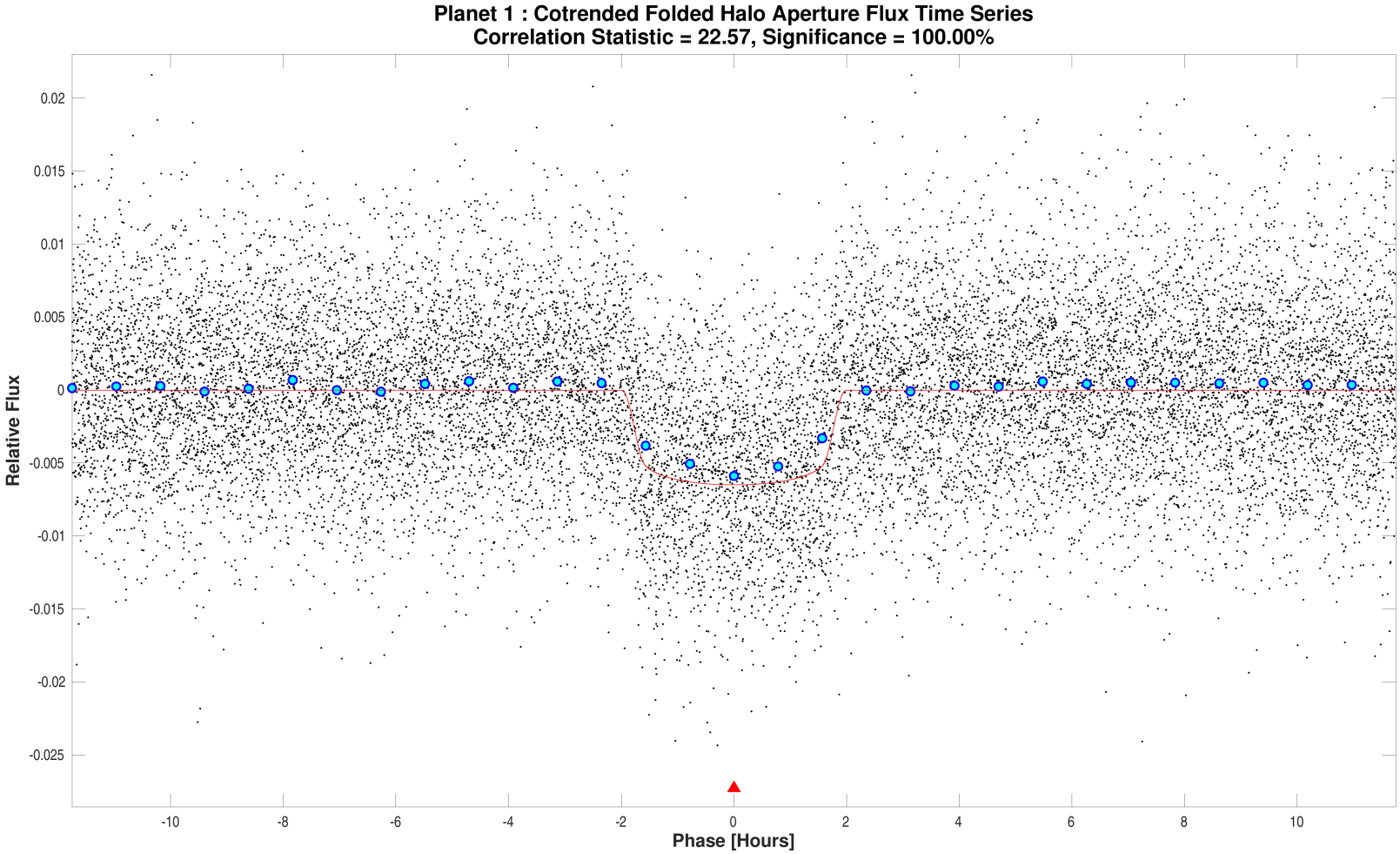


Bootstrap results for target 424865156, planet 1. Cumulative sum of the probabilities (derived from the histogram of counts) from upper tail to the search transit threshold; false alarm probability is indicated by the star. The Gaussian equivalent threshold for this false alarm probability is Inf. The threshold on this distribution that achieves the same false alarm rate as a 7.1 sigma threshold on a Gaussian distribution is 7.8095.
Open `./planet-01/bootstrap-results/0000000424865156-01-bootstrap-false-alarm.fig`



Optical ghost diagnostic core aperture flux time series for target 424865156, 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/0000000424865156-01-core-unwhitened-cotrended-zoomed-model.fig`

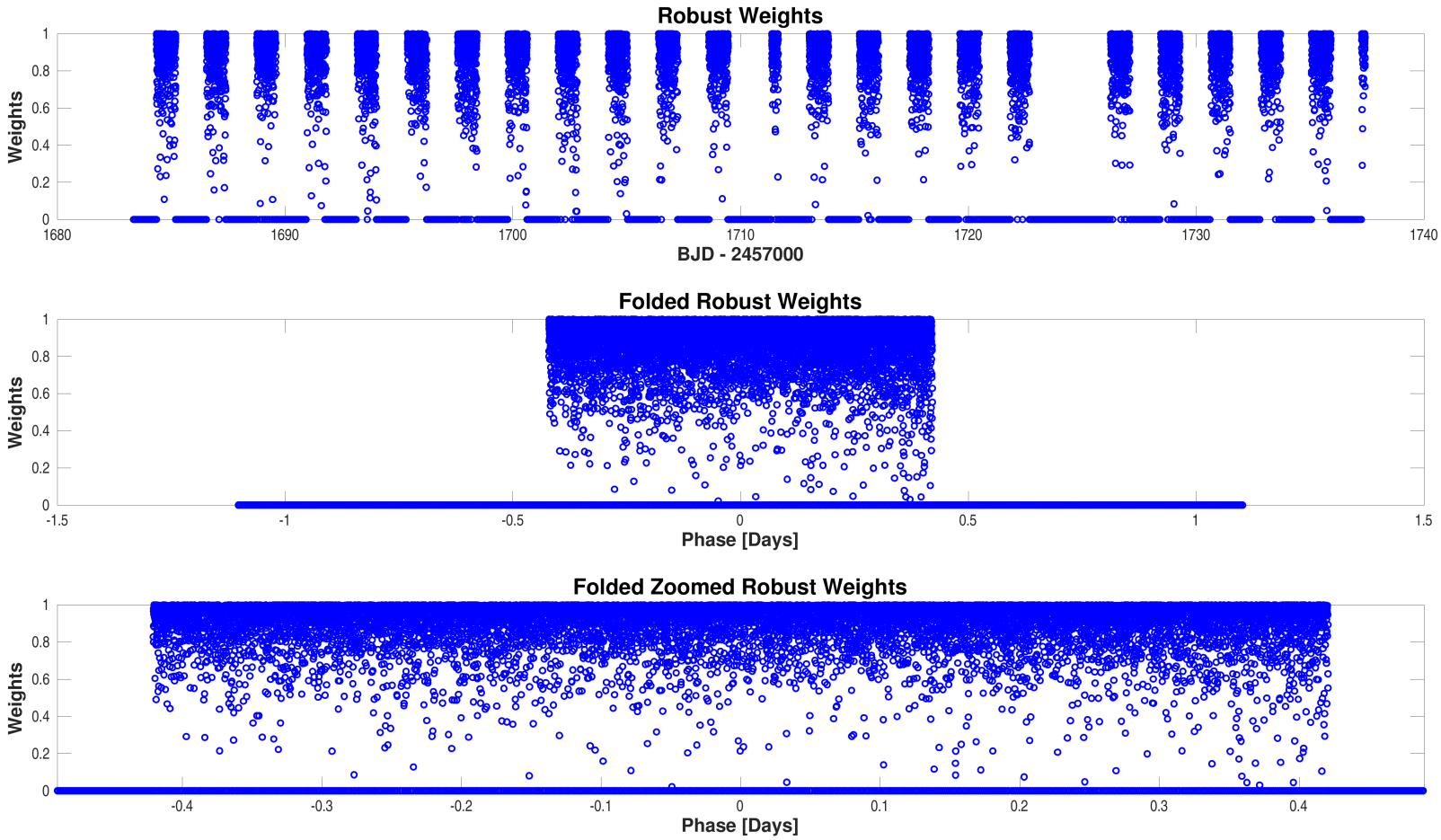


Optical ghost diagnostic halo aperture flux time series for target 424865156, planet candidate 1. The unwhitened time series is phase folded at the orbital period associated with the planet candidate and centered on the epoch of the first transit. The time series was first cotrended against spacecraft 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.

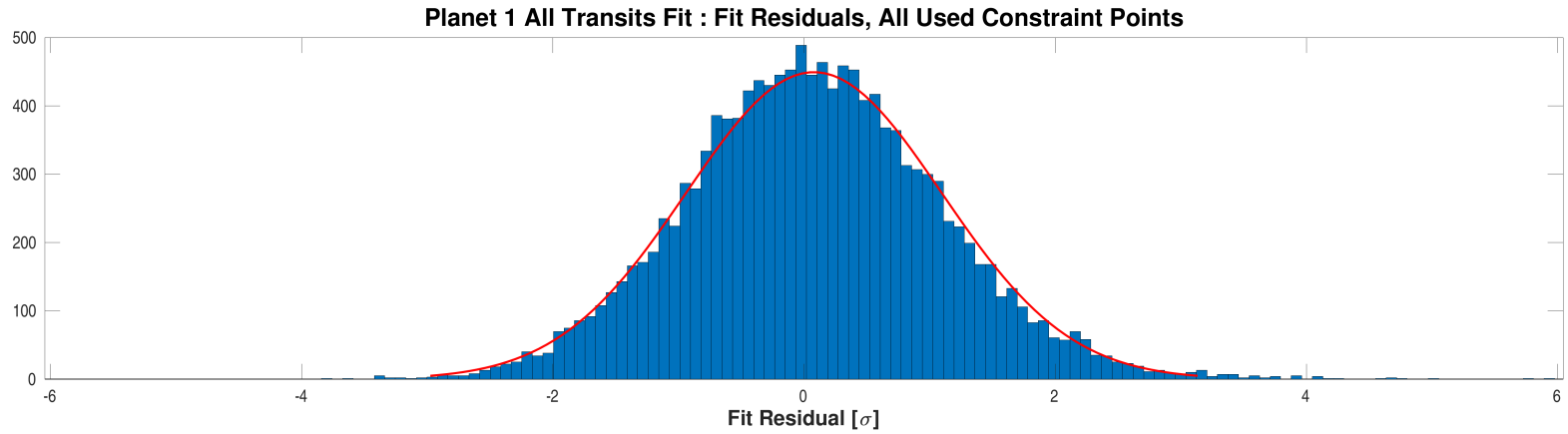
Open `./planet-01/ghost-diagnostic-results/0000000424865156-01-halo-unwhitened-cotrended-zoomed-model.fig`

Appendix A Planet Candidate 1

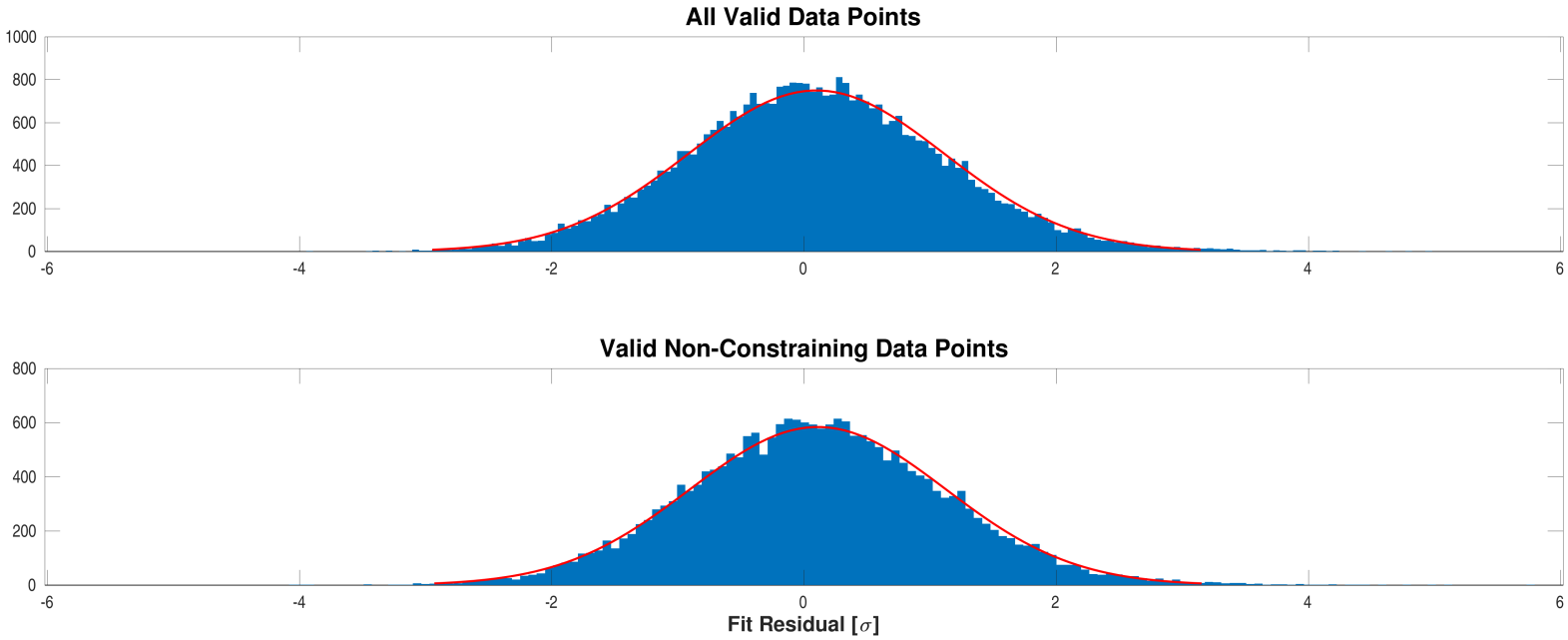
A.1 Model Fitter: All Transits



Robust weights distribution for CatId 424865156, 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/0000000424865156-01-all-robust-weights.fig`



Fit residuals distribution for CatId 424865156, 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/0000000424865156-01-all-histo-used.fig`

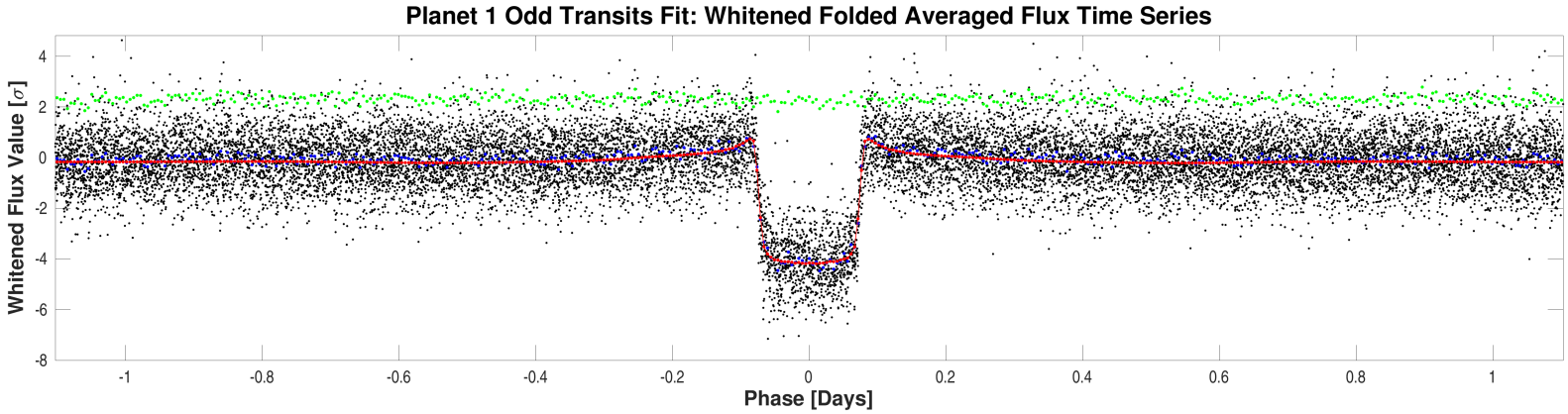


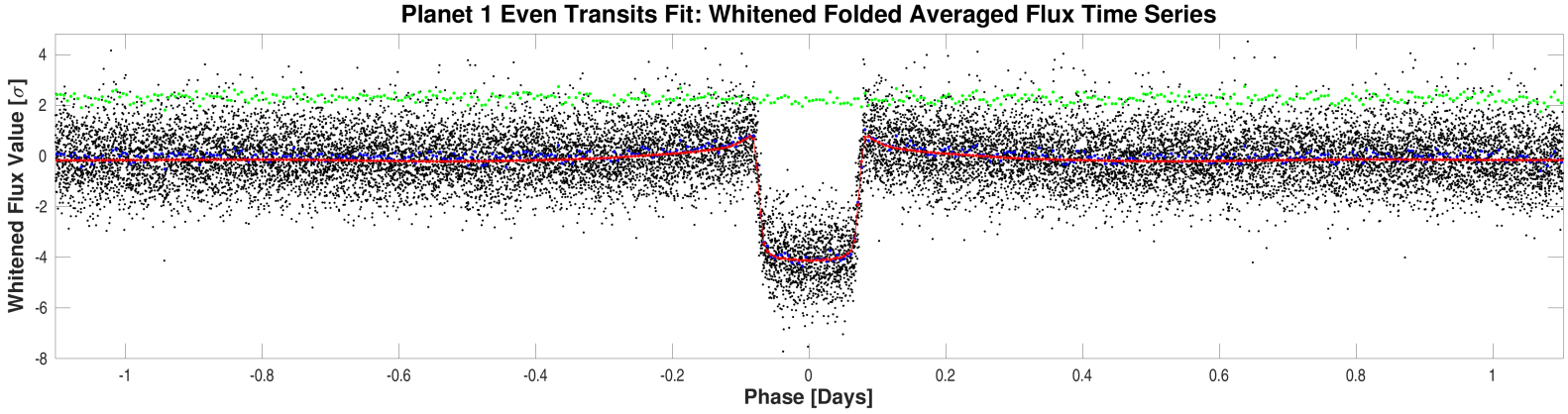
Fit residuals distribution for CatId 424865156, Planet candidate 1. Top plot: all valid data. Bottom plot: valid data not used to constrain fit (due to distance from a transit). Gaussian fits to the histograms are shown in red.
Open `./planet-01/planet-search-and-model-fitting-results/all-transits-fit/0000000424865156-01-all-histo-all-and-unused.fig`

A.2 Model Fitter: Odd & Even Transits

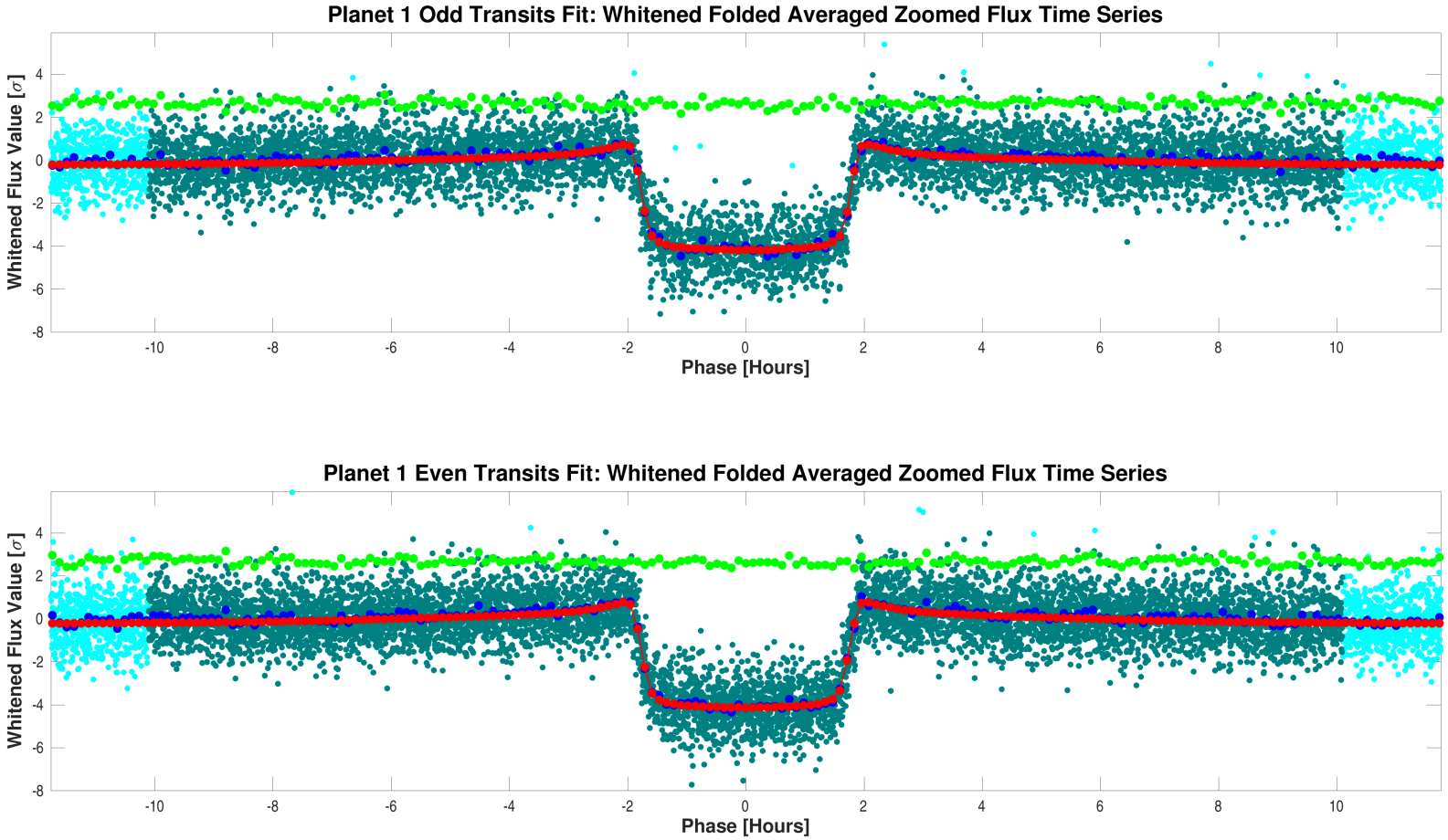
Parameter	Odd Transits Value	Odd Transits Uncertainty	Even Transits Value	Even Transits Uncertainty	Units	Difference / Uncertainty
SNR	122.9		134.7			
Orbital Period	2.2047677	3.2265e-05	2.2047500	3.1191e-05	days	3.9386e-01
Transit Epoch	1684.7722092	3.9057e-04	1686.9767256	3.9055e-04	BTJD	4.3094e-01
Impact Parameter	0.3952	9.7334e-02	0.4566	6.7203e-02		5.1946e-01
Planet Radius to Star Radius Ratio	0.0762646	6.3899e-04	0.0768715	5.6087e-04		7.1384e-01
Semi-major Axis to Star Radius Ratio	4.3598	1.8799e-01	4.2576	1.5559e-01		4.1885e-01
Planet Radius	16.5980	6.9067e-01	16.7301	6.9275e-01	Earth radii	1.3503e-01
Semi-major Axis	0.0366	2.5027e-03	0.0366	2.5026e-03	AU	5.5317e-05
Effective Stellar Flux	4831.0307	6.9885e+02	4831.0823	6.9886e+02	Goldilocks	5.2248e-05
Equilibrium Temperature	2126	7.6898e+01	2126	7.6898e+01	Kelvin	5.2248e-05
Stellar Density	0.2290	2.9627e-02	0.2133	2.3385e-02	Solar density	4.1677e-01
Transit Depth	6472	5.4028e+01	6513	4.9769e+01	ppm	5.5862e-01
Transit Duration	3.9187	3.2809e-02	3.9157	2.9638e-02	hours	6.8324e-02
Transit Ingress Duration	0.3298	3.2586e-02	0.3520	2.9617e-02	hours	5.0573e-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)	10091.7 (12325.0)		10091.7 (12325.0)			

DoF: Degrees of Freedom

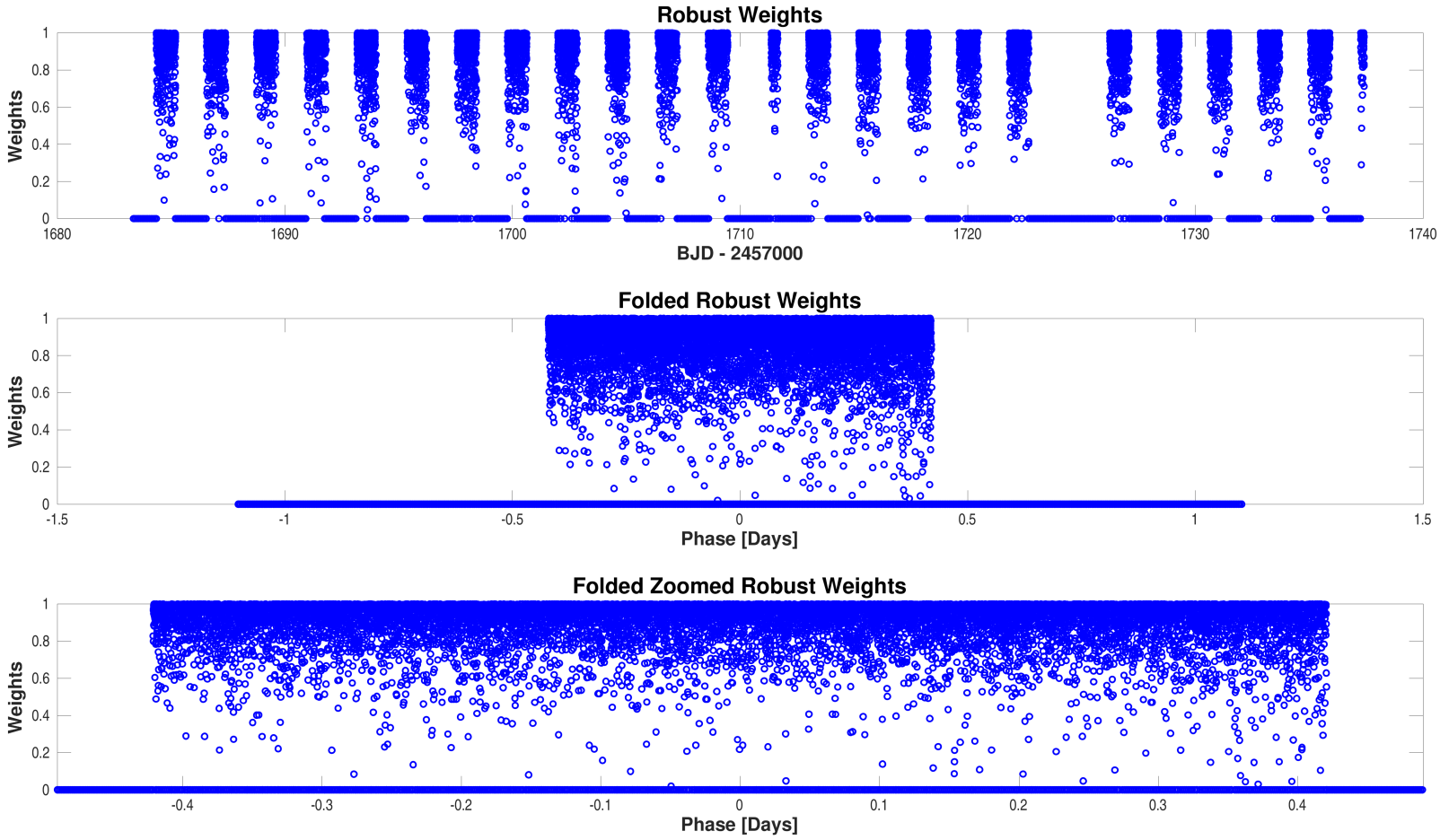




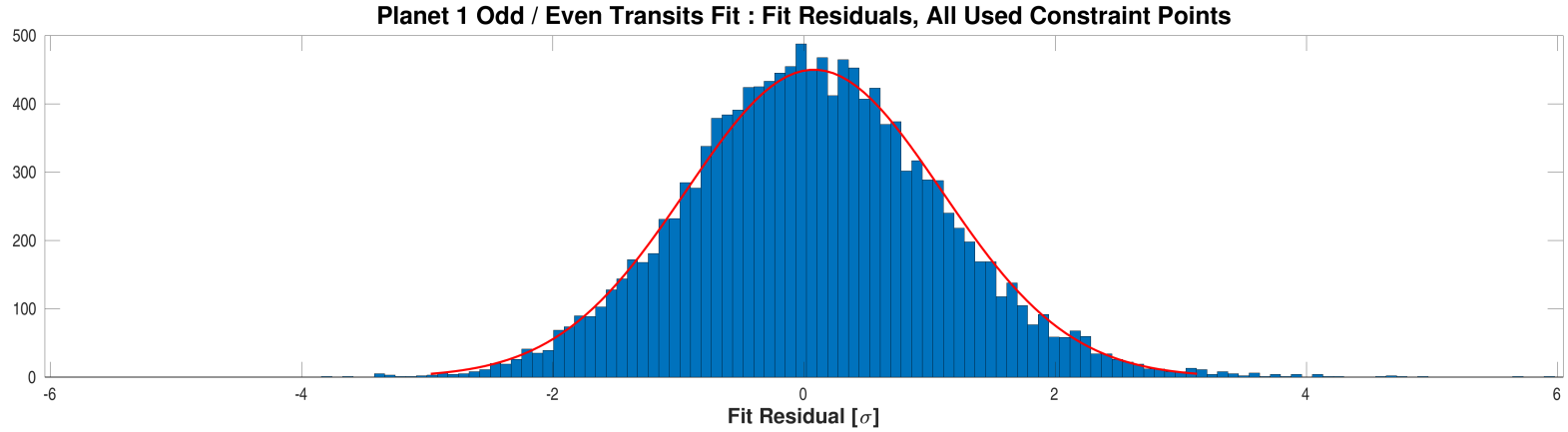
Folded flux time series for CatId 424865156, Planet candidate 1 in the whitened domain is plotted in black dots. Values are averaged into 1 cadence wide bins. The blue dots represent the averaged values of the folded flux time series; the red dots represent the averaged values of the folded model light 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/0000000424865156-01-odd-even-whitened.fig`



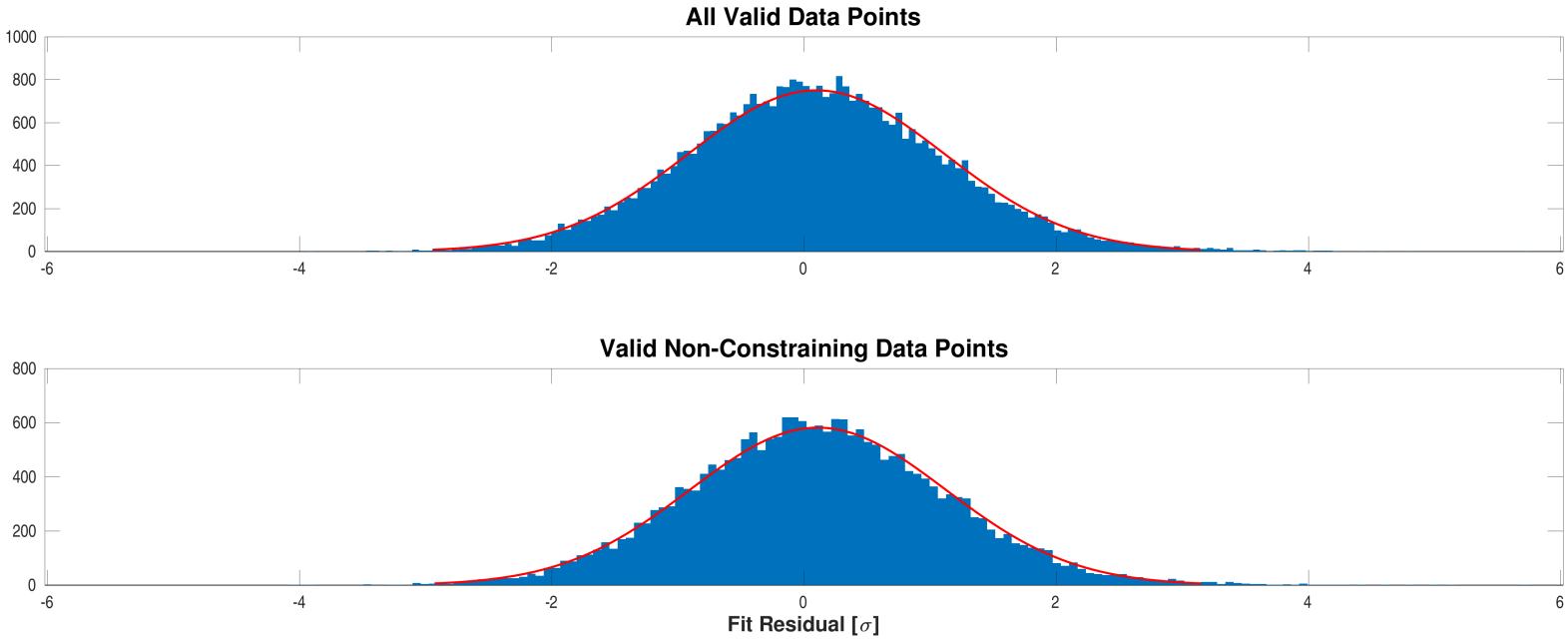
Folded flux time series for CatId 424865156, Planet candidate 1 in the whitened domain, zoomed on the transit. The flux data whose robust weights are larger/smaller than 0.1 are plotted in dark green/cyan dots, respectively. Values are averaged into 1 cadence wide bins. The blue dots represent the averaged 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/0000000424865156-01-odd-even-whitened-zoomed.fig`



Robust weights distribution for CatId 424865156, 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/0000000424865156-01-odd-even-robust-weights.fig`

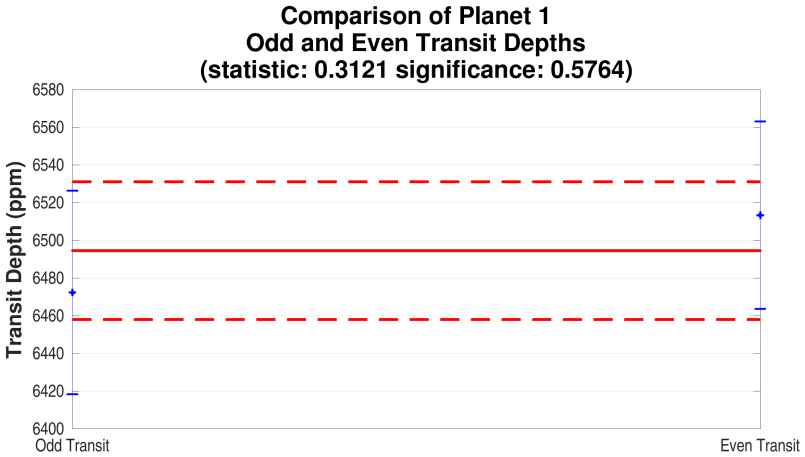


Fit residuals distribution for CatId 424865156, Planet candidate 1. Only the valid data points used to constrain the fit are shown here. A Gaussian fit to the histogram is shown in red.
Open `./planet-01/planet-search-and-model-fitting-results/odd-even-transits-fit/0000000424865156-01-odd-even-histo-used.fig`



Fit residuals distribution for CatId 424865156, 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/0000000424865156-01-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 424865156, planet 1. A significance level close to 1/0 favors a transiting planet/an eclipsing binary. Open `./planet-01/binary-discrimination-test-results/0000000424865156-01-eclipsing-binary-discrimination-tests.fig`

Appendix B Alerts

This target did not trigger any alerts.