

# KIC 008043968

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008043968-01	OBS	5469.01	1.559201	132.480609	80.0	4.025	14.6	14.3	0.86	5764	0.91	1092.93
008043968-02	OBS	No	1.559140	131.731521	70.3	4.030	12.7	13.3	0.86	5764	0.85	1092.99

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008043968-01	OBS	FP	0.00	0	1	0	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—EPHEM_MATCH
008043968-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_UNRESOLVED_OFFSET—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 008043968-01

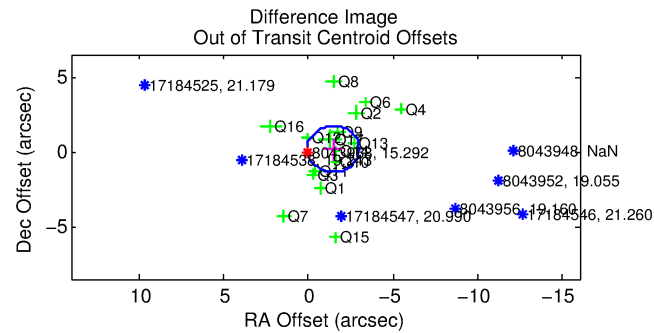
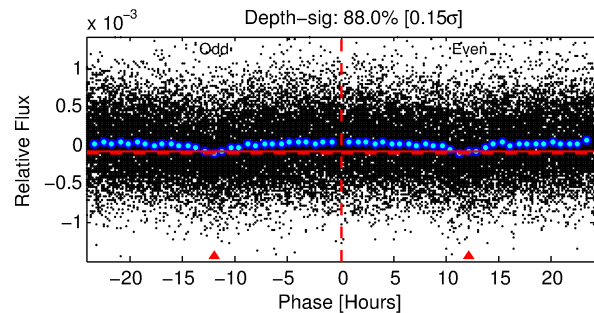
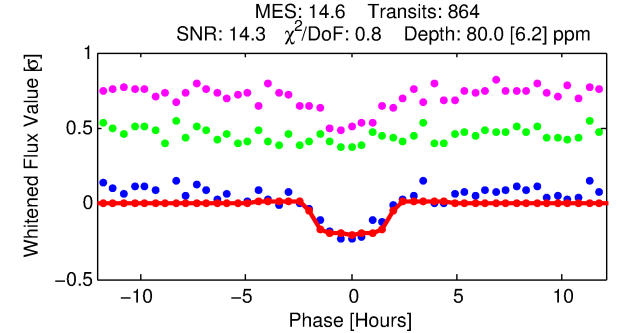
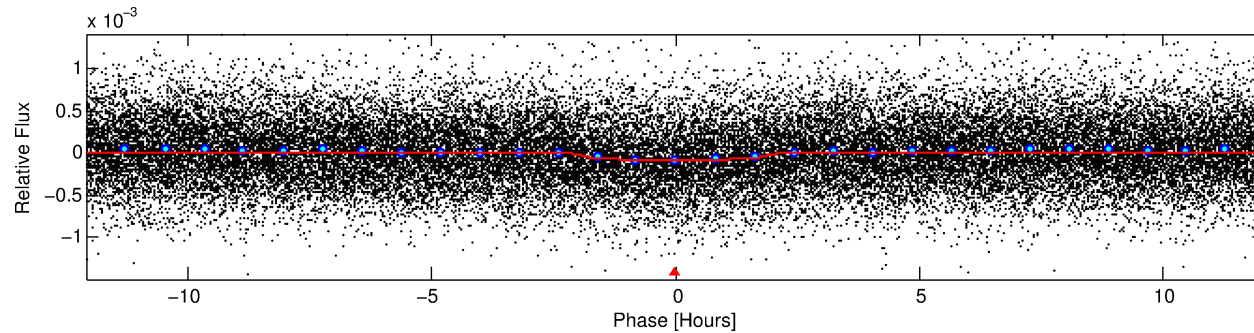
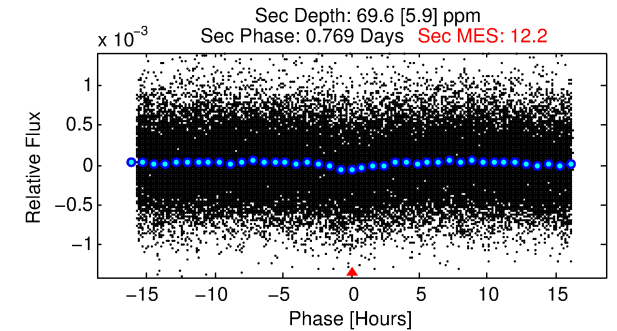
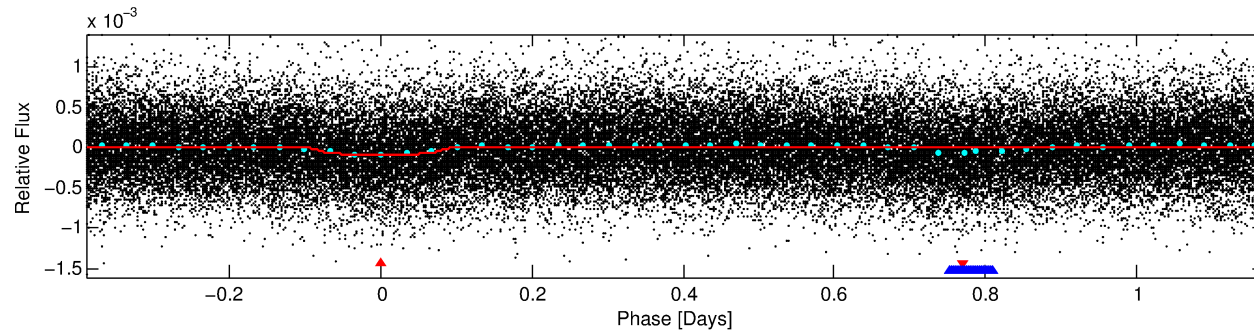
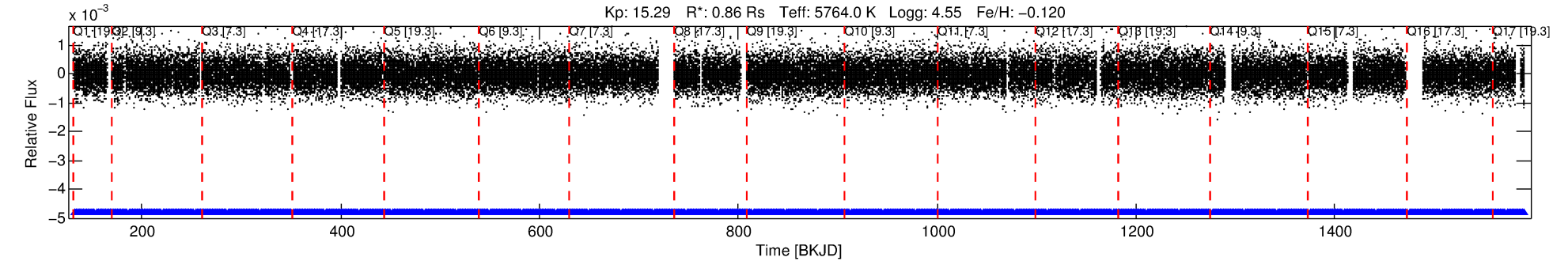
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
008043968-01	8043968	008043961-pri	8043961	1:1	83.8	-11	-17	10.74	15.30	2833.80	Direct-PRF	0	0.54	0.64

**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: 8043968 Candidate: 1 of 2 Period: 1.559 d

KOI: K05469 Corr: No Ephemeris Match



## DV Fit Results:

Period = 1.55920 [0.00001] d  
Epoch = 132.4806 [0.0035] BKJD  
Rp/R\* = 0.0097 [0.0041]  
a/R\* = 1.68 [2.23]  
b = 0.89 [0.48]  
Seff = 1092.94 [421.02]  
Teff = 1466 [141] K  
Rp = 0.91 [0.47] Re  
a = 0.0260 [0.0065] AU  
Ag = 31.17 [28.80] [1.05σ]  
**Teffp = 5356 [1147] K [3.37σ]**

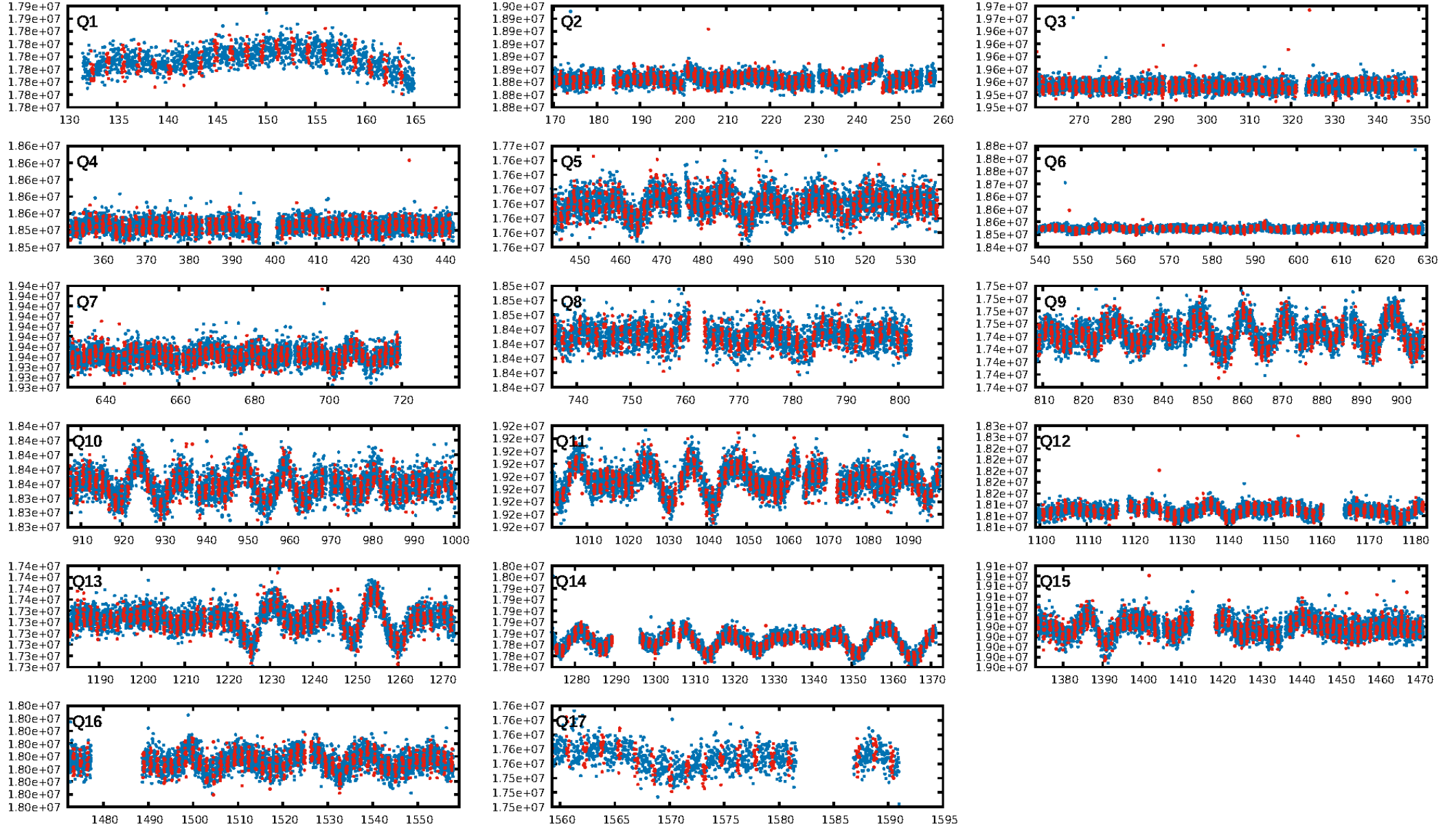
## DV Diagnostic Results:

**ShortPeriod-sig: 0.0% [0.00σ]**  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 3.34e-56  
RollingBand-fgt: 1.00 [826/826]  
**GhostDiagnostic-chr: 0.2551**  
Centroid-sig: 1.4%  
Centroid-so: 1.867 arcsec [2.33σ]  
OotOffset-rm: 1.458 arcsec [2.84σ]  
**KicOffset-rm: 1.504 arcsec [3.24σ]**  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.19 [3/16]  
DiffImageOverlap-fno: 1.00 [17/17]

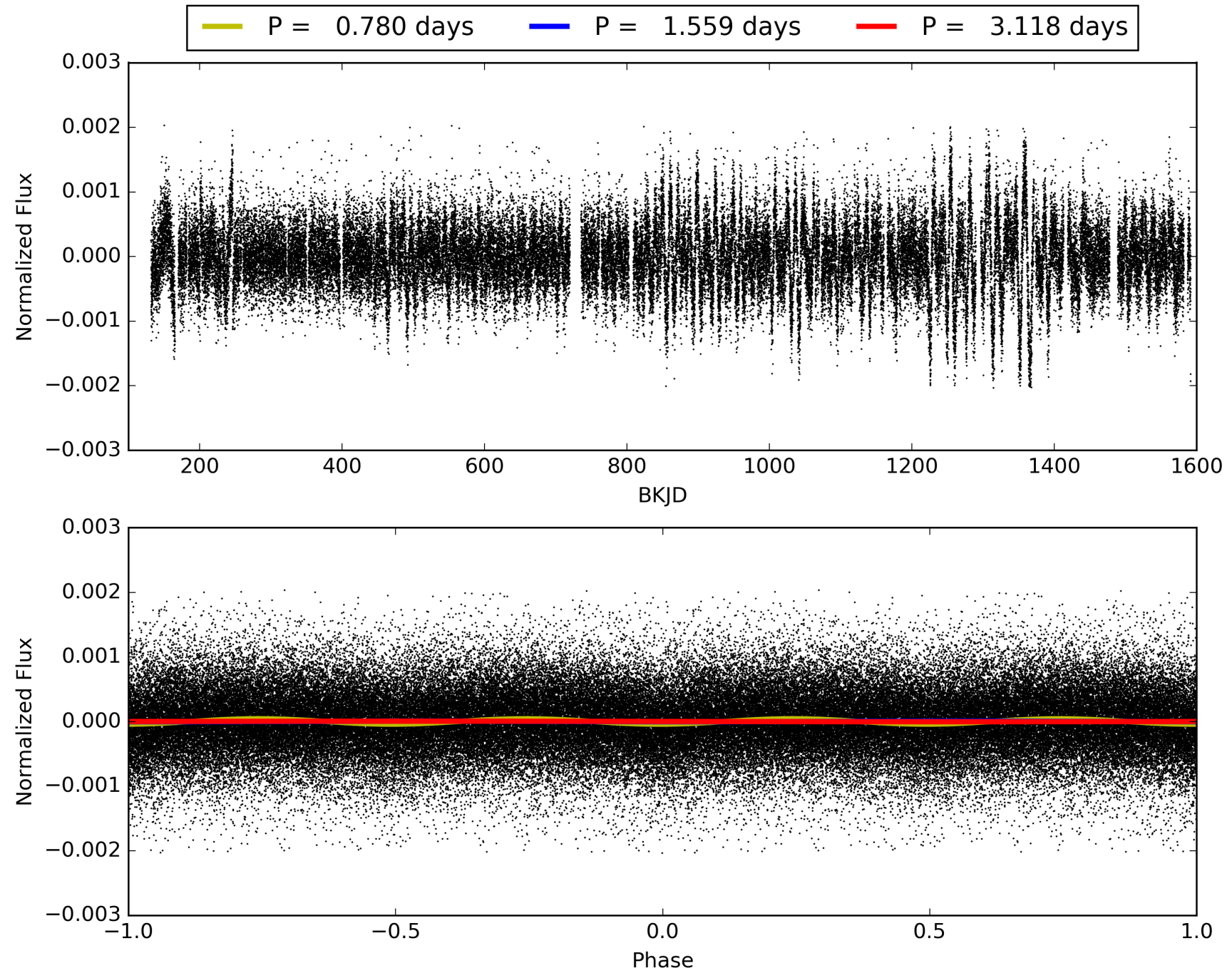
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 03:38:15 Z

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

# TCE 008043968-01, PDC Light Curves

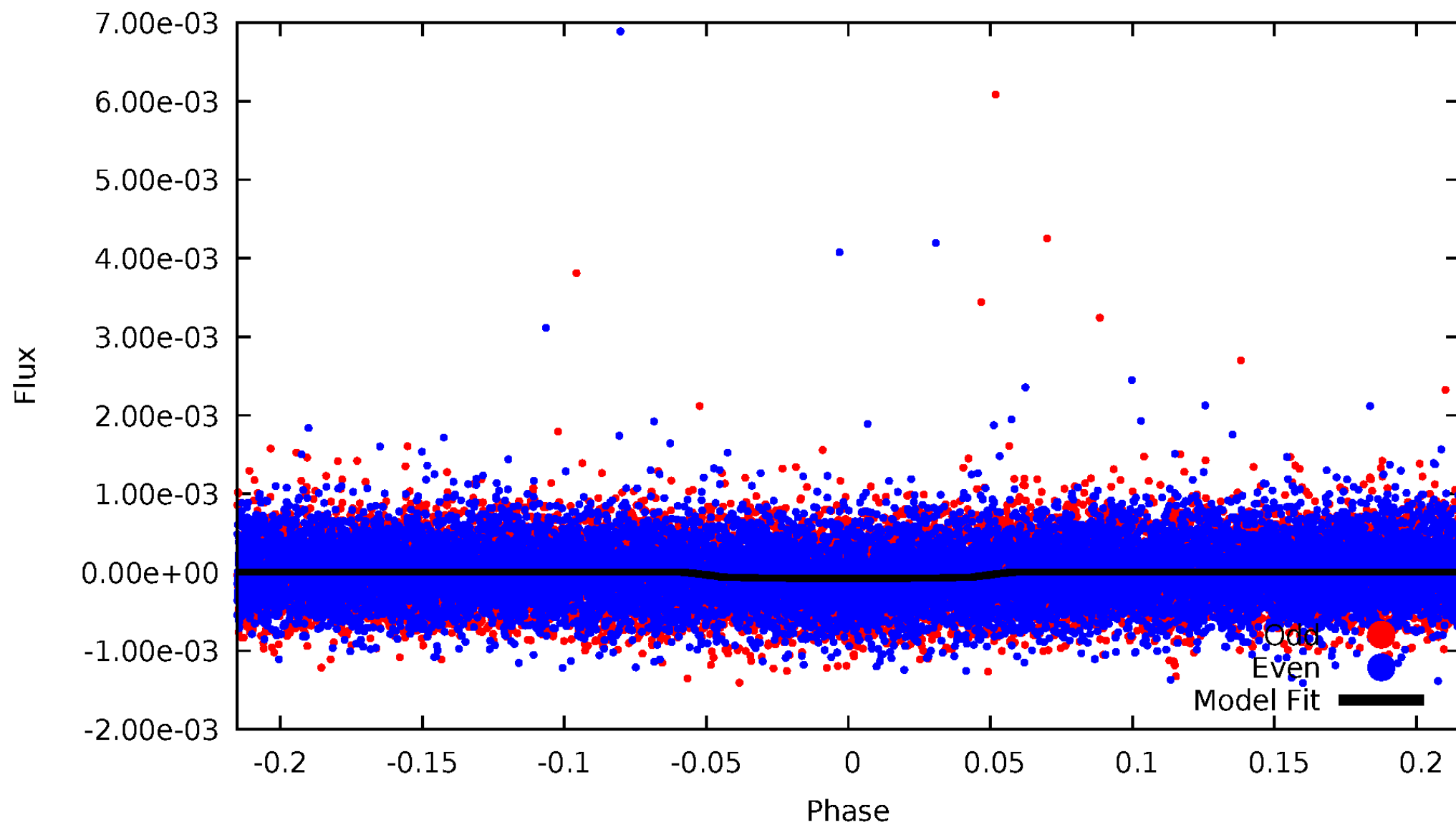


TCE 008043968-01



# DV Odd/Even

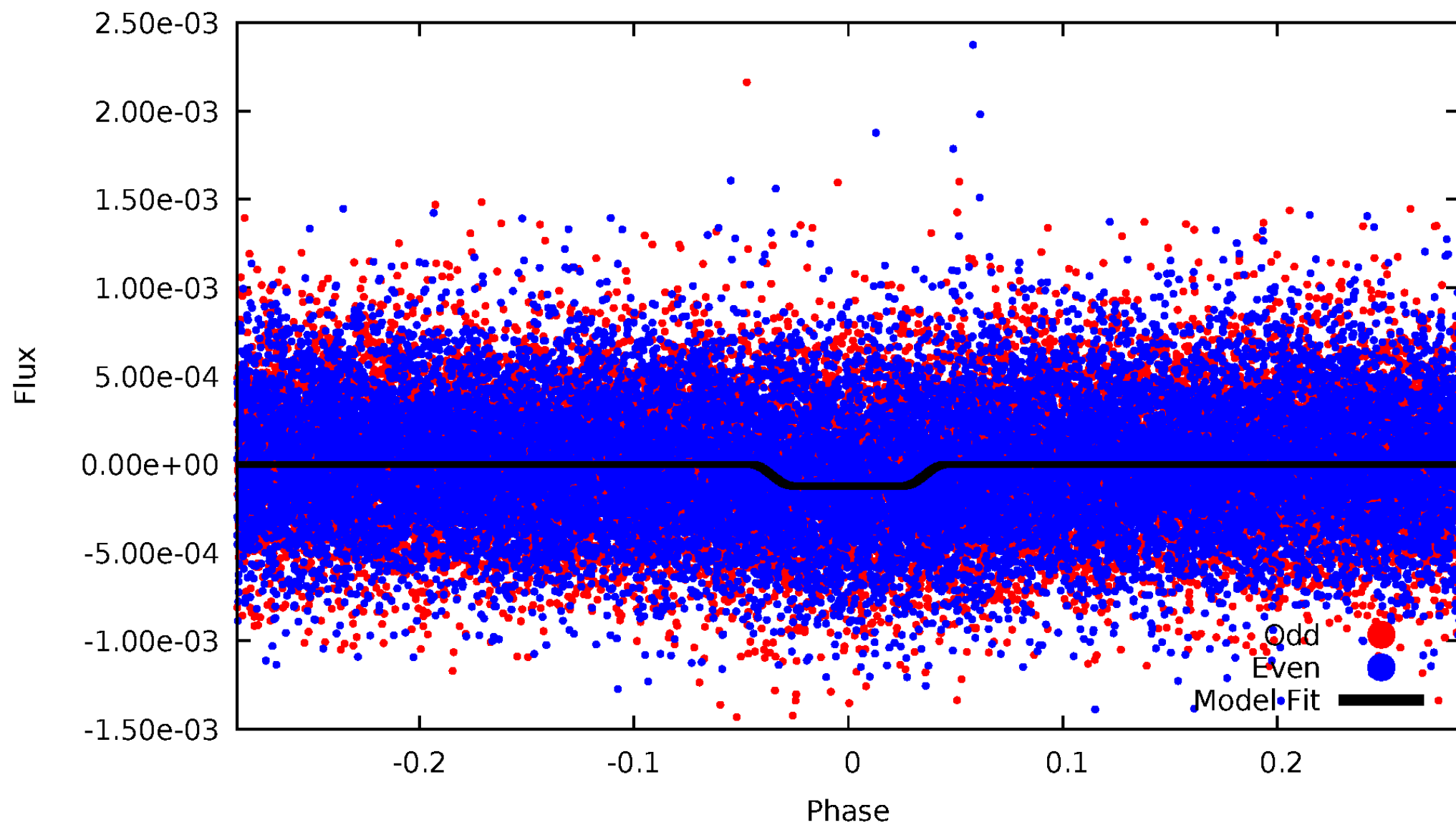
TCE 008043968-01





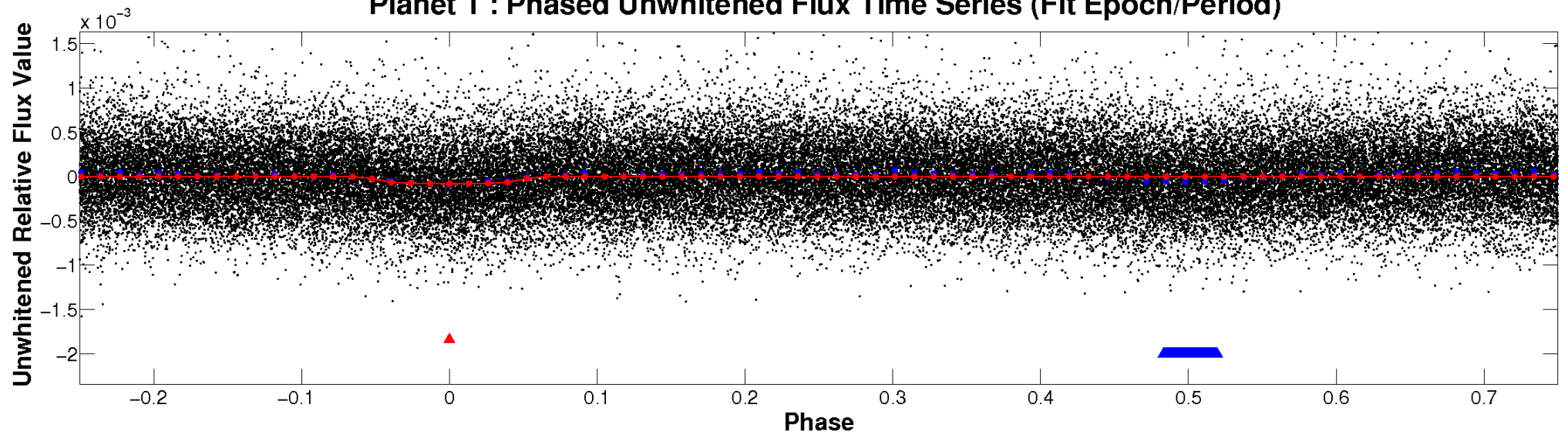
# ALT Odd/Even

TCE 008043968-01

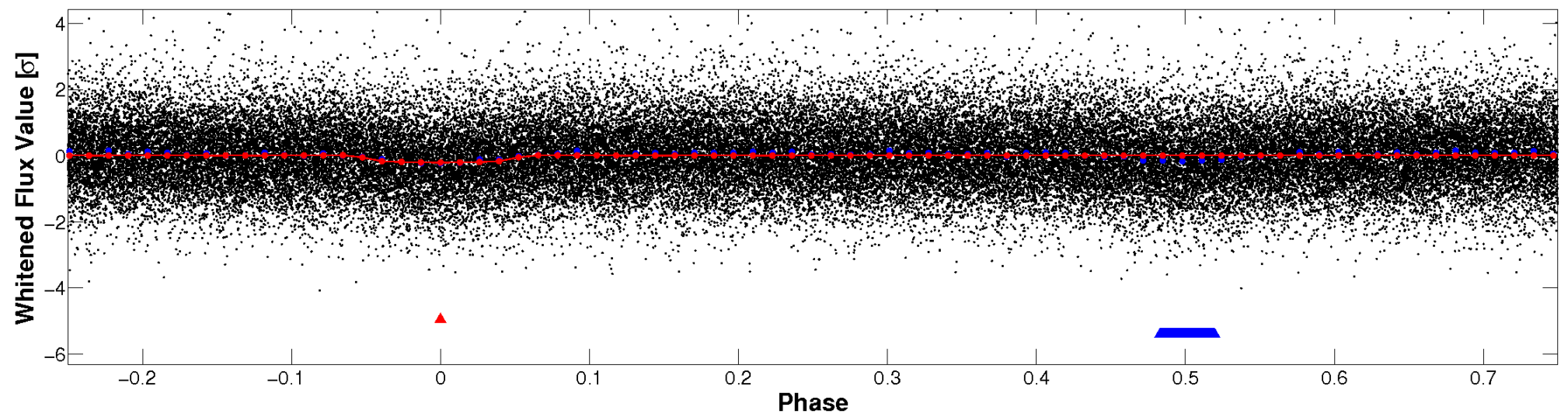


# Non-Whitened Vs. Whitened Light Curve

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

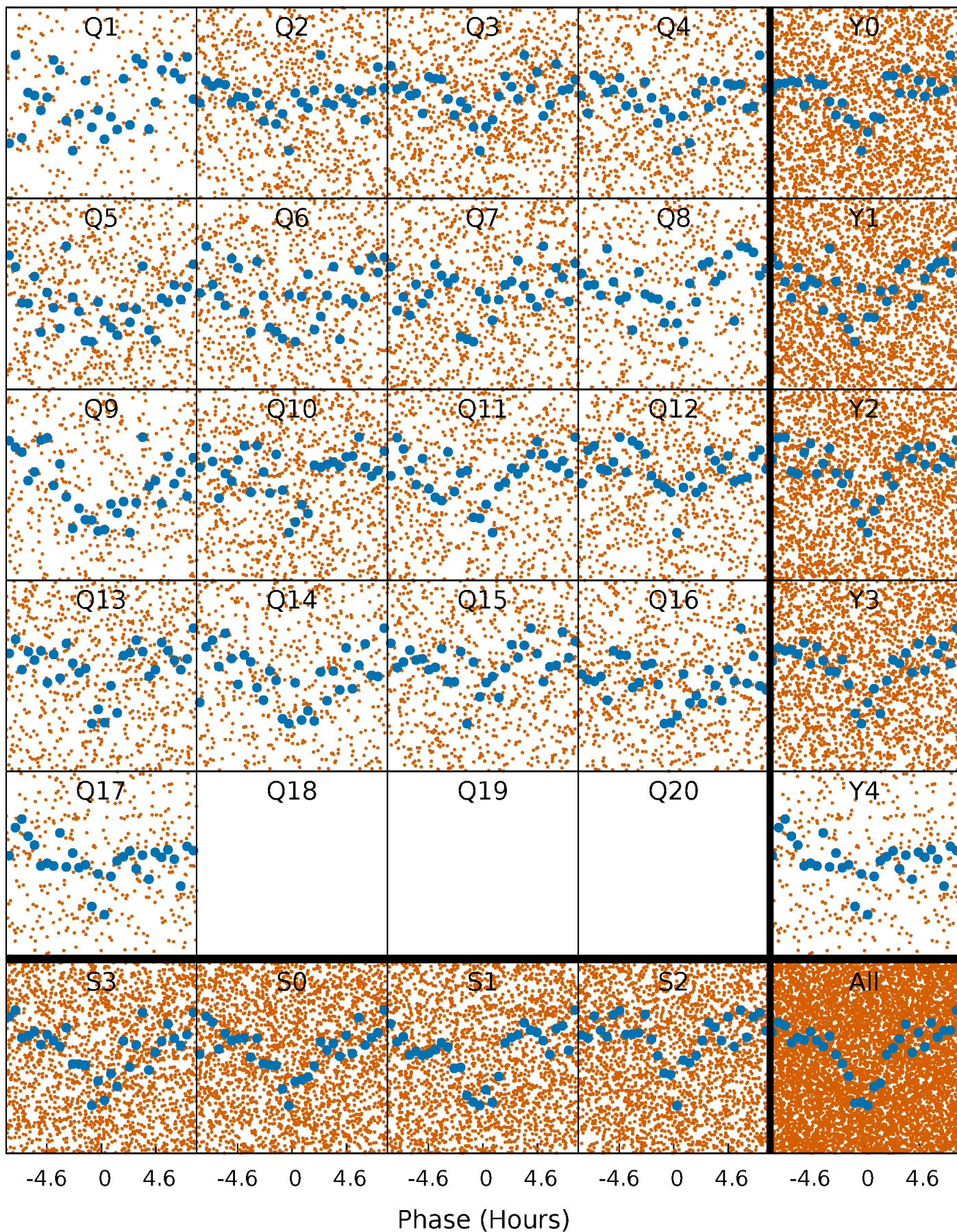


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

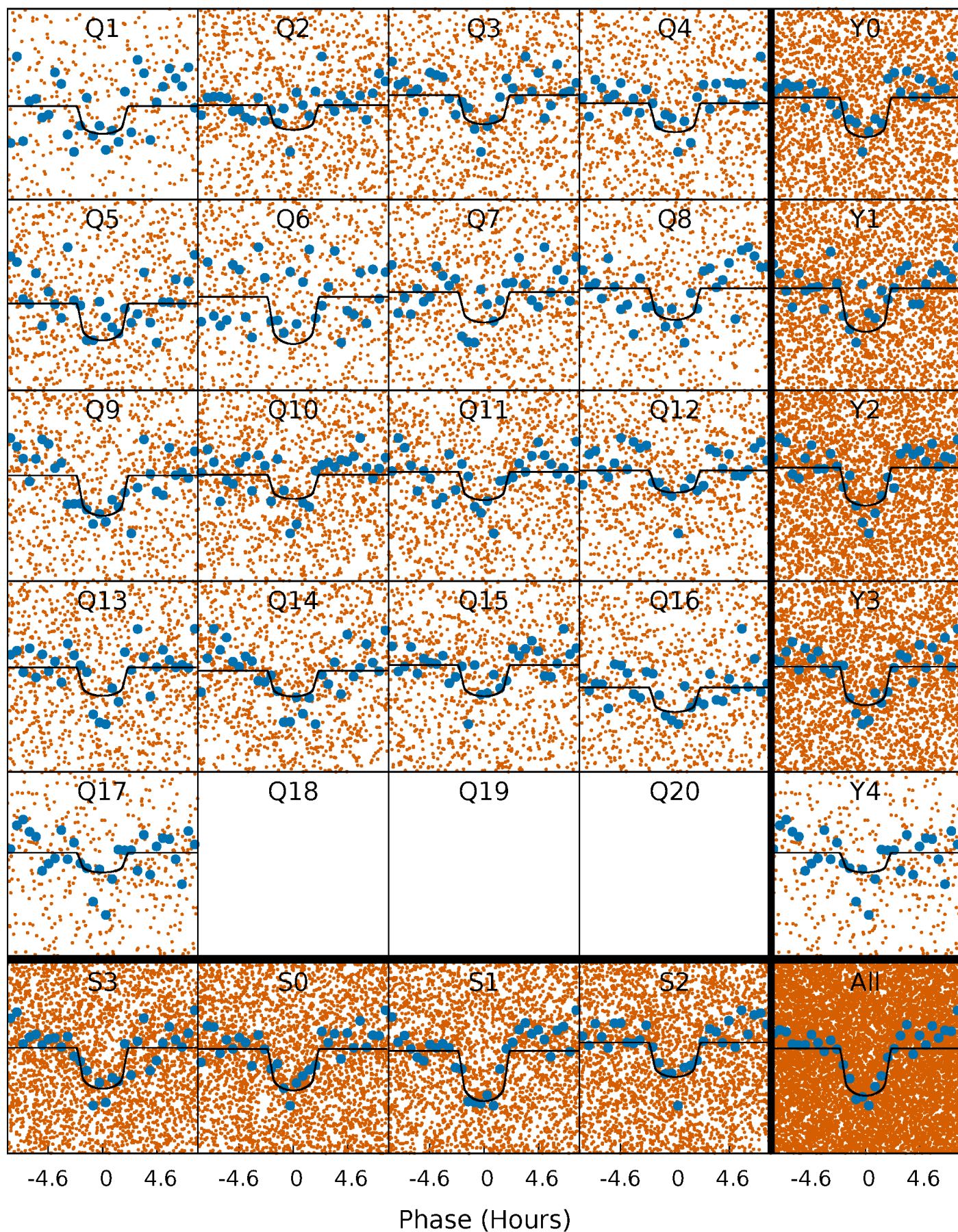
TCE 008043968-01 P= 1.559201 Days  $T_0=132.480609$  (BKJD)





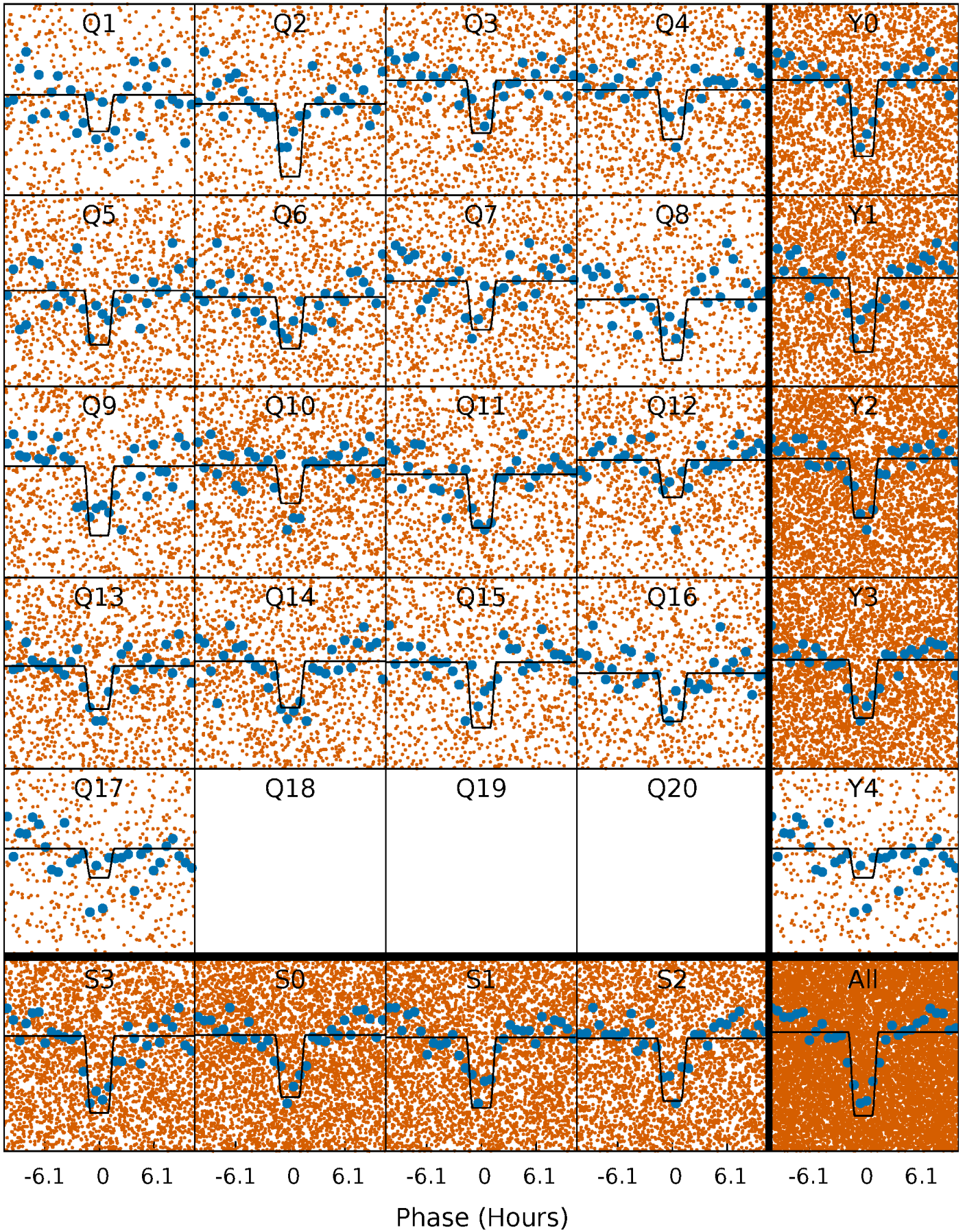
# DV Quarter-Phased Transit Curves

TCE 008043968-01 P= 1.559201 Days  $T_0=132.480609$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 008043968-01 P= 1.559228 Days  $T_0=132.465547$  (BKJD)

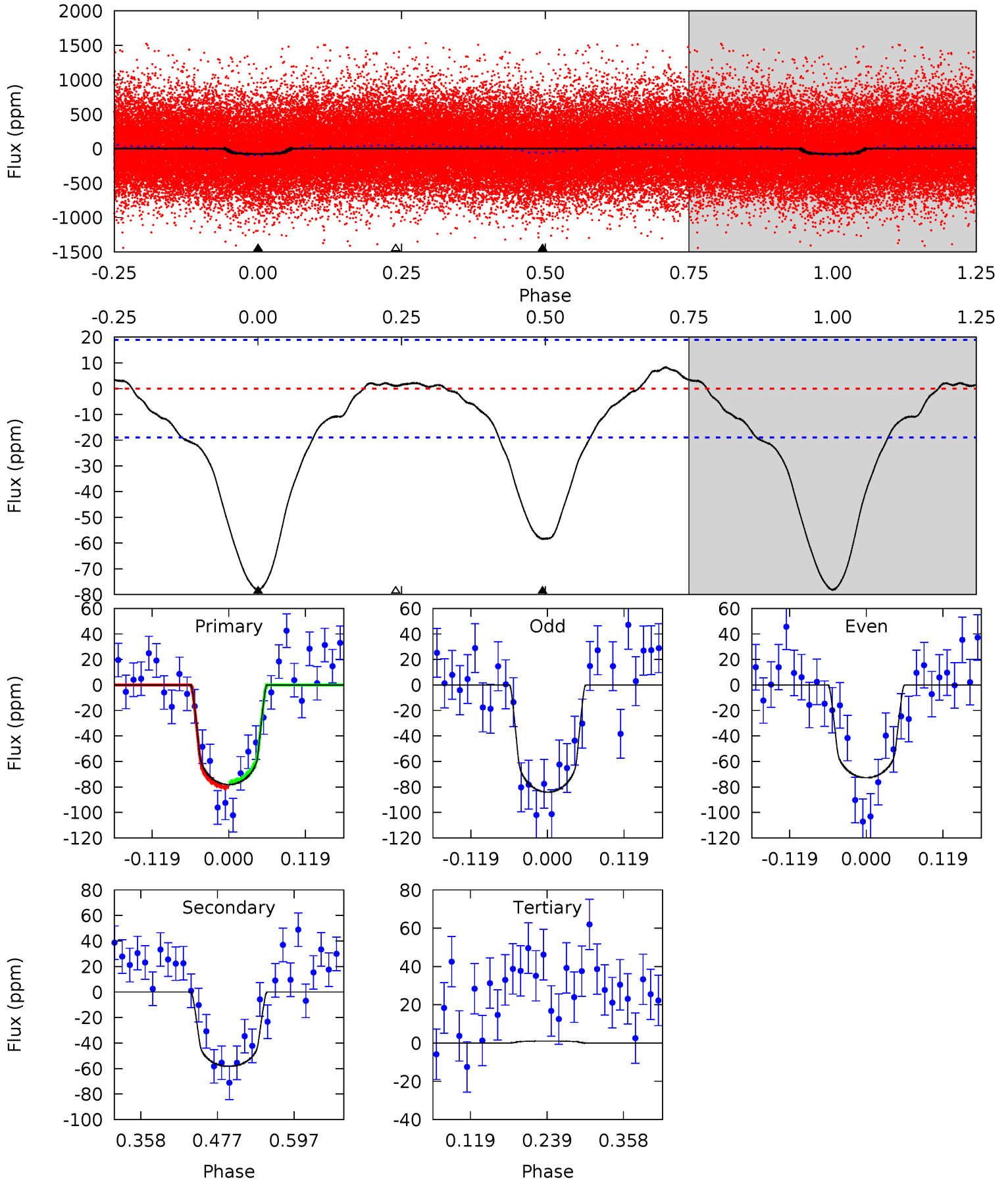




# DV Model-Shift Uniqueness Test

008043968-01, P = 1.559201 Days, E = 130.921408 Days

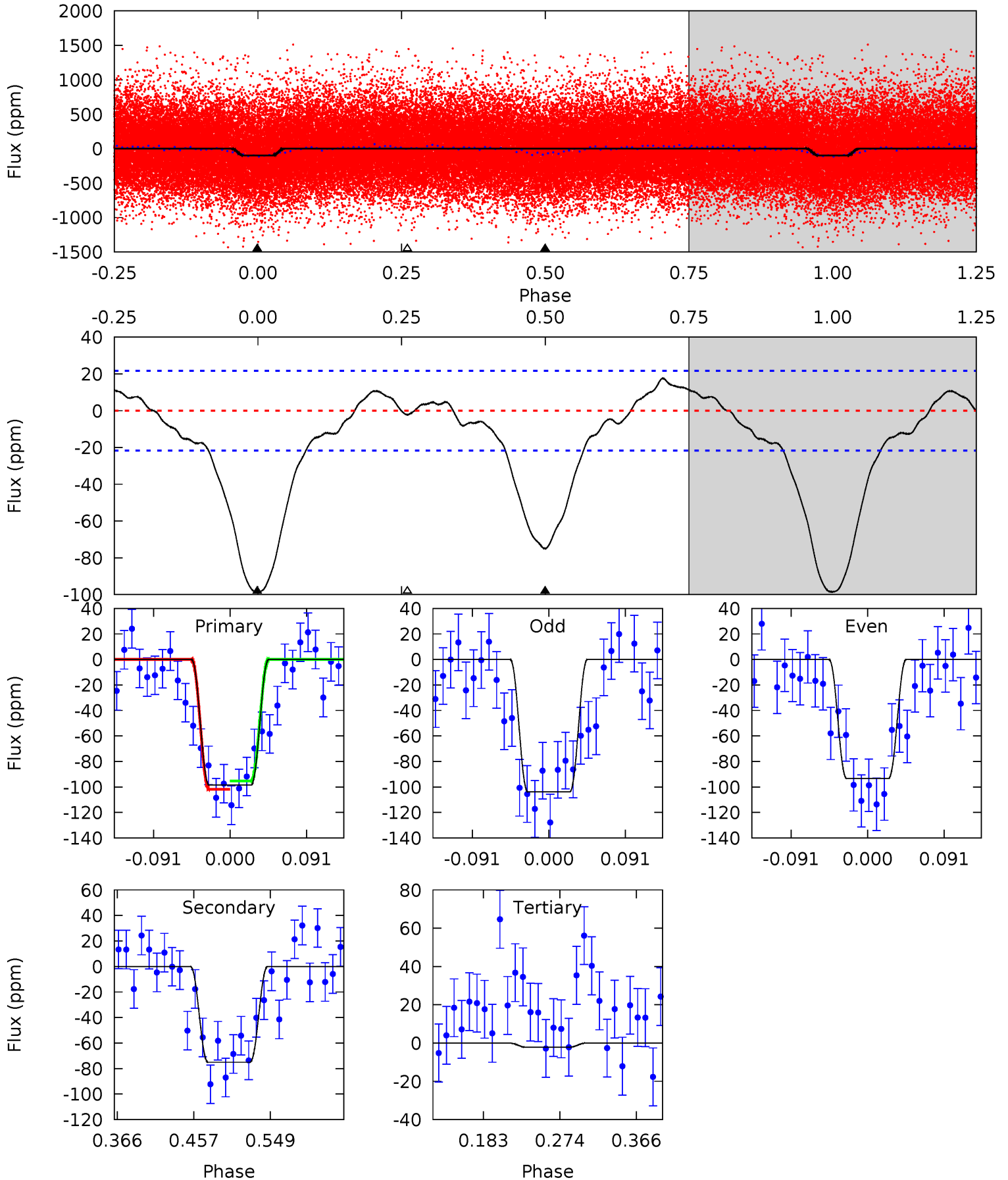
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
18.6	13.9	-0.24	0	4.53	1.56	1.58	18.9	18.6	14.2	13.9	1.35	0.90	0.10	0.50



# Alt Model-Shift Uniqueness Test

008043968-01, P = 1.559228 Days, E = 130.906319 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
20.8	15.9	0.47	0	4.58	1.69	1.94	20.4	20.8	15.4	15.9	1.12	0.98	0.15	0.68





### Stellar Parameters For KIC 008043968

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5764^{+156}_{-173}$	$4.548^{+0.037}_{-0.200}$	$-0.120^{+0.300}_{-0.300}$	$0.863^{+0.258}_{-0.069}$	$0.959^{+0.103}_{-0.114}$	$2.100^{+0.429}_{-1.106}$
	+3%/-3%	+1%/-4%	+250%/-250%	+30%/-8%	+11%/-12%	+20%/-53%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008043968-01 / KOI 5469.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-58 \pm 4$	$0.96^{+0.42}_{-0.41}$	$2093^{+138}_{-84}$	$5129^{+1606}_{-685}$	$22^{+48}_{-11}$
Alt.	$-75 \pm 5$	$1.11^{+0.41}_{-0.42}$	$2092^{+153}_{-88}$	$5135^{+1182}_{-643}$	$22^{+31}_{-10}$

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

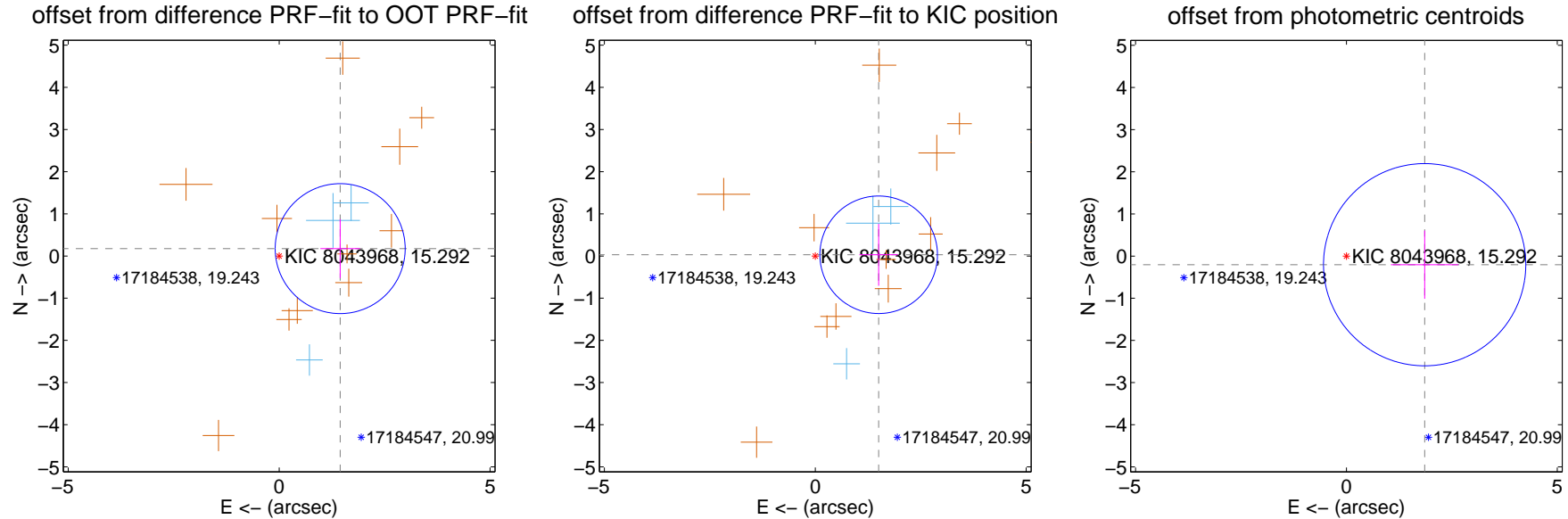
## DV Centroid Data

Supplemental centroid analysis for 008043968-01. Kepler magnitude: 15.29. Transit SNR 14.32

There are 3 quarters with good PRF difference image offsets

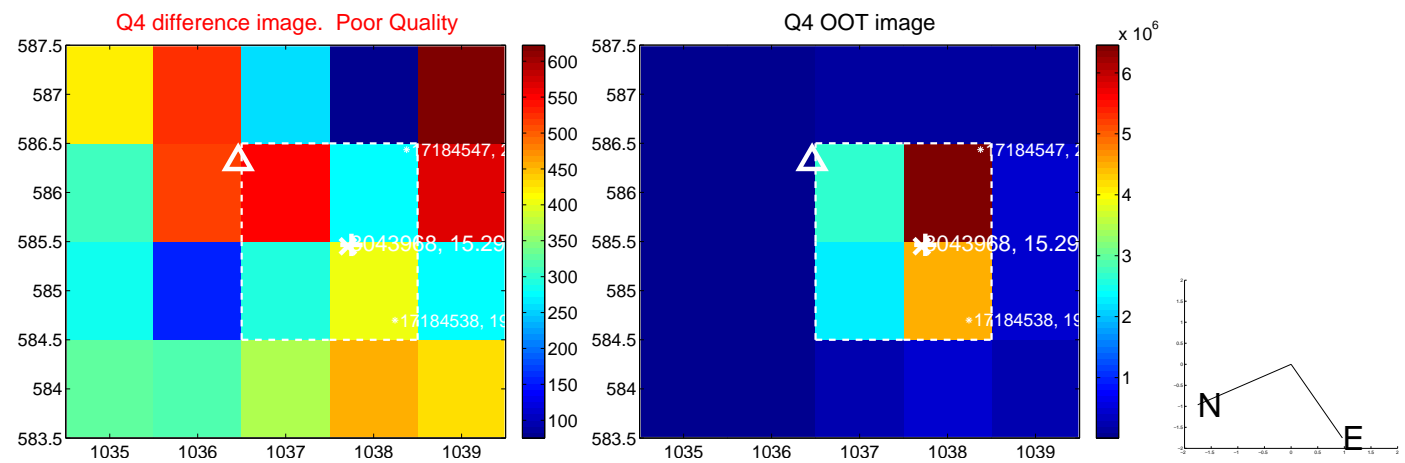
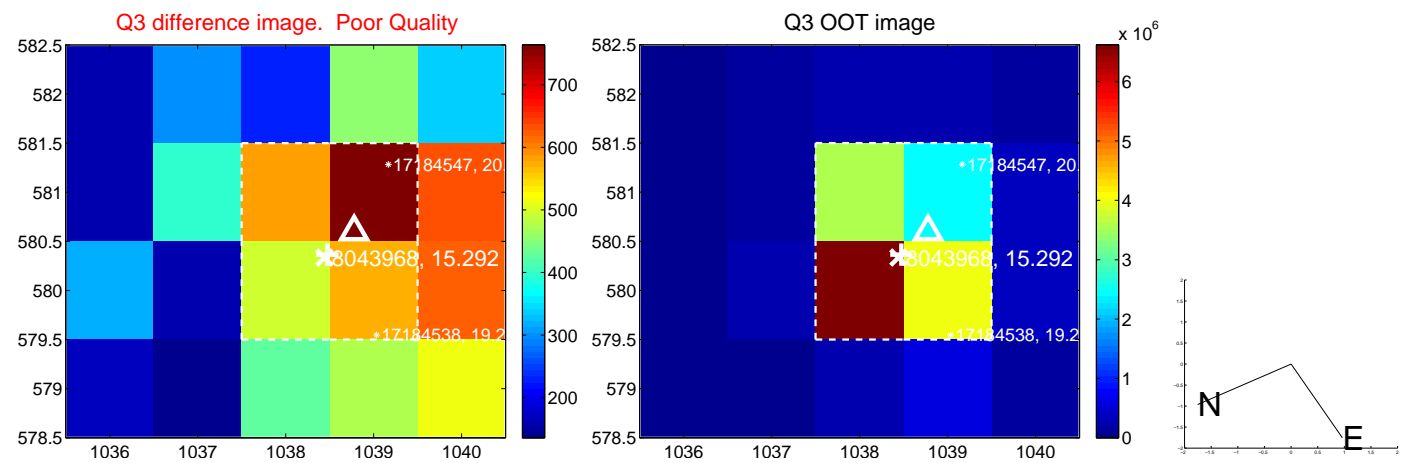
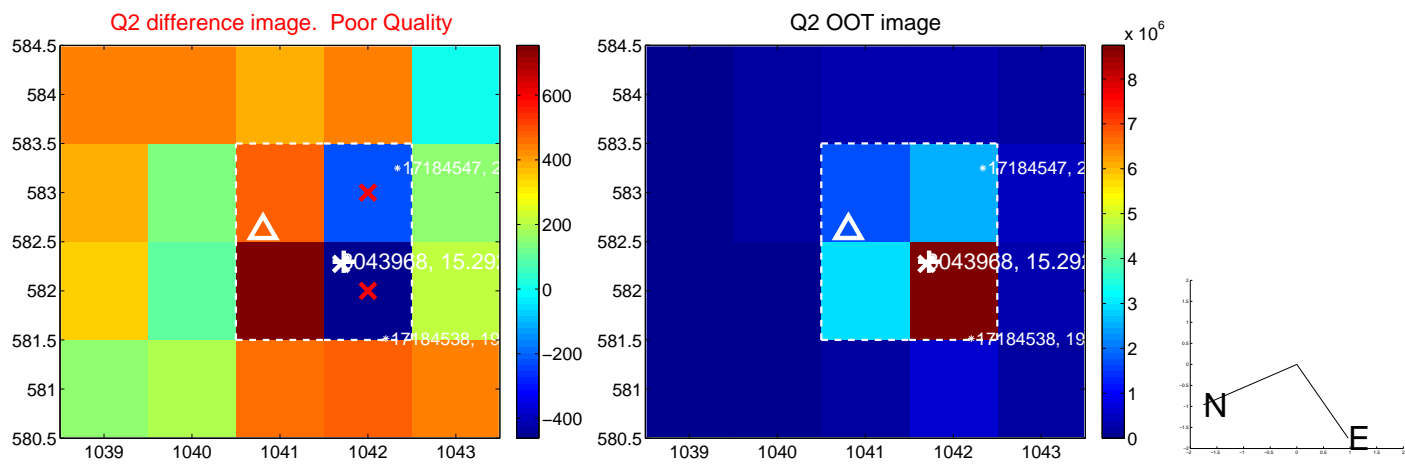
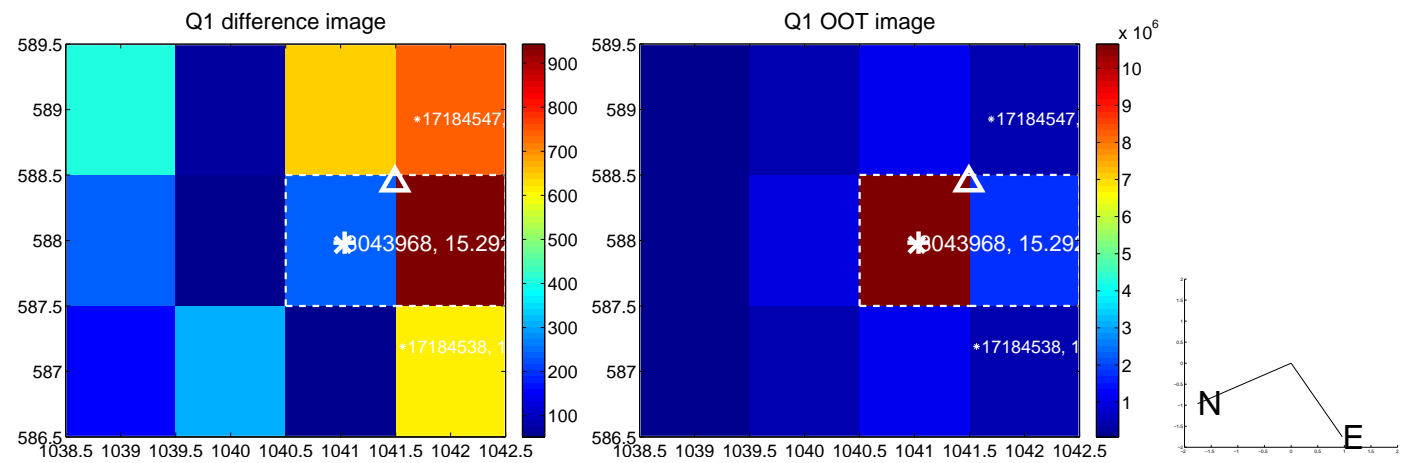
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.458 \pm 0.514$	2.84	$-1.447 \pm 0.470$	$0.175 \pm 0.698$
PRF-fit source offset from KIC position	$1.504 \pm 0.465$	3.24	$-1.503 \pm 0.457$	$0.030 \pm 0.735$
photometric centroid source offset	$1.87 \pm 0.80$	2.33	$-1.86 \pm 0.80$	$-0.20 \pm 0.81$

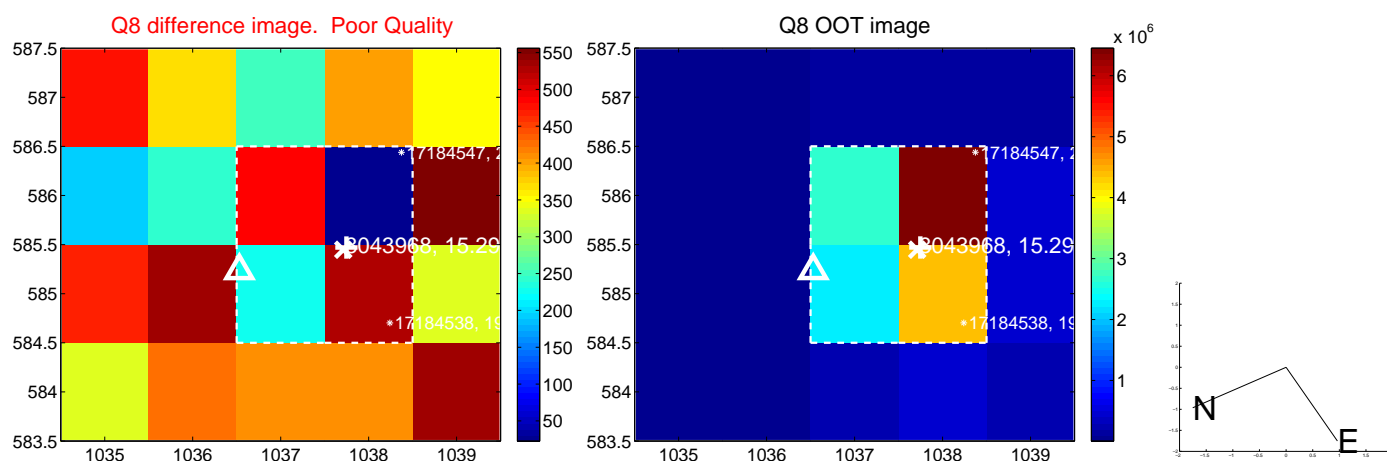
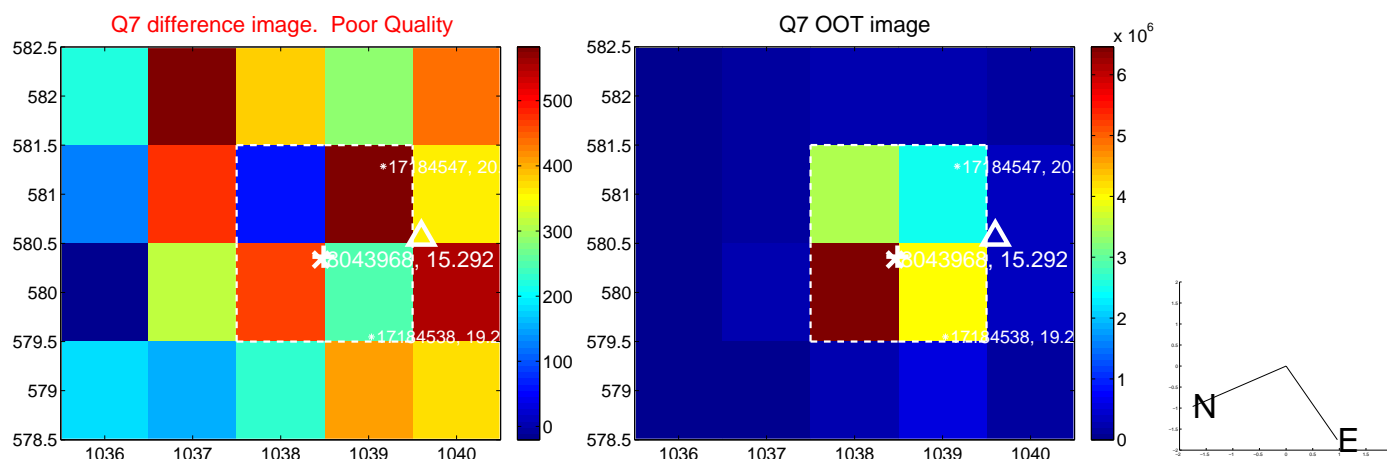
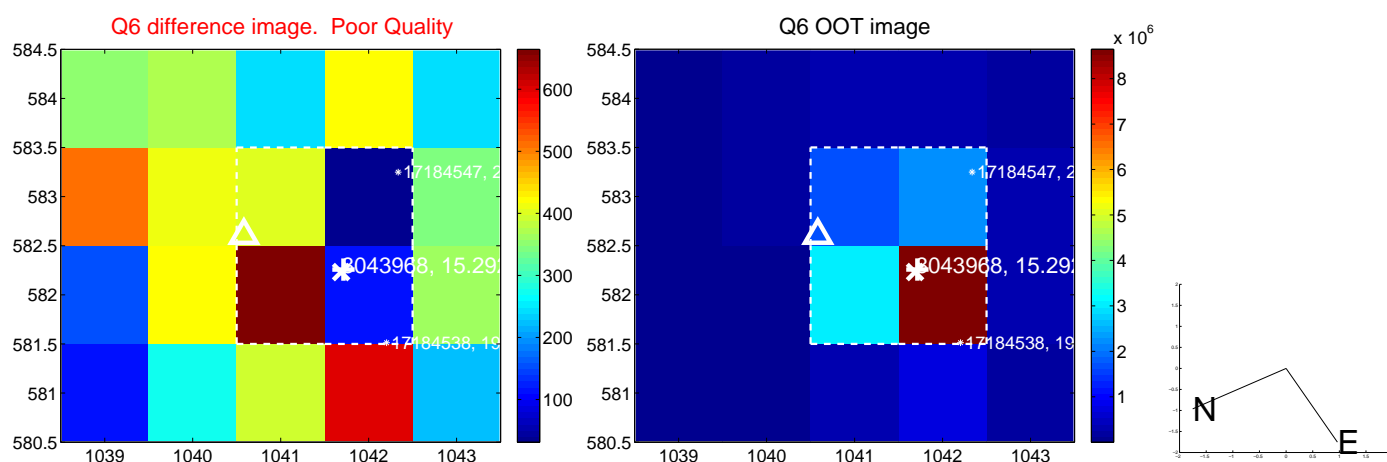
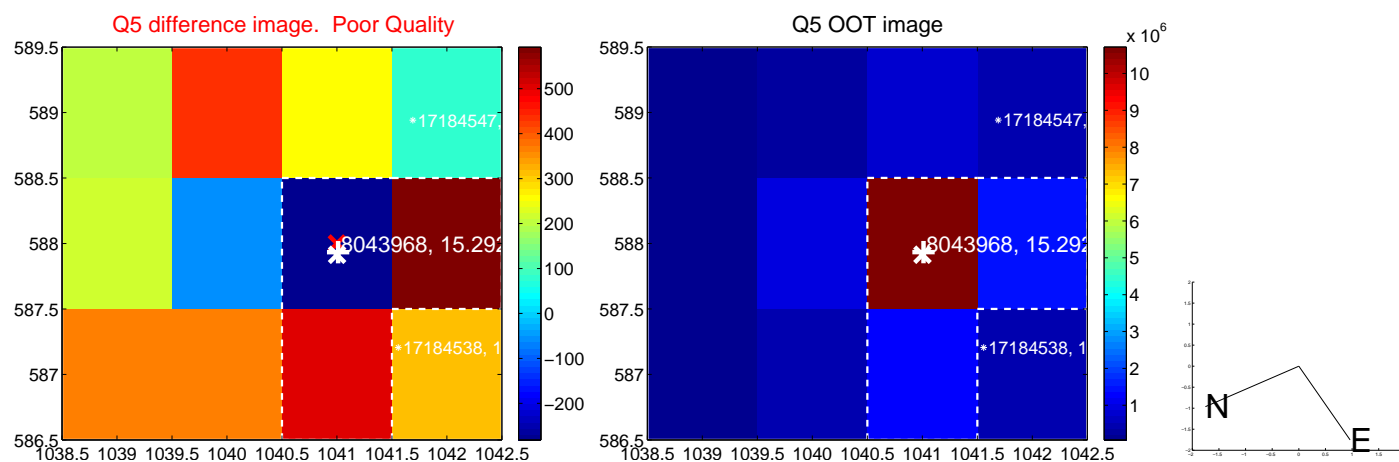


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

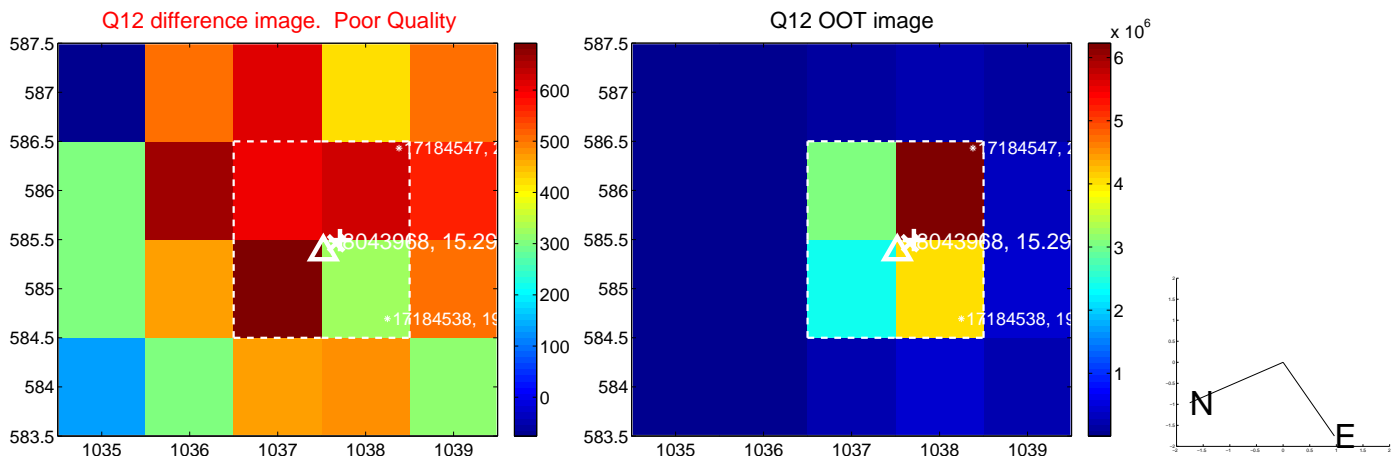
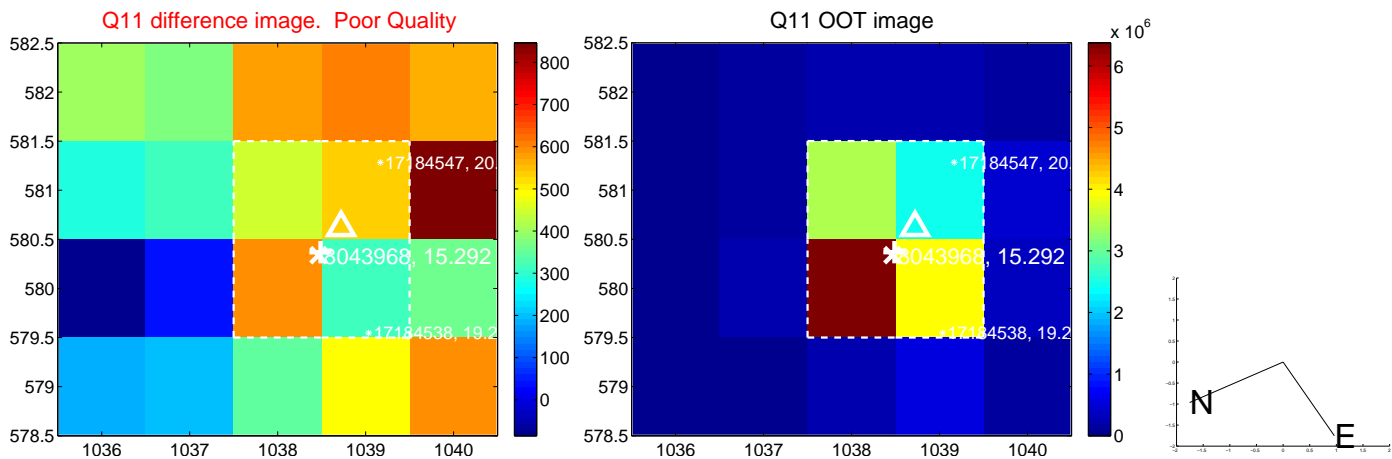
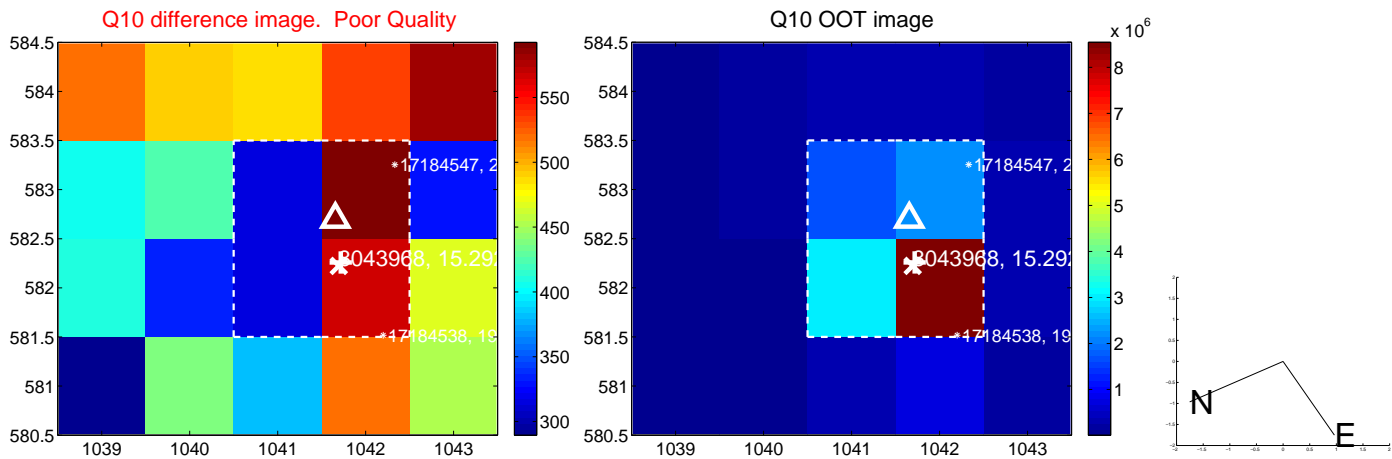
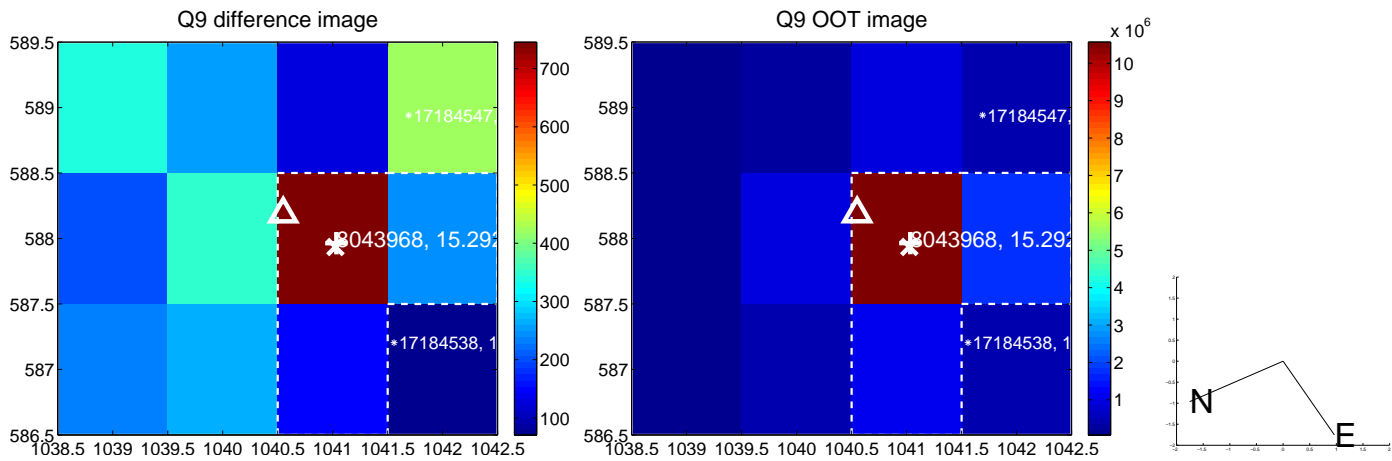


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

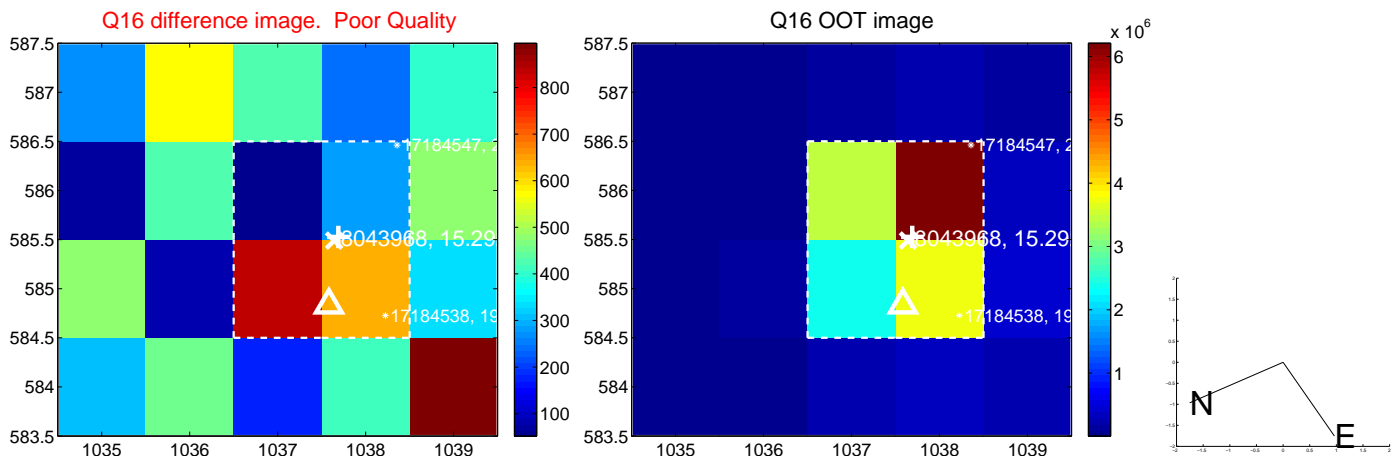
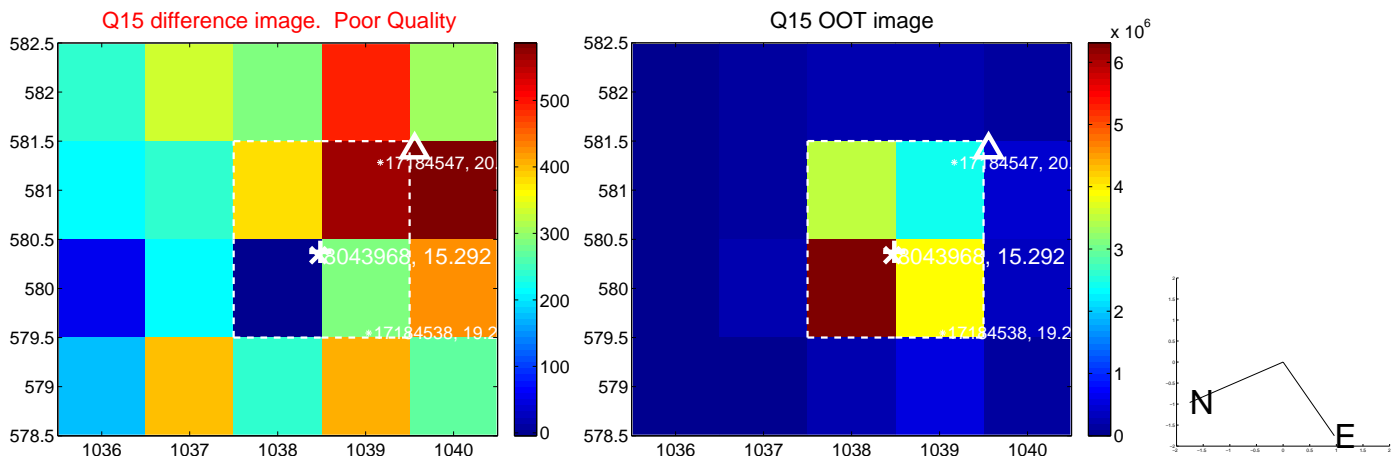
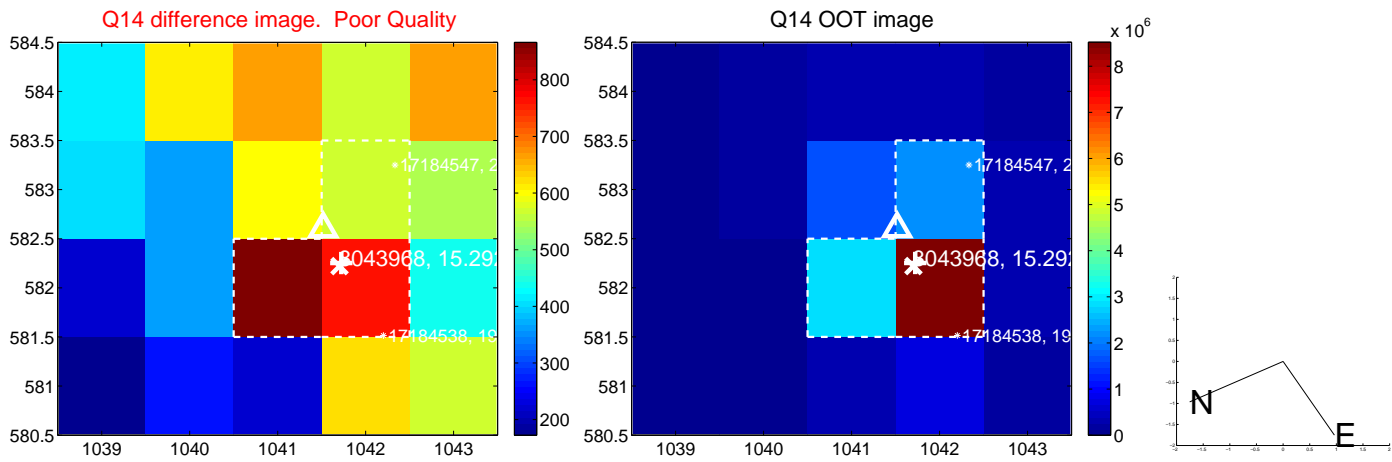
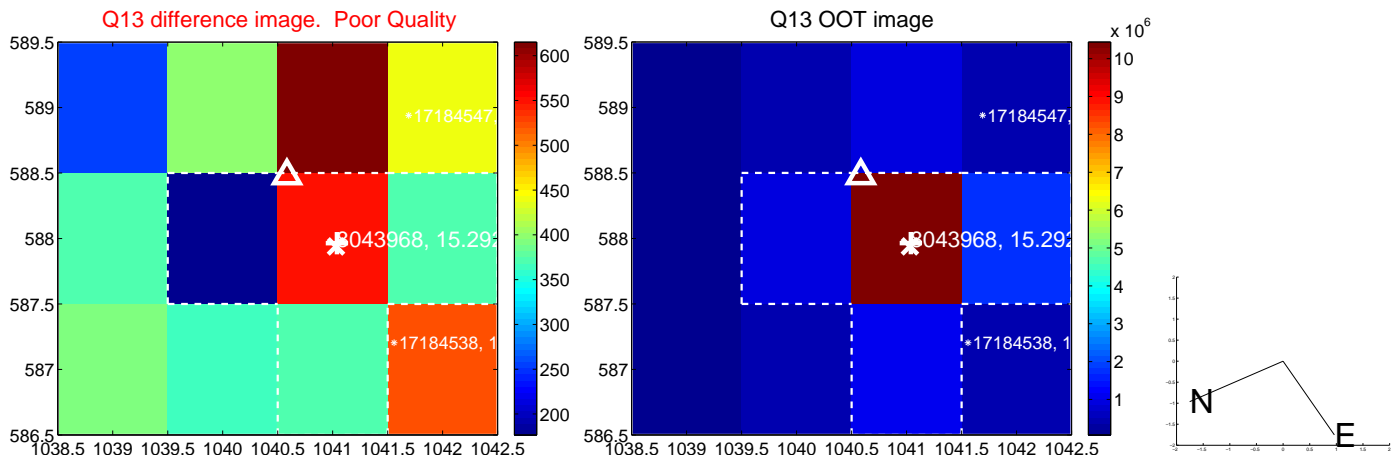




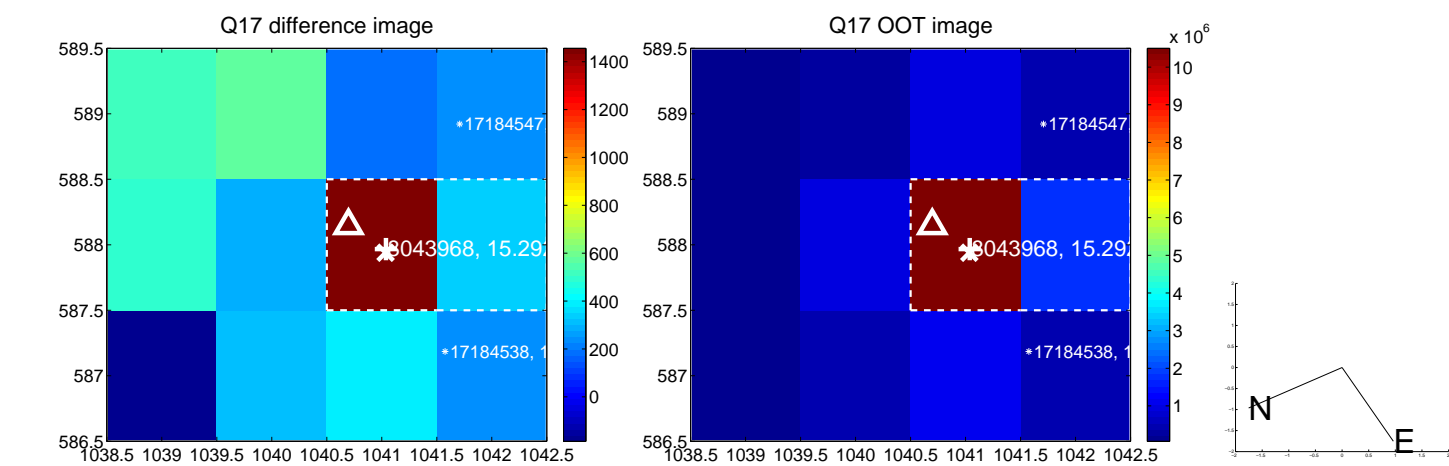
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



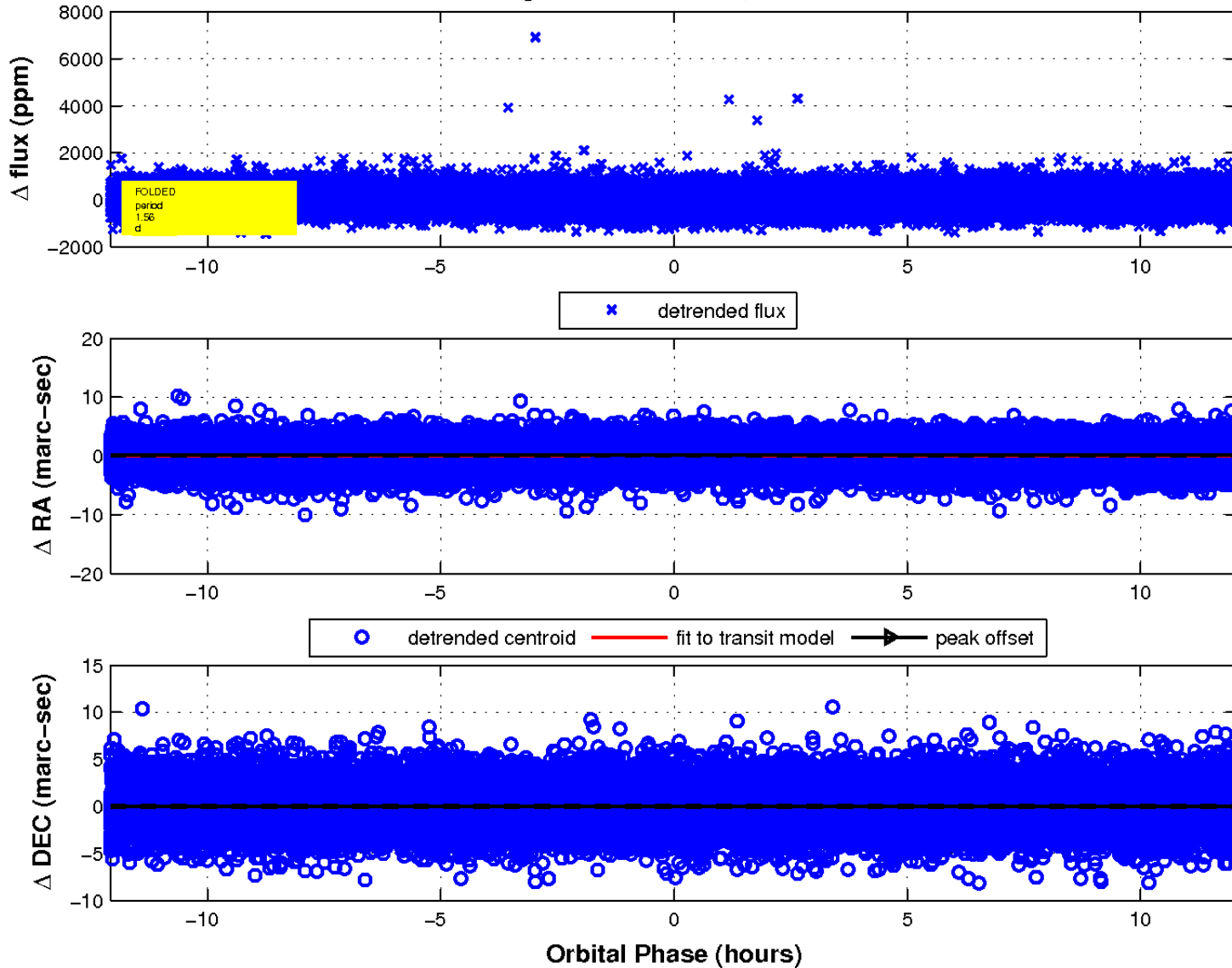
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

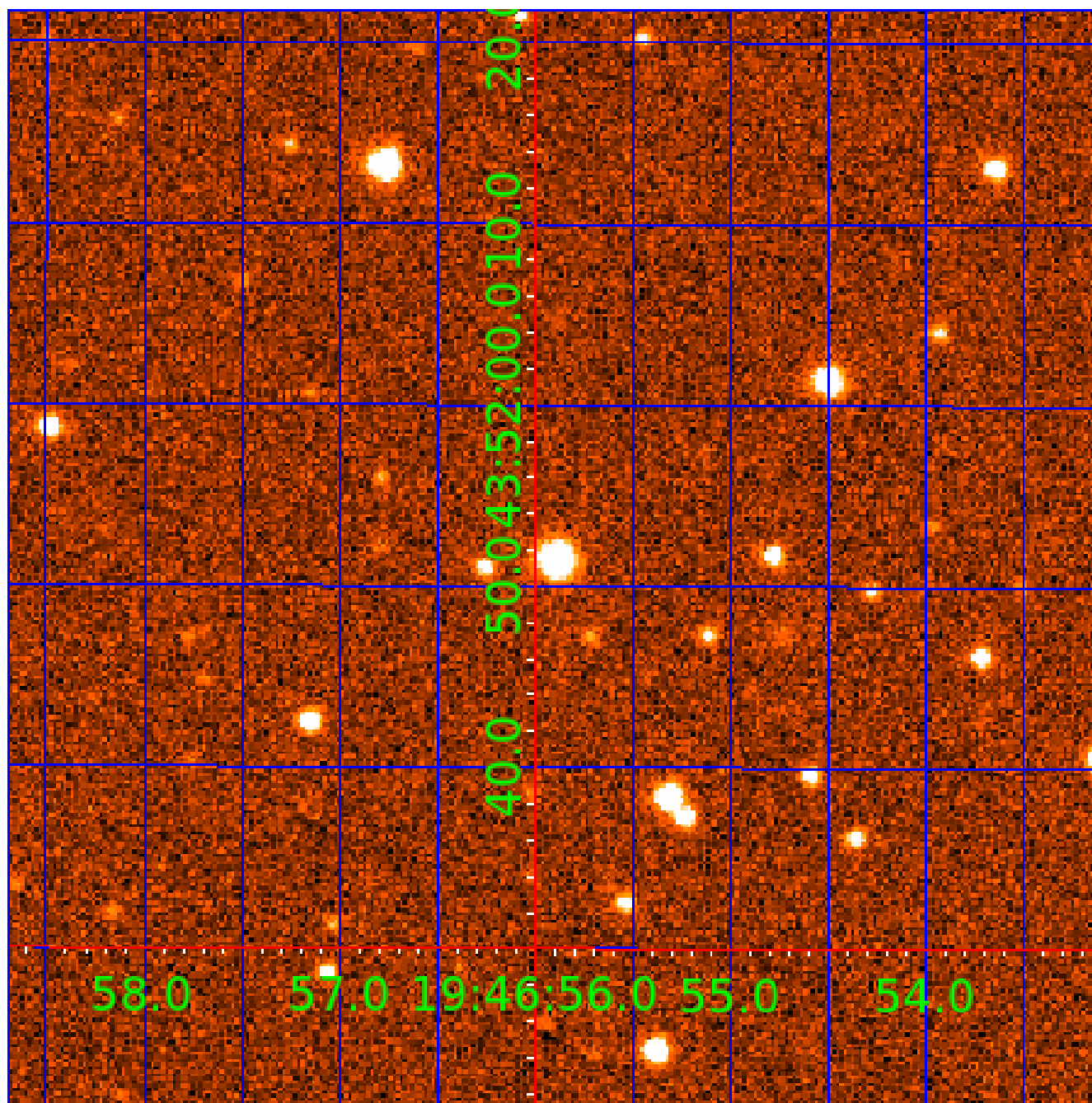


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 008043968

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008043968-01	OBS	5469.01	1.559201	132.480609	80.0	4.025	14.6	14.3	0.86	5764	0.91	1092.93
008043968-02	OBS	No	1.559140	131.731521	70.3	4.030	12.7	13.3	0.86	5764	0.85	1092.99

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008043968-01	OBS	FP	0.00	0	1	0	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—EPHEM_MATCH
008043968-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_UNRESOLVED_OFFSET—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 008043968-02

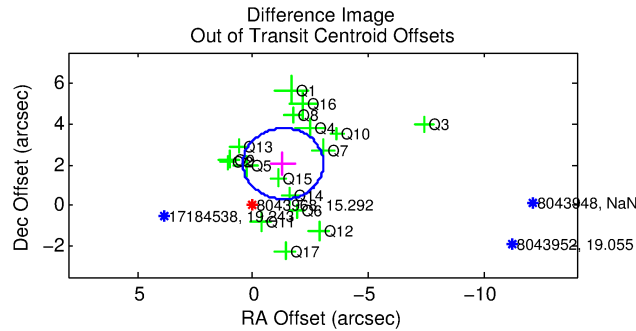
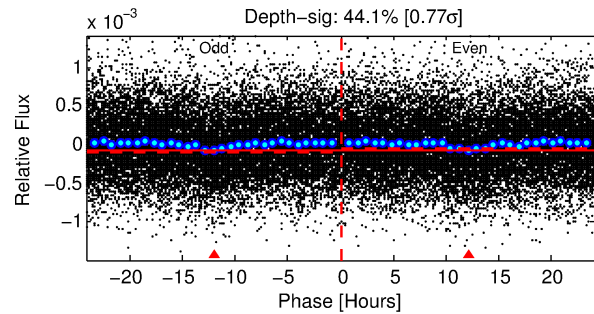
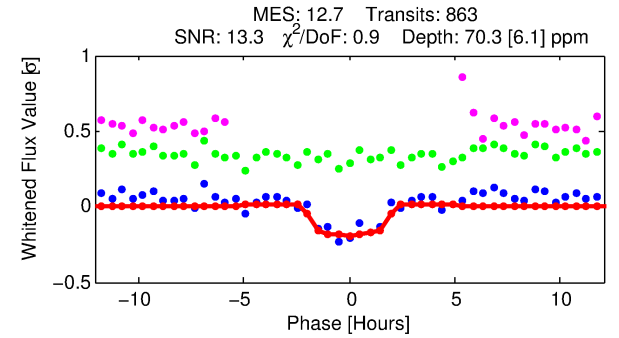
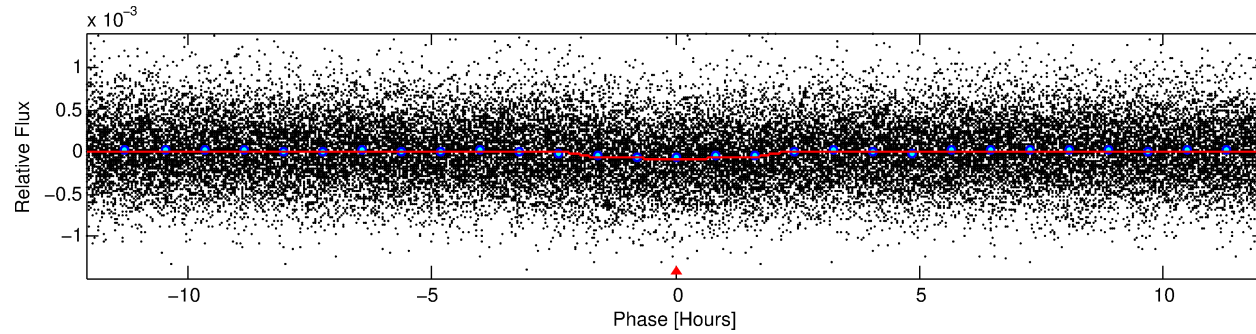
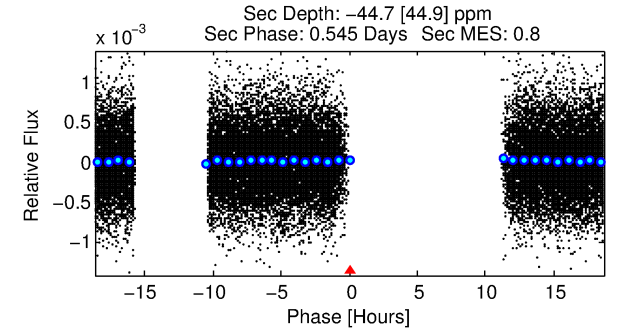
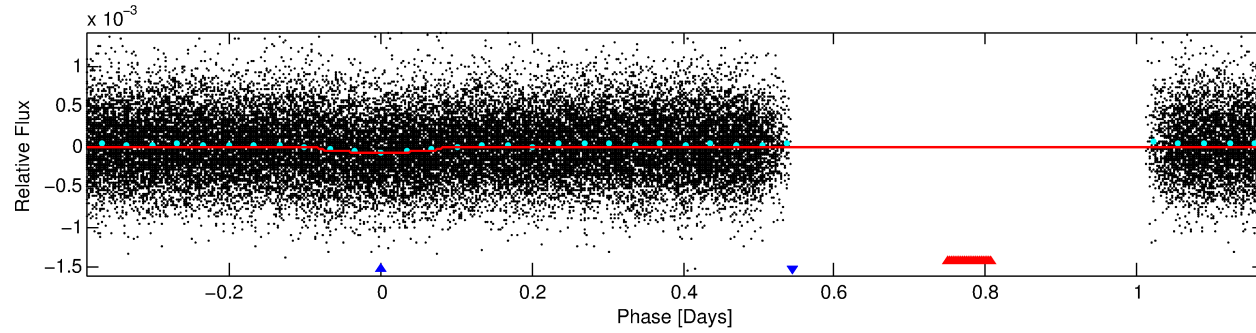
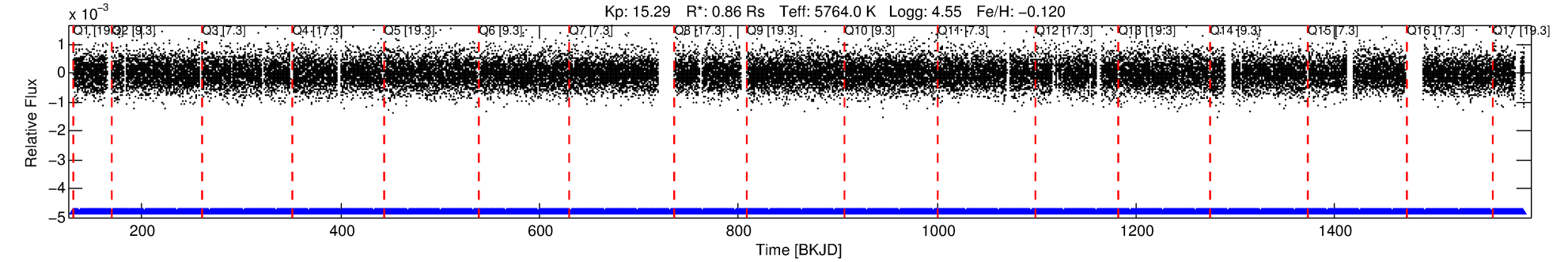
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
008043968-02	8043968	008043961-sec	8043961	1:1	83.8	-11	-17	10.74	15.30	2695.70	Direct-PRF	0	3.59	2.53

**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: 8043968 Candidate: 2 of 2 Period: 1.559 d

KOI: K05469 Corr: No Ephemeris Match



## DV Fit Results:

Period = 1.55914 [0.00001] d  
Epoch = 131.7315 [0.0040] BKJD  
Rp/R\* = 0.0091 [0.0044]  
a/R\* = 1.66 [2.50]  
b = 0.90 [0.53]  
Seff = 1092.99 [421.04]  
Teff = 1466 [141] K  
Rp = 0.85 [0.49] Re  
a = 0.0260 [0.0065] AU  
Ag = N/A  
Teffp = N/A

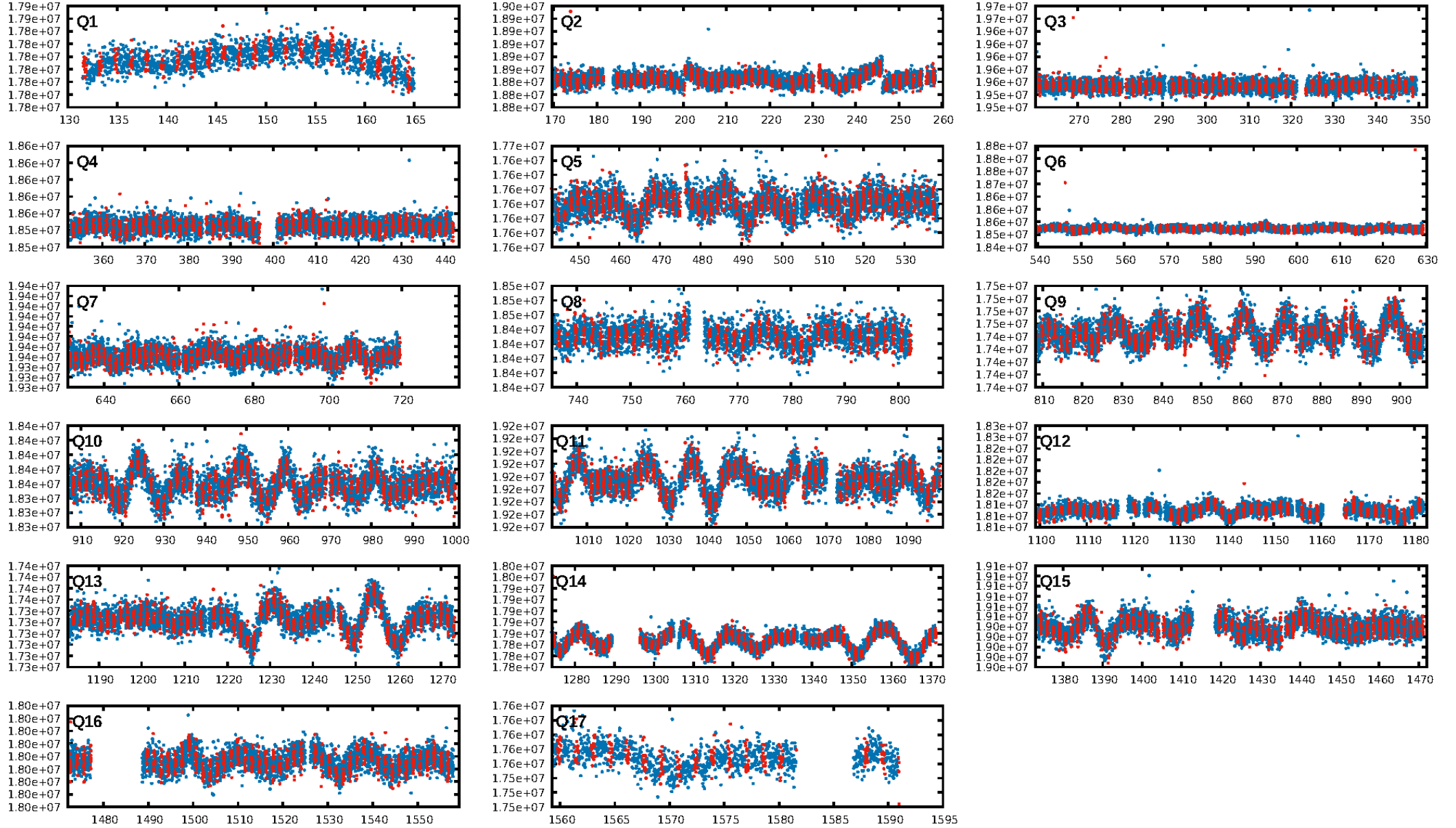
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.99e-47  
RollingBand-fgt: 1.00 [824/824]  
GhostDiagnostic-chr: 0.4034  
Centroid-sig: 3.5%  
Centroid-so: 1.902 arcsec [2.09σ]  
OotOffset-rm: 2.426 arcsec [4.19σ]  
KicOffset-rm: 2.347 arcsec [4.20σ]  
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]

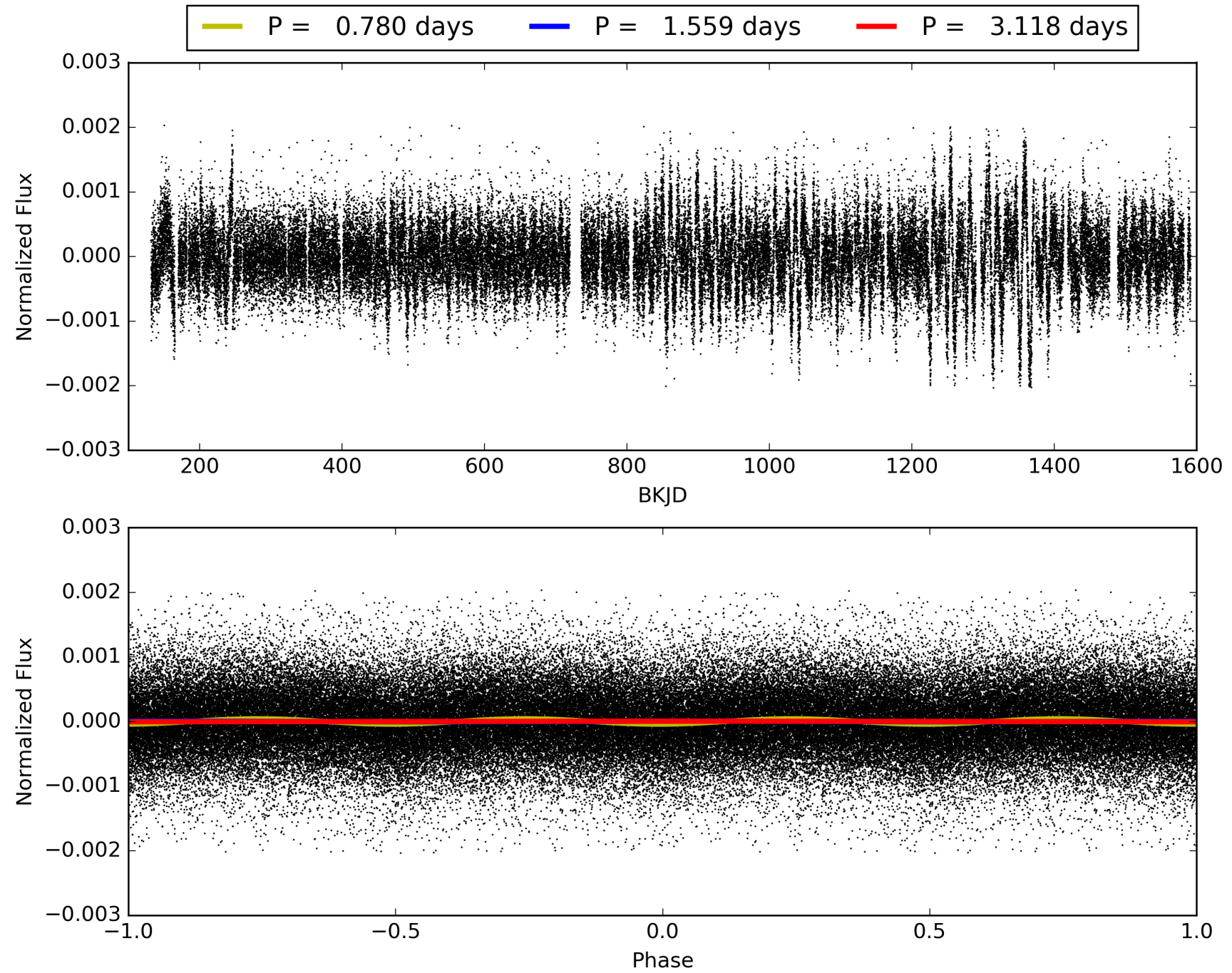
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 03:38:25 Z

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

# TCE 008043968-02, PDC Light Curves



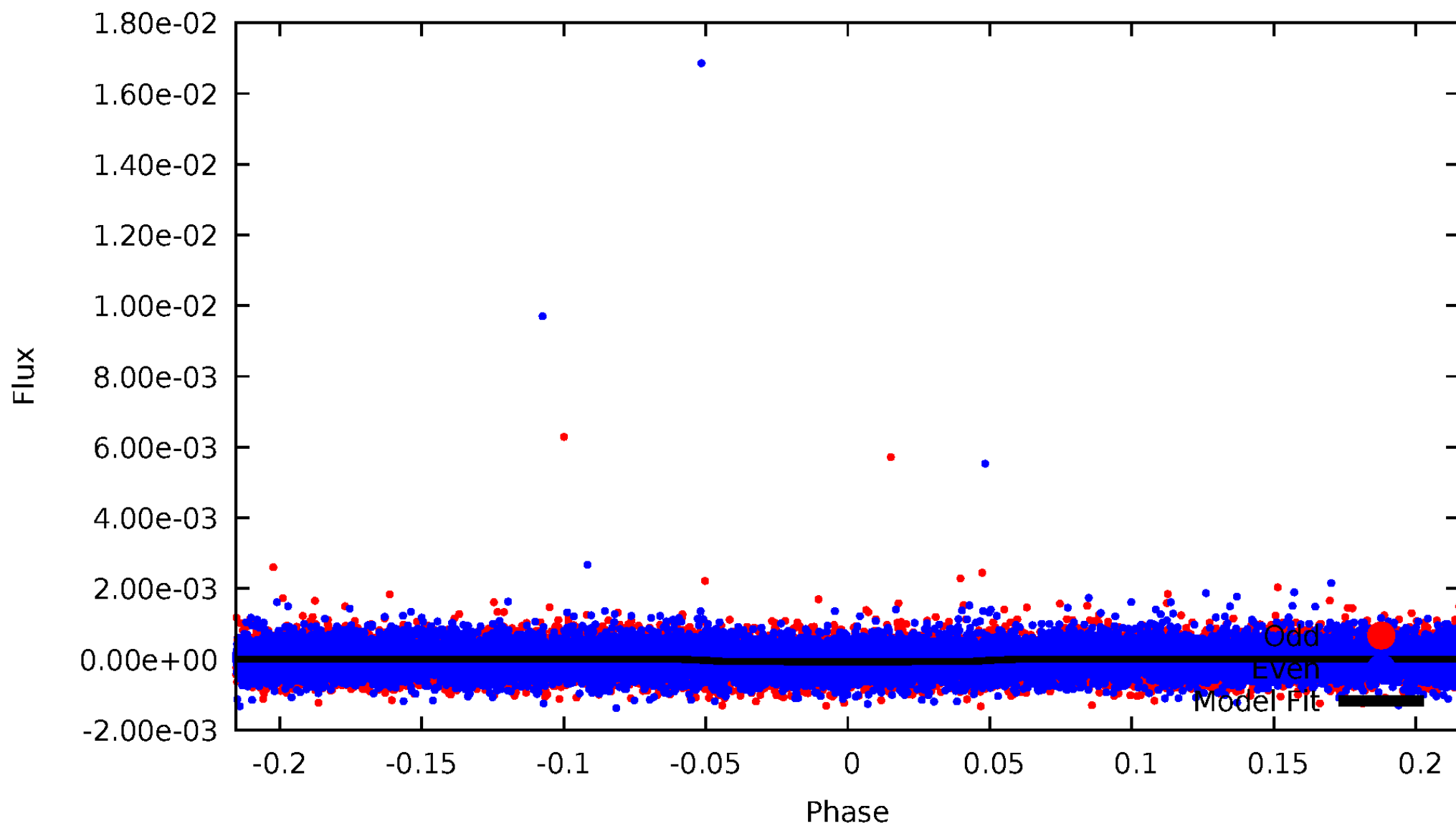
TCE 008043968-02





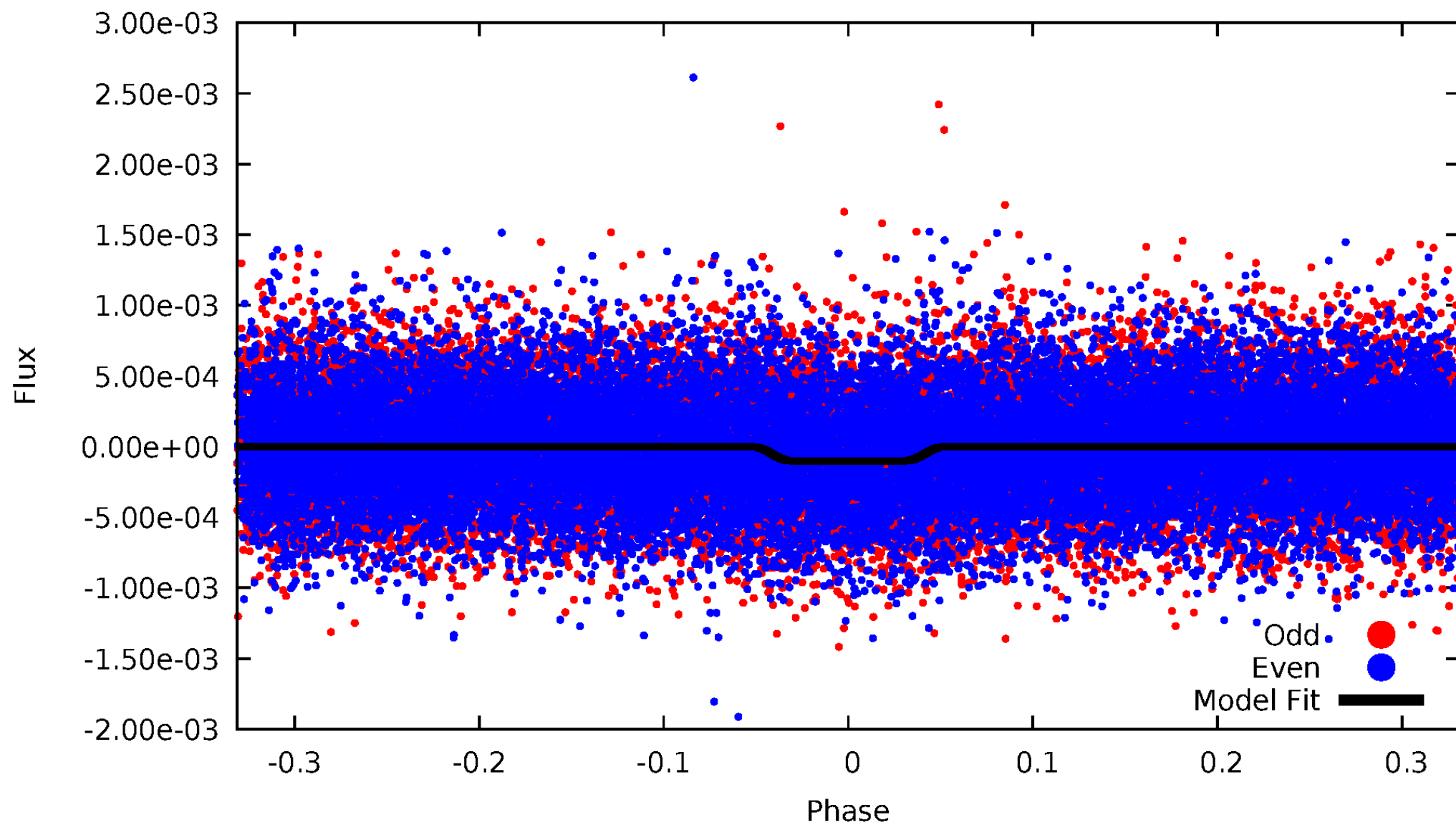
# DV Odd/Even

TCE 008043968-02



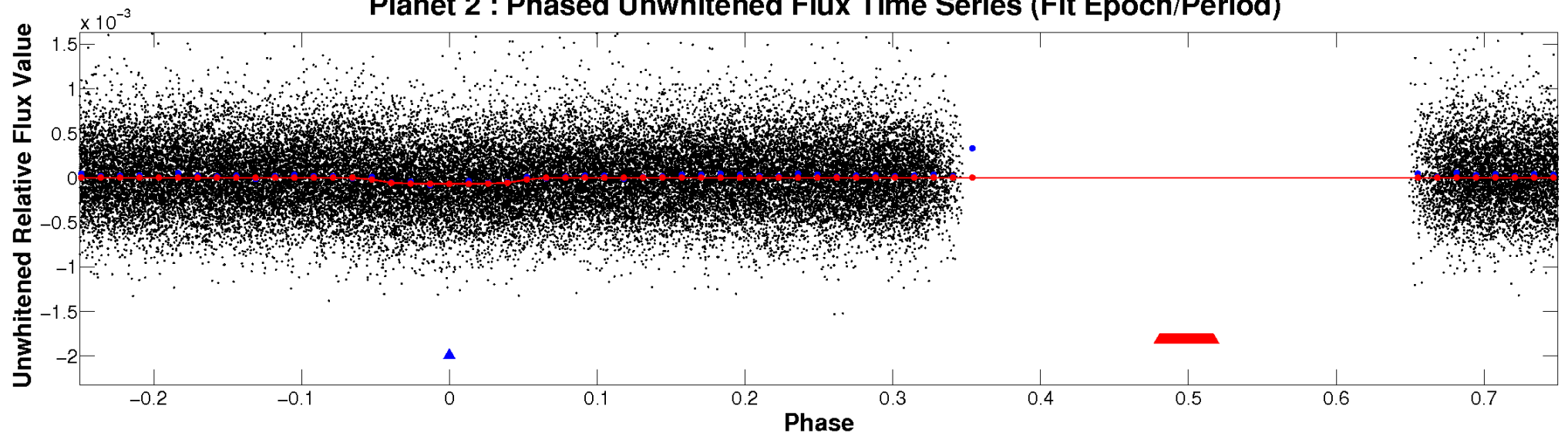
# ALT Odd/Even

TCE 008043968-02

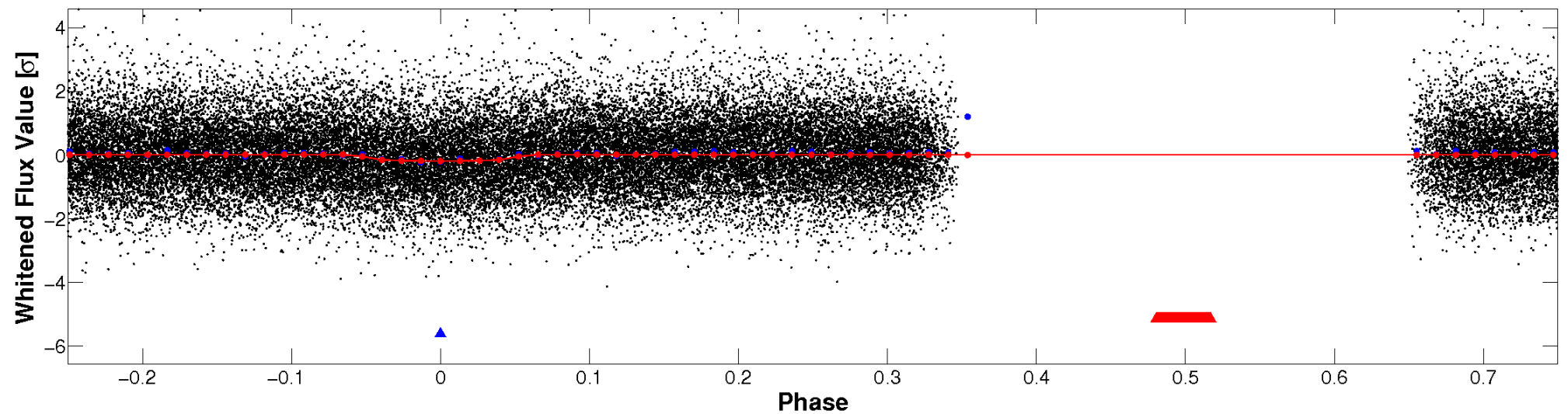


# Non-Whitened Vs. Whitened Light Curve

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

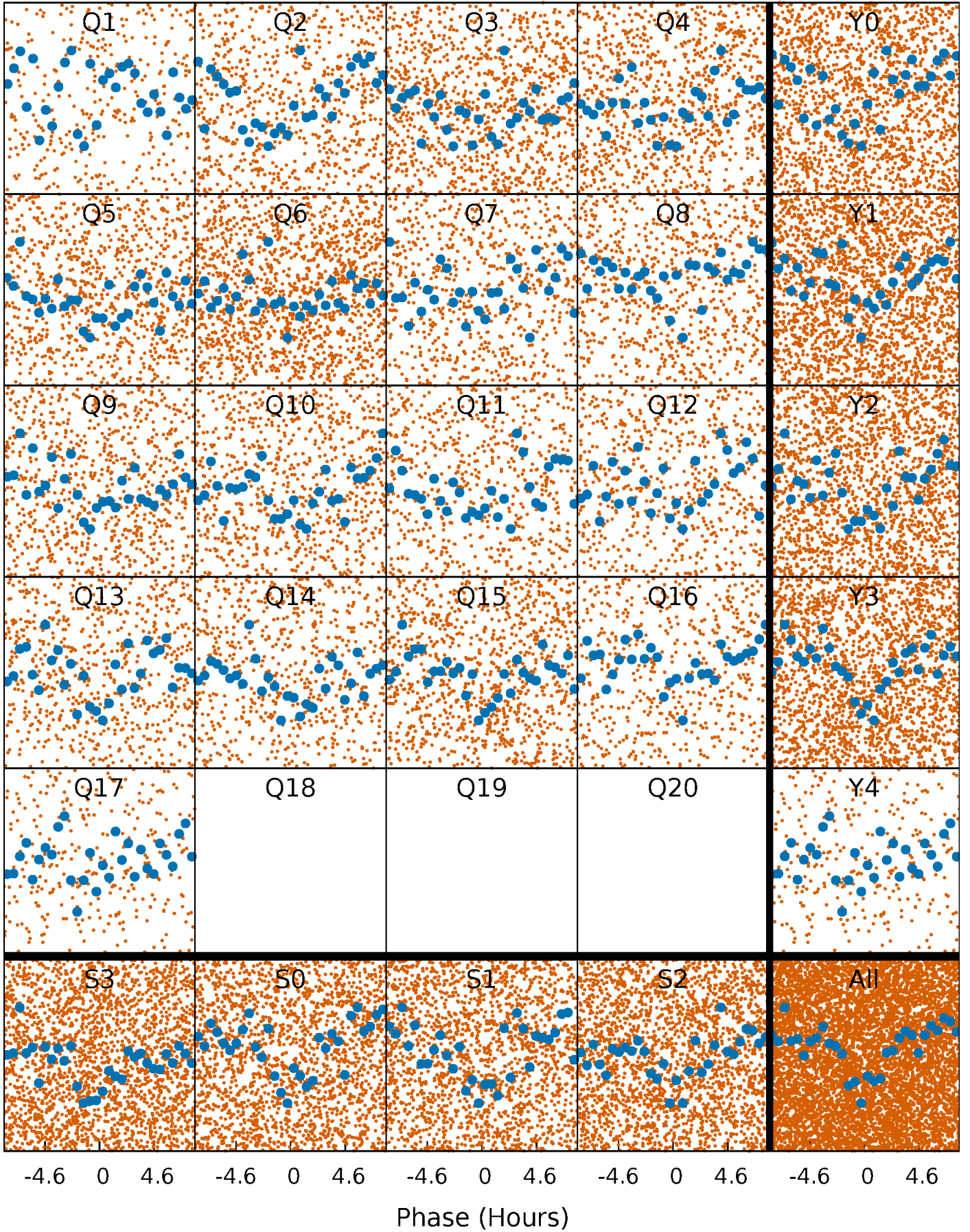


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

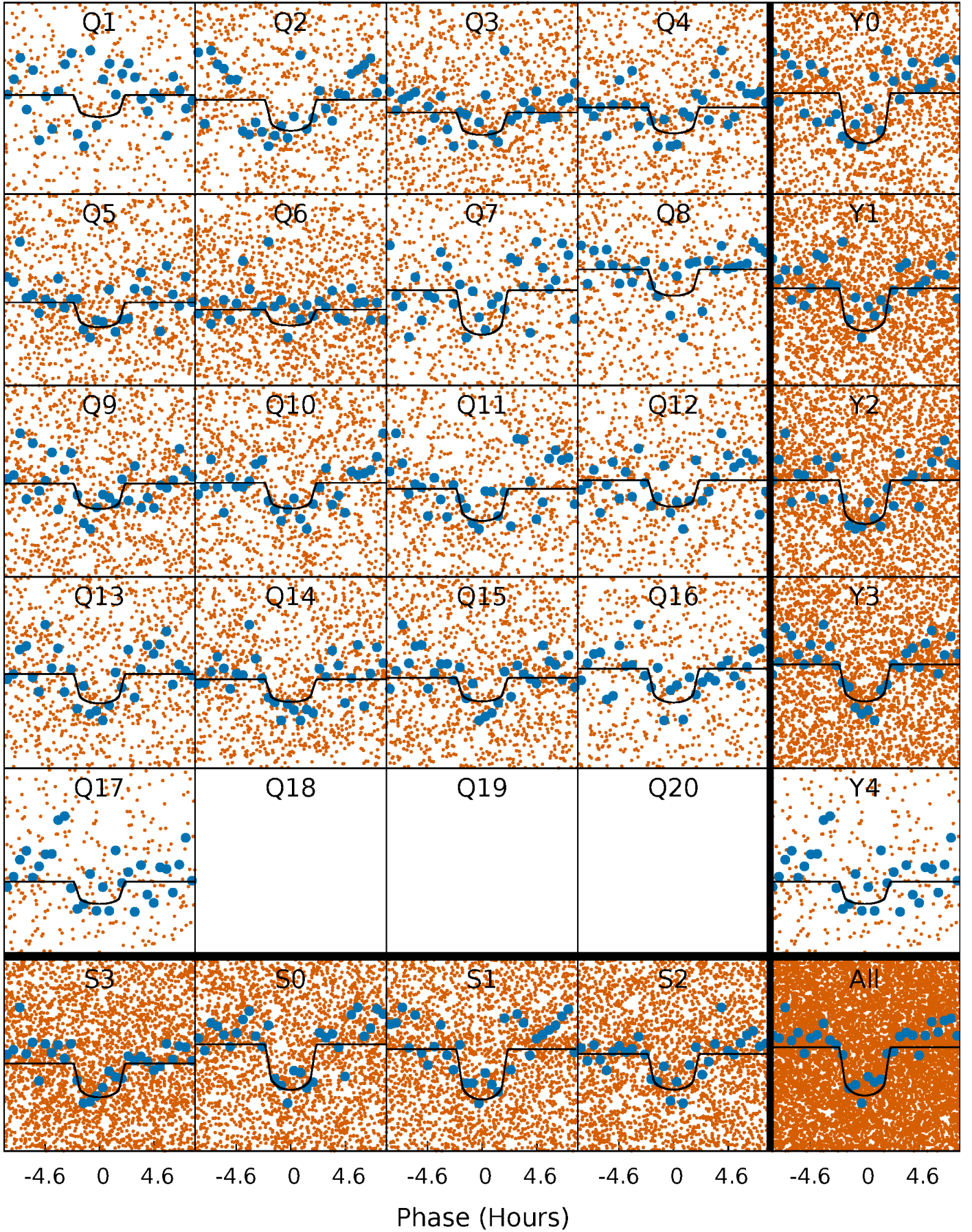
TCE 008043968-02   P= 1.559140 Days    $T_0=131.731521$  (BKJD)





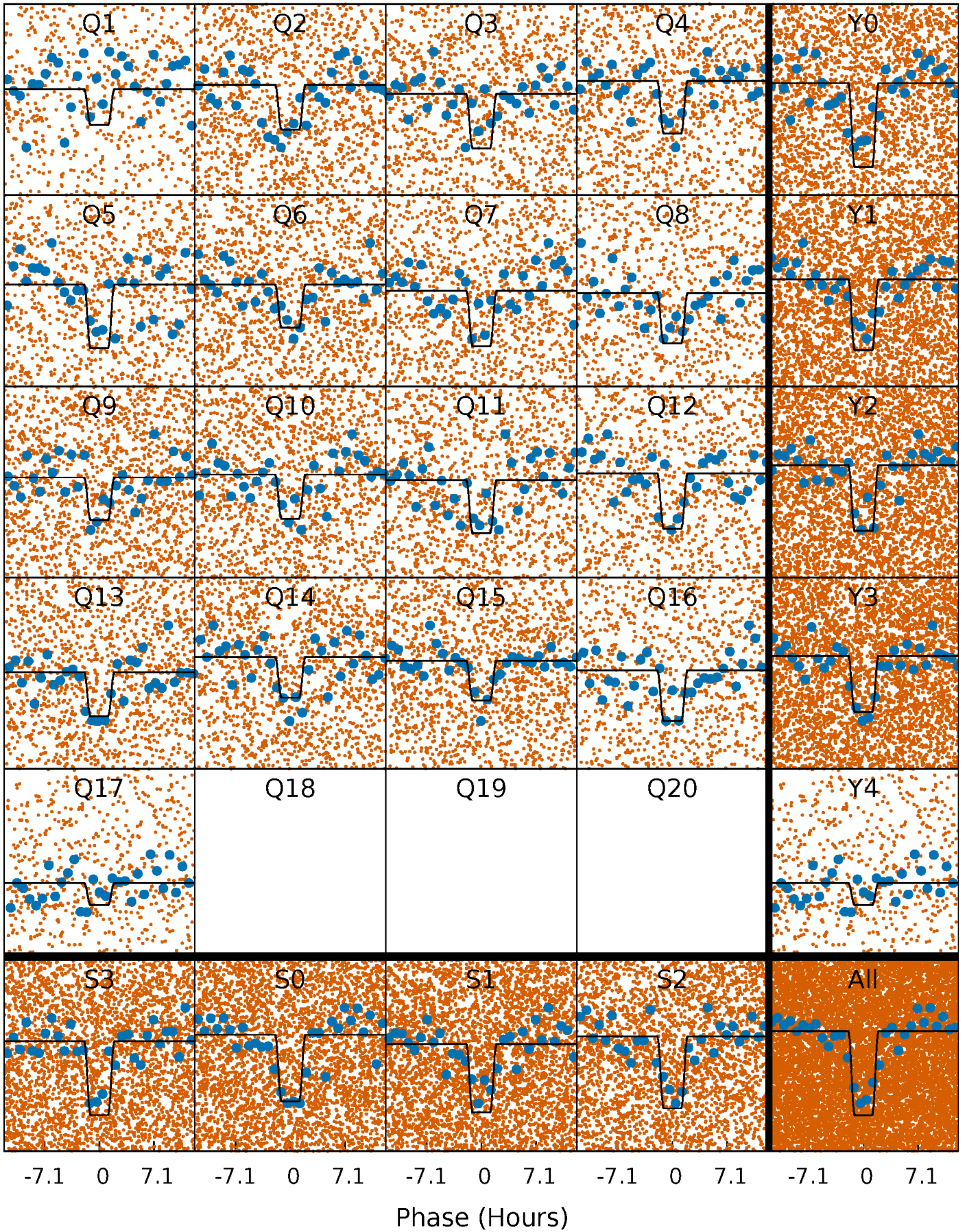
# DV Quarter-Phased Transit Curves

TCE 008043968-02 P= 1.559140 Days  $T_0=131.731521$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 008043968-02 P= 1.559173 Days  $T_0=131.707520$  (BKJD)

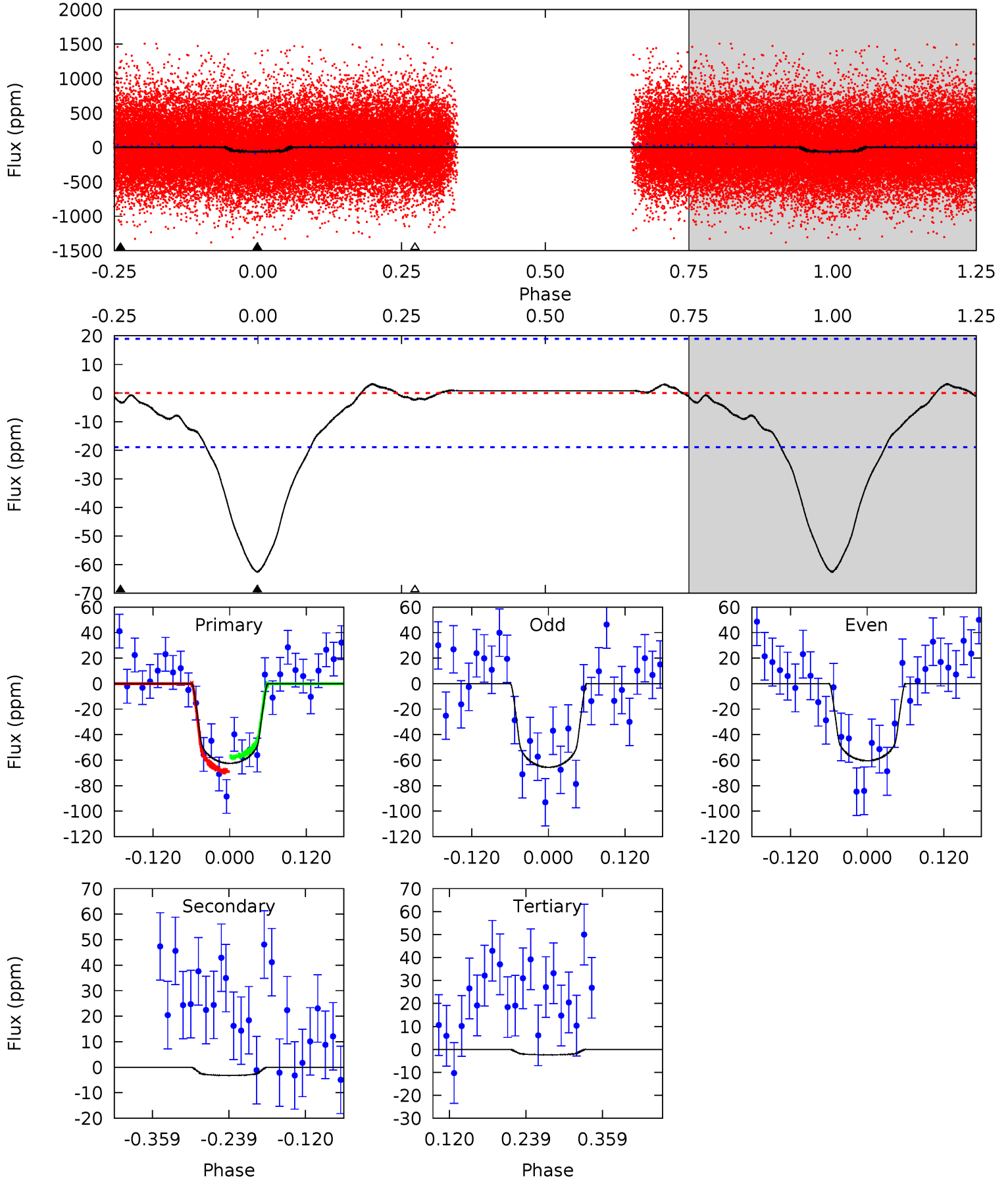




# DV Model-Shift Uniqueness Test

008043968-02, P = 1.559140 Days, E = 130.172381 Days

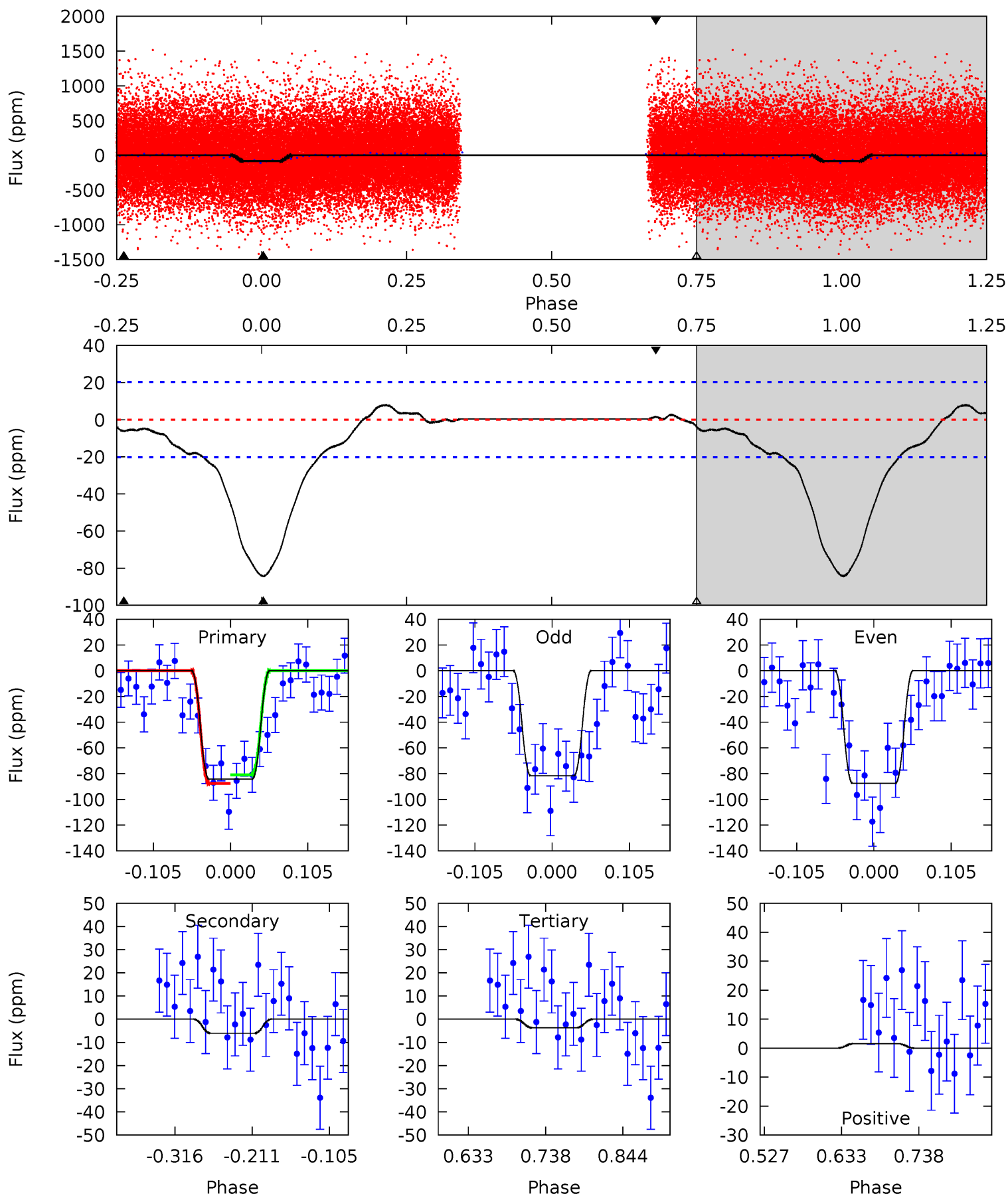
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.9	0.77	0.57	0	4.53	1.56	0.79	14.4	14.9	0.20	0.77	0.61	1.02	0.05	1.35



# Alt Model-Shift Uniqueness Test

008043968-02, P = 1.559173 Days, E = 130.148347 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
19.0	1.38	0.85	0.35	4.55	1.62	1.72	18.1	18.6	0.53	1.03	0.64	1.01	0.08	0.76



### Stellar Parameters For KIC 008043968

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5764^{+156}_{-173}$	$4.548^{+0.037}_{-0.200}$	$-0.120^{+0.300}_{-0.300}$	$0.863^{+0.258}_{-0.069}$	$0.959^{+0.103}_{-0.114}$	$2.100^{+0.429}_{-1.106}$
	+3%/-3%	+1%/-4%	+250%/-250%	+30%/-8%	+11%/-12%	+20%/-53%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 008043968-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-3\pm4$	$0.90^{+0.46}_{-0.42}$	$2087^{+139}_{-85}$	$2944^{+917}_{-5817}$	$1.173^{+4.002}_{-1.575}$
Alt.	$-6\pm4$	$1.01^{+0.44}_{-0.40}$	$2093^{+144}_{-89}$	$3244^{+780}_{-801}$	$1.969^{+4.870}_{-1.453}$

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

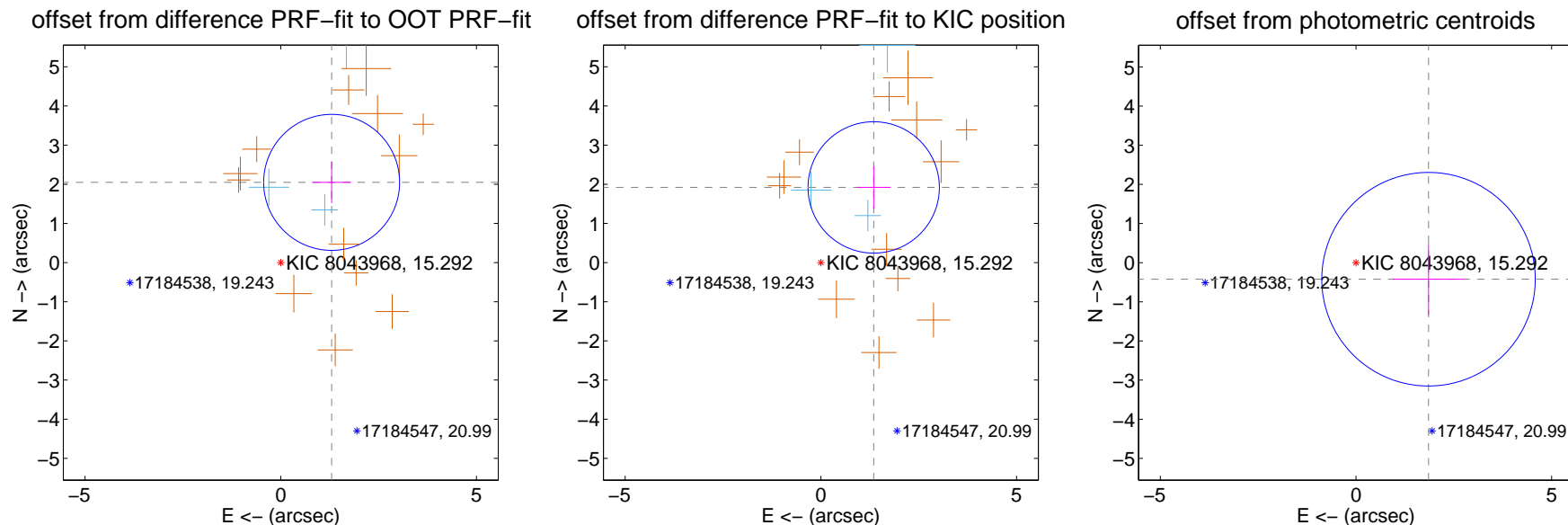
## DV Centroid Data

Supplemental centroid analysis for 008043968-02. Kepler magnitude: 15.29. Transit SNR 13.34

There are 3 quarters with good PRF difference image offsets

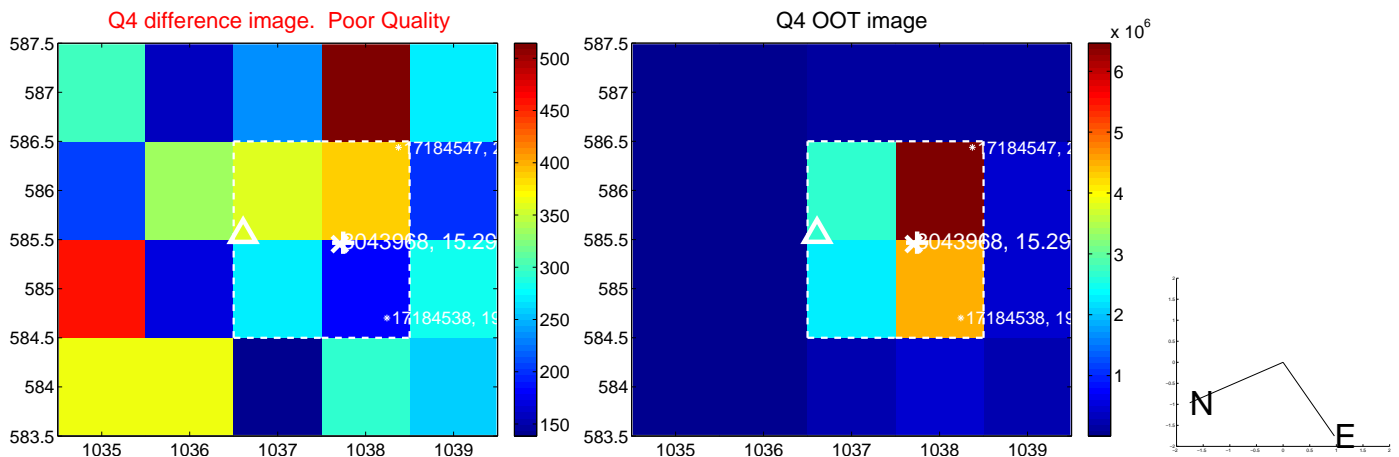
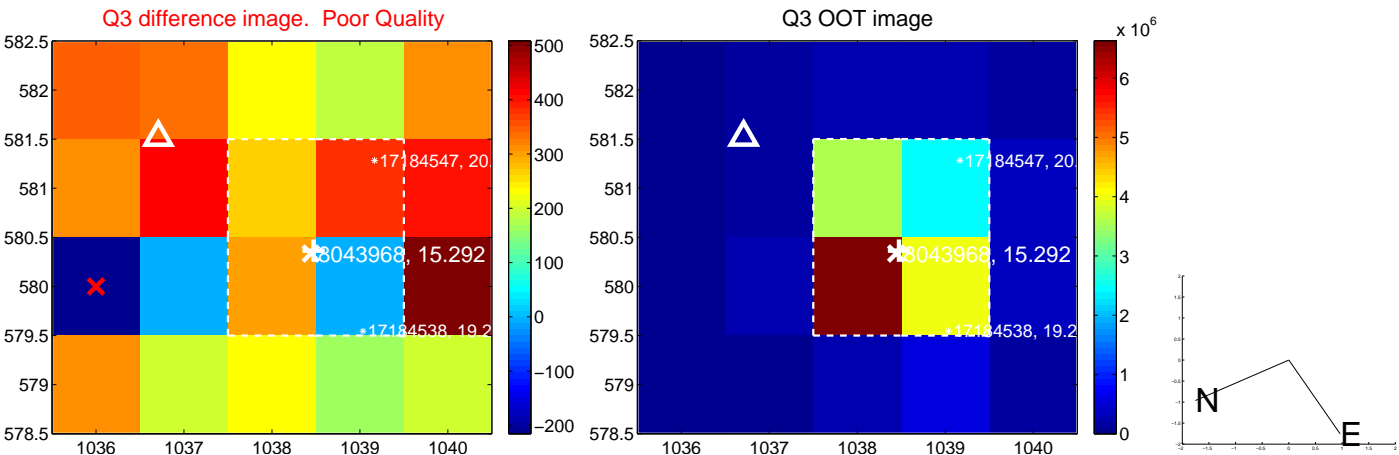
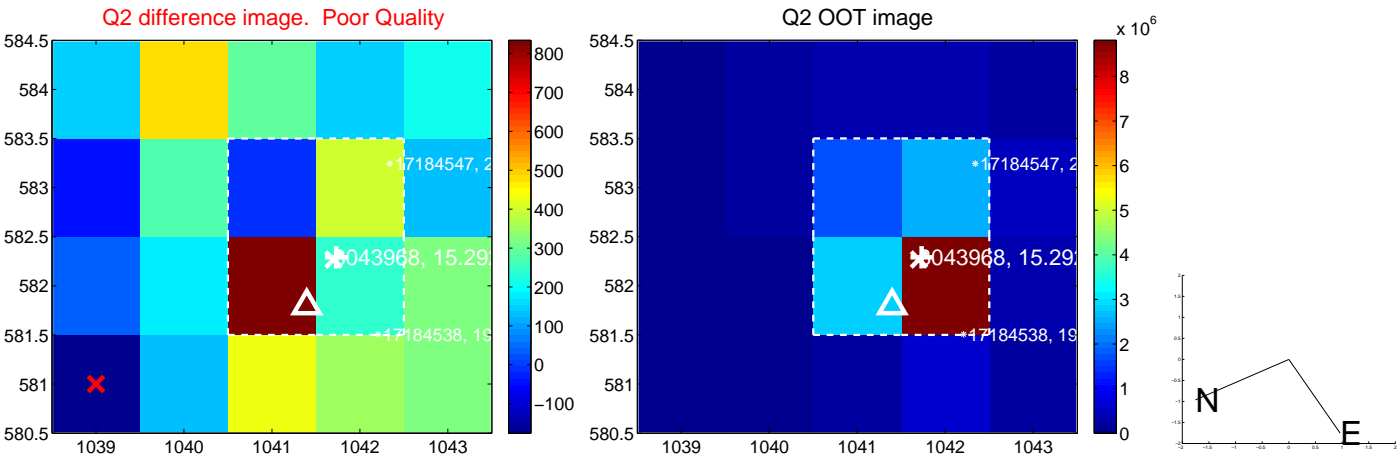
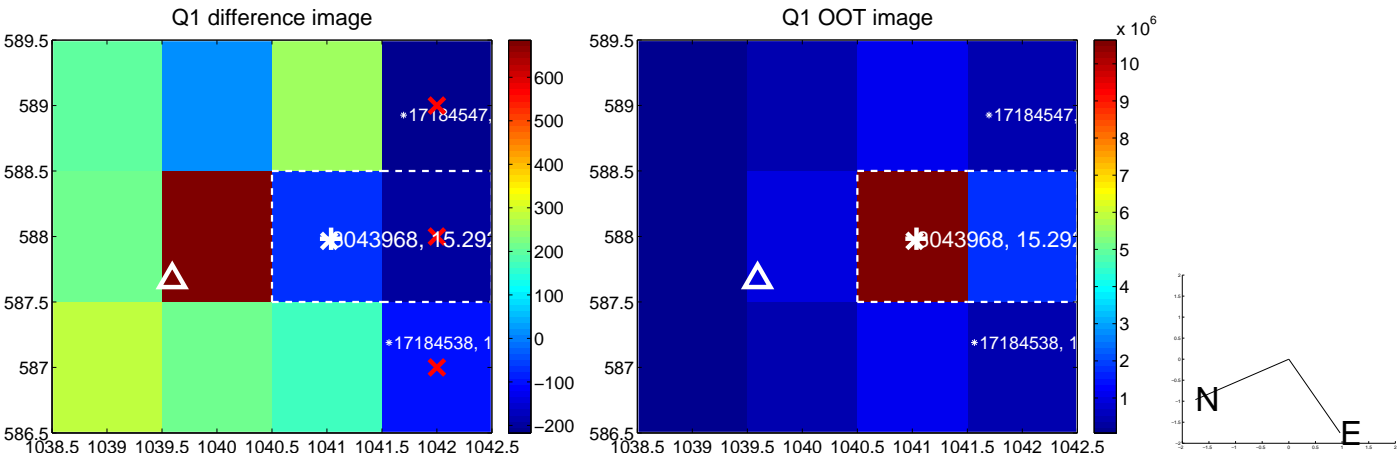
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.426 \pm 0.579$	4.19	$-1.300 \pm 0.498$	$2.049 \pm 0.530$
PRF-fit source offset from KIC position	$2.347 \pm 0.559$	4.20	$-1.350 \pm 0.431$	$1.920 \pm 0.544$
photometric centroid source offset	$1.90 \pm 0.91$	2.09	$-1.85 \pm 0.91$	$-0.42 \pm 0.92$

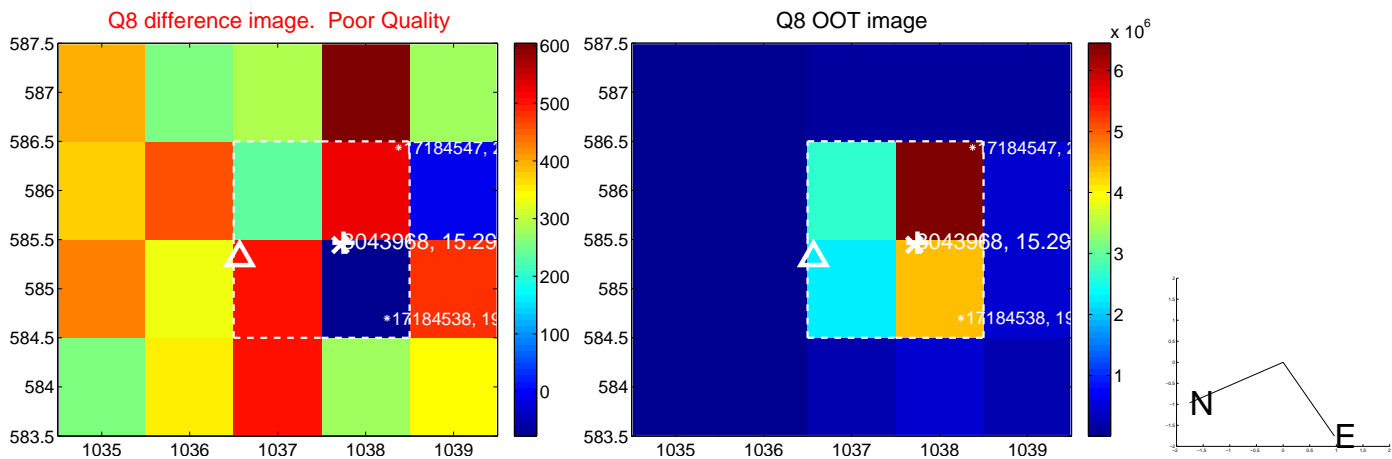
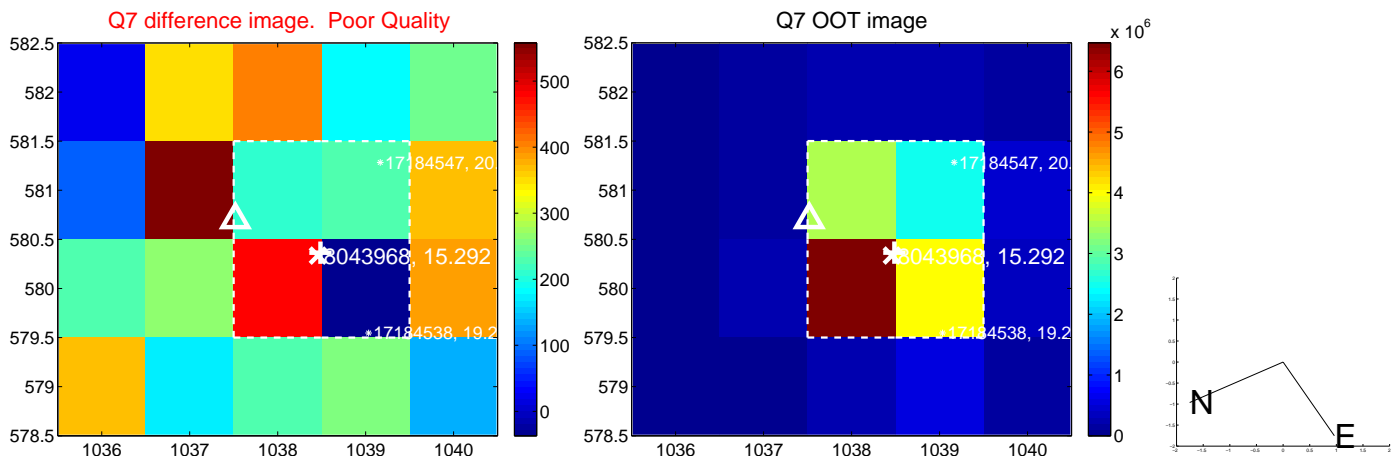
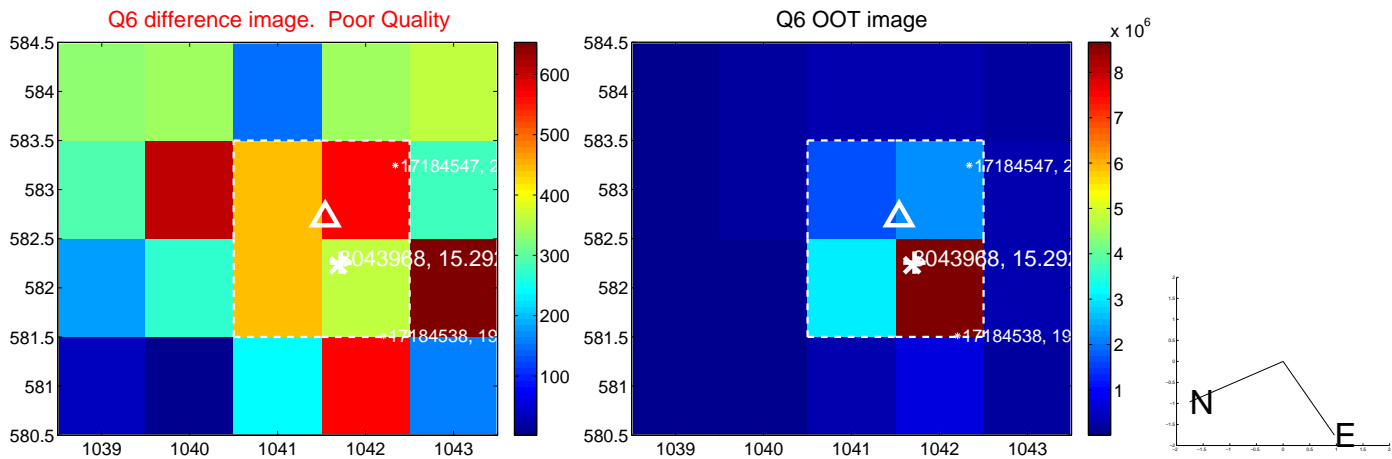
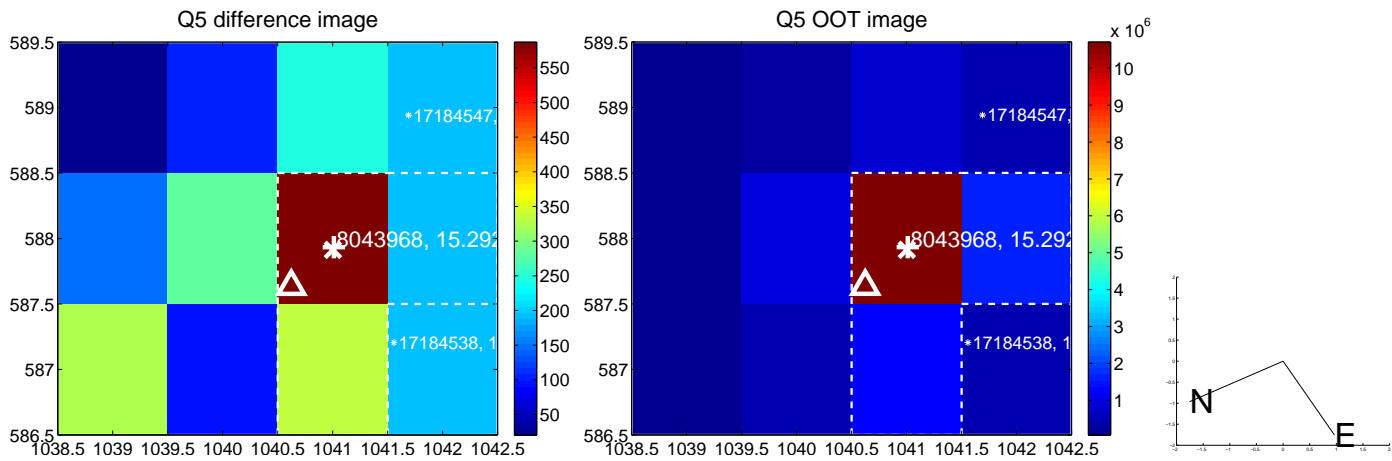


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

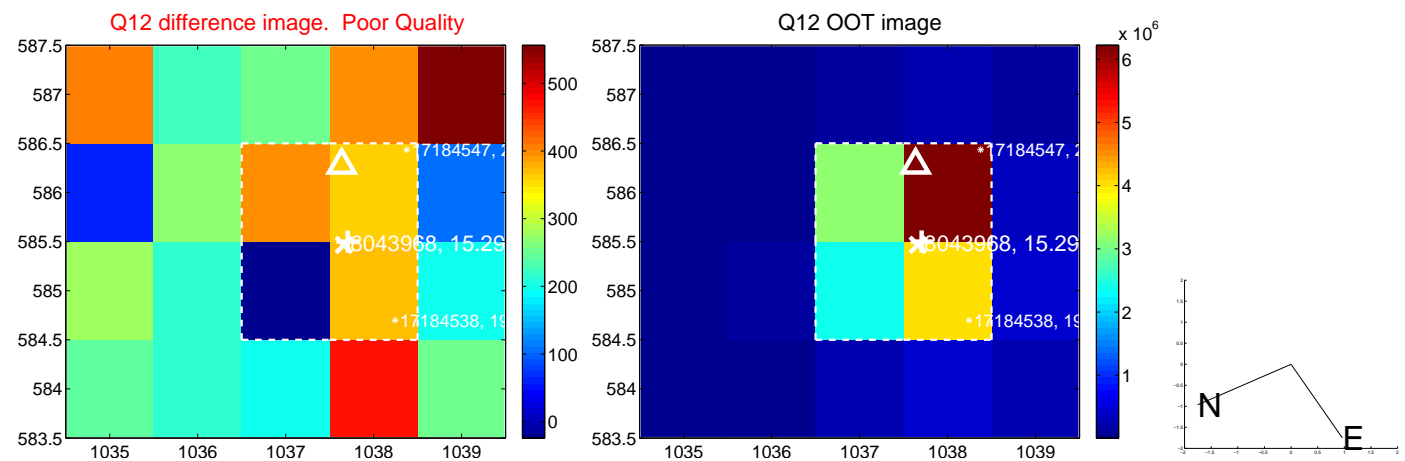
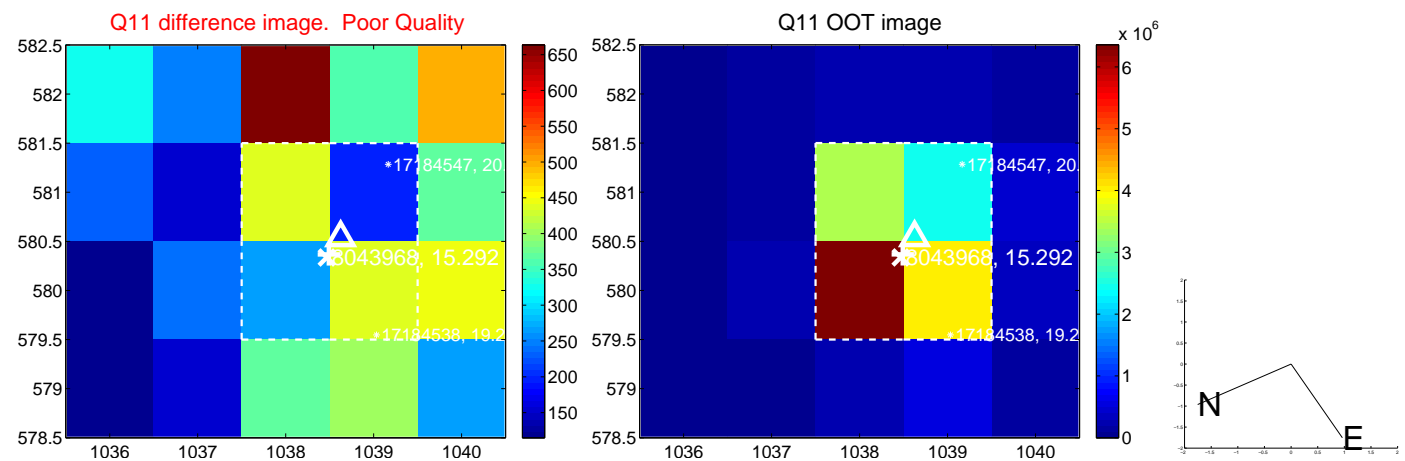
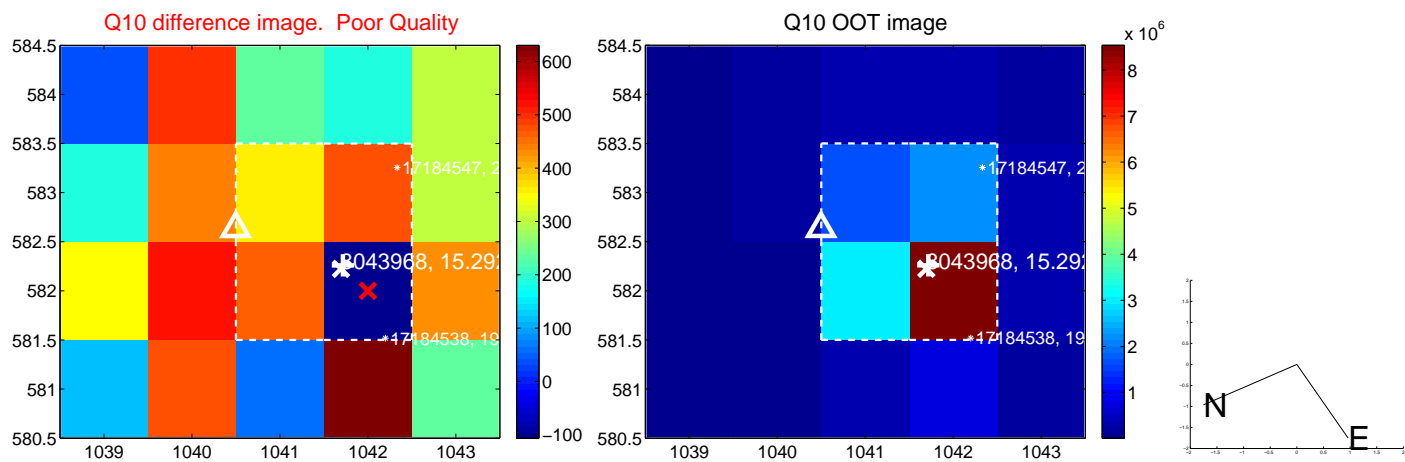
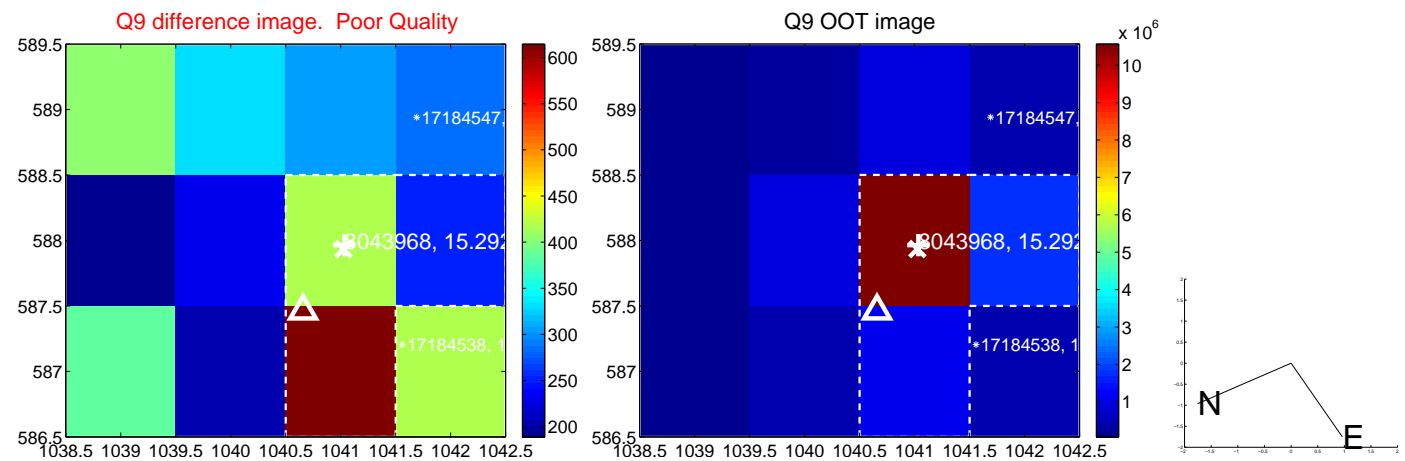


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

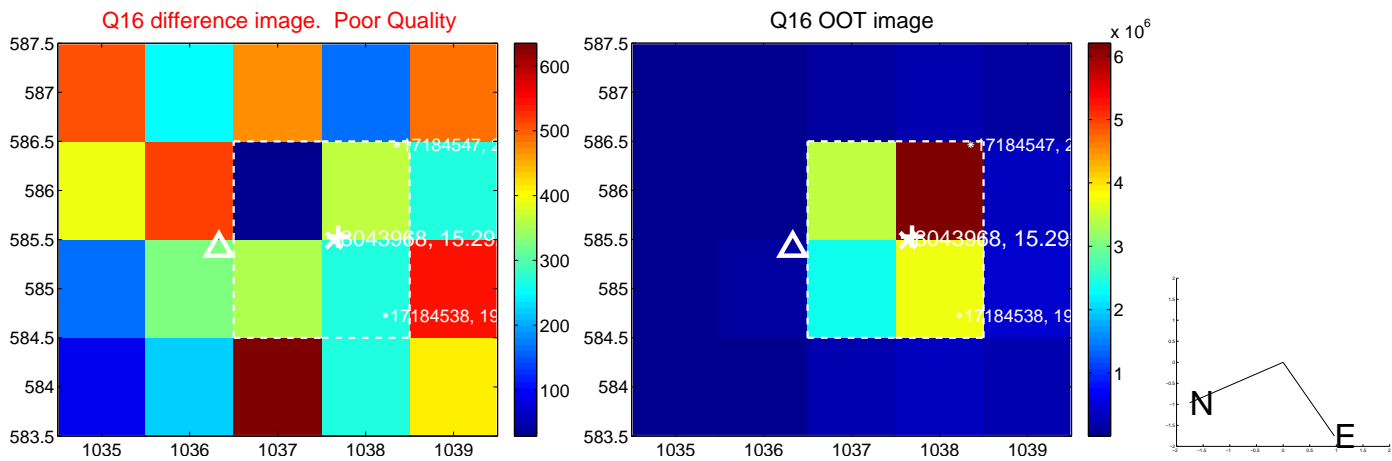
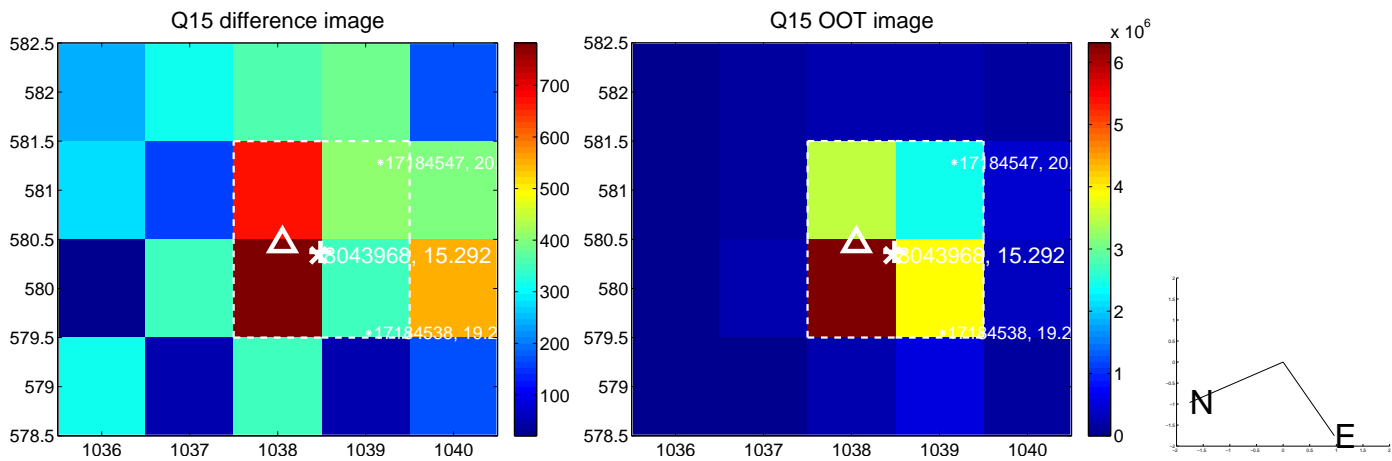
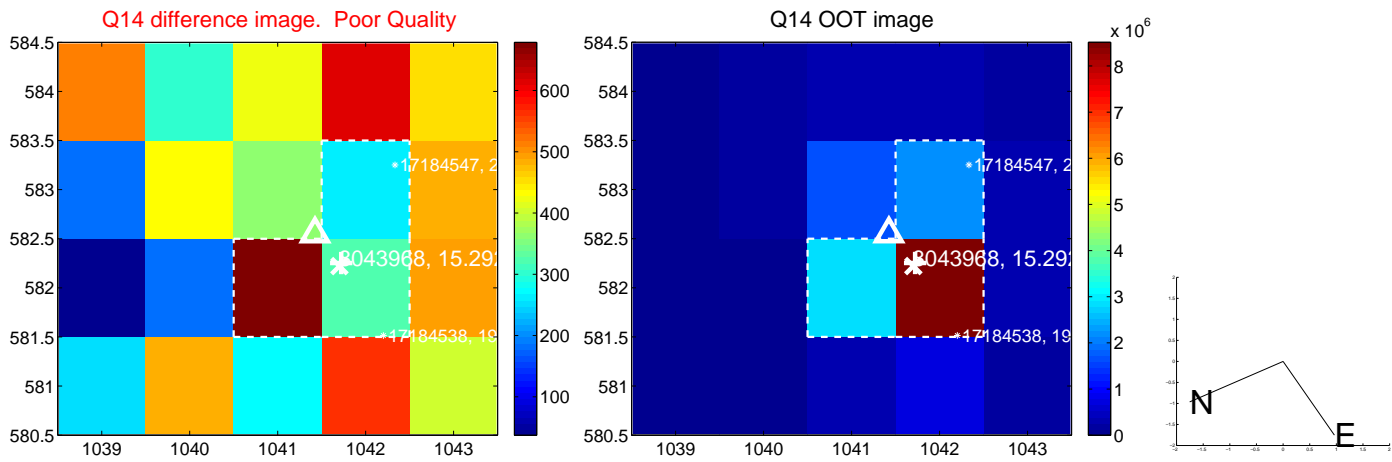
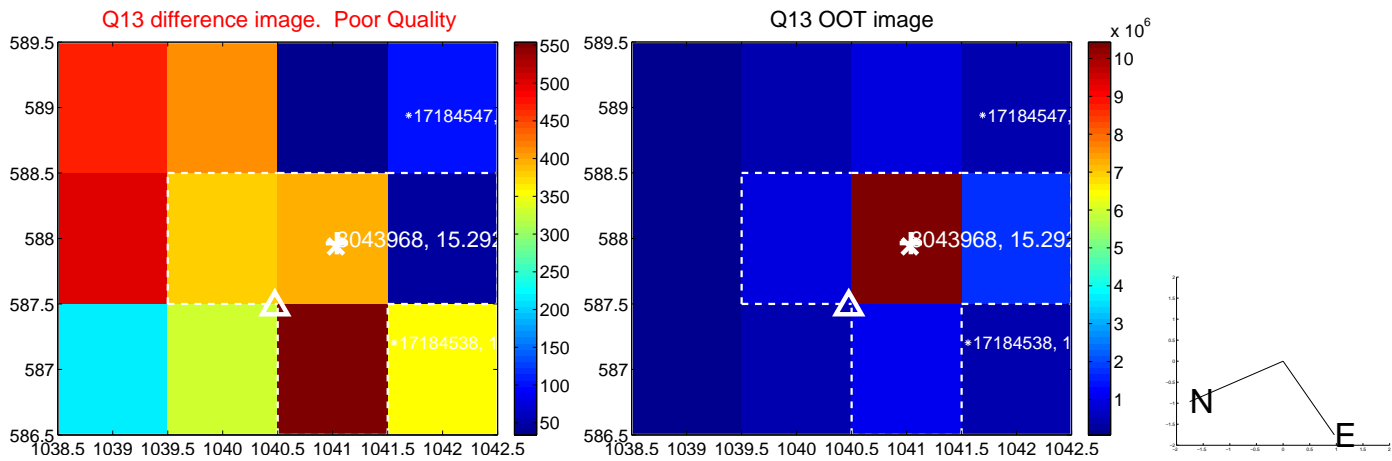




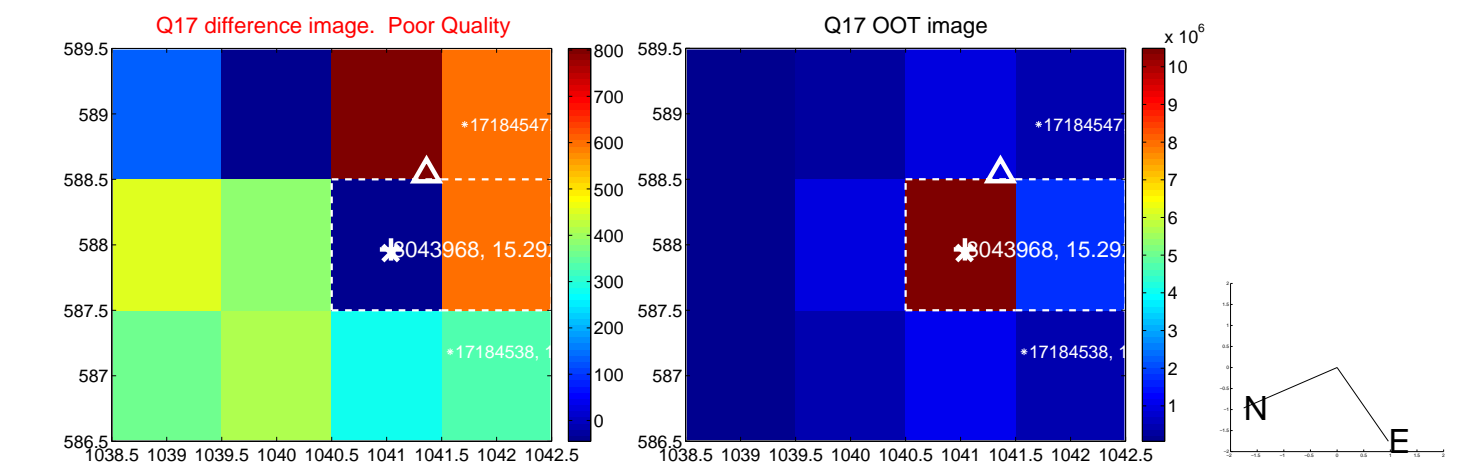
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



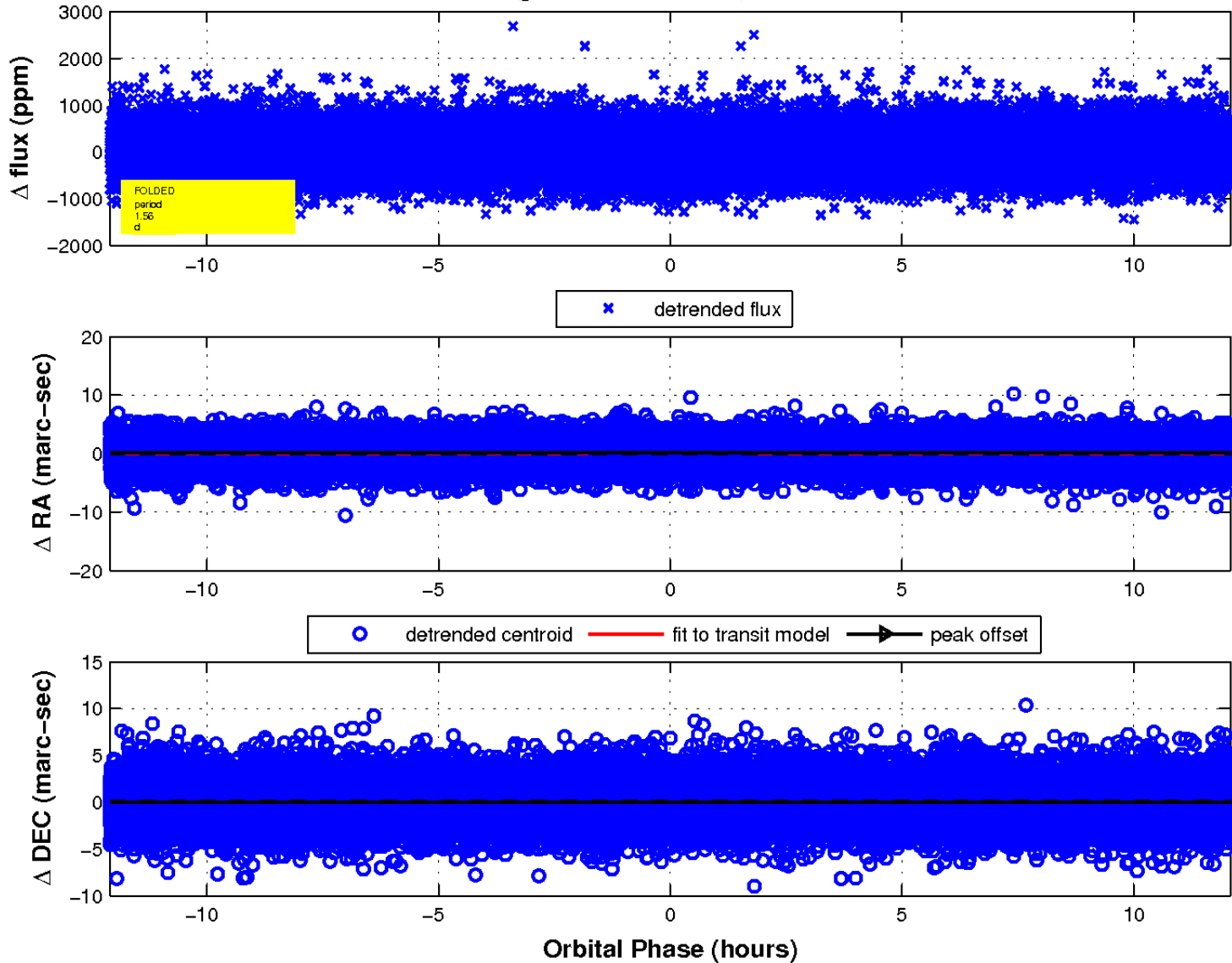
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

