

# KIC 006613006

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006613006-01	OBS	1223.01	7.388834	133.934387	13044.8	5.640	2522.4	2180.2	0.84	5845	10.69	140.20
006613006-02	OBS	No	7.388822	138.024772	976.2	7.686	198.9	200.1	0.84	5845	3.22	140.20

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006613006-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_KIC_POS
006613006-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_KIC_POS

**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.

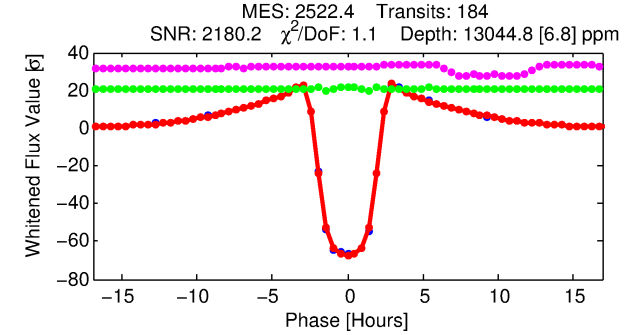
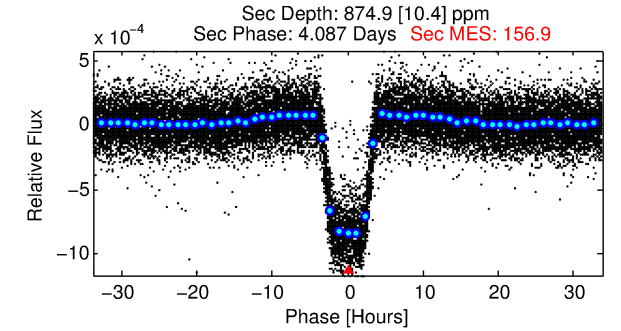
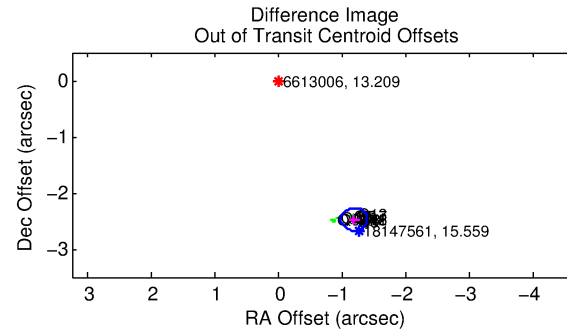
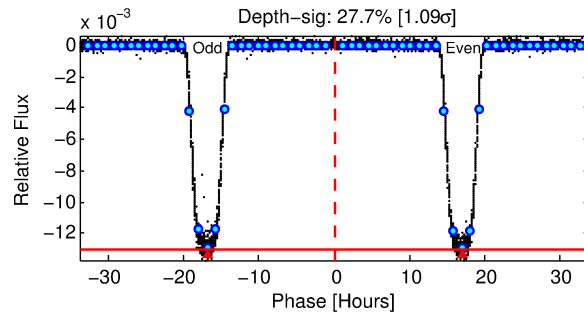
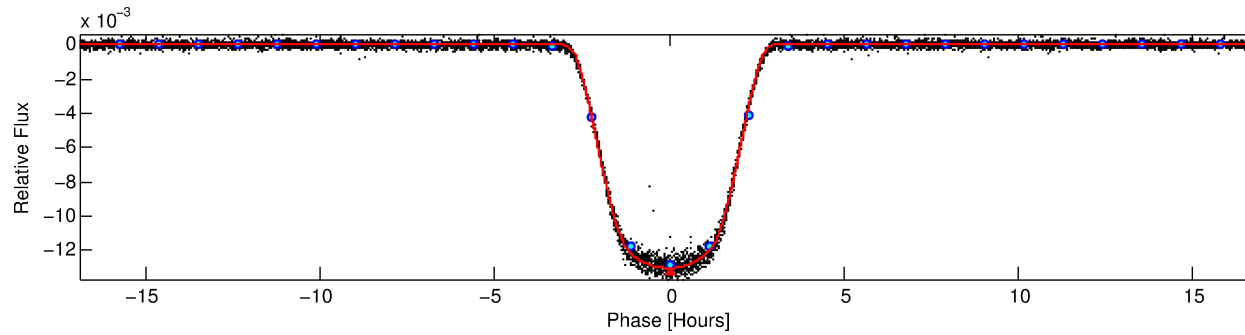
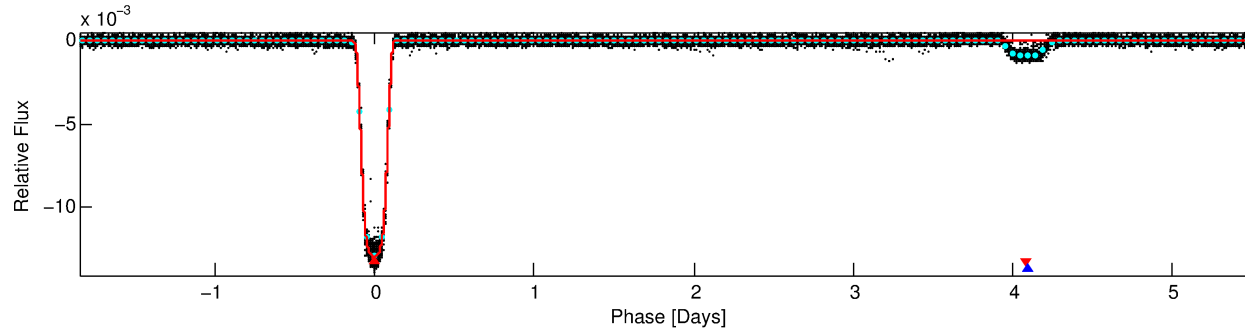
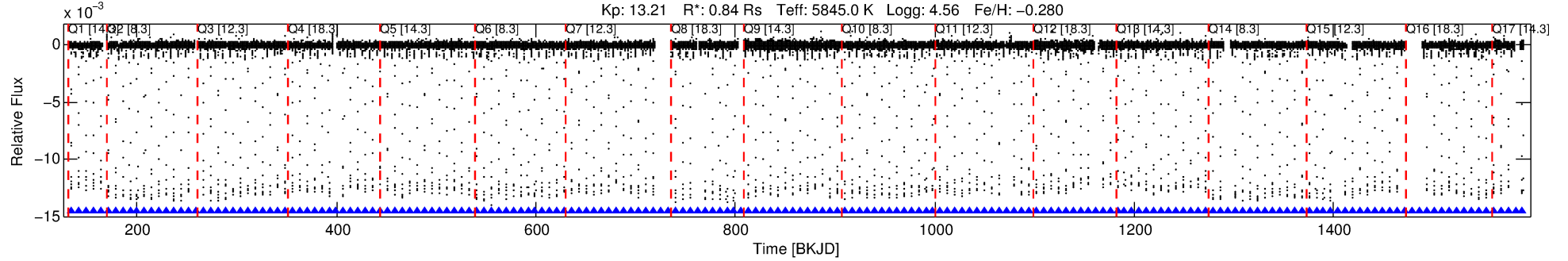
## Ephemeris Match Information For 006613006-01

No Significant Match Found

# DV One-Page Summary

KIC: 6613006 Candidate: 1 of 2 Period: 7.389 d  
KOI: K01223.01 Corr: 0.998

Kp: 13.21 R\*: 0.84 Rs Teff: 5845.0 K Logg: 4.56 Fe/H: -0.280



## DV Fit Results:

Period = 7.38883 [0.00000] d  
Epoch = 133.9344 [0.0000] BKJD  
Rp/R\* = 0.1169 [0.0000]  
a/R\* = 7.79 [0.01]  
b = 0.81 [0.00]  
Seff = 140.20 [51.55]  
Teq = 877 [81] K  
Rp = 10.69 [3.07] Re  
a = 0.0724 [0.0175] AU  
Ag = 22.06 [7.76] [2.71σ]  
Teffp = 2940 [79] K [18.2σ]

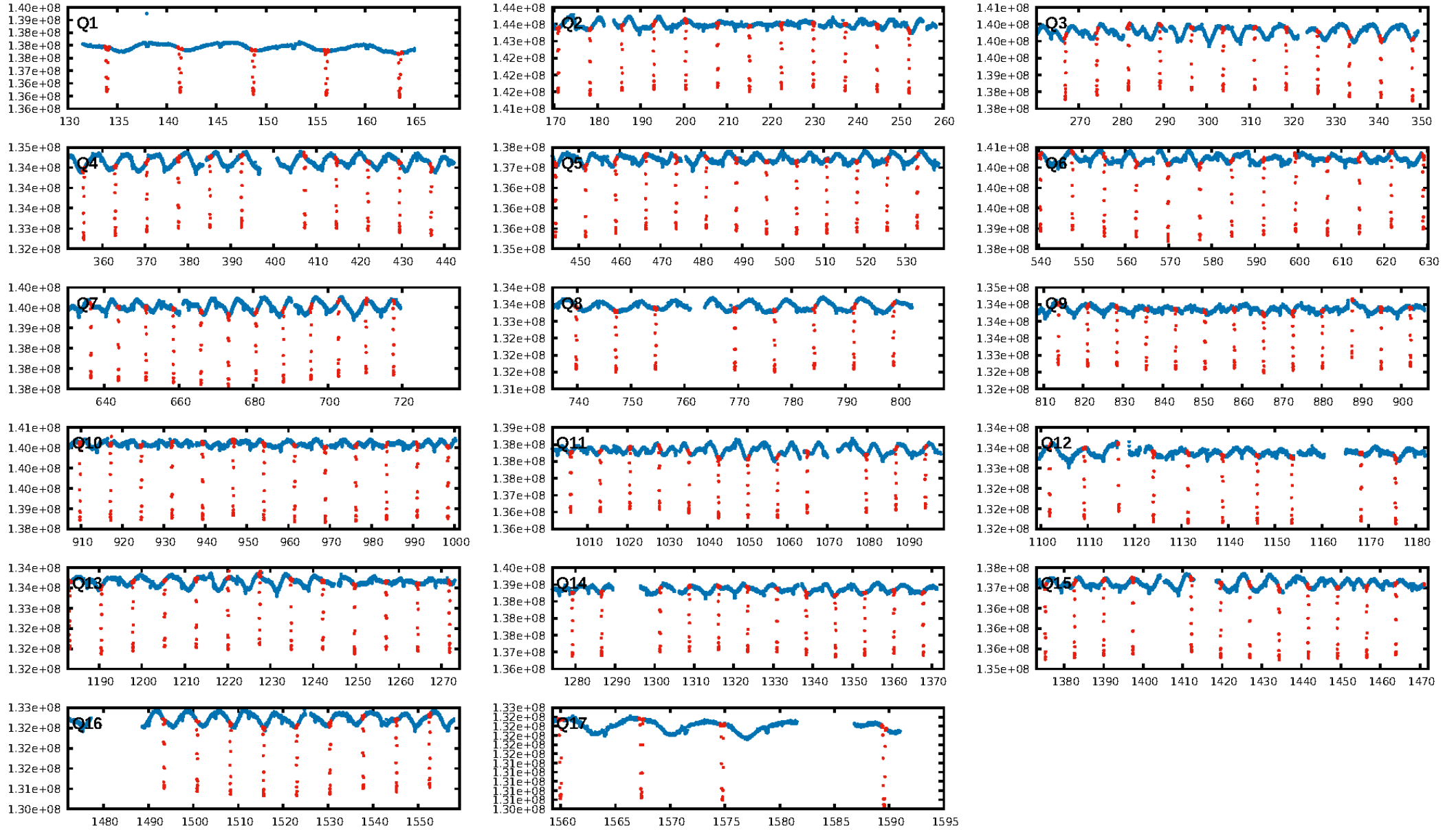
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 20.3%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [175/175]  
GhostDiagnostic-chr: 4.162  
Centroid-sig: 0.0%  
Centroid-so: 3.032 arcsec [556.22σ]  
OotOffset-rm: 2.742 arcsec [40.19σ]  
KicOffset-rm: 3.023 arcsec [44.87σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

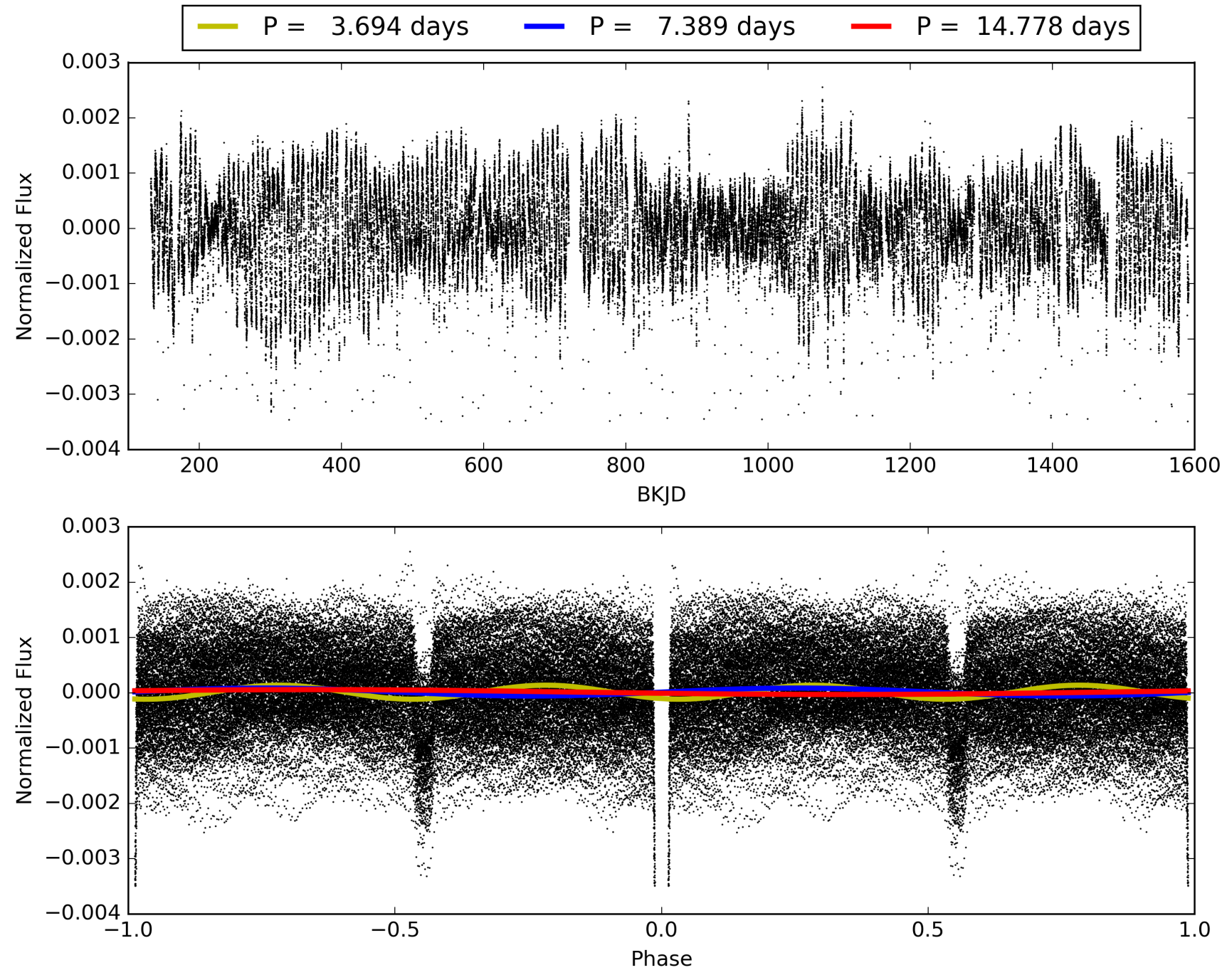
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 14:58:05 Z

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

# TCE 006613006-01, PDC Light Curves

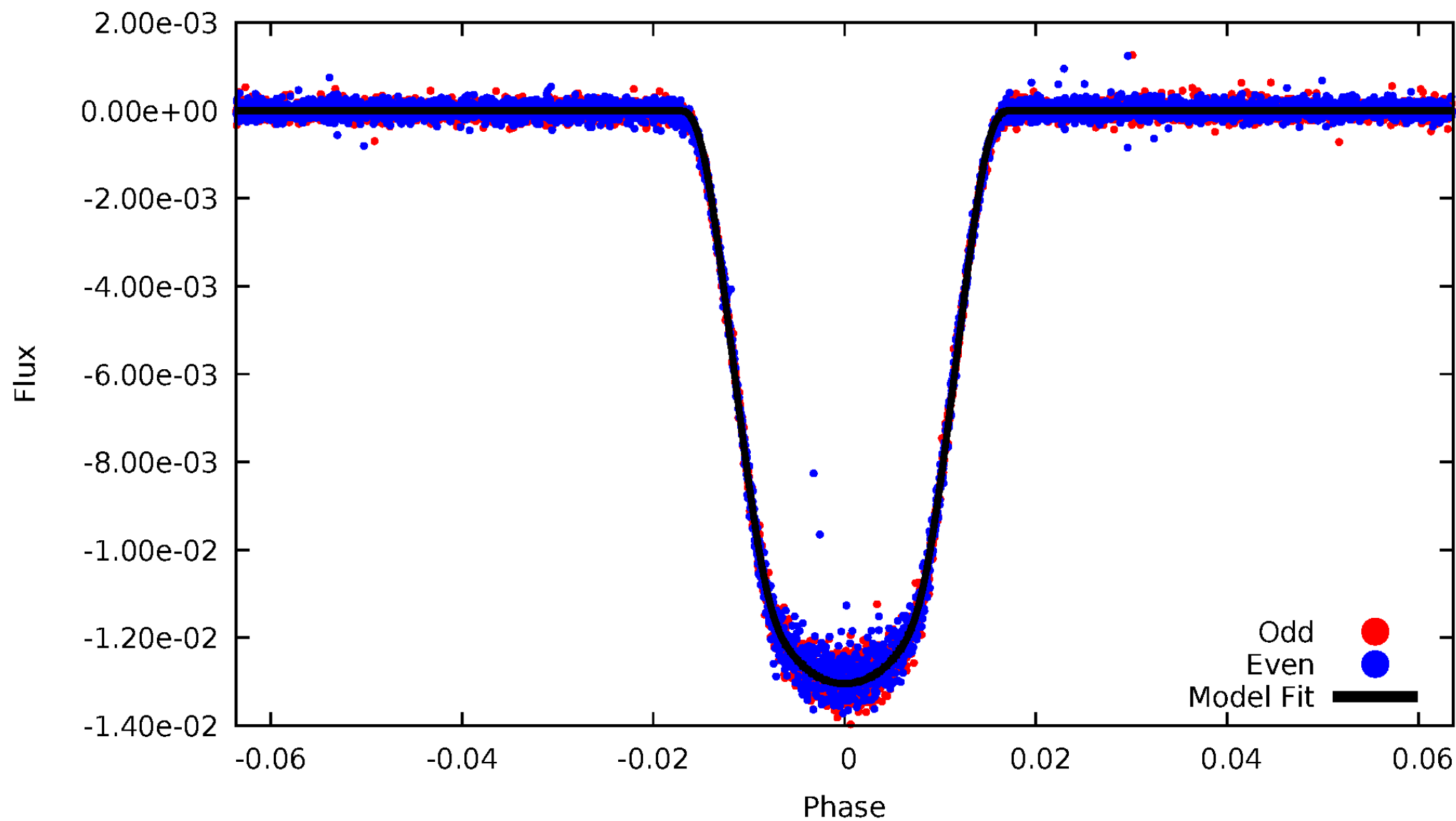


# TCE 006613006-01



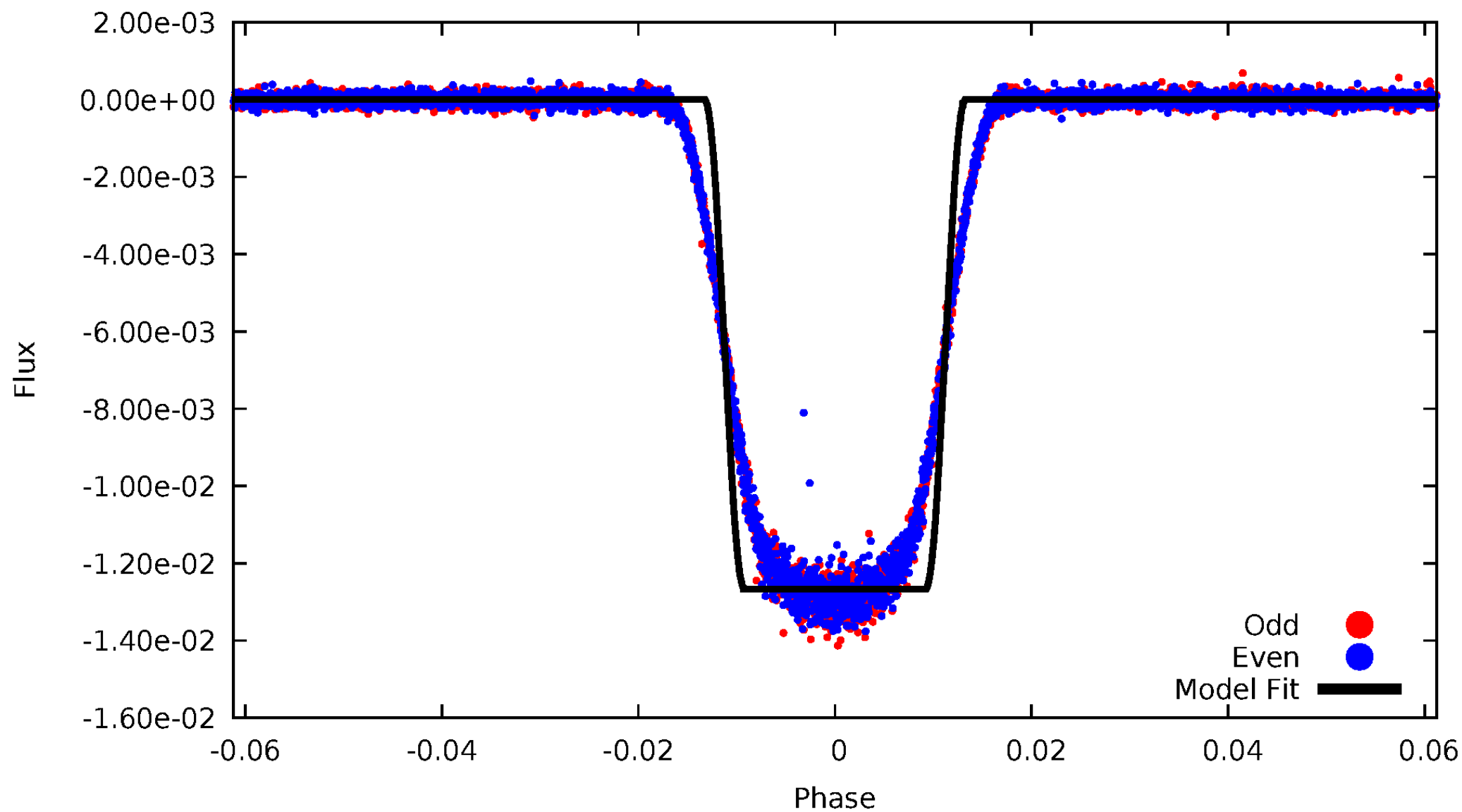
# DV Odd/Even

TCE 006613006-01



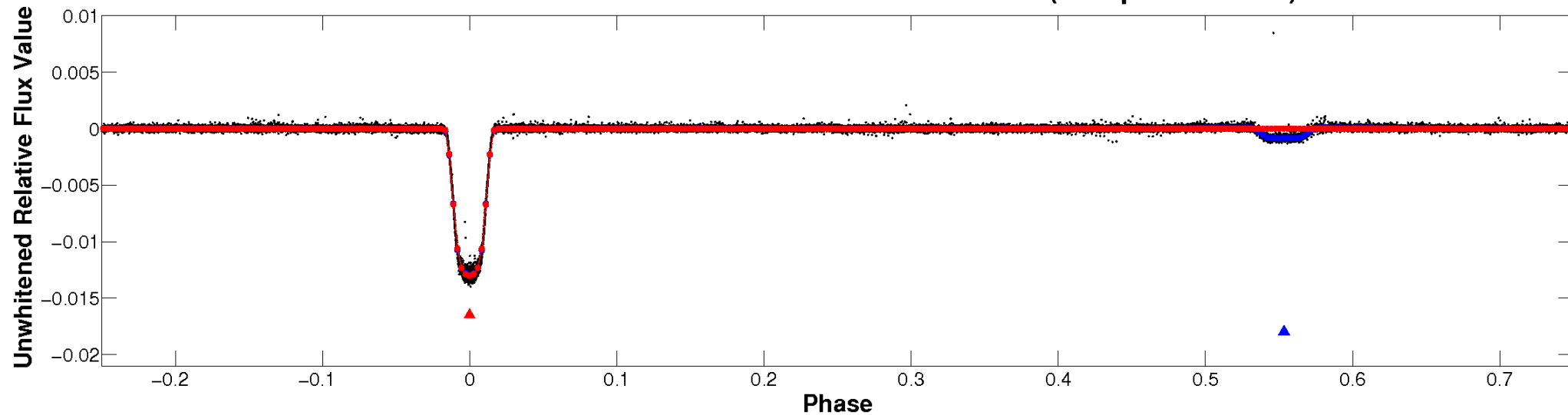
# ALT Odd/Even

TCE 006613006-01

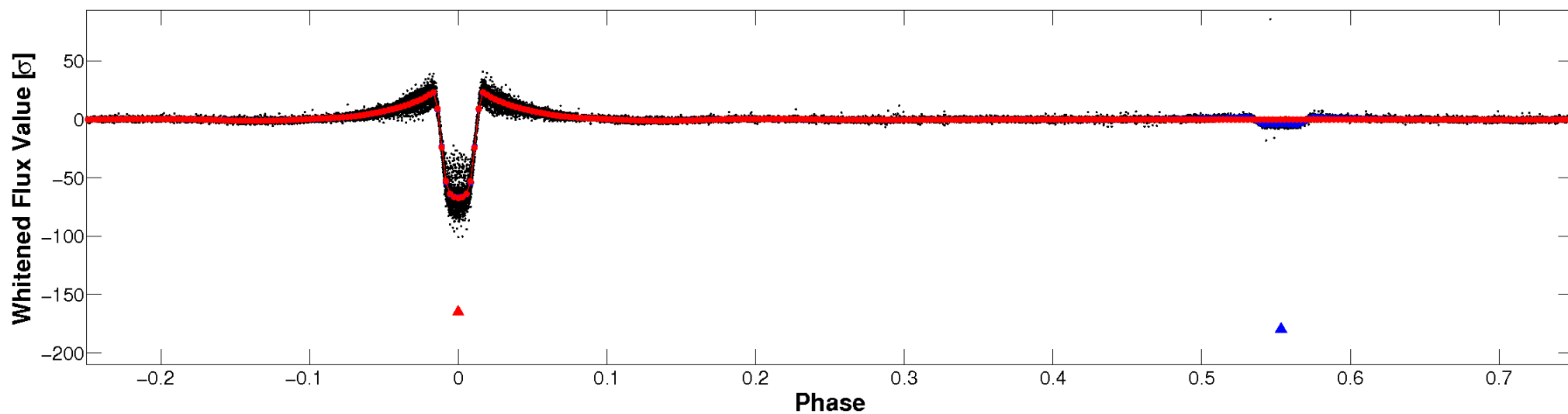


# Non-Whitened Vs. Whitened Light Curve

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

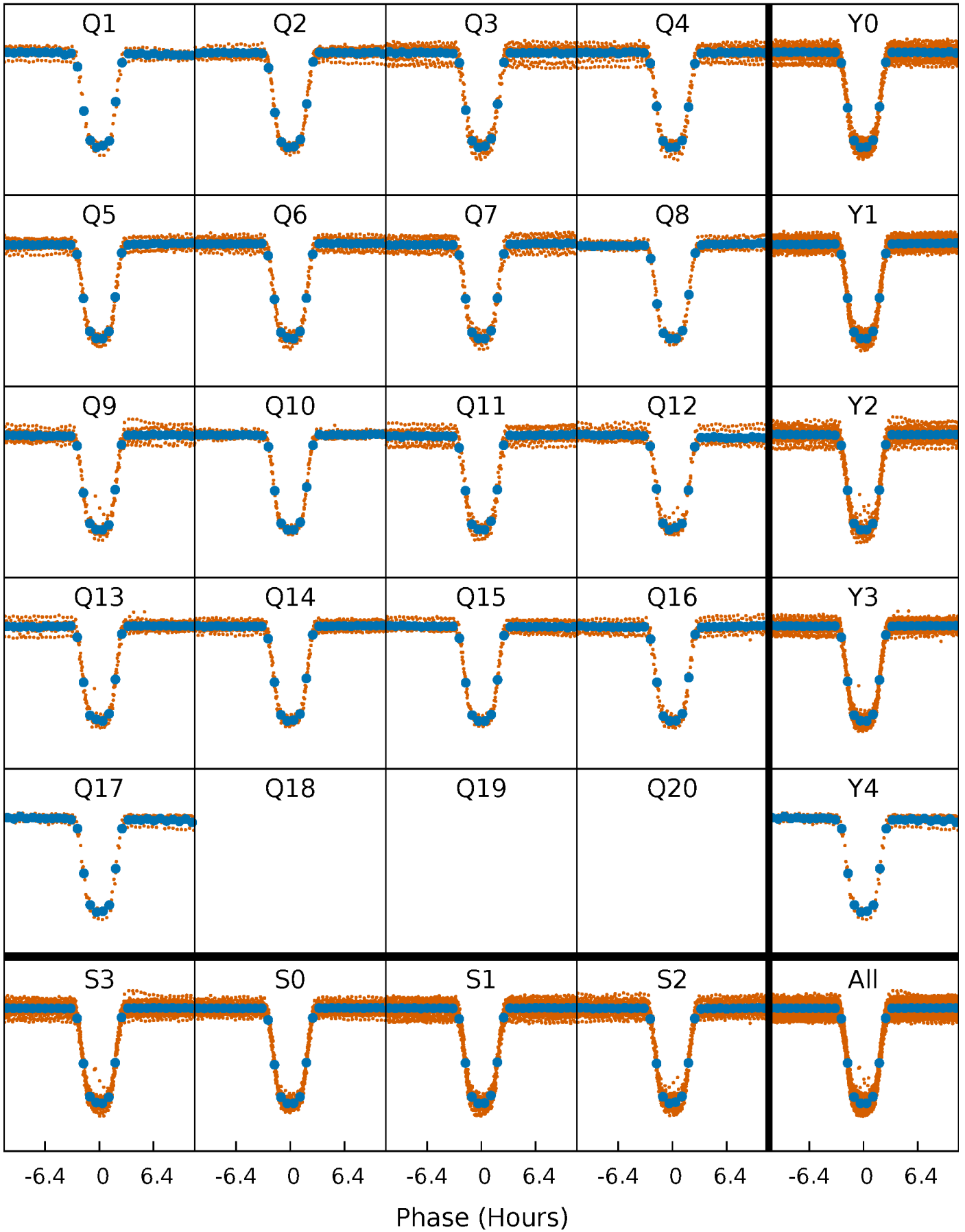


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

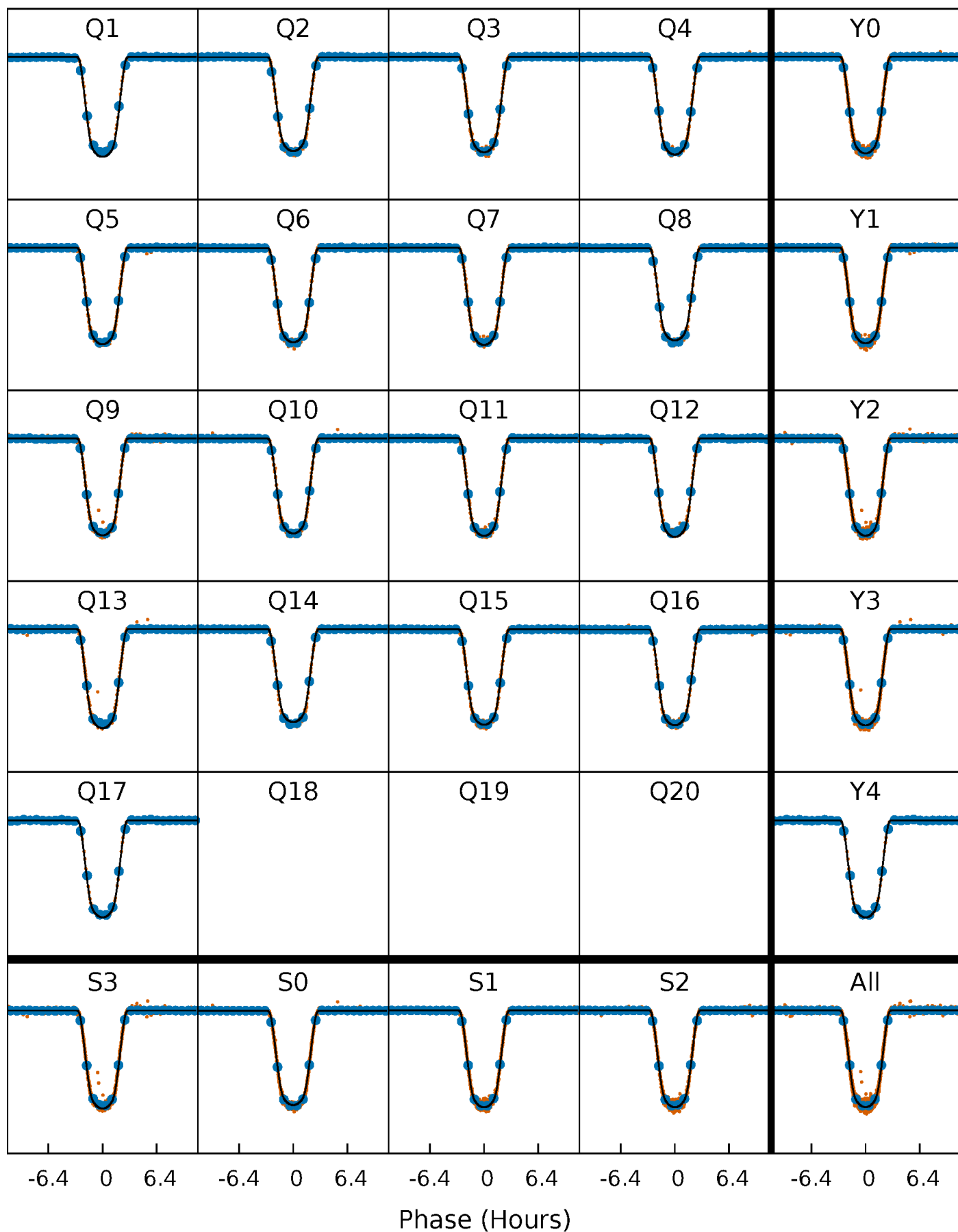
TCE 006613006-01   P= 7.388834 Days    $T_0=133.934387$  (BKJD)





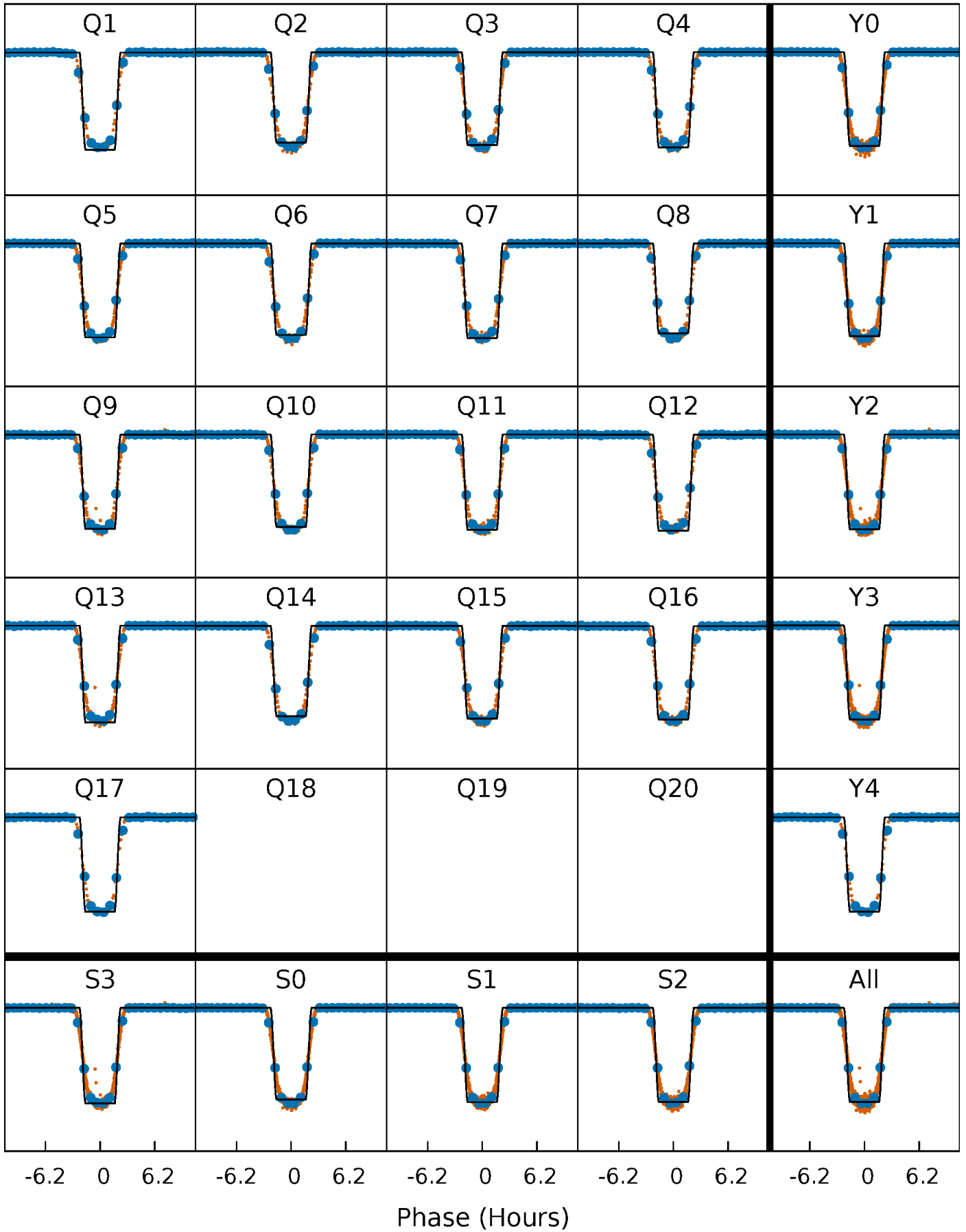
# DV Quarter-Phased Transit Curves

TCE 006613006-01 P= 7.388834 Days  $T_0=133.934387$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

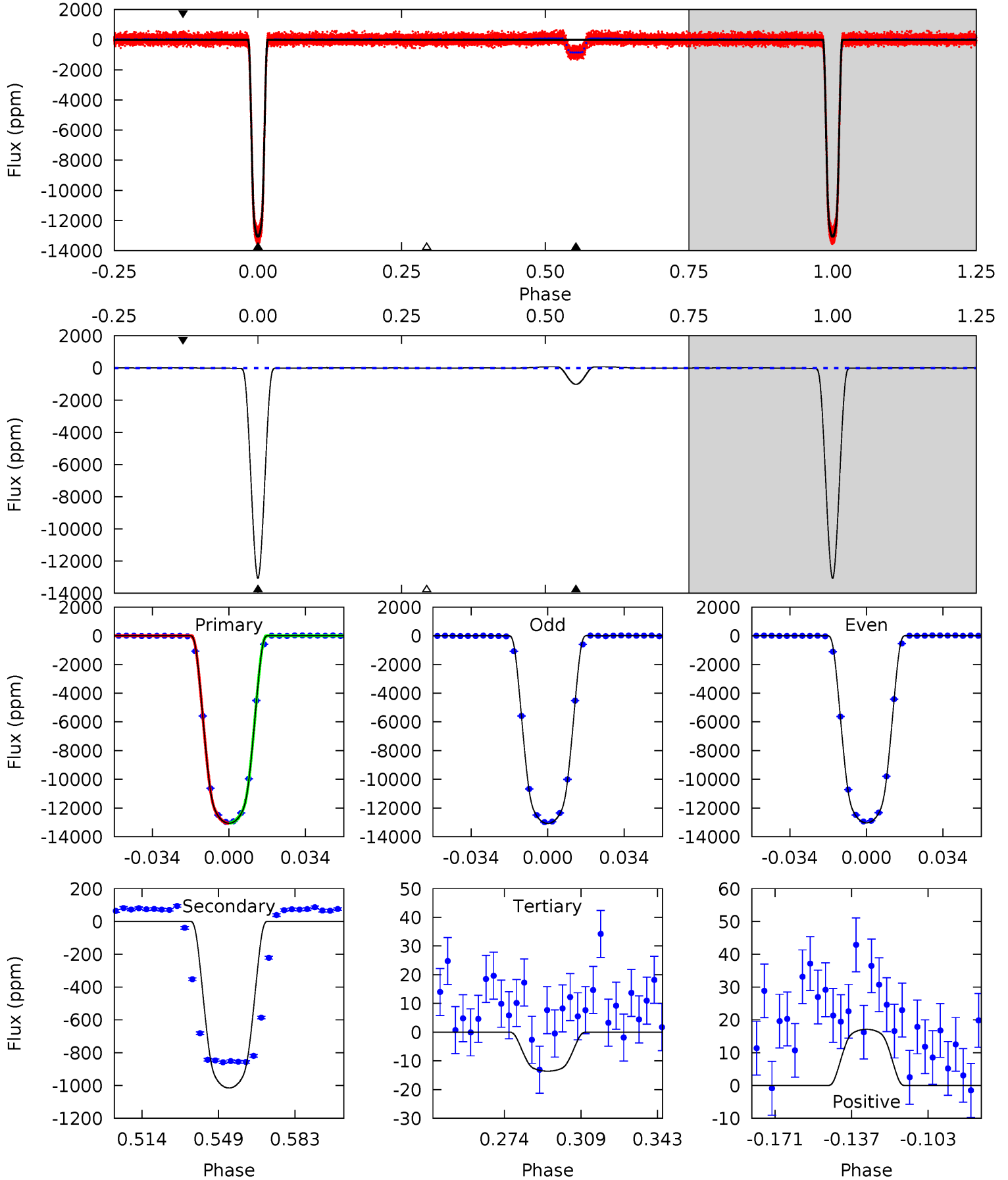
TCE 006613006-01 P= 7.388824 Days  $T_0=133.935332$  (BKJD)



# DV Model-Shift Uniqueness Test

006613006-01, P = 7.388834 Days, E = 126.545553 Days

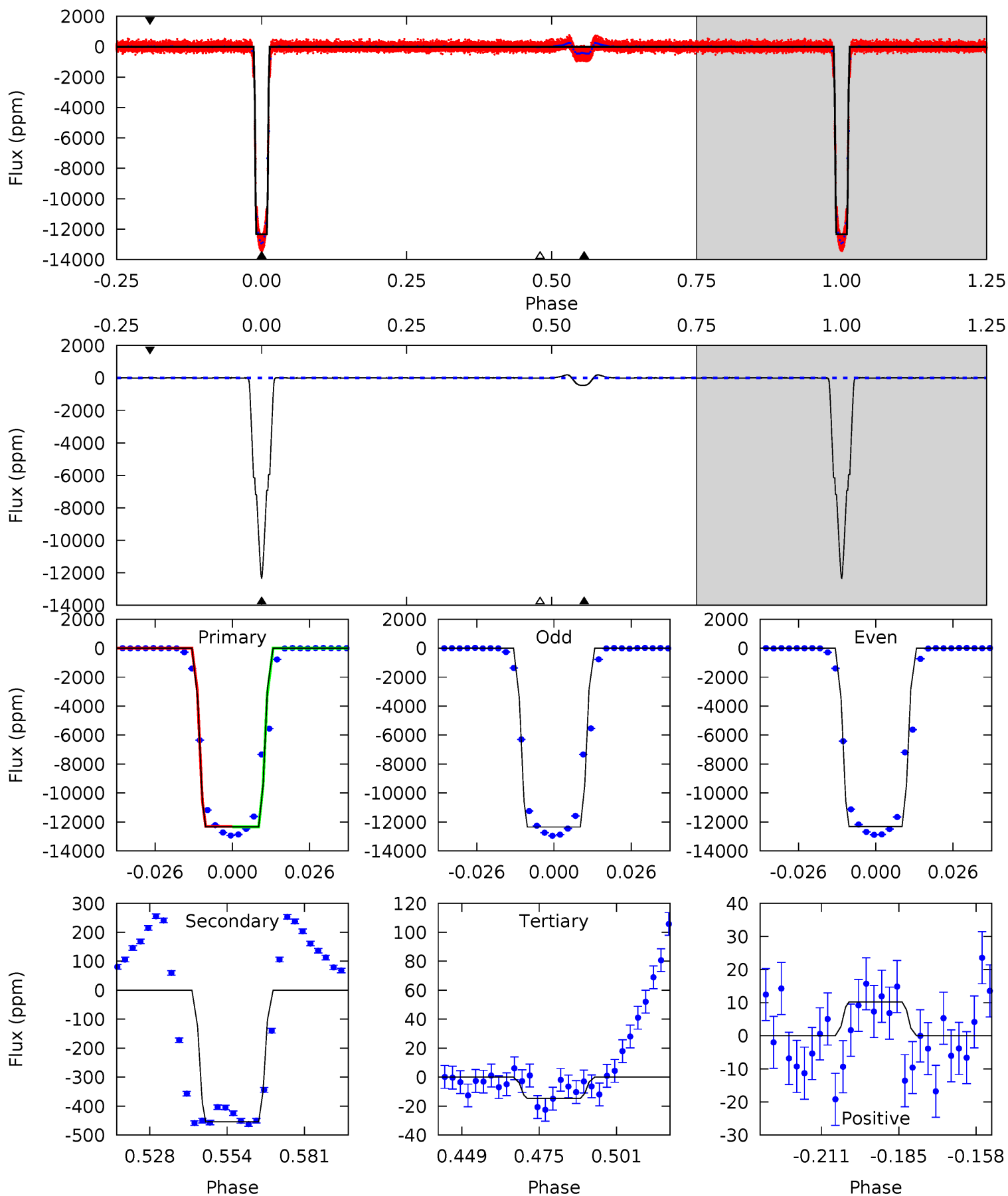
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4565	354.9	4.75	5.98	4.78	2.12	7.20	4561	4559	350.1	348.9	7.42	1.00	0.01	1.38



# Alt Model-Shift Uniqueness Test

006613006-01, P = 7.38824 Days, E = 126.546508 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
3434	126.4	4.09	2.85	4.84	2.22	6.92	3430	3431	122.3	123.6	2.92	1.00	0.02	3.59



### Stellar Parameters For KIC 006613006

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5845^{+139}_{-157}$	$4.558^{+0.036}_{-0.192}$	$-0.280^{+0.300}_{-0.300}$	$0.838^{+0.241}_{-0.075}$	$0.926^{+0.099}_{-0.110}$	$2.214^{+0.426}_{-1.121}$
	+2%/-3%	+1%/-4%	+107%/-107%	+29%/-9%	+11%/-12%	+19%/-51%
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 006613006-01 / KOI 1223.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-1015 \pm 3$	$11.03^{+1.72}_{-0.77}$	$1254^{+81}_{-52}$	$3516^{+59}_{-56}$	$24^{+3}_{-5}$
Alt.	$-454 \pm 4$	$10.63^{+1.53}_{-0.75}$	$1253^{+81}_{-51}$	$3139^{+45}_{-51}$	$11^{+1}_{-2}$

$T_{\text{max}}$  = 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

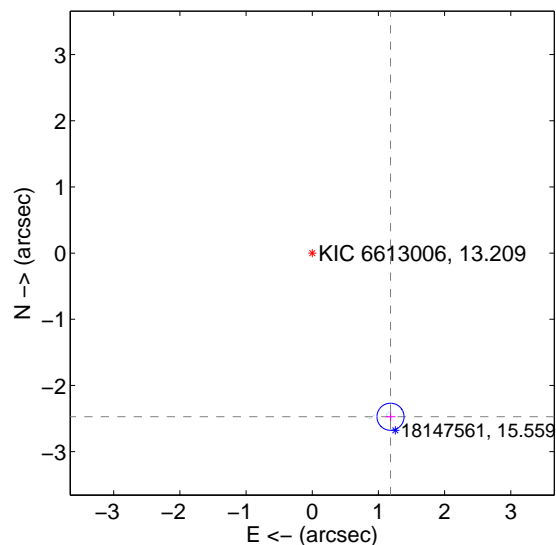
Supplemental centroid analysis for 006613006-01. Kepler magnitude: 13.21. Transit SNR 2180.16

There are 17 quarters with good PRF difference image offsets

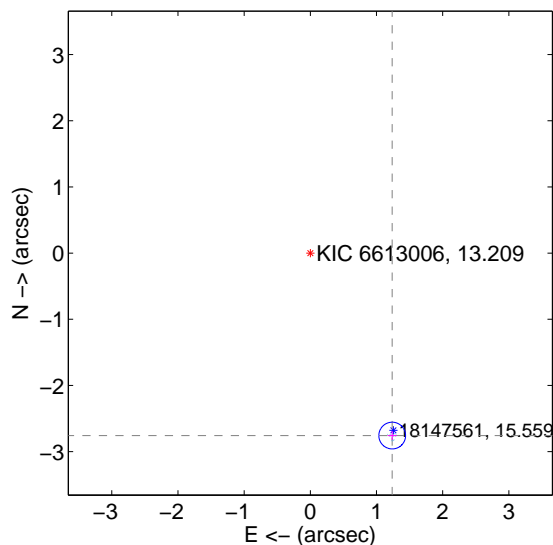
The direct PRF centroid is offset from the target star catalog position by about 0.34 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.742 \pm 0.068$	40.19	$-1.183 \pm 0.074$	$-2.473 \pm 0.067$
PRF-fit source offset from KIC position	$3.023 \pm 0.067$	44.87	$-1.238 \pm 0.067$	$-2.758 \pm 0.067$
photometric centroid source offset	$3.03 \pm 0.01$	556.22	$-1.23 \pm 0.00$	$-2.77 \pm 0.01$

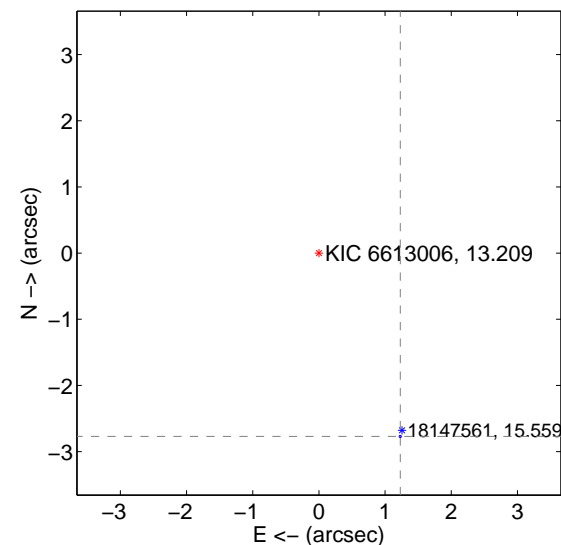
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

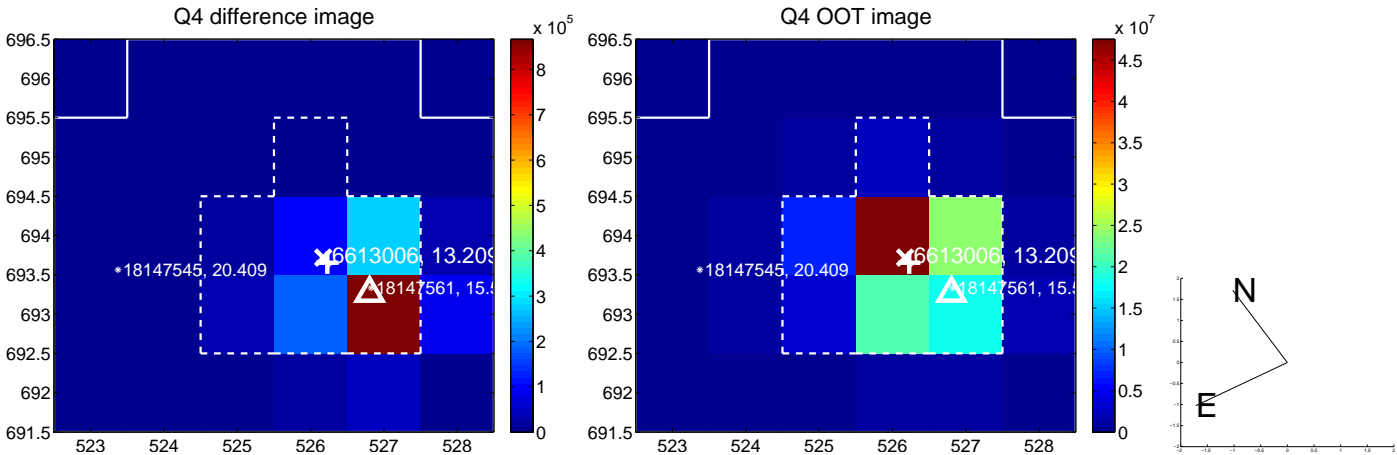
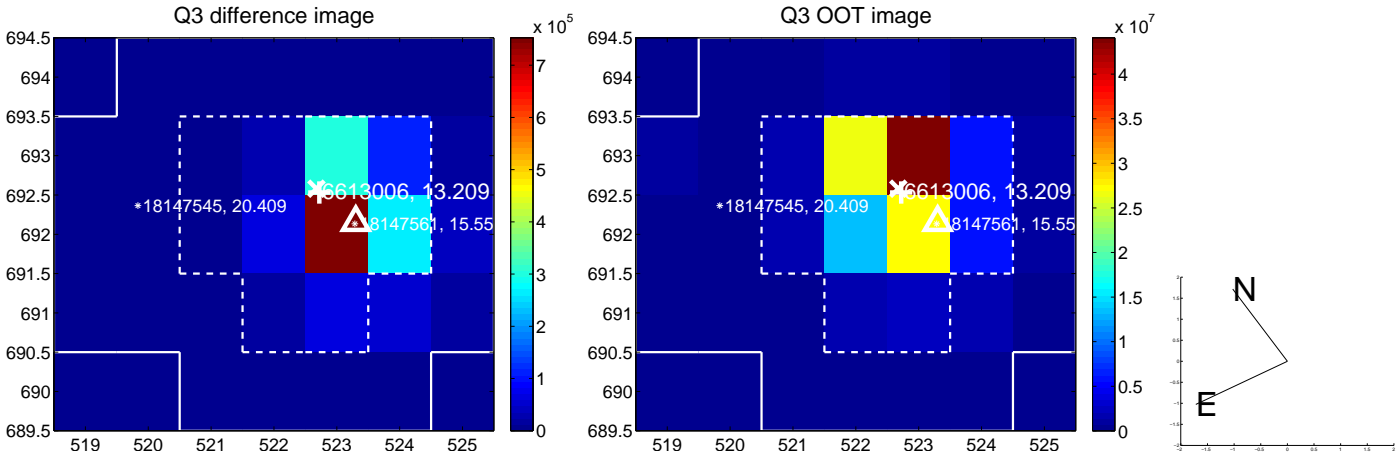
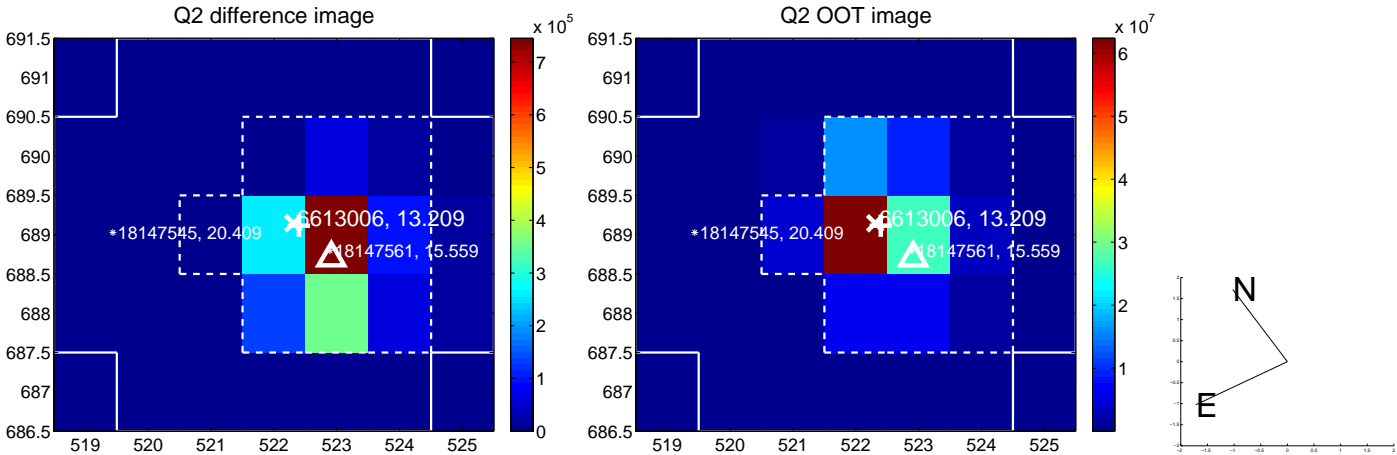
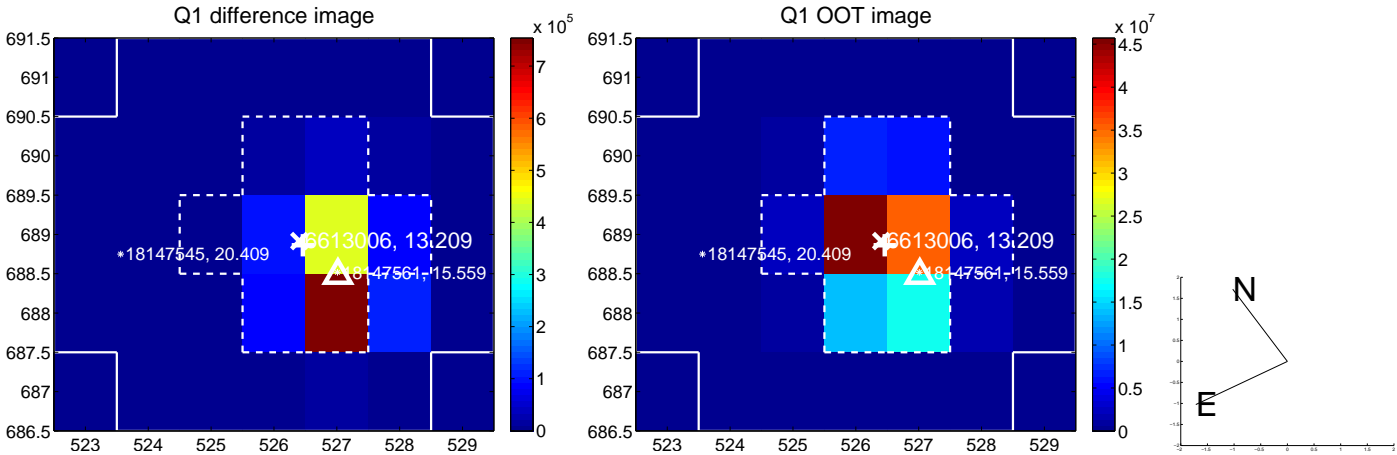


offset from photometric centroids

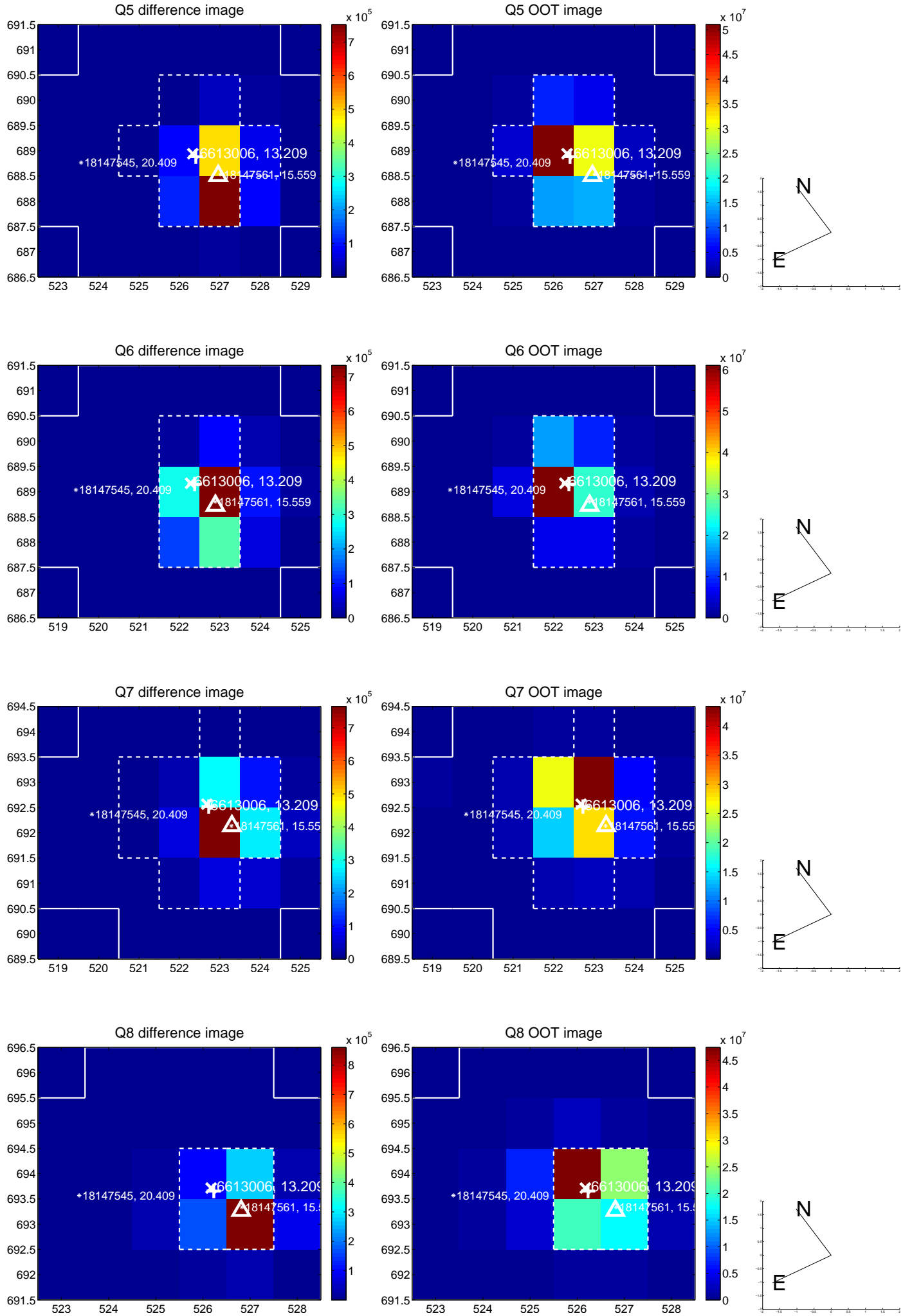


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

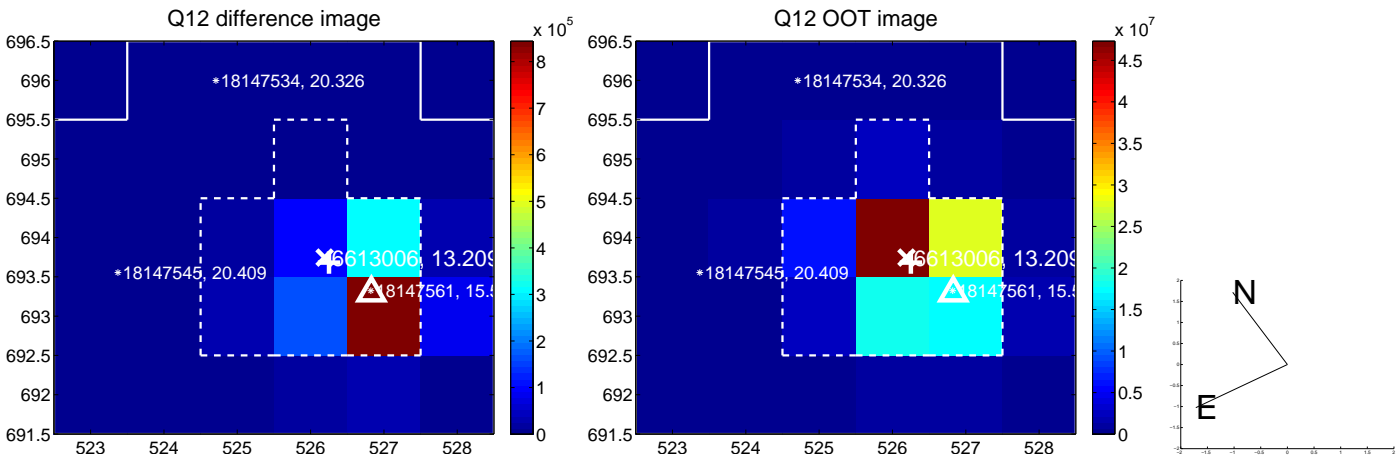
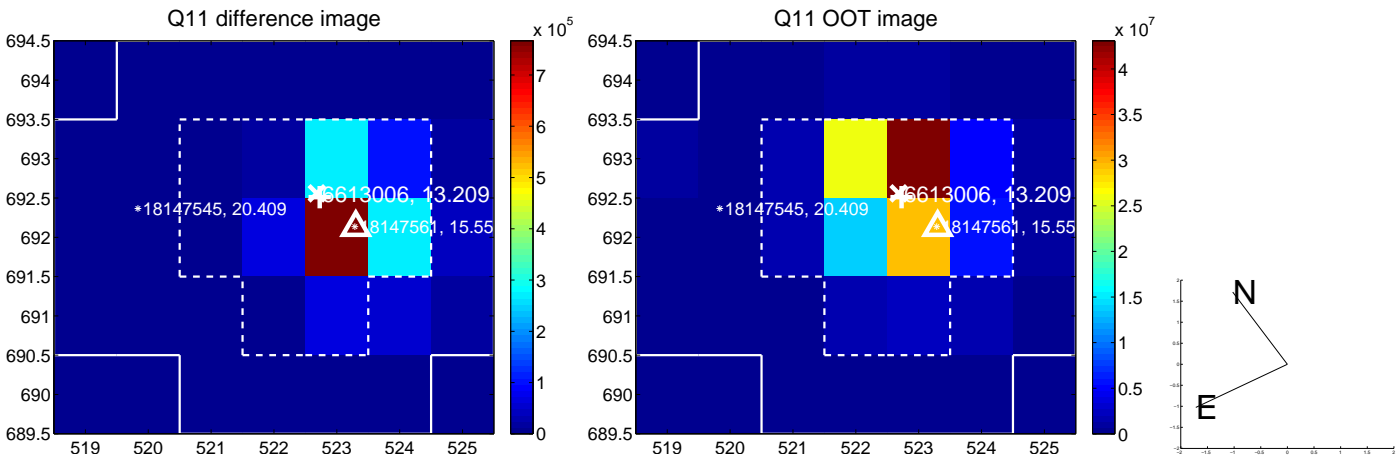
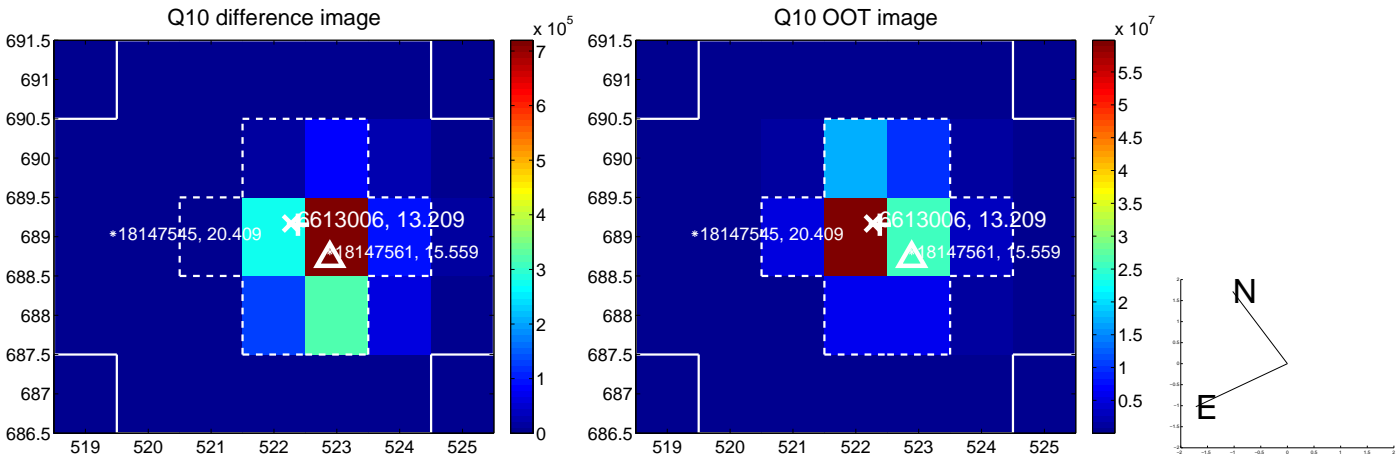
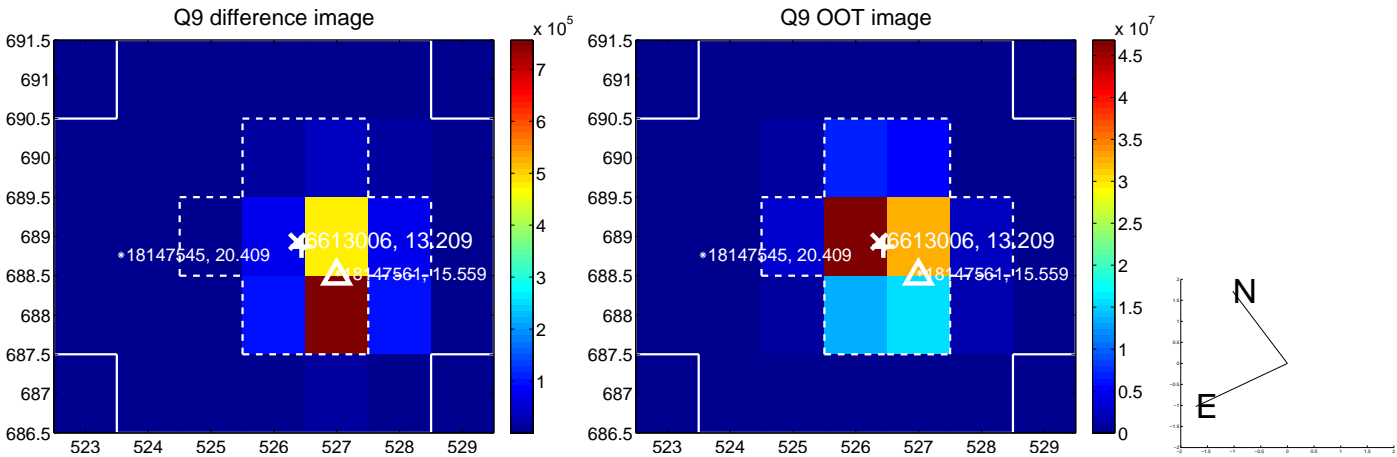


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

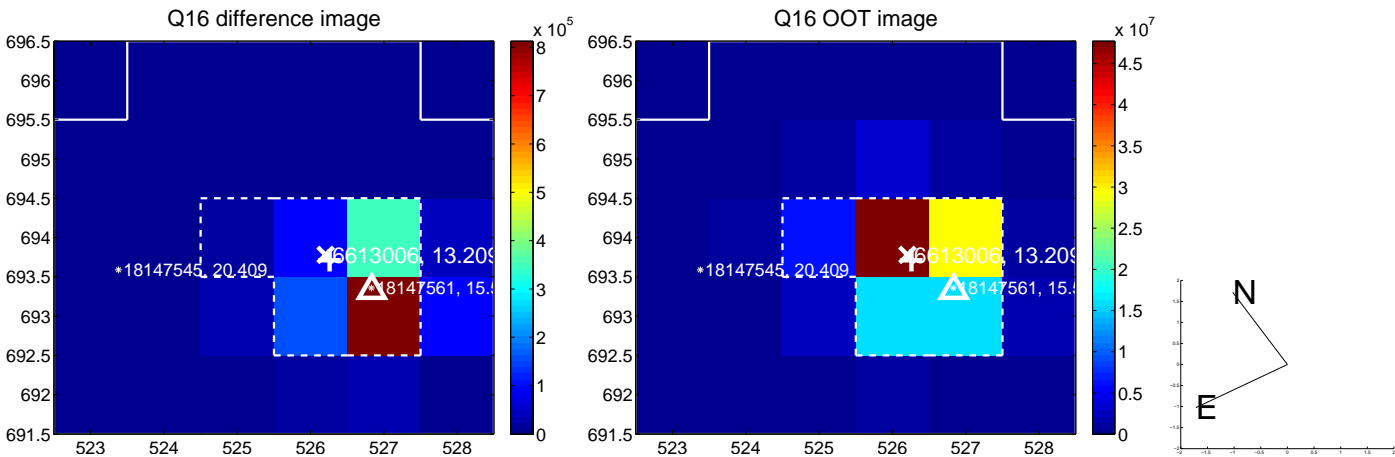
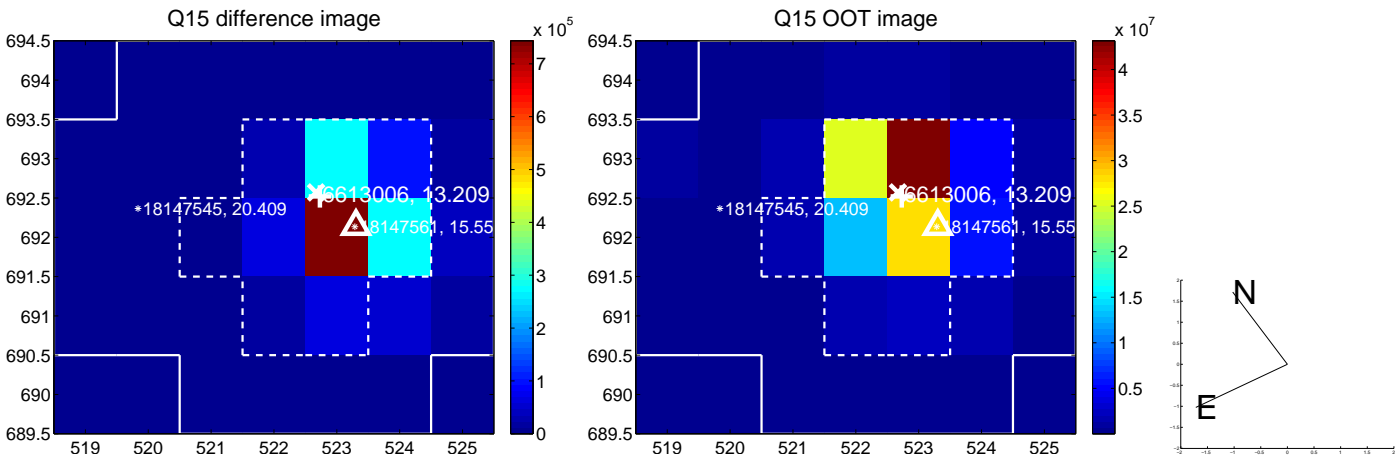
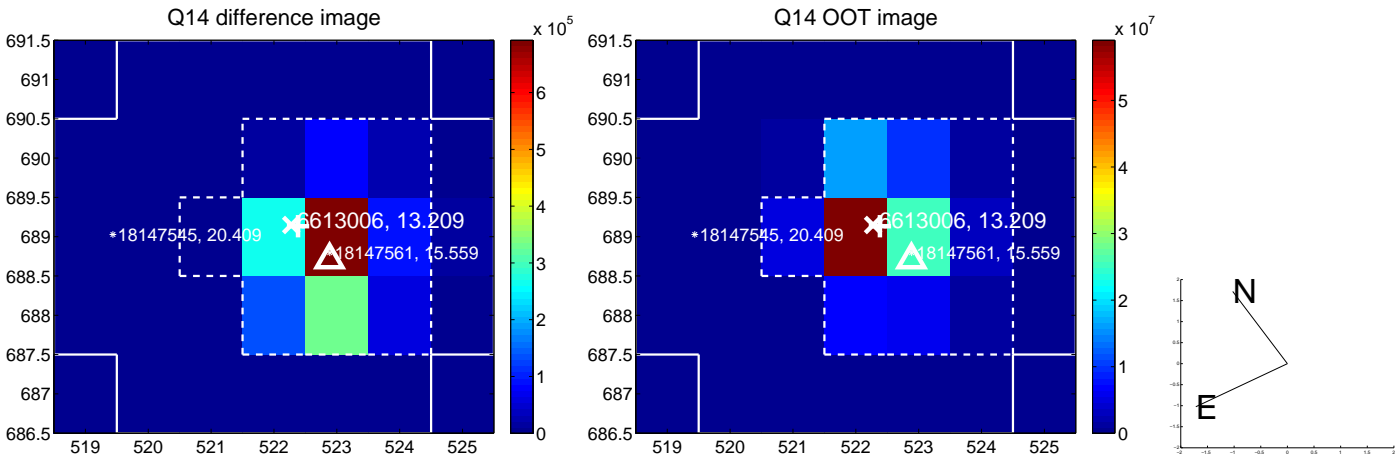
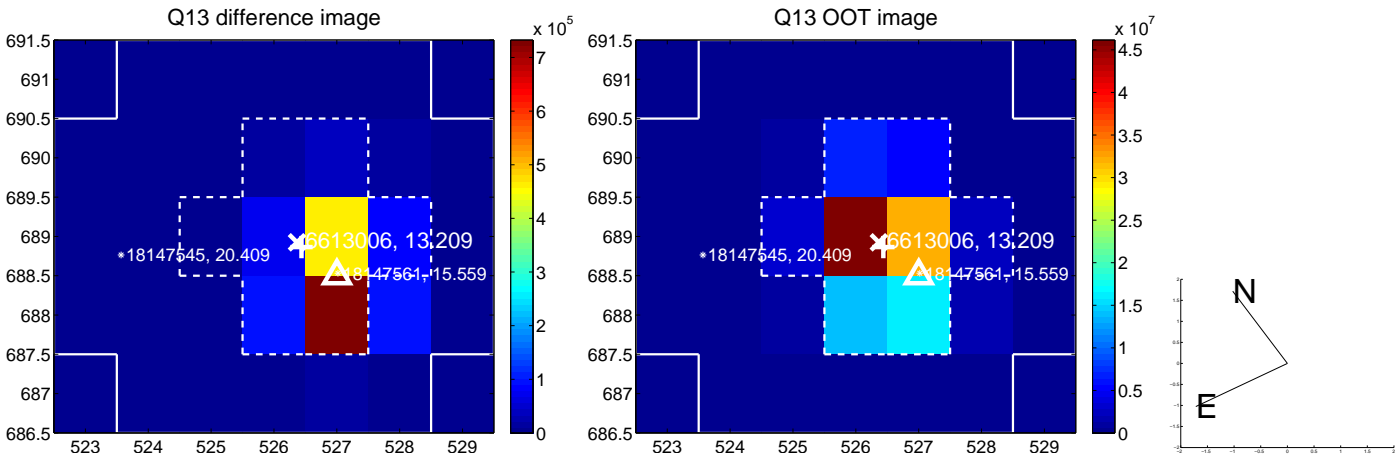




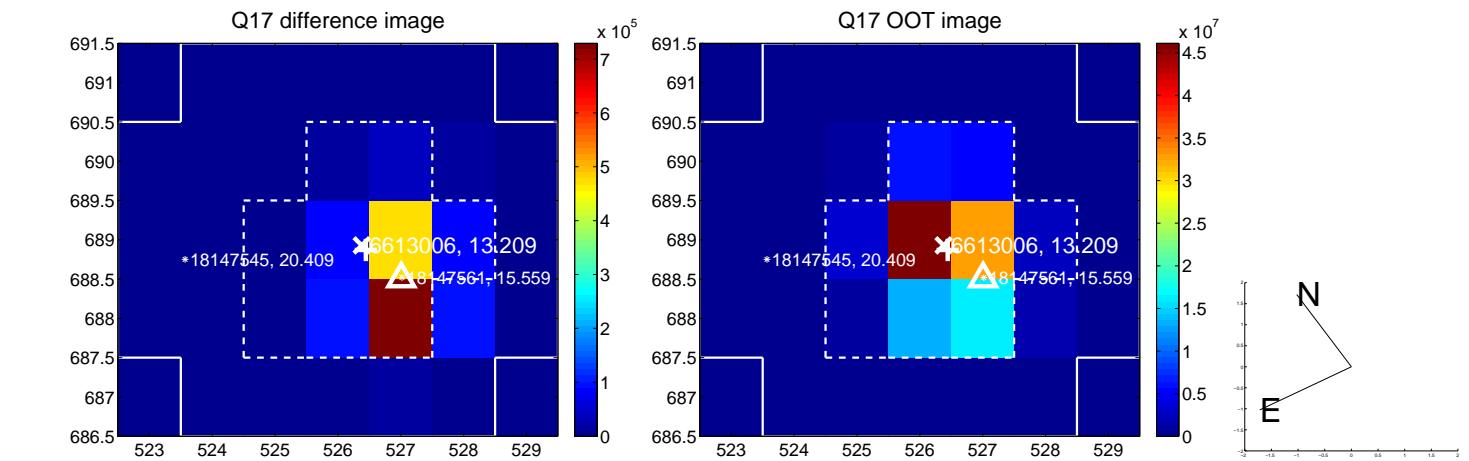
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



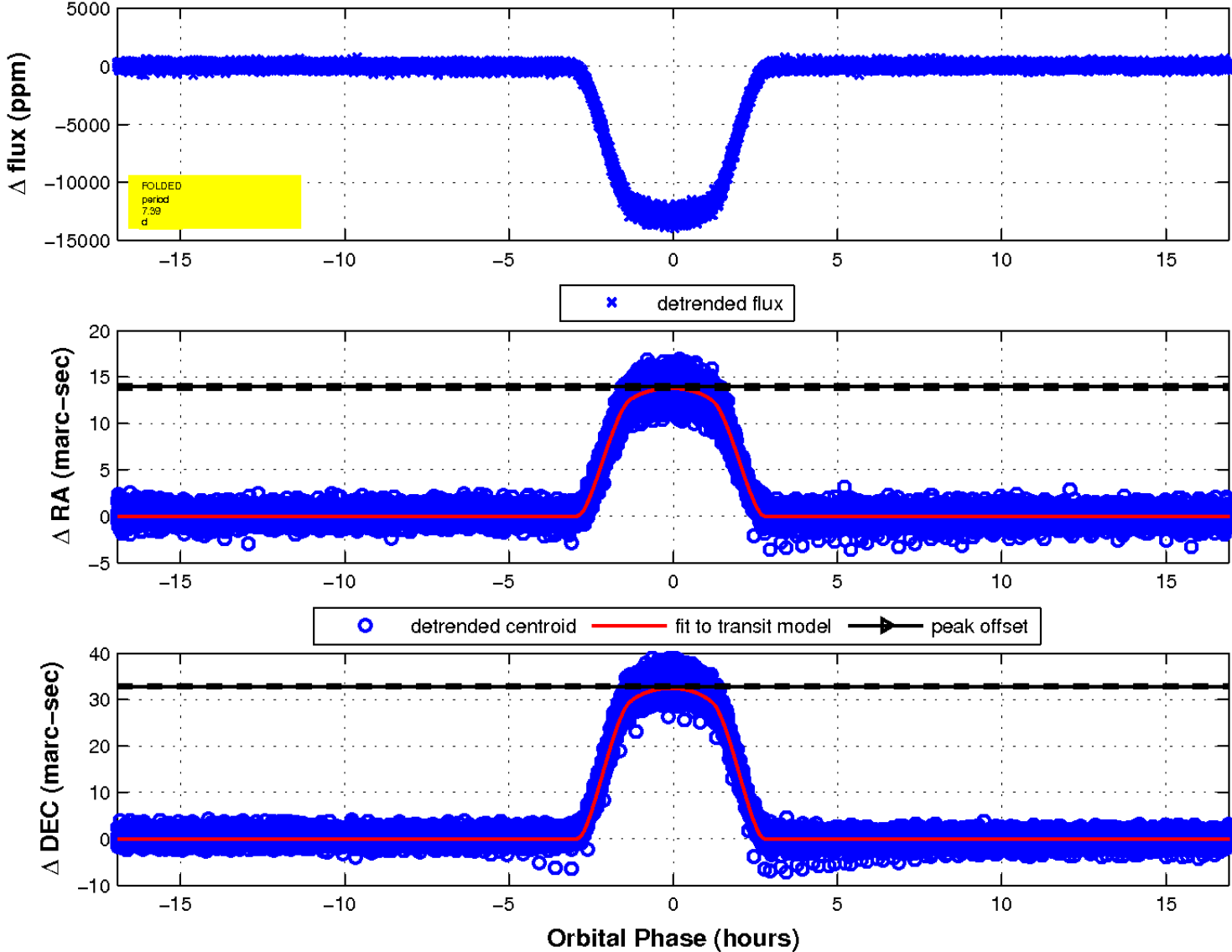
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

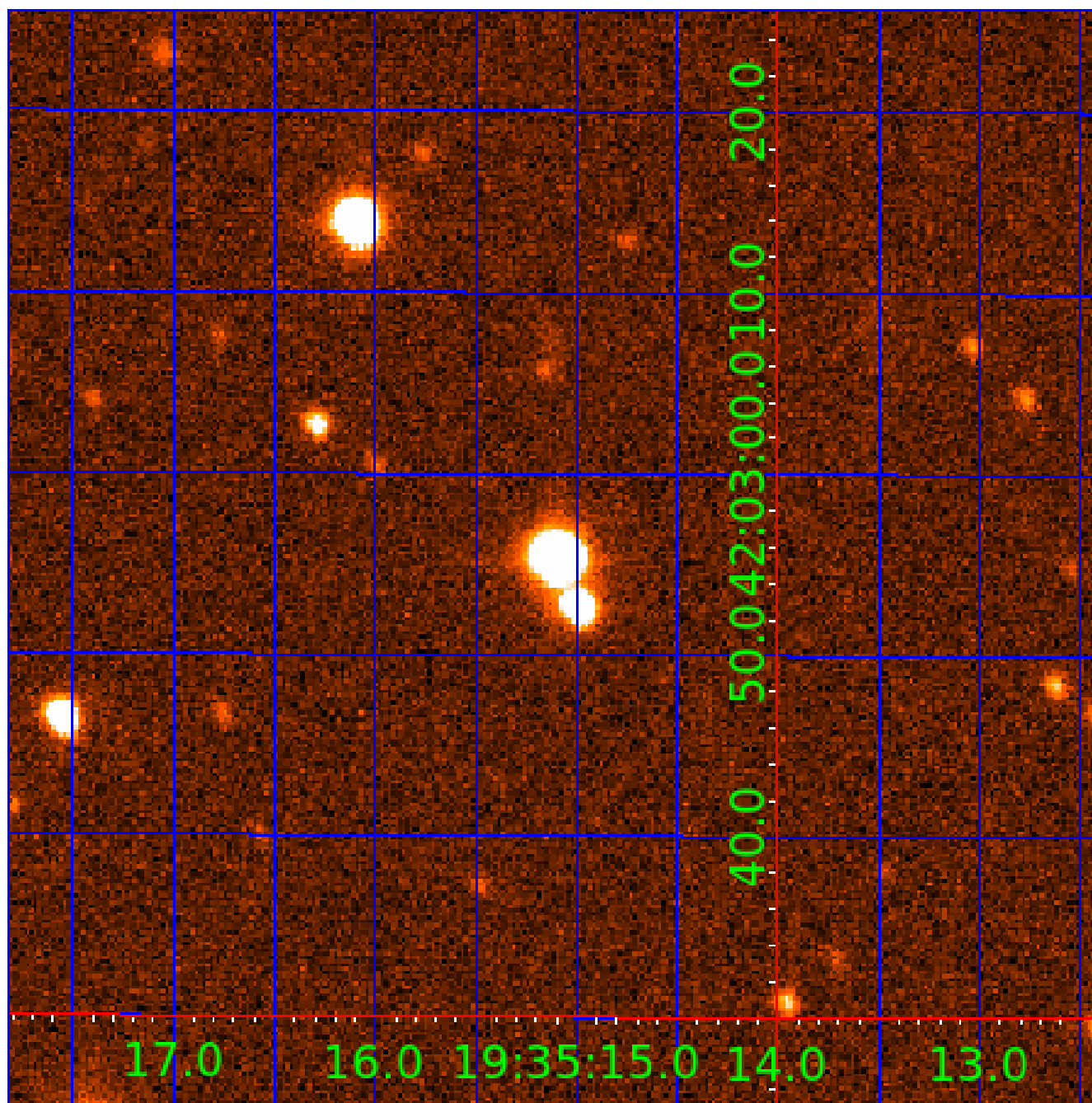


fluxWeightedCentroids, Planet 1 of 2



# UKIRT Image

Declination



# KIC 006613006

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006613006-01	OBS	1223.01	7.388834	133.934387	13044.8	5.640	2522.4	2180.2	0.84	5845	10.69	140.20
006613006-02	OBS	No	7.388822	138.024772	976.2	7.686	198.9	200.1	0.84	5845	3.22	140.20

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006613006-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_KIC_POS
006613006-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_KIC_POS

**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.

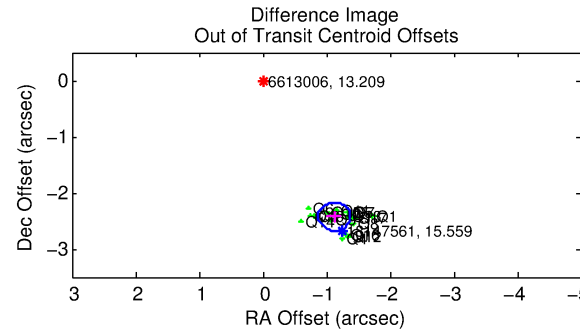
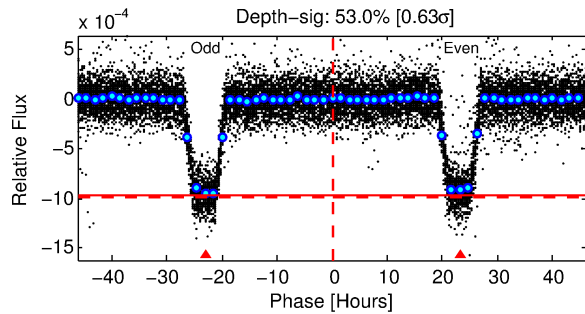
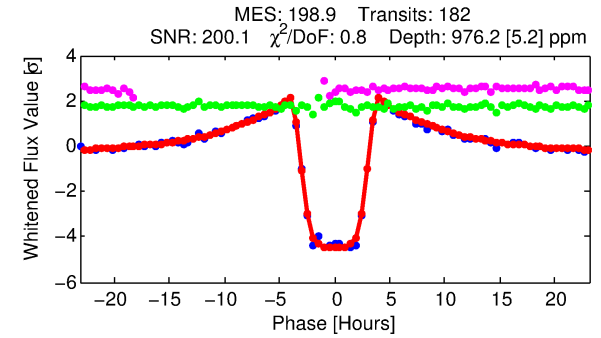
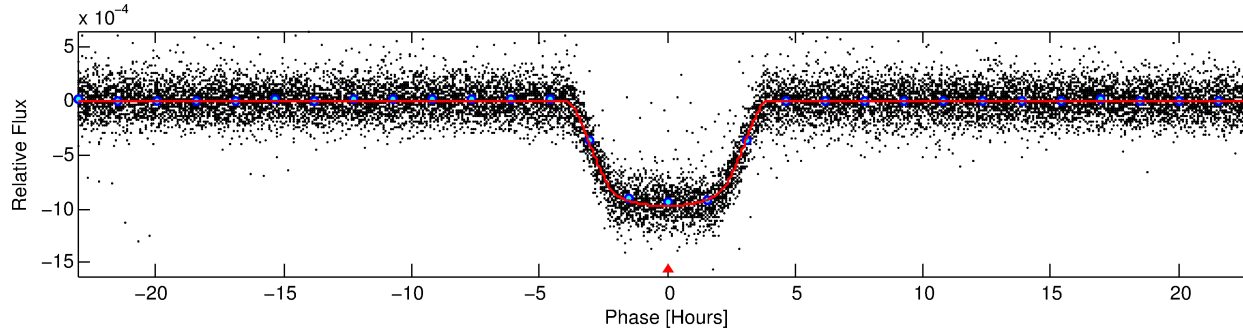
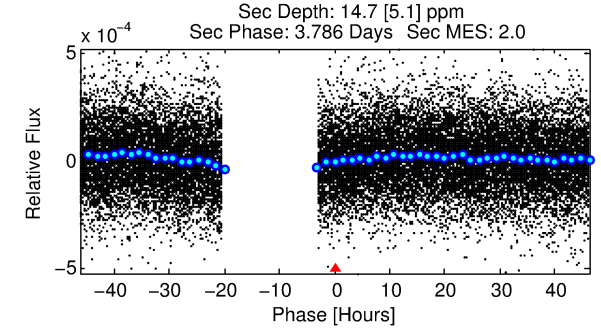
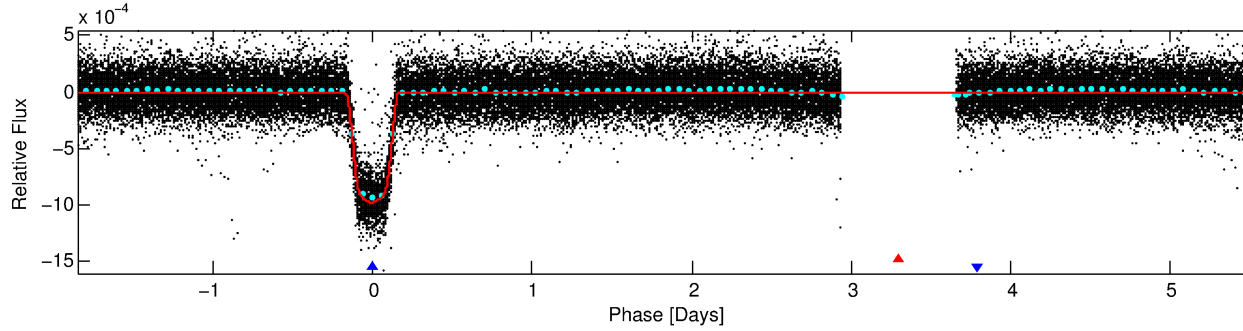
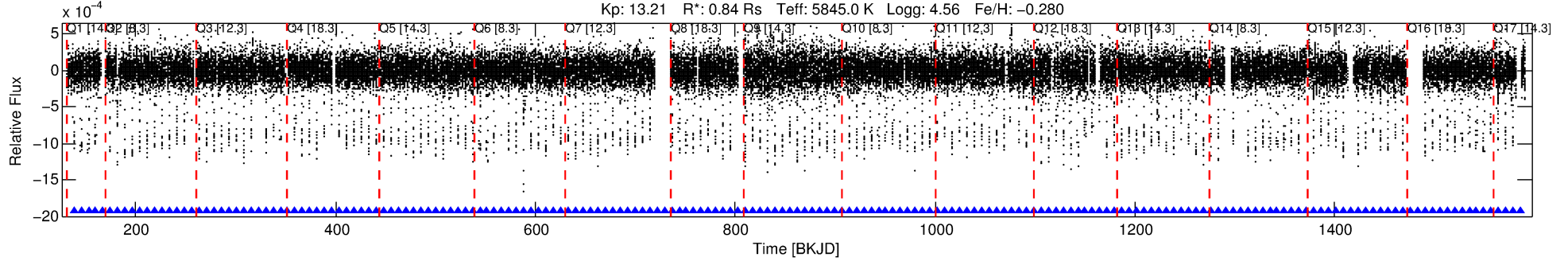
## Ephemeris Match Information For 006613006-02

No Significant Match Found

# DV One-Page Summary

KIC: 6613006 Candidate: 2 of 2 Period: 7.389 d  
KOI: K01223 Corr: No Ephemeris Match

Kp: 13.21 R\*: 0.84 Rs Teff: 5845.0 K Logg: 4.56 Fe/H: -0.280



## DV Fit Results:

Period = 7.38882 [0.00001] d  
Epoch = 138.0248 [0.0006] BKJD  
Rp/R\* = 0.0353 [0.0001]  
a/R\* = 3.41 [0.03]  
b = 0.93 [0.00]  
Seff = 140.20 [51.55]  
Teq = 877 [81] K  
Rp = 3.22 [0.93] Re  
a = 0.0724 [0.0175] AU  
Ag = 4.09 [2.01] [1.53σ]  
Teffp = 1929 [174] K [5.47σ]

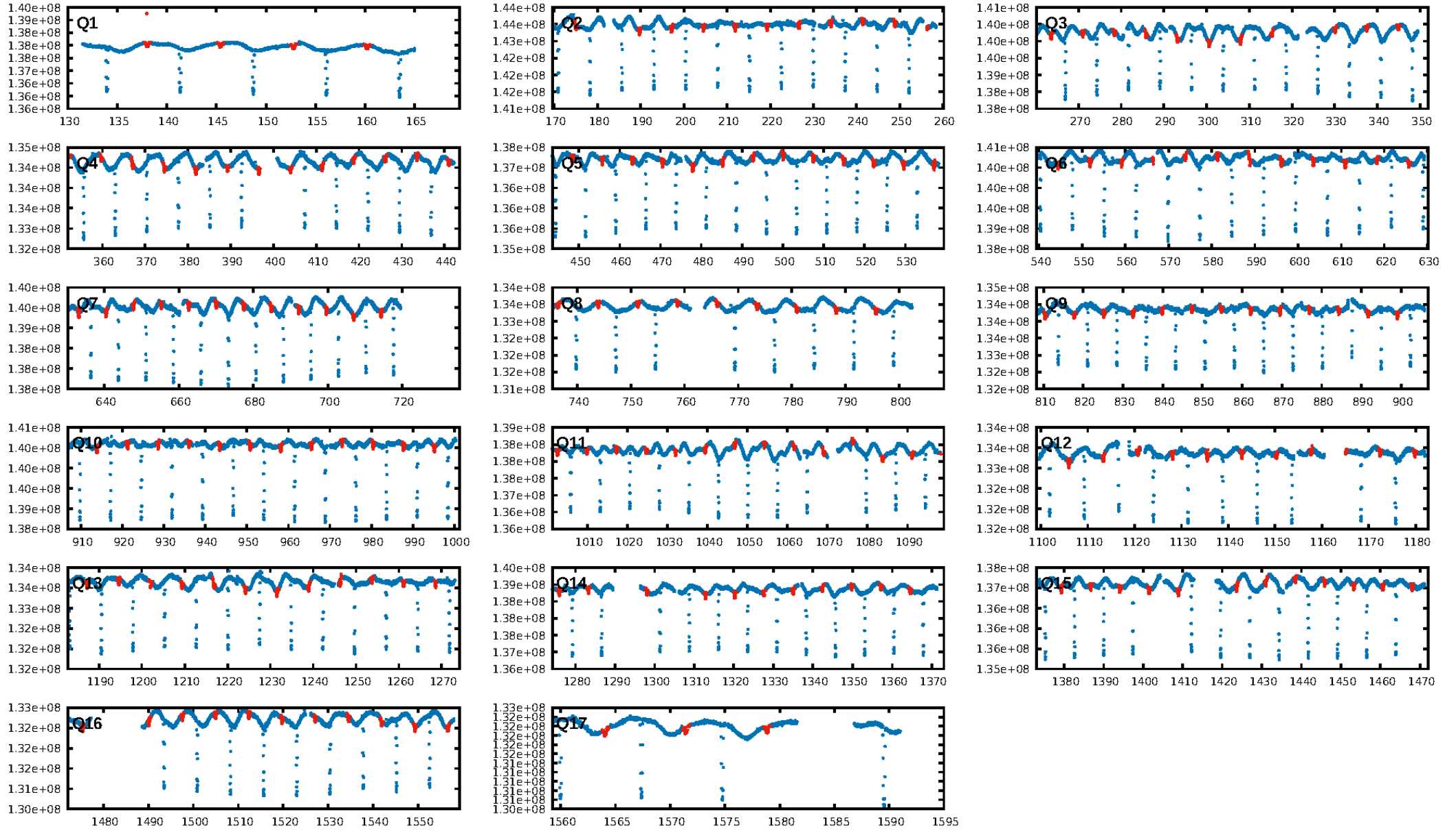
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 67.5%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [175/175]  
GhostDiagnostic-chr: 2.707  
Centroid-sig: 0.0%  
Centroid-so: 2.832 arcsec [39.36σ]  
OotOffset-rm: 2.676 arcsec [32.16σ]  
KicOffset-rm: 2.999 arcsec [35.85σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 14:58:11 Z

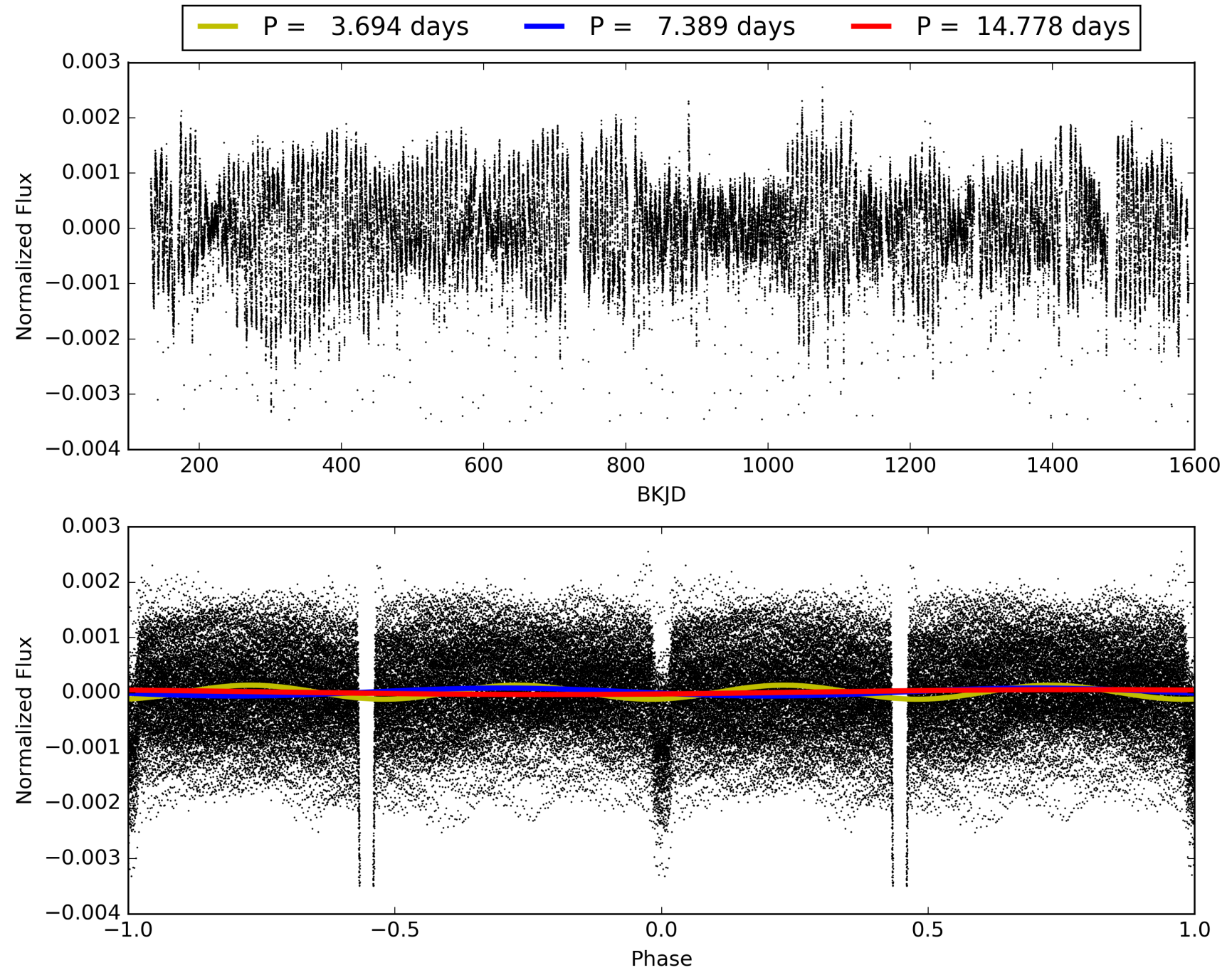
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006613006-02, PDC Light Curves





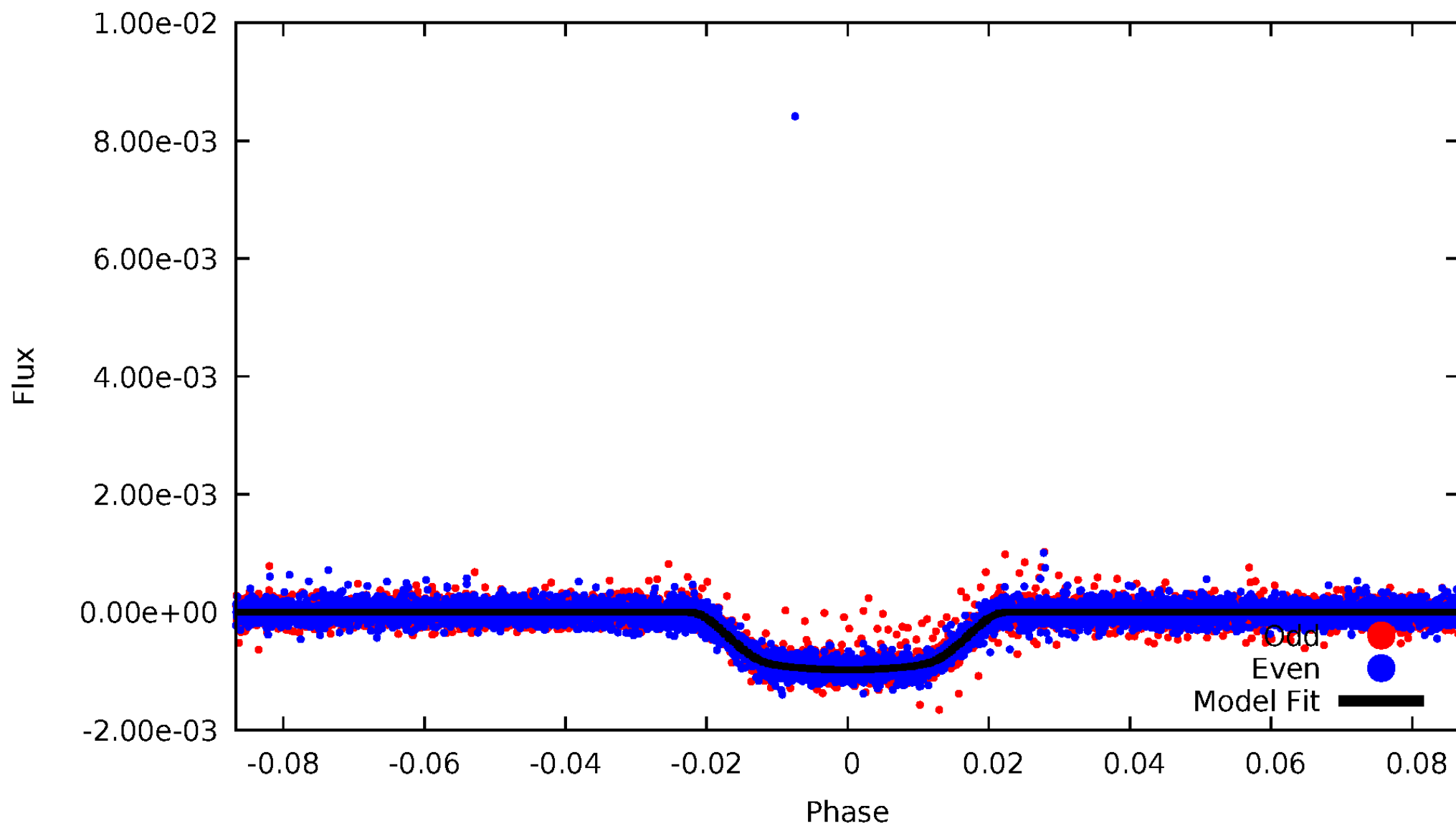
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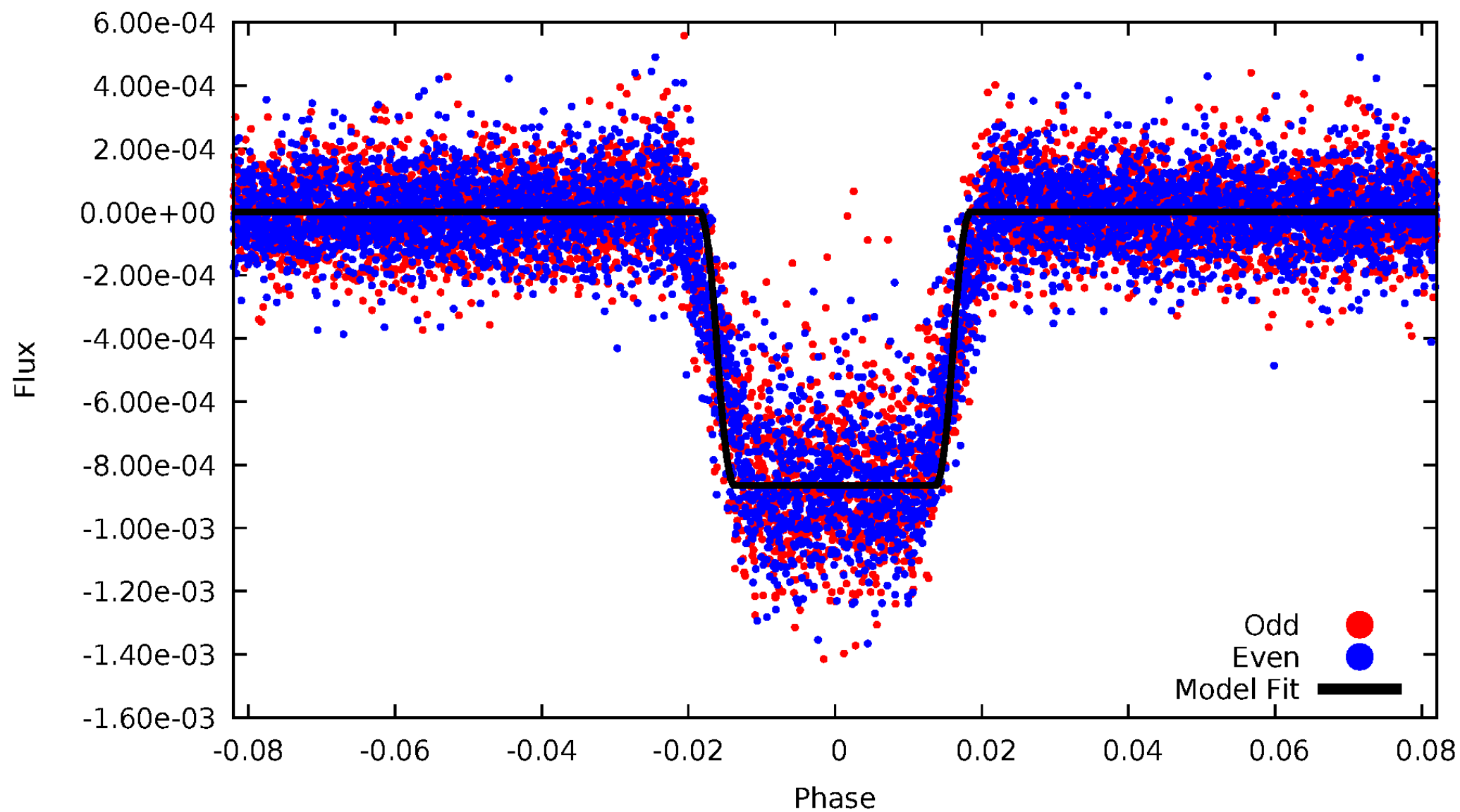
# DV Odd/Even

TCE 006613006-02



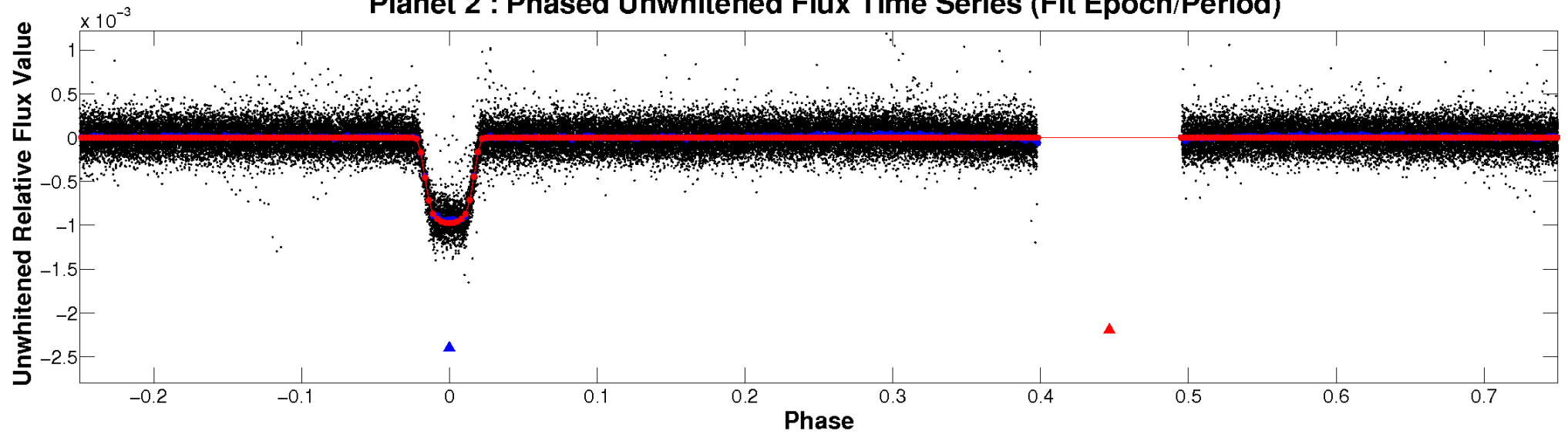
# ALT Odd/Even

TCE 006613006-02

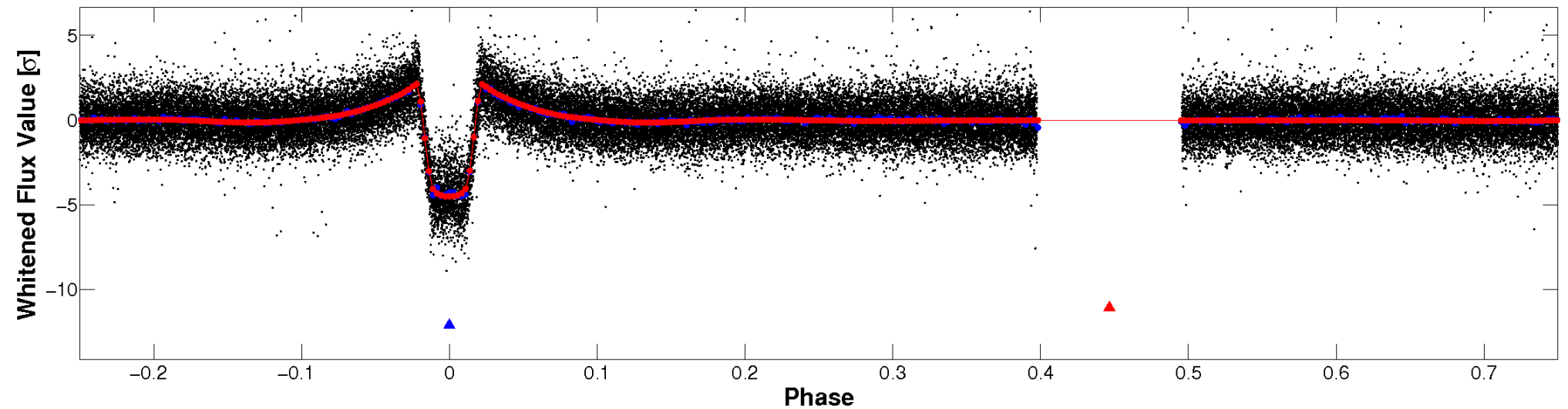


# Non-Whitened Vs. Whitened Light Curve

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

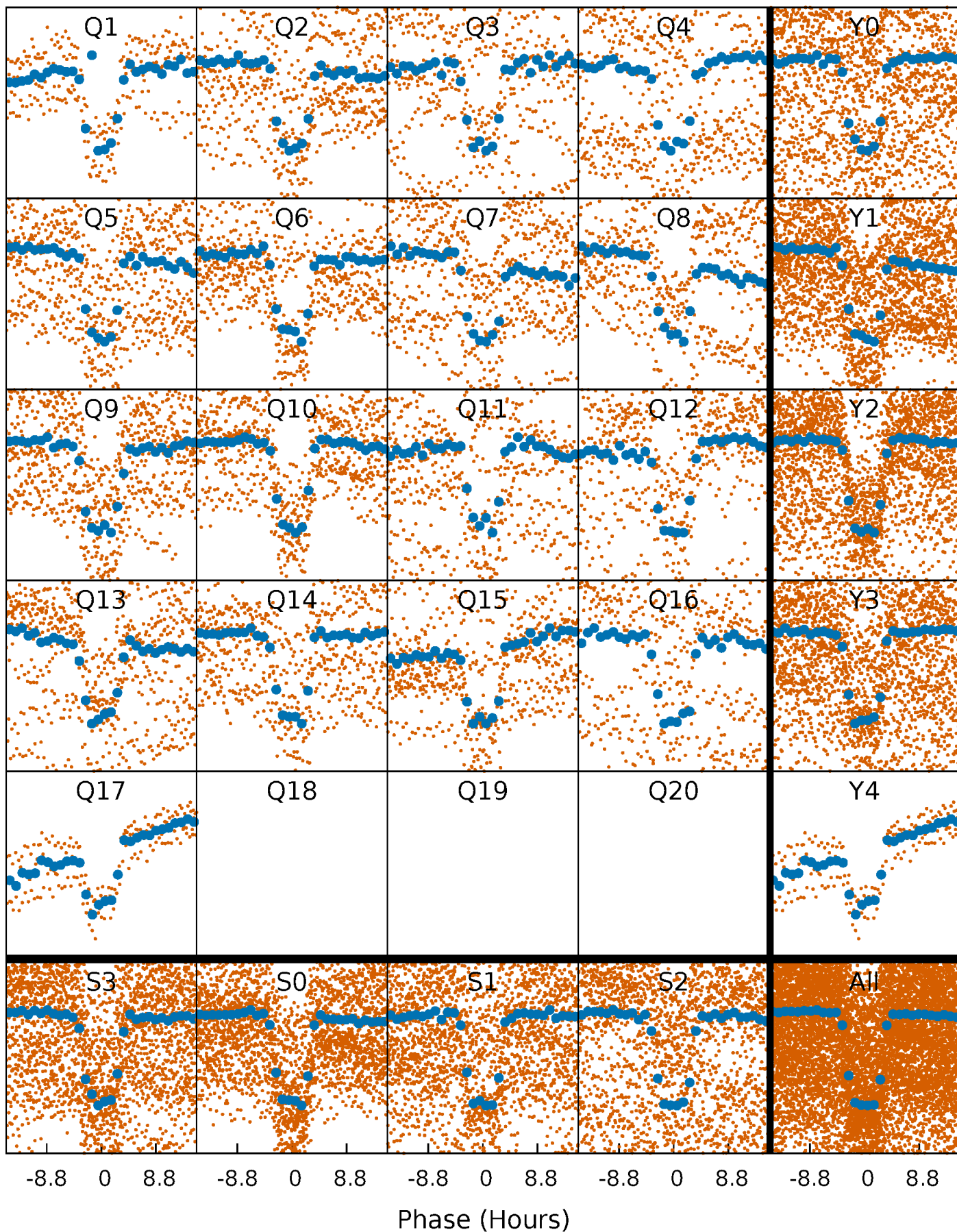


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



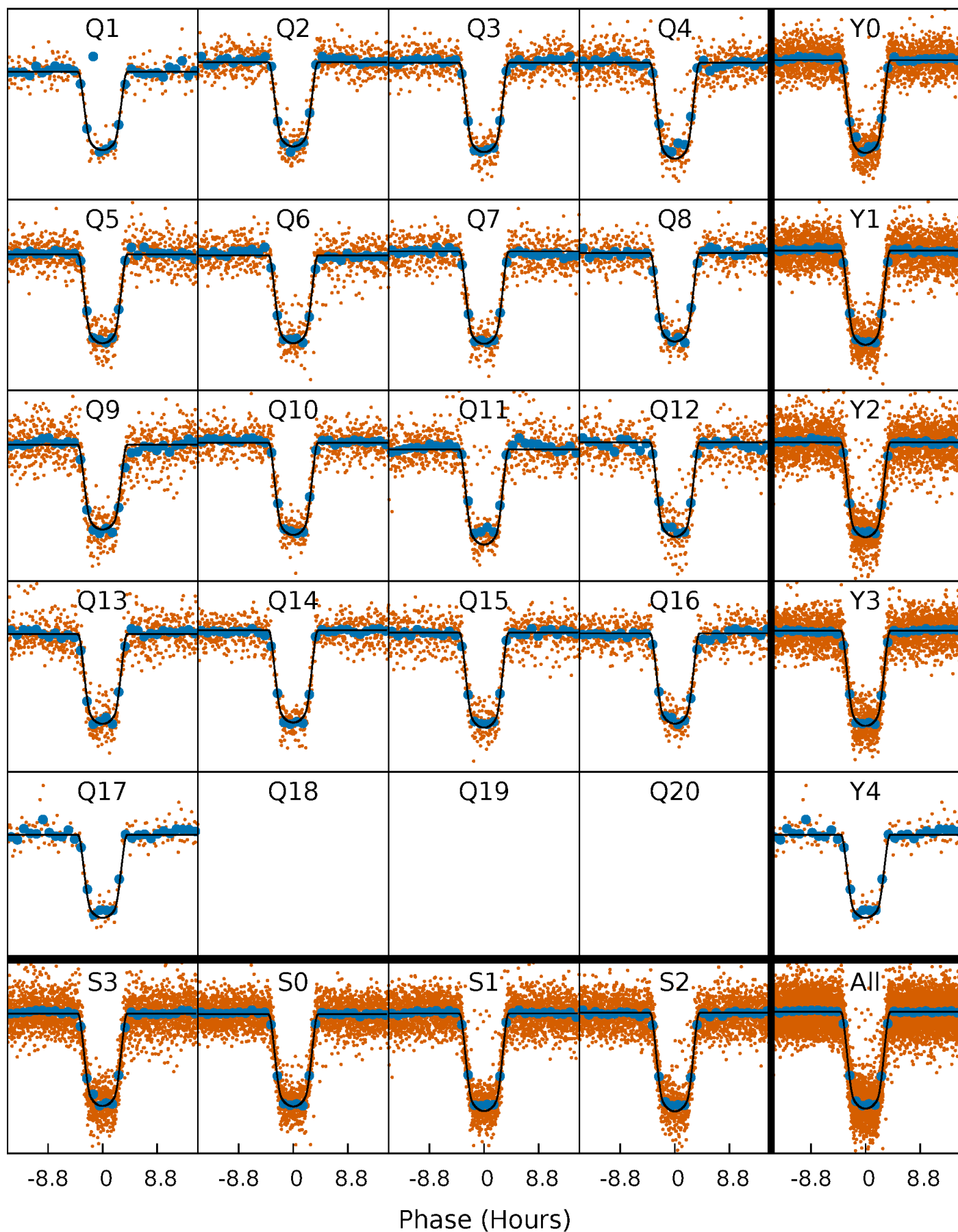
# PDC Quarter-Phased Transit Curves

TCE 006613006-02 P= 7.388822 Days  $T_0=138.024772$  (BKJD)



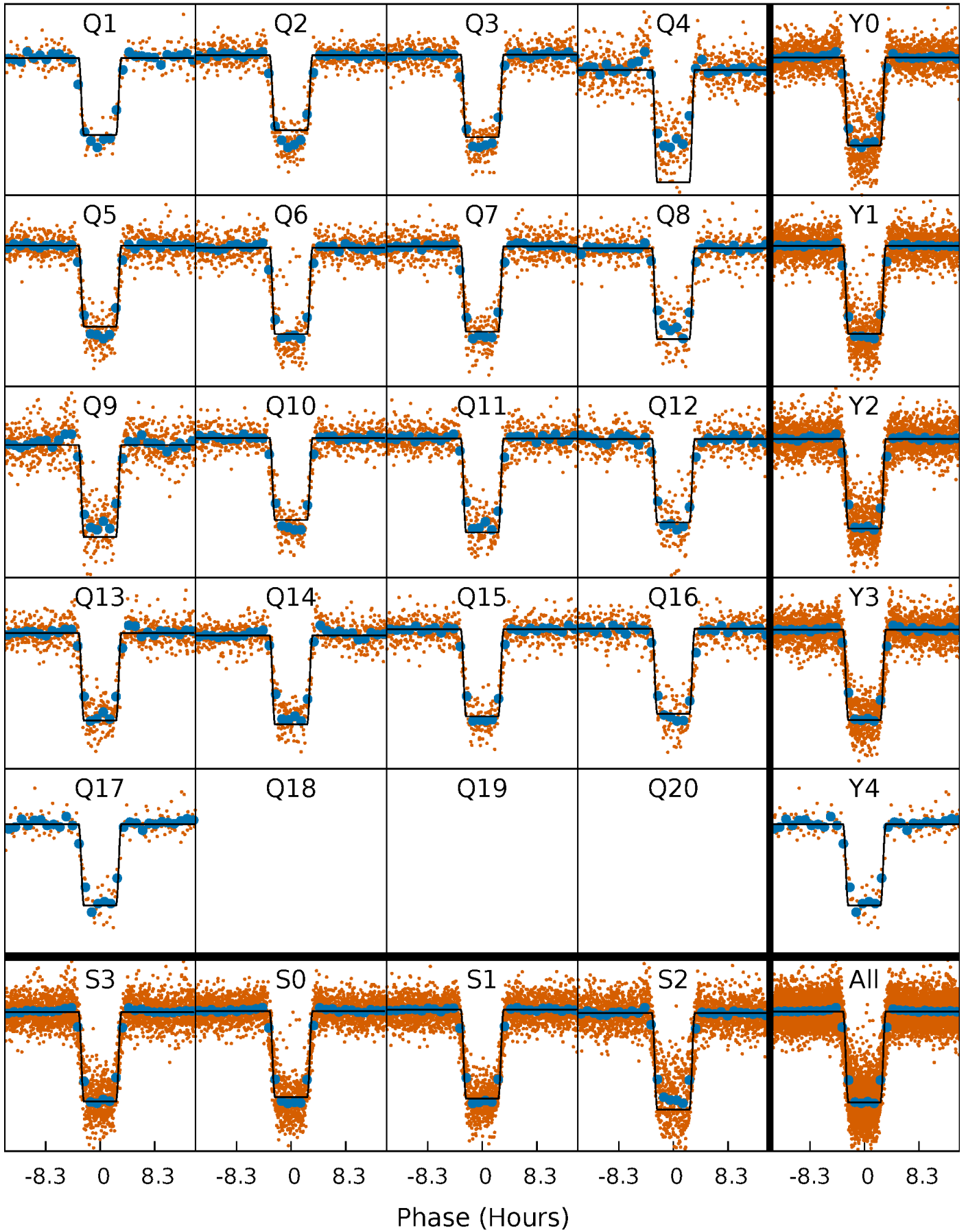
# DV Quarter-Phased Transit Curves

TCE 006613006-02   P= 7.388822 Days    $T_0=138.024772$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 006613006-02     $P = 7.388770$  Days     $T_0 = 138.029735$  (BKJD)

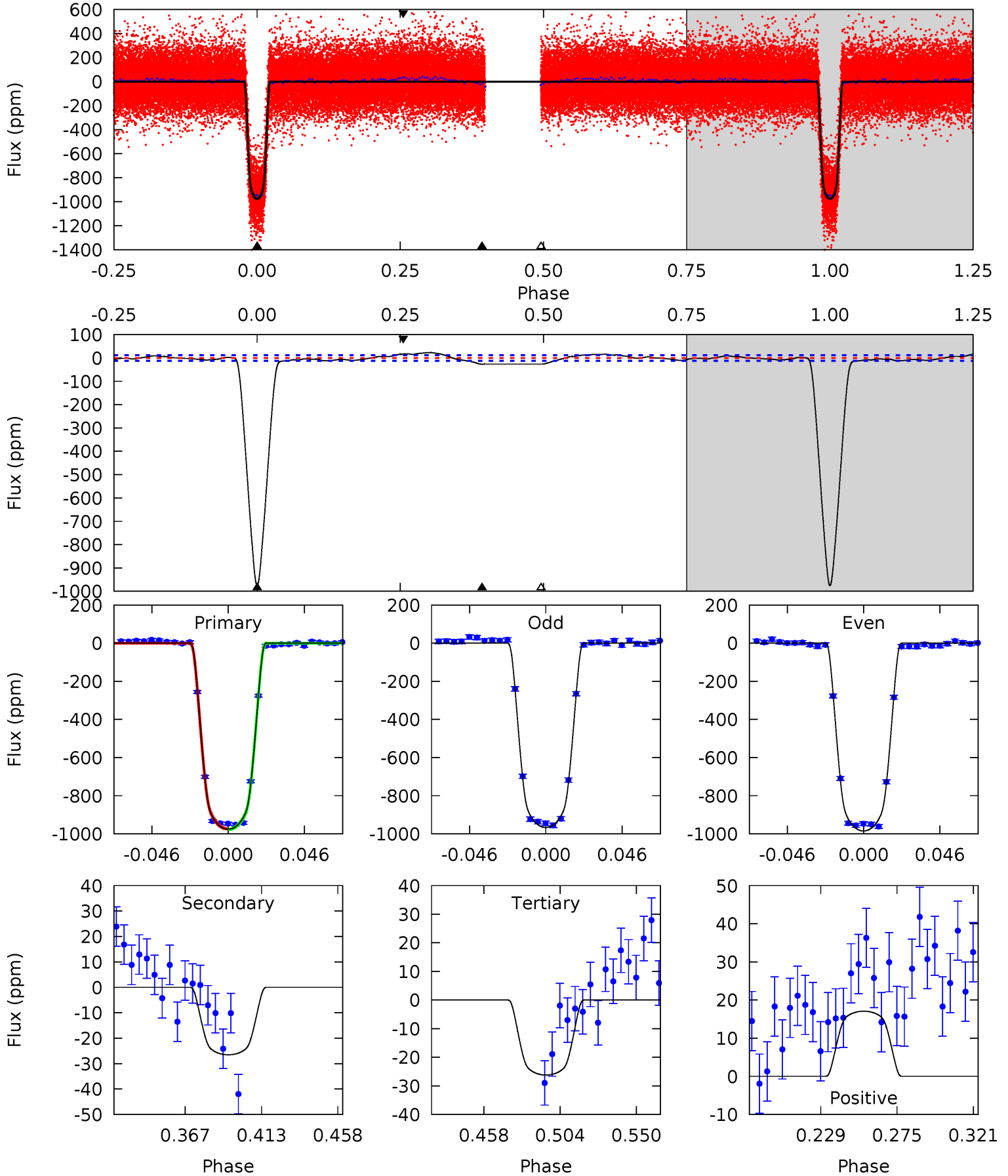




# DV Model-Shift Uniqueness Test

006613006-02, P = 7.388822 Days, E = 130.635950 Days

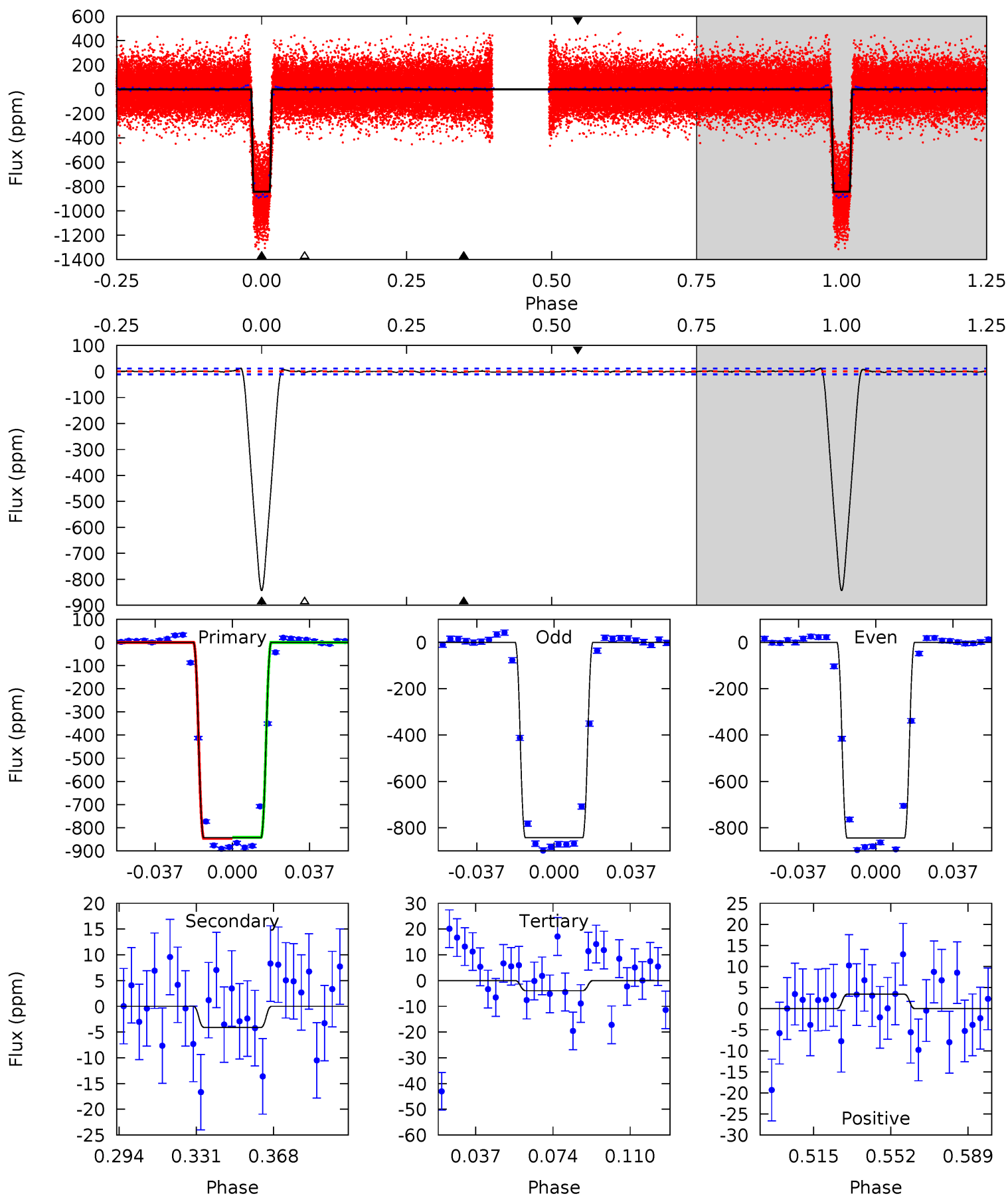
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
379.3	10.3	10.2	6.64	4.73	2.00	3.87	369.1	372.7	0.12	3.67	3.57	0.99	0.02	0.55



# Alt Model-Shift Uniqueness Test

006613006-02, P = 7.388770 Days, E = 130.640965 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
358.4	1.74	1.67	1.45	4.77	2.09	0.75	356.7	356.9	0.07	0.29	0.27	0.97	0.01	0.82





### Stellar Parameters For KIC 006613006

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5845^{+139}_{-157}$	$4.558^{+0.036}_{-0.192}$	$-0.280^{+0.300}_{-0.300}$	$0.838^{+0.241}_{-0.075}$	$0.926^{+0.099}_{-0.110}$	$2.214^{+0.426}_{-1.121}$
	+2%/-3%	+1%/-4%	+107%/-107%	+29%/-9%	+11%/-12%	+19%/-51%
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 006613006-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-27 \pm 3$	$3.33^{+0.52}_{-0.23}$	$1251^{+90}_{-46}$	$2905^{+54}_{-62}$	$6.633^{+1.122}_{-1.524}$
Alt.	$-4 \pm 2$	$2.77^{+0.44}_{-0.19}$	$1253^{+87}_{-50}$	$2326^{+175}_{-325}$	$1.331^{+1.014}_{-0.799}$

$T_{max}$  = 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

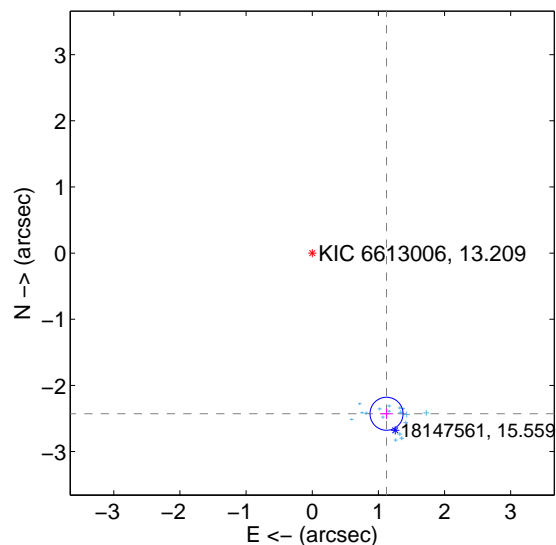
Supplemental centroid analysis for 006613006-02. Kepler magnitude: 13.21. Transit SNR 200.05

There are 17 quarters with good PRF difference image offsets

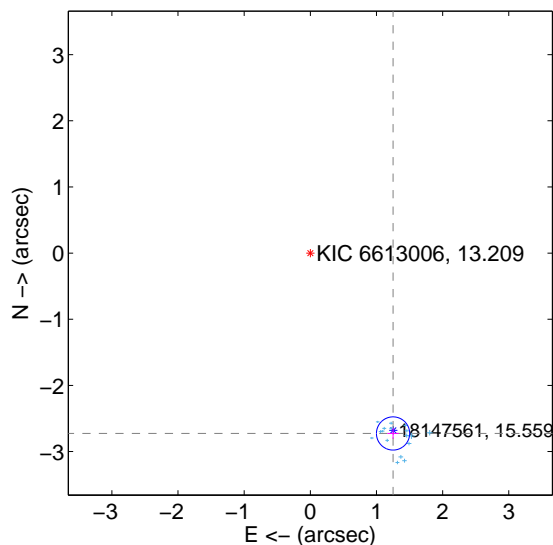
The direct PRF centroid is offset from the target star catalog position by about 0.34 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.676 \pm 0.083$	32.16	$-1.123 \pm 0.097$	$-2.429 \pm 0.078$
PRF-fit source offset from KIC position	$2.999 \pm 0.084$	35.85	$-1.250 \pm 0.086$	$-2.726 \pm 0.080$
photometric centroid source offset	$2.83 \pm 0.07$	39.36	$-1.12 \pm 0.05$	$-2.60 \pm 0.07$

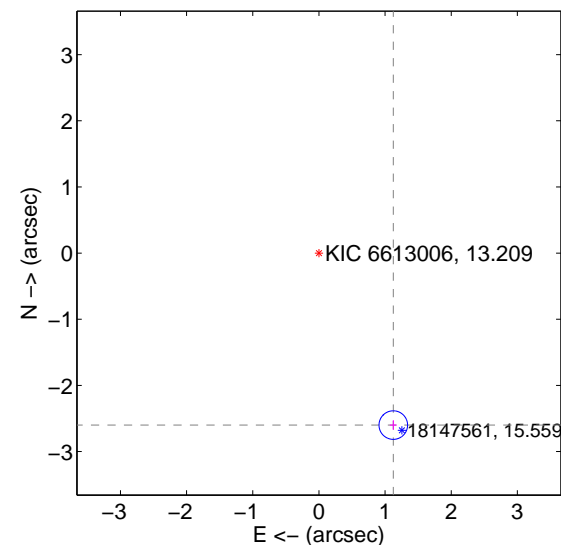
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

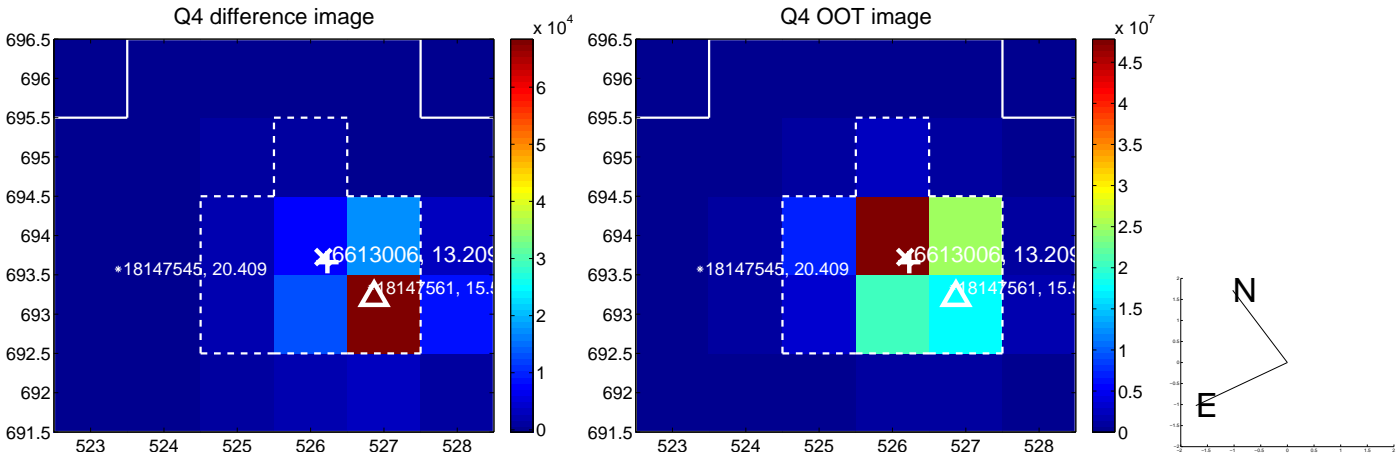
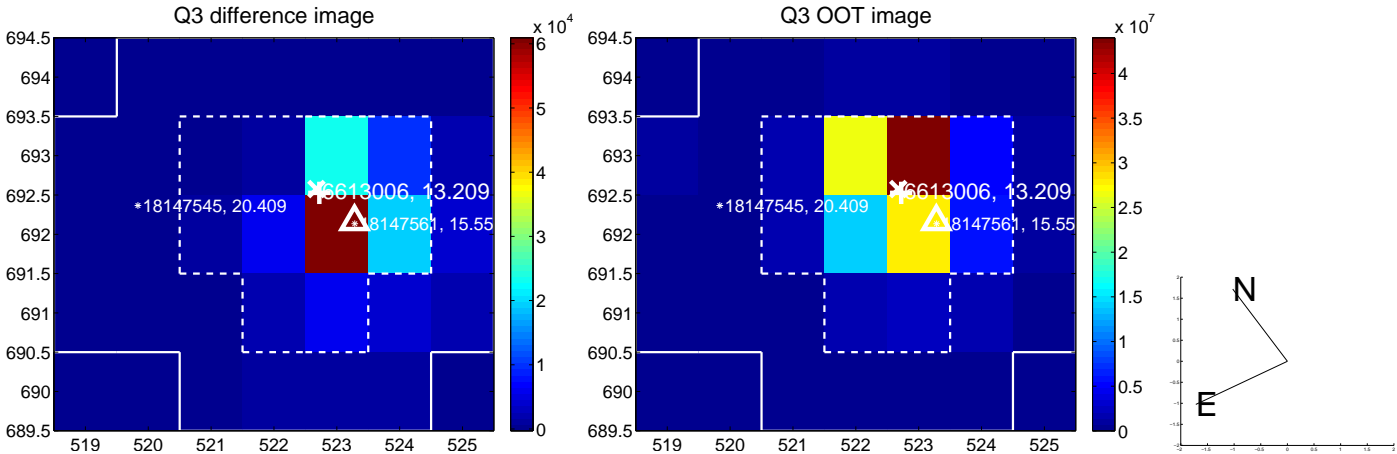
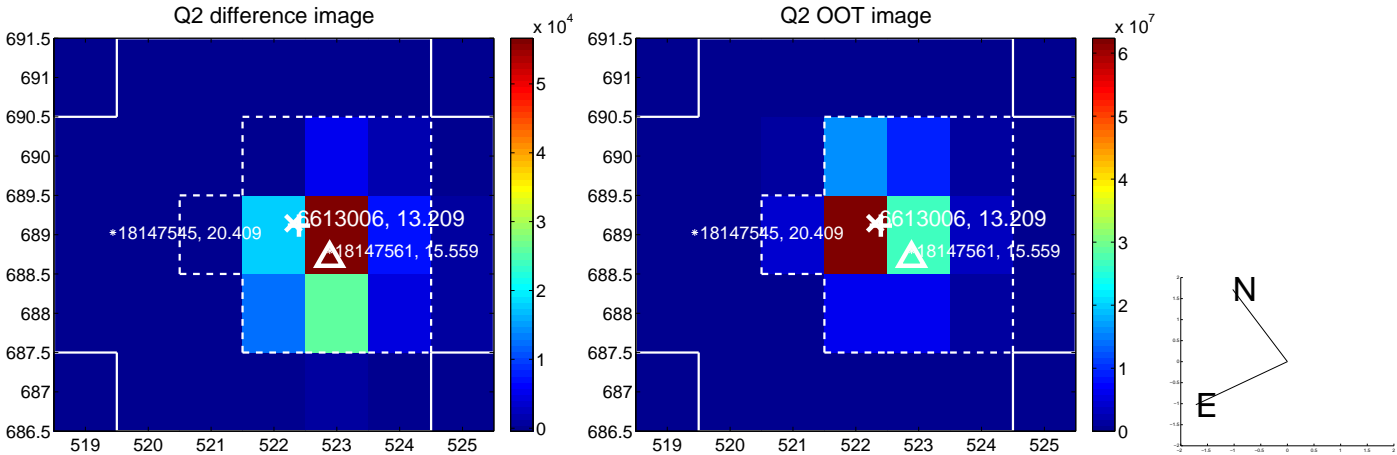
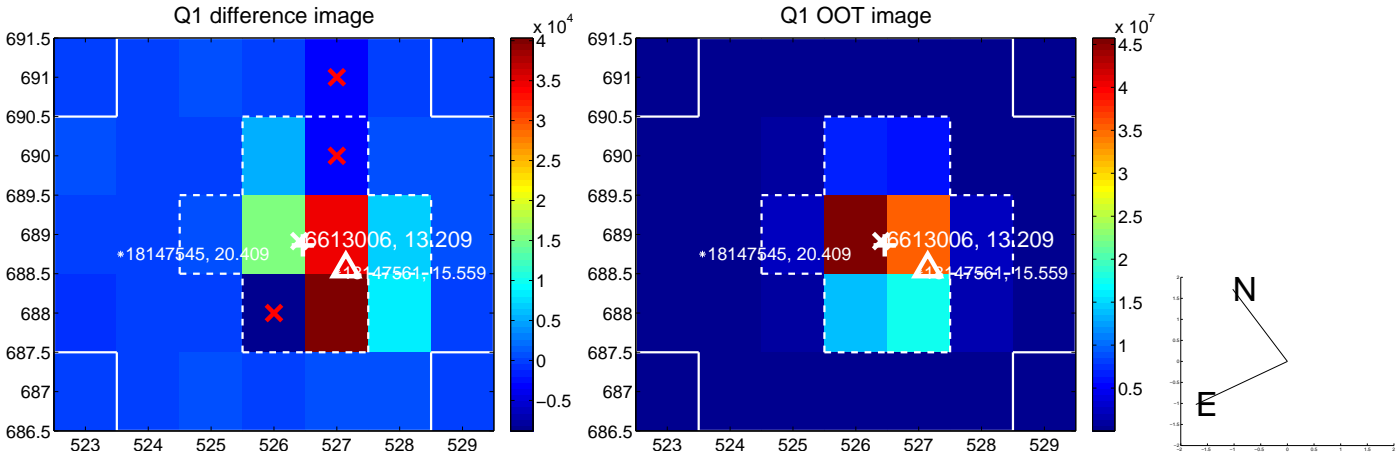


offset from photometric centroids

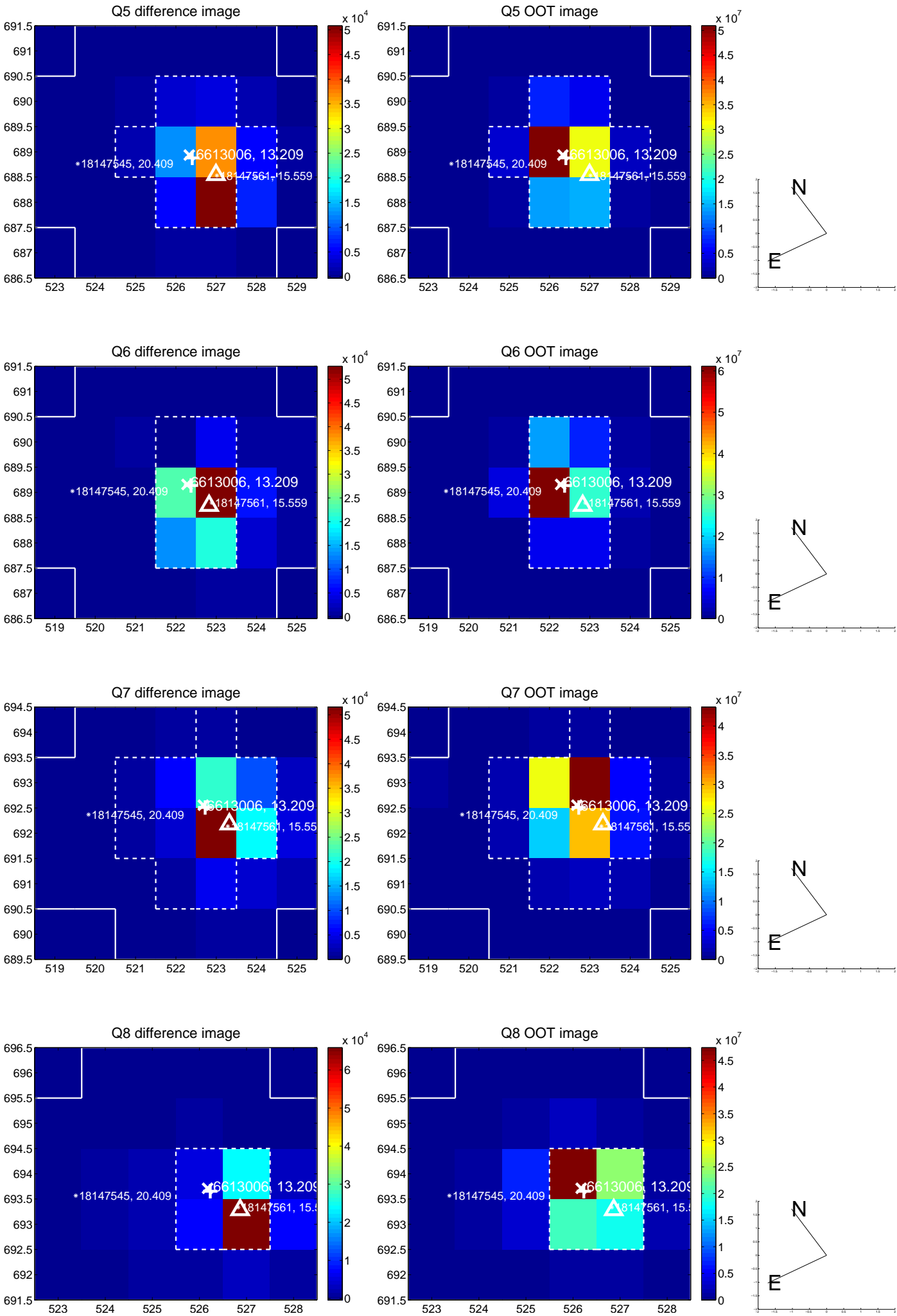


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

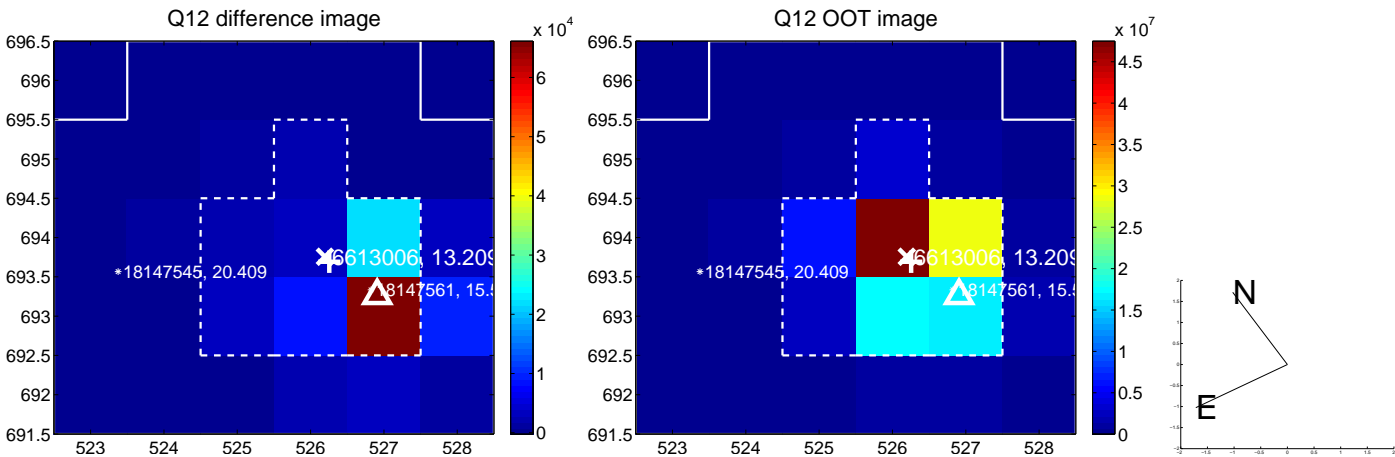
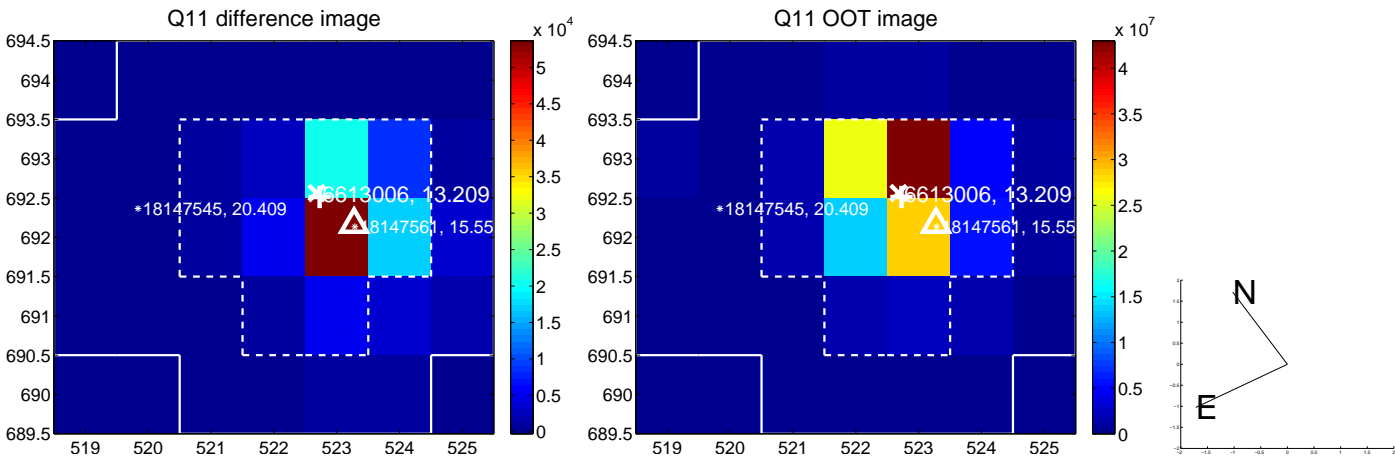
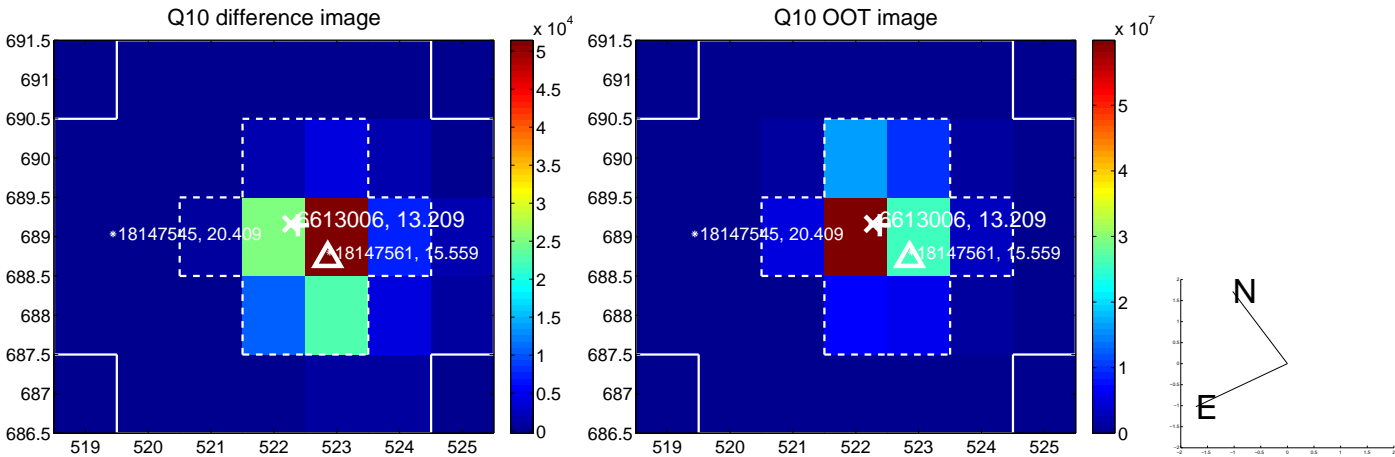
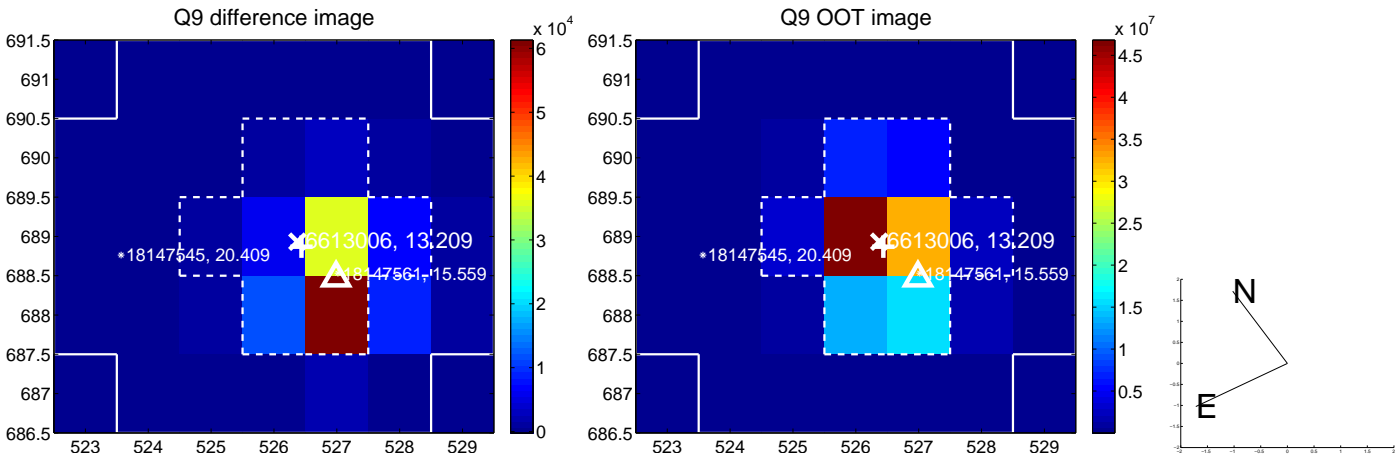
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



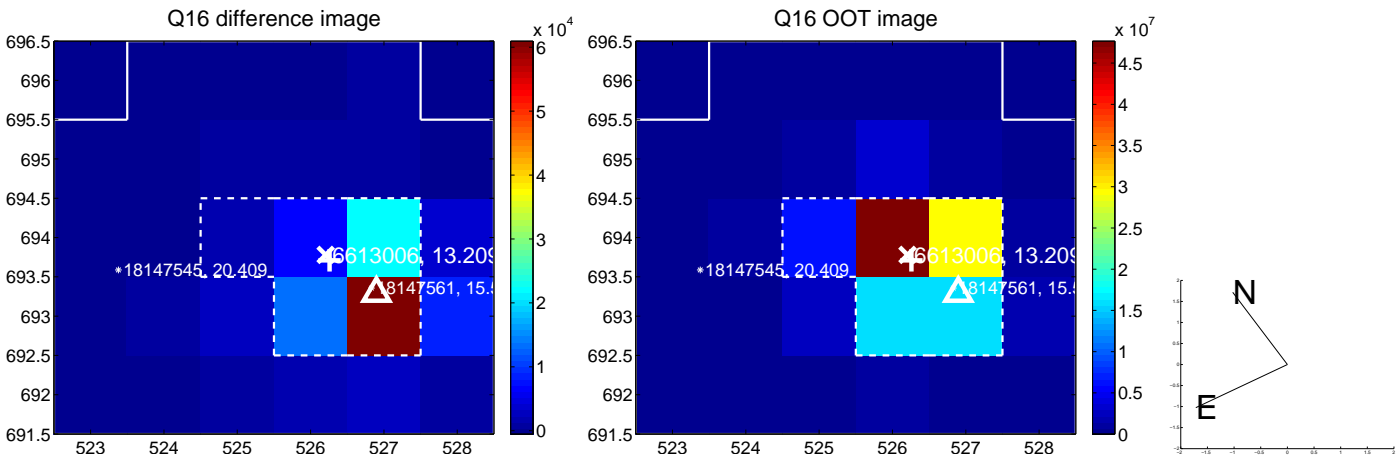
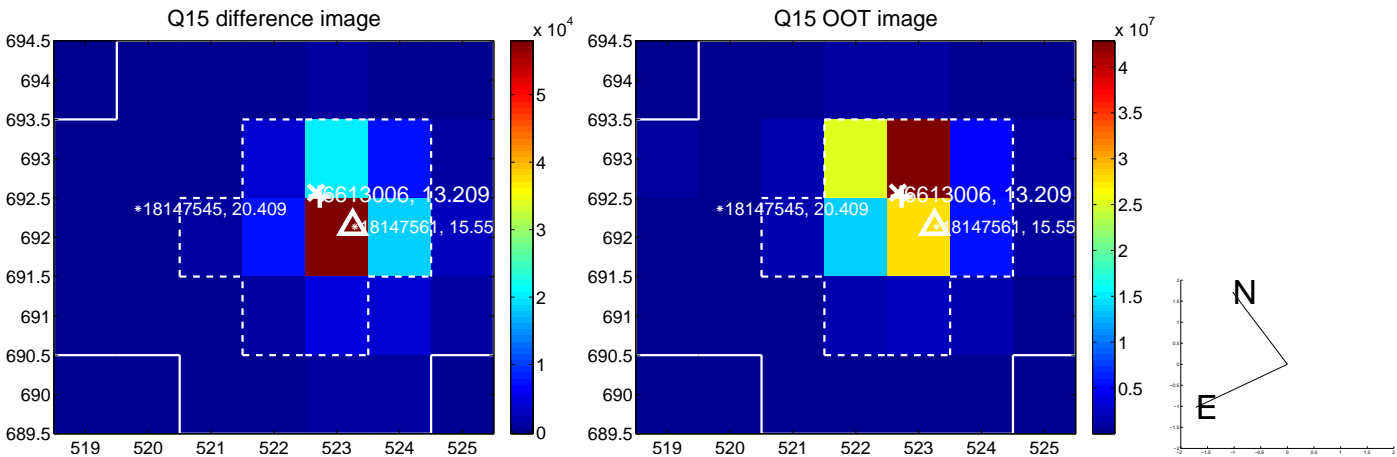
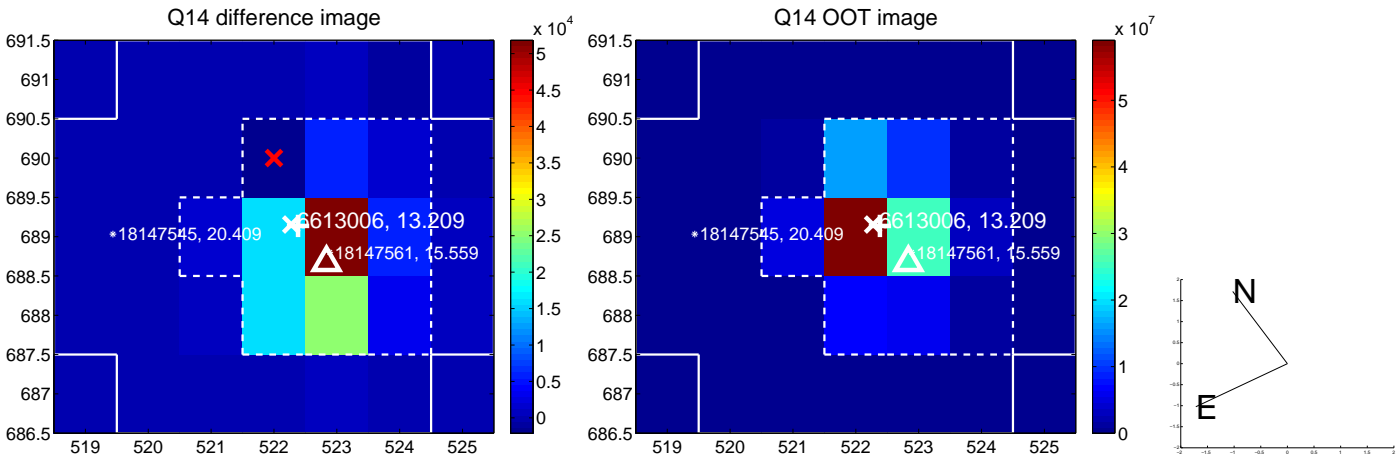
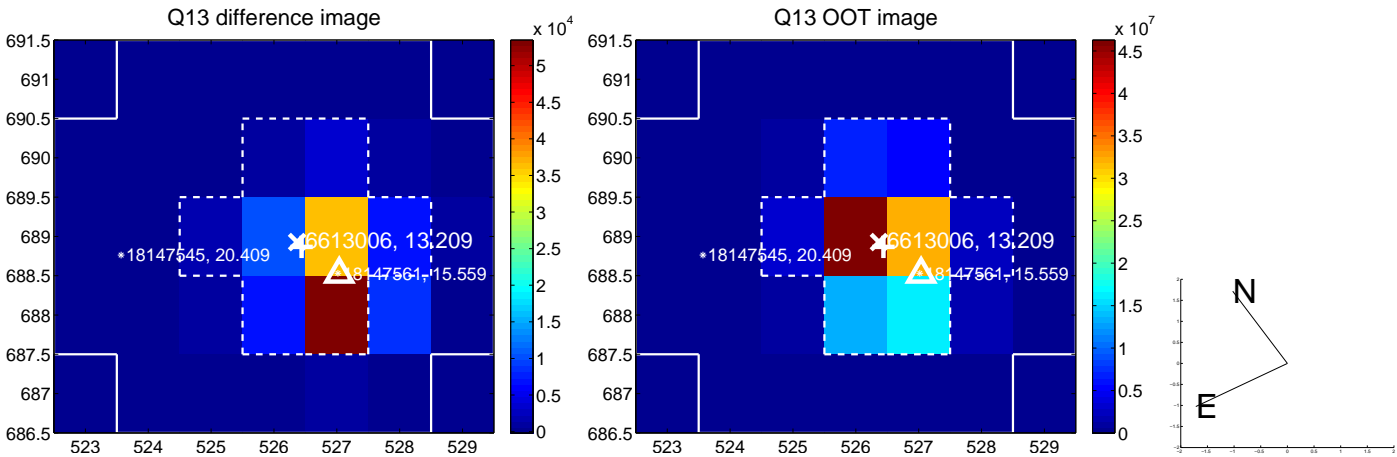
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

