

# KIC 008880003

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008880003-01	OBS	No	374.850669	174.380881	731.3	54.162	11.0	11.9	0.83	5813	4.40	0.72
008880003-02	OBS	7914.01	1.721277	132.549579	48.4	2.385	7.6	6.3	0.83	5813	0.69	948.69

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008880003-01	OBS	FP	0.00	1	0	0	1	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS—EPHEM_MATCH
008880003-02	OBS	FP	0.00	1	0	0	1	MOD_NONUNIQ_ALT—CENT_FEW_DIFFS—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.

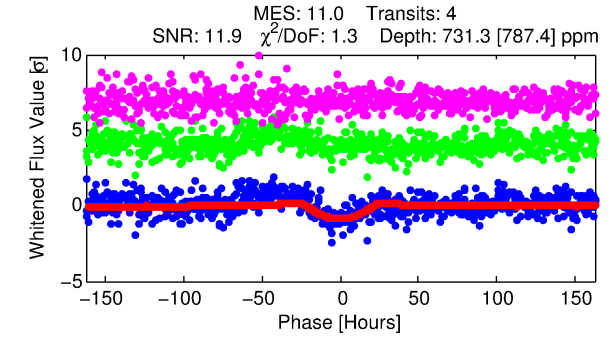
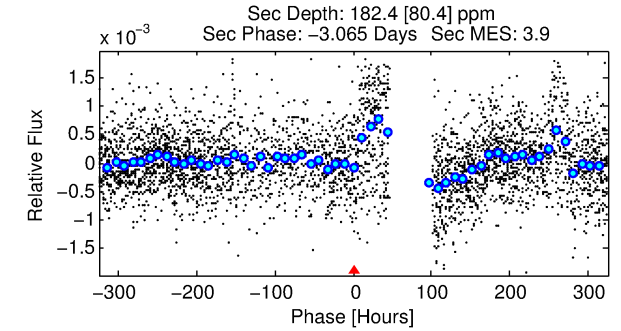
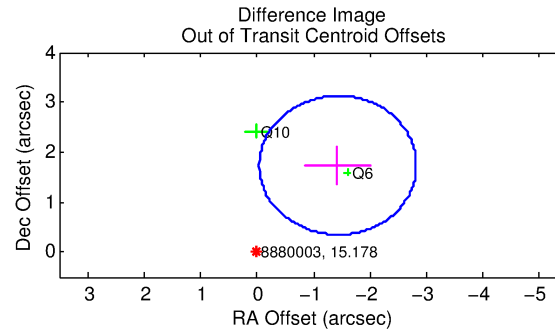
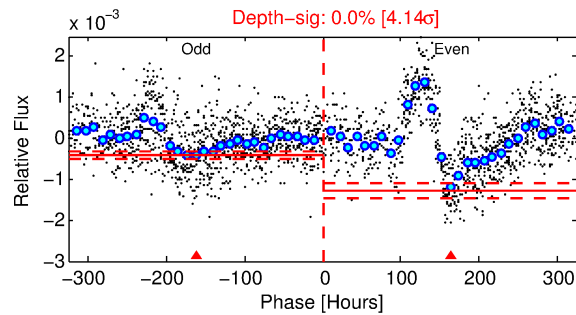
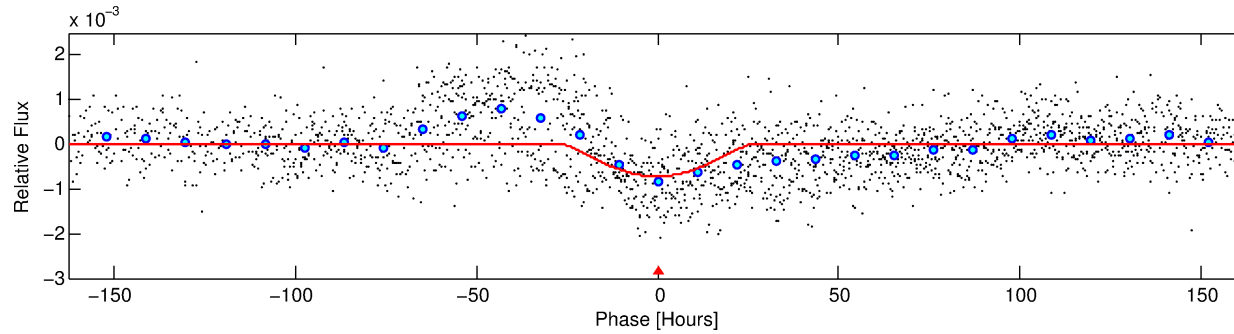
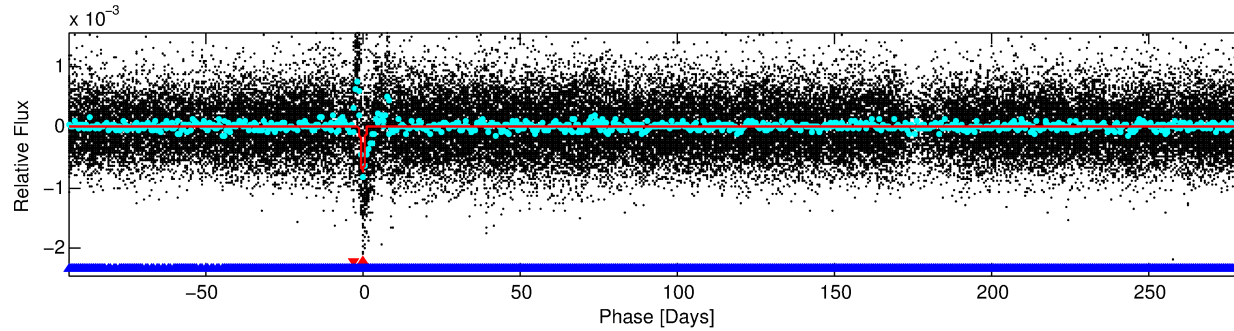
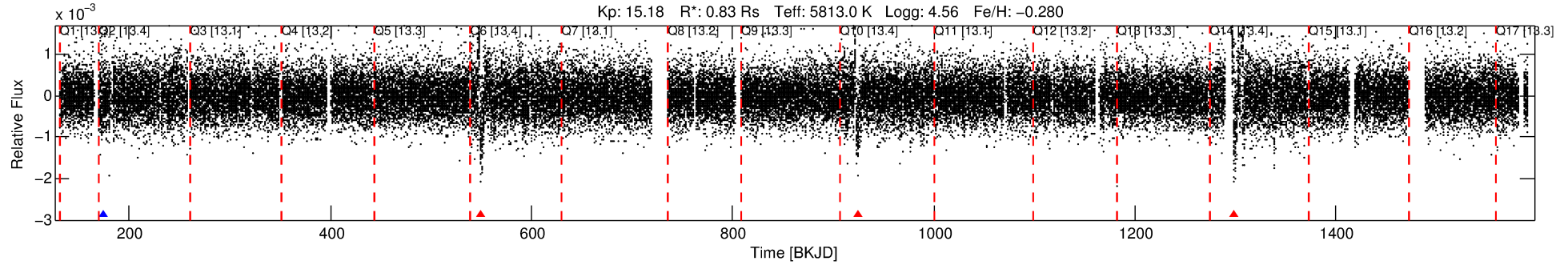
## Ephemeris Match Information For 008880003-01

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	$\sigma_P$	$\sigma_T$
008880003-01	8880003	008620348-01	8620348	1:1	1945.0	0	-489	15.75	15.18	1.34	Col-Anomaly	1	4.76	2.06

**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: 8880003 Candidate: 1 of 2 Period: 374.851 d



## DV Fit Results:

Period = 374.85067 [0.05094] d  
Epoch = 174.3809 [0.0918] BKJD  
Rp/R\* = 0.0484 [0.1245]  
a/R\* = 16.68 [10.32]  
b = 1.00 [0.21]  
Seff = 0.72 [0.26]  
Teq = 235 [21] K  
Rp = 4.40 [11.38] Re  
a = 0.9901 [0.2266] AU  
Ag = 5081.18 [26297.21] [0.19σ]  
Teffp = 3070 [3965] K [0.71σ]

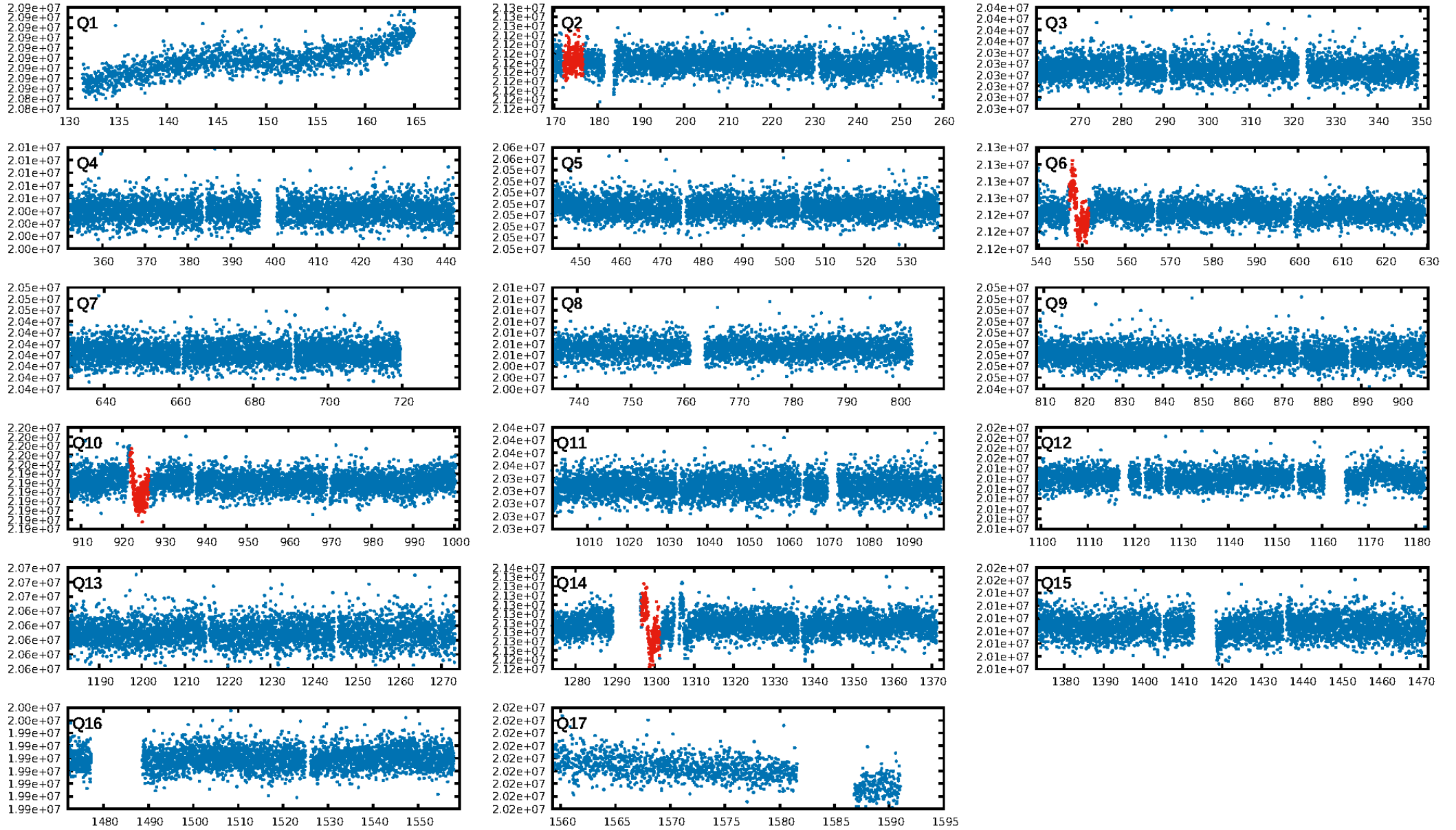
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [165.18σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 82.1%  
Bootstrap-pfa: 2.14e-16  
RollingBand-fgt: 0.25 [1/4]  
GhostDiagnostic-chr: 3.043  
Centroid-sig: 0.1%  
Centroid-so: 2.793 arcsec [2.83σ]  
OotOffset-rm: 2.249 arcsec [4.85σ]  
KicOffset-rm: 2.297 arcsec [5.16σ]  
OotOffset-st: 2/0/0/0 [2]  
KicOffset-st: 2/0/0/0 [2]  
DiffImageQuality-fgm: 0.00 [0/2]  
DiffImageOverlap-fno: 0.00 [0/3]

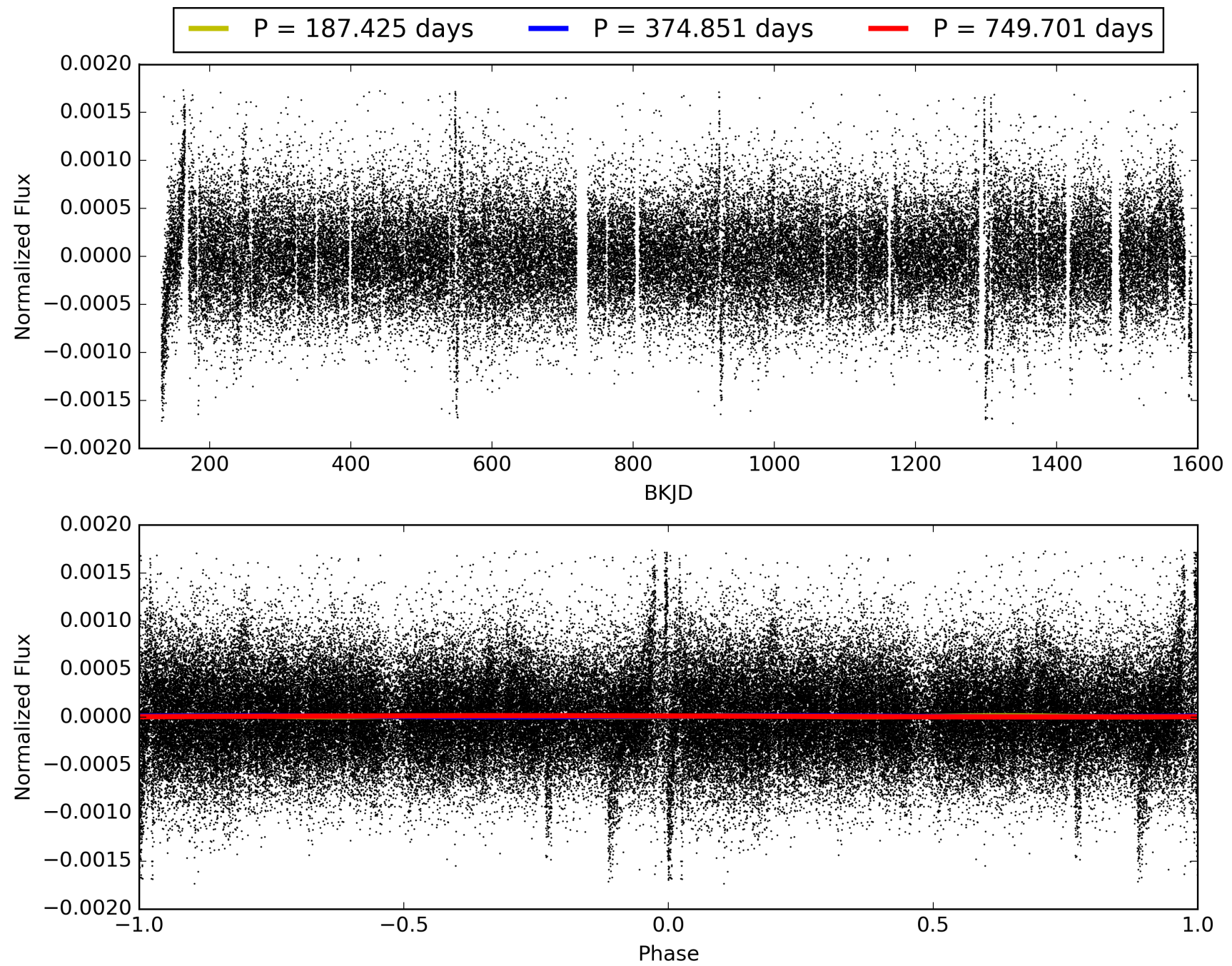
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 22:54:51 Z

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

# TCE 008880003-01, PDC Light Curves



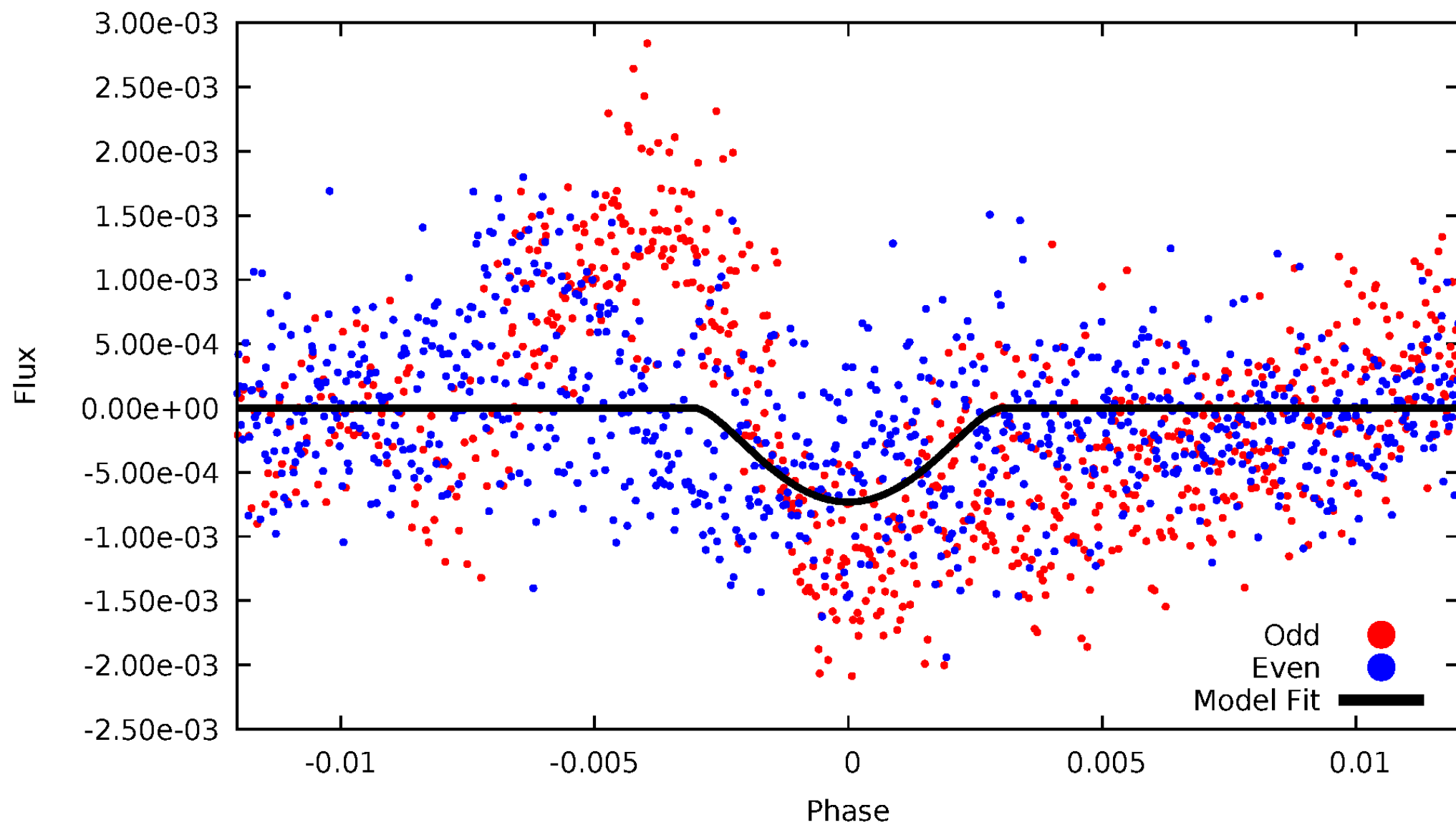
TCE 008880003-01





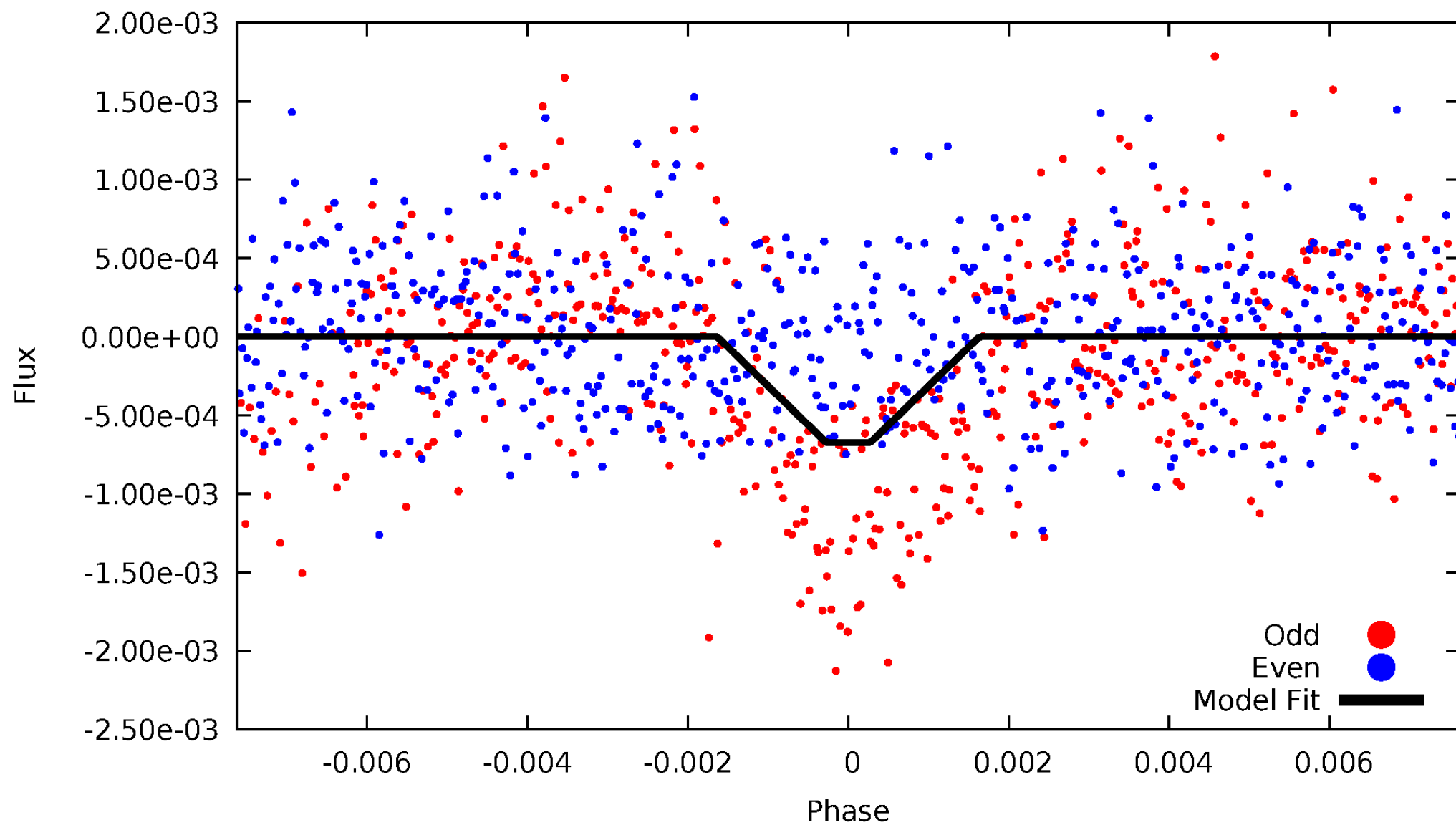
# DV Odd/Even

TCE 008880003-01



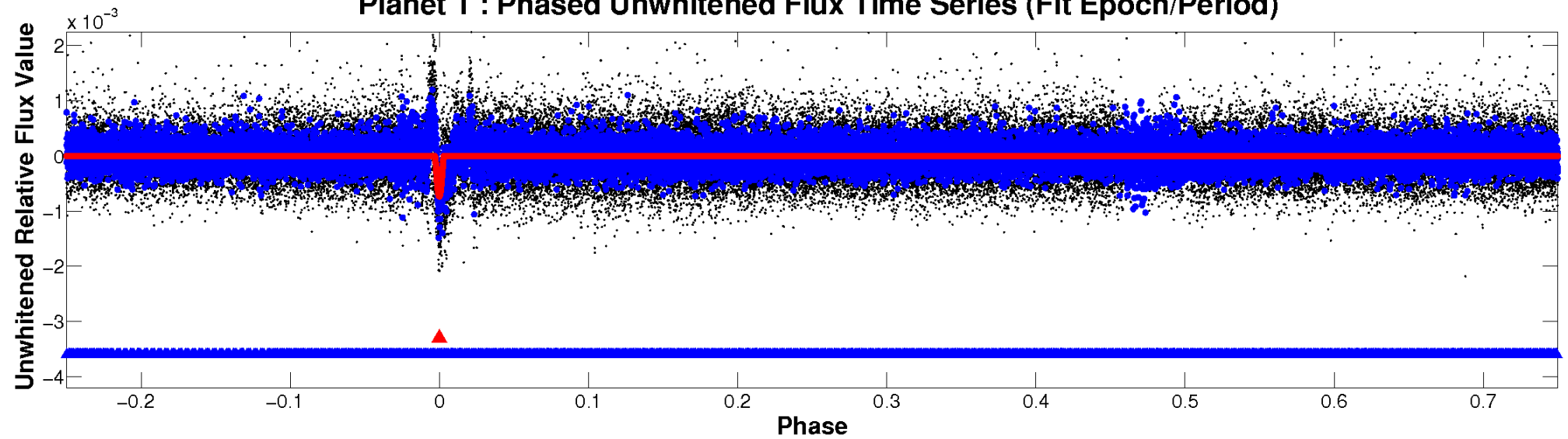
# ALT Odd/Even

TCE 008880003-01

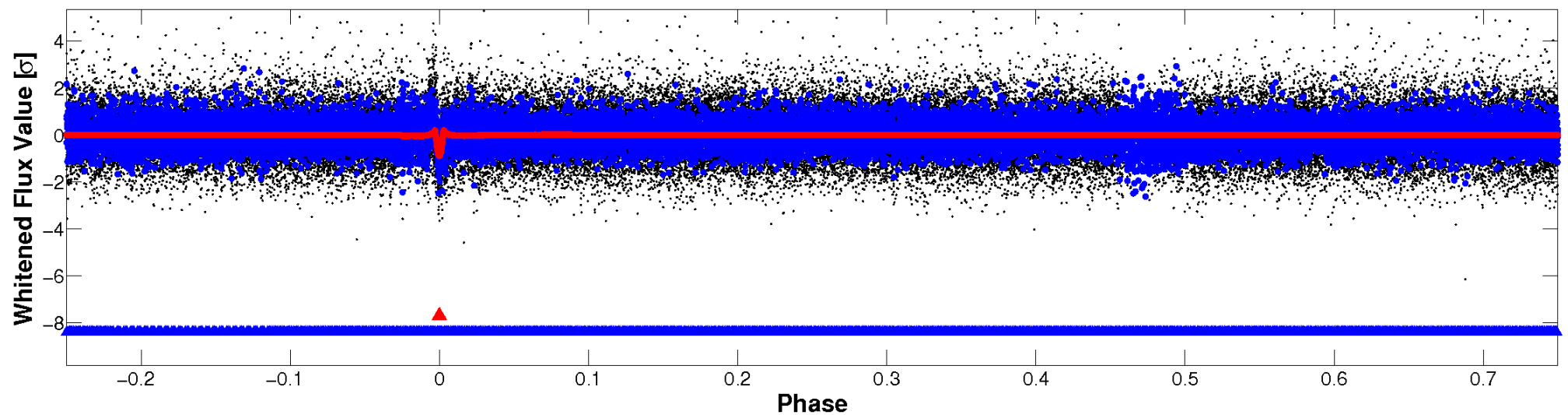


# Non-Whitened Vs. Whitened Light Curve

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

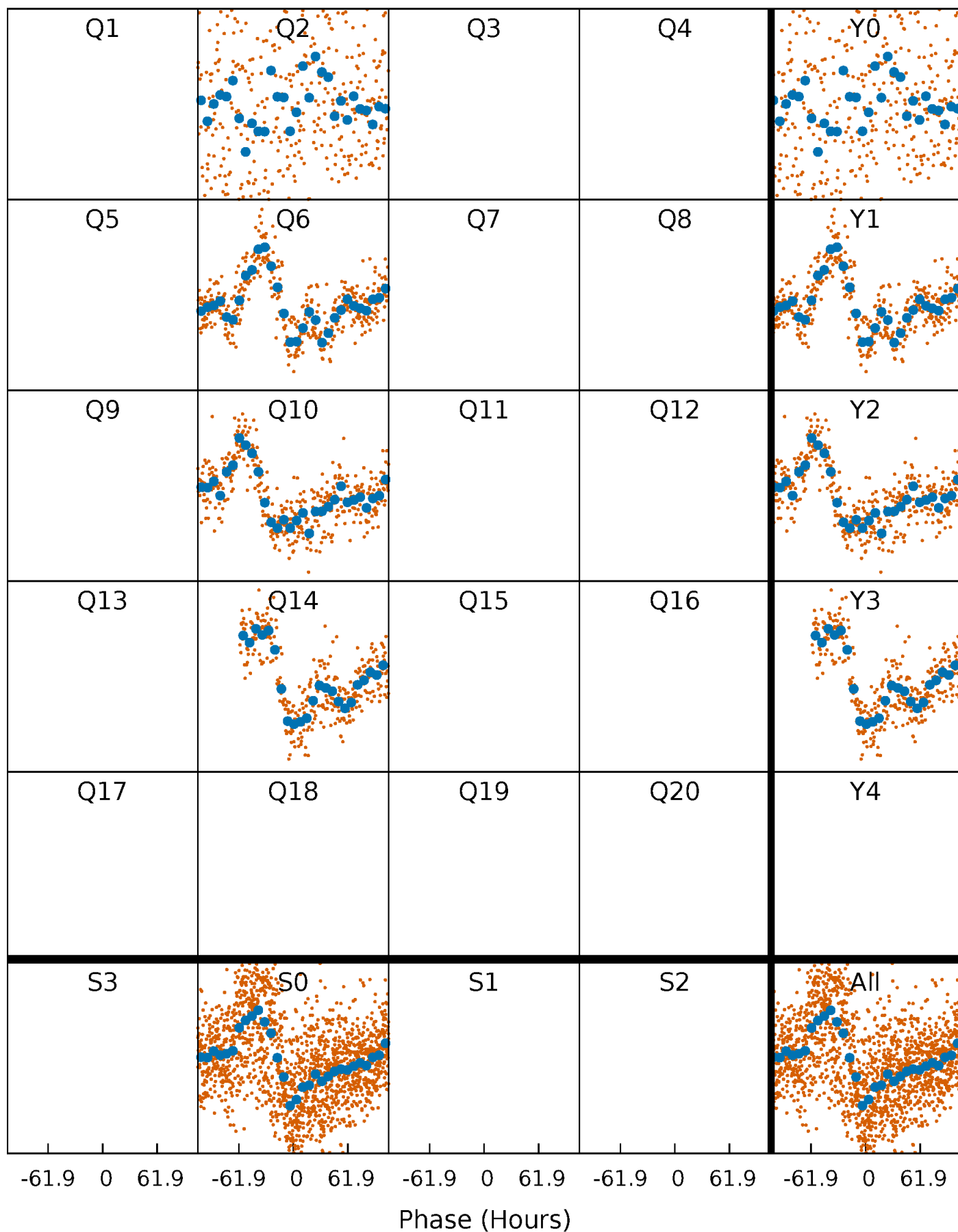


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

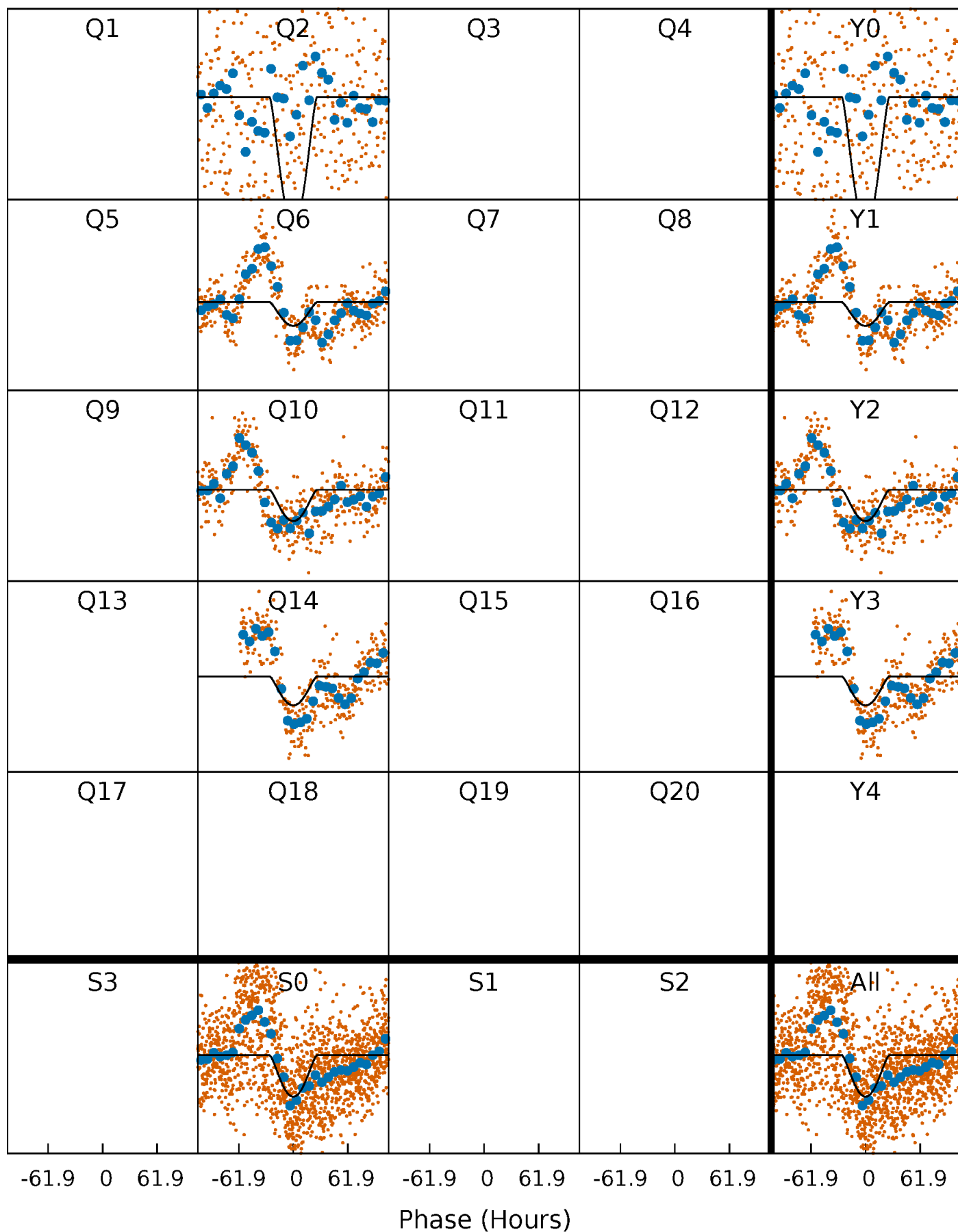
TCE 008880003-01 P=374.850669 Days  $T_0=174.380881$  (BKJD)





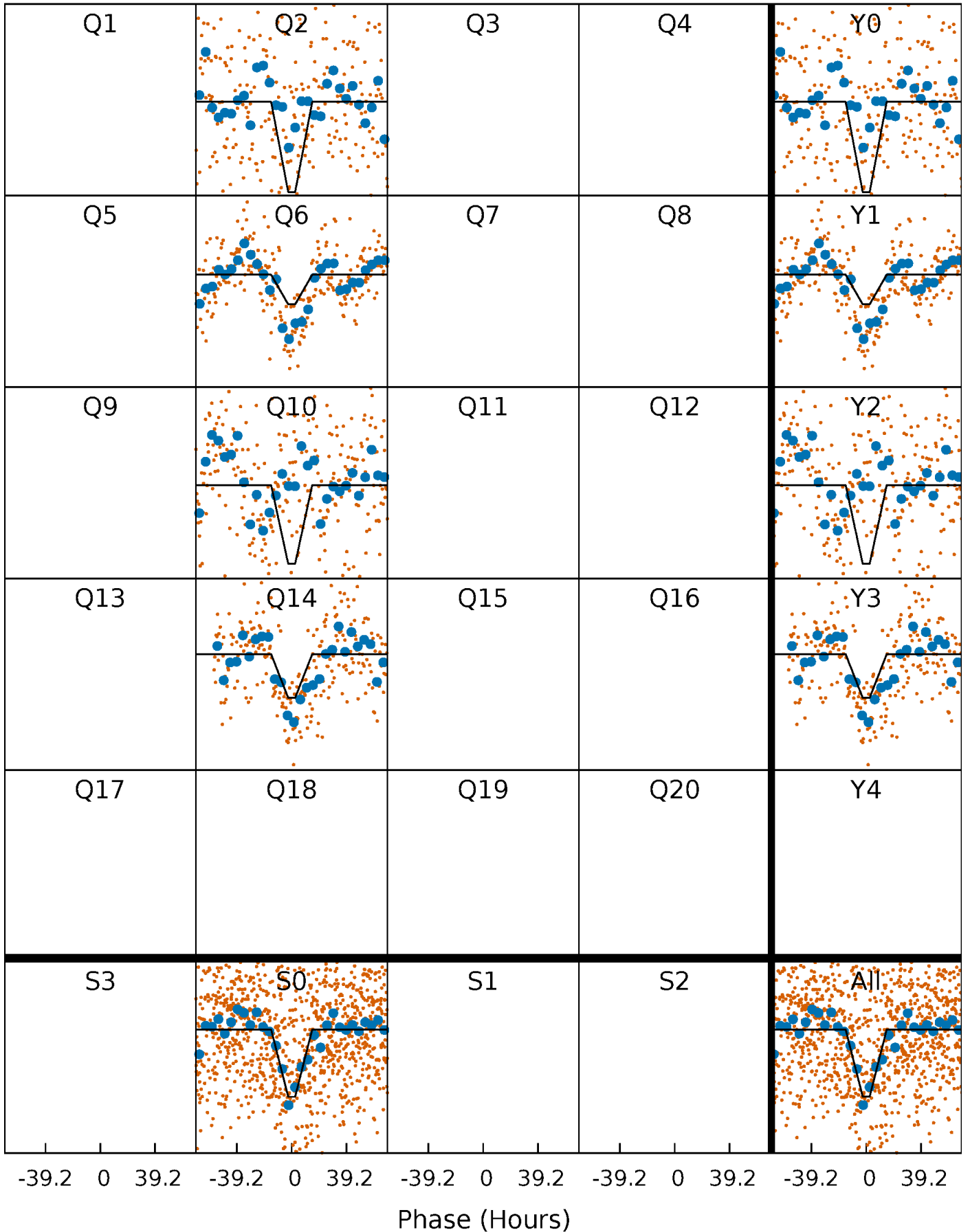
# DV Quarter-Phased Transit Curves

TCE 008880003-01 P=374.850669 Days  $T_0=174.380881$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

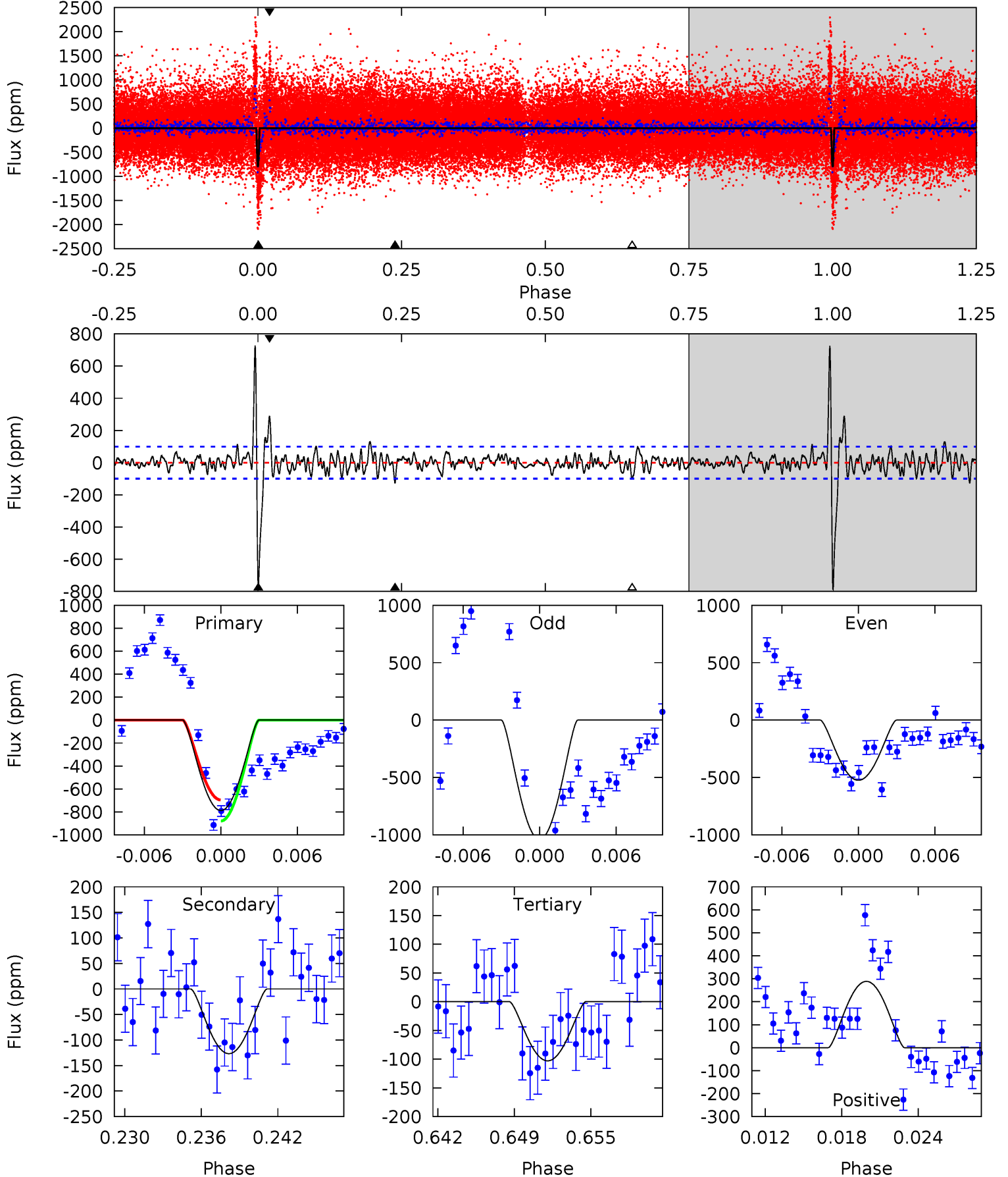
TCE 008880003-01 P=374.826413 Days  $T_0=174.245917$  (BKJD)



# DV Model-Shift Uniqueness Test

008880003-01, P = 374.850669 Days, E = 174.380881 Days

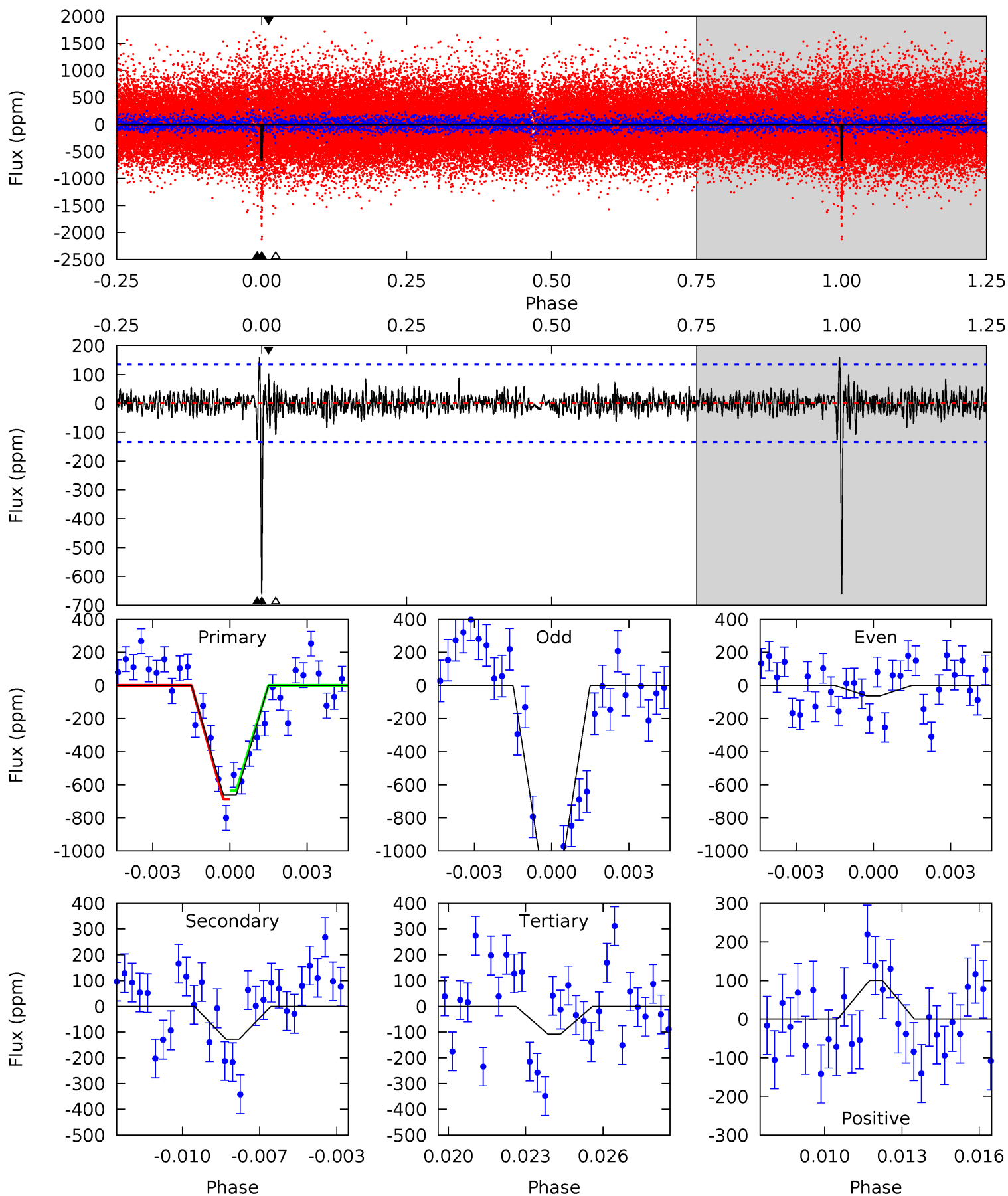
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
40.4	6.50	5.28	14.8	5.12	2.74	2.55	35.1	25.6	1.22	-8.31	13.3	0.82	0.48	4.72



# Alt Model-Shift Uniqueness Test

008880003-01, P = 374.826413 Days, E = 174.245917 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
25.8	4.98	4.20	3.92	5.24	2.94	0.98	21.6	21.9	0.79	1.07	23.1	1.05	0.19	1.01



### Stellar Parameters For KIC 008880003

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5813^{+157}_{-174}$	$4.561^{+0.035}_{-0.184}$	$-0.280^{+0.300}_{-0.300}$	$0.833^{+0.225}_{-0.075}$	$0.925^{+0.101}_{-0.111}$	$2.256^{+0.418}_{-1.112}$
	+3%/-3%	+1%/-4%	+107%/-107%	+27%/-9%	+11%/-12%	+19%/-49%
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 008880003-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-127 \pm 19$	$9.93^{+9.33}_{-6.64}$	$336^{+23}_{-15}$	$2702^{+1020}_{-416}$	$684^{+5641}_{-503}$
Alt.	$-128 \pm 26$	$9.47^{+9.59}_{-6.44}$	$337^{+20}_{-15}$	$2735^{+1125}_{-445}$	$777^{+6539}_{-594}$

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

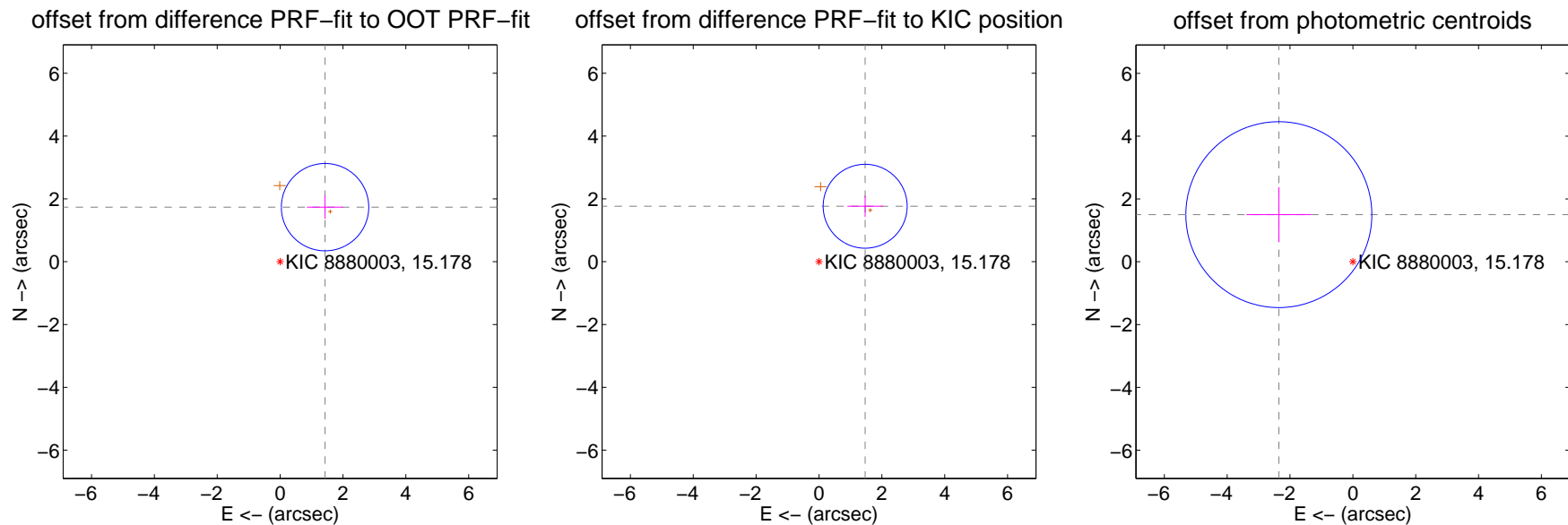
## DV Centroid Data

Supplemental centroid analysis for 008880003-01. Kepler magnitude: 15.18. Transit SNR 11.95

There are 0 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

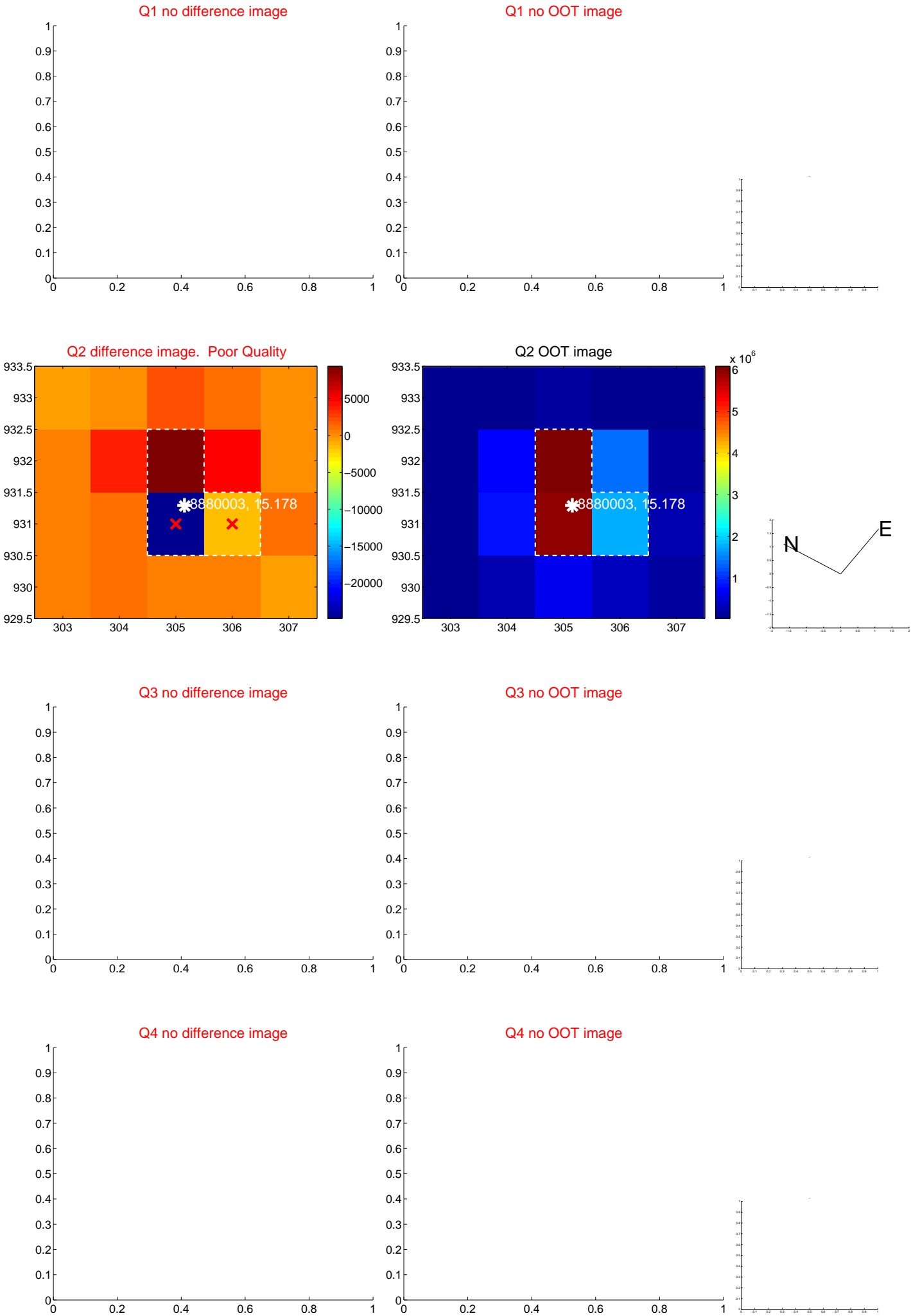
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.249 \pm 0.463$	4.85	$-1.429 \pm 0.576$	$1.736 \pm 0.368$
PRF-fit source offset from KIC position	$2.297 \pm 0.445$	5.16	$-1.469 \pm 0.567$	$1.765 \pm 0.336$
photometric centroid source offset	$2.79 \pm 0.99$	2.83	$2.36 \pm 1.03$	$1.50 \pm 0.87$



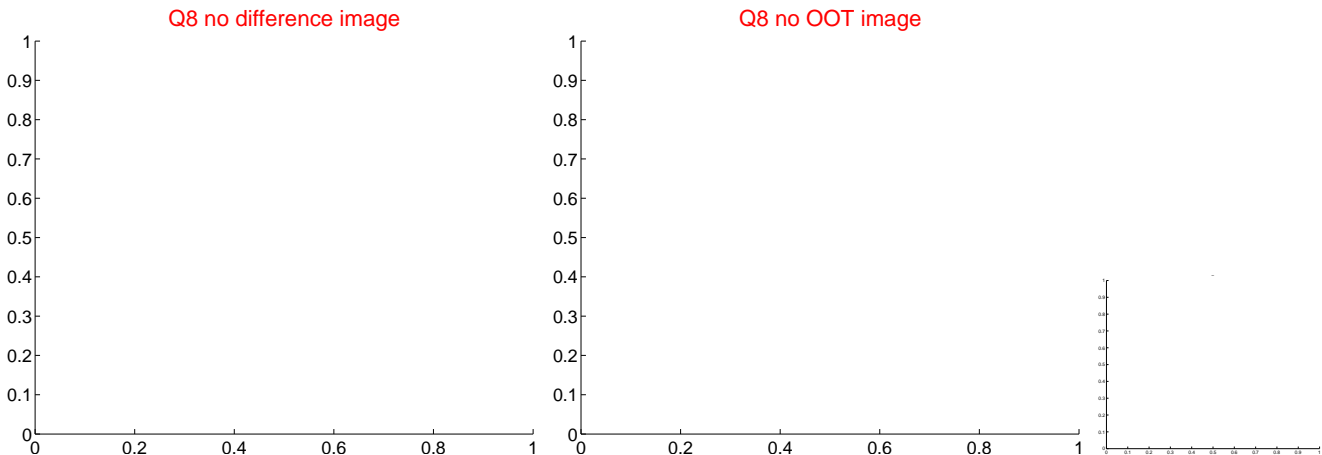
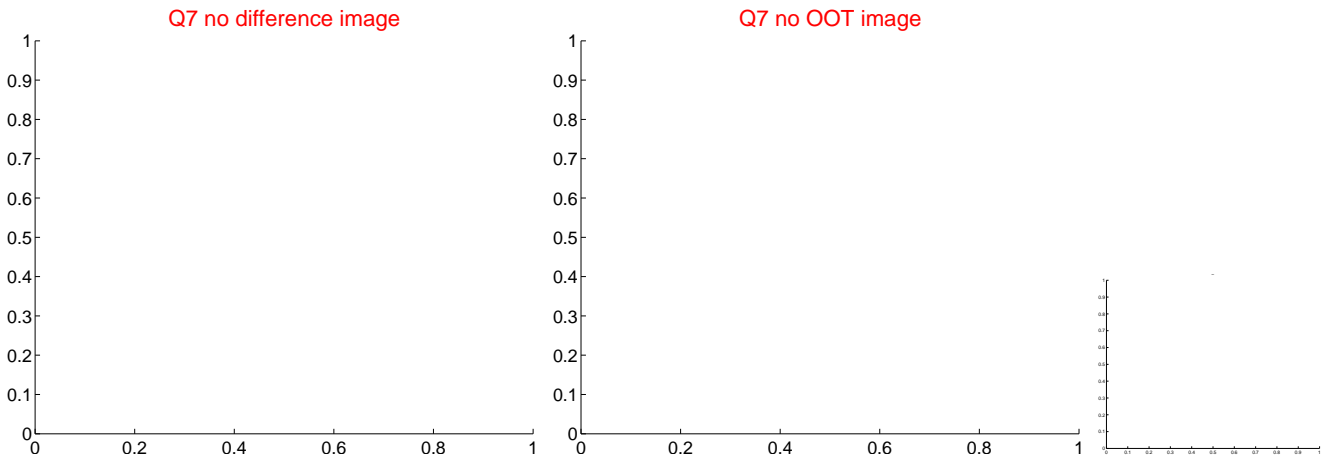
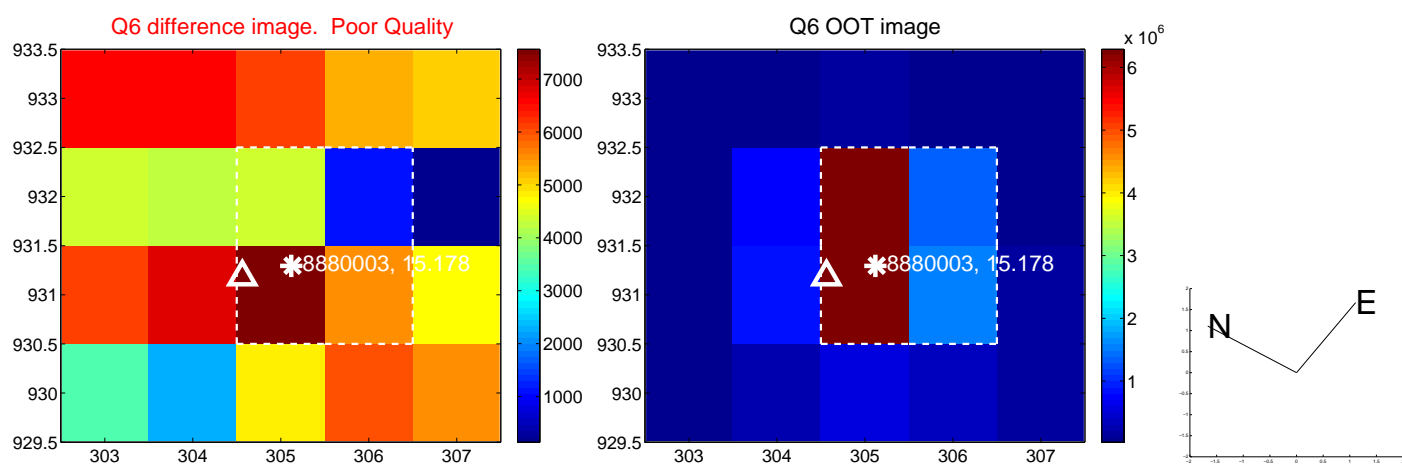
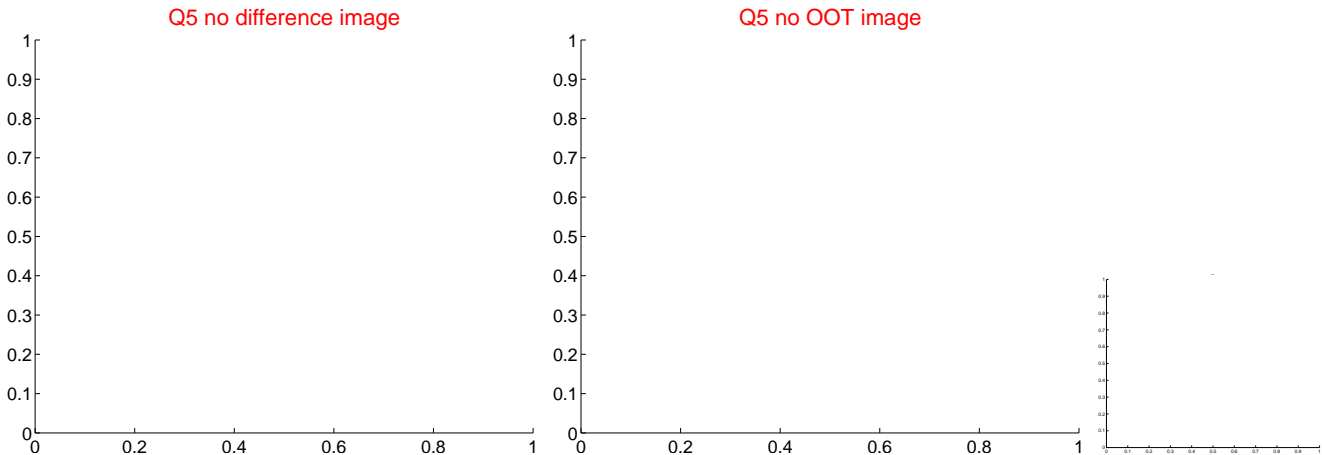
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



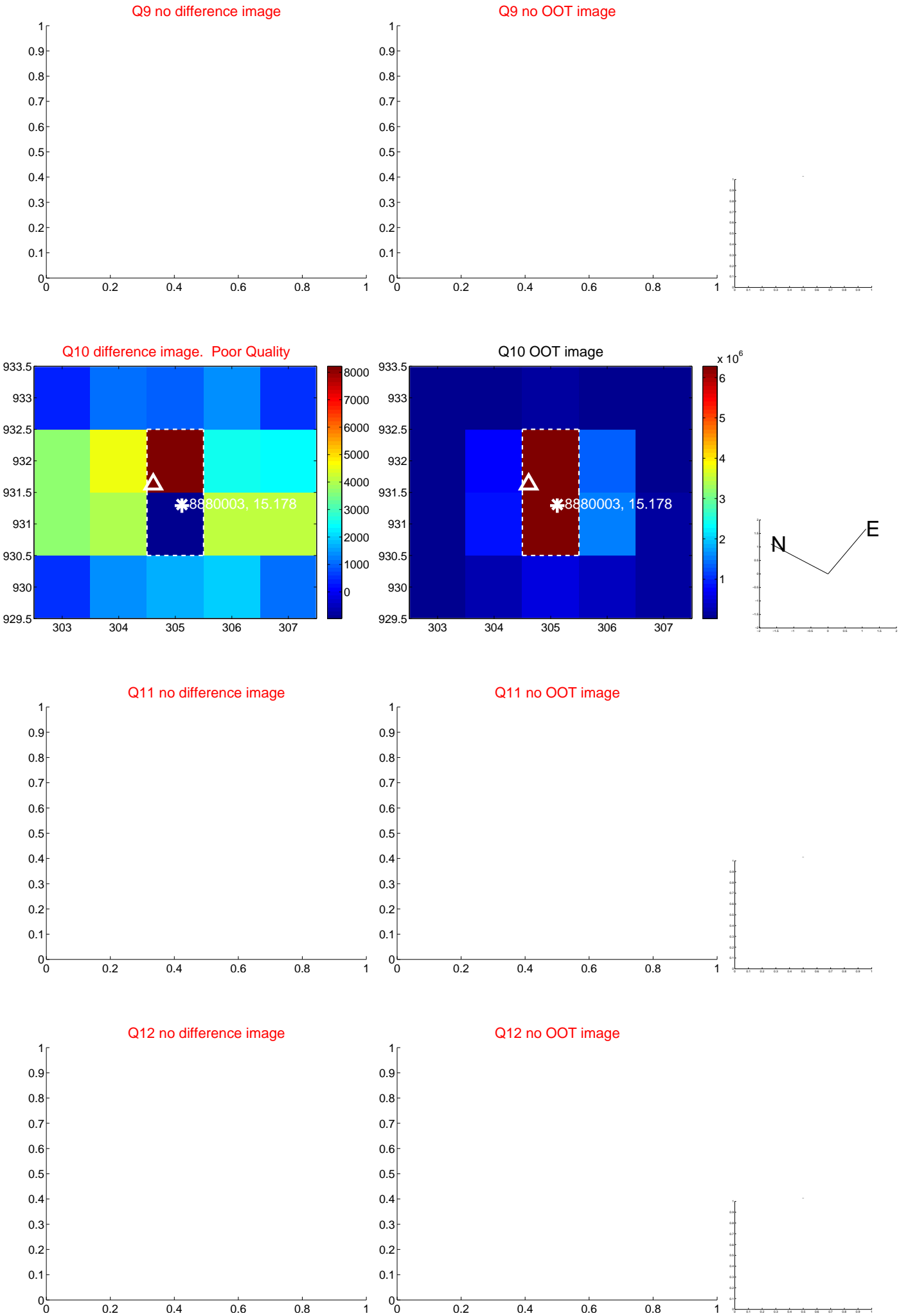
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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



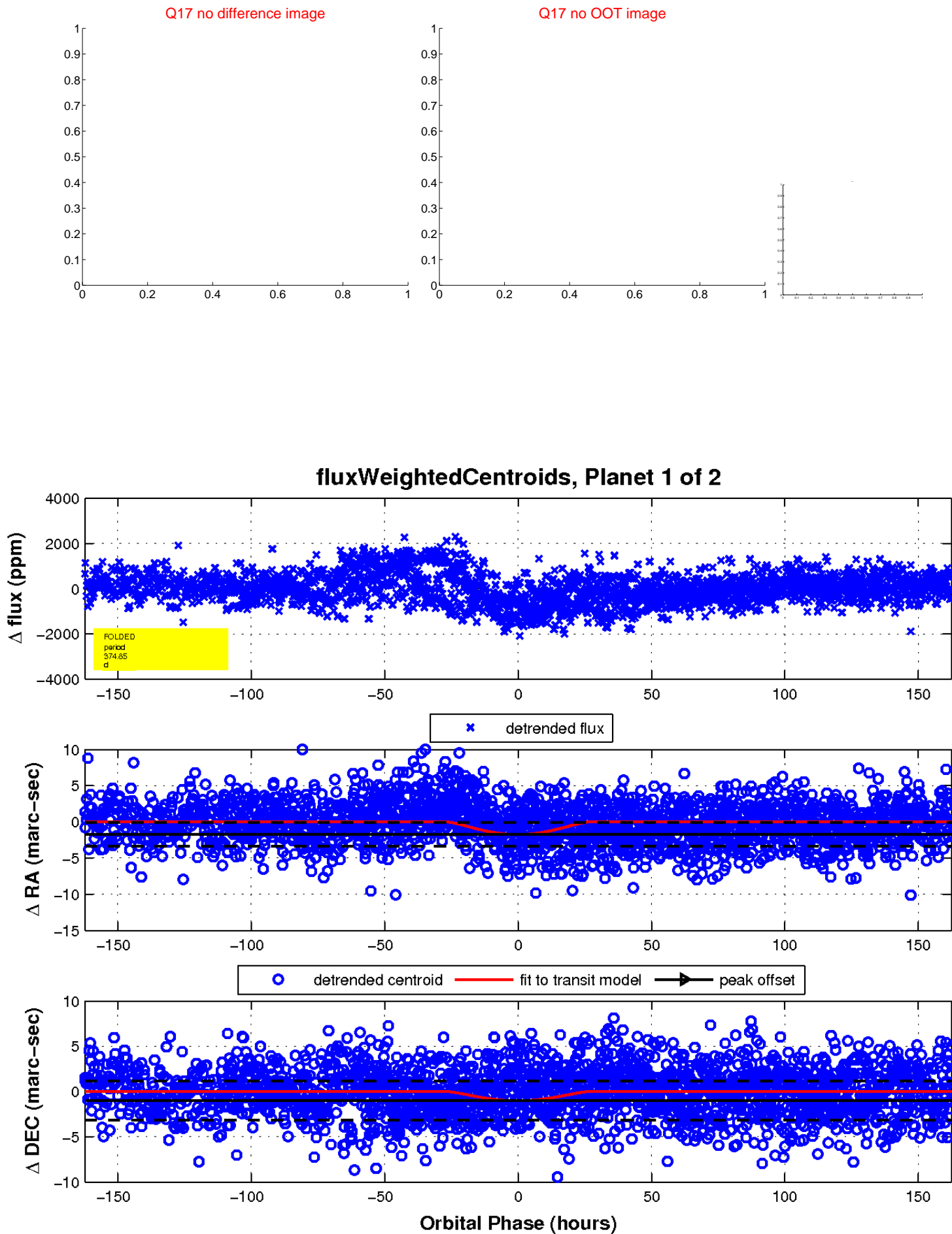
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

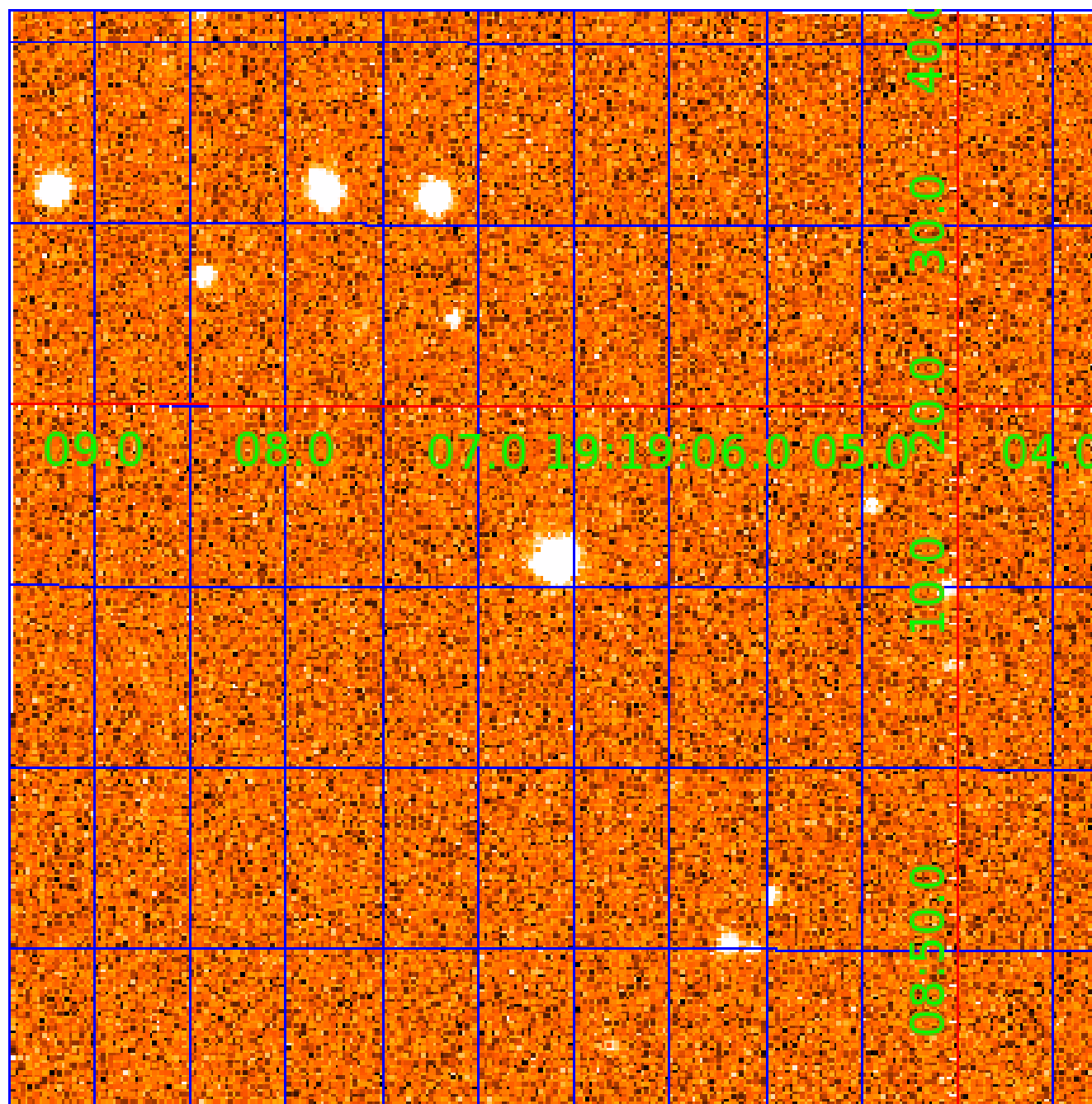


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination





# KIC 008880003

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008880003-01	OBS	No	374.850669	174.380881	731.3	54.162	11.0	11.9	0.83	5813	4.40	0.72
008880003-02	OBS	7914.01	1.721277	132.549579	48.4	2.385	7.6	6.3	0.83	5813	0.69	948.69

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008880003-01	OBS	FP	0.00	1	0	0	1	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS—EPHEM_MATCH
008880003-02	OBS	FP	0.00	1	0	0	1	MOD_NONUNIQ_ALT—CENT_FEW_DIFFS—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.

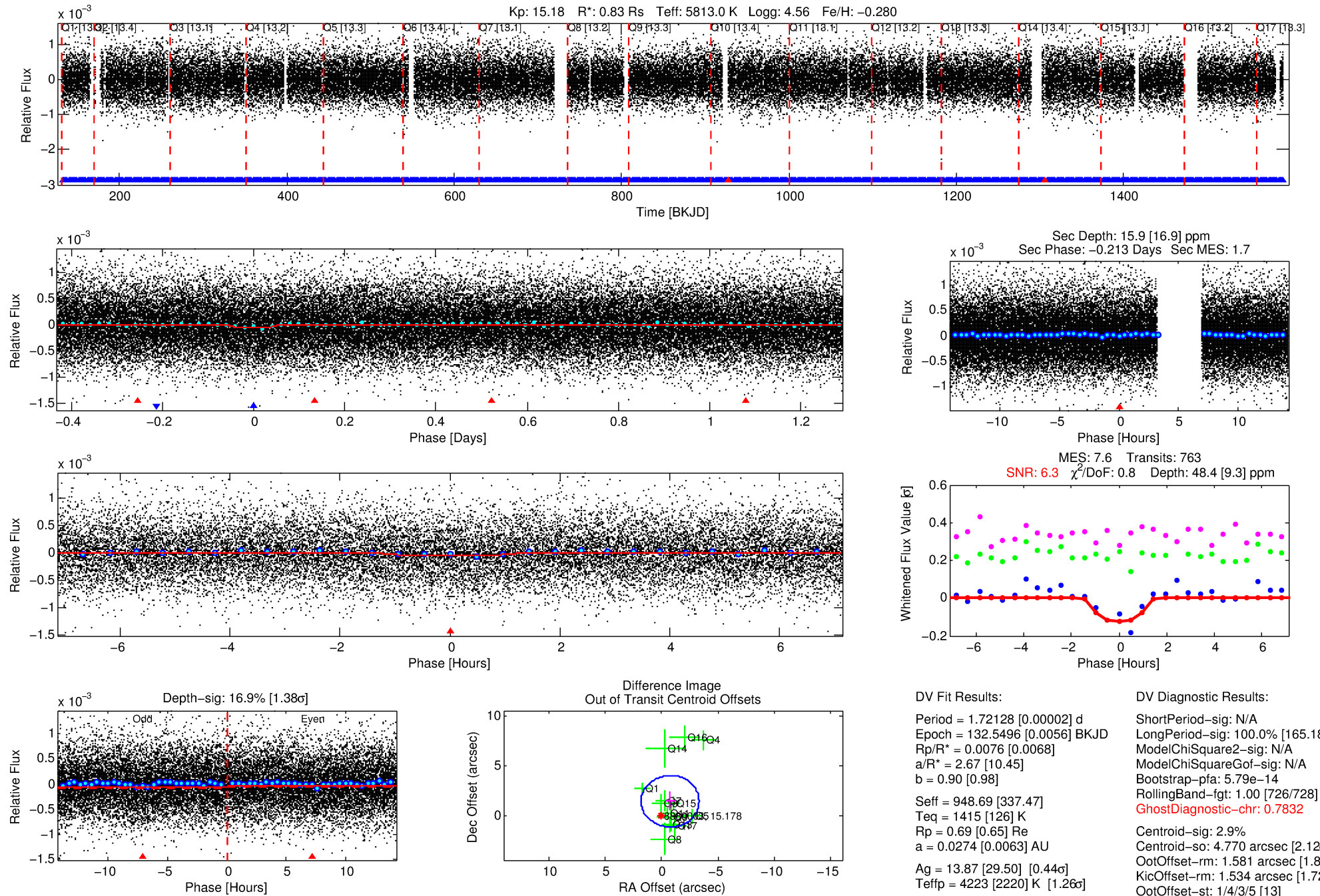
## Ephemeris Match Information For 008880003-02

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	$\sigma_P$	$\sigma_T$
008880003-02	8880003	008879915-pri	8879915	1:2	147.2	0	37	15.19	15.18	9897.90	Col-Anomaly	0	3.15	1.10

**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

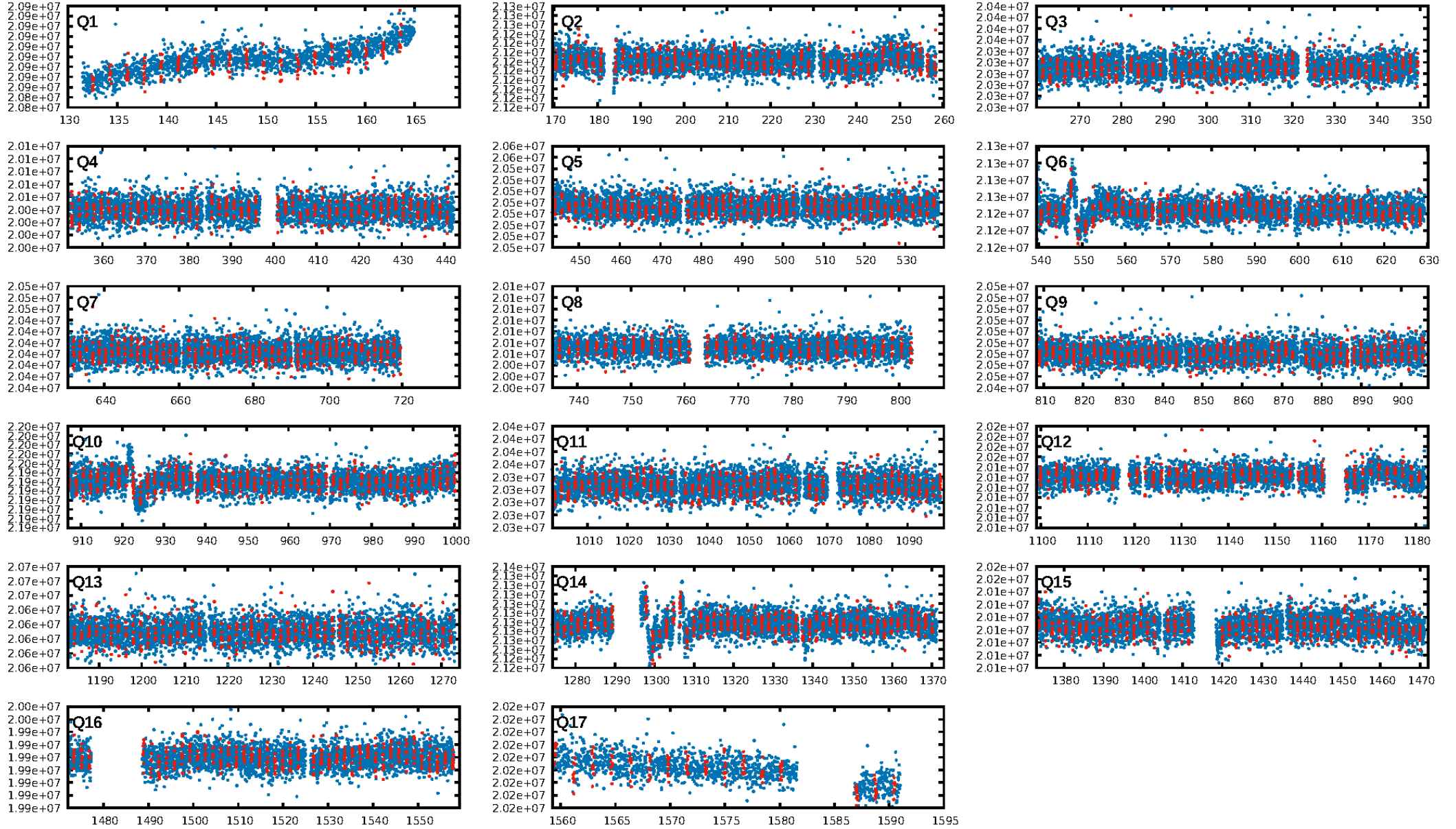
KIC: 8880003 Candidate: 2 of 2 Period: 1.721 d



Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 22:54:58 Z

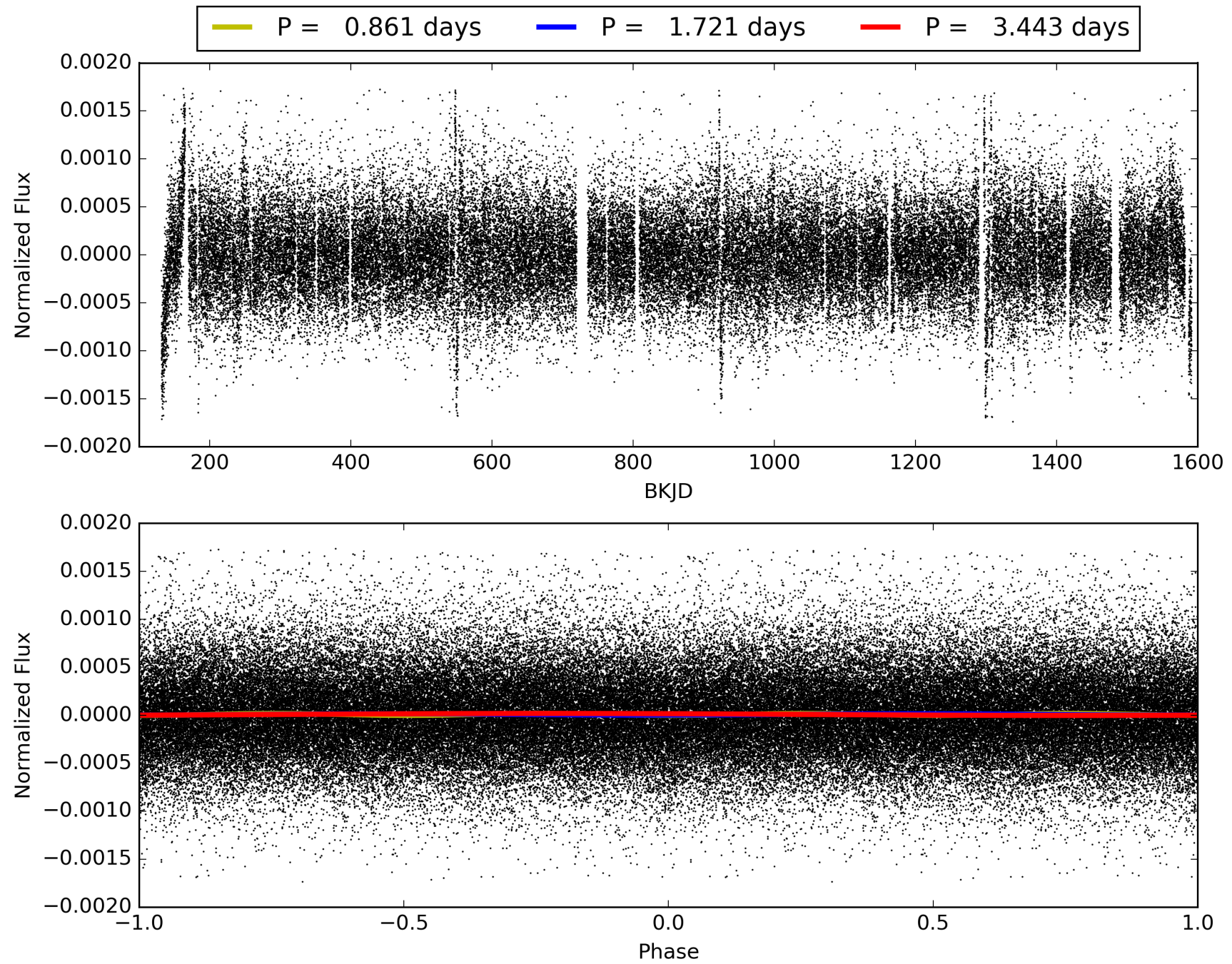
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008880003-02, PDC Light Curves



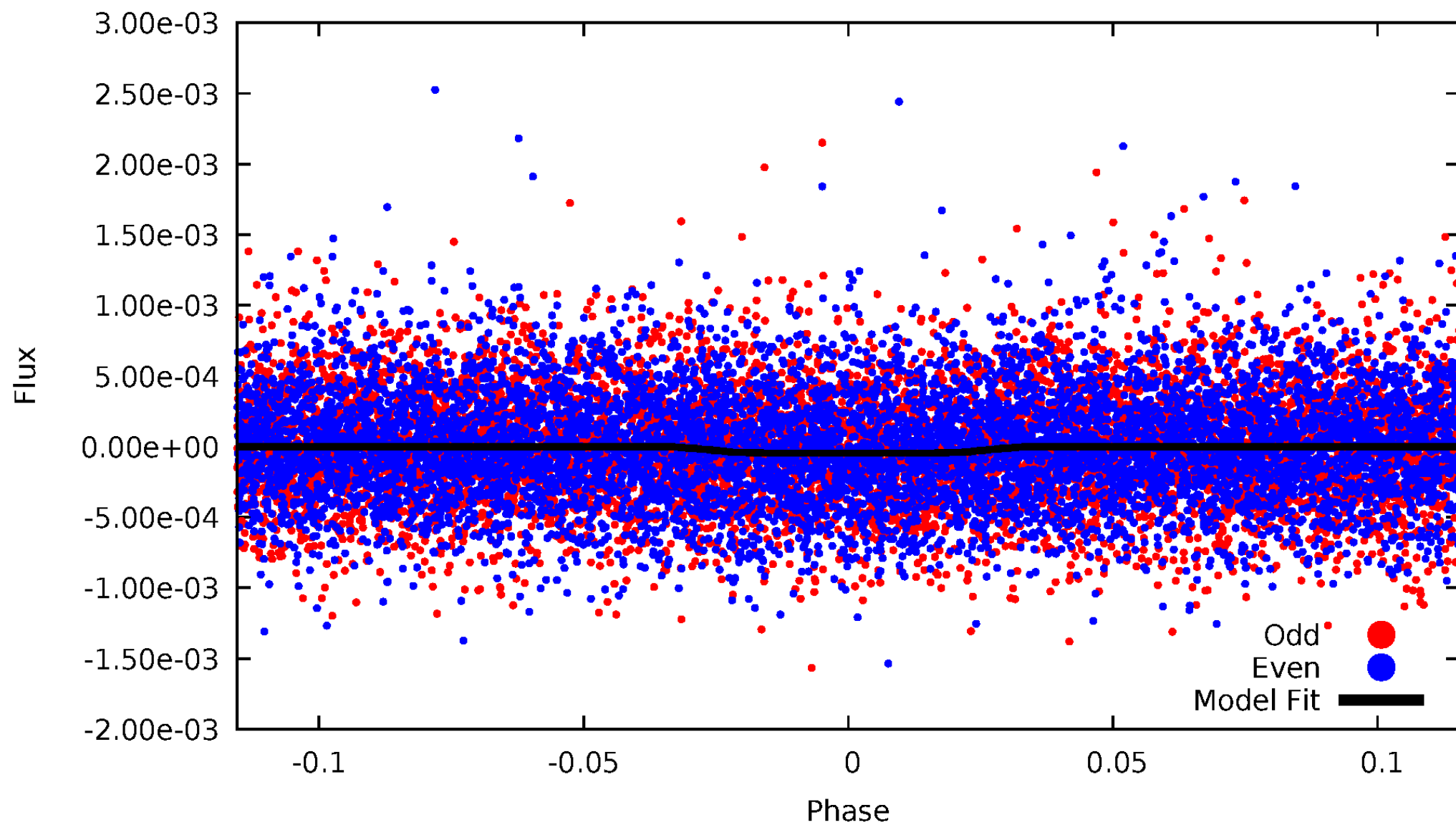


TCE 008880003-02



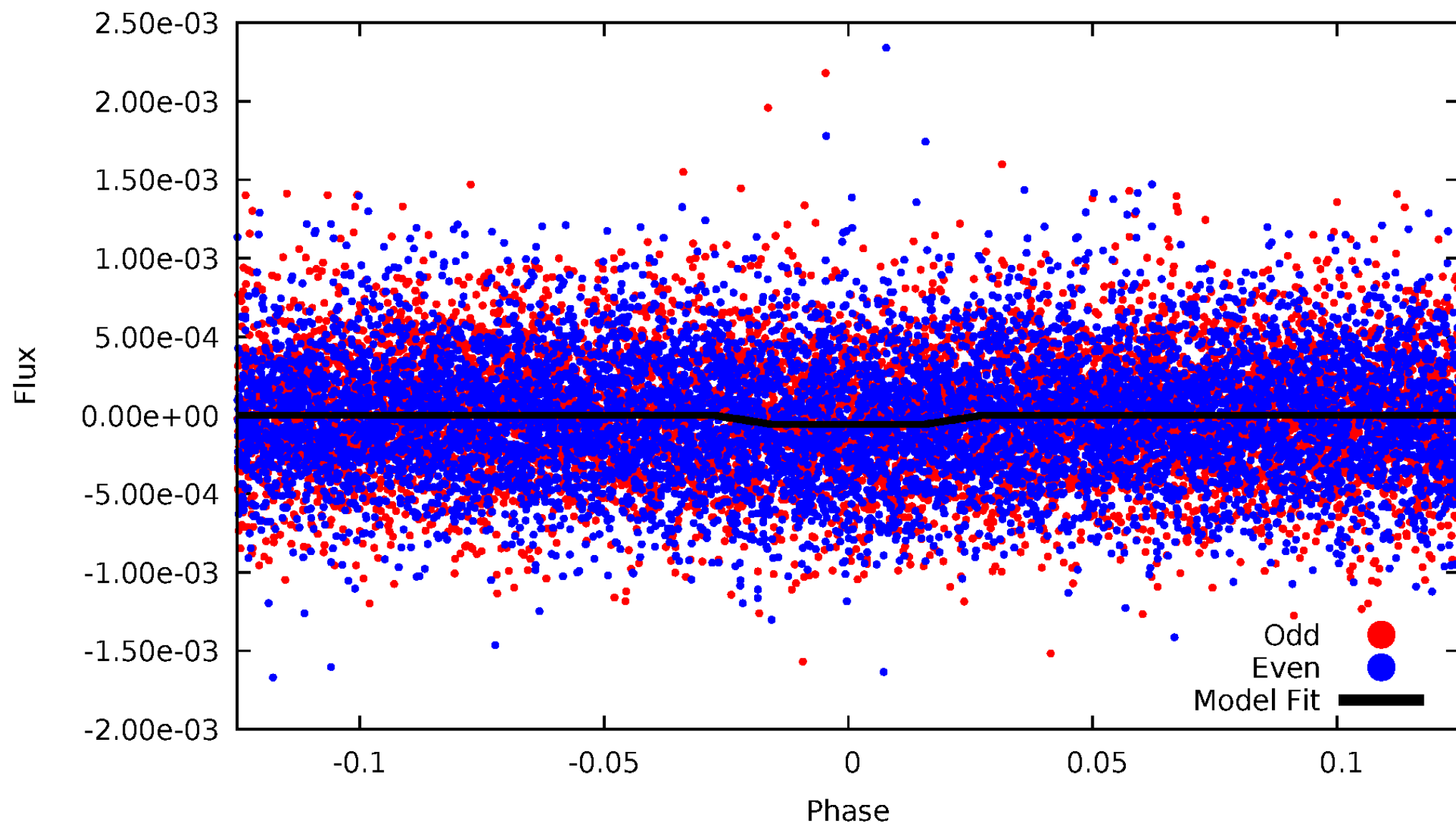
# DV Odd/Even

TCE 008880003-02



# ALT Odd/Even

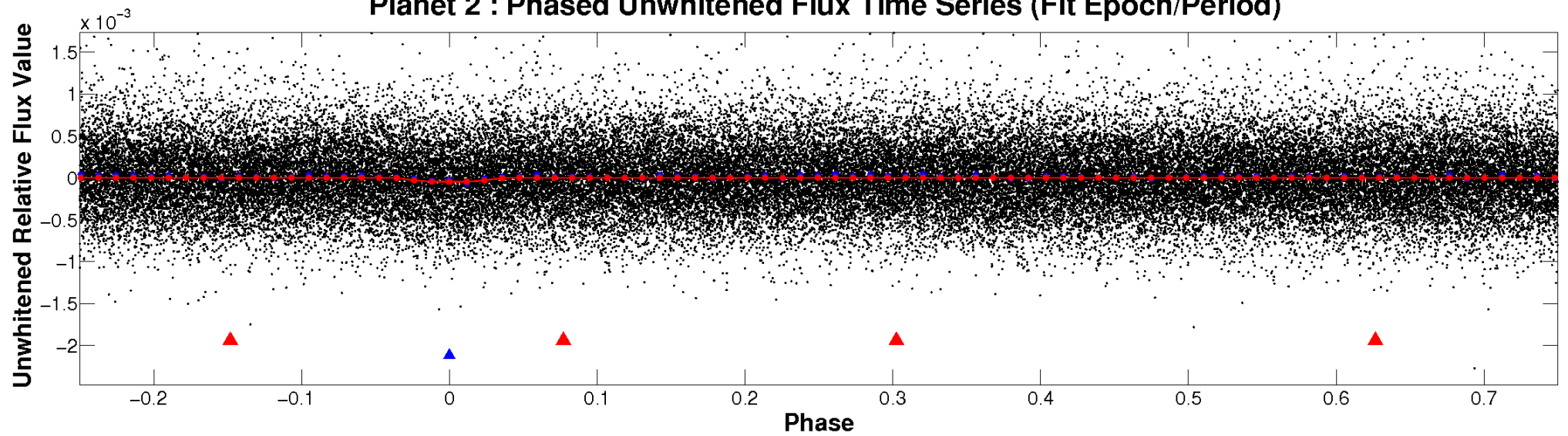
TCE 008880003-02



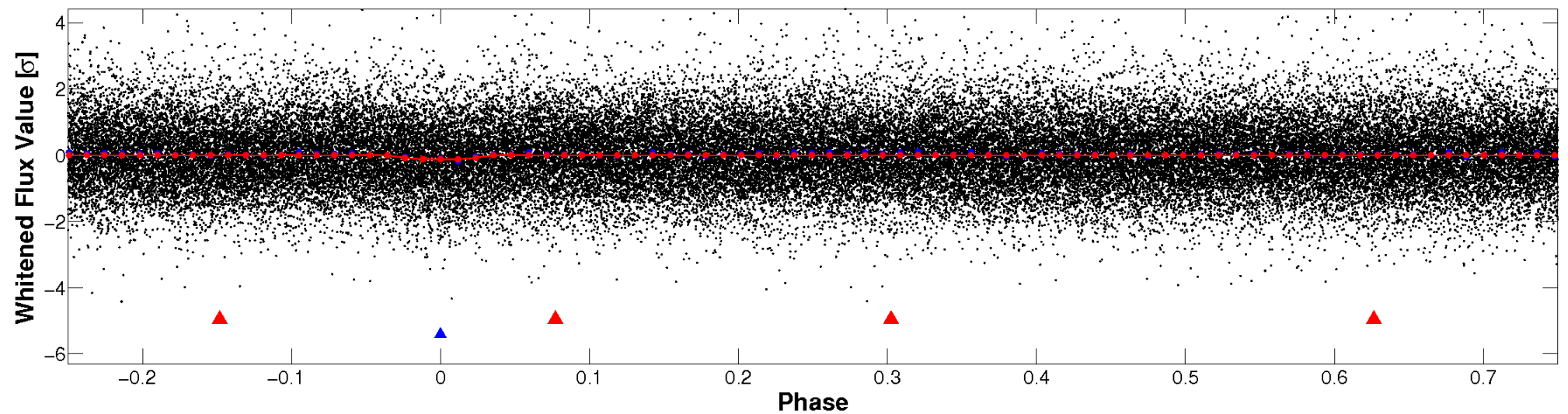


# Non-Whitened Vs. Whitened Light Curve

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

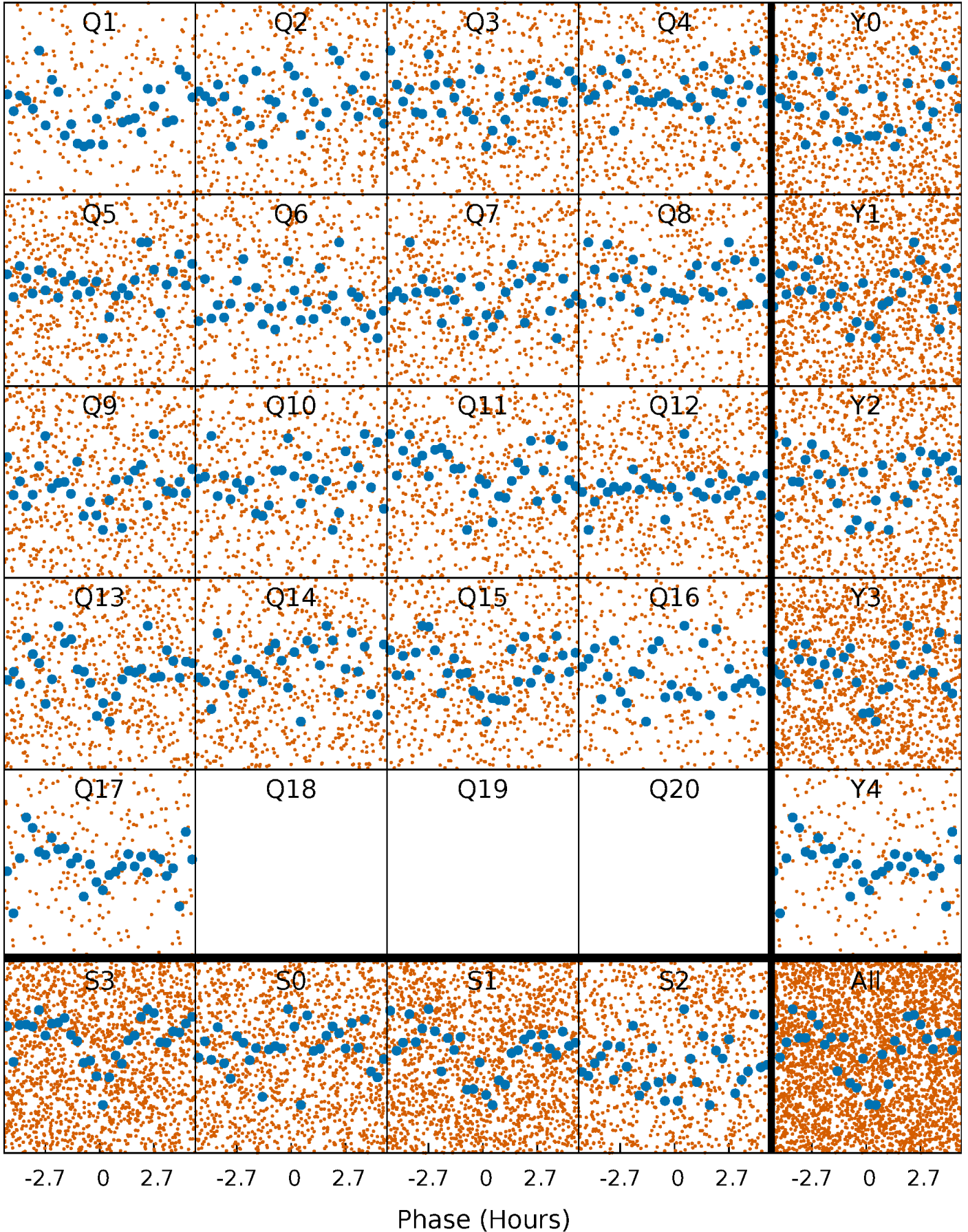


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



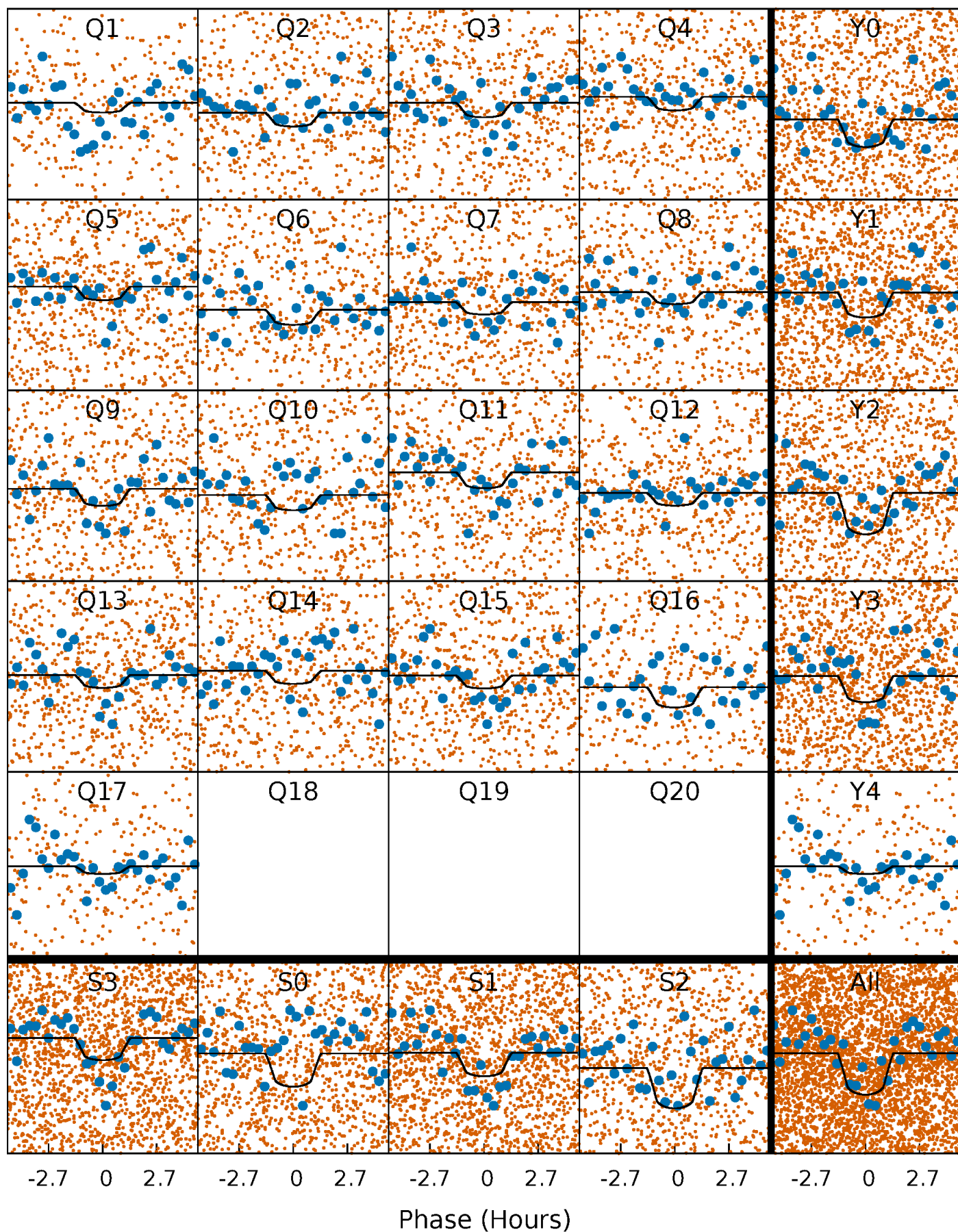
# PDC Quarter-Phased Transit Curves

TCE 008880003-02 P= 1.721277 Days  $T_0=132.549579$  (BKJD)



# DV Quarter-Phased Transit Curves

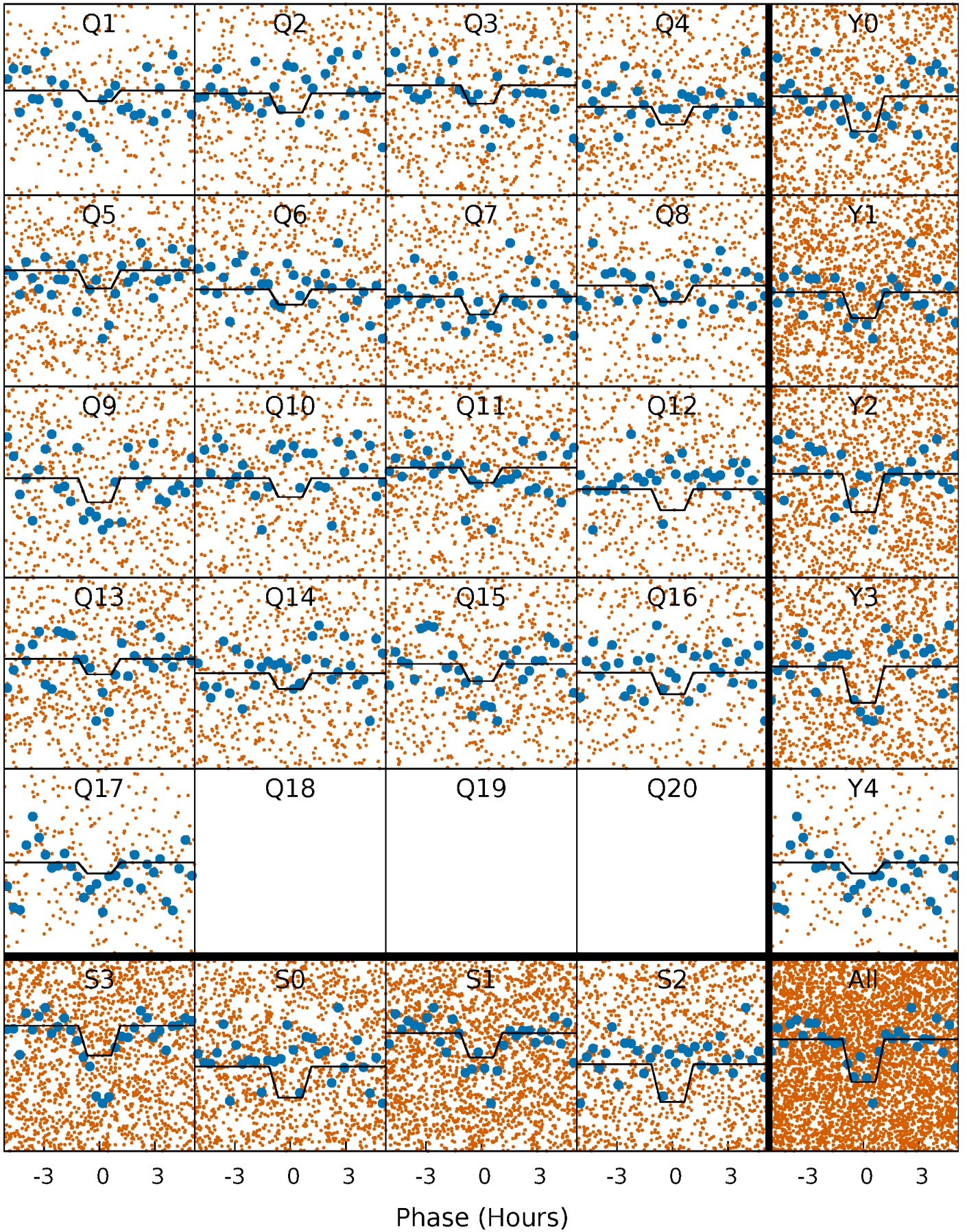
TCE 008880003-02 P= 1.721277 Days  $T_0=132.549579$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

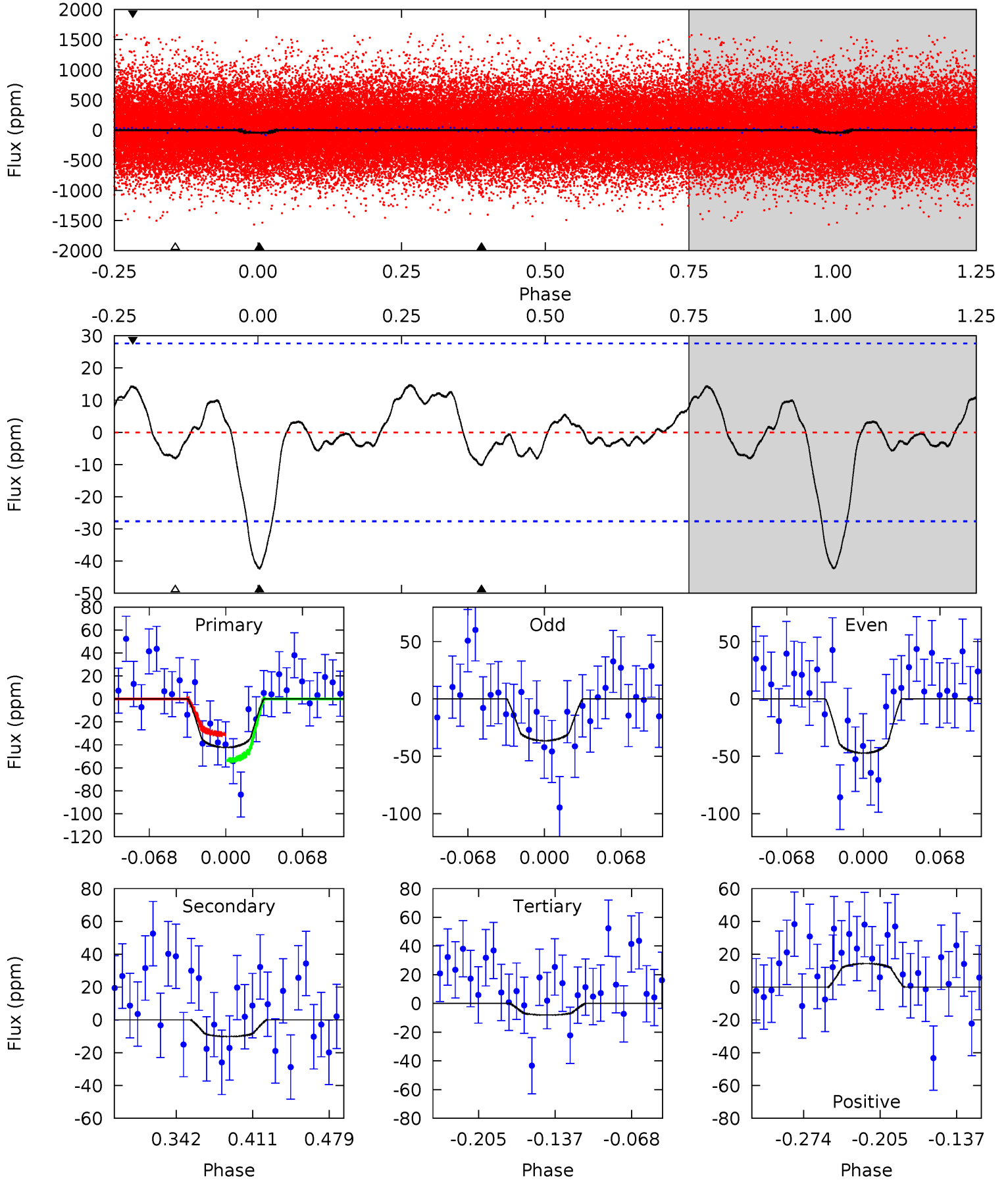
TCE 008880003-02 P= 1.721285 Days  $T_0=132.548424$  (BKJD)



# DV Model-Shift Uniqueness Test

008880003-02, P = 1.721277 Days, E = 130.828302 Days

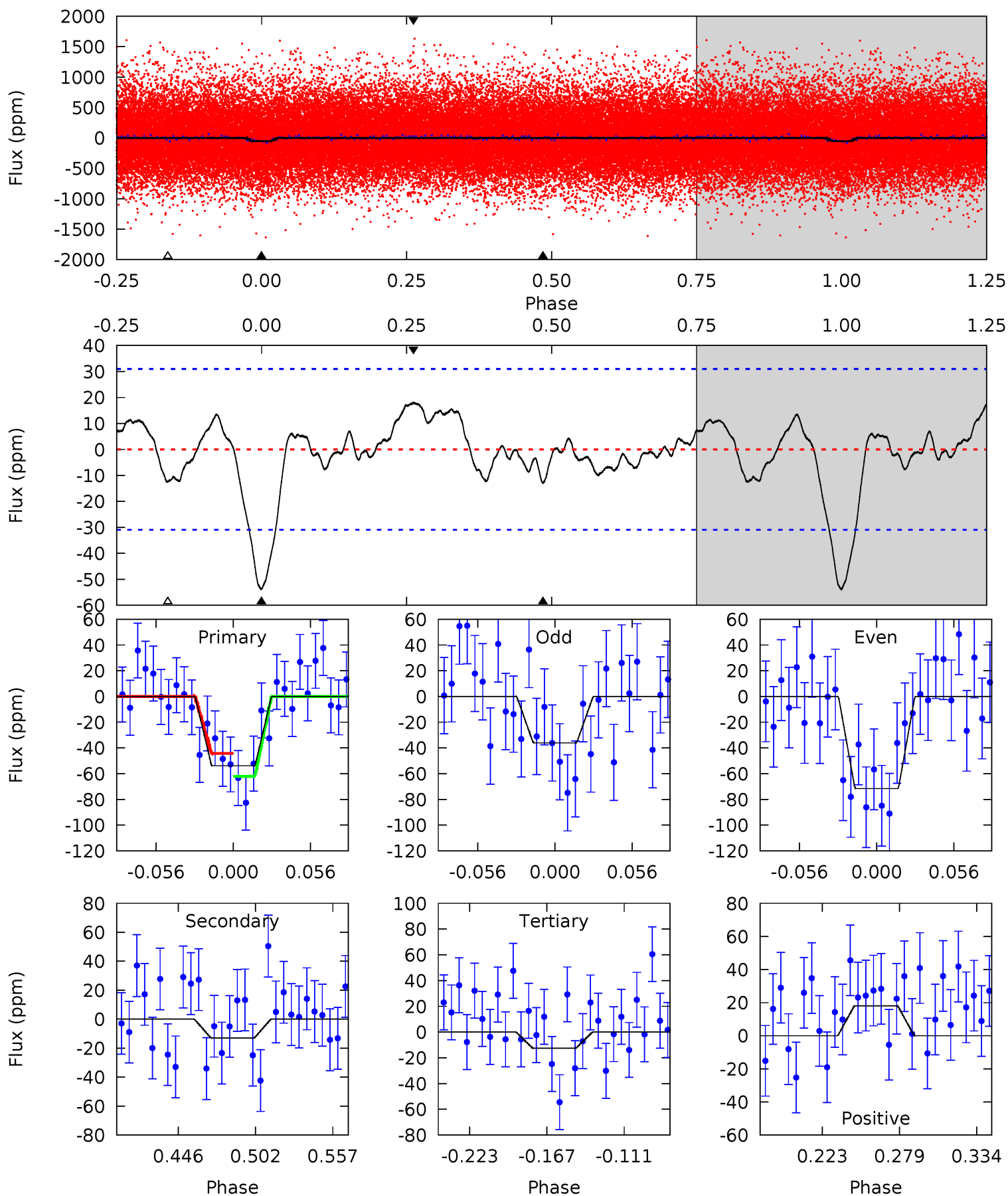
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.11	1.71	1.36	2.40	4.64	1.82	1.04	5.75	4.70	0.35	-0.70	0.91	0.81	0.26	1.92



# Alt Model-Shift Uniqueness Test

008880003-02, P = 1.721285 Days, E = 130.827139 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
8.15	1.97	1.89	2.74	4.69	1.91	1.19	6.26	5.42	0.08	-0.77	2.70	0.91	0.25	1.35





### Stellar Parameters For KIC 008880003

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5813^{+157}_{-174}$	$4.561^{+0.035}_{-0.184}$	$-0.280^{+0.300}_{-0.300}$	$0.833^{+0.225}_{-0.075}$	$0.925^{+0.101}_{-0.111}$	$2.256^{+0.418}_{-1.112}$
	+3%/-3%	+1%/-4%	+107%/-107%	+27%/-9%	+11%/-12%	+19%/-49%
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 008880003-02 / KOI 7914.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-10 \pm 6$	$0.87^{+0.61}_{-0.51}$	$2023^{+127}_{-84}$	$3706^{+1603}_{-833}$	$4.939^{+24.516}_{-3.806}$
Alt.	$-13 \pm 7$	$0.86^{+0.60}_{-0.52}$	$2027^{+126}_{-87}$	$3894^{+1811}_{-781}$	$6.515^{+35.263}_{-4.851}$

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

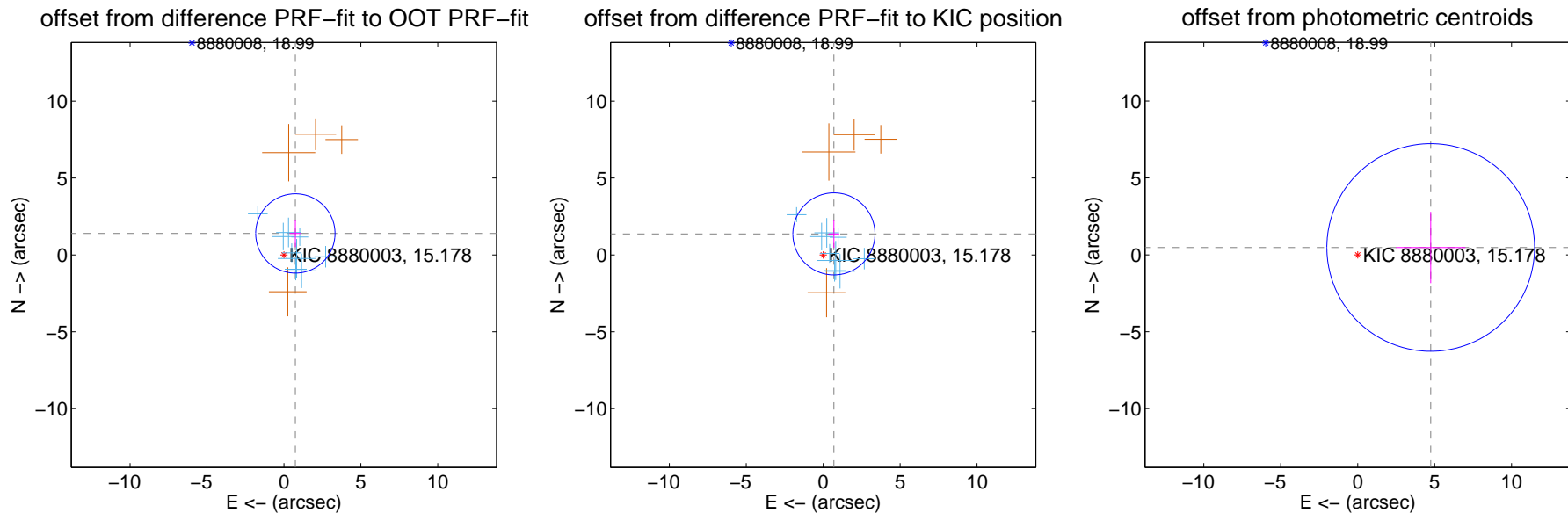
## DV Centroid Data

Supplemental centroid analysis for 008880003-02. Kepler magnitude: 15.18. Transit SNR 6.35

There are 9 quarters with good PRF difference image offsets

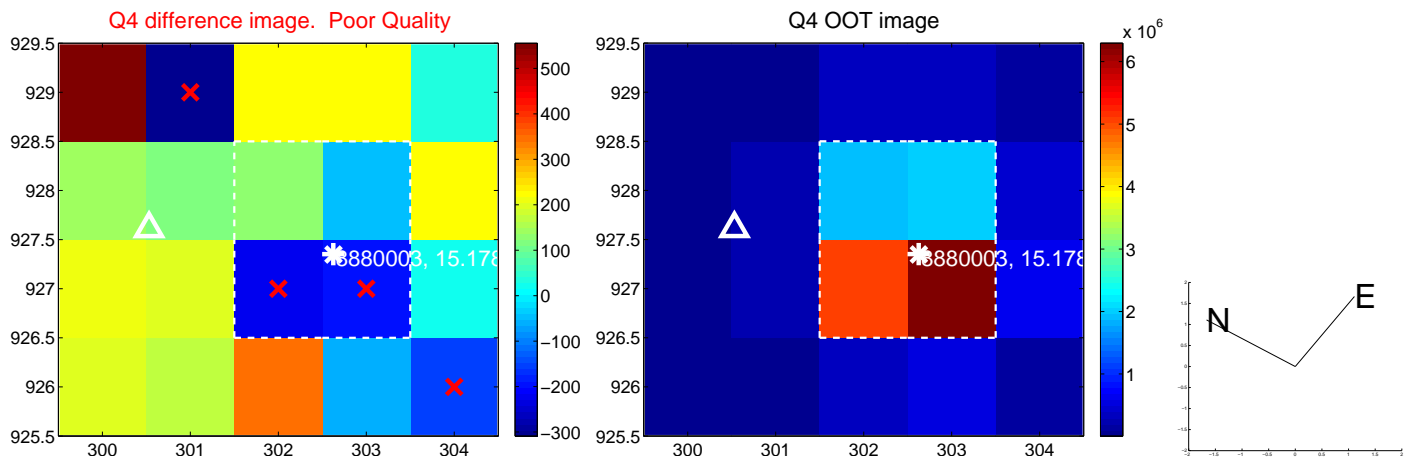
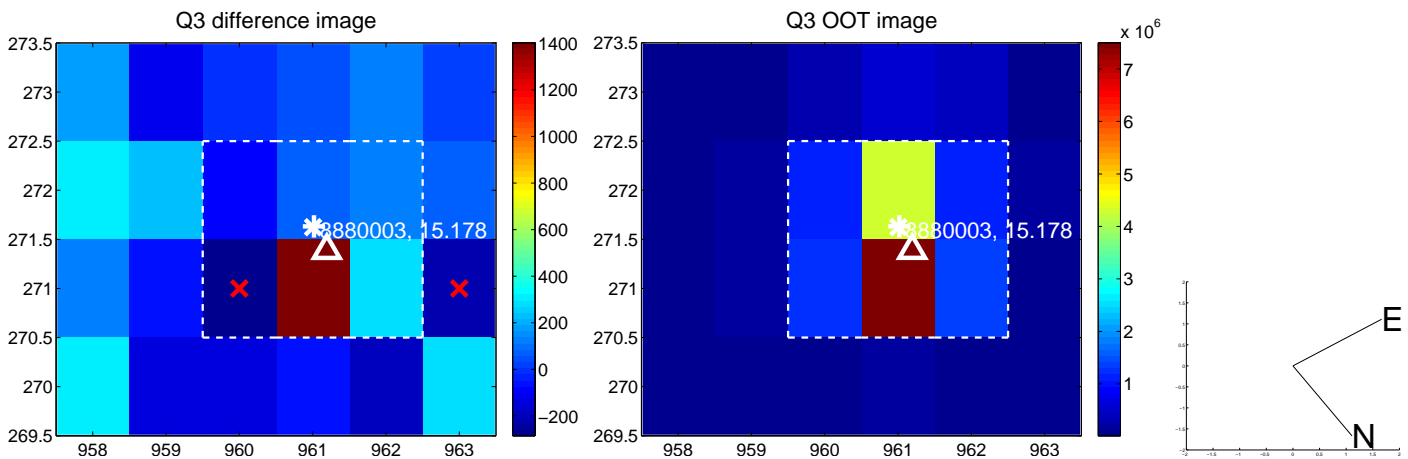
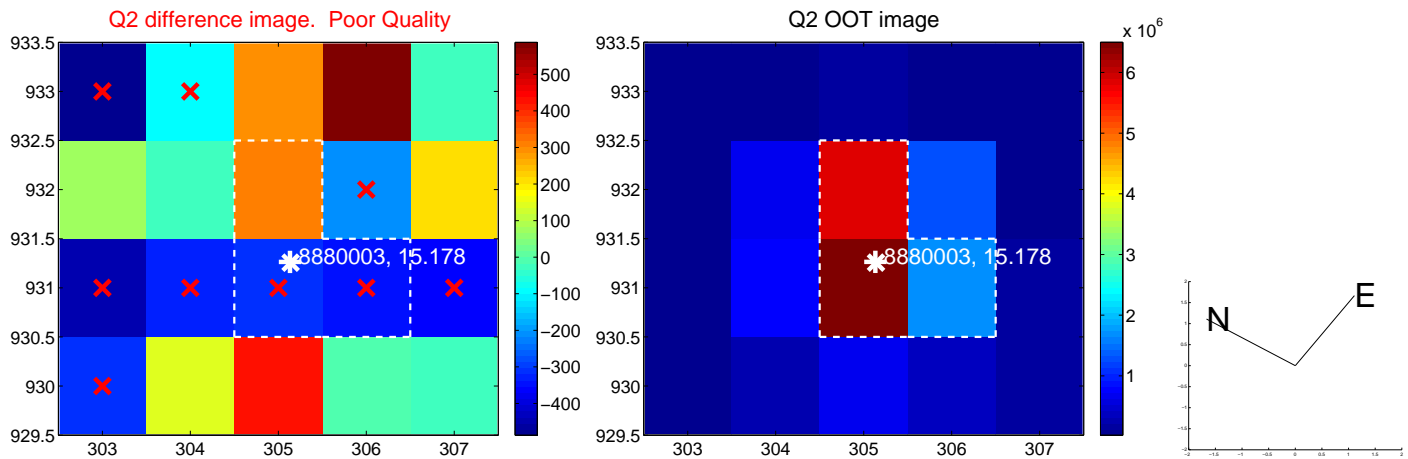
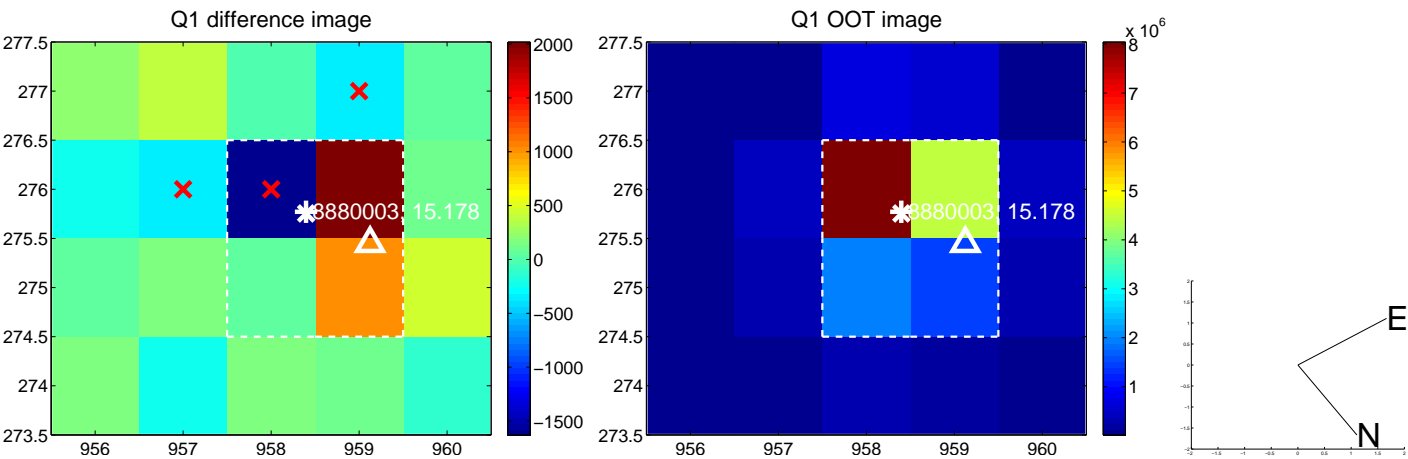
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.581 \pm 0.859$	1.84	$-0.743 \pm 0.369$	$1.395 \pm 0.888$
PRF-fit source offset from KIC position	$1.534 \pm 0.889$	1.72	$-0.698 \pm 0.349$	$1.366 \pm 0.907$
photometric centroid source offset	$4.77 \pm 2.25$	2.12	$-4.75 \pm 2.25$	$0.48 \pm 2.32$

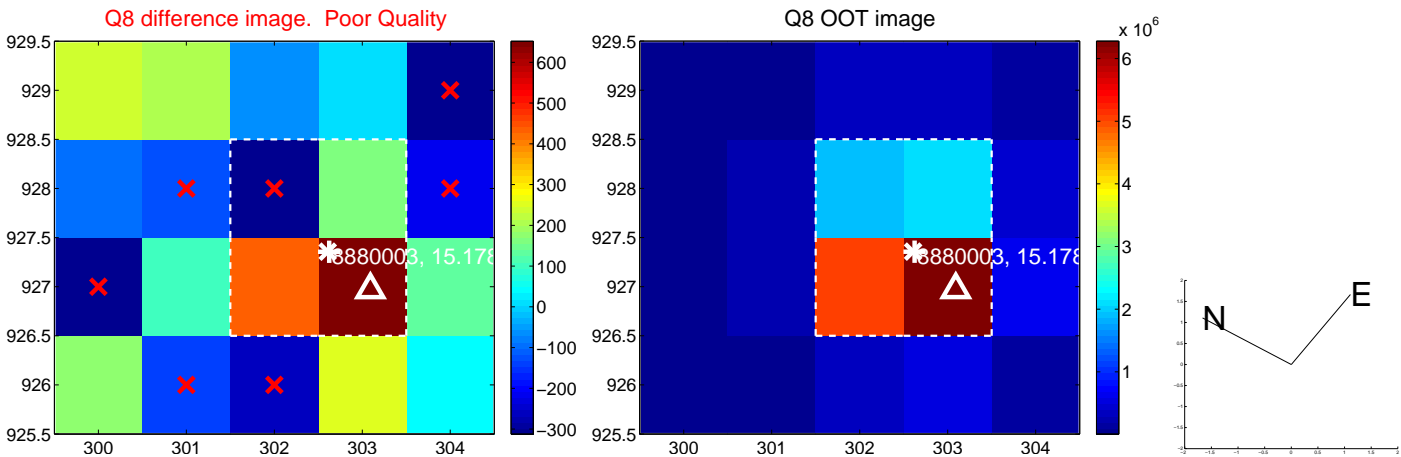
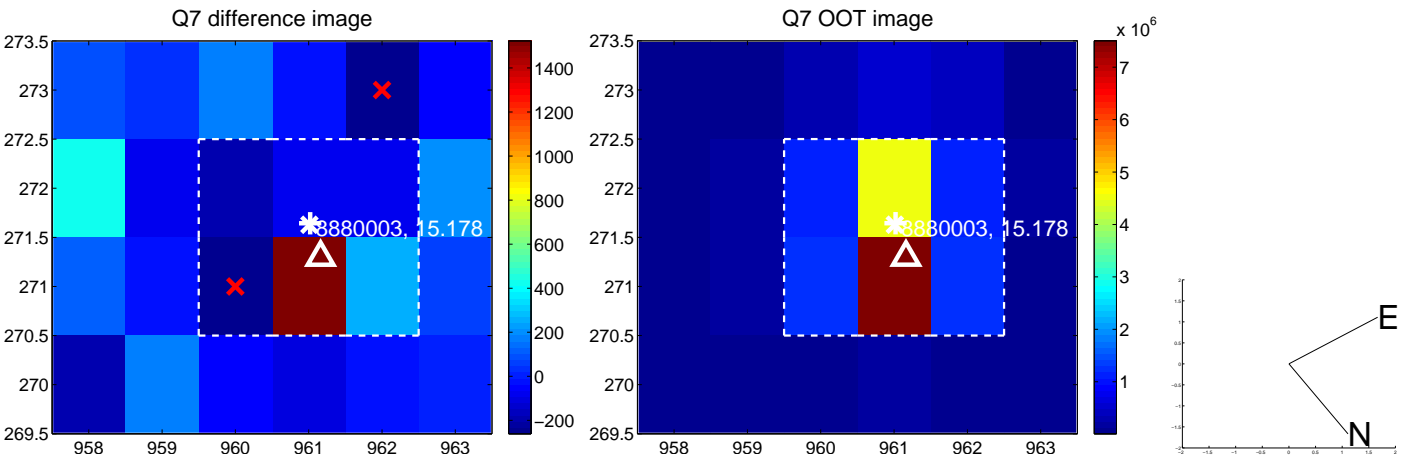
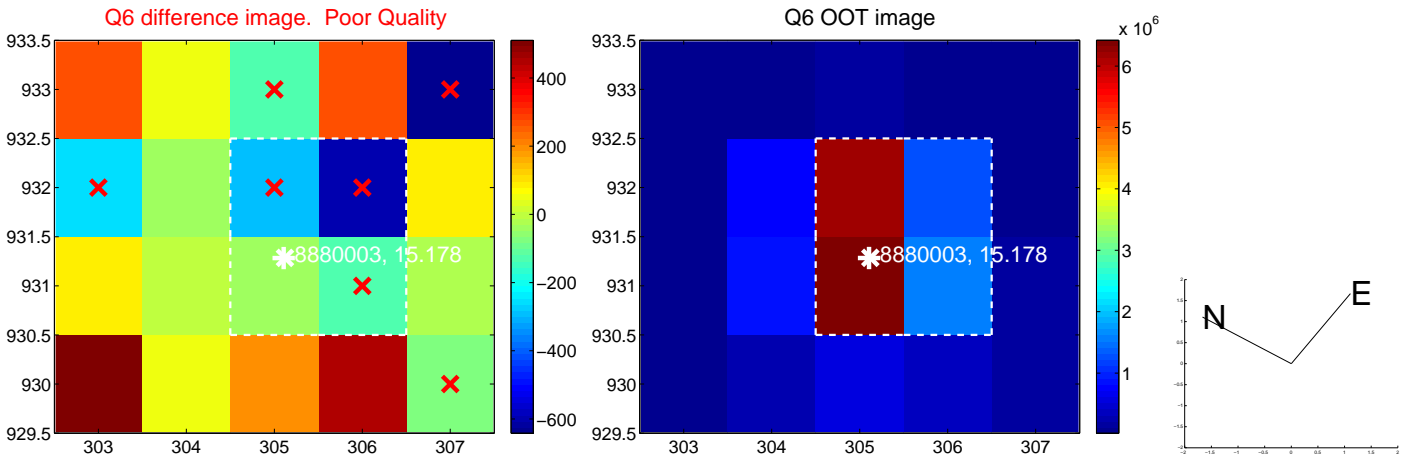
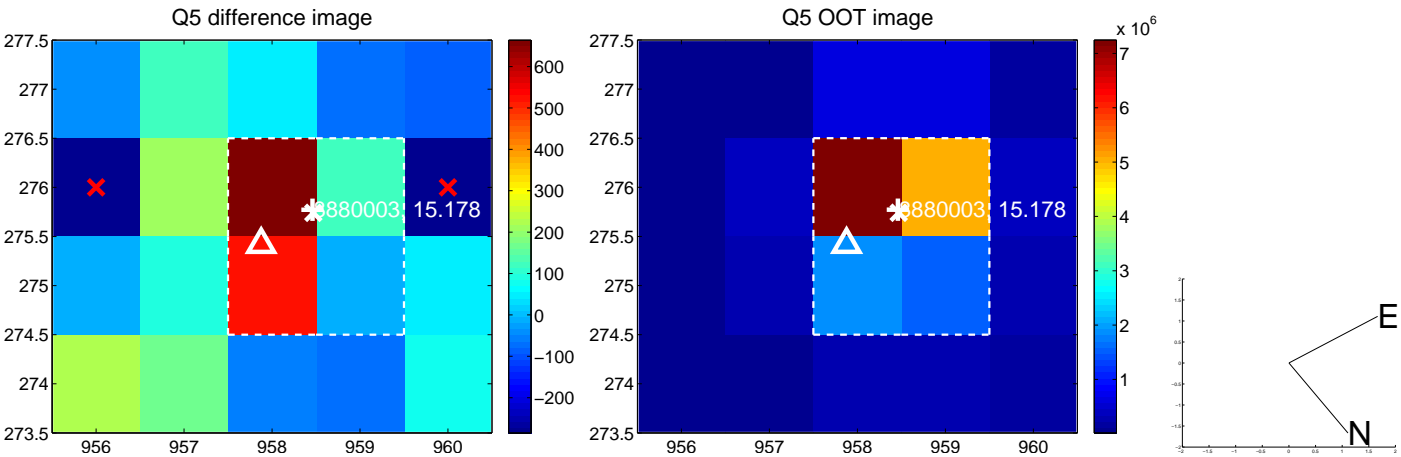


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

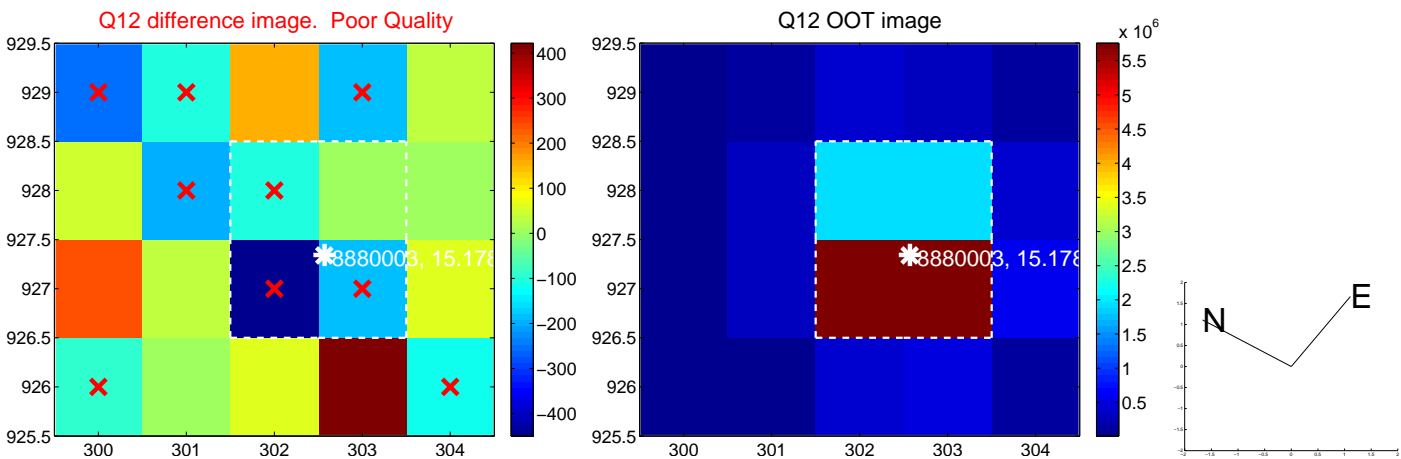
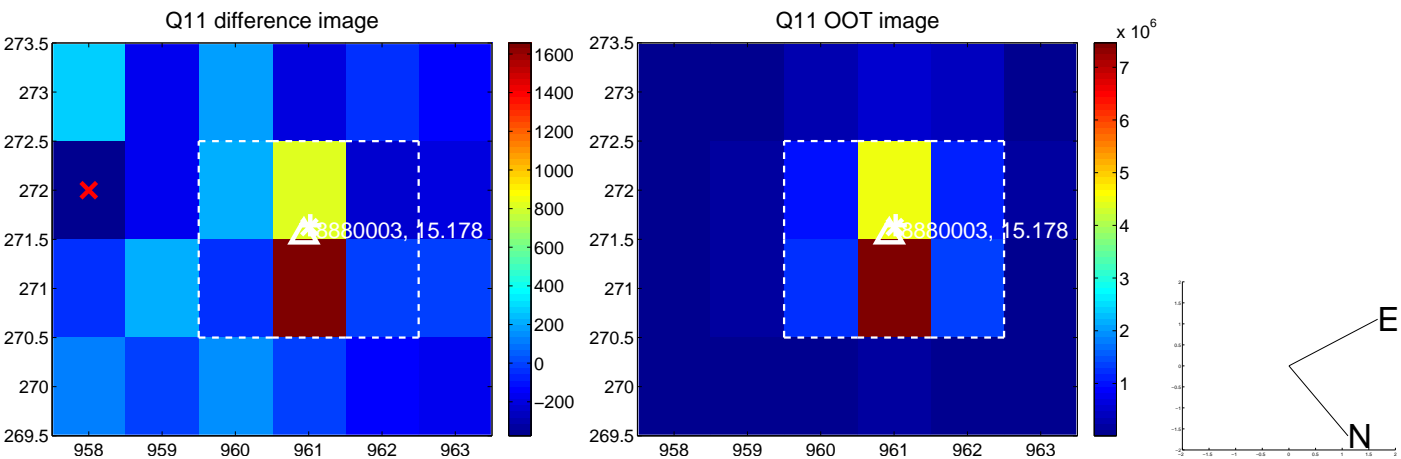
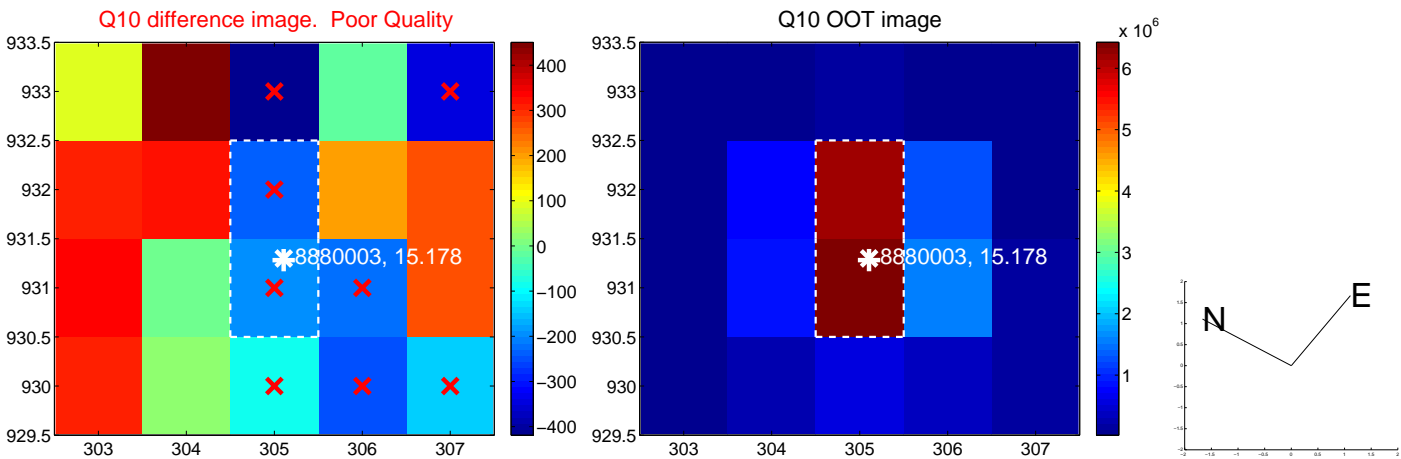
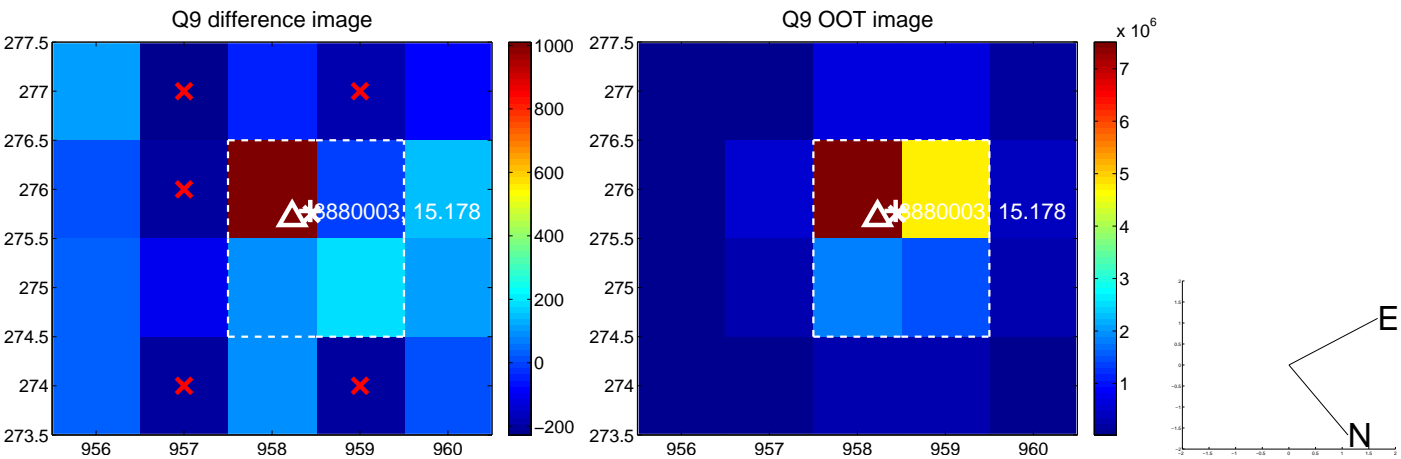
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



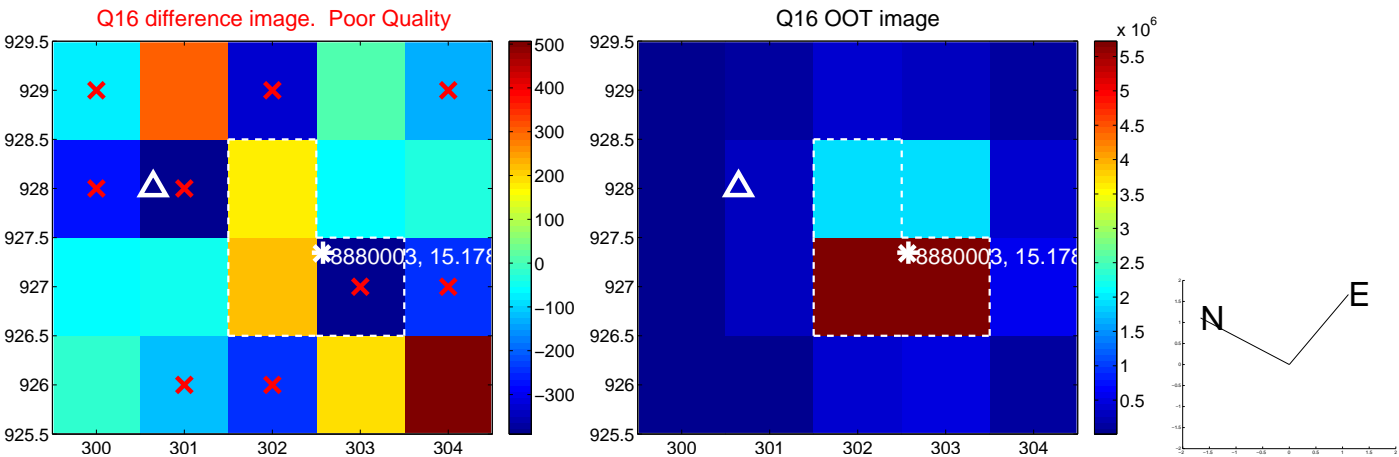
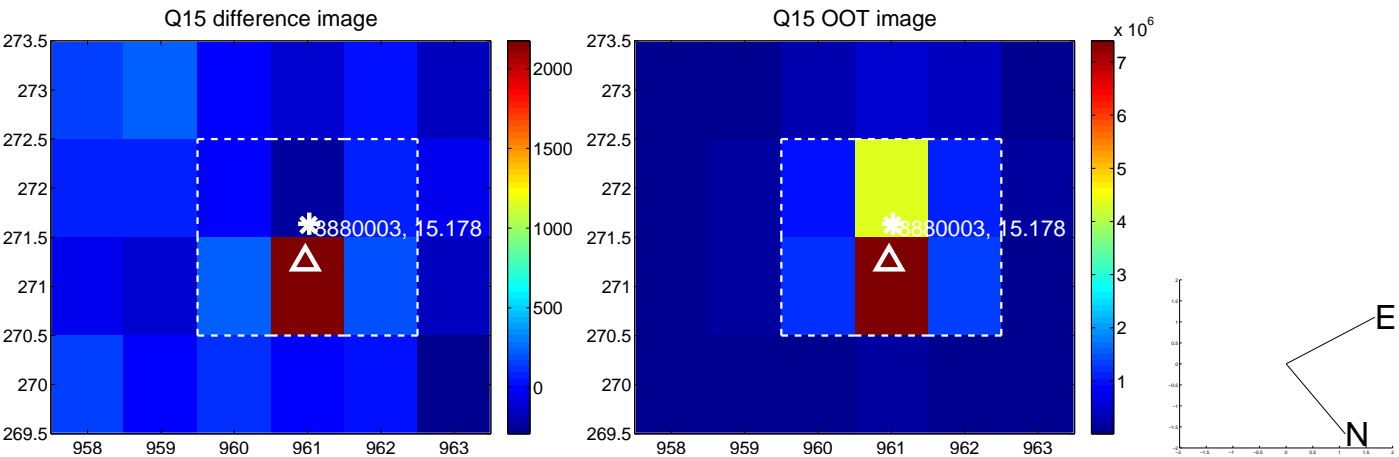
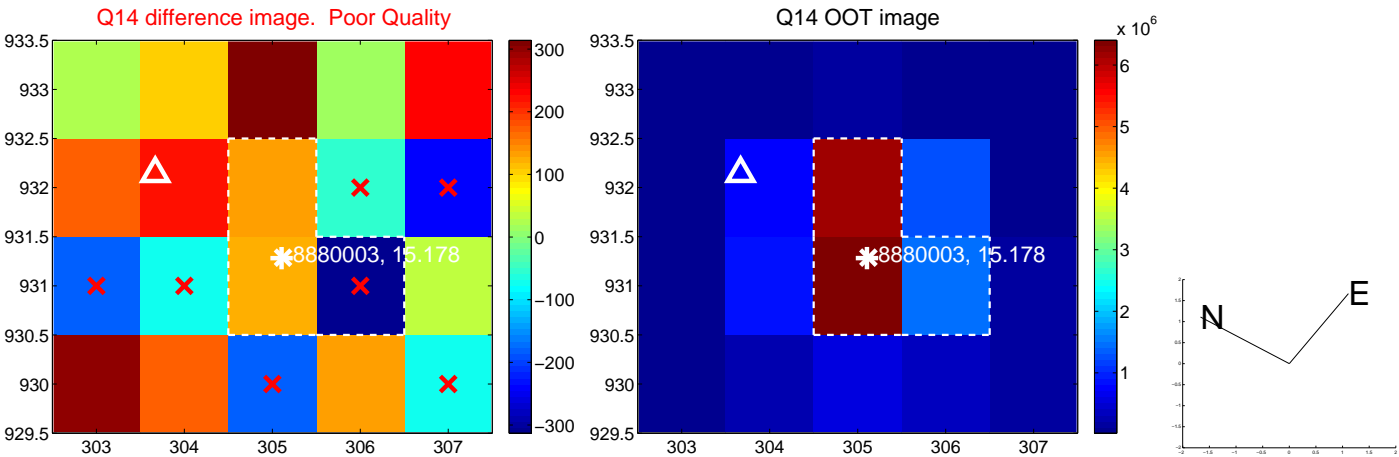
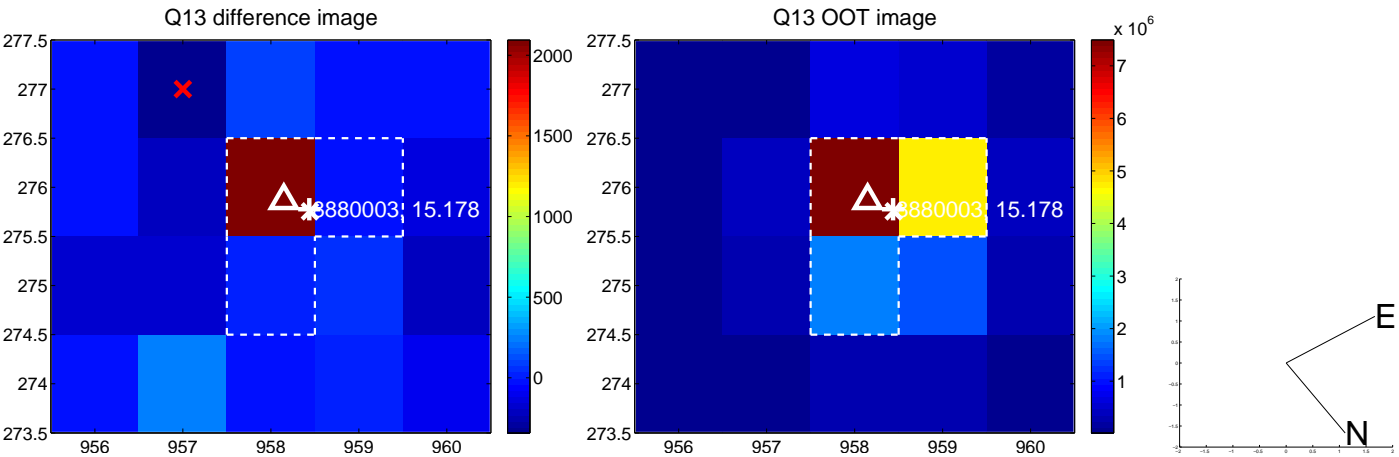
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



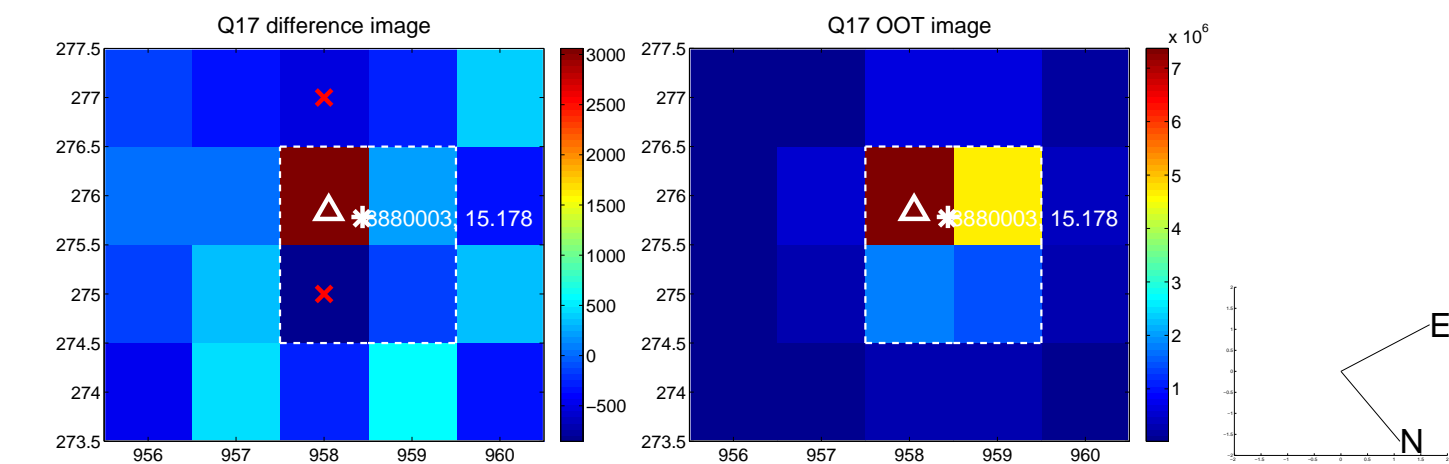
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



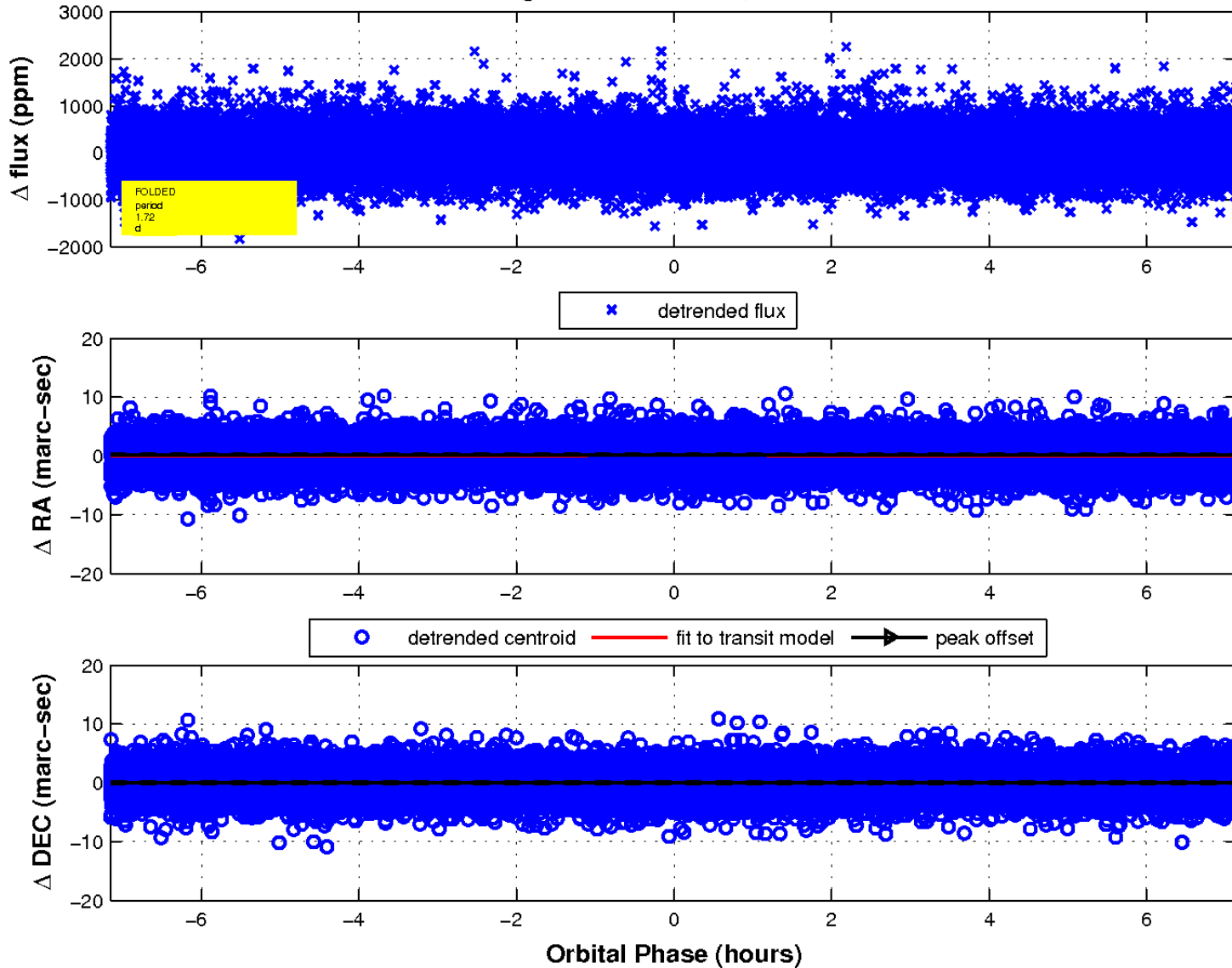
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



# UKIRT Image

Declination

