

# KIC 008358012

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008358012-01	OBS	2929.01	10.064721	135.250490	313.3	3.768	15.1	16.4	0.82	5438	2.43	66.91
008358012-02	OBS	No	10.064482	140.369726	140.4	3.166	8.3	8.9	0.82	5438	1.08	66.91

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008358012-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
008358012-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH

**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.

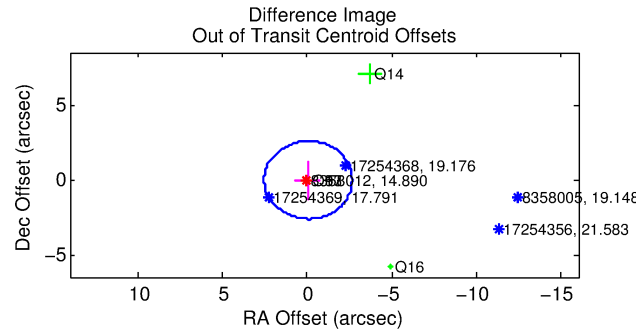
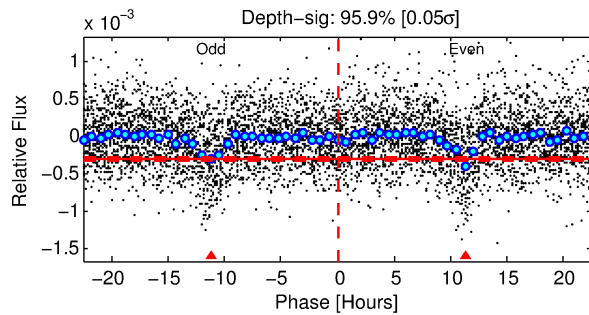
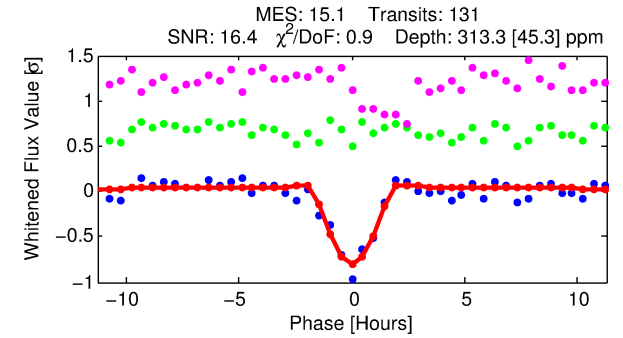
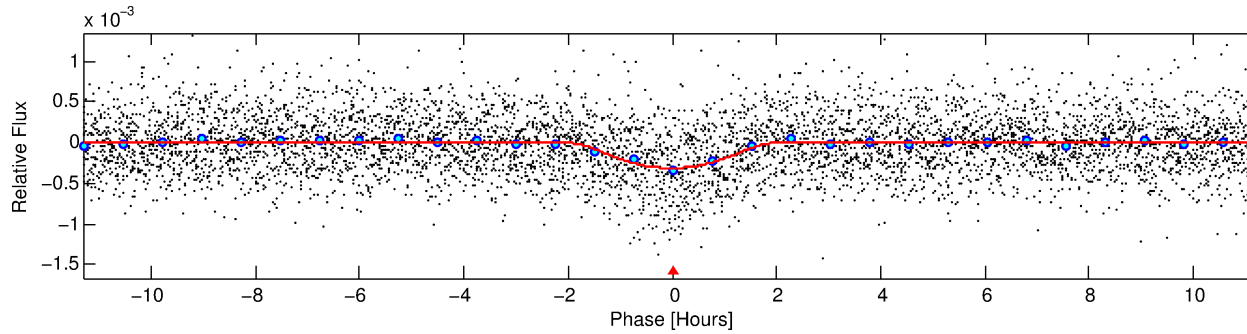
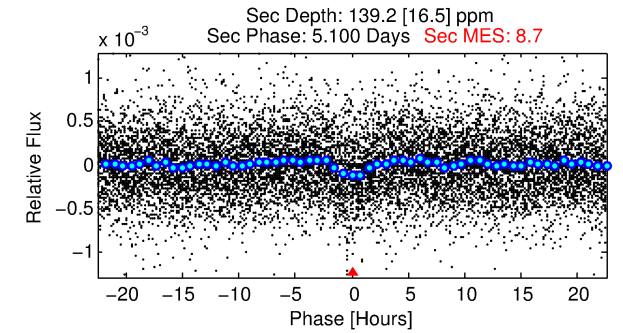
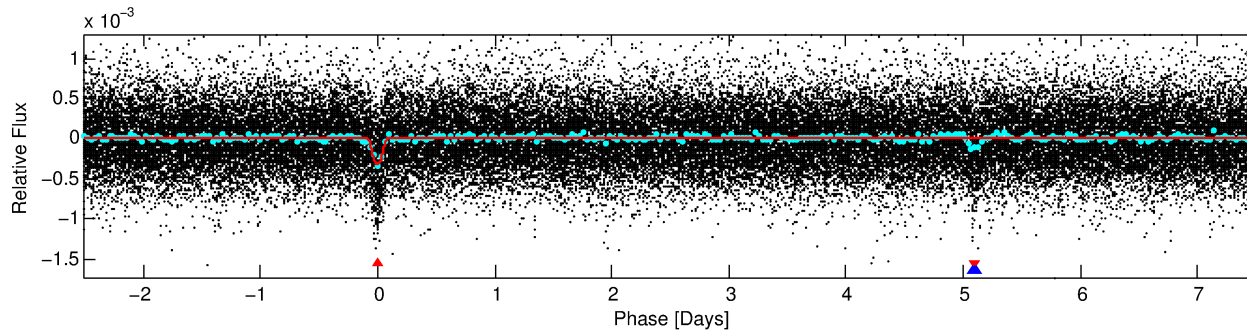
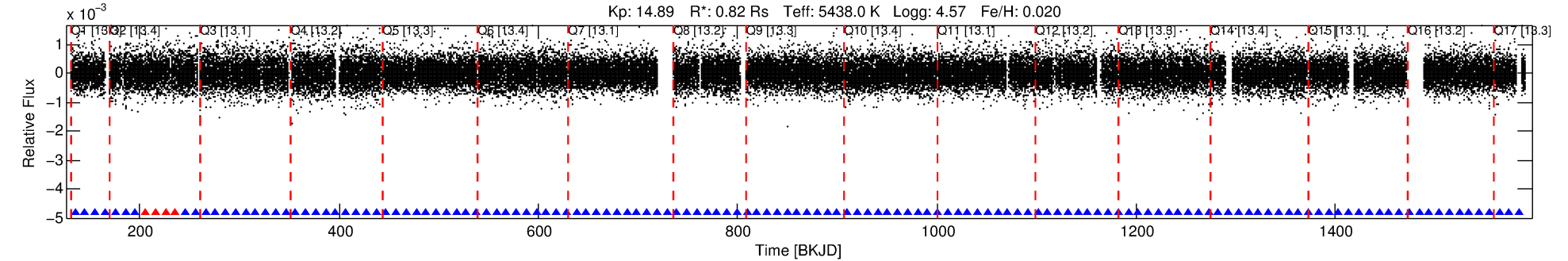
## Ephemeris Match Information For 008358012-01

TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
008358012-01	8358012	7022.01	8358008	1:1	10.9	3	0	14.67	14.89	32.56	Direct-PRF	0	0.13	0.02

**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  and  $\sigma_T$  are the significance of the match in period and epoch. For a match to be considered significant  $\sigma_P < 5.0$  and  $\sigma_T < 5.0$ . Matches which have  $\sigma_P$  and  $\sigma_T$  very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

# DV One-Page Summary

KIC: 8358012 Candidate: 1 of 2 Period: 10.065 d  
KOI: K02929.01 Corr: 0.898



## DV Fit Results:

Period = 10.06472 [0.00007] d  
Epoch = 135.2505 [0.0054] BKJD  
Rp/R\* = 0.0272 [0.0257]  
a/R\* = 5.73 [2.02]  
b = 0.99 [0.05]  
Seff = 66.90 [17.45]  
Teq = 729 [48] K  
Rp = 2.43 [2.34] Re  
a = 0.0887 [0.0140] AU  
Ag = 101.94 [194.37] [0.52σ]  
Teffp = 3583 [1699] K [1.68σ]

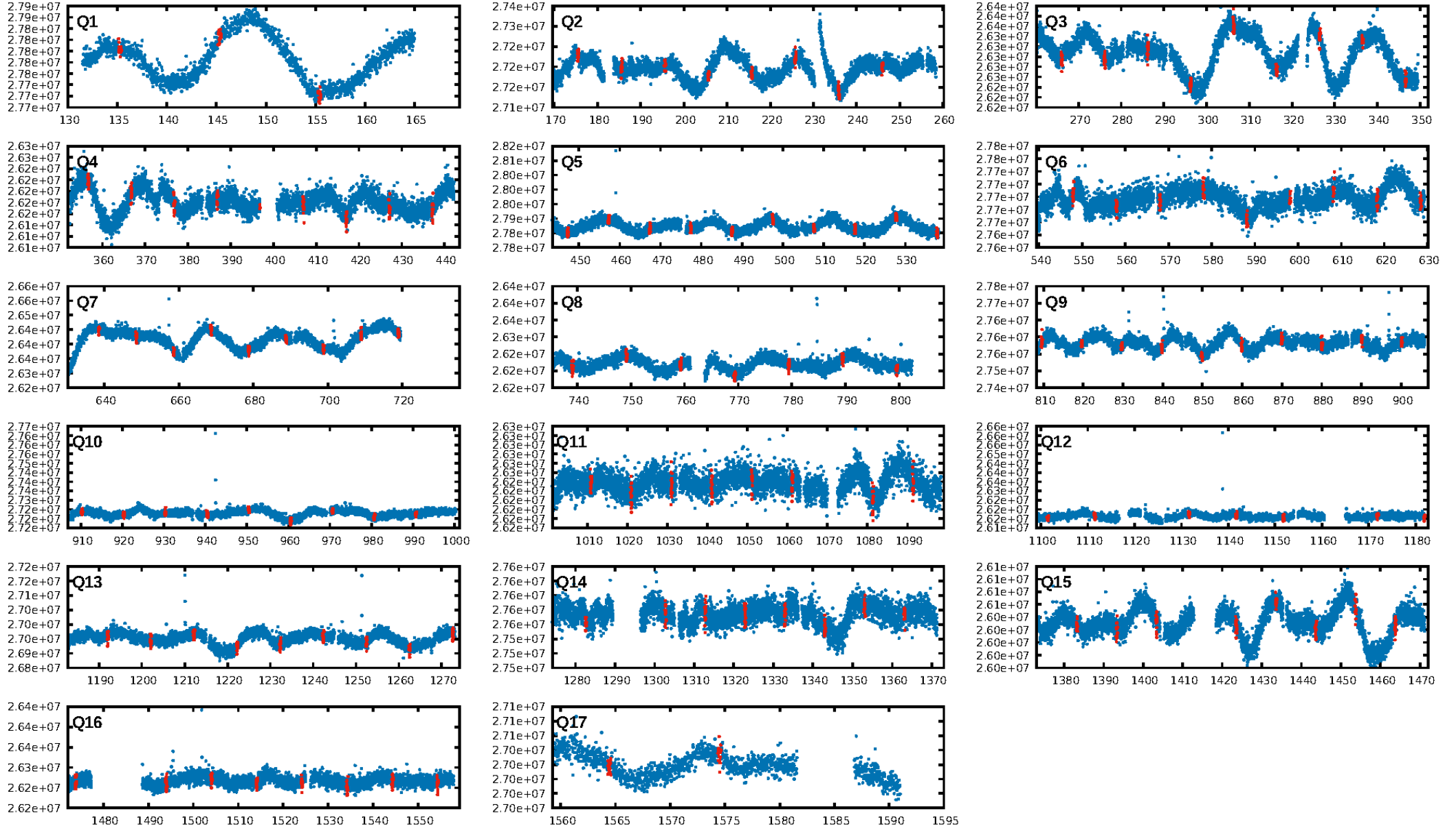
## DV Diagnostic Results:

ShortPeriod-sig: 0.1% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.12e-48  
RollingBand-fgt: 0.97 [122/126]  
GhostDiagnostic-chr: -0.1873  
Centroid-sig: 0.0%  
Centroid-so: 24.971 arcsec [35.64σ]  
OotOffset-rm: 0.061 arcsec [0.07σ]  
KicOffset-rm: 10.779 arcsec [7.37σ]  
OotOffset-st: 1/0/1/5 [7]  
KicOffset-st: 1/0/1/5 [7]  
DiffImageQuality-fgm: 0.86 [6/7]  
DiffImageOverlap-fno: 1.00 [17/17]

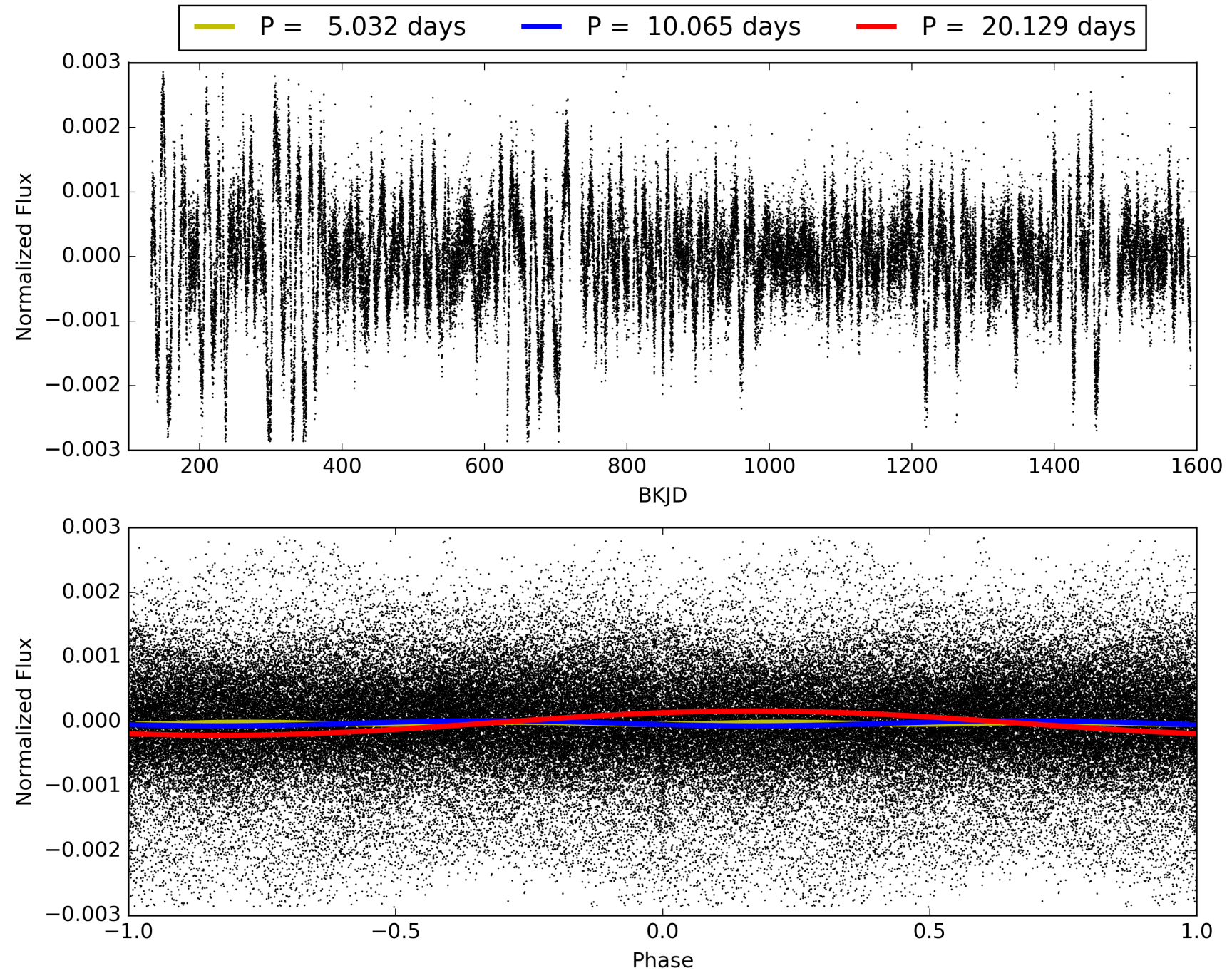
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 22:01:36 Z

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

# TCE 008358012-01, PDC Light Curves



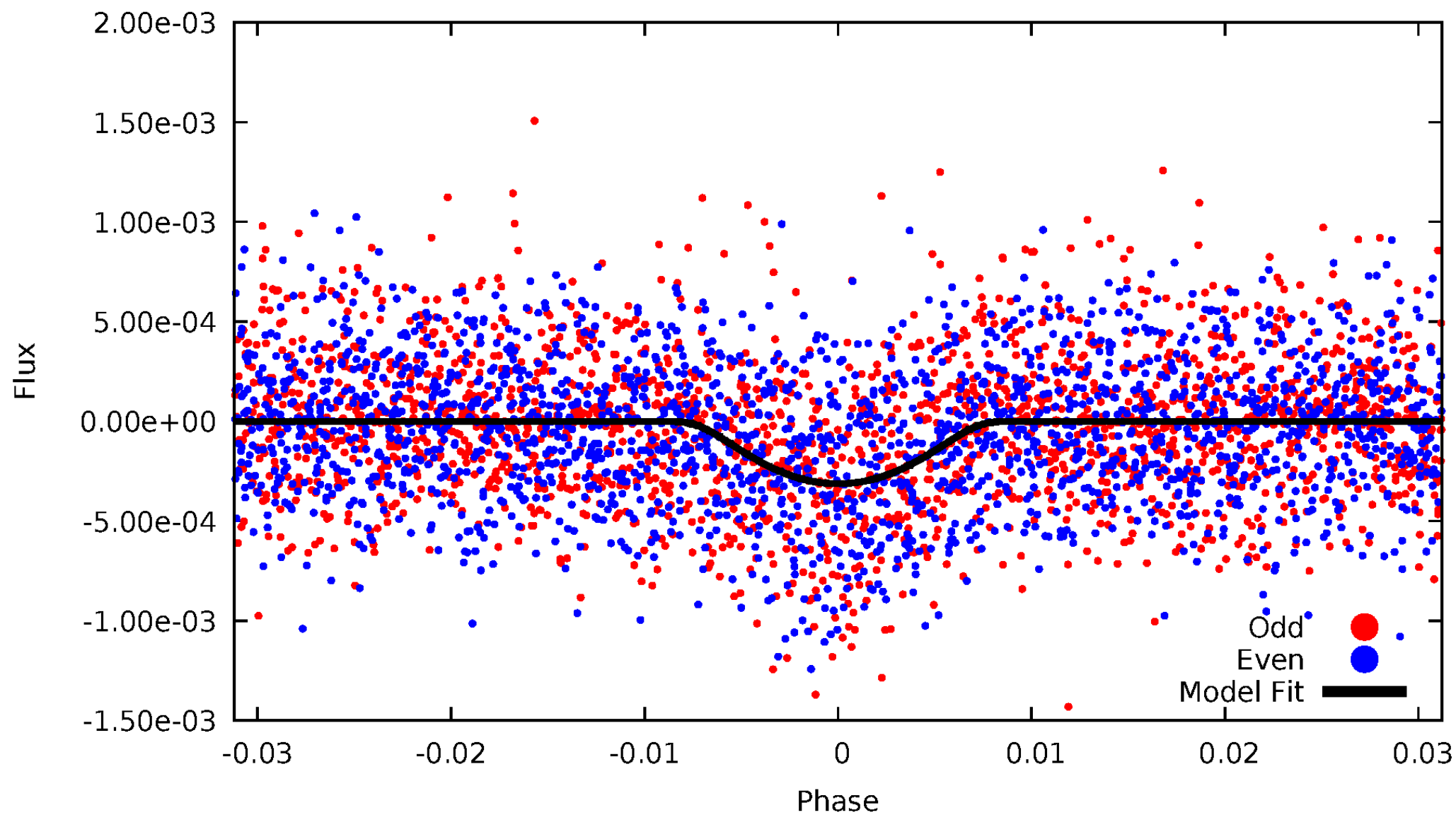
TCE 008358012-01





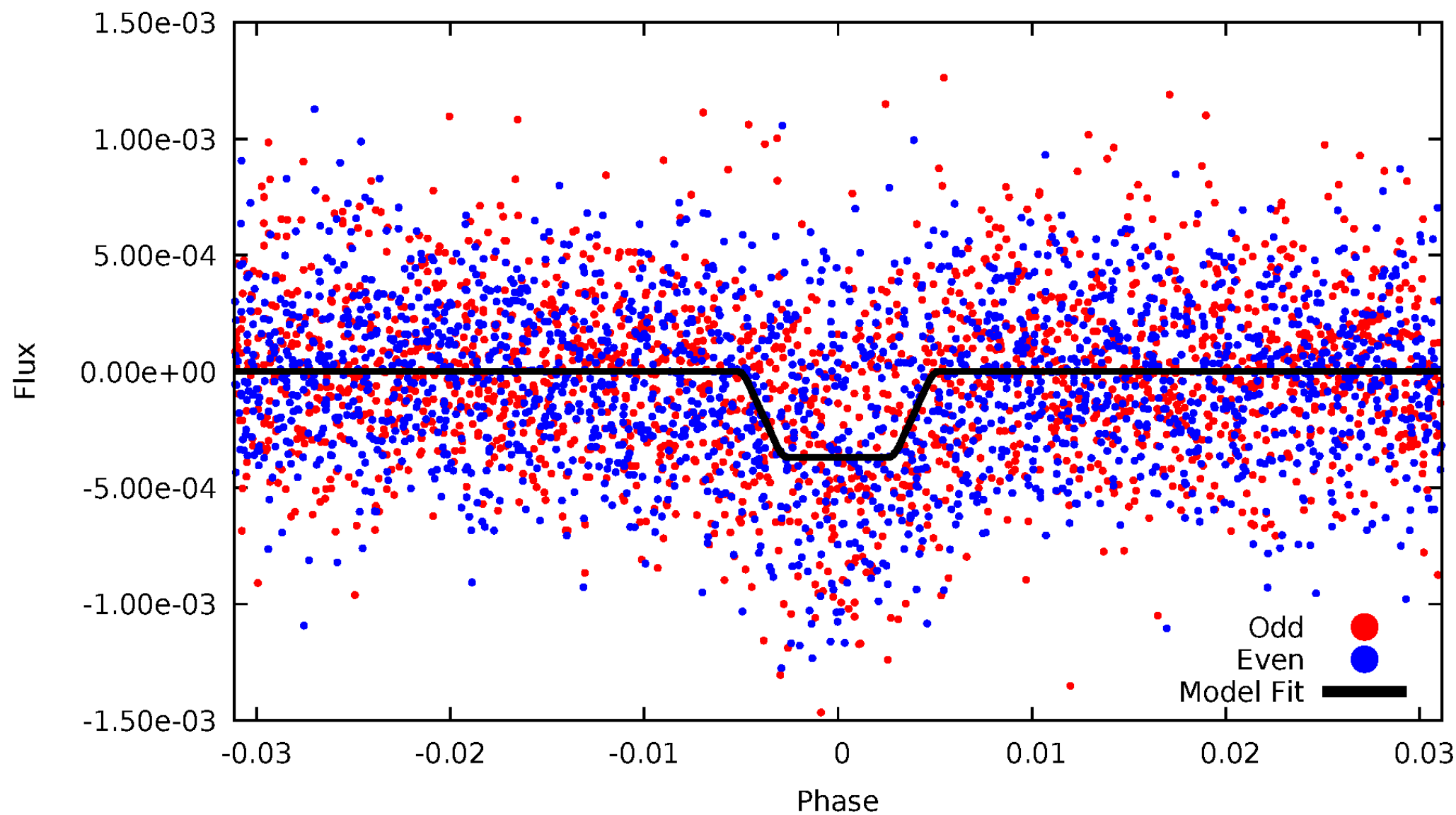
# DV Odd/Even

TCE 008358012-01



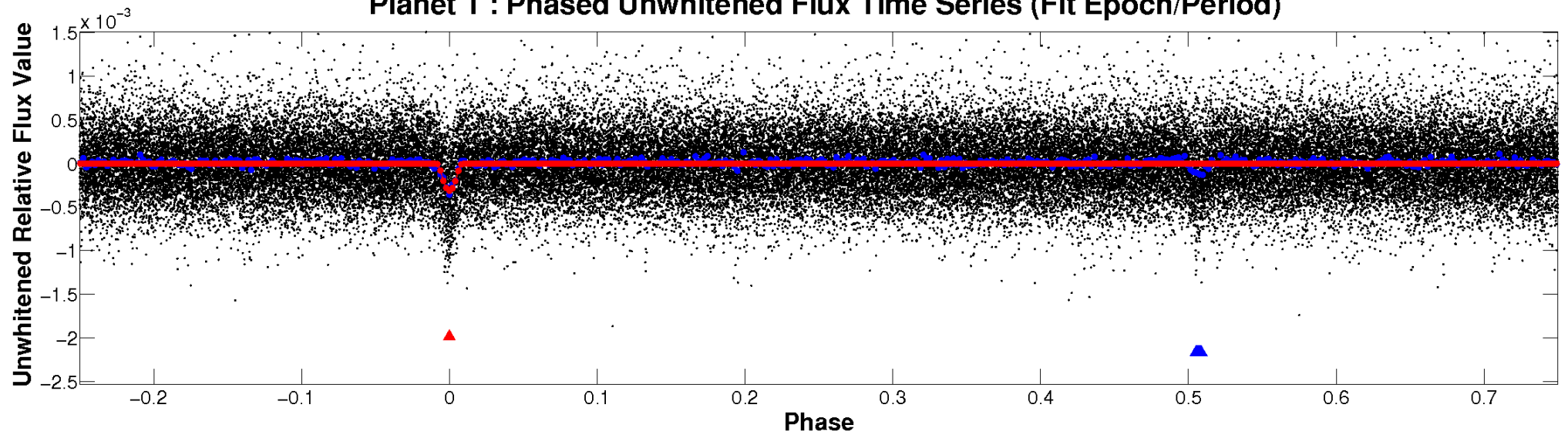
# ALT Odd/Even

TCE 008358012-01

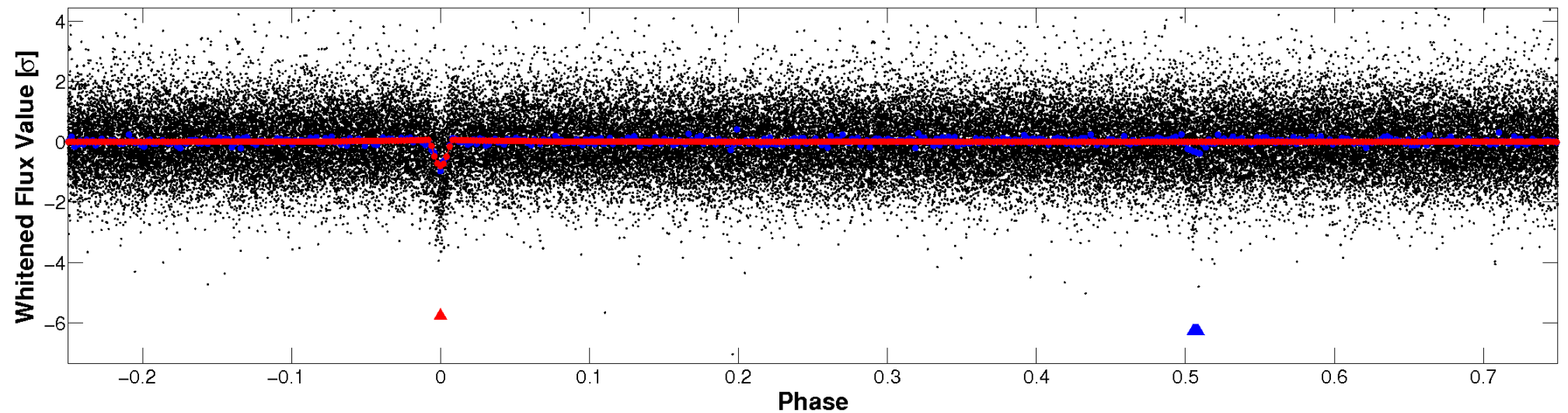


# Non-Whitened Vs. Whitened Light Curve

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

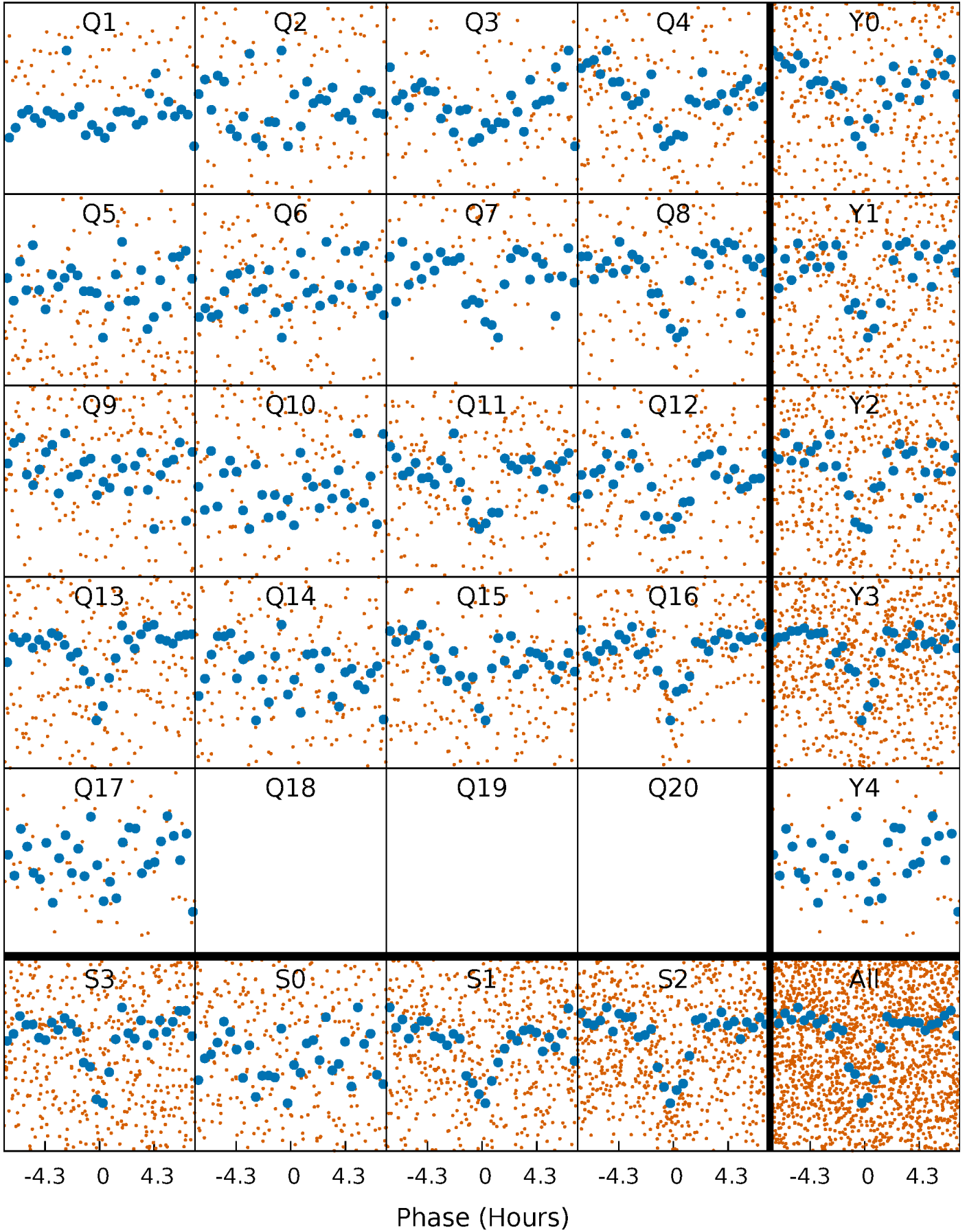


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

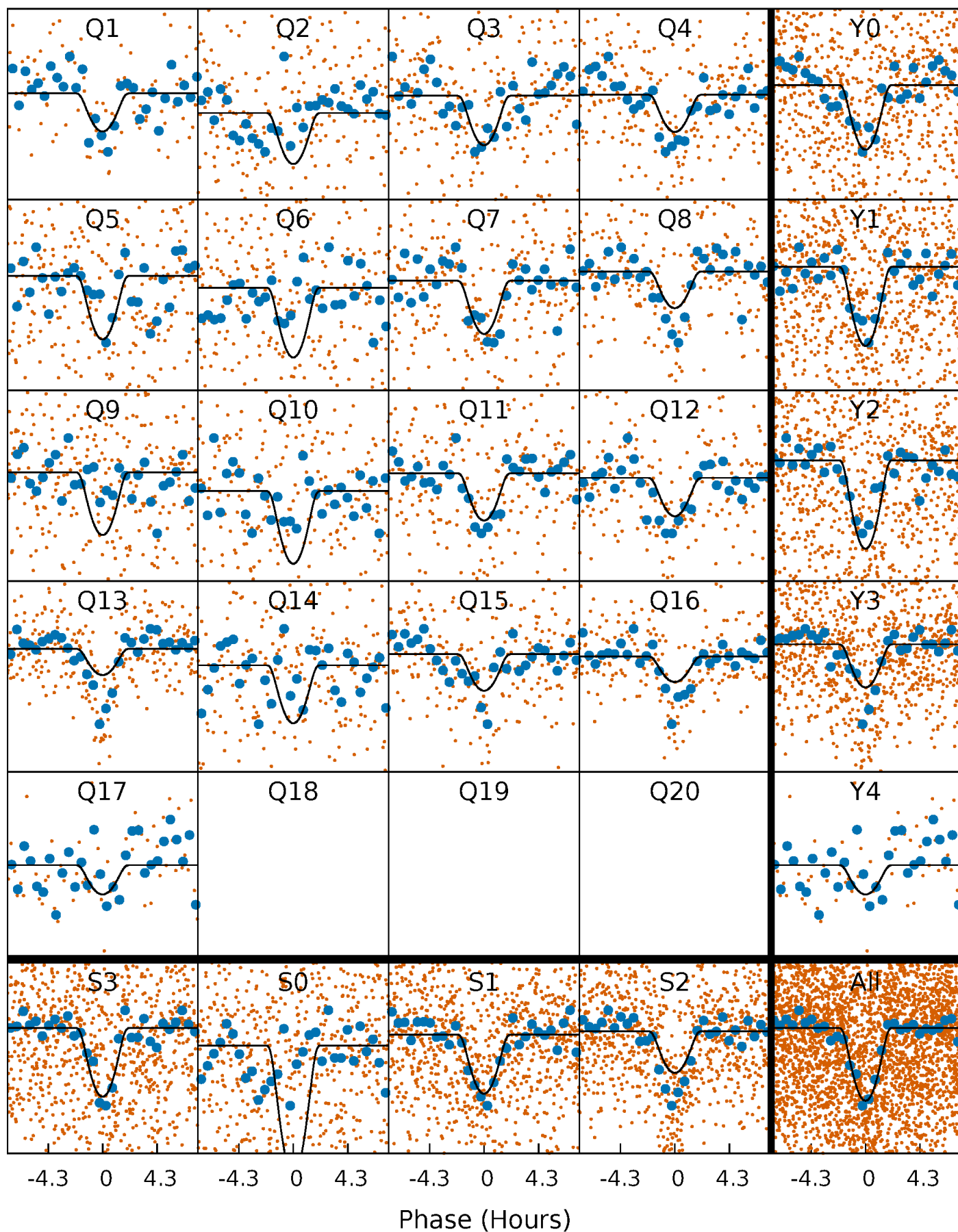
TCE 008358012-01 P= 10.064721 Days  $T_0=135.250490$  (BKJD)





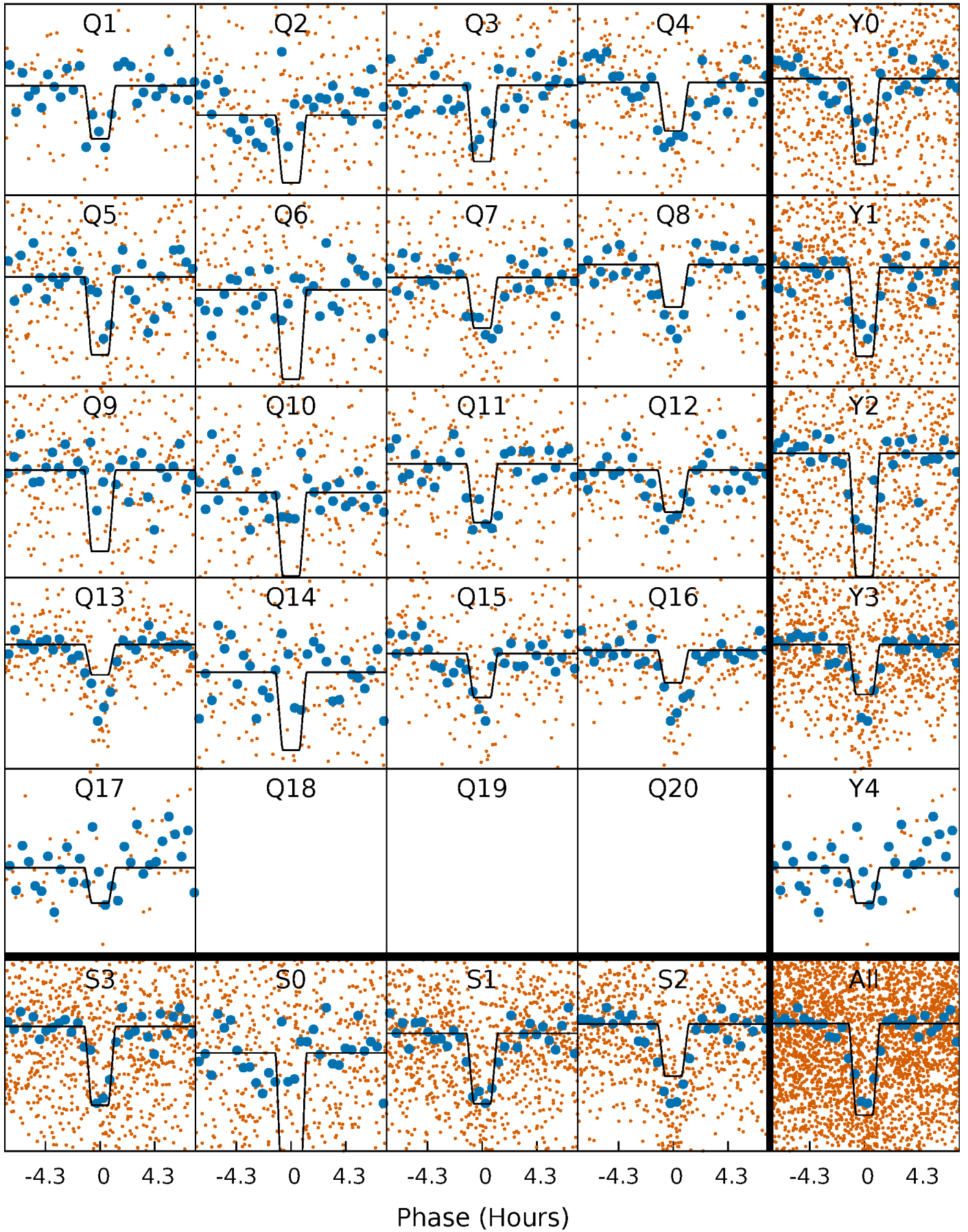
# DV Quarter-Phased Transit Curves

TCE 008358012-01 P= 10.064721 Days  $T_0=135.250490$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

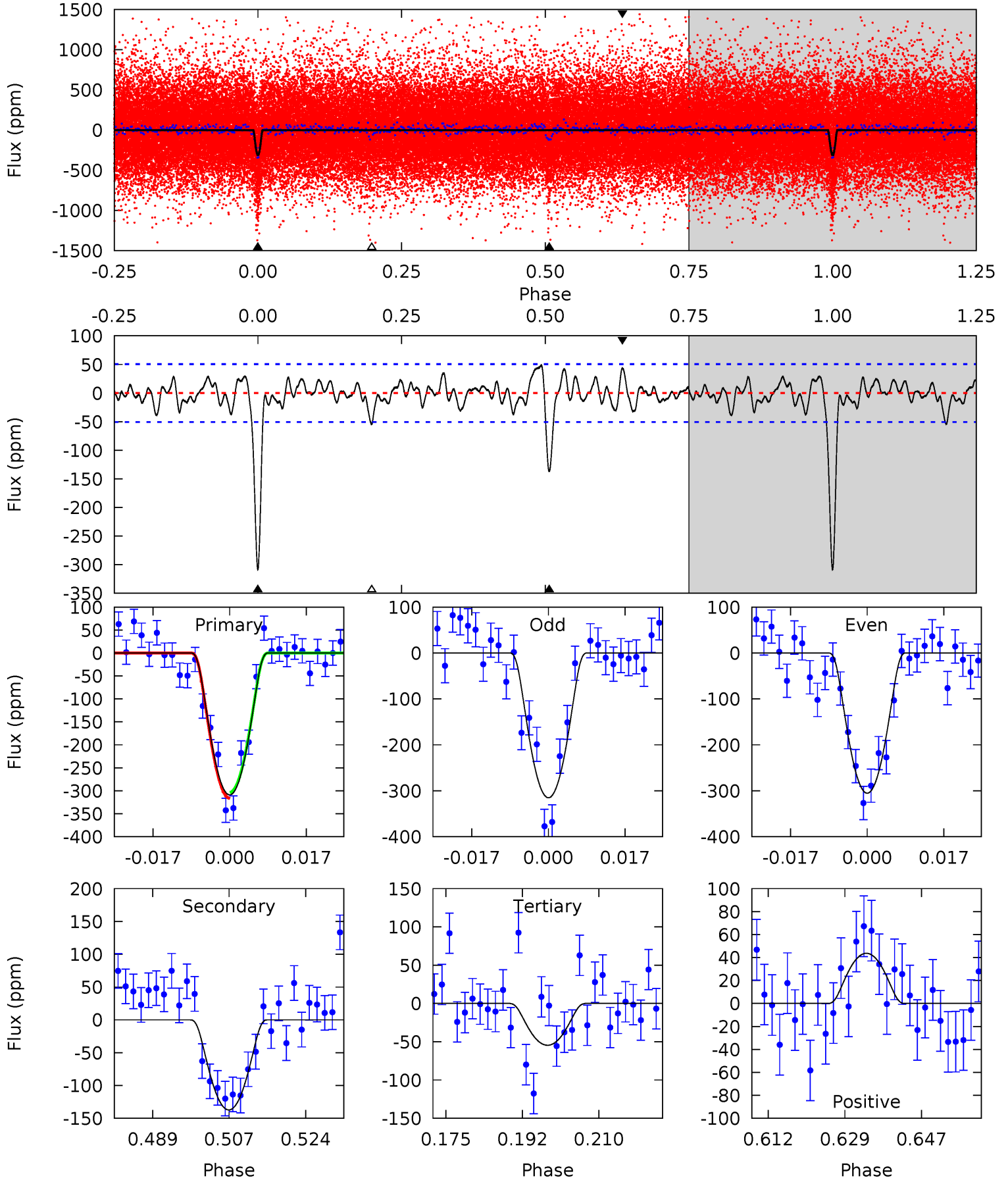
TCE 008358012-01 P= 10.064695 Days  $T_0=135.250416$  (BKJD)



# DV Model-Shift Uniqueness Test

008358012-01, P = 10.064721 Days, E = 125.185769 Days

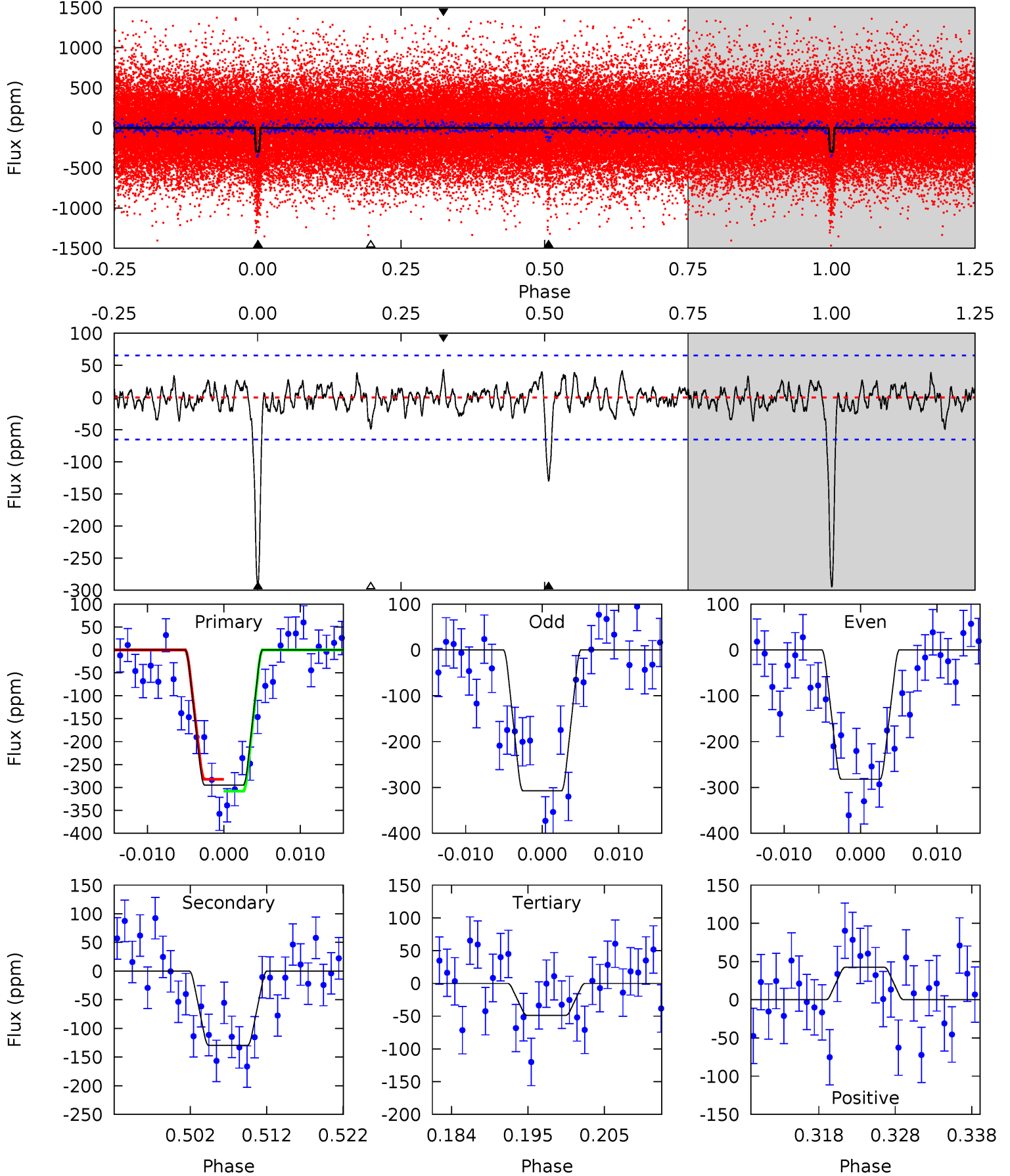
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
30.0	13.3	5.30	4.24	4.92	2.38	1.60	24.7	25.8	8.04	9.10	0.48	1.02	0.14	0.63



# Alt Model-Shift Uniqueness Test

008358012-01, P = 10.064695 Days, E = 125.185721 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
22.6	9.95	3.74	3.27	5.02	2.57	1.13	18.9	19.3	6.22	6.69	0.95	1.12	0.13	1.00



### Stellar Parameters For KIC 008358012

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5438^{+163}_{-163}$	$4.574^{+0.032}_{-0.128}$	$0.020^{+0.250}_{-0.300}$	$0.820^{+0.151}_{-0.065}$	$0.920^{+0.065}_{-0.101}$	$2.346^{+0.391}_{-0.820}$
	+3%/-3%	+1%/-3%	+1250%/-1500%	+18%/-8%	+7%/-11%	+17%/-35%
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 008358012-01 / KOI 2929.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-137 \pm 10$	$2.83^{+2.32}_{-1.70}$	$1035^{+52}_{-40}$	$3717^{+1608}_{-615}$	$72^{+401}_{-50}$
Alt.	$-130 \pm 13$	$2.40^{+2.18}_{-1.54}$	$1039^{+50}_{-41}$	$3939^{+2078}_{-761}$	$98^{+677}_{-72}$

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



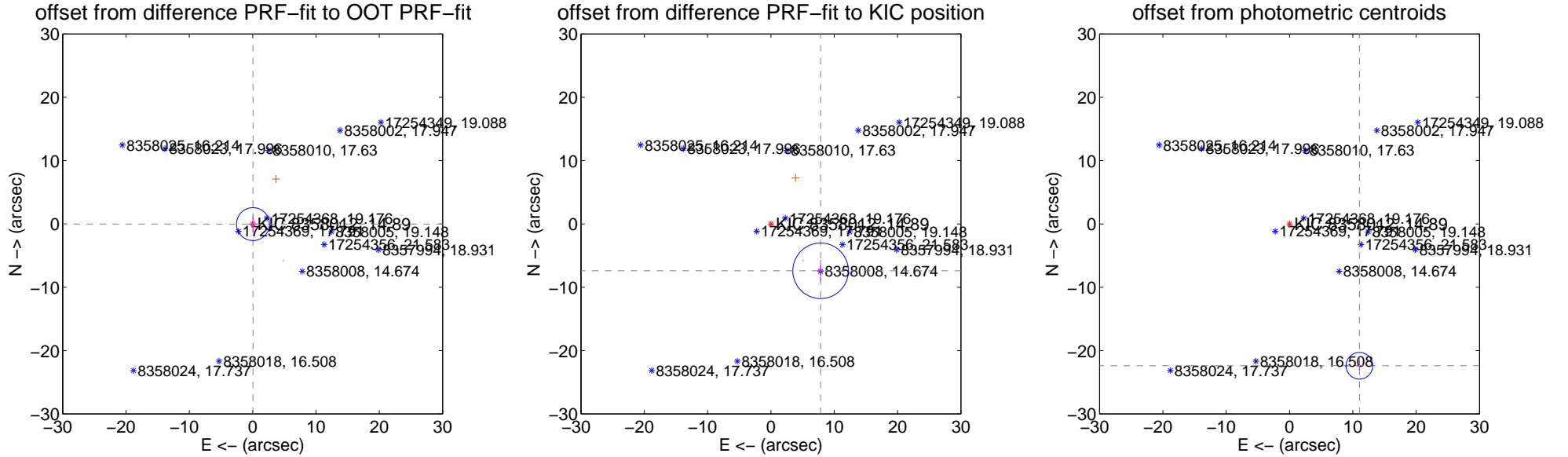
## DV Centroid Data

Supplemental centroid analysis for 008358012-01. Kepler magnitude: 14.89. Transit SNR 16.40

There are 6 quarters with good PRF difference image offsets

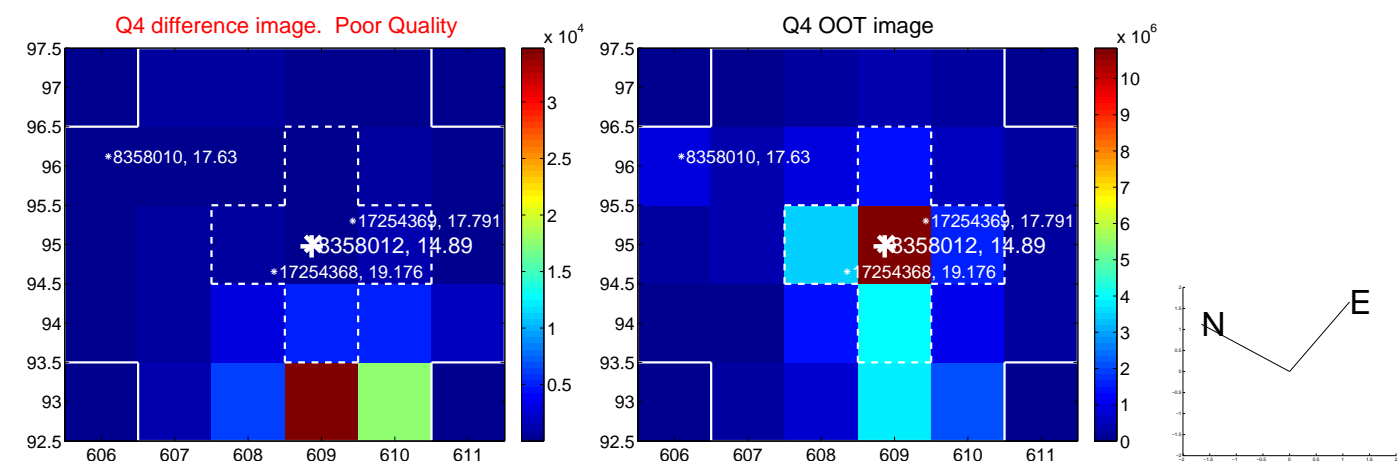
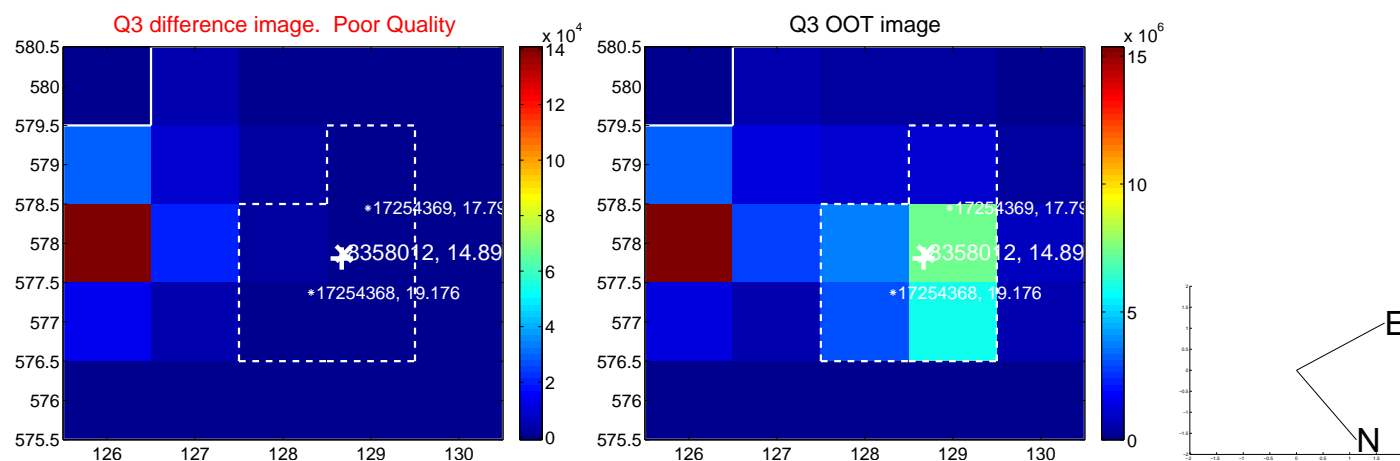
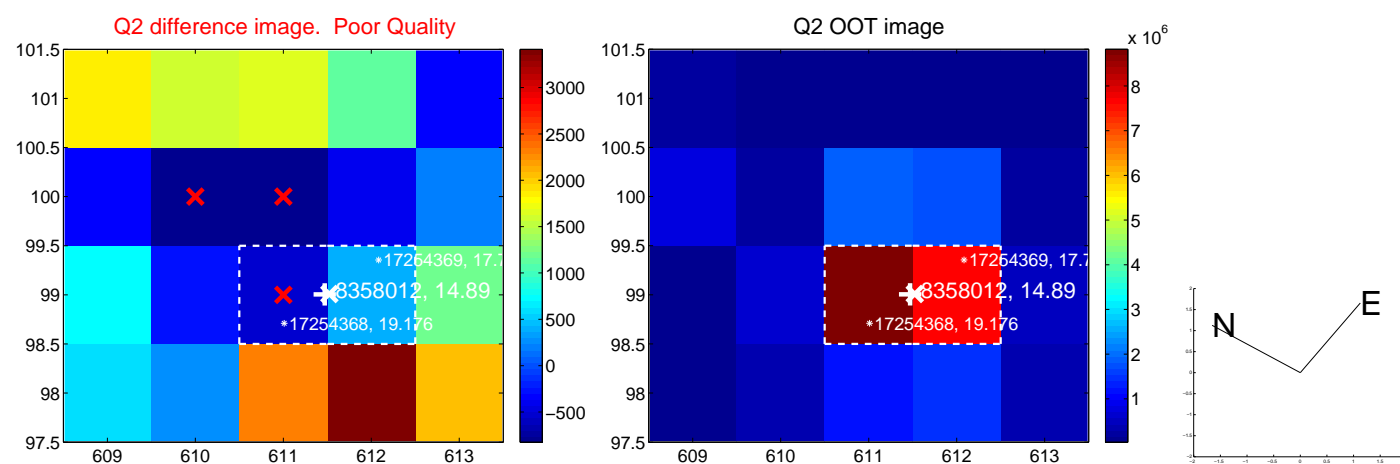
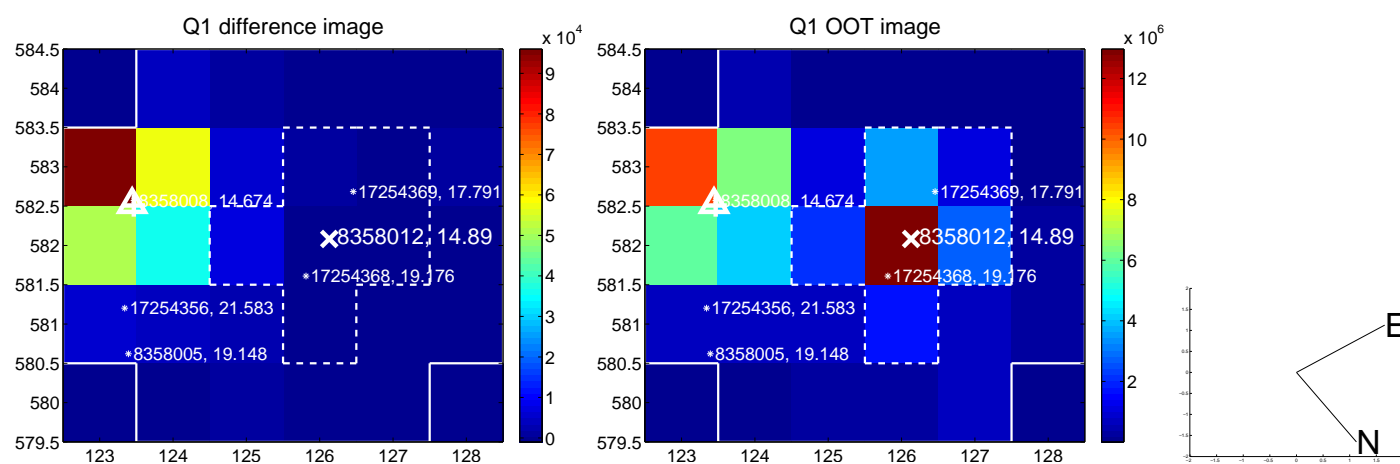
The OOT PRF centroid is offset from the target star catalog position by about 10.65 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.061 \pm 0.867$	0.07	$-0.054 \pm 0.710$	$-0.027 \pm 1.251$
PRF-fit source offset from KIC position	$10.779 \pm 1.462$	7.37	$-7.838 \pm 0.491$	$-7.398 \pm 1.681$
photometric centroid source offset	$24.97 \pm 0.70$	35.64	$-11.04 \pm 0.67$	$-22.40 \pm 0.71$

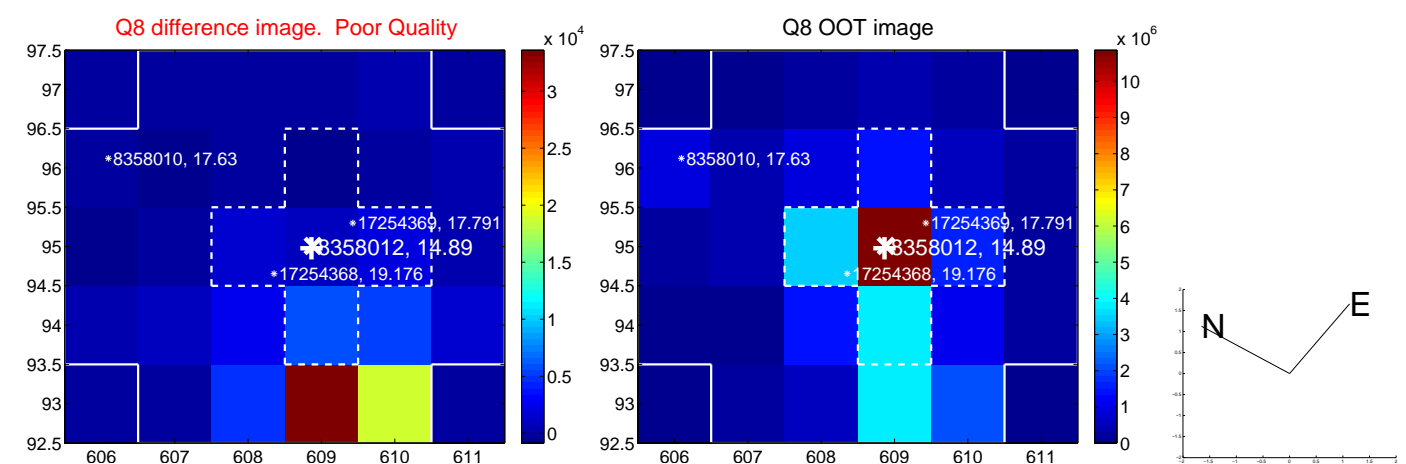
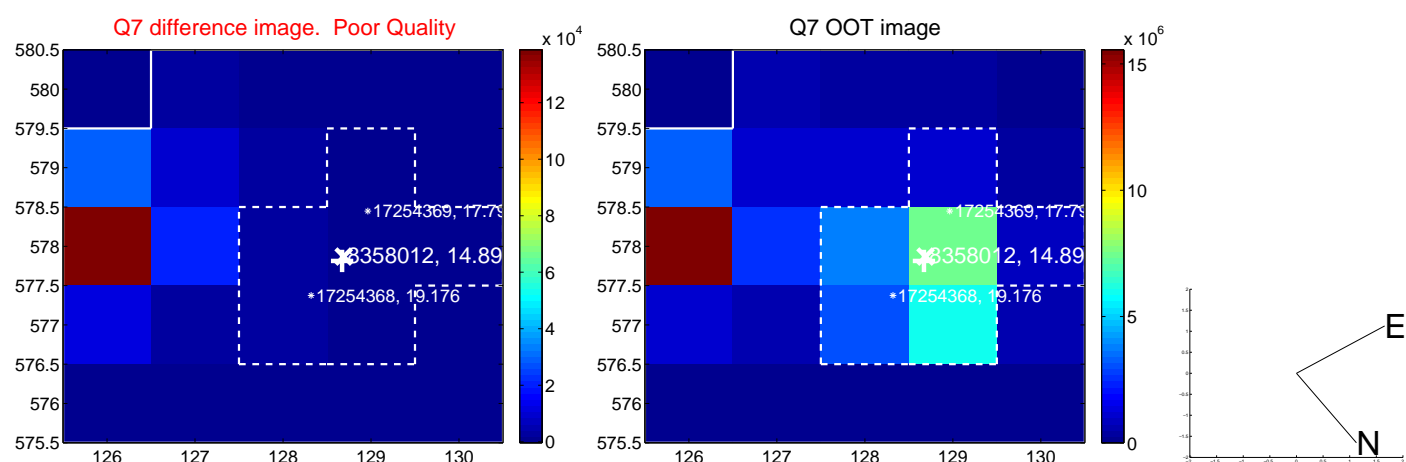
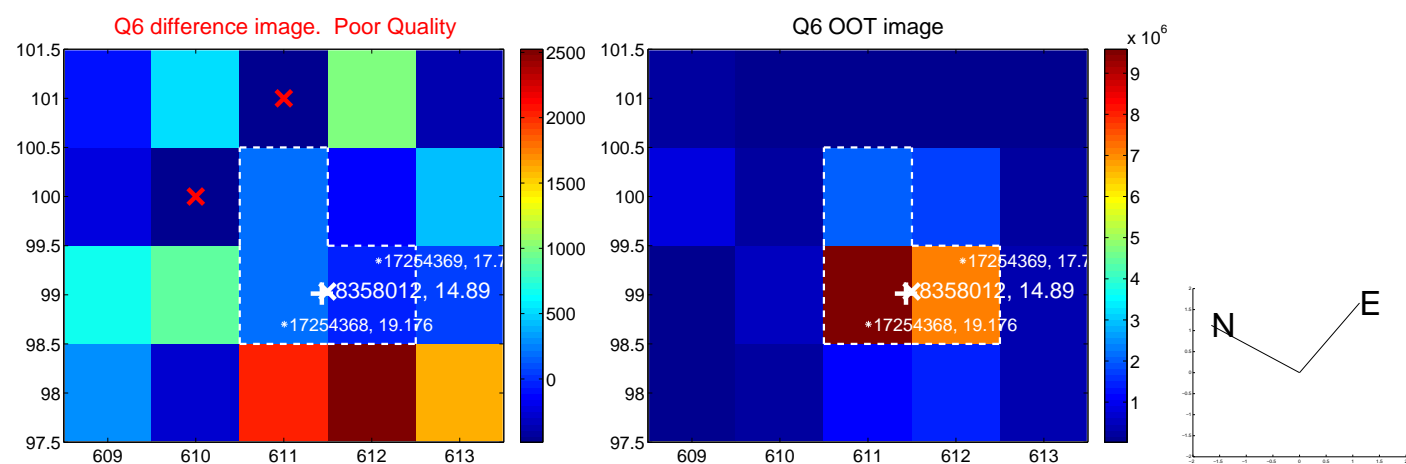
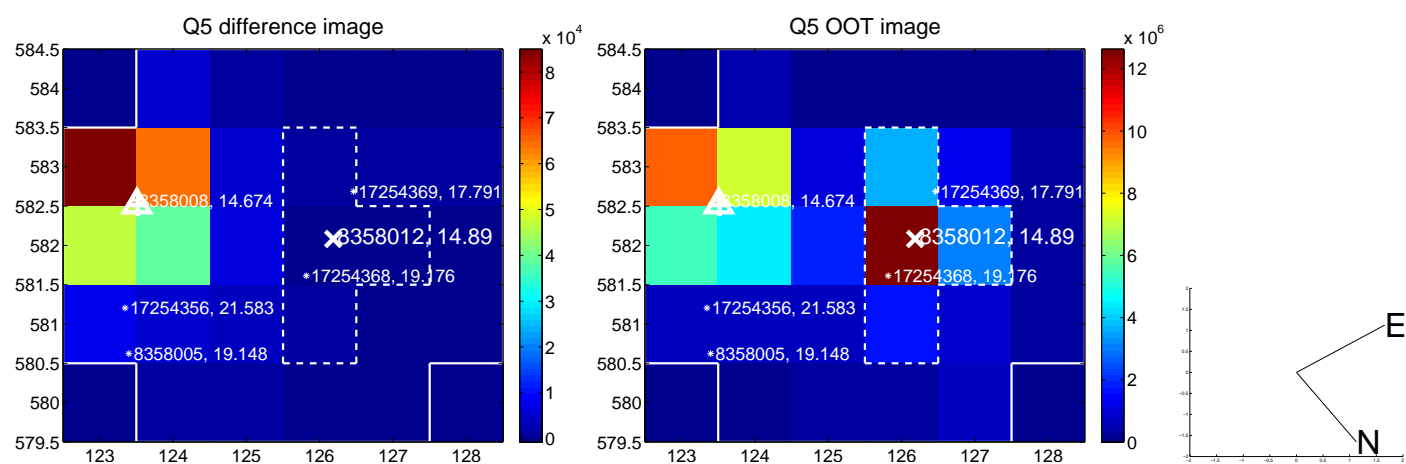


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

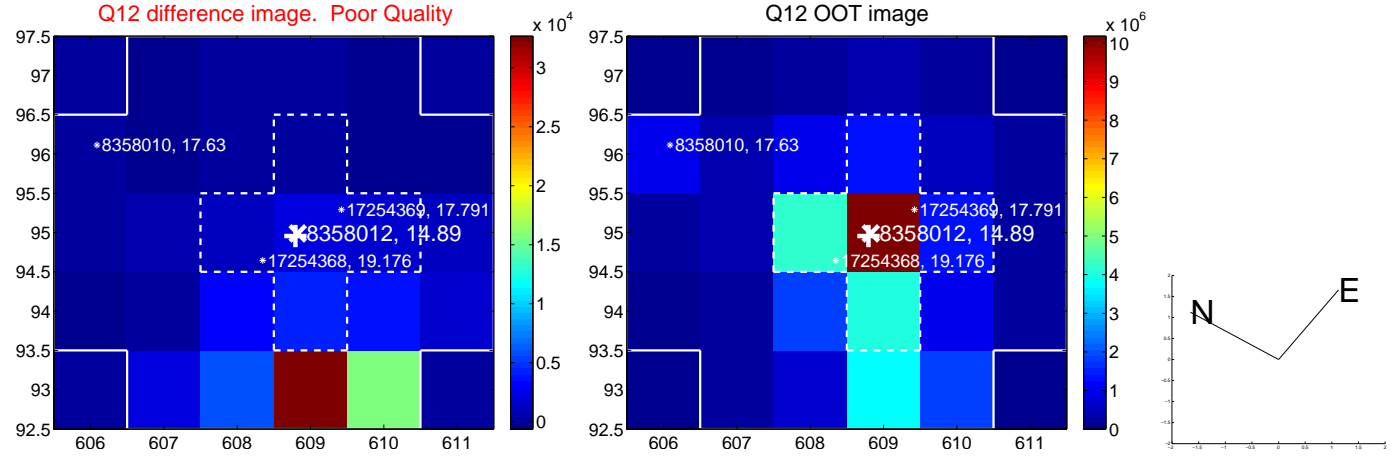
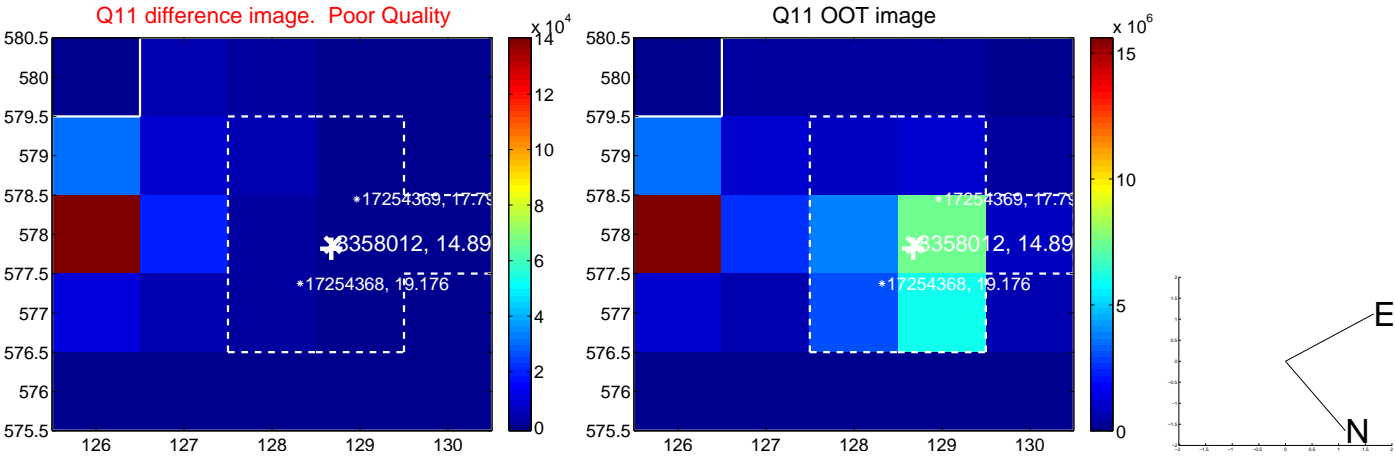
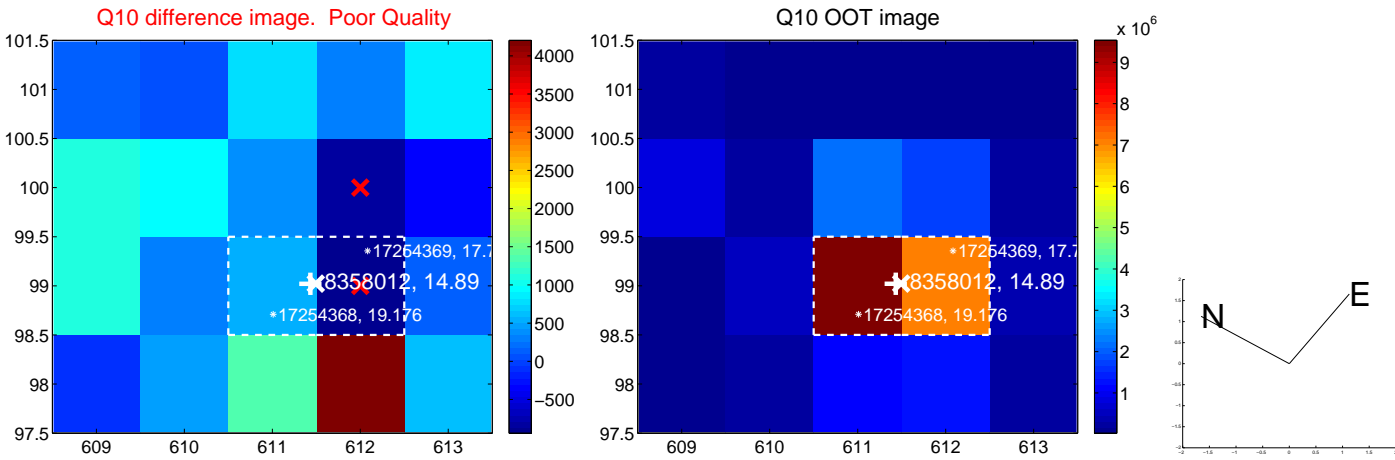
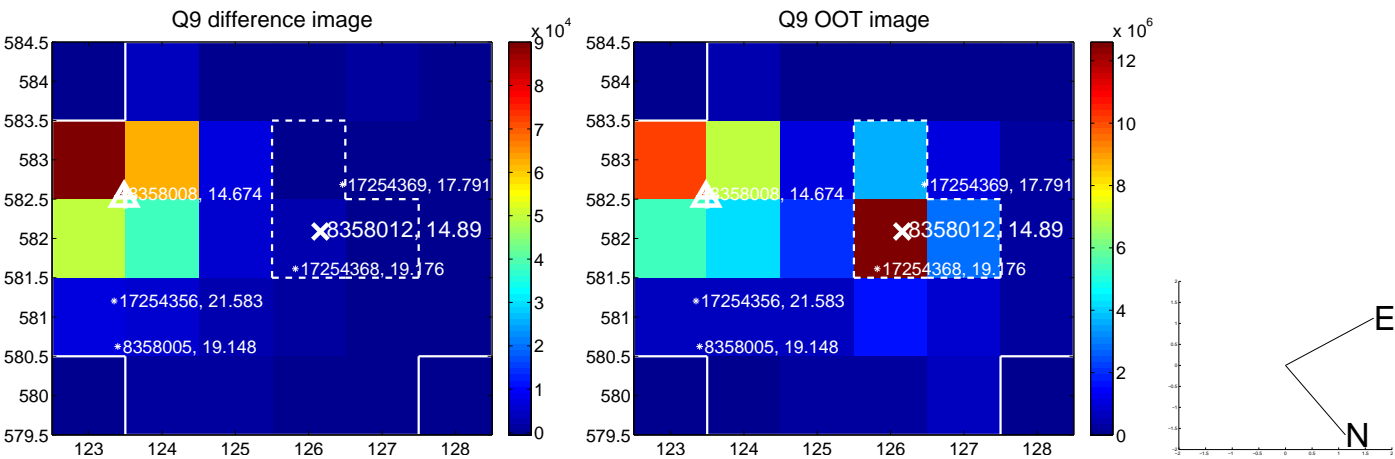
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



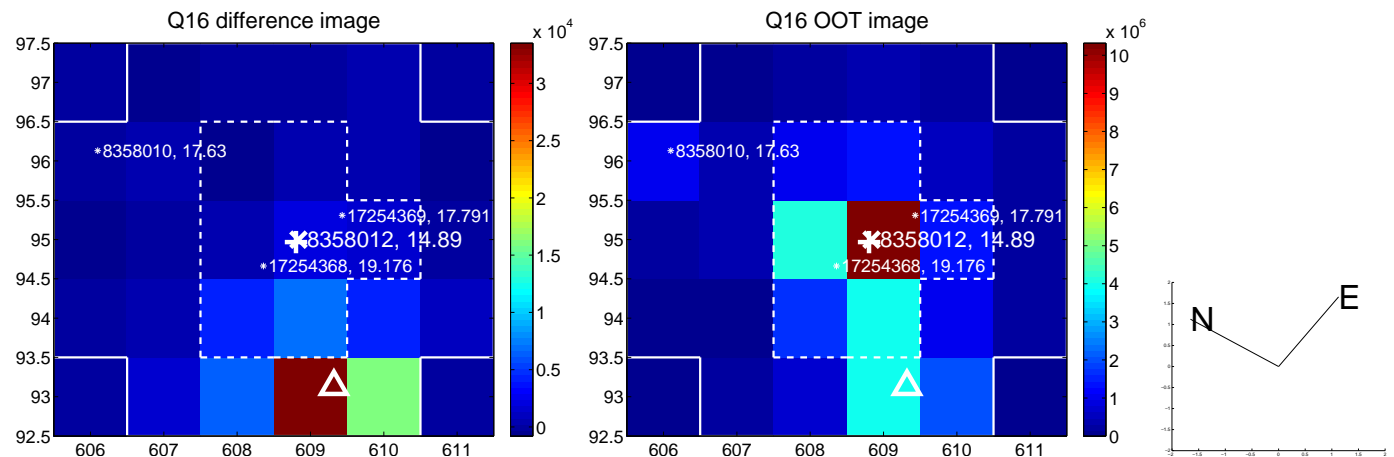
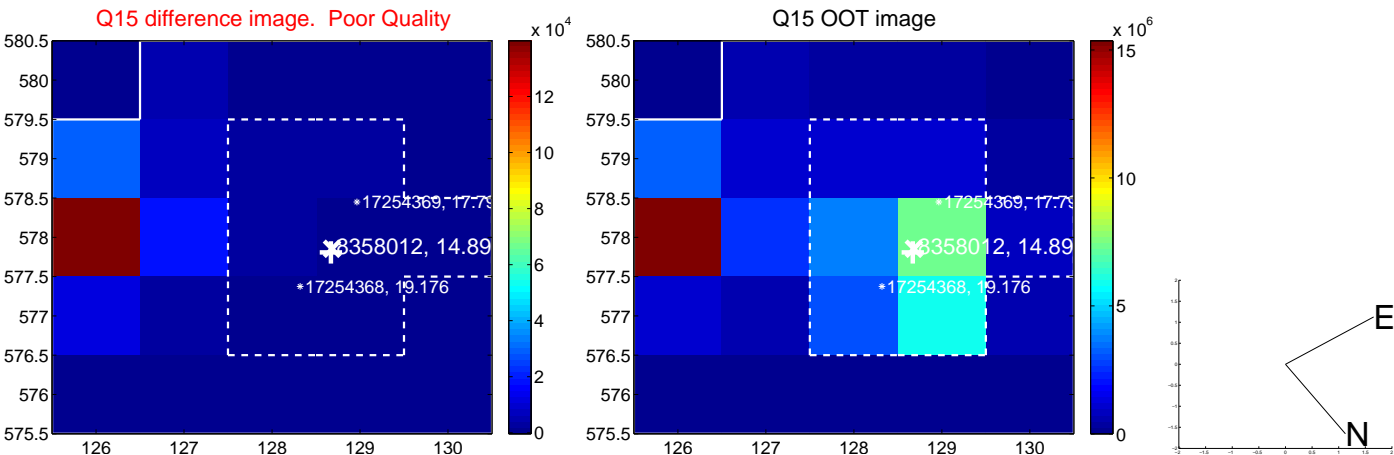
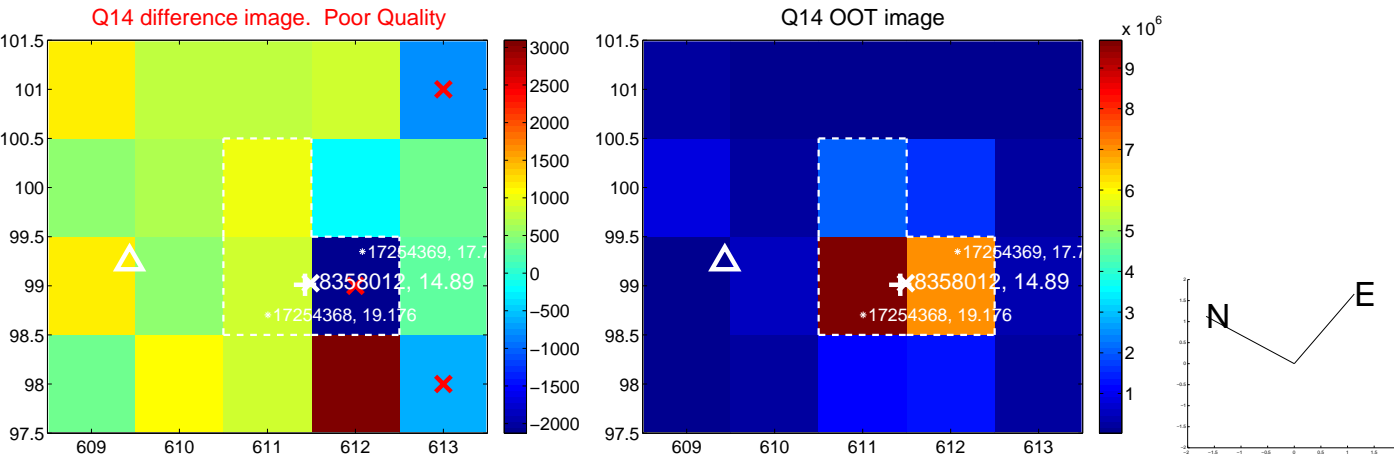
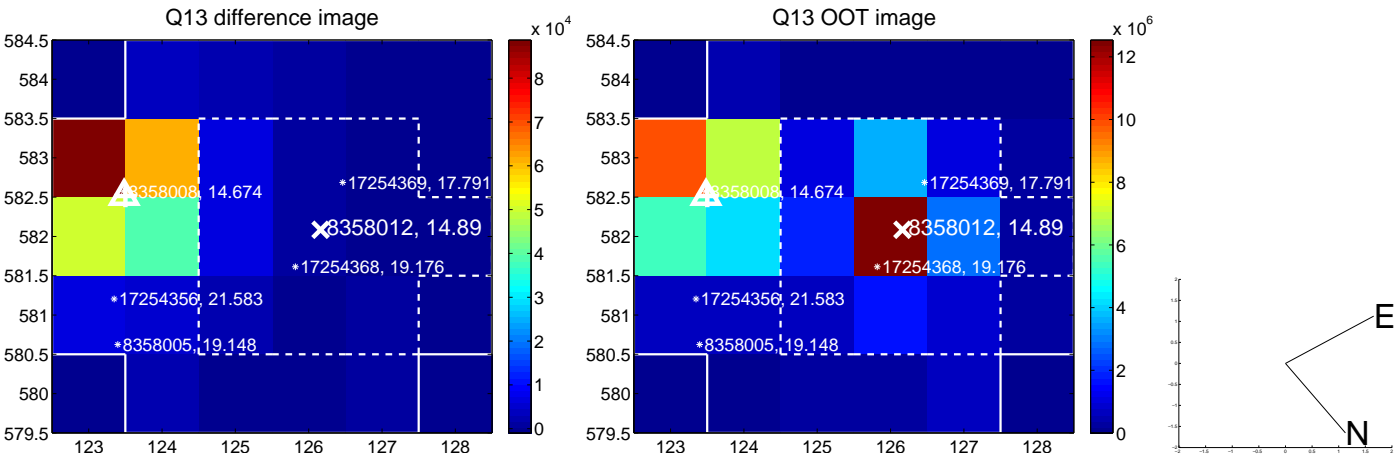
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

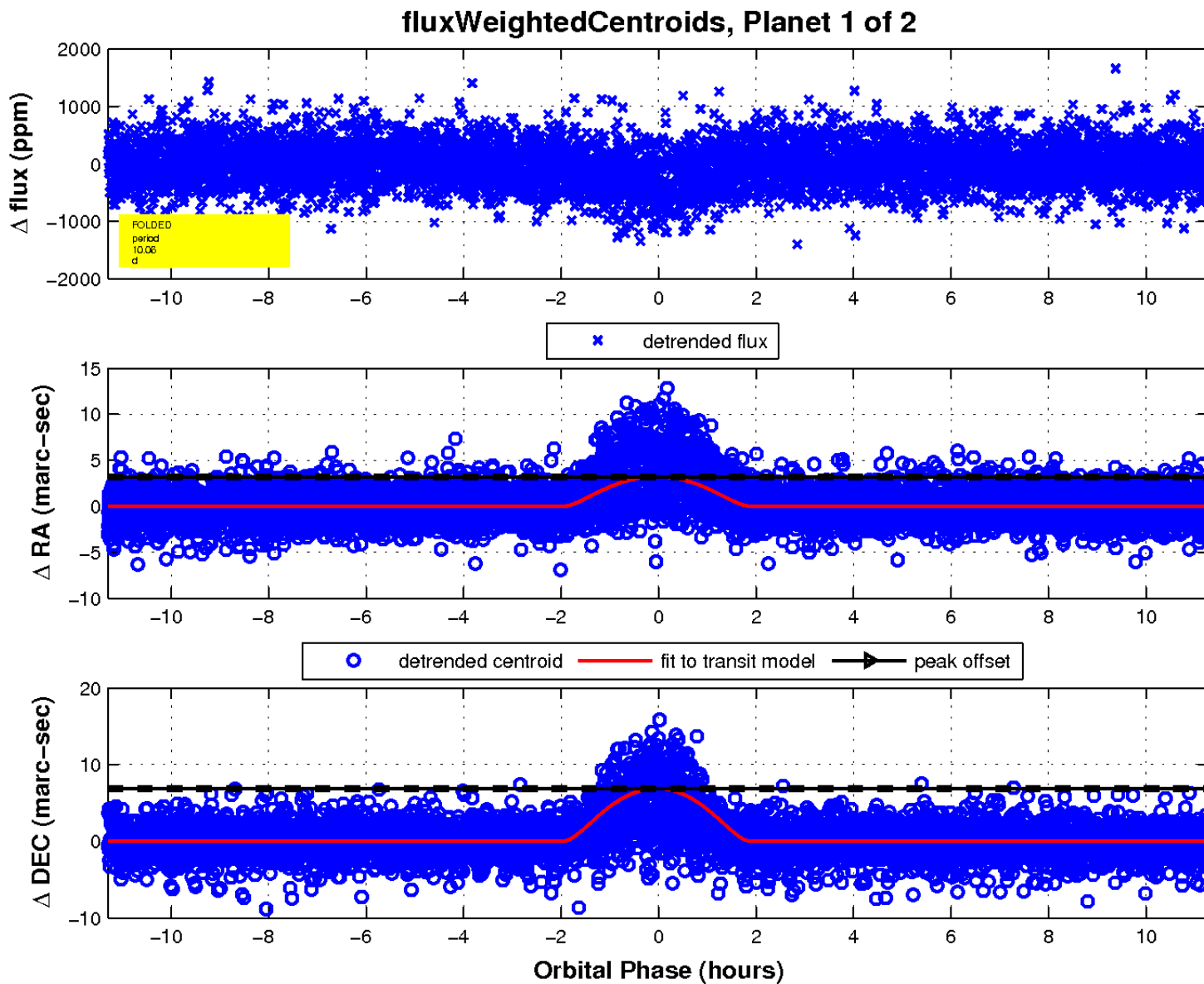
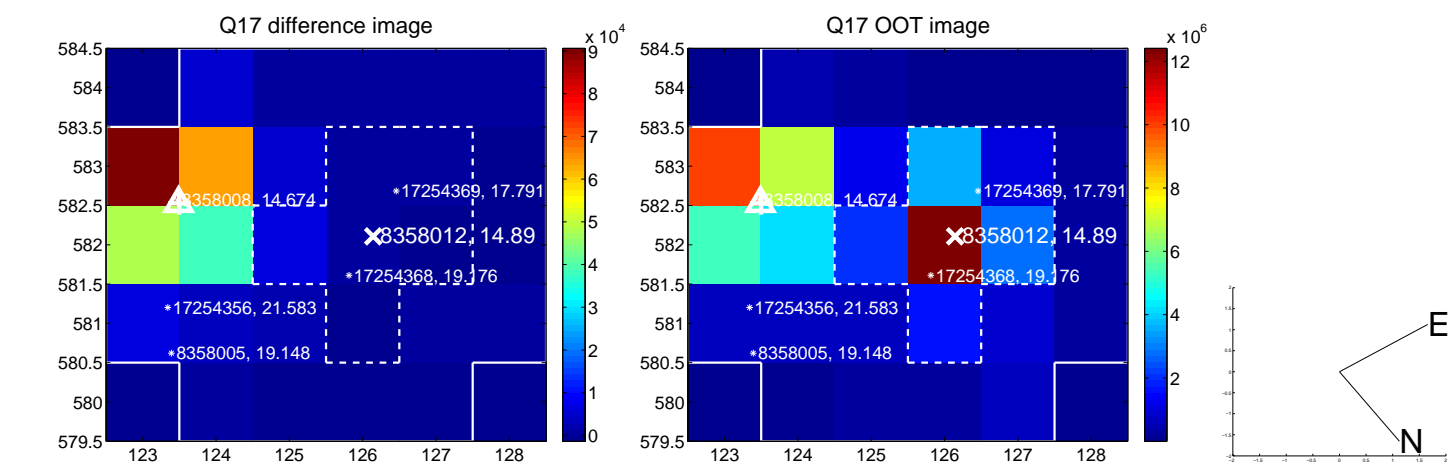


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



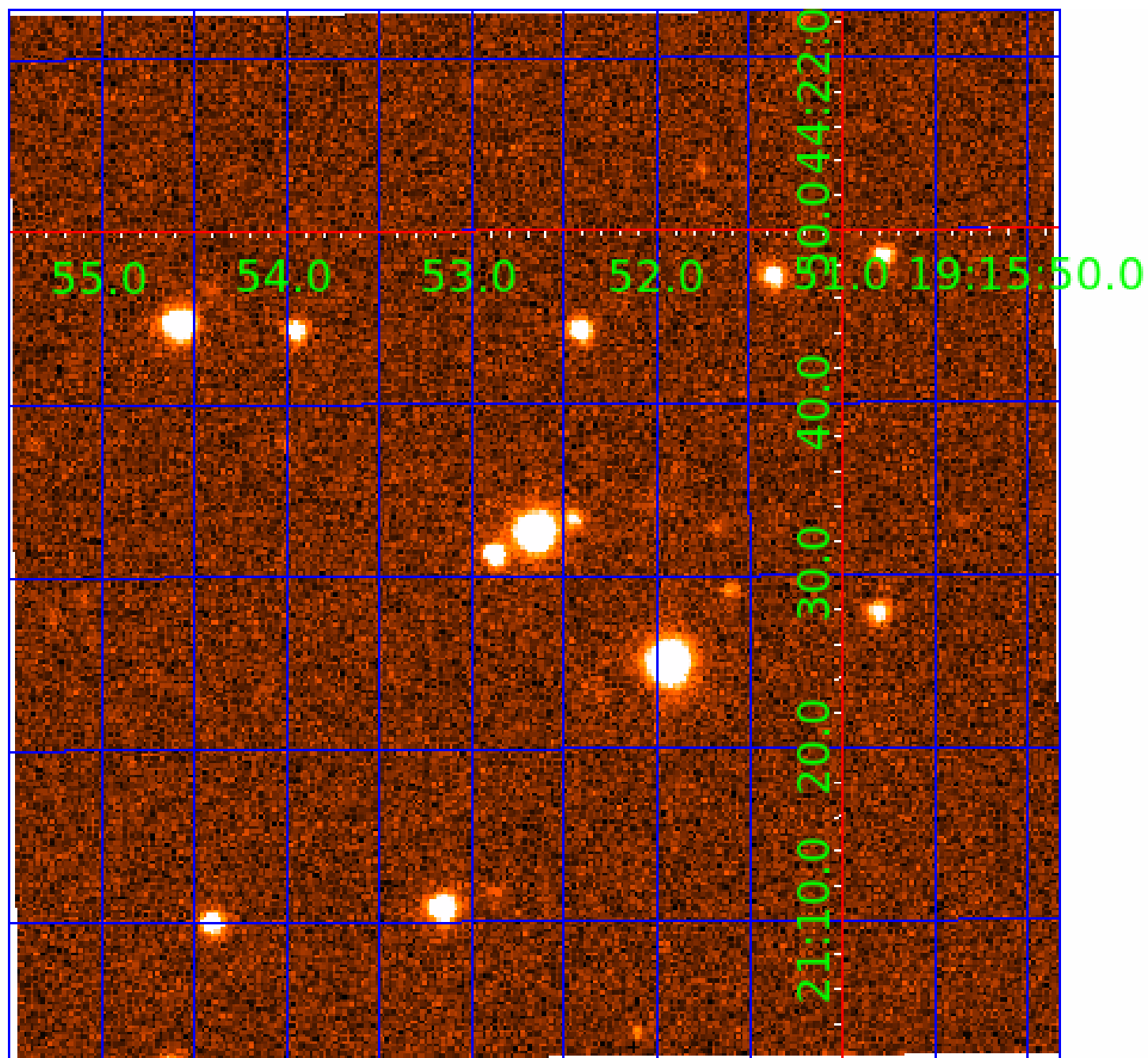


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008358012

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008358012-01	OBS	2929.01	10.064721	135.250490	313.3	3.768	15.1	16.4	0.82	5438	2.43	66.91
008358012-02	OBS	No	10.064482	140.369726	140.4	3.166	8.3	8.9	0.82	5438	1.08	66.91

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008358012-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
008358012-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH

**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 008358012-02

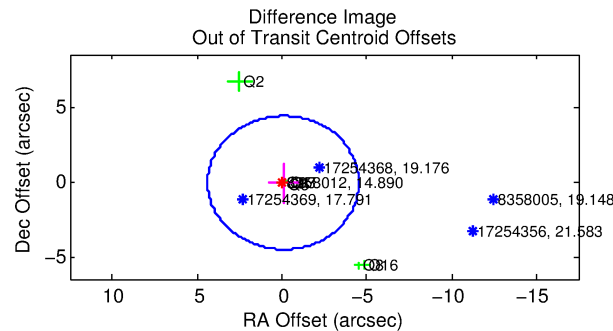
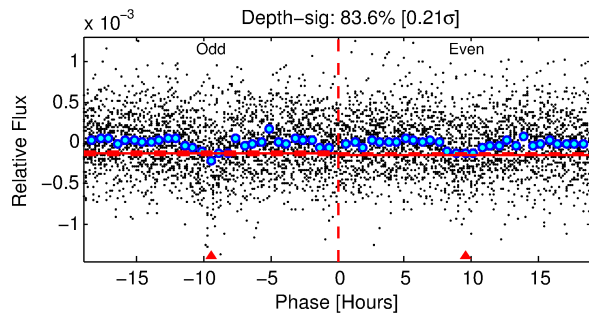
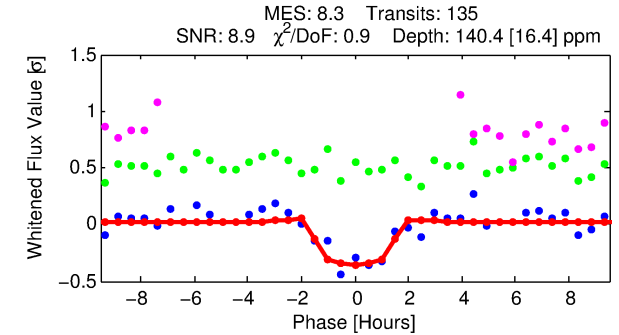
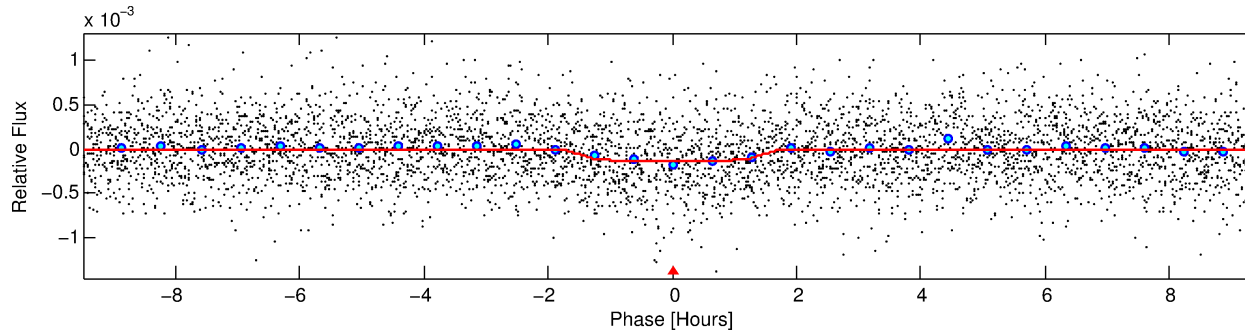
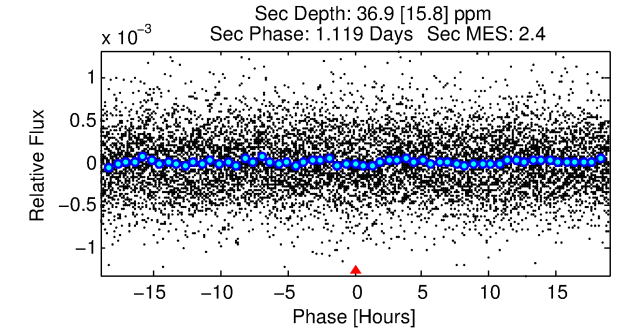
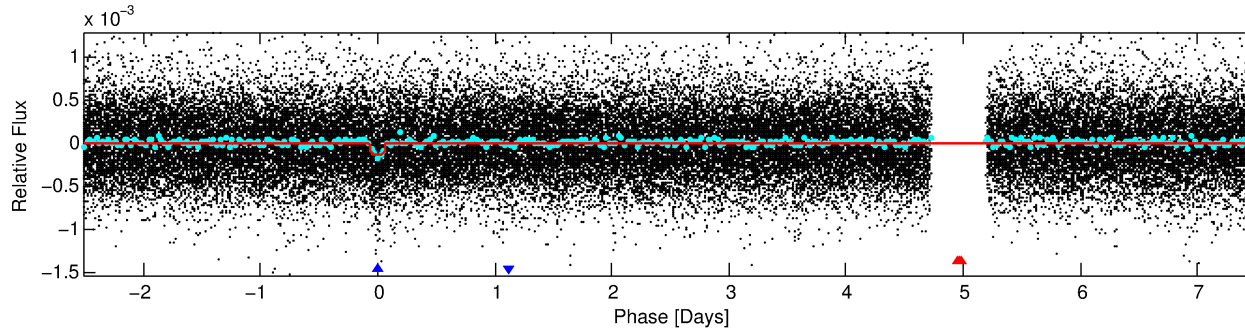
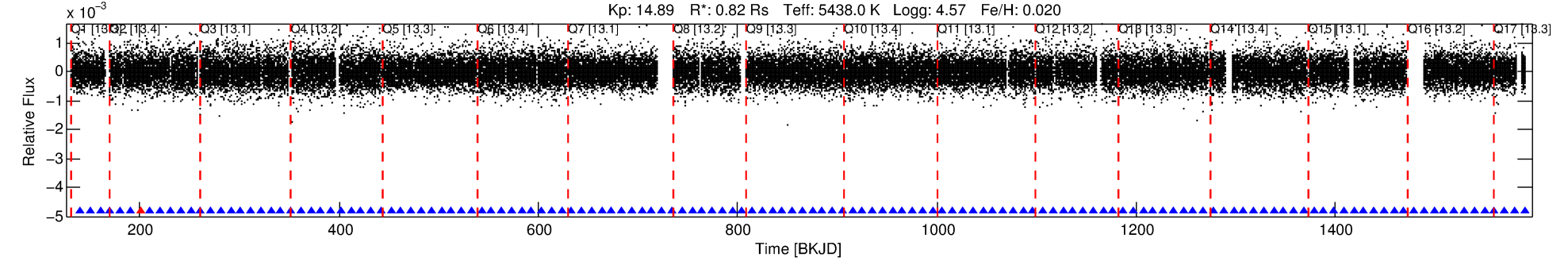
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
008358012-02	8358012	008358008-02	8358008	1:1	10.9	3	0	14.67	14.89	37.96	Direct-PRF	0	0.81	0.65

**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  and  $\sigma_T$  are the significance of the match in period and epoch. For a match to be considered significant  $\sigma_P < 5.0$  and  $\sigma_T < 5.0$ . Matches which have  $\sigma_P$  and  $\sigma_T$  very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

# DV One-Page Summary

KIC: 8358012 Candidate: 2 of 2 Period: 10.064 d  
KOI: K02929 Corr: No Ephemeris Match

Kp: 14.89 R\*: 0.82 Rs Teff: 5438.0 K Logg: 4.57 Fe/H: 0.020



## DV Fit Results:

Period = 10.06448 [0.00009] d  
Epoch = 140.3697 [0.0075] BKJD  
Rp/R\* = 0.0120 [0.0115]  
a/R\* = 15.48 [59.77]  
b = 0.79 [1.91]  
Seff = 66.91 [17.45]  
Teq = 729 [48] K  
Rp = 1.08 [1.04] Re  
a = 0.0887 [0.0140] AU  
Ag = 138.03 [271.76] [0.50σ]  
Teffp = 3865 [1893] K [1.66σ]

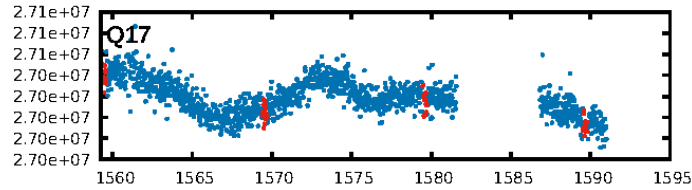
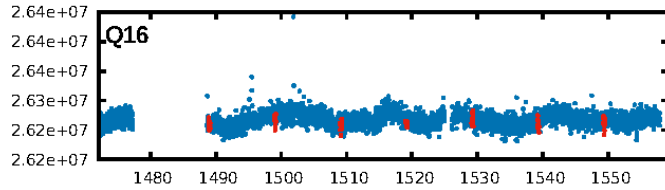
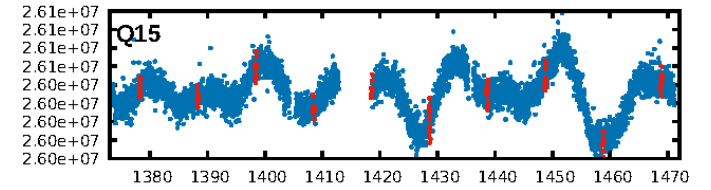
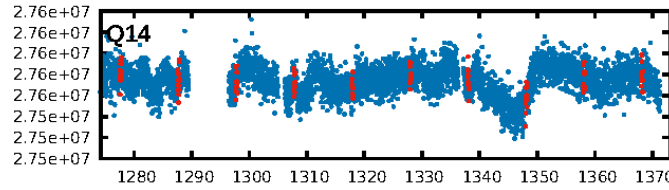
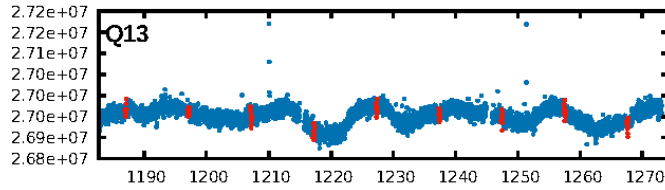
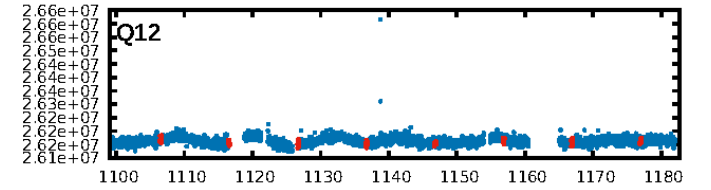
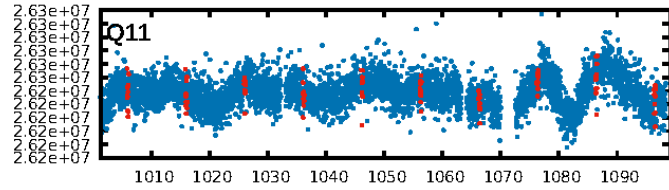
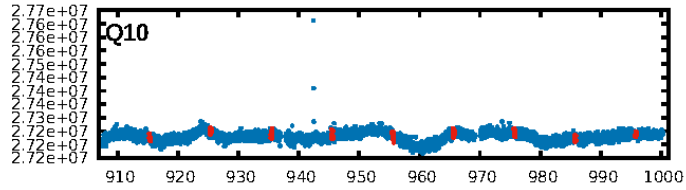
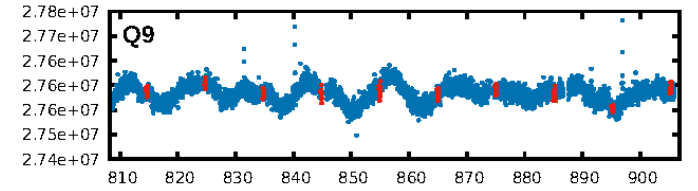
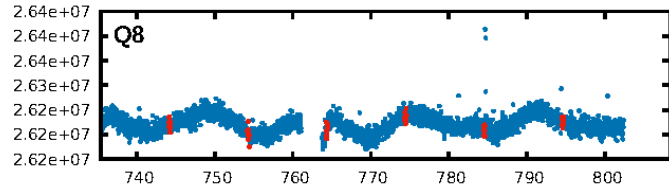
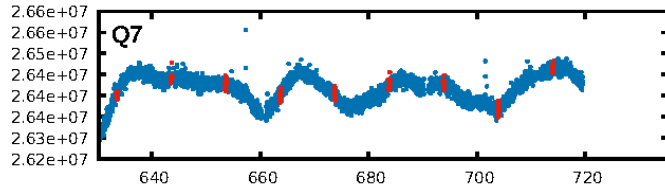
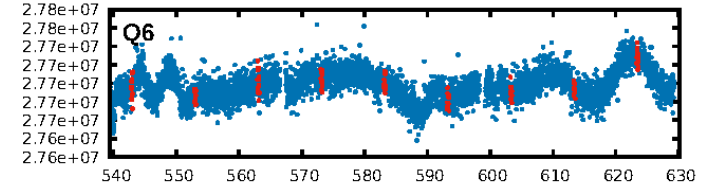
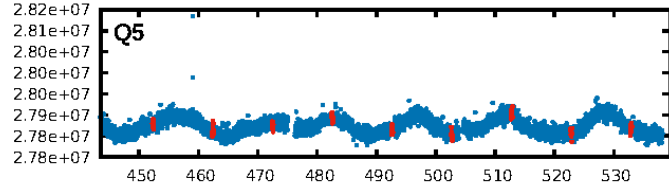
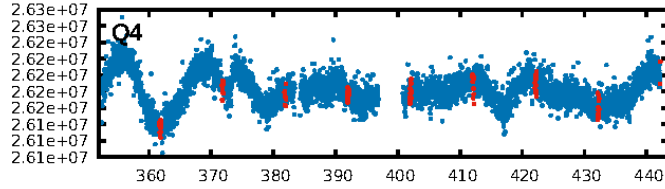
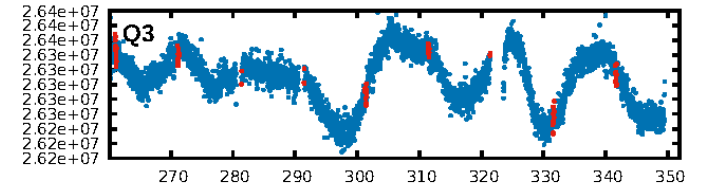
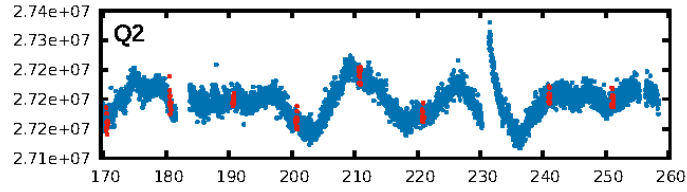
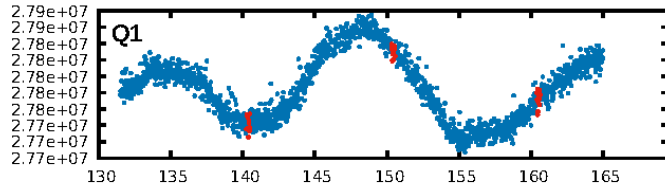
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.1% [0.00σ]  
ModelChiSquare2-sig: 92.7%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 4.44e-16  
RollingBand-fgt: 0.99 [127/128]  
GhostDiagnostic-chr: -0.1373  
Centroid-sig: 0.0%  
Centroid-so: 19.320 arcsec [14.58σ]  
OotOffset-rm: 0.112 arcsec [0.08σ]  
OotOffset-st: 1/0/2/5 [8]  
KicOffset-rm: 10.804 arcsec [6.23σ]  
KicOffset-st: 1/0/2/5 [8]  
DiffImageQuality-fgm: 0.88 [7/8]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 22:01:47 Z

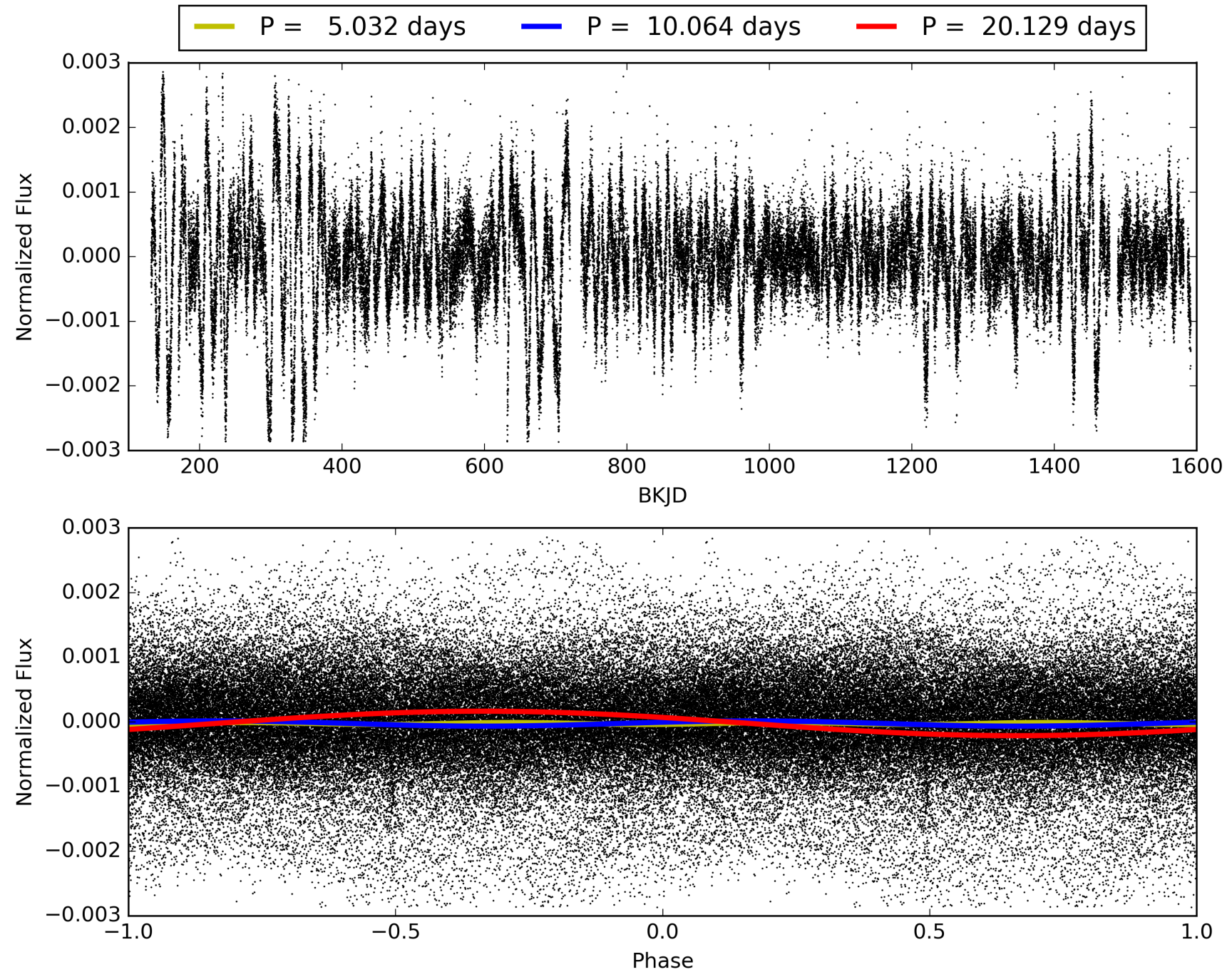
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008358012-02, PDC Light Curves



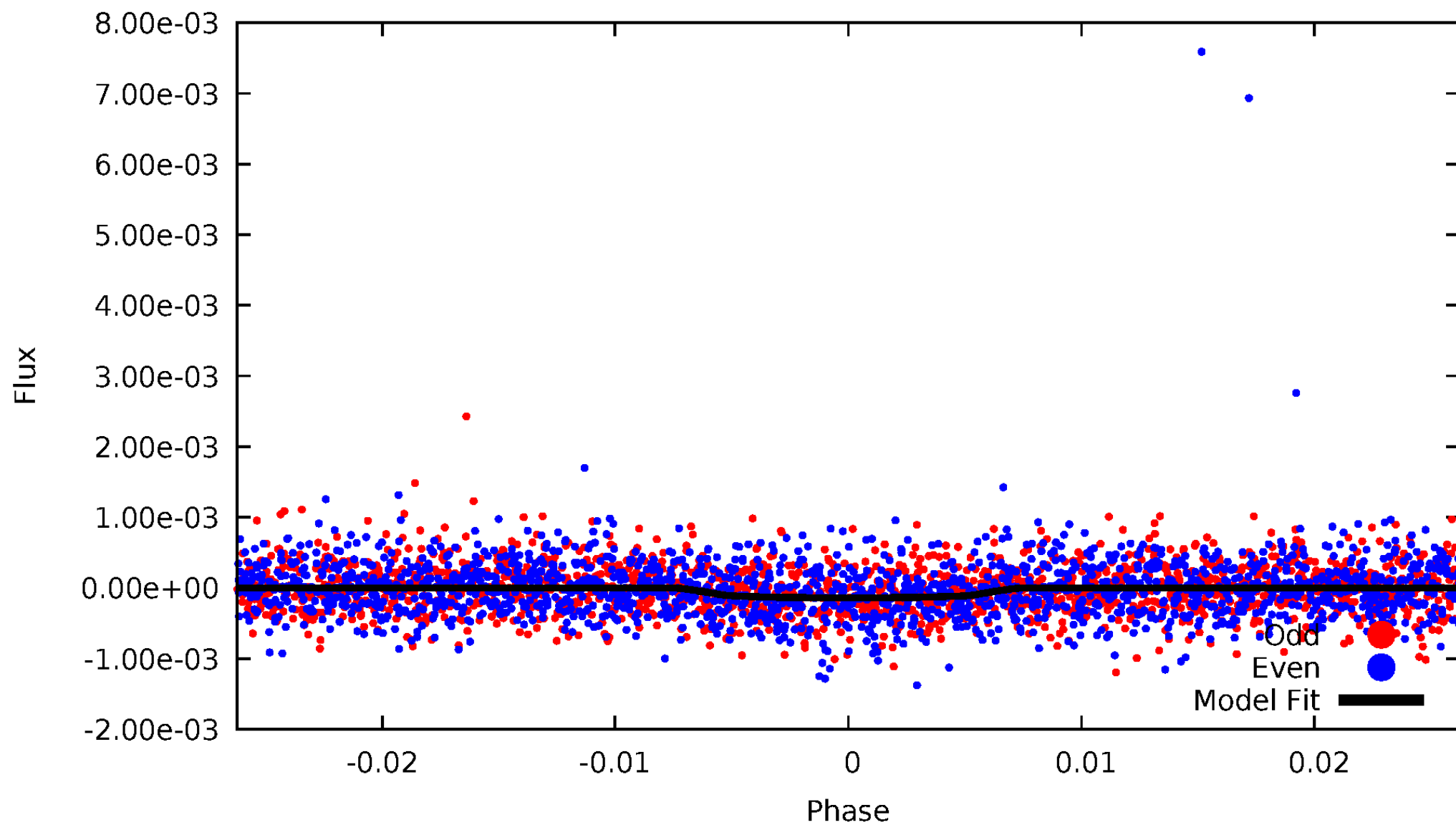


# TCE 008358012-02



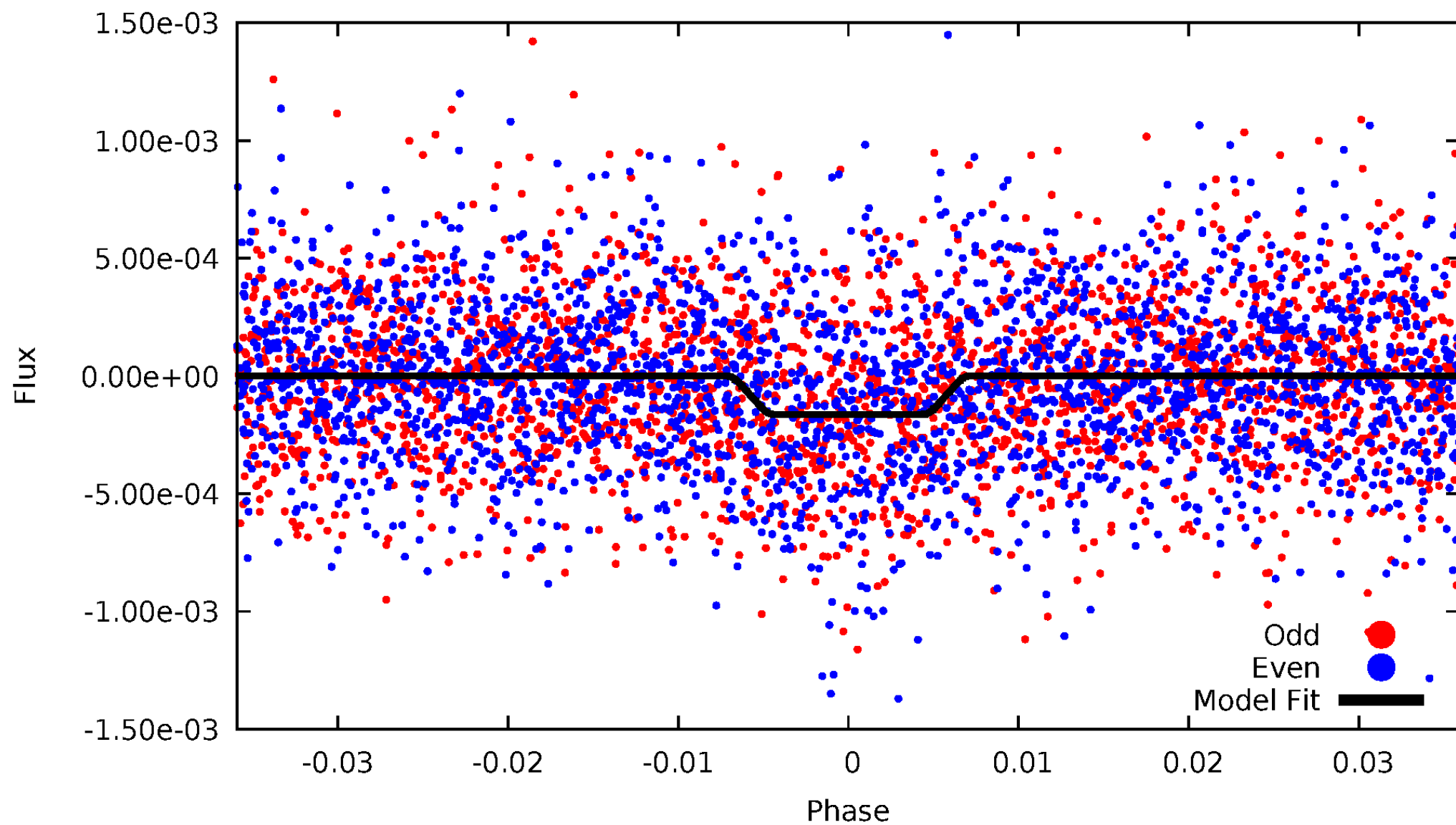
# DV Odd/Even

TCE 008358012-02



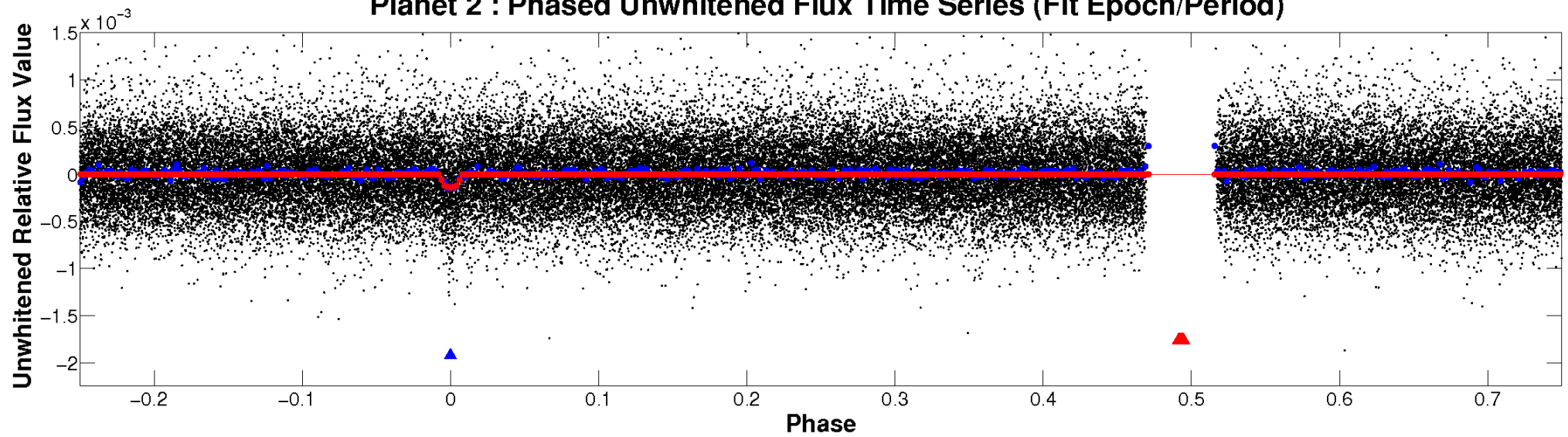
# ALT Odd/Even

TCE 008358012-02

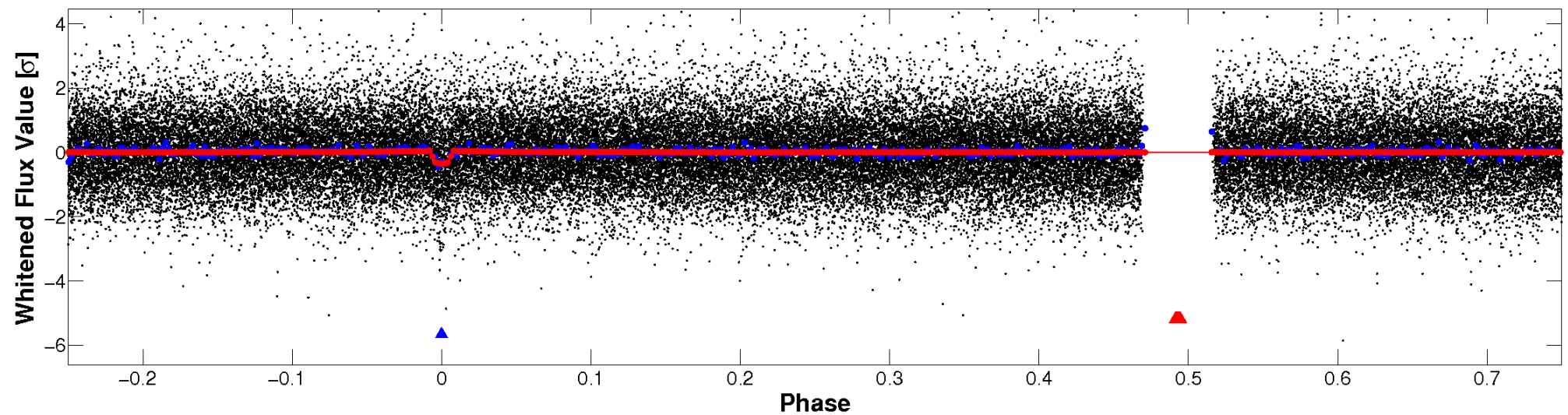


# Non-Whitened Vs. Whitened Light Curve

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

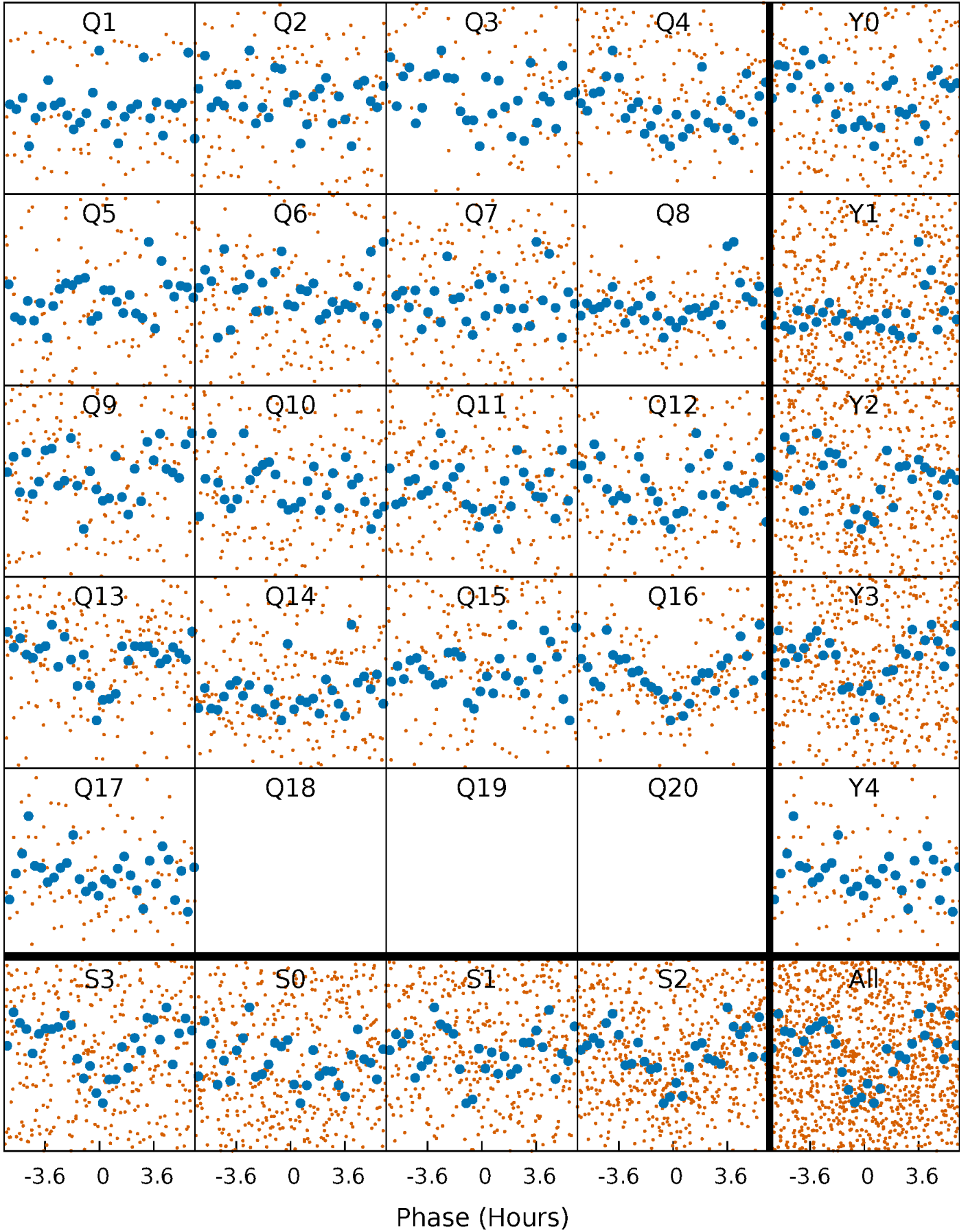


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

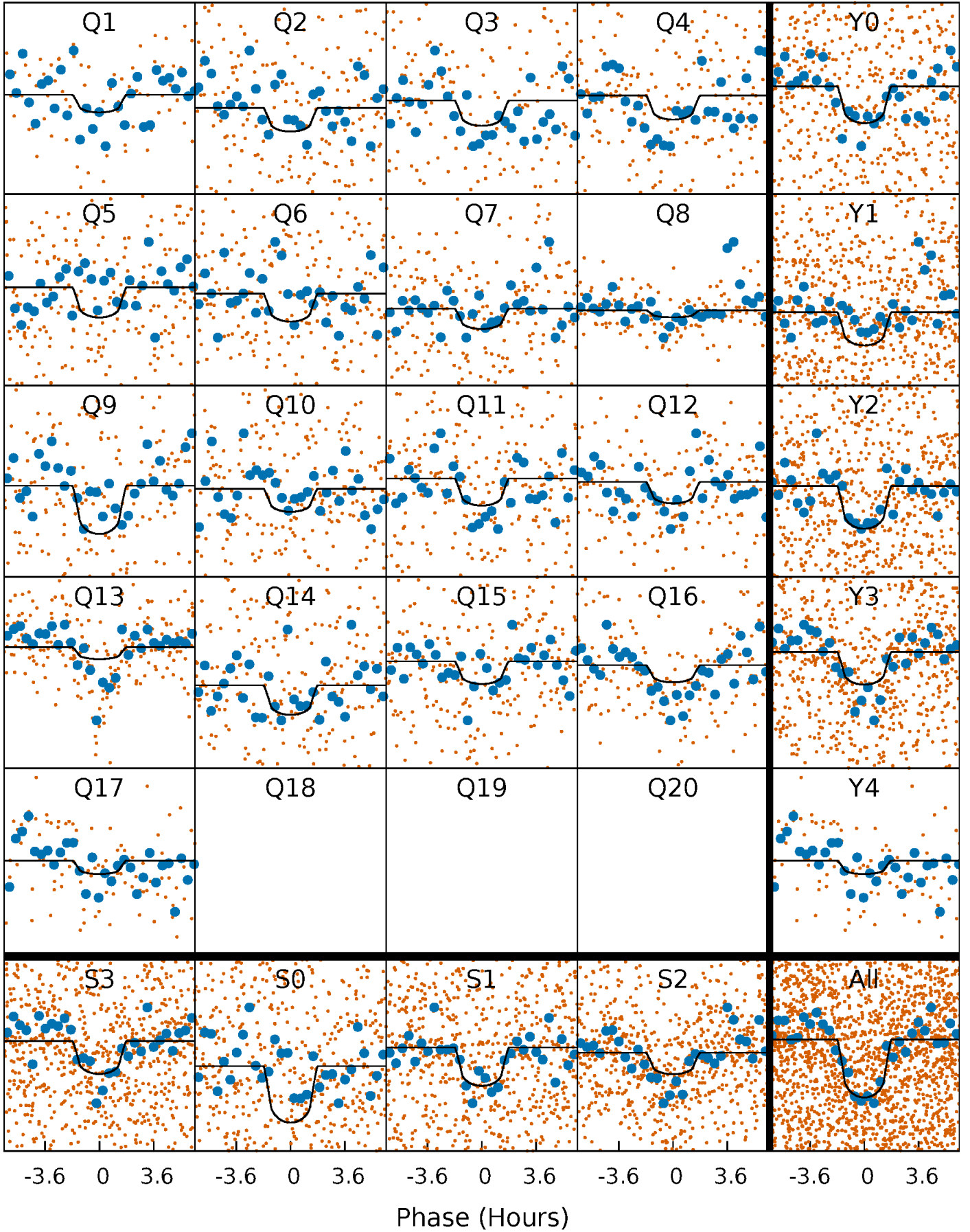
TCE 008358012-02   P= 10.064482 Days    $T_0=140.369726$  (BKJD)





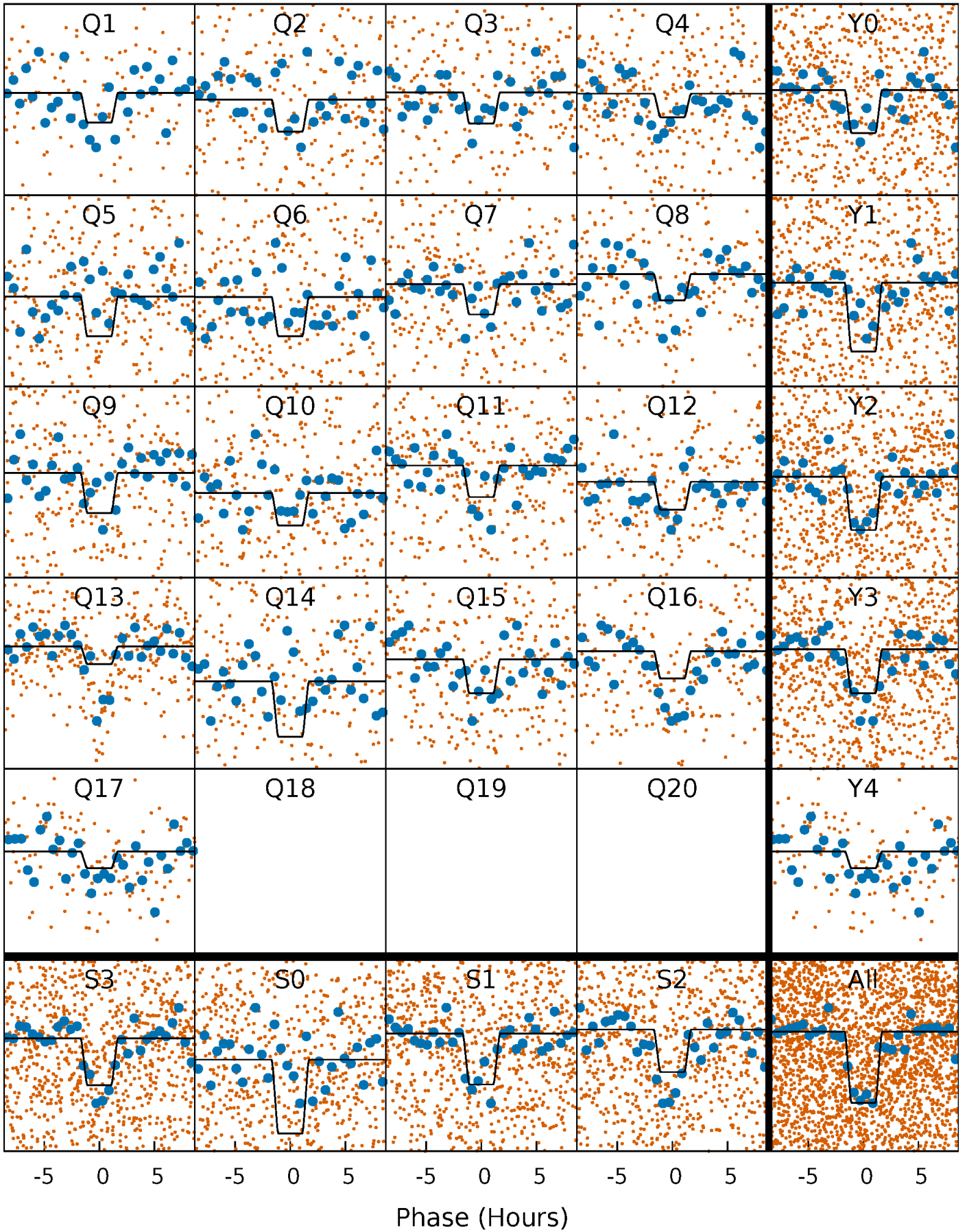
# DV Quarter-Phased Transit Curves

TCE 008358012-02 P= 10.064482 Days  $T_0=140.369726$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

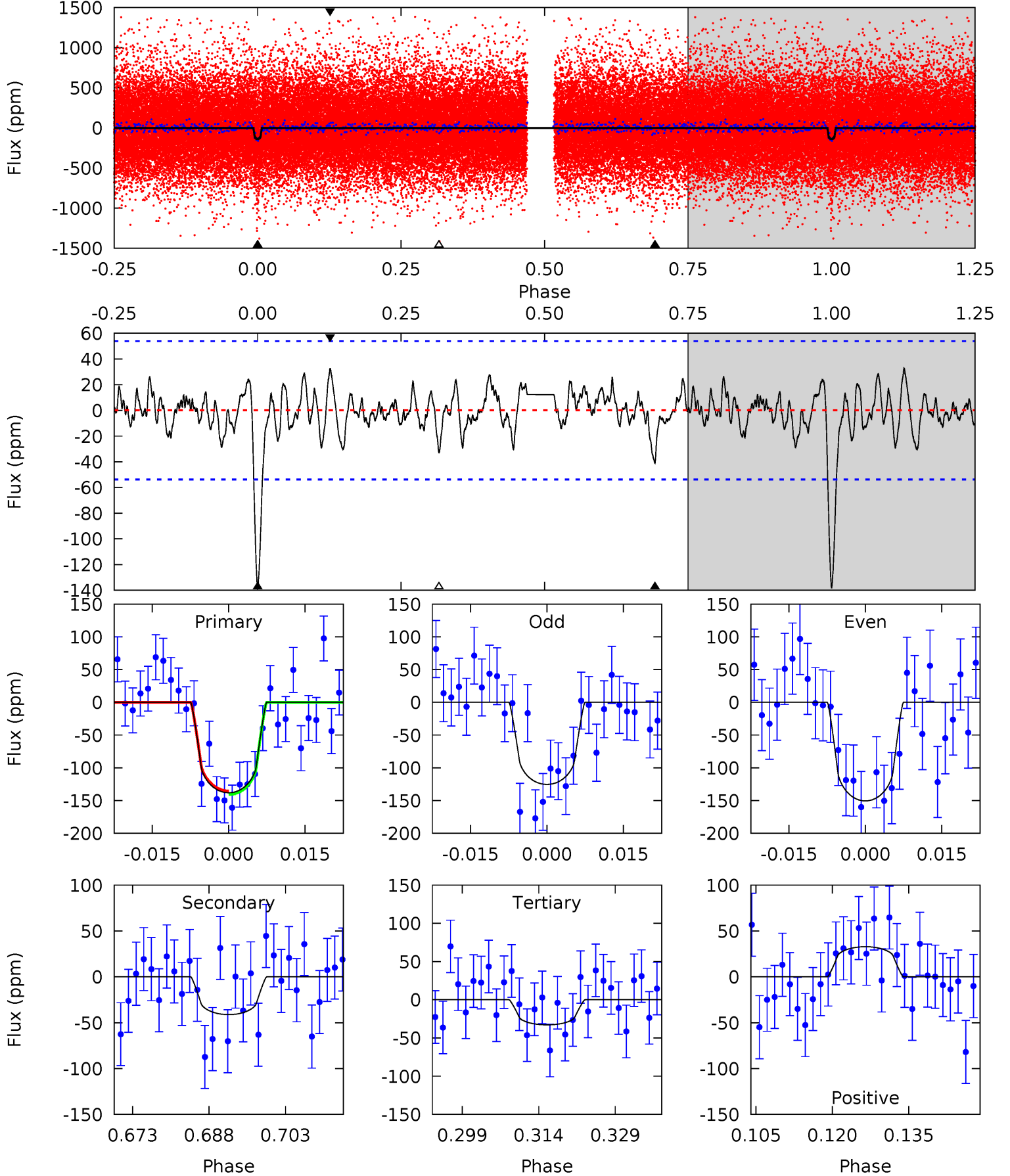
TCE 008358012-02 P= 10.064352 Days  $T_0=140.384225$  (BKJD)



# DV Model-Shift Uniqueness Test

008358012-02, P = 10.064482 Days, E = 130.305244 Days

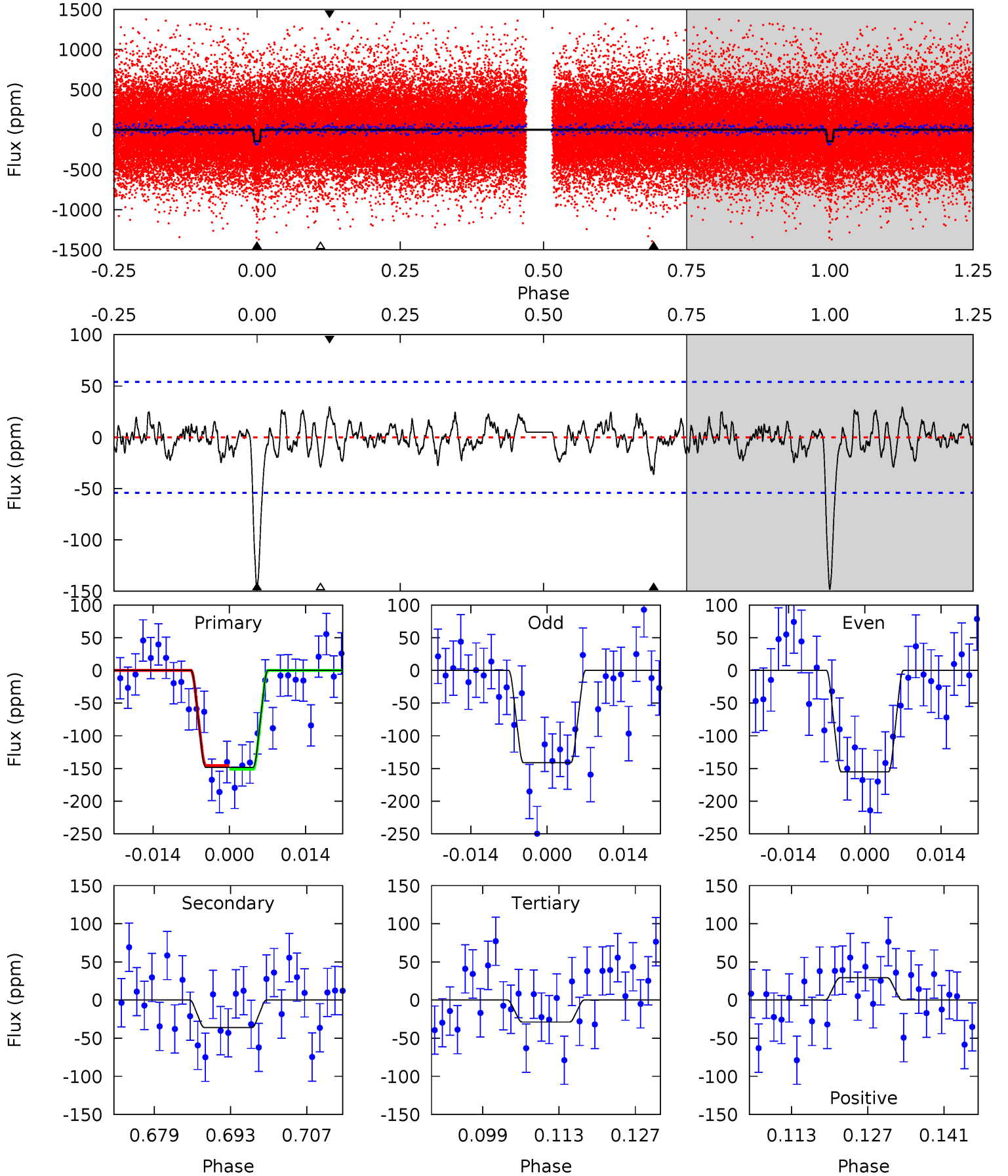
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.7	3.79	3.02	3.02	4.95	2.43	1.11	9.67	9.68	0.77	0.77	1.16	1.49	0.19	0.24



# Alt Model-Shift Uniqueness Test

008358012-02,  $P = 10.064352$  Days,  $E = 130.319873$  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
13.6	3.31	2.65	2.68	4.96	2.45	0.99	11.0	10.9	0.66	0.62	0.63	1.14	0.16	0.27



### Stellar Parameters For KIC 008358012

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5438^{+163}_{-163}$	$4.574^{+0.032}_{-0.128}$	$0.020^{+0.250}_{-0.300}$	$0.820^{+0.151}_{-0.065}$	$0.920^{+0.065}_{-0.101}$	$2.346^{+0.391}_{-0.820}$
	+3%/-3%	+1%/-3%	+1250%/-1500%	+18%/-8%	+7%/-11%	+17%/-35%
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 008358012-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-41 \pm 11$	$1.26^{+1.07}_{-0.77}$	$1036^{+50}_{-41}$	$3978^{+1833}_{-731}$	$106^{+594}_{-77}$
Alt.	$-36 \pm 11$	$1.33^{+0.95}_{-0.82}$	$1036^{+51}_{-42}$	$3832^{+1735}_{-651}$	$86^{+475}_{-60}$

$T_{max}$  = 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

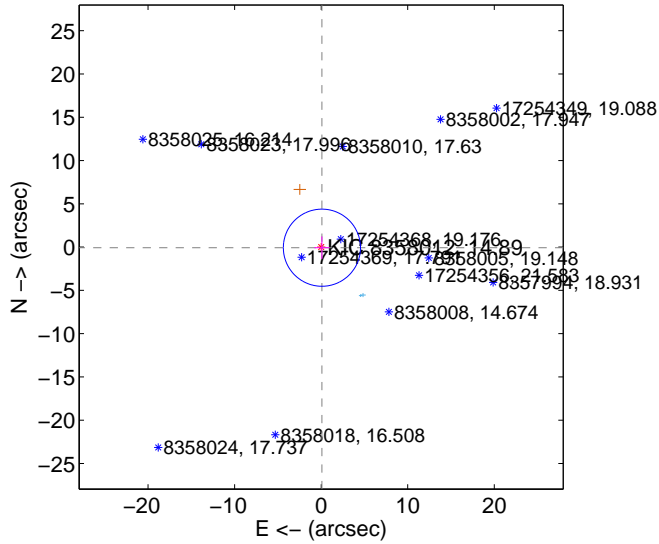
Supplemental centroid analysis for 008358012-02. Kepler magnitude: 14.89. Transit SNR 8.86

There are 7 quarters with good PRF difference image offsets

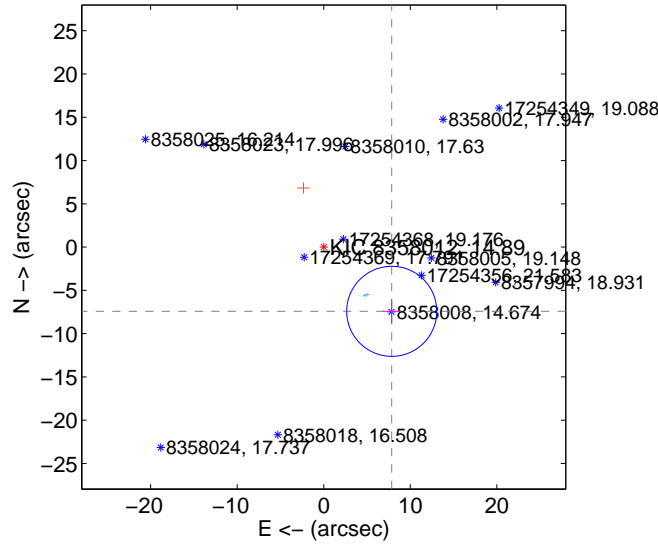
The OOT PRF centroid is offset from the target star catalog position by about 10.65 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.112 \pm 1.485$	0.08	$-0.087 \pm 0.879$	$-0.070 \pm 1.306$
PRF-fit source offset from KIC position	$10.804 \pm 1.734$	6.23	$-7.854 \pm 1.046$	$-7.419 \pm 1.441$
photometric centroid source offset	$19.32 \pm 1.33$	14.58	$-10.31 \pm 1.28$	$-16.34 \pm 1.34$

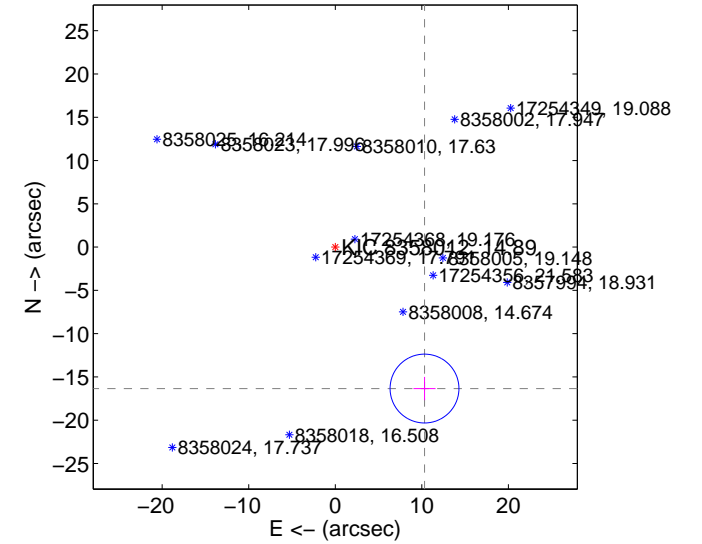
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



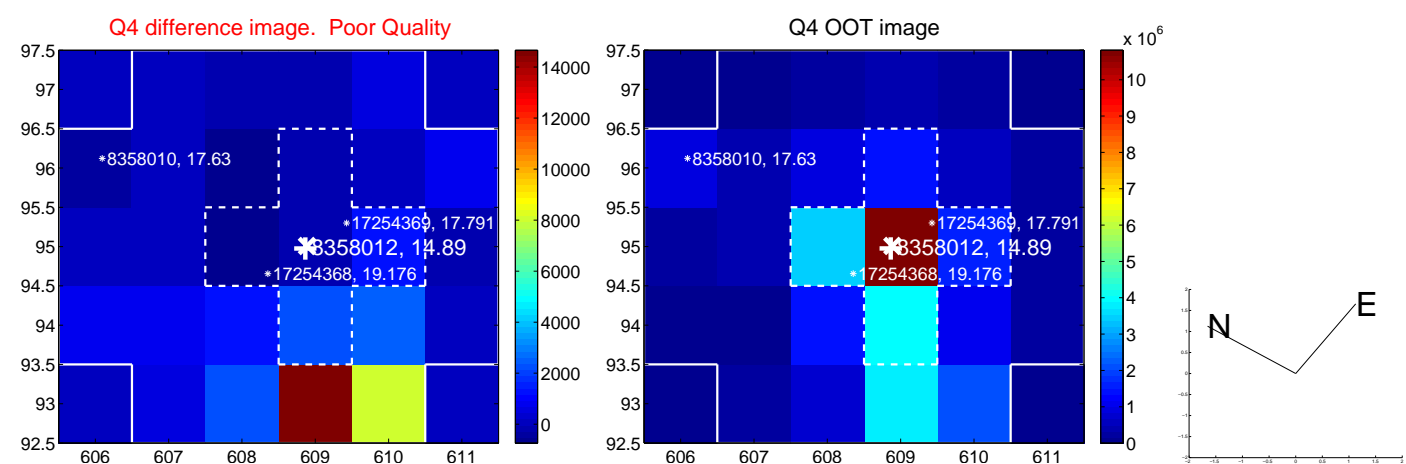
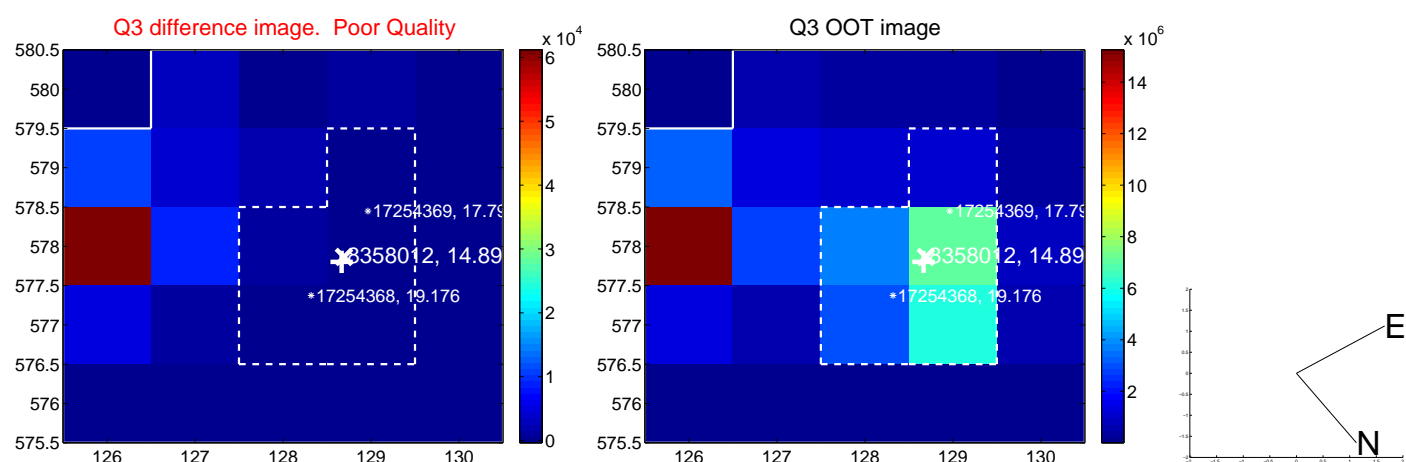
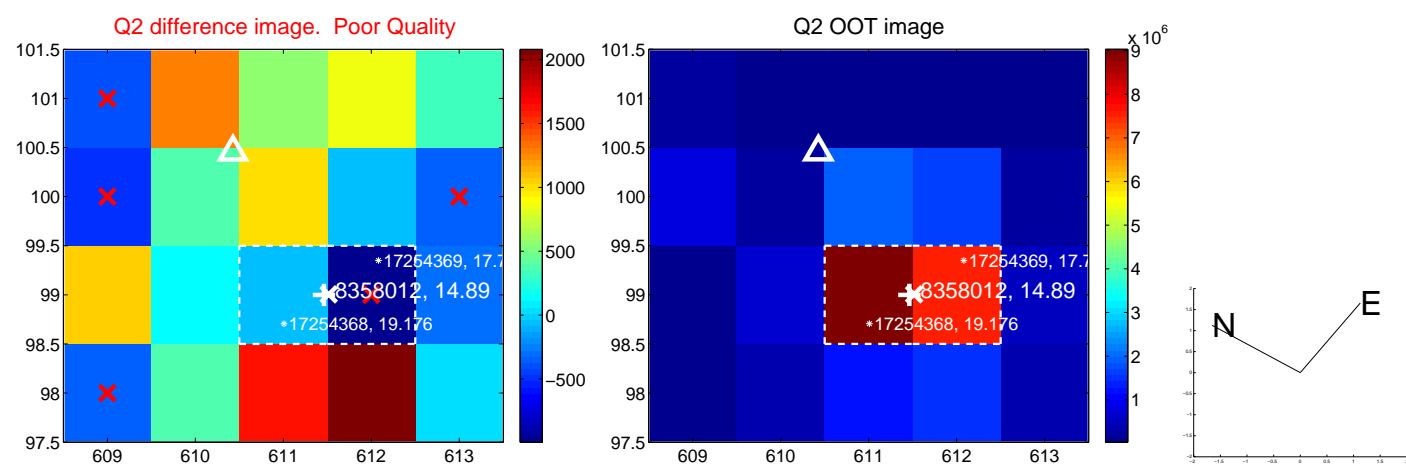
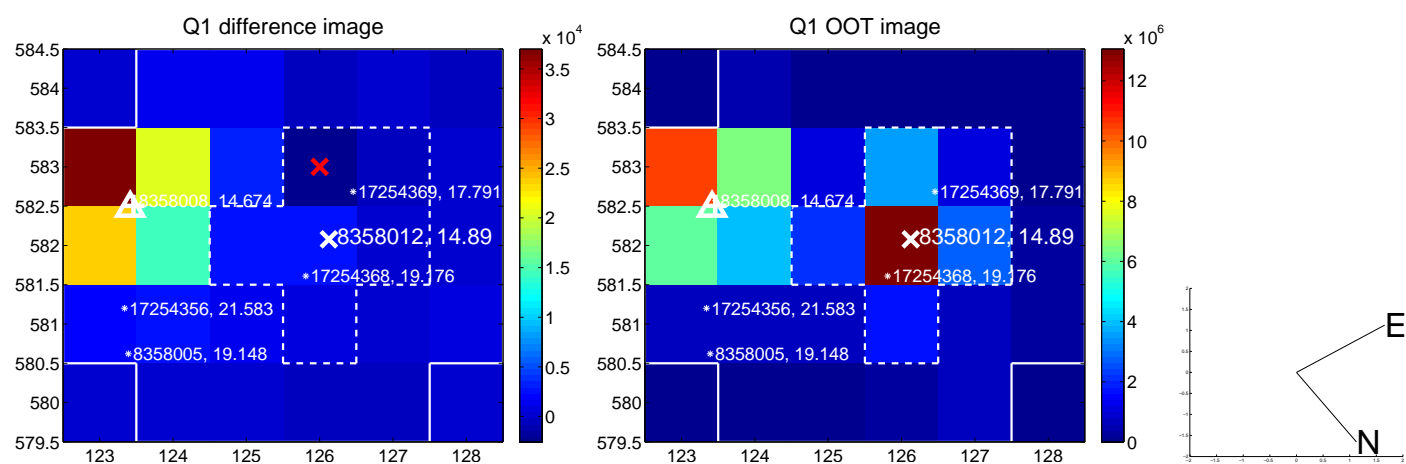
offset from photometric centroids



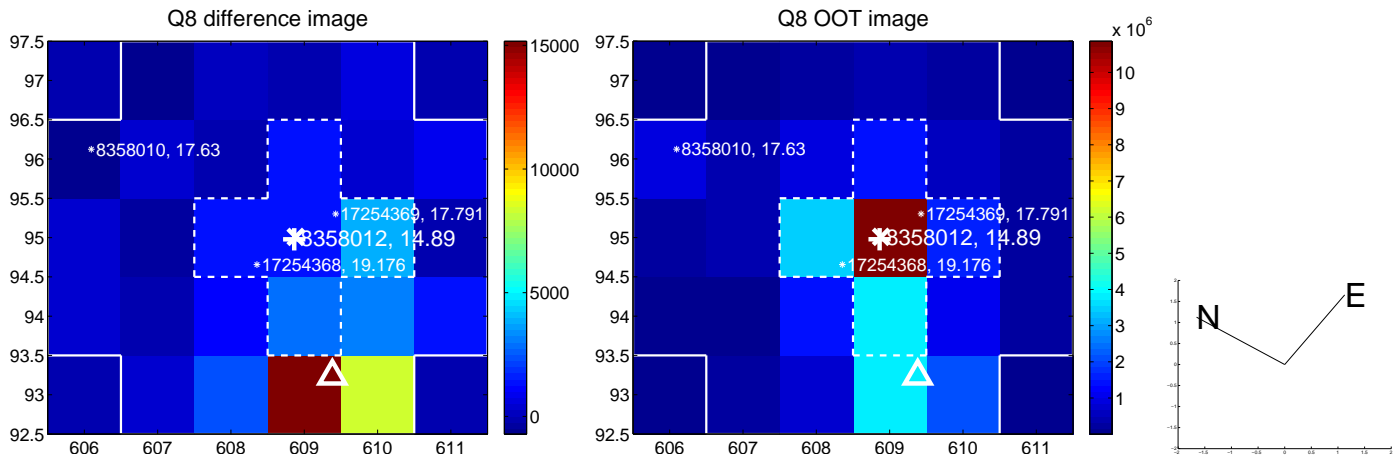
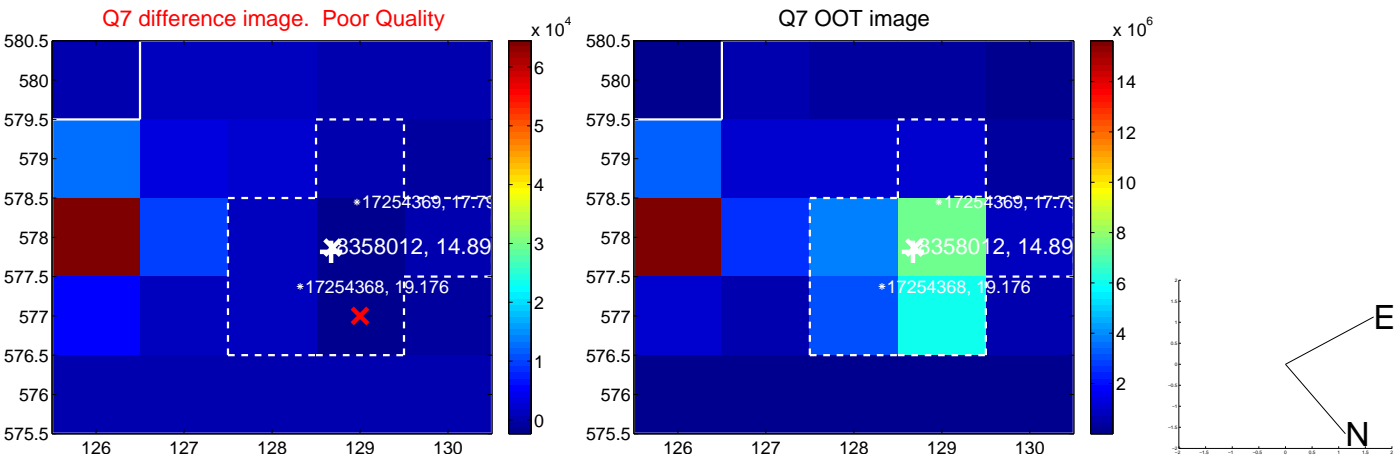
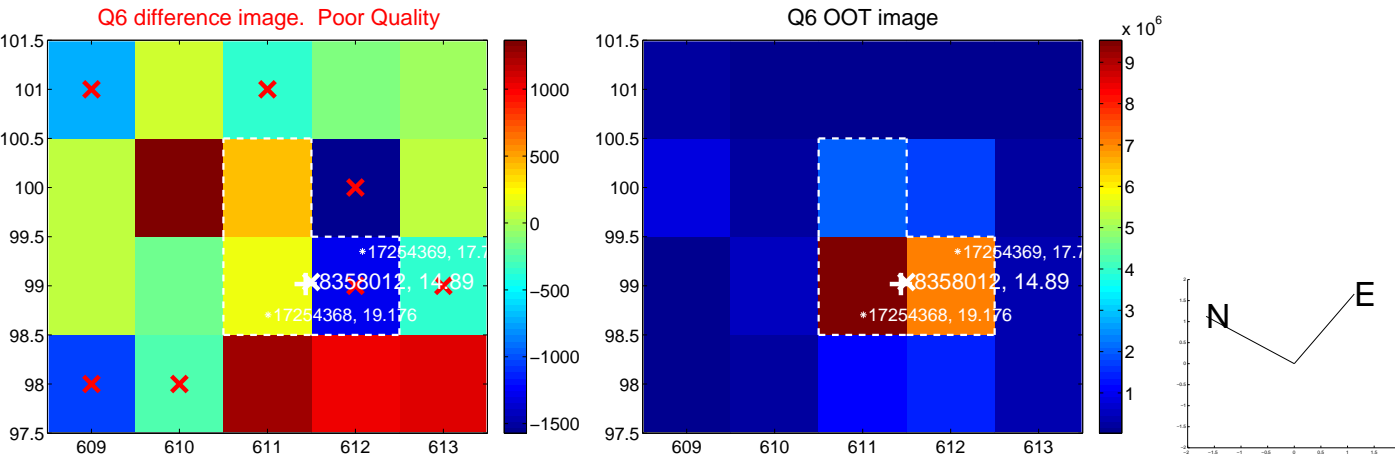
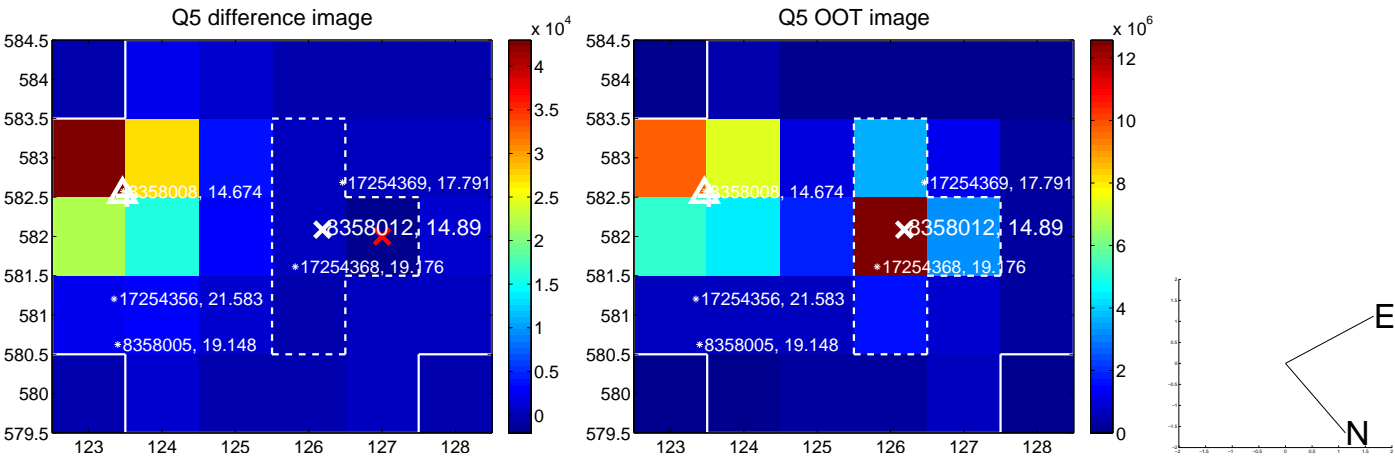
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



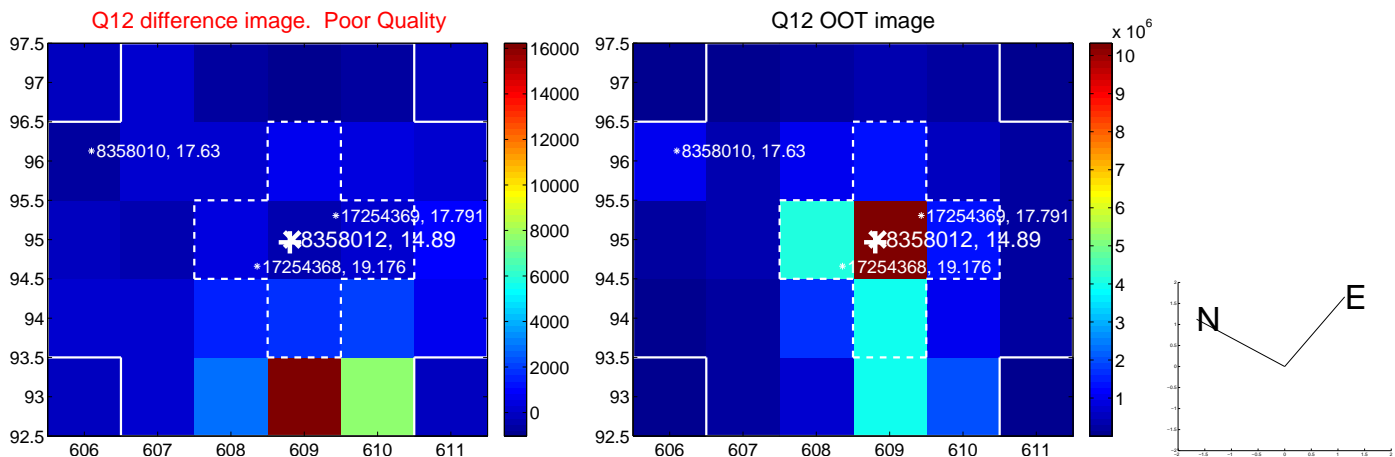
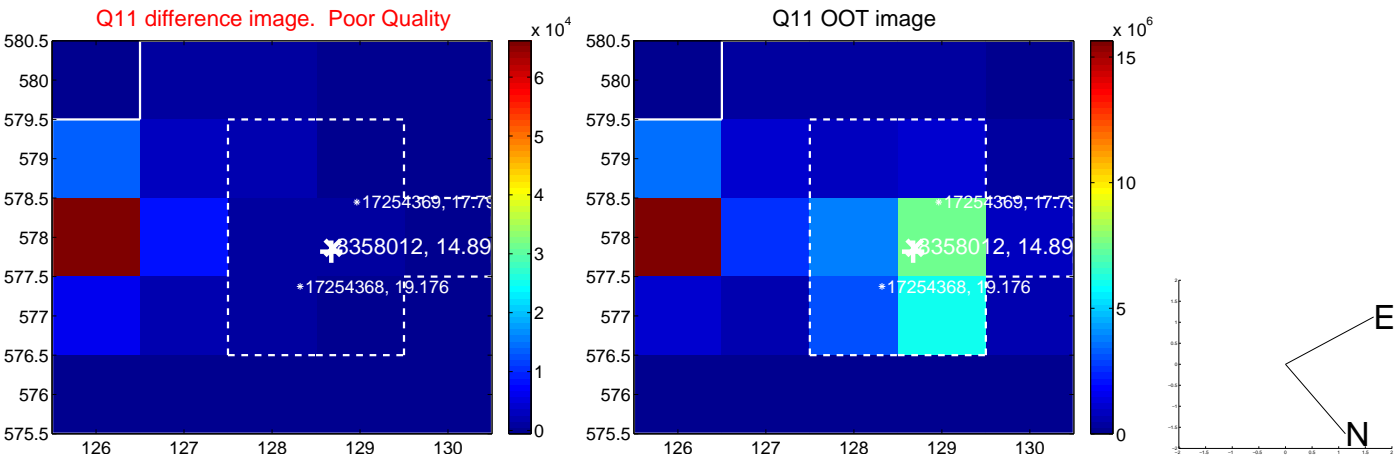
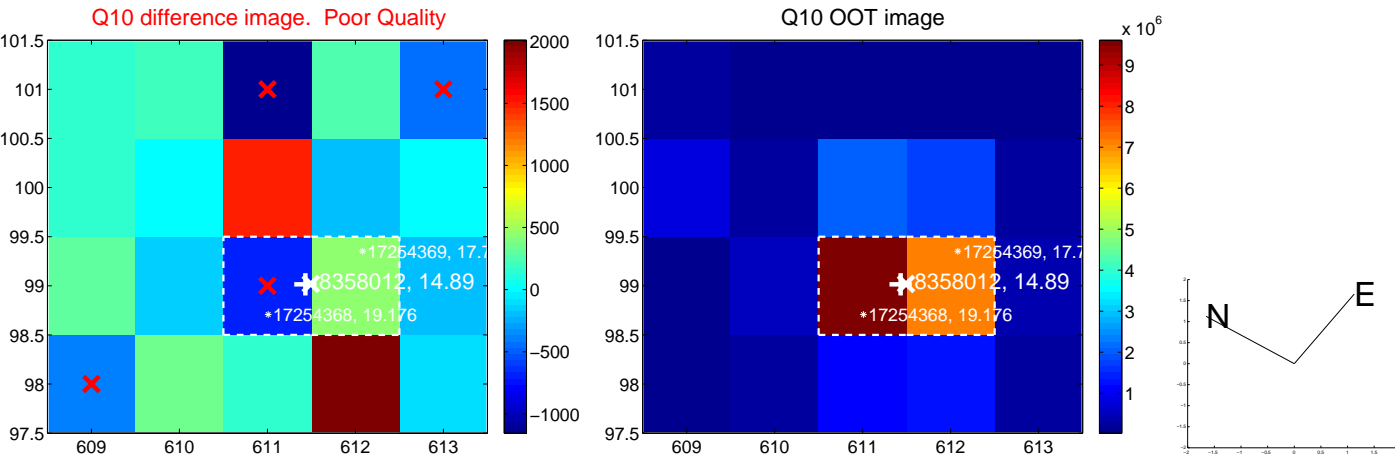
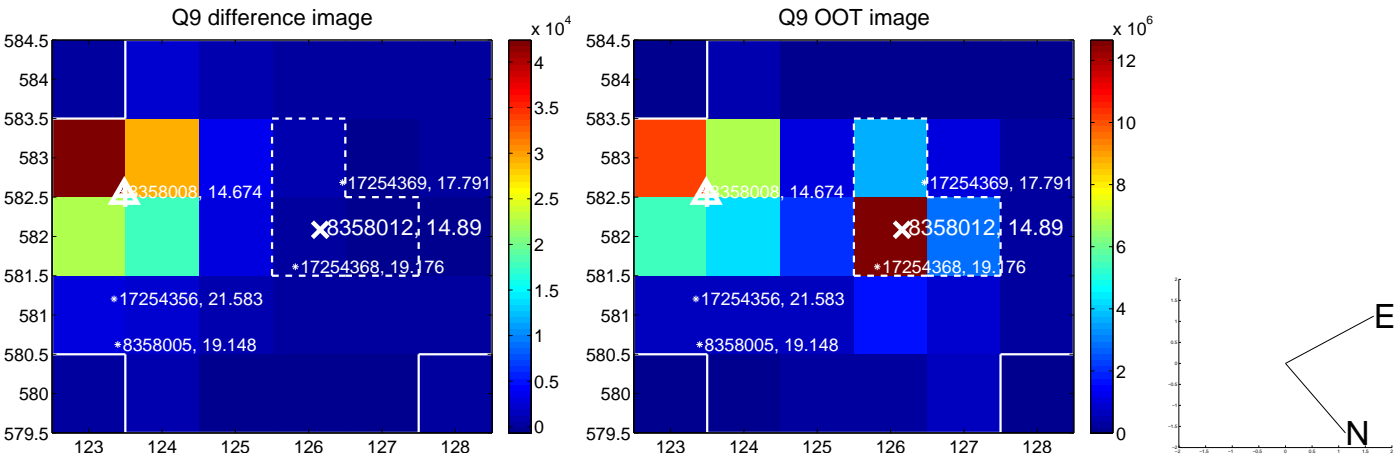
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



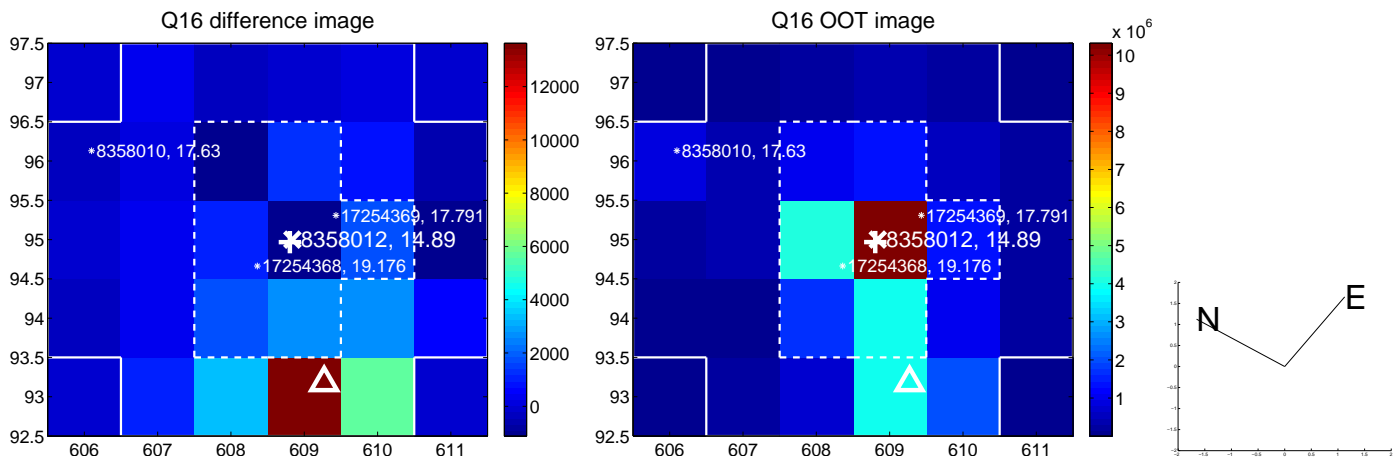
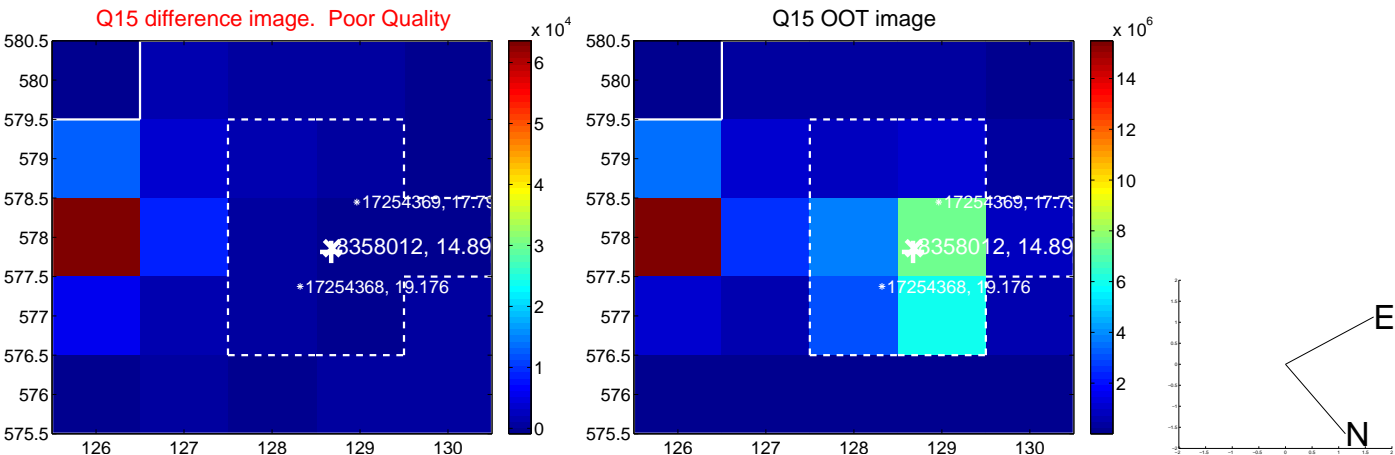
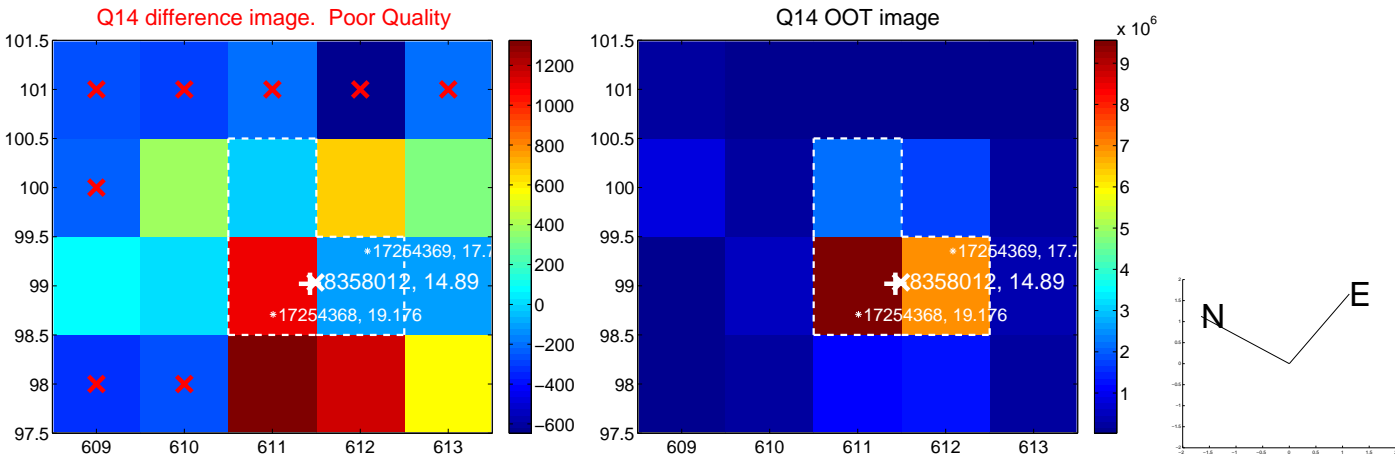
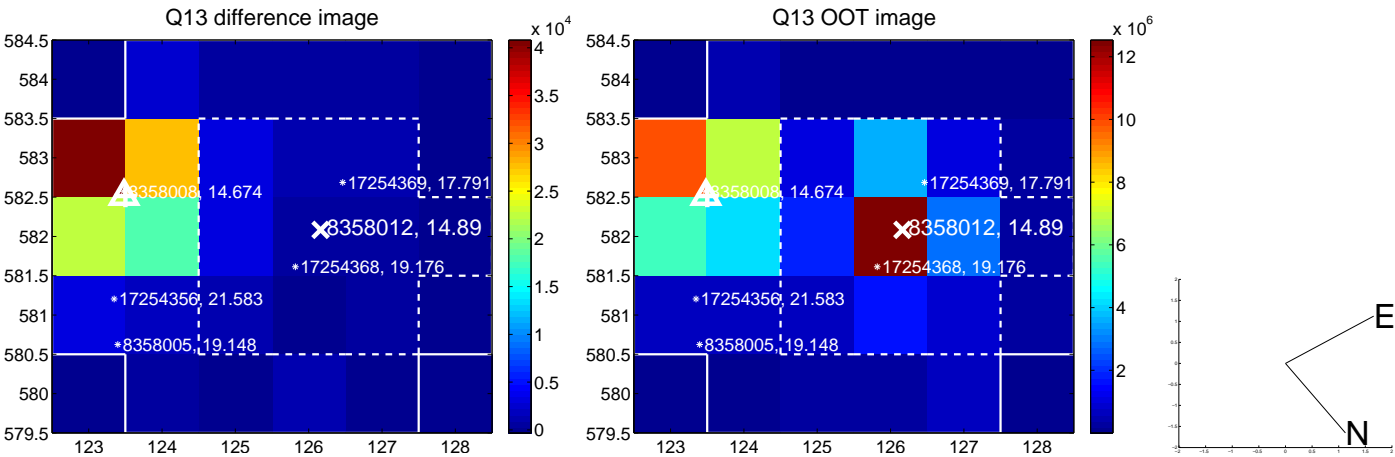
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



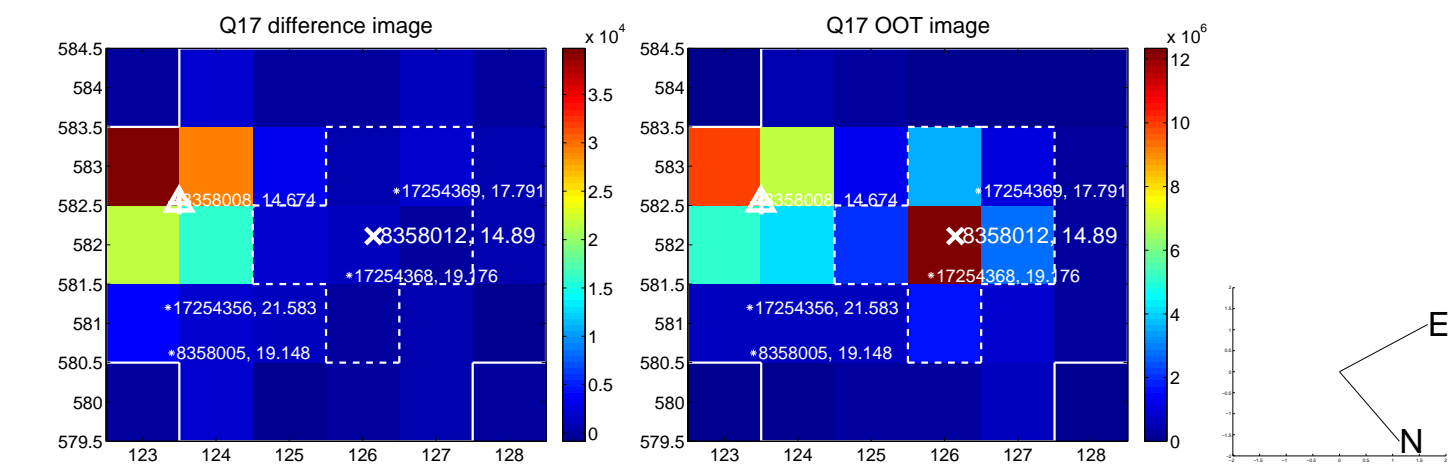
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



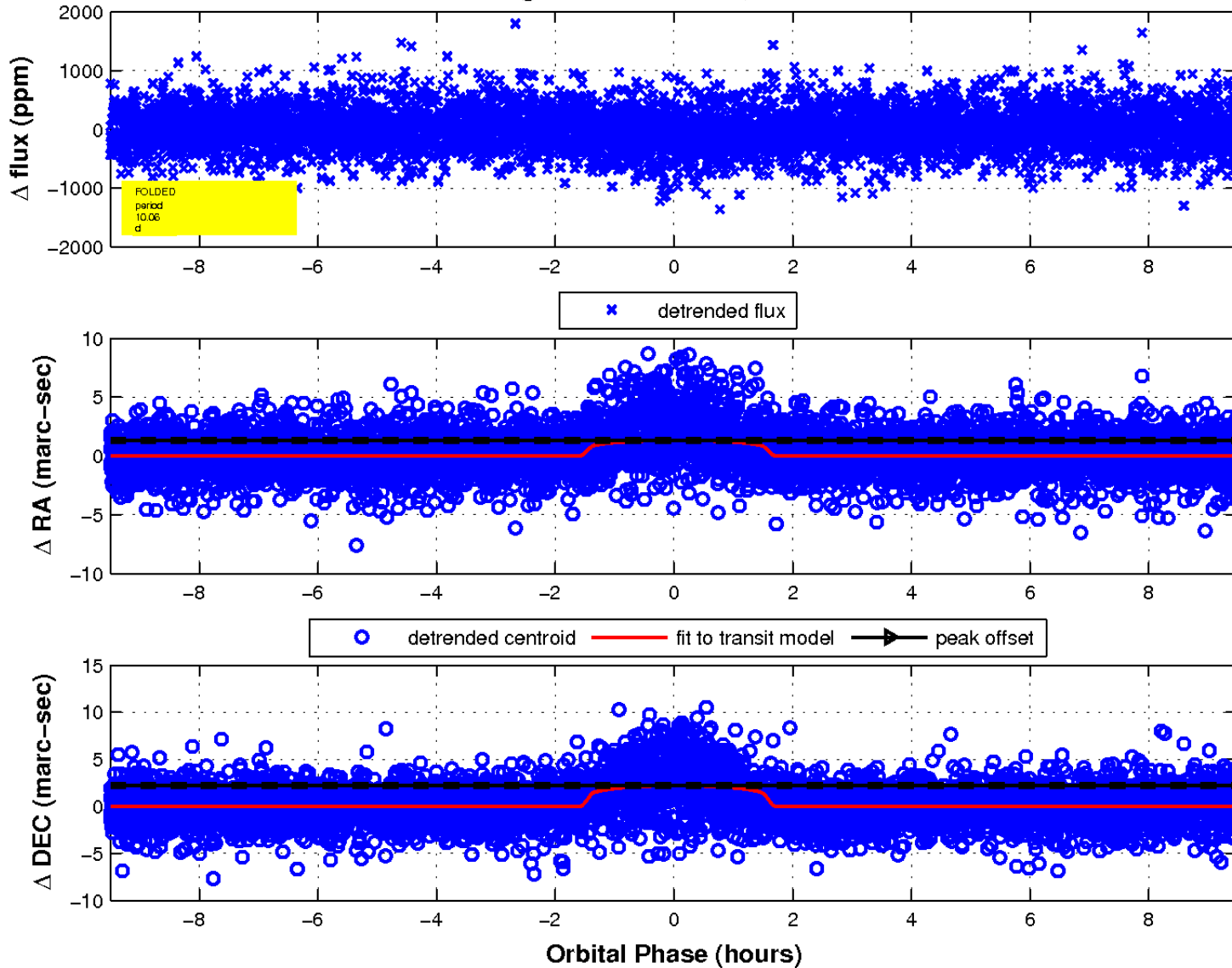
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

