

# KIC 009714123

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009714123-01	OBS	3392.01	50.355463	136.911316	105380.0	5.541	1914.7	1354.2	0.96	5936	31.35	13.84
009714123-02	OBS	No	50.355560	163.567735	3797.2	9.304	99.4	98.5	0.96	5936	6.81	13.84

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009714123-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
009714123-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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.

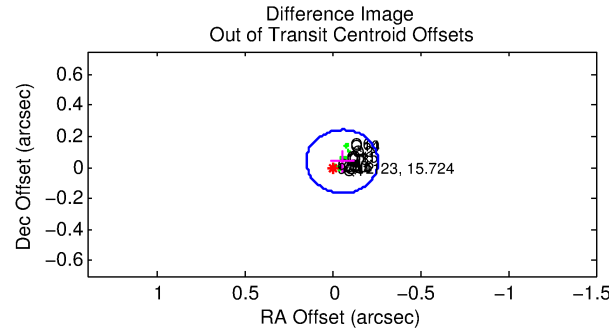
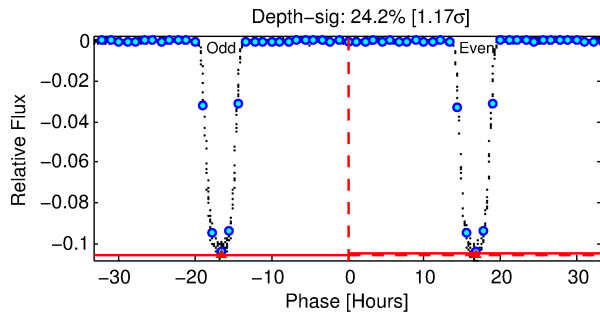
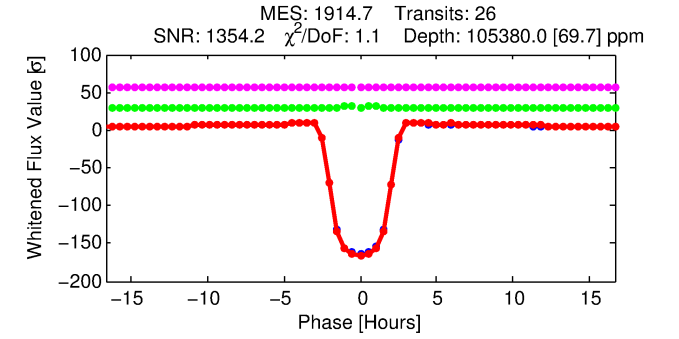
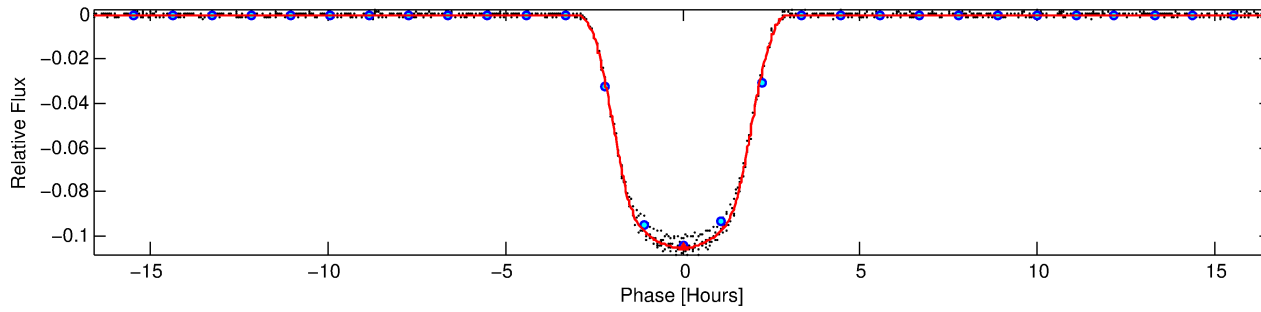
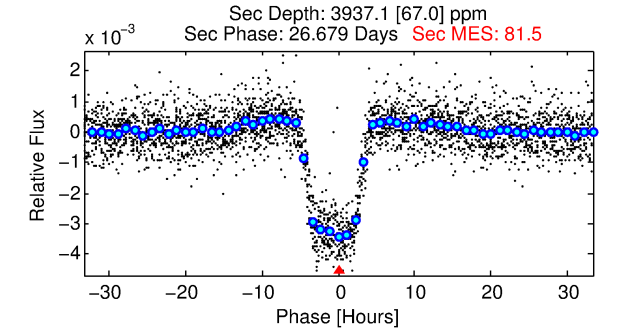
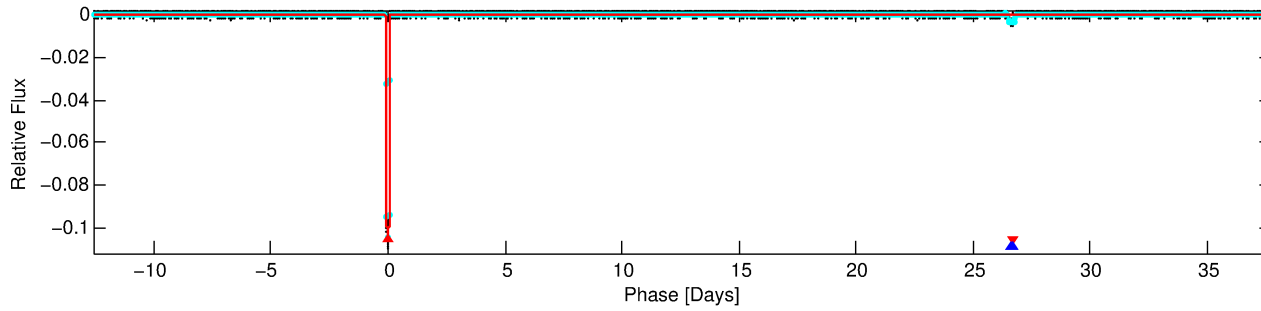
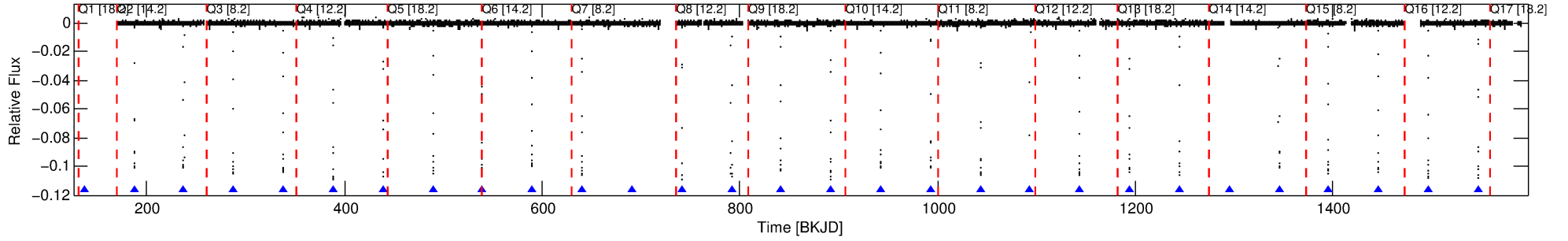
## Ephemeris Match Information For 009714123-01

No Significant Match Found

# DV One-Page Summary

KIC: 9714123 Candidate: 1 of 2 Period: 50.355 d  
KOI: K03392.01 Corr: 0.998

Kp: 15.72 R\*: 0.96 Rs Teff: 5936.0 K Logg: 4.50 Fe/H: 0.070



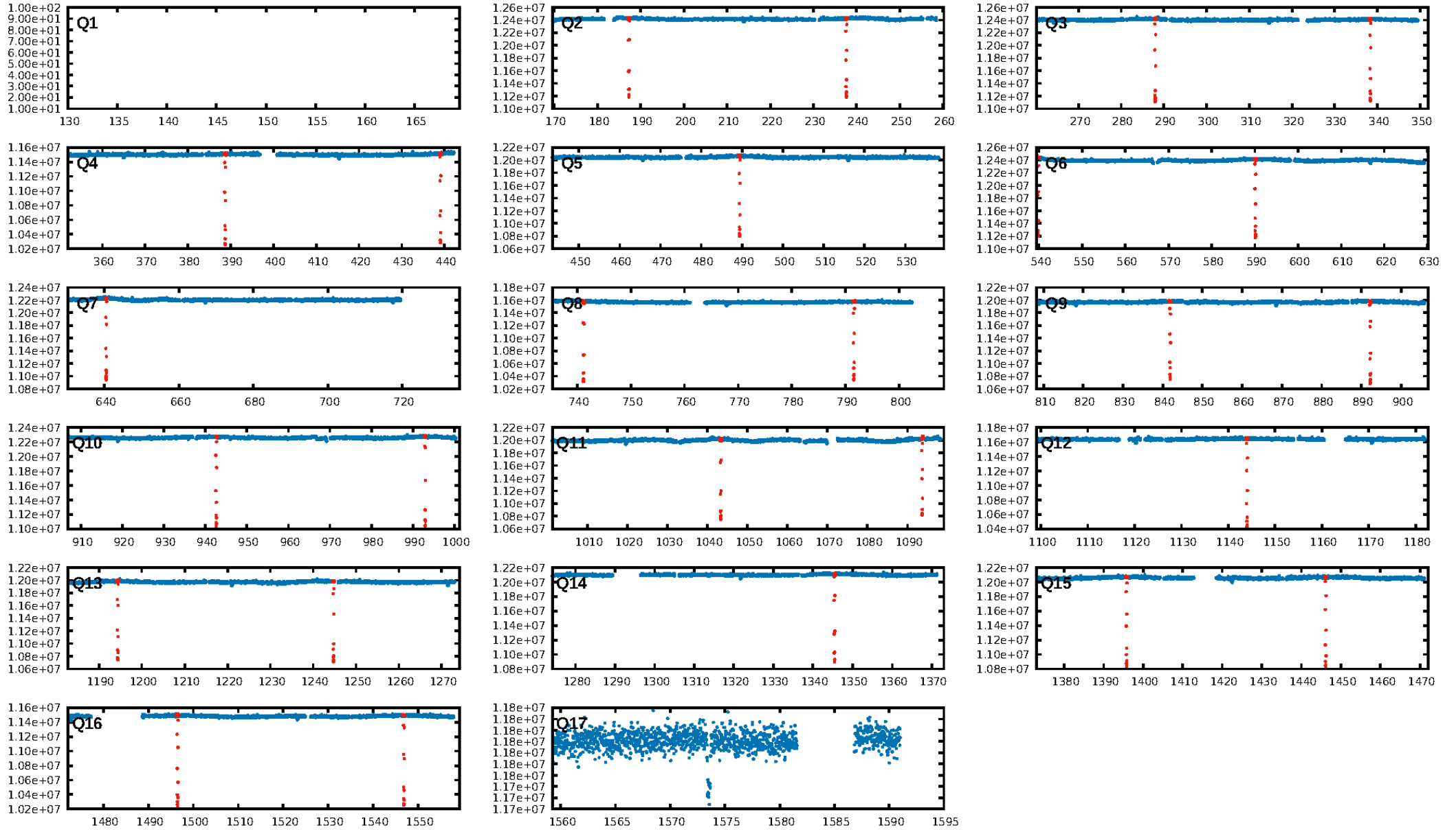
## DV Fit Results:

Period = 50.35546 [0.00000] d  
Epoch = 136.9113 [0.0001] BKJD  
Rp/R\* = 0.2977 [0.0002]  
a/R\* = 89.31 [0.17]  
b = 0.17 [0.01]  
Seff = 13.84 [5.74]  
Teq = 492 [51] K  
Rp = 31.35 [9.65] Re  
a = 0.2736 [0.0722] AU  
Ag = 164.95 [64.38] [2.55σ]  
Teffp = 2725 [98] K [20.28σ]

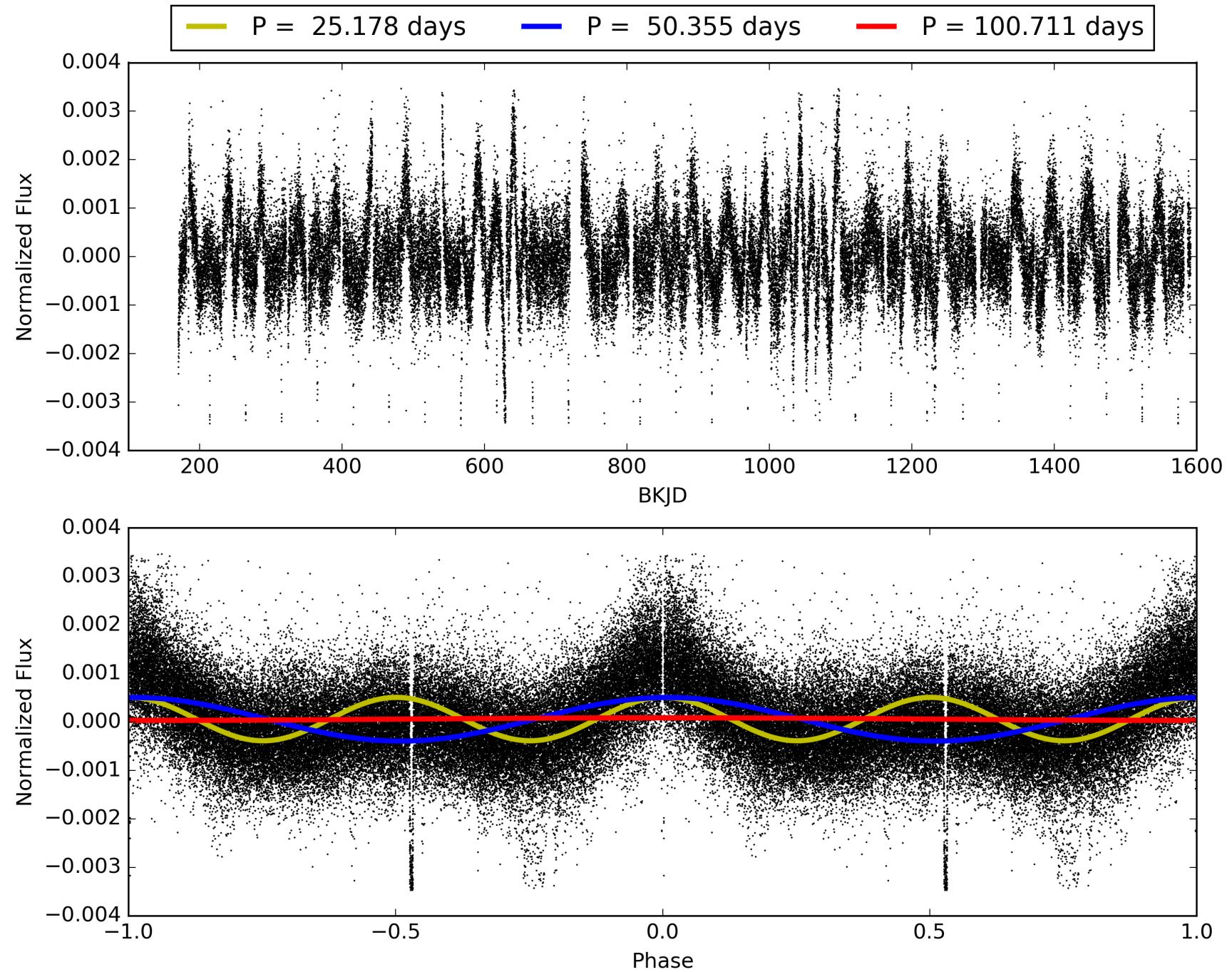
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [26/26]  
GhostDiagnostic-chr: 3.62  
Centroid-sig: 0.0%  
Centroid-so: 0.264 arcsec [46.24σ]  
OotOffset-rm: 0.066 arcsec [0.97σ]  
OotOffset-st: 4/4/4/3 [15]  
KicOffset-rm: 0.209 arcsec [3.11σ]  
KicOffset-st: 4/4/4/3 [15]  
DiffImageQuality-fgm: 1.00 [15/15]  
DiffImageOverlap-fno: 1.00 [15/15]

# TCE 009714123-01, PDC Light Curves

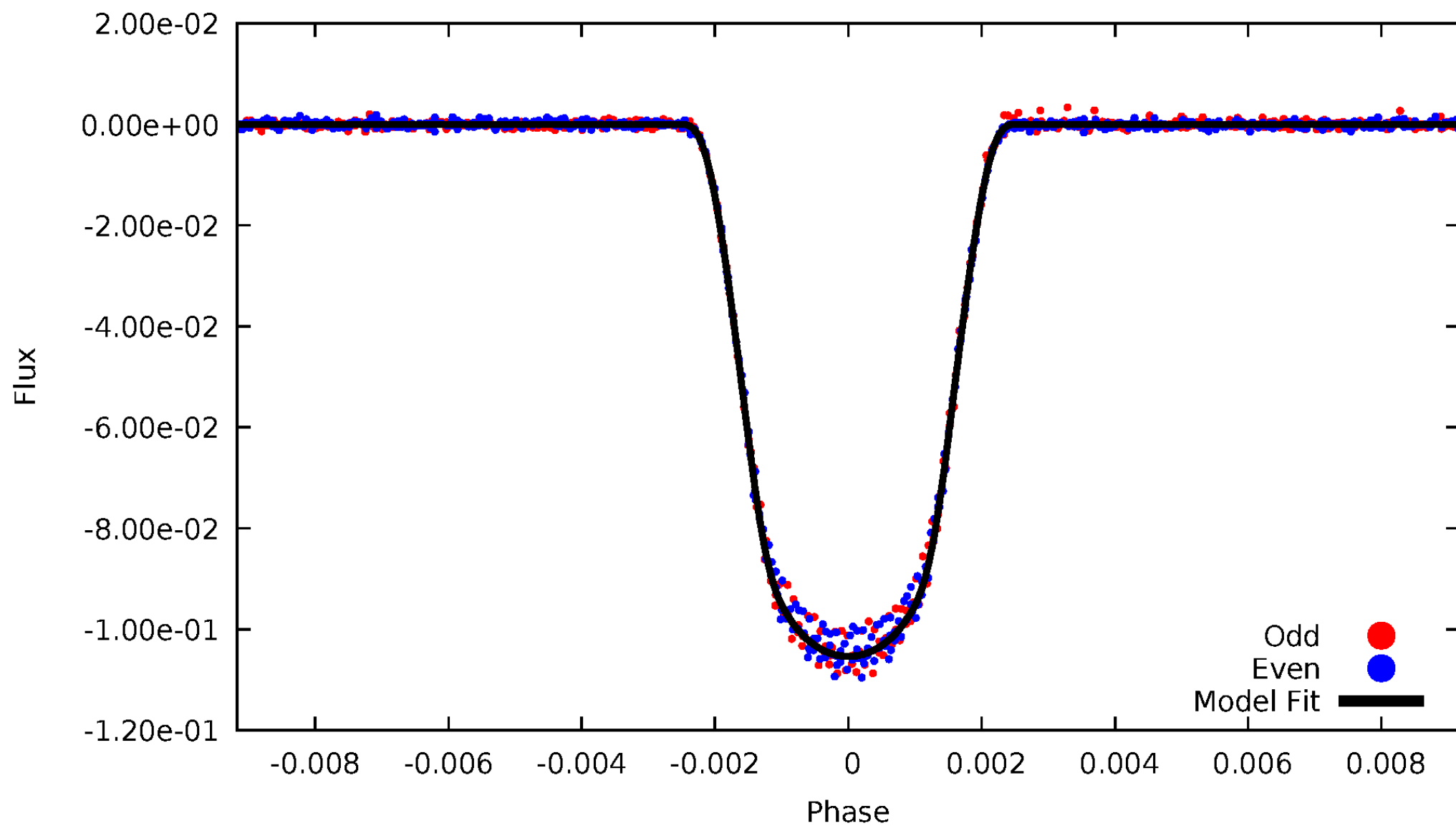


TCE 009714123-01



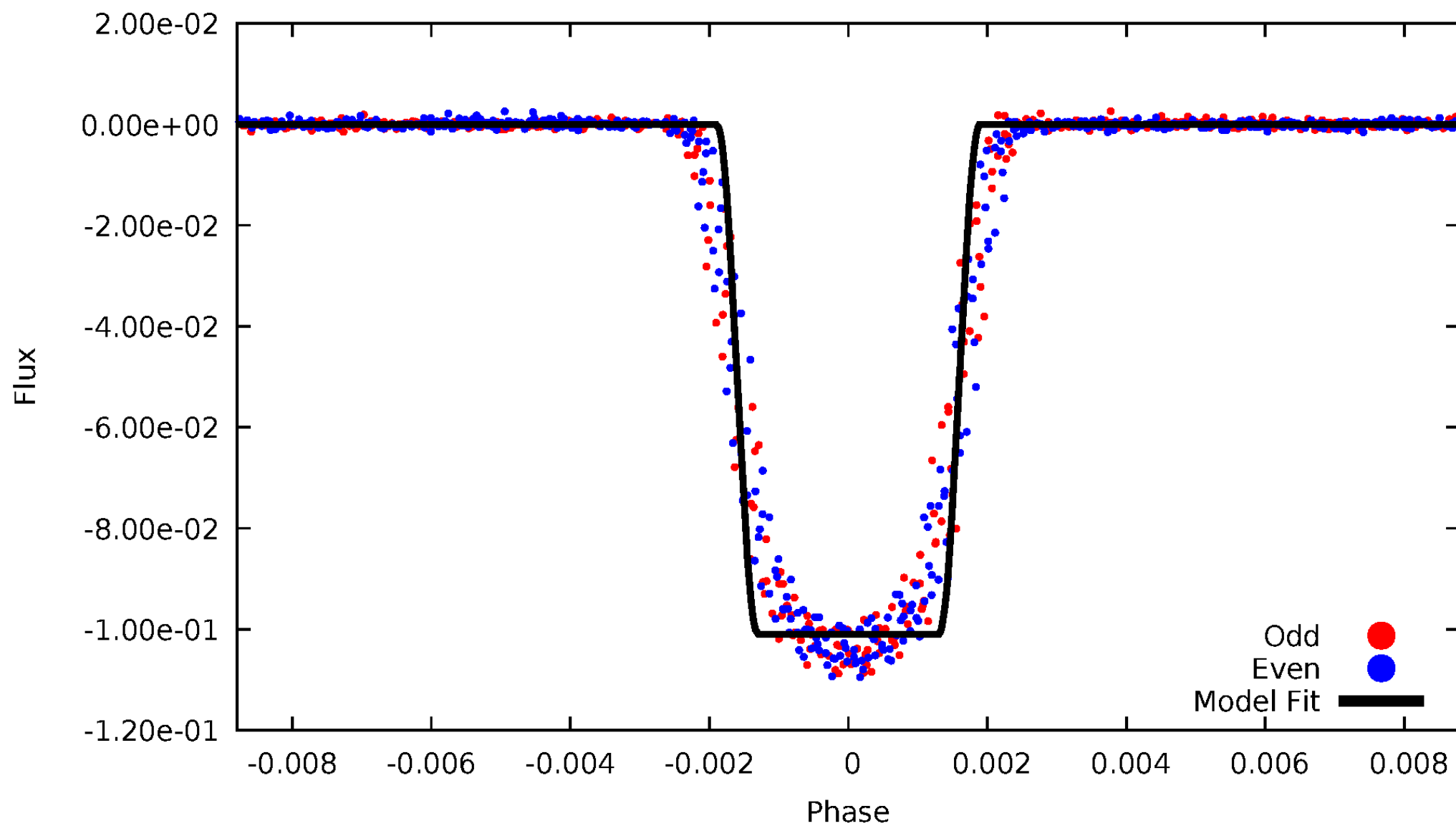
# DV Odd/Even

TCE 009714123-01



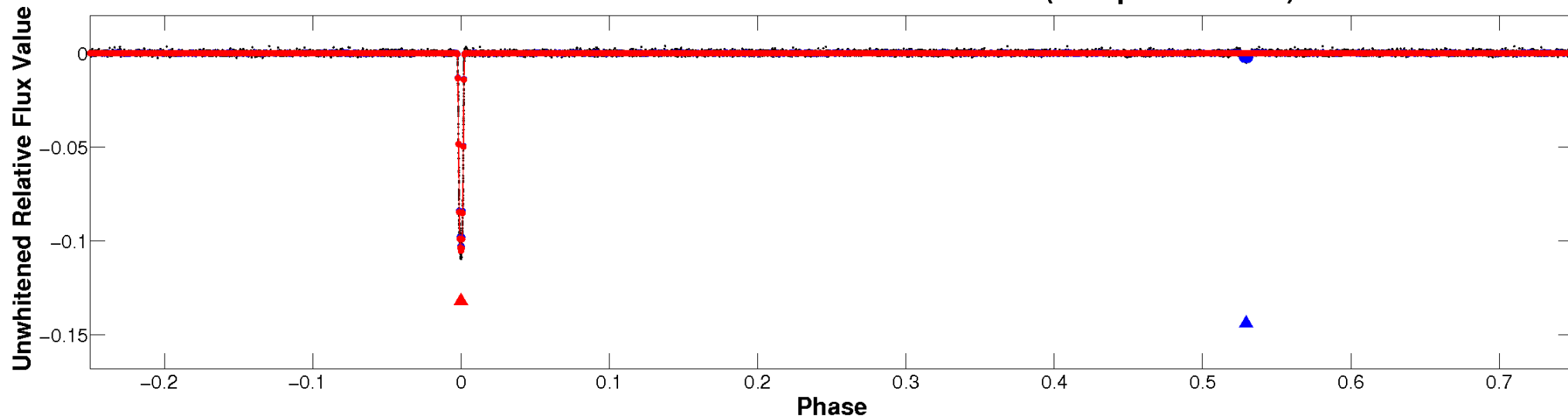
# ALT Odd/Even

TCE 009714123-01

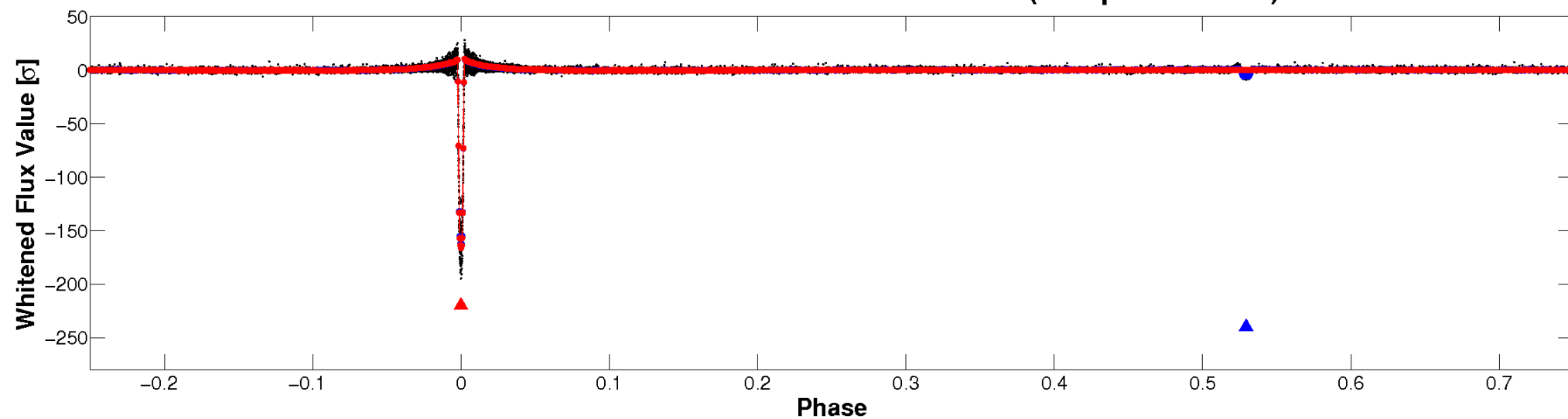


# Non-Whitened Vs. Whitened Light Curve

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

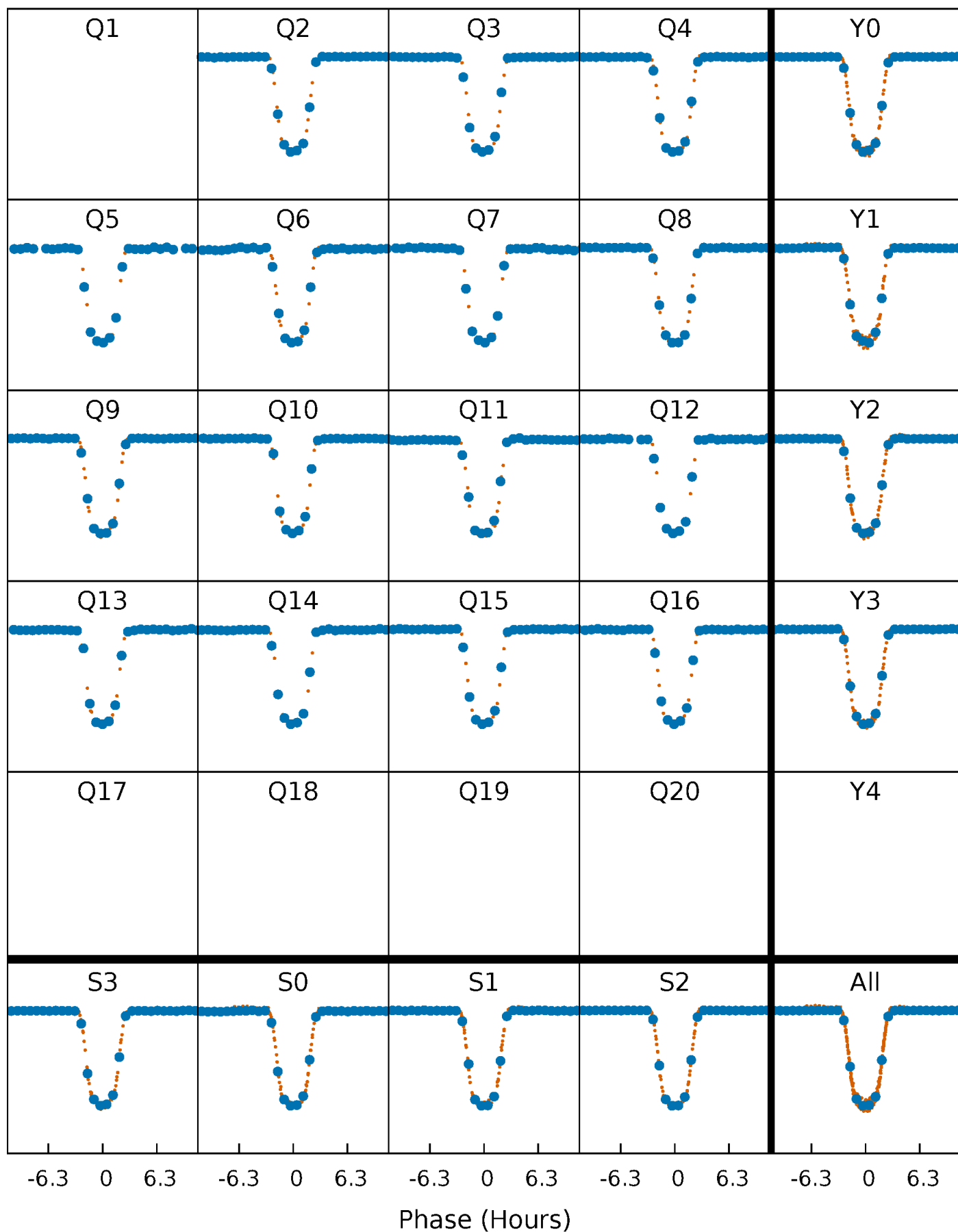


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

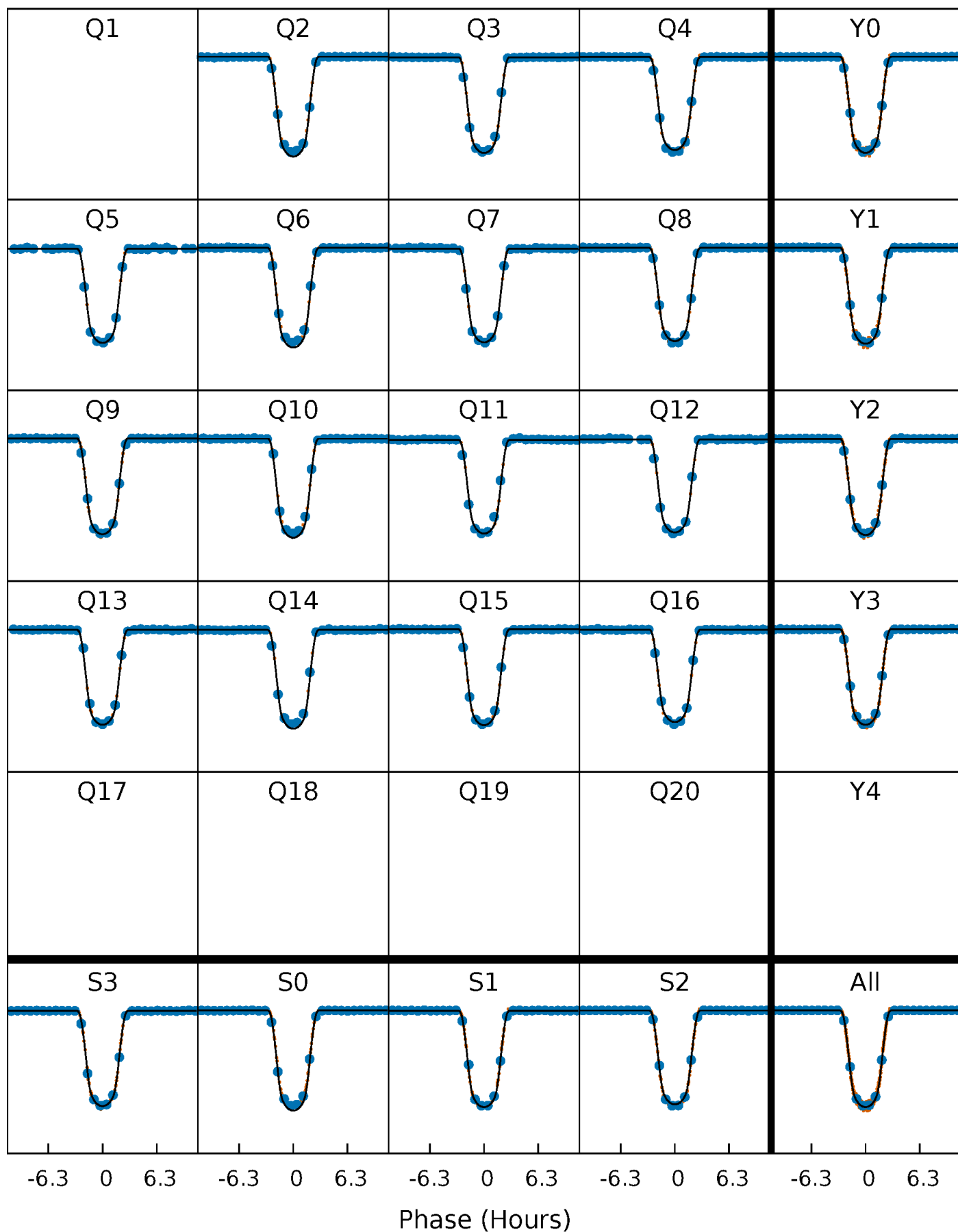
TCE 009714123-01 P= 50.355463 Days  $T_0=136.911316$  (BKJD)





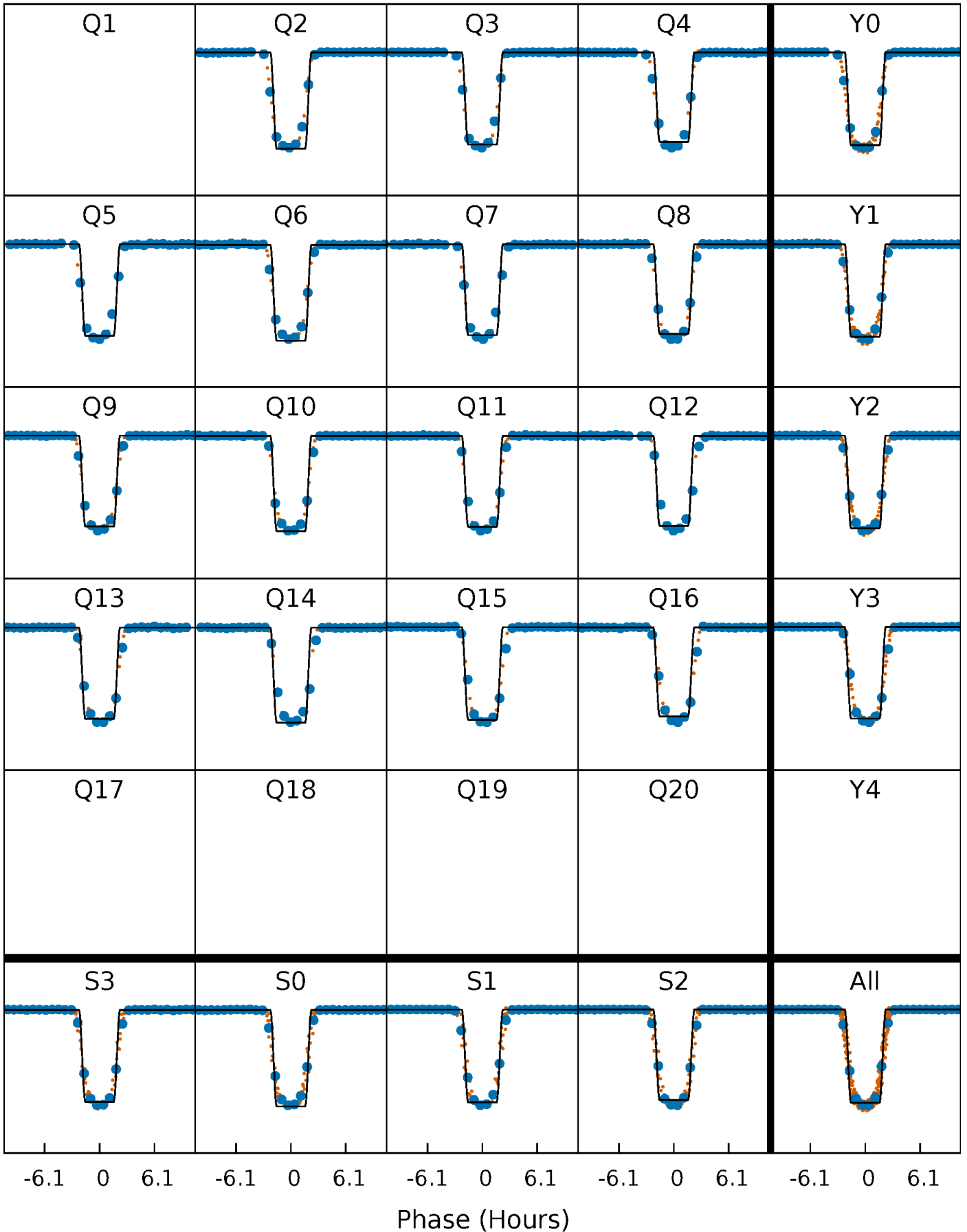
# DV Quarter-Phased Transit Curves

TCE 009714123-01 P= 50.355463 Days  $T_0=136.911316$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

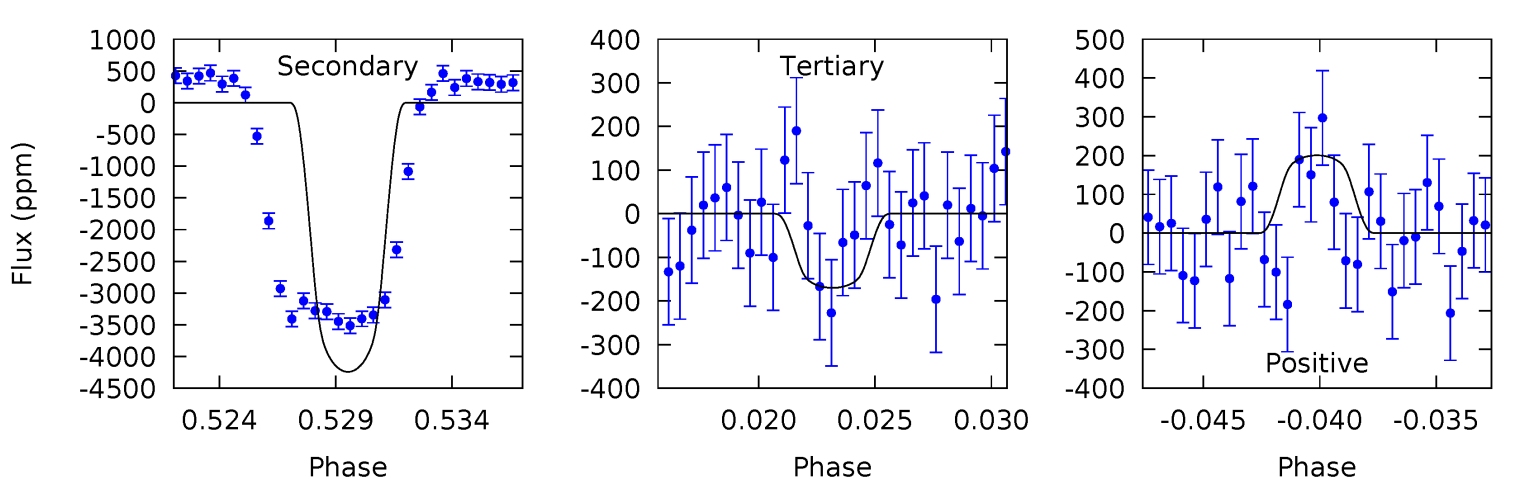
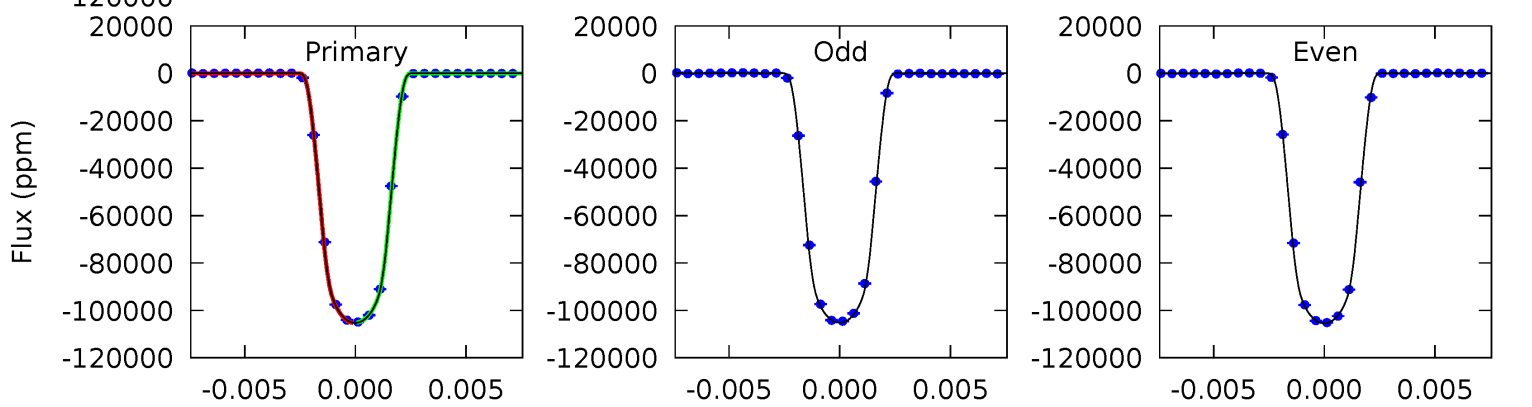
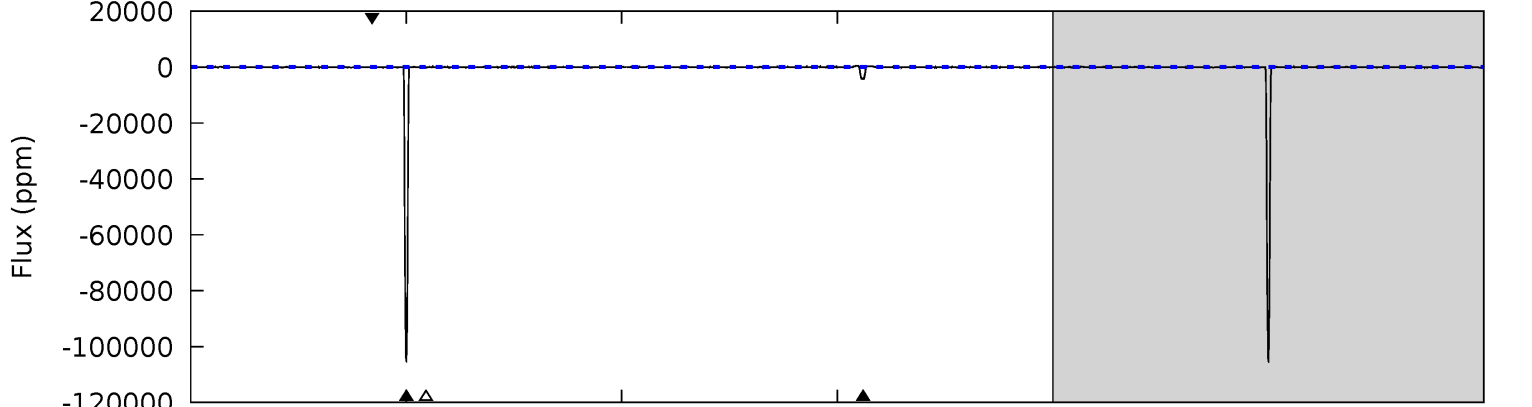
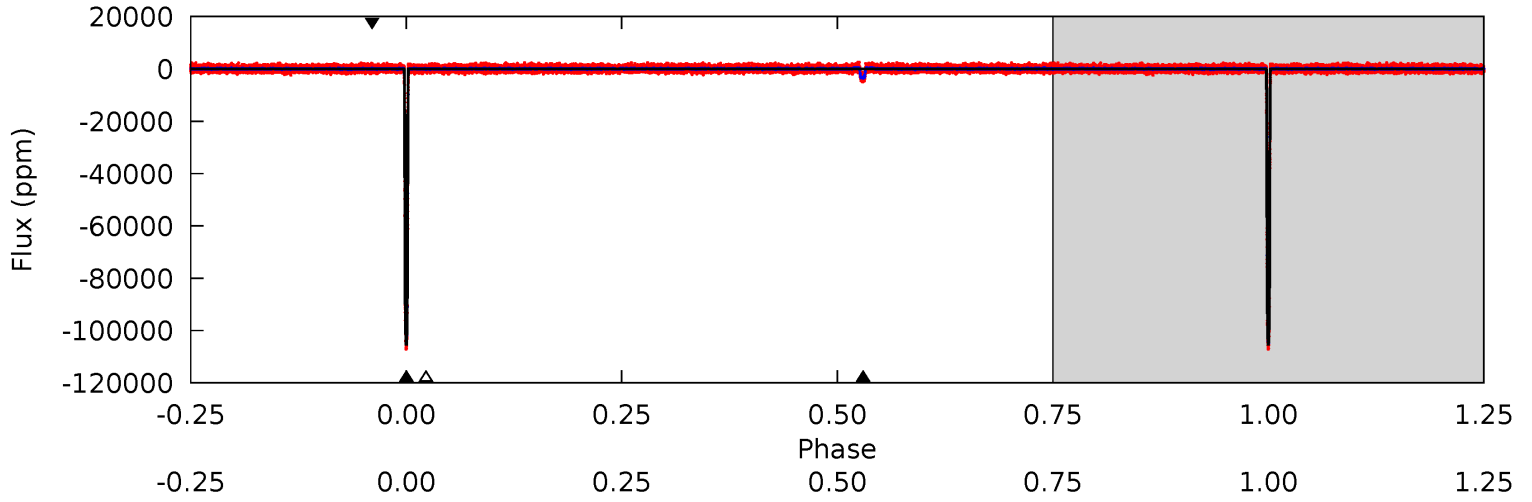
TCE 009714123-01 P= 50.354632 Days  $T_0=136.922948$  (BKJD)



# DV Model-Shift Uniqueness Test

009714123-01, P = 50.355463 Days, E = 136.911316 Days

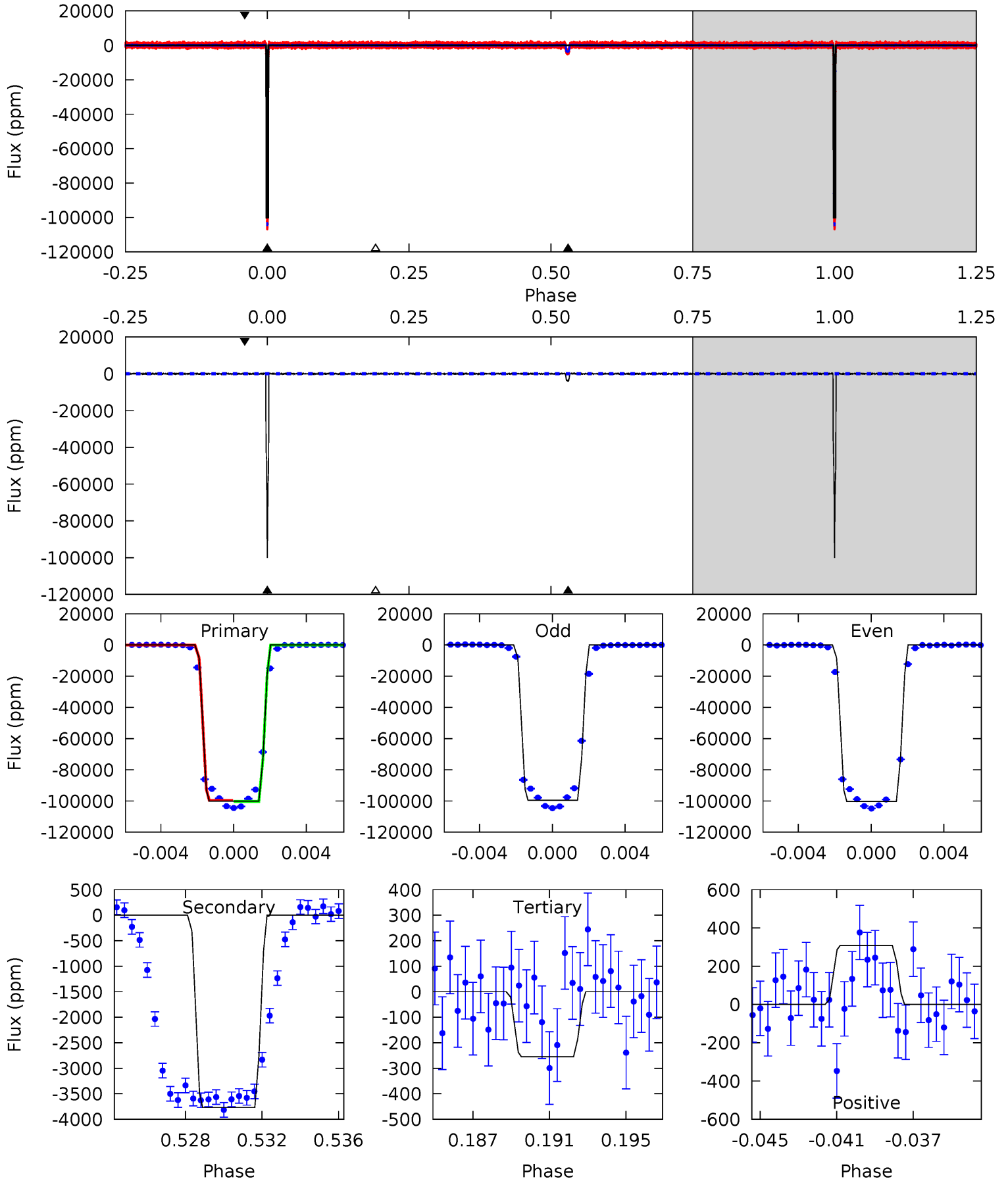
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2772	111.7	4.47	5.28	5.16	2.81	1.88	2767	2766	107.2	106.4	3.00	1.00	0.00	0



# Alt Model-Shift Uniqueness Test

009714123-01, P = 50.354632 Days, E = 136.922948 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
1556	58.6	3.97	4.80	5.21	2.90	1.14	1552	1551	54.6	53.8	5.58	0.99	0.00	0



### Stellar Parameters For KIC 009714123

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5936^{+176}_{-211}$	$4.501^{+0.040}_{-0.216}$	$0.070^{+0.250}_{-0.300}$	$0.965^{+0.297}_{-0.099}$	$1.075^{+0.124}_{-0.152}$	$1.685^{+0.367}_{-0.926}$
	+3%/-4%	+1%/-5%	+357%/-429%	+31%/-10%	+12%/-14%	+22%/-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 009714123-01 / KOI 3392.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-4241 \pm 38$	$32.13^{+5.47}_{-2.27}$	$705^{+50}_{-38}$	$3328^{+60}_{-79}$	$165^{+22}_{-38}$
Alt.	$-3768 \pm 64$	$34.51^{+5.67}_{-2.76}$	$706^{+51}_{-36}$	$3202^{+63}_{-67}$	$127^{+19}_{-30}$

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

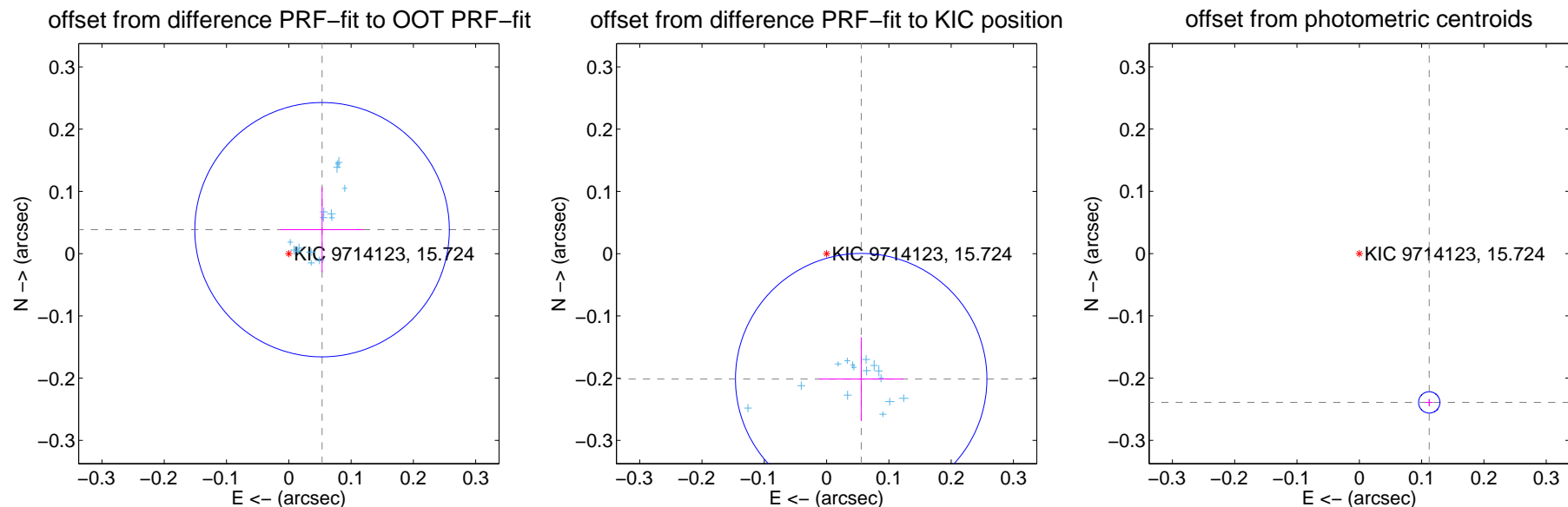
## DV Centroid Data

Supplemental centroid analysis for 009714123-01. Kepler magnitude: 15.72. Transit SNR 1354.22

There are 15 quarters with good PRF difference image offsets

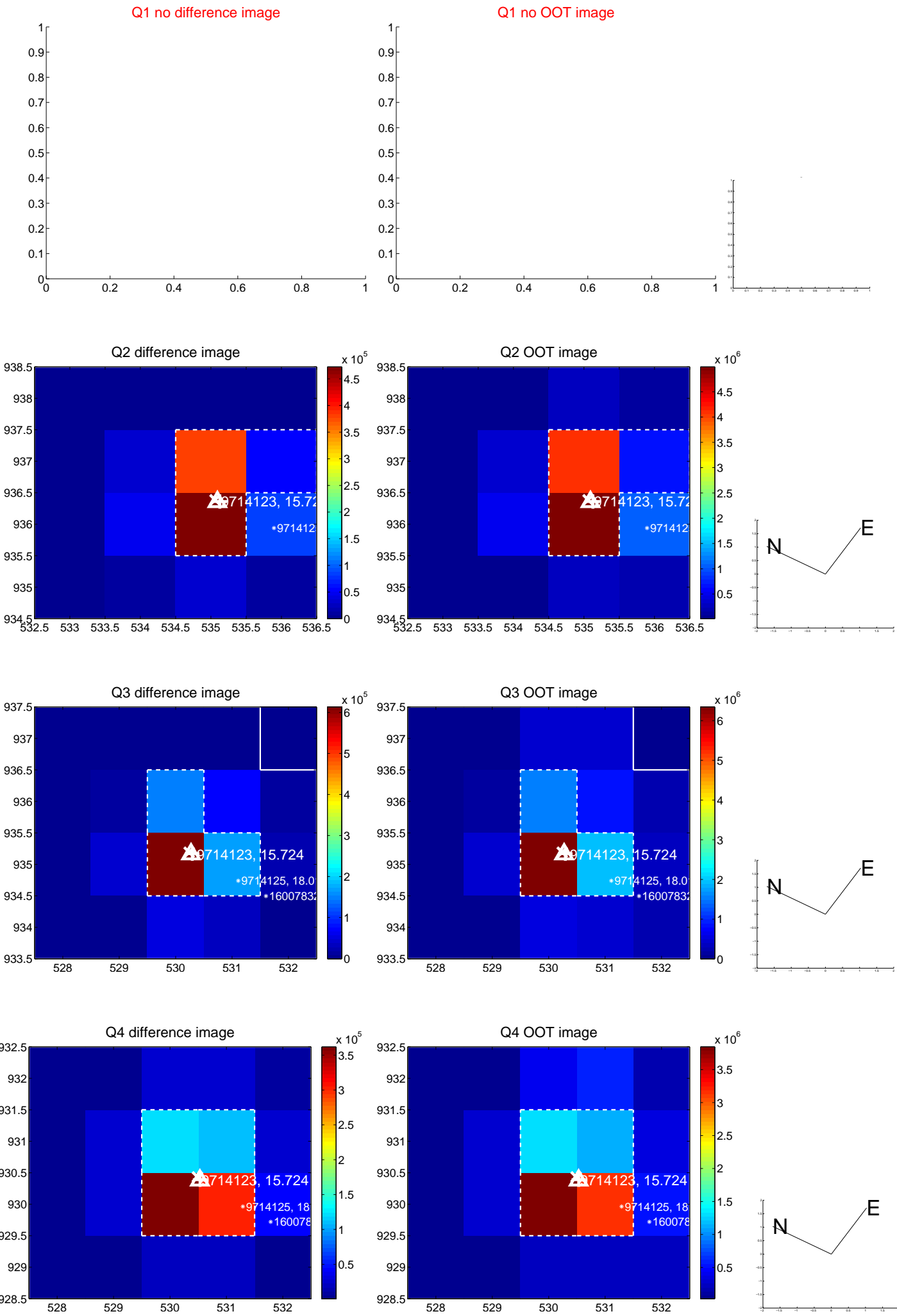
The direct PRF centroid is offset from the target star catalog position by about 0.25 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.066 \pm 0.068$	0.97	$-0.053 \pm 0.067$	$0.039 \pm 0.068$
PRF-fit source offset from KIC position	$0.209 \pm 0.067$	3.11	$-0.056 \pm 0.068$	$-0.202 \pm 0.067$
photometric centroid source offset	$0.26 \pm 0.01$	46.24	$-0.11 \pm 0.01$	$-0.24 \pm 0.01$

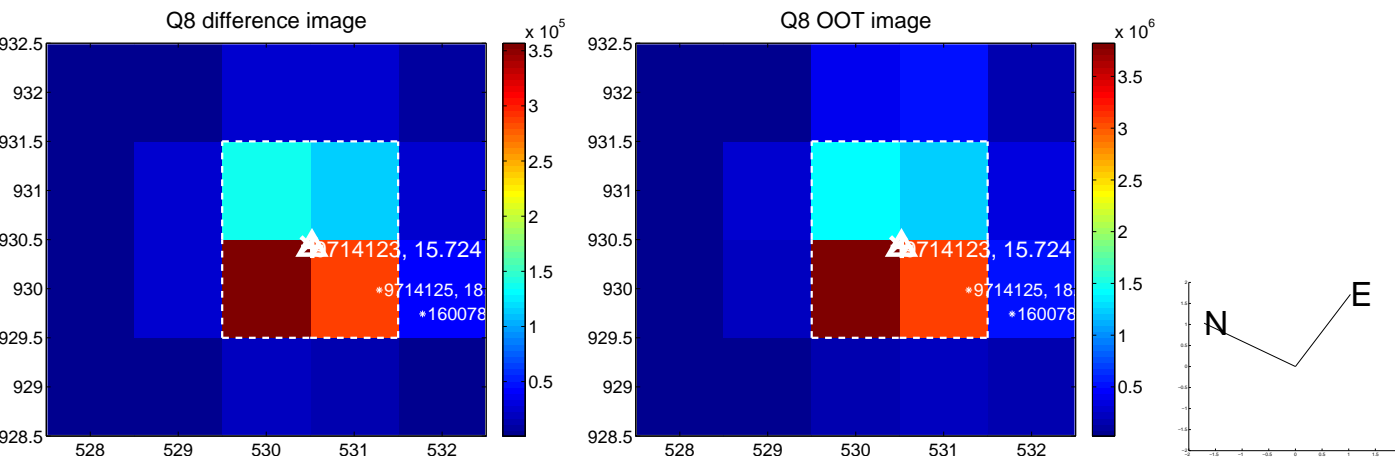
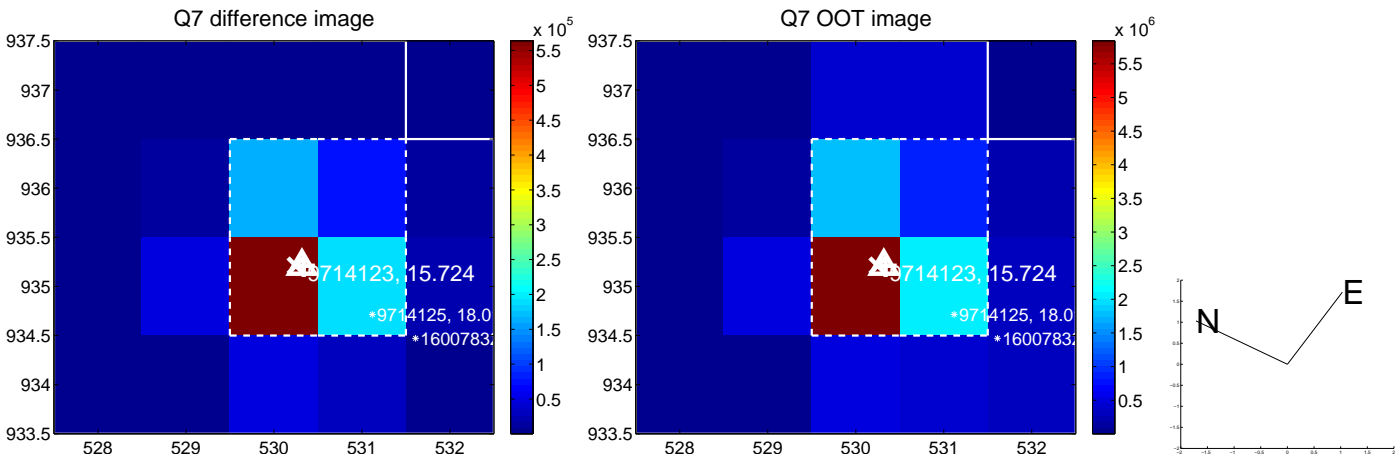
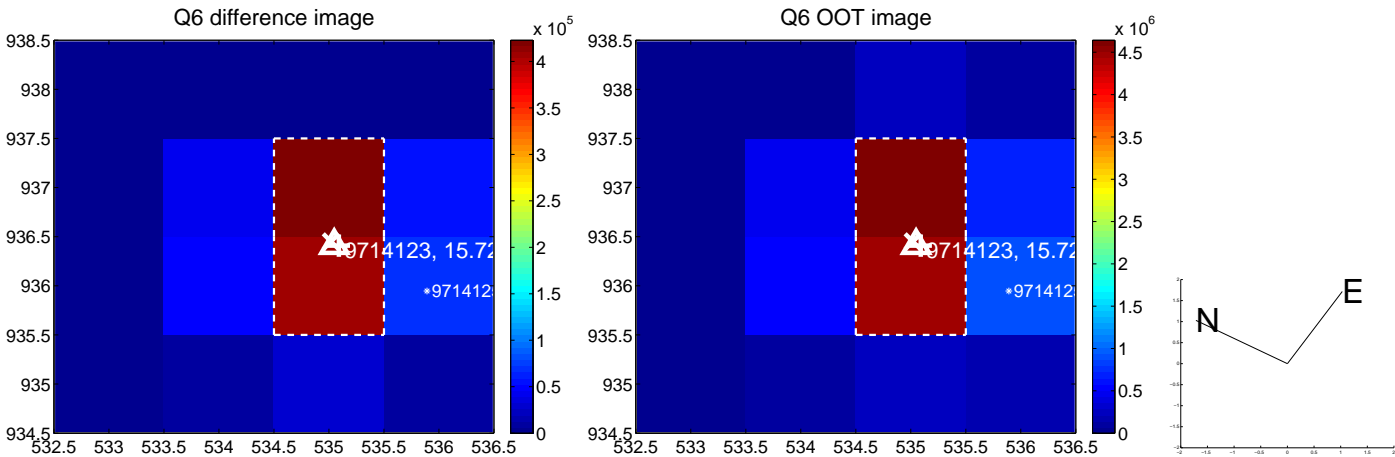
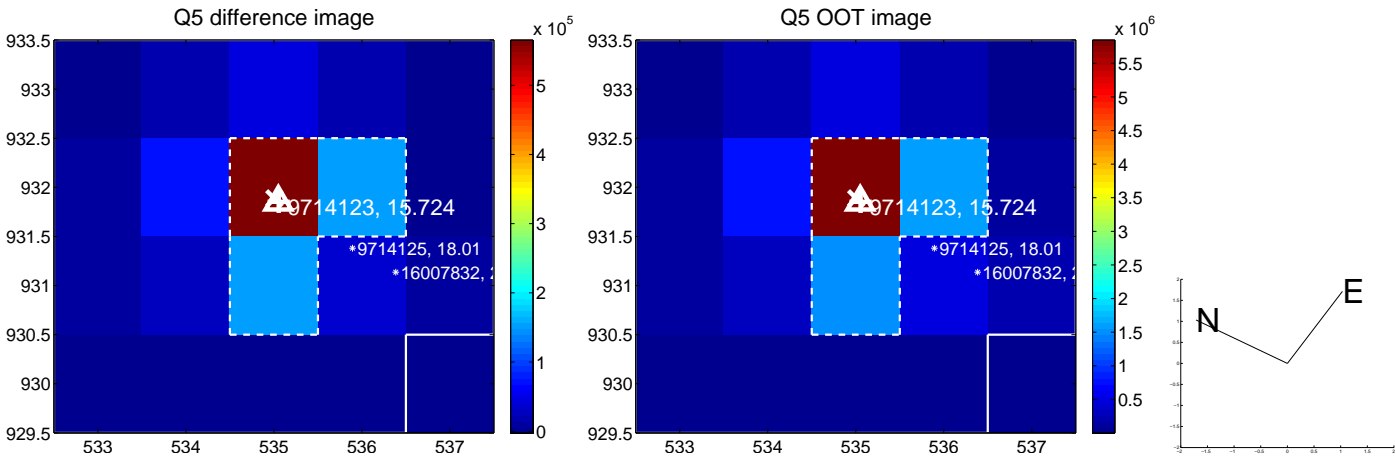


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

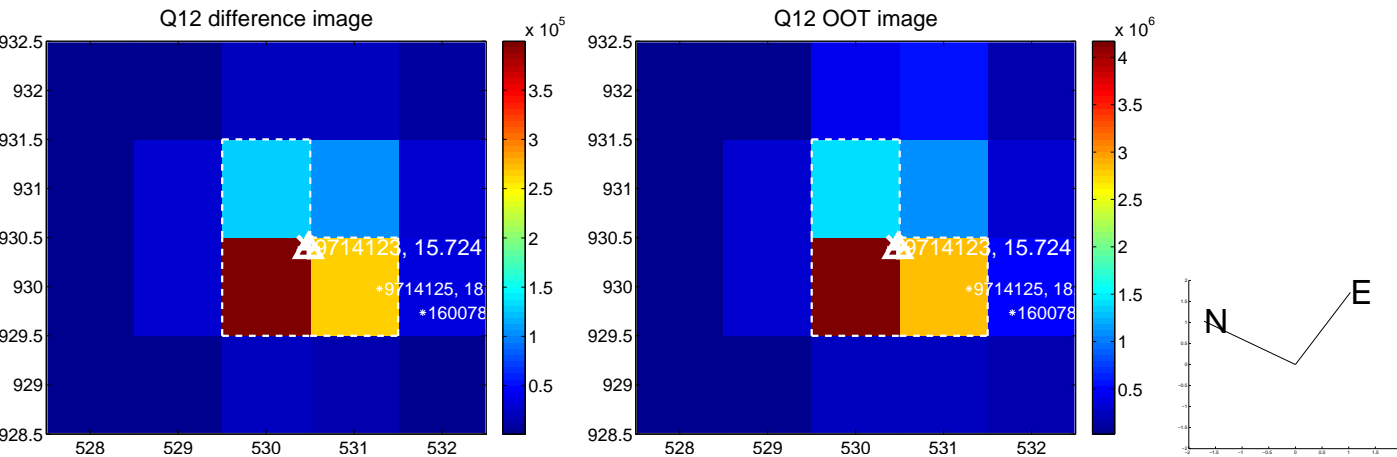
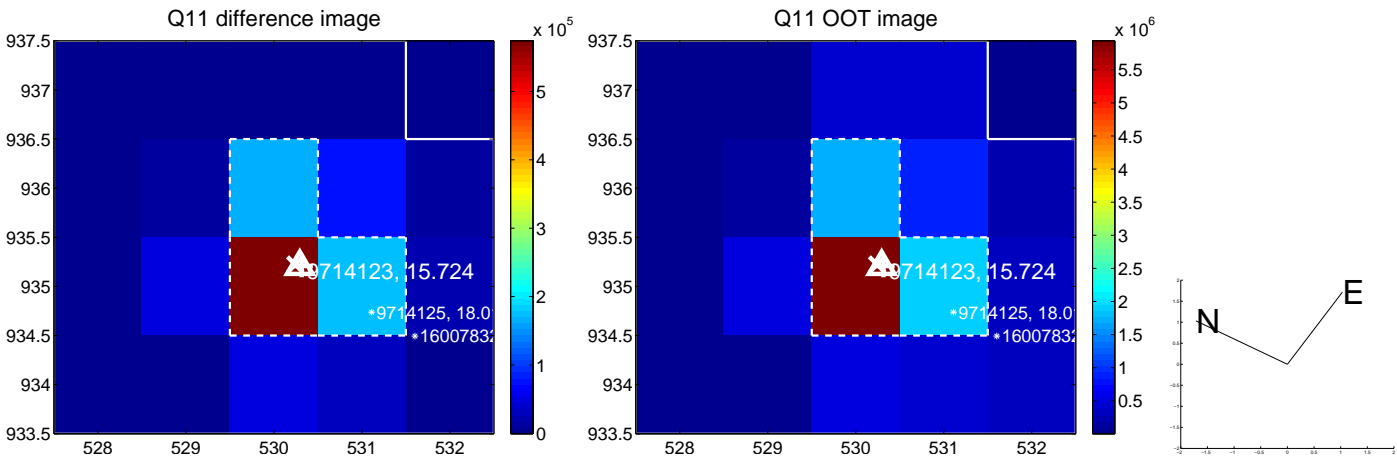
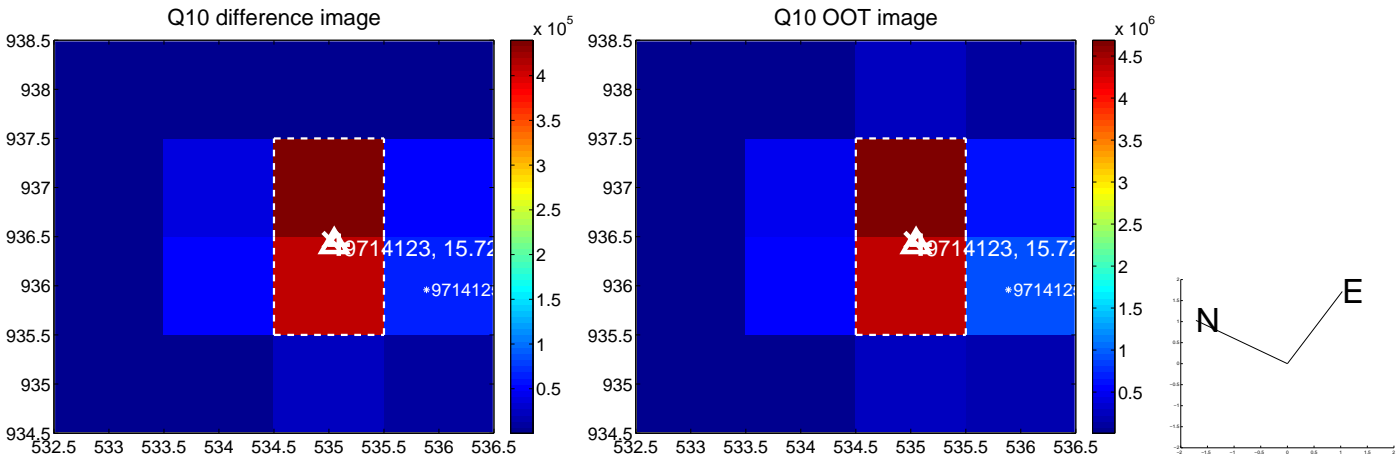
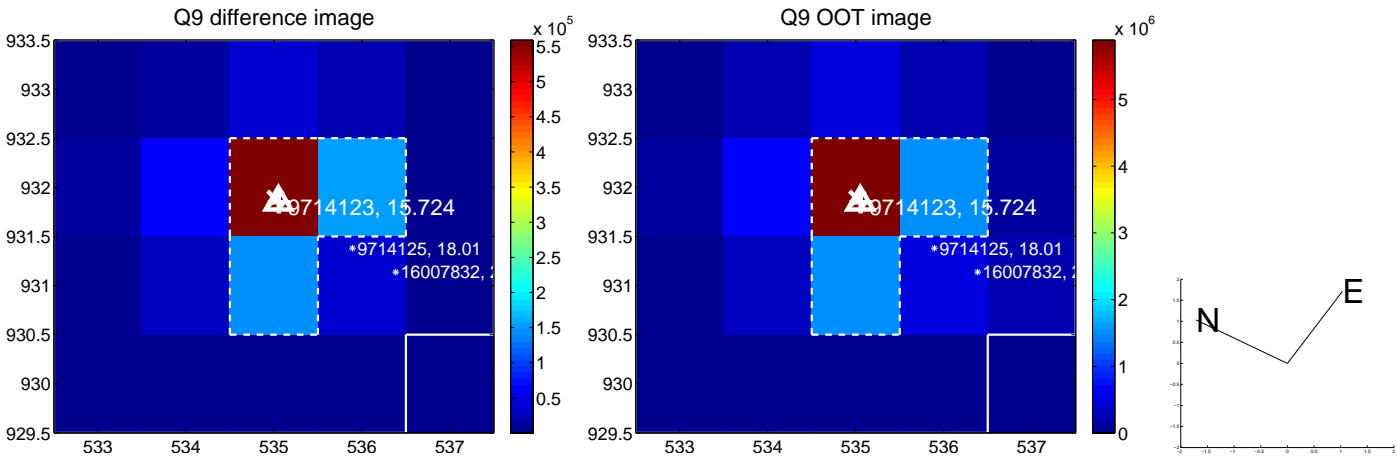


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

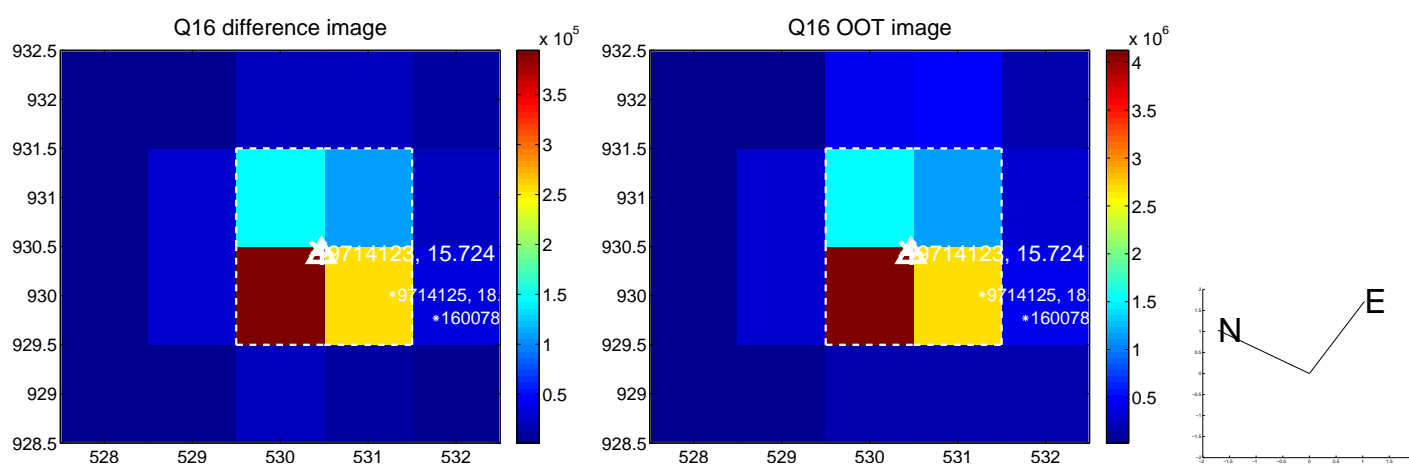
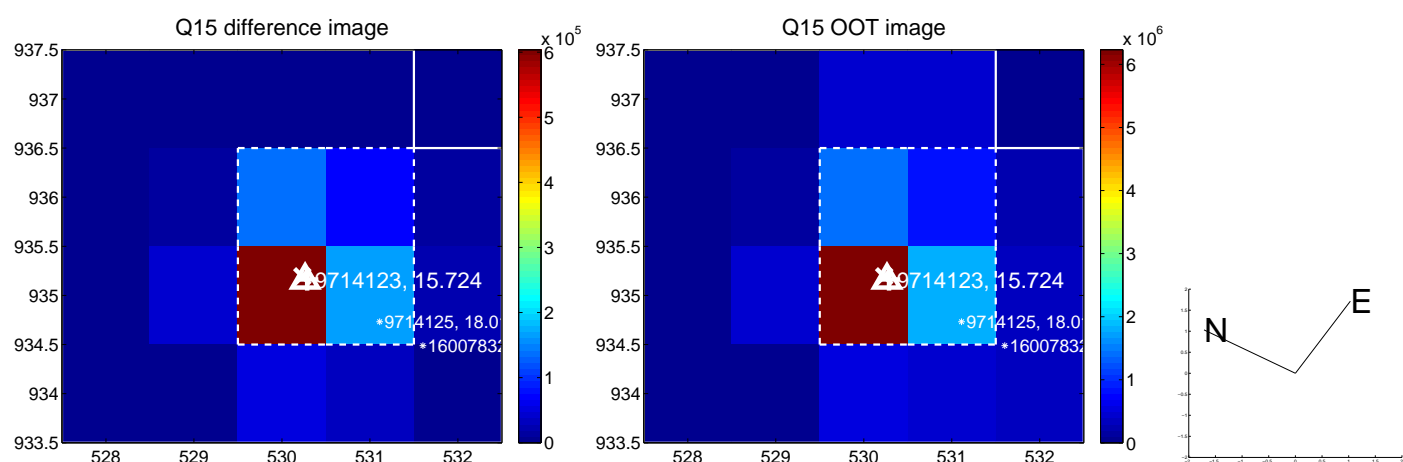
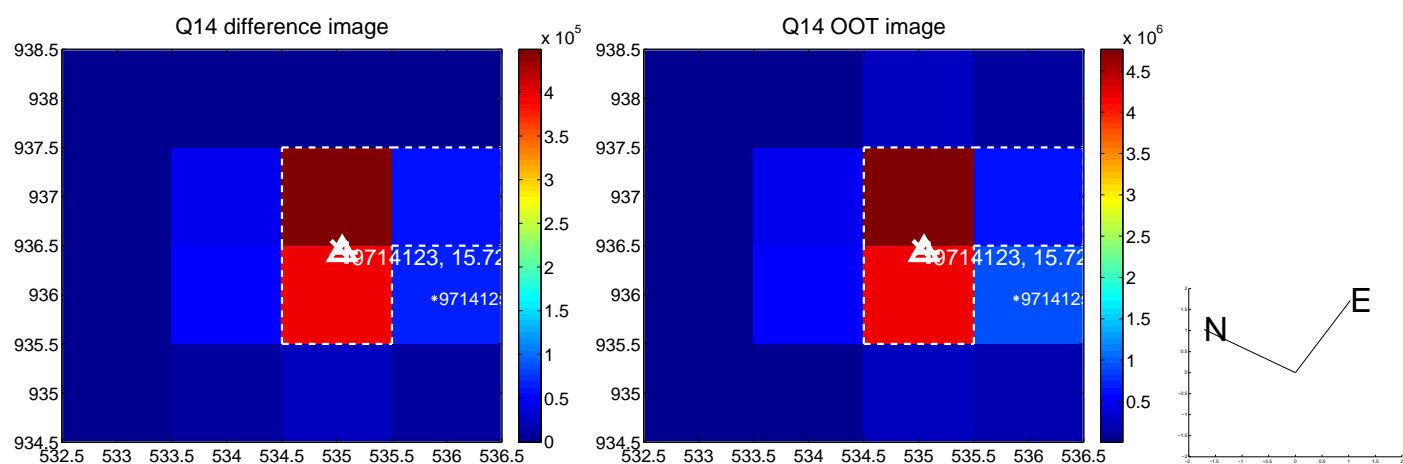
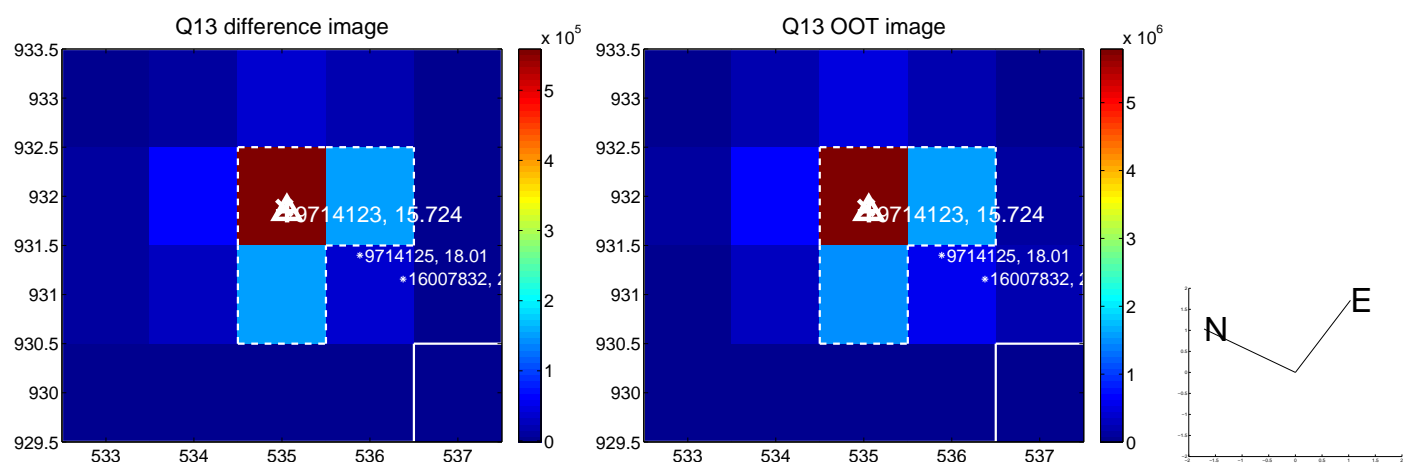




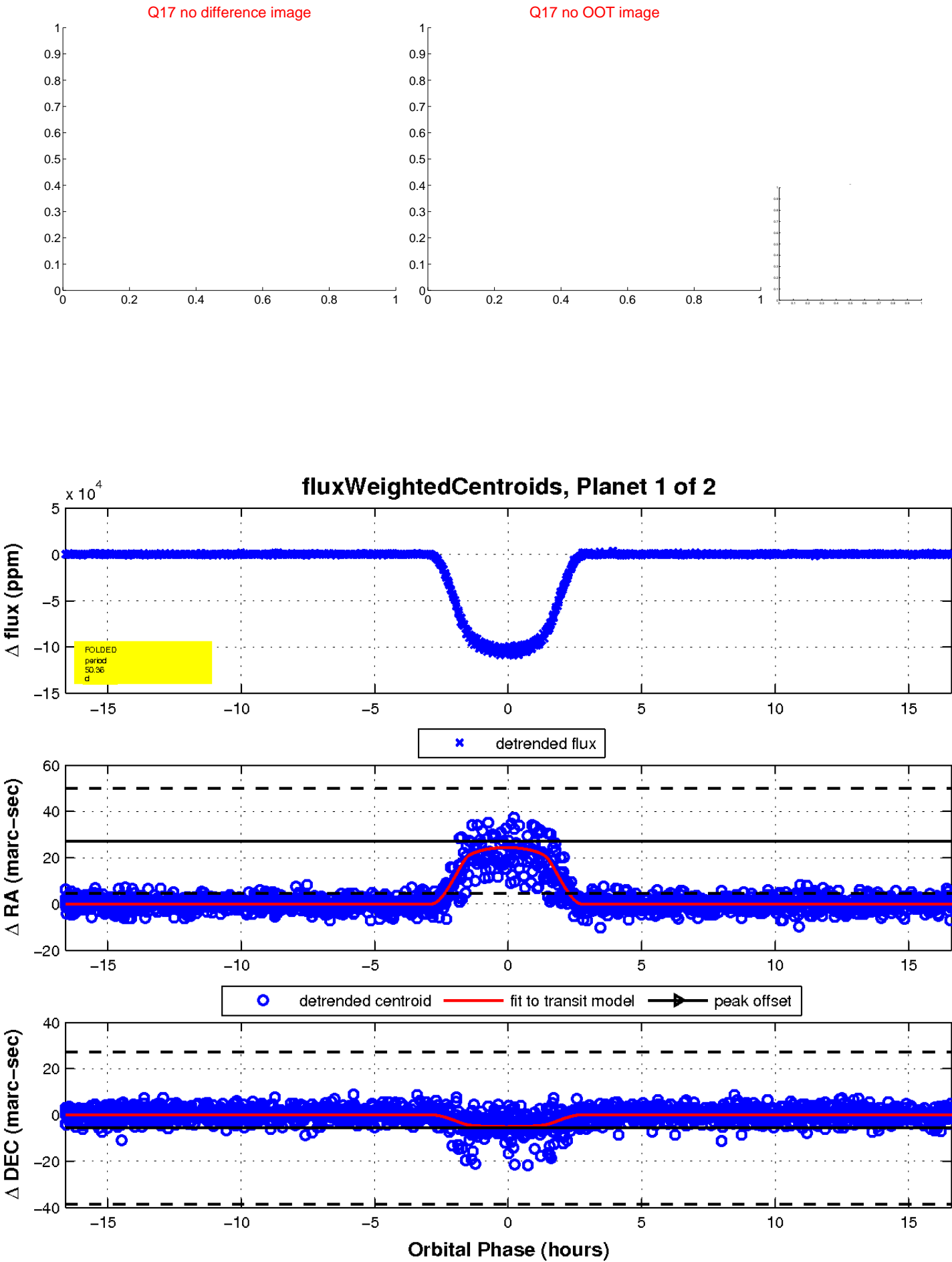
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

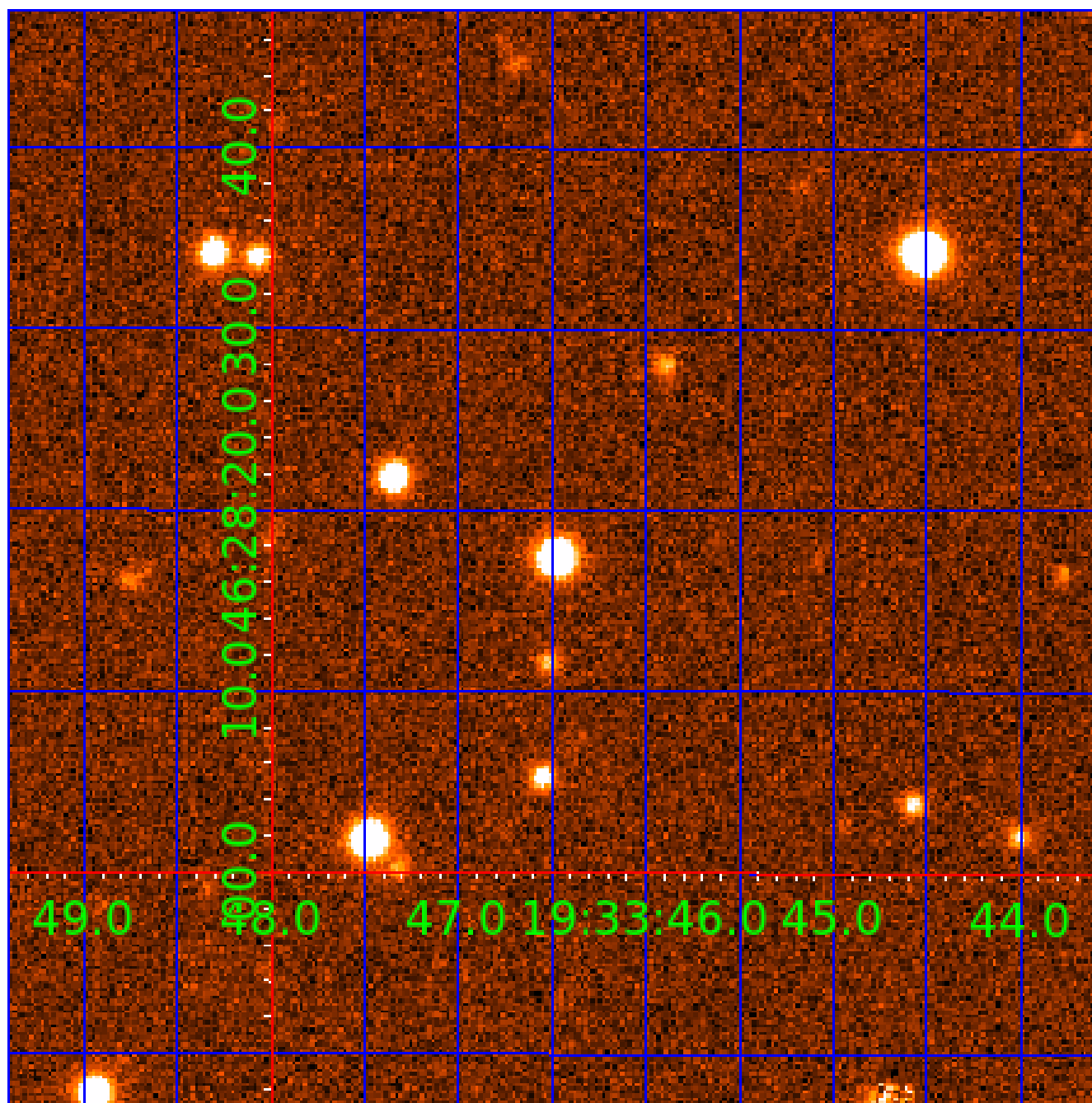


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009714123

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009714123-01	OBS	3392.01	50.355463	136.911316	105380.0	5.541	1914.7	1354.2	0.96	5936	31.35	13.84
009714123-02	OBS	No	50.355560	163.567735	3797.2	9.304	99.4	98.5	0.96	5936	6.81	13.84

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009714123-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
009714123-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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 009714123-02

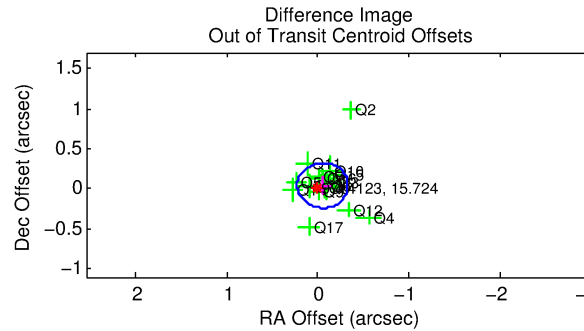
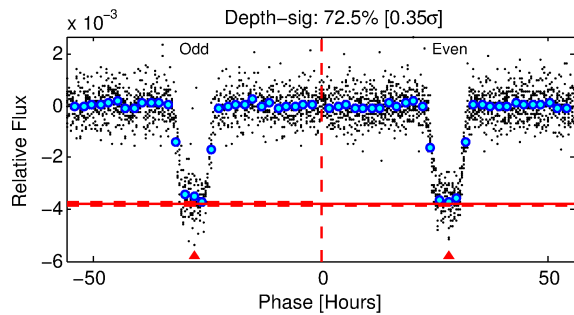
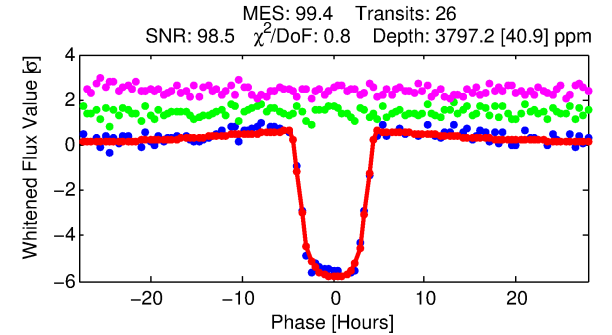
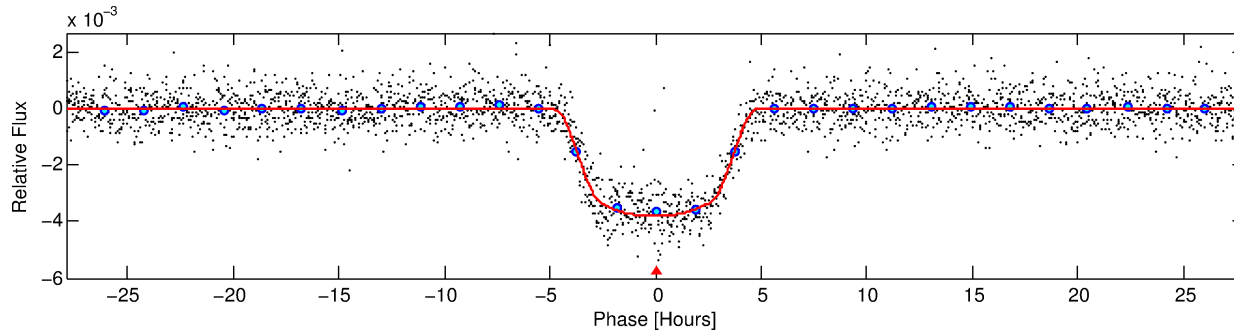
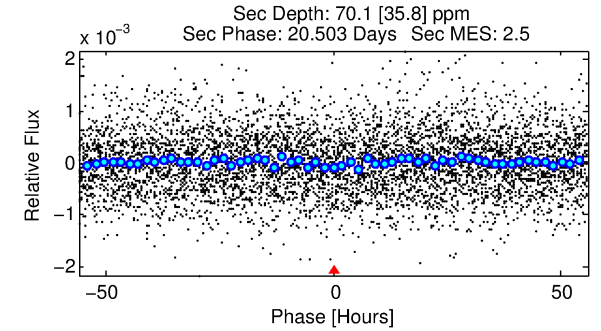
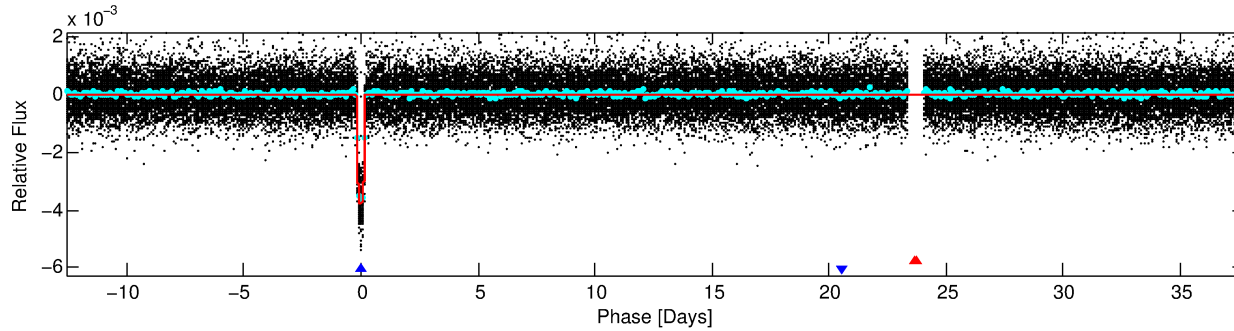
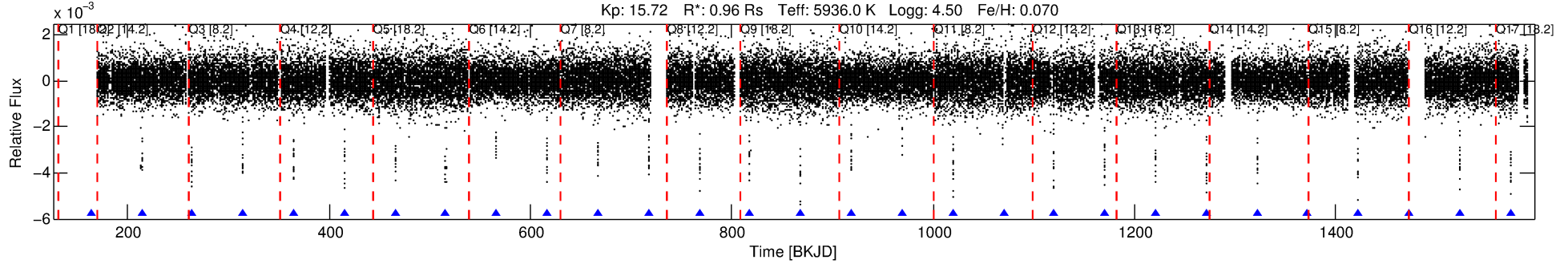
No Significant Match Found

# DV One-Page Summary

KIC: 9714123 Candidate: 2 of 2 Period: 50.356 d

KOI: K03392 Corr: No Ephemeris Match

Kp: 15.72 R\*: 0.96 Rs Teff: 5936.0 K Logg: 4.50 Fe/H: 0.070



## DV Fit Results:

Period = 50.35556 [0.00013] d  
Epoch = 163.5677 [0.0020] BKJD  
Rp/R\* = 0.0647 [0.0007]  
a/R\* = 26.28 [0.90]  
b = 0.85 [0.01]  
Seff = 13.84 [5.74]  
Teff = 492 [51] K  
Rp = 6.81 [2.10] Re  
a = 0.2736 [0.0722] AU  
Ag = 62.25 [40.04] [1.53σ]  
Teffp = 2136 [284] K [5.71σ]

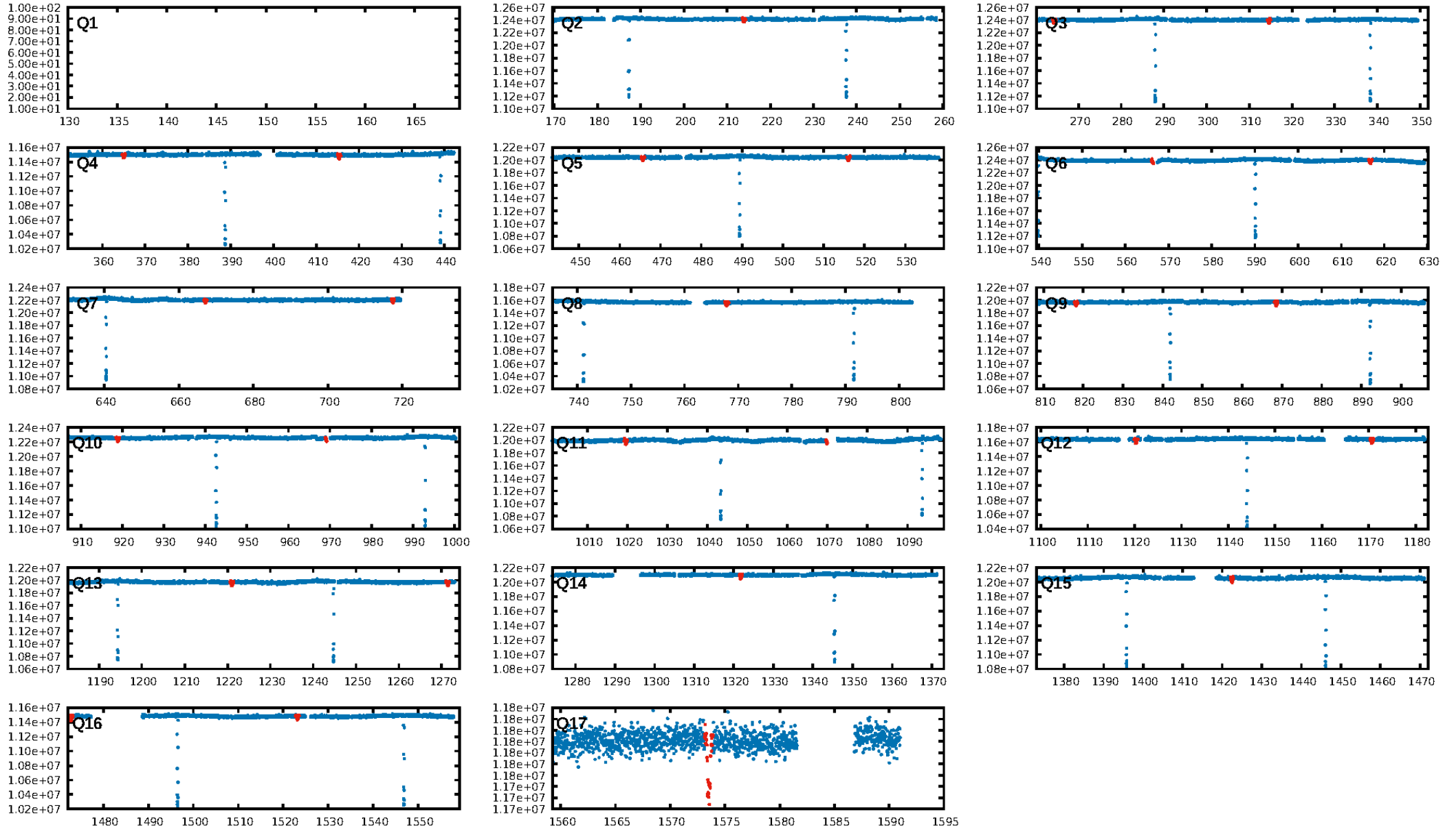
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 2.5%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [25/25]  
GhostDiagnostic-chr: 3.421  
Centroid-sig: 0.0%  
Centroid-so: 0.188 arcsec [1.52σ]  
OotOffset-rm: 0.066 arcsec [0.71σ]  
KicOffset-rm: 0.180 arcsec [1.83σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 1.00 [16/16]  
DiffImageOverlap-fno: 1.00 [16/16]

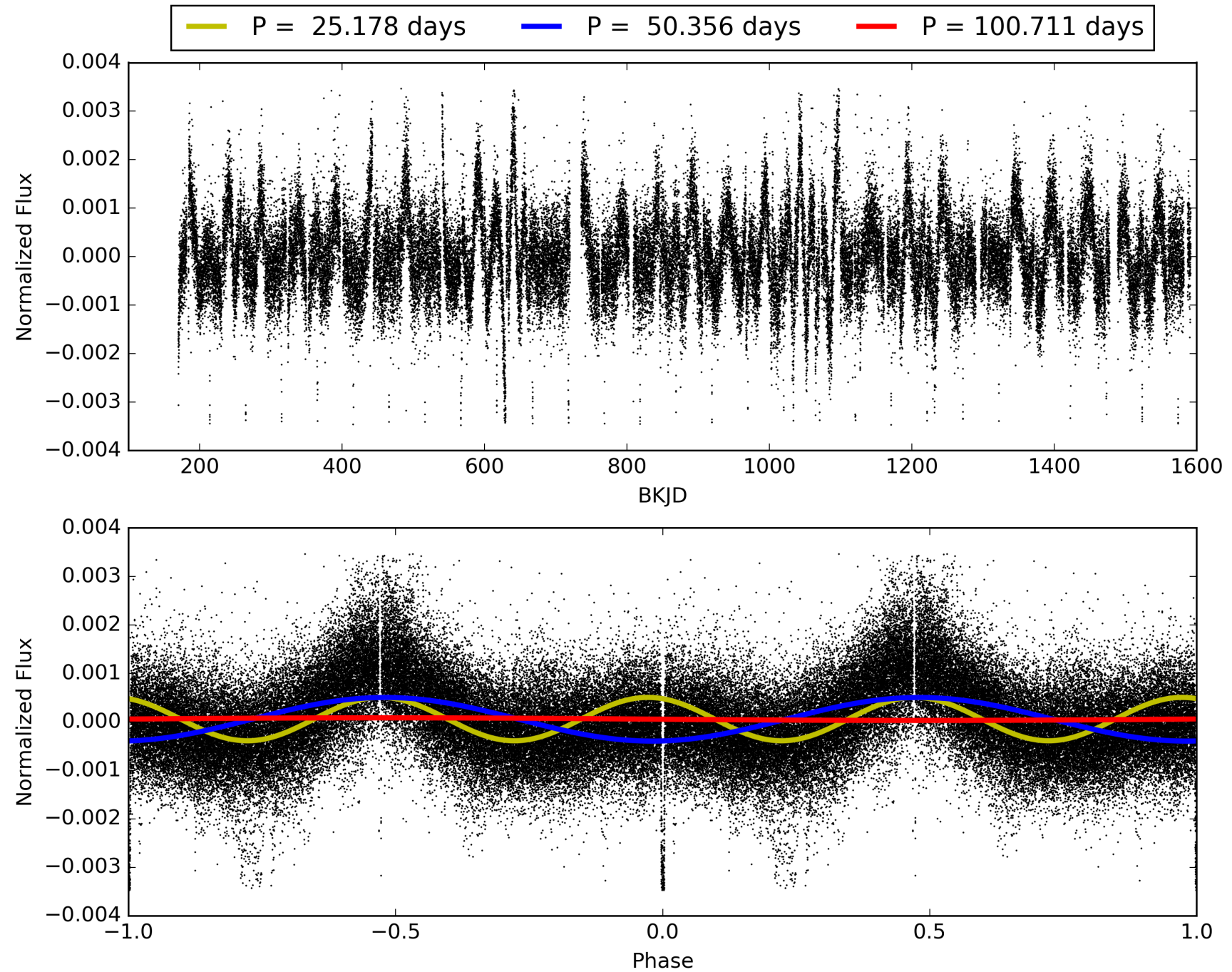
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 11:02:52 Z

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

# TCE 009714123-02, PDC Light Curves



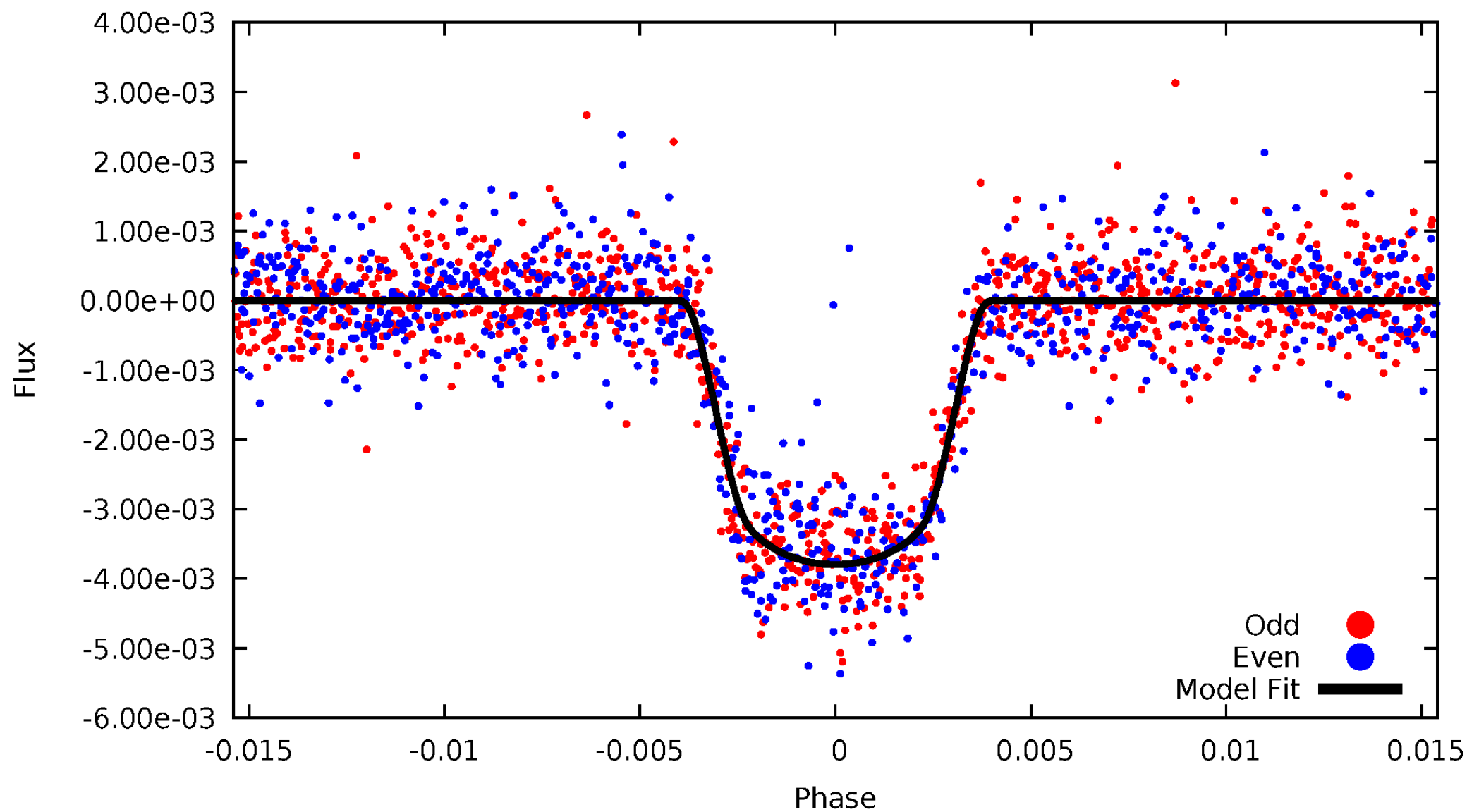
TCE 009714123-02





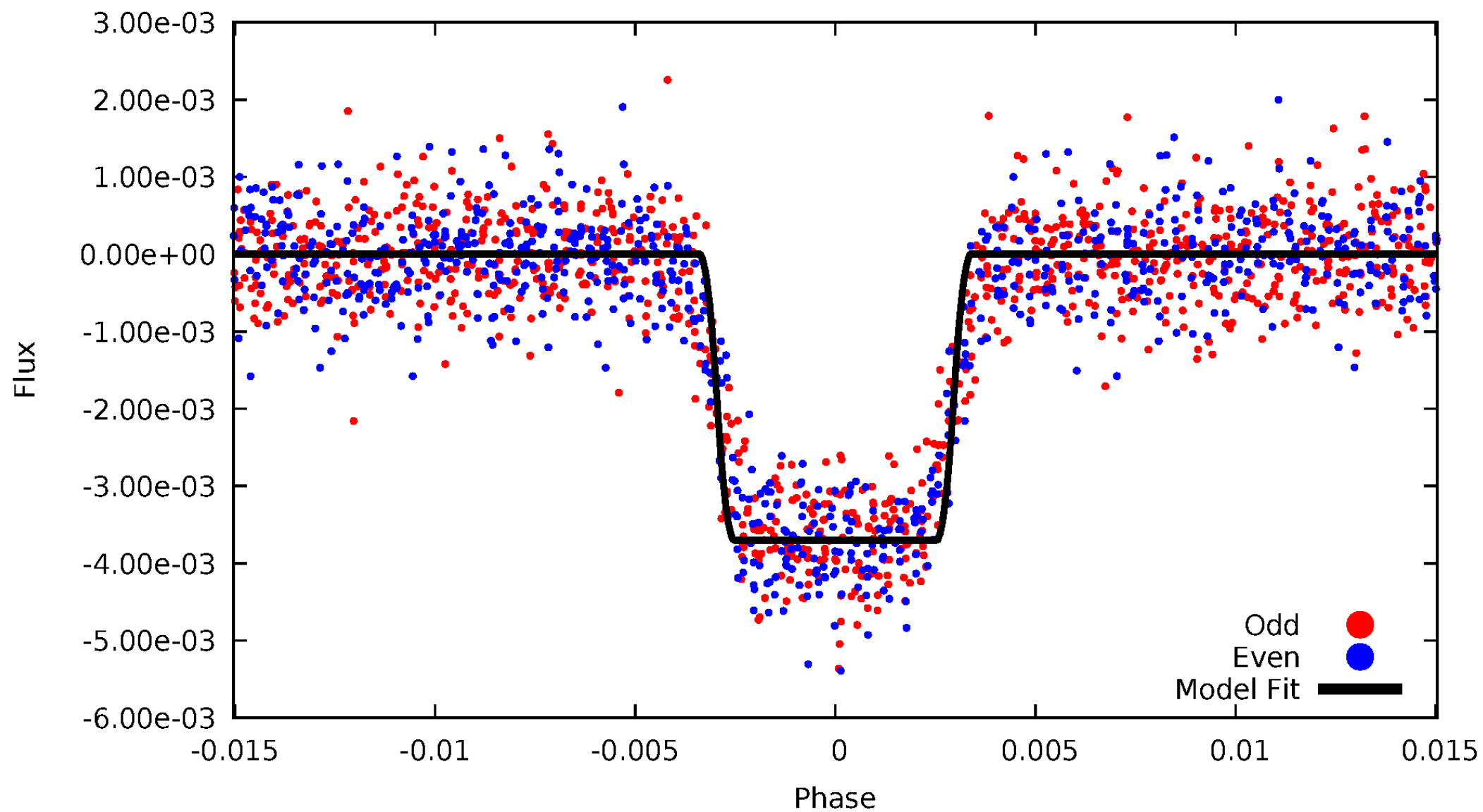
DV Odd/Even

TCE 009714123-02



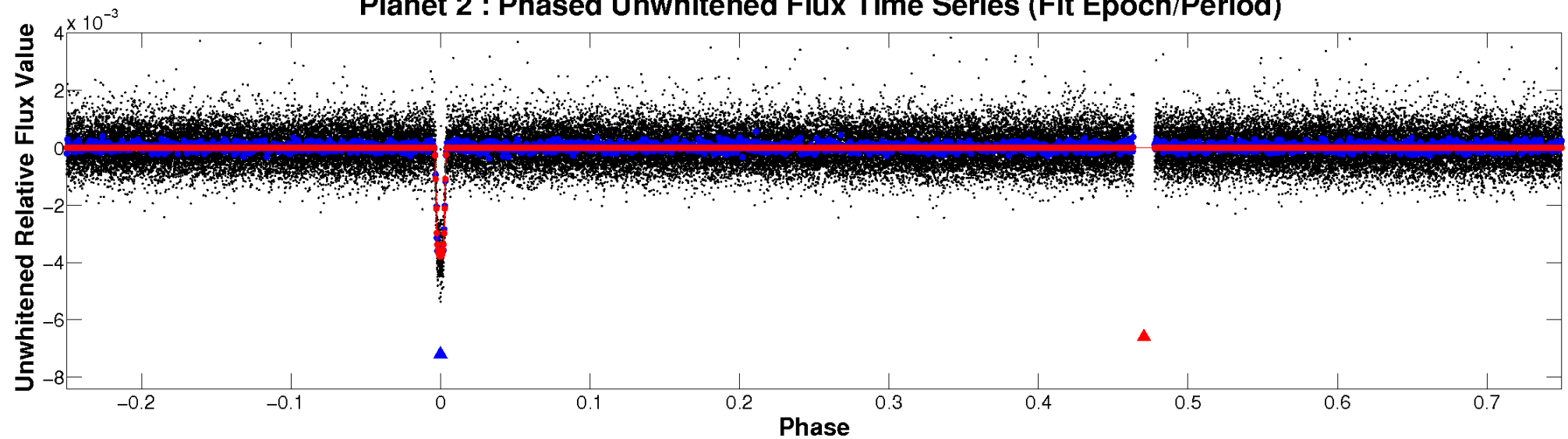
# ALT Odd/Even

TCE 009714123-02

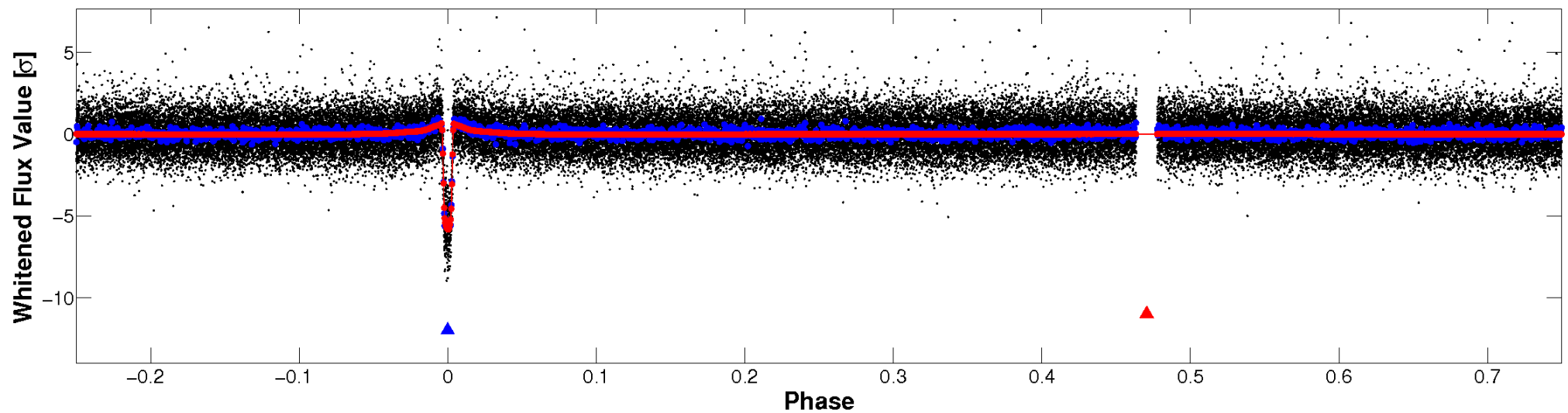


# Non-Whitened Vs. Whitened Light Curve

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

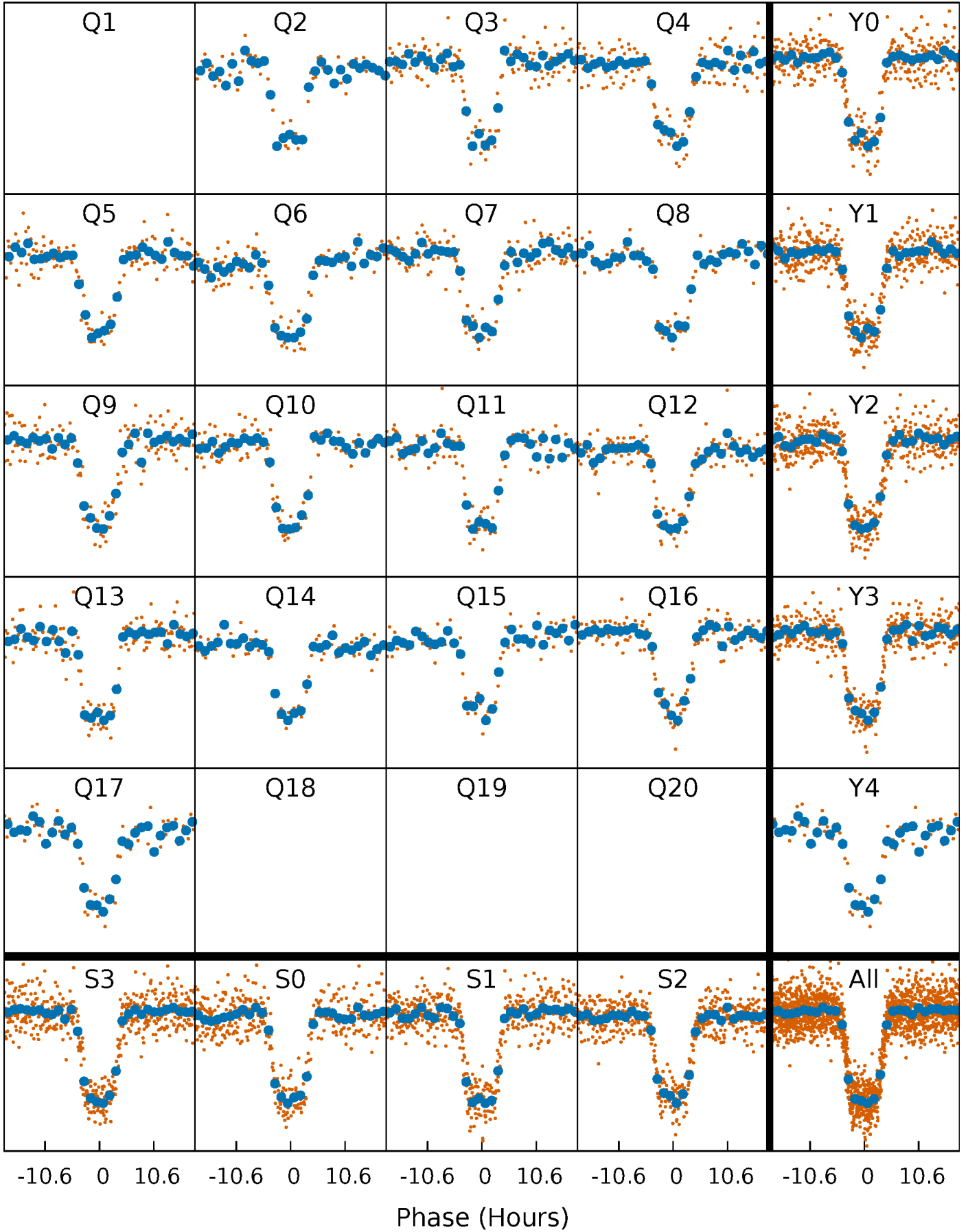


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



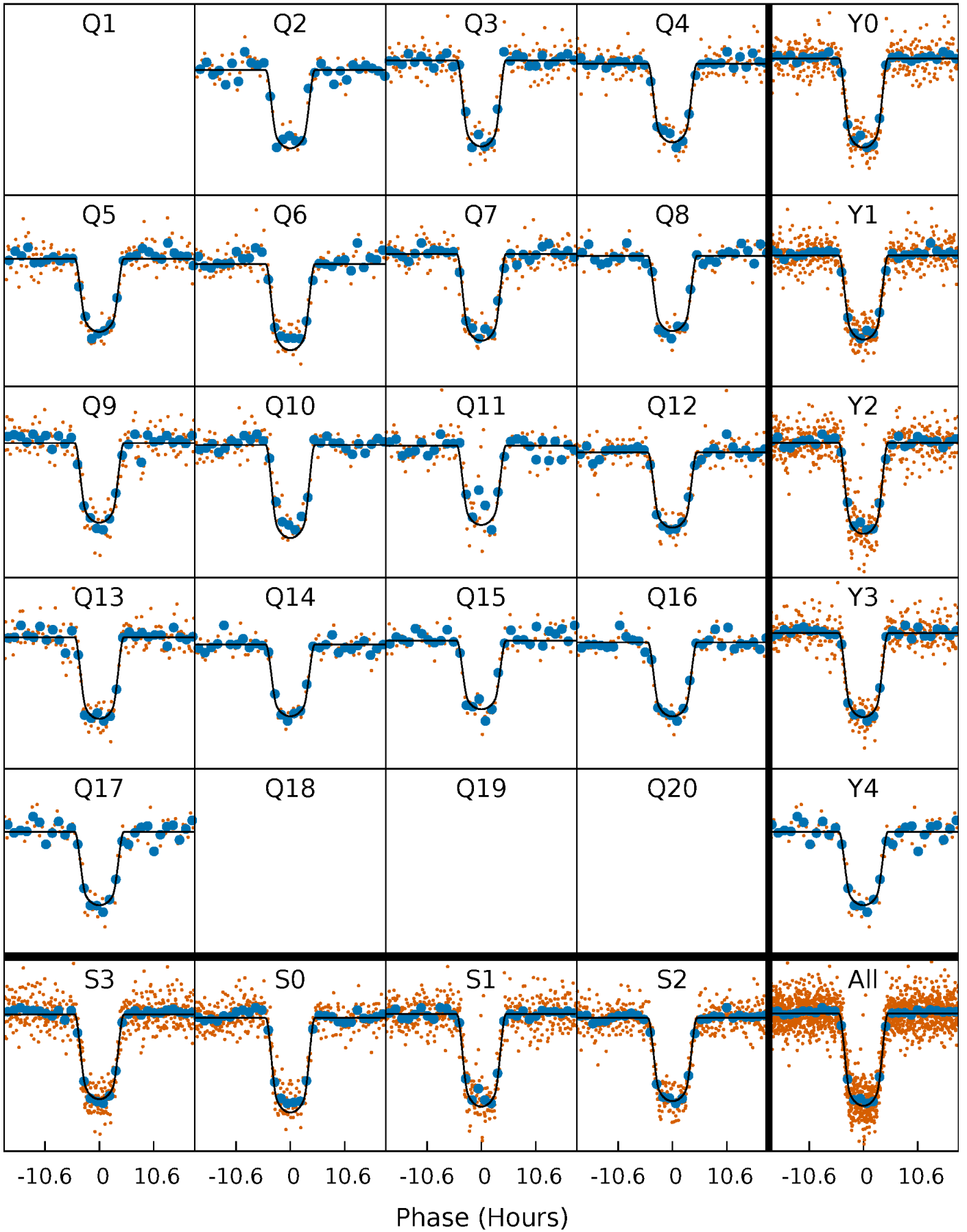
# PDC Quarter-Phased Transit Curves

TCE 009714123-02 P= 50.355560 Days  $T_0=163.567735$  (BKJD)



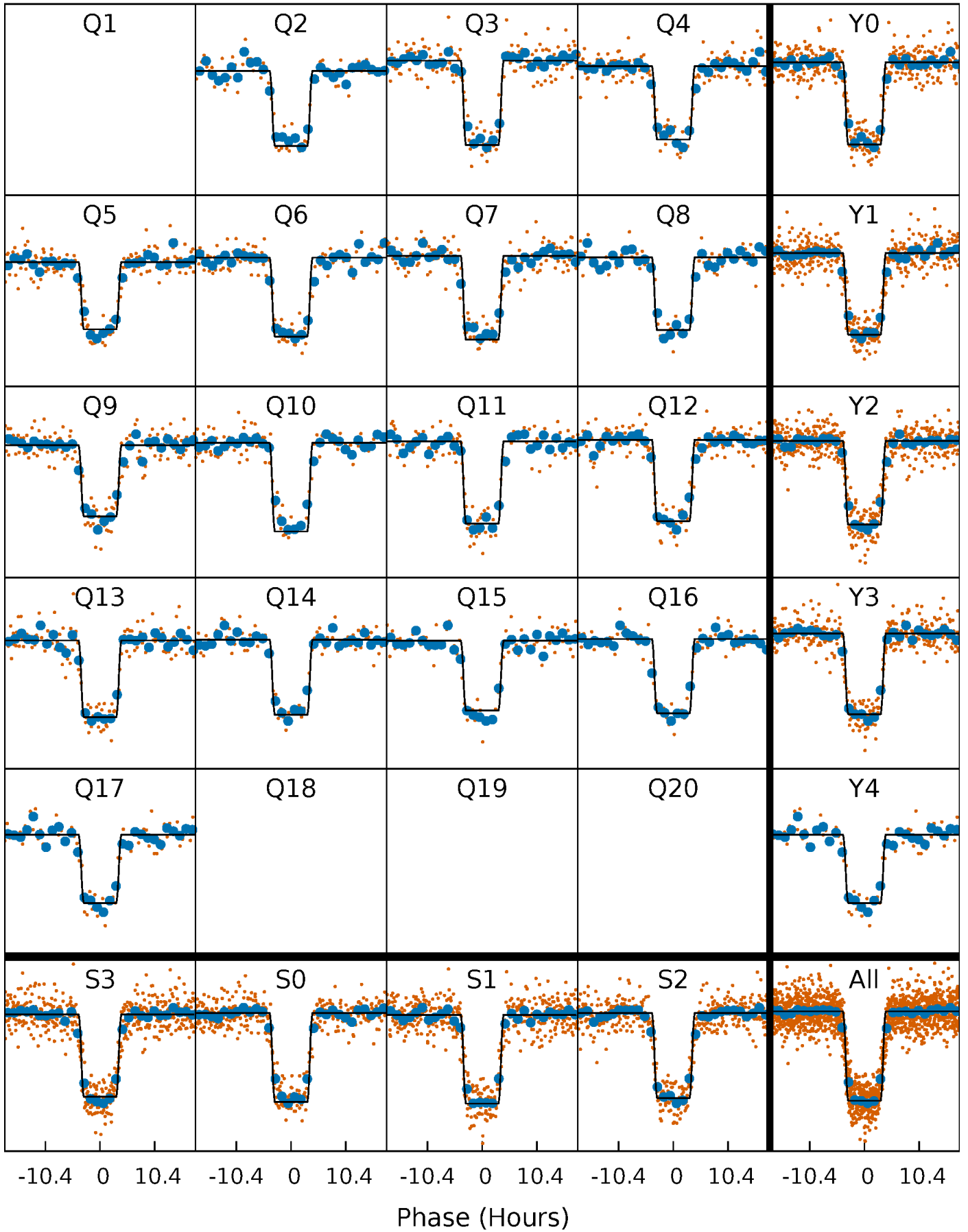
# DV Quarter-Phased Transit Curves

TCE 009714123-02 P= 50.355560 Days  $T_0=163.567735$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

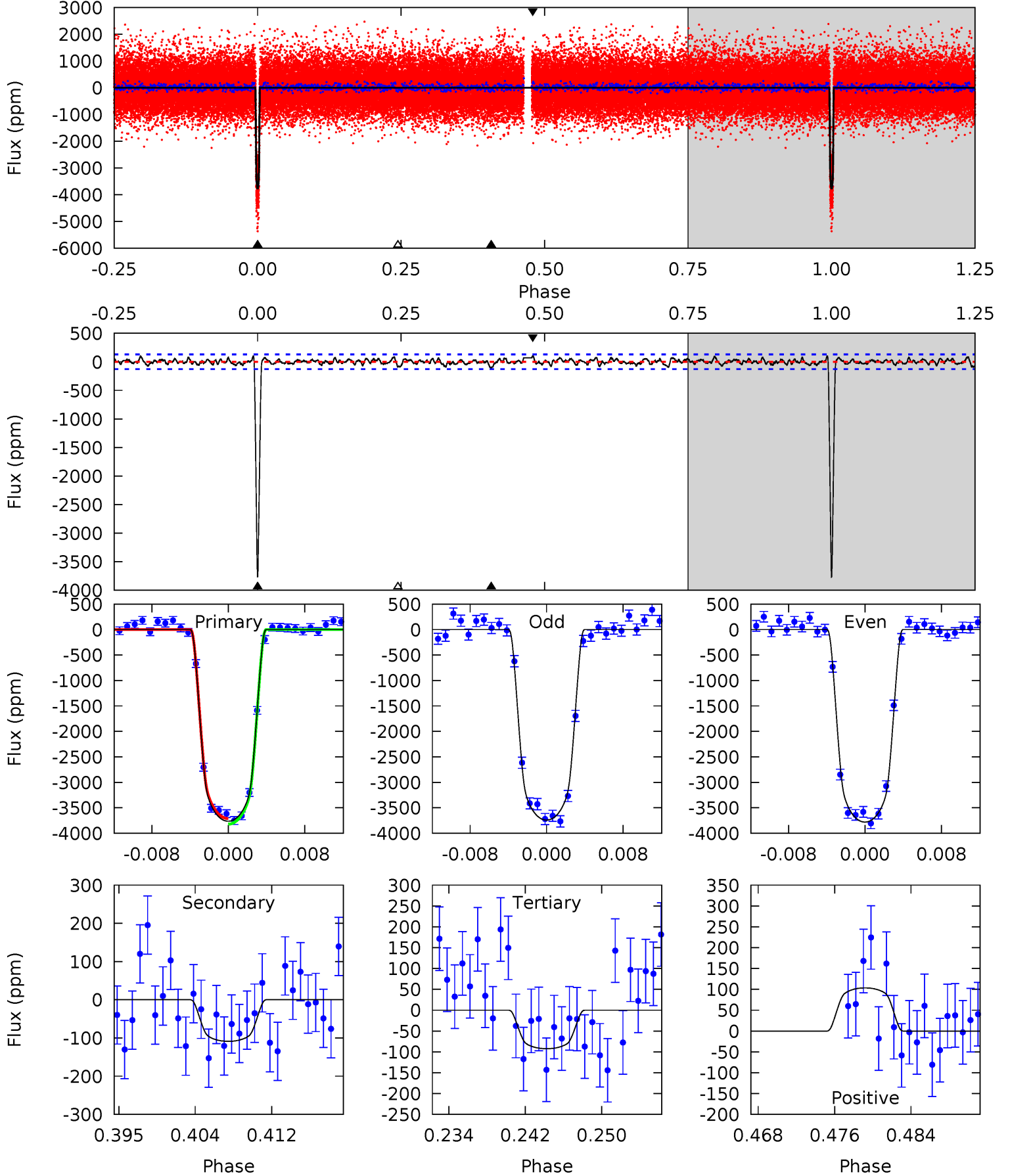
TCE 009714123-02   P= 50.356046 Days    $T_0=163.560348$  (BKJD)



# DV Model-Shift Uniqueness Test

009714123-02, P = 50.355560 Days, E = 163.567735 Days

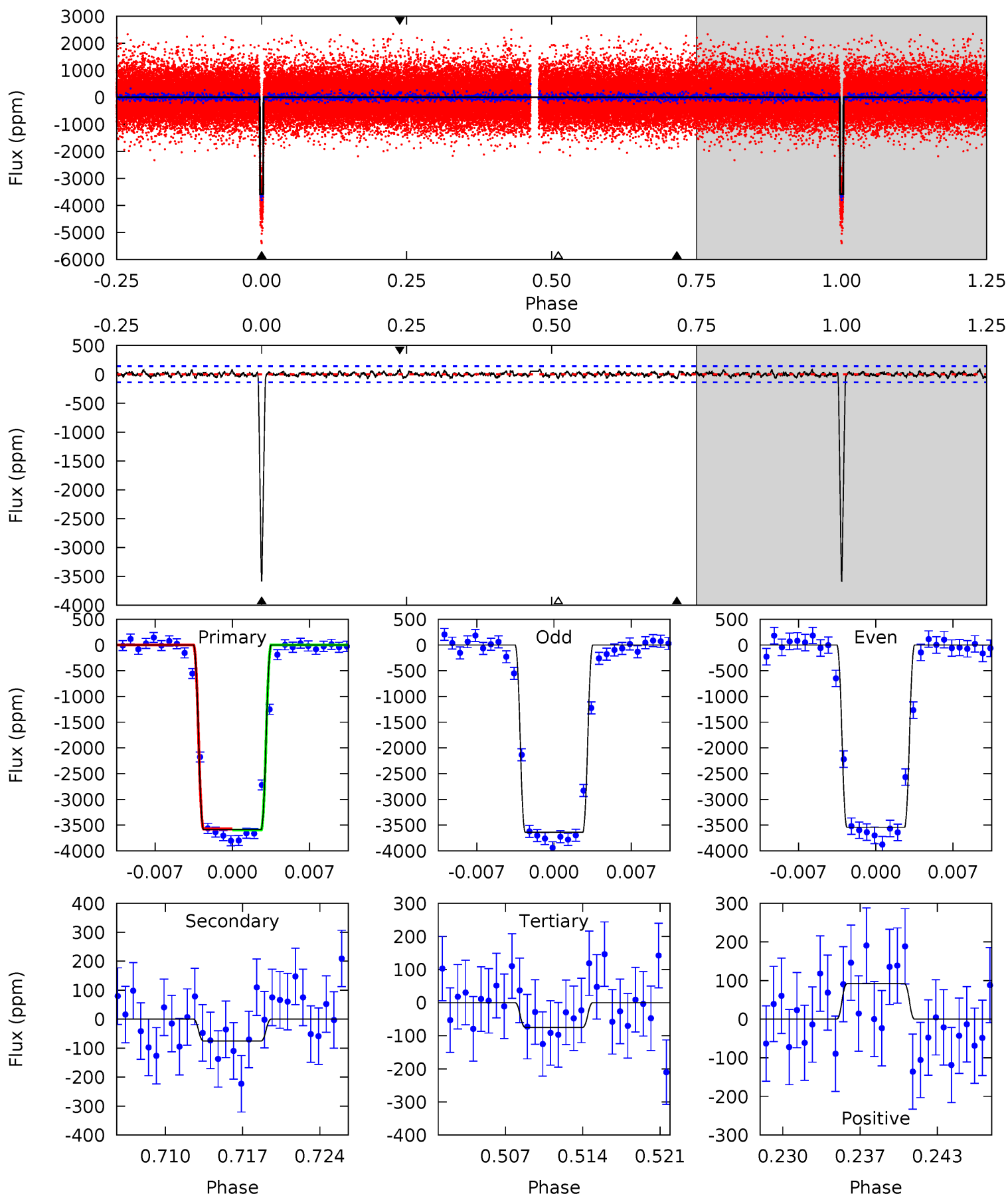
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
147.7	4.27	3.63	4.06	5.07	2.65	1.32	144.1	143.6	0.64	0.21	0.78	0.97	0.03	2.16



# Alt Model-Shift Uniqueness Test

009714123-02, P = 50.356046 Days, E = 163.560348 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
131.9	2.77	2.75	3.38	5.10	2.71	0.94	129.2	128.5	0.02	-0.60	1.76	0.99	0.02	0.36





### Stellar Parameters For KIC 009714123

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5936^{+176}_{-211}$	$4.501^{+0.040}_{-0.216}$	$0.070^{+0.250}_{-0.300}$	$0.965^{+0.297}_{-0.099}$	$1.075^{+0.124}_{-0.152}$	$1.685^{+0.367}_{-0.926}$
	+3%/-4%	+1%/-5%	+357%/-429%	+31%/-10%	+12%/-14%	+22%/-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 009714123-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-109 \pm 25$	$7.12^{+1.09}_{-0.60}$	$707^{+52}_{-35}$	$3027^{+114}_{-121}$	$83^{+27}_{-25}$
Alt.	$-75 \pm 27$	$6.62^{+1.09}_{-0.55}$	$704^{+52}_{-34}$	$2927^{+145}_{-177}$	$65^{+29}_{-26}$

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

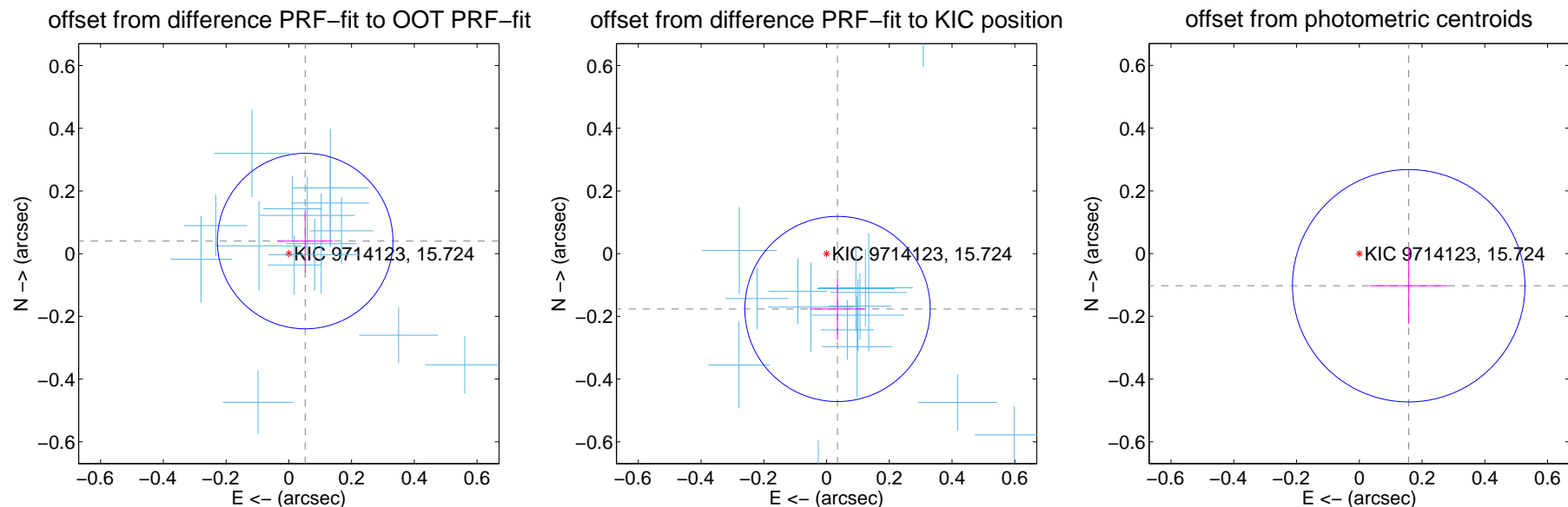
## DV Centroid Data

Supplemental centroid analysis for 009714123-02. Kepler magnitude: 15.72. Transit SNR 98.49

There are 16 quarters with good PRF difference image offsets

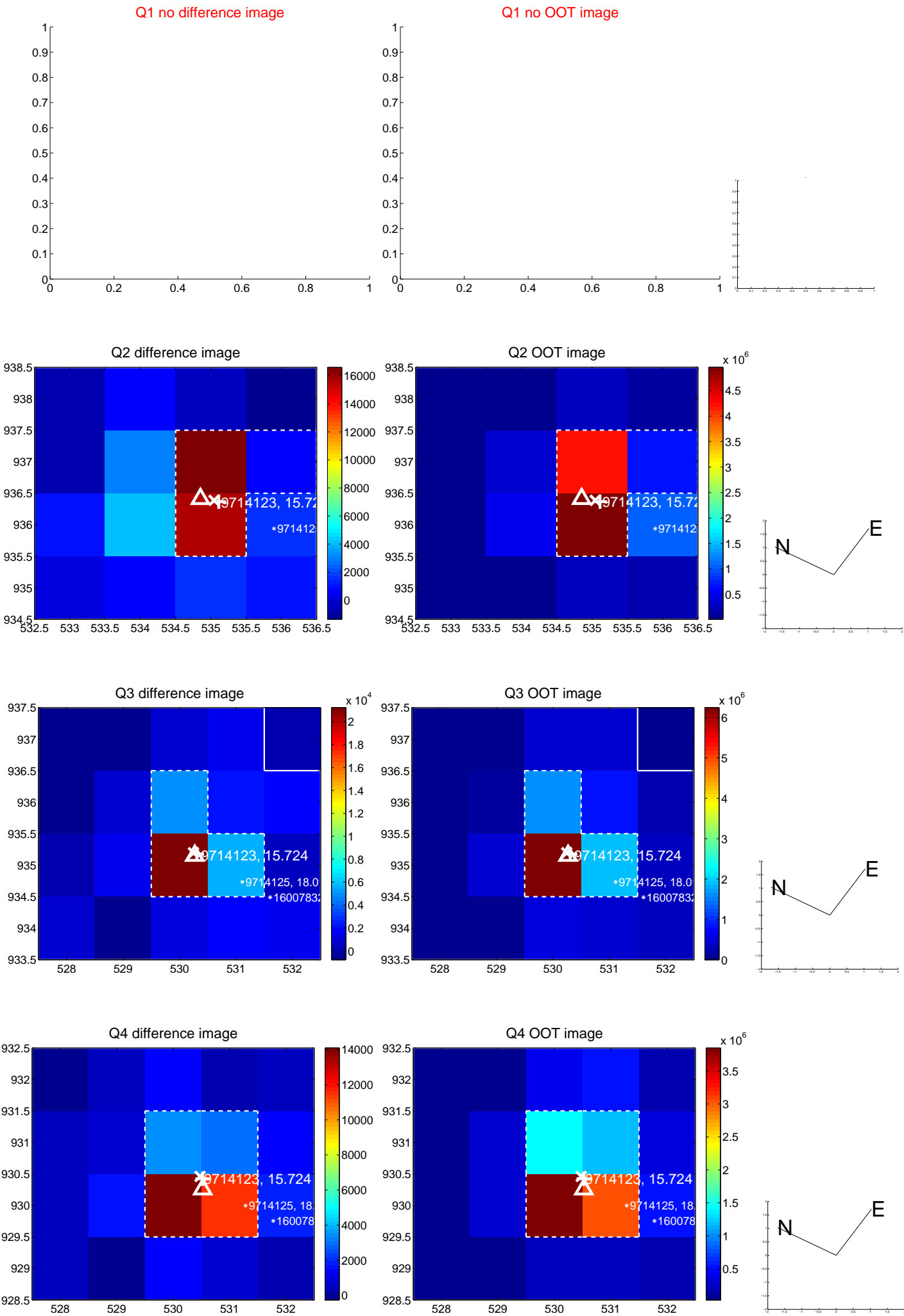
The direct PRF centroid is offset from the target star catalog position by about 0.23 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.066 \pm 0.093$	0.71	$-0.052 \pm 0.088$	$0.040 \pm 0.100$
PRF-fit source offset from KIC position	$0.180 \pm 0.098$	1.83	$-0.035 \pm 0.087$	$-0.176 \pm 0.099$
photometric centroid source offset	$0.19 \pm 0.12$	1.52	$-0.16 \pm 0.12$	$-0.10 \pm 0.12$

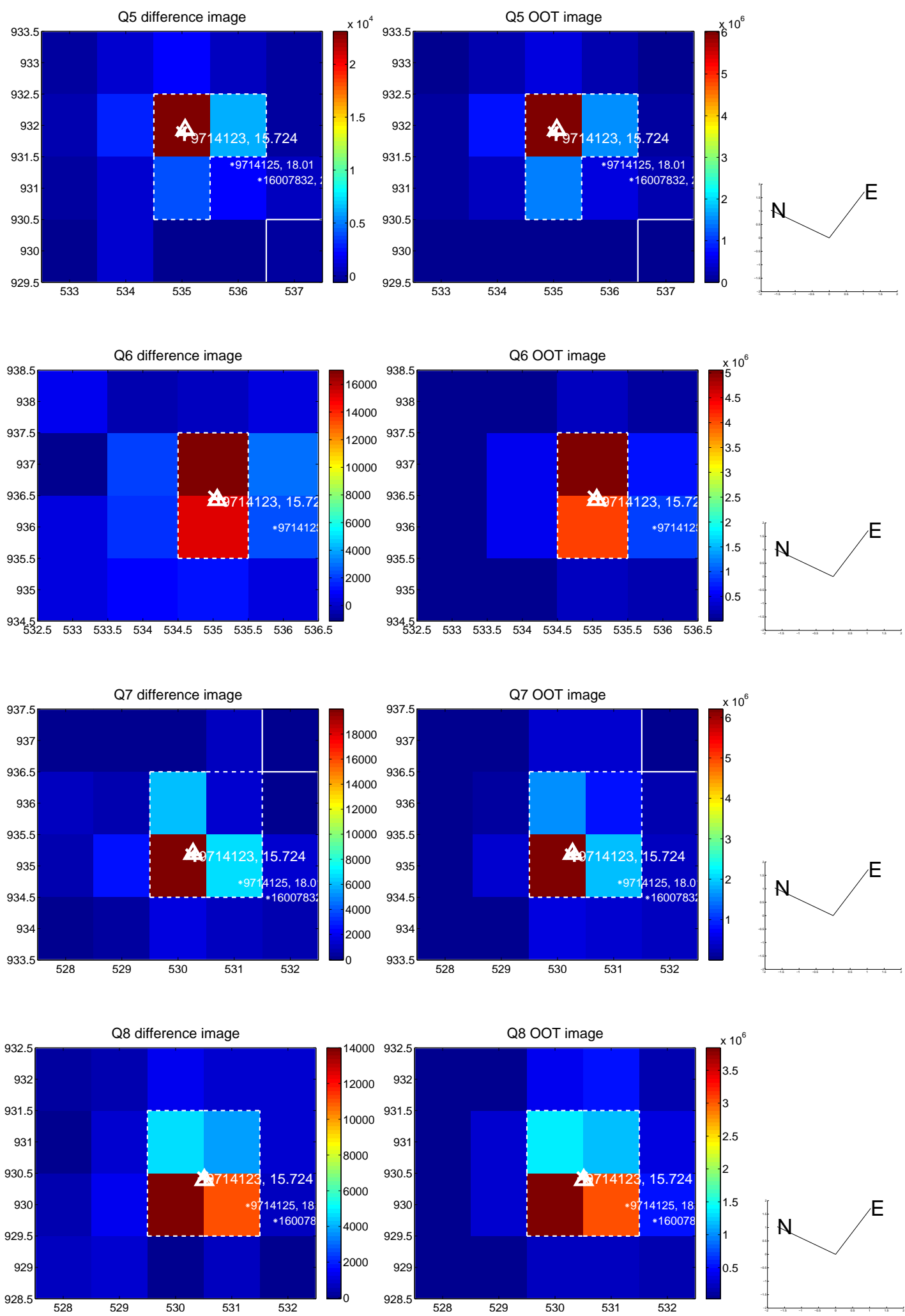


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

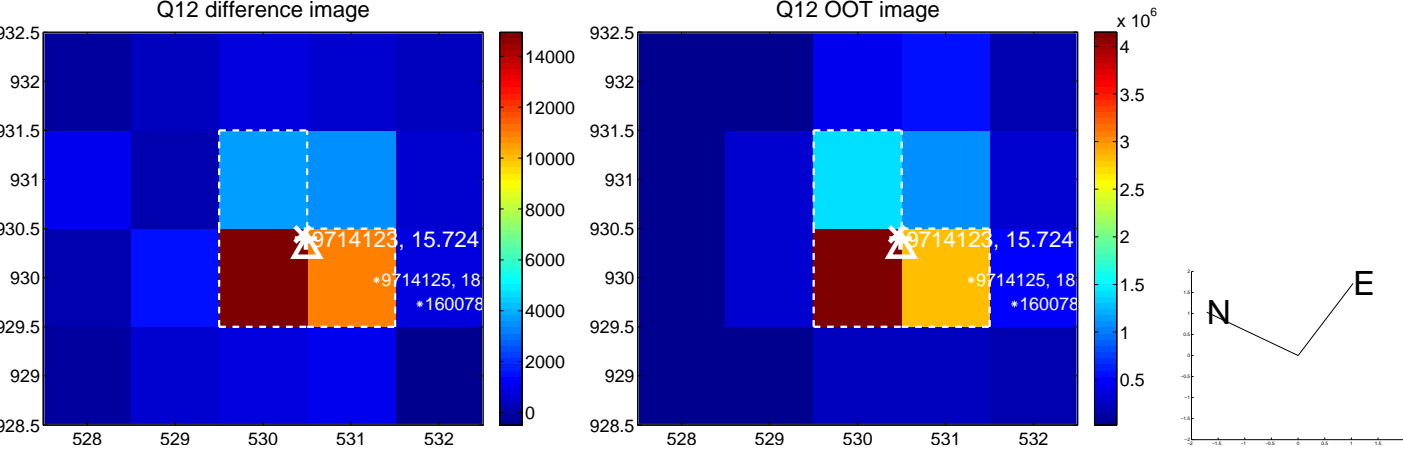
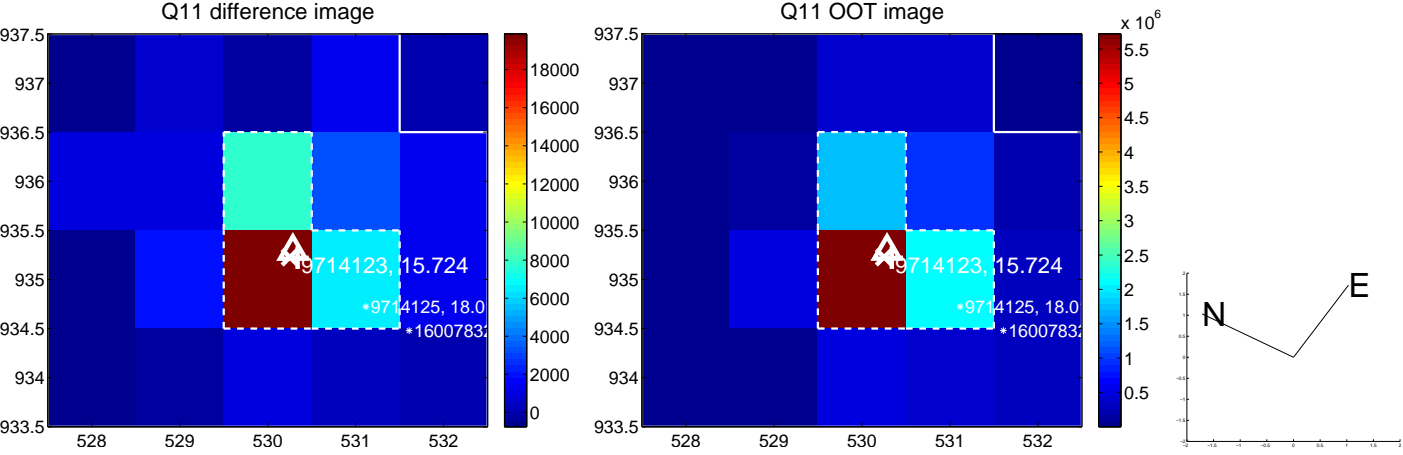
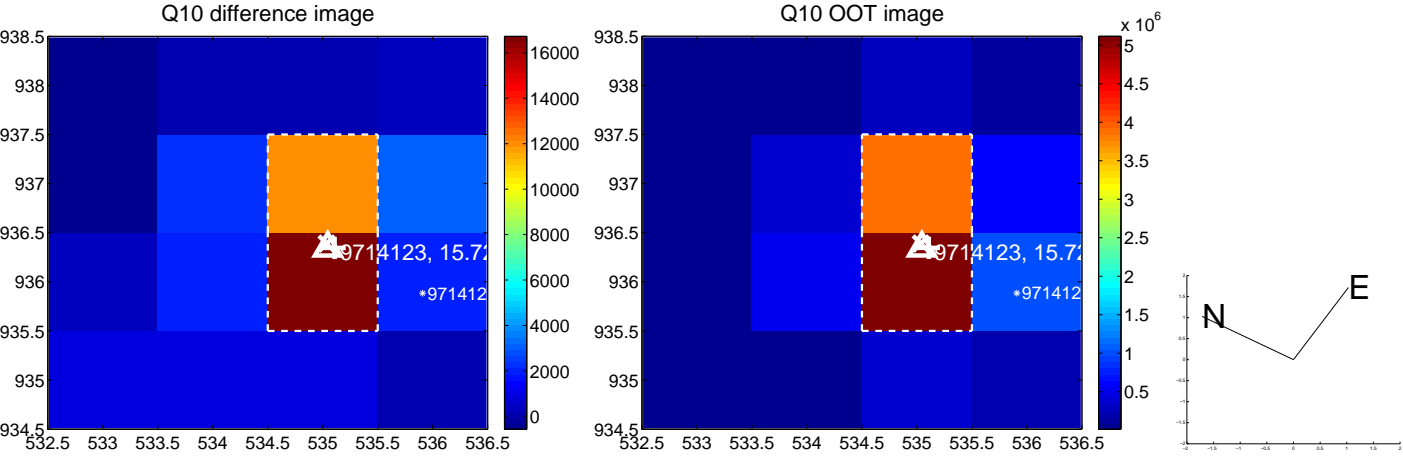
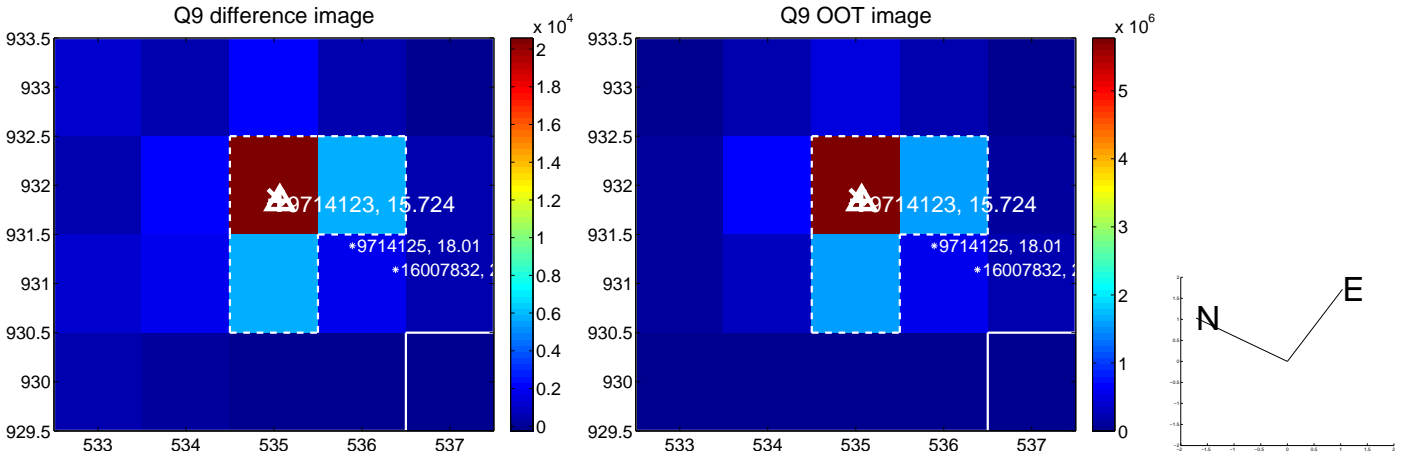
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



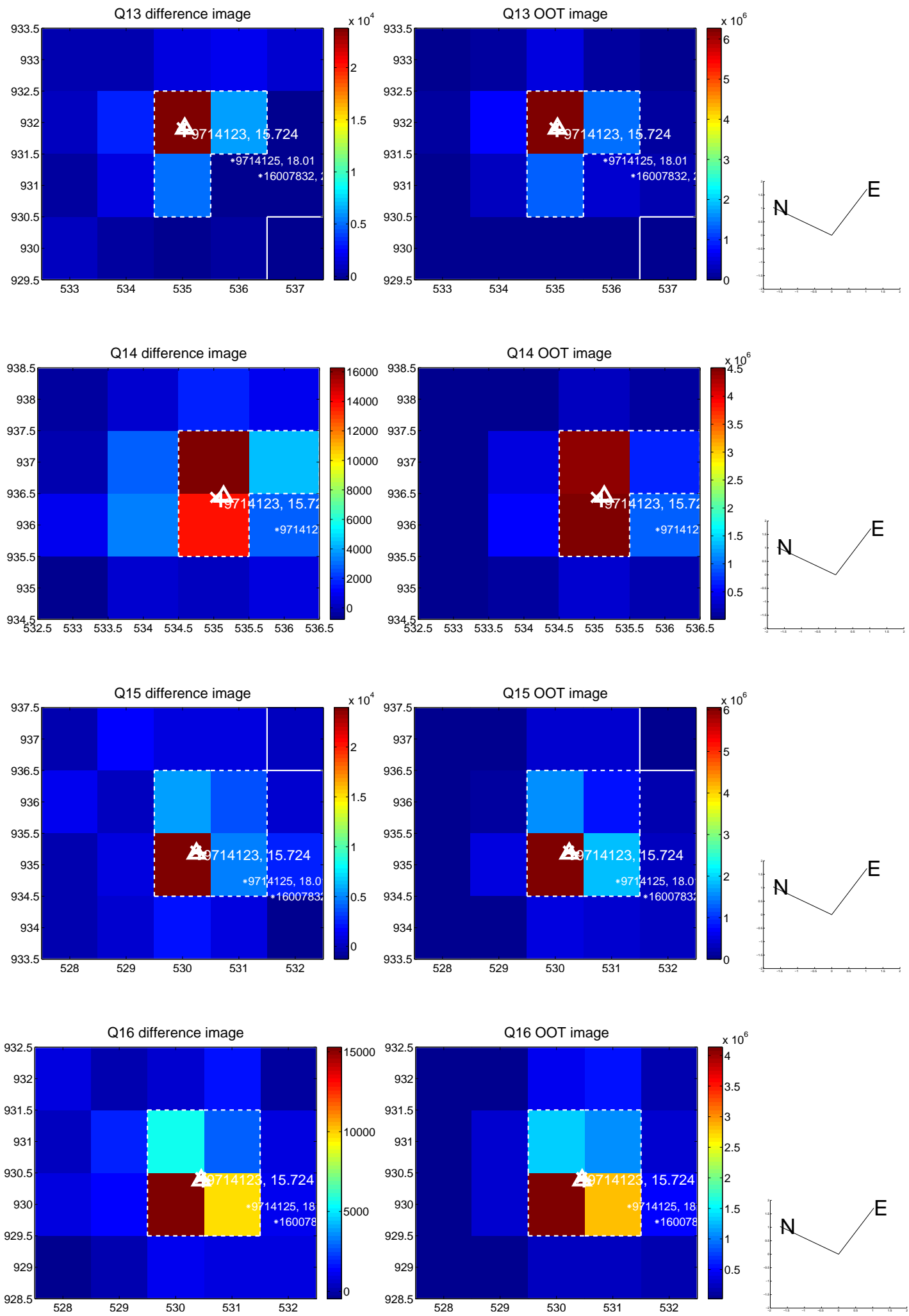
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



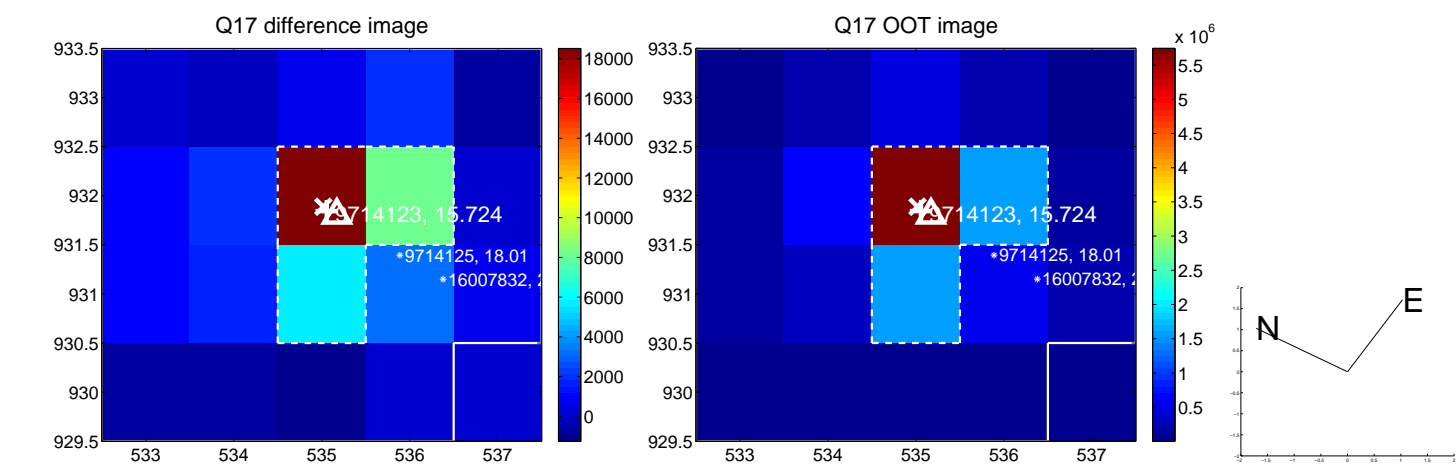
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



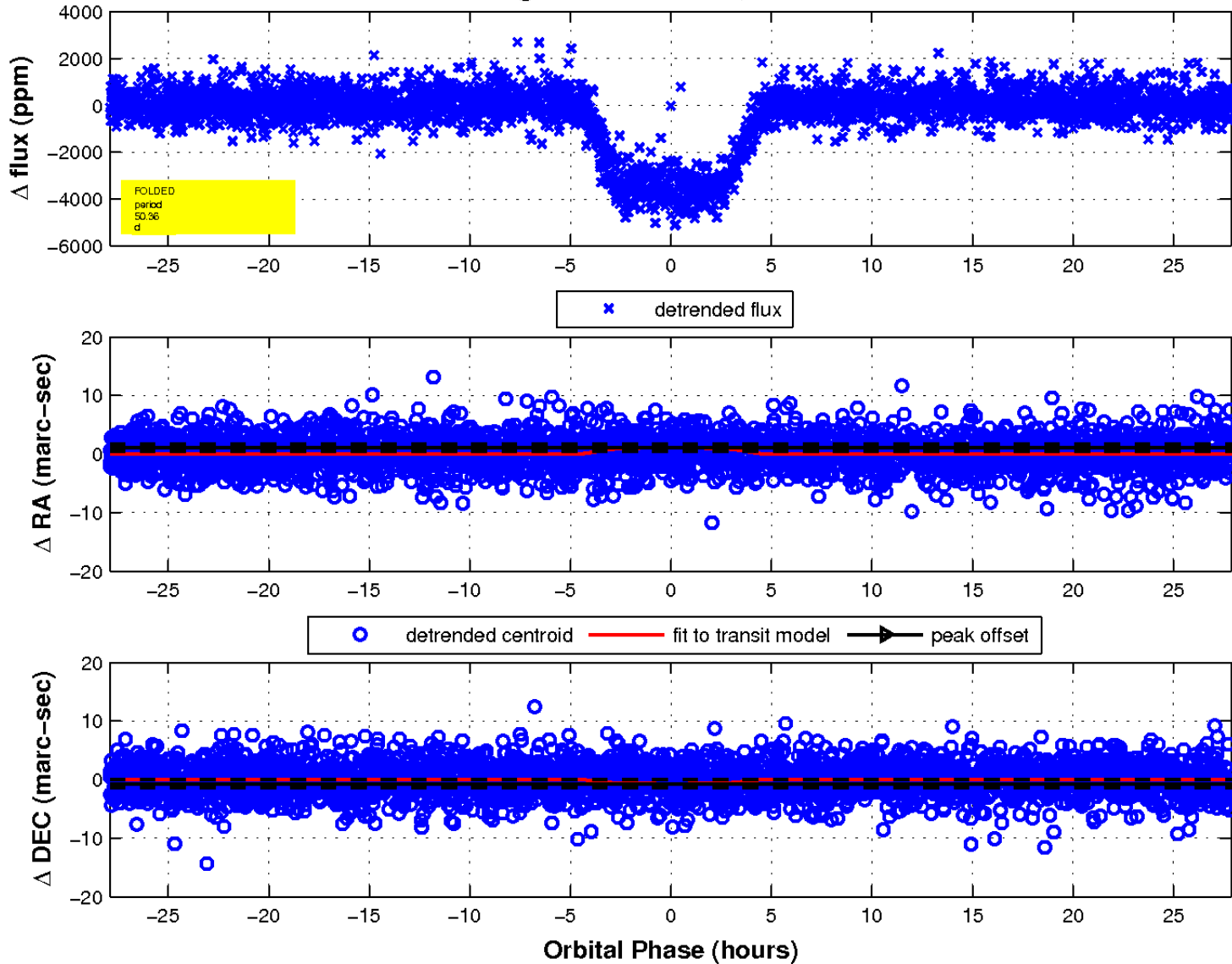
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

