

KIC 004037164

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})
004037164-01	OBS	1184.01	0.635451	131.640825	607.6	1.247	34.3	59.5	0.55	3920	1.63	453.77
004037164-02	OBS	No	0.635453	131.957981	520.3	1.191	22.6	52.6	0.55	3920	1.51	453.77

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004037164-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_KIC_POS—HALO_GHOST—EPHEM_MATCH
004037164-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_KIC_POS—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 004037164-01

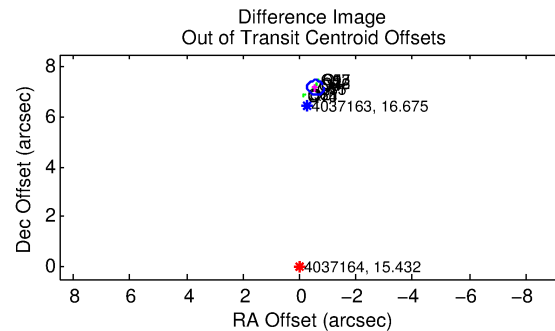
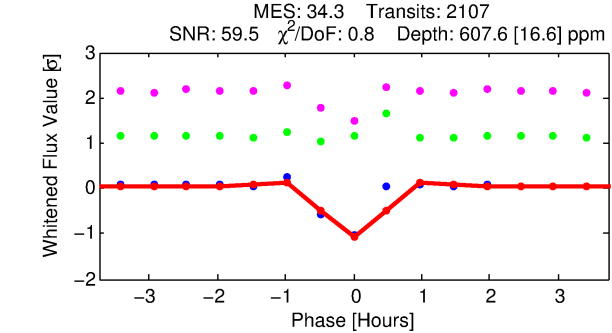
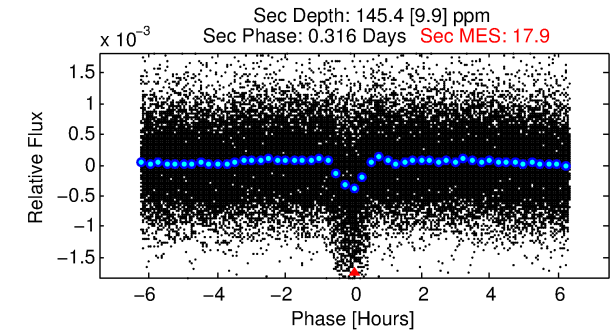
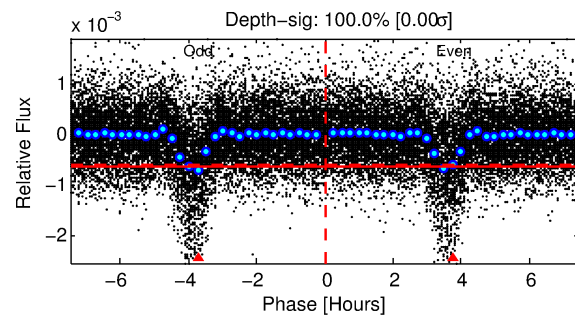
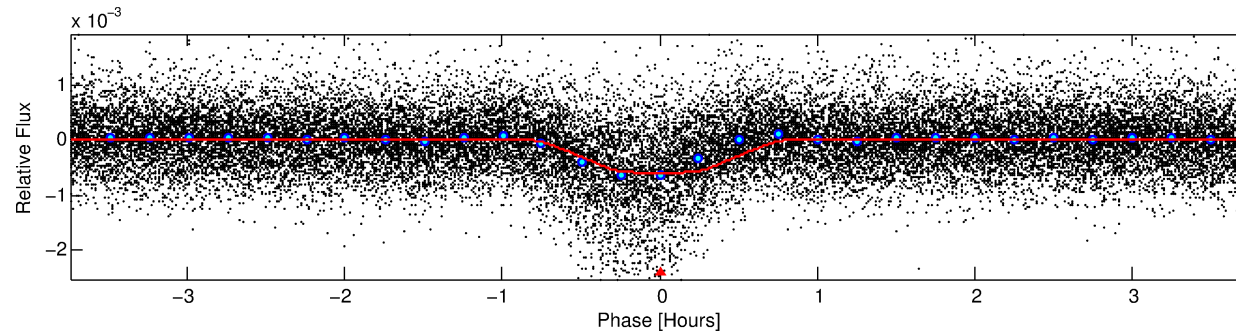
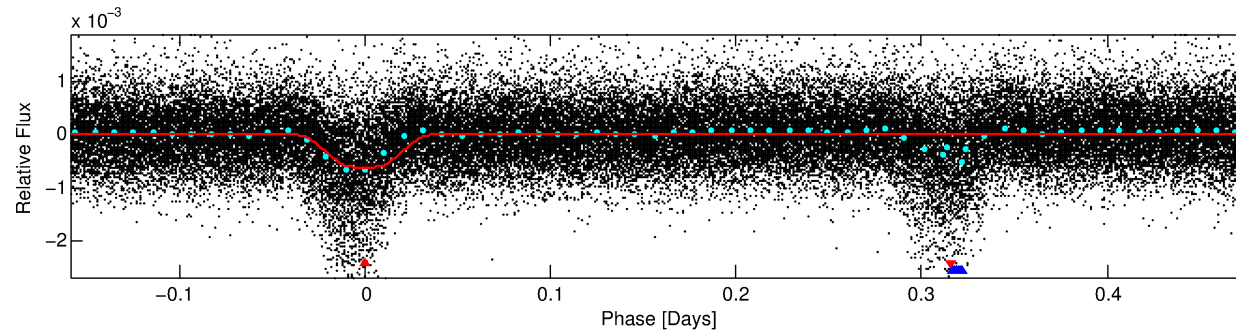
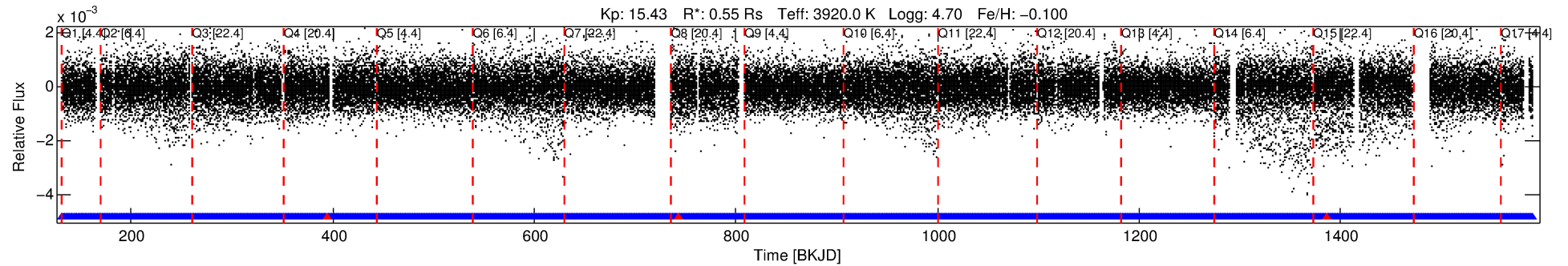
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ($''$)	Δ Row	Δ Col	m_2	m_1	D_2/D_1	Mechanism	Flag	σ_P	σ_T
004037164-01	4037164	004037163-pri	4037163	1:1	6.4	-1	2	16.68	15.44	227.96	Direct-PRF	0	1.18	0.20

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: 4037164 Candidate: 1 of 2 Period: 0.635 d

KOI: K01184.01 Corr: 0.813



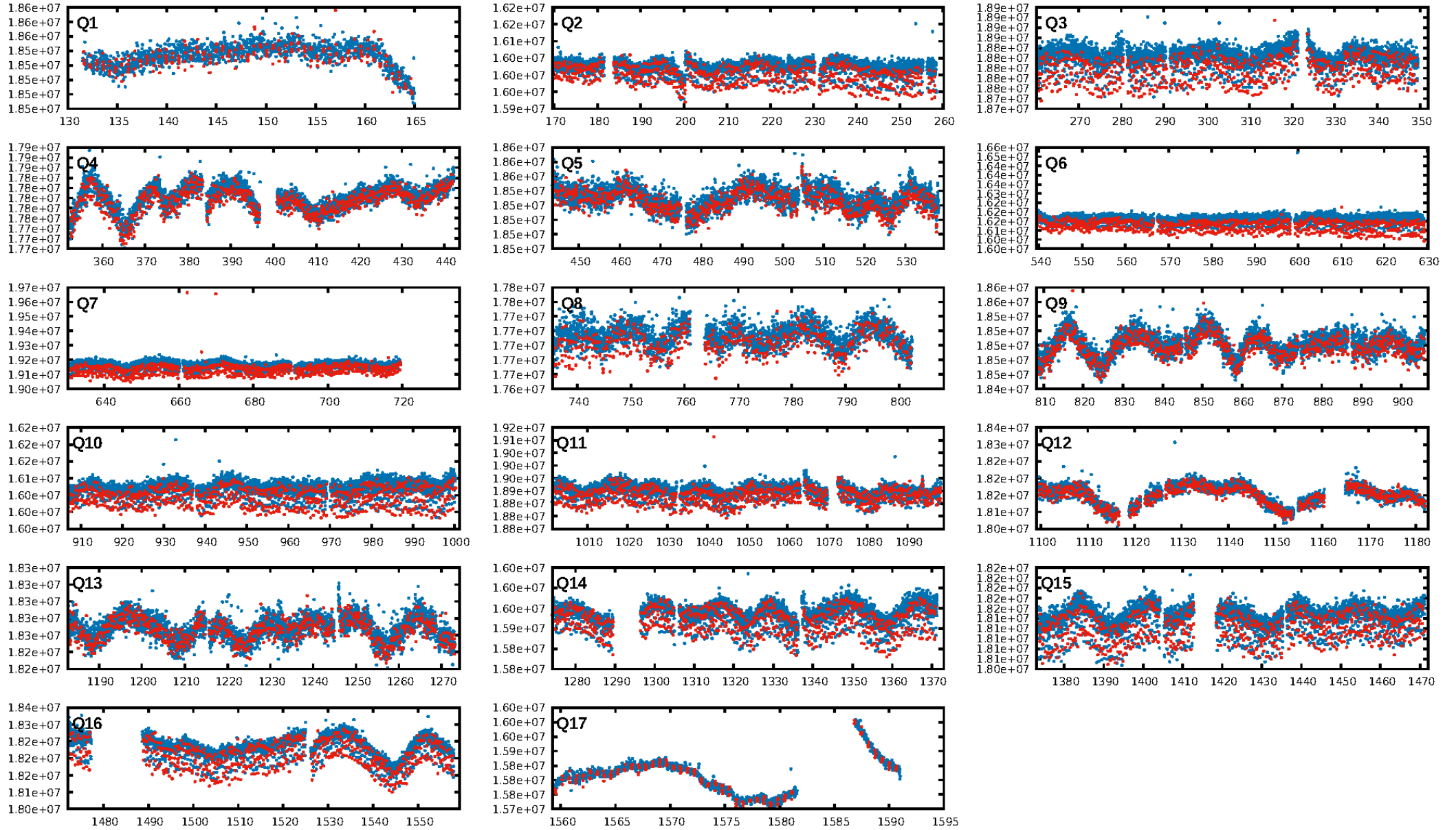
DV Fit Results:

Period = 0.63545 [0.00000] d
Epoch = 131.6408 [0.0003] BKJD
Rp/R* = 0.0272 [0.0026]
a/R* = 2.15 [0.67]
b = 0.90 [0.09]
Seff = 453.77 [96.31]
Teq = 1177 [62] K
Rp = 1.63 [0.27] Re
a = 0.0119 [0.0012] AU
Ag = 4.24 [1.04] [3.12 σ]
Teff = 2611 [167] K [8.03 σ]

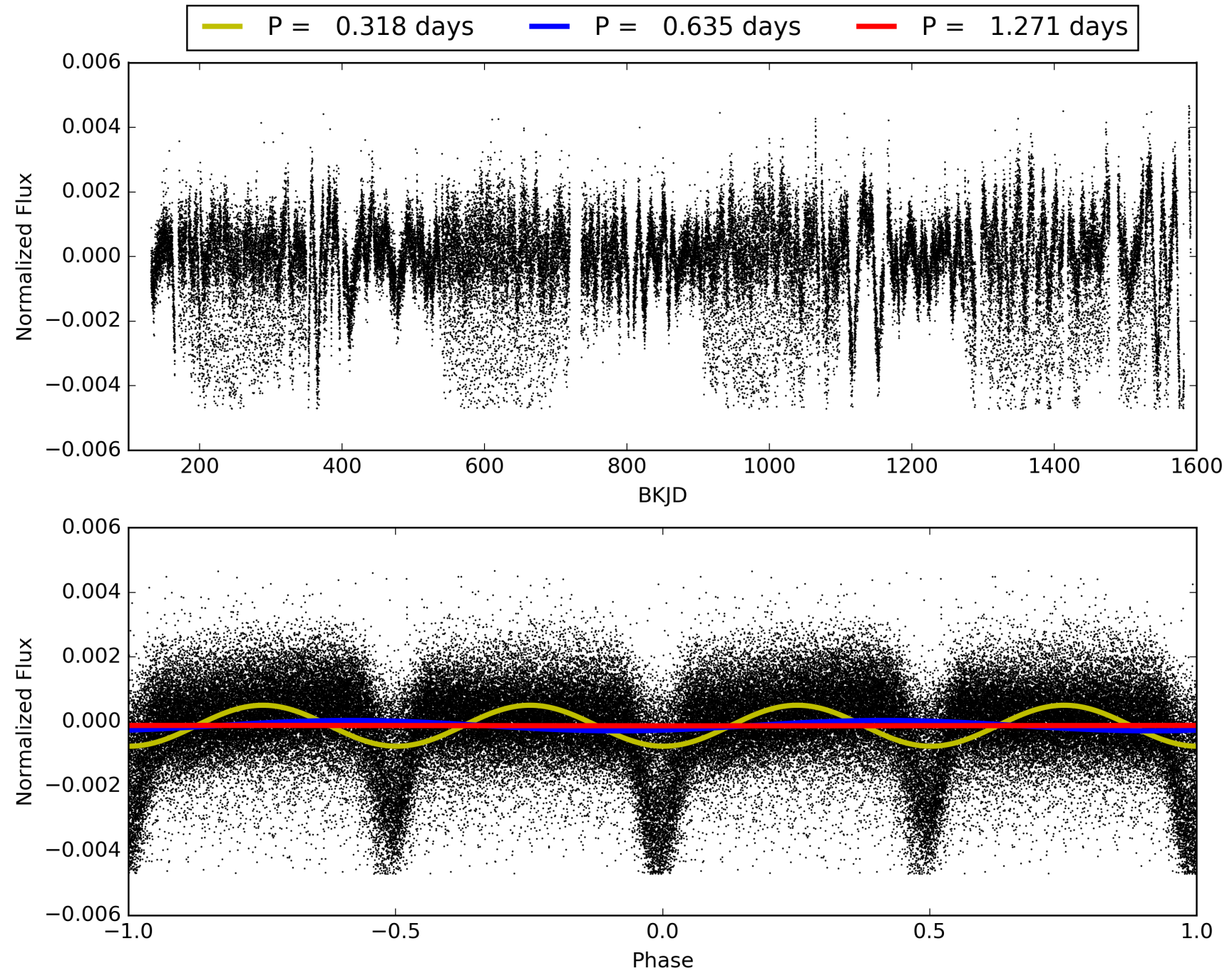
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00 σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGoF-sig: N/A
Bootstrap-pfa: 3.36e-232
RollingBand-fgt: 1.00 [2009/2012]
GhostDiagnostic-chr: -0.2037
Centroid-sig: N/A
Centroid-so: 90.553 arcsec [336.90 σ]
OotOffset-rm: 7.183 arcsec [72.79 σ]
KicOffset-rm: 6.831 arcsec [93.10 σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 1.00 [17/17]
DiffImageOverlap-fno: 1.00 [17/17]

TCE 004037164-01, PDC Light Curves

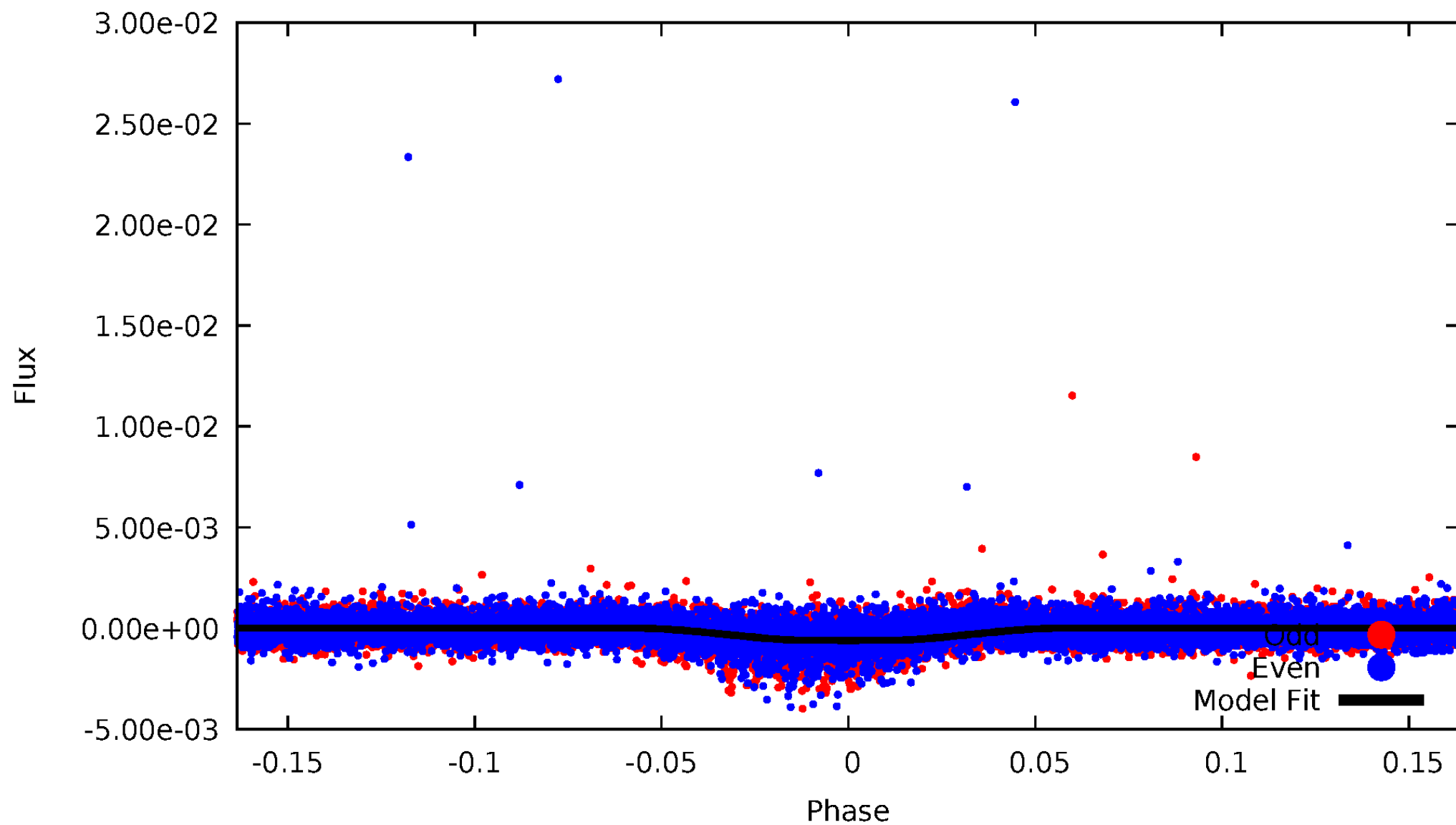


TCE 004037164-01



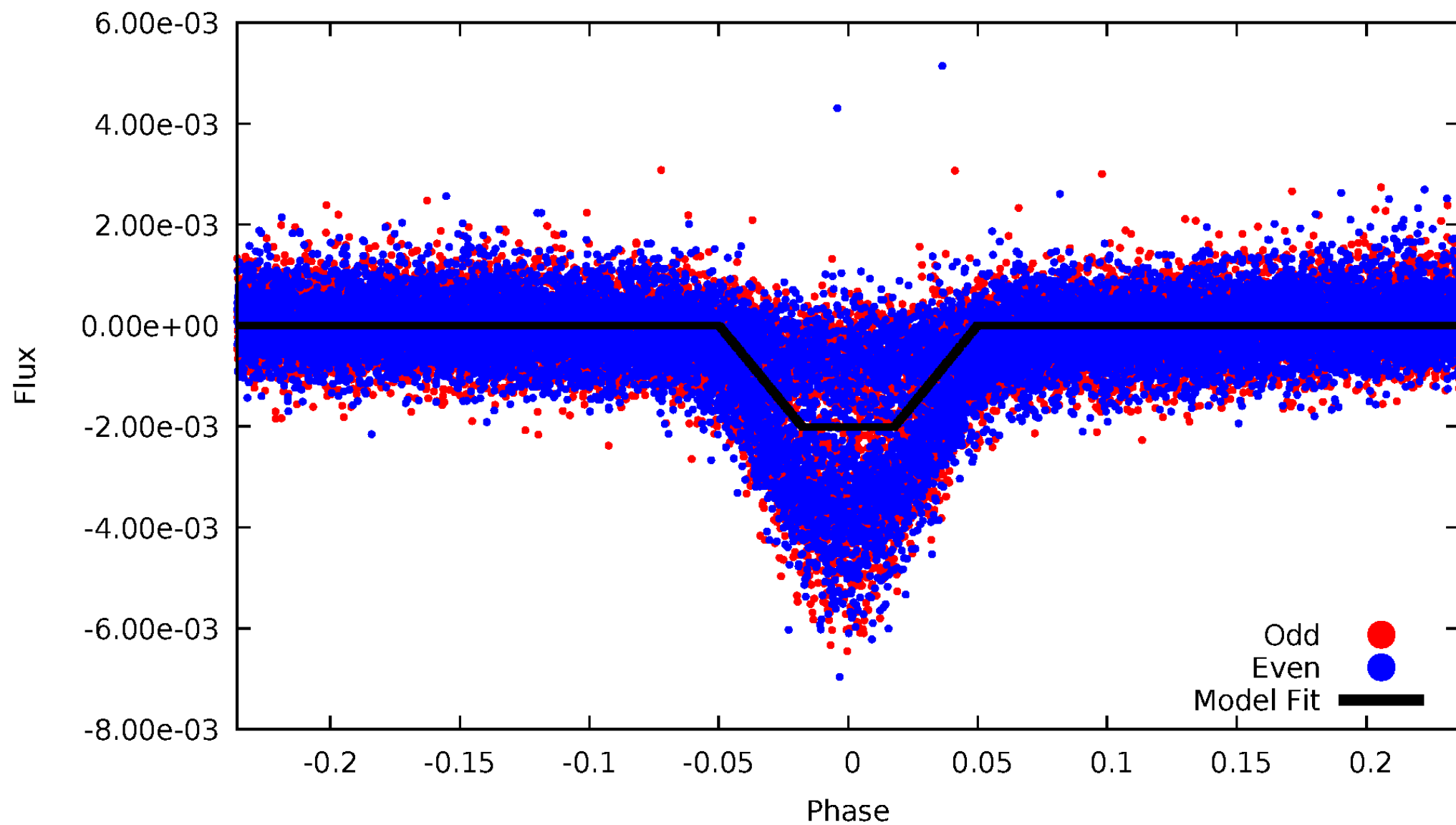
DV Odd/Even

TCE 004037164-01

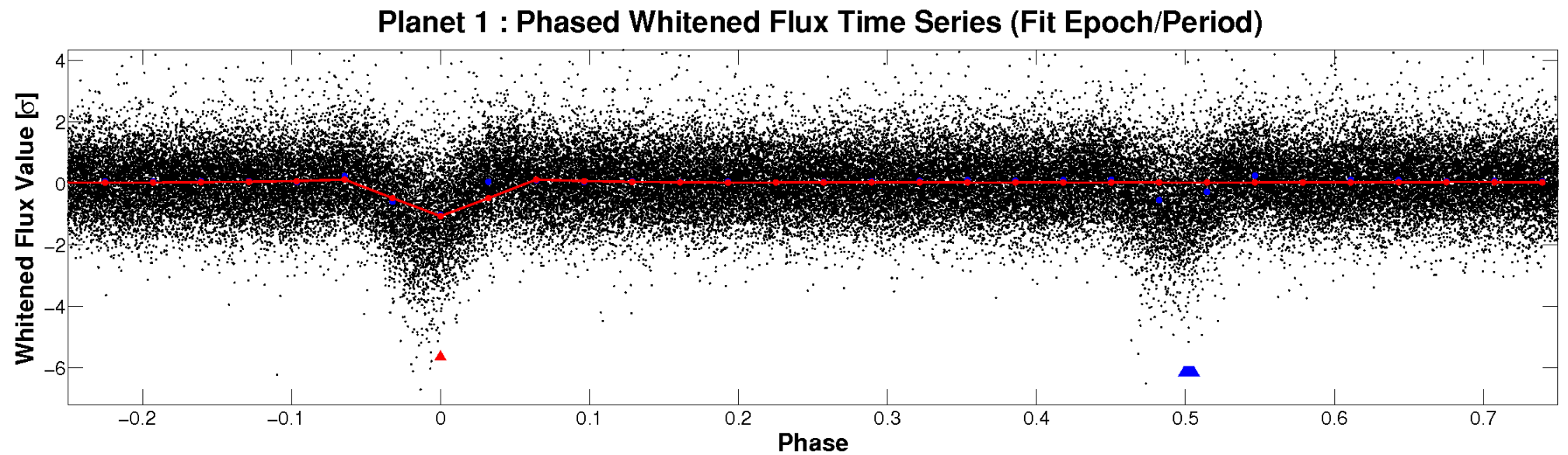
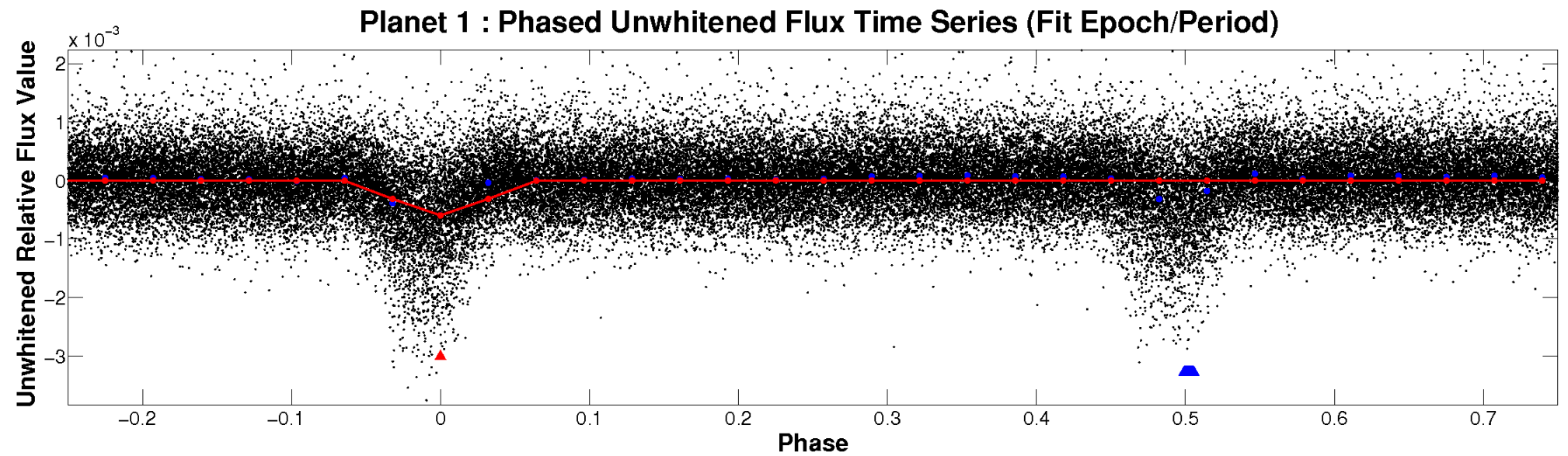


ALT Odd/Even

TCE 004037164-01

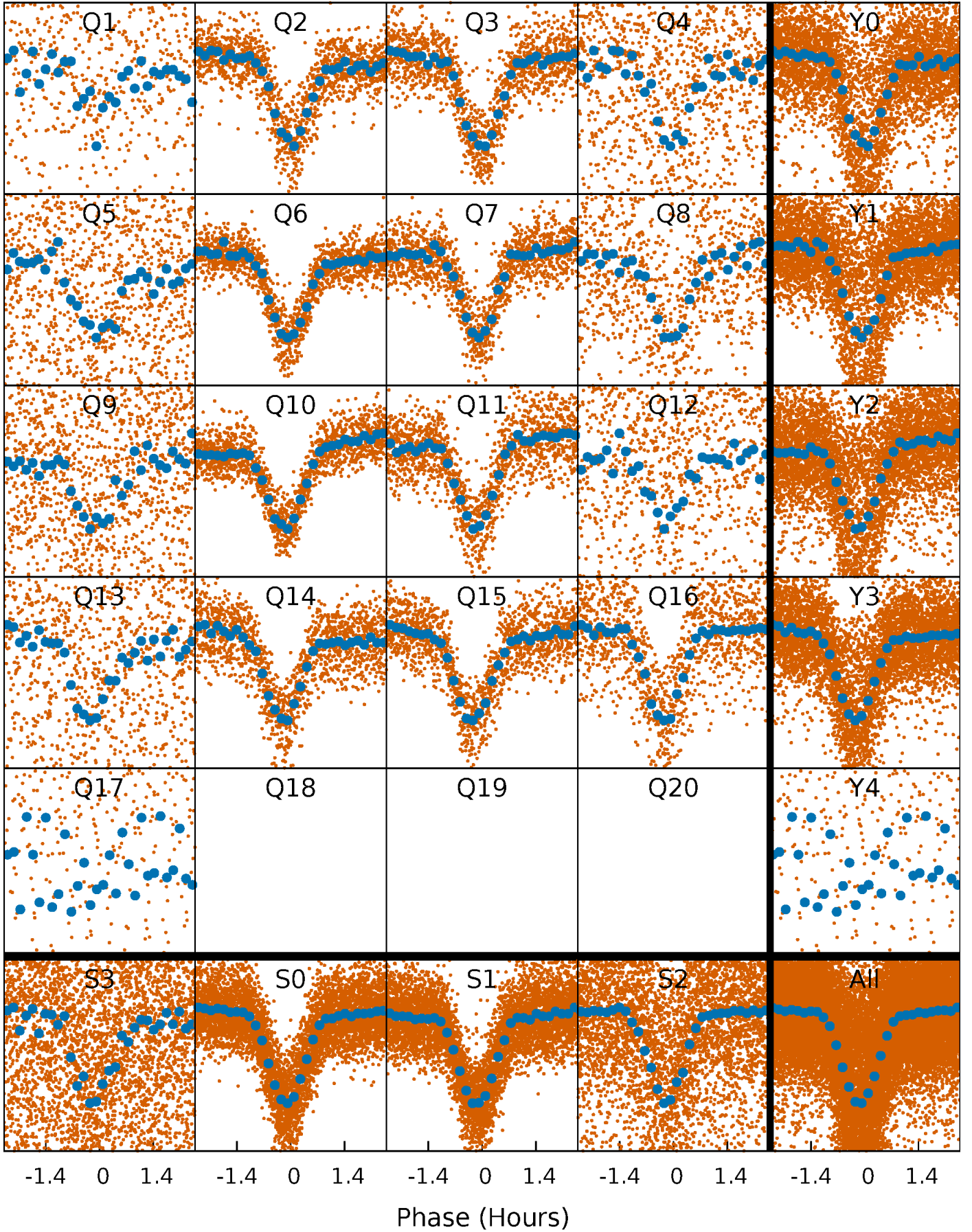


Non-Whitened Vs. Whitened Light Curve



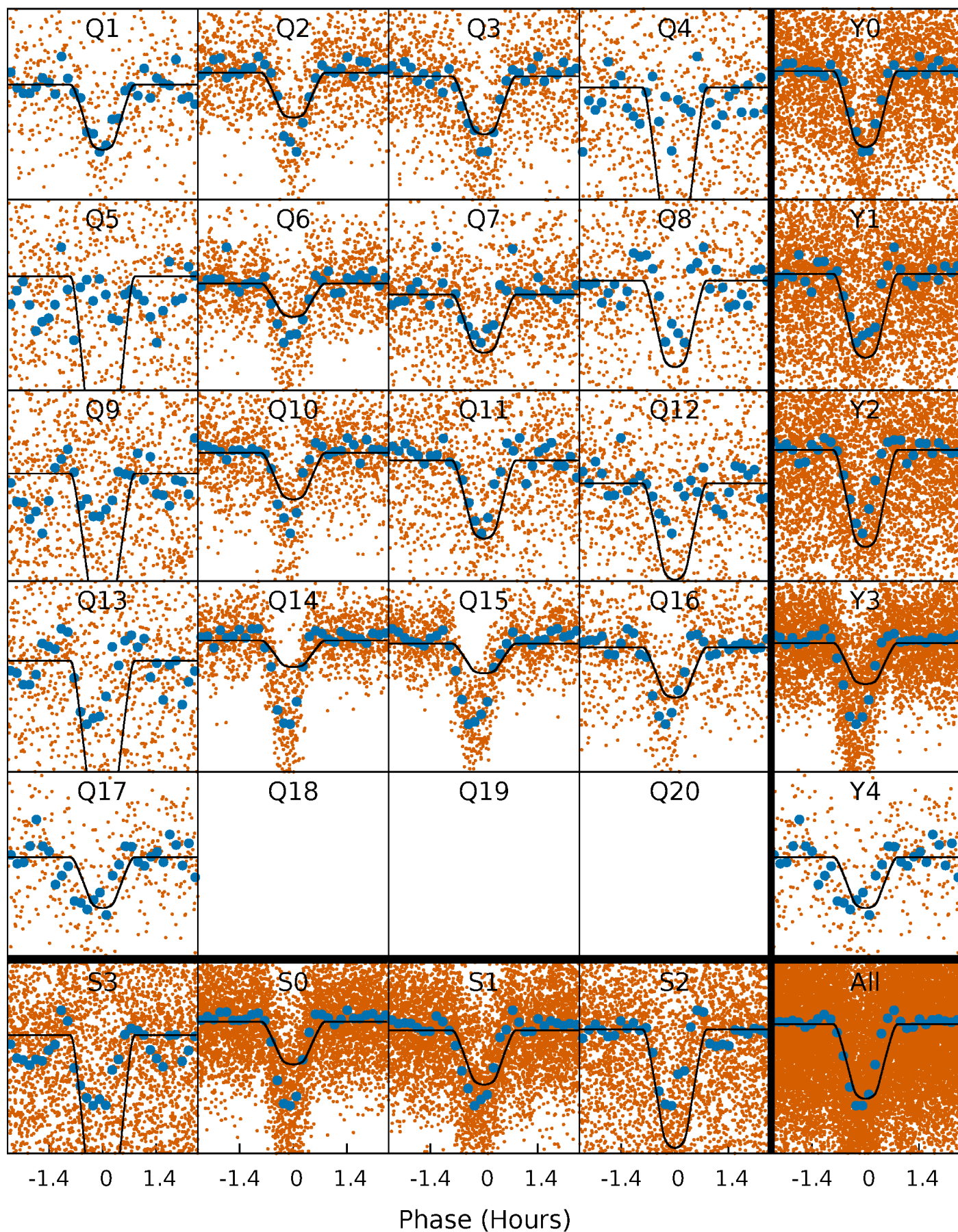
PDC Quarter-Phased Transit Curves

TCE 004037164-01 P= 0.635451 Days $T_0=131.640825$ (BKJD)



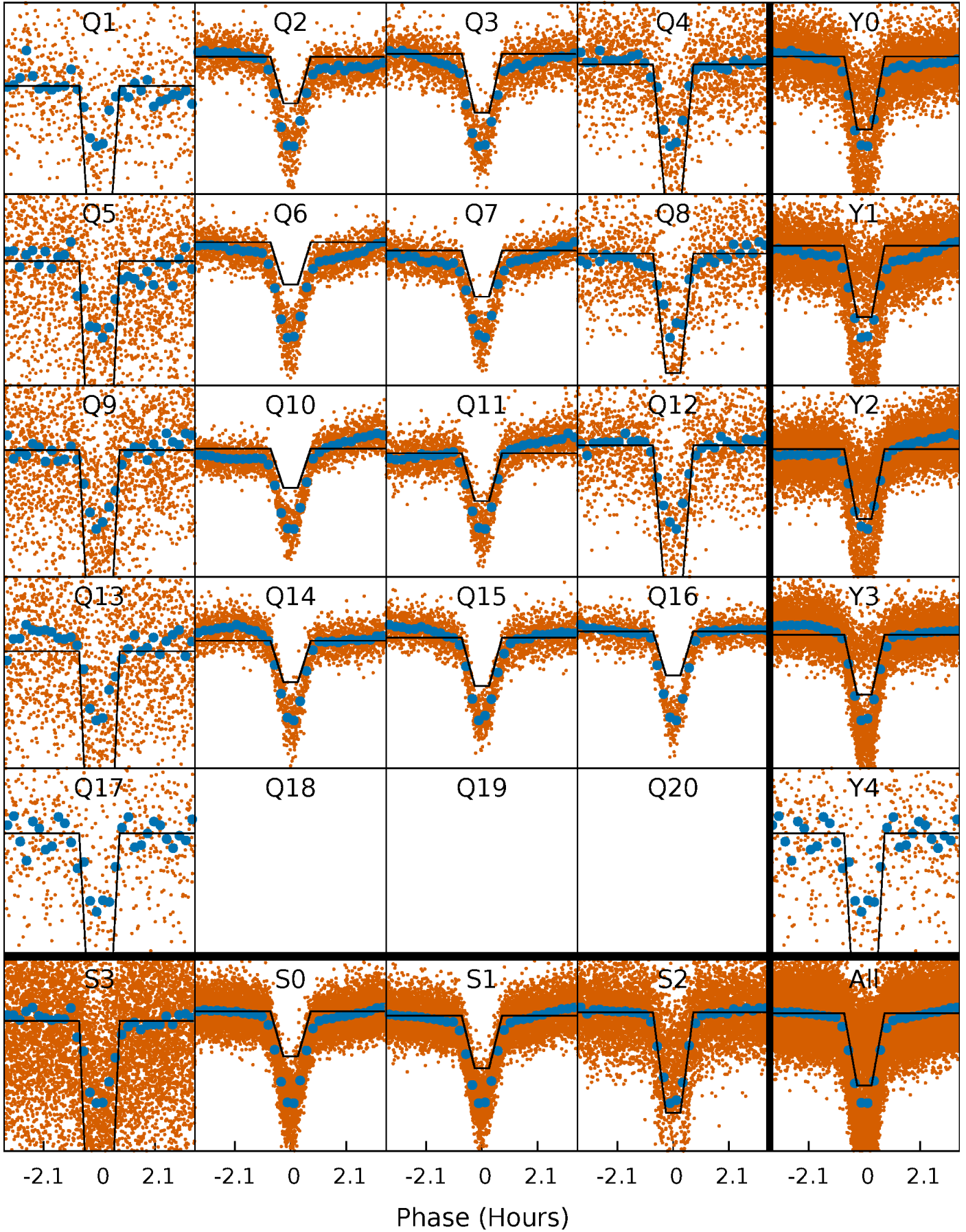
DV Quarter-Phased Transit Curves

TCE 004037164-01 P= 0.635451 Days $T_0=131.640825$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

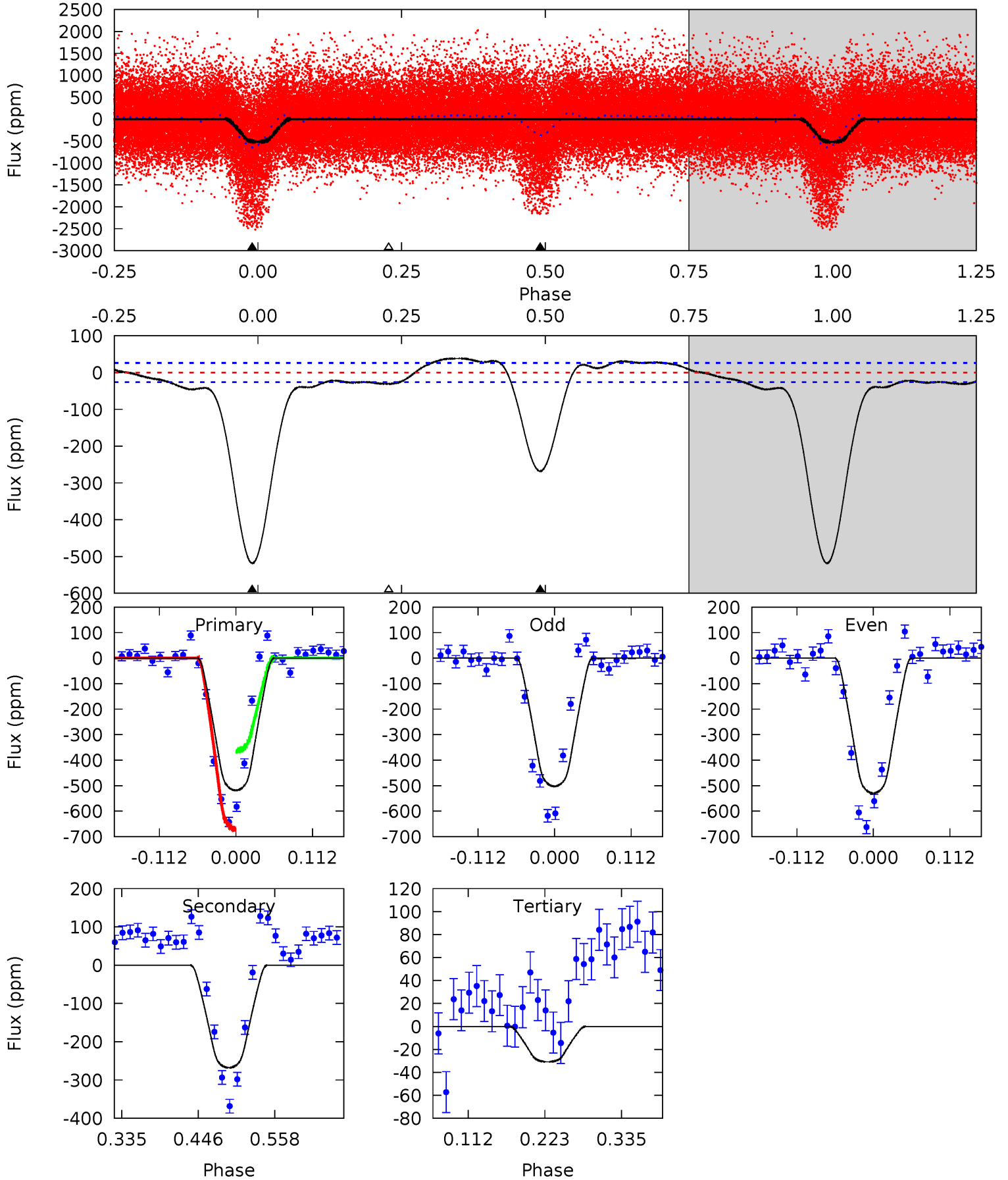
TCE 004037164-01 P= 0.635445 Days $T_0=131.643231$ (BKJD)



DV Model-Shift Uniqueness Test

004037164-01, P = 0.635451 Days, E = 131.005374 Days

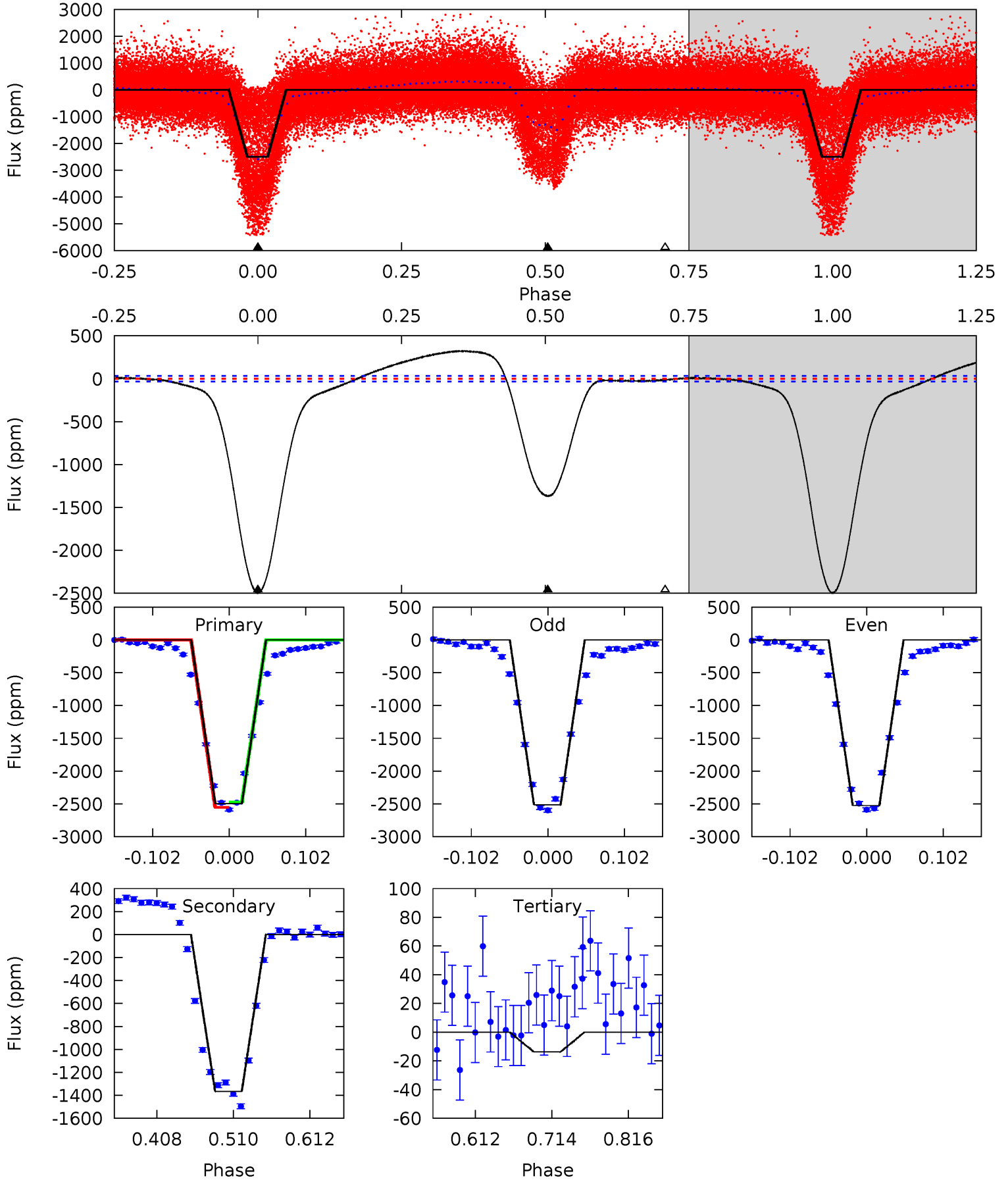
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
90.7	46.9	5.40	0	4.54	1.59	4.55	85.3	90.7	41.5	46.9	2.37	1.15	0.07	27.0



Alt Model-Shift Uniqueness Test

004037164-01, P = 0.635445 Days, E = 131.007786 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
342.5	187.5	1.89	0	4.56	1.64	19.7	340.7	342.5	185.6	187.5	0.74	0.88	0.11	0



Stellar Parameters For KIC 004037164

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	3920^{+141}_{-156}	$4.700^{+0.071}_{-0.033}$	$-0.100^{+0.300}_{-0.300}$	$0.550^{+0.055}_{-0.073}$	$0.554^{+0.057}_{-0.064}$	$4.675^{+1.629}_{-0.695}$
	+4%/-4%	+2%/-1%	+300%/-300%	+10%/-13%	+10%/-12%	+35%/-15%
Source	PHO2	PHO2	PHO2	DSEP		

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

Secondary Eclipse Parameters for KIC 004037164-01 / KOI 1184.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-268 ± 6	$1.62^{+0.18}_{-0.19}$	1634^{+65}_{-71}	3302^{+153}_{-143}	$7.997^{+1.978}_{-1.474}$
Alt.	-1366 ± 7	$2.65^{+0.22}_{-0.23}$	1630^{+72}_{-78}	3663^{+154}_{-144}	15^{+3}_{-2}

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 $T_{\text{obs}} \gg T_{\text{max}}$ AND $A_{\text{obs}} \gg 1.0$

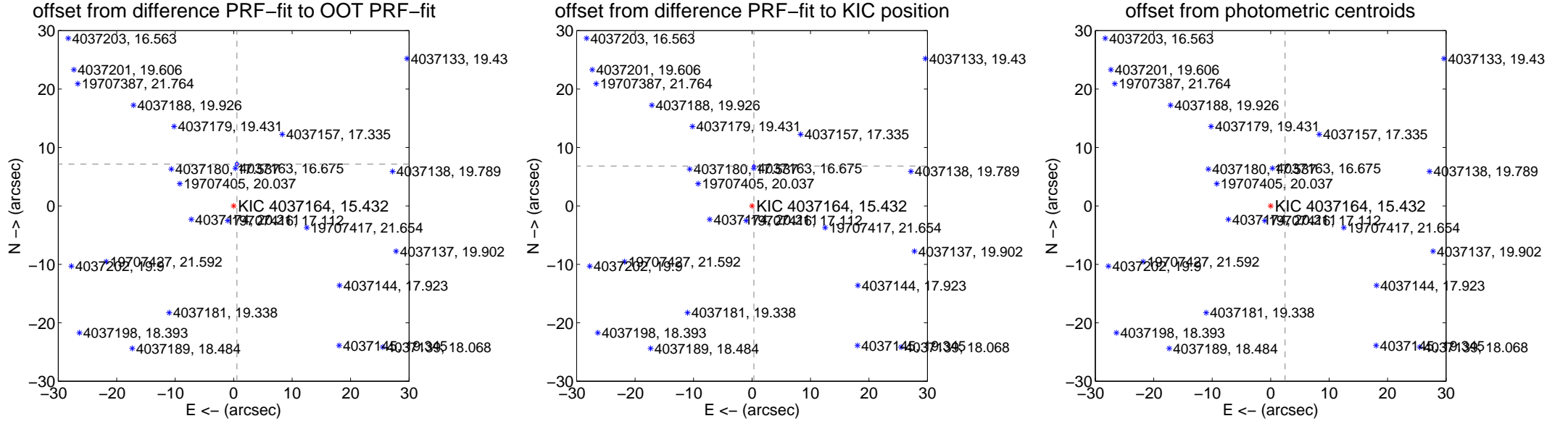
DV Centroid Data

Supplemental centroid analysis for 004037164-01. Kepler magnitude: 15.43. Transit SNR 59.46

There are 17 quarters with good PRF difference image offsets

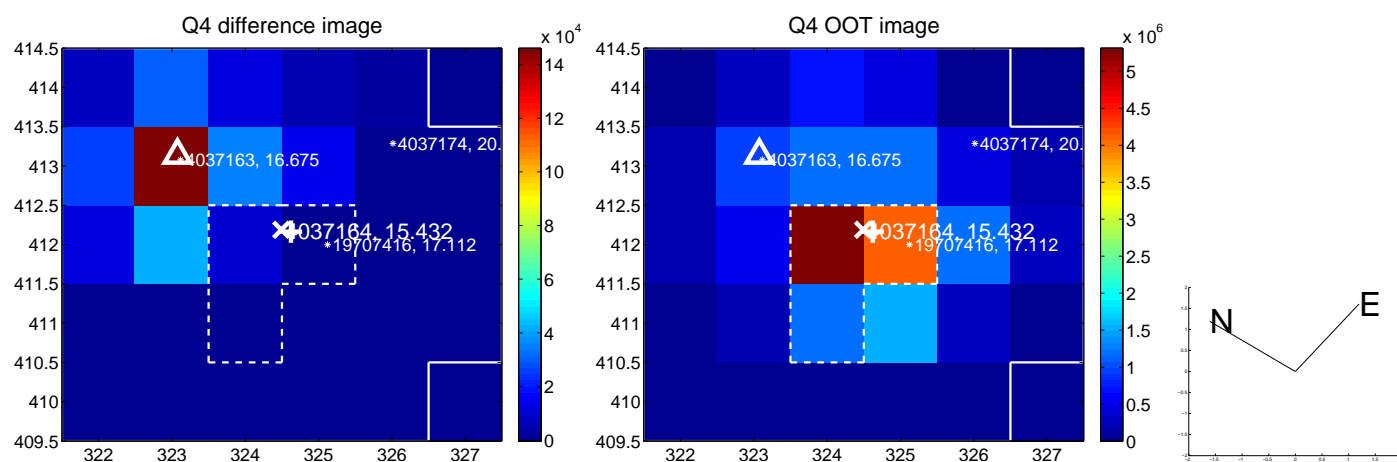
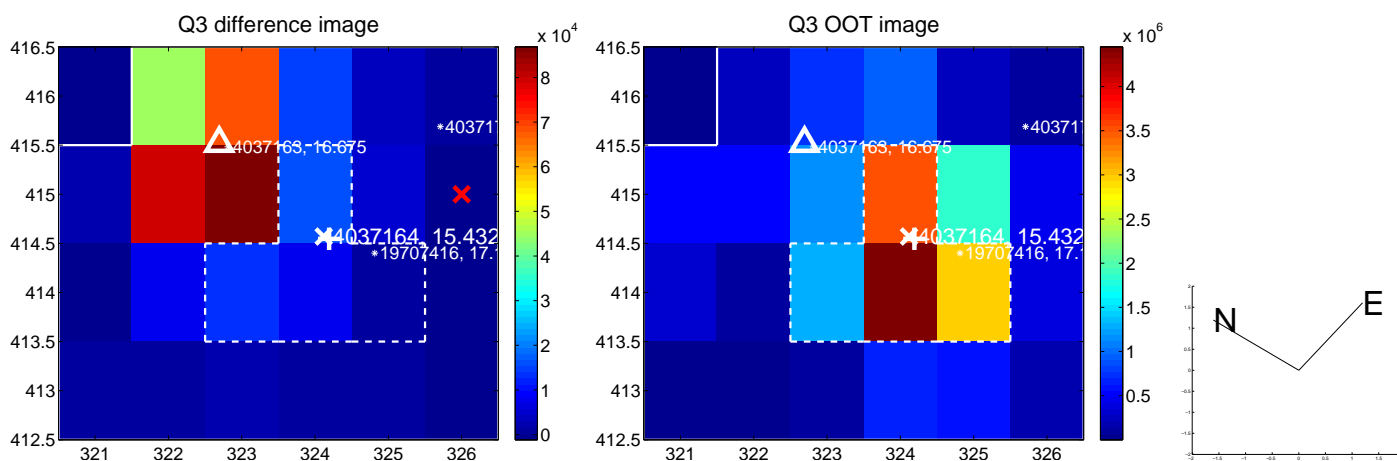
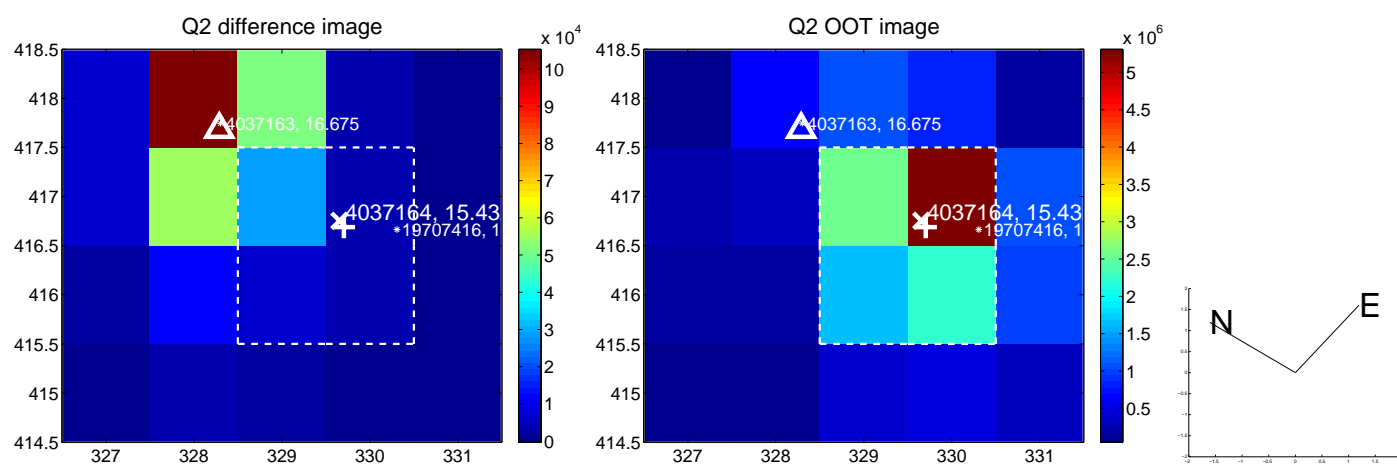
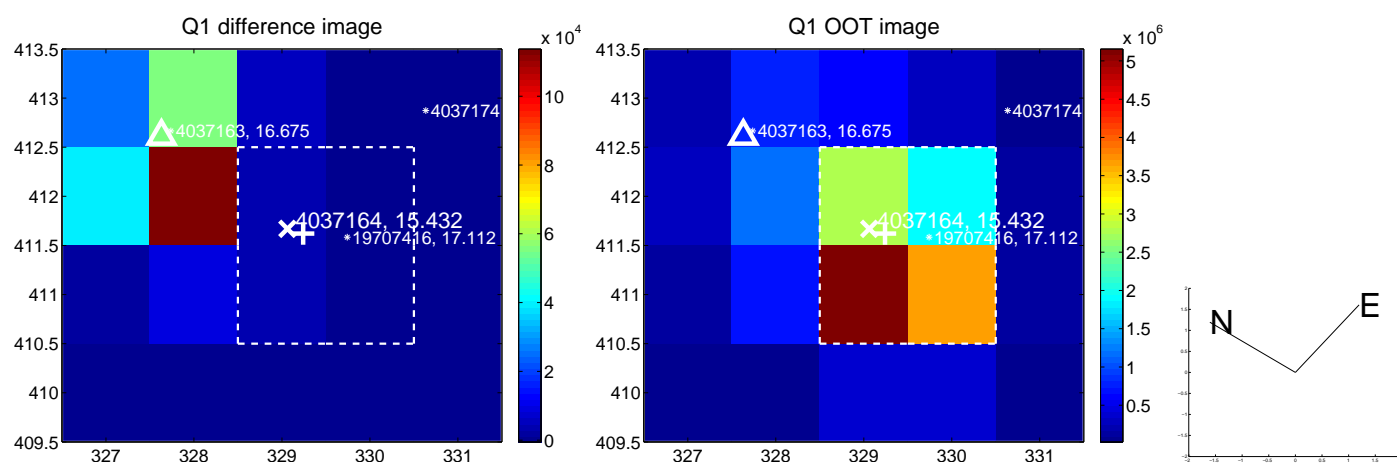
The direct PRF centroid is offset from the target star catalog position by about 0.71 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	7.183 \pm 0.099	72.79	-0.556 \pm 0.071	7.162 \pm 0.099
PRF-fit source offset from KIC position	6.831 \pm 0.073	93.10	-0.318 \pm 0.068	6.823 \pm 0.073
photometric centroid source offset	90.55 \pm 0.27	336.90	-2.46 \pm 0.18	90.52 \pm 0.27

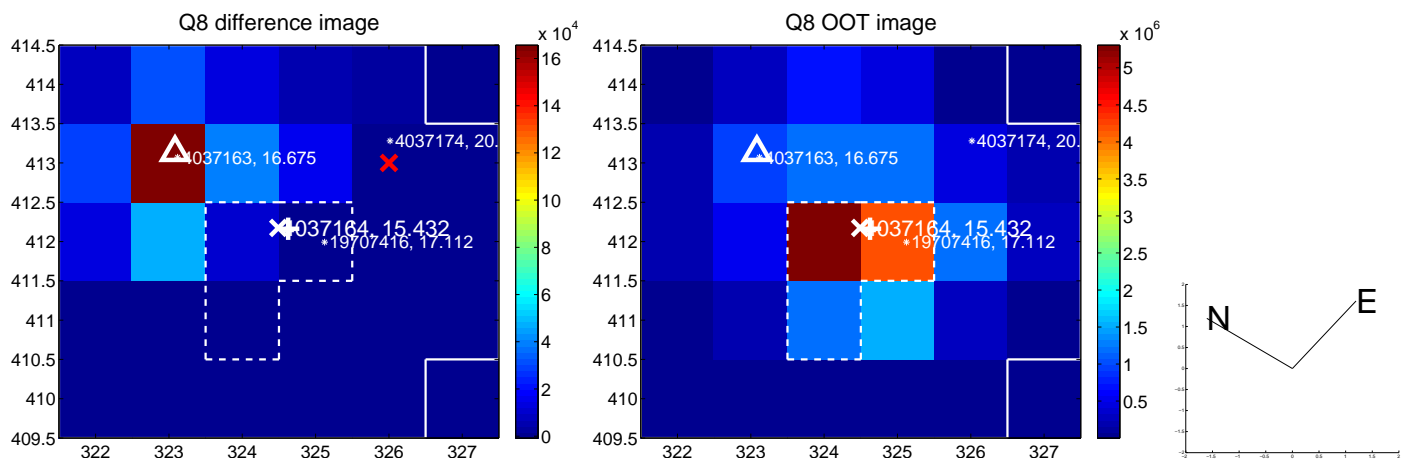
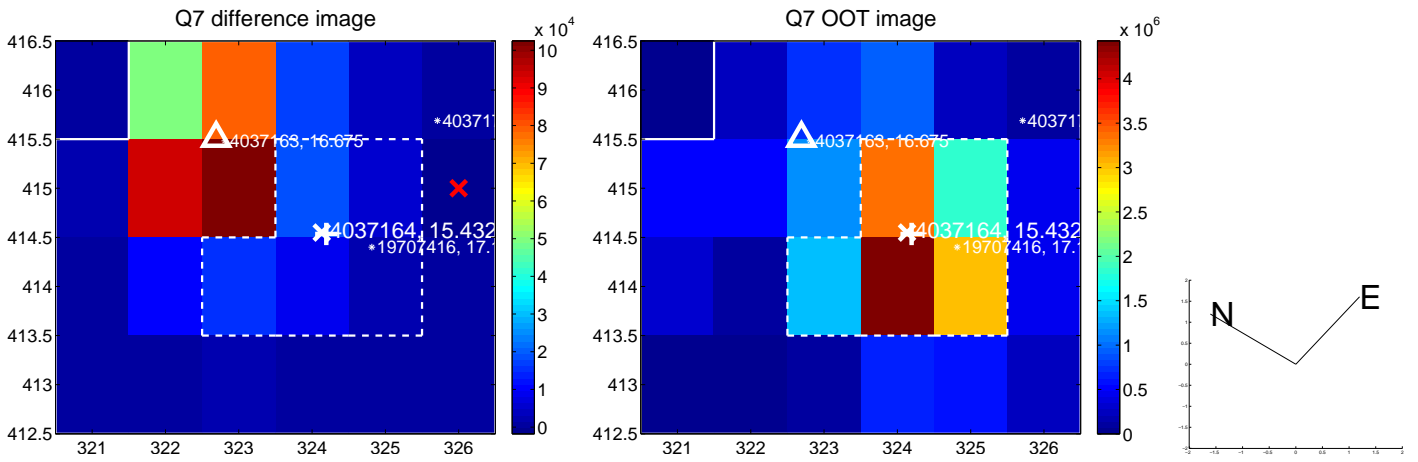
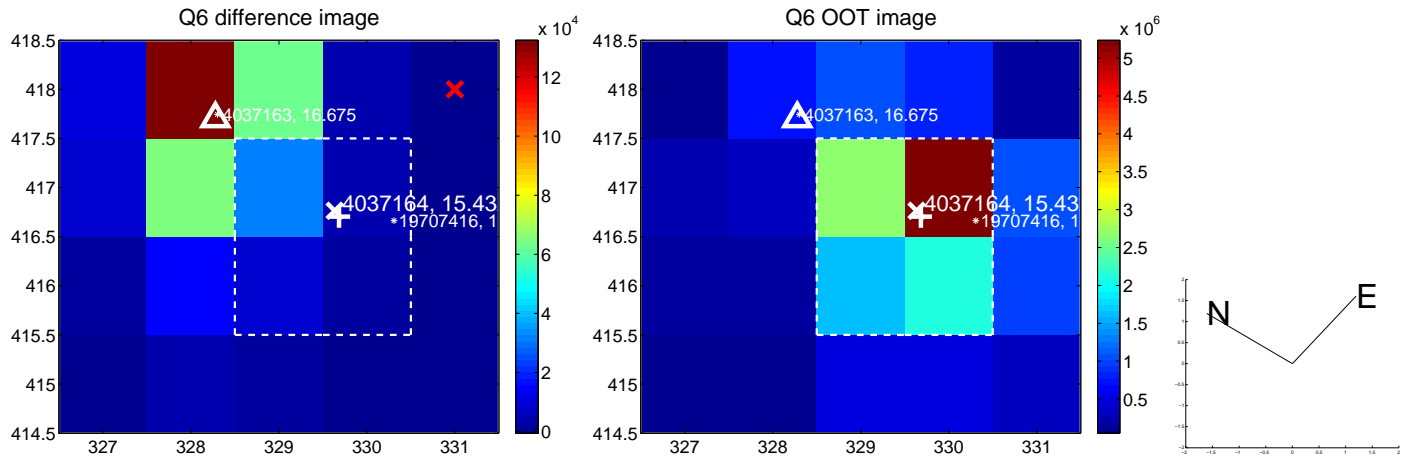
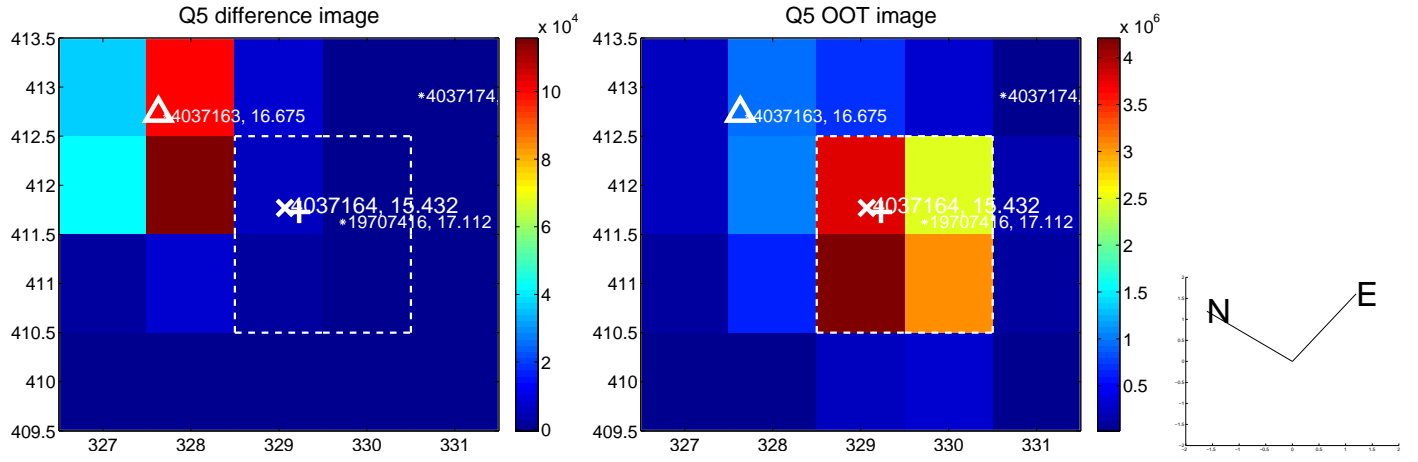


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- 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.

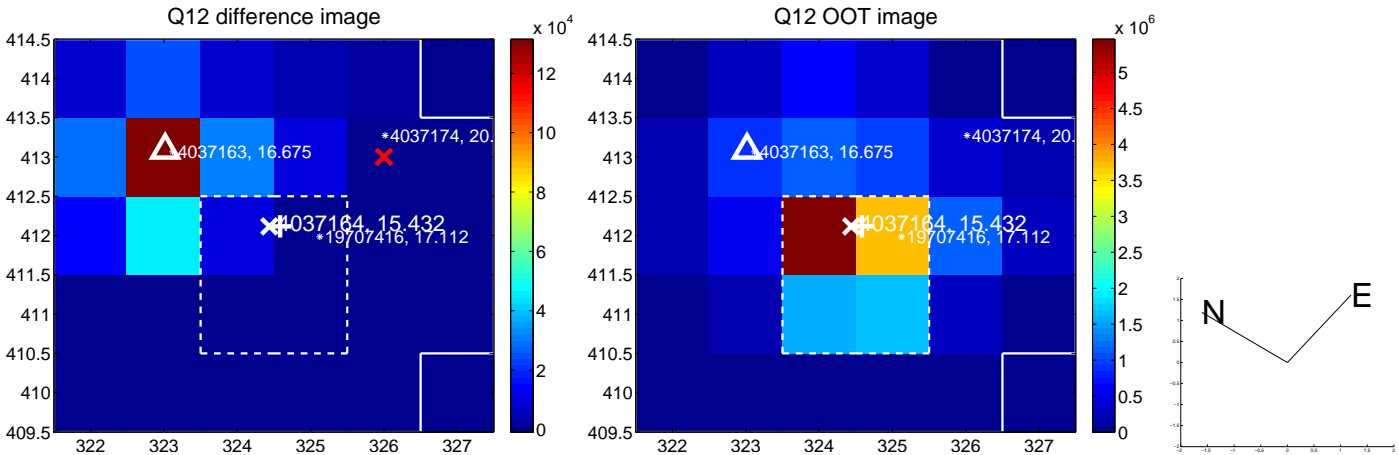
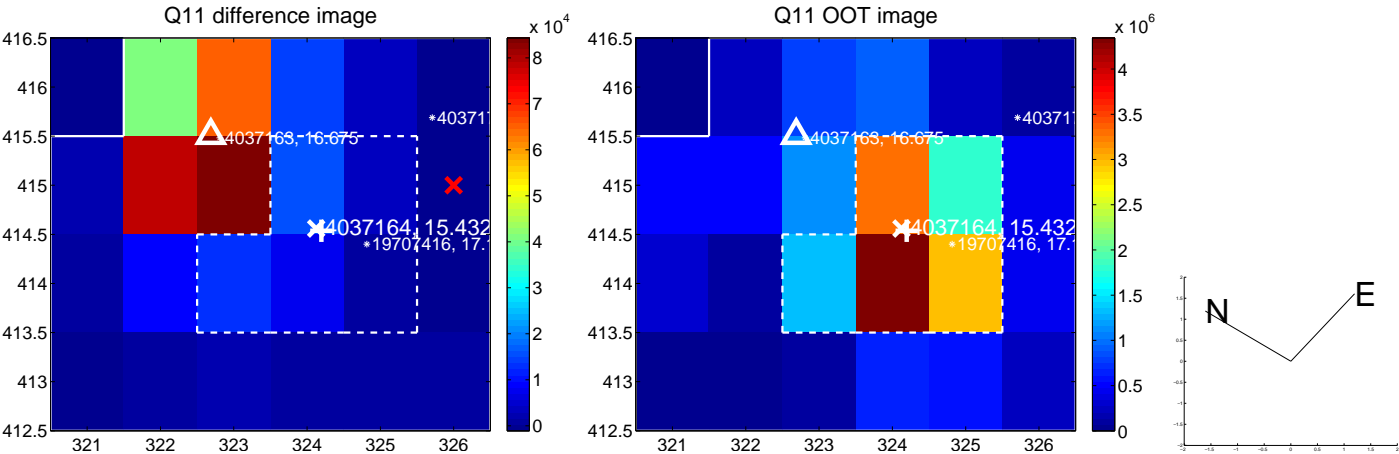
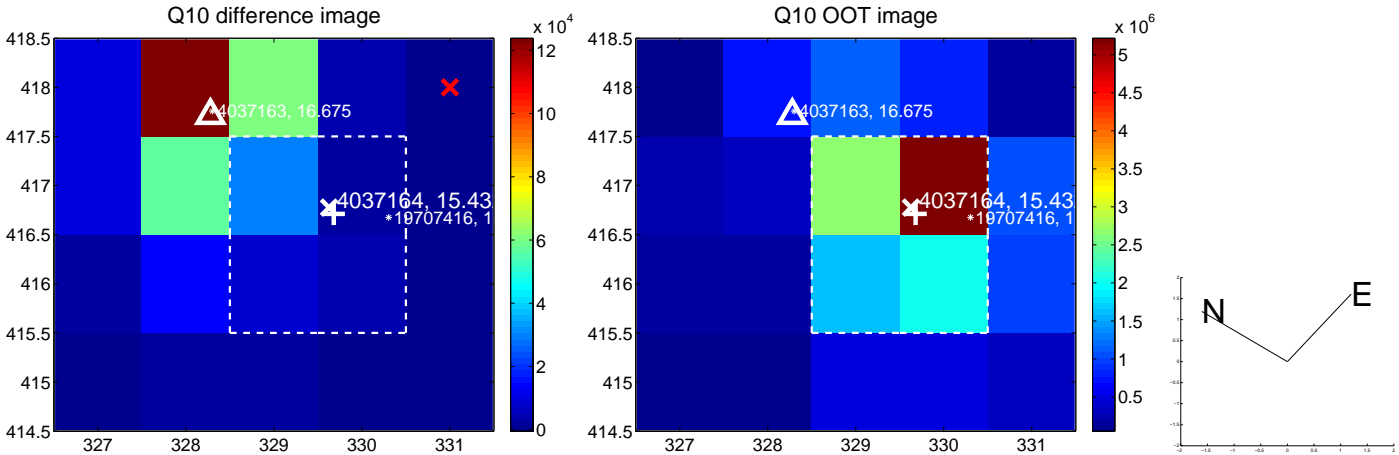
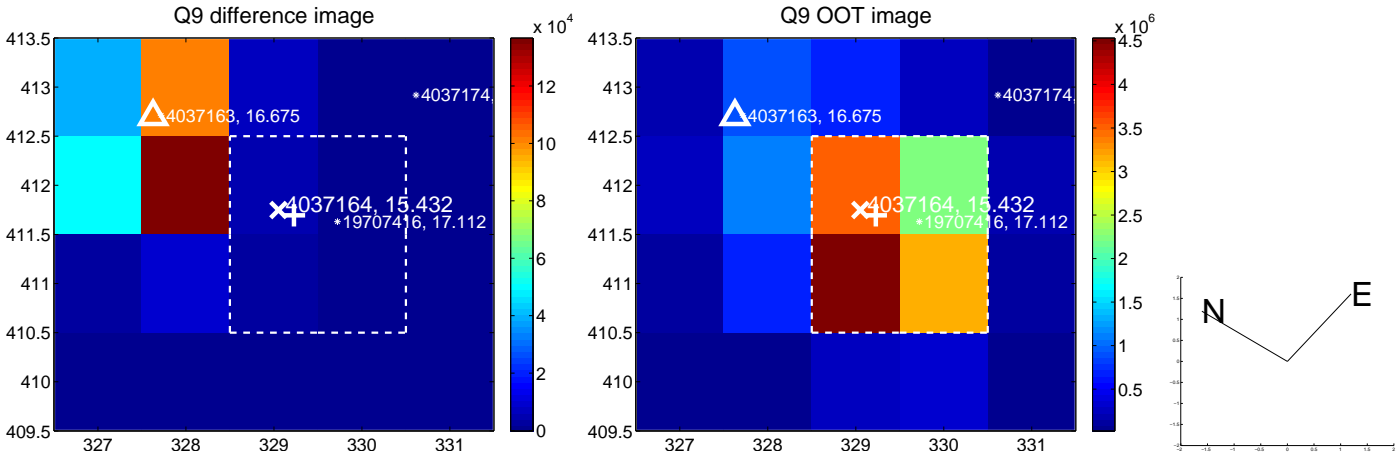
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



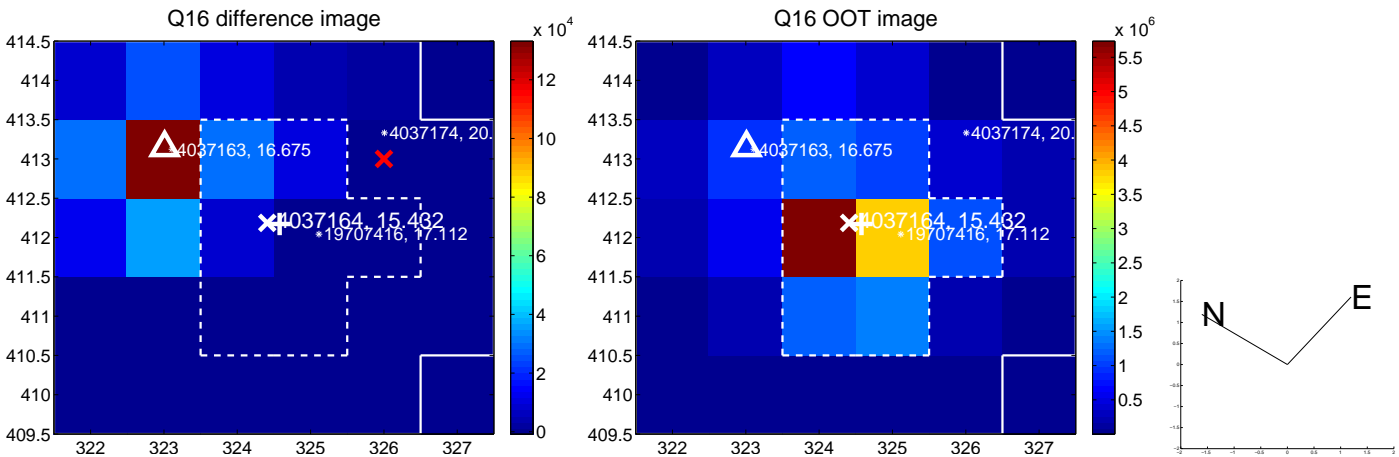
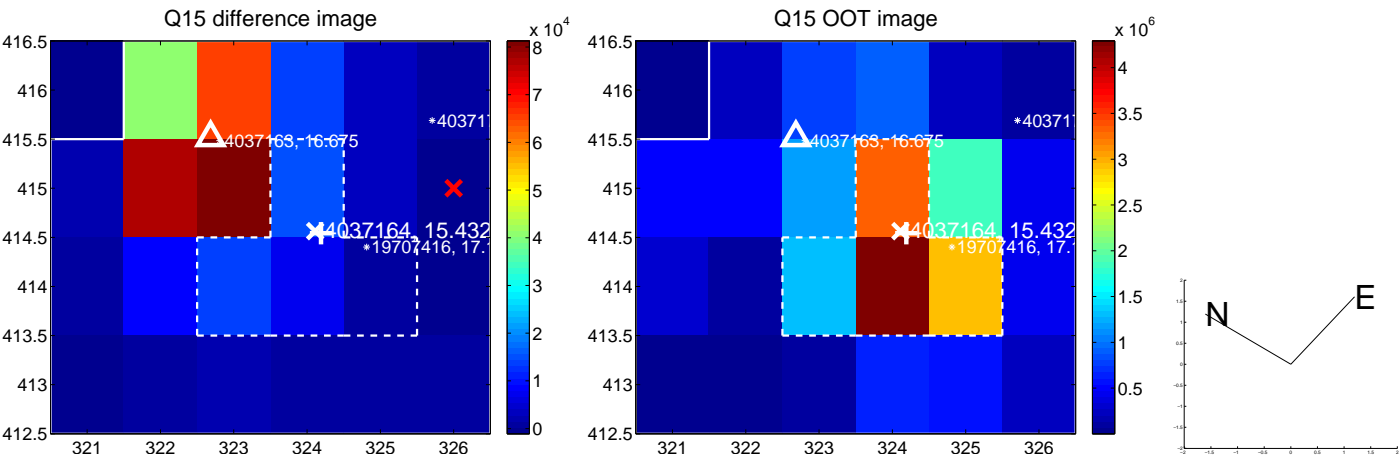
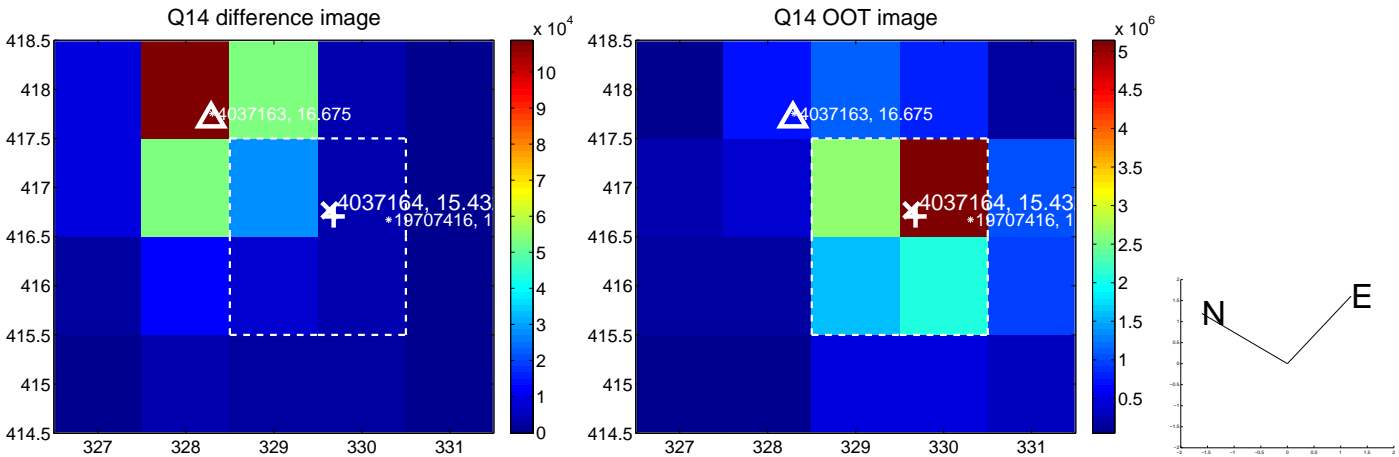
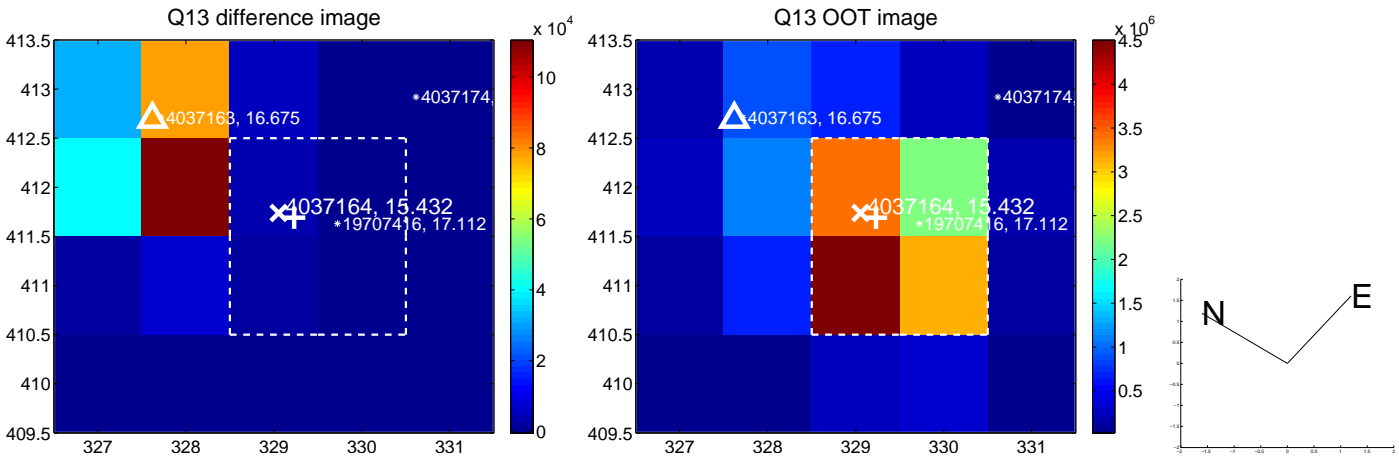
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



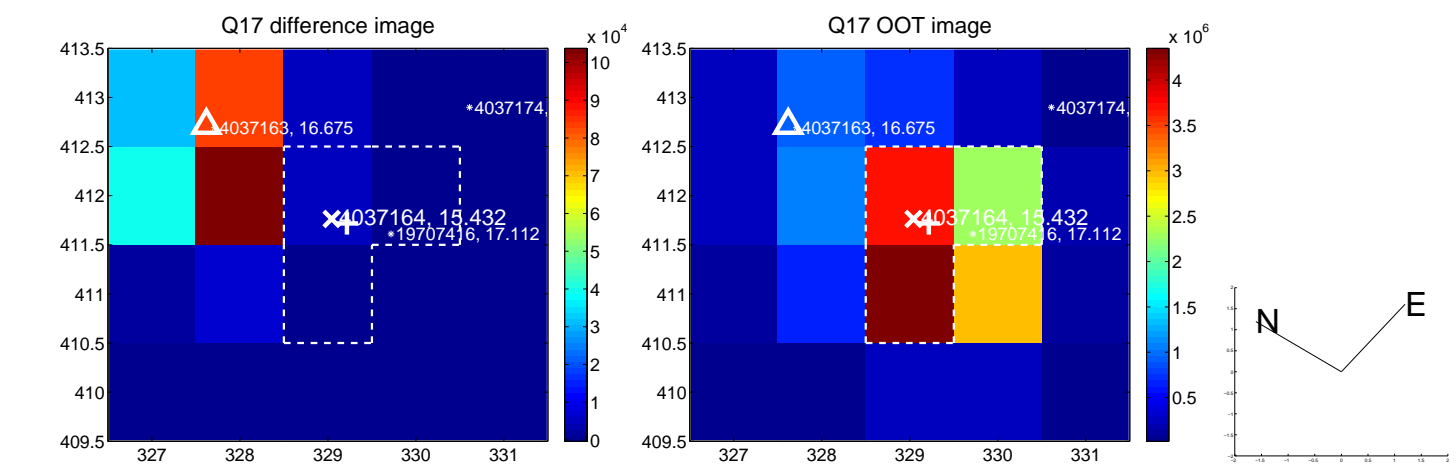
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



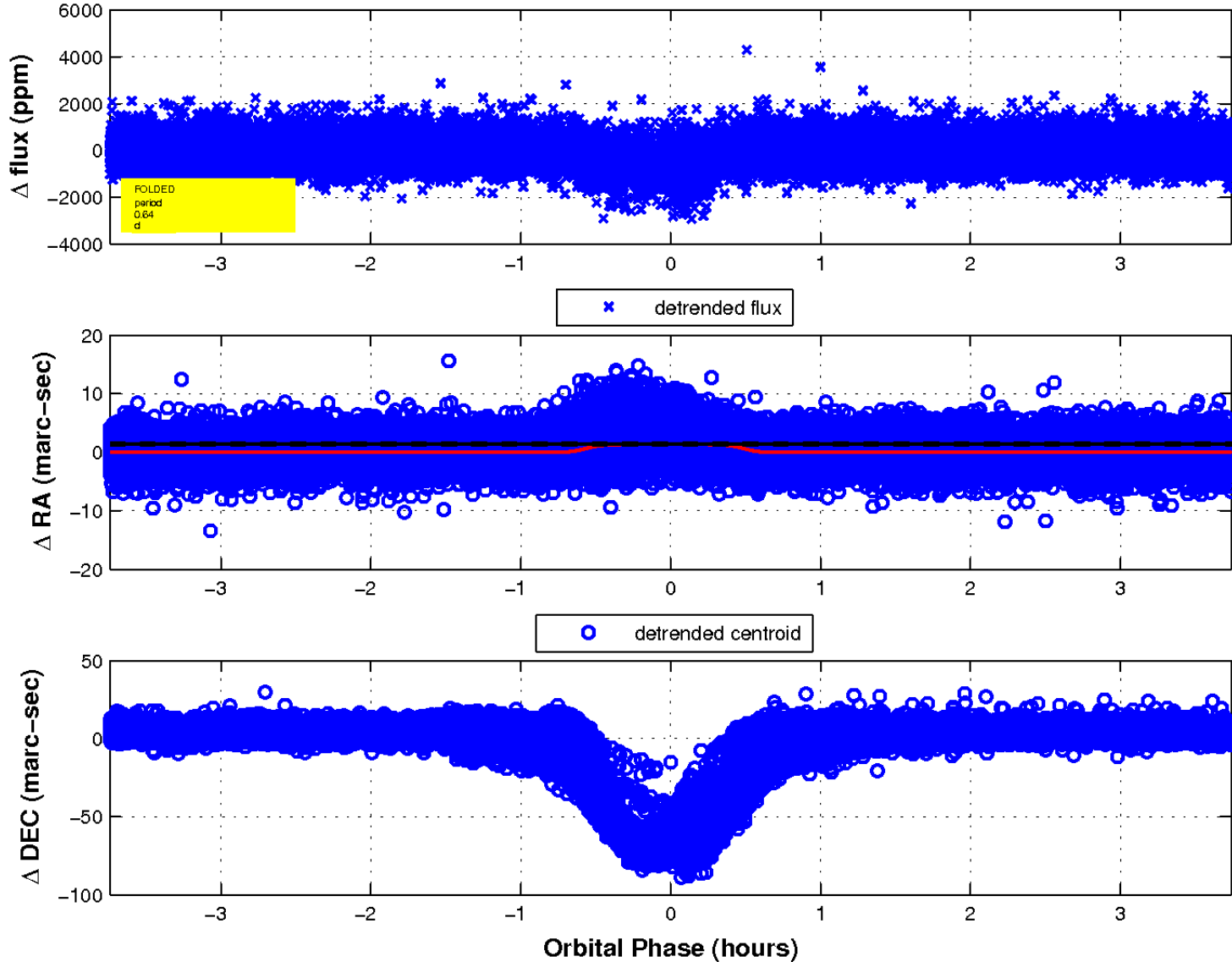
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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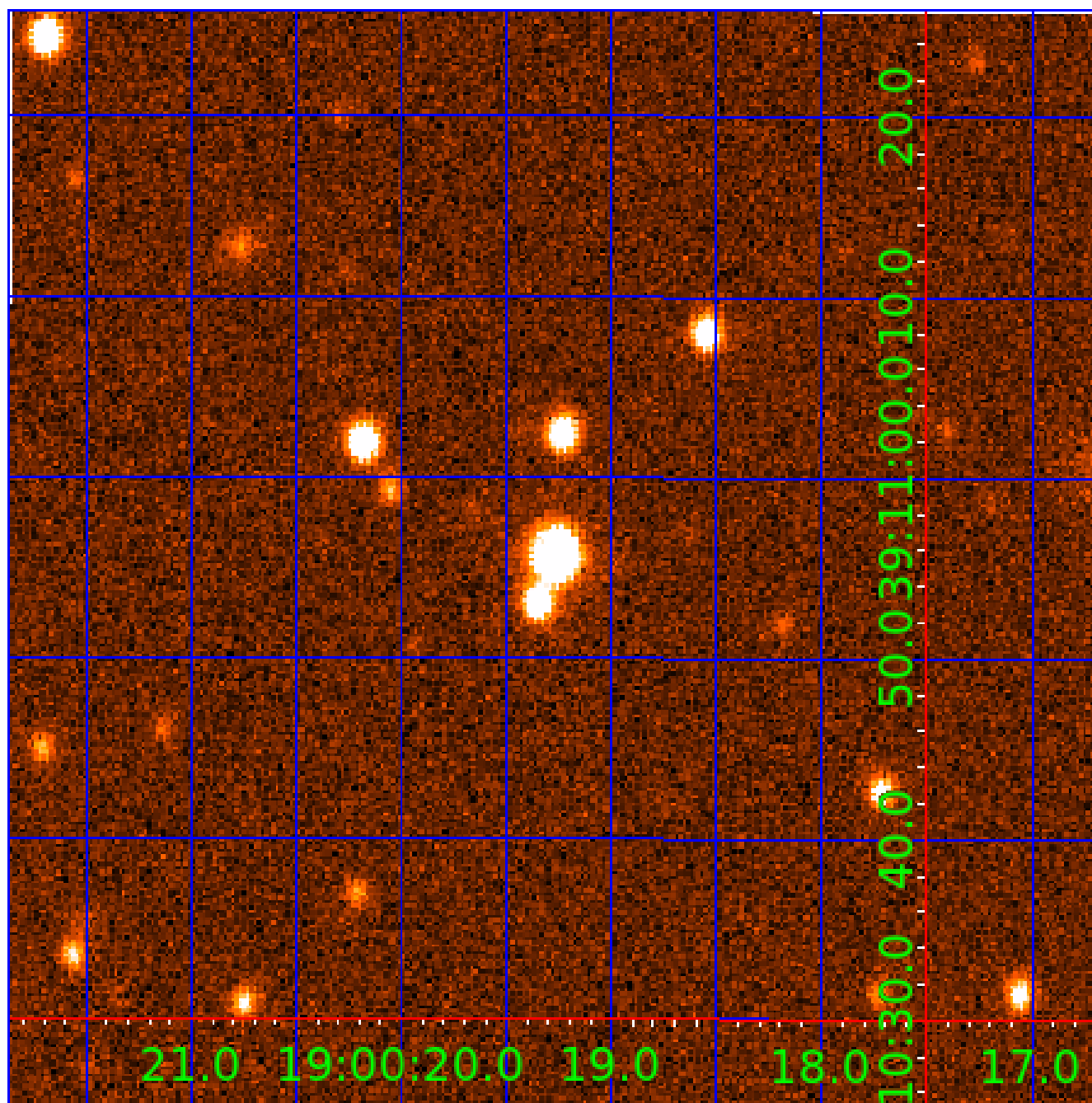


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



KIC 004037164

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})
004037164-01	OBS	1184.01	0.635451	131.640825	607.6	1.247	34.3	59.5	0.55	3920	1.63	453.77
004037164-02	OBS	No	0.635453	131.957981	520.3	1.191	22.6	52.6	0.55	3920	1.51	453.77

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004037164-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_KIC_POS—HALO_GHOST—EPHEM_MATCH
004037164-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_KIC_POS—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 004037164-02

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
004037164-02	4037164	3793.01	4037163	1:1	6.4	-1	2	16.68	15.44	345.31	Direct-PRF	0	1.79	0.68

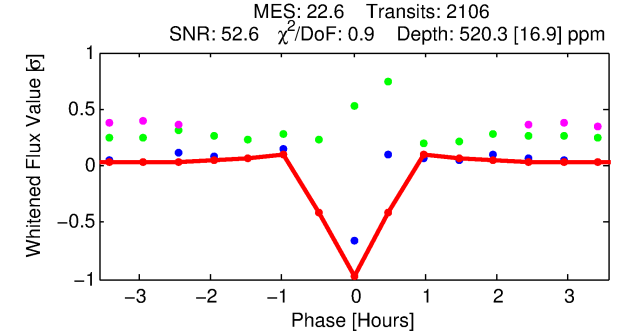
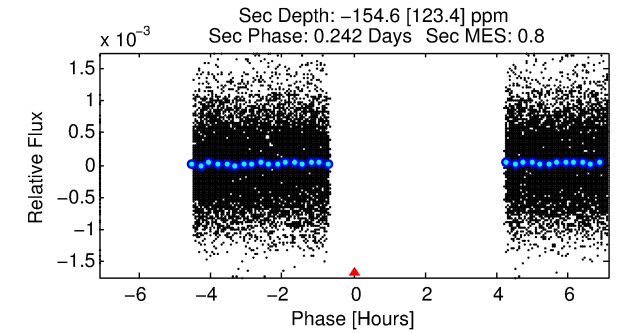
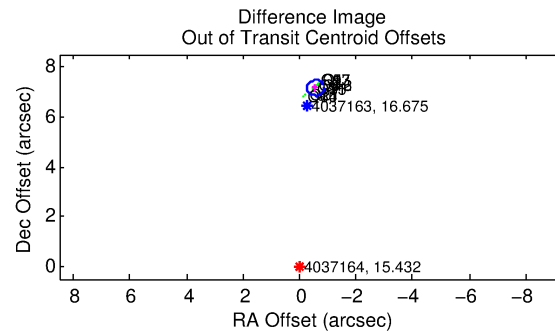
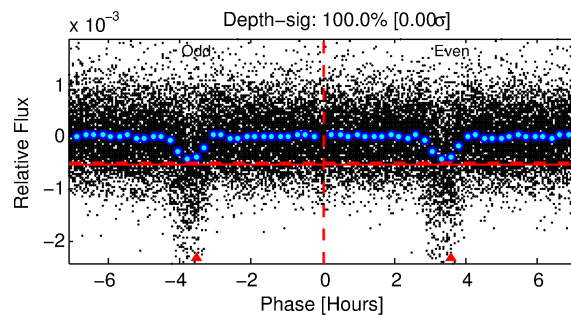
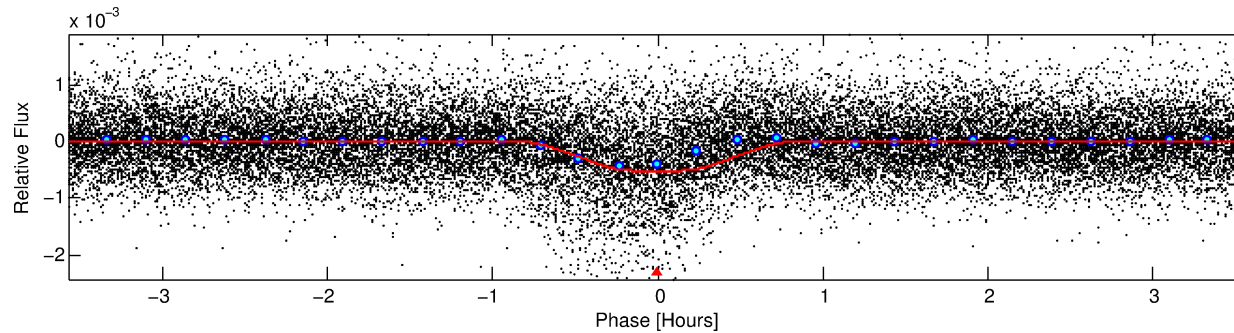
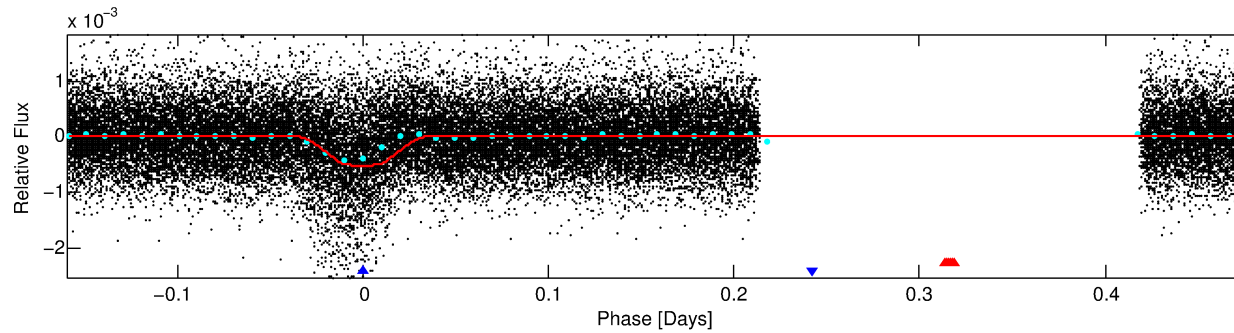
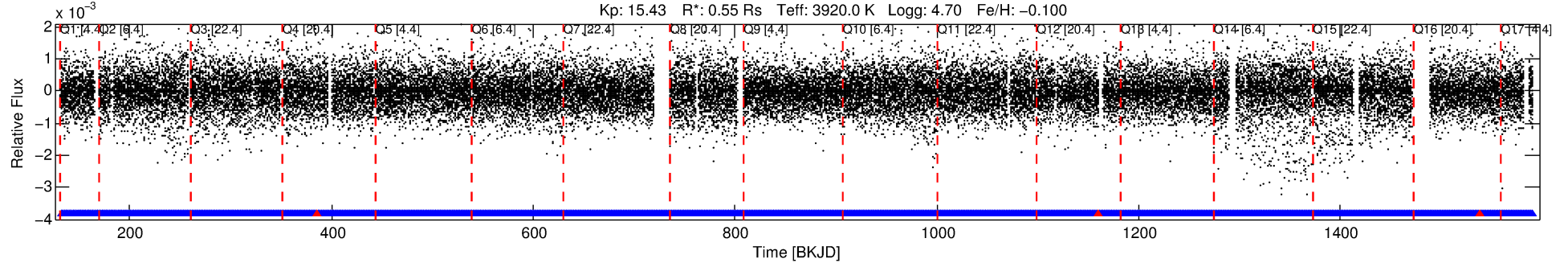
Notes: $P_1:P_2$ is the period ratio. Dist is the distance in arcseconds. Δ Row and Δ Col are the number of pixels apart in row and column. m_2 and m_1 are the magnitudes of the parent and child. D_2/D_1 is the parent's transit depth divided by the child's. σ_P and σ_T are the significance of the match 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: 4037164 Candidate: 2 of 2 Period: 0.635 d

KOI: K01184 Corr: No Ephemeris Match

Kp: 15.43 R*: 0.55 Rs Teff: 3920.0 K Logg: 4.70 Fe/H: -0.100



DV Fit Results:

Period = 0.63545 [0.00000] d
Epoch = 131.9580 [0.0003] BKJD
Rp/R* = 0.0252 [0.0032]
a/R* = 2.21 [0.96]
b = 0.90 [0.12]
Seff = 453.77 [96.31]
Teq = 1177 [62] K
Rp = 1.51 [0.28] Re
a = 0.0119 [0.0012] AU
Ag = N/A
Teff = N/A

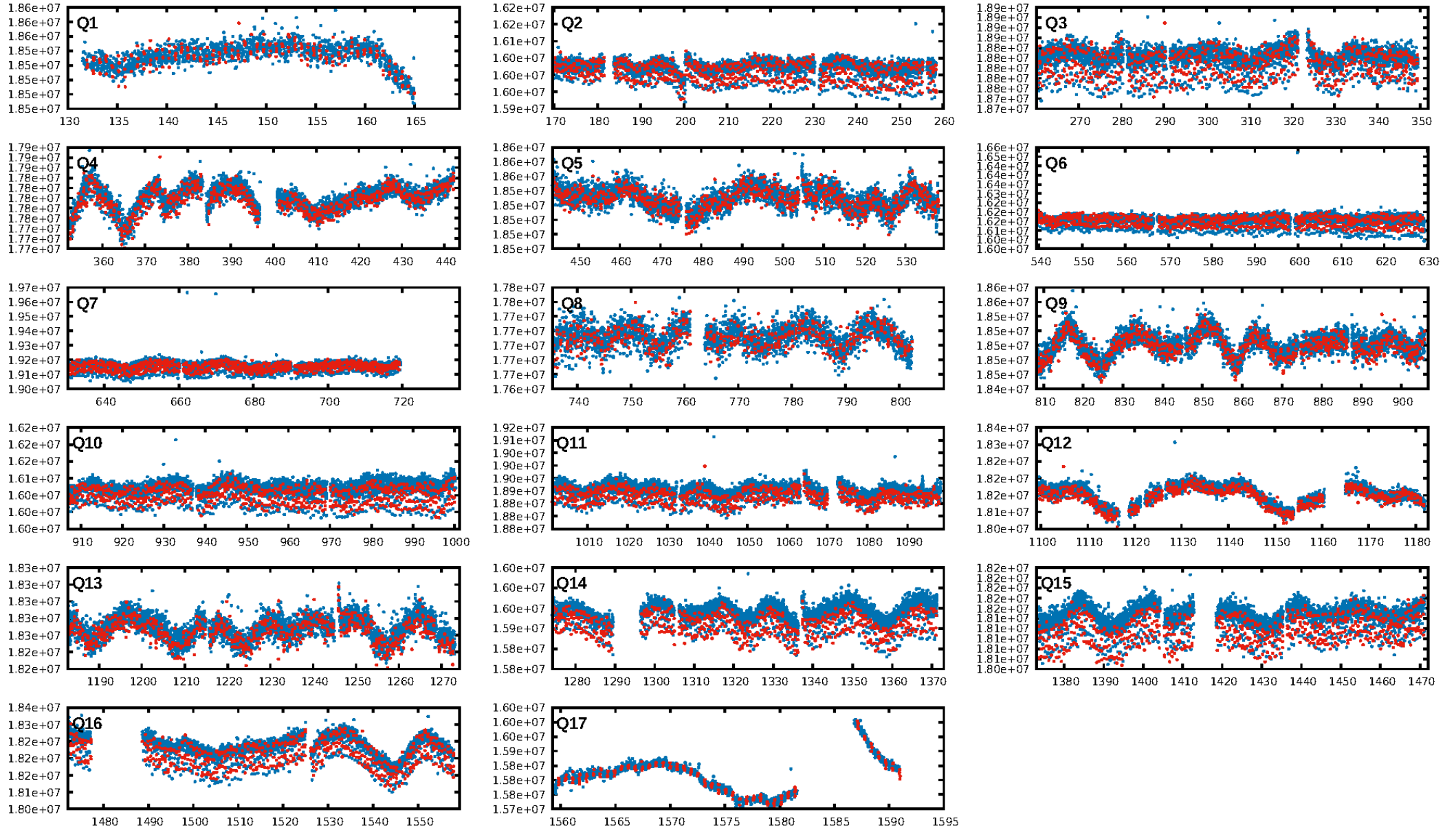
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 3.65e-108
RollingBand-fgt: 1.00 [2008/2011]
GhostDiagnostic-chr: -0.1749
Centroid-sig: N/A
Centroid-so: 81.020 arcsec [255.77σ]
OotOffset-rm: 7.177 arcsec [70.17σ]
KicOffset-rm: 6.829 arcsec [92.68σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 1.00 [17/17]
DiffImageOverlap-fno: 1.00 [17/17]

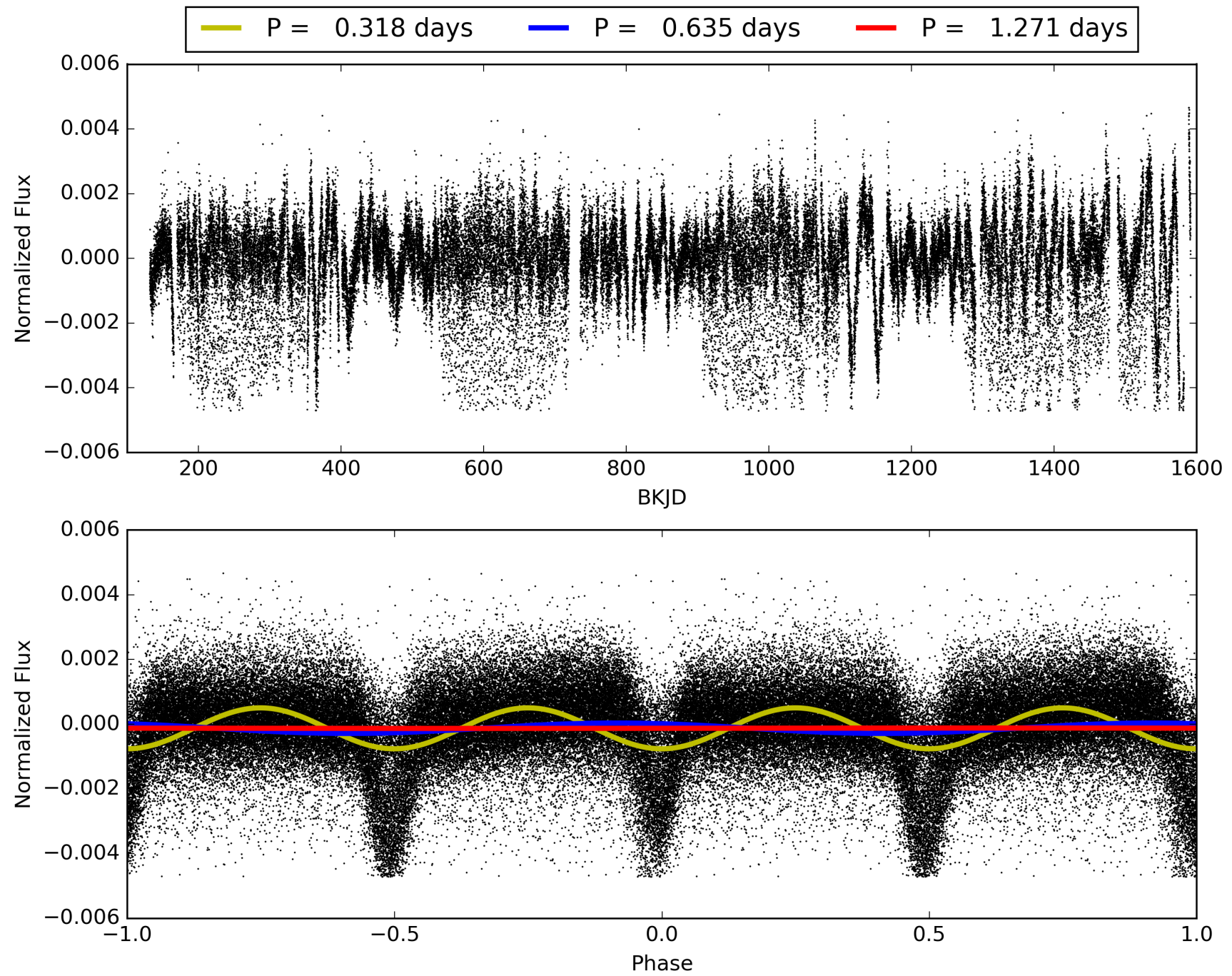
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

TCE 004037164-02, PDC Light Curves

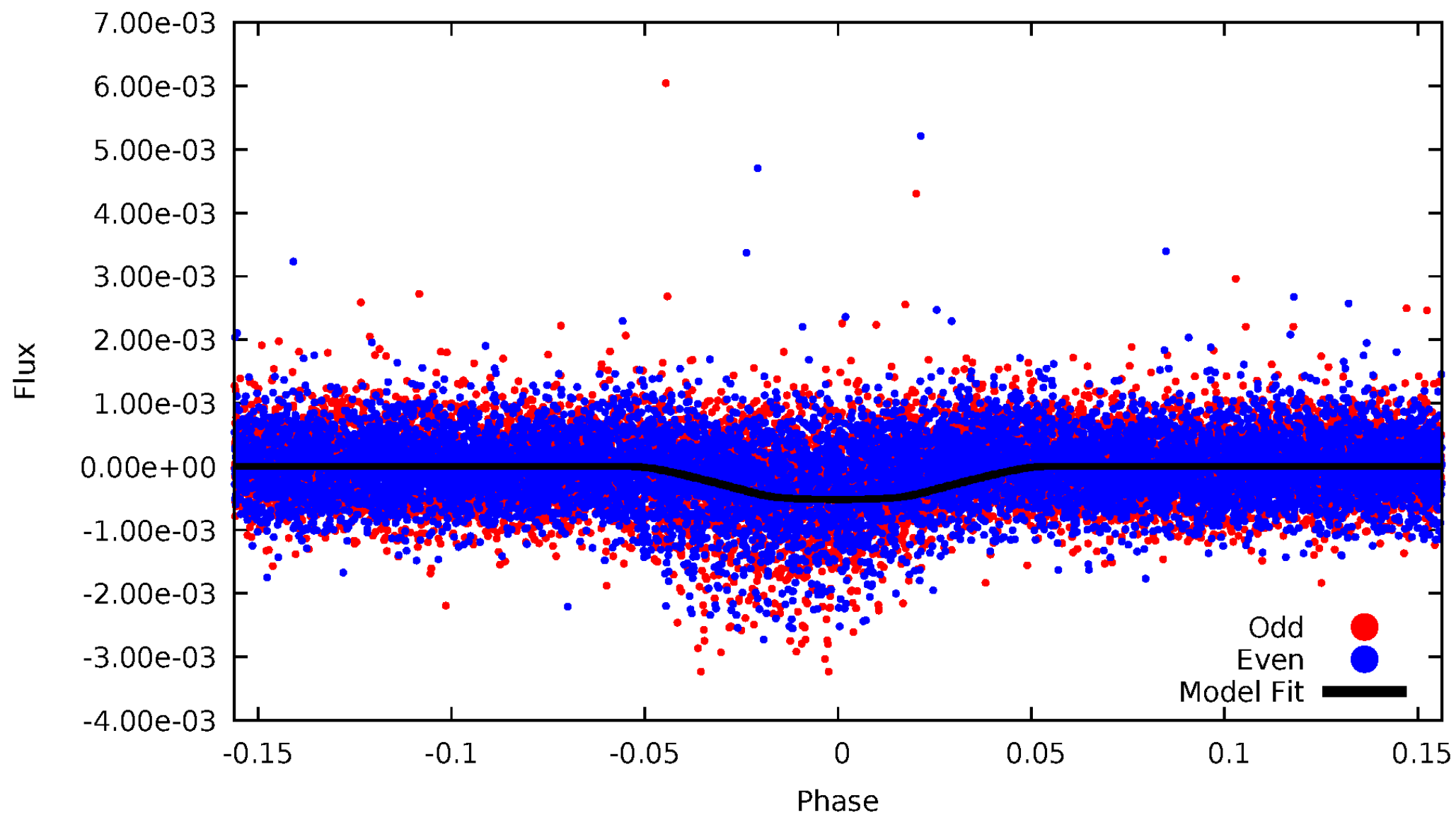


TCE 004037164-02



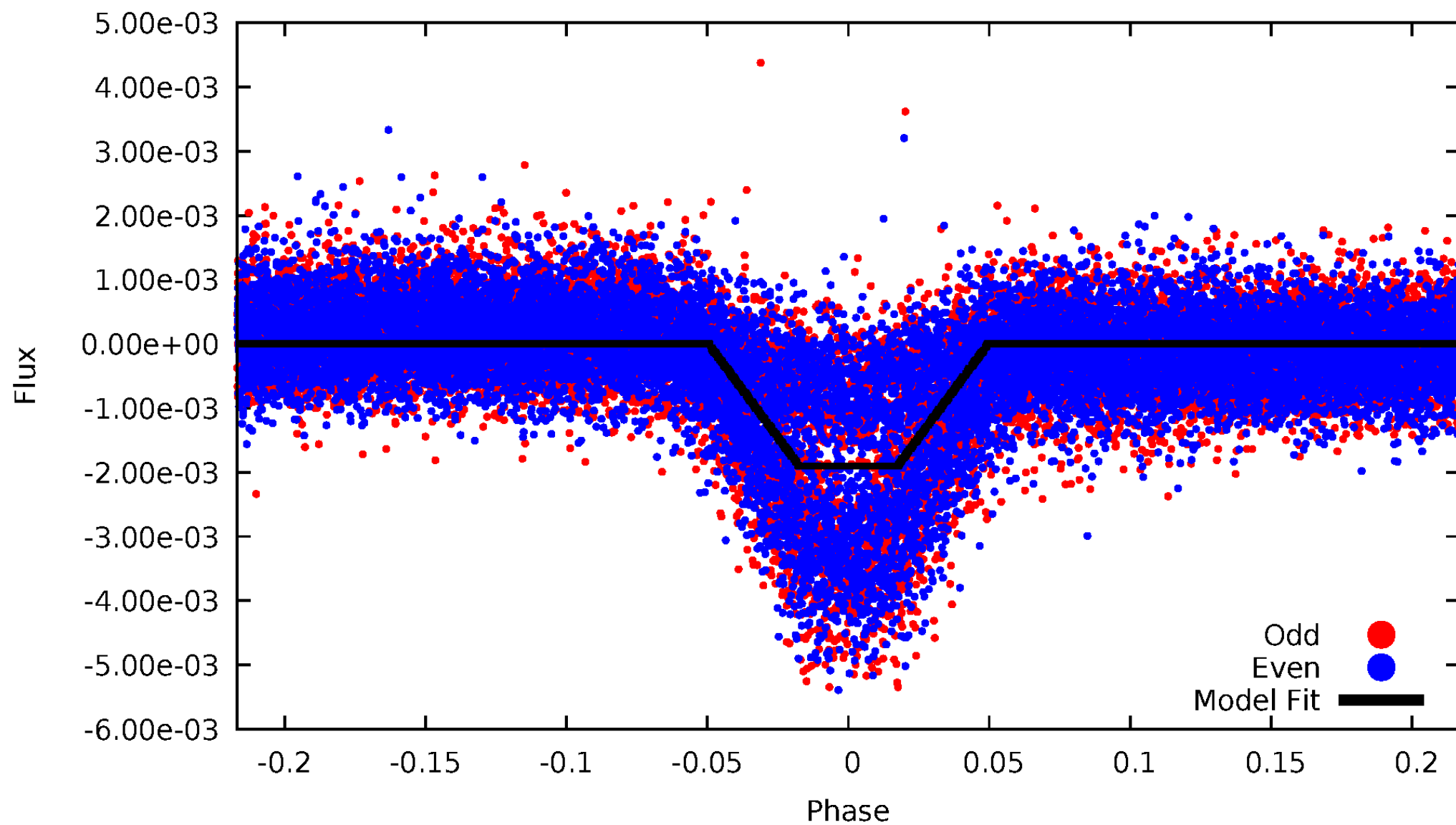
DV Odd/Even

TCE 004037164-02



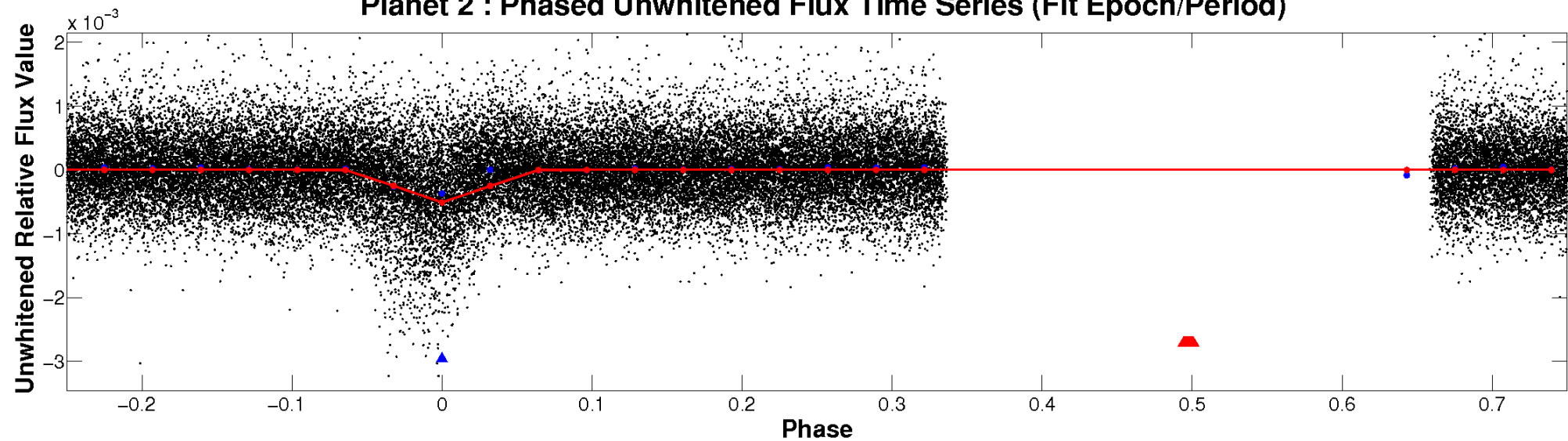
ALT Odd/Even

TCE 004037164-02

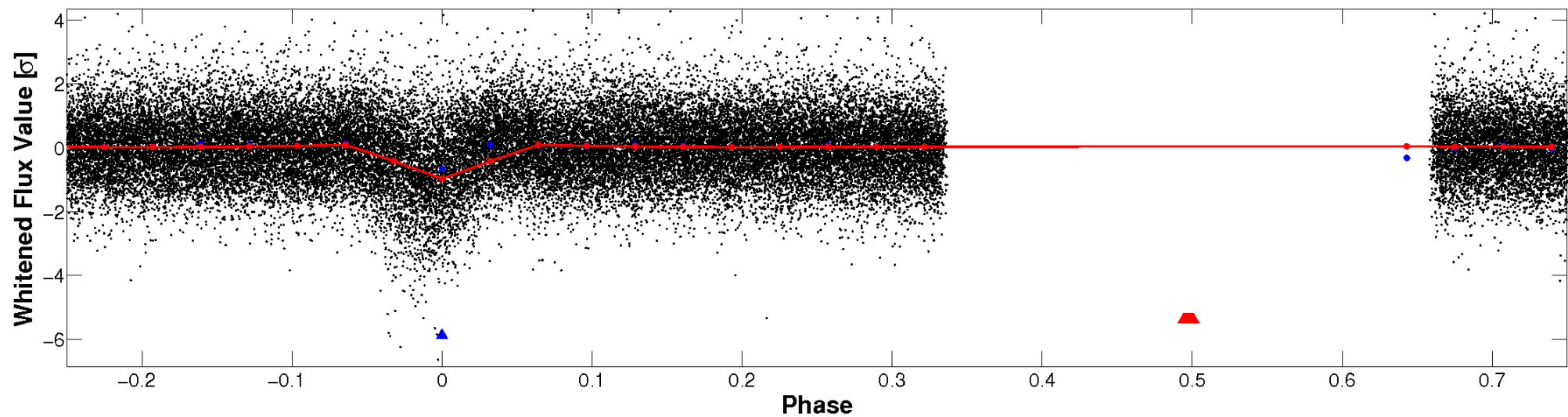


Non-Whitened Vs. Whitened Light Curve

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

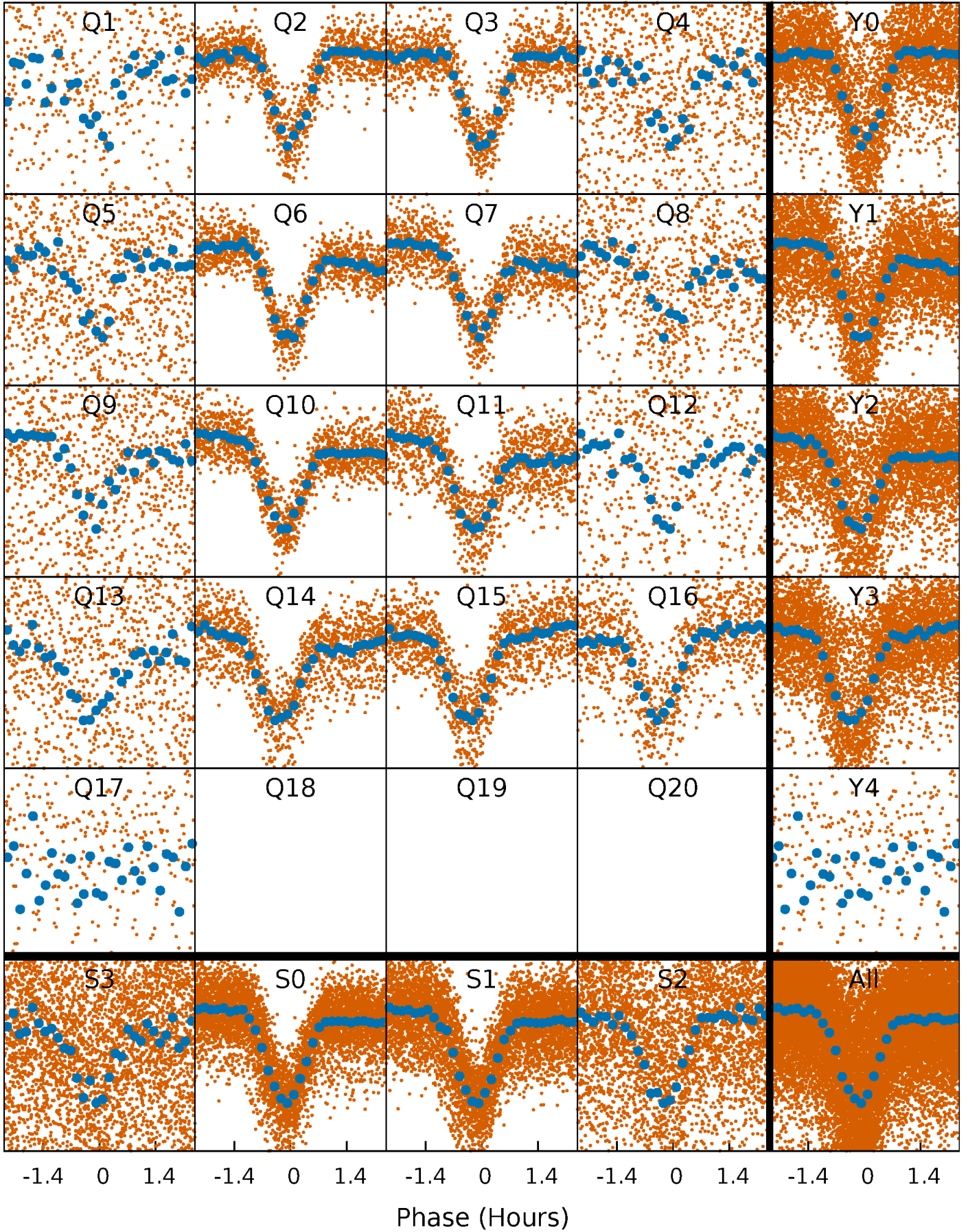


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



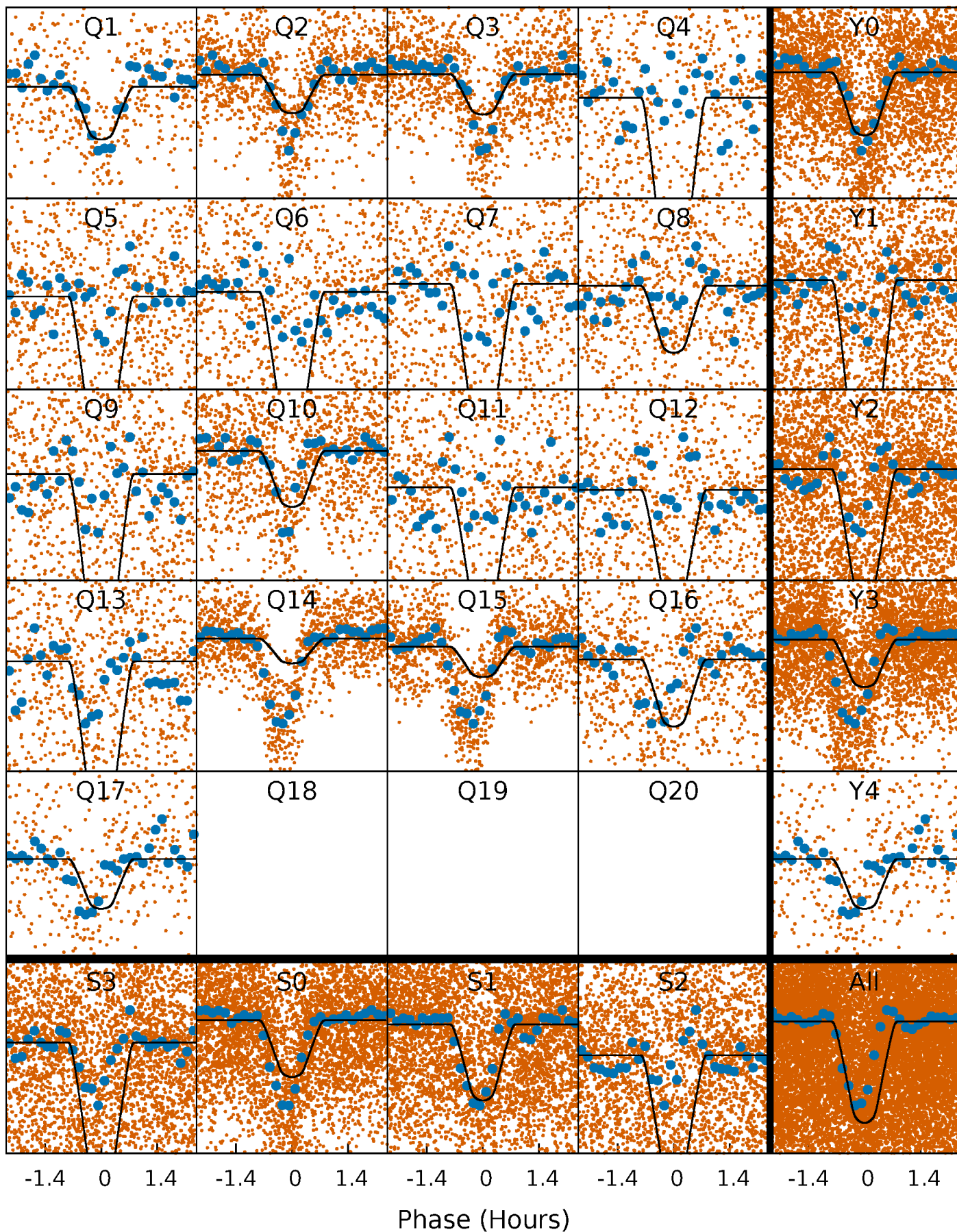
PDC Quarter-Phased Transit Curves

TCE 004037164-02 P= 0.635453 Days $T_0=131.957981$ (BKJD)



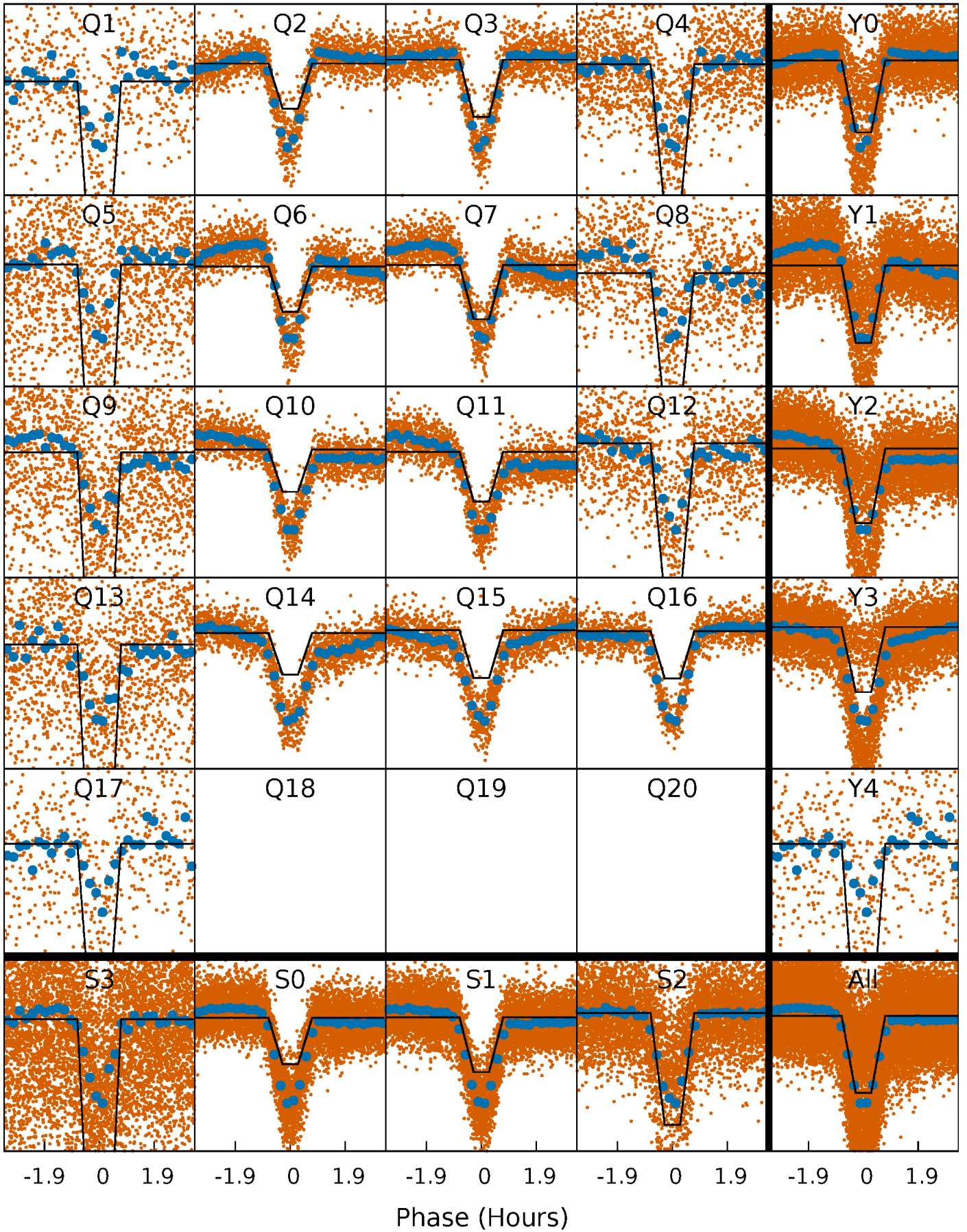
DV Quarter-Phased Transit Curves

TCE 004037164-02 P= 0.635453 Days $T_0=131.957981$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

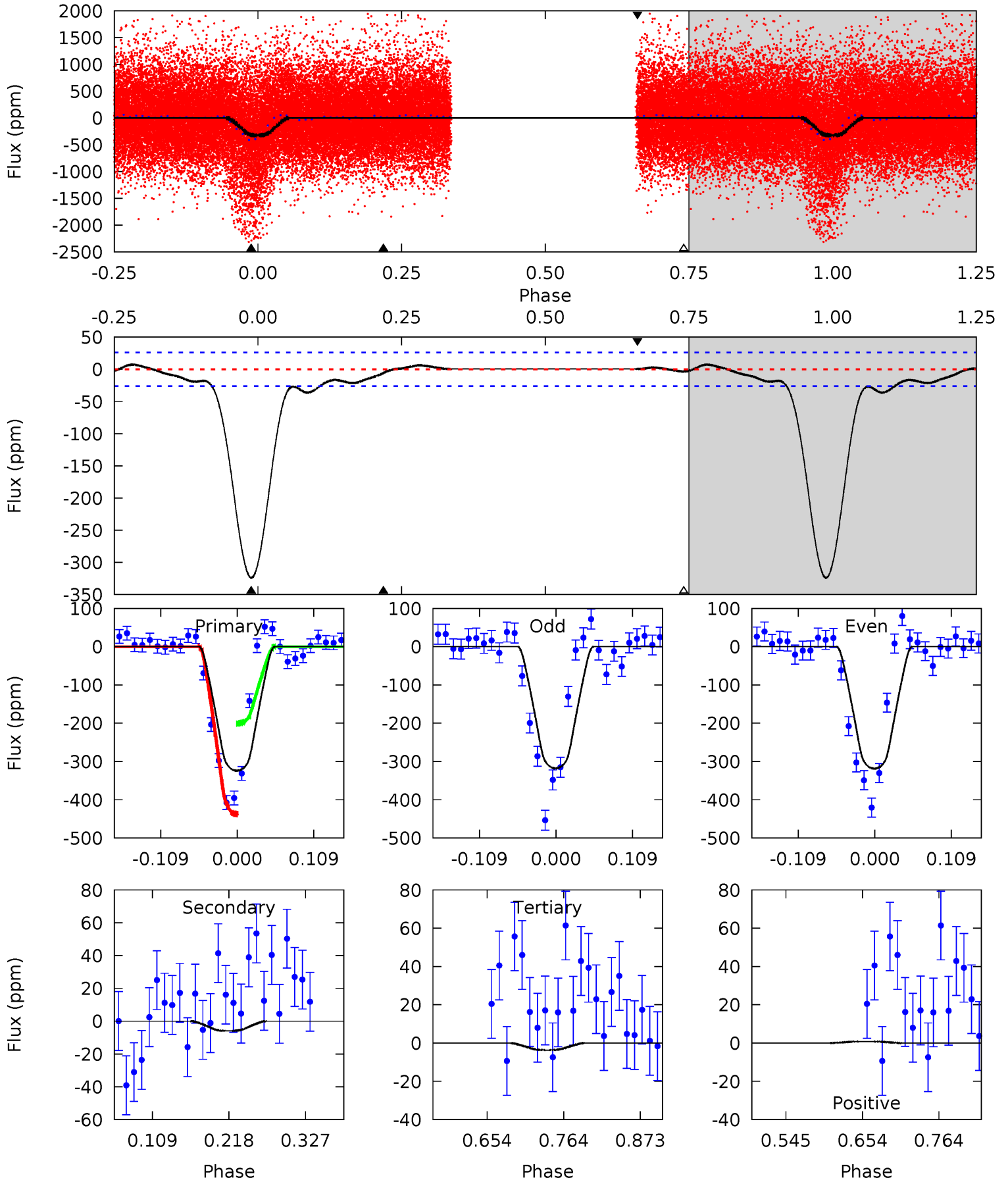
TCE 004037164-02 $P = 0.635445$ Days $T_0 = 131.961069$ (BKJD)



DV Model-Shift Uniqueness Test

004037164-02, P = 0.635453 Days, E = 131.322528 Days

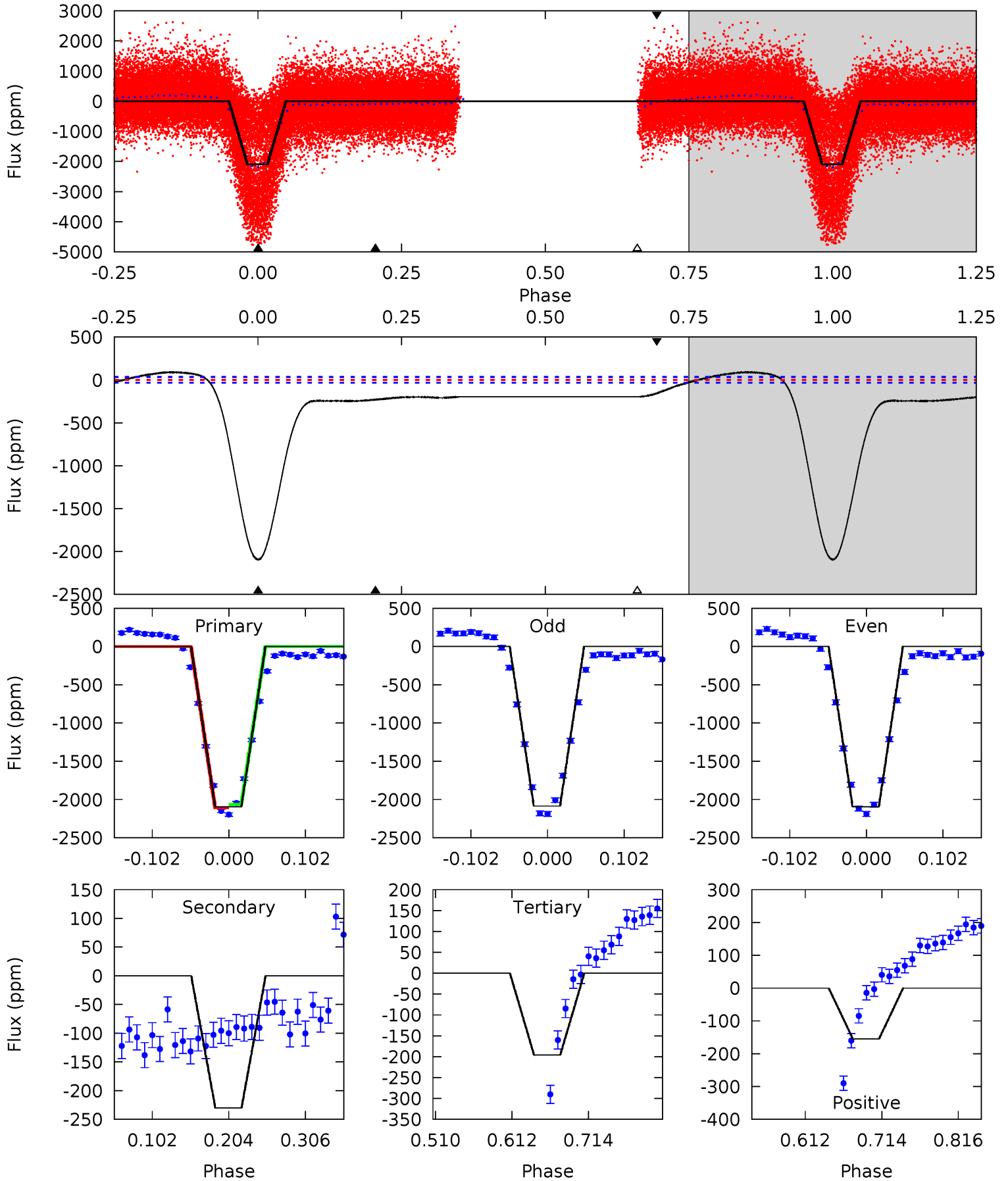
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
56.3	1.02	0.64	0.14	4.55	1.60	1.44	55.7	56.2	0.39	0.88	0.05	1.09	0.02	20.5



Alt Model-Shift Uniqueness Test

004037164-02, P = 0.635445 Days, E = 131.325624 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
286.6	31.5	26.8	-21.2	4.56	1.63	15.0	259.7	307.7	4.69	52.7	0.68	0.93	0.04	2.97



Stellar Parameters For KIC 004037164

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	3920^{+141}_{-156}	$4.700^{+0.071}_{-0.033}$	$-0.100^{+0.300}_{-0.300}$	$0.550^{+0.055}_{-0.073}$	$0.554^{+0.057}_{-0.064}$	$4.675^{+1.629}_{-0.695}$
	+4%/-4%	+2%/-1%	+300%/-300%	+10%/-13%	+10%/-12%	+35%/-15%
Source	PHO2	PHO2	PHO2	DSEP		

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

Secondary Eclipse Parameters for KIC 004037164-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-6 ± 6	$1.49^{+0.21}_{-0.20}$	1626^{+72}_{-72}	-1923^{+3910}_{-232}	$0.208^{+0.224}_{-0.191}$
Alt.	-230 ± 7	$2.60^{+0.26}_{-0.25}$	1628^{+73}_{-71}	2789^{+111}_{-108}	$2.669^{+0.581}_{-0.437}$

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 $T_{\text{obs}} \gg T_{\text{max}}$ AND $A_{\text{obs}} \gg 1.0$

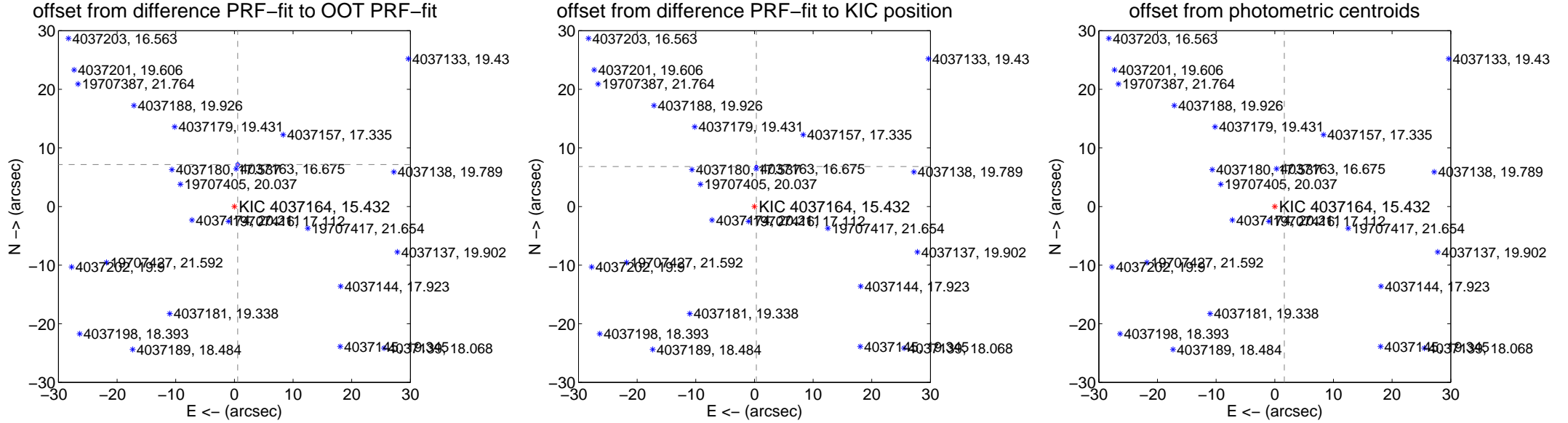
DV Centroid Data

Supplemental centroid analysis for 004037164-02. Kepler magnitude: 15.43. Transit SNR 52.61

There are 17 quarters with good PRF difference image offsets

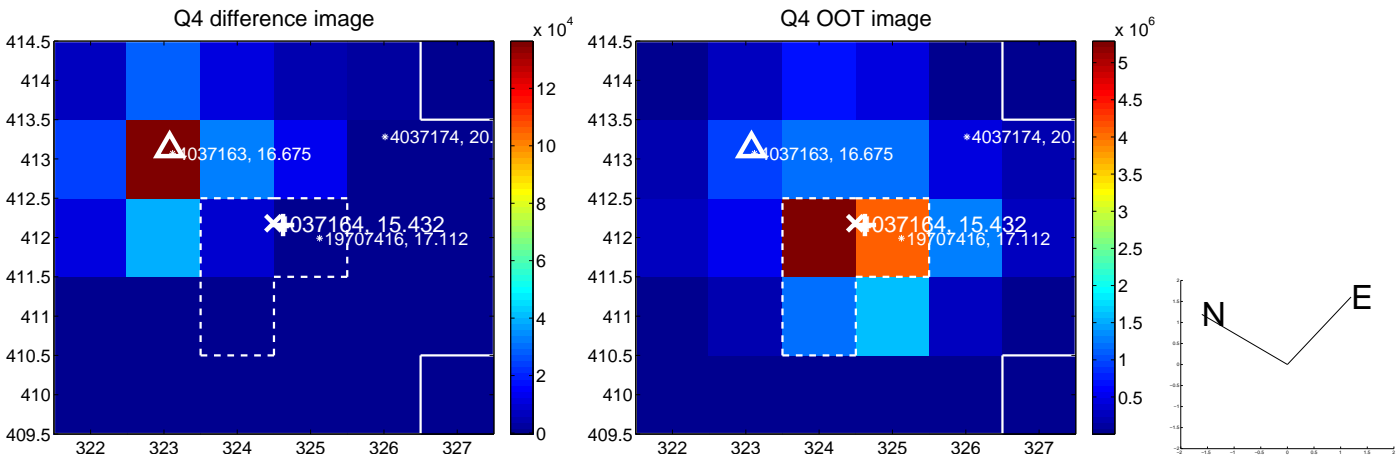
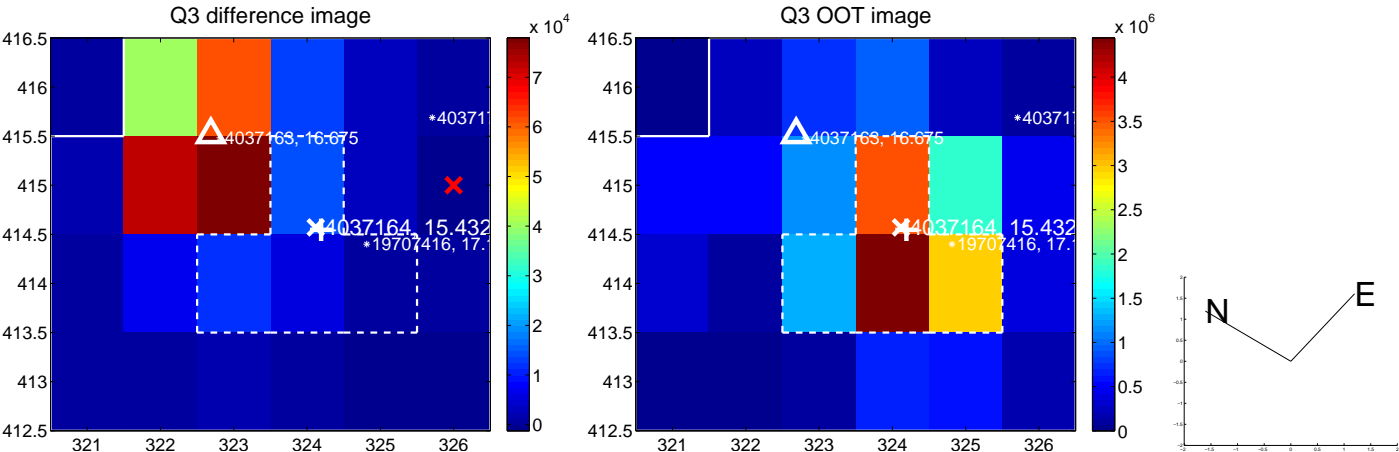
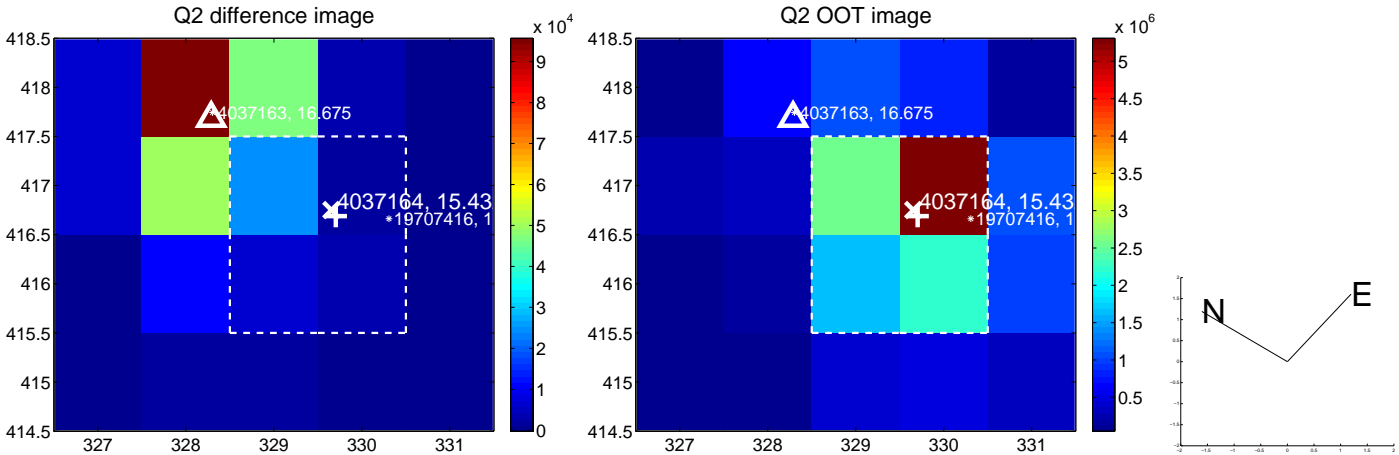
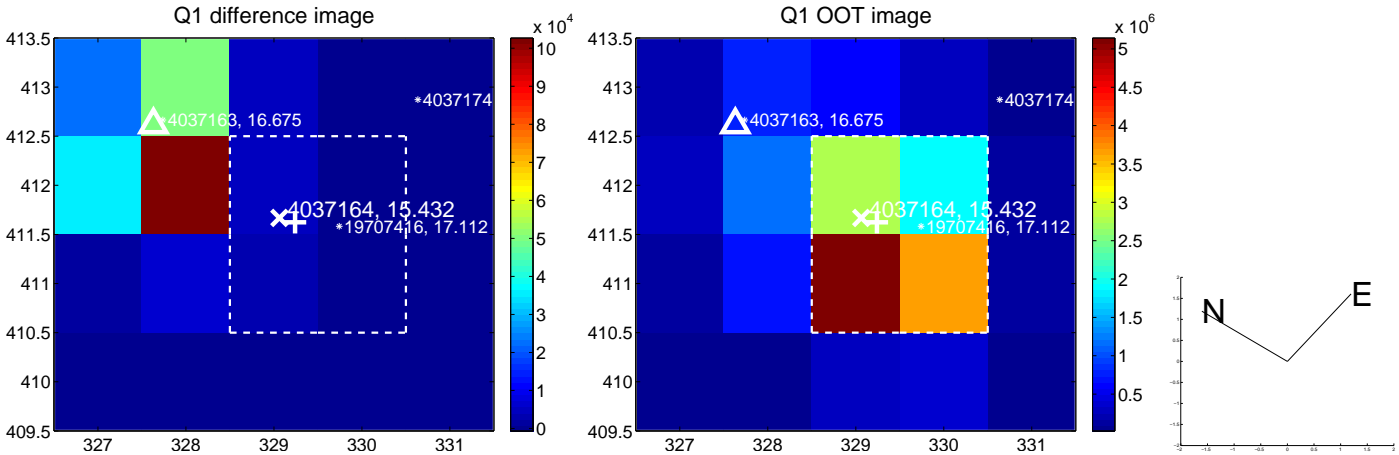
The direct PRF centroid is offset from the target star catalog position by about 0.71 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	7.177 ± 0.102	70.17	-0.555 ± 0.072	7.156 ± 0.102
PRF-fit source offset from KIC position	6.829 ± 0.074	92.68	-0.321 ± 0.068	6.821 ± 0.073
photometric centroid source offset	81.02 ± 0.32	255.77	-1.62 ± 0.22	81.00 ± 0.32

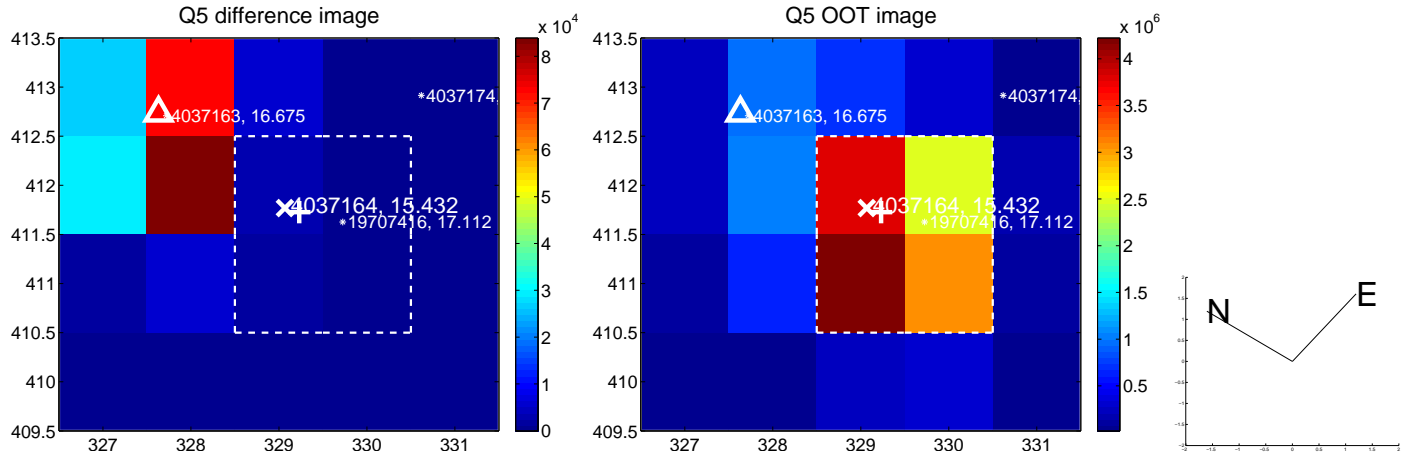


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- 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.

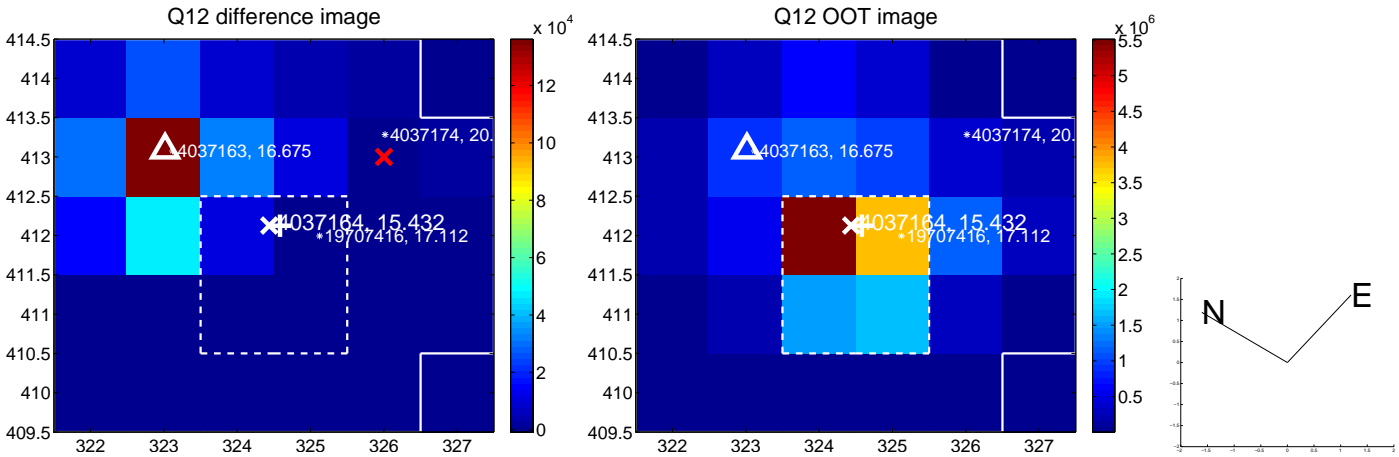
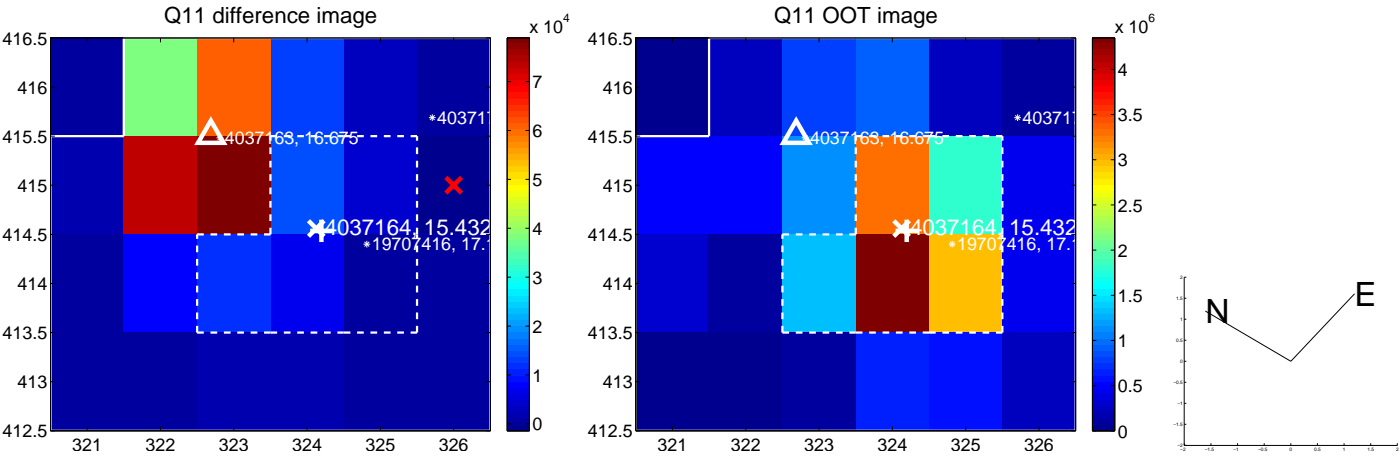
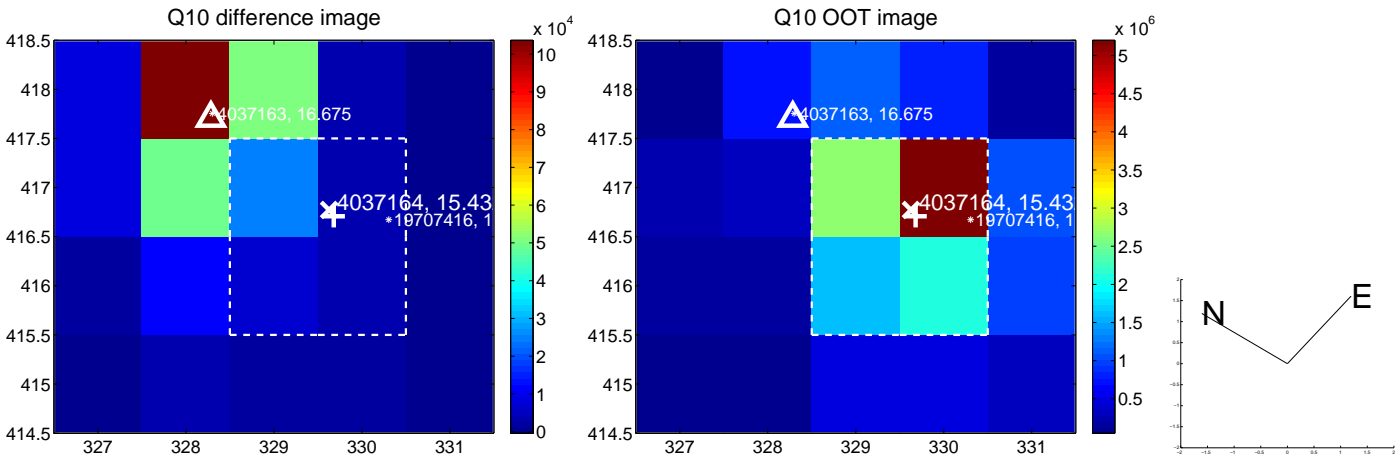
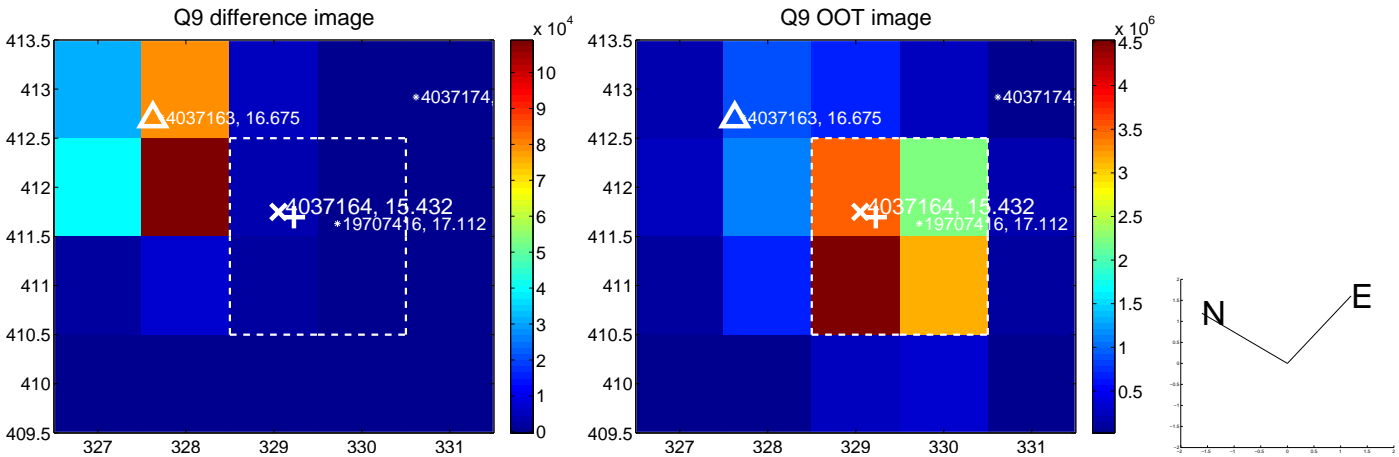
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



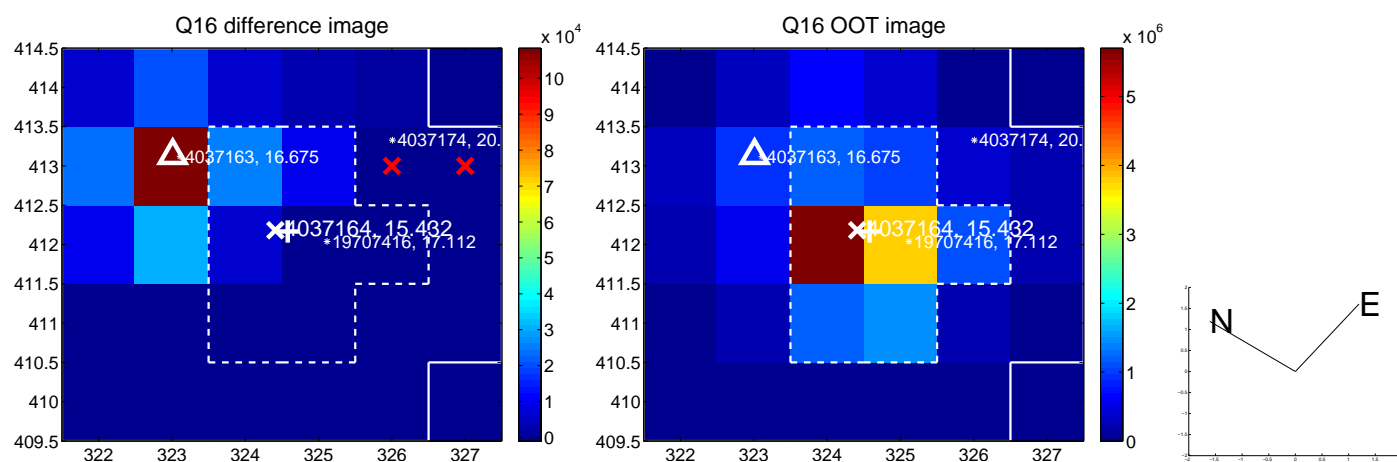
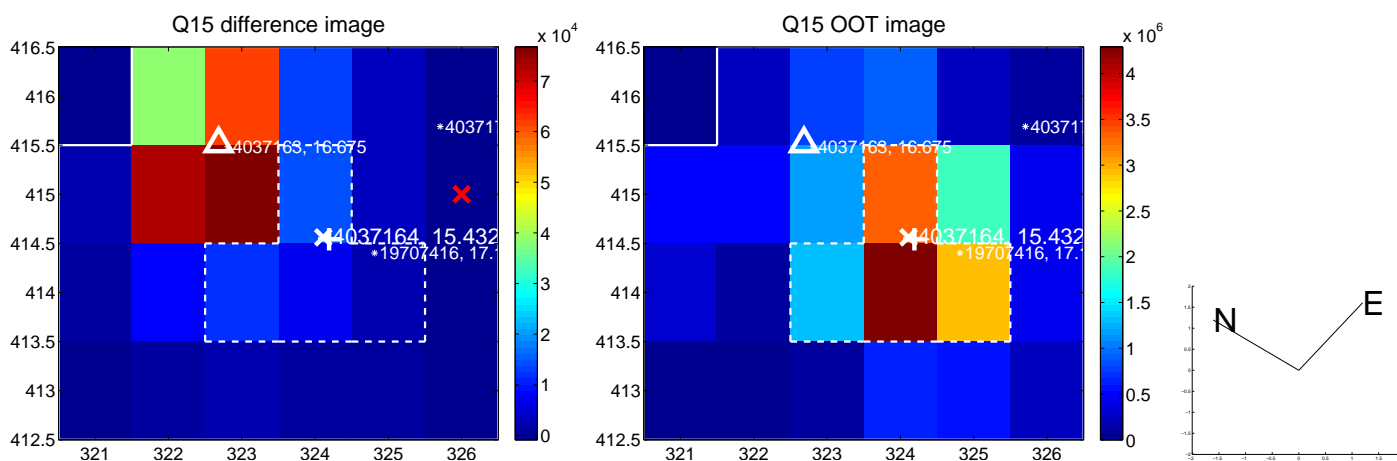
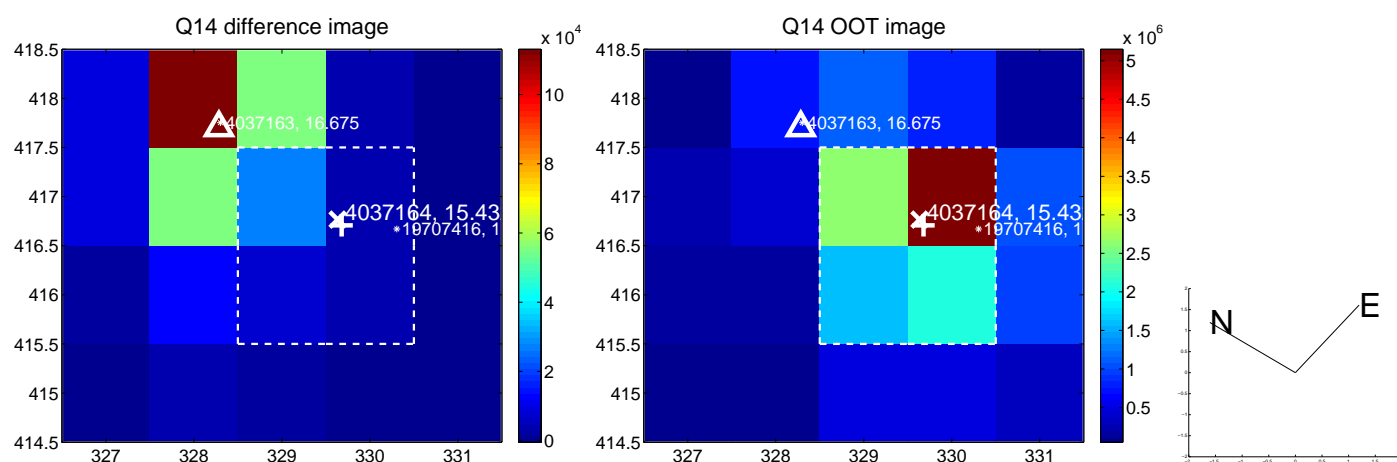
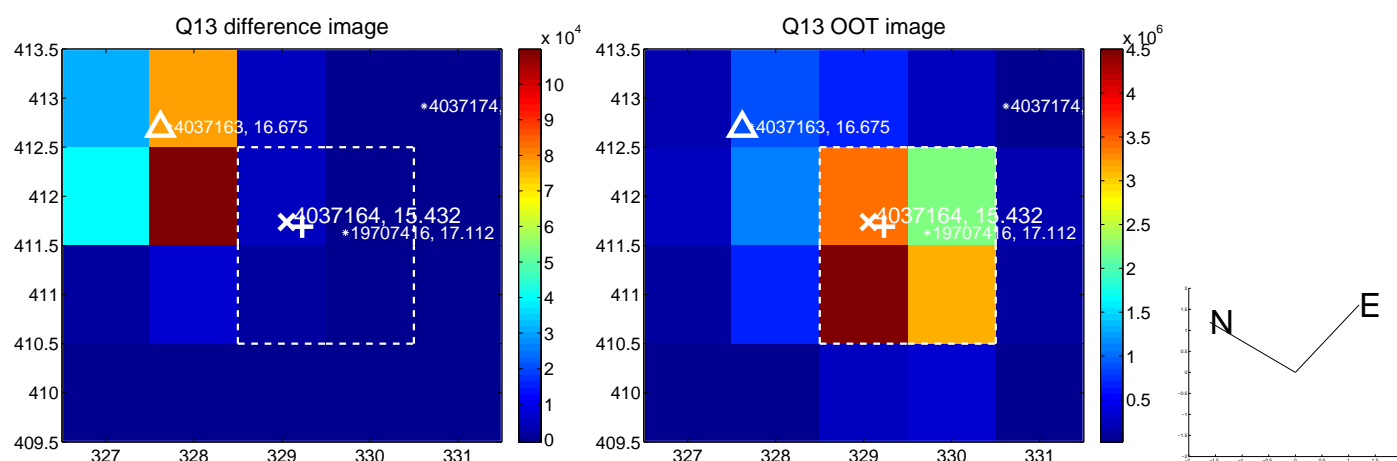
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



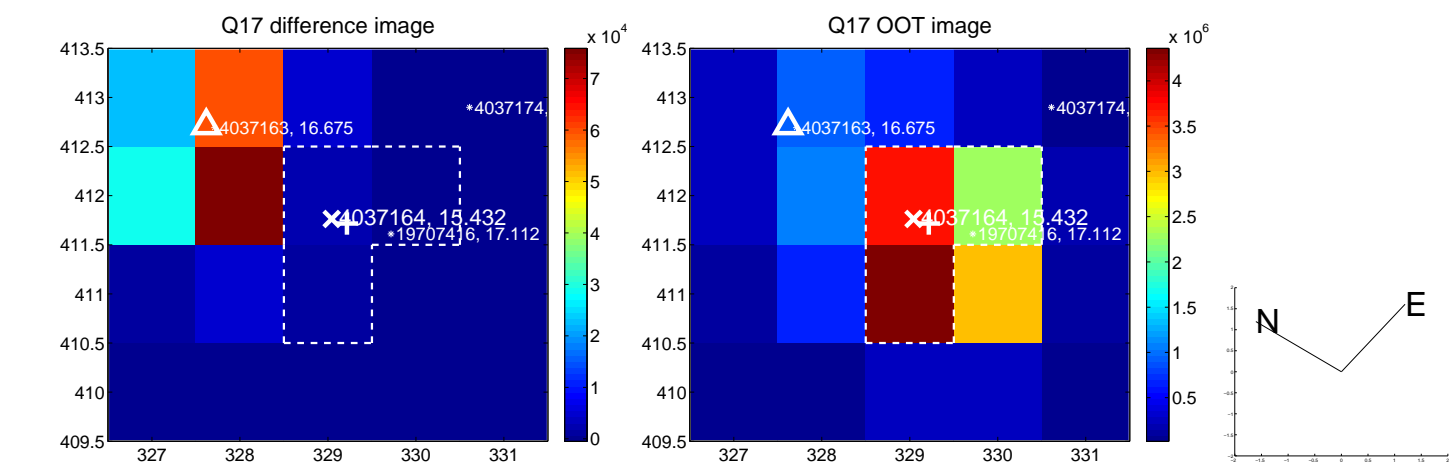
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



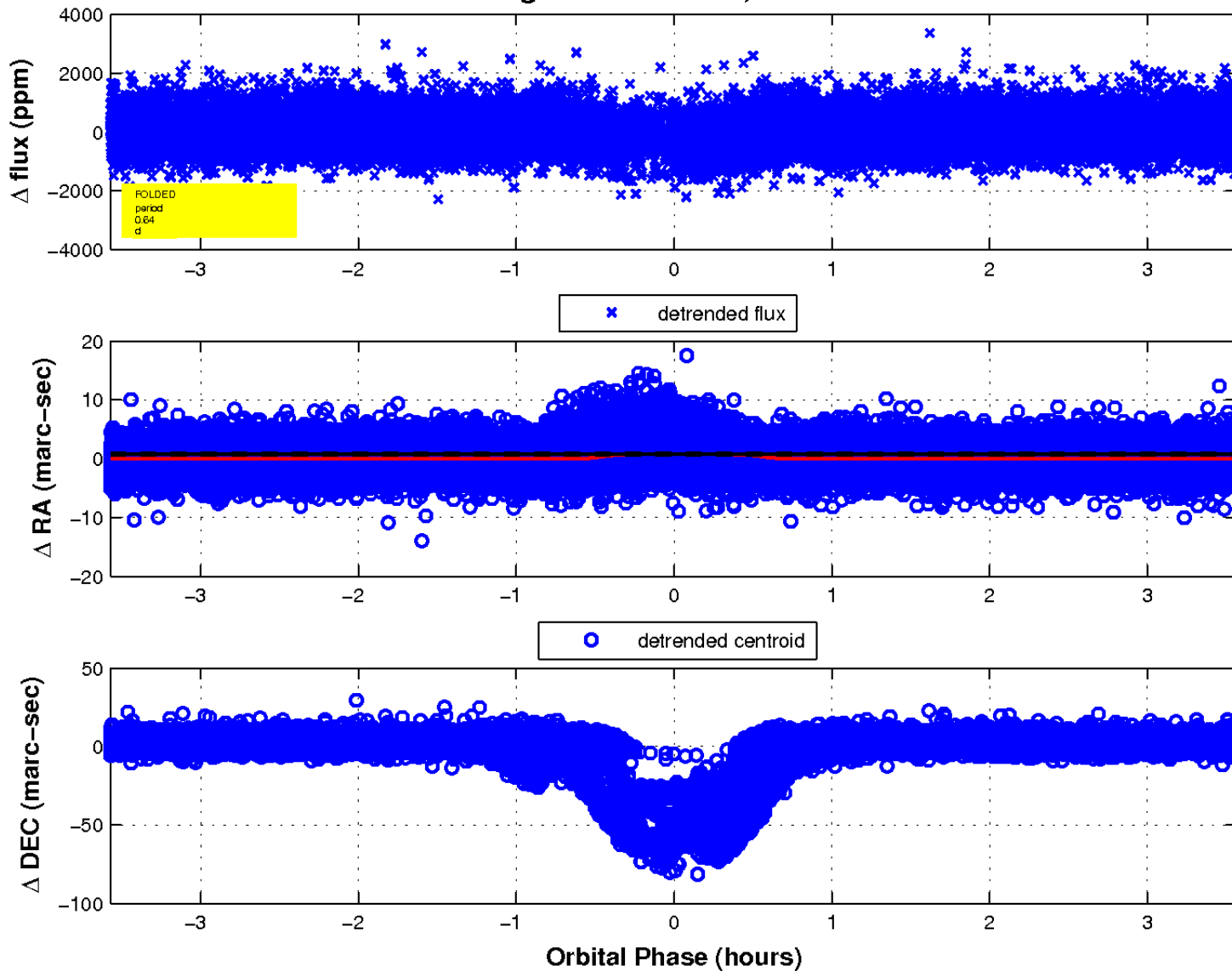
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

