

# KIC 003102024

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003102024-01	OBS	6304.01	13.782523	139.480629	248955.5	8.294	13155.2	8090.2	0.67	5246	41.45	31.74
003102024-02	OBS	No	13.782538	135.324935	176370.0	2.996	12136.2	5646.4	0.67	5246	37.50	31.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003102024-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
003102024-02	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.

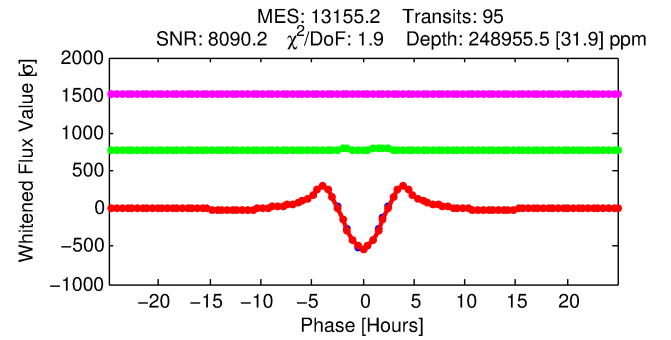
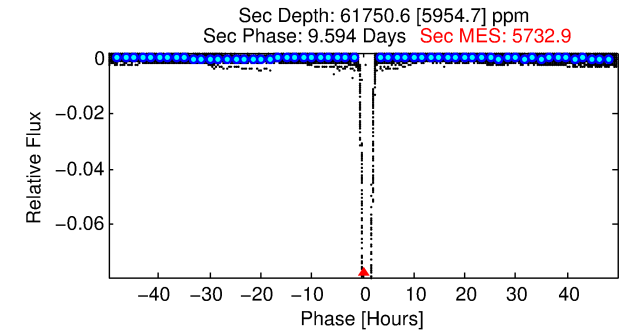
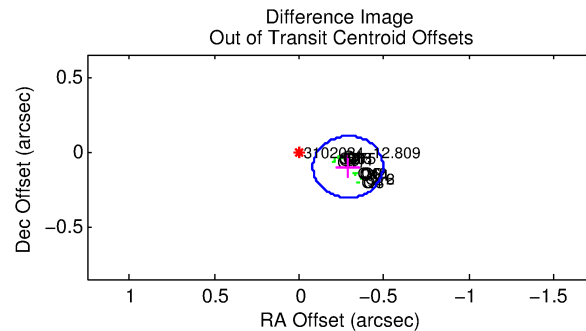
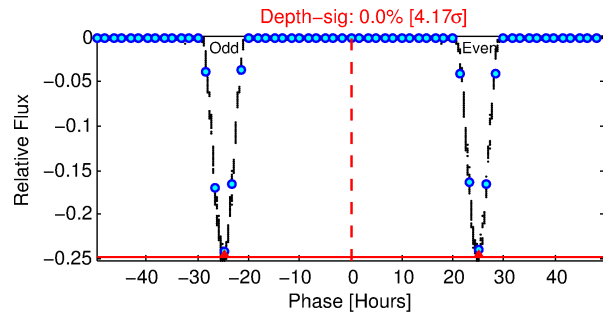
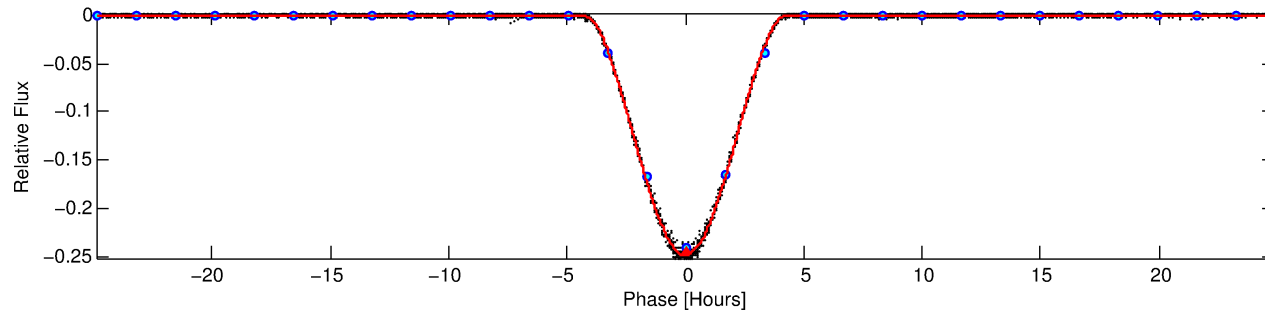
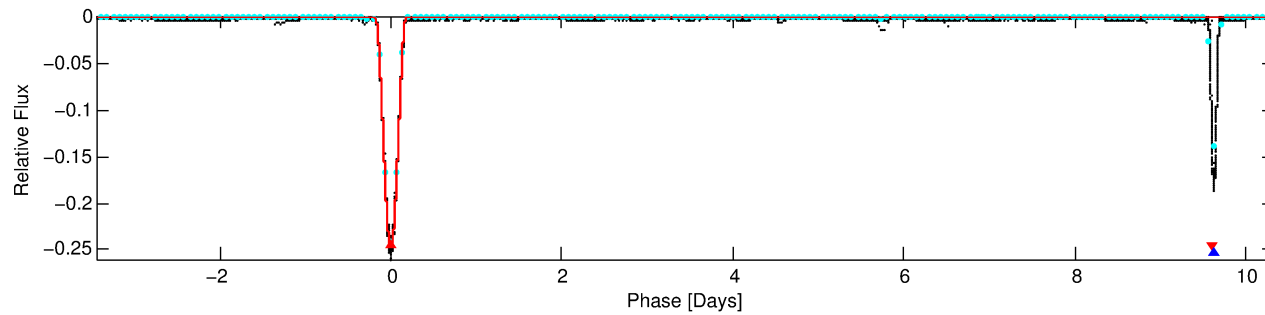
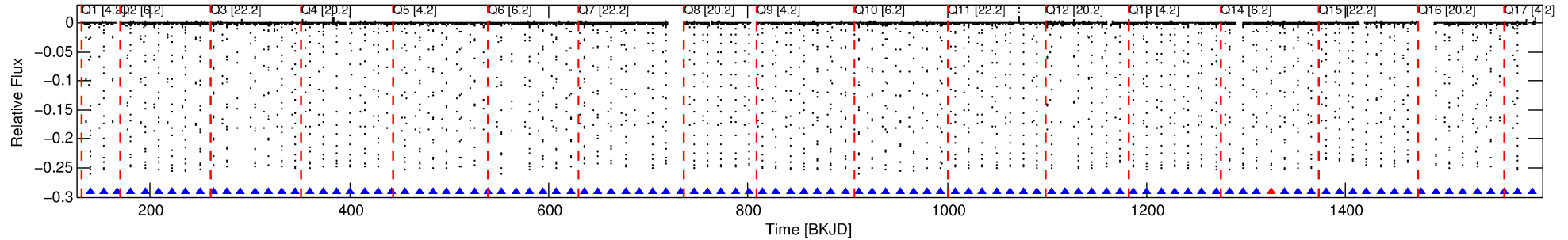
## Ephemeris Match Information For 003102024-01

No Significant Match Found

# DV One-Page Summary

KIC: 3102024 Candidate: 1 of 2 Period: 13.783 d  
KOI: K06304.01 Corr: 0.998

Kp: 12.81 R\*: 0.67 Rs Teff: 5246.0 K Logg: 4.60 Fe/H: -0.780



## DV Fit Results:

Period = 13.78252 [0.00000] d  
Epoch = 139.4806 [0.0000] BKJD  
Rp/R\* = 0.5686 [0.0056]  
a/R\* = 17.79 [0.02]  
b = 0.71 [0.01]  
Seff = 31.74 [5.54]  
Teq = 605 [26] K  
Rp = 41.45 [3.99] Re  
a = 0.0977 [0.0082] AU  
Ag = 188.64 [30.41] [6.17σ]  
Teffp = 3468 [134] K [20.98σ]

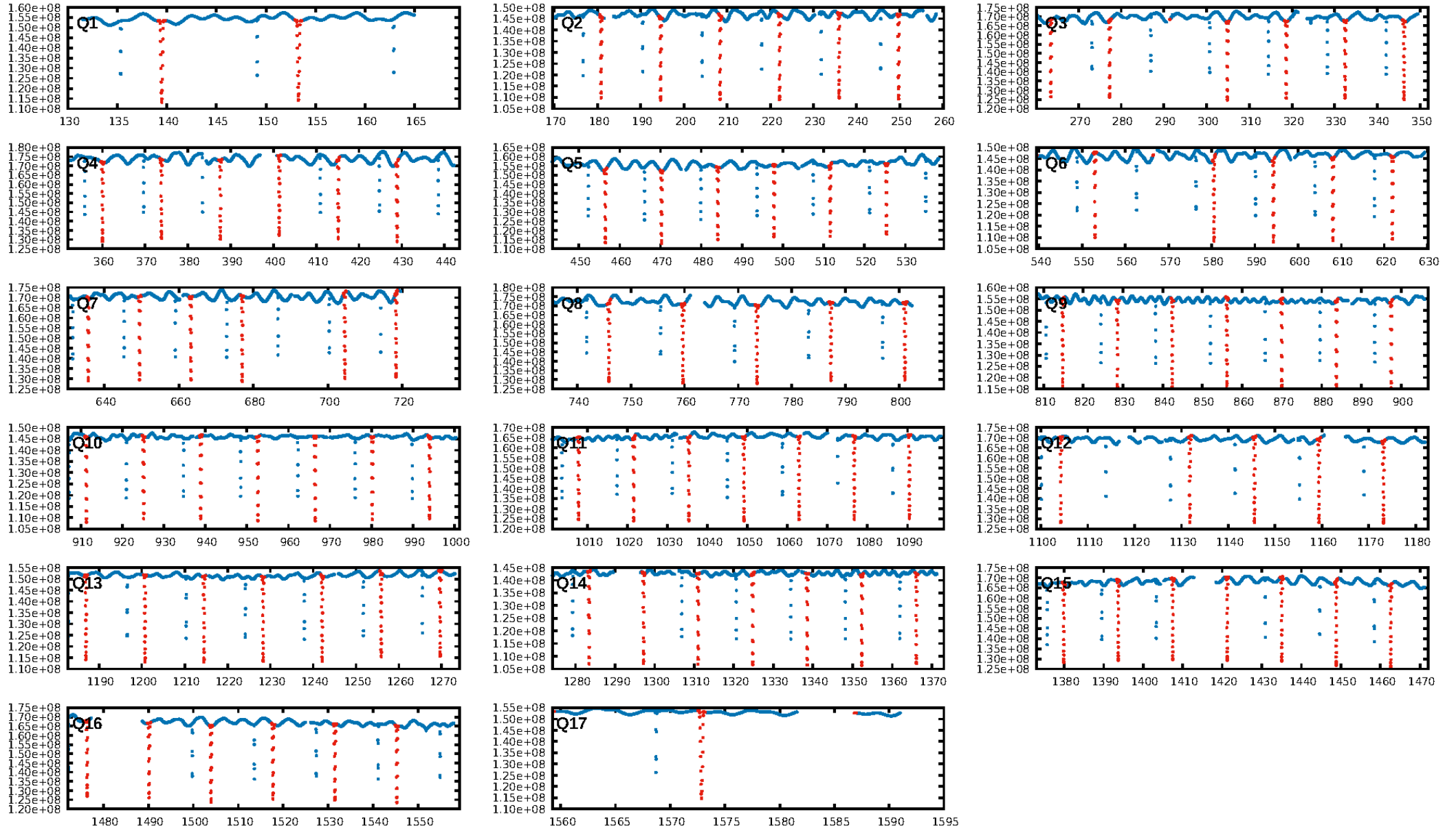
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.99 [91/92]  
GhostDiagnostic-chr: 2.804  
Centroid-sig: 0.0%  
Centroid-so: 0.264 arcsec [512.23σ]  
OotOffset-rm: 0.306 arcsec [4.45σ]  
KicOffset-rm: 0.304 arcsec [4.50σ]  
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]

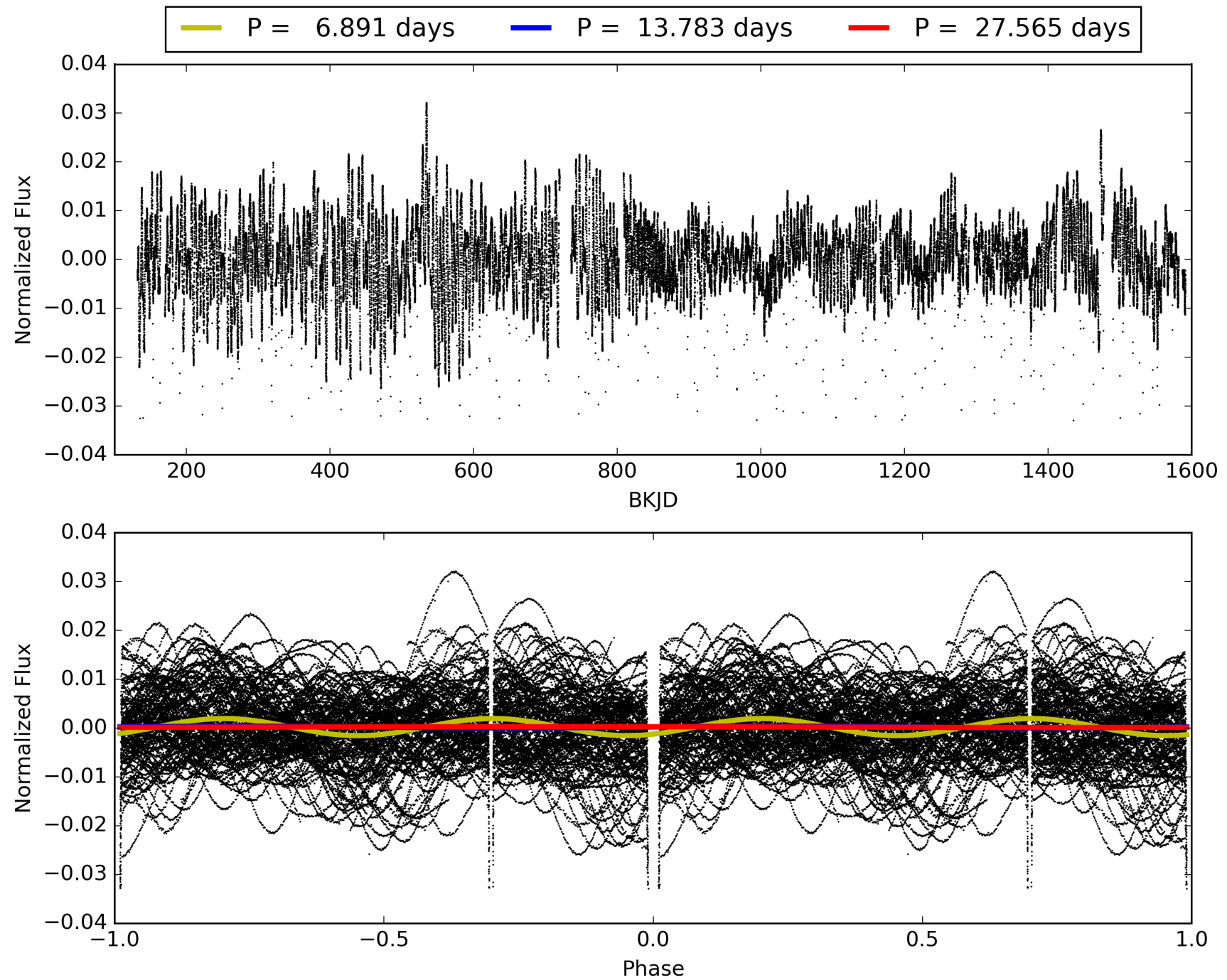
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 23:48:57 Z

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

# TCE 003102024-01, PDC Light Curves

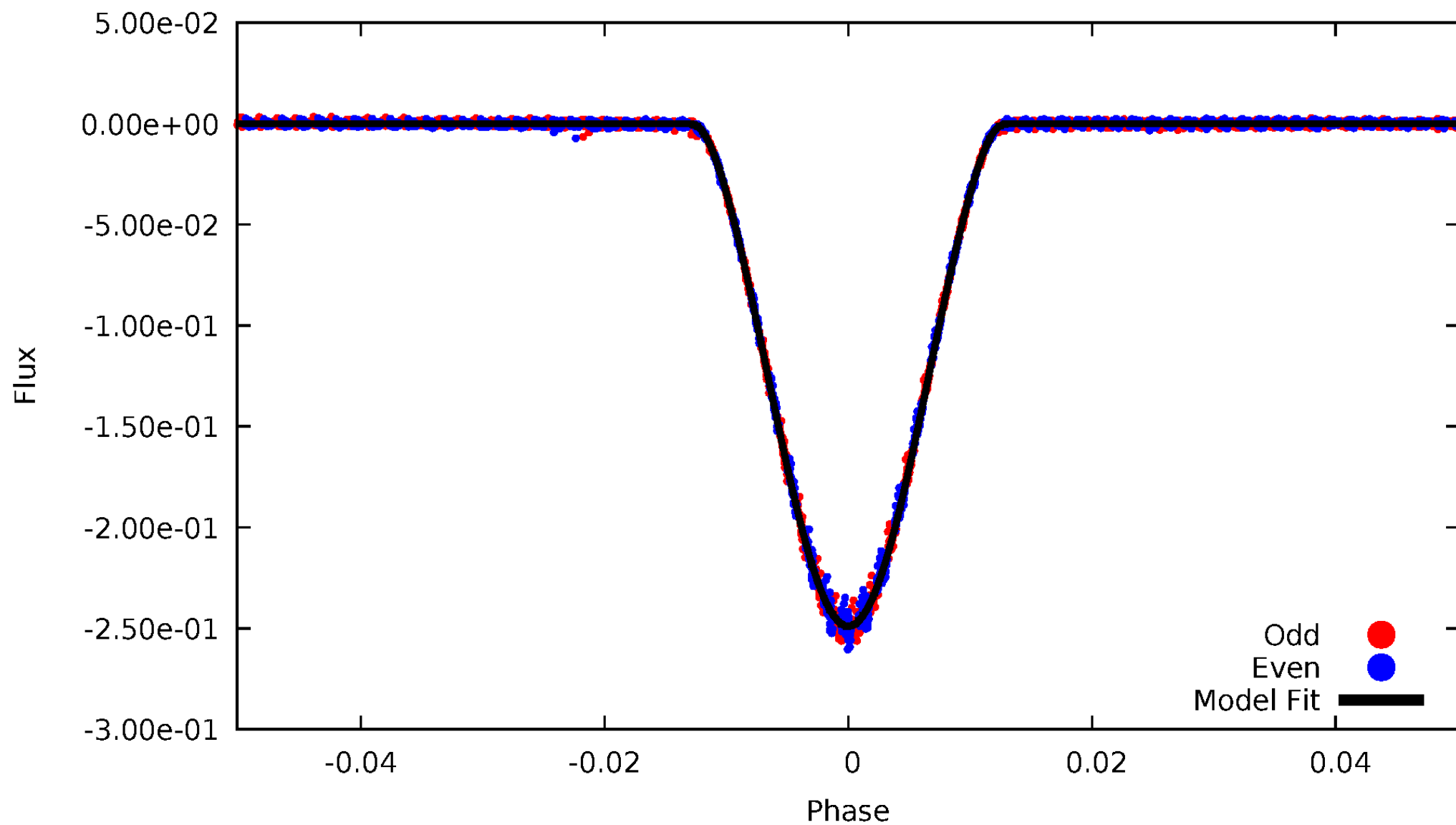


TCE 003102024-01



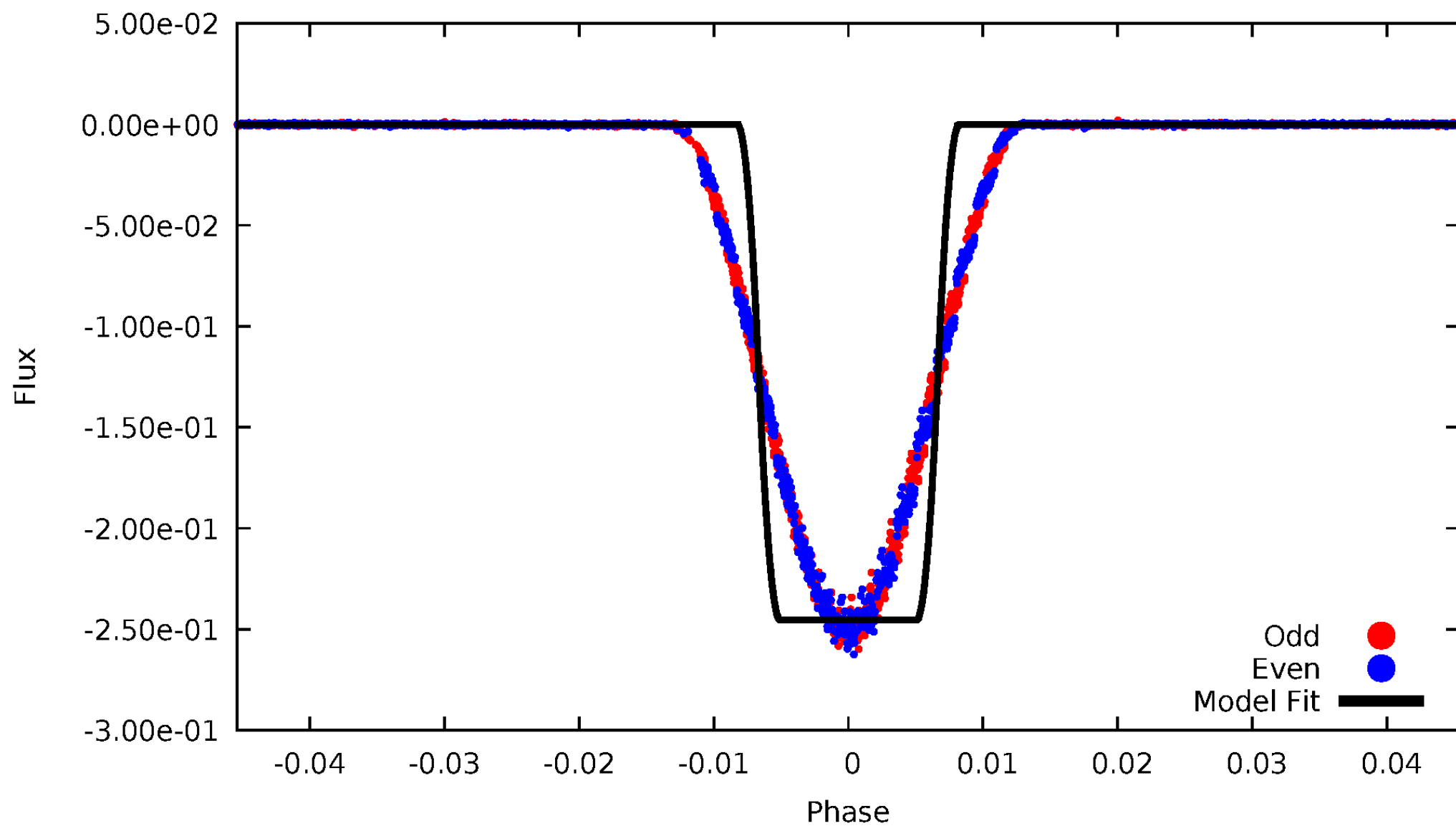
# DV Odd/Even

TCE 003102024-01



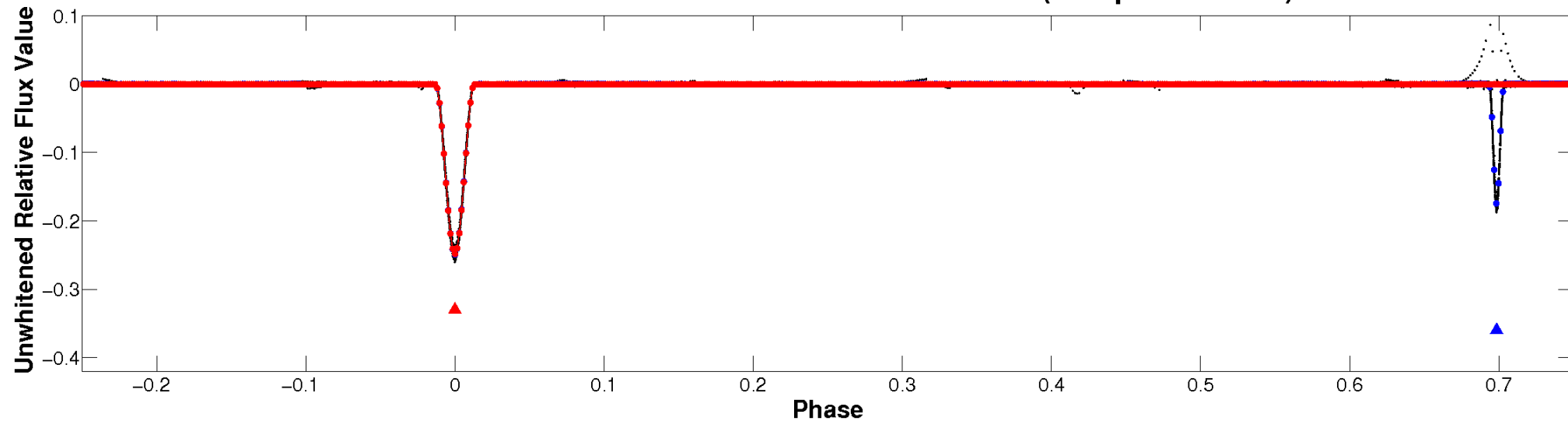
# ALT Odd/Even

TCE 003102024-01

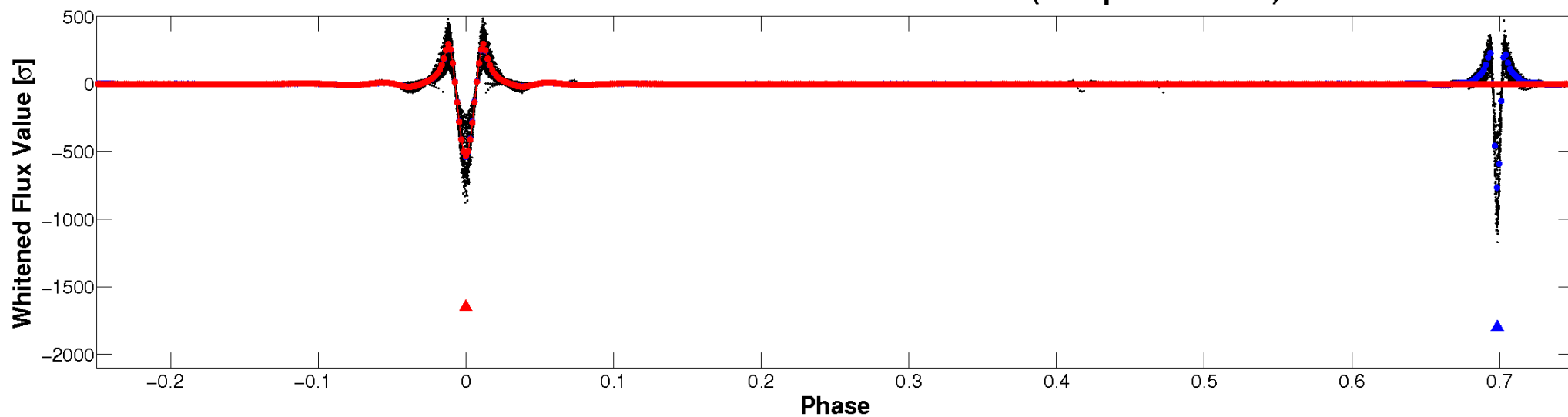


# Non-Whitened Vs. Whitened Light Curve

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

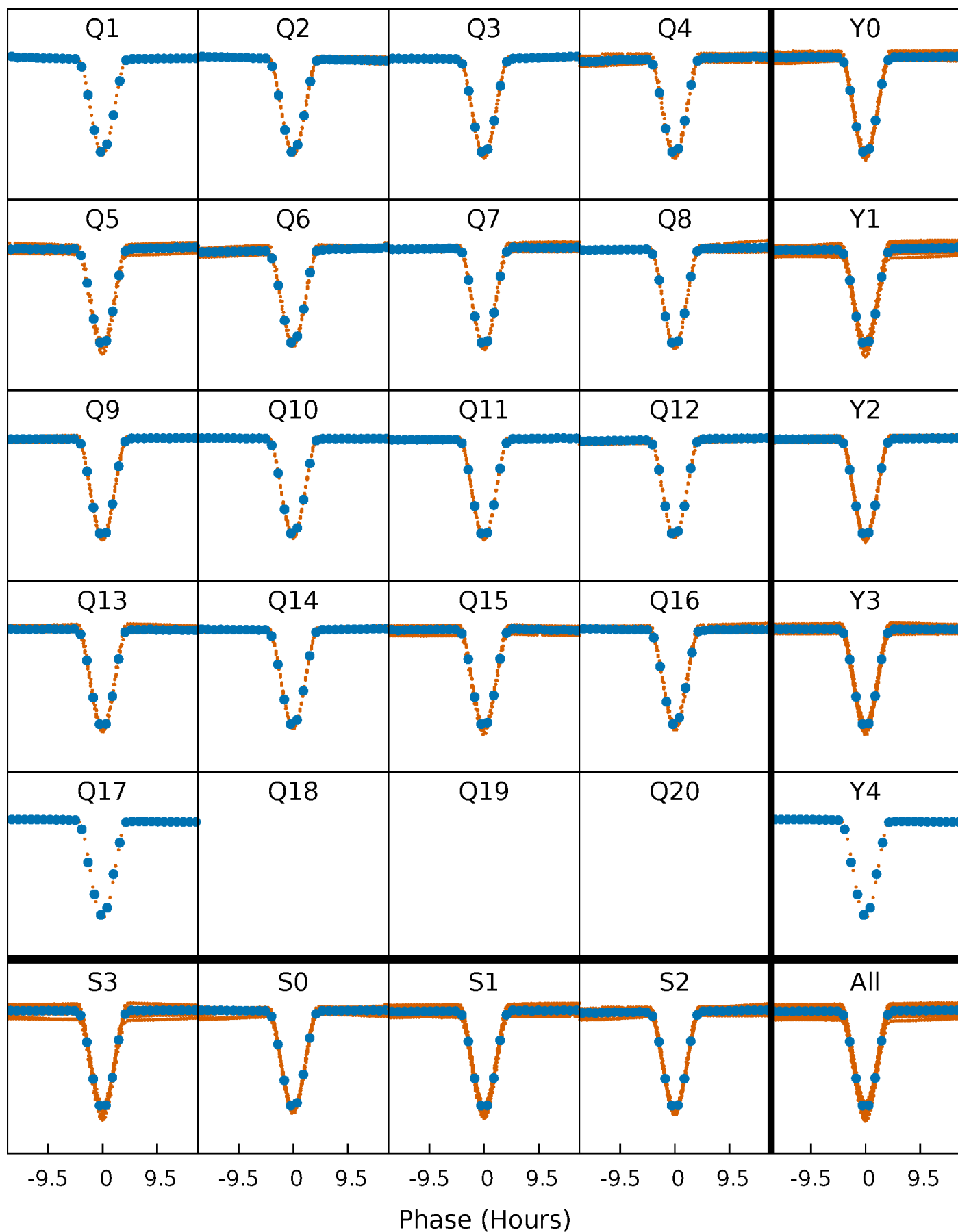


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

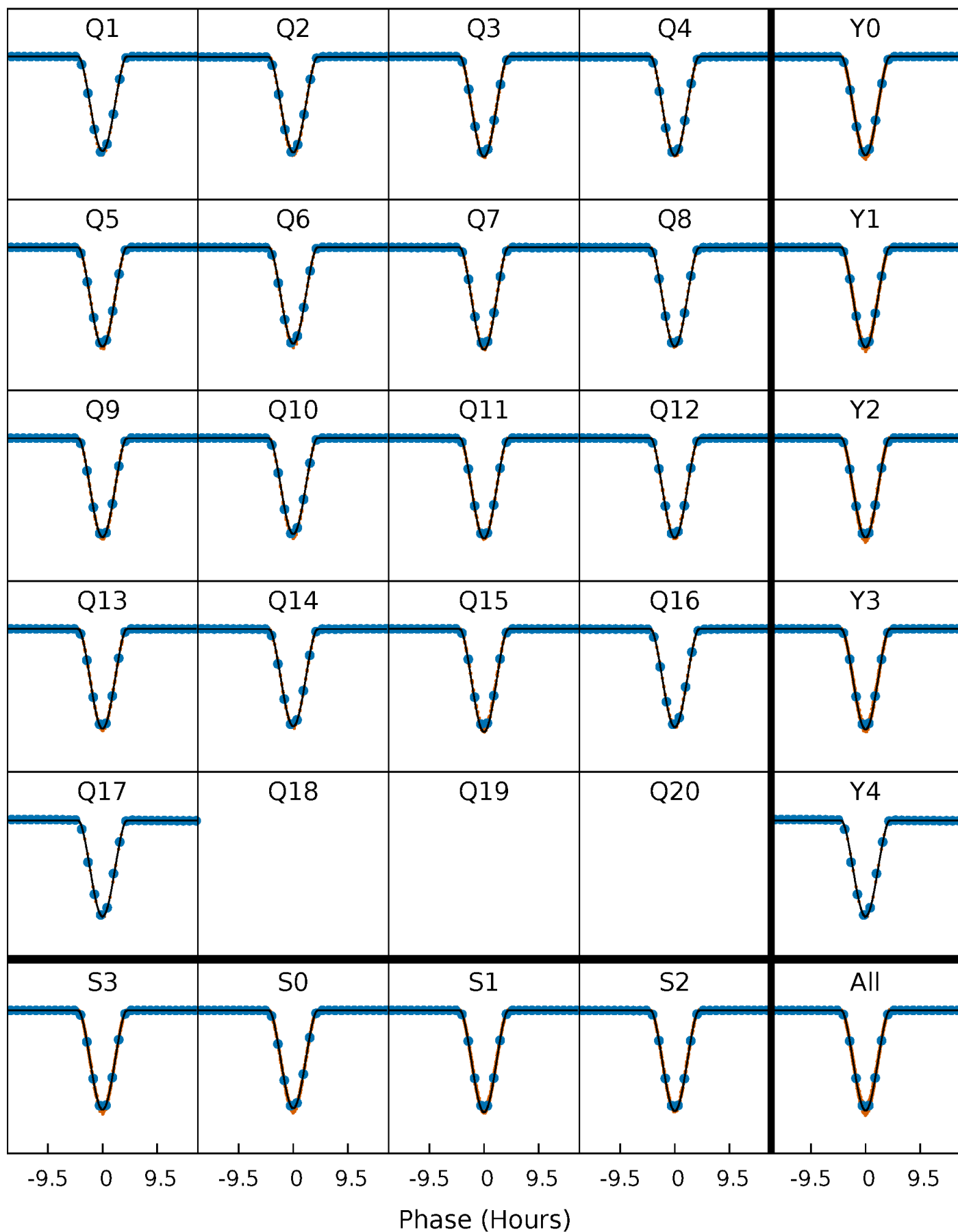
TCE 003102024-01 P= 13.782523 Days  $T_0=139.480629$  (BKJD)





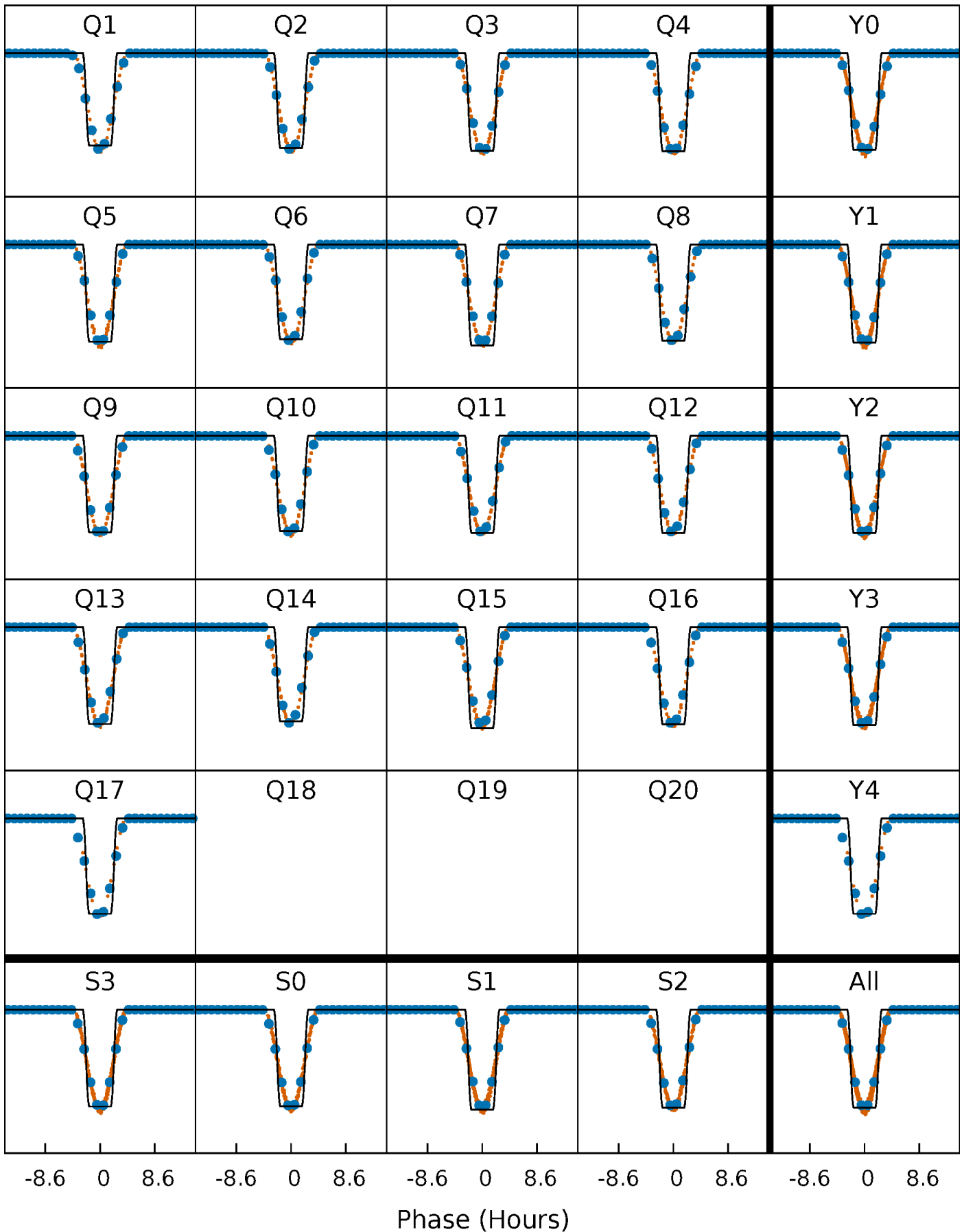
# DV Quarter-Phased Transit Curves

TCE 003102024-01 P= 13.782523 Days  $T_0=139.480629$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

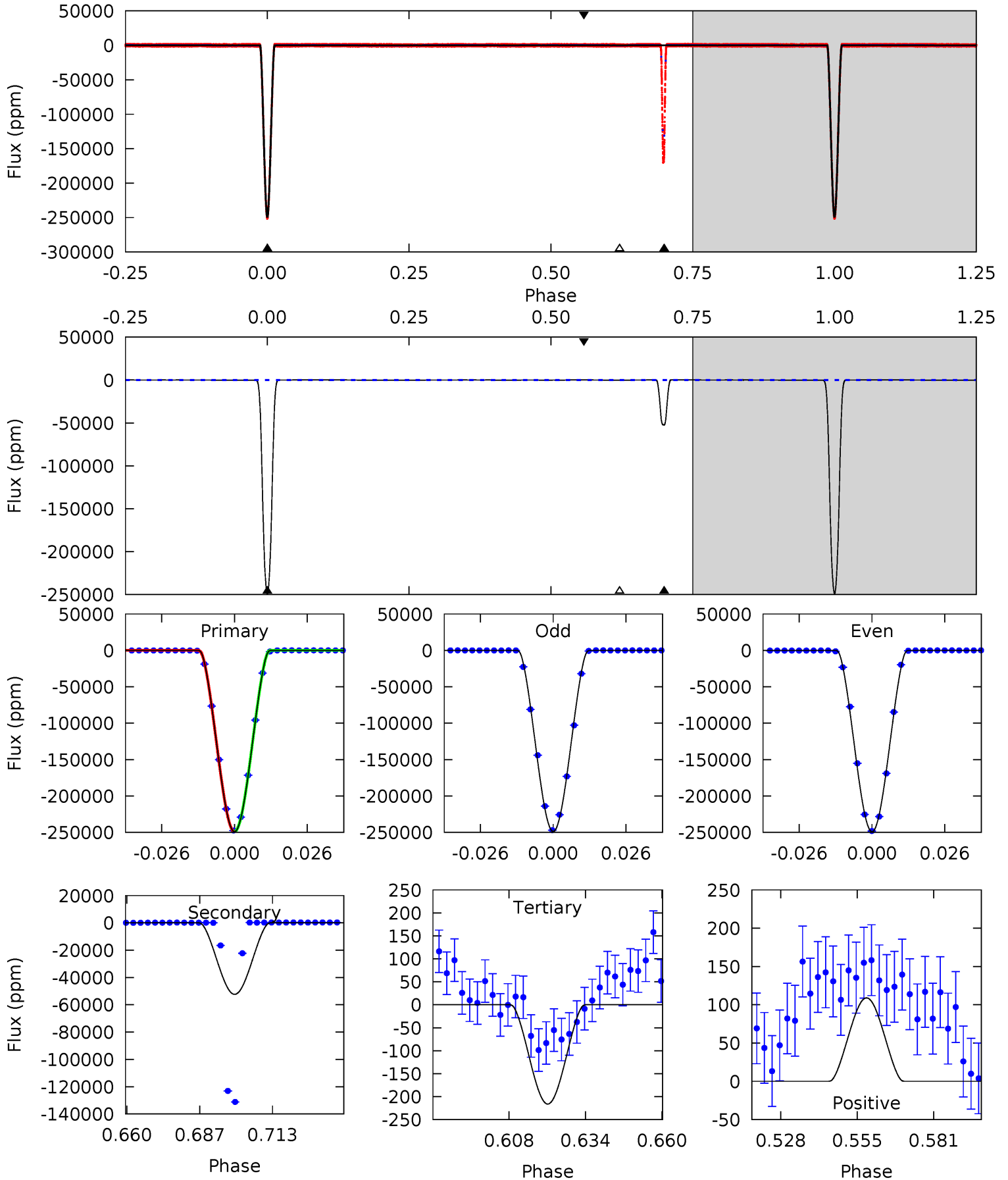
TCE 003102024-01   P= 13.782596 Days    $T_0=139.476656$  (BKJD)



# DV Model-Shift Uniqueness Test

003102024-01, P = 13.782523 Days, E = 125.698106 Days

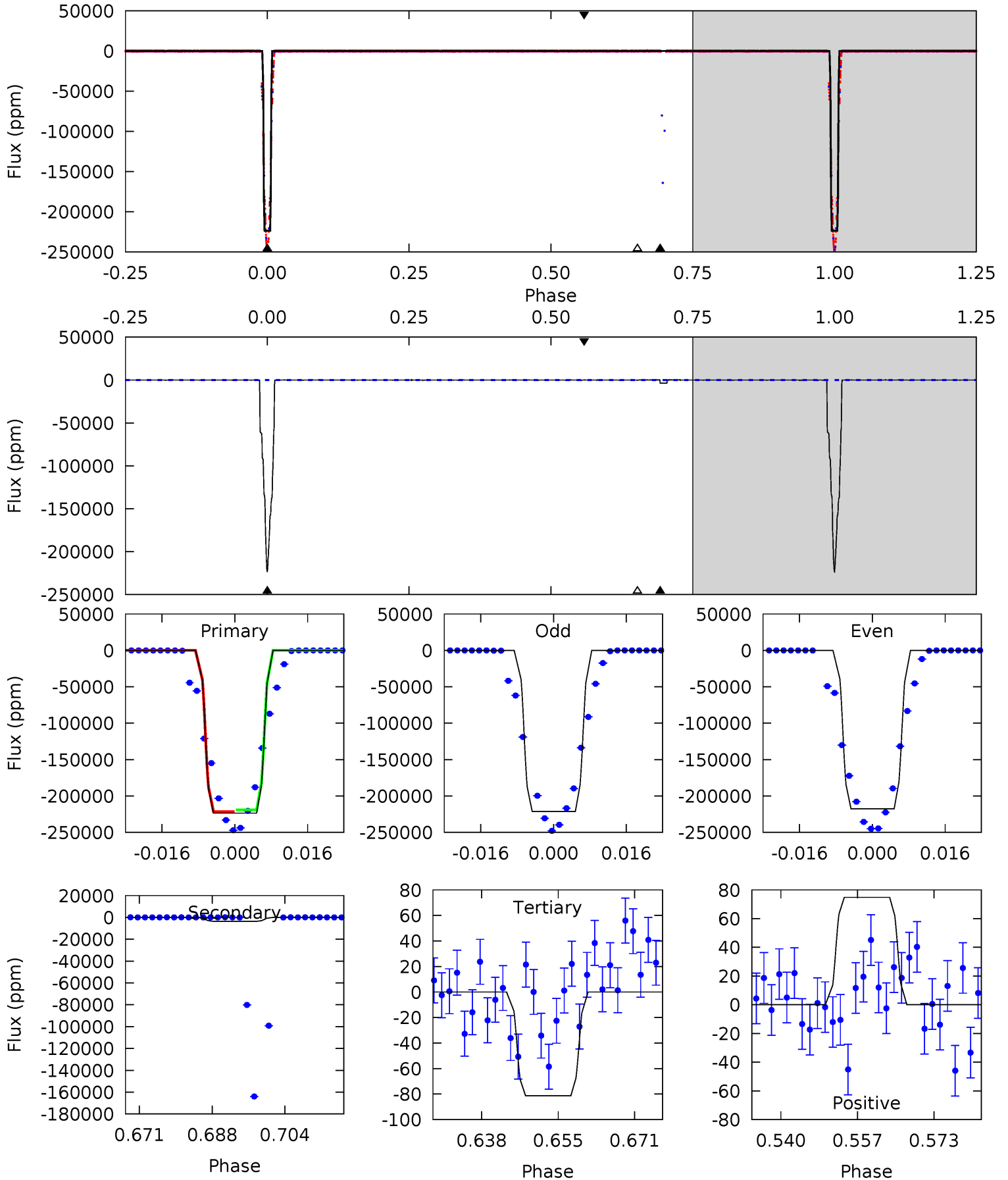
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14166	2980	12.3	6.20	4.84	2.22	5.75	14154	14160	2968	2974	10.4	1.00	0.00	0



# Alt Model-Shift Uniqueness Test

003102024-01, P = 13.782596 Days, E = 125.694060 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
11493	184.5	4.17	3.85	4.93	2.40	1.17	11489	11489	180.3	180.6	118.1	1.00	0.00	0



### Stellar Parameters For KIC 003102024

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5246^{+156}_{-156}$	$4.604^{+0.072}_{-0.048}$	$-0.780^{+0.300}_{-0.300}$	$0.668^{+0.064}_{-0.064}$	$0.653^{+0.070}_{-0.032}$	$3.083^{+0.882}_{-0.573}$
	+3%/-3%	+2%/-1%	+38%/-38%	+10%/-10%	+11%/-5%	+29%/-19%
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 003102024-01 / KOI 6304.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-52375 \pm 18$	$41.38^{+2.45}_{-2.22}$	$843^{+34}_{-32}$	$3743^{+98}_{-88}$	$171^{+19}_{-14}$
Alt.	$-3588 \pm 19$	$36.05^{+1.93}_{-1.90}$	$842^{+34}_{-31}$	$2614^{+47}_{-47}$	$15^{+1}_{-1}$

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

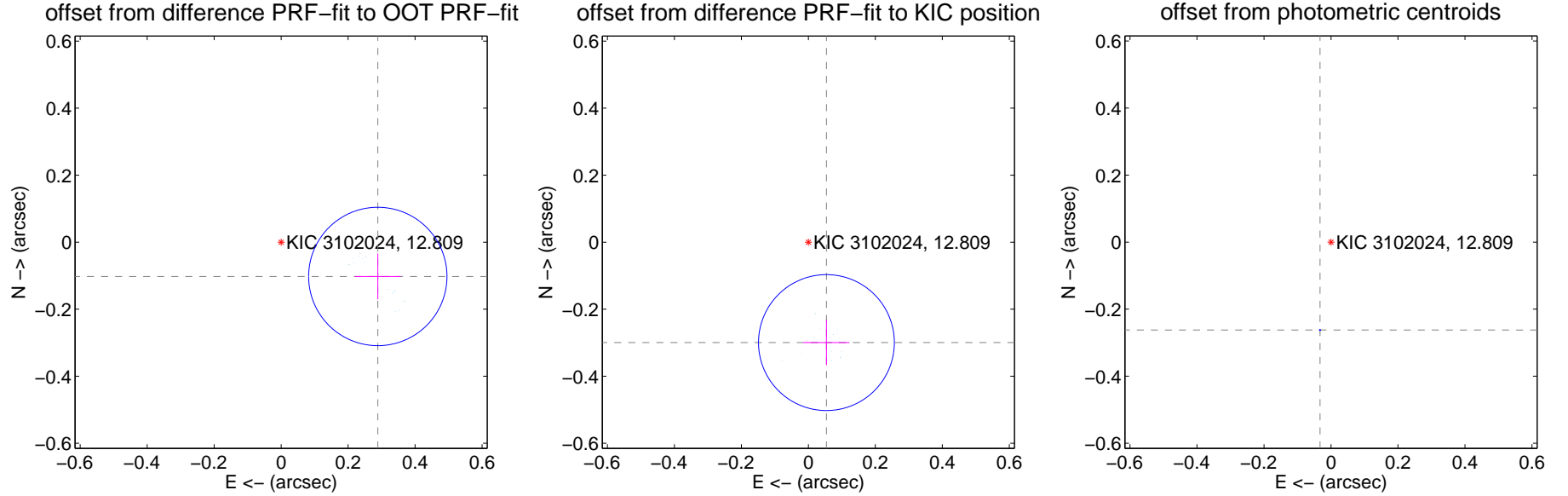
## DV Centroid Data

Supplemental centroid analysis for 003102024-01. Kepler magnitude: 12.81. Transit SNR 8090.17

There are 17 quarters with good PRF difference image offsets

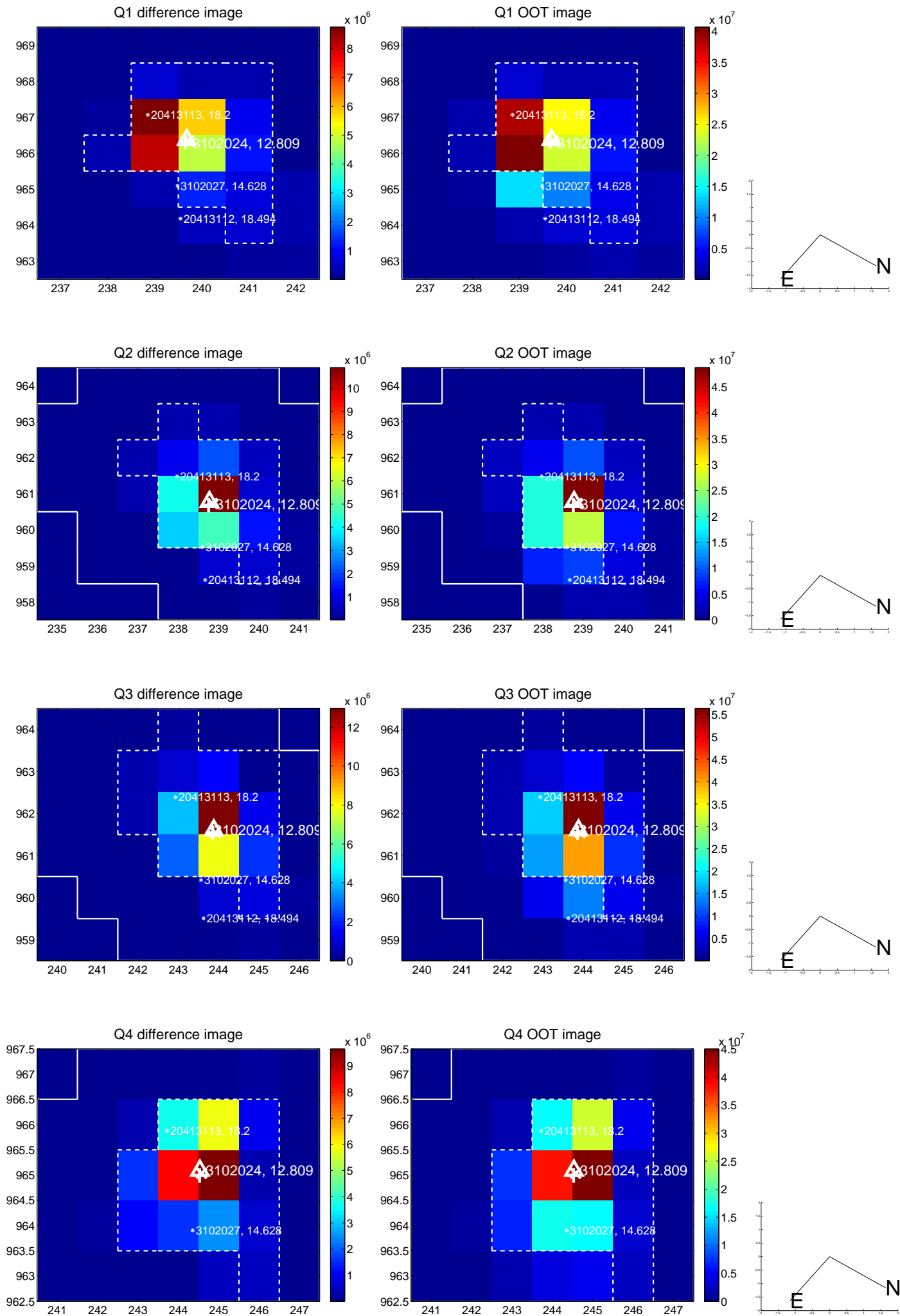
The direct PRF centroid is offset from the target star catalog position by about 0.30 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.306 \pm 0.069$	4.45	$-0.289 \pm 0.068$	$-0.102 \pm 0.068$
PRF-fit source offset from KIC position	$0.304 \pm 0.068$	4.50	$-0.054 \pm 0.069$	$-0.300 \pm 0.068$
photometric centroid source offset	$0.26 \pm 0.00$	512.23	$0.03 \pm 0.00$	$-0.26 \pm 0.00$

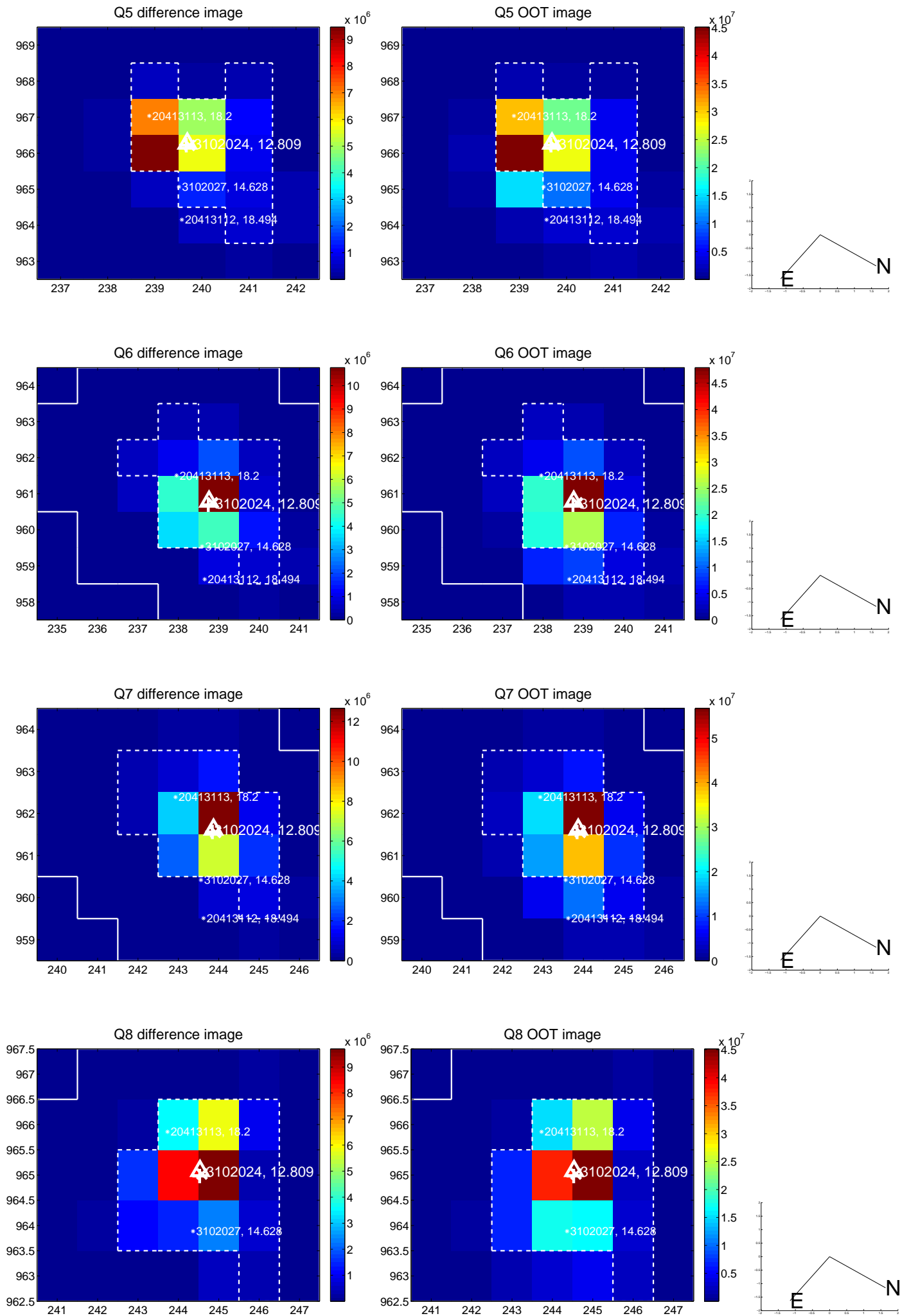


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

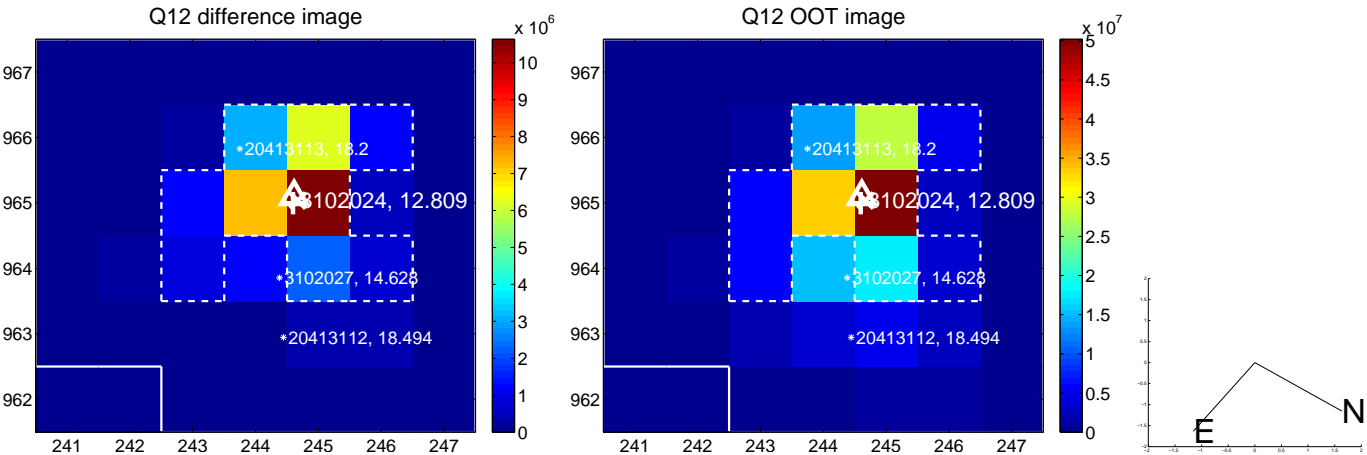
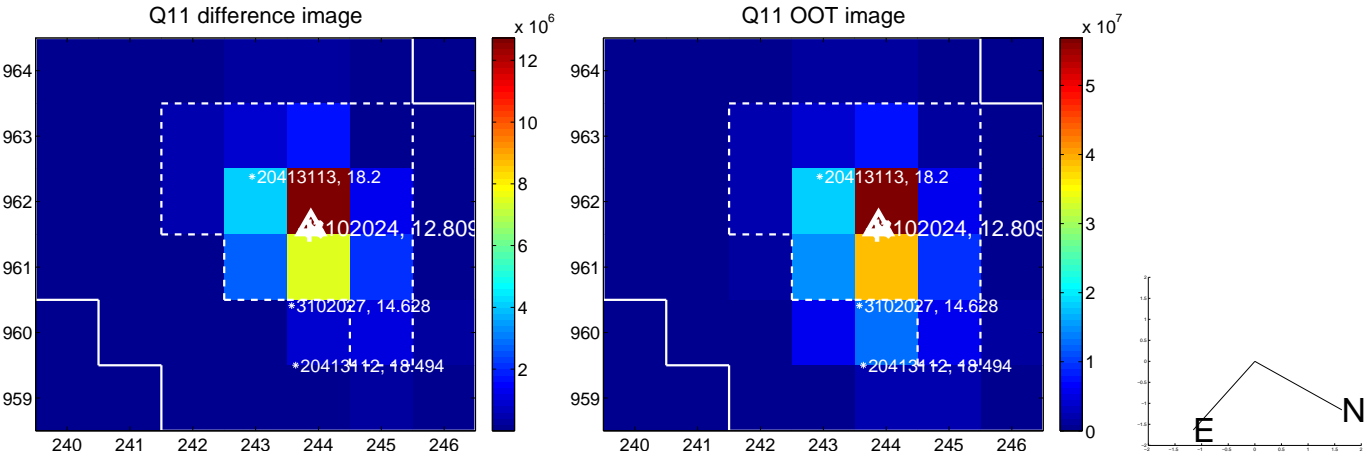
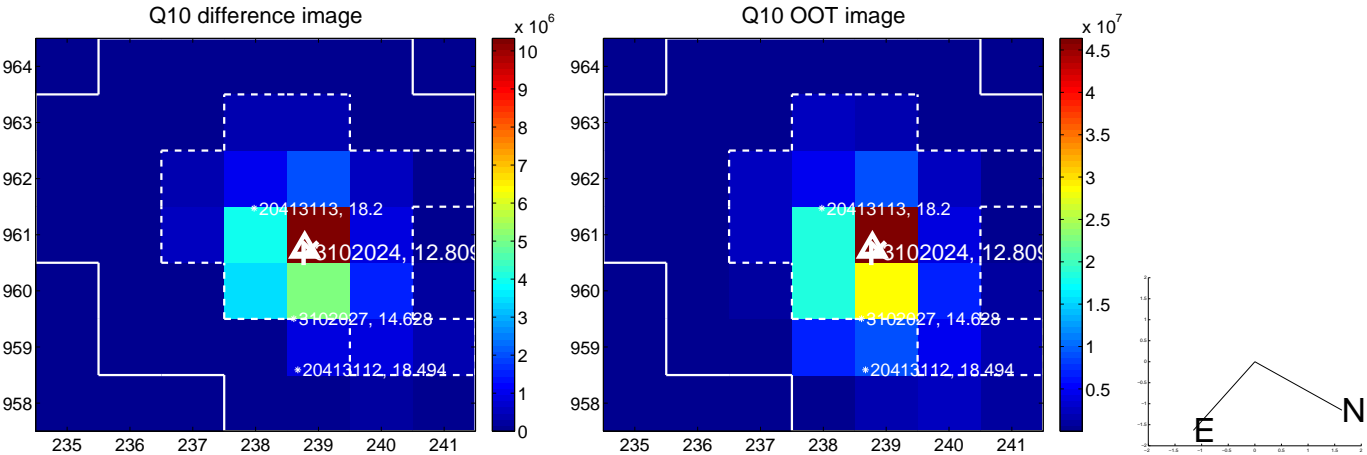
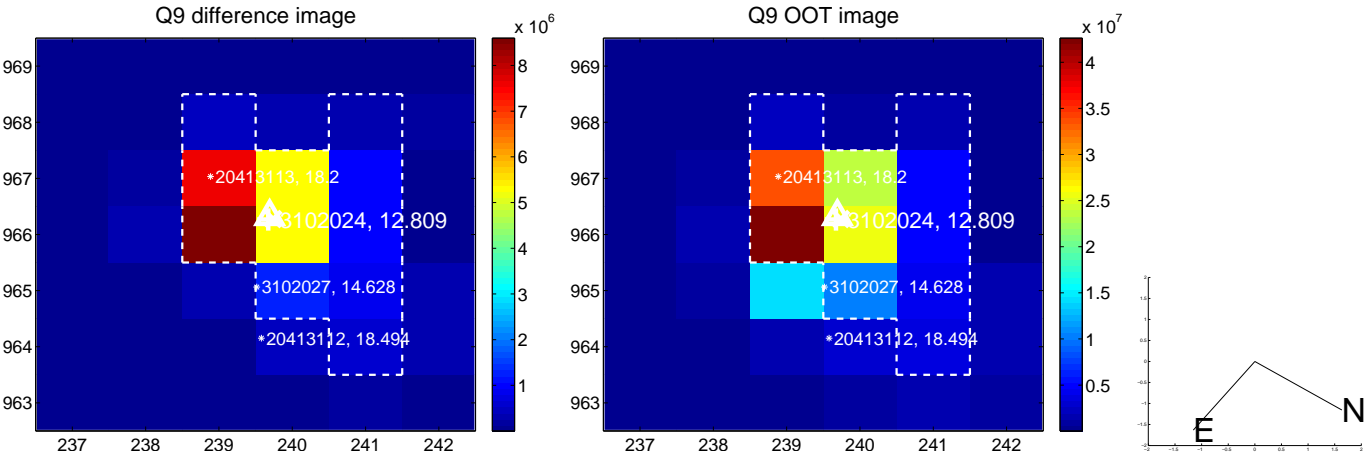


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

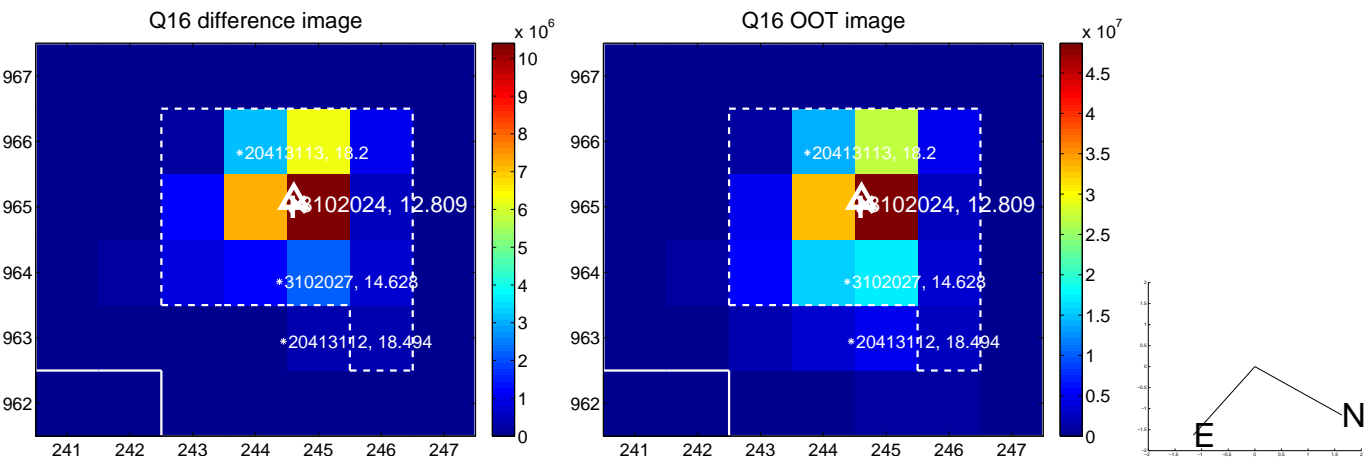
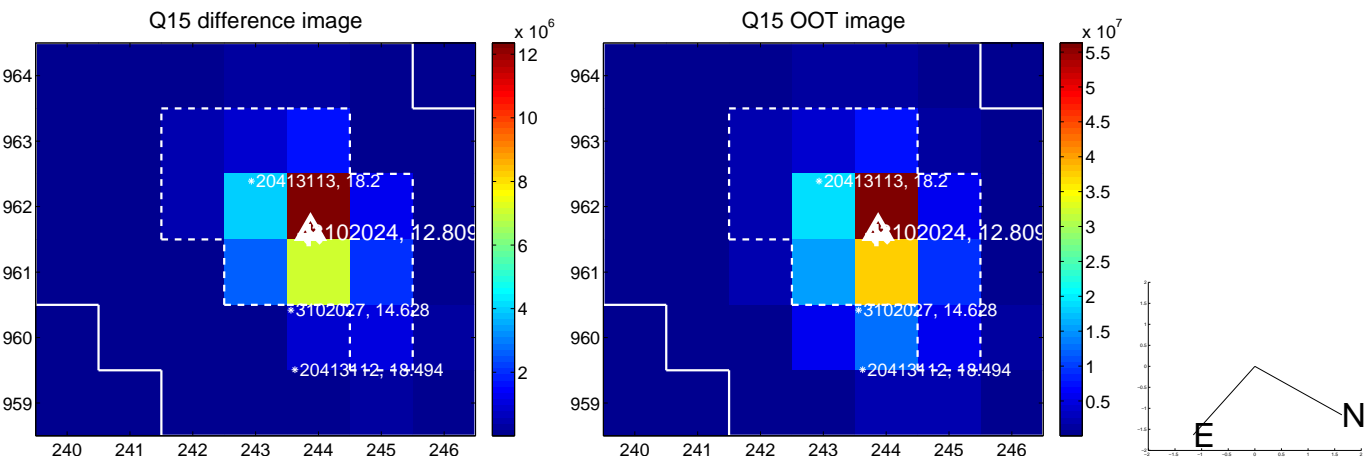
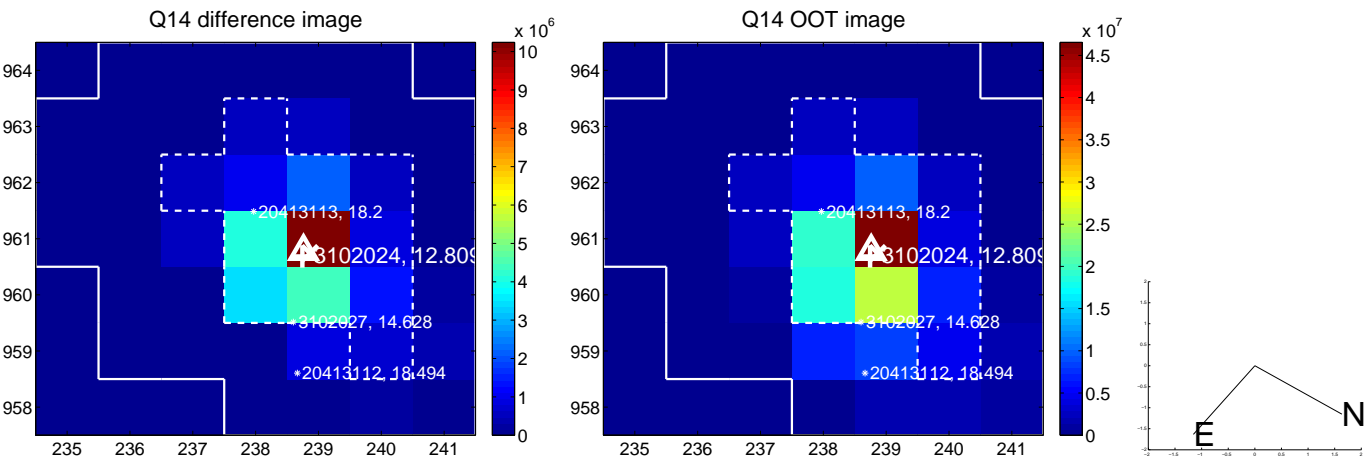
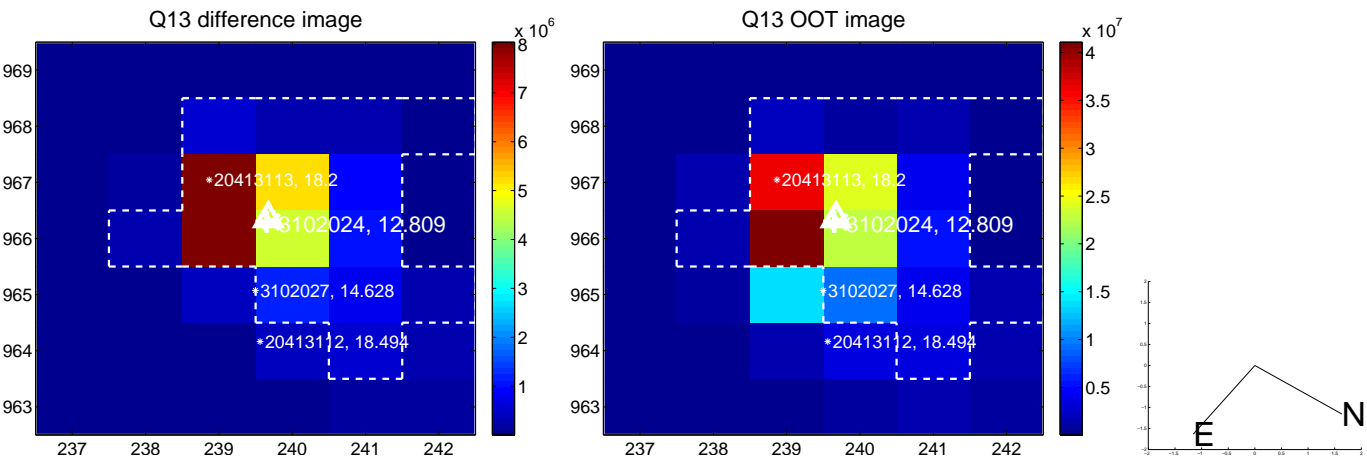




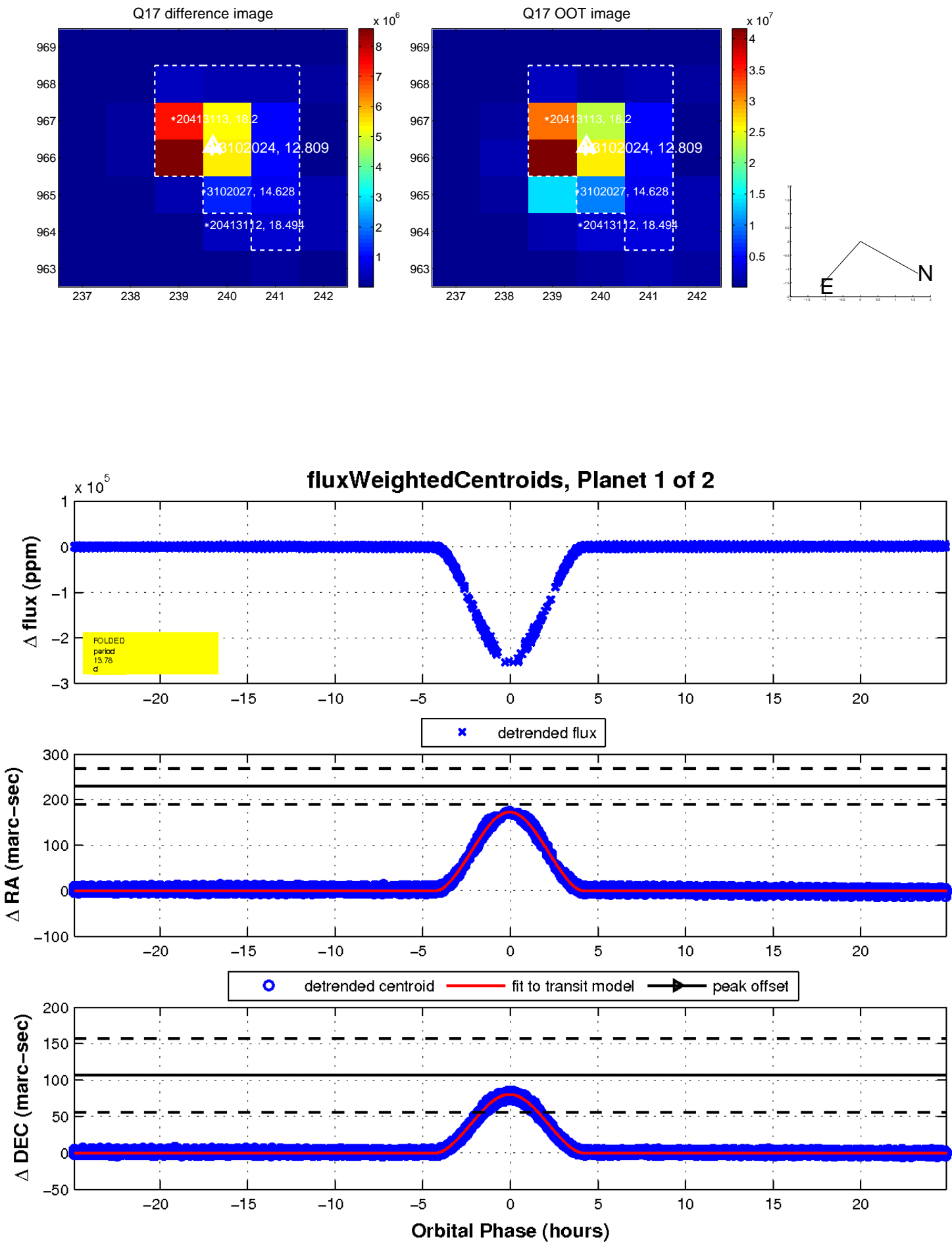
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



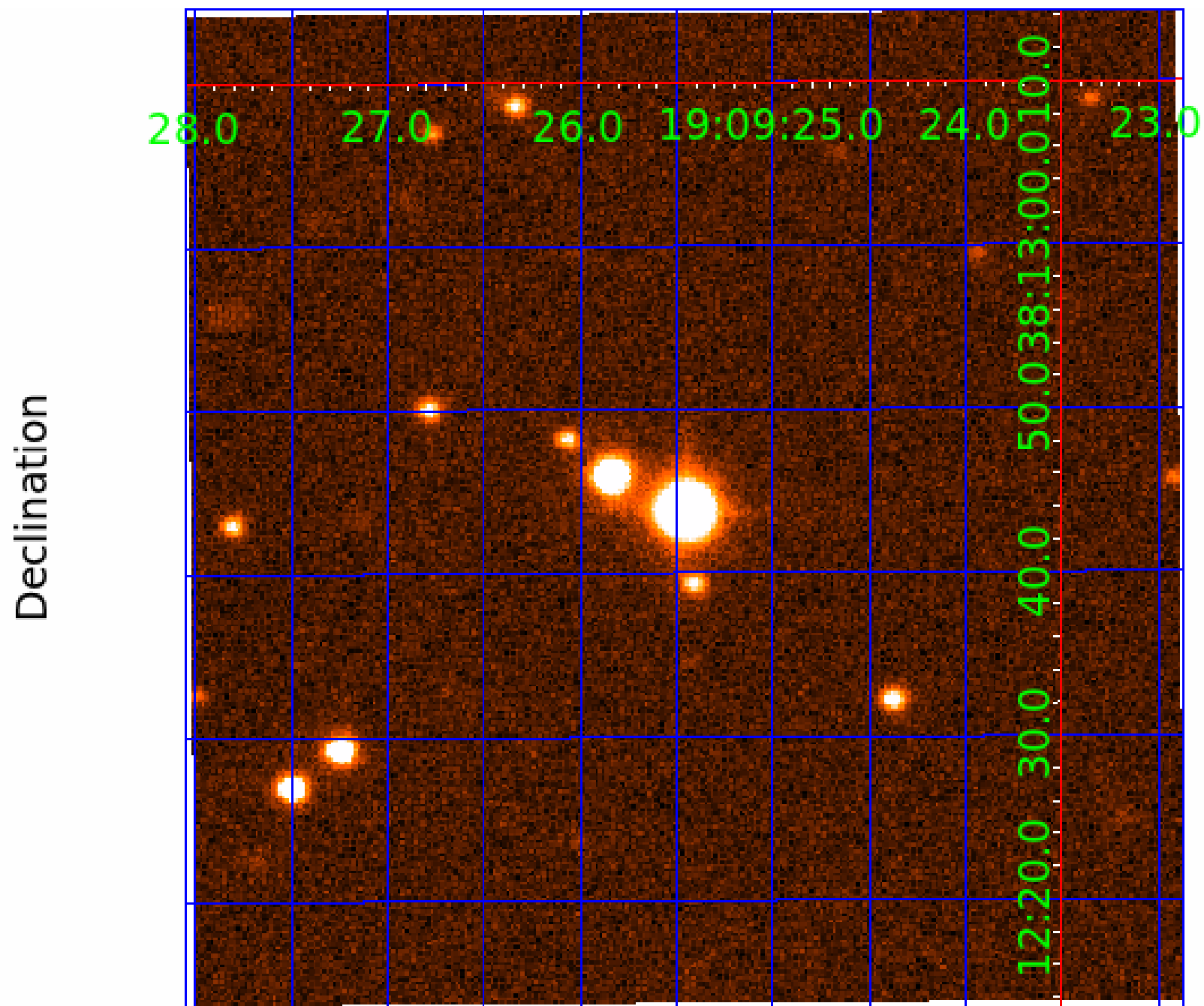
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 003102024

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003102024-01	OBS	6304.01	13.782523	139.480629	248955.5	8.294	13155.2	8090.2	0.67	5246	41.45	31.74
003102024-02	OBS	No	13.782538	135.324935	176370.0	2.996	12136.2	5646.4	0.67	5246	37.50	31.74

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003102024-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
003102024-02	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.

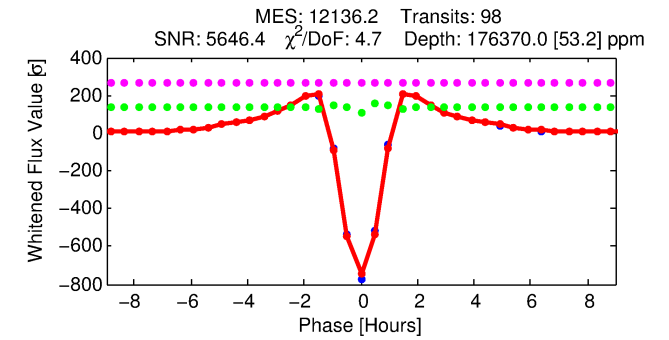
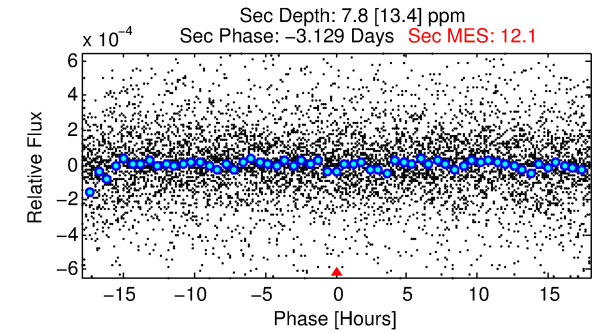
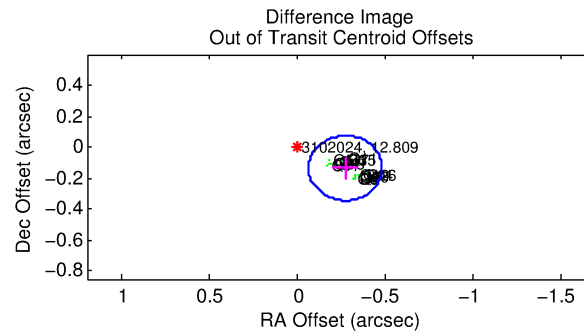
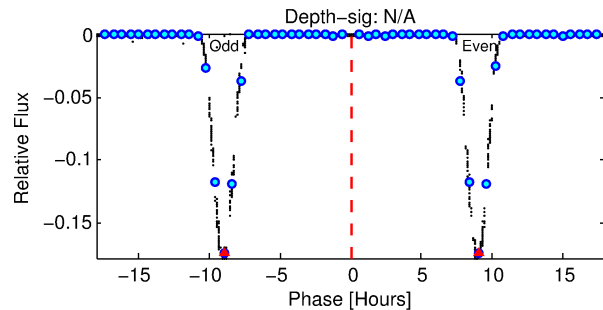
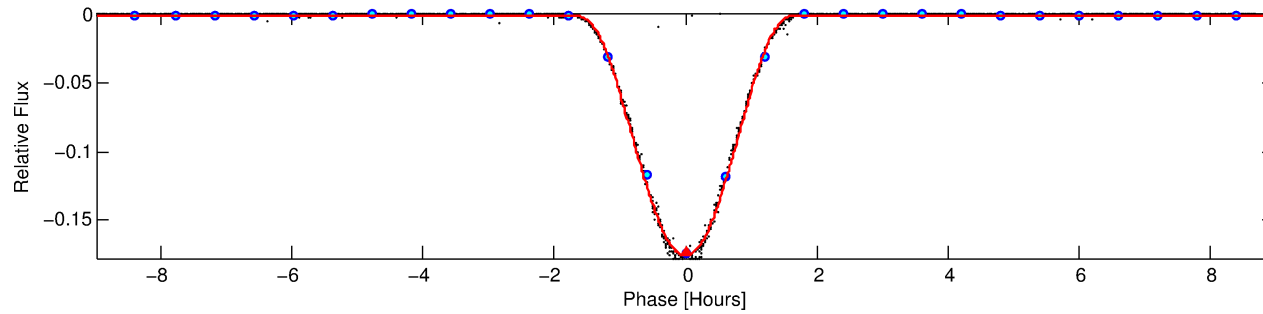
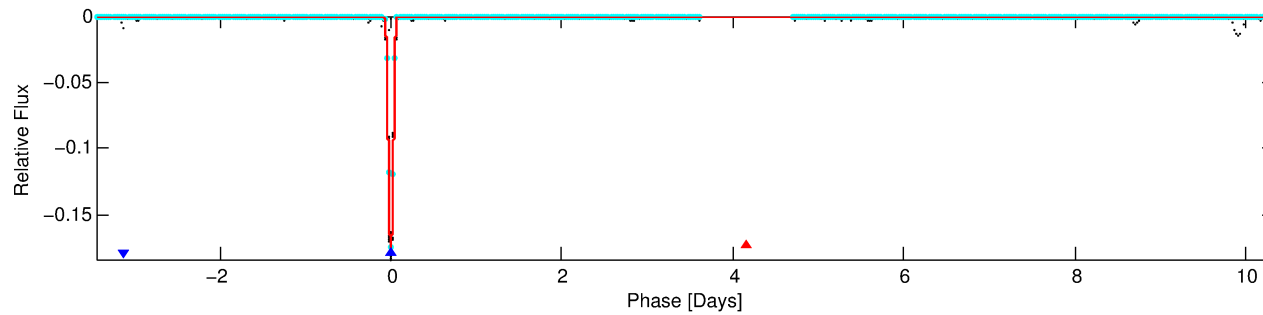
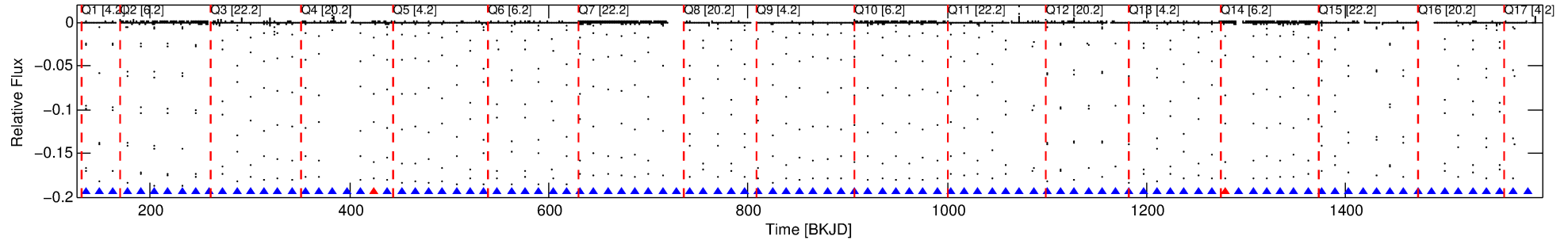
## Ephemeris Match Information For 003102024-02

No Significant Match Found

# DV One-Page Summary

KIC: 3102024 Candidate: 2 of 2 Period: 13.783 d  
KOI: K06304 Corr: No Ephemeris Match

Kp: 12.81 R\*: 0.67 Rs Teff: 5246.0 K Logg: 4.60 Fe/H: -0.780



## DV Fit Results:

Period = 13.78254 [0.00000] d  
Epoch = 135.3249 [0.0000] BKJD  
Rp/R\* = 0.5144 [0.0253]  
a/R\* = 45.19 [0.19]  
b = 0.80 [0.04]  
Seff = 31.74 [5.54]  
Teff = 605 [26] K  
Rp = 37.50 [4.04] Re  
a = 0.0977 [0.0082] AU  
Ag = 0.03 [0.05] [-19.29σ]  
Teffp = 386 [167] K [-1.29σ]

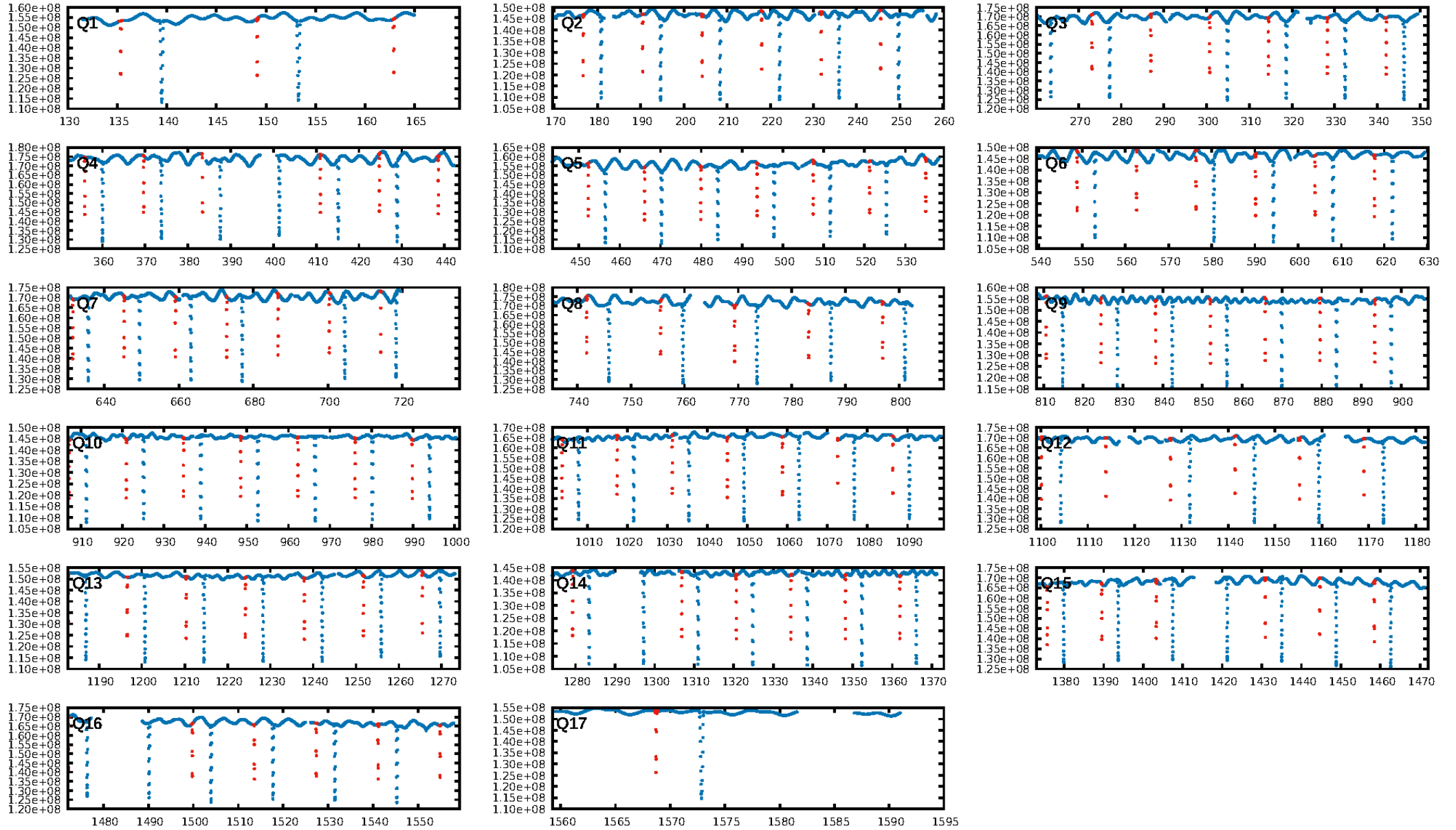
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.98 [92/94]  
GhostDiagnostic-chr: 2.193  
Centroid-sig: 0.0%  
Centroid-so: 0.294 arcsec [353.64σ]  
OotOffset-rm: 0.303 arcsec [4.35σ]  
KicOffset-rm: 0.338 arcsec [4.96σ]  
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]

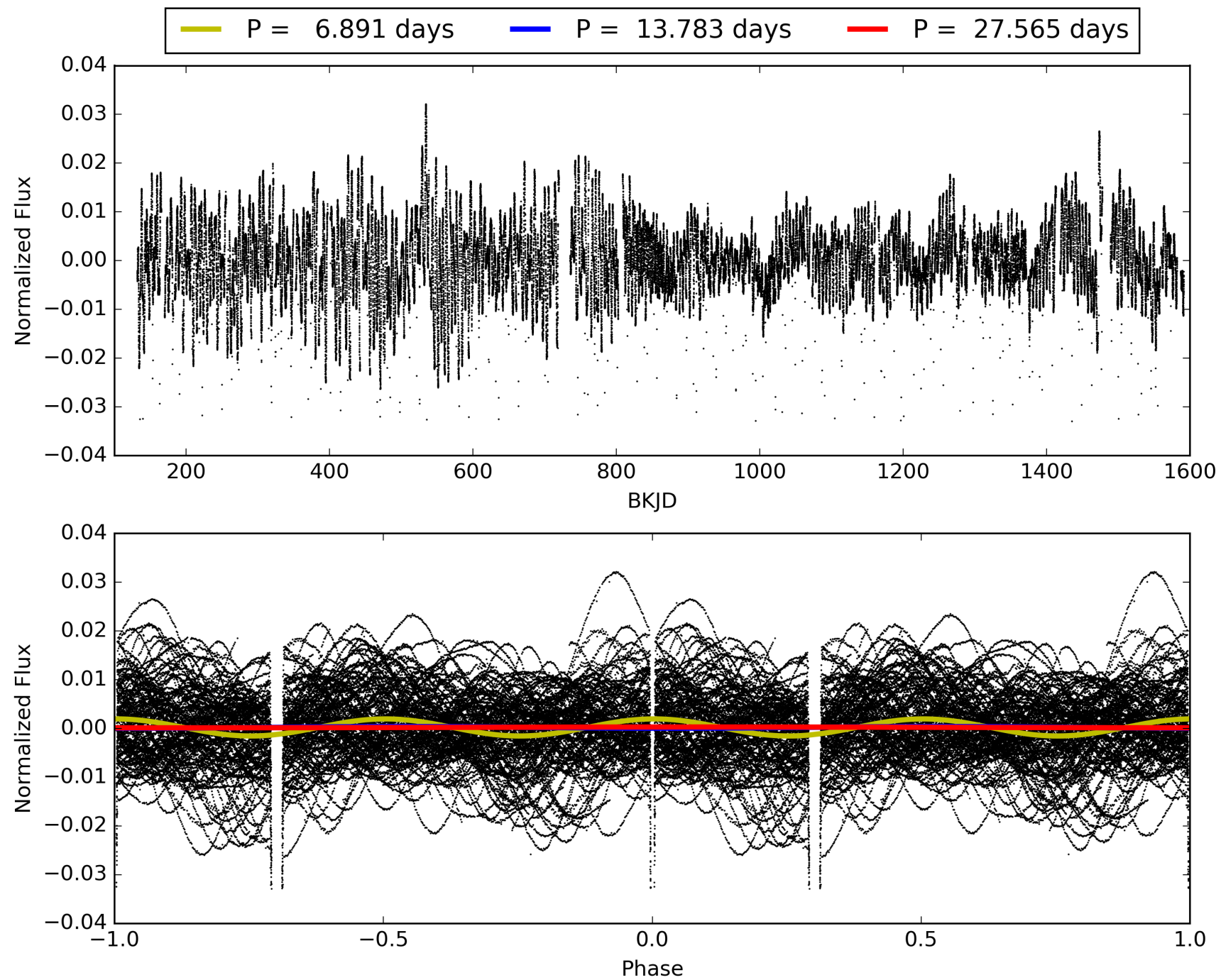
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 23:49:01 Z

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

# TCE 003102024-02, PDC Light Curves



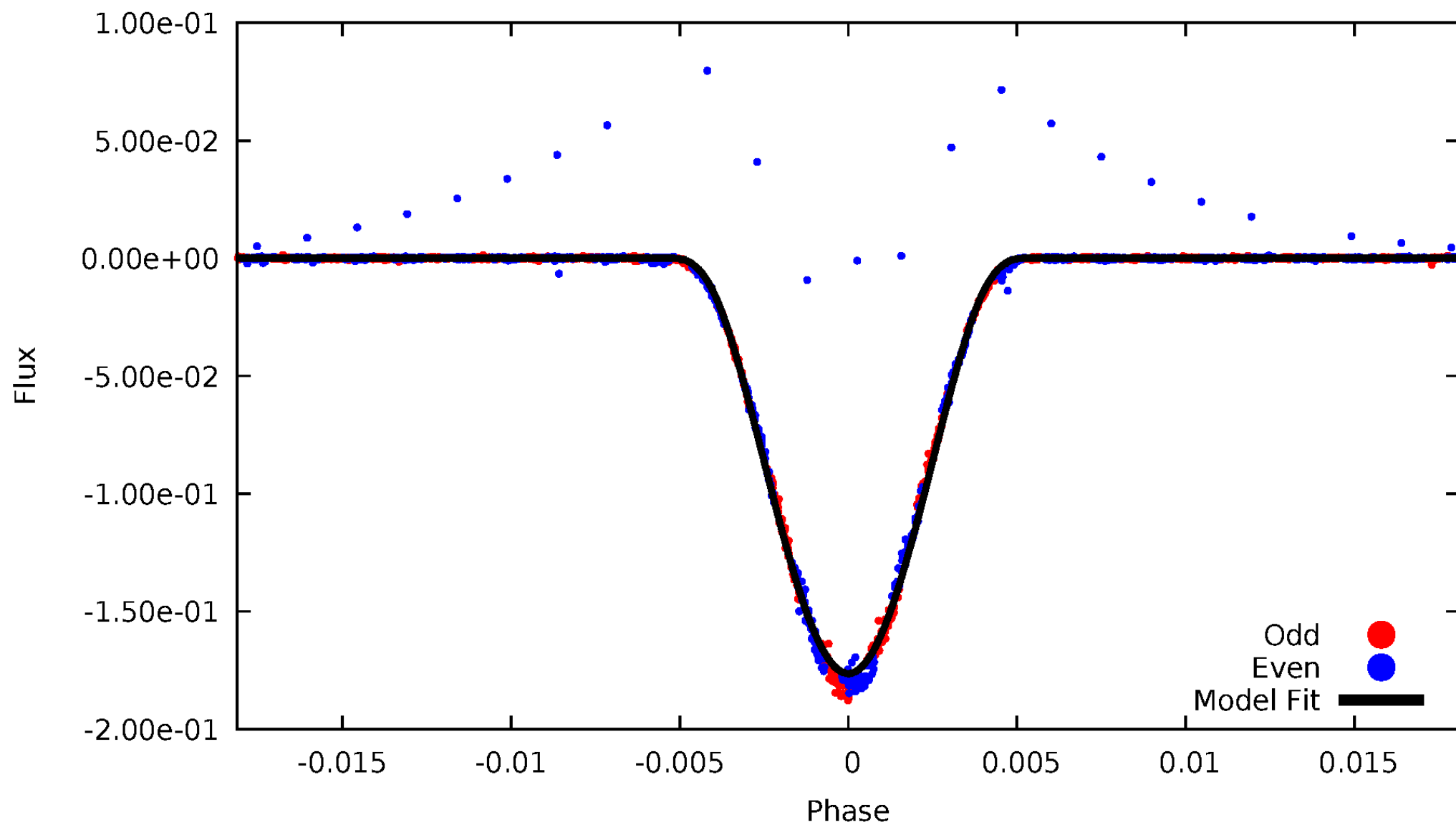
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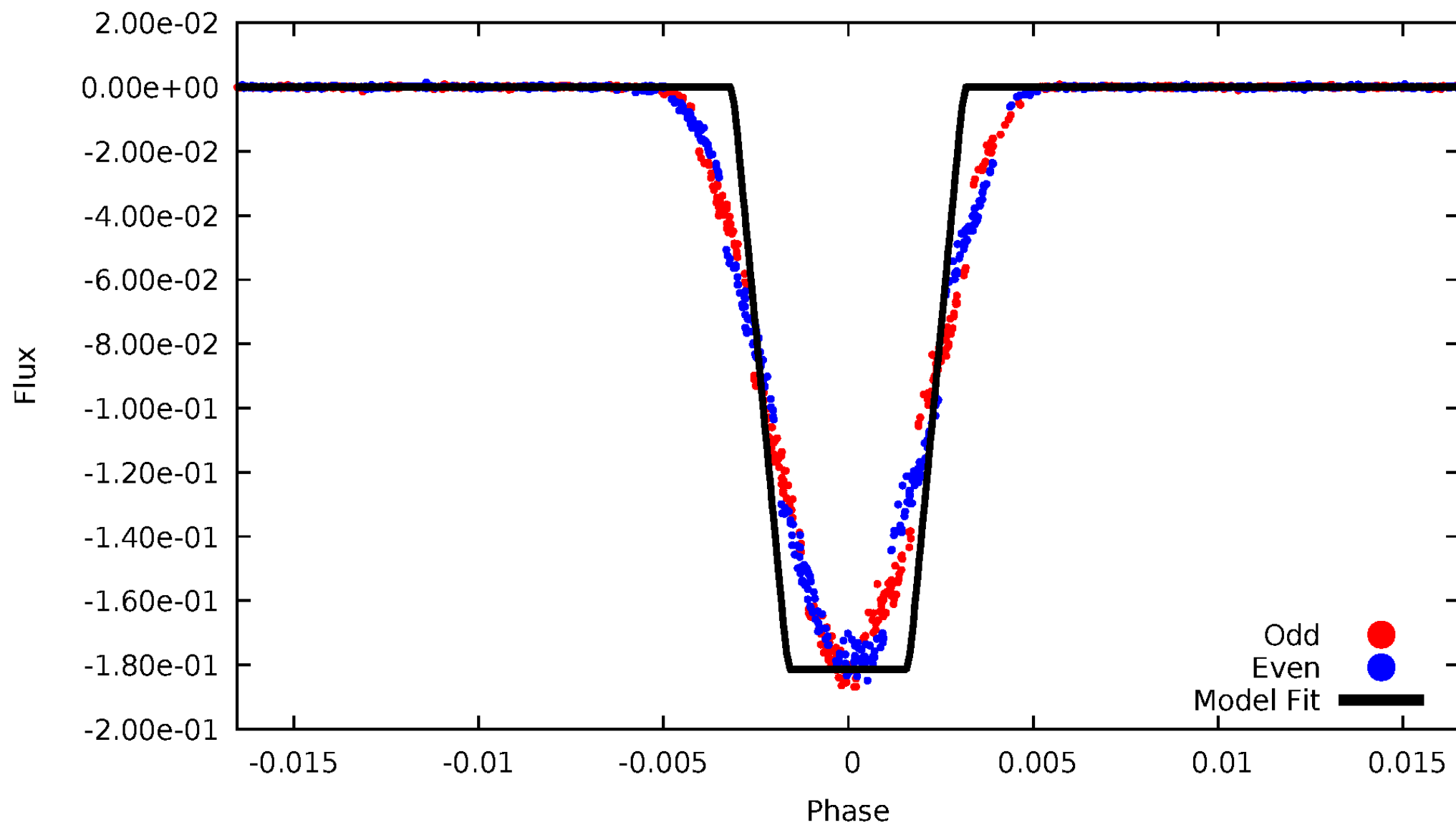
# DV Odd/Even

TCE 003102024-02



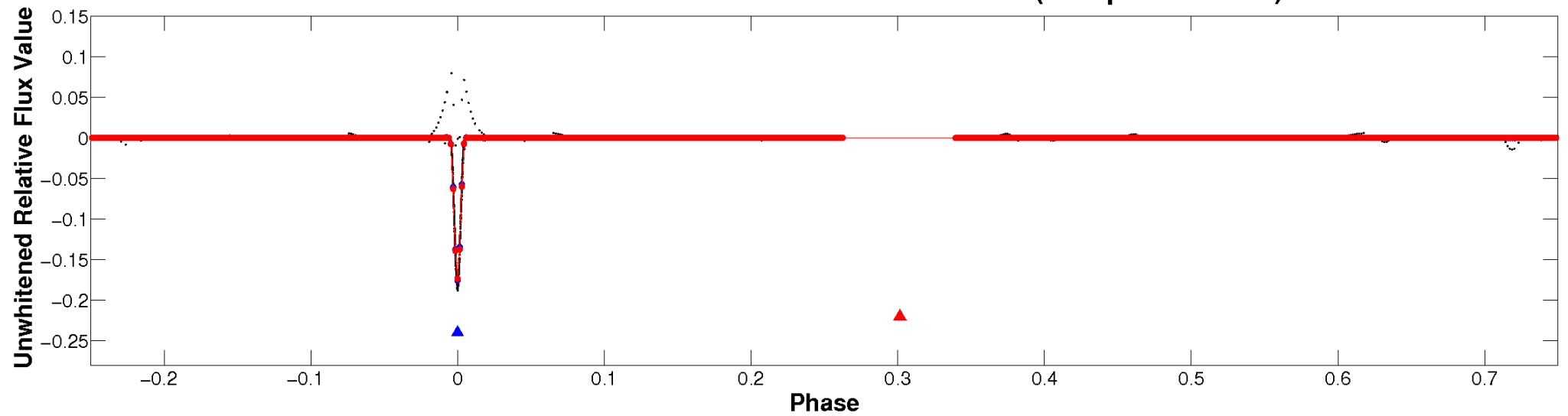
# ALT Odd/Even

TCE 003102024-02

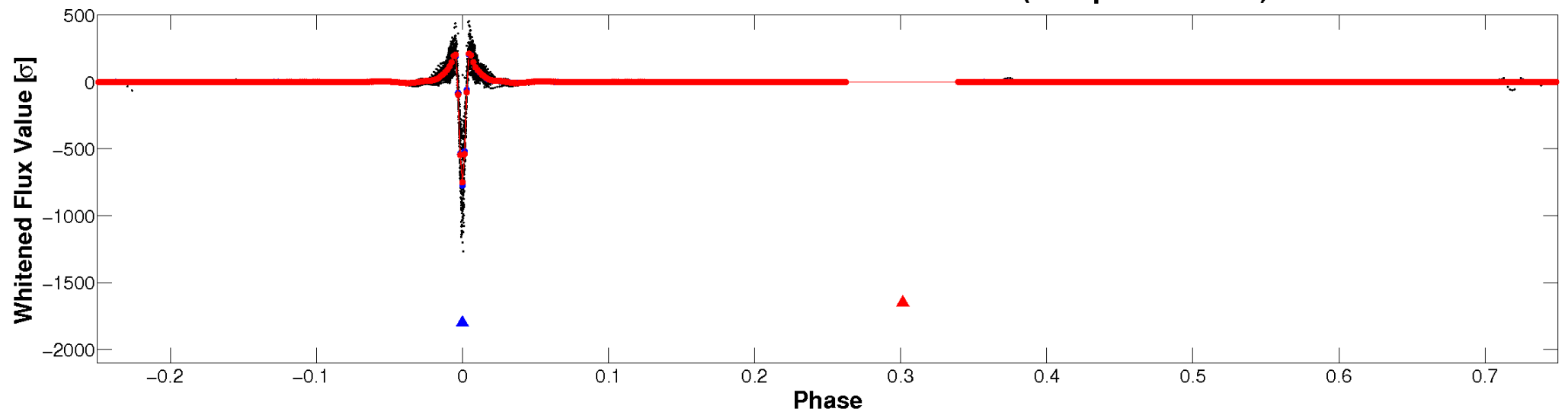


# Non-Whitened Vs. Whitened Light Curve

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

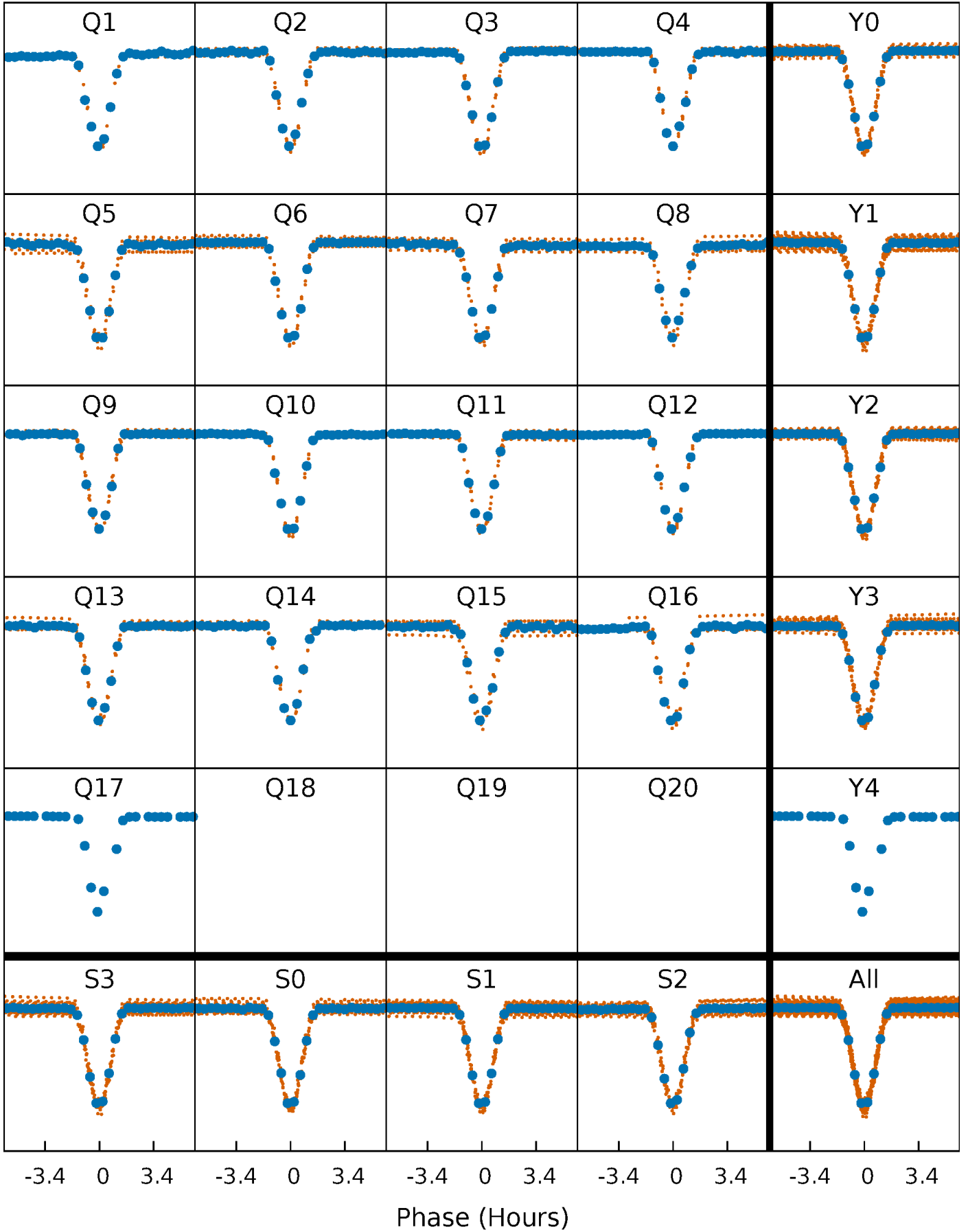


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



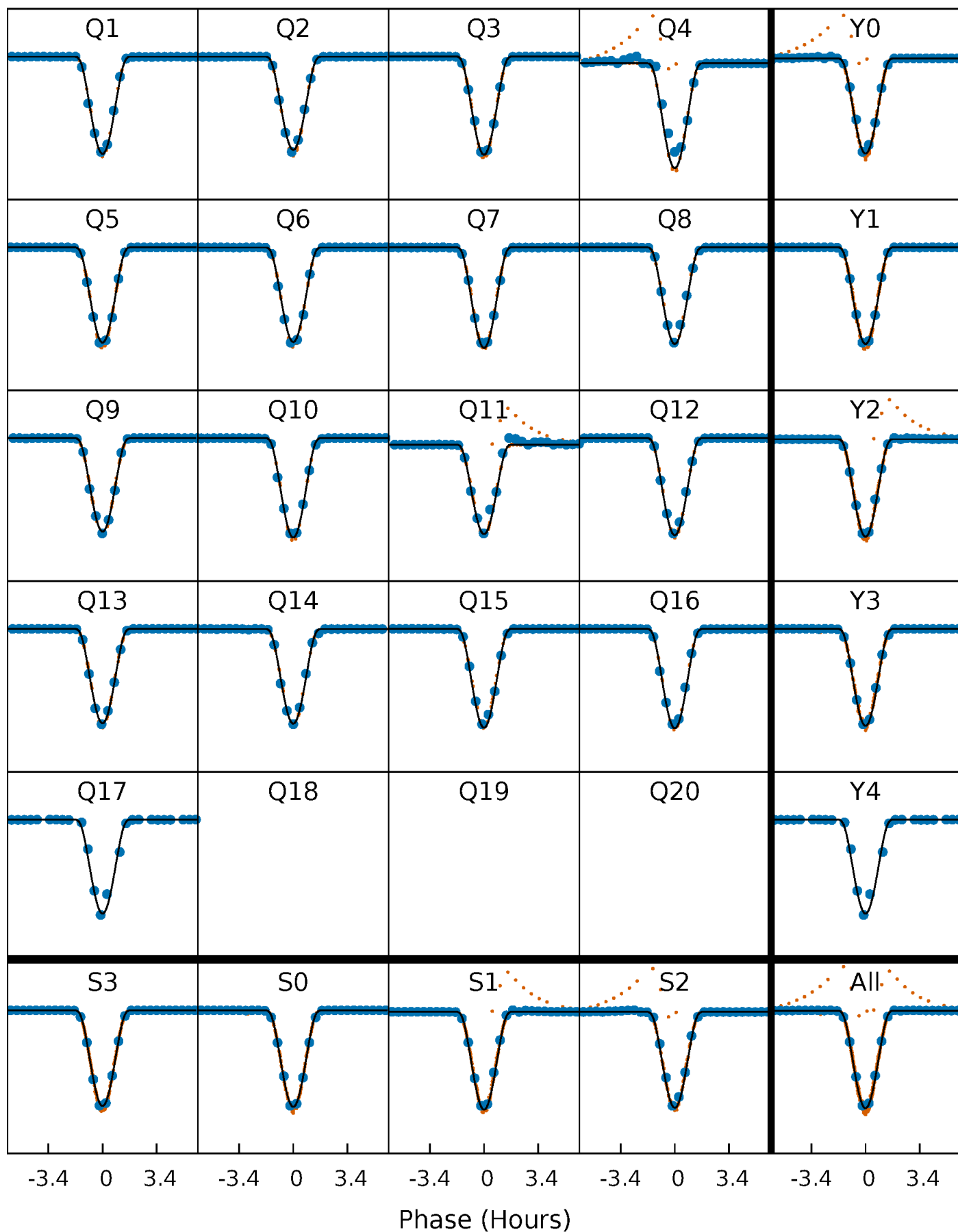
# PDC Quarter-Phased Transit Curves

TCE 003102024-02 P= 13.782538 Days  $T_0=135.324935$  (BKJD)



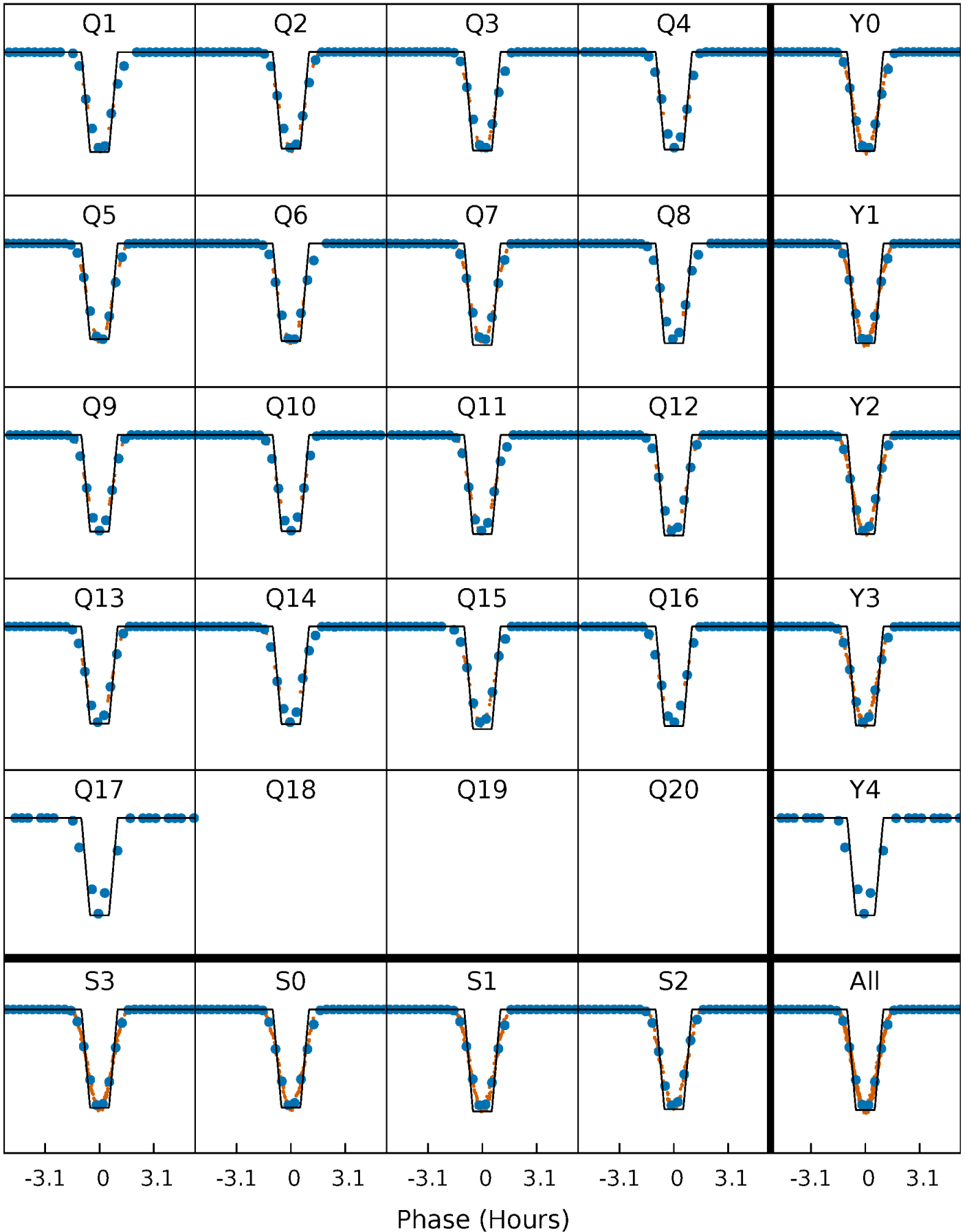
# DV Quarter-Phased Transit Curves

TCE 003102024-02 P= 13.782538 Days  $T_0=135.324935$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

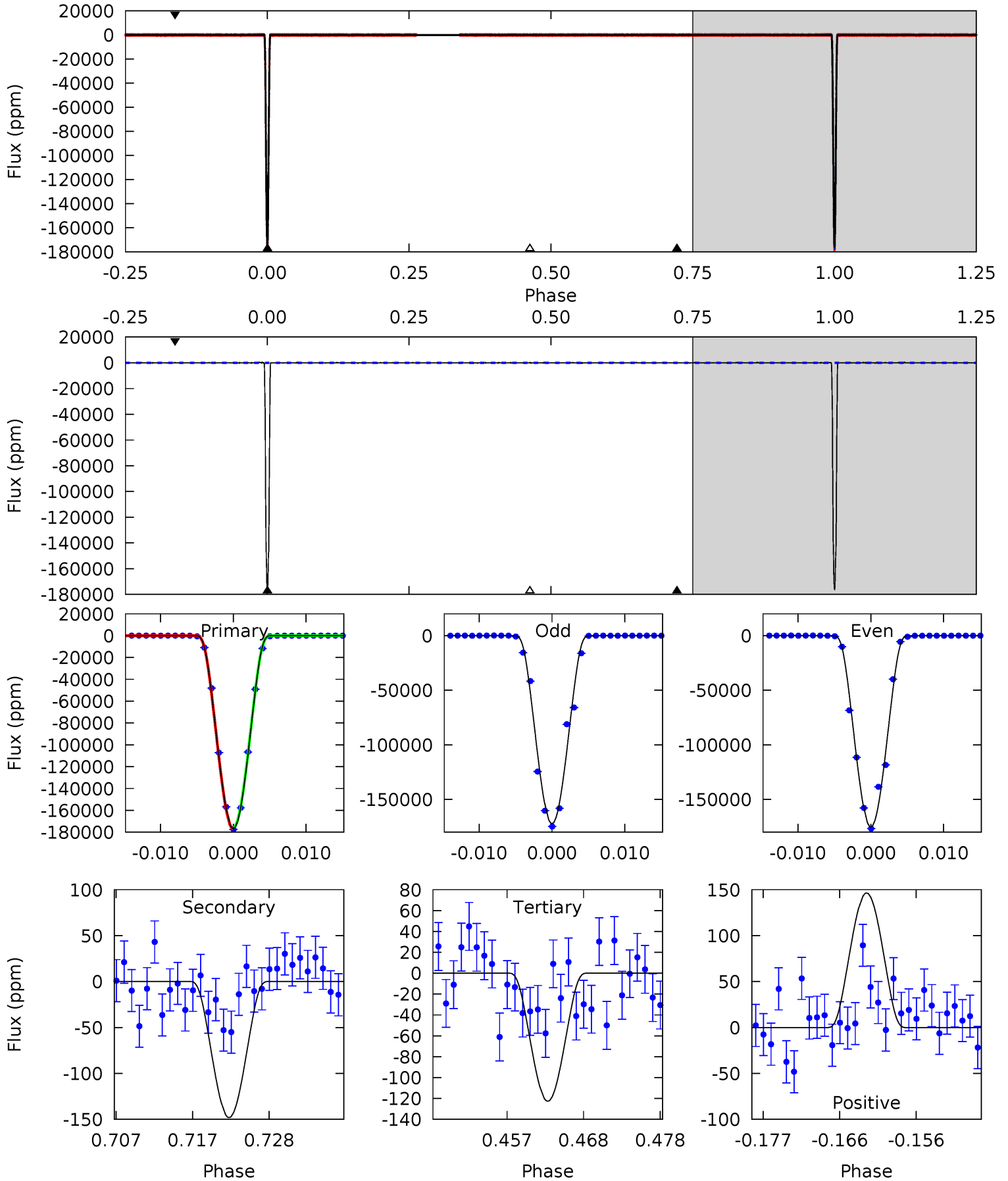
TCE 003102024-02 P= 13.782586 Days  $T_0=135.322152$  (BKJD)



# DV Model-Shift Uniqueness Test

003102024-02, P = 13.782538 Days, E = 121.542397 Days

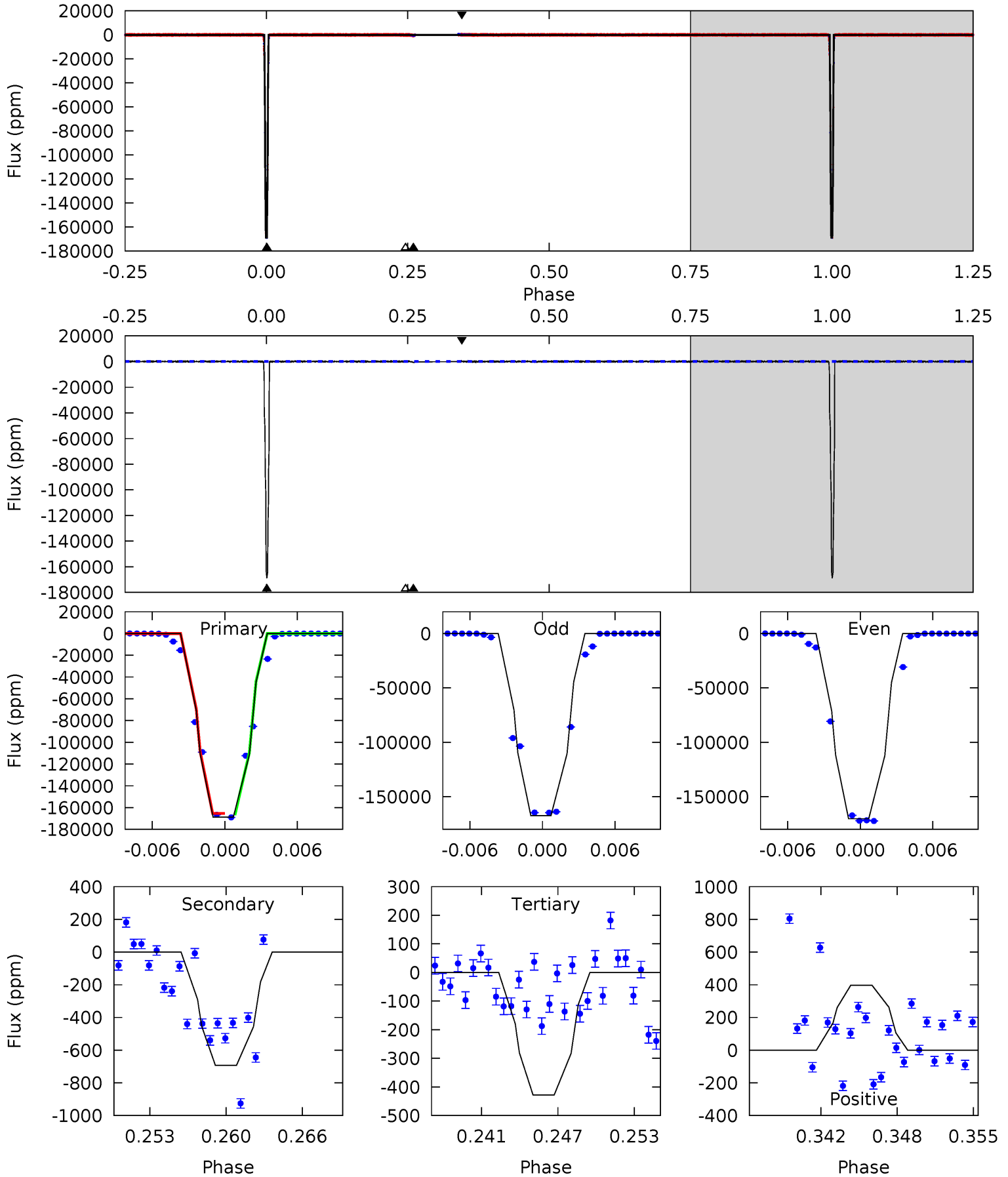
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12082	10.1	8.39	10.0	5.02	2.56	2.58	12074	12072	1.74	0.12	102.2	0.98	0.00	0



# Alt Model-Shift Uniqueness Test

003102024-02, P = 13.782586 Days, E = 121.539566 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
3014	12.4	7.64	7.09	5.11	2.73	1.30	3007	3007	4.73	5.27	35.5	1.00	0.00	4.01





### Stellar Parameters For KIC 003102024

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5246^{+156}_{-156}$	$4.604^{+0.072}_{-0.048}$	$-0.780^{+0.300}_{-0.300}$	$0.668^{+0.064}_{-0.064}$	$0.653^{+0.070}_{-0.032}$	$3.083^{+0.882}_{-0.573}$
	+3%/-3%	+2%/-1%	+38%/-38%	+10%/-10%	+11%/-5%	+29%/-19%
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 003102024-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-148 \pm 15$	$37.46^{+2.60}_{-2.72}$	$843^{+29}_{-32}$	$1708^{+47}_{-56}$	$0.561^{+0.105}_{-0.088}$
Alt.	$-693 \pm 56$	$30.92^{+2.57}_{-2.26}$	$842^{+32}_{-31}$	$2212^{+54}_{-49}$	$3.860^{+0.718}_{-0.613}$

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

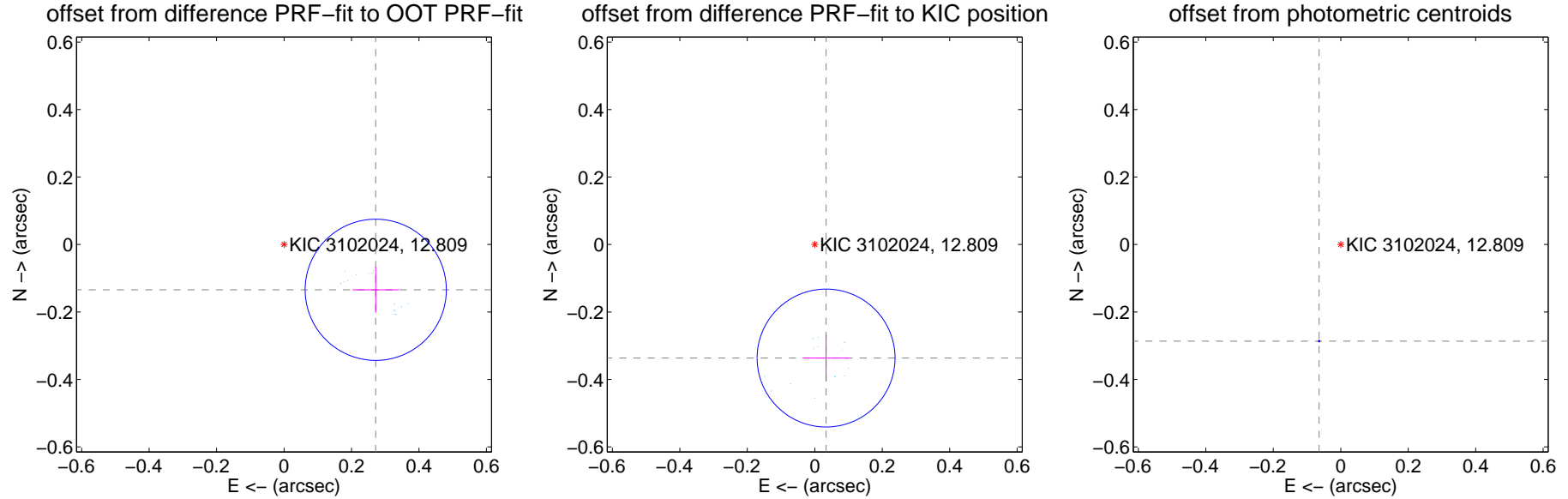
## DV Centroid Data

Supplemental centroid analysis for 003102024-02. Kepler magnitude: 12.81. Transit SNR 5646.35

There are 17 quarters with good PRF difference image offsets

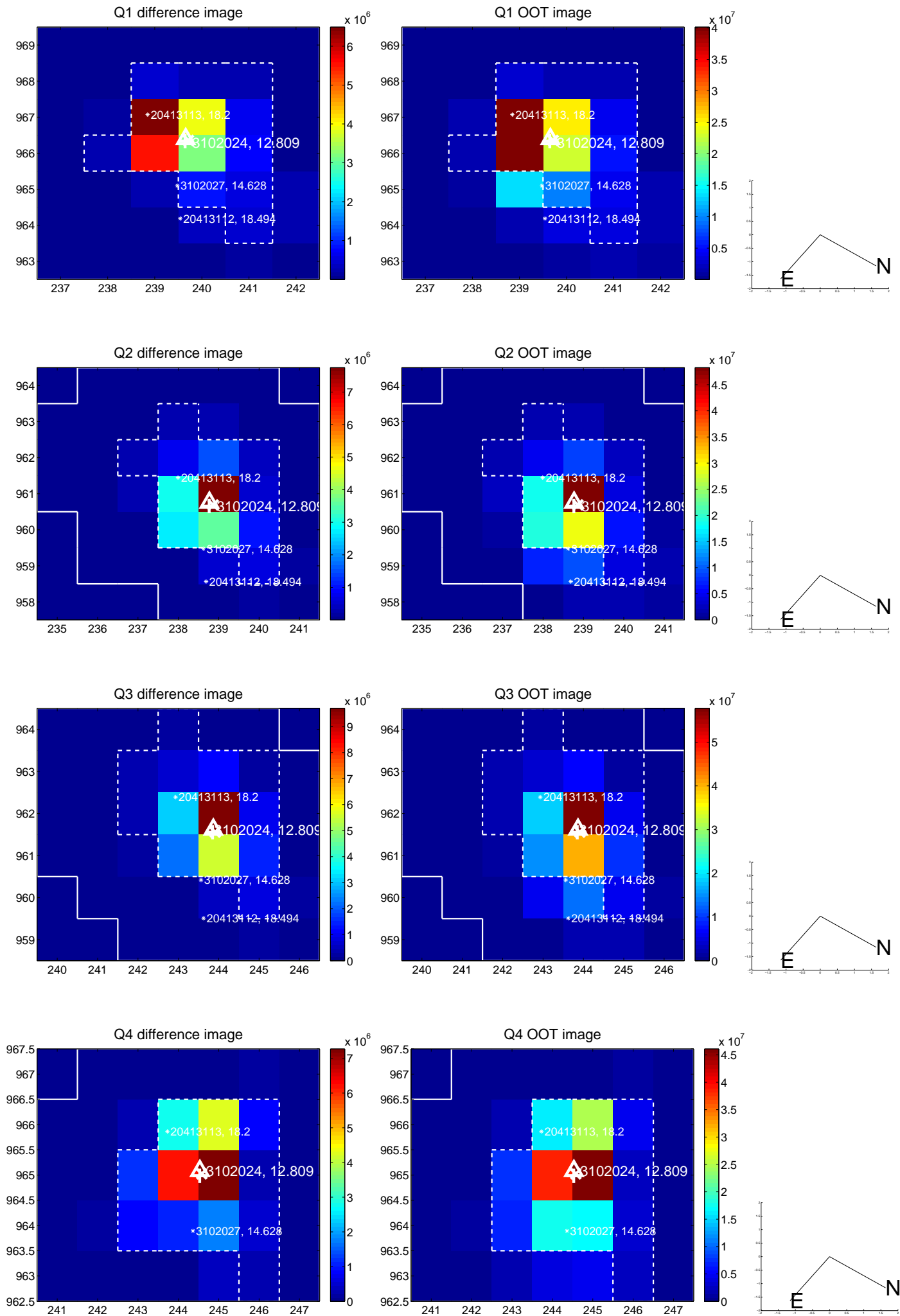
The direct PRF centroid is offset from the target star catalog position by about 0.30 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.303 \pm 0.070$	4.35	$-0.272 \pm 0.069$	$-0.134 \pm 0.068$
PRF-fit source offset from KIC position	$0.338 \pm 0.068$	4.96	$-0.034 \pm 0.069$	$-0.337 \pm 0.068$
photometric centroid source offset	$0.29 \pm 0.00$	353.64	$0.06 \pm 0.00$	$-0.29 \pm 0.00$

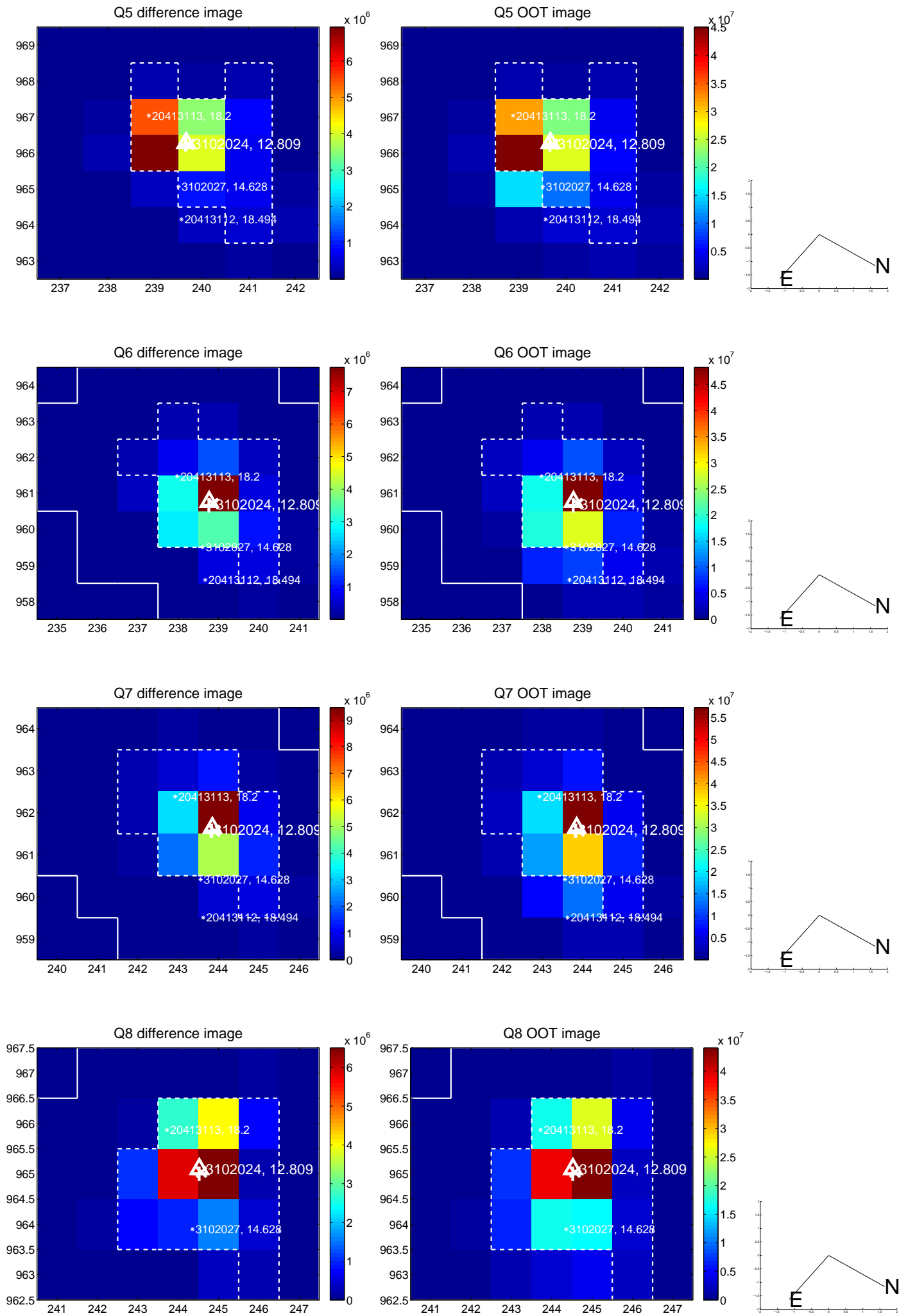


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

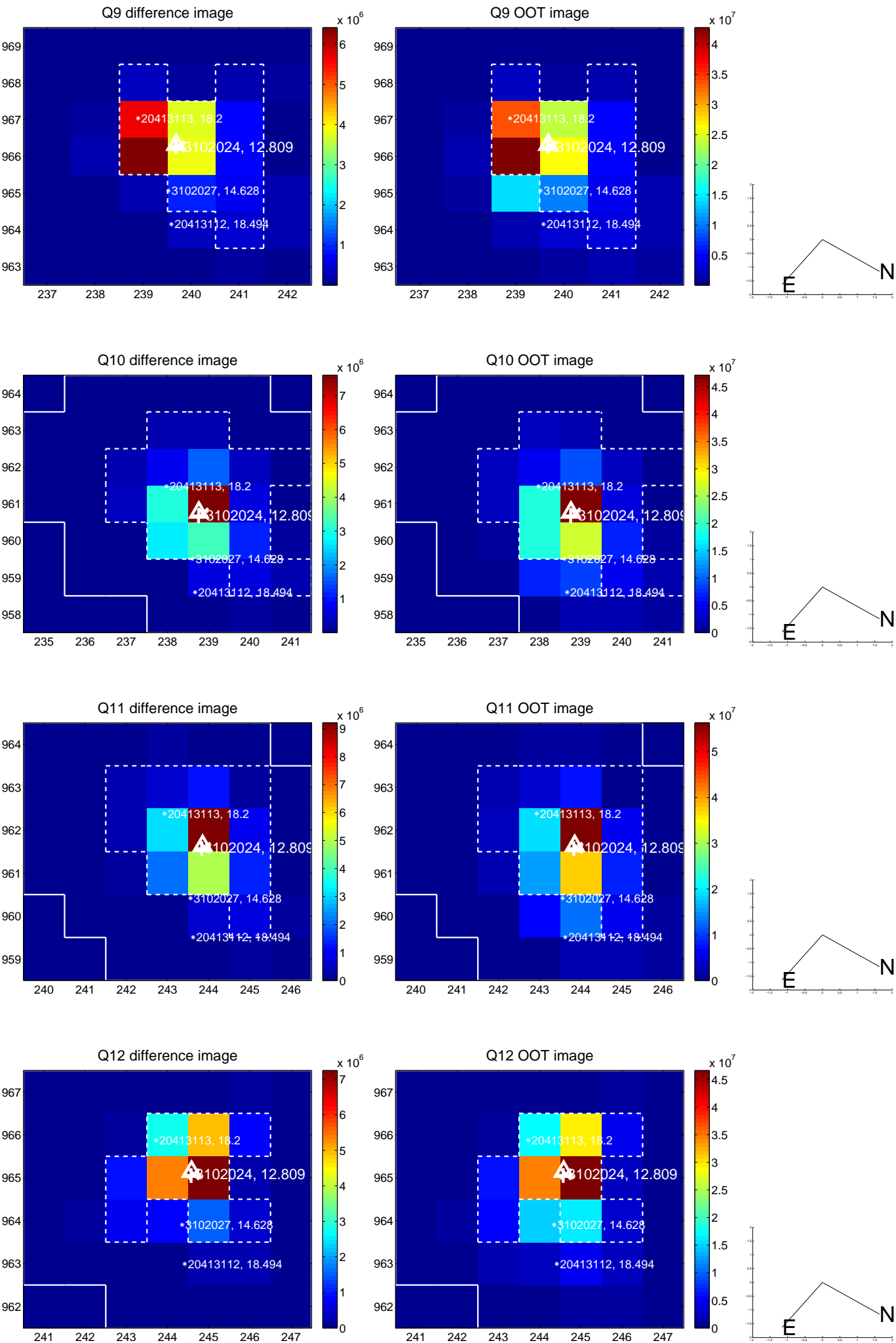
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



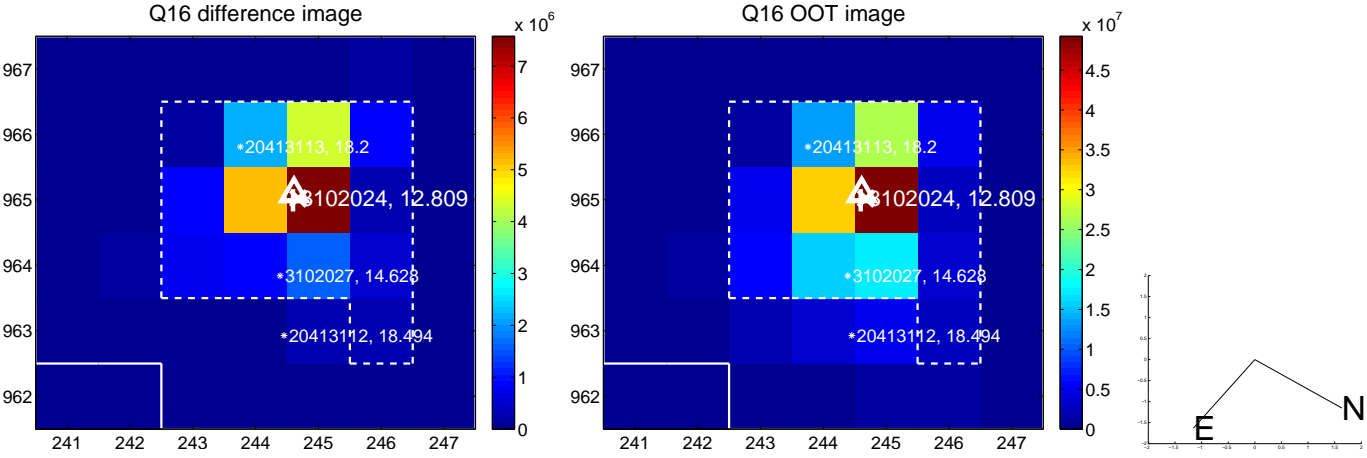
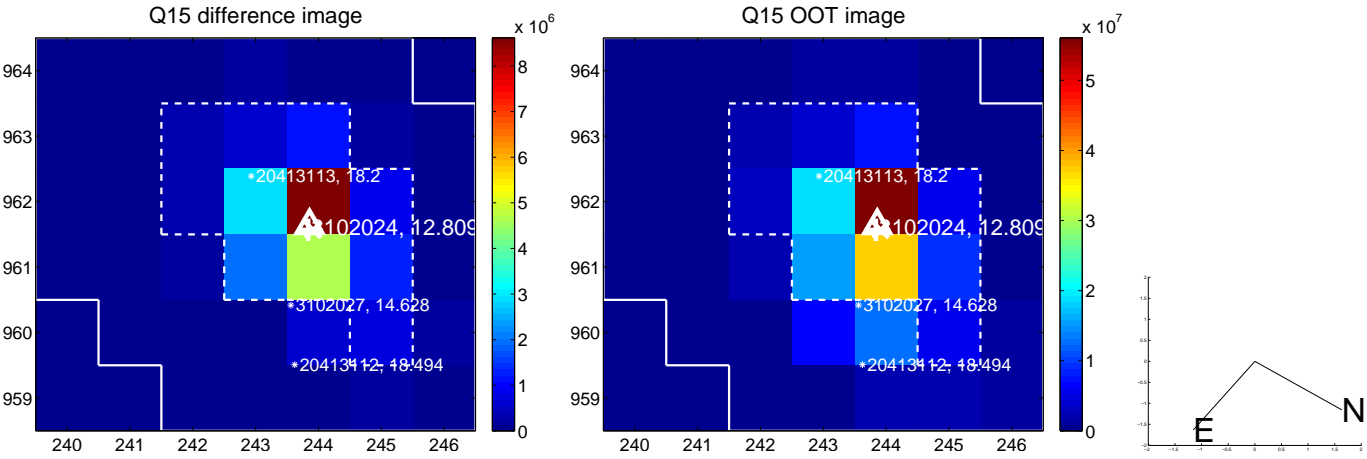
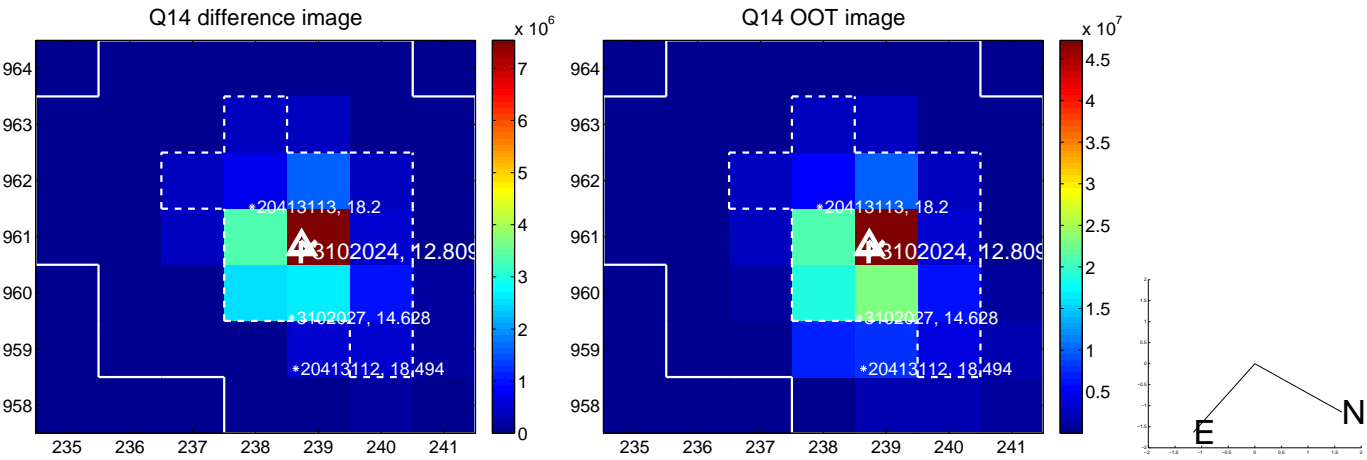
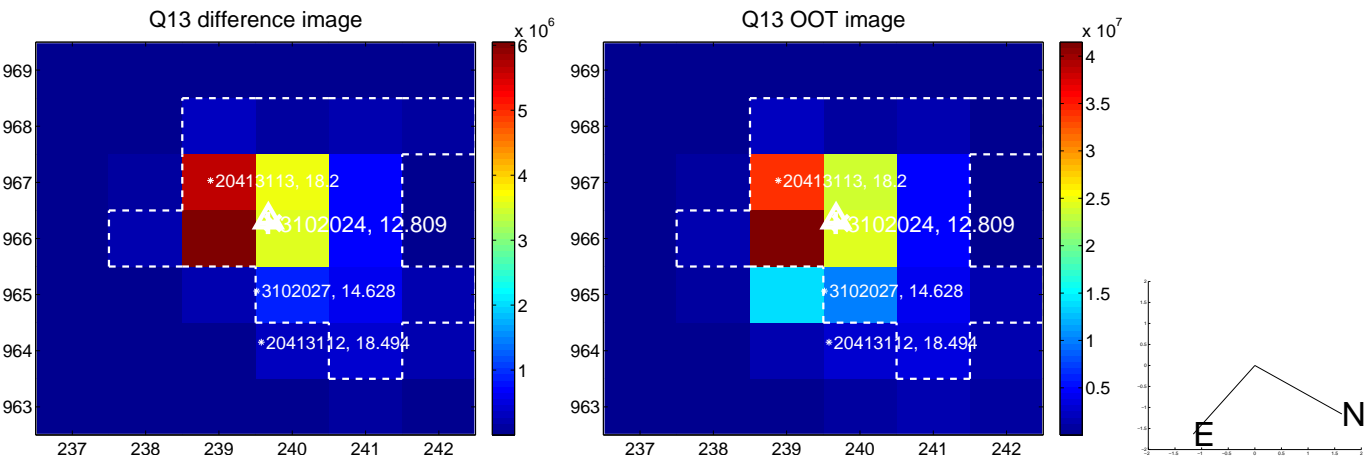
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



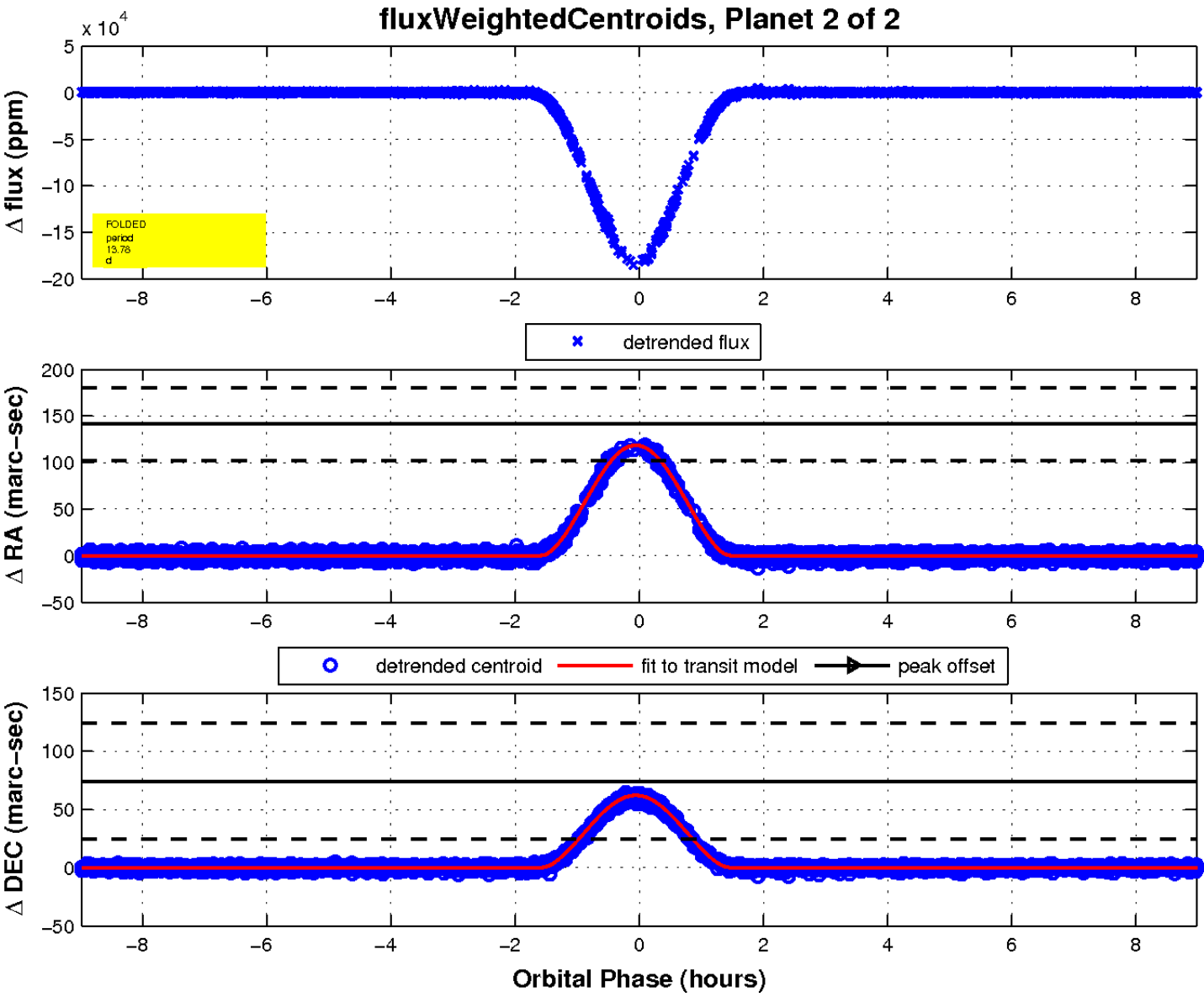
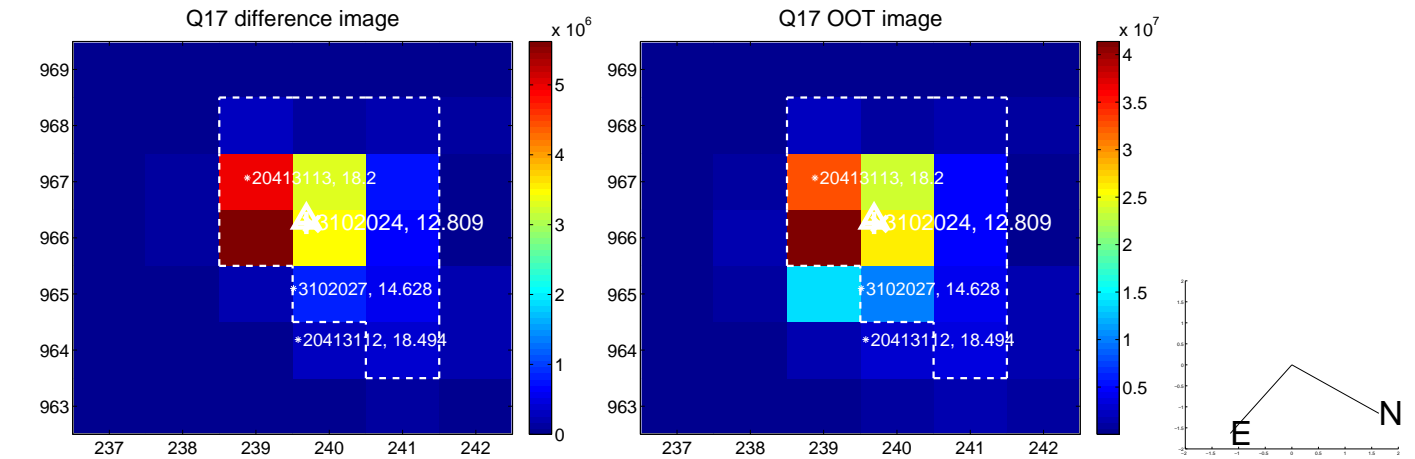
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

