

# KIC 006278670

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006278670-01	OBS	No	551.392000	237.901472	753.8	4.900	12.1	8.3	1.92	5115	5.91	1.42
006278670-02	OBS	7775.01	89.945682	133.560719	352.3	2.088	8.6	7.9	1.92	5115	3.97	15.89

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006278670-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006278670-02	OBS	PC	0.57	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.

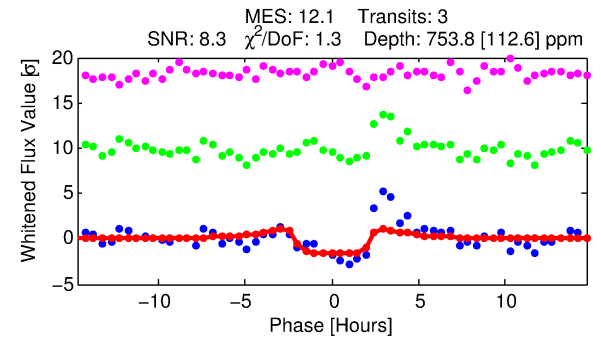
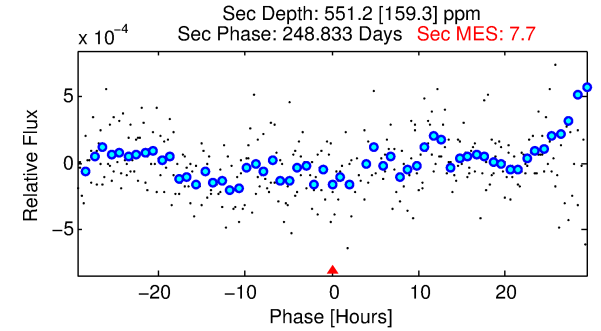
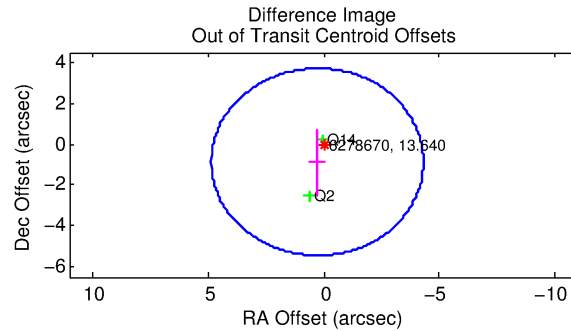
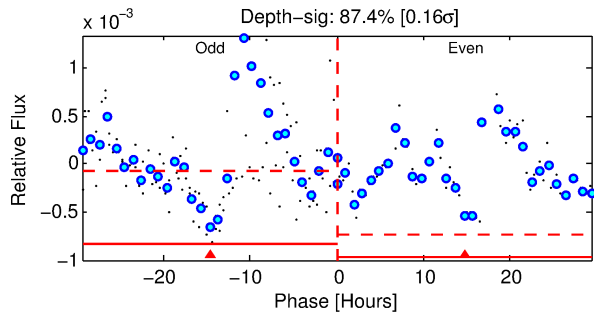
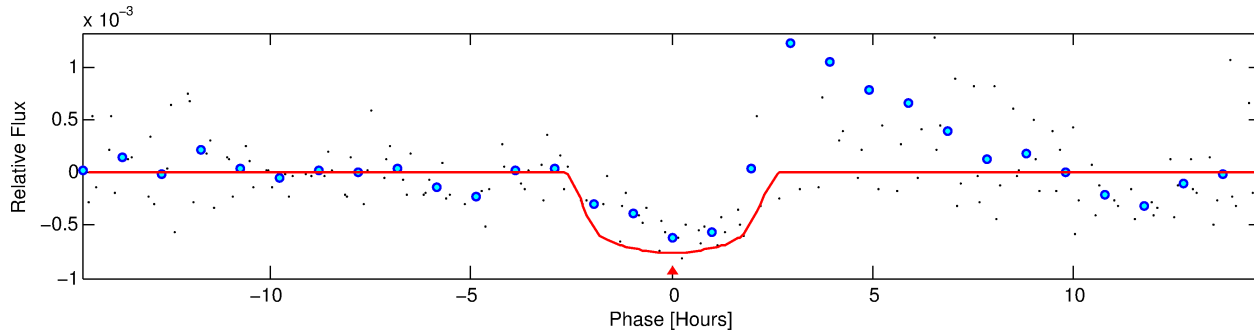
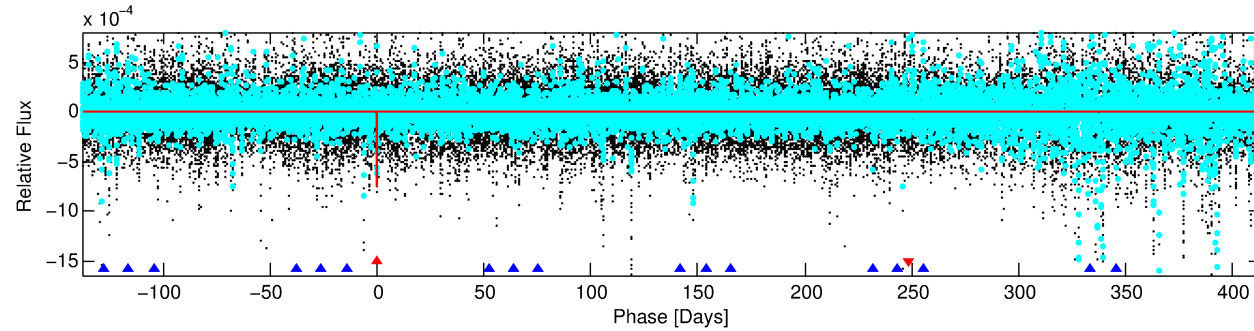
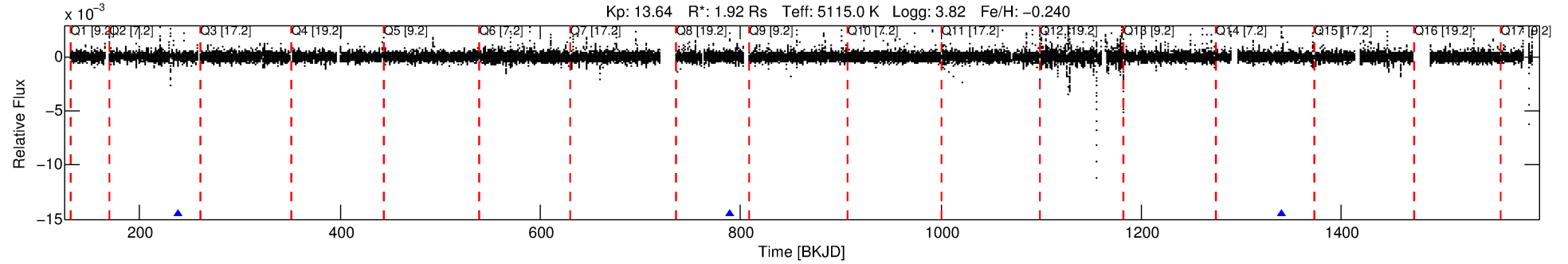
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006278670-01

No Significant Match Found

# DV One-Page Summary

KIC: 6278670 Candidate: 1 of 2 Period: 551.392 d



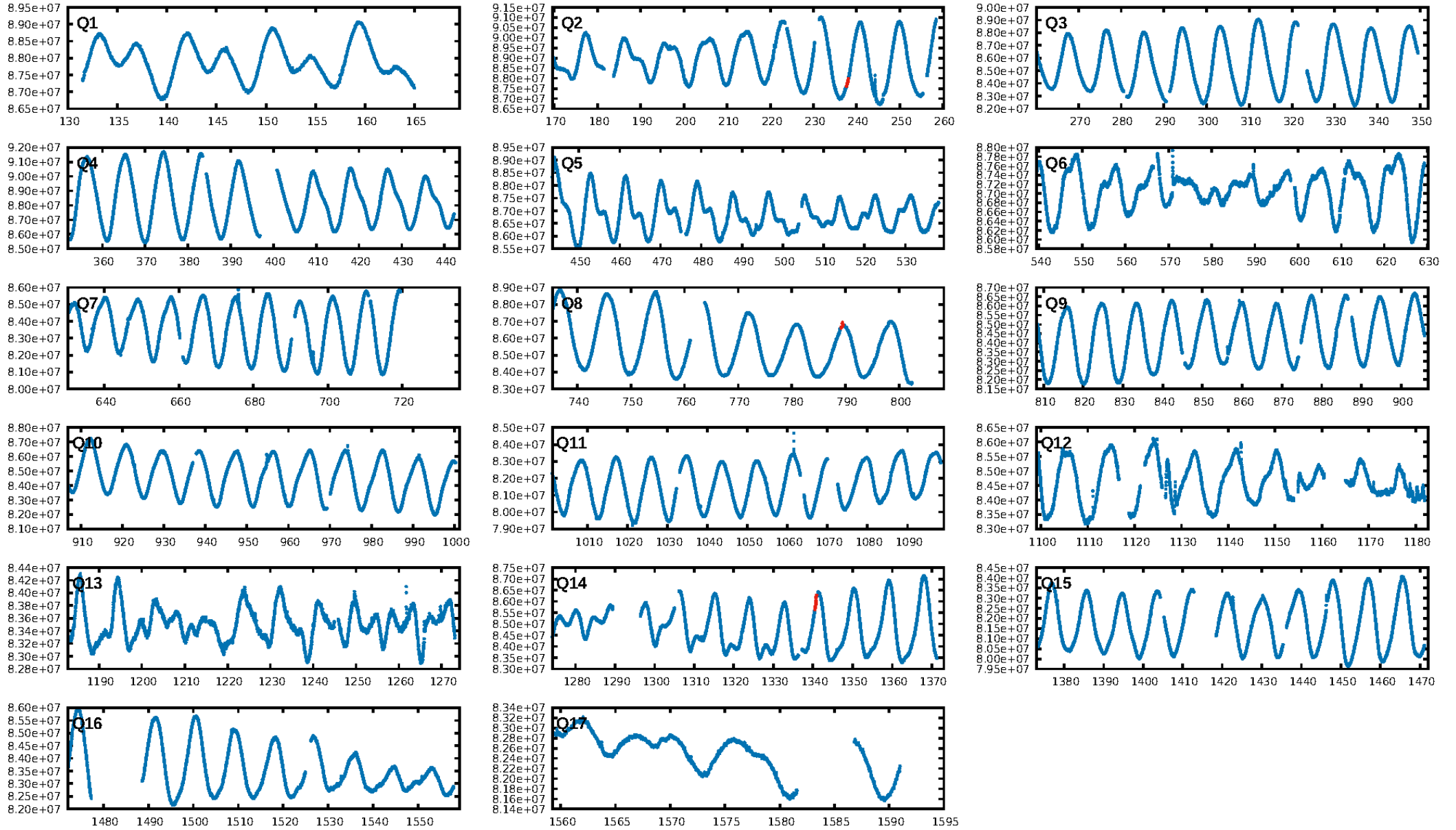
## DV Fit Results:

Period = 551.39200 [0.00508] d  
Epoch = 237.9015 [0.0066] BKJD  
Rp/R\* = 0.0281 [0.0214]  
a/R\* = 553.43 [1612.53]  
b = 0.80 [1.32]  
Seff = 1.42 [1.83]  
Teq = 278 [90] K  
Rp = 5.91 [5.87] Re  
a = 1.2661 [0.9394] AU  
Ag = 13926.69 [28050.75] [0.50 $\sigma$ ]  
Teffp = 4672 [1815] K [2.42 $\sigma$ ]

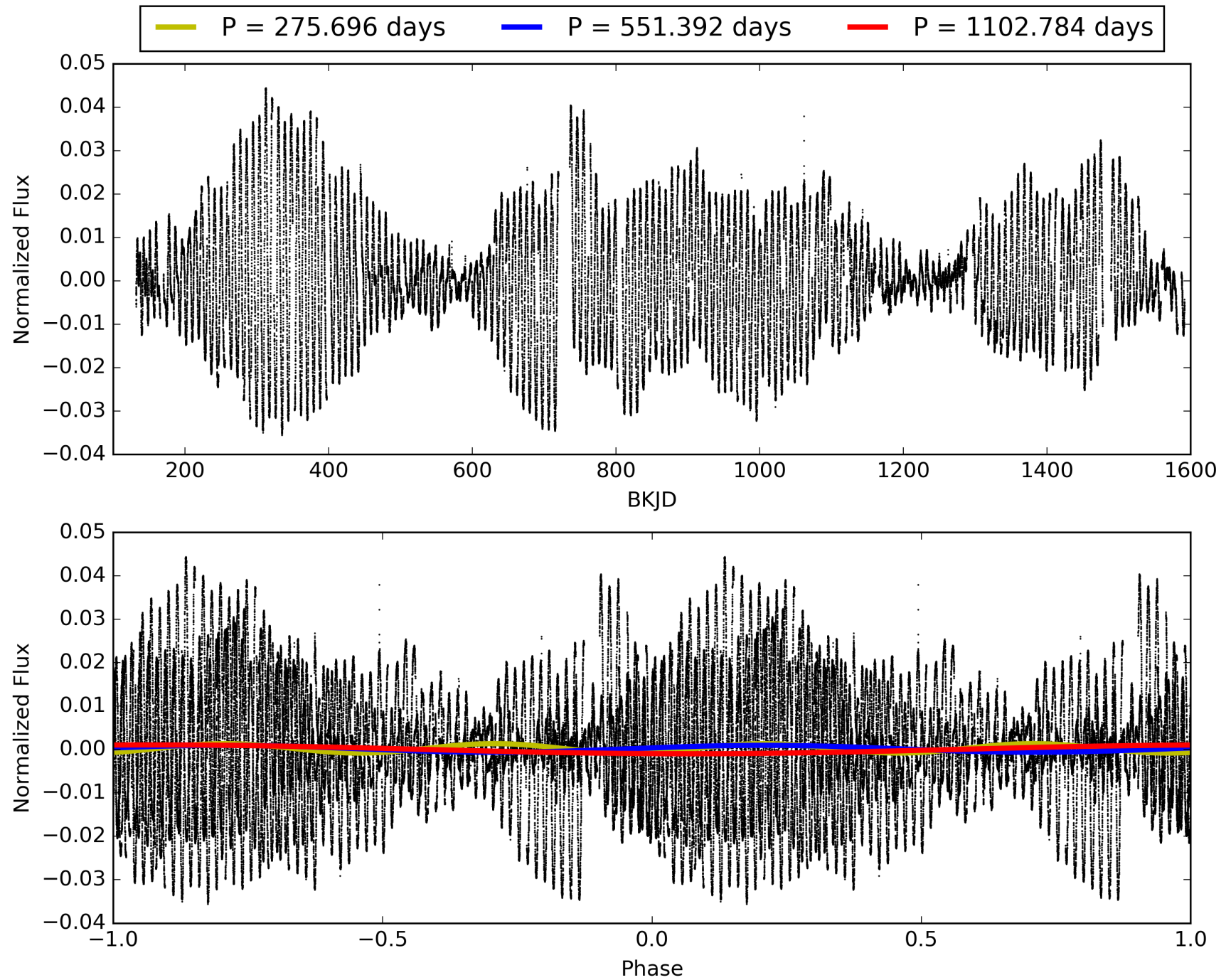
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [2079.06 $\sigma$ ]  
LongPeriod-sig: N/A  
**ModelChiSquare2-sig: 0.0%**  
ModelChiSquareGof-sig: 36.3%  
**Bootstrap-pfa: 1.08e-10**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 2.536  
Centroid-sig: 35.1%  
Centroid-so: 0.486 arcsec [0.83 $\sigma$ ]  
OotOffset-rm: 0.910 arcsec [0.60 $\sigma$ ]  
OotOffset-st: 2/0/0/0 [2]  
KicOffset-rm: 1.235 arcsec [0.82 $\sigma$ ]  
KicOffset-st: 2/0/0/0 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 006278670-01, PDC Light Curves

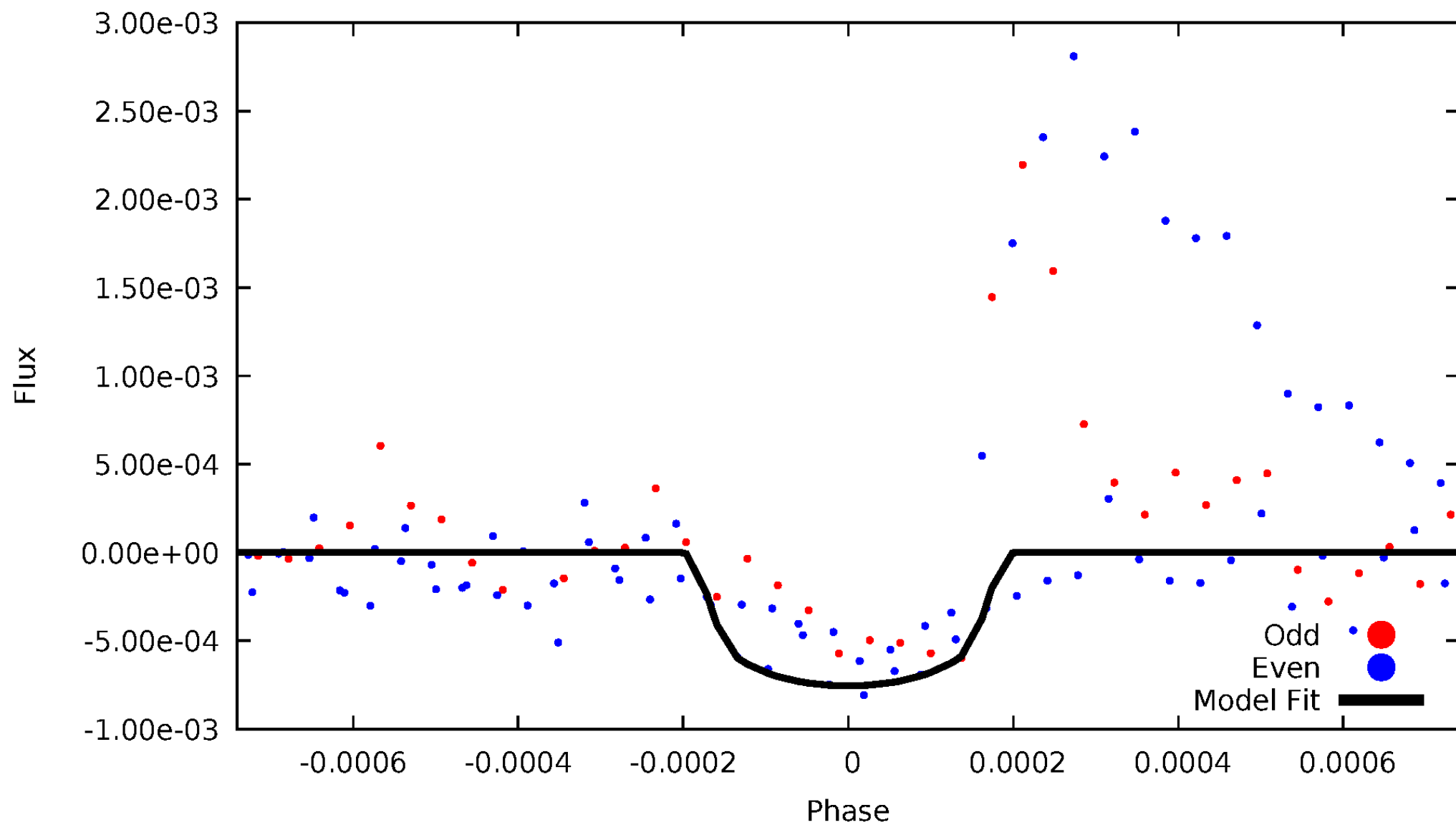


# TCE 006278670-01



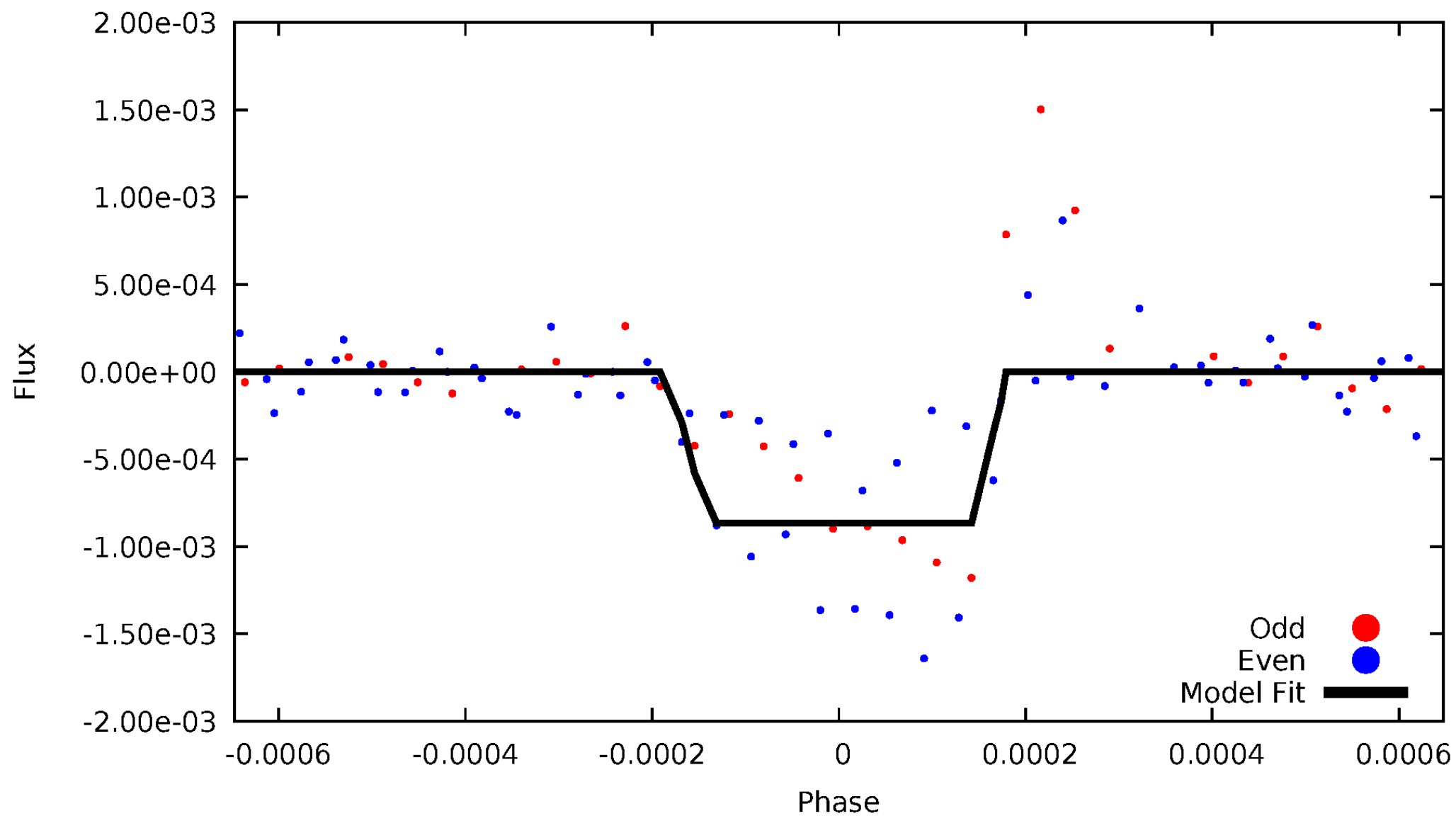
# DV Odd/Even

TCE 006278670-01



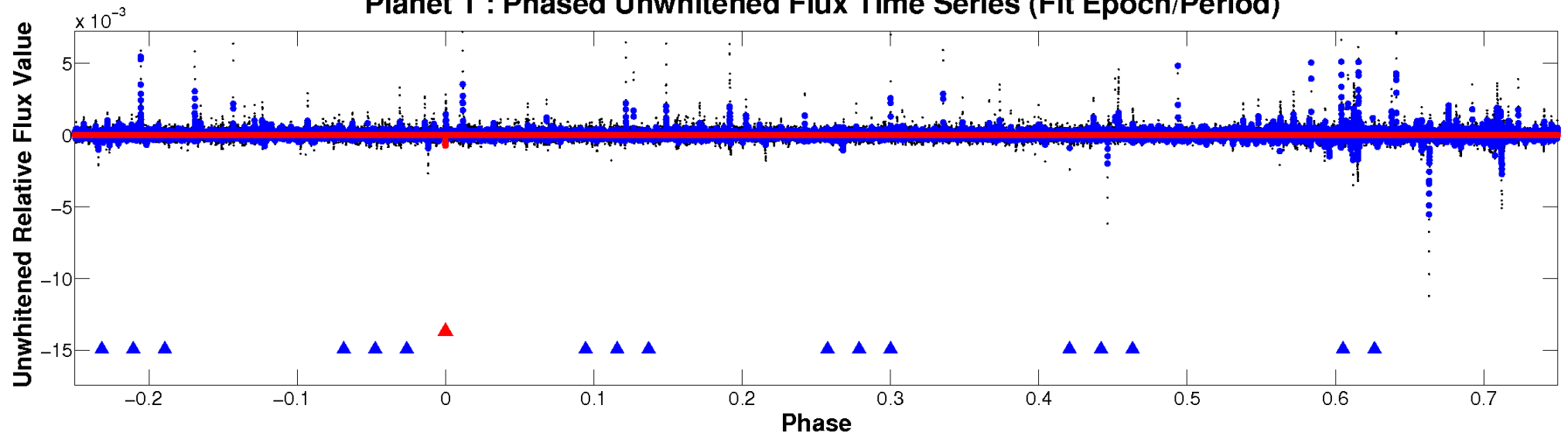
# ALT Odd/Even

TCE 006278670-01

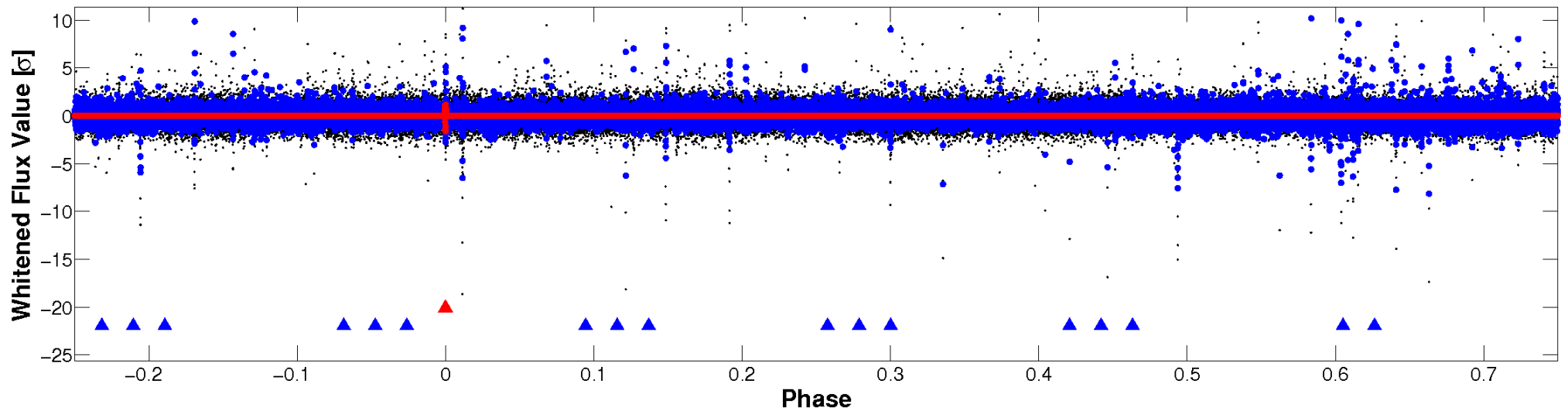


# Non-Whitened Vs. Whitened Light Curve

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

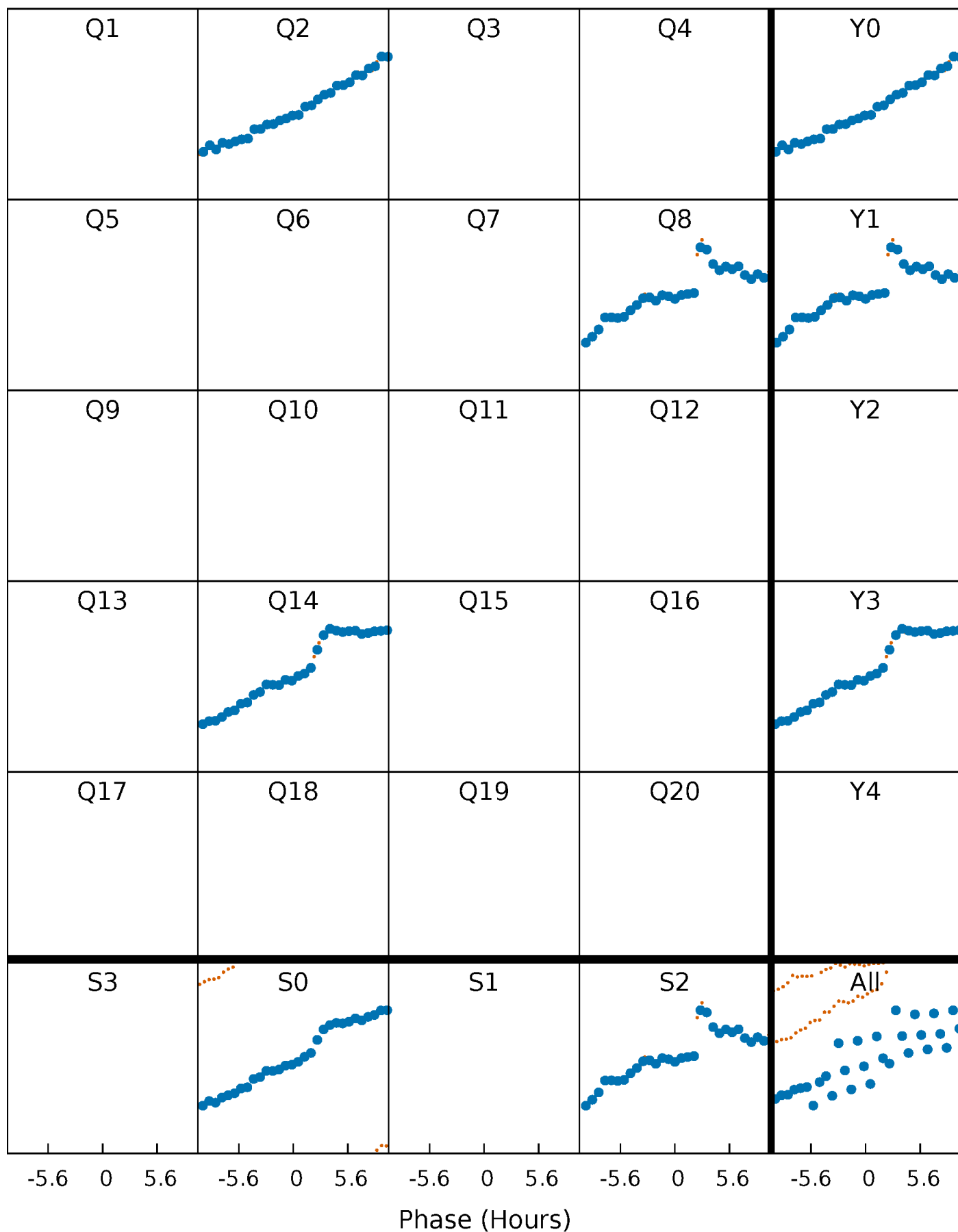


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



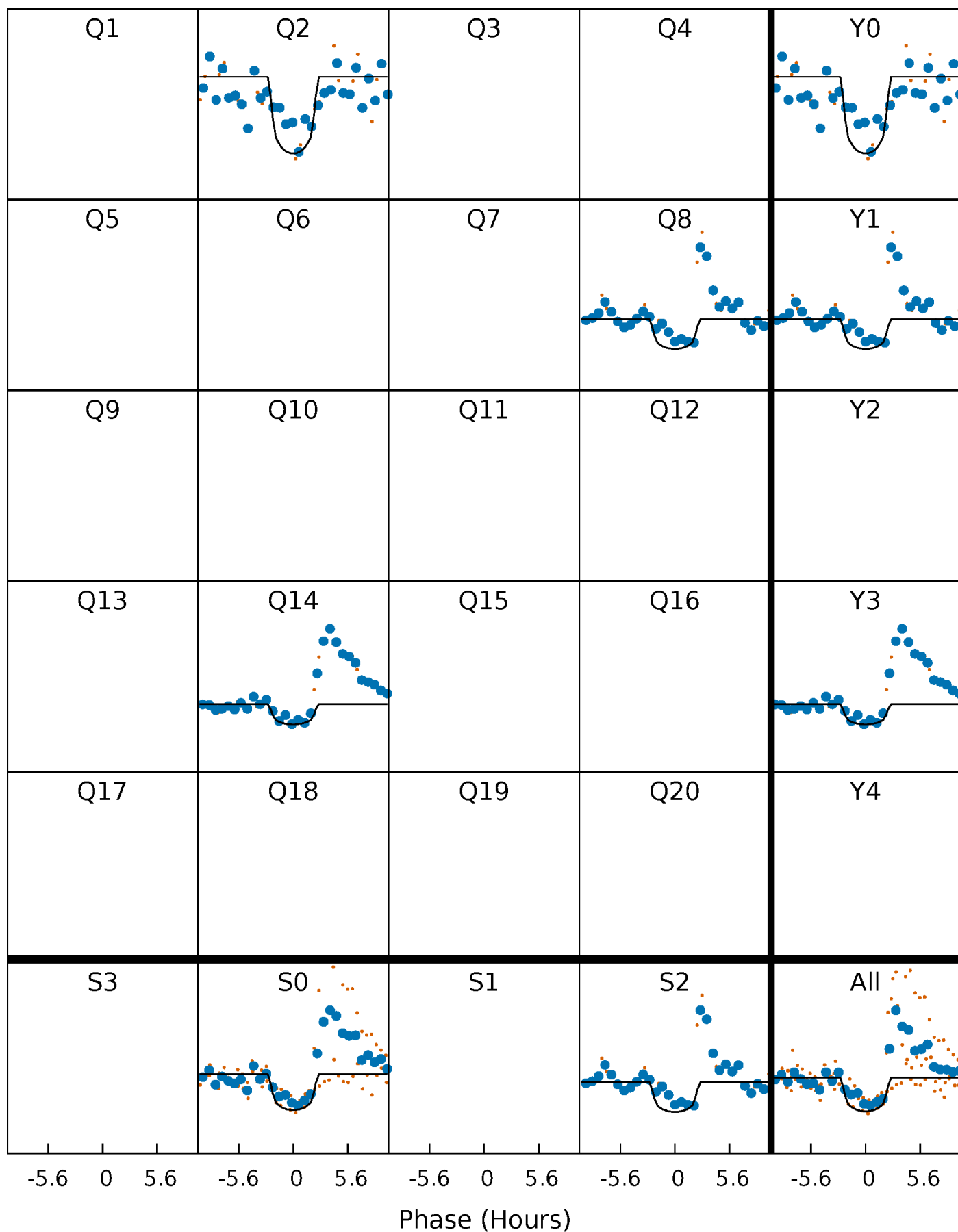
# PDC Quarter-Phased Transit Curves

TCE 006278670-01 P=551.392000 Days  $T_0=237.901472$  (BKJD)



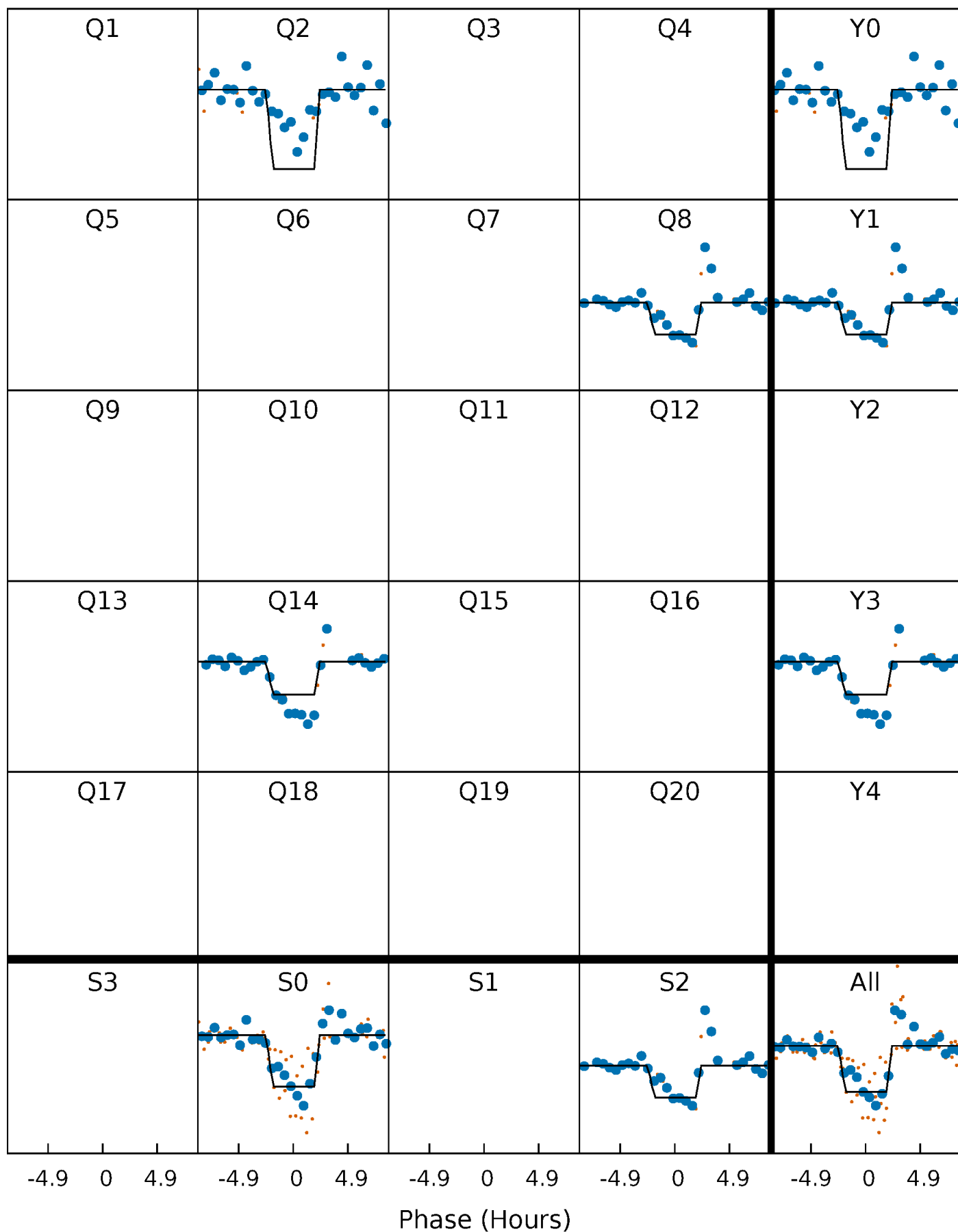
# DV Quarter-Phased Transit Curves

TCE 006278670-01 P=551.392000 Days  $T_0=237.901472$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

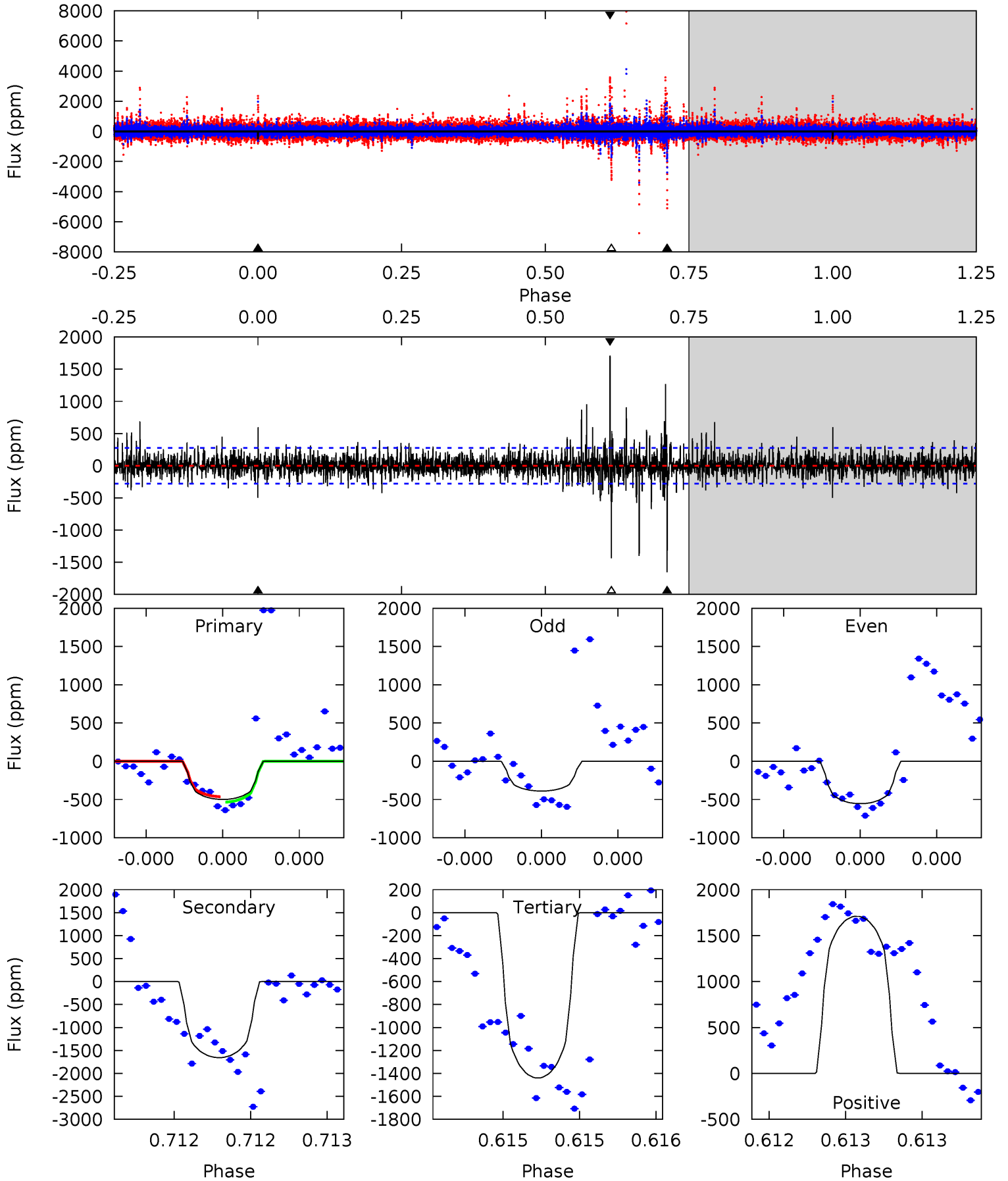
TCE 006278670-01 P=551.392805 Days  $T_0=237.897951$  (BKJD)



# DV Model-Shift Uniqueness Test

006278670-01, P = 551.392000 Days, E = 237.901472 Days

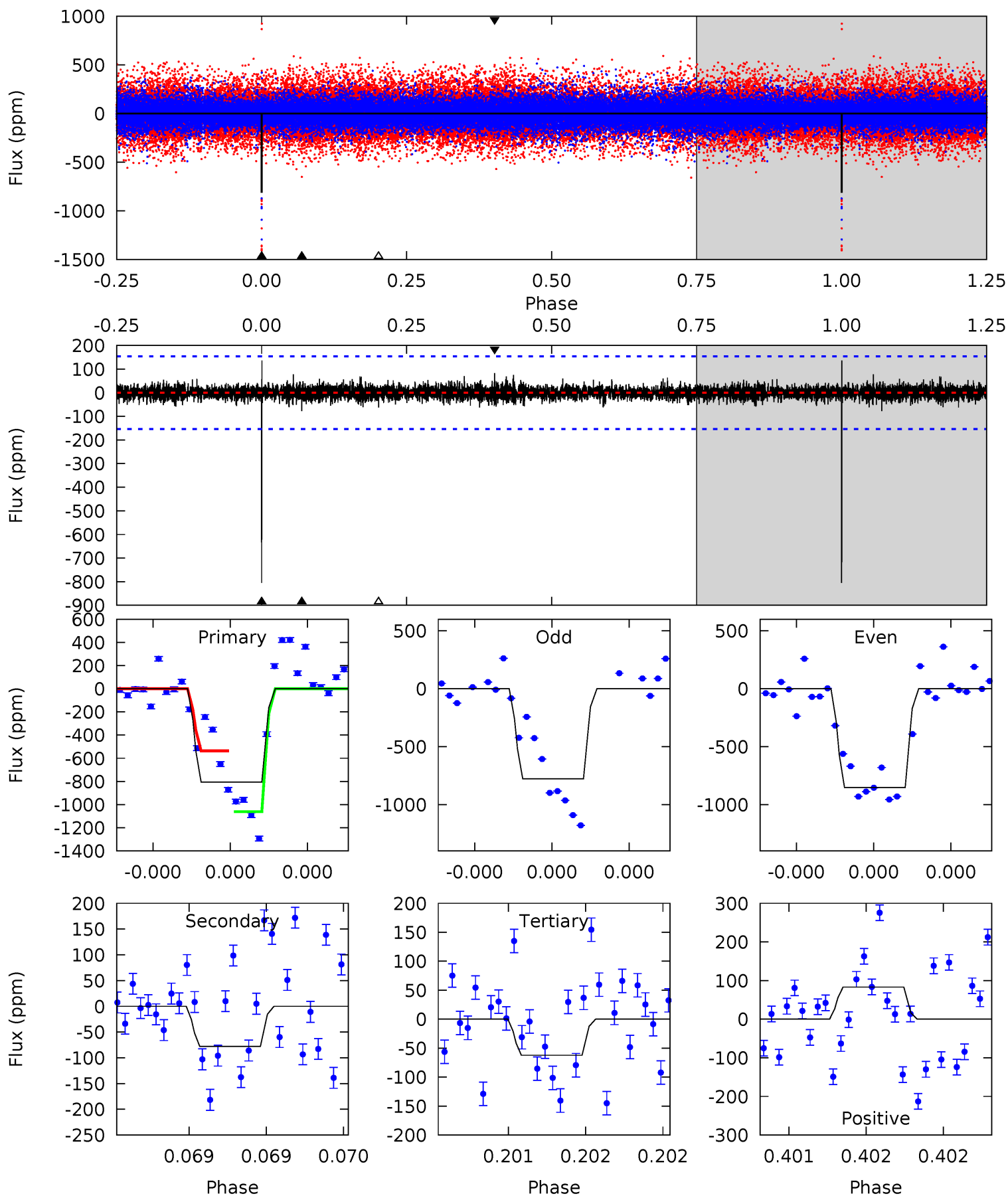
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.1	33.6	29.2	34.7	5.62	3.56	2.55	-19.1	-24.6	4.39	-1.10	1.28	0.92	0.51	0.70



# Alt Model-Shift Uniqueness Test

006278670-01, P = 551.392805 Days, E = 237.897951 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
29.5	2.85	2.28	3.05	5.64	3.58	0.55	27.3	26.5	0.56	-0.20	1.32	1.04	0.14	9.45



### Stellar Parameters For KIC 006278670

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5115^{+153}_{-138}$	$3.819^{+0.791}_{-0.339}$	$-0.240^{+0.300}_{-0.250}$	$1.924^{+1.231}_{-1.231}$	$0.891^{+0.254}_{-0.157}$	$0.176^{+2.561}_{-0.146}$
	+3%/-3%	+21%/-9%	+125%/-104%	+64%/-64%	+29%/-18%	+1454%/-83%
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 006278670-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1656 \pm 49$	$5.69^{+5.24}_{-3.39}$	$383^{+57}_{-70}$	$5925^{+4141}_{-1223}$	$46807^{+230059}_{-34264}$
Alt.	$-78 \pm 27$	$5.90^{+5.37}_{-3.49}$	$379^{+61}_{-67}$	$3232^{+896}_{-432}$	$1957^{+9478}_{-1447}$

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

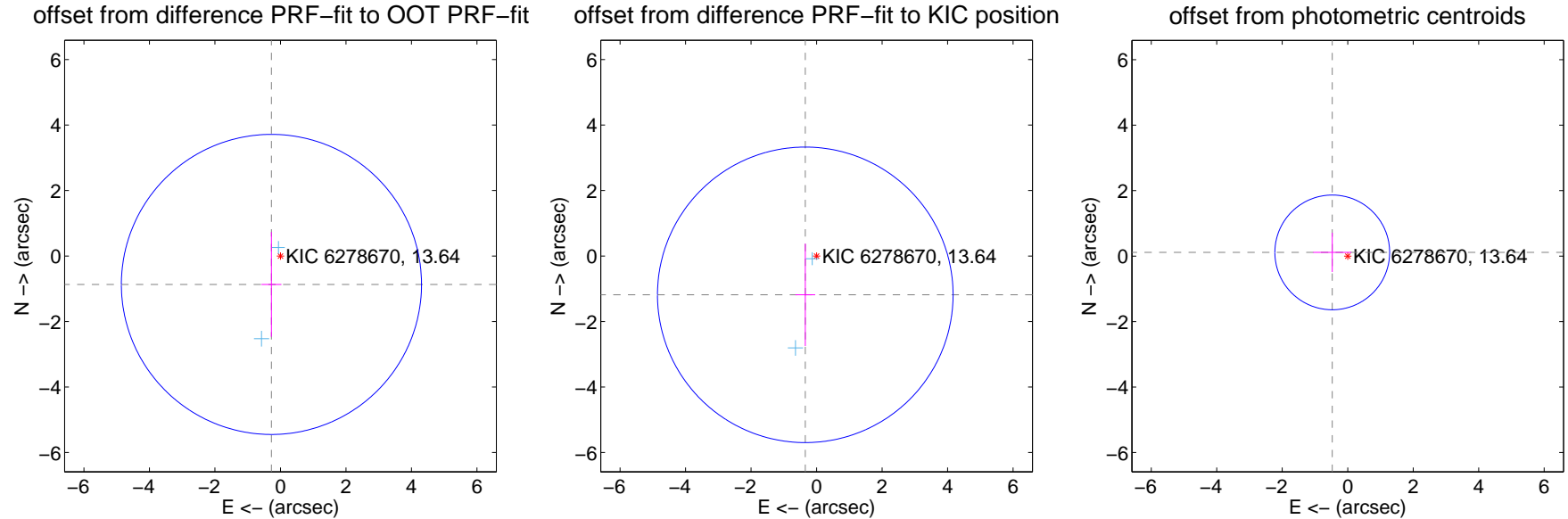
## DV Centroid Data

Supplemental centroid analysis for 006278670-01. Kepler magnitude: 13.64. Transit SNR 8.34

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.35 arcsec

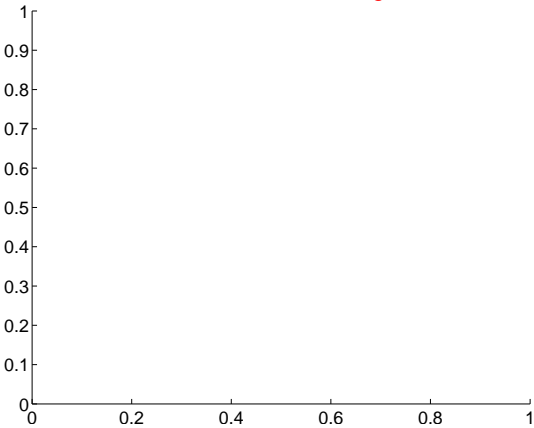
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.910 \pm 1.528$	0.60	$0.275 \pm 0.304$	$-0.868 \pm 1.600$
PRF-fit source offset from KIC position	$1.235 \pm 1.505$	0.82	$0.345 \pm 0.302$	$-1.185 \pm 1.565$
photometric centroid source offset	$0.49 \pm 0.58$	0.83	$0.47 \pm 0.58$	$0.11 \pm 0.60$



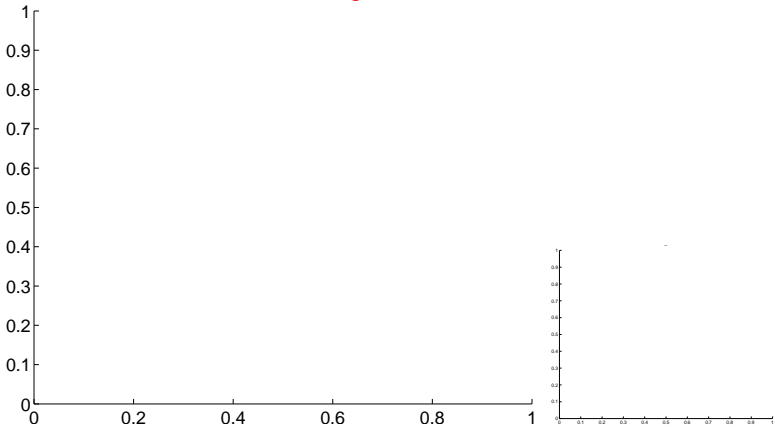
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

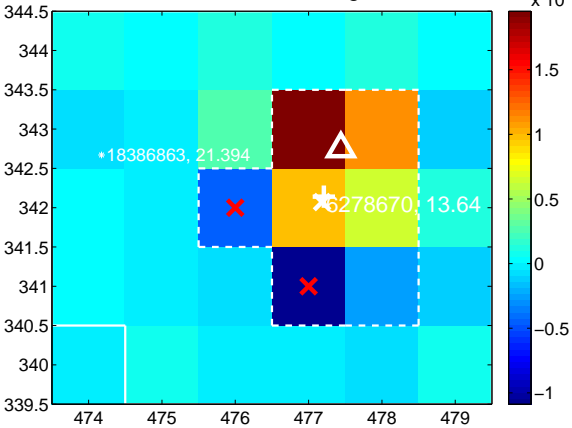
Q1 no difference image



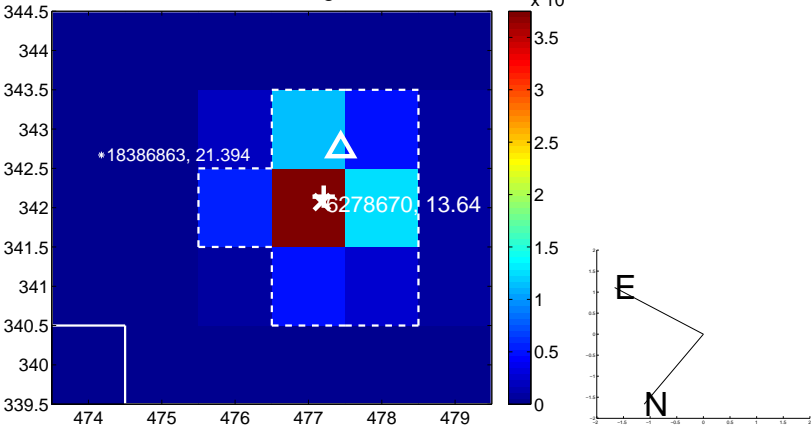
Q1 no OOT image



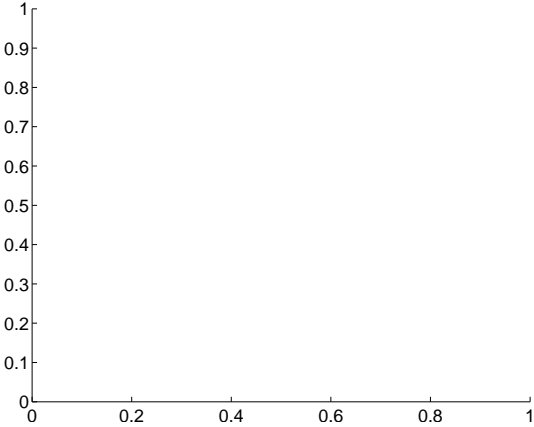
Q2 difference image



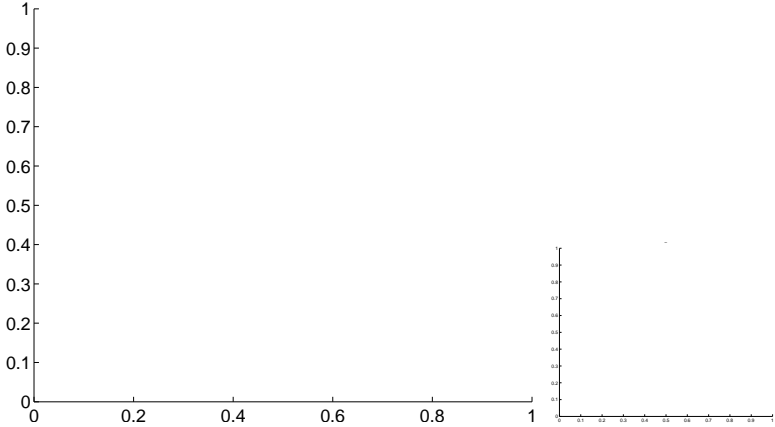
Q2 OOT image



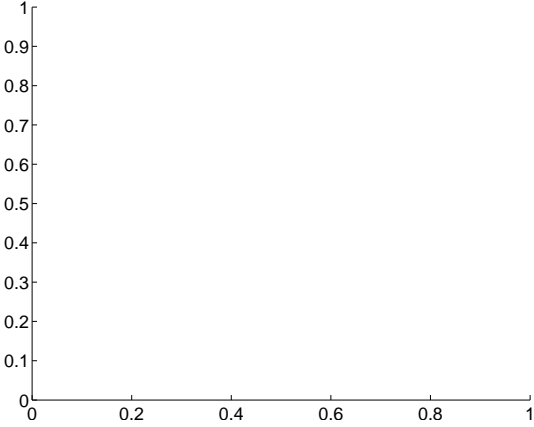
Q3 no difference image



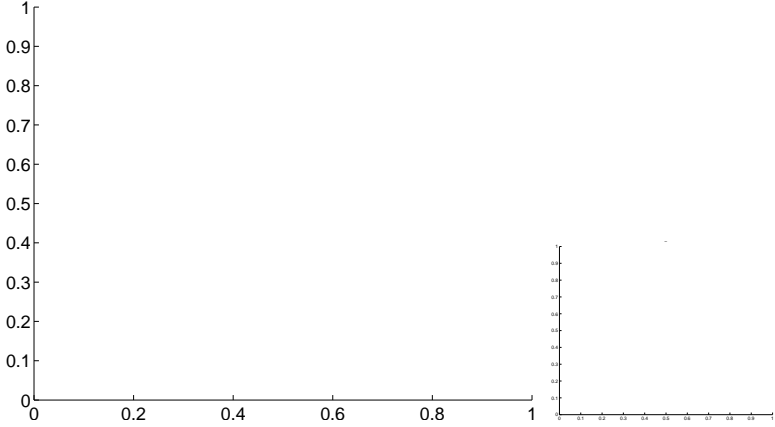
Q3 no OOT image



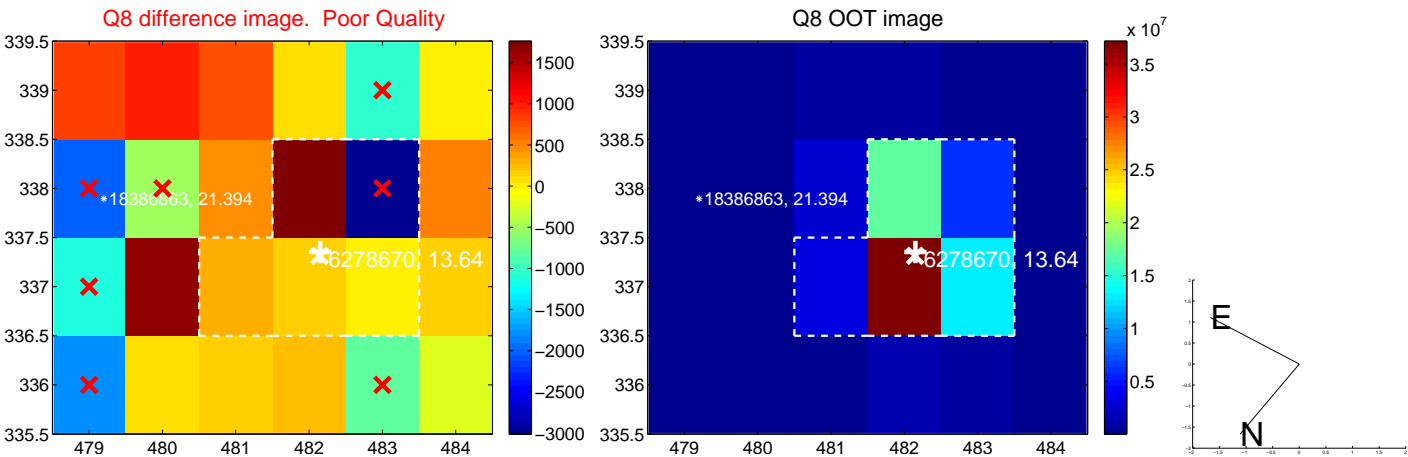
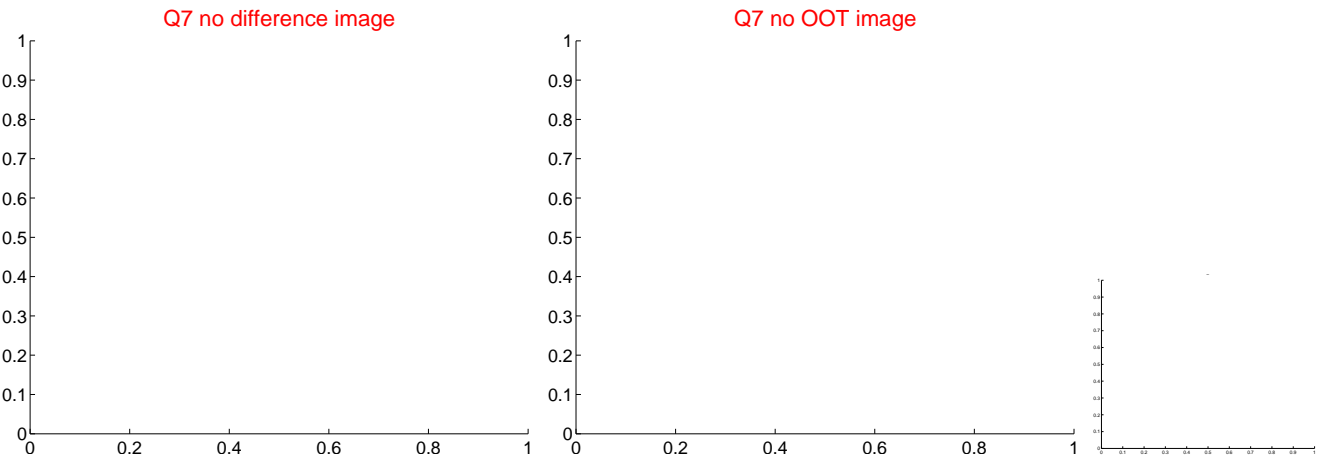
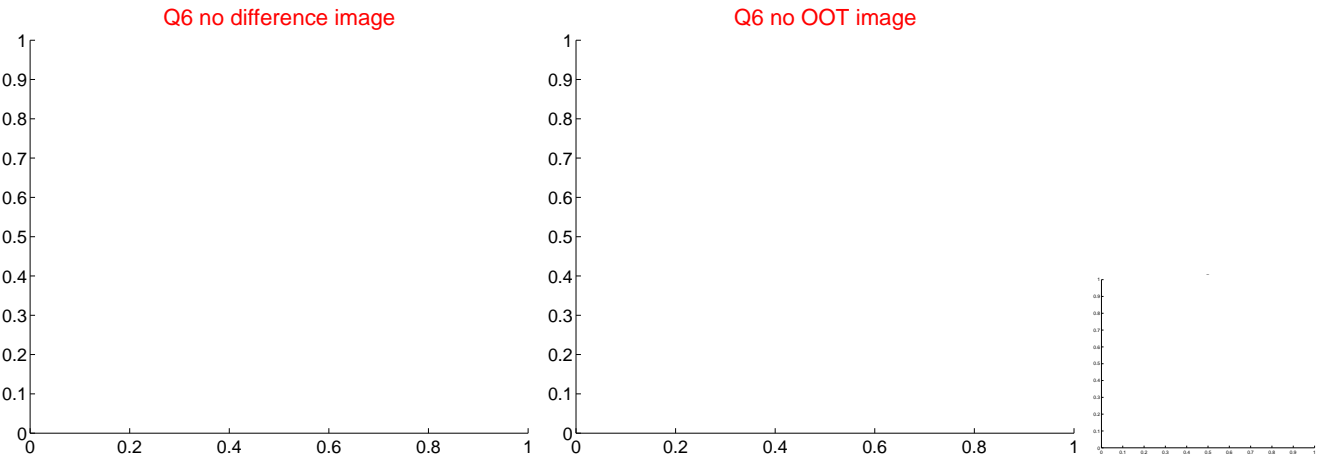
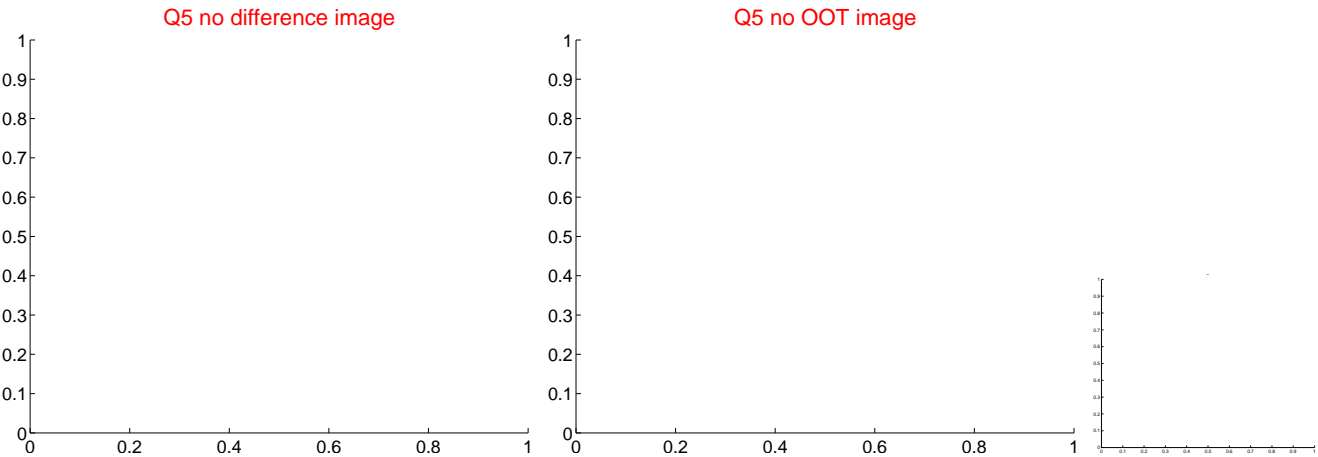
Q4 no difference image



Q4 no OOT image



white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

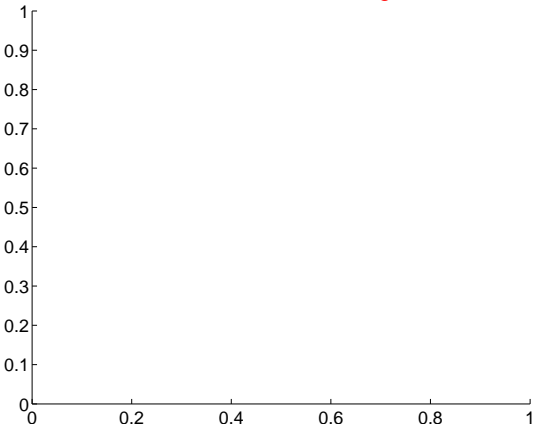


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

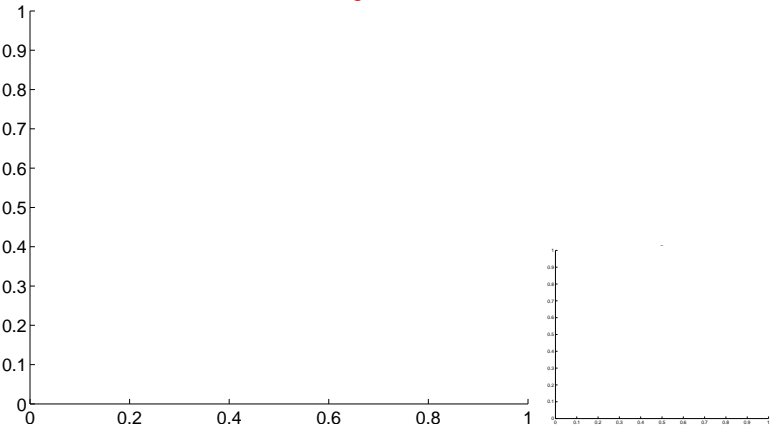


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

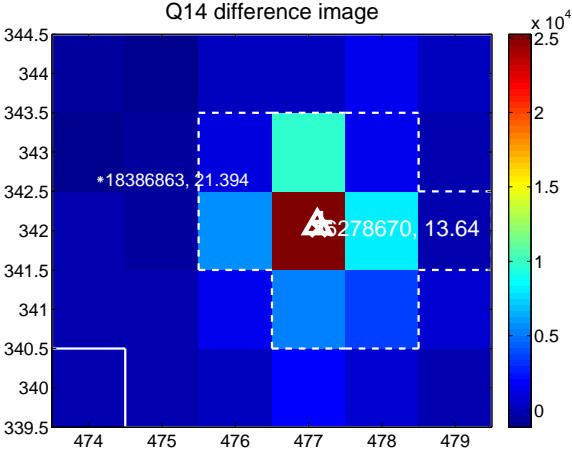
Q13 no difference image



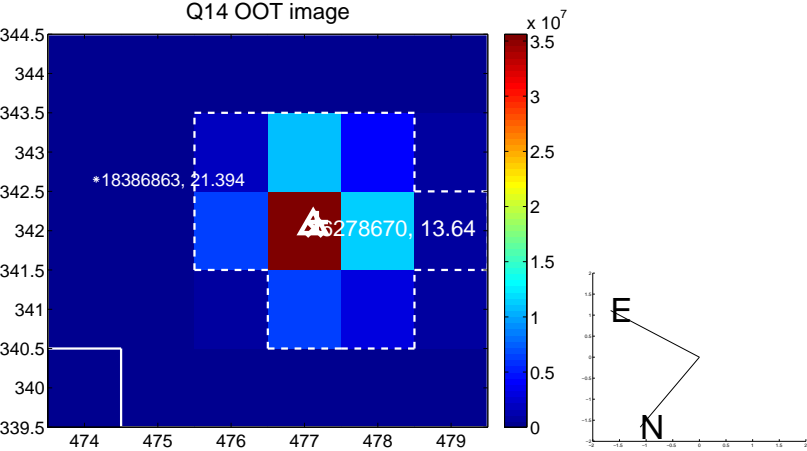
Q13 no OOT image



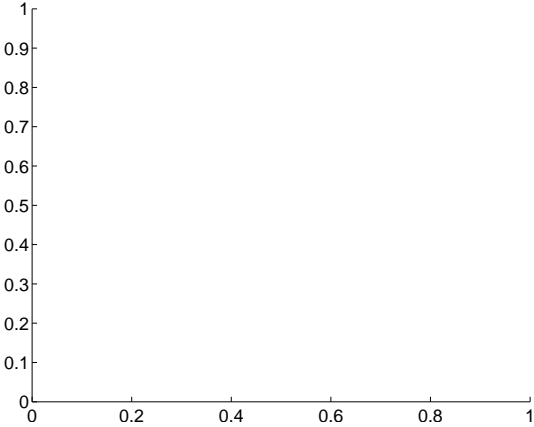
Q14 difference image



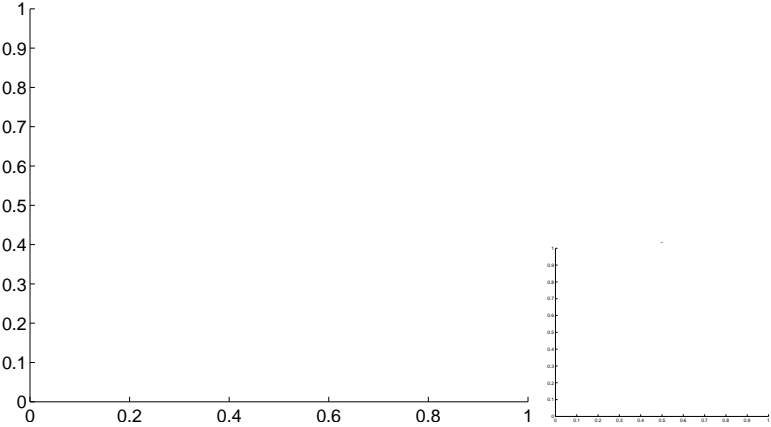
Q14 OOT image



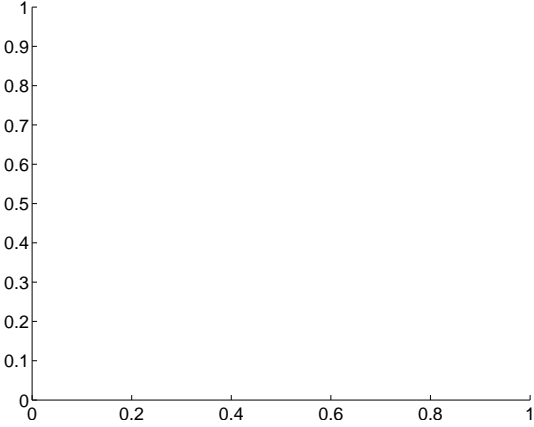
Q15 no difference image



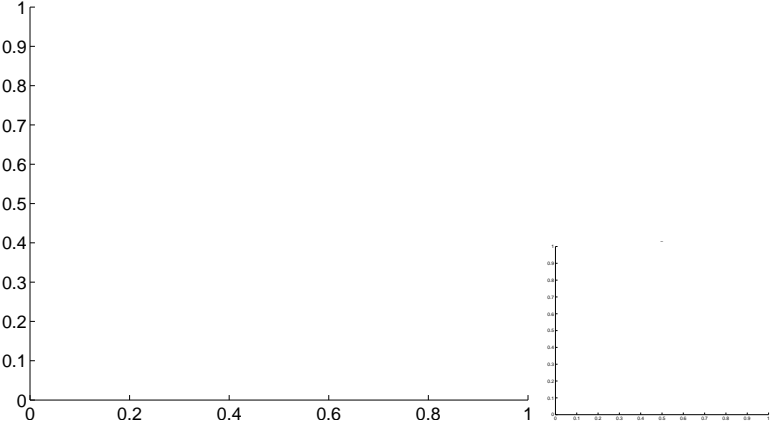
Q15 no OOT image



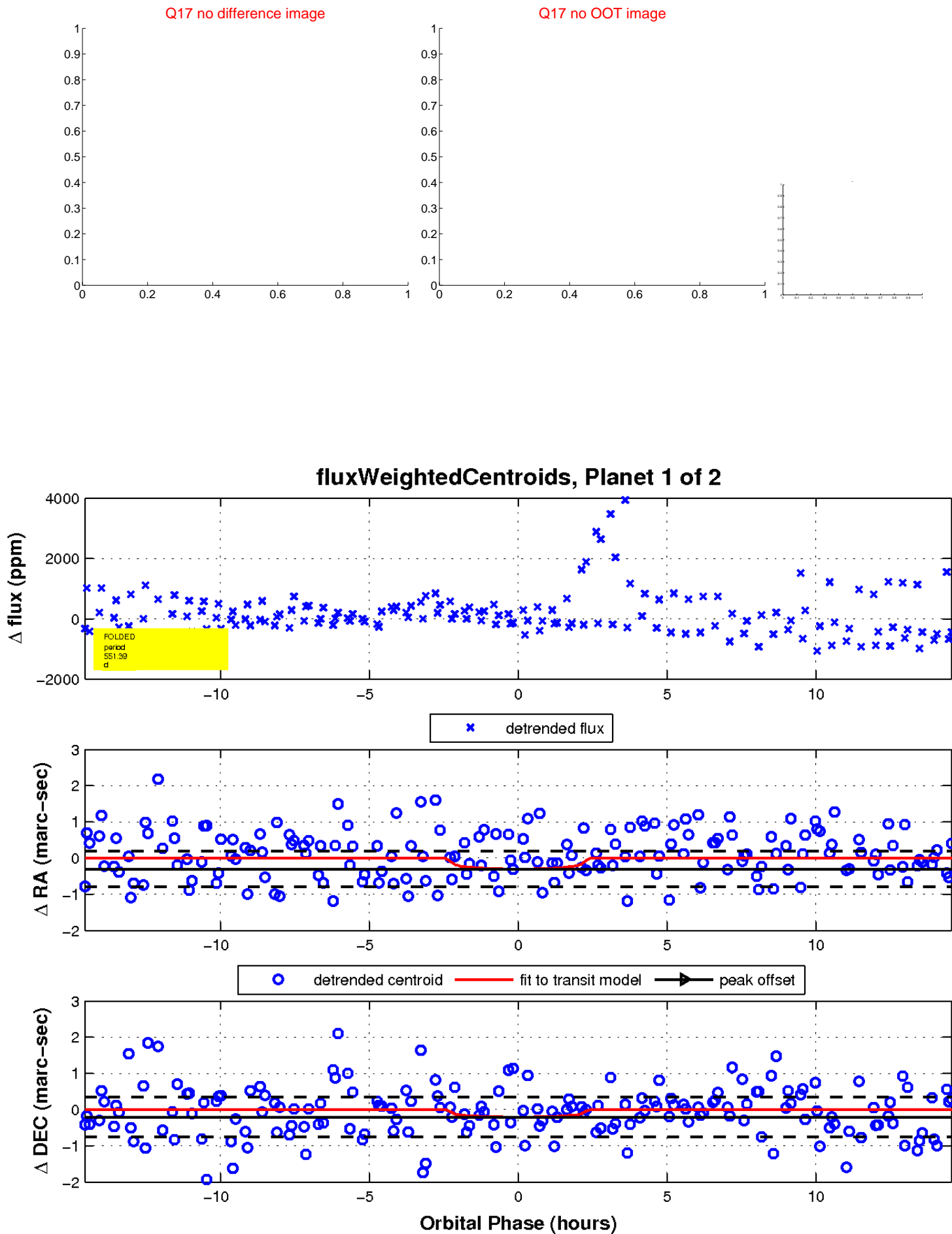
Q16 no difference image



Q16 no OOT image

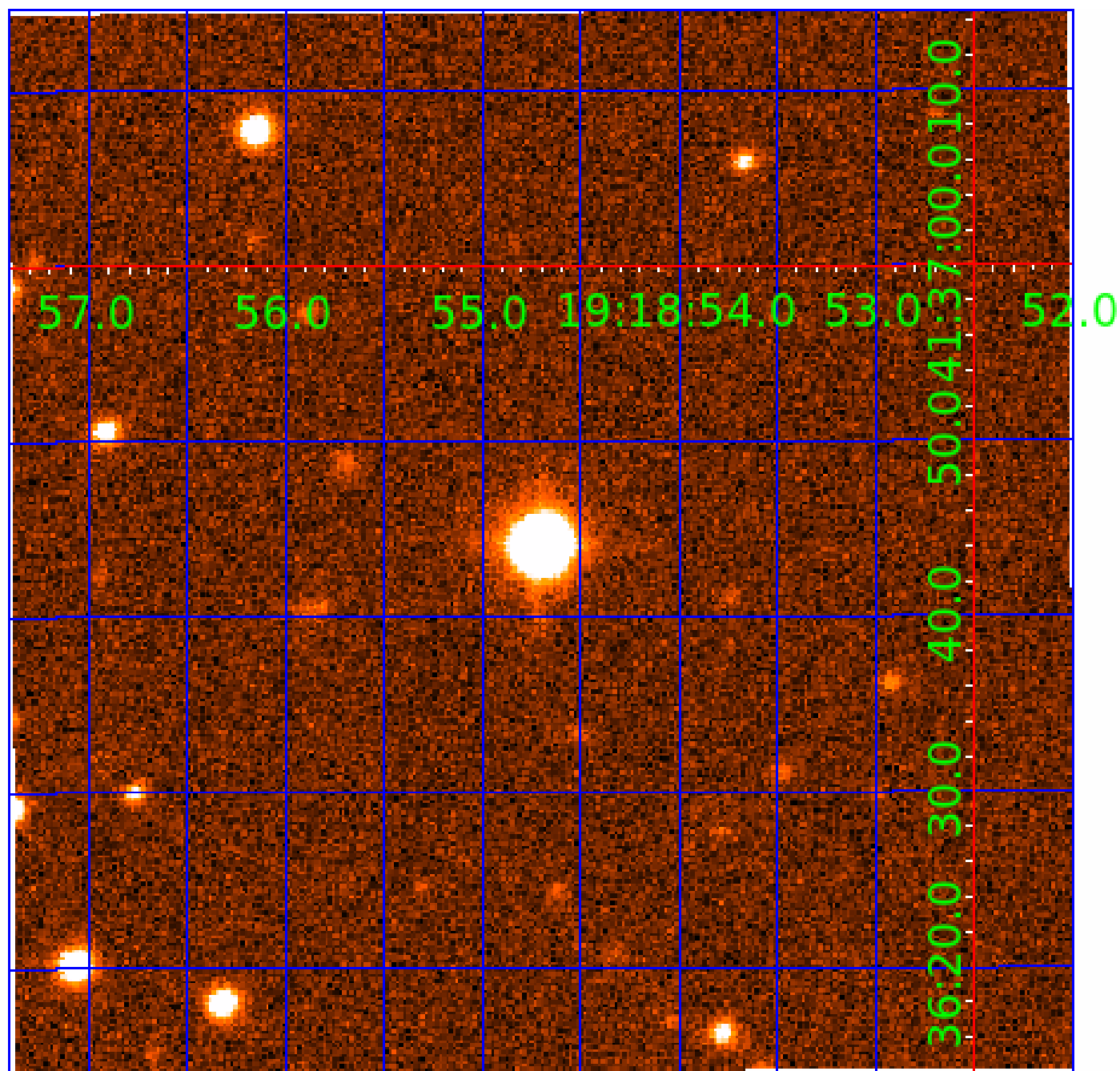


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 006278670

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006278670-01	OBS	No	551.392000	237.901472	753.8	4.900	12.1	8.3	1.92	5115	5.91	1.42
006278670-02	OBS	7775.01	89.945682	133.560719	352.3	2.088	8.6	7.9	1.92	5115	3.97	15.89

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006278670-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006278670-02	OBS	PC	0.57	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.

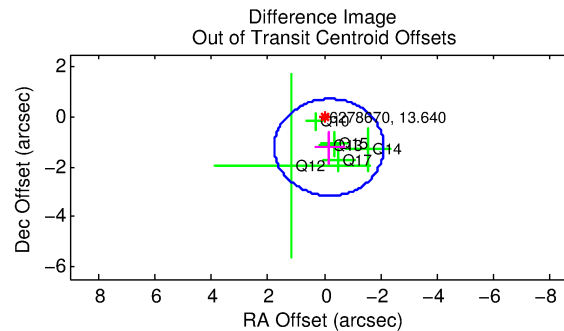
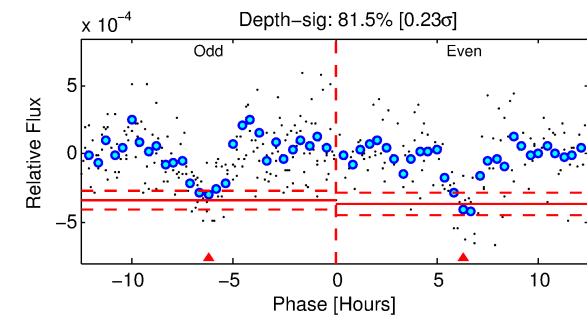
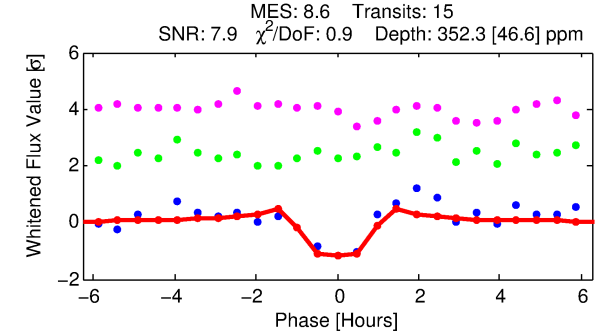
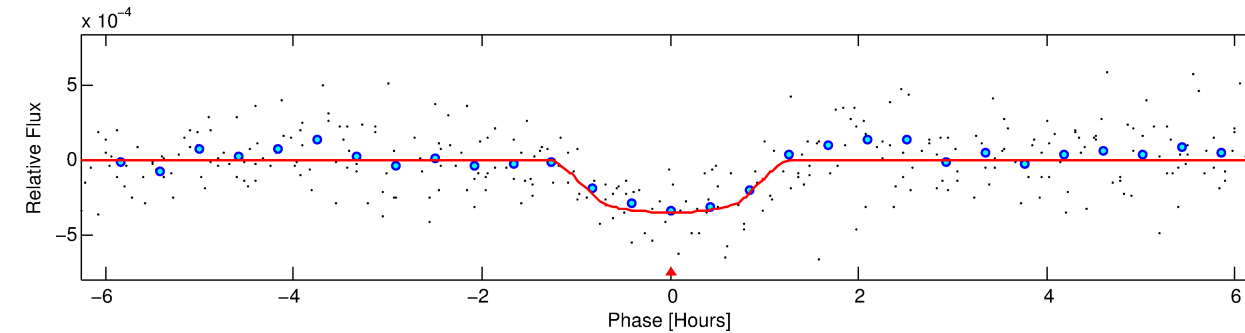
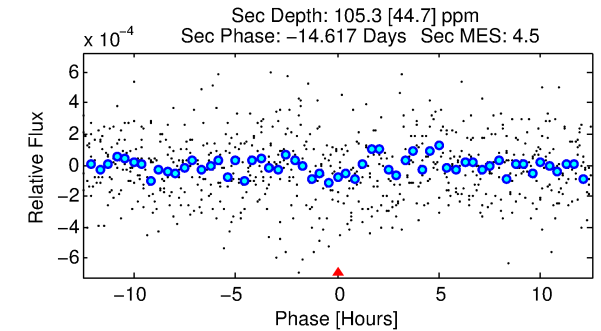
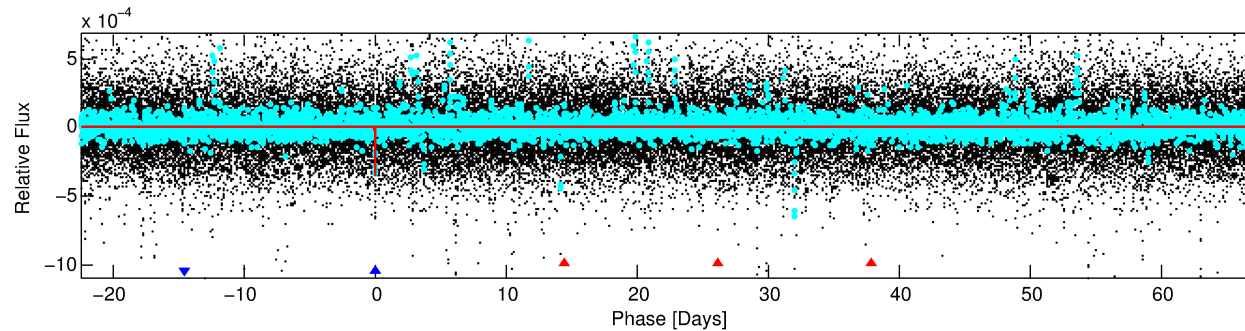
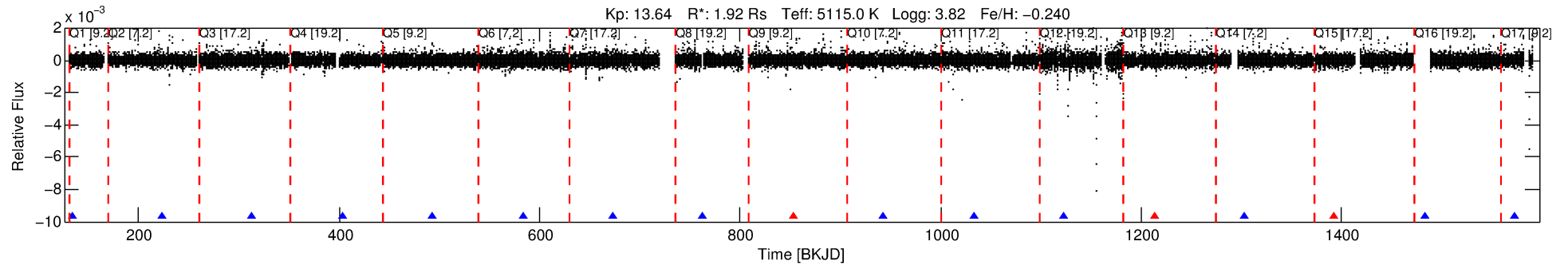
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006278670-02

No Significant Match Found

# DV One-Page Summary

KIC: 6278670 Candidate: 2 of 2 Period: 89.946 d



## DV Fit Results:

Period = 89.94568 [0.00057] d  
Epoch = 133.5607 [0.0054] BKJD  
Rp/R\* = 0.0189 [0.0211]  
a/R\* = 220.91 [934.51]  
b = 0.77 [2.33]  
Seff = 15.89 [20.54]  
Teq = 509 [165] K  
Rp = 3.97 [5.11] Re  
a = 0.3780 [0.2805] AU  
Ag = 525.23 [1371.27] [0.38σ]  
Teffp = 3768 [2143] K [1.52σ]

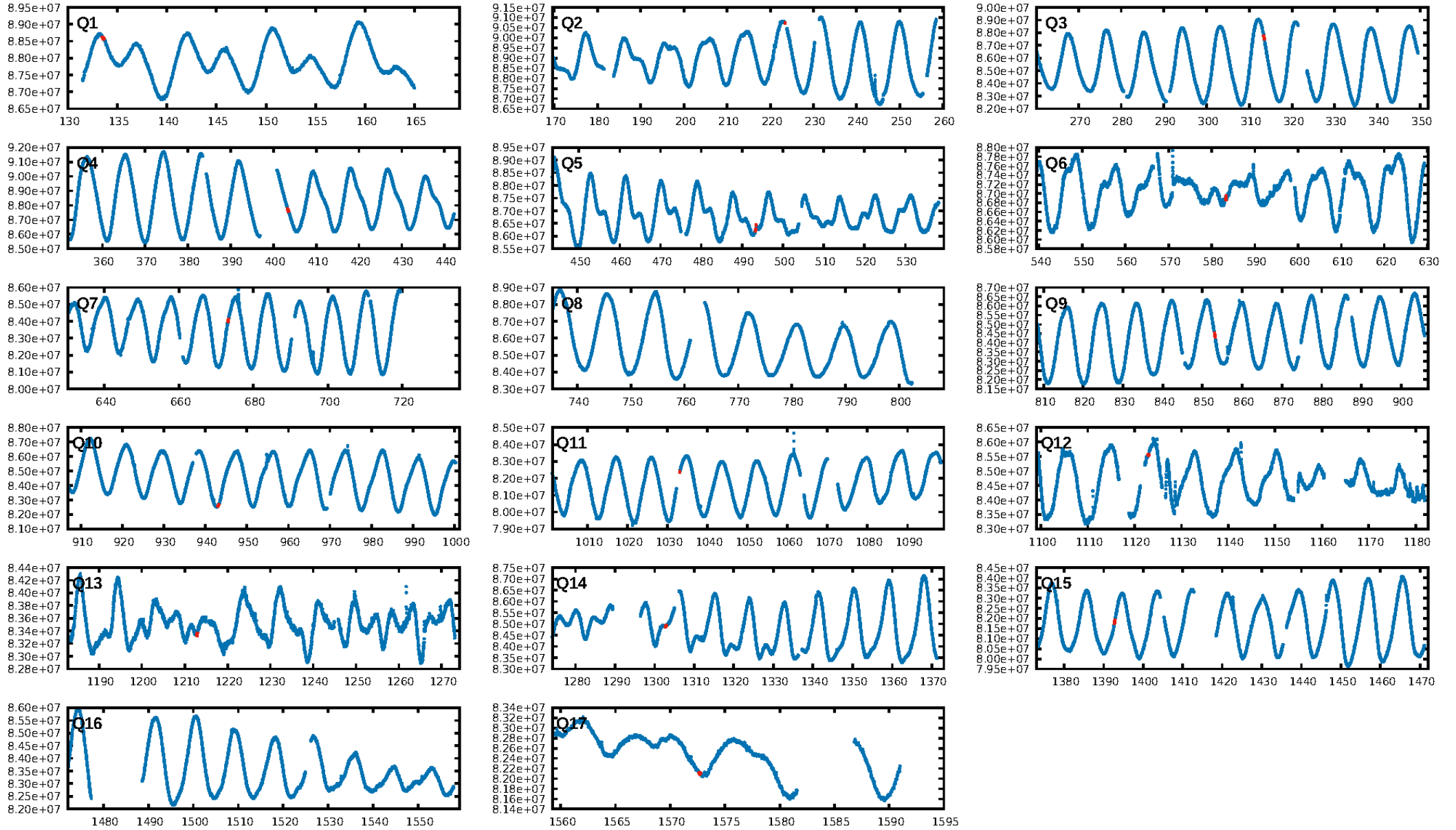
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [2079.06σ]  
ModelChiSquare2-sig: 21.1%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.11e-10**  
**RollingBand-fgt: 0.77 [10/13]**  
GhostDiagnostic-chr: -1.521  
Centroid-sig: 30.1%  
Centroid-so: 0.608 arcsec [0.61σ]  
OotOffset-rm: 1.237 arcsec [1.92σ]  
OotOffset-st: 2/1/1/2 [6]  
KicOffset-rm: 1.419 arcsec [2.19σ]  
KicOffset-st: 2/1/1/2 [6]  
DiffImageQuality-fgm: 0.83 [5/6]  
DiffImageOverlap-fno: 1.00 [13/13]

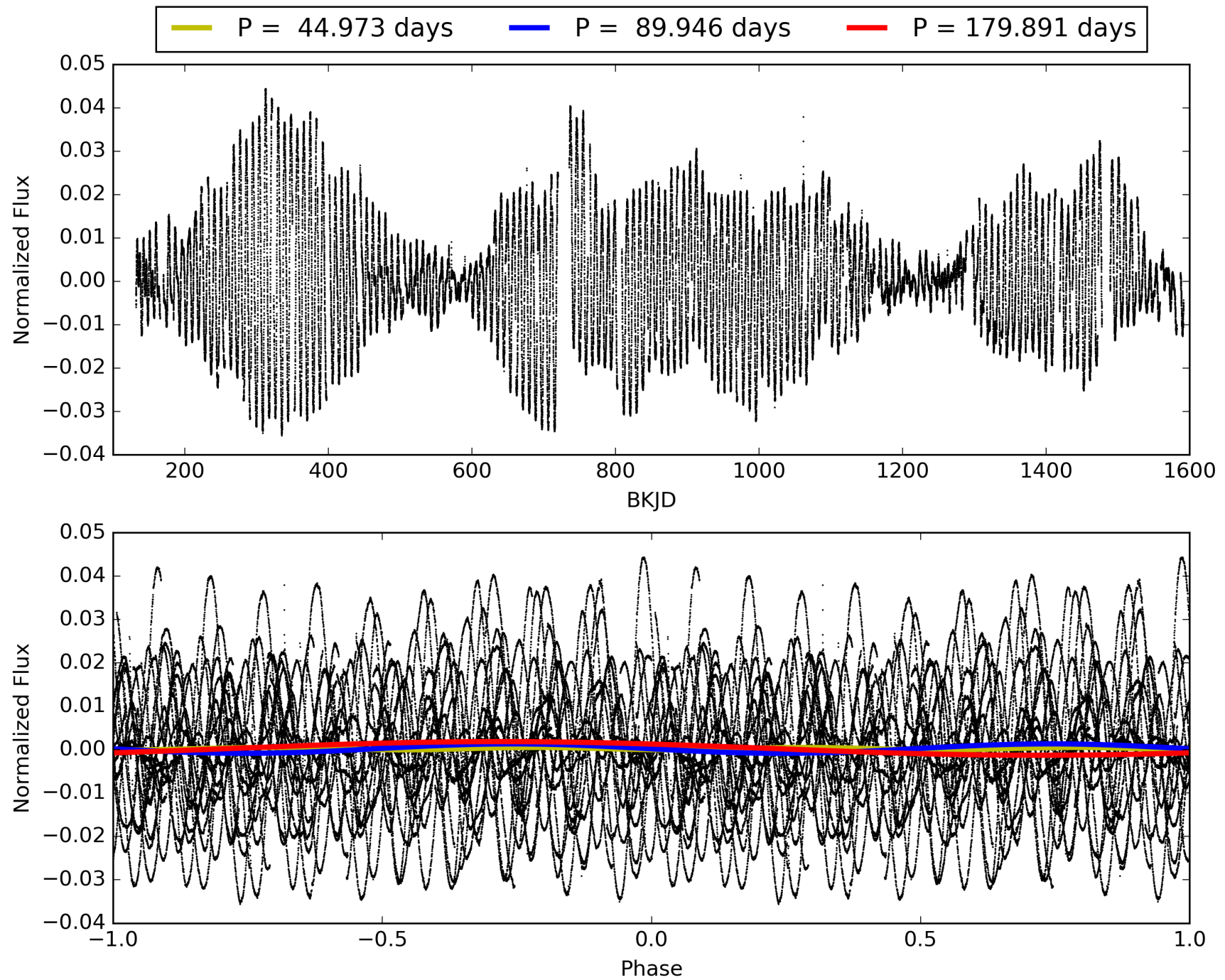
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 02:26:26 Z

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

# TCE 006278670-02, PDC Light Curves

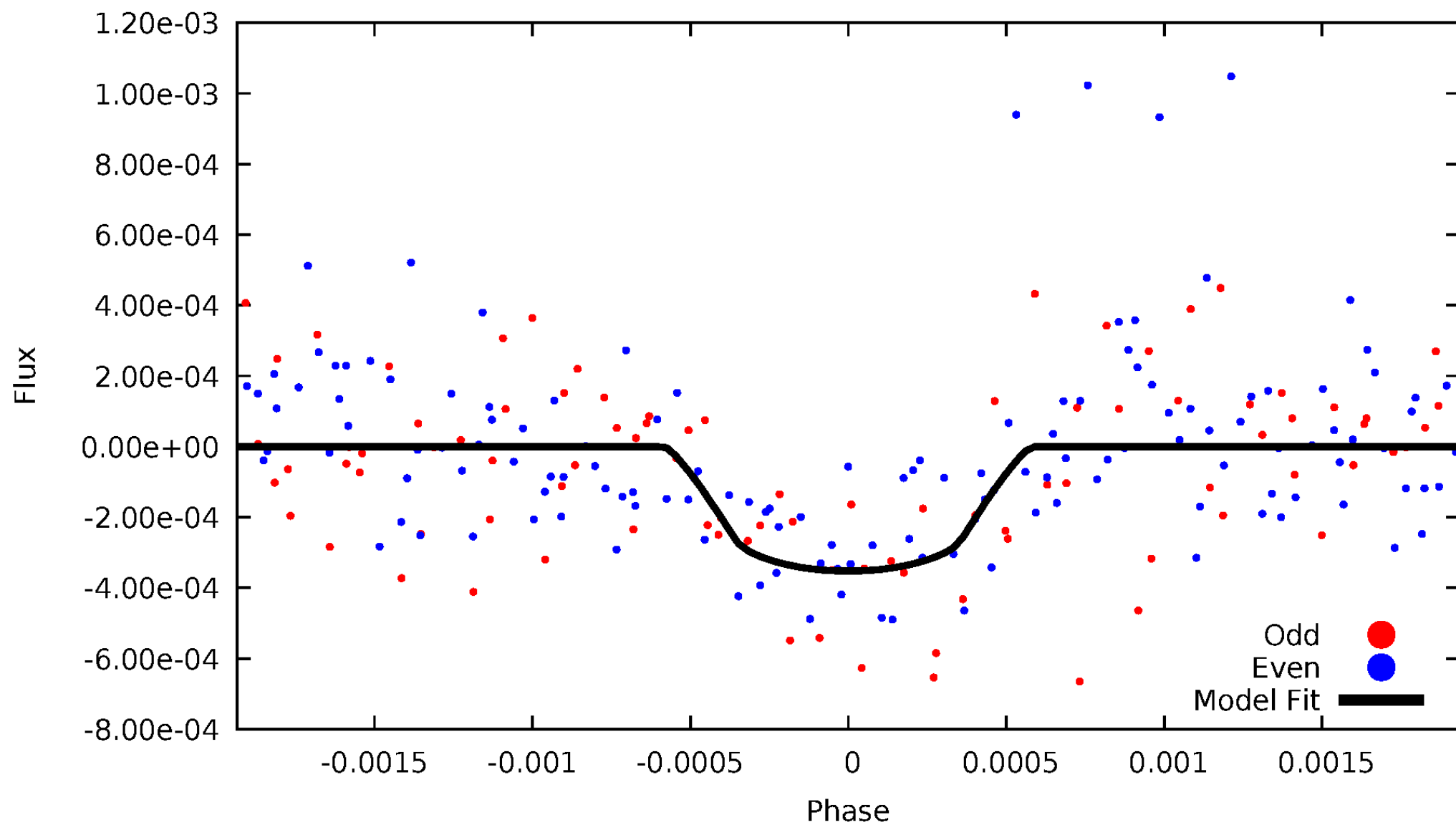


# TCE 006278670-02



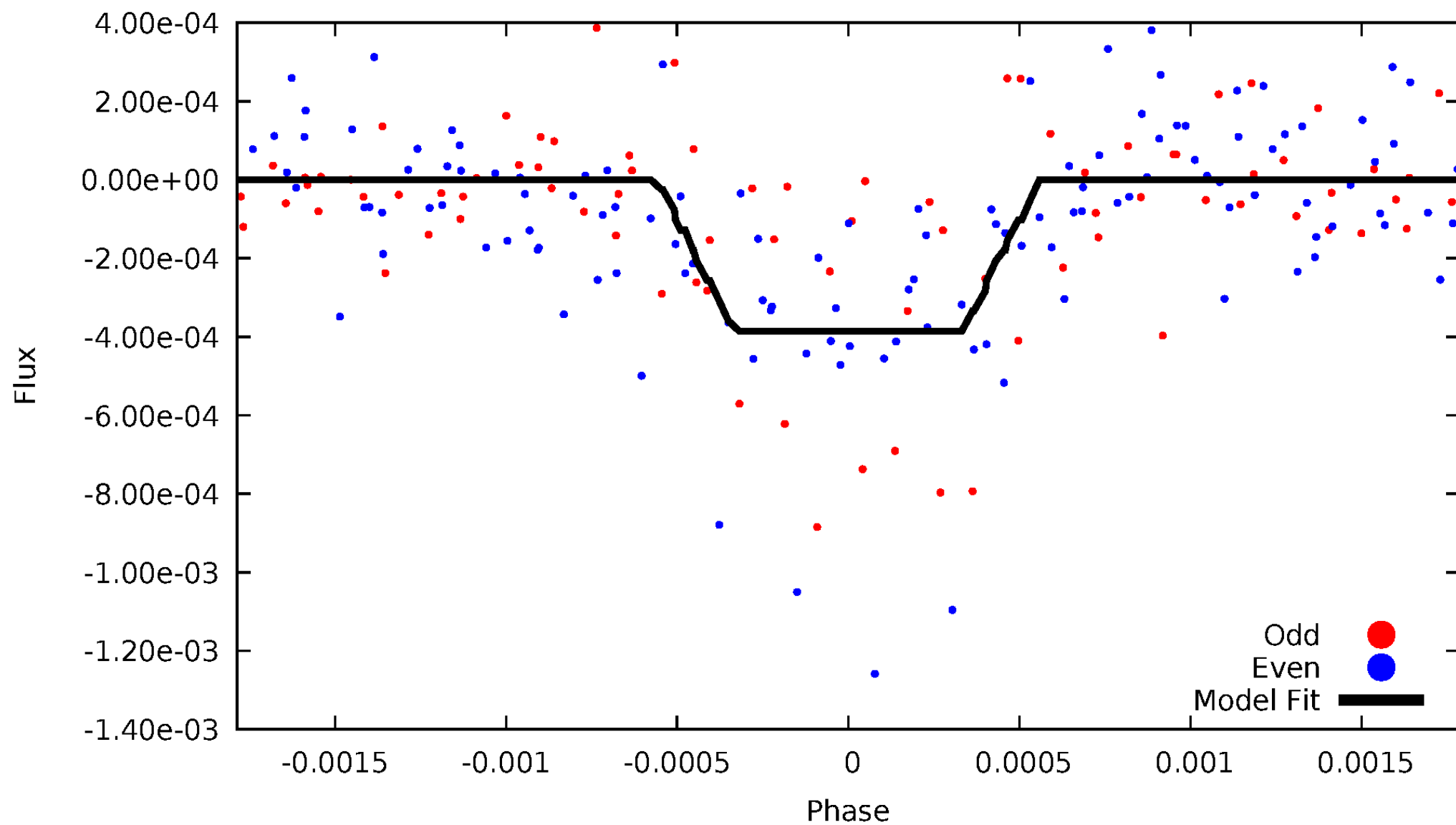
# DV Odd/Even

TCE 006278670-02



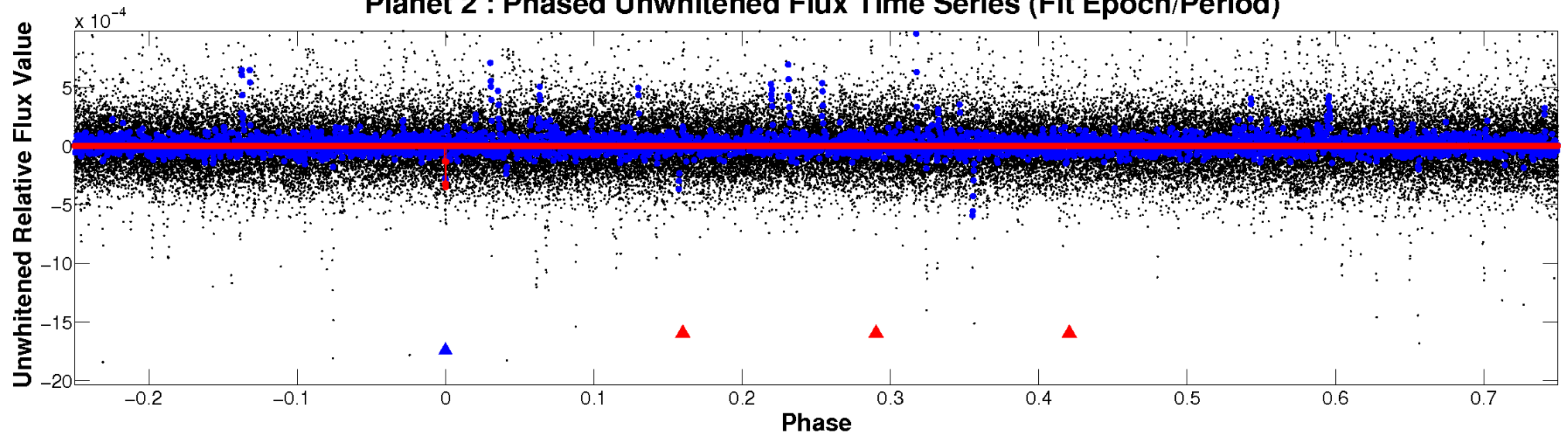
# ALT Odd/Even

TCE 006278670-02

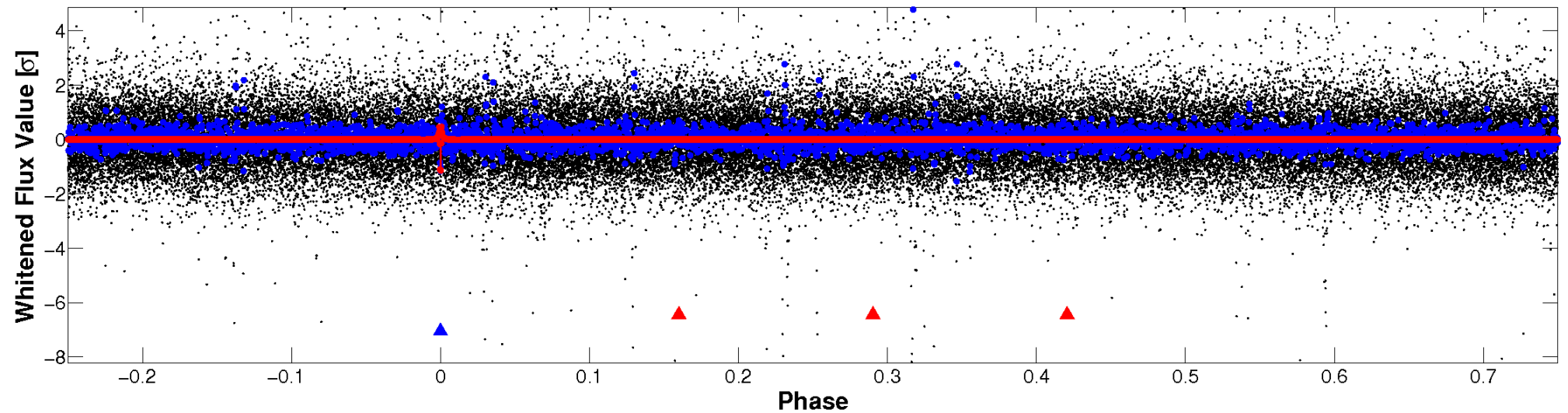


# Non-Whitened Vs. Whitened Light Curve

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

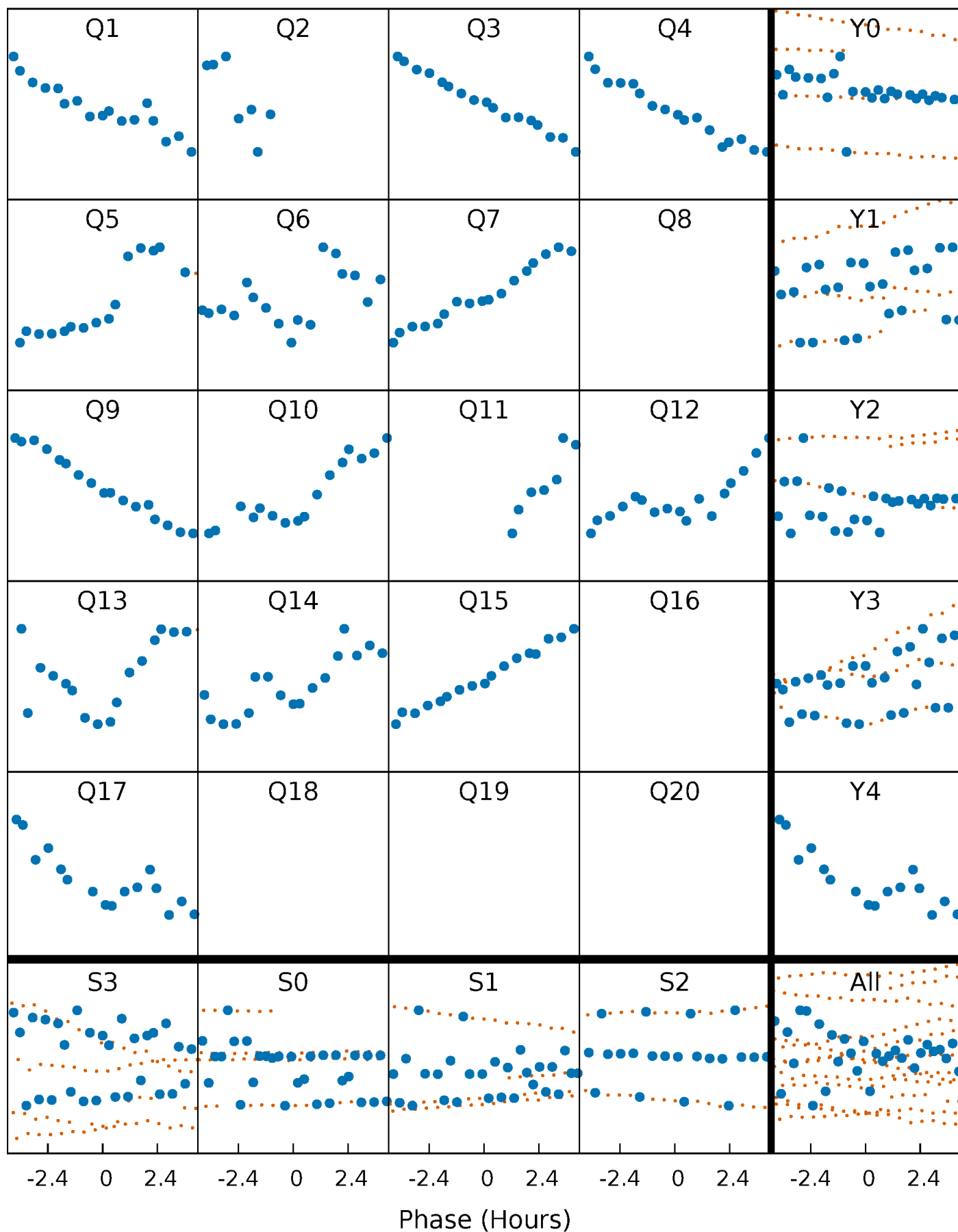


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



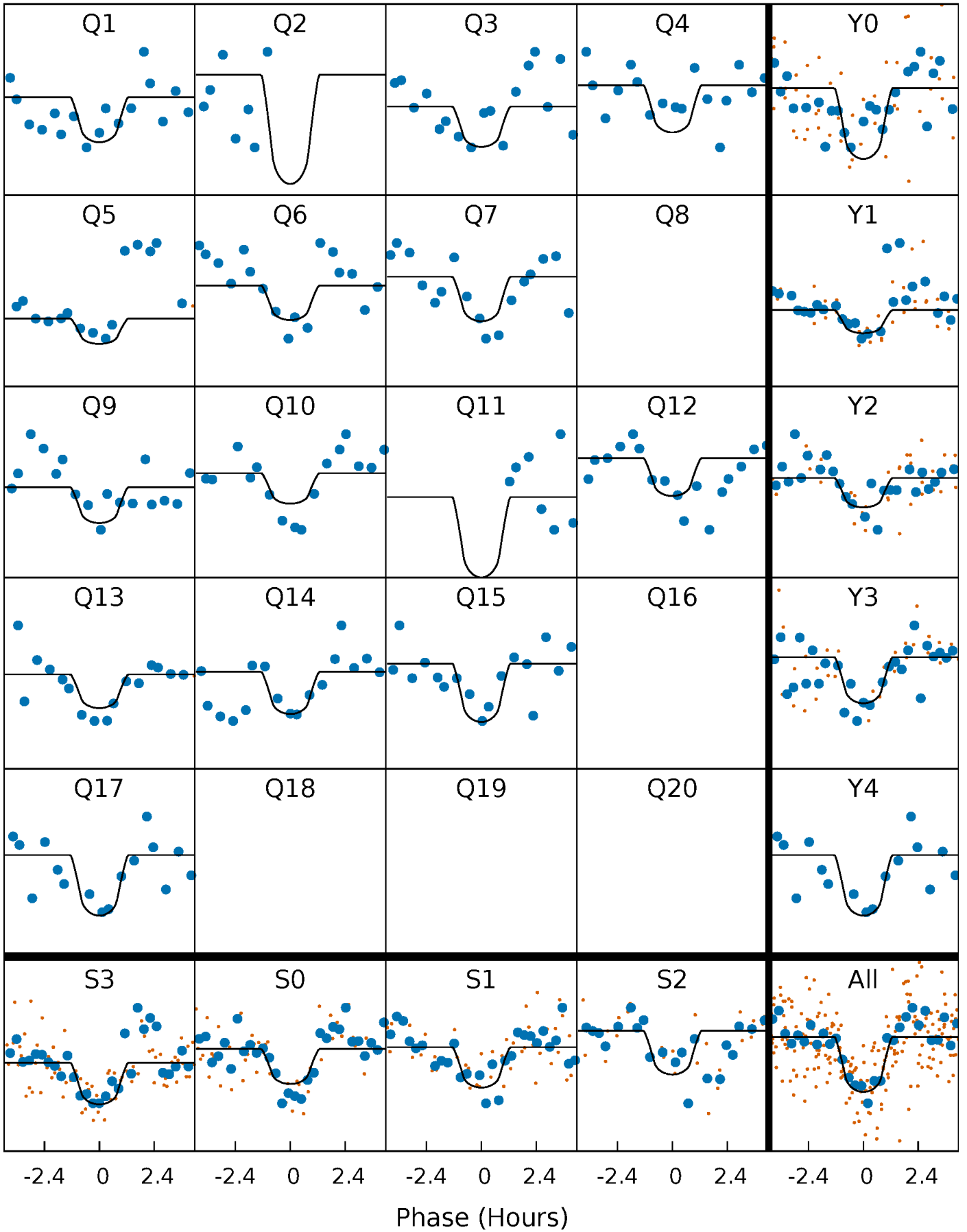
# PDC Quarter-Phased Transit Curves

TCE 006278670-02   P= 89.945682 Days    $T_0=133.560719$  (BKJD)



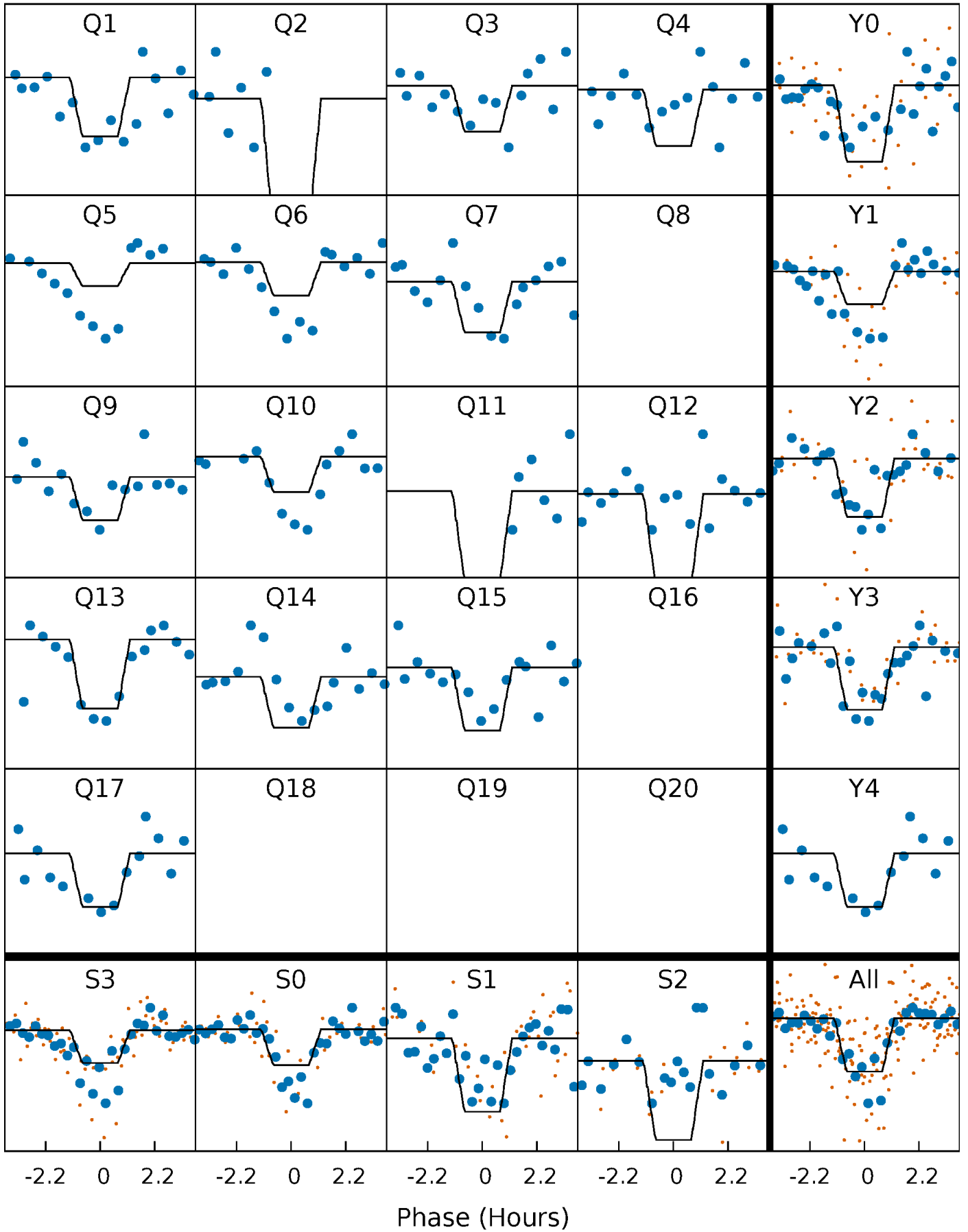
# DV Quarter-Phased Transit Curves

TCE 006278670-02   P= 89.945682 Days    $T_0=133.560719$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

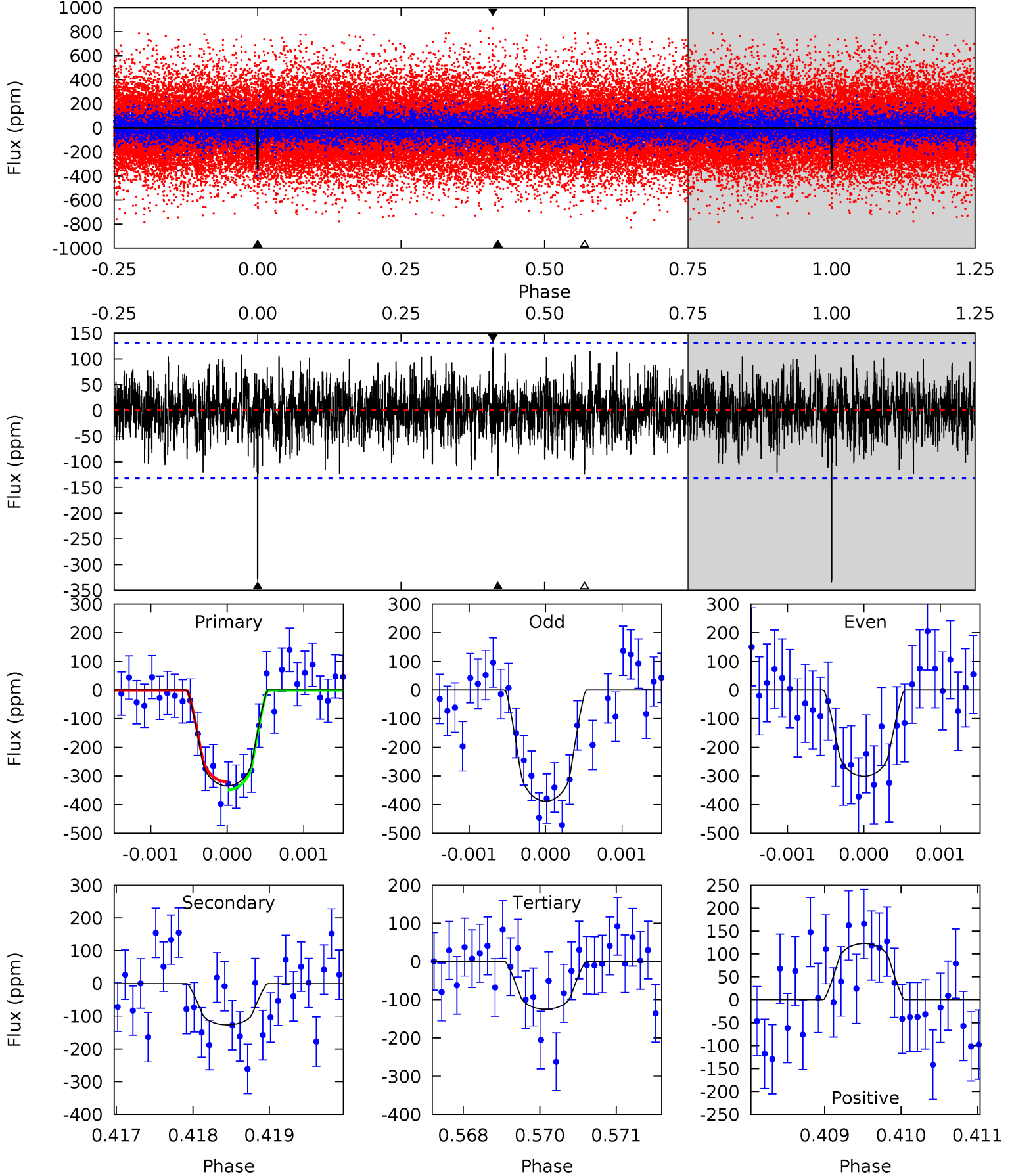
TCE 006278670-02   P= 89.945708 Days    $T_0=133.560574$  (BKJD)



# DV Model-Shift Uniqueness Test

006278670-02, P = 89.945682 Days, E = 43.615037 Days

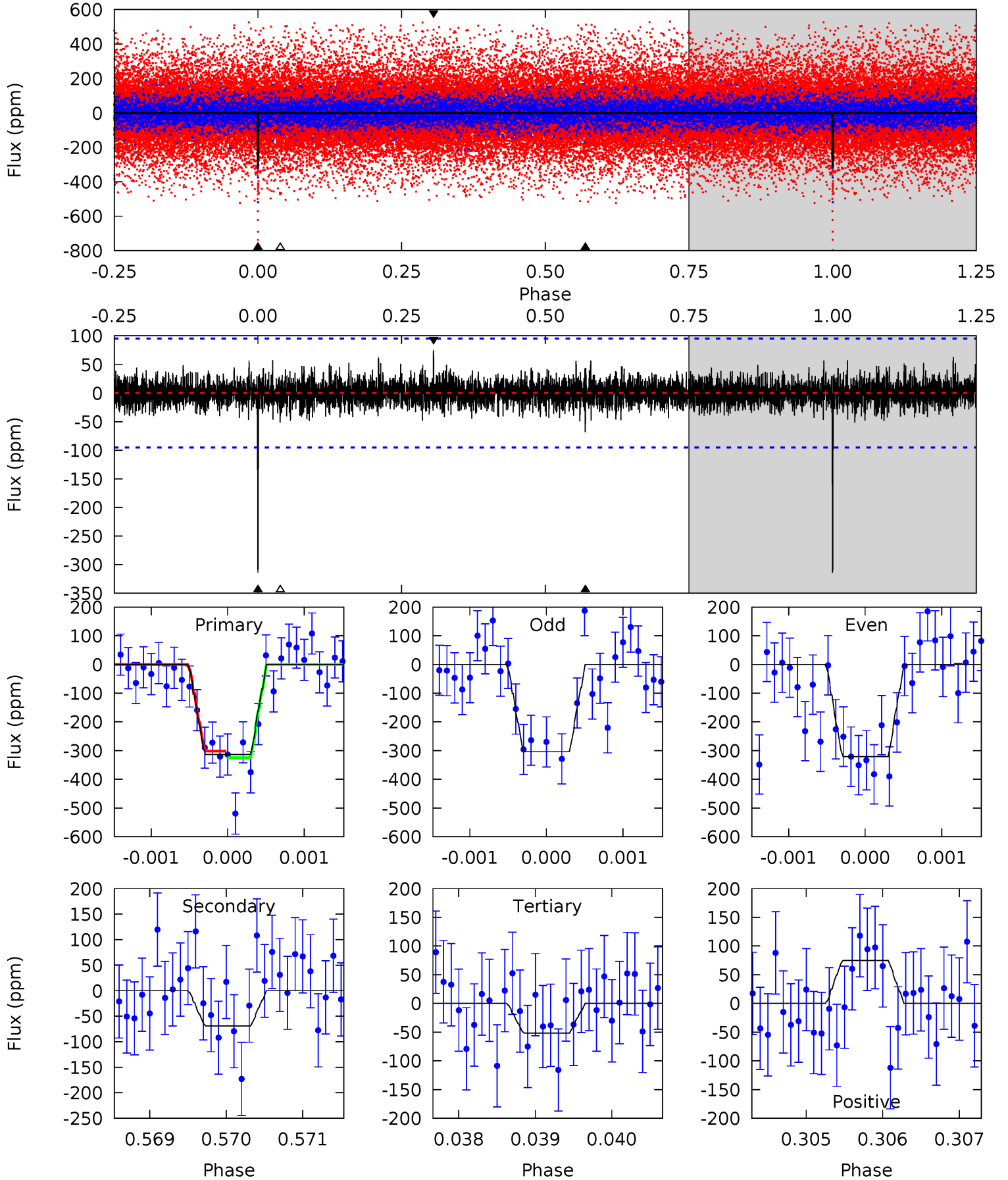
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.8	5.22	5.15	5.06	5.43	3.26	1.50	8.66	8.75	0.07	0.16	1.76	1.08	0.27	0.59



# Alt Model-Shift Uniqueness Test

006278670-02, P = 89.945708 Days, E = 43.614866 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
17.9	3.93	2.95	4.28	5.43	3.26	0.90	15.0	13.7	0.98	-0.35	0.48	1.36	0.19	0.67



### Stellar Parameters For KIC 006278670

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5115^{+153}_{-138}$	$3.819^{+0.791}_{-0.339}$	$-0.240^{+0.300}_{-0.250}$	$1.924^{+1.231}_{-1.231}$	$0.891^{+0.254}_{-0.157}$	$0.176^{+2.561}_{-0.146}$
	+3%/-3%	+21%/-9%	+125%/-104%	+64%/-64%	+29%/-18%	+1454%/-83%
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 006278670-02 / KOI 7775.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-127 \pm 24$	$4.38^{+4.60}_{-2.98}$	$701^{+115}_{-129}$	$3861^{+2131}_{-669}$	$516^{+4684}_{-394}$
Alt.	$-69 \pm 18$	$4.29^{+4.81}_{-2.83}$	$697^{+125}_{-133}$	$3492^{+1514}_{-588}$	$277^{+2121}_{-212}$

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

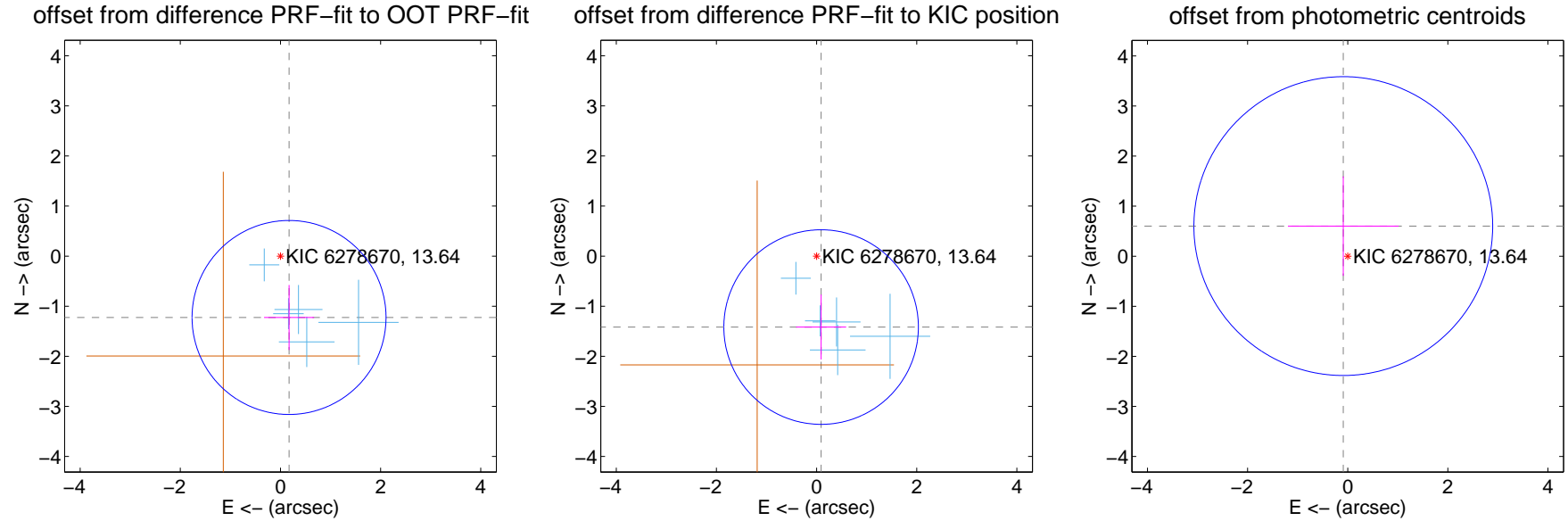
## DV Centroid Data

Supplemental centroid analysis for 006278670-02. Kepler magnitude: 13.64. Transit SNR 7.86

There are 5 quarters with good PRF difference image offsets

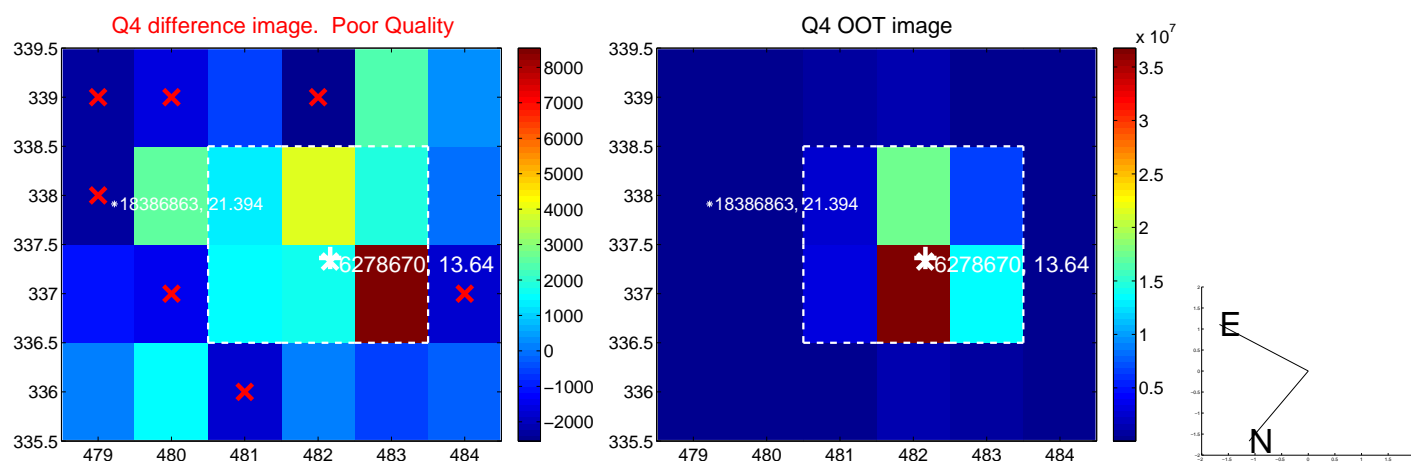
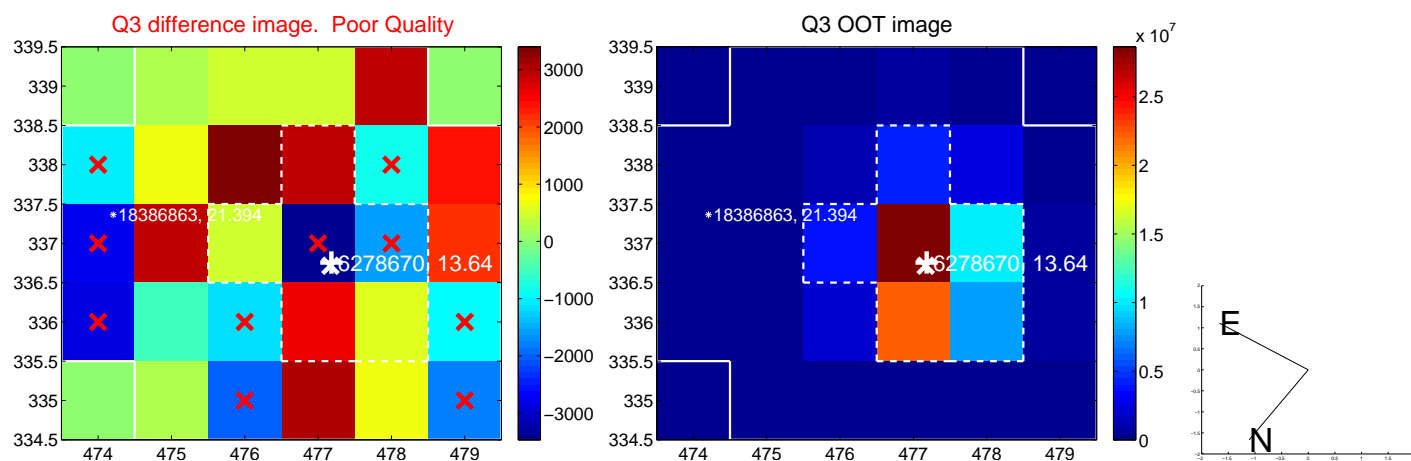
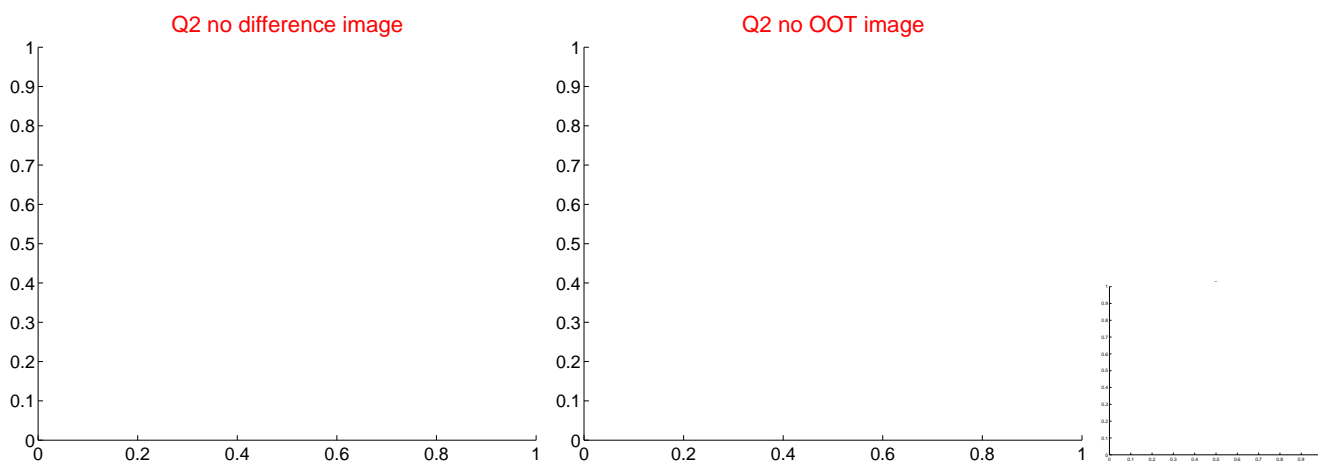
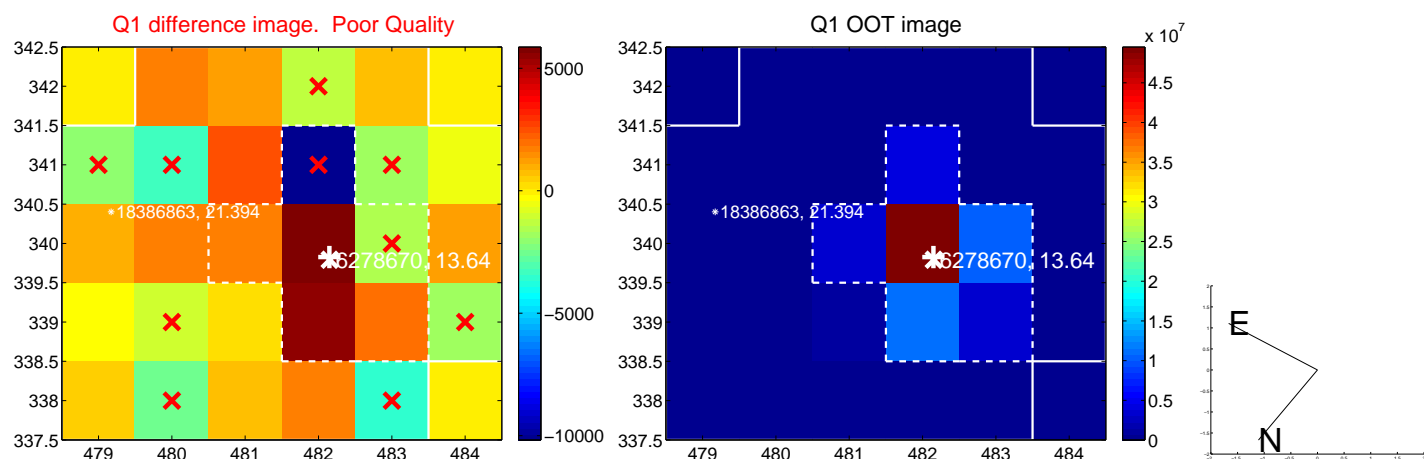
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.237 \pm 0.645$	1.92	$-0.171 \pm 0.500$	$-1.225 \pm 0.648$
PRF-fit source offset from KIC position	$1.419 \pm 0.647$	2.19	$-0.091 \pm 0.500$	$-1.416 \pm 0.648$
photometric centroid source offset	$0.61 \pm 0.99$	0.61	$0.09 \pm 1.11$	$0.60 \pm 0.99$

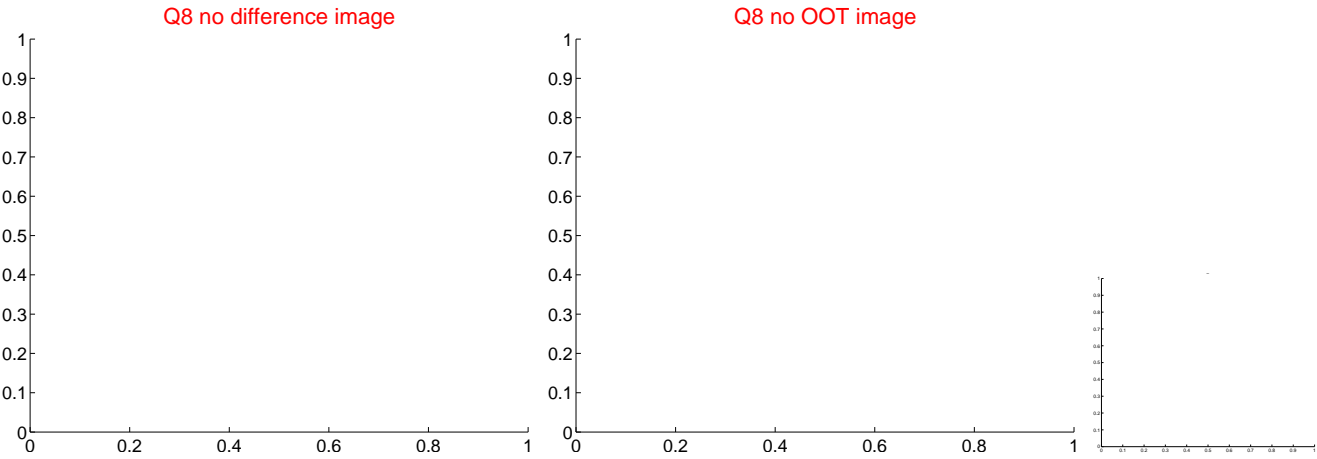
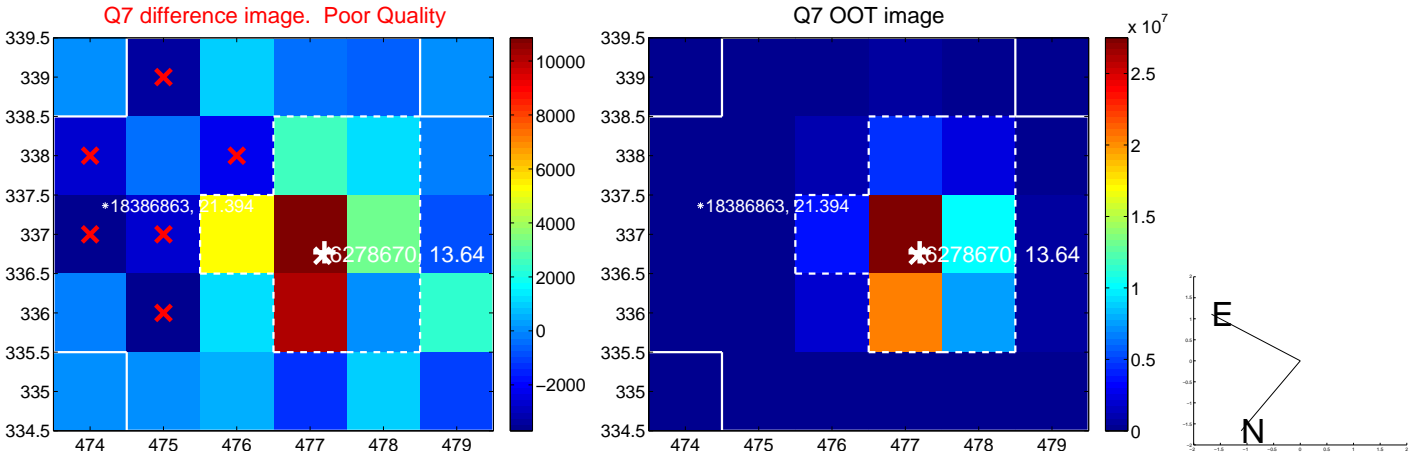
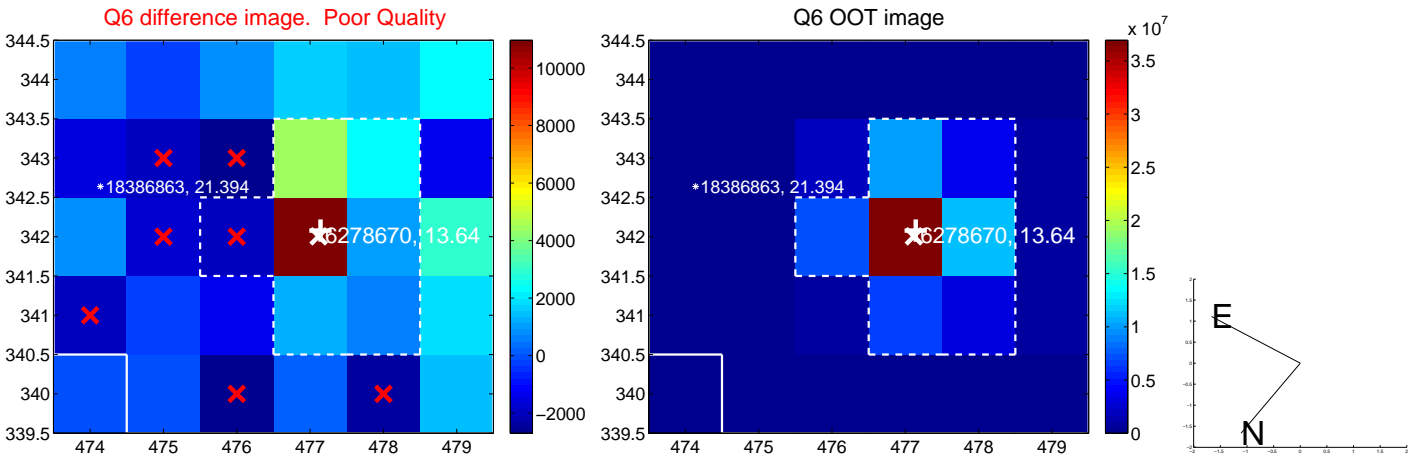
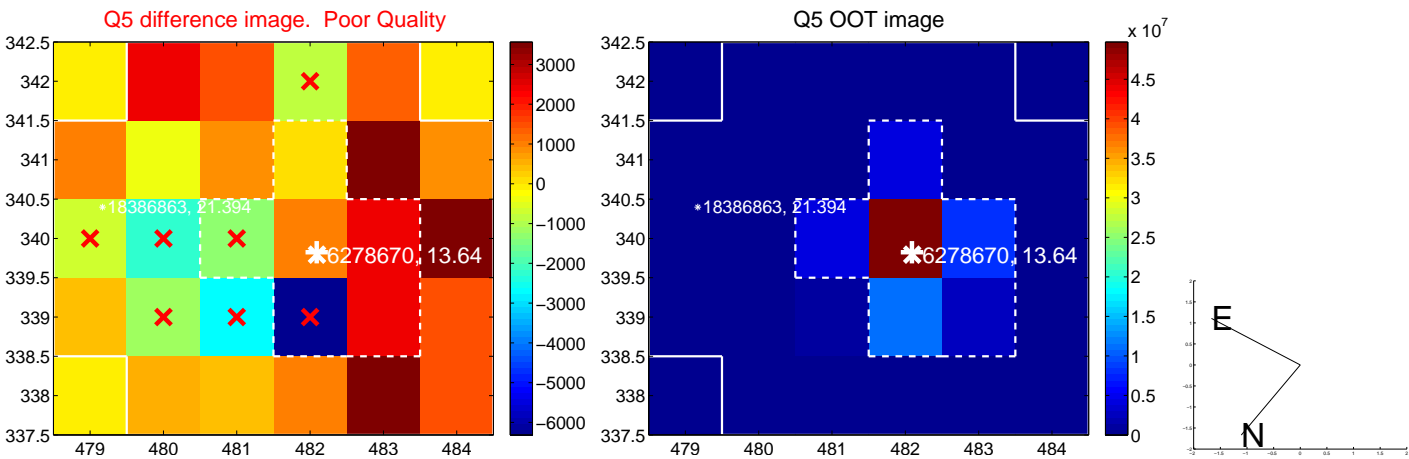


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

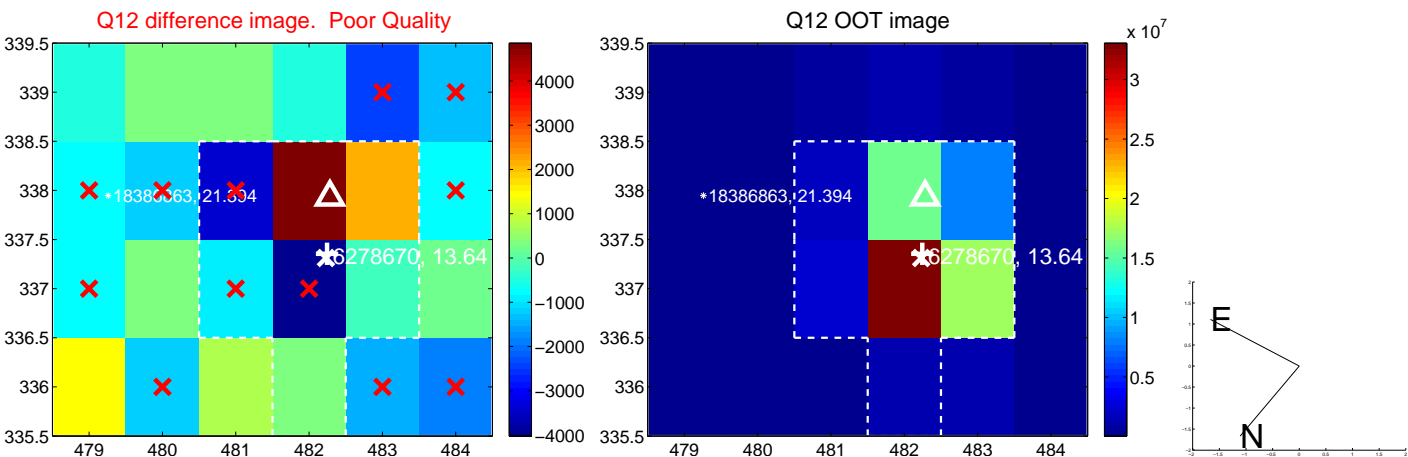
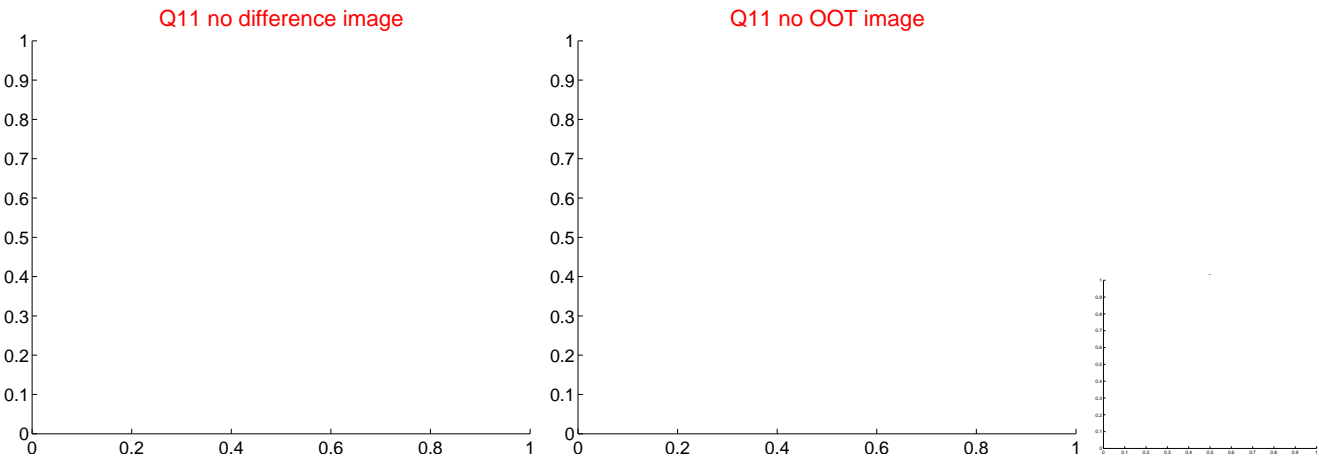
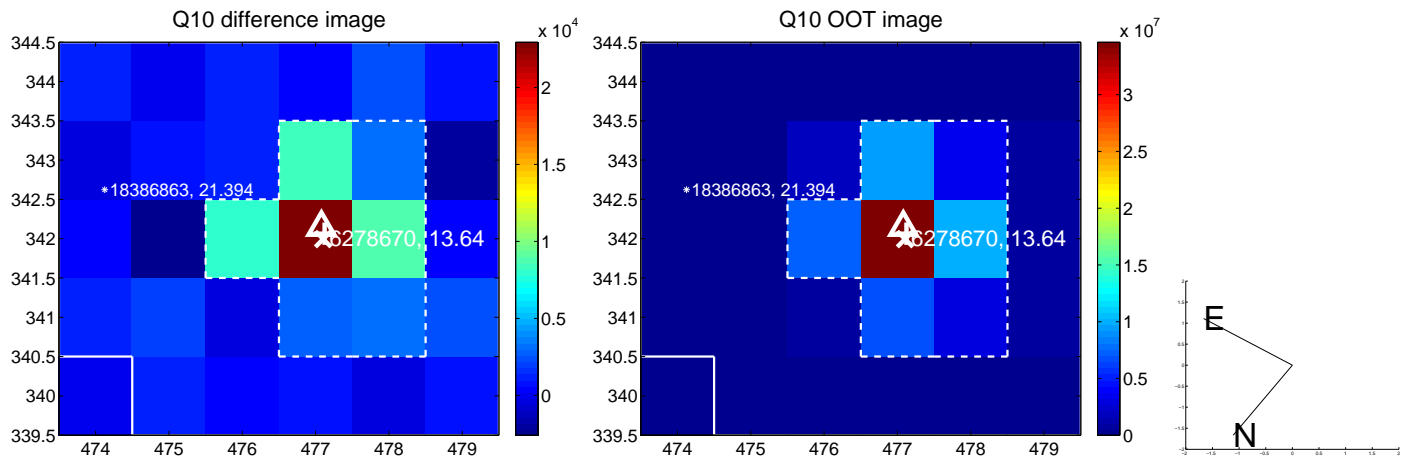
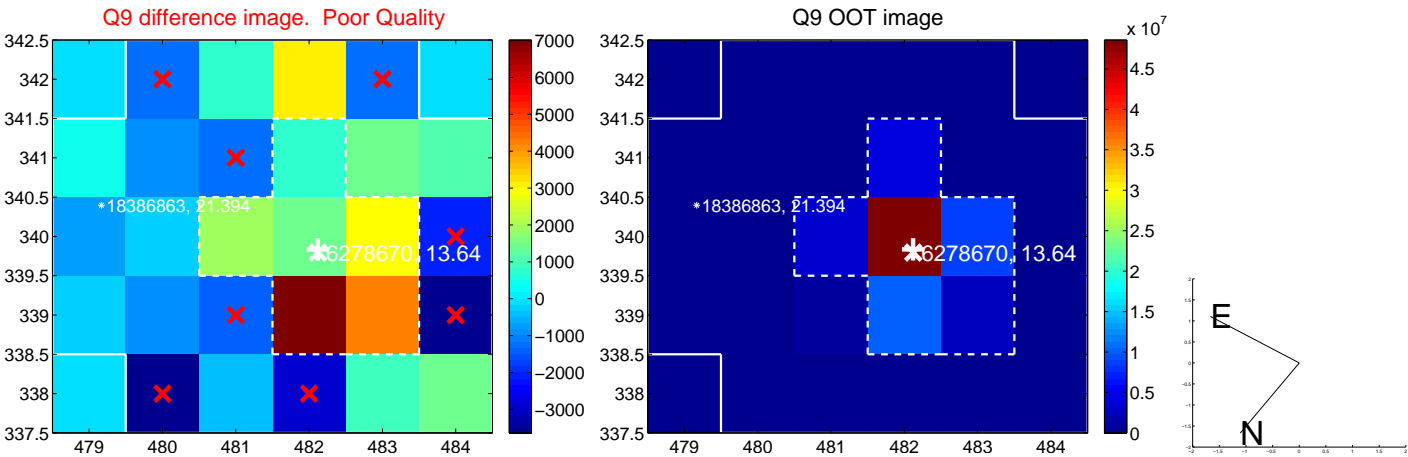
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



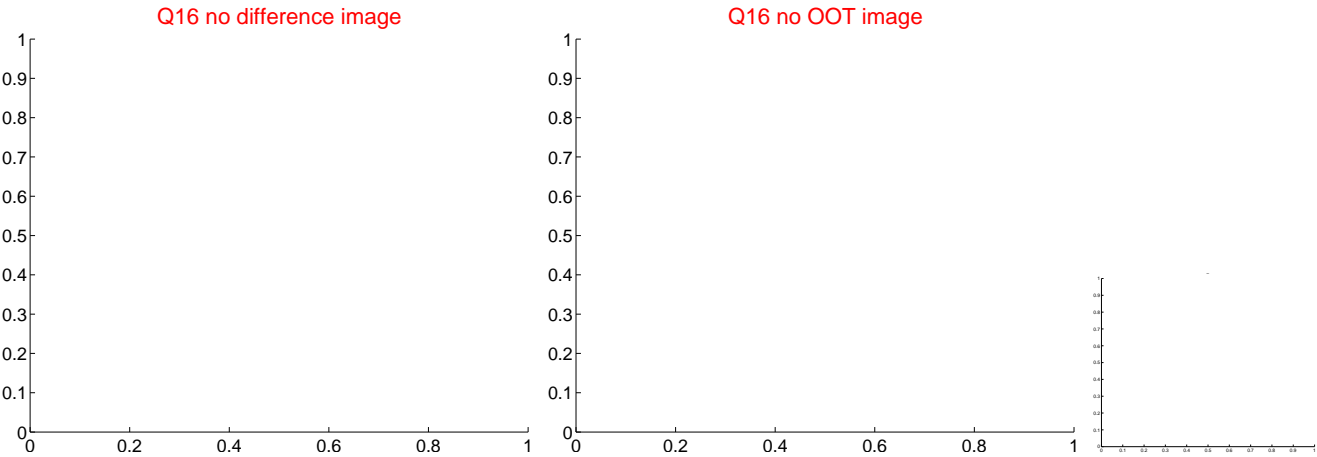
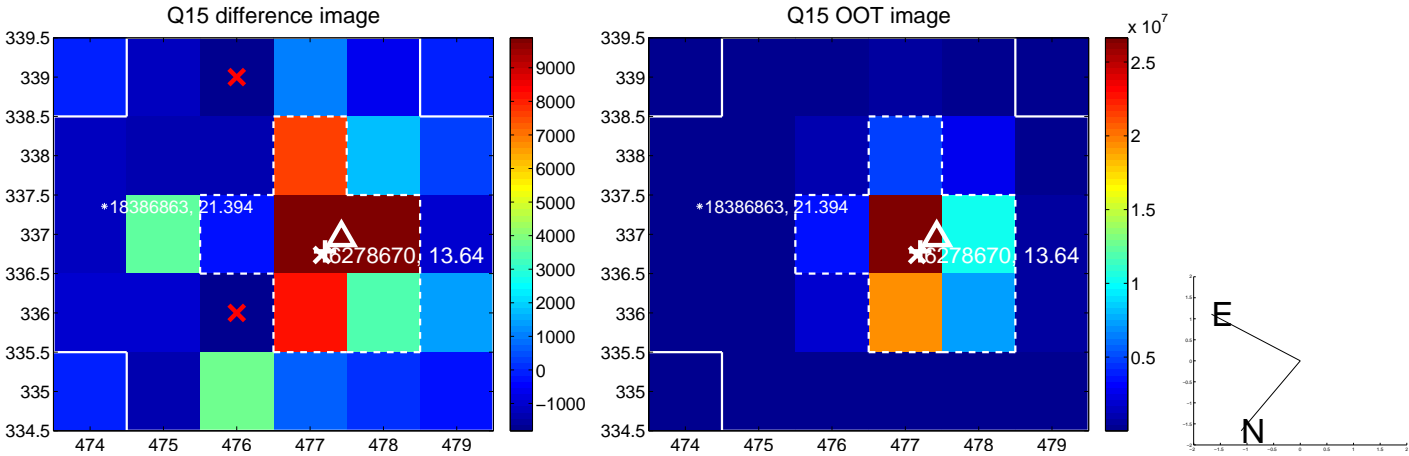
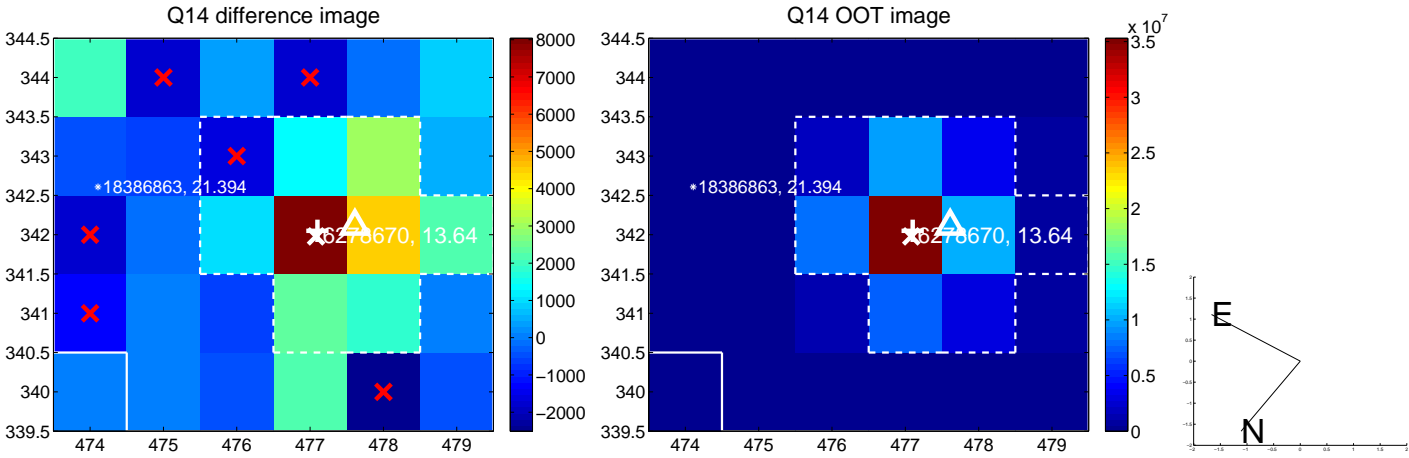
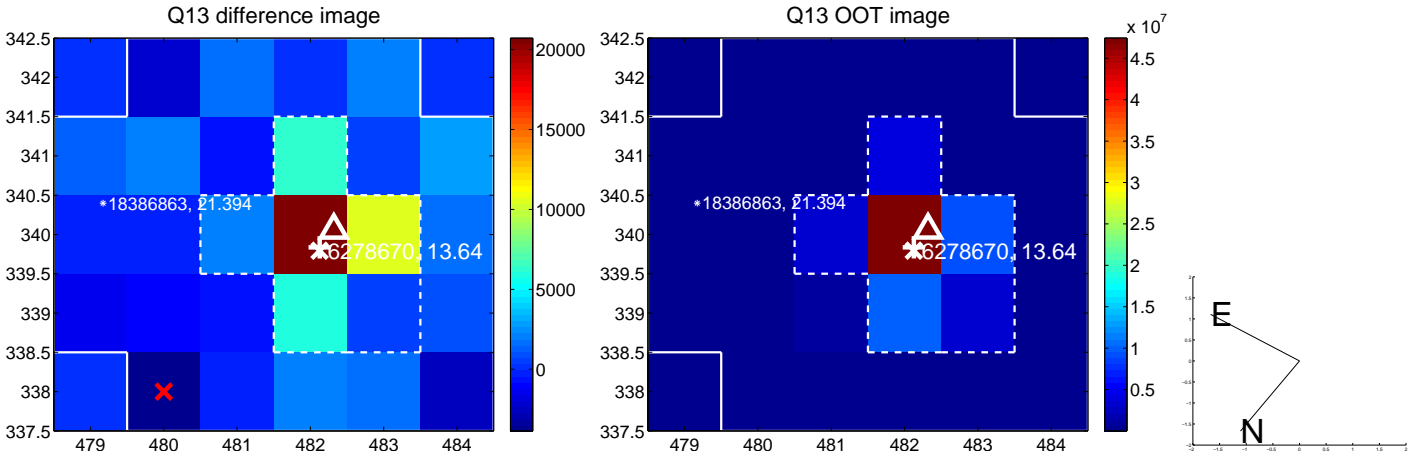
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

