

# KIC 007777372

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007777372-01	OBS	3958.01	1.770198	132.789981	72.9	3.143	16.2	16.8	1.00	5979	0.97	1389.31
007777372-02	OBS	No	1.770255	131.882683	96.0	3.788	17.7	19.7	1.00	5979	1.73	1389.25

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007777372-01	OBS	FP	0.00	0	0	1	1	MOD_SEC_DV—MOD_SEC_ALT—PLANET_PERIOD_IS_HALF_ALT—HAS_SEC_TCE—CENT_UNRESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
007777372-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_CROWDED—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 007777372-01

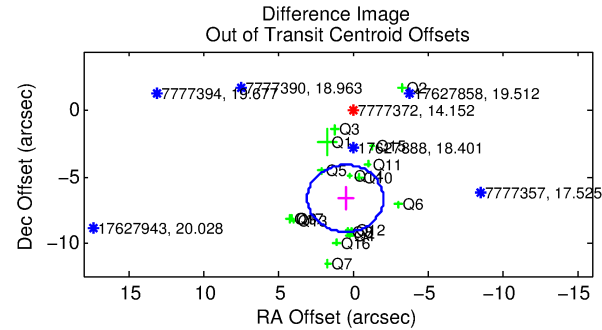
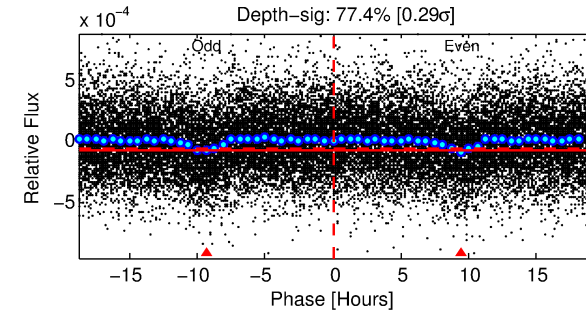
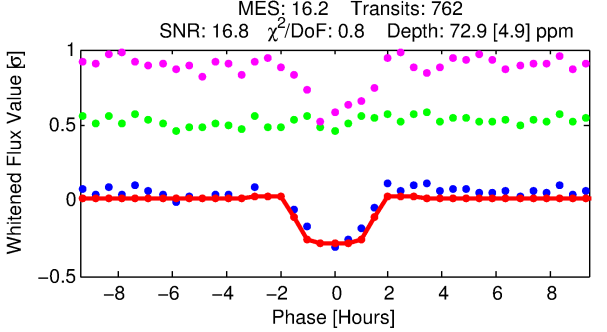
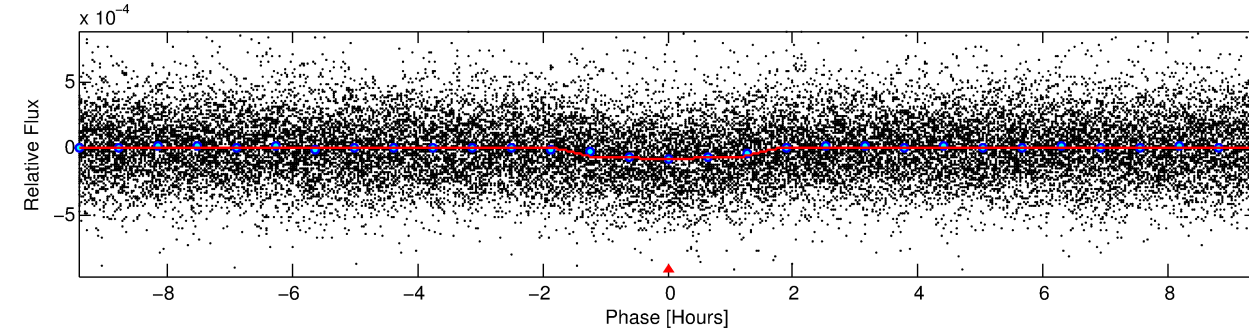
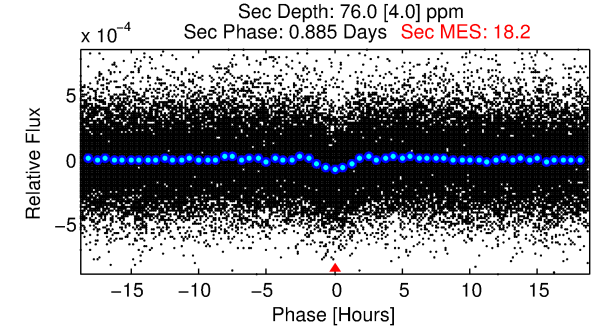
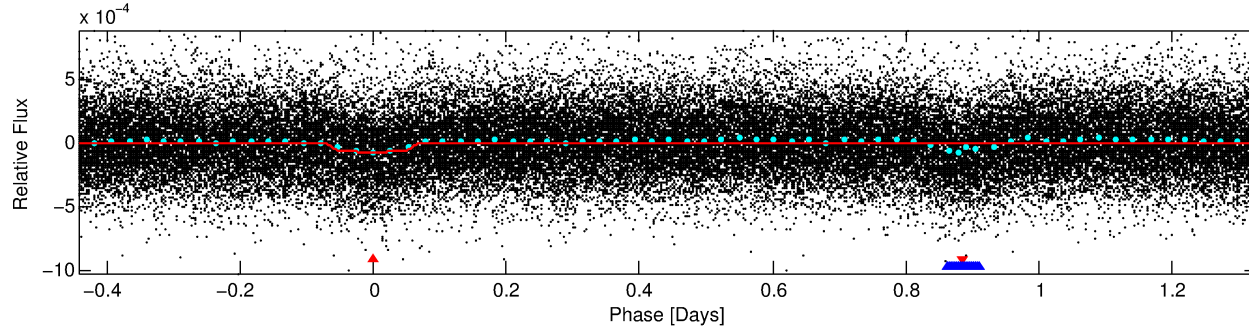
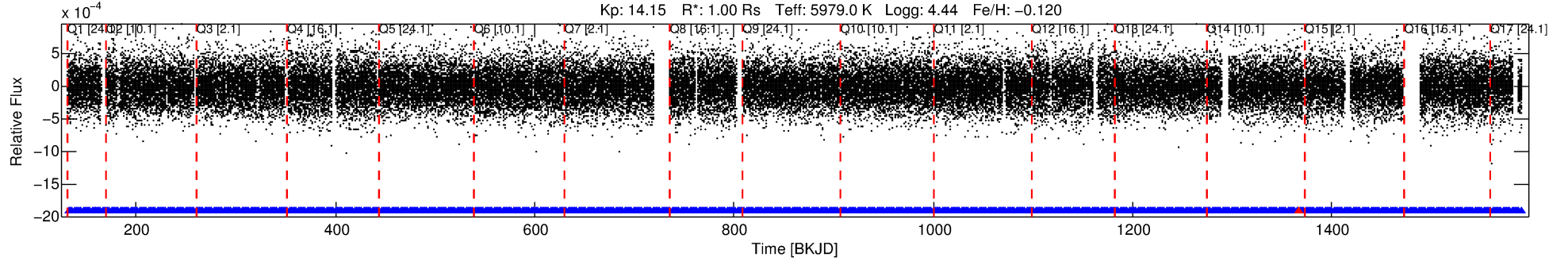
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
007777372-01	7777372	6916.01	7777365	2:1	84.8	10	18	15.87	14.15	2.10	Direct-PRF	1	4.45	1.59

**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: 7777372 Candidate: 1 of 2 Period: 1.770 d  
KOI: K03958 Corr: No Ephemeris Match

Kp: 14.15 R\*: 1.00 Rs Teff: 5979.0 K Logg: 4.44 Fe/H: -0.120



## DV Fit Results:

Period = 1.77020 [0.00001] d  
Epoch = 132.7900 [0.0025] BKJD  
Rp/R\* = 0.0089 [0.0035]  
a/R\* = 2.48 [4.03]  
b = 0.86 [0.62]  
Seff = 1389.31 [529.08]  
Teq = 1557 [148] K  
Rp = 0.97 [0.48] Re  
a = 0.0287 [0.0072] AU  
Ag = 36.29 [31.15] [1.13σ]  
Teffp = 5908 [1163] K [3.71σ]

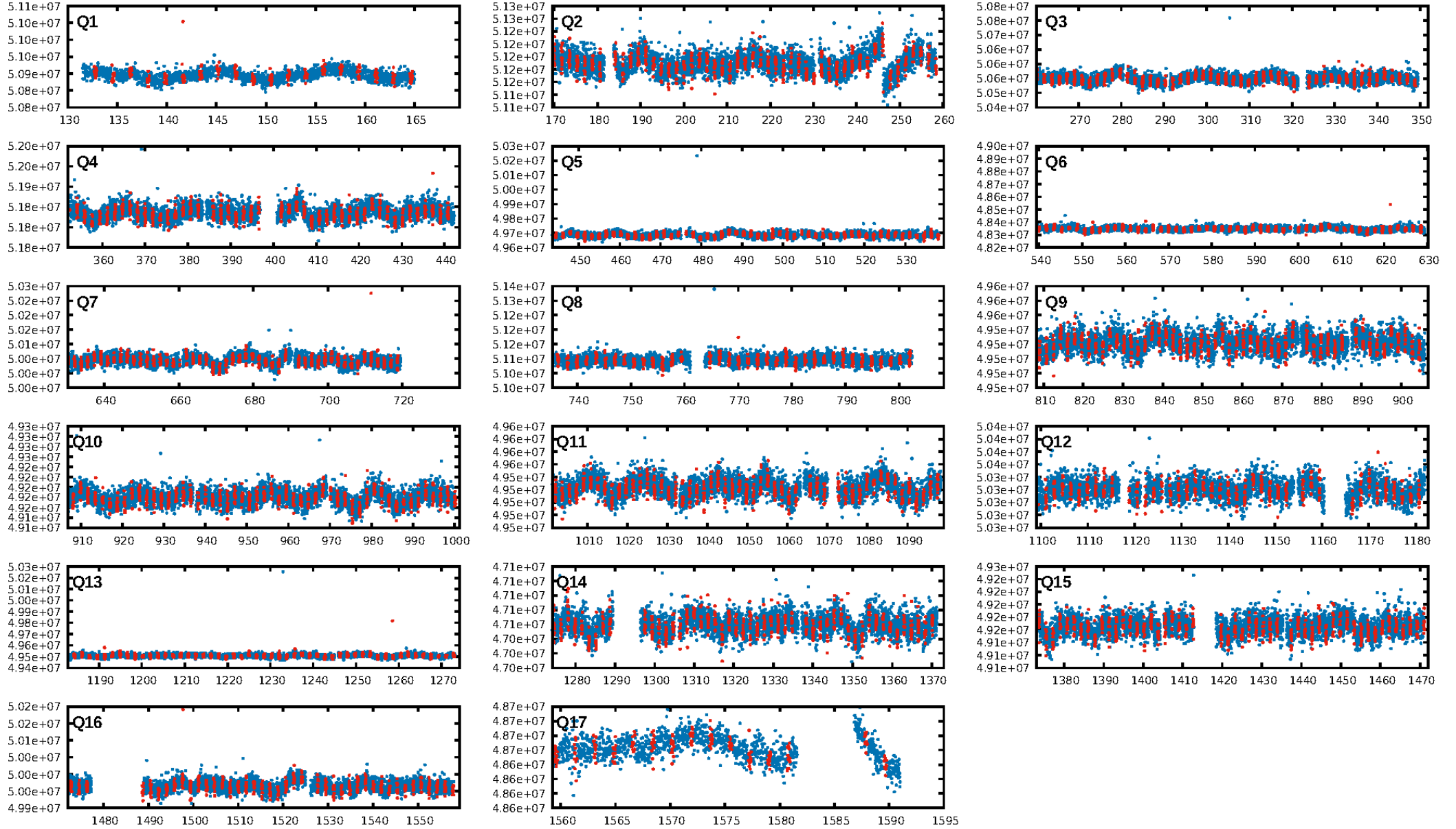
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.66e-59  
RollingBand-fgt: 1.00 [727/728]  
GhostDiagnostic-chr: 0.1491  
Centroid-sig: 0.0%  
Centroid-so: 4.168 arcsec [4.94σ]  
OotOffset-rm: 6.651 arcsec [7.86σ]  
KicOffset-rm: 6.592 arcsec [7.16σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.06 [1/17]  
DiffImageOverlap-fno: 1.00 [17/17]

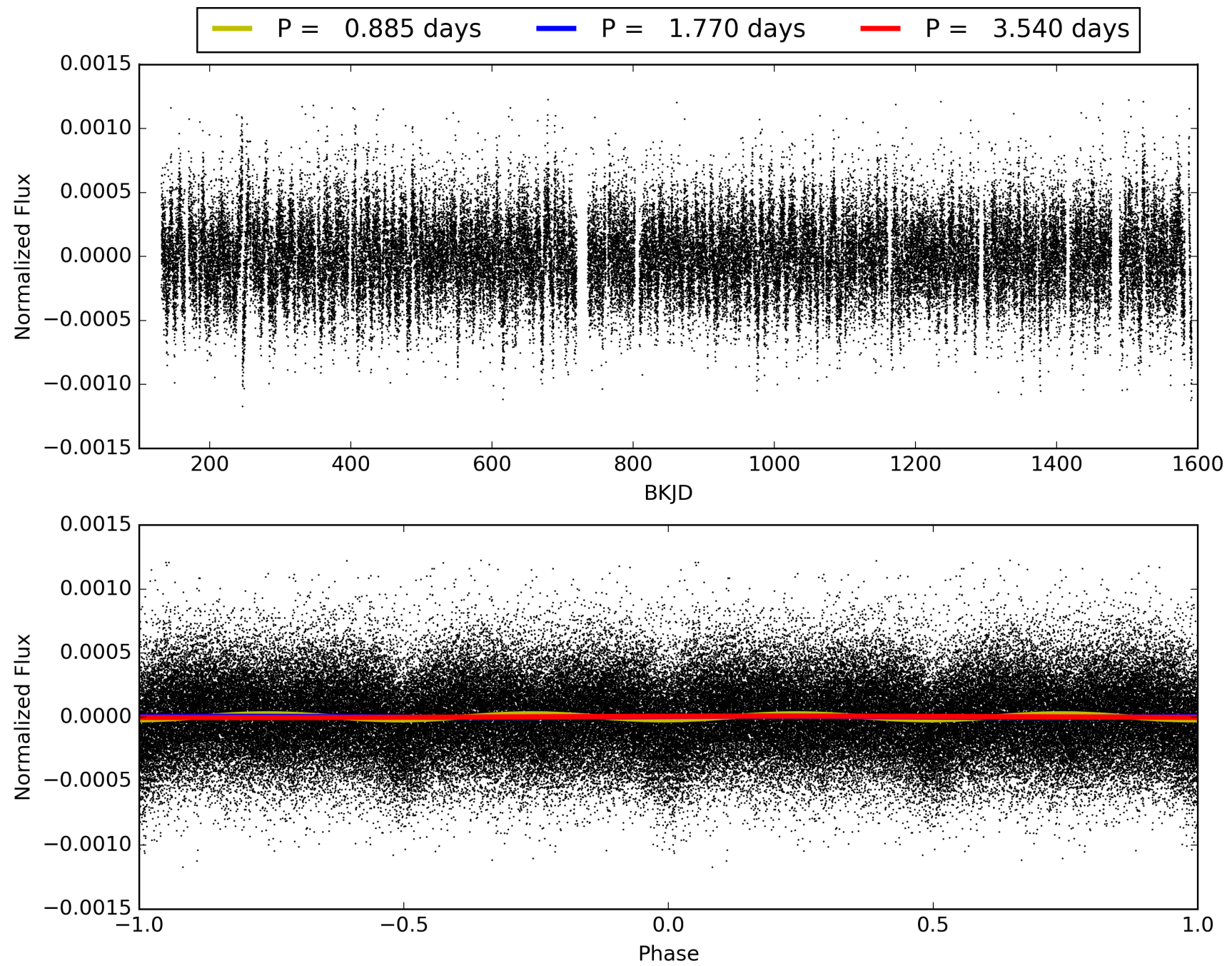
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:36:41 Z

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

# TCE 007777372-01, PDC Light Curves

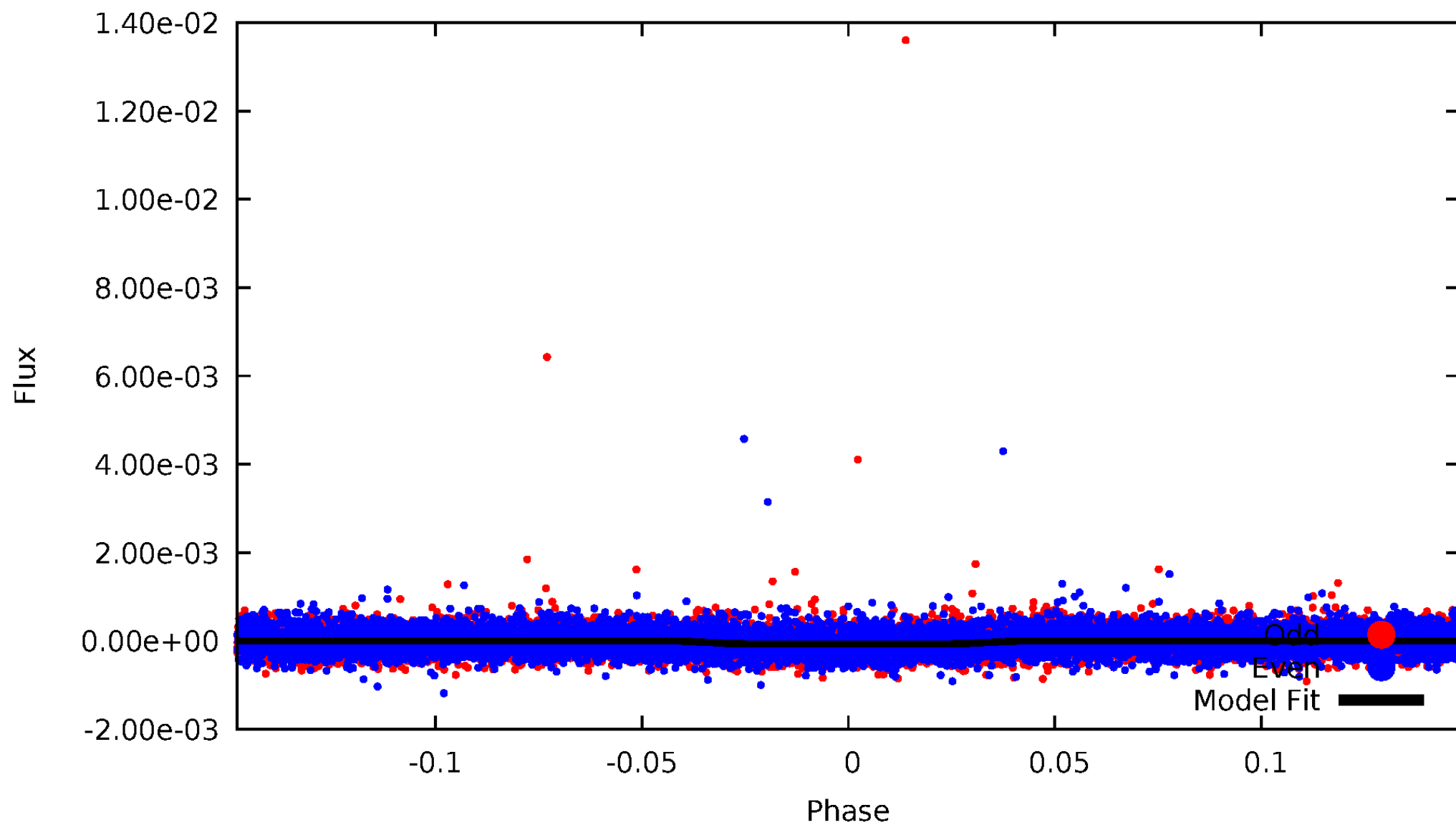


TCE 007777372-01



# DV Odd/Even

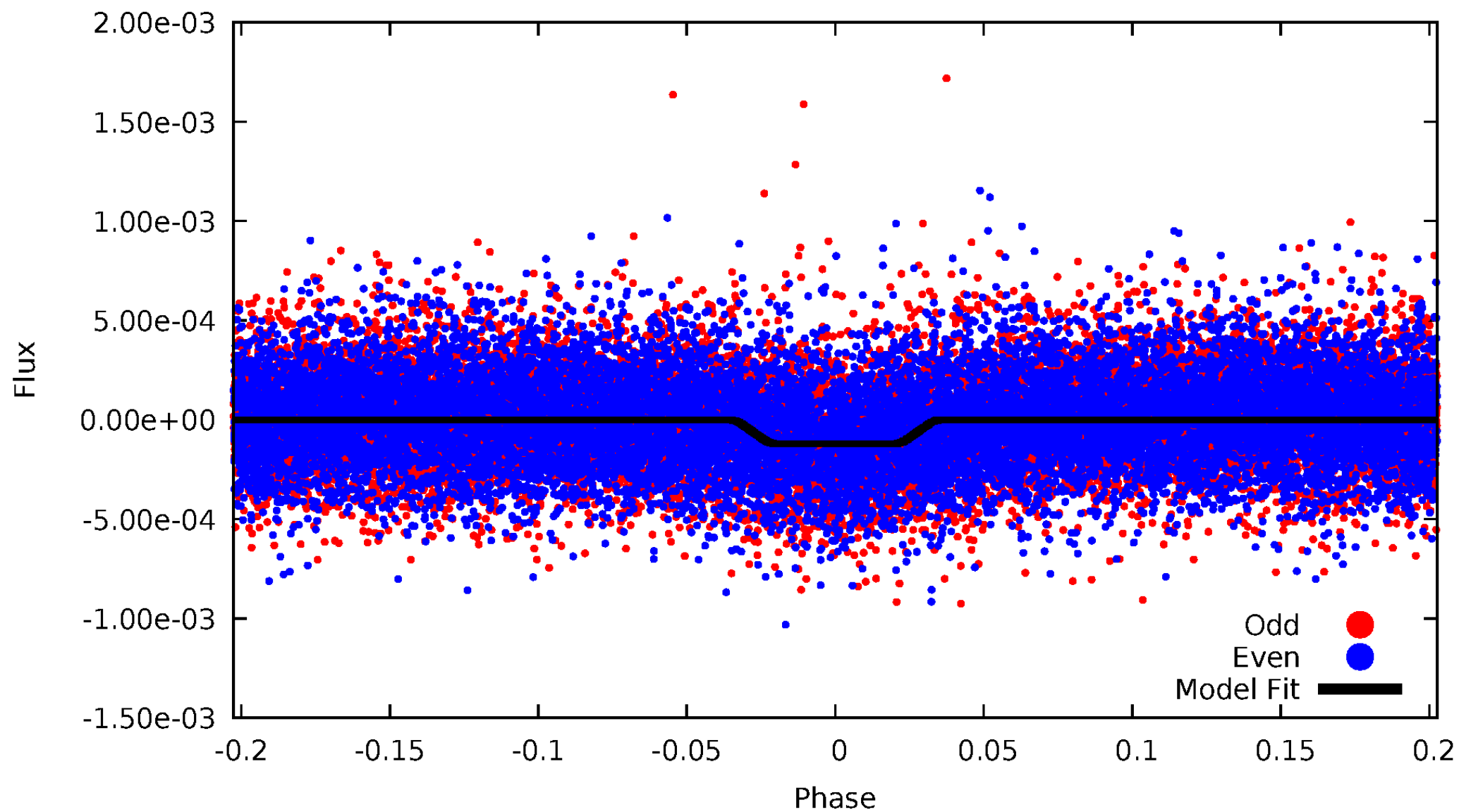
TCE 007777372-01





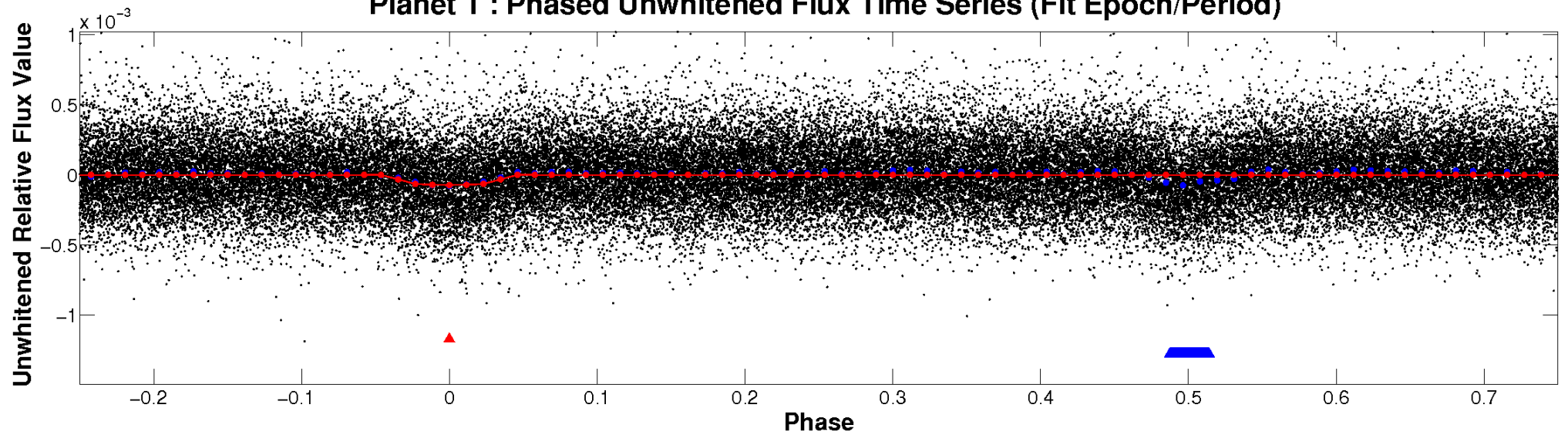
# ALT Odd/Even

TCE 007777372-01

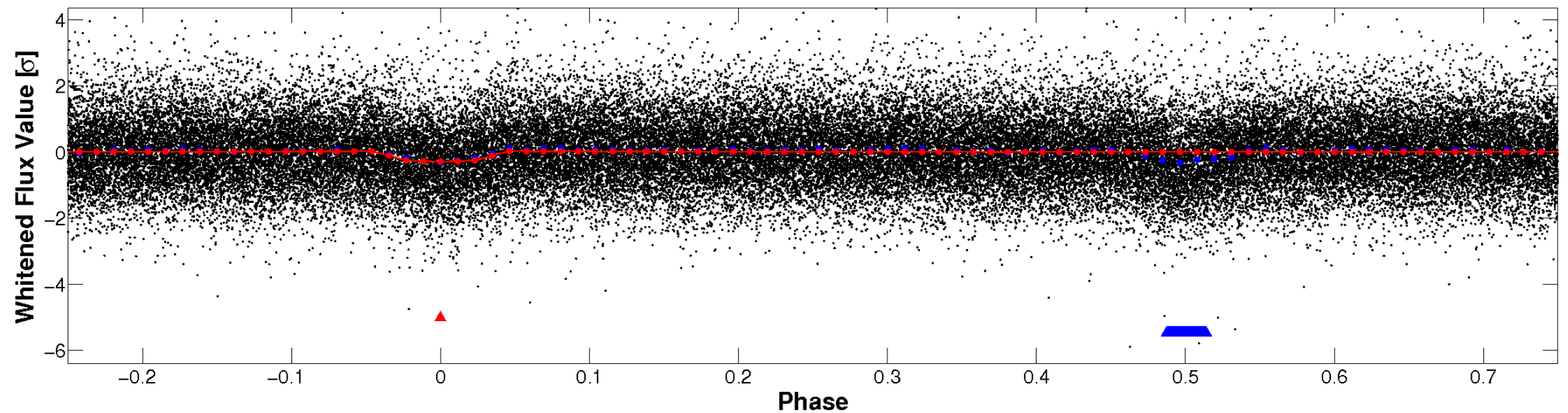


# Non-Whitened Vs. Whitened Light Curve

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

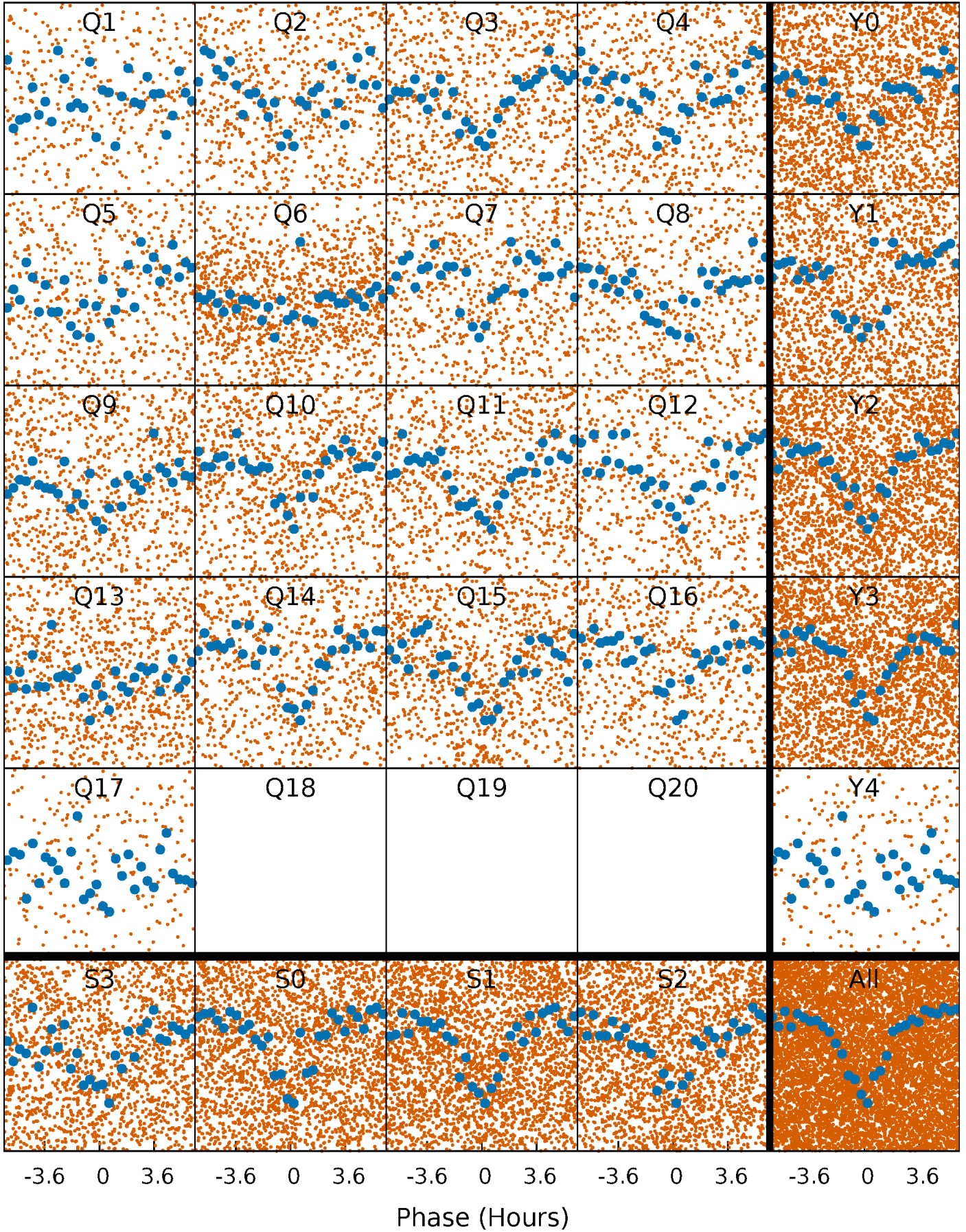


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

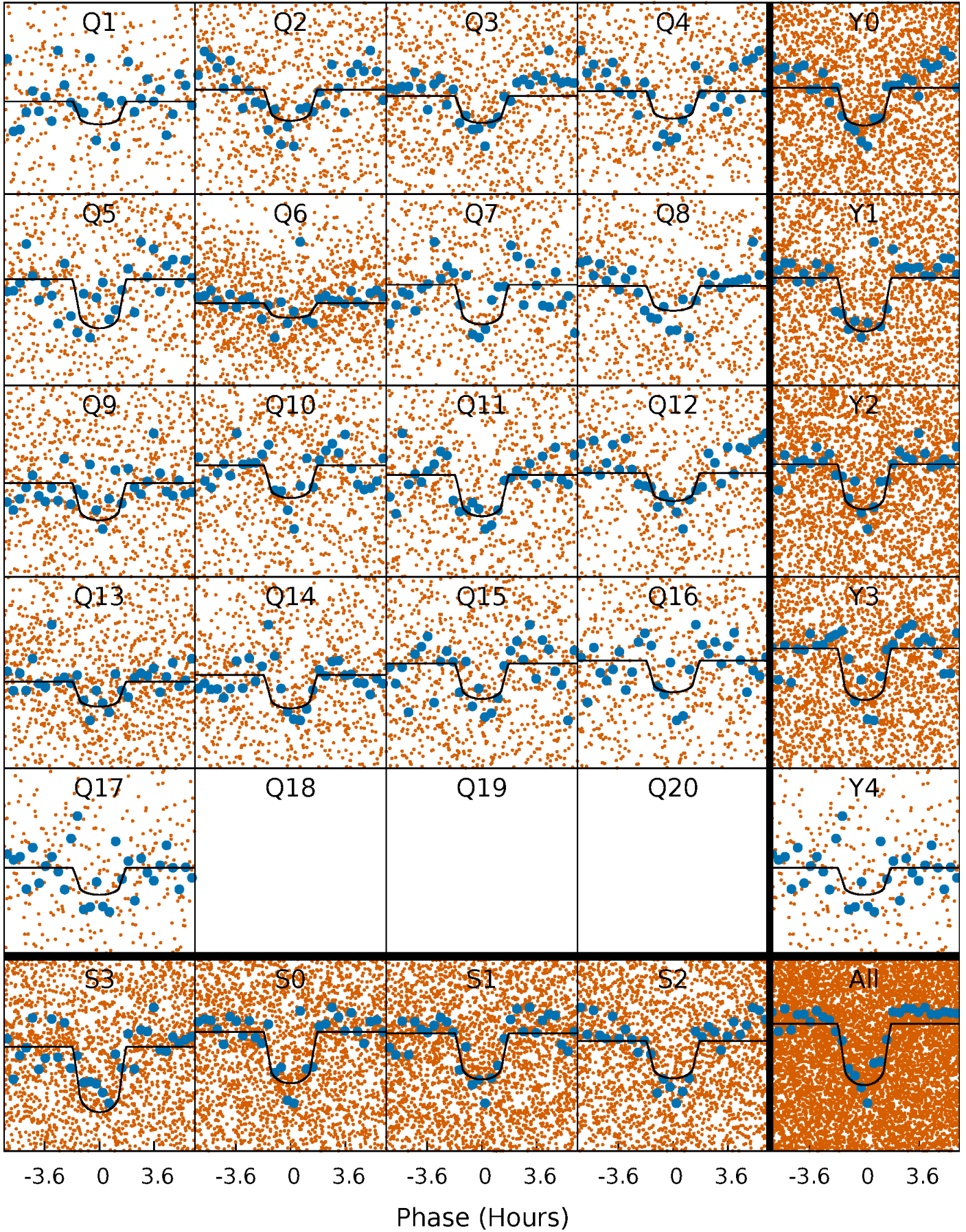
TCE 007777372-01 P= 1.770198 Days  $T_0=132.789981$  (BKJD)





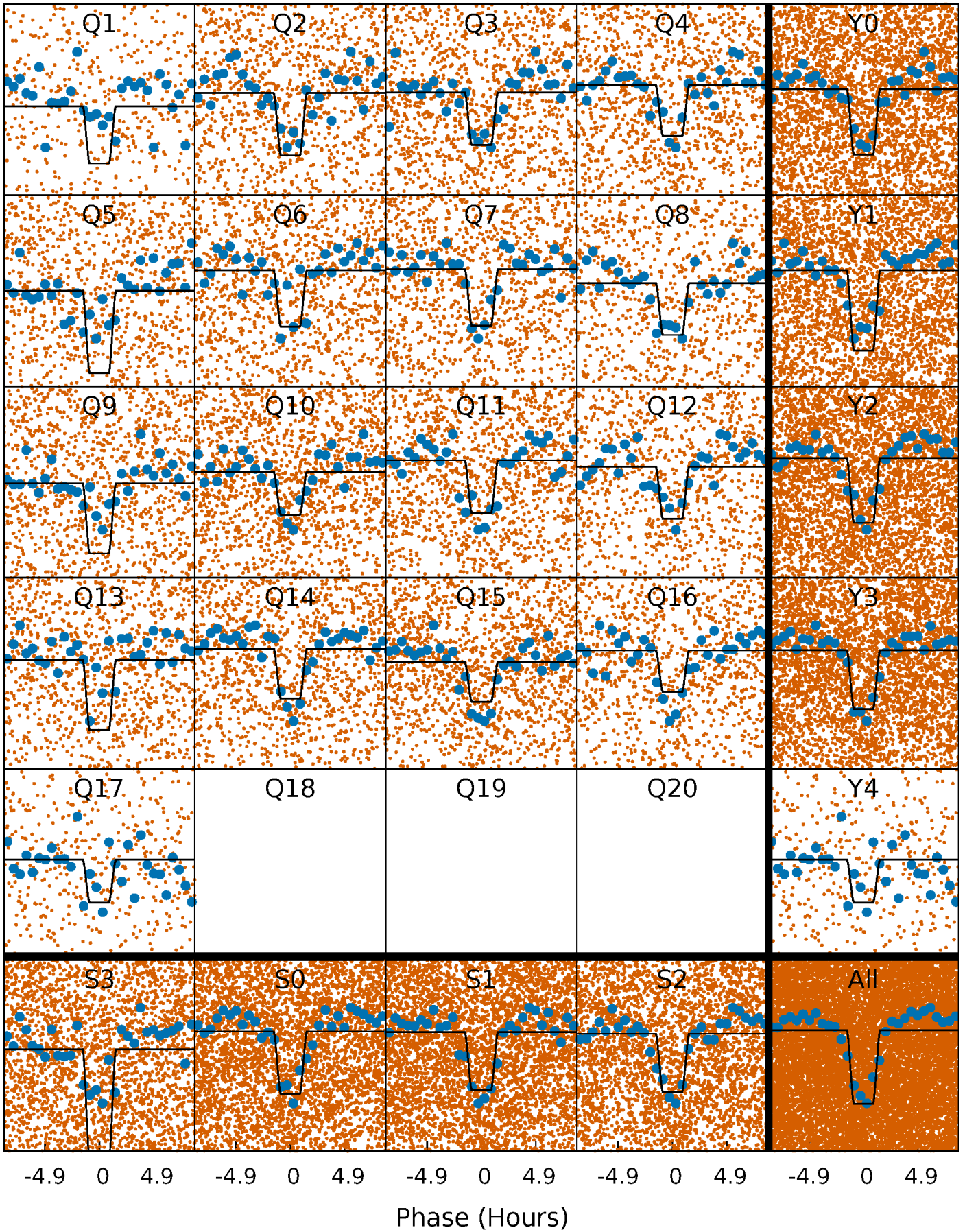
# DV Quarter-Phased Transit Curves

TCE 007777372-01 P= 1.770198 Days  $T_0=132.789981$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 007777372-01 P= 1.770240 Days  $T_0=132.771188$  (BKJD)

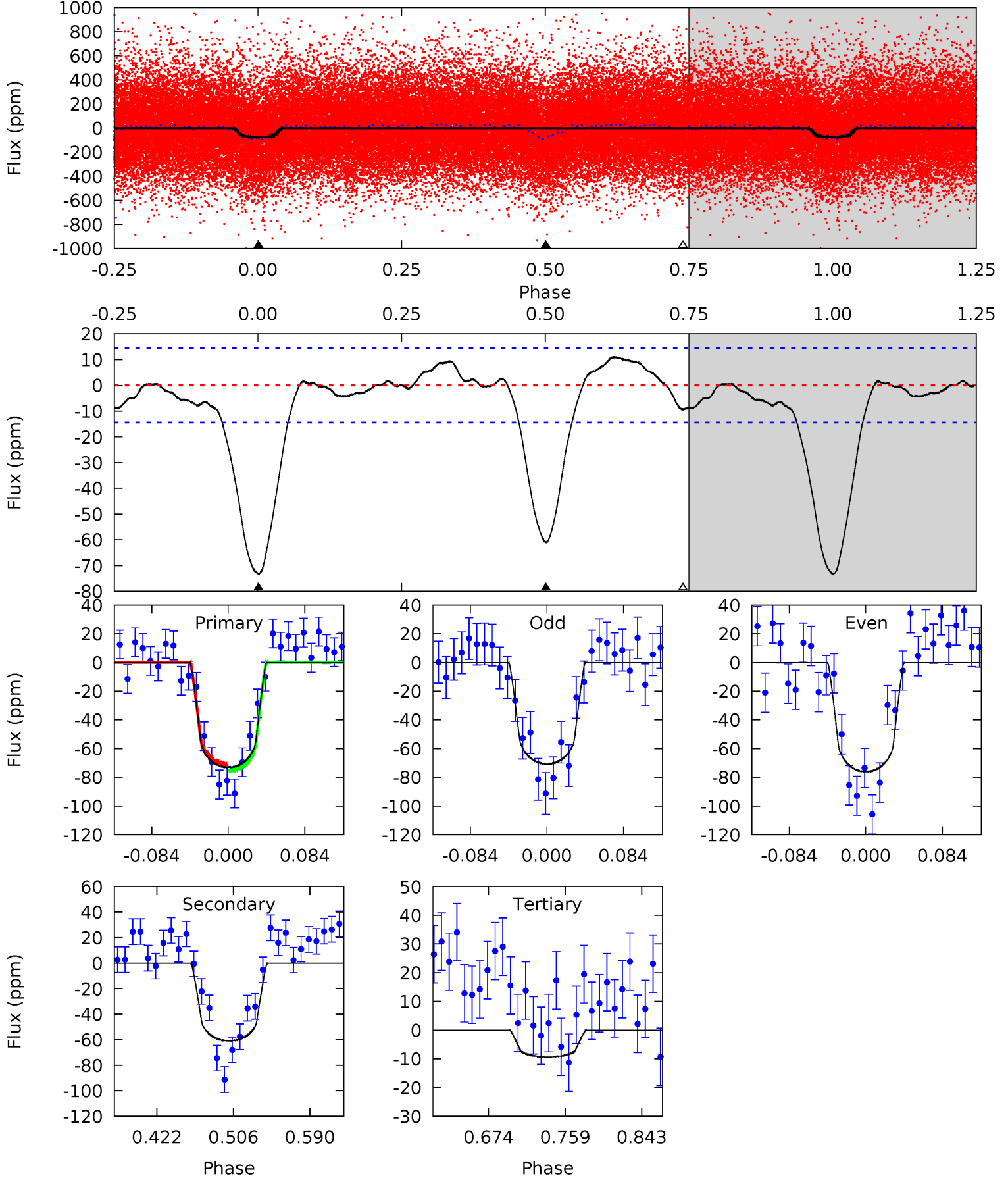




# DV Model-Shift Uniqueness Test

007777372-01, P = 1.770198 Days, E = 131.019783 Days

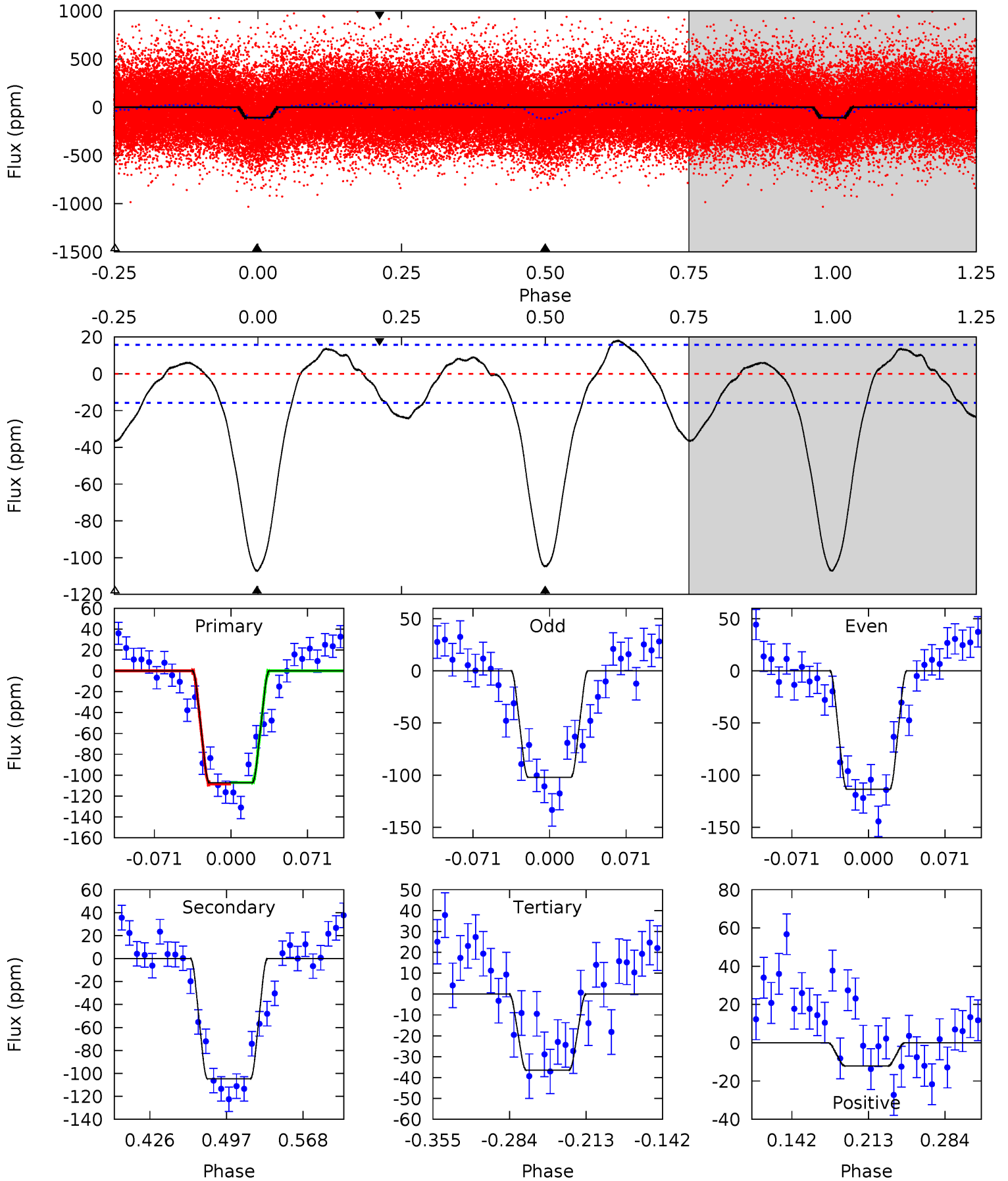
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
23.4	19.5	2.99	0	4.60	1.73	1.71	20.4	23.4	16.5	19.5	0.87	0.84	0.13	0.59



# Alt Model-Shift Uniqueness Test

007777372-01, P = 1.770240 Days, E = 131.000948 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
31.5	30.8	10.7	-3.56	4.64	1.81	3.99	20.8	35.1	20.1	34.4	1.67	0.94	0.14	0.23





### Stellar Parameters For KIC 007777372

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5979^{+161}_{-179}$	$4.440^{+0.084}_{-0.196}$	$-0.120^{+0.300}_{-0.300}$	$0.998^{+0.300}_{-0.129}$	$0.999^{+0.132}_{-0.119}$	$1.417^{+0.524}_{-0.742}$
	+3%/-3%	+2%/-4%	+250%/-250%	+30%/-13%	+13%/-12%	+37%/-52%
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 007777372-01 / KOI 3958.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-61 \pm 3$	$0.99^{+0.42}_{-0.36}$	$2205^{+146}_{-113}$	$5585^{+1462}_{-780}$	$28^{+38}_{-14}$
Alt.	$-105 \pm 3$	$1.23^{+0.45}_{-0.40}$	$2205^{+160}_{-109}$	$5745^{+1275}_{-701}$	$30^{+38}_{-13}$

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

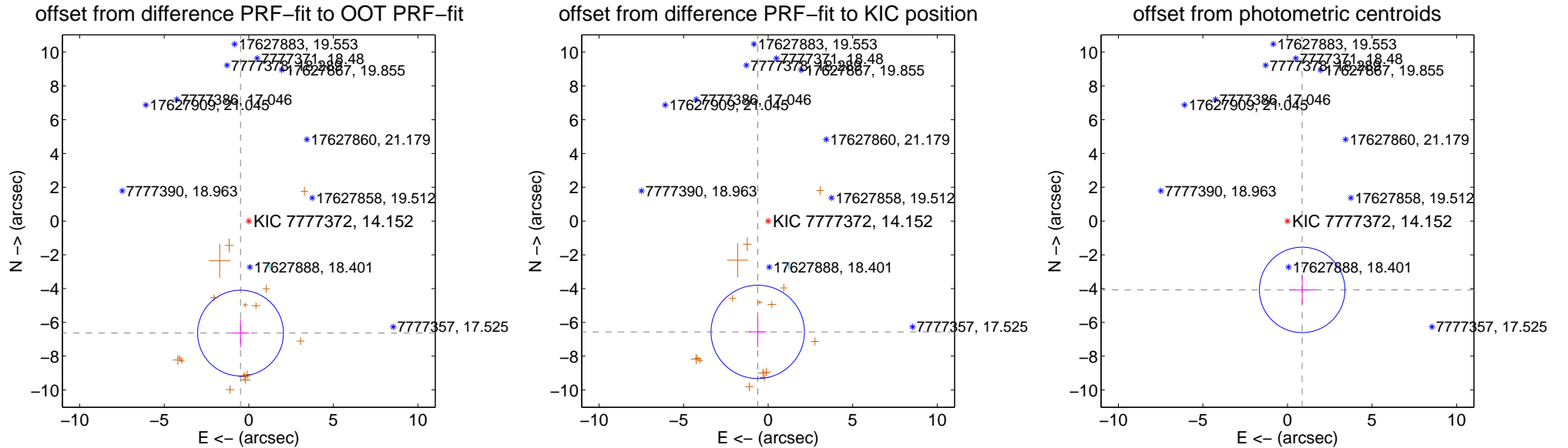
## DV Centroid Data

Supplemental centroid analysis for 007777372-01. Kepler magnitude: 14.15. Transit SNR 16.82

There are 1 quarters with good PRF difference image offsets

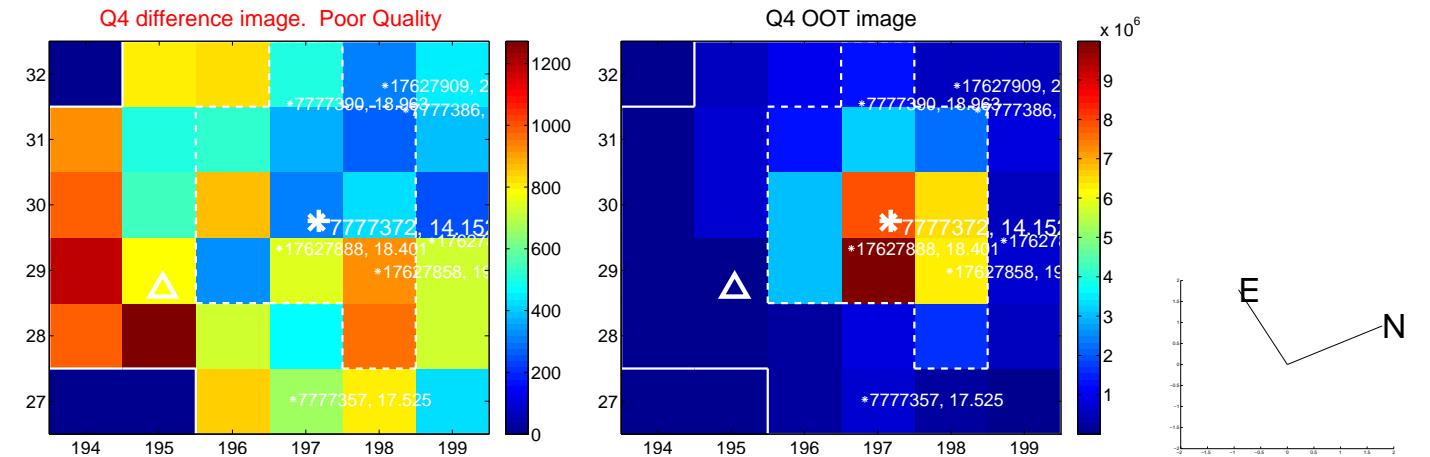
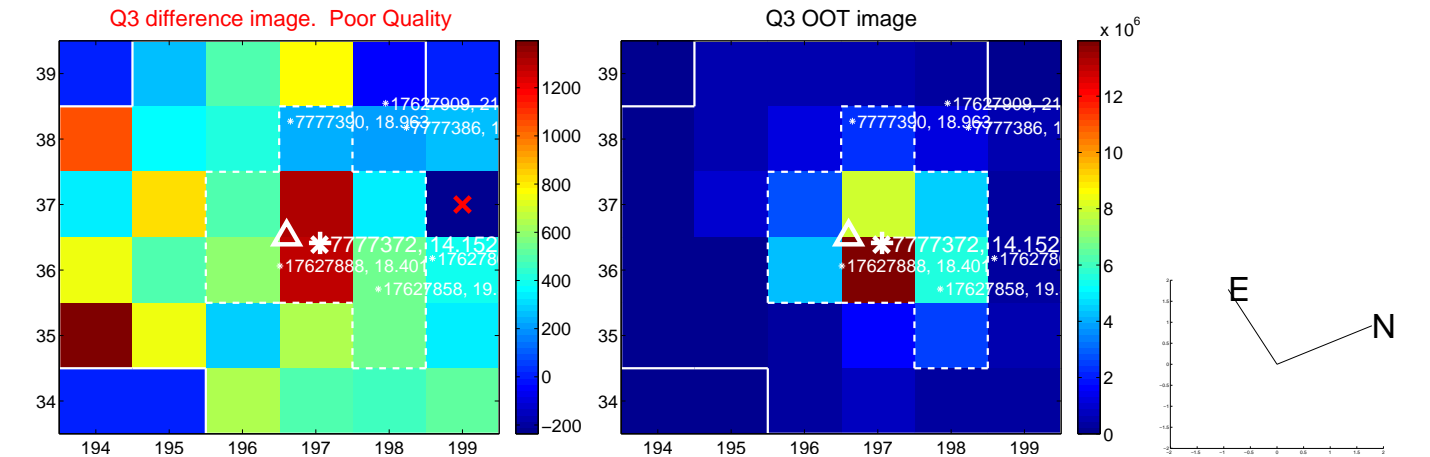
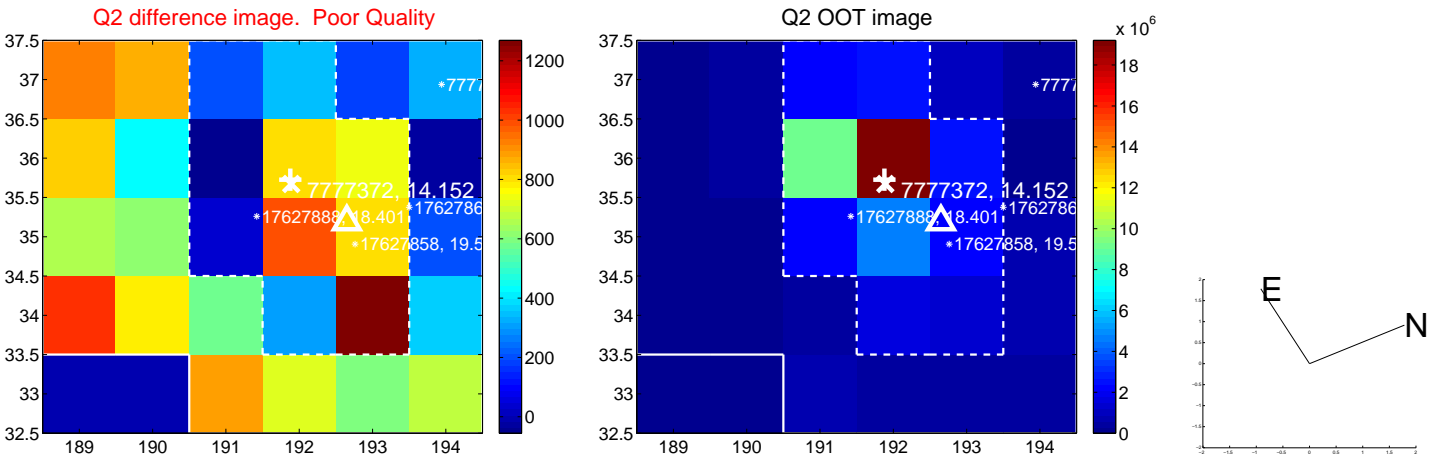
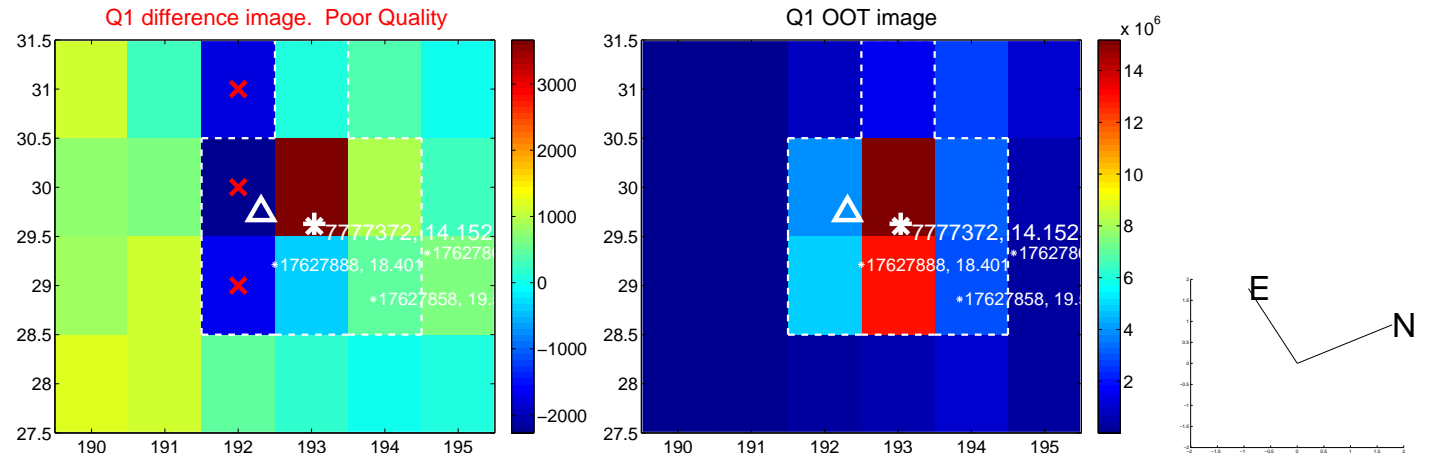
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$6.651 \pm 0.846$	7.86	$0.488 \pm 0.509$	$-6.633 \pm 0.830$
PRF-fit source offset from KIC position	$6.592 \pm 0.921$	7.16	$0.615 \pm 0.518$	$-6.563 \pm 0.902$
photometric centroid source offset	$4.17 \pm 0.84$	4.94	$-0.87 \pm 0.78$	$-4.08 \pm 0.85$

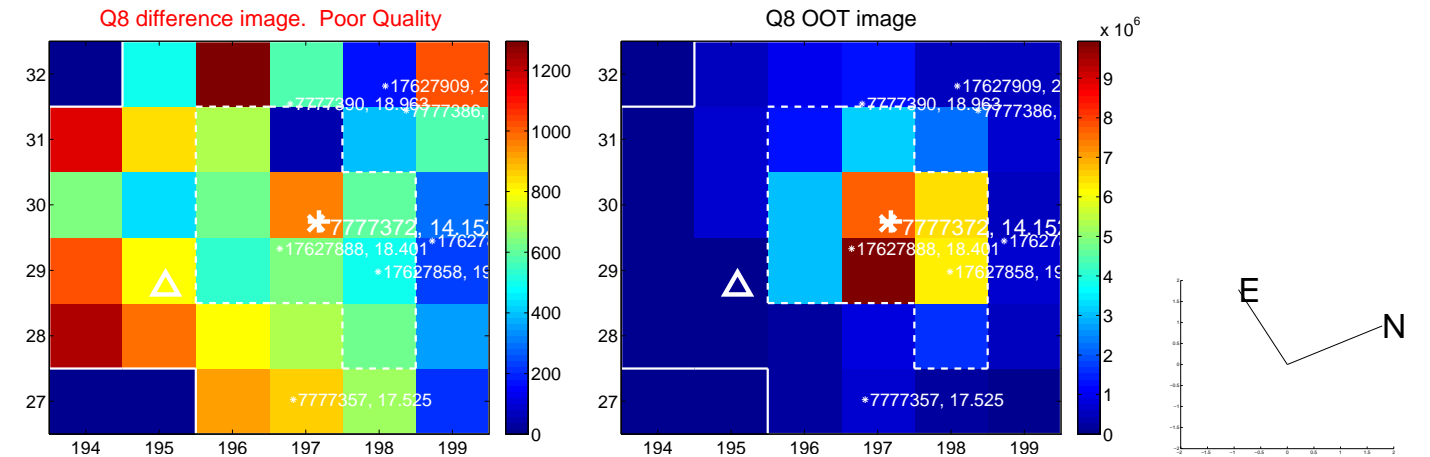
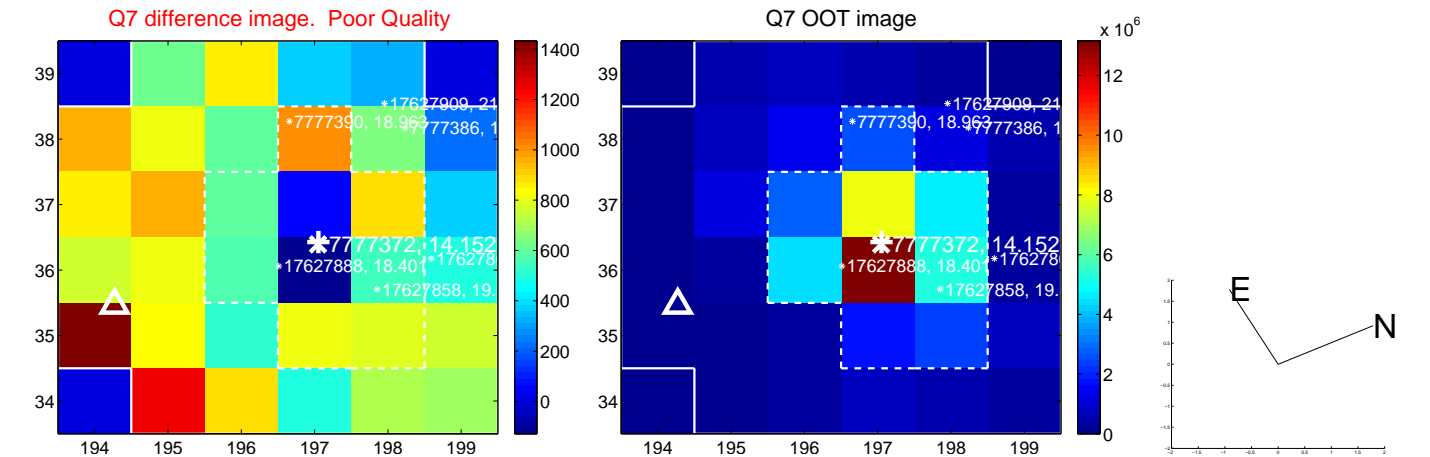
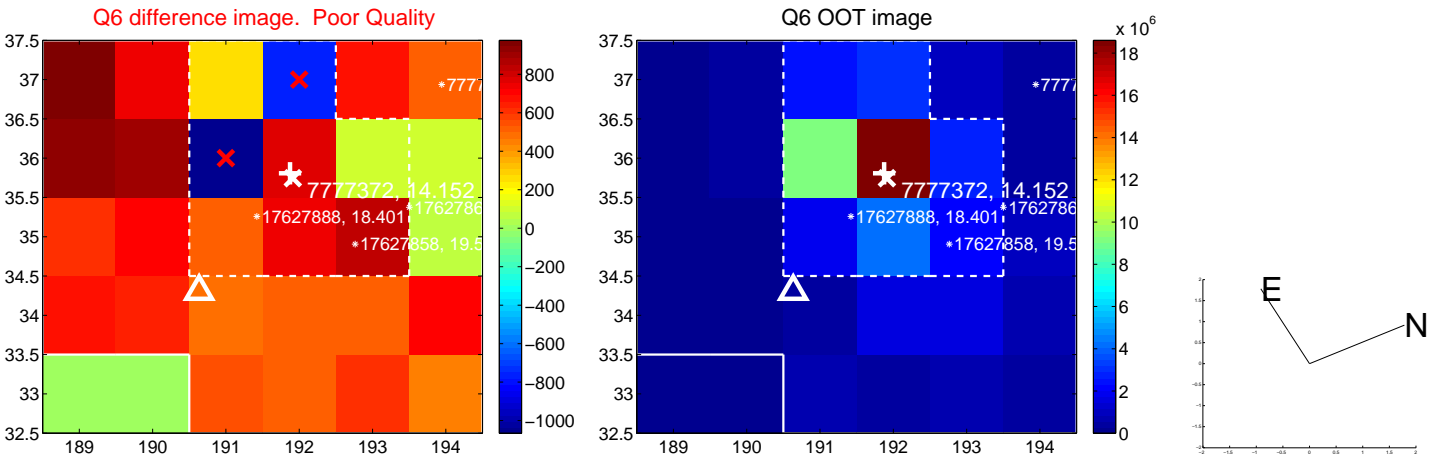
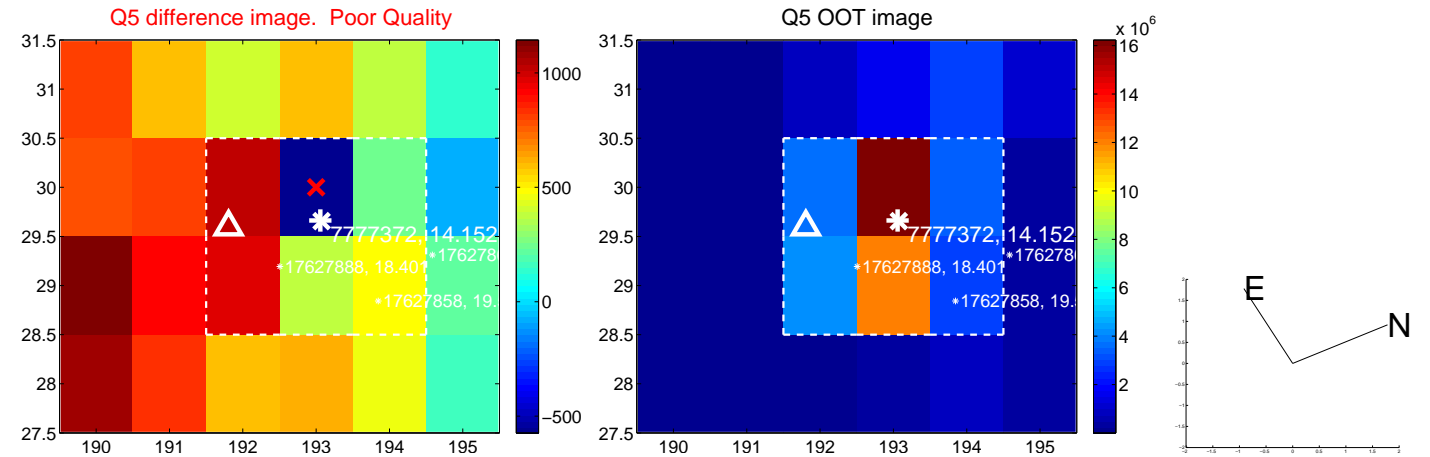


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

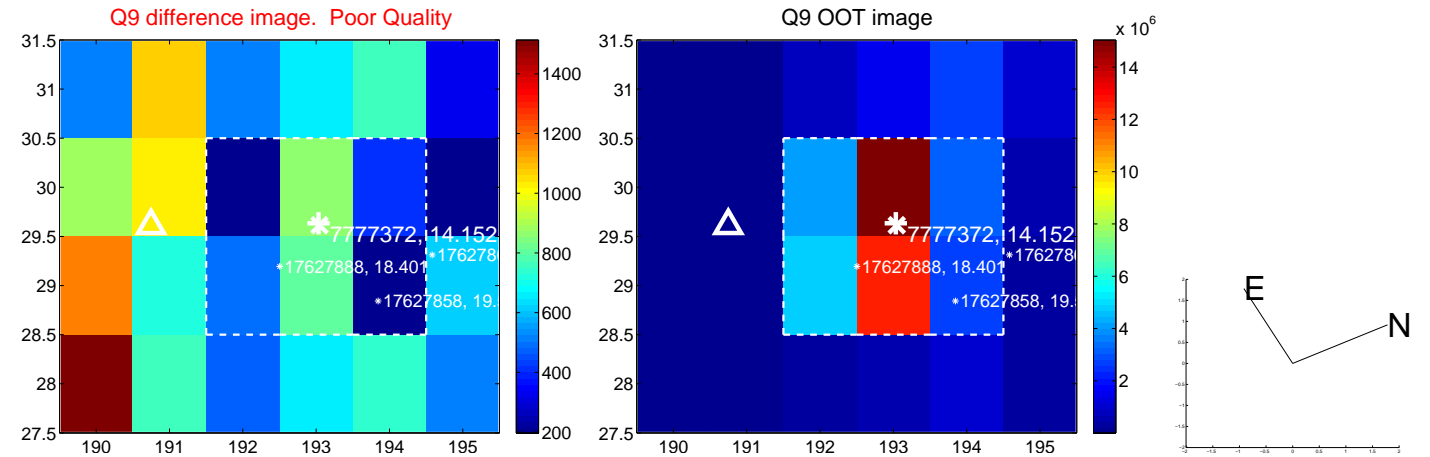


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

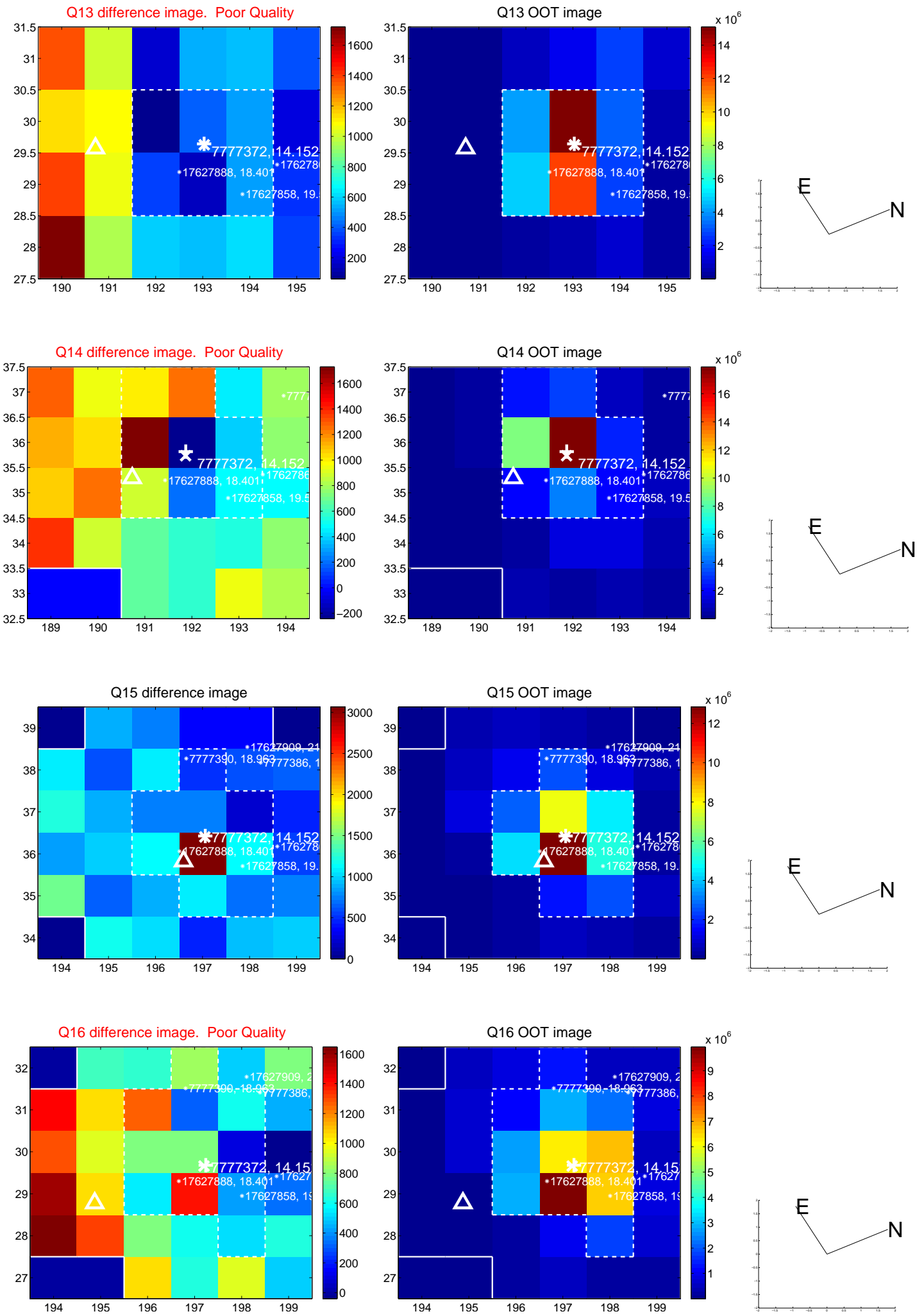




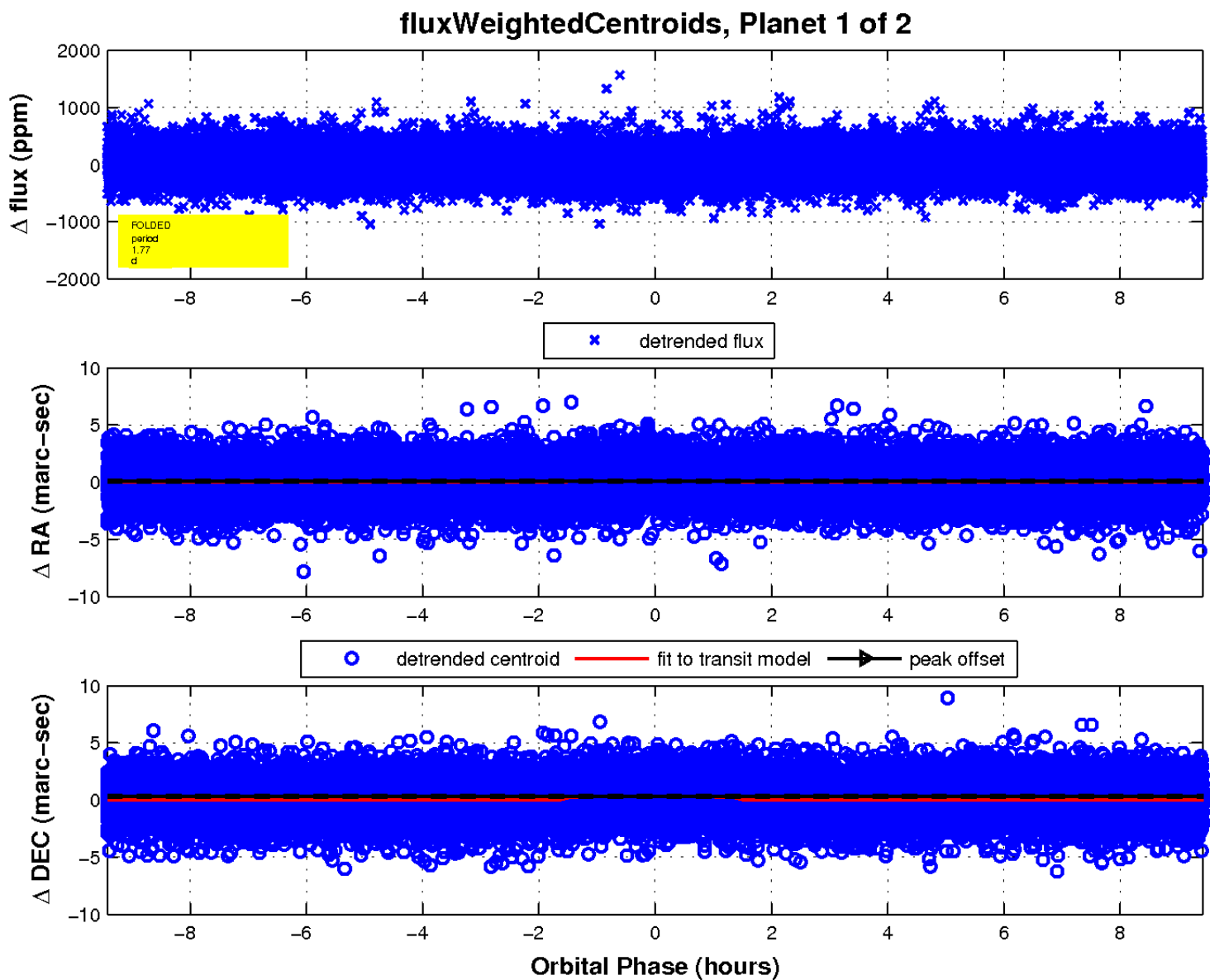
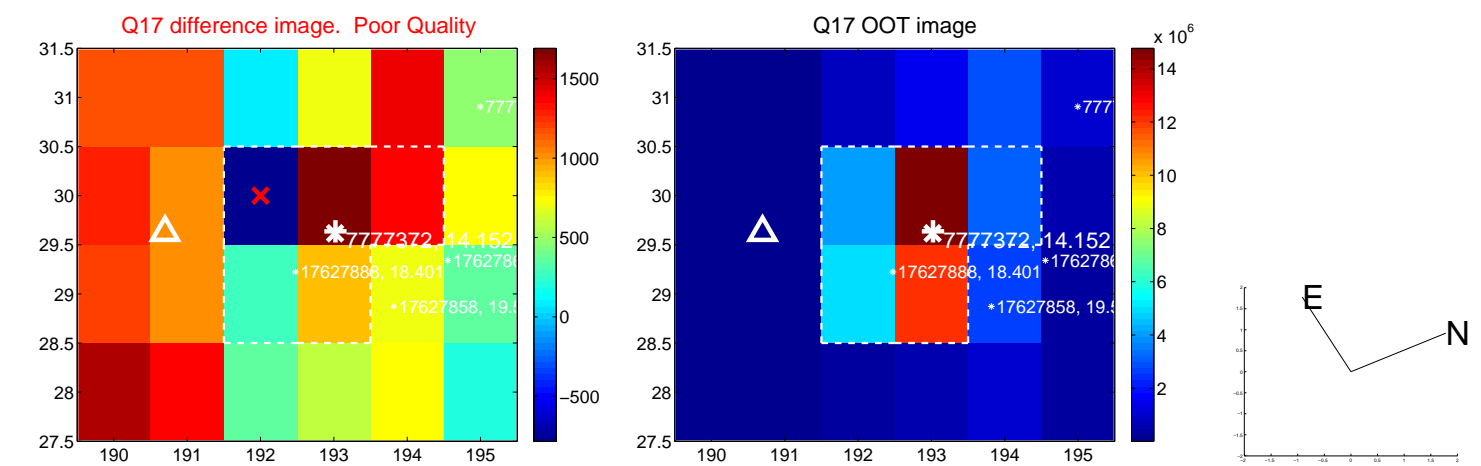
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

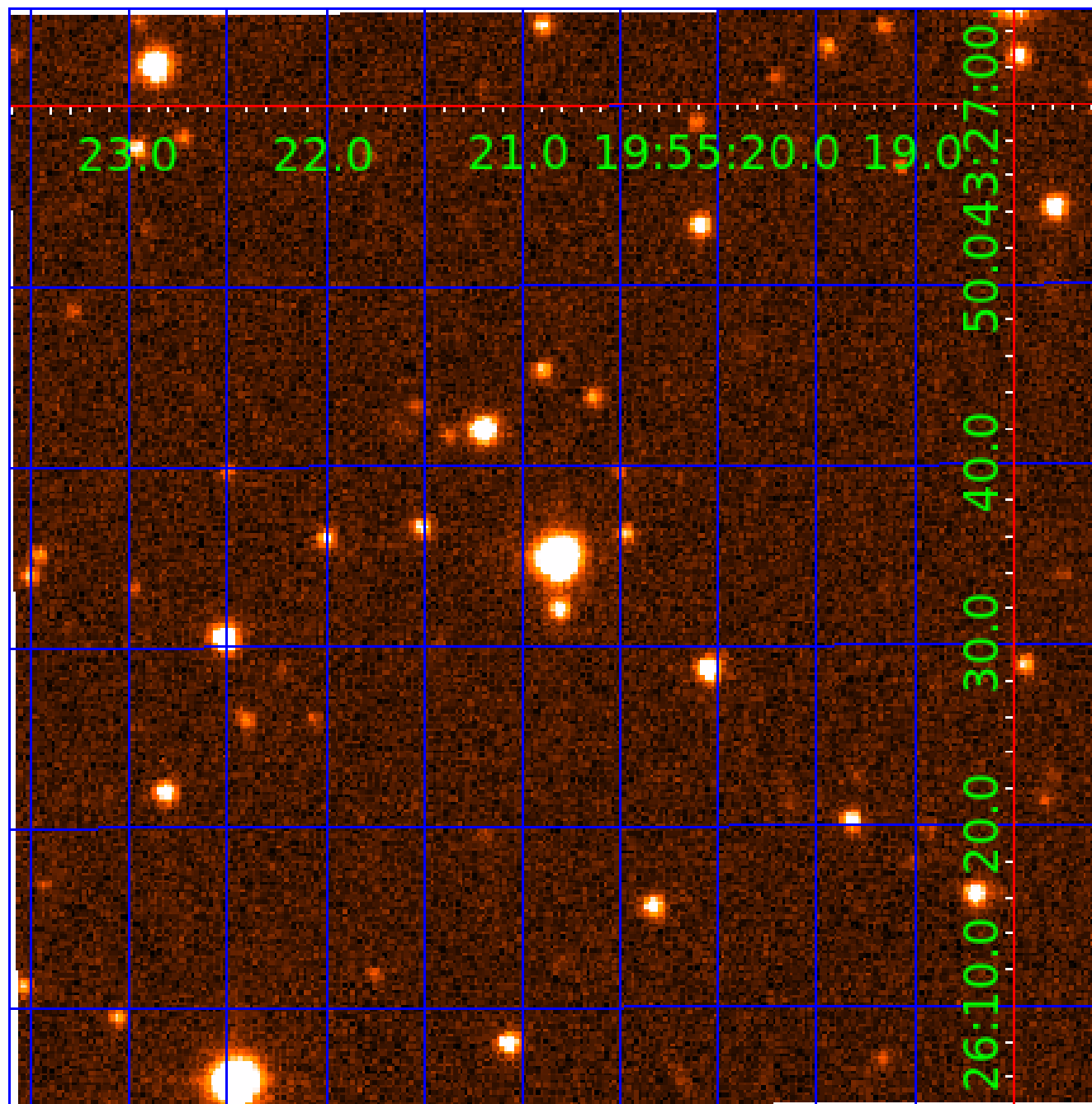


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\Delta$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 007777372

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007777372-01	OBS	3958.01	1.770198	132.789981	72.9	3.143	16.2	16.8	1.00	5979	0.97	1389.31
007777372-02	OBS	No	1.770255	131.882683	96.0	3.788	17.7	19.7	1.00	5979	1.73	1389.25

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007777372-01	OBS	FP	0.00	0	0	1	1	MOD_SEC_DV—MOD_SEC_ALT—PLANET_PERIOD_IS_HALF_ALT—HAS_SEC_TCE—CENT_UNRESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
007777372-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_CROWDED—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 007777372-02

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	$\sigma_P$	$\sigma_T$
007777372-02	7777372	007777443-pri	7777443	2:1	53.7	-7	12	11.91	14.15	3989.60	Direct-PRF	0	0.62	0.30

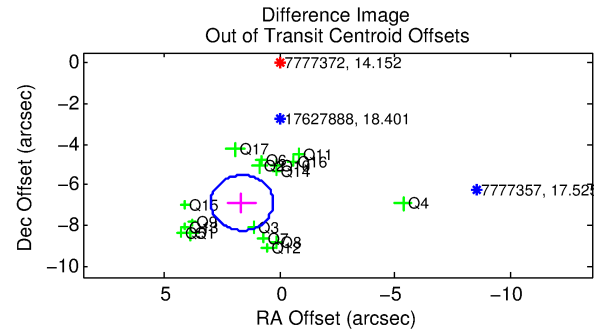
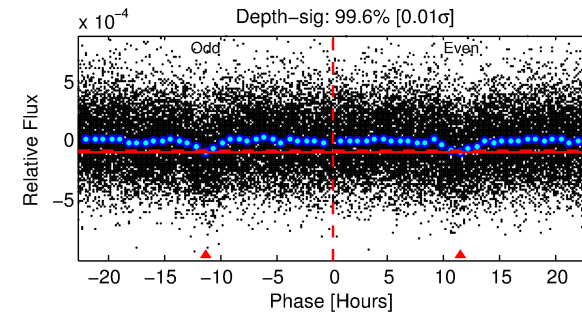
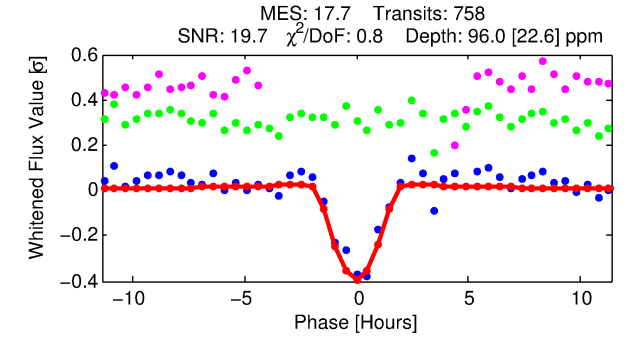
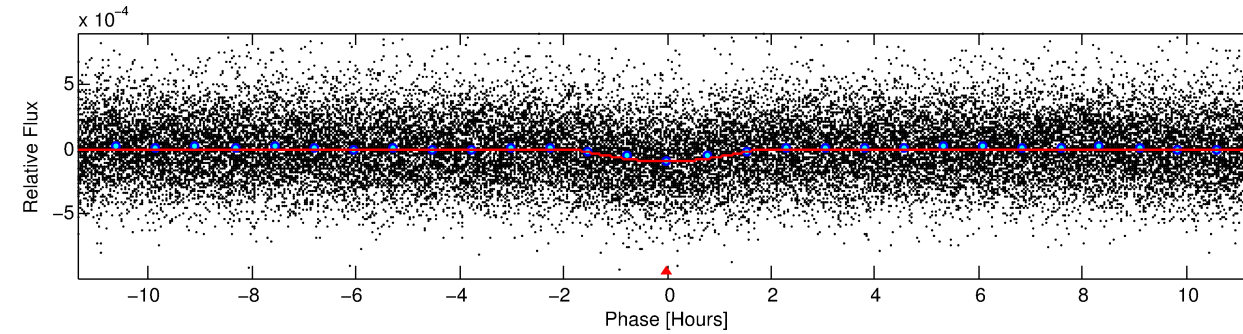
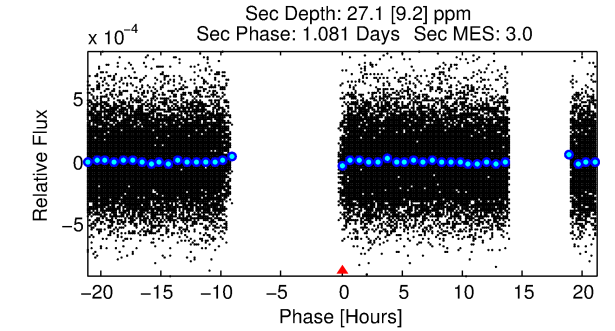
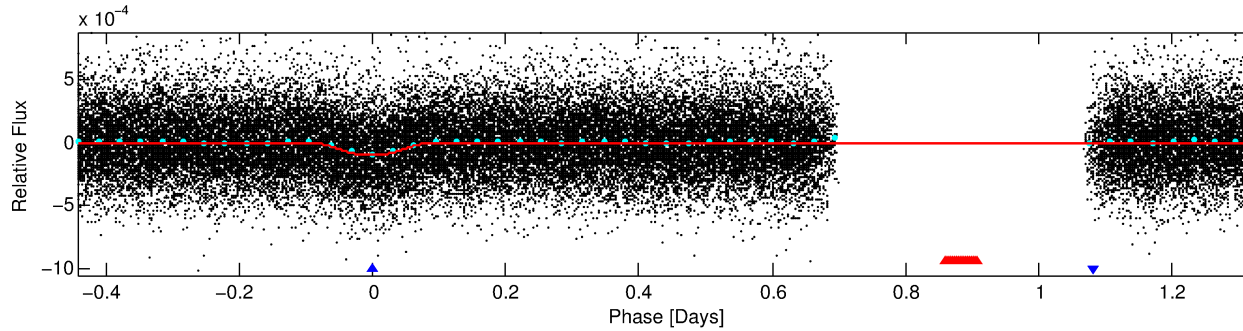
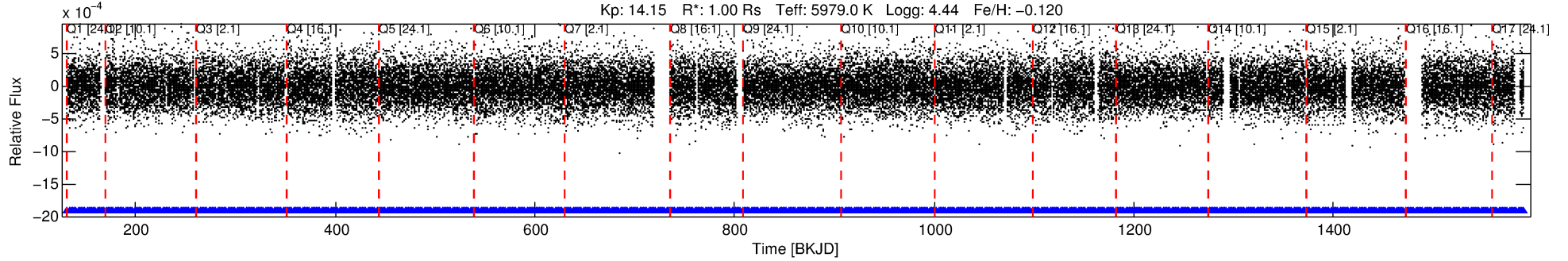
**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  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: 7777372 Candidate: 2 of 2 Period: 1.770 d

KOI: K03958 Corr: No Ephemeris Match

Kp: 14.15 R\*: 1.00 Rs Teff: 5979.0 K Logg: 4.44 Fe/H: -0.120



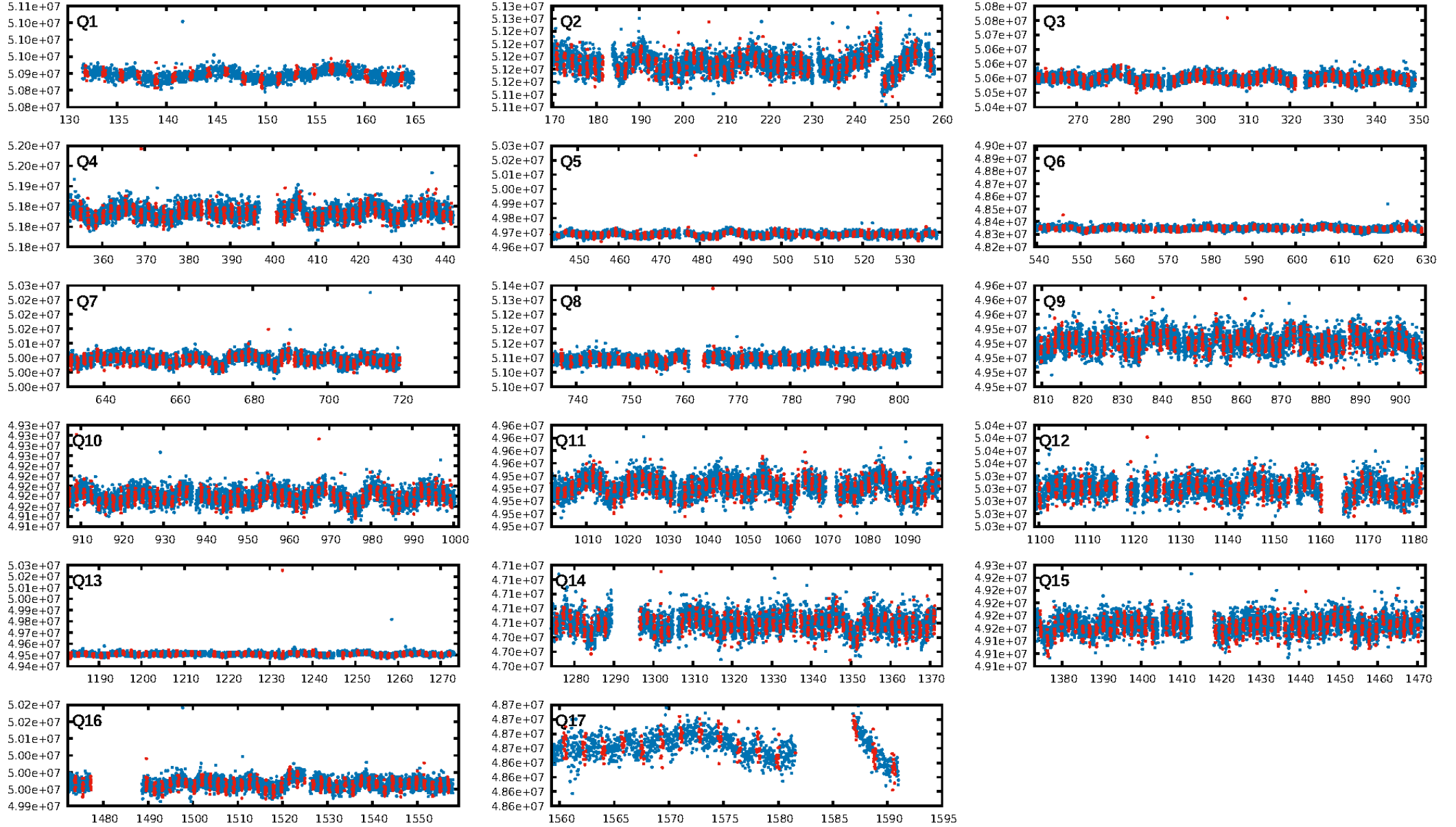
## DV Fit Results:

Period = 1.77026 [0.00001] d  
Epoch = 131.8827 [0.0031] BKJD  
Rp/R\* = 0.0159 [0.0161]  
a/R\* = 1.24 [0.14]  
b = 1.00 [0.03]  
Seff = 1389.25 [529.06]  
Teq = 1557 [148] K  
Rp = 1.73 [1.83] Re  
a = 0.0287 [0.0072] AU  
Ag = 4.10 [8.58] [0.36σ]  
Teffp = 3424 [1770] K [1.05σ]

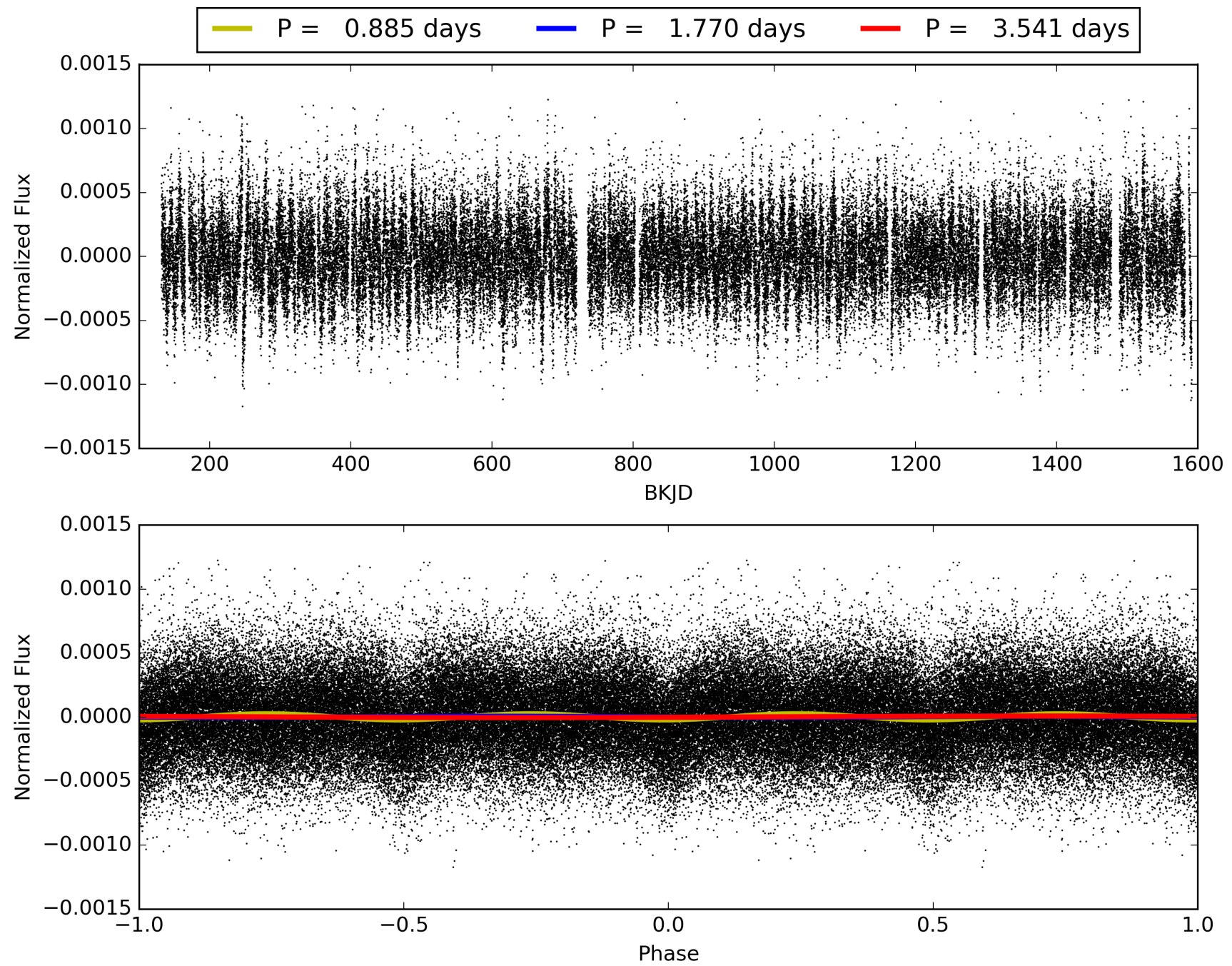
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.84e-69  
RollingBand-fgt: 1.00 [724/724]  
GhostDiagnostic-chr: -0.1507  
Centroid-sig: 0.0%  
Centroid-so: 4.746 arcsec [6.30σ]  
OotOffset-rm: 7.063 arcsec [15.65σ]  
KicOffset-rm: 7.030 arcsec [15.44σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.00 [0/17]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 007777372-02, PDC Light Curves



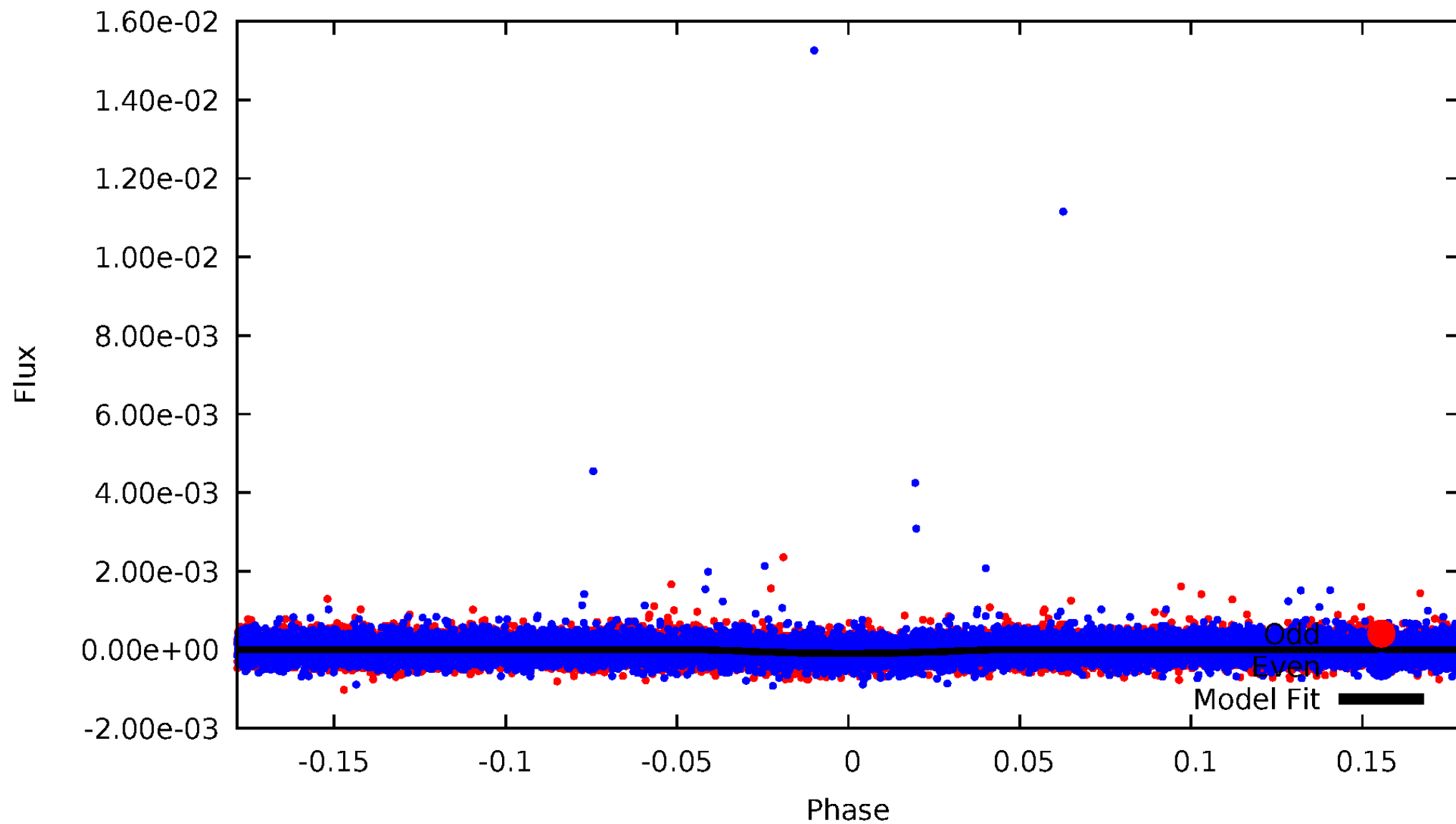
TCE 007777372-02





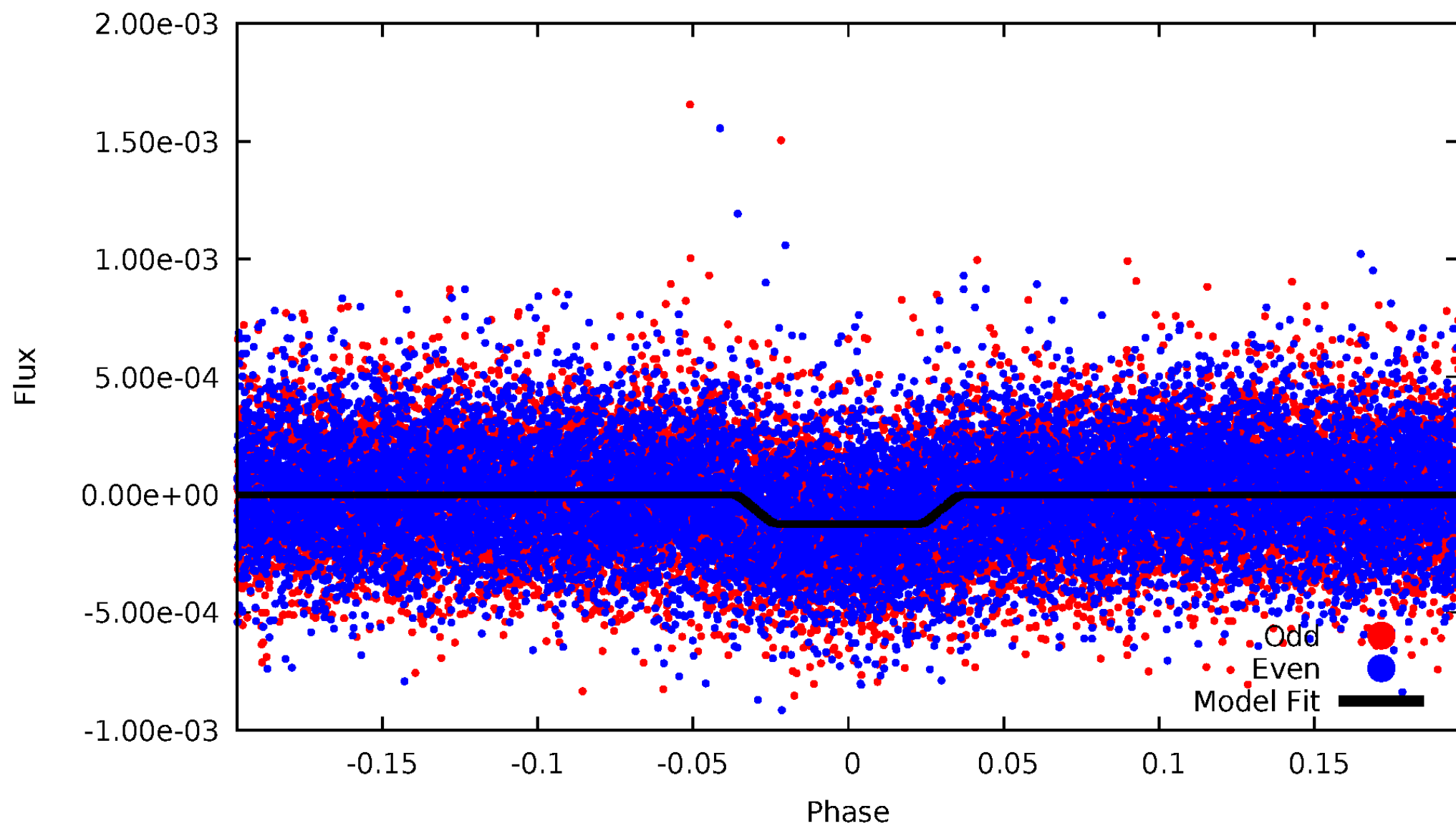
# DV Odd/Even

TCE 007777372-02



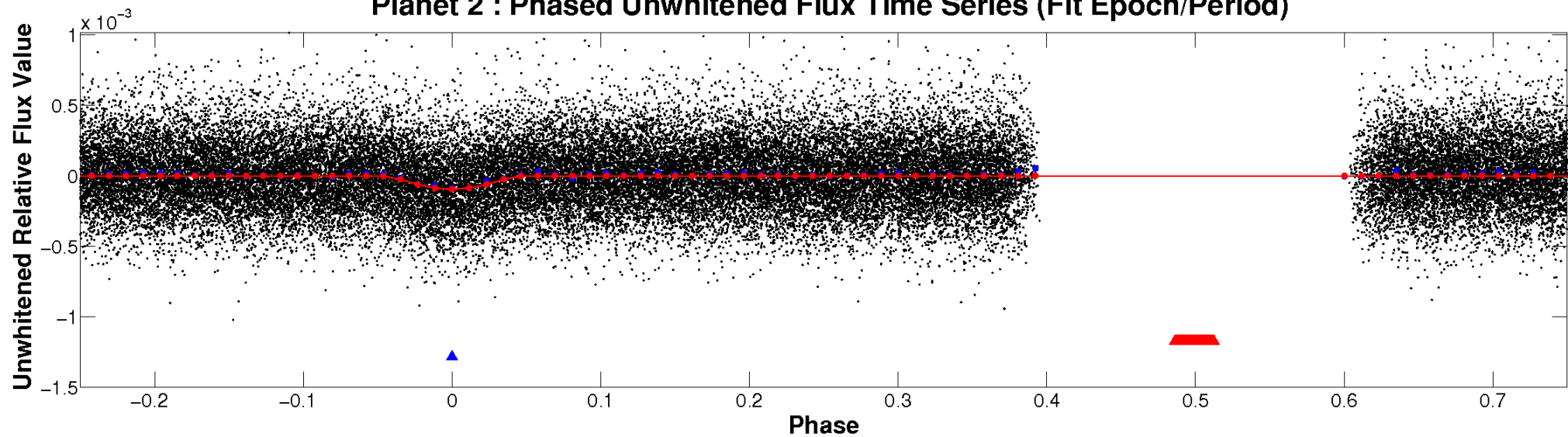
# ALT Odd/Even

TCE 007777372-02

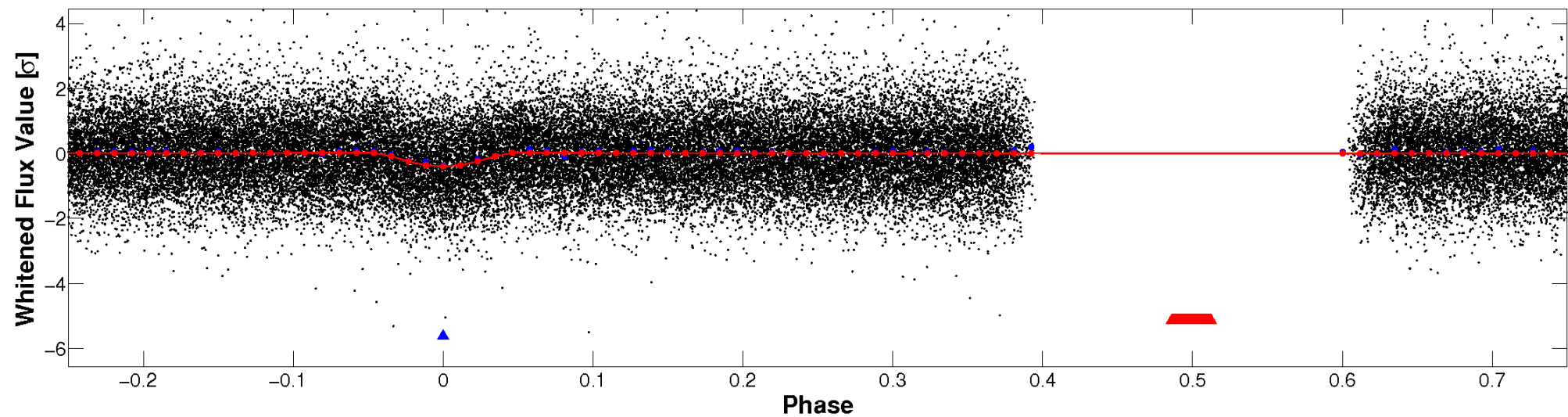


# Non-Whitened Vs. Whitened Light Curve

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

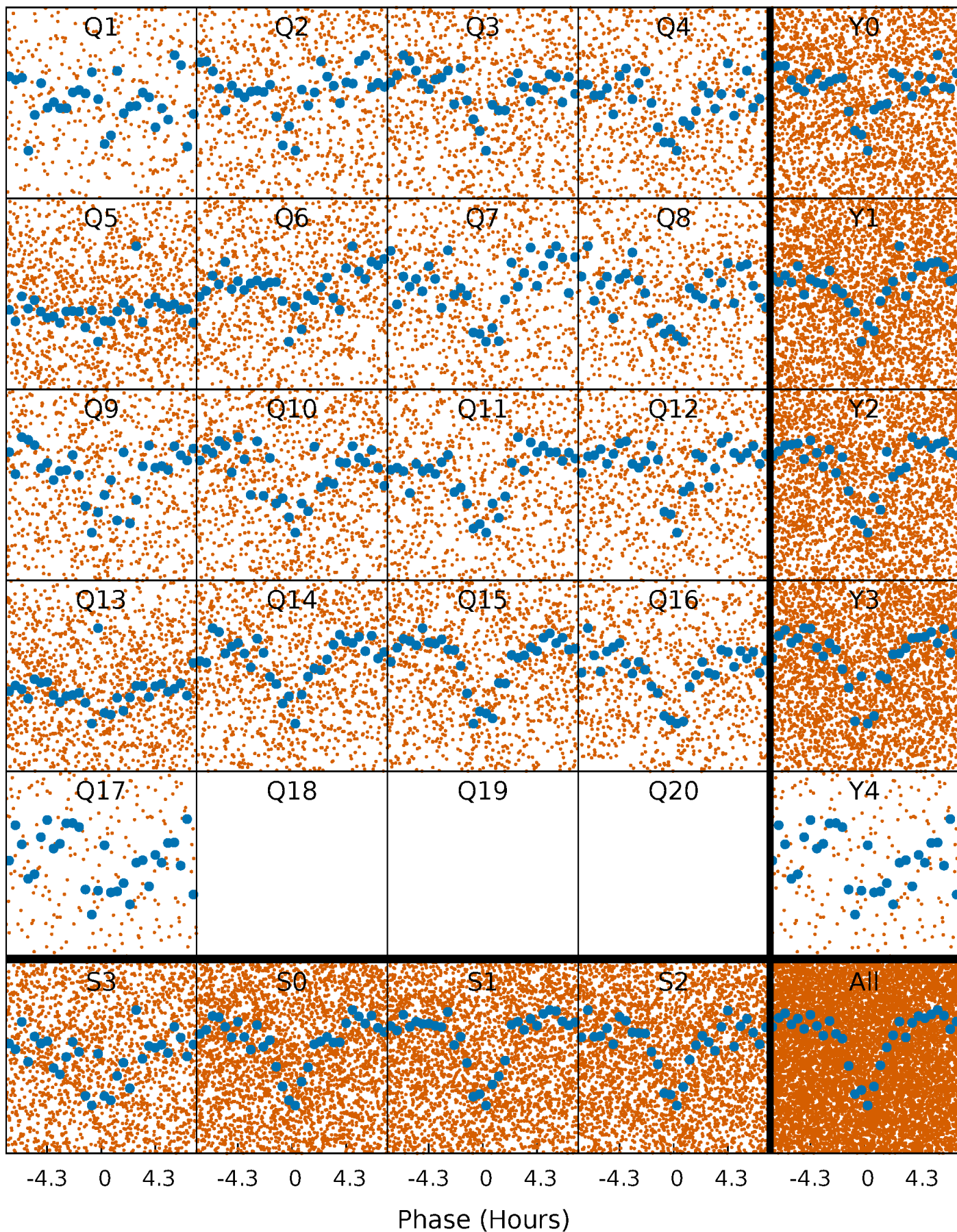


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

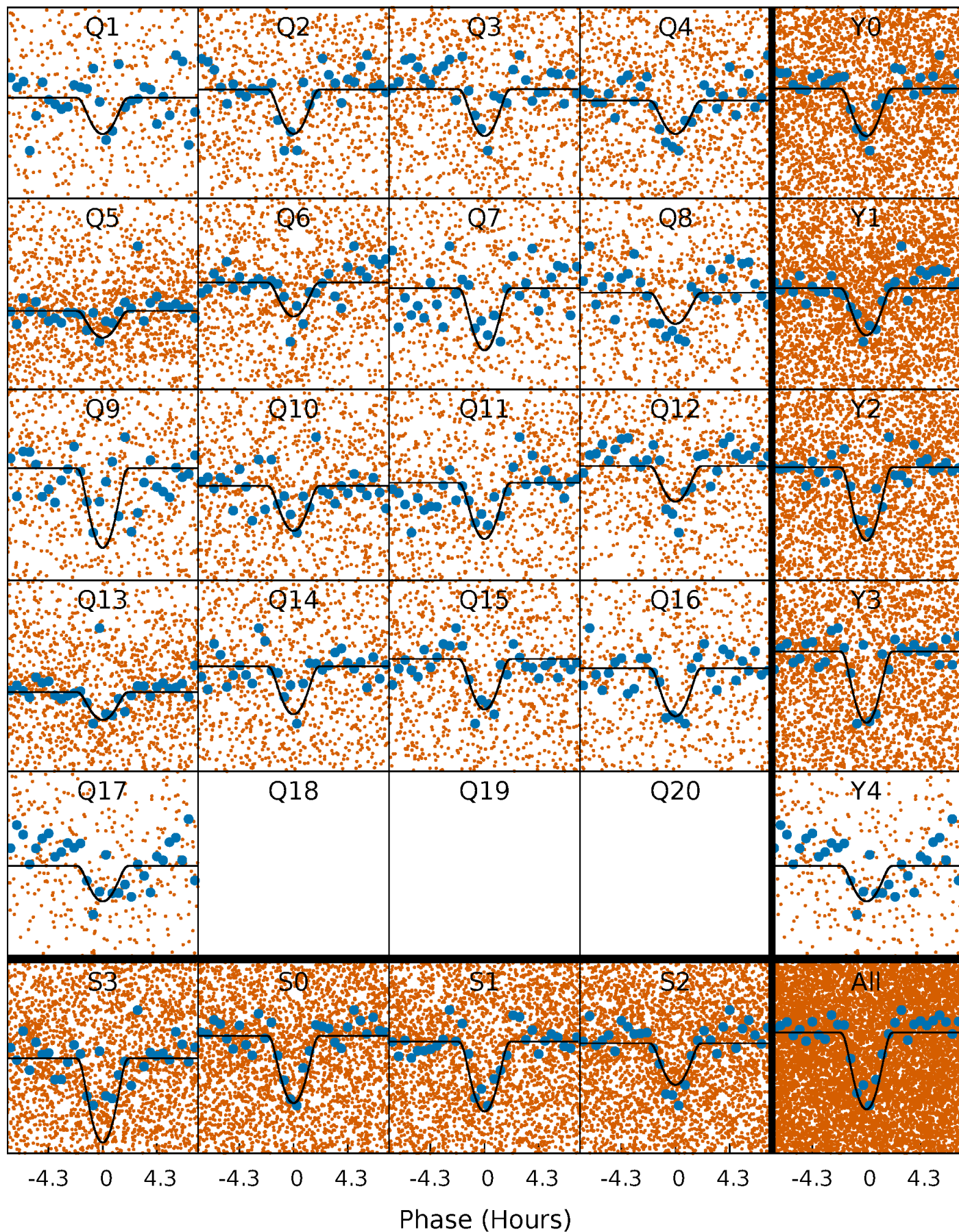
TCE 007777372-02   P= 1.770255 Days    $T_0=131.882683$  (BKJD)





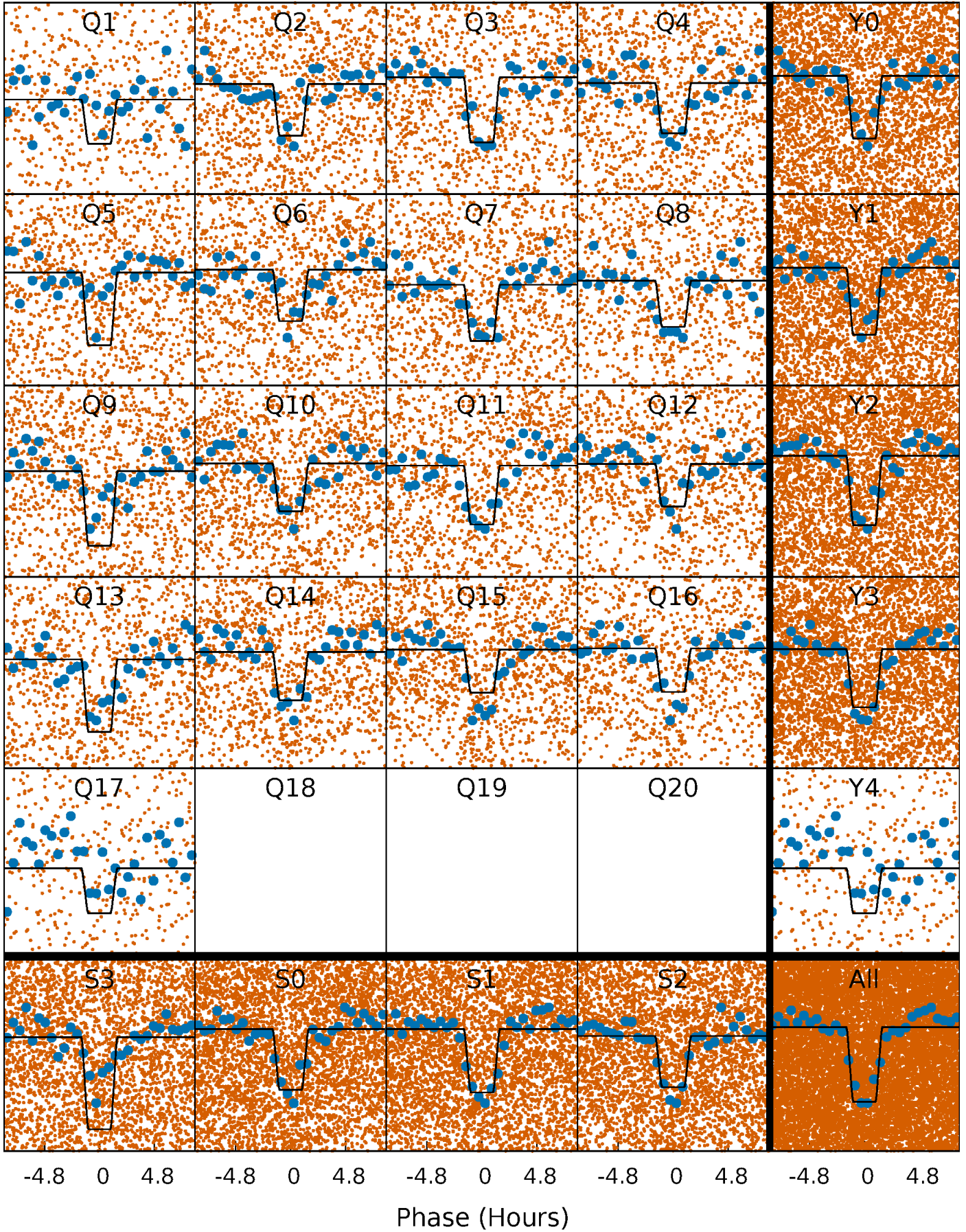
# DV Quarter-Phased Transit Curves

TCE 007777372-02   P= 1.770255 Days    $T_0=131.882683$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 007777372-02   P= 1.770251 Days    $T_0=131.884422$  (BKJD)

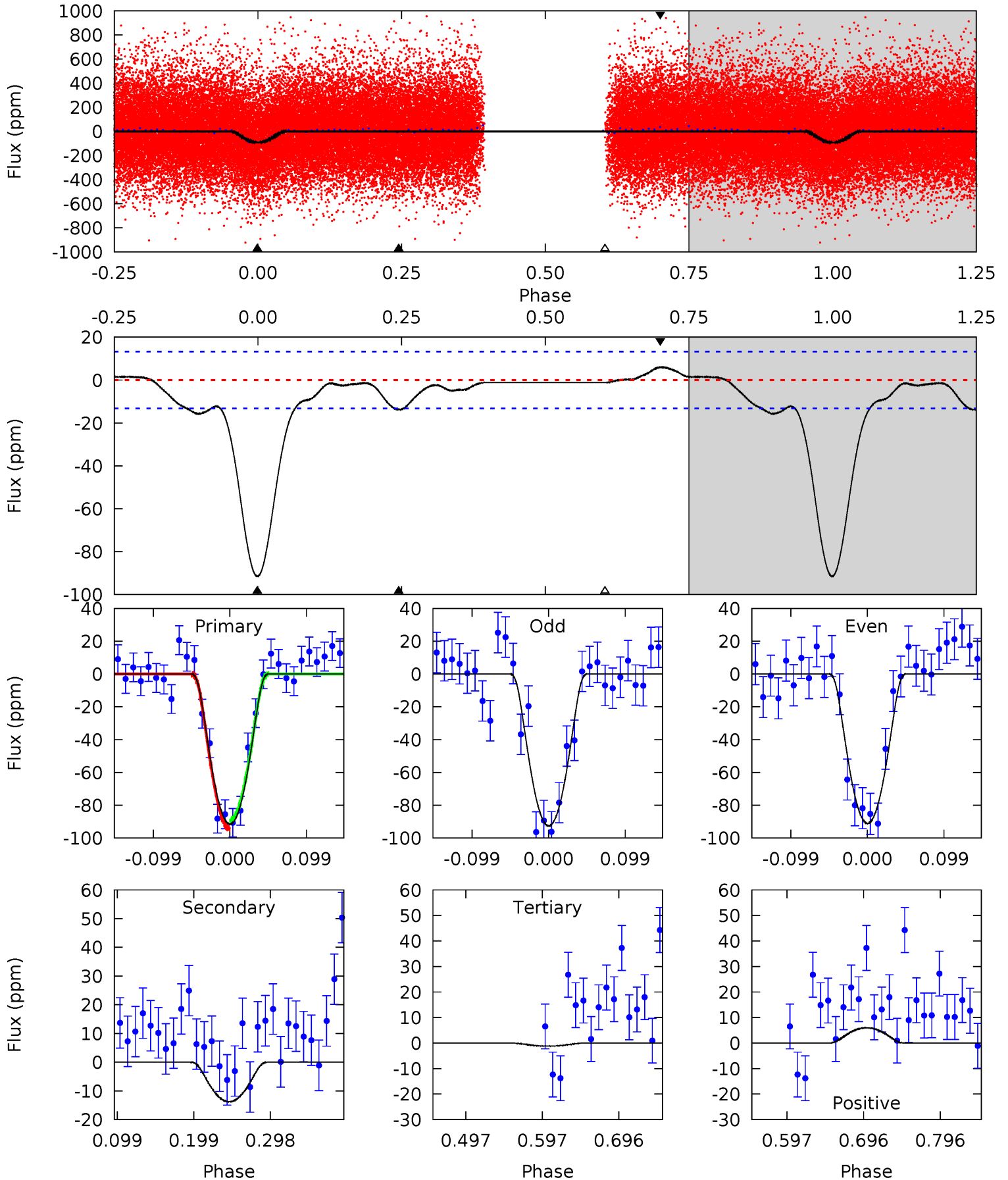




# DV Model-Shift Uniqueness Test

007777372-02, P = 1.770255 Days, E = 130.112428 Days

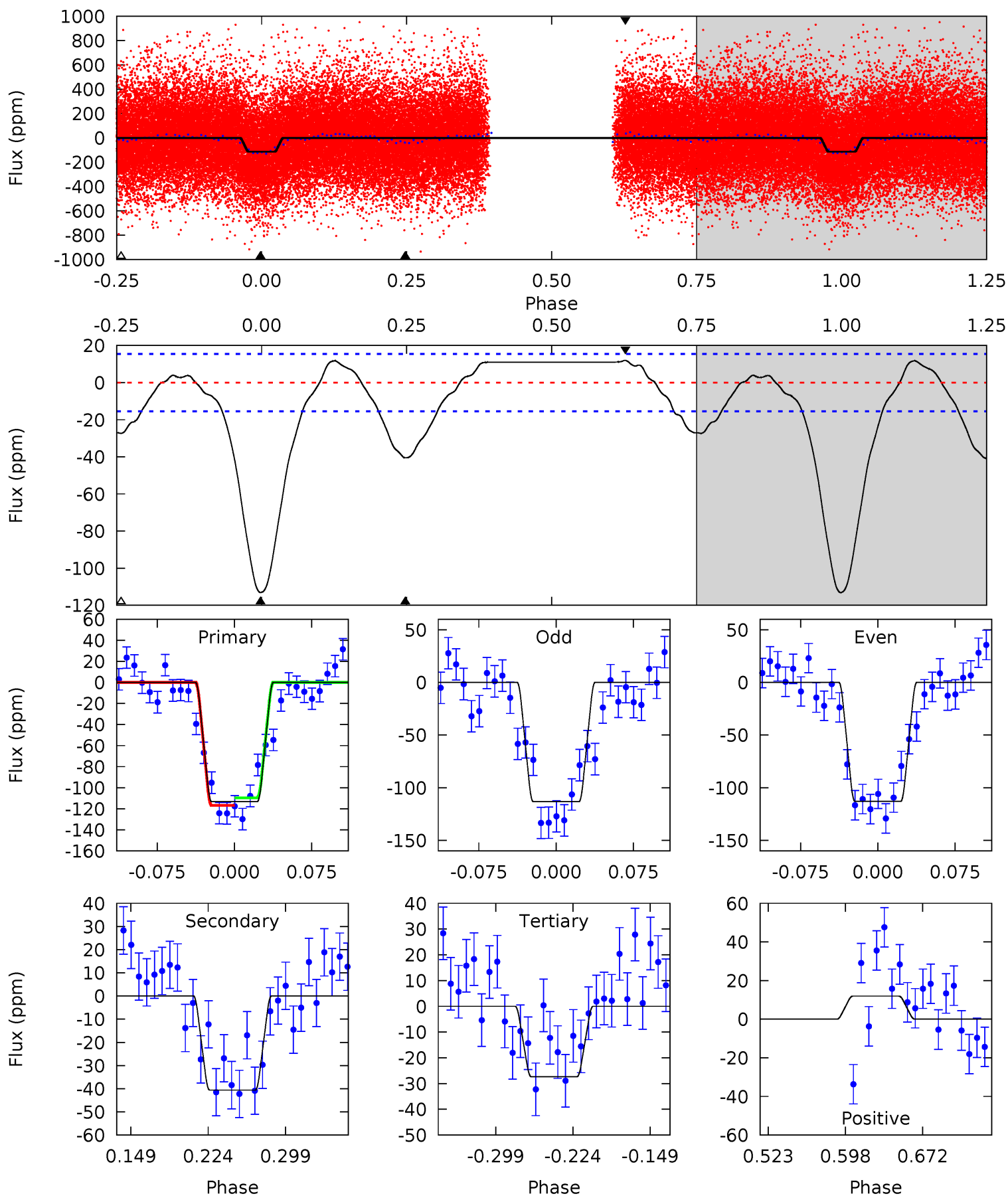
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
31.6	4.76	0.41	2.07	4.57	1.65	1.88	31.2	29.5	4.35	2.69	0.27	0.87	0.06	0.90



# Alt Model-Shift Uniqueness Test

007777372-02, P = 1.770251 Days, E = 130.114171 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
33.9	12.1	8.19	3.58	4.63	1.78	3.34	25.7	30.3	3.96	8.56	0.04	0.98	0.10	1.08



### Stellar Parameters For KIC 007777372

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5979^{+161}_{-179}$	$4.440^{+0.084}_{-0.196}$	$-0.120^{+0.300}_{-0.300}$	$0.998^{+0.300}_{-0.129}$	$0.999^{+0.132}_{-0.119}$	$1.417^{+0.524}_{-0.742}$
	+3%/-3%	+2%/-4%	+250%/-250%	+30%/-13%	+13%/-12%	+37%/-52%
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 007777372-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-14 \pm 3$	$2.32^{+1.74}_{-1.41}$	$2208^{+163}_{-109}$	$3010^{+1277}_{-857}$	$1.164^{+6.729}_{-0.810}$
Alt.	$-41 \pm 3$	$1.80^{+1.60}_{-1.14}$	$2202^{+156}_{-108}$	$4021^{+2206}_{-836}$	$5.568^{+35.027}_{-4.025}$

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

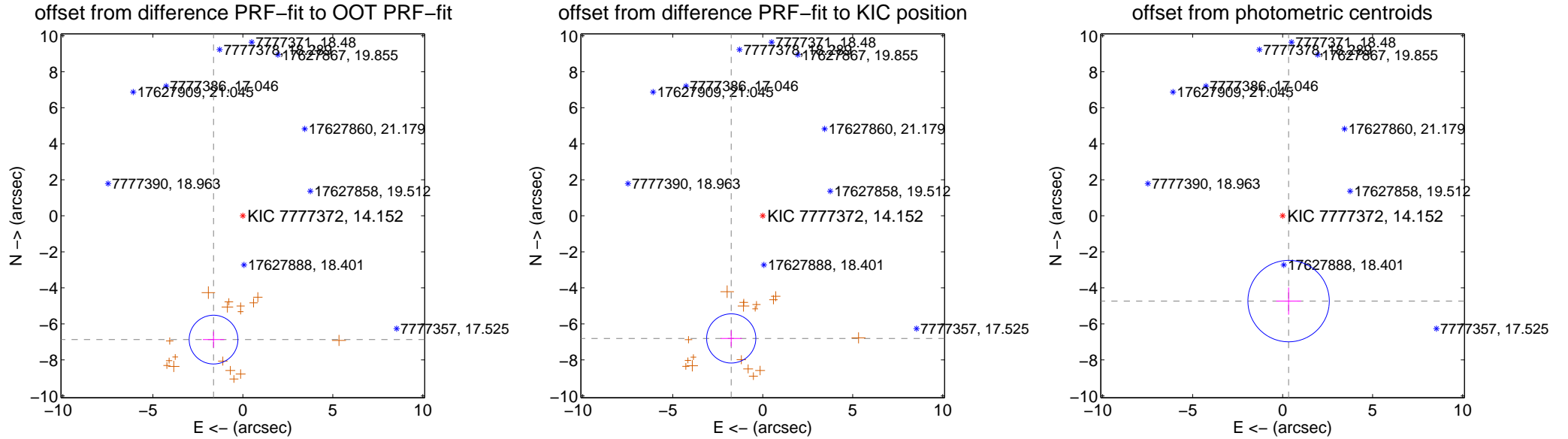
## DV Centroid Data

Supplemental centroid analysis for 007777372-02. Kepler magnitude: 14.15. Transit SNR 19.72

There are 0 quarters with good PRF difference image offsets

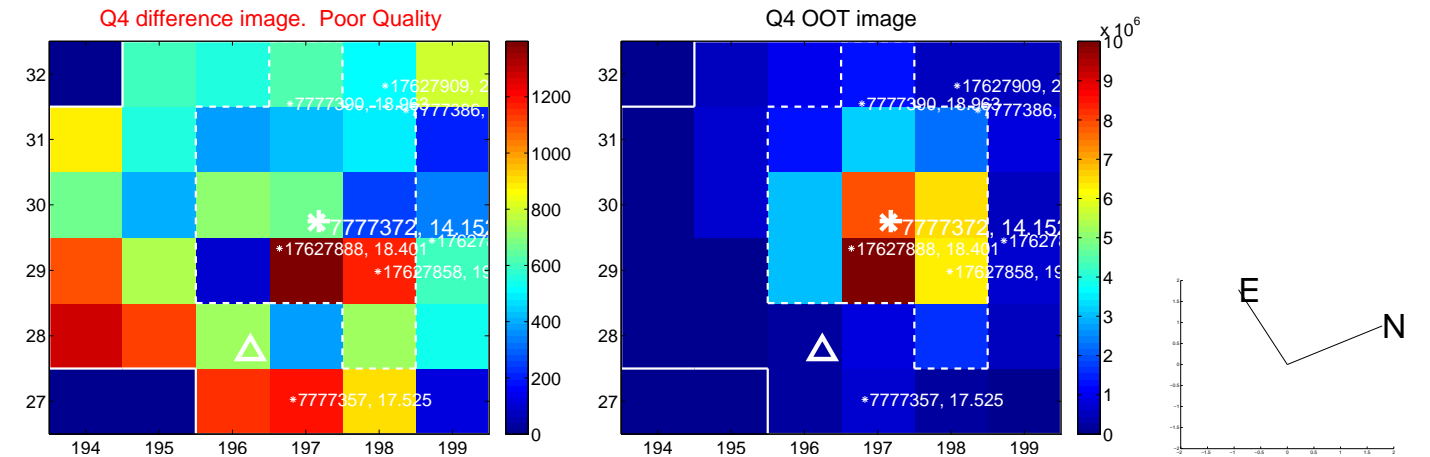
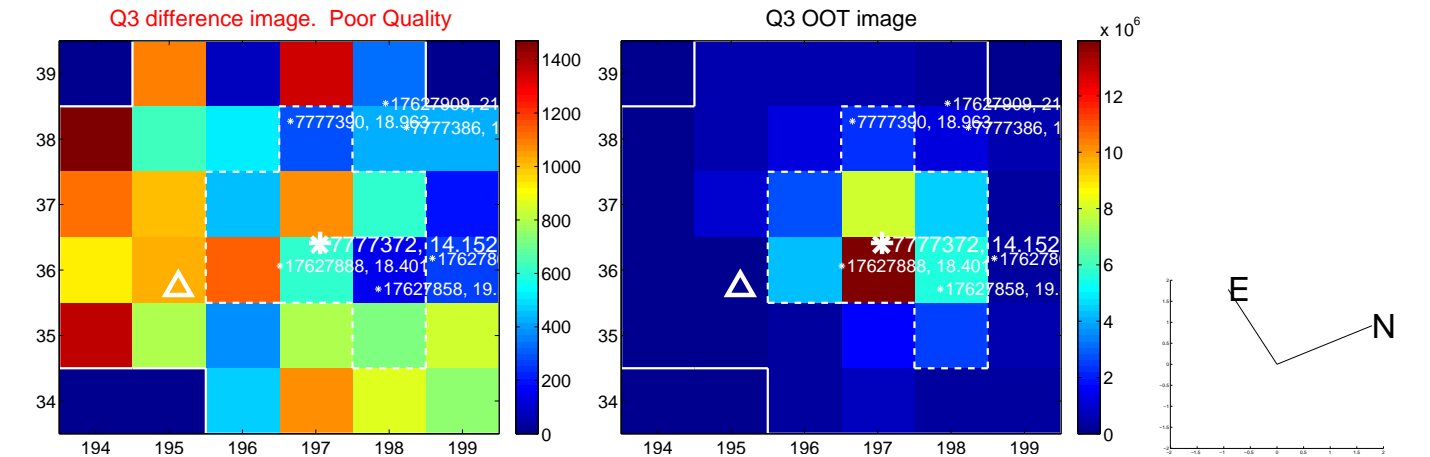
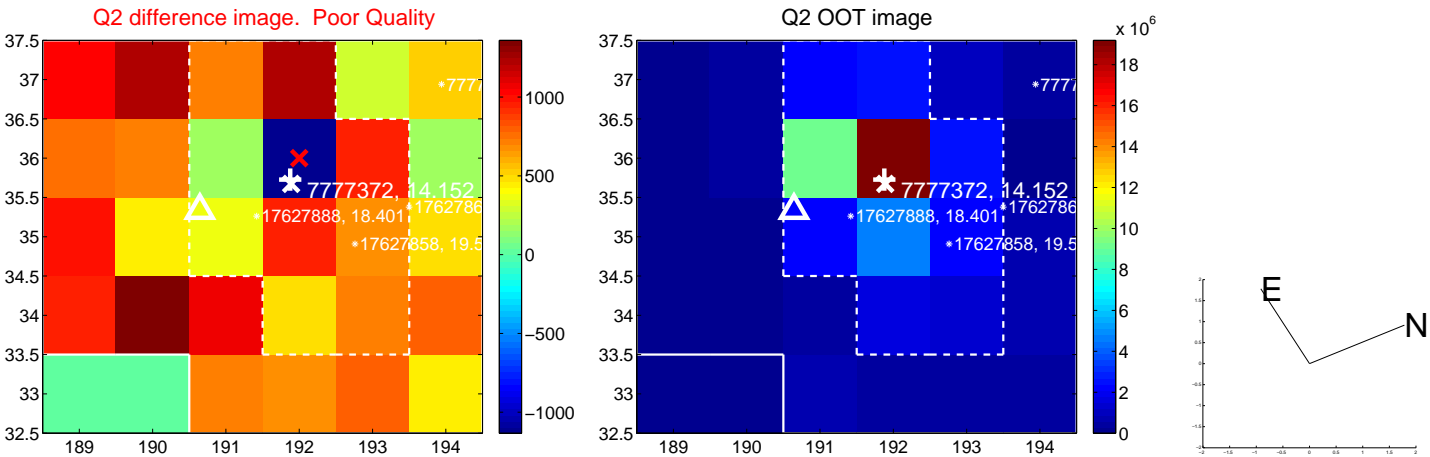
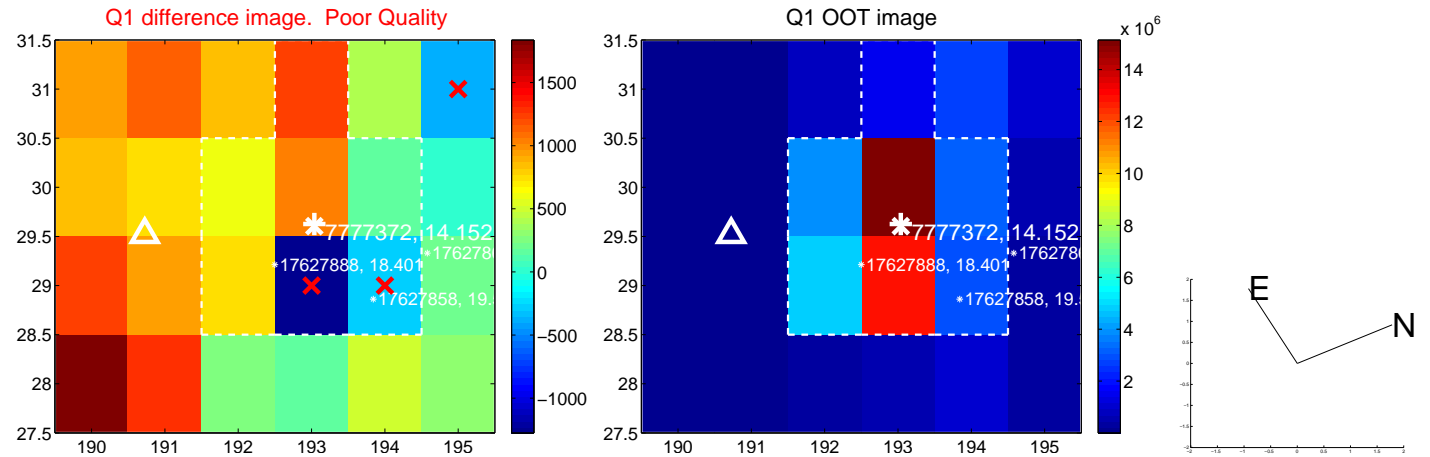
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$7.063 \pm 0.451$	15.65	$1.628 \pm 0.593$	$-6.873 \pm 0.442$
PRF-fit source offset from KIC position	$7.030 \pm 0.455$	15.44	$1.750 \pm 0.585$	$-6.808 \pm 0.445$
photometric centroid source offset	$4.75 \pm 0.75$	6.30	$-0.33 \pm 0.69$	$-4.73 \pm 0.75$

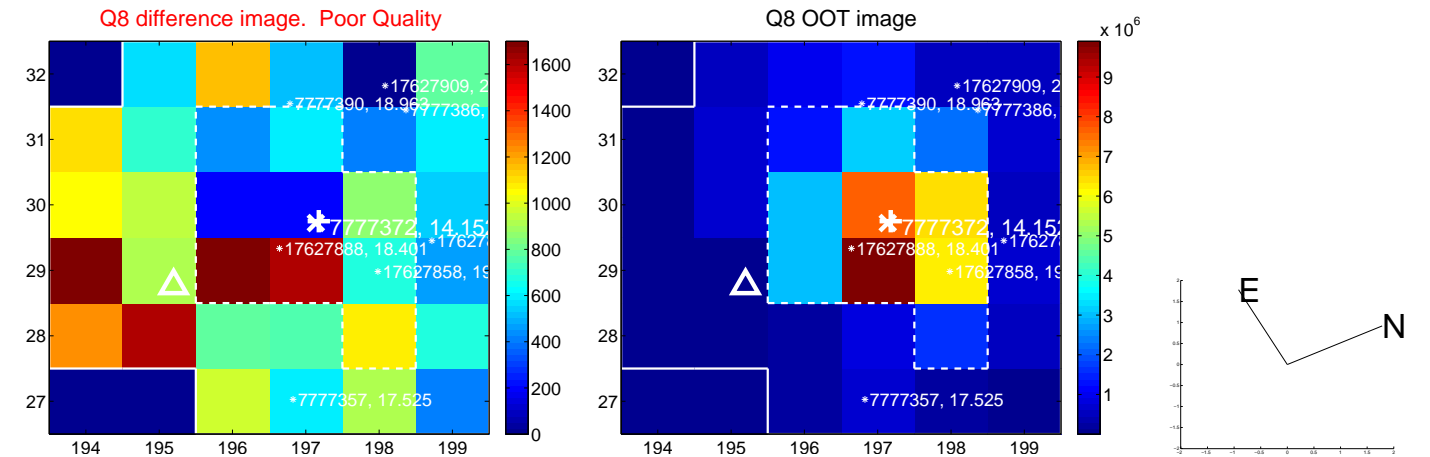
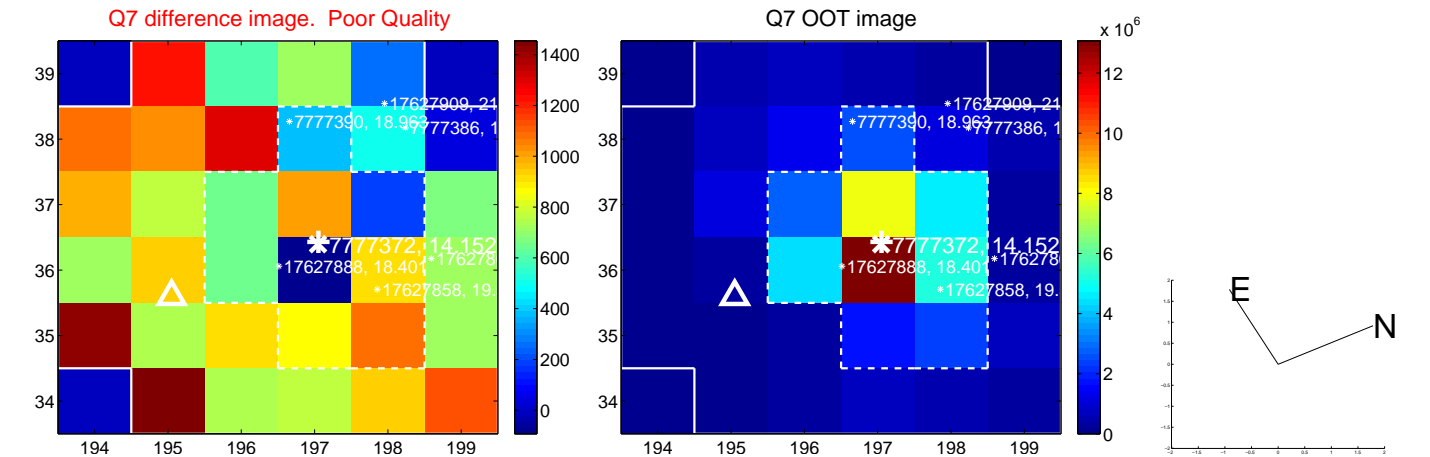
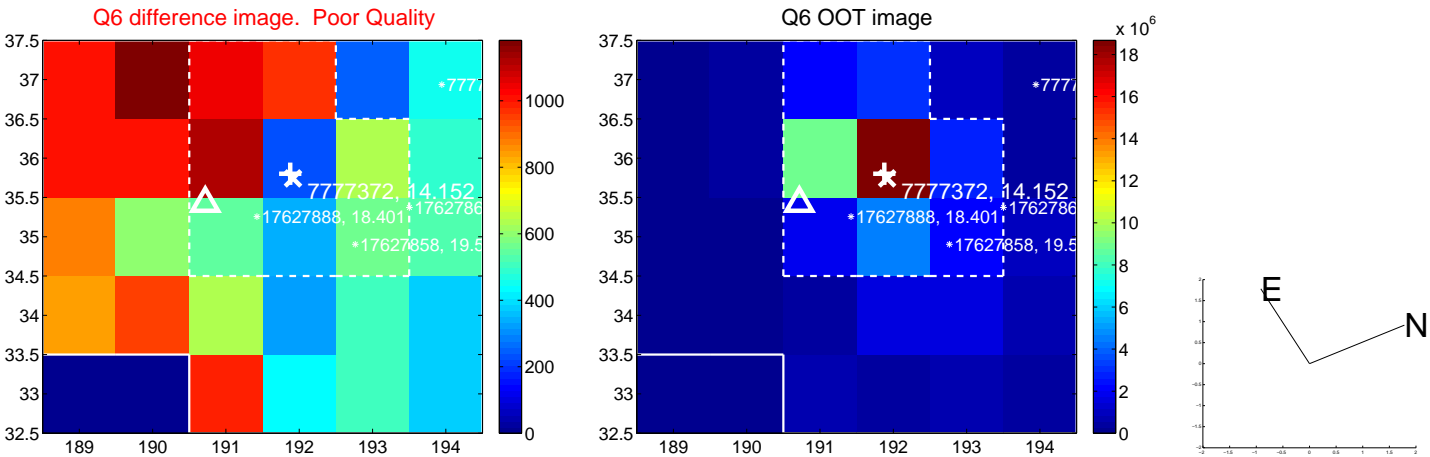
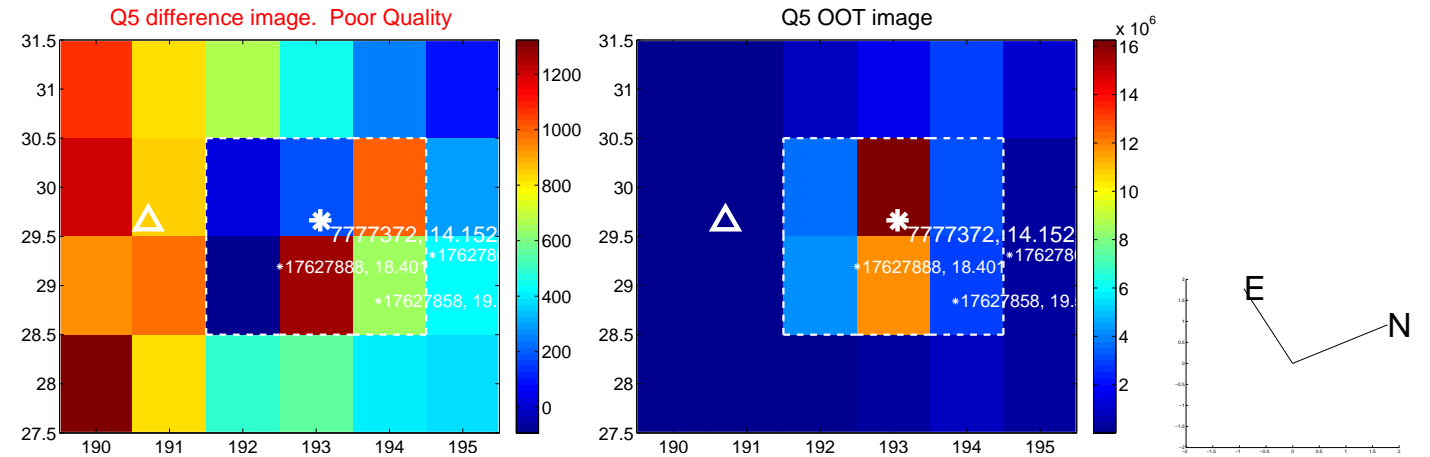


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

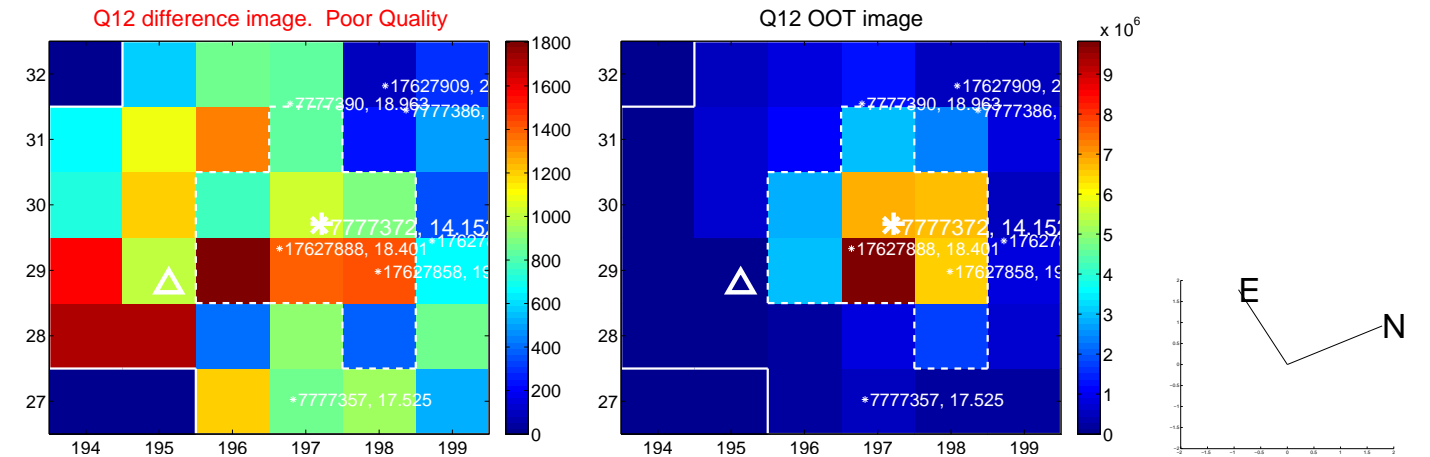
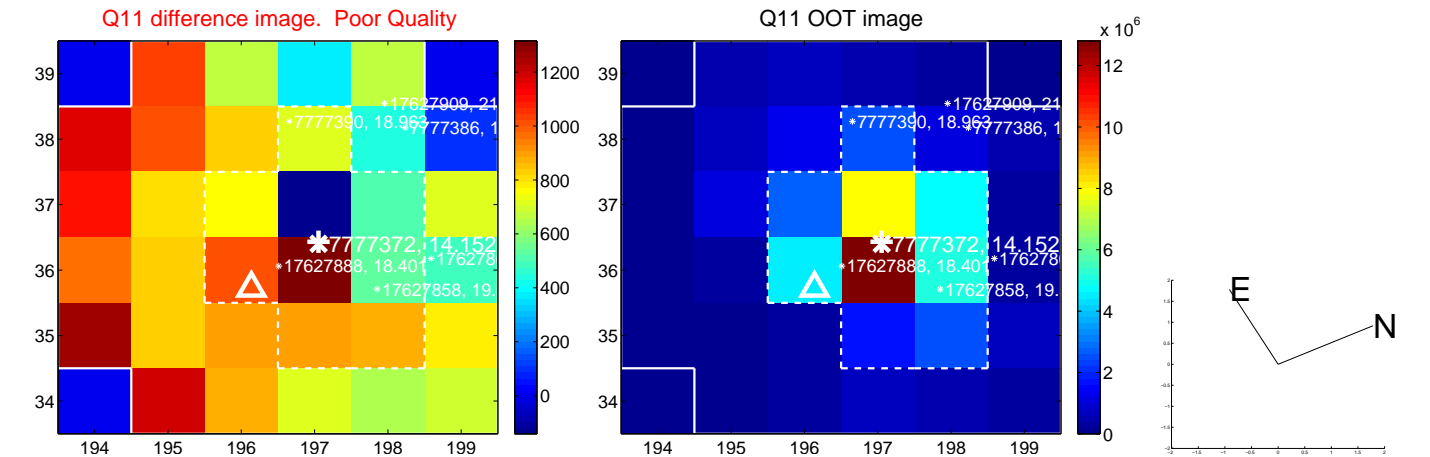
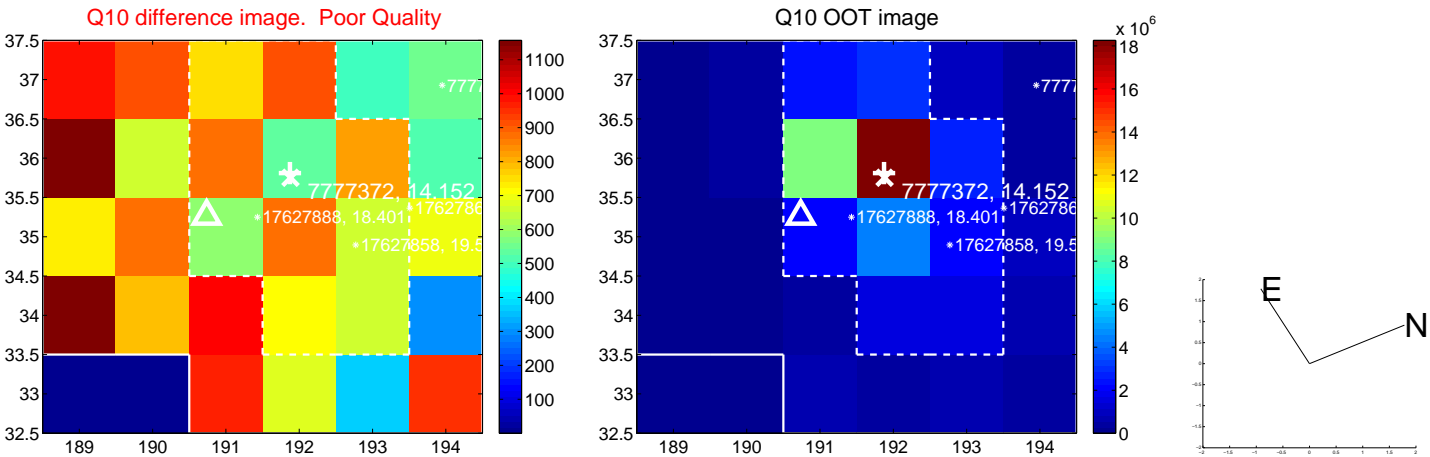
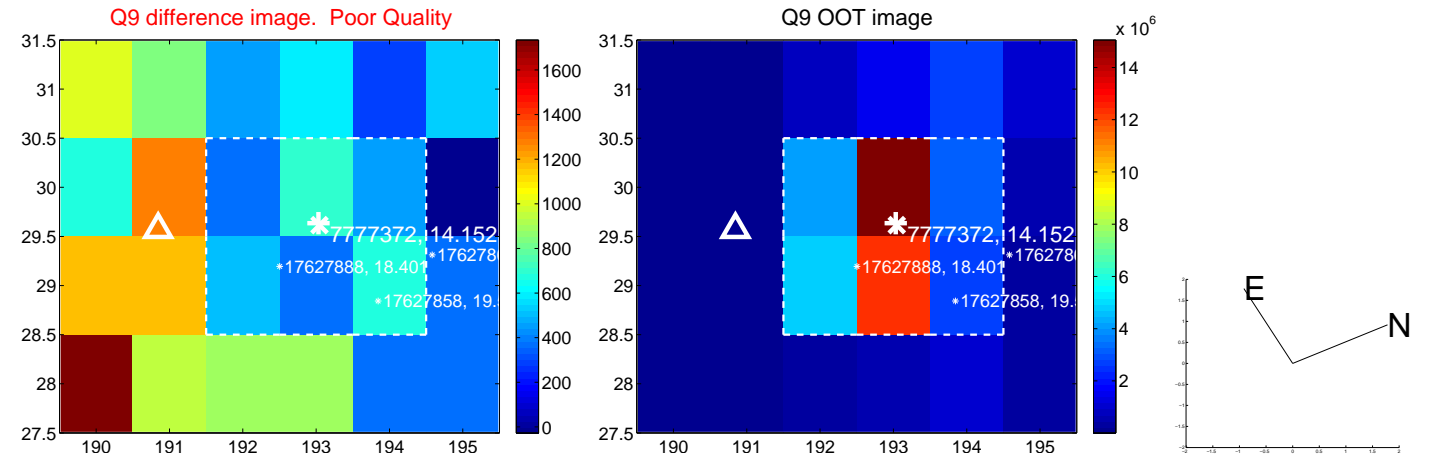


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

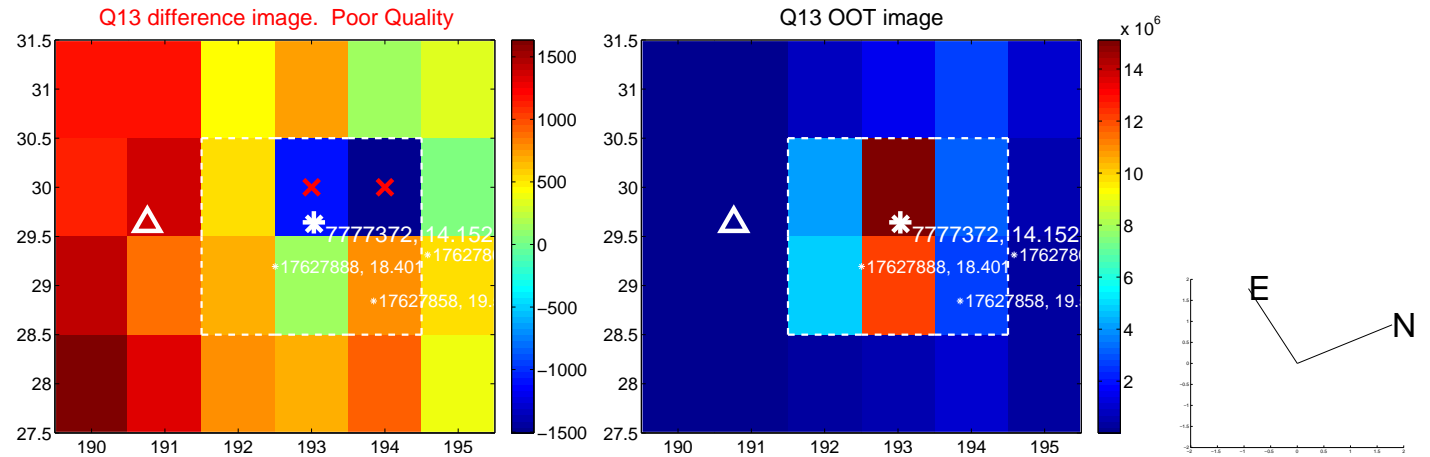




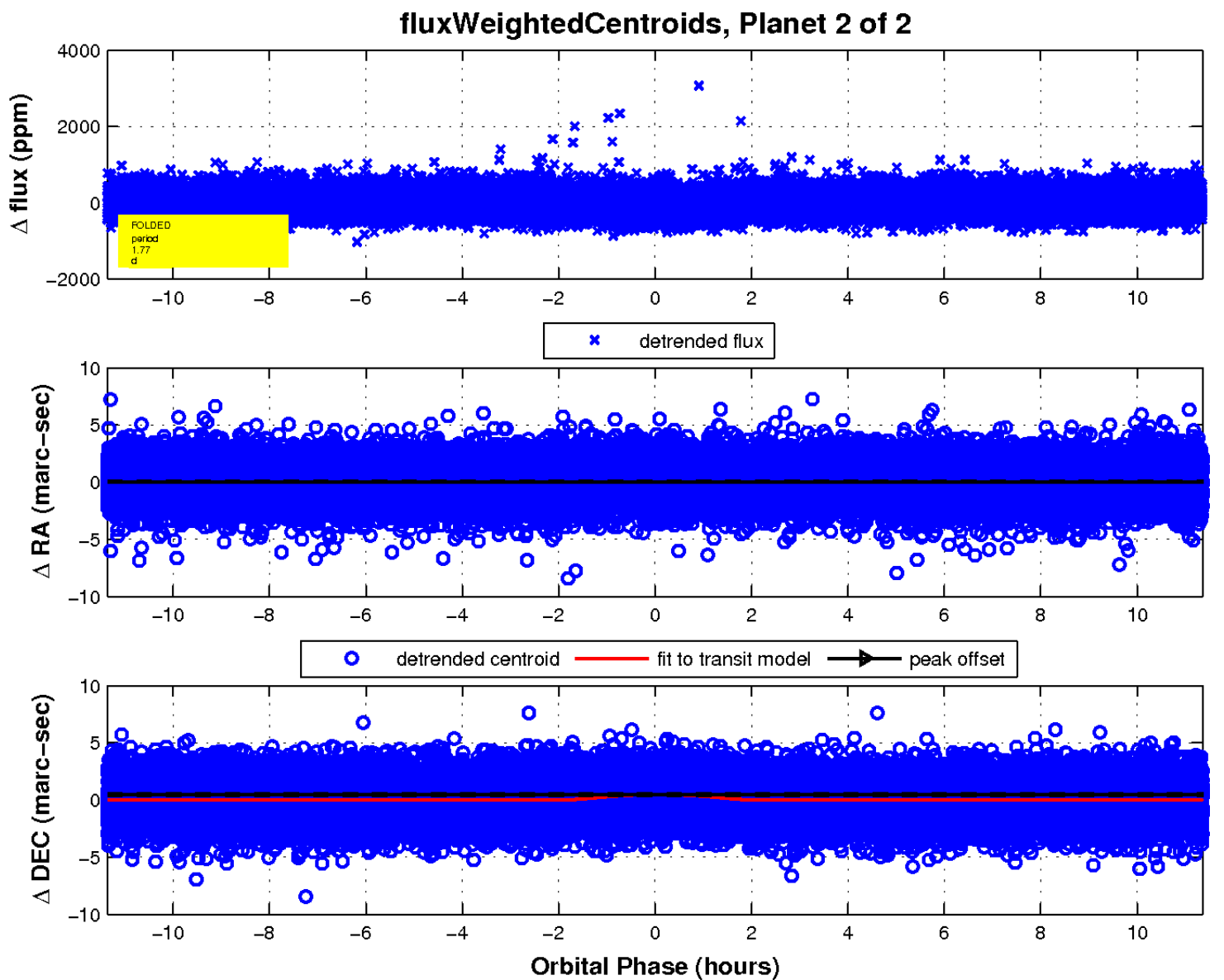
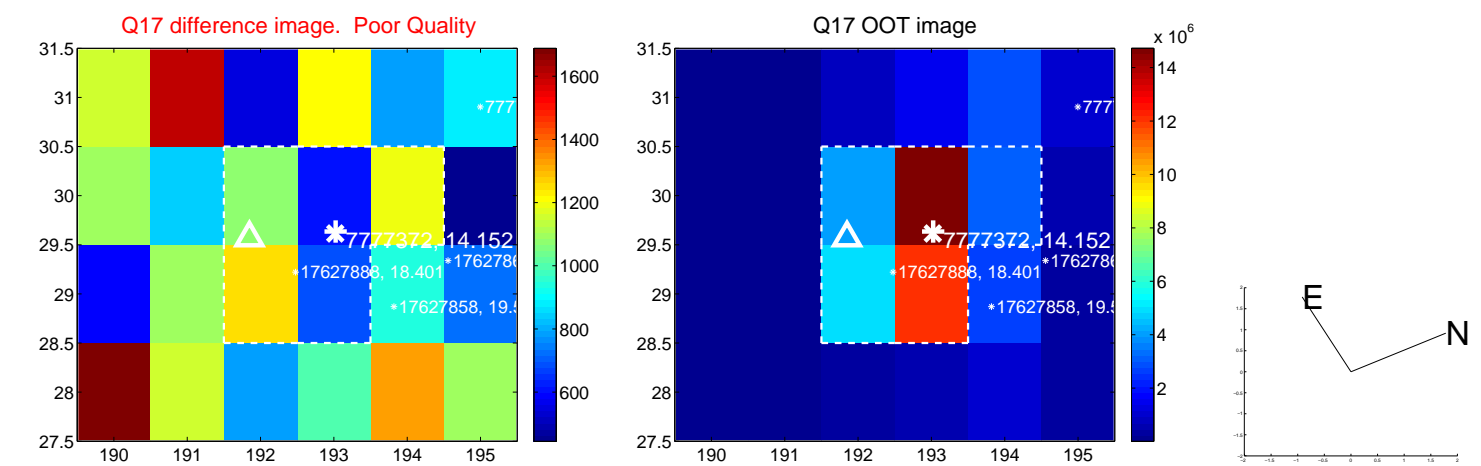
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

