

KIC 004659405

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})
004659405-01	OBS	0630.01	4.532396	135.668580	271.0	2.845	37.7	35.3	1.17	5575	2.61	428.19
004659405-02	OBS	No	4.532437	133.425210	117.0	1.704	13.6	14.3	1.17	5575	1.58	428.18

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004659405-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
004659405-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_RESOLVED_OFFSET—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 004659405-01

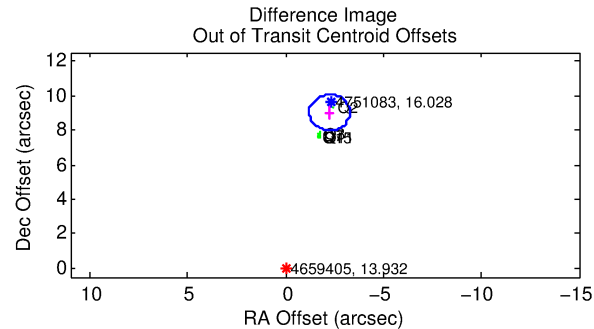
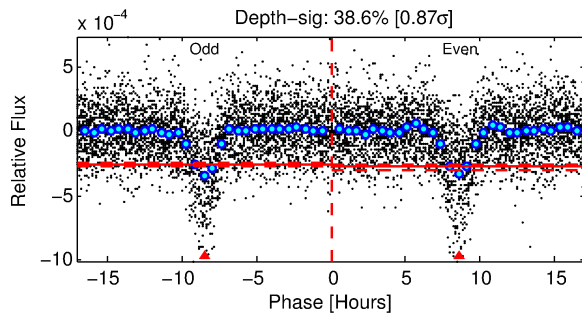
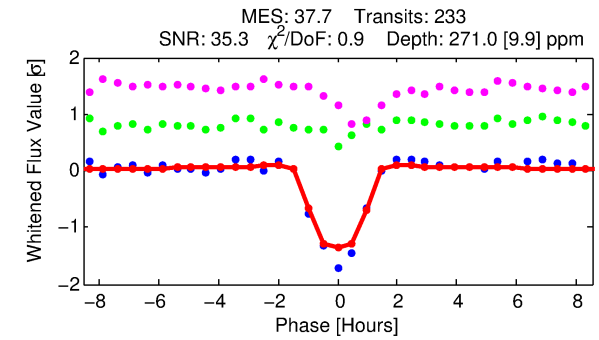
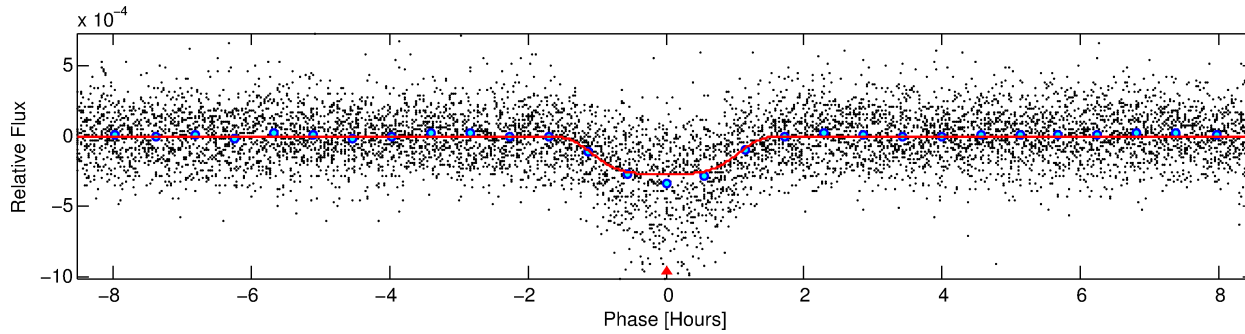
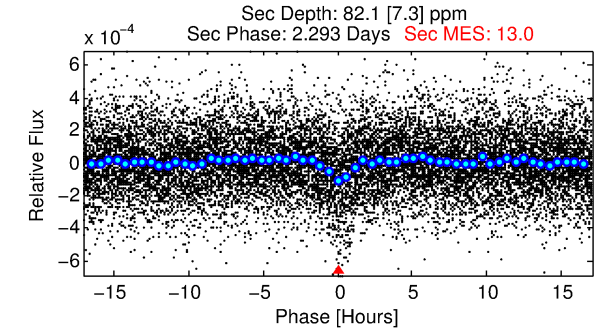
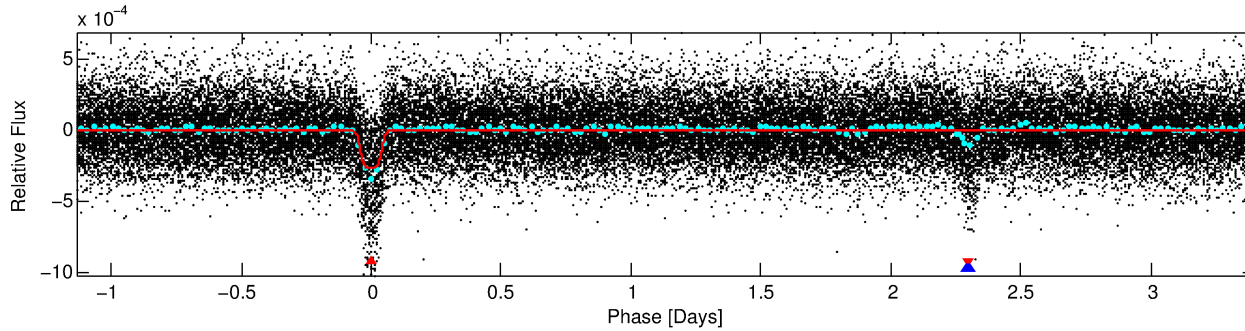
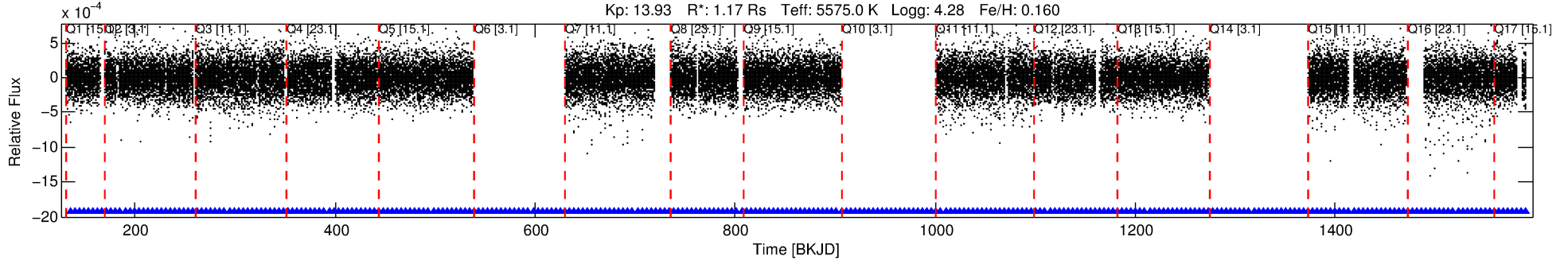
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ($''$)	Δ Row	Δ Col	m_2	m_1	D_2/D_1	Mechanism	Flag	σ_P	σ_T
004659405-01	4659405	3691.01	4751083	1:1	9.9	2	-1	16.03	13.93	186.32	Direct-PRF	0	0.20	0.16

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: 4659405 Candidate: 1 of 2 Period: 4.532 d
KOI: K00630.01 Corr: 0.946

Kp: 13.93 R*: 1.17 Rs Teff: 5575.0 K Logg: 4.28 Fe/H: 0.160



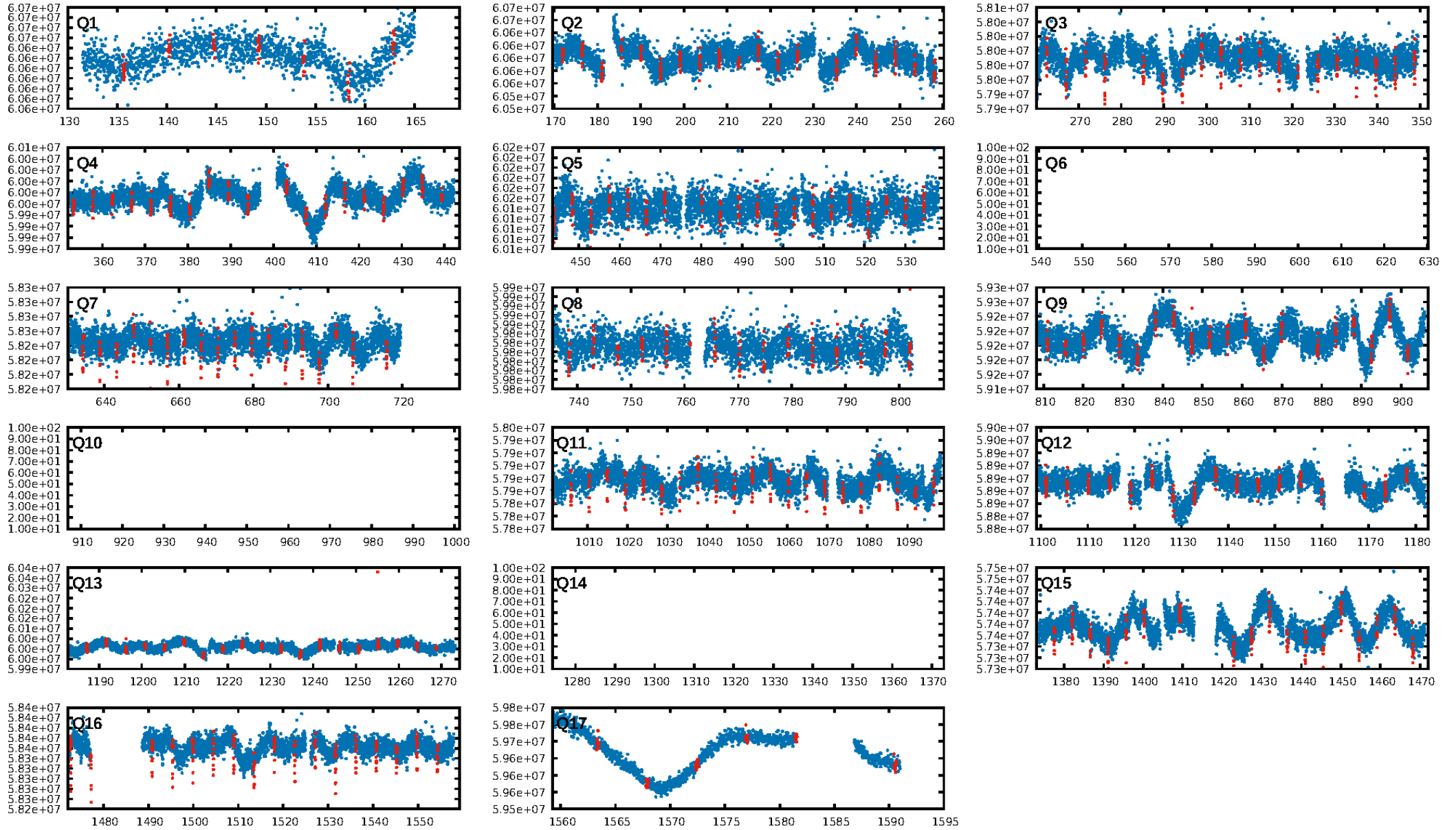
DV Fit Results:

Period = 4.53240 [0.00001] d
Epoch = 135.6686 [0.0015] BKJD
Rp/R* = 0.0204 [0.0007]
a/R* = 3.98 [0.38]
b = 0.97 [0.01]
Seff = 428.19 [157.70]
Teq = 1160 [107] K
Rp = 2.61 [0.70] Re
a = 0.0527 [0.0123] AU
Ag = 18.46 [6.74] [2.59σ]
Teff = 3717 [150] K [13.86σ]

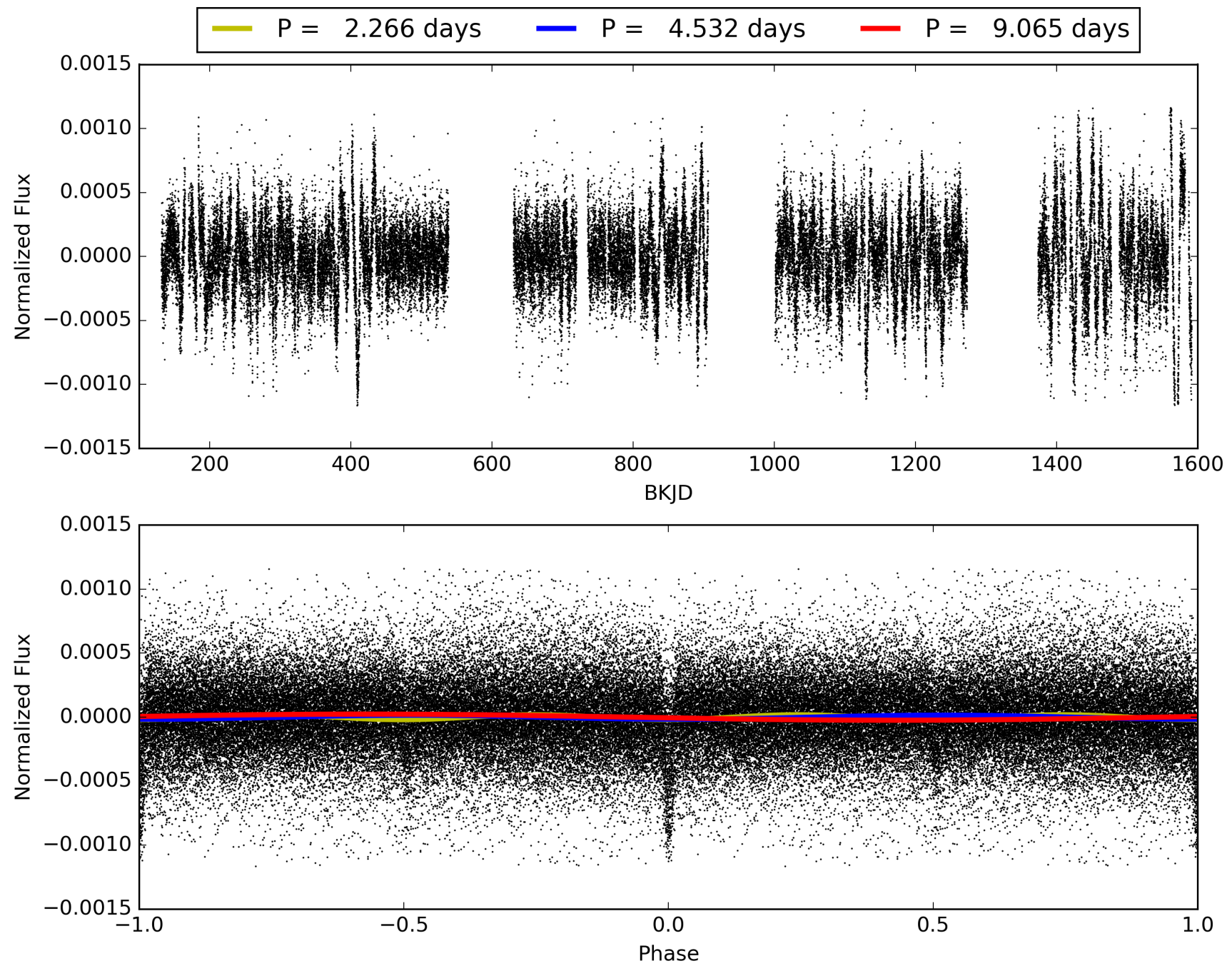
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 2.51e-306
RollingBand-fgt: 1.00 [220/220]
GhostDiagnostic-chr: -0.1829
Centroid-sig: 0.0%
Centroid-so: 57.141 arcsec [157.91σ]
OotOffset-rm: 9.285 arcsec [26.80σ]
KicOffset-rm: 9.113 arcsec [22.30σ]
OotOffset-st: 1/4/0/0 [5]
KicOffset-st: 1/4/0/0 [5]
DiffImageQuality-fgm: 1.00 [5/5]
DiffImageOverlap-fno: 1.00 [14/14]

TCE 004659405-01, PDC Light Curves

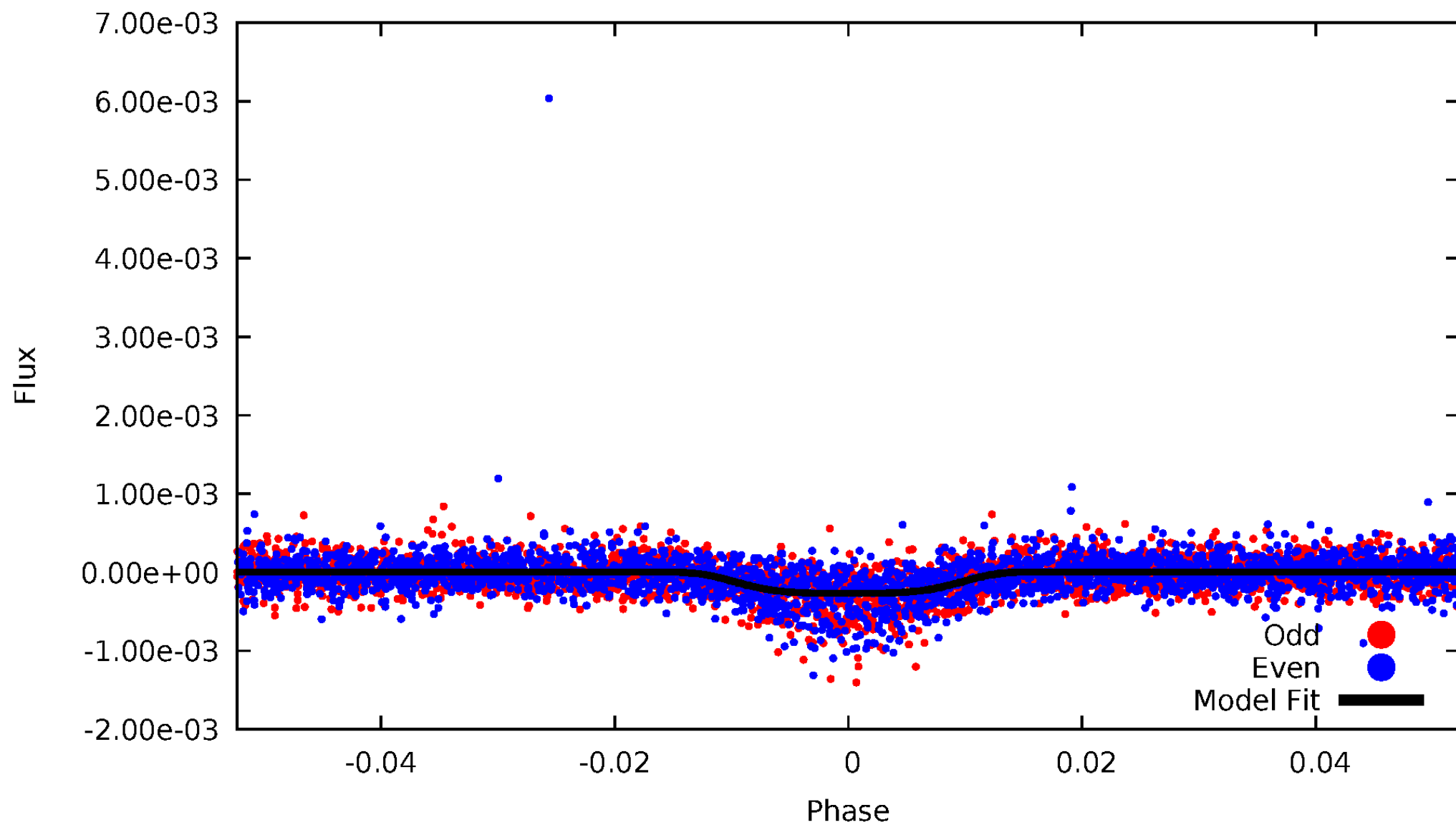


TCE 004659405-01



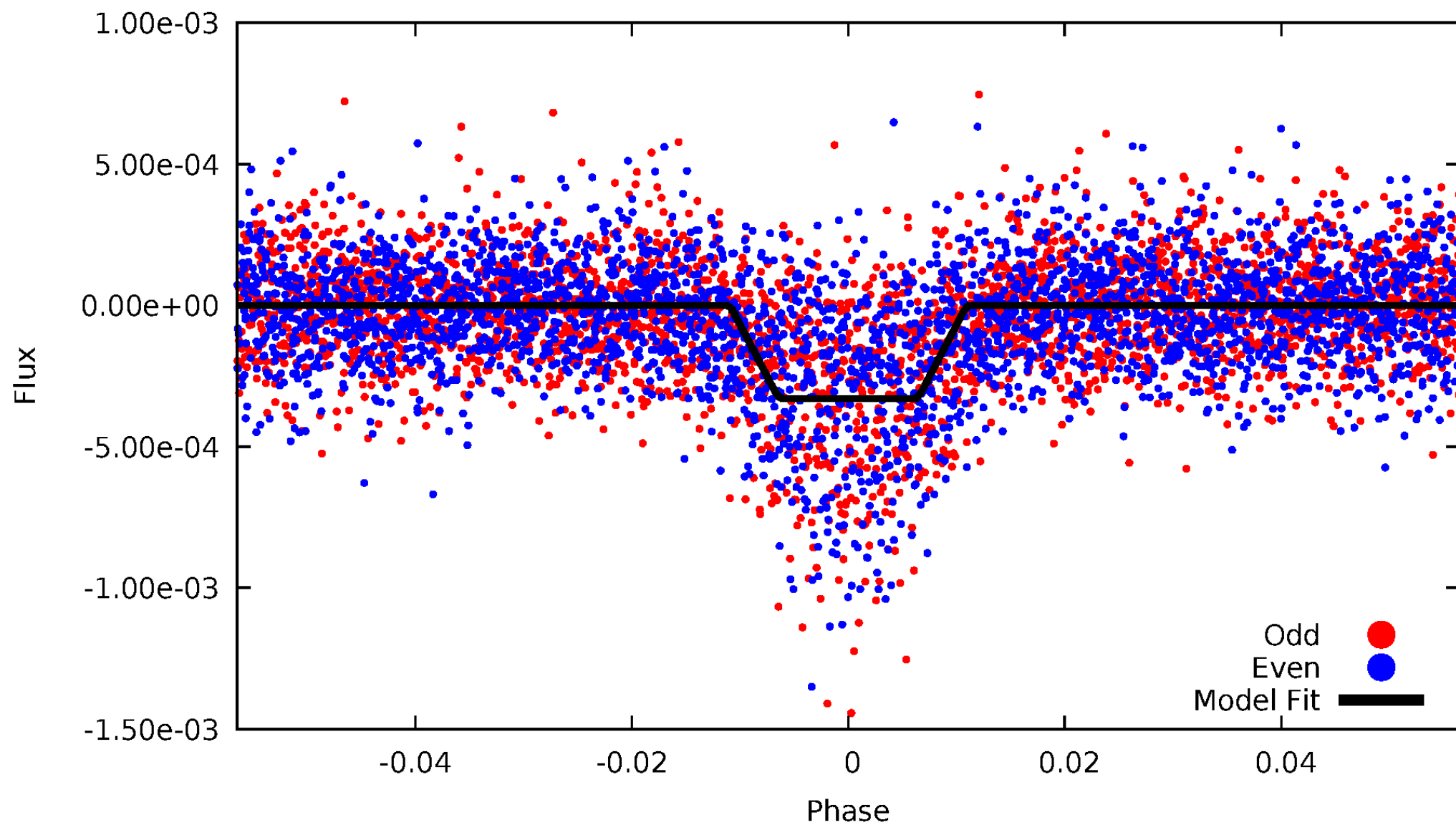
DV Odd/Even

TCE 004659405-01

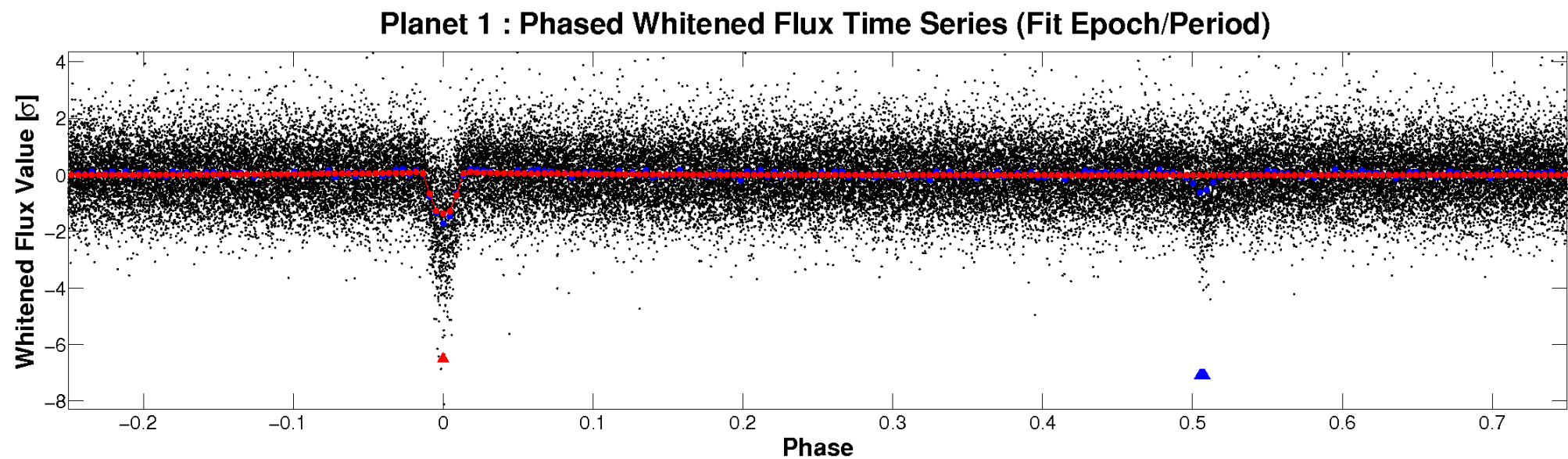
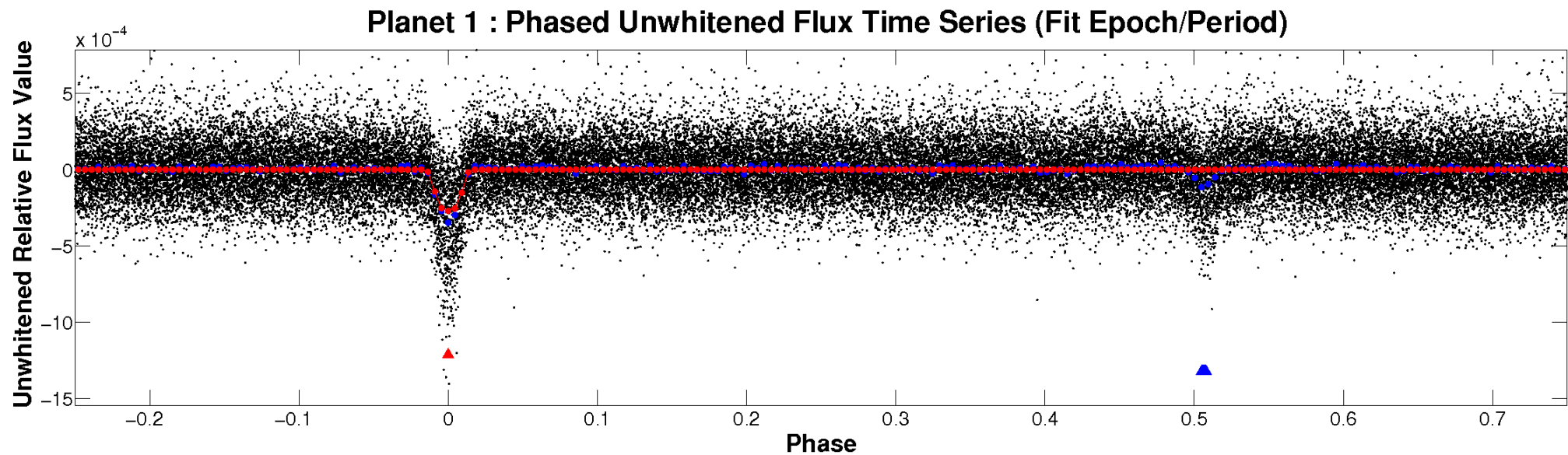


ALT Odd/Even

TCE 004659405-01

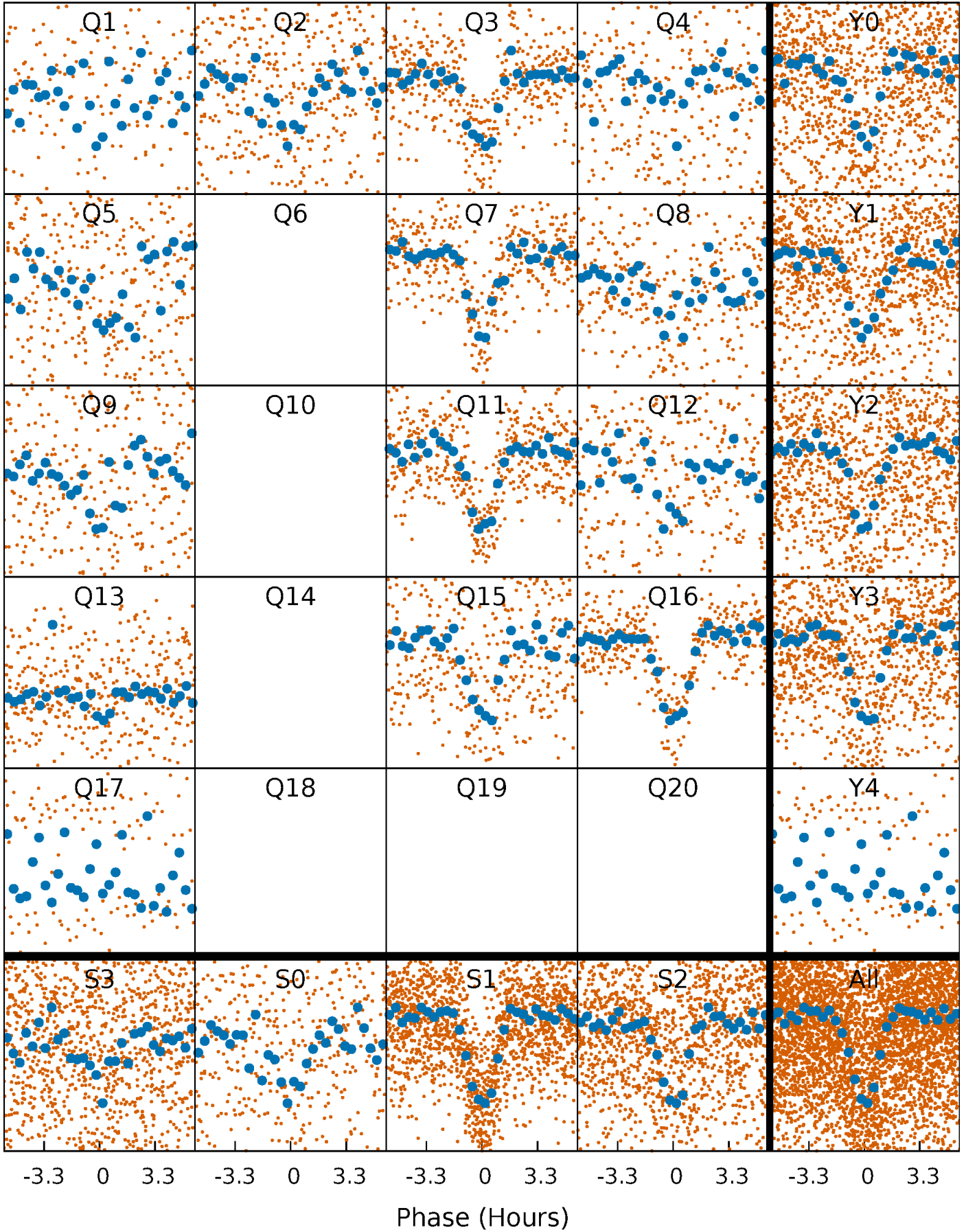


Non-Whitened Vs. Whitened Light Curve



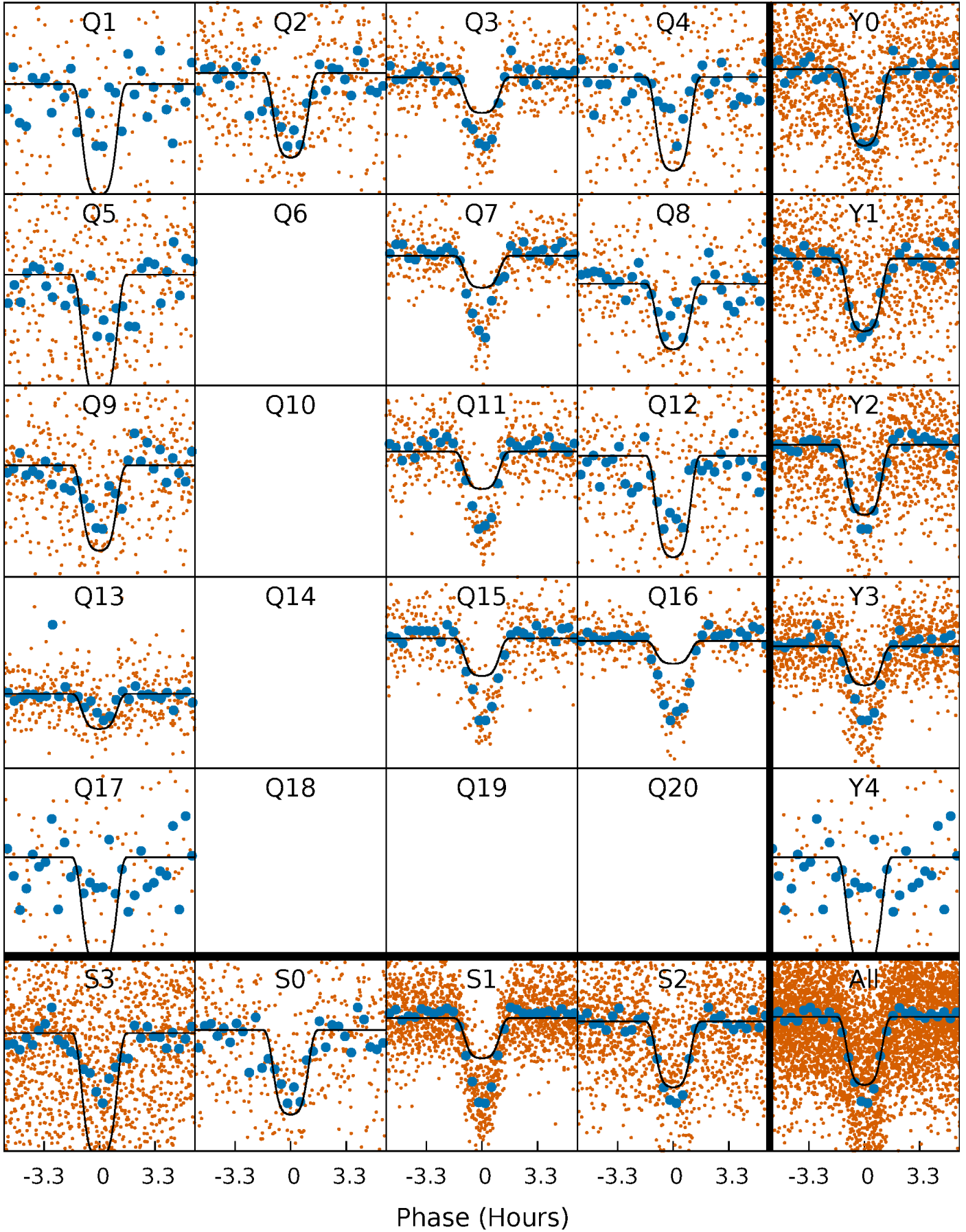
PDC Quarter-Phased Transit Curves

TCE 004659405-01 P= 4.532396 Days $T_0=135.668580$ (BKJD)



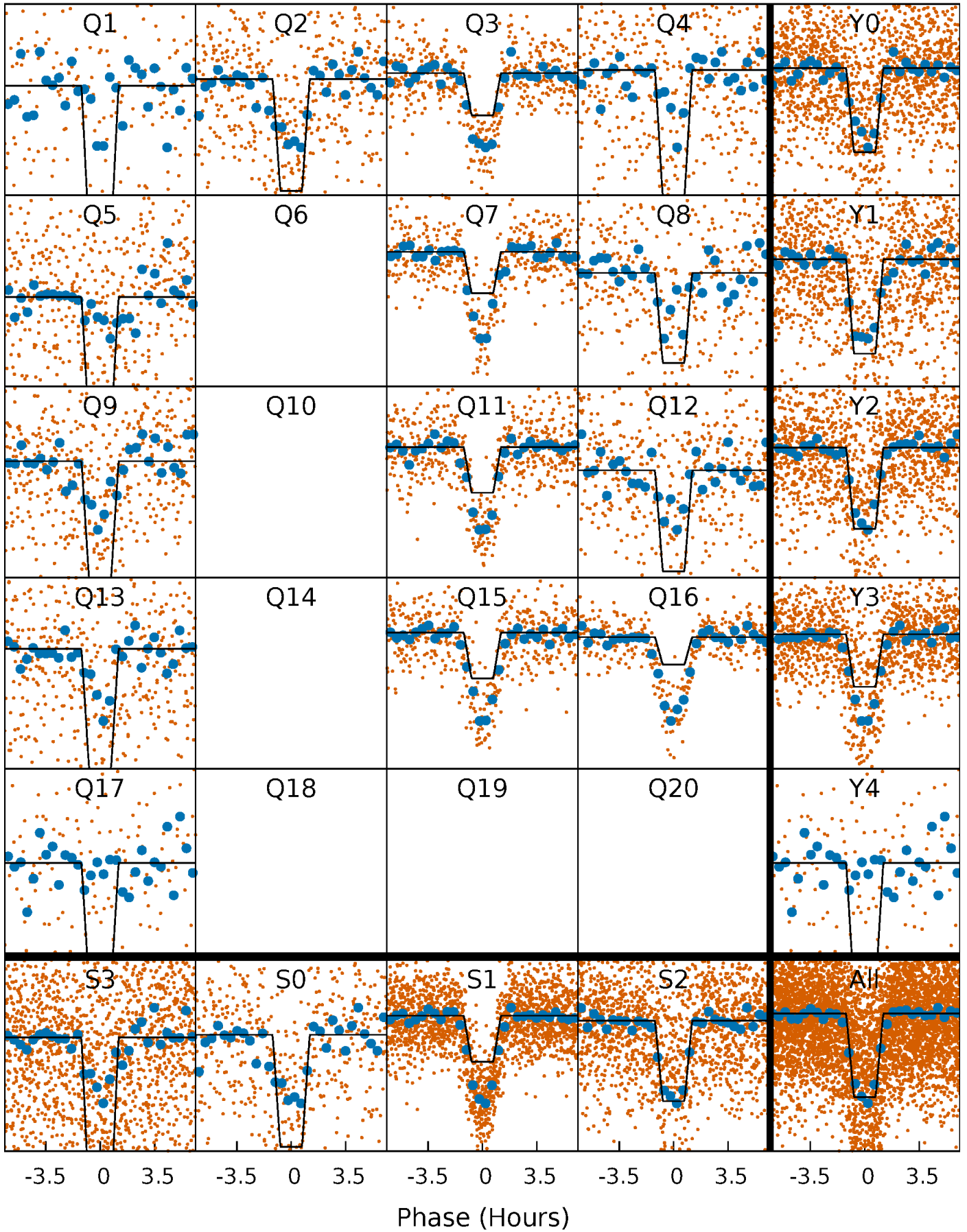
DV Quarter-Phased Transit Curves

TCE 004659405-01 P= 4.532396 Days $T_0=135.668580$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

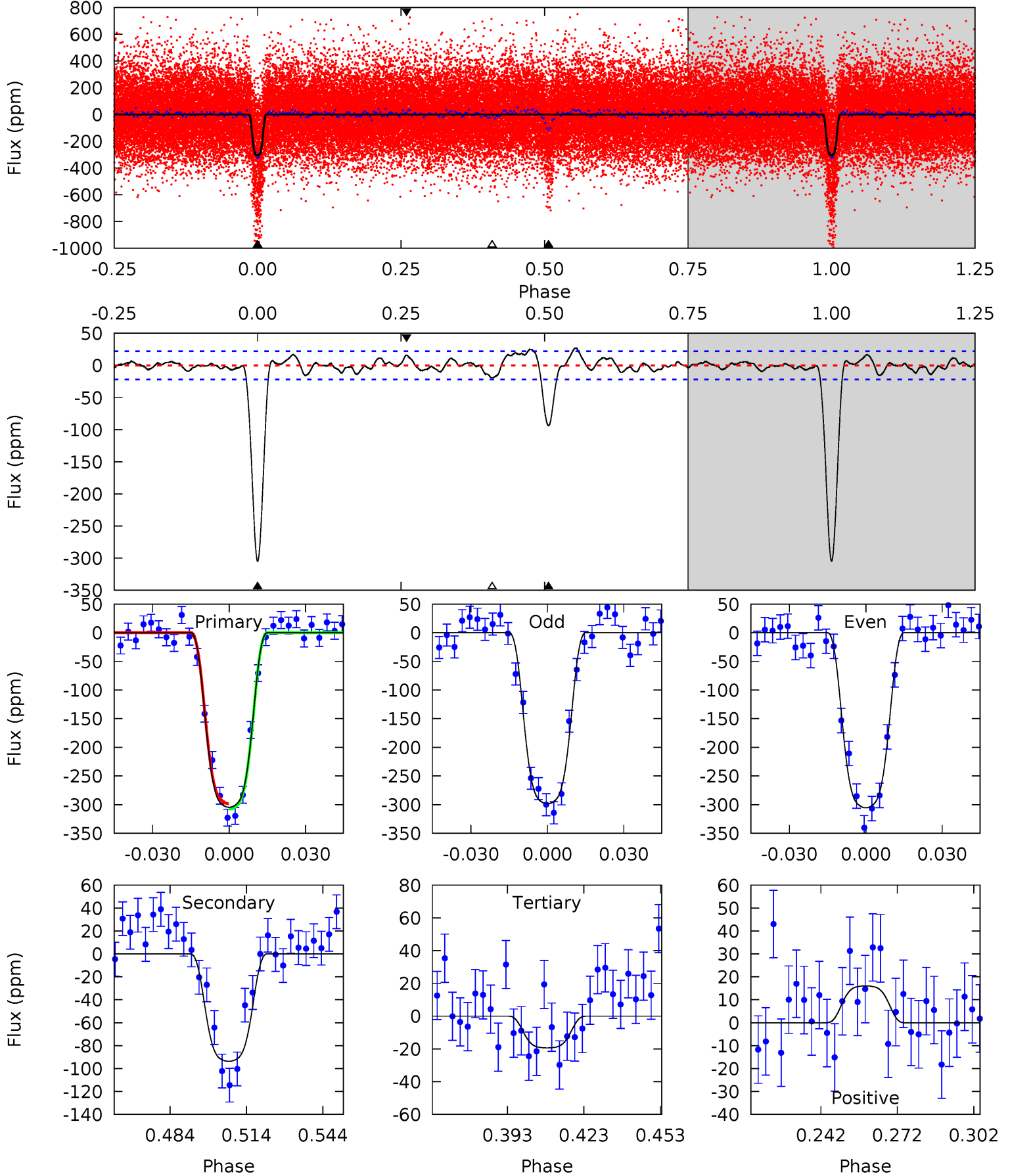
TCE 004659405-01 P= 4.532409 Days $T_0=135.666401$ (BKJD)



DV Model-Shift Uniqueness Test

004659405-01, P = 4.532396 Days, E = 131.136184 Days

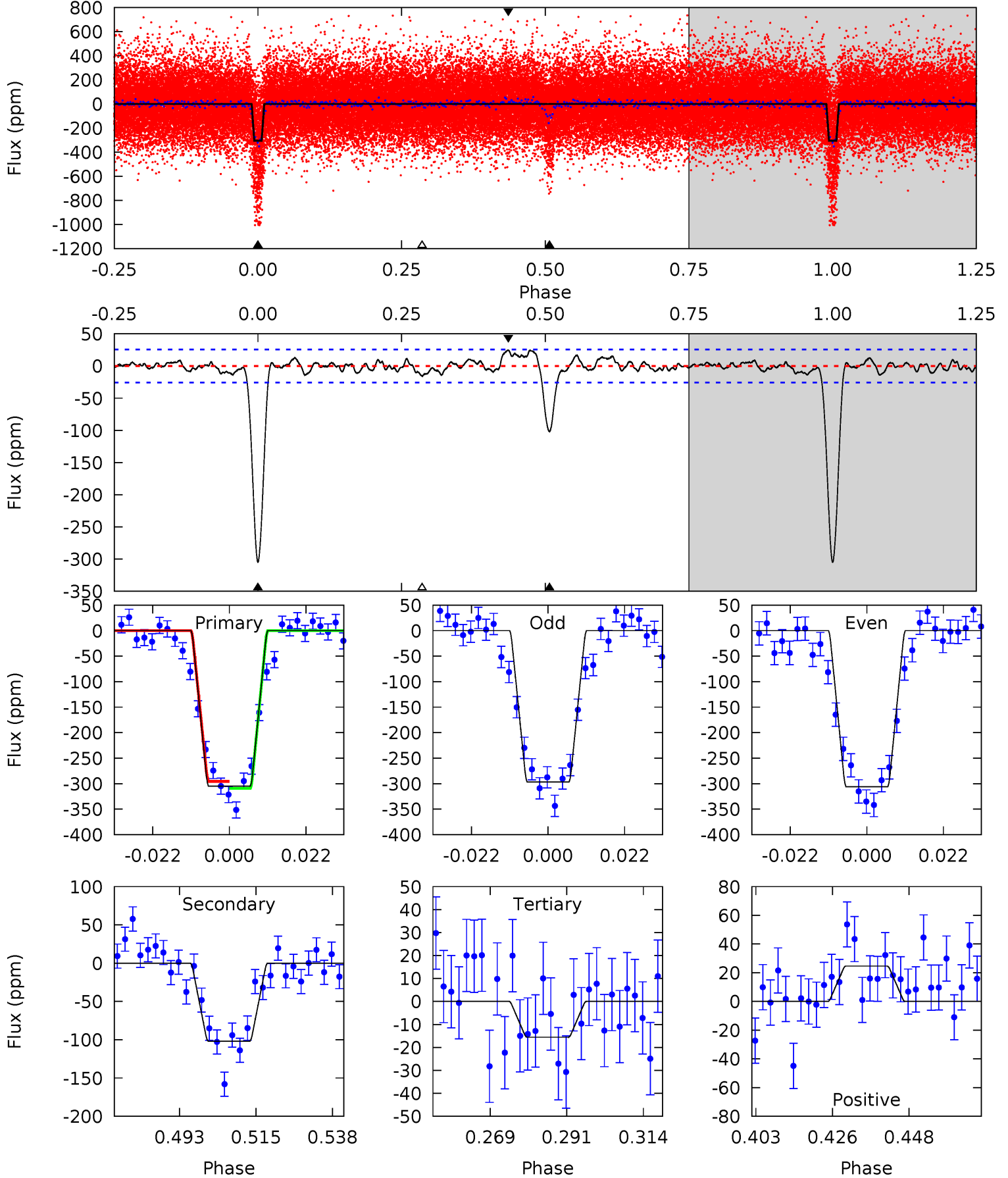
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
66.7	20.5	4.25	3.51	4.81	2.17	1.82	62.4	63.1	16.3	17.0	0.76	1.30	0.08	0.99



Alt Model-Shift Uniqueness Test

004659405-01, P = 4.532409 Days, E = 131.133992 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
57.6	19.2	2.94	4.65	4.87	2.28	1.47	54.7	53.0	16.3	14.6	0.85	1.38	0.07	1.28



Stellar Parameters For KIC 004659405

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5575^{+150}_{-166}	$4.278^{+0.195}_{-0.175}$	$0.160^{+0.200}_{-0.300}$	$1.173^{+0.314}_{-0.257}$	$0.951^{+0.104}_{-0.085}$	$0.831^{+0.943}_{-0.384}$
	+3%/-3%	+5%/-4%	+125%/-188%	+27%/-22%	+11%/-9%	+114%/-46%
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 004659405-01 / KOI 0630.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-94 ± 5	$2.59^{+0.41}_{-0.33}$	1614^{+117}_{-110}	4107^{+110}_{-109}	21^{+7}_{-5}
Alt.	-102 ± 5	$2.33^{+0.33}_{-0.30}$	1620^{+112}_{-114}	4350^{+133}_{-119}	29^{+9}_{-7}

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 $A_{\text{obs}} \gg 1.0$

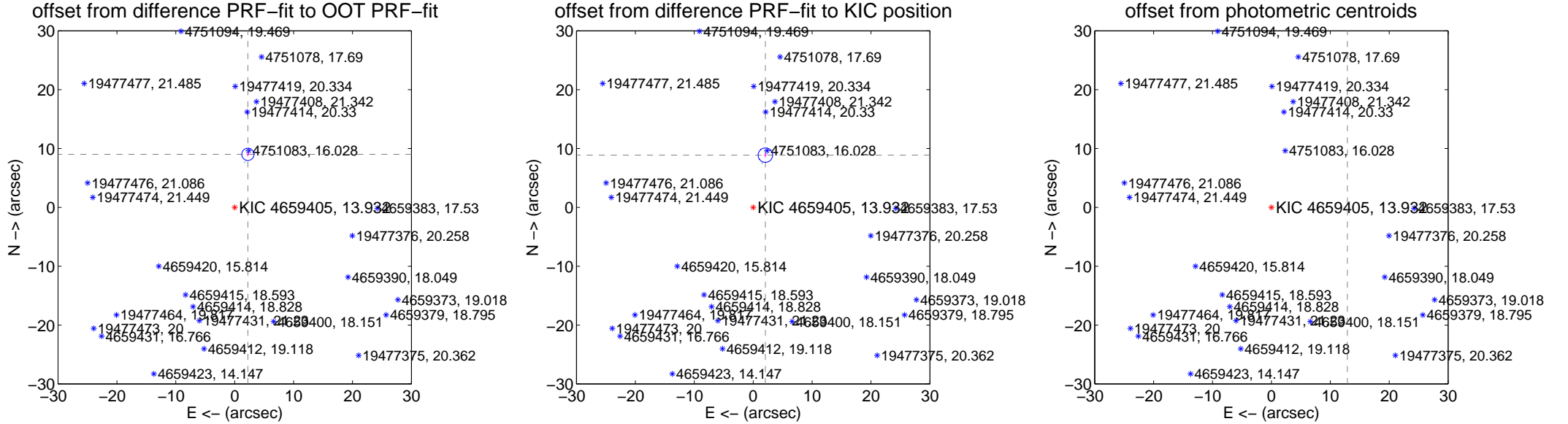
DV Centroid Data

Supplemental centroid analysis for 004659405-01. Kepler magnitude: 13.93. Transit SNR 35.33

There are 5 quarters with good PRF difference image offsets

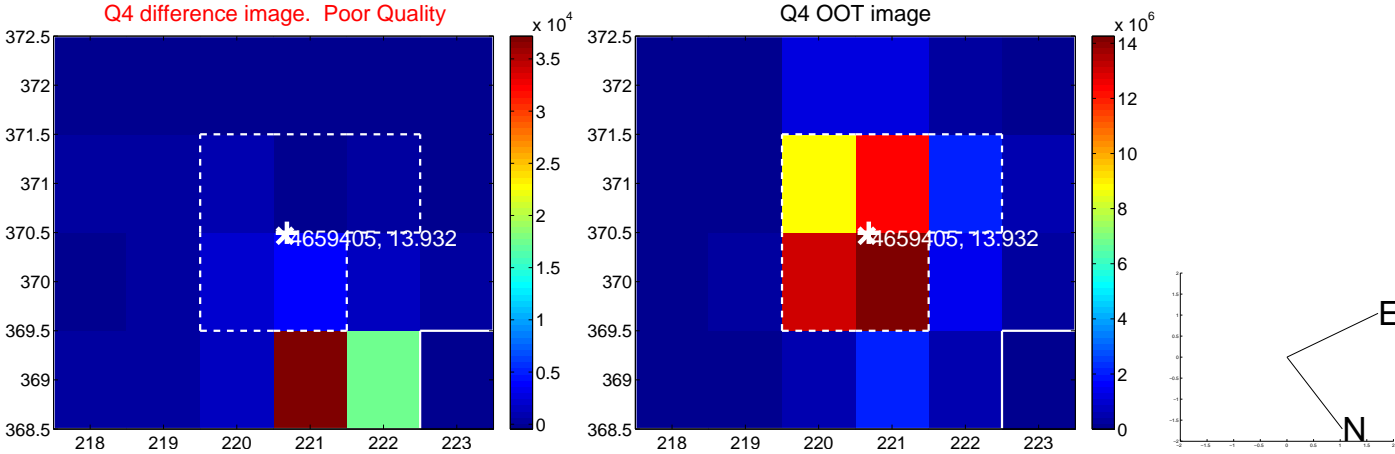
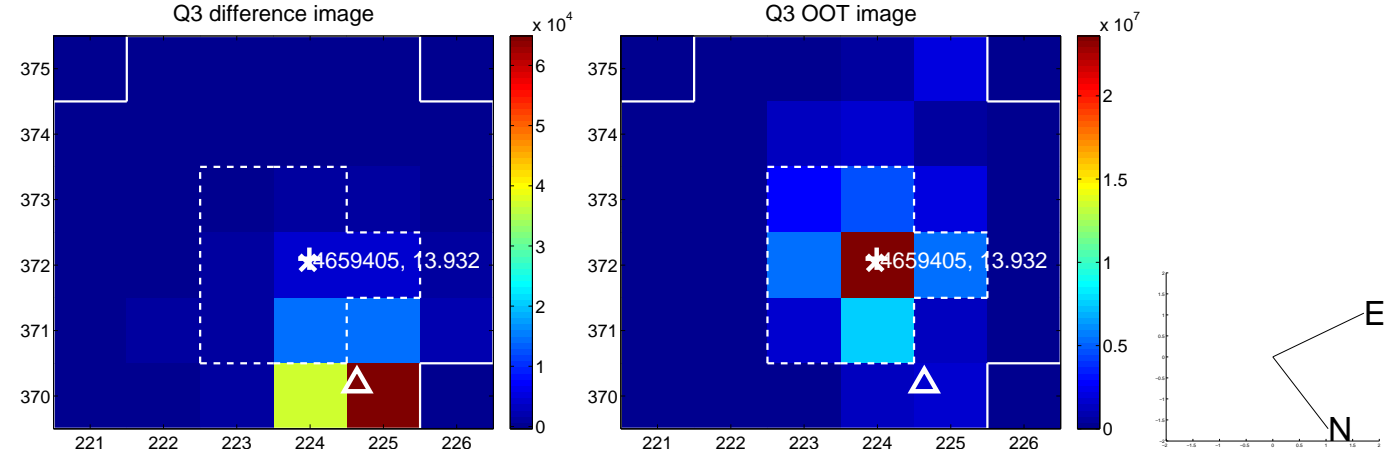
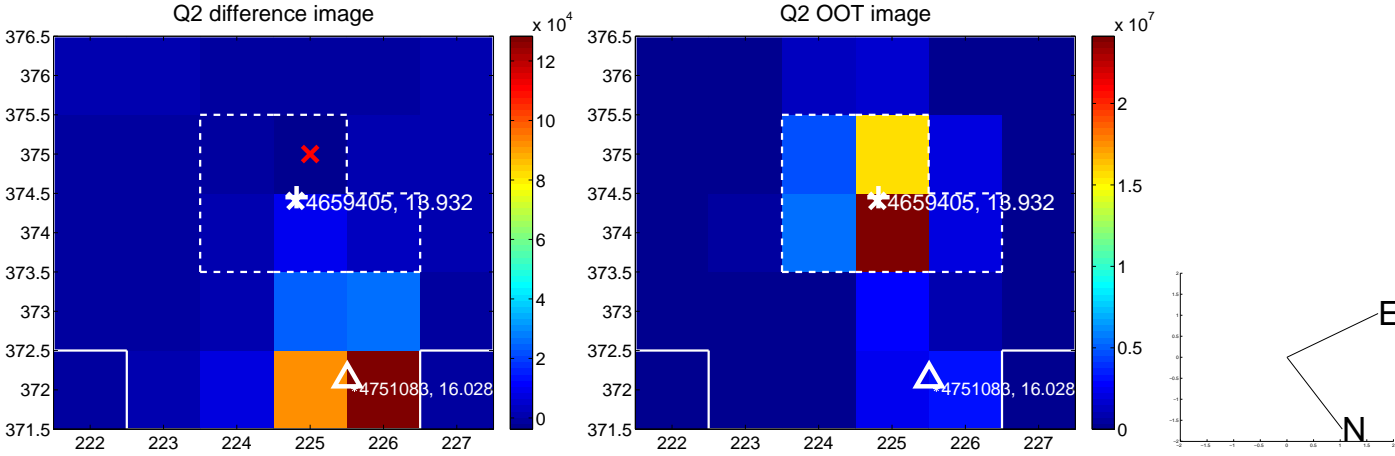
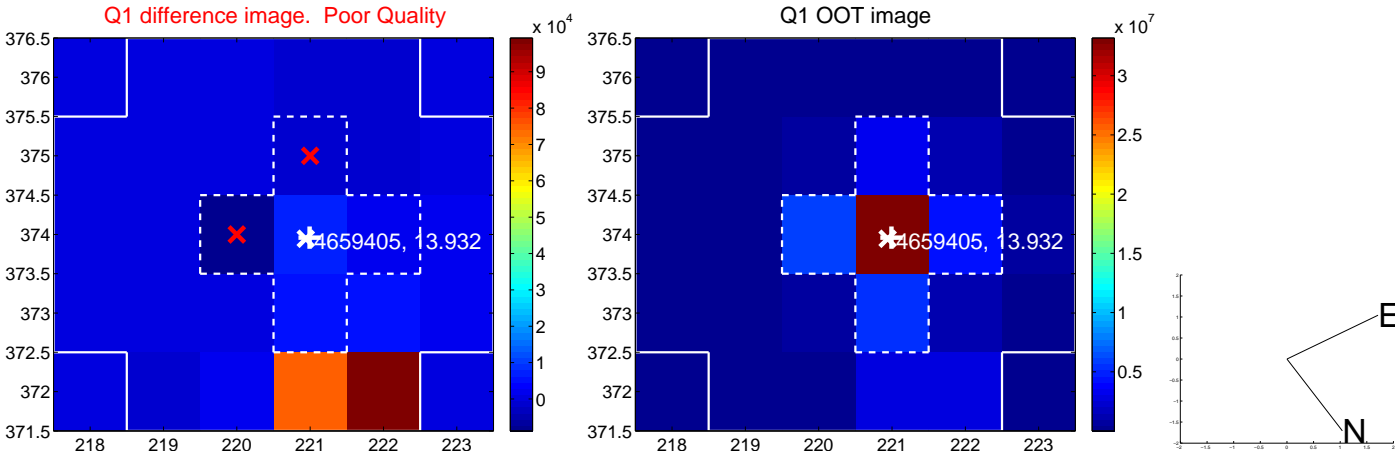
The direct PRF centroid is offset from the target star catalog position by about 0.29 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	9.285 \pm 0.347	26.80	-2.235 \pm 0.197	9.012 \pm 0.354
PRF-fit source offset from KIC position	9.113 \pm 0.409	22.30	-2.068 \pm 0.189	8.875 \pm 0.379
photometric centroid source offset	57.14 \pm 0.36	157.91	-12.90 \pm 0.36	55.67 \pm 0.36

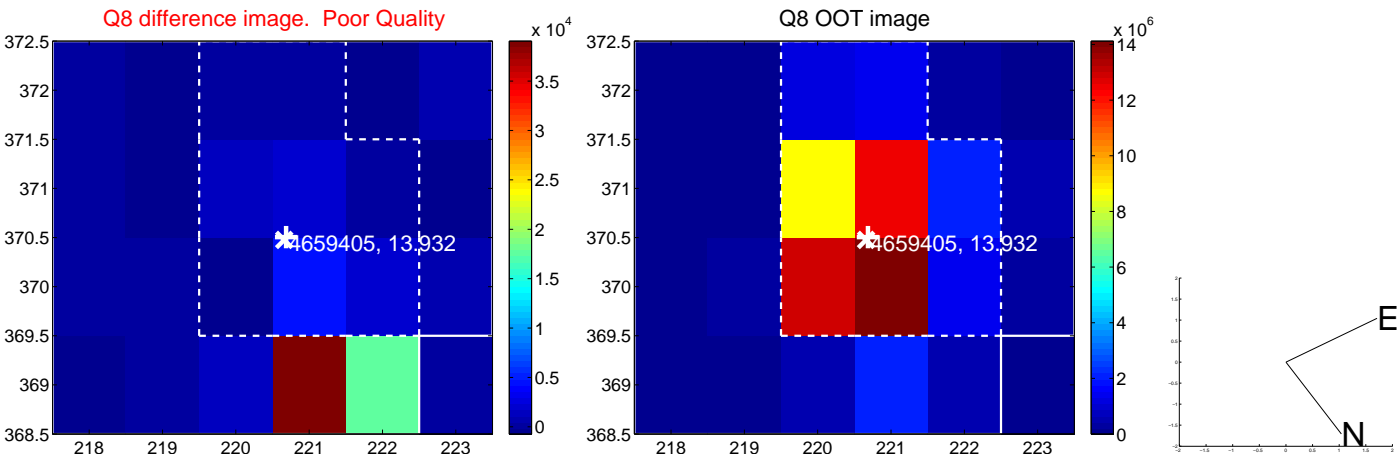
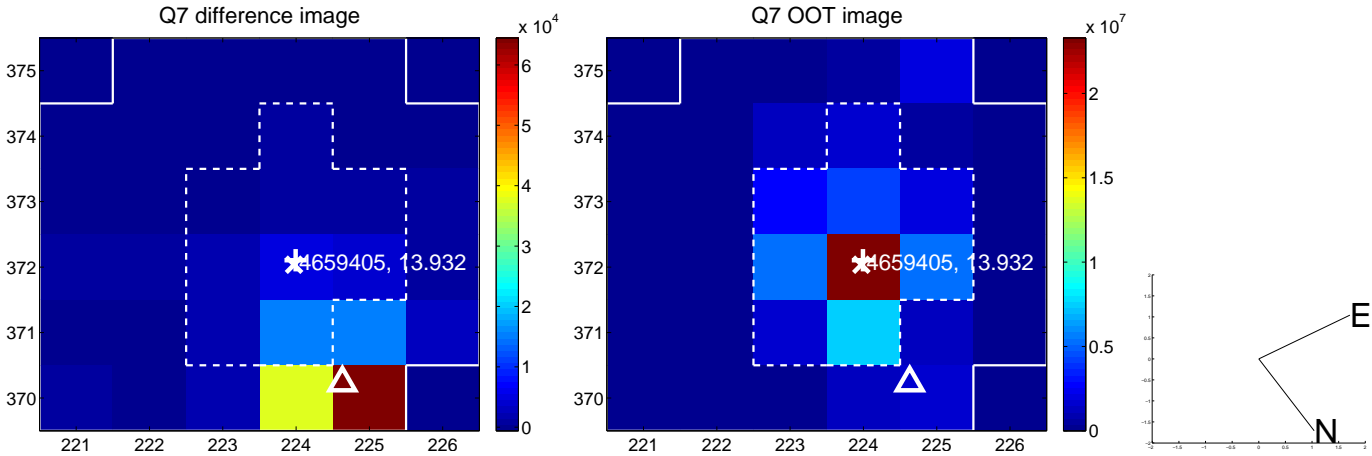
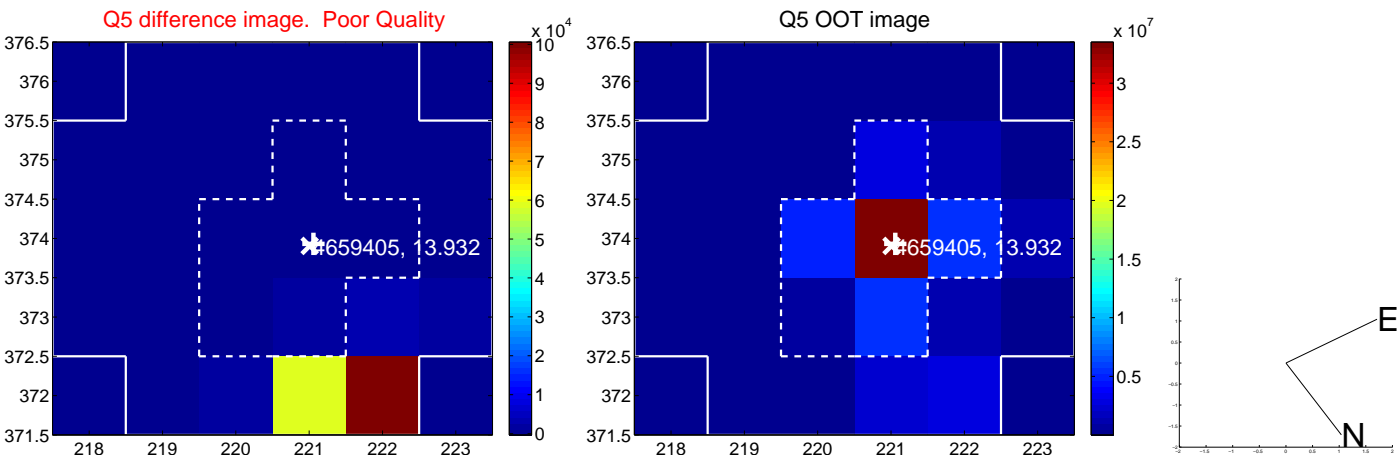


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

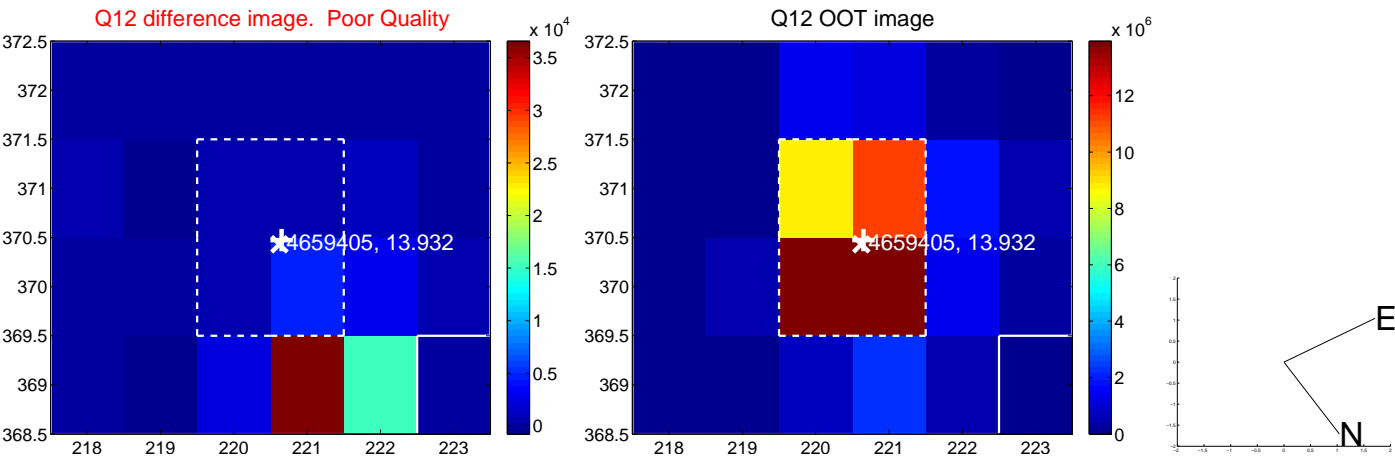
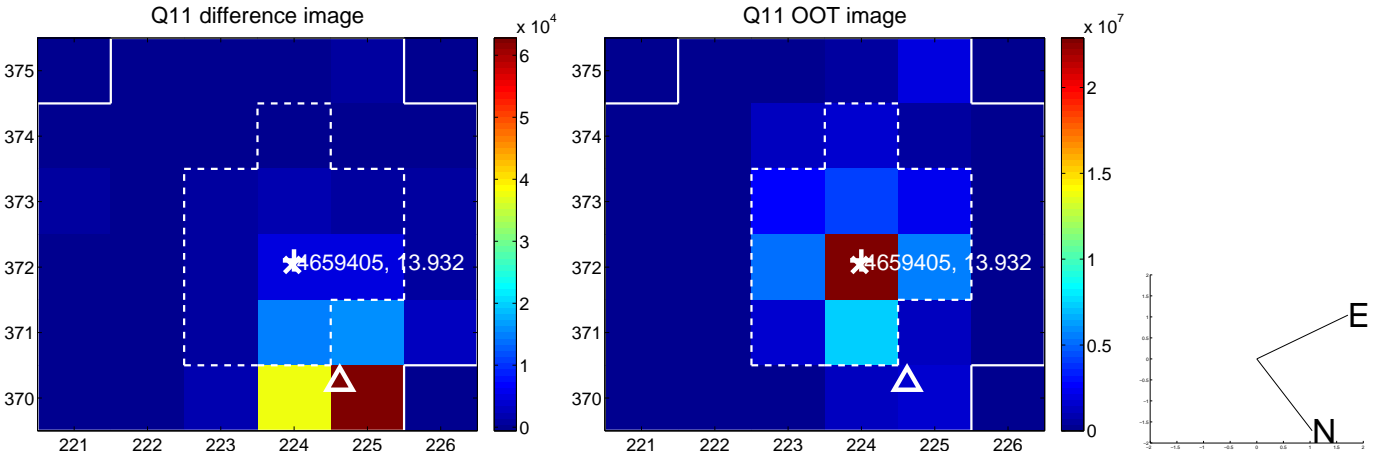
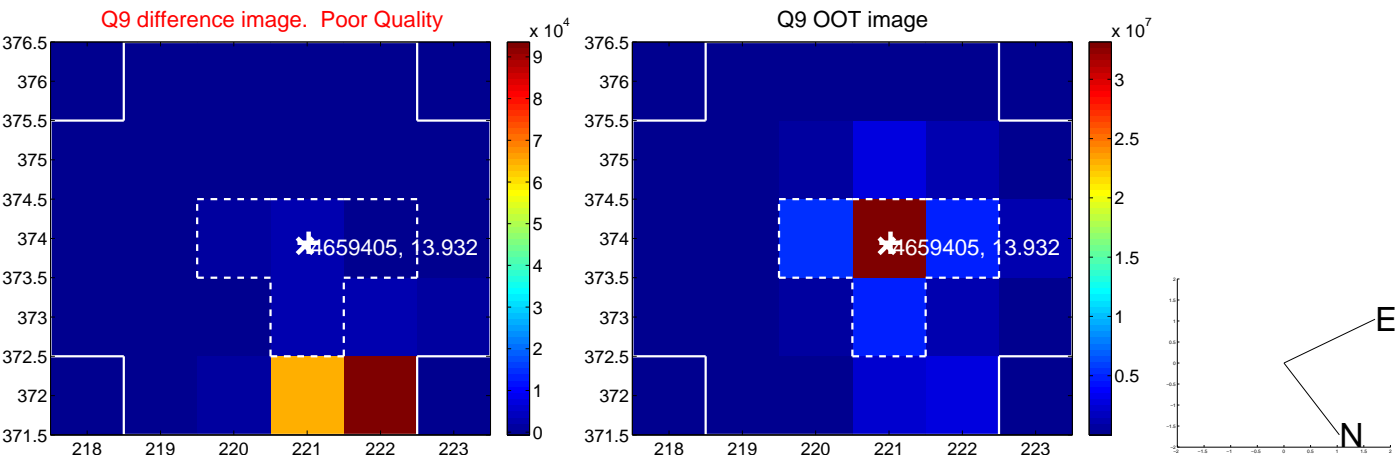
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



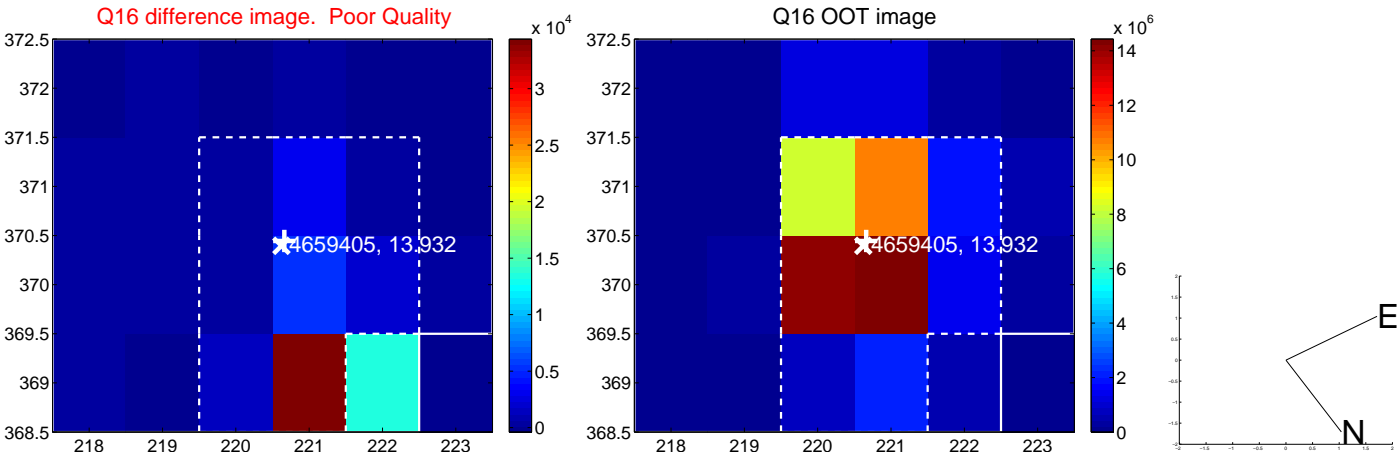
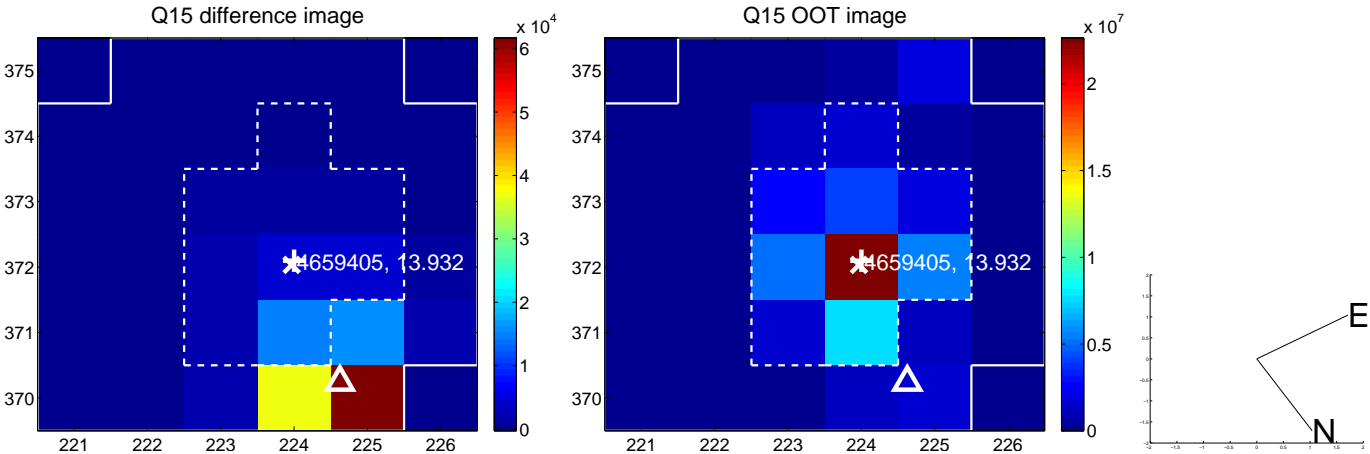
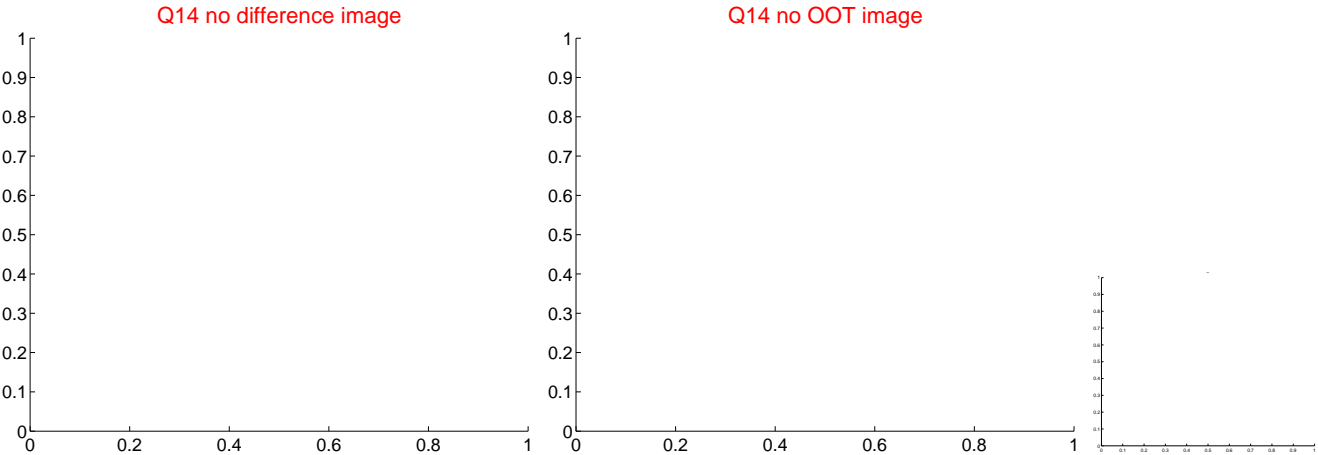
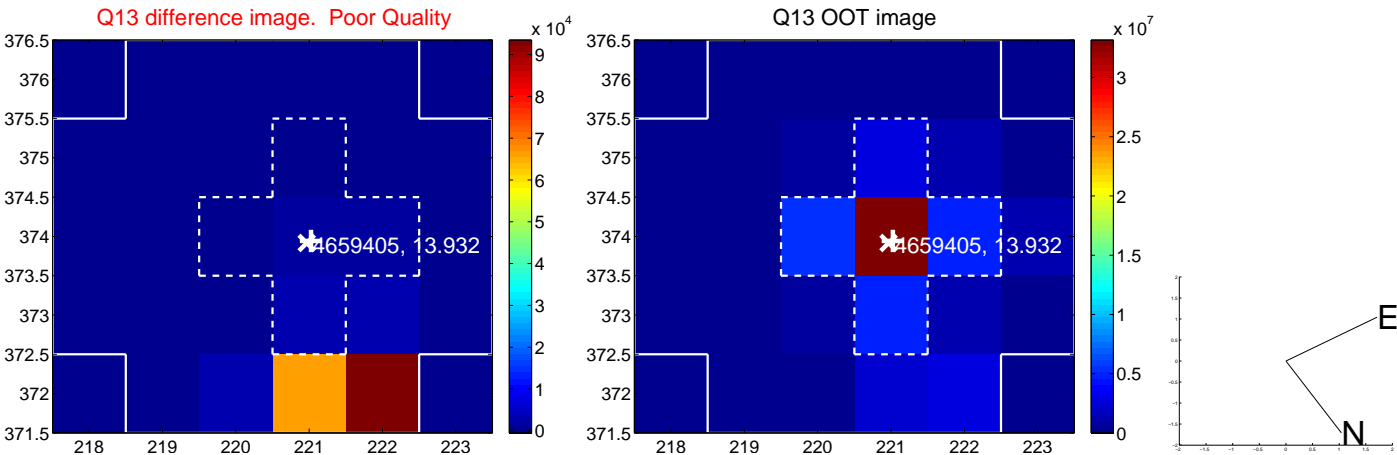
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



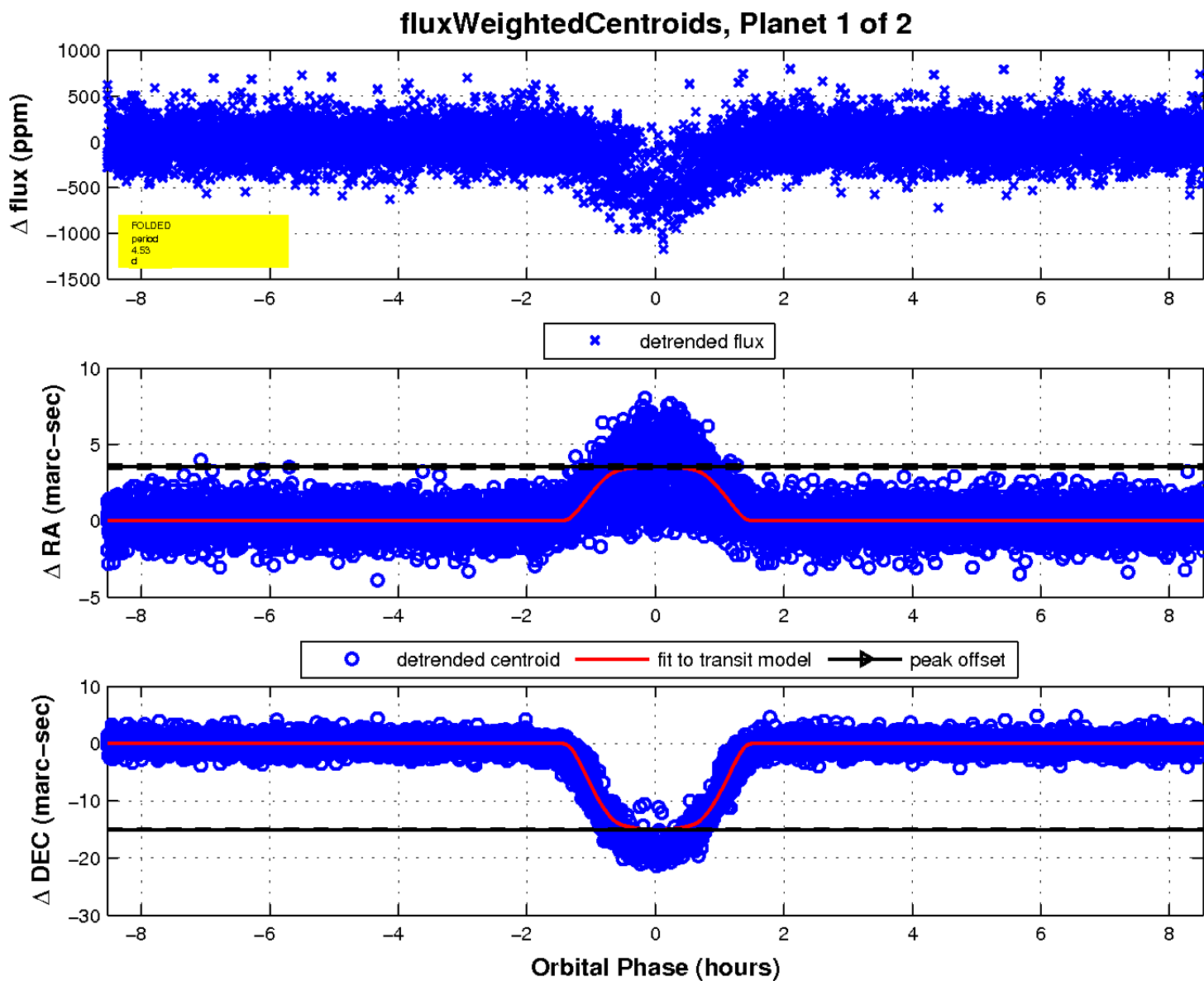
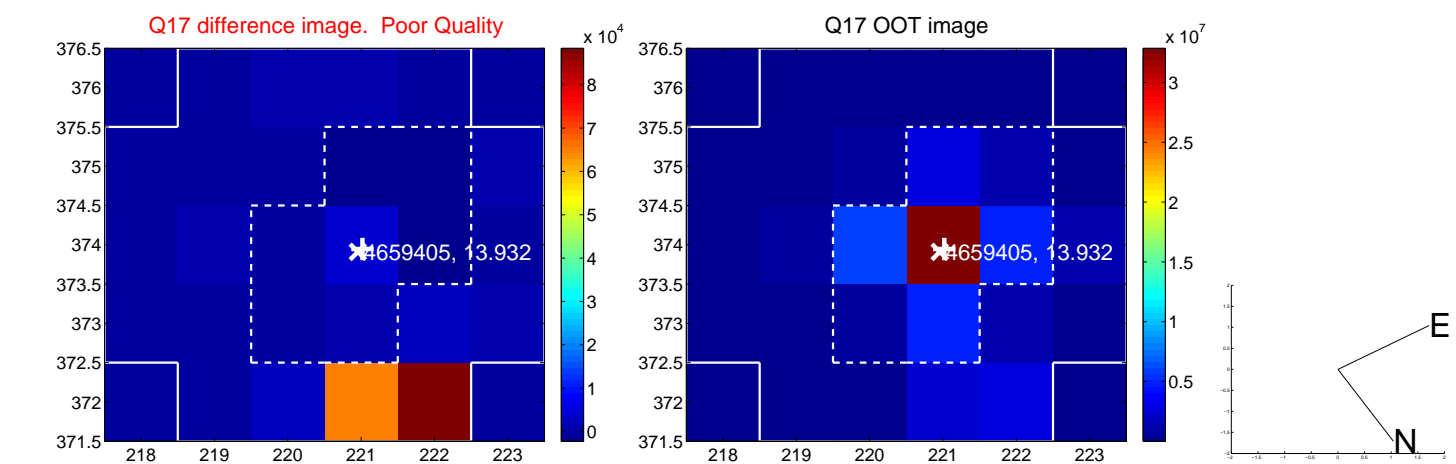
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

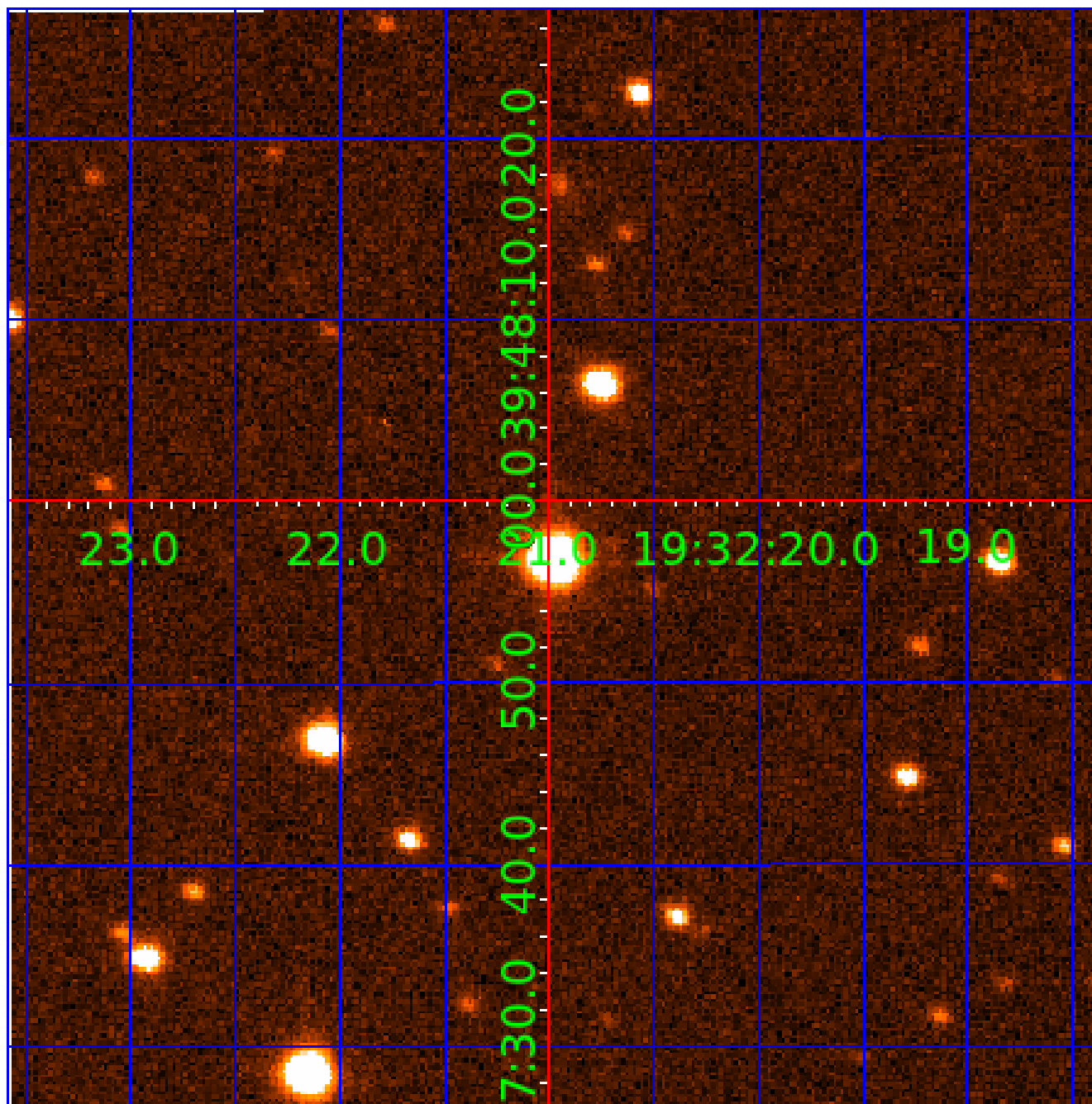


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 004659405

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})
004659405-01	OBS	0630.01	4.532396	135.668580	271.0	2.845	37.7	35.3	1.17	5575	2.61	428.19
004659405-02	OBS	No	4.532437	133.425210	117.0	1.704	13.6	14.3	1.17	5575	1.58	428.18

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
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004659405-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_RESOLVED_OFFSET—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 004659405-02

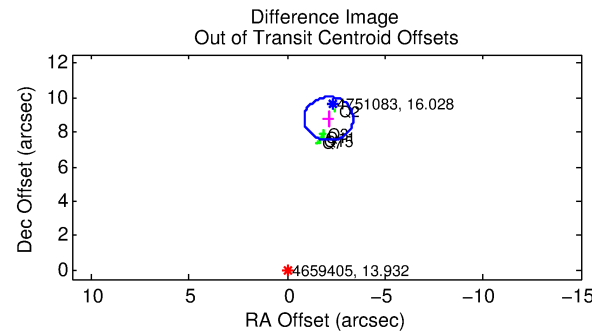
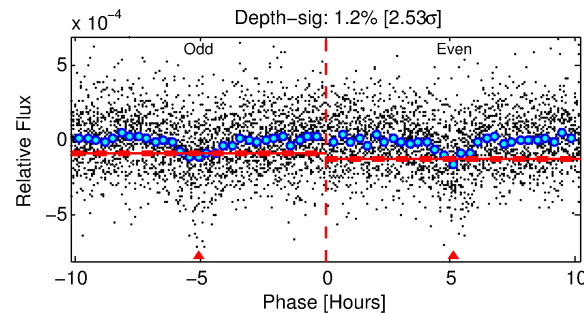
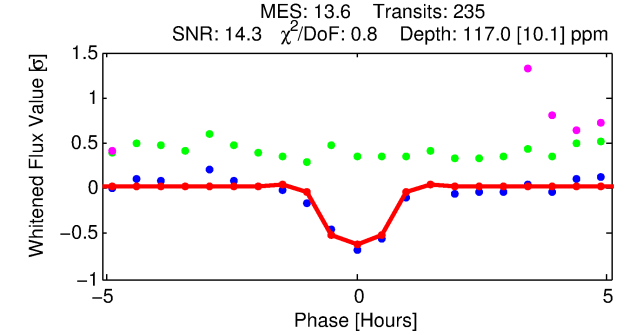
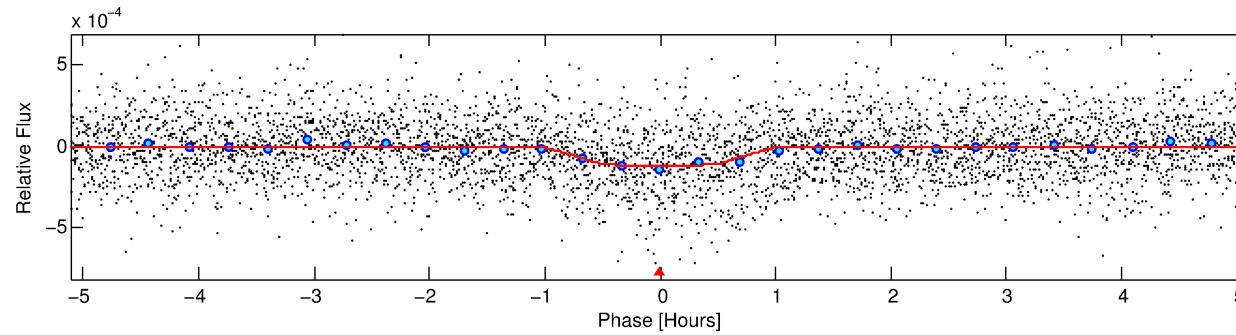
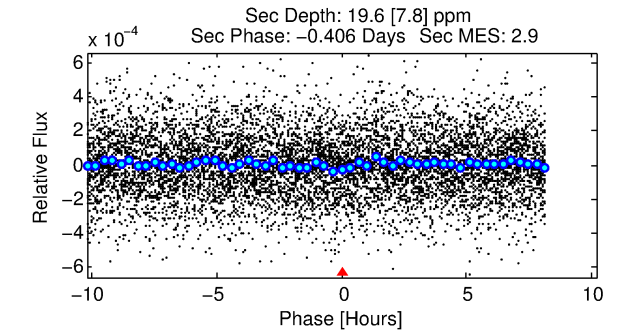
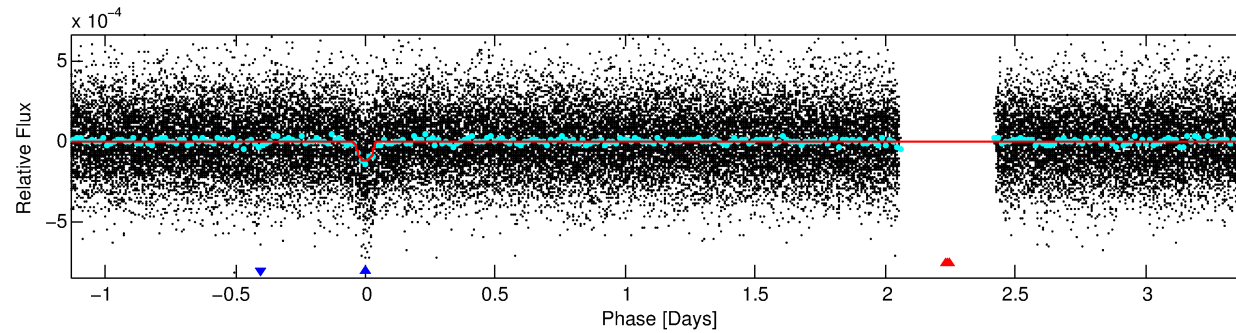
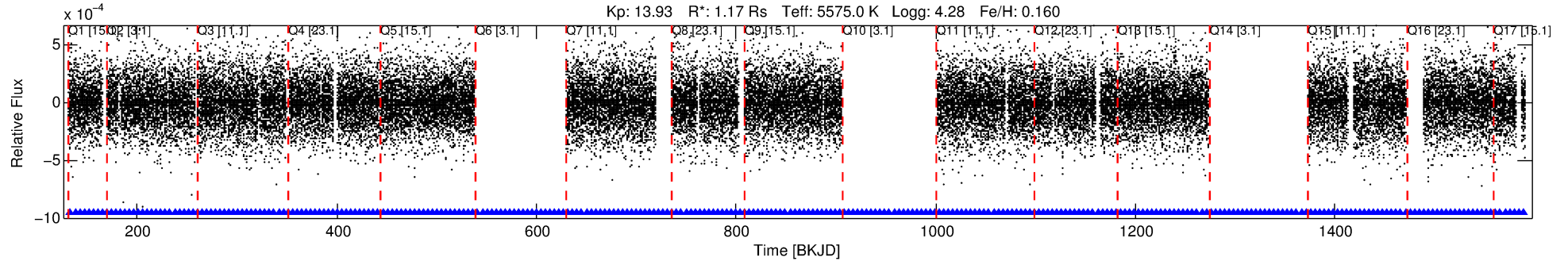
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist (″)	Δ Row	Δ Col	m_2	m_1	D_2/D_1	Mechanism	Flag	σ_P	σ_T
004659405-02	4659405	004751083-02	4751083	1:1	9.9	2	-1	16.03	13.93	146.63	Direct-PRF	0	0.25	0.39

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: 4659405 Candidate: 2 of 2 Period: 4.532 d
KOI: K00630 Corr: No Ephemeris Match

Kp: 13.93 R*: 1.17 Rs Teff: 5575.0 K Logg: 4.28 Fe/H: 0.160



DV Fit Results:

Period = 4.53244 [0.00002] d
Epoch = 133.4252 [0.0022] BKJD
Rp/R* = 0.0124 [0.0062]
a/R* = 8.18 [18.92]
b = 0.93 [0.35]
Seff = 428.18 [157.69]
Teff = 1160 [107] K
Rp = 1.58 [0.90] Re
a = 0.0527 [0.0123] AU
Ag = 11.98 [13.54] [0.81σ]
Teffp = 3336 [902] K [2.39σ]

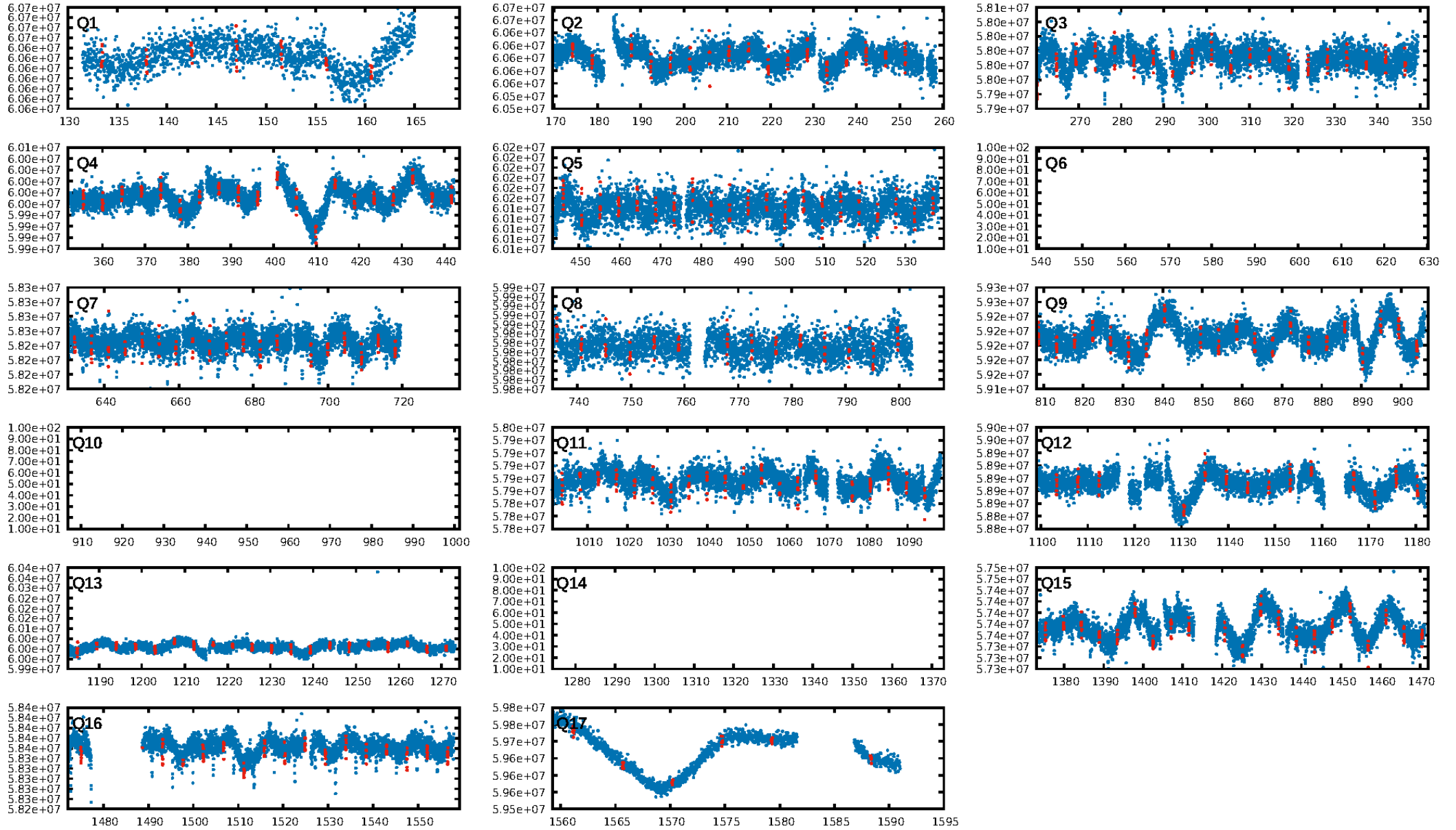
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 1.01e-41
RollingBand-fgt: 1.00 [222/222]
GhostDiagnostic-chr: -0.32
Centroid-sig: 0.0%
Centroid-so: 66.902 arcsec [70.57σ]
OotOffset-rm: 9.029 arcsec [21.60σ]
KicOffset-rm: 8.856 arcsec [20.47σ]
OotOffset-st: 1/4/0/0 [5]
KicOffset-st: 1/4/0/0 [5]
DiffImageQuality-fgm: 1.00 [5/5]
DiffImageOverlap-fno: 1.00 [14/14]

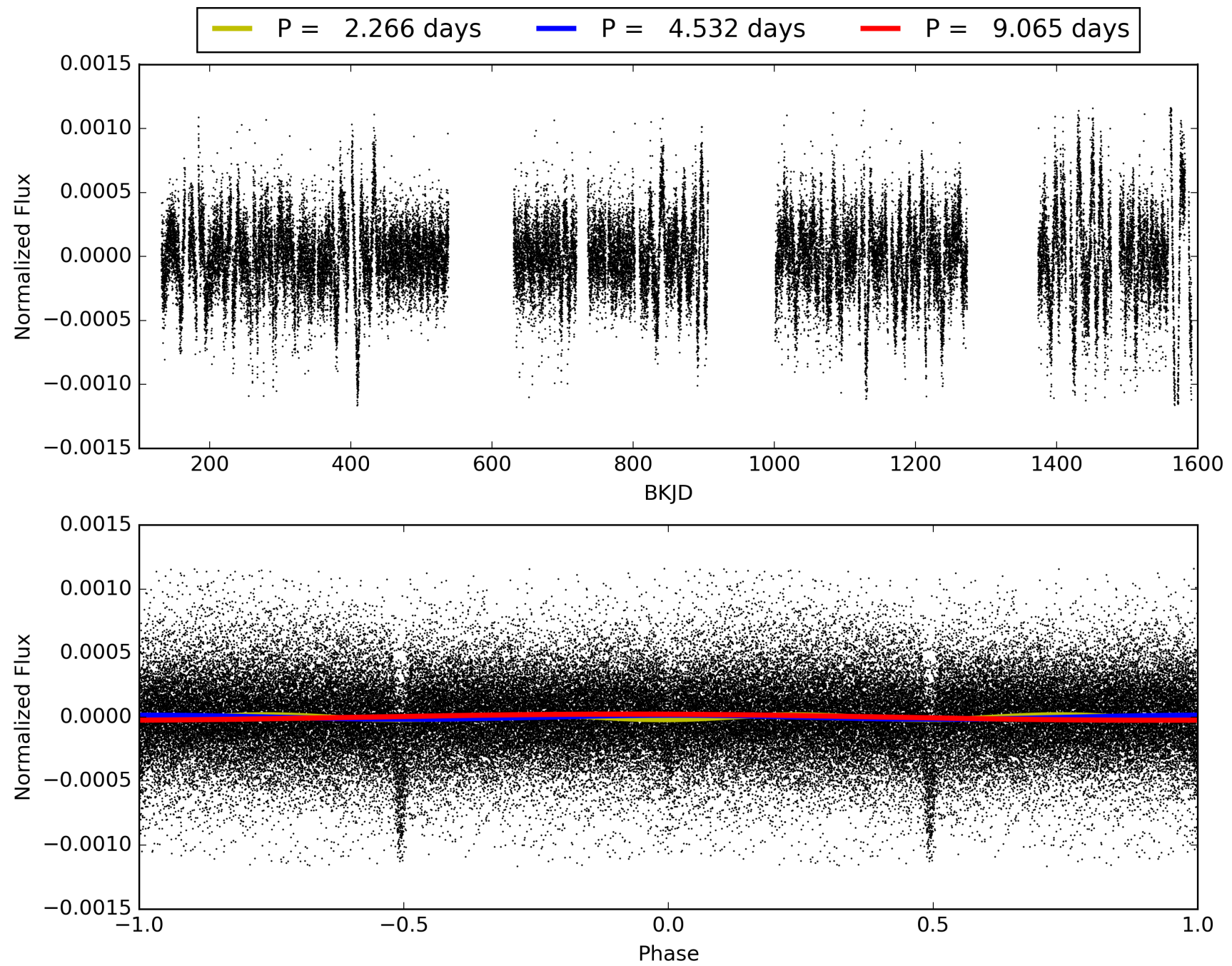
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 11:55:11 Z

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

TCE 004659405-02, PDC Light Curves

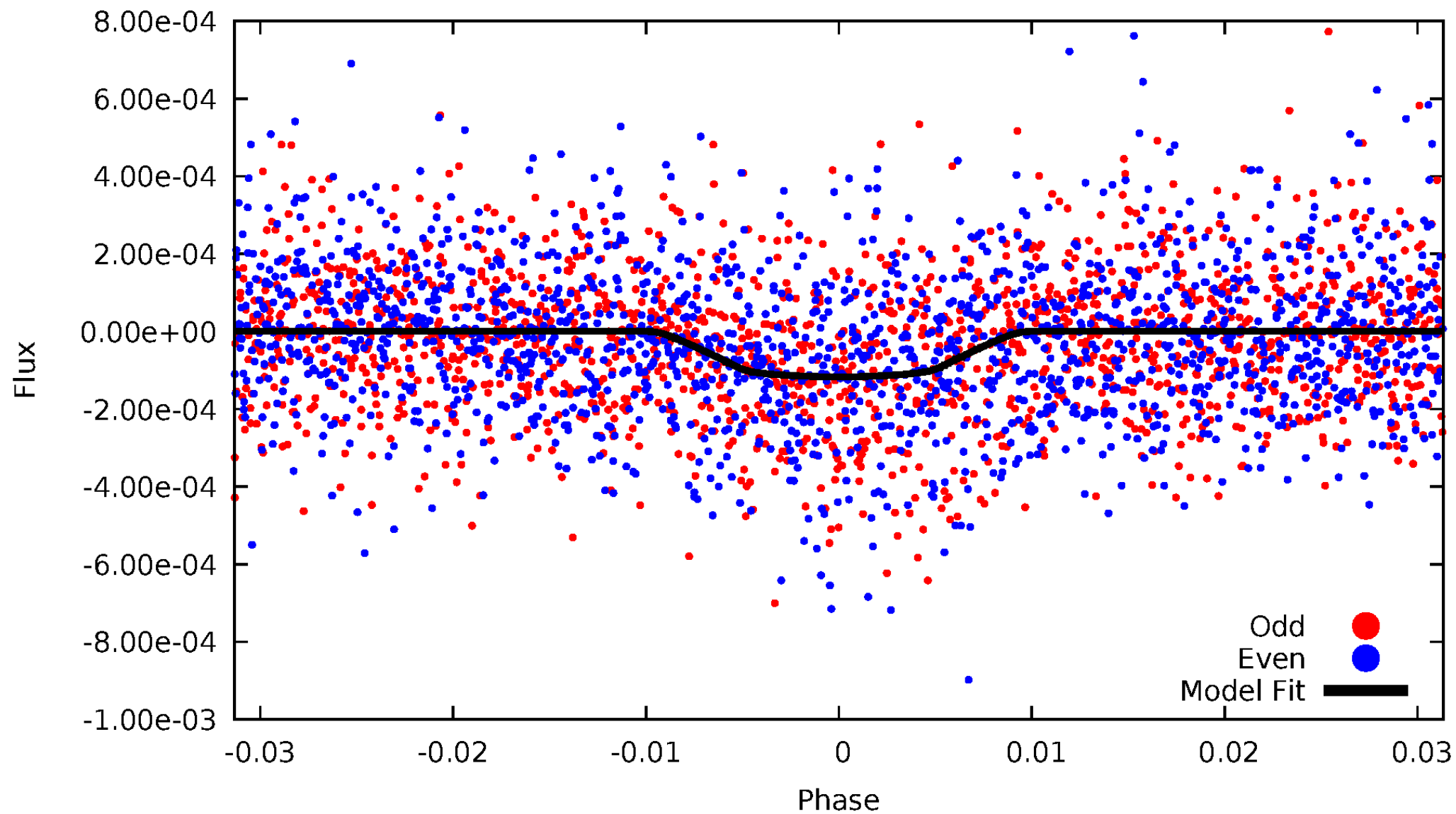


TCE 004659405-02



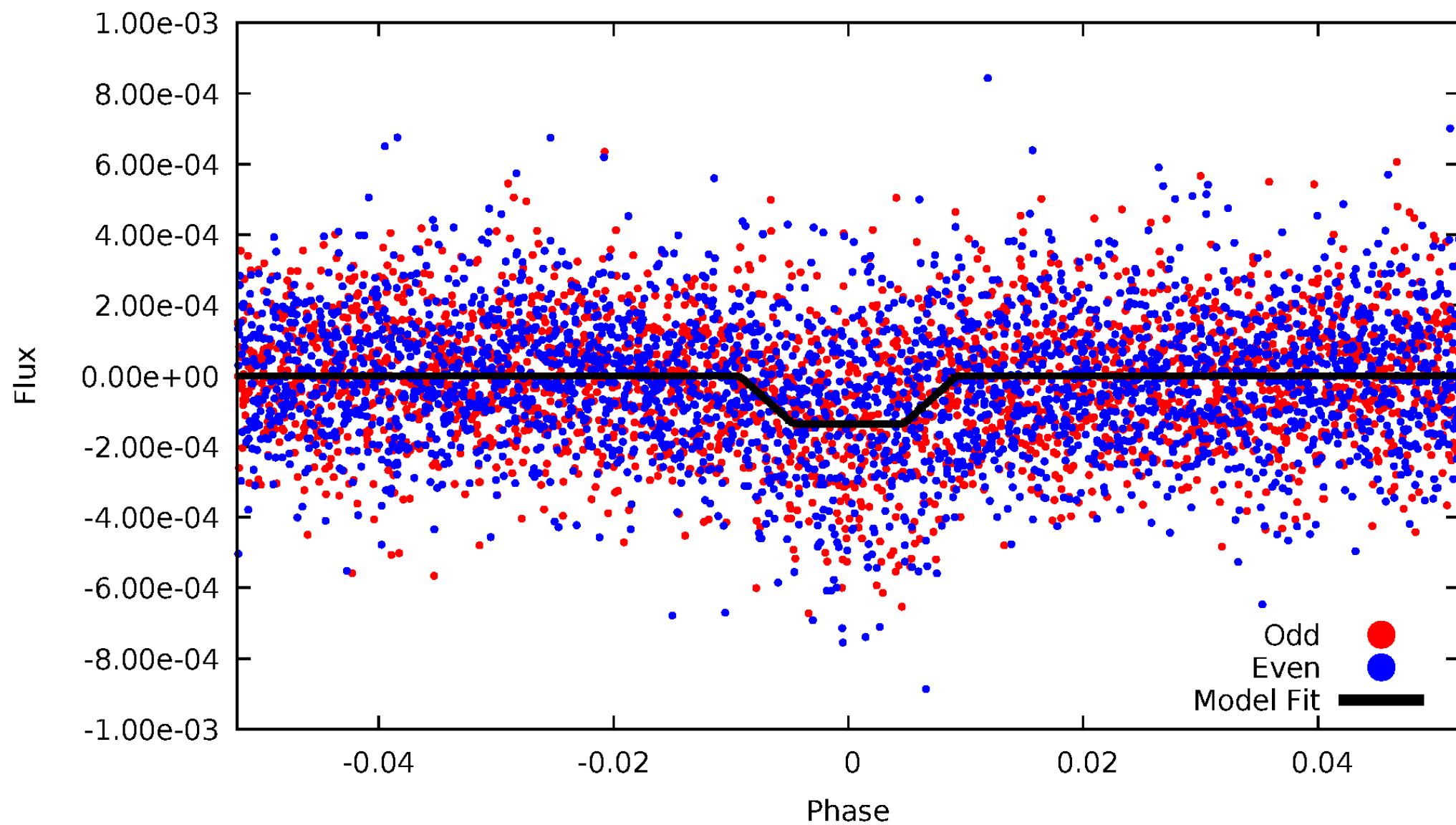
DV Odd/Even

TCE 004659405-02



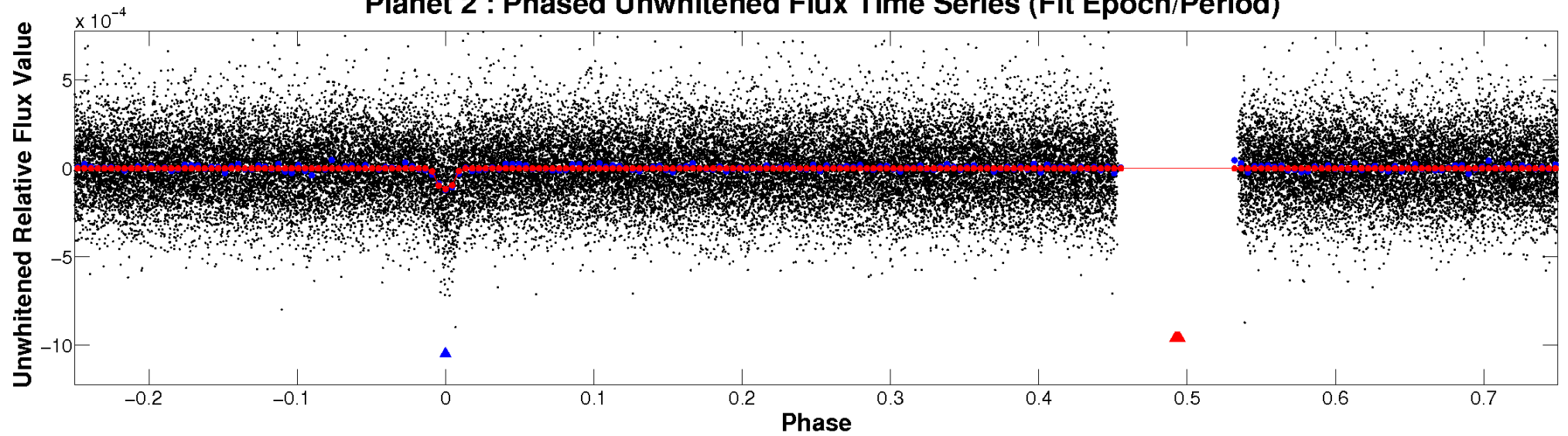
ALT Odd/Even

TCE 004659405-02

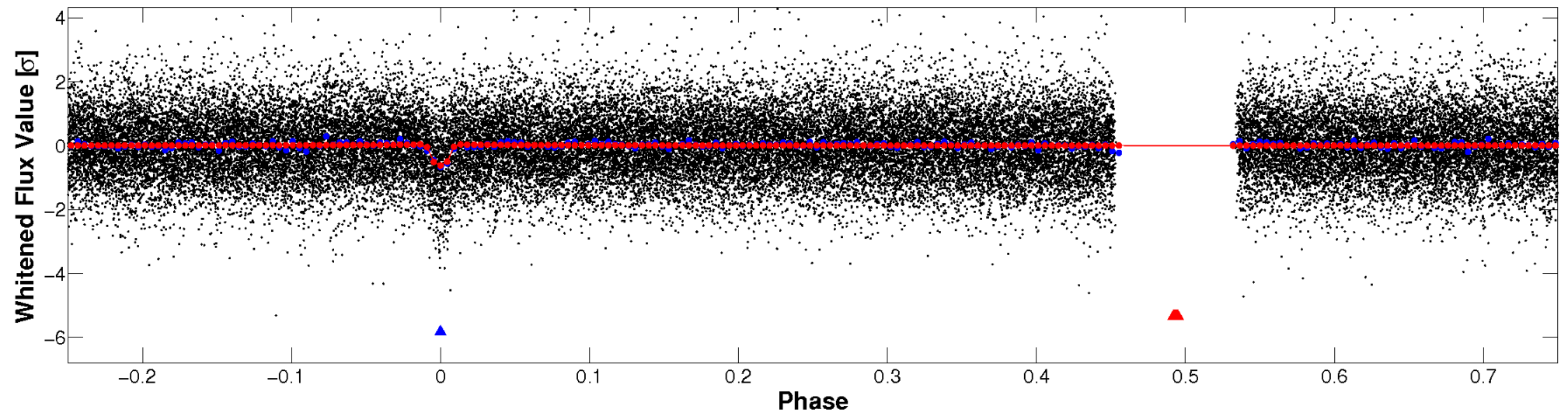


Non-Whitened Vs. Whitened Light Curve

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

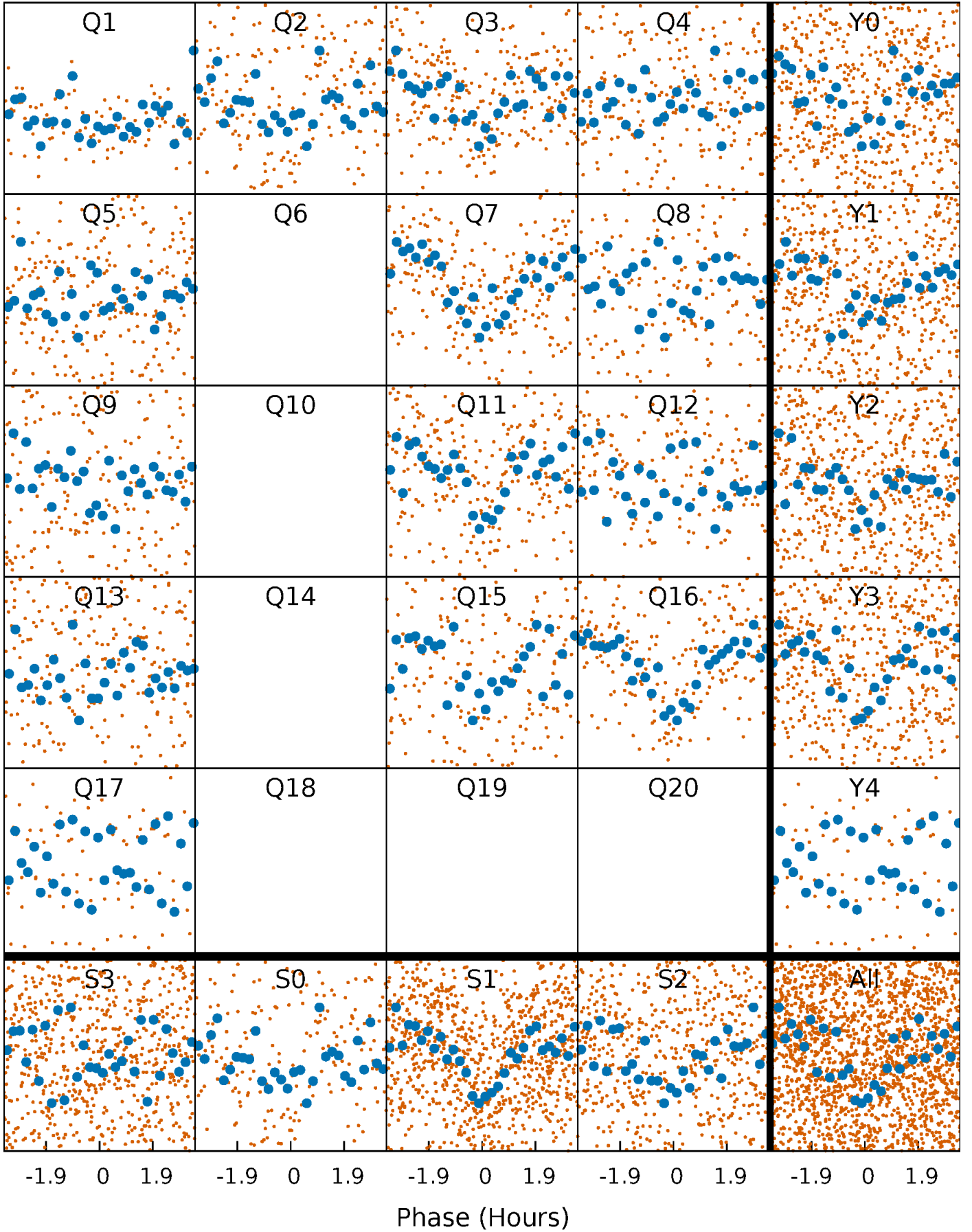


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



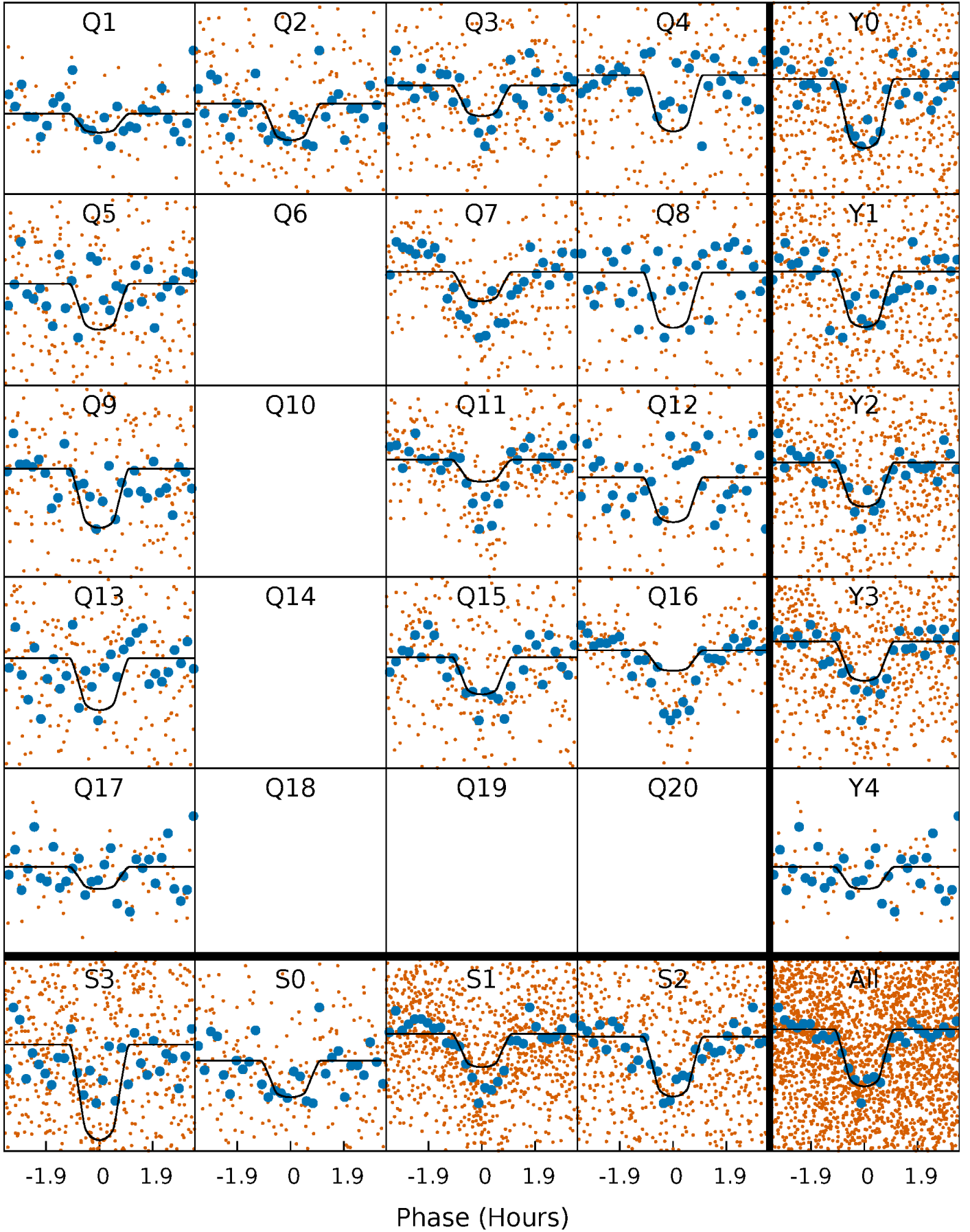
PDC Quarter-Phased Transit Curves

TCE 004659405-02 P= 4.532437 Days $T_0=133.425210$ (BKJD)



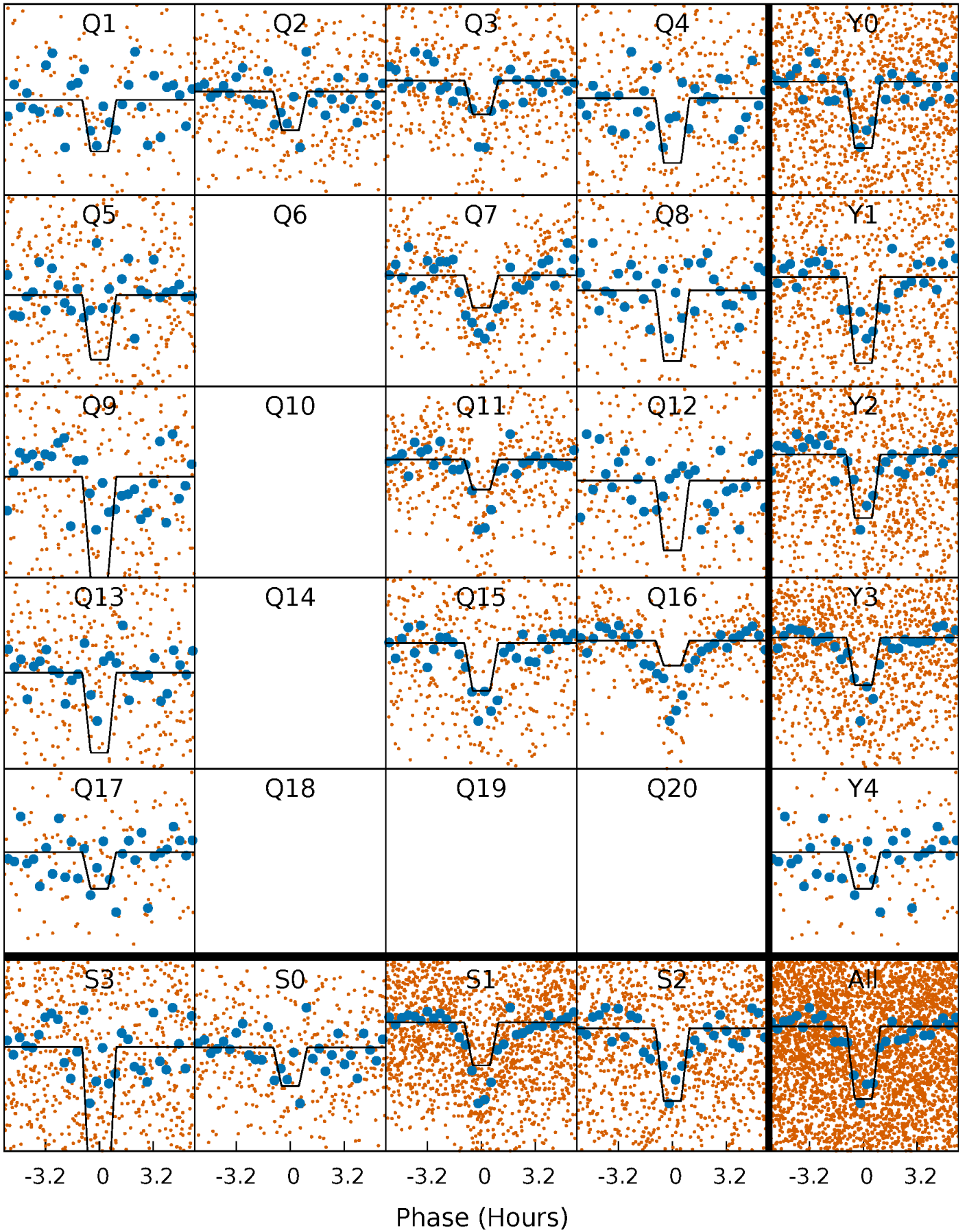
DV Quarter-Phased Transit Curves

TCE 004659405-02 P= 4.532437 Days $T_0=133.425210$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

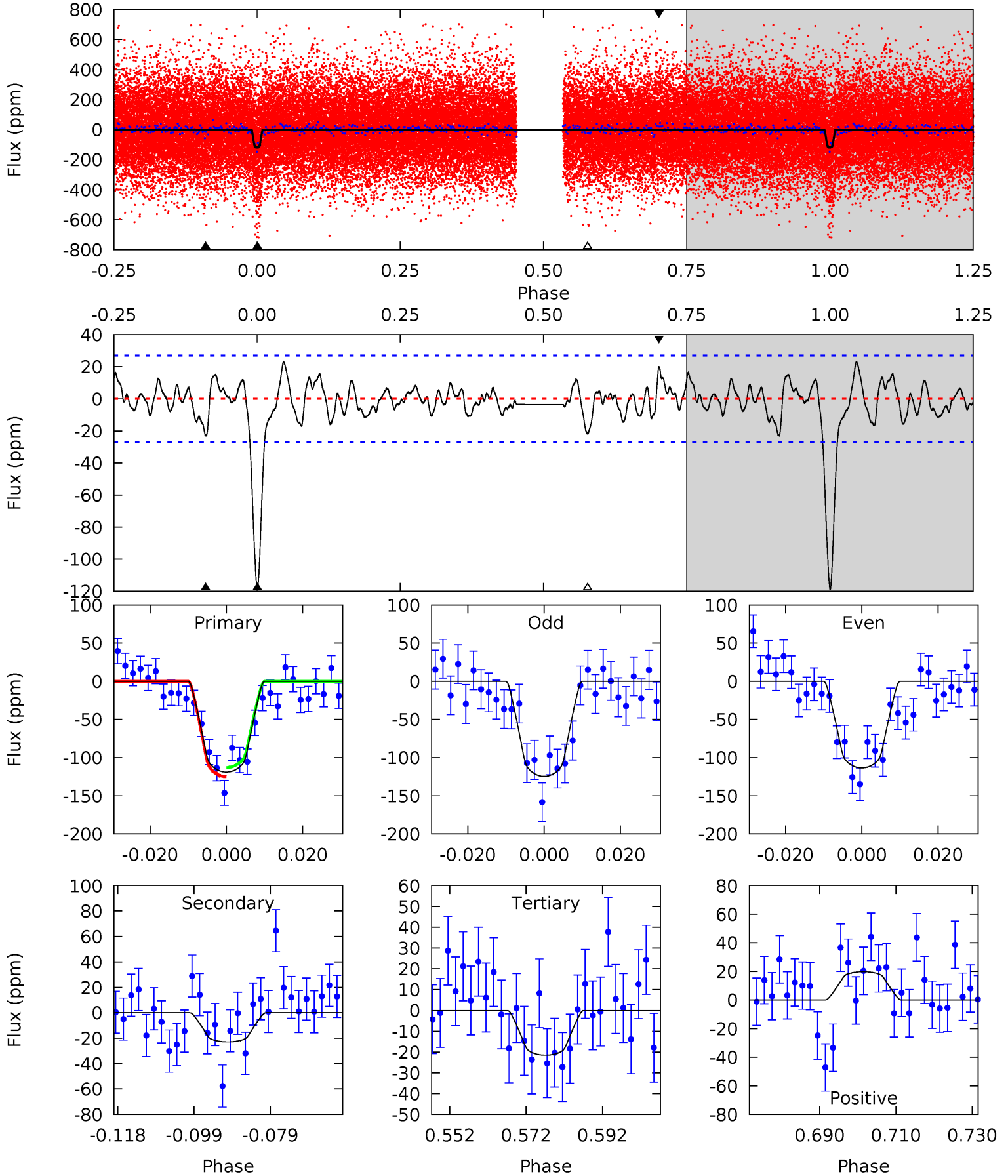
TCE 004659405-02 P= 4.532436 Days $T_0=133.425753$ (BKJD)



DV Model-Shift Uniqueness Test

004659405-02, P = 4.532437 Days, E = 128.892773 Days

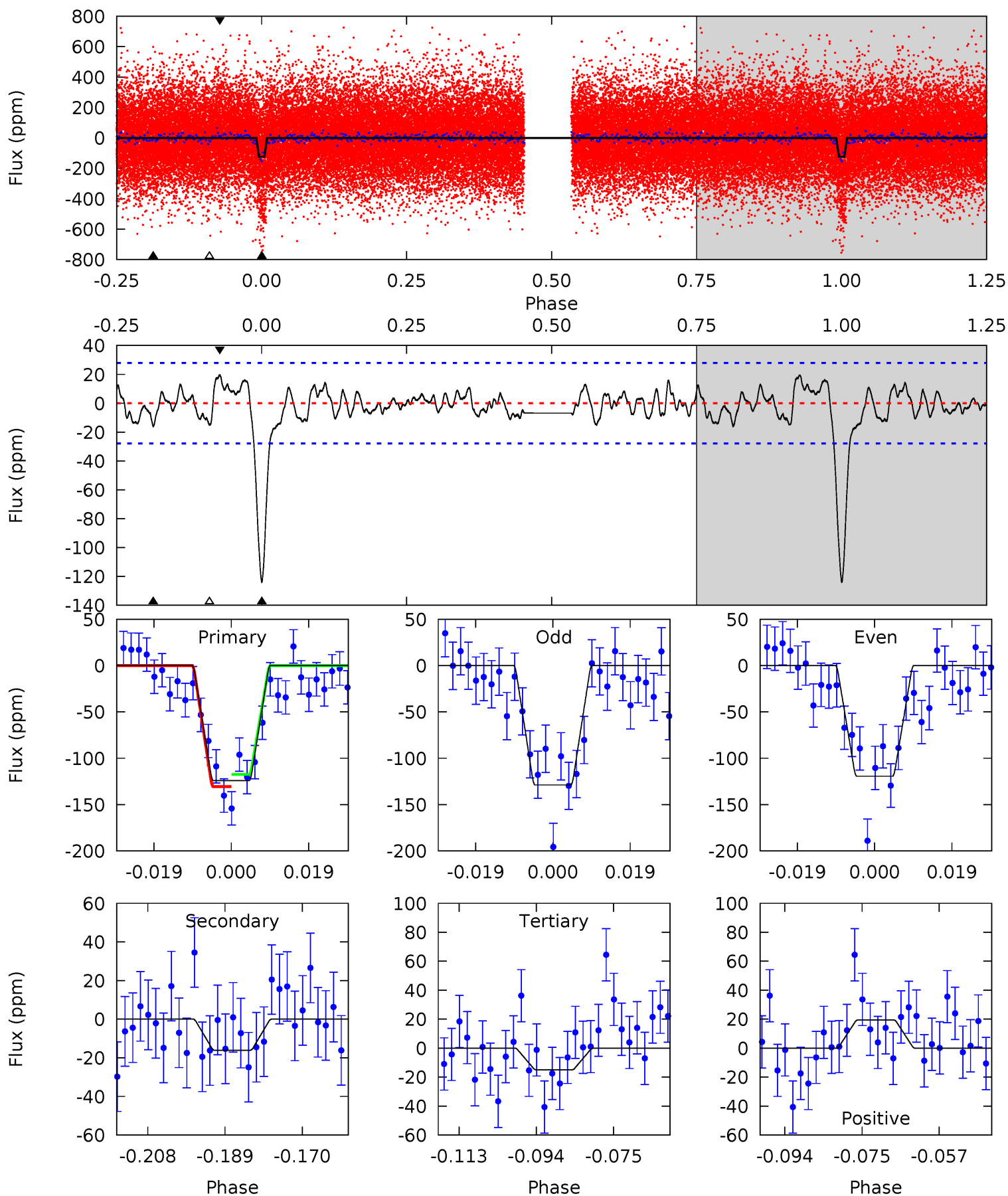
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
21.5	4.14	3.89	3.58	4.89	2.33	1.37	17.6	17.9	0.25	0.56	1.00	1.19	0.16	1.09



Alt Model-Shift Uniqueness Test

004659405-02, P = 4.532436 Days, E = 128.893317 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
21.8	2.82	2.63	3.44	4.90	2.35	1.31	19.2	18.4	0.19	-0.61	0.83	1.14	0.14	1.15



Stellar Parameters For KIC 004659405

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5575^{+150}_{-166}	$4.278^{+0.195}_{-0.175}$	$0.160^{+0.200}_{-0.300}$	$1.173^{+0.314}_{-0.257}$	$0.951^{+0.104}_{-0.085}$	$0.831^{+0.943}_{-0.384}$
	+3%/-3%	+5%/-4%	+125%/-188%	+27%/-22%	+11%/-9%	+114%/-46%
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 004659405-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-23 ± 6	$1.56^{+0.81}_{-0.72}$	1616^{+123}_{-113}	3807^{+987}_{-513}	14^{+34}_{-9}
Alt.	-16 ± 6	$1.52^{+0.80}_{-0.78}$	1614^{+130}_{-113}	3617^{+1025}_{-515}	10^{+31}_{-6}

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 $A_{obs} \gg 1.0$

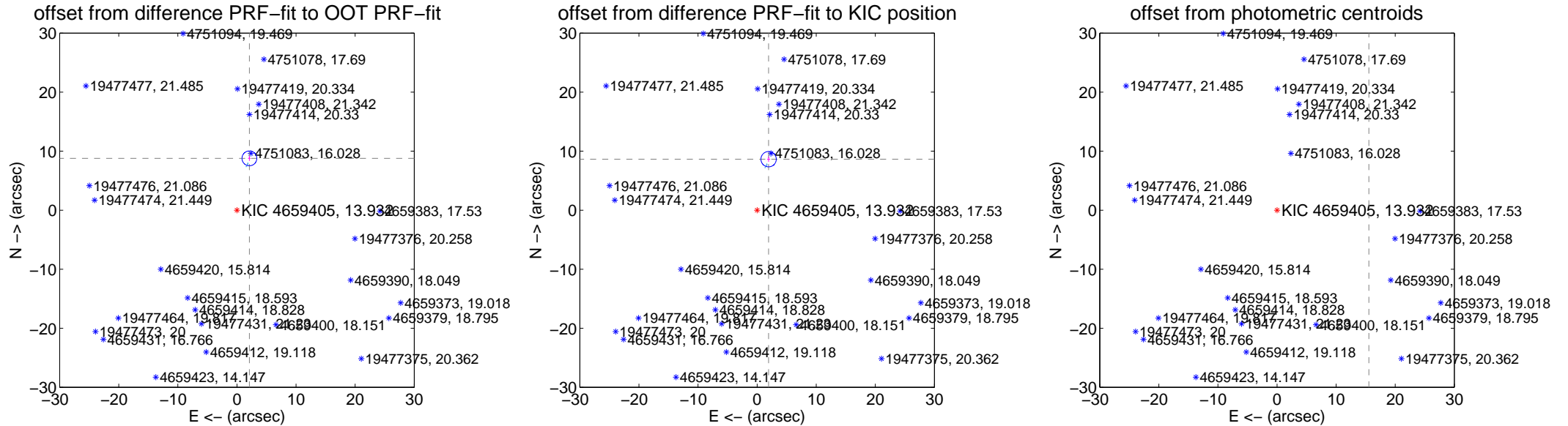
DV Centroid Data

Supplemental centroid analysis for 004659405-02. Kepler magnitude: 13.93. Transit SNR 14.35

There are 5 quarters with good PRF difference image offsets

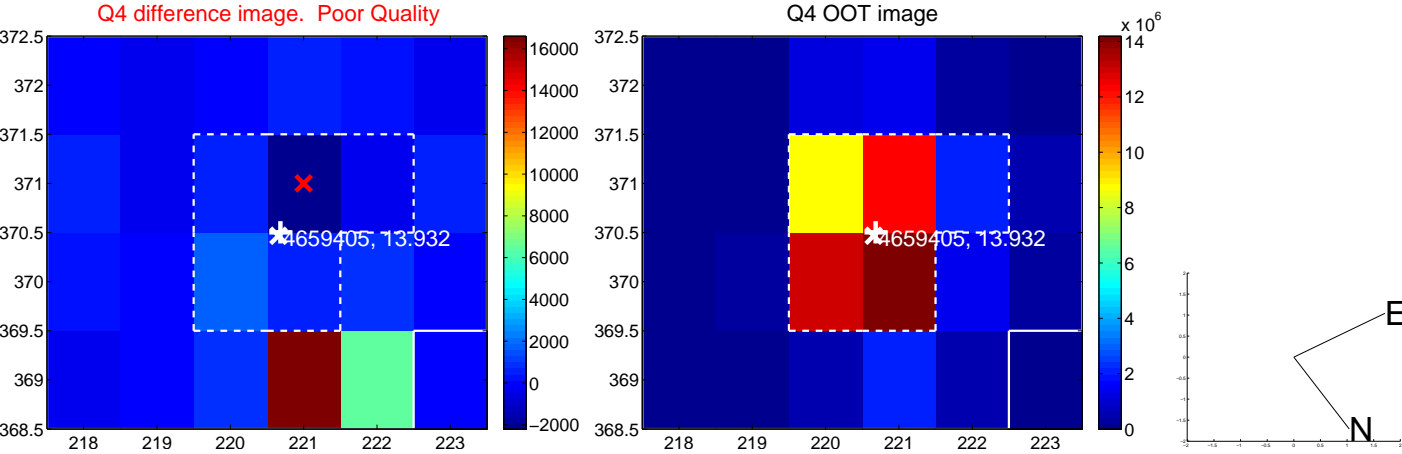
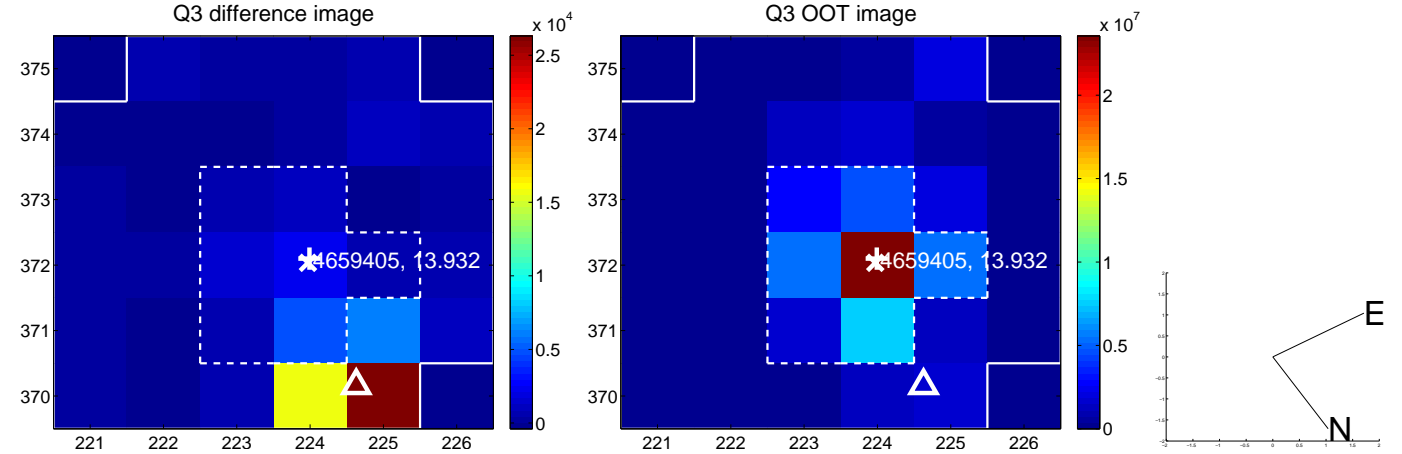
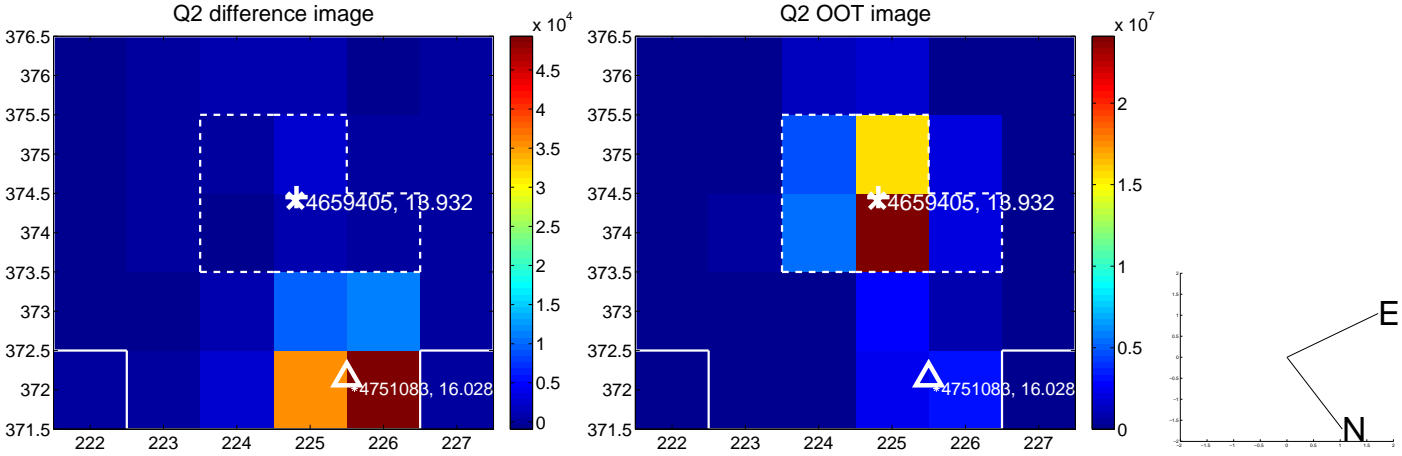
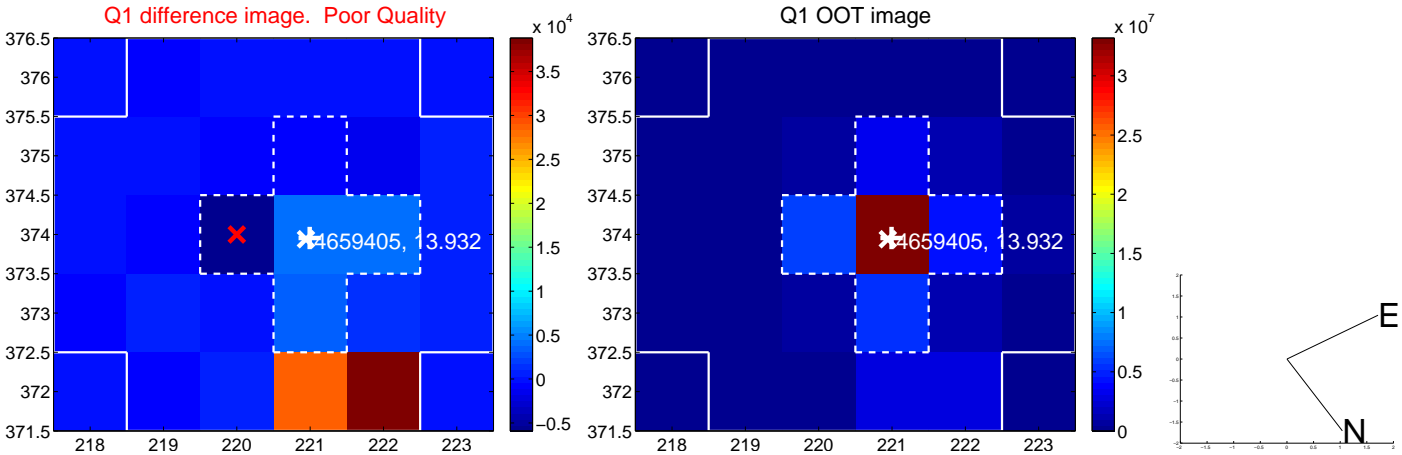
The direct PRF centroid is offset from the target star catalog position by about 0.29 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	9.029 \pm 0.418	21.60	-2.109 \pm 0.225	8.780 \pm 0.427
PRF-fit source offset from KIC position	8.856 \pm 0.433	20.47	-1.942 \pm 0.245	8.641 \pm 0.440
photometric centroid source offset	66.90 \pm 0.95	70.57	-15.53 \pm 0.94	65.07 \pm 0.95

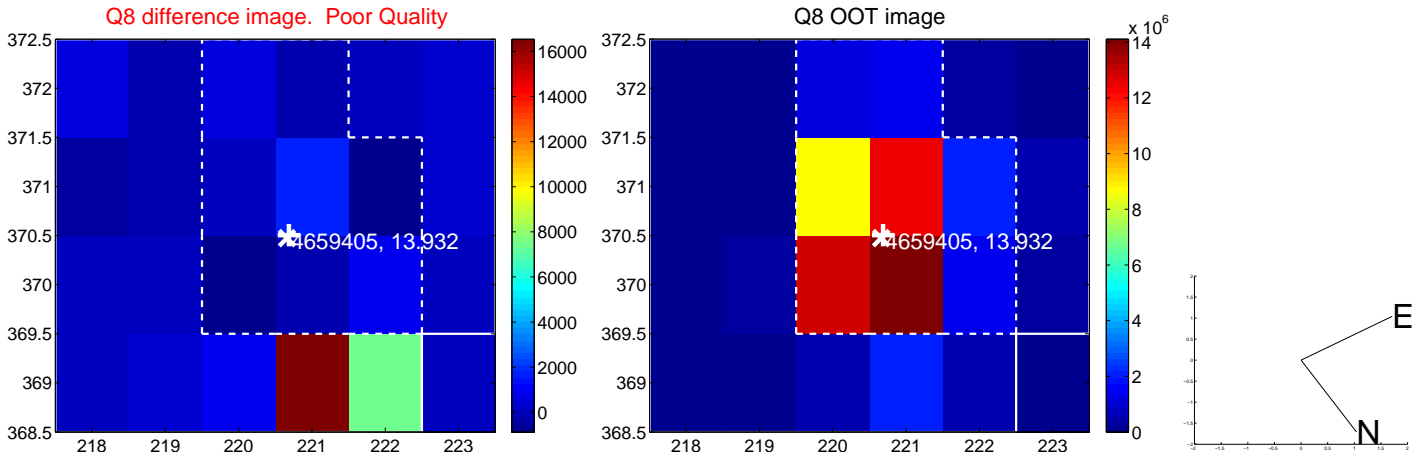
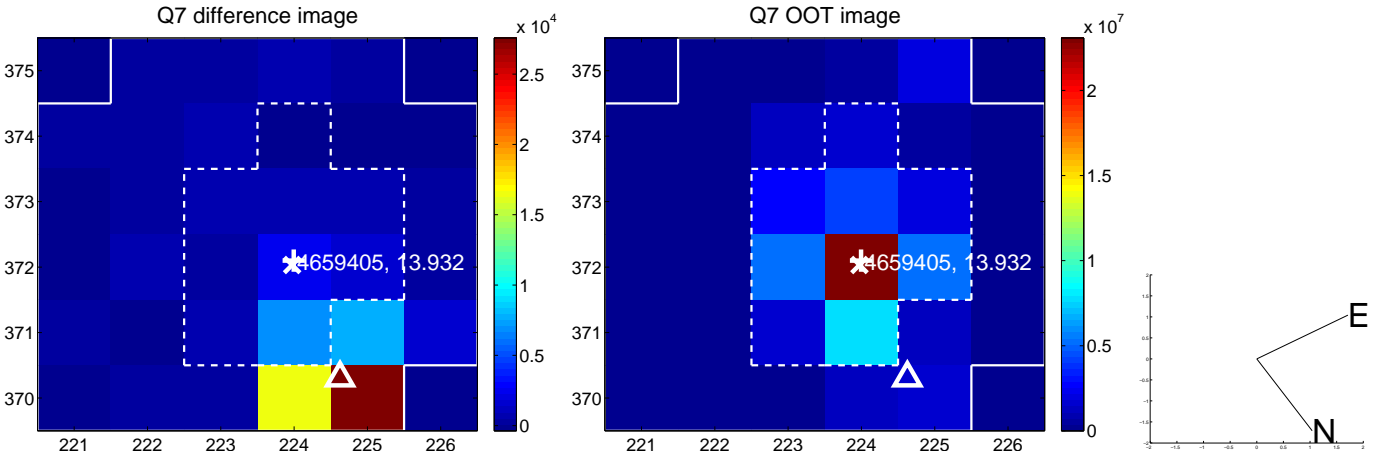
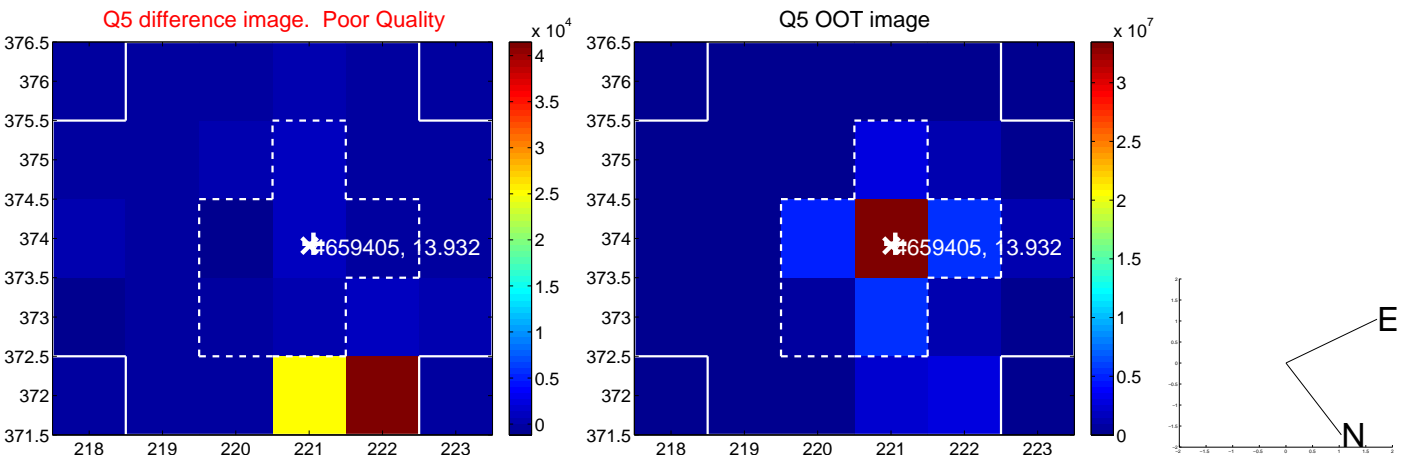


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

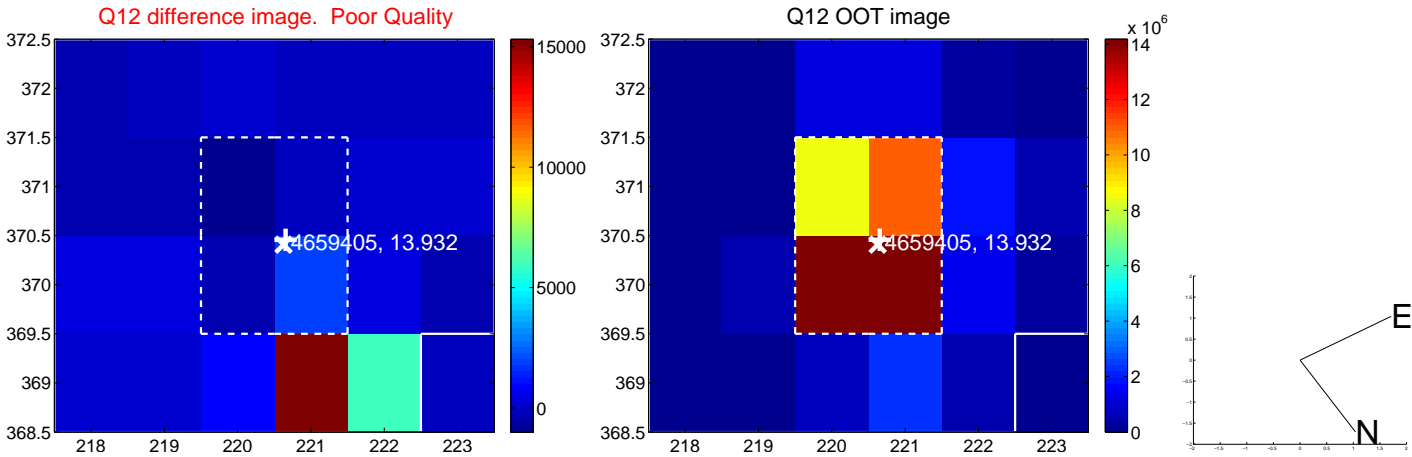
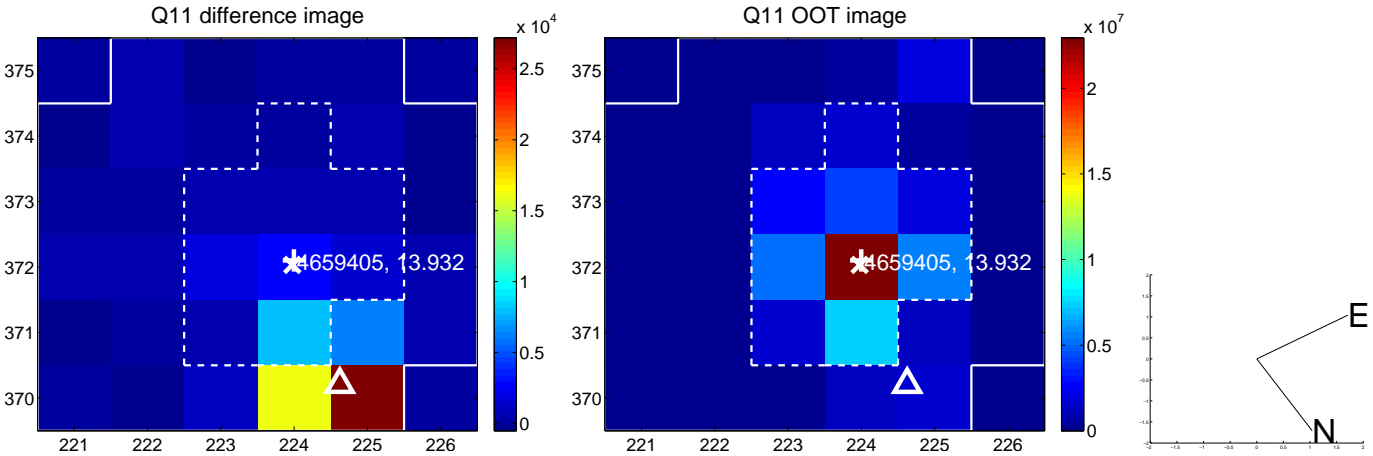
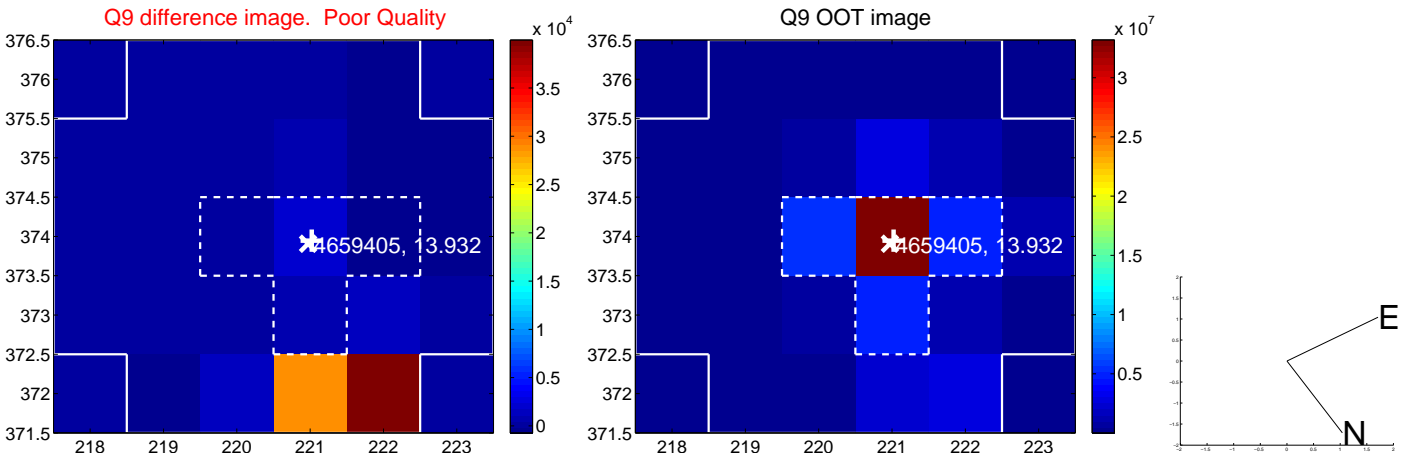
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



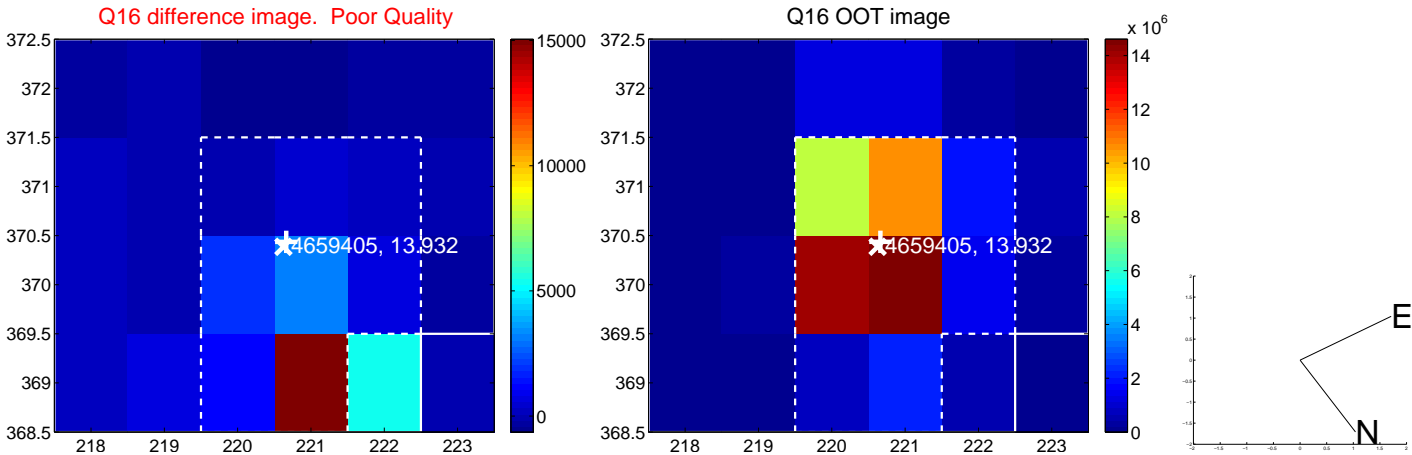
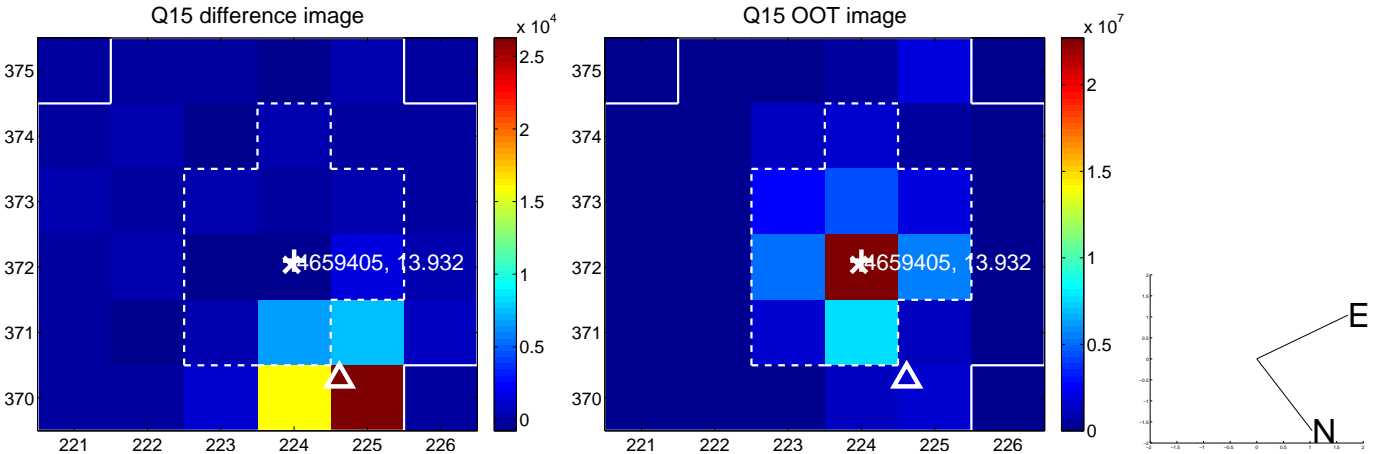
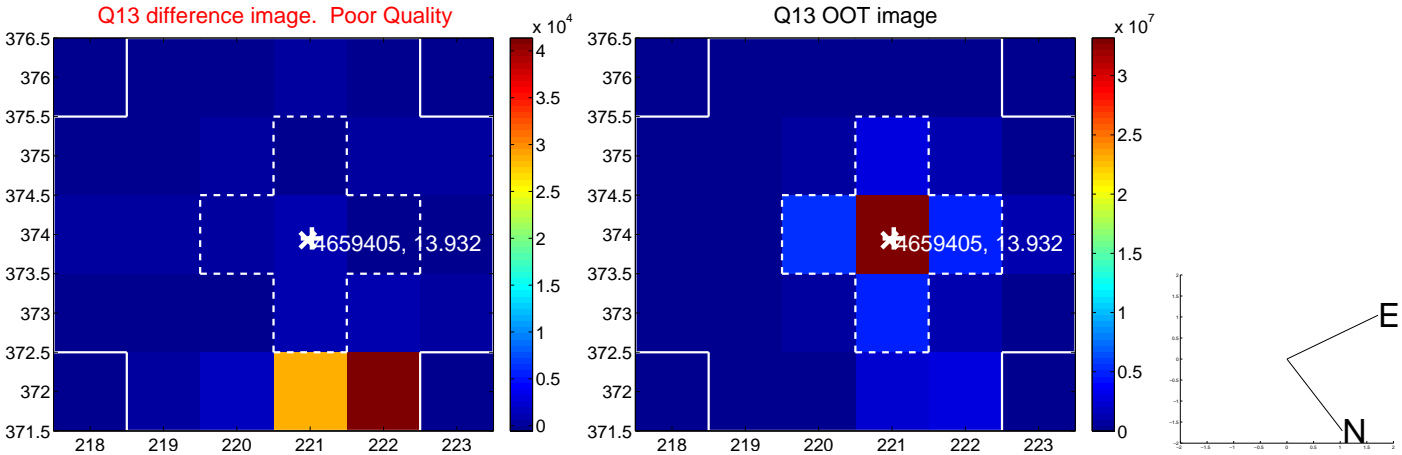
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



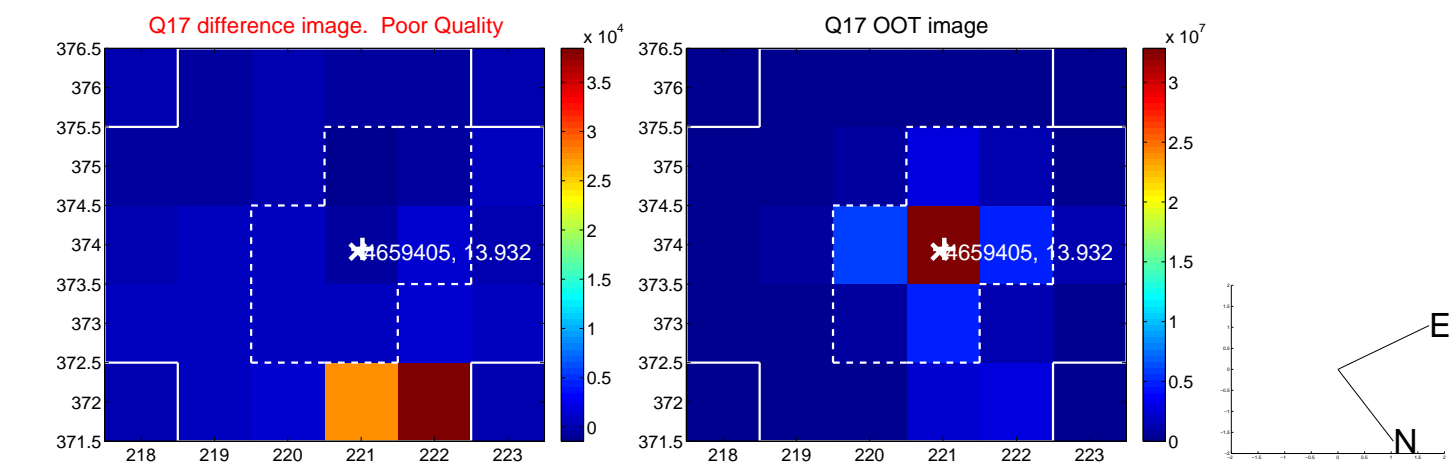
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



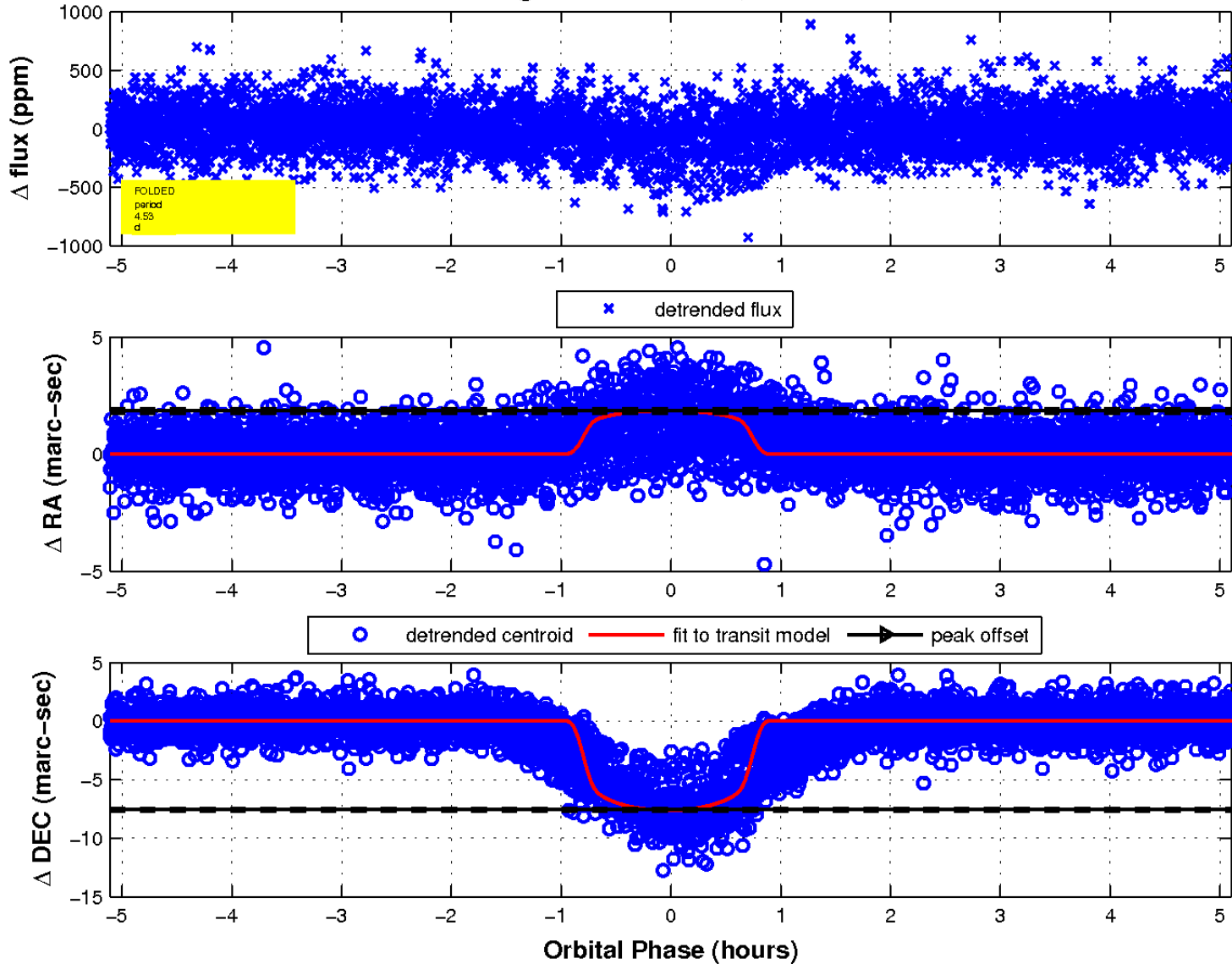
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

