

# KIC 004666008

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004666008-01	OBS	3872.01	2.248009	132.774662	282.8	3.817	43.3	39.6	1.11	6325	2.49	1426.08
004666008-02	OBS	No	2.248012	131.650996	124.7	2.807	19.6	19.7	1.11	6325	1.46	1426.07

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004666008-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH
004666008-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_RESOLVED_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 004666008-01

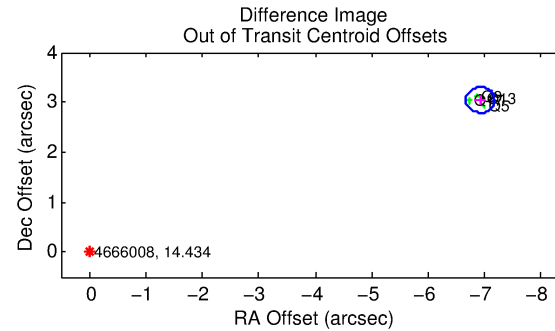
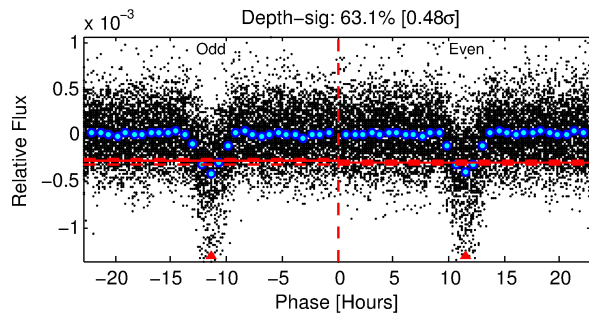
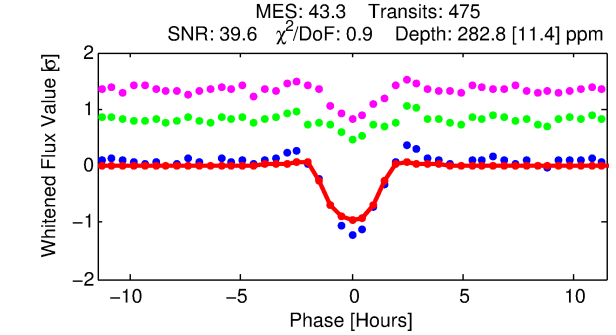
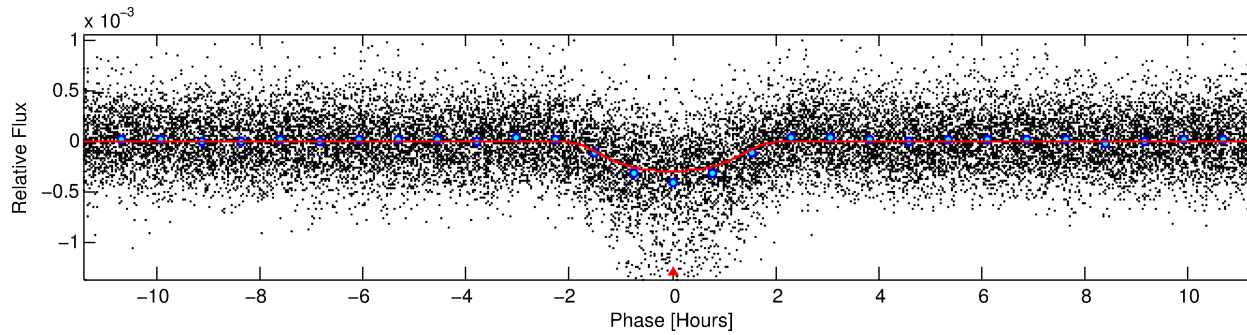
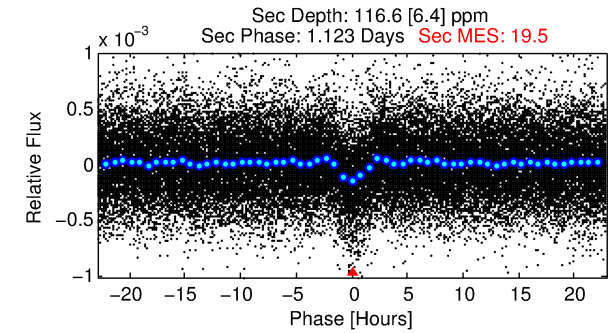
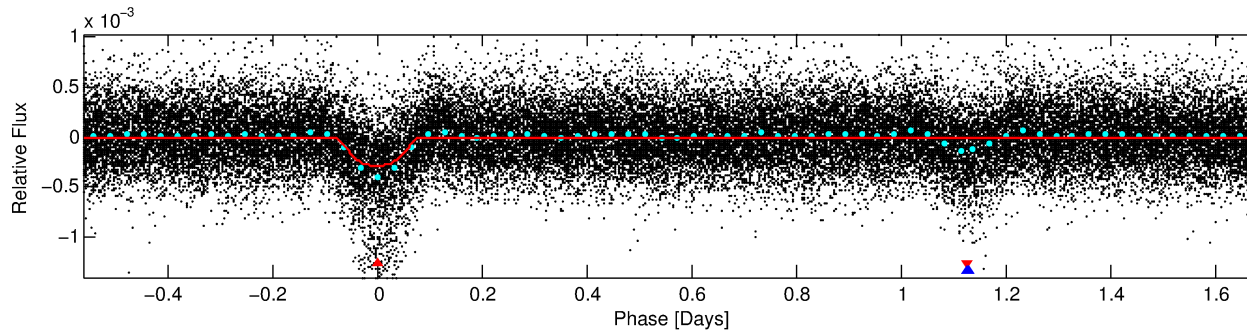
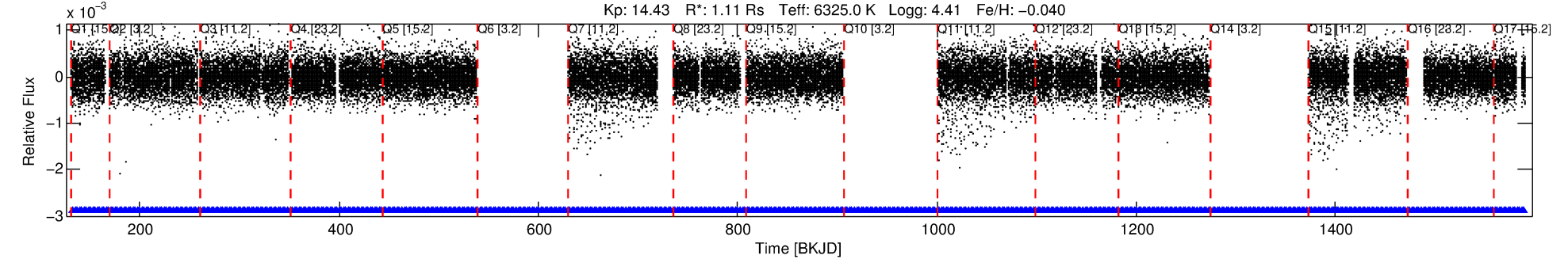
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
004666008-01	4666008	004665989-pri	4665989	1:1	19.3	4	-3	13.02	14.44	1018.00	Direct-PRF	0	1.77	1.23

**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: 4666008 Candidate: 1 of 2 Period: 2.248 d  
KOI: K03872.01 Corr: 0.868

Kp: 14.43 R\*: 1.11 Rs Teff: 6325.0 K Logg: 4.41 Fe/H: -0.040



## DV Fit Results:

Period = 2.24801 [0.00001] d  
Epoch = 132.7747 [0.0016] BKJD  
Rp/R\* = 0.0205 [0.0006]  
a/R\* = 1.65 [0.06]  
b = 0.98 [0.00]  
Seff = 1426.07 [592.04]  
Teq = 1567 [163] K  
Rp = 2.49 [0.85] Re  
a = 0.0353 [0.0098] AU  
Ag = 12.87 [5.18] [2.29σ]  
Teffp = 4589 [174] K [12.69σ]

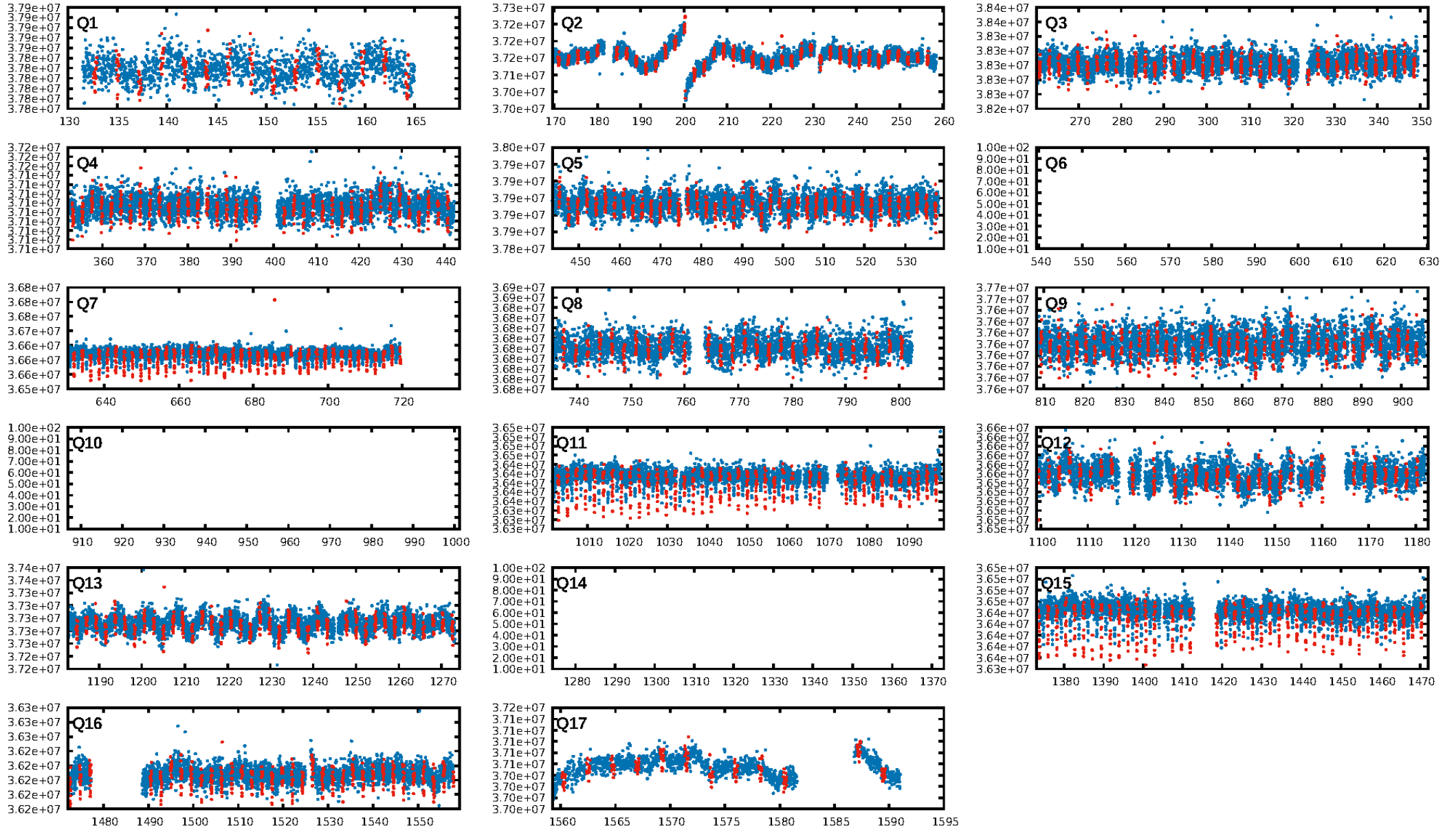
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [448/448]  
GhostDiagnostic-chr: -0.5898  
Centroid-sig: 0.0%  
Centroid-so: 22.014 arcsec [72.11σ]  
OotOffset-rm: 7.561 arcsec [89.18σ]  
KicOffset-rm: 7.813 arcsec [88.51σ]  
OotOffset-st: 0/0/0/4 [4]  
KicOffset-st: 0/0/0/4 [4]  
DiffImageQuality-fgm: 1.00 [4/4]  
DiffImageOverlap-fno: 1.00 [14/14]

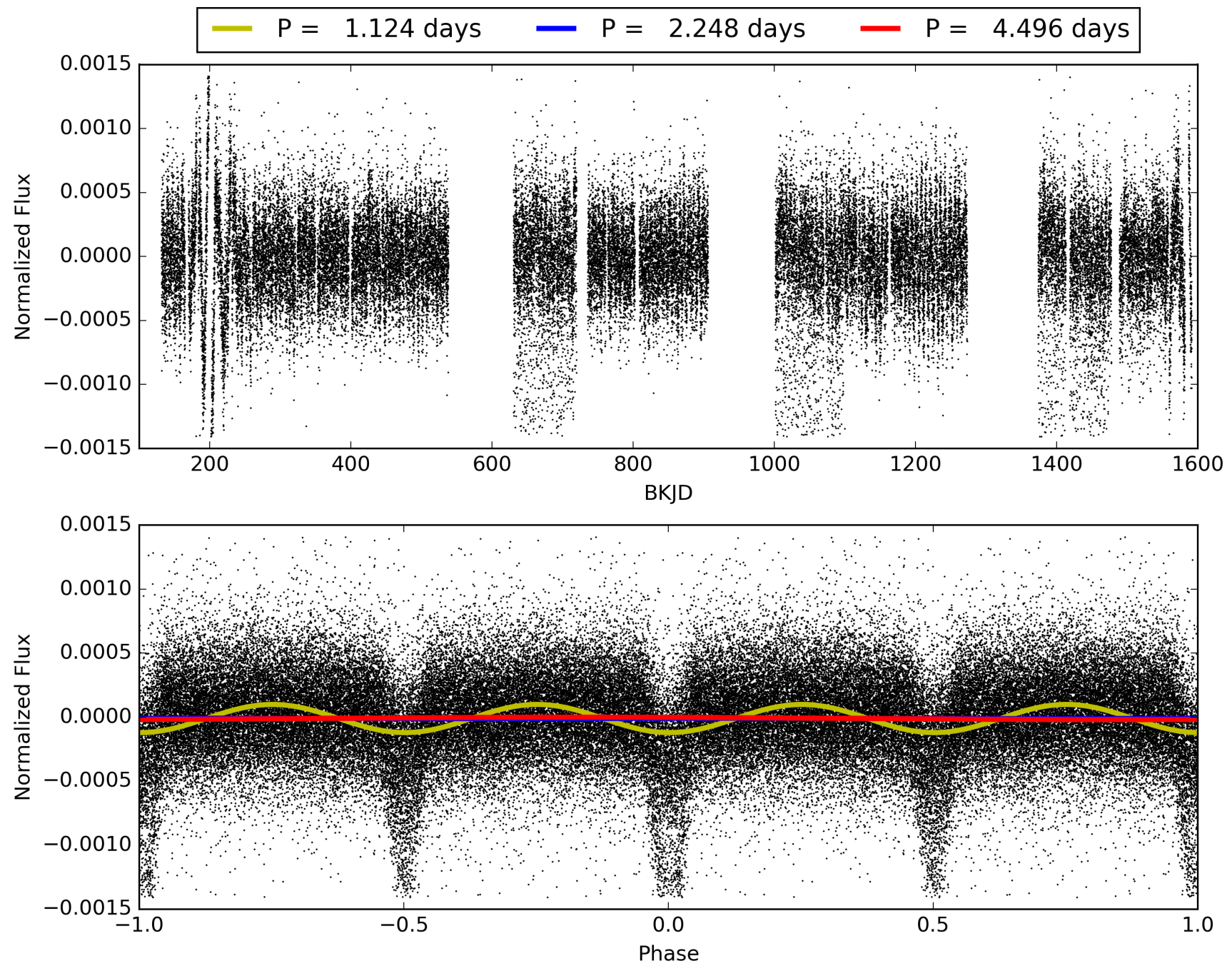
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 11:14:37 Z

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

# TCE 004666008-01, PDC Light Curves



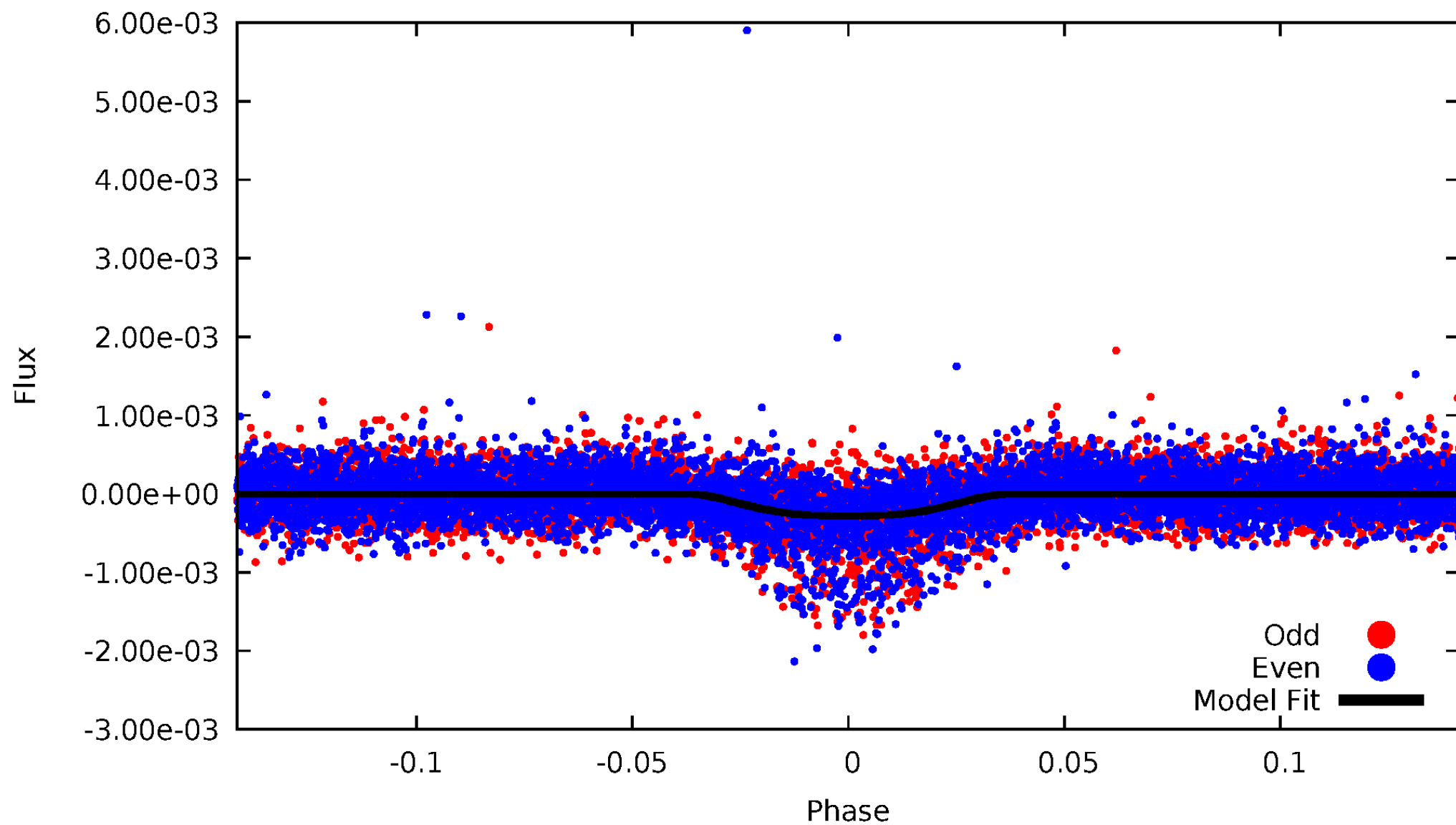
TCE 004666008-01





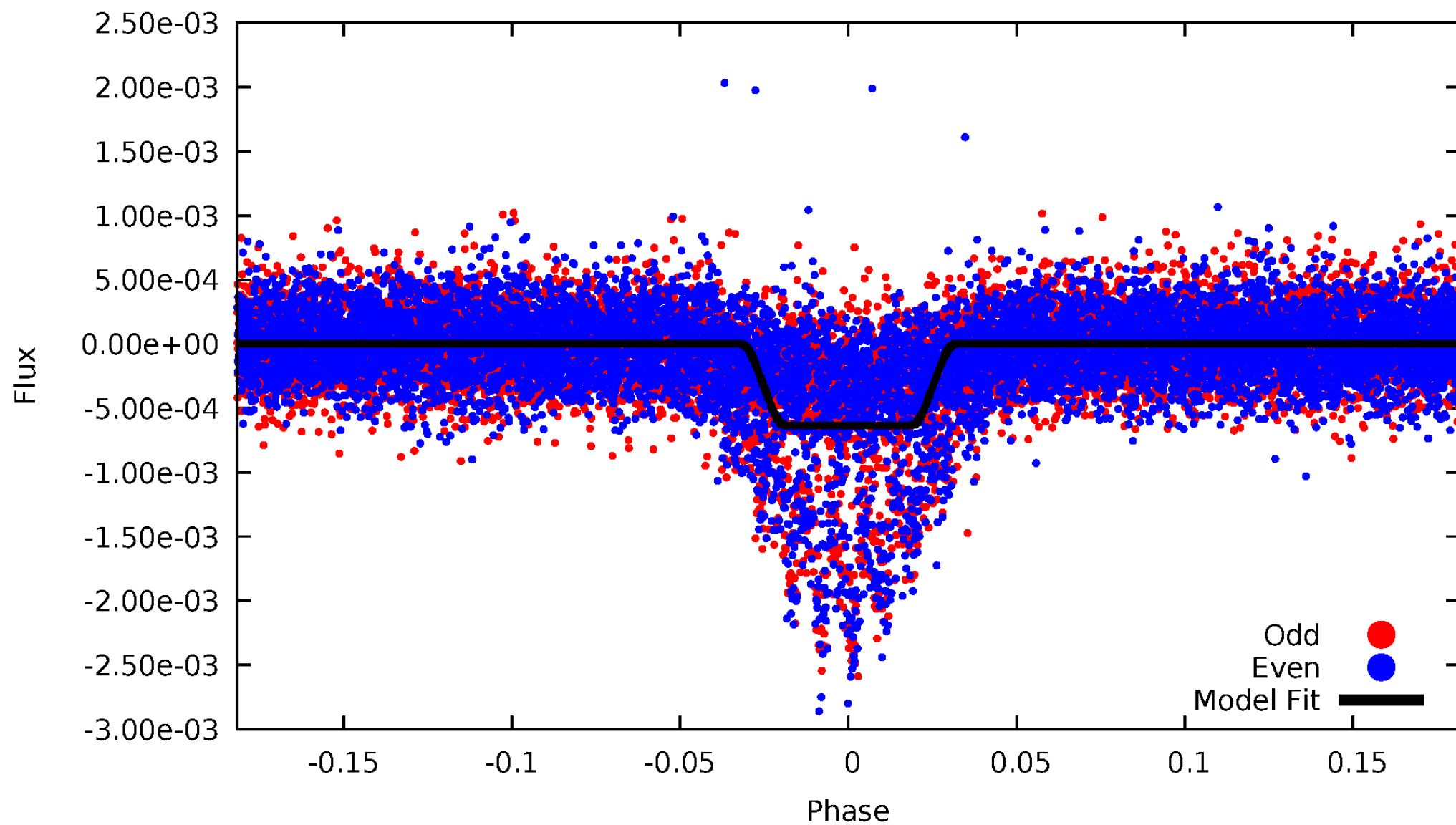
# DV Odd/Even

TCE 004666008-01



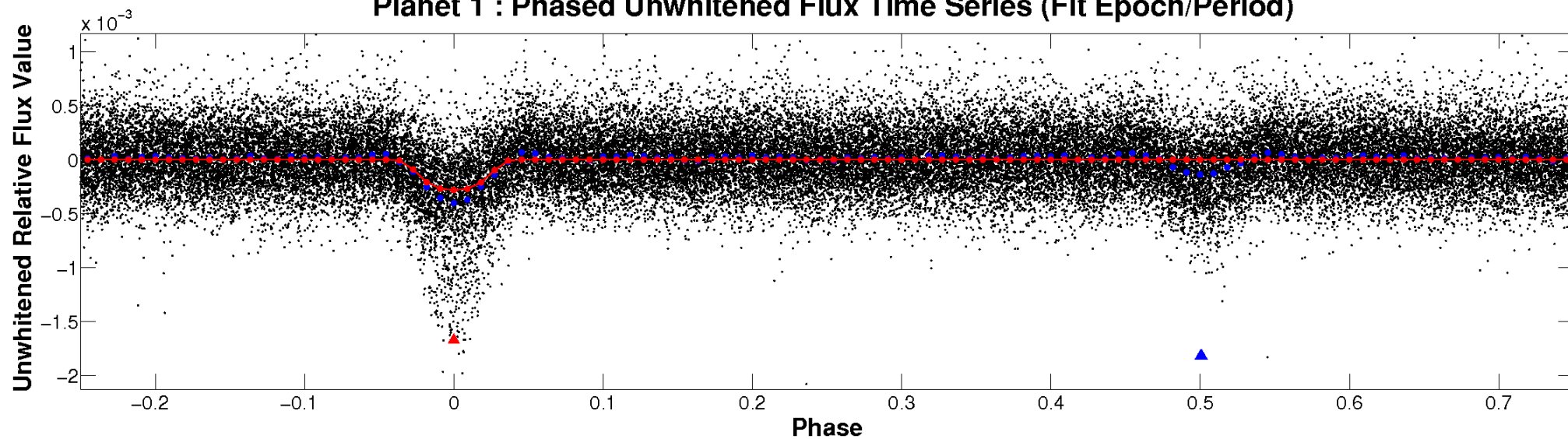
# ALT Odd/Even

TCE 004666008-01

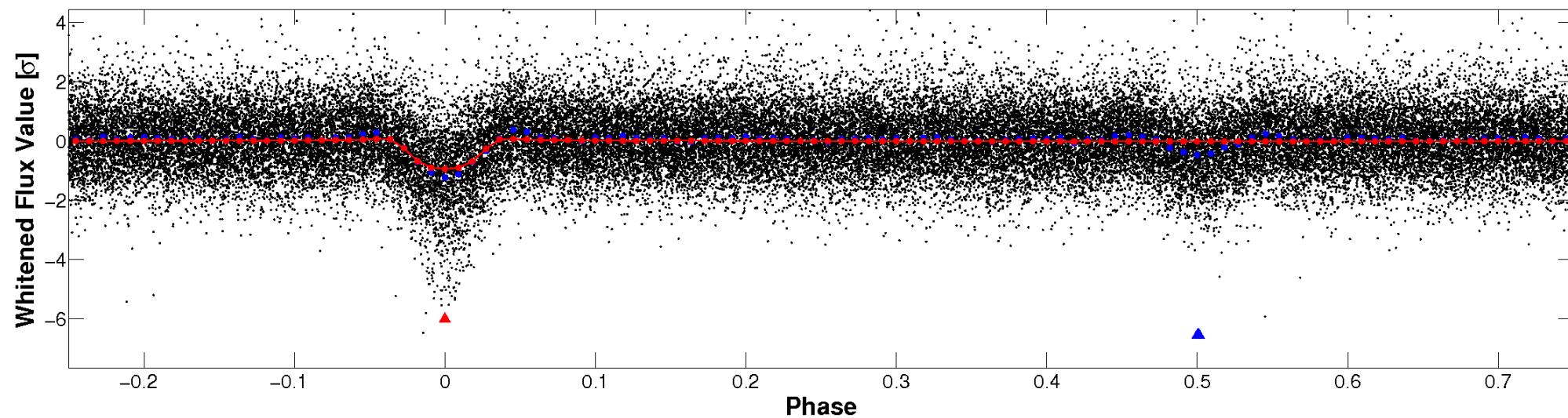


# Non-Whitened Vs. Whitened Light Curve

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

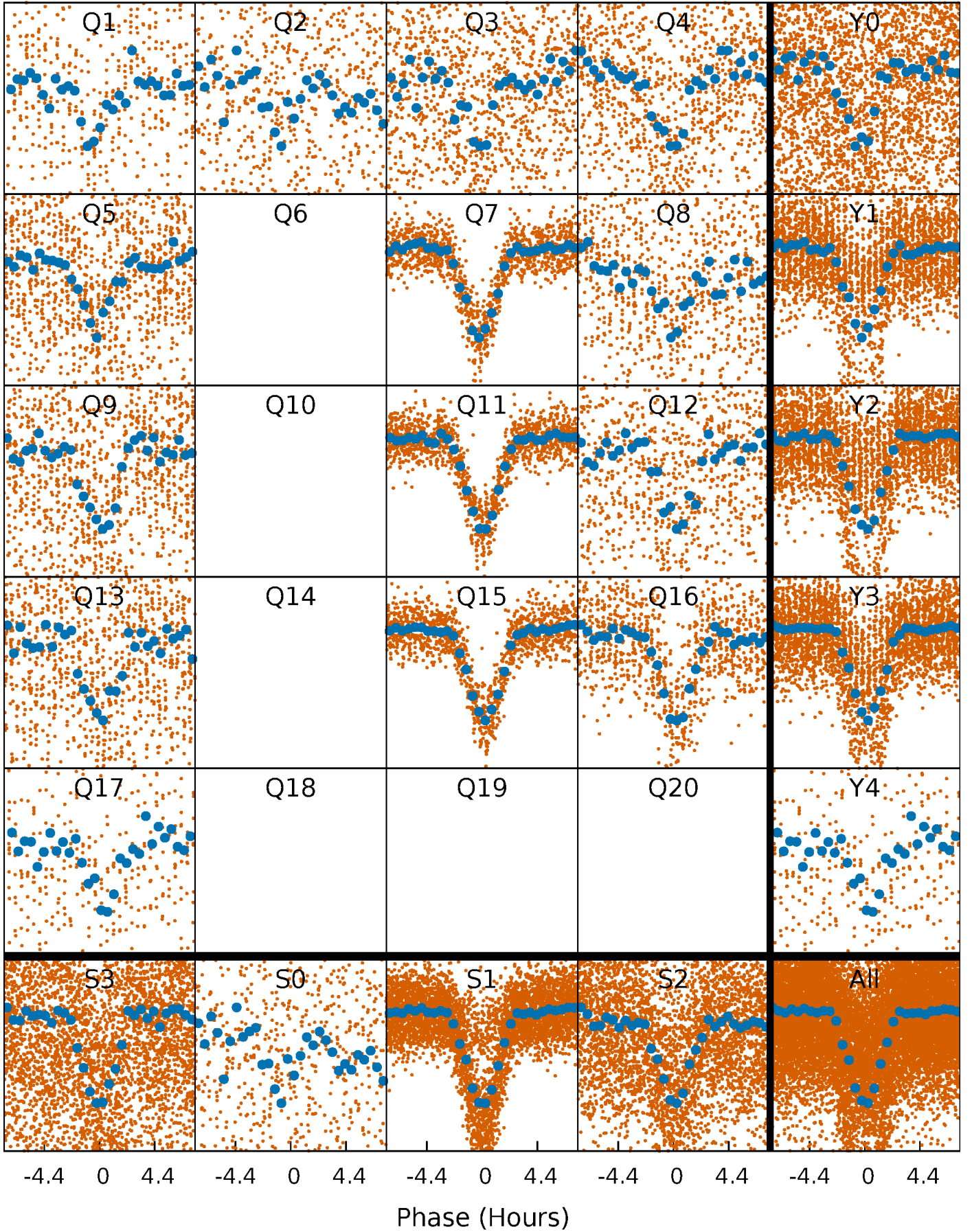


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

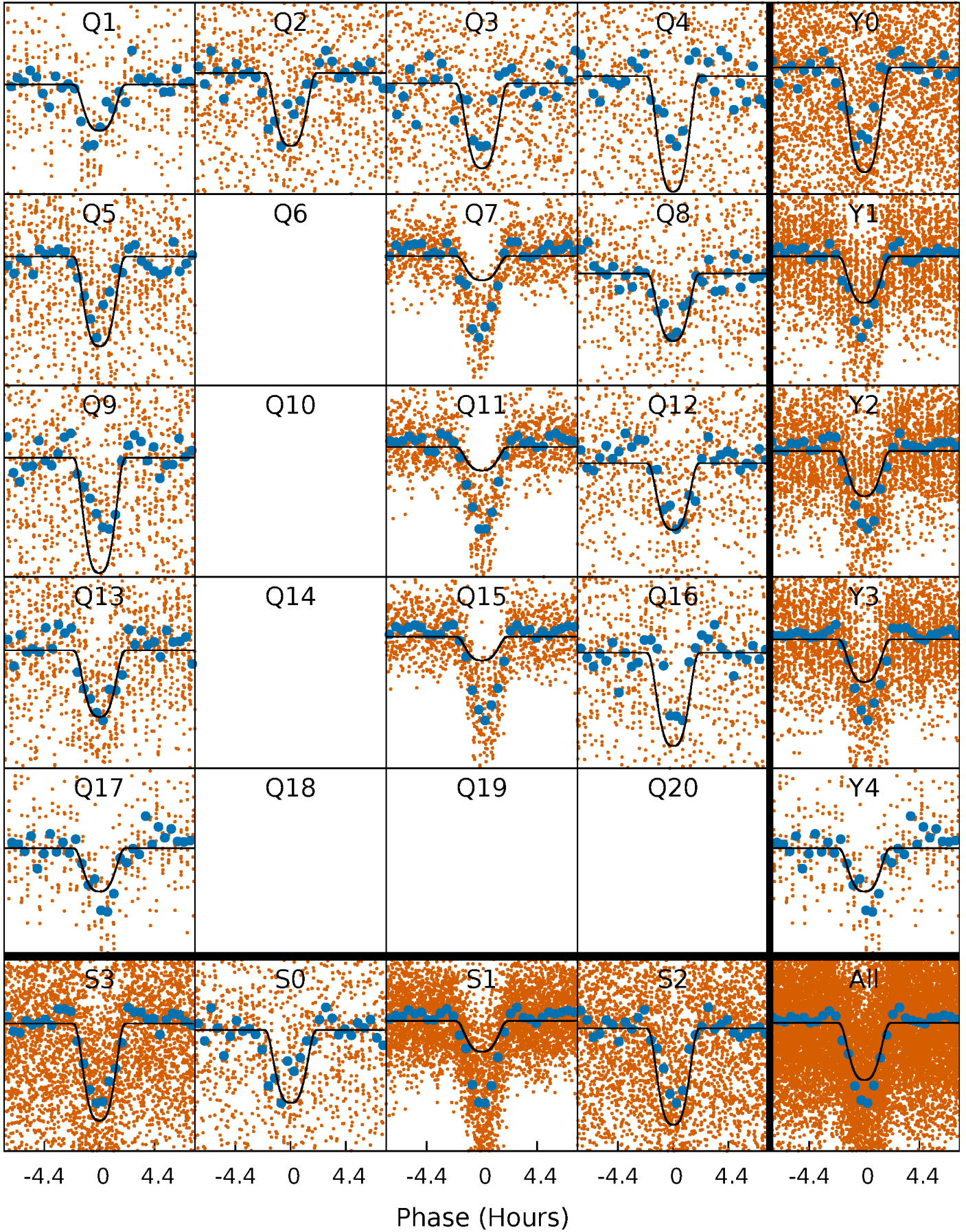
TCE 004666008-01 P= 2.248009 Days  $T_0=132.774662$  (BKJD)





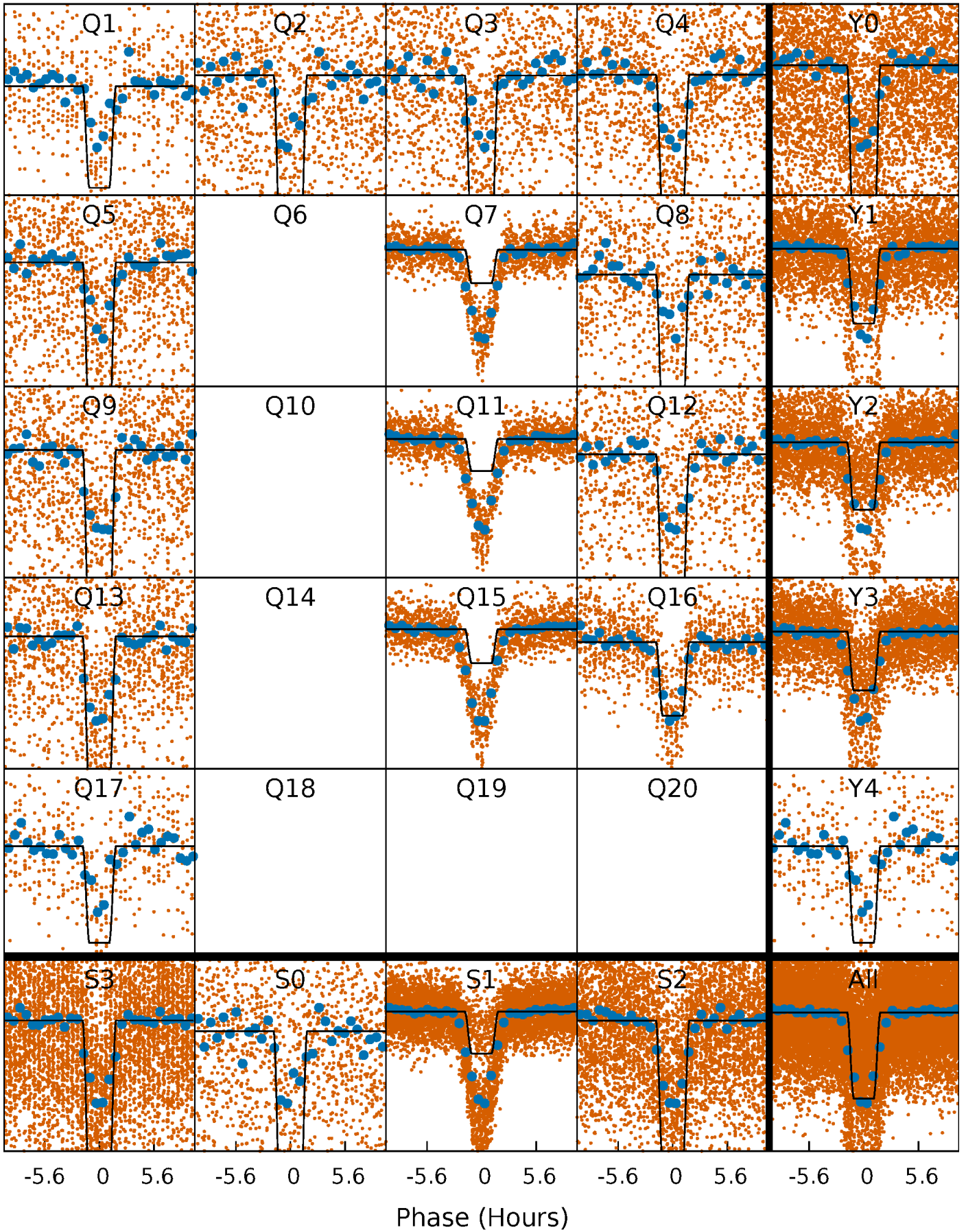
# DV Quarter-Phased Transit Curves

TCE 004666008-01 P= 2.248009 Days  $T_0=132.774662$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

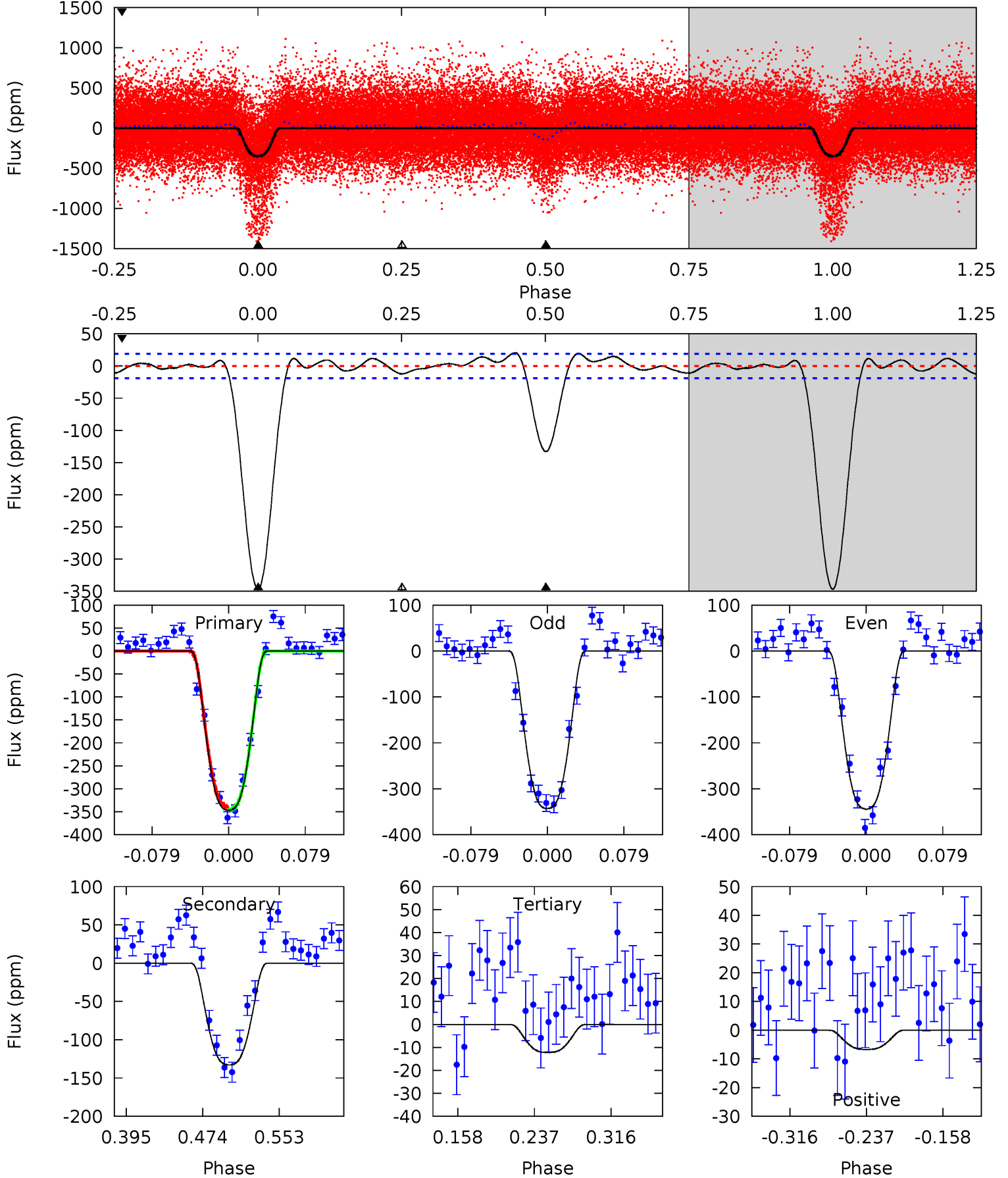
TCE 004666008-01 P= 2.248074 Days  $T_0=132.750523$  (BKJD)



# DV Model-Shift Uniqueness Test

004666008-01, P = 2.248009 Days, E = 130.526653 Days

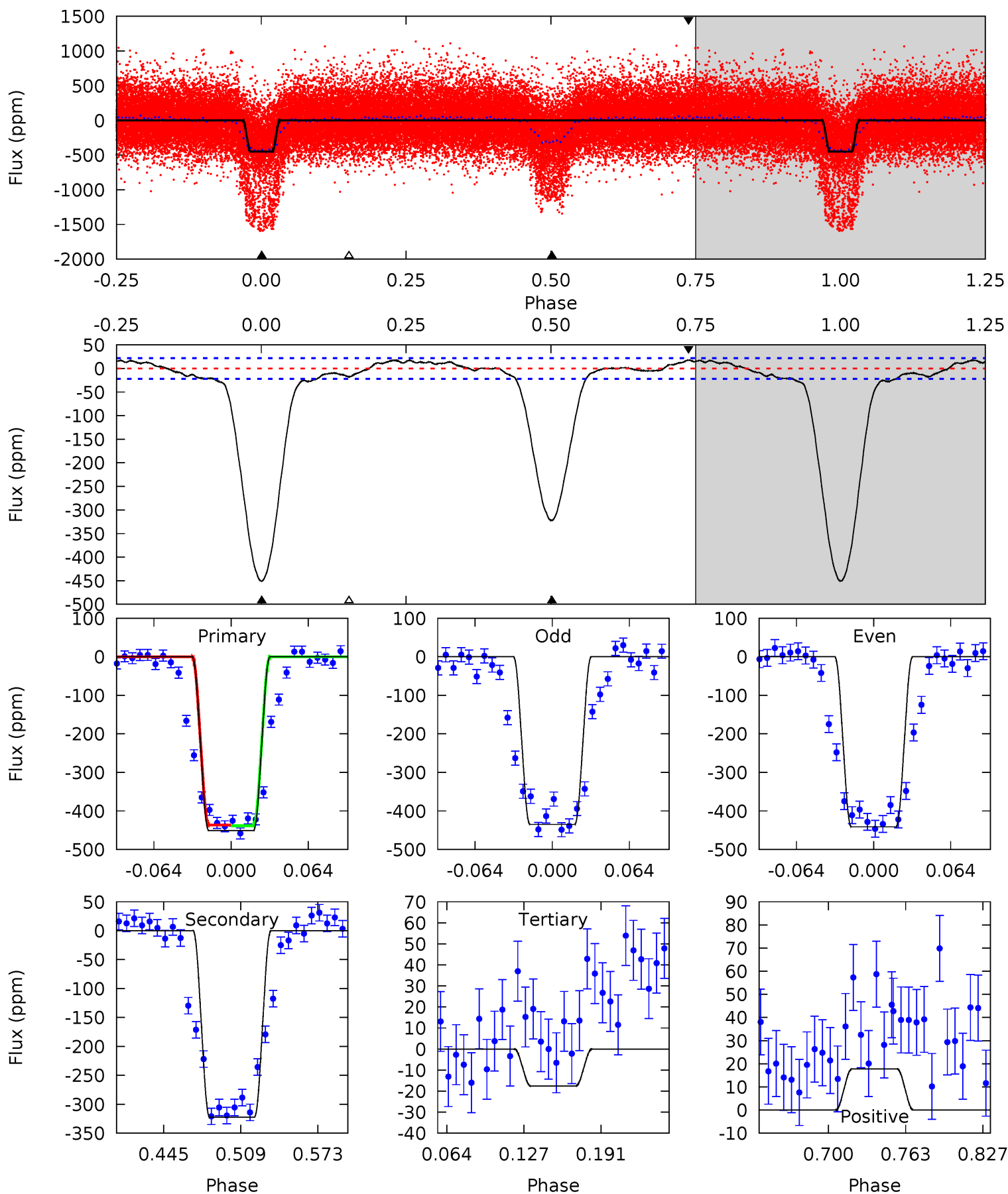
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
84.3	32.3	2.98	-1.64	4.61	1.76	1.59	81.4	86.0	29.3	34.0	0.14	1.43	0.06	0.83



# Alt Model-Shift Uniqueness Test

004666008-01, P = 2.248074 Days, E = 130.502449 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
95.4	68.2	3.73	3.77	4.66	1.85	2.71	91.7	91.6	64.5	64.5	0.66	1.82	0.04	0





### Stellar Parameters For KIC 004666008

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6325^{+149}_{-205}$	$4.409^{+0.056}_{-0.210}$	$-0.040^{+0.250}_{-0.300}$	$1.112^{+0.379}_{-0.126}$	$1.157^{+0.156}_{-0.156}$	$1.184^{+0.346}_{-0.632}$
	+2%/-3%	+1%/-5%	+625%/-750%	+34%/-11%	+13%/-13%	+29%/-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 004666008-01 / KOI 3872.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-133 \pm 4$	$2.52^{+0.44}_{-0.20}$	$2218^{+165}_{-109}$	$4816^{+131}_{-144}$	$14^{+2}_{-3}$
Alt.	$-322 \pm 5$	$3.11^{+0.59}_{-0.24}$	$2224^{+178}_{-101}$	$5350^{+136}_{-152}$	$22^{+3}_{-6}$

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

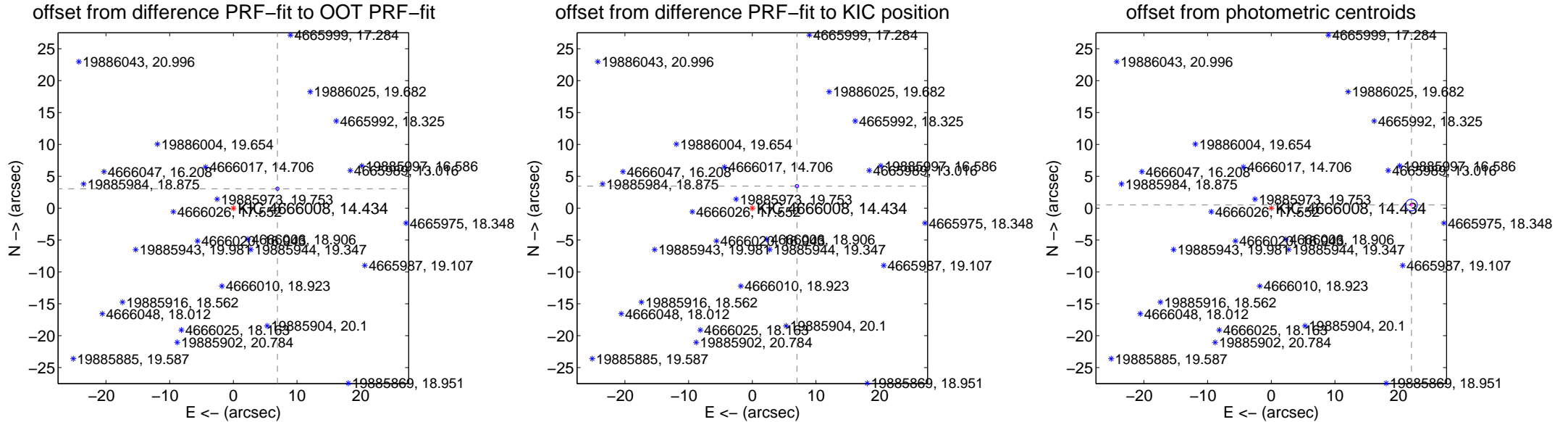
## DV Centroid Data

Supplemental centroid analysis for 004666008-01. Kepler magnitude: 14.43. Transit SNR 39.59

There are 4 quarters with good PRF difference image offsets

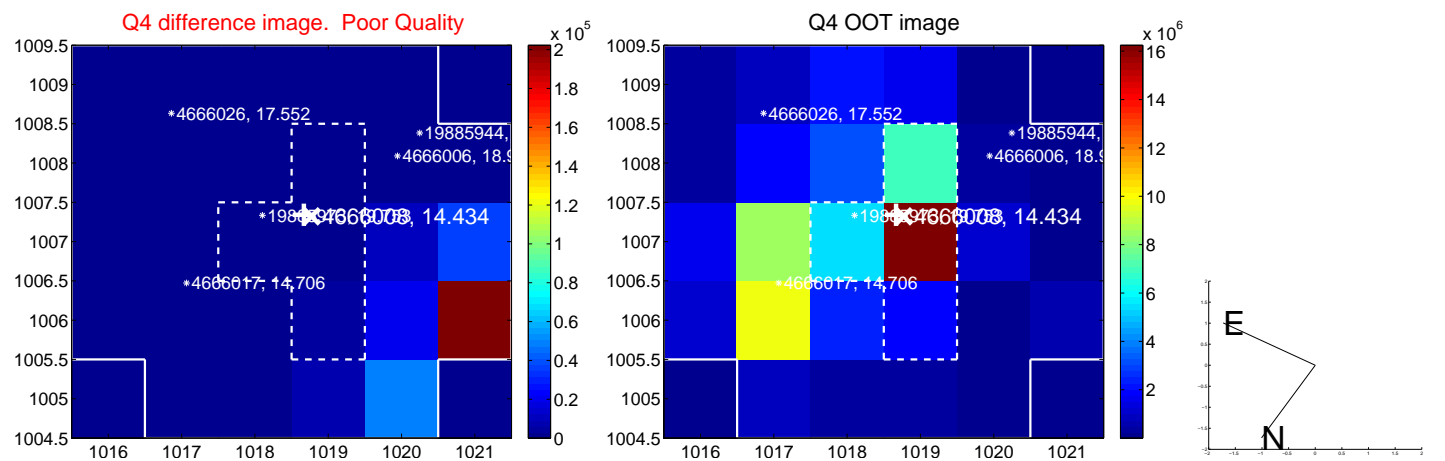
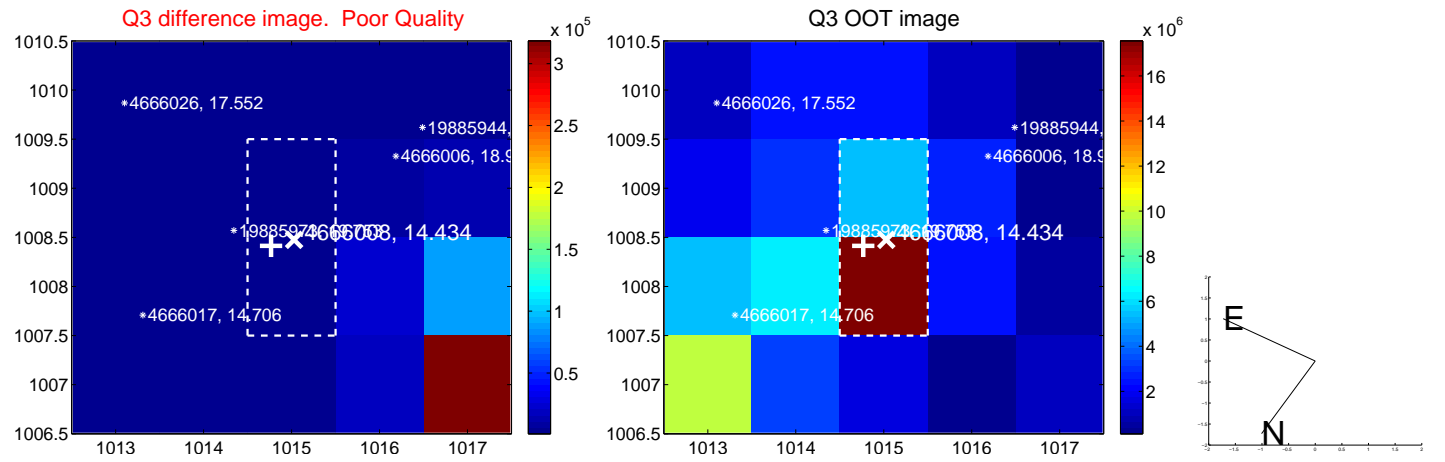
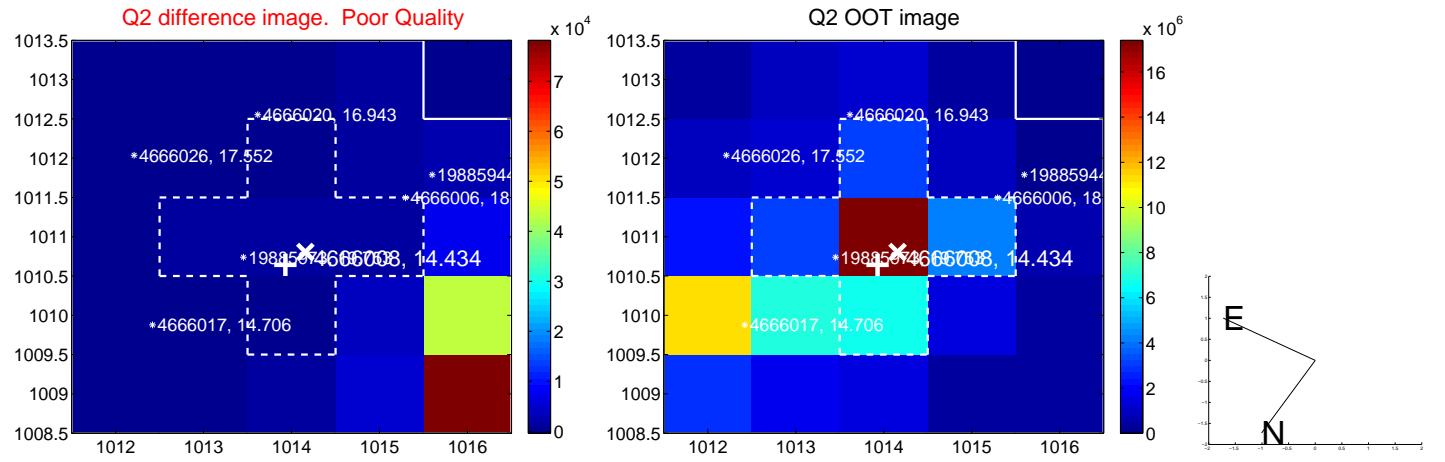
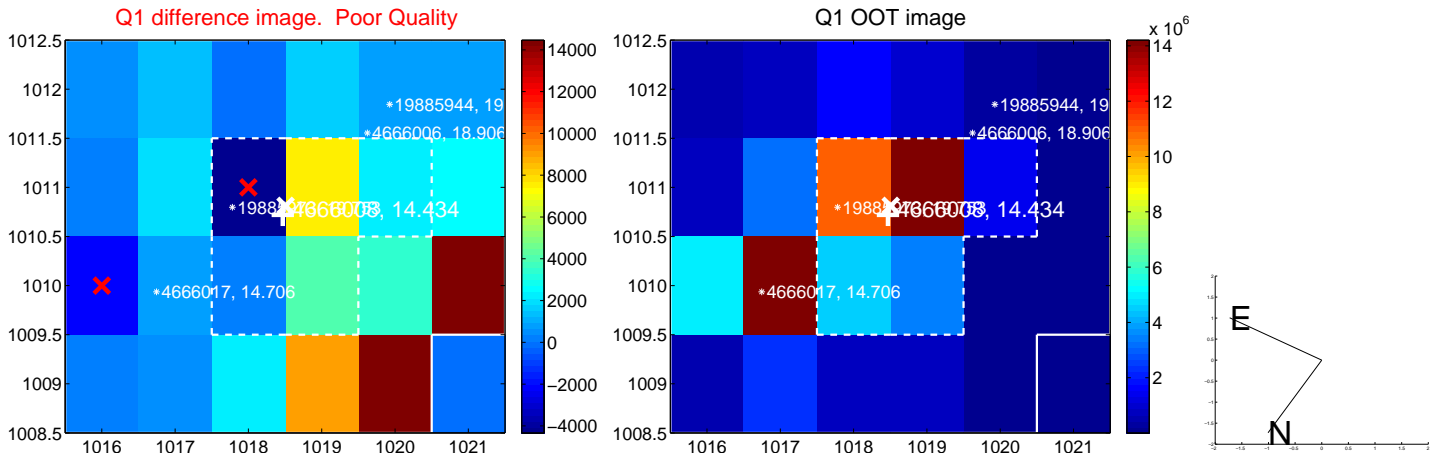
The direct PRF centroid is offset from the target star catalog position by about 0.43 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>7.561 <math>\pm</math> 0.085</b>	<b>89.18</b>	-6.921 $\pm$ 0.087	3.046 $\pm$ 0.074
PRF-fit source offset from KIC position	<b>7.813 <math>\pm</math> 0.088</b>	<b>88.51</b>	-7.008 $\pm$ 0.088	3.453 $\pm$ 0.091
photometric centroid source offset	<b>22.01 <math>\pm</math> 0.31</b>	<b>72.11</b>	-22.01 $\pm$ 0.31	0.50 $\pm$ 0.34

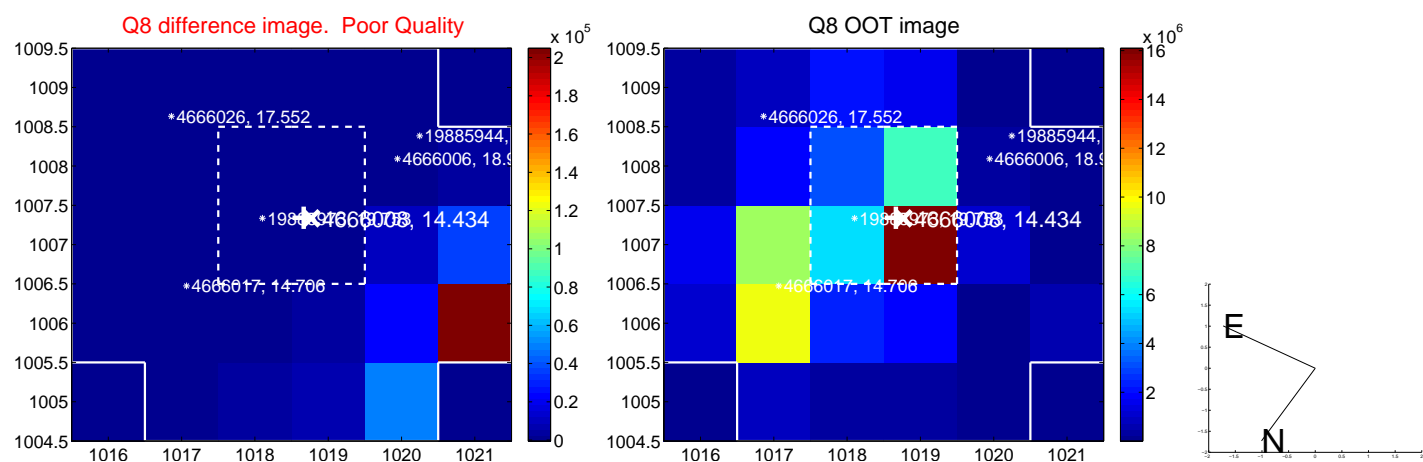
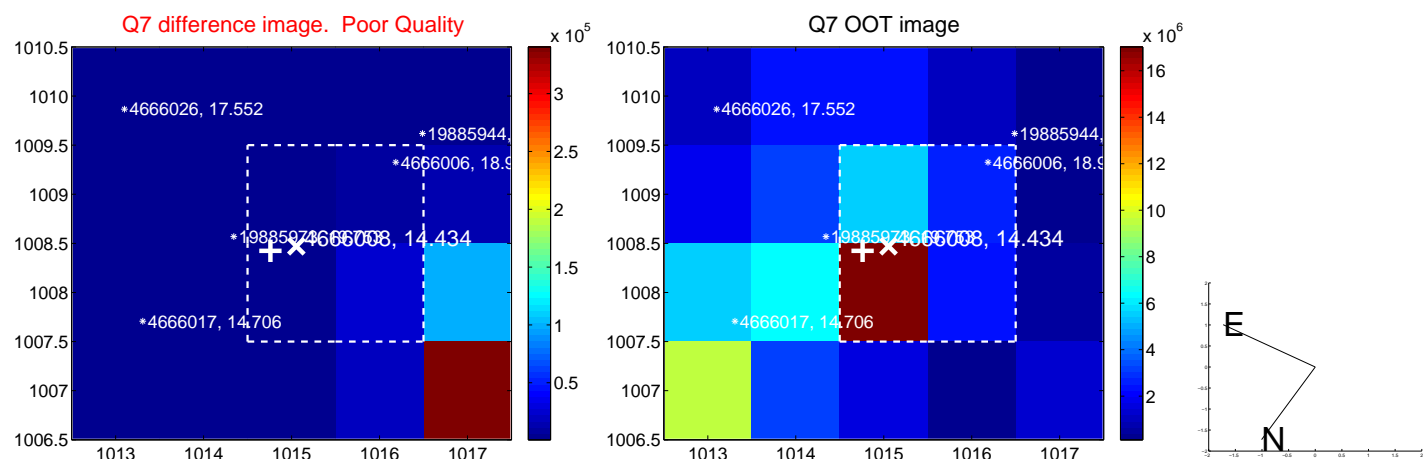
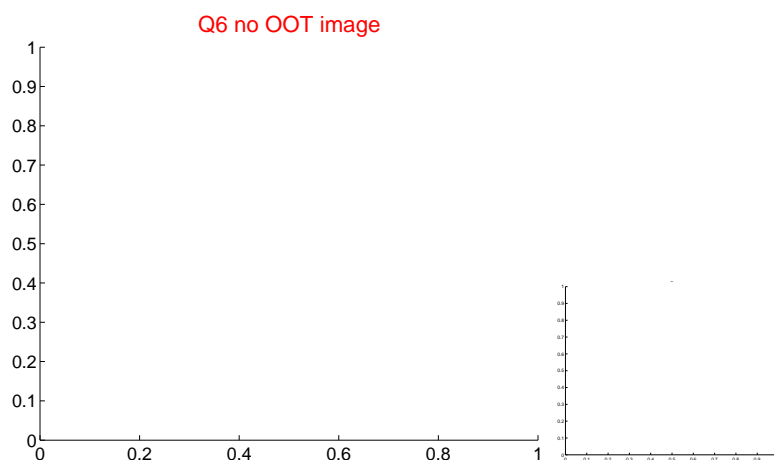
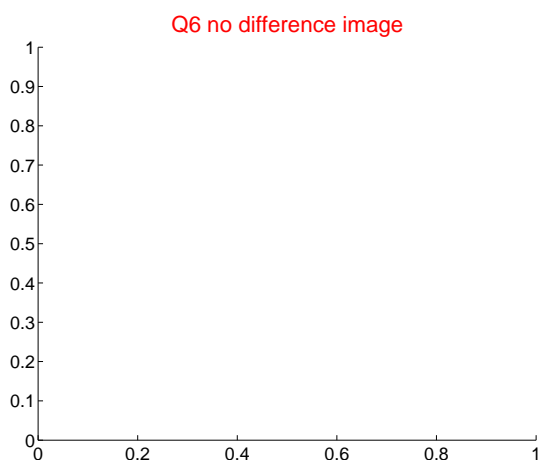
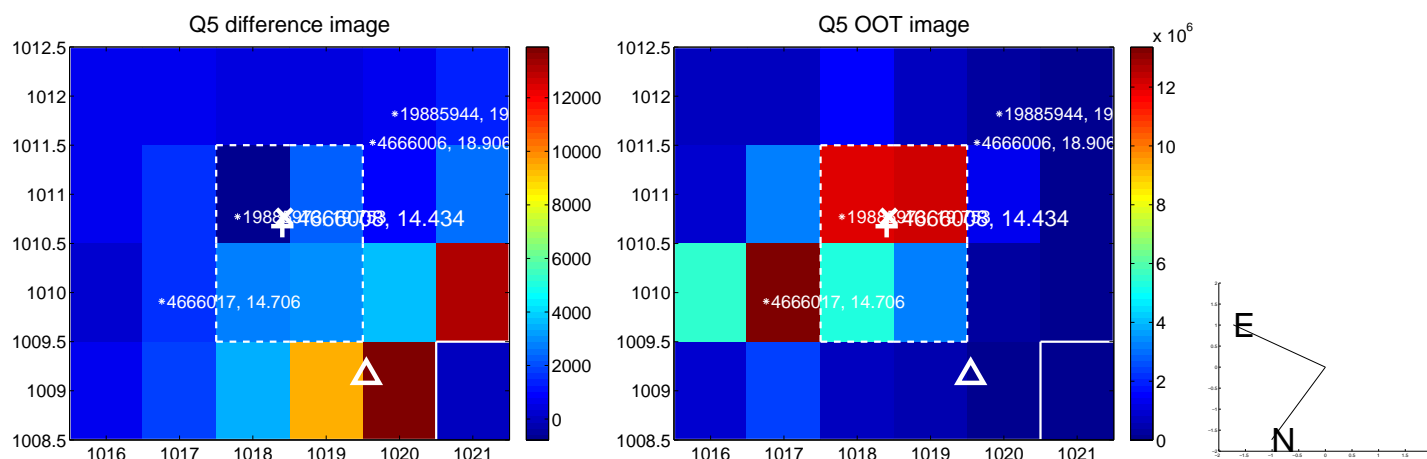


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

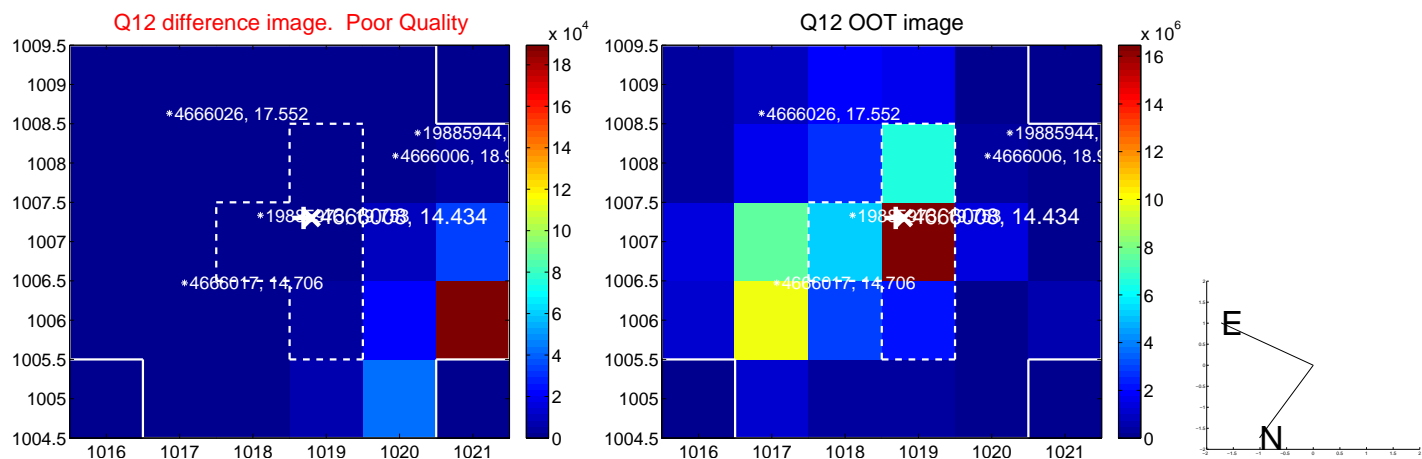
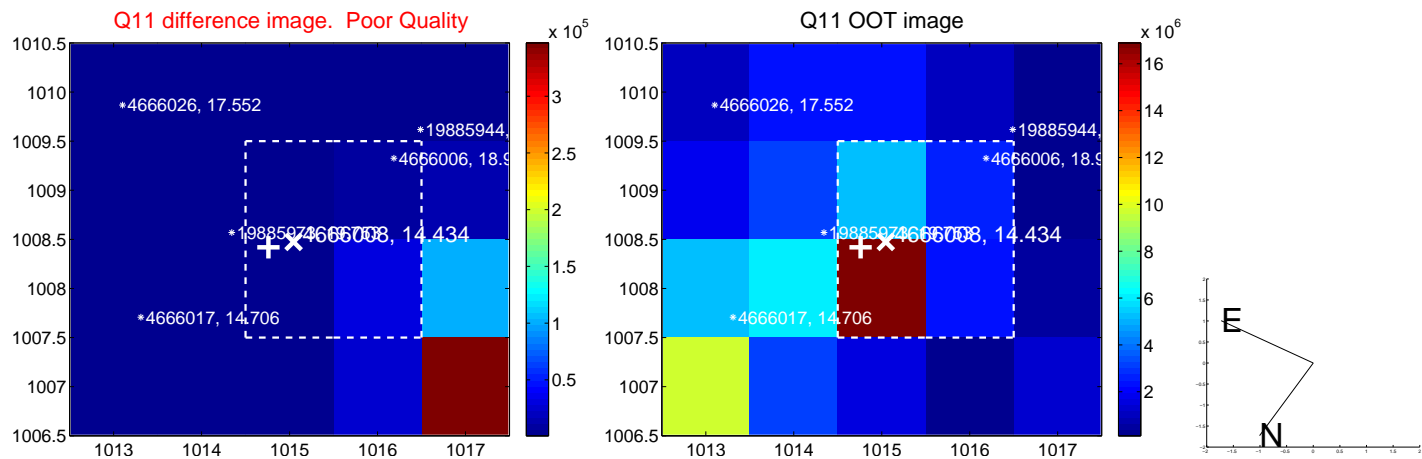
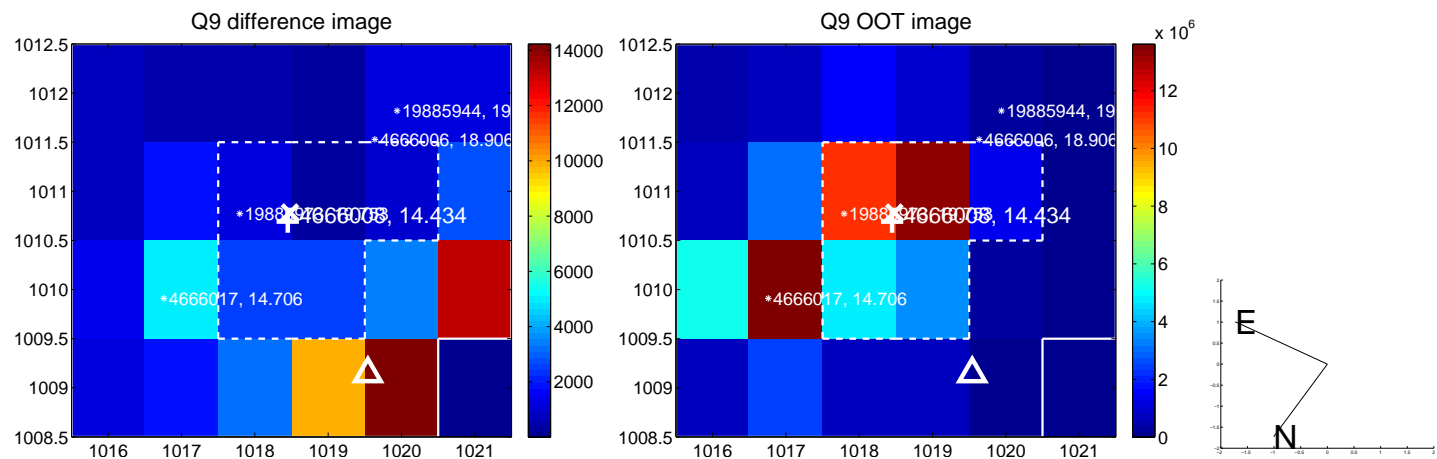


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

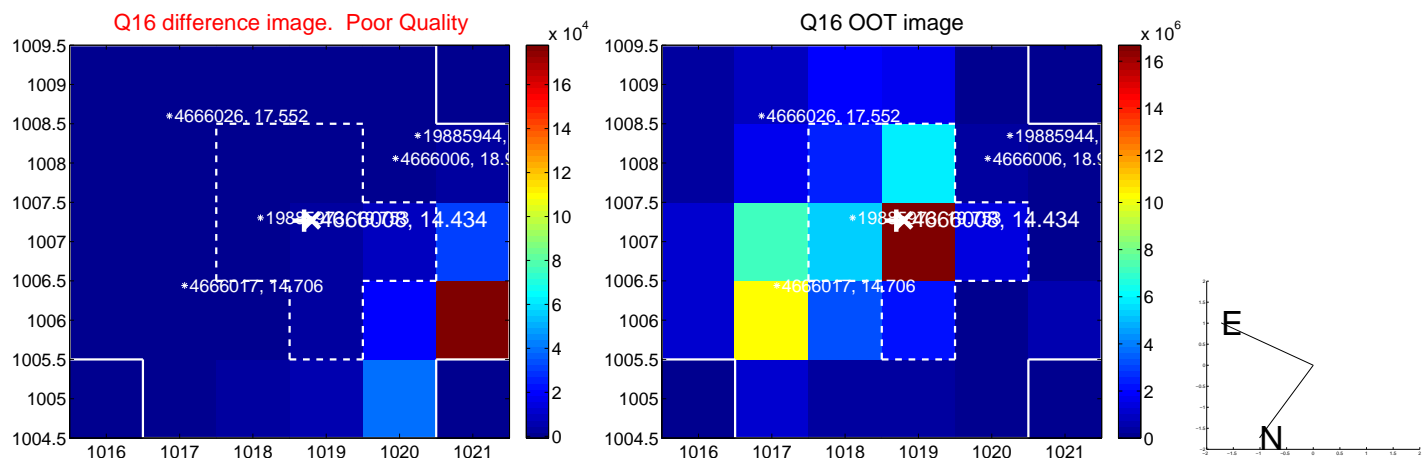
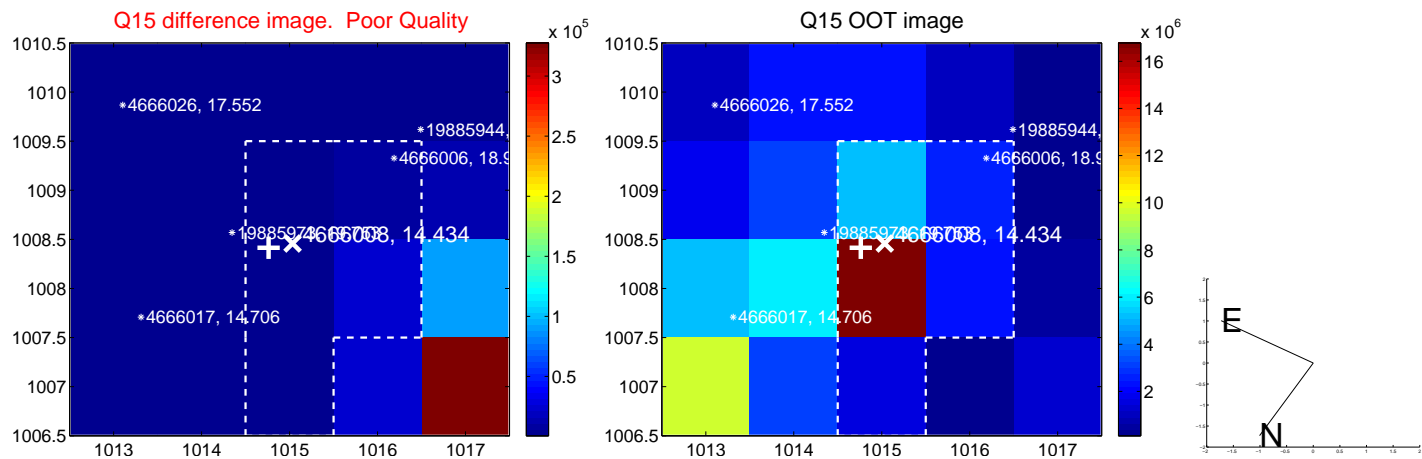
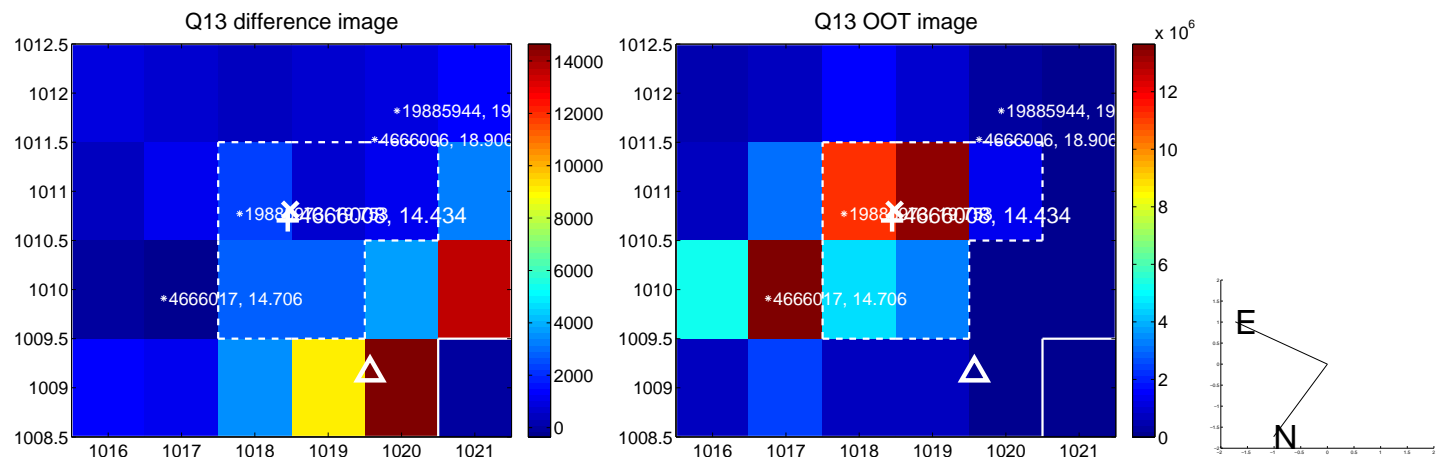




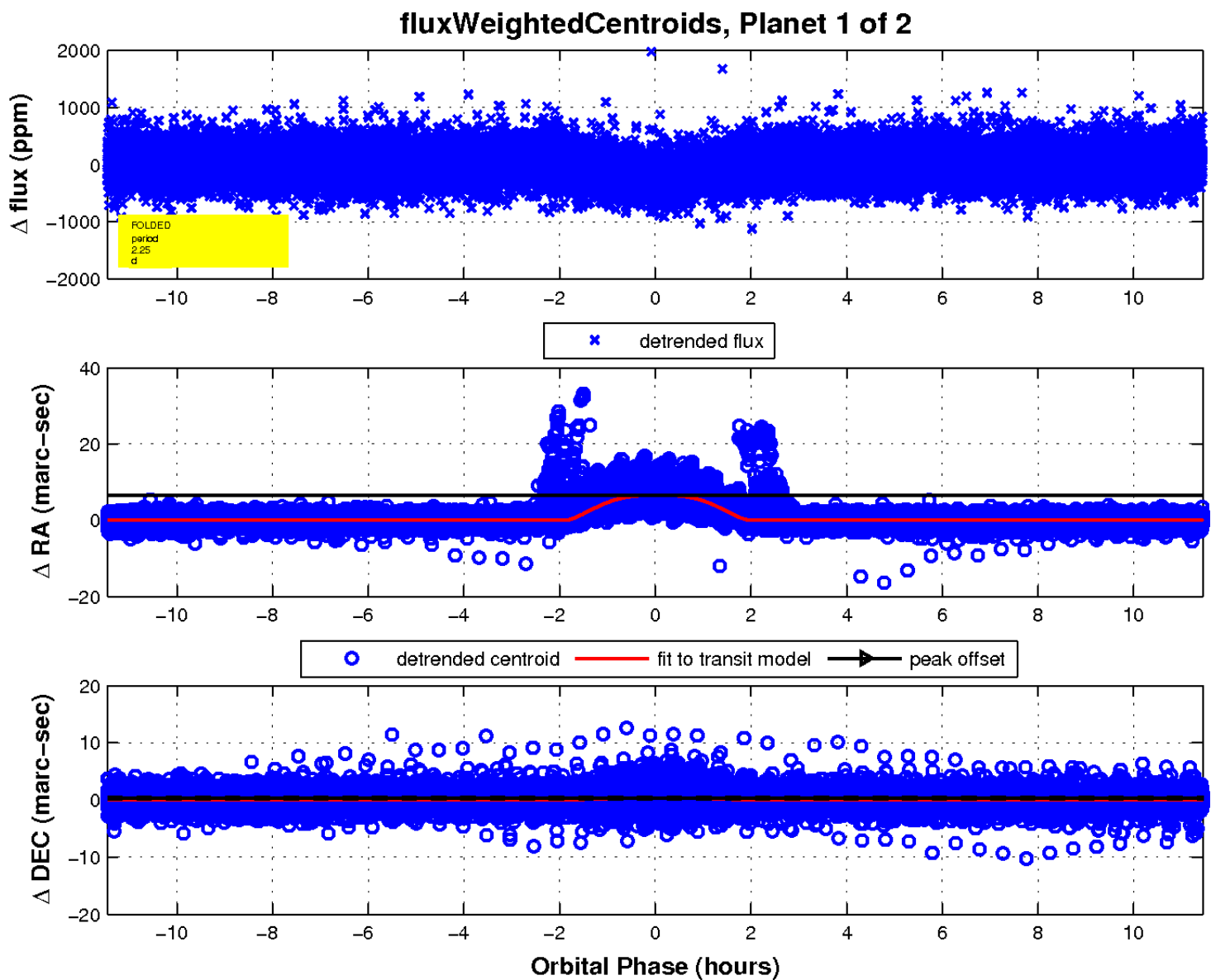
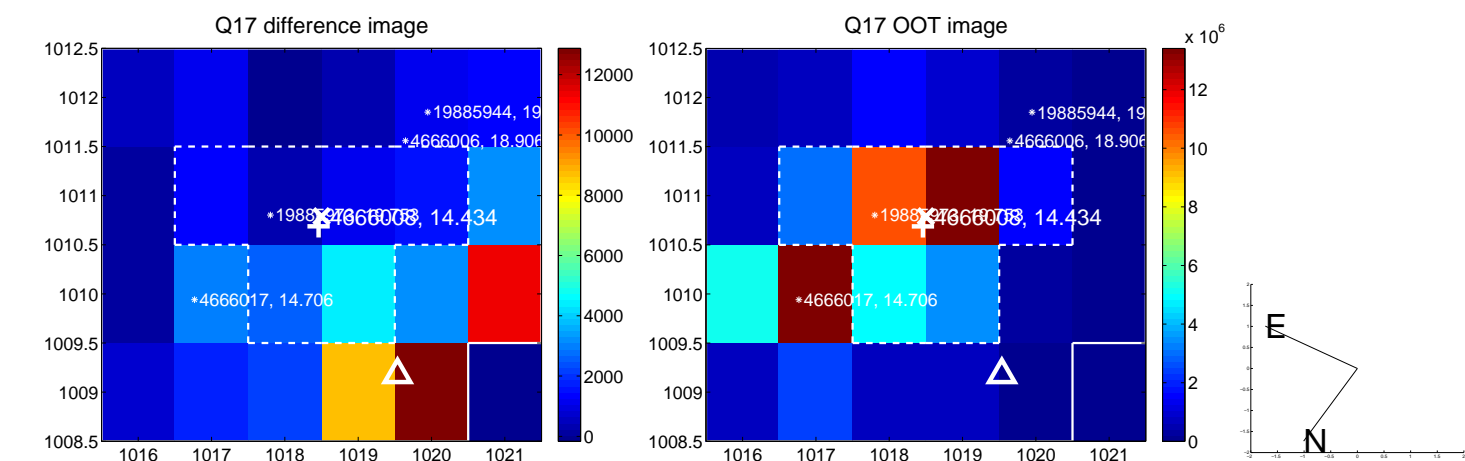
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

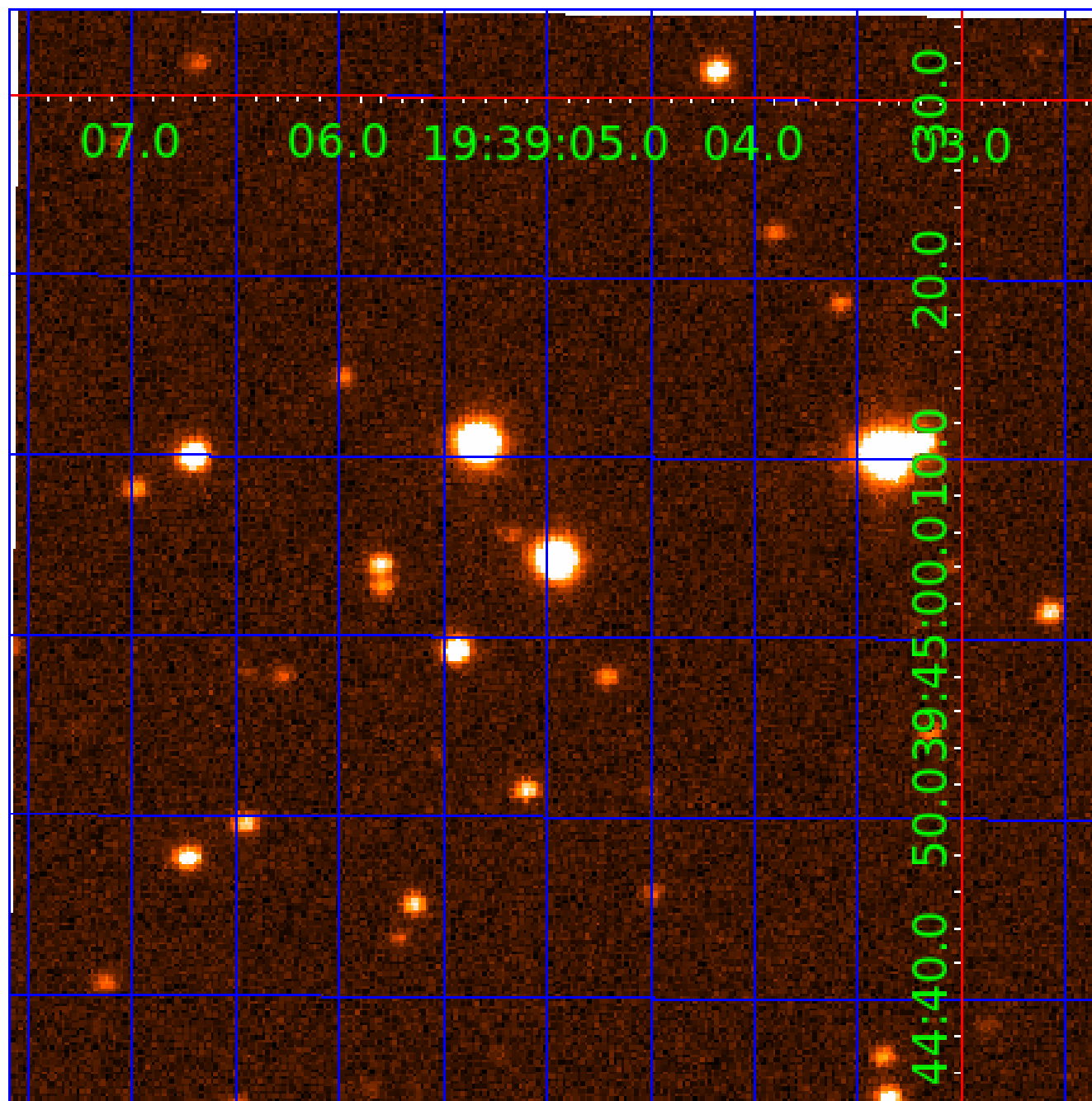


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 004666008

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004666008-01	OBS	3872.01	2.248009	132.774662	282.8	3.817	43.3	39.6	1.11	6325	2.49	1426.08
004666008-02	OBS	No	2.248012	131.650996	124.7	2.807	19.6	19.7	1.11	6325	1.46	1426.07

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004666008-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH
004666008-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_RESOLVED_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 004666008-02

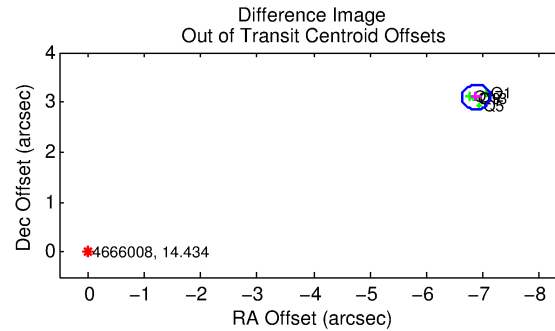
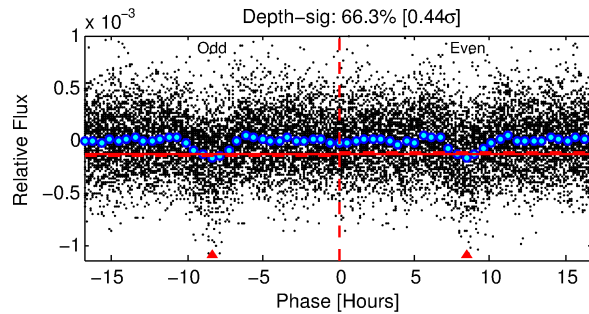
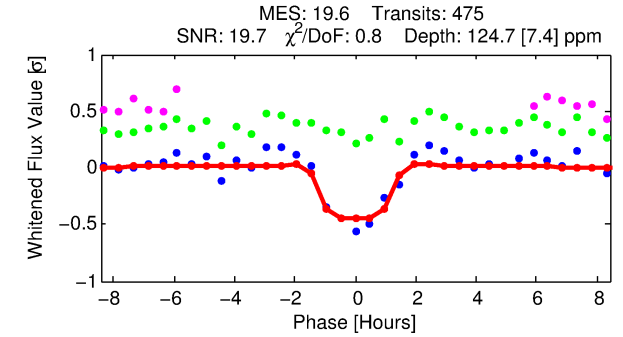
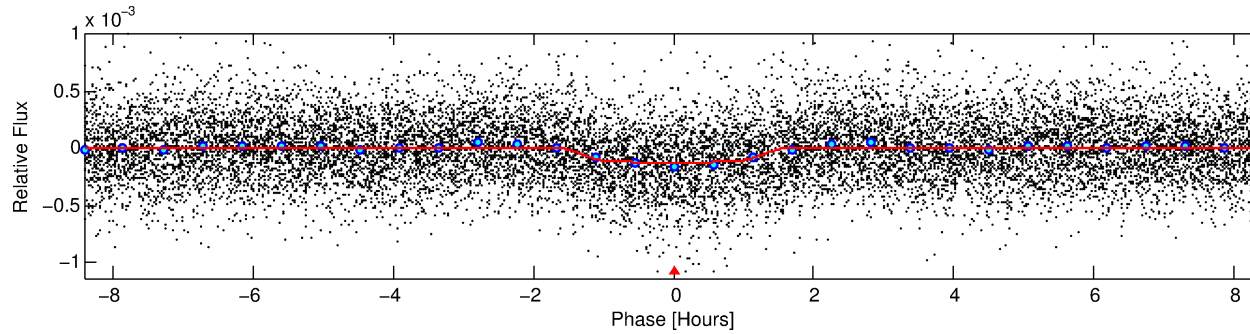
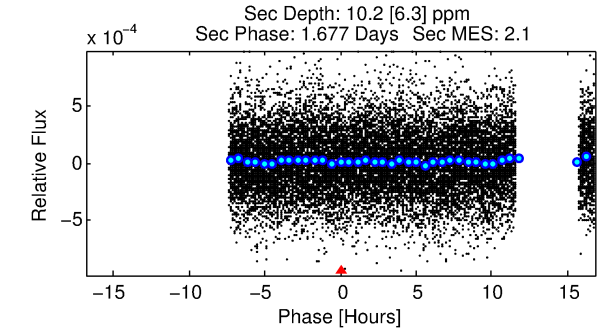
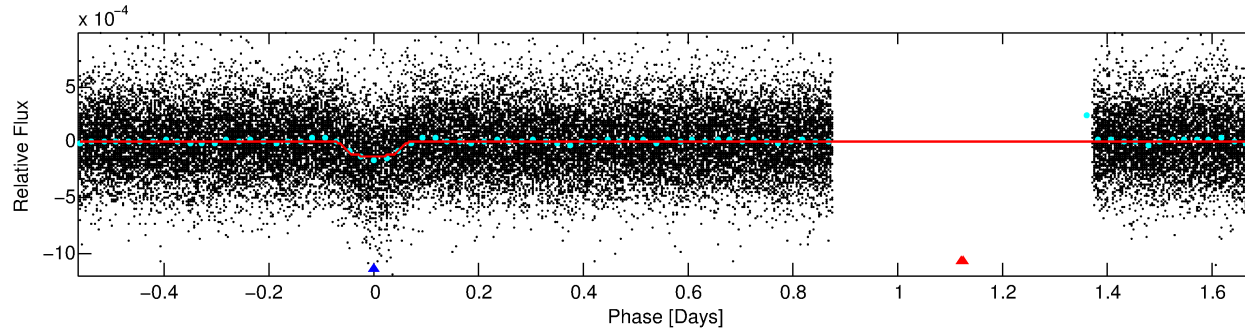
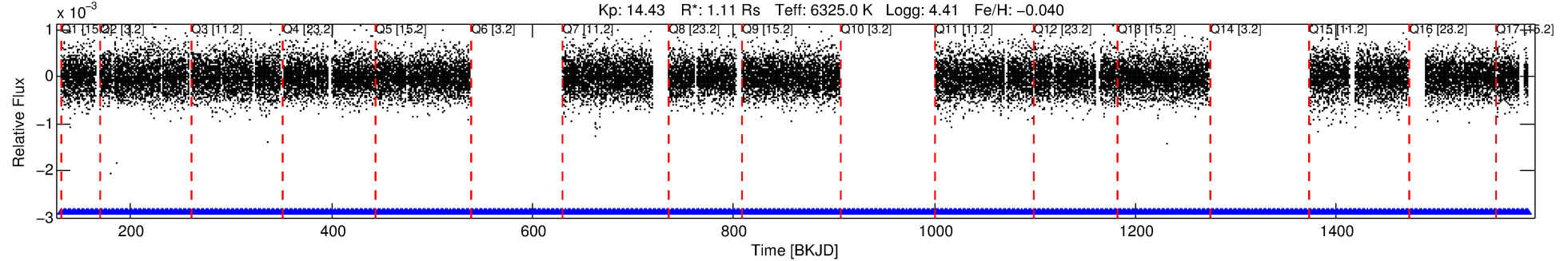
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
004666008-02	4666008	6433.01	4665989	2:1	19.3	4	-3	13.02	14.44	2039.10	Direct-PRF	0	4.37	1.55

**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: 4666008 Candidate: 2 of 2 Period: 2.248 d  
KOI: K03872 Corr: No Ephemeris Match

Kp: 14.43 R\*: 1.11 Rs Teff: 6325.0 K Logg: 4.41 Fe/H: -0.040



## DV Fit Results:

Period = 2.24801 [0.00001] d  
Epoch = 131.6510 [0.0020] BKJD  
Rp/R\* = 0.0120 [0.0035]  
a/R\* = 3.00 [4.21]  
b = 0.90 [0.34]  
Seff = 1426.07 [592.04]  
Teff = 1567 [163] K  
Rp = 1.46 [0.65] Re  
a = 0.0353 [0.0098] AU  
Ag = 3.29 [3.07] [0.75σ]  
Teffp = 3263 [699] K [2.36σ]

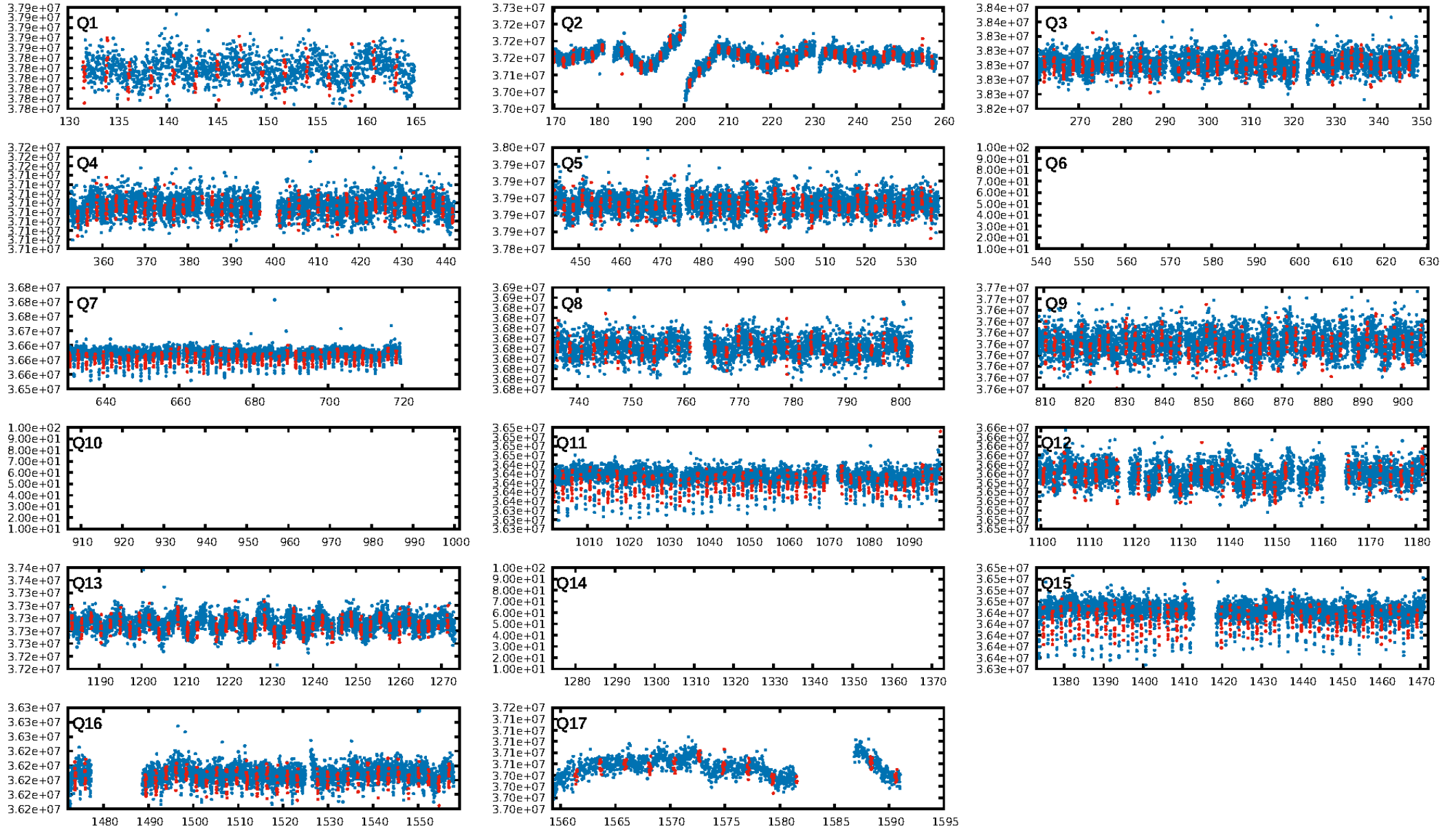
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 5.29e-80  
RollingBand-fgt: 1.00 [448/448]  
GhostDiagnostic-chr: -0.6464  
Centroid-sig: 0.0%  
Centroid-so: 17.413 arcsec [26.89σ]  
OotOffset-rm: 7.541 arcsec [90.85σ]  
KicOffset-rm: 7.775 arcsec [100.29σ]  
OotOffset-st: 0/0/0/5 [5]  
KicOffset-st: 0/0/0/5 [5]  
DiffImageQuality-fgm: 0.80 [4/5]  
DiffImageOverlap-fno: 1.00 [14/14]

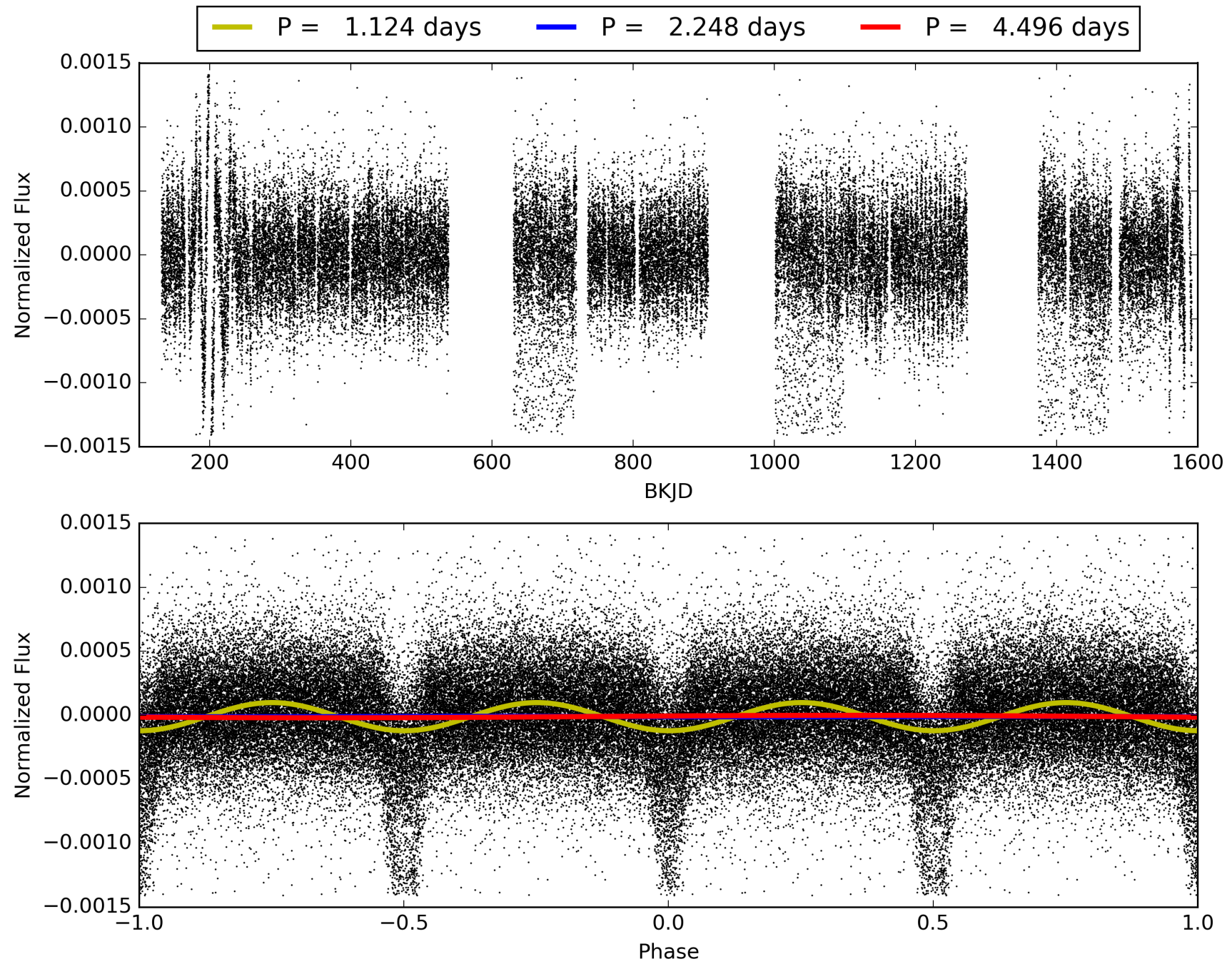
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 11:14:45 Z

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

# TCE 004666008-02, PDC Light Curves



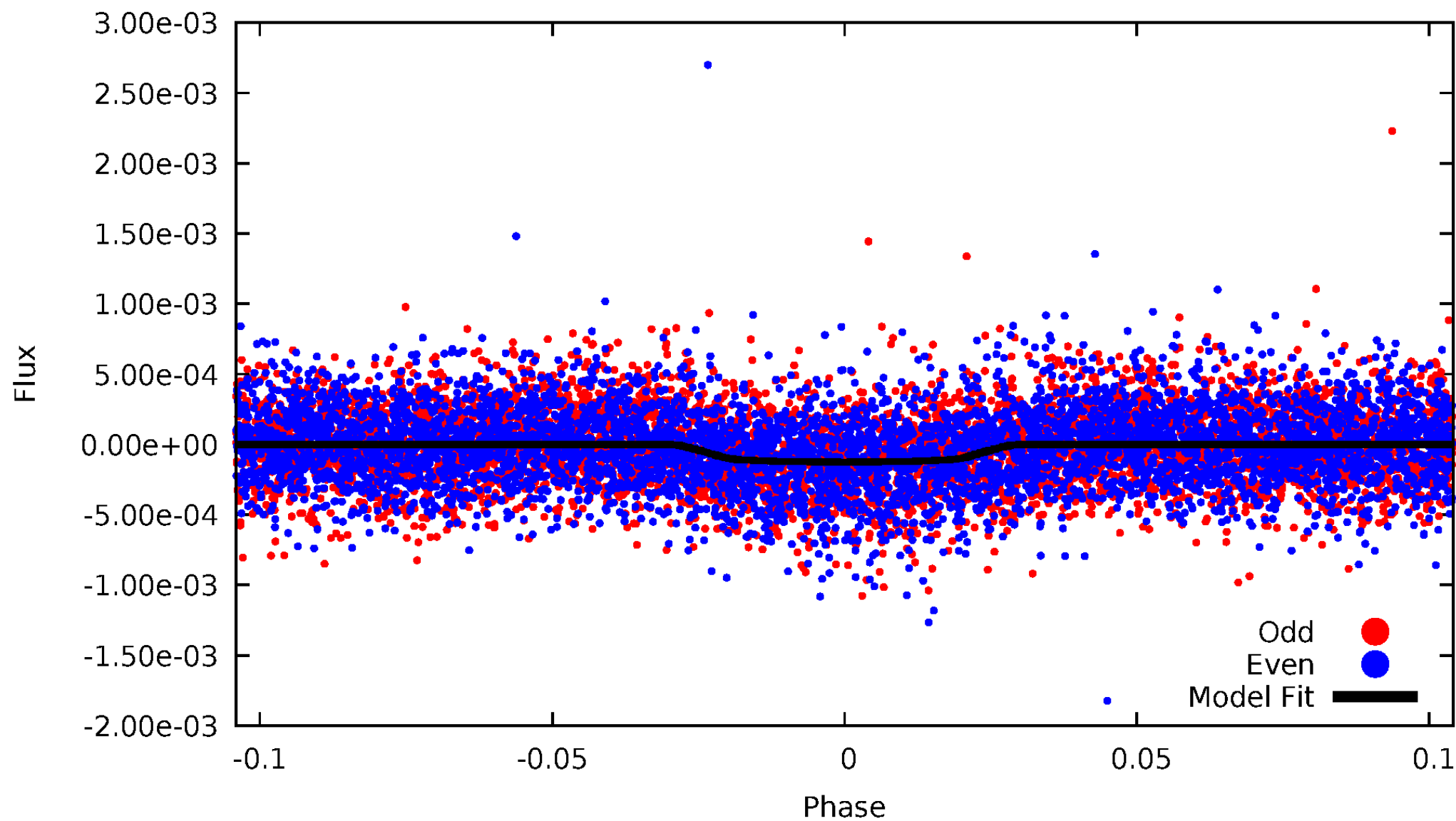
TCE 004666008-02





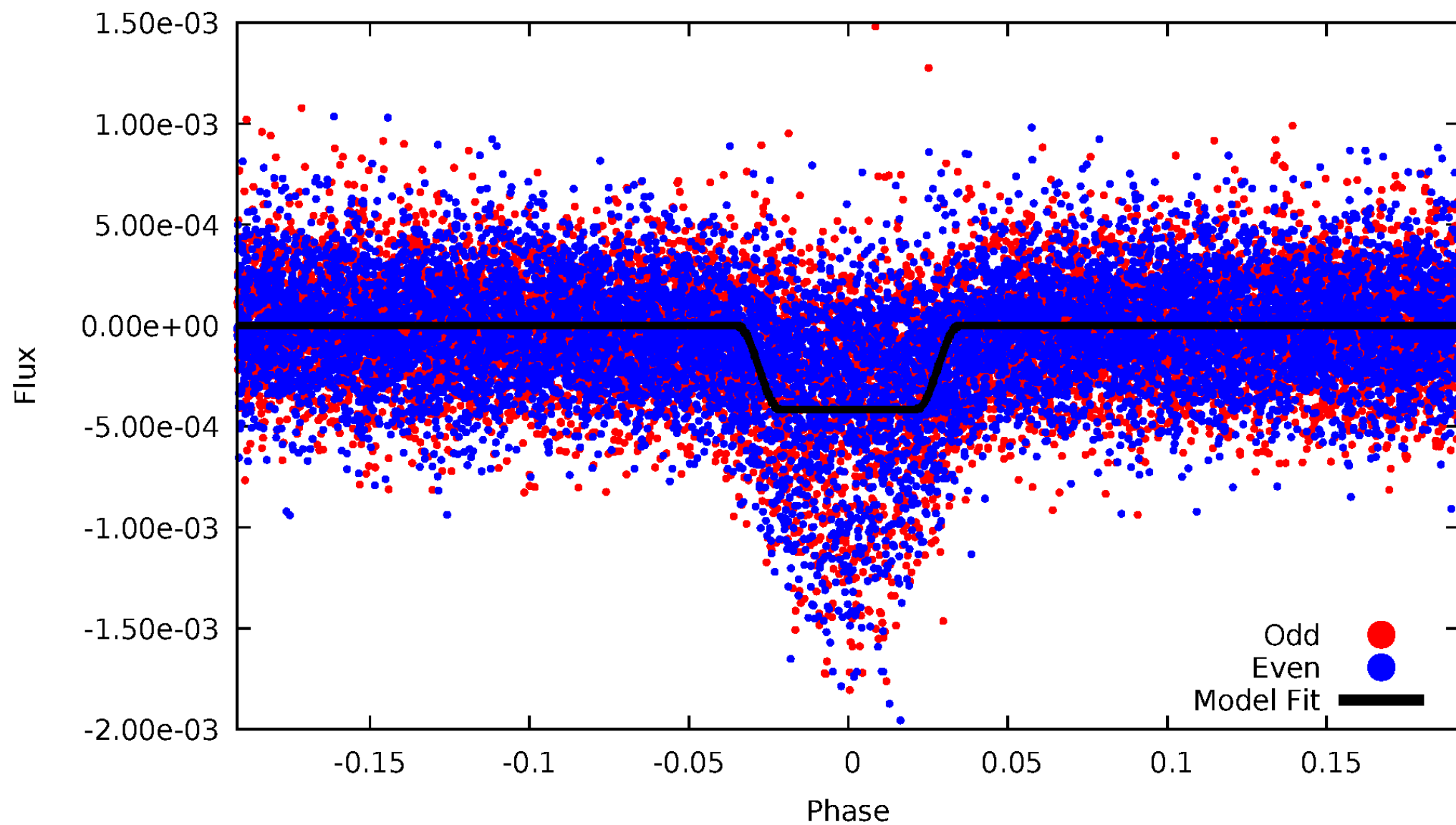
# DV Odd/Even

TCE 004666008-02



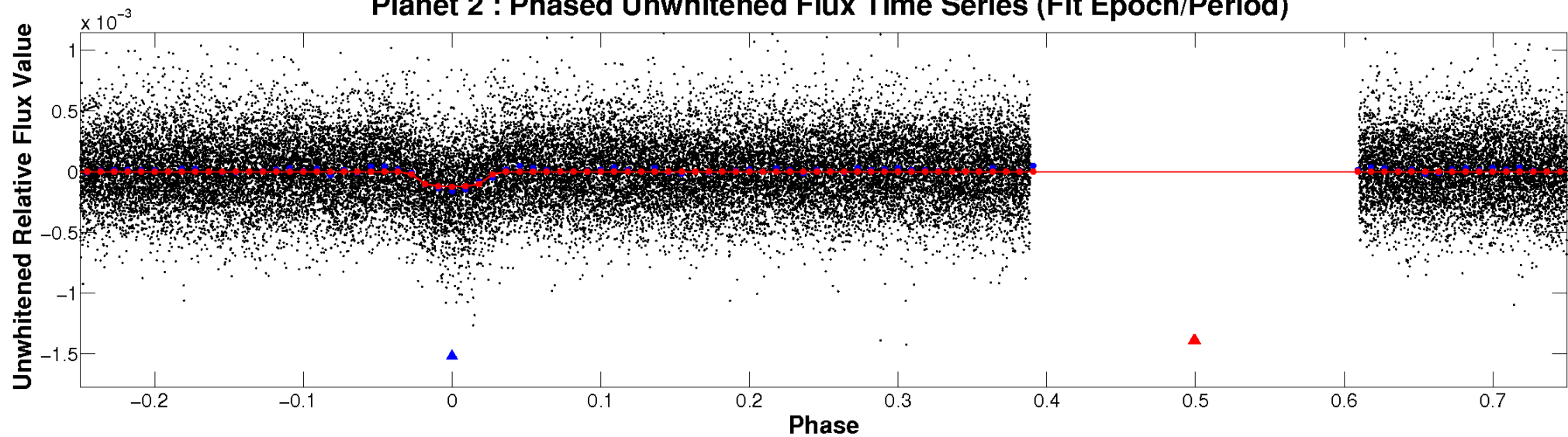
# ALT Odd/Even

TCE 004666008-02

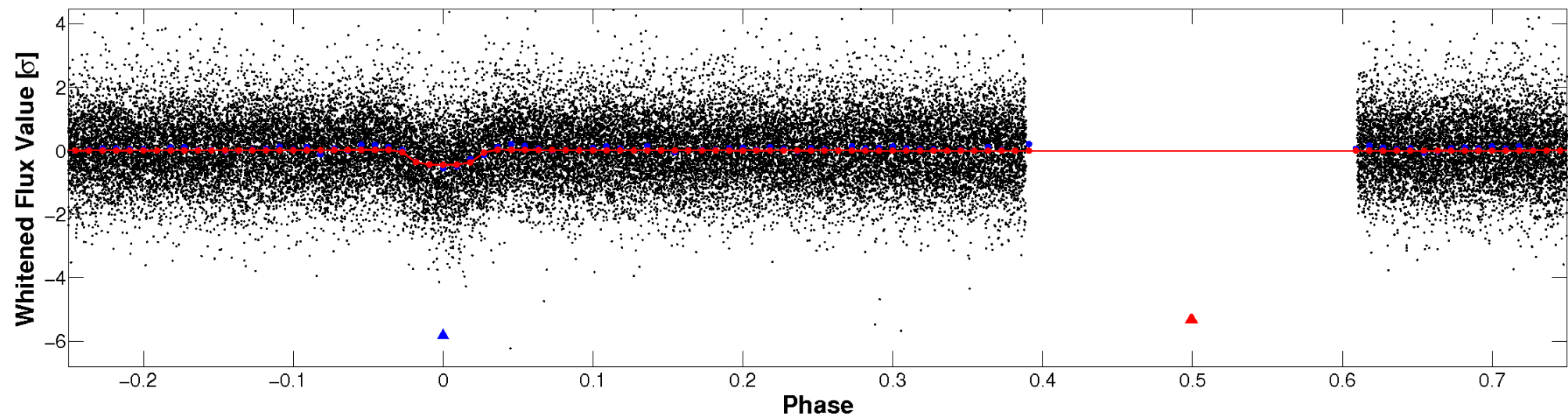


# Non-Whitened Vs. Whitened Light Curve

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

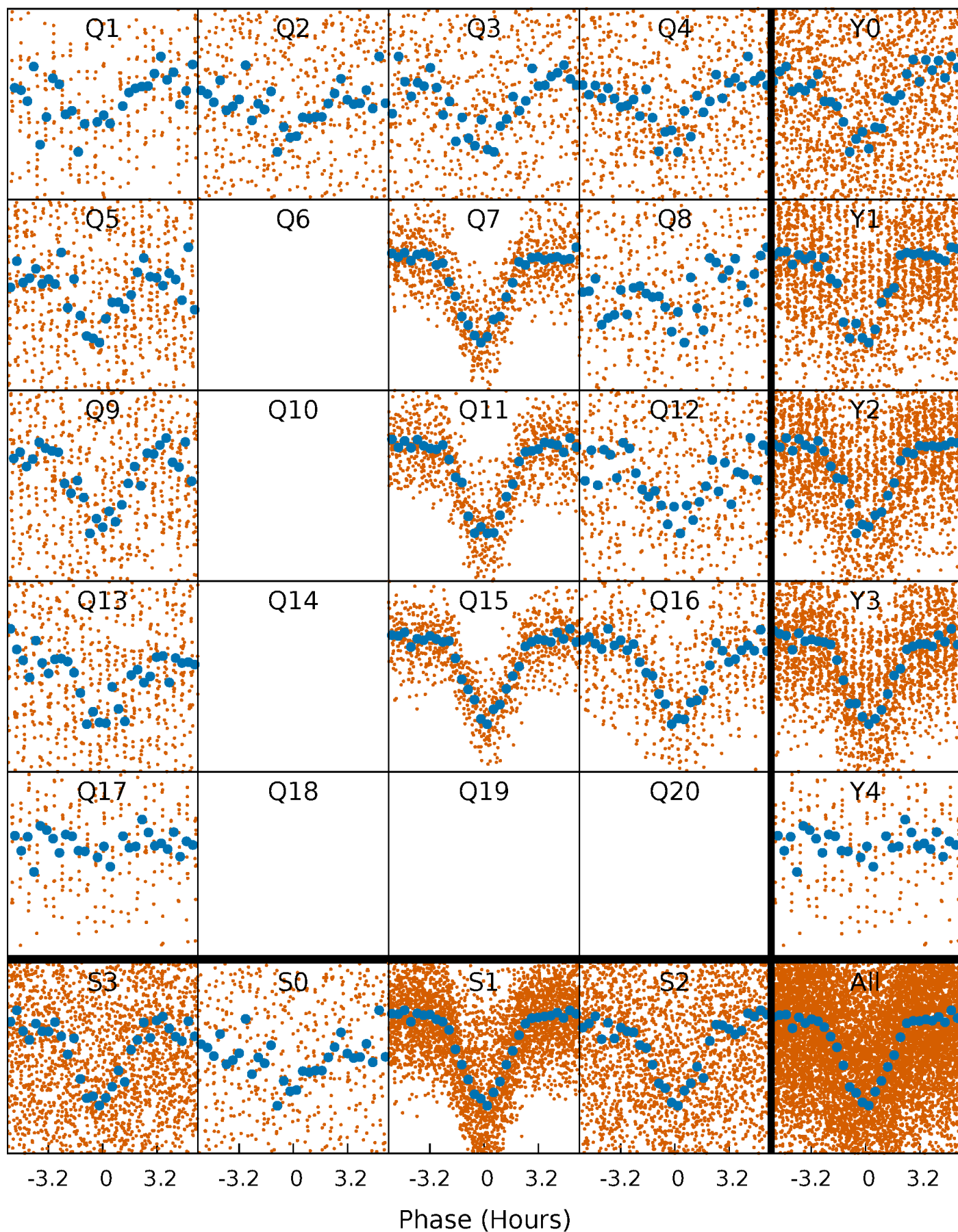


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

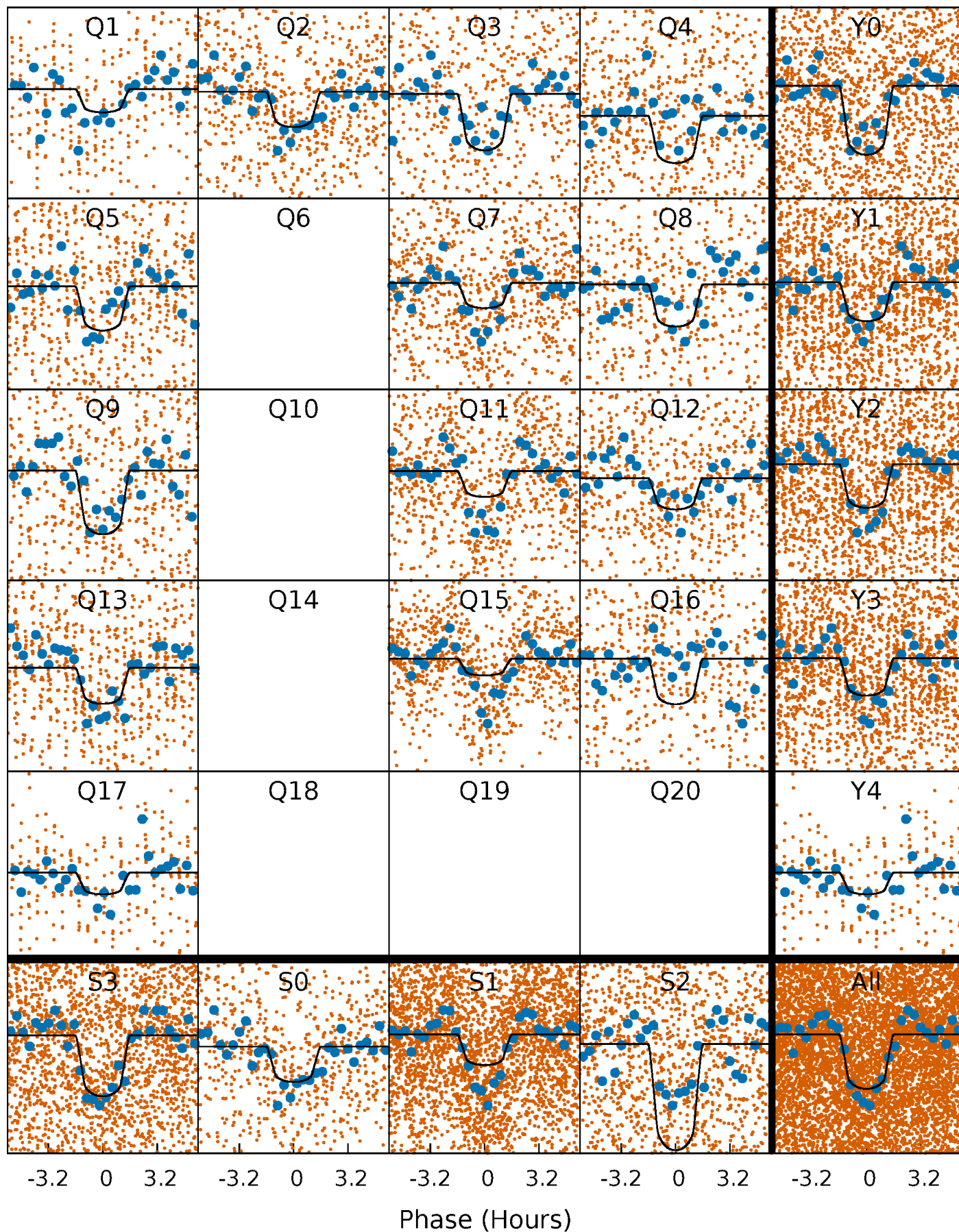
TCE 004666008-02 P= 2.248012 Days  $T_0=131.650996$  (BKJD)





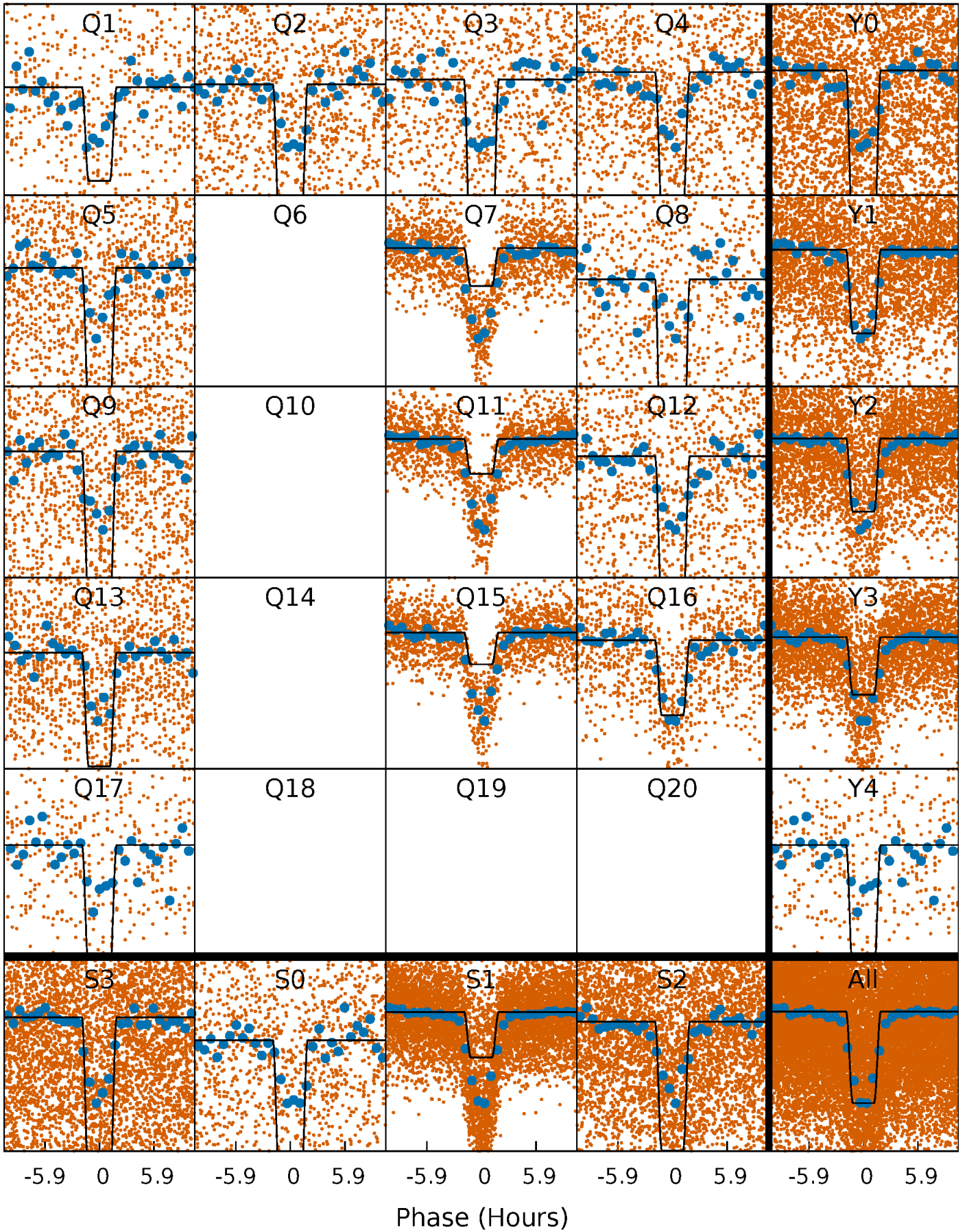
# DV Quarter-Phased Transit Curves

TCE 004666008-02   P= 2.248012 Days    $T_0=131.650996$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 004666008-02   P= 2.248043 Days    $T_0=131.639342$  (BKJD)

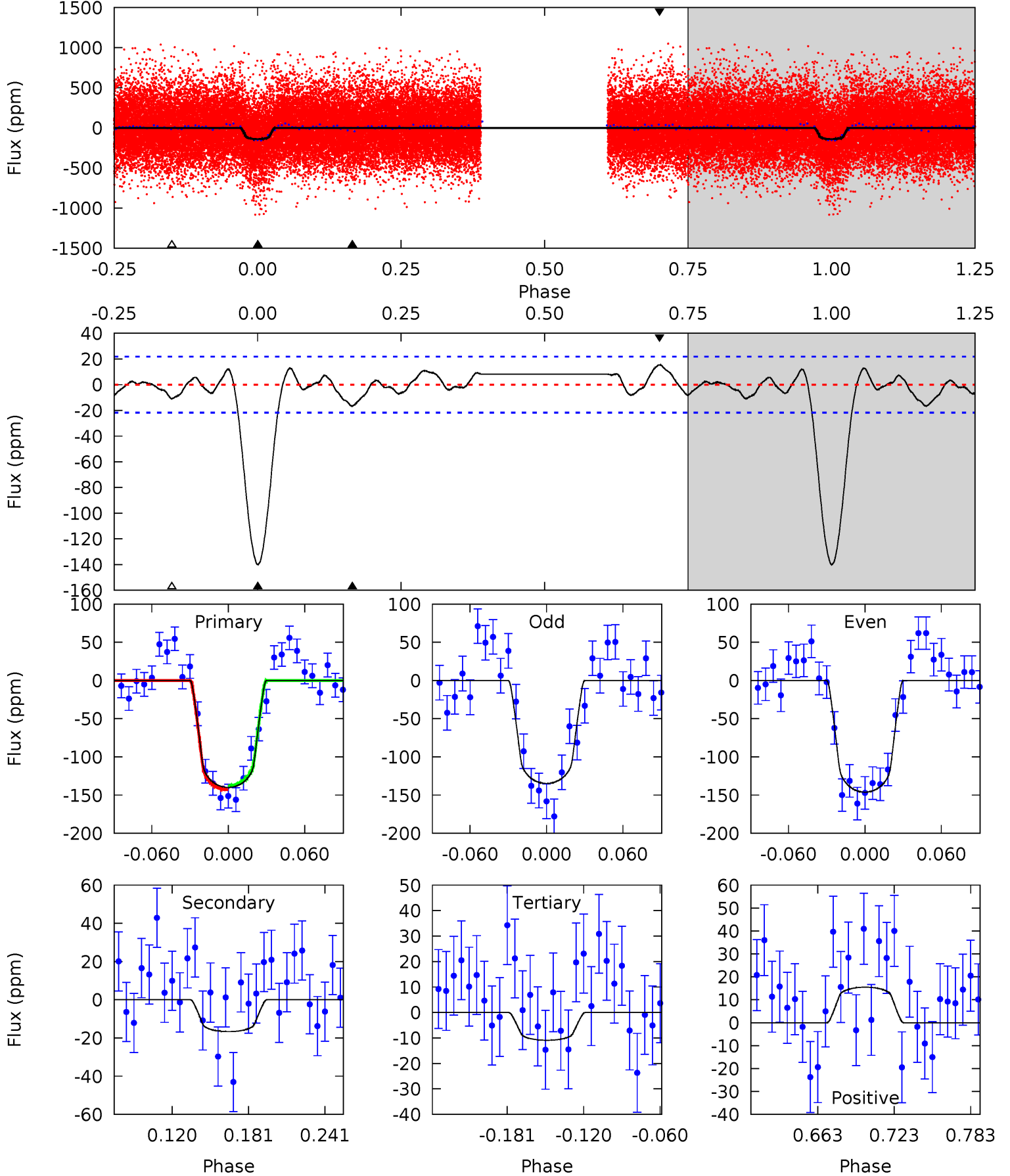




# DV Model-Shift Uniqueness Test

004666008-02, P = 2.248012 Days, E = 129.402984 Days

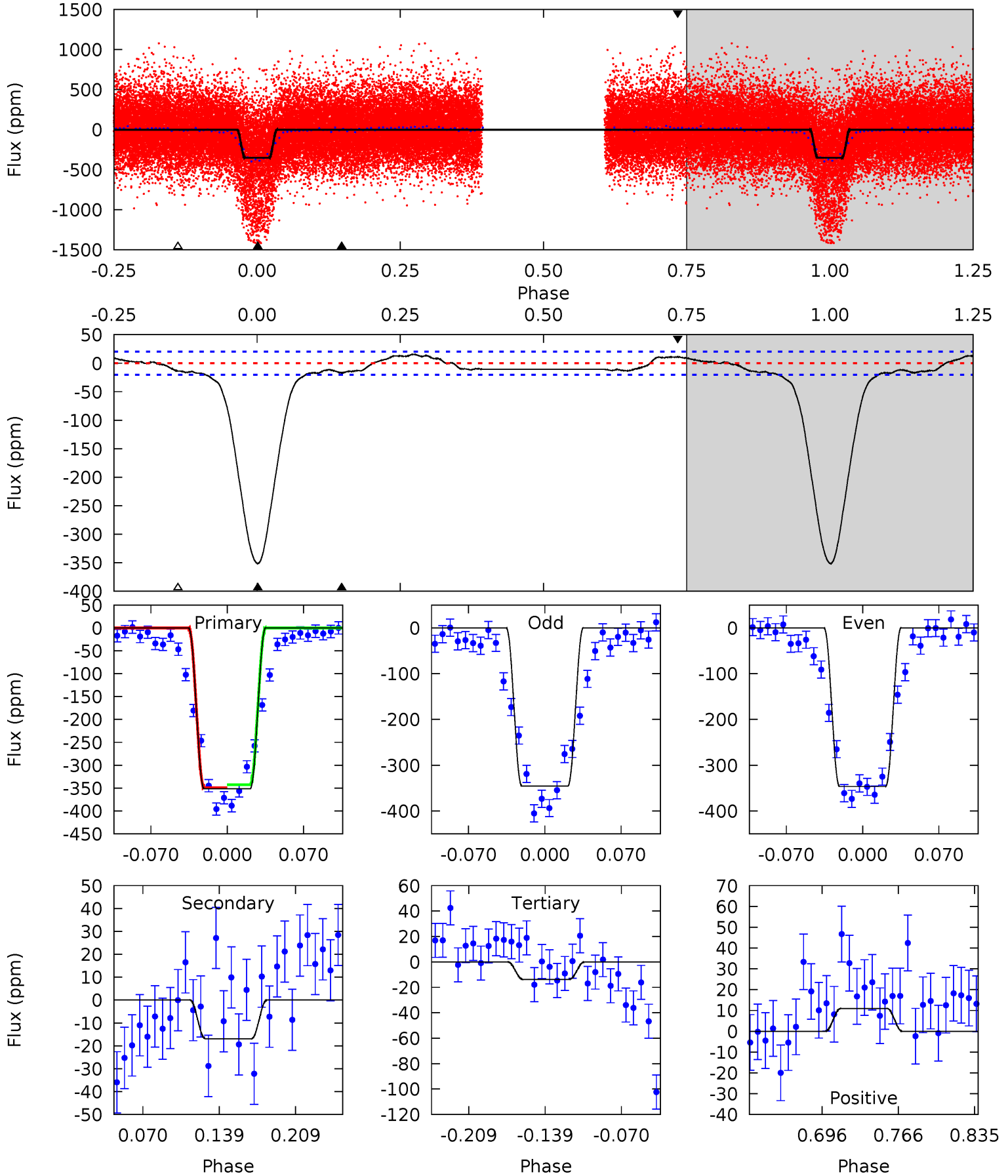
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
30.0	3.58	2.34	3.32	4.67	1.88	1.28	27.7	26.7	1.24	0.26	1.21	1.14	0.10	0.56



# Alt Model-Shift Uniqueness Test

004666008-02, P = 2.248043 Days, E = 129.391299 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
80.1	3.85	3.13	2.50	4.64	1.81	2.66	77.0	77.7	0.72	1.35	0.13	1.55	0.04	0.78



### Stellar Parameters For KIC 004666008

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6325^{+149}_{-205}$	$4.409^{+0.056}_{-0.210}$	$-0.040^{+0.250}_{-0.300}$	$1.112^{+0.379}_{-0.126}$	$1.157^{+0.156}_{-0.156}$	$1.184^{+0.346}_{-0.632}$
	+2%/-3%	+1%/-5%	+625%/-750%	+34%/-11%	+13%/-13%	+29%/-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 004666008-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-17 \pm 5$	$1.53^{+0.51}_{-0.44}$	$2231^{+170}_{-111}$	$3928^{+626}_{-413}$	$4.609^{+5.499}_{-2.109}$
Alt.	$-17 \pm 4$	$2.57^{+0.59}_{-0.53}$	$2231^{+161}_{-106}$	$3254^{+284}_{-268}$	$1.650^{+1.100}_{-0.653}$

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

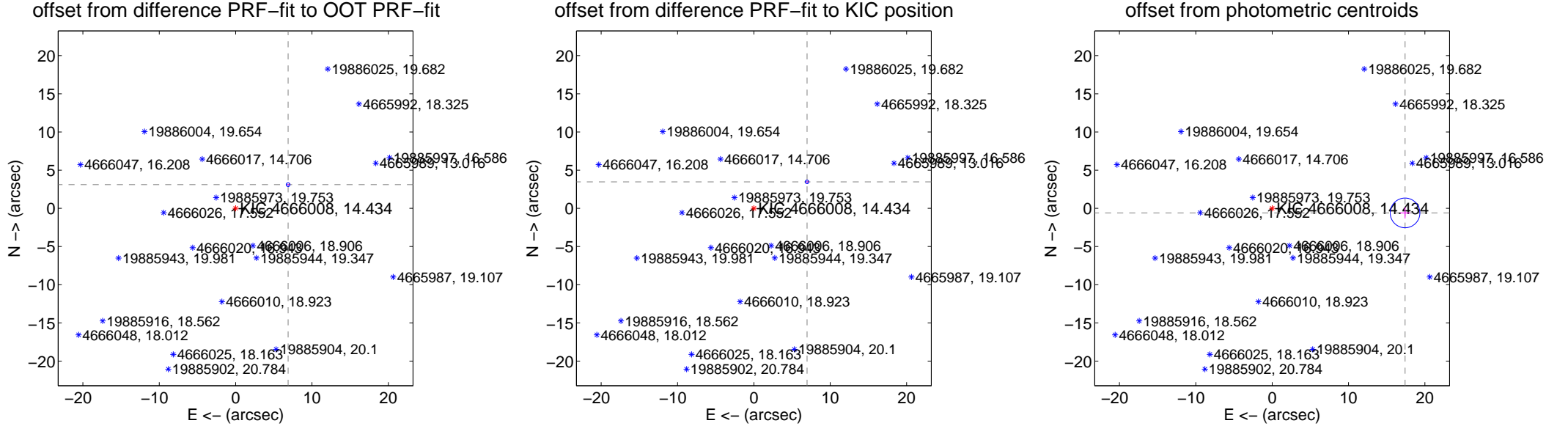
## DV Centroid Data

Supplemental centroid analysis for 004666008-02. Kepler magnitude: 14.43. Transit SNR 19.68

There are 4 quarters with good PRF difference image offsets

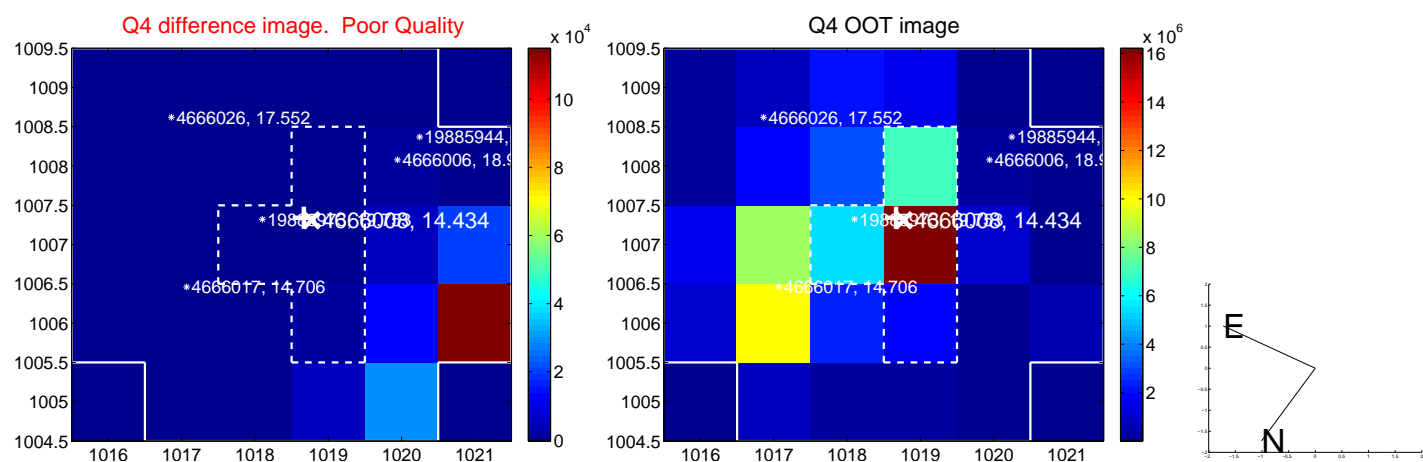
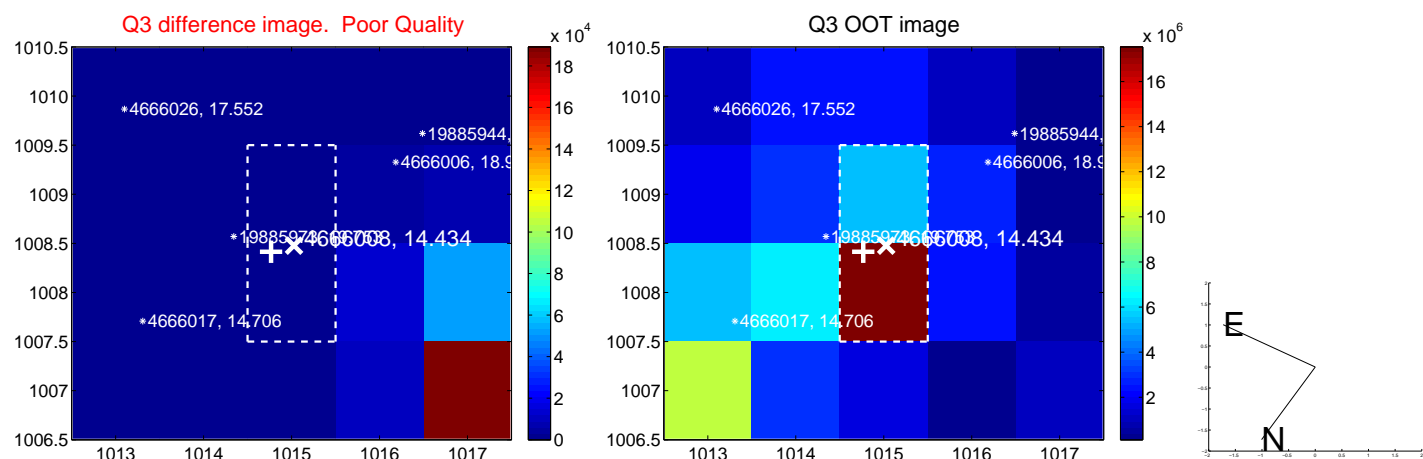
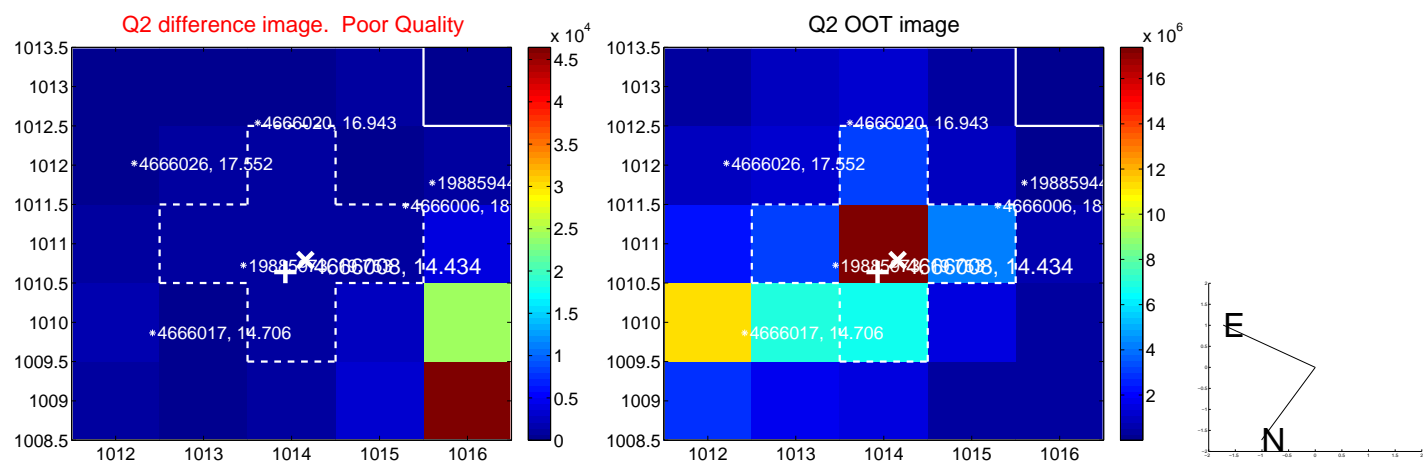
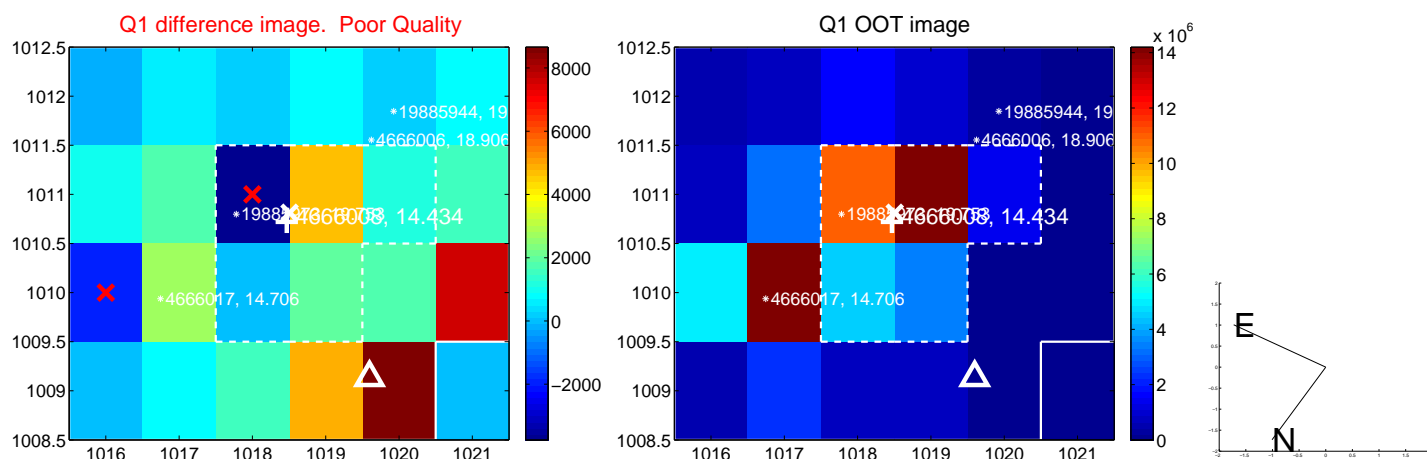
The direct PRF centroid is offset from the target star catalog position by about 0.44 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	7.541 $\pm$ 0.083	90.85	-6.872 $\pm$ 0.084	3.103 $\pm$ 0.076
PRF-fit source offset from KIC position	7.775 $\pm$ 0.078	100.29	-6.958 $\pm$ 0.076	3.469 $\pm$ 0.084
photometric centroid source offset	17.41 $\pm$ 0.65	26.89	-17.40 $\pm$ 0.65	-0.60 $\pm$ 0.73

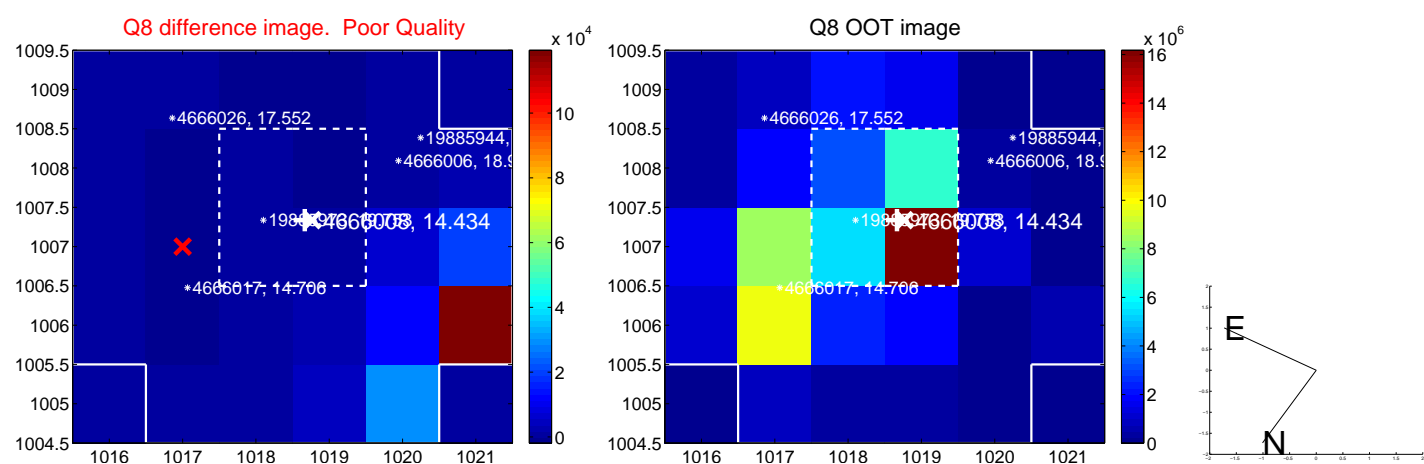
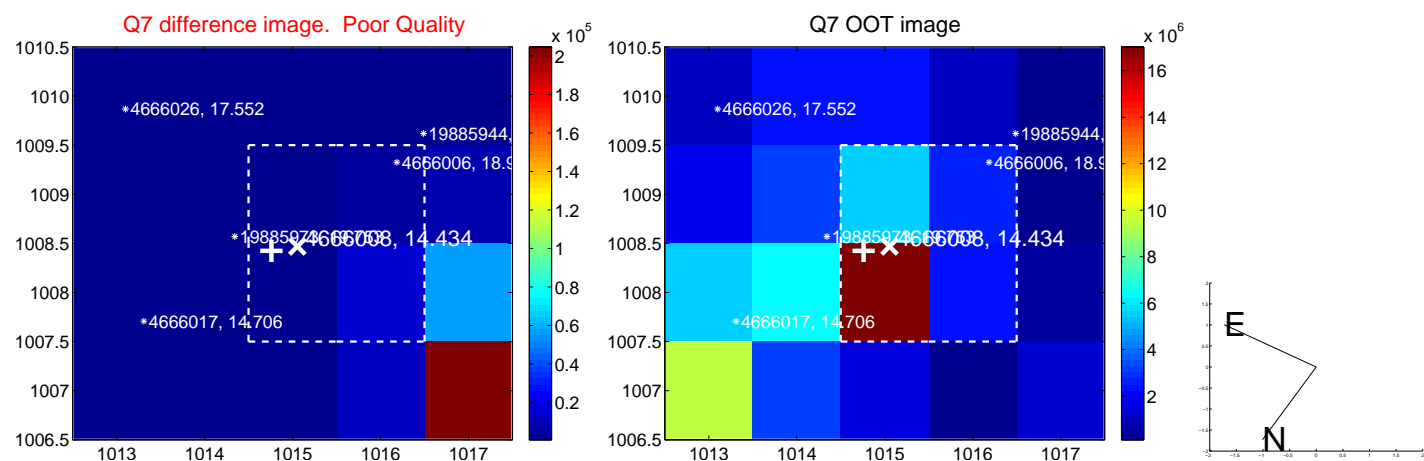
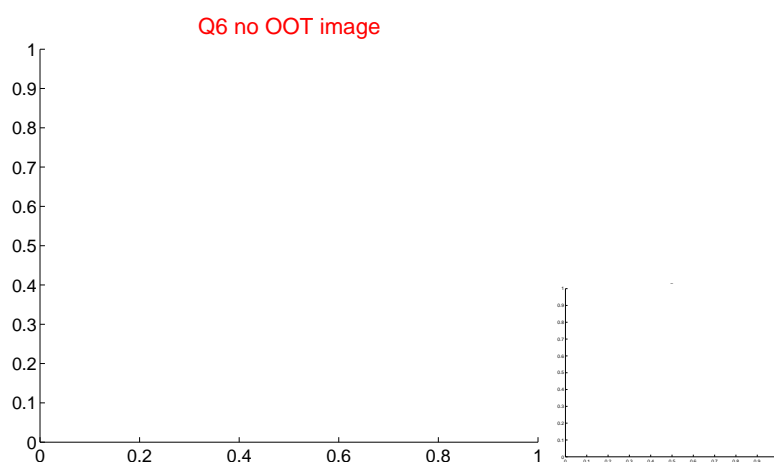
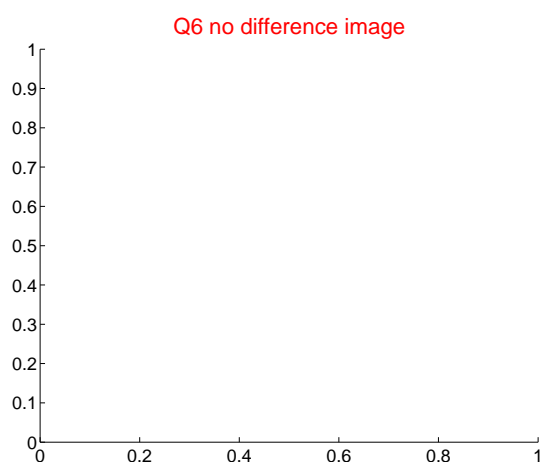
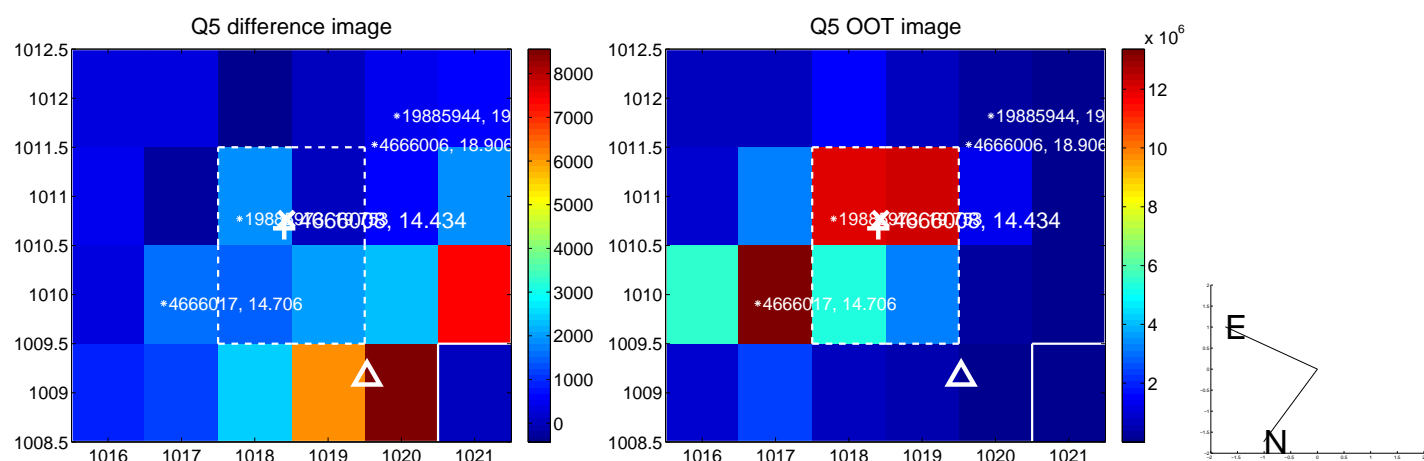


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

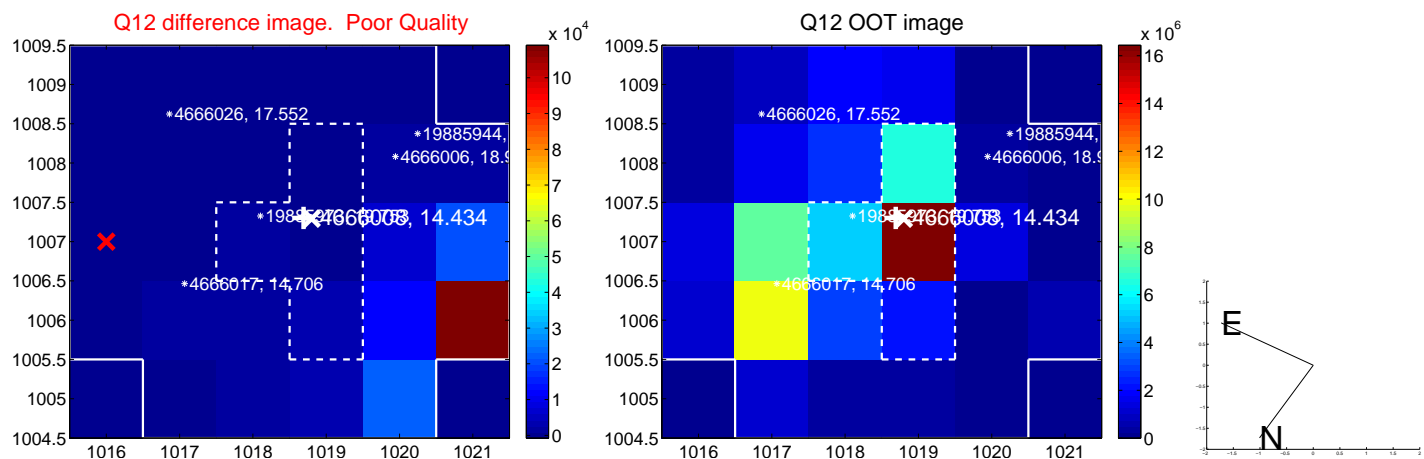
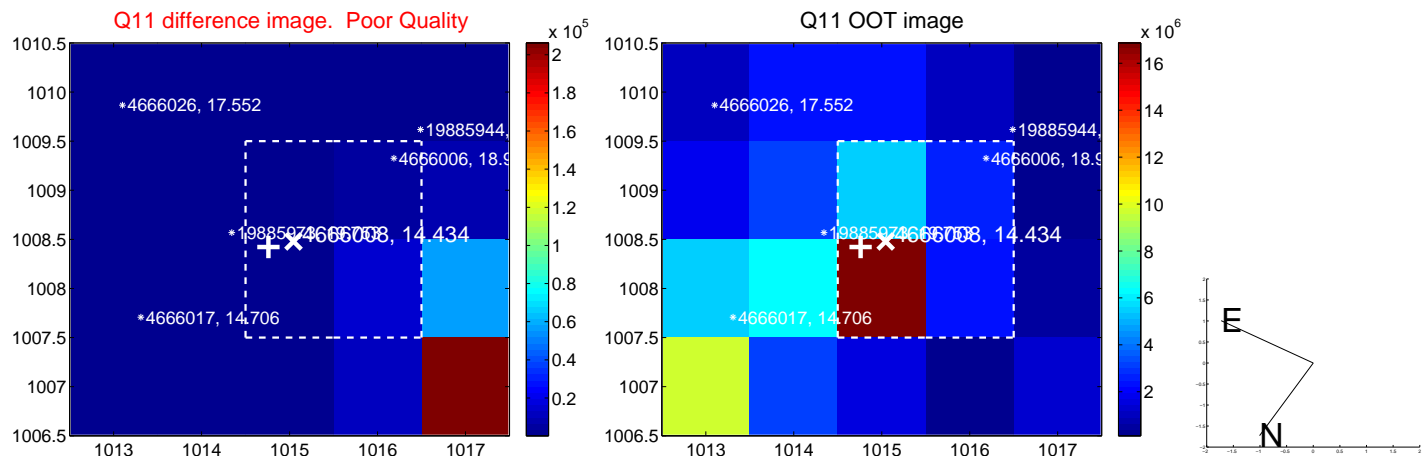
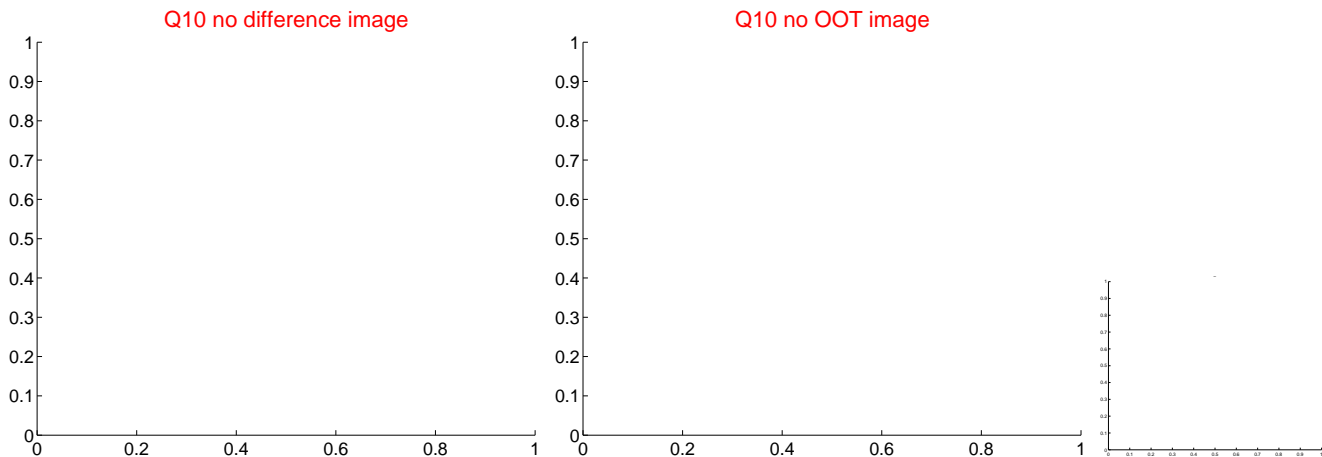
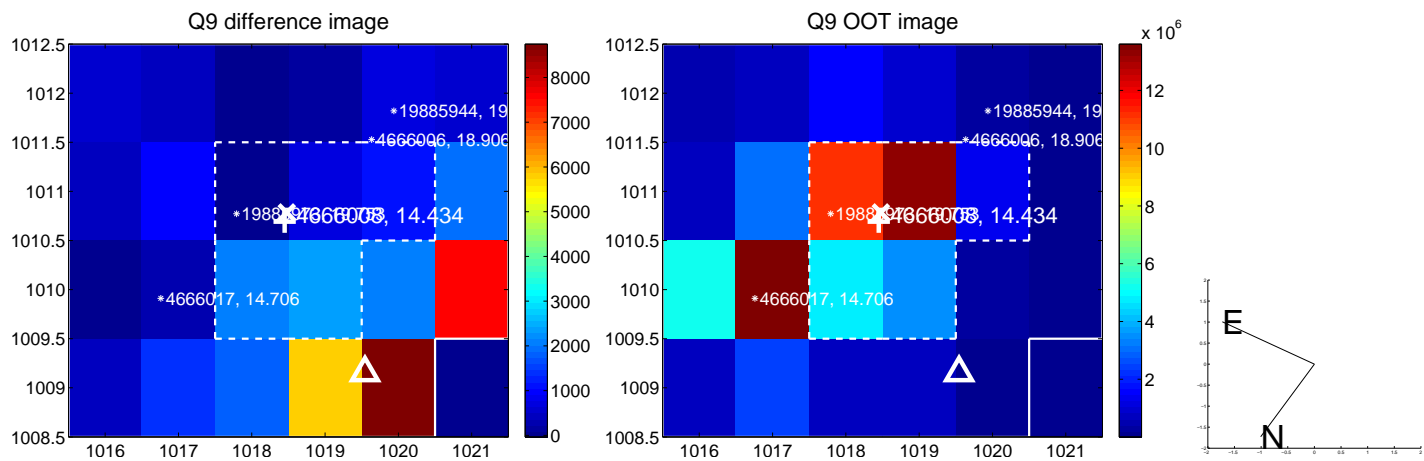


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

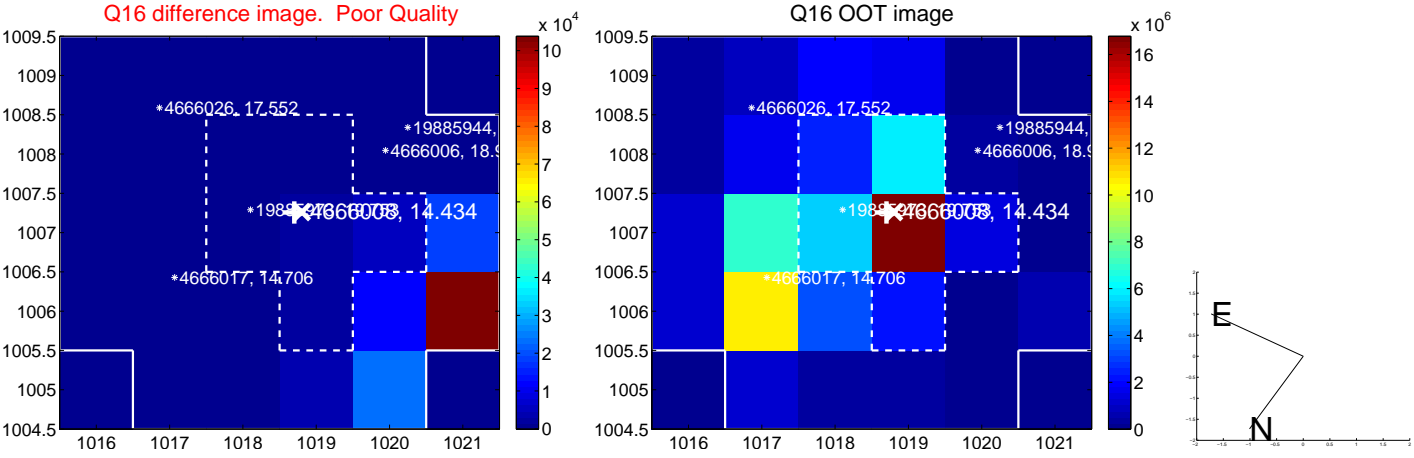
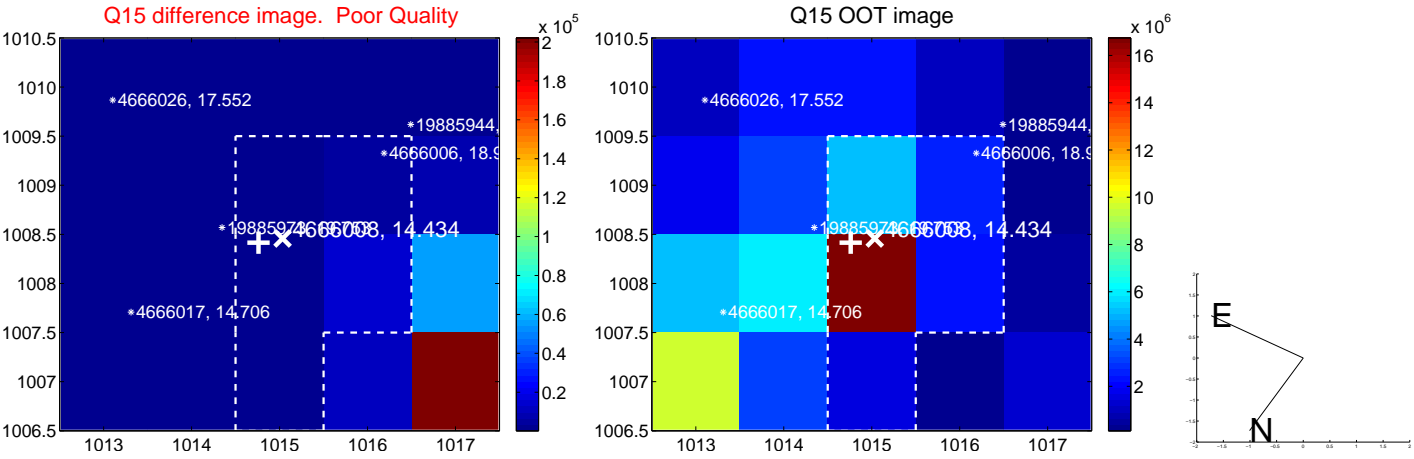
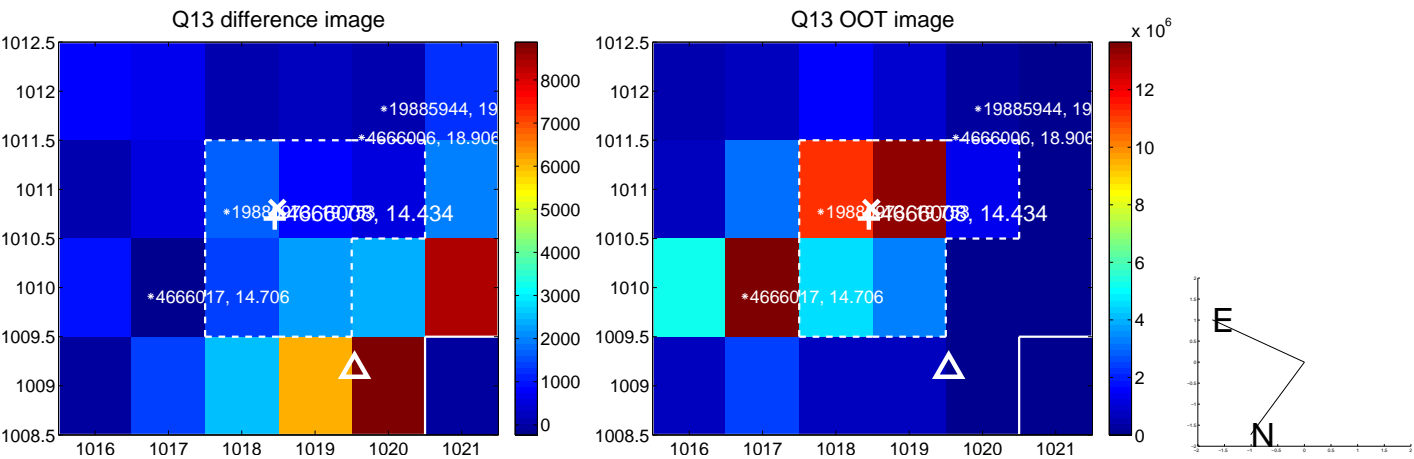




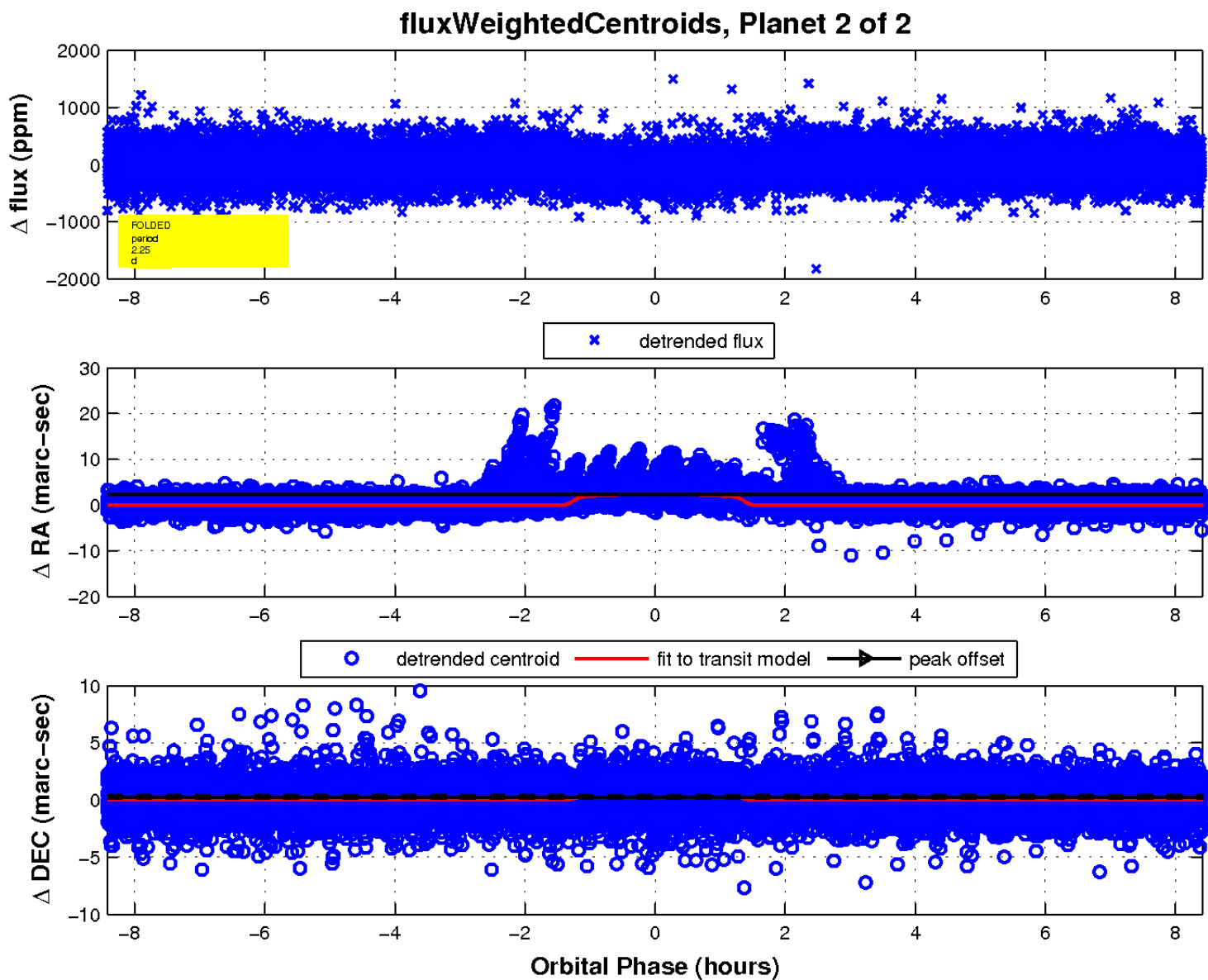
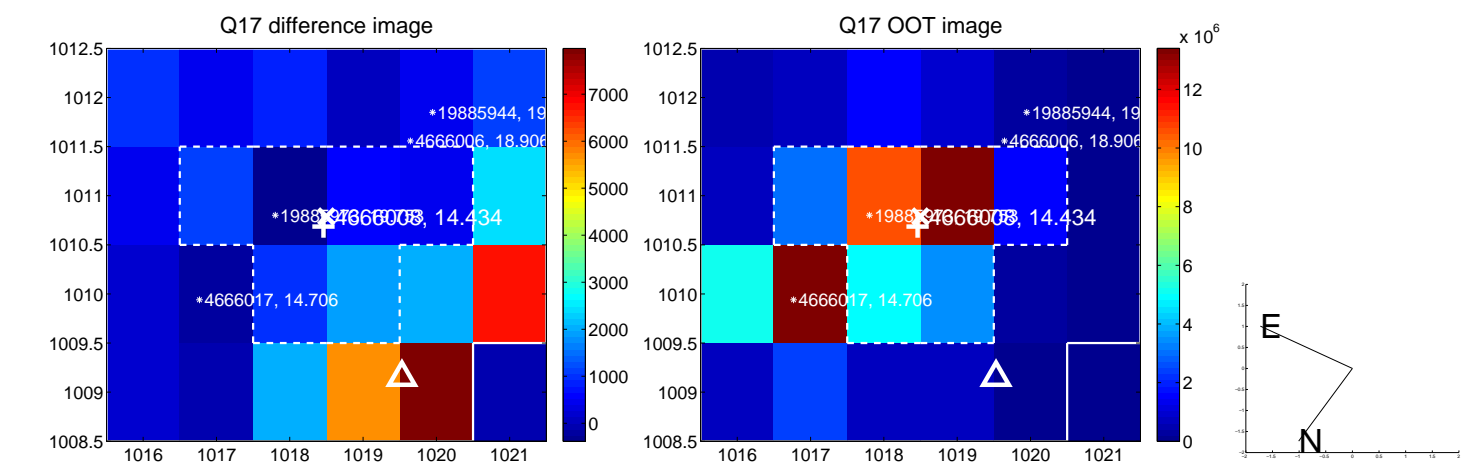
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

