

# KIC 005866099

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005866099-01	OBS	1055.01	36.977168	133.624923	1263.8	4.861	70.1	63.5	1.24	5589	8.57	31.12
005866099-02	OBS	No	36.977305	160.679057	212.8	11.452	15.6	16.5	1.24	5589	3.67	31.12

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005866099-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_DV—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH
005866099-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_RESOLVED_OFFSET—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 005866099-01

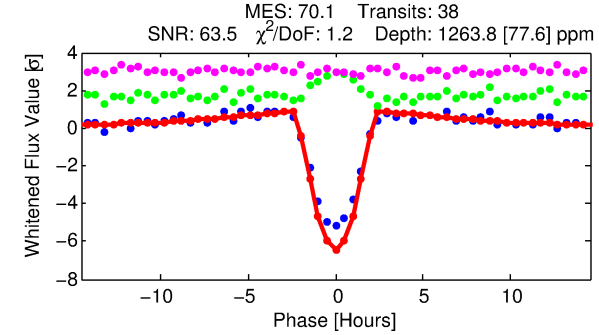
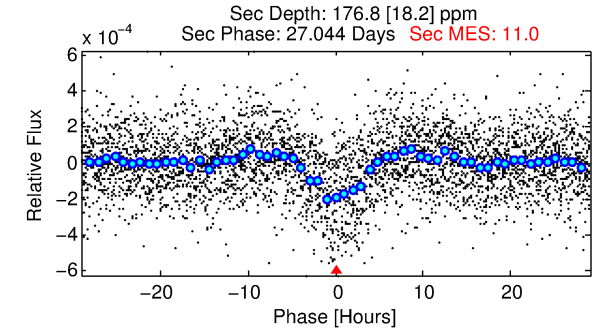
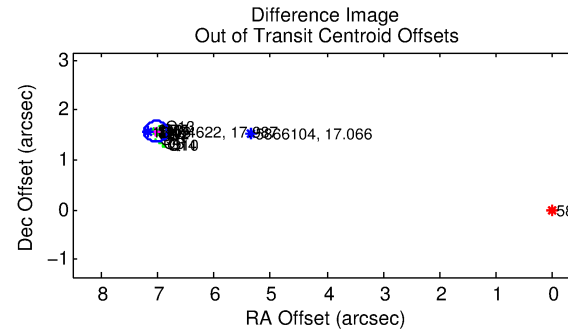
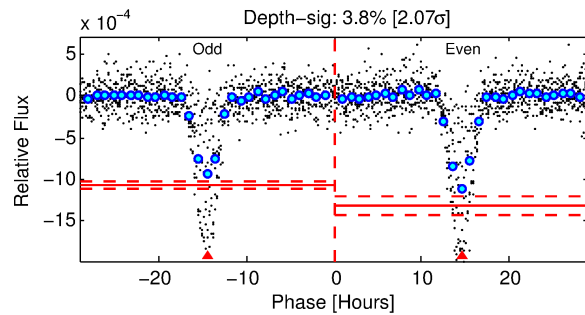
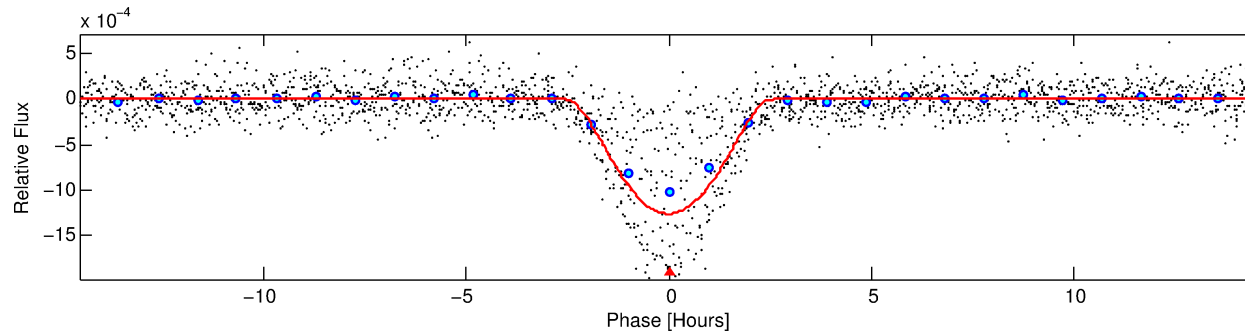
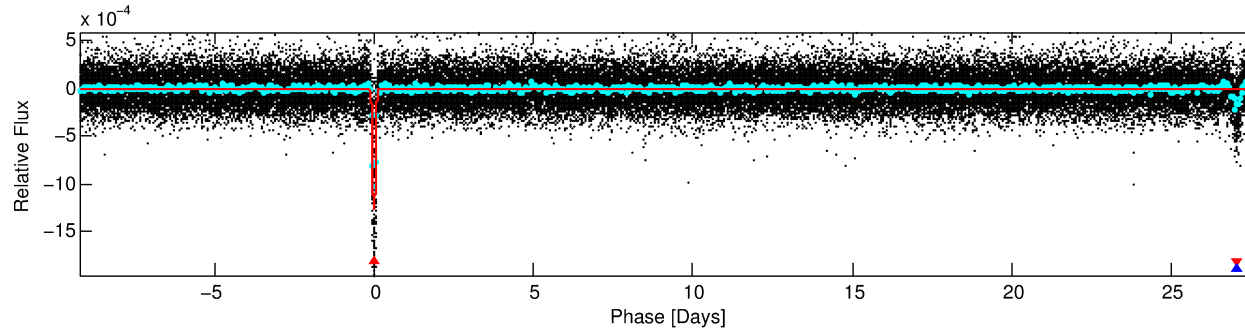
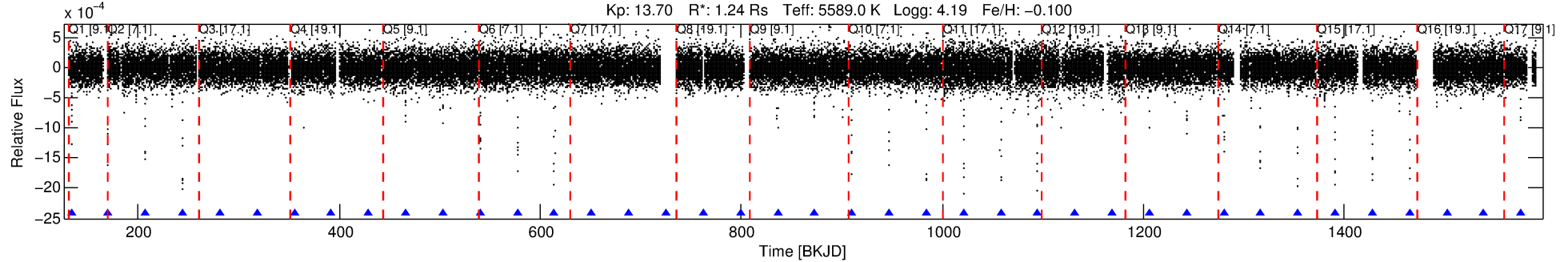
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
005866099-01	5866099	3651.01	5866104	1:1	5.5	0	-1	17.07	13.70	168.61	Direct-PRF	0	0.04	0.04

**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: 5866099 Candidate: 1 of 2 Period: 36.977 d  
KOI: K01055.01 Corr: 0.996

Kp: 13.70 R\*: 1.24 Rs Teff: 5589.0 K Logg: 4.19 Fe/H: -0.100



## DV Fit Results:

Period = 36.97717 [0.00007] d  
Epoch = 133.6249 [0.0015] BKJD  
Rp/R\* = 0.0634 [0.0361]  
a/R\* = 21.09 [2.75]  
b = 1.00 [0.05]  
Seff = 31.12 [16.07]  
Teq = 602 [78] K  
Rp = 8.57 [5.51] Re  
a = 0.2077 [0.0633] AU  
Ag = 57.08 [71.20] [0.79σ]  
Teff = 2559 [735] K [2.65σ]

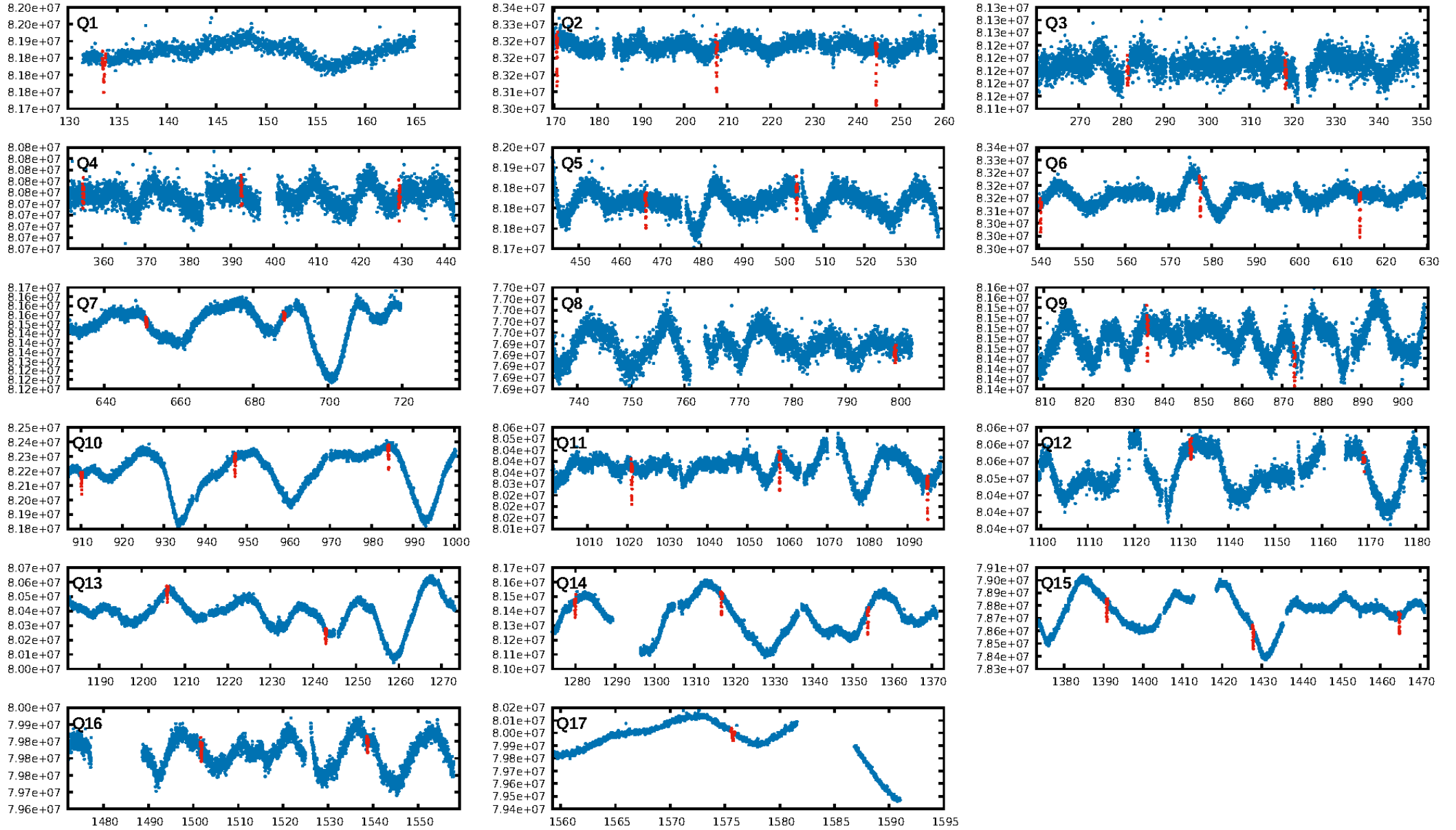
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 56.7%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [36/36]  
GhostDiagnostic-chr: -0.5162  
Centroid-sig: 0.0%  
Centroid-so: 37.837 arcsec [322.44σ]  
OotOffset-rm: 7.196 arcsec [104.62σ]  
KicOffset-rm: 7.391 arcsec [104.93σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

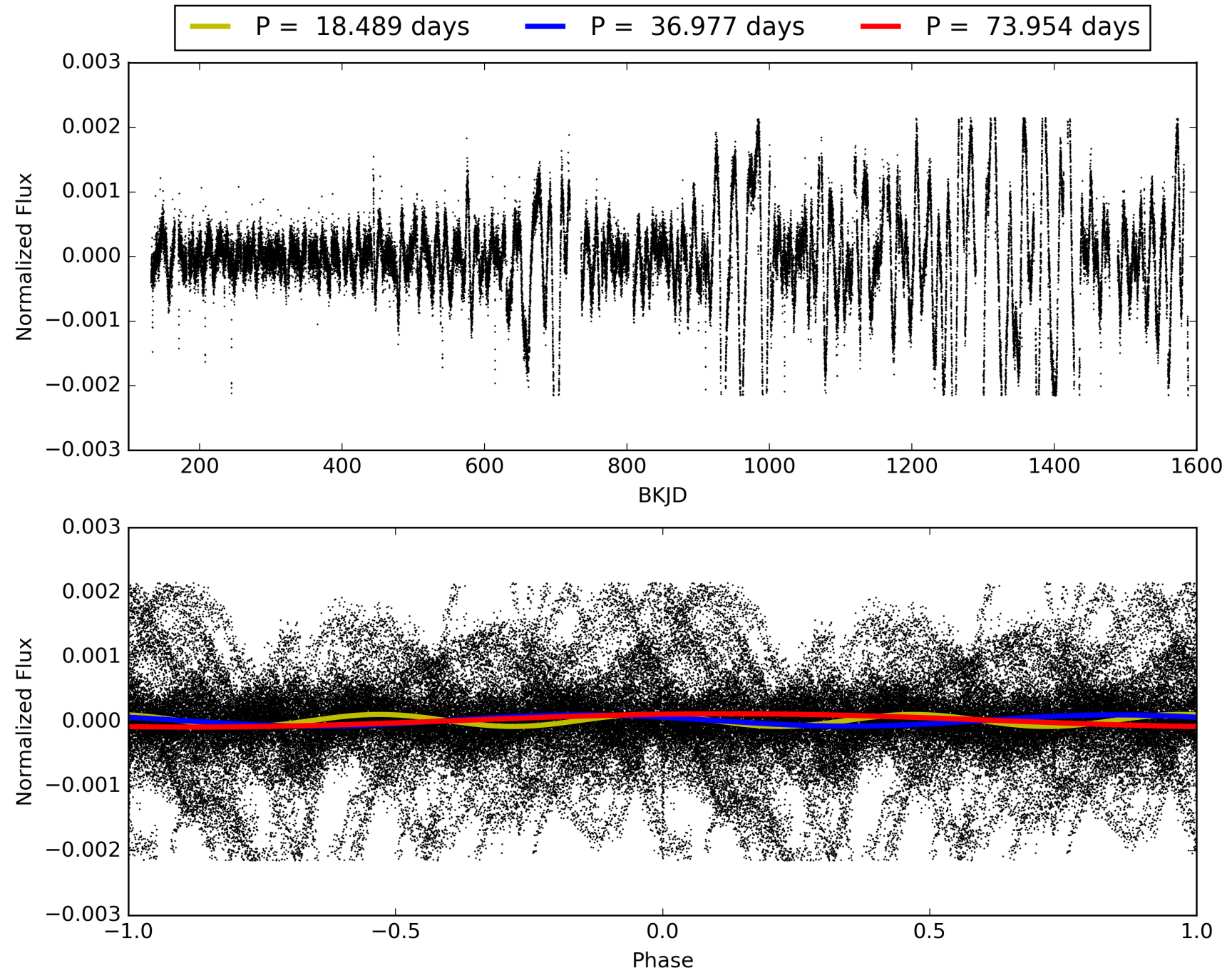
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 19:26:34 Z

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

# TCE 005866099-01, PDC Light Curves

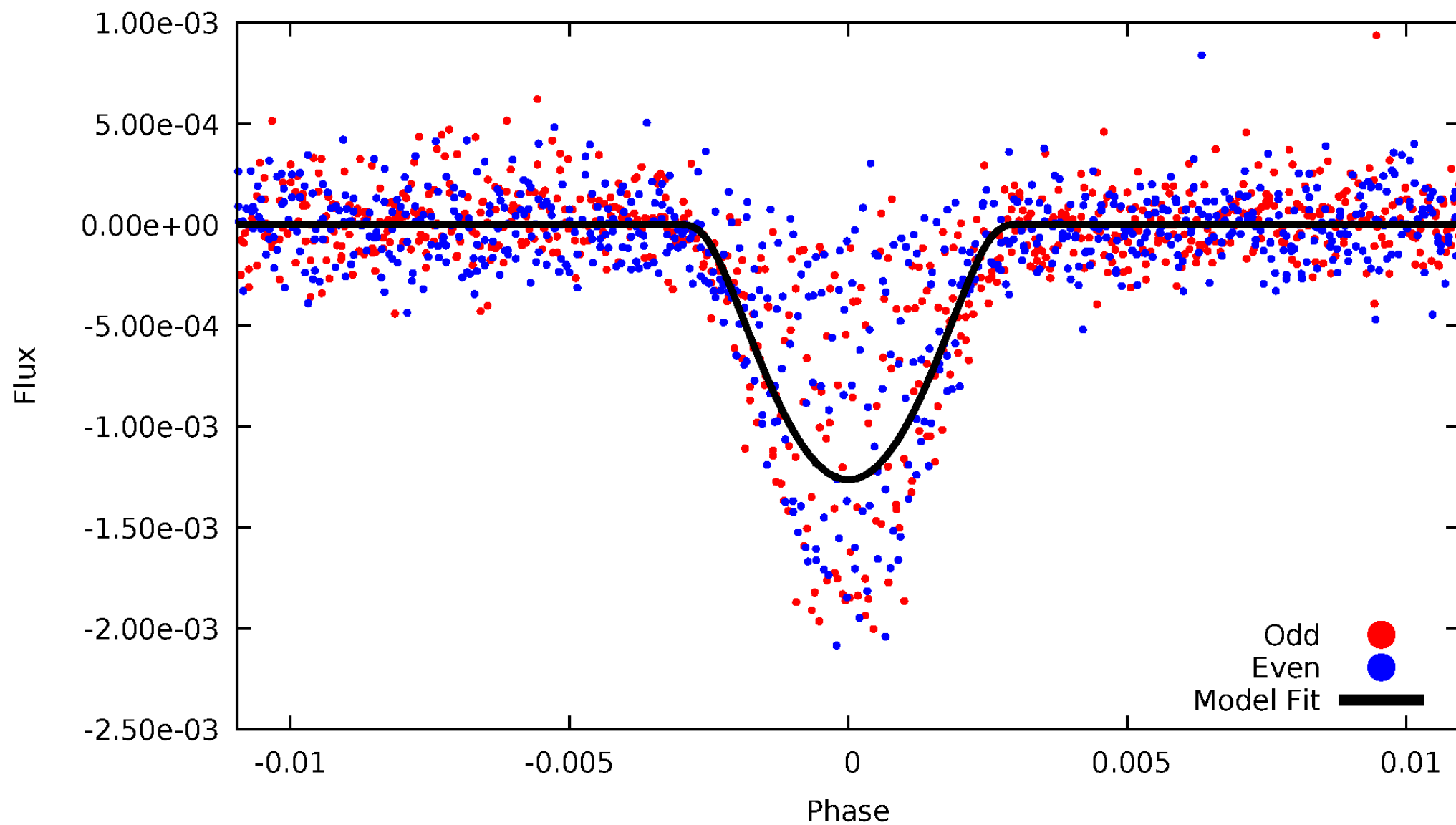


TCE 005866099-01



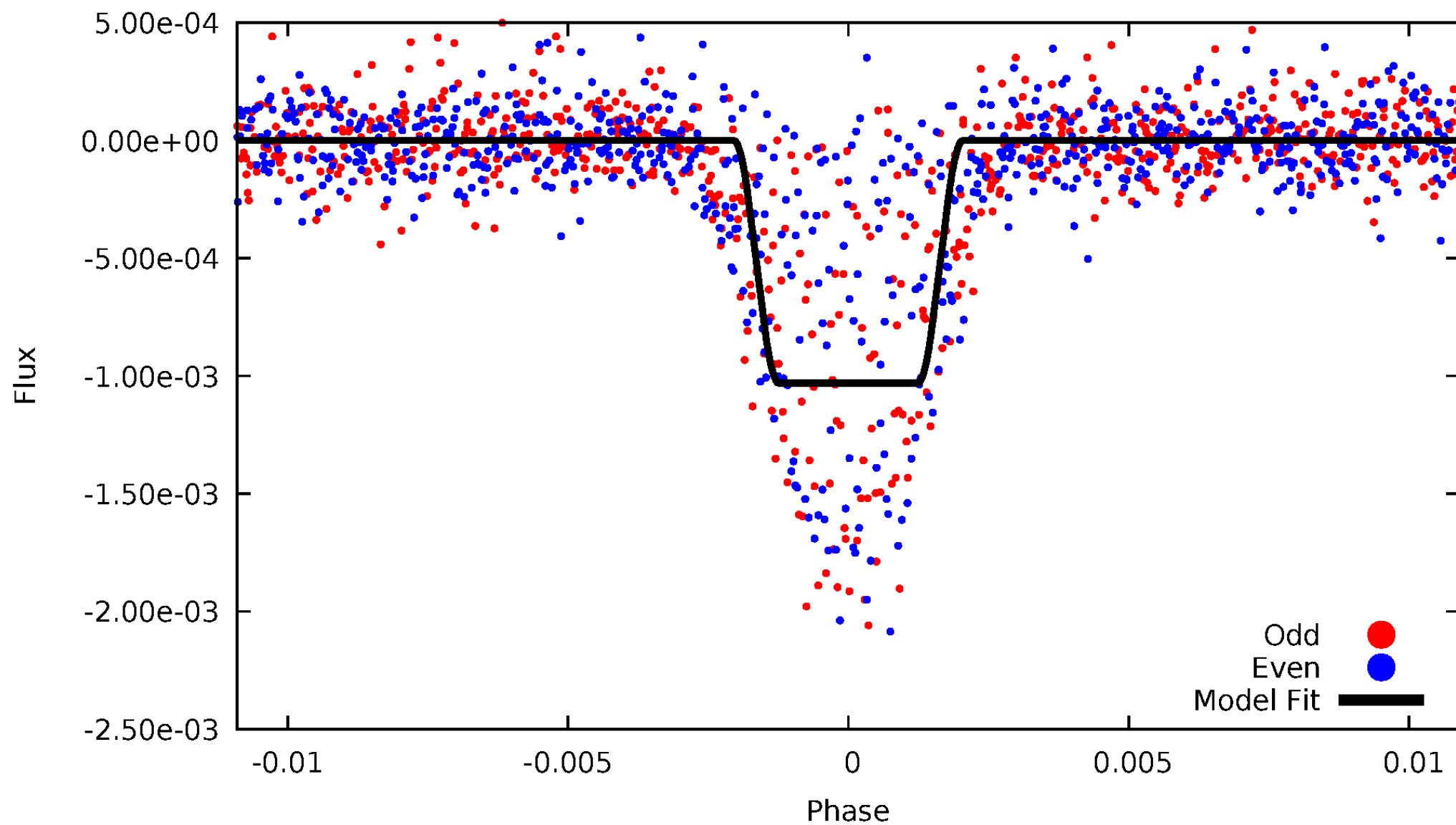
# DV Odd/Even

TCE 005866099-01

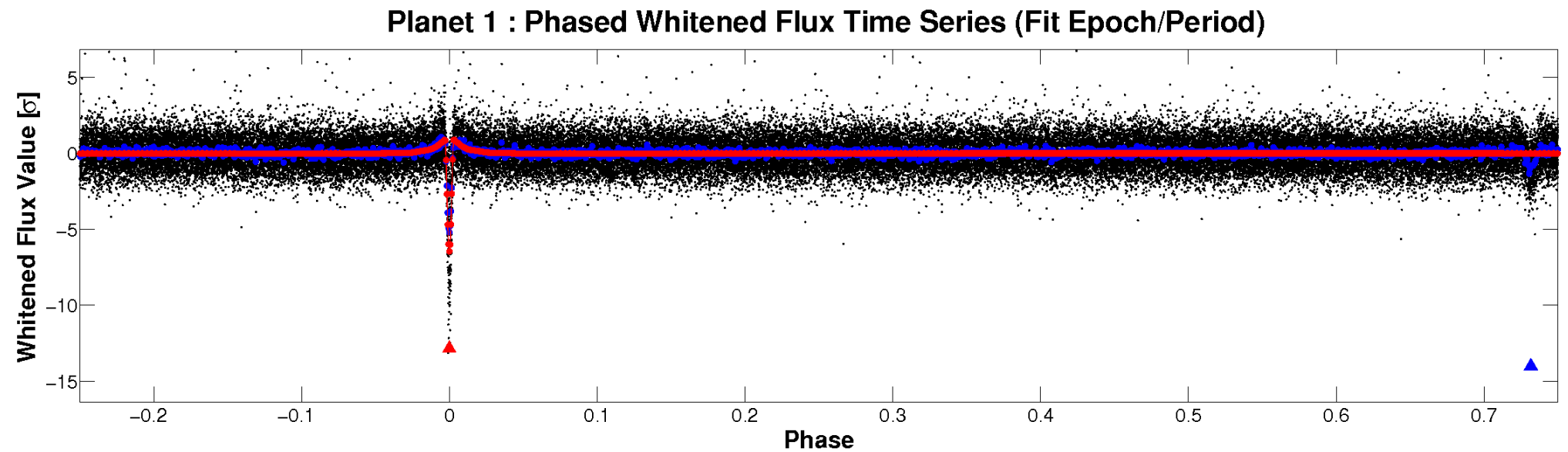
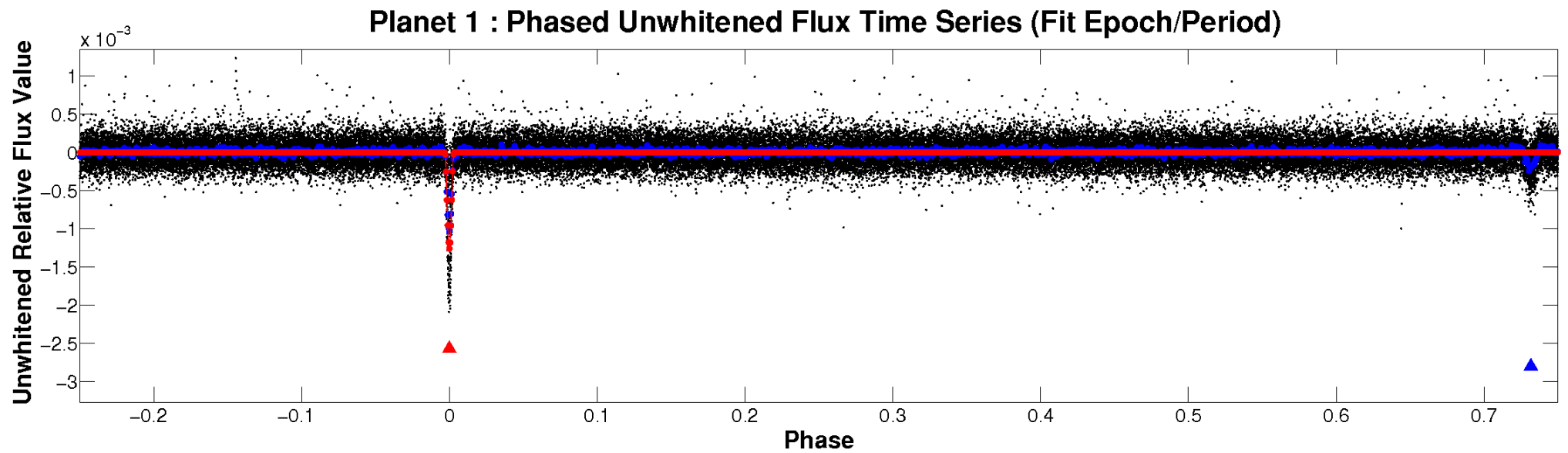


# ALT Odd/Even

TCE 005866099-01



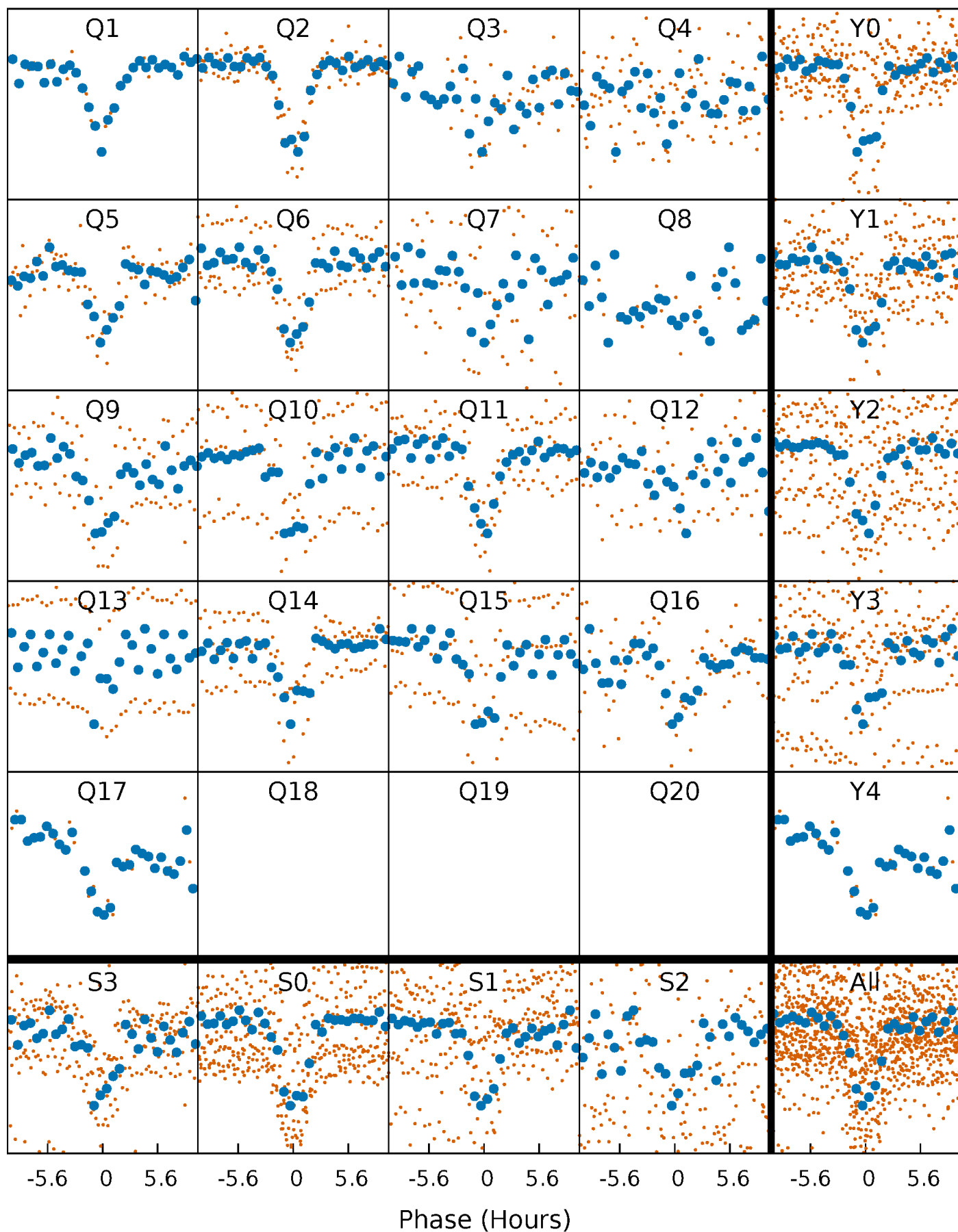
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

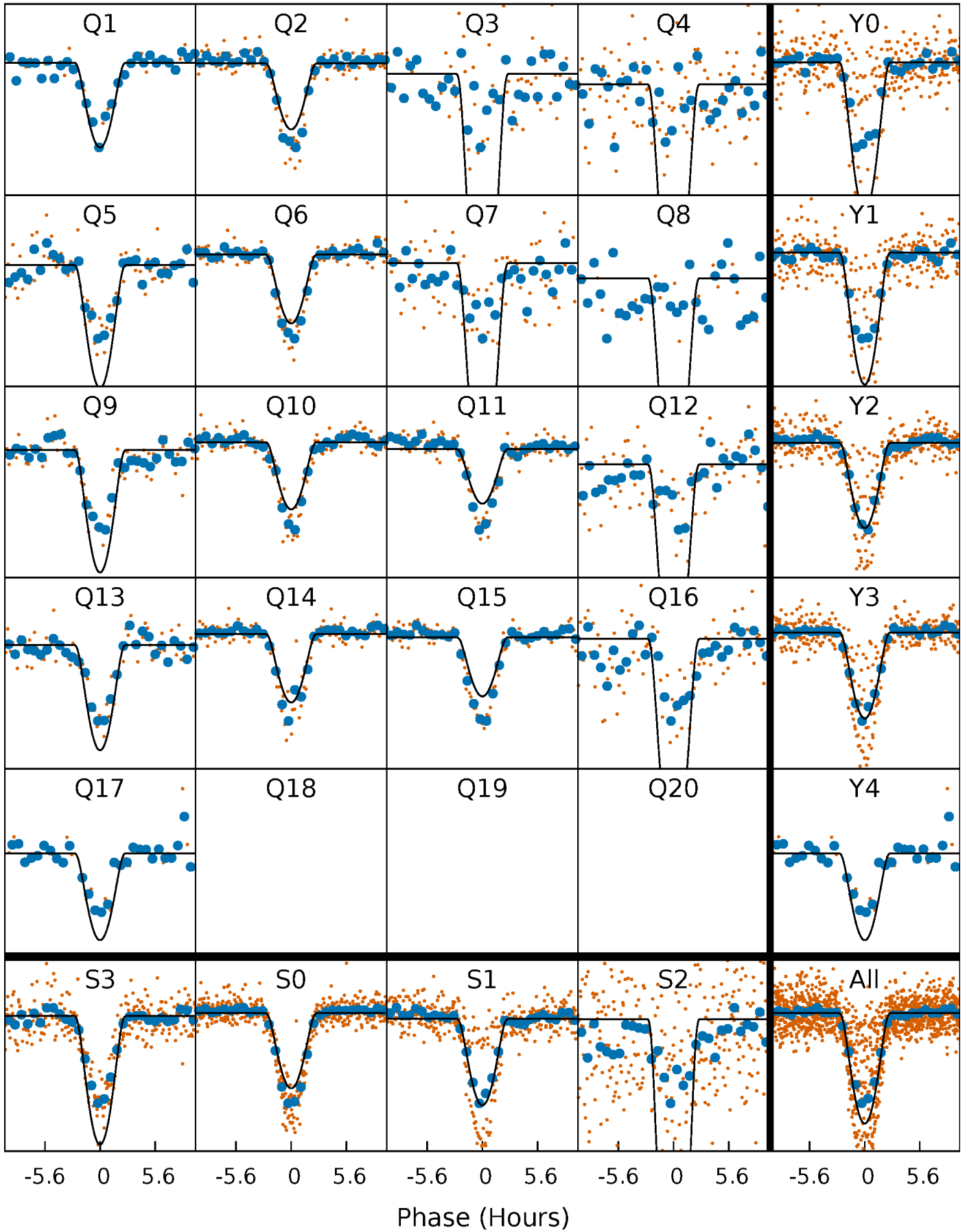
TCE 005866099-01   P= 36.977168 Days    $T_0=133.624923$  (BKJD)





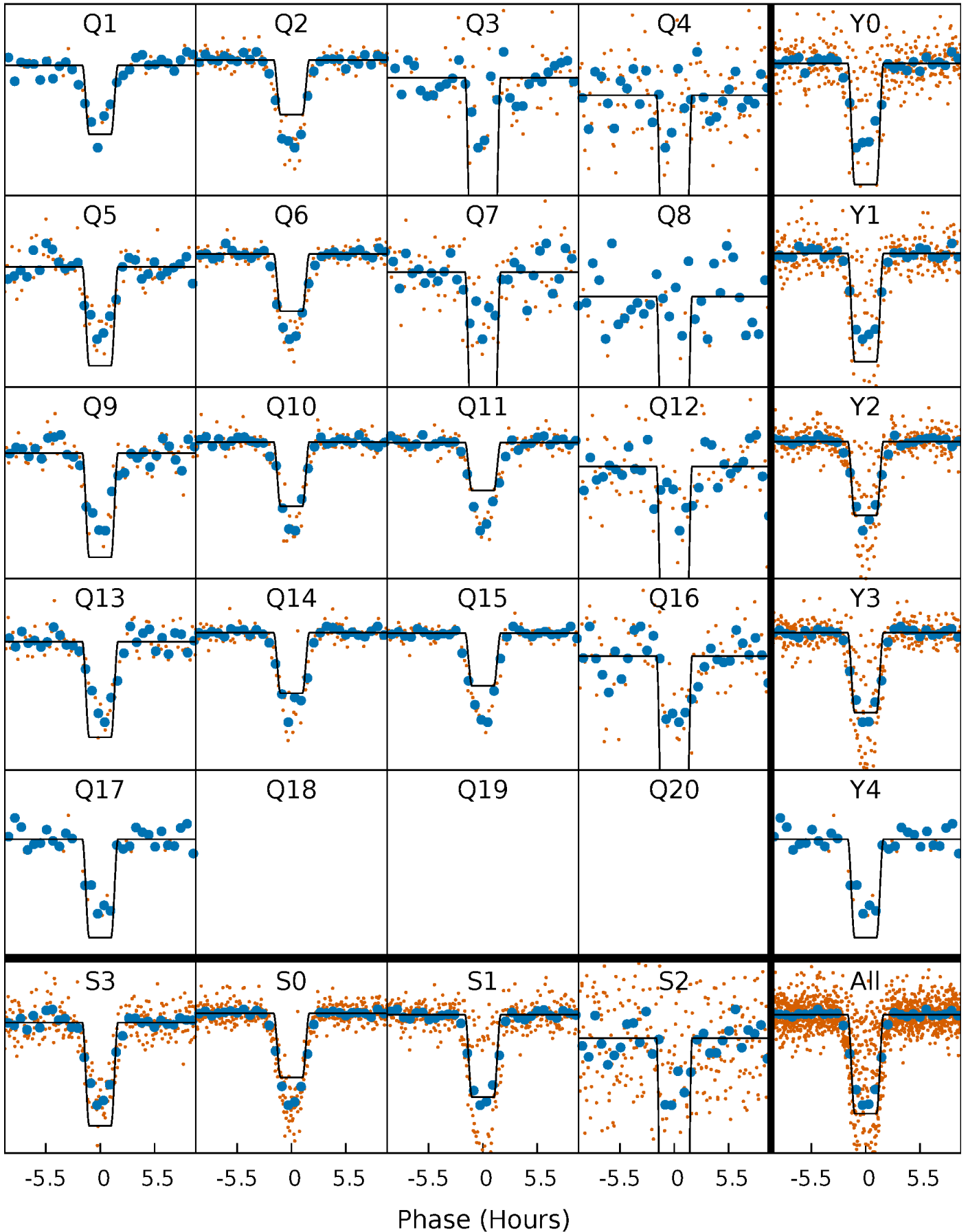
# DV Quarter-Phased Transit Curves

TCE 005866099-01 P= 36.977168 Days  $T_0=133.624923$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

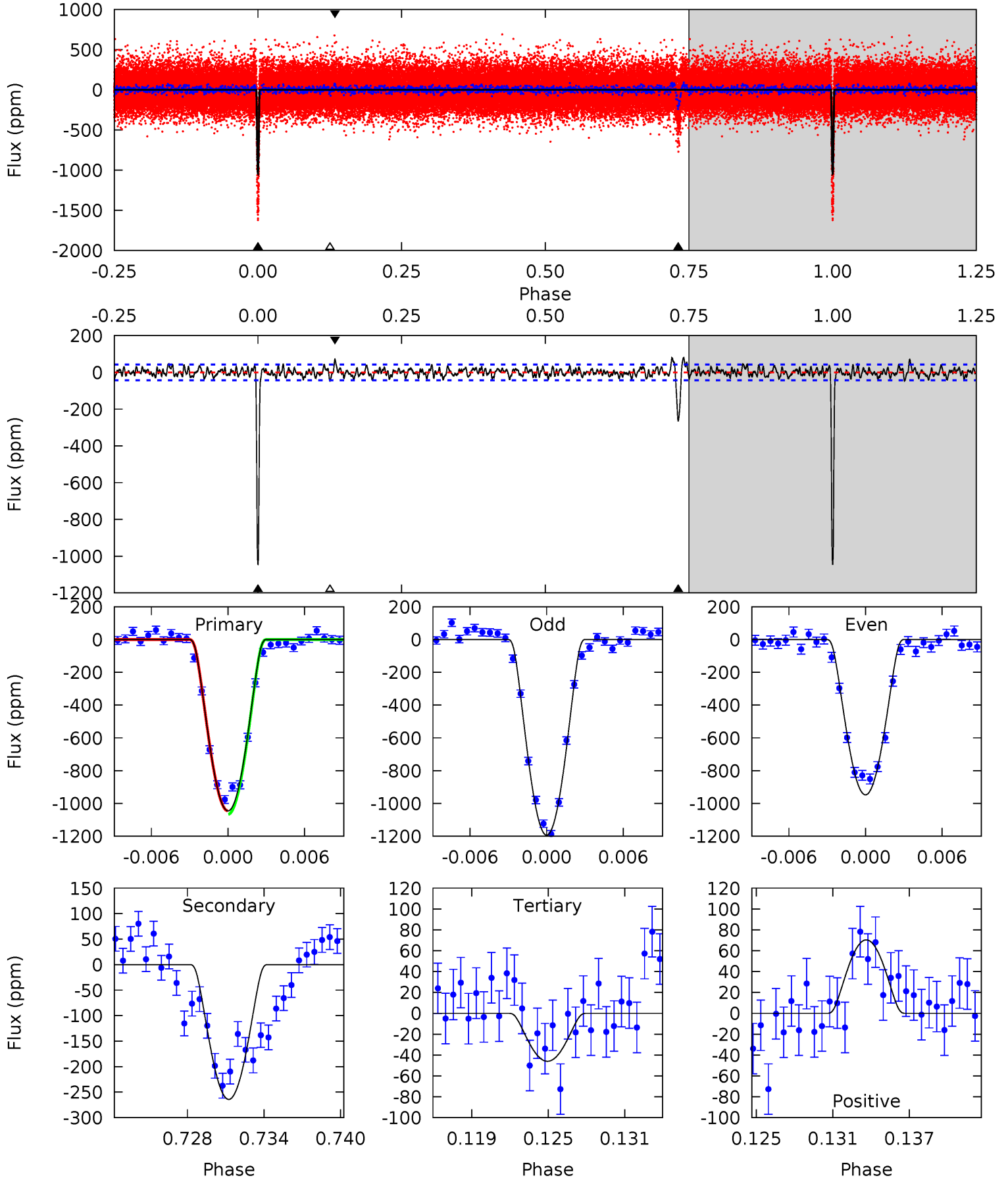
TCE 005866099-01 P= 36.976900 Days  $T_0=133.629071$  (BKJD)



# DV Model-Shift Uniqueness Test

005866099-01, P = 36.977168 Days, E = 96.647755 Days

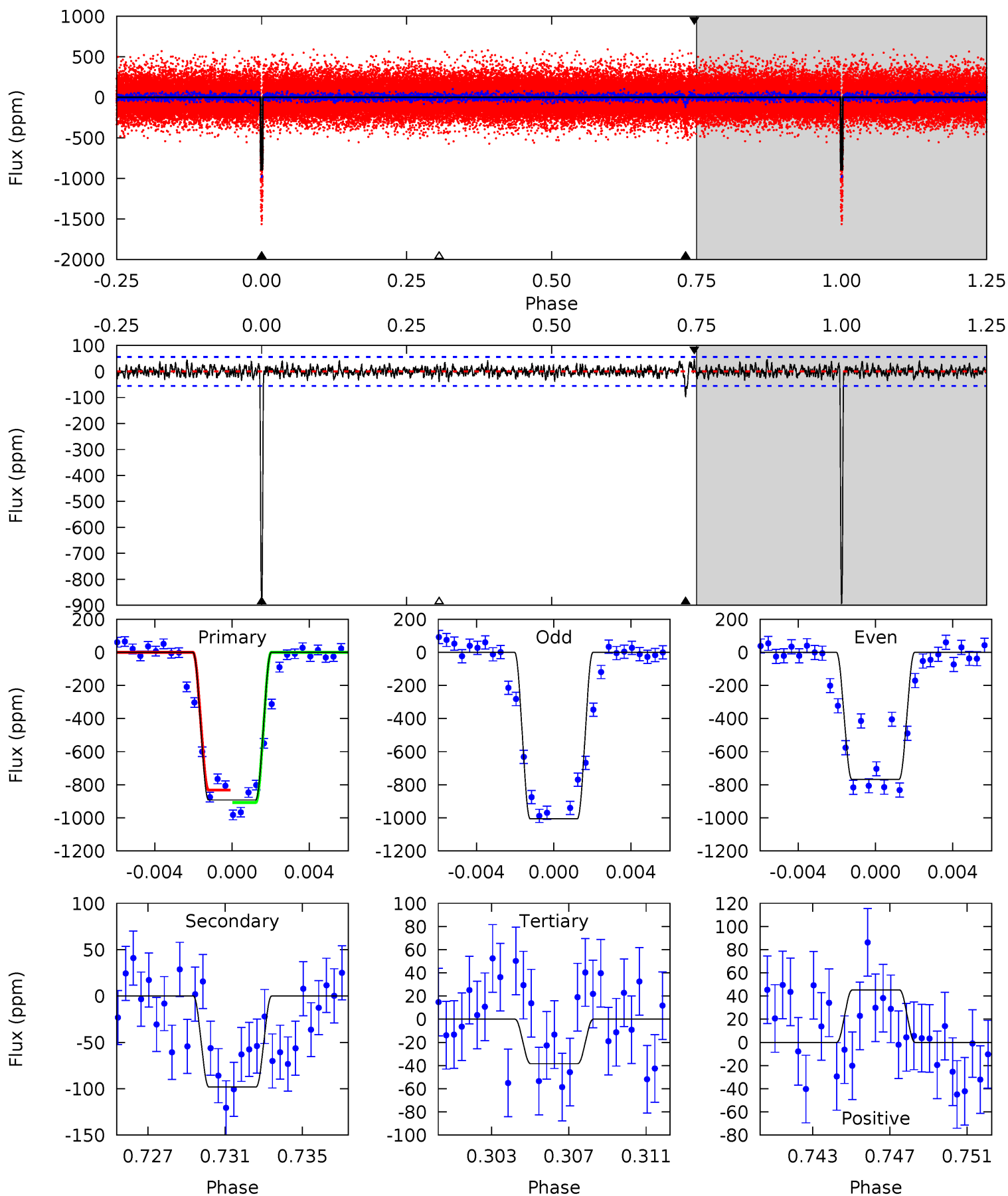
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
123.9	31.3	5.45	8.35	5.12	2.75	2.17	118.5	115.6	25.9	23.0	14.5	1.03	0.07	0



# Alt Model-Shift Uniqueness Test

005866099-01, P = 36.976900 Days, E = 96.652171 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
83.1	9.14	3.58	4.22	5.20	2.88	1.18	79.5	78.9	5.56	4.92	11.0	1.11	0.05	0



### Stellar Parameters For KIC 005866099

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5589^{+169}_{-152}$	$4.193^{+0.300}_{-0.200}$	$-0.100^{+0.300}_{-0.250}$	$1.239^{+0.371}_{-0.371}$	$0.873^{+0.123}_{-0.076}$	$0.647^{+1.233}_{-0.330}$
	+3%/-3%	+7%/-5%	+300%/-250%	+30%/-30%	+14%/-9%	+190%/-51%
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 005866099-01 / KOI 1055.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-264 \pm 8$	$8.65^{+5.51}_{-4.33}$	$841^{+77}_{-81}$	$3325^{+828}_{-381}$	$88^{+259}_{-56}$
Alt.	$-98 \pm 11$	$5.58^{+4.37}_{-3.66}$	$840^{+68}_{-82}$	$3269^{+1427}_{-501}$	$78^{+571}_{-55}$

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

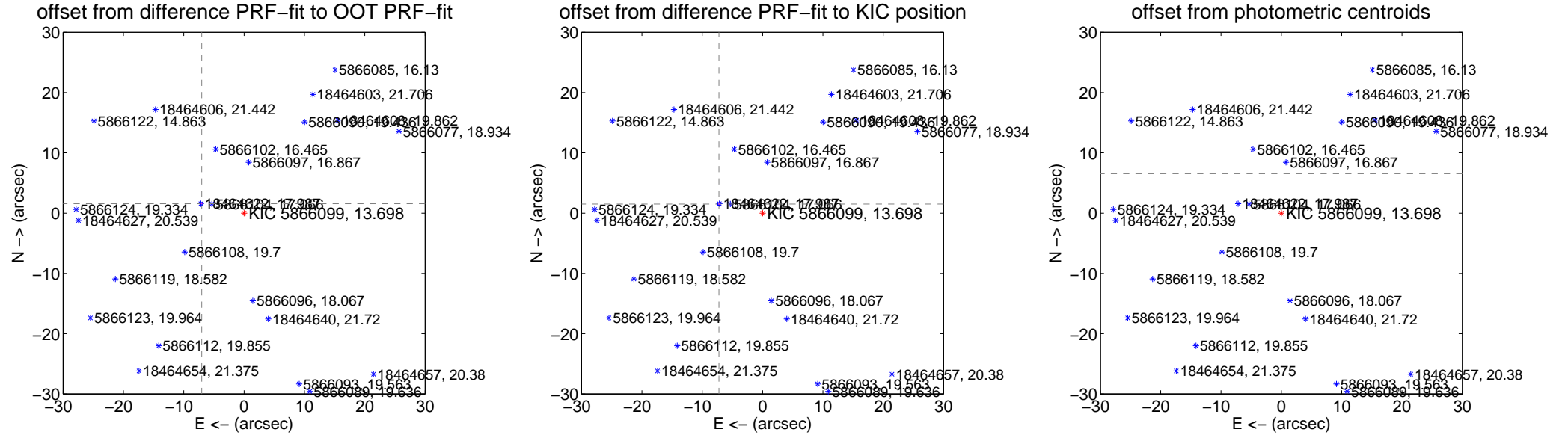
## DV Centroid Data

Supplemental centroid analysis for 005866099-01. Kepler magnitude: 13.70. Transit SNR 63.46

There are 17 quarters with good PRF difference image offsets

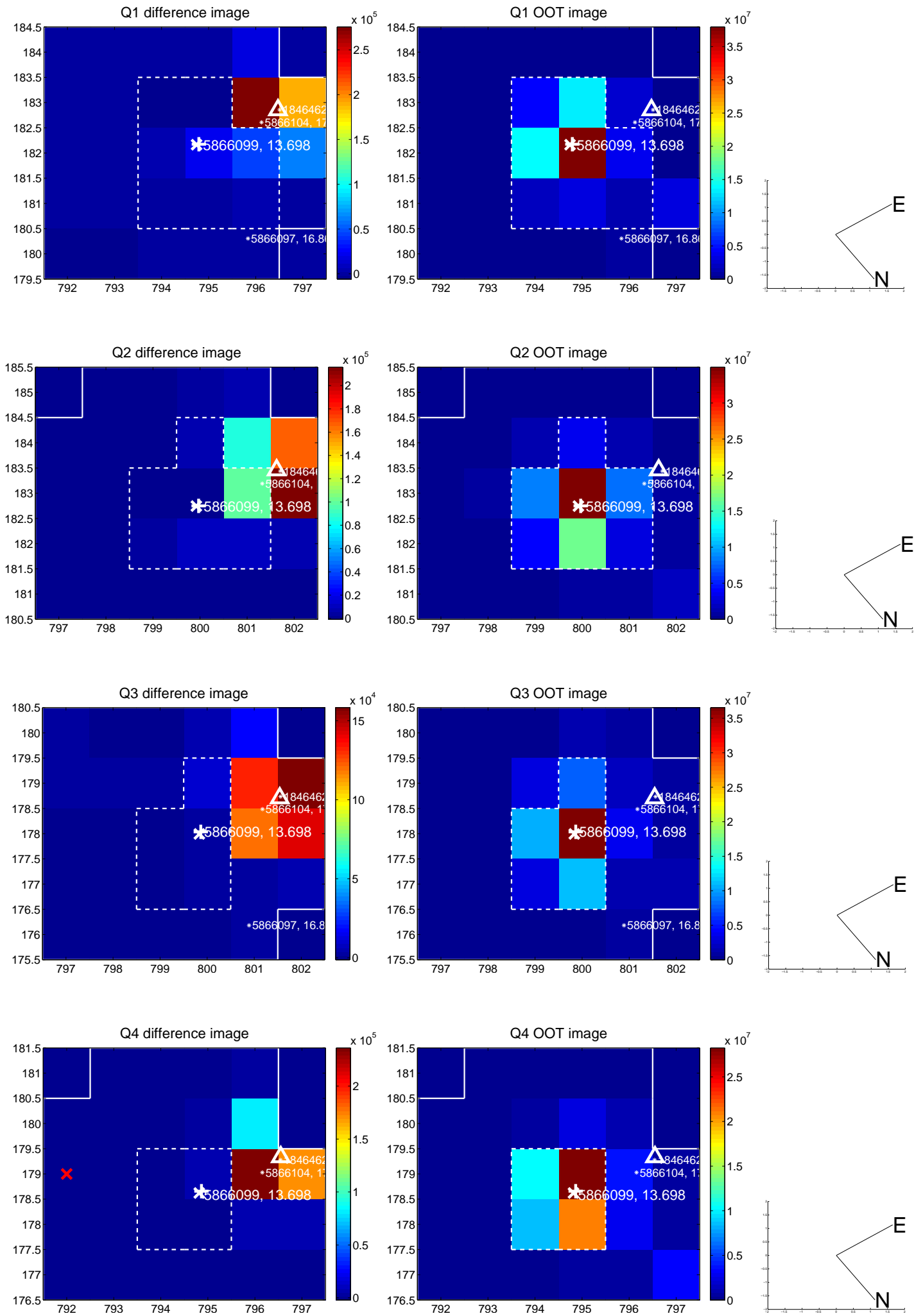
The direct PRF centroid is offset from the target star catalog position by about 0.23 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	7.196 $\pm$ 0.069	104.62	7.024 $\pm$ 0.068	1.564 $\pm$ 0.071
PRF-fit source offset from KIC position	7.391 $\pm$ 0.070	104.93	7.233 $\pm$ 0.069	1.517 $\pm$ 0.071
photometric centroid source offset	37.84 $\pm$ 0.12	322.44	37.27 $\pm$ 0.12	6.54 $\pm$ 0.12



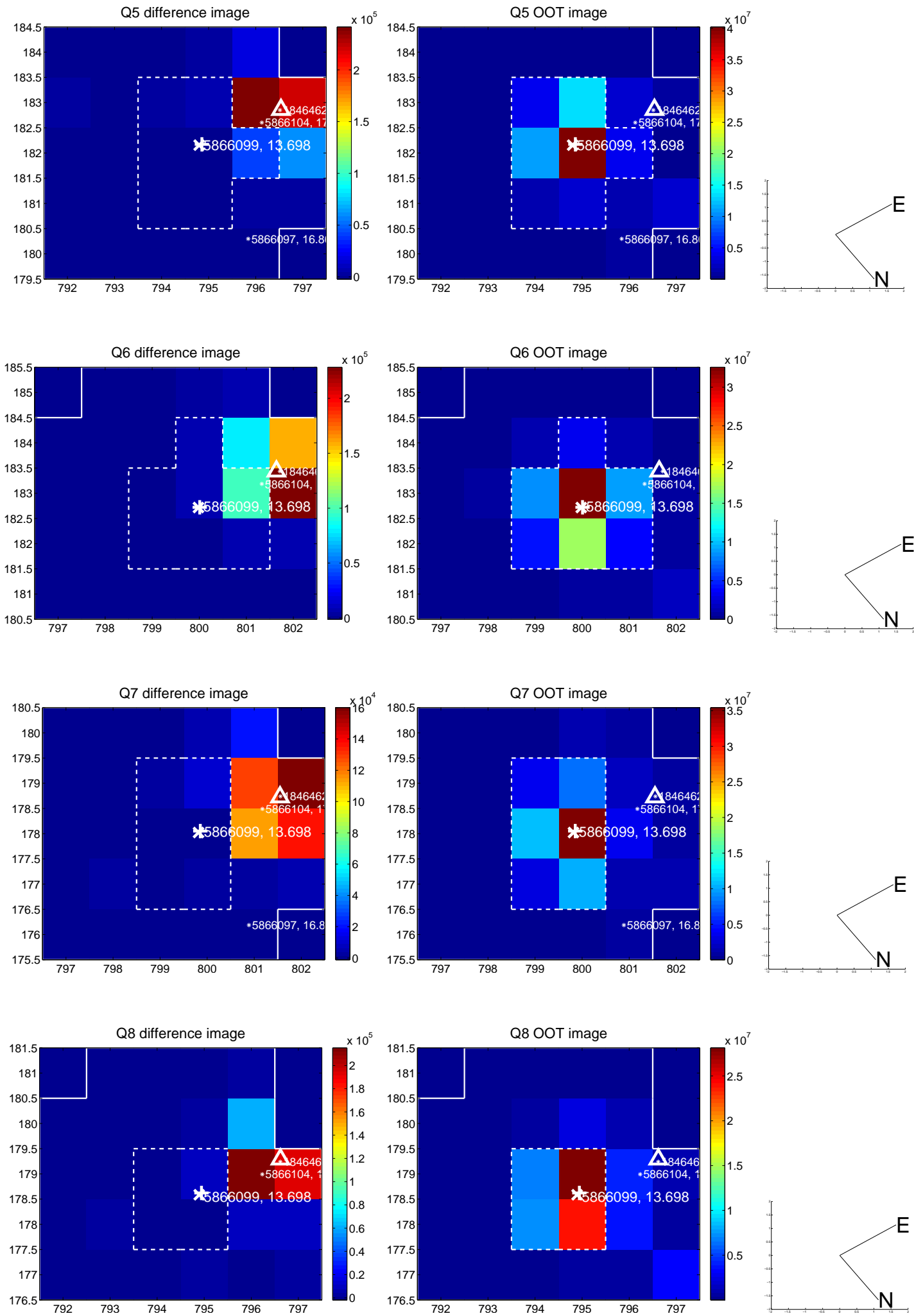
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

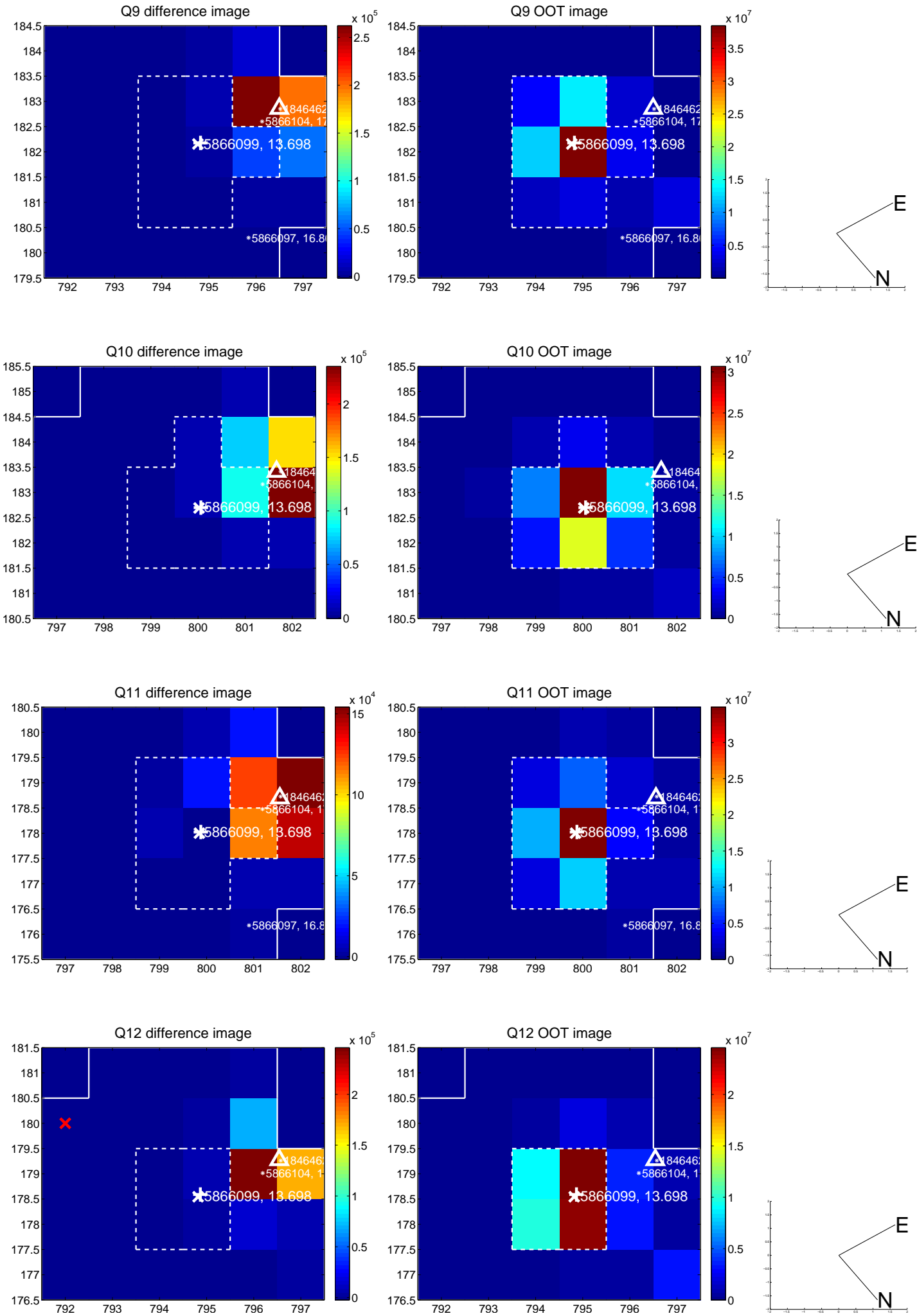




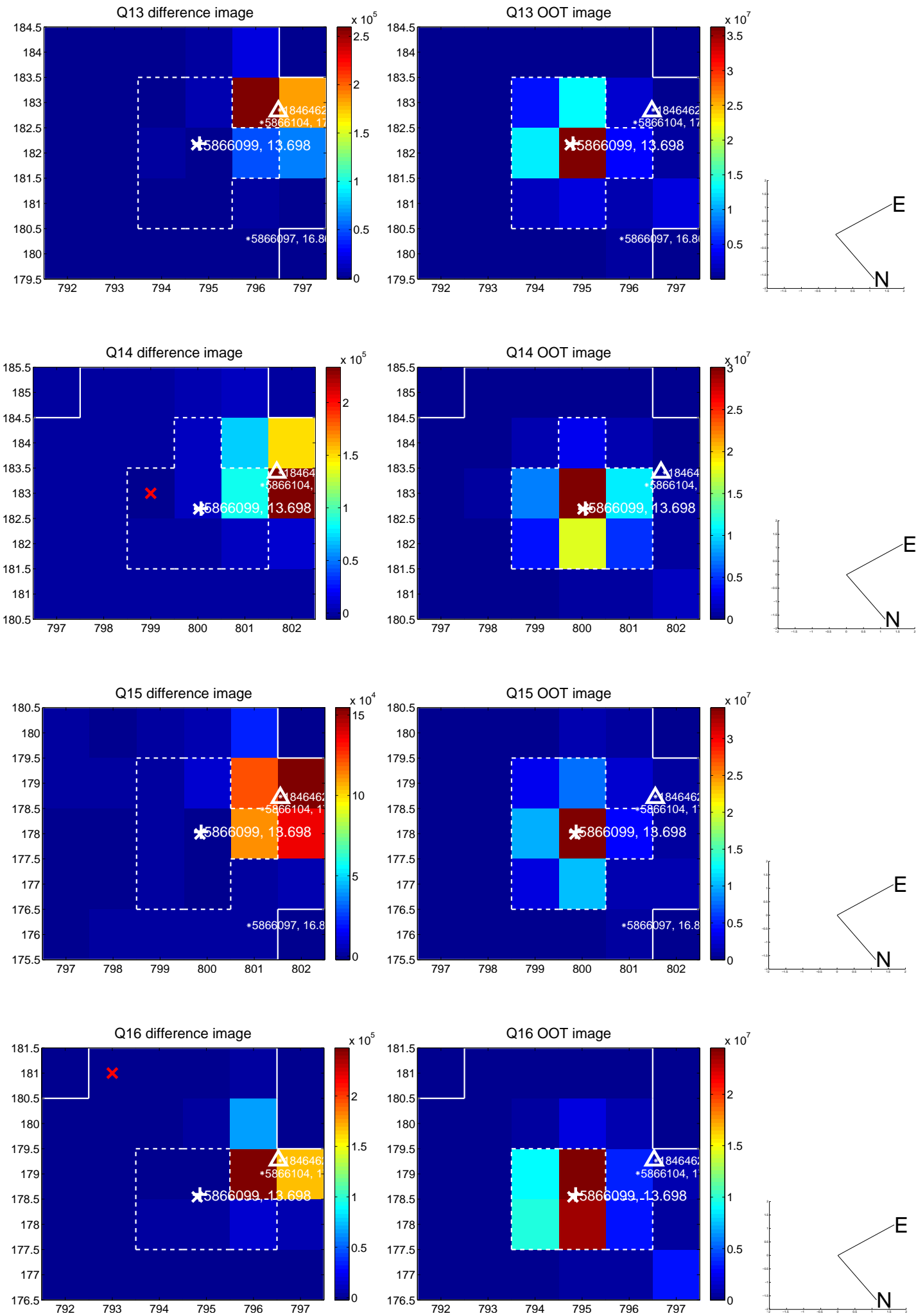
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



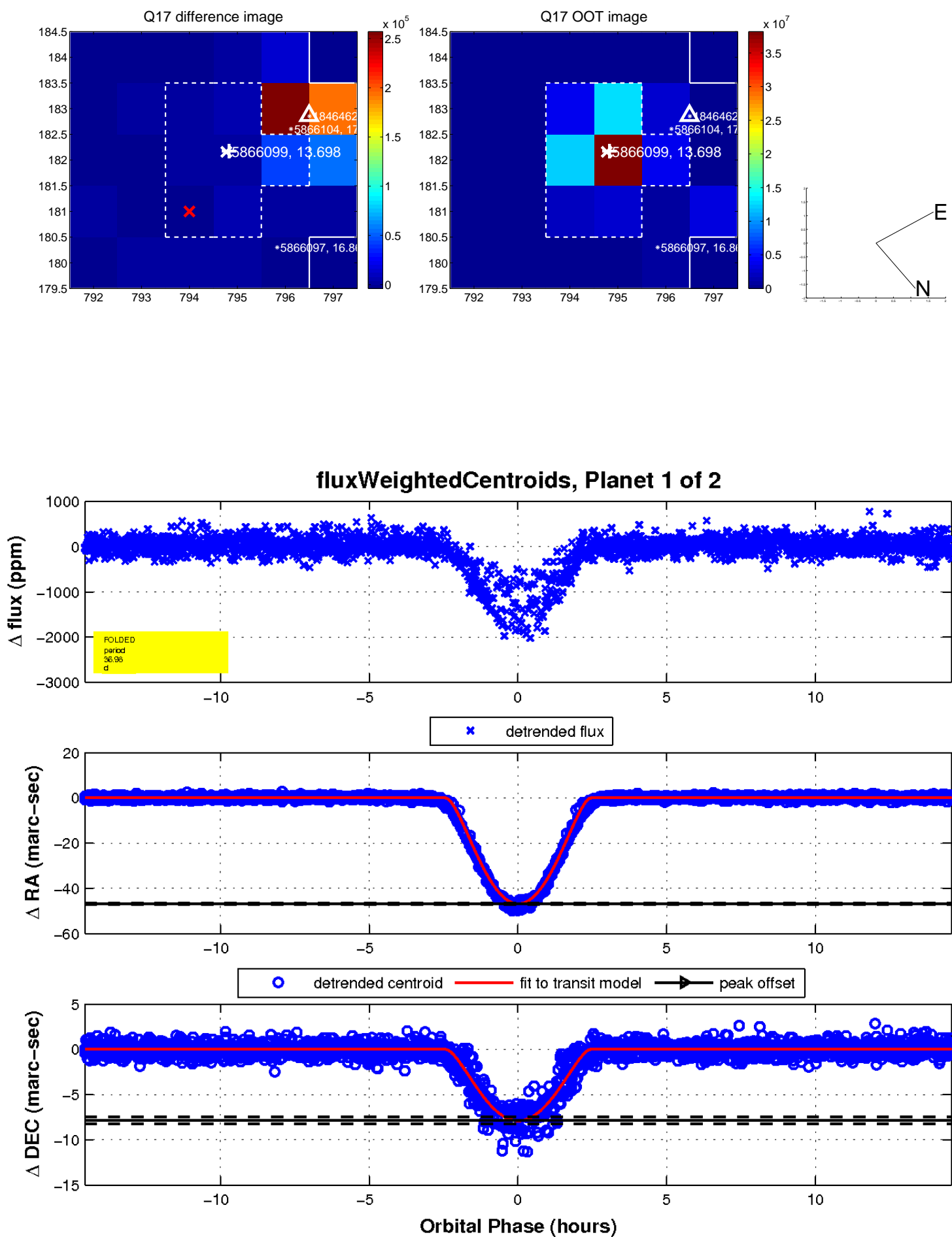
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

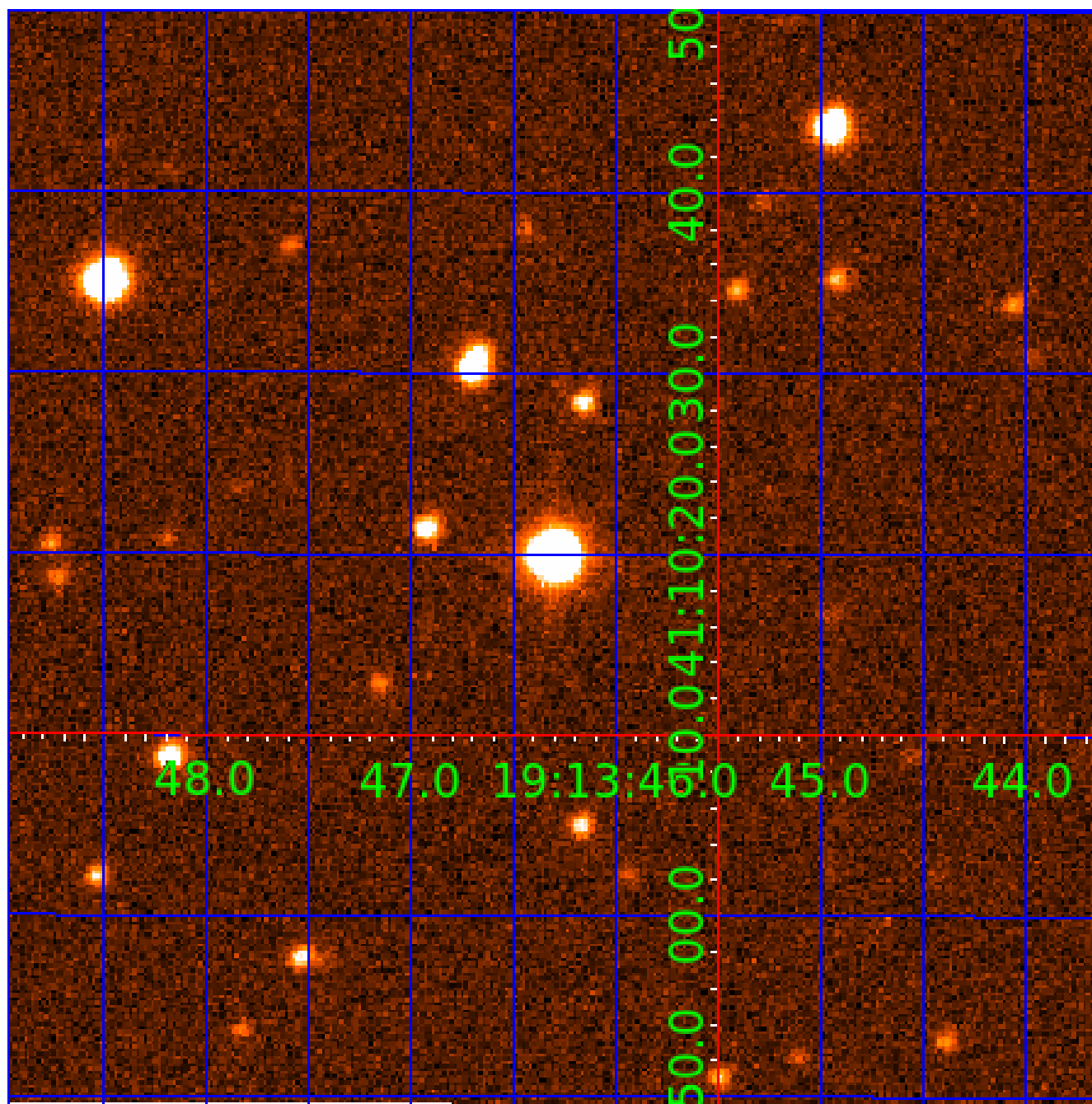


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 005866099

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005866099-01	OBS	1055.01	36.977168	133.624923	1263.8	4.861	70.1	63.5	1.24	5589	8.57	31.12
005866099-02	OBS	No	36.977305	160.679057	212.8	11.452	15.6	16.5	1.24	5589	3.67	31.12

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005866099-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_DV—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH
005866099-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_RESOLVED_OFFSET—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 005866099-02

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	$\sigma_P$	$\sigma_T$
005866099-02	5866099	005866104-02	5866104	1:1	5.5	0	-1	17.07	13.70	226.02	Direct-PRF	0	0.16	0.10

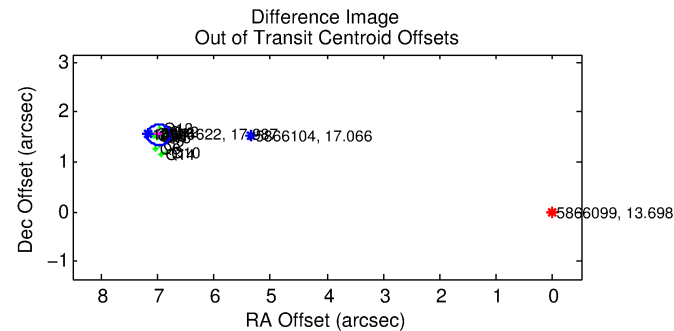
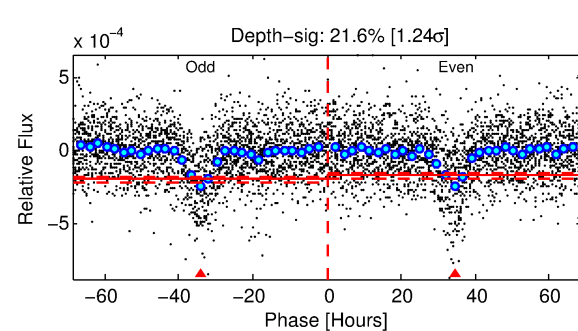
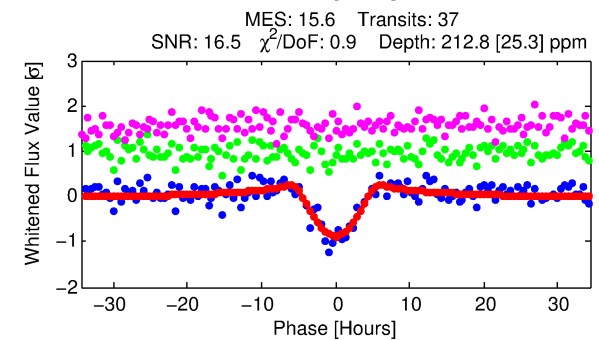
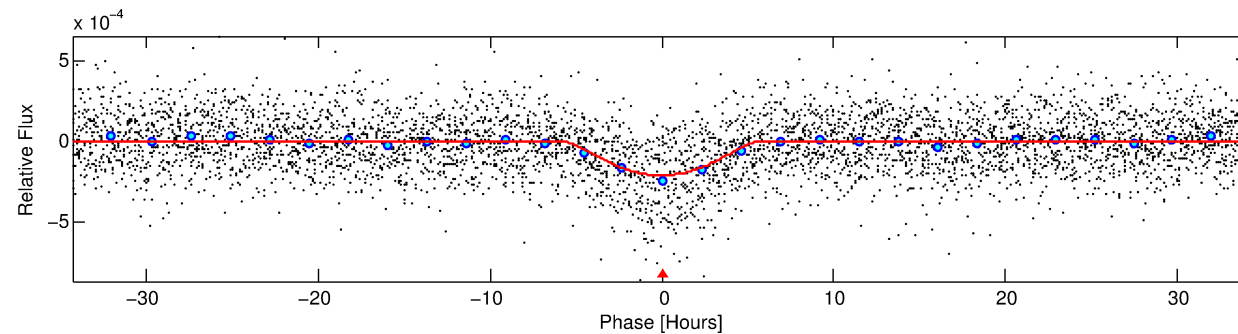
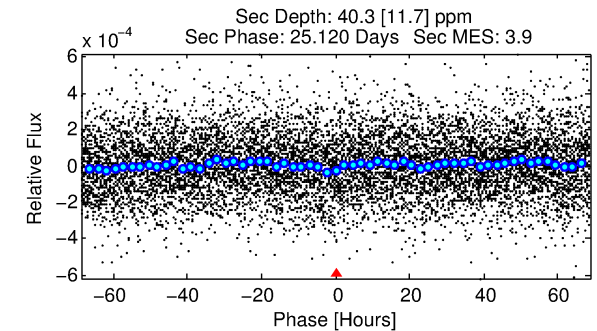
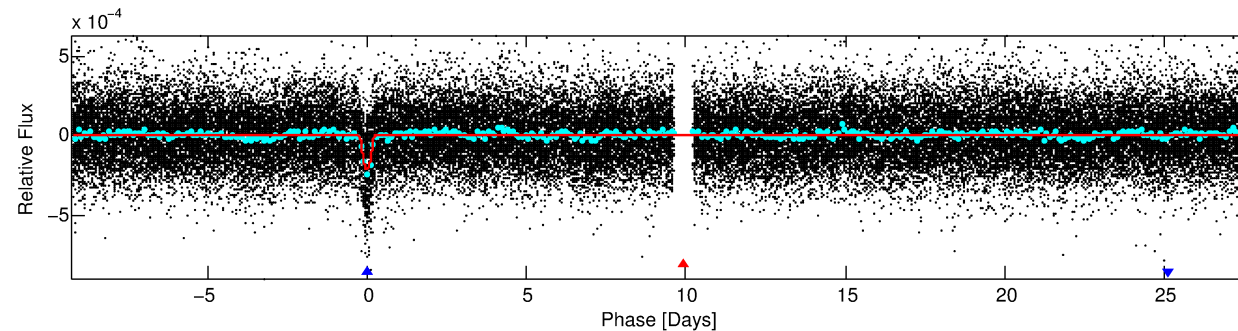
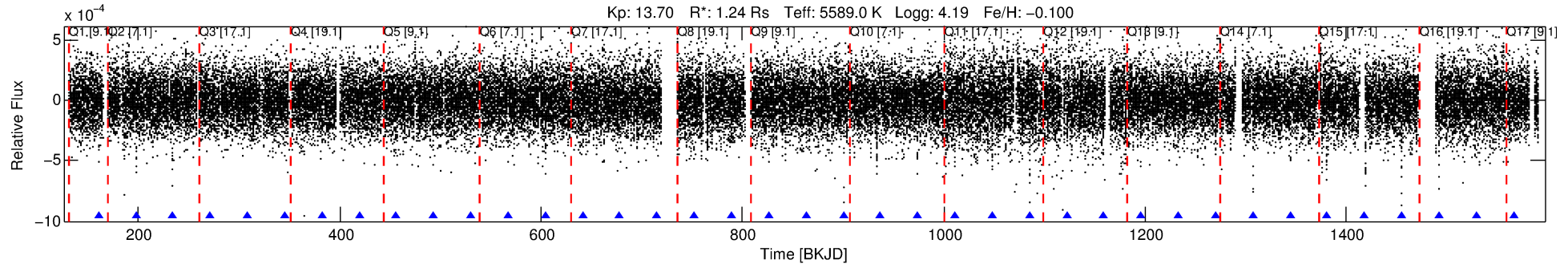
**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  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: 5866099 Candidate: 2 of 2 Period: 36.977 d

KOI: K01055 Corr: No Ephemeris Match

Kp: 13.70 R\*: 1.24 Rs Teff: 5589.0 K Logg: 4.19 Fe/H: -0.100



## DV Fit Results:

Period = 36.97731 [0.00057] d  
Epoch = 160.6791 [0.0124] BKJD  
Rp/R\* = 0.0272 [0.0403]  
a/R\* = 5.94 [2.29]  
b = 1.00 [0.06]  
Seff = 31.12 [16.07]  
Teq = 602 [78] K  
Rp = 3.67 [5.56] Re  
a = 0.2077 [0.0633] AU  
Ag = 70.80 [213.83] [0.33σ]  
Teff = 2701 [2013] K [1.04σ]

## DV Diagnostic Results:

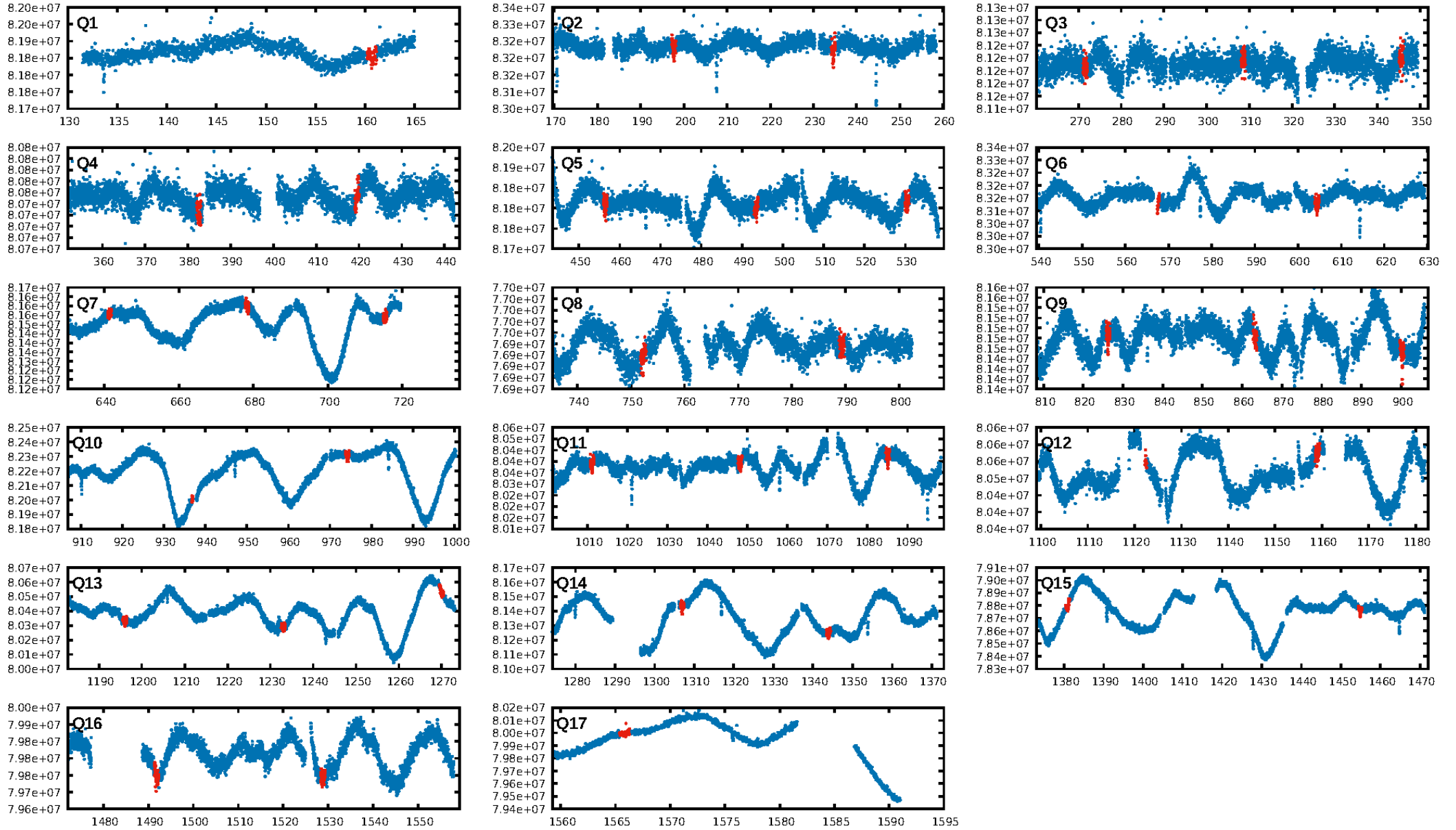
ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGoF-sig: 100.0%  
Bootstrap-pfa: 5.51e-50  
RollingBand-fgt: 1.00 [35/35]  
GhostDiagnostic-chr: -0.2113  
Centroid-sig: 0.0%  
Centroid-so: 53.668 arcsec [106.67σ]  
OotOffset-rm: 7.149 arcsec [103.26σ]  
KicOffset-rm: 7.335 arcsec [102.34σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 19:26:41 Z

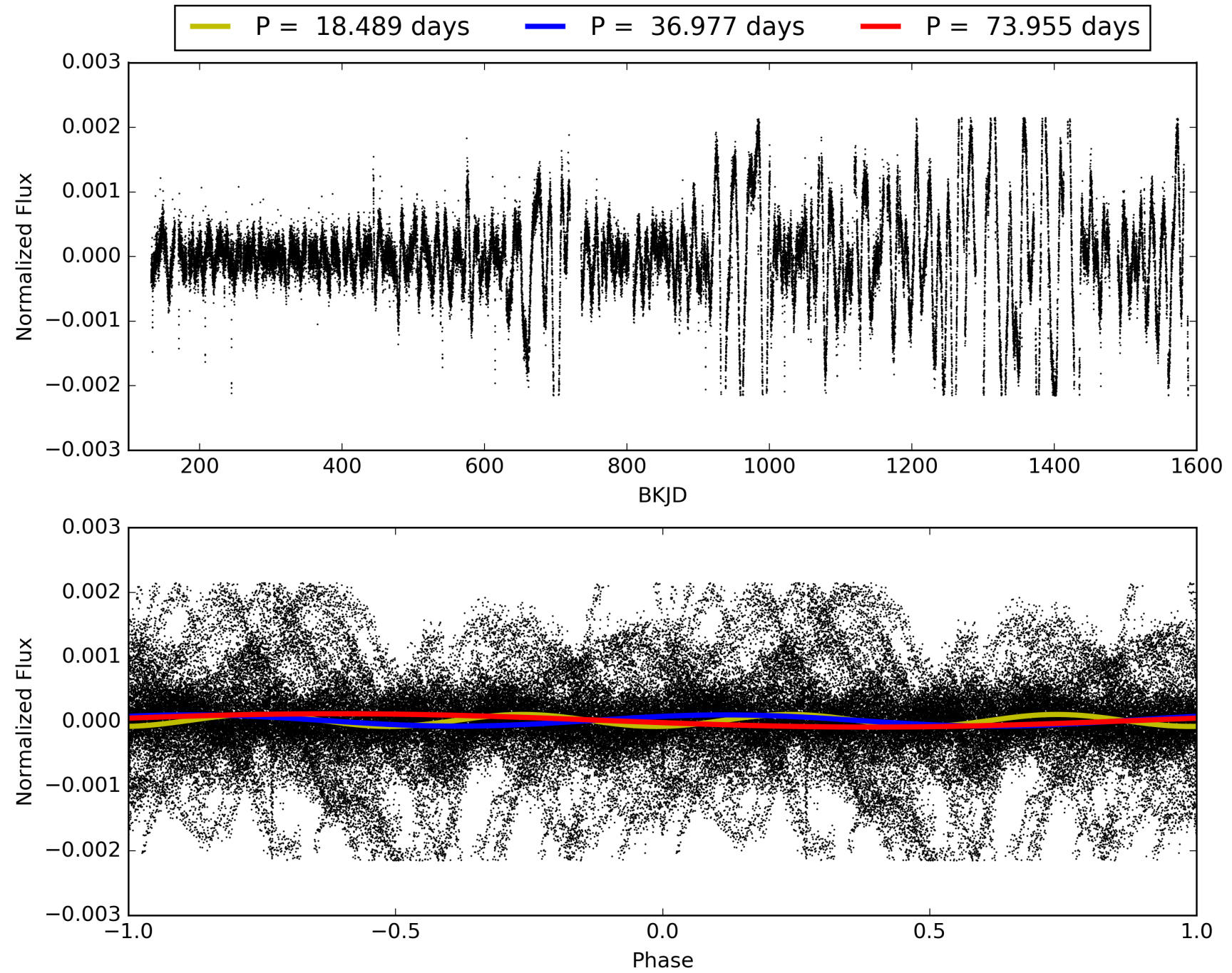
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 005866099-02, PDC Light Curves

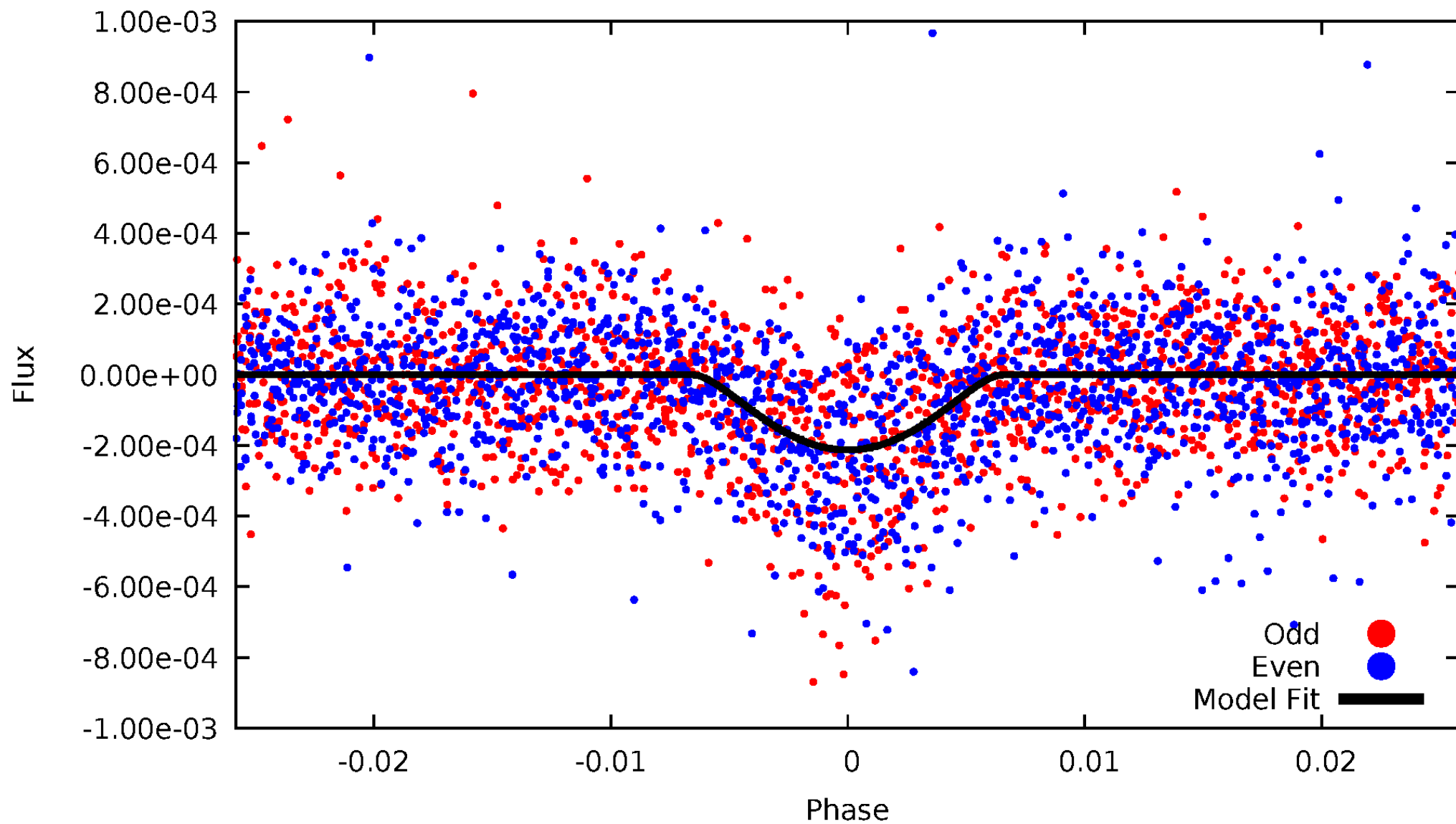


TCE 005866099-02



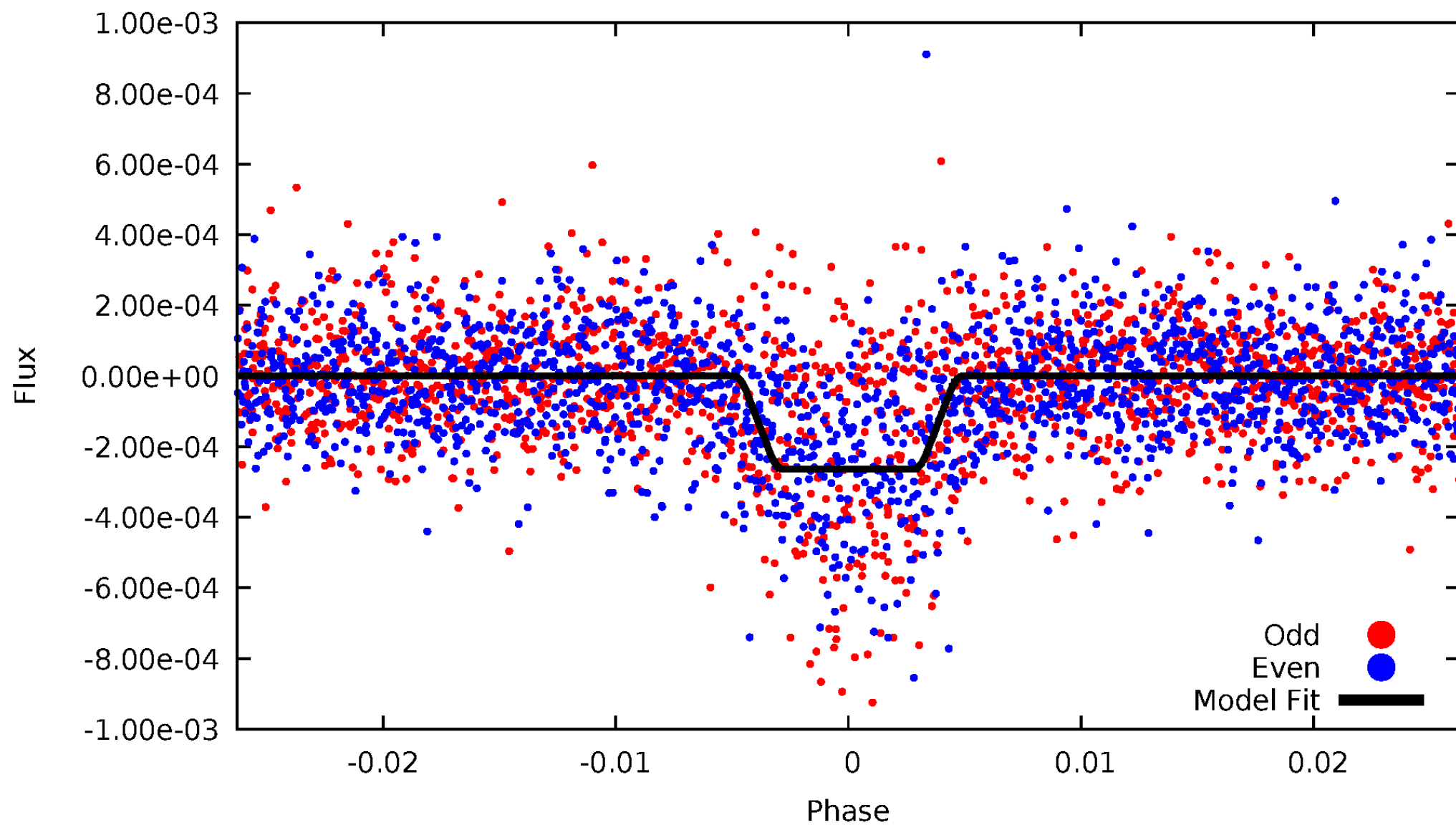
# DV Odd/Even

TCE 005866099-02



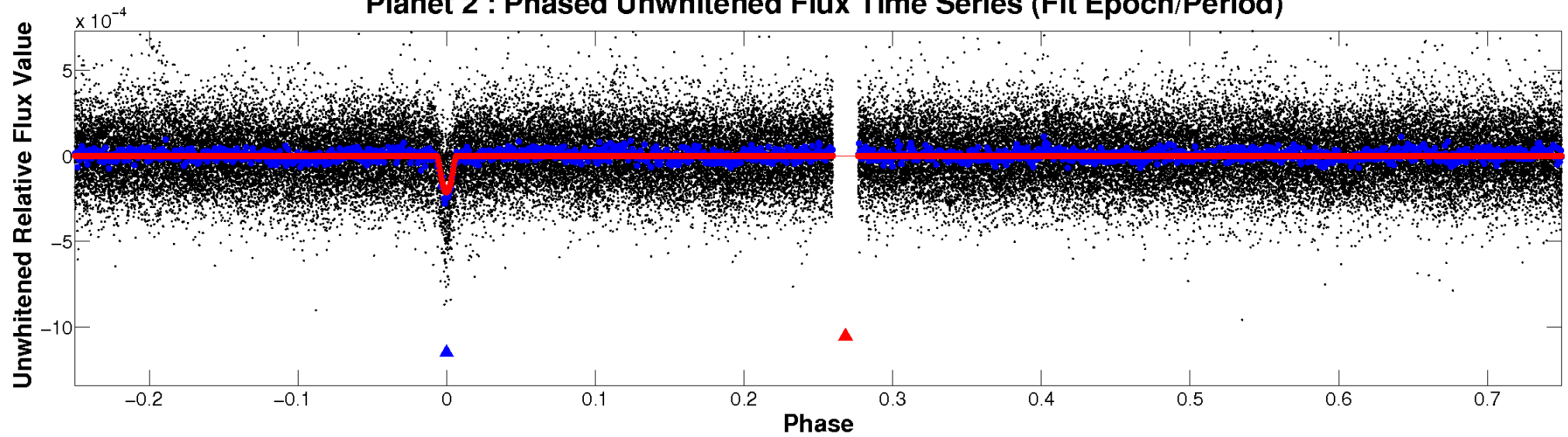
# ALT Odd/Even

TCE 005866099-02

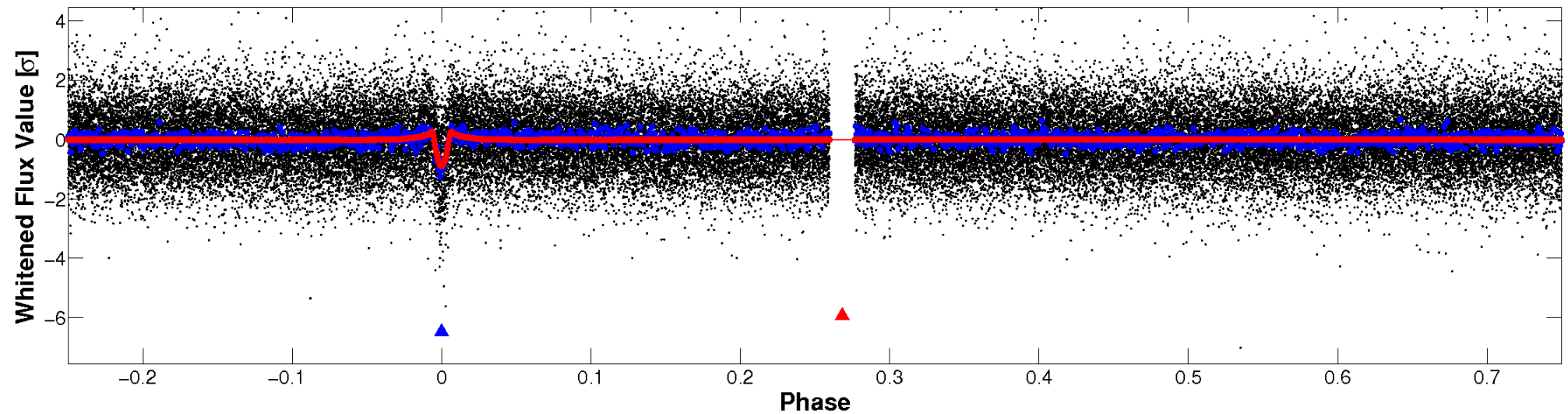


# Non-Whitened Vs. Whitened Light Curve

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



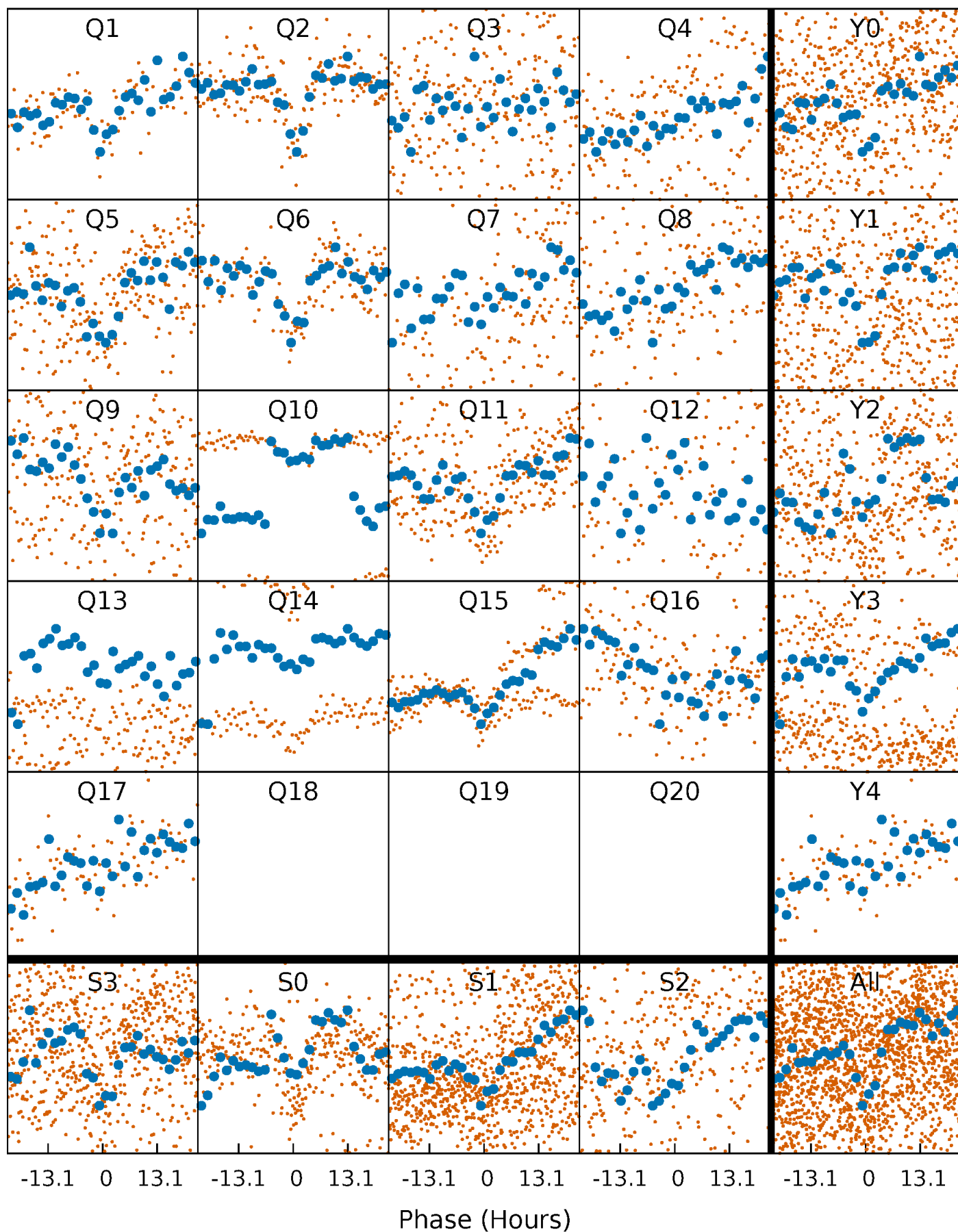
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





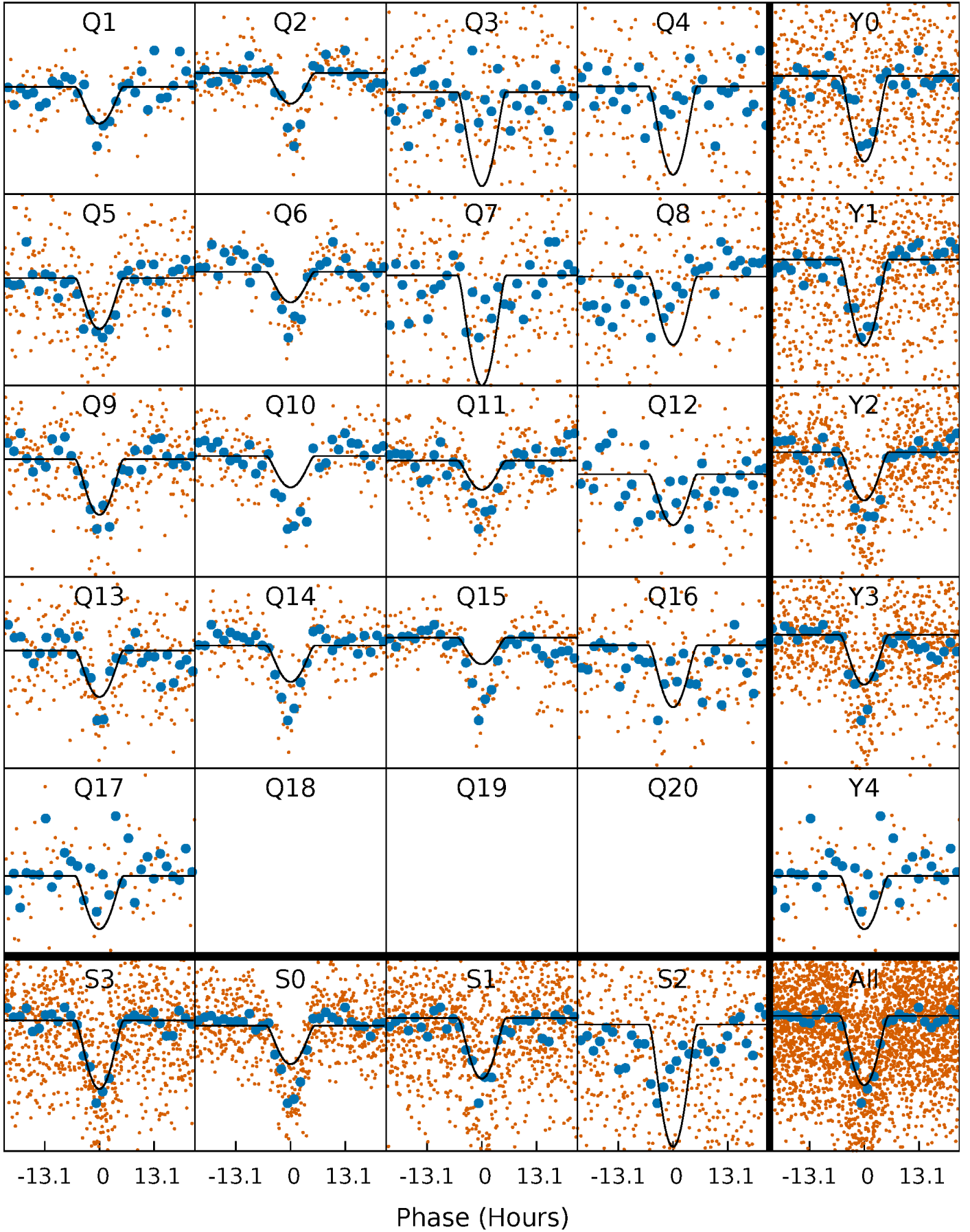
# PDC Quarter-Phased Transit Curves

TCE 005866099-02 P= 36.977305 Days  $T_0=160.679057$  (BKJD)



# DV Quarter-Phased Transit Curves

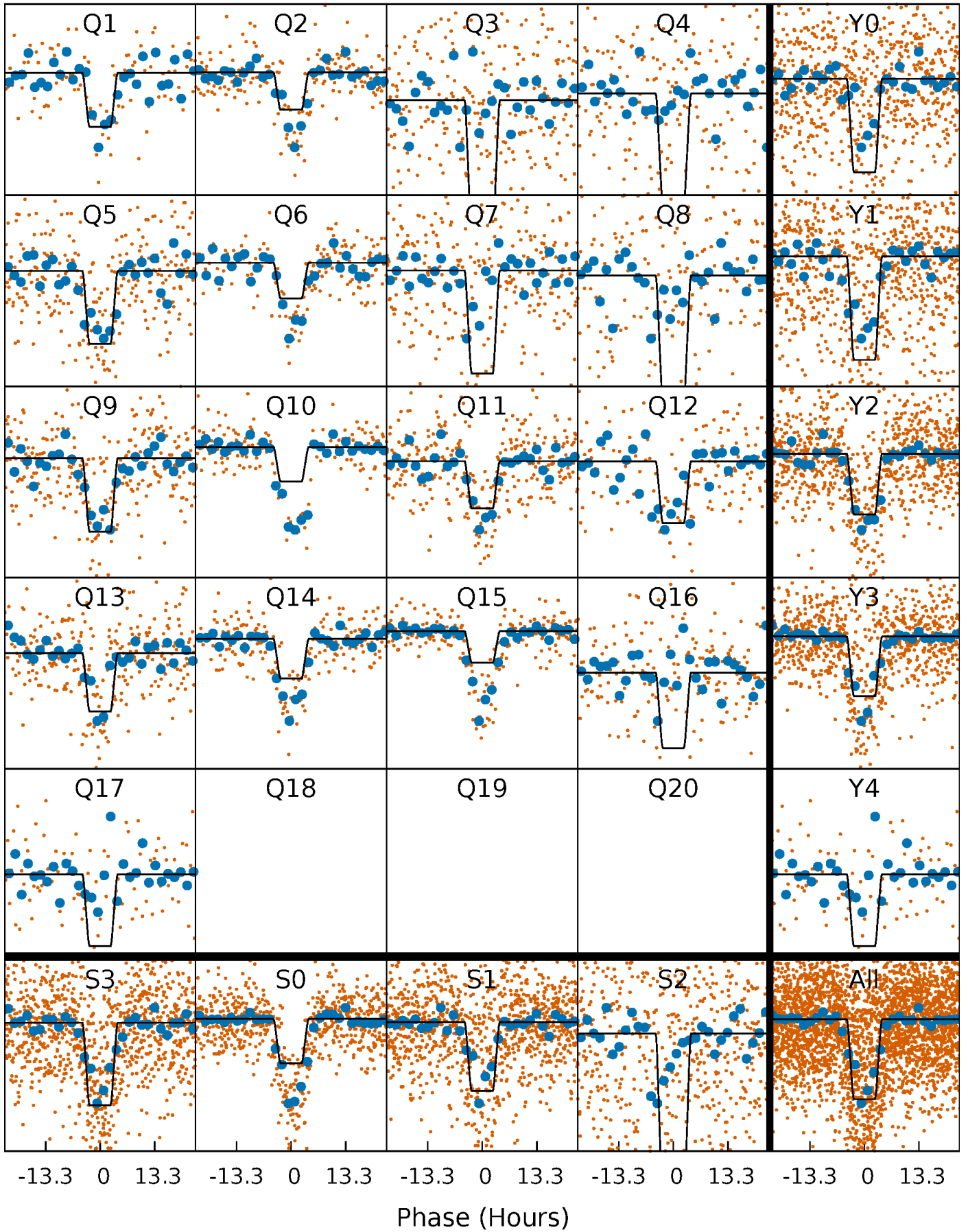
TCE 005866099-02     $P = 36.977305$  Days     $T_0 = 160.679057$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

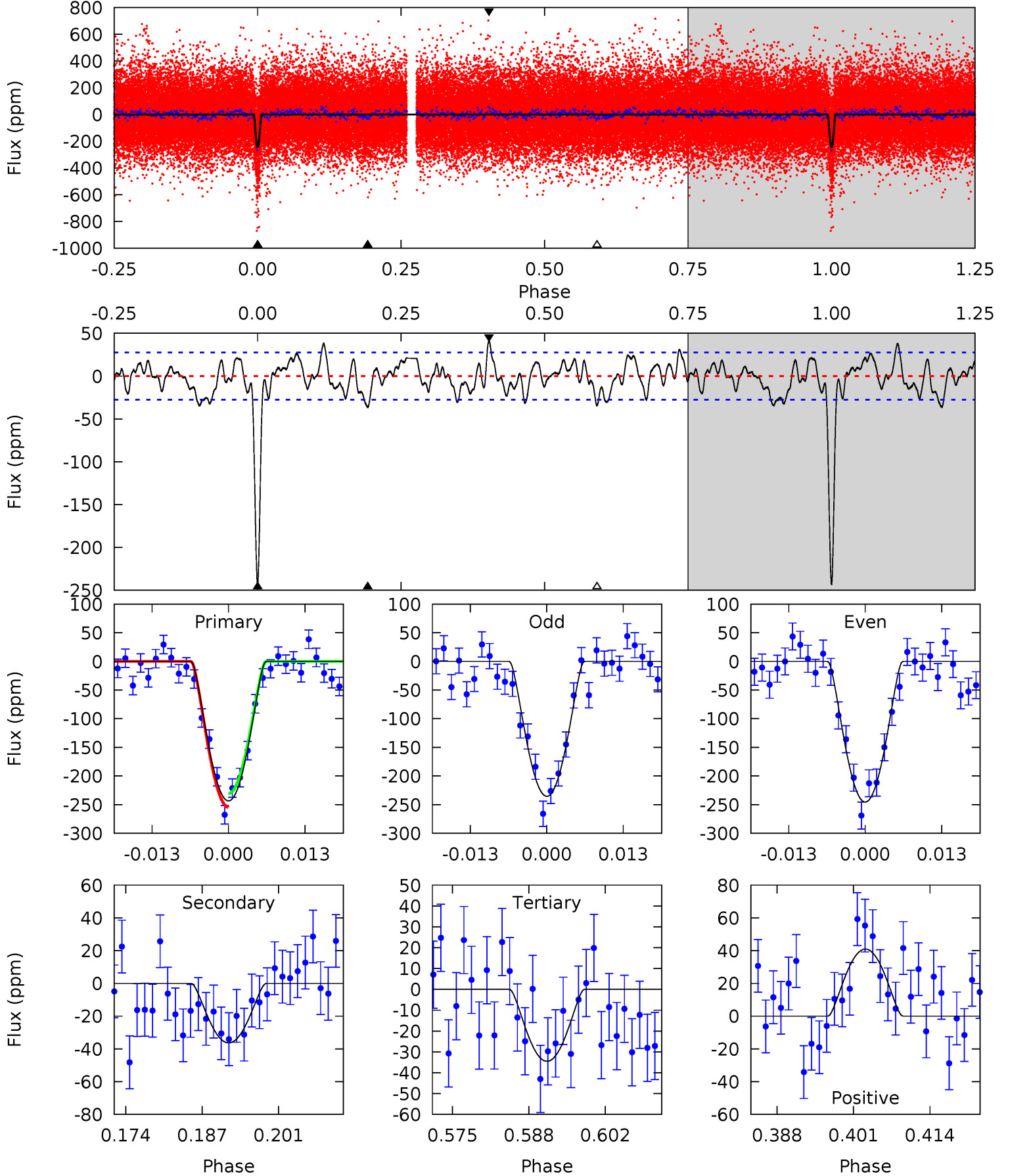
TCE 005866099-02 P= 36.977851 Days  $T_0=160.666640$  (BKJD)



# DV Model-Shift Uniqueness Test

005866099-02, P = 36.977305 Days, E = 123.701752 Days

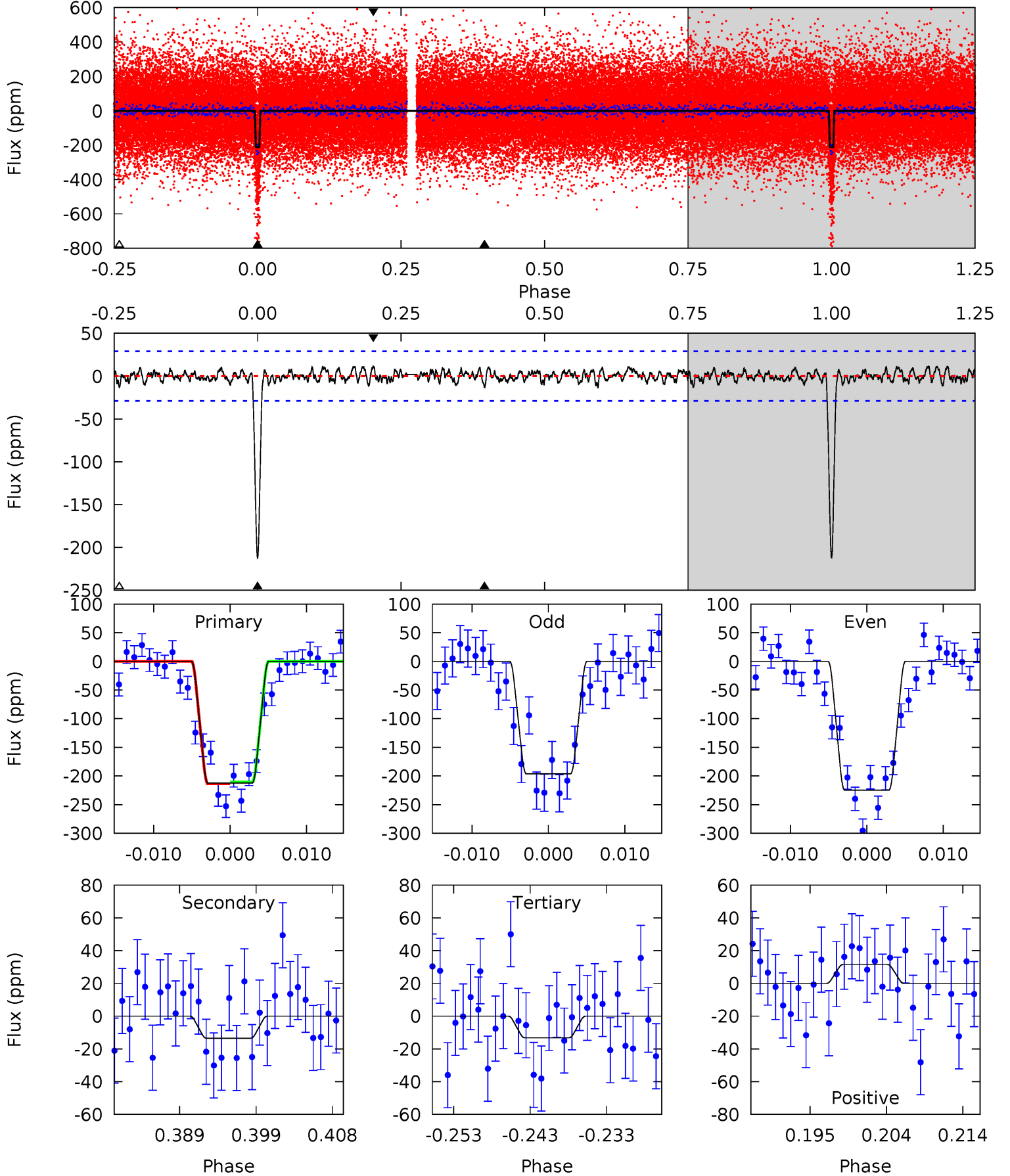
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
43.9	6.55	6.22	7.38	4.97	2.47	2.61	37.7	36.5	0.33	-0.83	0.91	1.04	0.14	2.13



# Alt Model-Shift Uniqueness Test

005866099-02,  $P = 36.977851$  Days,  $E = 123.688789$  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
37.0	2.35	2.30	2.02	5.03	2.59	0.82	34.7	35.0	0.05	0.34	2.48	1.04	0.05	0.29



### Stellar Parameters For KIC 005866099

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5589^{+169}_{-152}$	$4.193^{+0.300}_{-0.200}$	$-0.100^{+0.300}_{-0.250}$	$1.239^{+0.371}_{-0.371}$	$0.873^{+0.123}_{-0.076}$	$0.647^{+1.233}_{-0.330}$
	+3%/-3%	+7%/-5%	+300%/-250%	+30%/-30%	+14%/-9%	+190%/-51%
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 005866099-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-36 \pm 6$	$5.40^{+4.42}_{-3.55}$	$837^{+73}_{-79}$	$2840^{+1090}_{-397}$	$29^{+217}_{-20}$
Alt.	$-13 \pm 6$	$4.50^{+4.31}_{-3.17}$	$836^{+74}_{-71}$	$2616^{+1163}_{-433}$	$15^{+150}_{-12}$

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

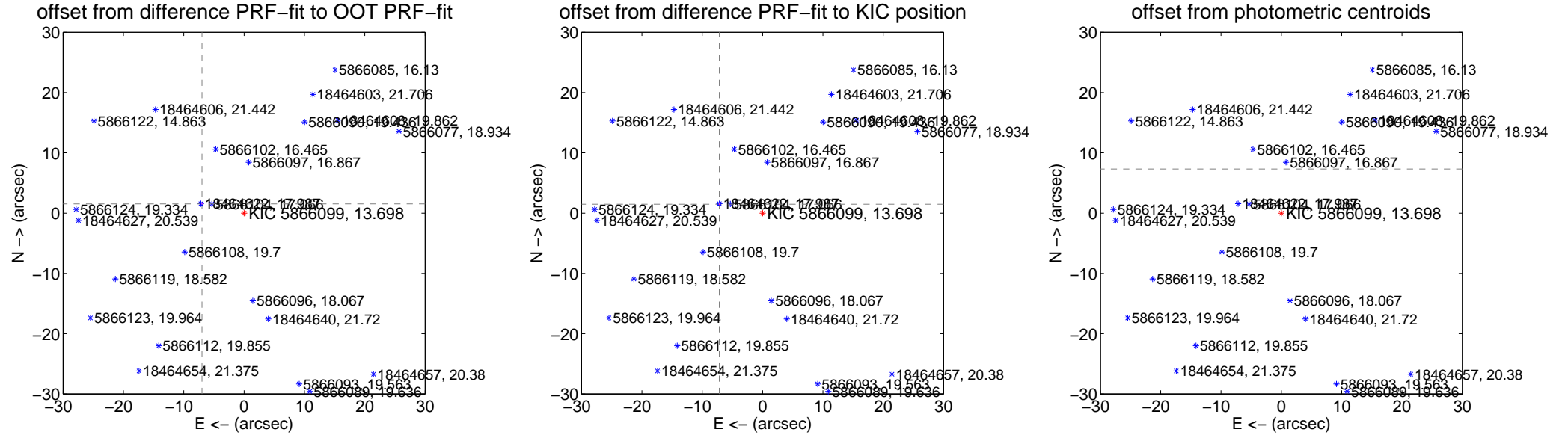
## DV Centroid Data

Supplemental centroid analysis for 005866099-02. Kepler magnitude: 13.70. Transit SNR 16.50

There are 17 quarters with good PRF difference image offsets

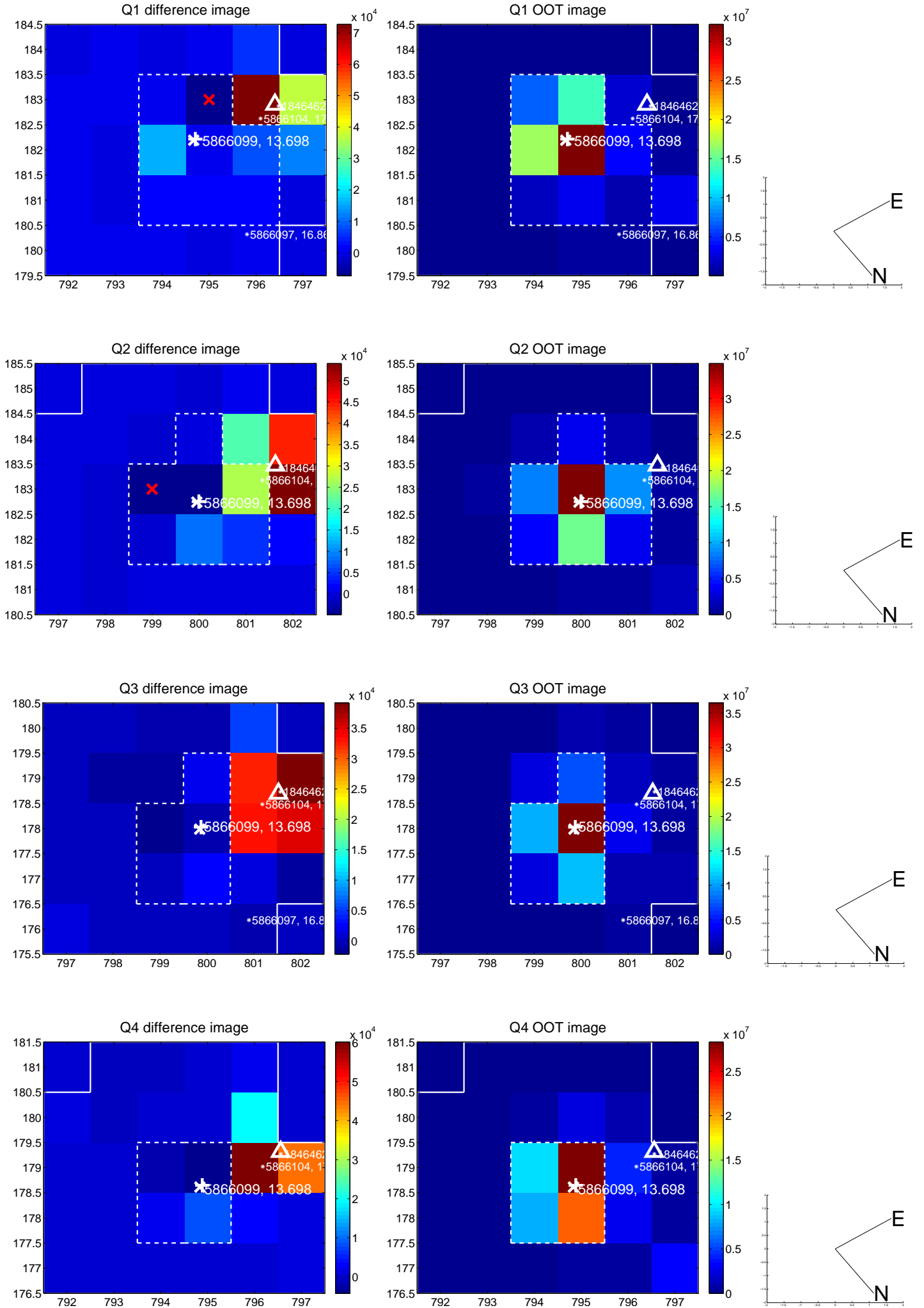
The direct PRF centroid is offset from the target star catalog position by about 0.23 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>7.149 <math>\pm</math> 0.069</b>	<b>103.26</b>	6.981 $\pm$ 0.069	1.538 $\pm$ 0.075
PRF-fit source offset from KIC position	<b>7.335 <math>\pm</math> 0.072</b>	<b>102.34</b>	7.183 $\pm$ 0.070	1.488 $\pm$ 0.074
photometric centroid source offset	<b>53.67 <math>\pm</math> 0.50</b>	<b>106.67</b>	53.17 $\pm$ 0.50	7.32 $\pm$ 0.50

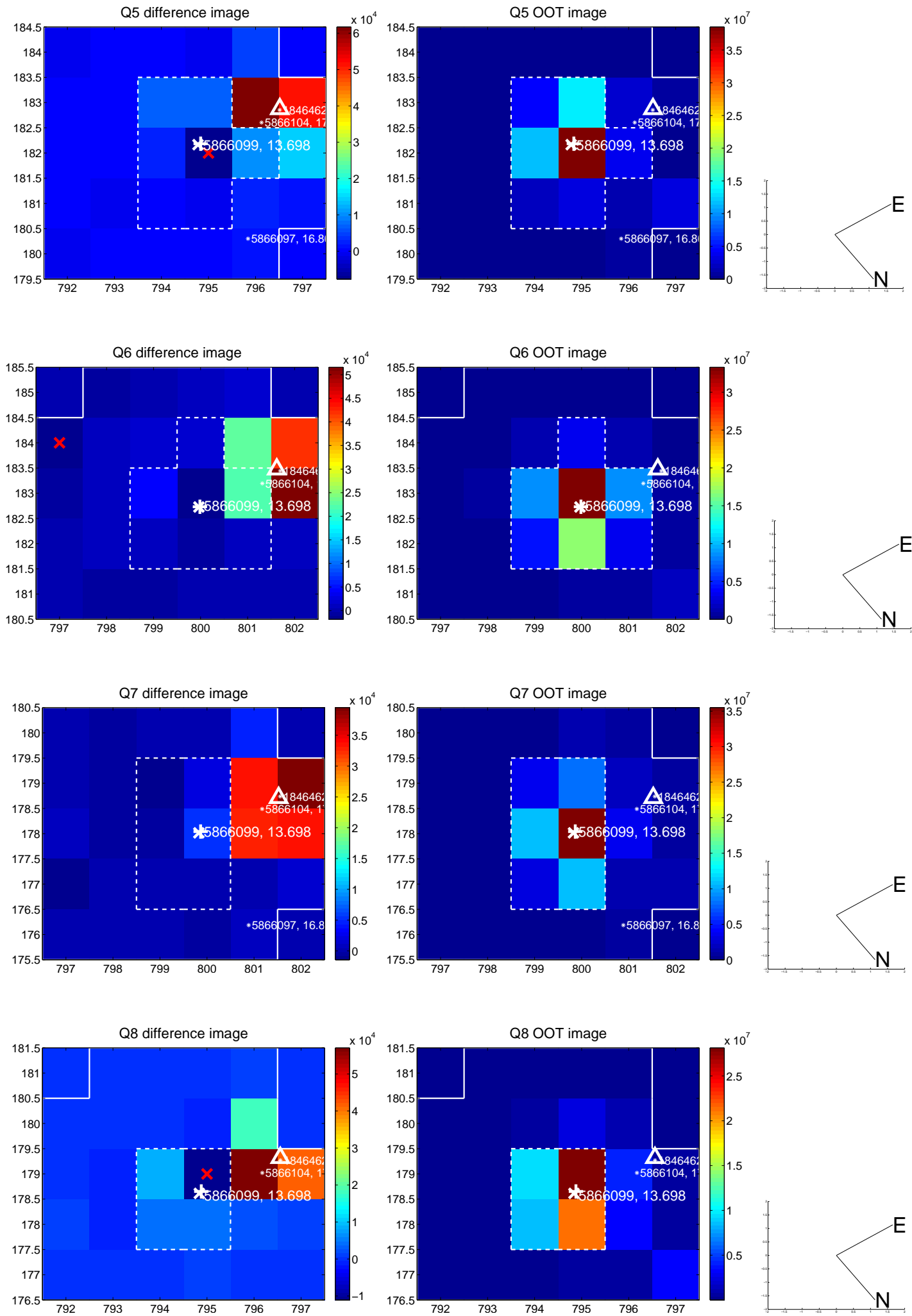


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

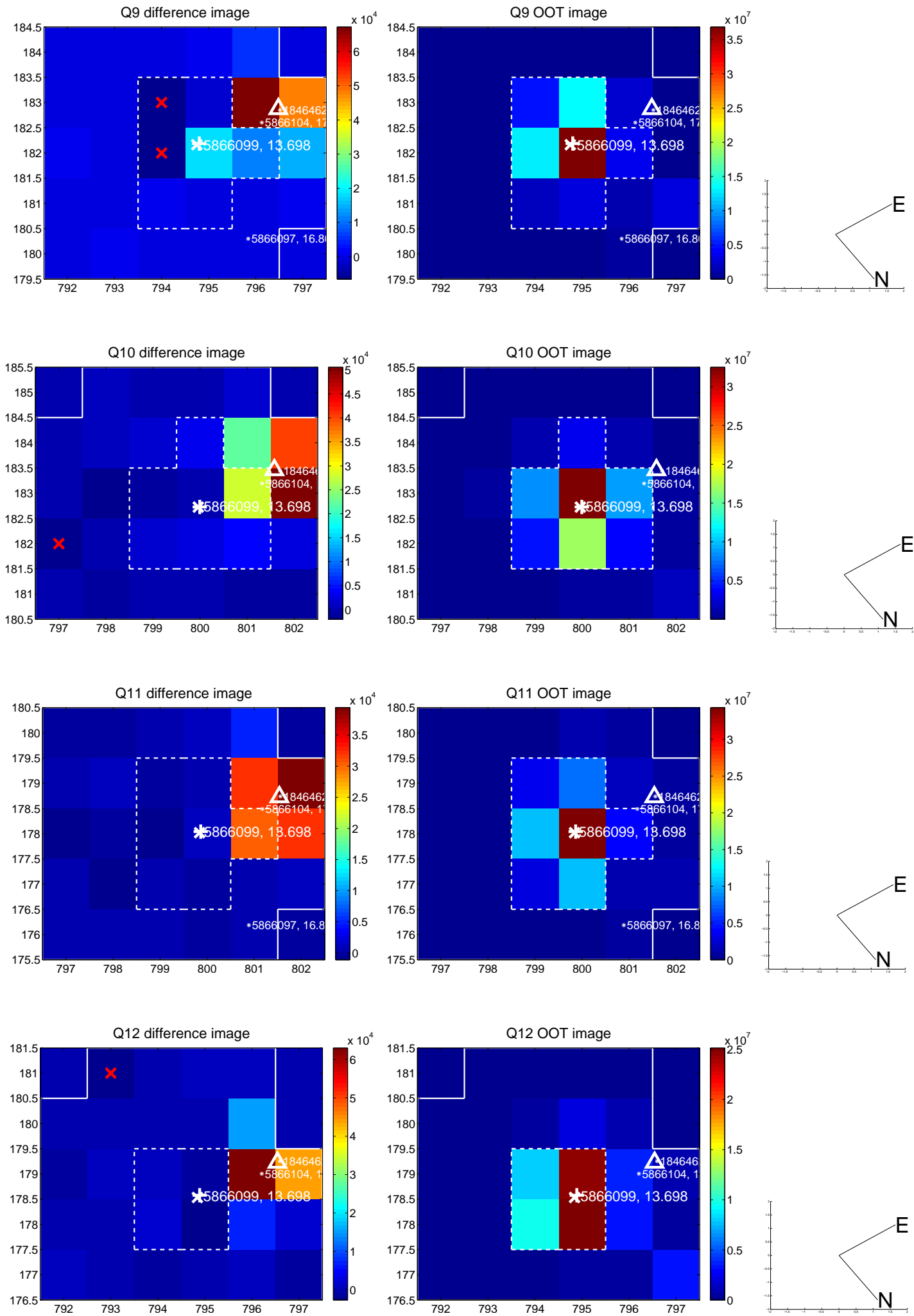


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

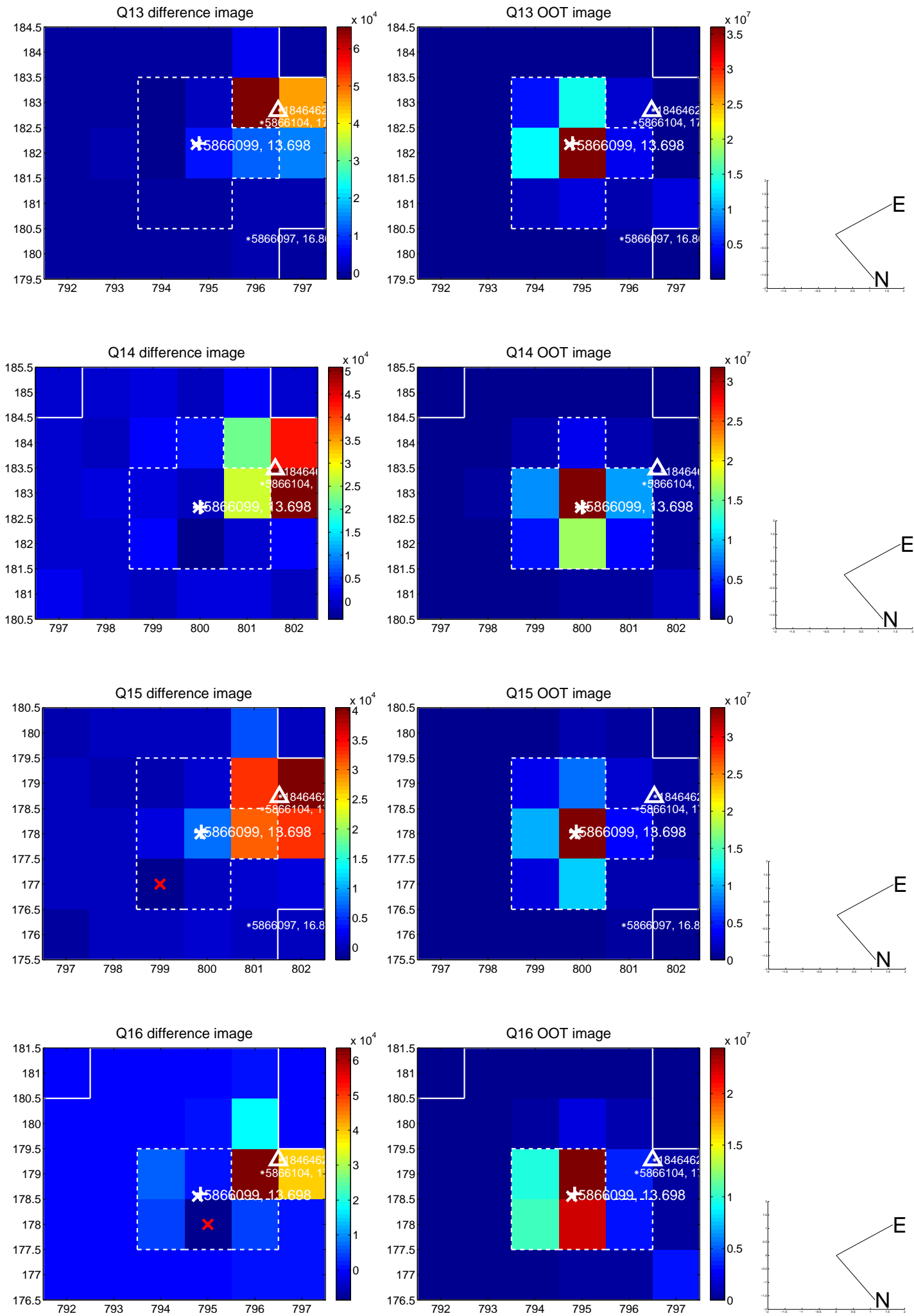




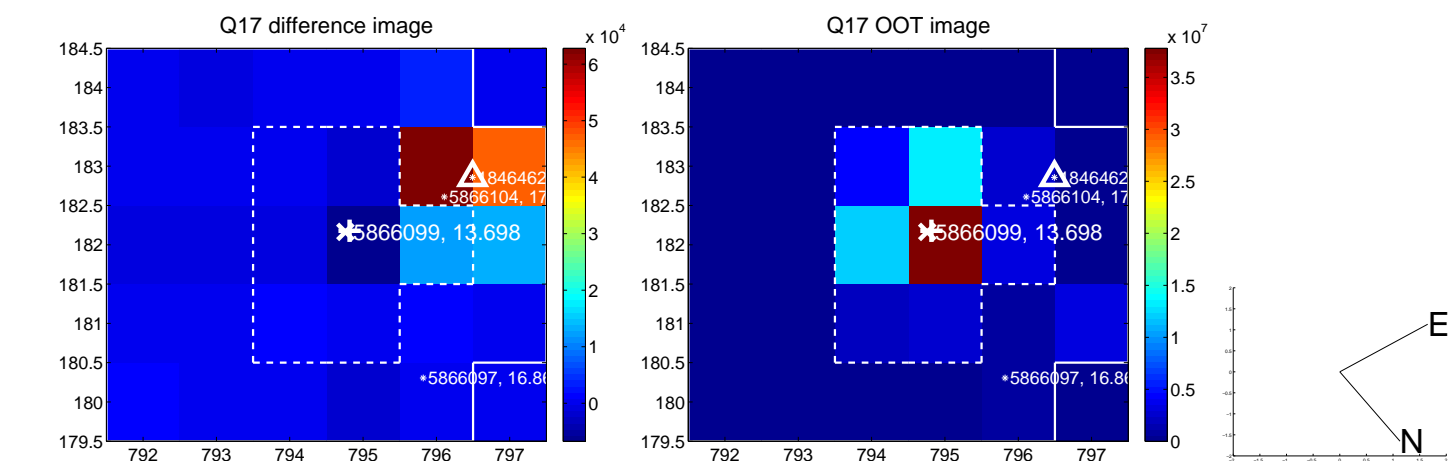
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



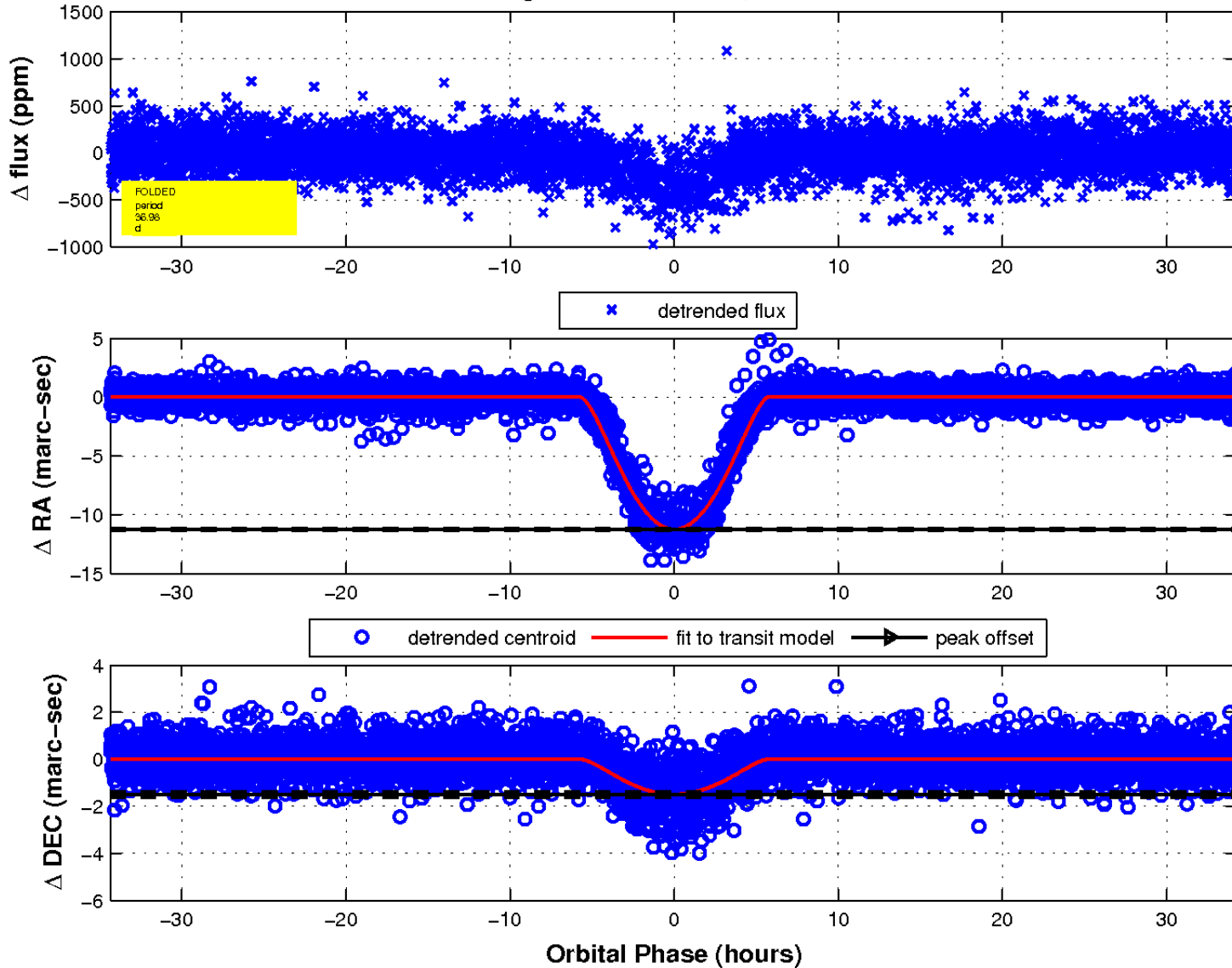
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

