

# KIC 004544623

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004544623-01	OBS	6423.01	2.189095	132.083385	1223.5	3.923	28.2	32.2	0.41	3624	2.78	41.46
004544623-02	OBS	No	2.189111	133.504744	3949.4	1.500	21.1	-1.0	0.41	3624	2.54	41.46

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004544623-01	OBS	FP	0.00	0	1	1	1	<del>MOD_SEC_ALT</del> <del>DEEP_V_SHAPED</del> <del>HAS_SEC_TCE</del> <del>CENT_FEW_DIFFS</del> <del>HALO_GHOST</del> <del>EPHEM_MATCH</del>
004544623-02	OBS	FP	0.00	1	1	1	1	<del>IS_SEC_TCE</del> <del>CENT_NOFITS</del> <del>HALO_GHOST</del> <del>EPHEM_MATCH</del>

**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.

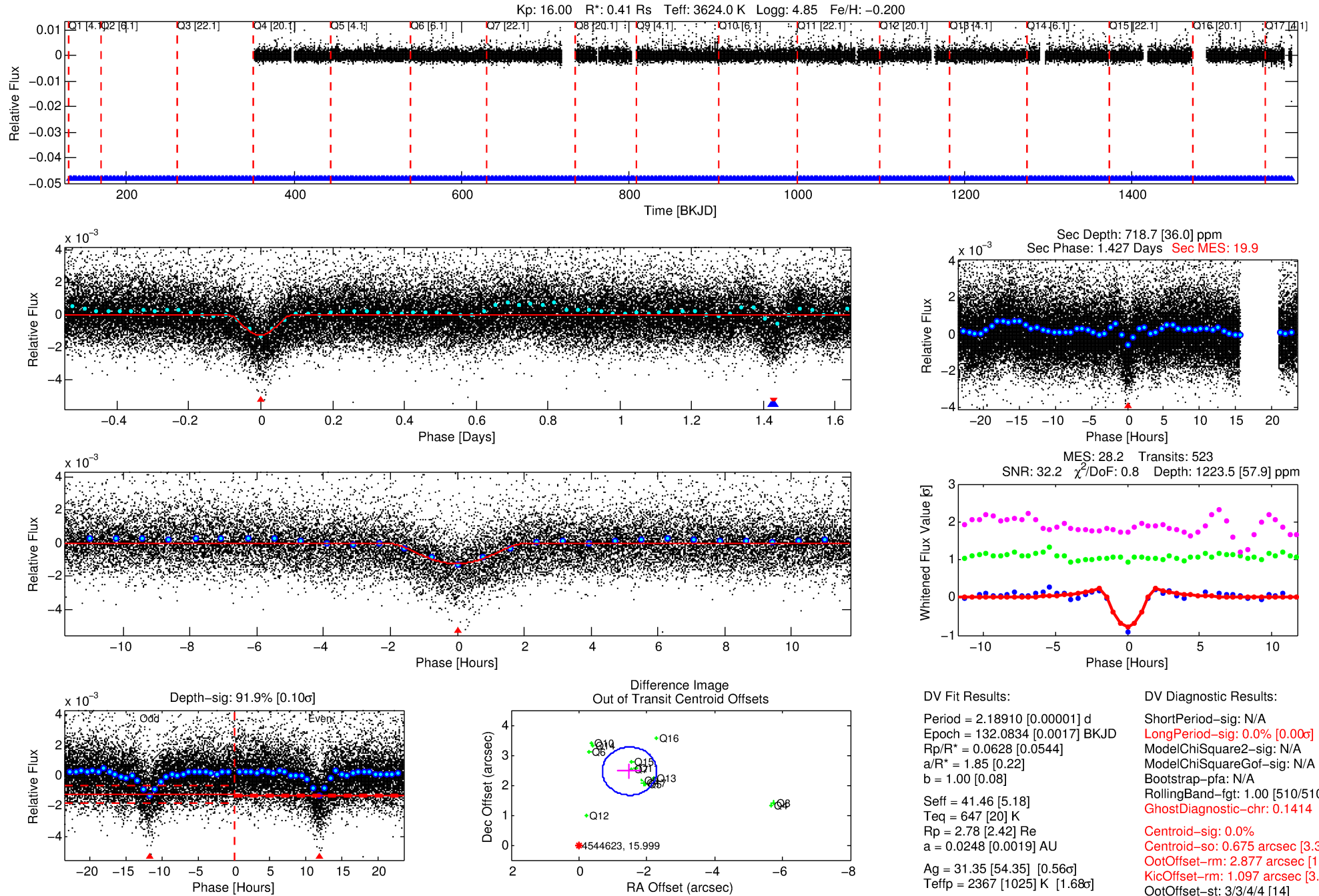
## Ephemeris Match Information For 004544623-01

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	$\sigma_P$	$\sigma_T$
004544623-01	4544623	004544587-pri	4544587	1:1	43.7	-11	0	10.80	16.00	366.23	Direct-PRF	0	0.06	0.12

**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: 4544623 Candidate: 1 of 2 Period: 2.189 d  
KOI: K06423.01 Corr: 0.845



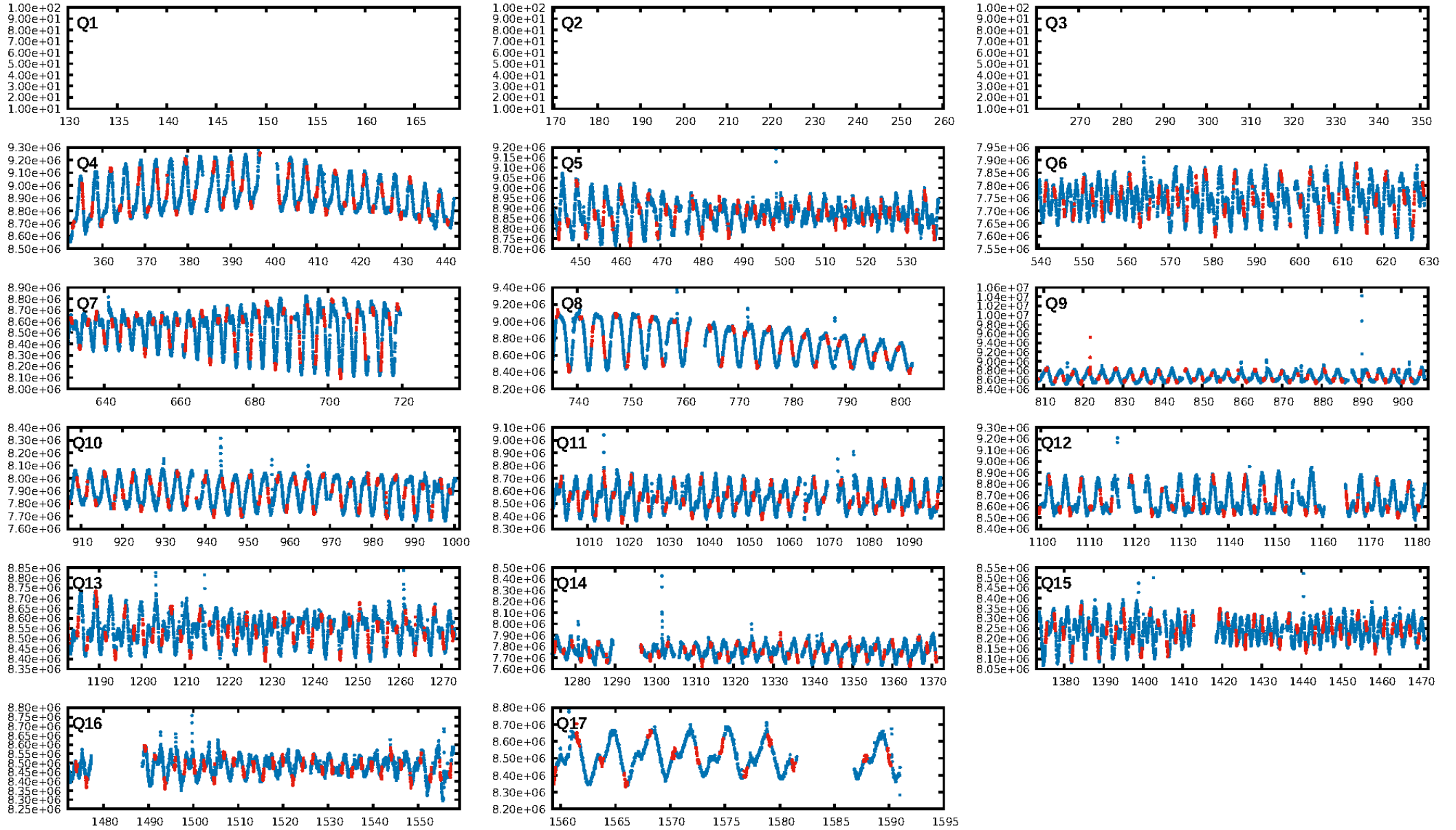
## DV Fit Results:

Period = 2.18910 [0.00001] d  
Epoch = 132.0834 [0.0017] BKJD  
Rp/R\* = 0.0628 [0.0544]  
a/R\* = 1.85 [0.22]  
b = 1.00 [0.08]  
Seff = 41.46 [5.18]  
Teff = 647 [20] K  
Rp = 2.78 [2.42] Re  
a = 0.0248 [0.0019] AU  
Ag = 31.35 [54.35] [0.56 $\sigma$ ]  
Teffp = 2367 [1025] K [1.68 $\sigma$ ]

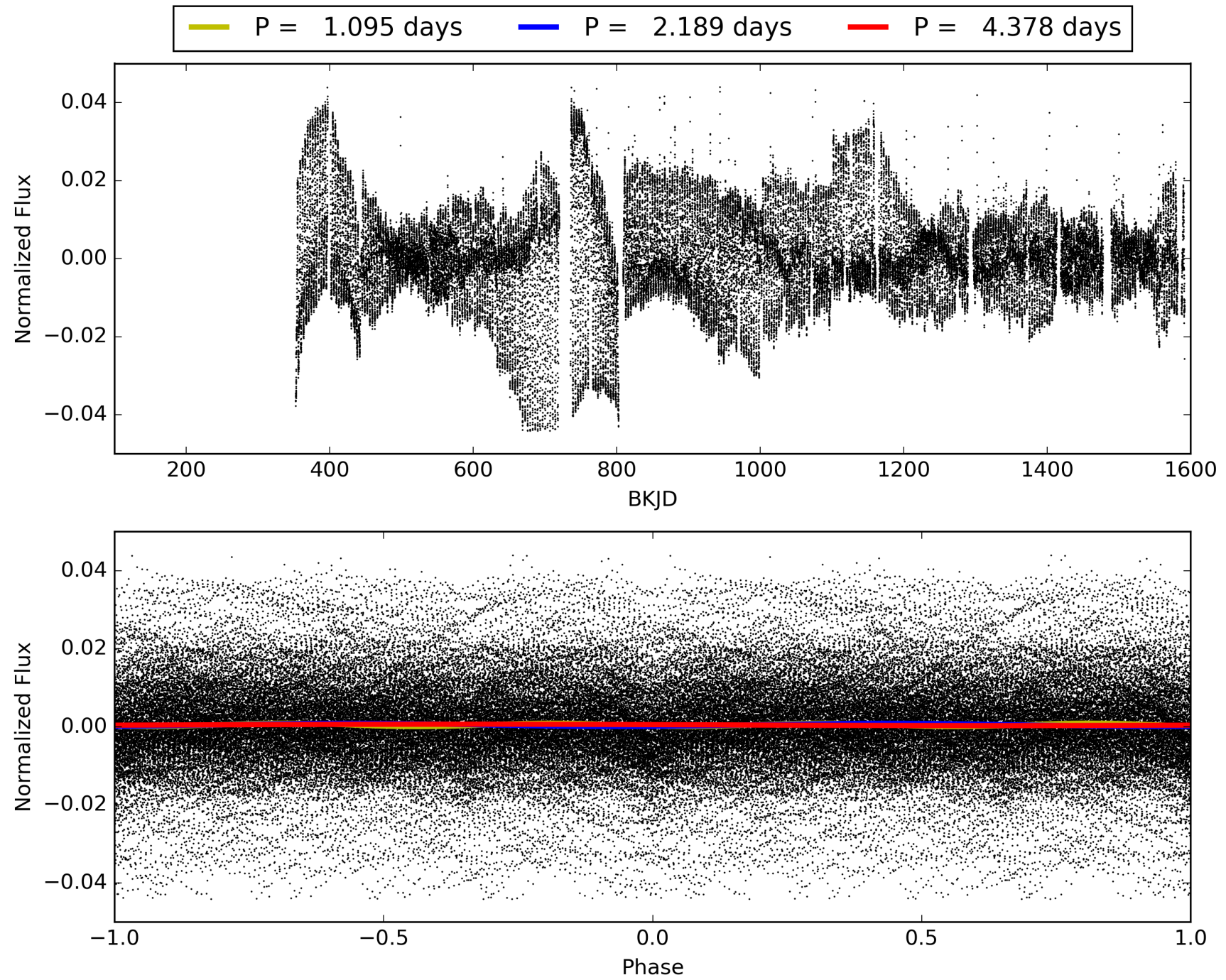
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGoF-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [510/510]  
GhostDiagnostic-chr: 0.1414  
Centroid-sig: 0.0%  
Centroid-so: 0.675 arcsec [3.31 $\sigma$ ]  
OotOffset-rm: 2.877 arcsec [10.77 $\sigma$ ]  
KicOffset-rm: 1.097 arcsec [3.21 $\sigma$ ]  
OotOffset-st: 3/3/4/4 [14]  
KicOffset-st: 3/3/4/4 [14]  
DiffImageQuality-fgm: 0.00 [0/14]  
DiffImageOverlap-fno: 1.00 [14/14]

# TCE 004544623-01, PDC Light Curves

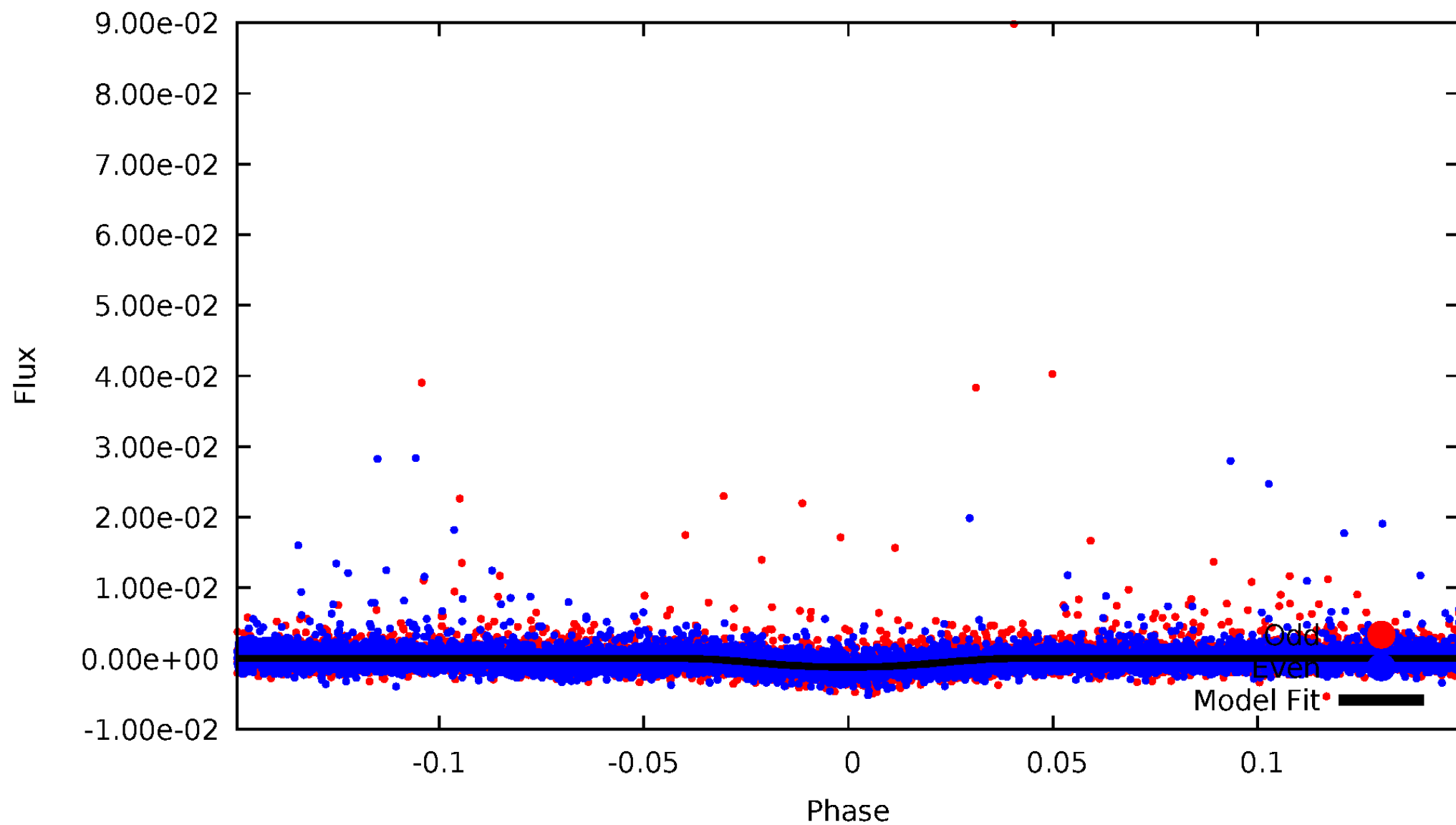


TCE 004544623-01



# DV Odd/Even

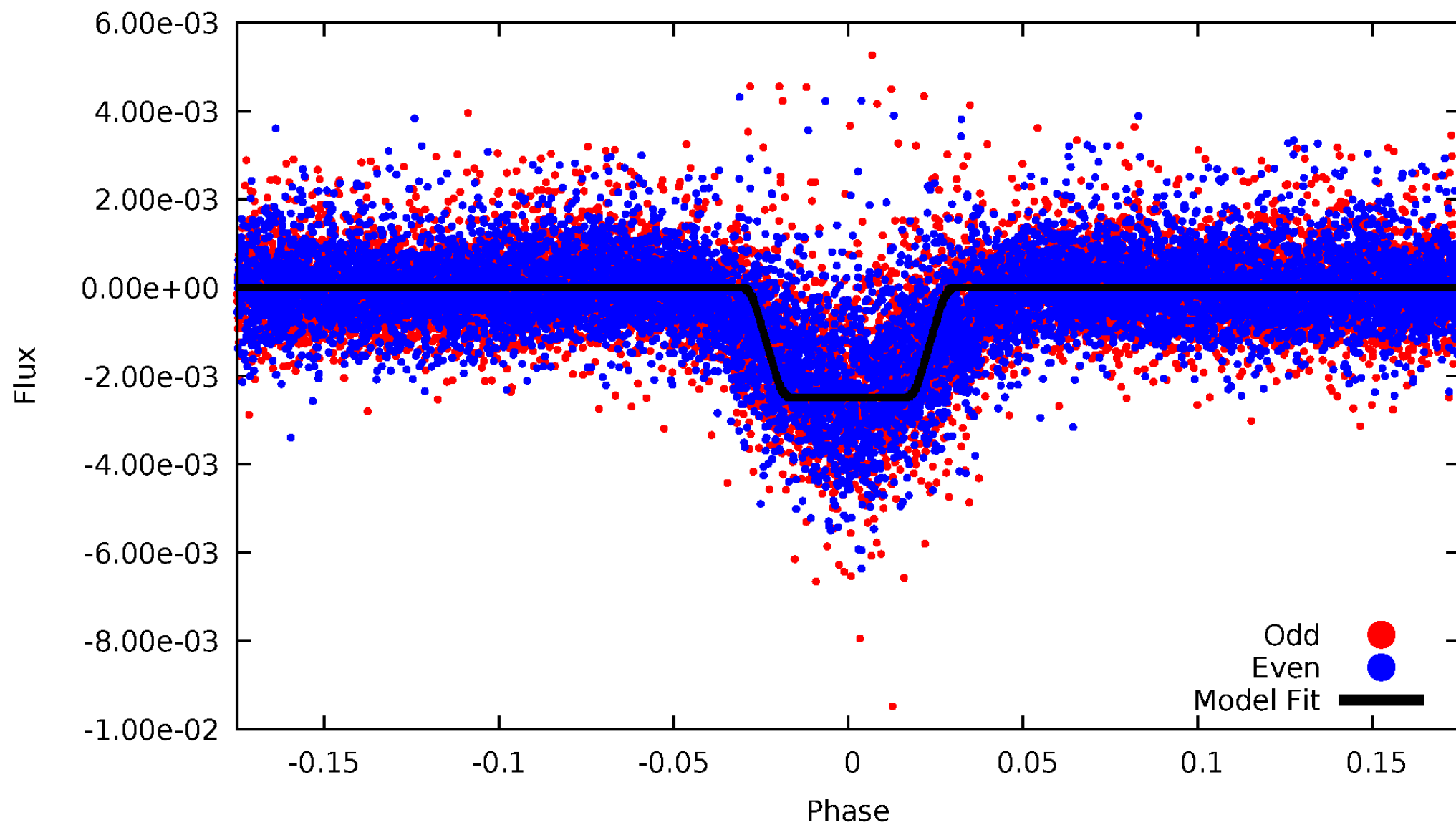
TCE 004544623-01





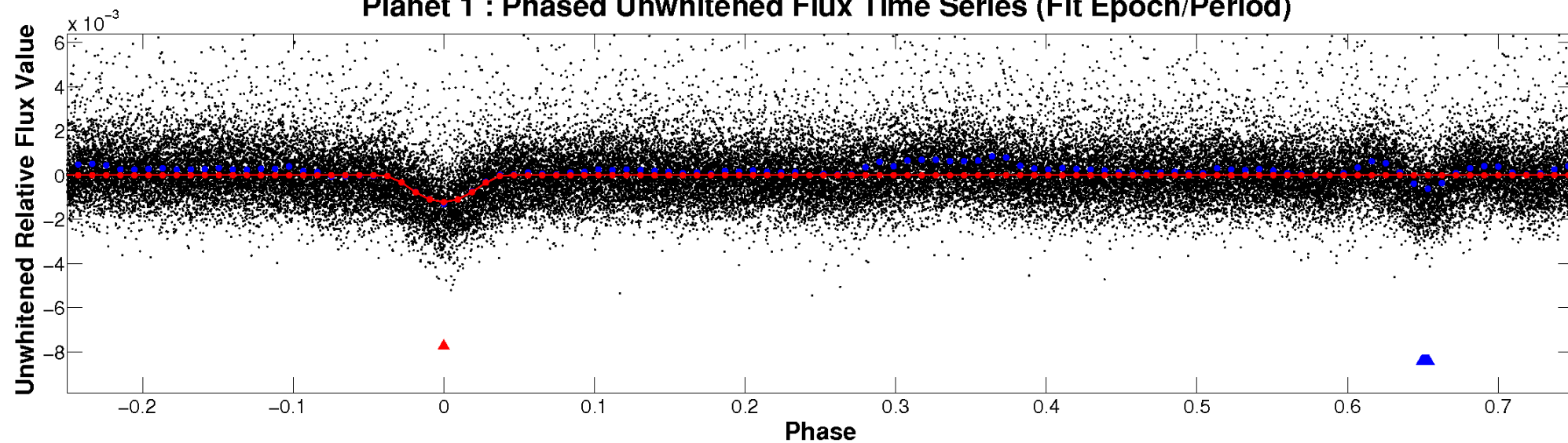
# ALT Odd/Even

TCE 004544623-01

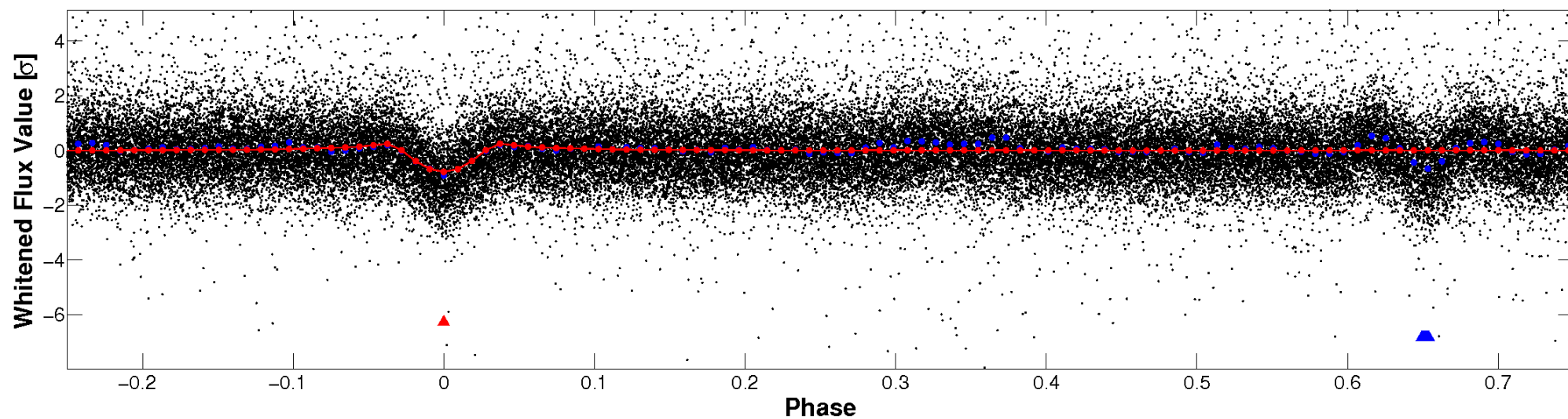


# Non-Whitened Vs. Whitened Light Curve

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

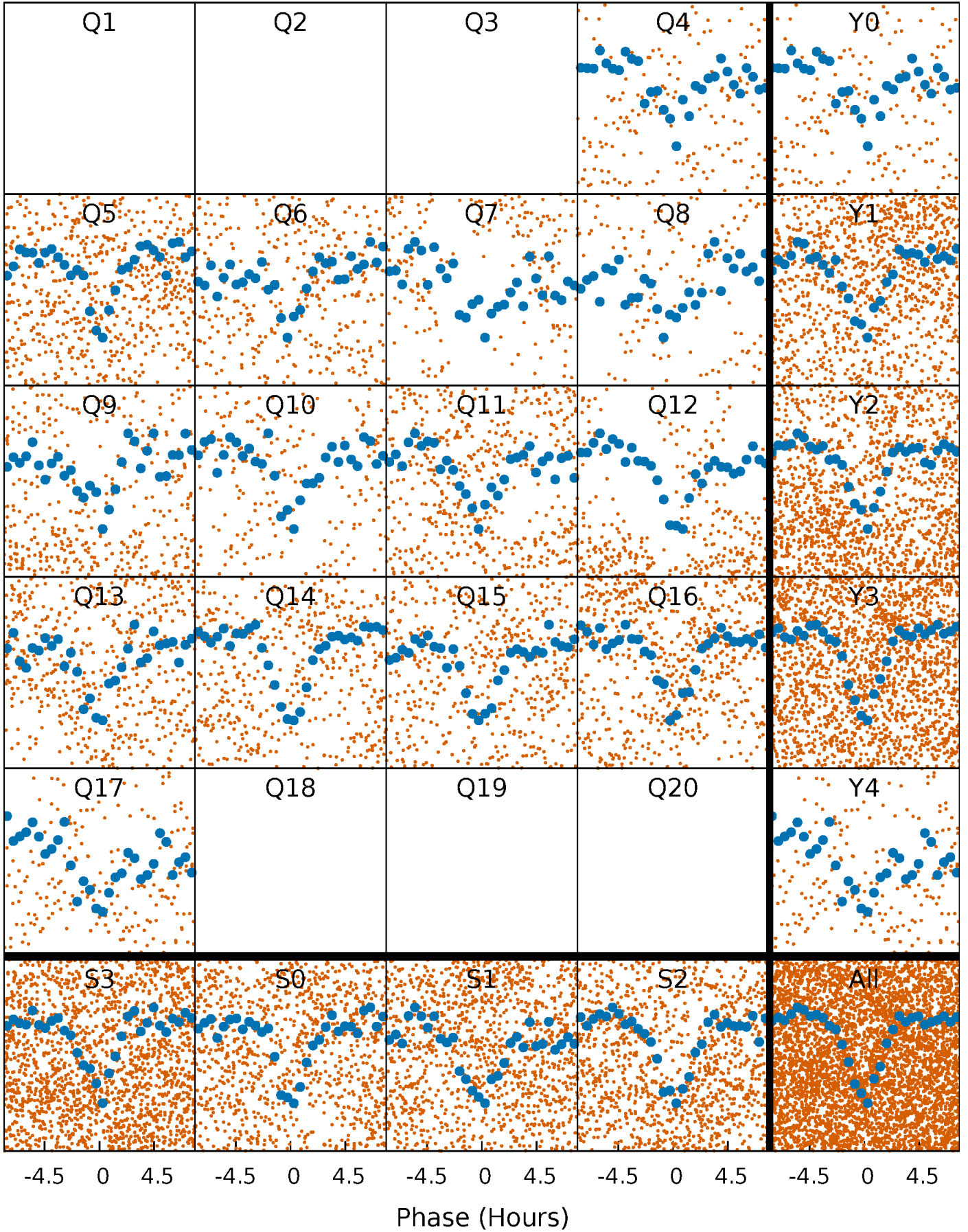


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

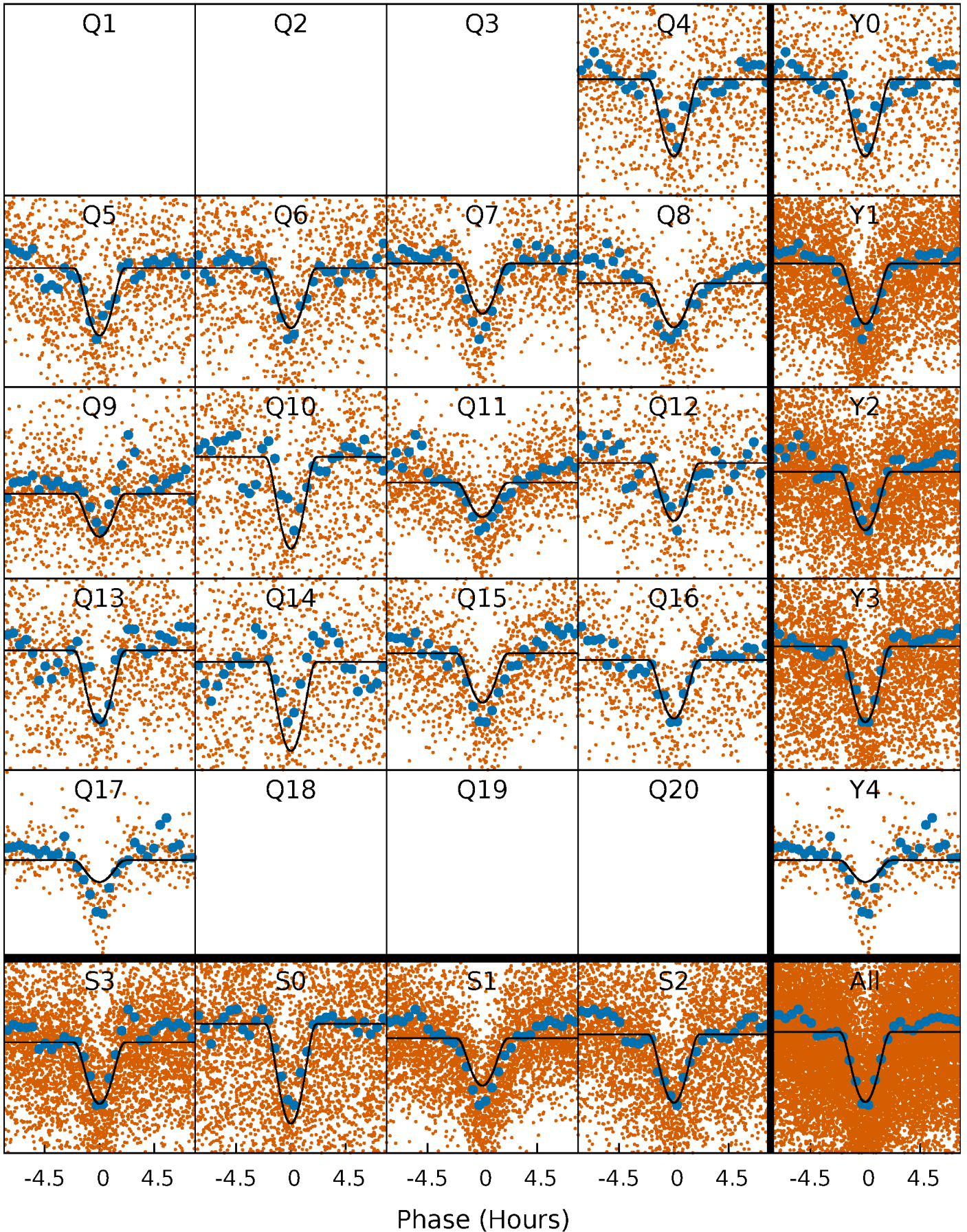
TCE 004544623-01   P= 2.189095 Days    $T_0=132.083385$  (BKJD)





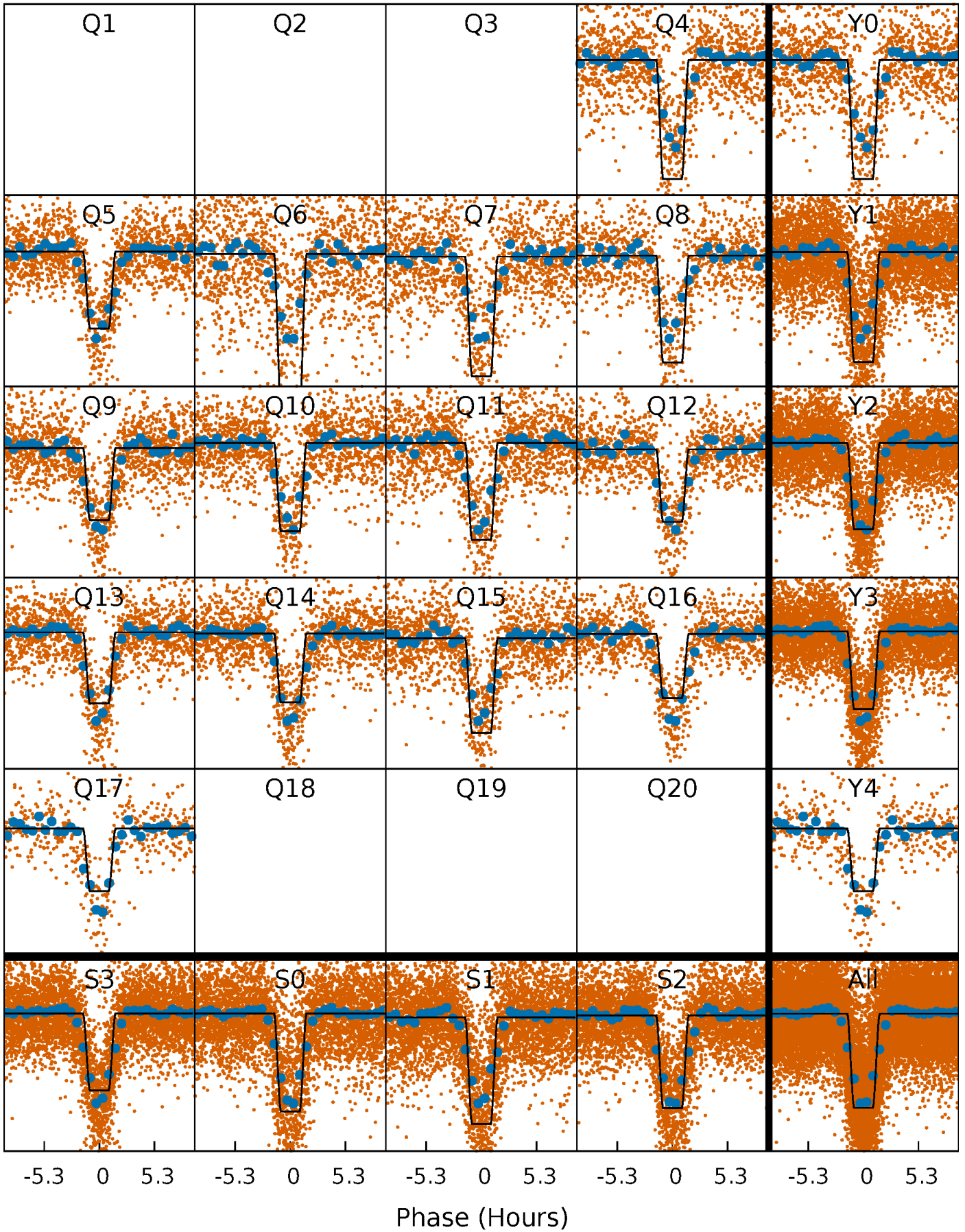
# DV Quarter-Phased Transit Curves

TCE 004544623-01 P= 2.189095 Days  $T_0=132.083385$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

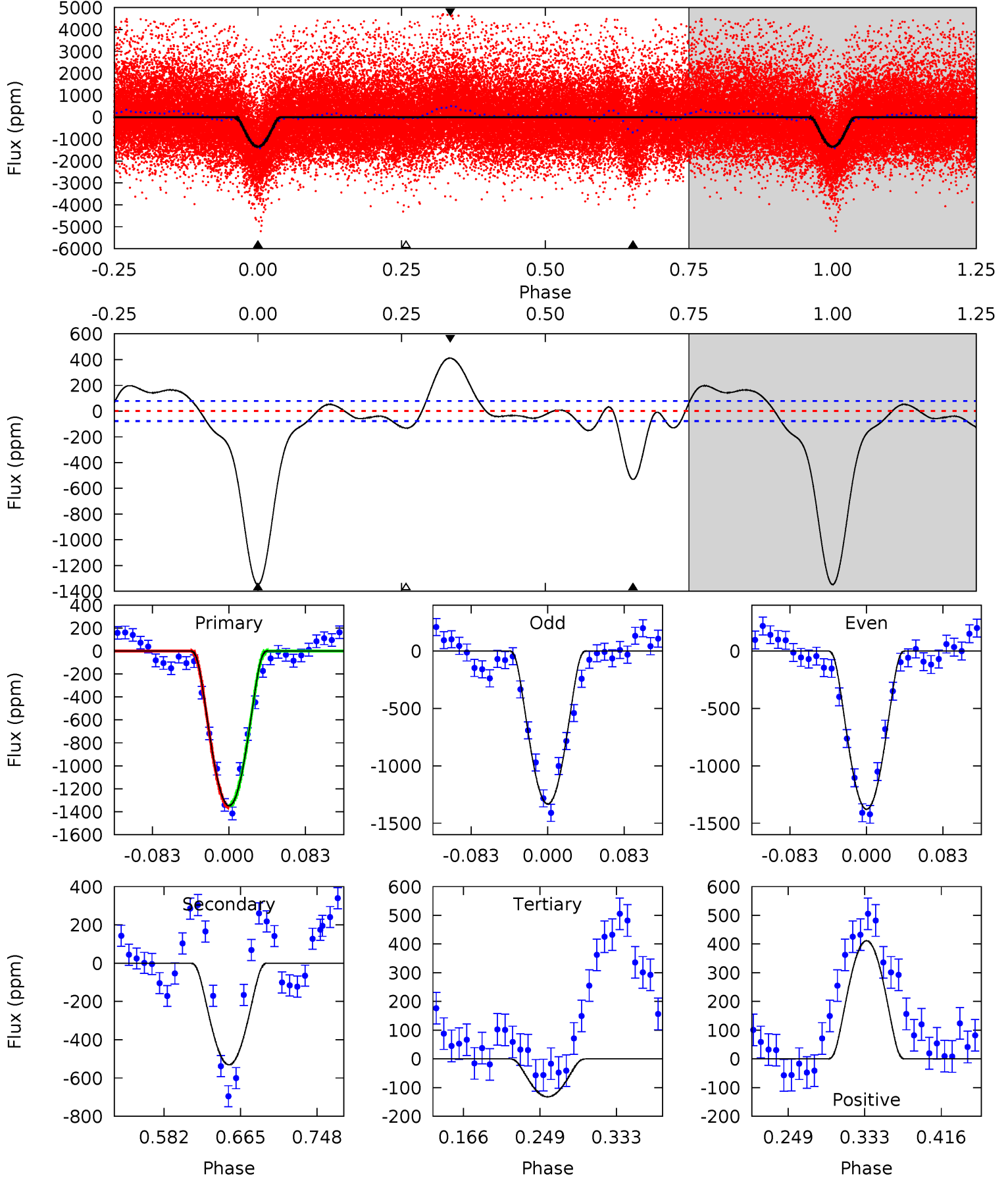
TCE 004544623-01 P= 2.189103 Days  $T_0=132.080727$  (BKJD)



# DV Model-Shift Uniqueness Test

004544623-01, P = 2.189095 Days, E = 132.083385 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
79.6	31.4	7.81	24.3	4.60	1.73	7.74	71.8	55.3	23.6	7.07	1.35	0.92	0.23	0.43

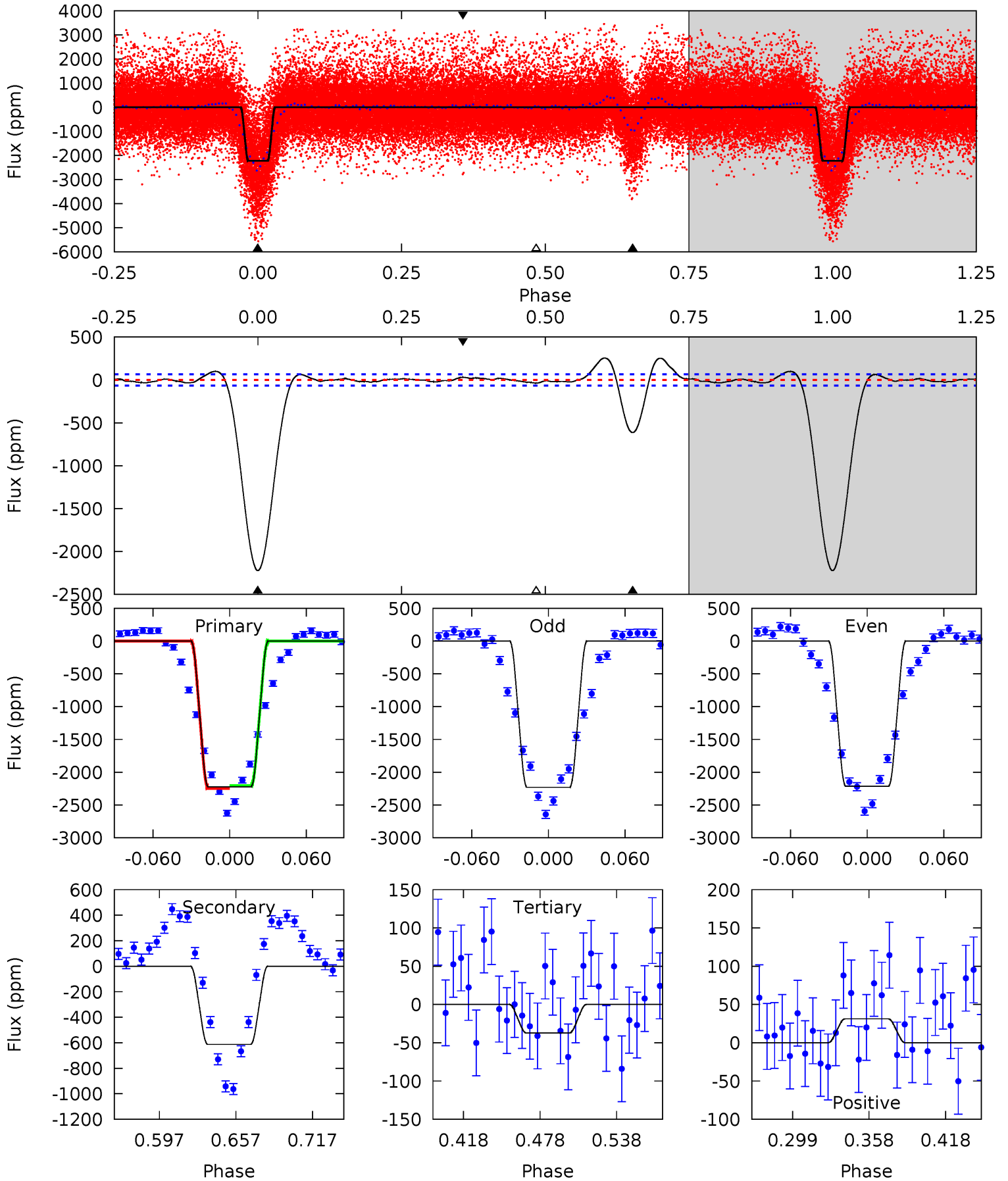




# Alt Model-Shift Uniqueness Test

004544623-01, P = 2.189103 Days, E = 132.080727 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
156.7	43.2	2.62	2.21	4.67	1.88	2.69	154.0	154.4	40.6	41.0	0.56	0.98	0.10	1.49



### Stellar Parameters For KIC 004544623

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3624^{+58}_{-72}$	$4.848^{+0.045}_{-0.036}$	$-0.200^{+0.100}_{-0.100}$	$0.406^{+0.038}_{-0.041}$	$0.425^{+0.036}_{-0.044}$	$8.948^{+2.013}_{-1.369}$
	+2%/-2%	+1%/-1%	+50%/-50%	+9%/-10%	+8%/-10%	+22%/-15%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 004544623-01 / KOI 6423.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-531 \pm 17$	$3.11^{+2.34}_{-1.79}$	$901^{+23}_{-26}$	$2611^{+694}_{-324}$	$19^{+82}_{-12}$
Alt.	$-613 \pm 14$	$2.72^{+2.33}_{-1.73}$	$902^{+21}_{-24}$	$2759^{+953}_{-392}$	$28^{+187}_{-20}$

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



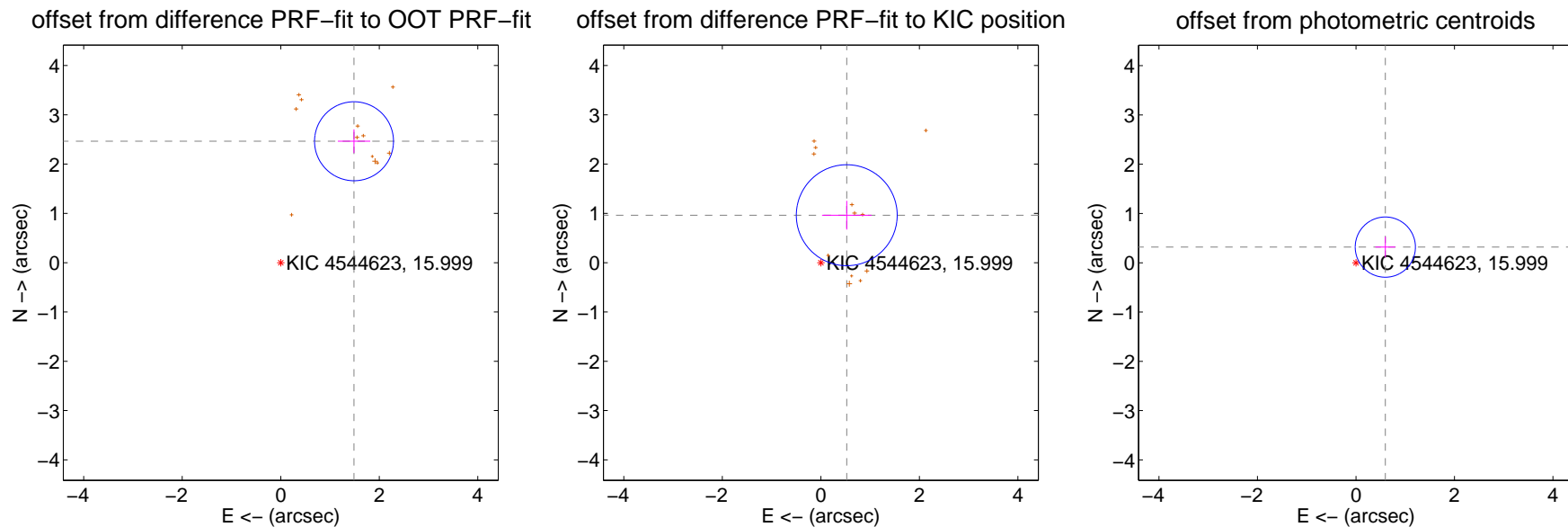
## DV Centroid Data

Supplemental centroid analysis for 004544623-01. Kepler magnitude: 16.00. Transit SNR 32.21

There are 0 quarters with good PRF difference image offsets

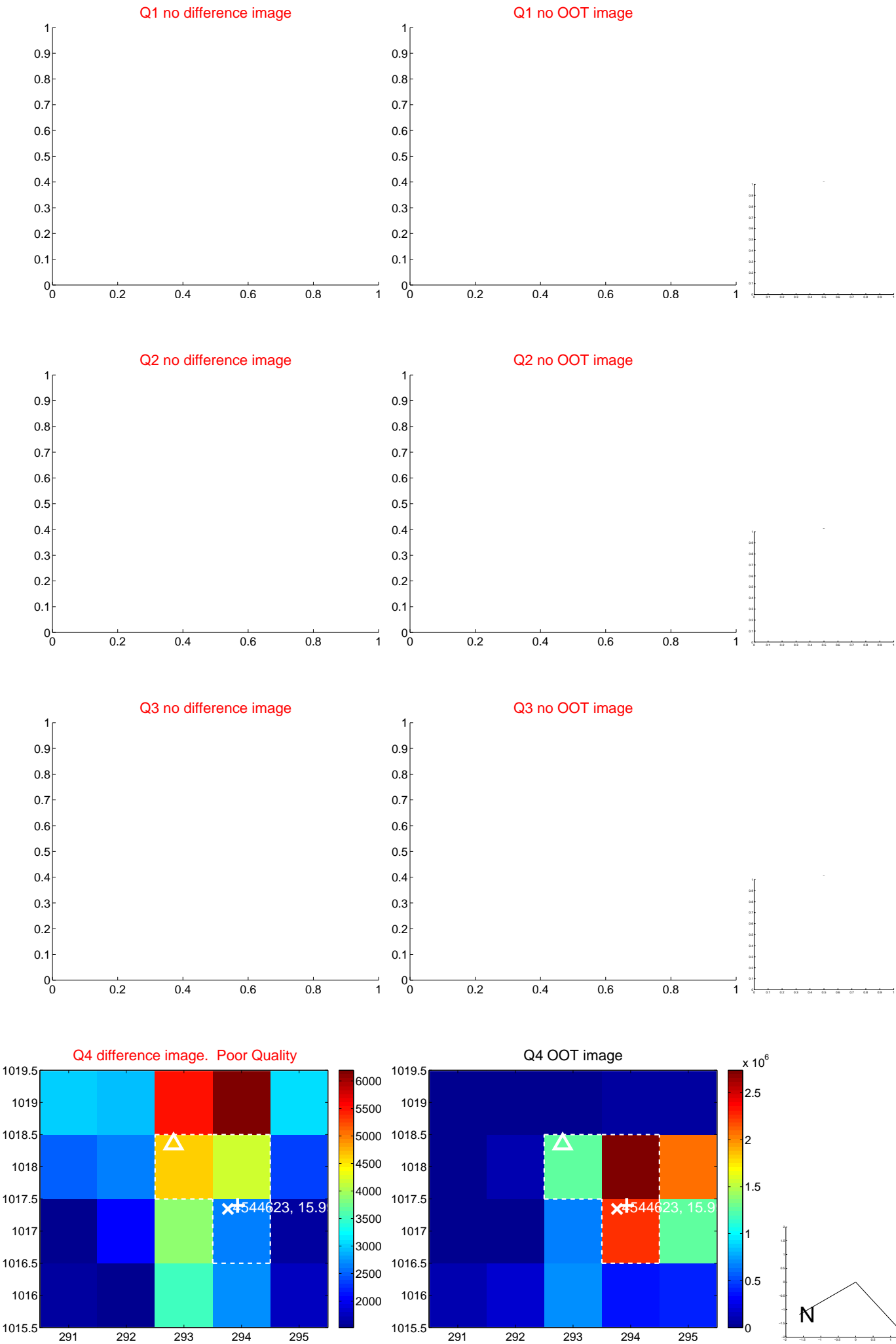
The OOT PRF centroid is offset from the target star catalog position by about 2.82 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.877 \pm 0.267$	10.77	$-1.487 \pm 0.330$	$2.463 \pm 0.240$
PRF-fit source offset from KIC position	$1.097 \pm 0.341$	3.21	$-0.526 \pm 0.502$	$0.963 \pm 0.291$
photometric centroid source offset	$0.68 \pm 0.20$	3.31	$-0.60 \pm 0.20$	$0.32 \pm 0.21$

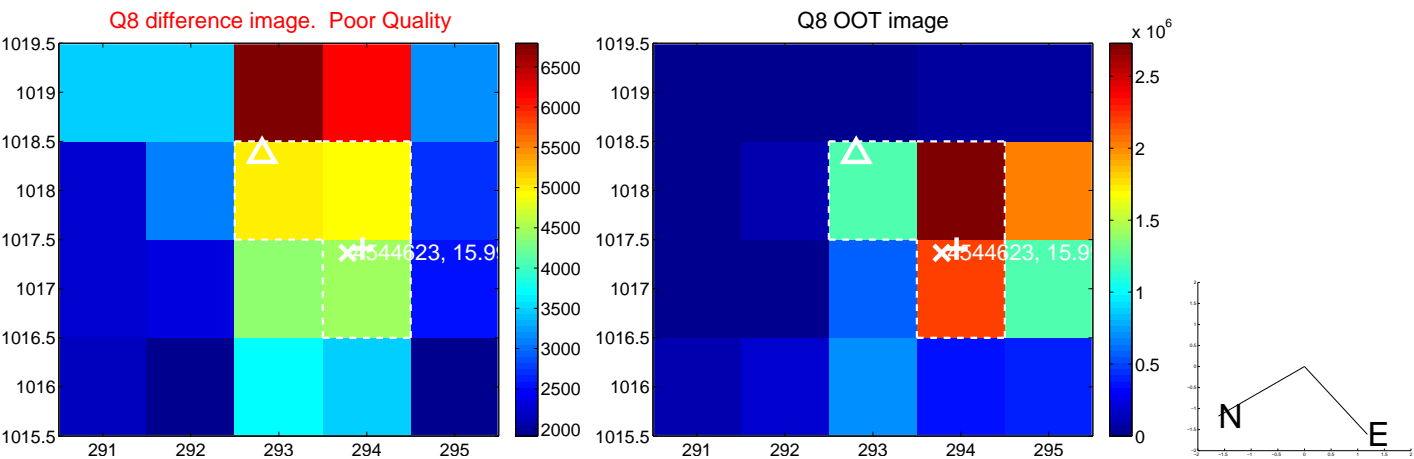
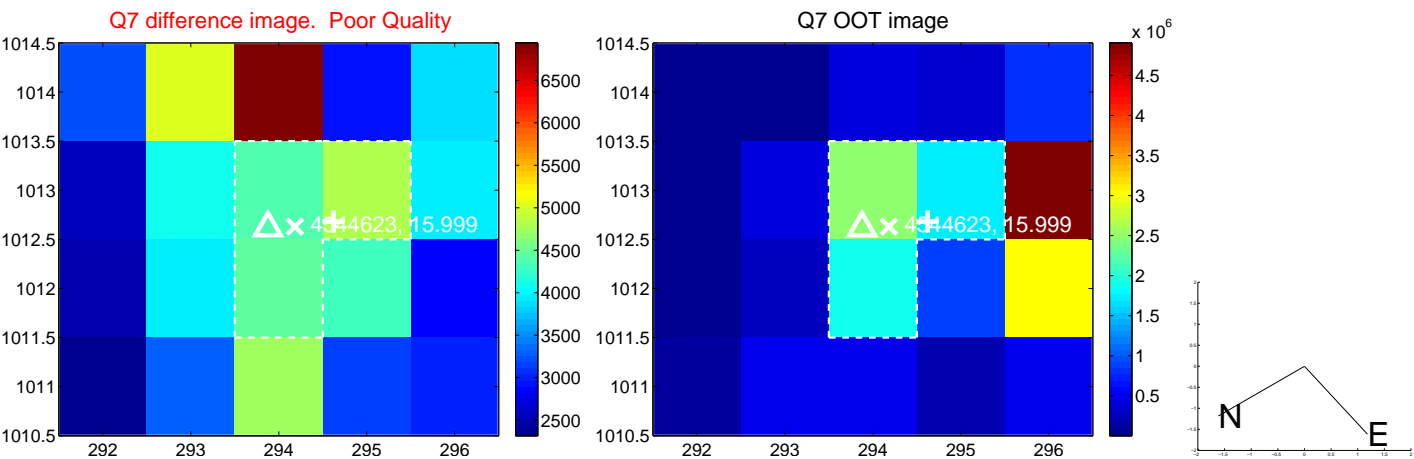
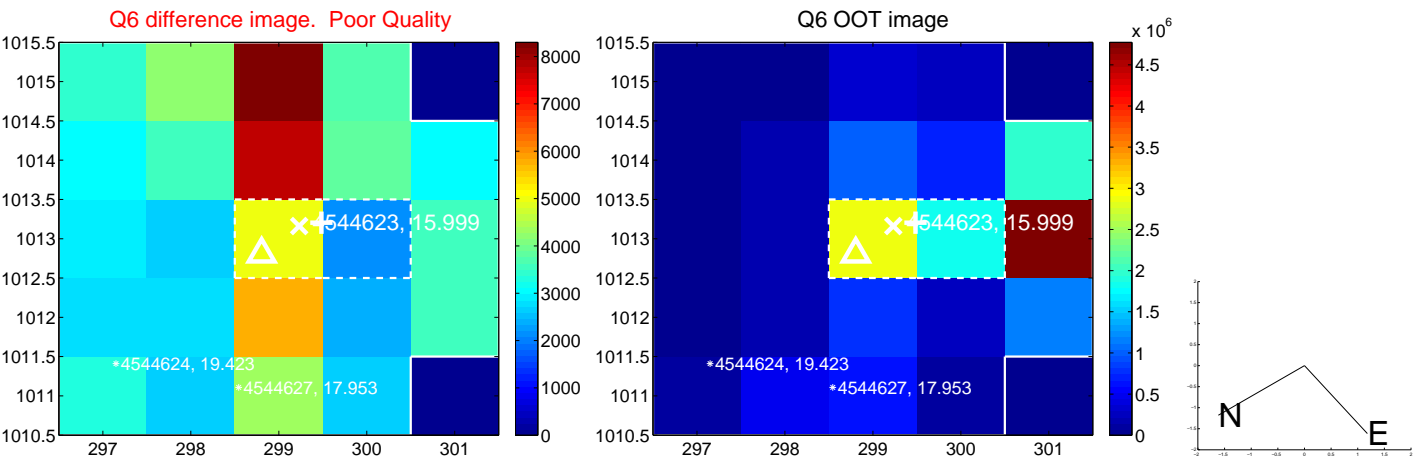
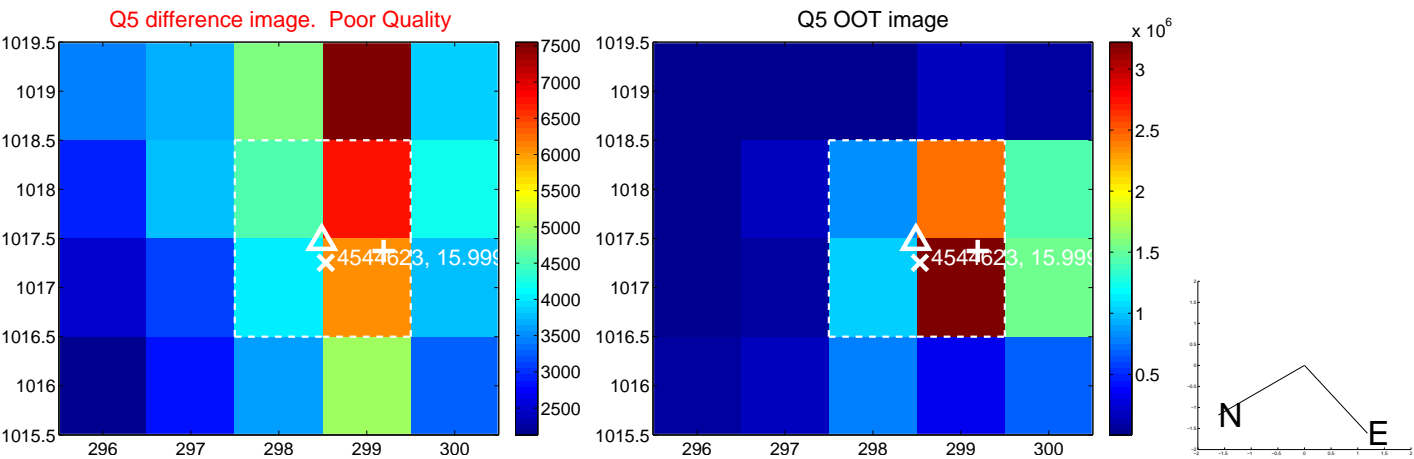


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

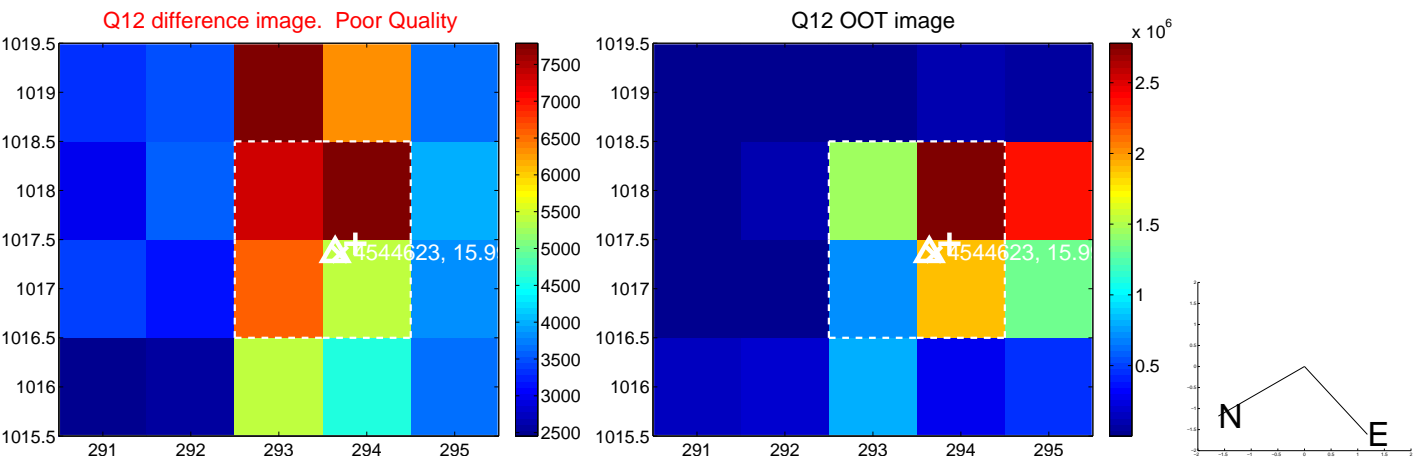
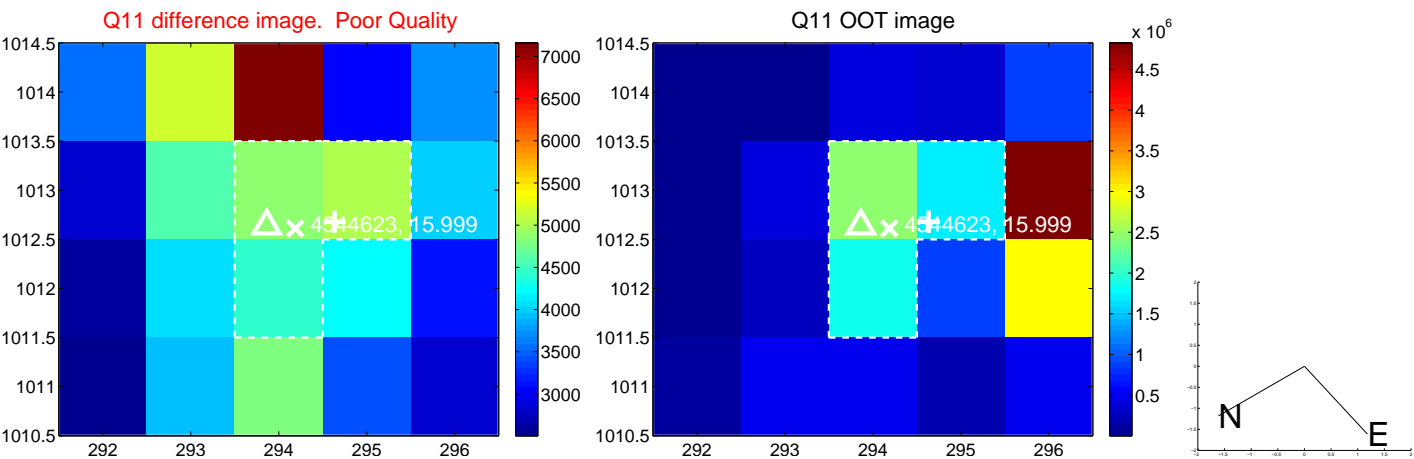
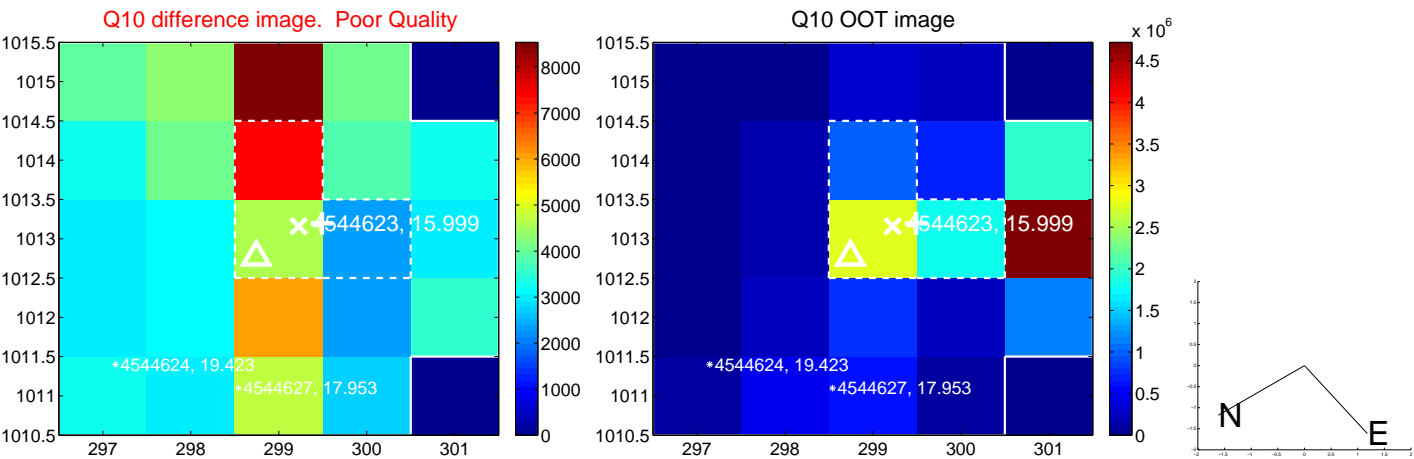
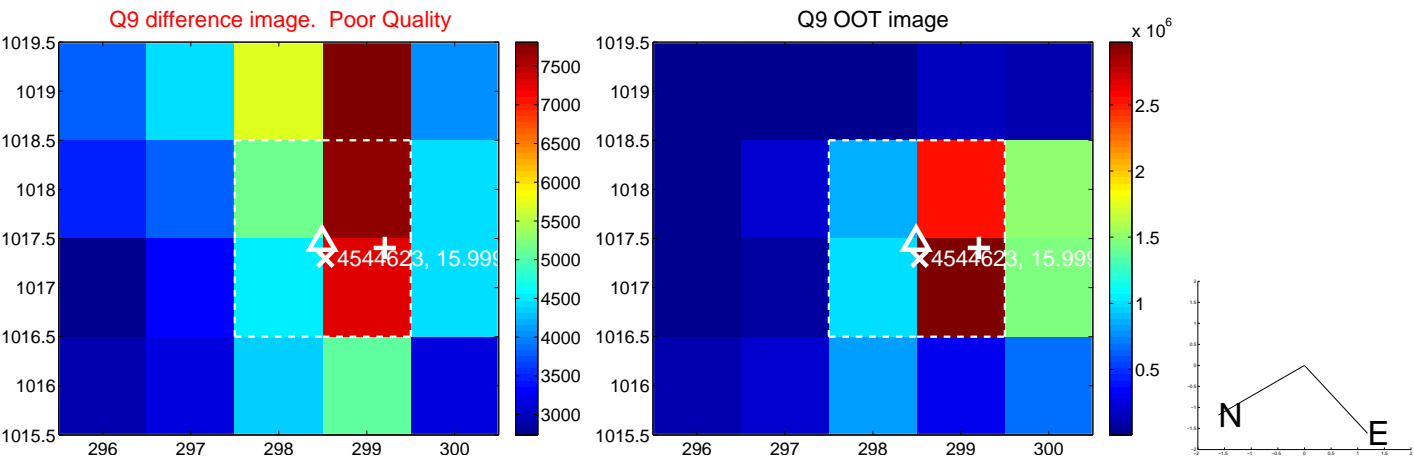
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



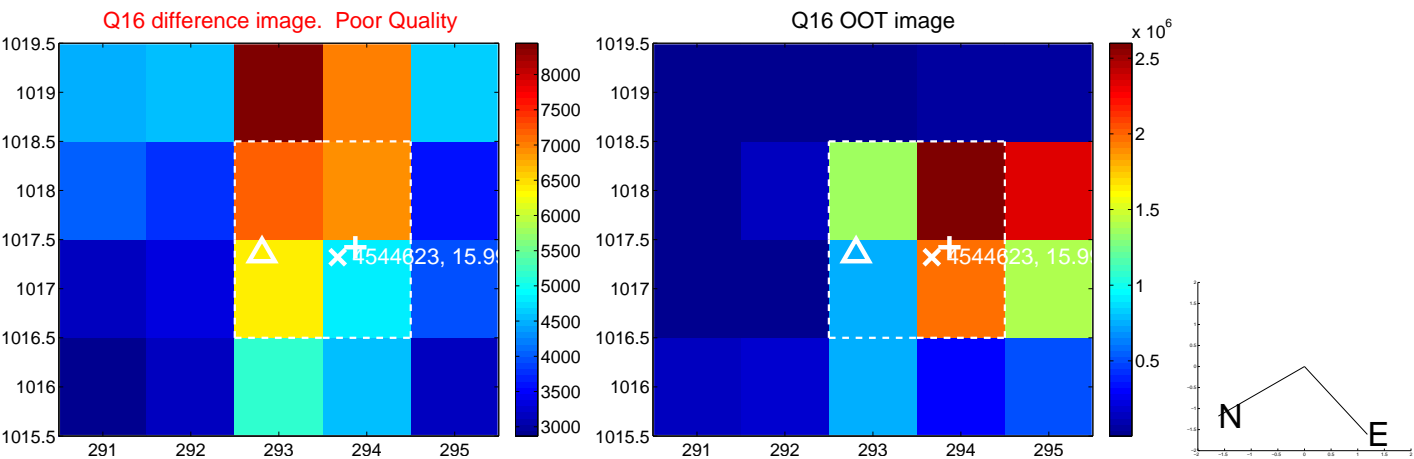
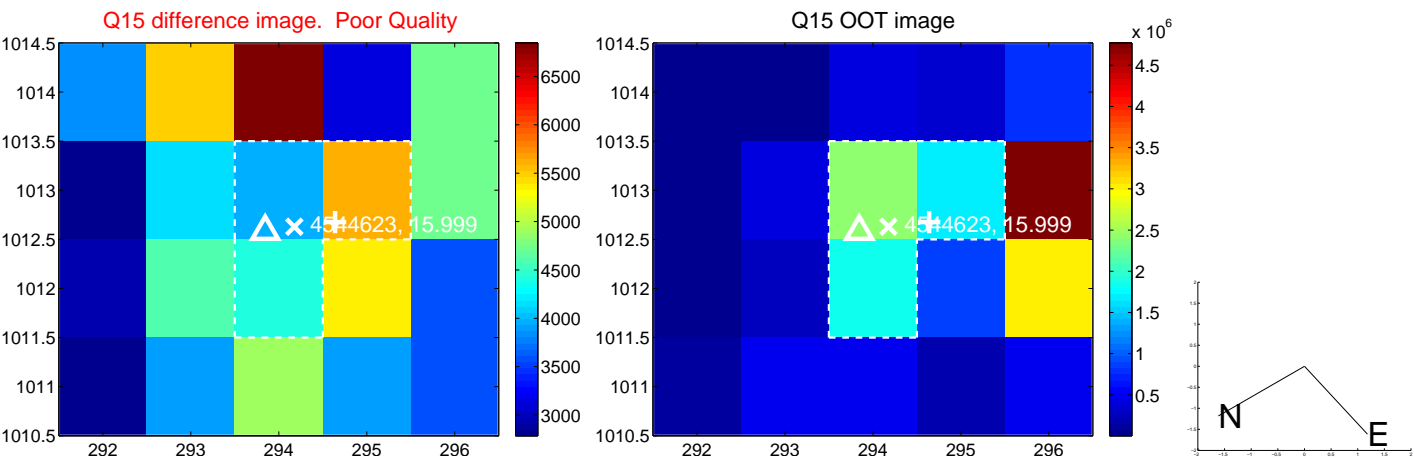
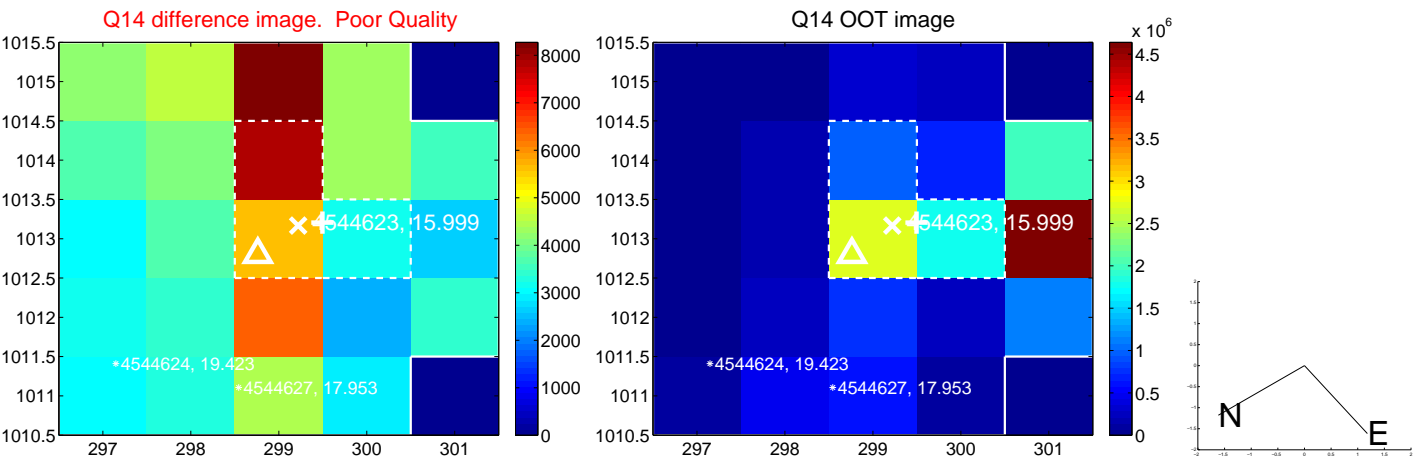
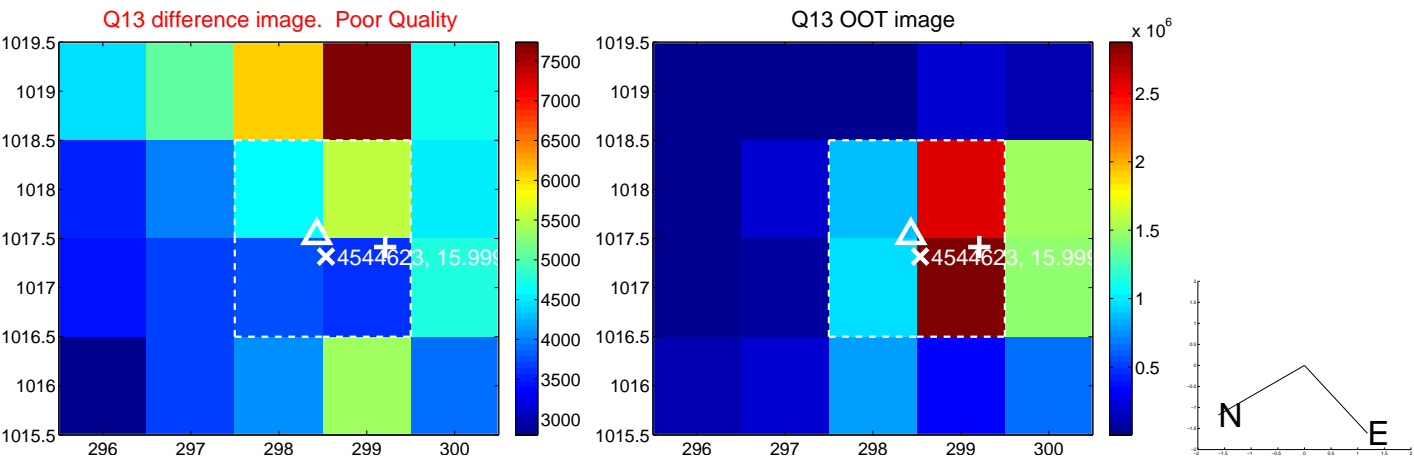
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

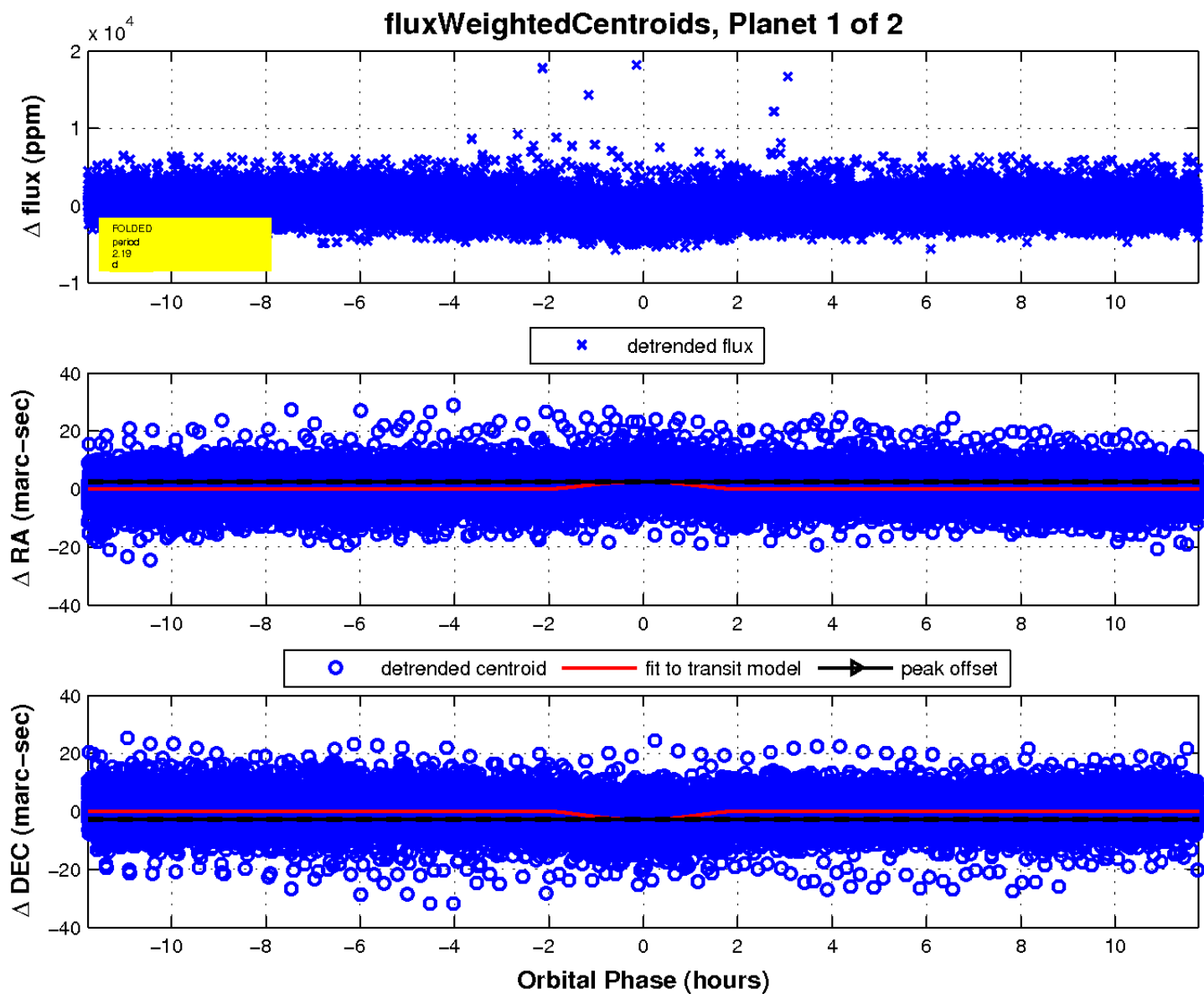
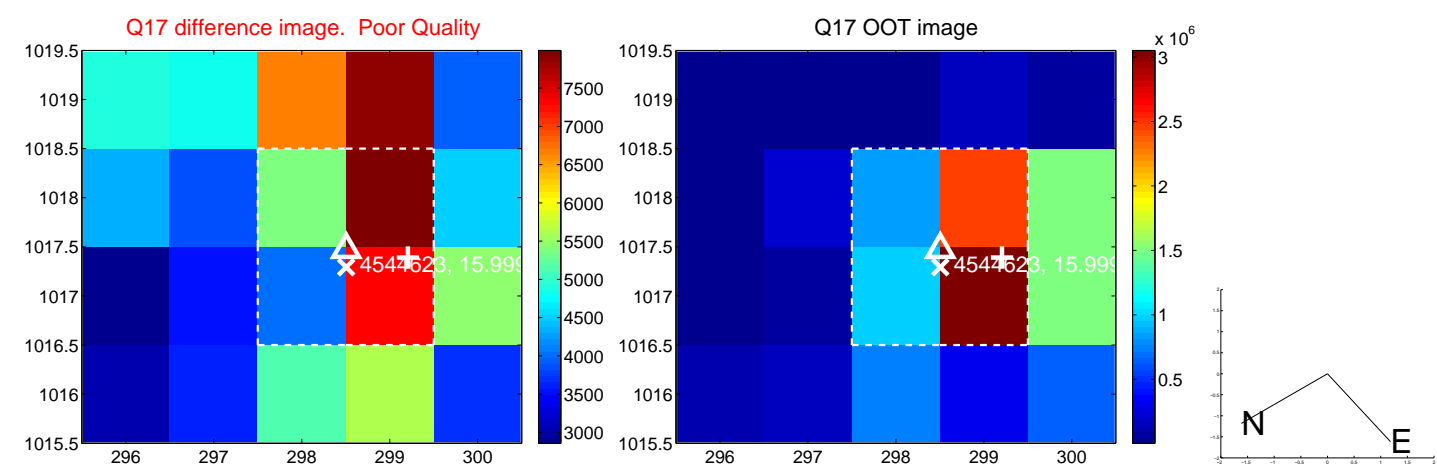


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



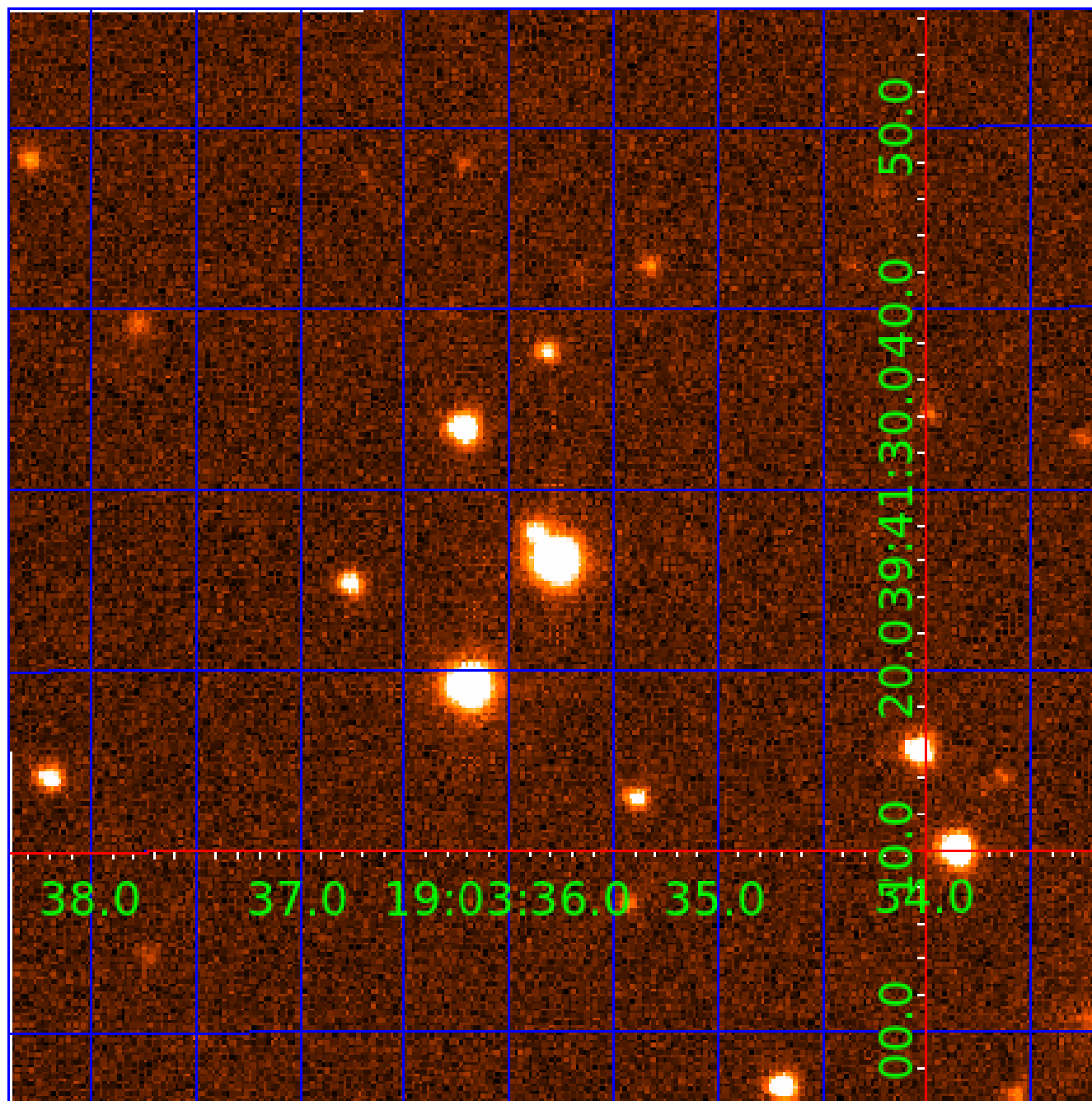


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004544623

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004544623-01	OBS	6423.01	2.189095	132.083385	1223.5	3.923	28.2	32.2	0.41	3624	2.78	41.46
004544623-02	OBS	No	2.189111	133.504744	3949.4	1.500	21.1	-1.0	0.41	3624	2.54	41.46

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004544623-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH
004544623-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_NOFITS—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 004544623-02

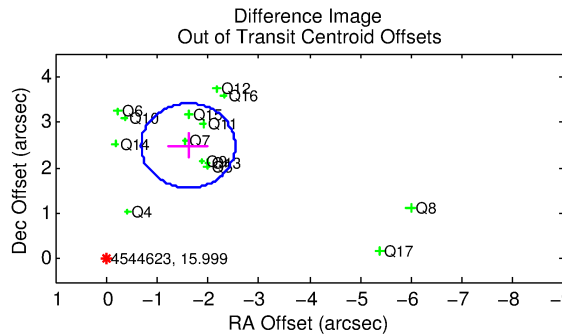
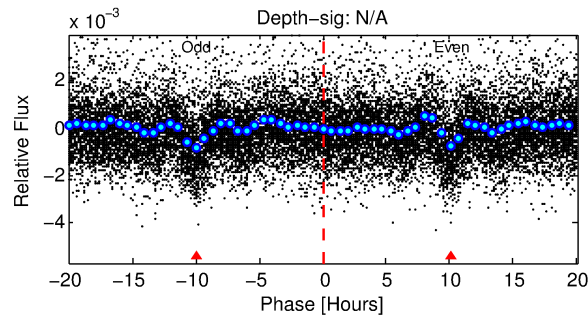
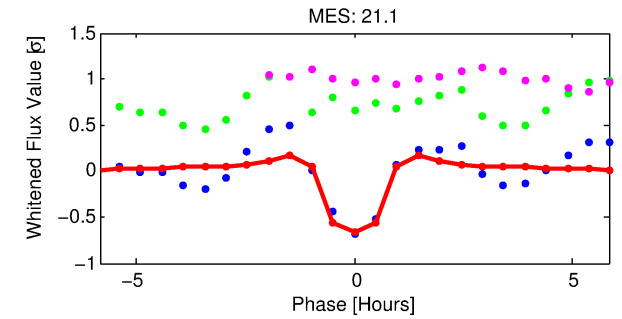
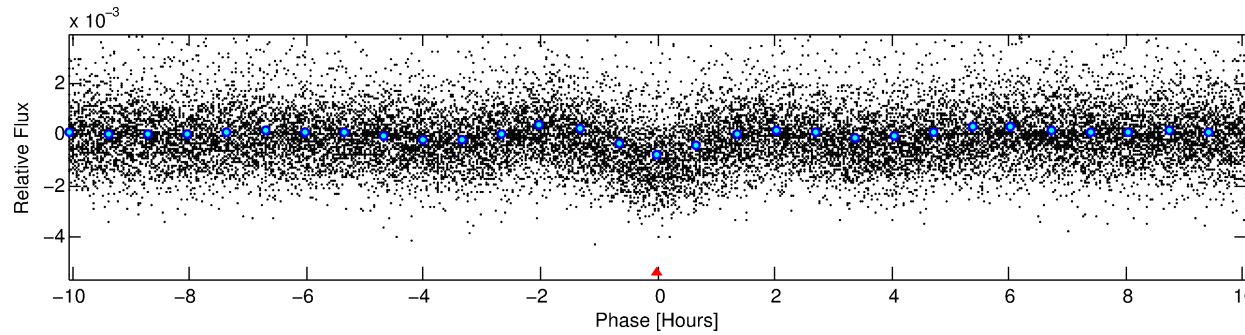
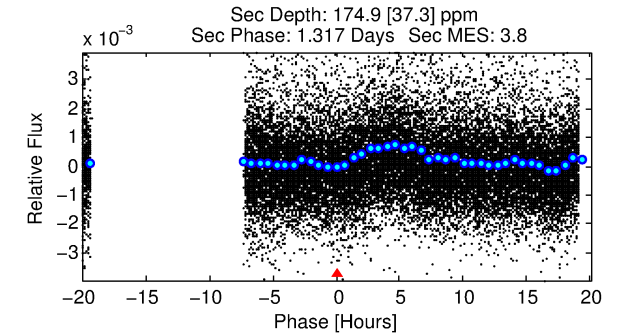
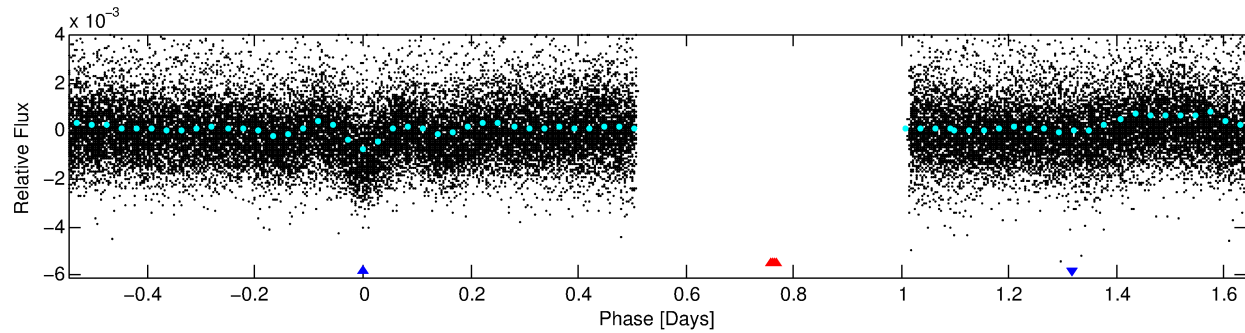
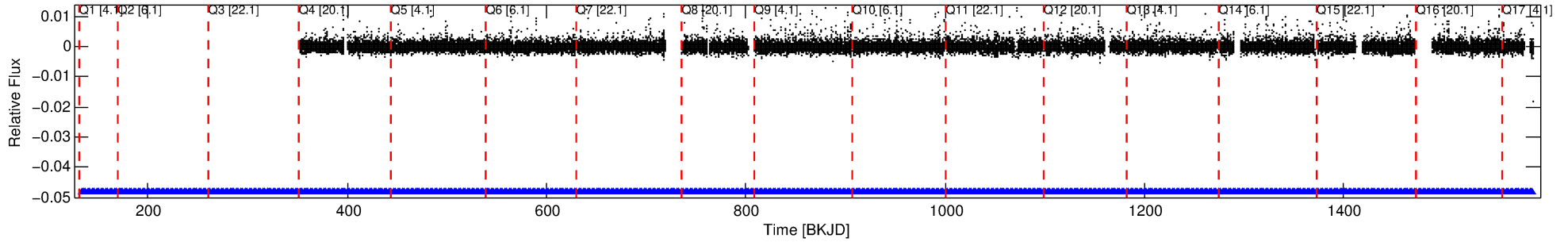
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
004544623-02	4544623	004544587-sec	4544587	1:1	43.7	-11	0	10.80	16.00	82.05	Direct-PRF	0	0.43	0.15

**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: 4544623 Candidate: 2 of 2 Period: 2.189 d  
KOI: K06423 Corr: No Ephemeris Match

Kp: 16.00 R\*: 0.41 Rs Teff: 3624.0 K Logg: 4.85 Fe/H: -0.200



TPS TCE Results:

Period = 2.18911 d  
Epoch = 133.5047 BKJD

DV fit results are unavailable

DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]

LongPeriod-sig: N/A

ModelChiSquare2-sig: N/A

ModelChiSquareGof-sig: N/A

Bootstrap-pfa: N/A

RollingBand-fgt: 1.00 [509/509]

GhostDiagnostic-chr: 0.2419

Centroid-sig: 0.0%

Centroid-so: 1.094 arcsec [7.96σ]

OotOffset-rm: 2.959 arcsec [9.60σ]

KicOffset-rm: 1.293 arcsec [3.52σ]

OotOffset-st: 3/3/4/4 [14]

KicOffset-st: 3/3/4/4 [14]

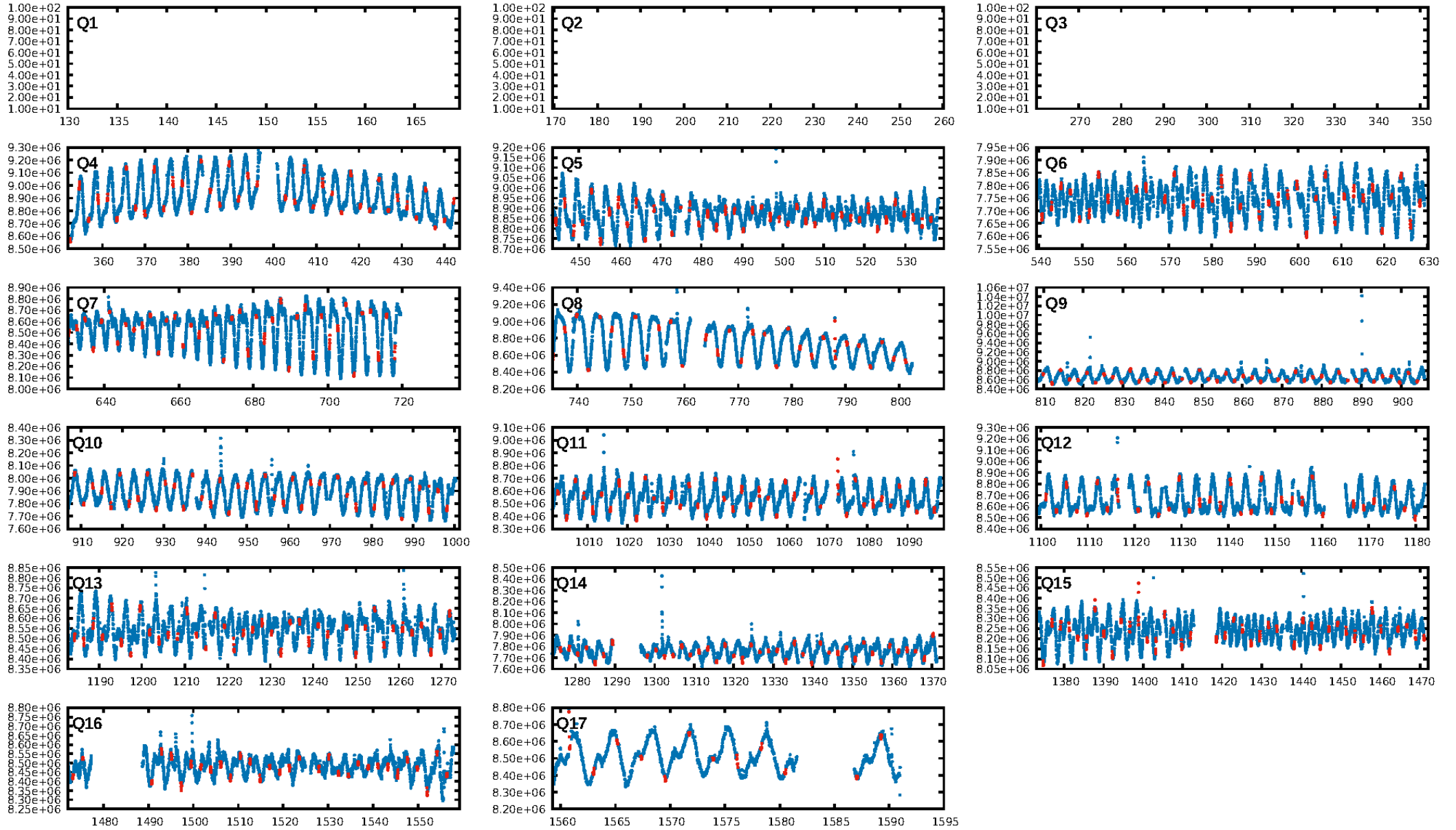
DiffImageQuality-fgm: 0.07 [1/14]

DiffImageOverlap-fno: 1.00 [14/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 07:33:59 Z

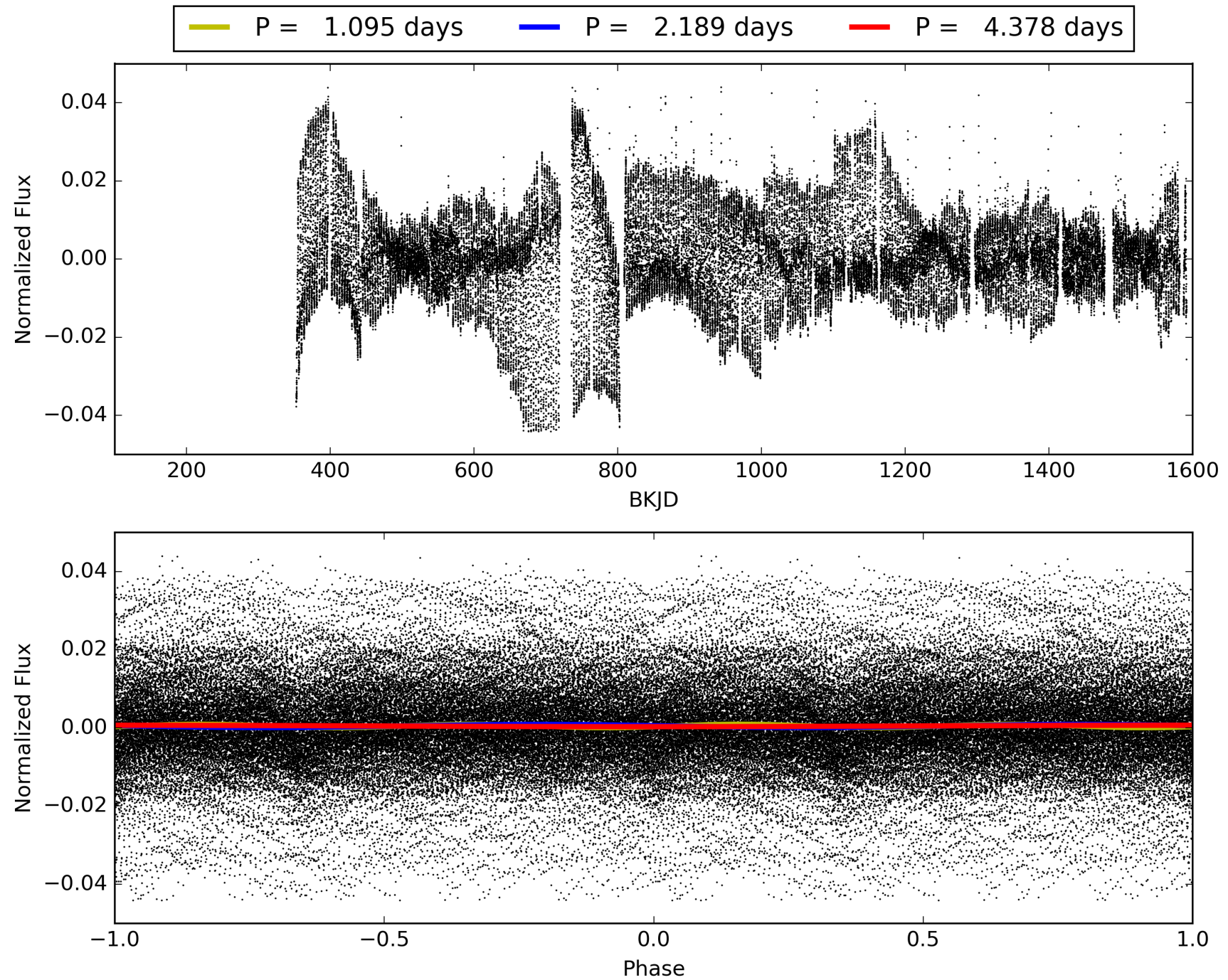
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004544623-02, PDC Light Curves



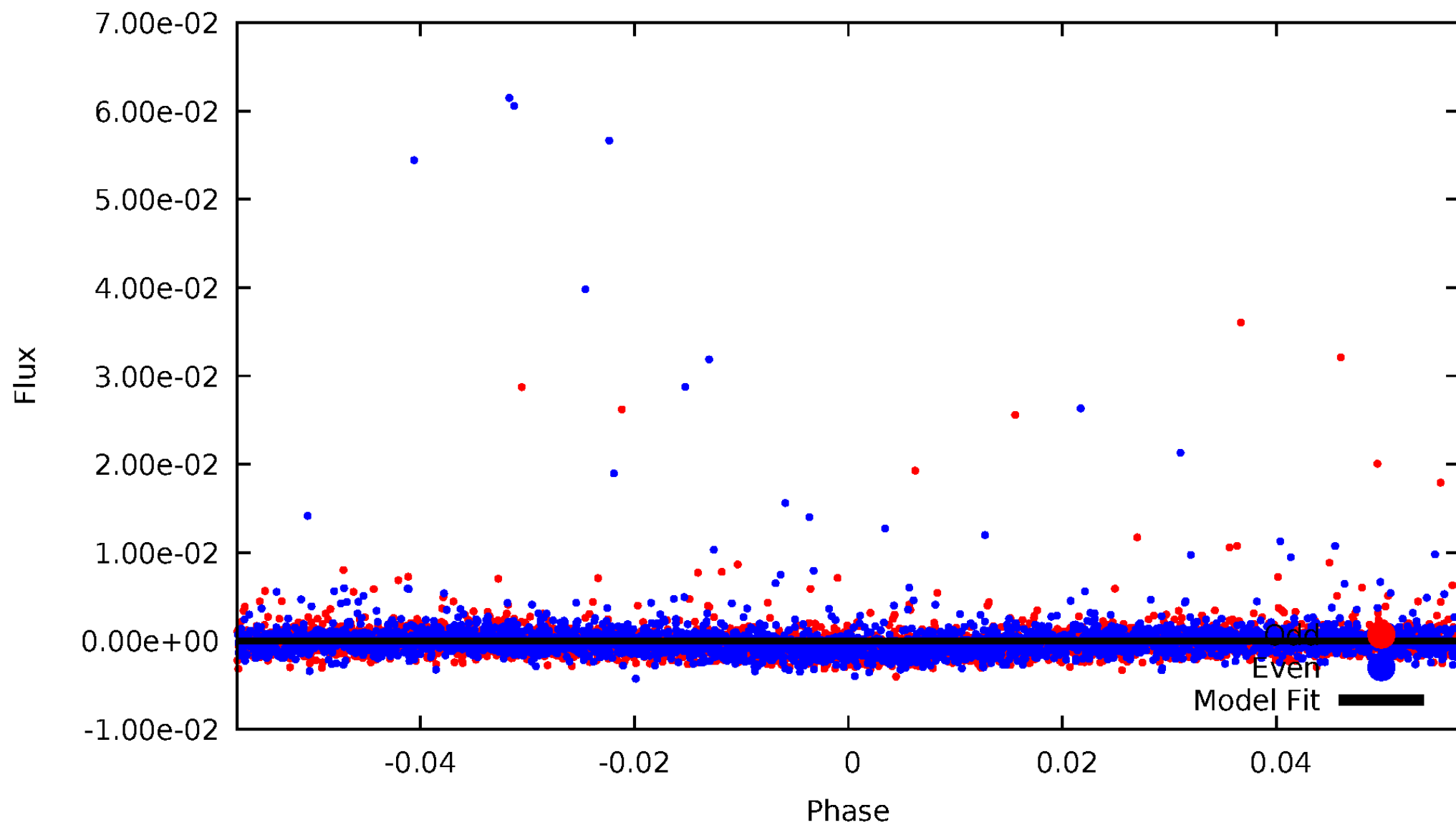


TCE 004544623-02



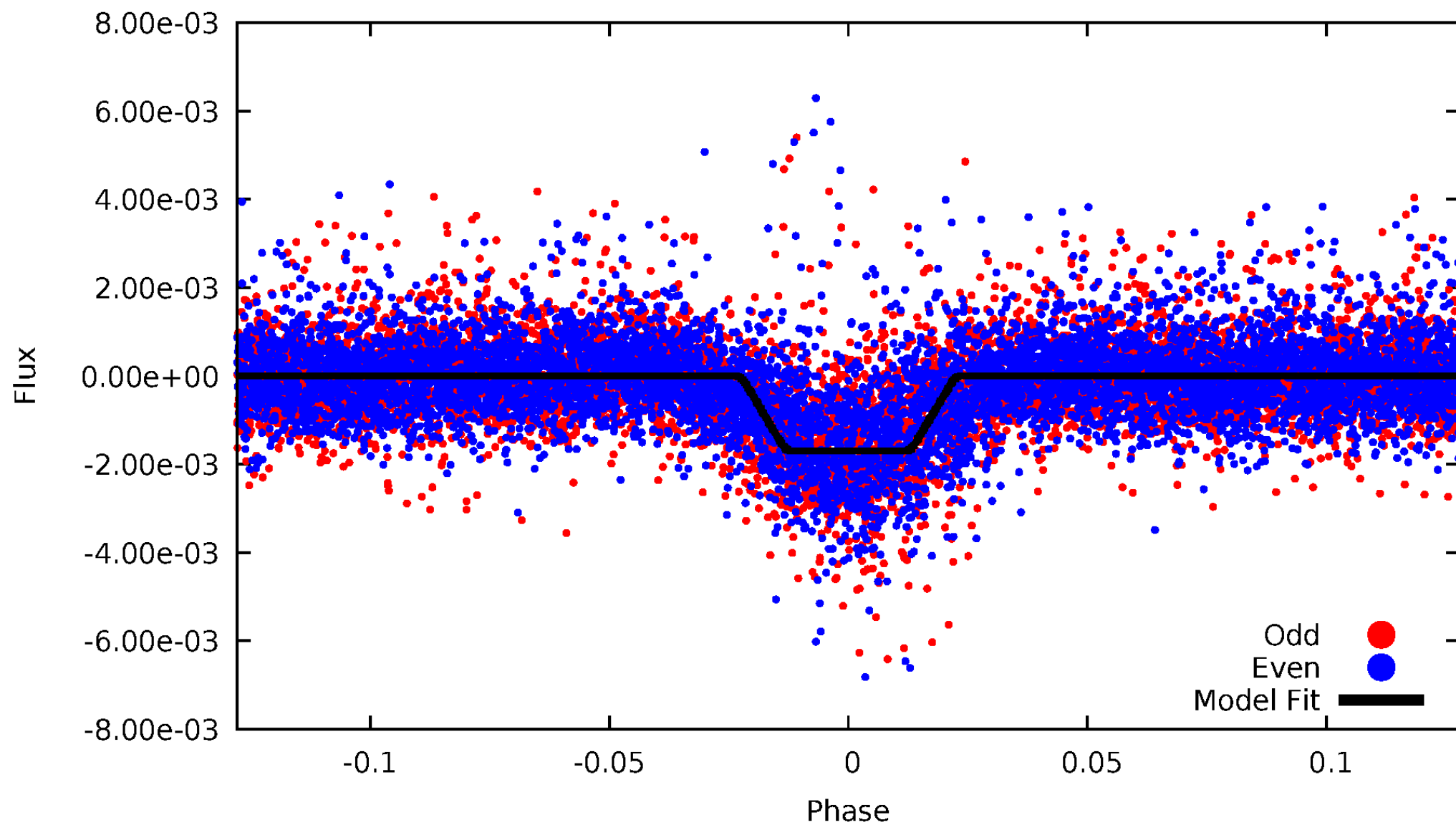
# DV Odd/Even

TCE 004544623-02



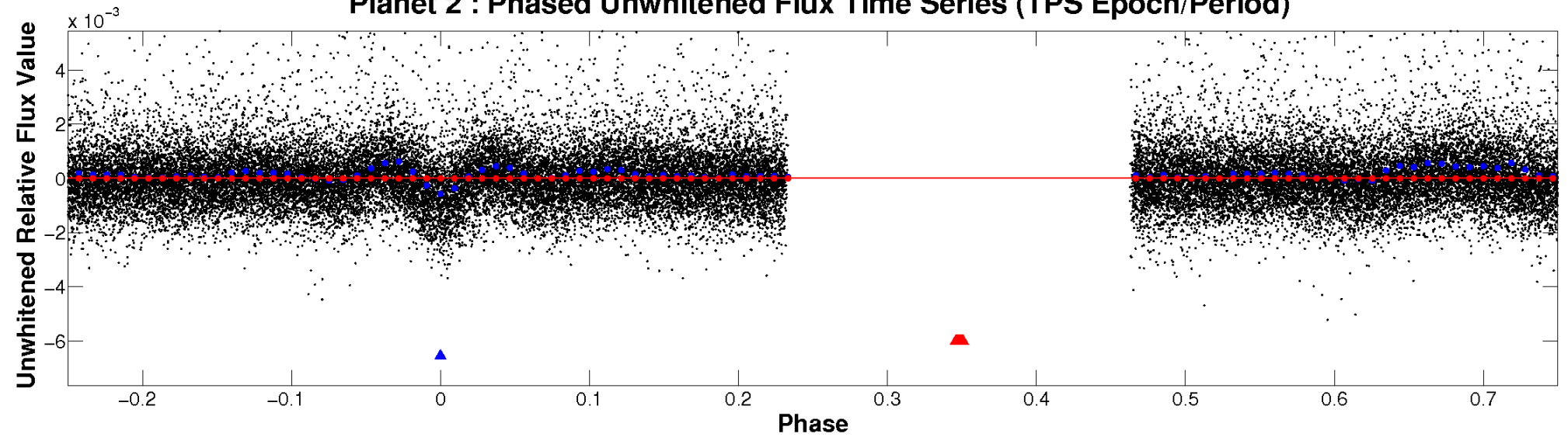
# ALT Odd/Even

TCE 004544623-02

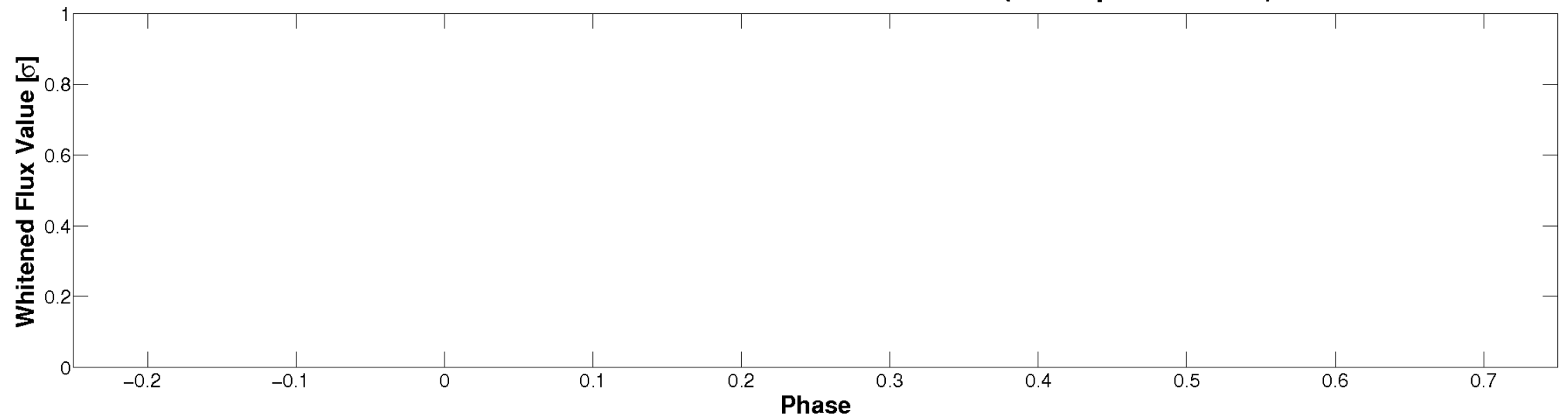


# Non-Whitened Vs. Whitened Light Curve

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

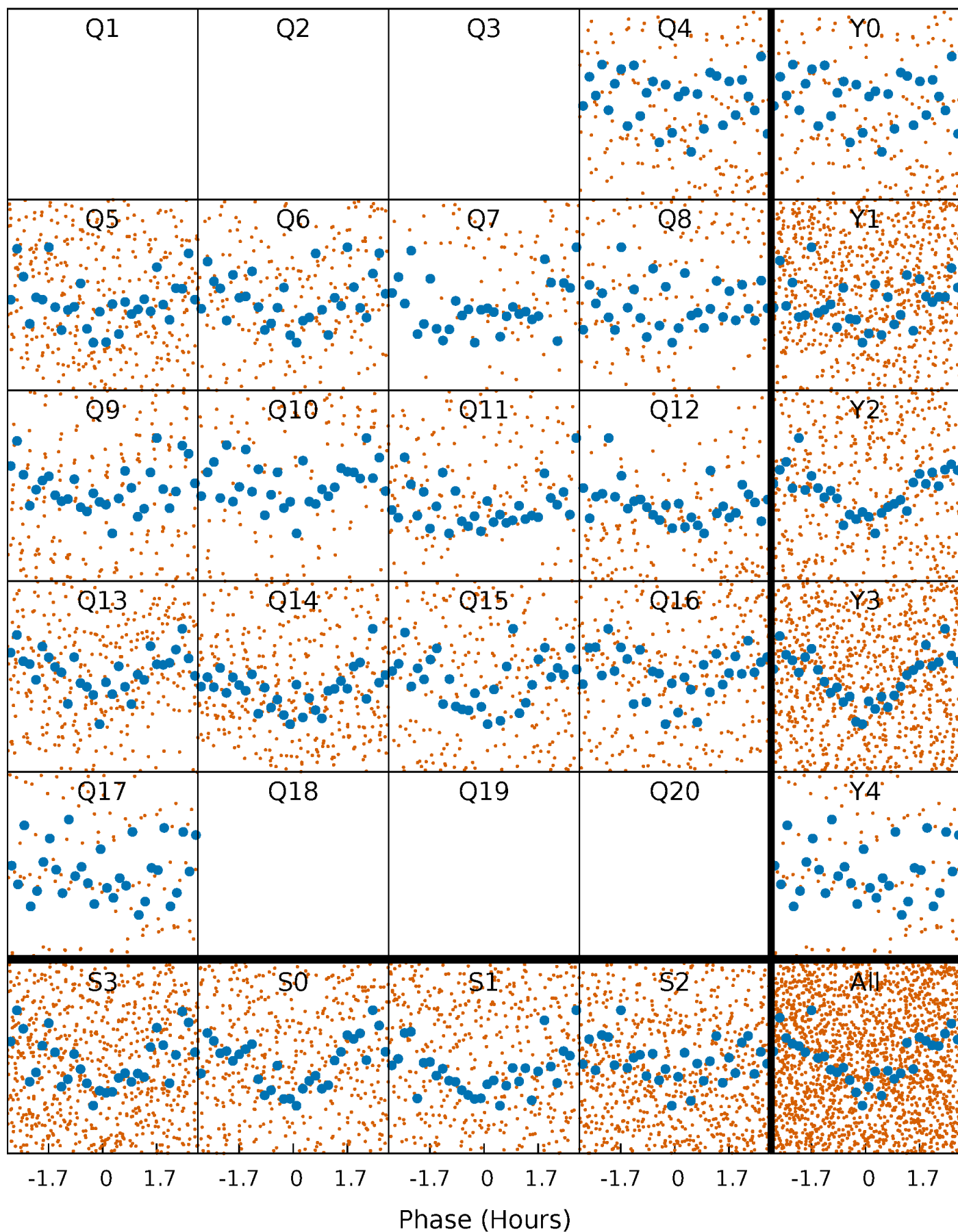


**Planet 2 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



# PDC Quarter-Phased Transit Curves

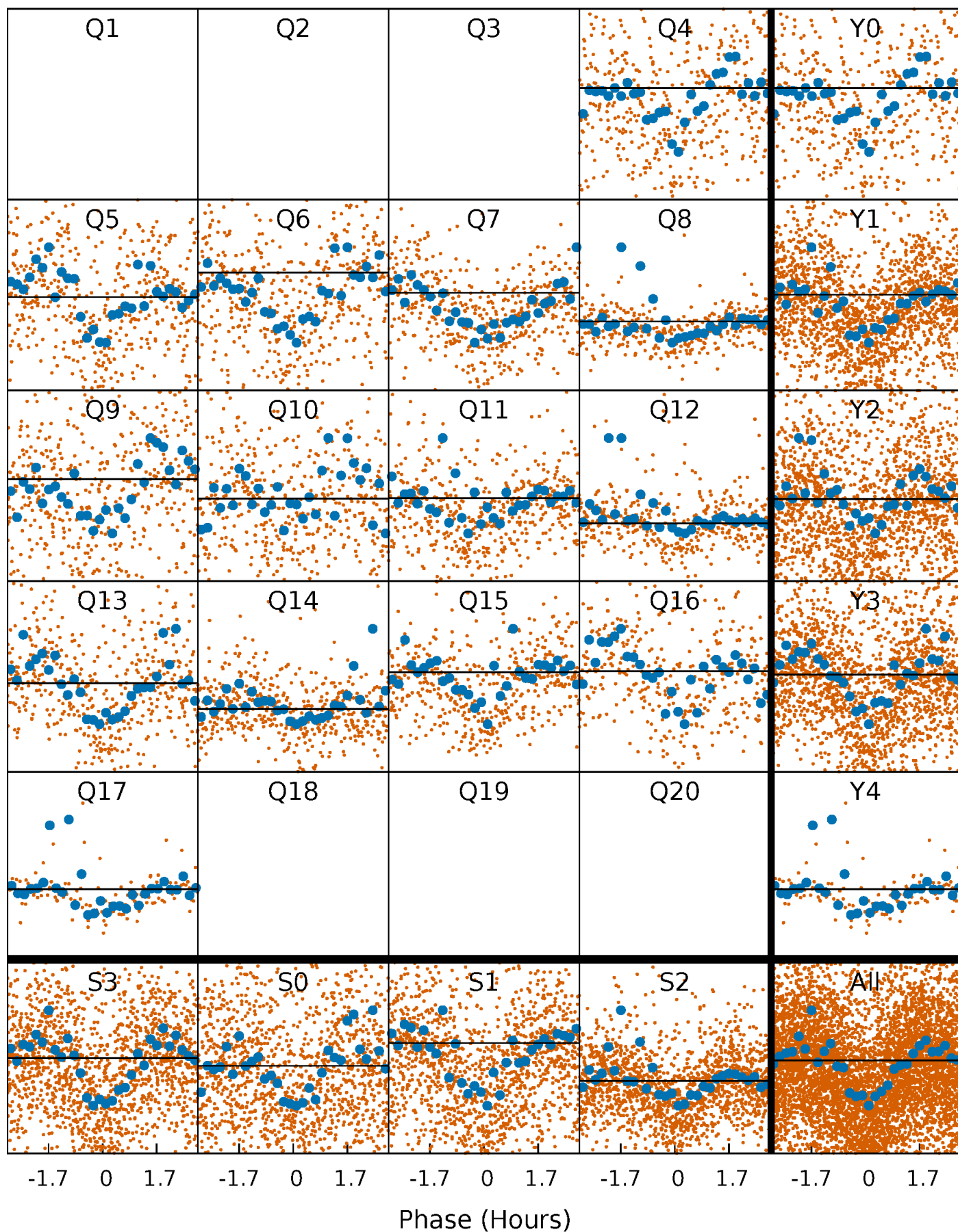
TCE 004544623-02 P= 2.189111 Days  $T_0=133.504744$  (BKJD)





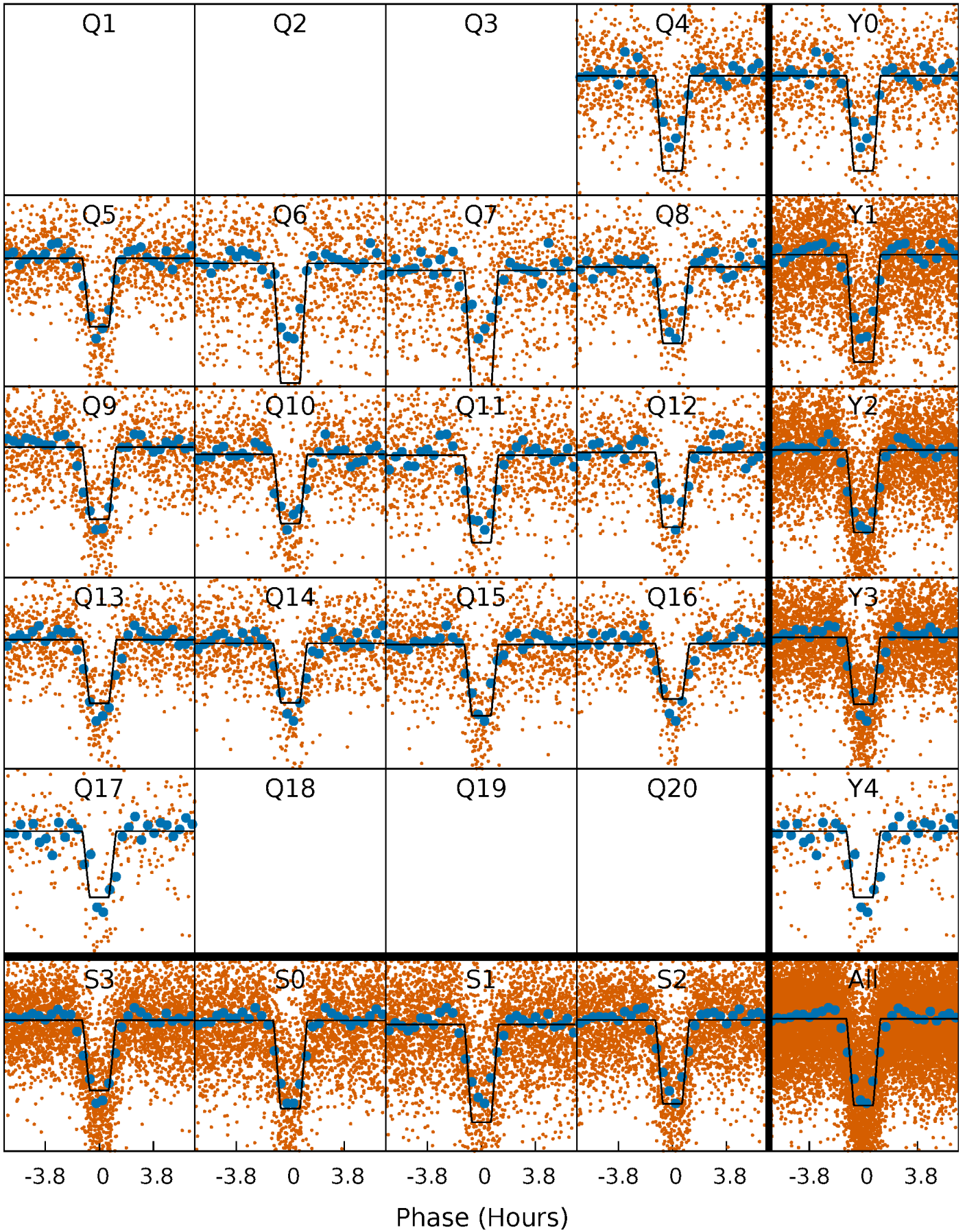
# DV Quarter-Phased Transit Curves

TCE 004544623-02 P= 2.189111 Days  $T_0=133.504744$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

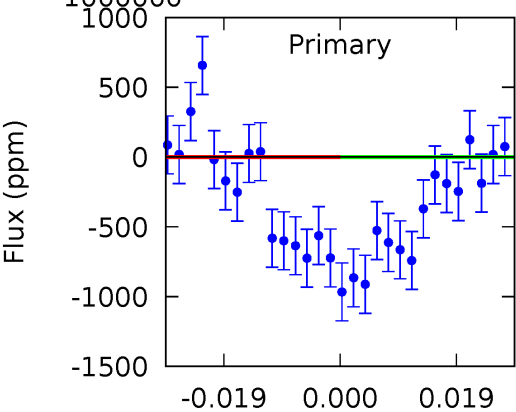
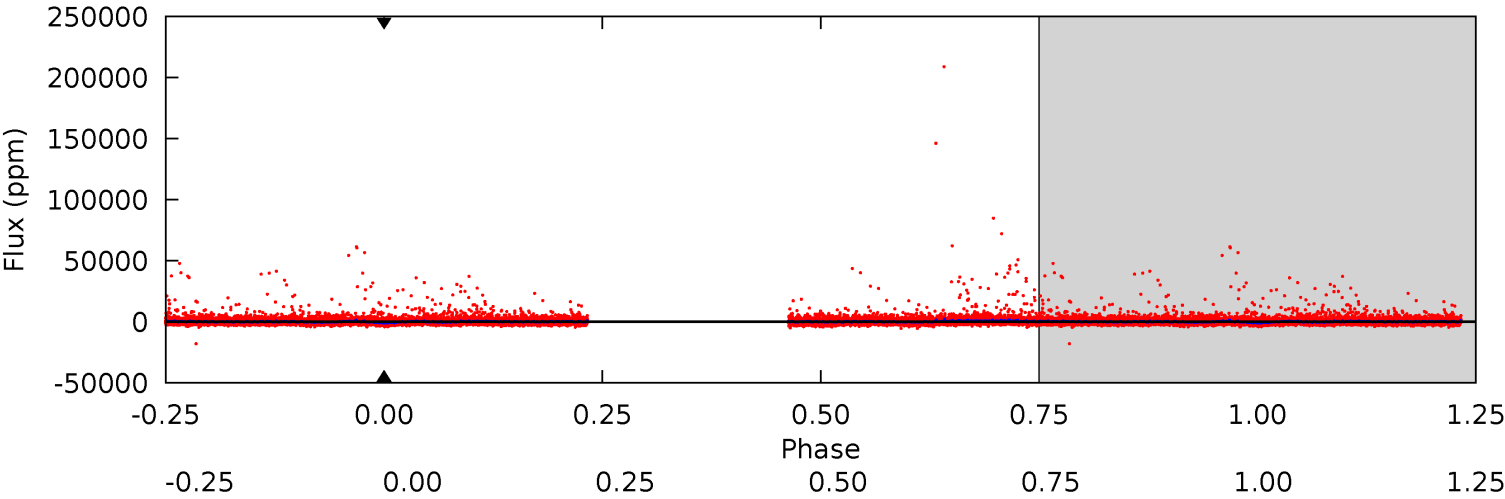
TCE 004544623-02 P= 2.189111 Days  $T_0=133.505770$  (BKJD)



# DV Model-Shift Uniqueness Test

004544623-02, P = 2.189111 Days, E = 133.504744 Days

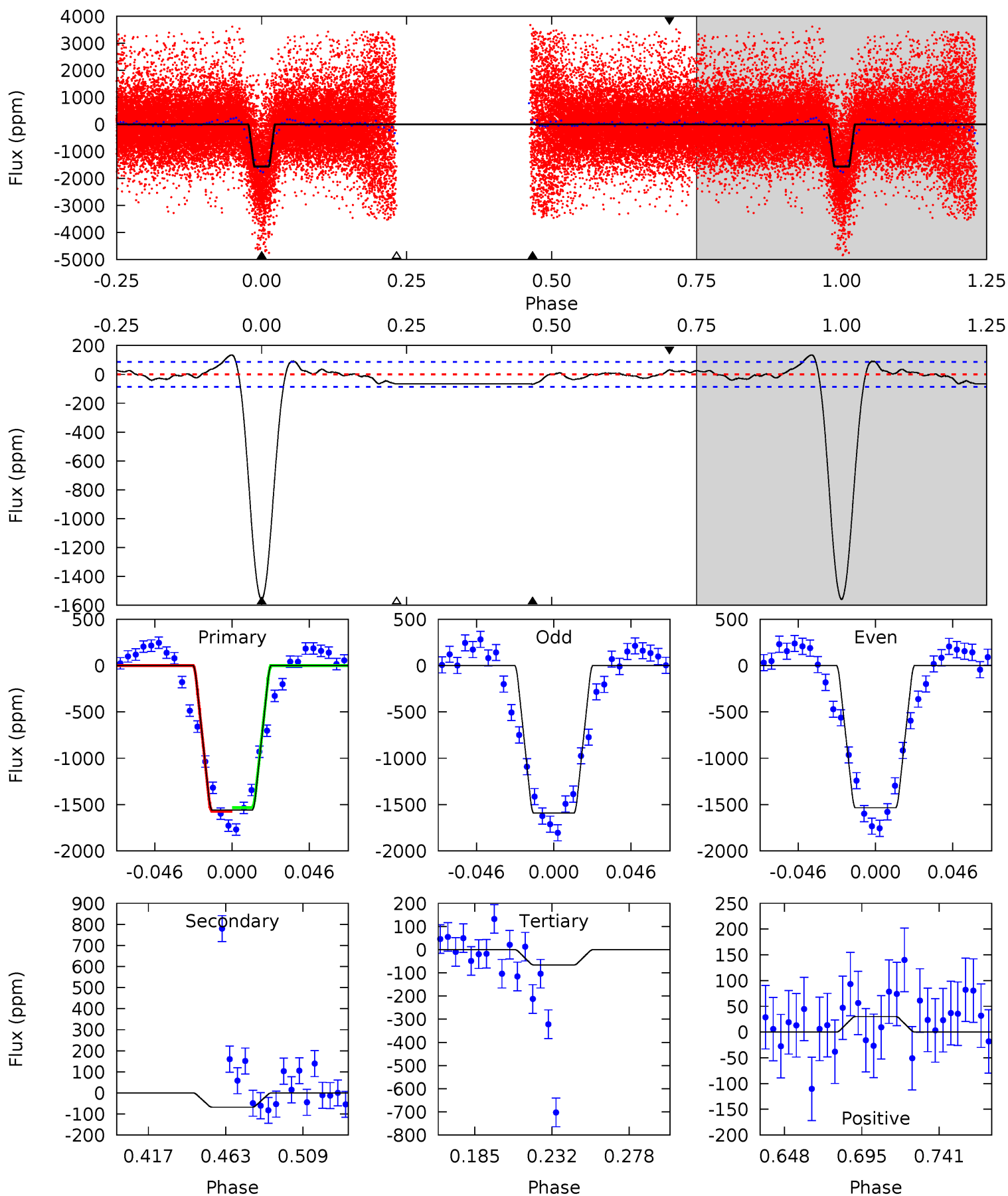
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

004544623-02, P = 2.189111 Days, E = 133.505770 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
85.2	3.69	3.60	1.65	4.72	1.99	1.89	81.6	83.5	0.09	2.05	1.58	0.99	0.08	1.03



### Stellar Parameters For KIC 004544623

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3624^{+58}_{-72}$	$4.848^{+0.045}_{-0.036}$	$-0.200^{+0.100}_{-0.100}$	$0.406^{+0.038}_{-0.041}$	$0.425^{+0.036}_{-0.044}$	$8.948^{+2.013}_{-1.369}$
	+2%/-2%	+1%/-1%	+50%/-50%	+9%/-10%	+8%/-10%	+22%/-15%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 004544623-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$0 \pm 1000000$	$3.90^{+3.70}_{-2.56}$	$901^{+22}_{-22}$	$3028^{+3998}_{-9103}$	$55^{+4052}_{-2461}$
Alt.	$-68 \pm 18$	$3.85^{+3.43}_{-2.51}$	$902^{+21}_{-23}$	$1935^{+552}_{-404}$	$1.478^{+11.112}_{-1.092}$

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

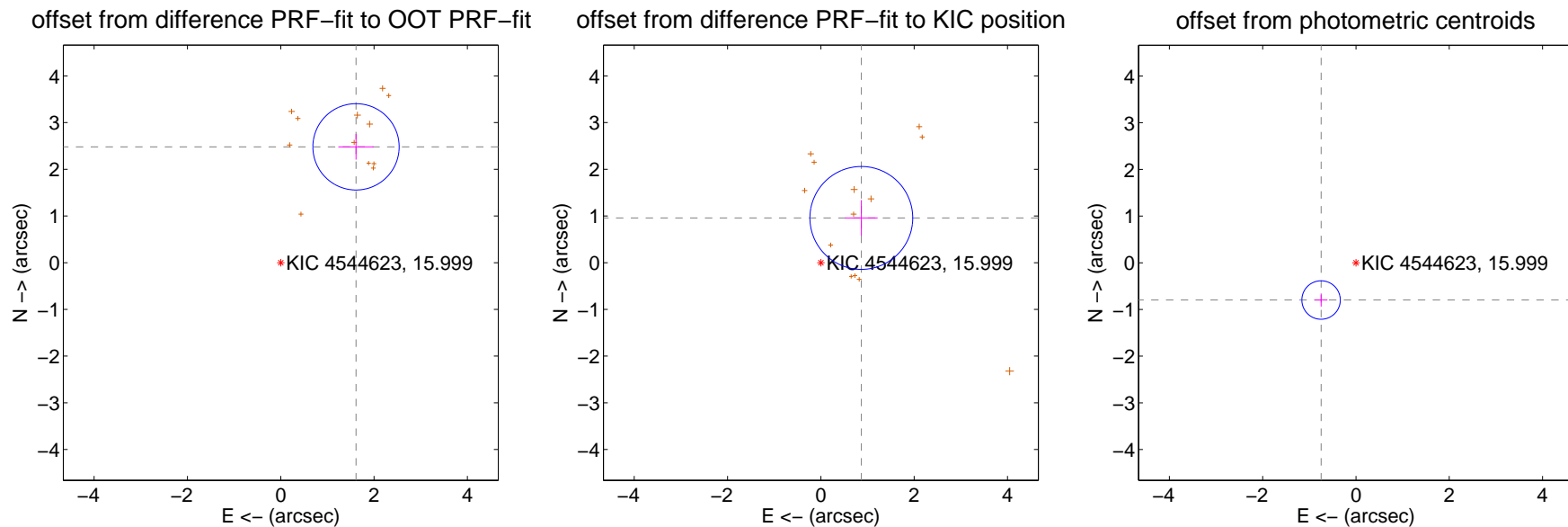
## DV Centroid Data

Supplemental centroid analysis for 004544623-02. Kepler magnitude: 16.00. Transit SNR -1.00

There are 1 quarters with good PRF difference image offsets

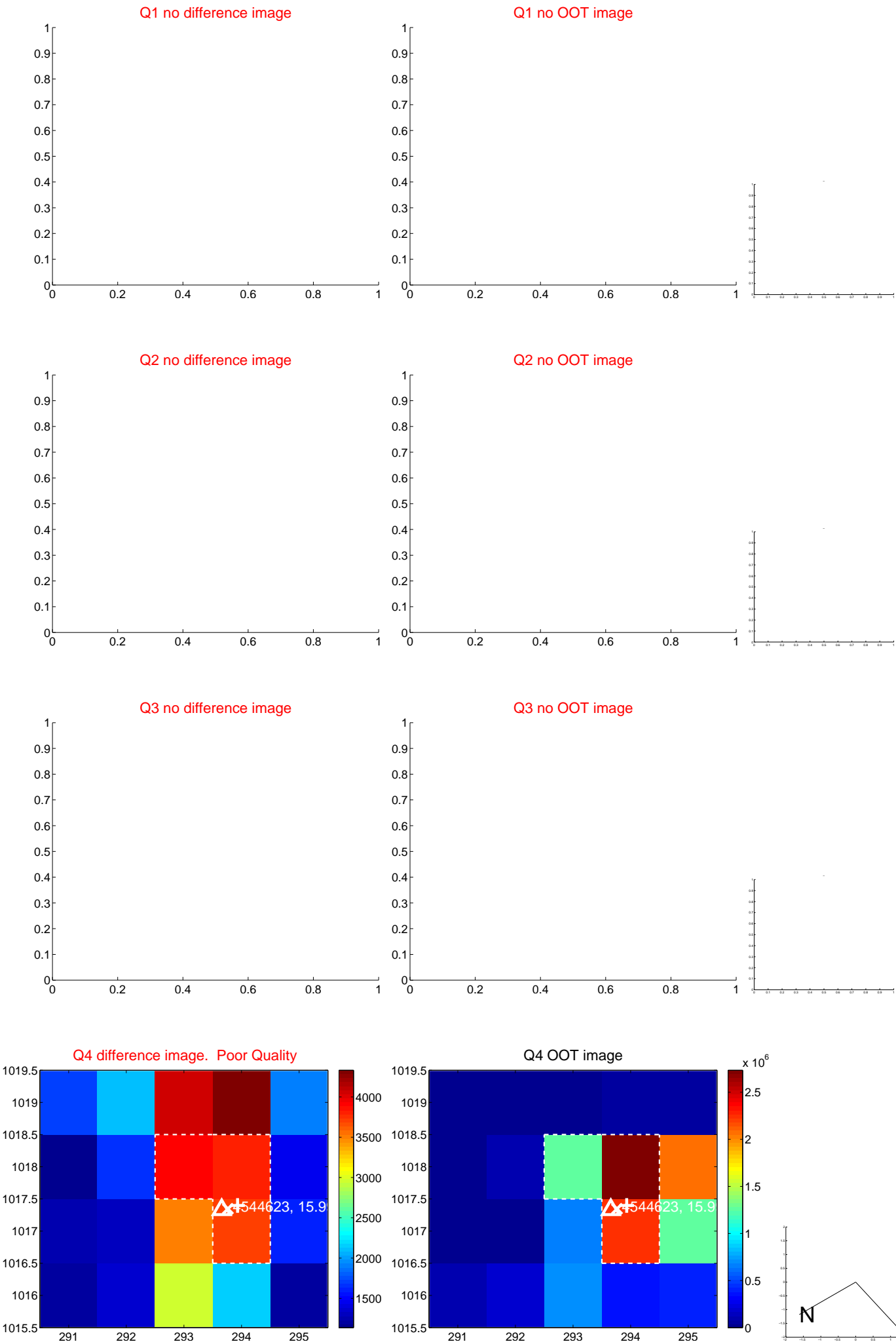
The OOT PRF centroid is offset from the target star catalog position by about 2.82 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.959 \pm 0.308$	9.60	$-1.613 \pm 0.378$	$2.481 \pm 0.273$
PRF-fit source offset from KIC position	$1.293 \pm 0.367$	3.52	$-0.867 \pm 0.348$	$0.958 \pm 0.382$
photometric centroid source offset	$1.09 \pm 0.14$	7.96	$0.75 \pm 0.13$	$-0.80 \pm 0.14$



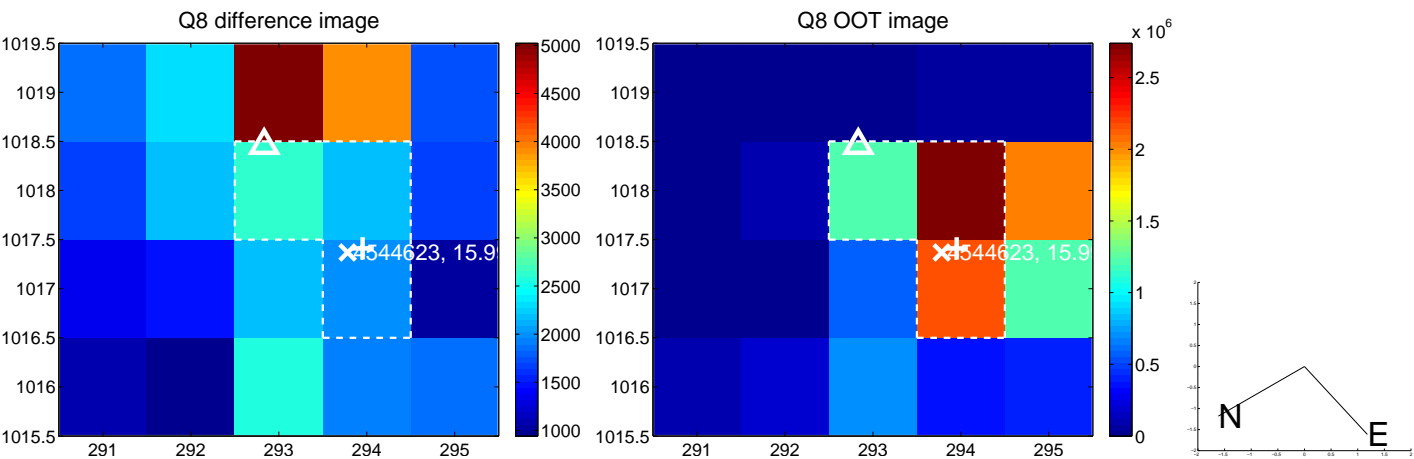
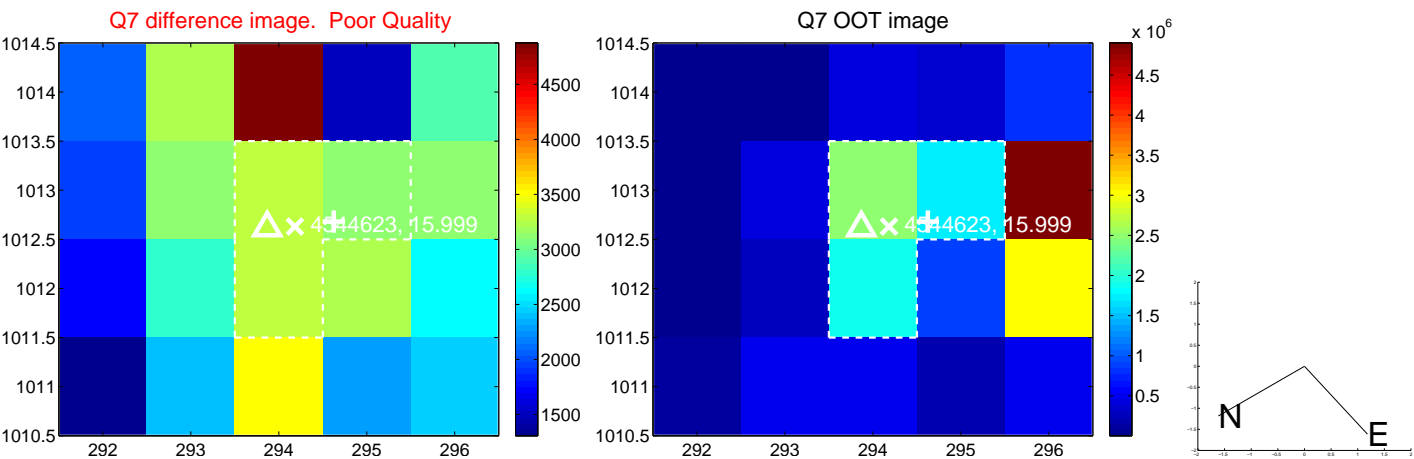
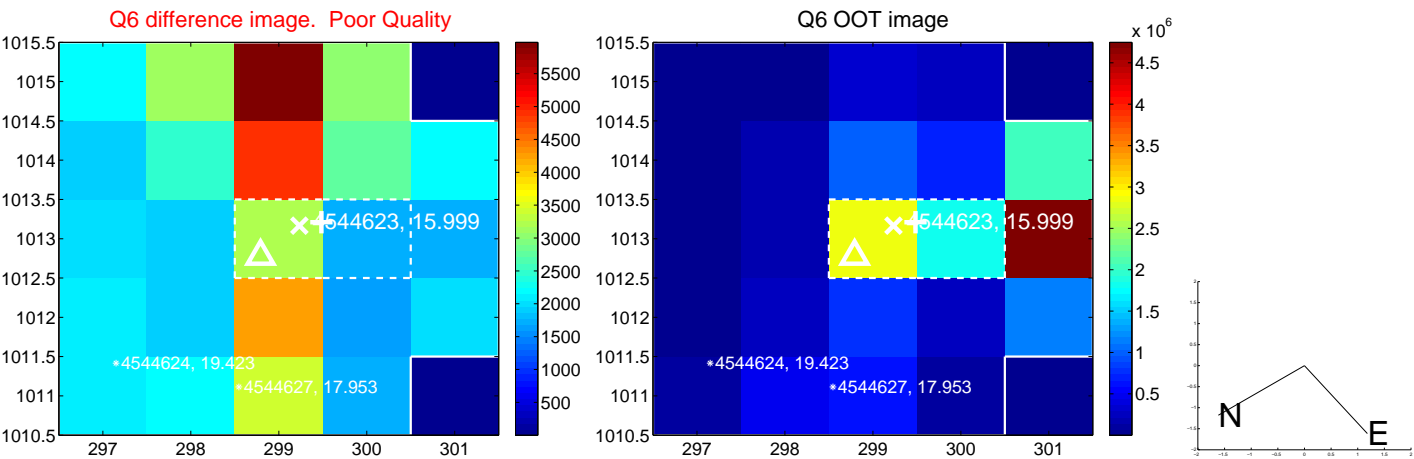
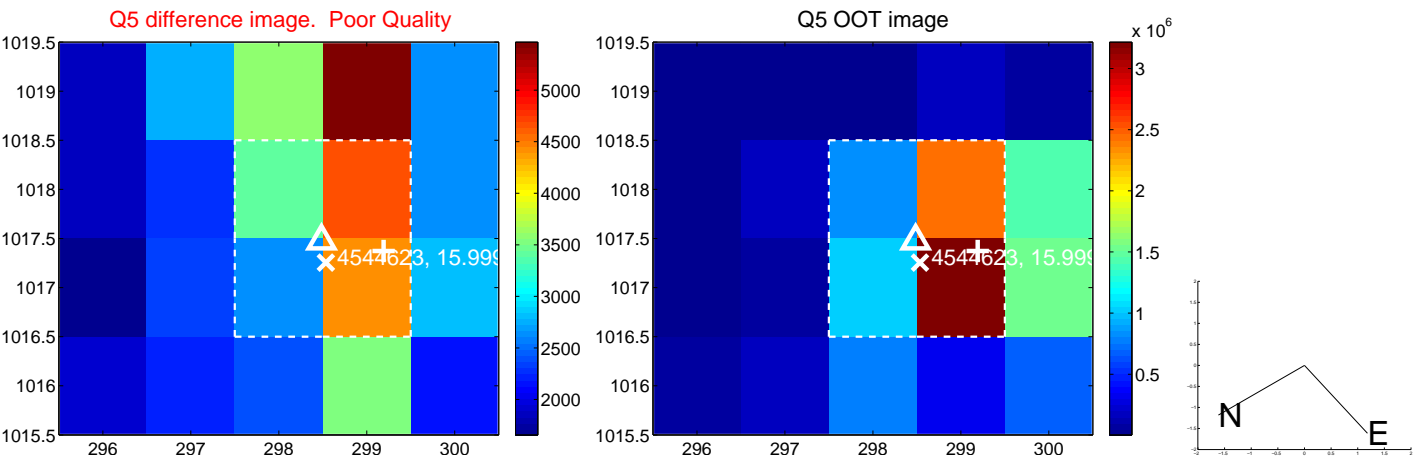
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

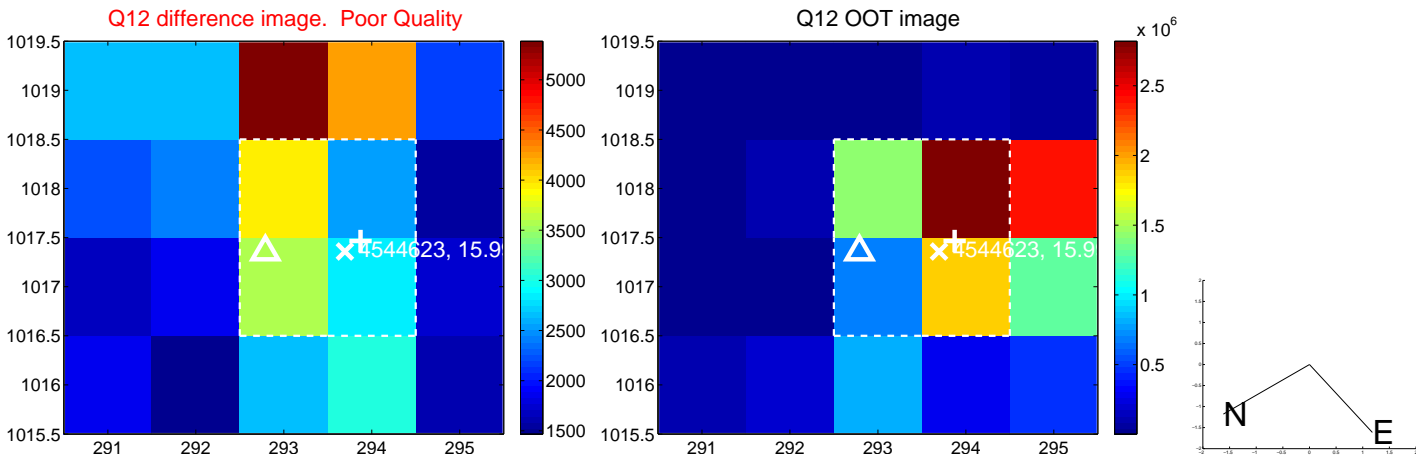
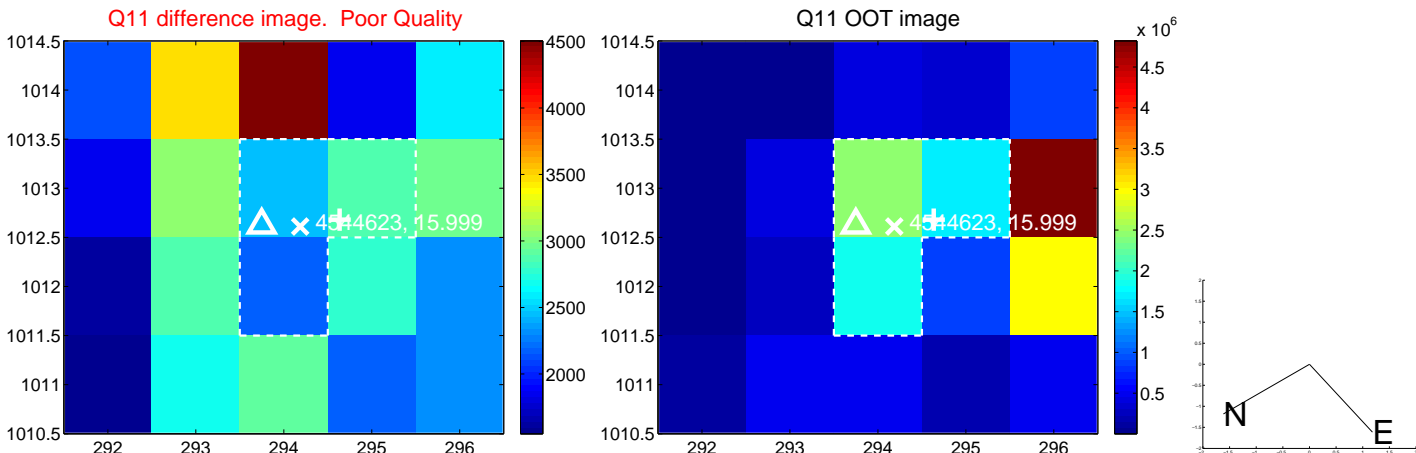
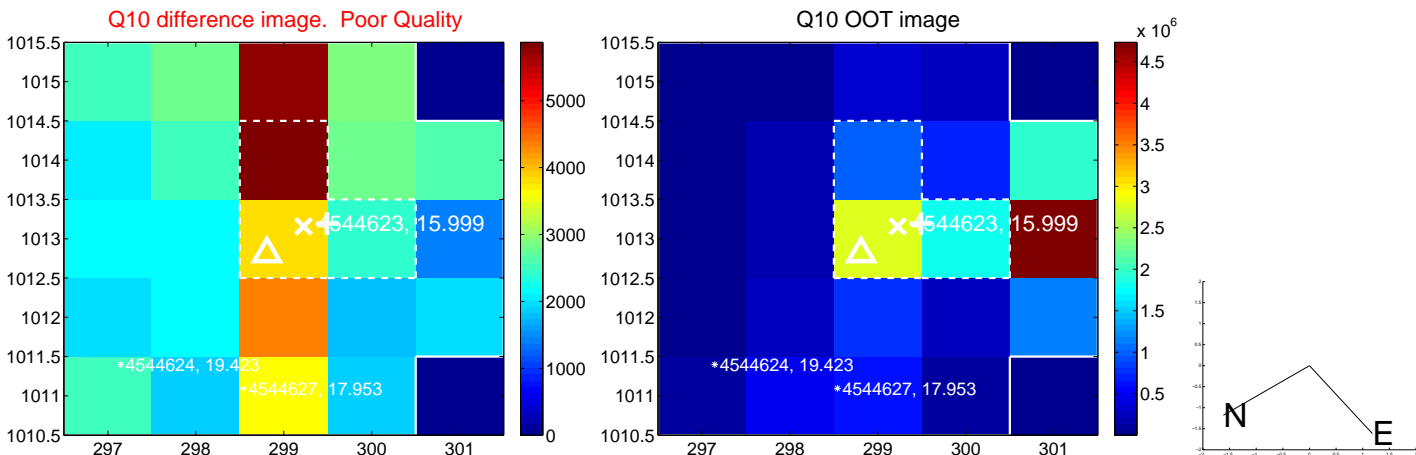
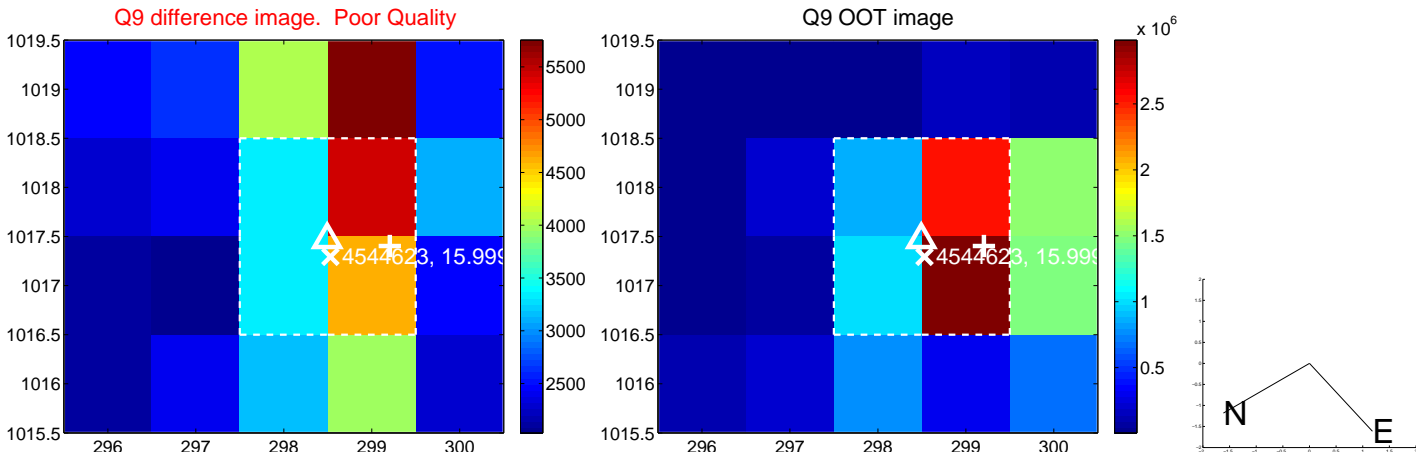




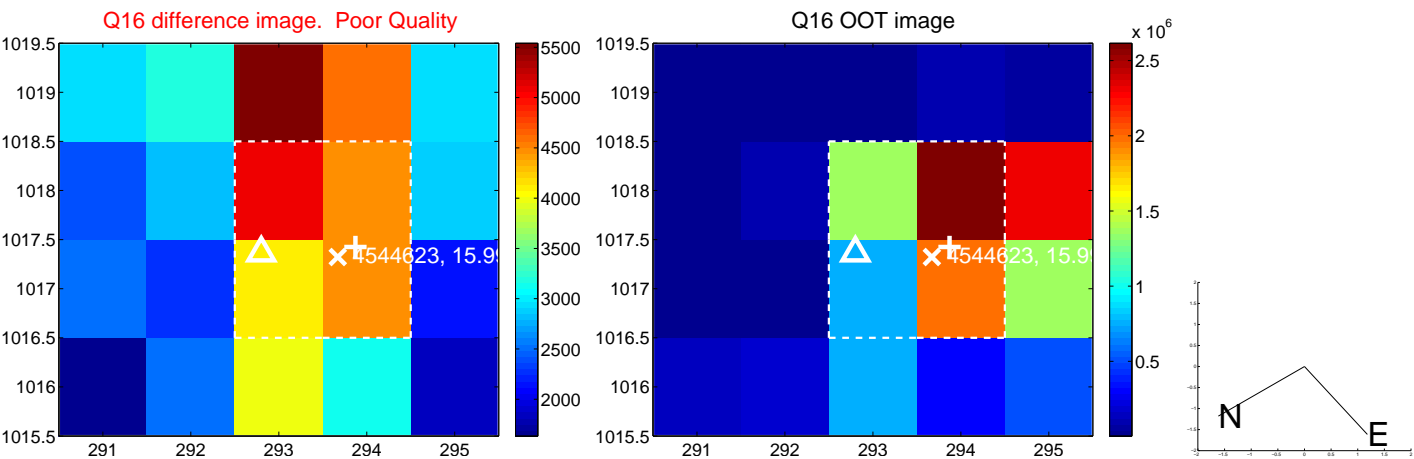
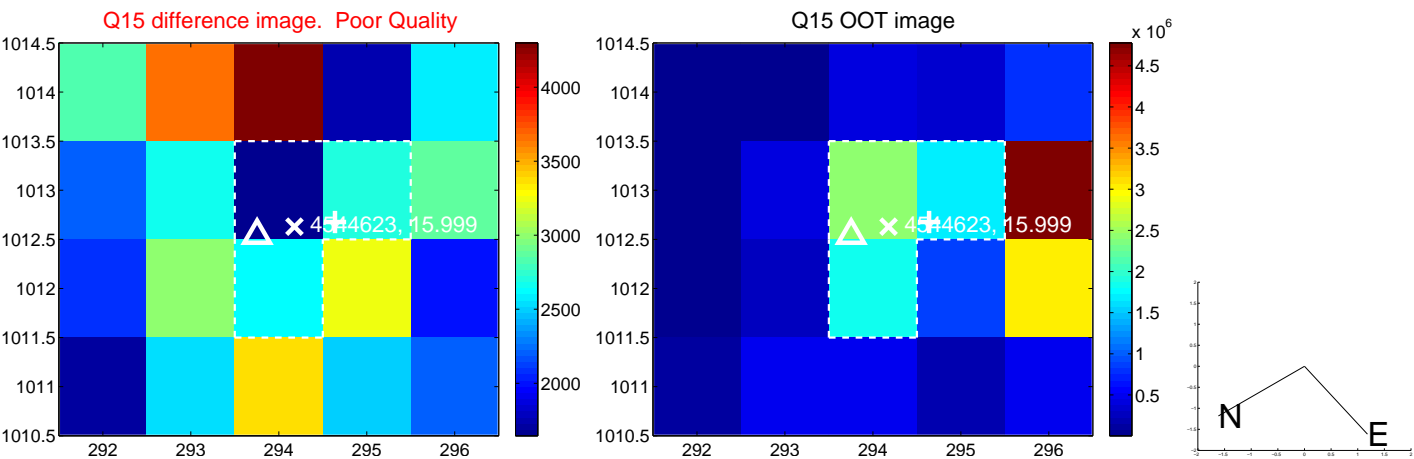
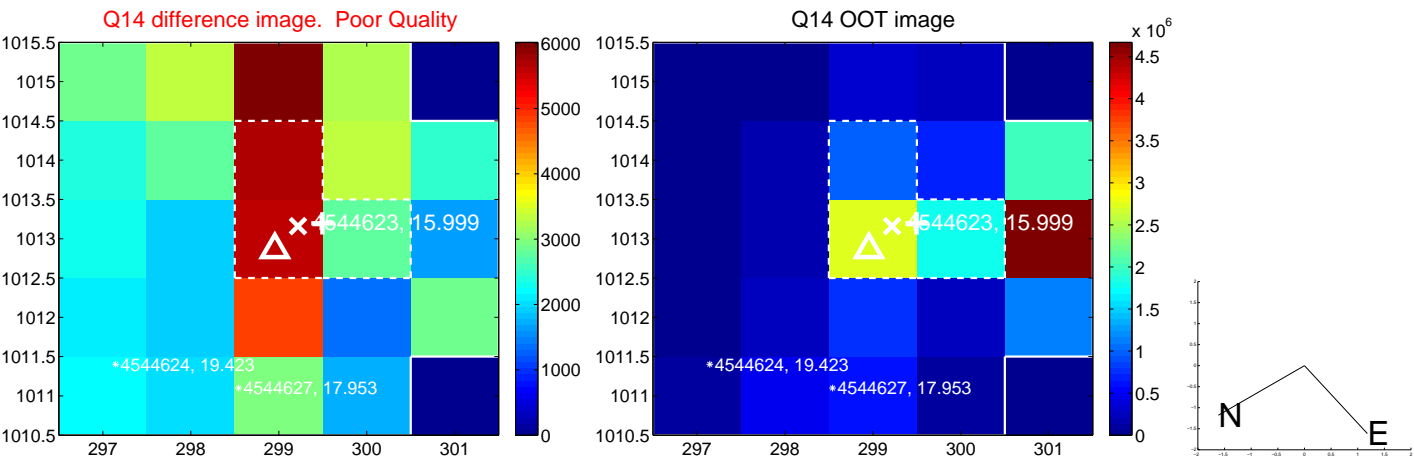
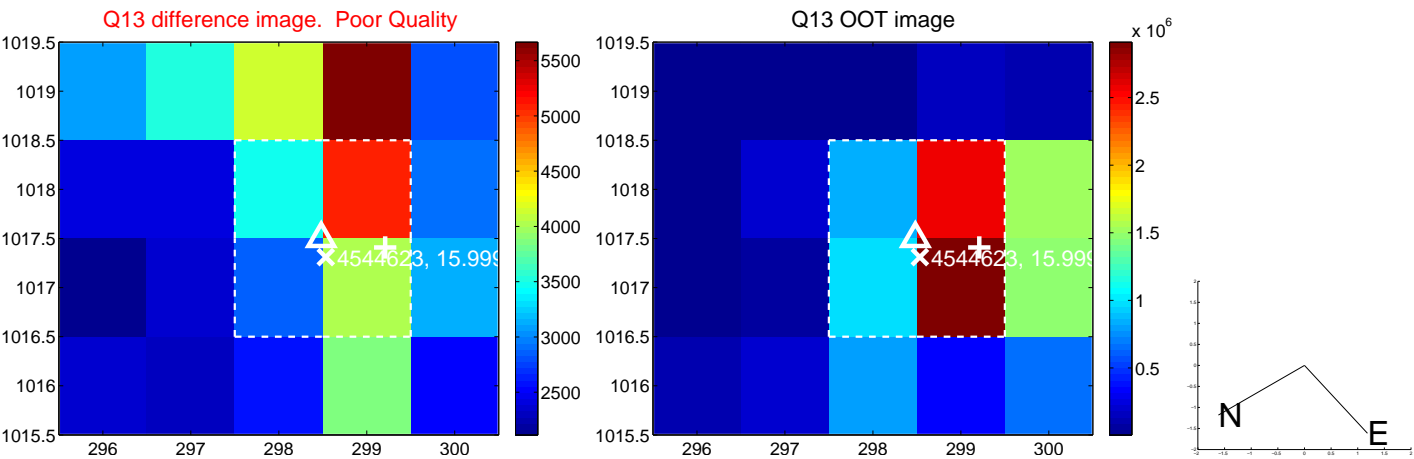
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



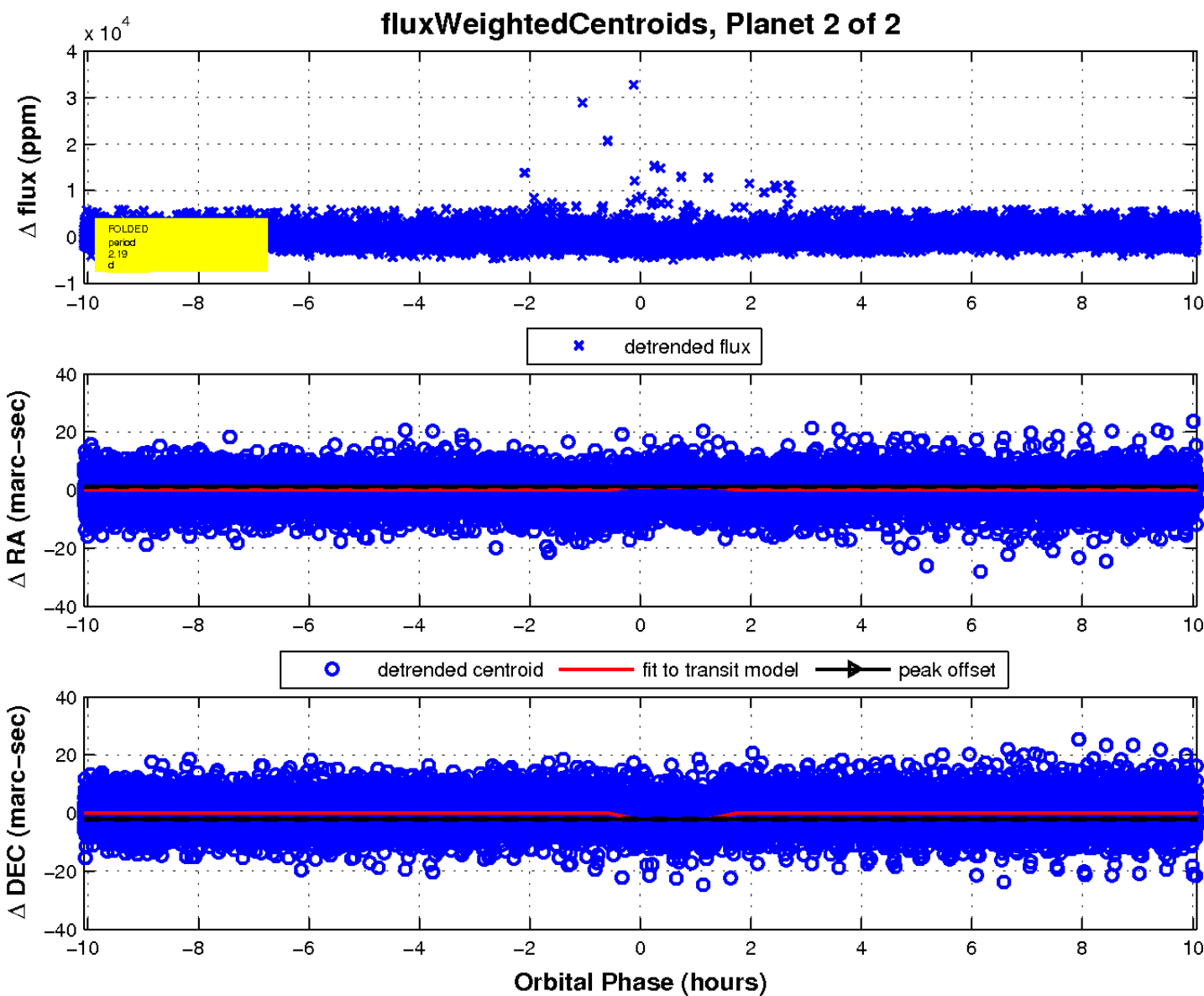
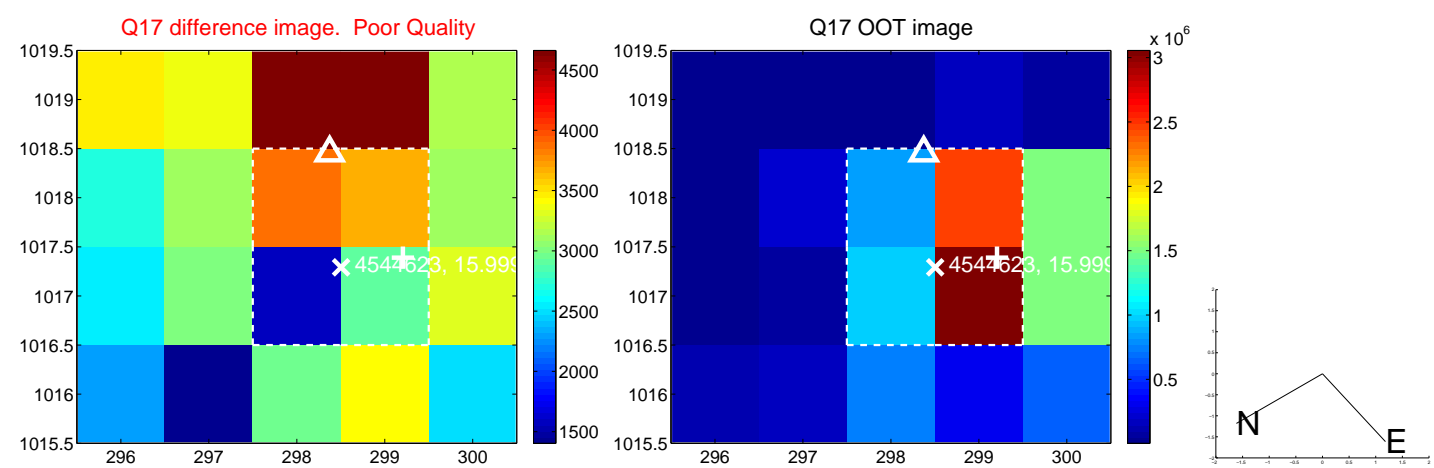
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

