

# KIC 004740676

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004740676-01	OBS	6119.01	3.454242	131.711273	87810.3	4.688	12647.5	10975.1	2.43	6562	75.18	3866.61
004740676-02	OBS	No	1.727106	131.717828	5370.2	4.592	871.8	742.0	2.43	6562	20.33	9743.36

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004740676-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
004740676-02	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.

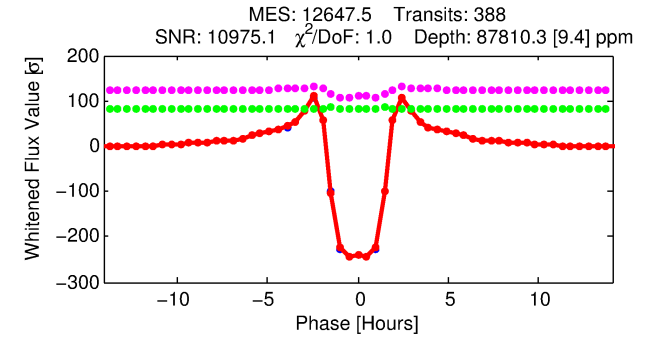
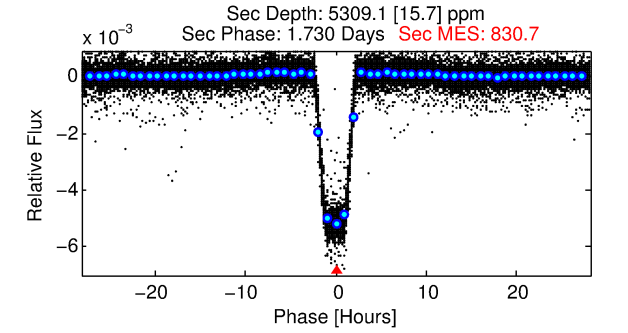
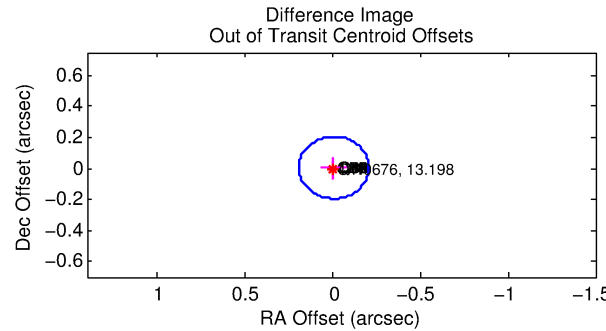
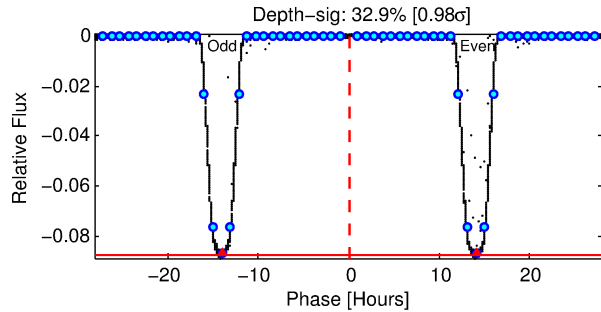
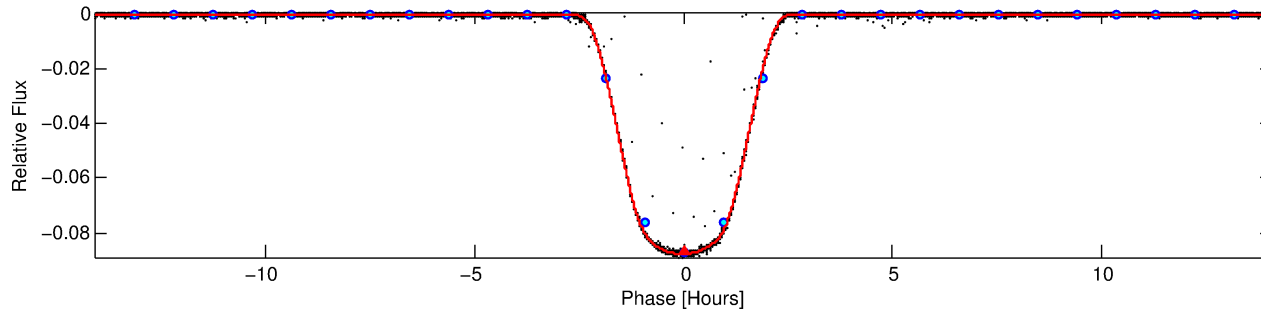
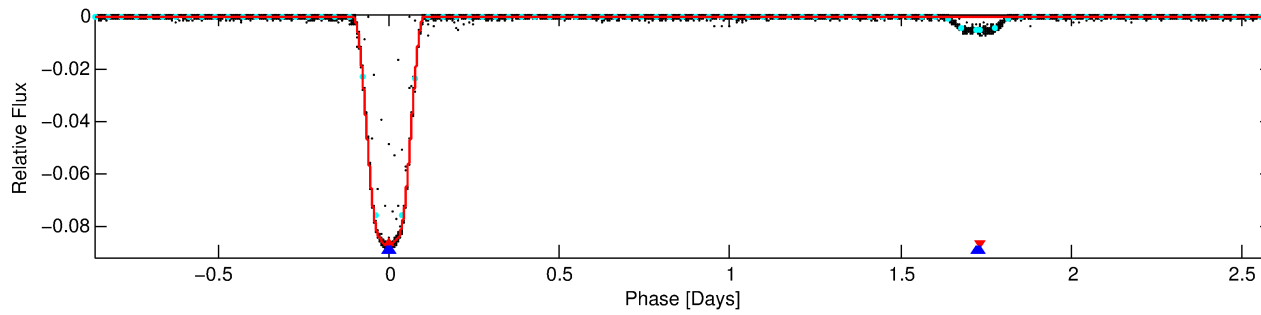
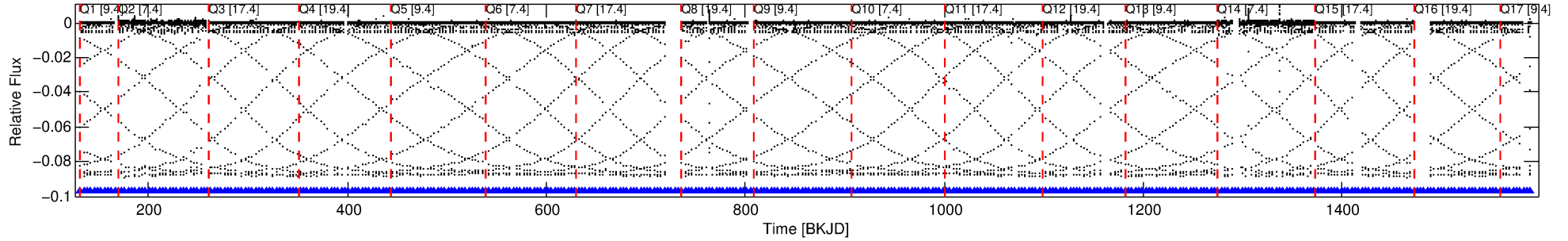
## Ephemeris Match Information For 004740676-01

No Significant Match Found

# DV One-Page Summary

KIC: 4740676 Candidate: 1 of 2 Period: 3.454 d  
KOI: K06119.01 Corr: 1.000

Kp: 13.20 R\*: 2.43 Rs Teff: 6562.0 K Logg: 3.82 Fe/H: -0.140



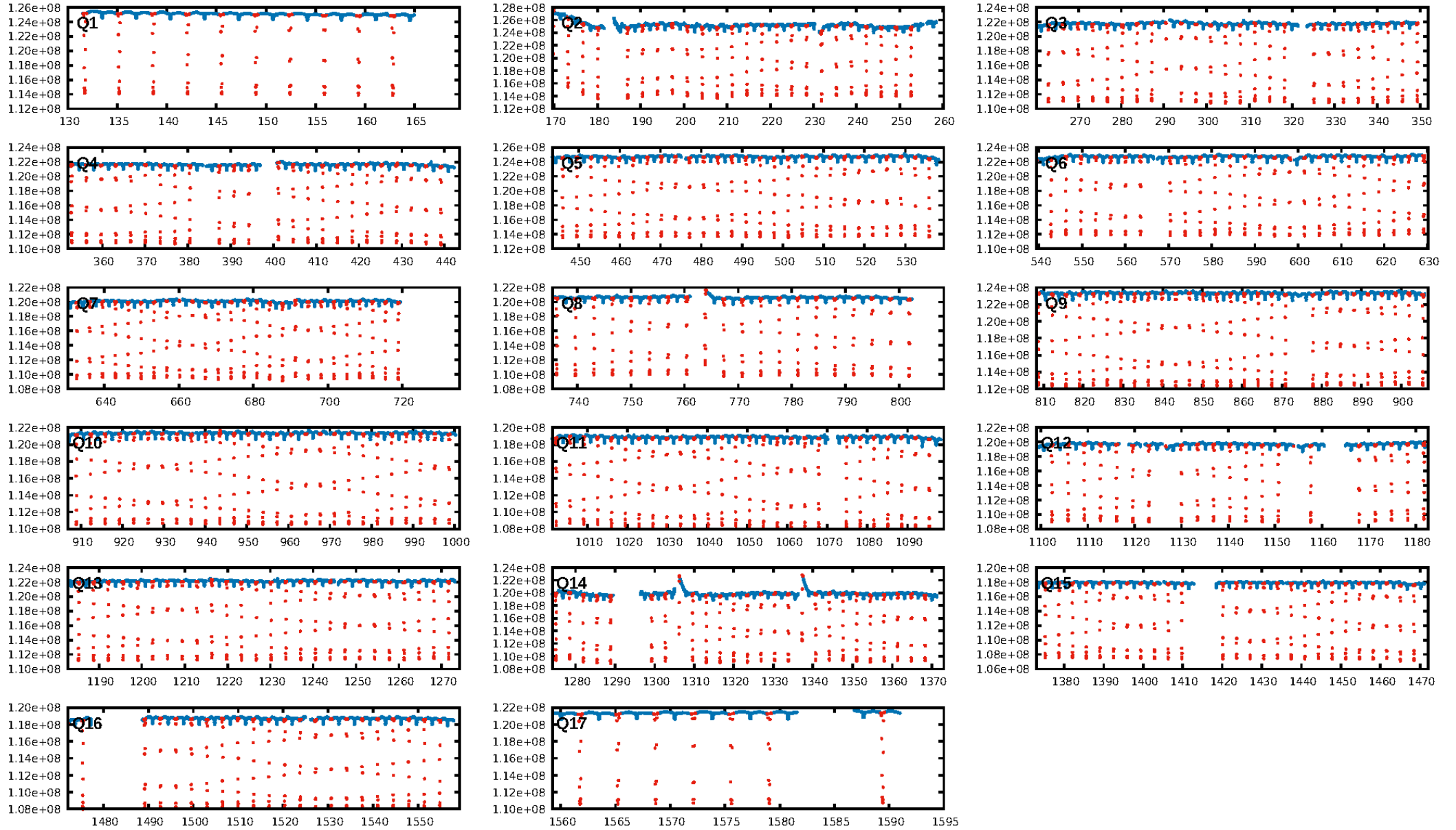
## DV Fit Results:

Period = 3.45424 [0.00000] d  
Epoch = 131.7113 [0.0000] BKJD  
Rp/R\* = 0.2832 [0.0000]  
a/R\* = 6.67 [0.00]  
b = 0.51 [0.00]  
Seff = 3866.61 [2000.84]  
Teff = 2011 [260] K  
Rp = 75.18 [25.89] Re  
a = 0.0504 [0.0162] AU  
Ag = 1.31 [0.66] [0.47σ]  
Teffp = 3329 [99] K [4.74σ]

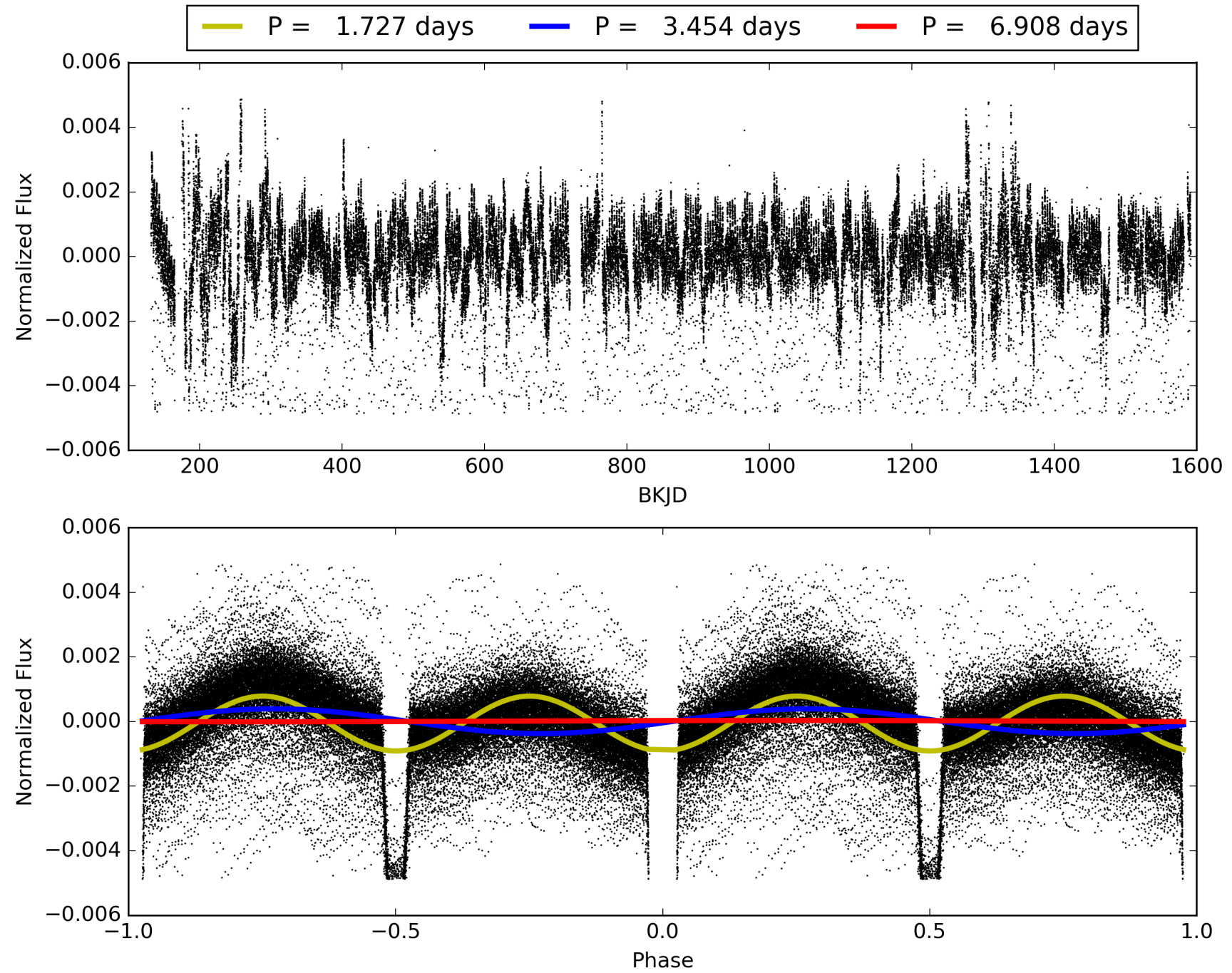
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [6.32σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [371/371]  
GhostDiagnostic-chr: 4.317  
Centroid-sig: 0.0%  
Centroid-so: 0.155 arcsec [246.27σ]  
OotOffset-rm: 0.008 arcsec [0.12σ]  
KicOffset-rm: 0.085 arcsec [1.27σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.00 [0/17]

# TCE 004740676-01, PDC Light Curves

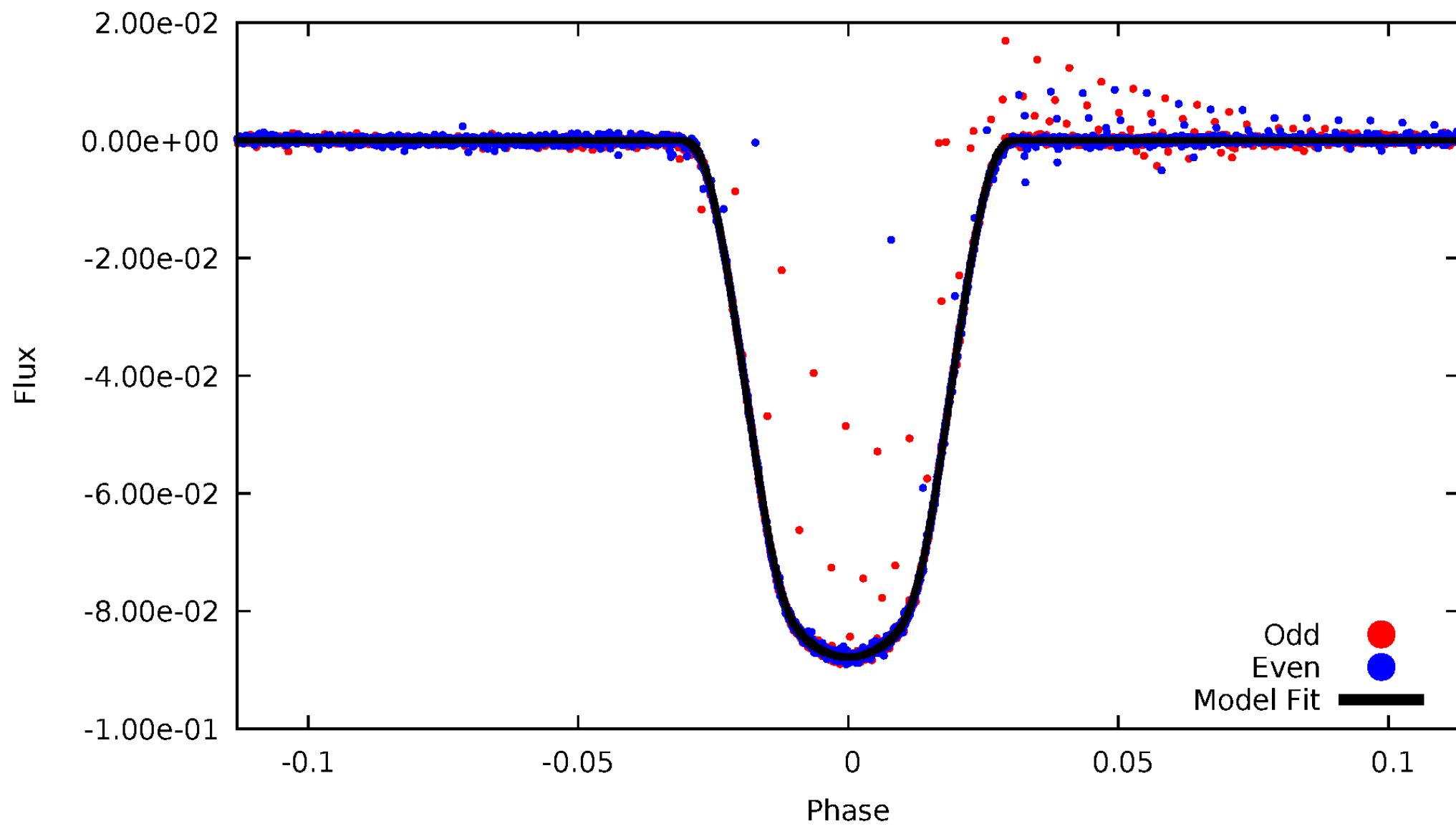


TCE 004740676-01



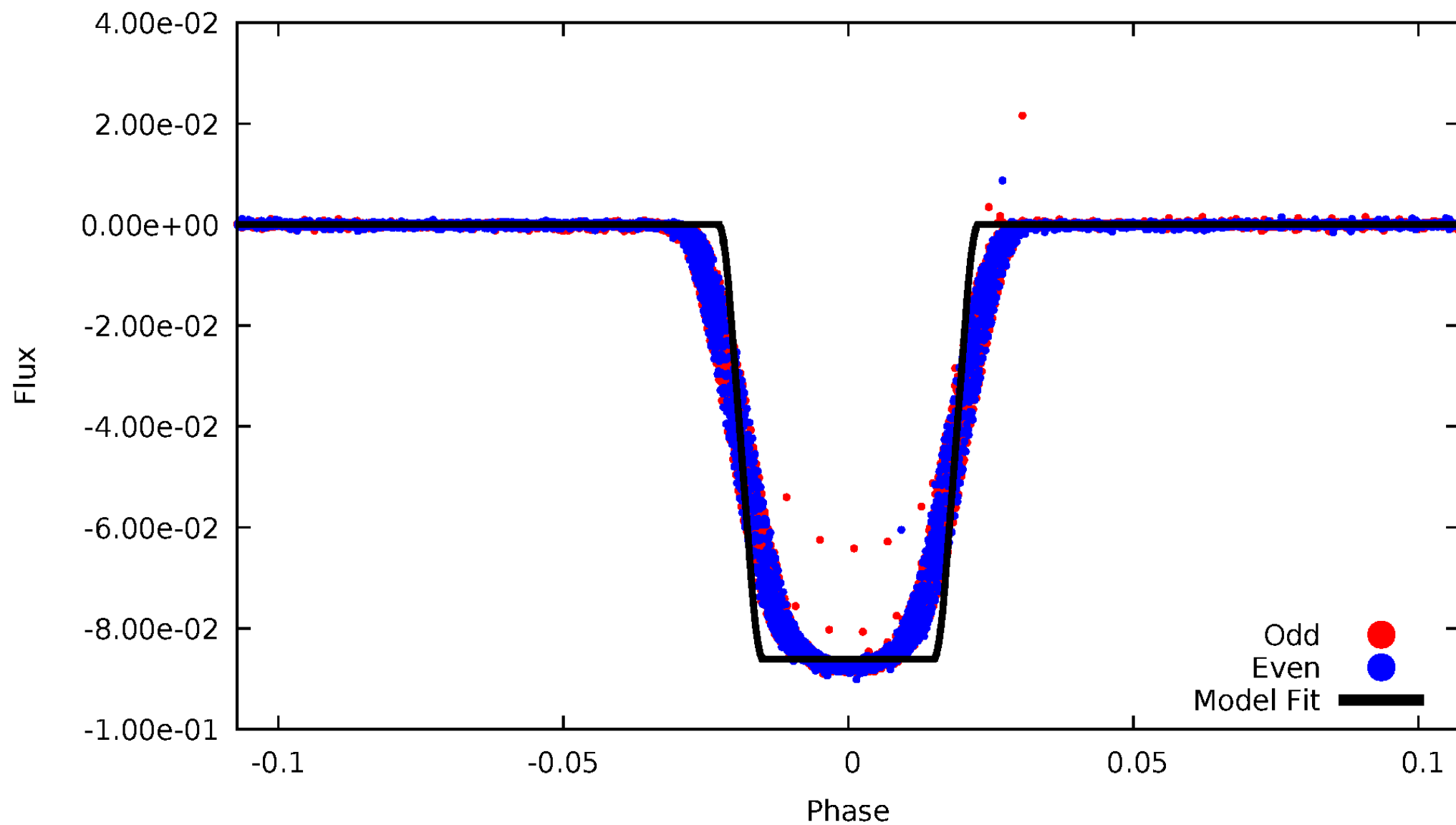
# DV Odd/Even

TCE 004740676-01



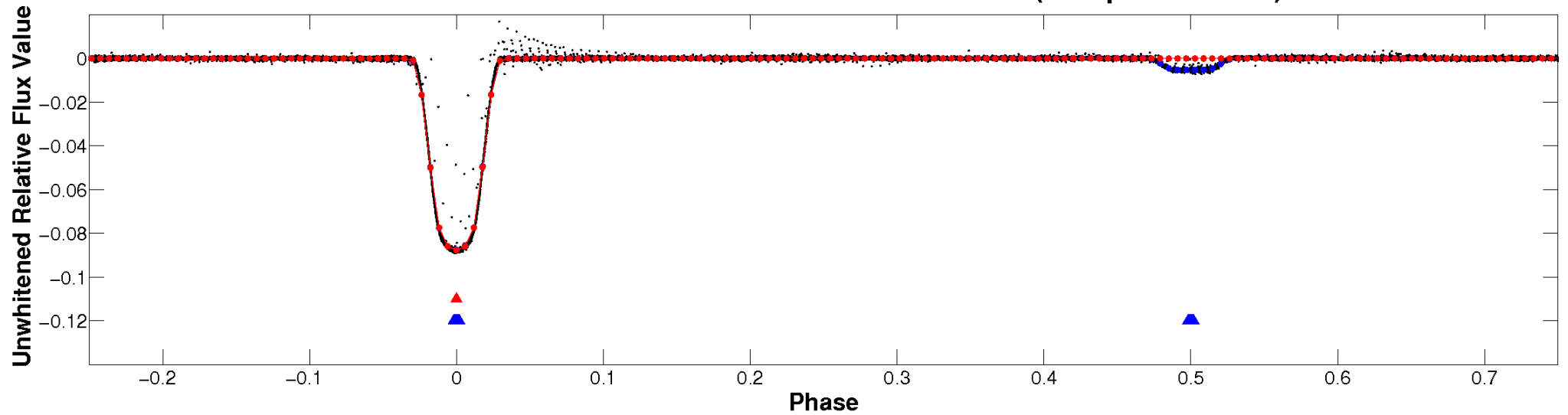
# ALT Odd/Even

TCE 004740676-01

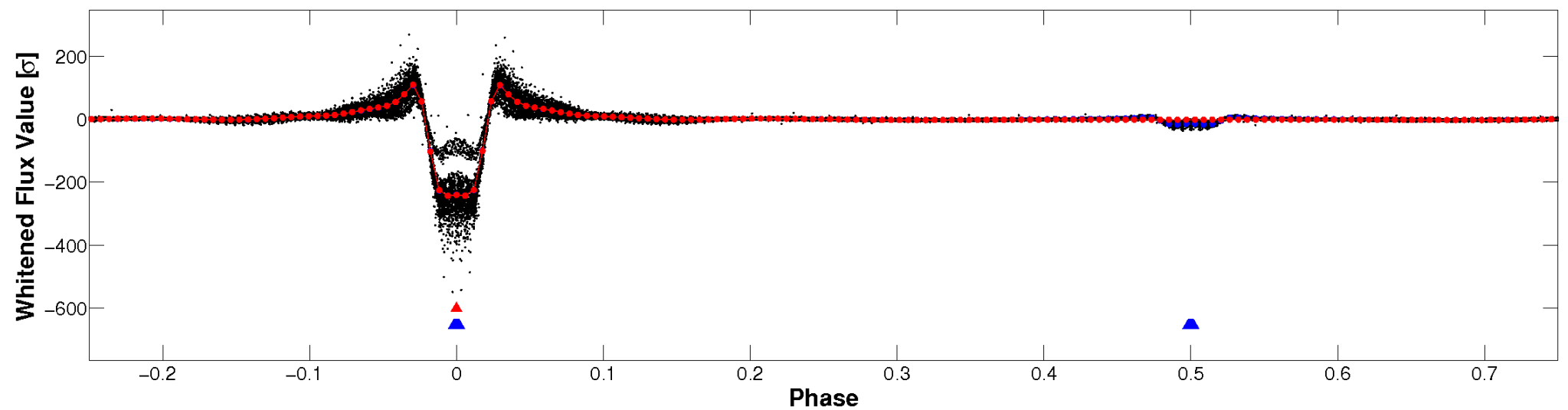


# Non-Whitened Vs. Whitened Light Curve

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

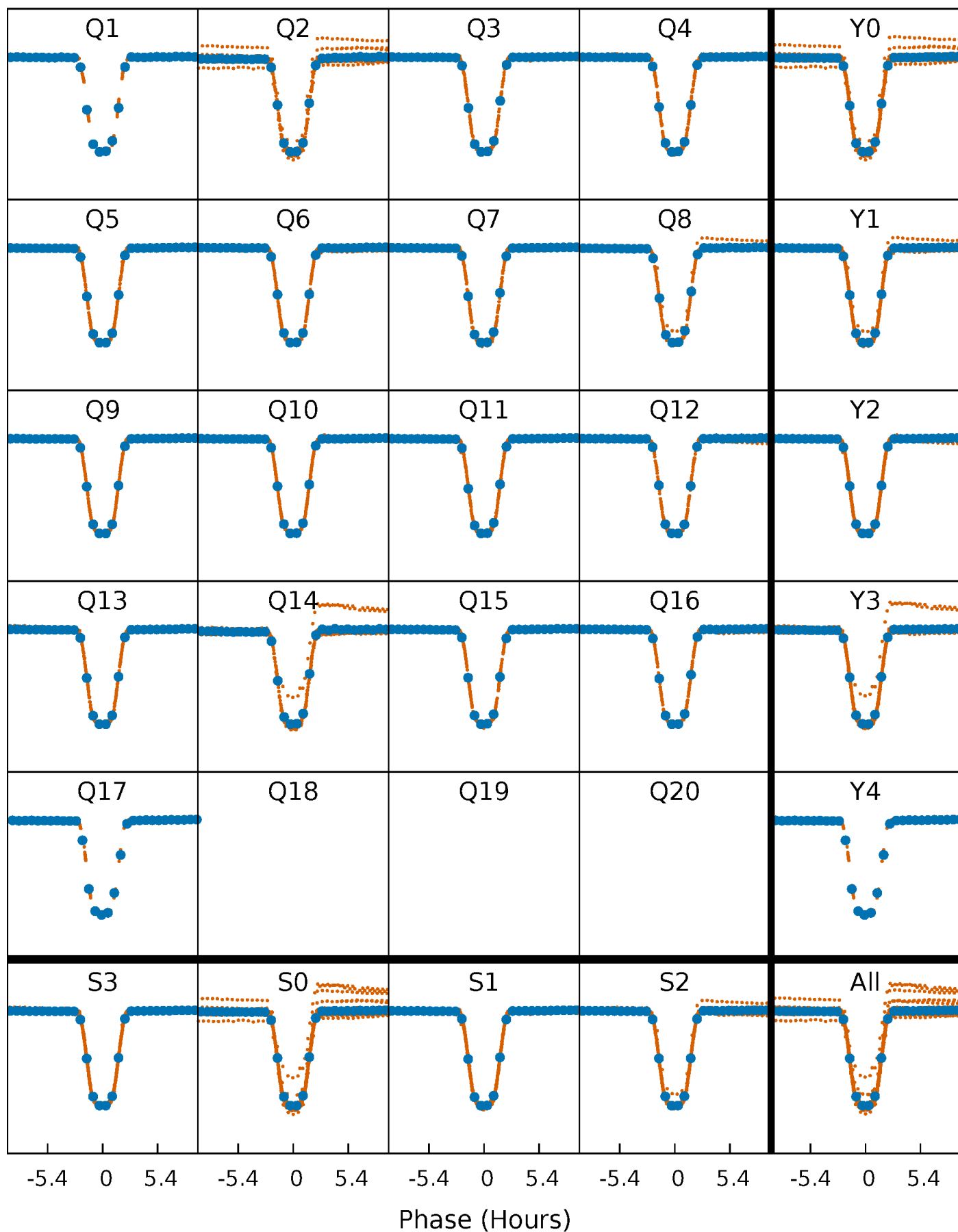


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

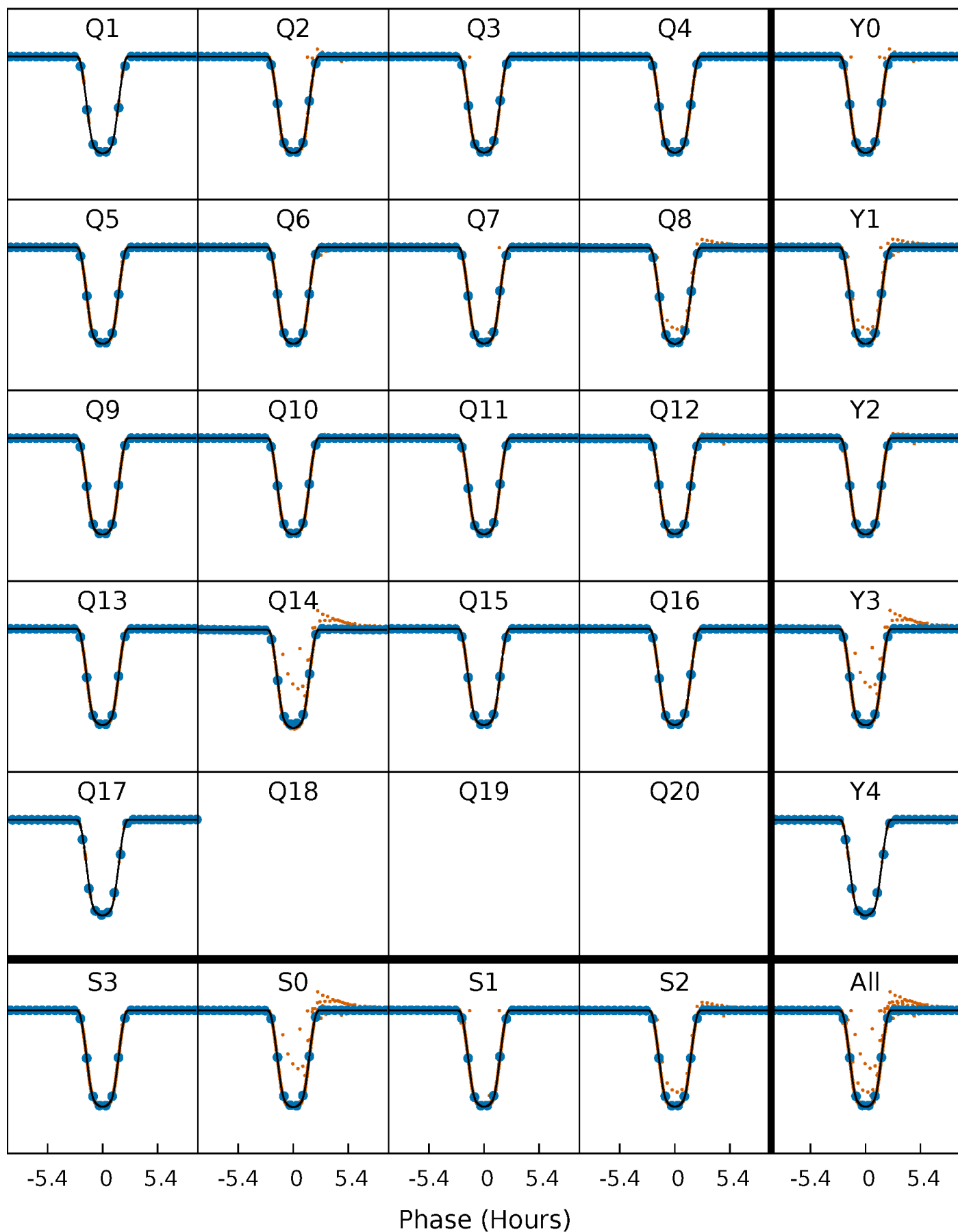
TCE 004740676-01 P= 3.454242 Days  $T_0=131.711273$  (BKJD)





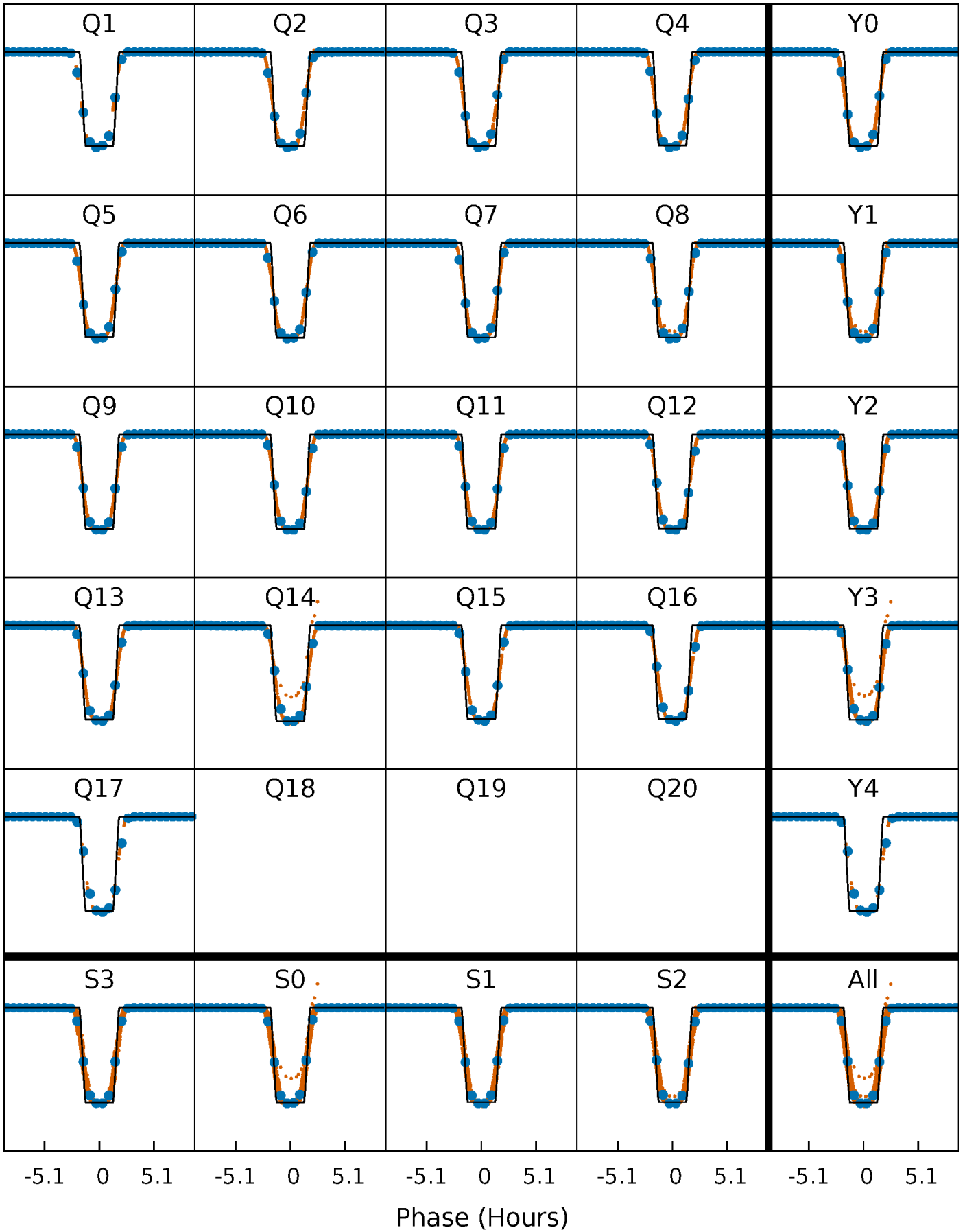
# DV Quarter-Phased Transit Curves

TCE 004740676-01 P= 3.454242 Days  $T_0=131.711273$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

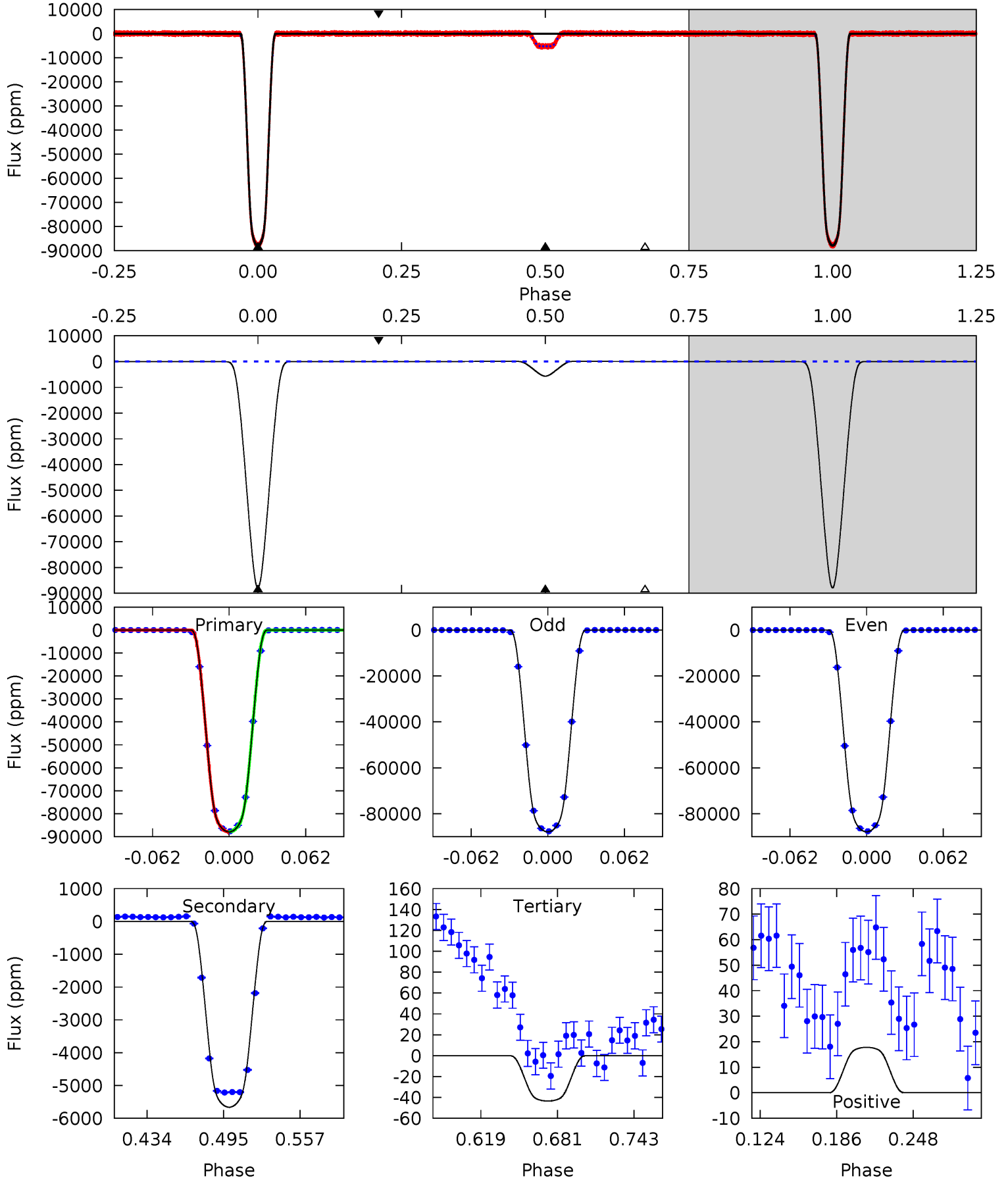
TCE 004740676-01   P= 3.454207 Days    $T_0=131.718382$  (BKJD)



# DV Model-Shift Uniqueness Test

004740676-01, P = 3.454242 Days, E = 128.257031 Days

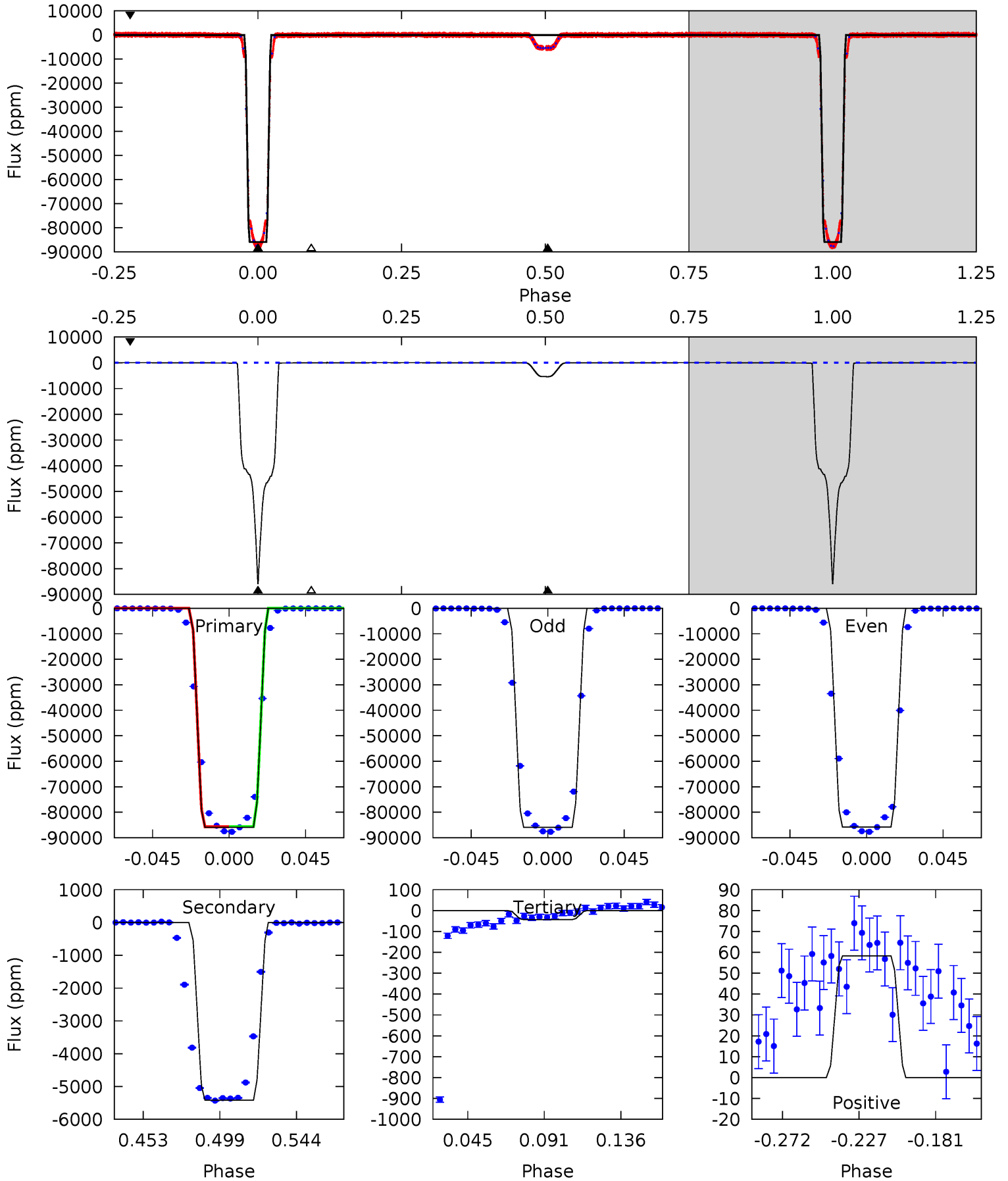
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
22189	1429	11.0	4.50	4.66	1.87	11.0	22178	22185	1418	1425	2.29	0.99	0.00	6.93



# Alt Model-Shift Uniqueness Test

004740676-01, P = 3.454207 Days, E = 128.264175 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
12948	817.2	6.56	8.78	4.73	2.00	5.05	12942	12940	810.6	808.4	8.51	1.00	0.00	0



### Stellar Parameters For KIC 004740676

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6562^{+176}_{-195}$	$3.822^{+0.292}_{-0.097}$	$-0.140^{+0.300}_{-0.250}$	$2.433^{+0.516}_{-0.838}$	$1.435^{+0.222}_{-0.272}$	$0.140^{+0.261}_{-0.044}$
	+3%/-3%	+8%/-3%	+214%/-179%	+21%/-34%	+15%/-19%	+186%/-31%
Source	PHO1	FLK73	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 004740676-01 / KOI 6119.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-5662 \pm 4$	$72.97^{+9.49}_{-12.93}$	$2739^{+171}_{-220}$	$3634^{+79}_{-76}$	$1.516^{+0.644}_{-0.286}$
Alt.	$-5419 \pm 7$	$75.54^{+9.13}_{-13.26}$	$2751^{+161}_{-248}$	$3558^{+76}_{-79}$	$1.351^{+0.578}_{-0.236}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature  
 $T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )  
 $A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$

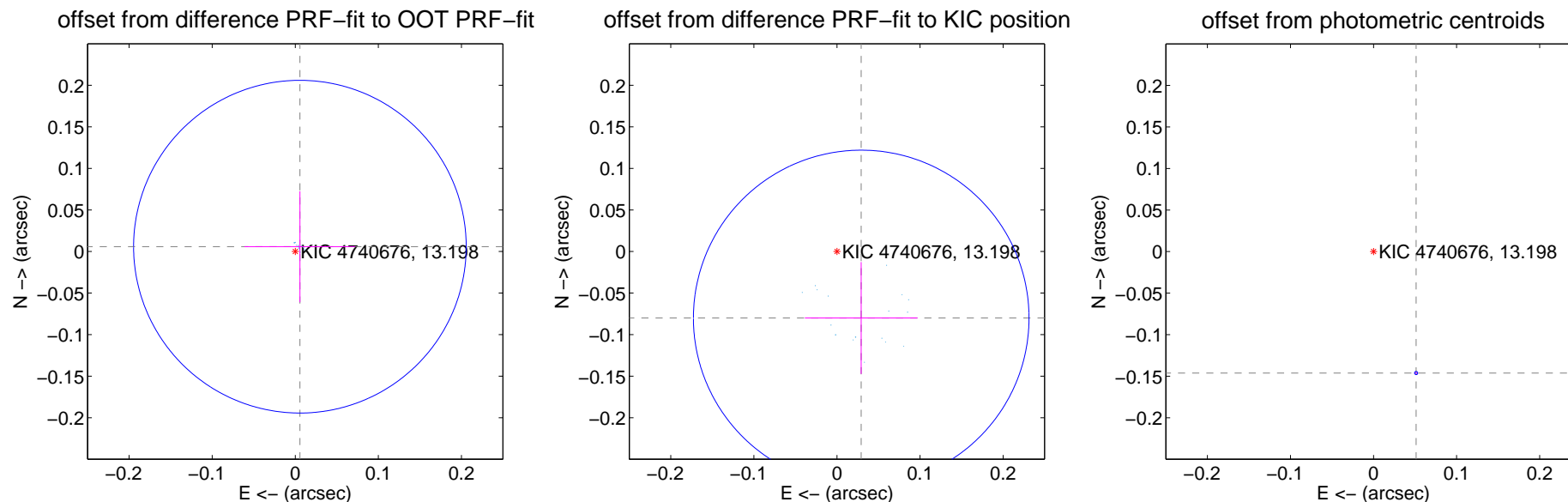
## DV Centroid Data

Supplemental centroid analysis for 004740676-01. Kepler magnitude: 13.20. Transit SNR 10975.12

There are 17 quarters with good PRF difference image offsets

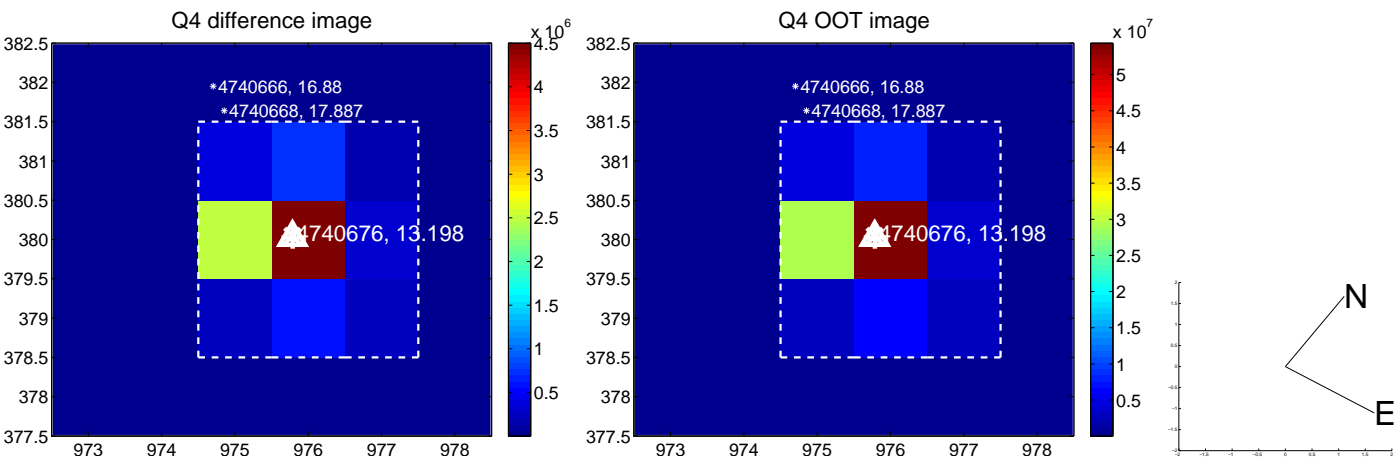
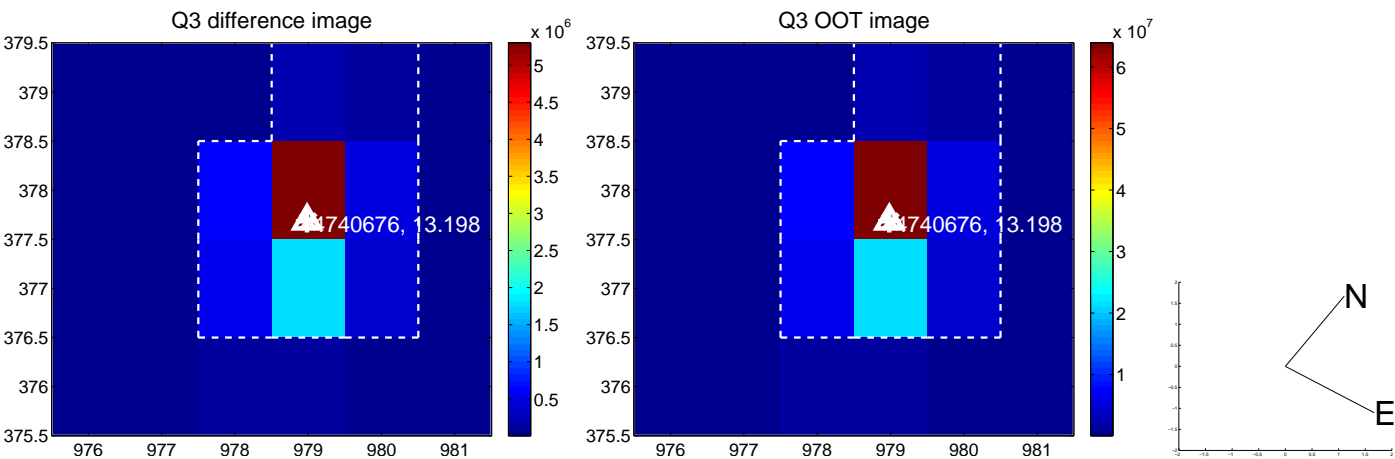
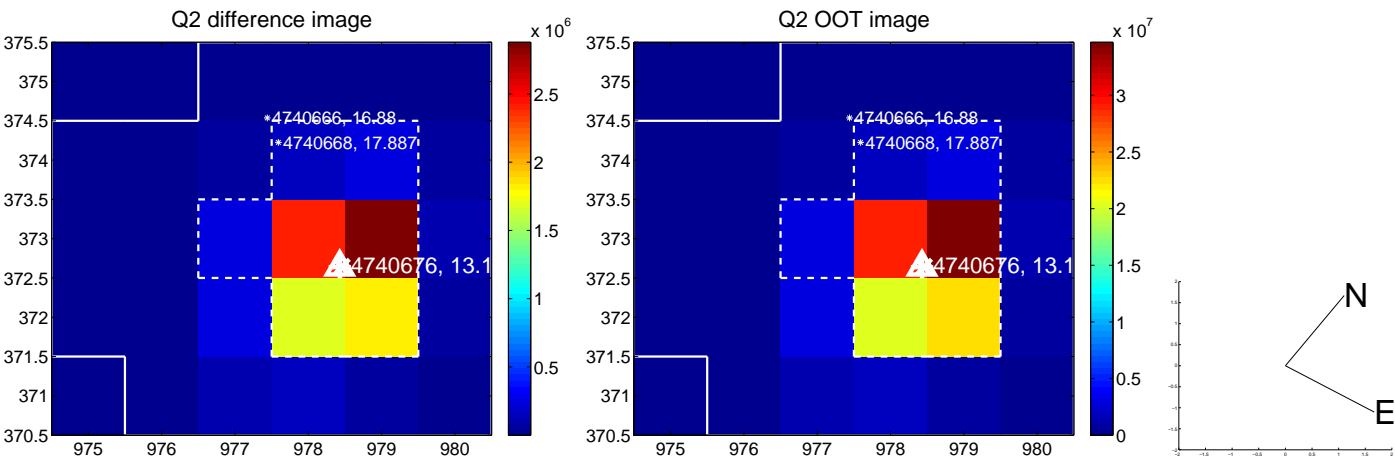
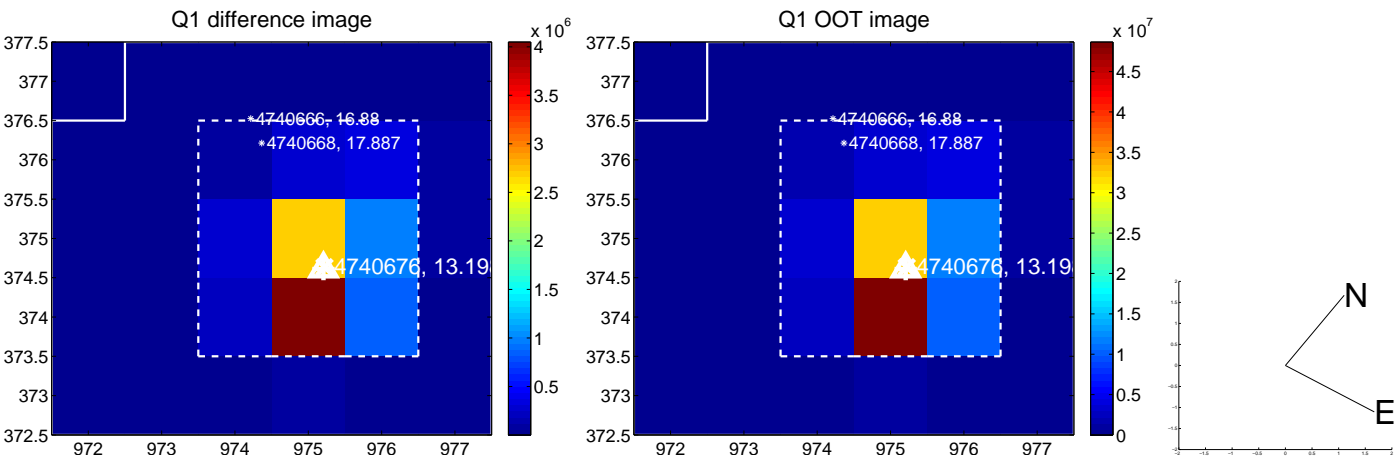
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.008 \pm 0.067$	0.12	$-0.006 \pm 0.067$	$0.006 \pm 0.067$
PRF-fit source offset from KIC position	$0.085 \pm 0.067$	1.27	$-0.029 \pm 0.068$	$-0.080 \pm 0.067$
photometric centroid source offset	$0.15 \pm 0.00$	<b>246.27</b>	$-0.05 \pm 0.00$	$-0.15 \pm 0.00$

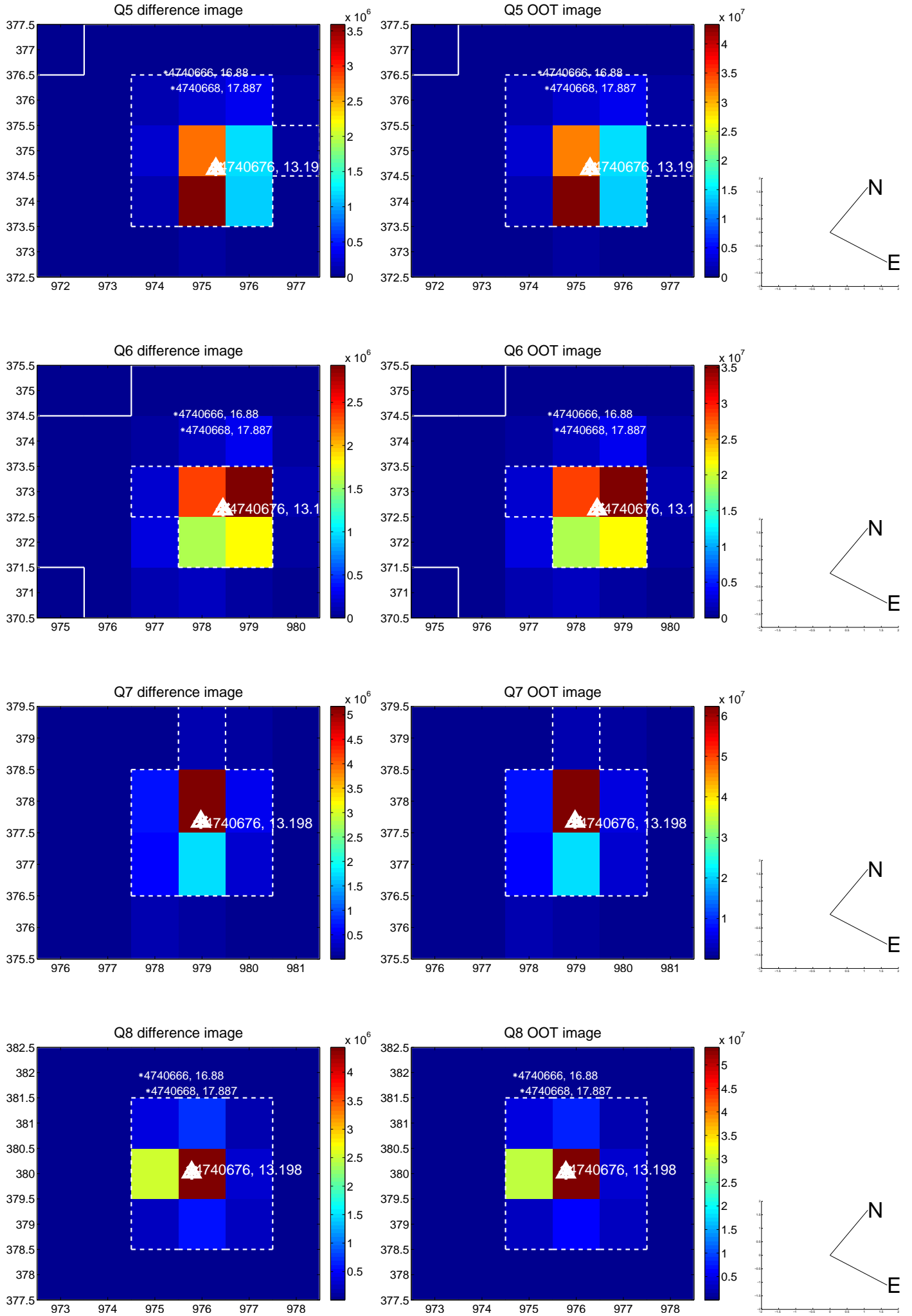


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

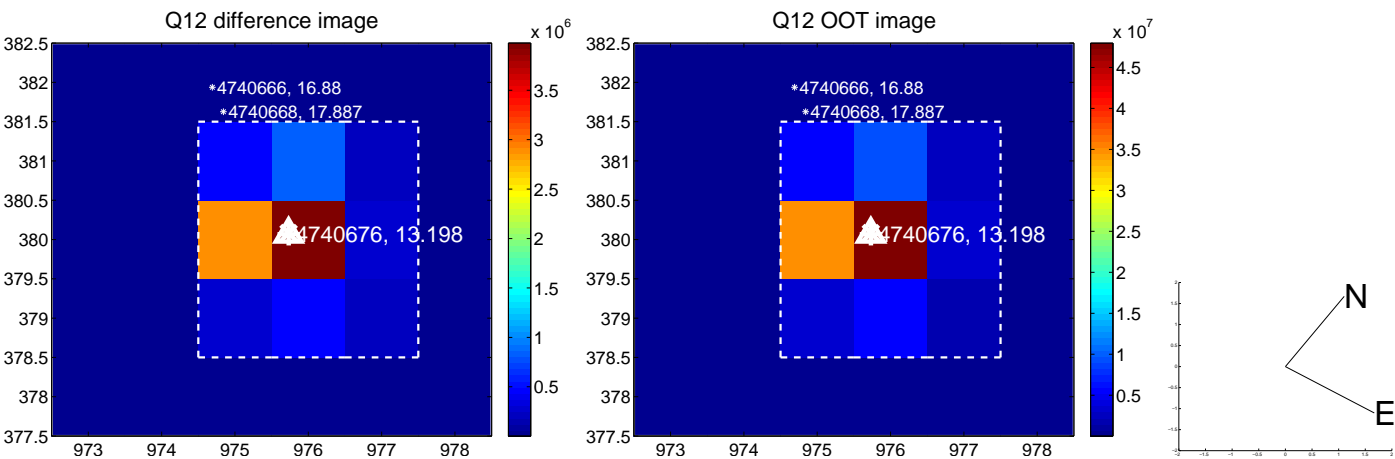
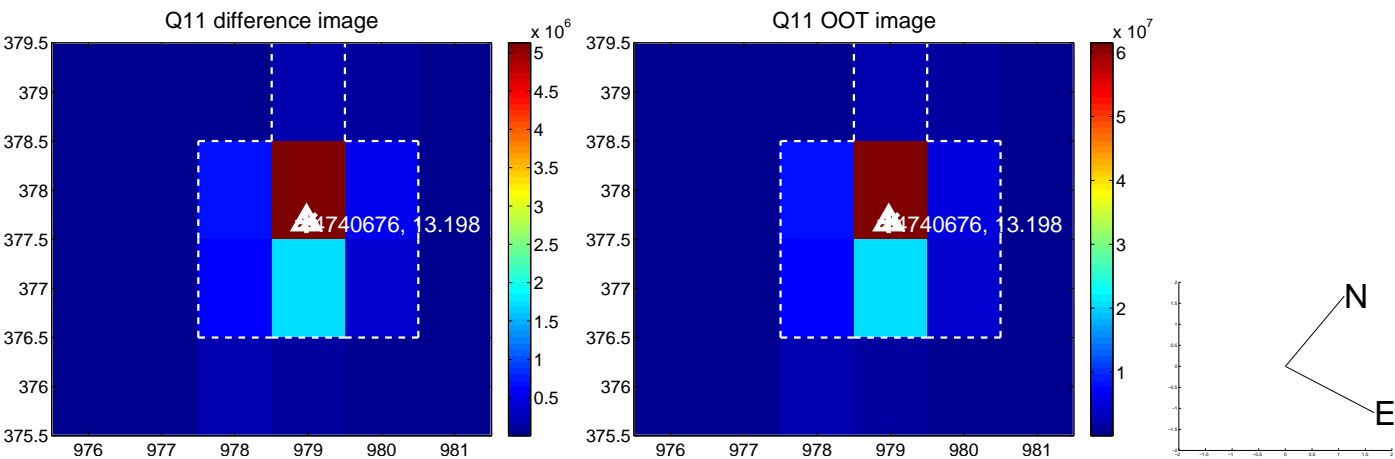
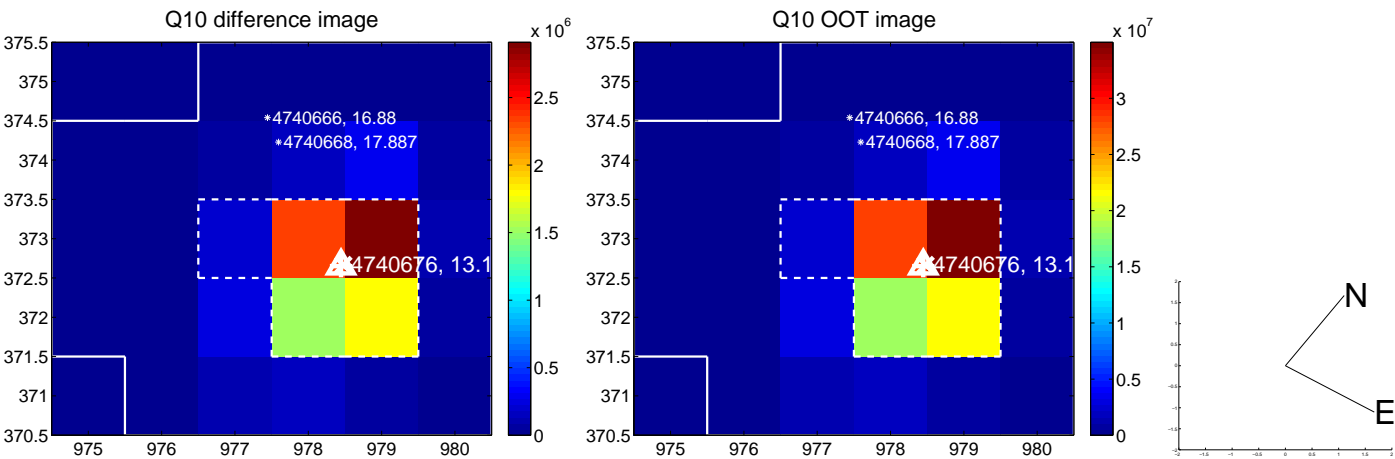
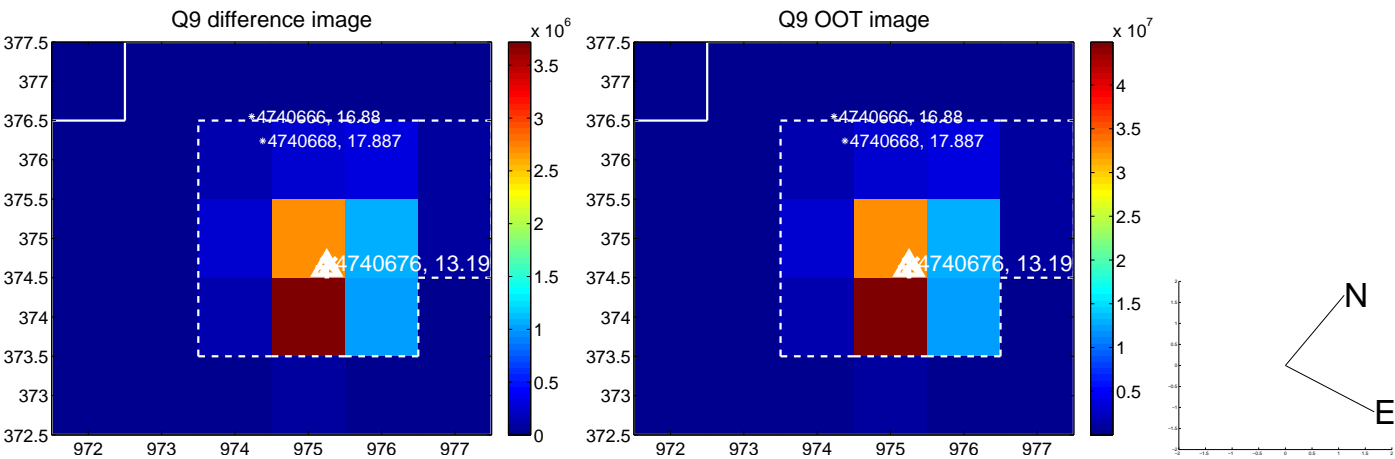


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

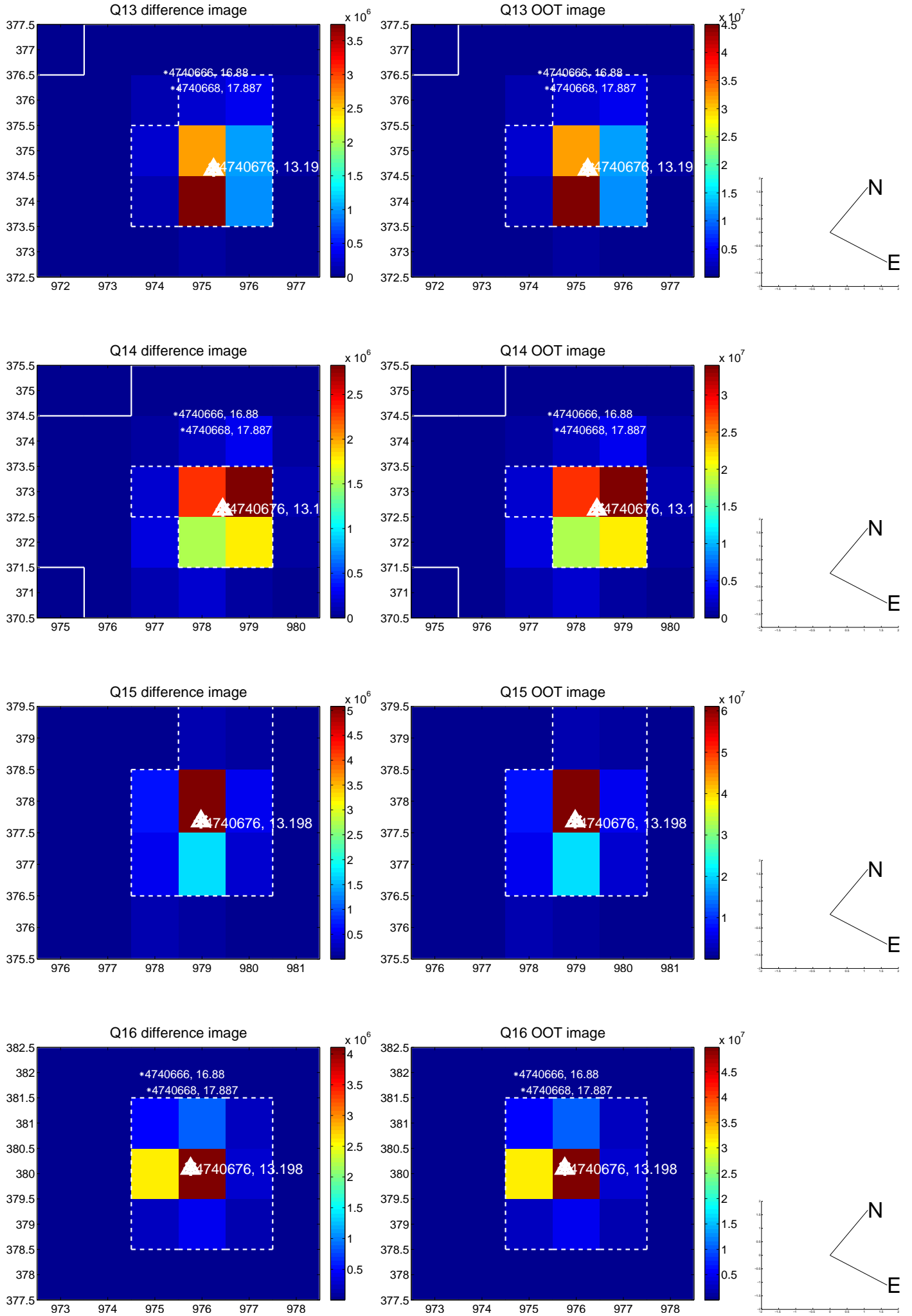




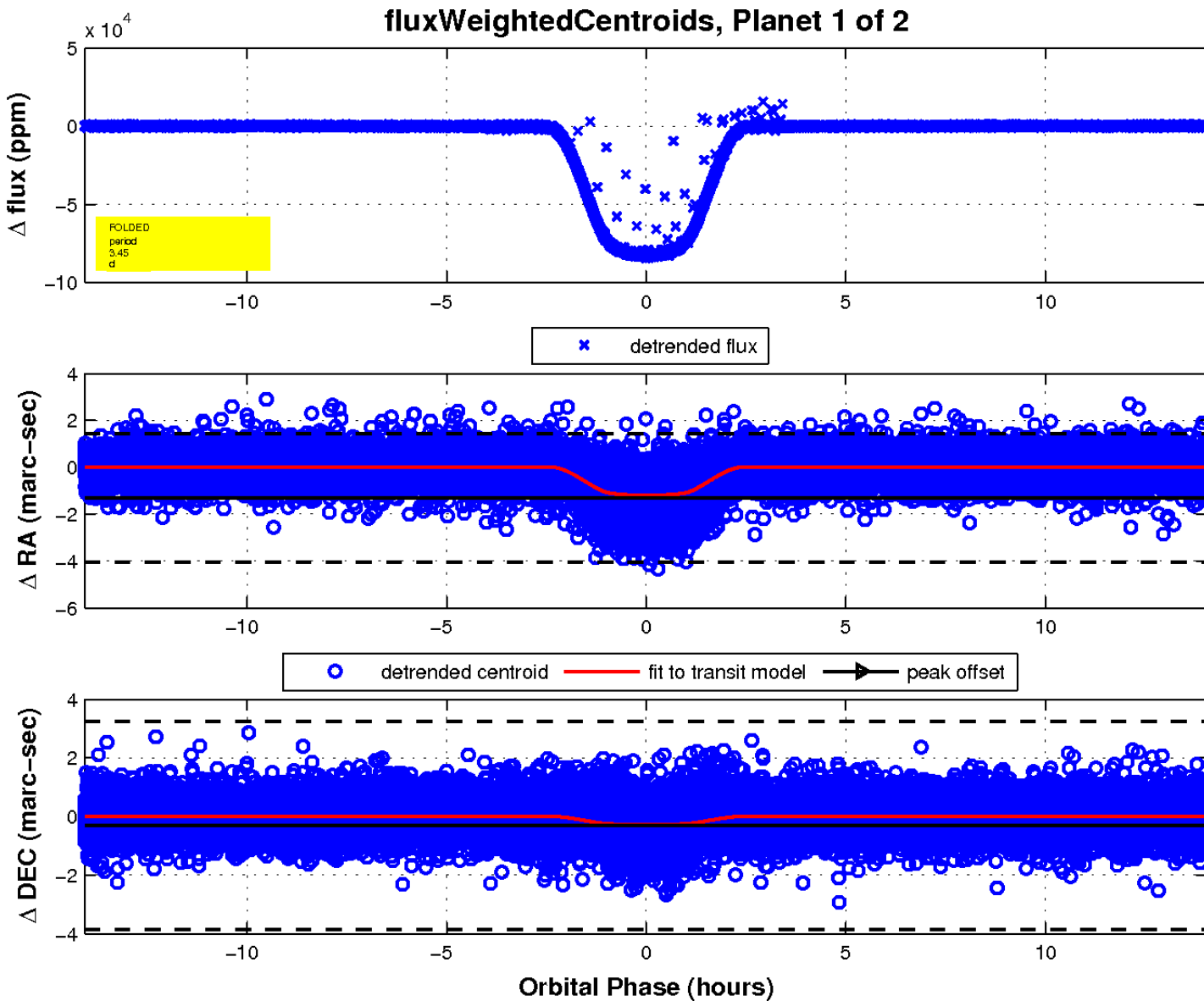
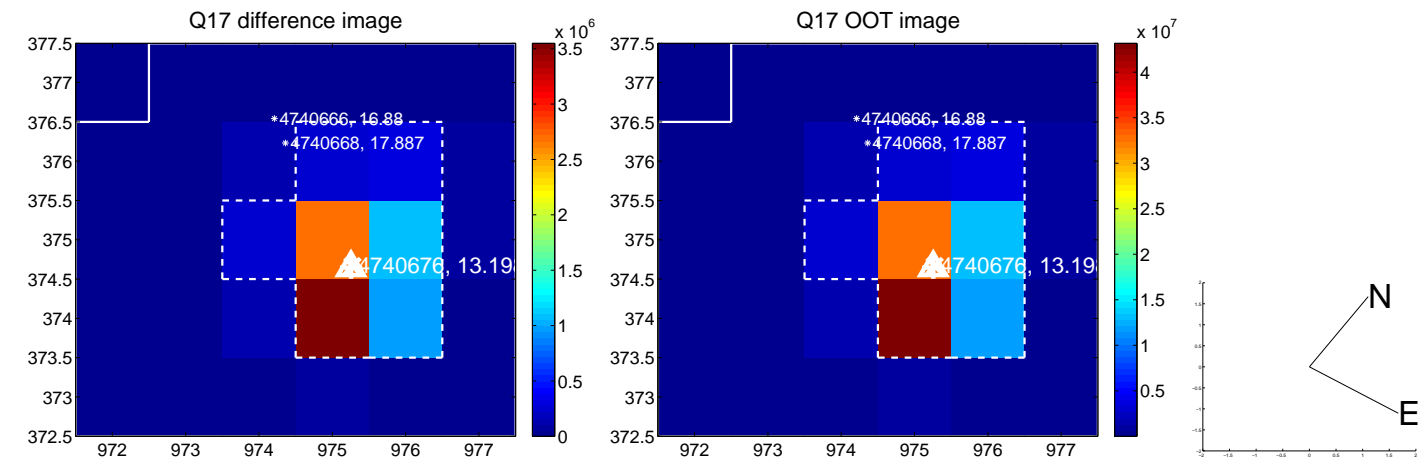
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



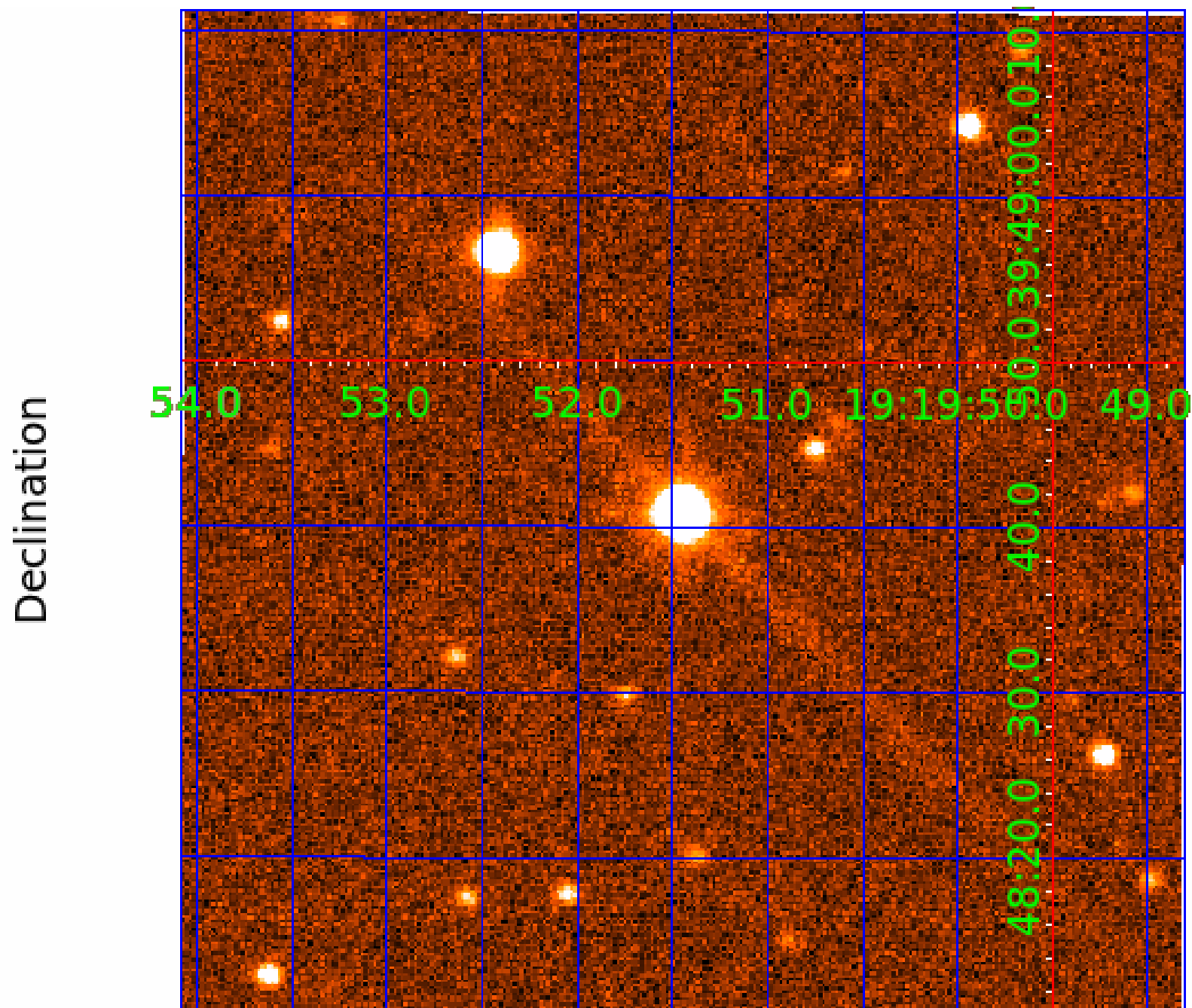
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 004740676

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004740676-01	OBS	6119.01	3.454242	131.711273	87810.3	4.688	12647.5	10975.1	2.43	6562	75.18	3866.61
004740676-02	OBS	No	1.727106	131.717828	5370.2	4.592	871.8	742.0	2.43	6562	20.33	9743.36

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004740676-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
004740676-02	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.

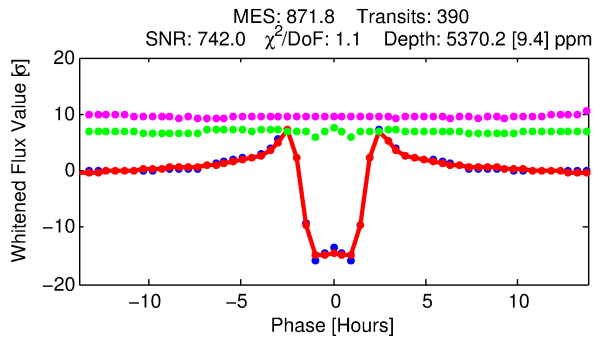
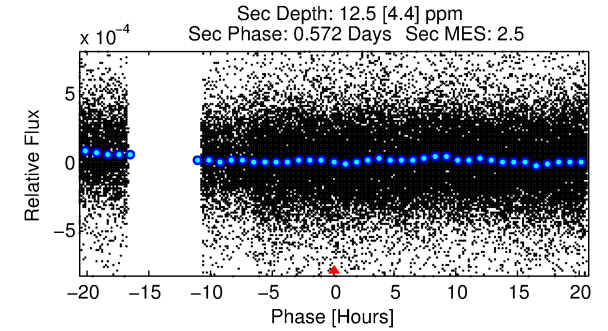
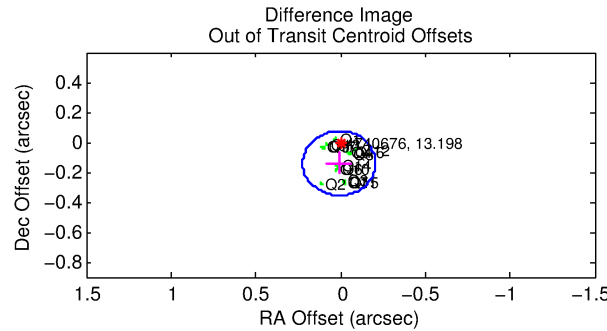
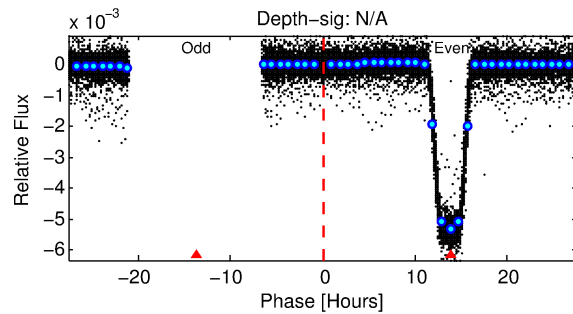
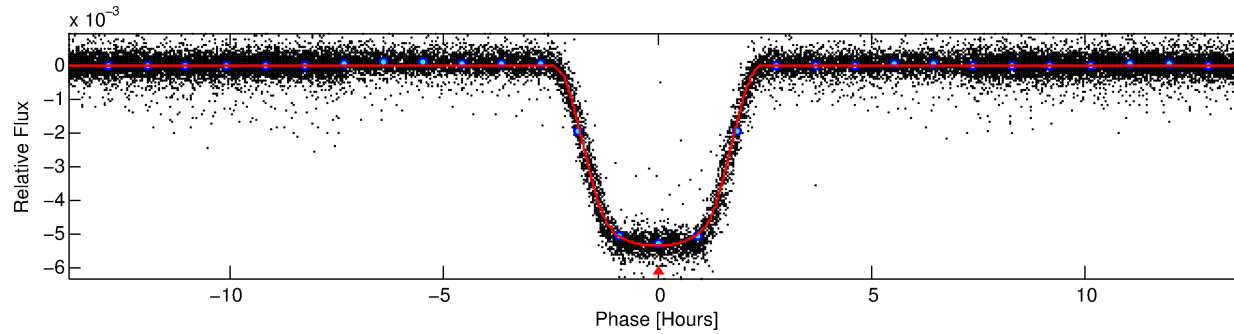
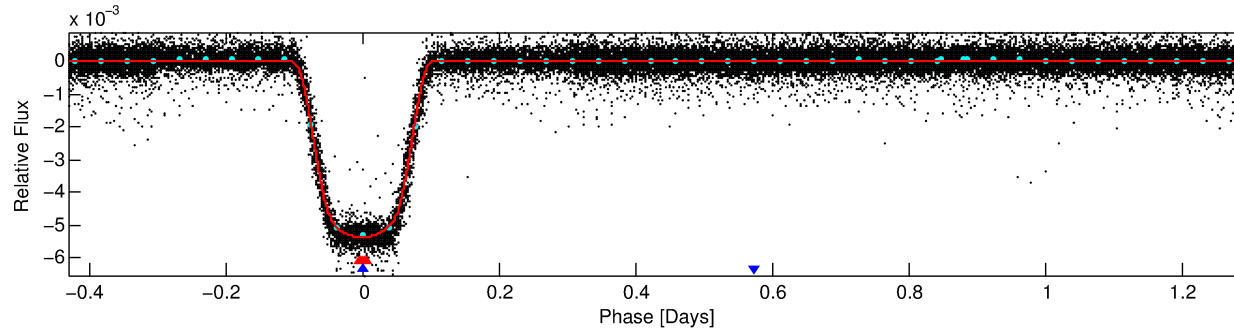
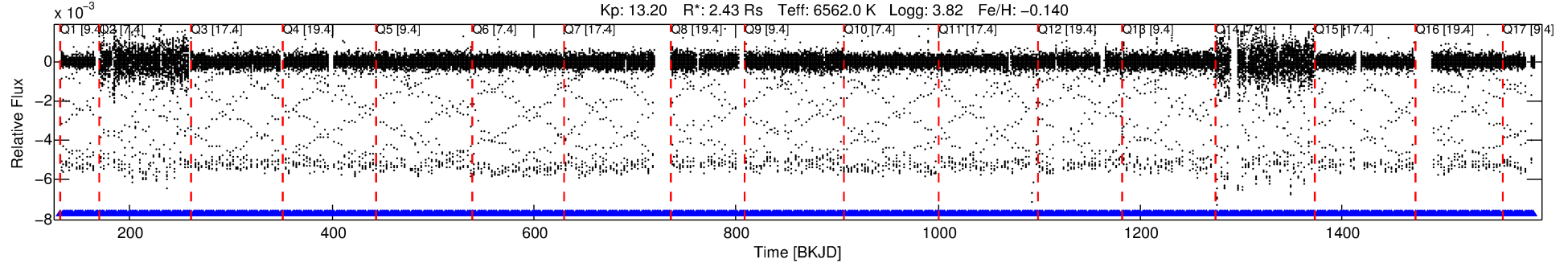
## Ephemeris Match Information For 004740676-02

No Significant Match Found

# DV One-Page Summary

KIC: 4740676 Candidate: 2 of 2 Period: 1.727 d  
KOI: K06119 Corr: No Ephemeris Match

Kp: 13.20 R\*: 2.43 Rs Teff: 6562.0 K Logg: 3.82 Fe/H: -0.140



## DV Fit Results:

Period = 1.72711 [0.00000] d  
Epoch = 131.7178 [0.0001] BKJD  
Rp/R\* = 0.0766 [0.0001]  
a/R\* = 2.08 [0.00]  
b = 0.86 [0.00]  
Seff = 9743.36 [5041.86]  
Teff = 2533 [328] K  
Rp = 20.33 [7.00] Re  
a = 0.0318 [0.0102] AU  
Ag = 0.02 [0.01] [-95.40σ]  
Teffp = 1410 [131] K [-3.18σ]

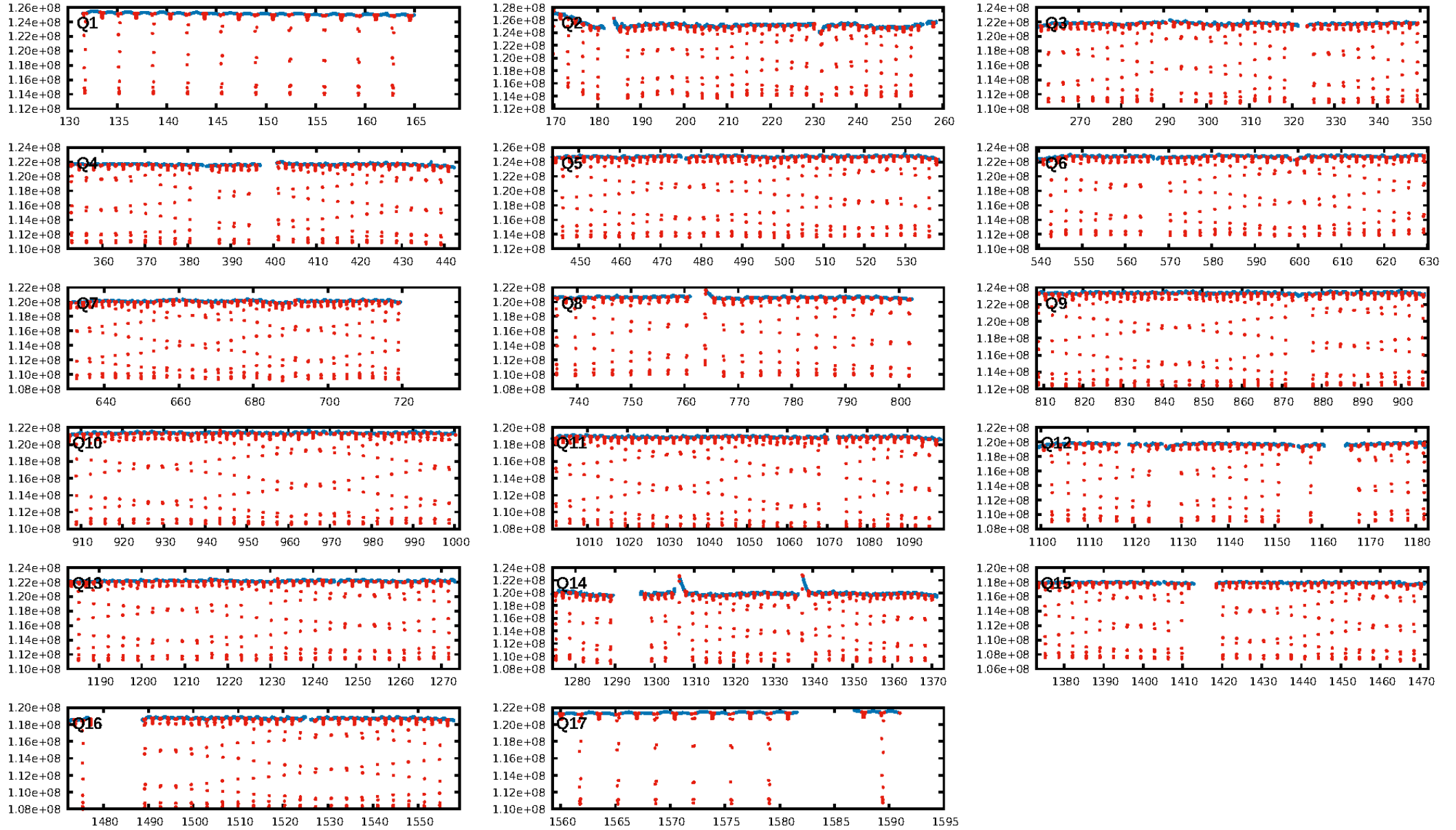
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [6.32σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [372/372]  
GhostDiagnostic-chr: 4.768  
Centroid-sig: 0.0%  
Centroid-so: 0.247 arcsec [38.13σ]  
OotOffset-rm: 0.141 arcsec [1.96σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-rm: 0.226 arcsec [3.18σ]  
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 18:30:06 Z

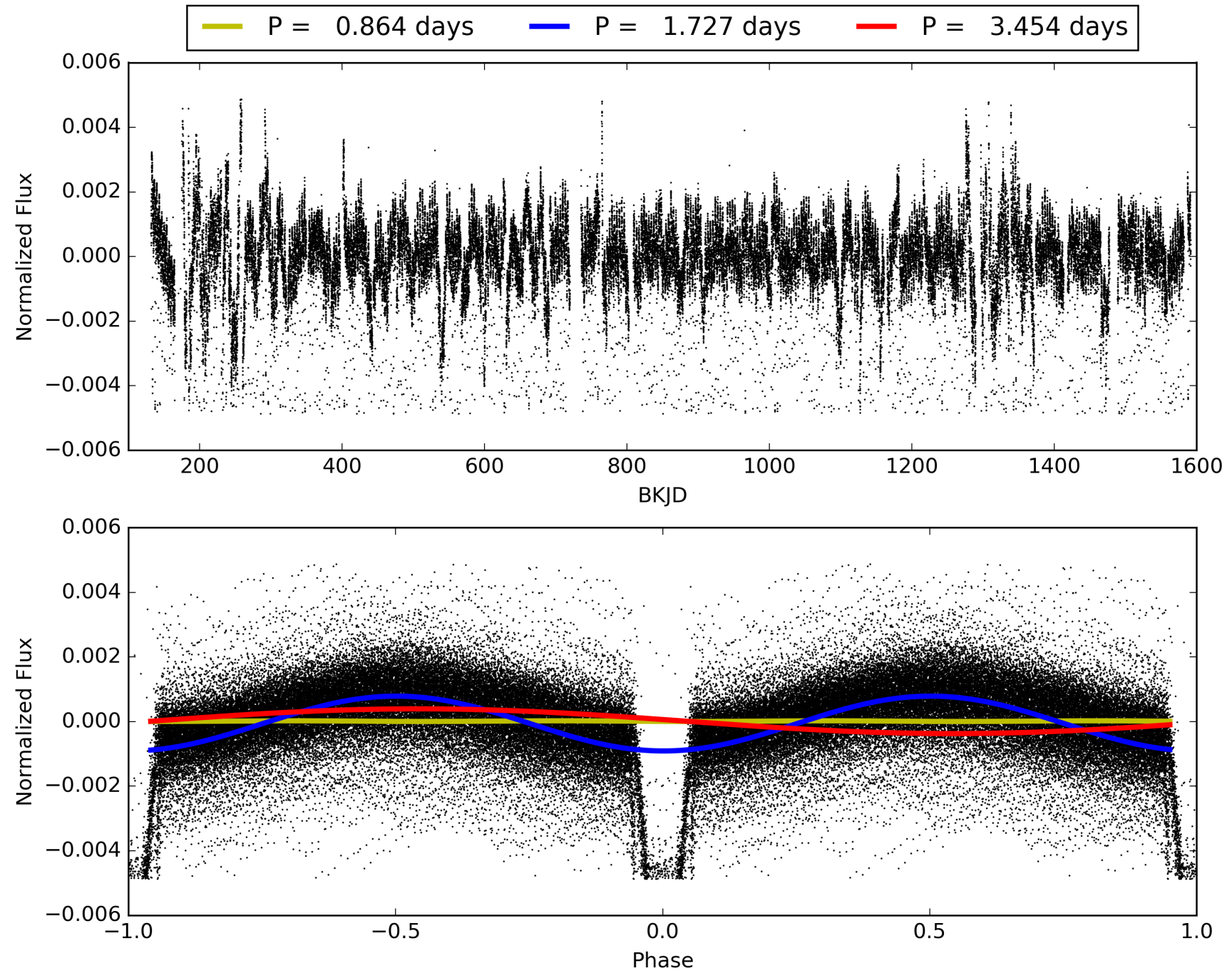
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004740676-02, PDC Light Curves





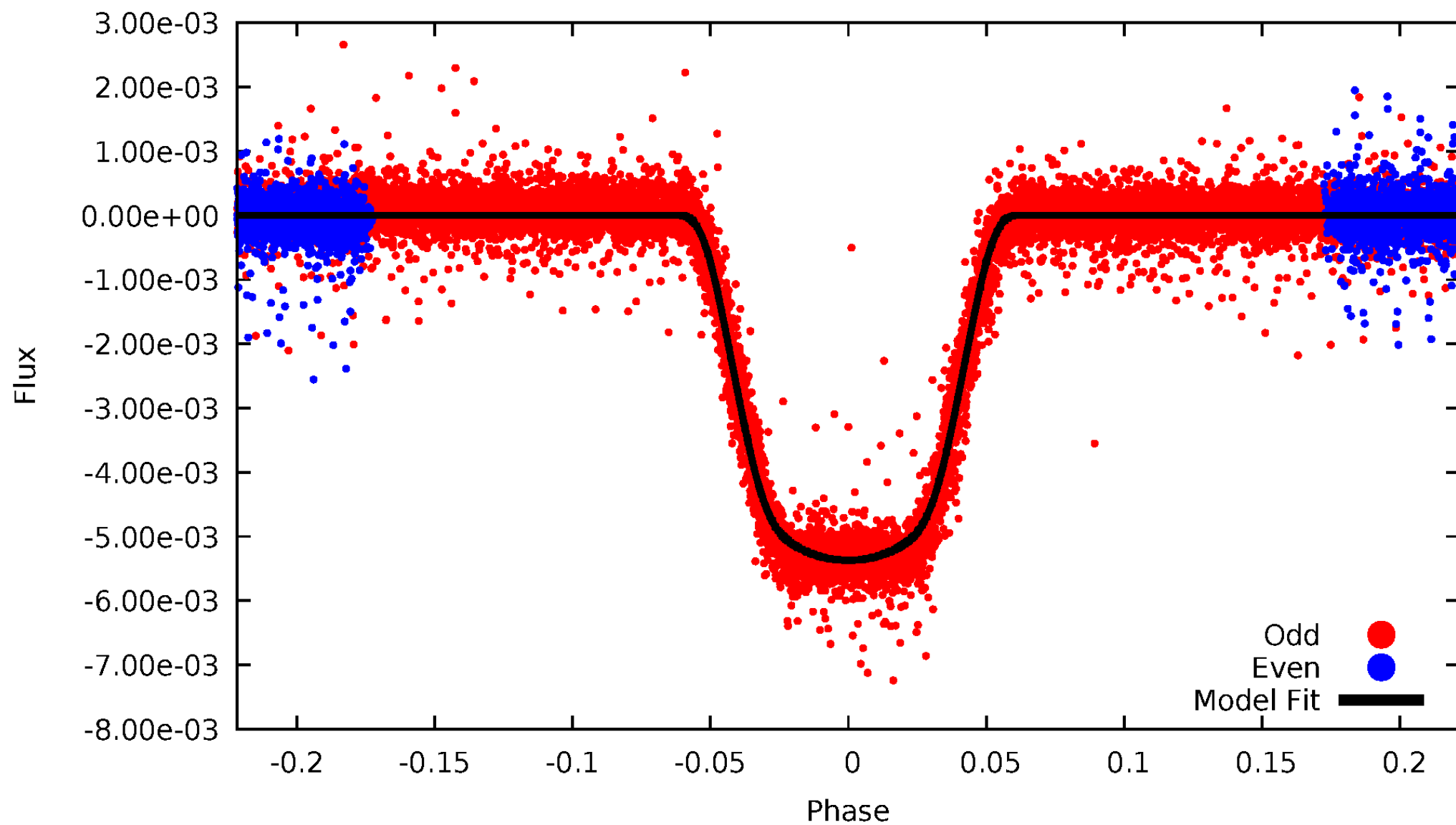
TCE 004740676-02





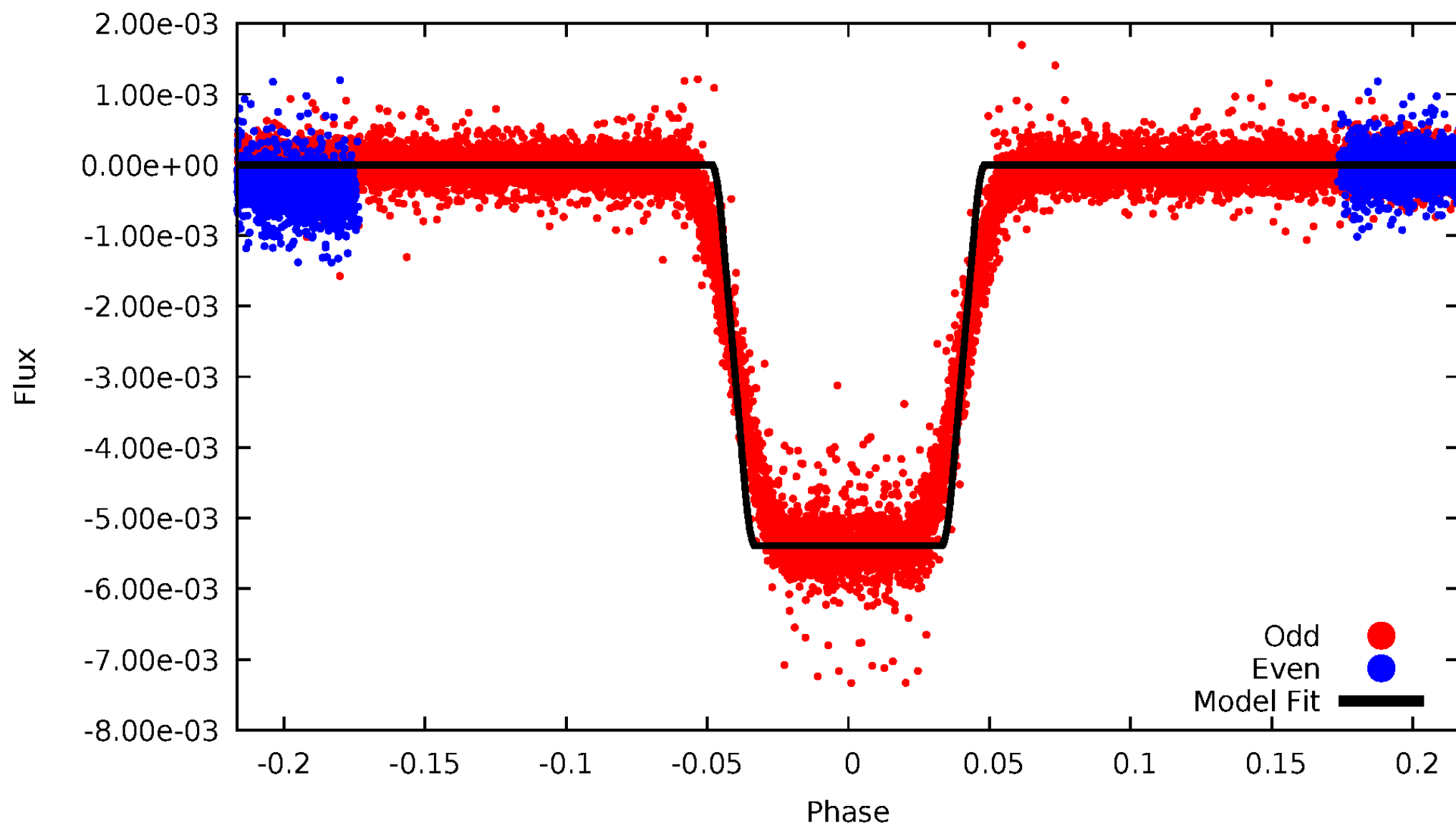
# DV Odd/Even

TCE 004740676-02



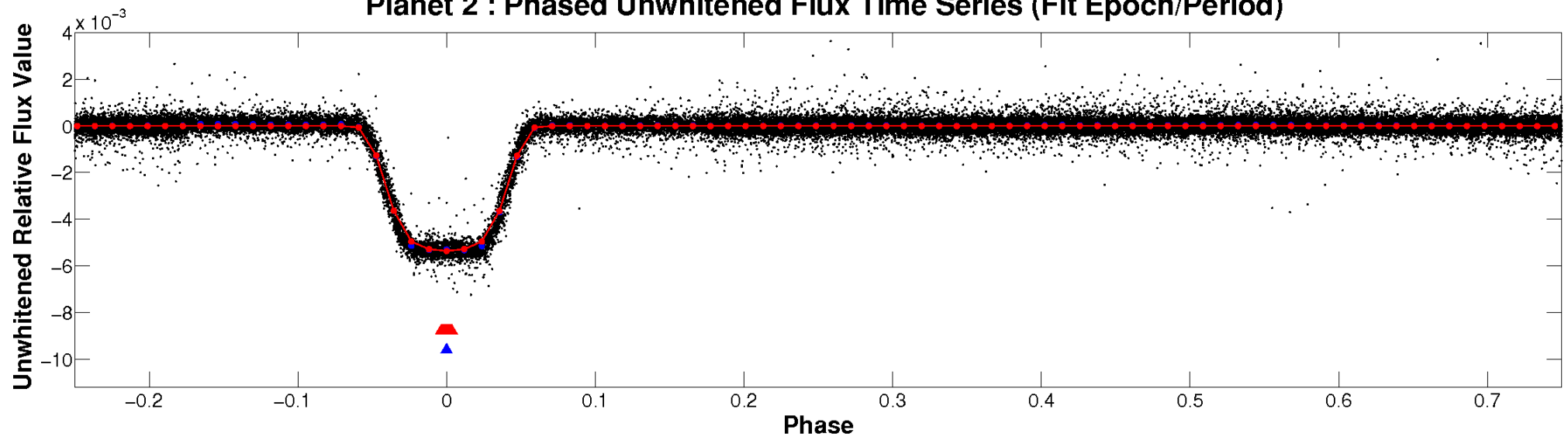
# ALT Odd/Even

TCE 004740676-02

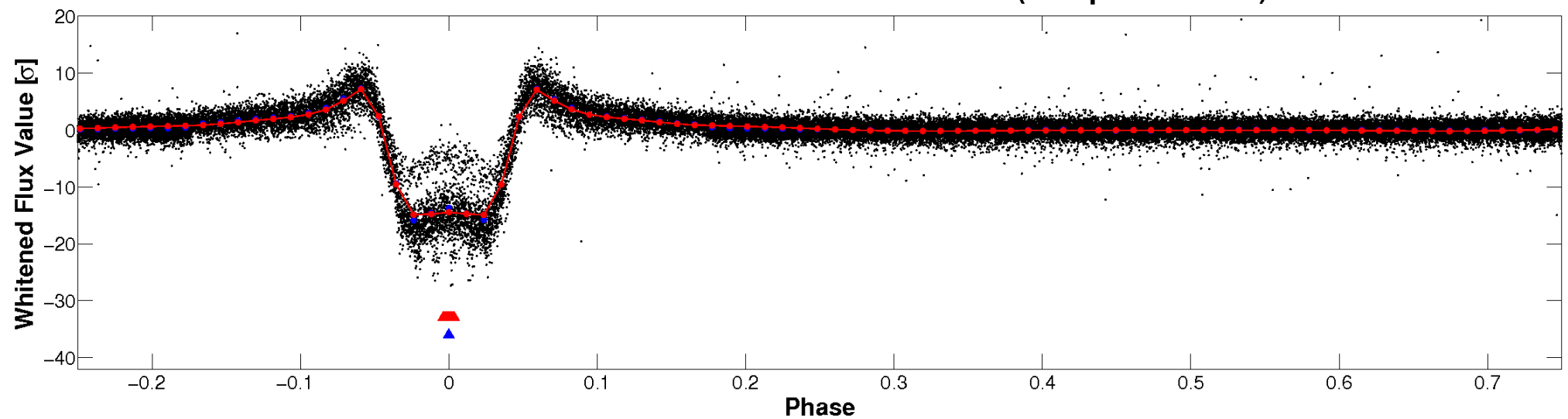


# Non-Whitened Vs. Whitened Light Curve

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

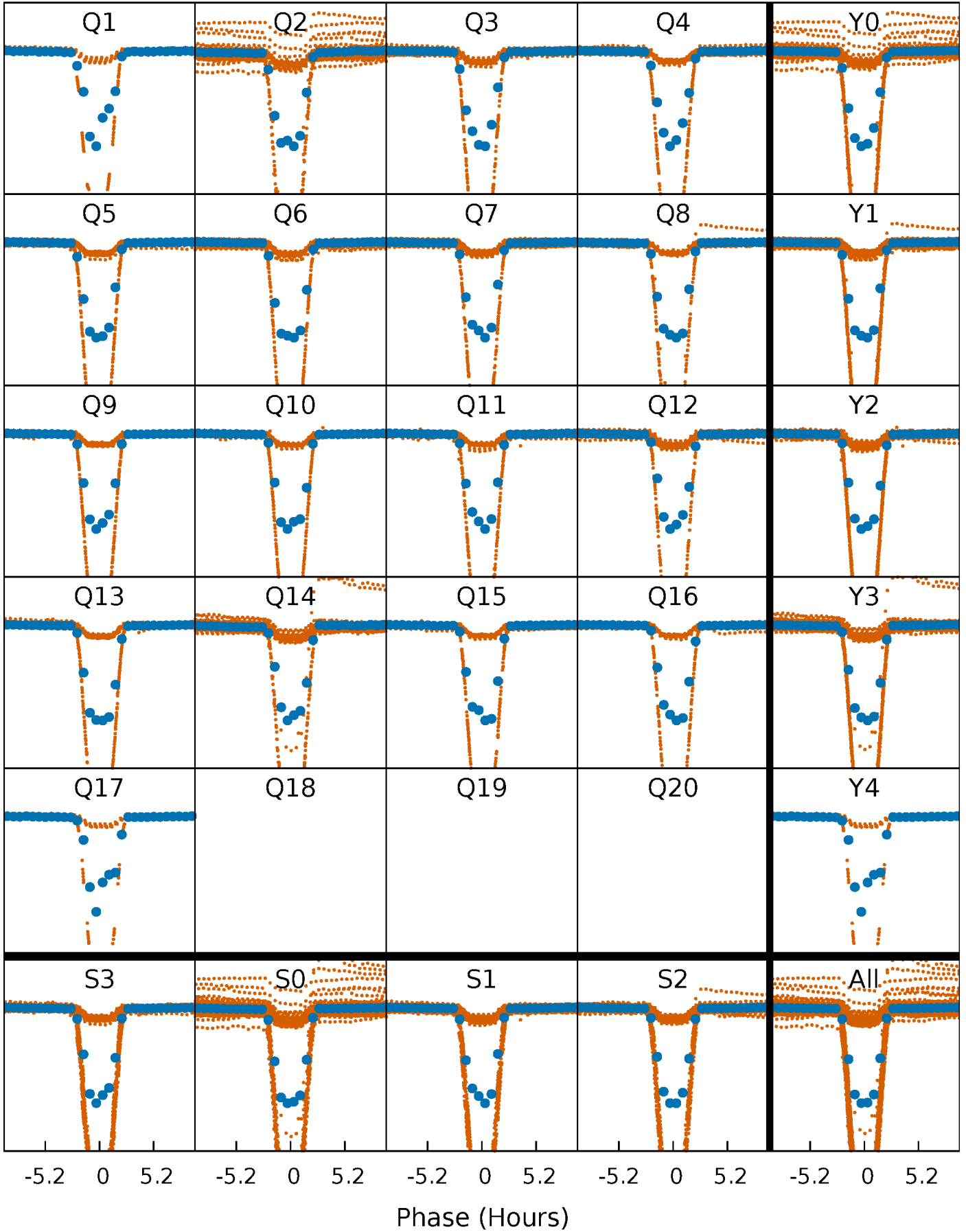


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



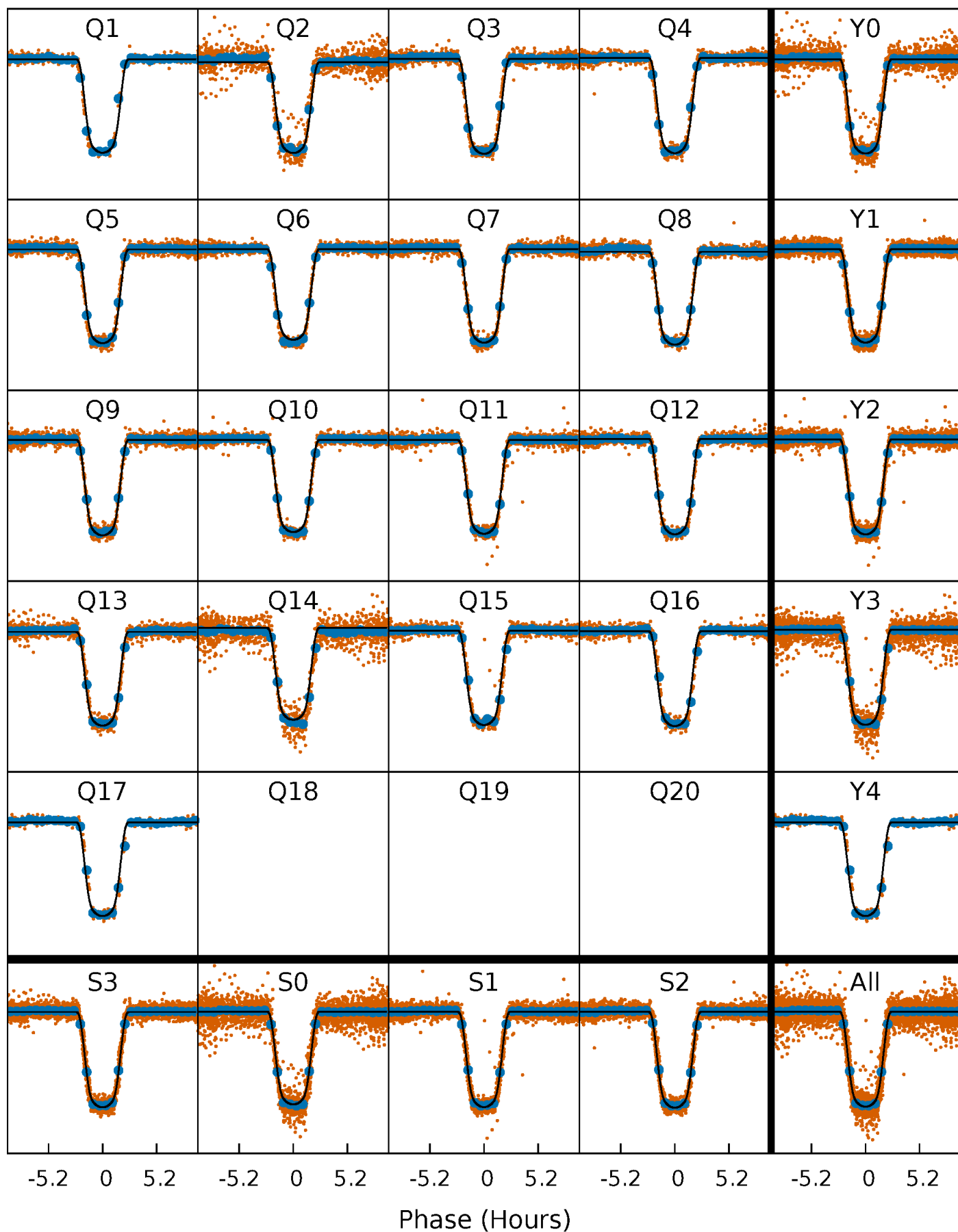
# PDC Quarter-Phased Transit Curves

TCE 004740676-02 P= 1.727106 Days  $T_0=131.717828$  (BKJD)



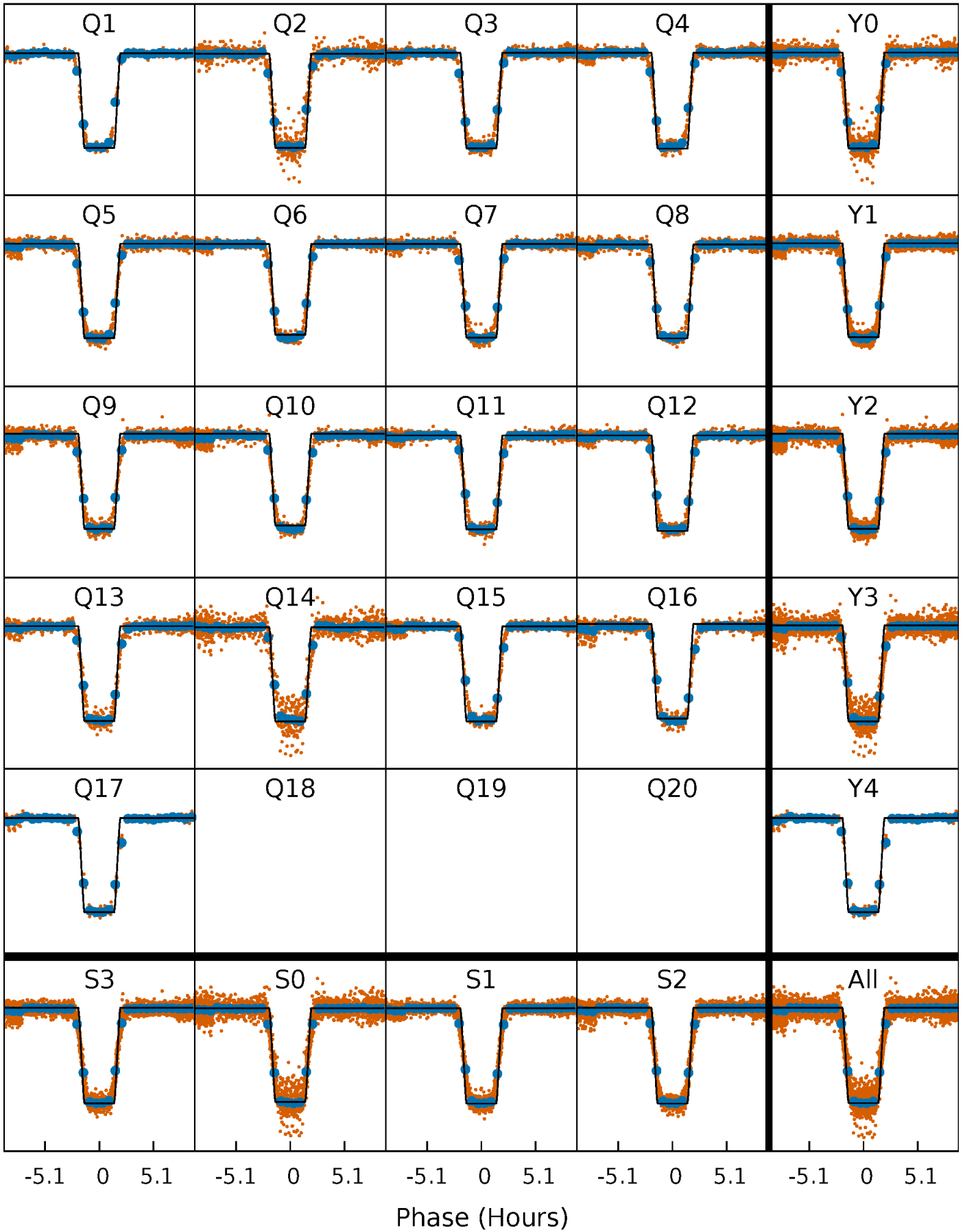
# DV Quarter-Phased Transit Curves

TCE 004740676-02   P= 1.727106 Days    $T_0=131.717828$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

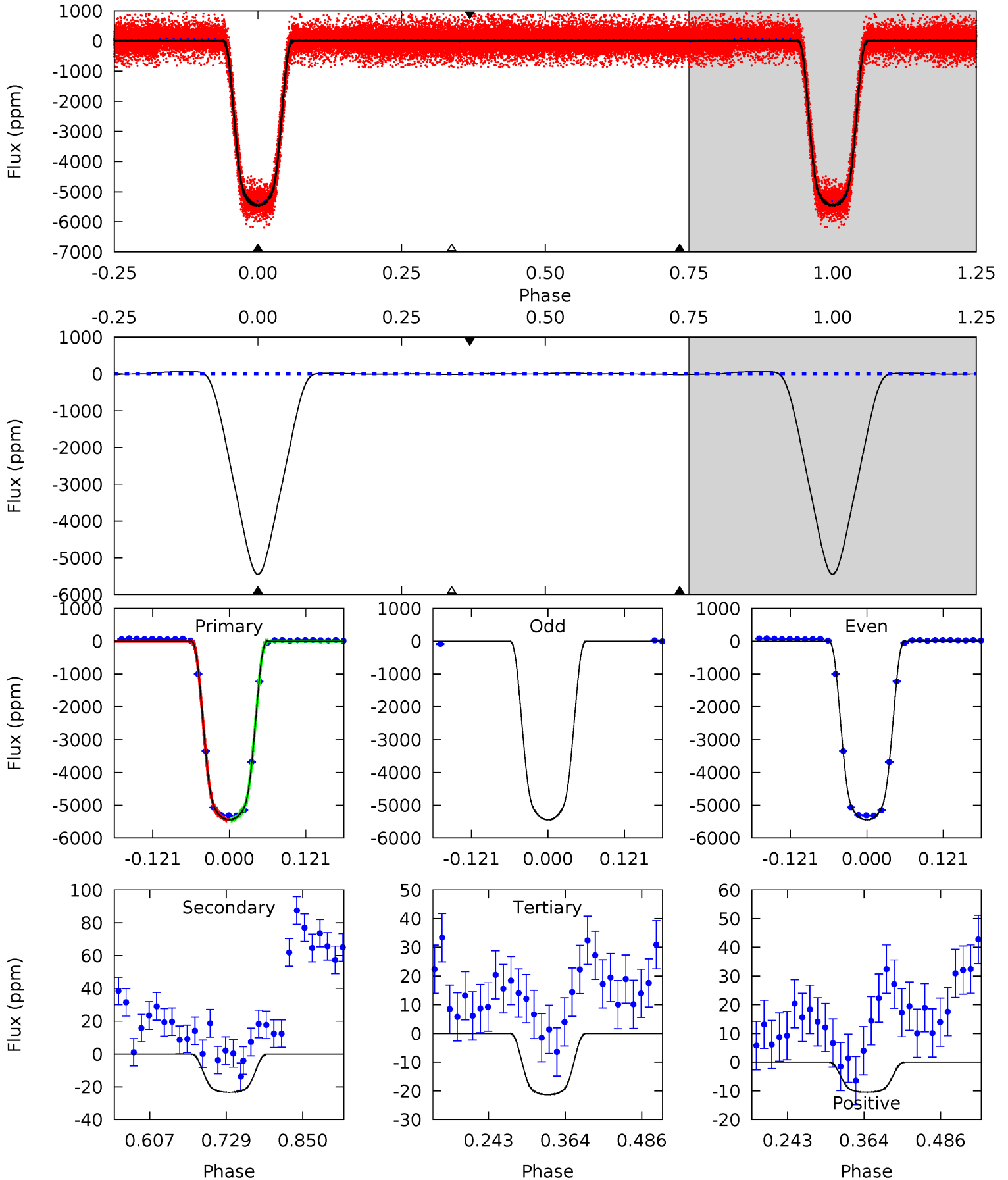
TCE 004740676-02   P= 1.727110 Days    $T_0=131.715624$  (BKJD)



# DV Model-Shift Uniqueness Test

004740676-02, P = 1.727106 Days, E = 131.717828 Days

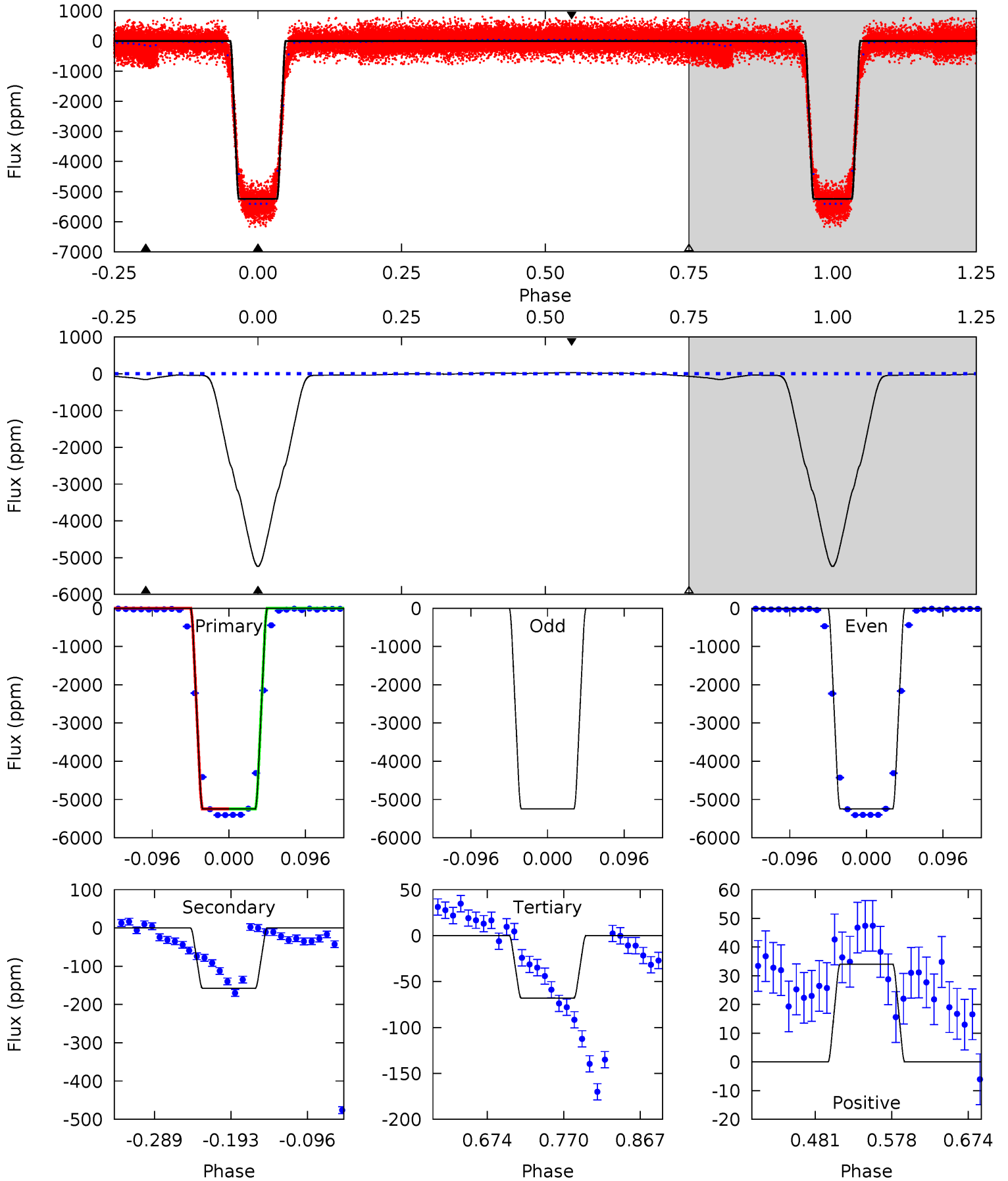
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1446	6.21	5.67	-2.78	4.52	1.55	3.78	1440	1449	0.54	8.99	0.01	1.00	0.01	0



# Alt Model-Shift Uniqueness Test

004740676-02, P = 1.727110 Days, E = 131.715624 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
1408	42.4	18.3	9.14	4.57	1.66	6.07	1389	1399	24.1	33.2	0.30	1.00	0.01	0.06





### Stellar Parameters For KIC 004740676

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6562^{+176}_{-195}$	$3.822^{+0.292}_{-0.097}$	$-0.140^{+0.300}_{-0.250}$	$2.433^{+0.516}_{-0.838}$	$1.435^{+0.222}_{-0.272}$	$0.140^{+0.261}_{-0.044}$
	+3%/-3%	+8%/-3%	+214%/-179%	+21%/-34%	+15%/-19%	+186%/-31%
Source	PHO1	FLK73	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 004740676-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-23 \pm 4$	$19.46^{+2.67}_{-3.57}$	$3453^{+215}_{-287}$	$-3298^{+189}_{-134}$	$0.035^{+0.015}_{-0.009}$
Alt.	$-158 \pm 4$	$19.17^{+2.16}_{-3.52}$	$3469^{+214}_{-290}$	$-2648^{+5127}_{-311}$	$0.245^{+0.099}_{-0.044}$

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

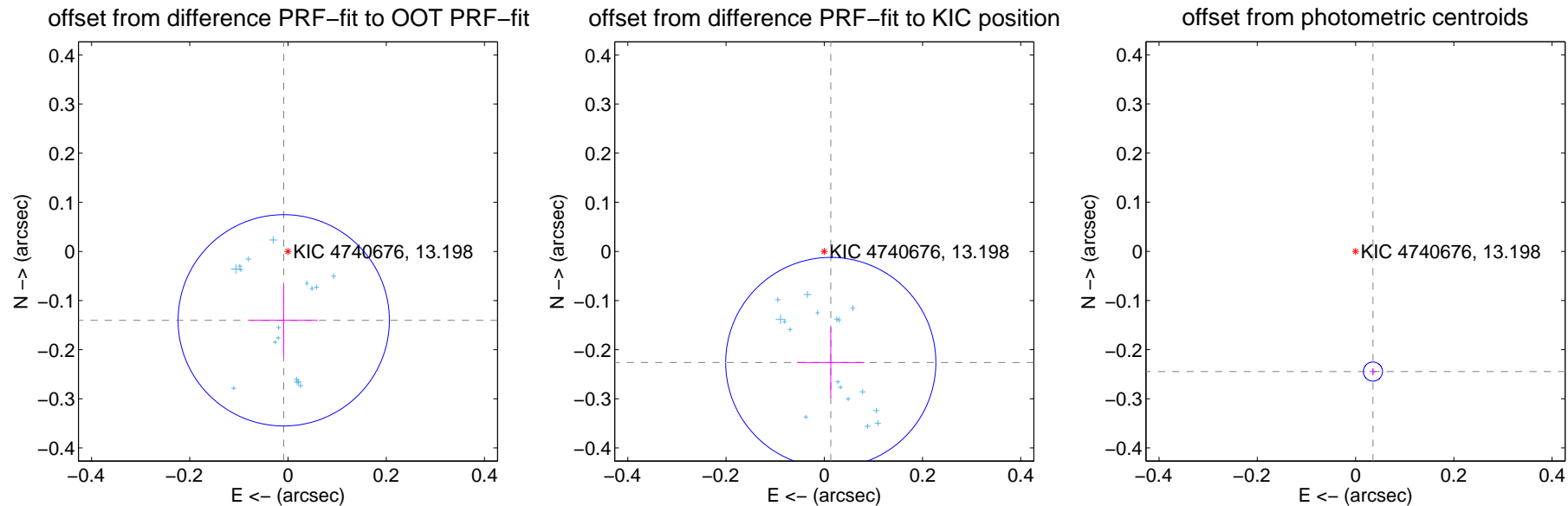
## DV Centroid Data

Supplemental centroid analysis for 004740676-02. Kepler magnitude: 13.20. Transit SNR 741.99

There are 17 quarters with good PRF difference image offsets

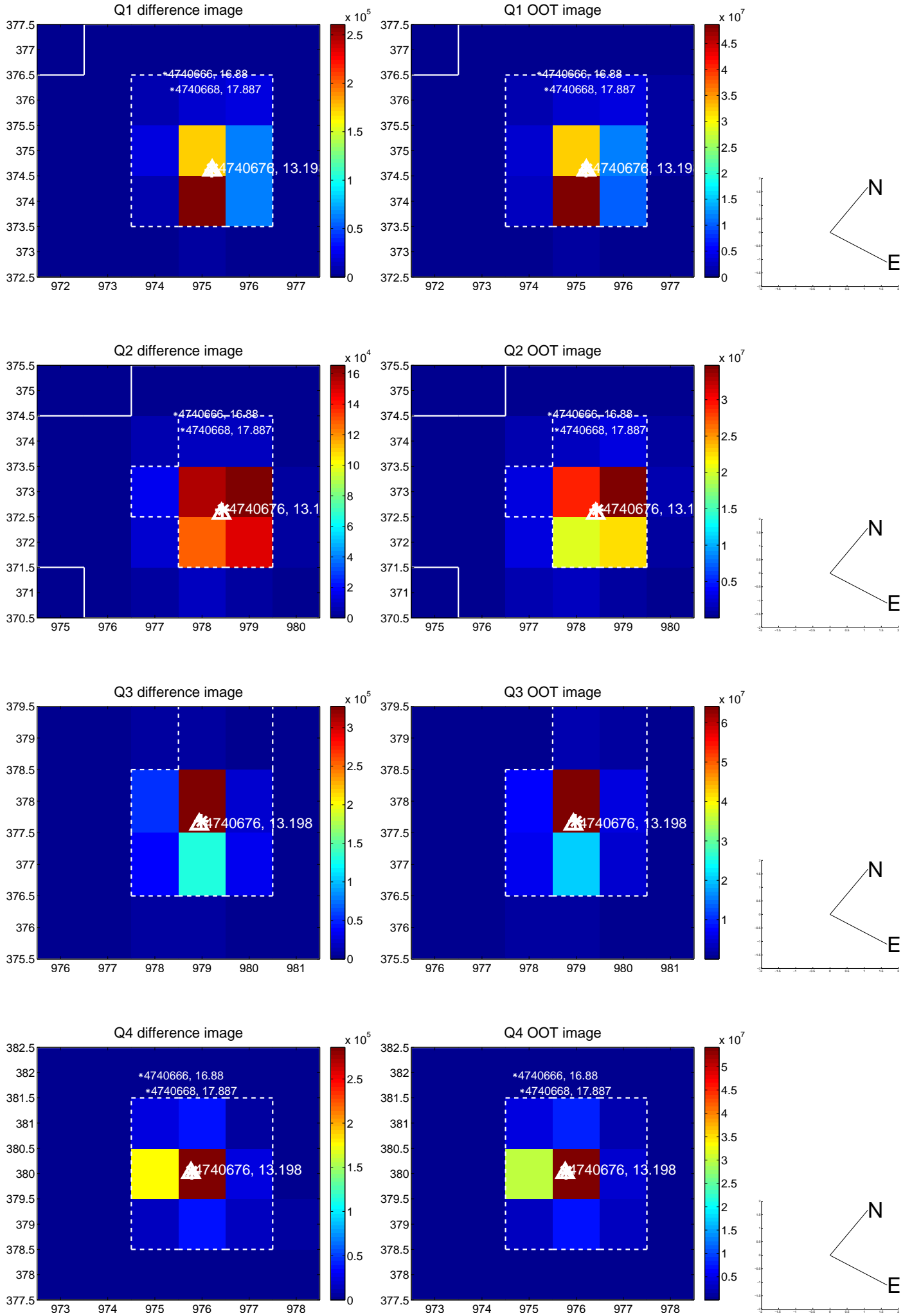
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.141 \pm 0.072$	1.96	$0.009 \pm 0.069$	$-0.140 \pm 0.072$
PRF-fit source offset from KIC position	$0.226 \pm 0.071$	3.18	$-0.013 \pm 0.069$	$-0.226 \pm 0.071$
photometric centroid source offset	$0.25 \pm 0.01$	38.13	$-0.04 \pm 0.01$	$-0.24 \pm 0.01$

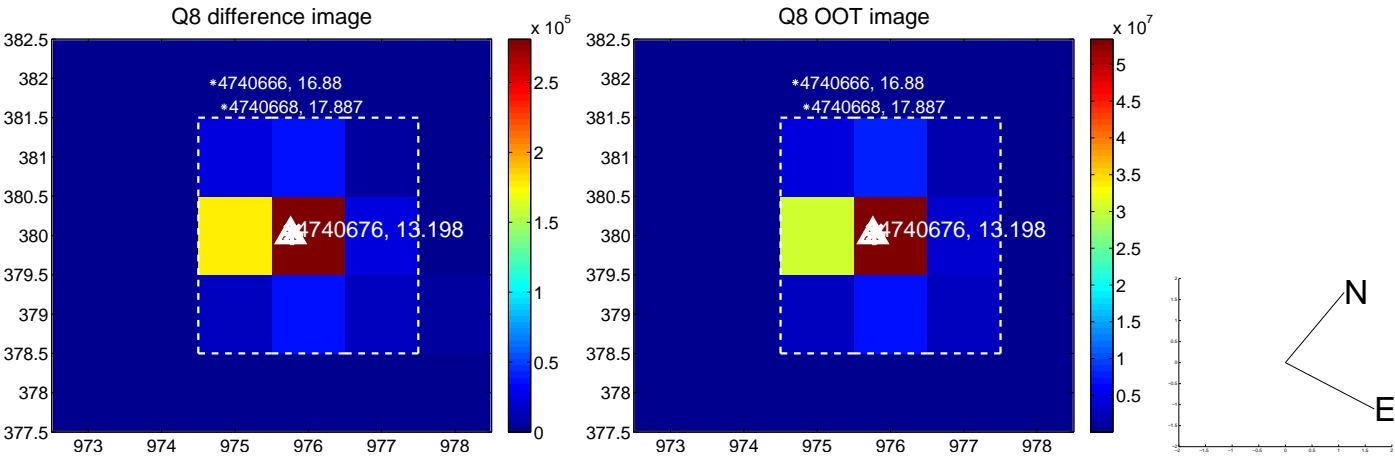
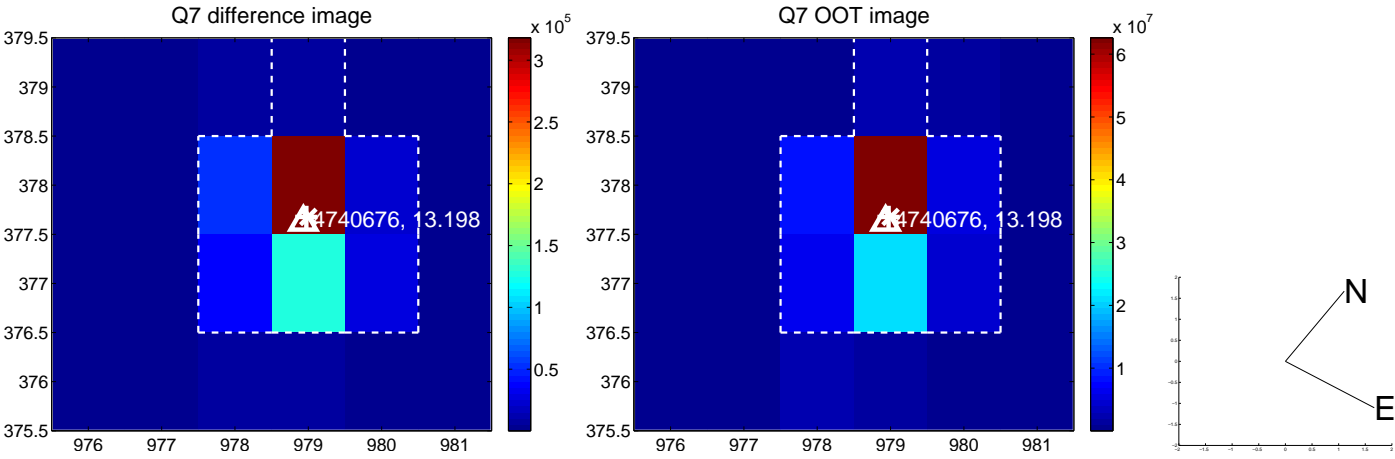
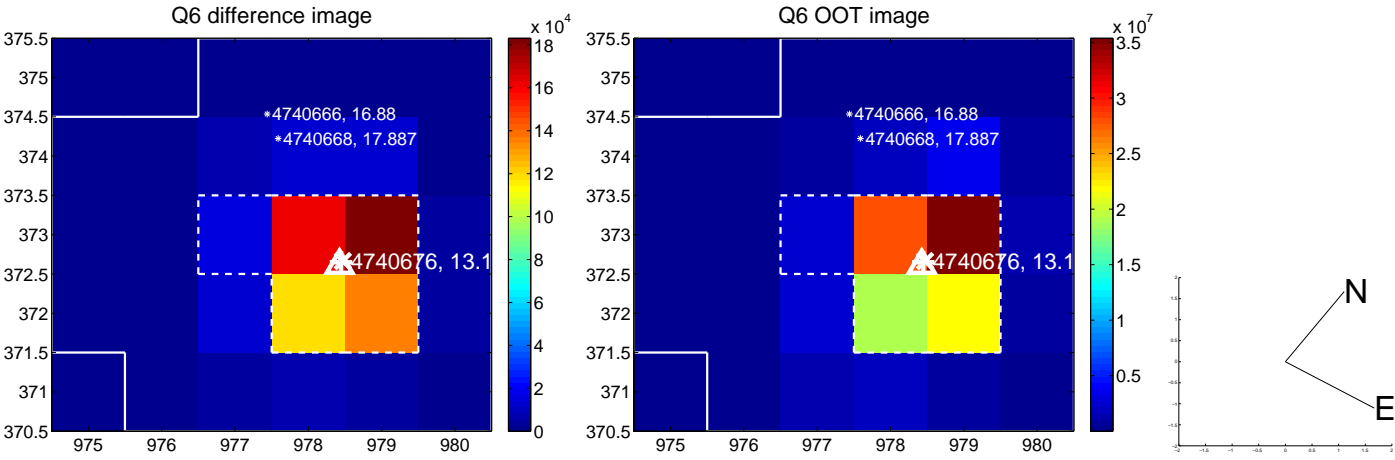
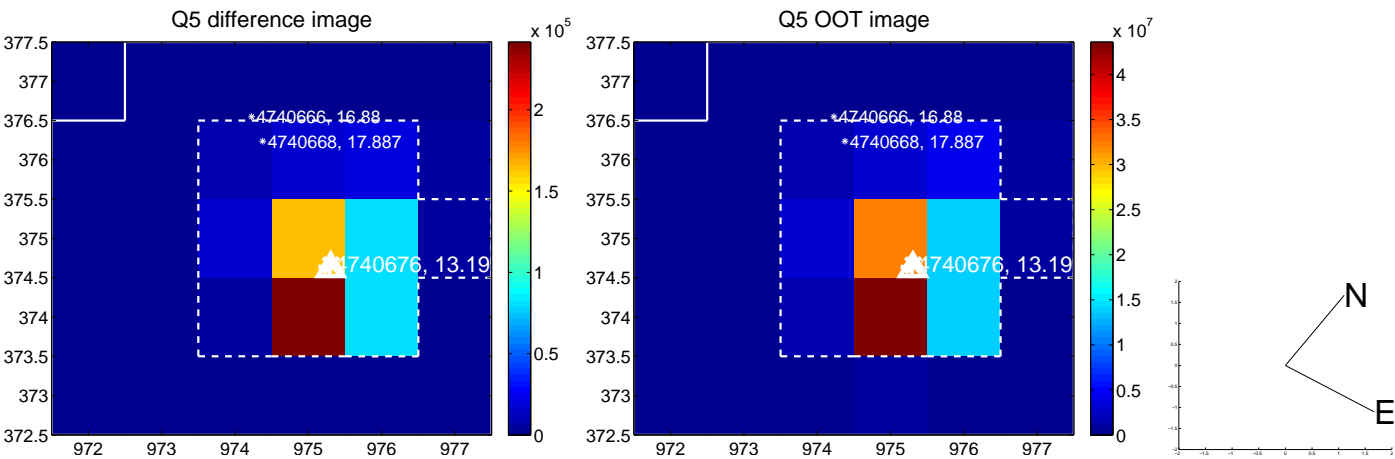


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

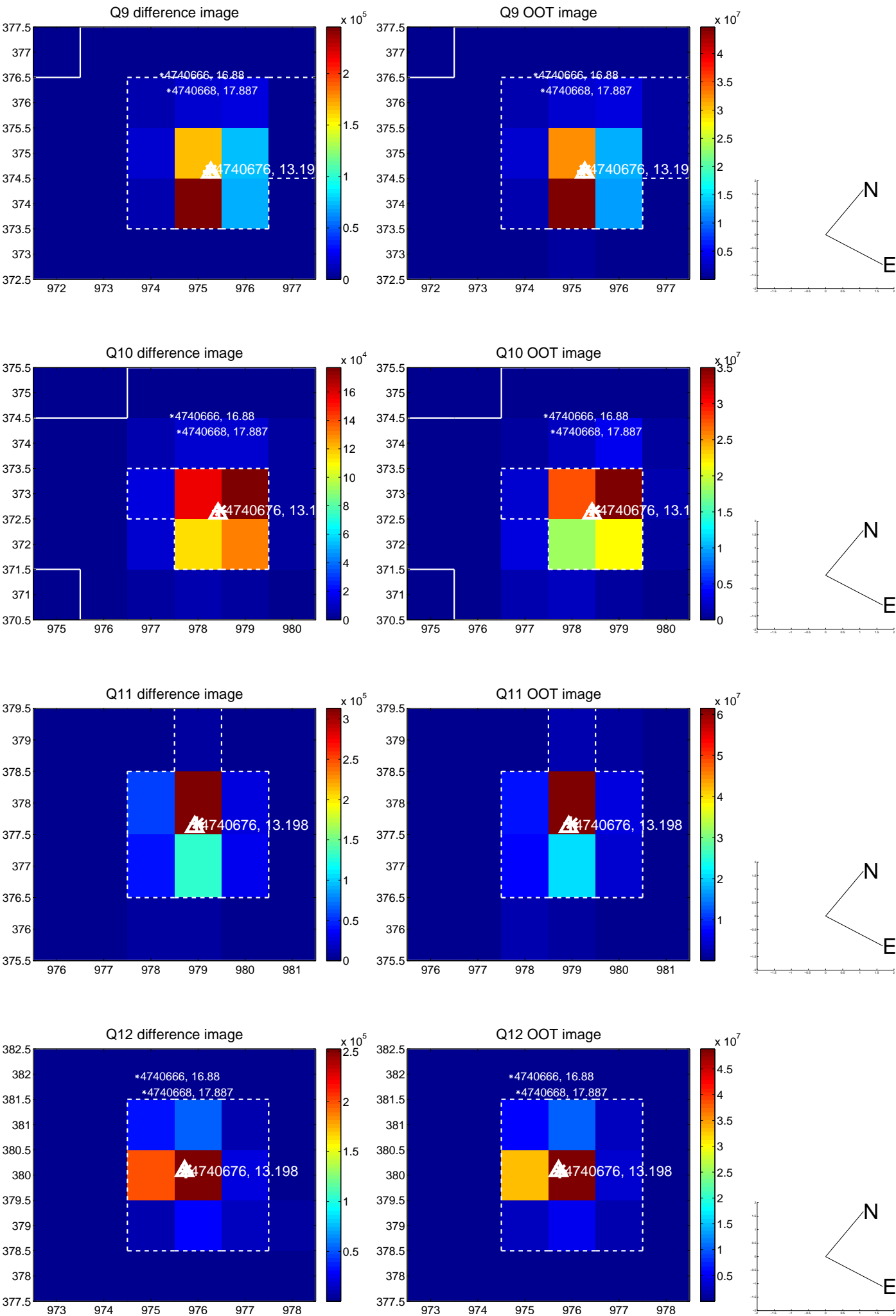
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



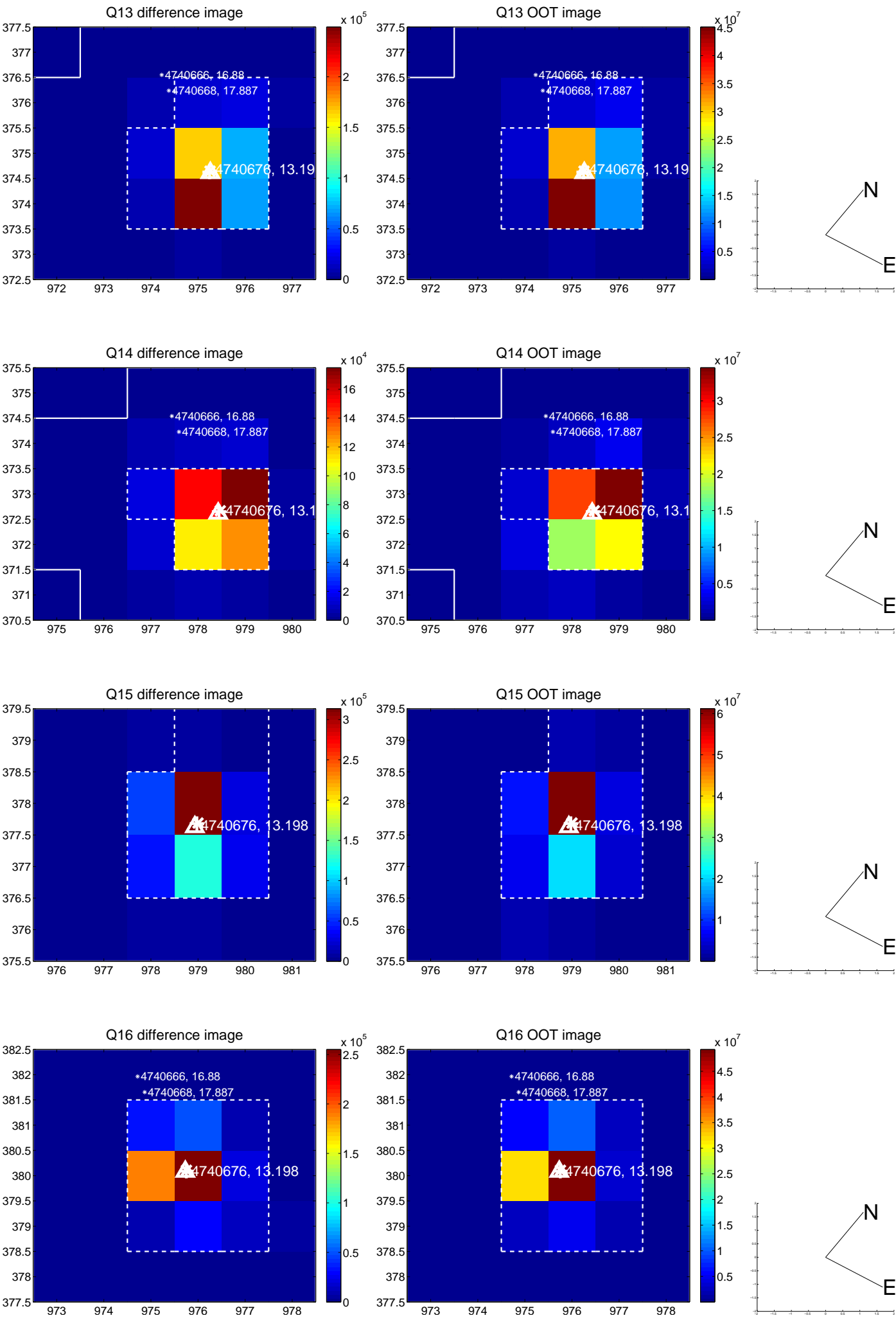
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



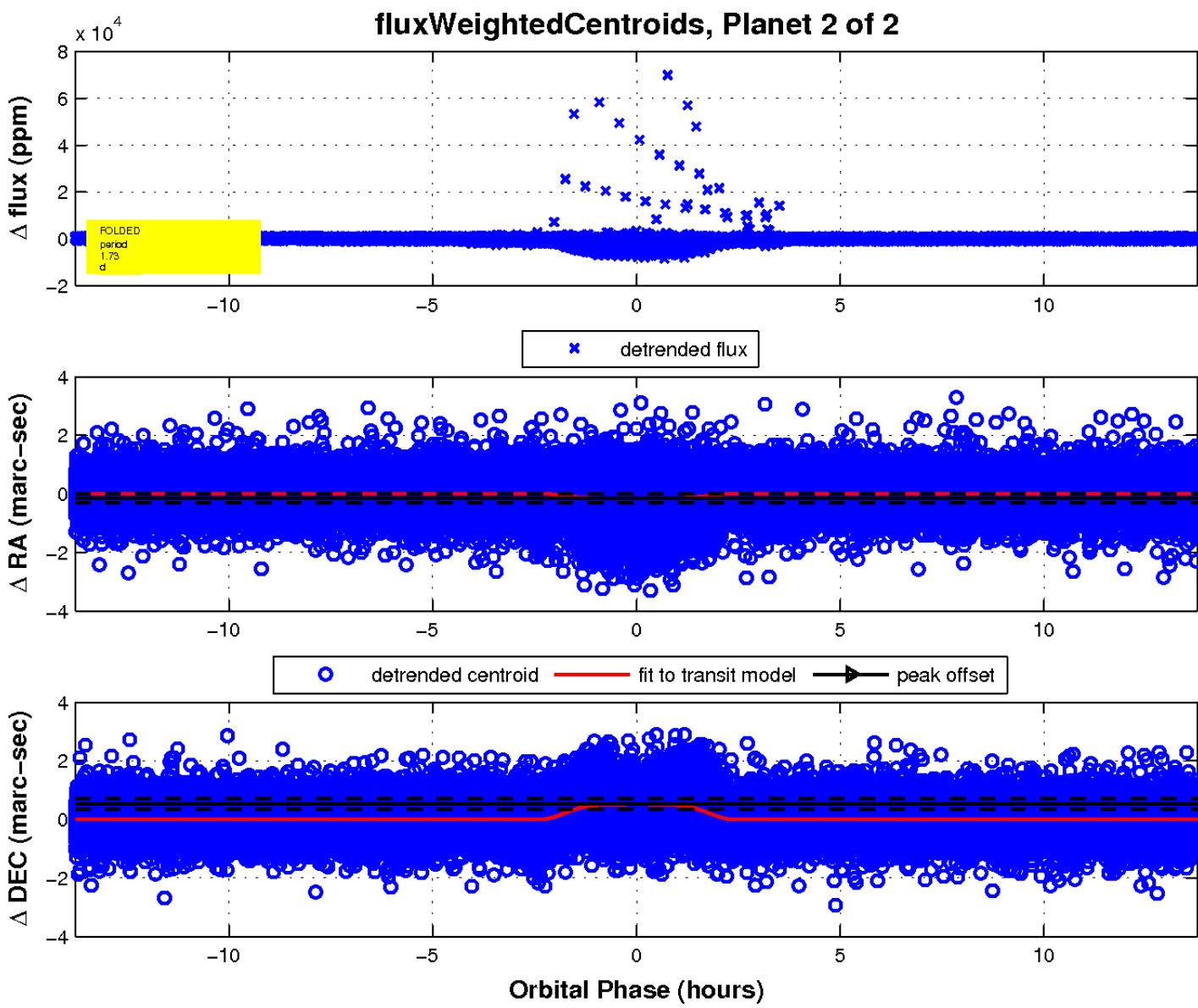
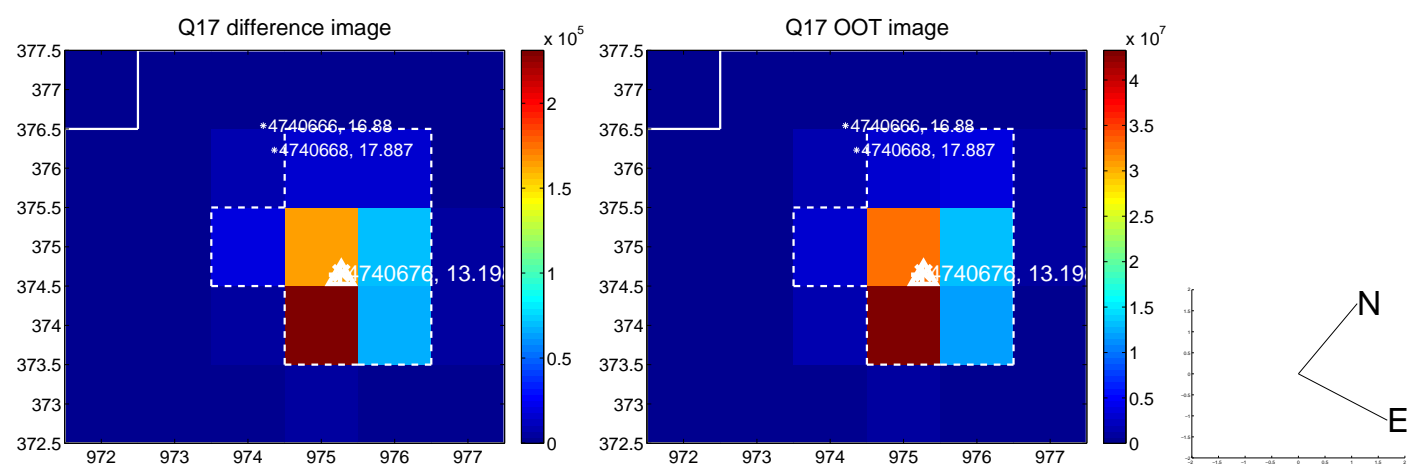
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

