

# KIC 003940418

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003940418-01	OBS	0810.01	4.783001	132.244965	1019.0	2.688	57.6	64.8	0.81	5170	3.21	145.83
003940418-02	OBS	No	397.771585	226.057985	697.8	18.945	8.1	8.3	0.81	5170	2.62	0.40

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003940418-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
003940418-02	OBS	FP	0.02	1	0	0	0	ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS

**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](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003940418-01

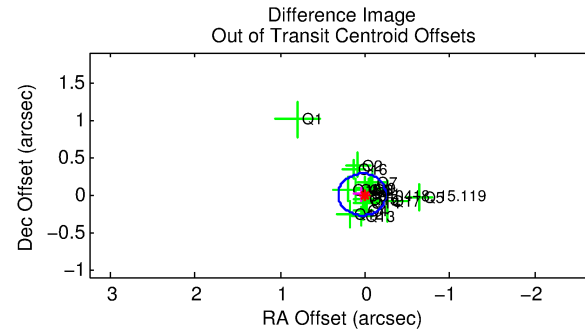
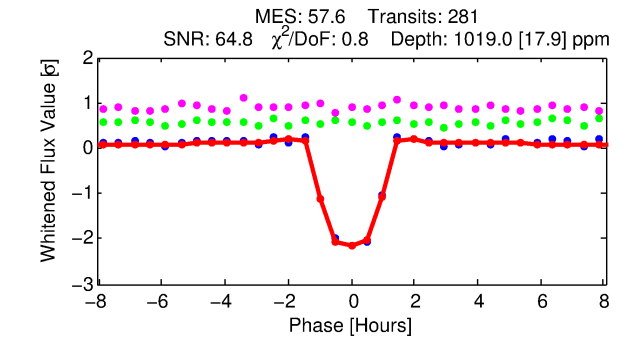
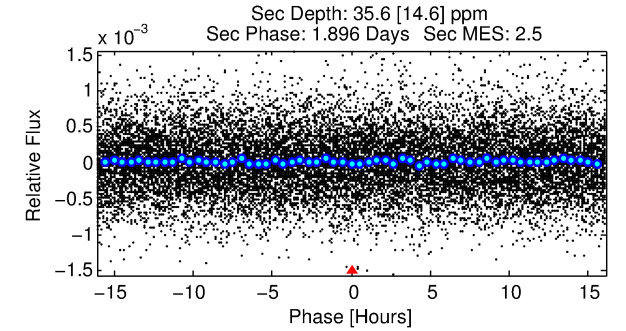
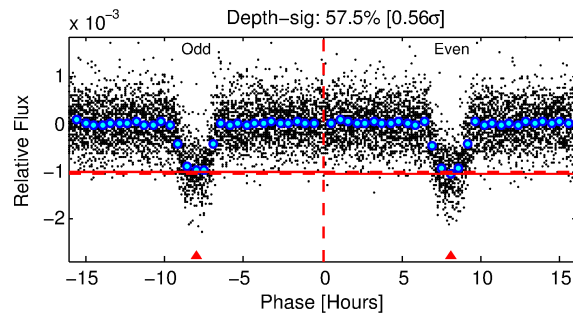
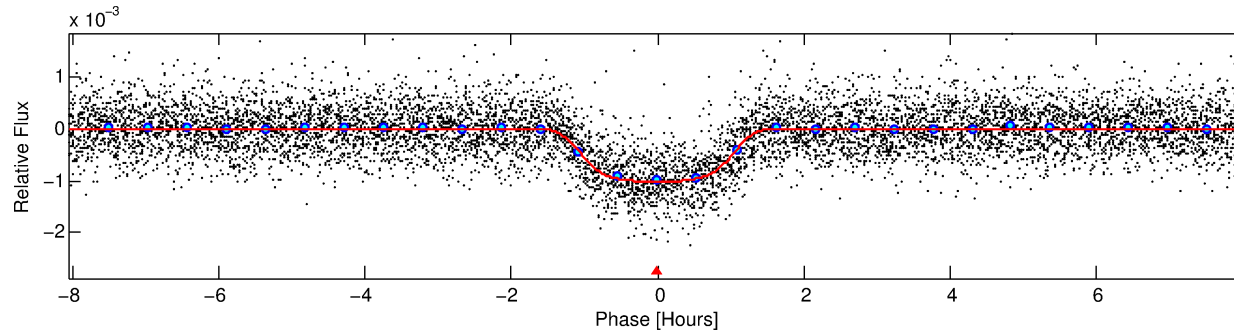
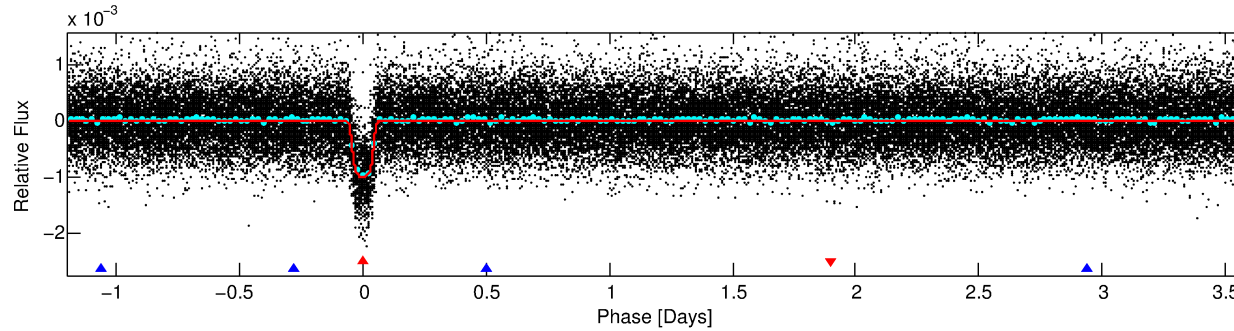
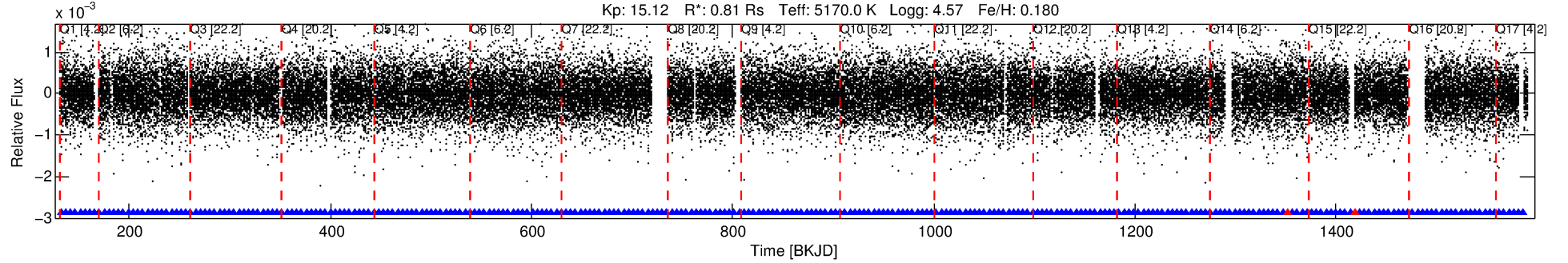
No Significant Match Found

# DV One-Page Summary

KIC: 3940418 Candidate: 1 of 2 Period: 4.783 d

KOI: K00810.01 Corr: 0.941

Kp: 15.12 R\*: 0.81 Rs Teff: 5170.0 K Logg: 4.57 Fe/H: 0.180



## DV Fit Results:

Period = 4.78300 [0.00000] d  
Epoch = 132.2450 [0.0007] BKJD  
Rp/R\* = 0.0364 [0.0011]  
a/R\* = 6.61 [0.67]  
b = 0.92 [0.02]  
Seff = 145.83 [30.92]  
Teq = 886 [47] K  
Rp = 3.21 [0.45] Re  
a = 0.0535 [0.0063] AU  
Ag = 5.44 [2.45] [1.82σ]  
Teffp = 2093 [226] K [5.24σ]

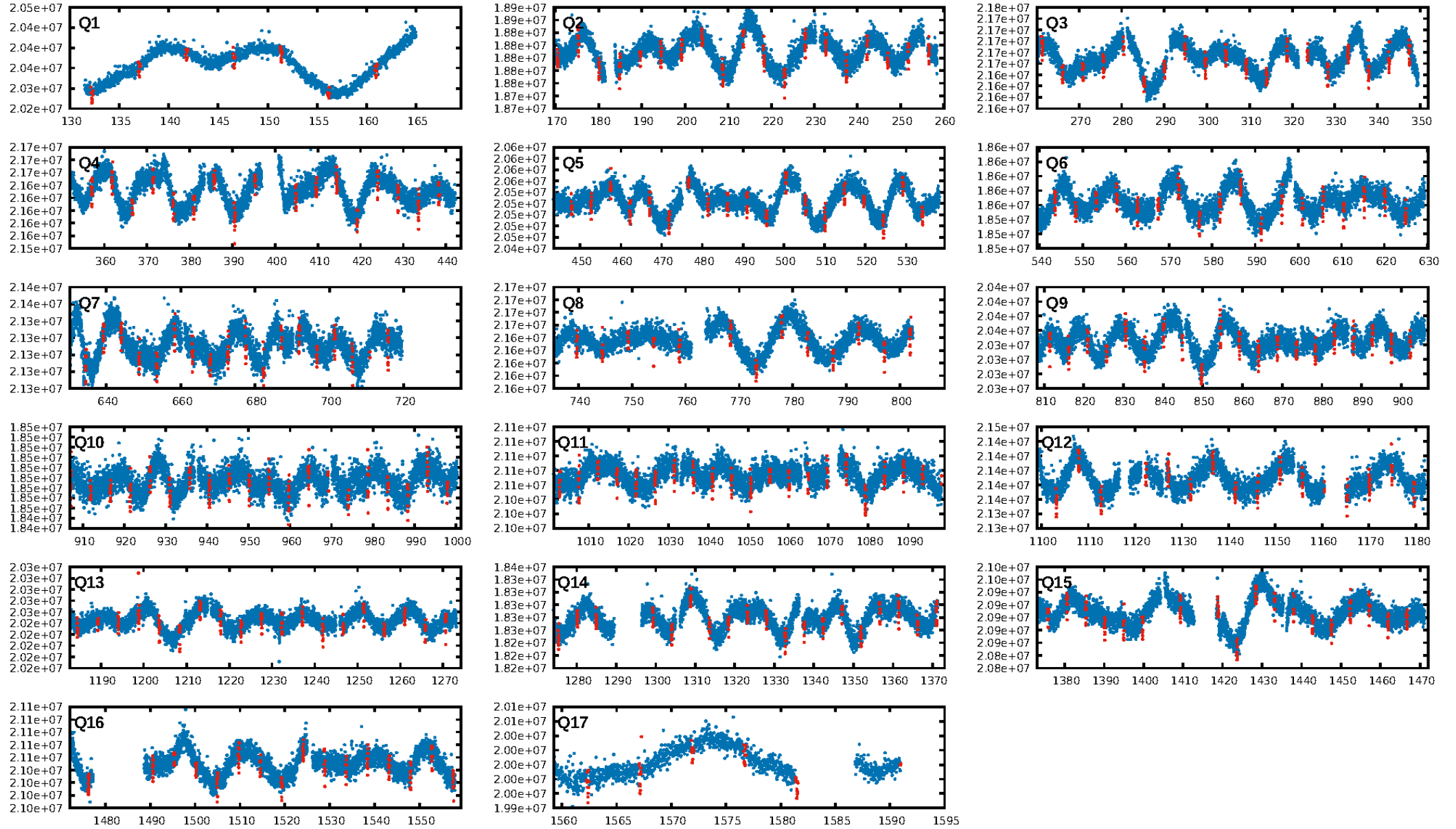
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [492.92σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.99 [266/268]  
GhostDiagnostic-chr: 4.271  
Centroid-sig: 28.2%  
Centroid-so: 0.248 arcsec [1.15σ]  
OotOffset-rm: 0.034 arcsec [0.37σ]  
KicOffset-rm: 0.246 arcsec [2.44σ]  
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]

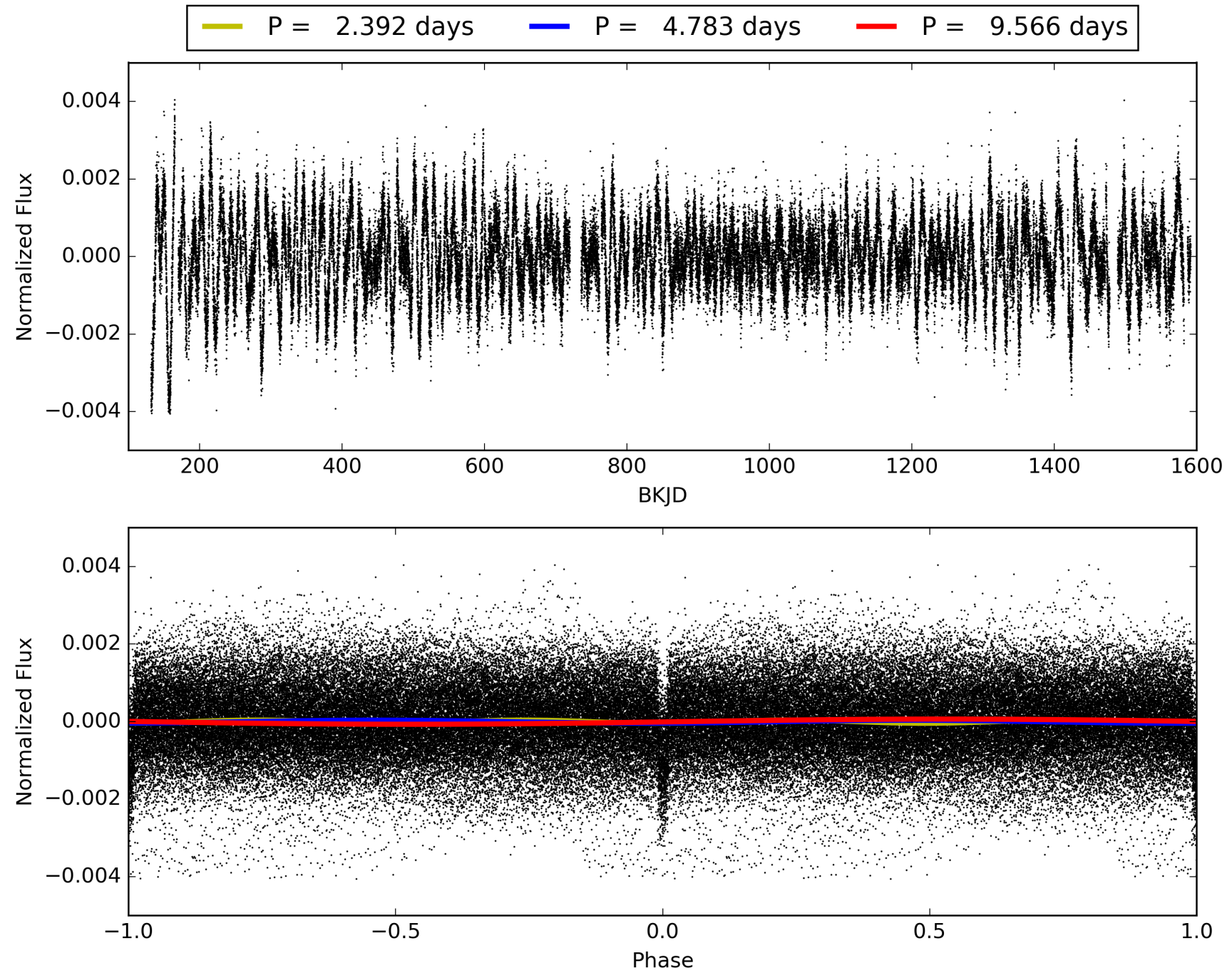
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 21:16:21 Z

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

# TCE 003940418-01, PDC Light Curves

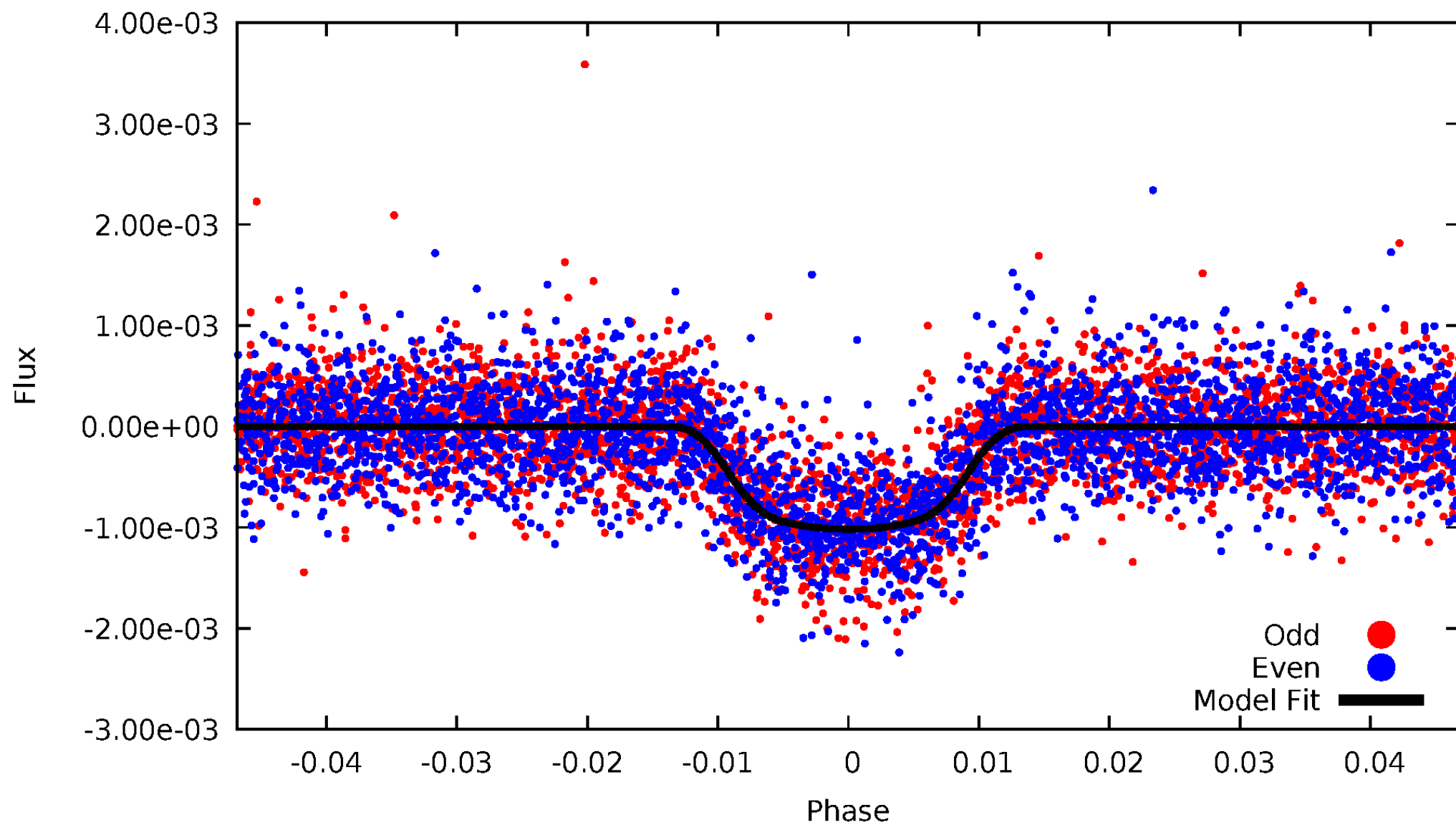


TCE 003940418-01



# DV Odd/Even

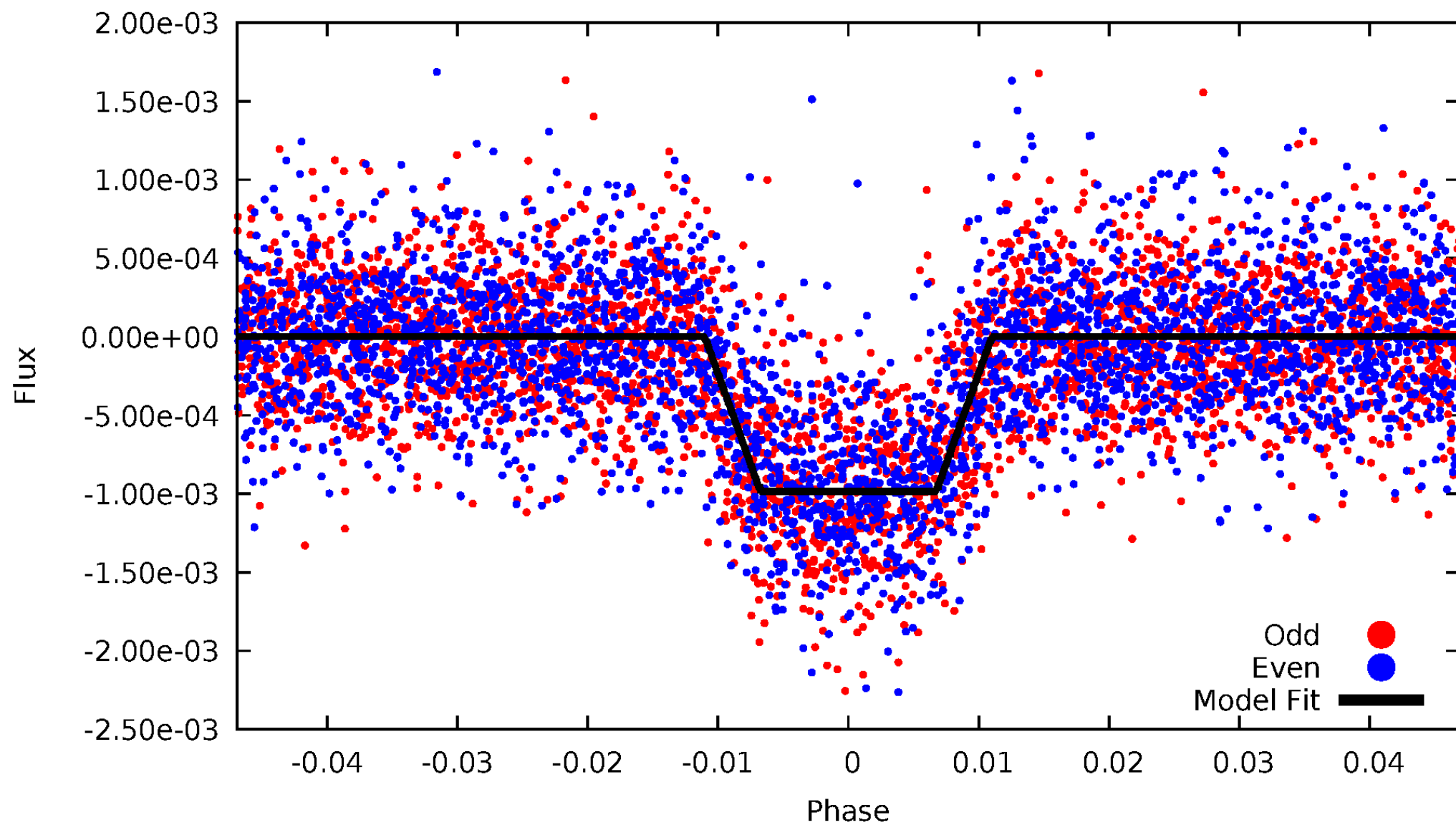
TCE 003940418-01





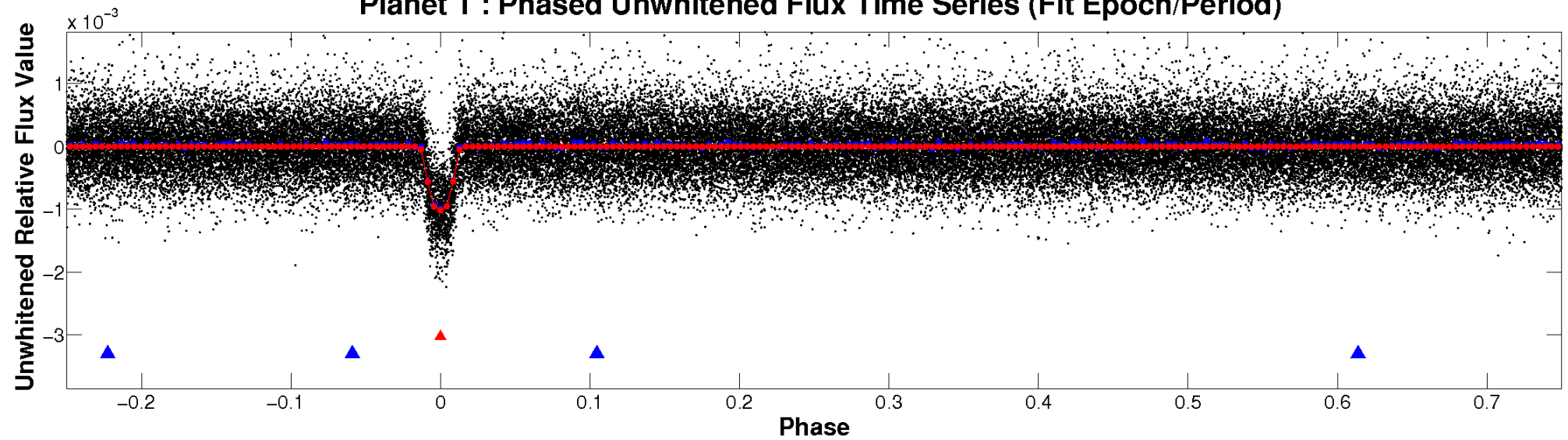
# ALT Odd/Even

TCE 003940418-01

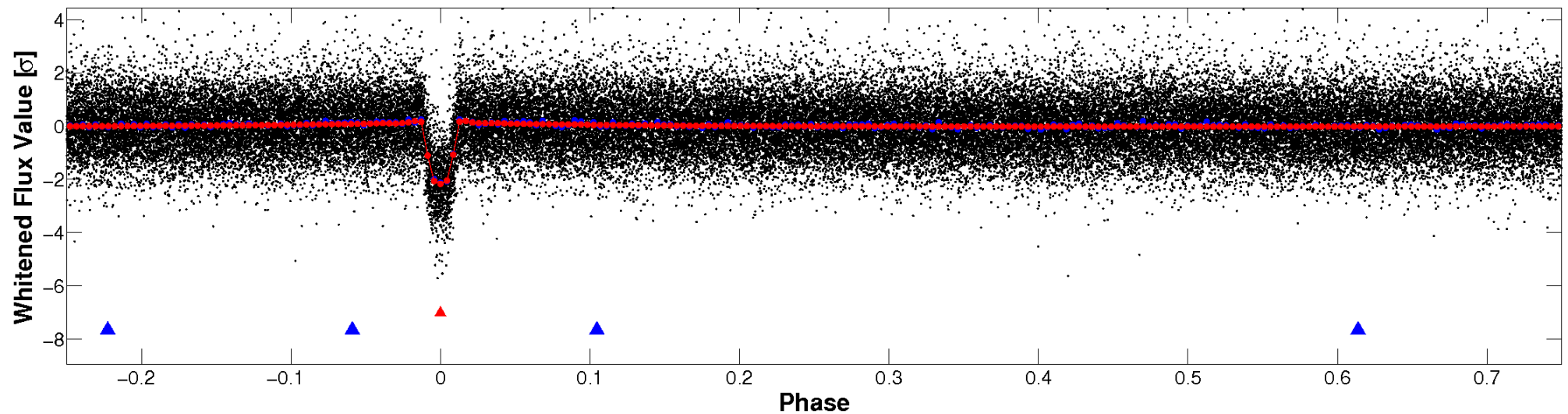


# Non-Whitened Vs. Whitened Light Curve

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

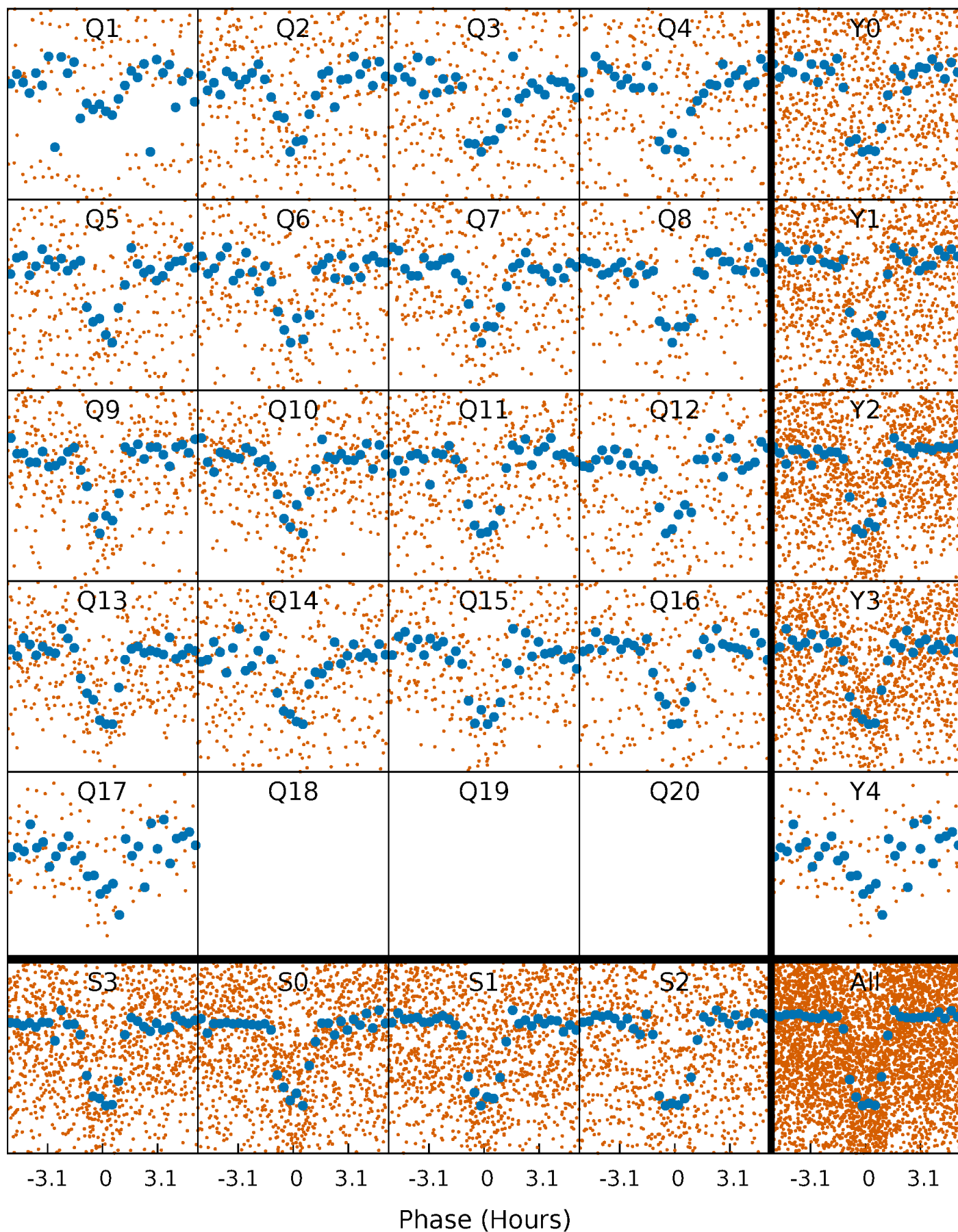


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

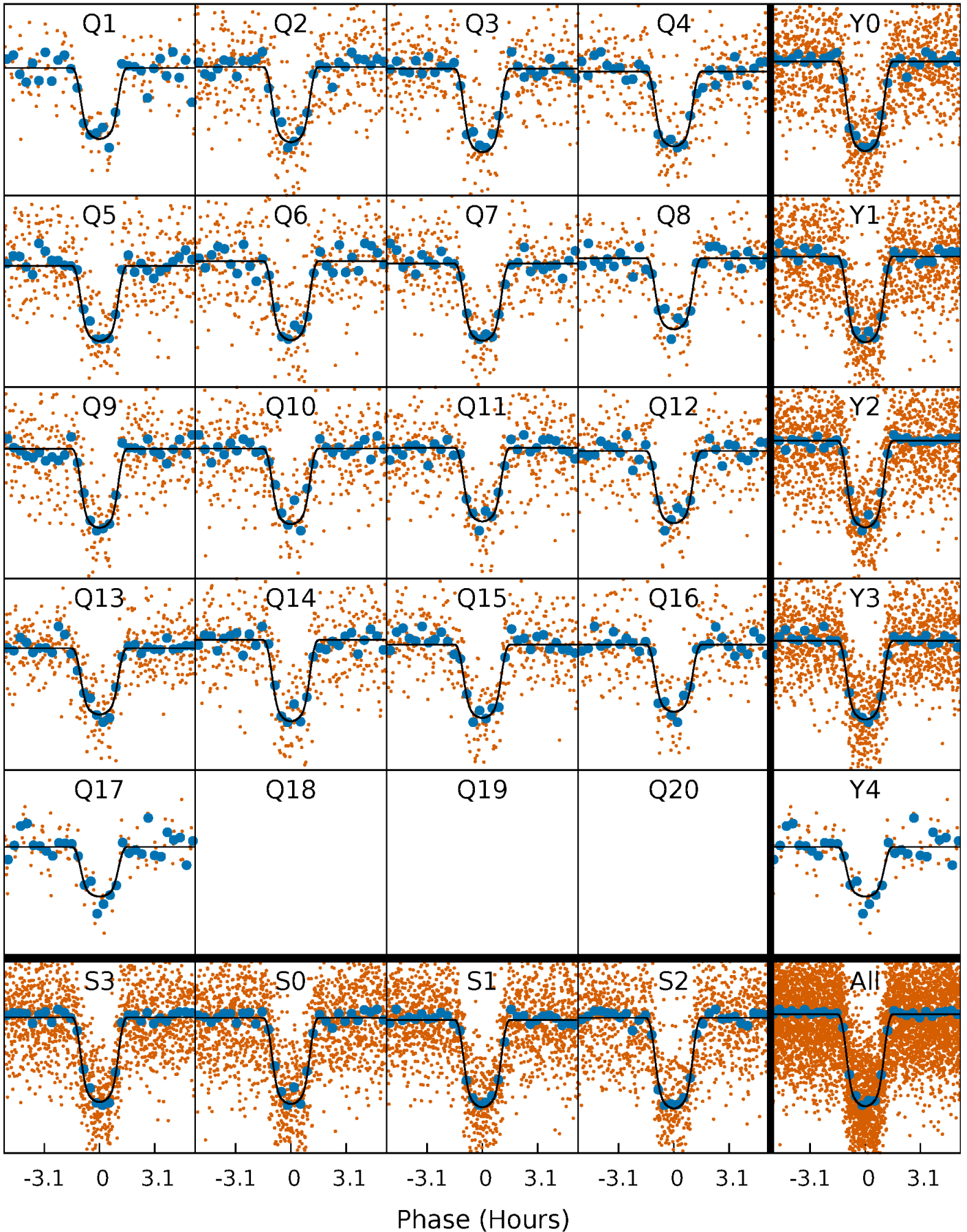
TCE 003940418-01 P= 4.783001 Days  $T_0=132.244965$  (BKJD)





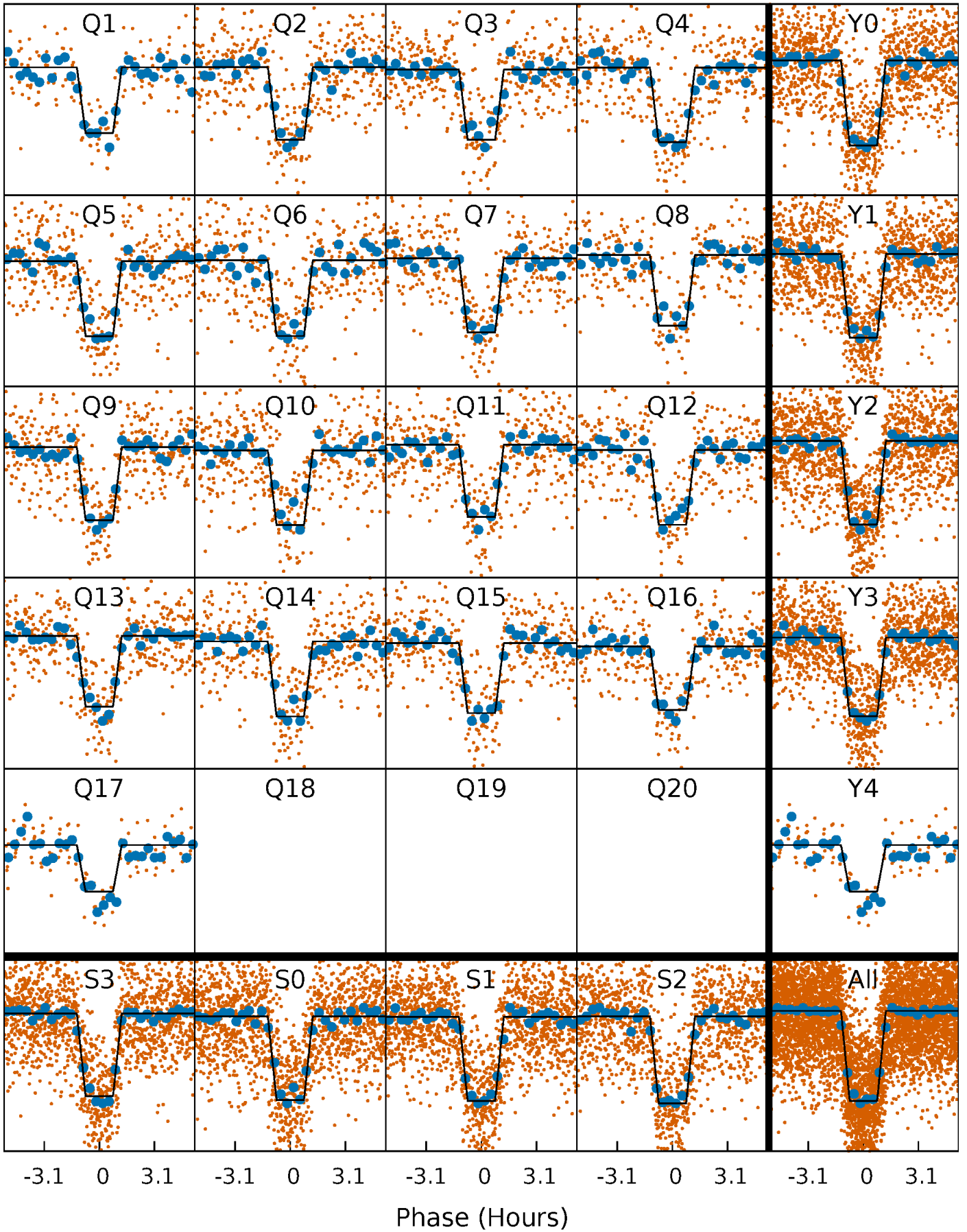
# DV Quarter-Phased Transit Curves

TCE 003940418-01 P= 4.783001 Days  $T_0=132.244965$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

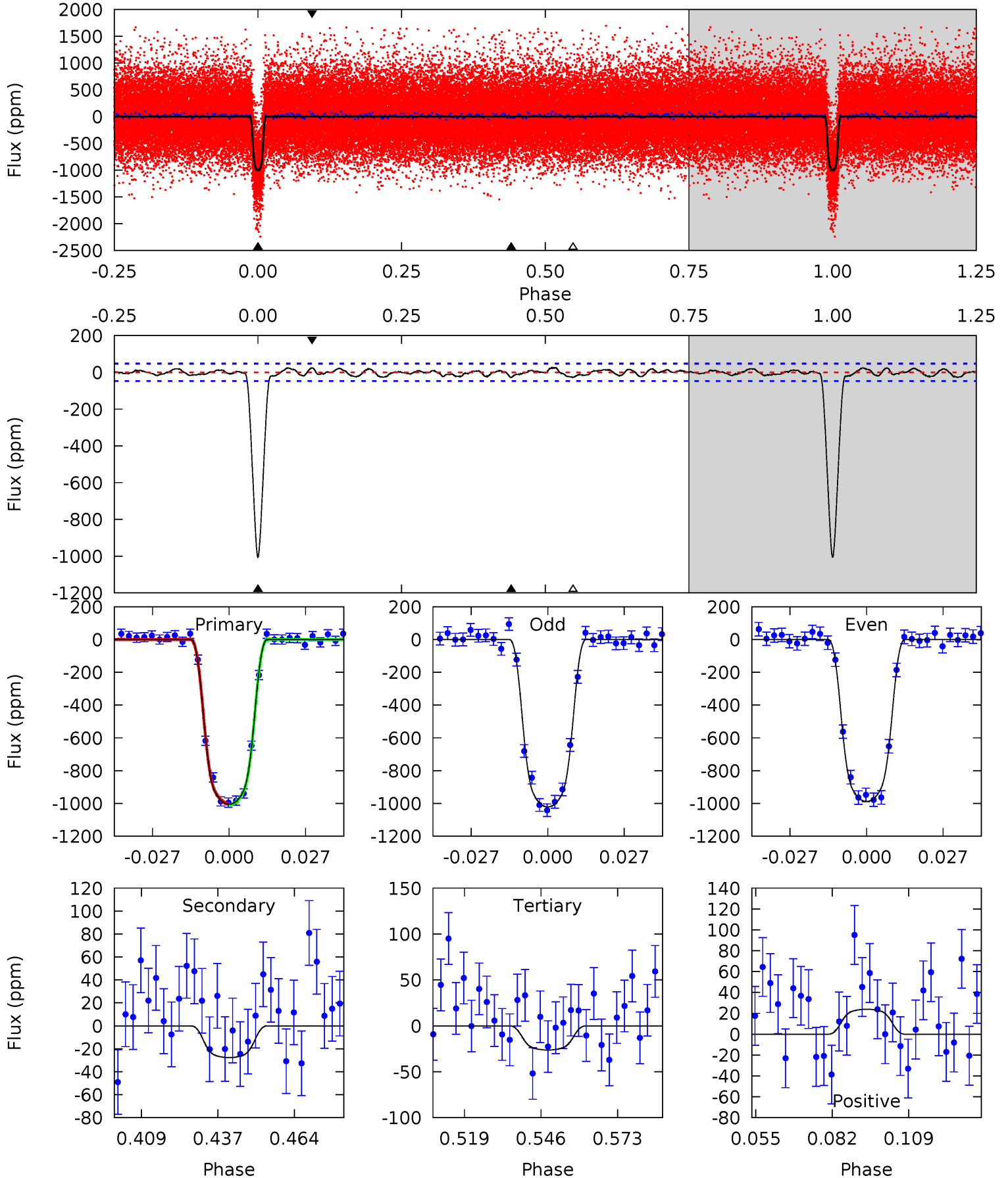
TCE 003940418-01 P= 4.782997 Days  $T_0=132.245419$  (BKJD)



# DV Model-Shift Uniqueness Test

003940418-01, P = 4.783001 Days, E = 127.461964 Days

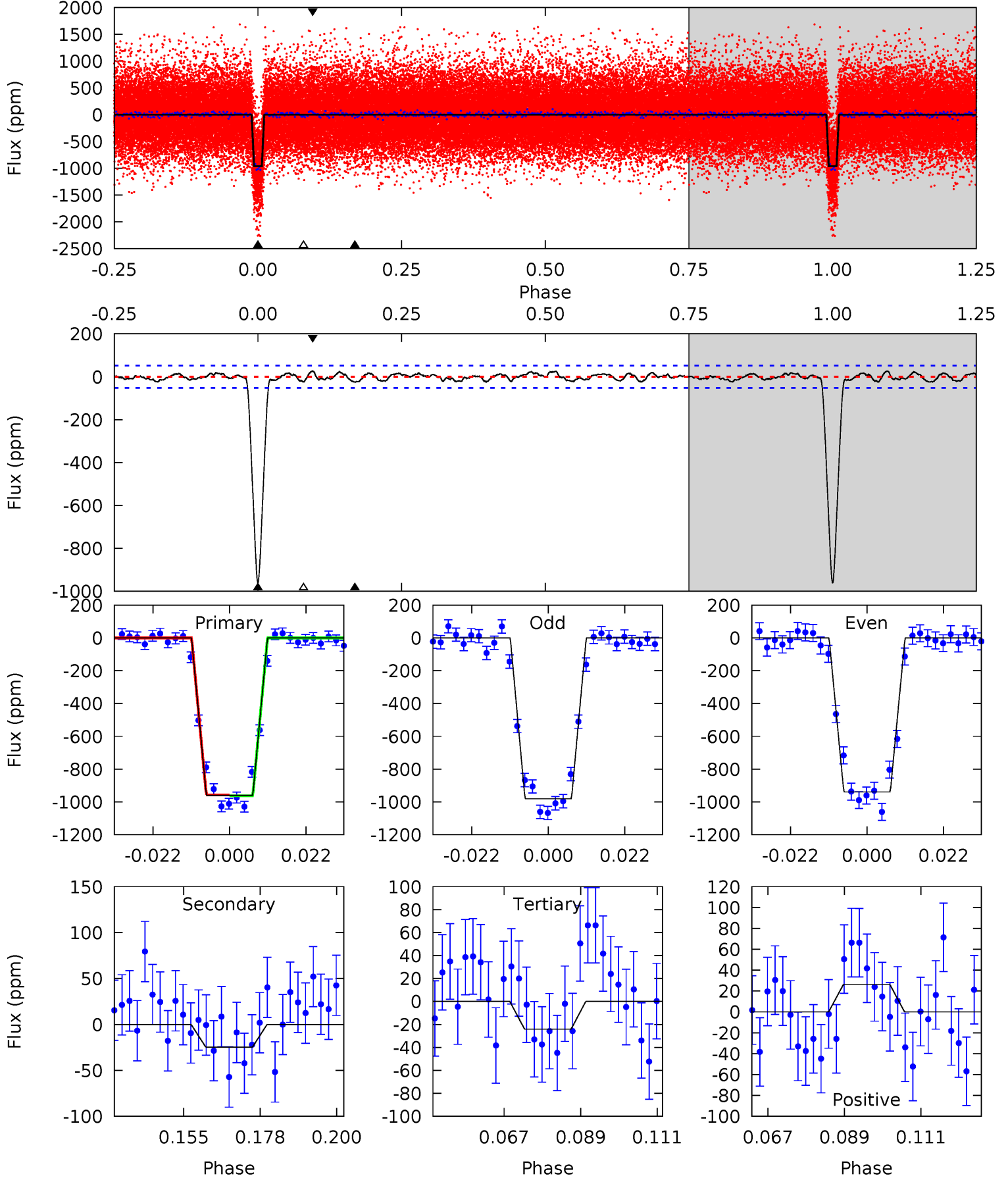
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
102.2	2.82	2.68	2.43	4.83	2.21	1.23	99.5	99.8	0.14	0.39	1.69	0.98	0.02	0.33



# Alt Model-Shift Uniqueness Test

003940418-01, P = 4.782997 Days, E = 127.462422 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
90.1	2.33	2.27	2.46	4.87	2.29	1.09	87.8	87.6	0.06	-0.13	1.97	0.97	0.03	0.29



### Stellar Parameters For KIC 003940418

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$5170^{+155}_{-155}$	$4.574^{+0.026}_{-0.097}$	$0.180^{+0.200}_{-0.300}$	$0.807^{+0.111}_{-0.060}$	$0.891^{+0.053}_{-0.084}$	$2.384^{+0.369}_{-0.679}$
	+3%/-3%	+1%/-2%	+111%/-167%	+14%/-7%	+6%/-9%	+15%/-28%
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 003940418-01 / KOI 0810.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-28 \pm 10$	$3.28^{+0.25}_{-0.20}$	$1255^{+50}_{-43}$	$2683^{+128}_{-160}$	$3.932^{+1.613}_{-1.387}$
Alt.	$-25 \pm 11$	$2.82^{+0.22}_{-0.18}$	$1257^{+50}_{-49}$	$2766^{+147}_{-213}$	$4.827^{+2.003}_{-2.054}$

$T_{max}$  = 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  $A_{obs} \gg 1.0$



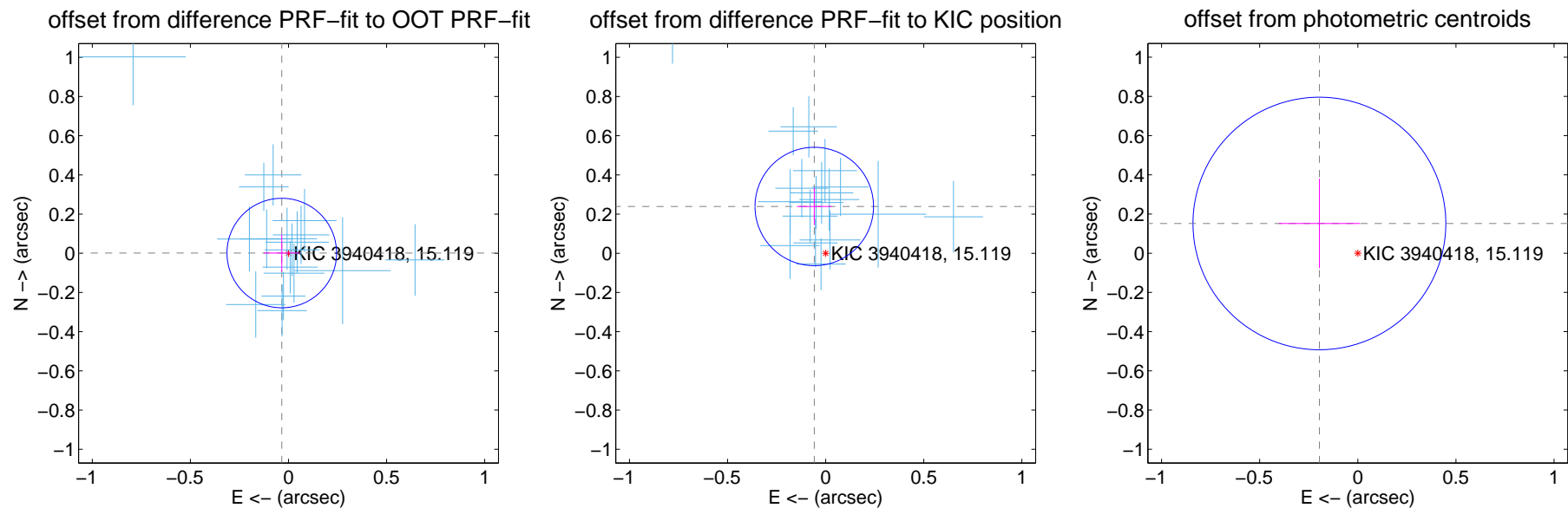
## DV Centroid Data

Supplemental centroid analysis for 003940418-01. Kepler magnitude: 15.12. Transit SNR 64.84

There are 17 quarters with good PRF difference image offsets

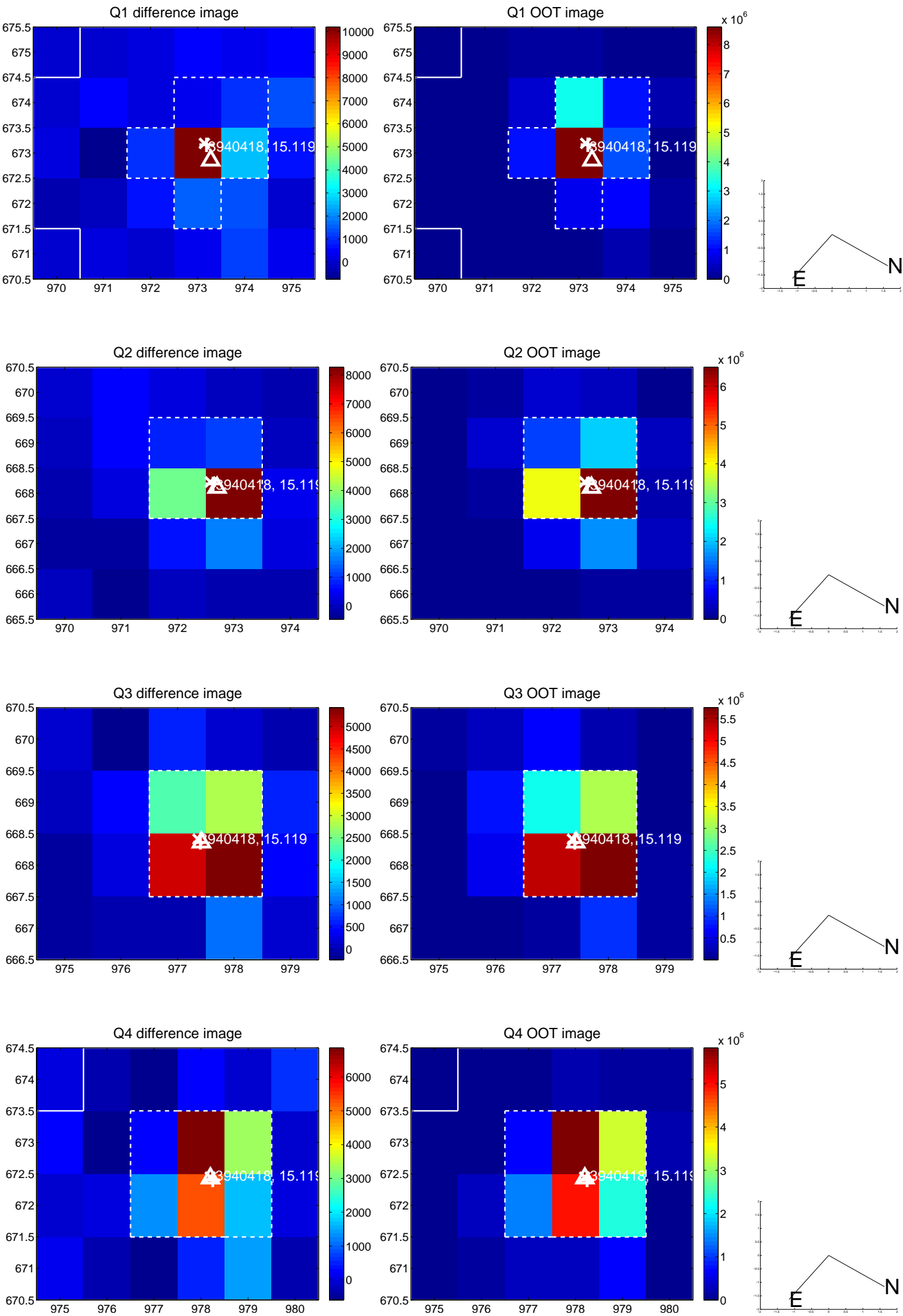
The direct PRF centroid is offset from the target star catalog position by about 0.29 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.034 \pm 0.093$	0.37	$0.034 \pm 0.092$	$0.001 \pm 0.095$
PRF-fit source offset from KIC position	$0.246 \pm 0.101$	2.44	$0.058 \pm 0.089$	$0.239 \pm 0.095$
photometric centroid source offset	$0.25 \pm 0.21$	1.15	$0.20 \pm 0.21$	$0.15 \pm 0.23$



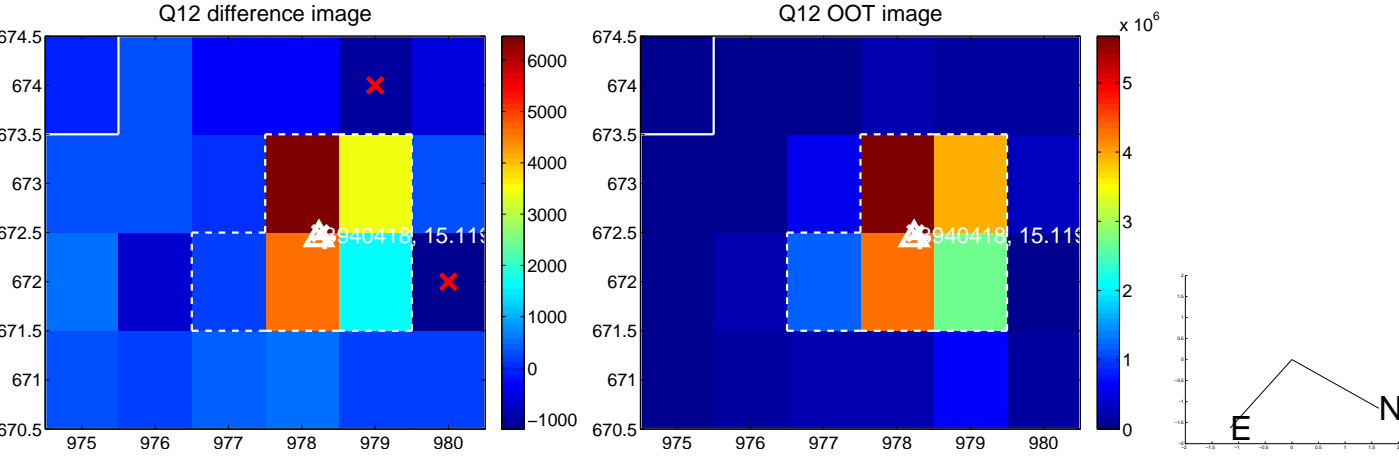
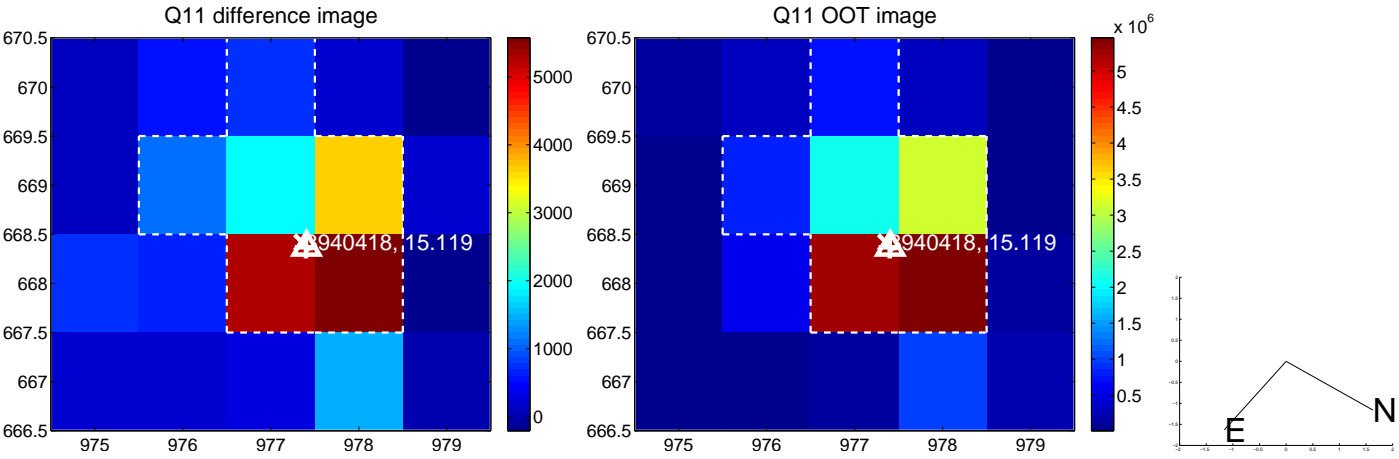
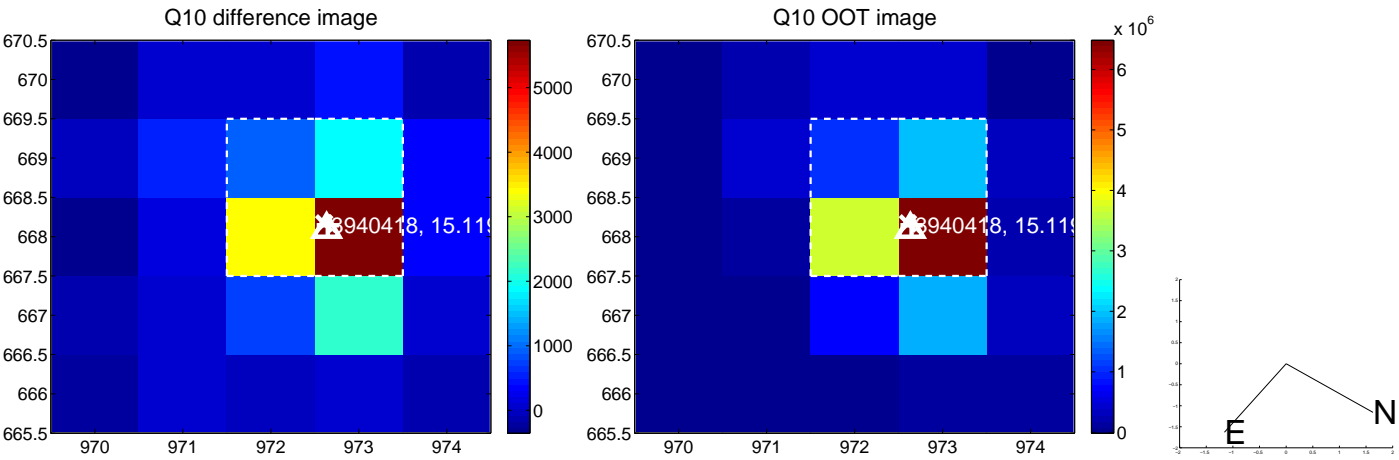
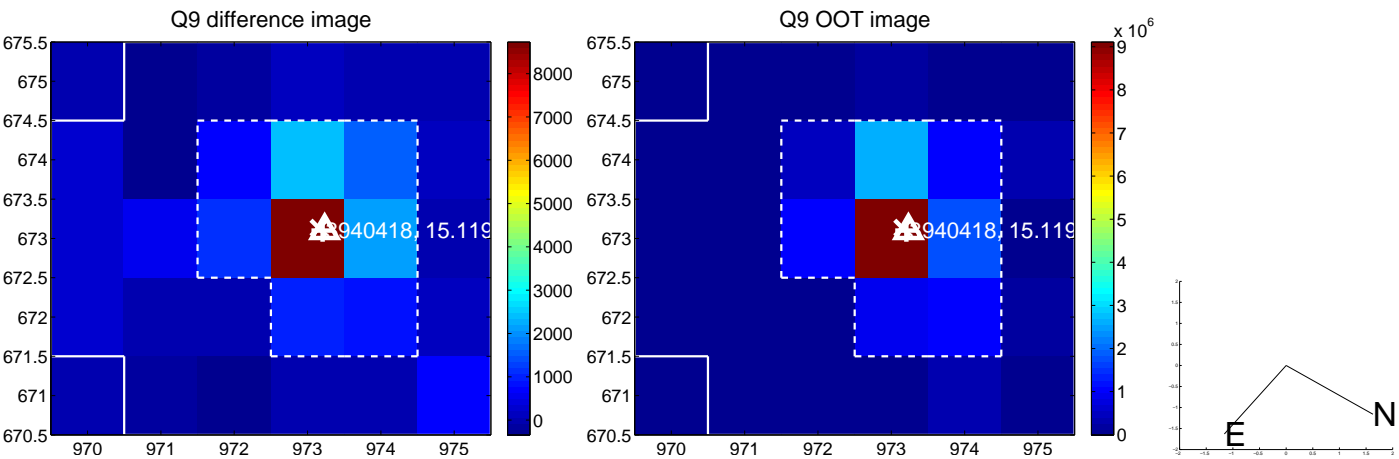
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

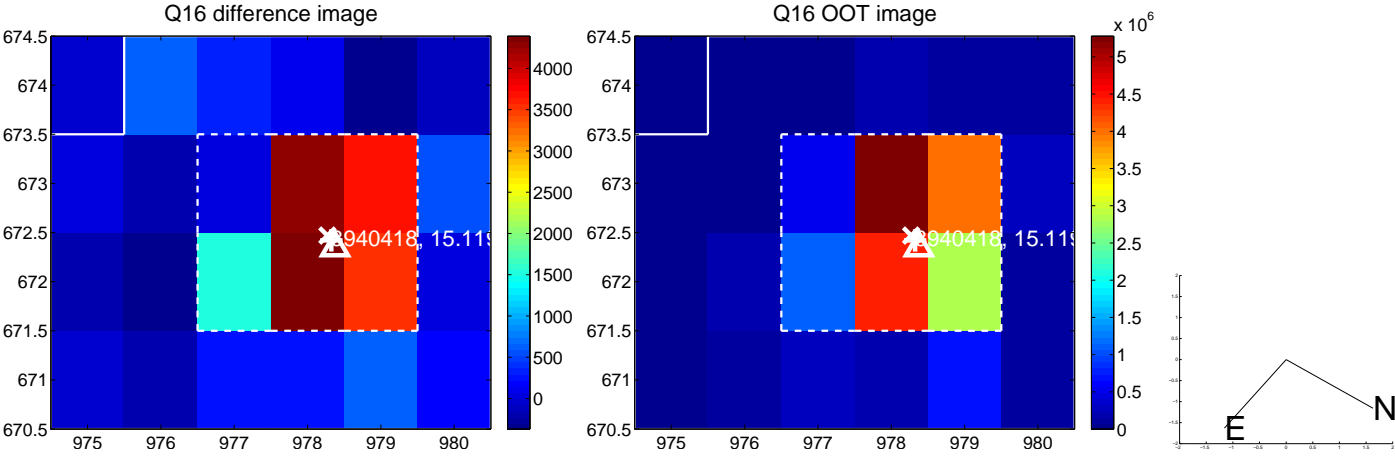
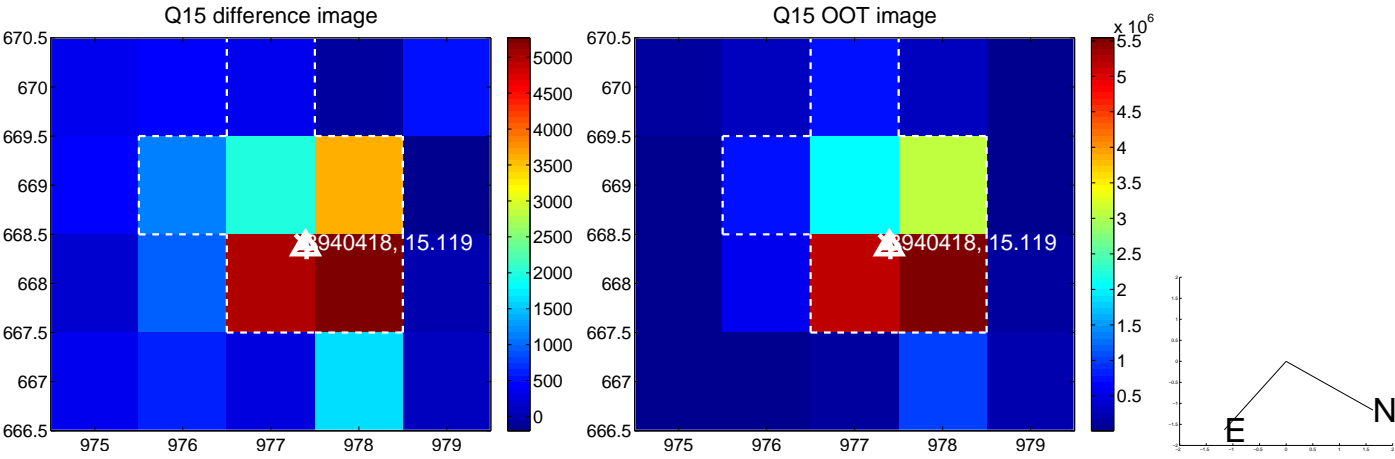
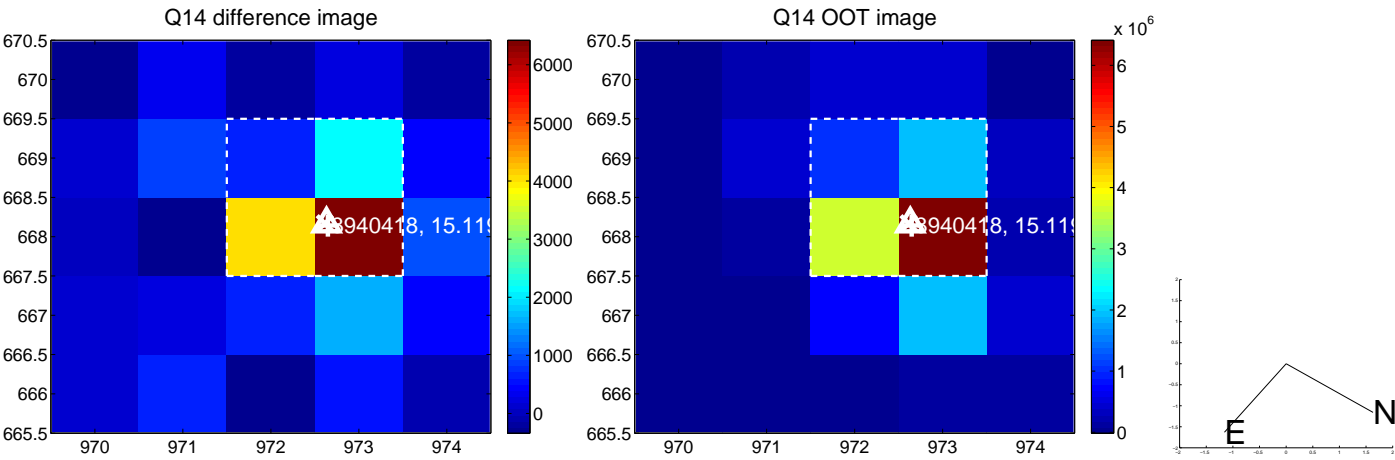
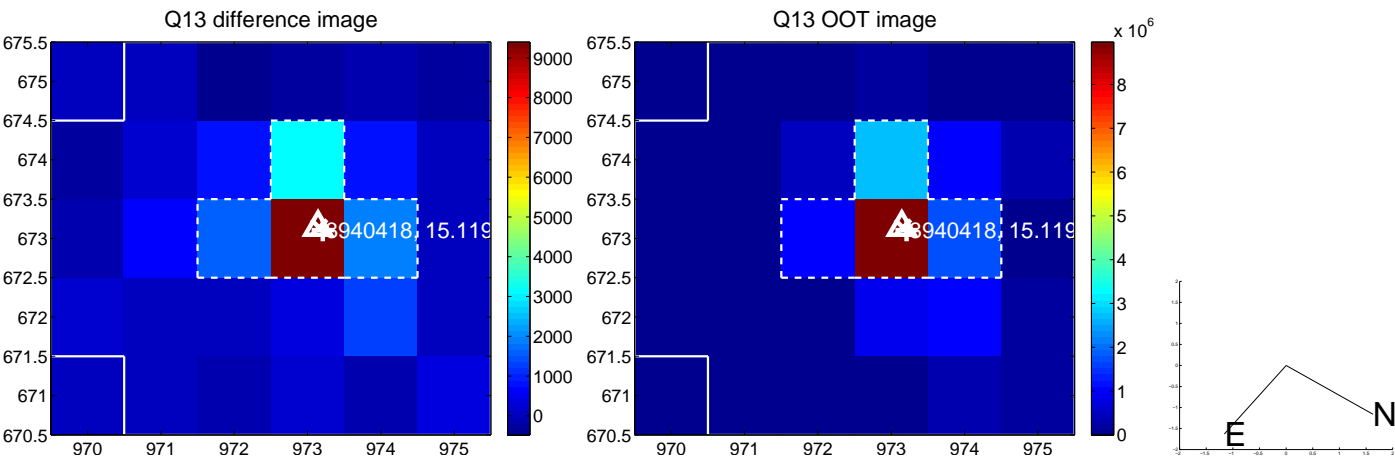




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

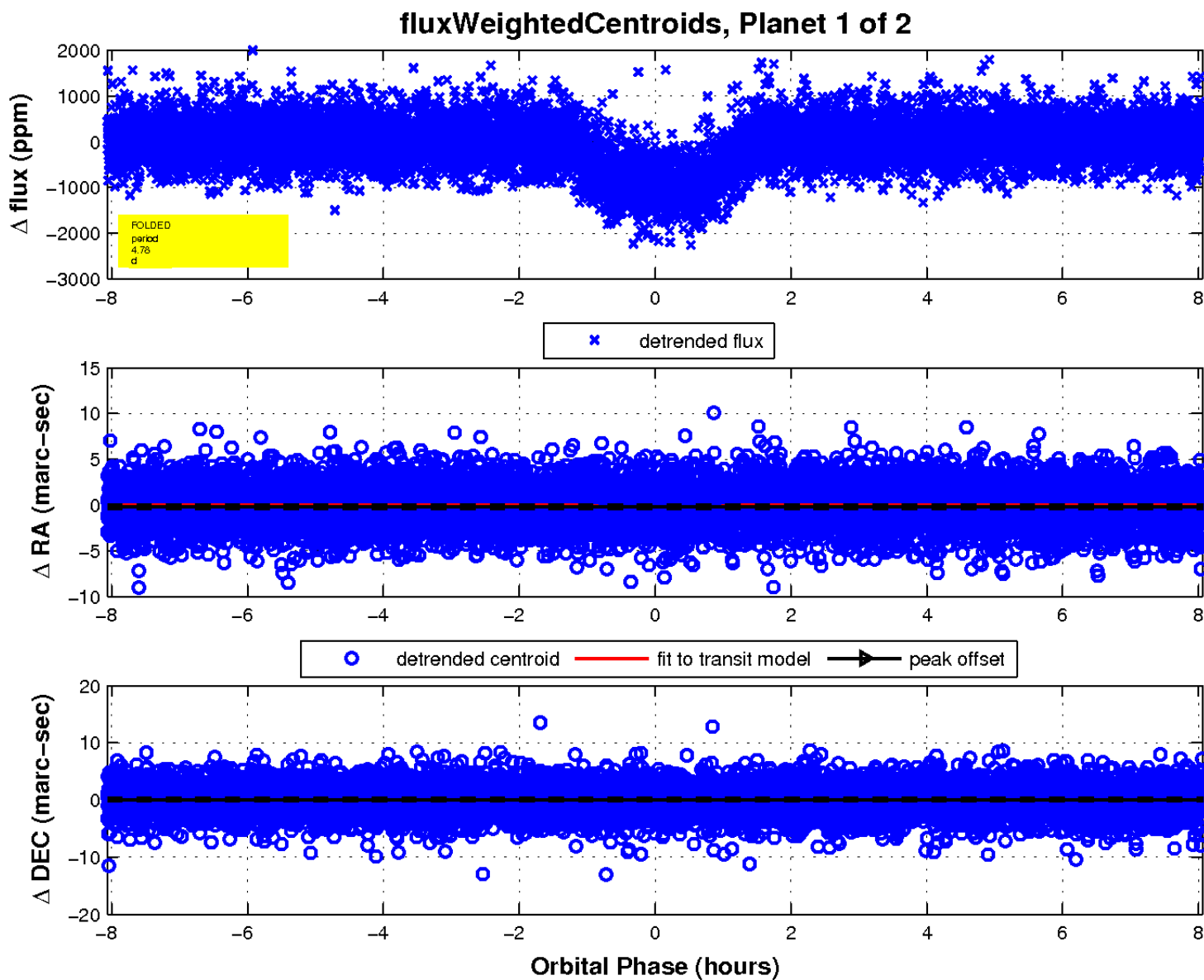
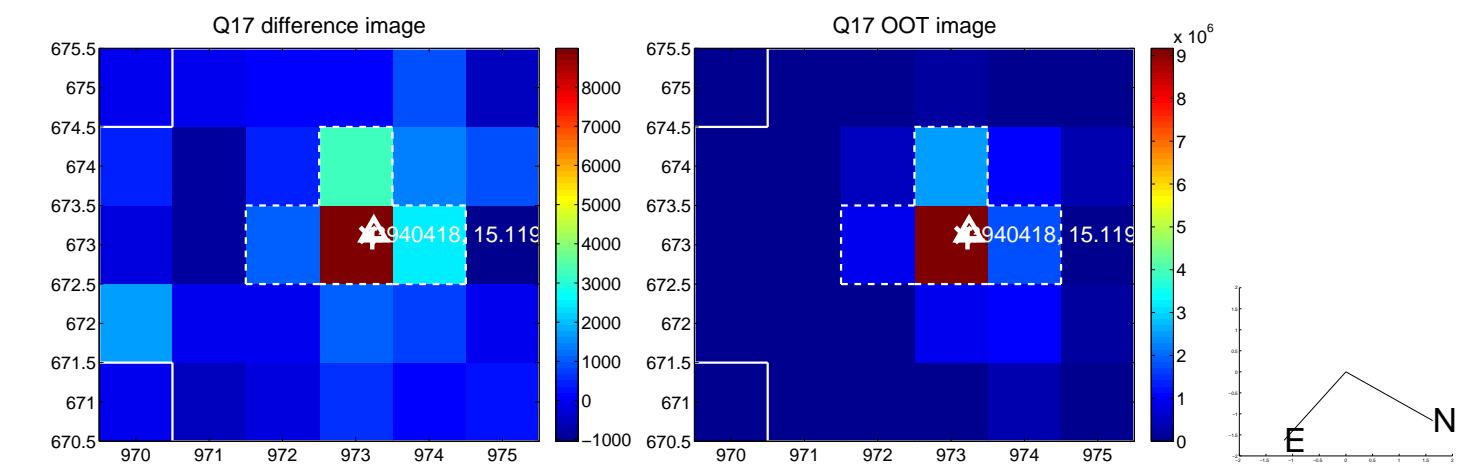


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



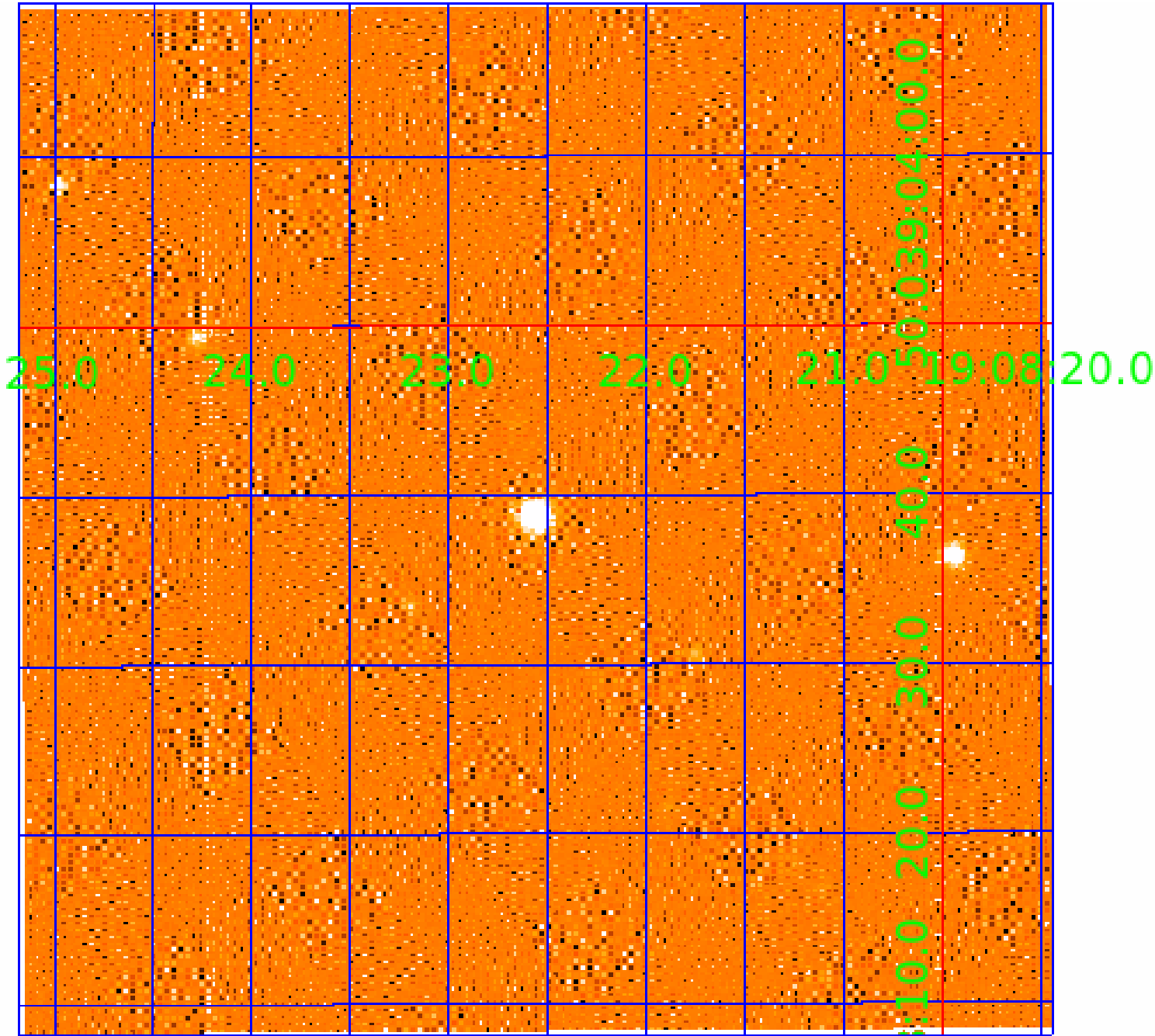


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 003940418

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003940418-01	OBS	0810.01	4.783001	132.244965	1019.0	2.688	57.6	64.8	0.81	5170	3.21	145.83
003940418-02	OBS	No	397.771585	226.057985	697.8	18.945	8.1	8.3	0.81	5170	2.62	0.40

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003940418-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
003940418-02	OBS	FP	0.02	1	0	0	0	ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS

**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](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

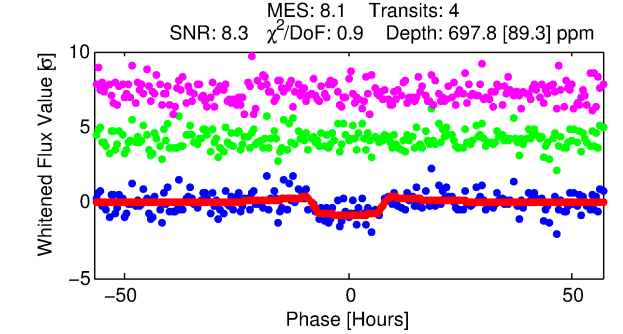
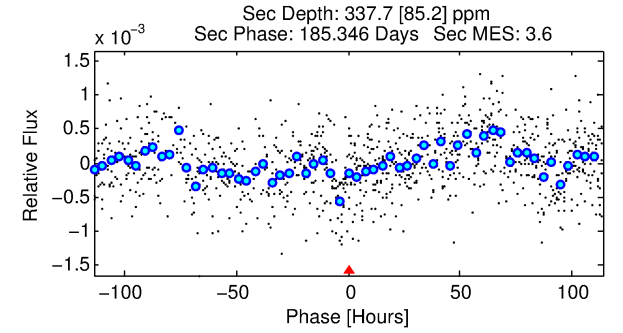
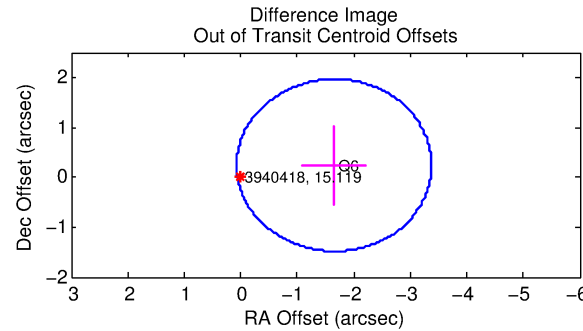
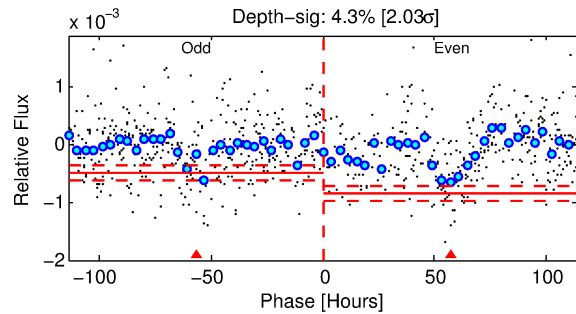
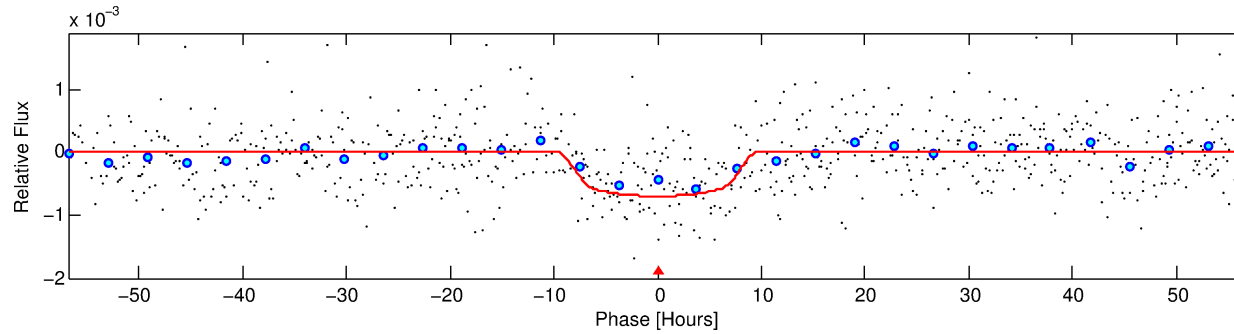
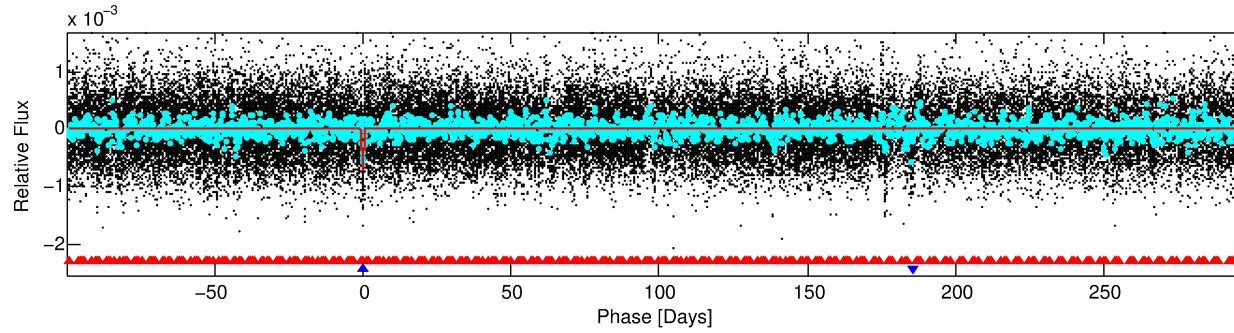
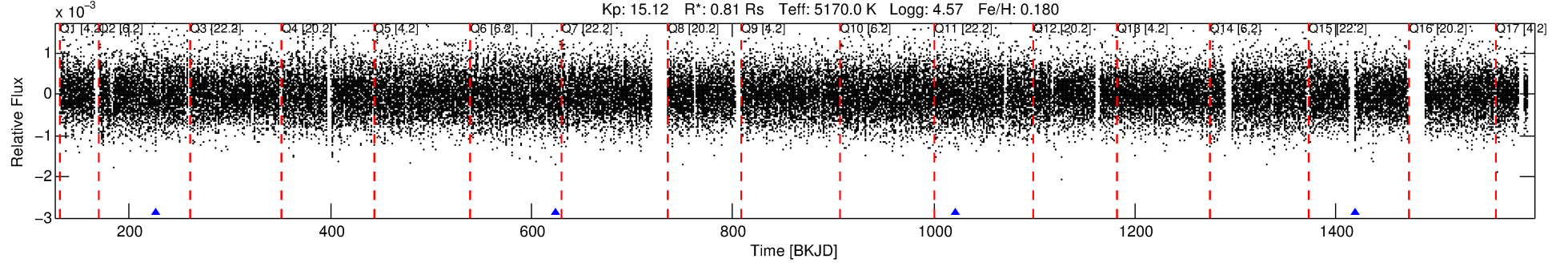
## Ephemeris Match Information For 003940418-02

No Significant Match Found

# DV One-Page Summary

KIC: 3940418 Candidate: 2 of 2 Period: 397.772 d  
KOI: K00810 Corr: No Ephemeris Match

Kp: 15.12 R\*: 0.81 Rs Teff: 5170.0 K Logg: 4.57 Fe/H: 0.180



## DV Fit Results:

Period = 397.77158 [0.01667] d  
Epoch = 226.0580 [0.0302] BKJD  
Rp/R\* = 0.0297 [0.0035]  
a/R\* = 77.32 [28.57]  
b = 0.91 [0.07]  
Seff = 0.40 [0.09]  
Teq = 203 [11] K  
Rp = 2.62 [0.47] Re  
a = 1.0187 [0.1203] AU  
Ag = 28100.00 [10854.07] [2.59σ]  
Teff = 4064 [371] K [10.42σ]

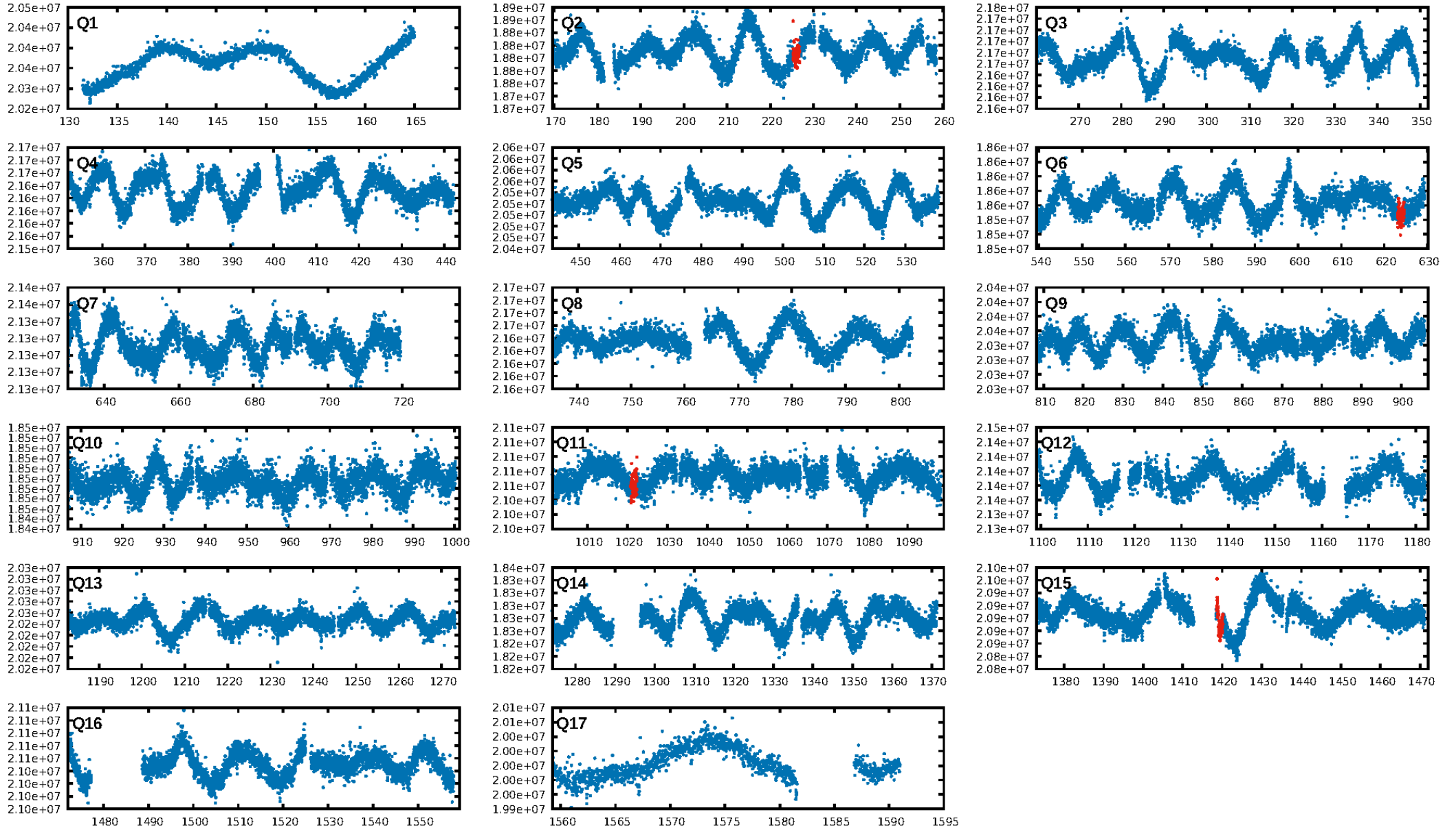
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [492.92σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 14.4%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 2.16e-11**  
RollingBand-fgt: 1.00 [4/4]  
**GhostDiagnostic-chr: 0.3584**  
**Centroid-sig: 0.2%**  
Centroid-so: 2.294 arcsec [2.31σ]  
OotOffset-rm: 1.669 arcsec [2.90σ]  
OotOffset-st: 1/0/0/0 [1]  
KicOffset-rm: 1.740 arcsec [2.97σ]  
KicOffset-st: 1/0/0/0 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 0.50 [1/2]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 21:16:29 Z

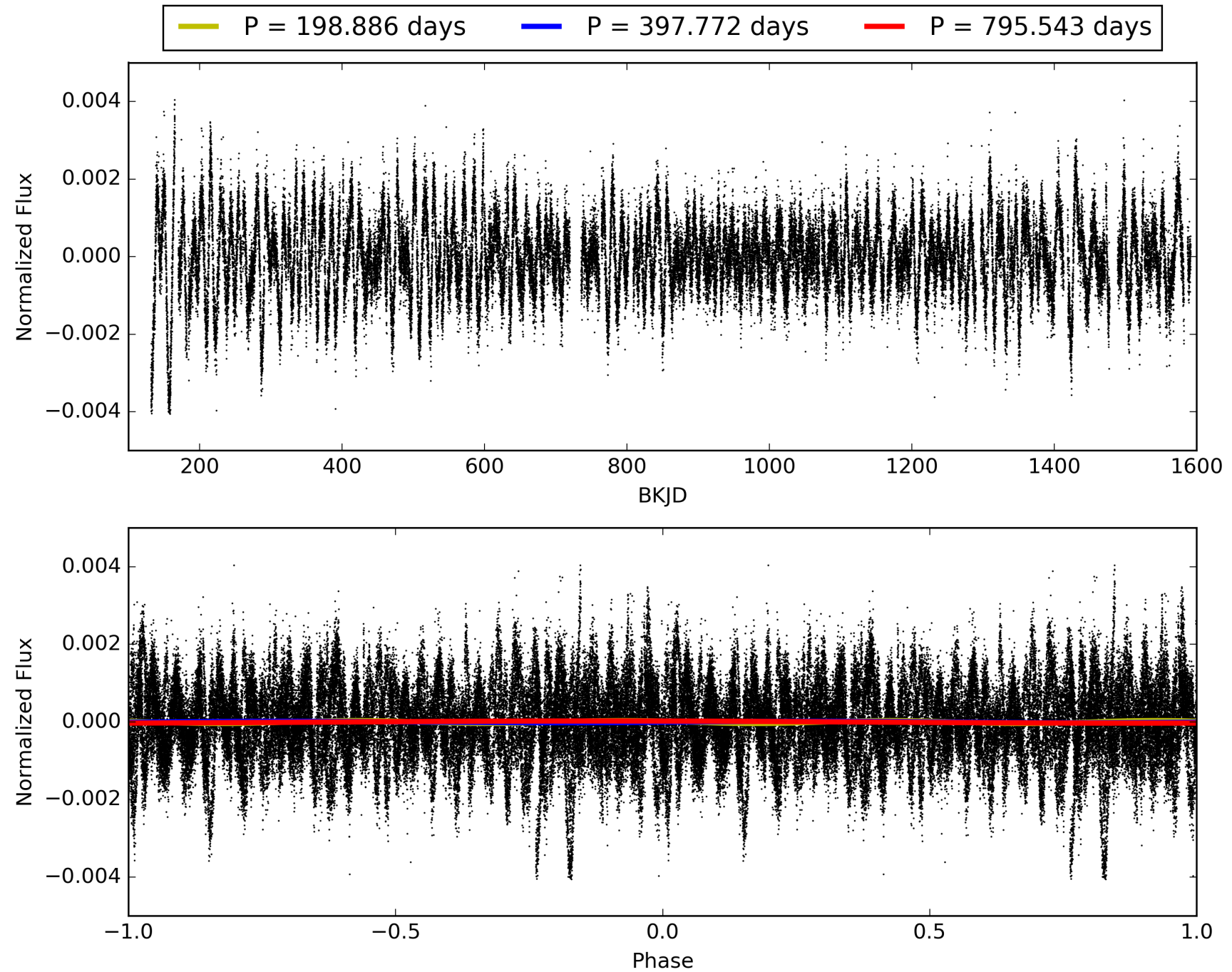
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 003940418-02, PDC Light Curves



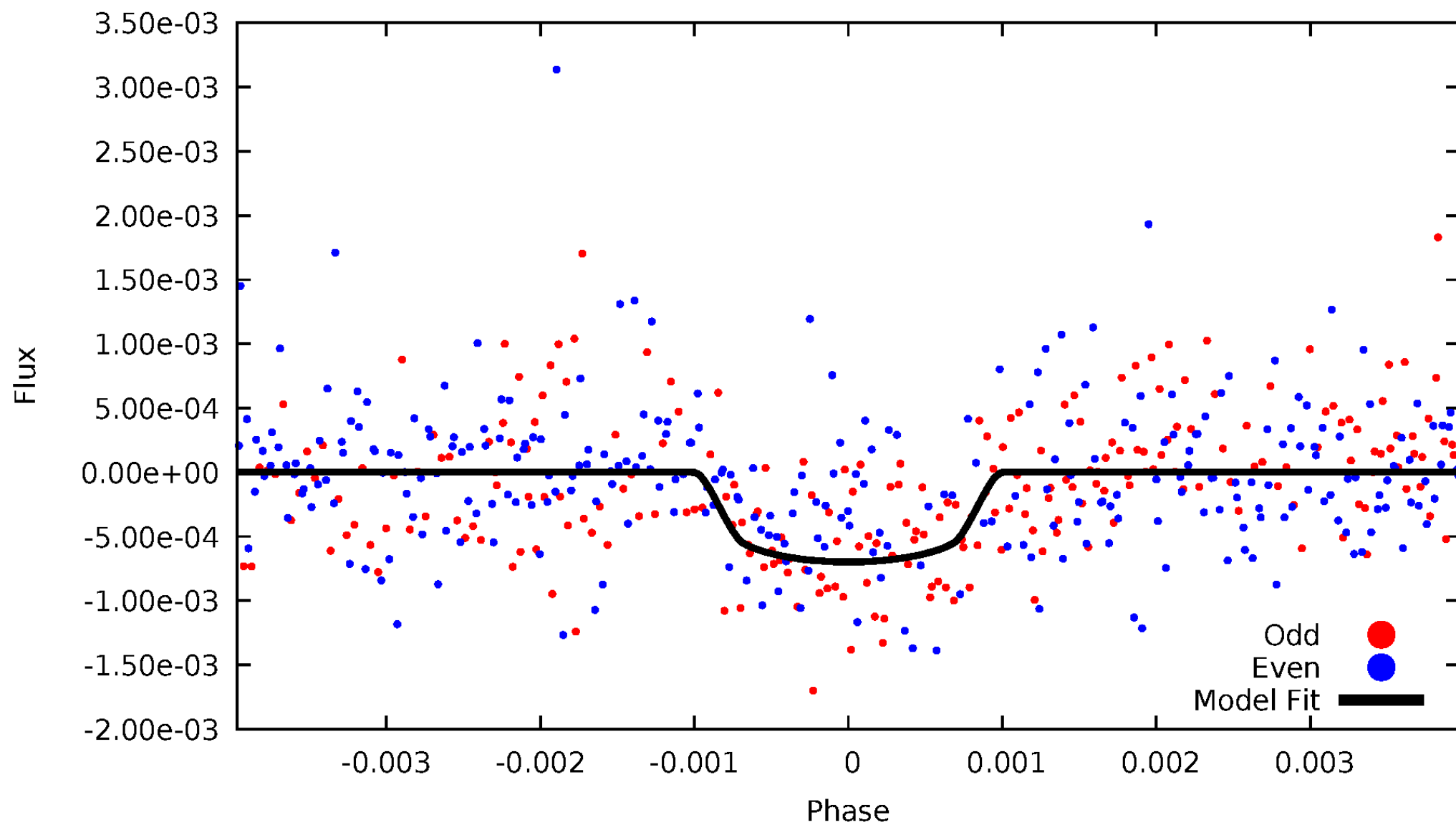


TCE 003940418-02



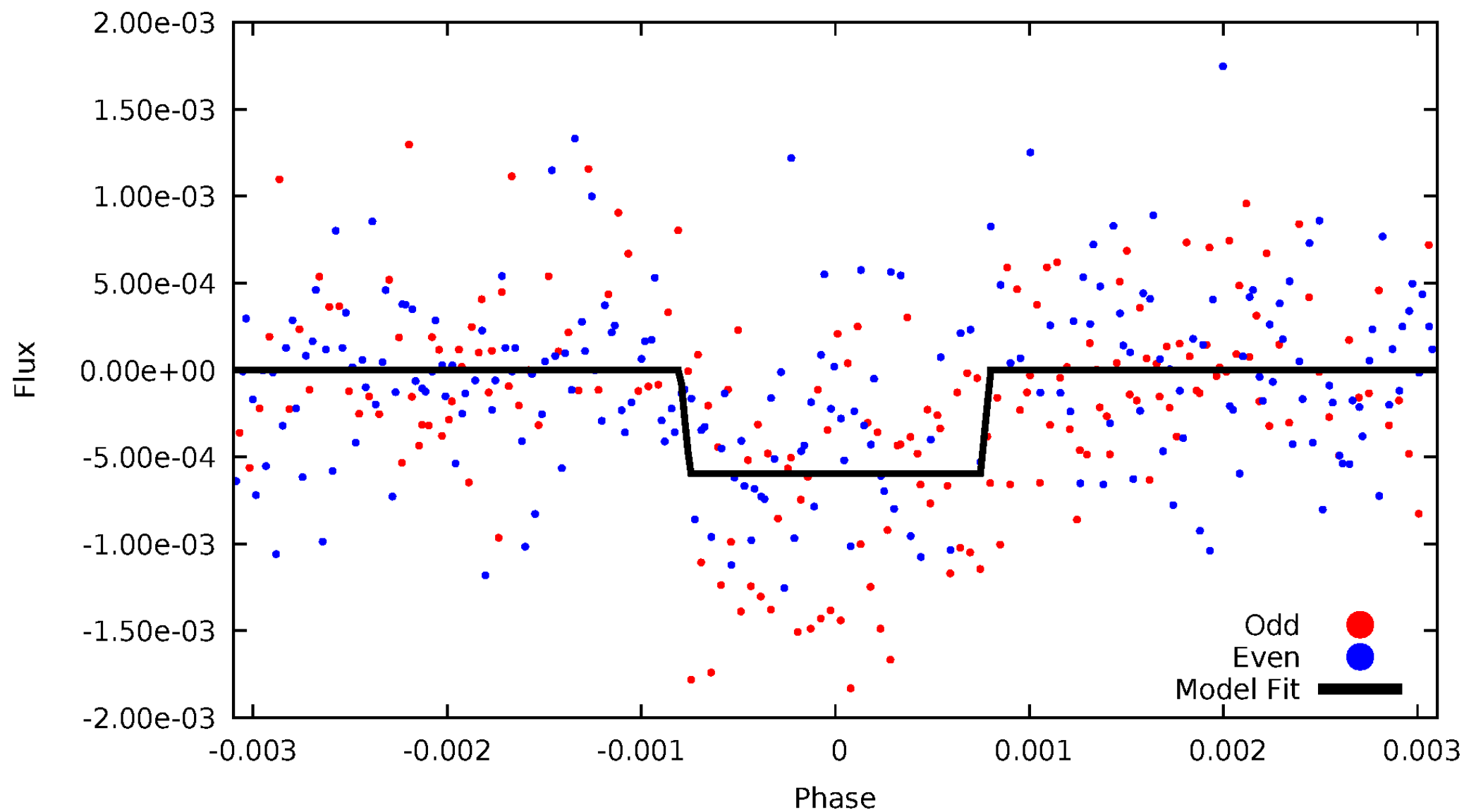
# DV Odd/Even

TCE 003940418-02



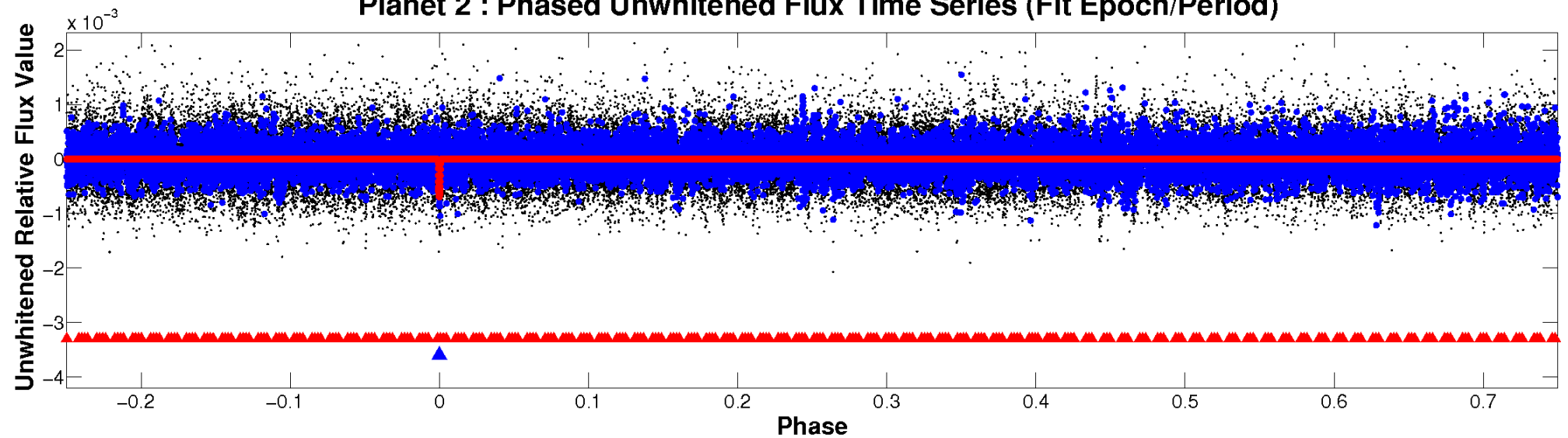
# ALT Odd/Even

TCE 003940418-02

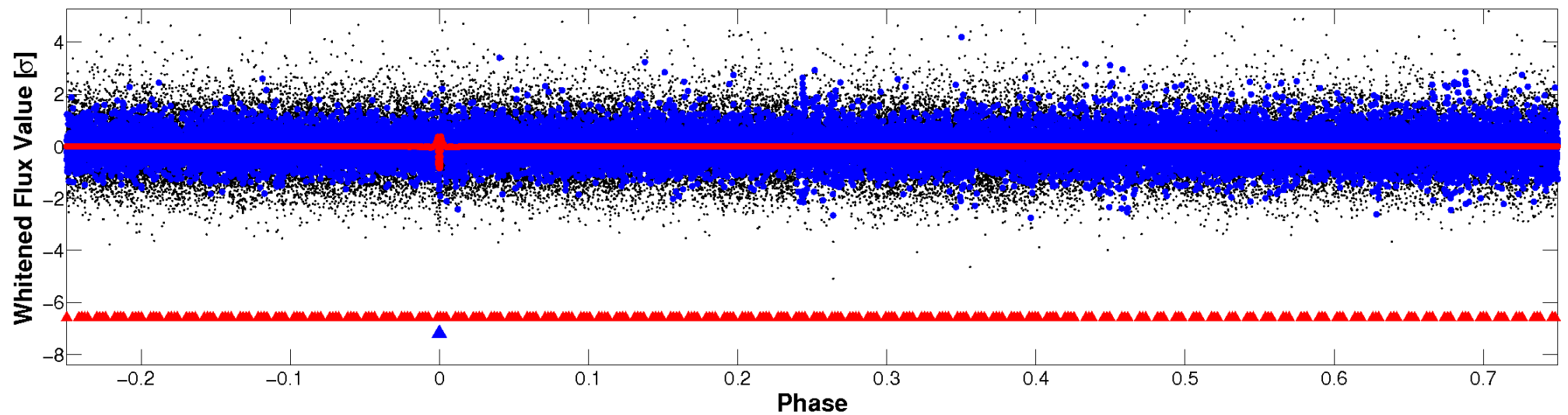


# Non-Whitened Vs. Whitened Light Curve

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



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



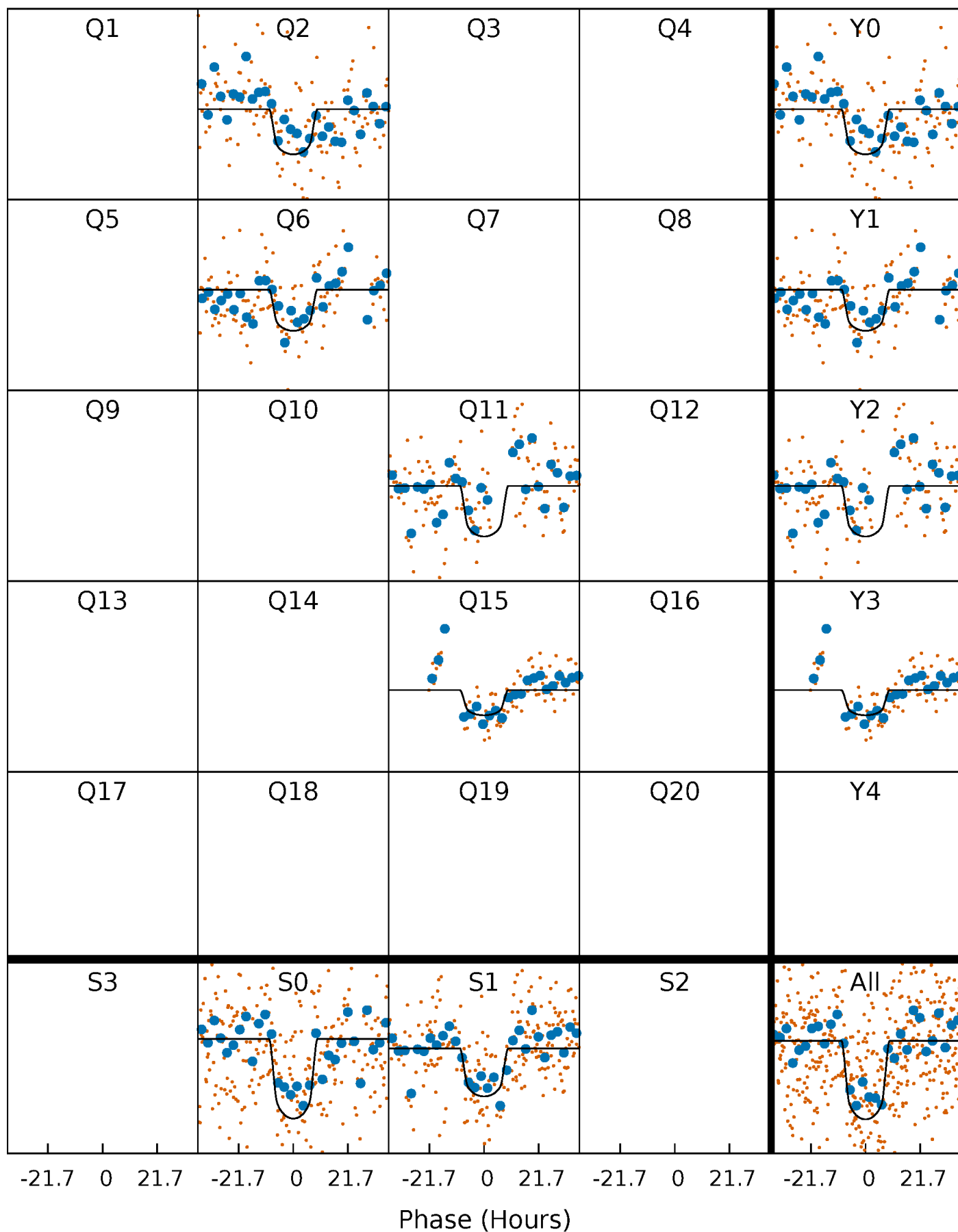
# PDC Quarter-Phased Transit Curves

TCE 003940418-02     $P=397.771585$  Days     $T_0=226.057985$  (BKJD)



# DV Quarter-Phased Transit Curves

TCE 003940418-02 P=397.771585 Days  $T_0=226.057985$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 003940418-02 P=397.766490 Days  $T_0=226.049123$  (BKJD)

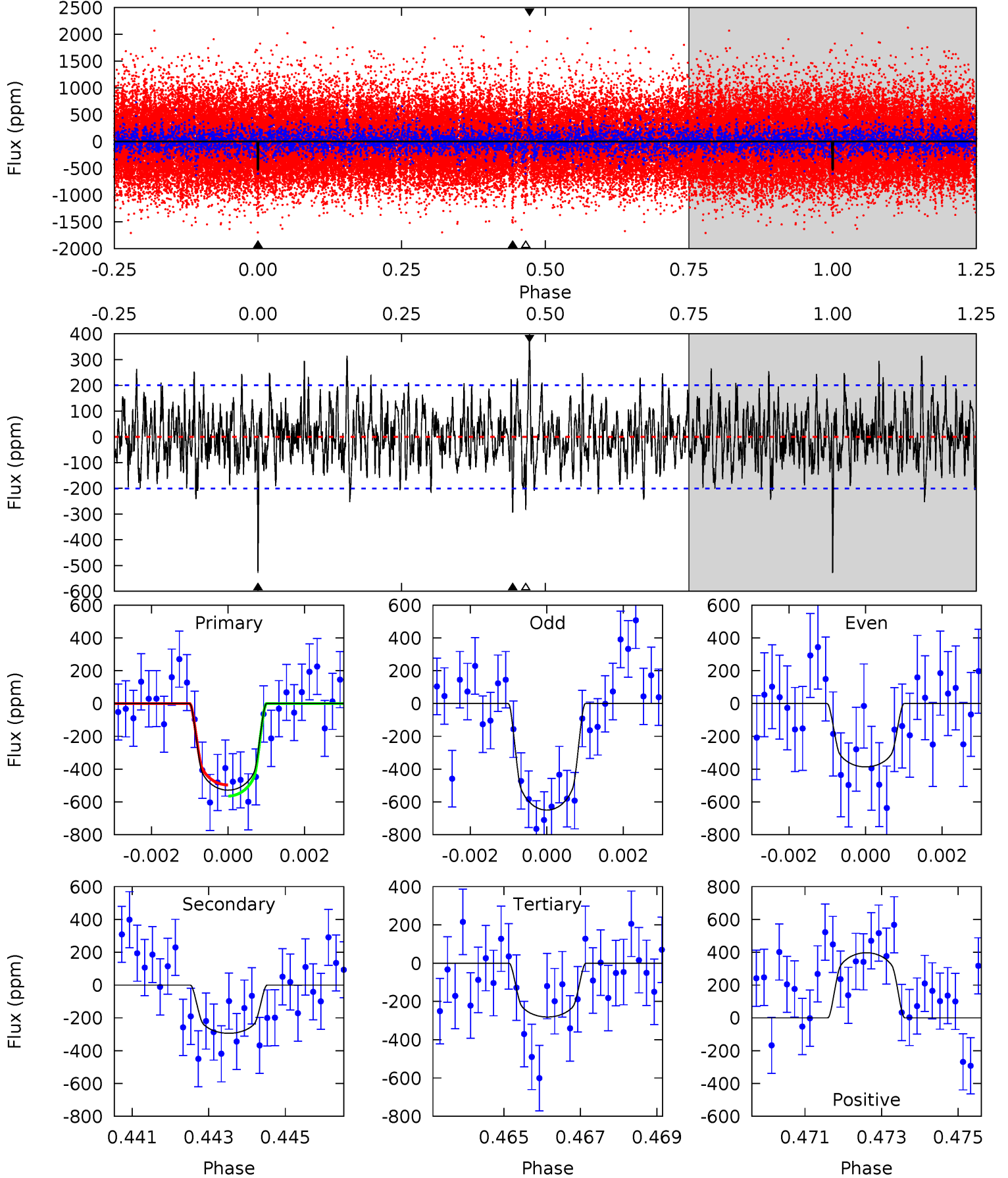




# DV Model-Shift Uniqueness Test

003940418-02, P = 397.771585 Days, E = 226.057985 Days

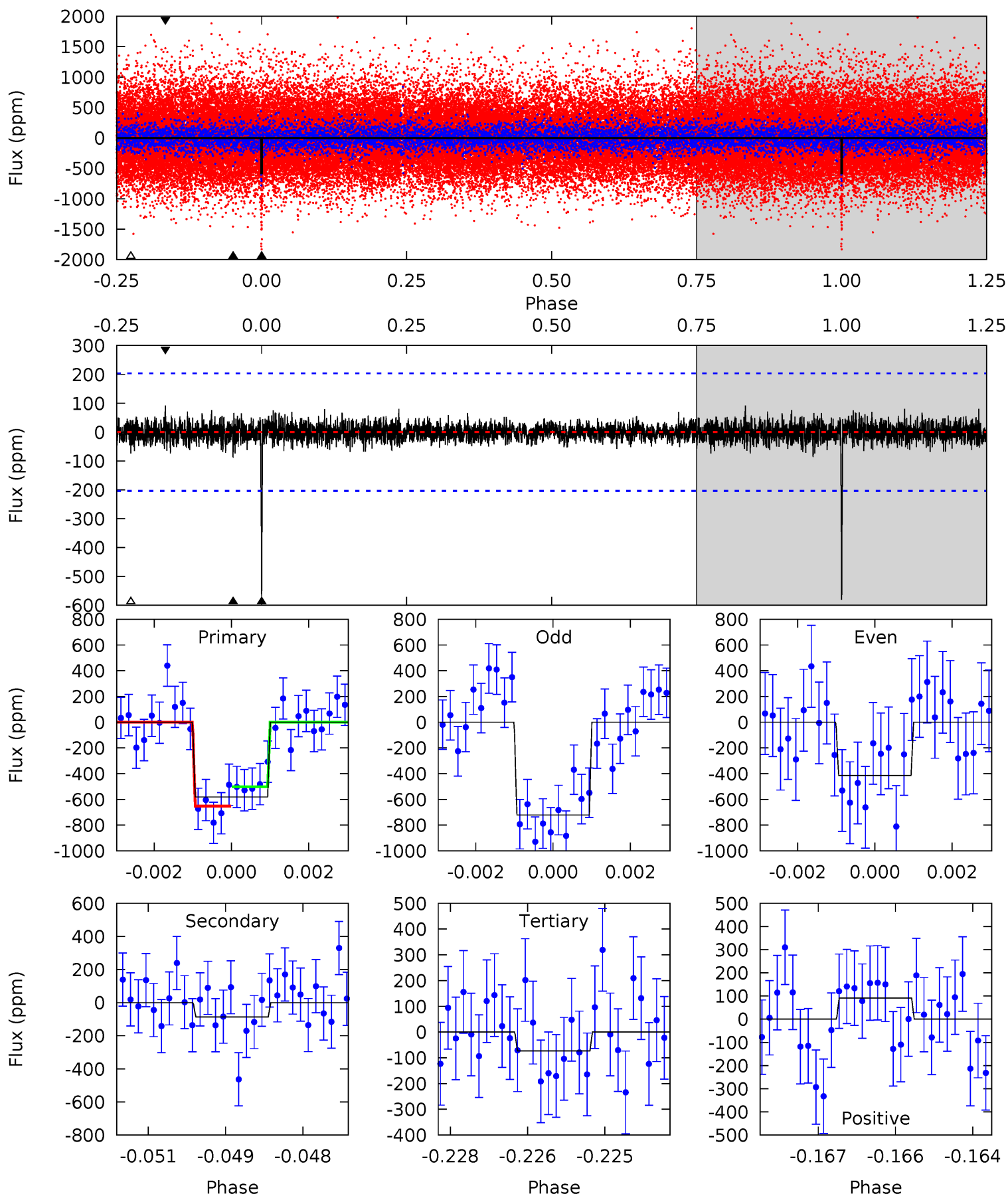
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.0	7.81	7.46	10.5	5.33	3.09	2.36	6.56	3.49	0.34	-2.73	3.49	1.06	0.43	0.90



# Alt Model-Shift Uniqueness Test

003940418-02, P = 397.766490 Days, E = 226.049123 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.3	2.27	1.94	2.42	5.37	3.16	0.53	13.4	12.9	0.33	-0.15	4.06	1.41	0.14	1.99



### Stellar Parameters For KIC 003940418

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$5170^{+155}_{-155}$	$4.574^{+0.026}_{-0.097}$	$0.180^{+0.200}_{-0.300}$	$0.807^{+0.111}_{-0.060}$	$0.891^{+0.053}_{-0.084}$	$2.384^{+0.369}_{-0.679}$
	+3%/-3%	+1%/-2%	+111%/-167%	+14%/-7%	+6%/-9%	+15%/-28%
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 003940418-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-294 \pm 38$	$2.69^{+0.36}_{-0.36}$	$288^{+13}_{-11}$	$4165^{+243}_{-224}$	$23051^{+8012}_{-5419}$
Alt.	$-86 \pm 38$	$2.19^{+0.34}_{-0.34}$	$288^{+12}_{-10}$	$3600^{+329}_{-346}$	$10147^{+6069}_{-4900}$

$T_{max}$  = 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

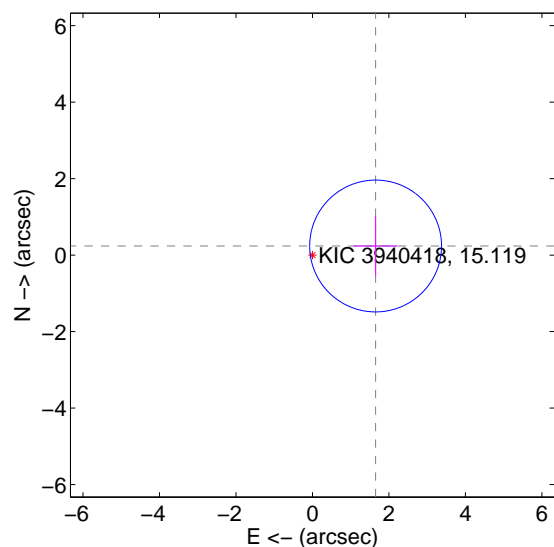
Supplemental centroid analysis for 003940418-02. Kepler magnitude: 15.12. Transit SNR 8.27

There are 1 quarters with good PRF difference image offsets

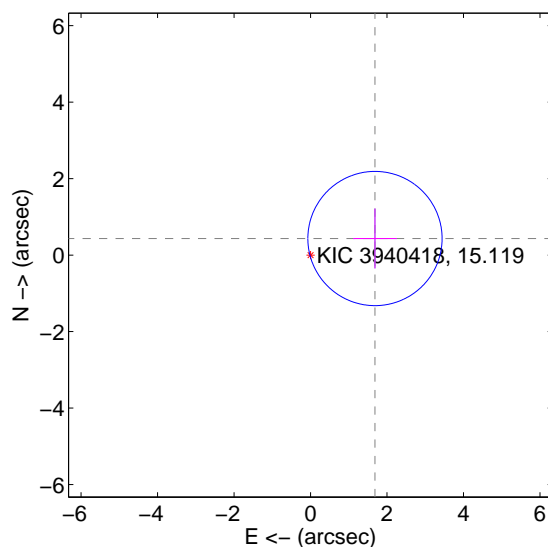
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.669 \pm 0.575$	2.90	$-1.652 \pm 0.570$	$0.238 \pm 0.783$
PRF-fit source offset from KIC position	$1.740 \pm 0.585$	2.97	$-1.686 \pm 0.570$	$0.433 \pm 0.783$
photometric centroid source offset	$2.29 \pm 0.99$	2.31	$1.86 \pm 0.93$	$1.34 \pm 1.11$

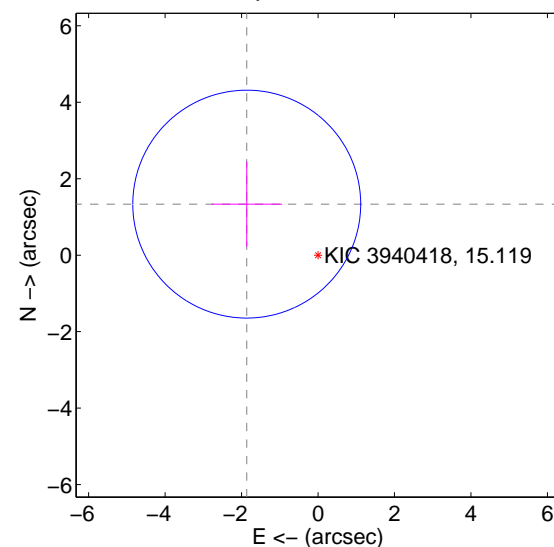
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

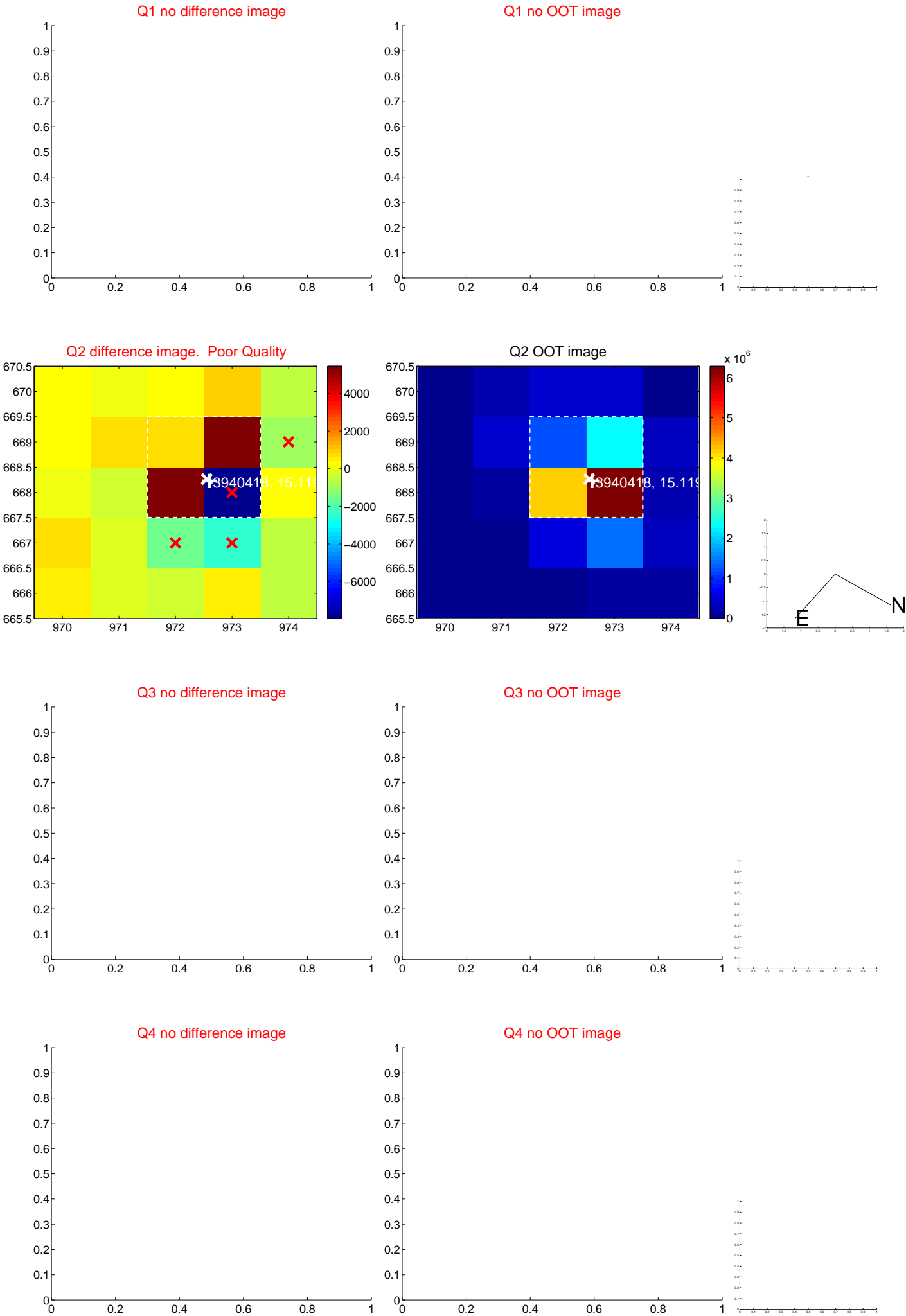


offset from photometric centroids

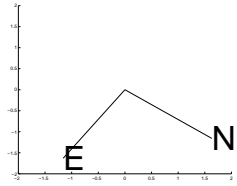
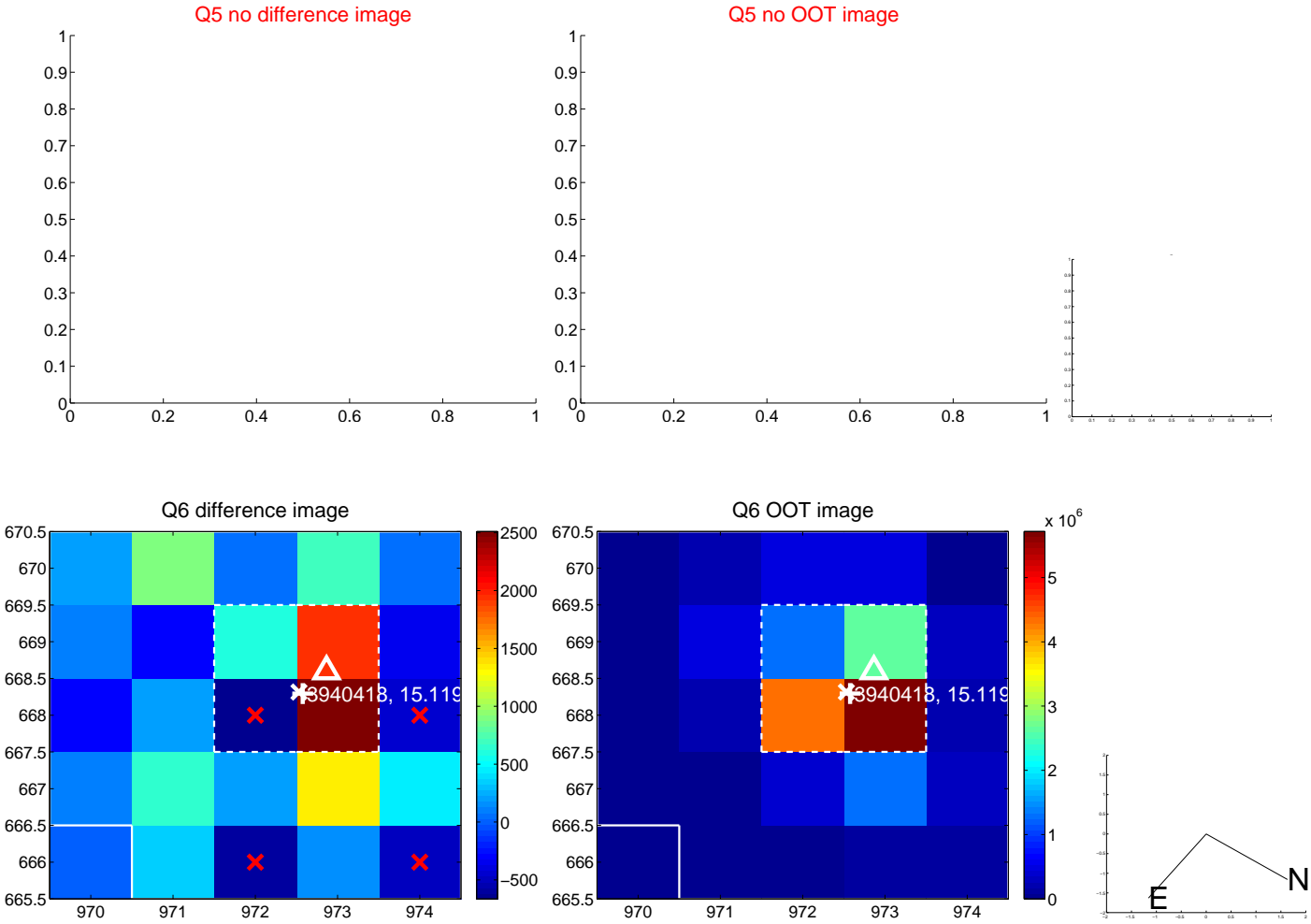


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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





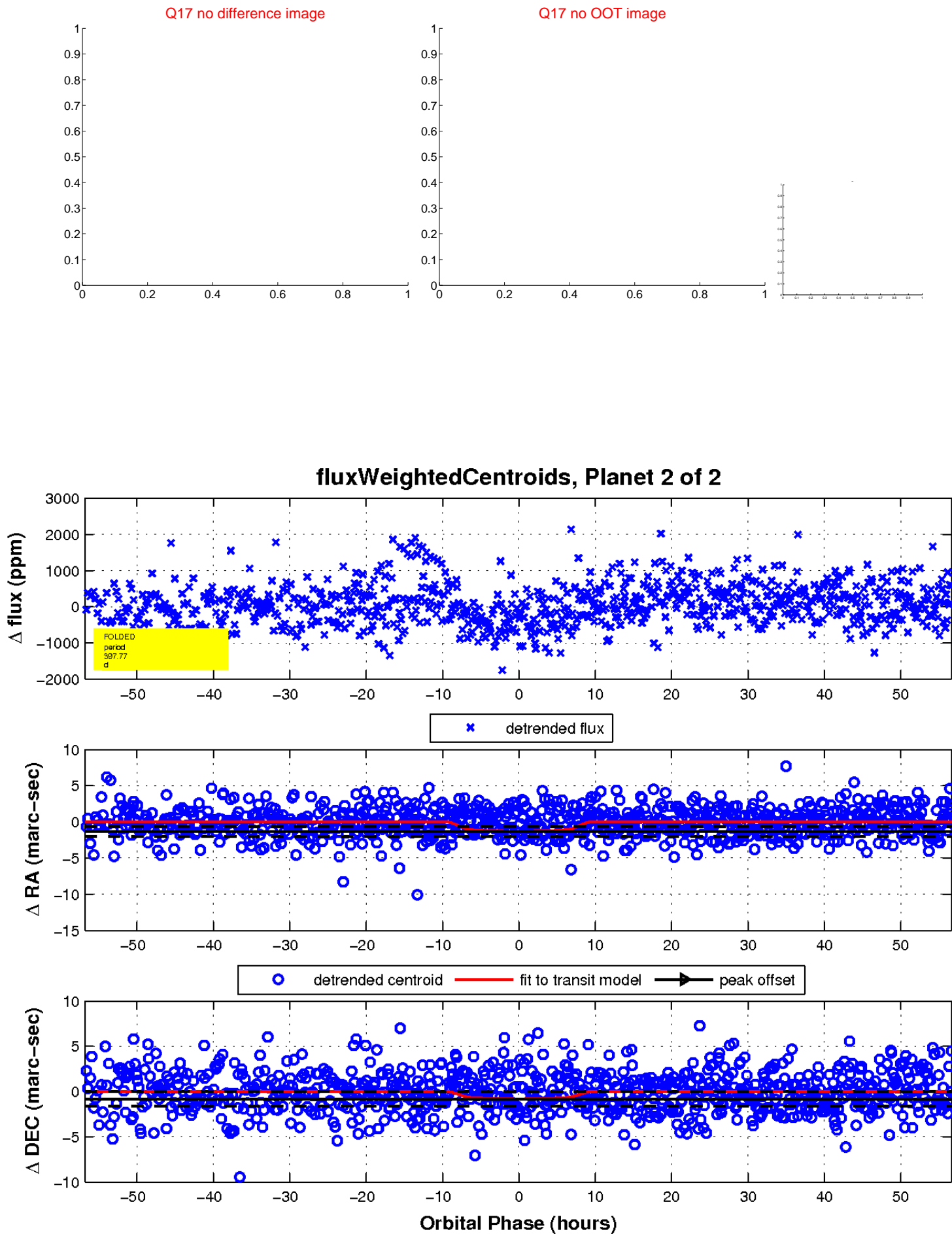
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

