

KIC 003644601

Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	R_{\star} (R_{\odot})	T_{\star} (K)	R_p (R_{\oplus})	S_p (S_{\oplus})
003644601-01	OBS	3862.01	359.040205	295.788452	2684.7	29.318	30.2	33.6	0.83	5715	7.68	0.74
003644601-02	OBS	No	359.035018	274.245063	1883.6	14.075	25.7	25.2	0.83	5715	4.46	0.74
003644601-03	OBS	3862.02	119.681034	176.089715	754.3	27.303	19.1	20.2	0.83	5715	4.12	3.22
003644601-04	OBS	No	119.680595	154.565873	507.3	14.096	10.2	12.3	0.83	5715	2.37	3.22

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003644601-01	OBS	FP	0.00	1	0	1	1	INDIV_TRANS_MARSHALL_SKYE—CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH
003644601-02	OBS	FP	0.00	1	0	1	1	INDIV_TRANS_MARSHALL_SKYE—SAME_NTL_PERIOD—CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH
003644601-03	OBS	FP	0.00	1	0	1	1	INDIV_TRANS_SKYE—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
003644601-04	OBS	FP	0.00	1	0	1	1	SAME_NTL_PERIOD—CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH

Notes: OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 003644601-01

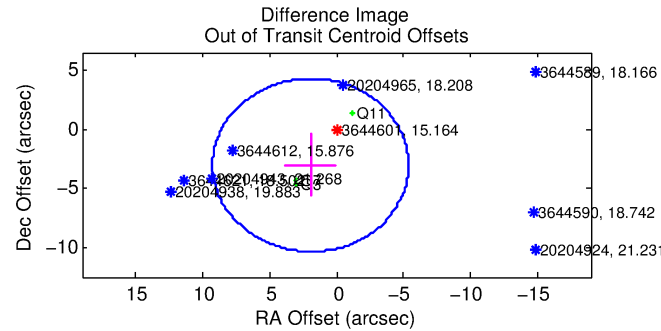
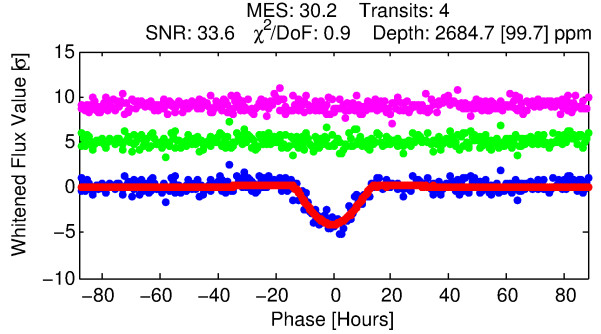
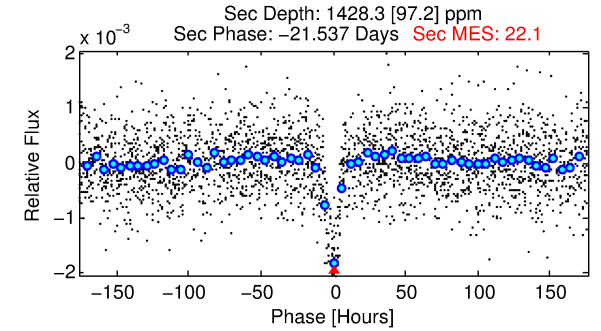
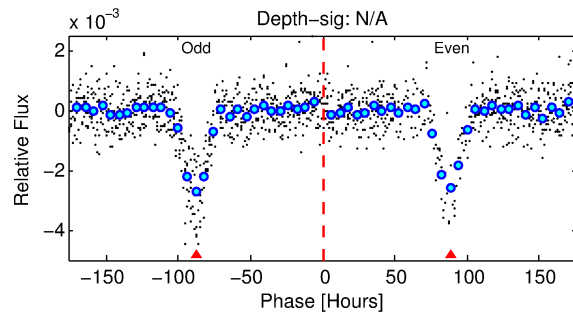
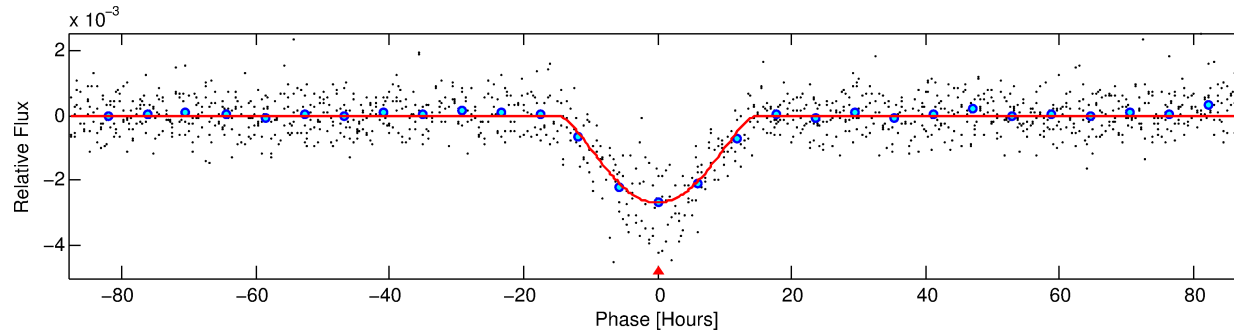
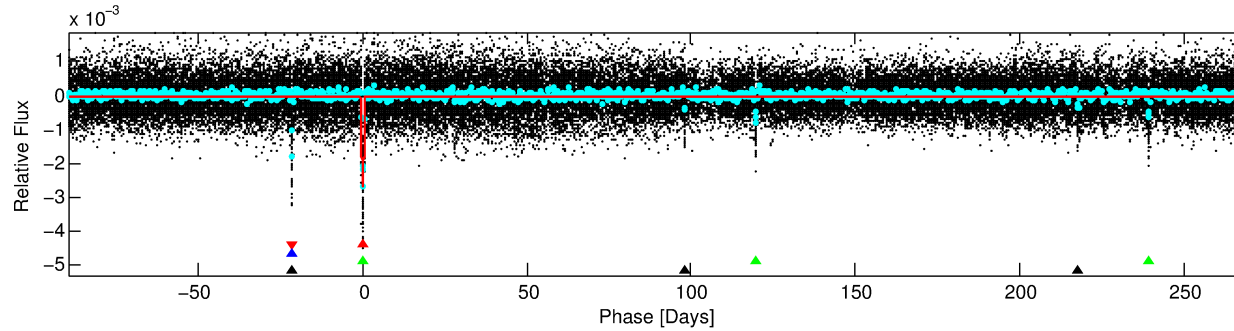
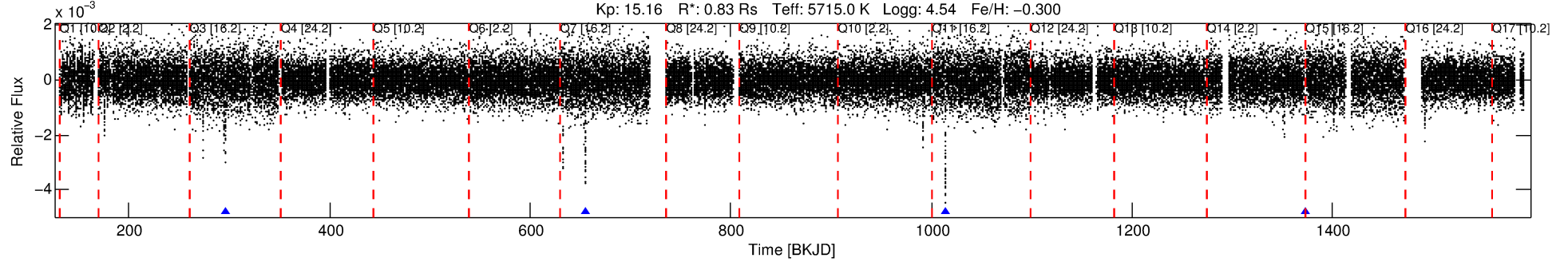
TCE (1)	KIC	Parent (2)	Parent KIC	P ₁ :P ₂	Dist (μ)	Δ Row	Δ Col	m ₂	m ₁	D ₂ /D ₁	Mechanism	Flag	σ_P	σ_T
003644601-01	3644601	3511.01	3644542	3:1	71.5	17	-4	8.35	15.16	111.36	Direct-PRF	0	0.15	0.03

Notes: P₁:P₂ is the period ratio. Dist is the distance in arcseconds. Δ Row and Δ Col are the number of pixels apart in row and column. m₂ and m₁ are the magnitudes of the parent and child. D₂/D₁ is the parent's transit depth divided by the child's. σ_P and σ_T are the significance of the match in period and epoch. For a match to be considered significant $\sigma_P < 5.0$ and $\sigma_T < 5.0$. Matches which have σ_P and σ_T very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

DV One-Page Summary

KIC: 3644601 Candidate: 1 of 4 Period: 359.040 d
KOI: K03862 Corr: No Ephemeris Match

Kp: 15.16 R*: 0.83 Rs Teff: 5715.0 K Logg: 4.54 Fe/H: -0.300



DV Fit Results:

Period = 359.04021 [0.01255] d
Epoch = 295.7885 [0.0152] BKJD
Rp/R* = 0.0844 [0.0805]
a/R* = 40.82 [8.77]
b = 0.99 [0.12]
Seff = 0.74 [0.26]
Teq = 237 [20] K
Rp = 7.68 [7.61] Re
a = 0.9453 [0.2120] AU
Ag = 11901.73 [23053.08] [0.52σ]
Teffp = 3824 [1829] K [1.96σ]

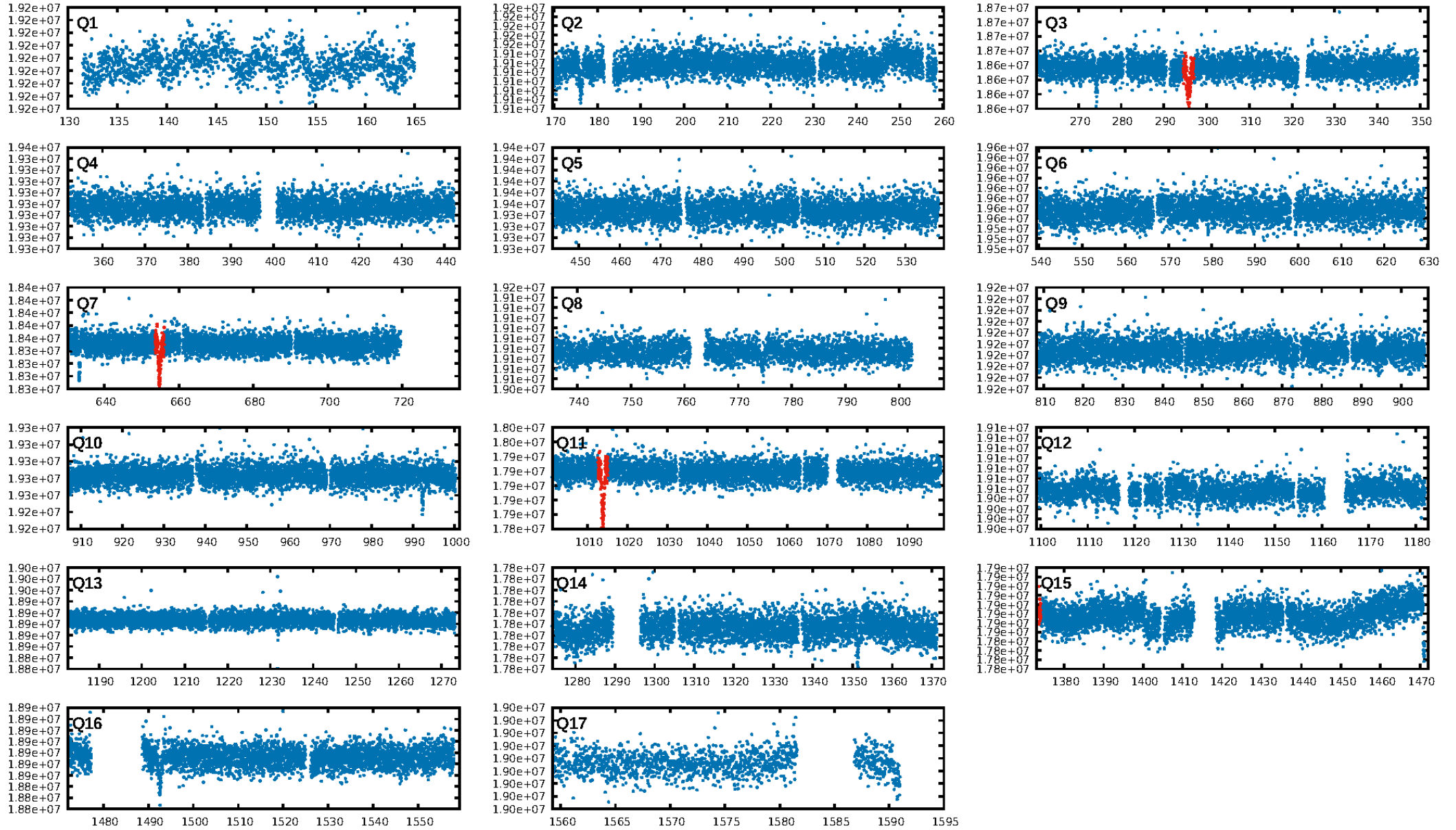
DV Diagnostic Results:

ShortPeriod-sig: 0.3% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 4.25e-220
RollingBand-fgt: 1.00 [4/4]
GhostDiagnostic-chr: -0.07341
Centroid-sig: 0.0%
Centroid-so: 0.551 arcsec [1.52σ]
OotOffset-rm: 3.607 arcsec [1.48σ]
OotOffset-st: 0/3/0/0 [3]
KicOffset-rm: 4.111 arcsec [1.67σ]
KicOffset-st: 0/3/0/0 [3]
DiffImageQuality-fgm: 0.00 [0/3]
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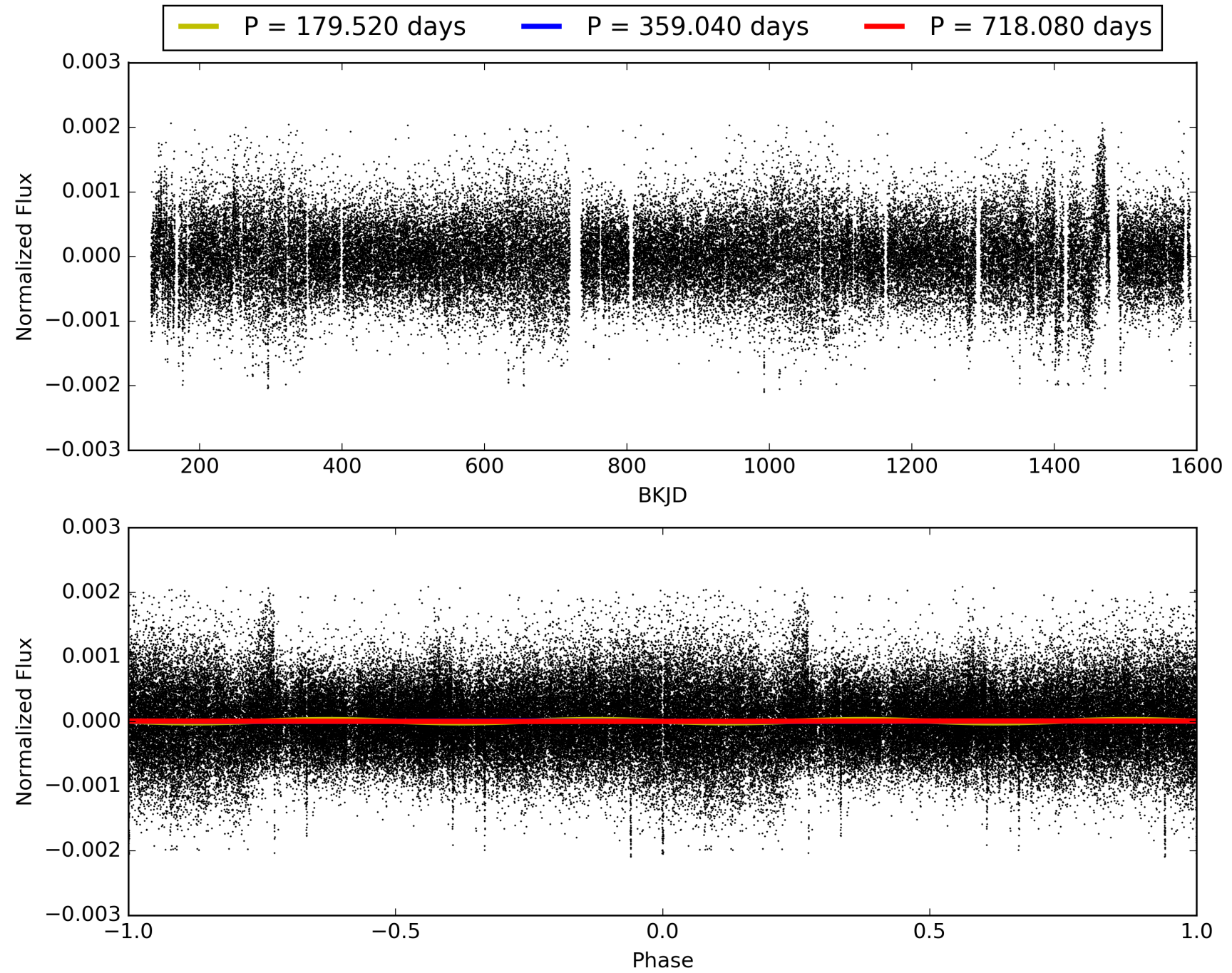
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

TCE 003644601-01, PDC Light Curves

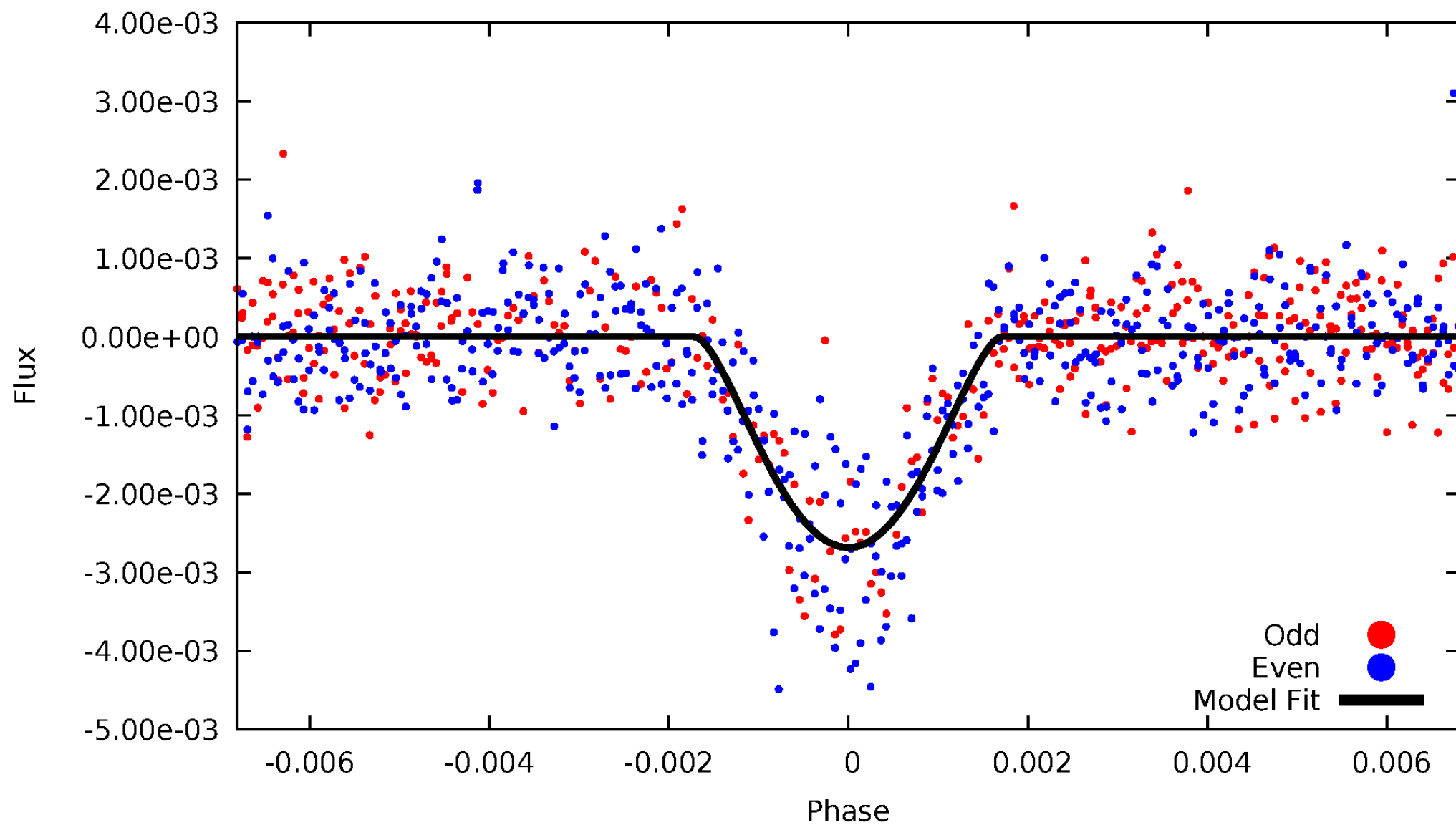


TCE 003644601-01



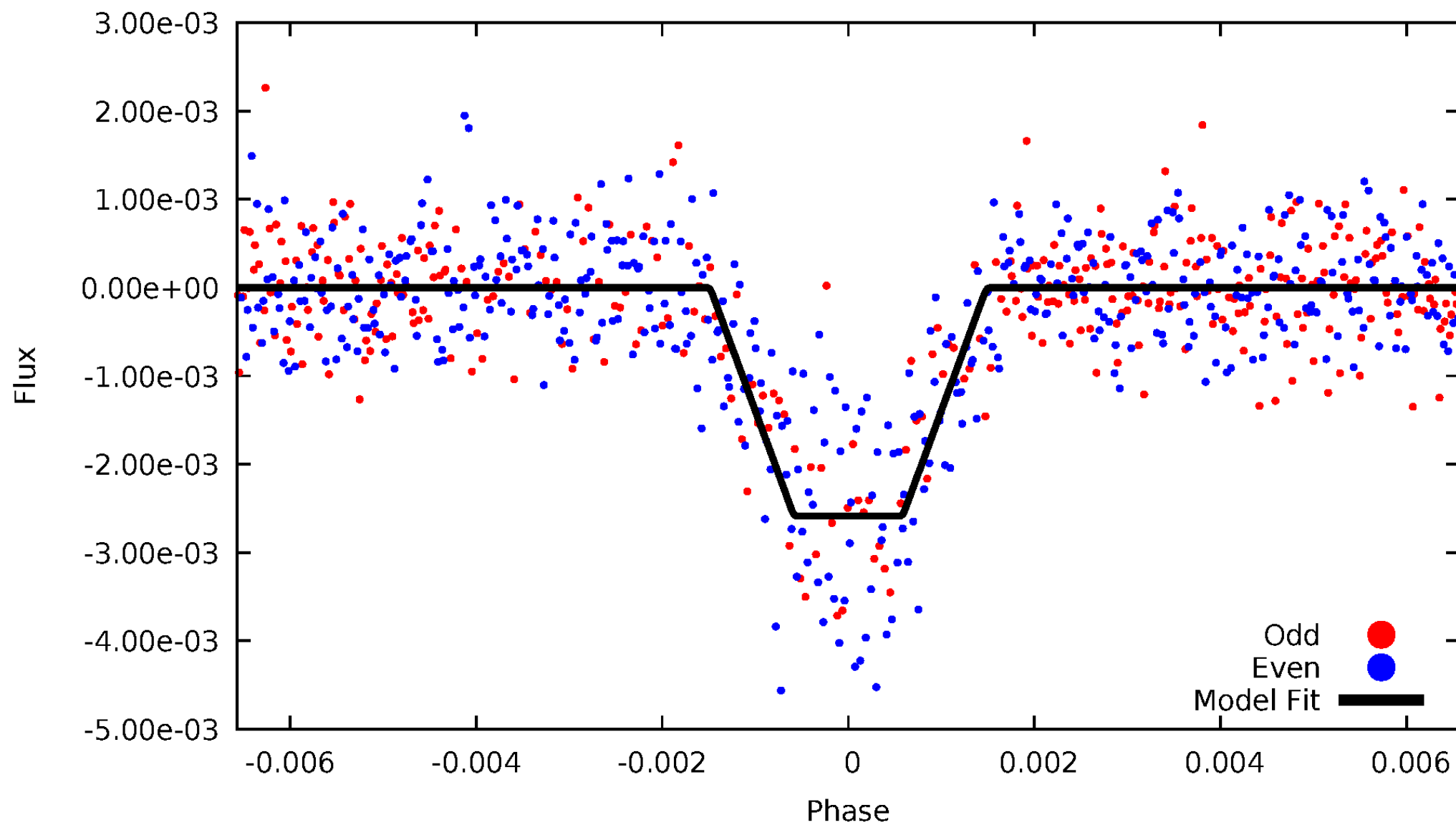
DV Odd/Even

TCE 003644601-01



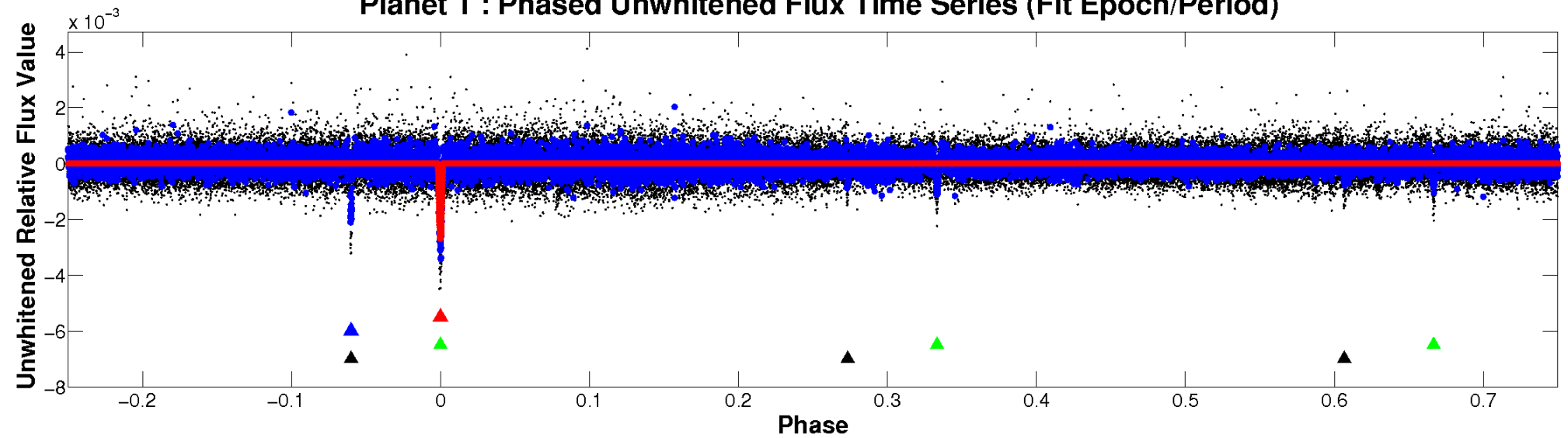
ALT Odd/Even

TCE 003644601-01

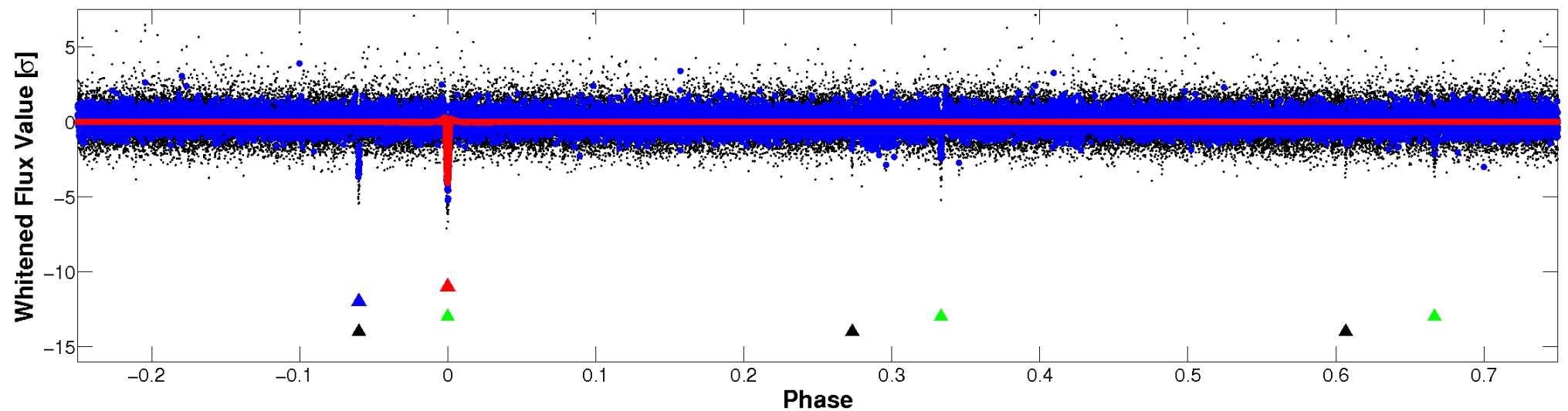


Non-Whitened Vs. Whitened Light Curve

Planet 1 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

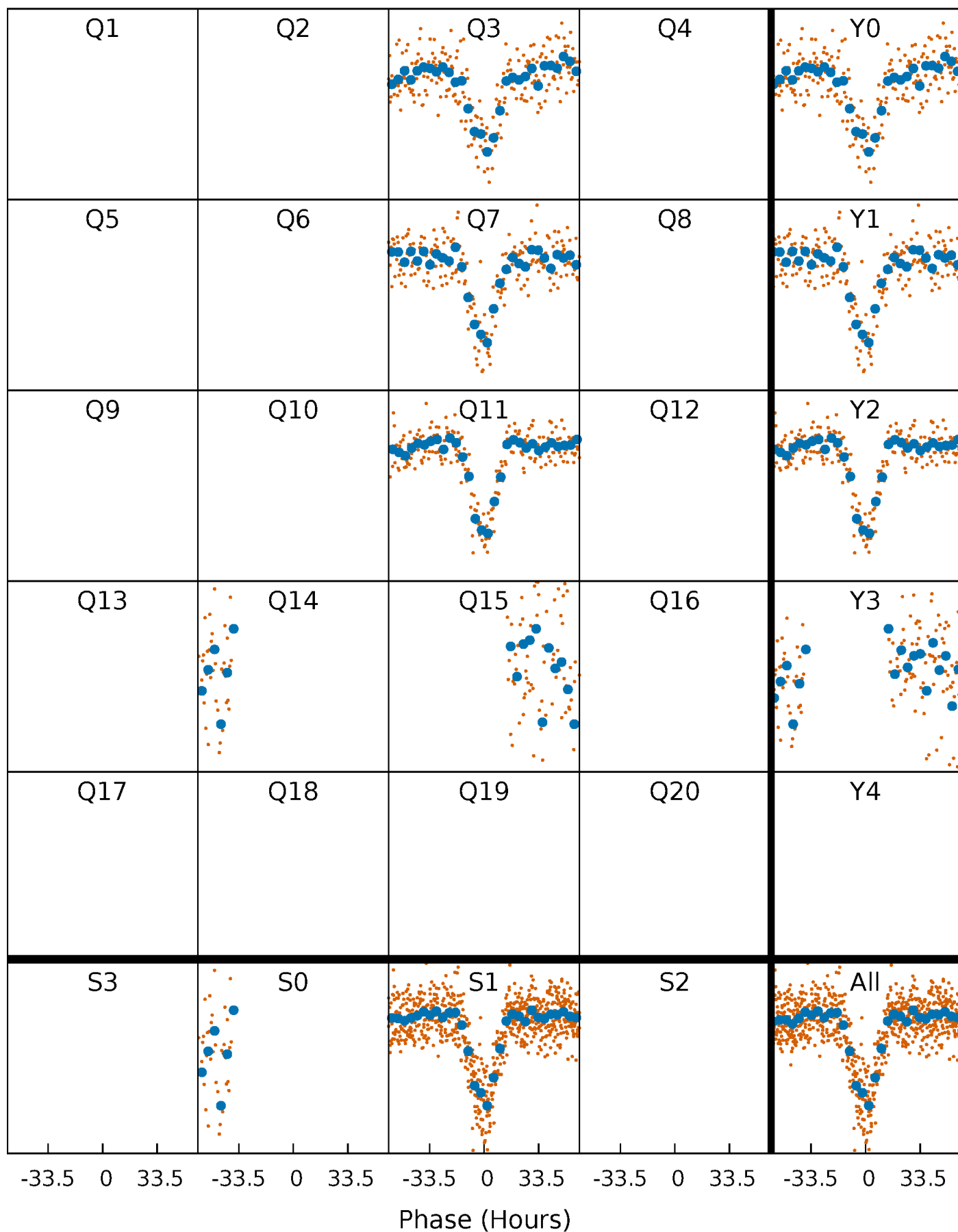


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



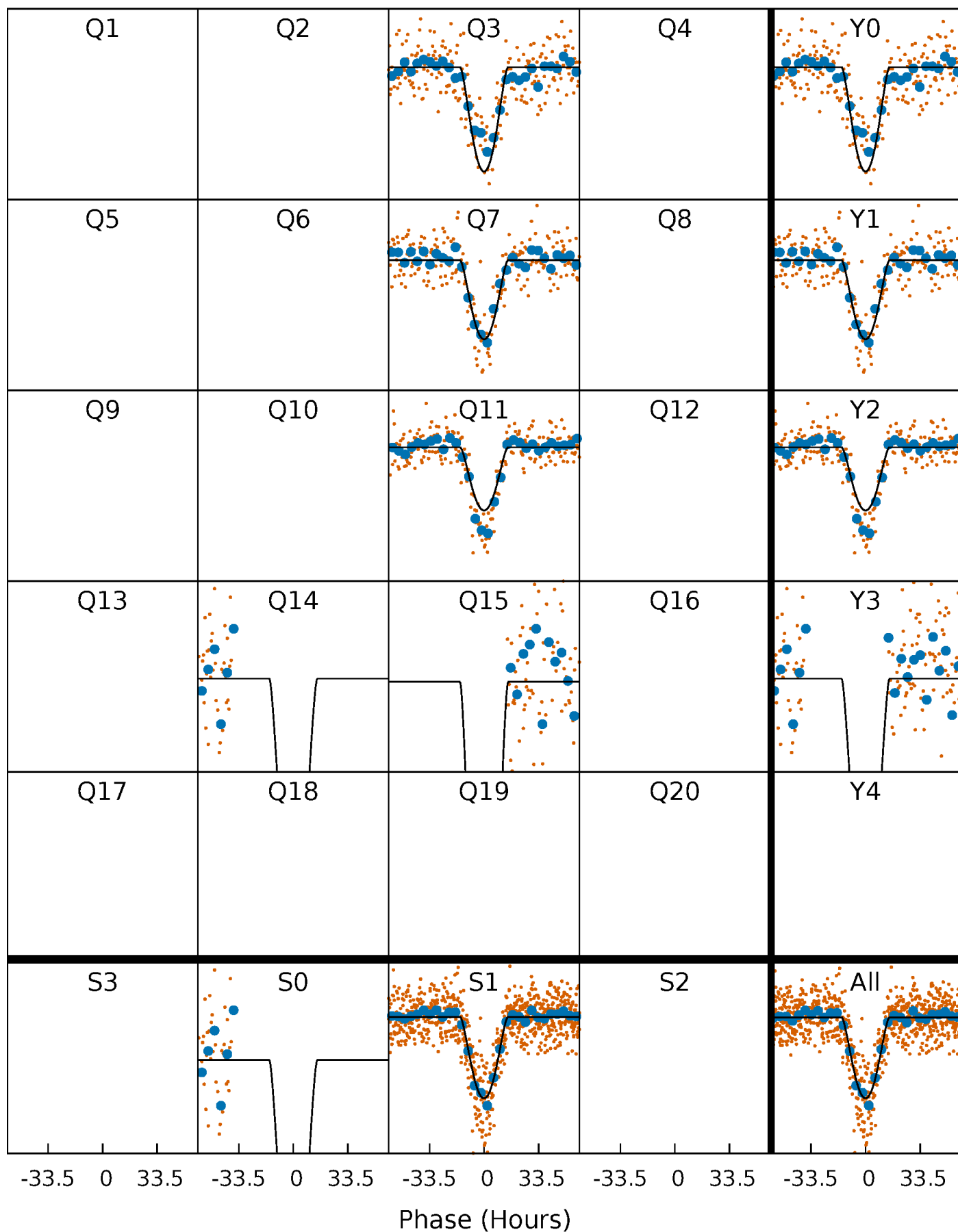
PDC Quarter-Phased Transit Curves

TCE 003644601-01 P=359.040205 Days $T_0=295.788452$ (BKJD)



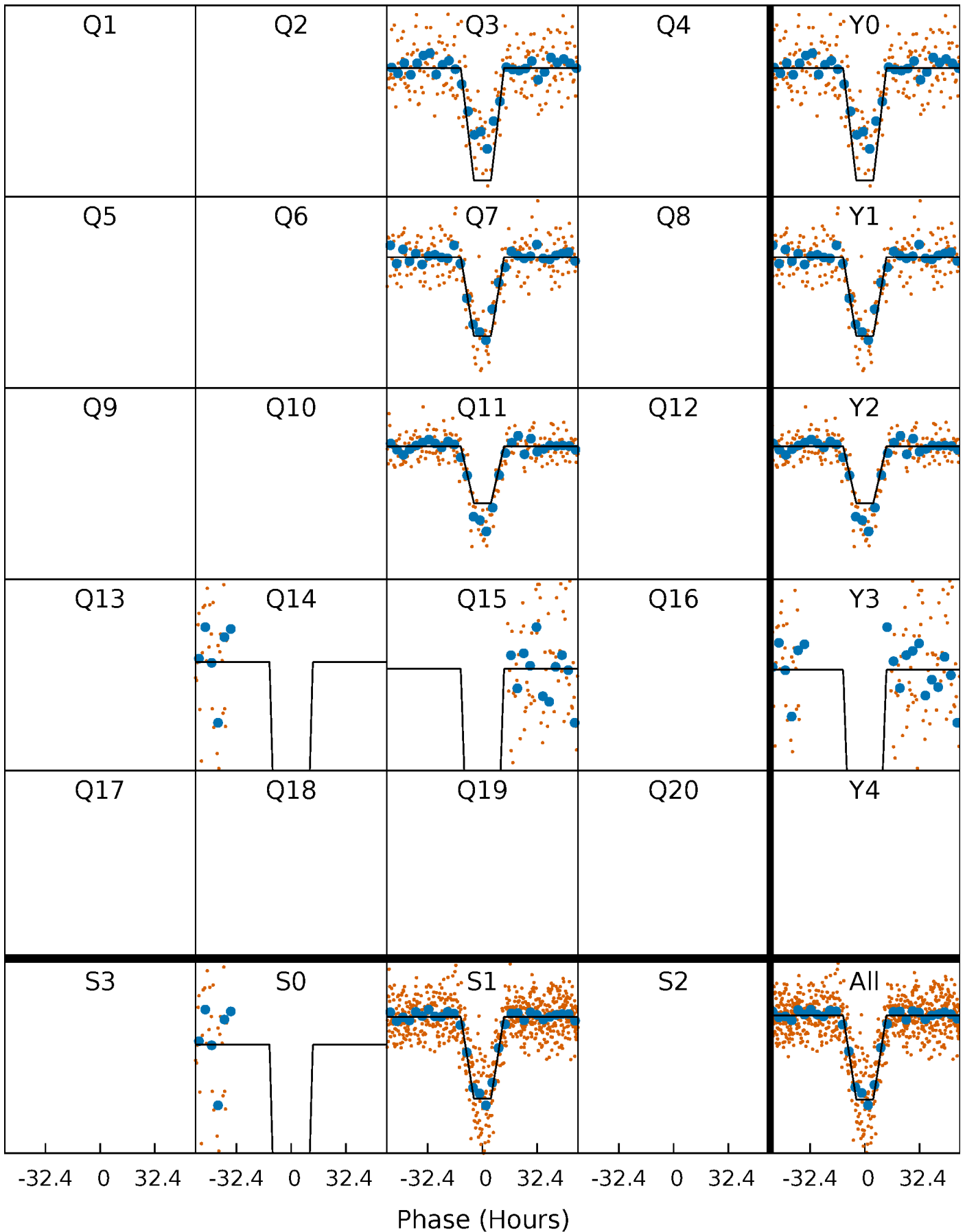
DV Quarter-Phased Transit Curves

TCE 003644601-01 P=359.040205 Days $T_0=295.788452$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

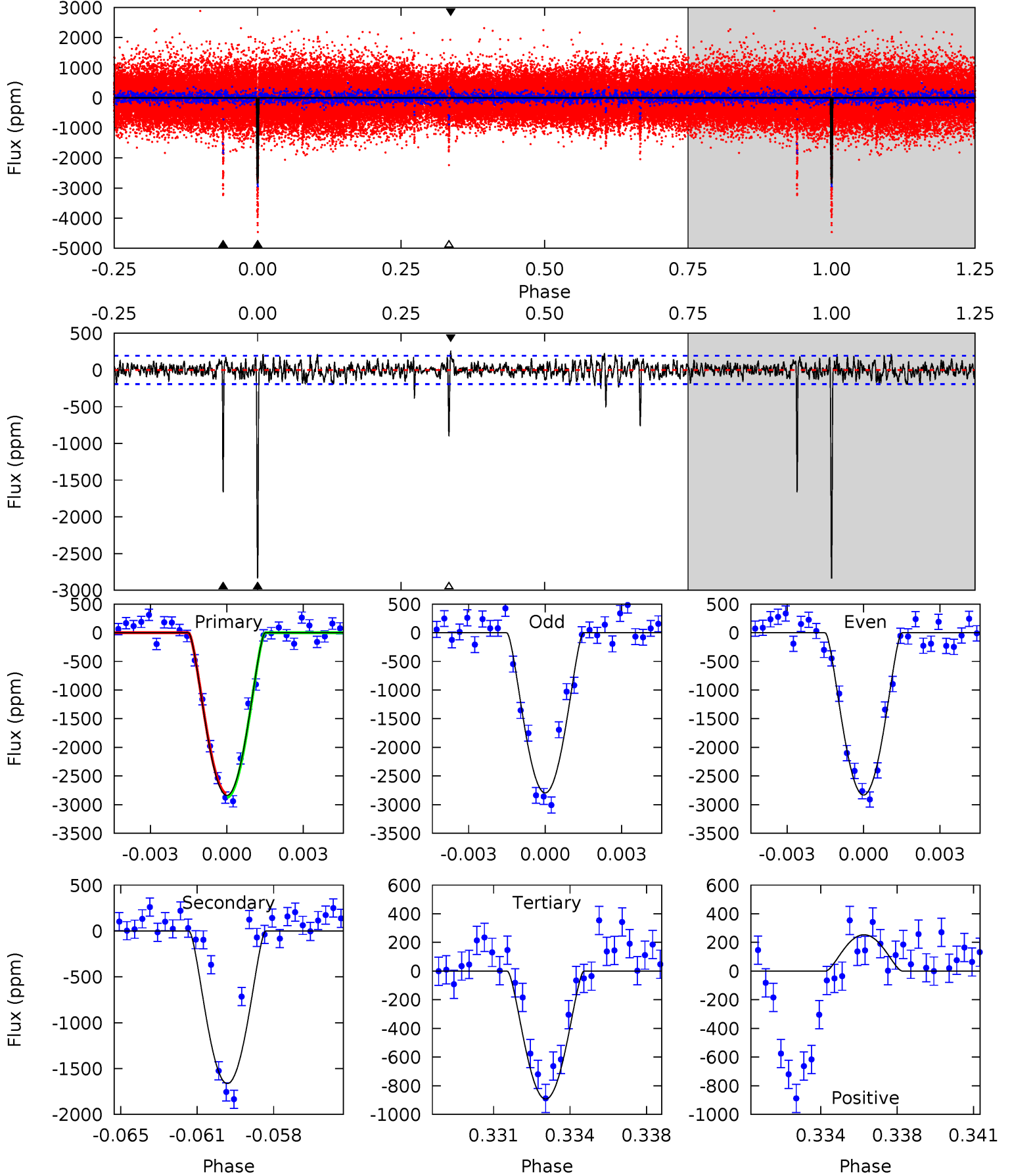
TCE 003644601-01 P=359.031272 Days $T_0=295.788299$ (BKJD)



DV Model-Shift Uniqueness Test

003644601-01, P = 359.040205 Days, E = 295.788452 Days

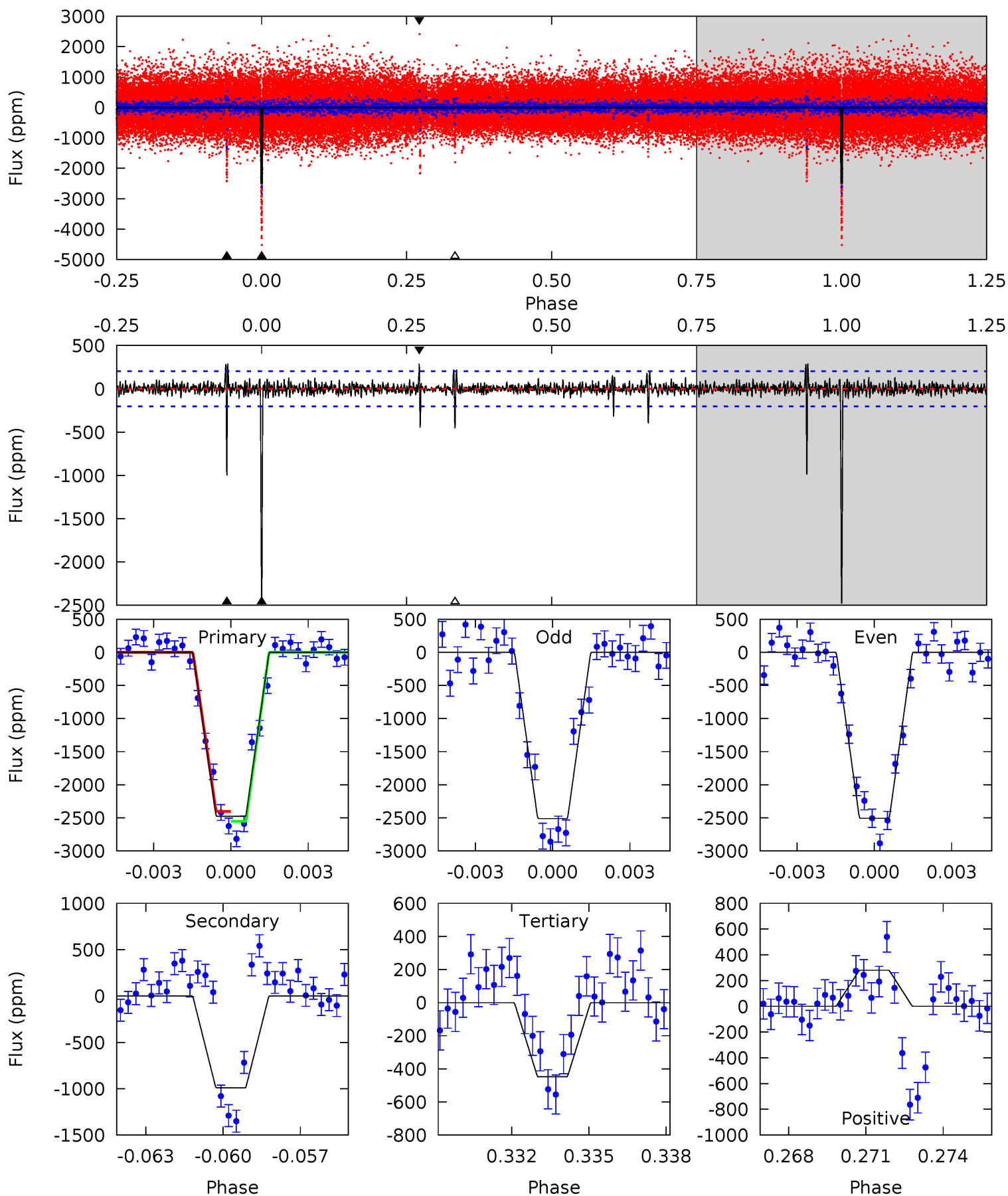
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
76.9	45.1	24.2	6.87	5.23	2.93	2.39	52.7	70.1	20.9	38.2	0.48	1.04	0.08	0.92



Alt Model-Shift Uniqueness Test

003644601-01, P = 359.031272 Days, E = 295.788299 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
64.0	25.6	11.6	7.22	5.25	2.97	1.28	52.4	56.8	14.0	18.4	0.06	1.03	0.10	1.92



Stellar Parameters For KIC 003644601

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5715^{+155}_{-172}	$4.537^{+0.055}_{-0.176}$	$-0.300^{+0.300}_{-0.300}$	$0.834^{+0.224}_{-0.075}$	$0.873^{+0.100}_{-0.090}$	$2.122^{+0.505}_{-1.004}$
	+3%/-3%	+1%/-4%	+100%/-100%	+27%/-9%	+11%/-10%	+24%/-47%
Source	PHO1	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

Secondary Eclipse Parameters for KIC 003644601-01 / KOI 3862.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-1664 ± 37	$9.82^{+6.36}_{-6.21}$	337^{+21}_{-16}	3929^{+1918}_{-586}	8453^{+55166}_{-5346}
Alt.	-992 ± 39	$6.80^{+6.82}_{-4.35}$	336^{+21}_{-15}	4035^{+2400}_{-768}	10393^{+71804}_{-7824}

T_{max} = Theoretical Maximum Planetary Temperature

T_{obs} = Observed Planetary Temperature (Assuming $A=0.3$)

A_{obs} = Observed Albedo (Assuming $T=0$)

If a secondary eclipse is present, the system is likely an EB if $T_{obs} \gg T_{max}$ AND $A_{obs} \gg 1.0$

DV Centroid Data

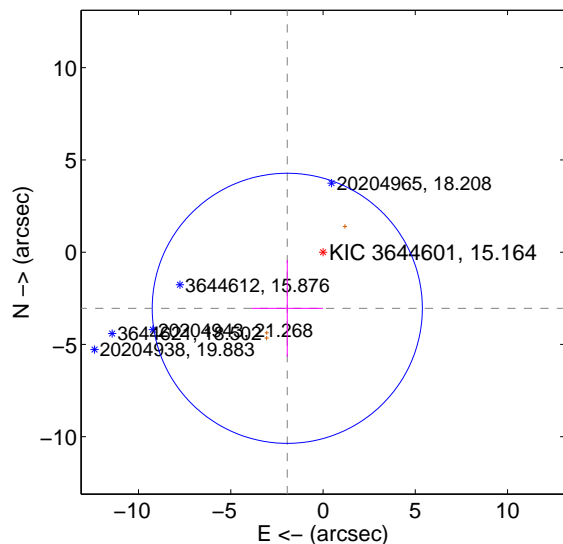
Supplemental centroid analysis for 003644601-01. Kepler magnitude: 15.16. Transit SNR 33.62

There are 0 quarters with good PRF difference image offsets

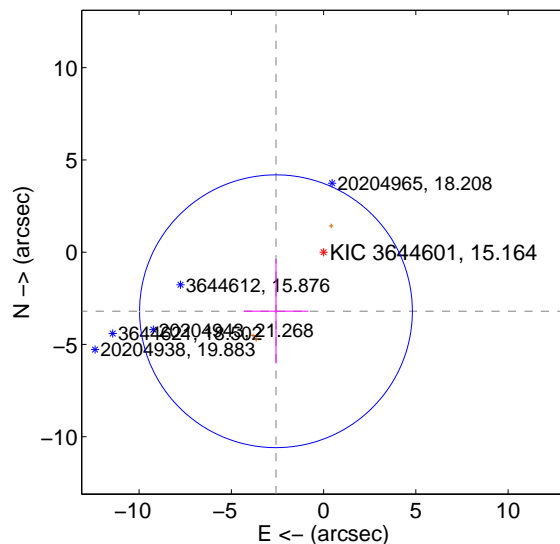
The direct PRF centroid is offset from the target star catalog position by about 0.77 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	3.607 ± 2.439	1.48	1.938 ± 1.927	-3.042 ± 2.618
PRF-fit source offset from KIC position	4.111 ± 2.463	1.67	2.580 ± 1.752	-3.201 ± 2.831
photometric centroid source offset	0.55 ± 0.36	1.52	0.23 ± 0.44	-0.50 ± 0.35

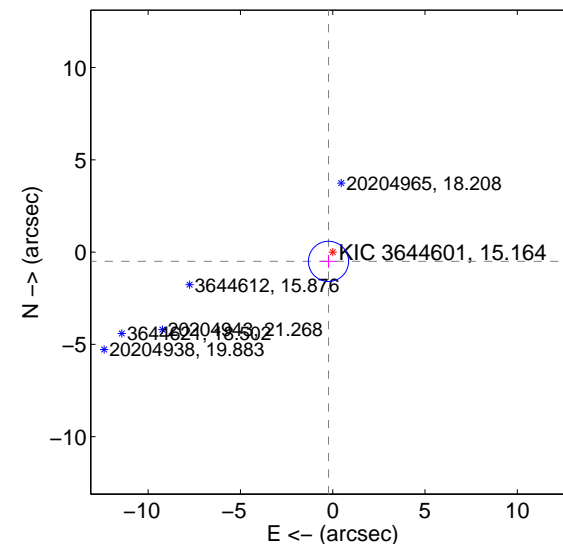
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

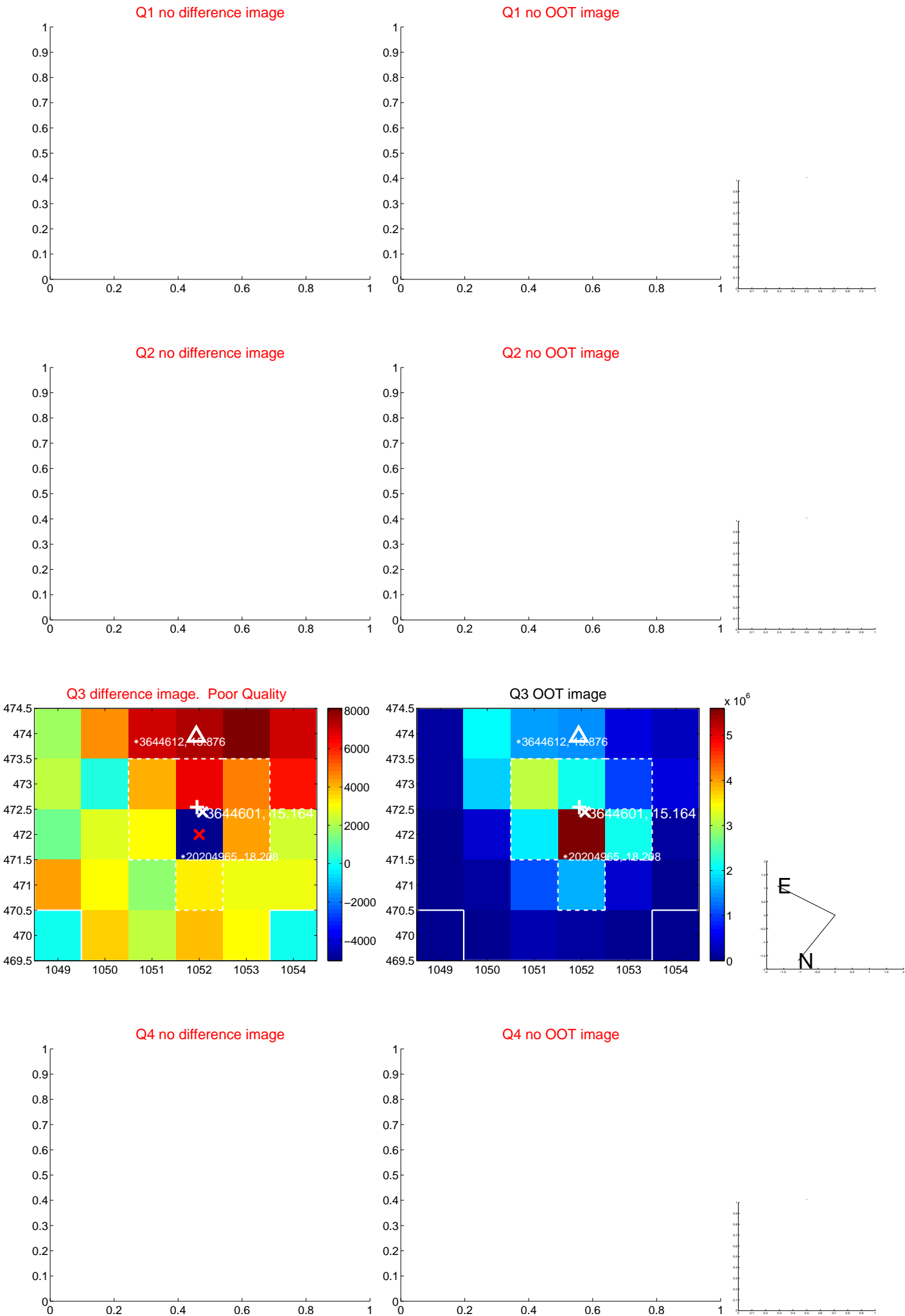


offset from photometric centroids



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ . Red *: target star. Blue *: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

Q5 no difference image



Q5 no OOT image



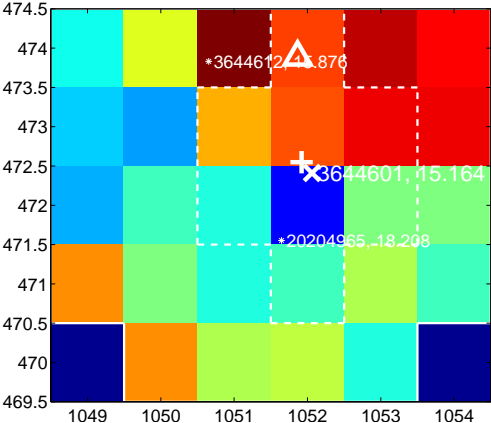
Q6 no difference image



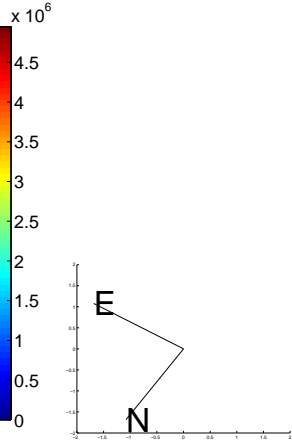
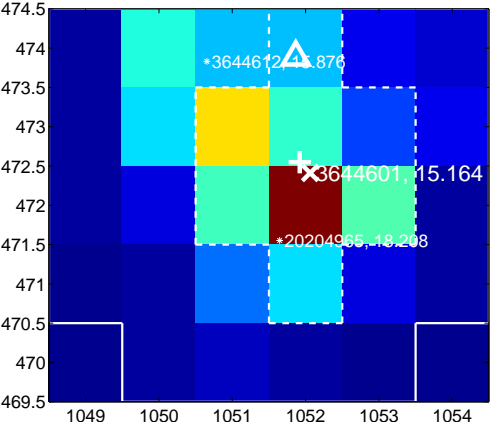
Q6 no OOT image



Q7 difference image. Poor Quality



Q7 OOT image



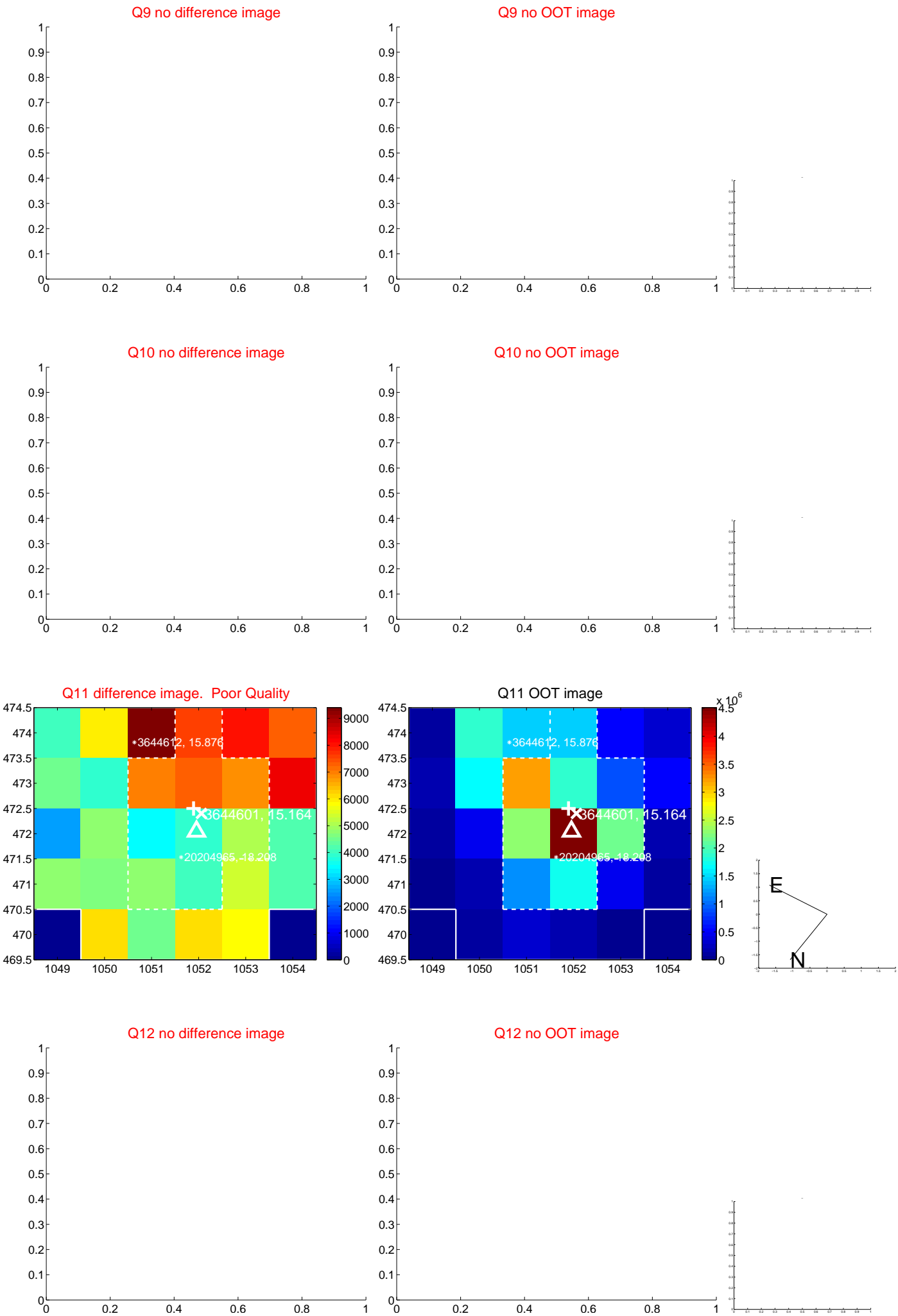
Q8 no difference image



Q8 no OOT image



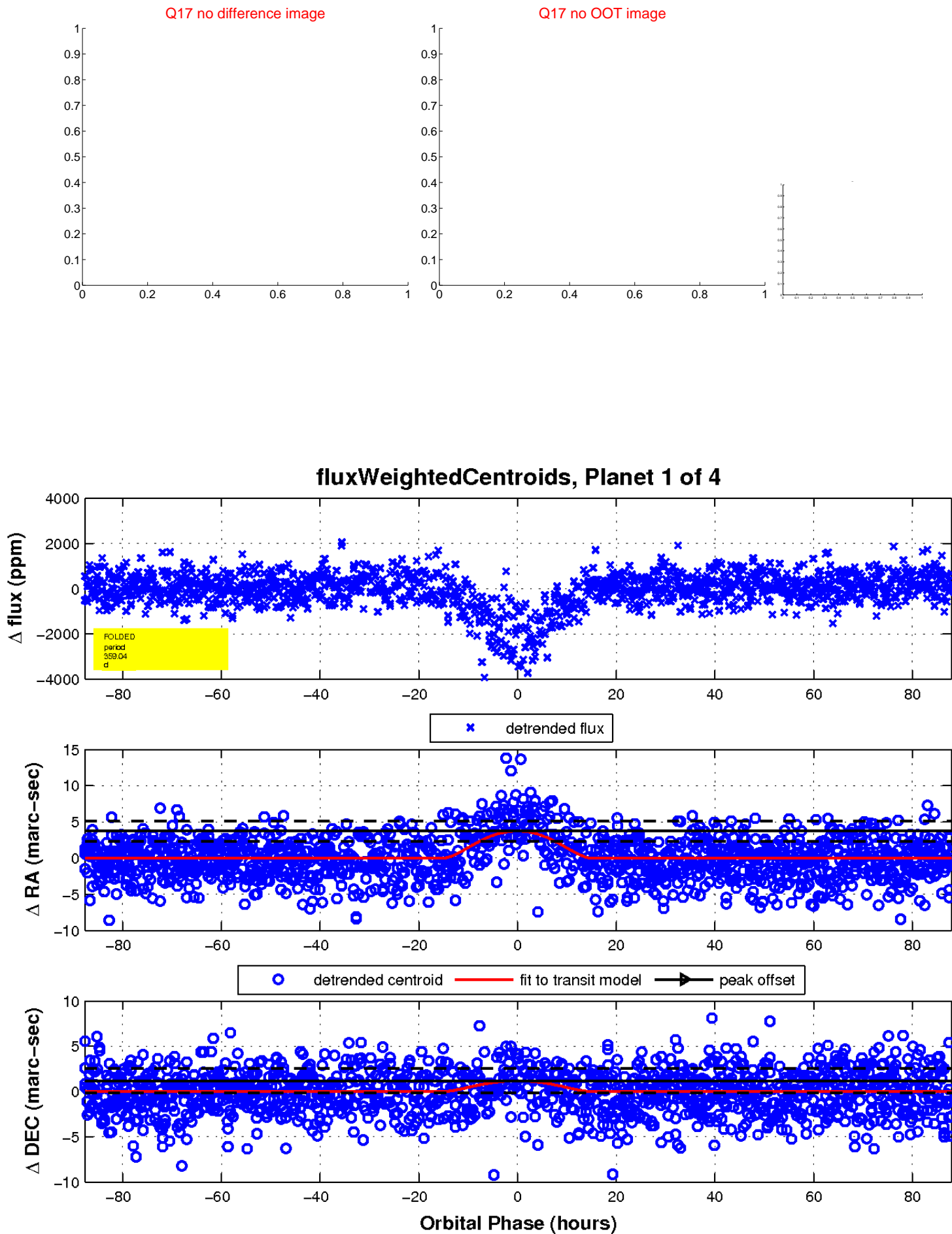
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



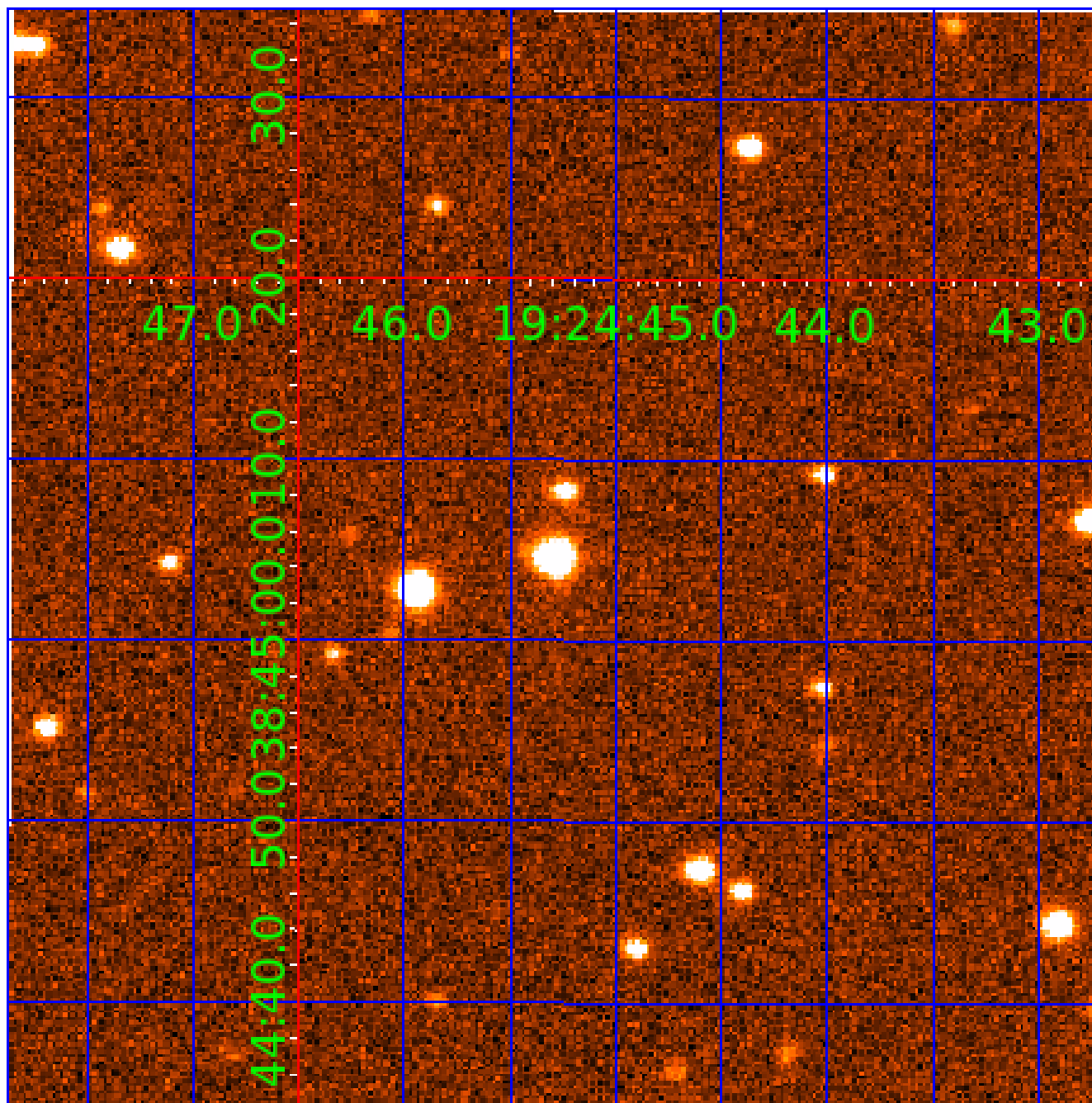
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image



KIC 003644601

Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	R_{\star} (R_{\odot})	T_{\star} (K)	R_p (R_{\oplus})	S_p (S_{\oplus})
003644601-01	OBS	3862.01	359.040205	295.788452	2684.7	29.318	30.2	33.6	0.83	5715	7.68	0.74
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Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
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003644601-02	OBS	FP	0.00	1	0	1	1	INDIV_TRANS_MARSHALL_SKYE—SAME_NTL_PERIOD—CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH
003644601-03	OBS	FP	0.00	1	0	1	1	INDIV_TRANS_SKYE—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
003644601-04	OBS	FP	0.00	1	0	1	1	SAME_NTL_PERIOD—CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH

Notes: OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 003644601-02

TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ($''$)	Δ Row	Δ Col	m_2	m_1	D_2/D_1	Mechanism	Flag	σ_P	σ_T
003644601-02	3644601	003644542-sec	3644542	3:1	71.5	17	-4	8.35	15.16	136.41	Direct-PRF	0	0.55	0.33

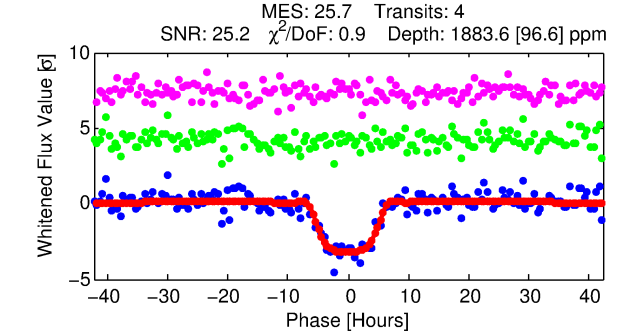
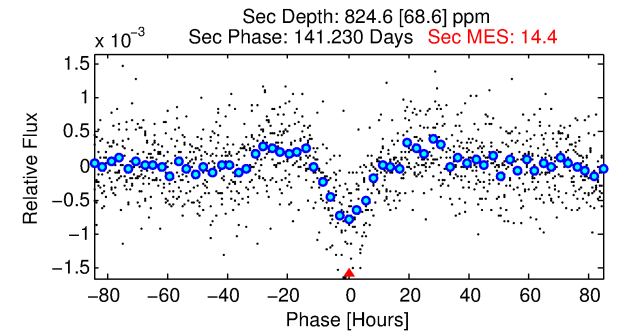
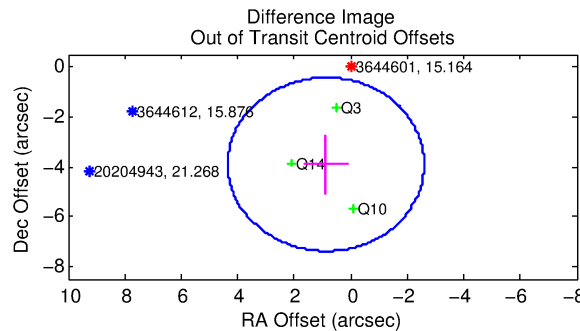
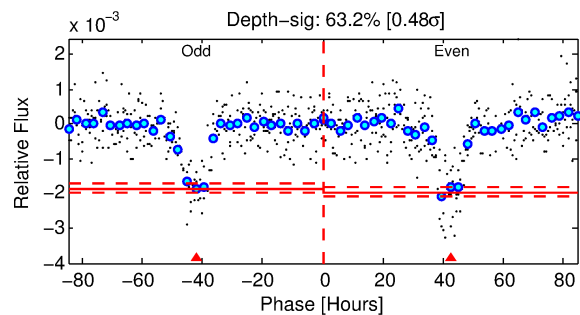
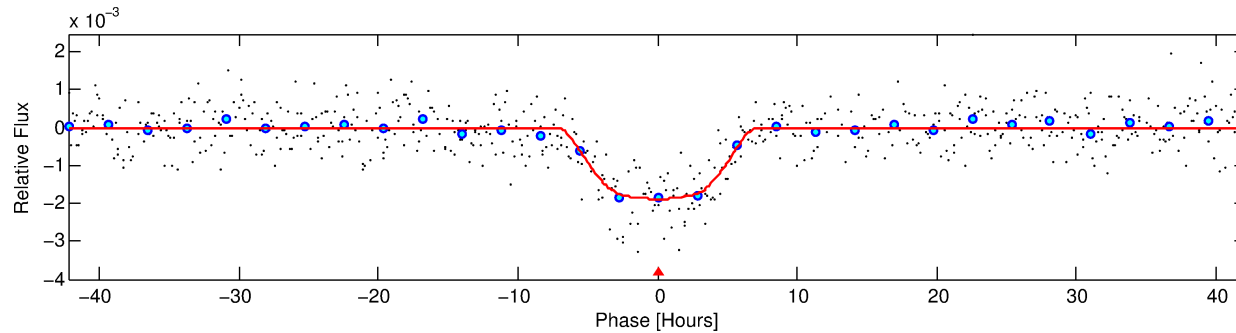
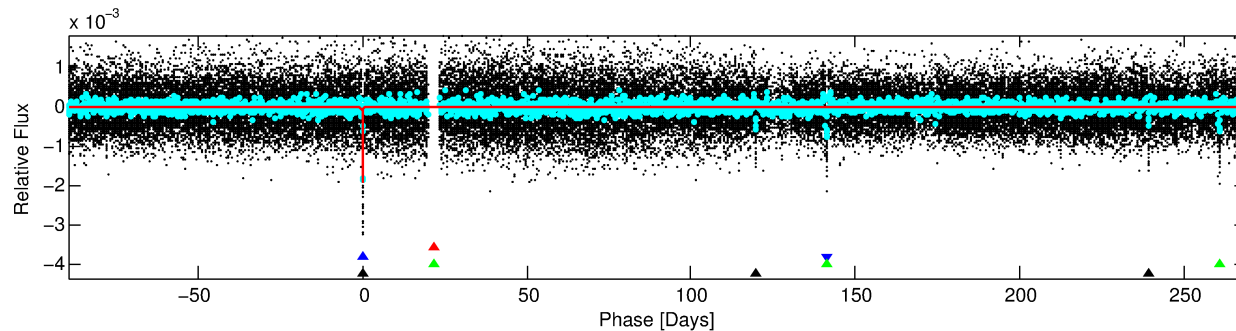
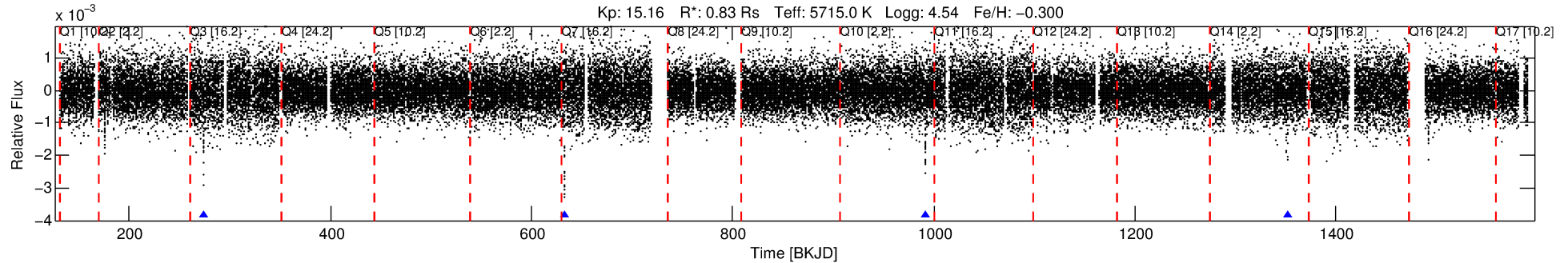
Notes: $P_1:P_2$ is the period ratio. Dist is the distance in arcseconds. Δ Row and Δ Col are the number of pixels apart in row and column. m_2 and m_1 are the magnitudes of the parent and child. D_2/D_1 is the parent's transit depth divided by the child's. σ_P and σ_T are the significance of the match in period and epoch. For a match to be considered significant $\sigma_P < 5.0$ and $\sigma_T < 5.0$. Matches which have σ_P and σ_T very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

DV One-Page Summary

KIC: 3644601 Candidate: 2 of 4 Period: 359.035 d

KOI: K03862 Corr: No Ephemeris Match

Kp: 15.16 R*: 0.83 Rs Teff: 5715.0 K Logg: 4.54 Fe/H: -0.300



DV Fit Results:

Period = 359.03502 [0.00617] d
Epoch = 274.2451 [0.0124] BKJD
Rp/R* = 0.0490 [0.0020]
a/R* = 94.43 [9.65]
b = 0.93 [0.02]
Seff = 0.74 [0.26]
Teq = 237 [20] K
Rp = 4.46 [1.21] Re
a = 0.9453 [0.2120] AU
Ag = 20384.63 [7027.84] [2.90σ]
Teffp = 4375 [184] K [22.35σ]

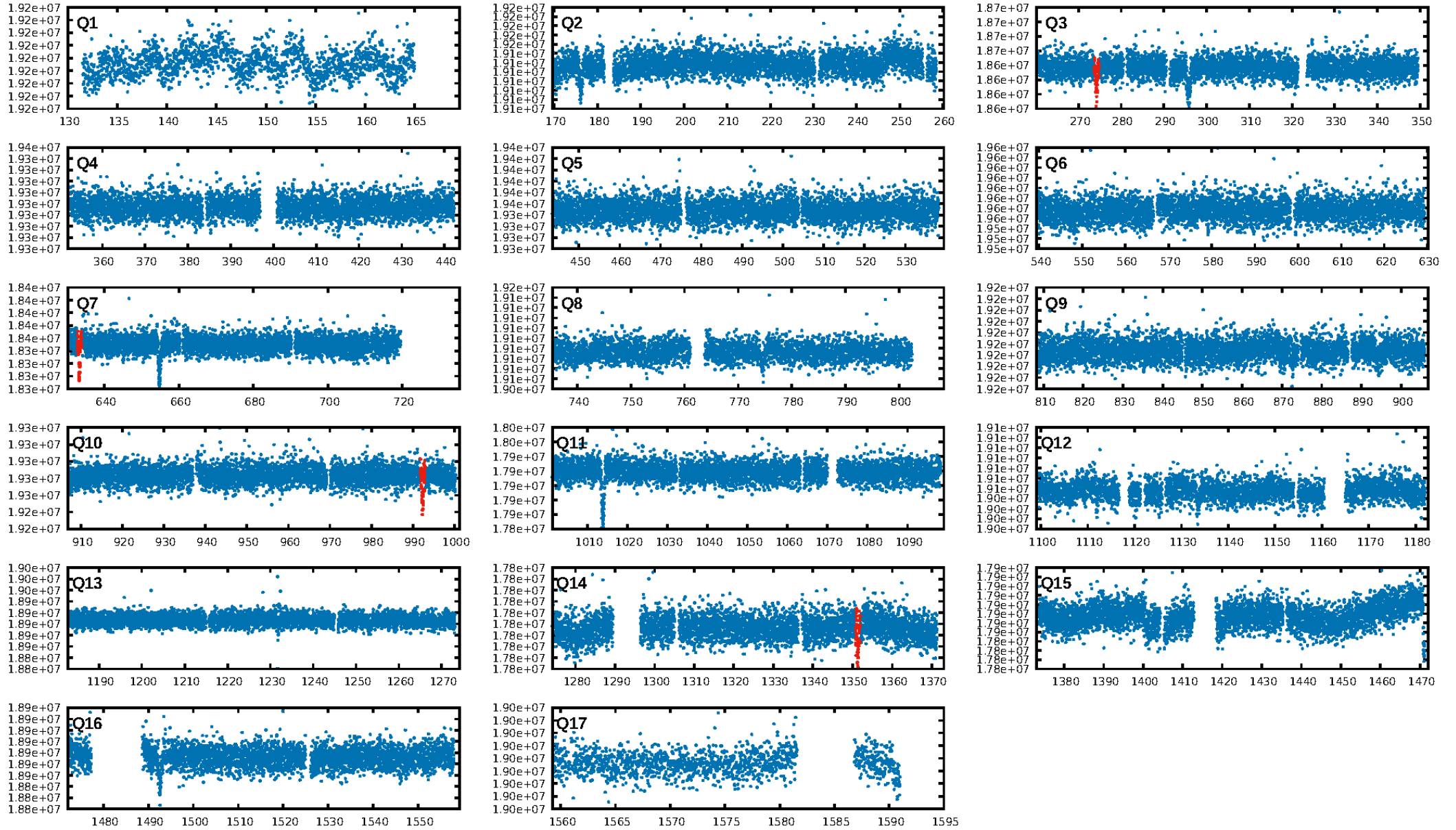
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [187.01σ]
LongPeriod-sig: 0.3% [0.00σ]
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 99.7%
Bootstrap-pfa: 1.68e-148
RollingBand-fgt: 1.00 [4/4]
GhostDiagnostic-chr: -0.1008
Centroid-sig: 0.0%
Centroid-so: 2.246 arcsec [4.61σ]
OotOffset-rm: 4.007 arcsec [3.46σ]
KicOffset-rm: 4.038 arcsec [3.70σ]
OotOffset-st: 2/1/0/0 [3]
KicOffset-st: 2/1/0/0 [3]
DiffImageQuality-fgm: 0.00 [0/3]
DiffImageOverlap-fno: 0.00 [0/3]

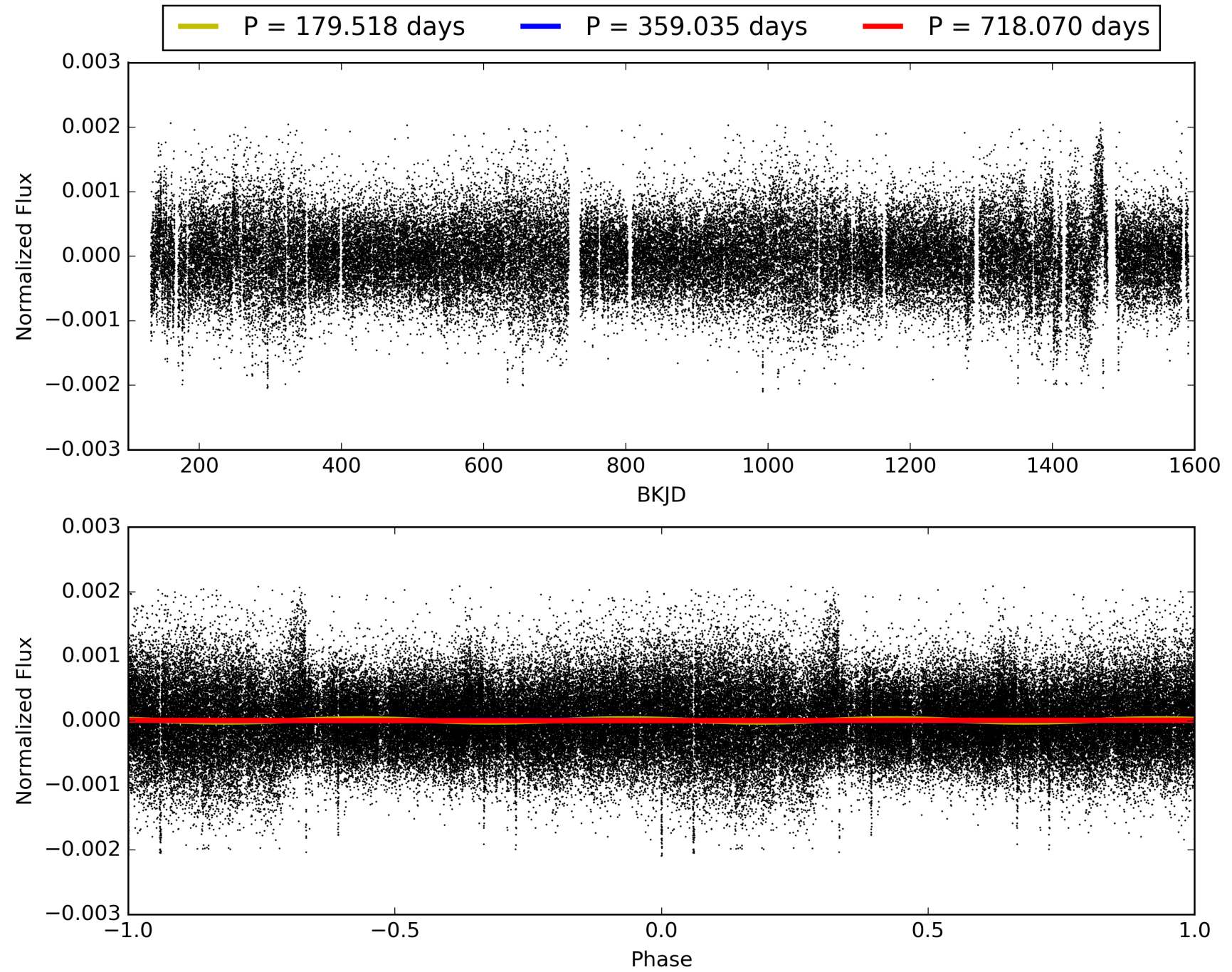
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 07:50:44 Z

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TCE 003644601-02, PDC Light Curves

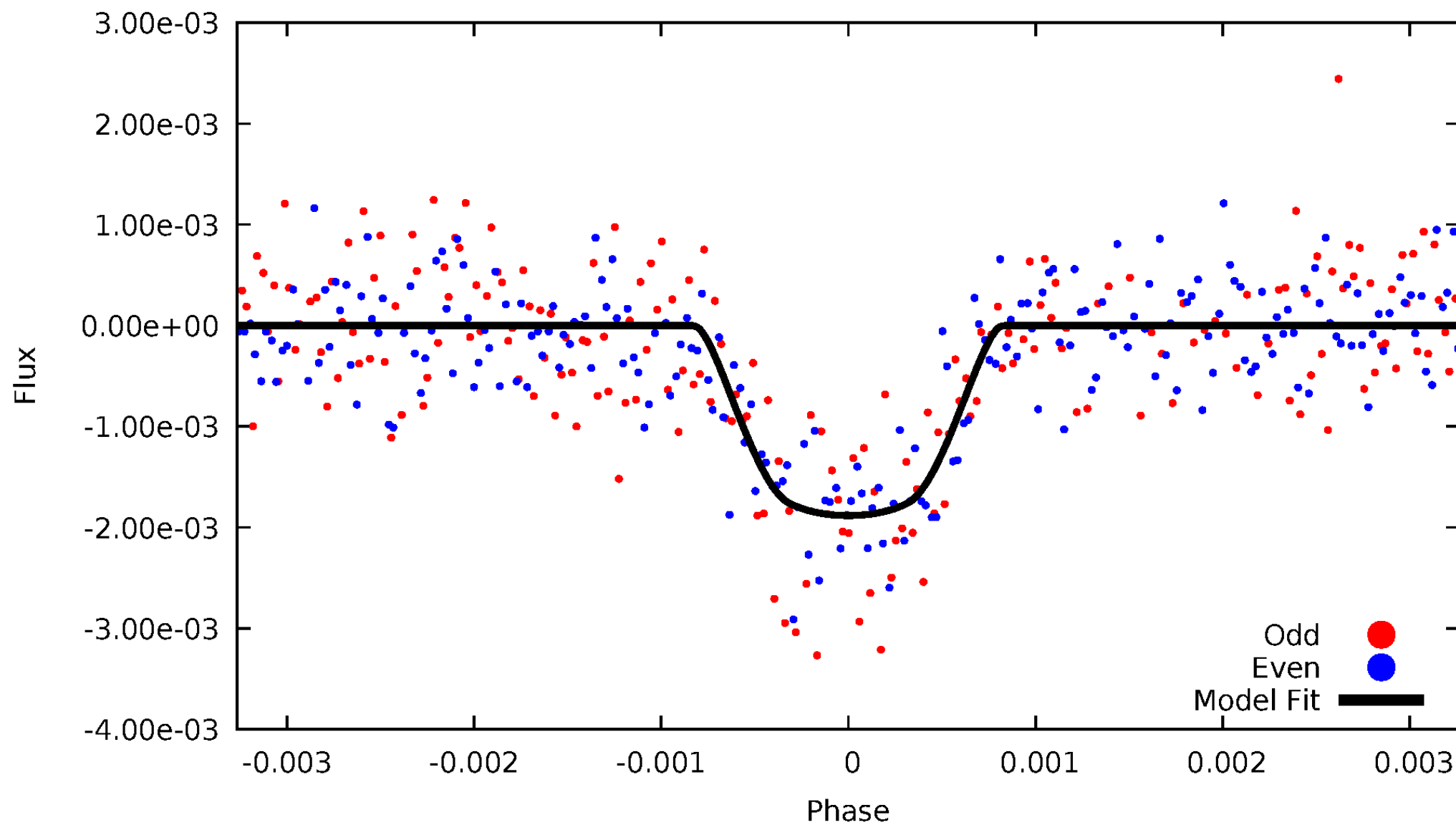


TCE 003644601-02



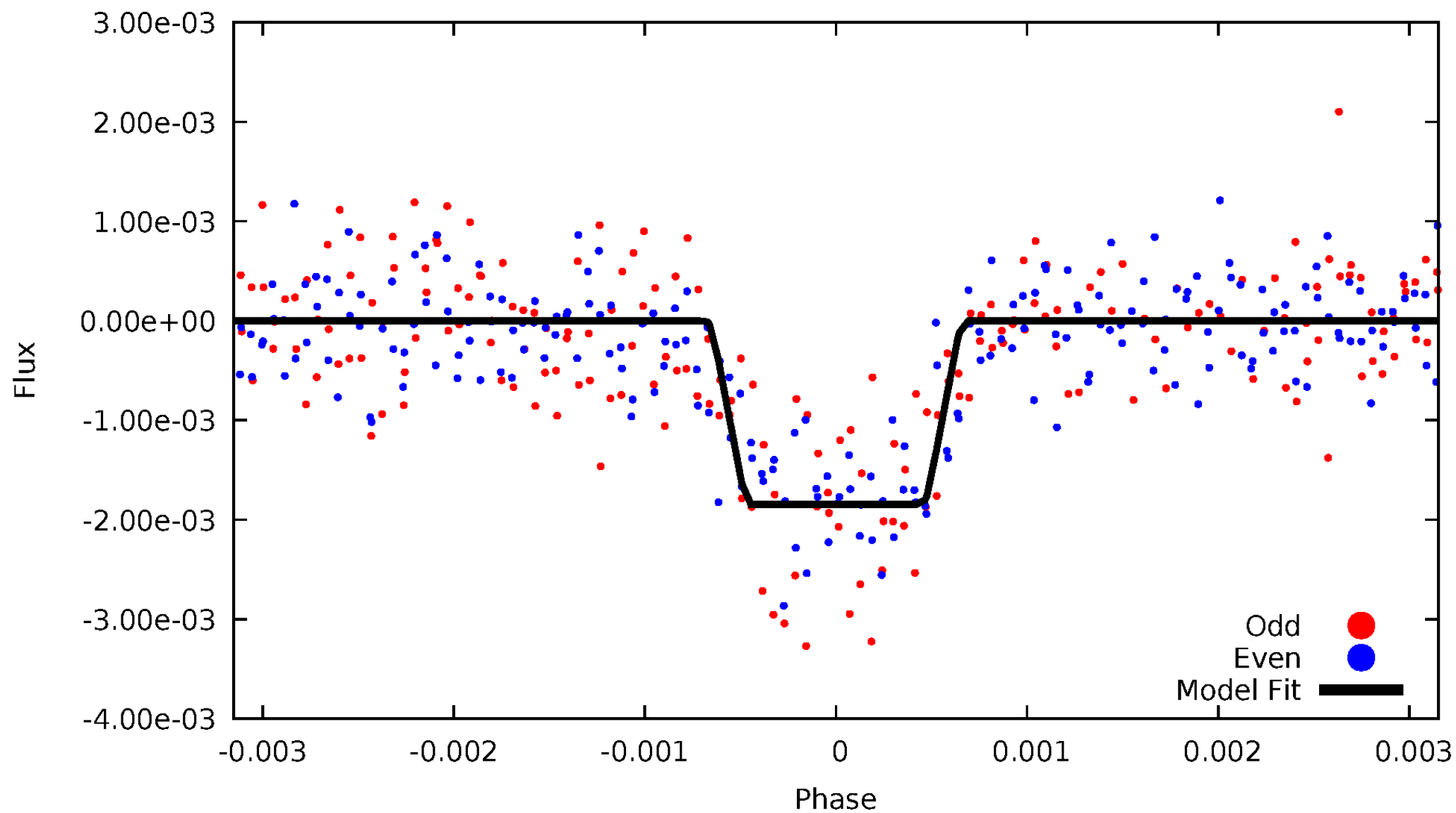
DV Odd/Even

TCE 003644601-02



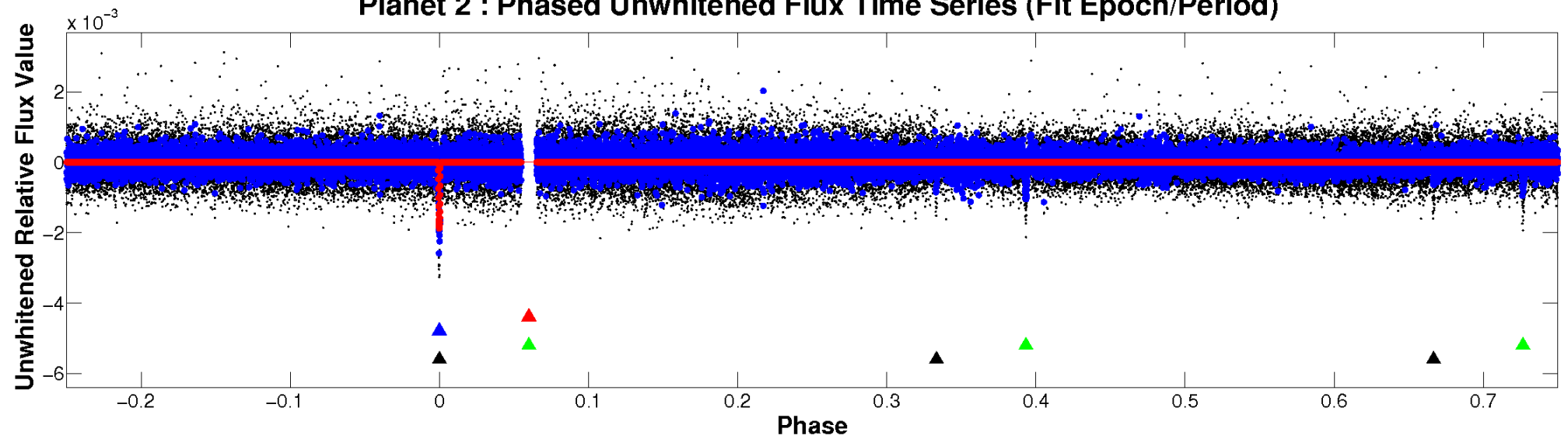
ALT Odd/Even

TCE 003644601-02

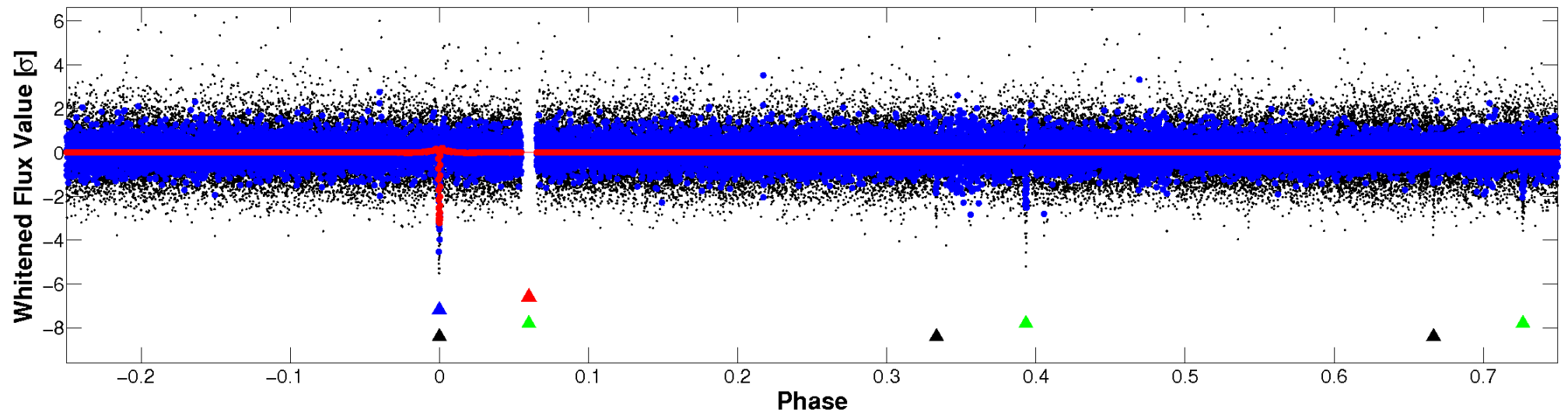


Non-Whitened Vs. Whitened Light Curve

Planet 2 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

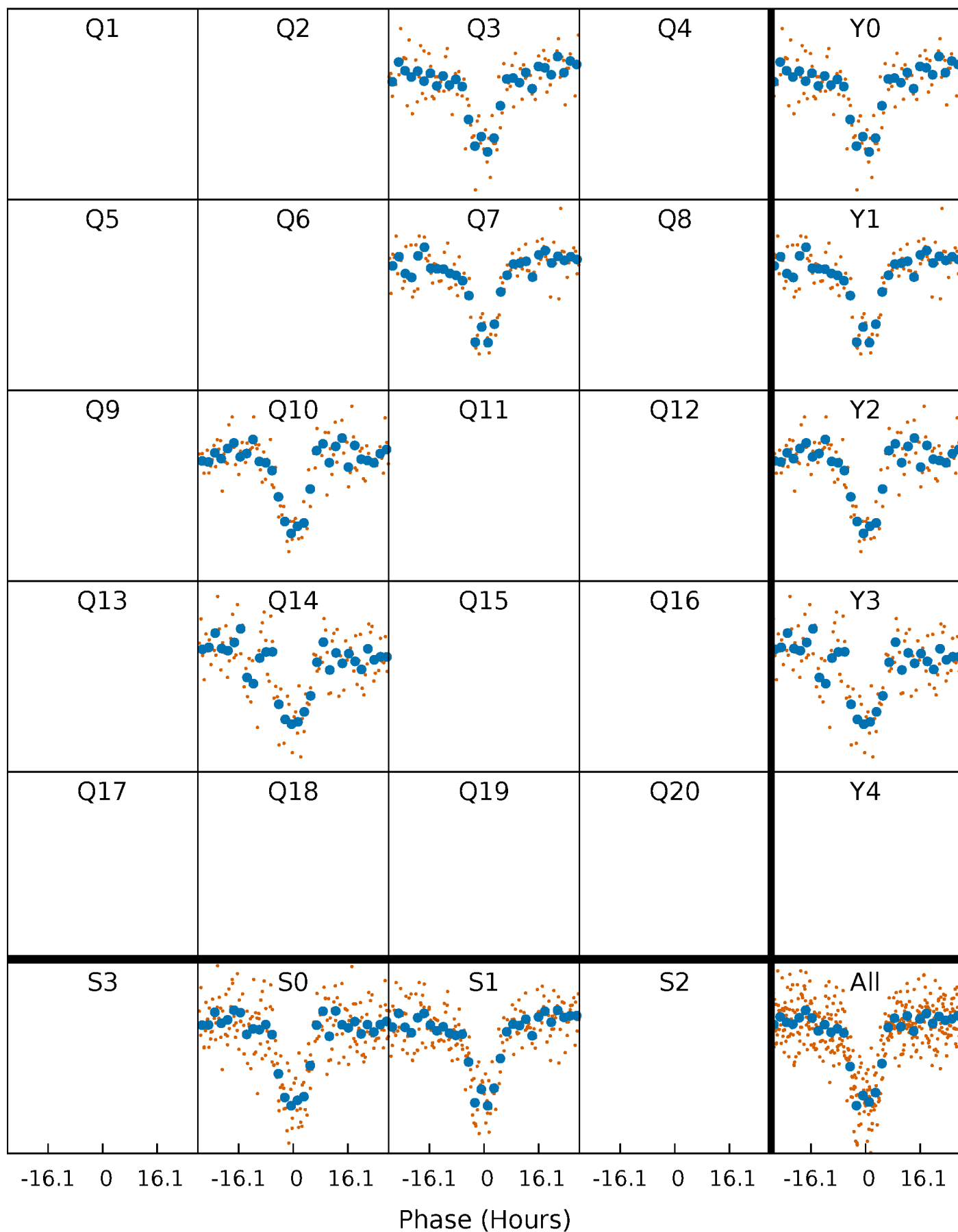


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



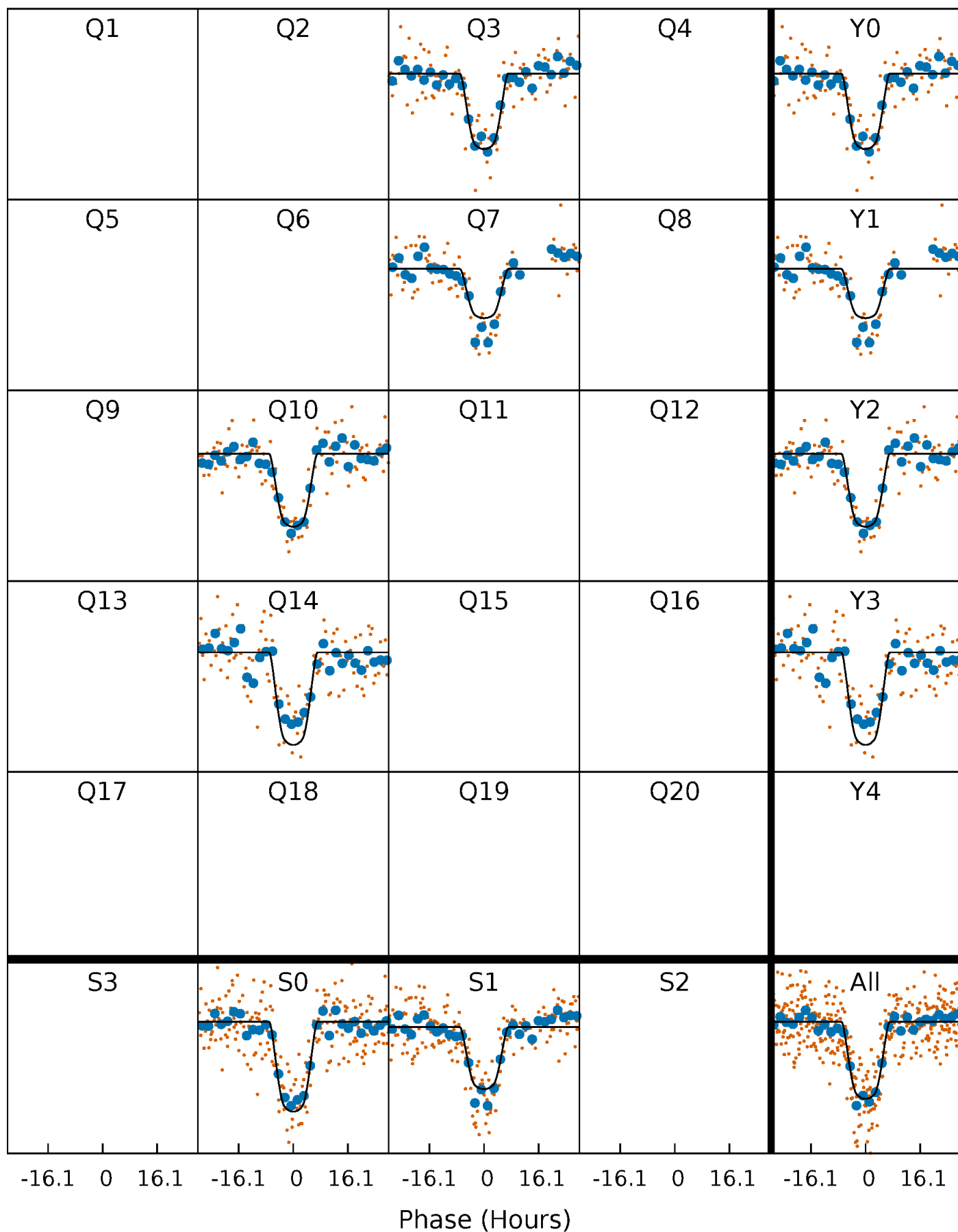
PDC Quarter-Phased Transit Curves

TCE 003644601-02 $P=359.035018$ Days $T_0=274.245063$ (BKJD)



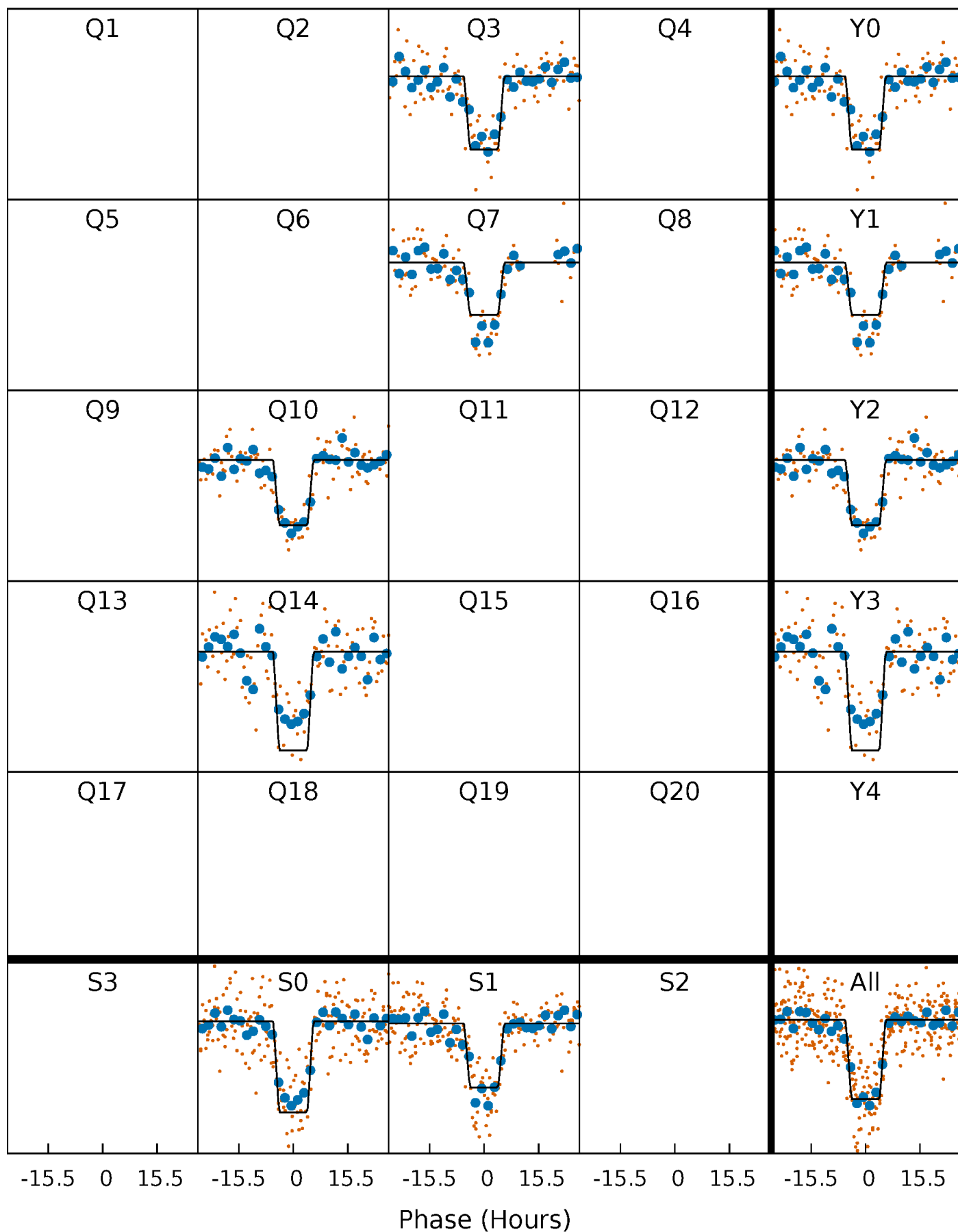
DV Quarter-Phased Transit Curves

TCE 003644601-02 $P=359.035018$ Days $T_0=274.245063$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

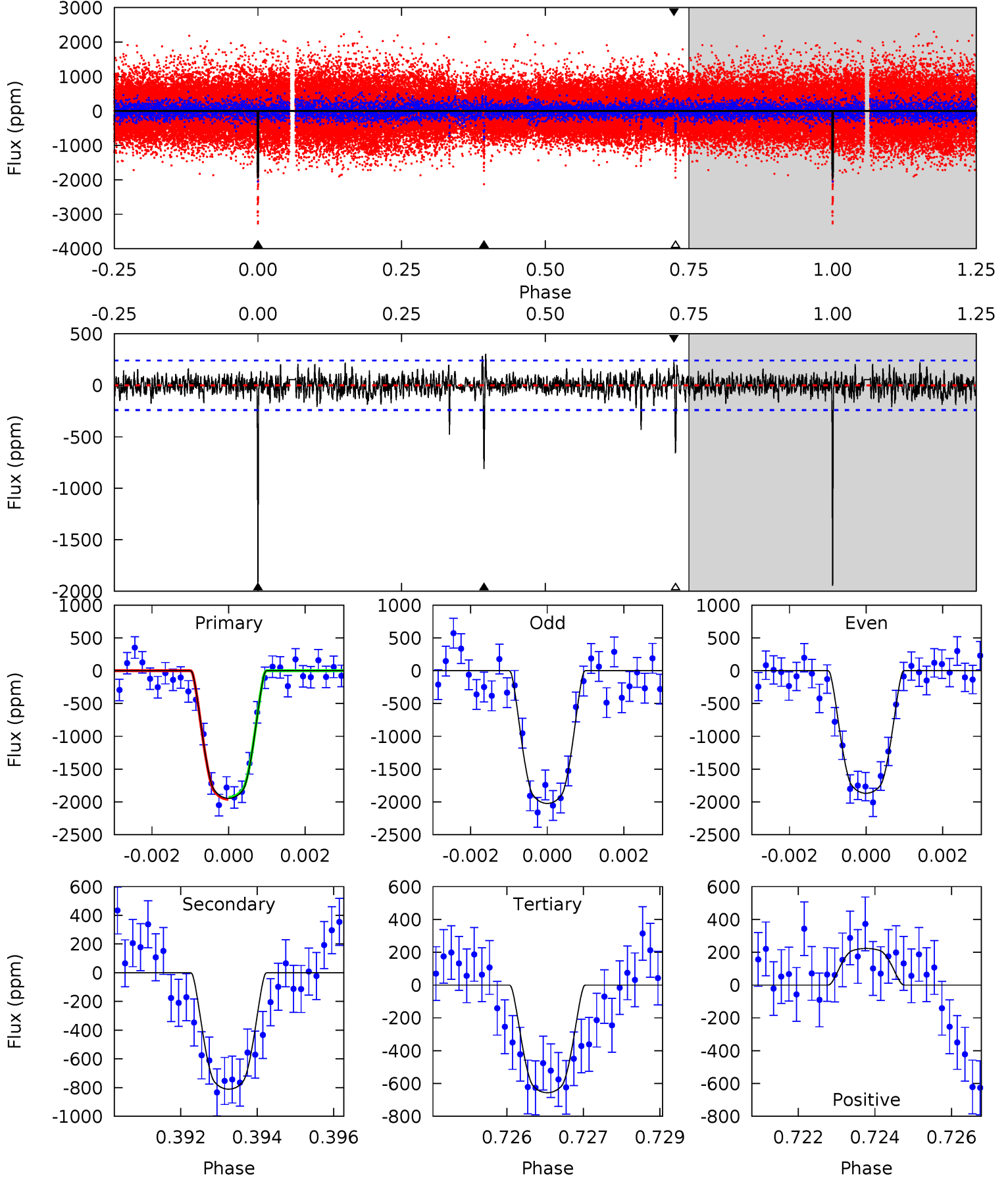
TCE 003644601-02 P=359.038083 Days $T_0=274.237946$ (BKJD)



DV Model-Shift Uniqueness Test

003644601-02, P = 359.035018 Days, E = 274.245063 Days

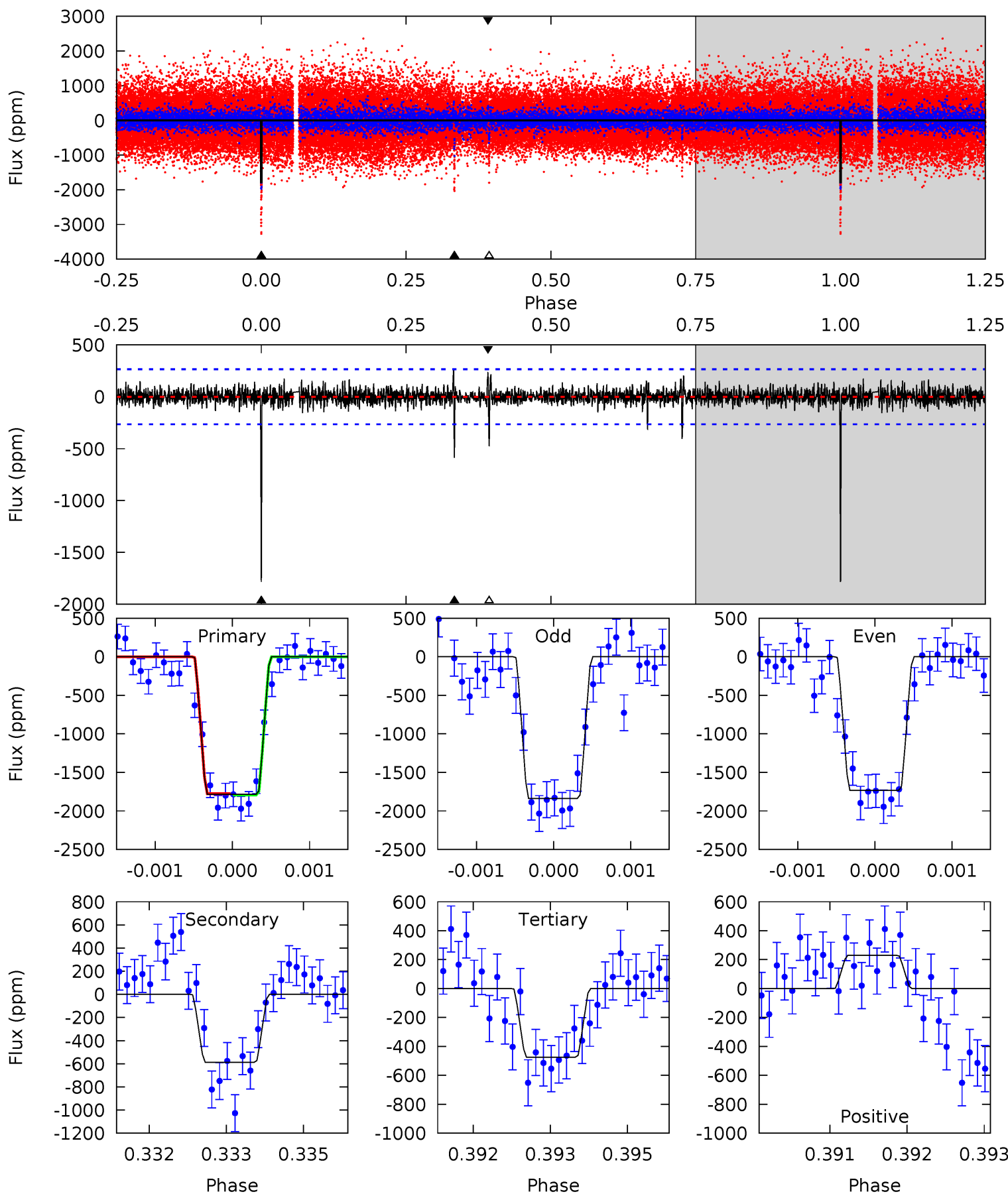
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
43.3	18.1	14.6	4.97	5.36	3.14	1.62	28.7	38.4	3.45	13.1	1.73	1.04	0.13	0.32



Alt Model-Shift Uniqueness Test

003644601-02, P = 359.038083 Days, E = 274.237946 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
36.3	12.0	9.66	4.68	5.40	3.20	1.11	26.7	31.6	2.31	7.29	1.08	1.03	0.13	0.17



Stellar Parameters For KIC 003644601

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	M (M_{\odot})	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5715^{+155}_{-172}	$4.537^{+0.055}_{-0.176}$	$-0.300^{+0.300}_{-0.300}$	$0.834^{+0.224}_{-0.075}$	$0.873^{+0.100}_{-0.090}$	$2.122^{+0.505}_{-1.004}$
	+3%/-3%	+1%/-4%	+100%/-100%	+27%/-9%	+11%/-10%	+24%/-47%
Source	PHO1	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

Secondary Eclipse Parameters for KIC 003644601-02 / KOI

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-811 ± 45	$4.55^{+0.68}_{-0.39}$	335^{+21}_{-16}	4526^{+138}_{-147}	18933^{+3549}_{-4192}
Alt.	-588 ± 49	$4.02^{+0.54}_{-0.35}$	336^{+19}_{-16}	4467^{+159}_{-152}	17517^{+3708}_{-3706}

T_{max} = Theoretical Maximum Planetary Temperature

T_{obs} = Observed Planetary Temperature (Assuming $A=0.3$)

A_{obs} = Observed Albedo (Assuming $T=0$)

If a secondary eclipse is present, the system is likely an EB if $T_{obs} \gg T_{max}$ AND $A_{obs} \gg 1.0$

DV Centroid Data

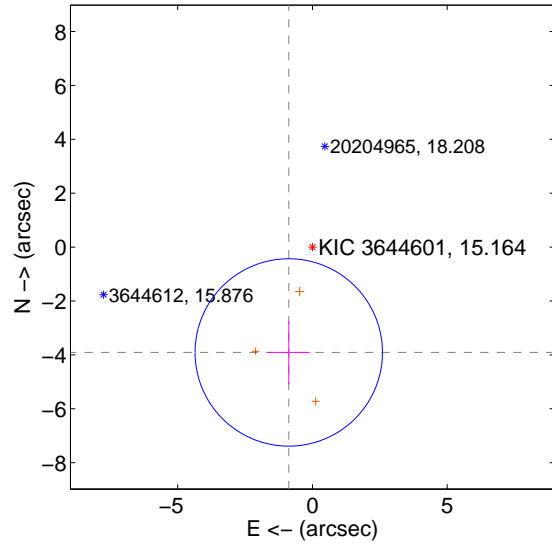
Supplemental centroid analysis for 003644601-02. Kepler magnitude: 15.16. Transit SNR 25.18

There are 0 quarters with good PRF difference image offsets

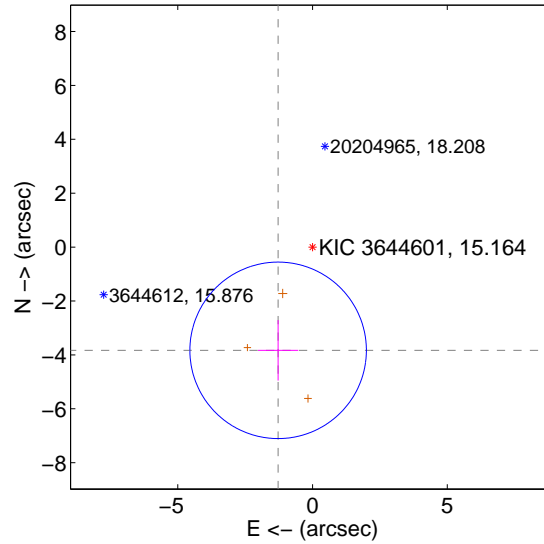
The direct PRF centroid is offset from the target star catalog position by about 0.34 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	4.007 ± 1.159	3.46	0.879 ± 0.782	-3.909 ± 1.175
PRF-fit source offset from KIC position	4.038 ± 1.092	3.70	1.276 ± 0.749	-3.831 ± 1.123
photometric centroid source offset	2.25 ± 0.49	4.61	-0.26 ± 0.65	-2.23 ± 0.48

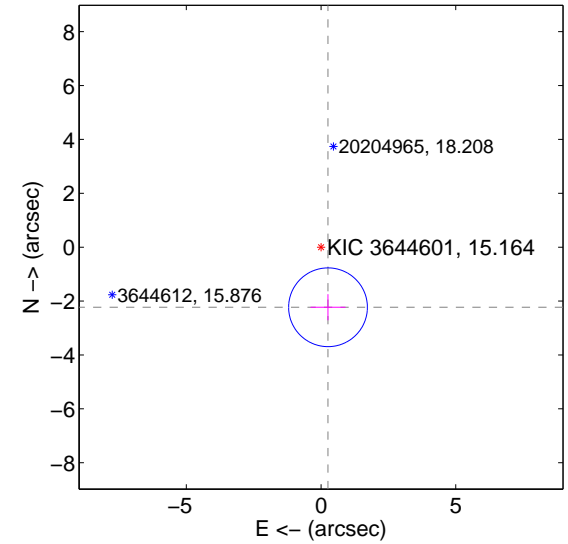
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

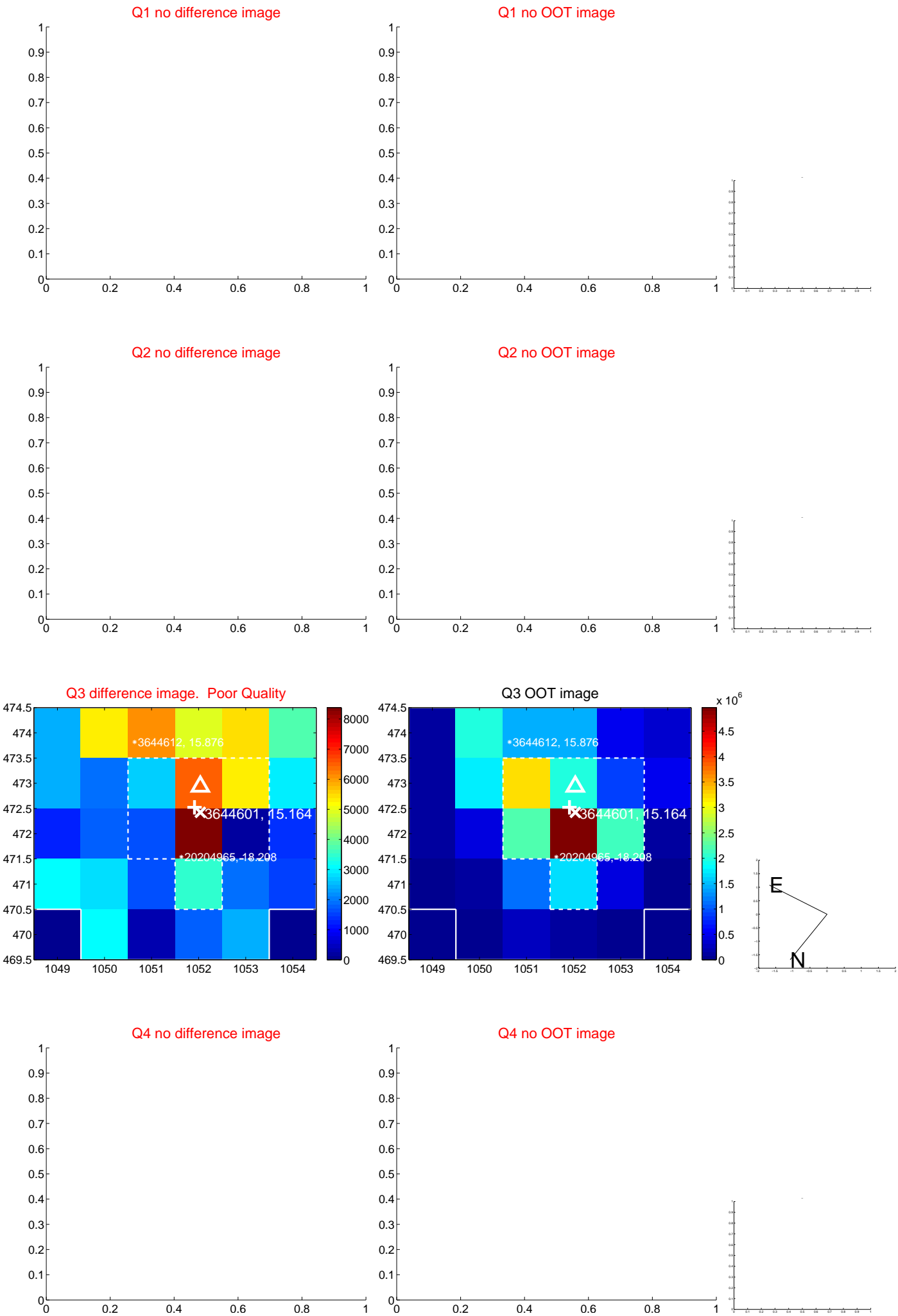


offset from photometric centroids



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ . Red *: target star. Blue *: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

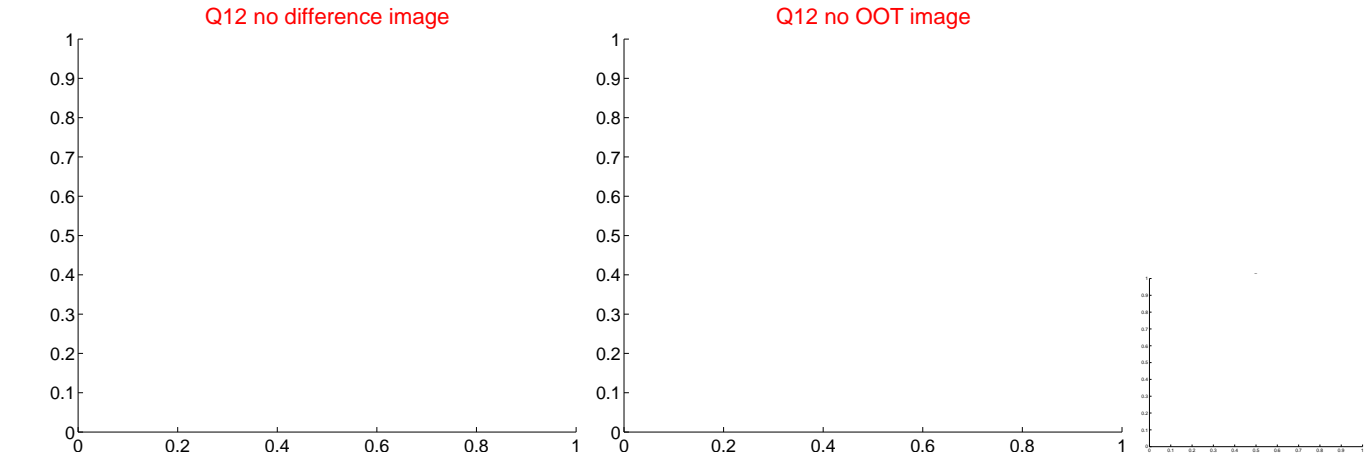
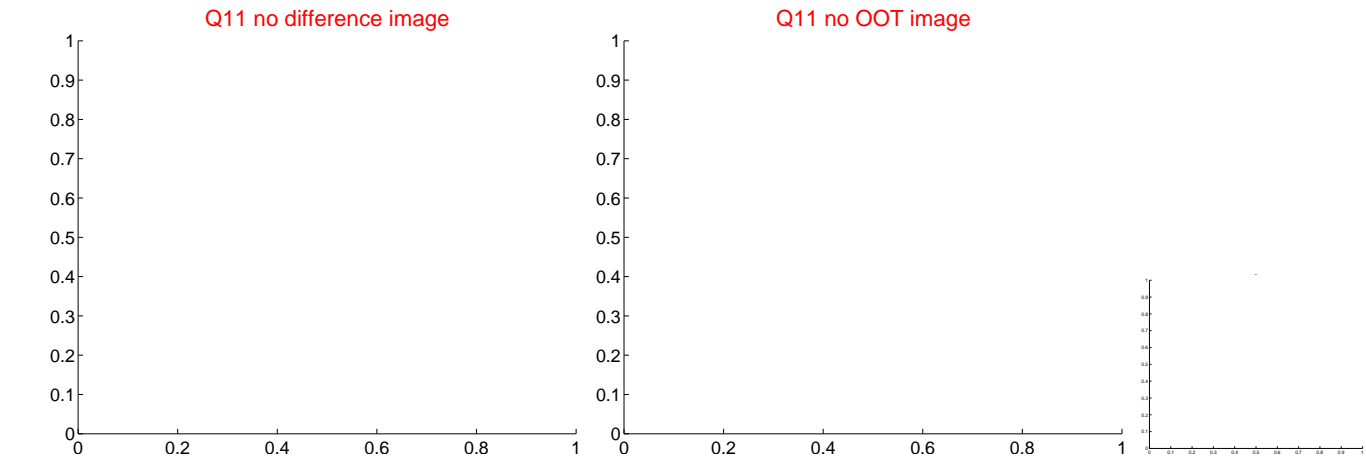
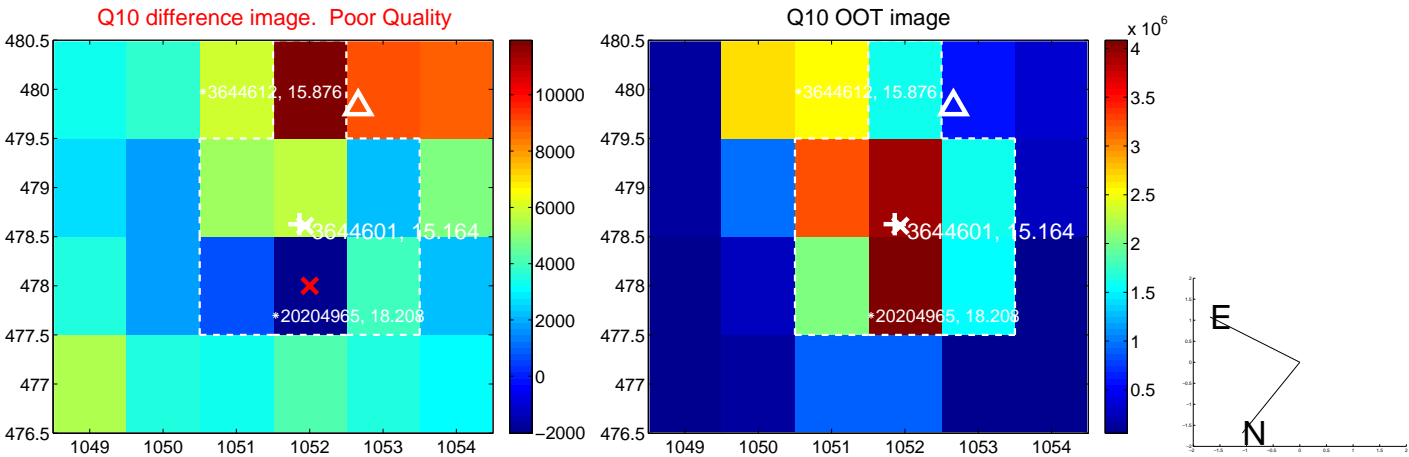
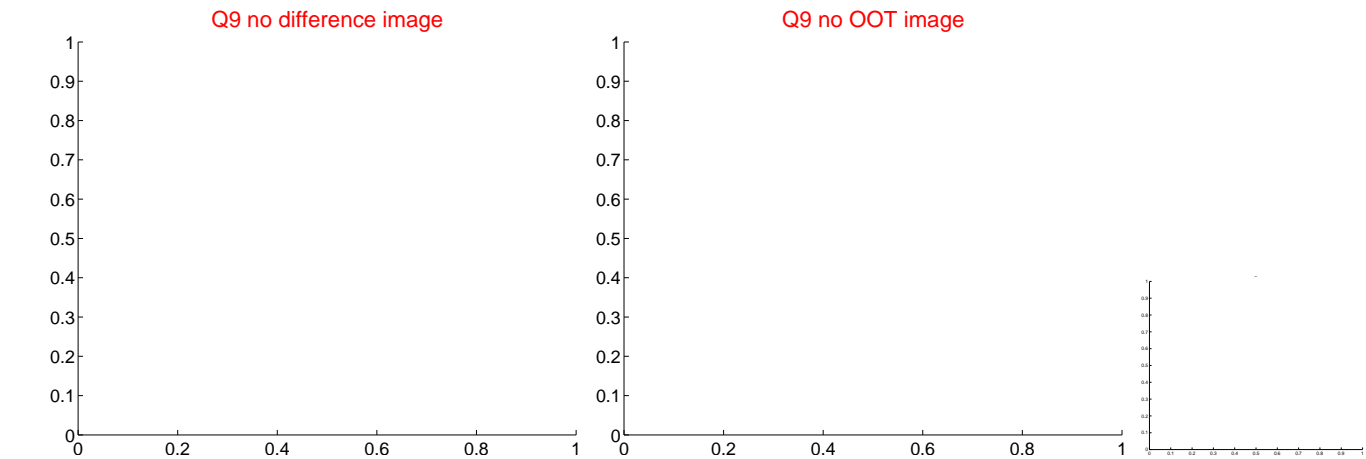
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



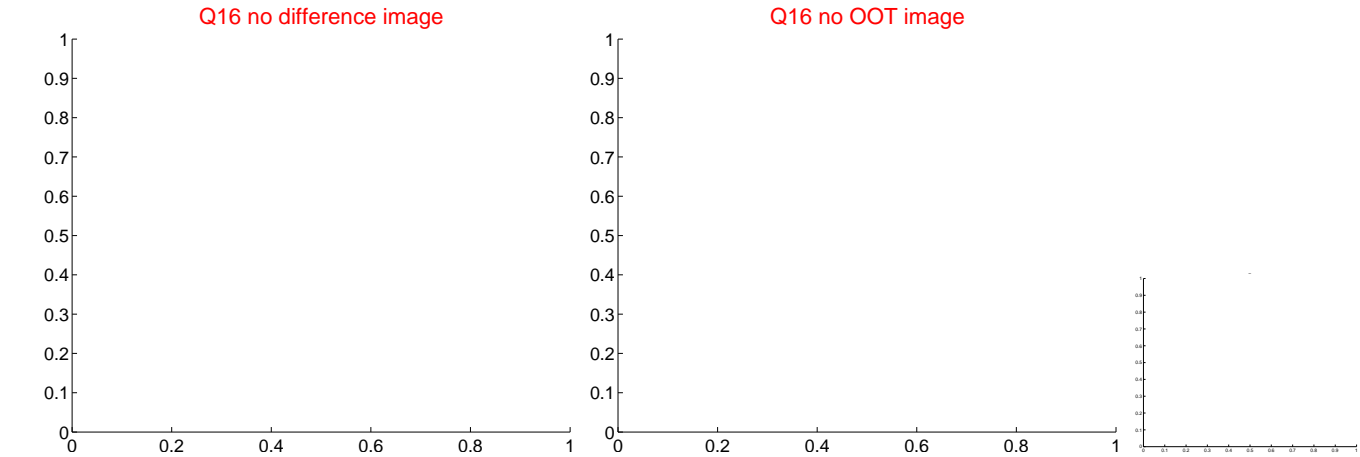
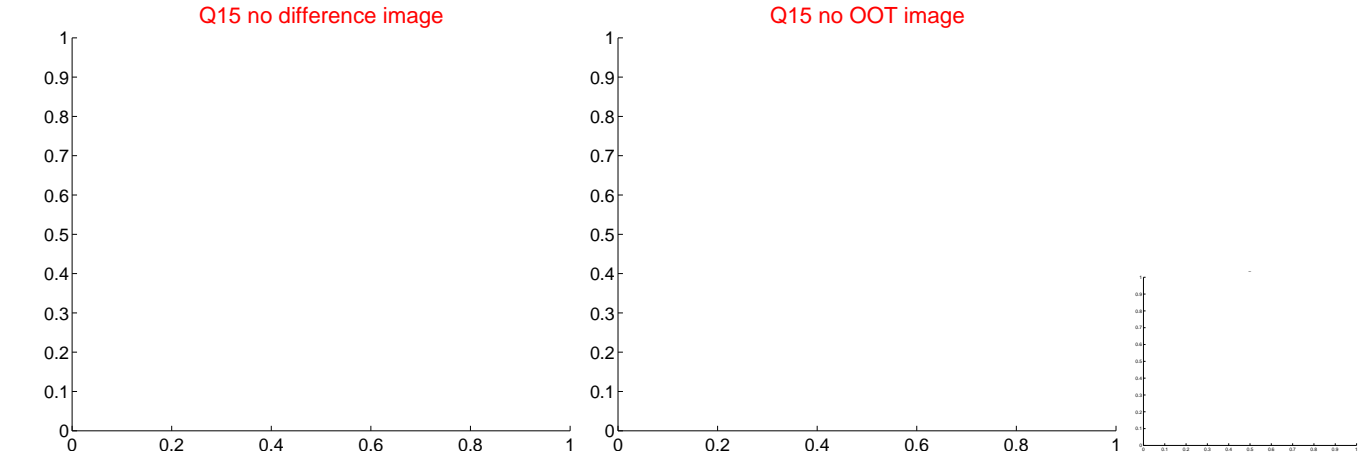
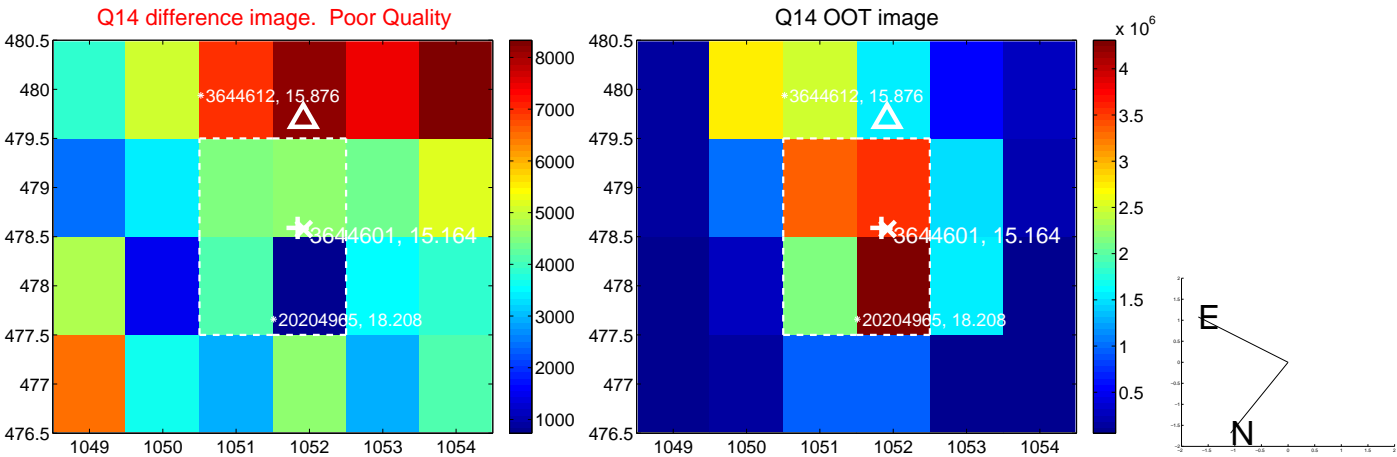
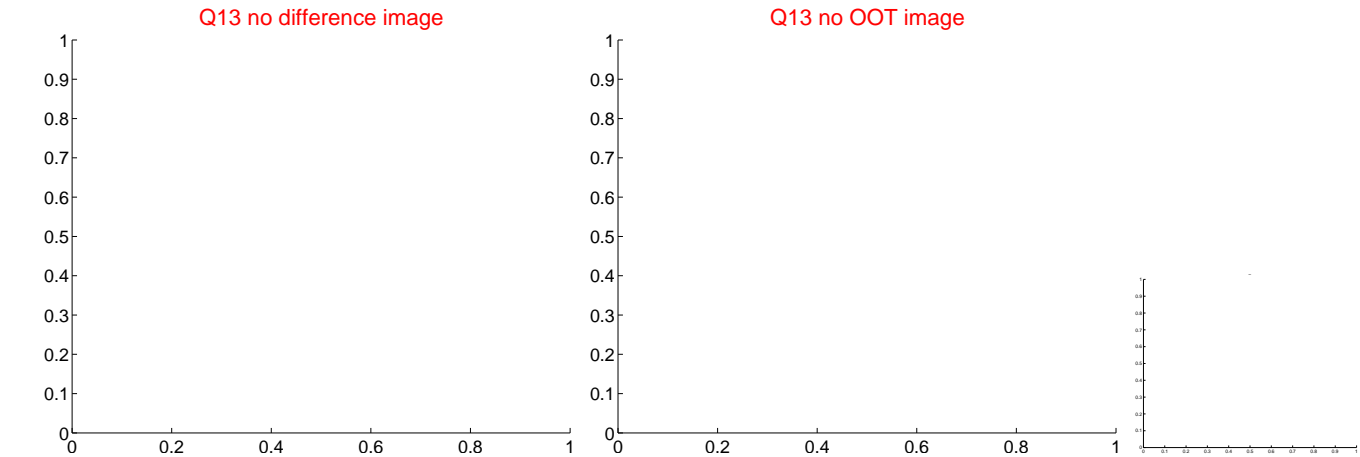
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



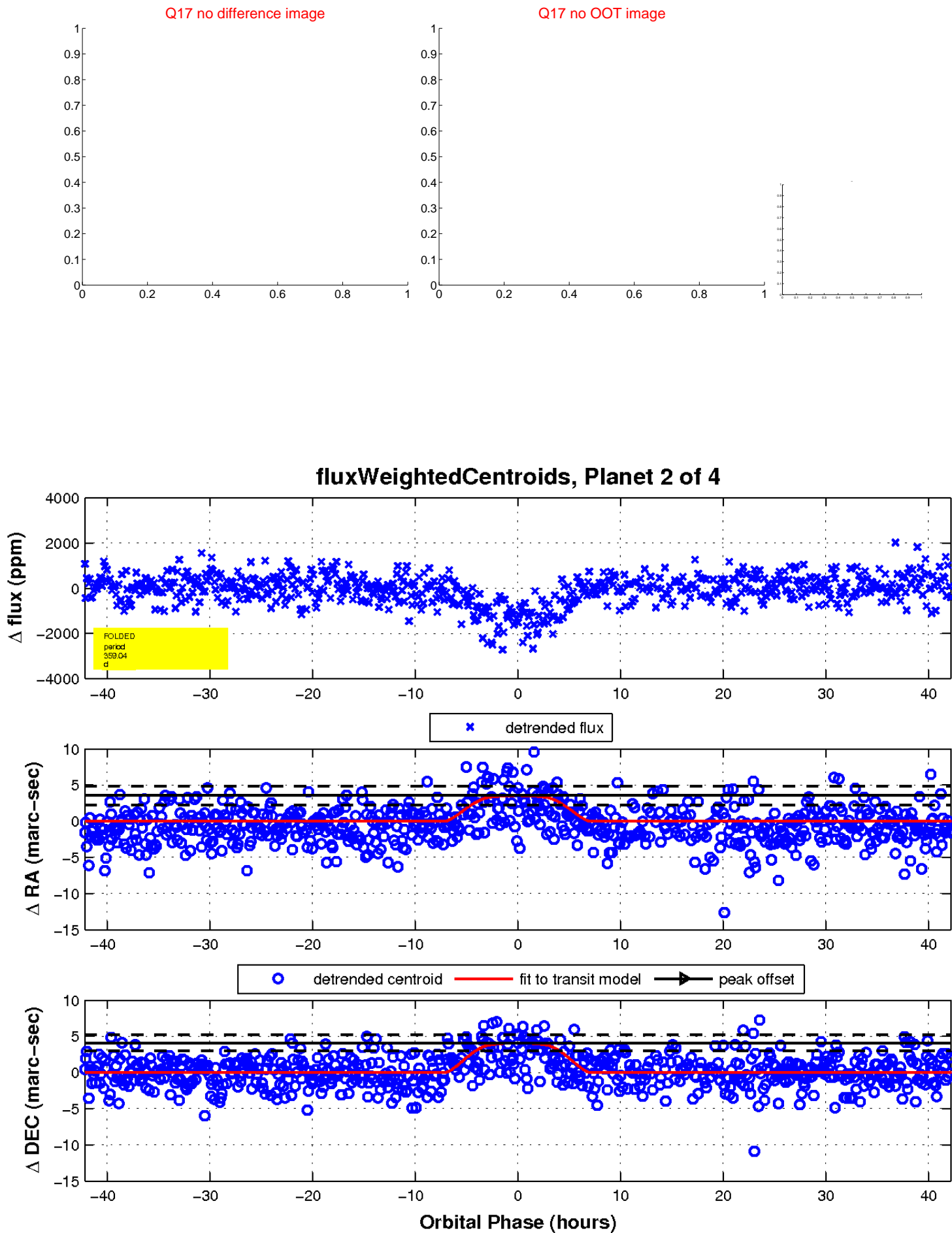
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

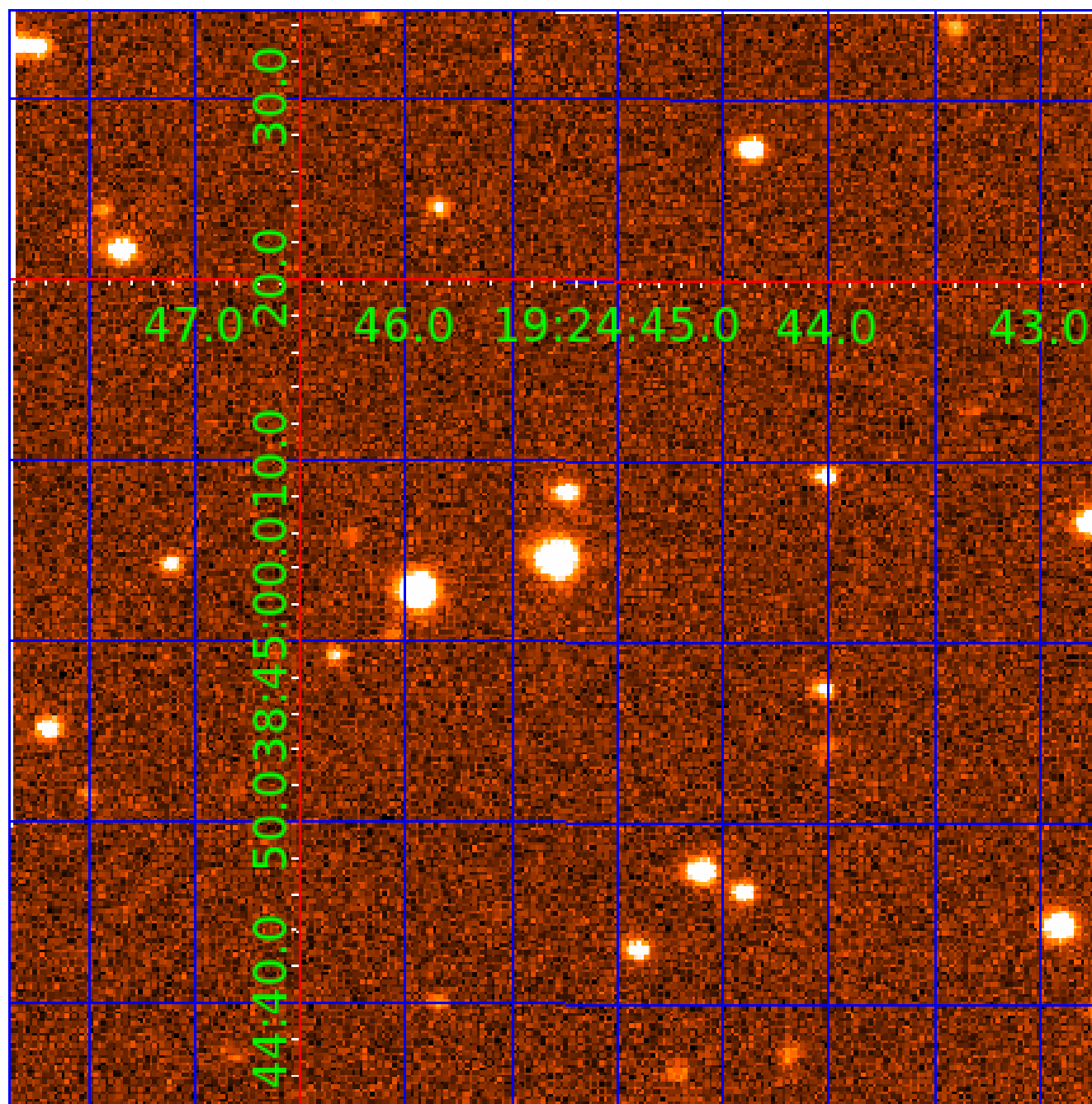


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 003644601

Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	R_{\star} (R_{\odot})	T_{\star} (K)	R_p (R_{\oplus})	S_p (S_{\oplus})
003644601-01	OBS	3862.01	359.040205	295.788452	2684.7	29.318	30.2	33.6	0.83	5715	7.68	0.74
003644601-02	OBS	No	359.035018	274.245063	1883.6	14.075	25.7	25.2	0.83	5715	4.46	0.74
003644601-03	OBS	3862.02	119.681034	176.089715	754.3	27.303	19.1	20.2	0.83	5715	4.12	3.22
003644601-04	OBS	No	119.680595	154.565873	507.3	14.096	10.2	12.3	0.83	5715	2.37	3.22

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003644601-01	OBS	FP	0.00	1	0	1	1	INDIV_TRANS_MARSHALL_SKYE—CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH
003644601-02	OBS	FP	0.00	1	0	1	1	INDIV_TRANS_MARSHALL_SKYE—SAME_NTL_PERIOD—CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH
003644601-03	OBS	FP	0.00	1	0	1	1	INDIV_TRANS_SKYE—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
003644601-04	OBS	FP	0.00	1	0	1	1	SAME_NTL_PERIOD—CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH

Notes: OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 003644601-03

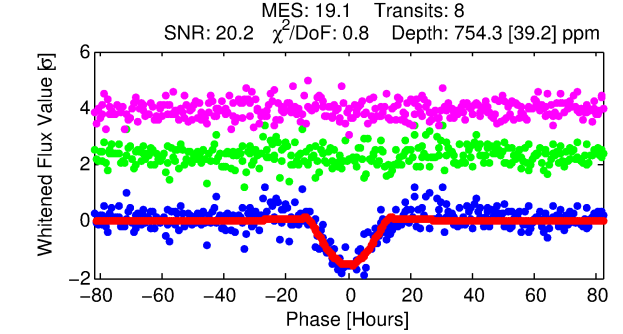
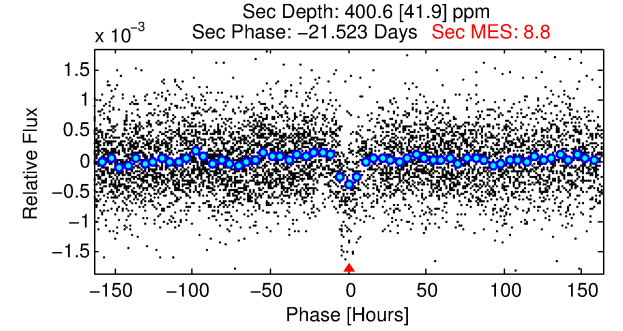
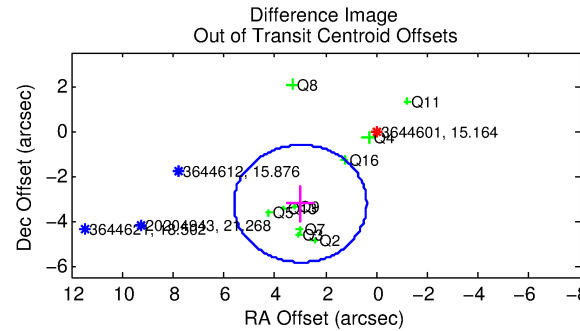
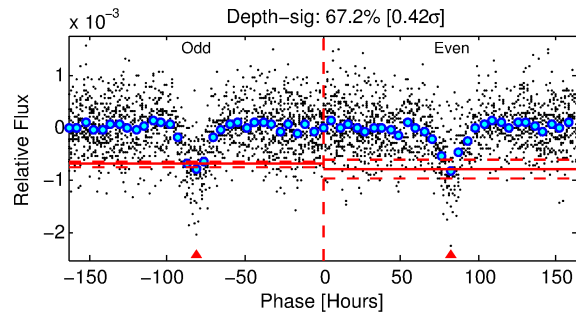
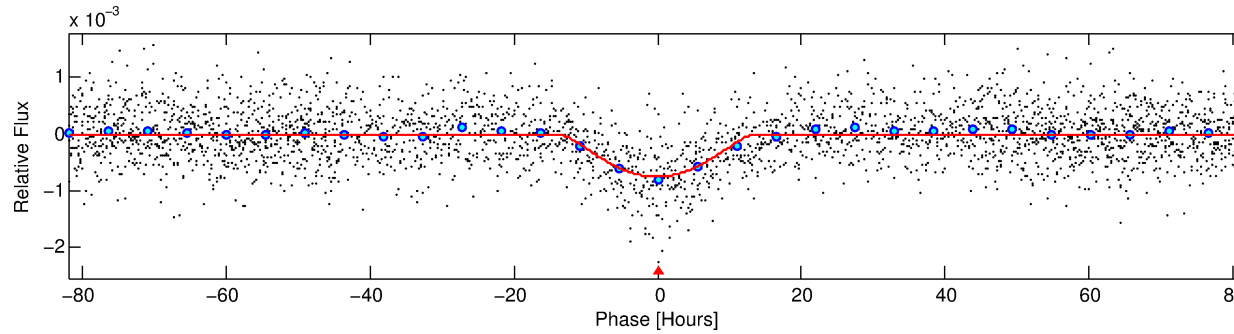
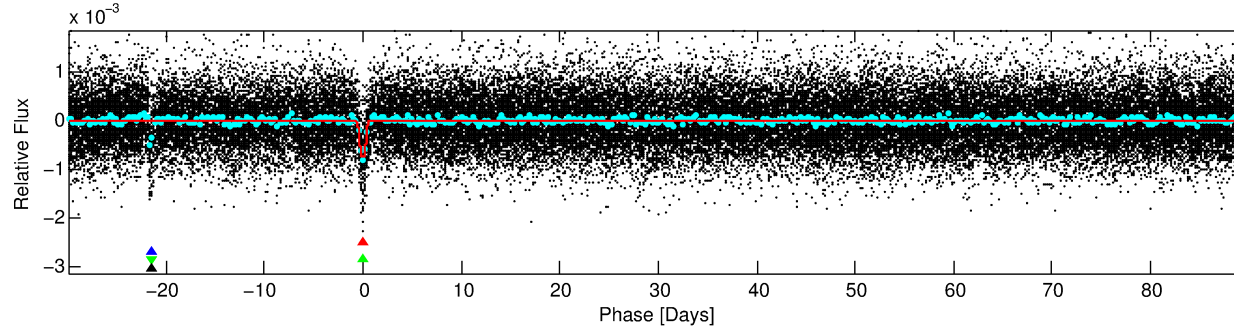
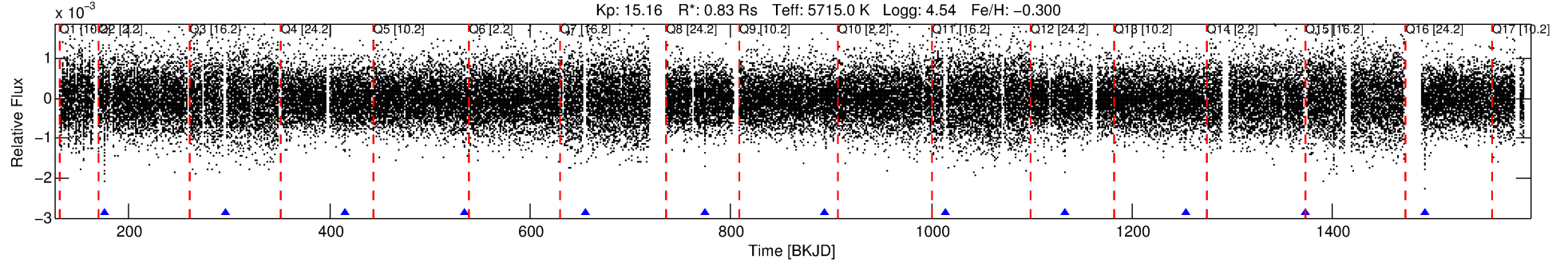
TCE (1)	KIC	Parent (2)	Parent KIC	P ₁ :P ₂	Dist ($''$)	Δ Row	Δ Col	m ₂	m ₁	D ₂ /D ₁	Mechanism	Flag	σ_P	σ_T
003644601-03	3644601	3511.01	3644542	1:1	71.5	17	-4	8.35	15.16	396.56	Direct-PRF	0	0.17	0.22

Notes: P₁:P₂ is the period ratio. Dist is the distance in arcseconds. Δ Row and Δ Col are the number of pixels apart in row and column. m₂ and m₁ are the magnitudes of the parent and child. D₂/D₁ is the parent's transit depth divided by the child's. σ_P and σ_T are the significance of the match in period and epoch. For a match to be considered significant $\sigma_P < 5.0$ and $\sigma_T < 5.0$. Matches which have σ_P and σ_T very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

DV One-Page Summary

KIC: 3644601 Candidate: 3 of 4 Period: 119.681 d
KOI: K03862 Corr: No Ephemeris Match

Kp: 15.16 R*: 0.83 Rs Teff: 5715.0 K Logg: 4.54 Fe/H: -0.300



DV Fit Results:

Period = 119.68103 [0.00462] d
Epoch = 176.0897 [0.0317] BKJD
Rp/R* = 0.0453 [0.0544]
a/R* = 10.90 [3.57]
b = 0.99 [0.09]
Seff = 3.22 [1.11]
Teq = 342 [30] K
Rp = 4.12 [5.08] Re
a = 0.4545 [0.1019] AU
Ag = 2679.78 [6507.63] [0.41σ]
Teffp = 3799 [2289] K [1.51σ]

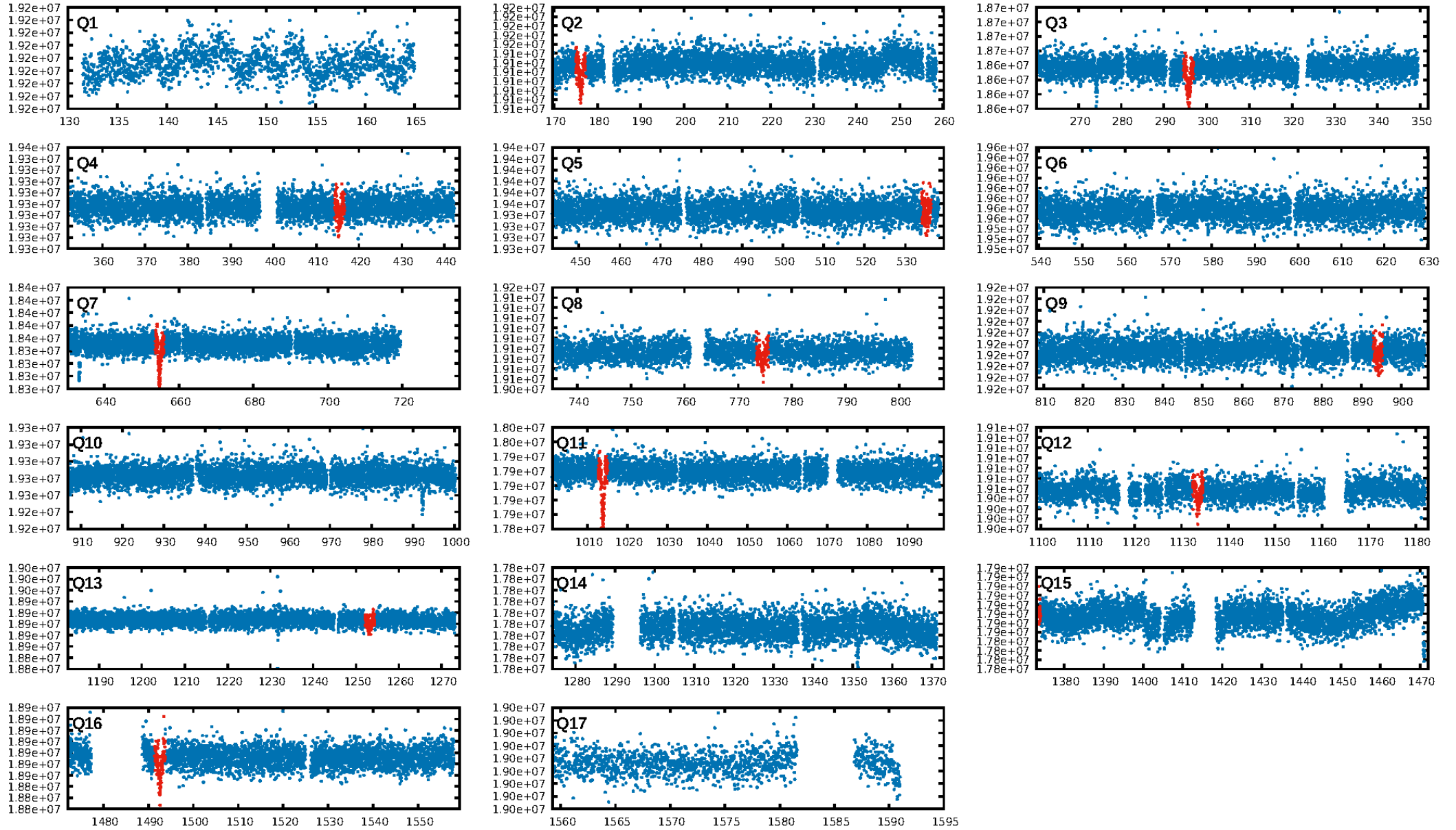
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: 100.0% [187.01σ]
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 2.89e-80
RollingBand-fgt: 1.00 [8/8]
GhostDiagnostic-chr: -0.1774
Centroid-sig: 0.0%
Centroid-so: 2.037 arcsec [3.53σ]
OotOffset-rm: 4.408 arcsec [5.06σ]
KicOffset-rm: 4.547 arcsec [6.12σ]
OotOffset-st: 1/3/3/3 [10]
KicOffset-st: 1/3/3/3 [10]
DiffImageQuality-fgm: 0.00 [0/10]
DiffImageOverlap-fno: 0.70 [7/10]

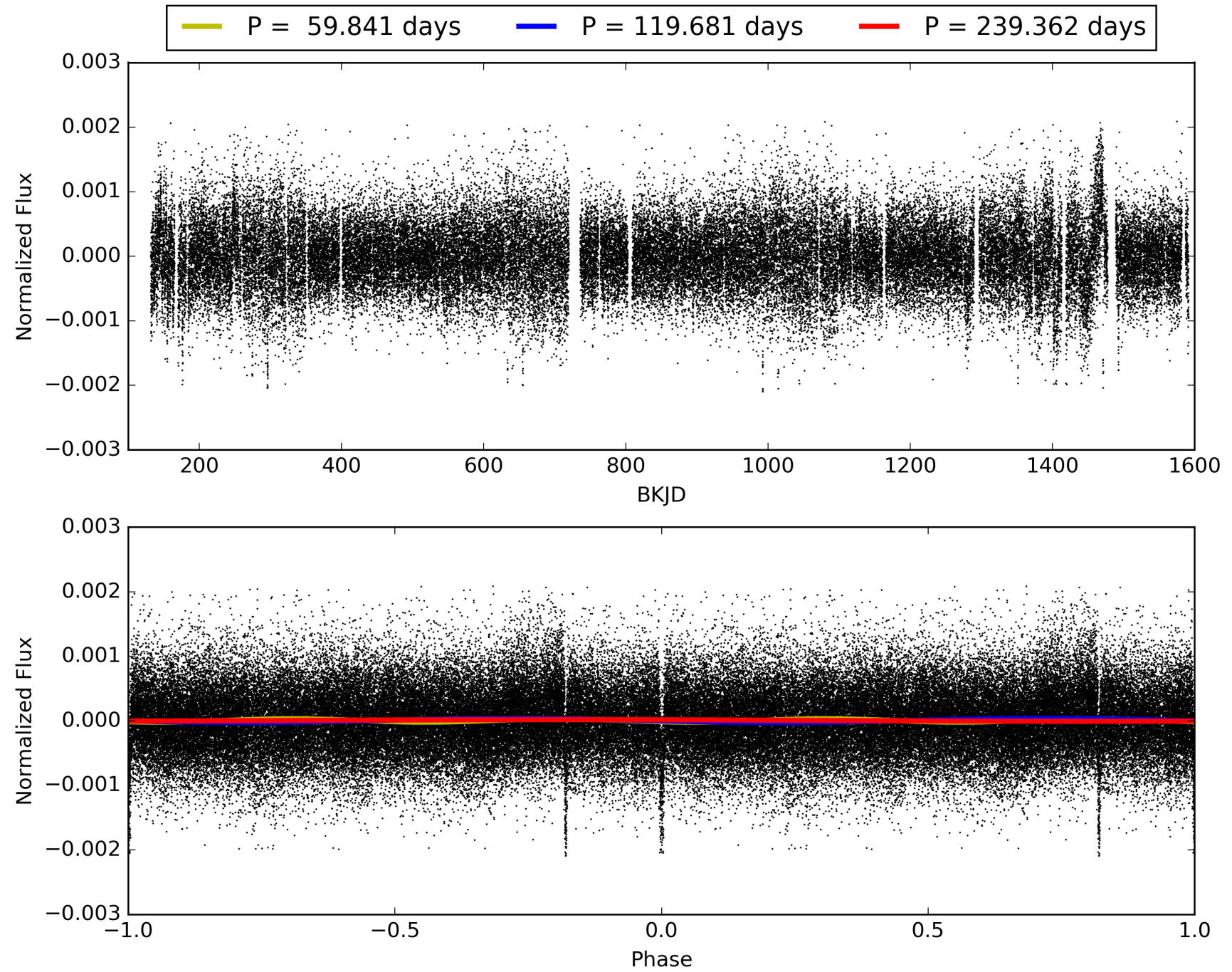
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 07:50:51 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

TCE 003644601-03, PDC Light Curves

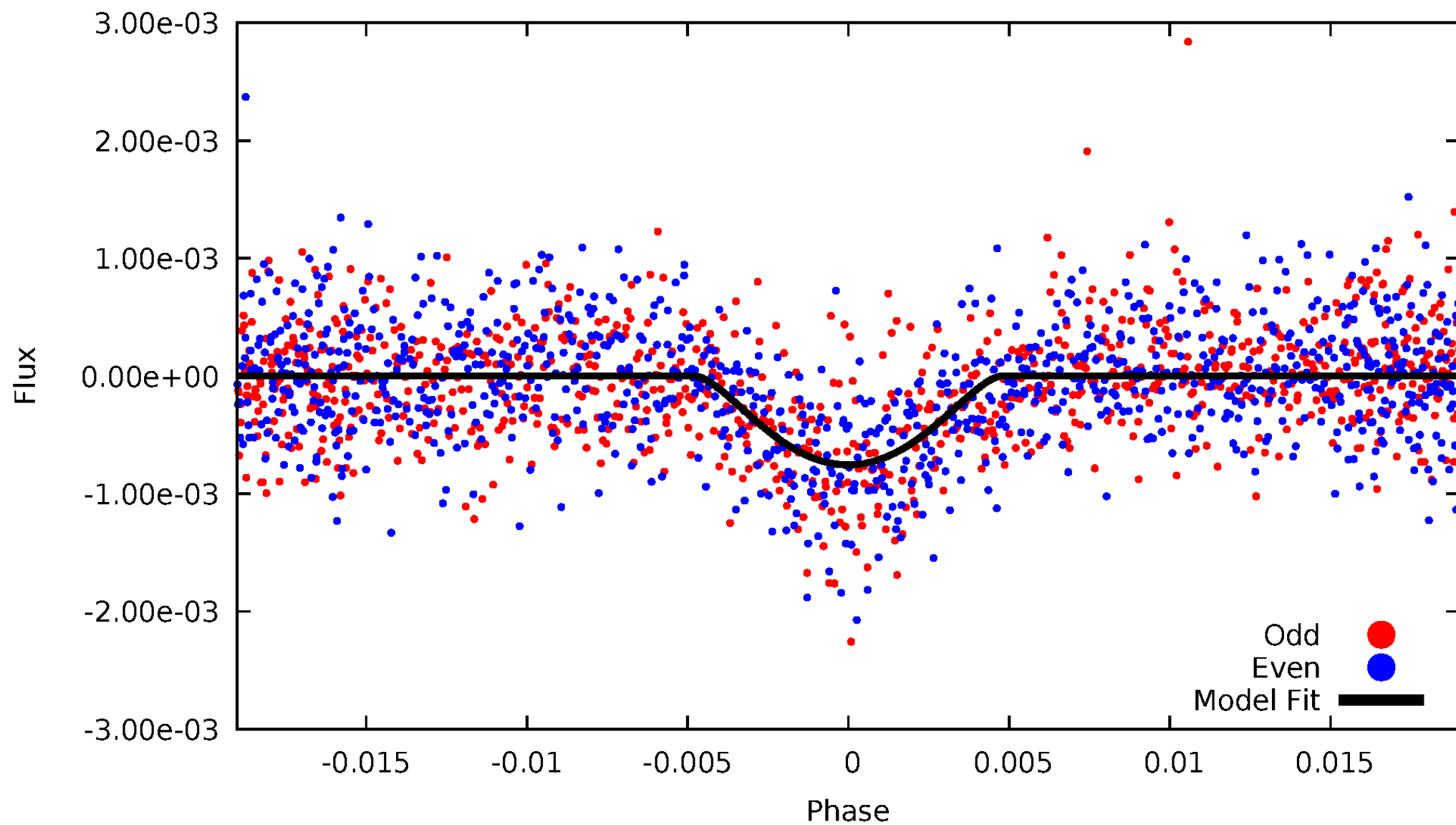


TCE 003644601-03



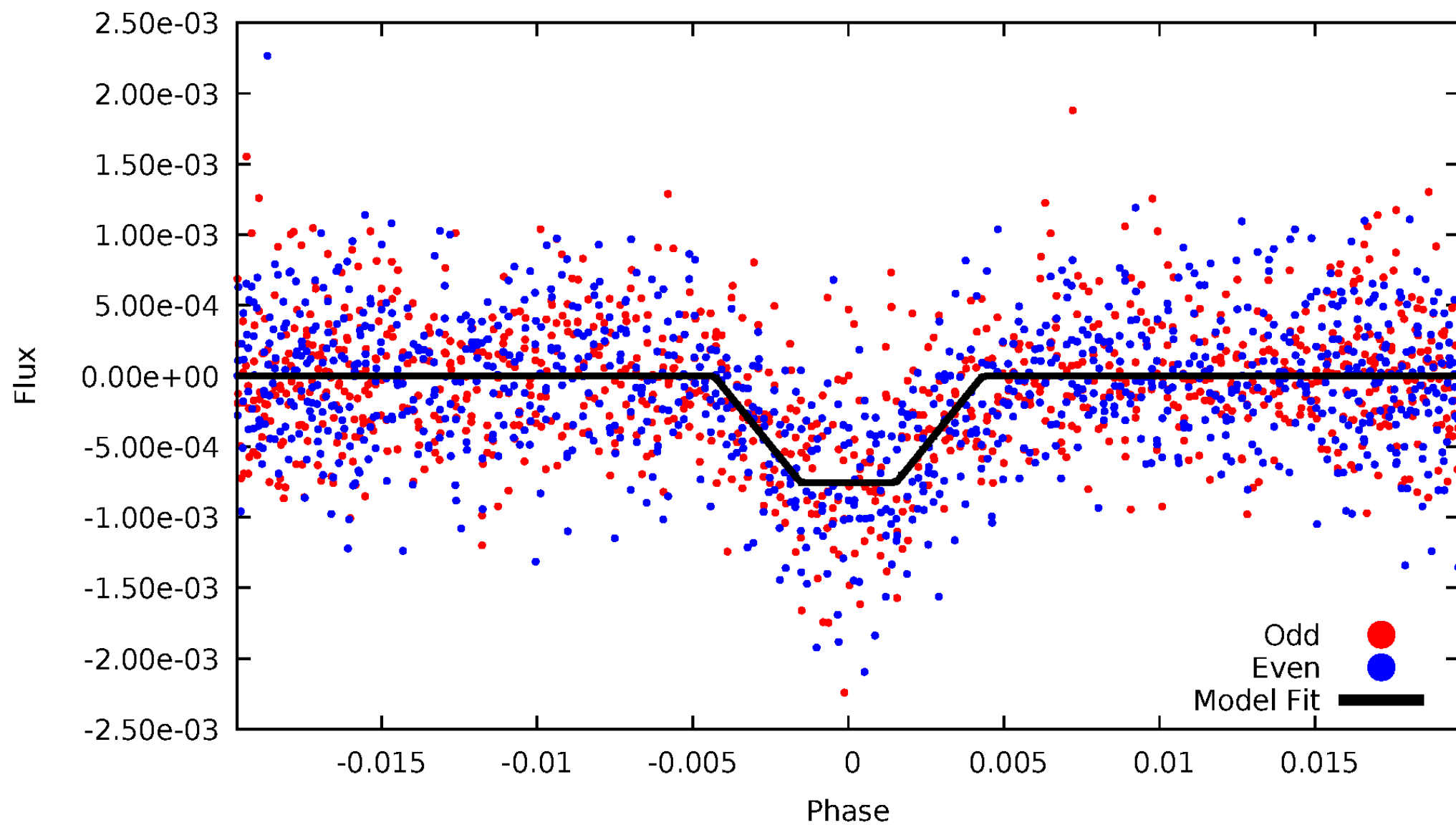
DV Odd/Even

TCE 003644601-03



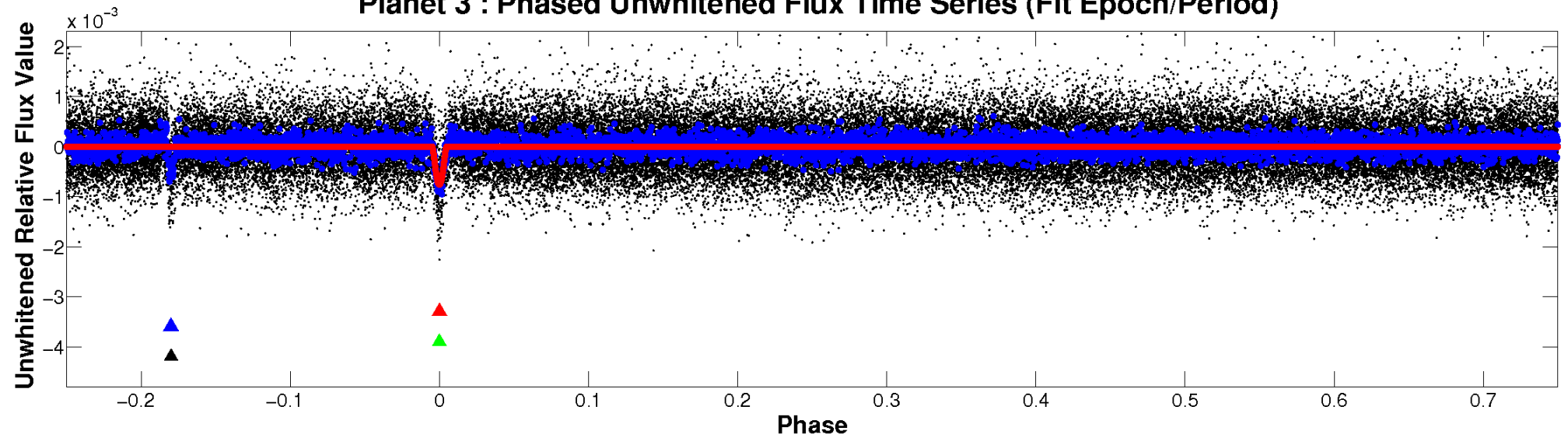
ALT Odd/Even

TCE 003644601-03

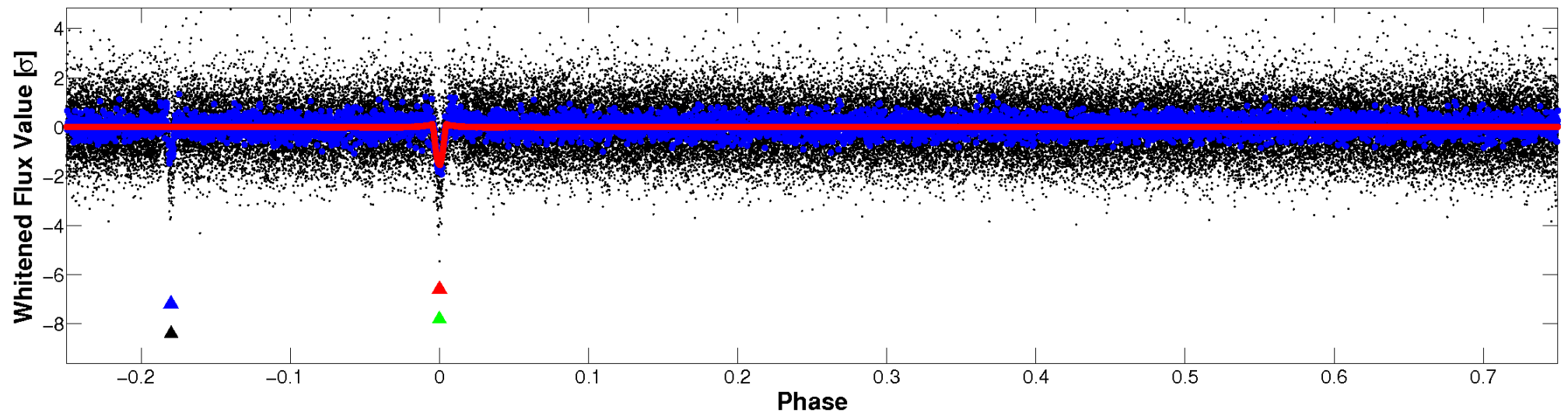


Non-Whitened Vs. Whitened Light Curve

Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

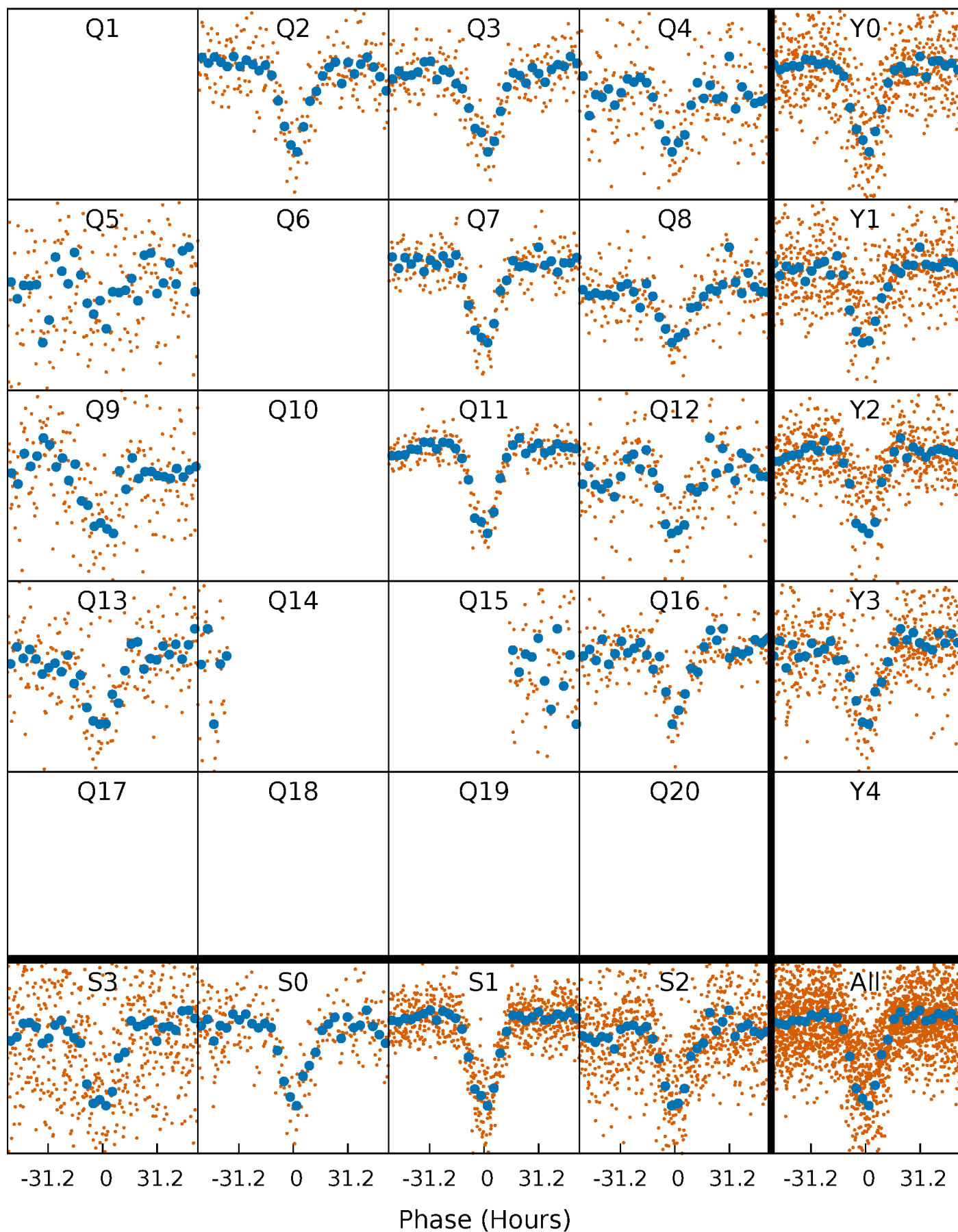


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



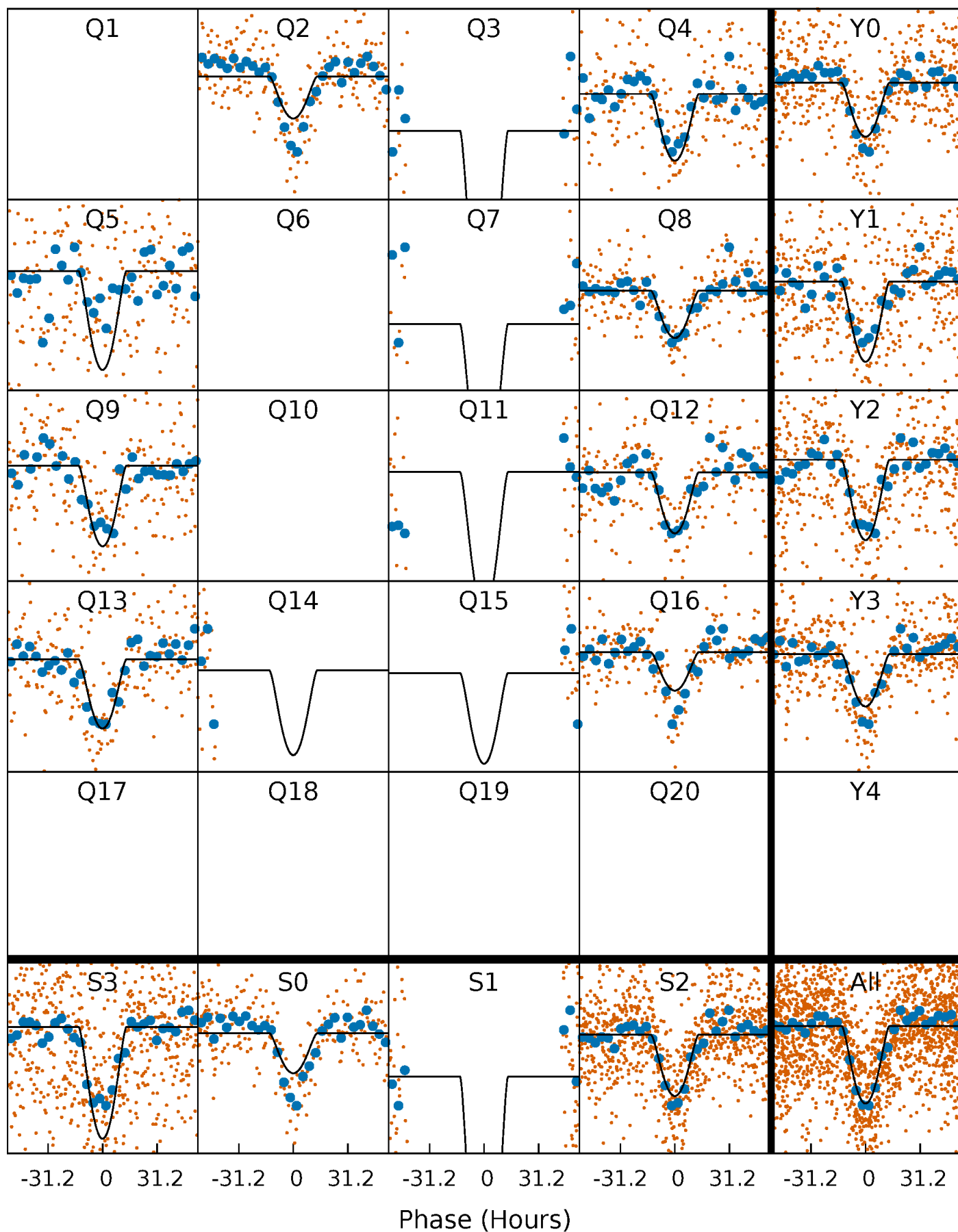
PDC Quarter-Phased Transit Curves

TCE 003644601-03 P=119.681033 Days $T_0=176.089715$ (BKJD)



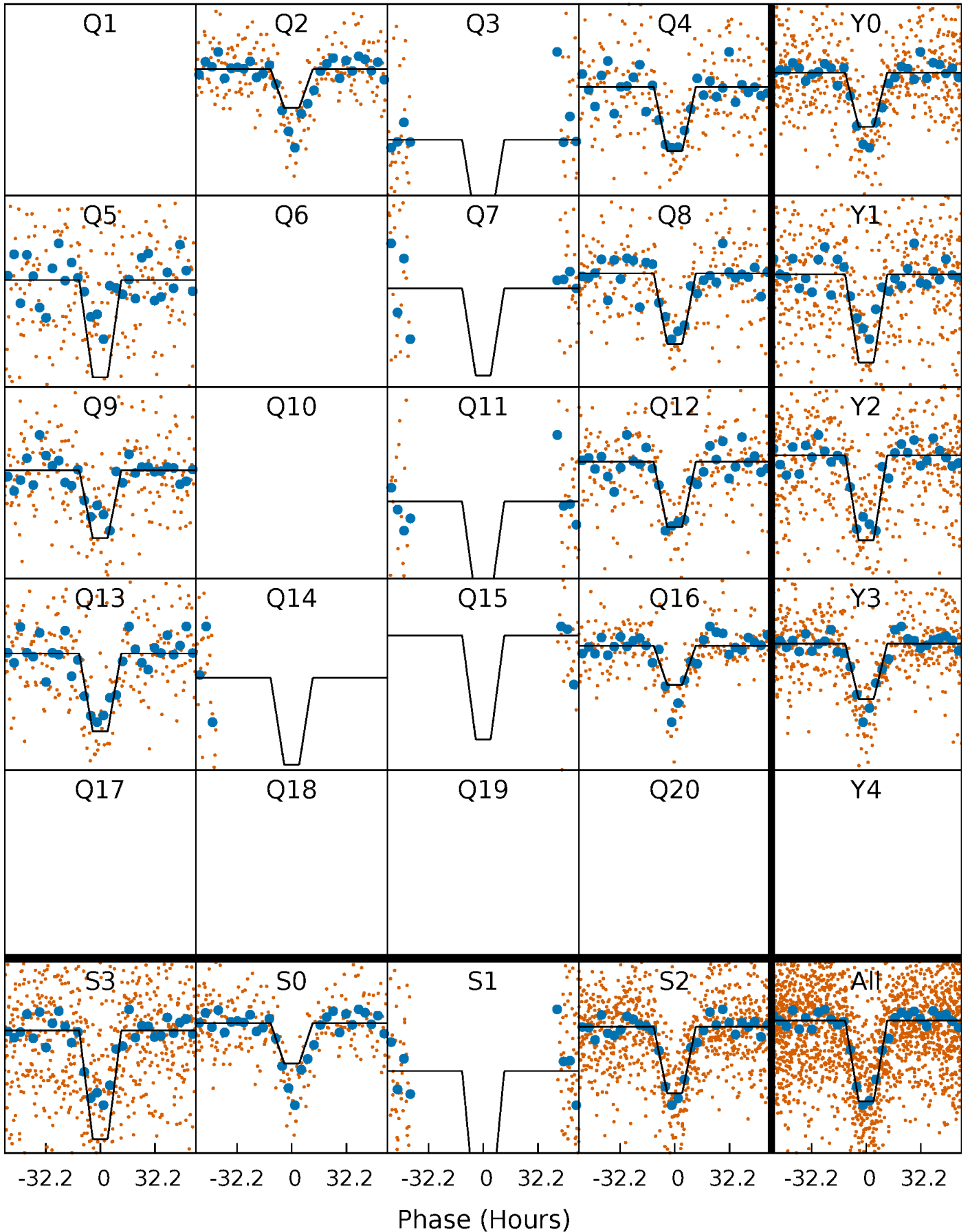
DV Quarter-Phased Transit Curves

TCE 003644601-03 P=119.681033 Days $T_0=176.089715$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

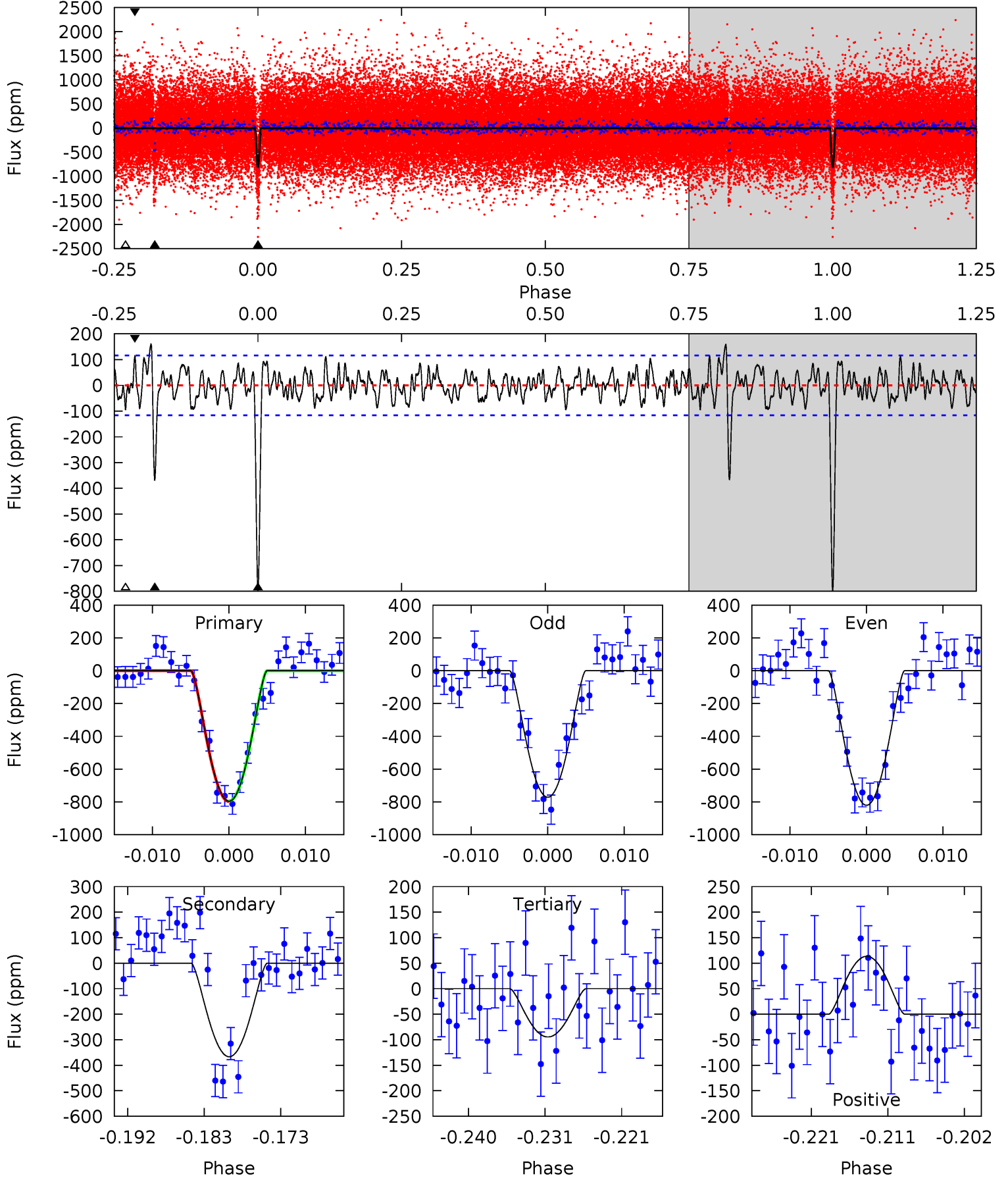
TCE 003644601-03 P=119.686172 Days $T_0=176.058733$ (BKJD)



DV Model-Shift Uniqueness Test

003644601-03, P = 119.681033 Days, E = 56.408682 Days

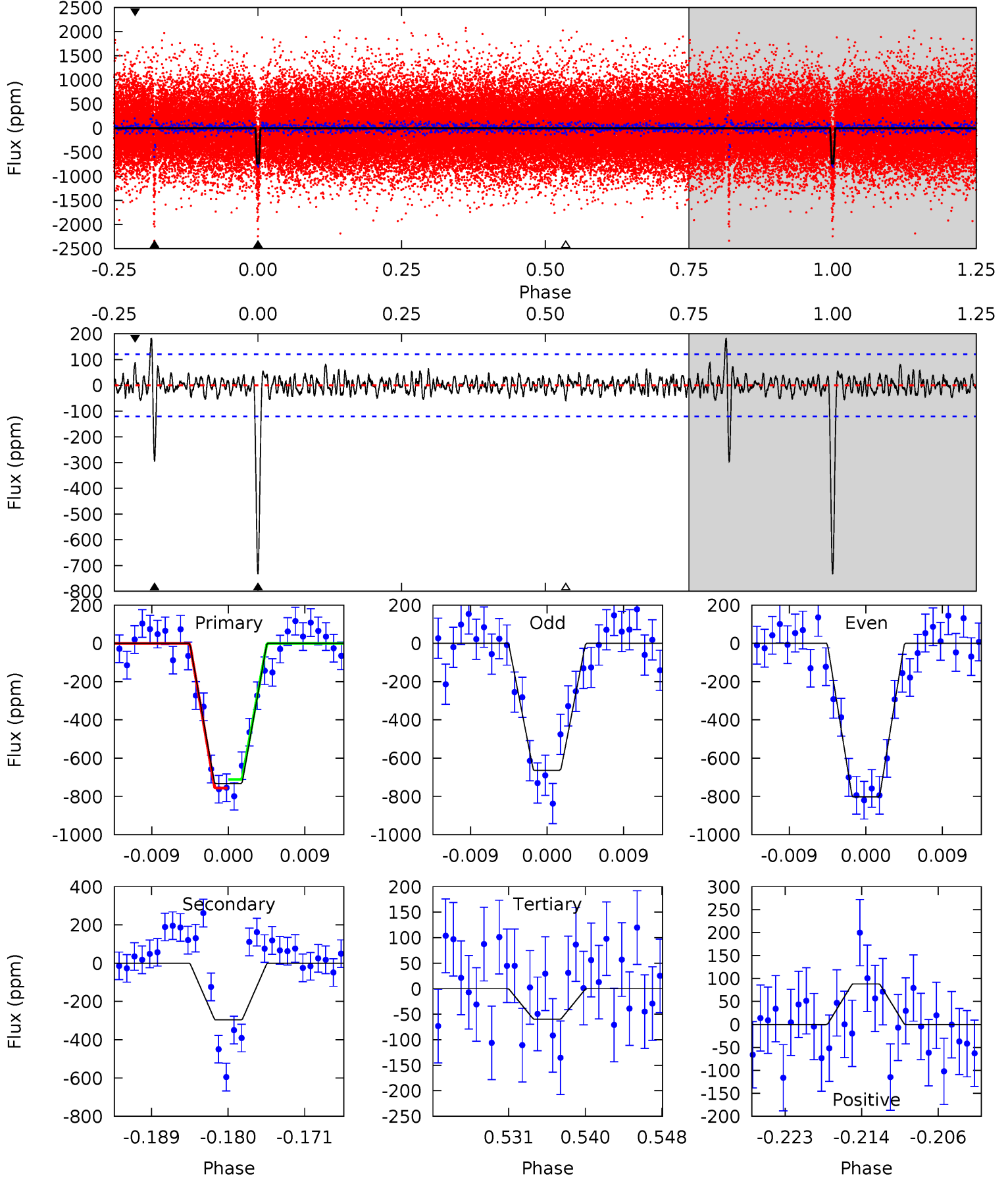
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
34.5	15.9	4.10	4.91	5.03	2.59	1.82	30.4	29.6	11.8	11.0	1.06	1.05	0.17	0.07



Alt Model-Shift Uniqueness Test

003644601-03, P = 119.686172 Days, E = 56.372561 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
30.7	12.4	2.50	3.69	5.06	2.63	1.00	28.2	27.0	9.90	8.72	2.91	1.09	0.20	0.93



Stellar Parameters For KIC 003644601

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	M (M_{\odot})	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5715^{+155}_{-172}	$4.537^{+0.055}_{-0.176}$	$-0.300^{+0.300}_{-0.300}$	$0.834^{+0.224}_{-0.075}$	$0.873^{+0.100}_{-0.090}$	$2.122^{+0.505}_{-1.004}$
	+3%/-3%	+1%/-4%	+100%/-100%	+27%/-9%	+11%/-10%	+24%/-47%
Source	PHO1	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

Secondary Eclipse Parameters for KIC 003644601-03 / KOI 3862.02

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-367 ± 23	$5.88^{+4.73}_{-3.86}$	484^{+34}_{-20}	3599^{+1789}_{-568}	1197^{+8739}_{-827}
Alt.	-296 ± 24	$4.46^{+4.29}_{-3.06}$	485^{+30}_{-23}	3810^{+2408}_{-720}	1711^{+15555}_{-1279}

T_{max} = Theoretical Maximum Planetary Temperature

T_{obs} = Observed Planetary Temperature (Assuming $A=0.3$)

A_{obs} = Observed Albedo (Assuming $T=0$)

If a secondary eclipse is present, the system is likely an EB if $T_{obs} \gg T_{max}$ AND $A_{obs} \gg 1.0$

DV Centroid Data

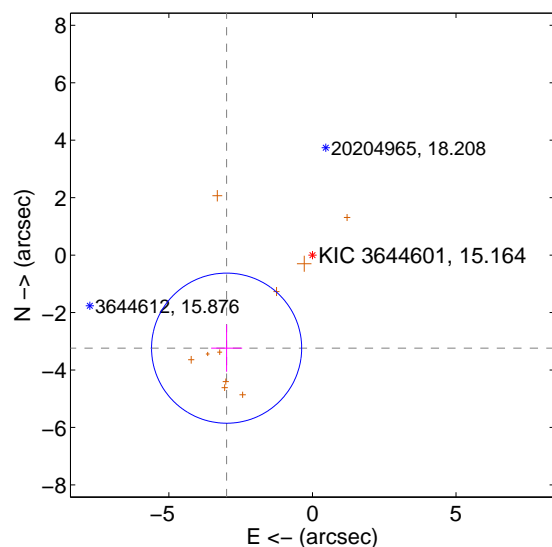
Supplemental centroid analysis for 003644601-03. Kepler magnitude: 15.16. Transit SNR 20.16

There are 0 quarters with good PRF difference image offsets

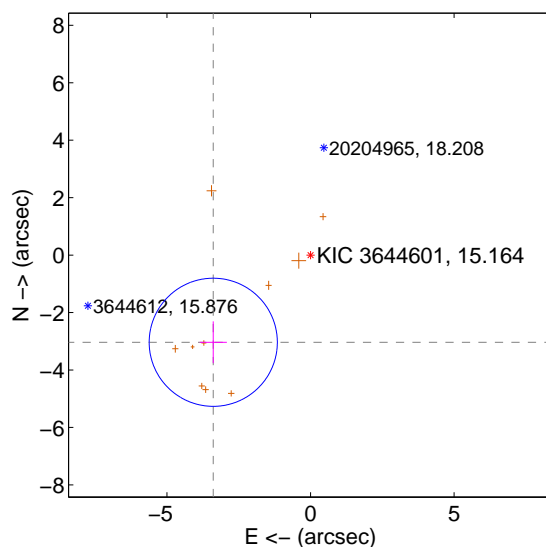
The direct PRF centroid is offset from the target star catalog position by about 0.30 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	4.408 \pm 0.871	5.06	2.988 \pm 0.540	-3.241 \pm 0.820
PRF-fit source offset from KIC position	4.547 \pm 0.744	6.12	3.386 \pm 0.472	-3.035 \pm 0.728
photometric centroid source offset	2.04 \pm 0.58	3.53	0.46 \pm 0.66	-1.98 \pm 0.57

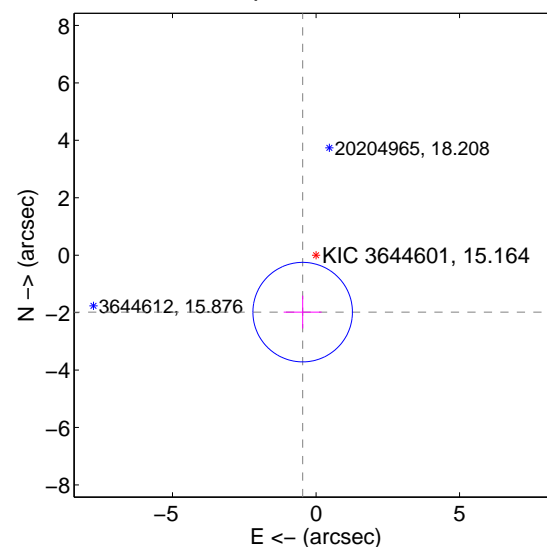
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

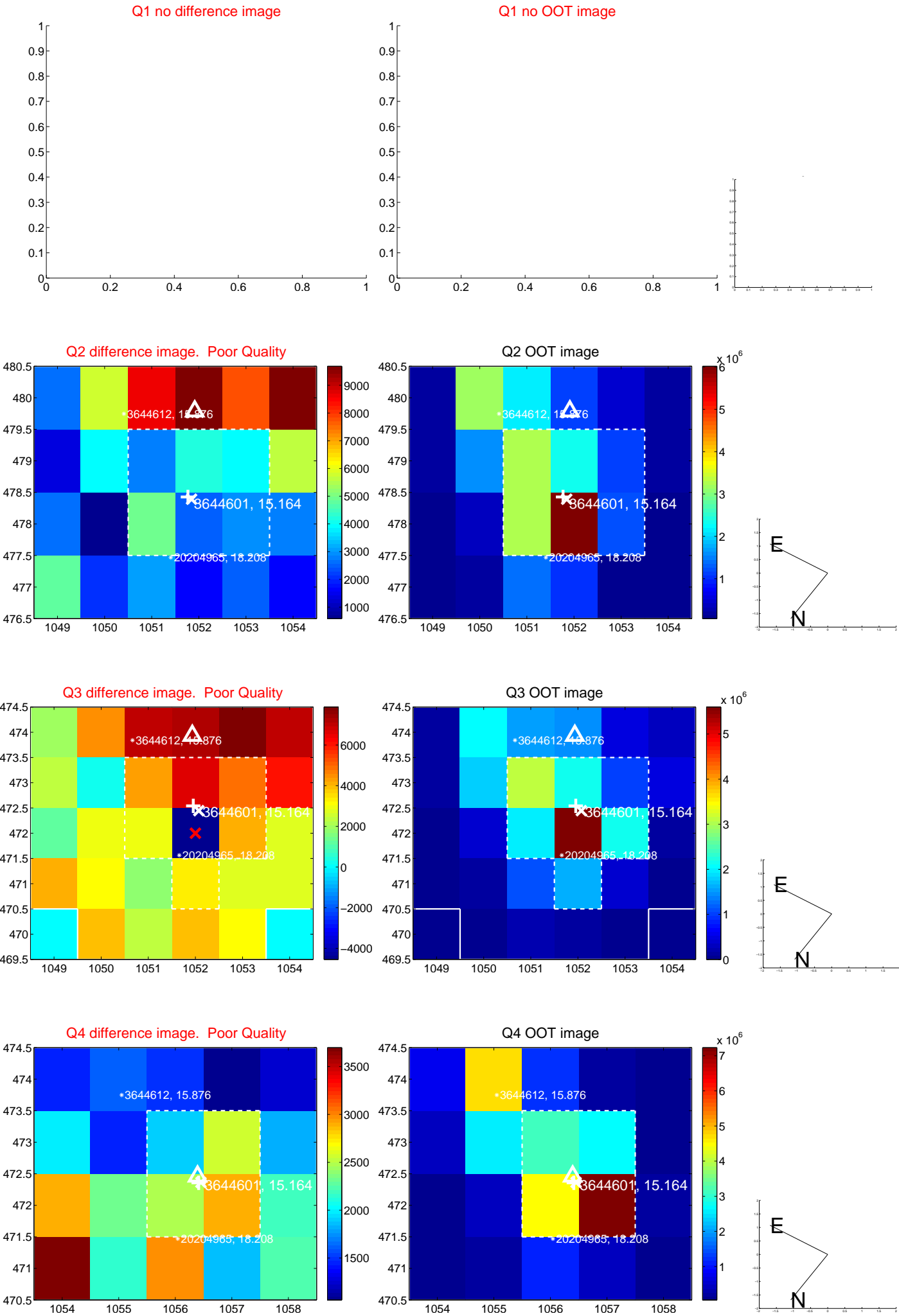


offset from photometric centroids

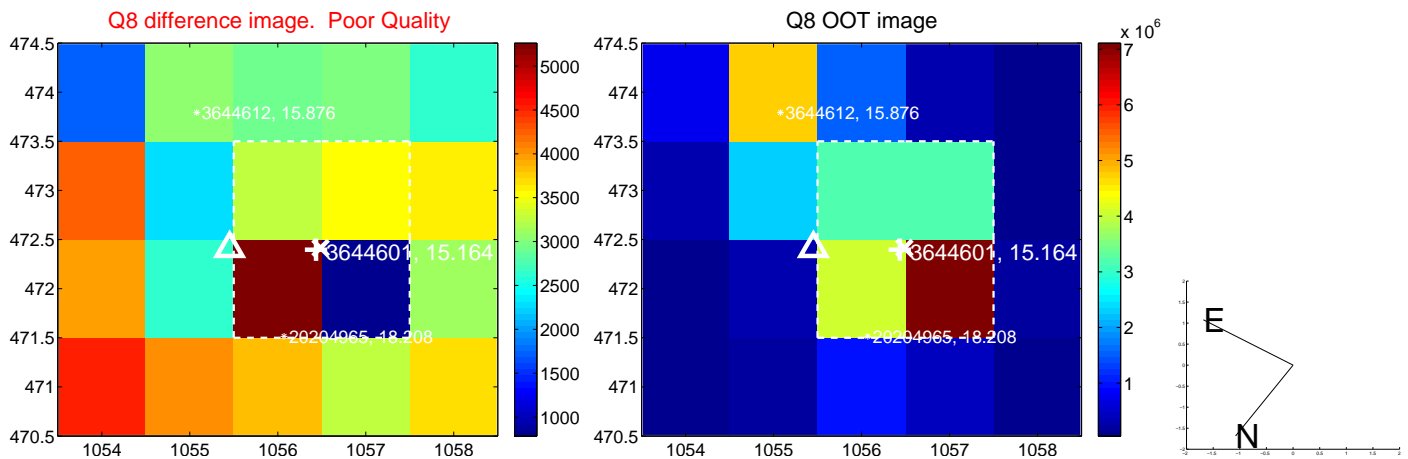
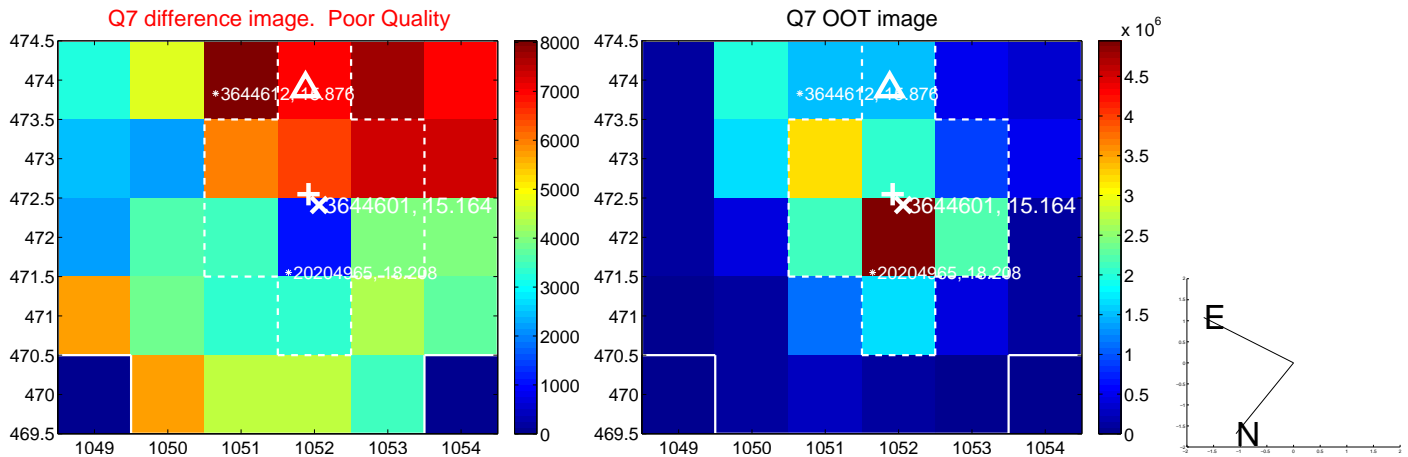
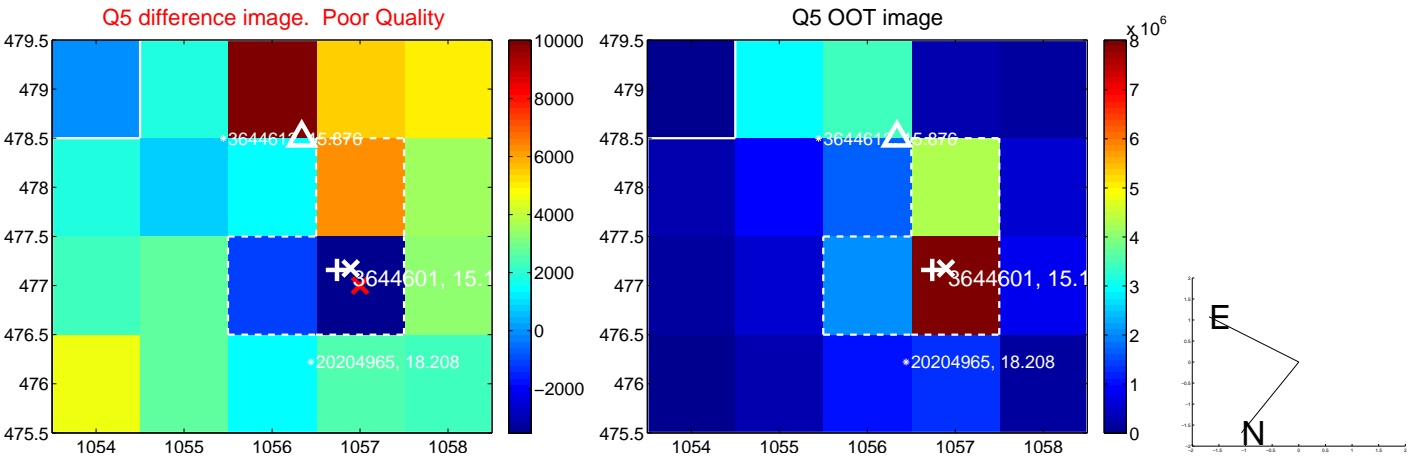


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ . Red *: target star. Blue *: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

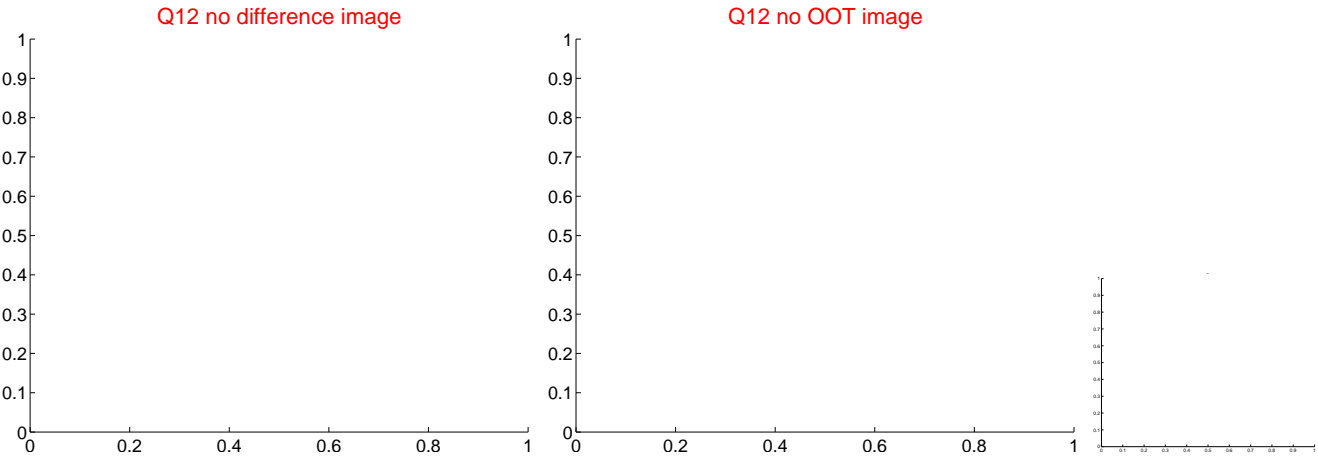
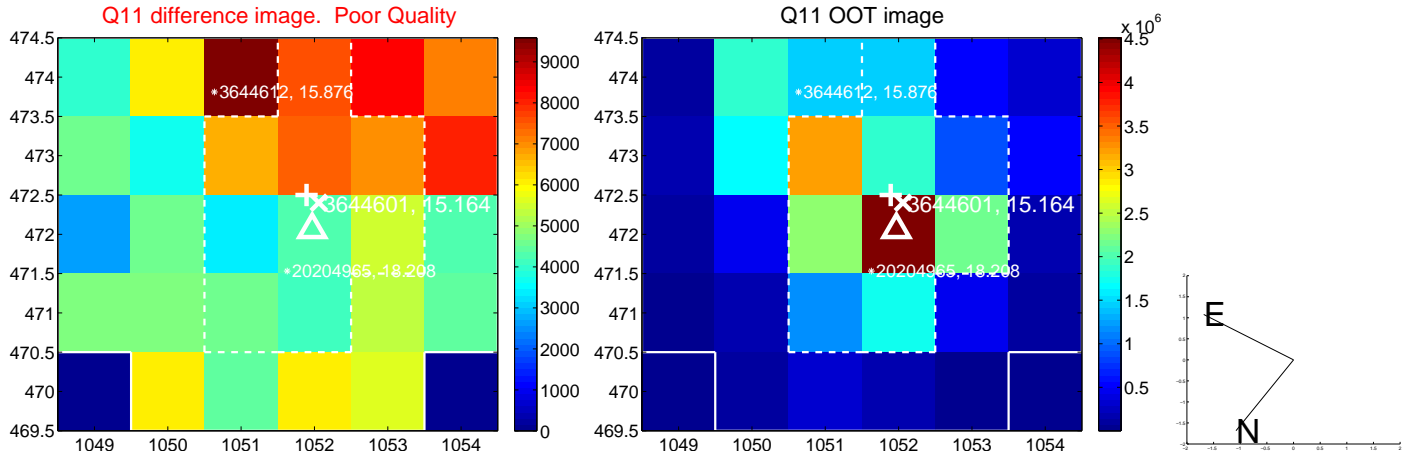
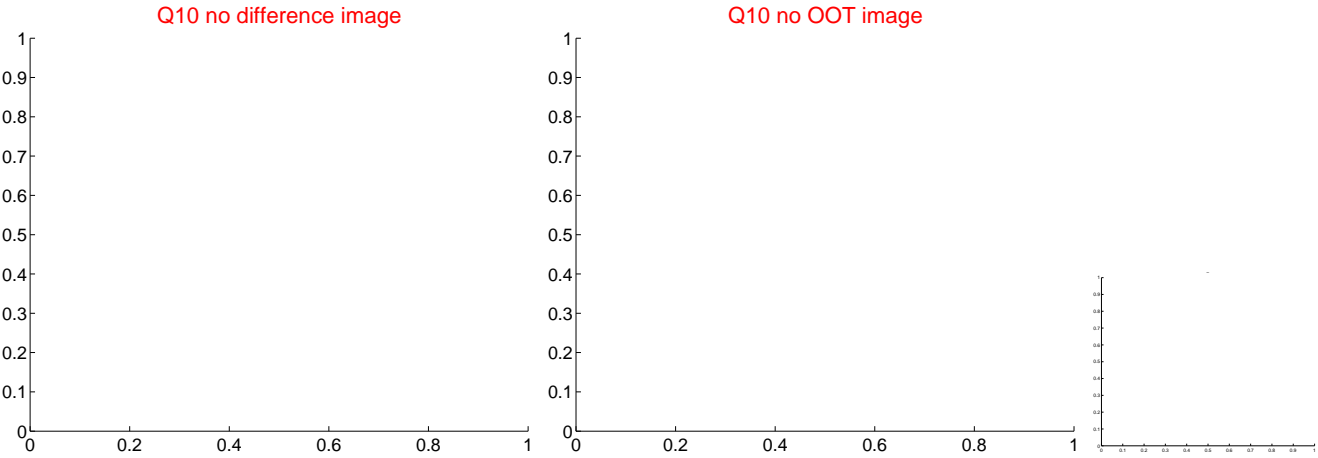
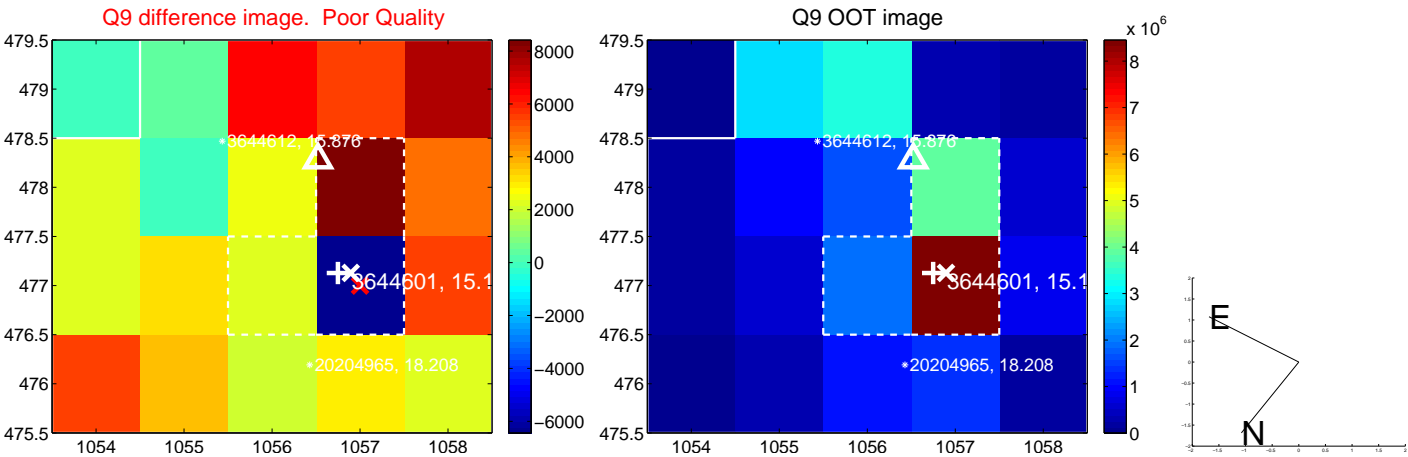
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



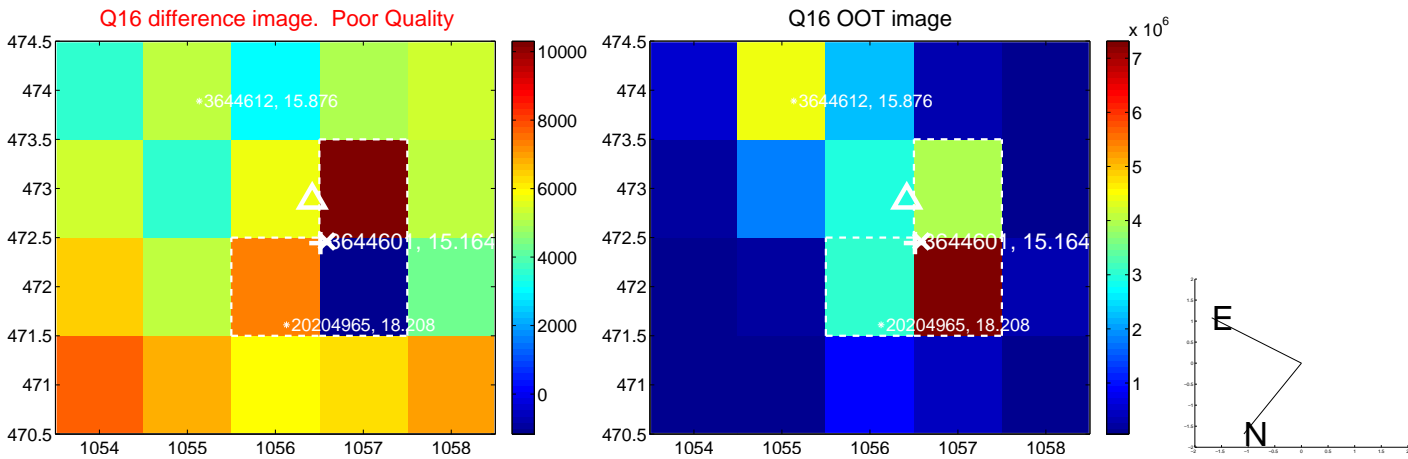
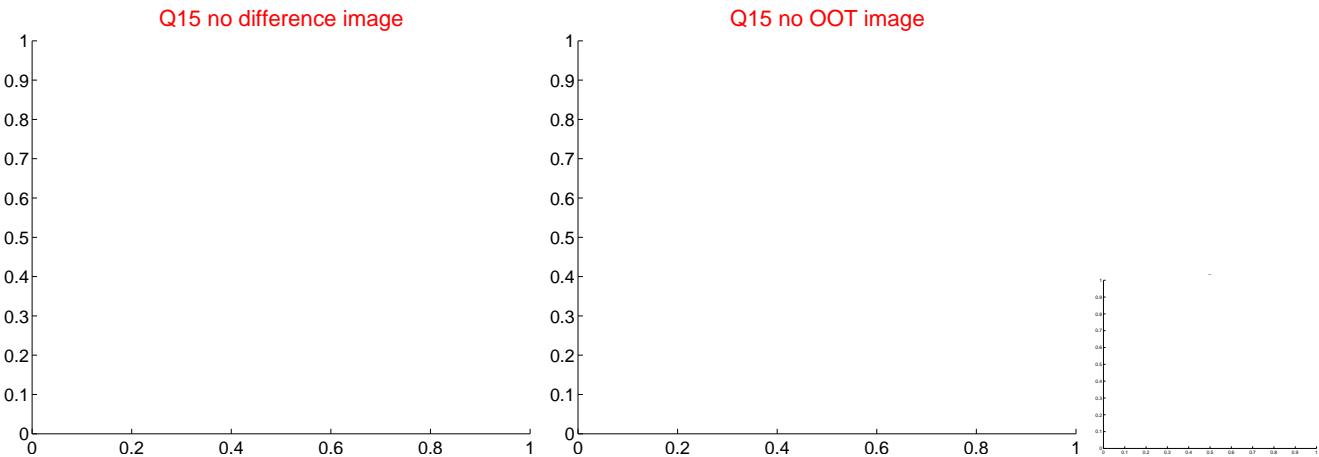
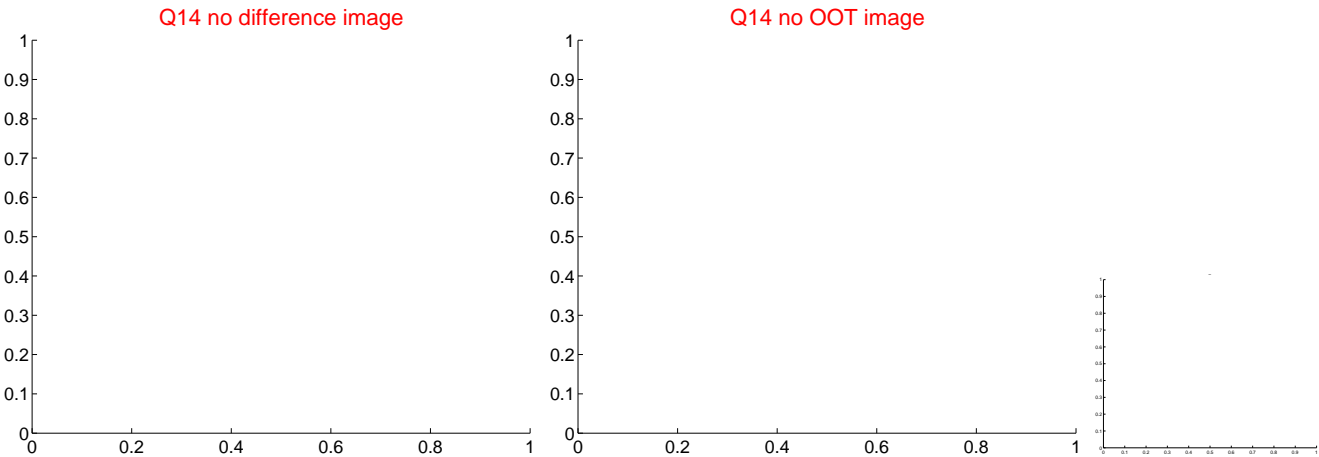
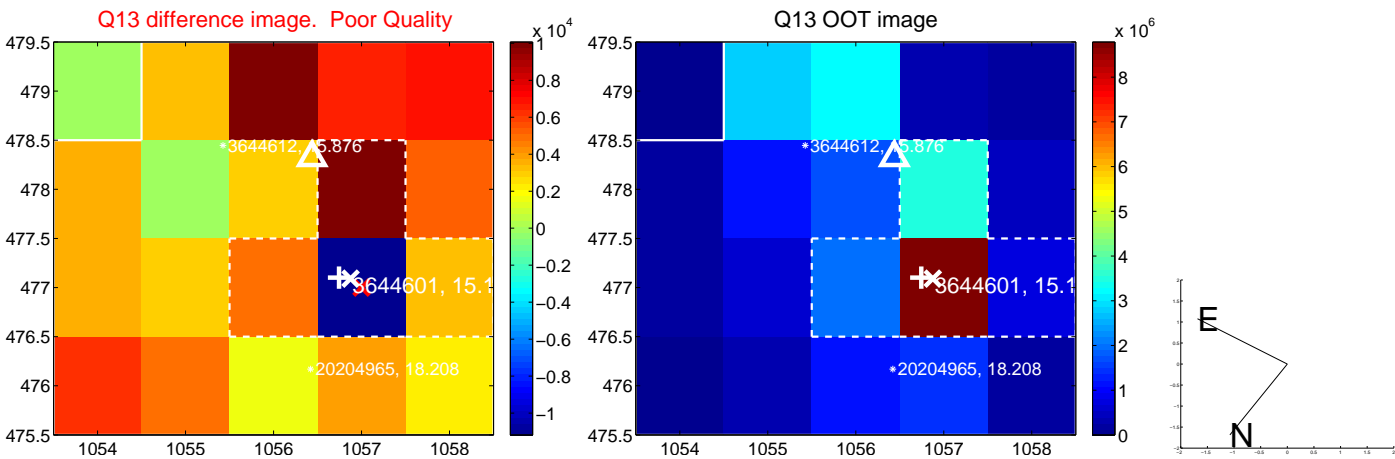
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



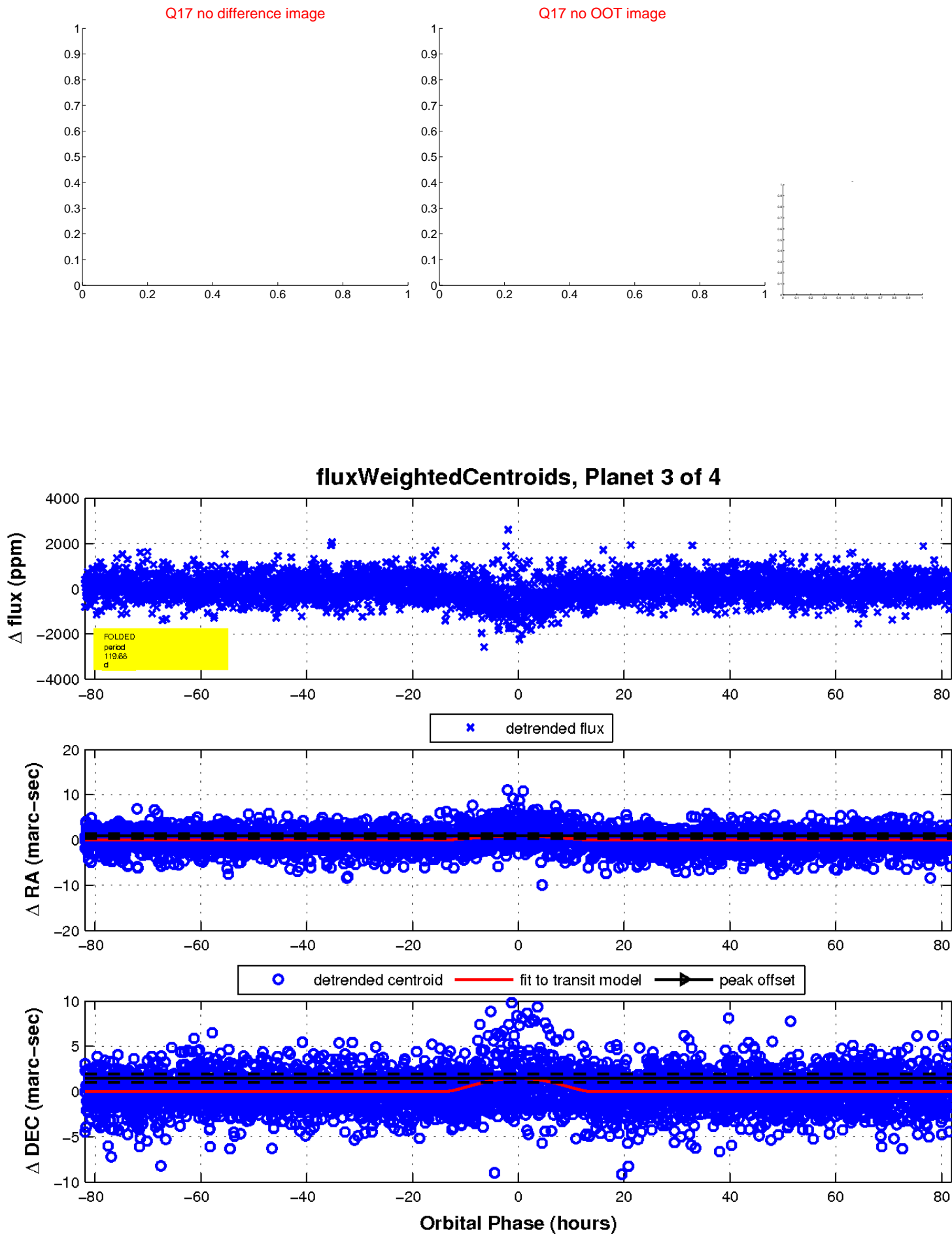
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

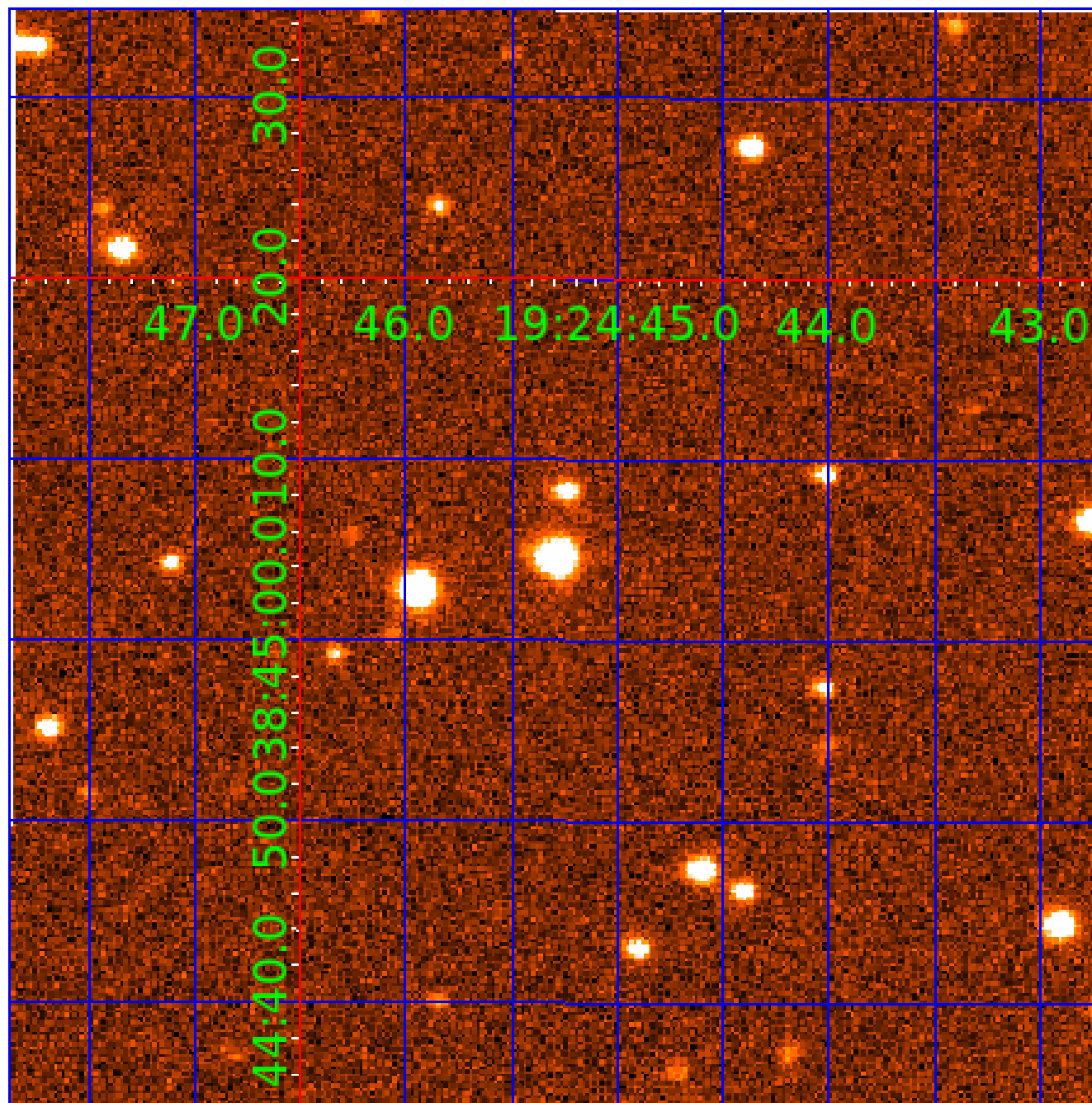


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 003644601

Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	R_{\star} (R_{\odot})	T_{\star} (K)	R_p (R_{\oplus})	S_p (S_{\oplus})
003644601-01	OBS	3862.01	359.040205	295.788452	2684.7	29.318	30.2	33.6	0.83	5715	7.68	0.74
003644601-02	OBS	No	359.035018	274.245063	1883.6	14.075	25.7	25.2	0.83	5715	4.46	0.74
003644601-03	OBS	3862.02	119.681034	176.089715	754.3	27.303	19.1	20.2	0.83	5715	4.12	3.22
003644601-04	OBS	No	119.680595	154.565873	507.3	14.096	10.2	12.3	0.83	5715	2.37	3.22

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003644601-01	OBS	FP	0.00	1	0	1	1	INDIV_TRANS_MARSHALL_SKYE—CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH
003644601-02	OBS	FP	0.00	1	0	1	1	INDIV_TRANS_MARSHALL_SKYE—SAME_NTL_PERIOD—CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH
003644601-03	OBS	FP	0.00	1	0	1	1	INDIV_TRANS_SKYE—SAME_NTL_PERIOD—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
003644601-04	OBS	FP	0.00	1	0	1	1	SAME_NTL_PERIOD—CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH

Notes: OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 003644601-04

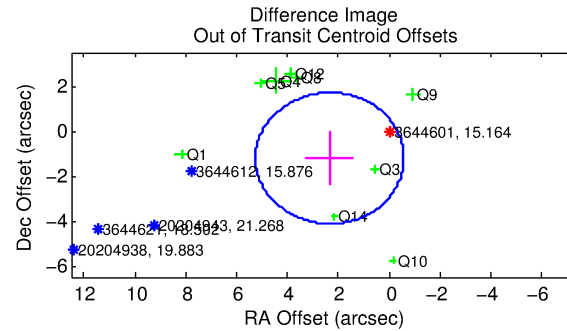
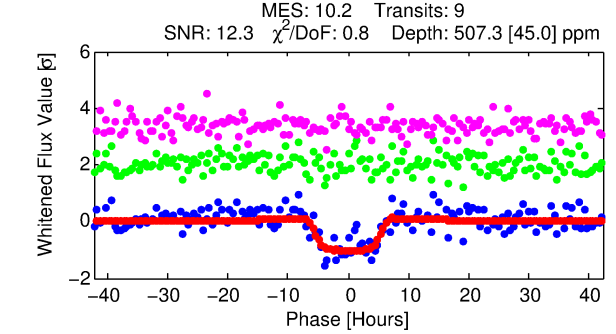
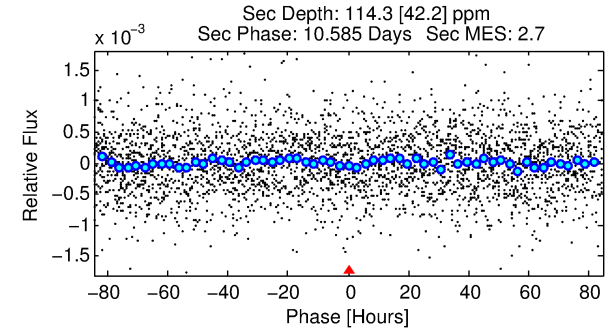
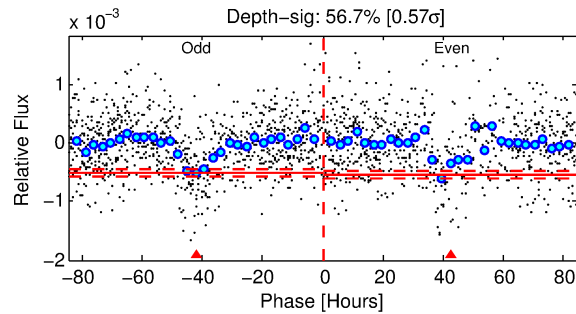
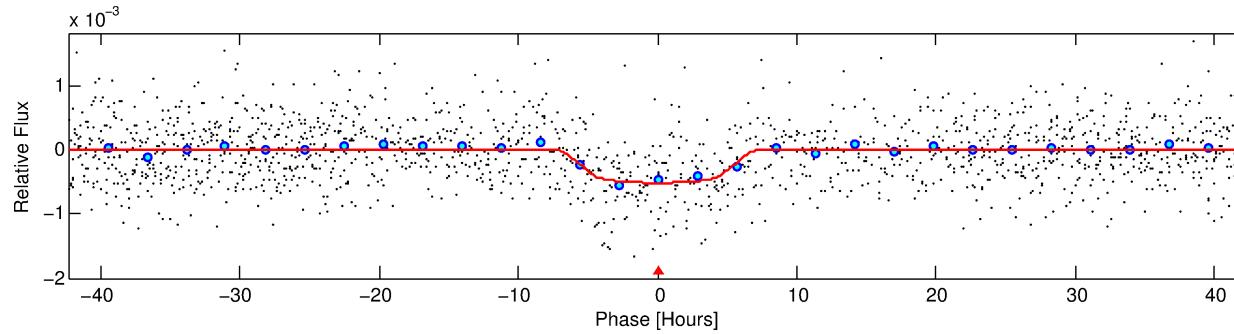
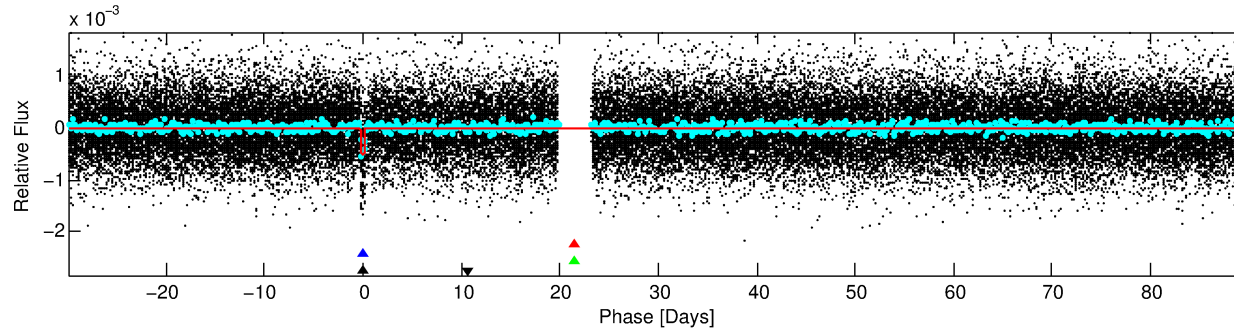
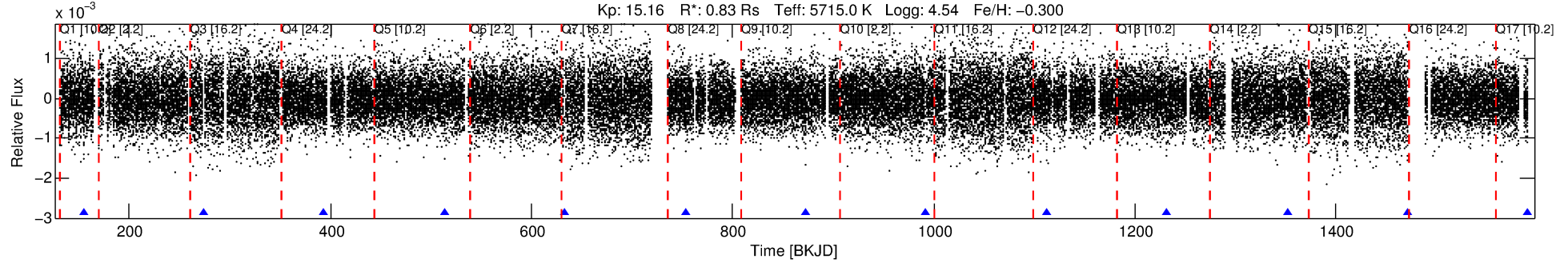
TCE (1)	KIC	Parent (2)	Parent KIC	P ₁ :P ₂	Dist (″)	Δ Row	Δ Col	m ₂	m ₁	D ₂ /D ₁	Mechanism	Flag	σ_P	σ_T
003644601-04	3644601	003644542-sec	3644542	1:1	71.5	17	-4	8.35	15.16	506.90	Direct-PRF	0	0.10	0.34

Notes: P₁:P₂ is the period ratio. Dist is the distance in arcseconds. Δ Row and Δ Col are the number of pixels apart in row and column. m₂ and m₁ are the magnitudes of the parent and child. D₂/D₁ is the parent's transit depth divided by the child's. σ_P and σ_T are the significance of the match in period and epoch. For a match to be considered significant $\sigma_P < 5.0$ and $\sigma_T < 5.0$. Matches which have σ_P and σ_T very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

DV One-Page Summary

KIC: 3644601 Candidate: 4 of 4 Period: 119.681 d
KOI: K03862 Corr: No Ephemeris Match

Kp: 15.16 R*: 0.83 Rs Teff: 5715.0 K Logg: 4.54 Fe/H: -0.300



DV Fit Results:

Period = 119.68059 [0.00339] d
Epoch = 154.5659 [0.0229] BKJD
Rp/R* = 0.0261 [0.0019]
a/R* = 25.38 [6.08]
b = 0.95 [0.03]
Seff = 3.22 [1.11]
Teq = 342 [30] K
Rp = 2.37 [0.66] Re
a = 0.4545 [0.1019] AU
Ag = 2306.70 [1183.28] [1.95σ]
Teffp = 3660 [380] K [8.70σ]

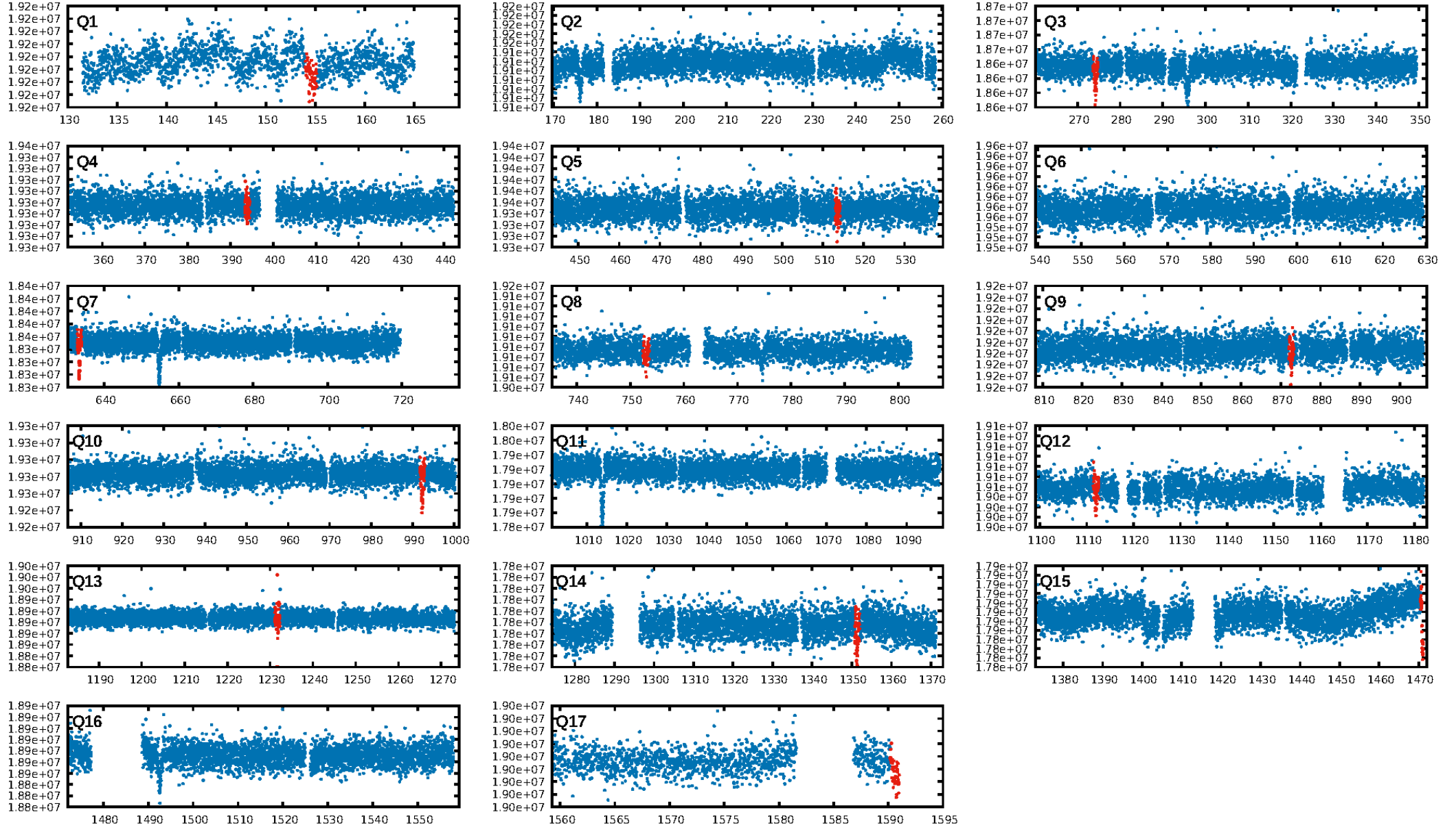
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: 26.9%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 1.28e-23
RollingBand-fgt: 1.00 [7/7]
GhostDiagnostic-chr: -0.1101
Centroid-sig: 65.7%
Centroid-so: 1.951 arcsec [1.97σ]
OotOffset-rm: 2.634 arcsec [2.71σ]
KicOffset-rm: 2.861 arcsec [2.96σ]
OotOffset-st: 2/1/3/3 [9]
KicOffset-st: 2/1/3/3 [9]
DiffImageQuality-fgm: 0.00 [0/9]
DiffImageOverlap-fno: 0.67 [6/9]

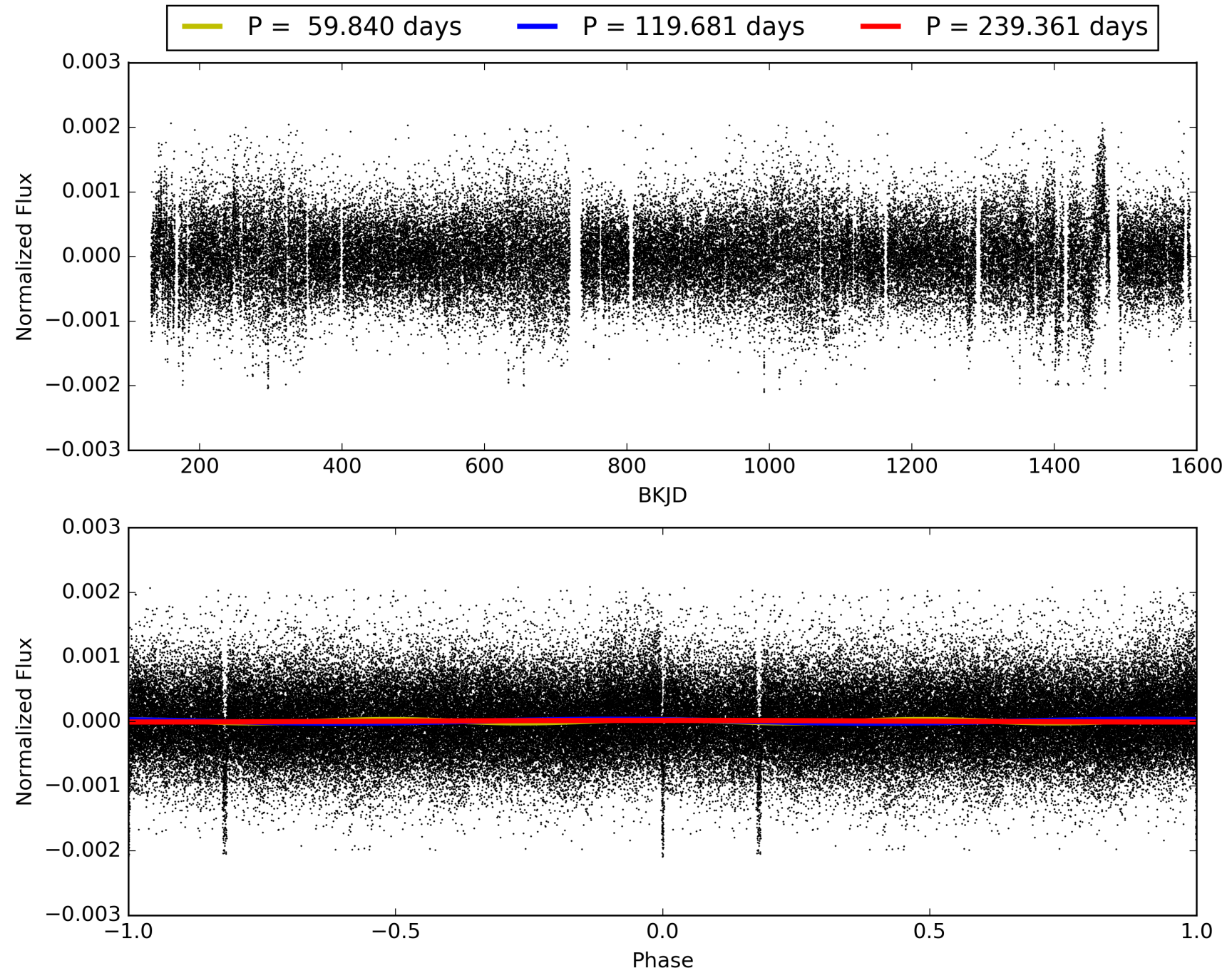
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 07:50:58 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

TCE 003644601-04, PDC Light Curves

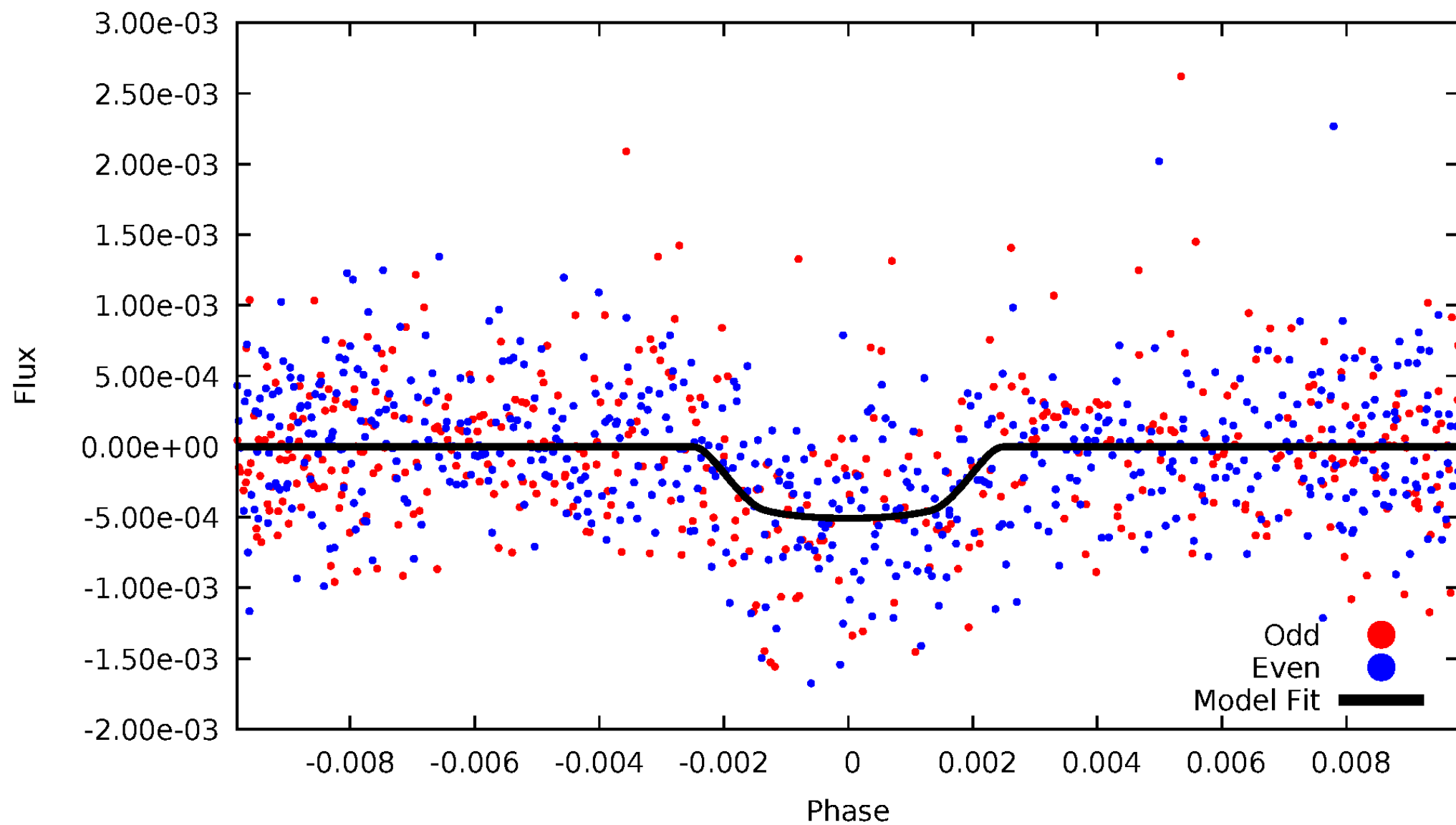


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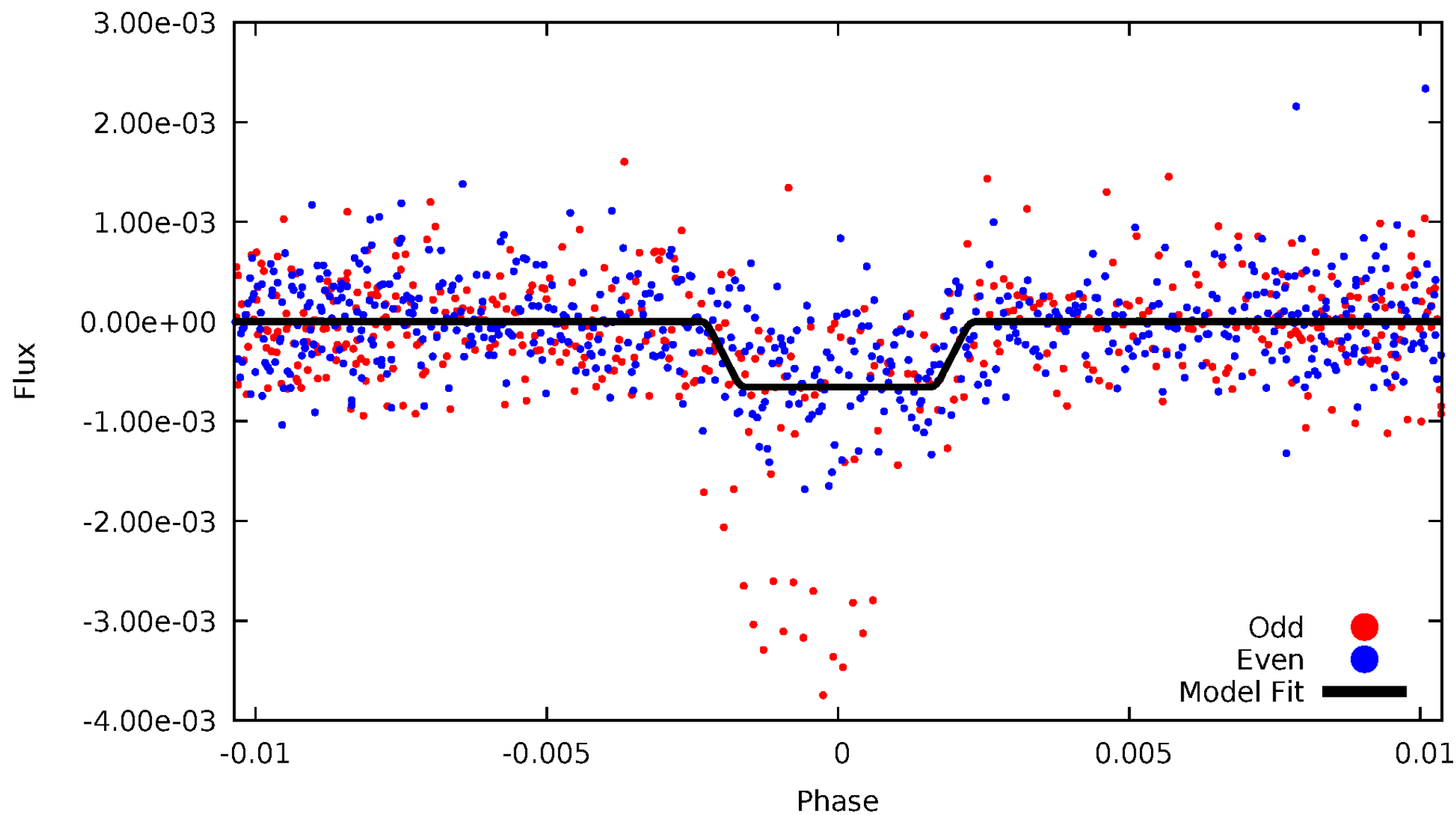
DV Odd/Even

TCE 003644601-04



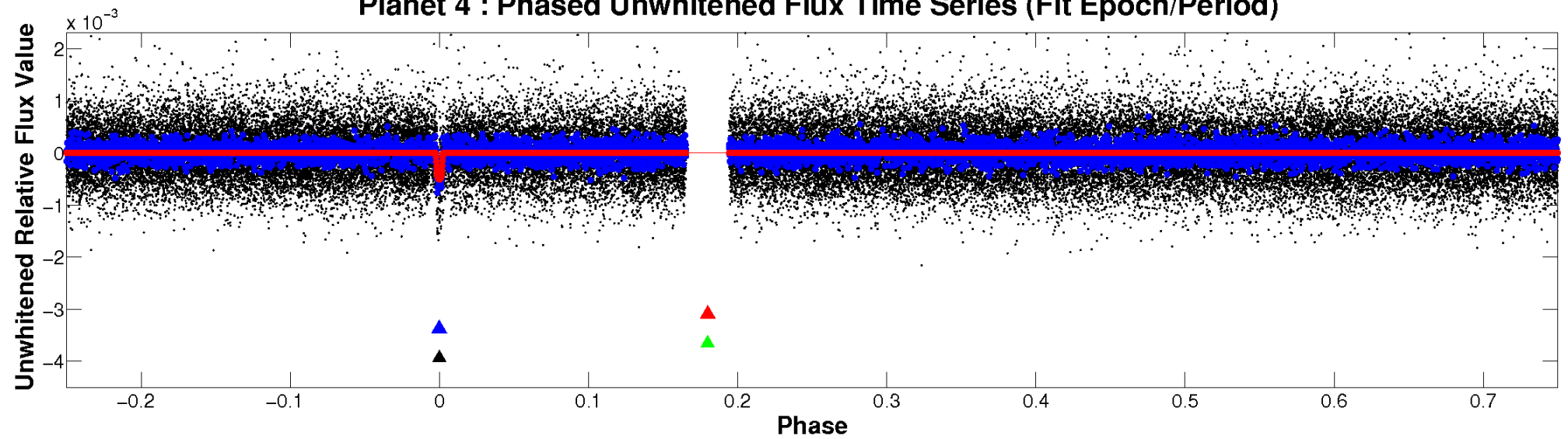
ALT Odd/Even

TCE 003644601-04

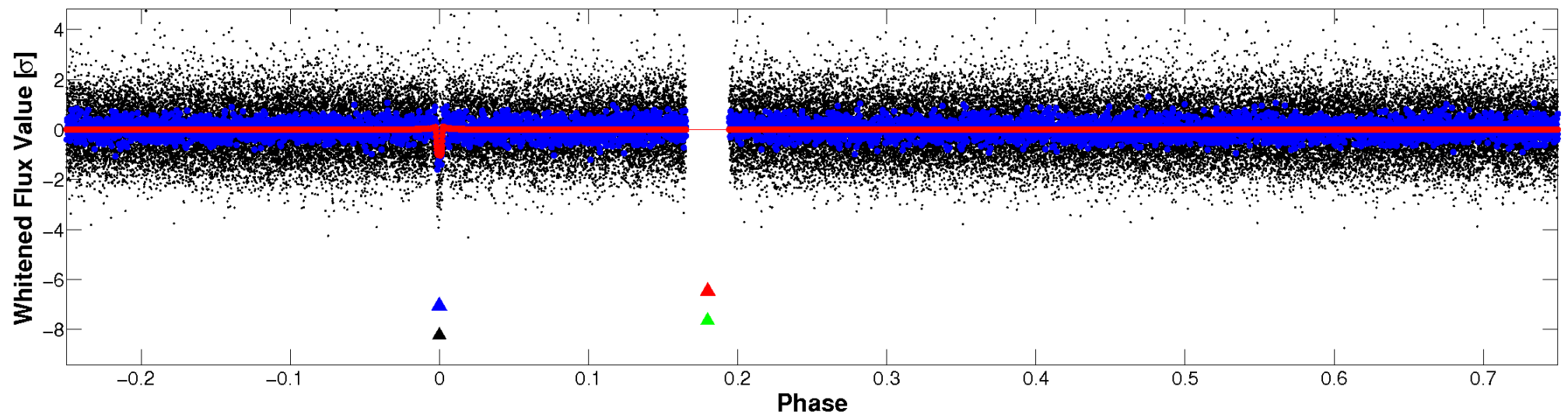


Non-Whitened Vs. Whitened Light Curve

Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

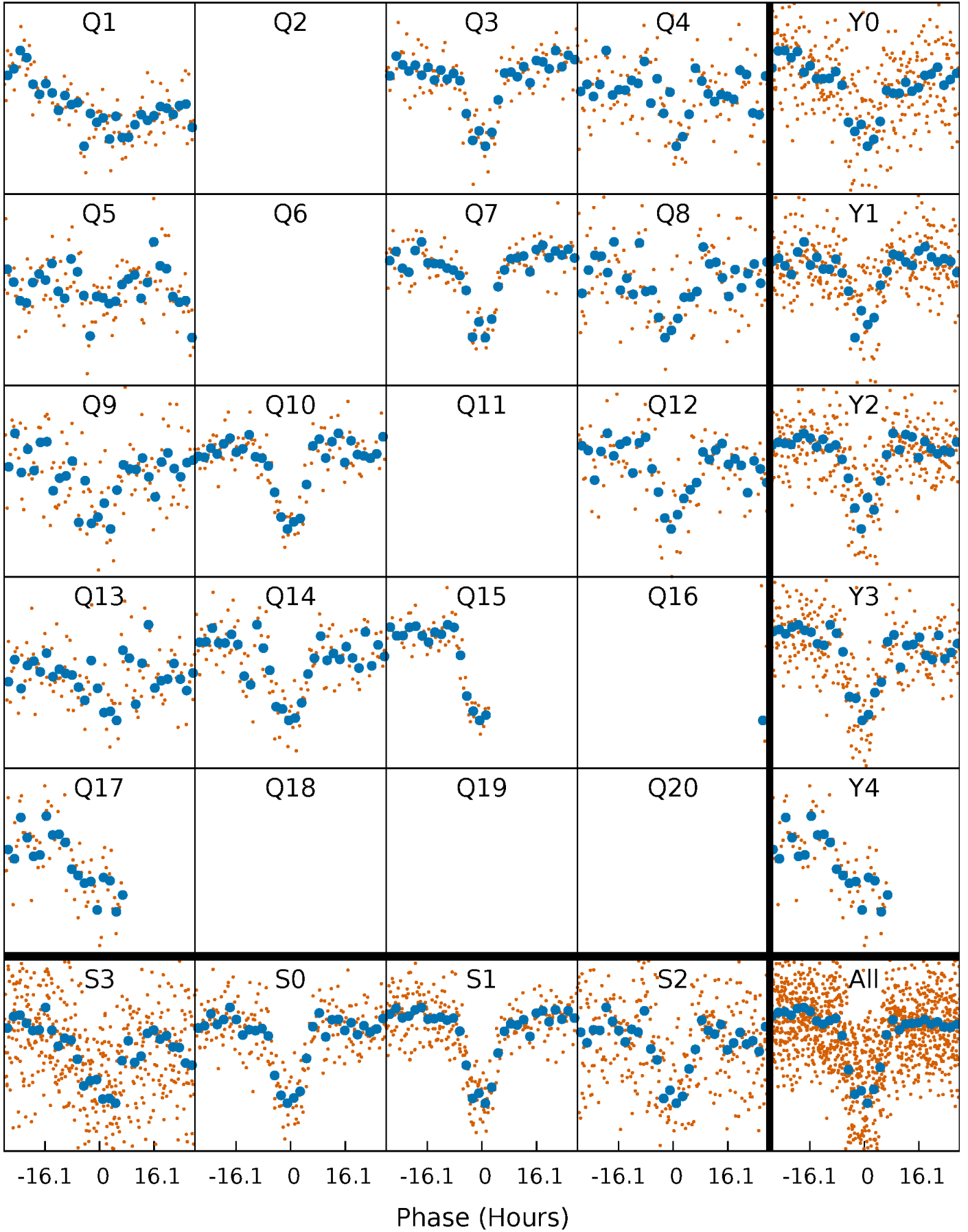


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



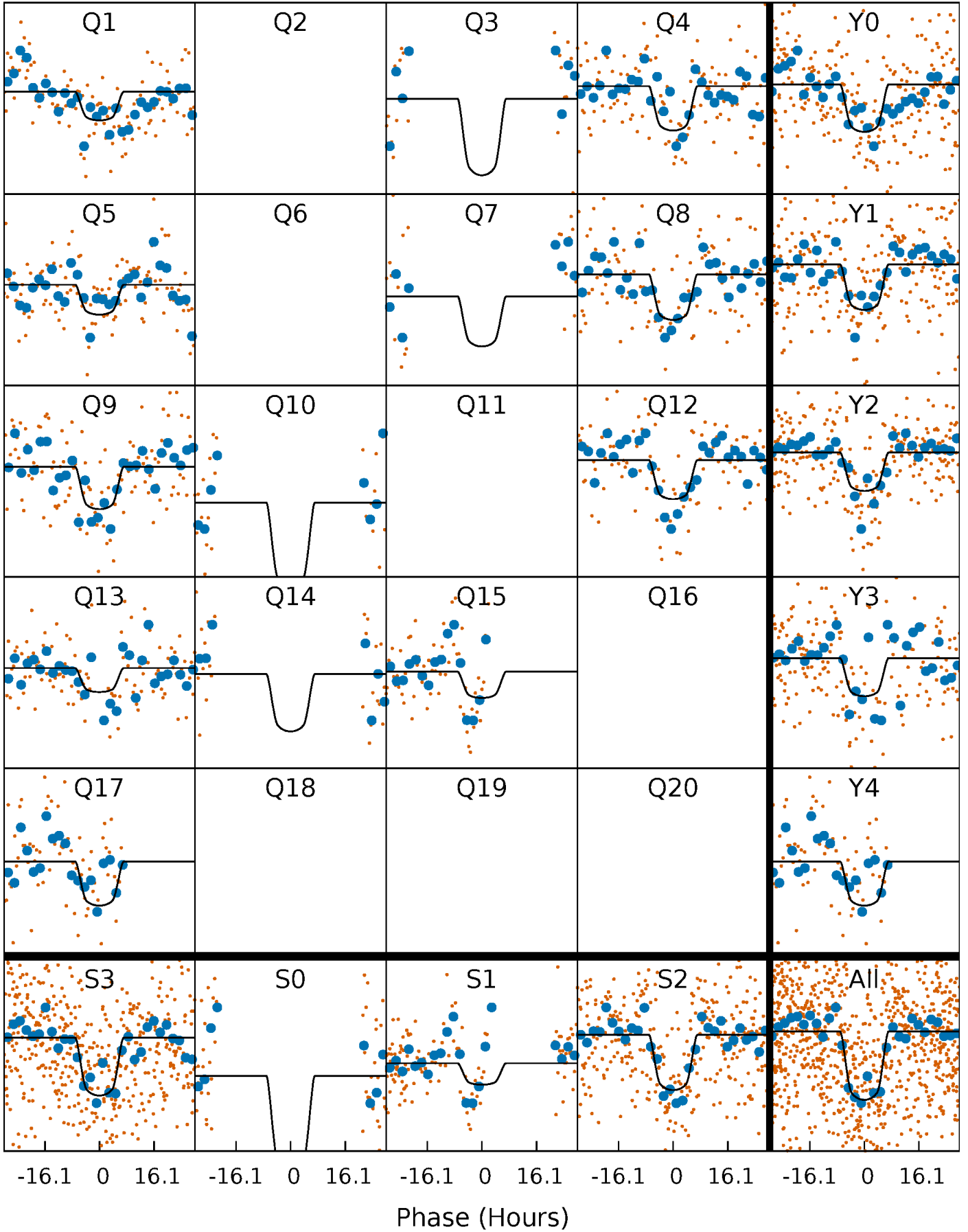
PDC Quarter-Phased Transit Curves

TCE 003644601-04 $P=119.680595$ Days $T_0=154.565873$ (BKJD)



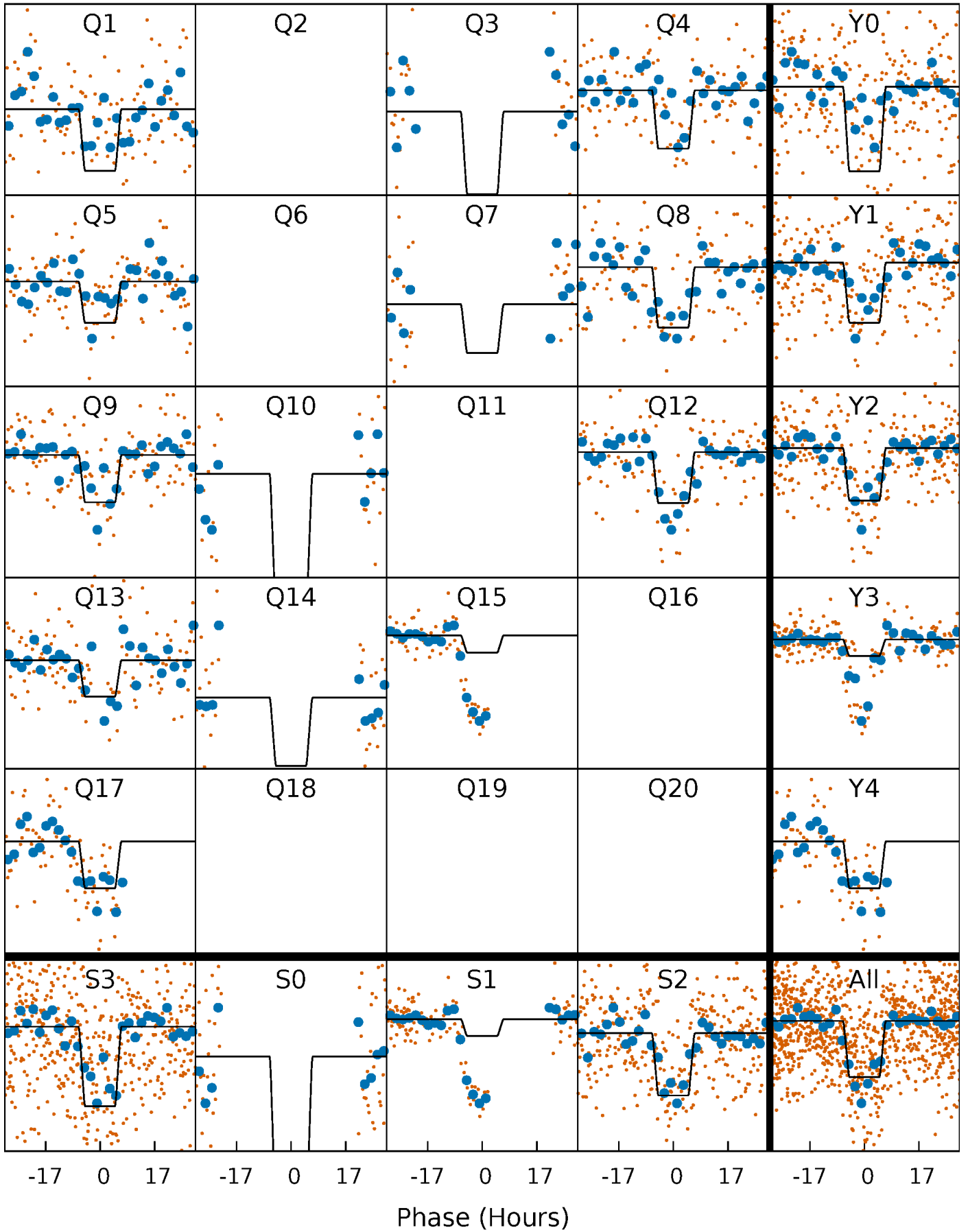
DV Quarter-Phased Transit Curves

TCE 003644601-04 $P=119.680595$ Days $T_0=154.565873$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

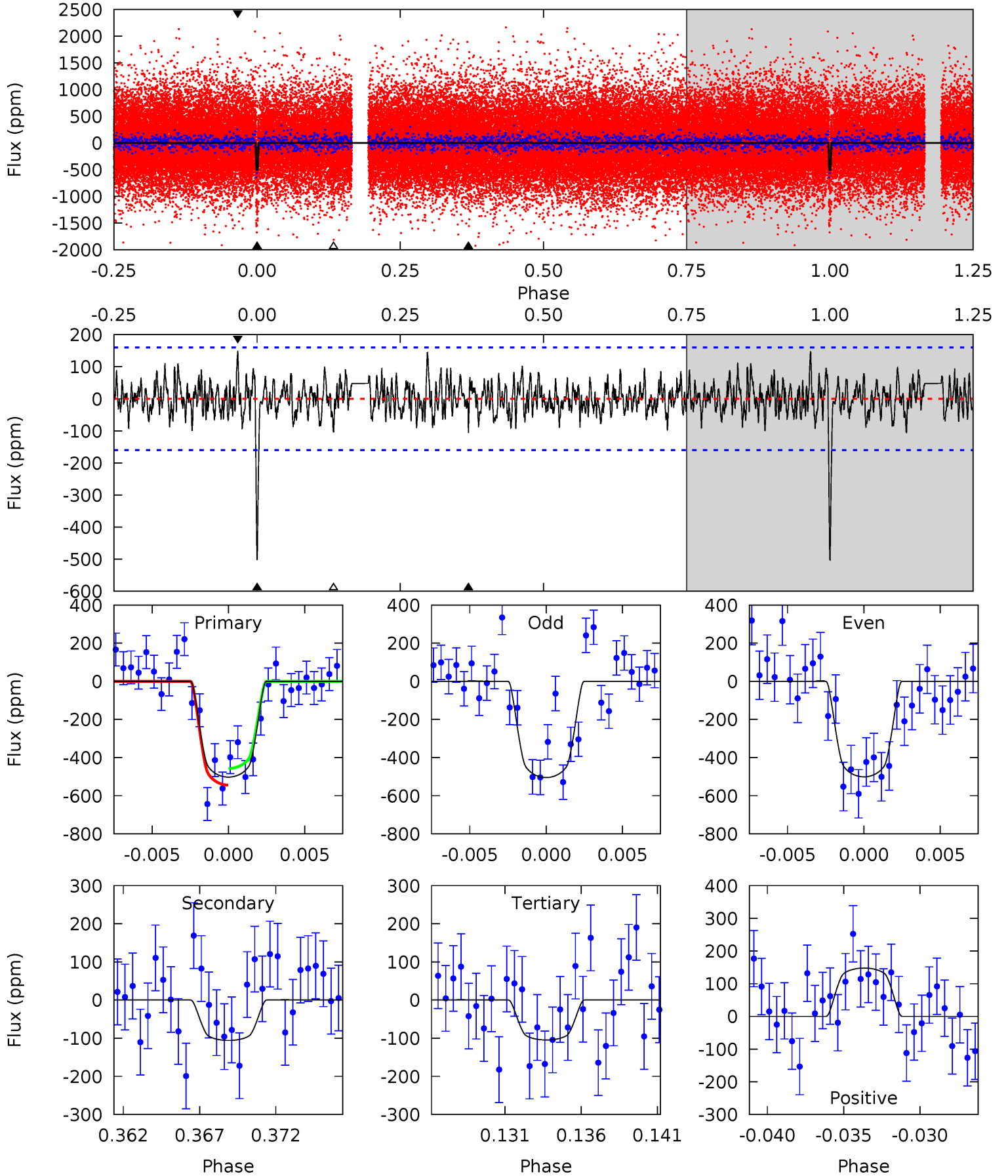
TCE 003644601-04 P=119.683611 Days $T_0=154.544848$ (BKJD)



DV Model-Shift Uniqueness Test

003644601-04, $P = 119.680595$ Days, $E = 34.885278$ Days

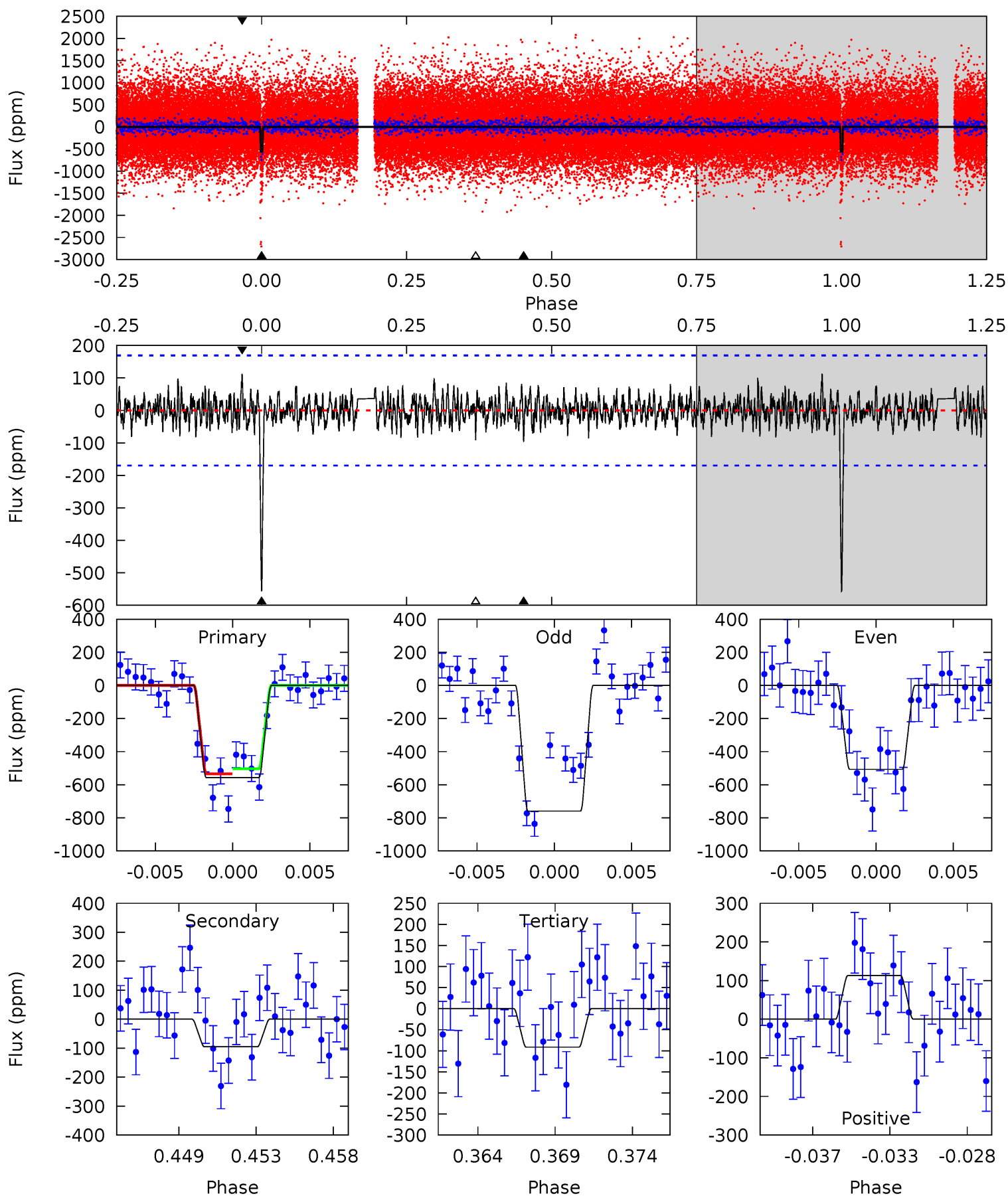
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.2	3.42	3.38	4.77	5.16	2.81	1.29	12.8	11.4	0.04	-1.35	0.06	0.88	0.23	1.41



Alt Model-Shift Uniqueness Test

003644601-04, P = 119.683611 Days, E = 34.861237 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.0	2.91	2.79	3.45	5.17	2.83	0.94	14.2	13.6	0.13	-0.53	3.71	1.43	0.17	0.47



Stellar Parameters For KIC 003644601

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5715^{+155}_{-172}	$4.537^{+0.055}_{-0.176}$	$-0.300^{+0.300}_{-0.300}$	$0.834^{+0.224}_{-0.075}$	$0.873^{+0.100}_{-0.090}$	$2.122^{+0.505}_{-1.004}$
	+3%/-3%	+1%/-4%	+100%/-100%	+27%/-9%	+11%/-10%	+24%/-47%
Source	PHO1	KIC0	KIC0	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

Secondary Eclipse Parameters for KIC 003644601-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-106 ± 31	$2.43^{+0.37}_{-0.24}$	485^{+29}_{-23}	3914^{+235}_{-242}	1926^{+826}_{-638}
Alt.	-95 ± 33	$2.39^{+0.36}_{-0.25}$	484^{+31}_{-21}	3875^{+246}_{-274}	1820^{+841}_{-702}

T_{max} = Theoretical Maximum Planetary Temperature

T_{obs} = Observed Planetary Temperature (Assuming A=0.3)

A_{obs} = Observed Albedo (Assuming T=0)

If a secondary eclipse is present, the system is likely an EB if $T_{obs} \gg T_{max}$ AND $A_{obs} \gg 1.0$

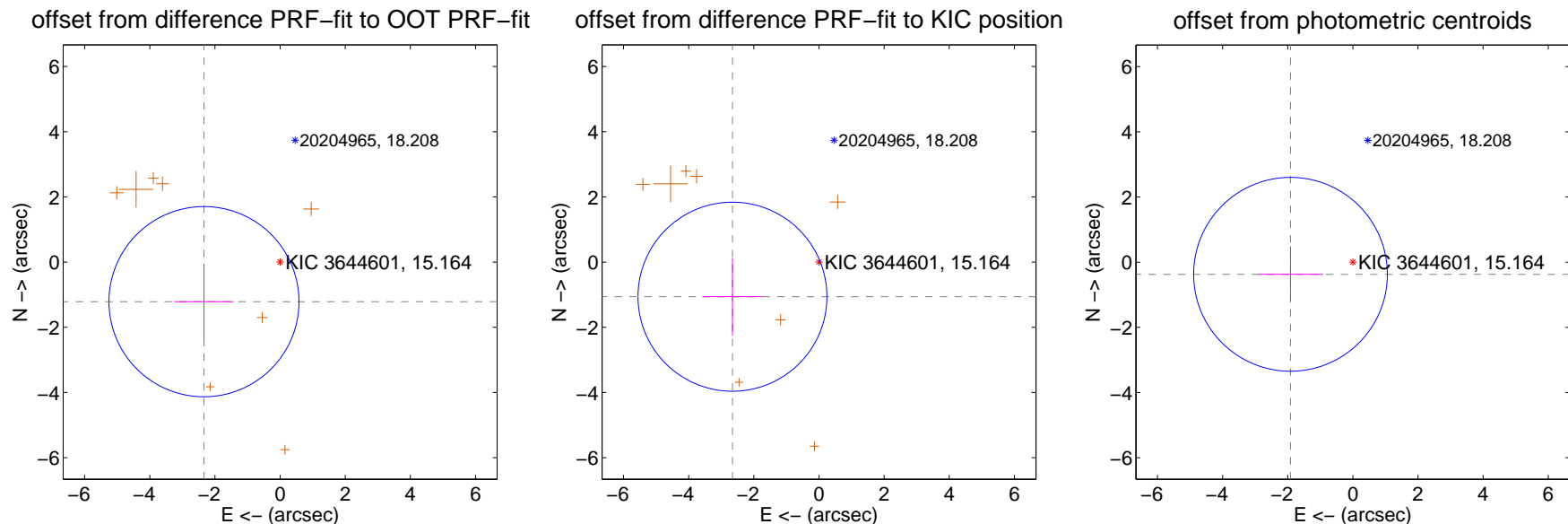
DV Centroid Data

Supplemental centroid analysis for 003644601-04. Kepler magnitude: 15.16. Transit SNR 12.32

There are 0 quarters with good PRF difference image offsets

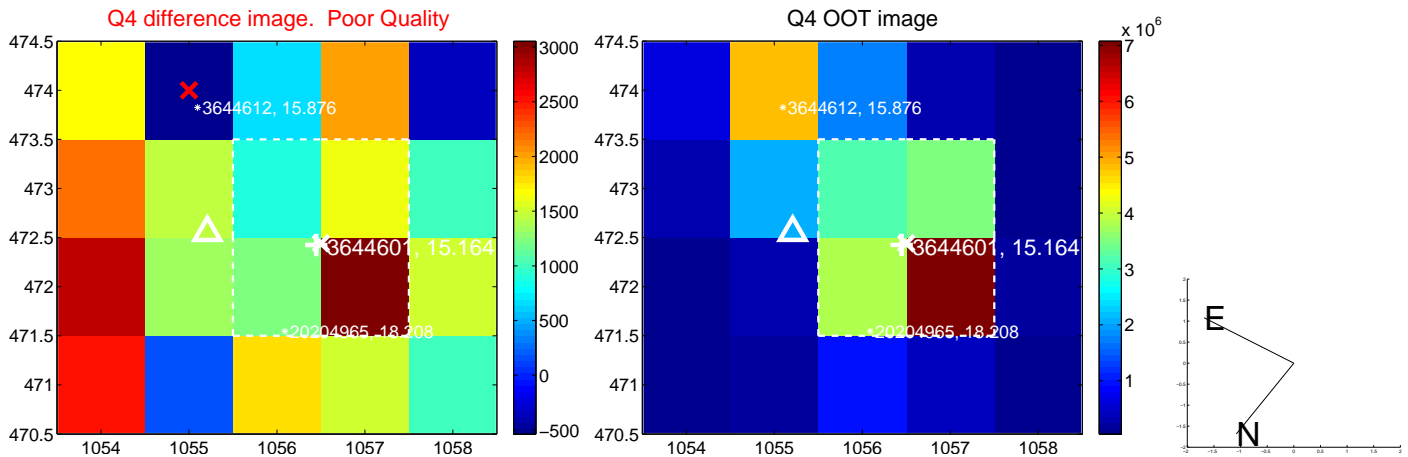
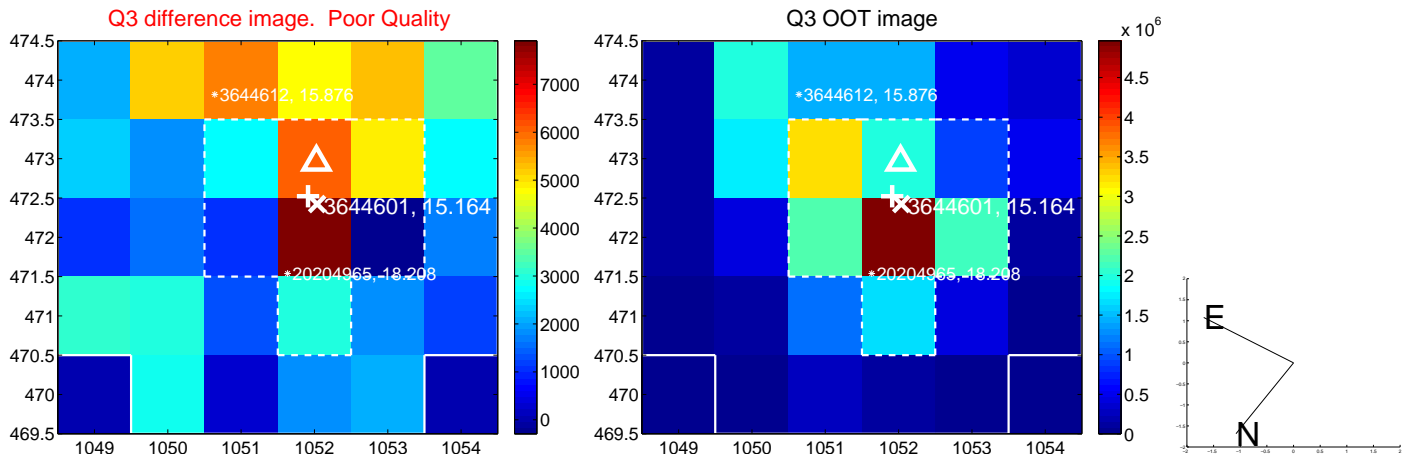
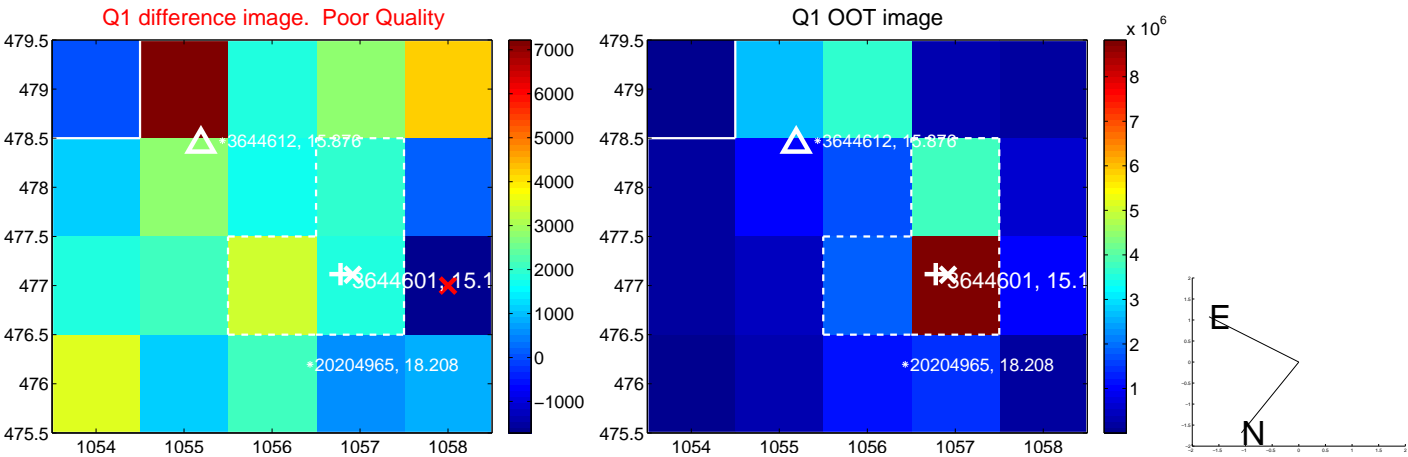
The direct PRF centroid is offset from the target star catalog position by about 0.34 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	2.634 ± 0.972	2.71	2.338 ± 0.912	-1.214 ± 1.169
PRF-fit source offset from KIC position	2.861 ± 0.967	2.96	2.657 ± 0.926	-1.062 ± 1.190
photometric centroid source offset	1.95 ± 0.99	1.97	1.92 ± 1.00	-0.37 ± 0.86

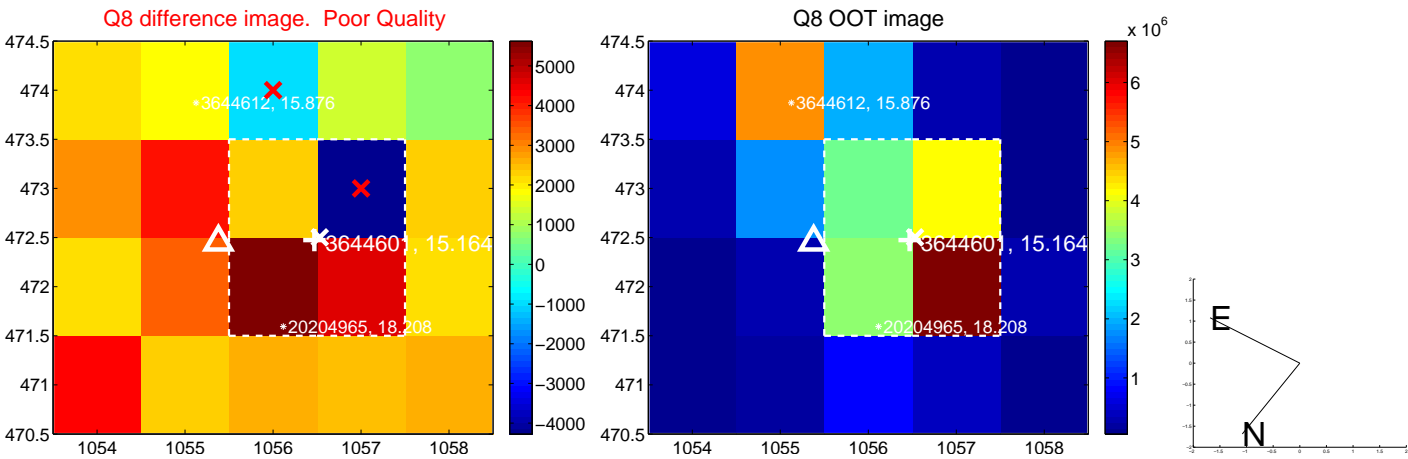
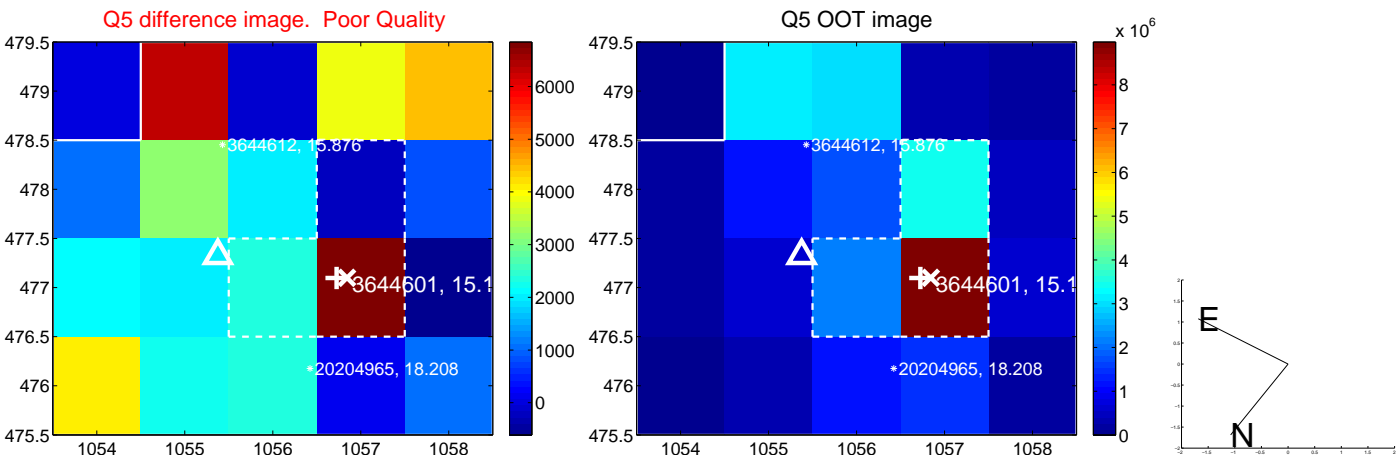


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ . Red *: target star. Blue *: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

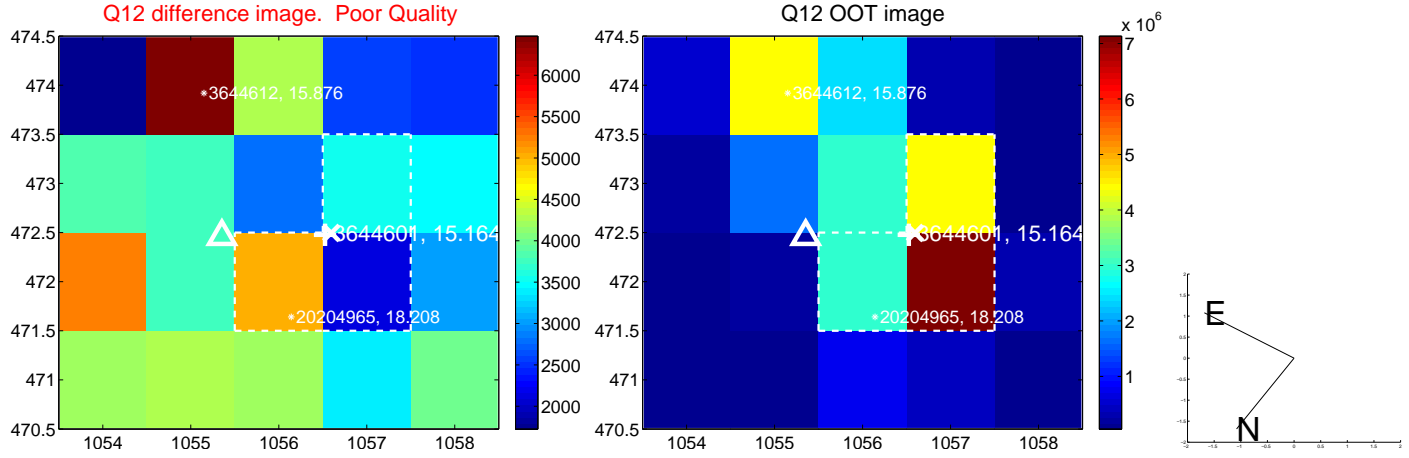
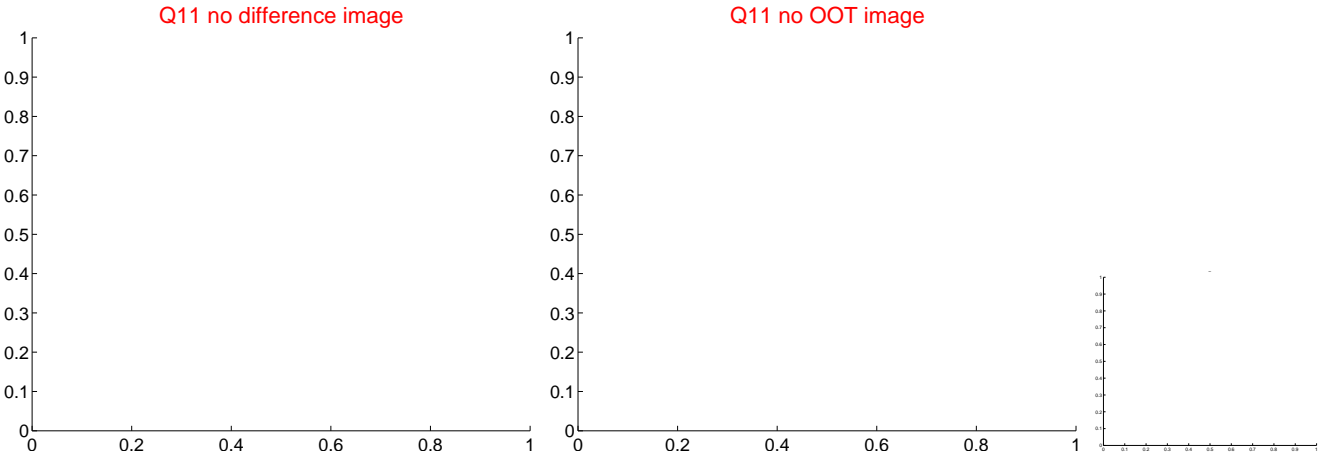
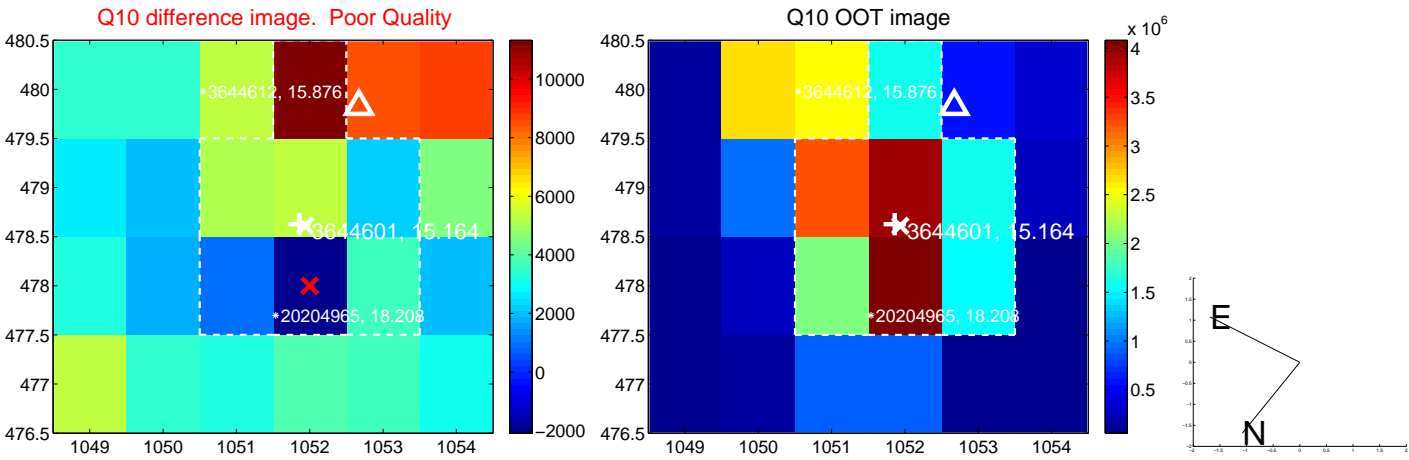
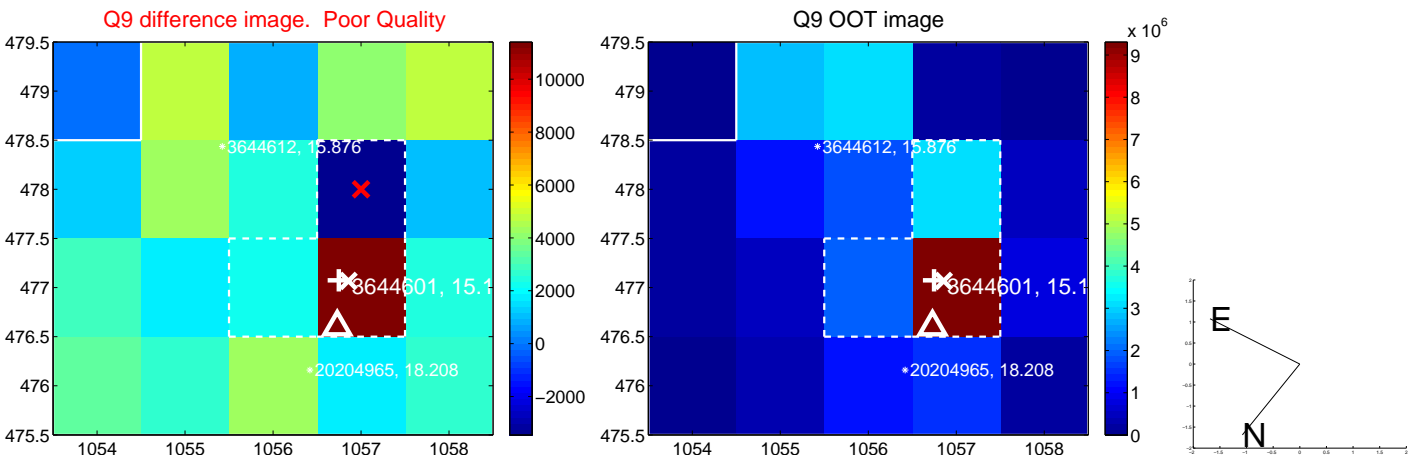
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



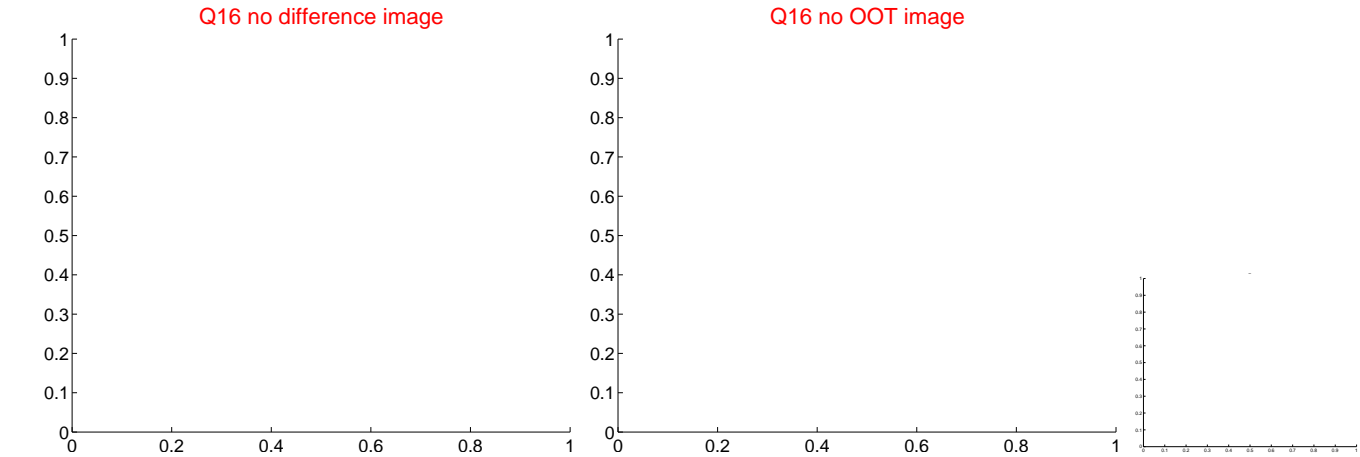
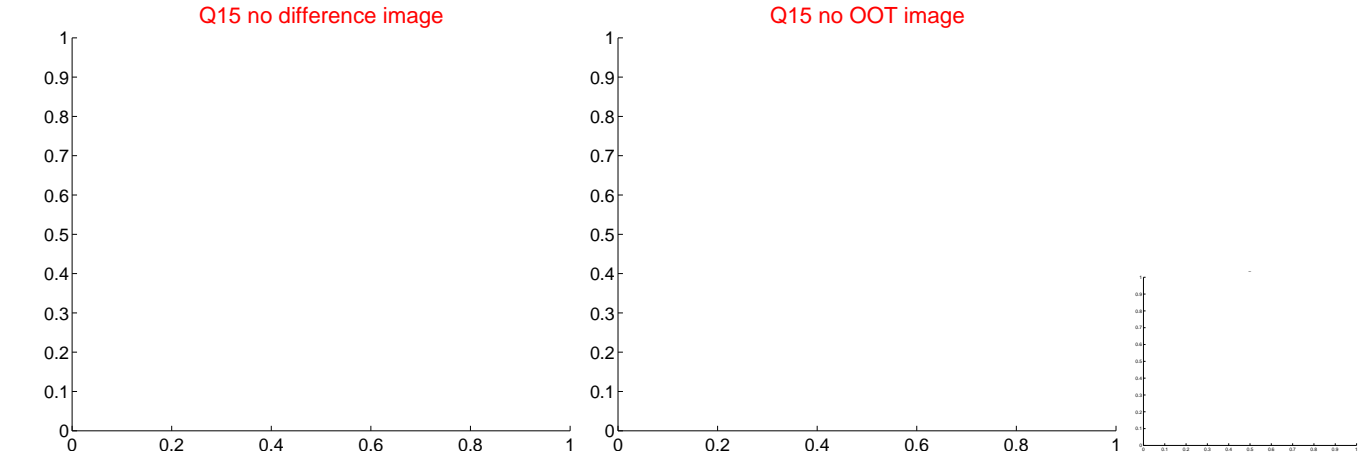
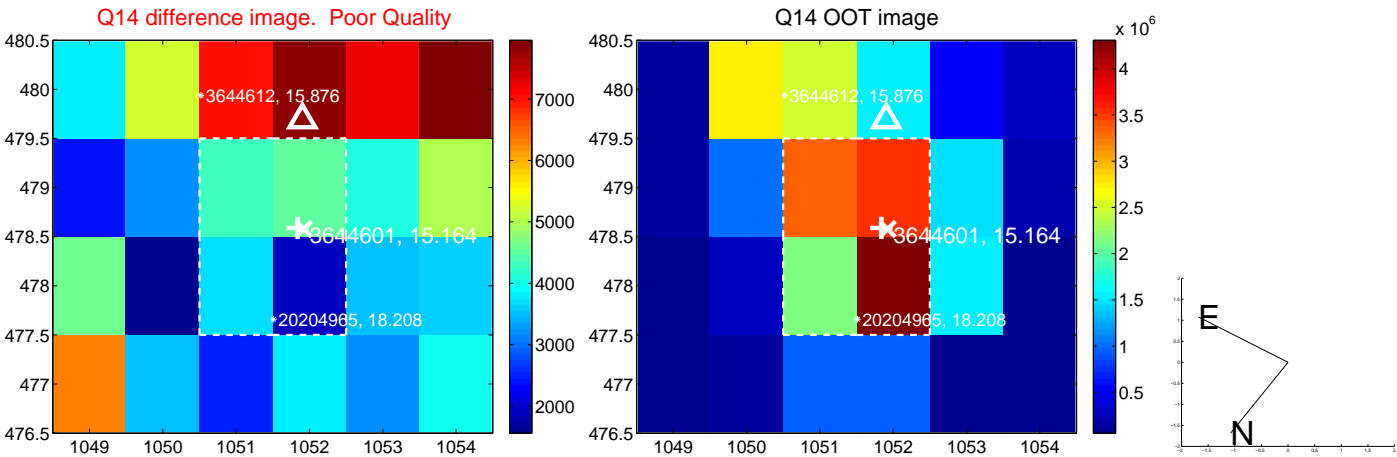
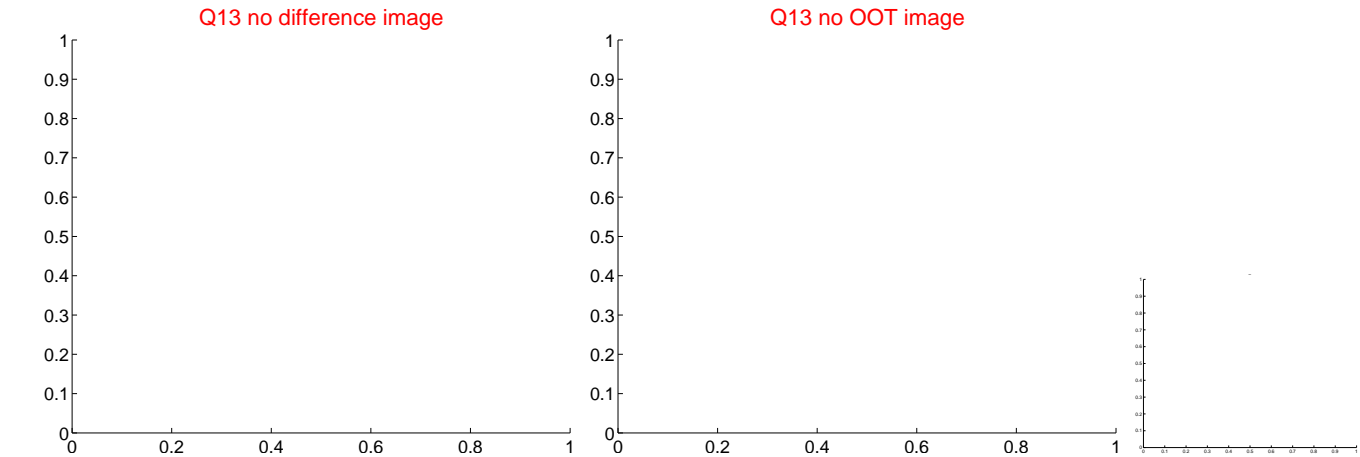
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



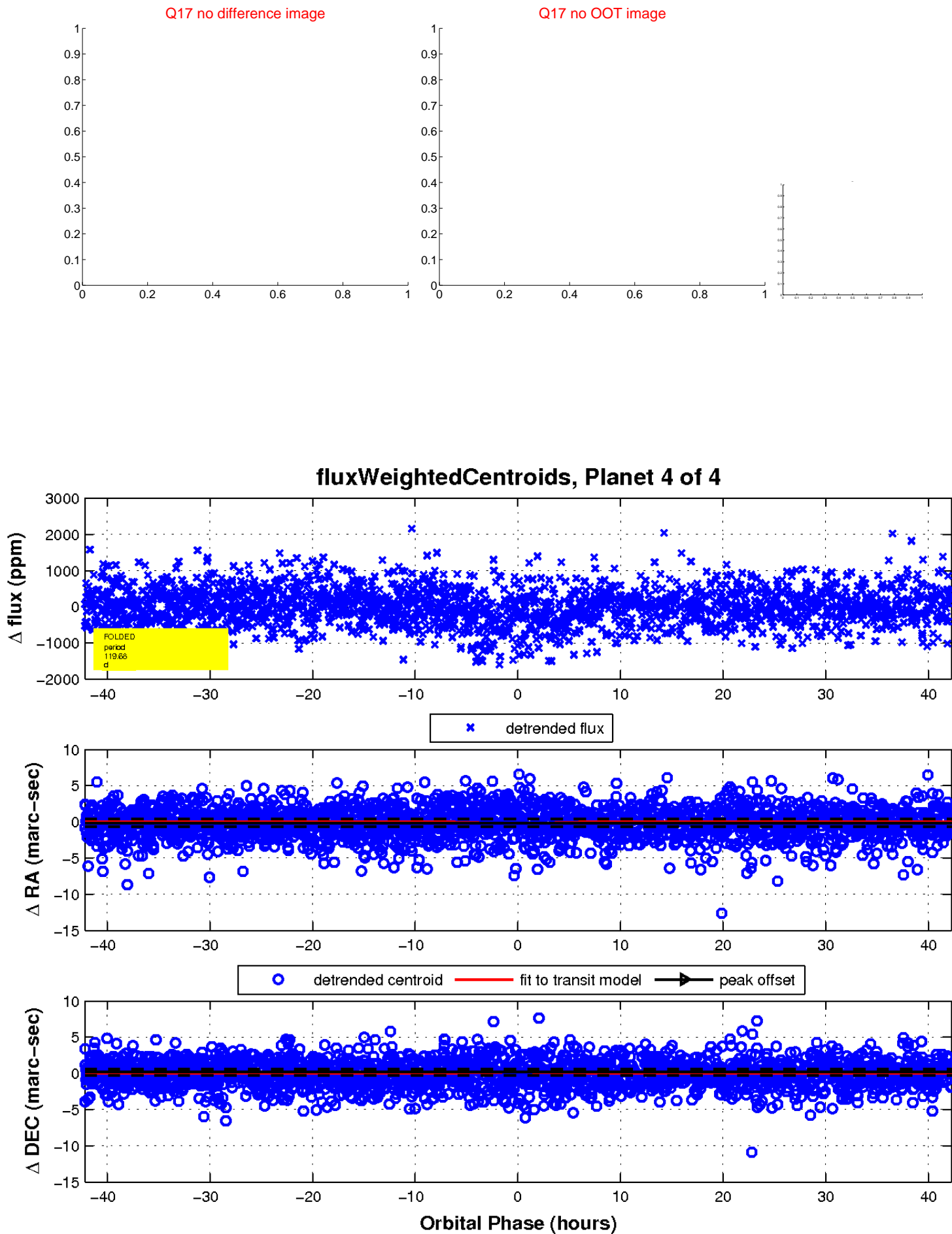
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination

