

KIC 012316431

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})
012316431-01	OBS	0485.01	17.907661	139.744772	1039.7	5.395	75.2	70.0	0.99	6153	4.31	67.69
012316431-02	OBS	No	17.907094	134.925785	101.6	3.606	7.5	7.4	0.99	6153	1.18	67.69

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012316431-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
012316431-02	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 012316431-01

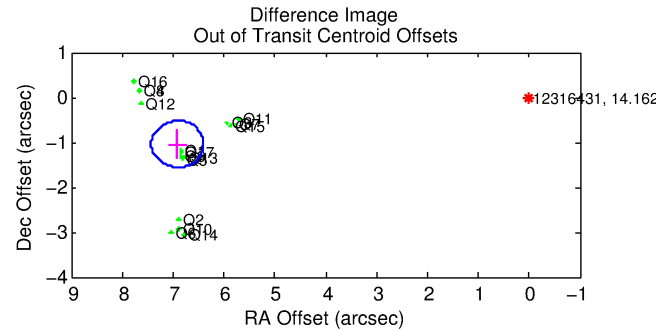
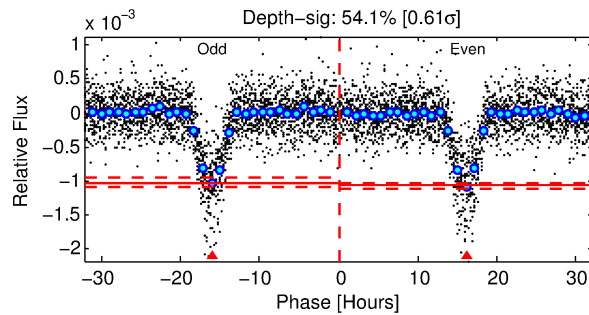
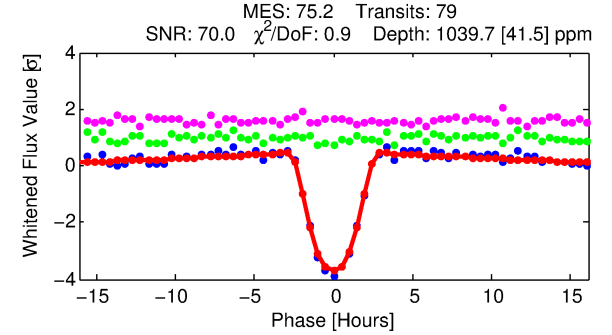
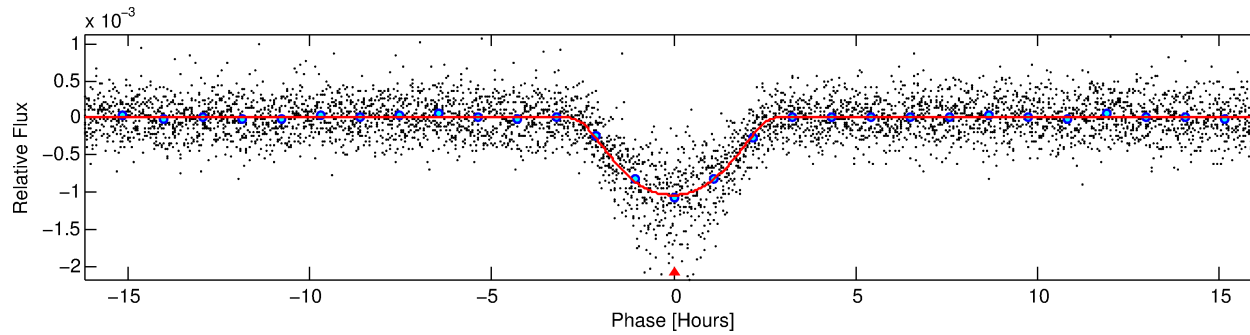
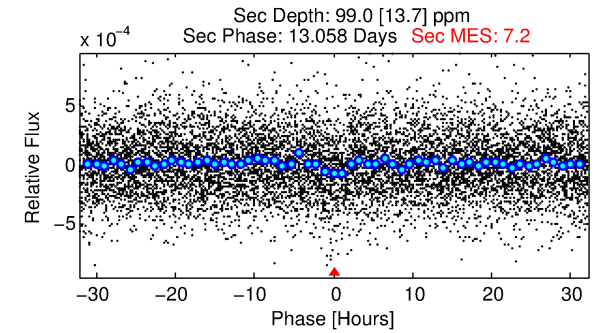
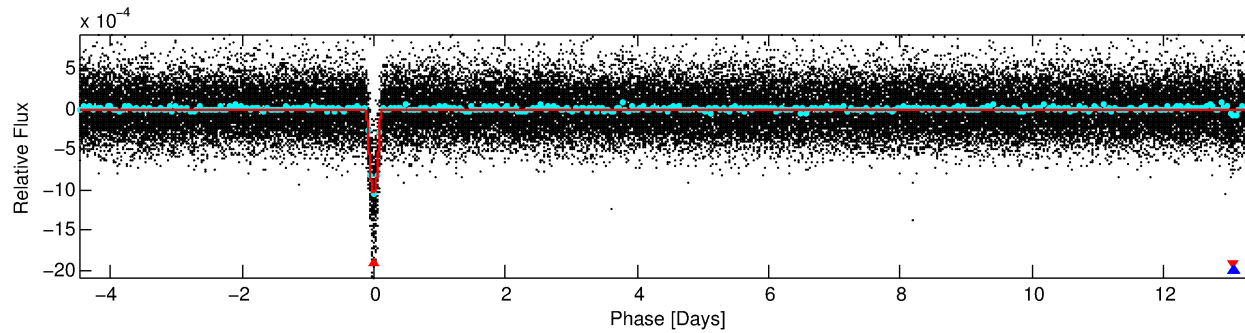
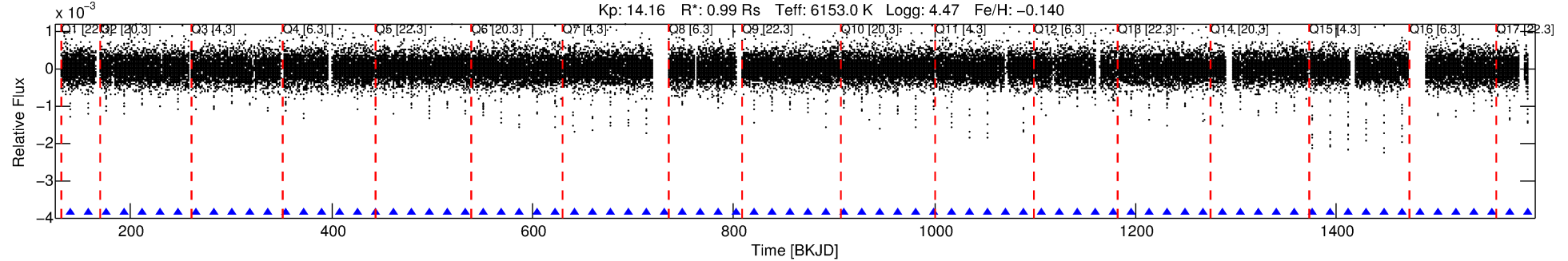
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ($''$)	Δ Row	Δ Col	m_2	m_1	D_2/D_1	Mechanism	Flag	σ_P	σ_T
012316431-01	12316431	3575.01	12316447	1:1	14.4	4	0	16.11	14.17	295.19	Direct-PRF	0	0.01	0.03

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: 12316431 Candidate: 1 of 2 Period: 17.908 d
KOI: K00485.01 Corr: 0.992

Kp: 14.16 R*: 0.99 Rs Teff: 6153.0 K Logg: 4.47 Fe/H: -0.140



DV Fit Results:

Period = 17.90766 [0.00004] d
Epoch = 139.7448 [0.0017] BKJD
Rp/R* = 0.0398 [0.0029]
a/R* = 9.63 [0.47]
b = 0.97 [0.01]
Seff = 67.68 [28.27]
Teq = 731 [76] K
Rp = 4.31 [1.44] Re
a = 0.1368 [0.0374] AU
Ag = 54.80 [24.34] [2.21σ]
Teffp = 3077 [184] K [11.76σ]

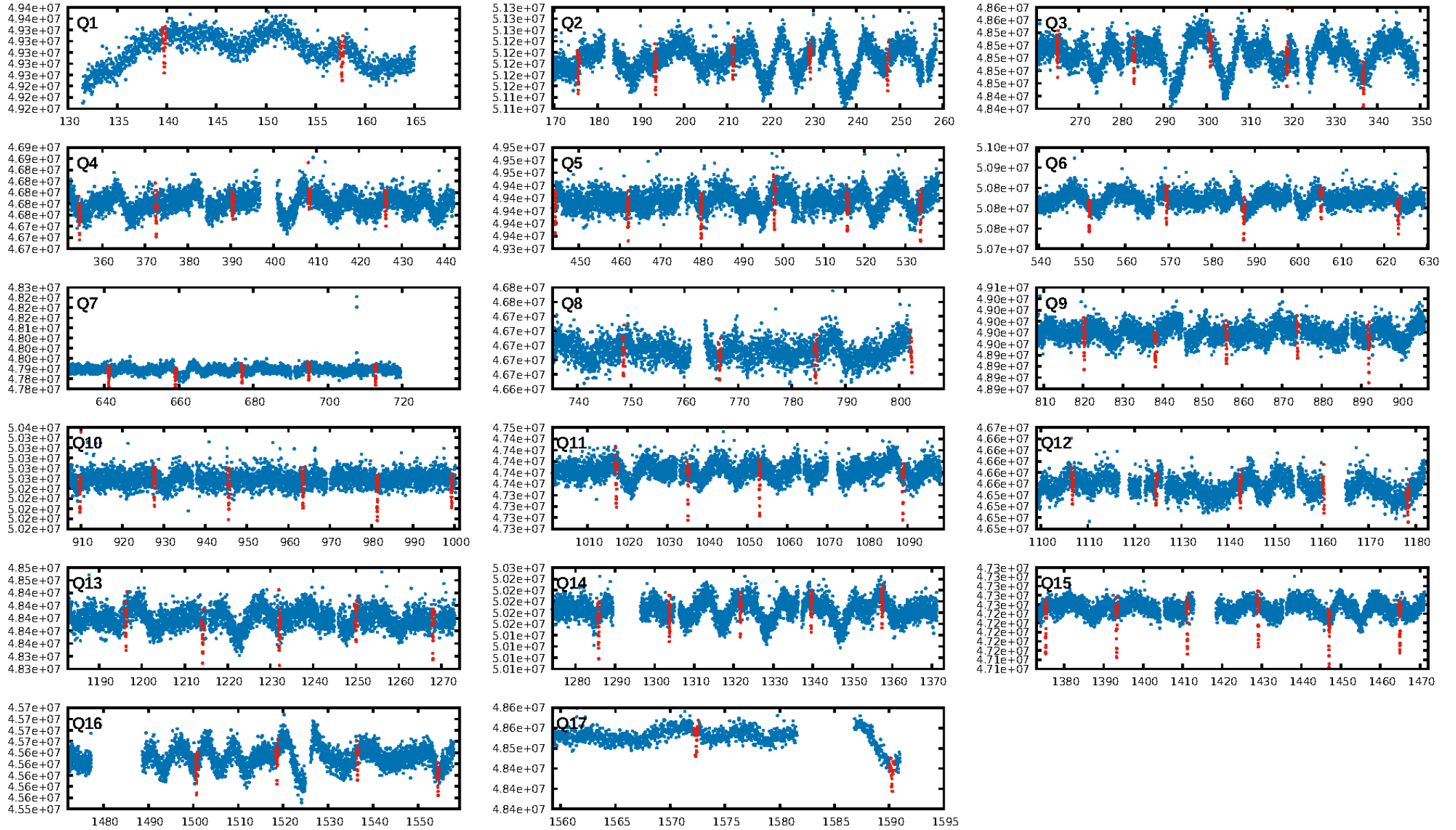
DV Diagnostic Results:

ShortPeriod-sig: 0.2% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [75/75]
GhostDiagnostic-chr: -0.1843
Centroid-sig: 0.0%
Centroid-so: 23.248 arcsec [112.90σ]
OotOffset-rm: 6.992 arcsec [40.66σ]
KicOffset-rm: 6.967 arcsec [42.17σ]
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]

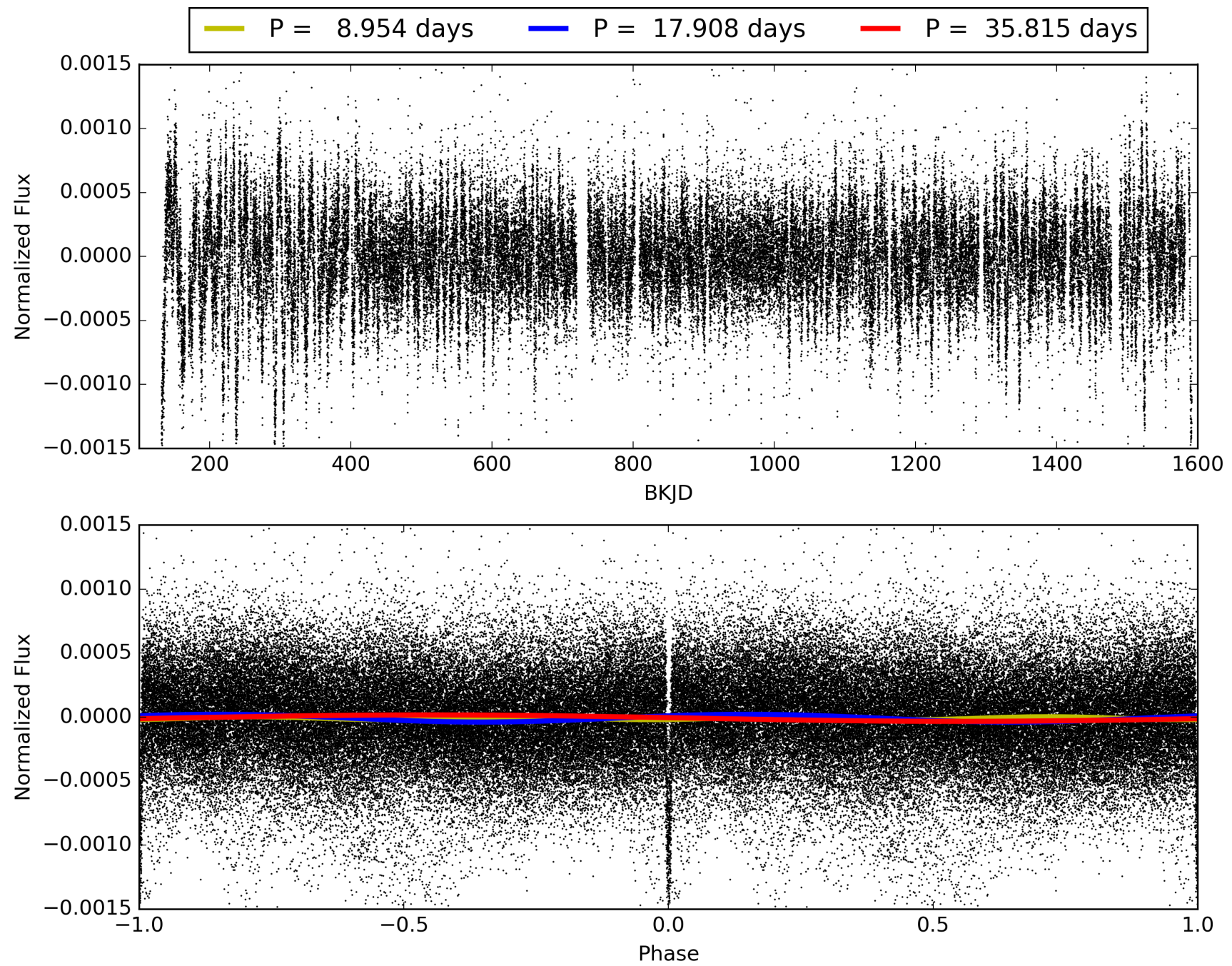
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 01:41:45 Z

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

TCE 012316431-01, PDC Light Curves

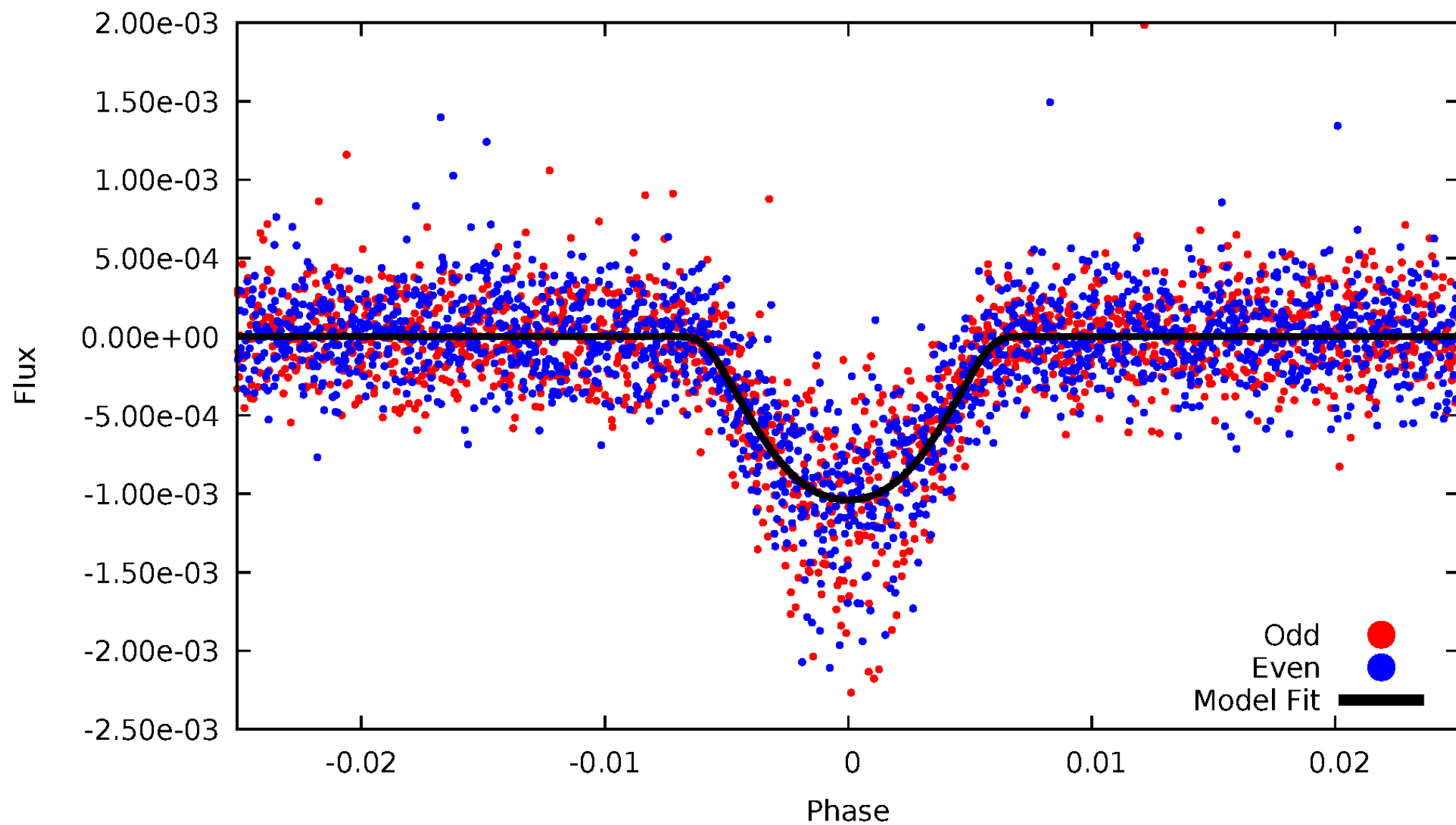


TCE 012316431-01



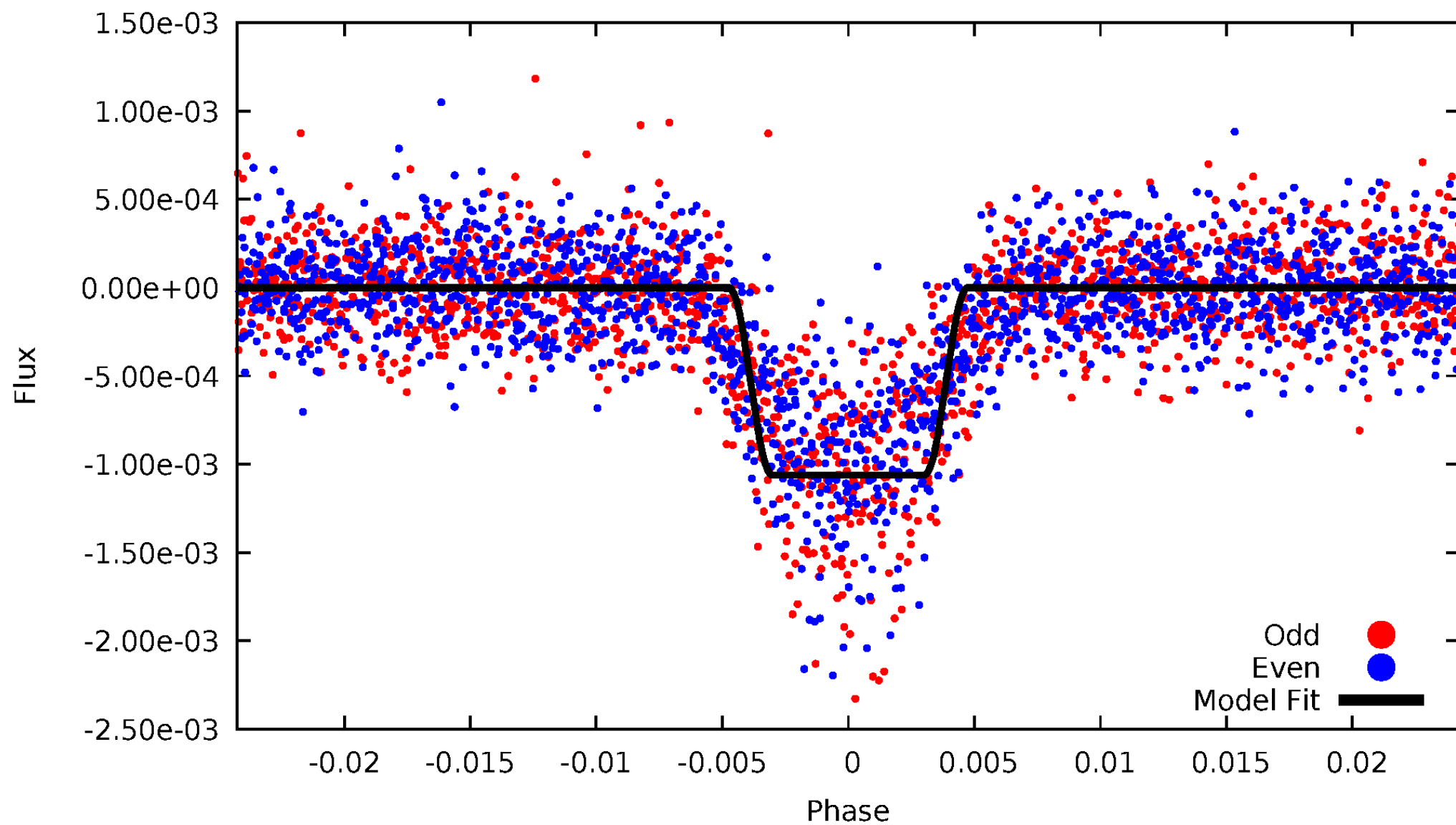
DV Odd/Even

TCE 012316431-01



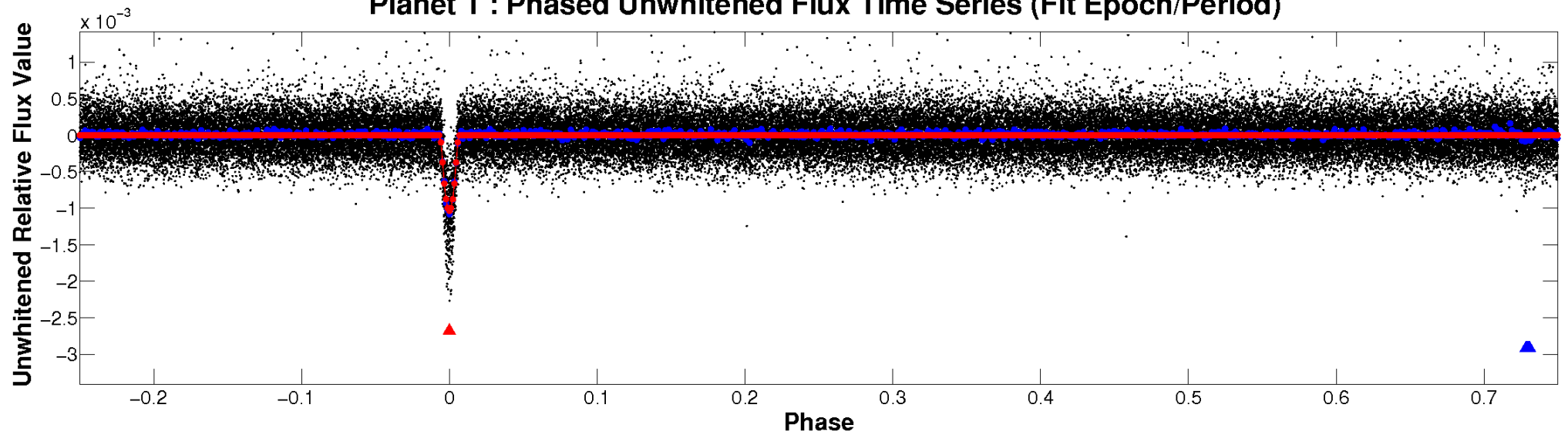
ALT Odd/Even

TCE 012316431-01

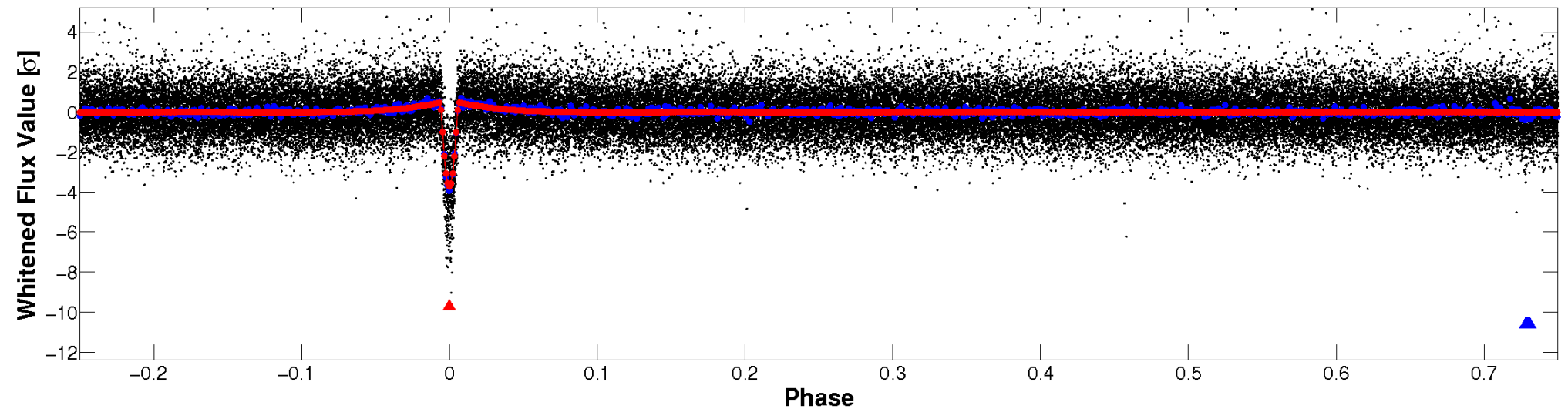


Non-Whitened Vs. Whitened Light Curve

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

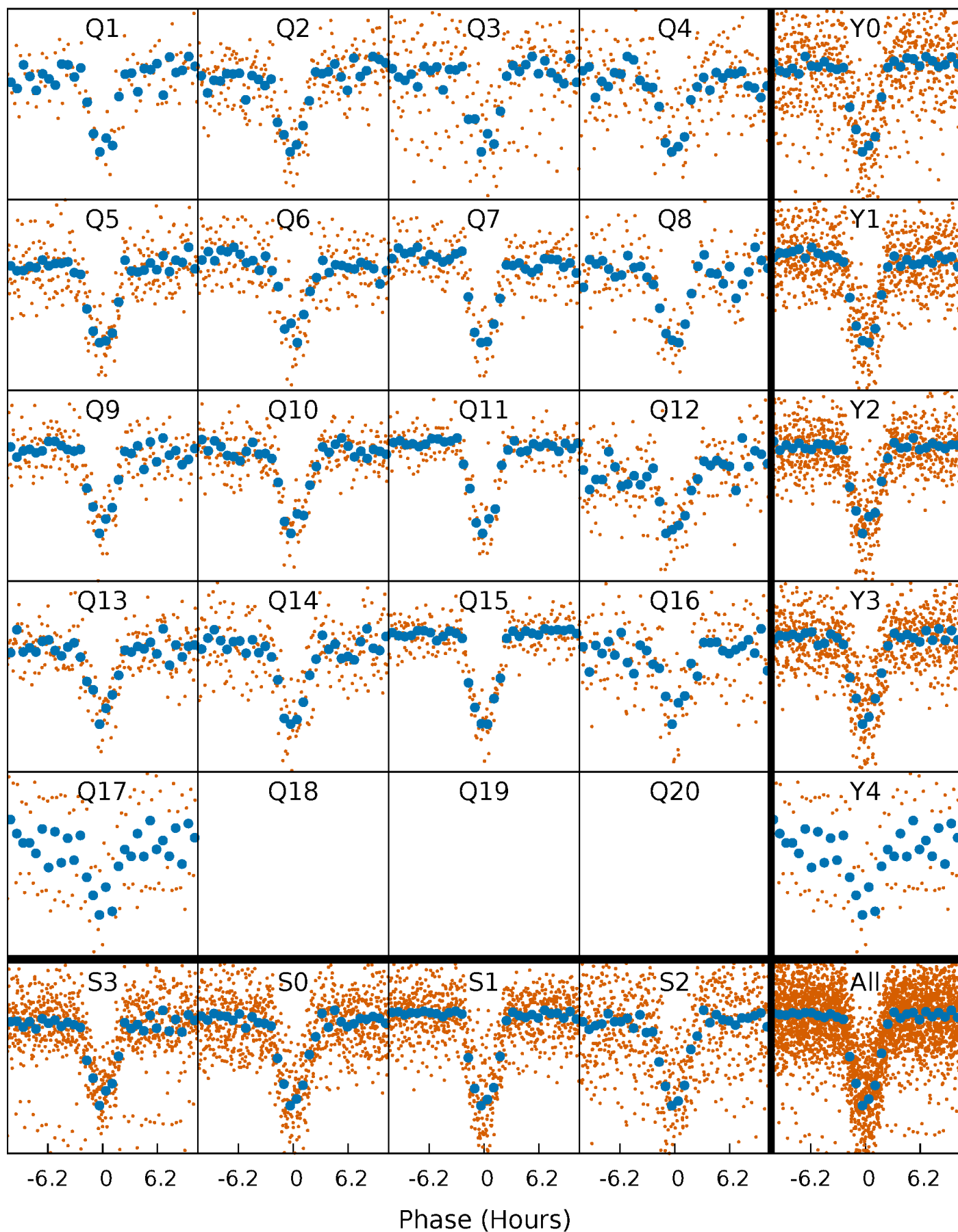


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



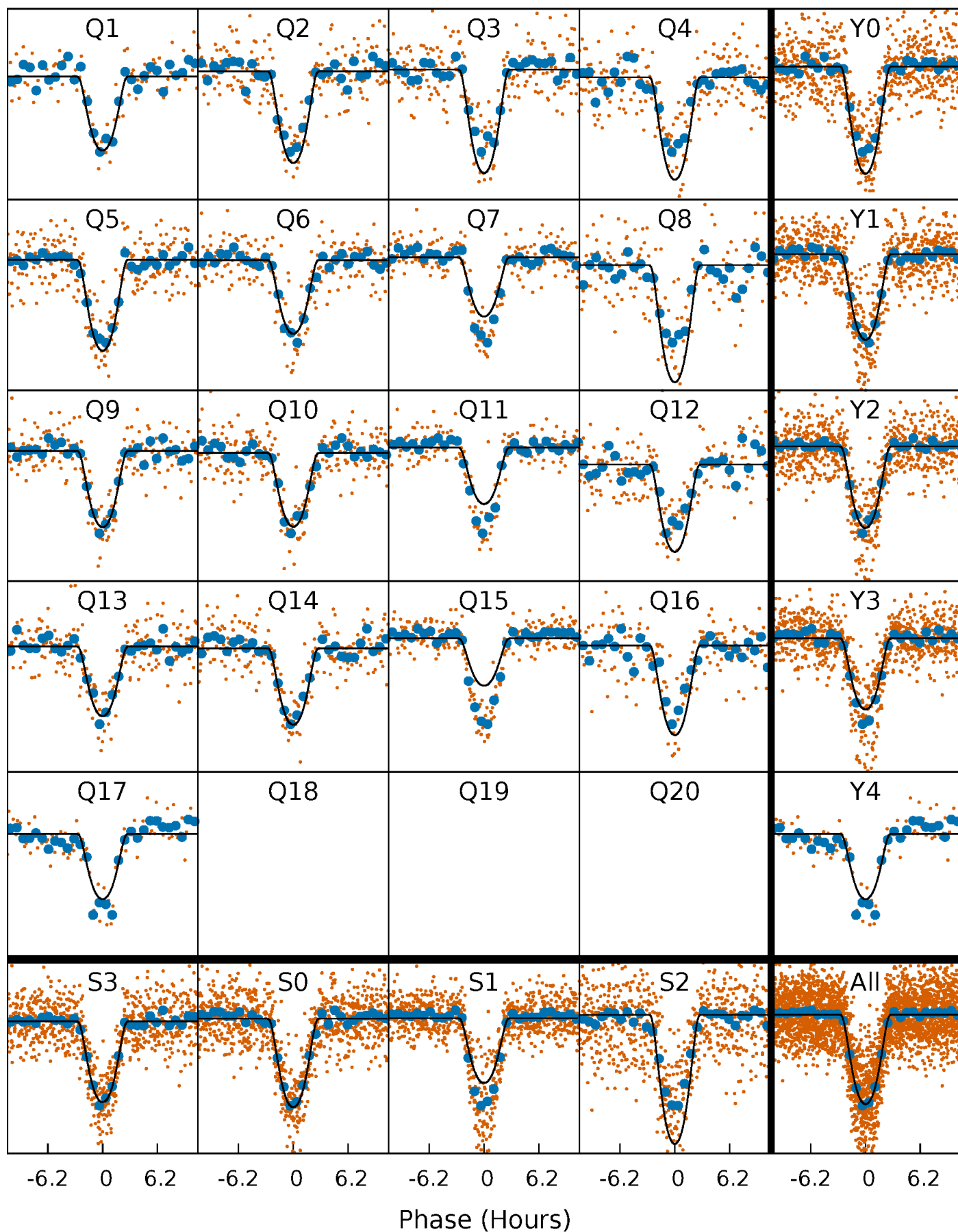
PDC Quarter-Phased Transit Curves

TCE 012316431-01 P= 17.907661 Days $T_0=139.744772$ (BKJD)



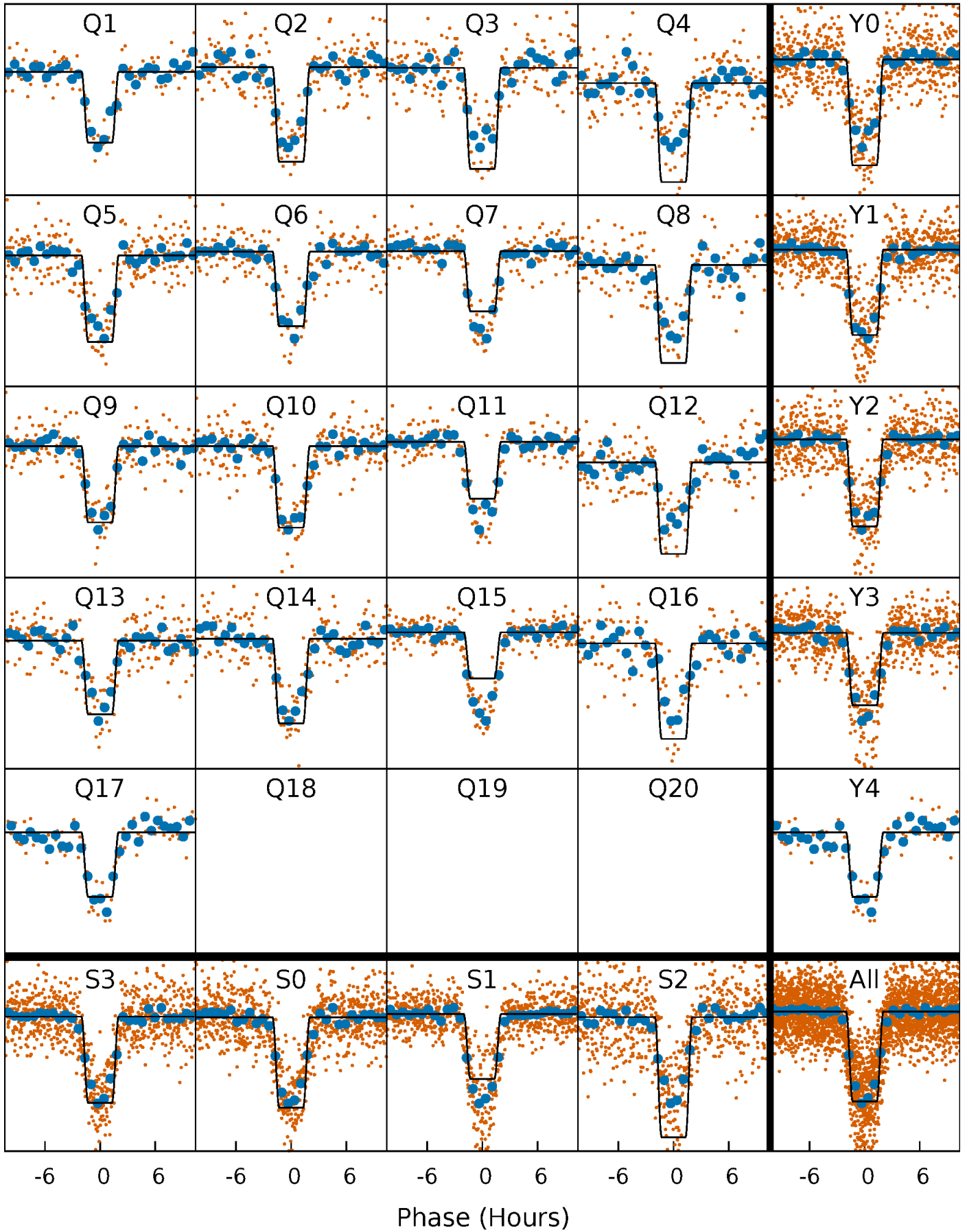
DV Quarter-Phased Transit Curves

TCE 012316431-01 P= 17.907661 Days $T_0=139.744772$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

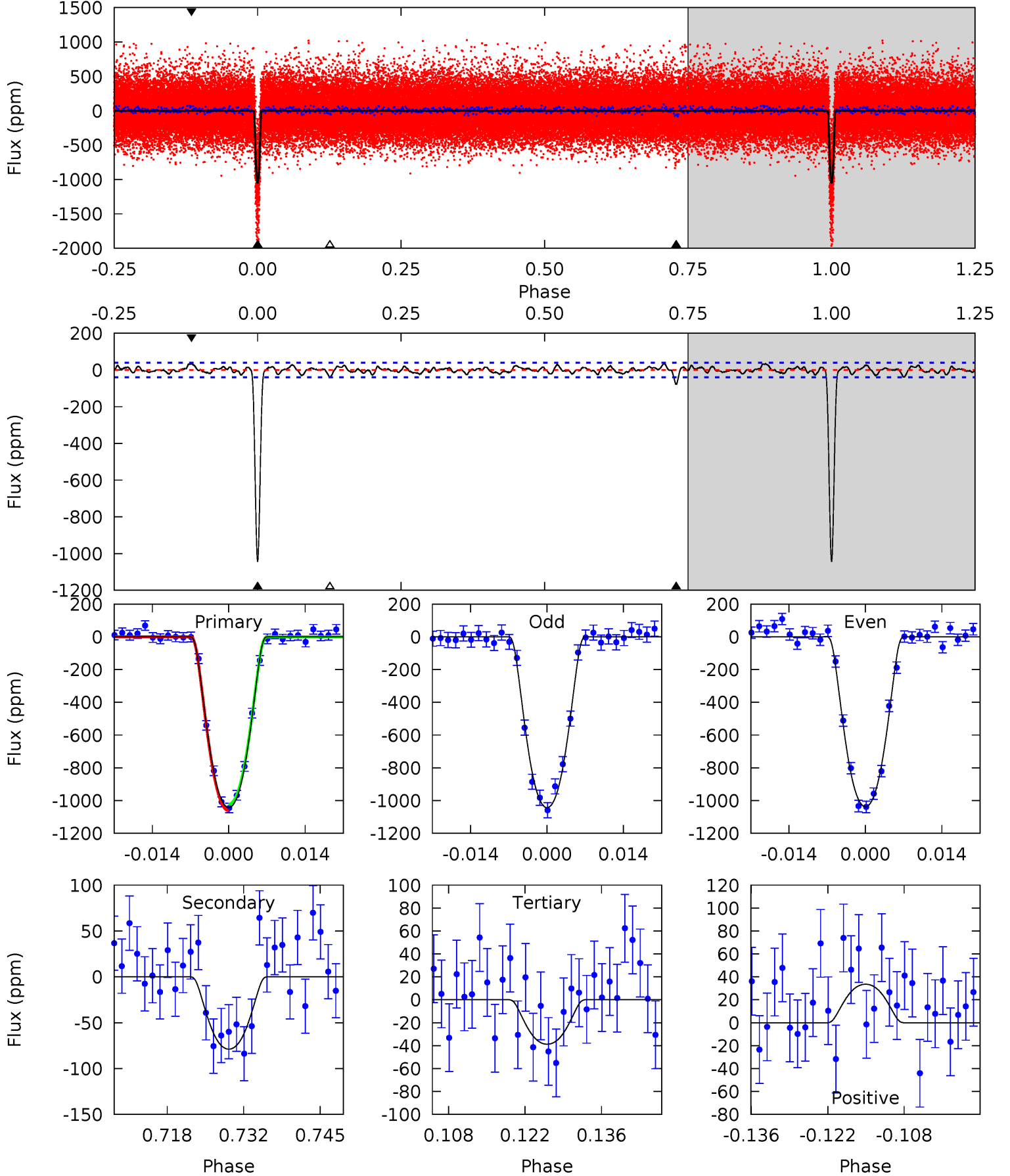
TCE 012316431-01 P= 17.907570 Days $T_0=139.748554$ (BKJD)



DV Model-Shift Uniqueness Test

012316431-01, P = 17.907661 Days, E = 121.837111 Days

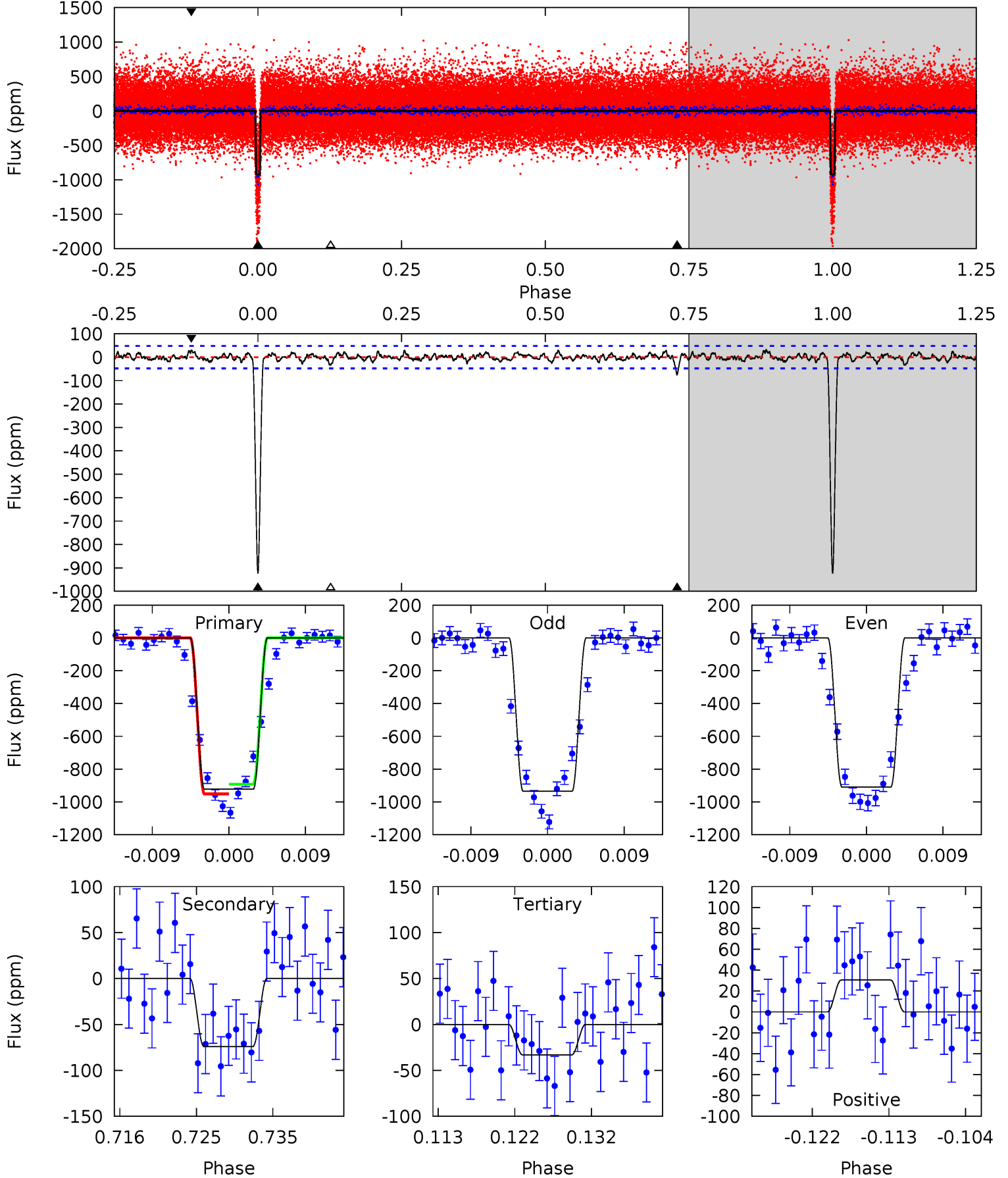
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
130.6	9.88	4.86	4.20	4.97	2.47	1.58	125.7	126.4	5.02	5.68	0.38	1.08	0.03	2.42



Alt Model-Shift Uniqueness Test

012316431-01, P = 17.907570 Days, E = 121.840984 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
97.0	7.78	3.48	3.22	5.04	2.60	1.09	93.5	93.7	4.30	4.57	1.33	1.07	0.03	3.08



Stellar Parameters For KIC 012316431

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6153^{+165}_{-202}	$4.471^{+0.054}_{-0.216}$	$-0.140^{+0.250}_{-0.350}$	$0.993^{+0.324}_{-0.108}$	$1.065^{+0.139}_{-0.139}$	$1.531^{+0.433}_{-0.844}$
	+3%/-3%	+1%/-5%	+179%/-250%	+33%/-11%	+13%/-13%	+28%/-55%
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 012316431-01 / KOI 0485.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-79 ± 8	$4.48^{+0.73}_{-0.53}$	1048^{+73}_{-52}	3417^{+120}_{-107}	39^{+11}_{-10}
Alt.	-74 ± 10	$3.74^{+0.71}_{-0.52}$	1046^{+82}_{-54}	3587^{+155}_{-141}	53^{+18}_{-15}

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 $A_{obs} \gg 1.0$

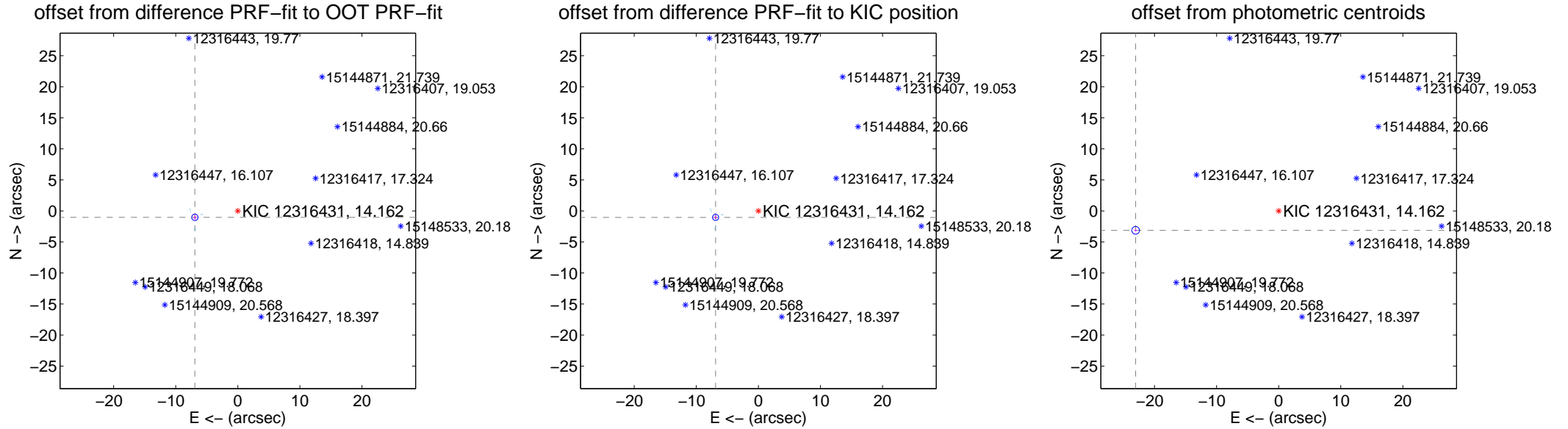
DV Centroid Data

Supplemental centroid analysis for 012316431-01. Kepler magnitude: 14.16. Transit SNR 69.96

There are 17 quarters with good PRF difference image offsets

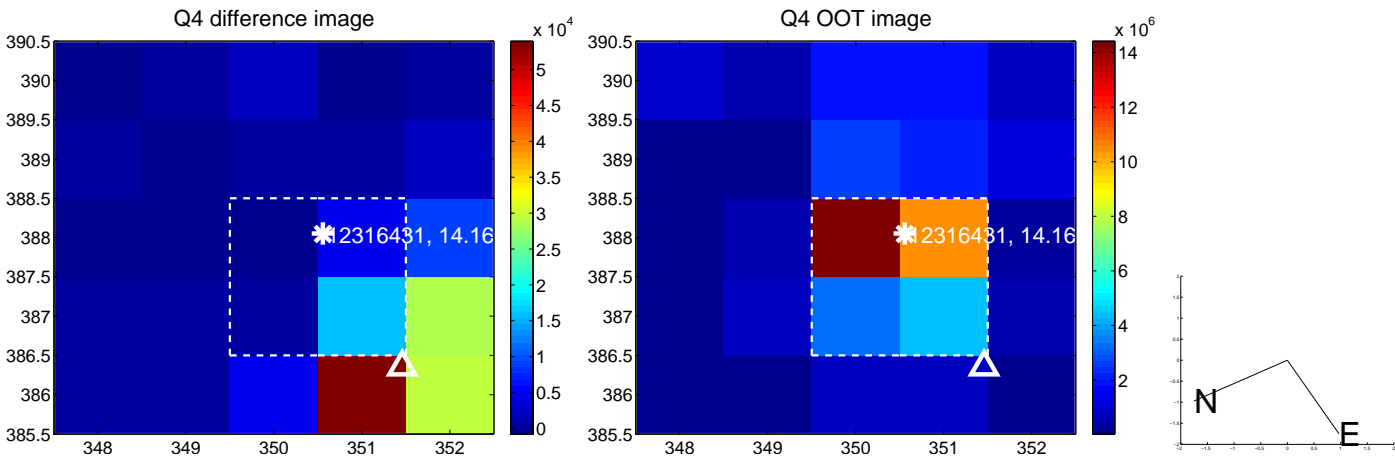
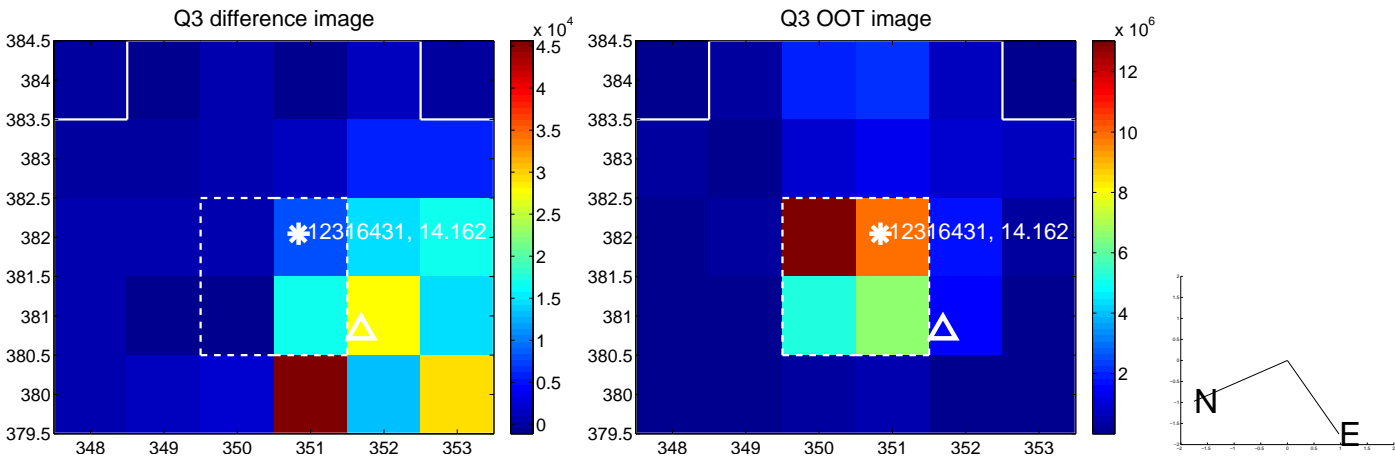
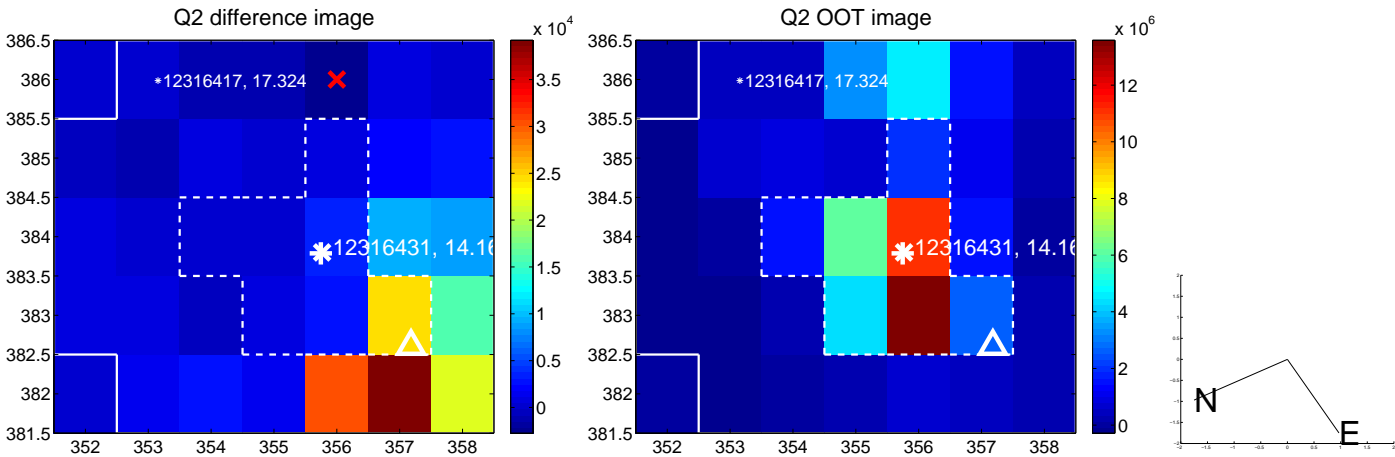
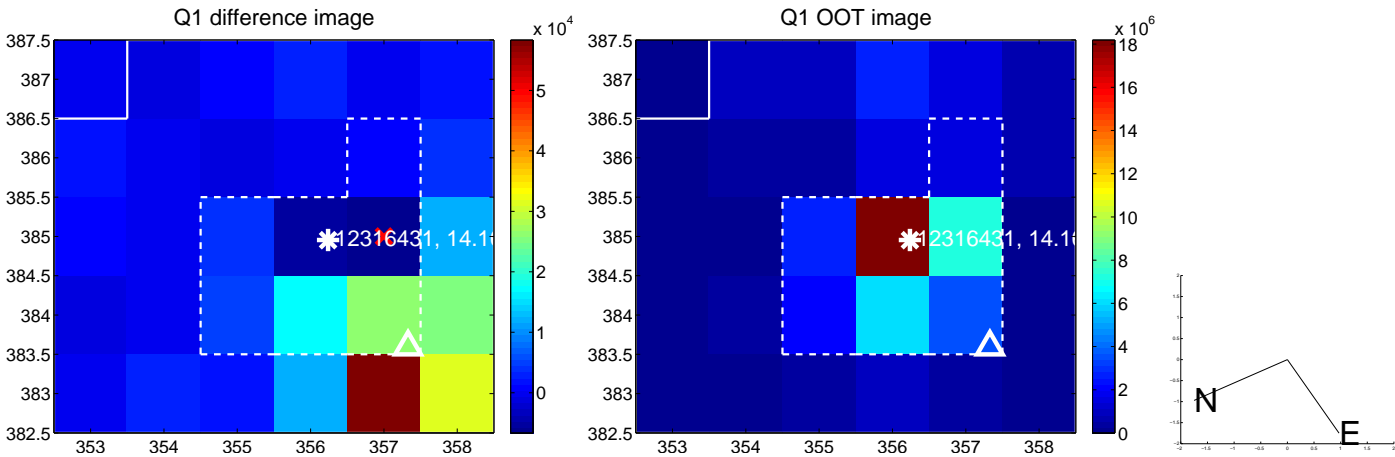
The direct PRF centroid is offset from the target star catalog position by about 0.01 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	6.992 ± 0.172	40.66	6.914 ± 0.167	-1.042 ± 0.317
PRF-fit source offset from KIC position	6.967 ± 0.165	42.17	6.888 ± 0.167	-1.047 ± 0.262
photometric centroid source offset	23.25 ± 0.21	112.90	23.04 ± 0.21	-3.13 ± 0.19

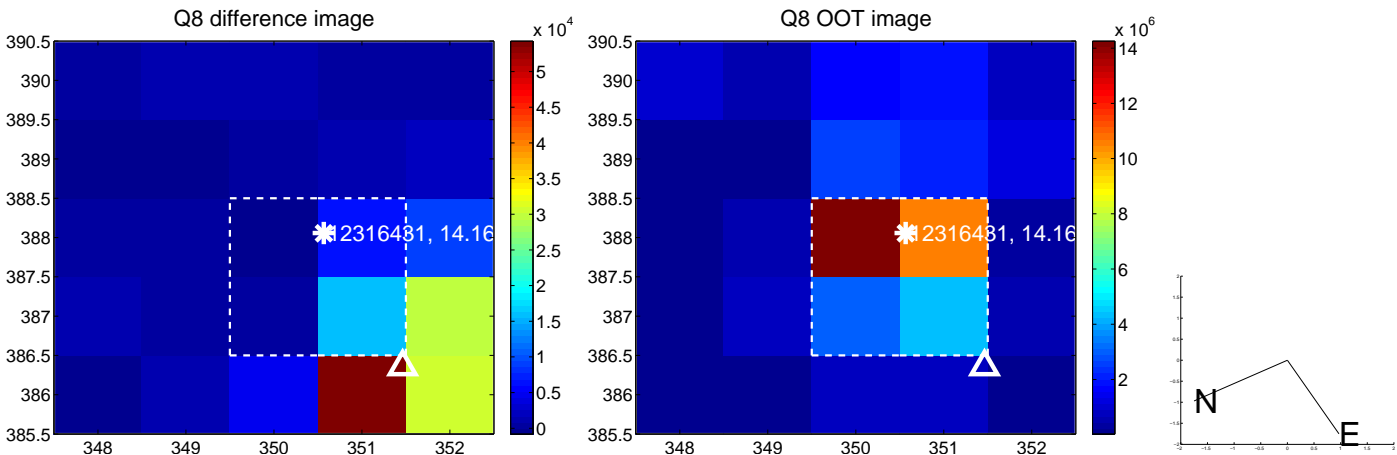
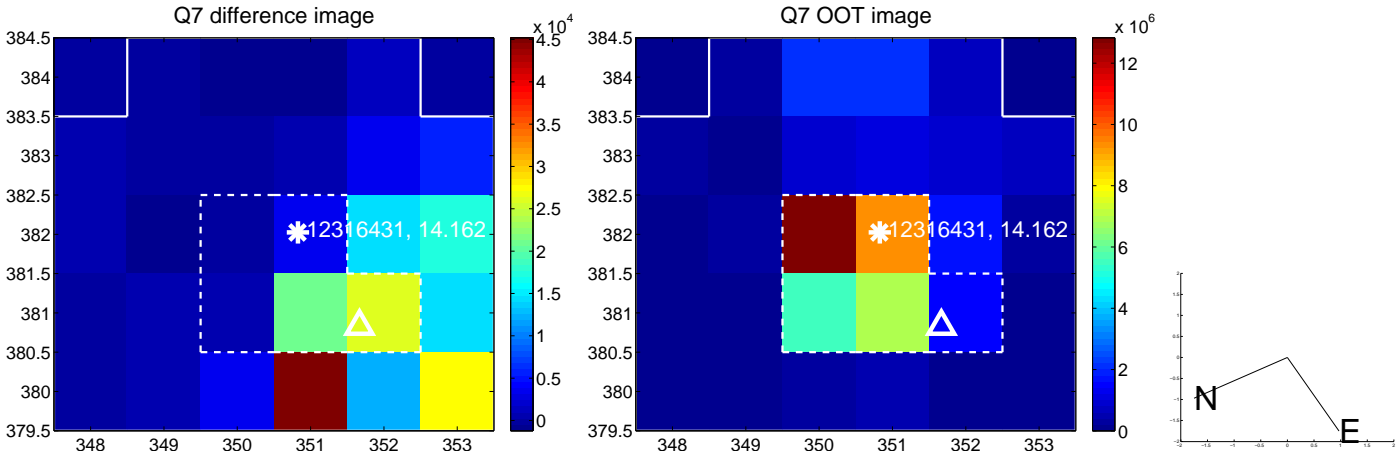
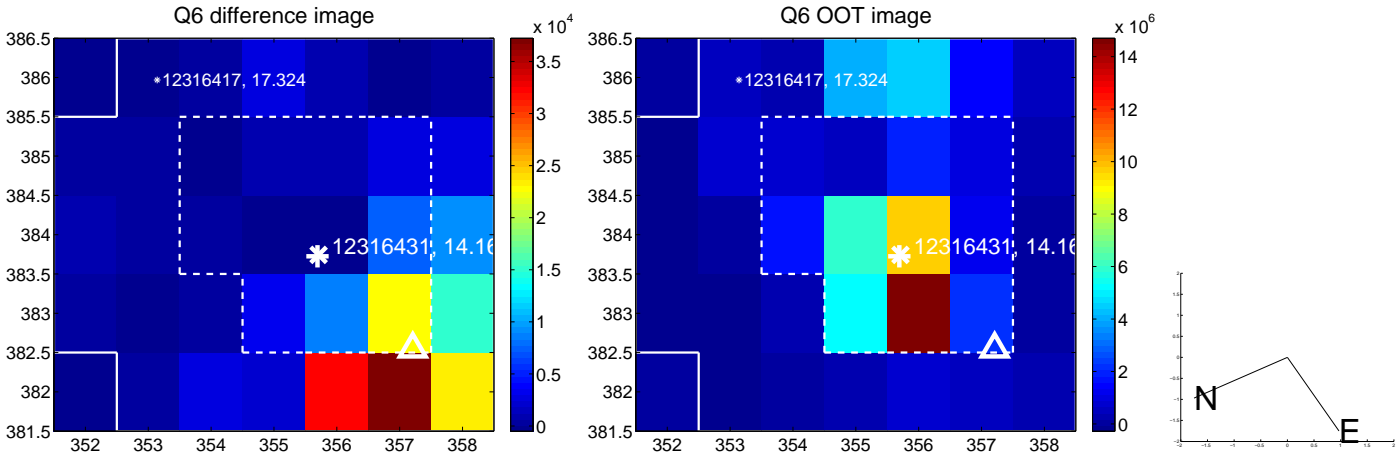
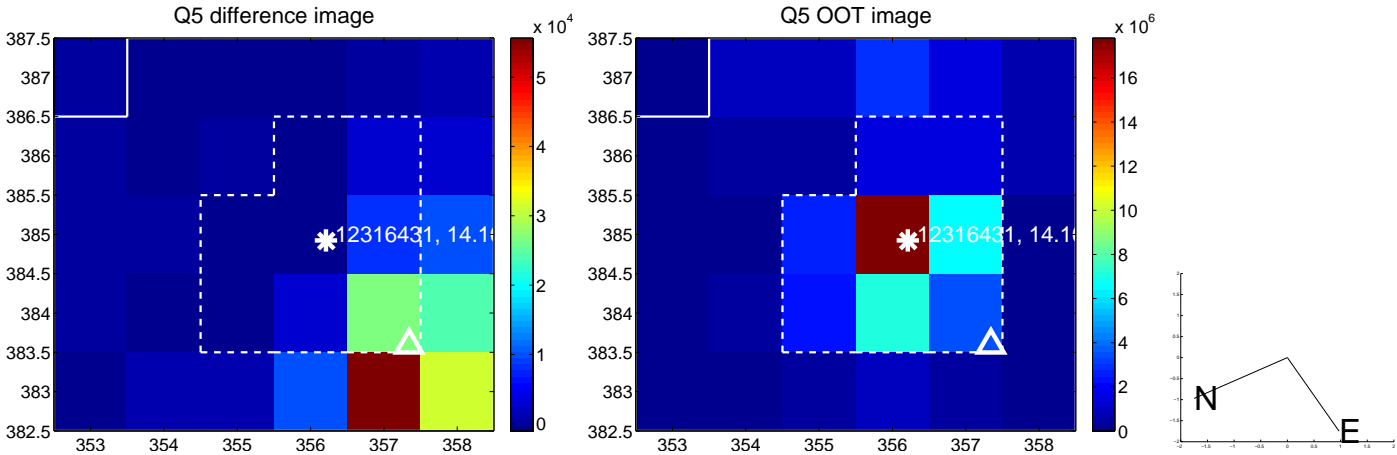


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

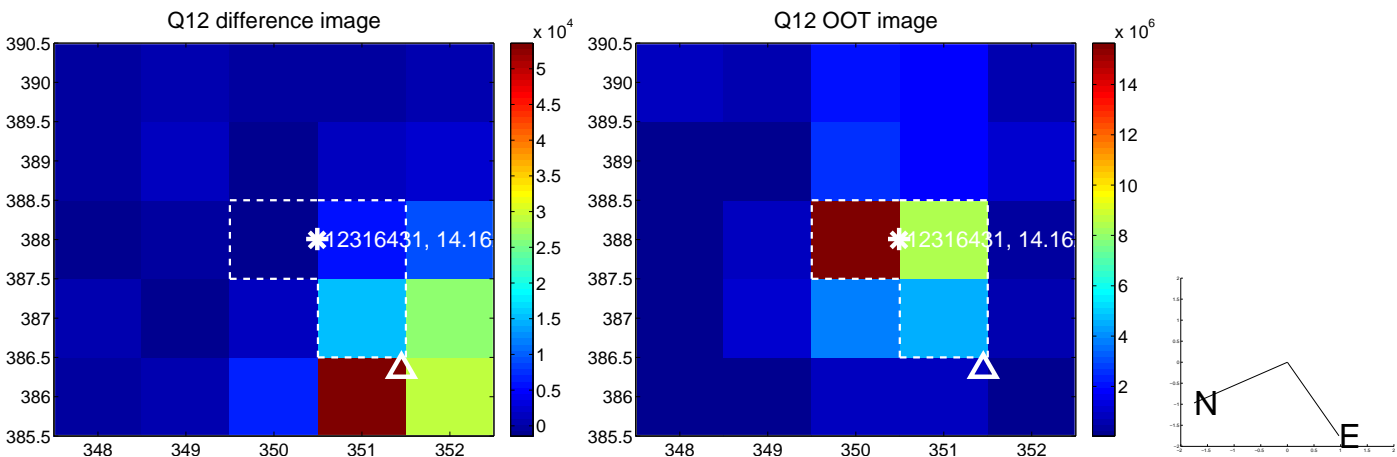
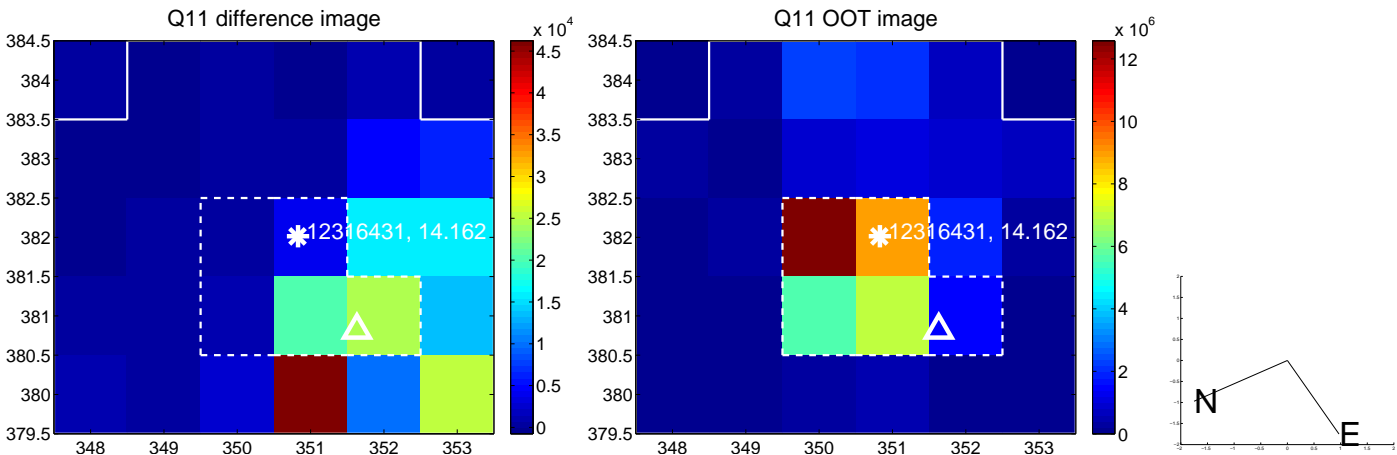
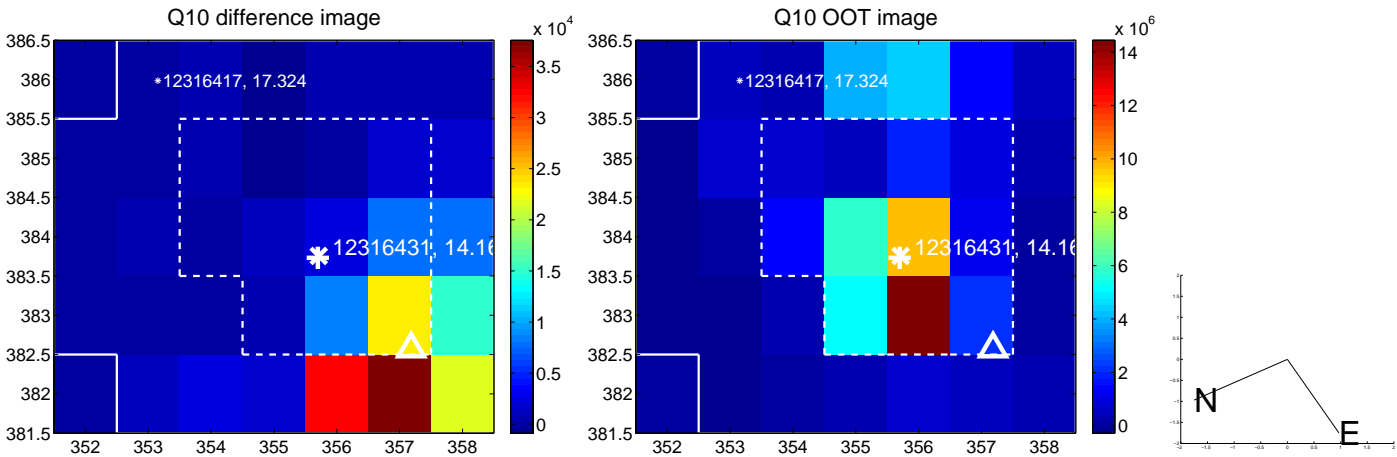
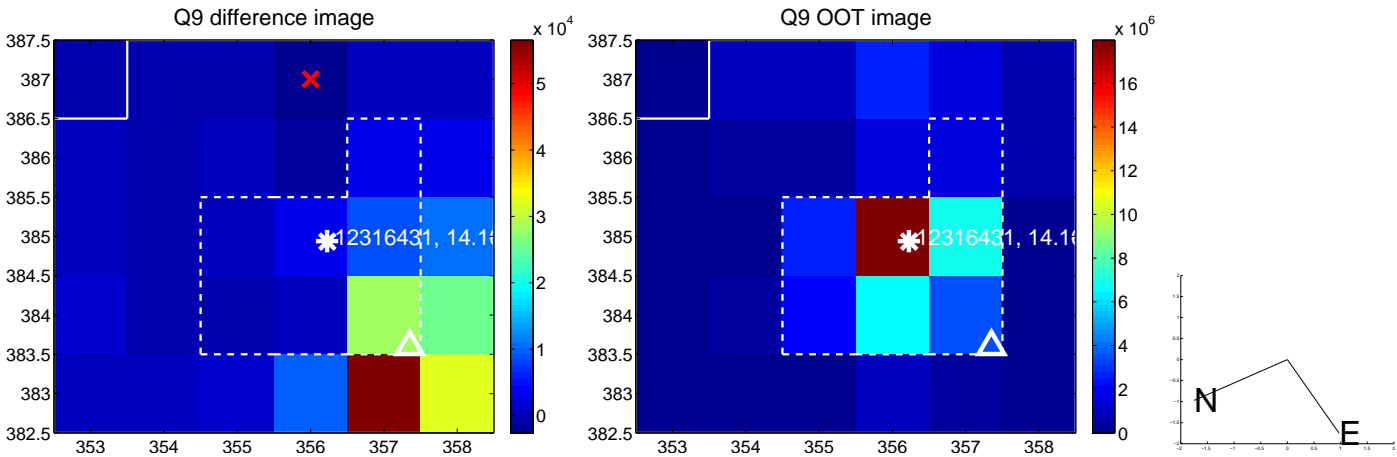
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



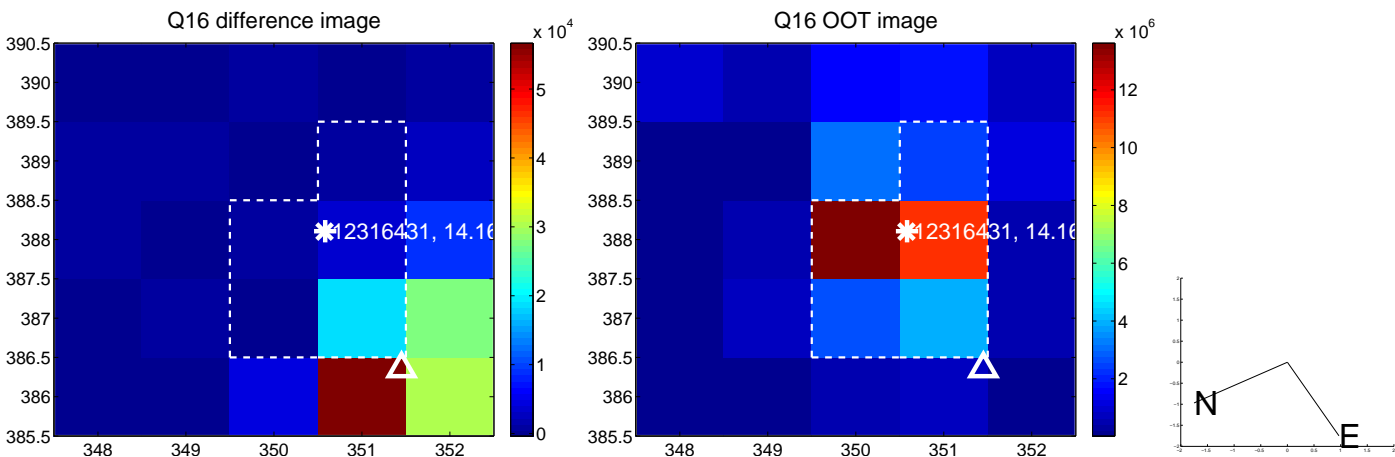
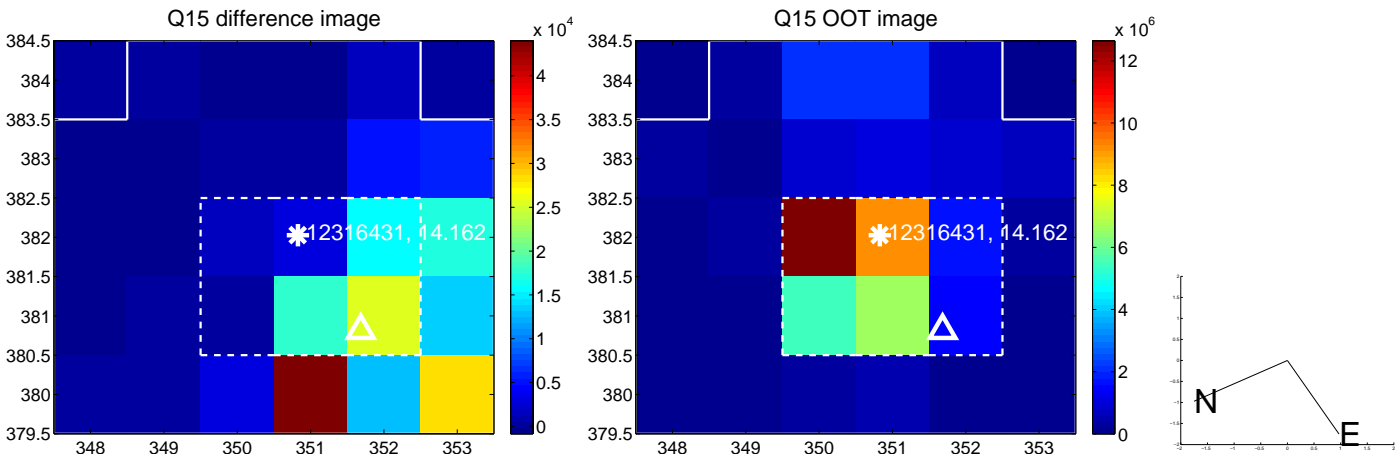
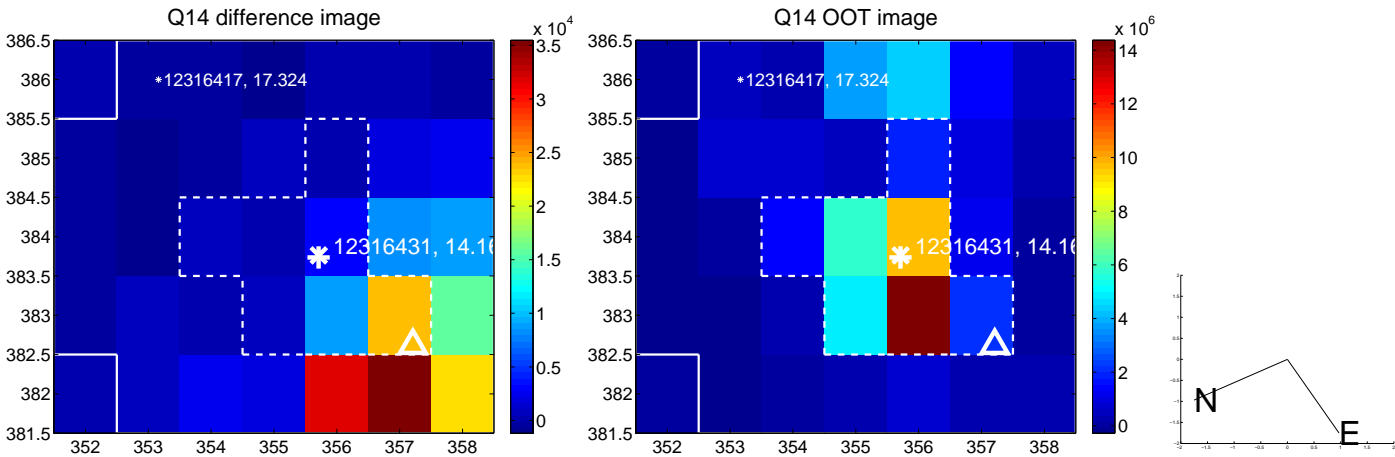
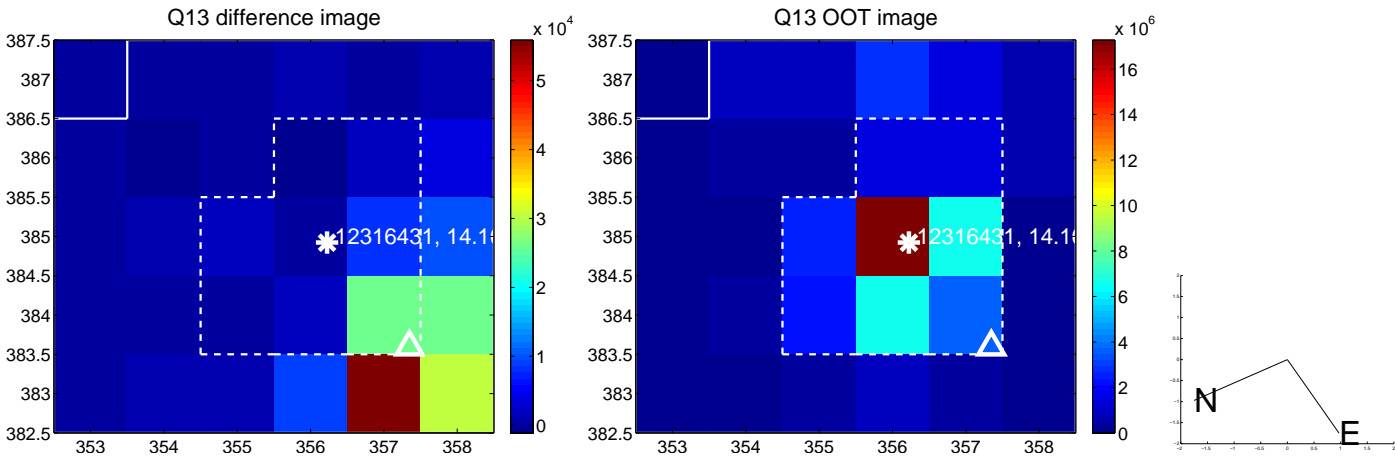
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



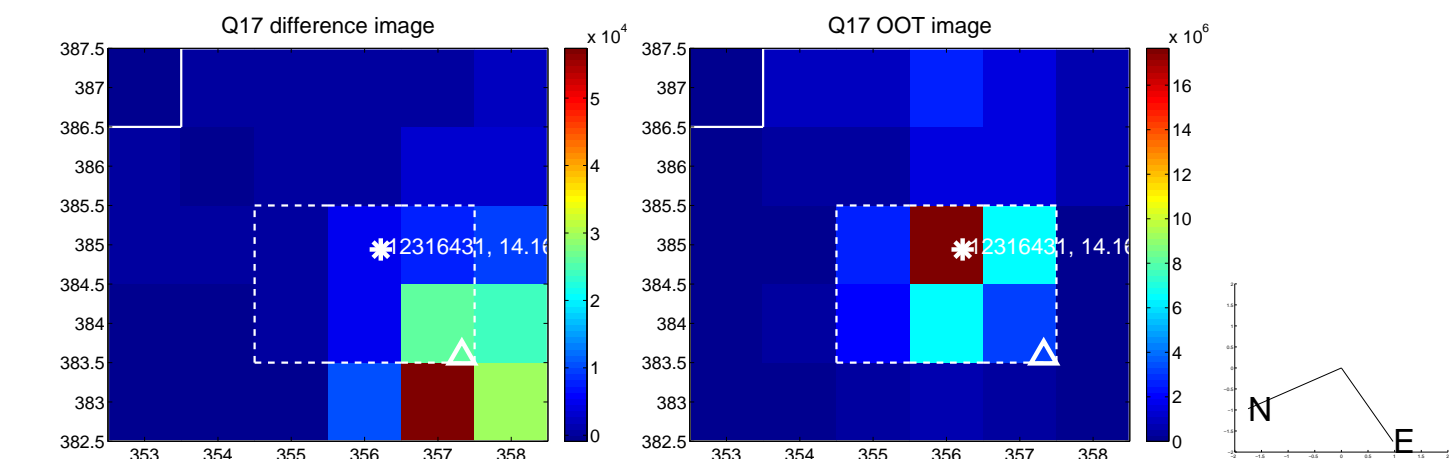
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



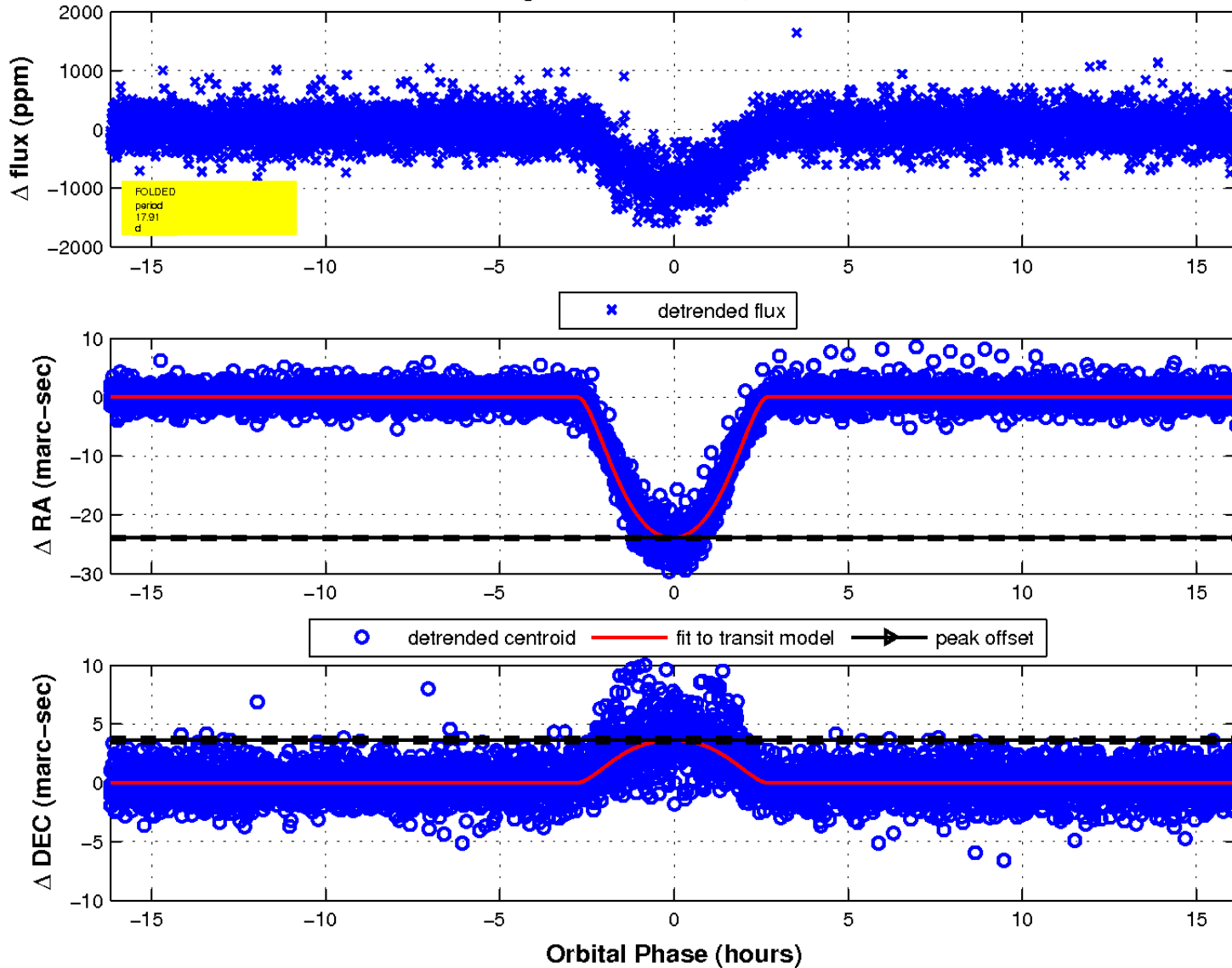
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

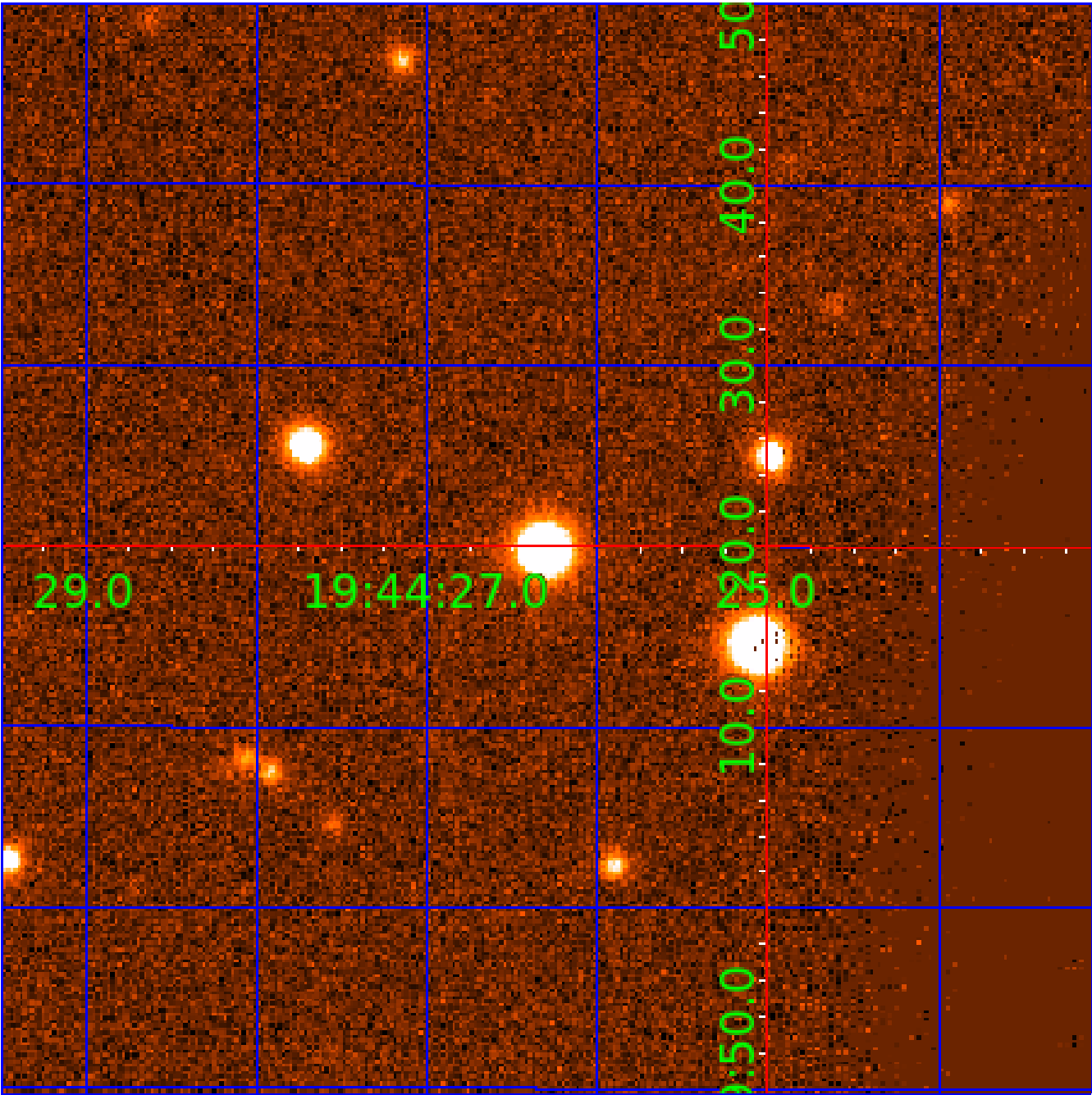


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



KIC 012316431

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})
012316431-01	OBS	0485.01	17.907661	139.744772	1039.7	5.395	75.2	70.0	0.99	6153	4.31	67.69
012316431-02	OBS	No	17.907094	134.925785	101.6	3.606	7.5	7.4	0.99	6153	1.18	67.69

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012316431-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
012316431-02	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 012316431-02

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
012316431-02	12316431	012316447-02	12316447	1:1	14.4	4	0	16.11	14.17	229.65	Direct-PRF	0	0.98	0.78

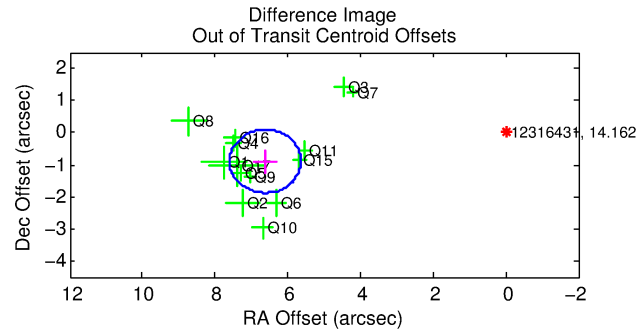
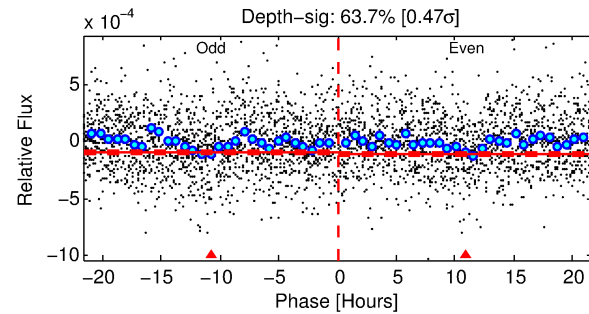
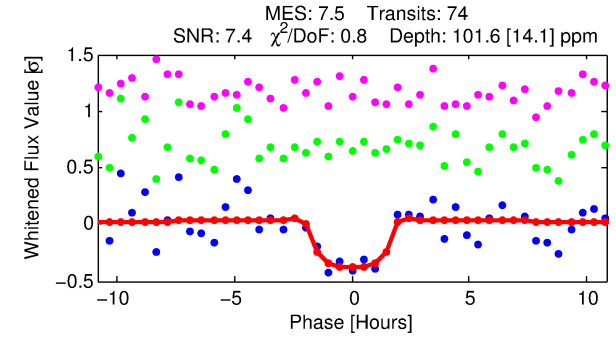
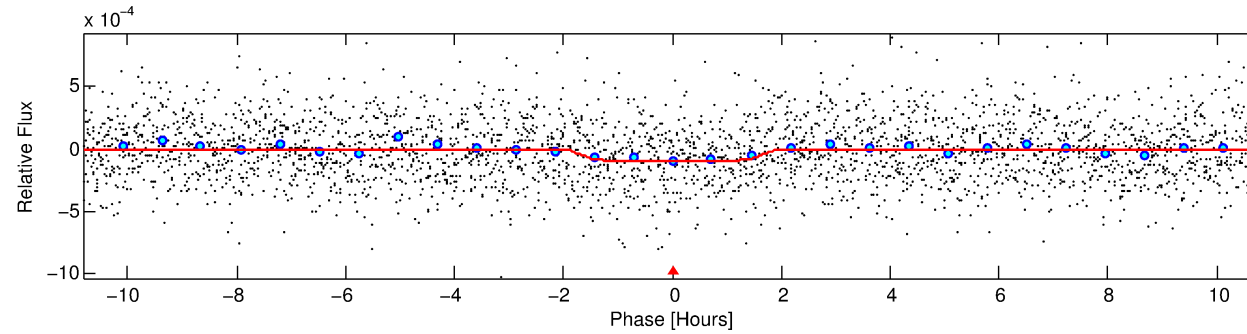
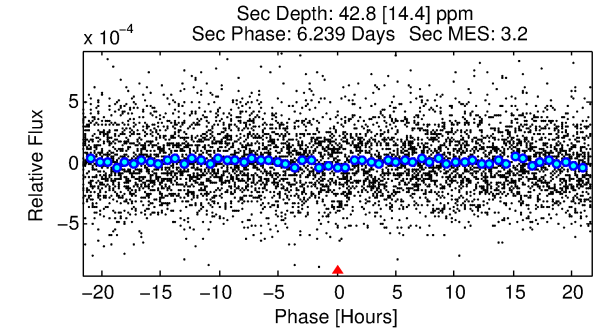
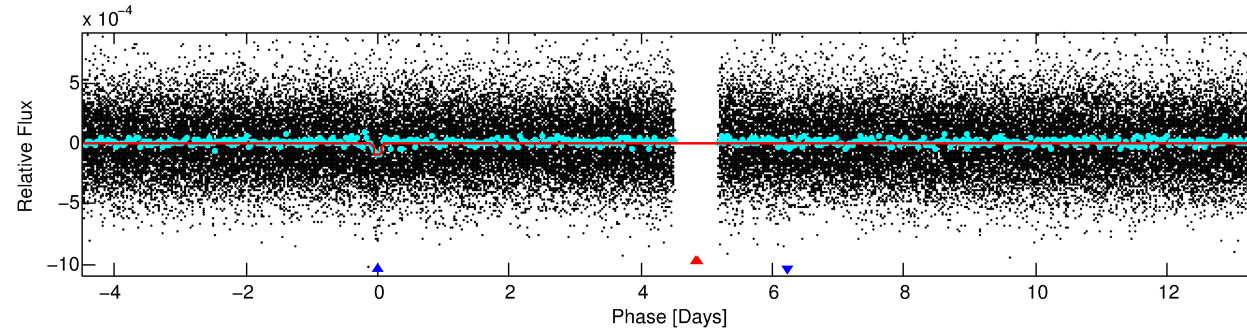
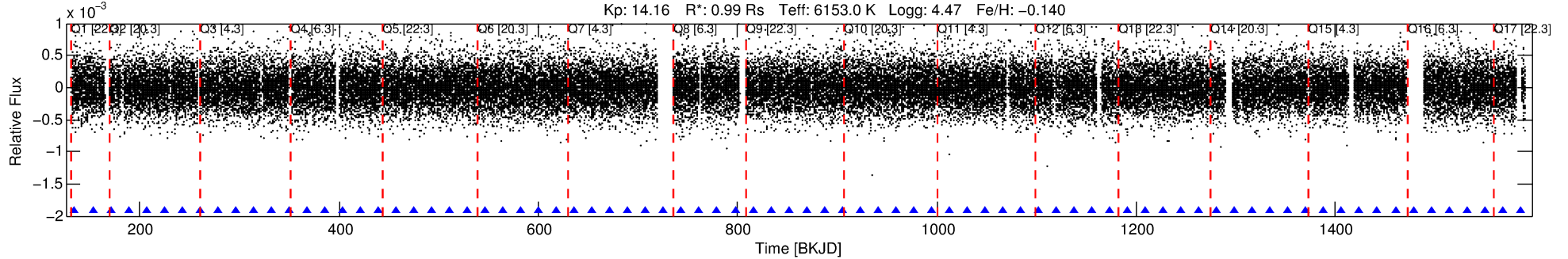
Notes: $P_1:P_2$ is the period ratio. Dist is the distance in arcseconds. Δ Row and Δ Col are the number of pixels apart in row and column. m_2 and m_1 are the magnitudes of the parent and child. D_2/D_1 is the parent's transit depth divided by the child's. σ_P and σ_T are the significance of the match 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: 12316431 Candidate: 2 of 2 Period: 17.907 d

KOI: K00485 Corr: No Ephemeris Match

Kp: 14.16 R*: 0.99 Rs Teff: 6153.0 K Logg: 4.47 Fe/H: -0.140



DV Fit Results:

Period = 17.90709 [0.00022] d
Epoch = 134.9258 [0.0105] BKJD
Rp/R* = 0.0109 [0.0078]
a/R* = 17.45 [67.23]
b = 0.90 [0.82]
Seff = 67.69 [28.28]
Teq = 731 [76] K
Rp = 1.18 [0.93] Re
a = 0.1368 [0.0374] AU
Ag = 318.12 [487.11] [0.65σ]
Teffp = 4776 [1773] K [2.28σ]

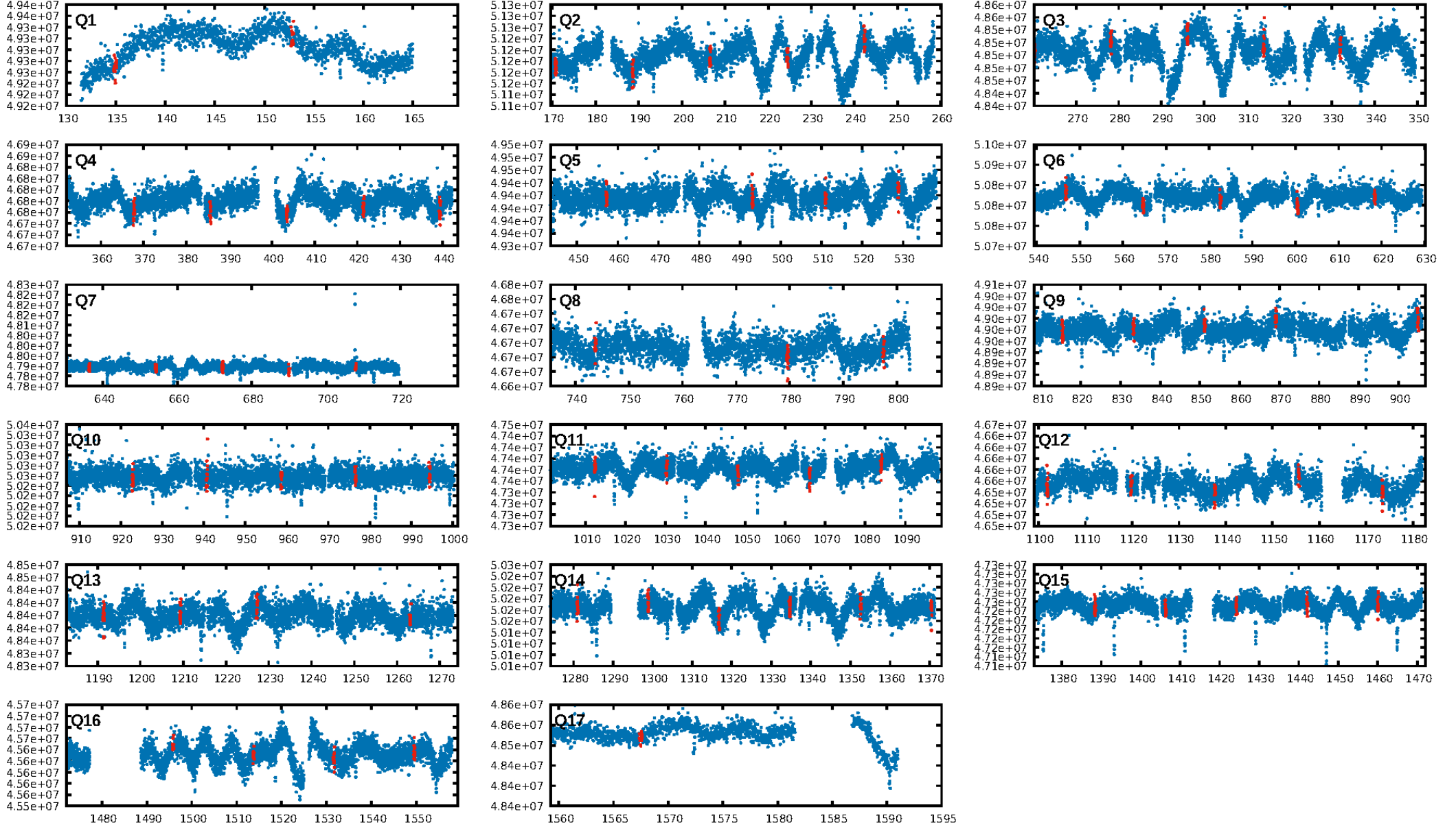
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.2% [0.00σ]
ModelChiSquare2-sig: 96.1%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 8.01e-14
RollingBand-fgt: 1.00 [71/71]
GhostDiagnostic-chr: -0.318
Centroid-sig: 0.0%
Centroid-so: 19.486 arcsec [9.69σ]
OotOffset-rm: 6.687 arcsec [20.37σ]
KicOffset-rm: 6.690 arcsec [19.22σ]
OotOffset-st: 3/4/3/4 [14]
KicOffset-st: 3/4/3/4 [14]
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DiffImageOverlap-fno: 1.00 [17/17]

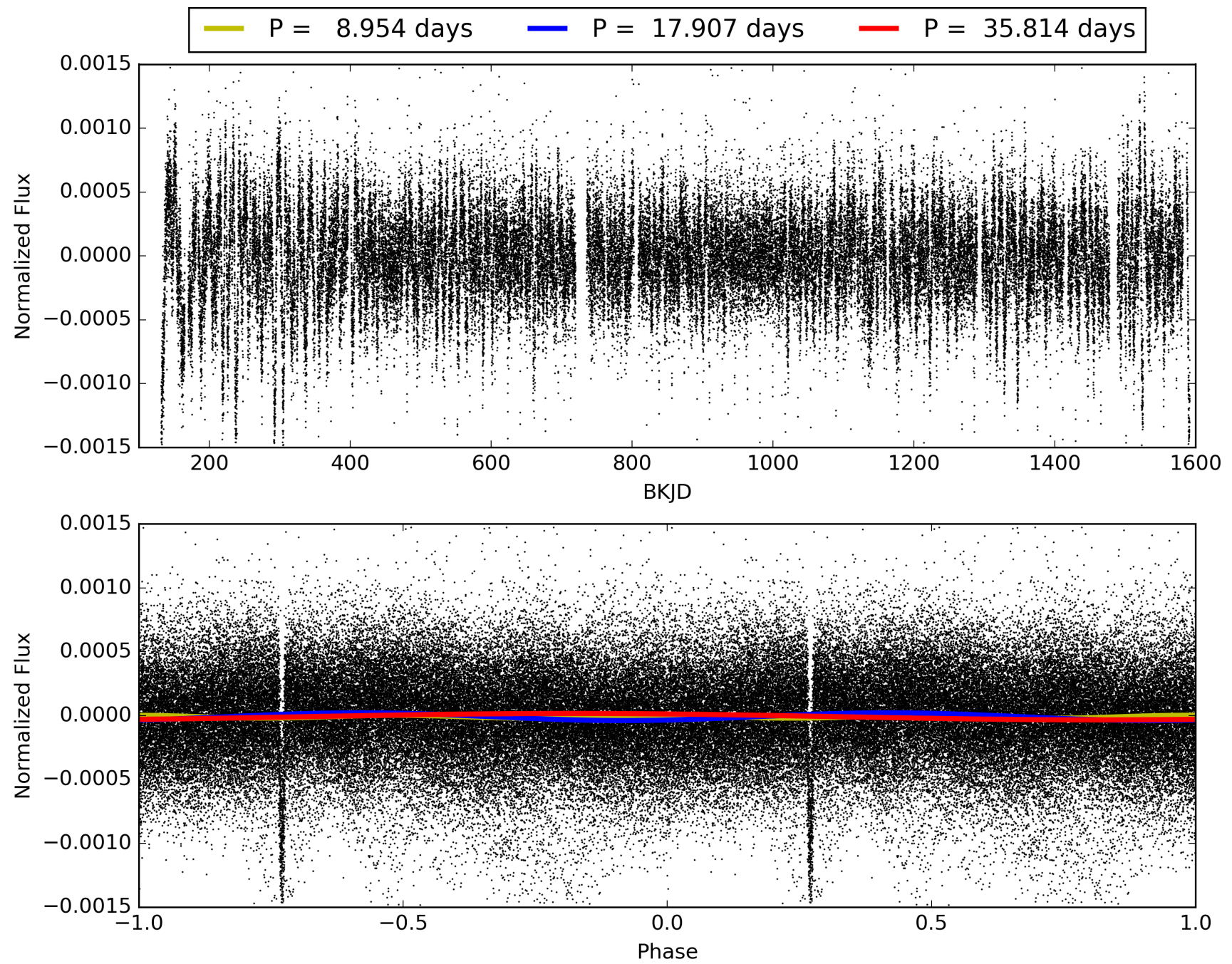
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

TCE 012316431-02, PDC Light Curves

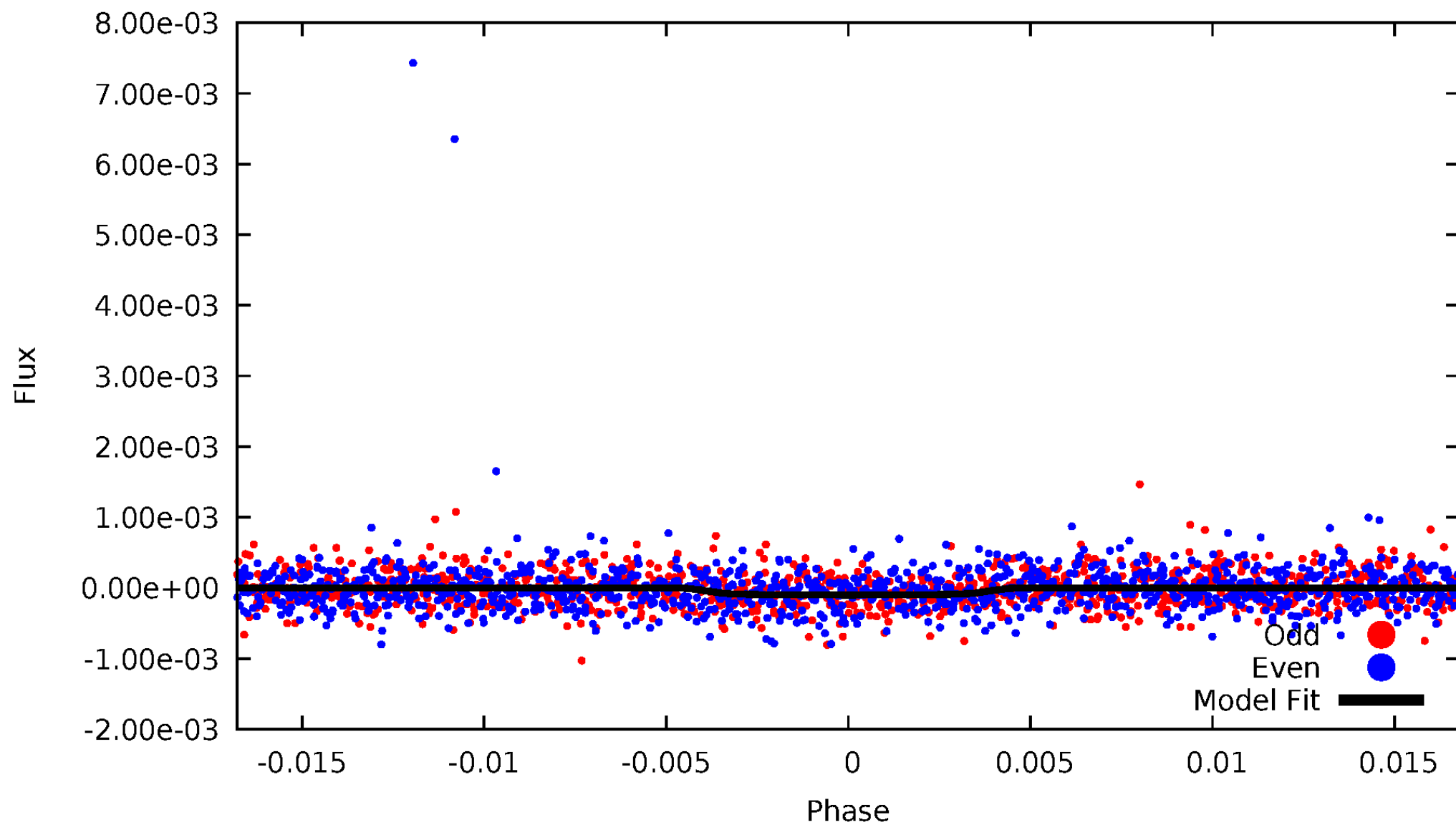


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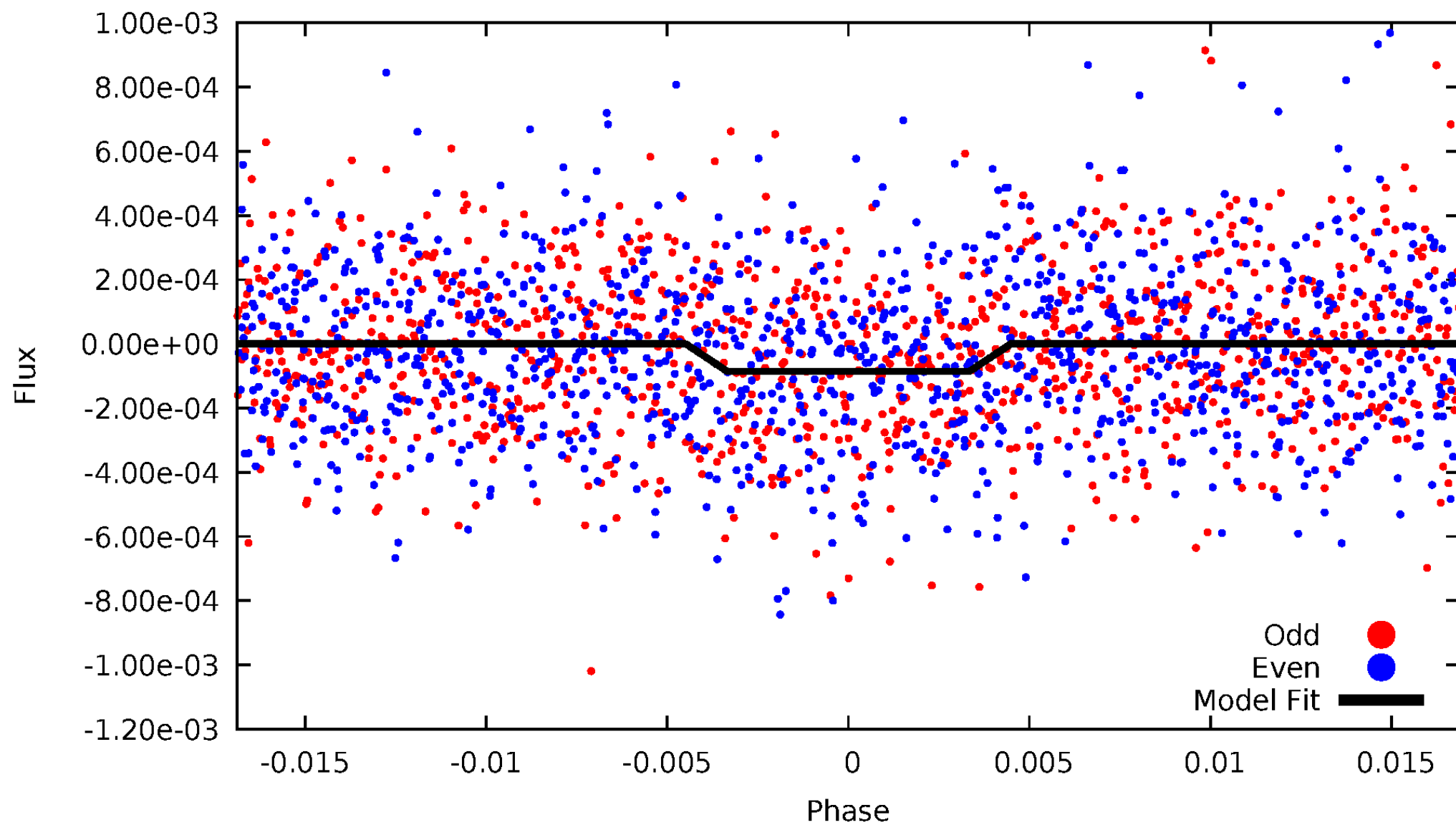
DV Odd/Even

TCE 012316431-02



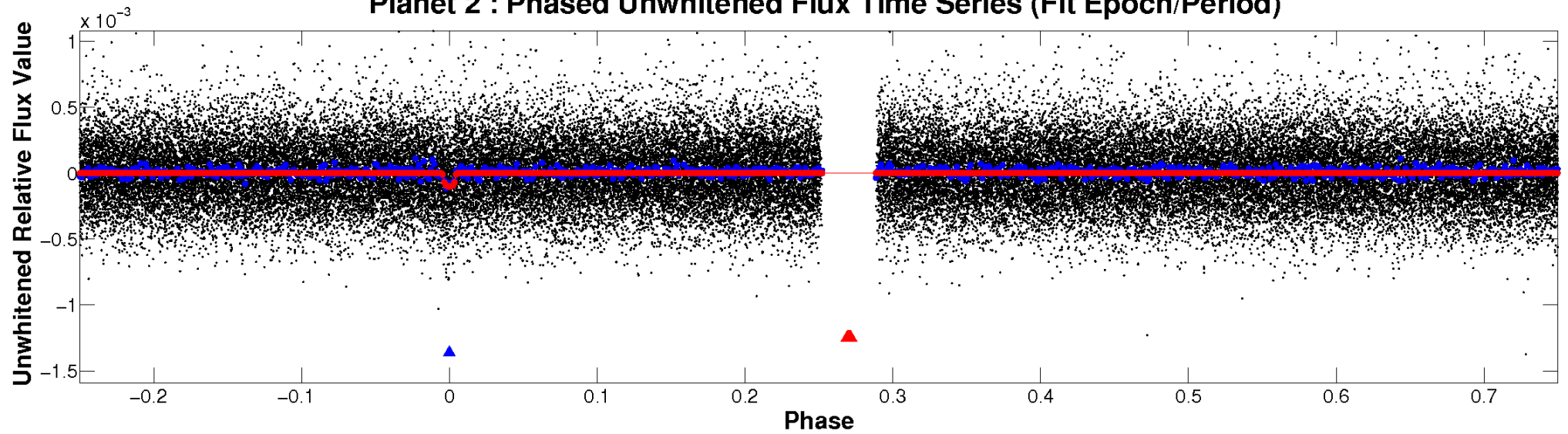
ALT Odd/Even

TCE 012316431-02

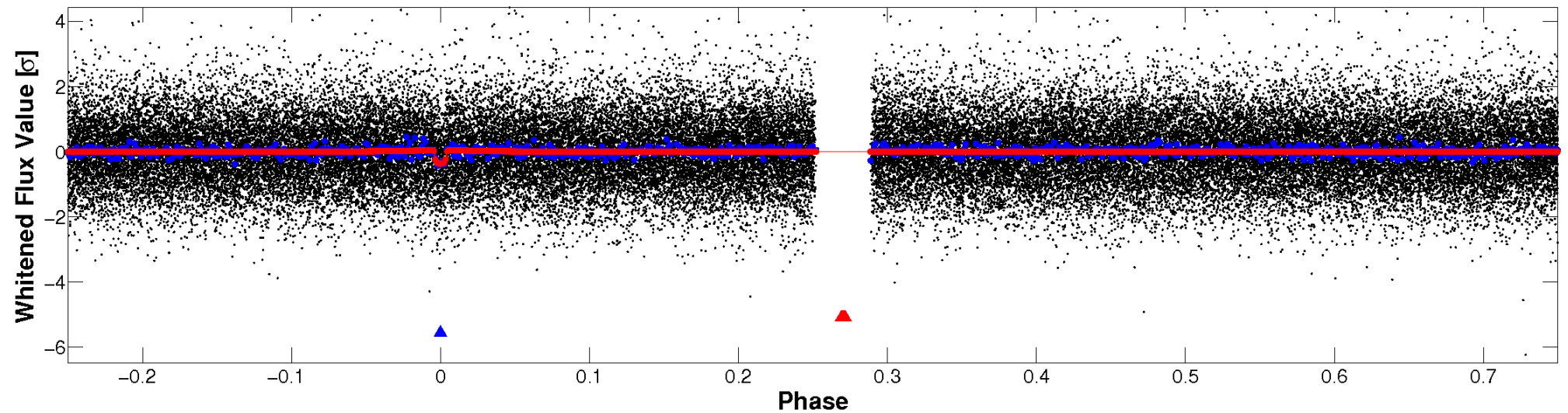


Non-Whitened Vs. Whitened Light Curve

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

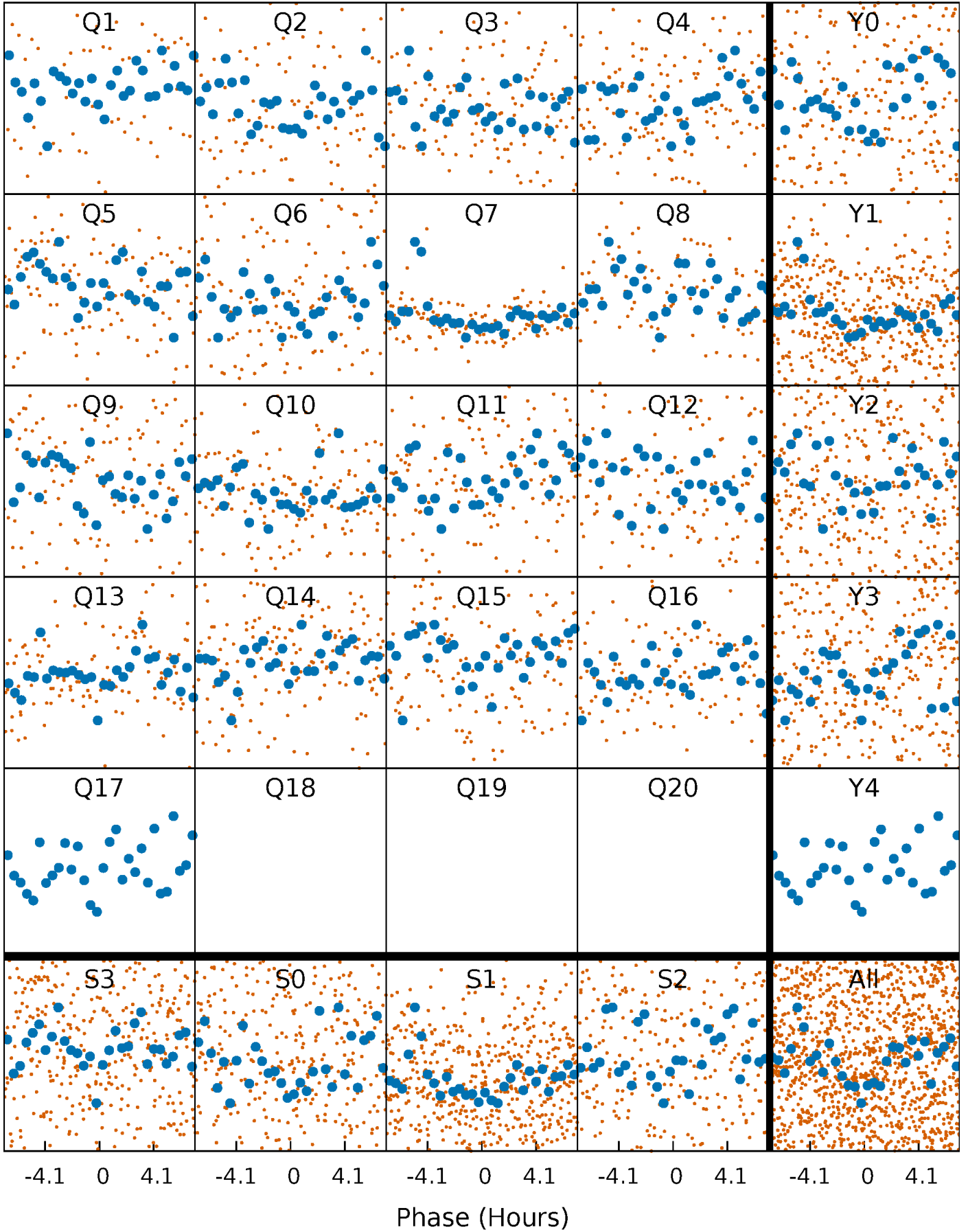


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



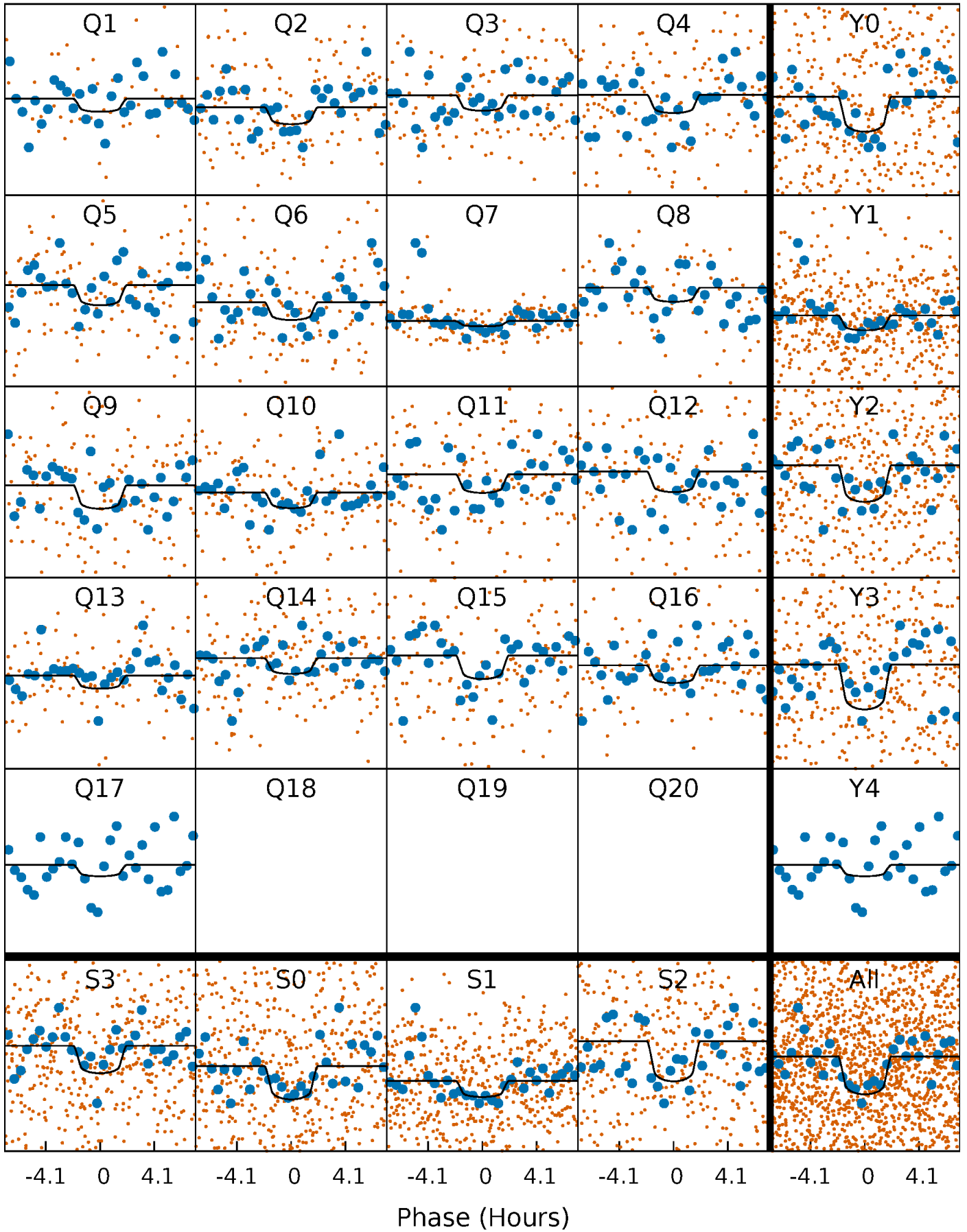
PDC Quarter-Phased Transit Curves

TCE 012316431-02 $P = 17.907094$ Days $T_0 = 134.925785$ (BKJD)



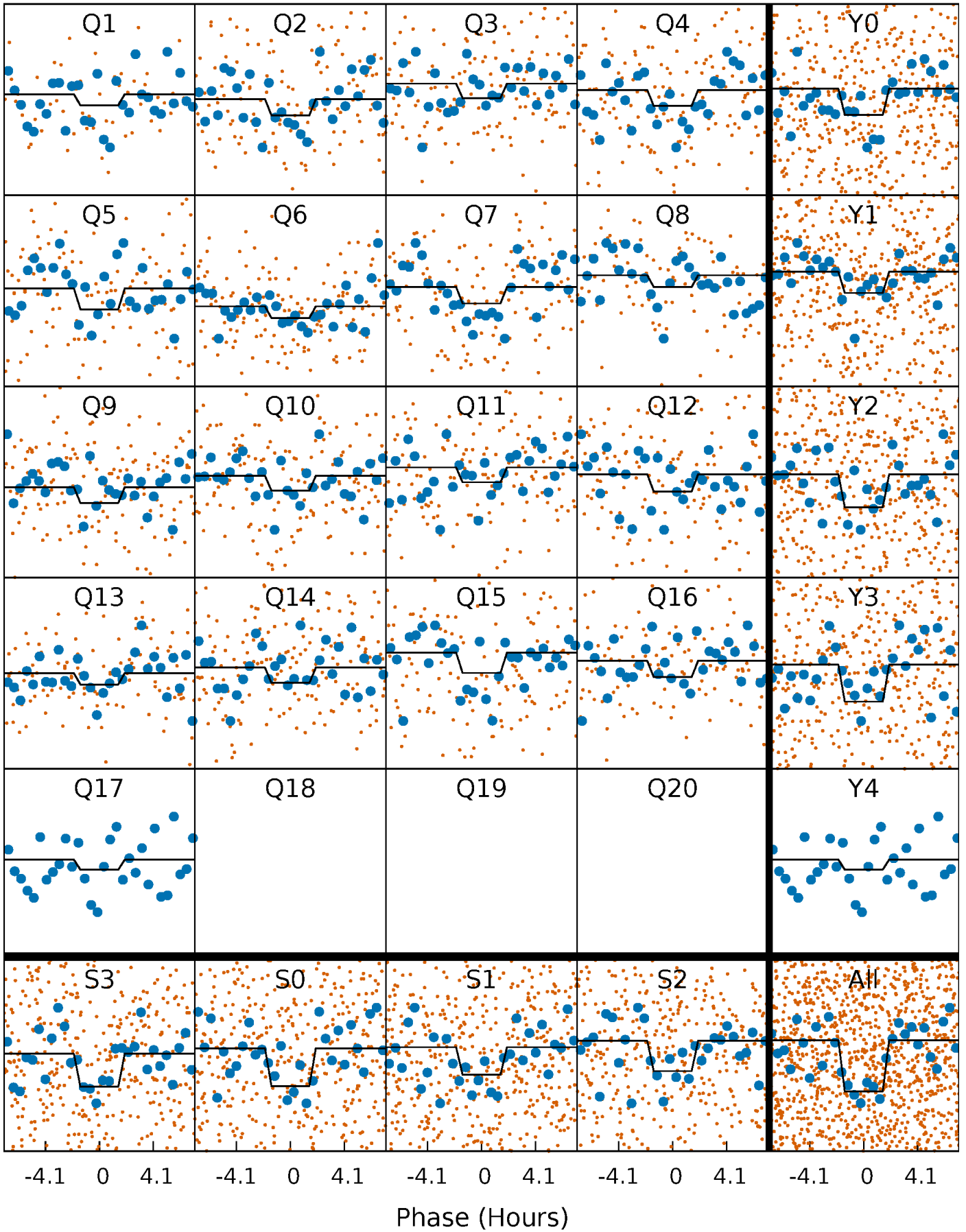
DV Quarter-Phased Transit Curves

TCE 012316431-02 P= 17.907094 Days $T_0=134.925785$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

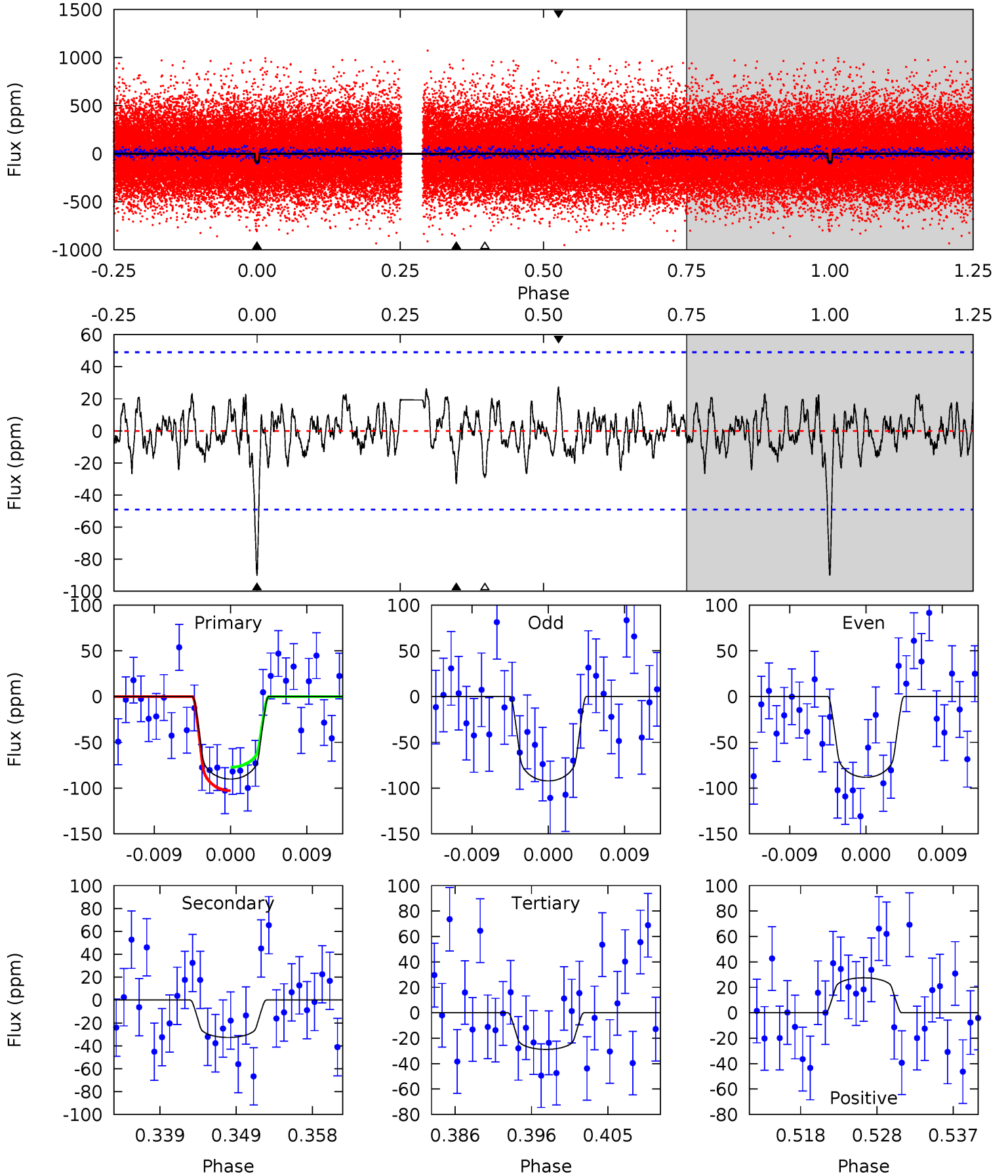
TCE 012316431-02 P= 17.907214 Days $T_0=134.915997$ (BKJD)



DV Model-Shift Uniqueness Test

012316431-02, $P = 17.907094$ Days, $E = 117.018691$ Days

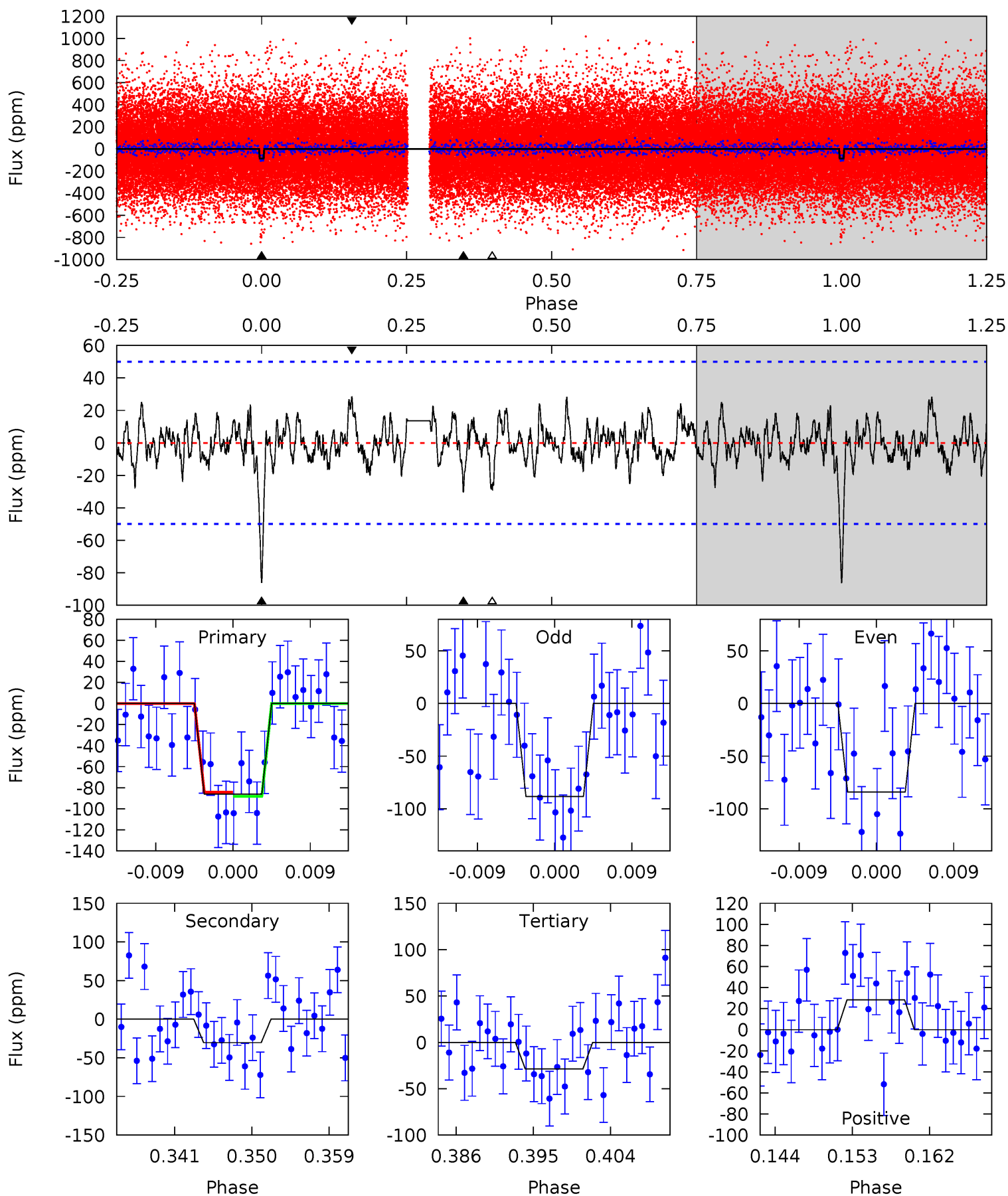
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.25	3.36	2.96	2.82	5.04	2.60	1.04	6.30	6.43	0.40	0.54	0.20	0.90	0.23	1.32



Alt Model-Shift Uniqueness Test

012316431-02, P = 17.907214 Days, E = 117.008783 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.70	3.07	2.91	2.87	5.05	2.61	1.00	5.80	5.83	0.16	0.20	0.21	0.77	0.25	0.20



Stellar Parameters For KIC 012316431

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	6153^{+165}_{-202}	$4.471^{+0.054}_{-0.216}$	$-0.140^{+0.250}_{-0.350}$	$0.993^{+0.324}_{-0.108}$	$1.065^{+0.139}_{-0.139}$	$1.531^{+0.433}_{-0.844}$
	+3%/-3%	+1%/-5%	+179%/-250%	+33%/-11%	+13%/-13%	+28%/-55%
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 012316431-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	A_{obs}
DV	-33 ± 10	$1.36^{+0.81}_{-0.76}$	1045^{+76}_{-54}	4462^{+1949}_{-757}	177^{+724}_{-114}
Alt.	-30 ± 10	$1.22^{+0.79}_{-0.75}$	1042^{+79}_{-49}	4607^{+2491}_{-820}	214^{+1180}_{-141}

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

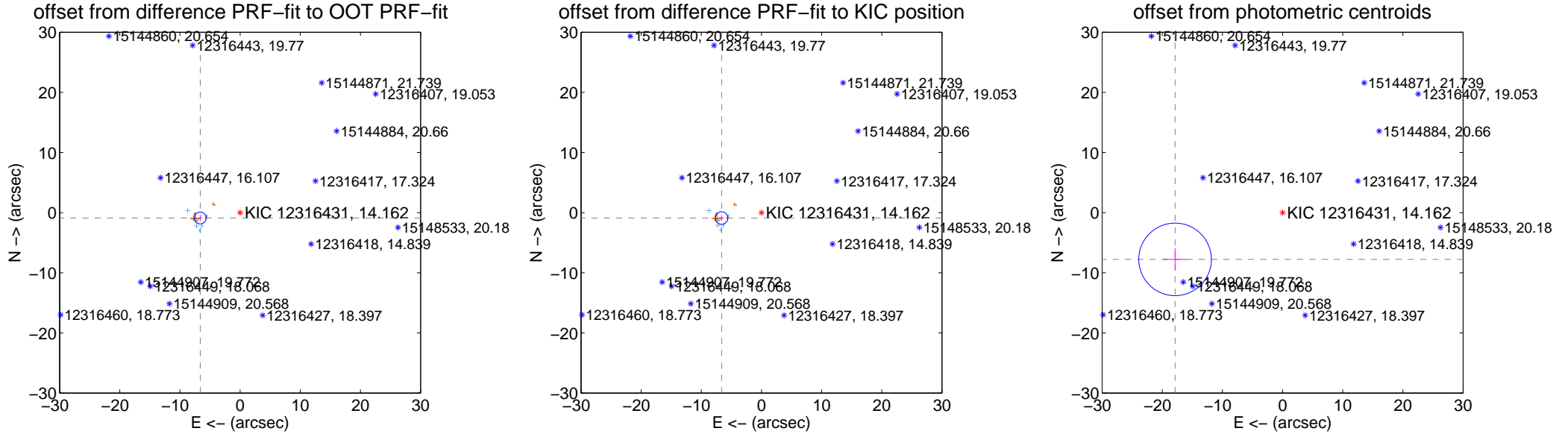
DV Centroid Data

Supplemental centroid analysis for 012316431-02. Kepler magnitude: 14.16. Transit SNR 7.44

There are 8 quarters with good PRF difference image offsets

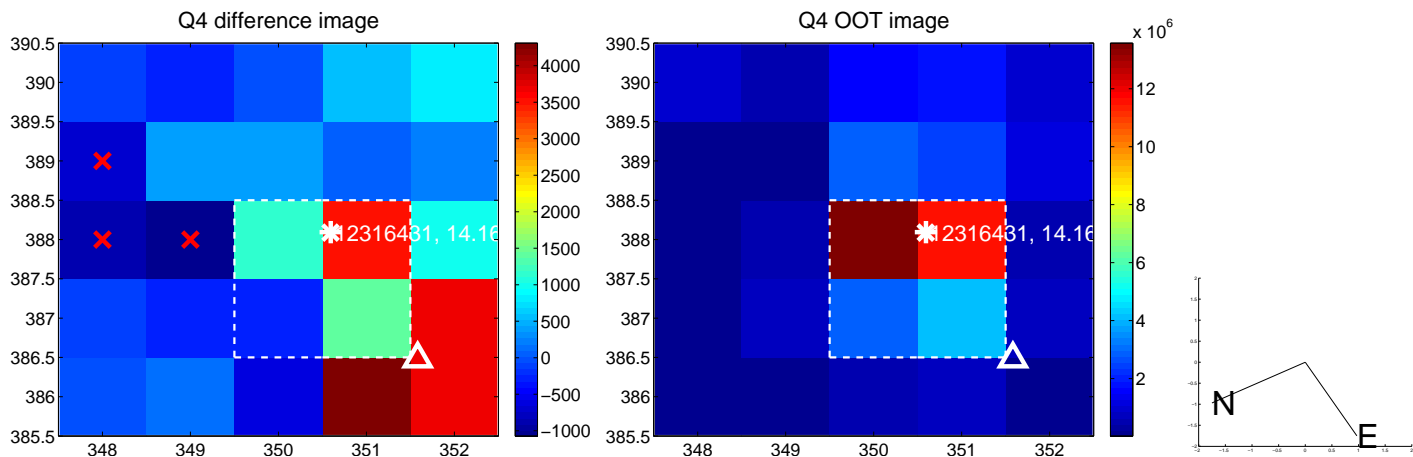
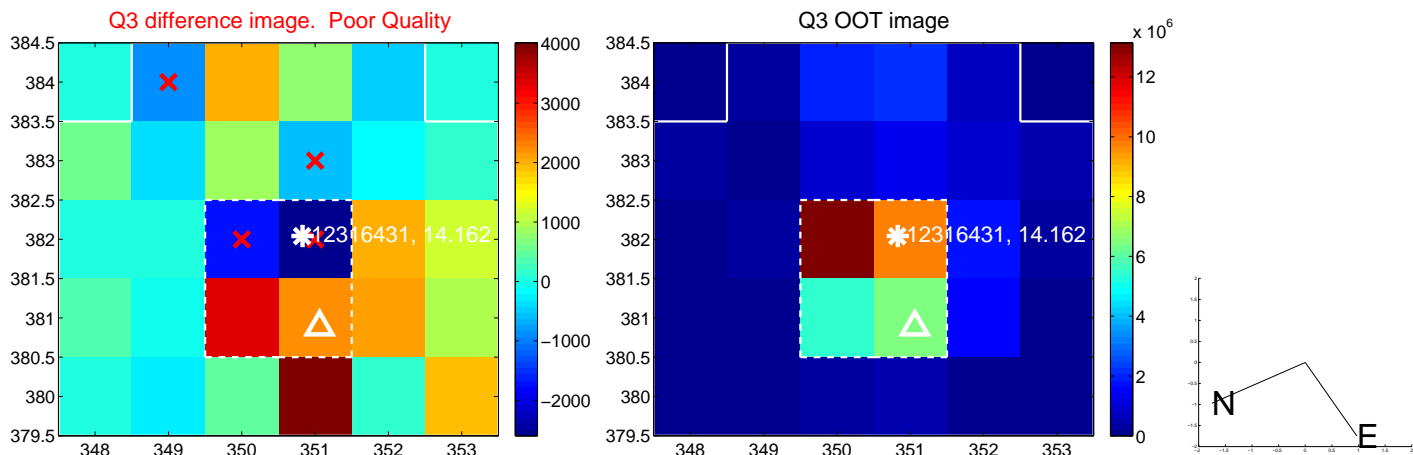
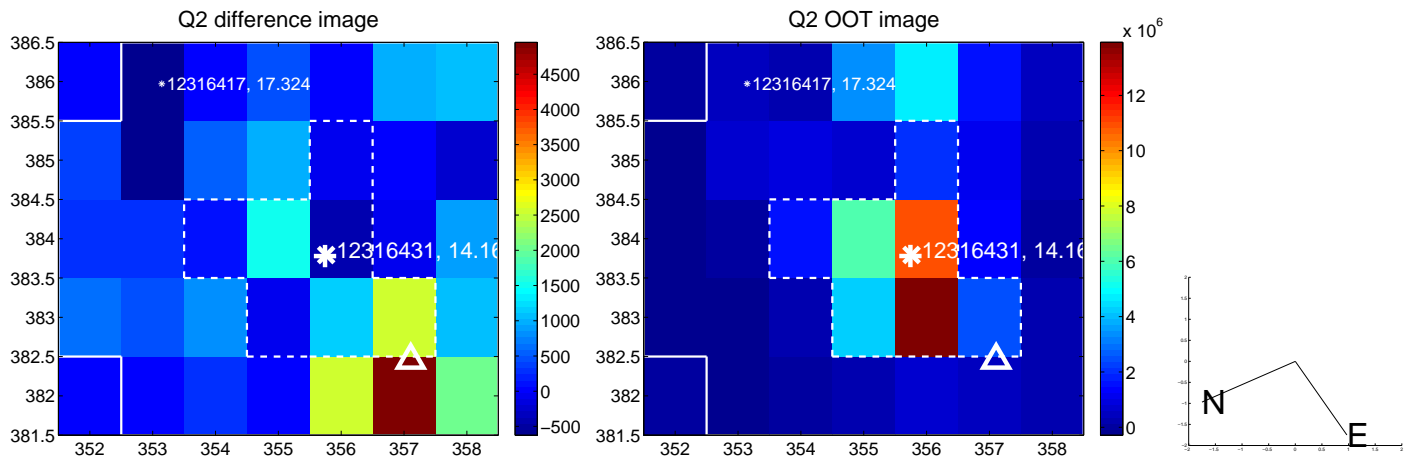
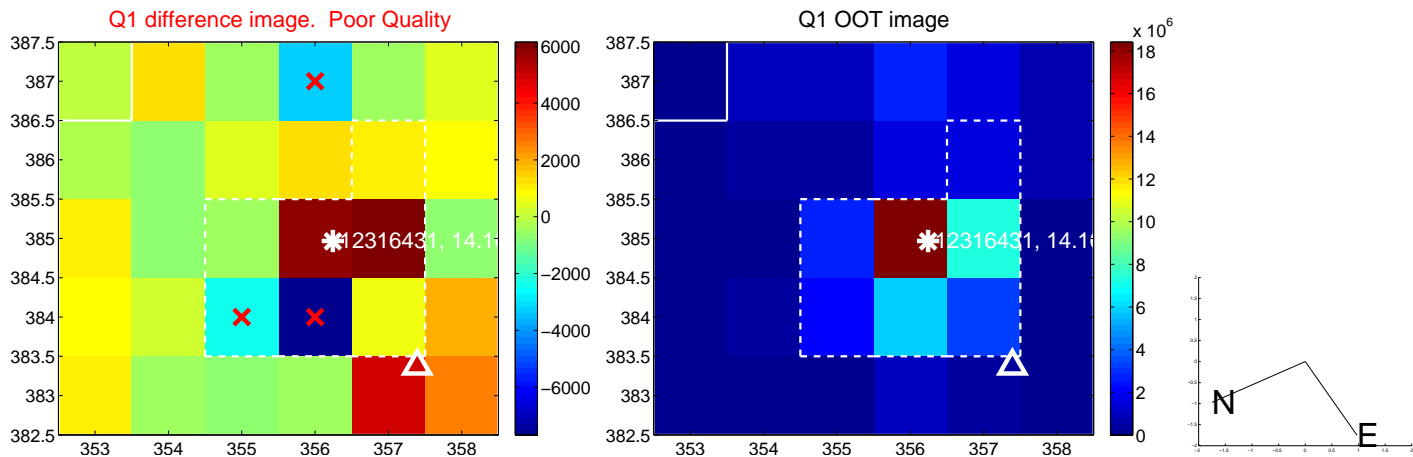
The direct PRF centroid is offset from the target star catalog position by about 0.01 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	6.687 ± 0.328	20.37	6.627 ± 0.313	-0.894 ± 0.350
PRF-fit source offset from KIC position	6.690 ± 0.348	19.22	6.630 ± 0.332	-0.894 ± 0.313
photometric centroid source offset	19.49 ± 2.01	9.69	17.87 ± 2.04	-7.77 ± 1.86

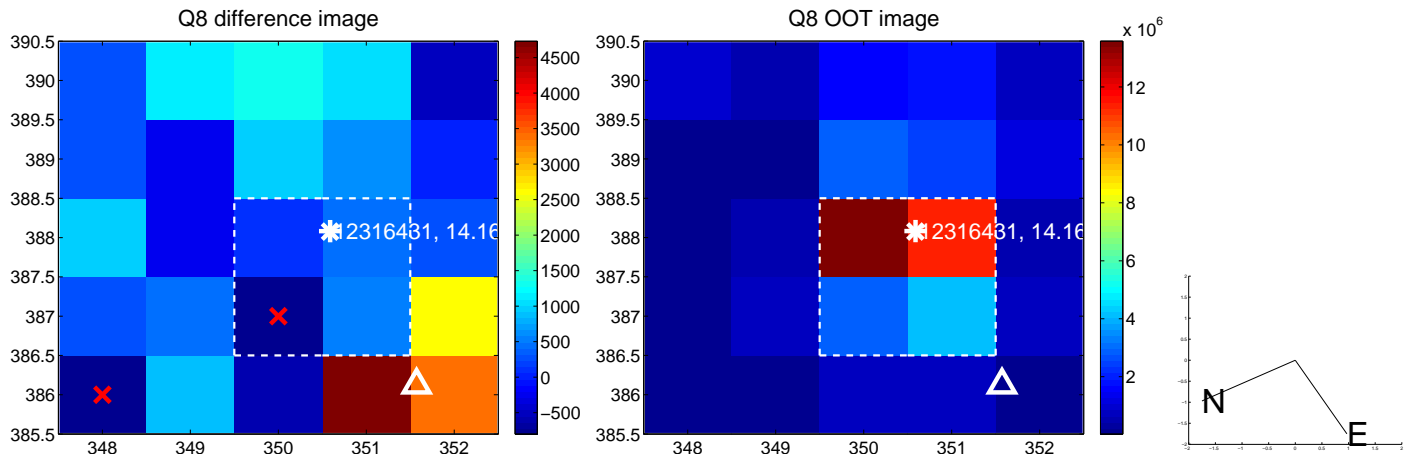
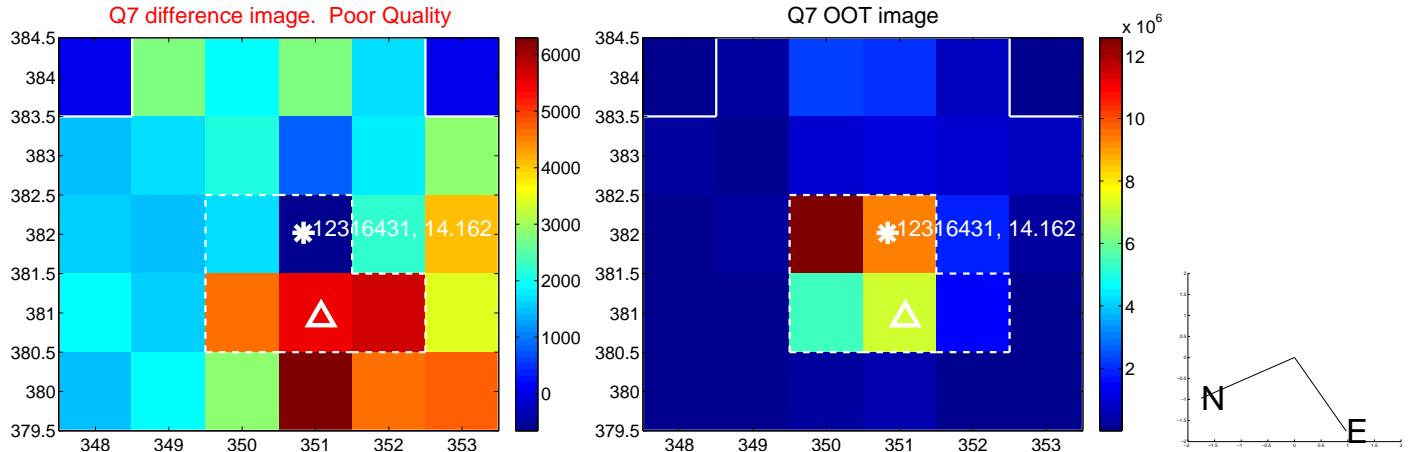
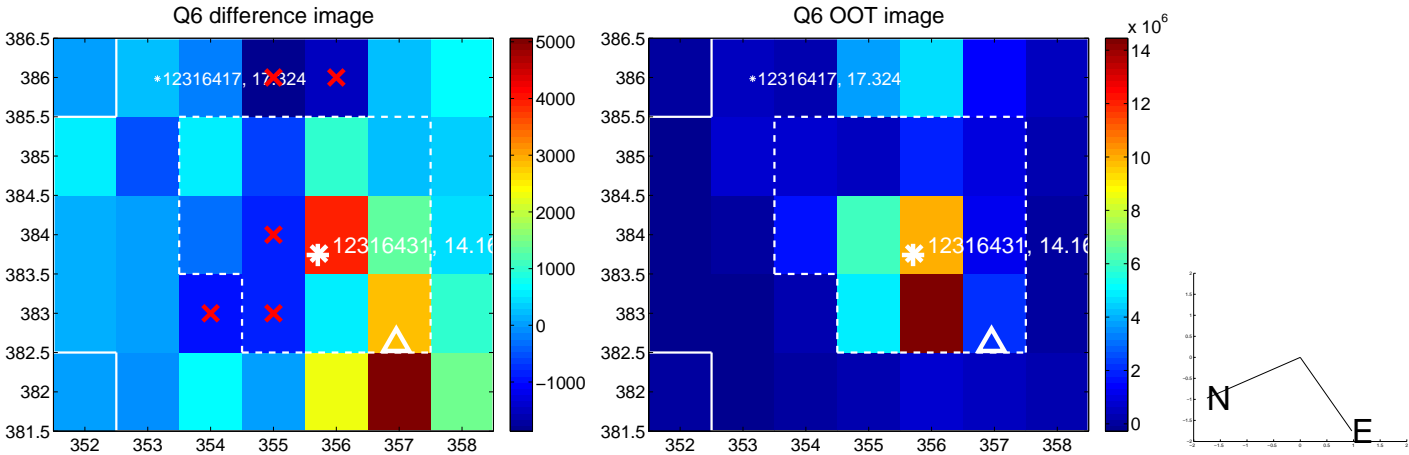
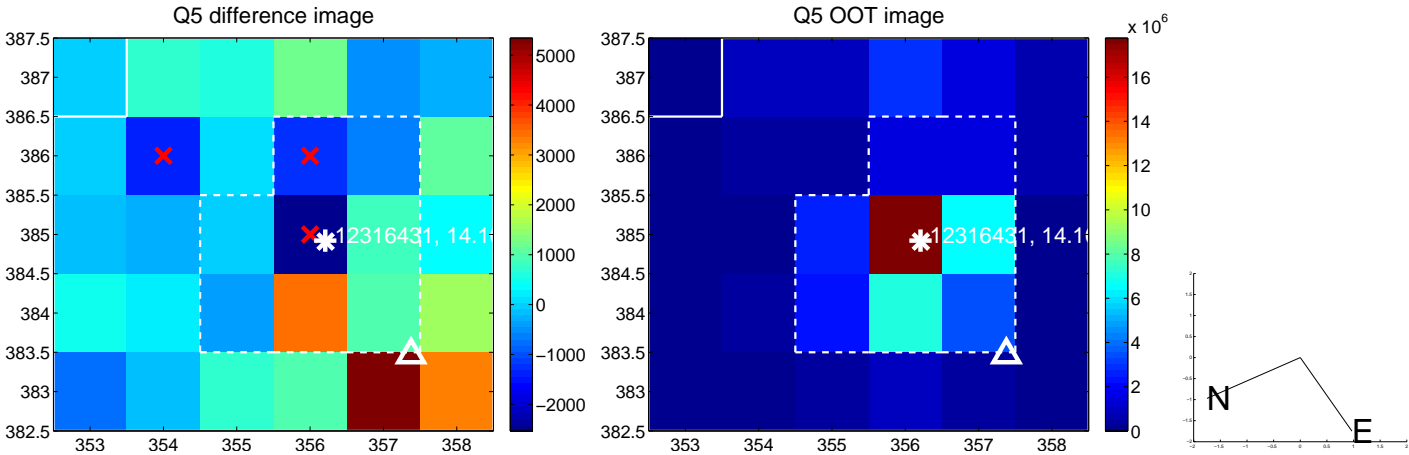


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

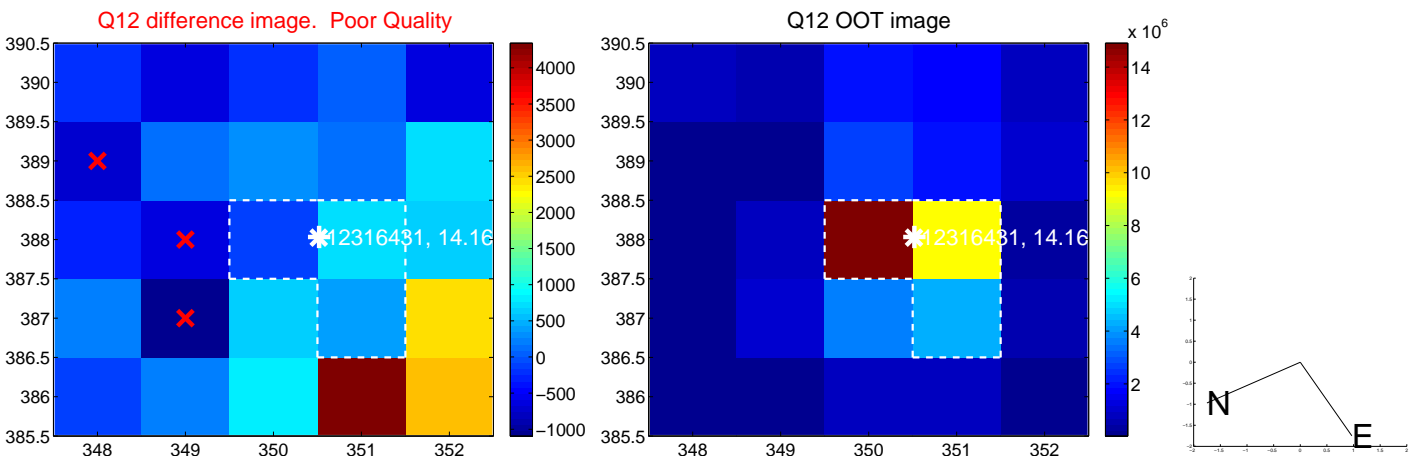
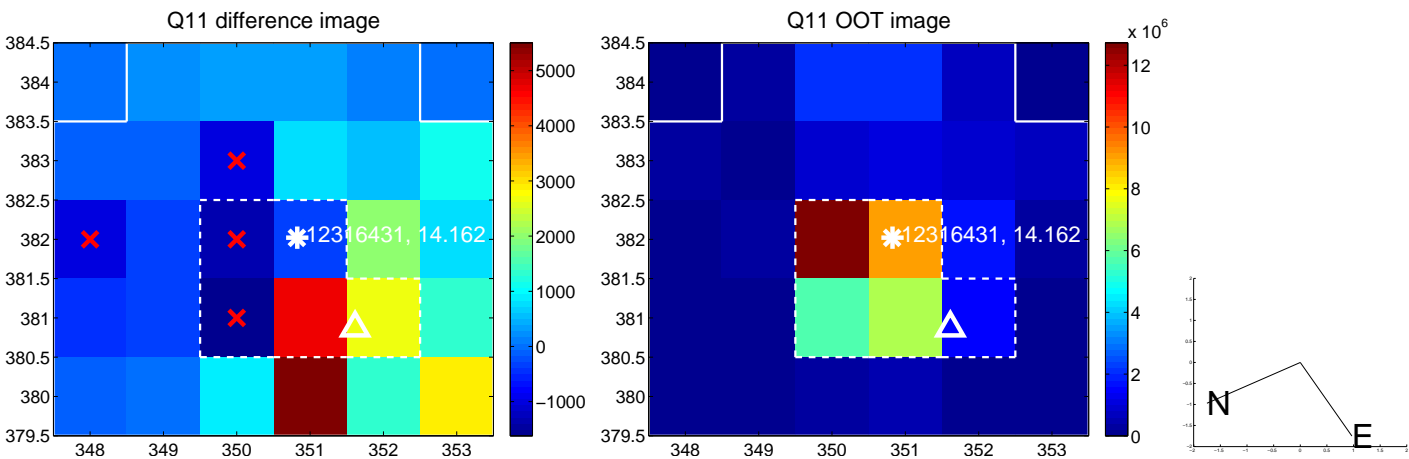
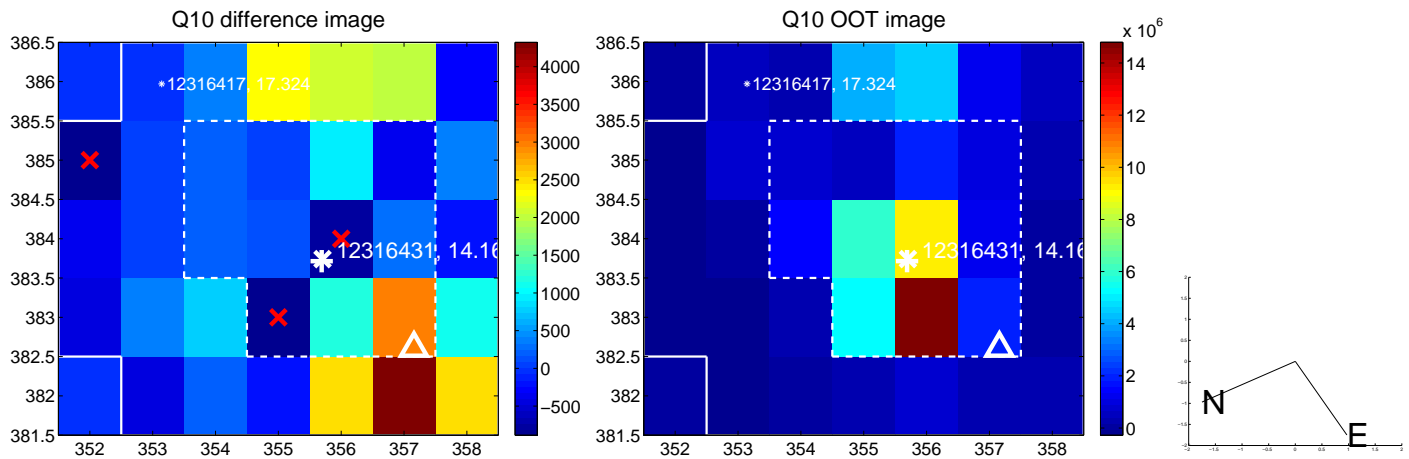
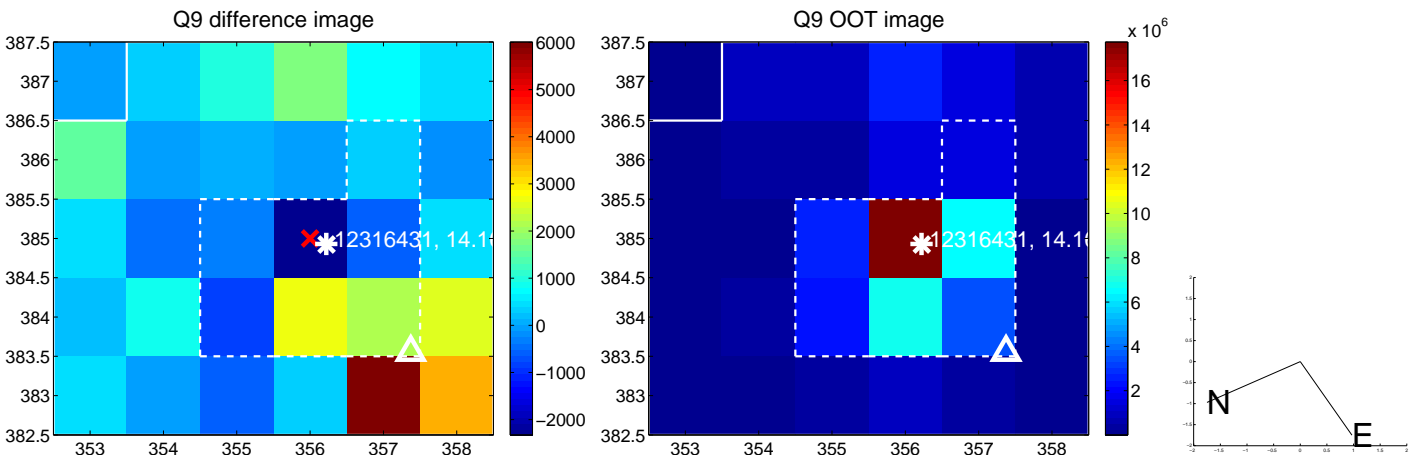
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



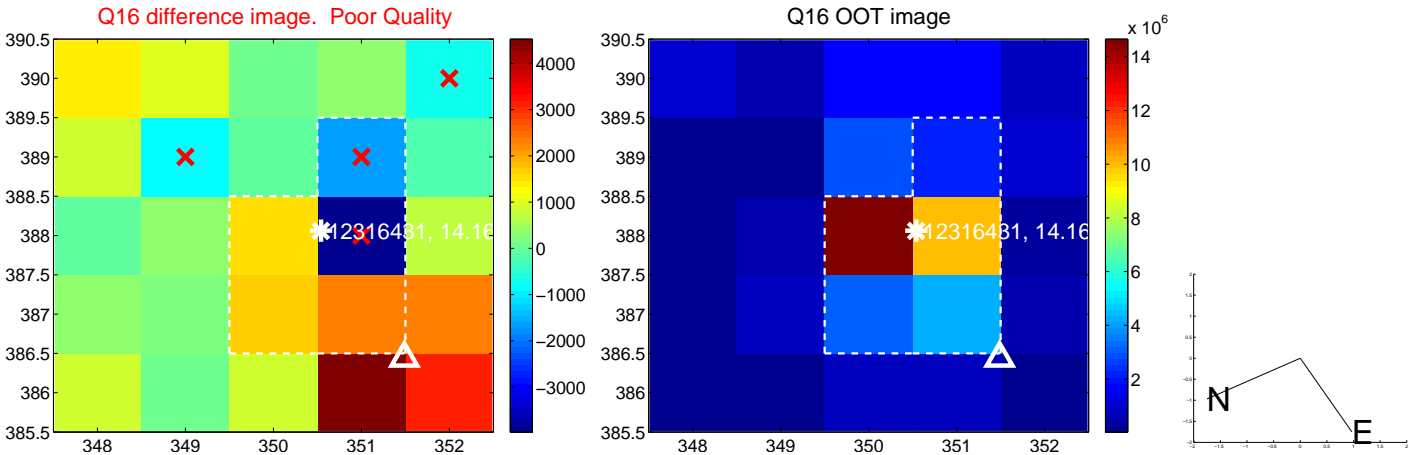
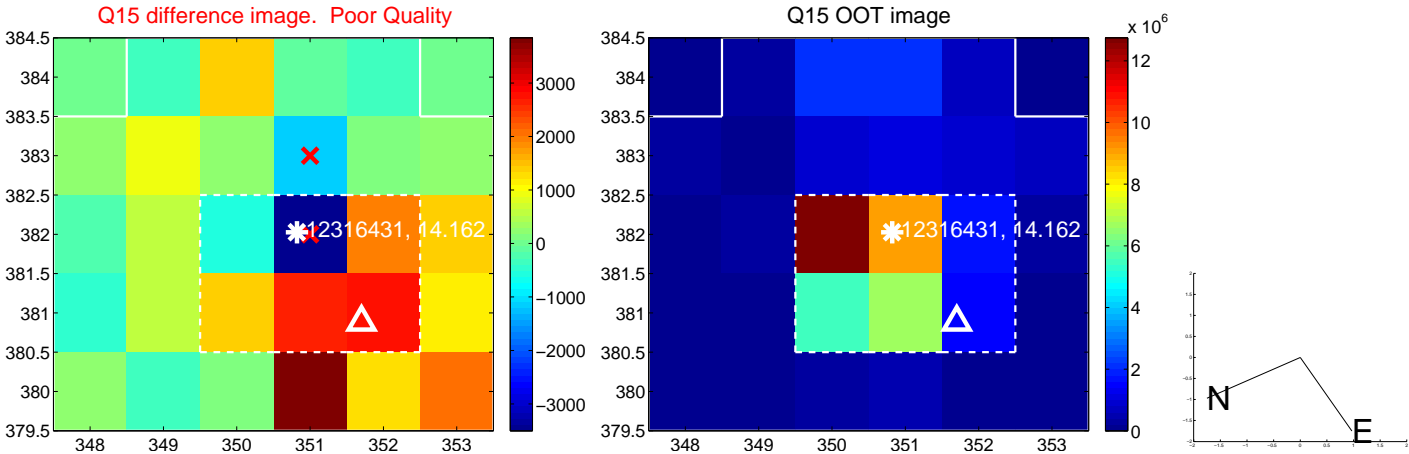
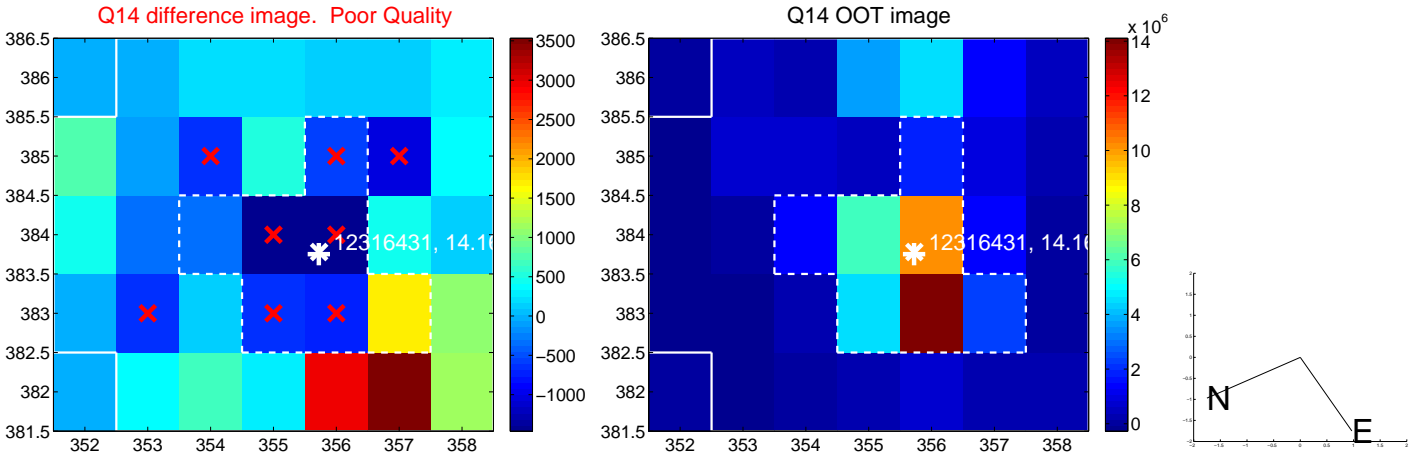
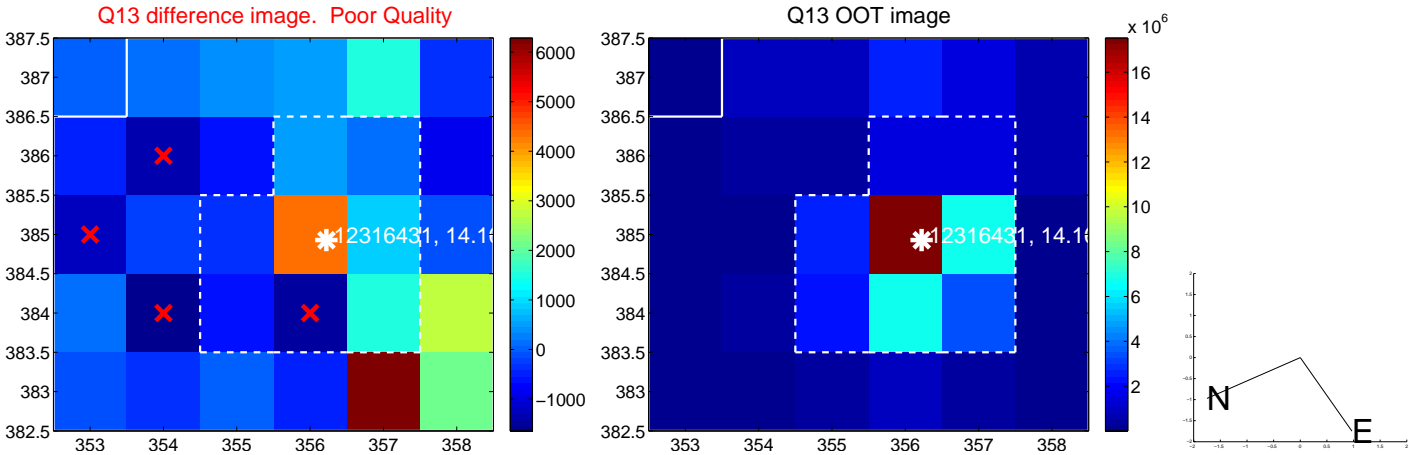
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



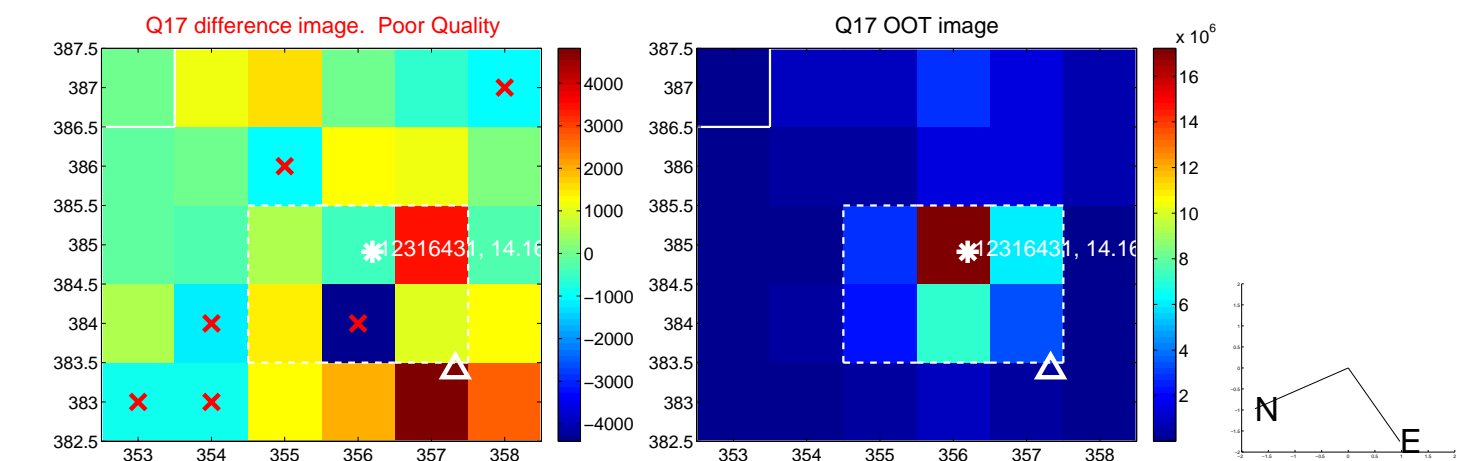
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



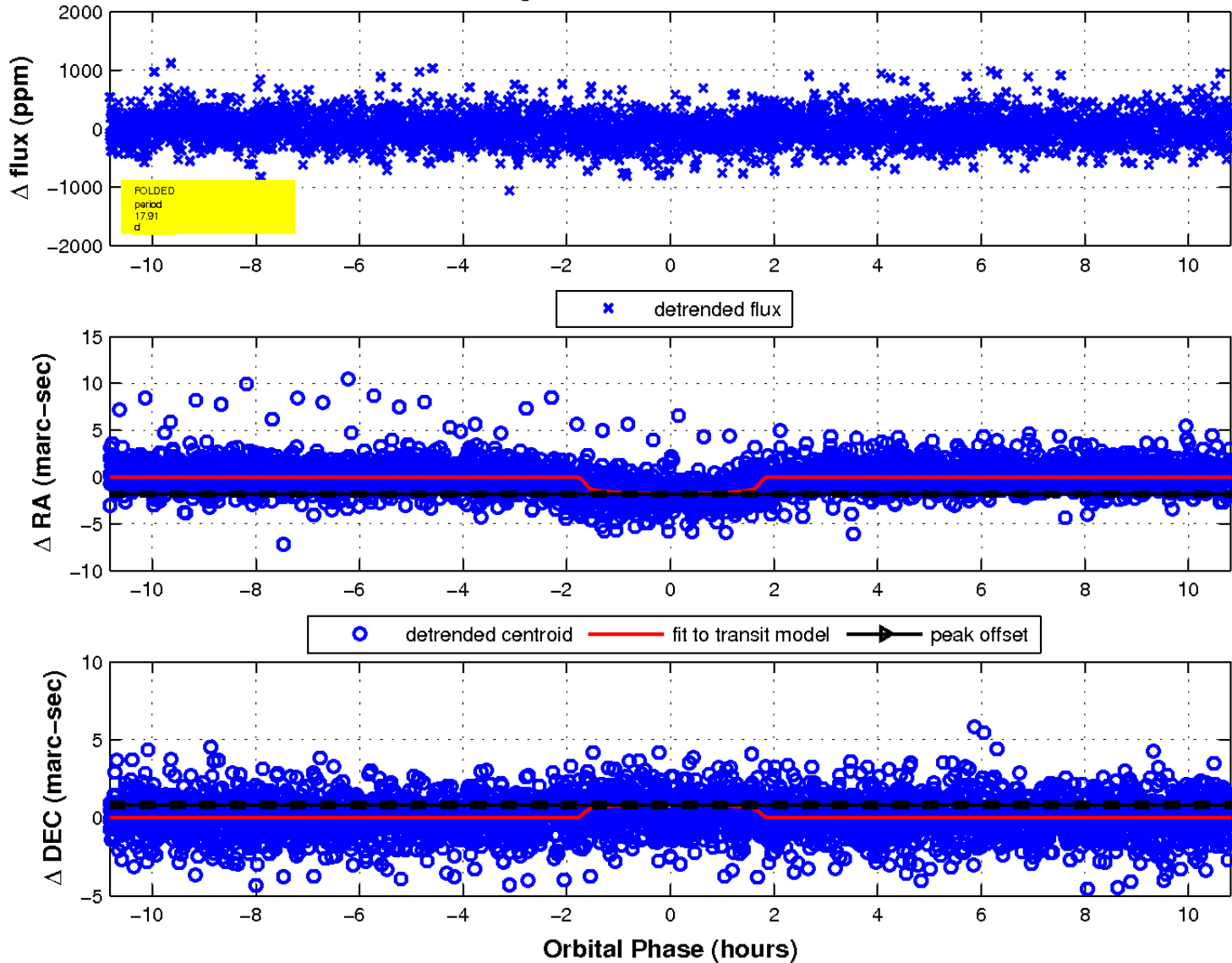
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

