

# KIC 005474613

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005474613-01	OBS	1599.01	20.407560	140.174954	330.1	8.233	19.4	20.4	0.97	5823	2.45	44.90
005474613-02	OBS	1599.02	13.616634	140.919898	363.5	5.006	20.2	21.7	0.97	5823	3.52	77.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005474613-01	OBS	PC	0.90	0	0	0	0	NO_COMMENT
005474613-02	OBS	PC	0.99	0	0	0	0	NO_COMMENT

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

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

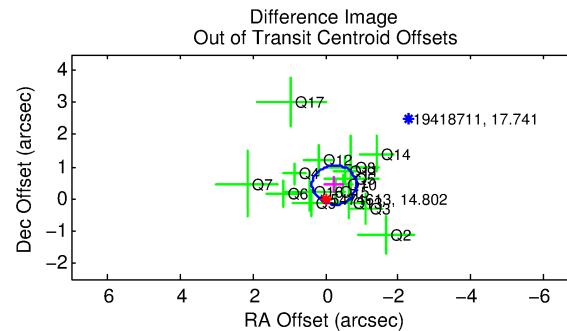
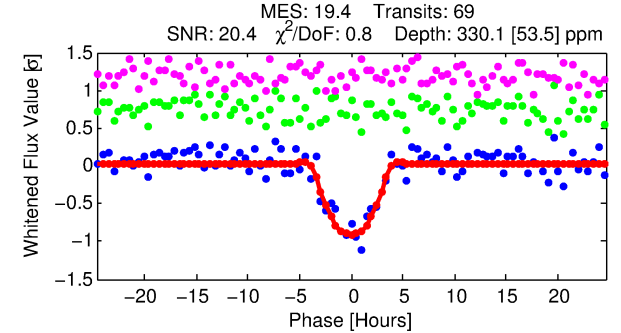
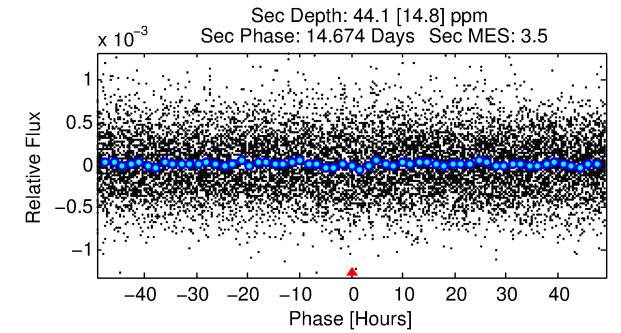
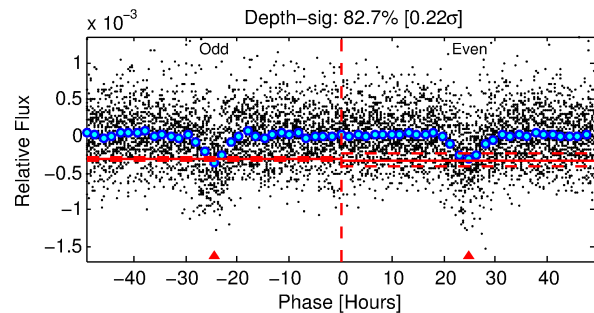
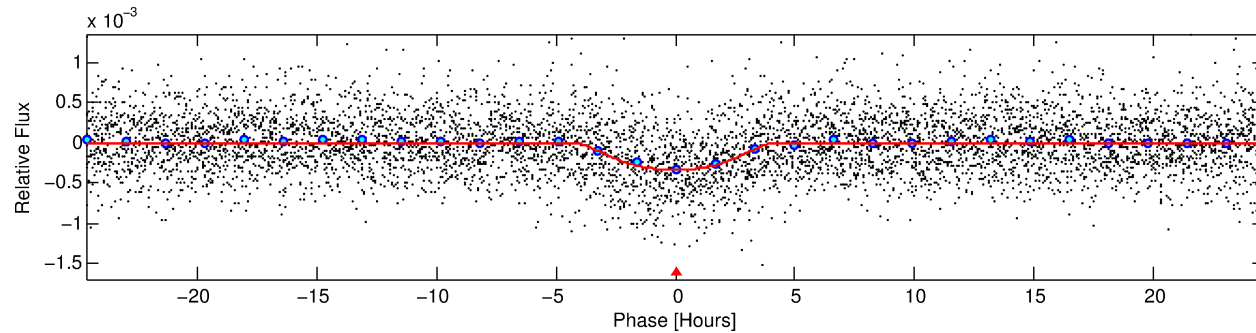
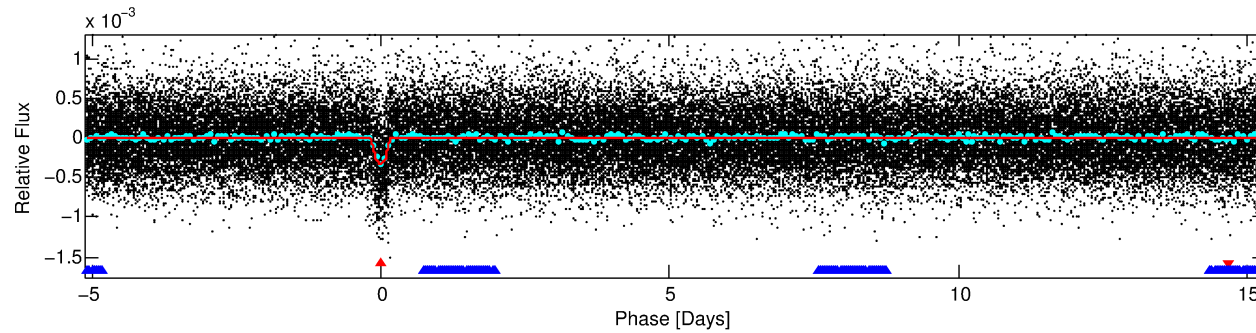
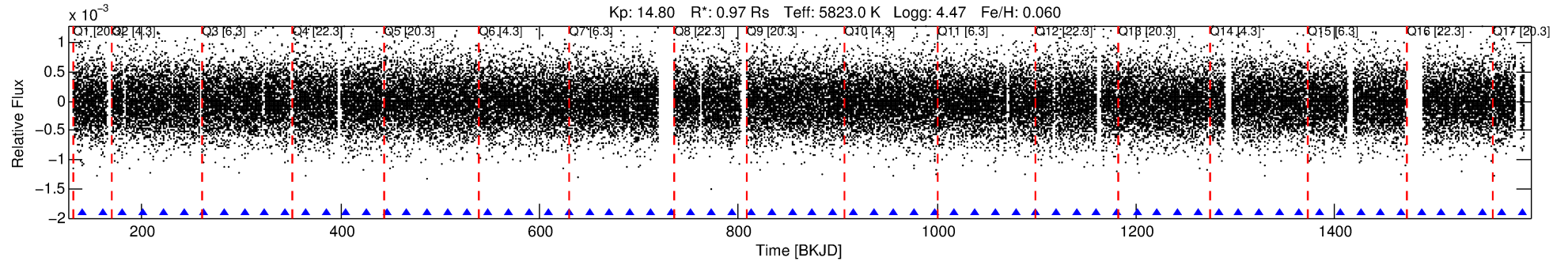
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005474613-01

No Significant Match Found

# DV One-Page Summary

KIC: 5474613 Candidate: 1 of 2 Period: 20.408 d  
KOI: K01599.01 Corr: 0.898



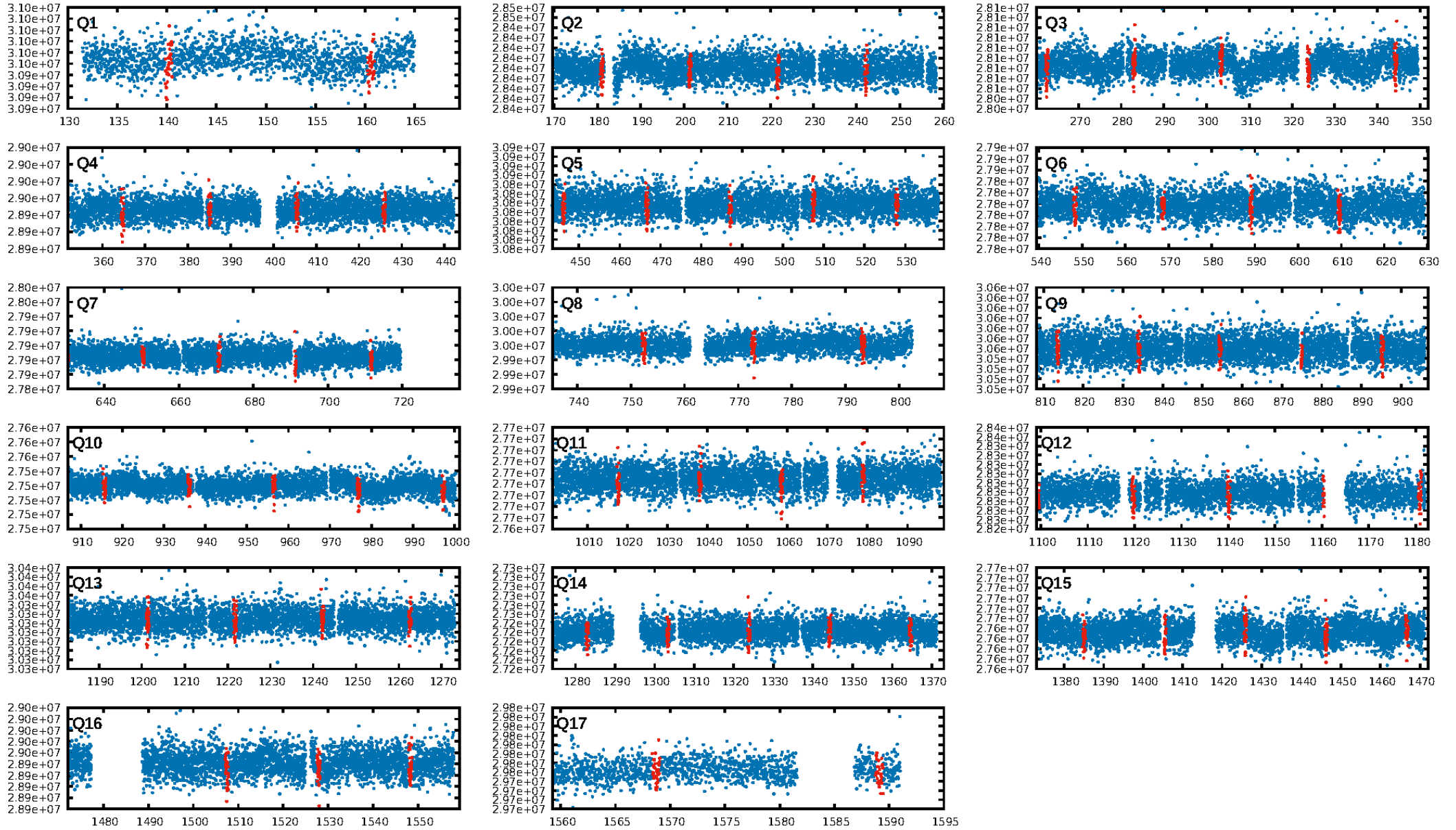
## DV Fit Results:

Period = 20.40756 [0.00023] d  
Epoch = 140.1750 [0.0097] BKJD  
Rp/R\* = 0.0231 [0.0034]  
a/R\* = 5.72 [0.79]  
b = 0.98 [0.01]  
Seff = 44.90 [17.92]  
Teff = 660 [66] K  
Rp = 2.45 [0.82] Re  
a = 0.1472 [0.0376] AU  
Ag = 87.82 [51.39] [1.69σ]  
Teffp = 3124 [365] K [6.65σ]

## DV Diagnostic Results:

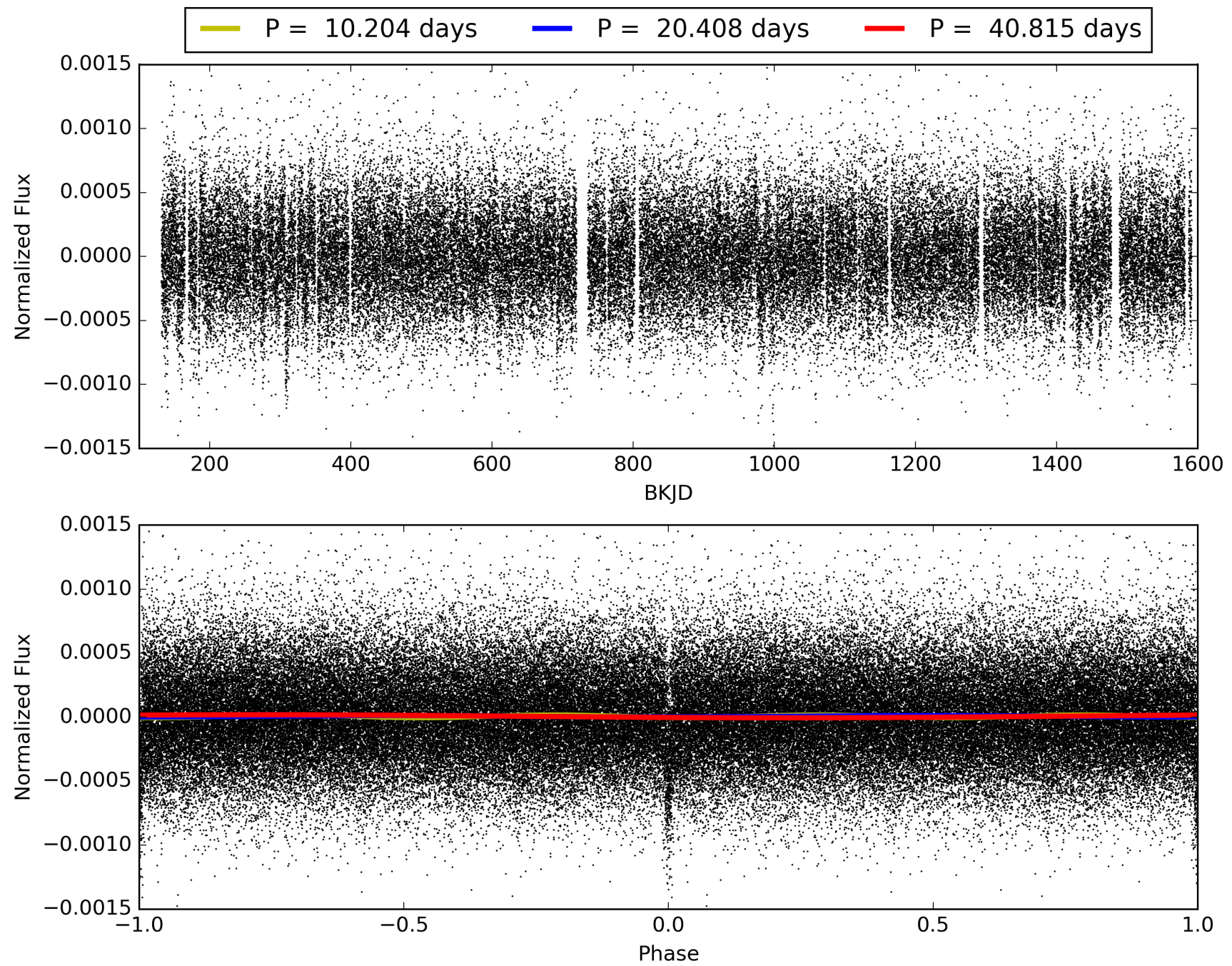
ShortPeriod-sig: 100.0% [16.91σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 77.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.21e-81  
RollingBand-fgt: 1.00 [65/65]  
GhostDiagnostic-chr: 3.462  
Centroid-sig: 83.2%  
Centroid-so: 0.560 arcsec [0.79σ]  
OotOffset-rm: 0.490 arcsec [2.41σ]  
KicOffset-rm: 0.559 arcsec [2.70σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.88 [14/16]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 005474613-01, PDC Light Curves



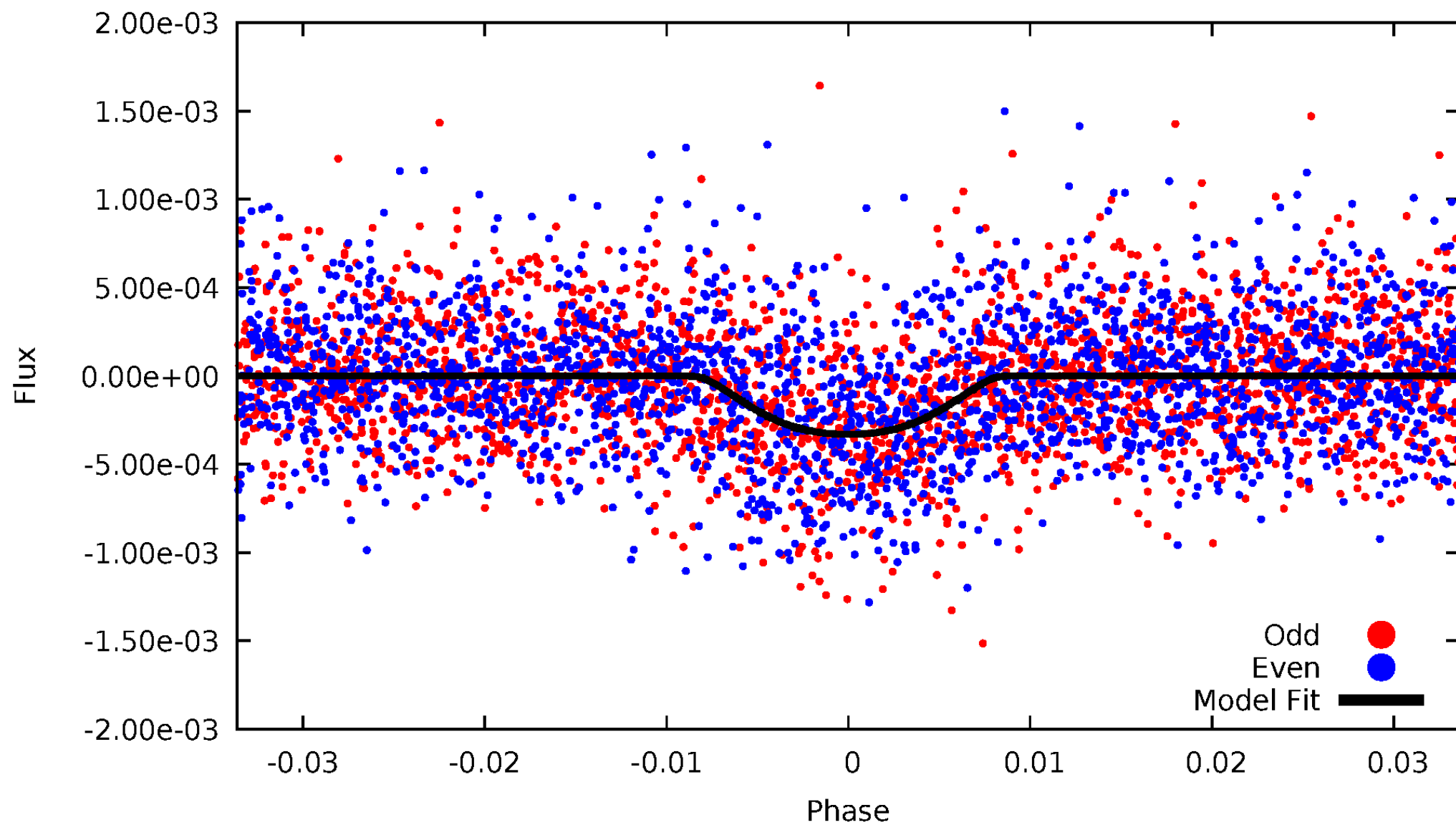


TCE 005474613-01



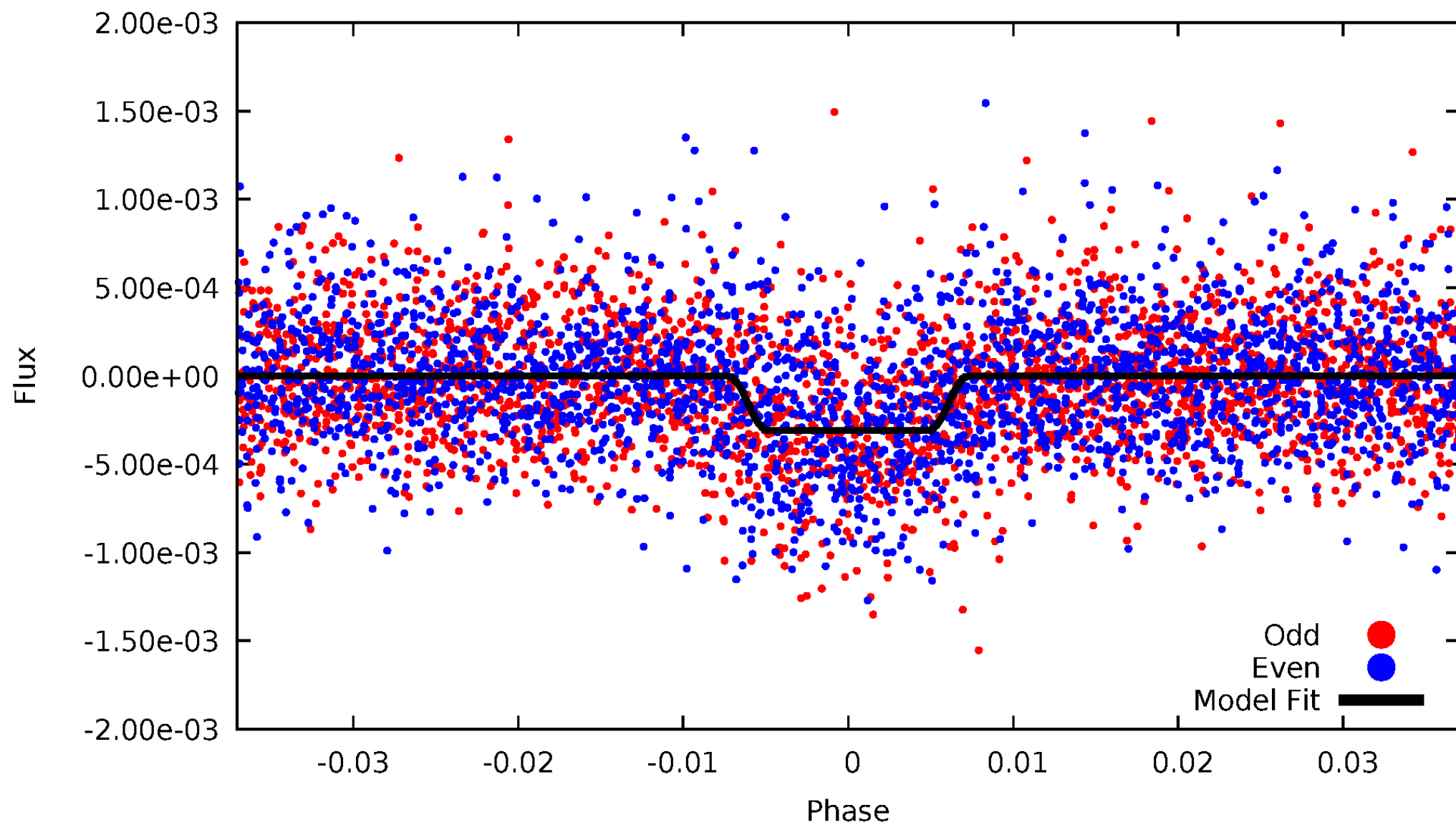
# DV Odd/Even

TCE 005474613-01



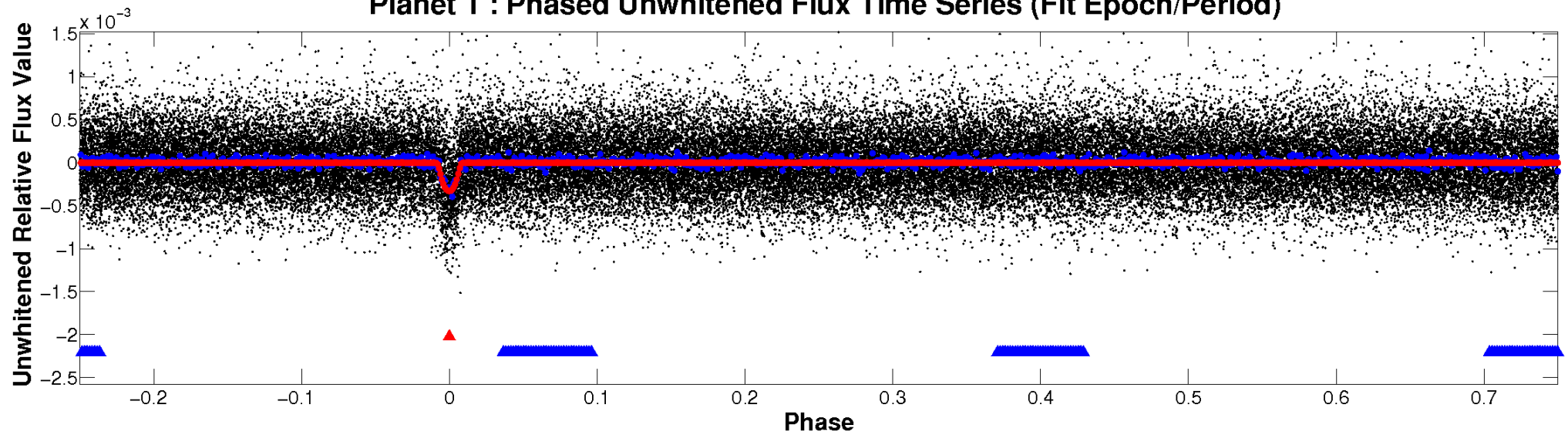
# ALT Odd/Even

TCE 005474613-01

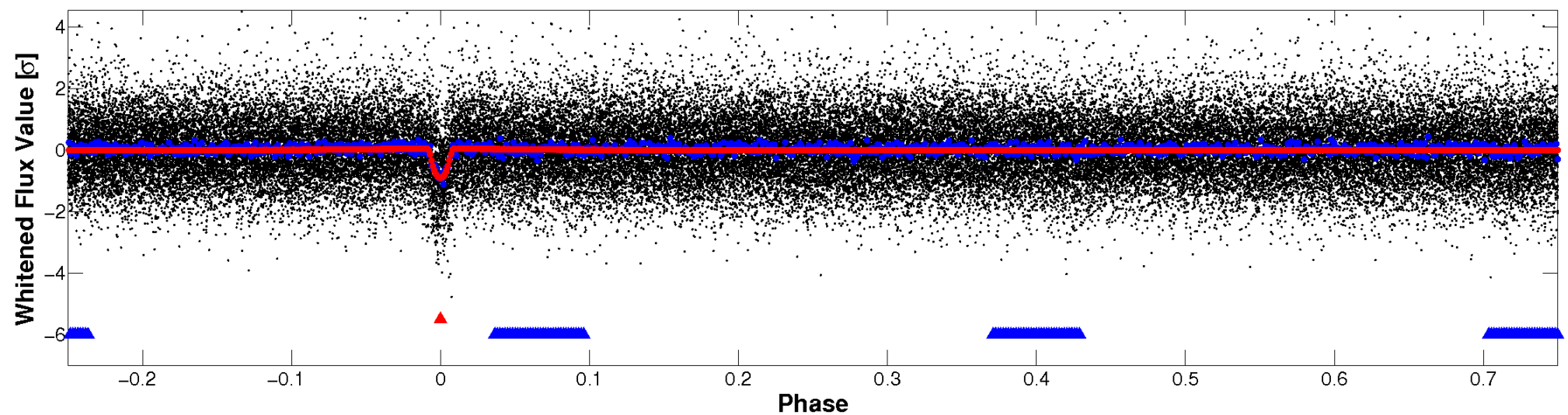


# Non-Whitened Vs. Whitened Light Curve

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



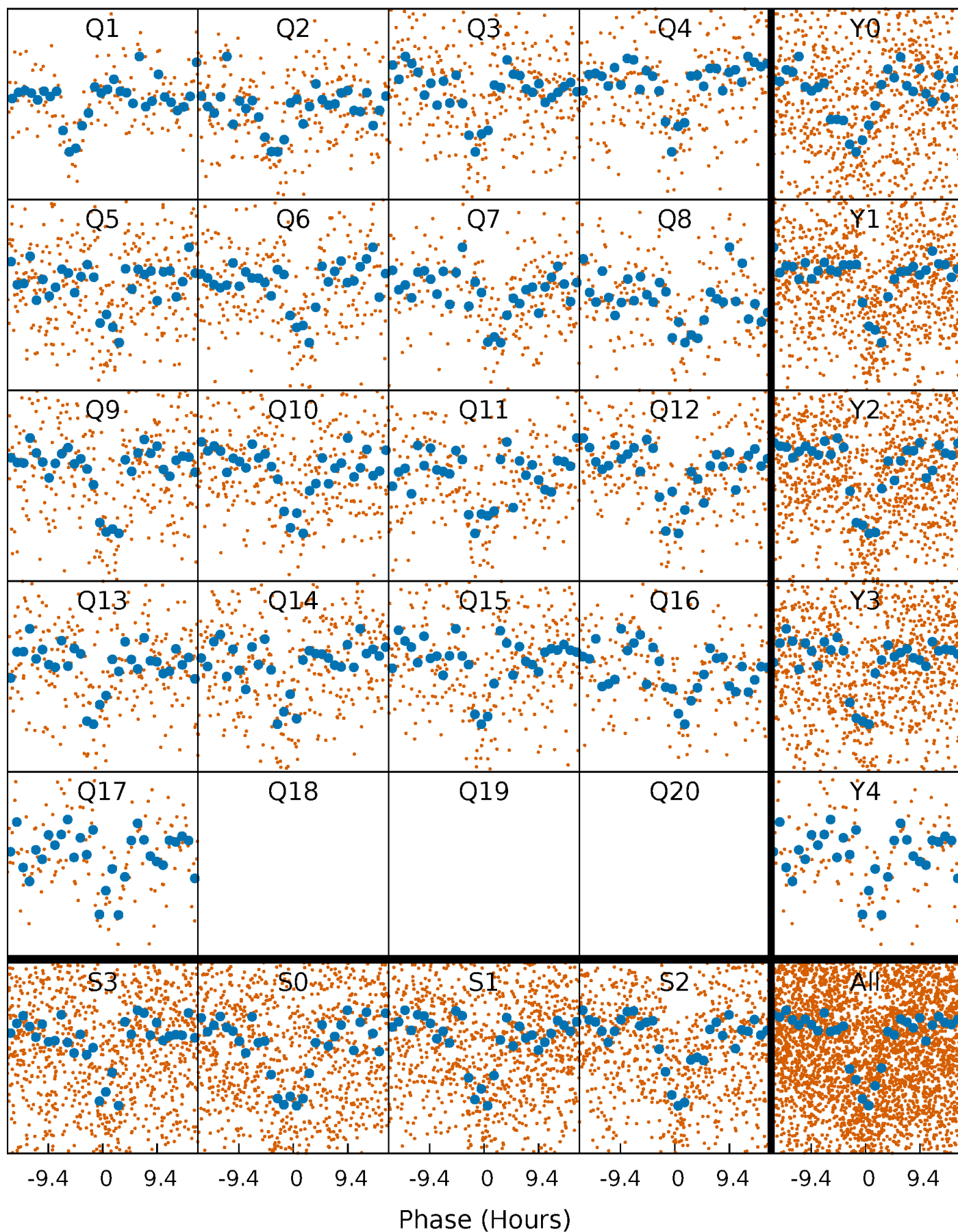
Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

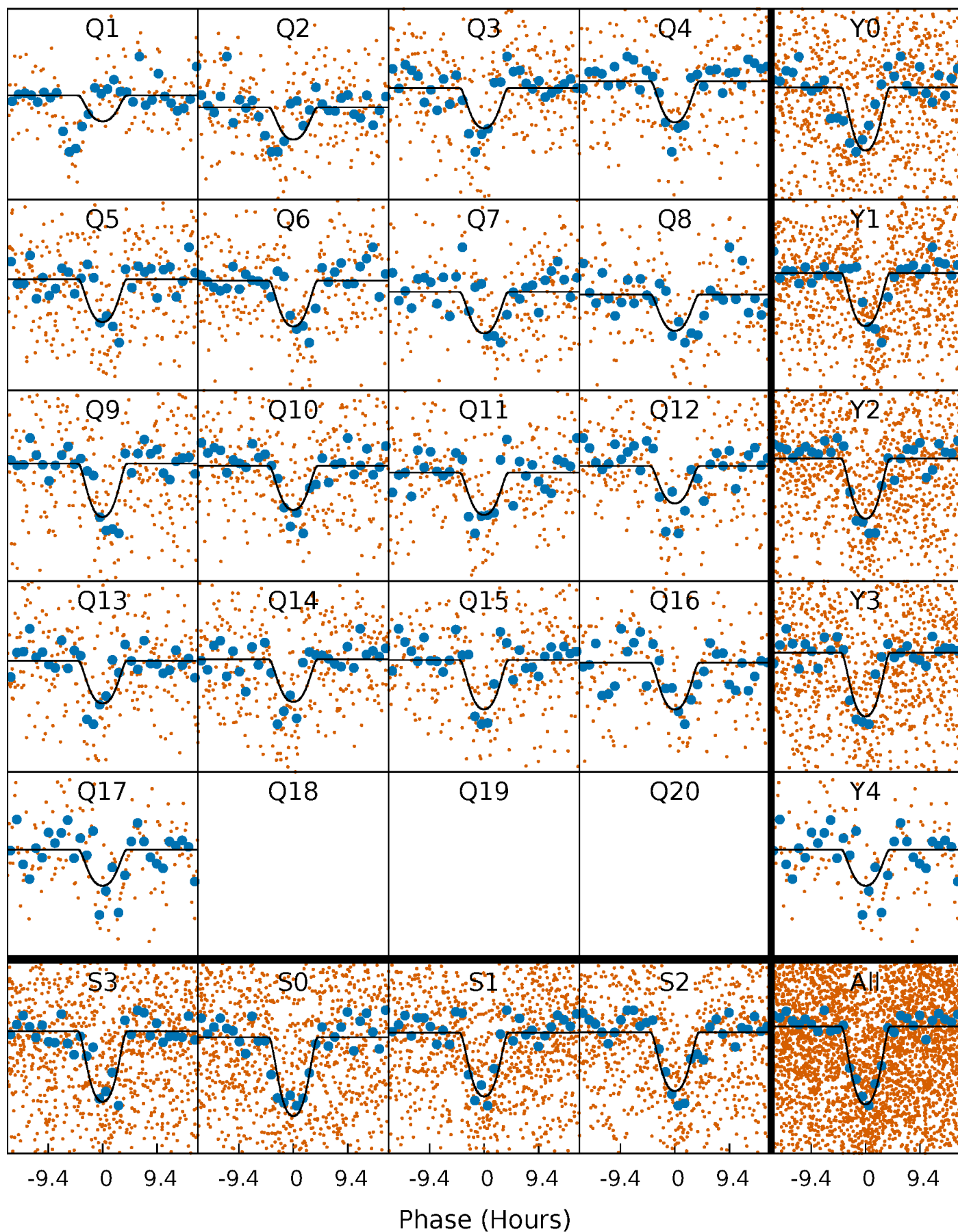
TCE 005474613-01 P= 20.407560 Days  $T_0=140.174954$  (BKJD)





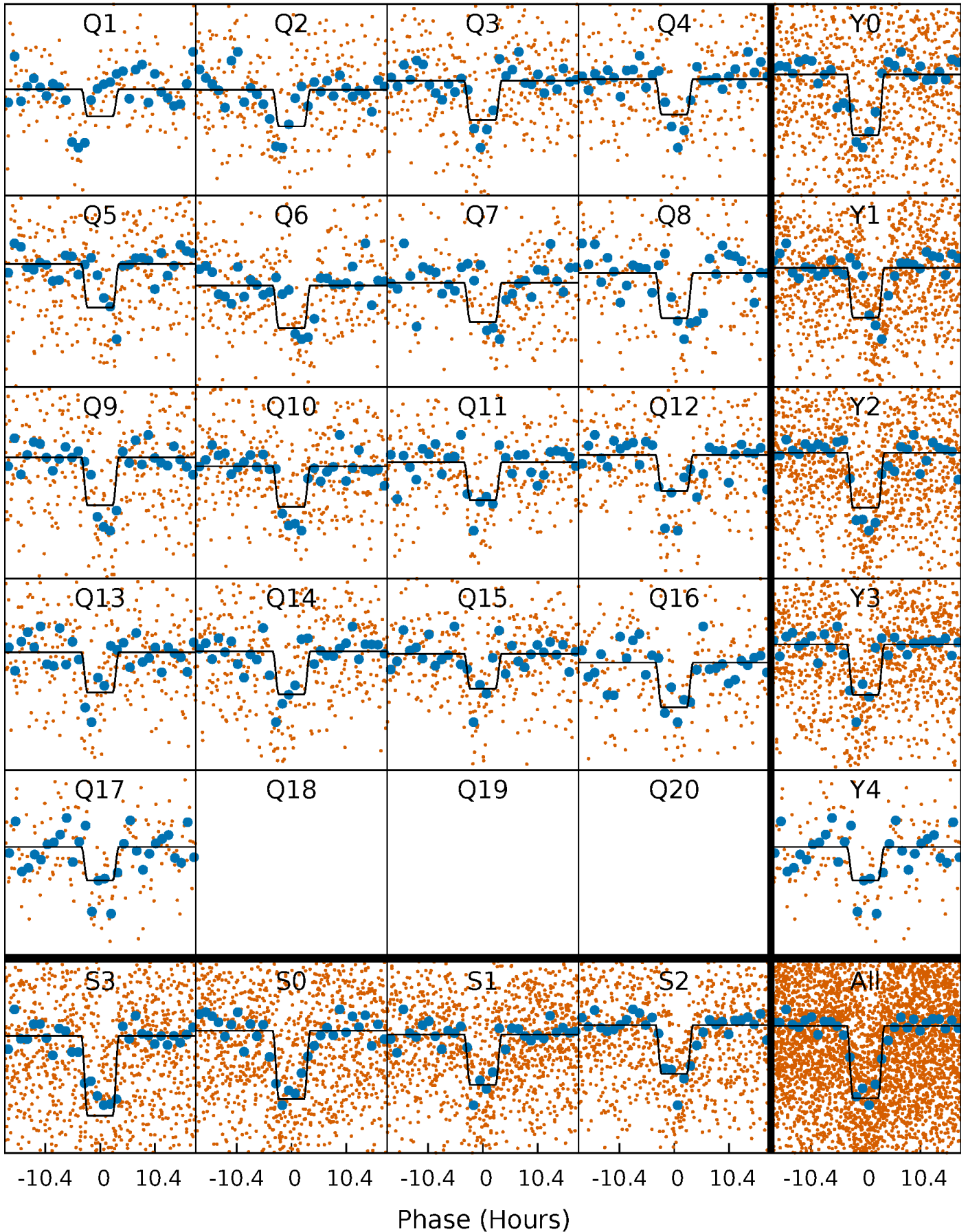
# DV Quarter-Phased Transit Curves

TCE 005474613-01 P= 20.407560 Days  $T_0=140.174954$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

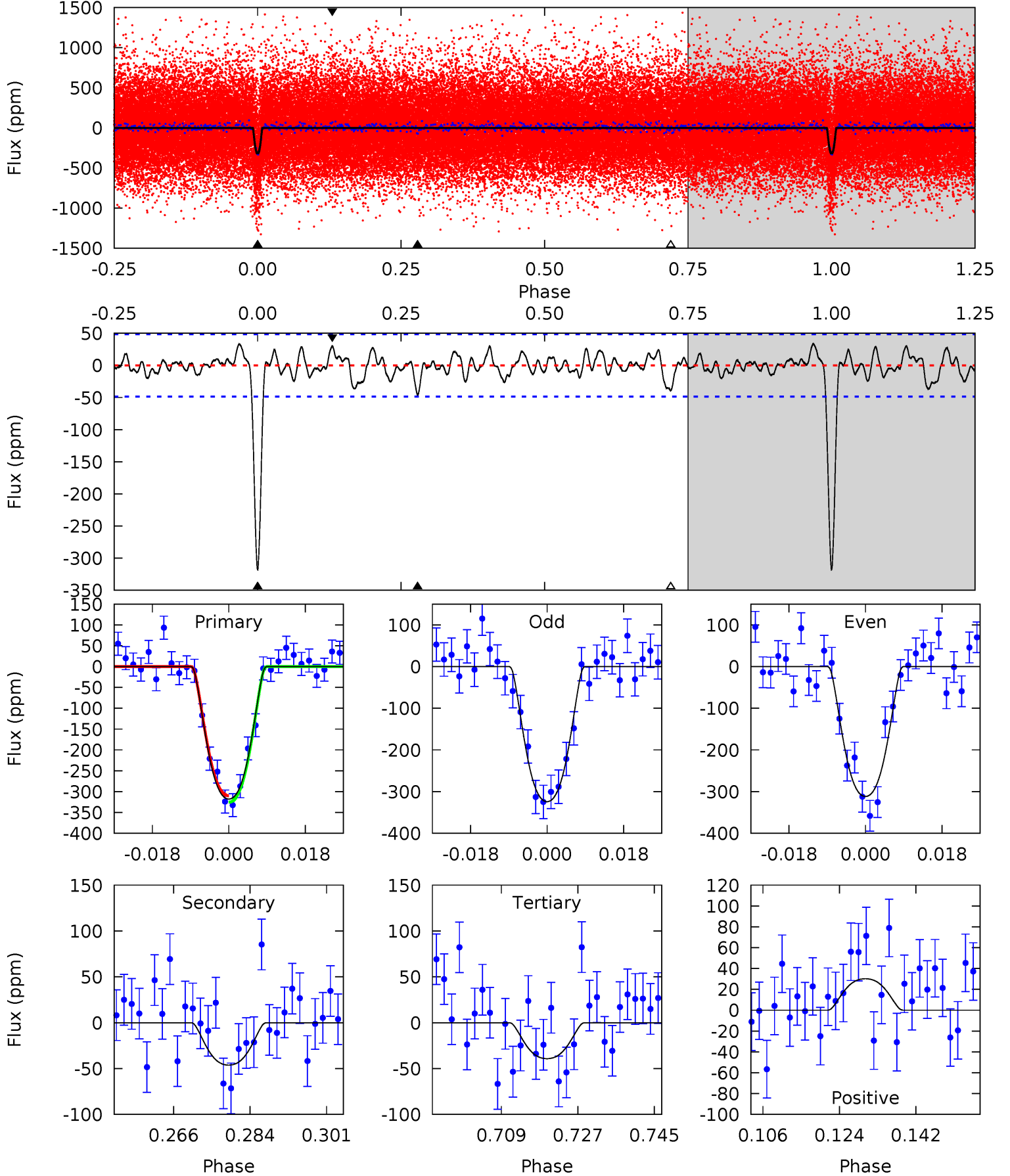
TCE 005474613-01 P= 20.408645 Days  $T_0=140.131024$  (BKJD)



# DV Model-Shift Uniqueness Test

005474613-01, P = 20.407560 Days, E = 119.767394 Days

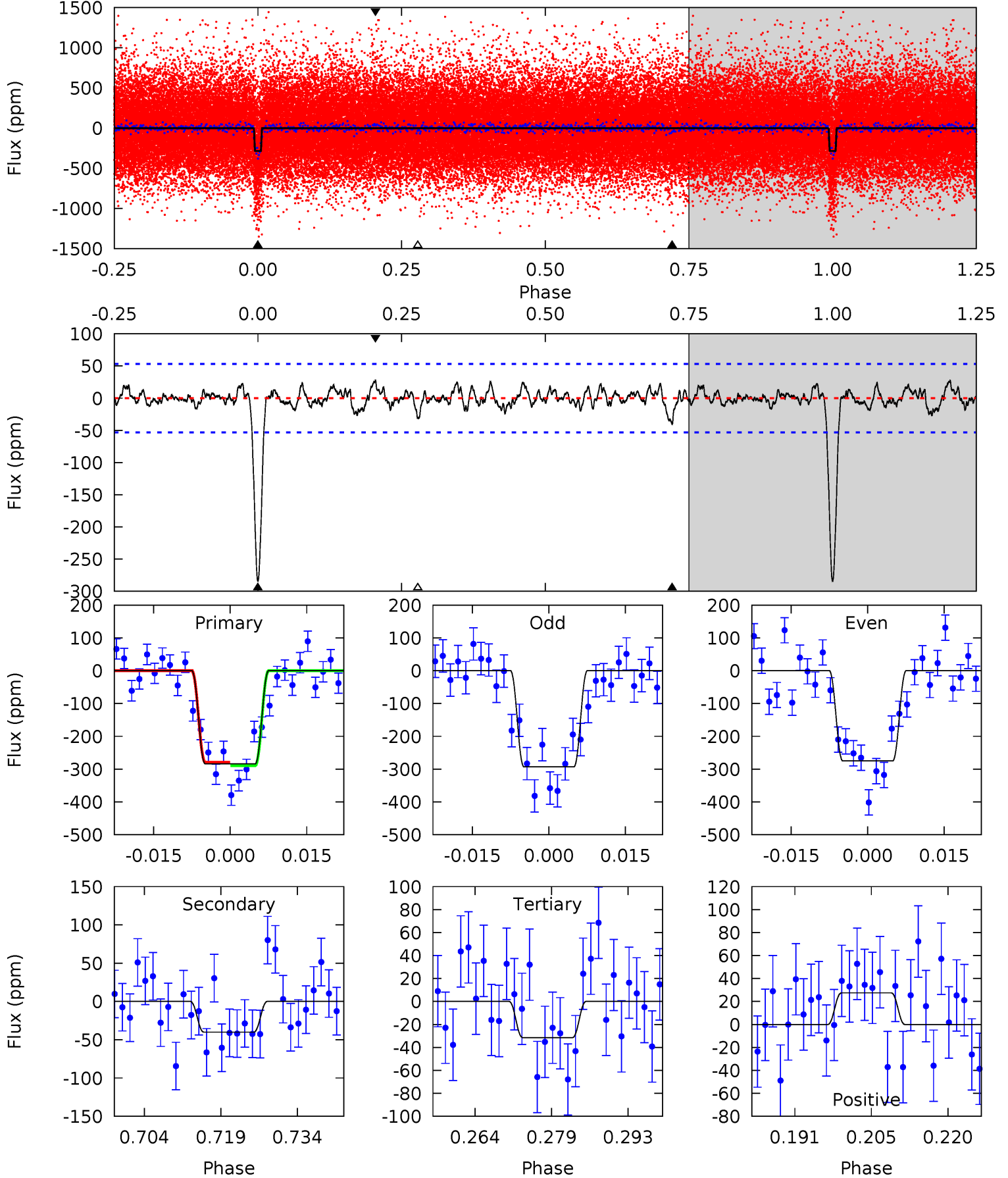
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
32.2	4.69	3.97	3.06	4.92	2.37	1.35	28.2	29.1	0.71	1.63	0.63	0.99	0.10	0.78



# Alt Model-Shift Uniqueness Test

005474613-01, P = 20.408645 Days, E = 119.722379 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
26.5	3.74	2.93	2.56	4.95	2.44	0.94	23.6	23.9	0.81	1.18	0.84	1.01	0.09	0.47





### Stellar Parameters For KIC 005474613

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5823^{+158}_{-193}$	$4.472^{+0.052}_{-0.208}$	$0.060^{+0.250}_{-0.300}$	$0.972^{+0.291}_{-0.104}$	$1.020^{+0.115}_{-0.127}$	$1.566^{+0.446}_{-0.833}$
	+3%/-3%	+1%/-5%	+417%/-500%	+30%/-11%	+11%/-12%	+29%/-53%
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 005474613-01 / KOI 1599.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-46 \pm 10$	$2.59^{+0.55}_{-0.46}$	$945^{+67}_{-51}$	$3579^{+255}_{-197}$	$79^{+43}_{-27}$
Alt.	$-40 \pm 11$	$1.98^{+0.47}_{-0.41}$	$942^{+65}_{-45}$	$3832^{+346}_{-307}$	$116^{+79}_{-45}$

$T_{\text{max}}$  = 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

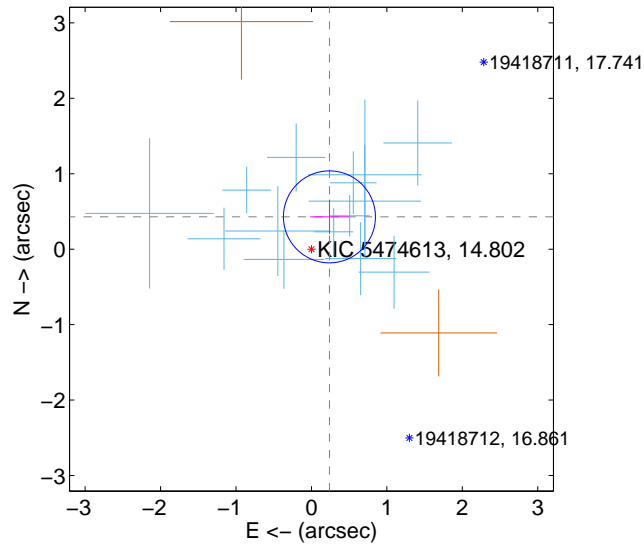
Supplemental centroid analysis for 005474613-01. Kepler magnitude: 14.80. Transit SNR 20.44

There are 14 quarters with good PRF difference image offsets

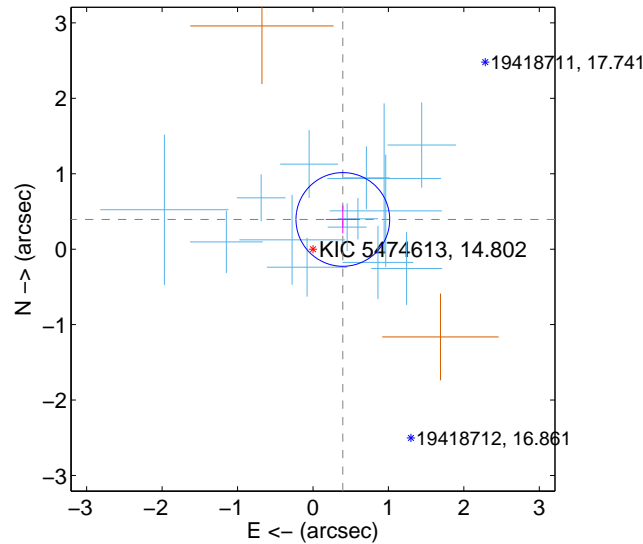
The direct PRF centroid is offset from the target star catalog position by about 0.26 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.490 \pm 0.203$	2.41	$-0.238 \pm 0.254$	$0.428 \pm 0.229$
PRF-fit source offset from KIC position	$0.559 \pm 0.207$	2.70	$-0.396 \pm 0.226$	$0.394 \pm 0.186$
photometric centroid source offset	$0.56 \pm 0.70$	0.79	$0.19 \pm 0.72$	$-0.53 \pm 0.70$

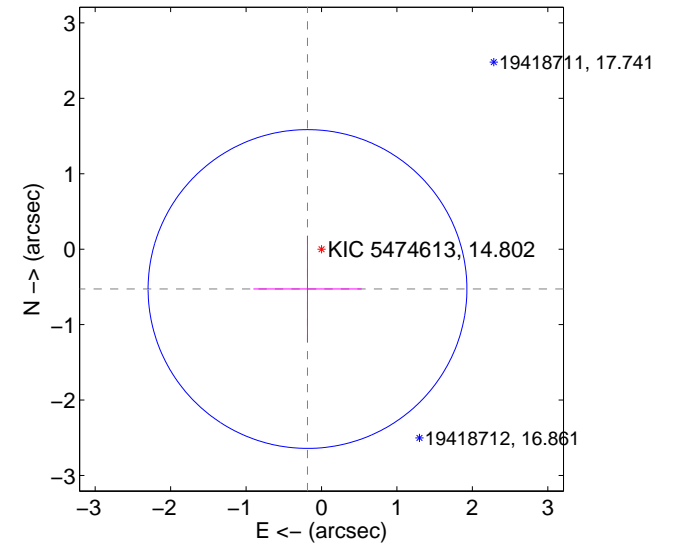
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

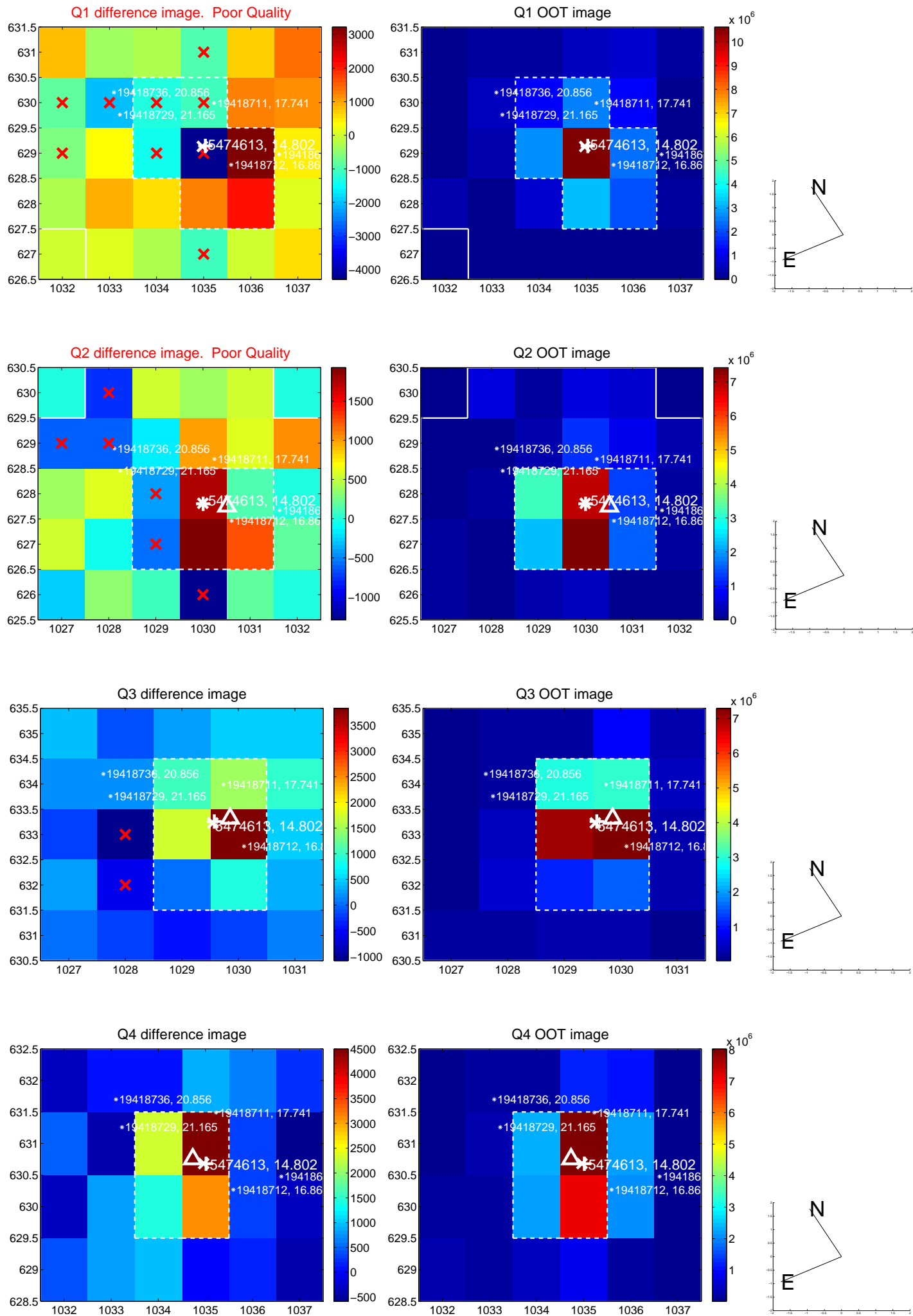


offset from photometric centroids

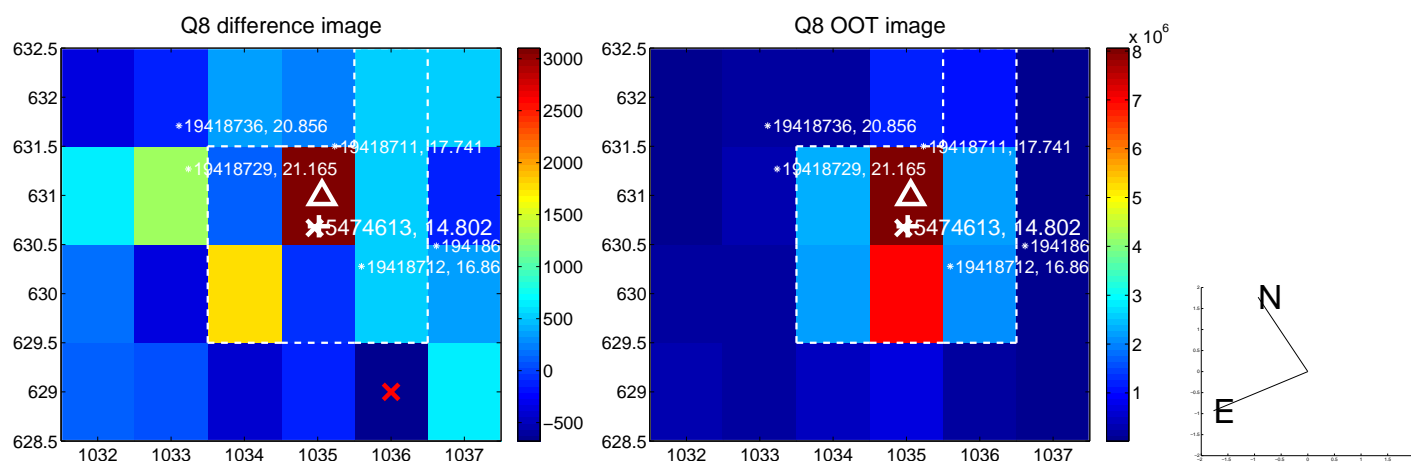
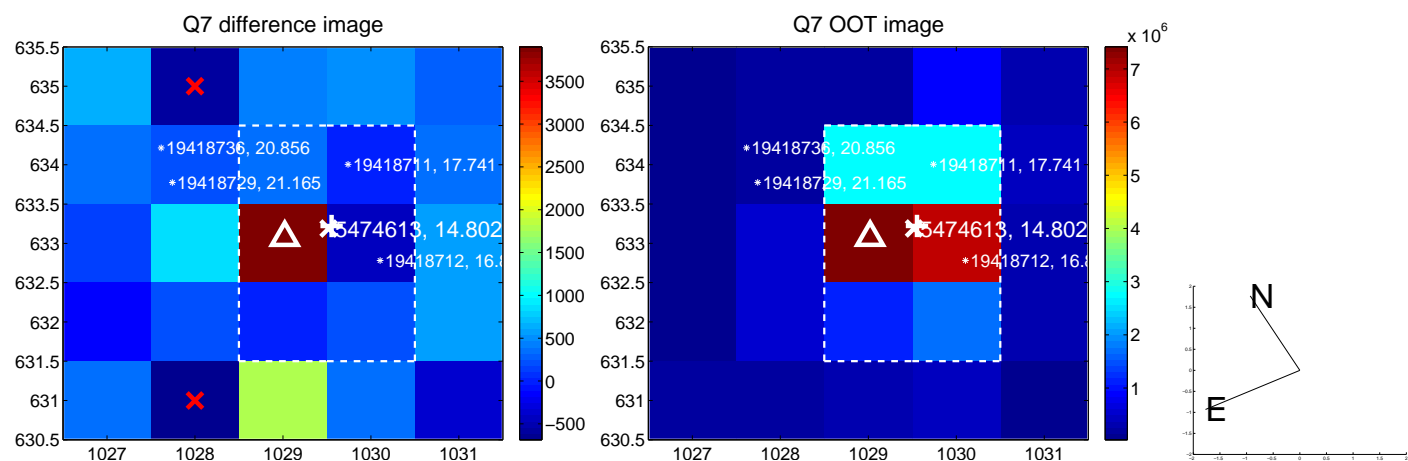
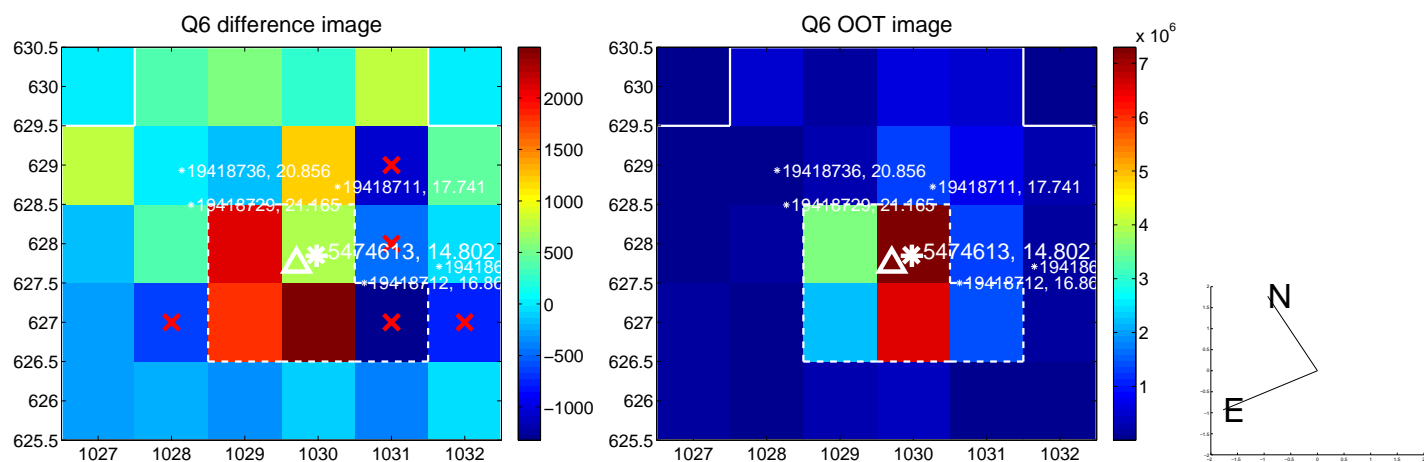
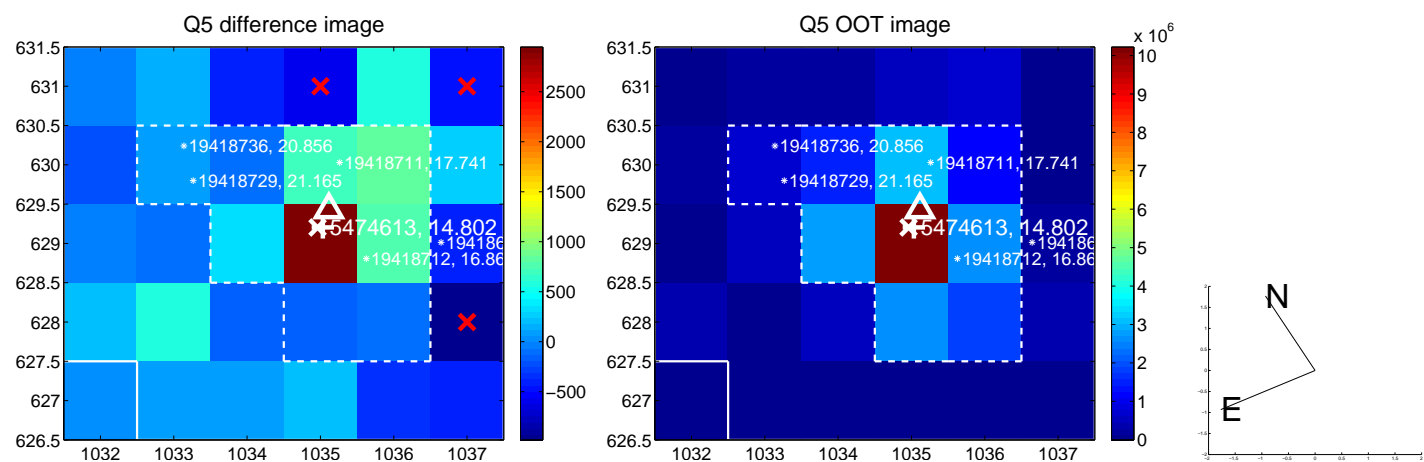


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

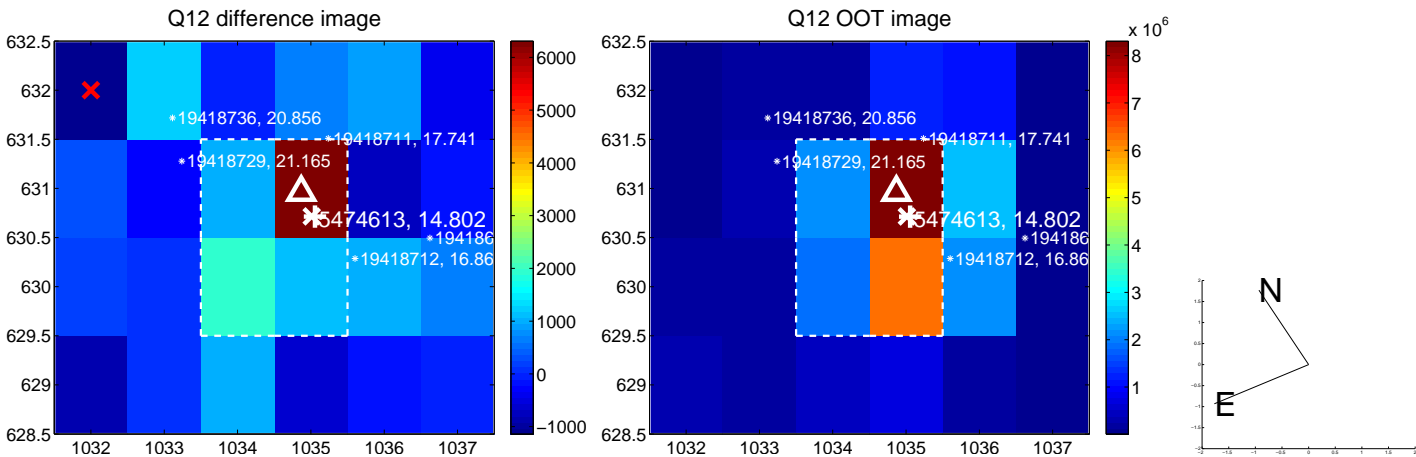
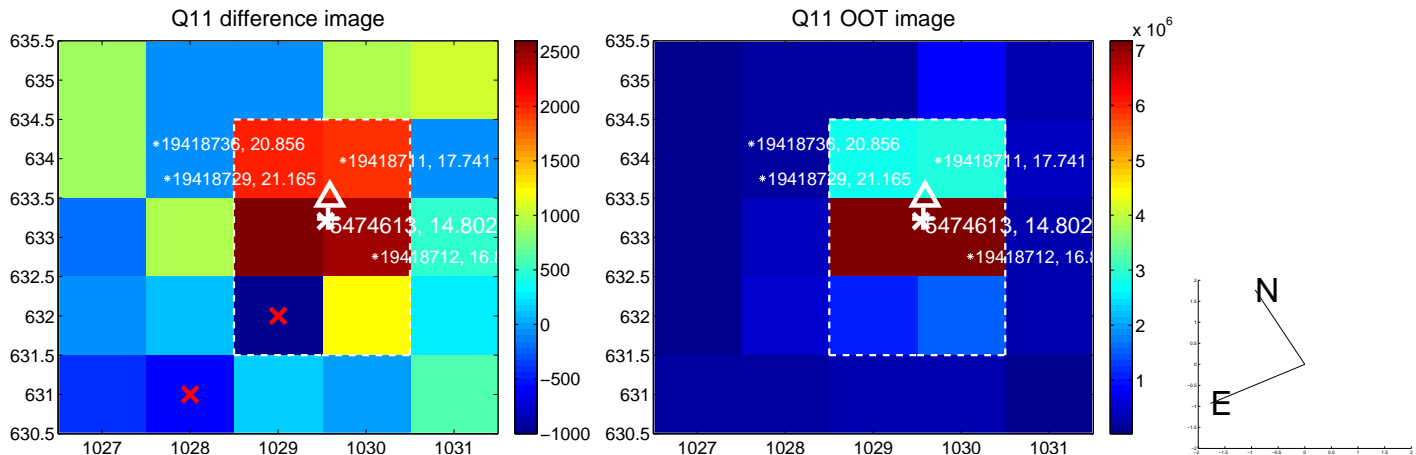
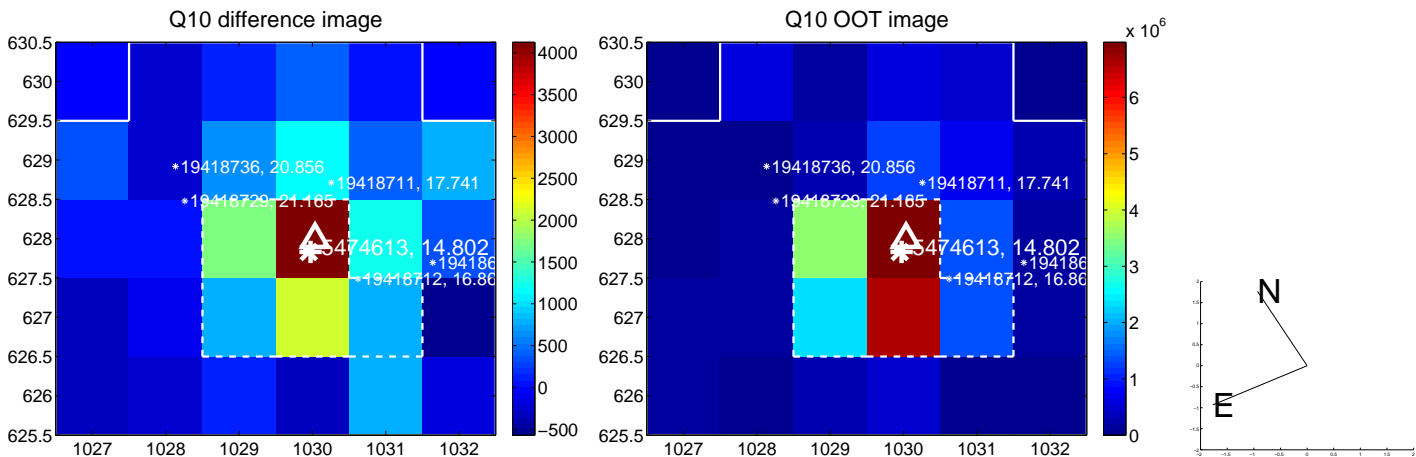
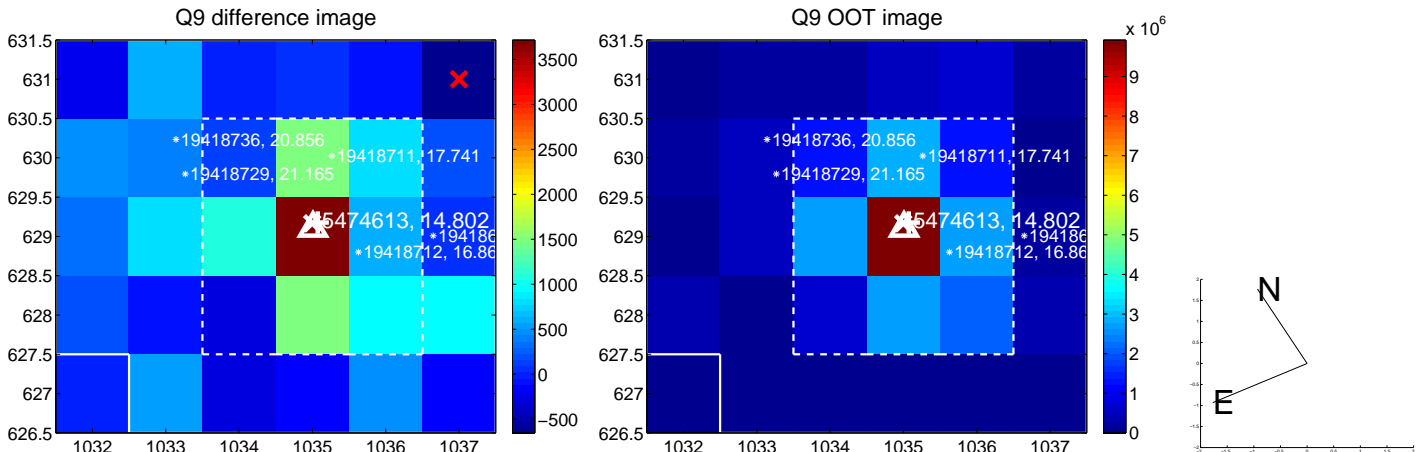


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

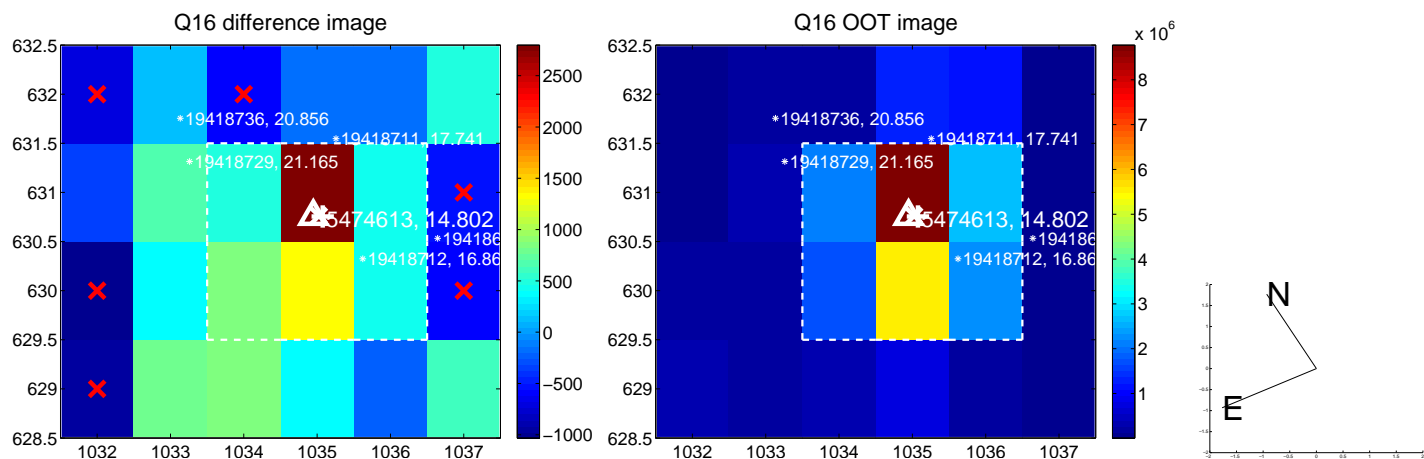
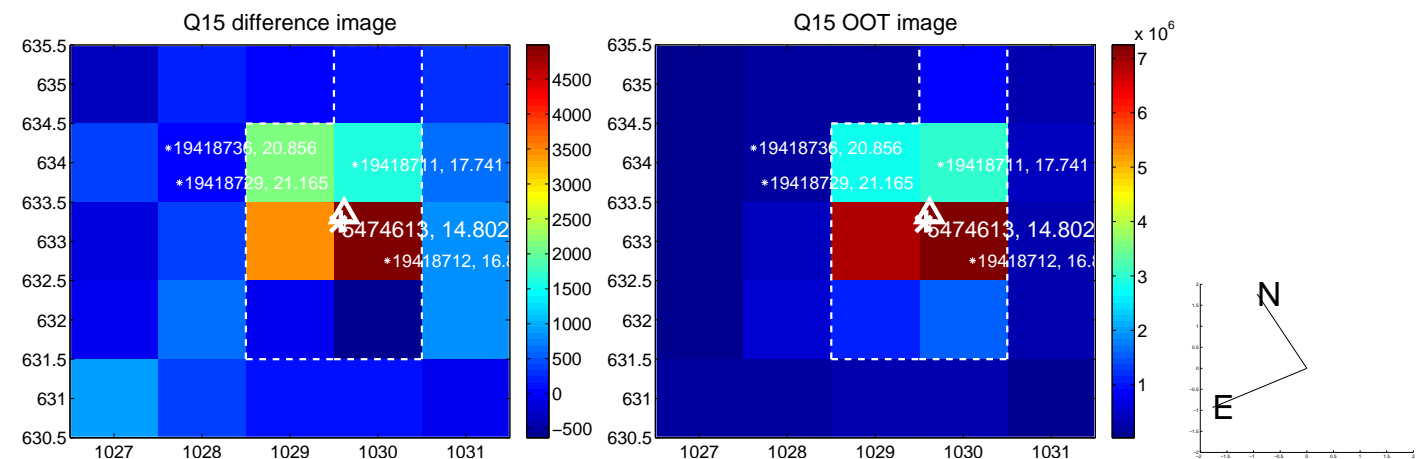
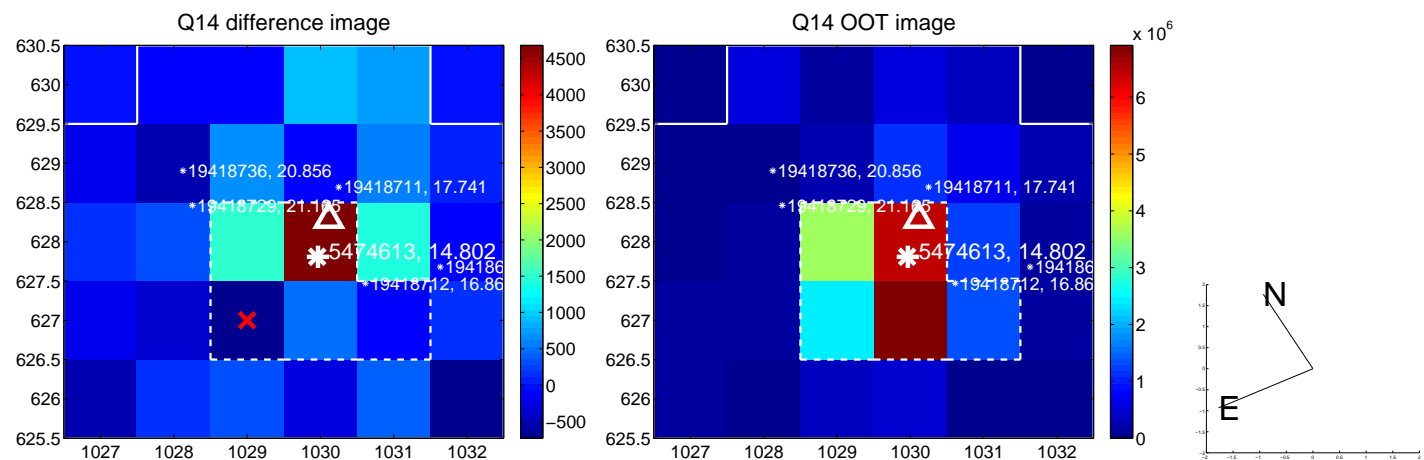
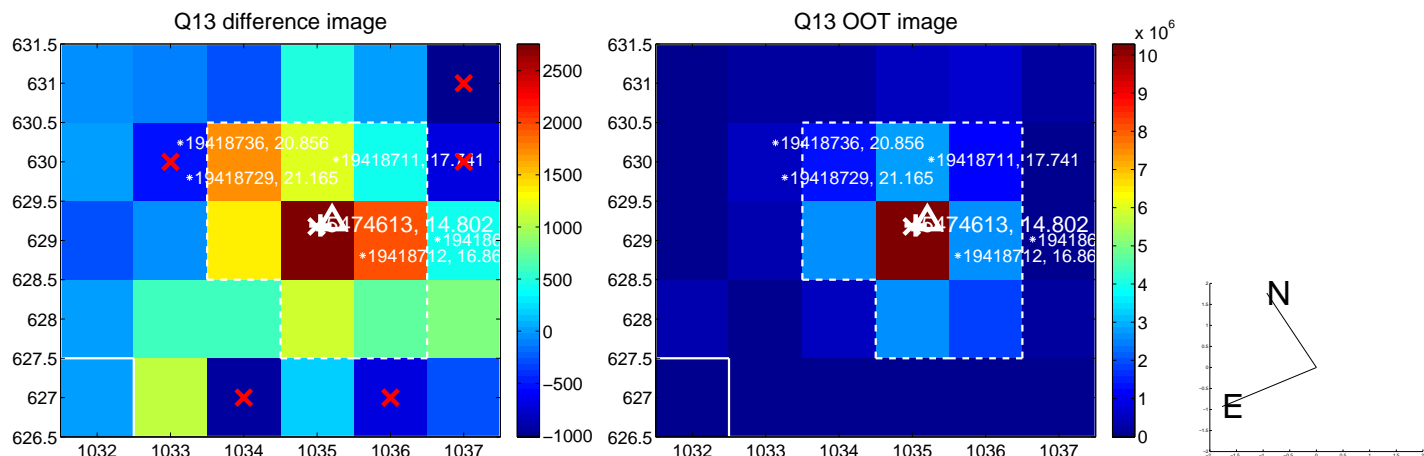




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



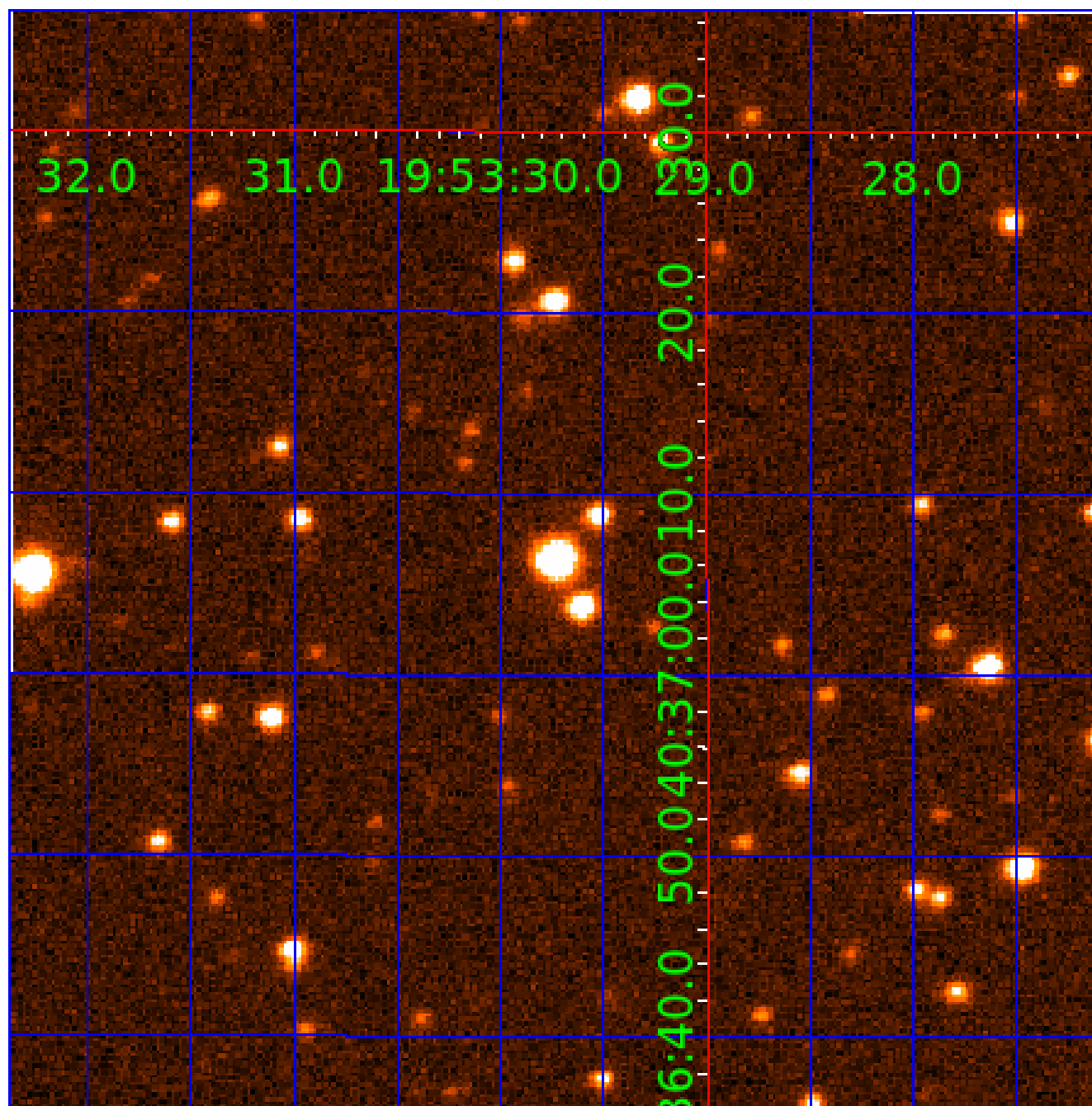
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination





# KIC 005474613

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005474613-01	OBS	1599.01	20.407560	140.174954	330.1	8.233	19.4	20.4	0.97	5823	2.45	44.90
005474613-02	OBS	1599.02	13.616634	140.919898	363.5	5.006	20.2	21.7	0.97	5823	3.52	77.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005474613-01	OBS	PC	0.90	0	0	0	0	NO_COMMENT
005474613-02	OBS	PC	0.99	0	0	0	0	NO_COMMENT

**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.

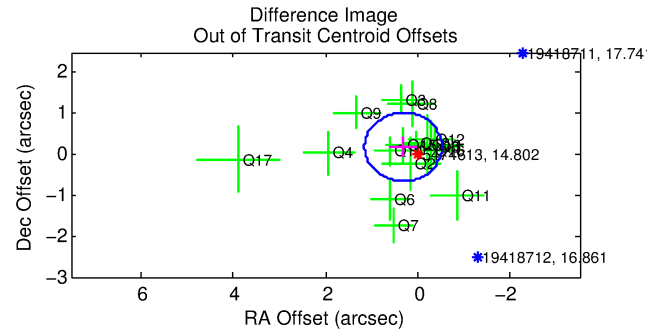
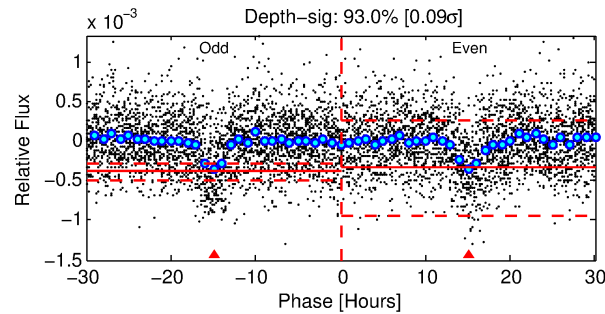
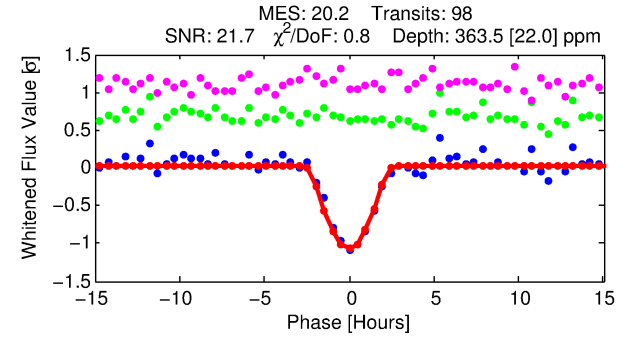
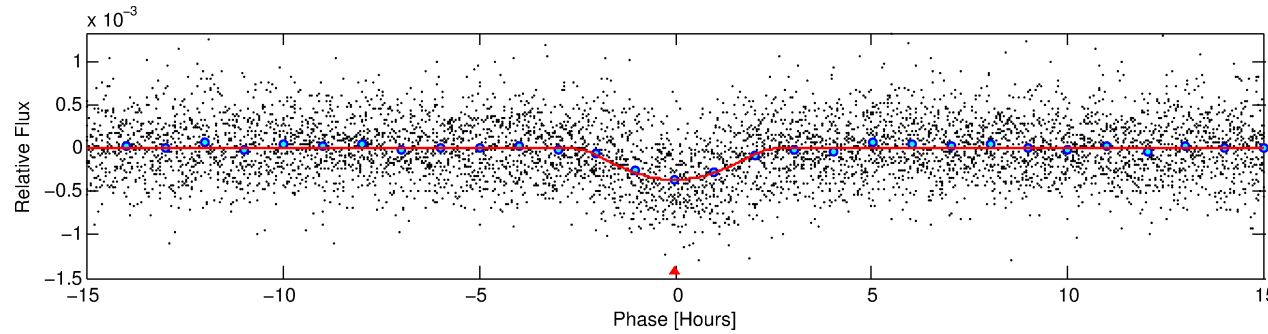
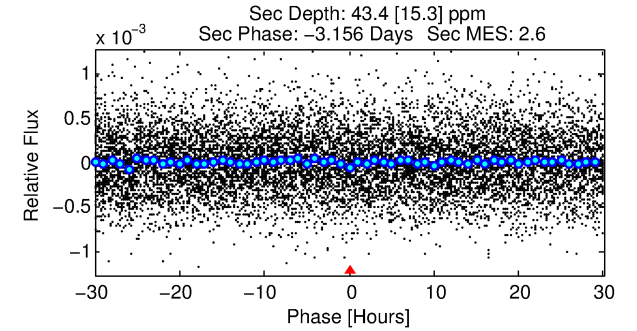
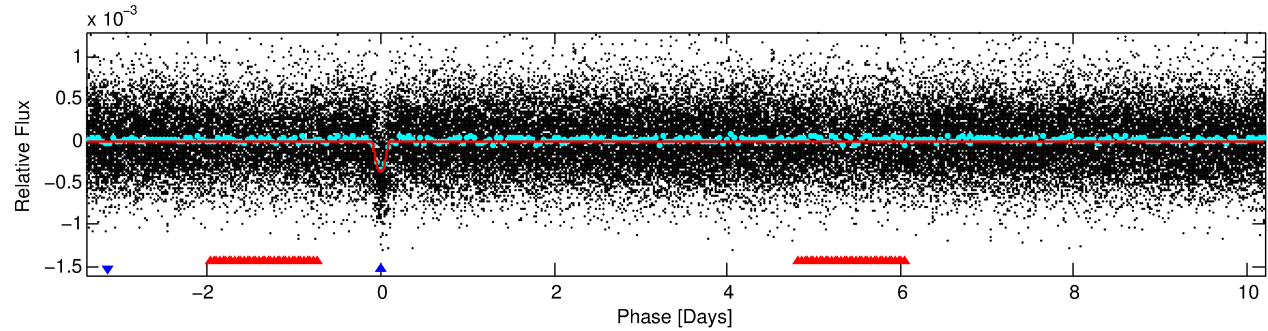
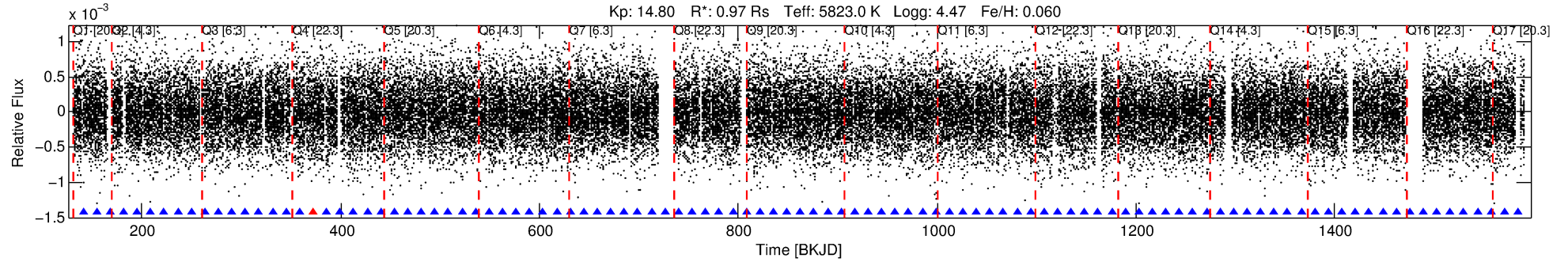
## Ephemeris Match Information For 005474613-02

No Significant Match Found

# DV One-Page Summary

KIC: 5474613 Candidate: 2 of 2 Period: 13.617 d

KOI: K01599.02 Corr: 0.915



## DV Fit Results:

Period = 13.61663 [0.00010] d  
Epoch = 140.9199 [0.0060] BKJD  
Rp/R\* = 0.0332 [0.0508]  
a/R\* = 5.74 [2.36]  
b = 1.00 [0.08]  
Seff = 77.00 [30.74]  
Teq = 755 [75] K  
Rp = 3.52 [5.49] Re  
a = 0.1124 [0.0287] AU  
Ag = 24.35 [75.64] [0.31σ]  
Teffp = 2594 [2002] K [0.92σ]

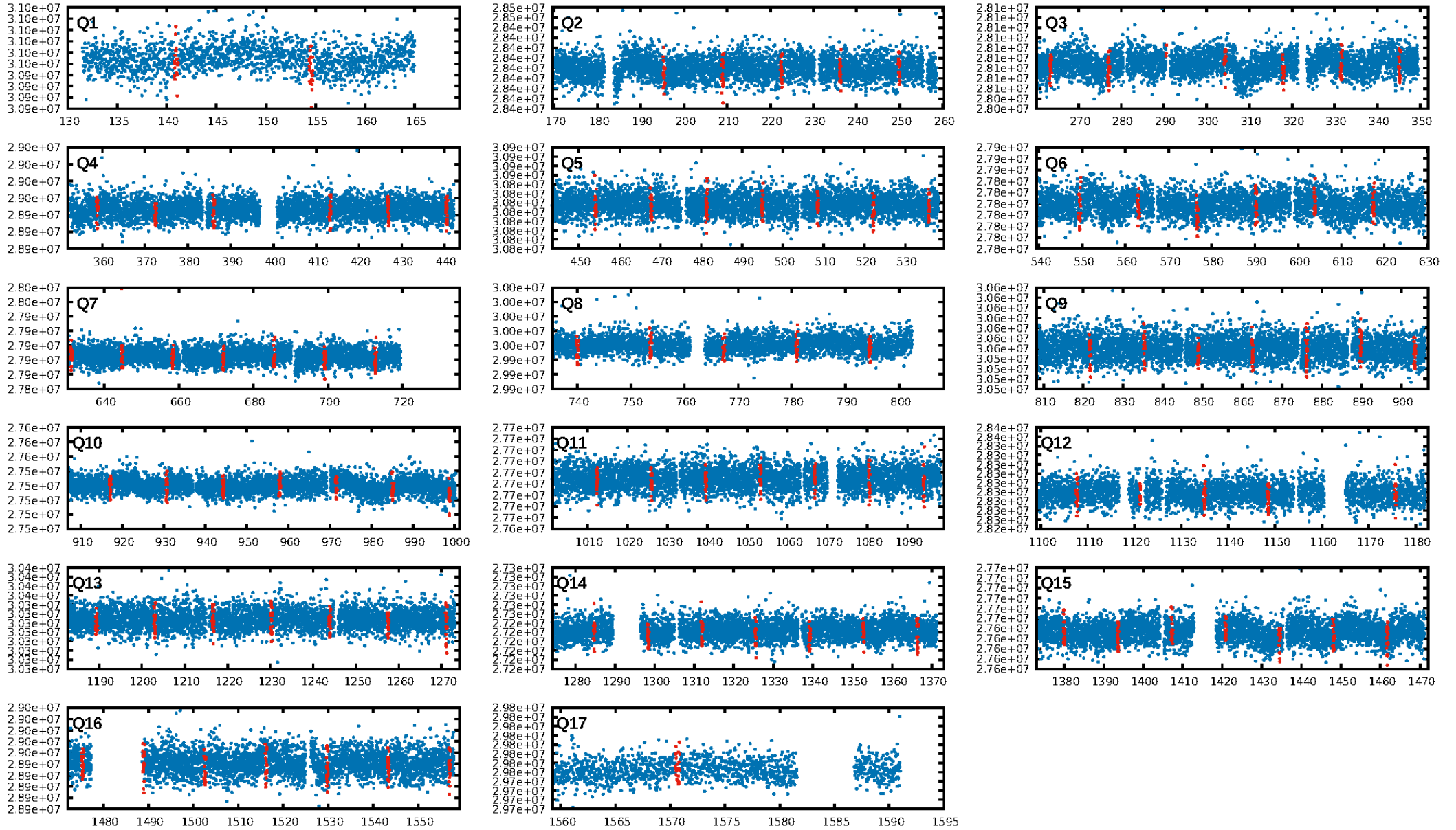
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [16.91σ]  
ModelChiSquare2-sig: 67.2%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.98e-88  
RollingBand-fgt: 0.99 [94/95]  
GhostDiagnostic-chr: 3.683  
Centroid-sig: 37.0%  
Centroid-so: 0.165 arcsec [0.23σ]  
OotOffset-rm: 0.367 arcsec [1.32σ]  
KicOffset-rm: 0.235 arcsec [0.92σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.88 [14/16]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 12:58:53 Z

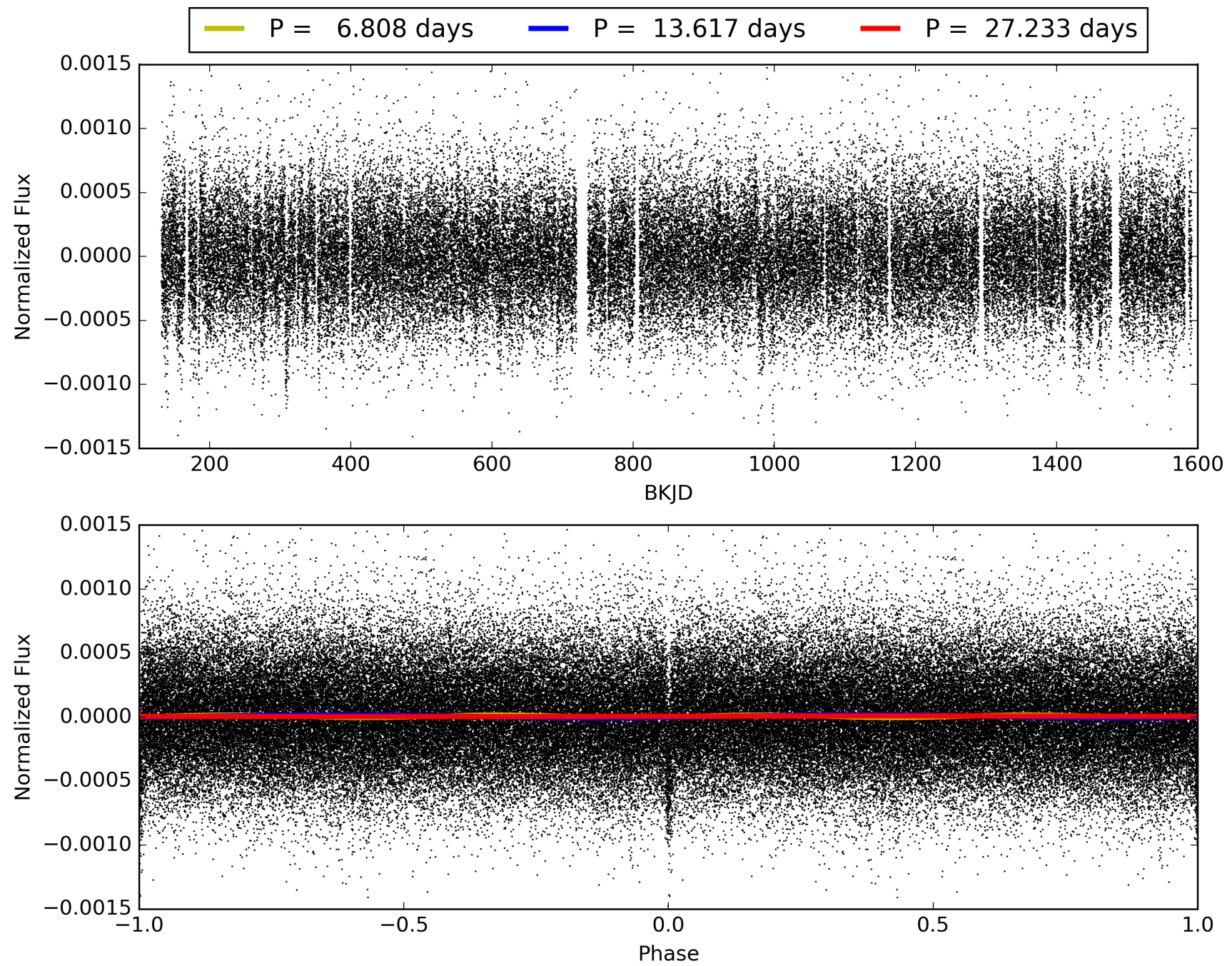
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 005474613-02, PDC Light Curves





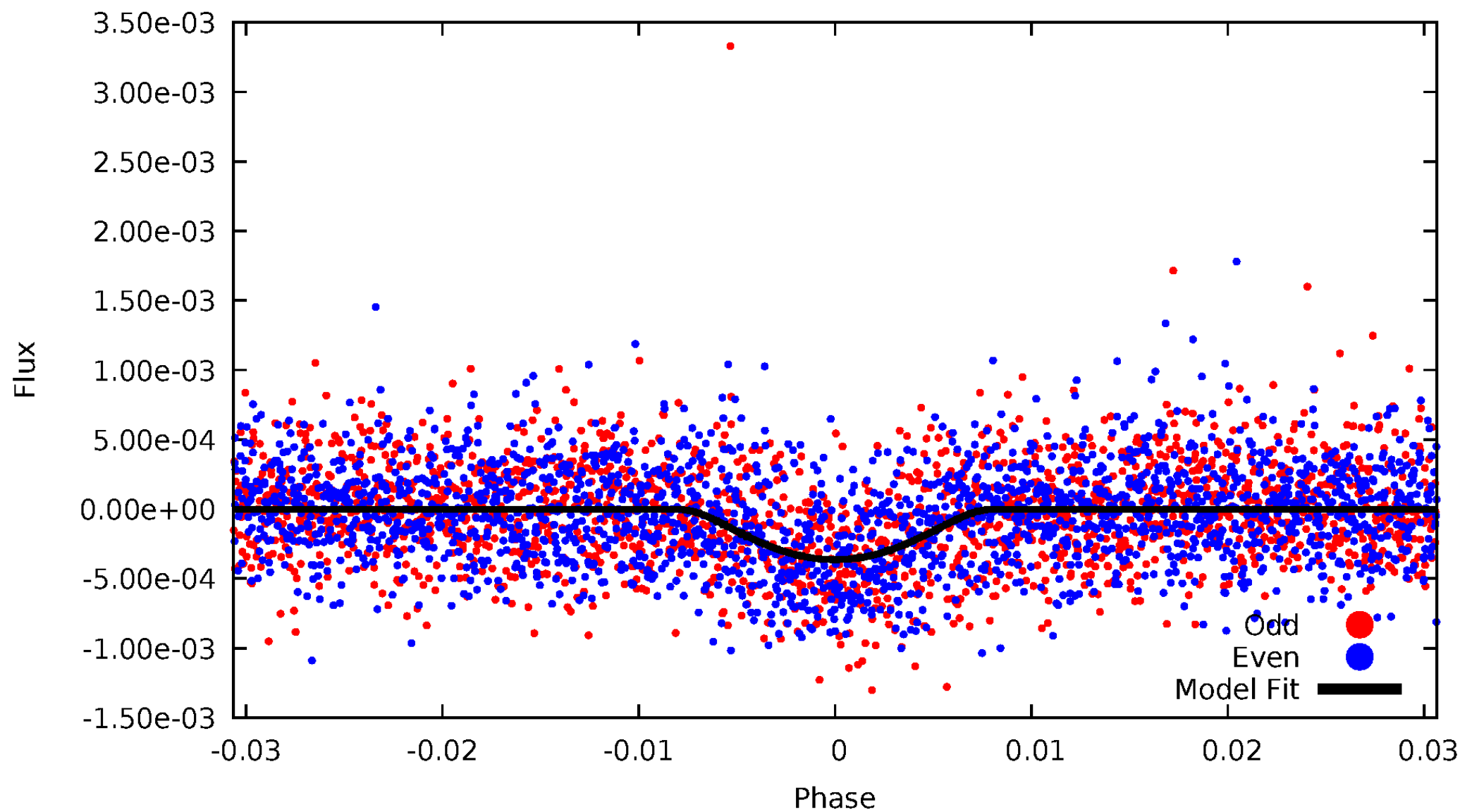
TCE 005474613-02





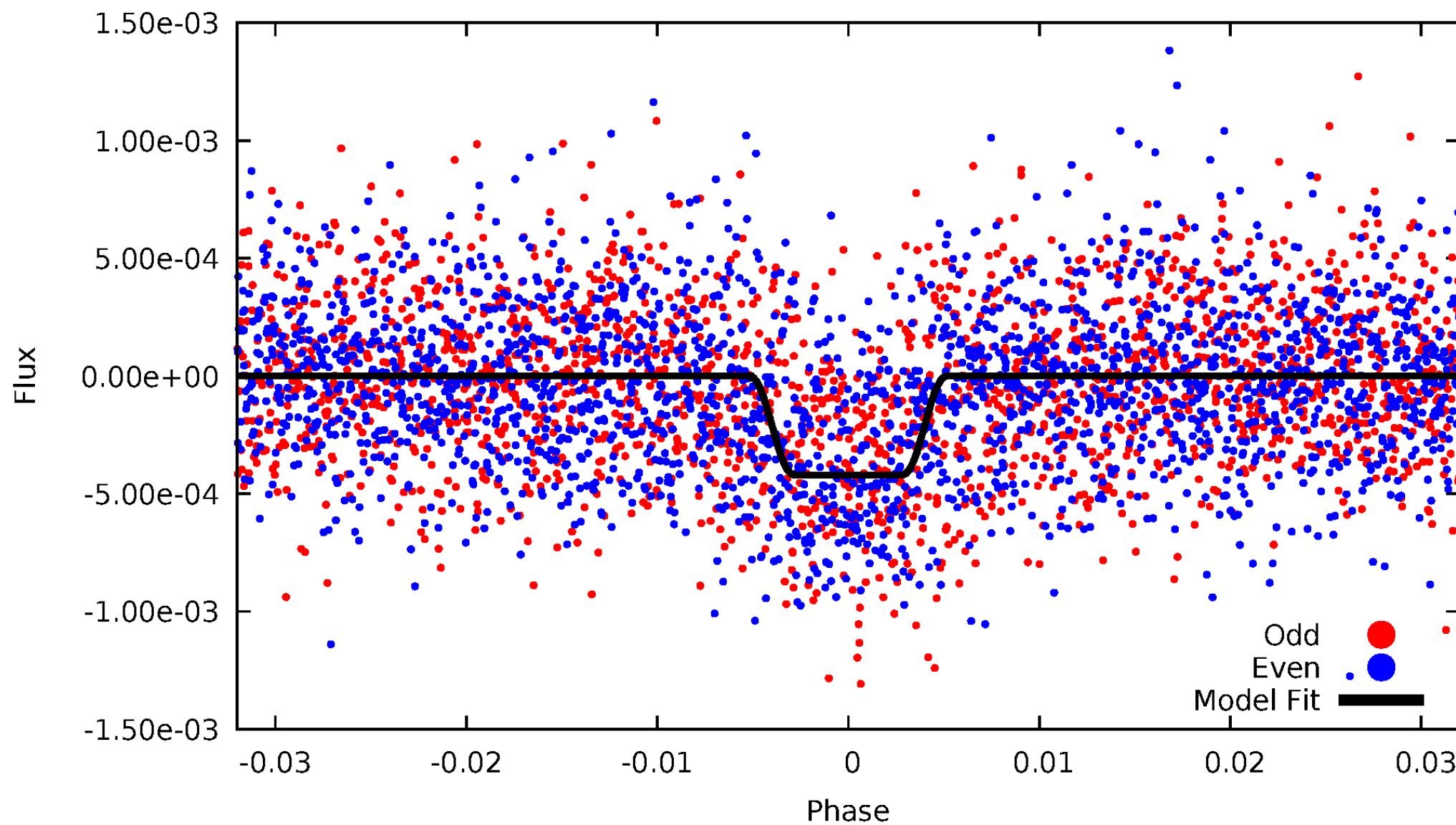
# DV Odd/Even

TCE 005474613-02



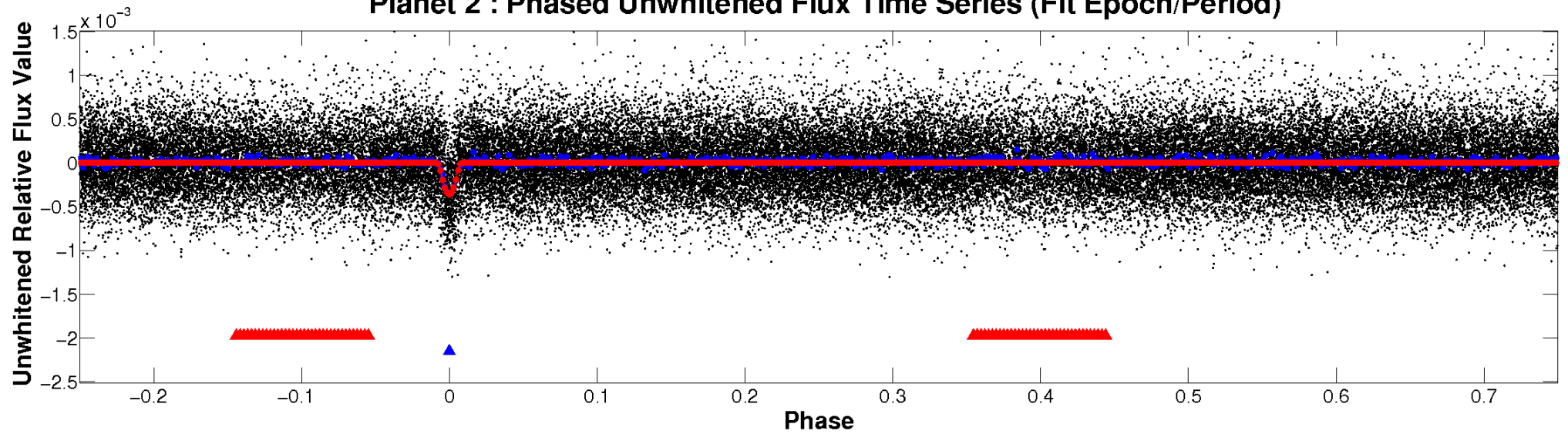
# ALT Odd/Even

TCE 005474613-02

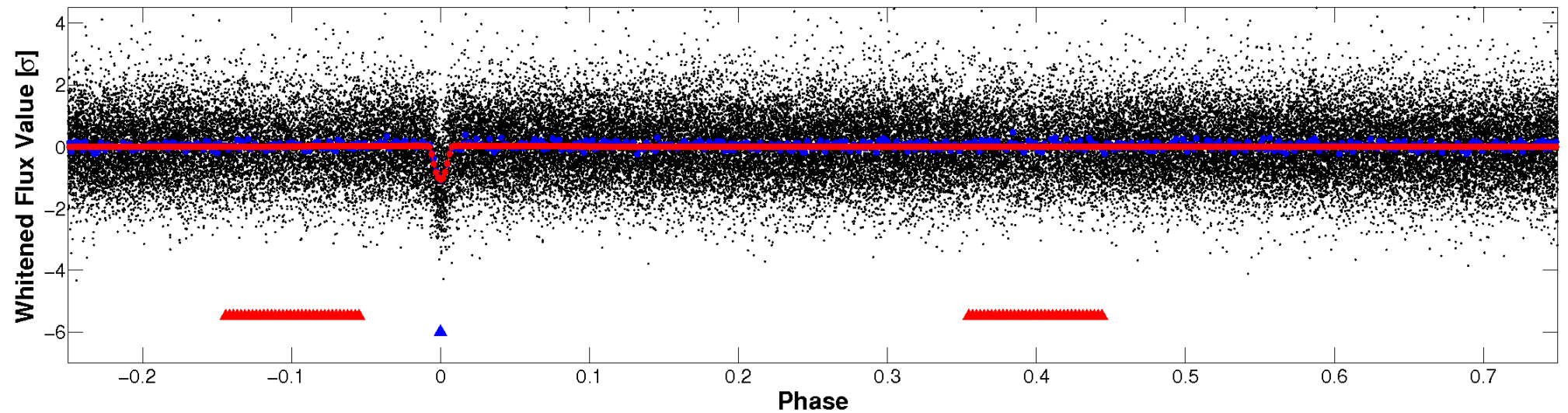


# Non-Whitened Vs. Whitened Light Curve

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

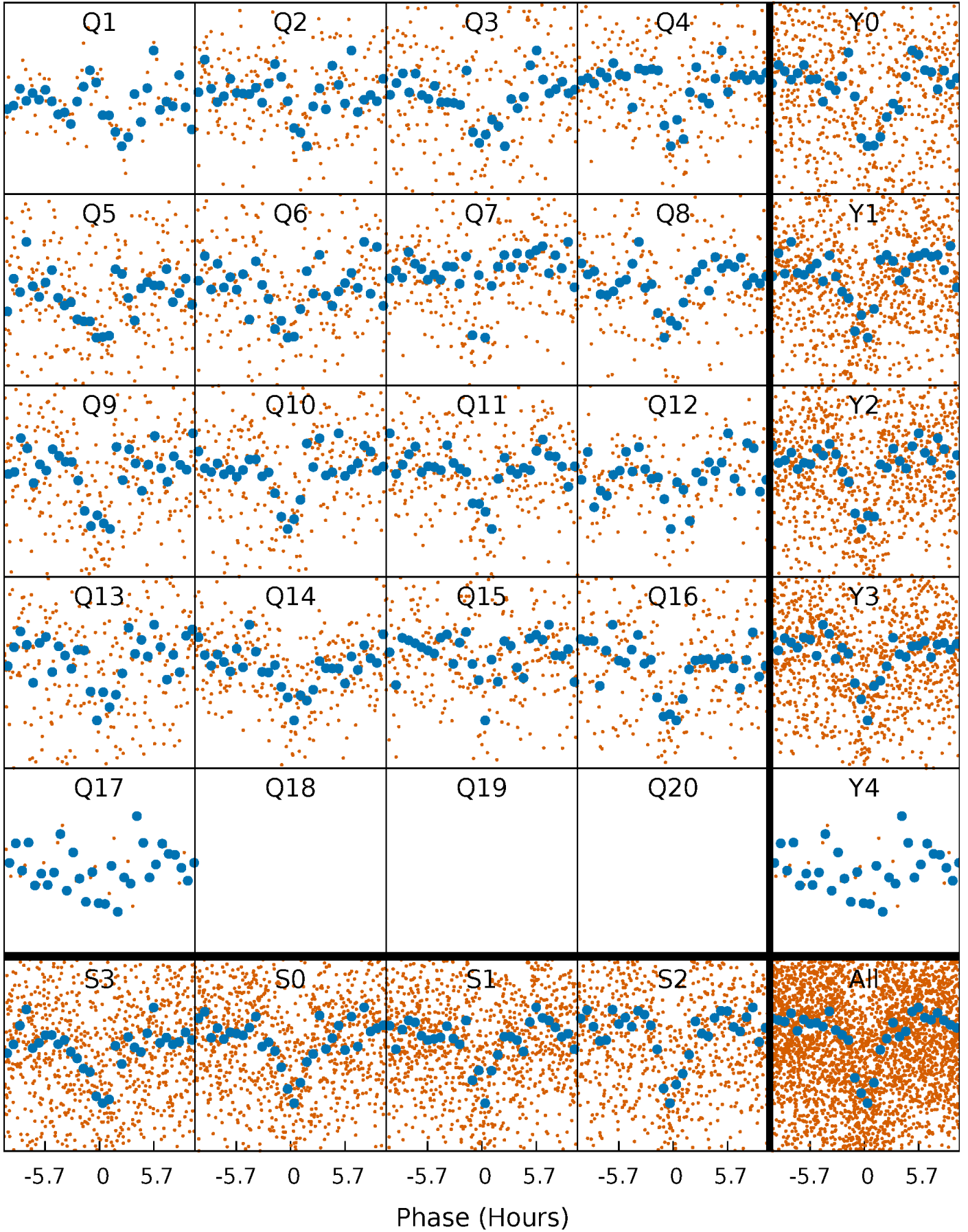


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



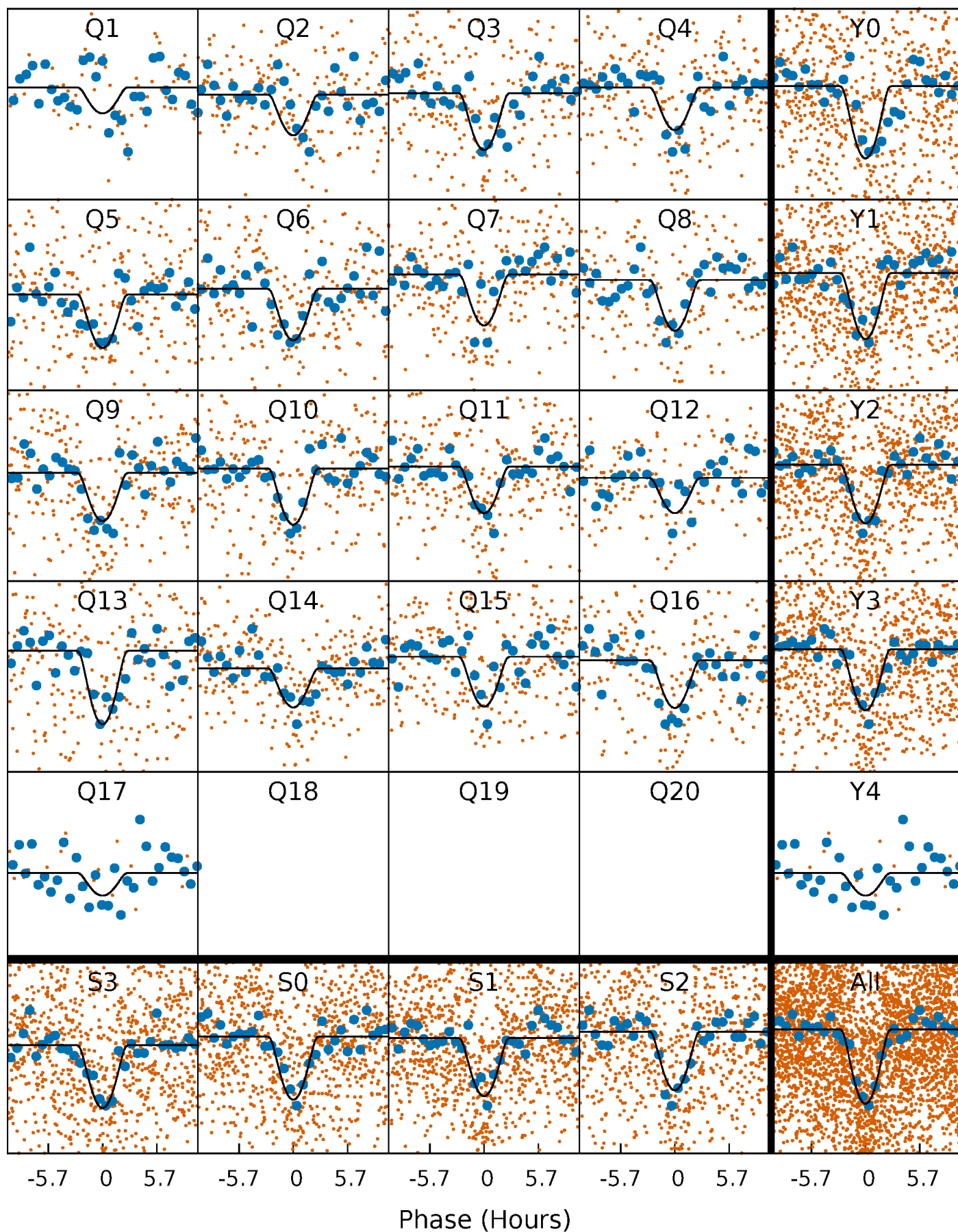
# PDC Quarter-Phased Transit Curves

TCE 005474613-02 P= 13.616634 Days  $T_0=140.919898$  (BKJD)



# DV Quarter-Phased Transit Curves

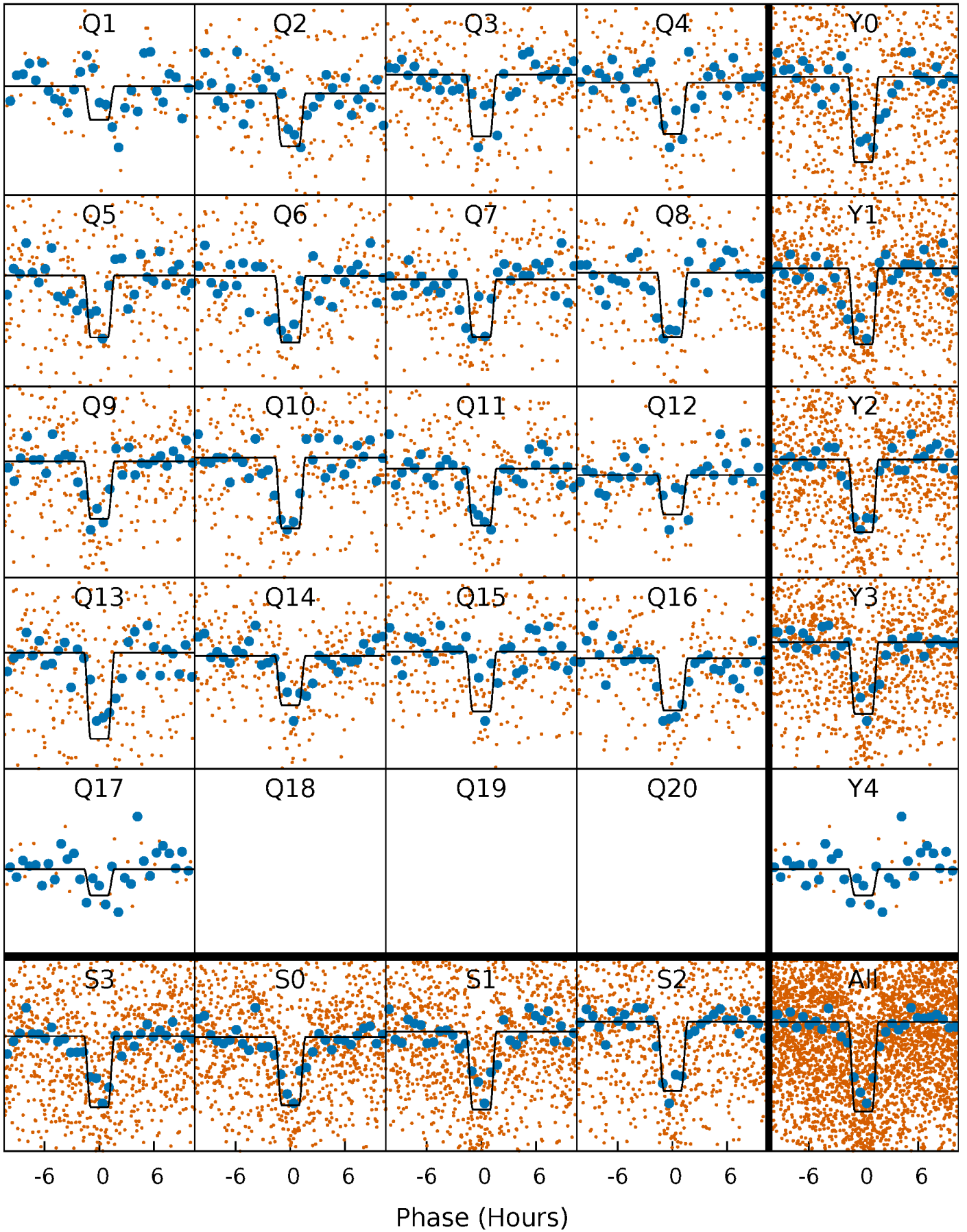
TCE 005474613-02 P= 13.616634 Days  $T_0=140.919898$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 005474613-02 P= 13.616416 Days  $T_0=140.936898$  (BKJD)

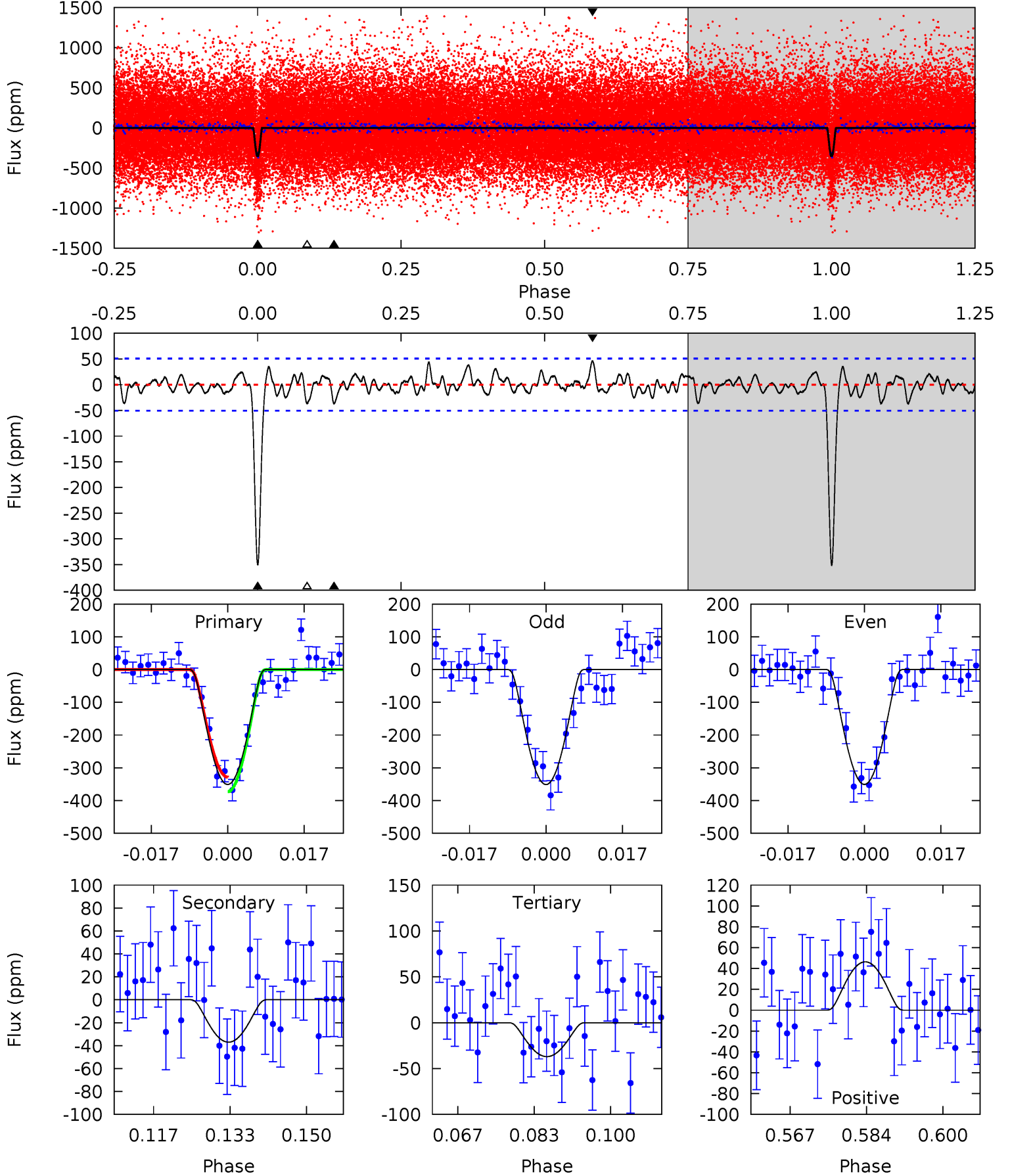




# DV Model-Shift Uniqueness Test

005474613-02,  $P = 13.616634$  Days,  $E = 127.303264$  Days

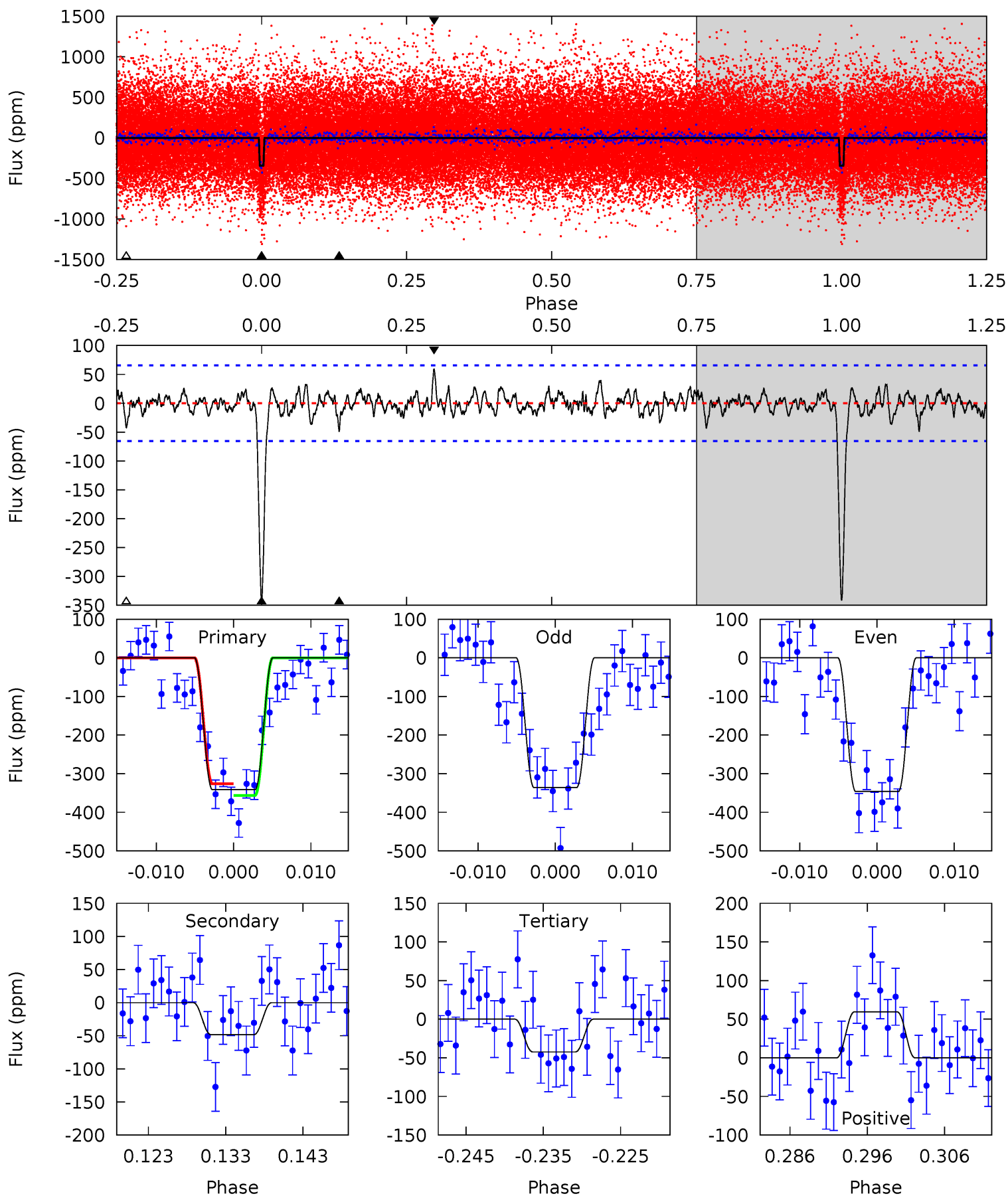
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
34.1	3.60	3.60	4.52	4.93	2.39	1.32	30.5	29.6	0.00	-0.92	0.02	0.98	0.12	2.17



# Alt Model-Shift Uniqueness Test

005474613-02, P = 13.616416 Days, E = 127.320482 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
26.2	3.73	3.26	4.57	5.02	2.57	1.05	22.9	21.6	0.47	-0.84	0.39	0.95	0.15	1.16



### Stellar Parameters For KIC 005474613

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5823^{+158}_{-193}$	$4.472^{+0.052}_{-0.208}$	$0.060^{+0.250}_{-0.300}$	$0.972^{+0.291}_{-0.104}$	$1.020^{+0.115}_{-0.127}$	$1.566^{+0.446}_{-0.833}$
	+3%/-3%	+1%/-5%	+417%/-500%	+30%/-11%	+11%/-12%	+29%/-53%
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 005474613-02 / KOI 1599.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-37 \pm 10$	$5.46^{+5.44}_{-3.42}$	$1074^{+80}_{-54}$	$2757^{+953}_{-439}$	$8.284^{+47.250}_{-6.134}$
Alt.	$-49 \pm 13$	$4.81^{+4.96}_{-3.33}$	$1079^{+79}_{-53}$	$2992^{+1375}_{-538}$	$14^{+128}_{-10}$

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

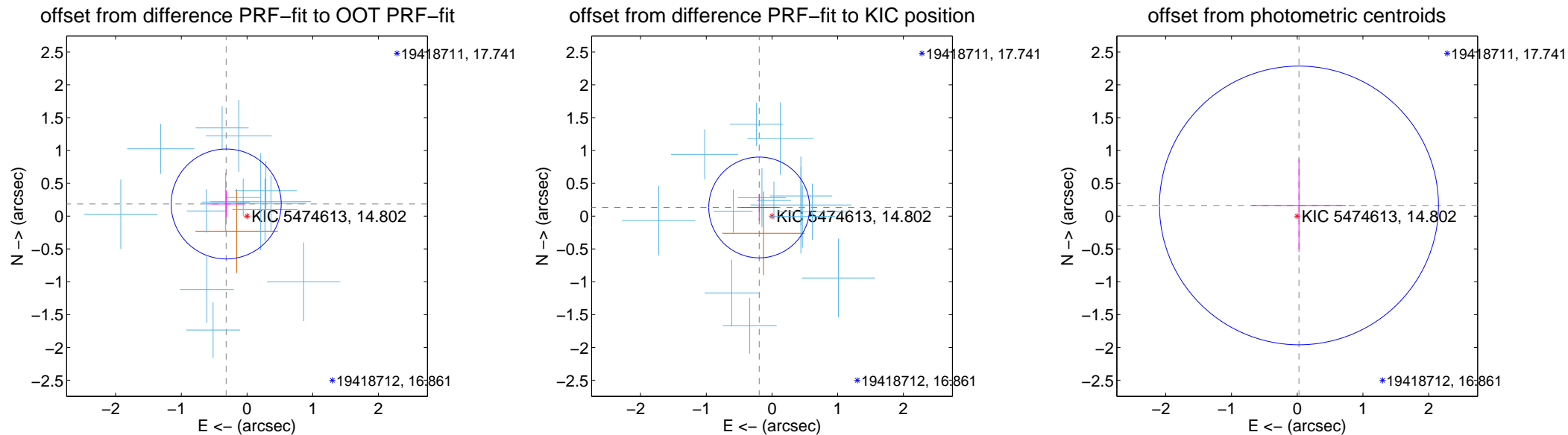
## DV Centroid Data

Supplemental centroid analysis for 005474613-02. Kepler magnitude: 14.80. Transit SNR 21.72

There are 14 quarters with good PRF difference image offsets

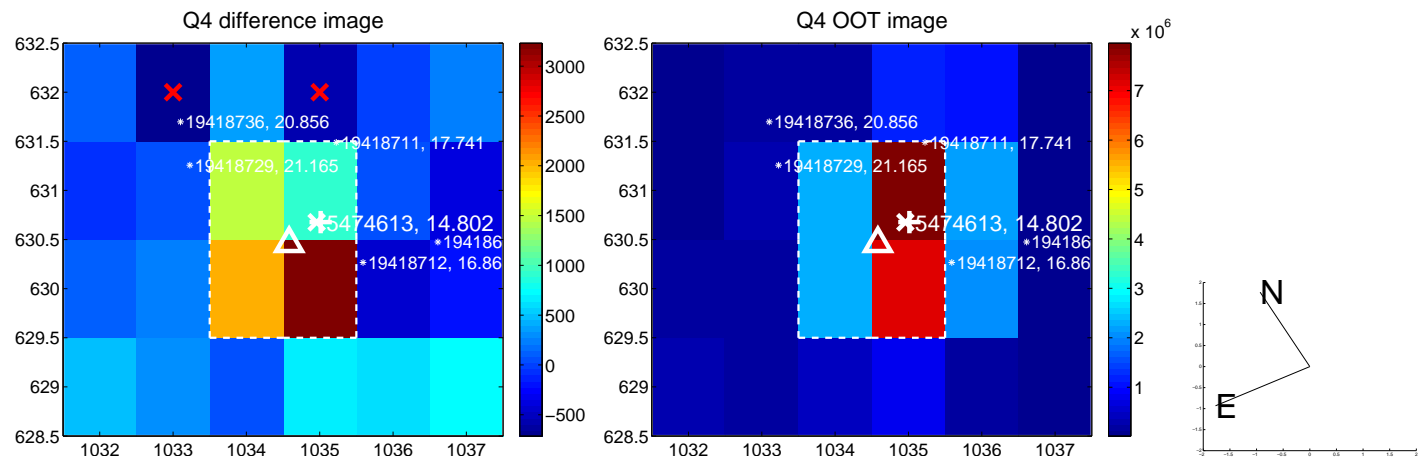
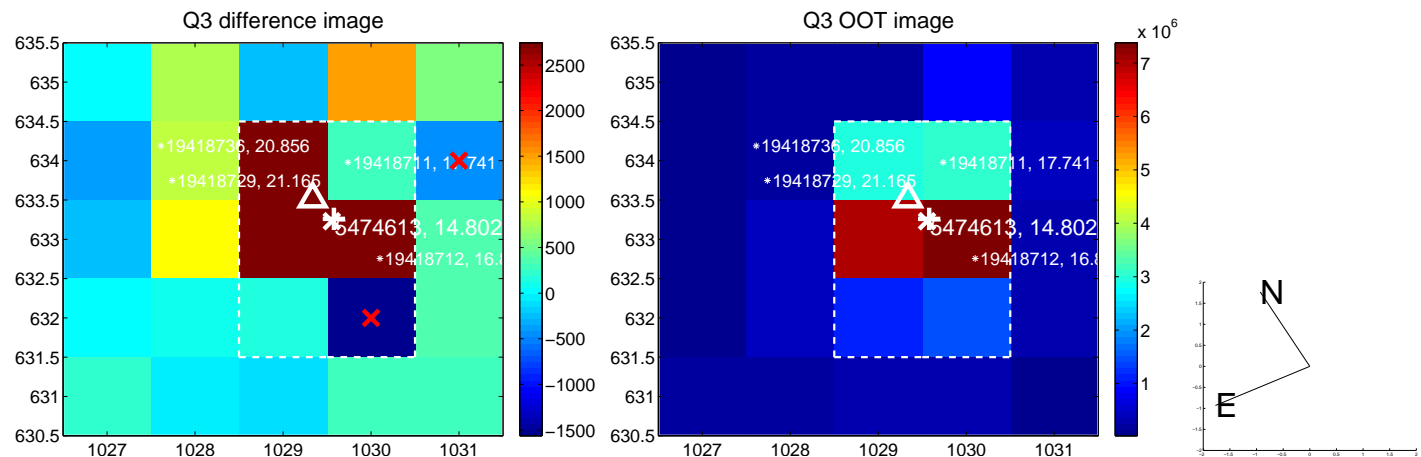
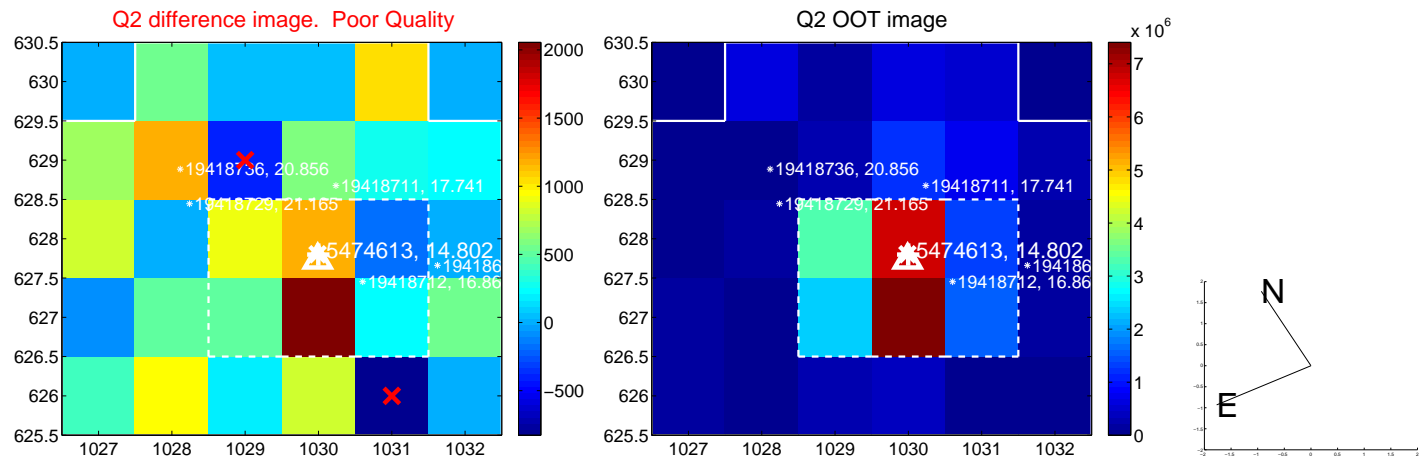
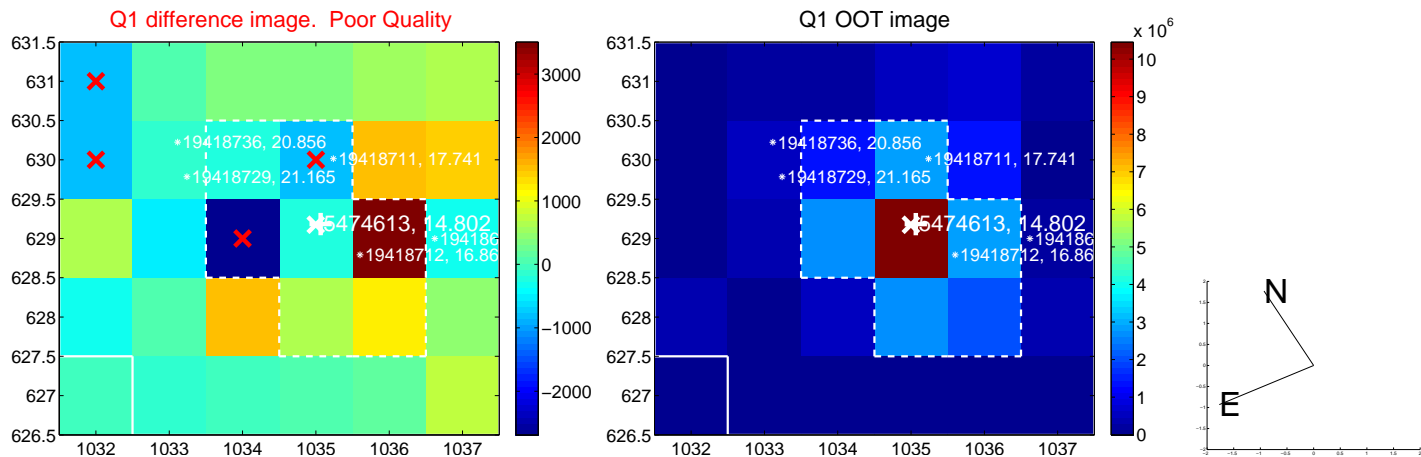
The direct PRF centroid is offset from the target star catalog position by about 0.26 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.367 \pm 0.279$	1.32	$0.317 \pm 0.295$	$0.185 \pm 0.210$
PRF-fit source offset from KIC position	$0.235 \pm 0.256$	0.92	$0.195 \pm 0.280$	$0.132 \pm 0.199$
photometric centroid source offset	$0.17 \pm 0.71$	0.23	$-0.03 \pm 0.72$	$0.16 \pm 0.71$

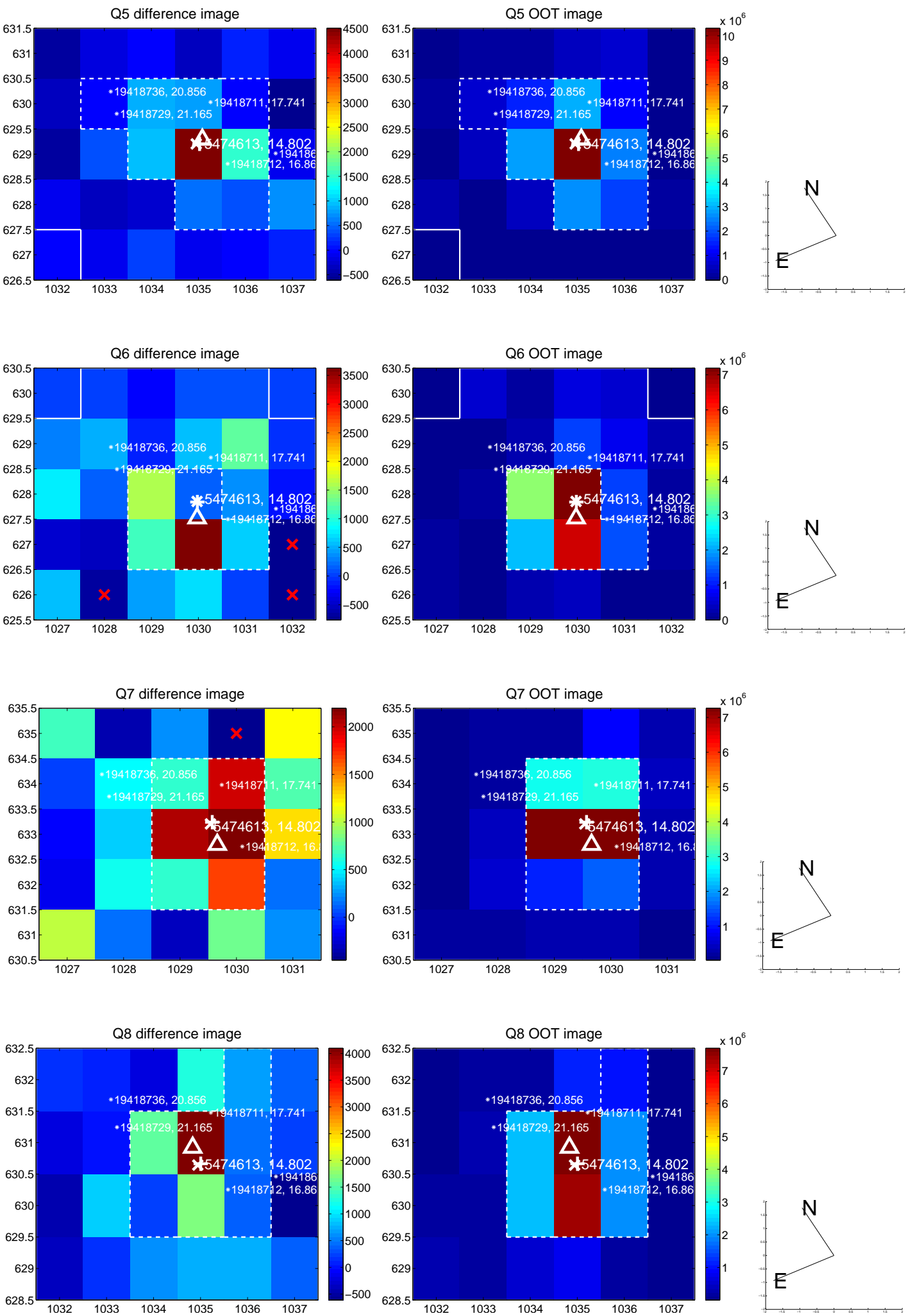


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

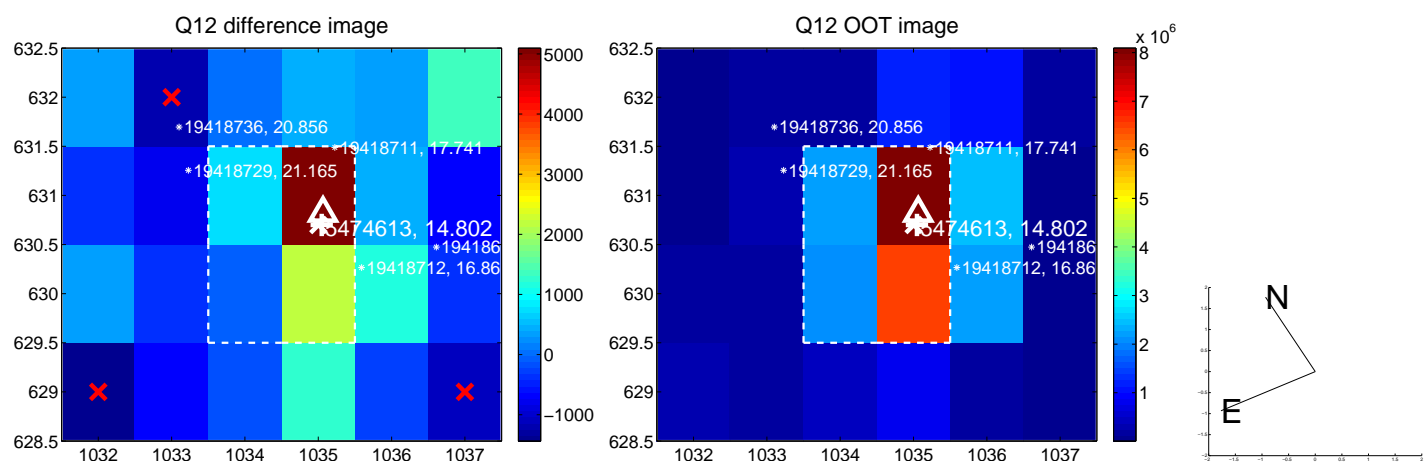
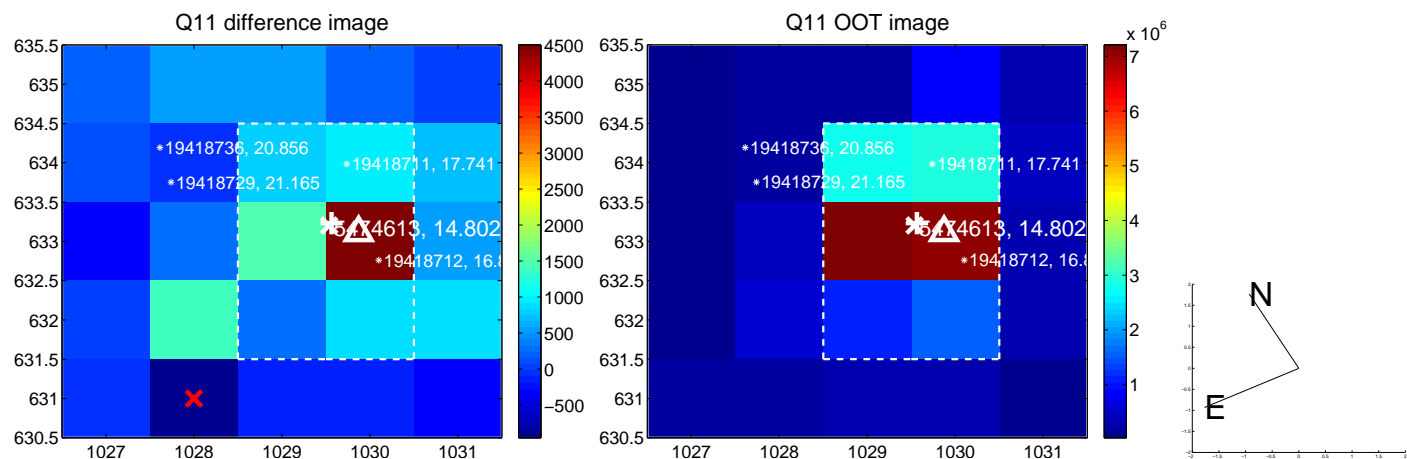
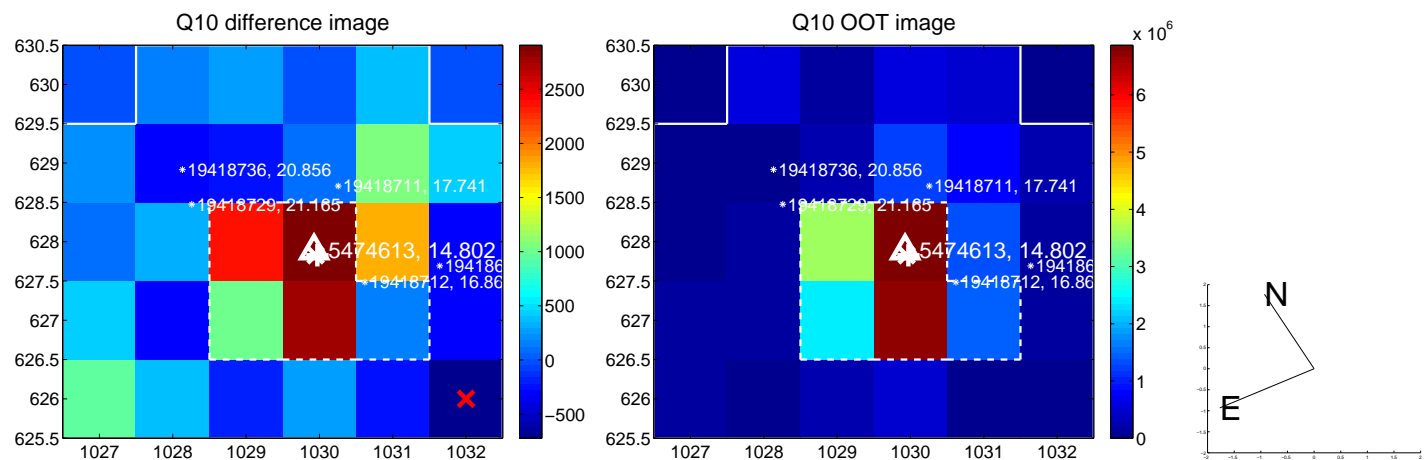
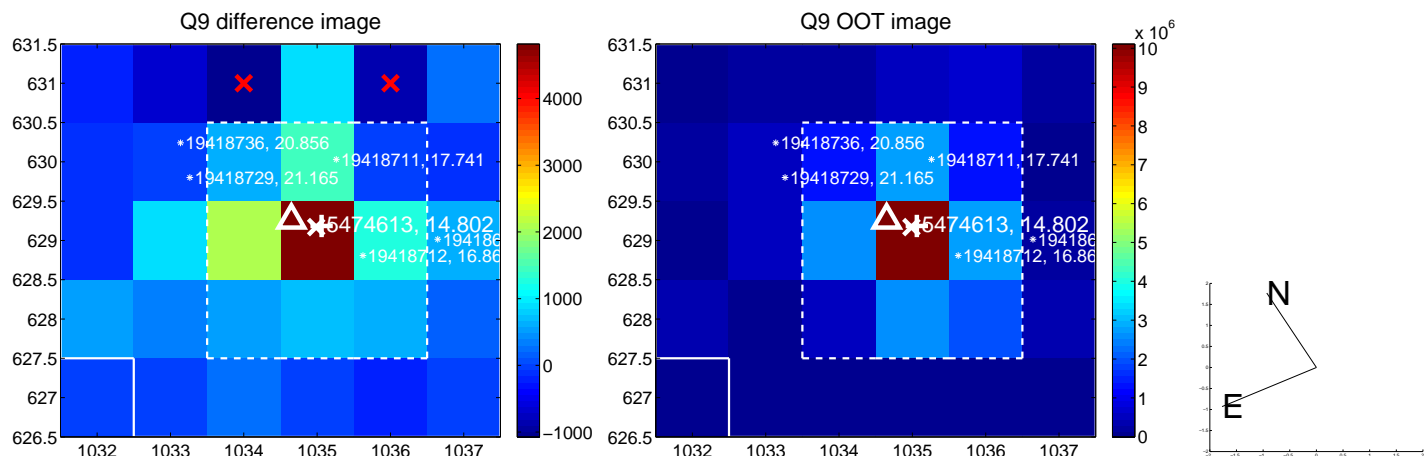


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

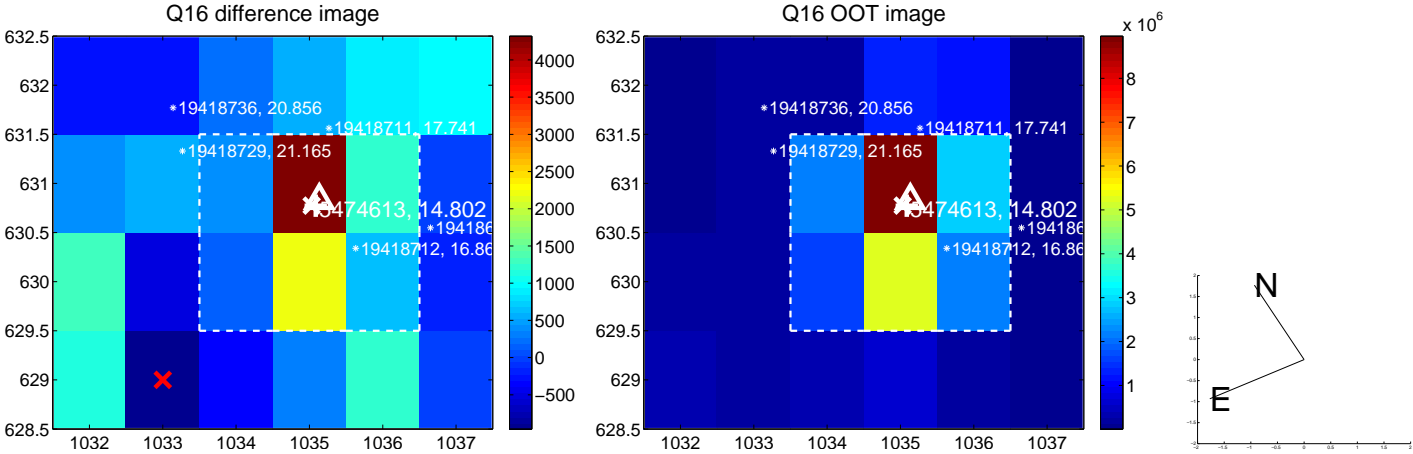
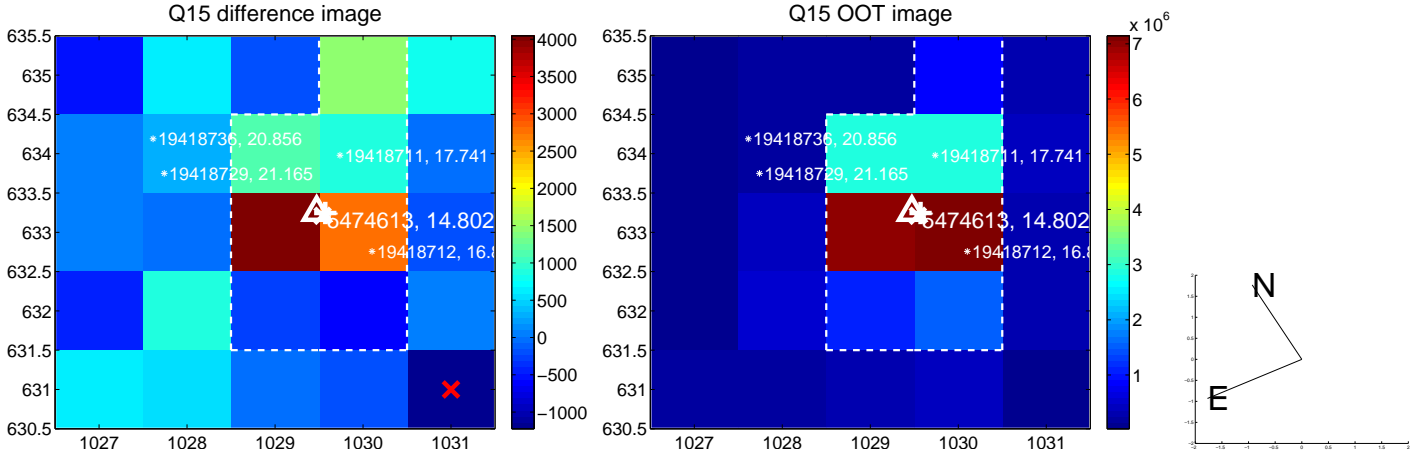
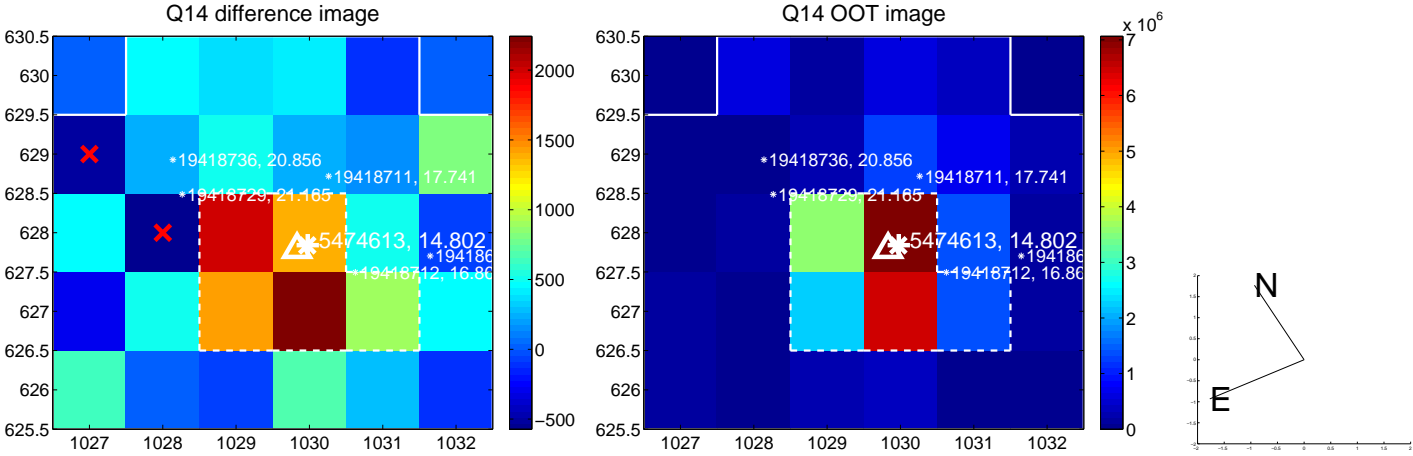
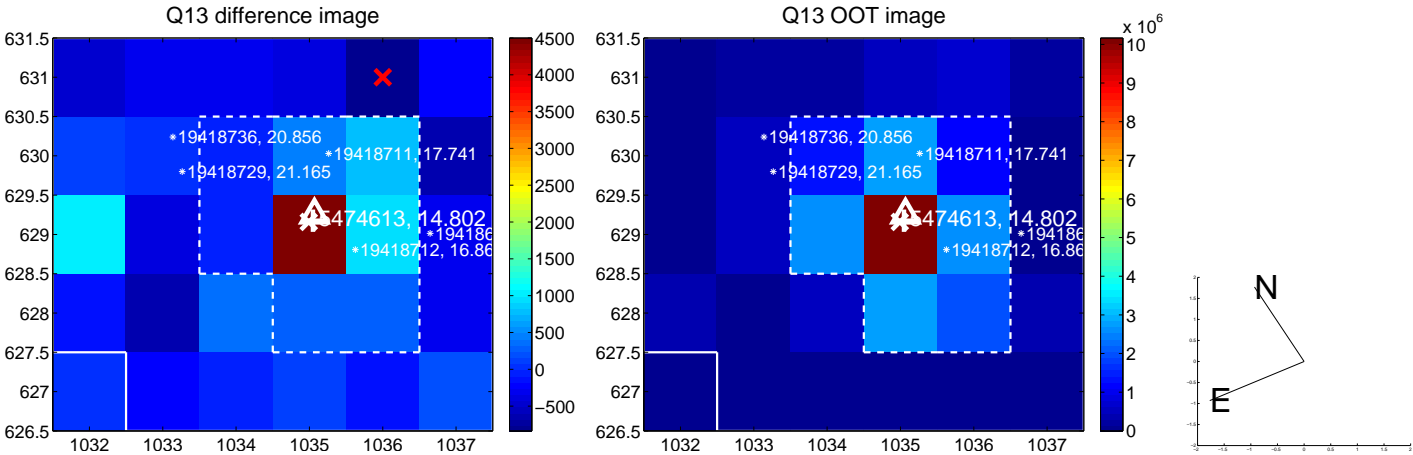




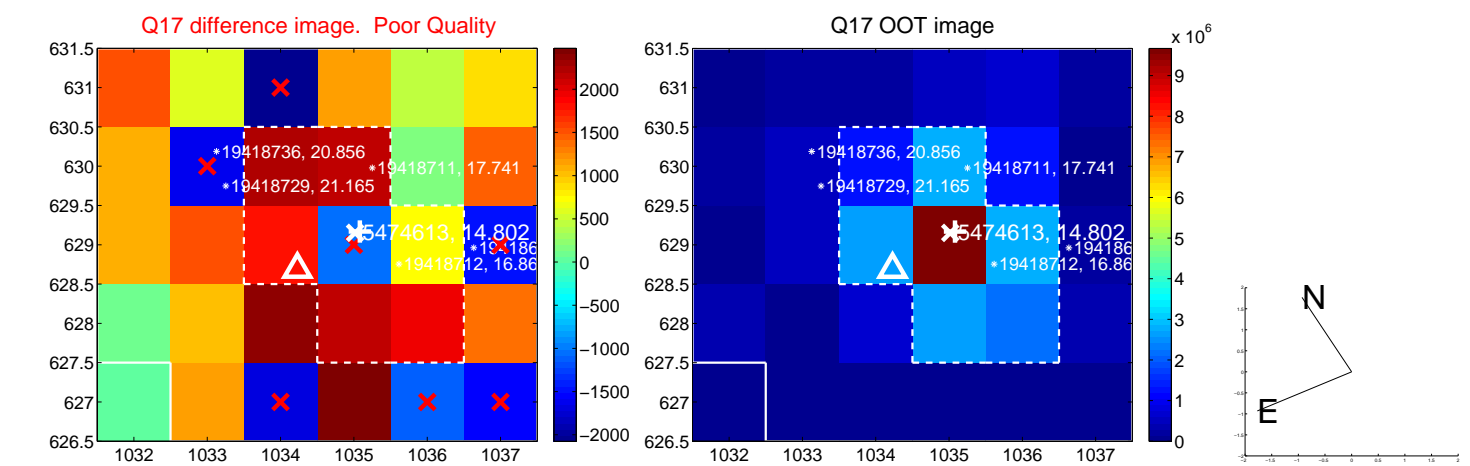
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



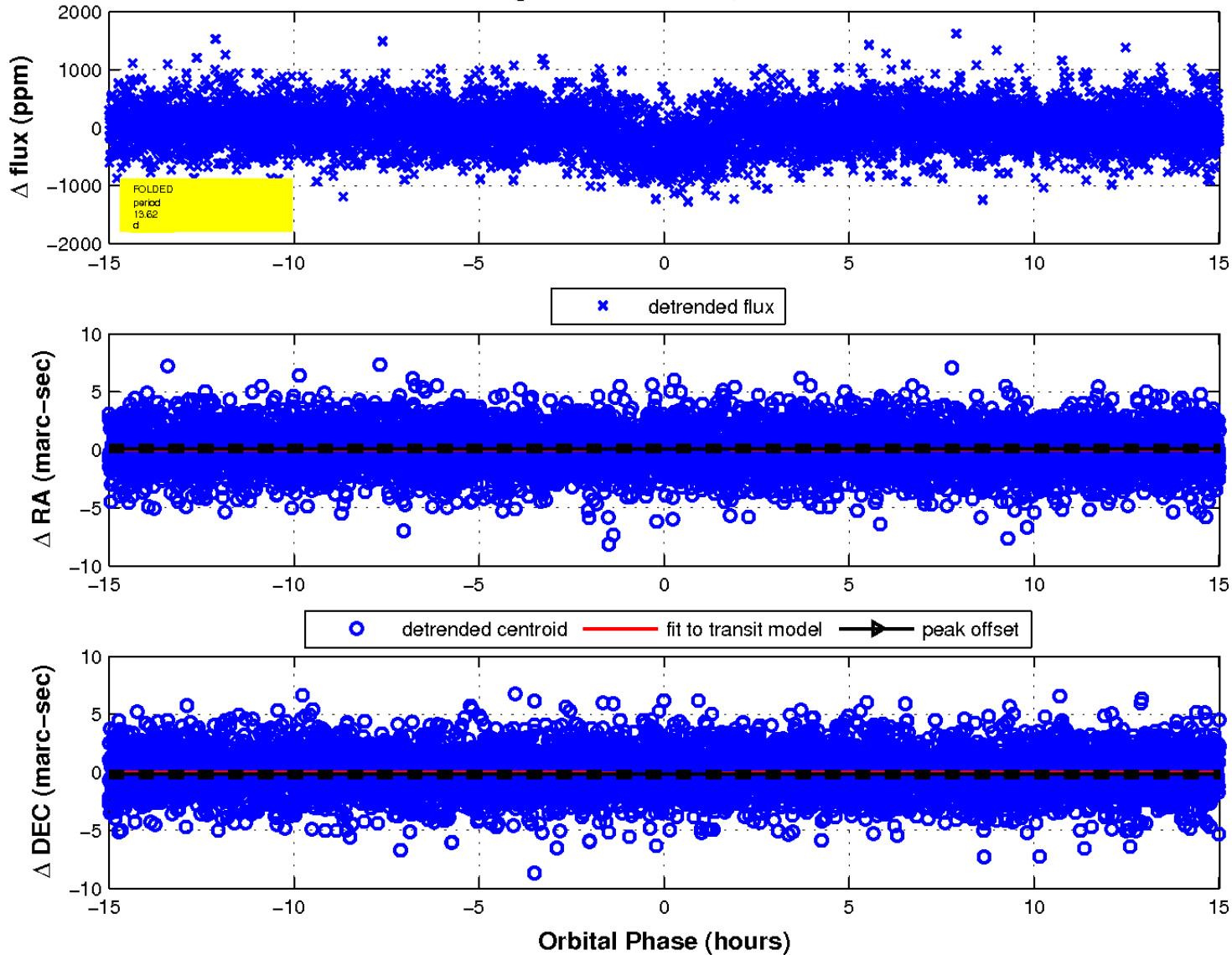
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

