

KIC 009413156

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})
009413156-01	OBS	4700.01	3.834867	135.090515	213.6	2.205	9.3	9.7	0.78	5515	1.32	240.04
009413156-02	OBS	4700.02	66.478145	184.258824	464.8	4.549	7.3	7.4	0.78	5515	1.84	5.35

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009413156-01	OBS	PC	1.00	0	0	0	0	CENT_FEW_DIFFS
009413156-02	OBS	PC	0.57	0	0	0	0	CENT_FEW_MEAS

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 009413156-01

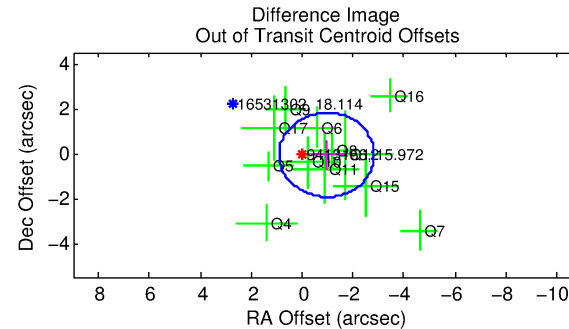
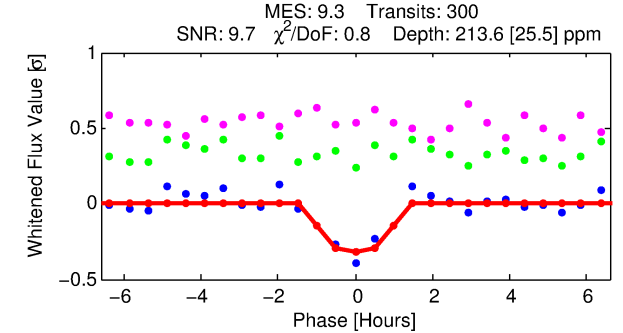
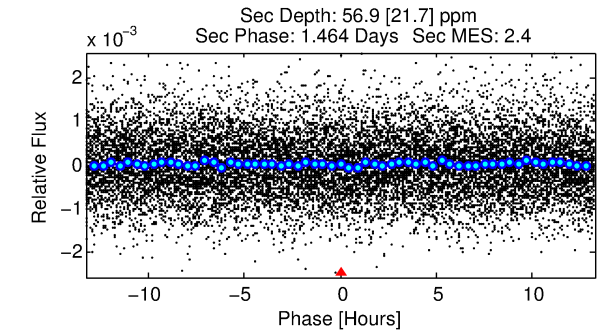
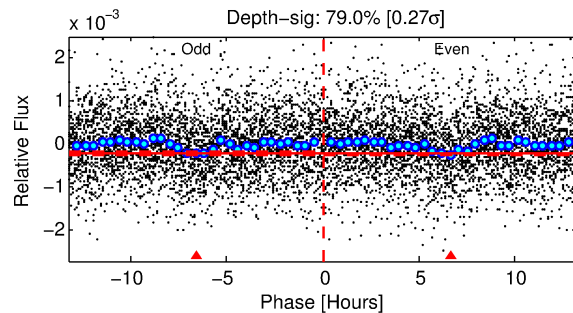
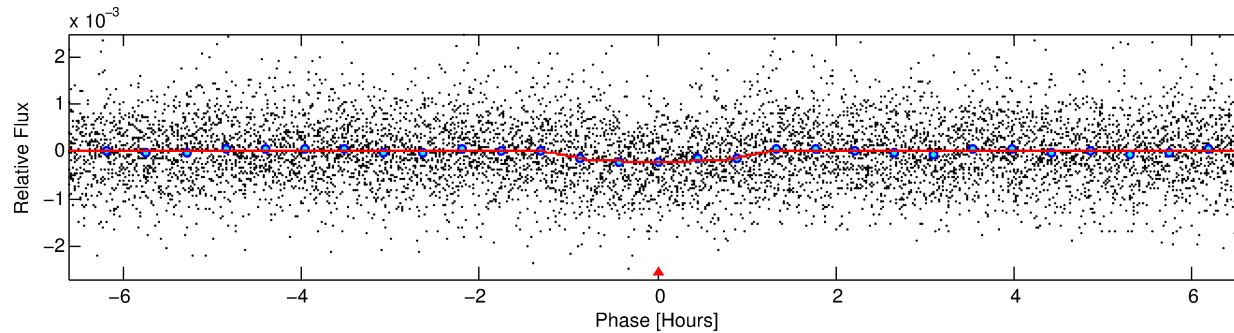
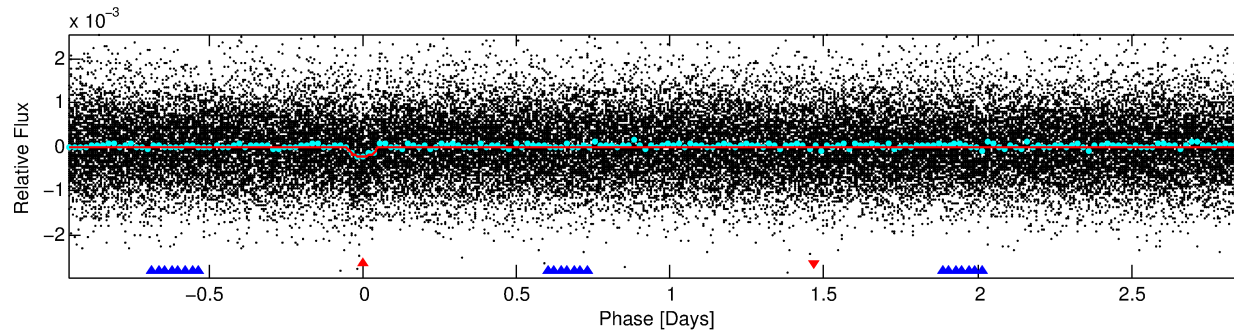
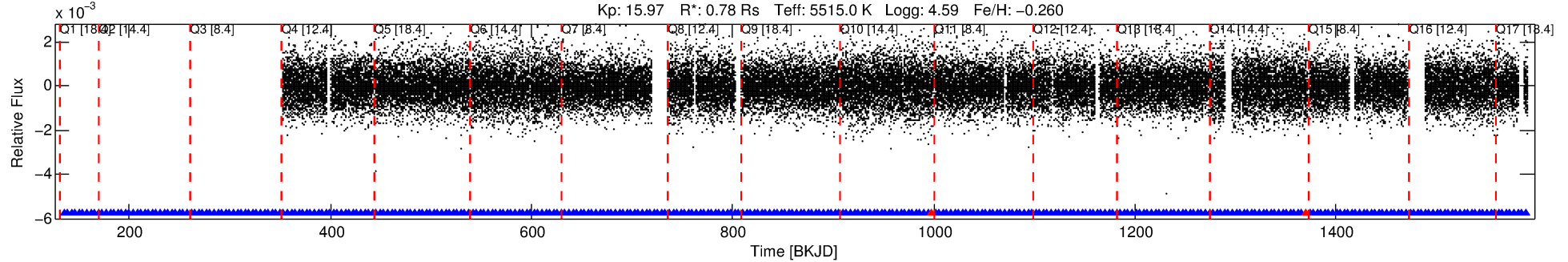
No Significant Match Found

DV One-Page Summary

KIC: 9413156 Candidate: 1 of 2 Period: 3.835 d

KOI: K04700.01 Corr: 0.914

Kp: 15.97 R*: 0.78 Rs Teff: 5515.0 K Logg: 4.59 Fe/H: -0.260



DV Fit Results:

Period = 3.83487 [0.00002] d
Epoch = 135.0905 [0.0044] BKJD
Rp/R* = 0.0156 [0.0147]
a/R* = 6.92 [28.54]
b = 0.87 [1.16]
Seff = 240.04 [69.44]
Teq = 1004 [73] K
Rp = 1.32 [1.27] Re
a = 0.0455 [0.0080] AU
Ag = 37.07 [71.59] [0.50σ]
Teffp = 3829 [1838] K [1.54σ]

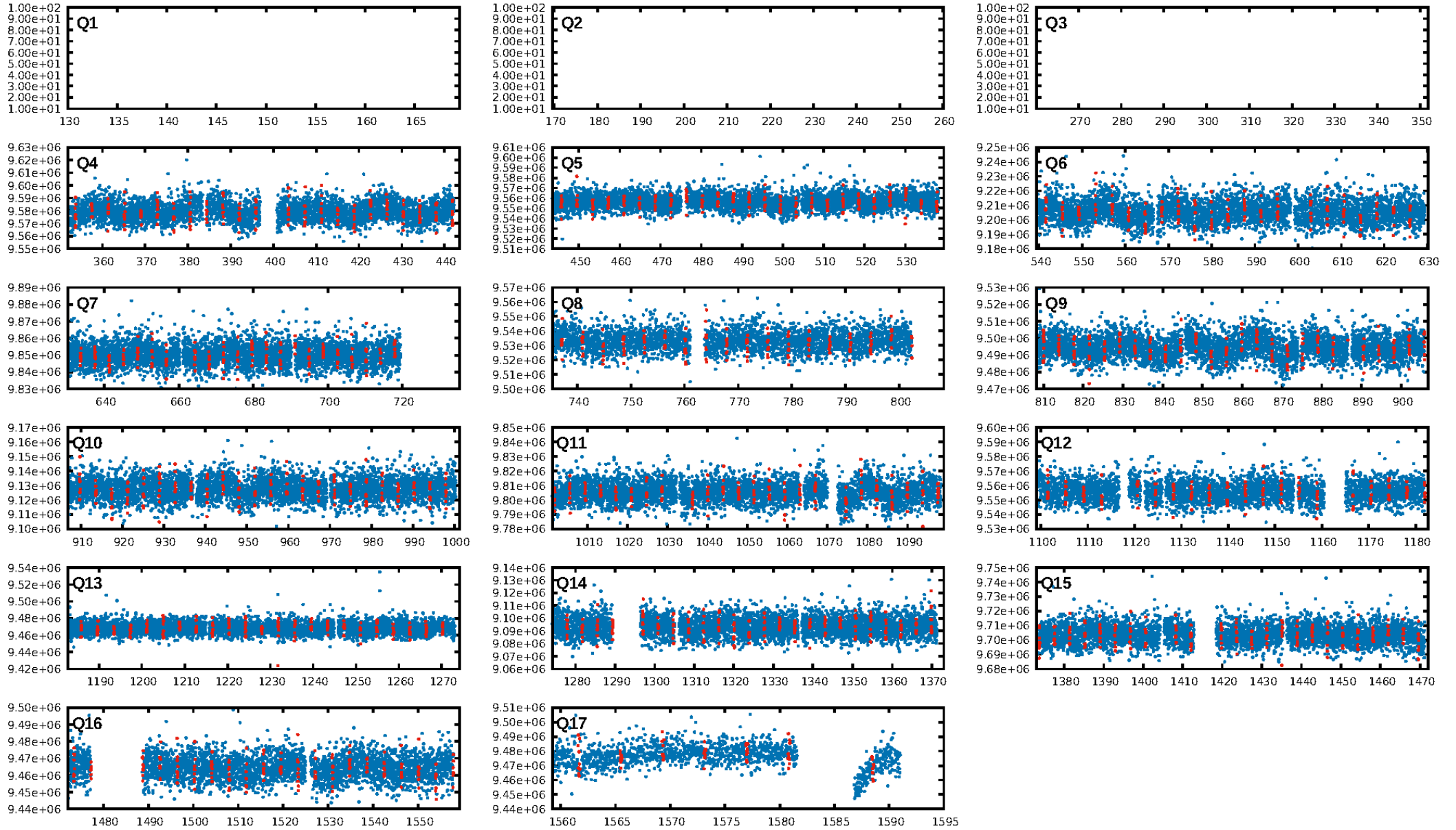
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [297.40σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 6.28e-21
RollingBand-fgt: 0.99 [291/293]
GhostDiagnostic-chr: 24.25
Centroid-sig: 58.7%
Centroid-so: 0.938 arcsec [0.74σ]
OotOffset-rm: 0.968 arcsec [1.55σ]
KicOffset-rm: 0.623 arcsec [1.01σ]
OotOffset-st: 2/3/4/3 [12]
KicOffset-st: 2/3/4/3 [12]
DiffImageQuality-fgm: 0.50 [6/12]
DiffImageOverlap-fno: 1.00 [14/14]

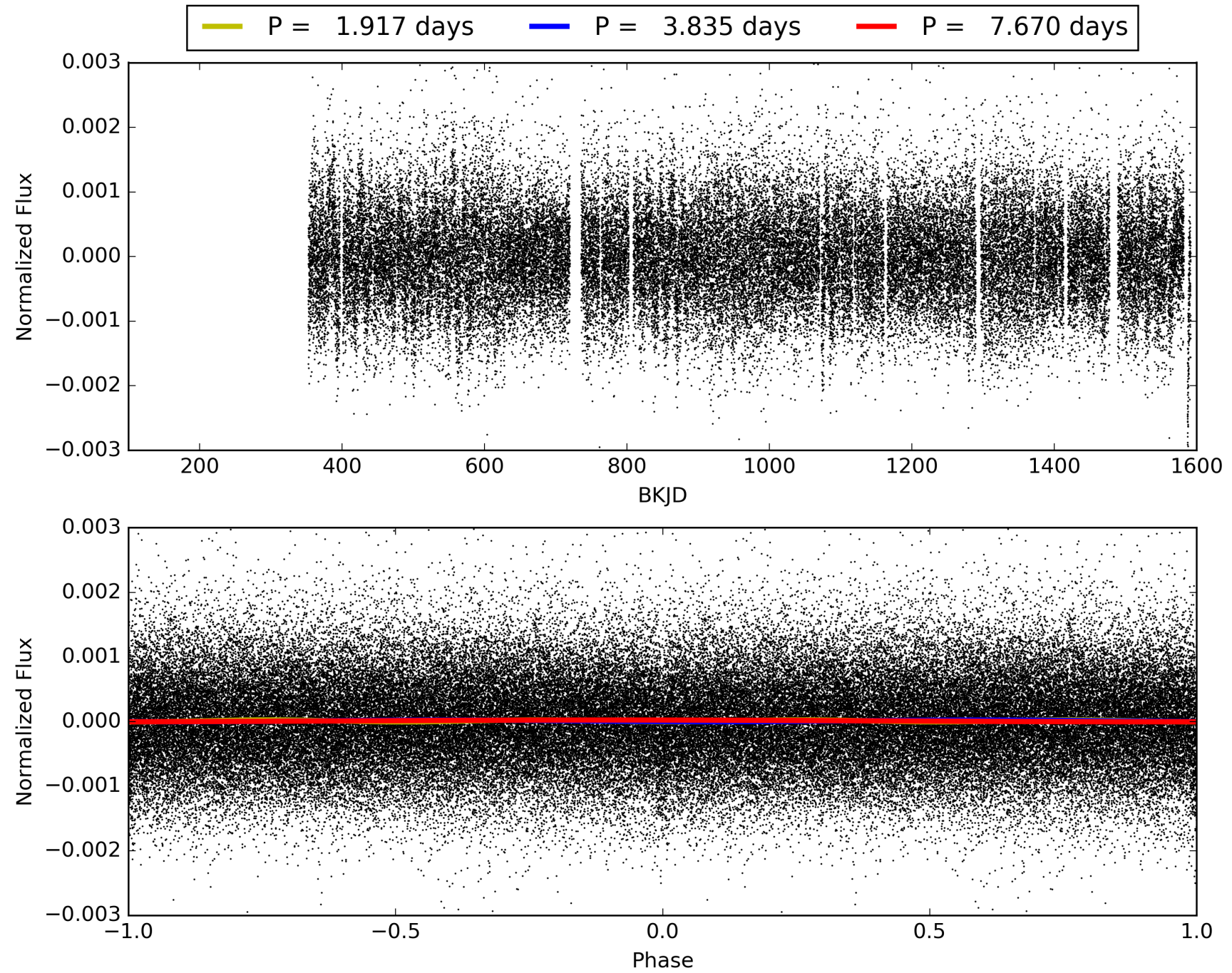
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:20:31 Z

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

TCE 009413156-01, PDC Light Curves

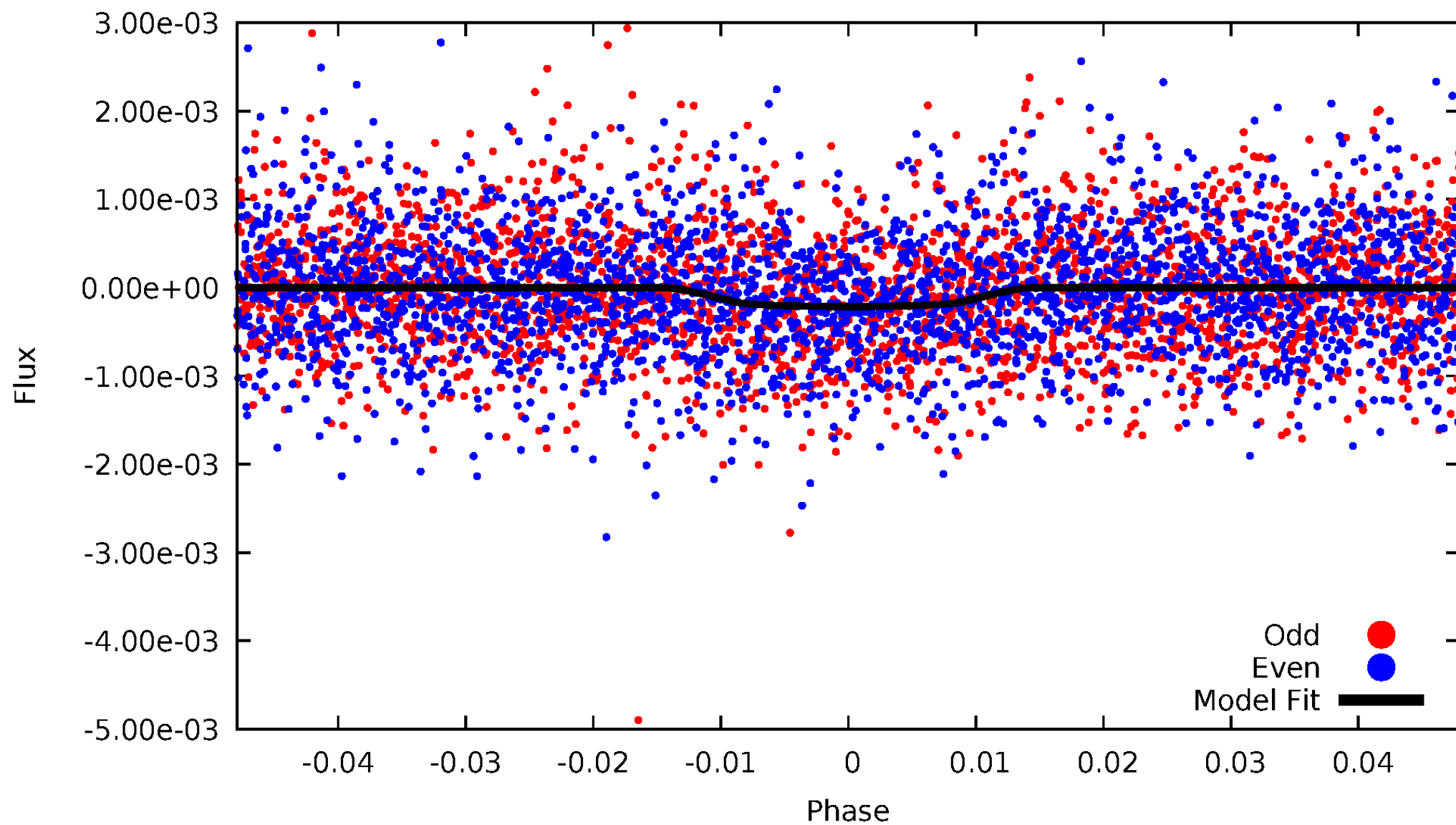


TCE 009413156-01



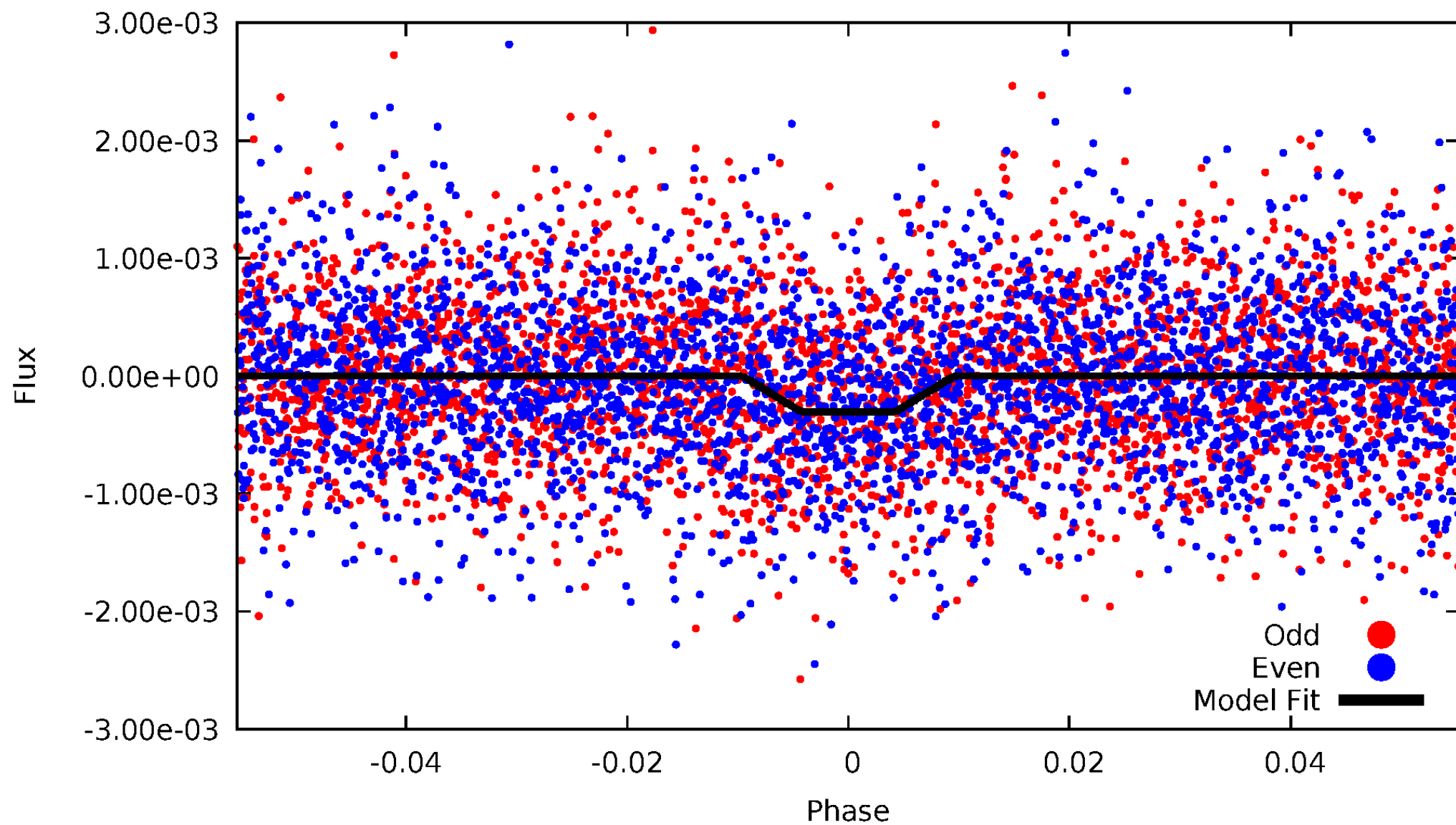
DV Odd/Even

TCE 009413156-01



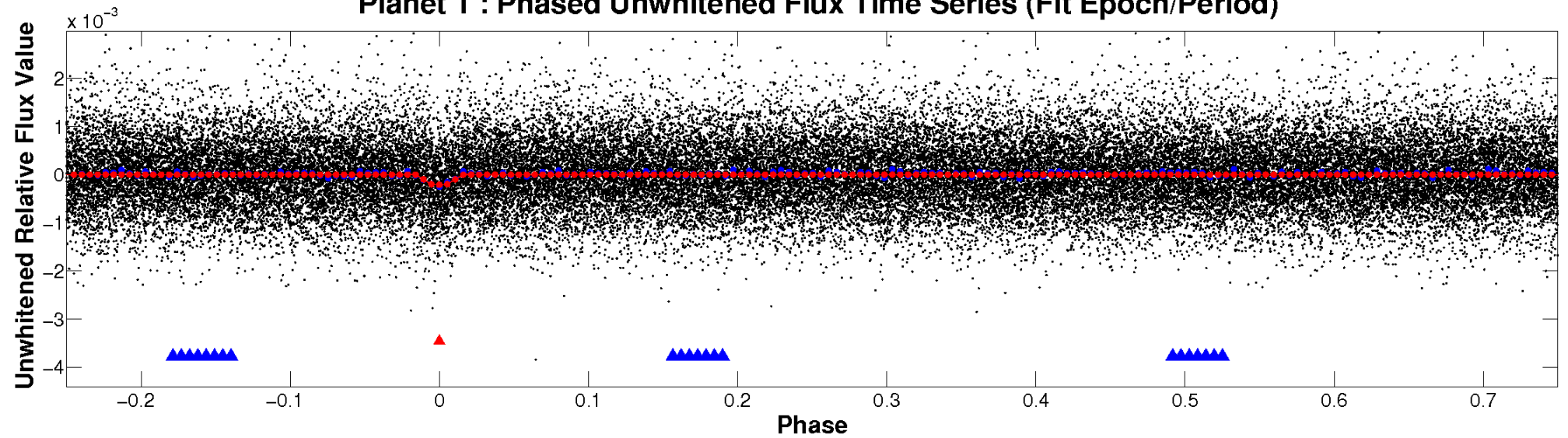
ALT Odd/Even

TCE 009413156-01

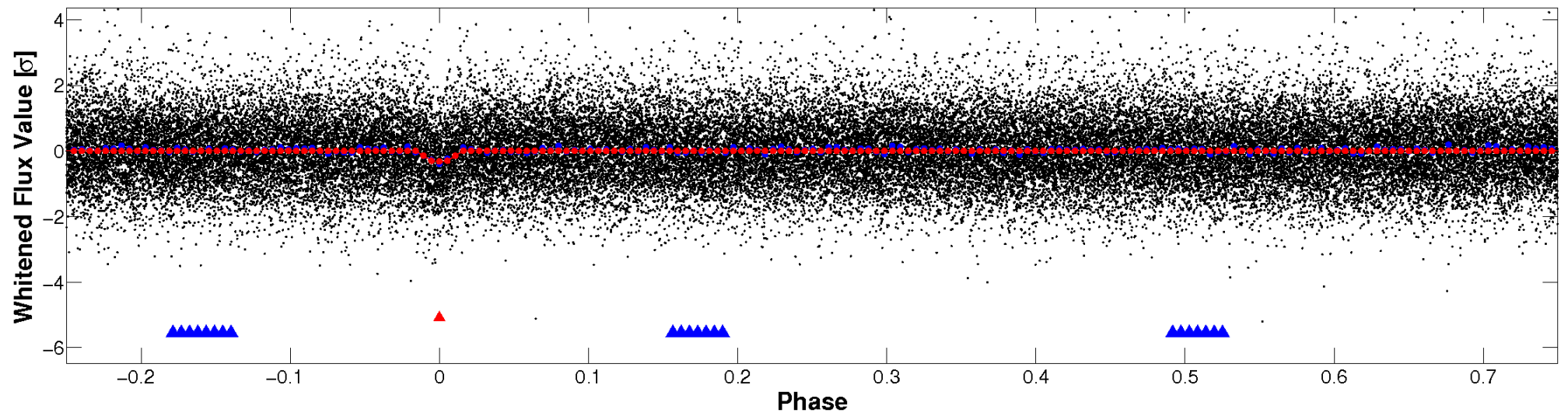


Non-Whitened Vs. Whitened Light Curve

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

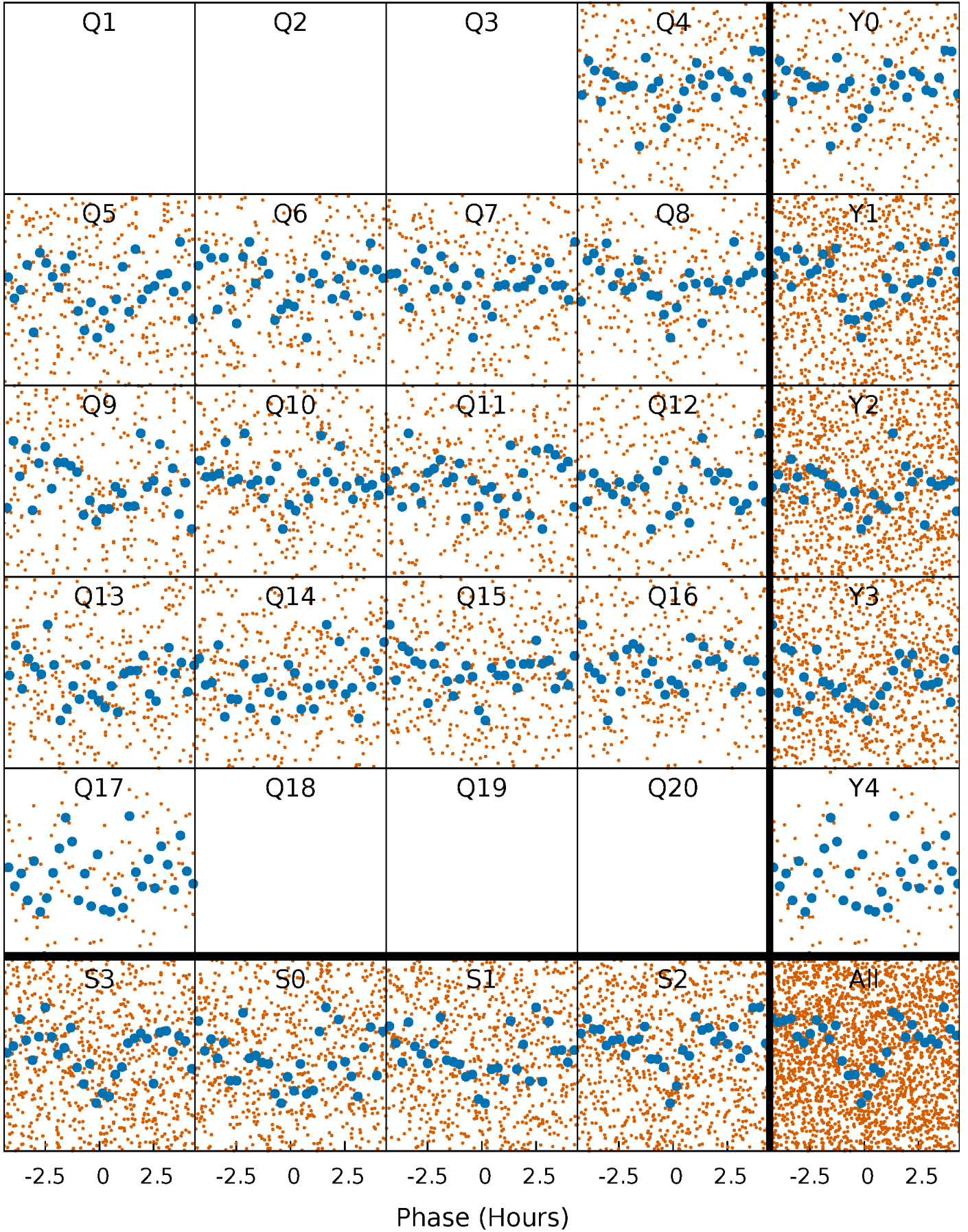


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



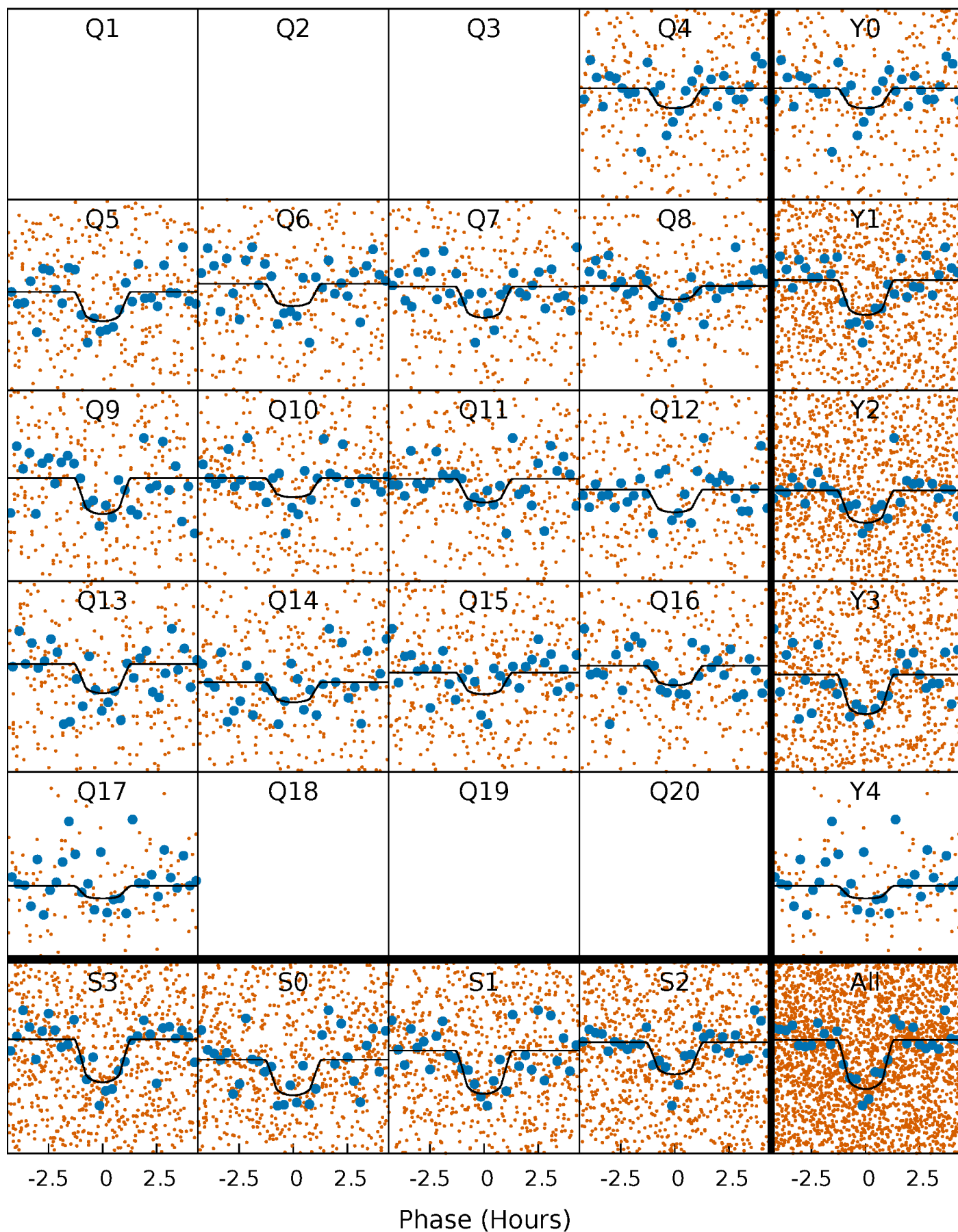
PDC Quarter-Phased Transit Curves

TCE 009413156-01 P= 3.834867 Days $T_0=135.090515$ (BKJD)



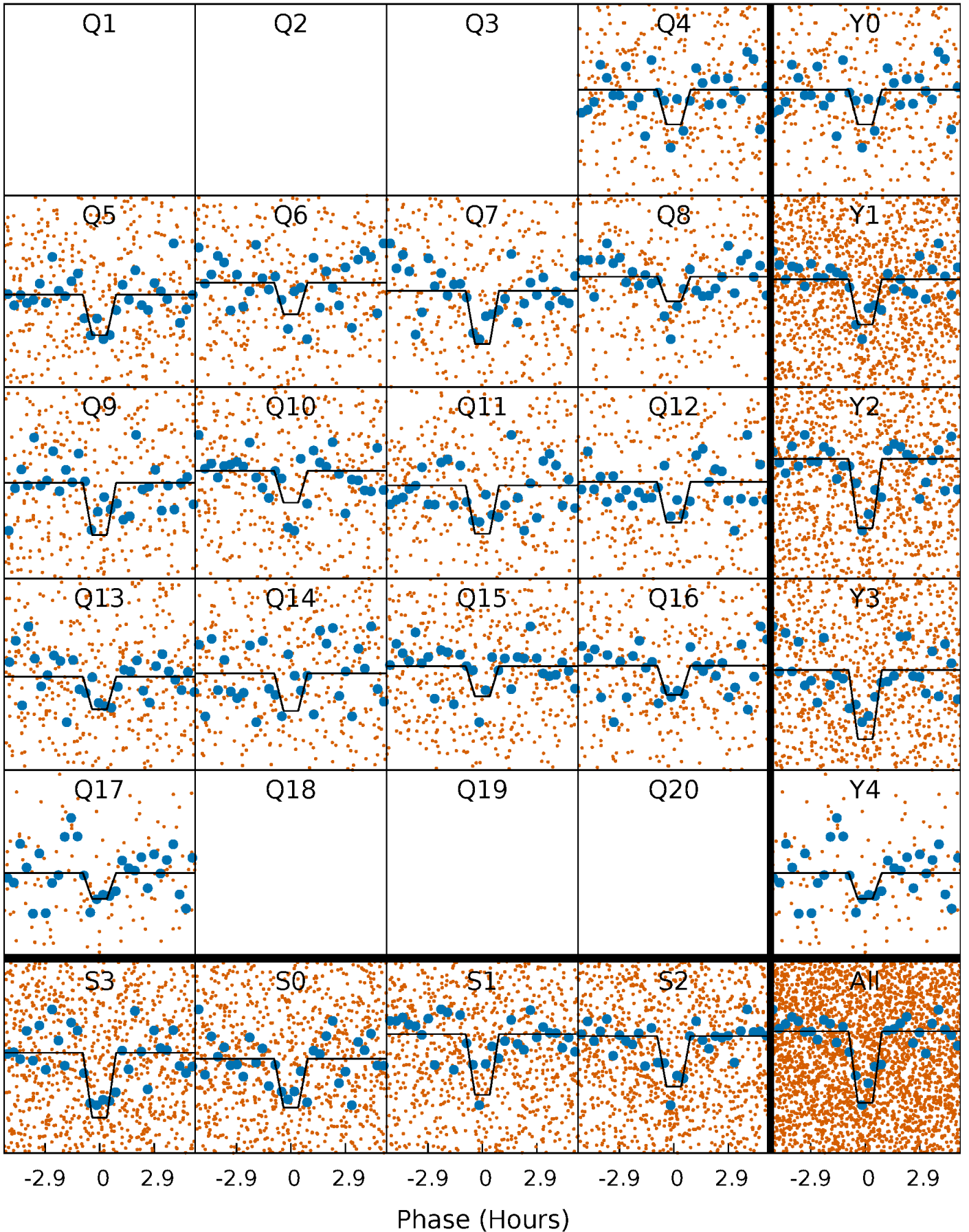
DV Quarter-Phased Transit Curves

TCE 009413156-01 P= 3.834867 Days $T_0=135.090515$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

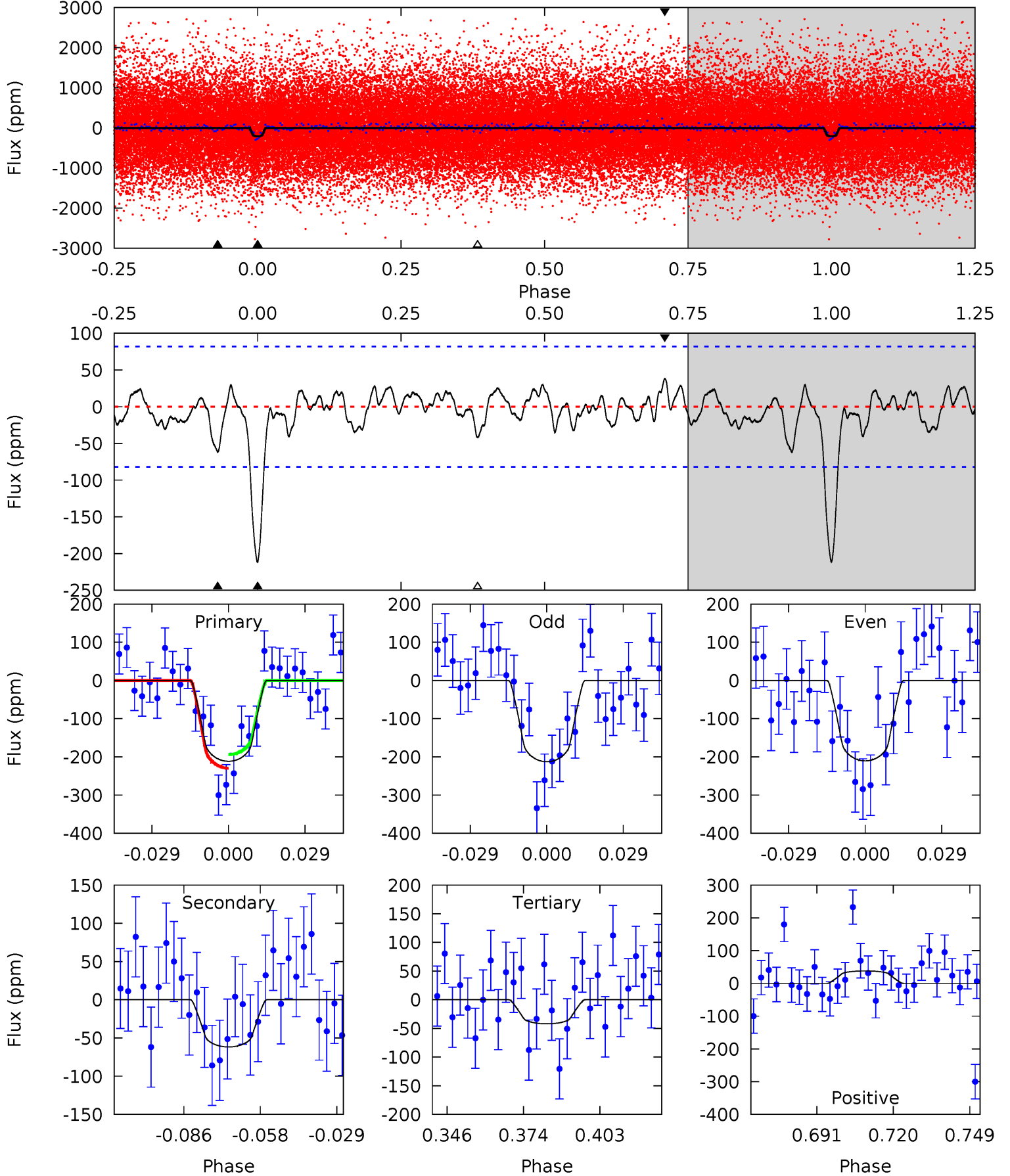
TCE 009413156-01 P= 3.834899 Days $T_0=135.081818$ (BKJD)



DV Model-Shift Uniqueness Test

009413156-01, P = 3.834867 Days, E = 135.090515 Days

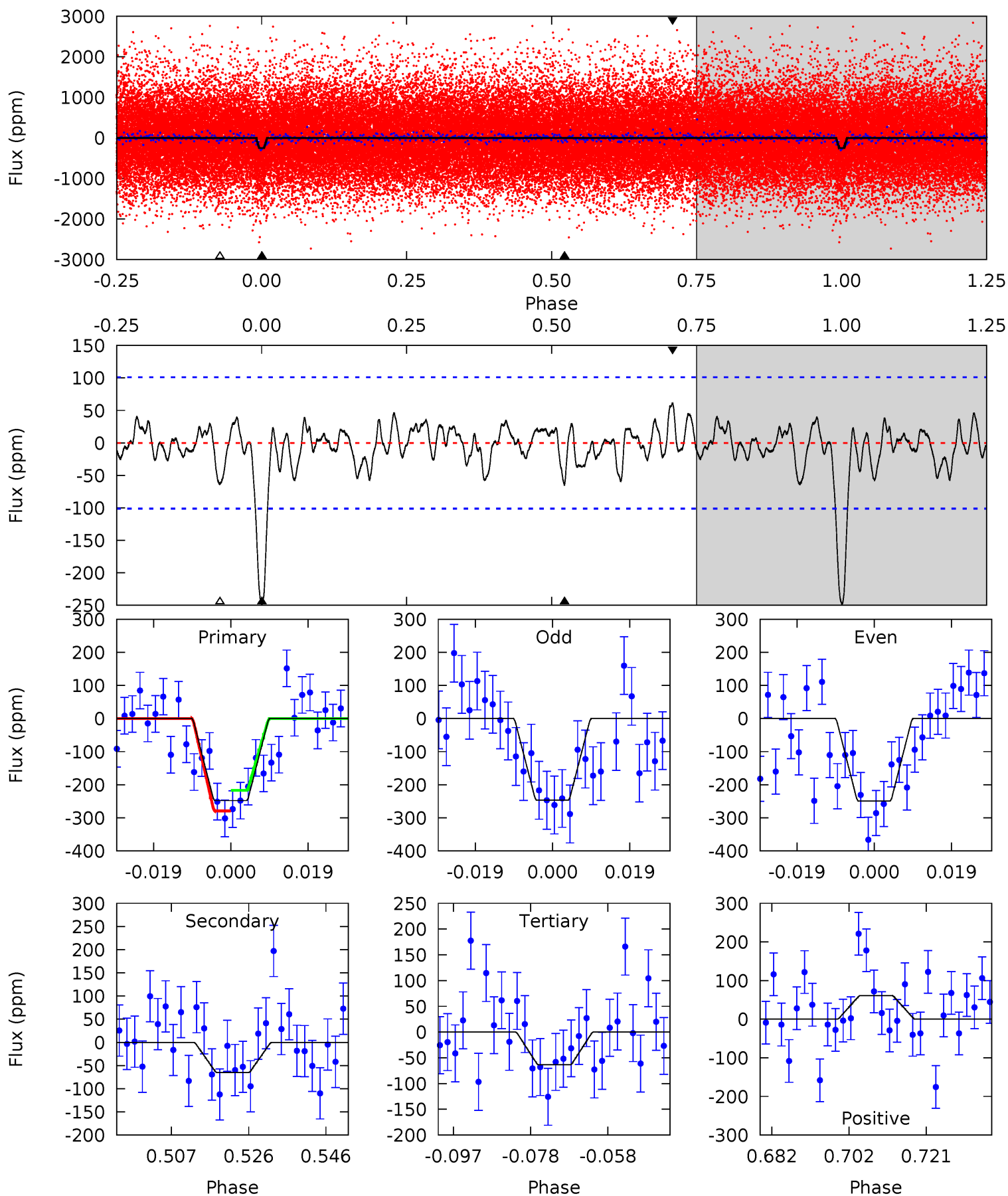
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.5	3.64	2.47	2.24	4.82	2.19	0.98	9.99	10.2	1.17	1.40	0.07	1.13	0.15	1.06



Alt Model-Shift Uniqueness Test

009413156-01, P = 3.834899 Days, E = 135.081818 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.0	3.15	3.08	2.95	4.90	2.34	1.13	8.93	9.06	0.07	0.19	0.06	1.01	0.20	1.51



Stellar Parameters For KIC 009413156

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	5515^{+182}_{-199}	$4.592^{+0.036}_{-0.135}$	$-0.260^{+0.300}_{-0.300}$	$0.775^{+0.164}_{-0.070}$	$0.868^{+0.083}_{-0.102}$	$2.624^{+0.470}_{-1.020}$
	+3%/-4%	+1%/-3%	+115%/-115%	+21%/-9%	+10%/-12%	+18%/-39%
Source	KIC0	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 009413156-01 / KOI 4700.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	A_{obs}
DV	-62 ± 17	$1.59^{+1.19}_{-0.99}$	1427^{+81}_{-63}	3926^{+1939}_{-701}	25^{+174}_{-17}
Alt.	-65 ± 21	$1.75^{+1.23}_{-1.04}$	1429^{+77}_{-65}	3826^{+1688}_{-641}	24^{+118}_{-16}

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 $A_{obs} \gg 1.0$

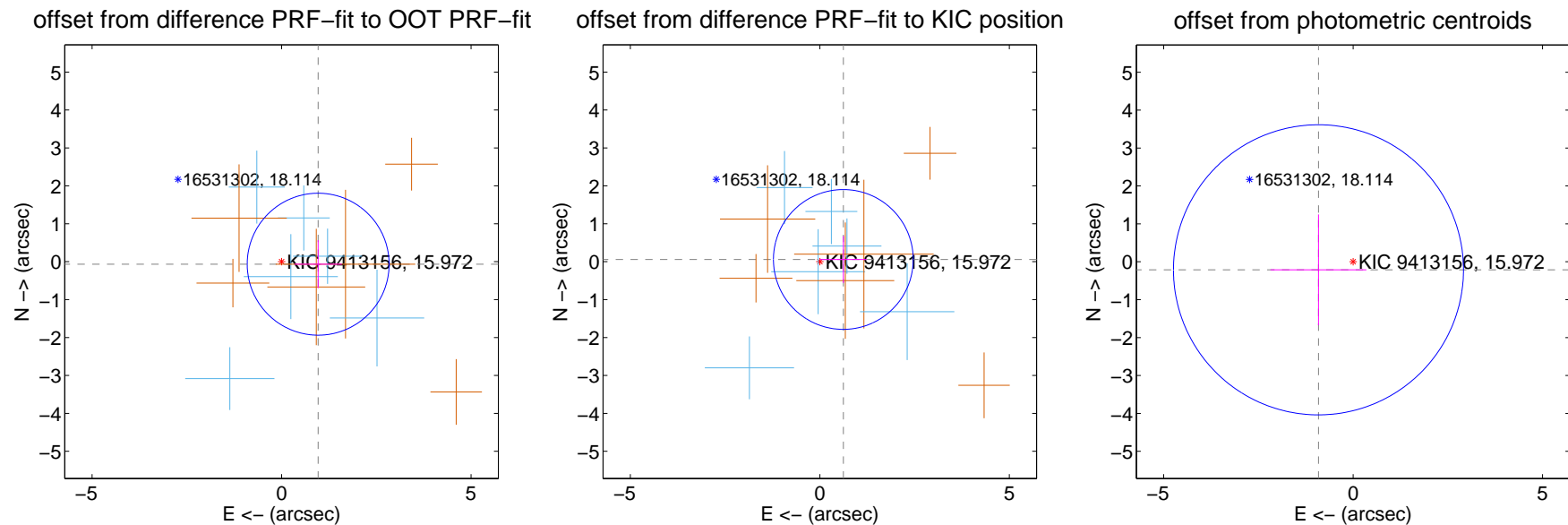
DV Centroid Data

Supplemental centroid analysis for 009413156-01. Kepler magnitude: 15.97. Transit SNR 9.70

There are 6 quarters with good PRF difference image offsets

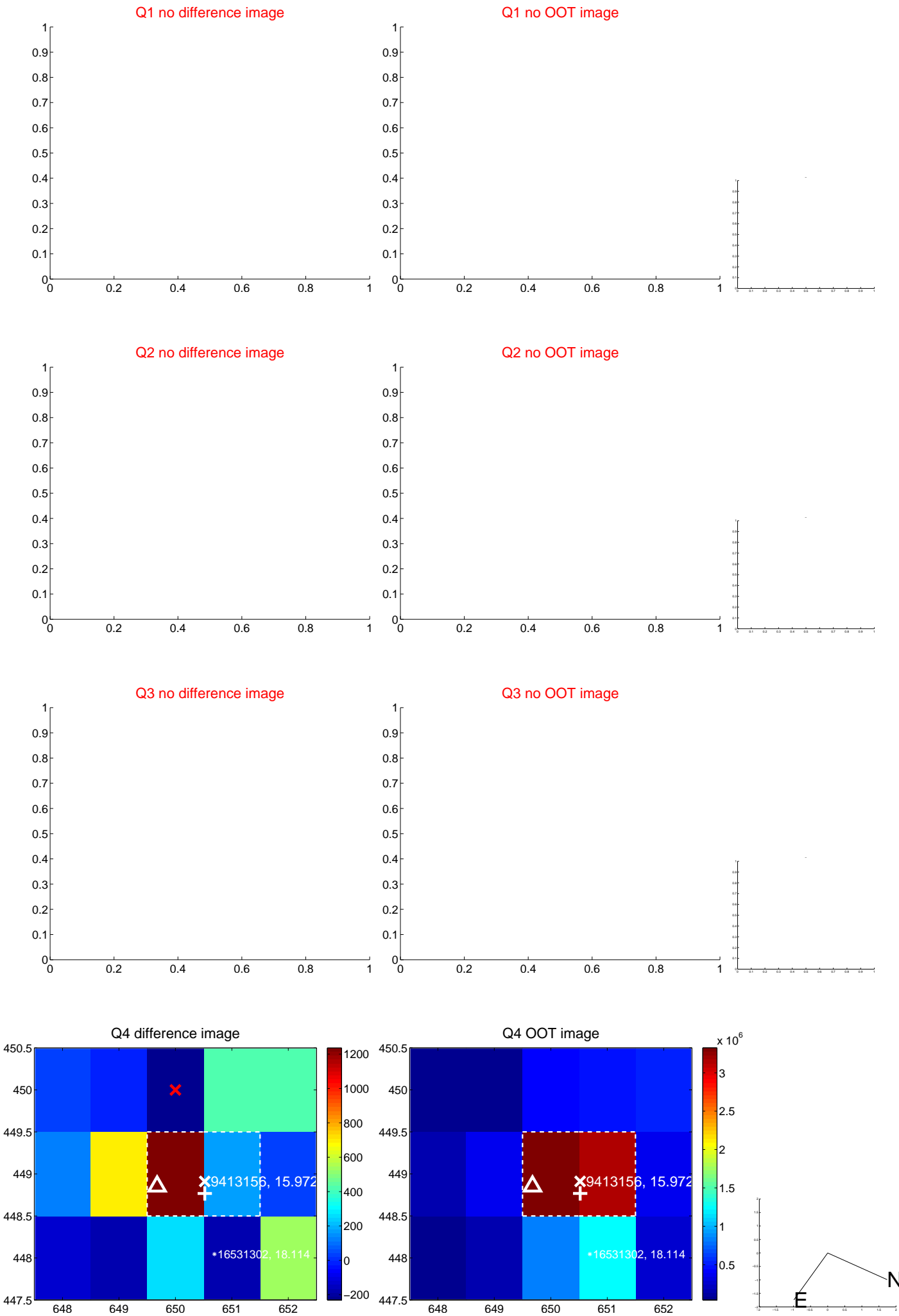
The direct PRF centroid is offset from the target star catalog position by about 0.26 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	0.968 ± 0.624	1.55	-0.965 ± 0.624	-0.066 ± 0.633
PRF-fit source offset from KIC position	0.623 ± 0.615	1.01	-0.620 ± 0.614	0.059 ± 0.620
photometric centroid source offset	0.94 ± 1.28	0.74	0.91 ± 1.26	-0.21 ± 1.46

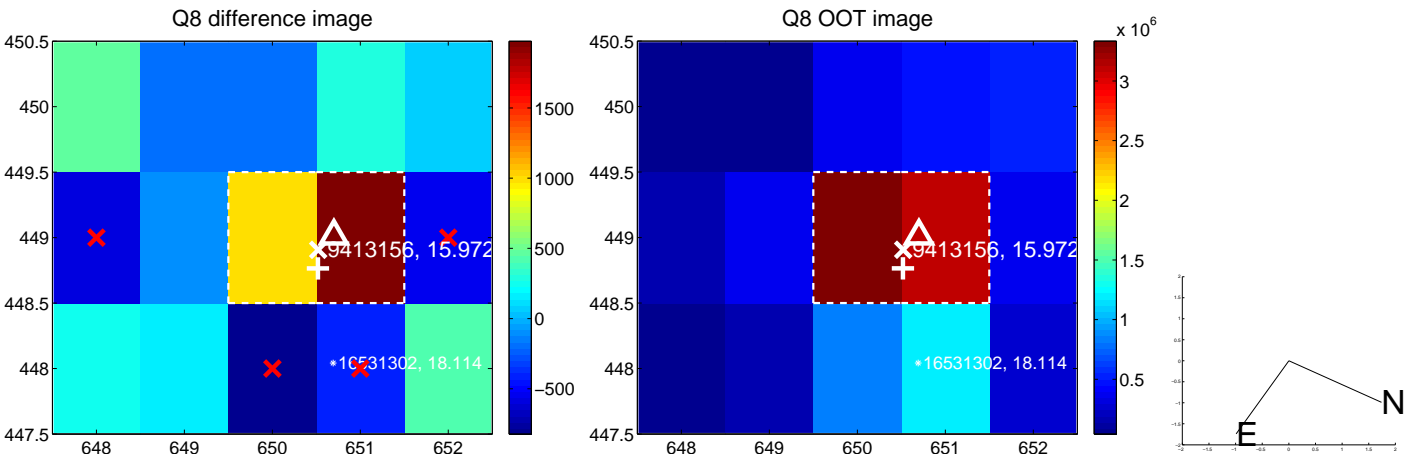
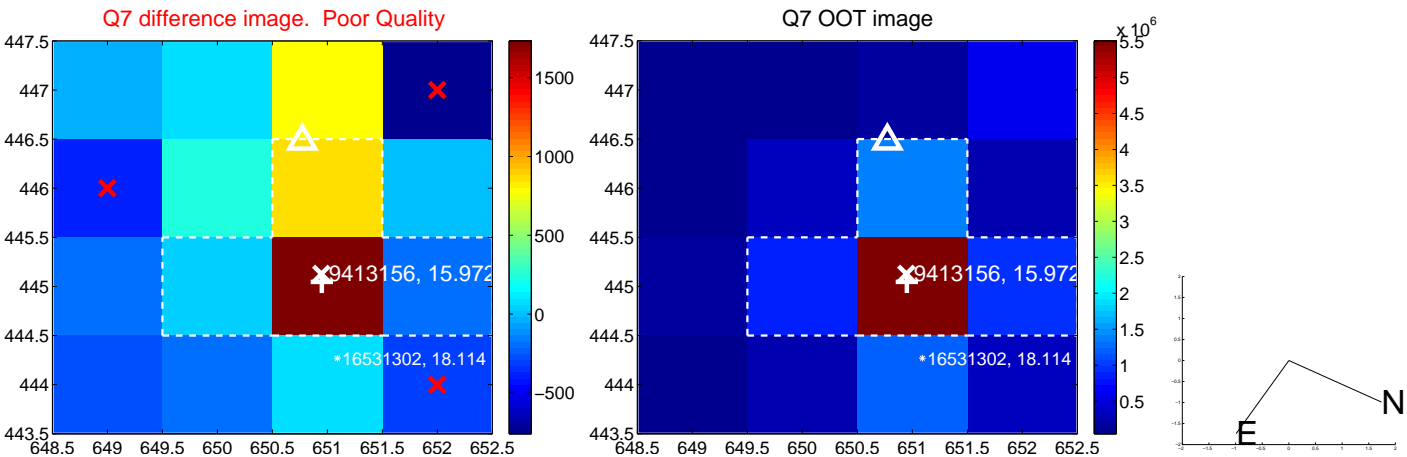
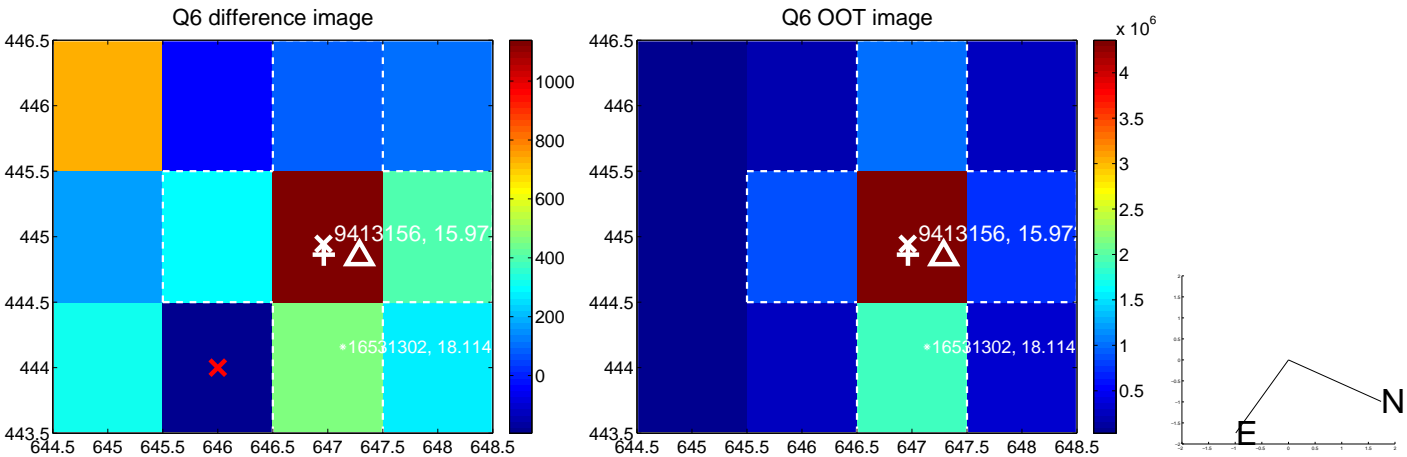
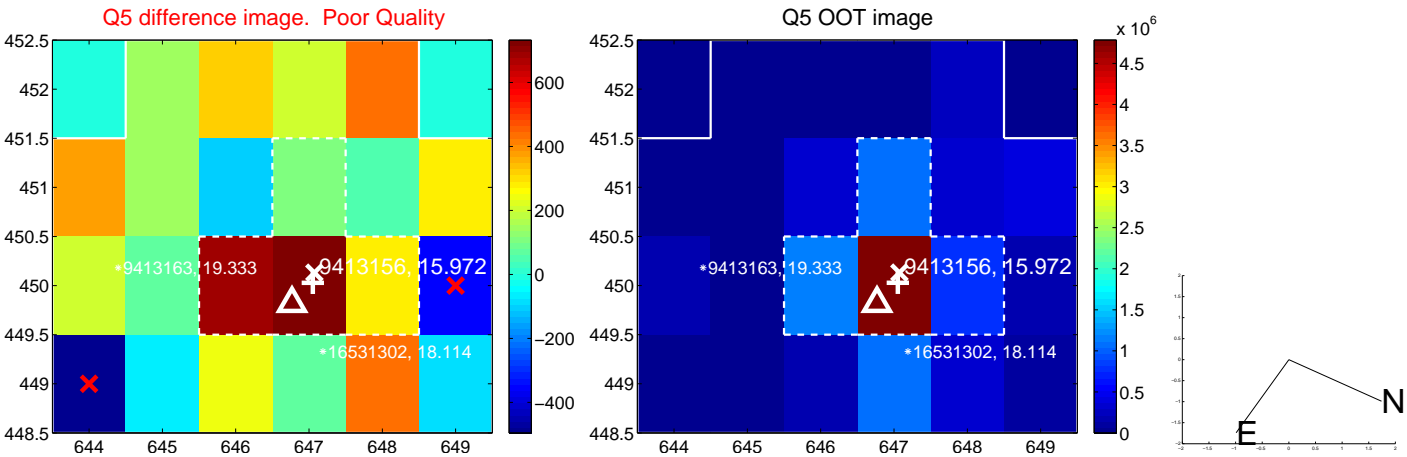


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

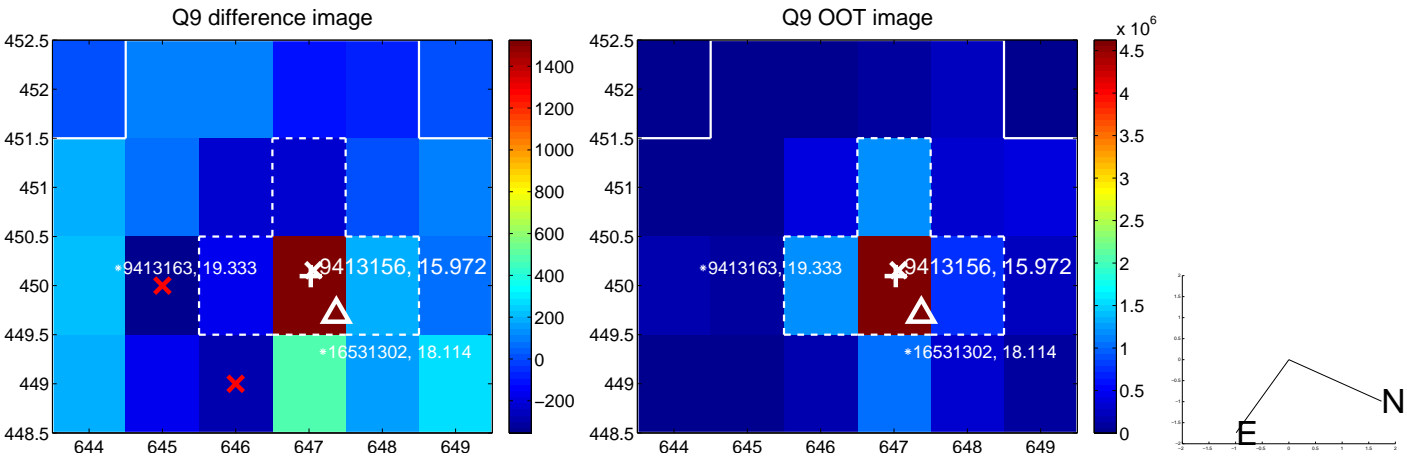
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



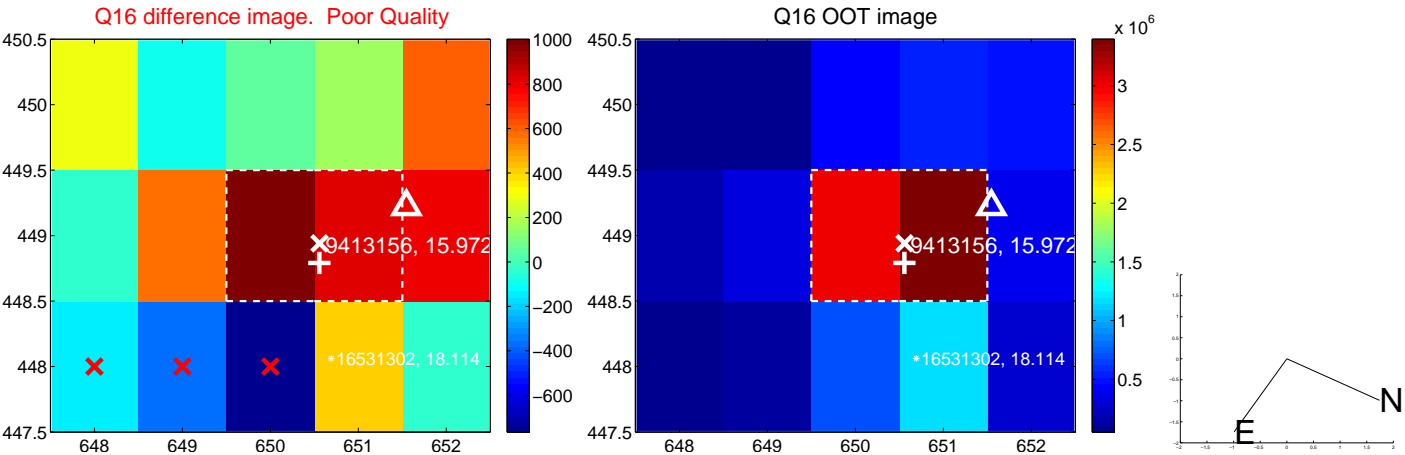
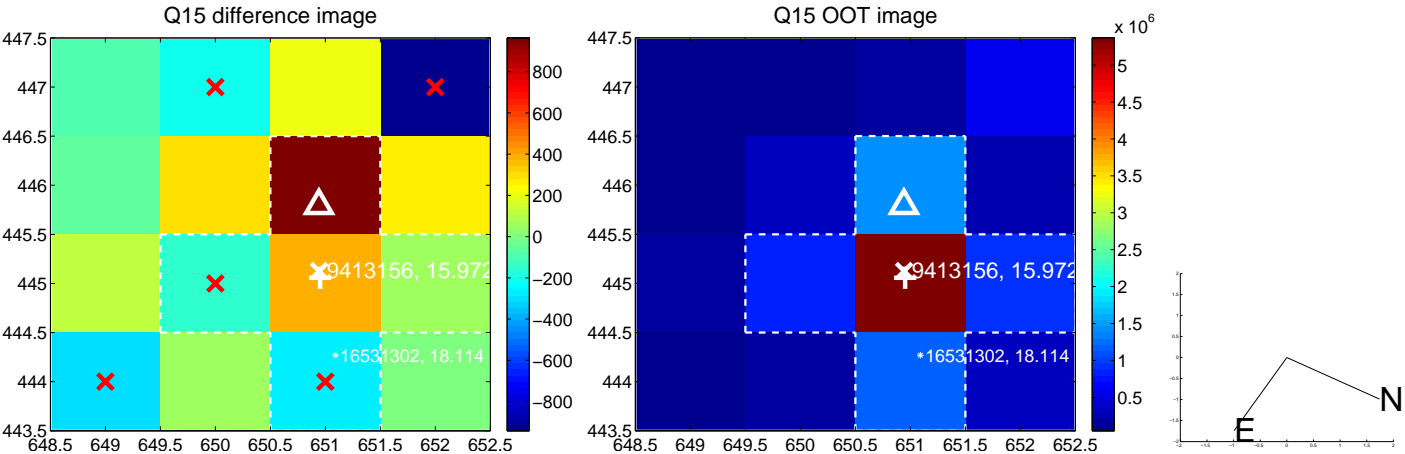
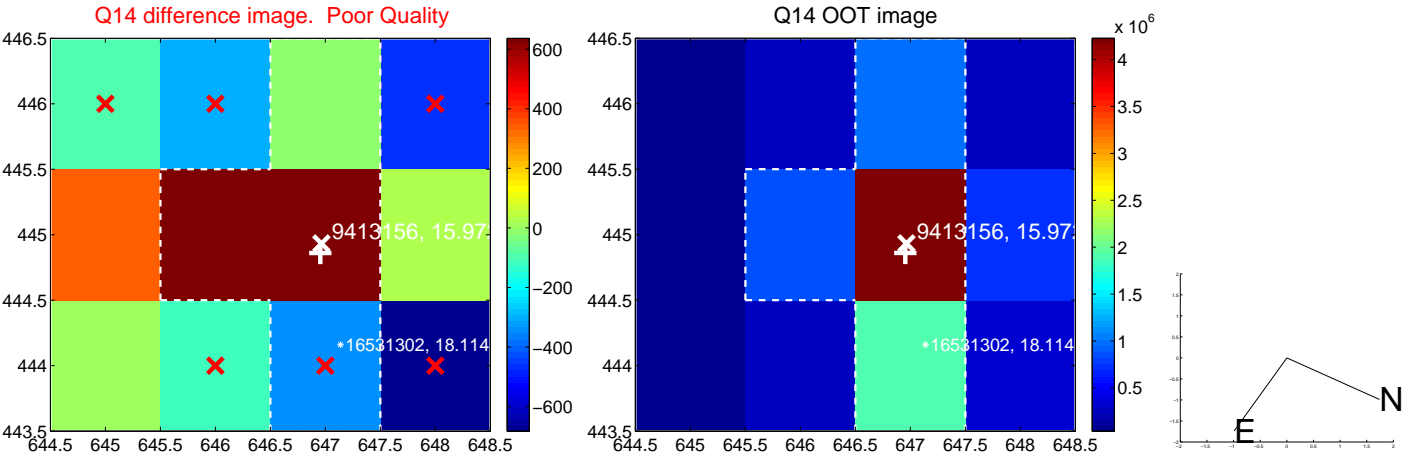
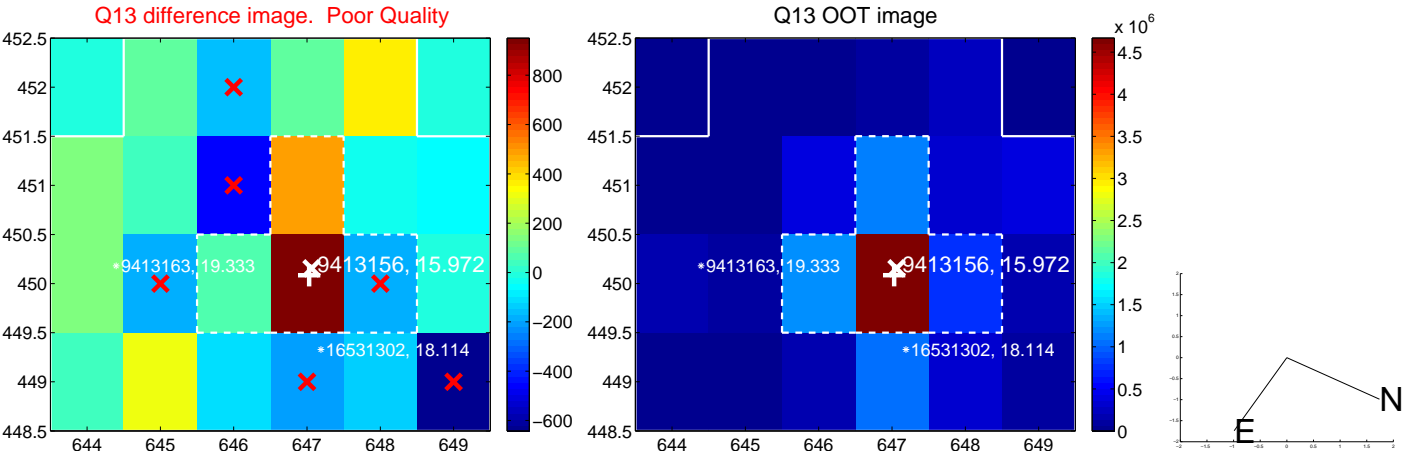
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



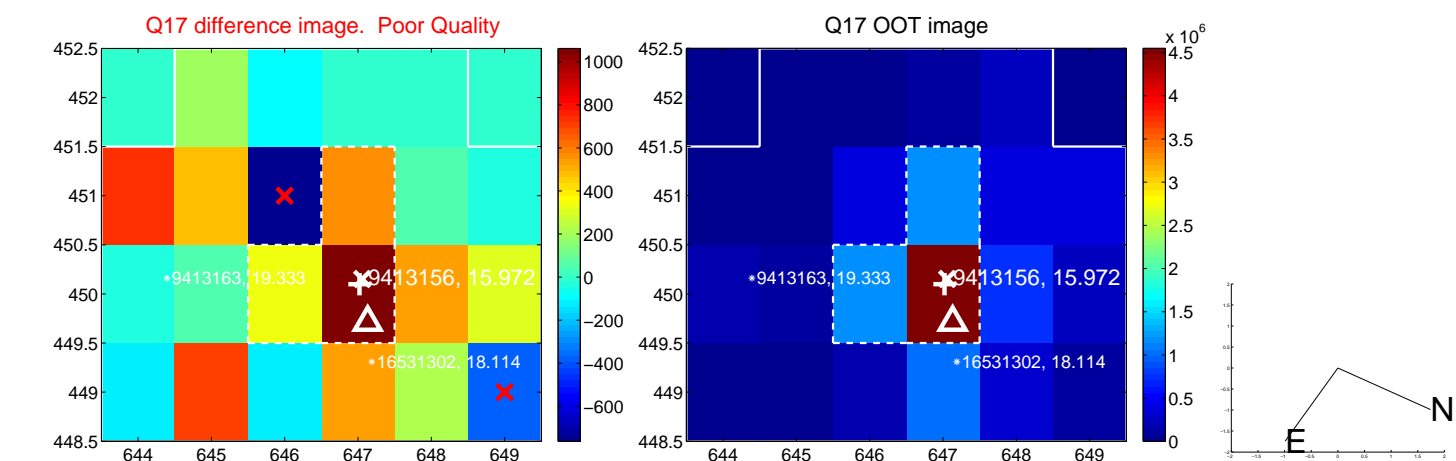
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



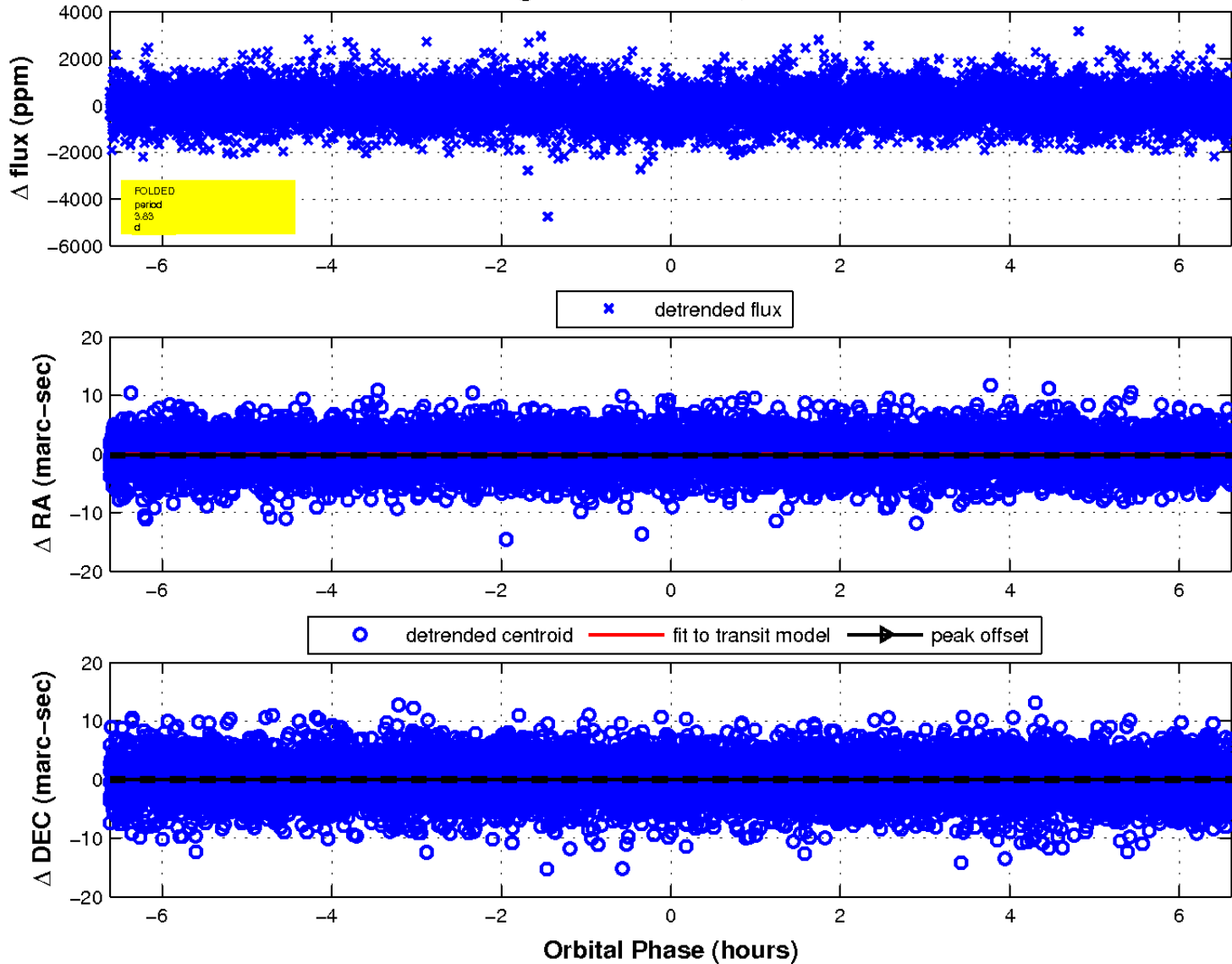
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

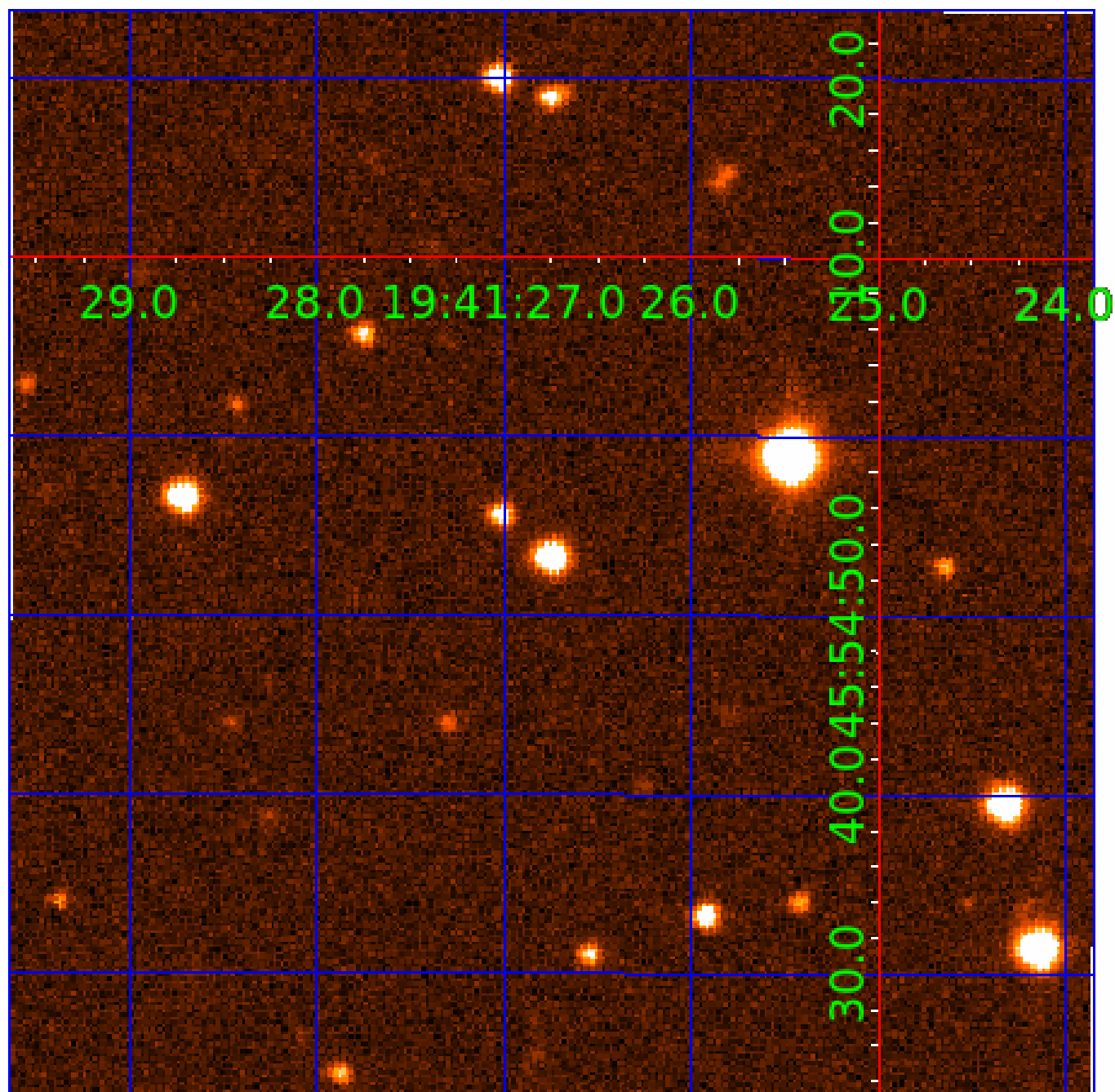


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



KIC 009413156

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})
009413156-01	OBS	4700.01	3.834867	135.090515	213.6	2.205	9.3	9.7	0.78	5515	1.32	240.04
009413156-02	OBS	4700.02	66.478145	184.258824	464.8	4.549	7.3	7.4	0.78	5515	1.84	5.35

Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009413156-01	OBS	PC	1.00	0	0	0	0	CENT_FEW_DIFFS
009413156-02	OBS	PC	0.57	0	0	0	0	CENT_FEW_MEAS

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

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

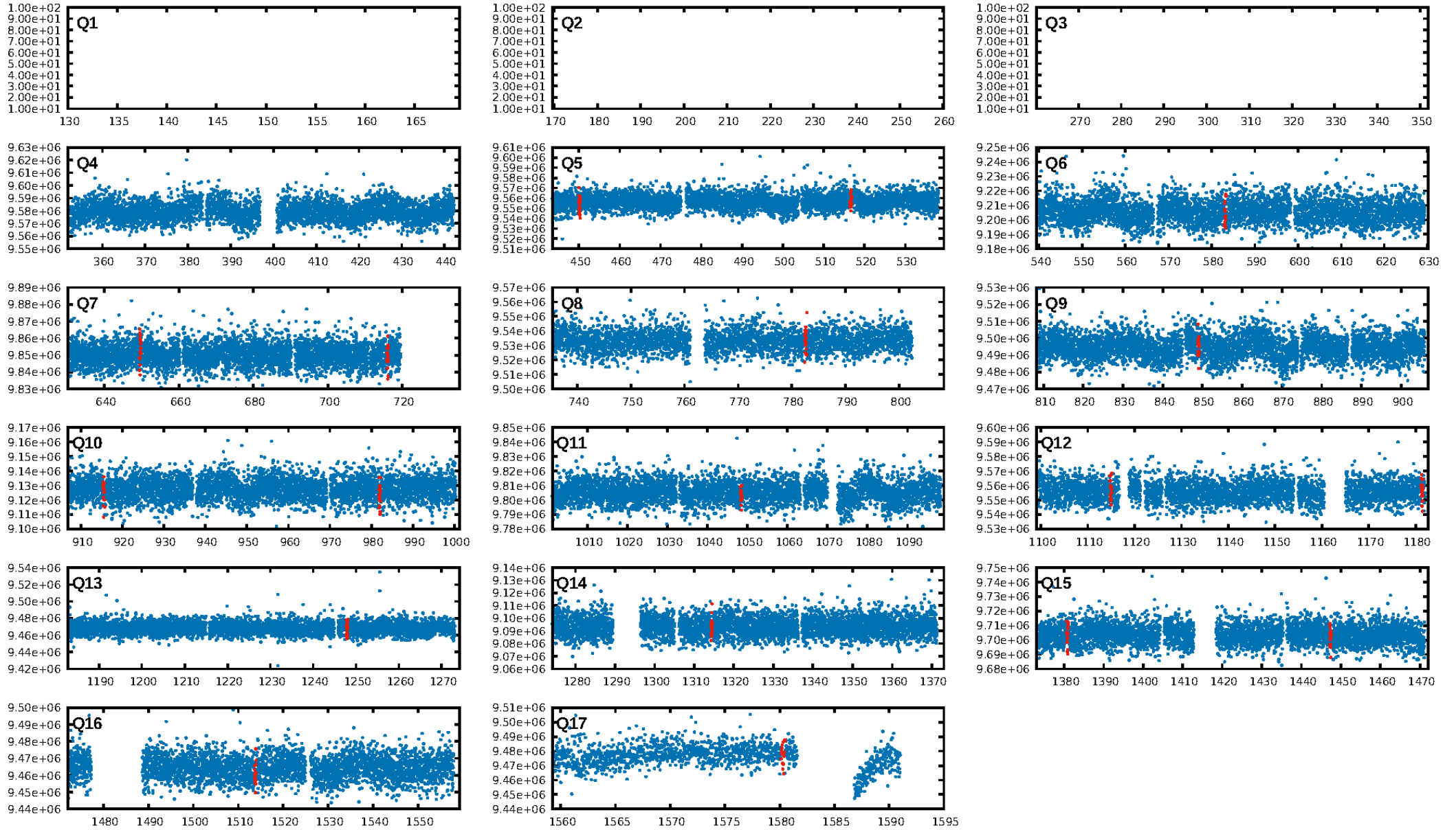
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009413156-02

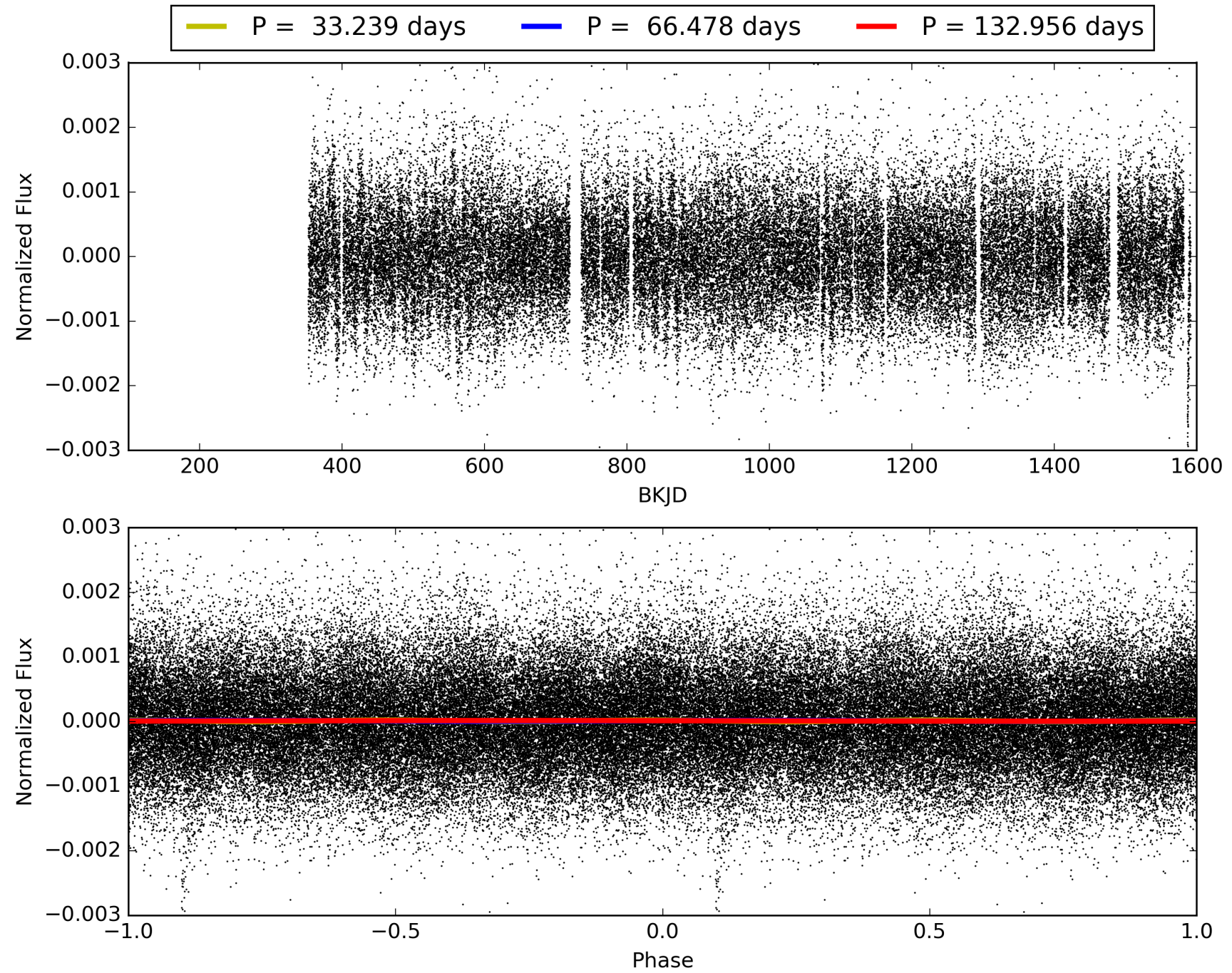
No Significant Match Found

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

TCE 009413156-02, PDC Light Curves

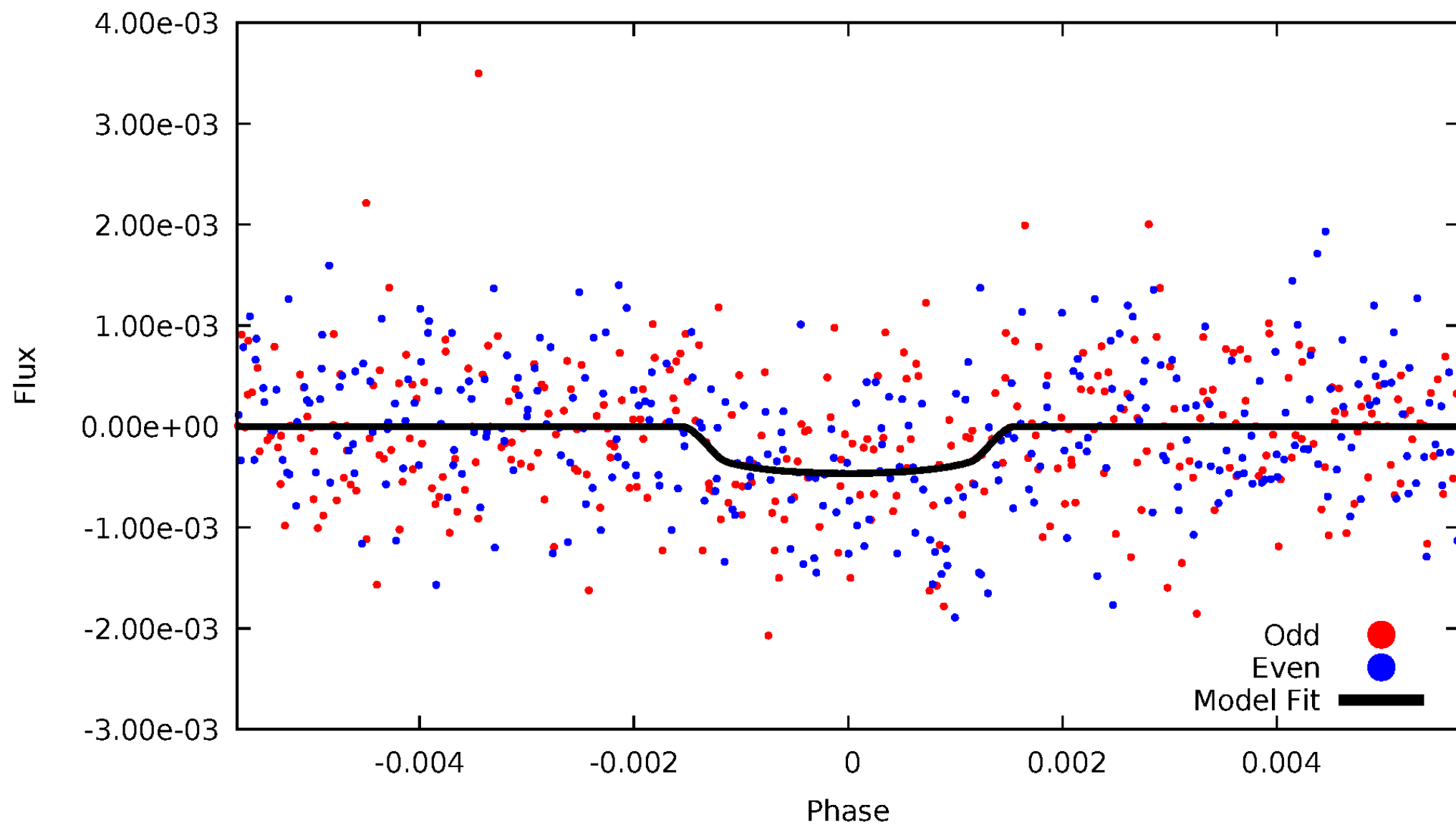


TCE 009413156-02



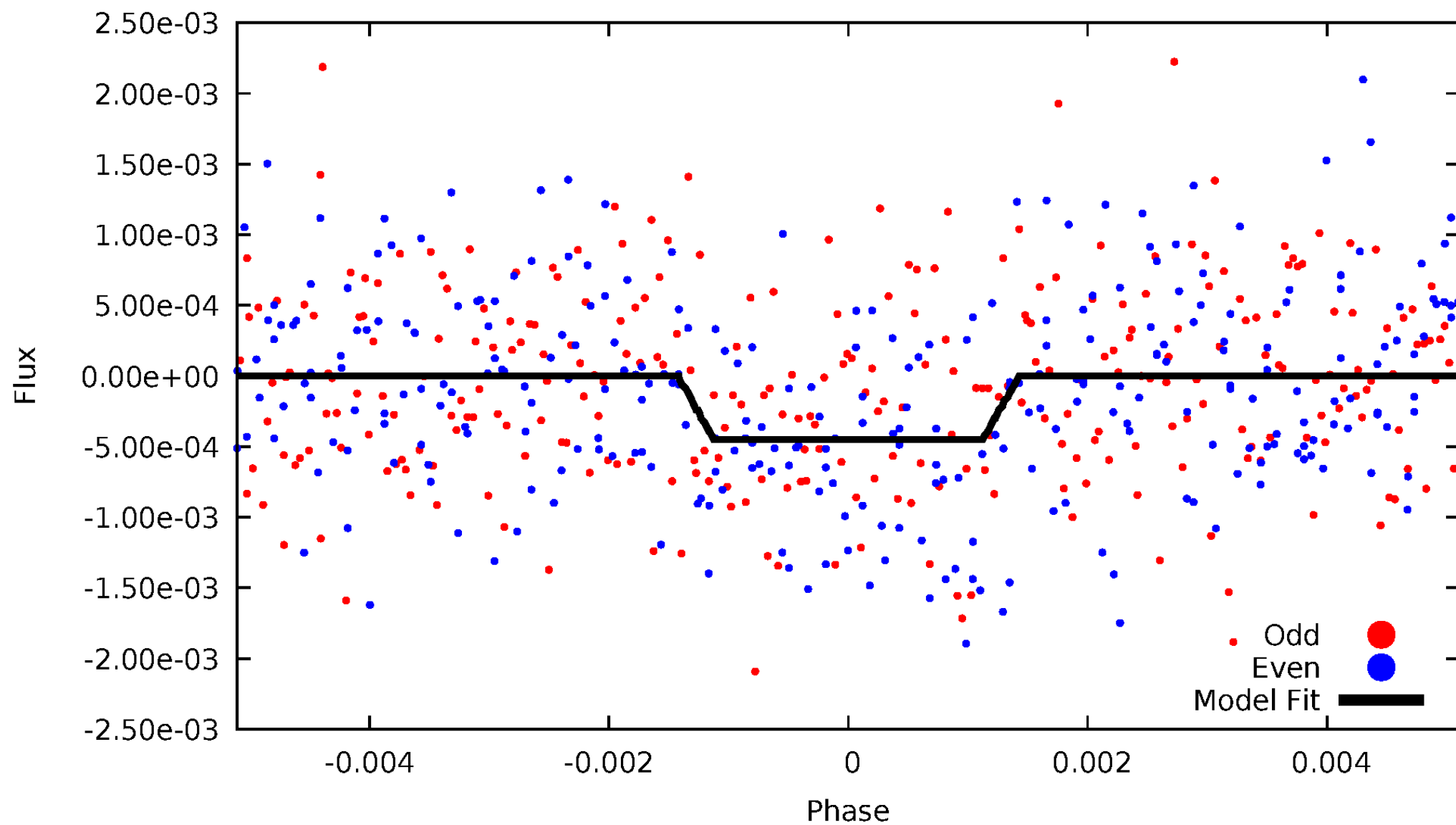
DV Odd/Even

TCE 009413156-02



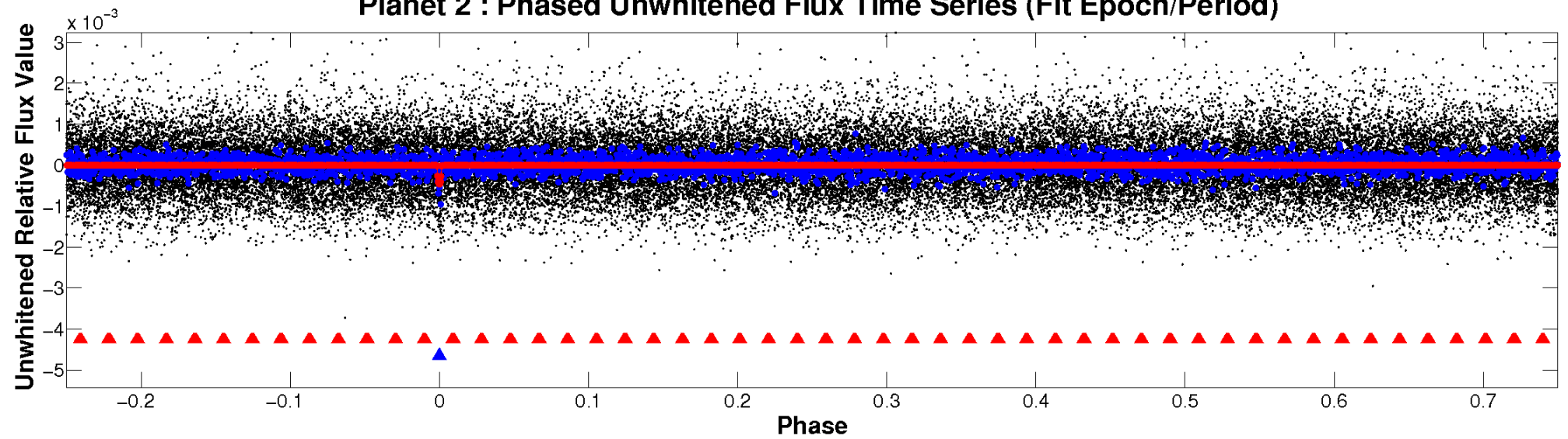
ALT Odd/Even

TCE 009413156-02

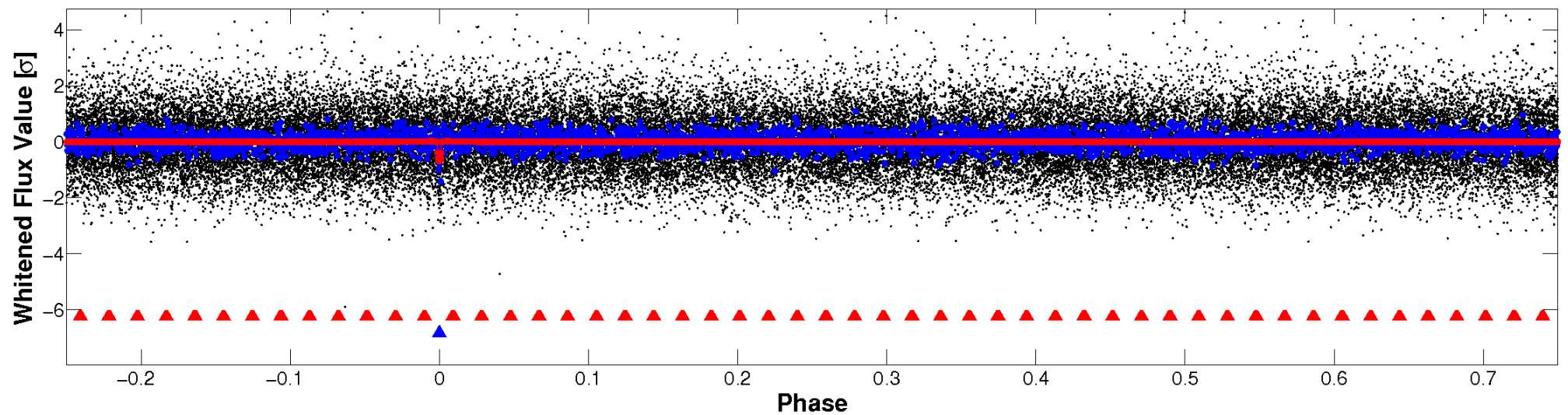


Non-Whitened Vs. Whitened Light Curve

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

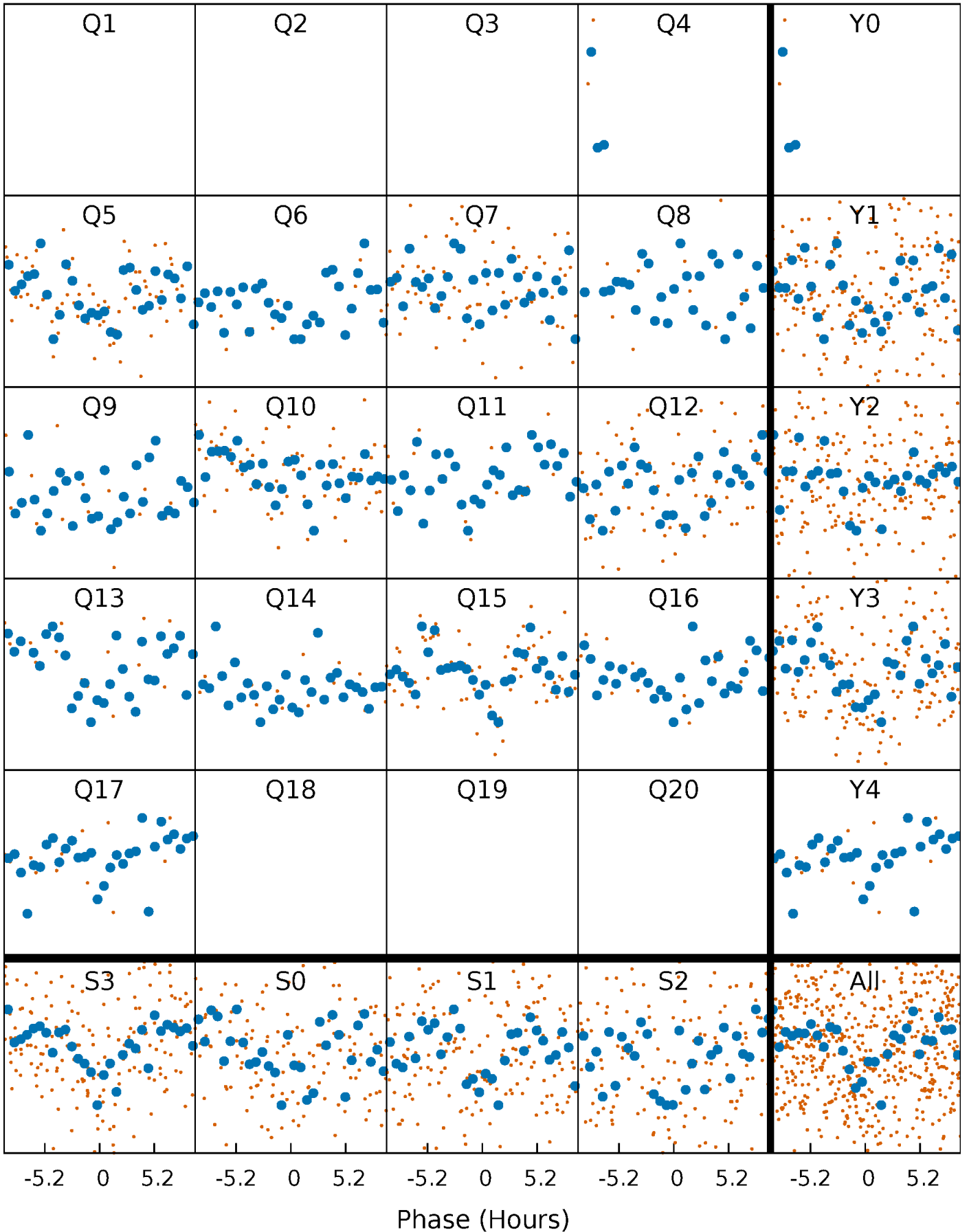


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



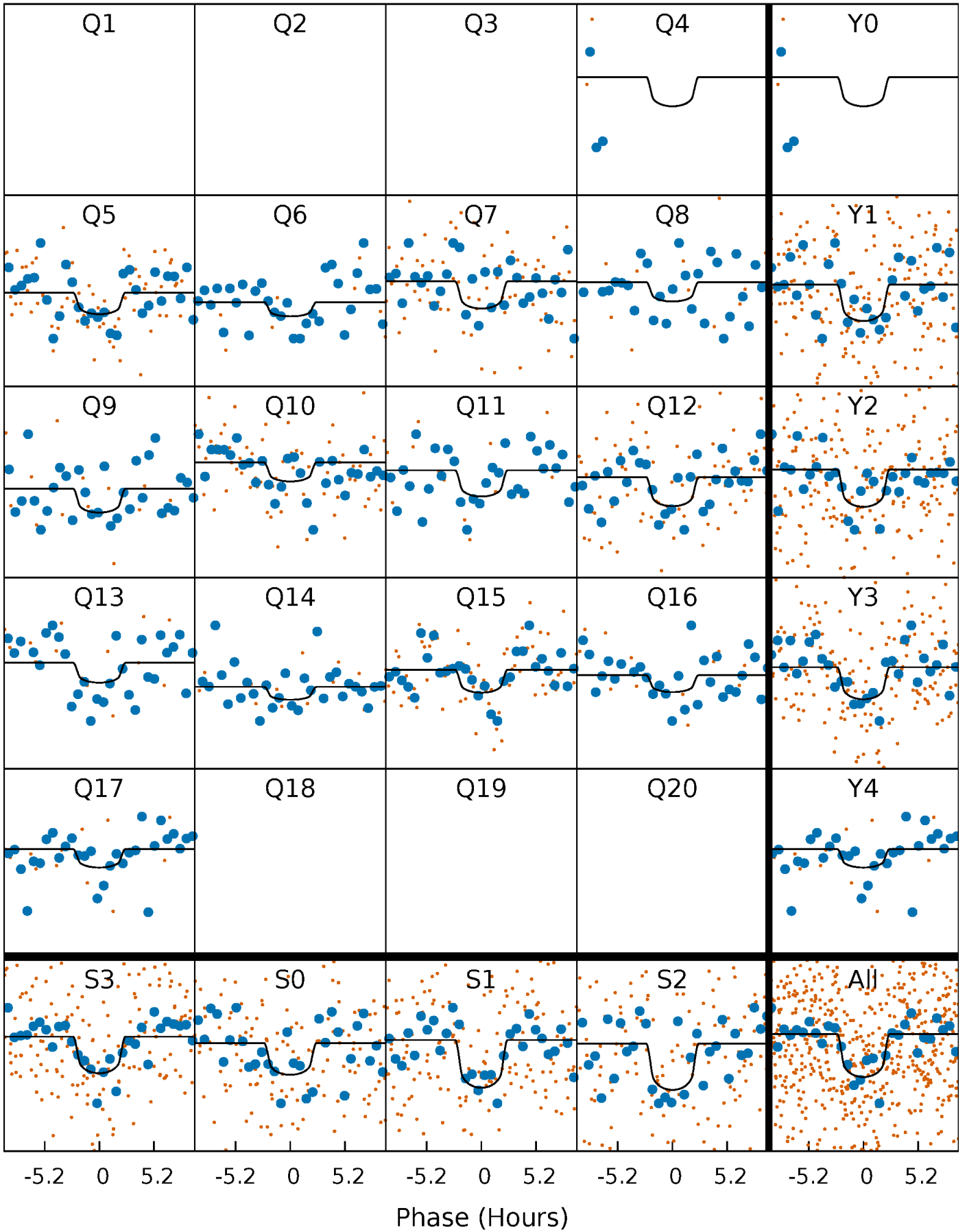
PDC Quarter-Phased Transit Curves

TCE 009413156-02 P= 66.478145 Days $T_0=184.258824$ (BKJD)



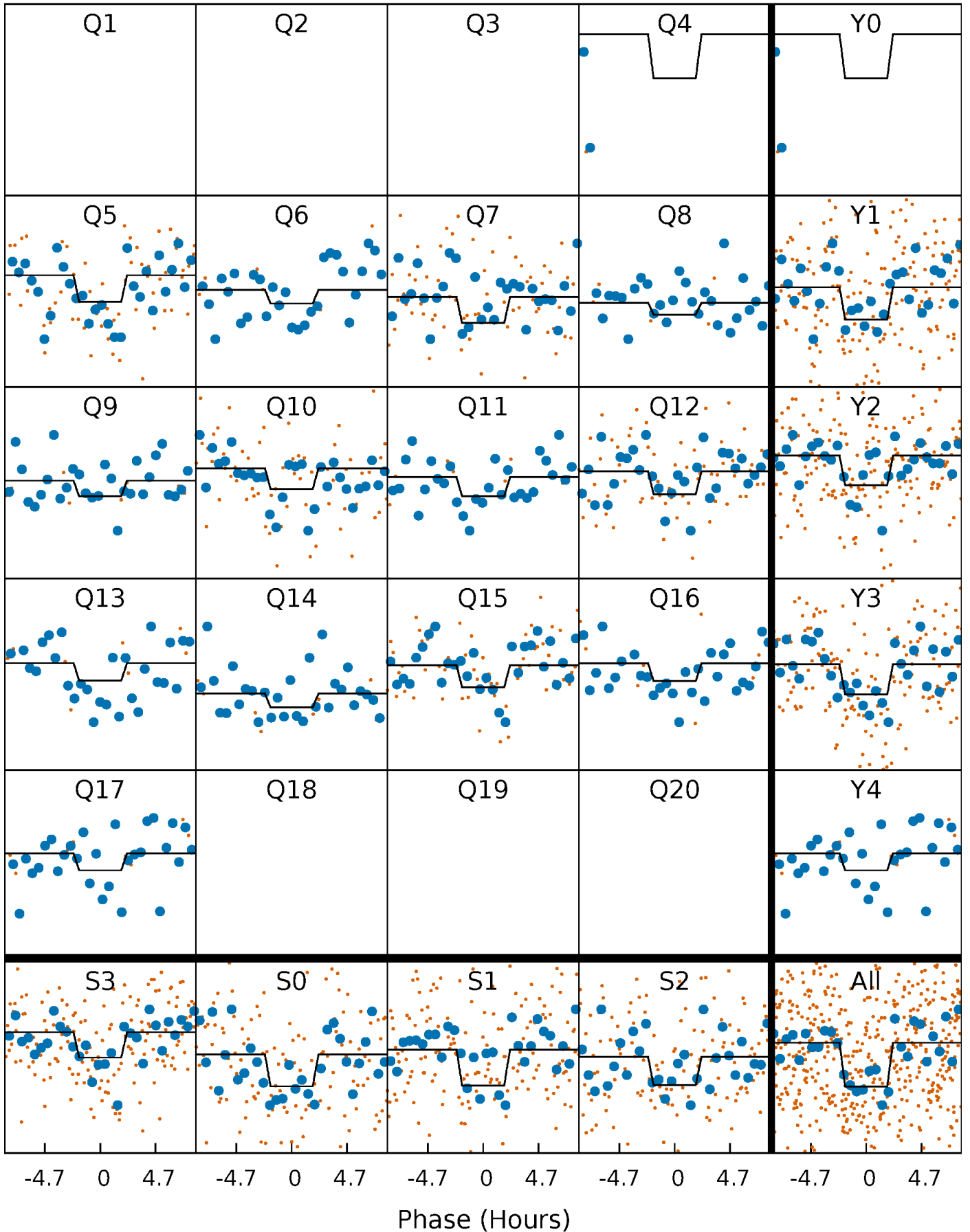
DV Quarter-Phased Transit Curves

TCE 009413156-02 P= 66.478145 Days $T_0=184.258824$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

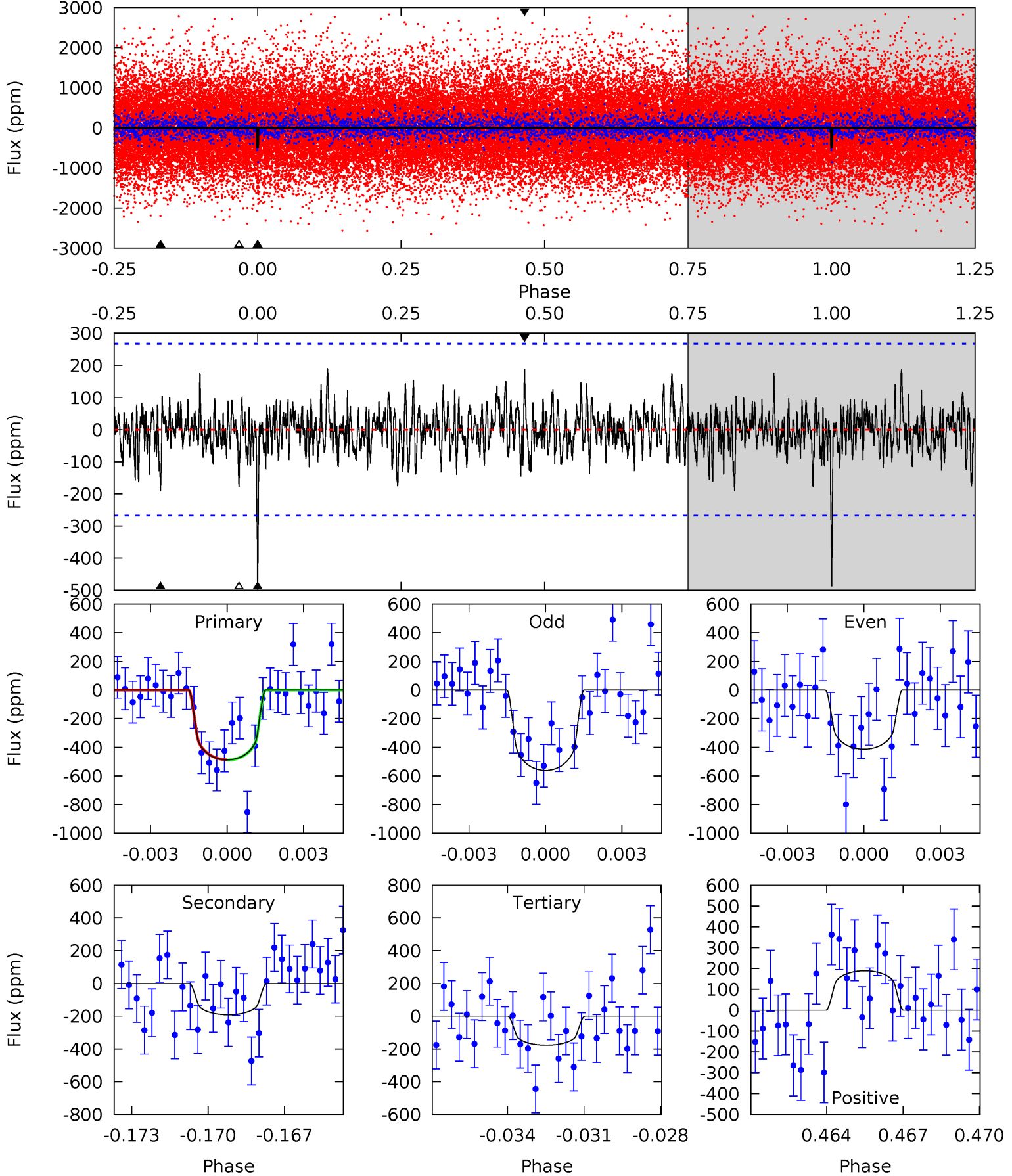
TCE 009413156-02 P= 66.476586 Days $T_0=184.278216$ (BKJD)



DV Model-Shift Uniqueness Test

009413156-02, P = 66.478145 Days, E = 184.258824 Days

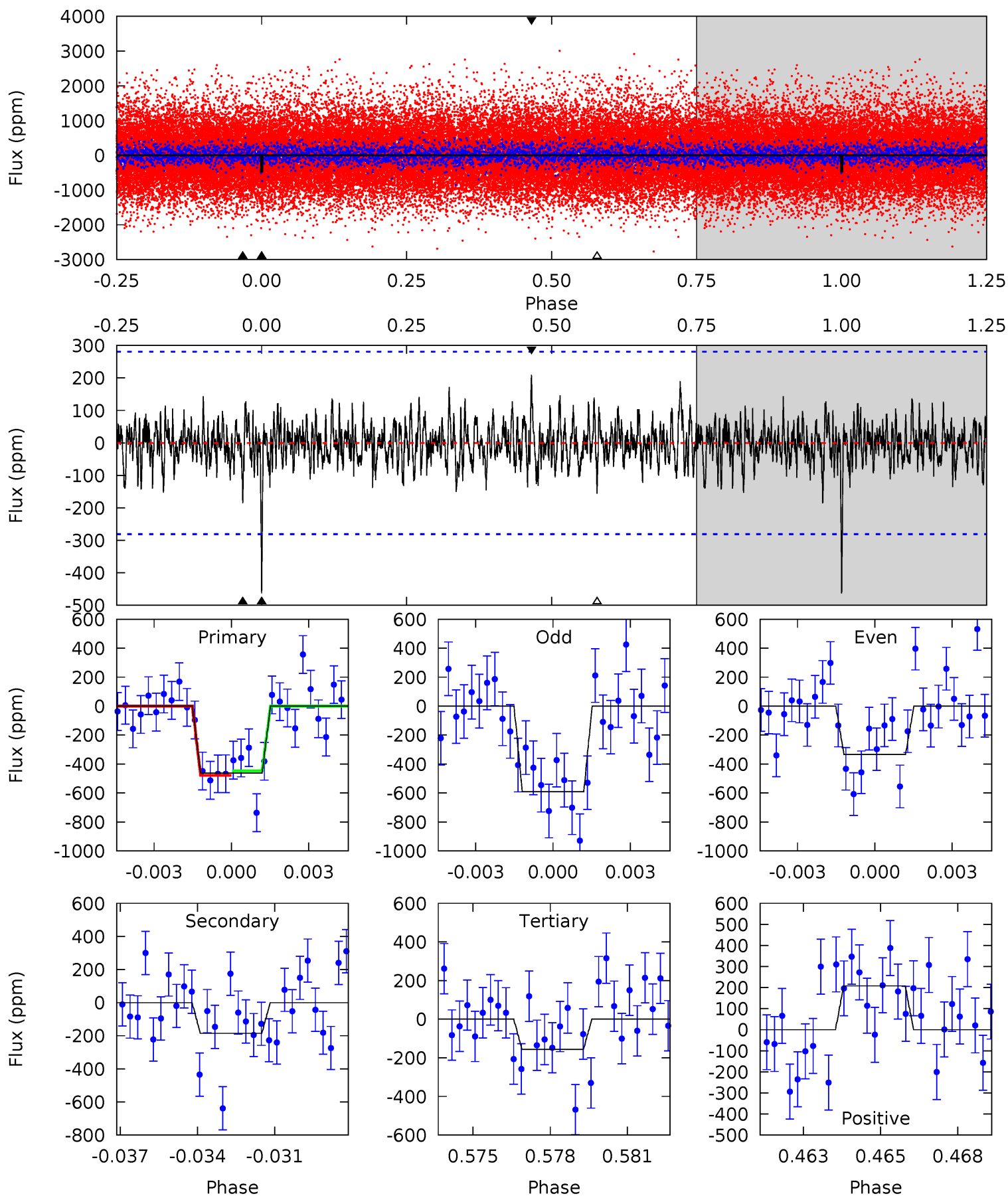
Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.57	3.76	3.48	3.71	5.25	2.96	1.09	6.08	5.85	0.28	0.05	1.46	1.00	0.28	0.03



Alt Model-Shift Uniqueness Test

009413156-02, P = 66.476586 Days, E = 184.278216 Days

Pri	Sec	Ter	Pos	FA ₁	FA ₂	F _{Red}	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.68	3.47	2.92	3.89	5.26	2.99	0.98	5.75	4.78	0.55	-0.42	2.41	1.12	0.31	0.29



Stellar Parameters For KIC 009413156

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	R (R_{\odot})	M (M_{\odot})	p_{\star} ($\text{g}\cdot\text{cm}^{-3}$)
	5515^{+182}_{-199}	$4.592^{+0.036}_{-0.135}$	$-0.260^{+0.300}_{-0.300}$	$0.775^{+0.164}_{-0.070}$	$0.868^{+0.083}_{-0.102}$	$2.624^{+0.470}_{-1.020}$
	+3%/-4%	+1%/-3%	+115%/-115%	+21%/-9%	+10%/-12%	+18%/-39%
Source	KIC0	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 009413156-02 / KOI 4700.02

Detrend	Depth (ppm)	R_p (R_{\oplus})	T_{max} (K)	T_{obs} (K)	A_{obs}
DV	-192 ± 51	$2.56^{+2.05}_{-1.65}$	553^{+28}_{-25}	4080^{+2248}_{-736}	1494^{+10157}_{-1049}
Alt.	-185 ± 53	$2.66^{+1.96}_{-1.80}$	551^{+29}_{-23}	3992^{+2362}_{-701}	1361^{+11269}_{-952}

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

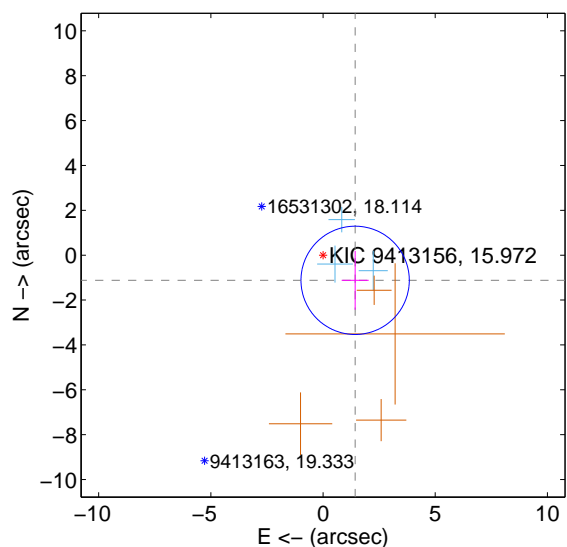
Supplemental centroid analysis for 009413156-02. Kepler magnitude: 15.97. Transit SNR 7.45

There are 3 quarters with good PRF difference image offsets

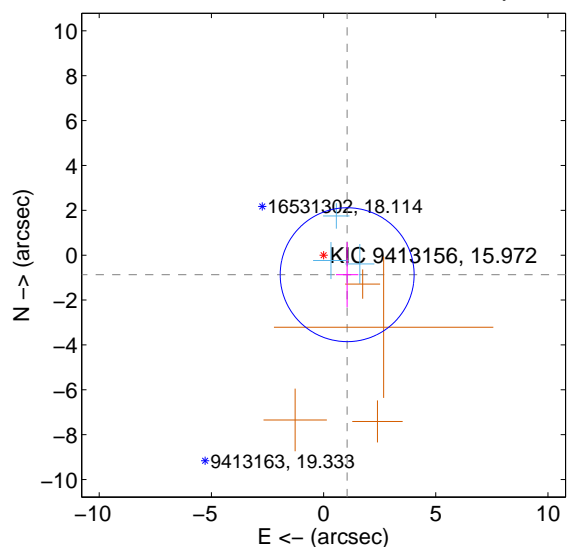
The direct PRF centroid is offset from the target star catalog position by about 0.26 arcsec

	Distance in arcsec	Distance / σ	Δ RA	Δ Dec
PRF-fit source offset from OOT	1.818 ± 0.805	2.26	-1.431 ± 0.601	-1.121 ± 1.312
PRF-fit source offset from KIC position	1.364 ± 0.995	1.37	-1.051 ± 0.496	-0.870 ± 1.448
photometric centroid source offset	3.51 ± 1.83	1.92	0.33 ± 1.68	3.49 ± 1.83

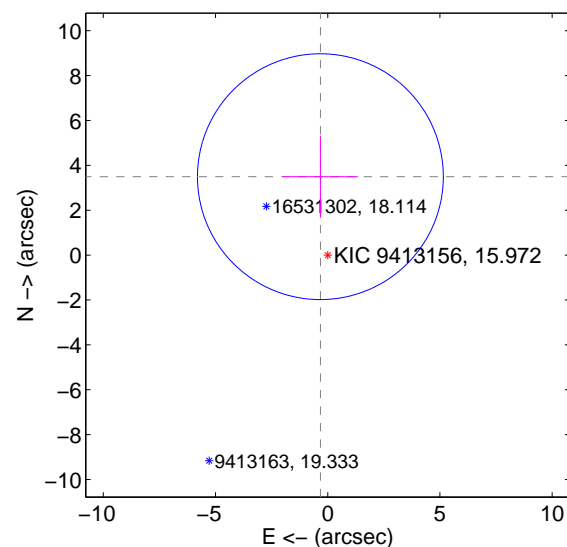
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids

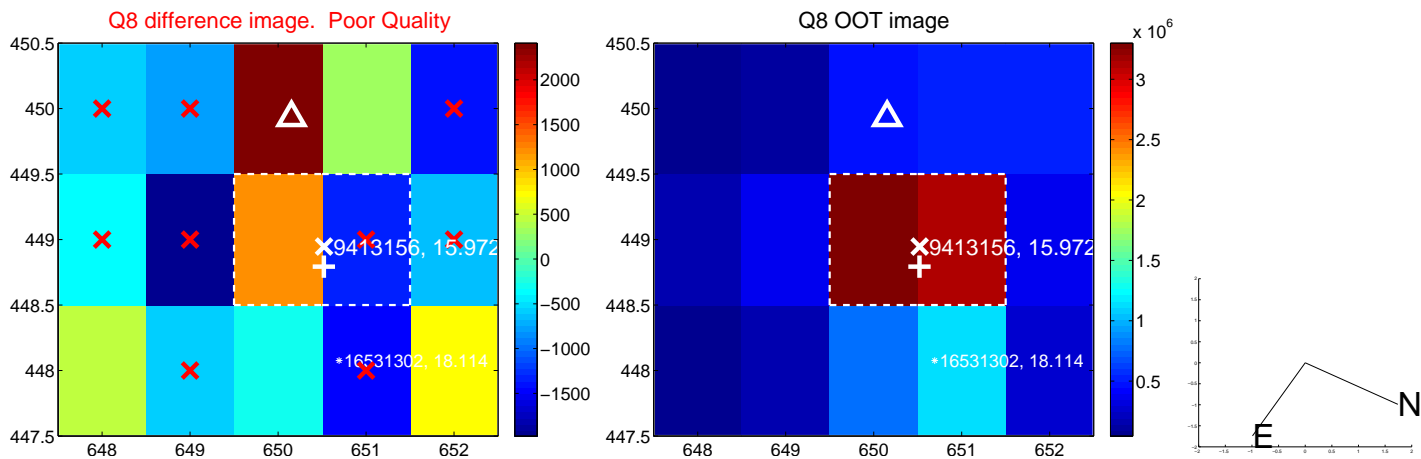
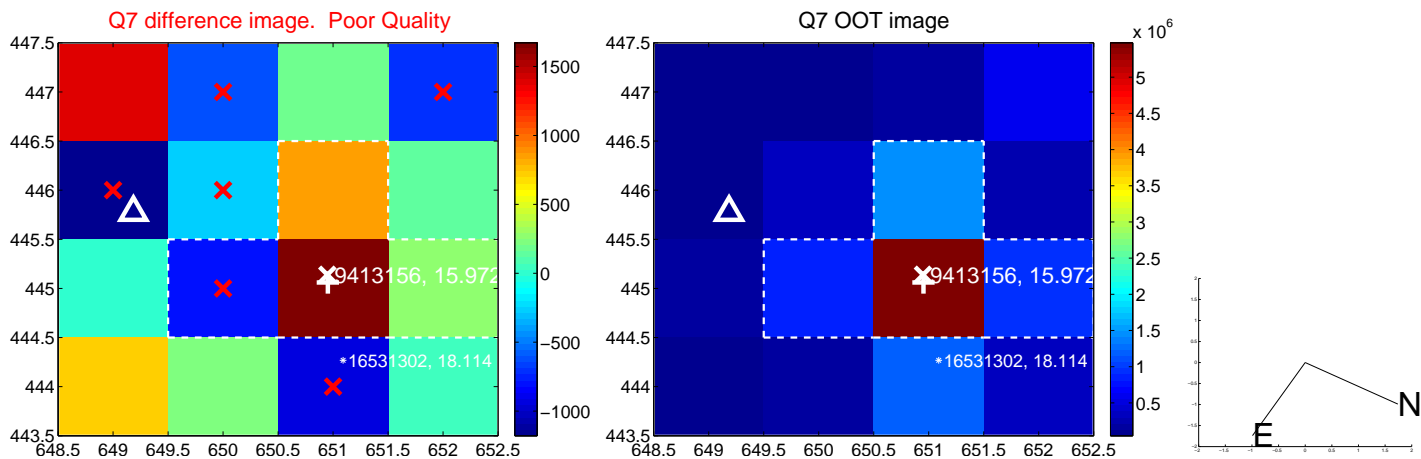
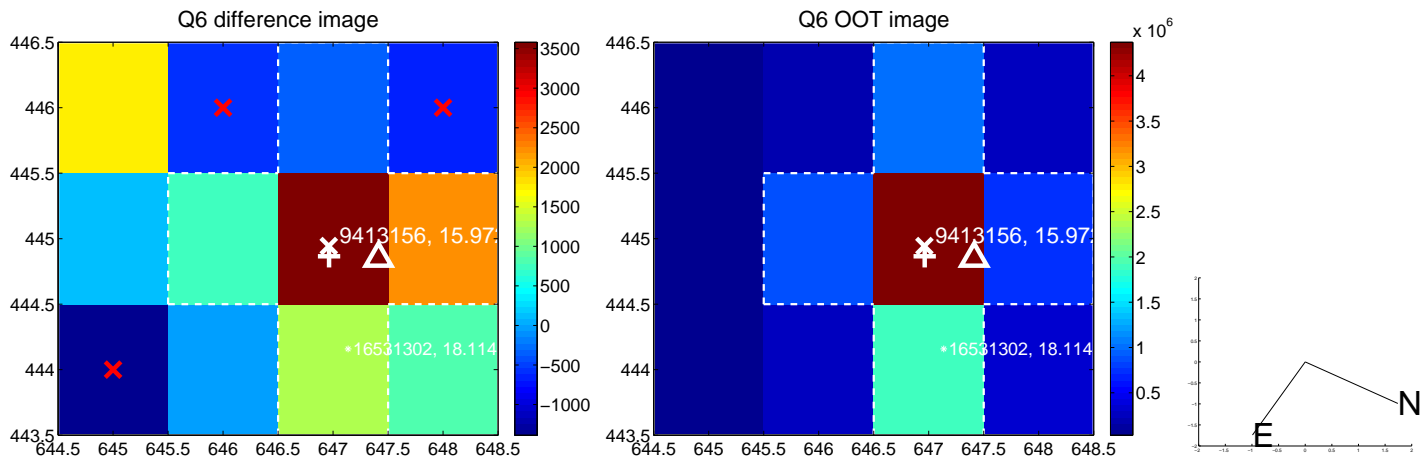
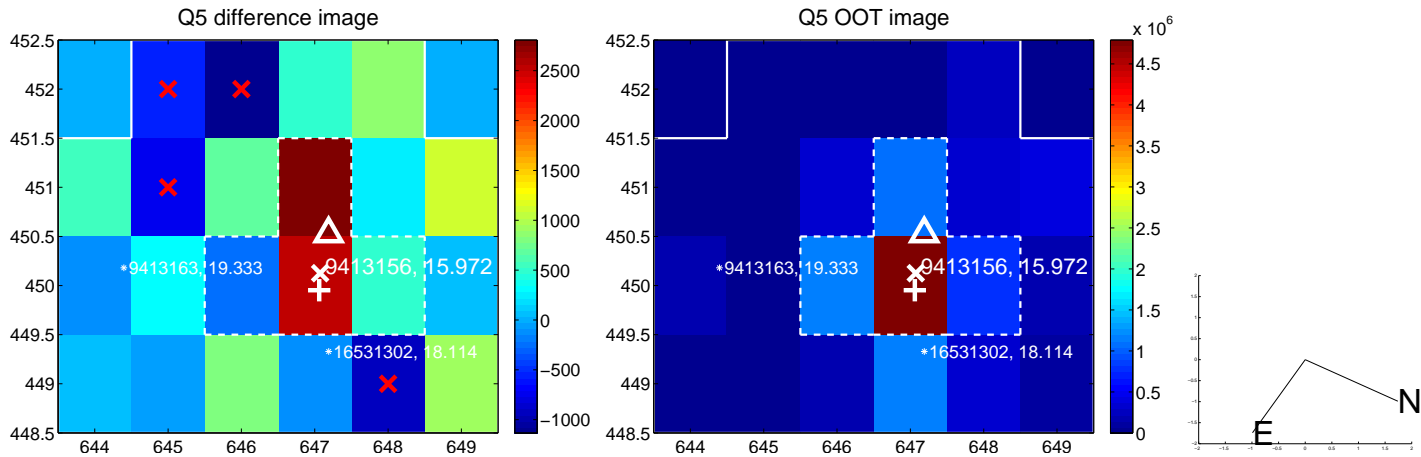


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

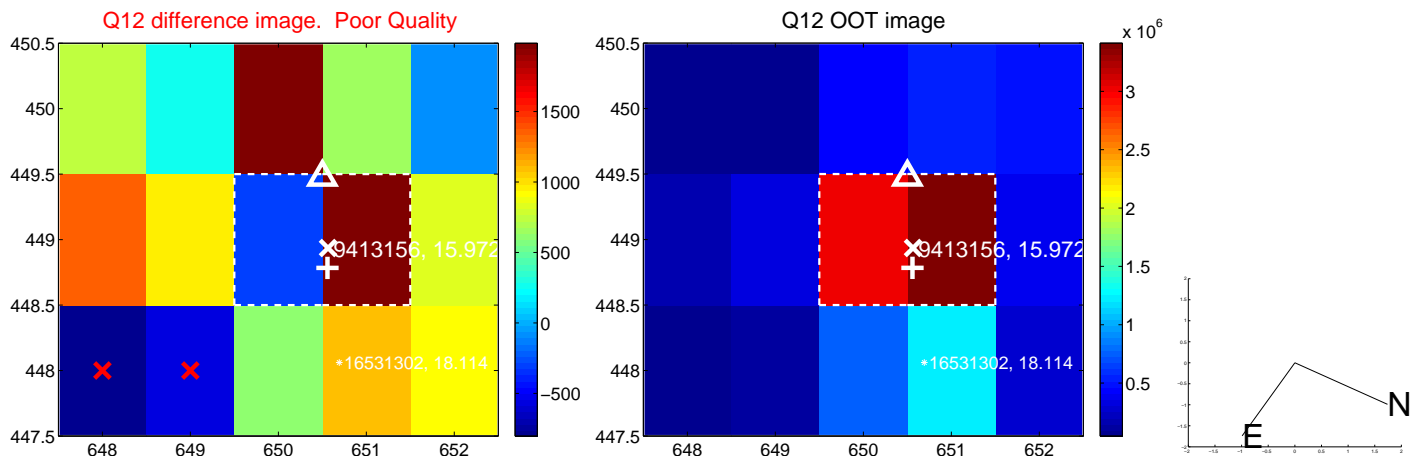
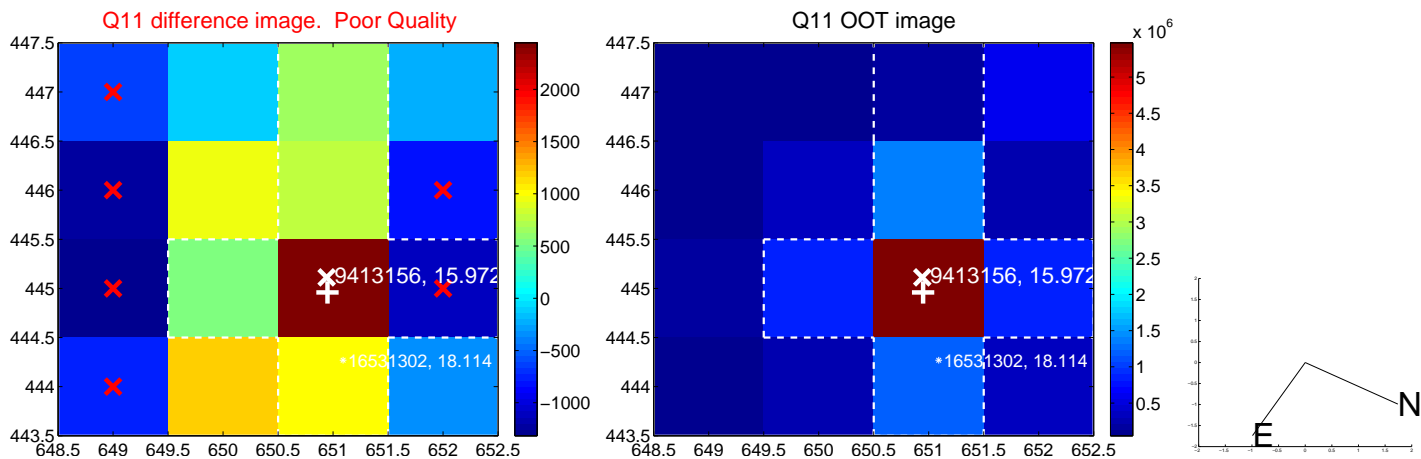
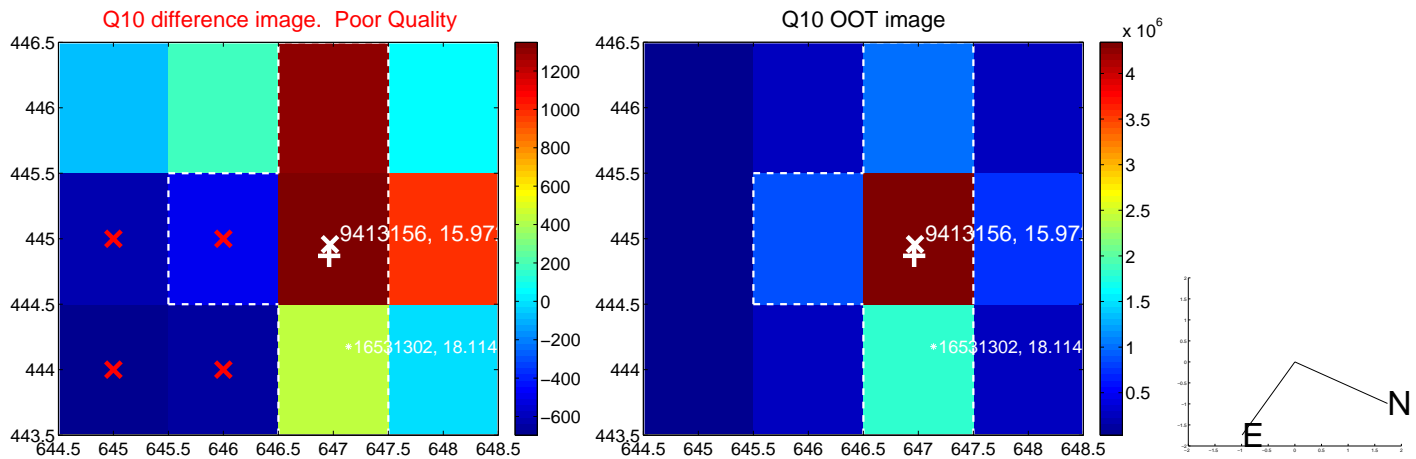
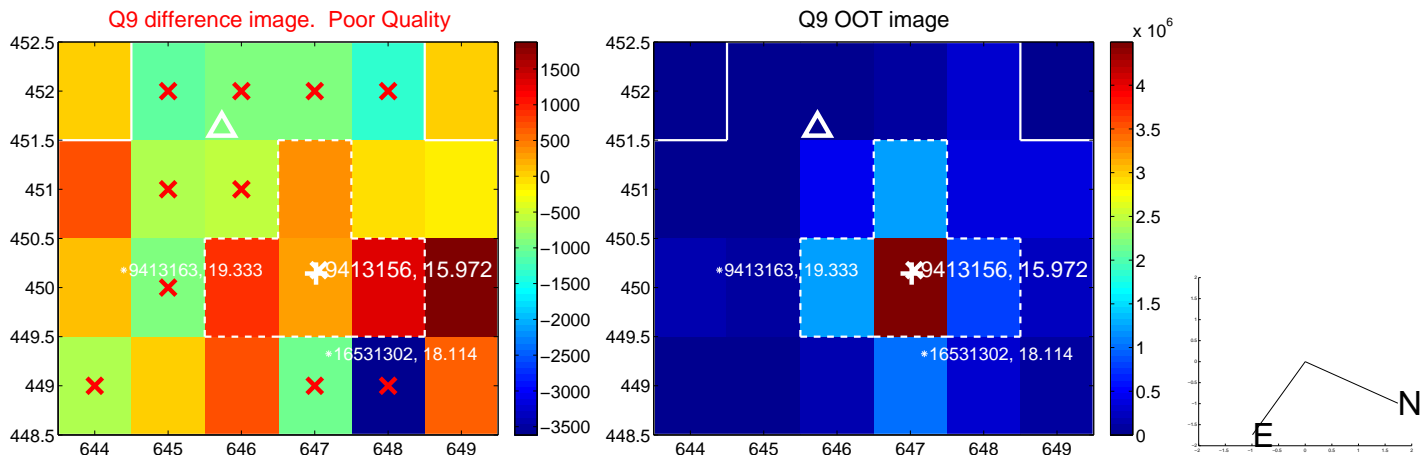
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



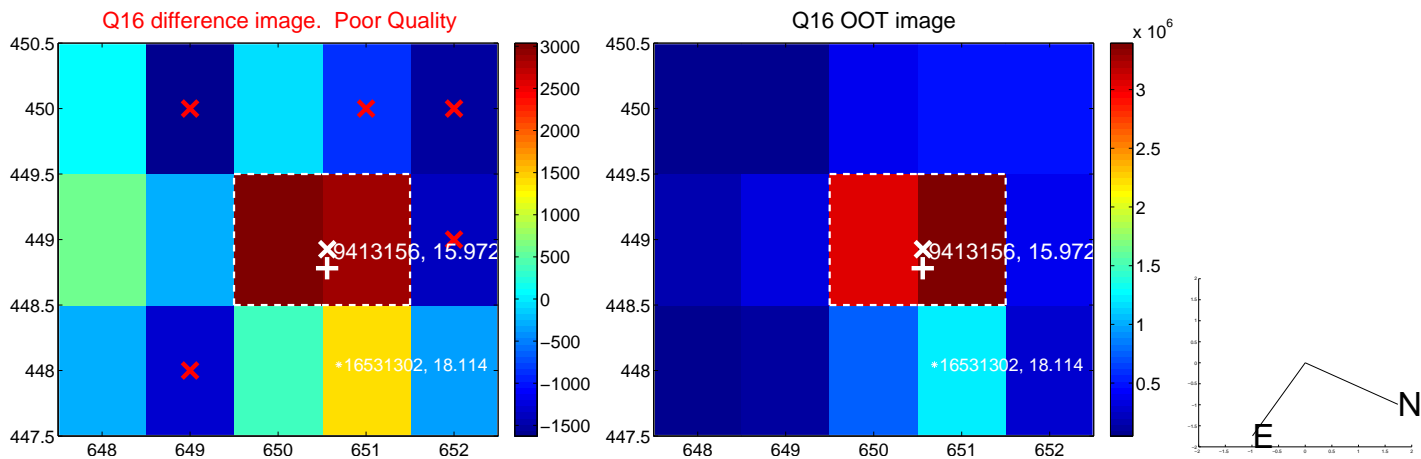
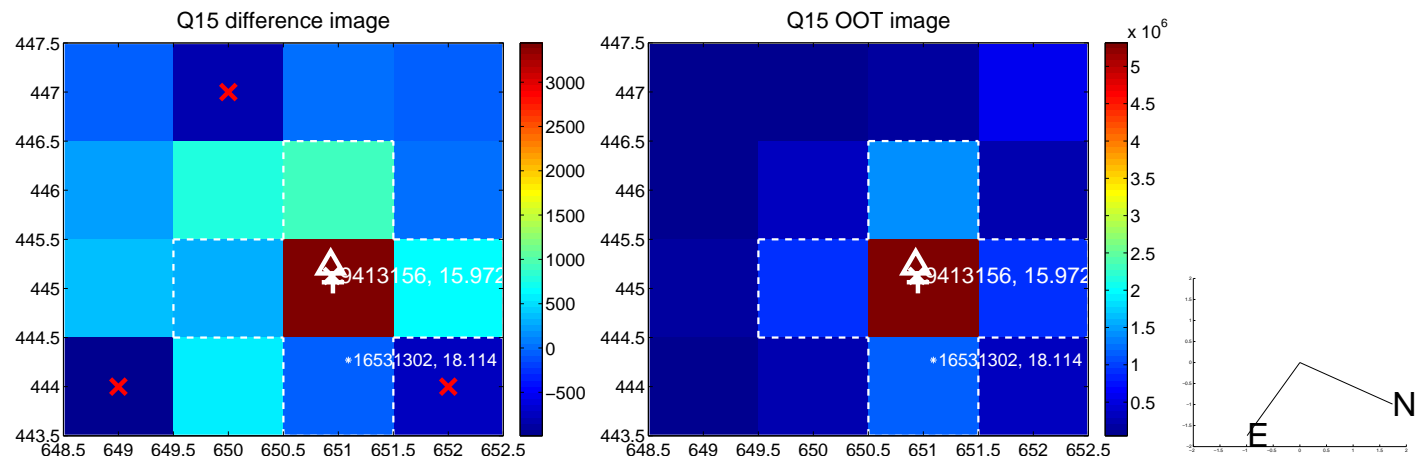
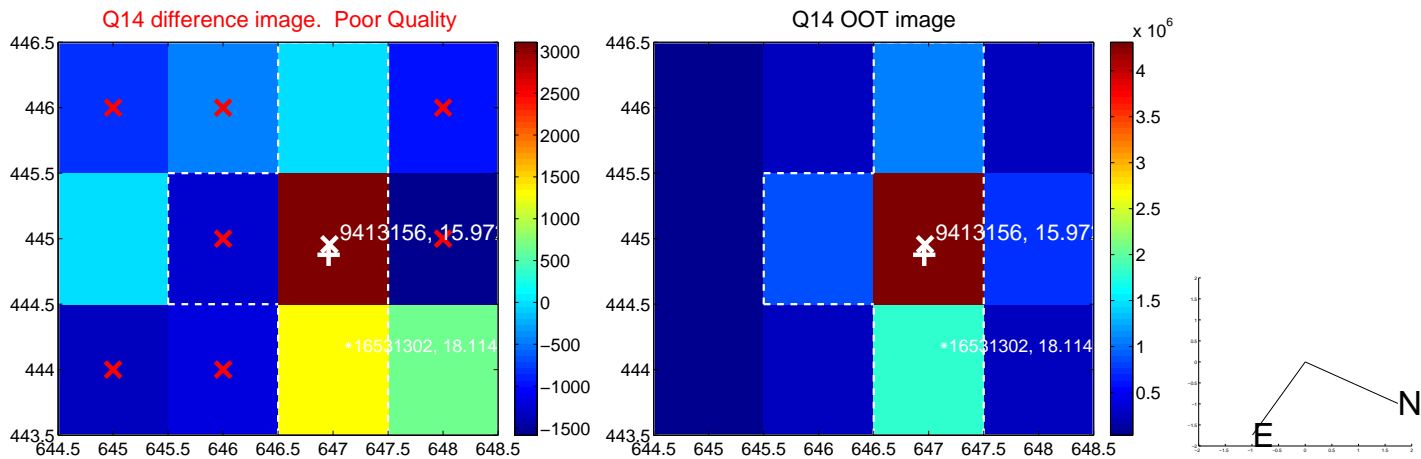
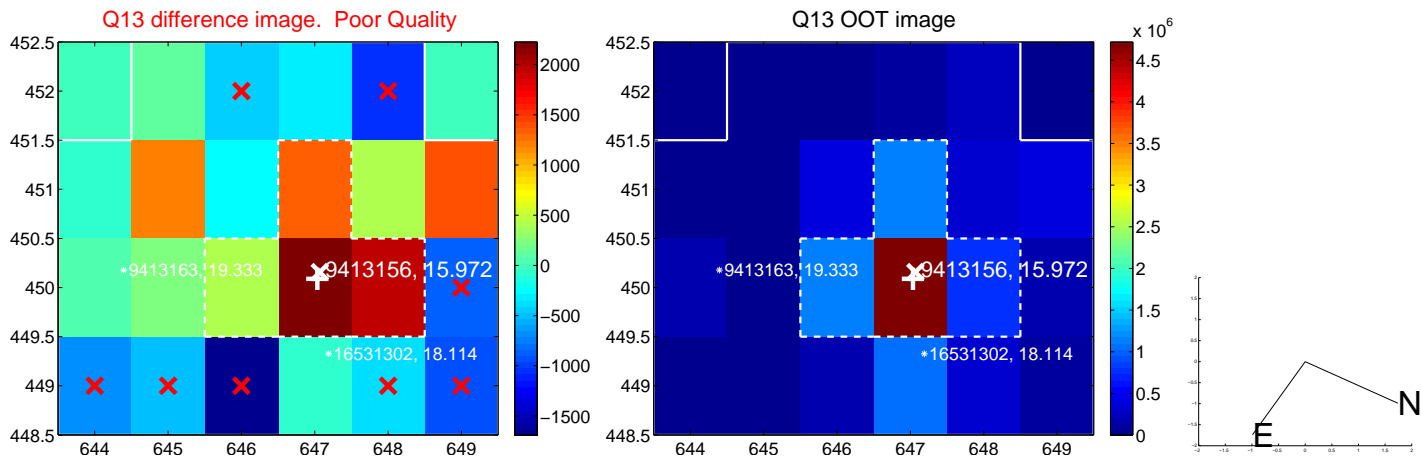
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



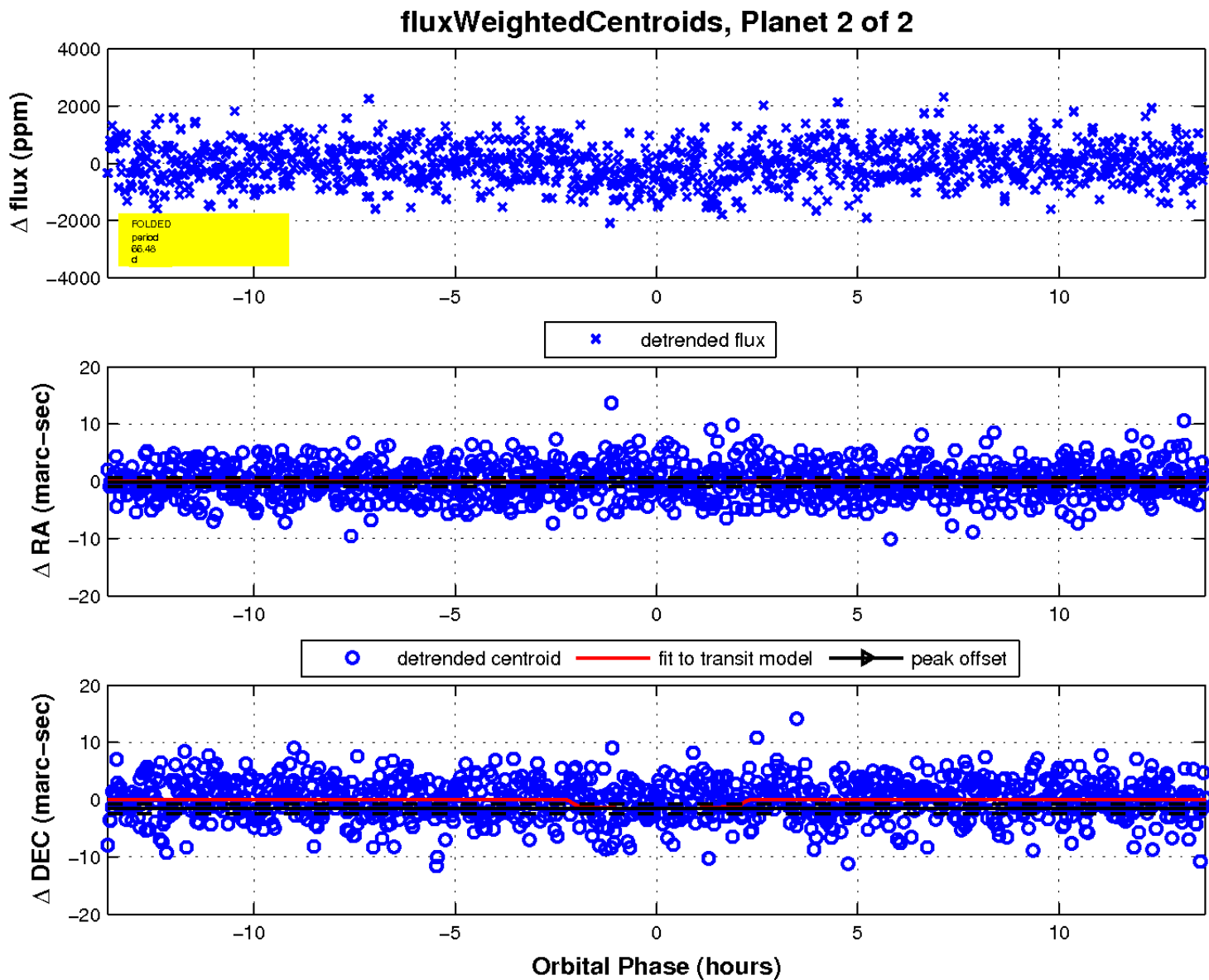
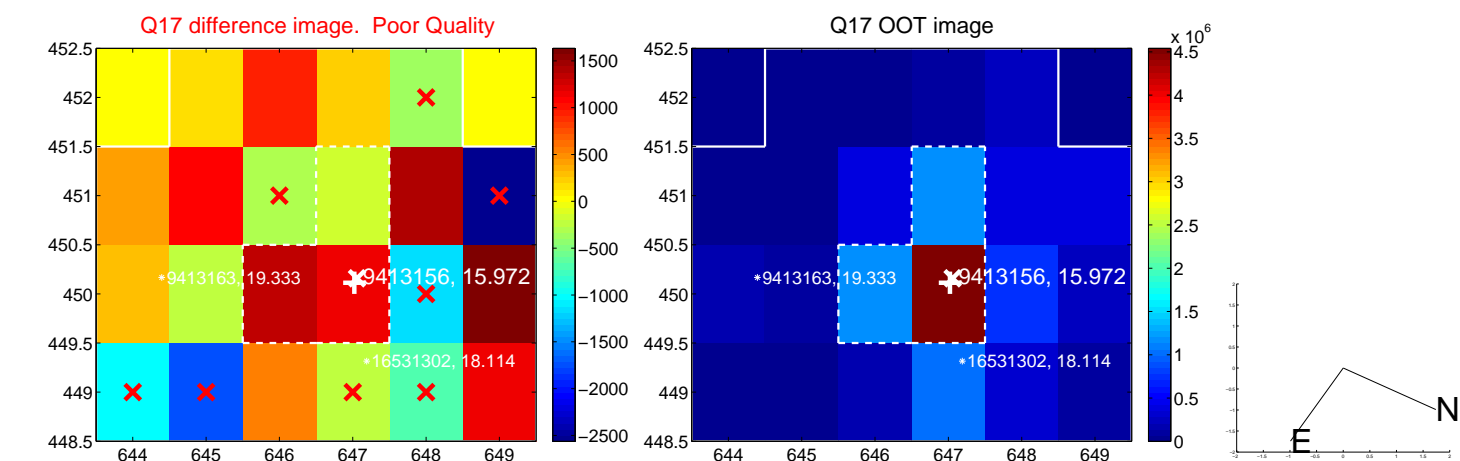
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

