

# KIC 008560804

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008560804-01	OBS	2969.01	31.973081	133.868512	177.5	12.056	23.5	25.8	1.76	6007	3.81	77.62
008560804-02	OBS	No	31.971526	150.650010	98.1	12.455	13.5	14.4	1.76	6007	3.54	77.63

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008560804-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—HALO_GHOST—EPHEM_MATCH
008560804-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—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.

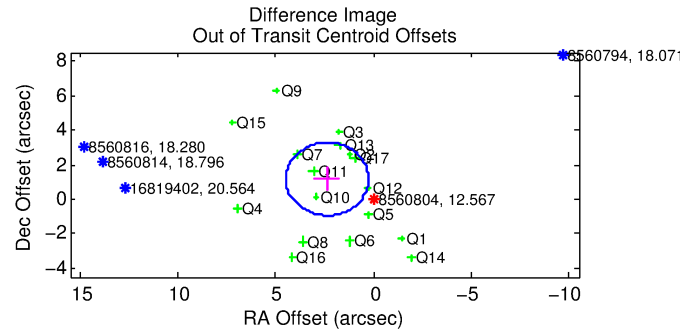
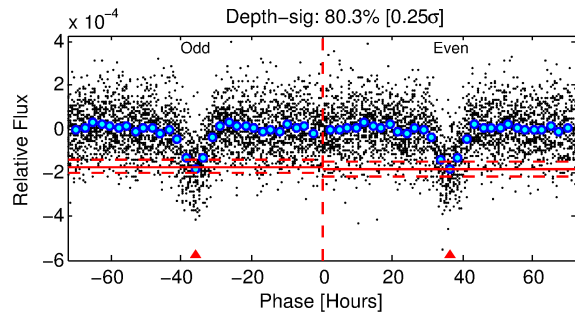
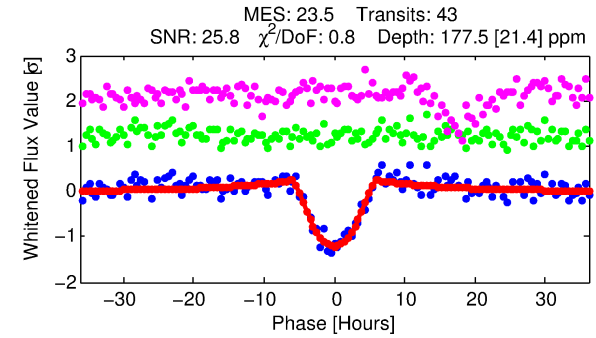
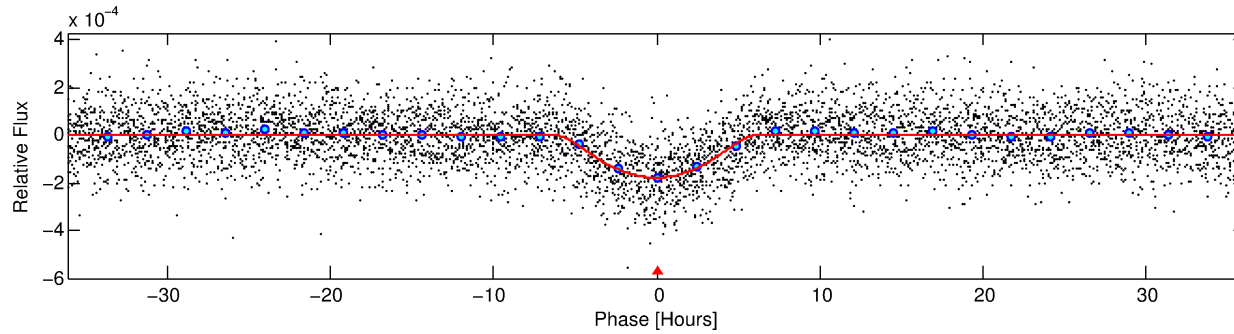
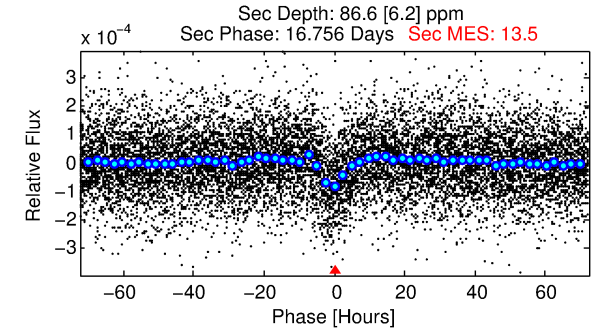
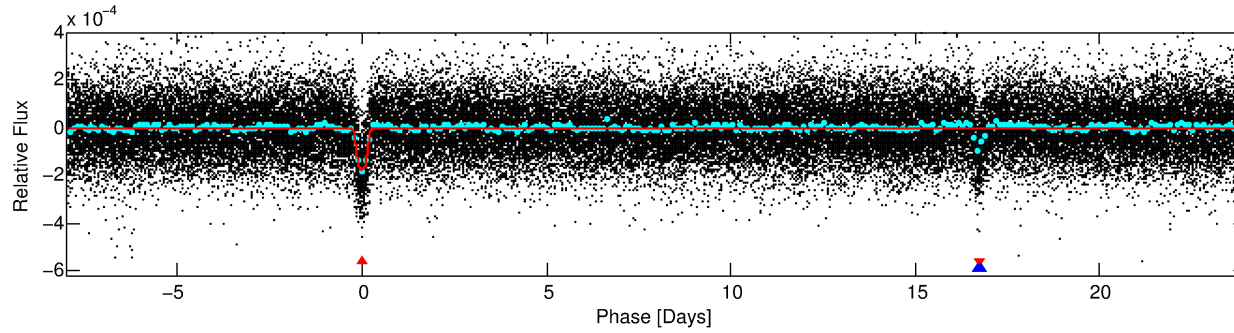
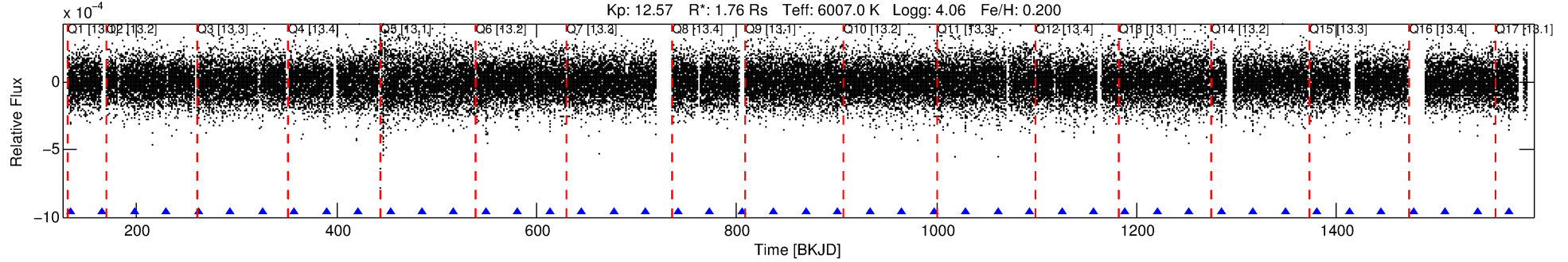
## Ephemeris Match Information For 008560804-01

TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $\mu$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
008560804-01	8560804	008560861-01	8560861	1:1	73.8	18	-5	8.50	12.57	424.48	Direct-PRF	0	0.16	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: 8560804 Candidate: 1 of 2 Period: 31.973 d  
KOI: K02969.01 Corr: 0.878



## DV Fit Results:

Period = 31.97308 [0.00036] d  
Epoch = 133.8685 [0.0093] BKJD  
Rp/R\* = 0.0198 [0.0077]  
a/R\* = 4.96 [0.77]  
b = 0.99 [0.02]  
Seff = 77.62 [24.33]  
Teff = 757 [59] K  
Rp = 3.81 [1.73] Re  
a = 0.2156 [0.0441] AU  
Ag = 152.83 [128.89] [1.18σ]  
Teffp = 4114 [809] K [4.14σ]

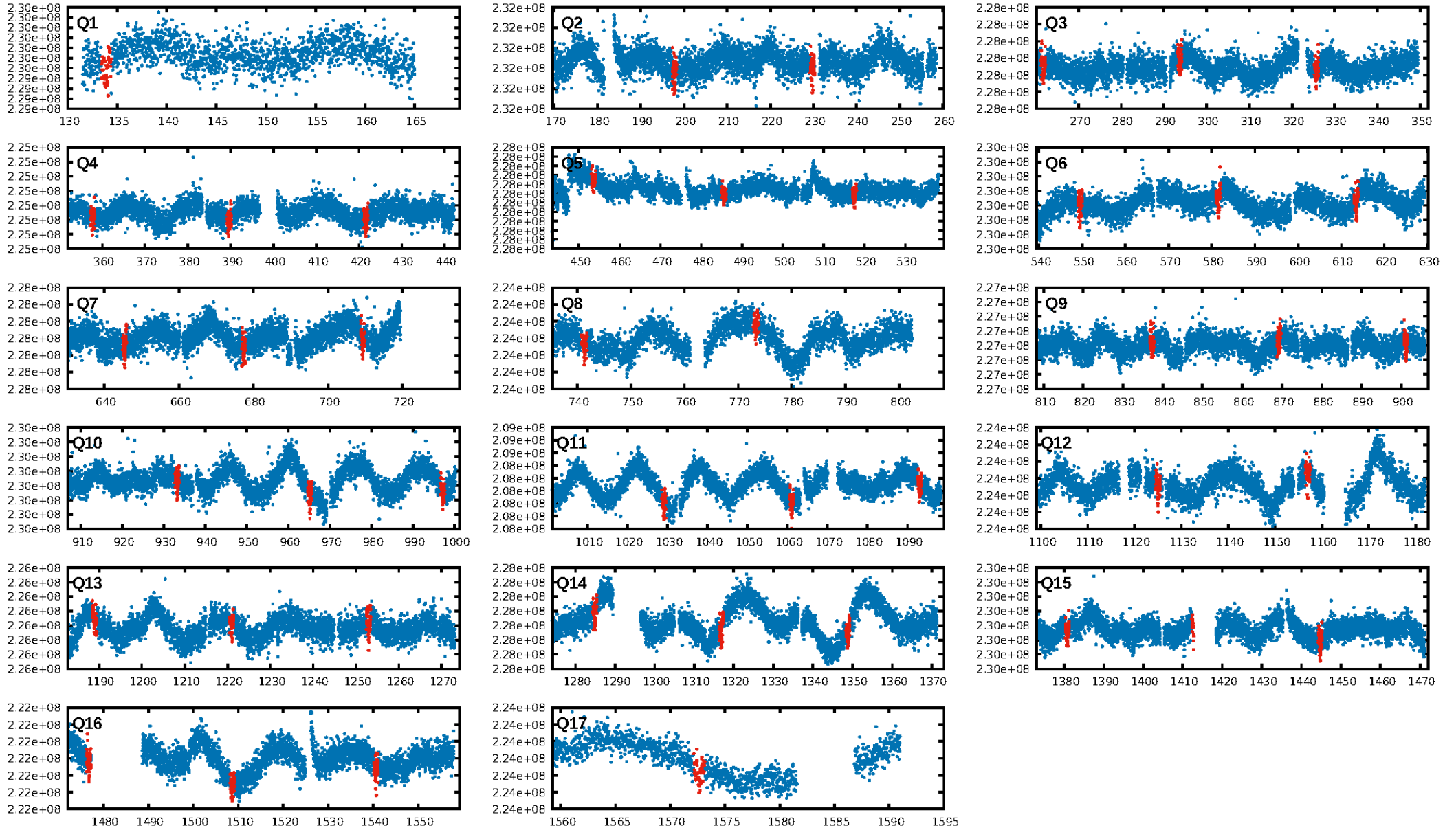
## DV Diagnostic Results:

ShortPeriod-sig: 0.2% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 96.7%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.48e-101  
RollingBand-fgt: 1.00 [41/41]  
GhostDiagnostic-chr: -0.07323  
Centroid-sig: 0.0%  
Centroid-so: 1.205 arcsec [3.39σ]  
OotOffset-rm: 2.649 arcsec [3.76σ]  
KicOffset-rm: 2.407 arcsec [3.48σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.18 [3/17]  
DiffImageOverlap-fno: 1.00 [17/17]

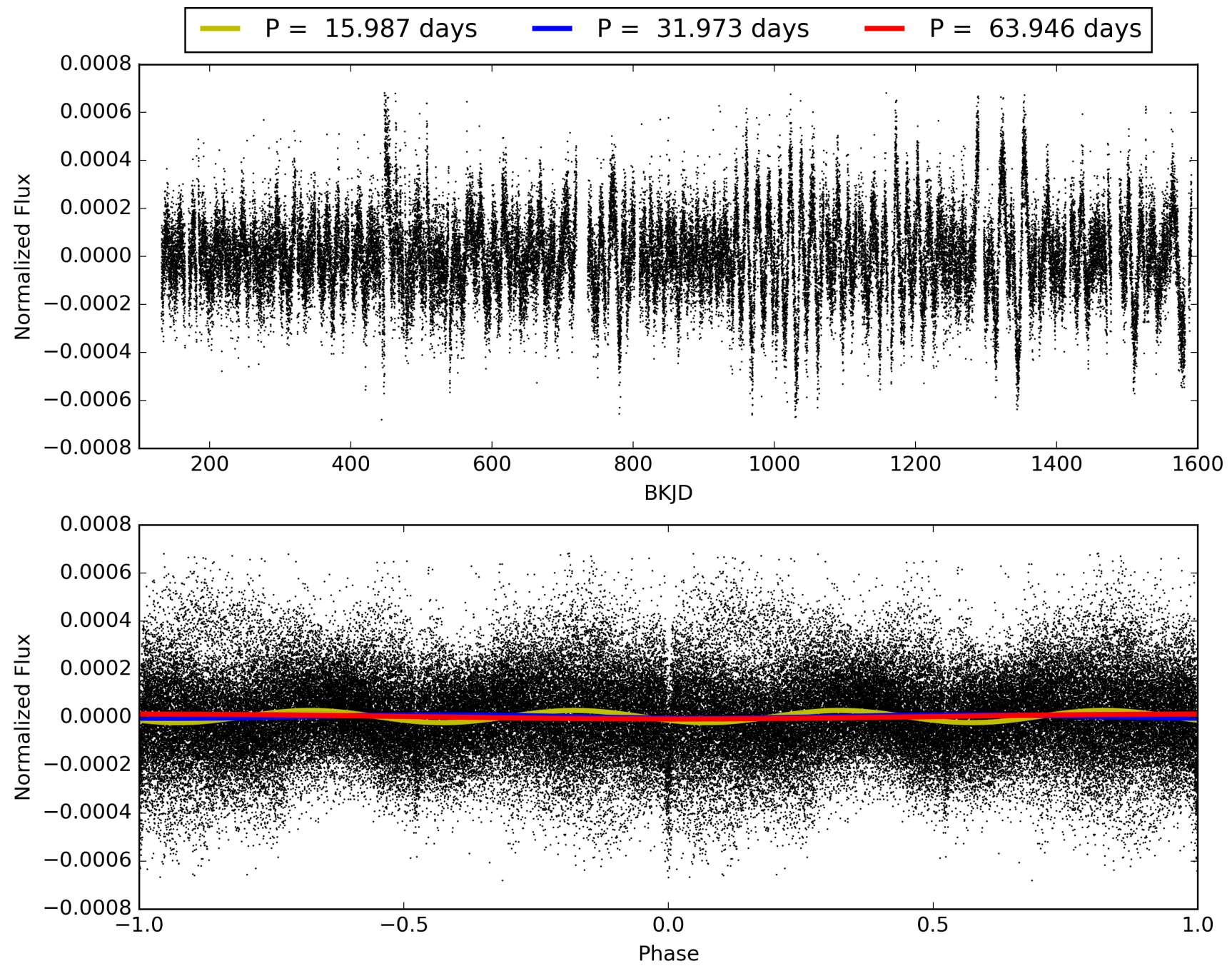
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 13:31:03 Z

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

# TCE 008560804-01, PDC Light Curves

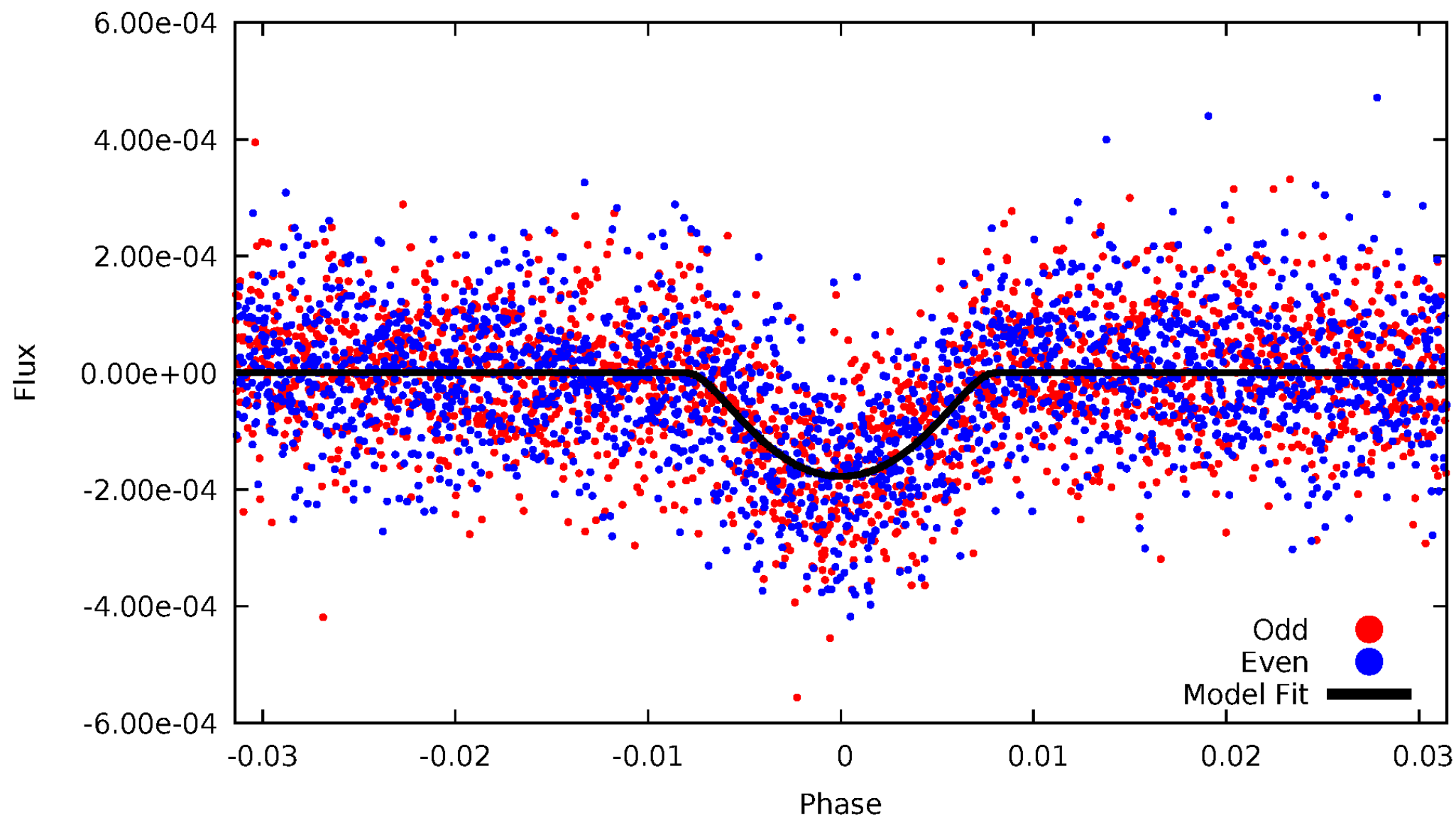


TCE 008560804-01



# DV Odd/Even

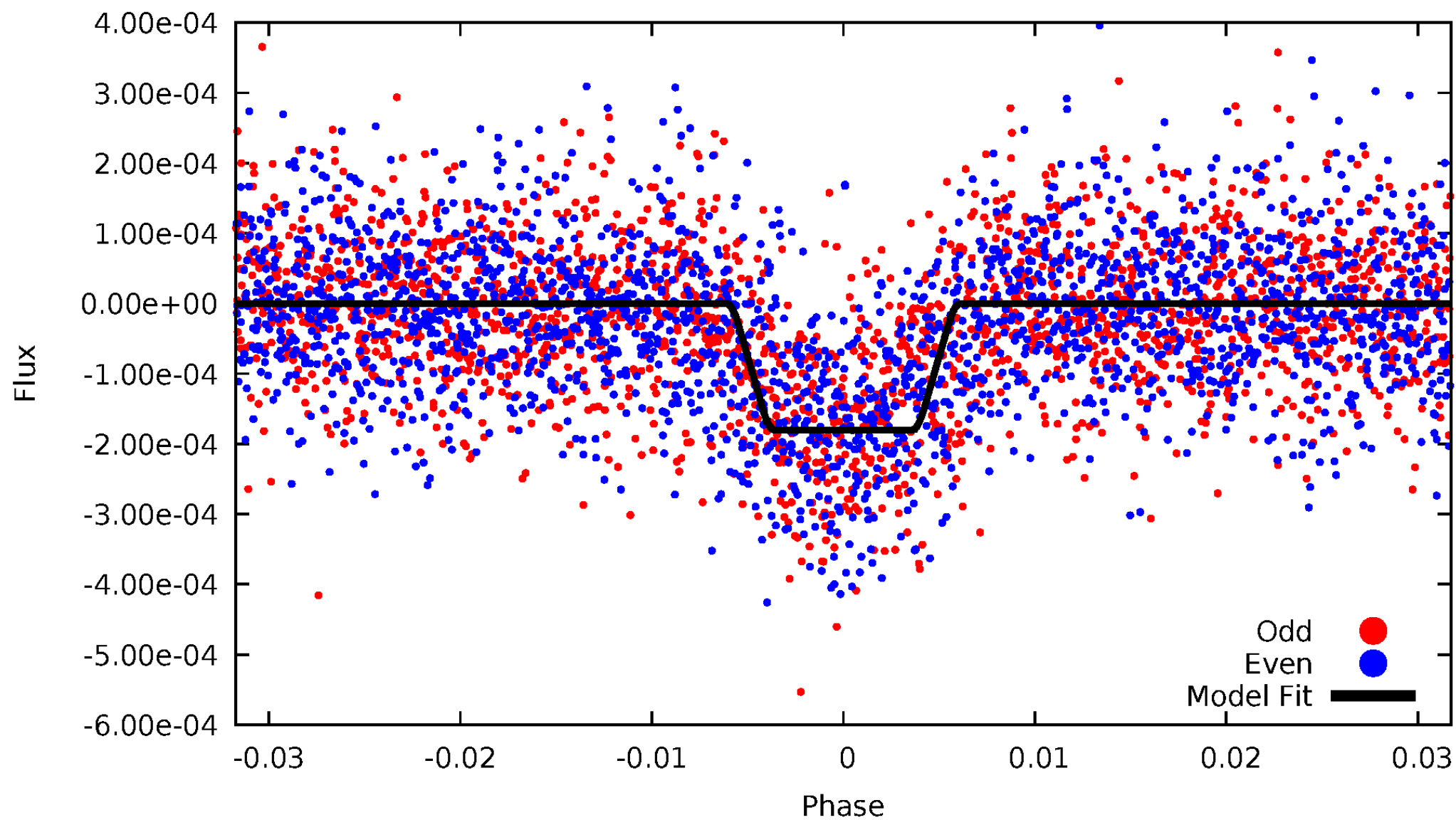
TCE 008560804-01





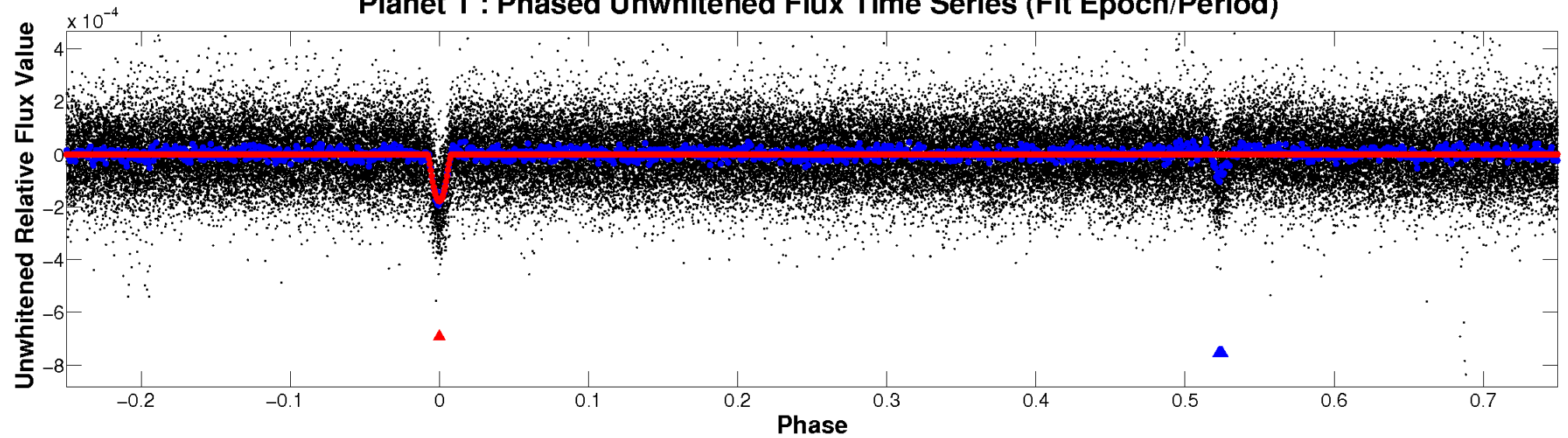
# ALT Odd/Even

TCE 008560804-01

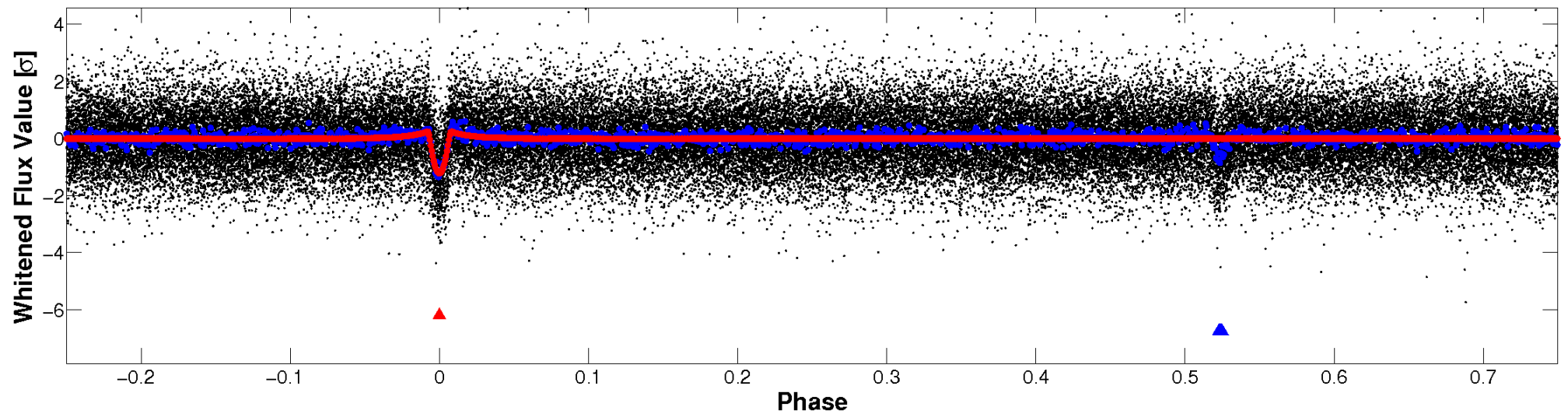


# Non-Whitened Vs. Whitened Light Curve

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

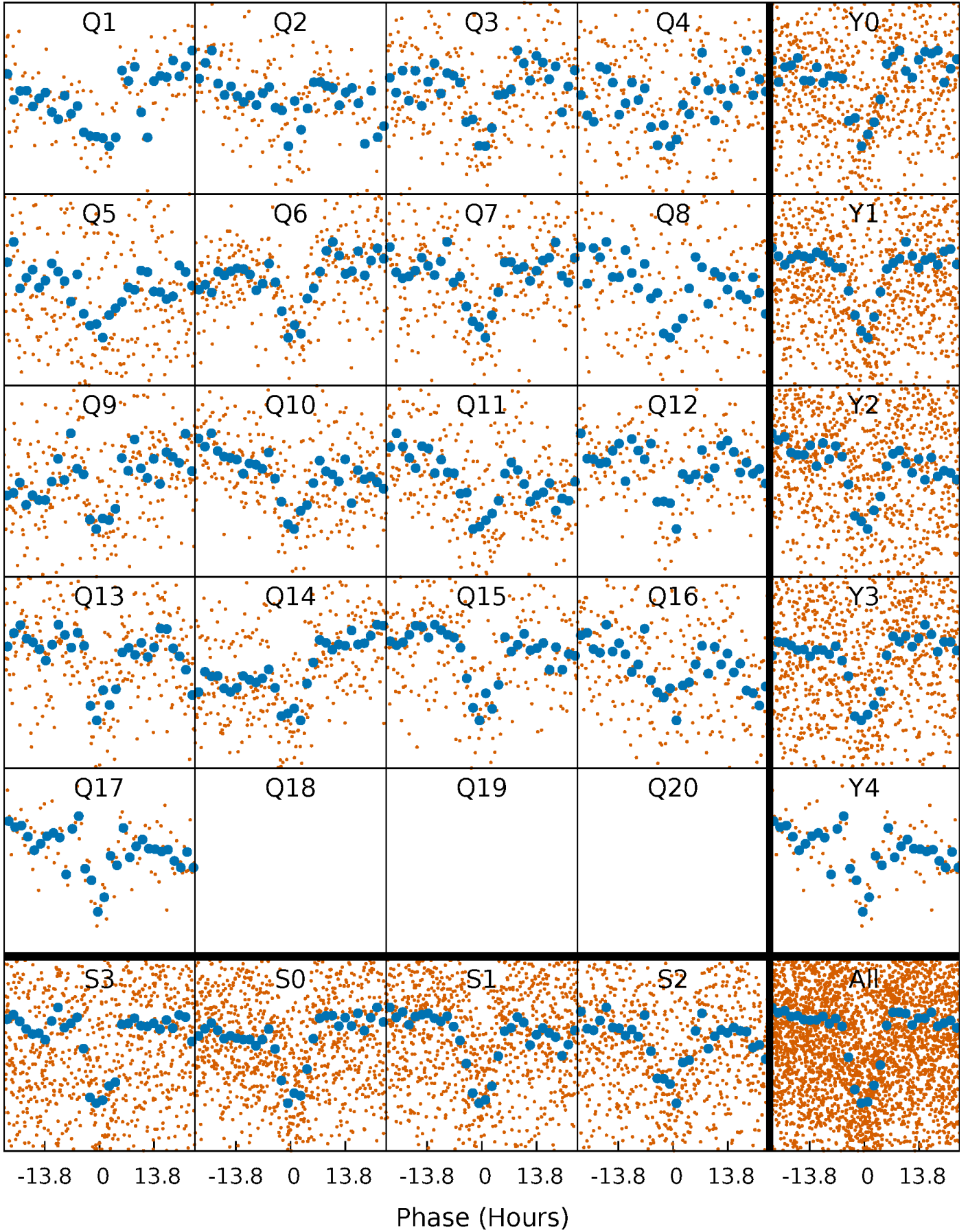


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

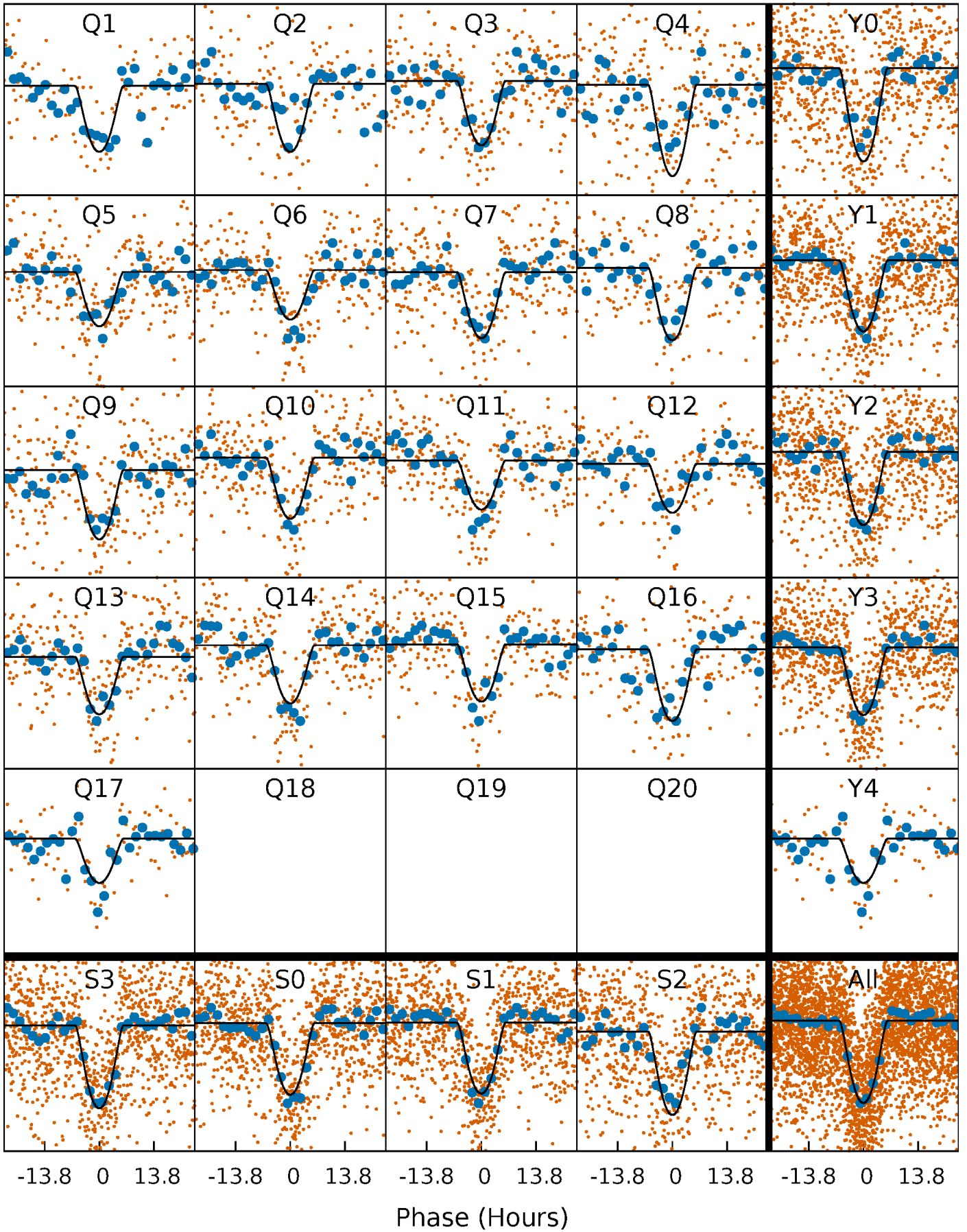
TCE 008560804-01 P= 31.973081 Days  $T_0=133.868512$  (BKJD)





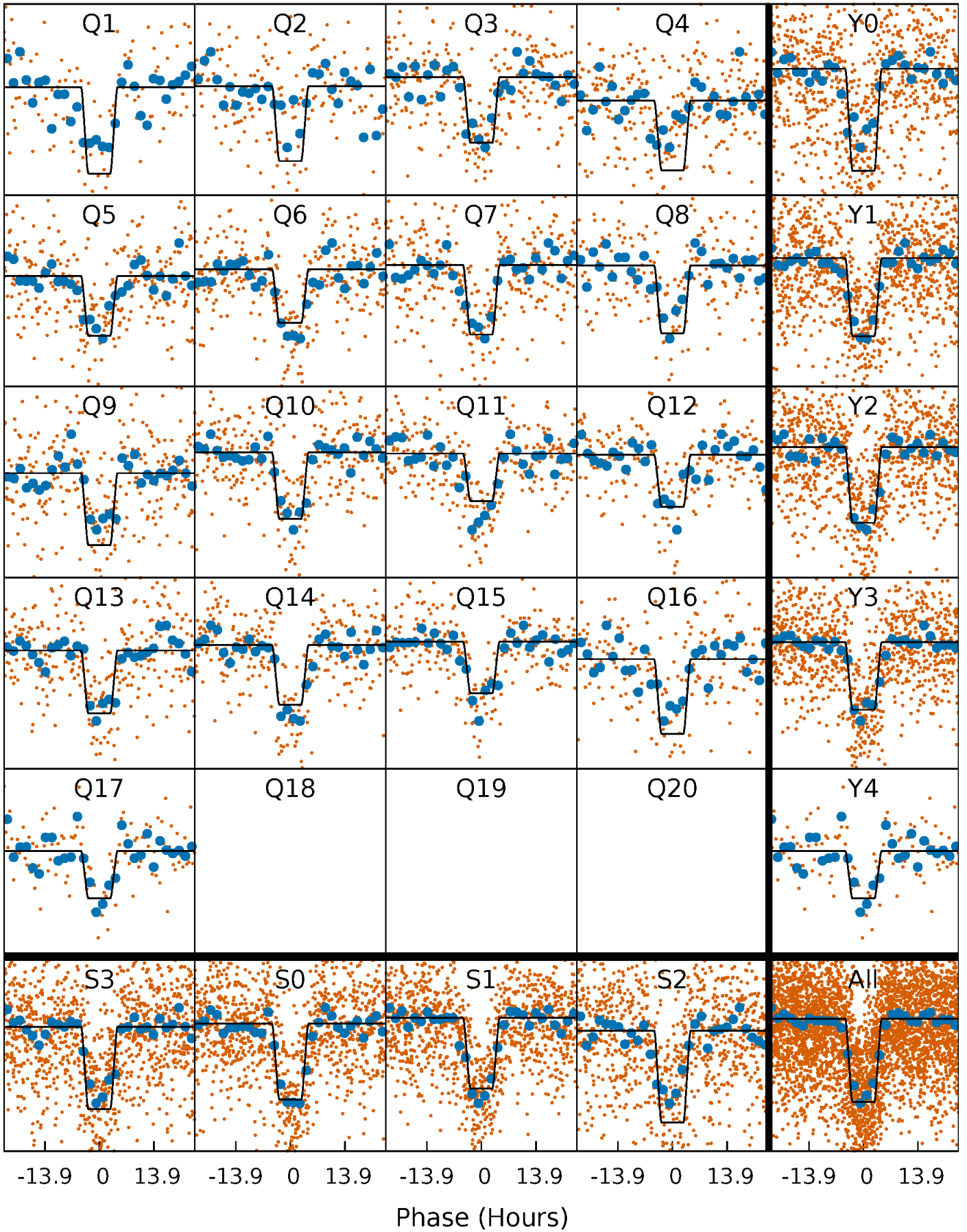
# DV Quarter-Phased Transit Curves

TCE 008560804-01 P= 31.973081 Days  $T_0=133.868512$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

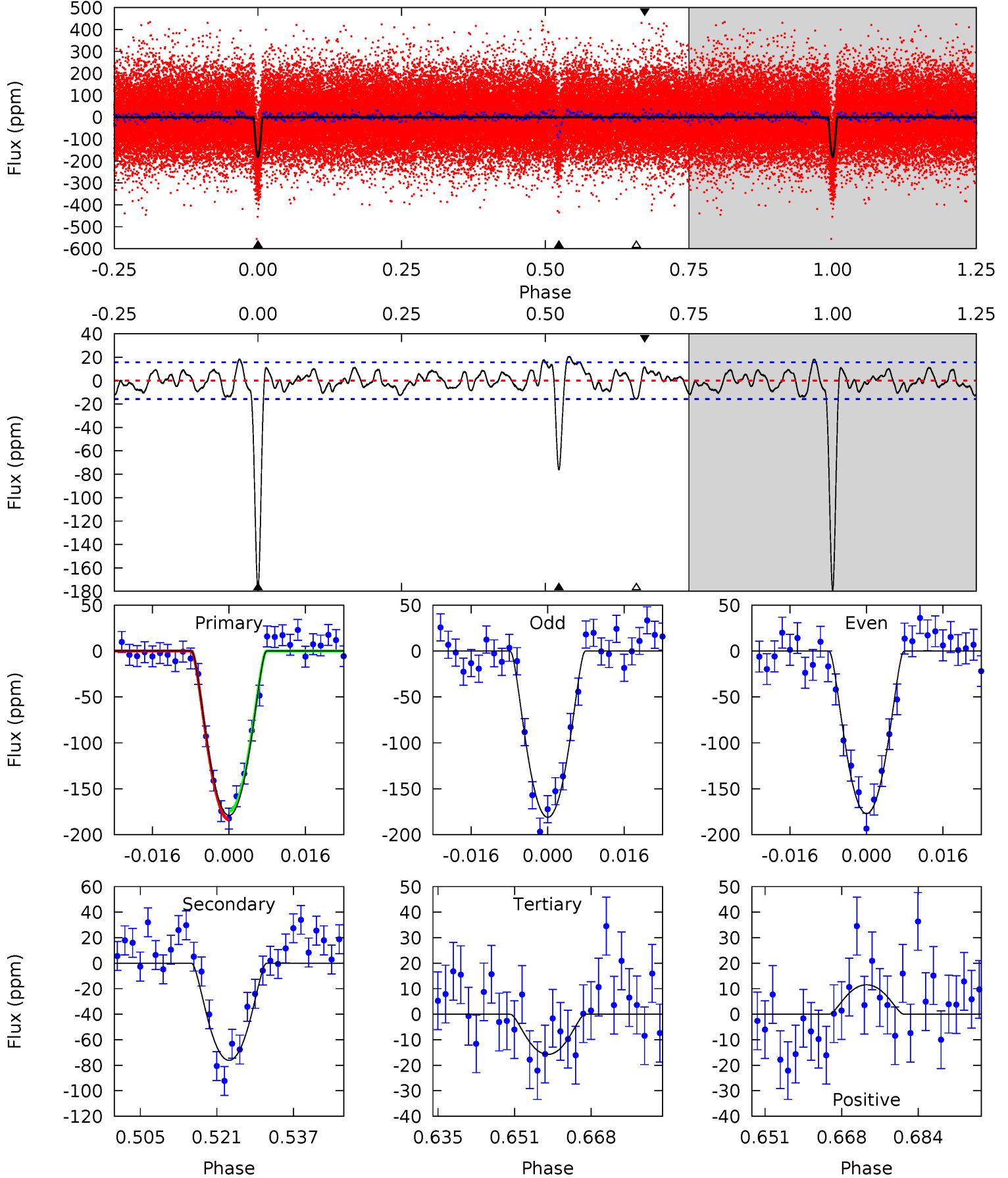
TCE 008560804-01 P= 31.972148 Days  $T_0=133.894386$  (BKJD)



# DV Model-Shift Uniqueness Test

008560804-01, P = 31.973081 Days, E = 101.895431 Days

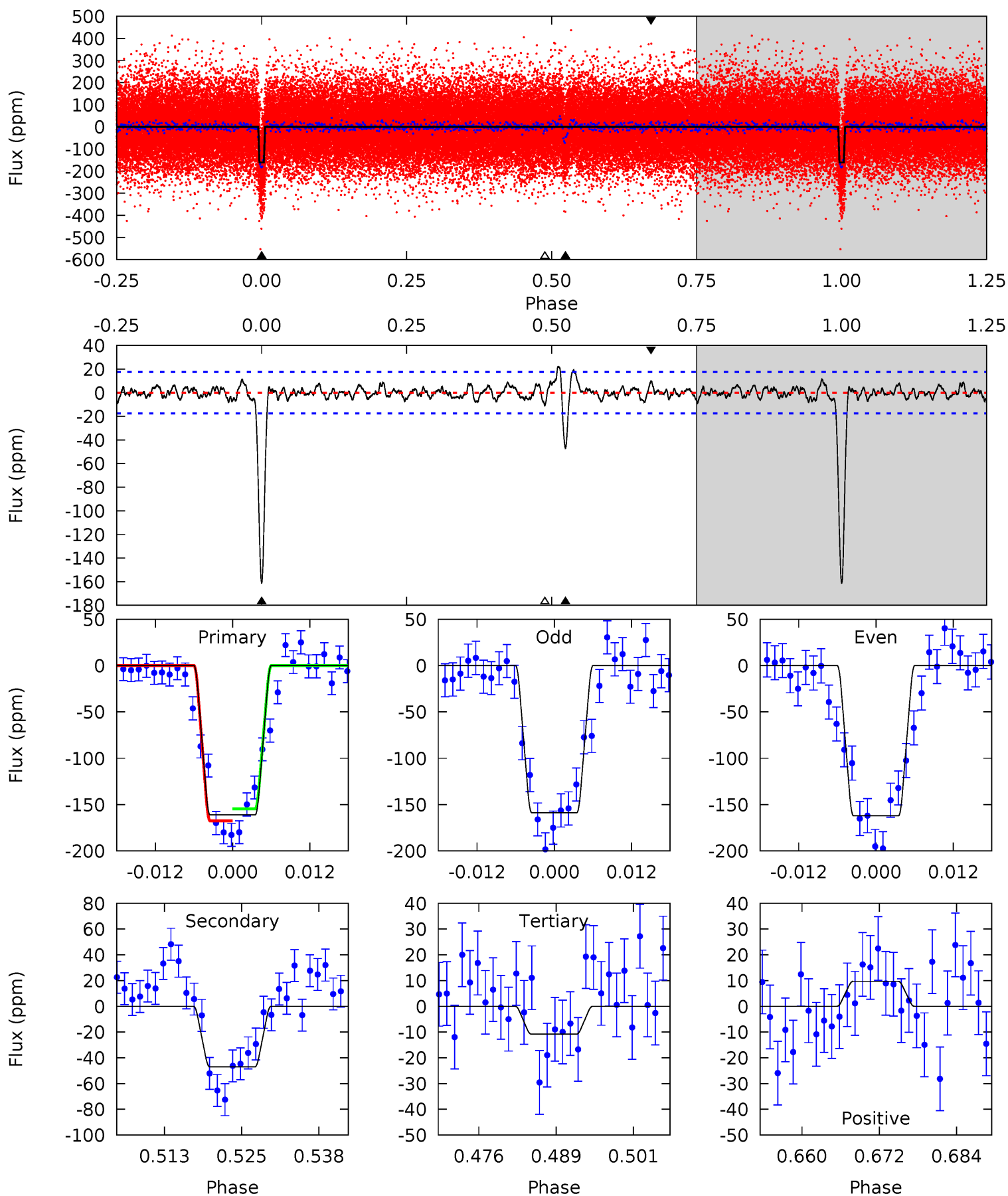
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
56.4	24.0	4.97	3.63	4.93	2.40	2.16	51.5	52.8	19.0	20.4	0.64	0.98	0.10	1.43



# Alt Model-Shift Uniqueness Test

008560804-01, P = 31.972148 Days, E = 101.922238 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
45.8	13.4	3.08	2.75	4.99	2.51	1.22	42.7	43.0	10.3	10.6	0.47	0.99	0.12	1.82



### Stellar Parameters For KIC 008560804

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6007^{+81}_{-81}$	$4.064^{+0.174}_{-0.101}$	$0.200^{+0.150}_{-0.100}$	$1.759^{+0.297}_{-0.409}$	$1.311^{+0.120}_{-0.173}$	$0.339^{+0.310}_{-0.119}$
	+1%/-1%	+4%/-2%	+75%/-50%	+17%/-23%	+9%/-13%	+91%/-35%
Source	SPE68	SPE68	SPE68	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 008560804-01 / KOI 2969.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-76 \pm 3$	$3.72^{+1.47}_{-1.37}$	$1053^{+52}_{-57}$	$4230^{+856}_{-468}$	$140^{+217}_{-70}$
Alt.	$-47 \pm 4$	$2.65^{+1.44}_{-1.35}$	$1054^{+49}_{-56}$	$4432^{+1586}_{-648}$	$173^{+549}_{-102}$

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



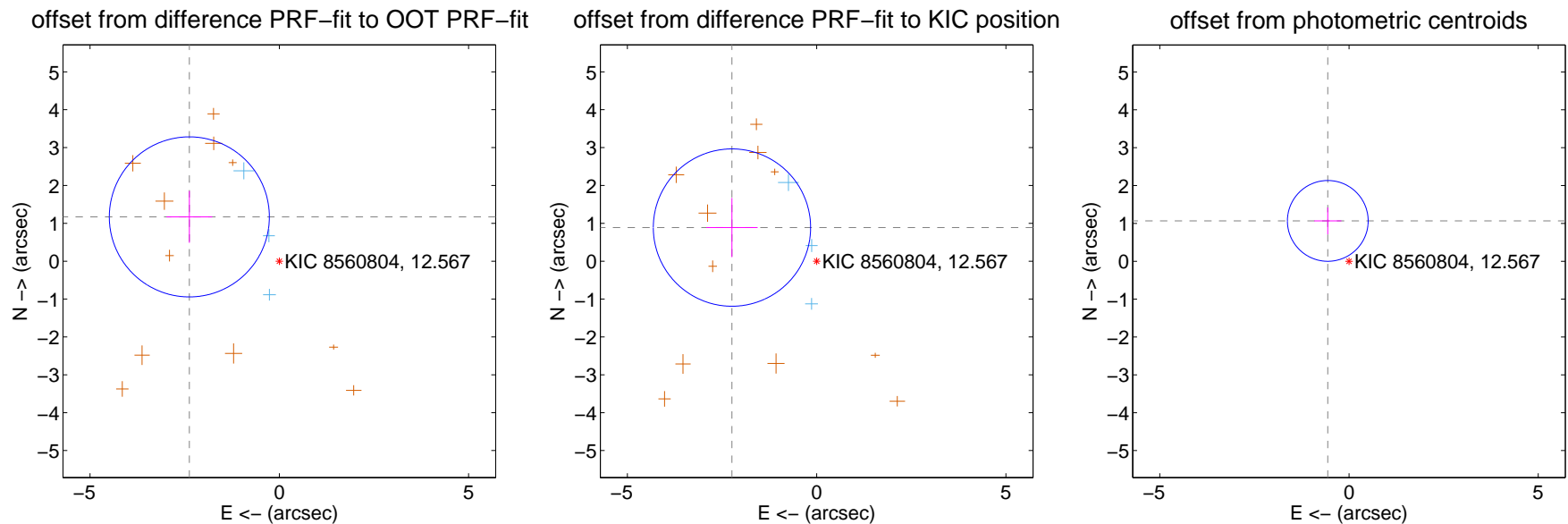
## DV Centroid Data

Supplemental centroid analysis for 008560804-01. Kepler magnitude: 12.57. Transit SNR 25.83

There are 3 quarters with good PRF difference image offsets

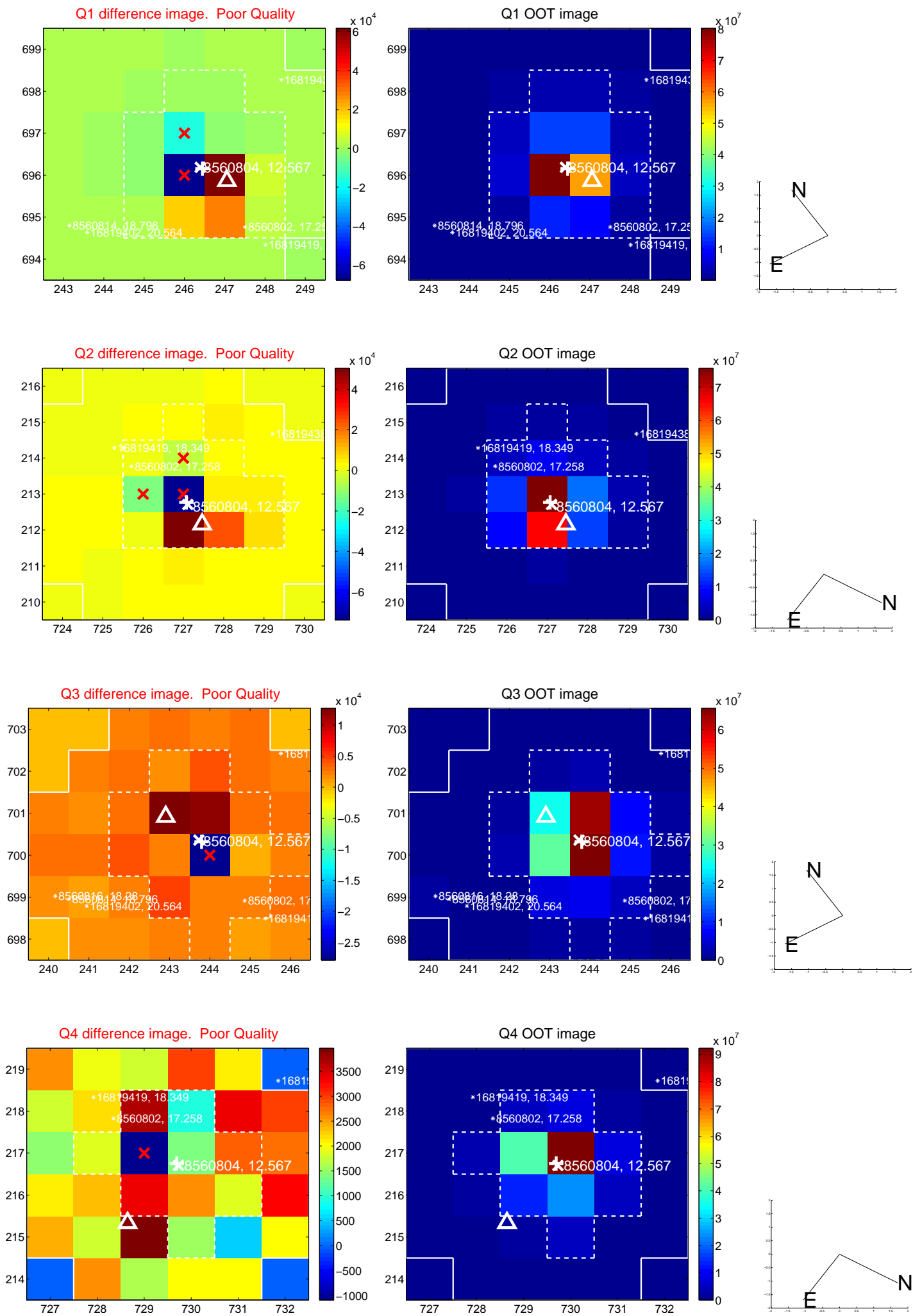
The direct PRF centroid is offset from the target star catalog position by about 0.36 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.649 \pm 0.704$	3.76	$2.376 \pm 0.603$	$1.170 \pm 0.683$
PRF-fit source offset from KIC position	$2.407 \pm 0.692$	3.48	$2.237 \pm 0.677$	$0.888 \pm 0.782$
photometric centroid source offset	$1.20 \pm 0.36$	3.39	$0.56 \pm 0.36$	$1.07 \pm 0.36$

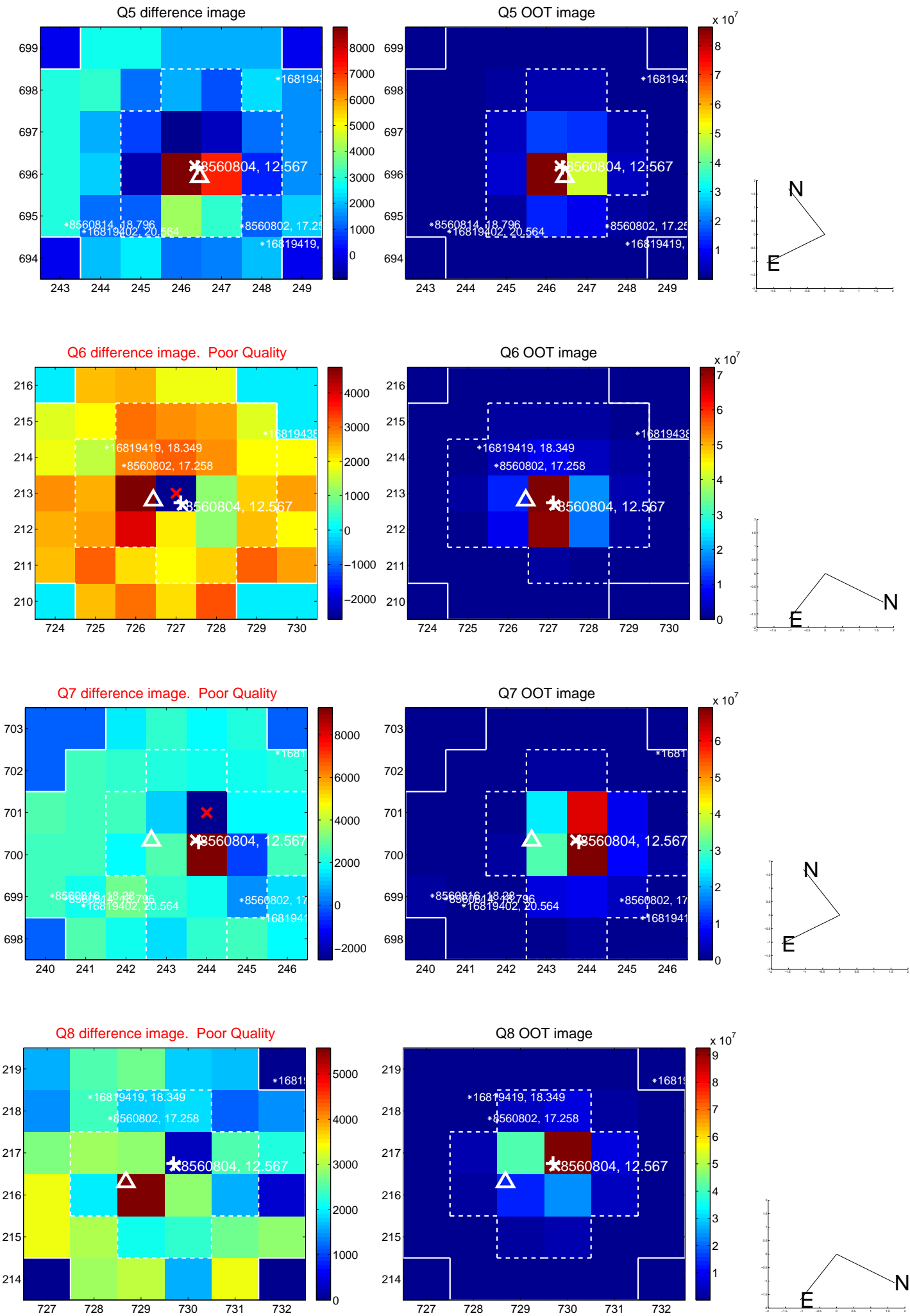


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

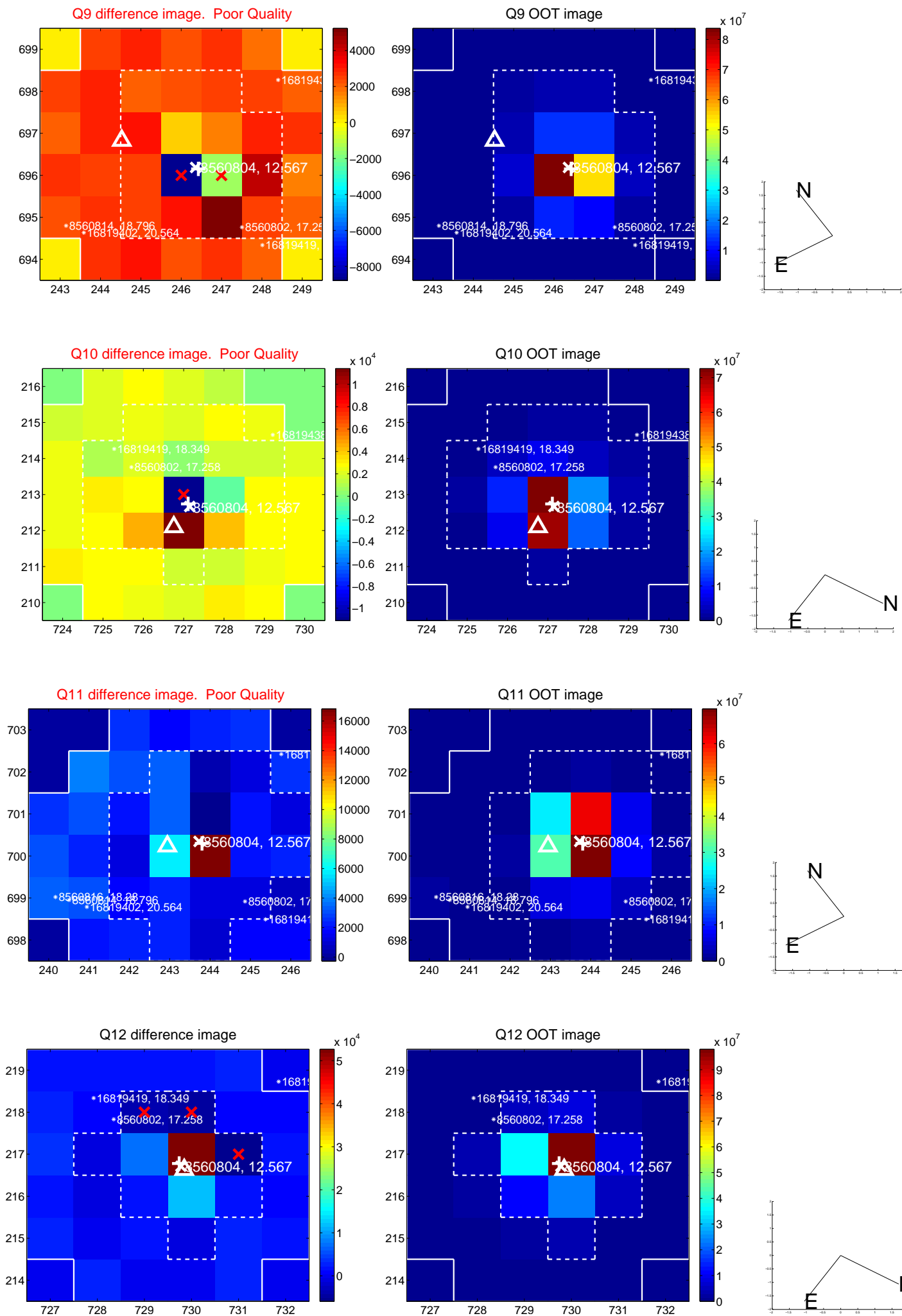
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



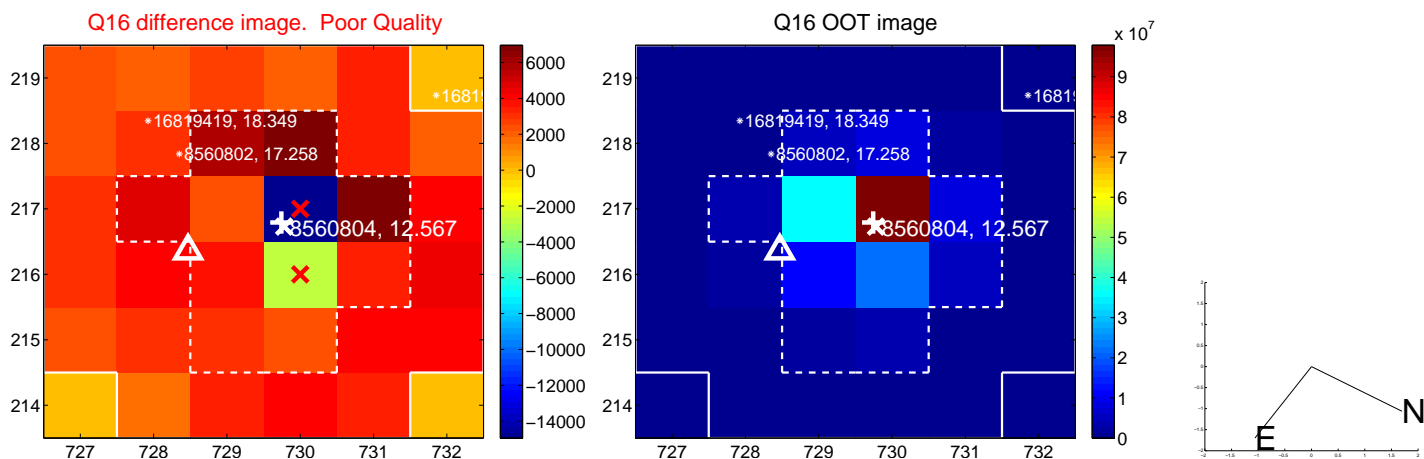
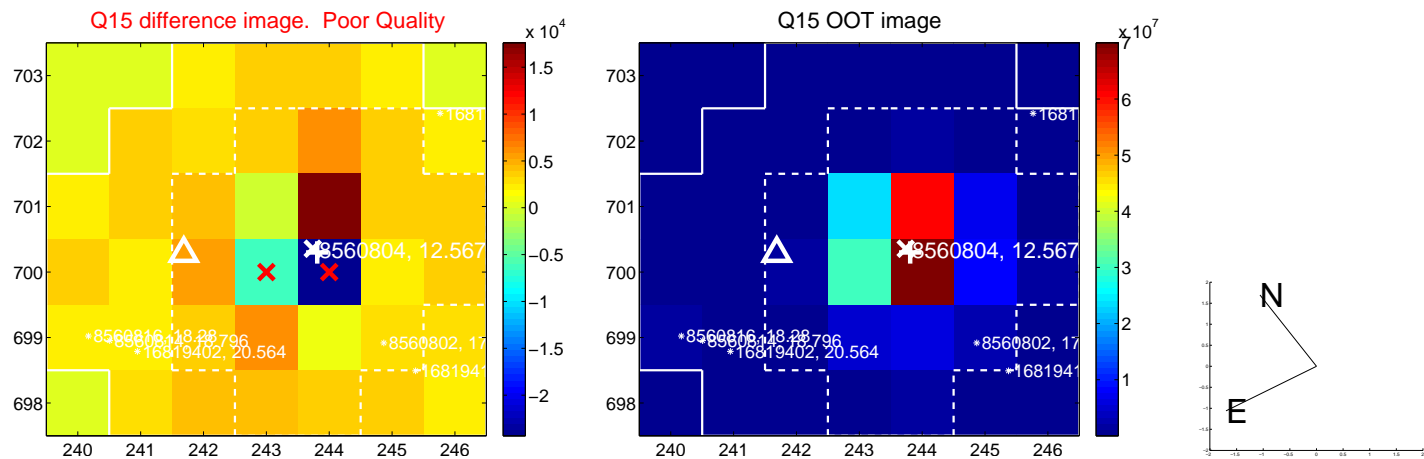
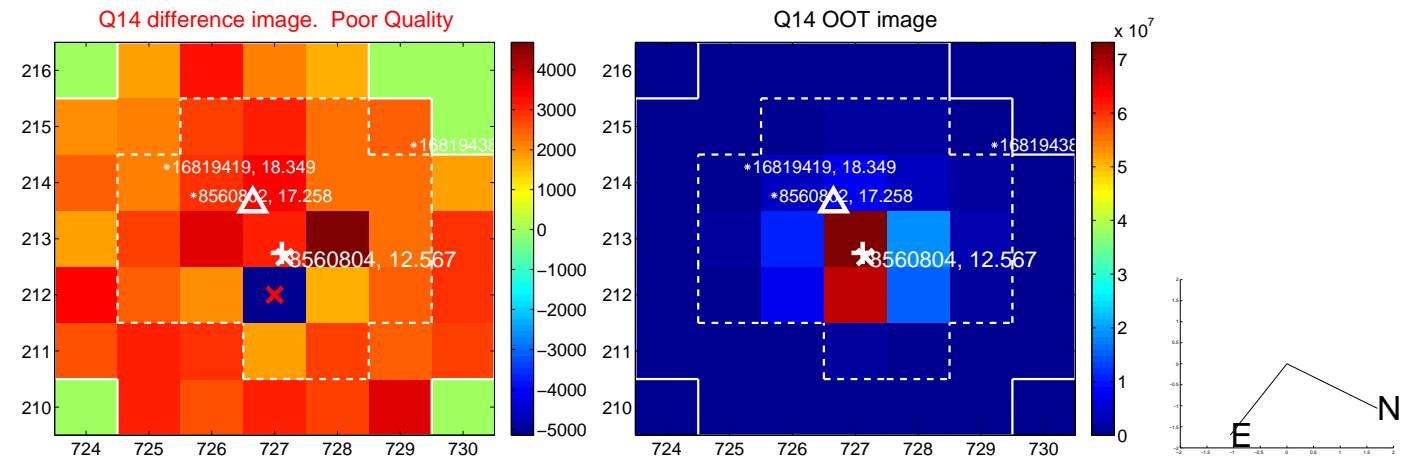
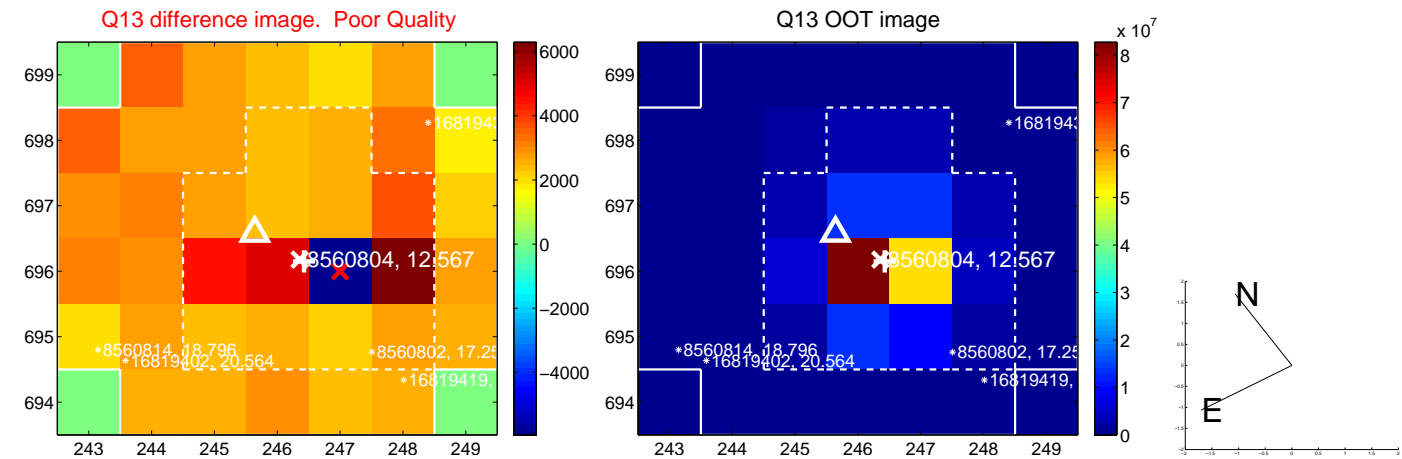
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

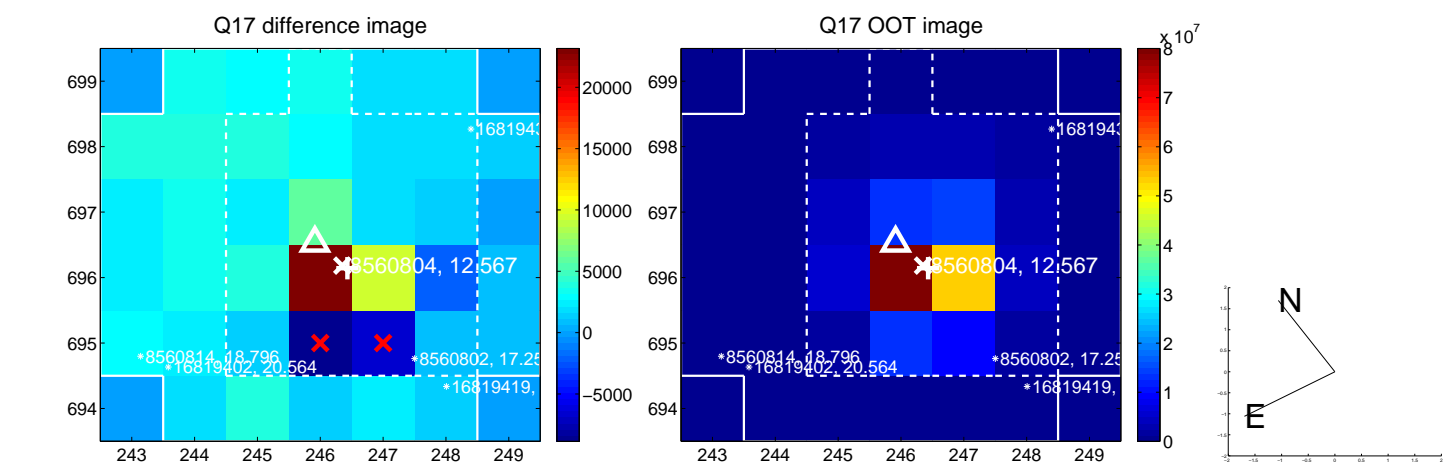


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

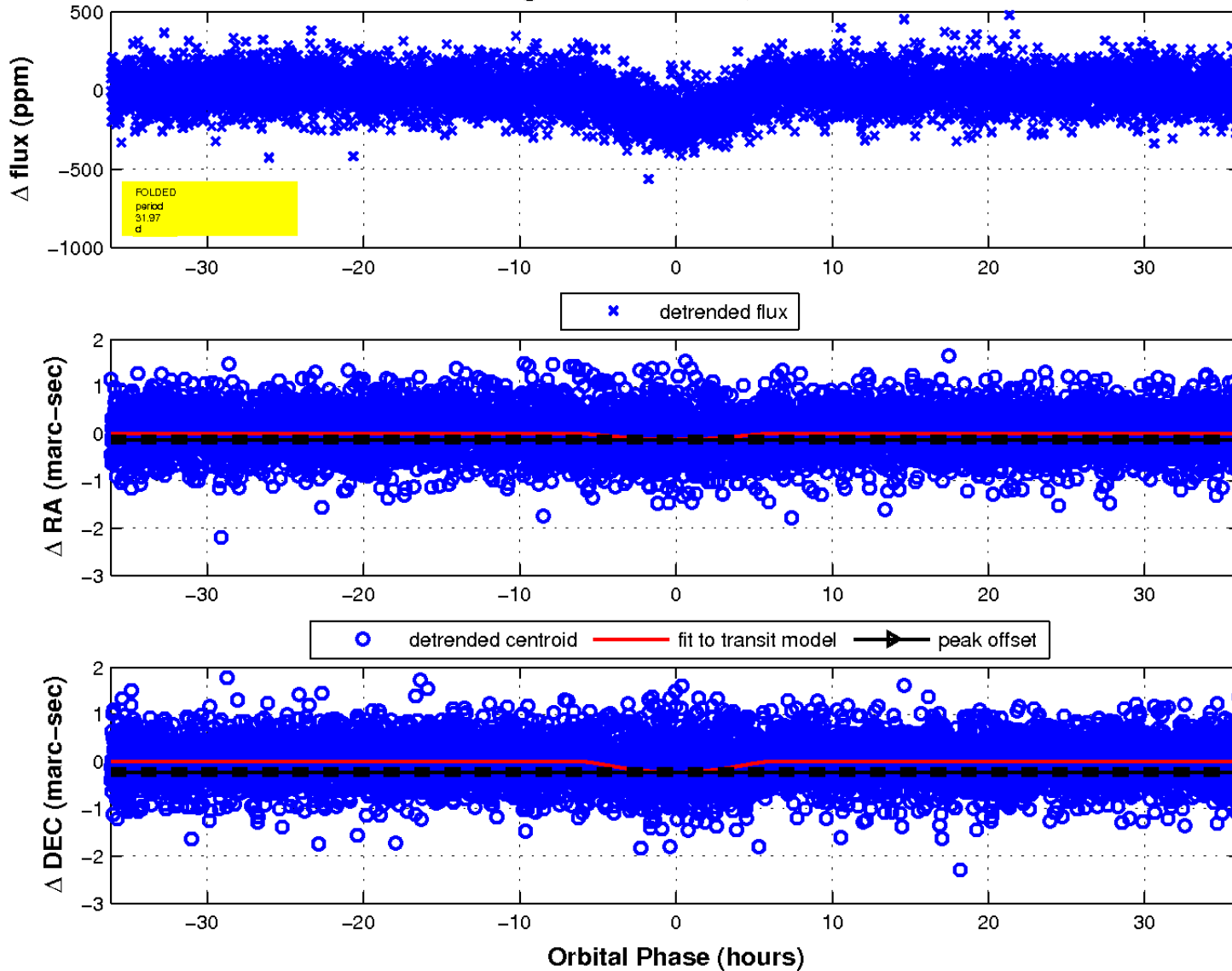




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

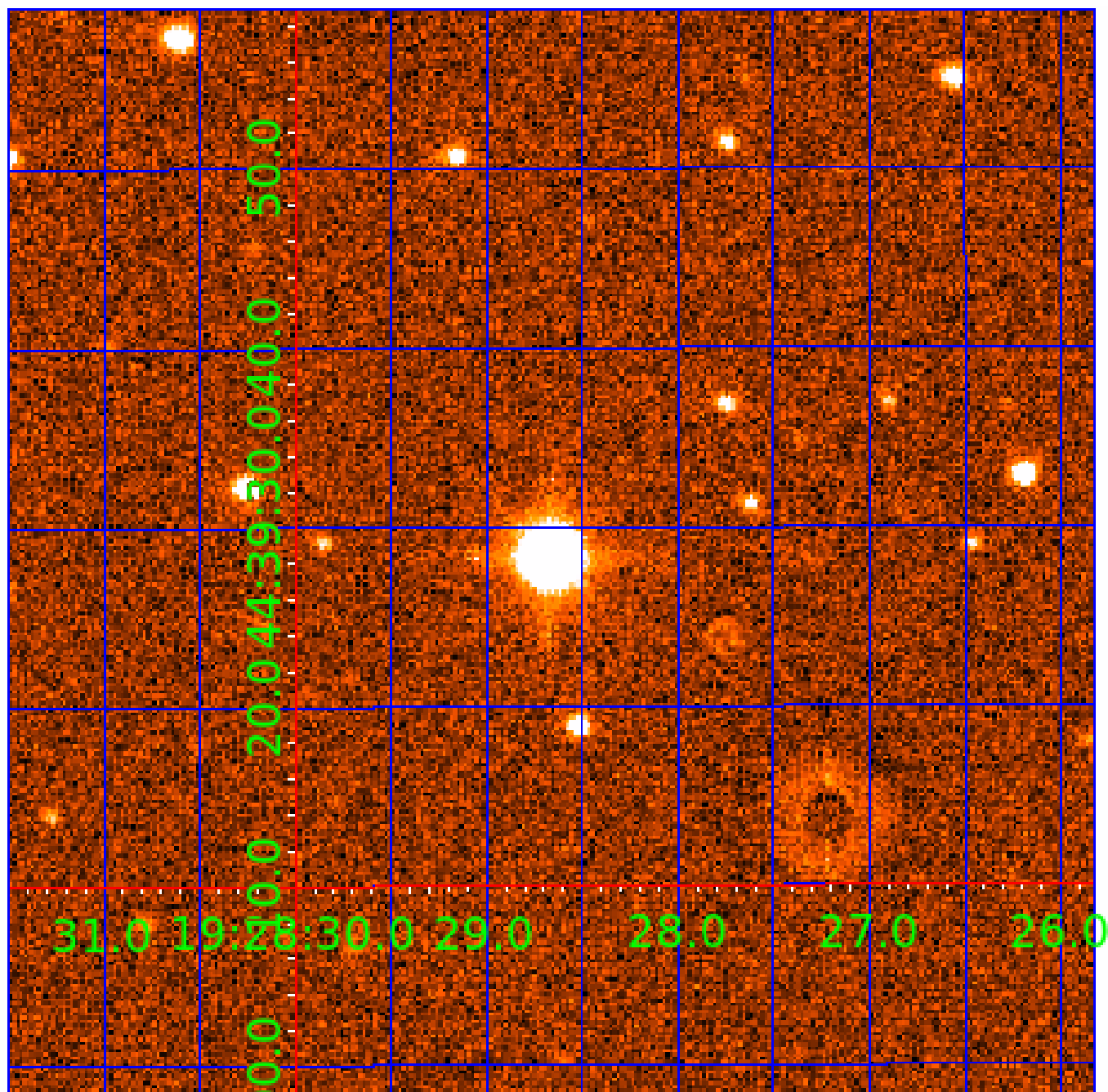


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



# KIC 008560804

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008560804-01	OBS	2969.01	31.973081	133.868512	177.5	12.056	23.5	25.8	1.76	6007	3.81	77.62
008560804-02	OBS	No	31.971526	150.650010	98.1	12.455	13.5	14.4	1.76	6007	3.54	77.63

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008560804-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—HALO_GHOST—EPHEM_MATCH
008560804-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—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.

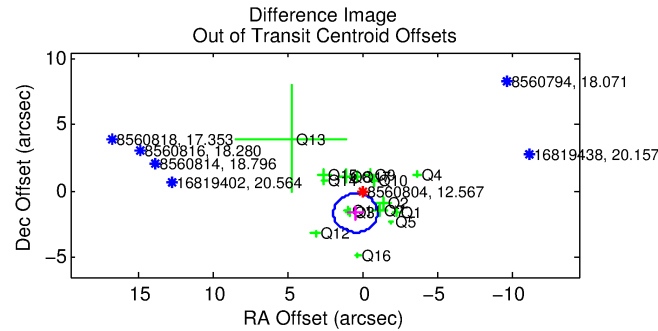
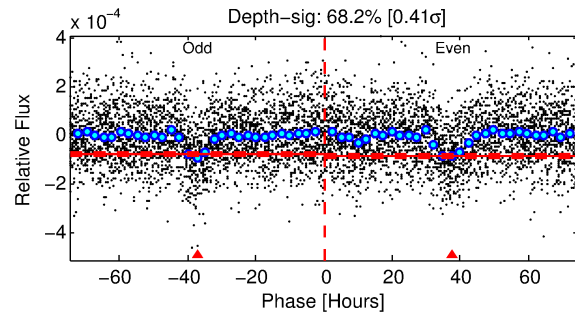
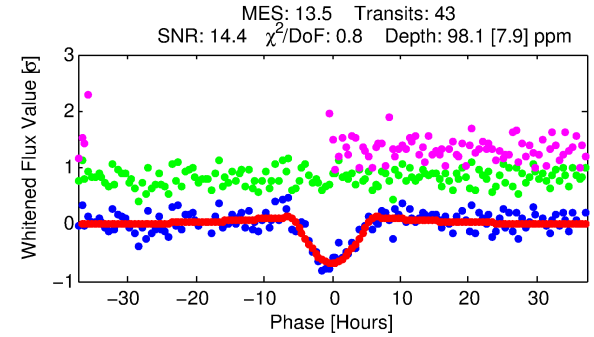
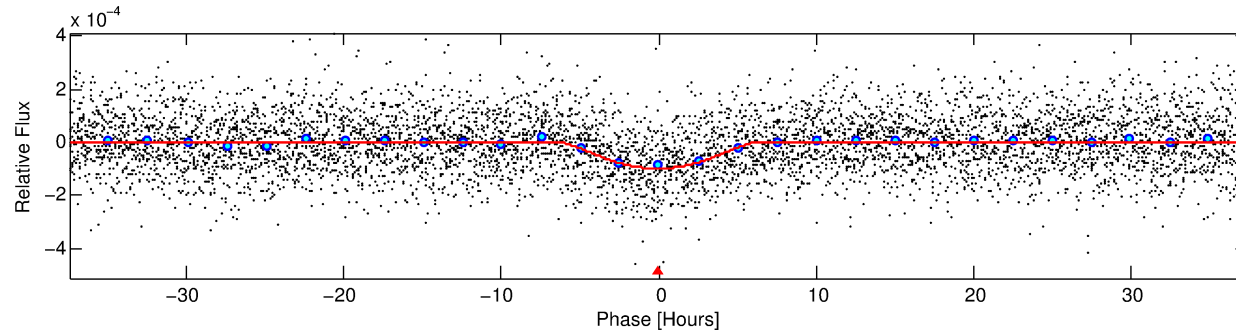
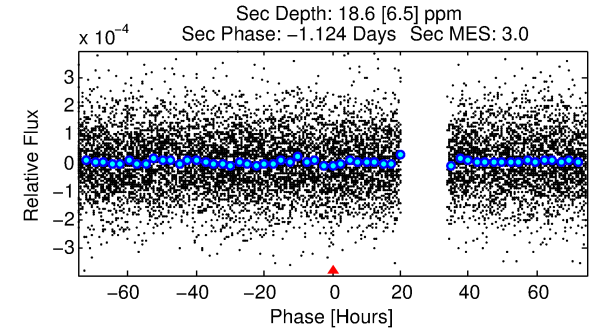
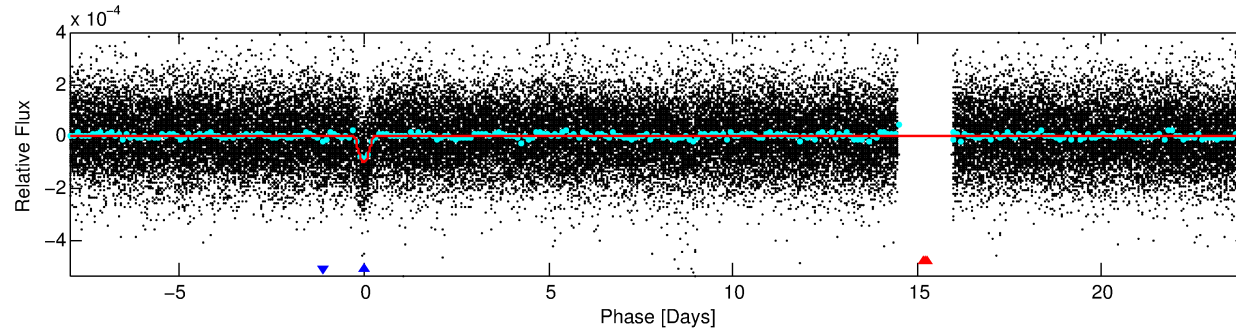
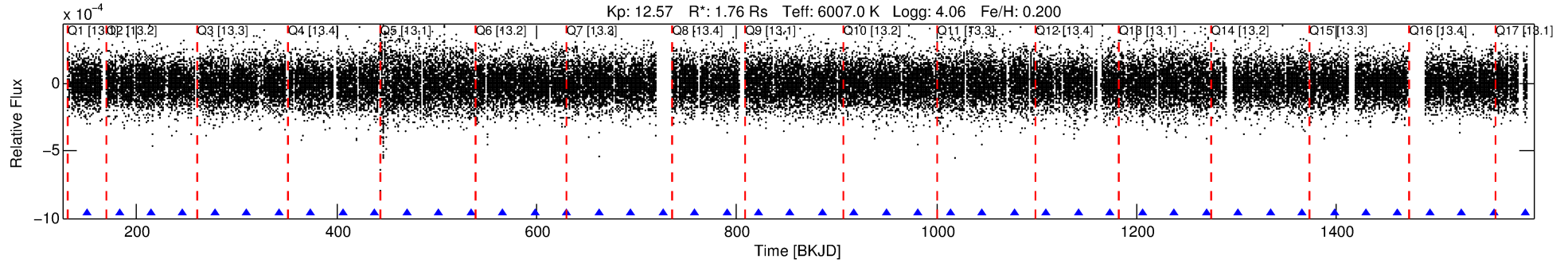
## Ephemeris Match Information For 008560804-02

TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $\mu$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
008560804-02	8560804	008560861-02	8560861	2:1	73.8	18	-5	8.50	12.57	350.45	Direct-PRF	0	3.52	1.33

**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: 8560804 Candidate: 2 of 2 Period: 31.972 d  
KOI: K02969 Corr: No Ephemeris Match



## DV Fit Results:

Period = 31.97153 [0.00066] d  
Epoch = 150.6500 [0.0174] BKJD  
Rp/R\* = 0.0184 [0.0321]  
a/R\* = 3.98 [1.81]  
b = 1.00 [0.05]  
Seff = 77.63 [24.34]  
Teff = 757 [59] K  
Rp = 3.54 [6.21] Re  
a = 0.2156 [0.0441] AU  
Ag = 37.92 [133.10] [0.28σ]  
Teffp = 2904 [2539] K [0.85σ]

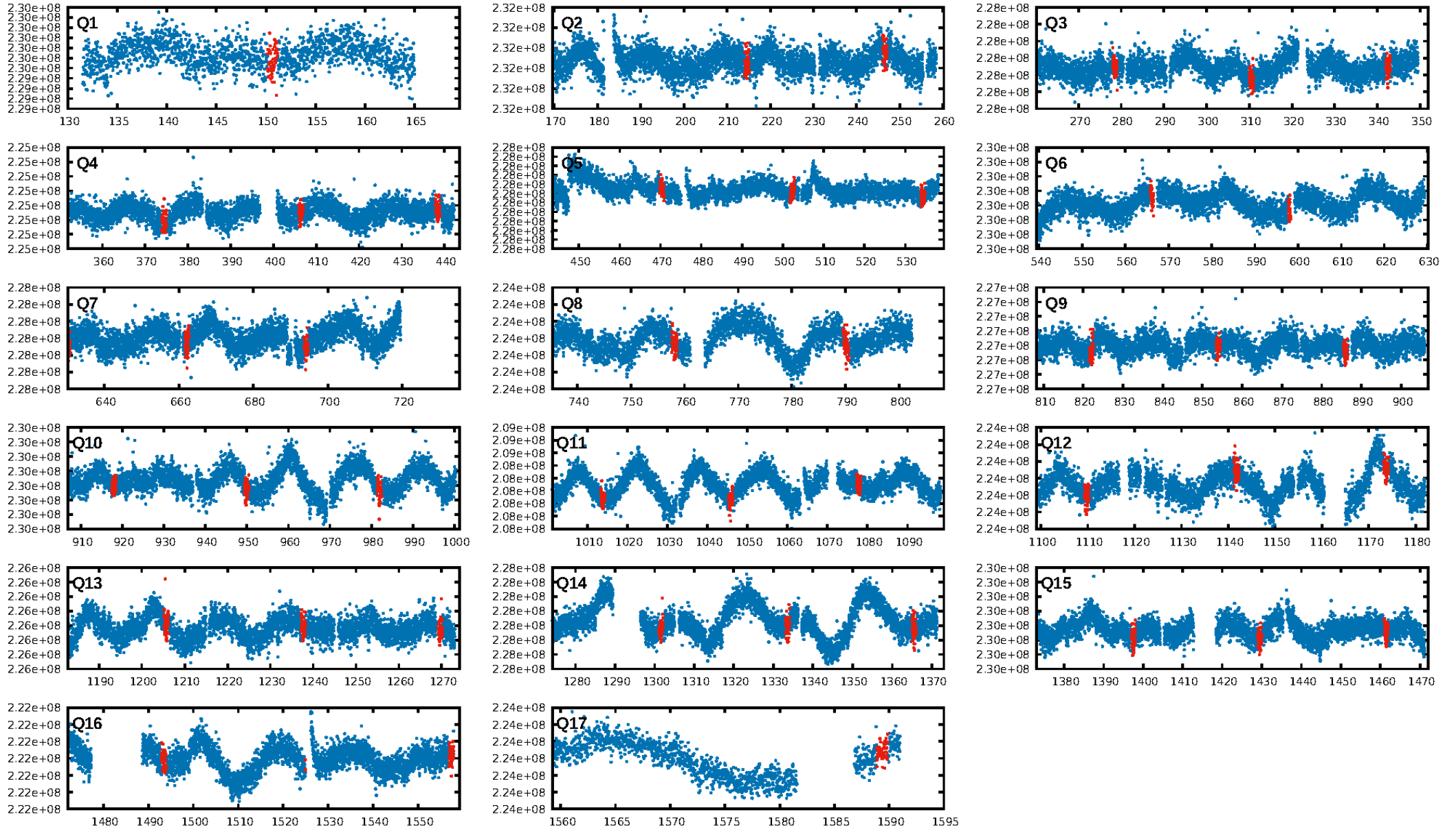
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.2% [0.00σ]  
ModelChiSquare2-sig: 22.5%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 9.59e-37  
RollingBand-fgt: 1.00 [41/41]  
GhostDiagnostic-chr: -0.1134  
Centroid-sig: 9.5%  
Centroid-so: 0.677 arcsec [1.05σ]  
OotOffset-rm: 1.711 arcsec [3.49σ]  
KicOffset-rm: 1.937 arcsec [3.53σ]  
OotOffset-st: 3/4/4/5 [16]  
KicOffset-st: 3/4/4/5 [16]  
DiffImageQuality-fgm: 0.31 [5/16]  
DiffImageOverlap-fno: 1.00 [16/16]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 13:31:10 Z

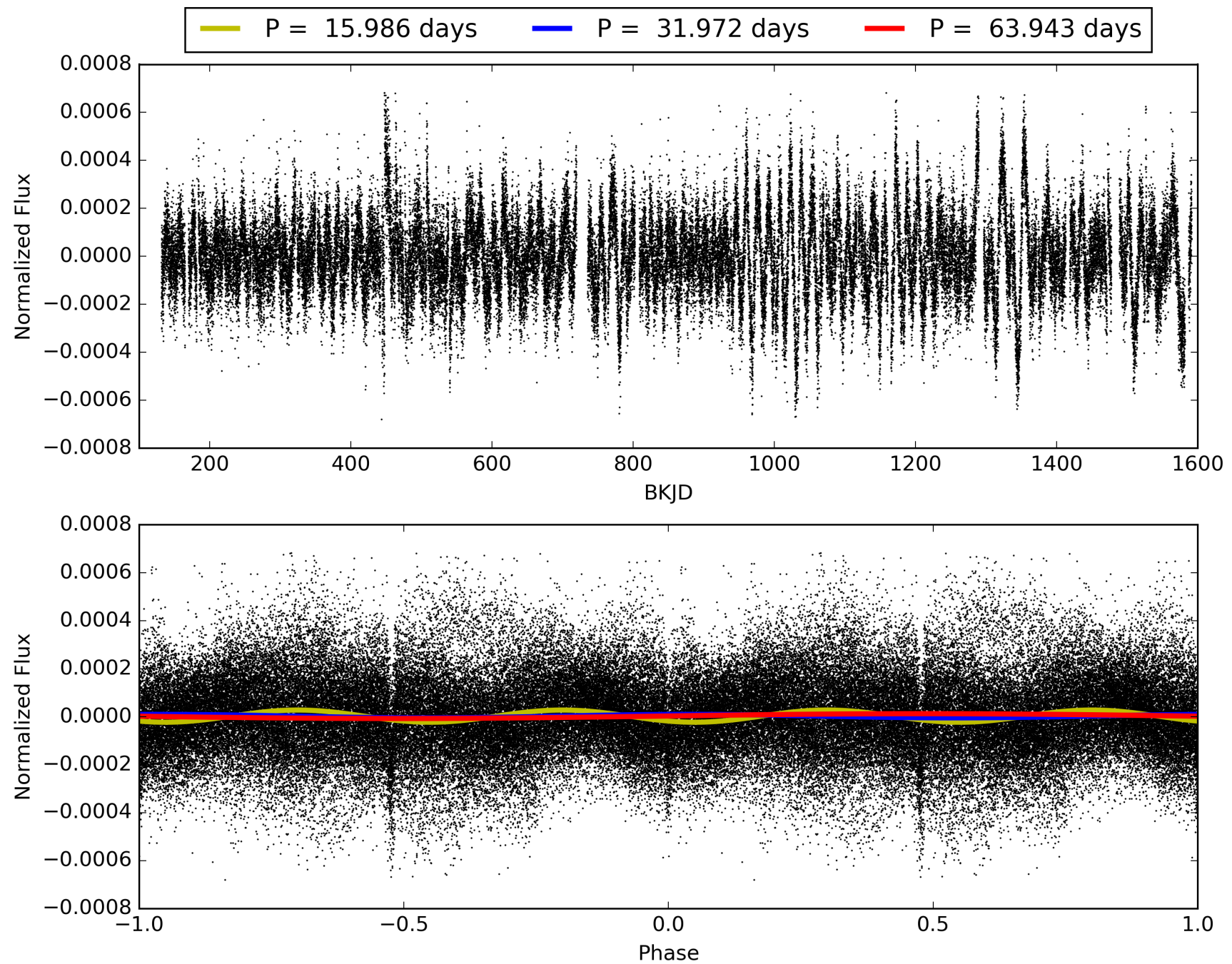
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008560804-02, PDC Light Curves



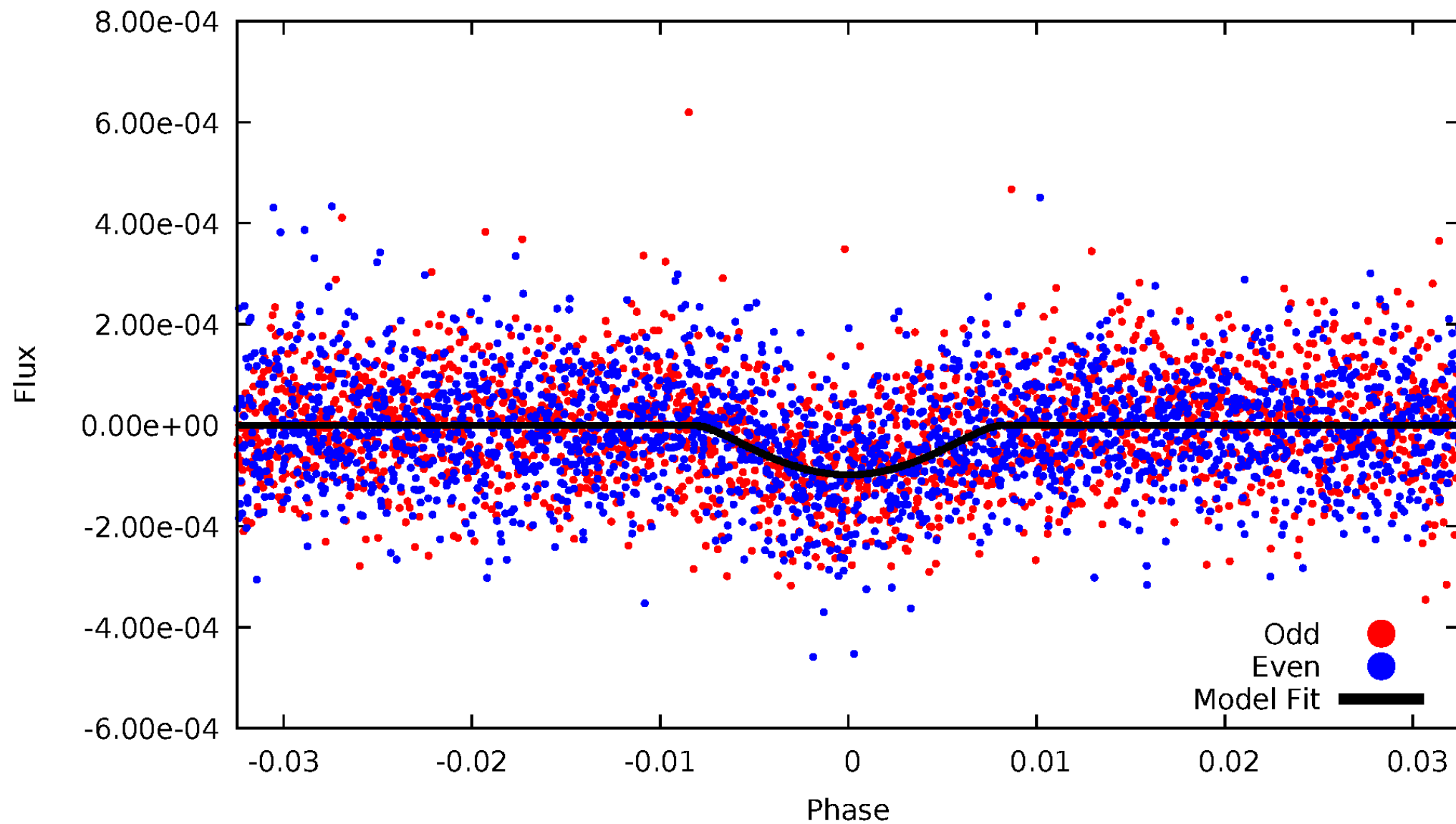


TCE 008560804-02



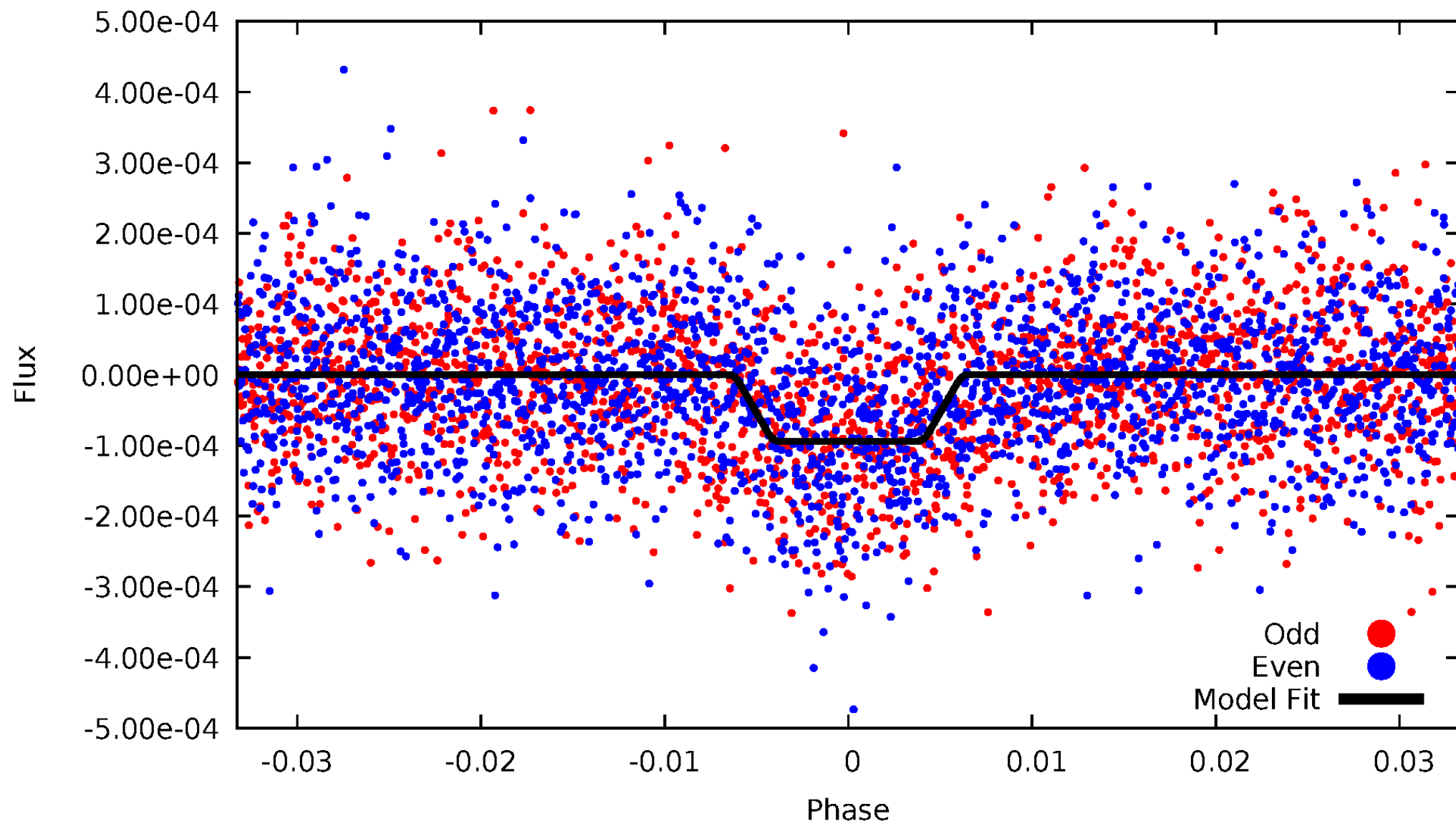
# DV Odd/Even

TCE 008560804-02



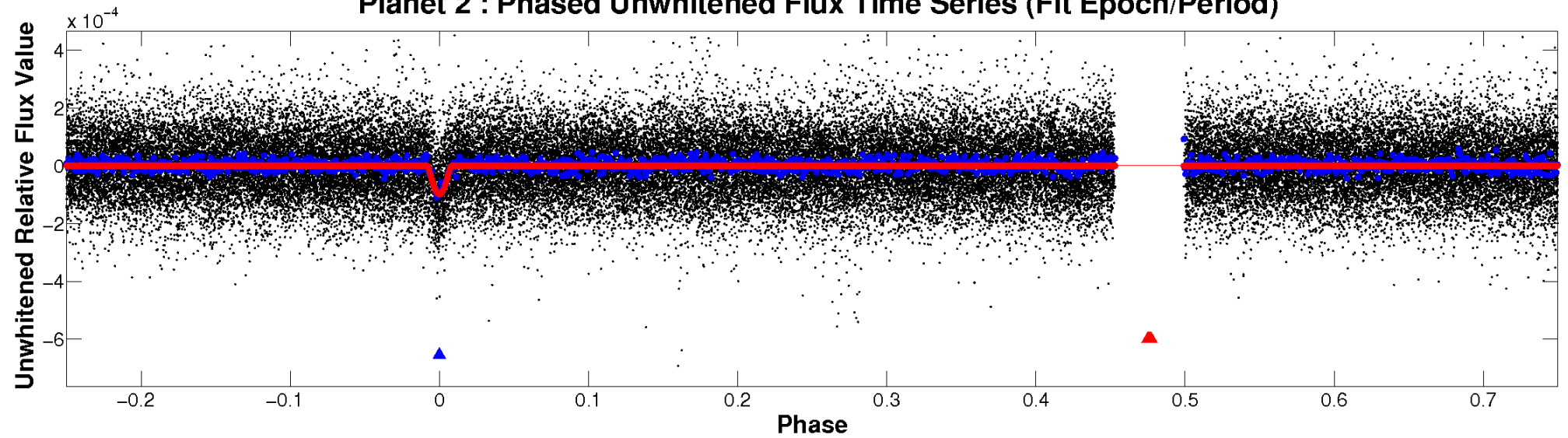
# ALT Odd/Even

TCE 008560804-02

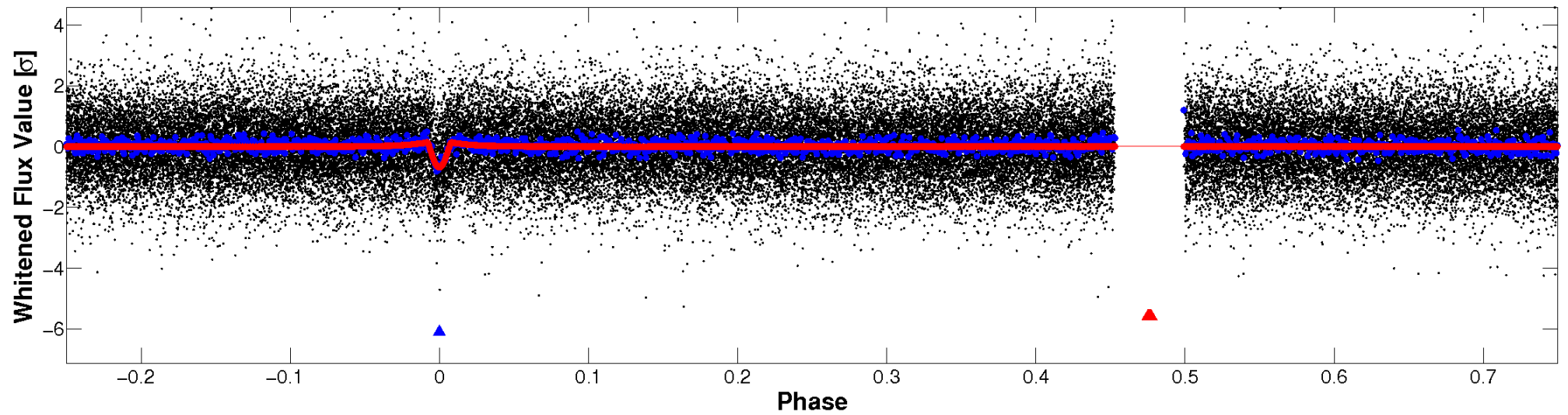


# Non-Whitened Vs. Whitened Light Curve

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

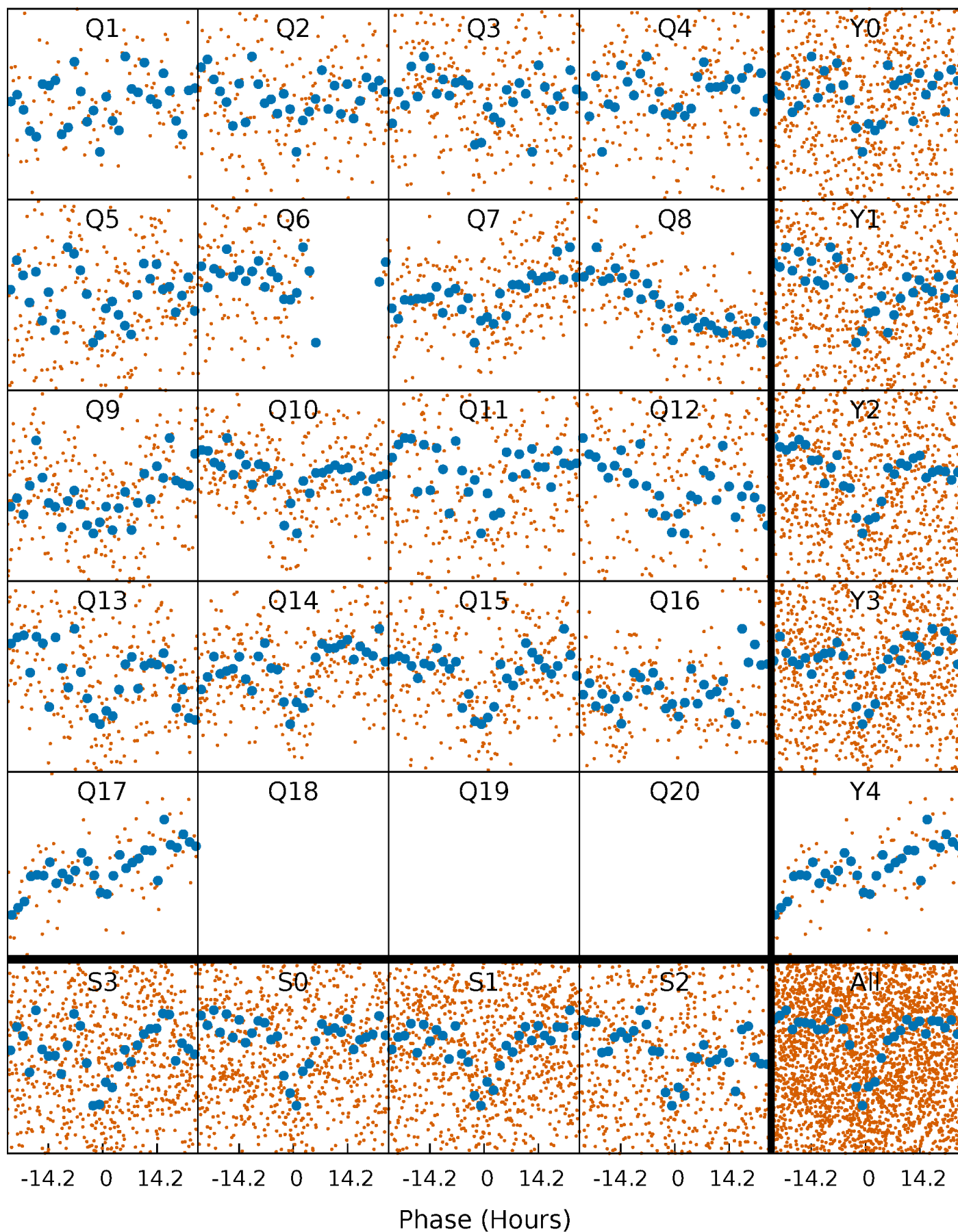


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

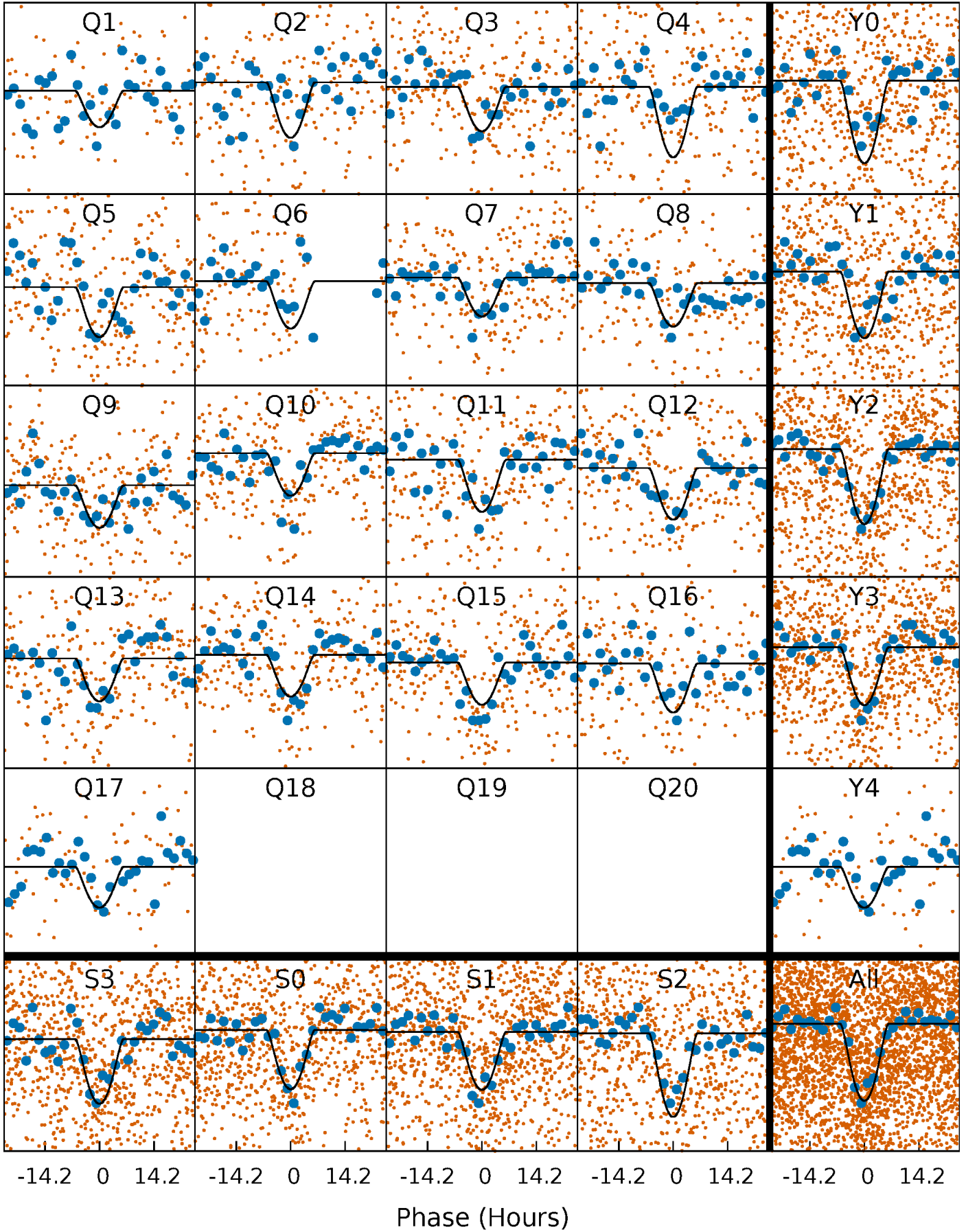
TCE 008560804-02 P= 31.971526 Days  $T_0=150.650010$  (BKJD)





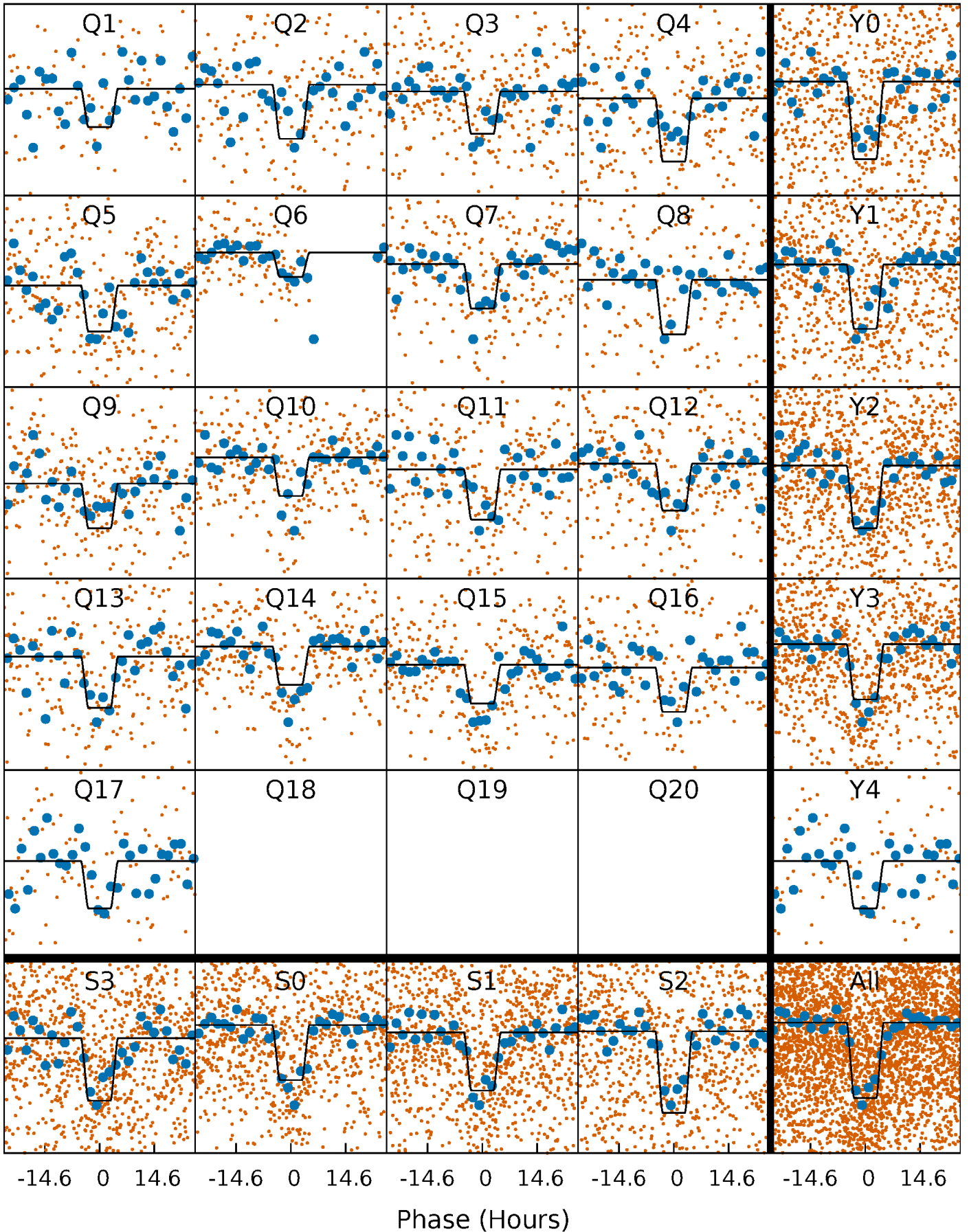
# DV Quarter-Phased Transit Curves

TCE 008560804-02 P= 31.971526 Days  $T_0=150.650010$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

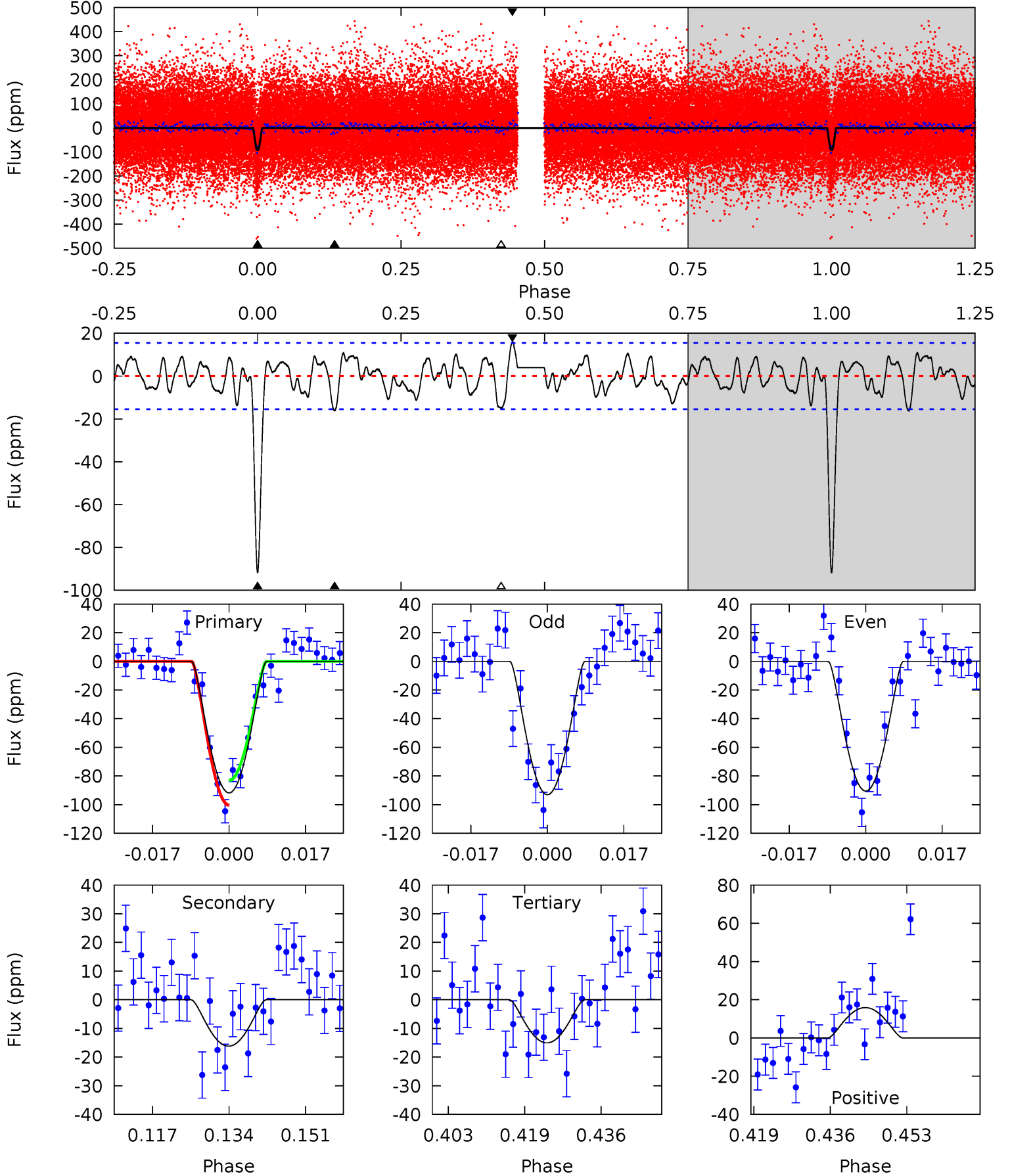
TCE 008560804-02 P= 31.971457 Days  $T_0=150.652650$  (BKJD)



# DV Model-Shift Uniqueness Test

008560804-02,  $P = 31.971526$  Days,  $E = 118.678484$  Days

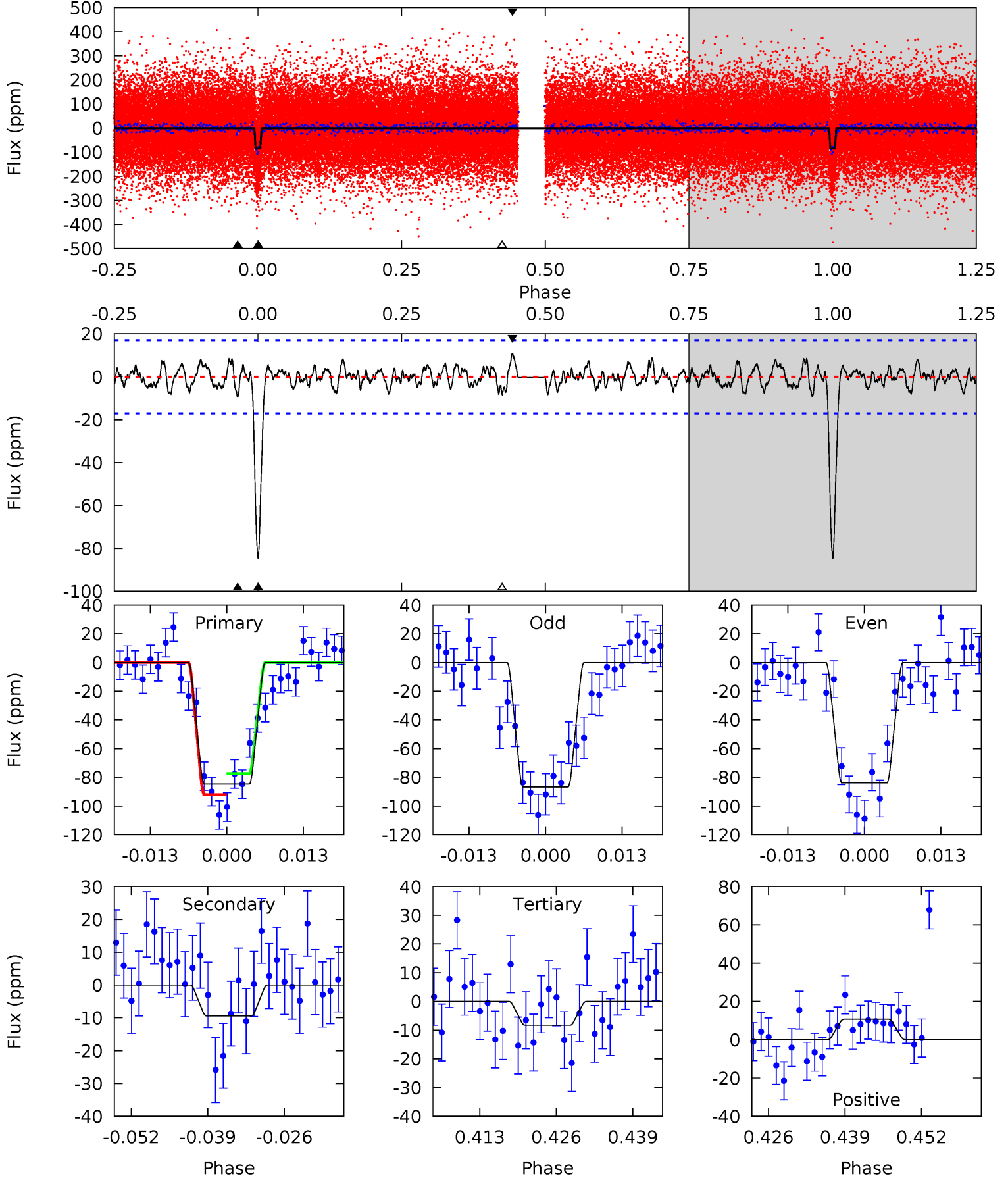
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
29.2	5.14	4.78	5.05	4.93	2.39	1.91	24.4	24.1	0.36	0.09	0.41	1.17	0.15	2.74



# Alt Model-Shift Uniqueness Test

008560804-02, P = 31.971457 Days, E = 118.681193 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
24.7	2.74	2.42	3.12	4.98	2.49	1.04	22.3	21.6	0.32	-0.38	0.41	0.99	0.11	2.14



### Stellar Parameters For KIC 008560804

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6007^{+81}_{-81}$	$4.064^{+0.174}_{-0.101}$	$0.200^{+0.150}_{-0.100}$	$1.759^{+0.297}_{-0.409}$	$1.311^{+0.120}_{-0.173}$	$0.339^{+0.310}_{-0.119}$
	+1%/-1%	+4%/-2%	+75%/-50%	+17%/-23%	+9%/-13%	+91%/-35%
Source	SPE68	SPE68	SPE68	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 008560804-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-16 \pm 3$	$5.61^{+5.42}_{-3.65}$	$1053^{+47}_{-59}$	$2882^{+1125}_{-462}$	$13^{+97}_{-10}$
Alt.	$-9 \pm 3$	$4.80^{+4.90}_{-3.33}$	$1051^{+48}_{-58}$	$2789^{+1259}_{-483}$	$9.750^{+103.231}_{-7.402}$

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

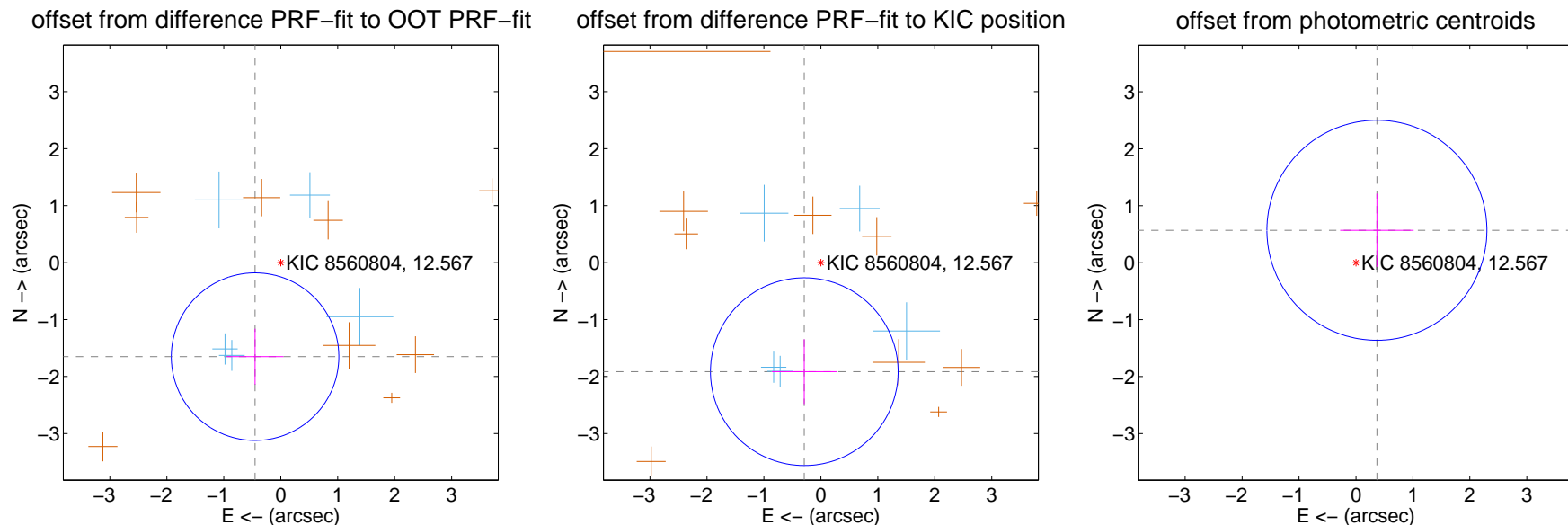
## DV Centroid Data

Supplemental centroid analysis for 008560804-02. Kepler magnitude: 12.57. Transit SNR 14.43

There are 5 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.37 arcsec

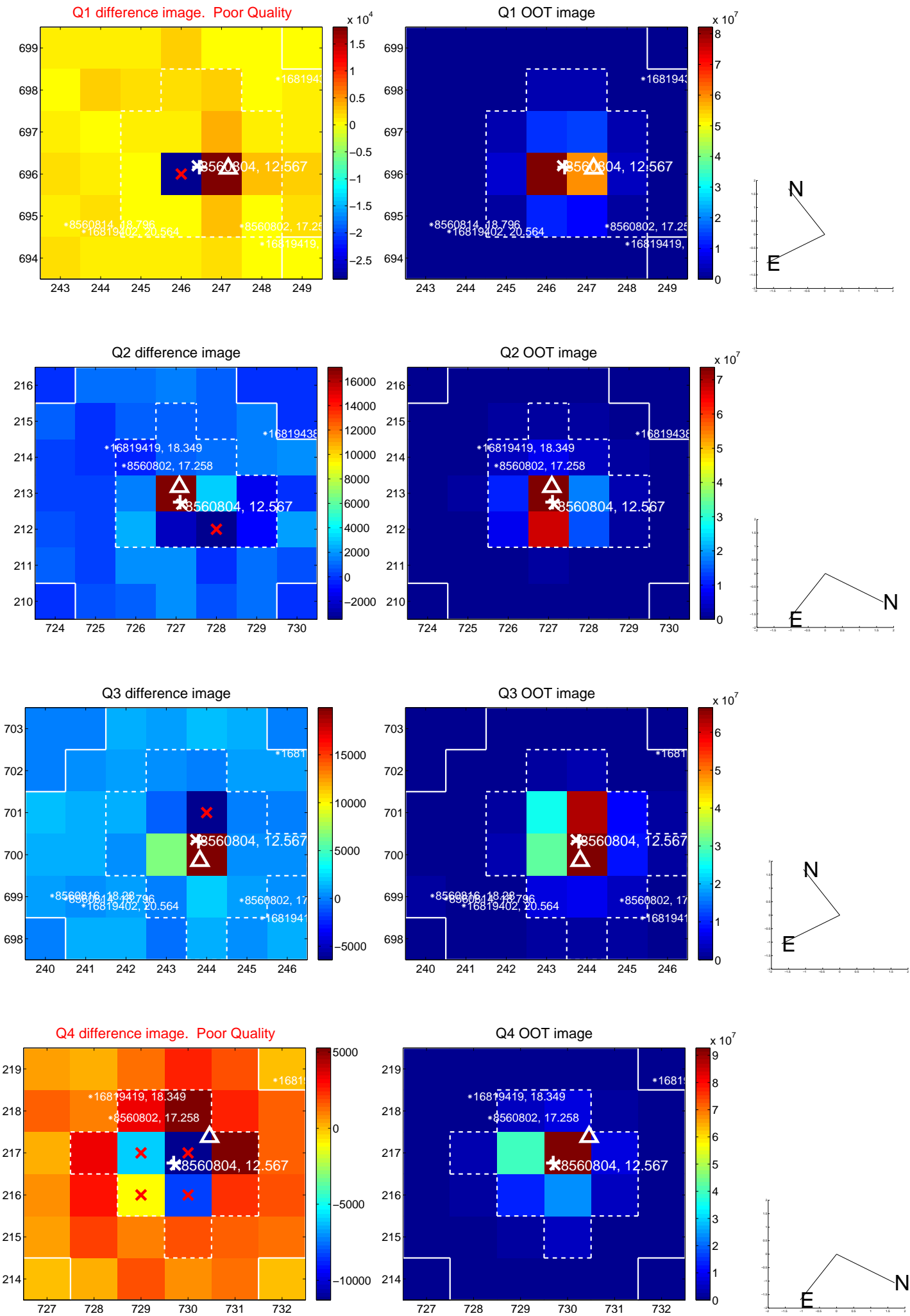
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.711 \pm 0.490$	$3.49$	$0.451 \pm 0.497$	$-1.651 \pm 0.490$
PRF-fit source offset from KIC position	$1.937 \pm 0.549$	$3.53$	$0.291 \pm 0.568$	$-1.915 \pm 0.569$
photometric centroid source offset	$0.68 \pm 0.64$	1.05	$-0.37 \pm 0.65$	$0.57 \pm 0.64$



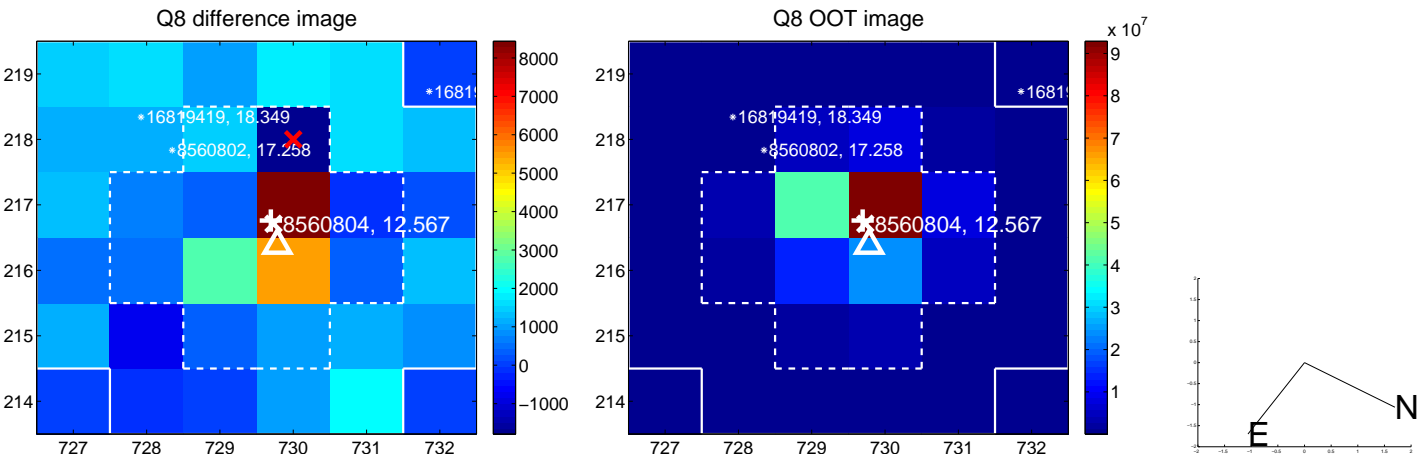
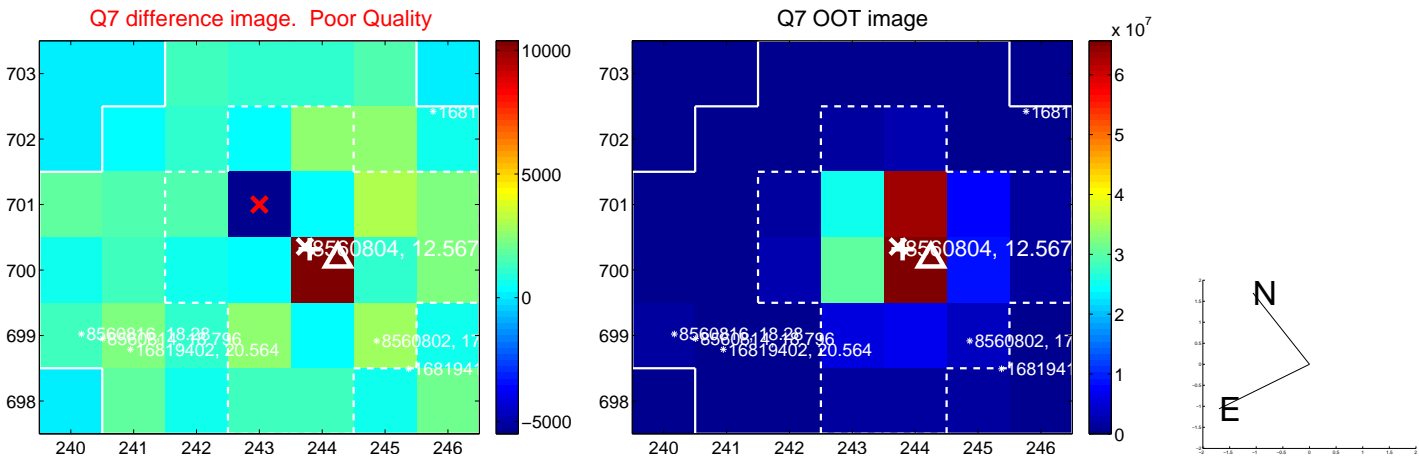
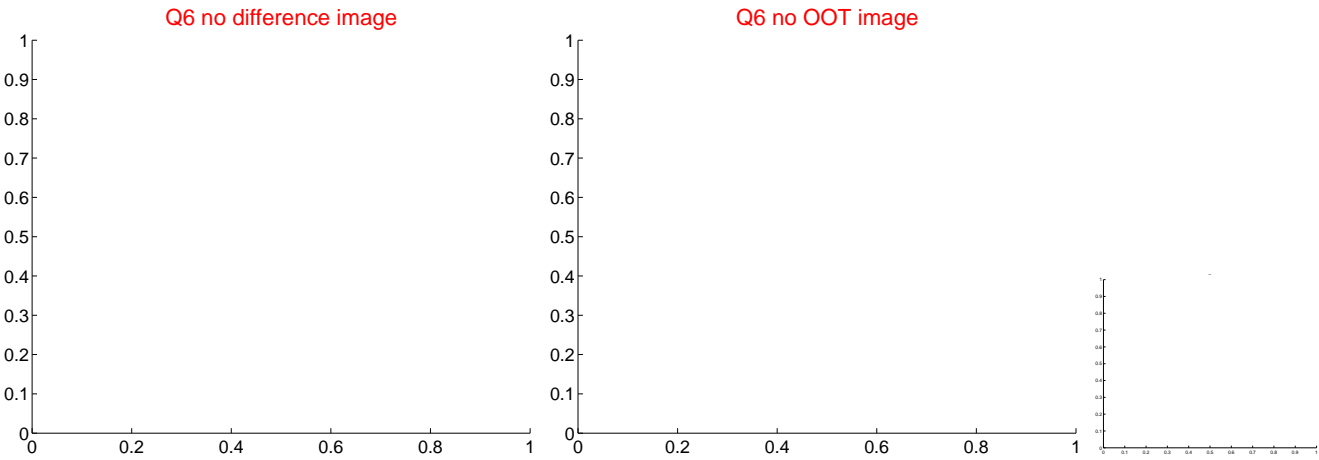
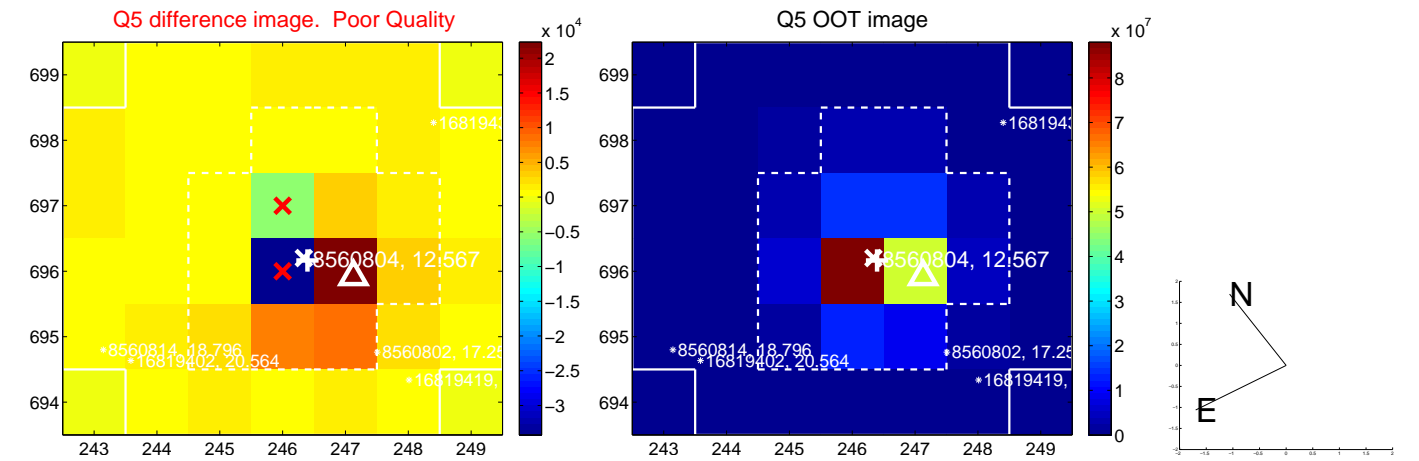
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



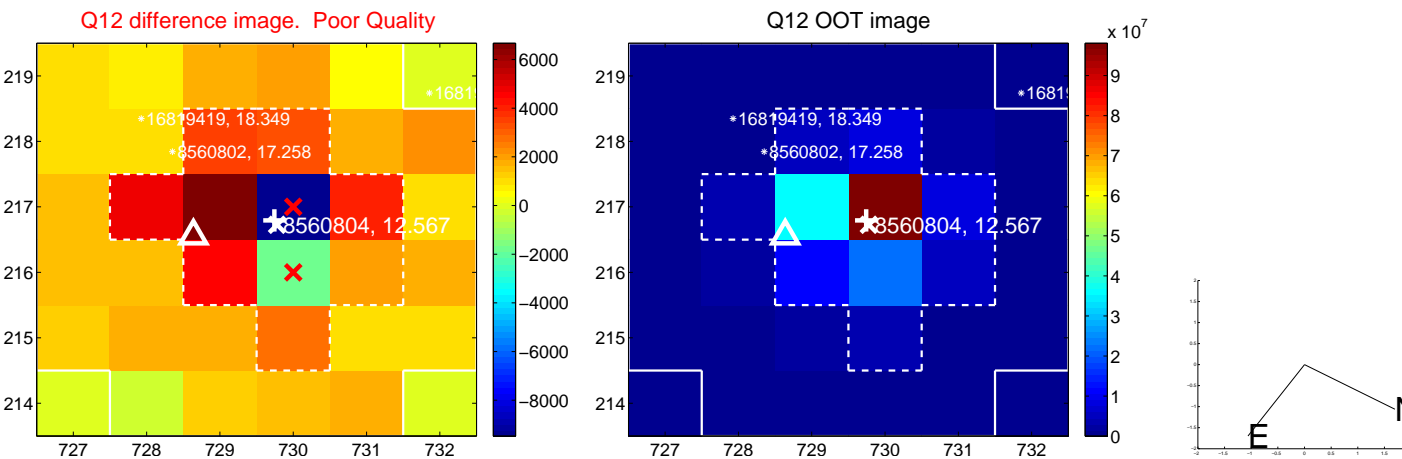
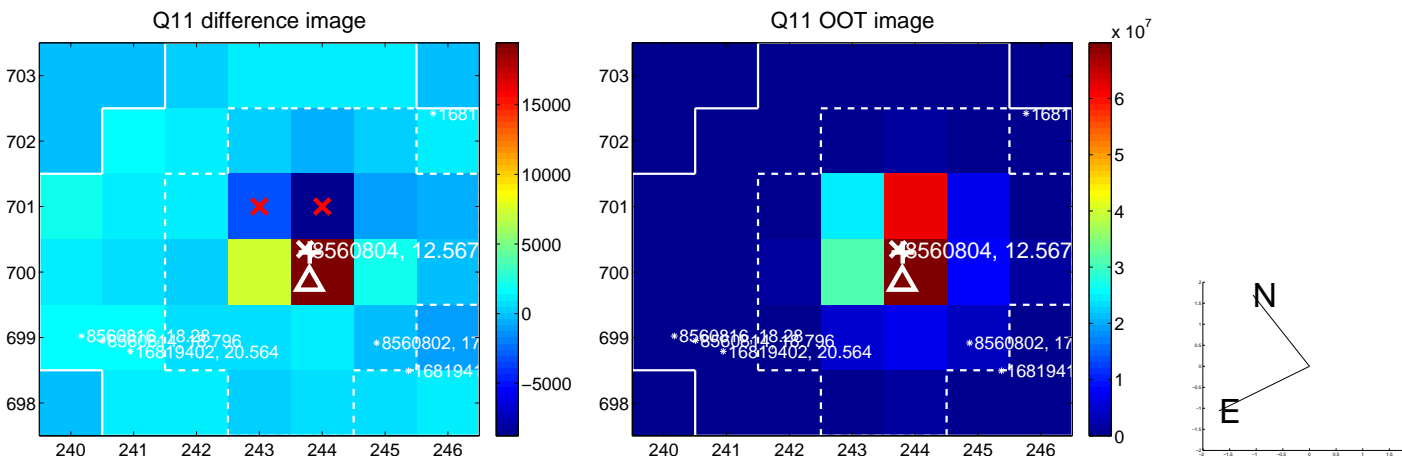
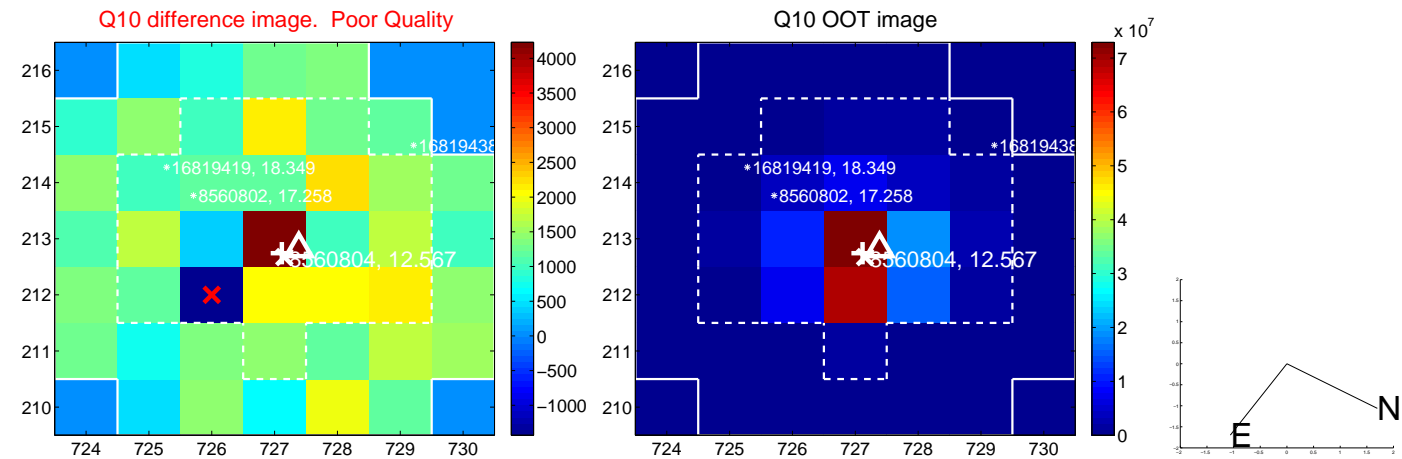
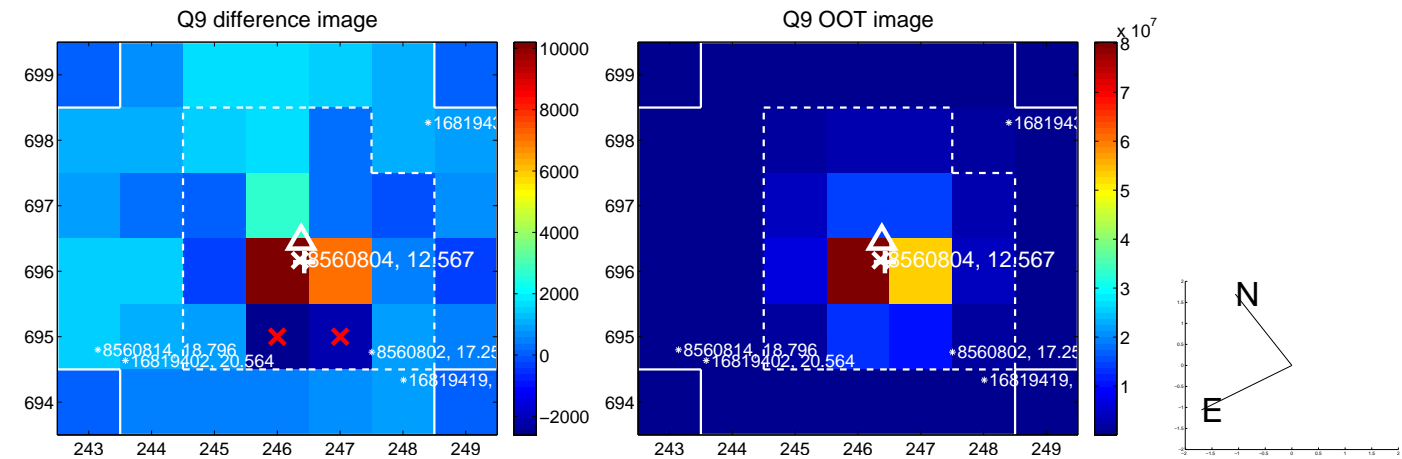
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



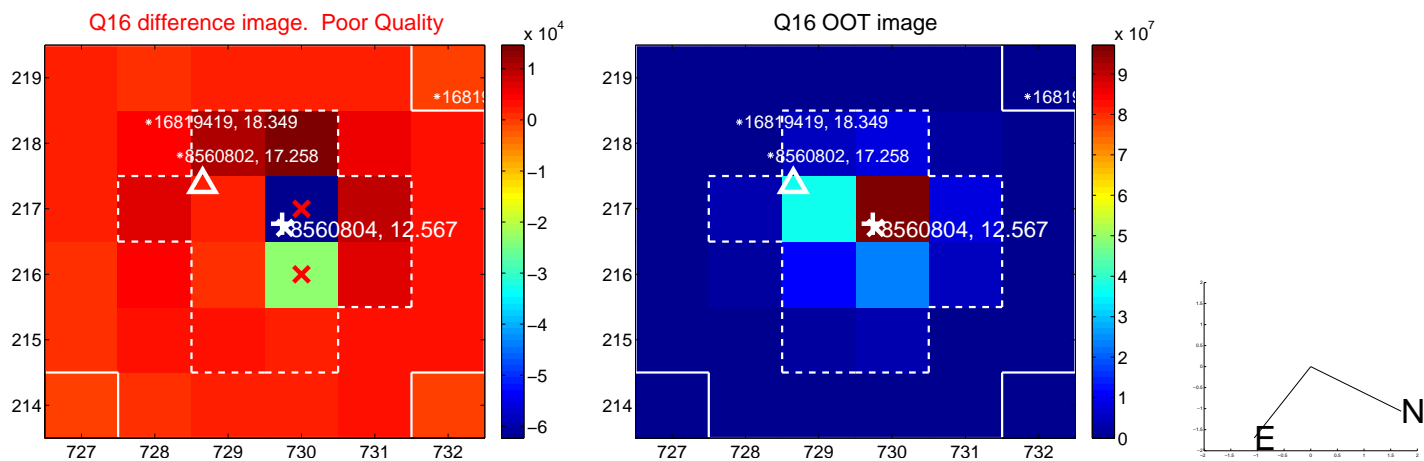
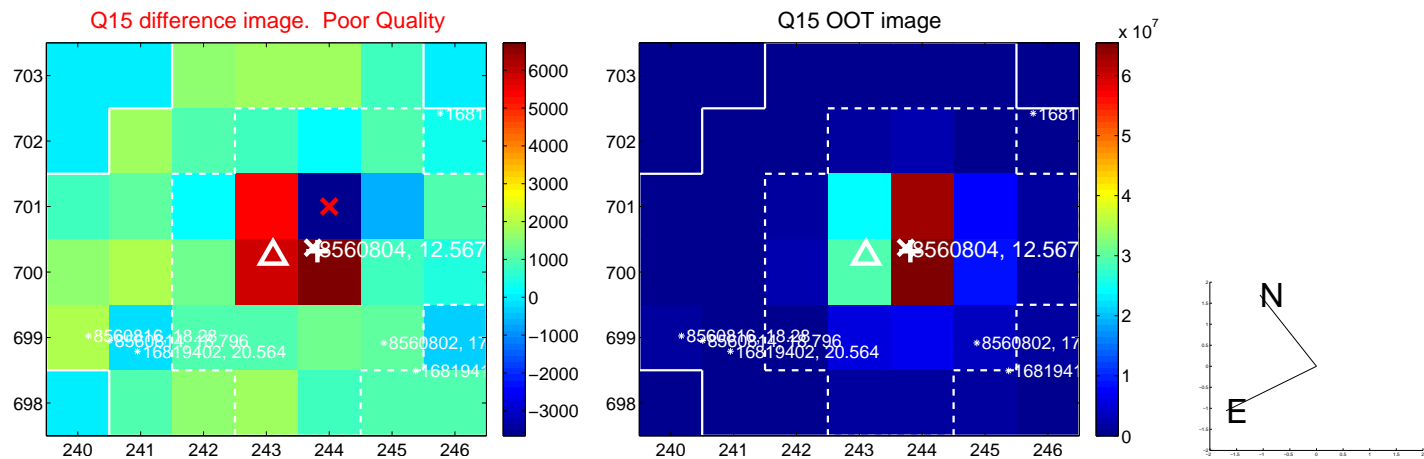
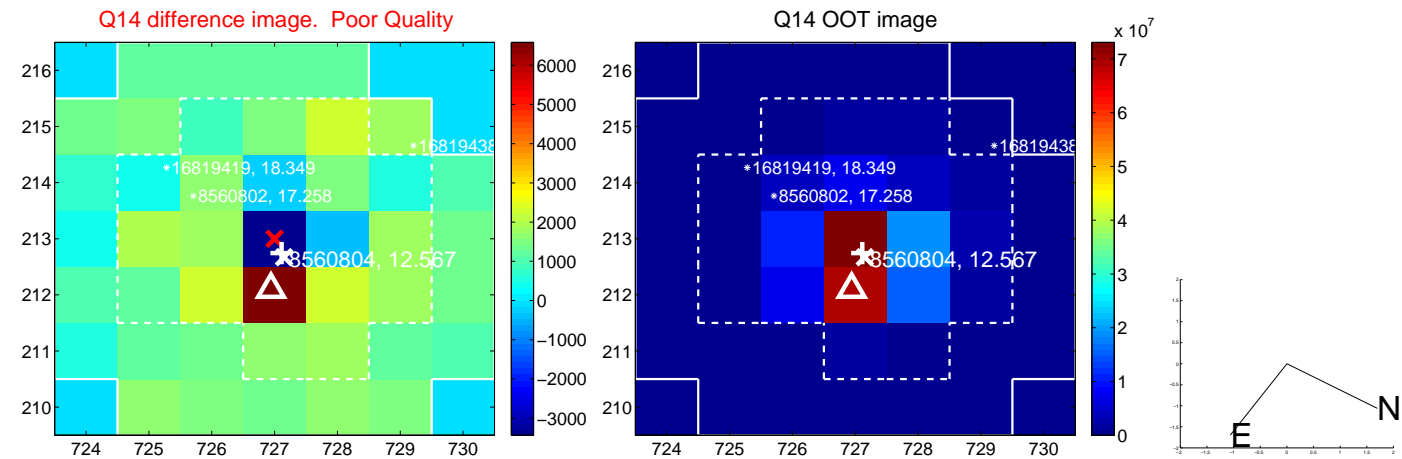
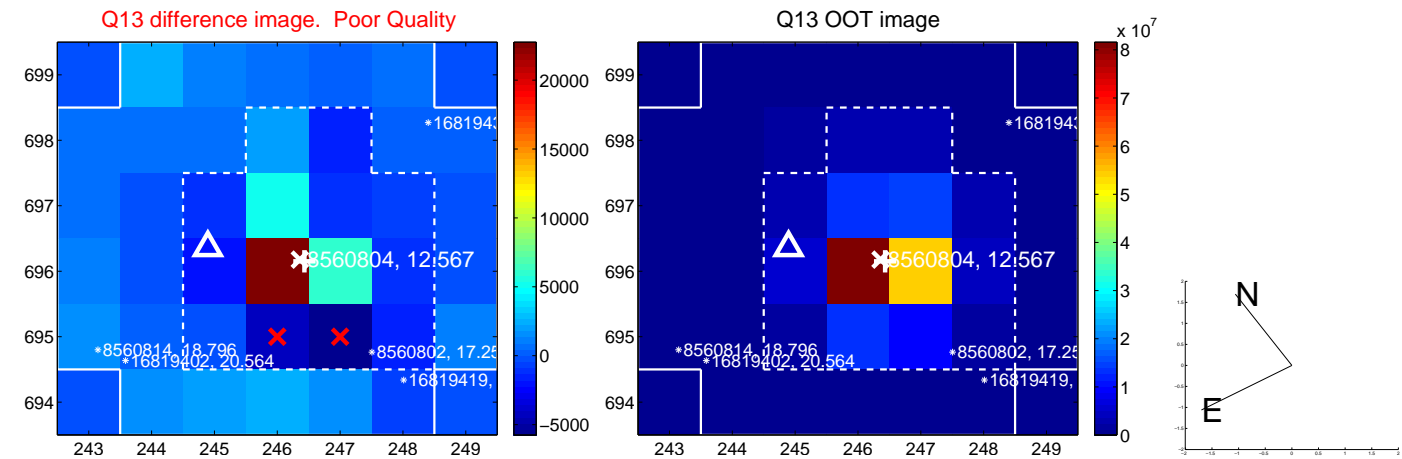
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



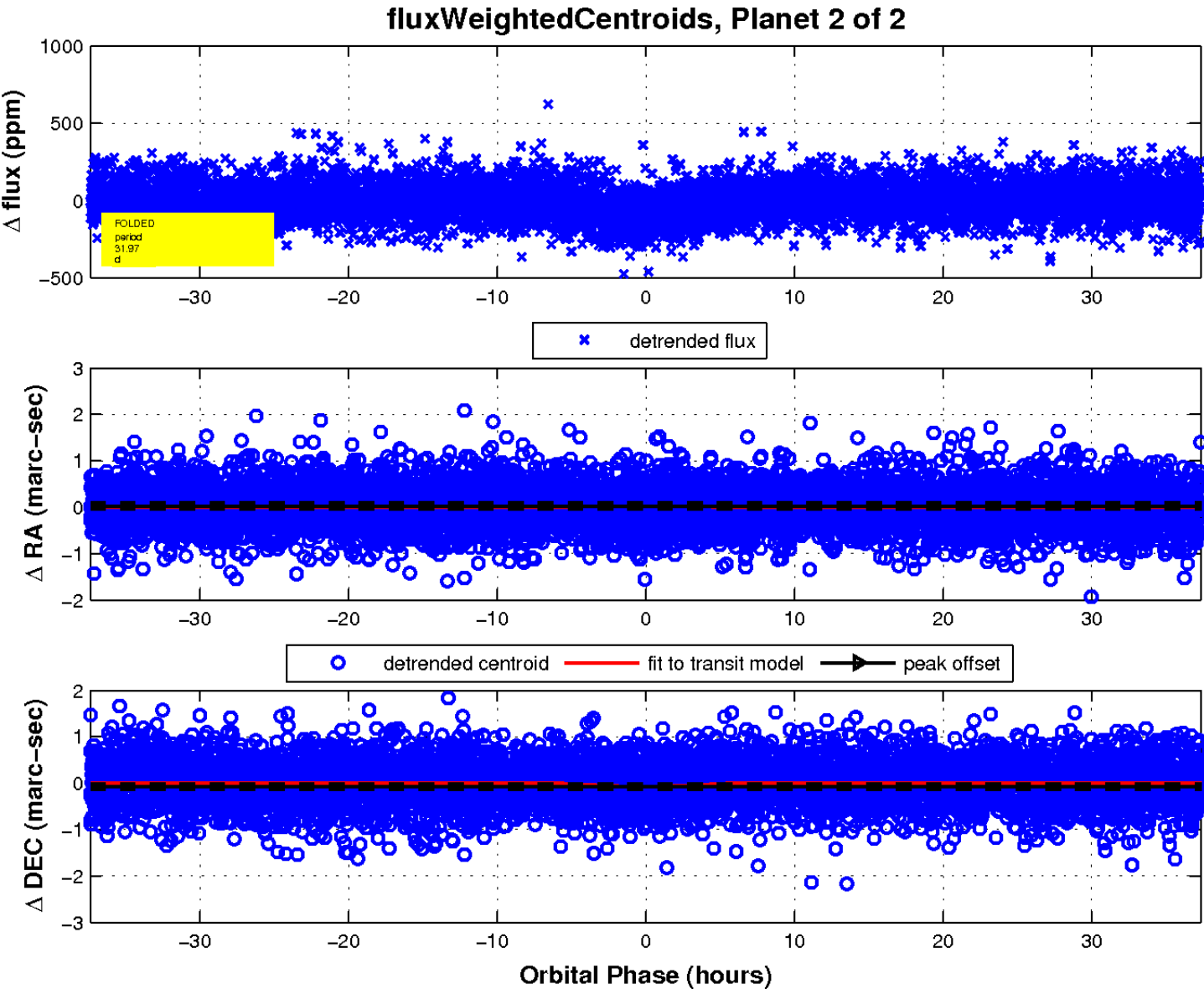
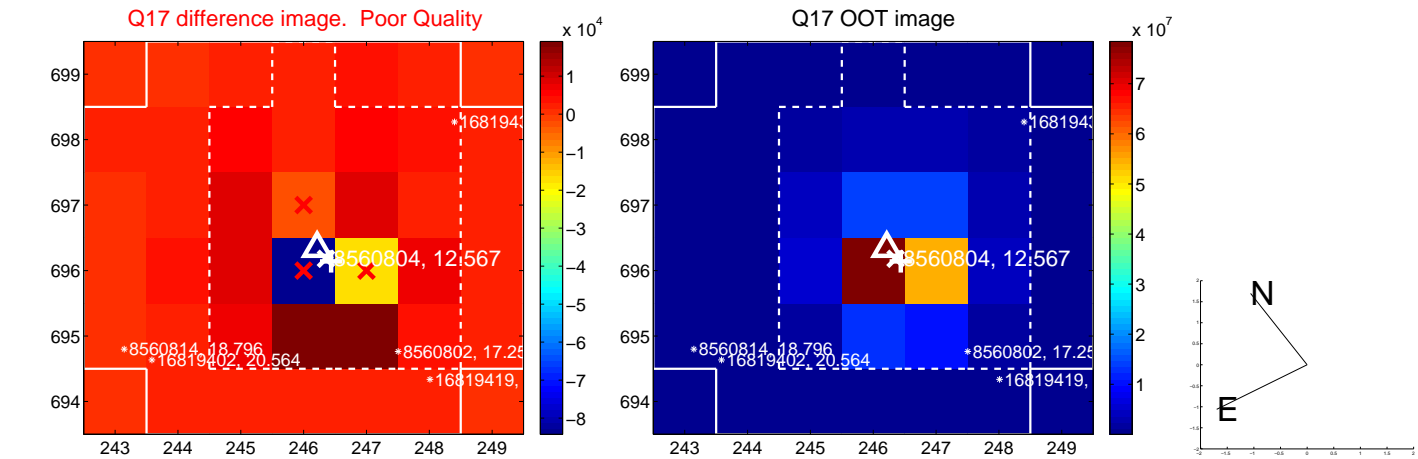
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image

Declination

