

# KIC 012257886

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012257886-01	OBS	4148.01	2.615851	132.423280	112.8	6.270	15.1	16.1	0.94	6131	1.21	806.29
012257886-02	OBS	No	2.616448	133.604527	30.6	12.824	7.8	6.1	0.94	6131	0.53	806.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012257886-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
012257886-02	OBS	FP	0.00	1	1	1	0	IS_SEC_TCE—CENT_RESOLVED_OFFSET

**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.

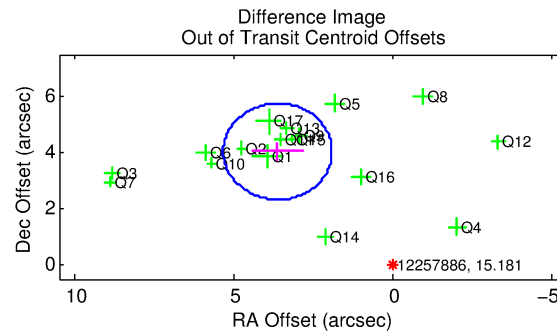
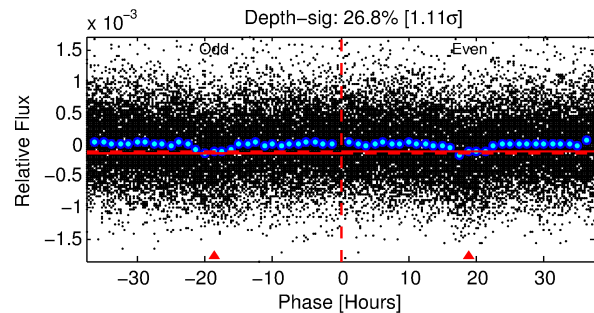
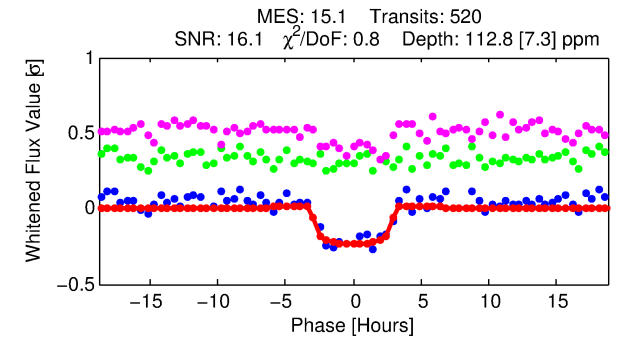
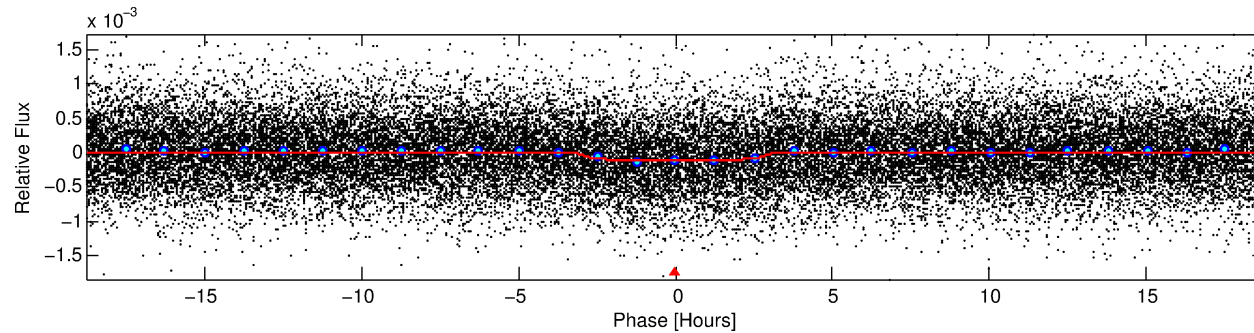
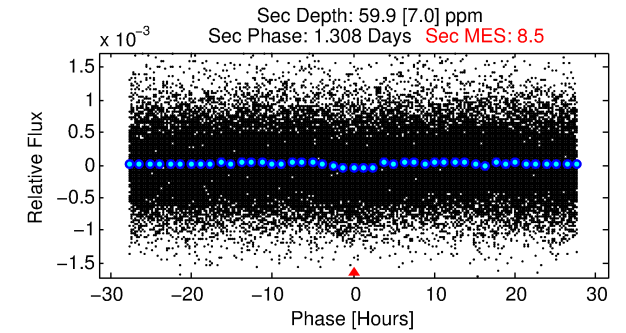
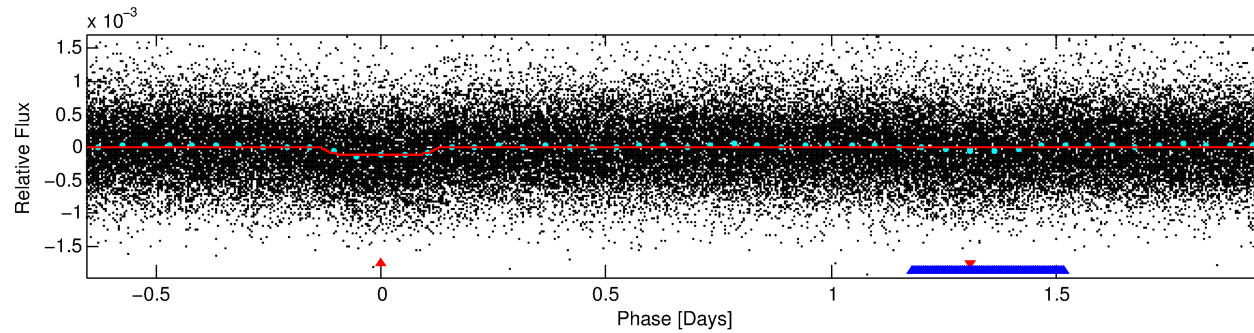
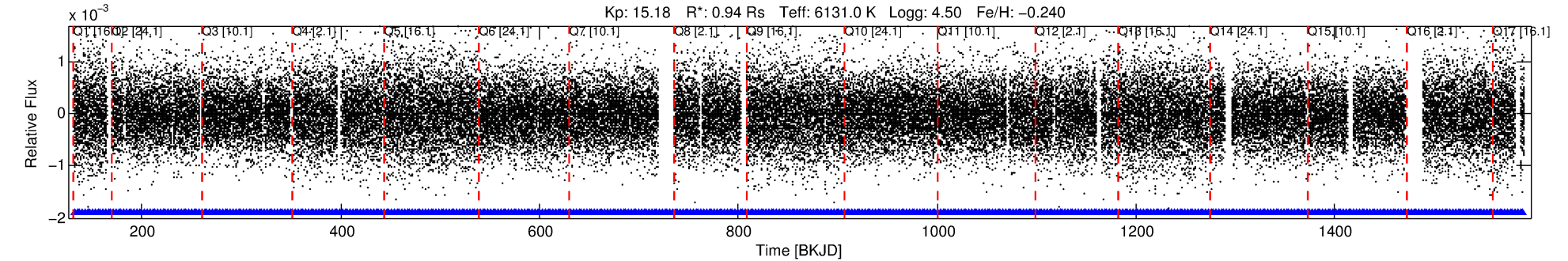
## Ephemeris Match Information For 012257886-01

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	$\sigma_P$	$\sigma_T$
012257886-01	12257886	012257908-pri	12257908	1:1	53.4	-4	12	10.43	15.18	1178.80	Direct-PRF	0	1.61	2.26

**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: 12257886 Candidate: 1 of 2 Period: 2.616 d  
KOI: K04148.01 Corr: 0.976



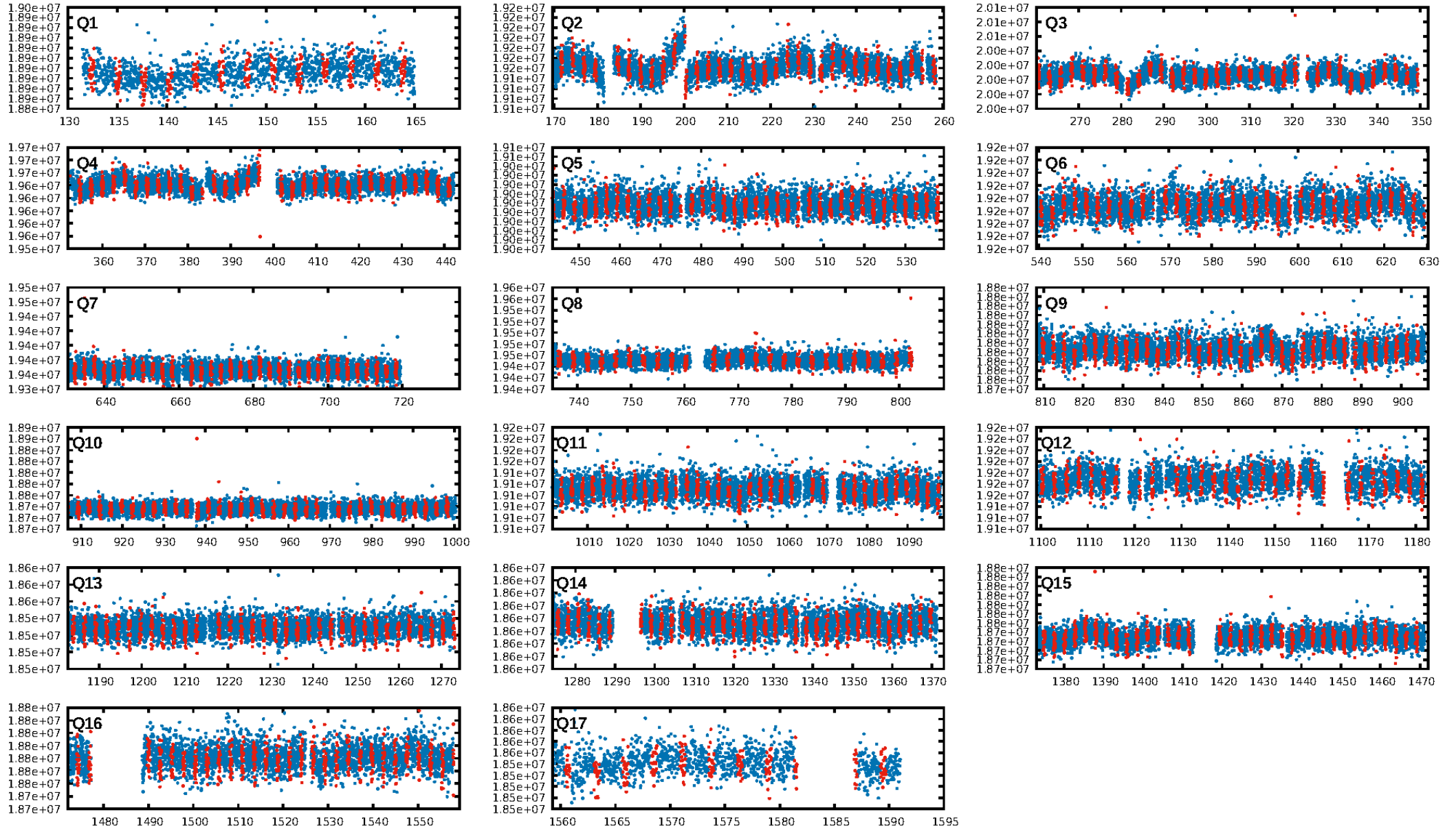
## DV Fit Results:

Period = 2.61585 [0.00002] d  
Epoch = 132.4233 [0.0048] BKJD  
Rp/R\* = 0.0117 [0.0016]  
a/R\* = 1.62 [0.74]  
b = 0.92 [0.12]  
Seff = 806.29 [322.77]  
Teff = 1359 [136] K  
Rp = 1.21 [0.40] Re  
a = 0.0374 [0.0097] AU  
Ag = 31.64 [15.28] [2.01σ]  
**Teffp = 4983 [408] K [8.44σ]**

## DV Diagnostic Results:

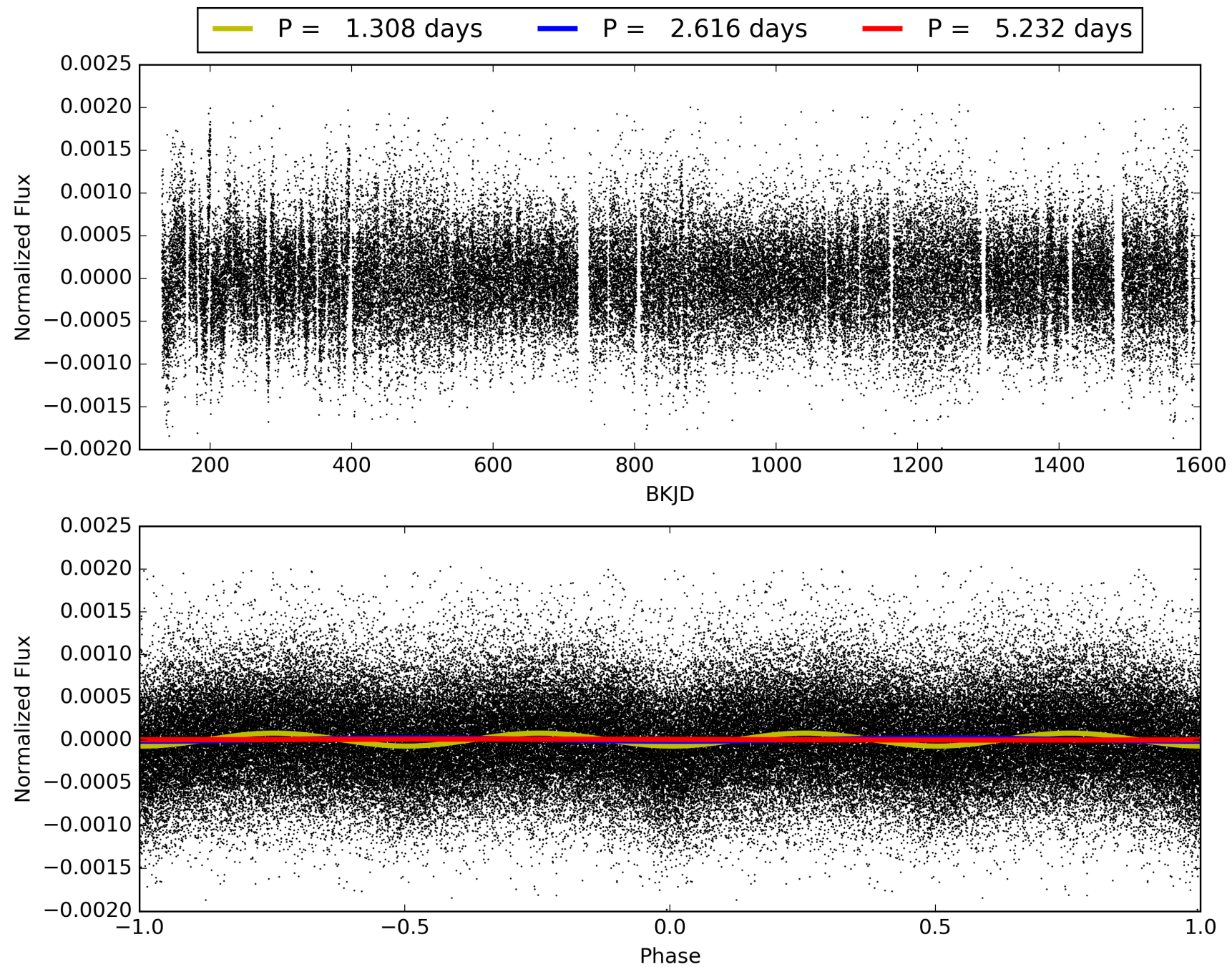
ShortPeriod-sig: N/A  
**LongPeriod-sig: 0.1% [0.00σ]**  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.95e-53  
RollingBand-fgt: 1.00 [496/496]  
**GhostDiagnostic-chr: -0.04319**  
Centroid-sig: 0.8%  
Centroid-so: 1.873 arcsec [1.98σ]  
**OotOffset-rm: 5.429 arcsec [9.51σ]**  
**KicOffset-rm: 5.567 arcsec [9.77σ]**  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.00 [0/17]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 012257886-01, PDC Light Curves



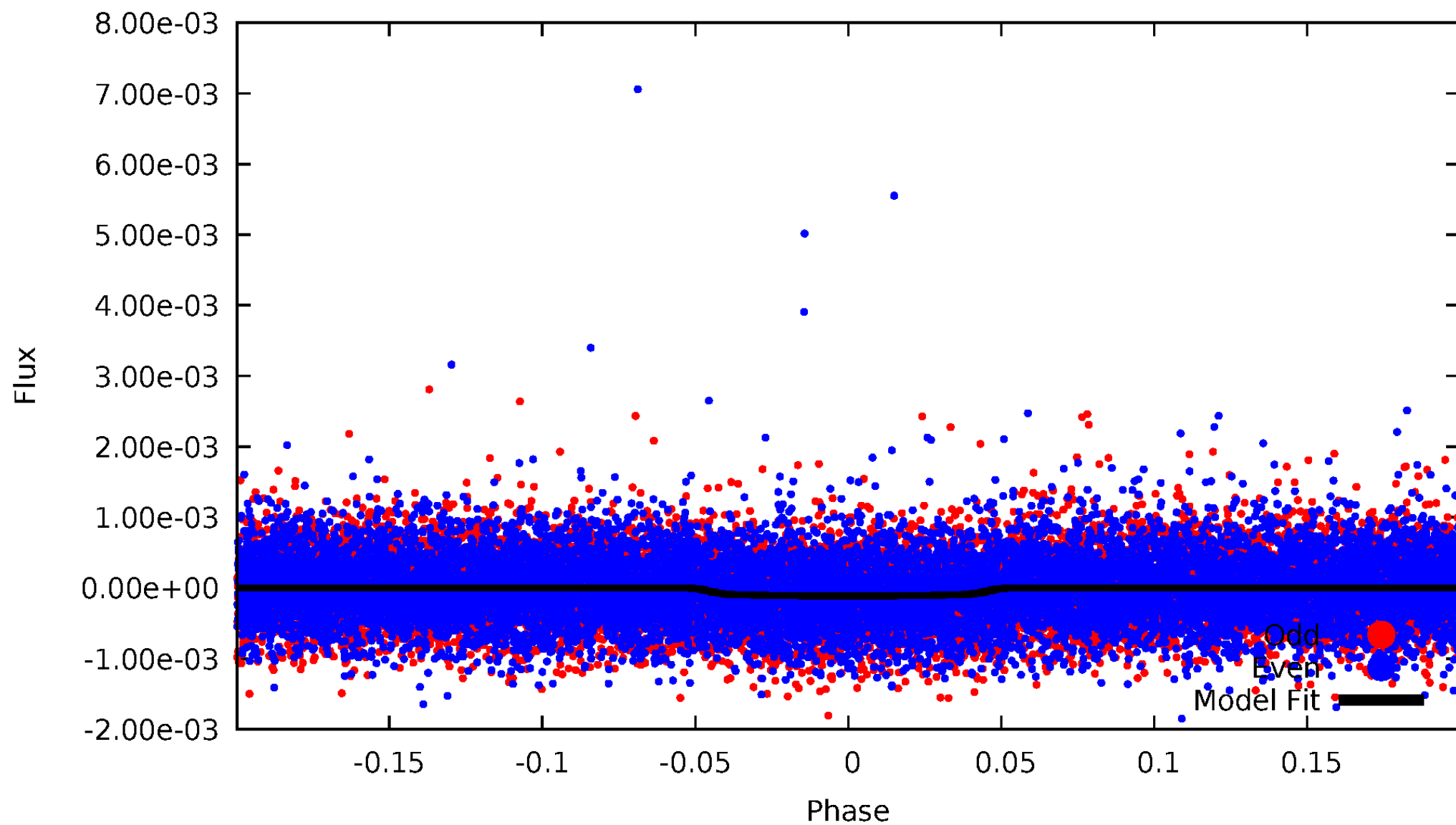


# TCE 012257886-01



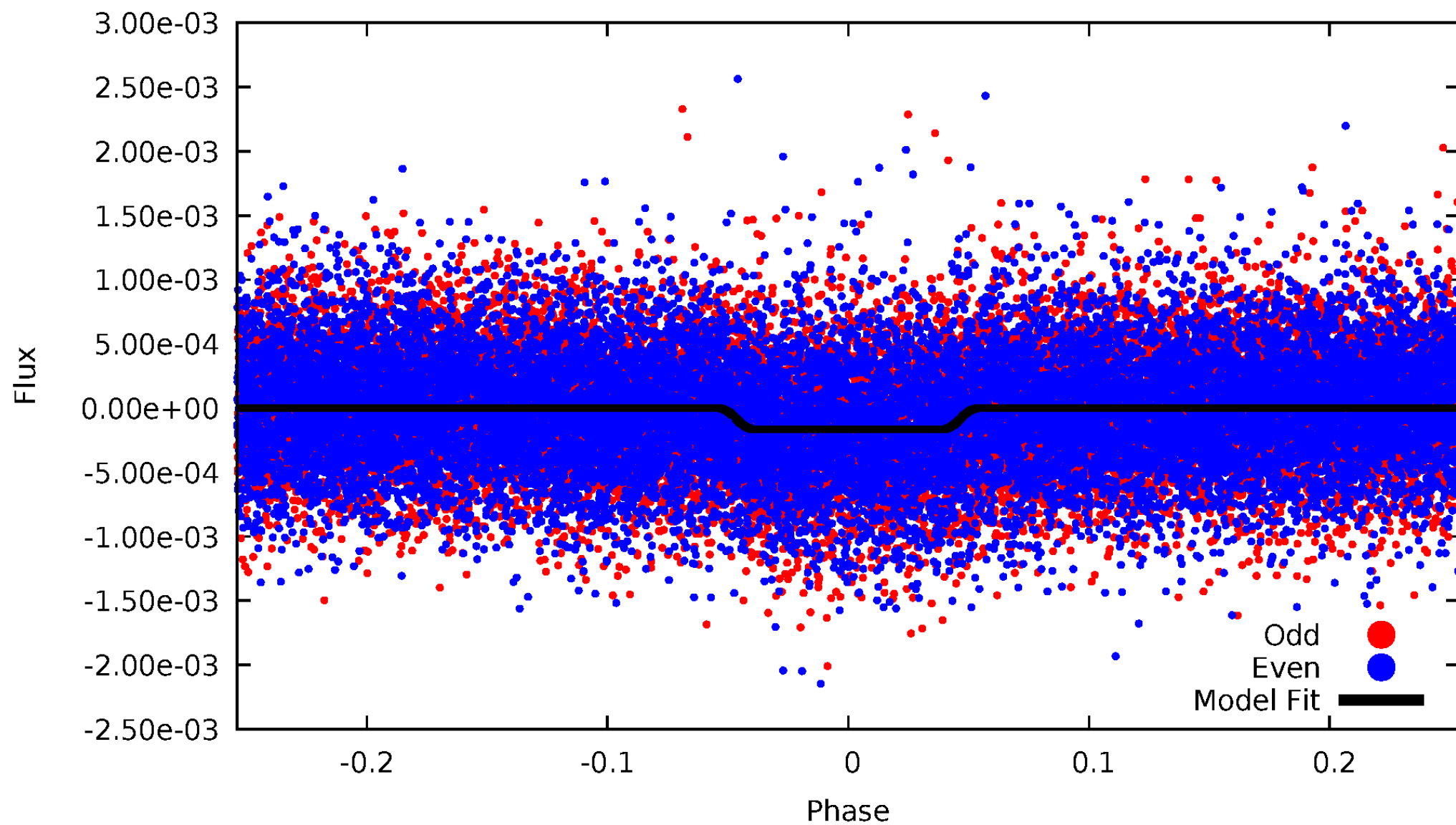
# DV Odd/Even

TCE 012257886-01

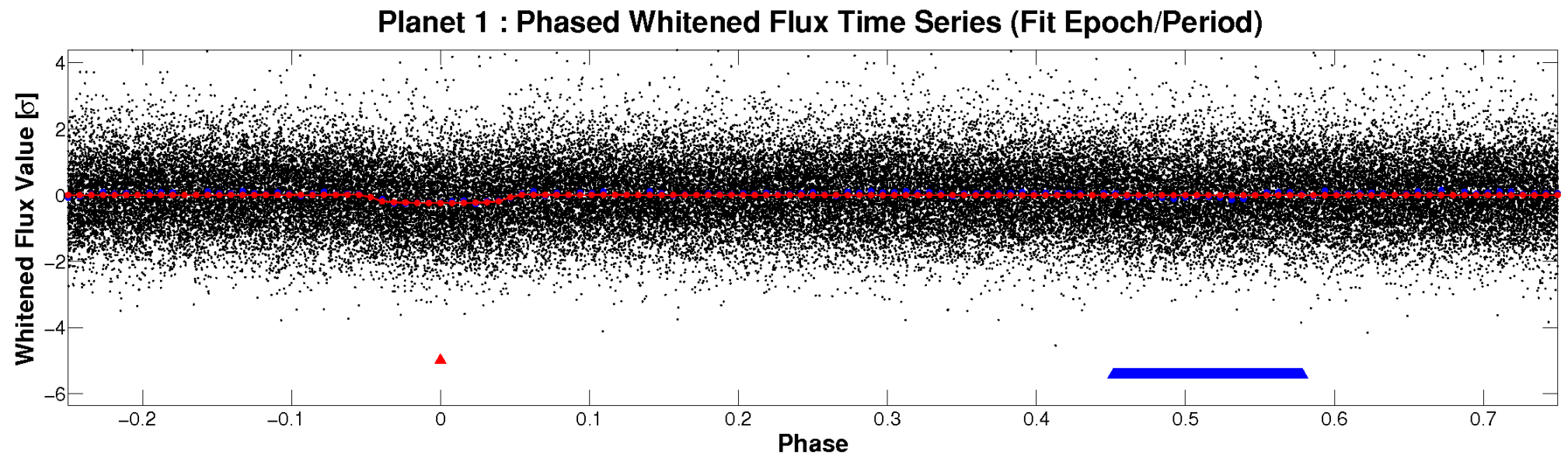
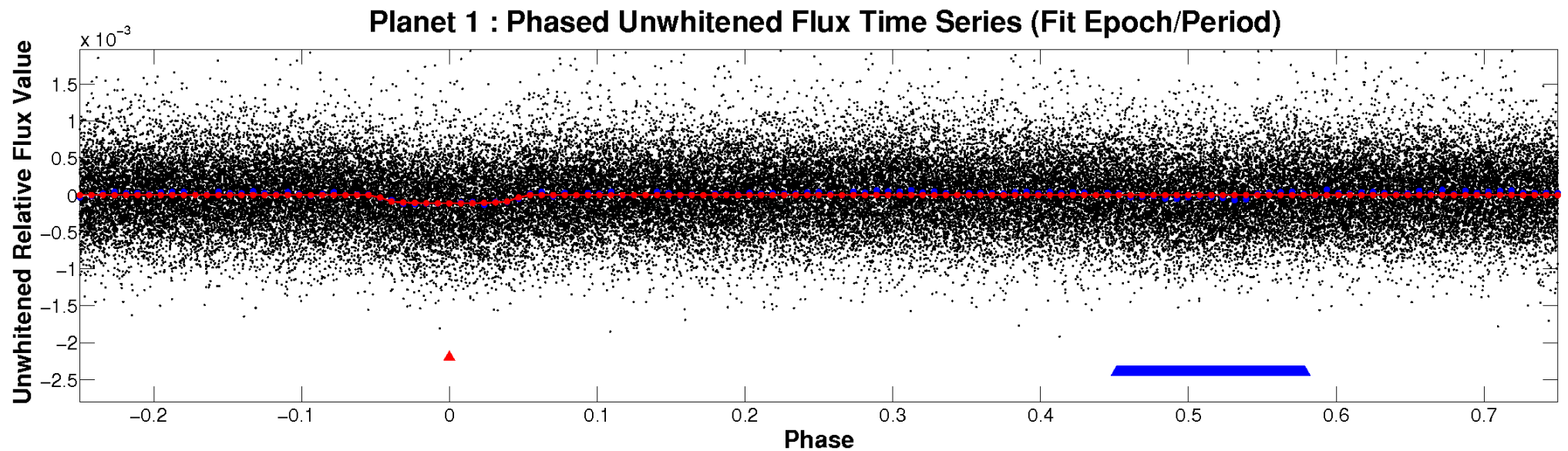


# ALT Odd/Even

TCE 012257886-01



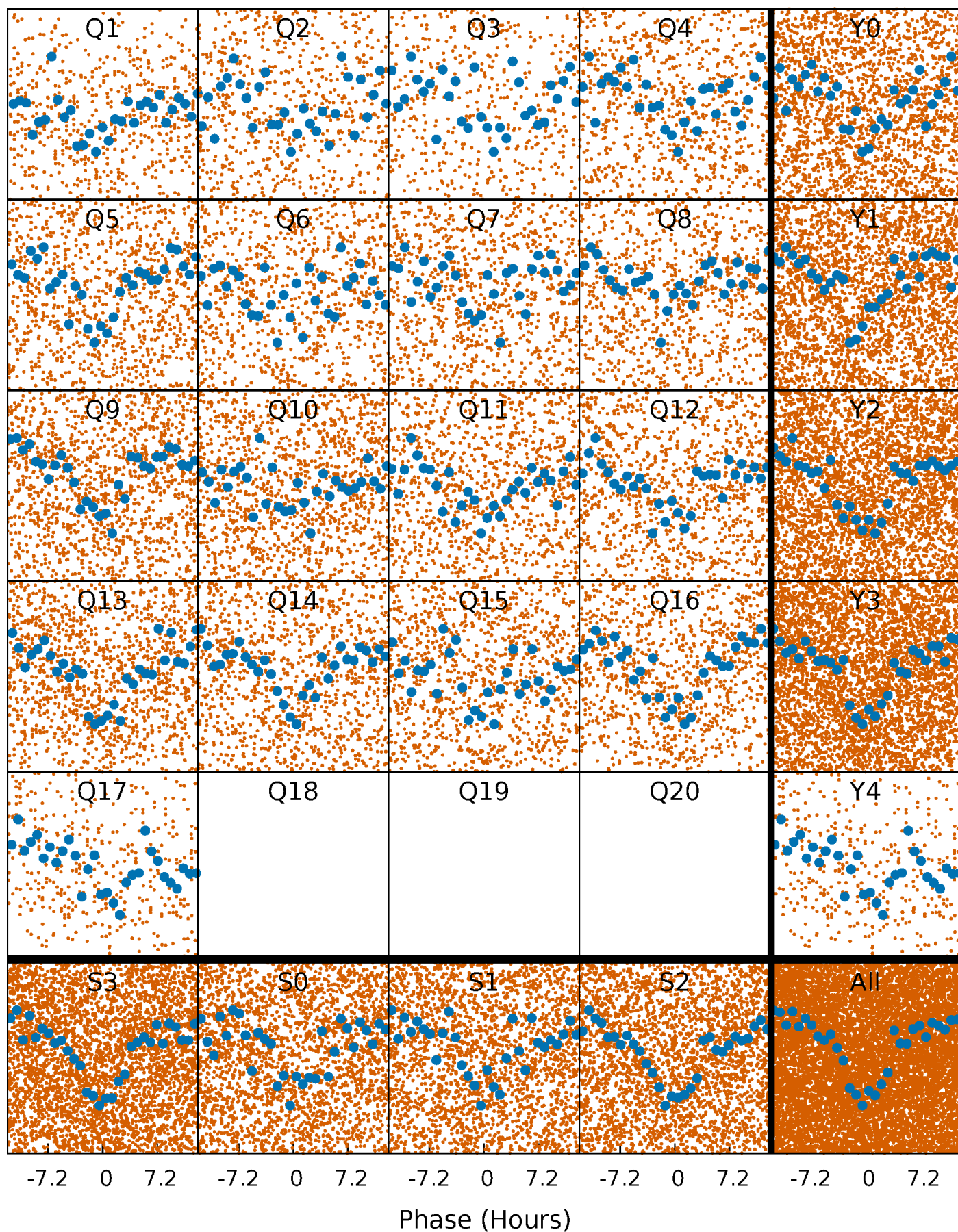
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

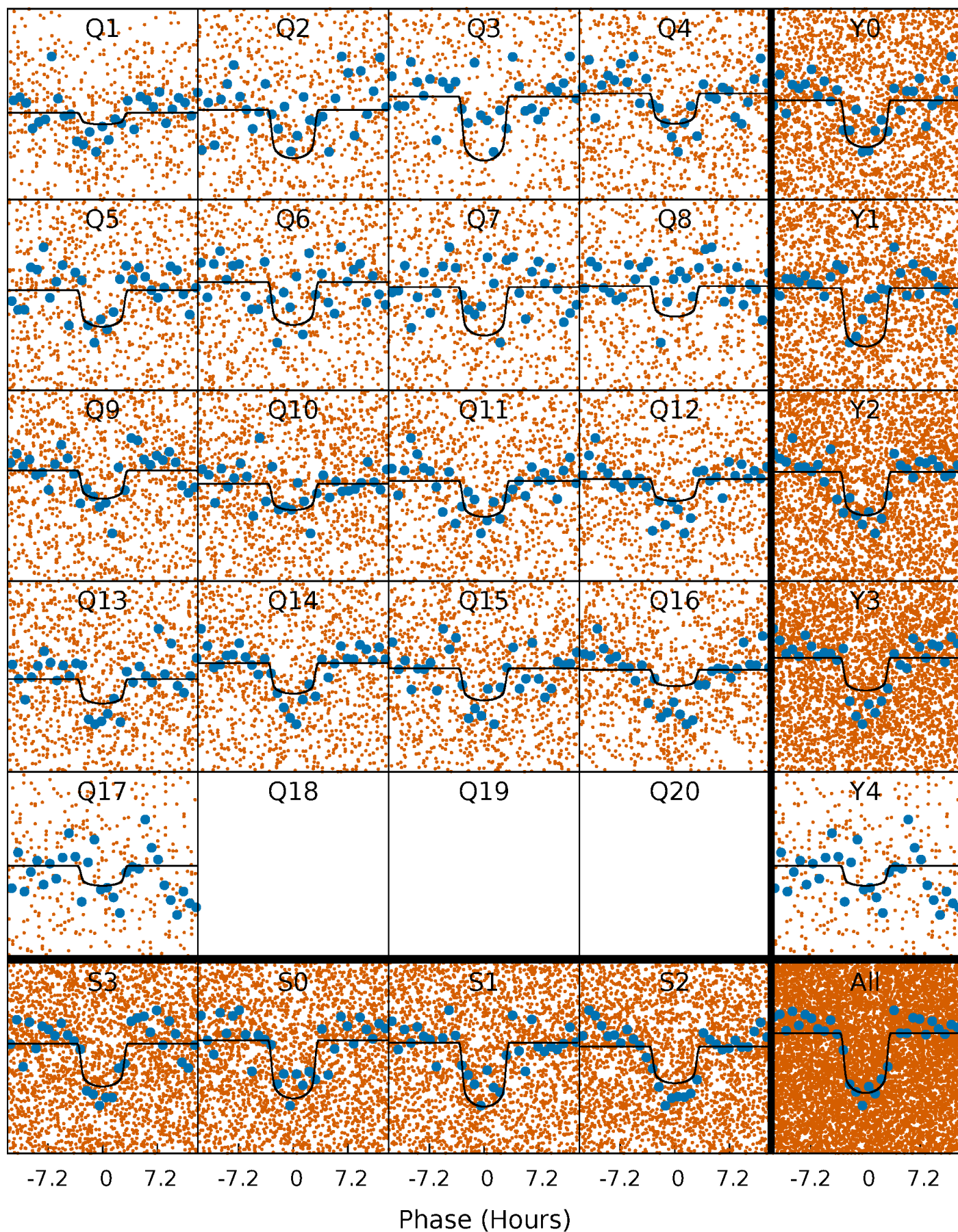
TCE 012257886-01 P= 2.615851 Days  $T_0=132.423280$  (BKJD)





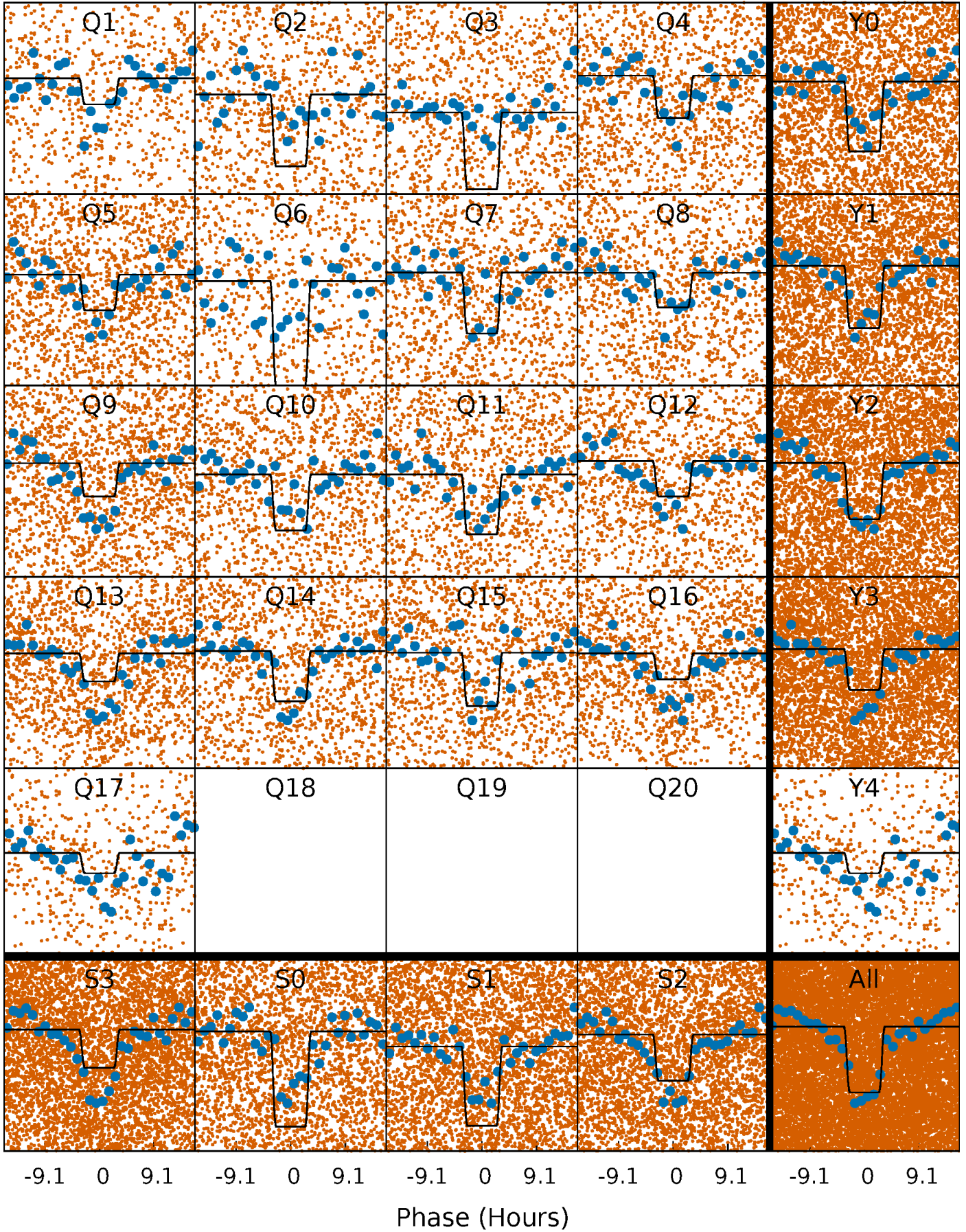
# DV Quarter-Phased Transit Curves

TCE 012257886-01 P= 2.615851 Days  $T_0=132.423280$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 012257886-01 P= 2.615891 Days  $T_0=132.411931$  (BKJD)

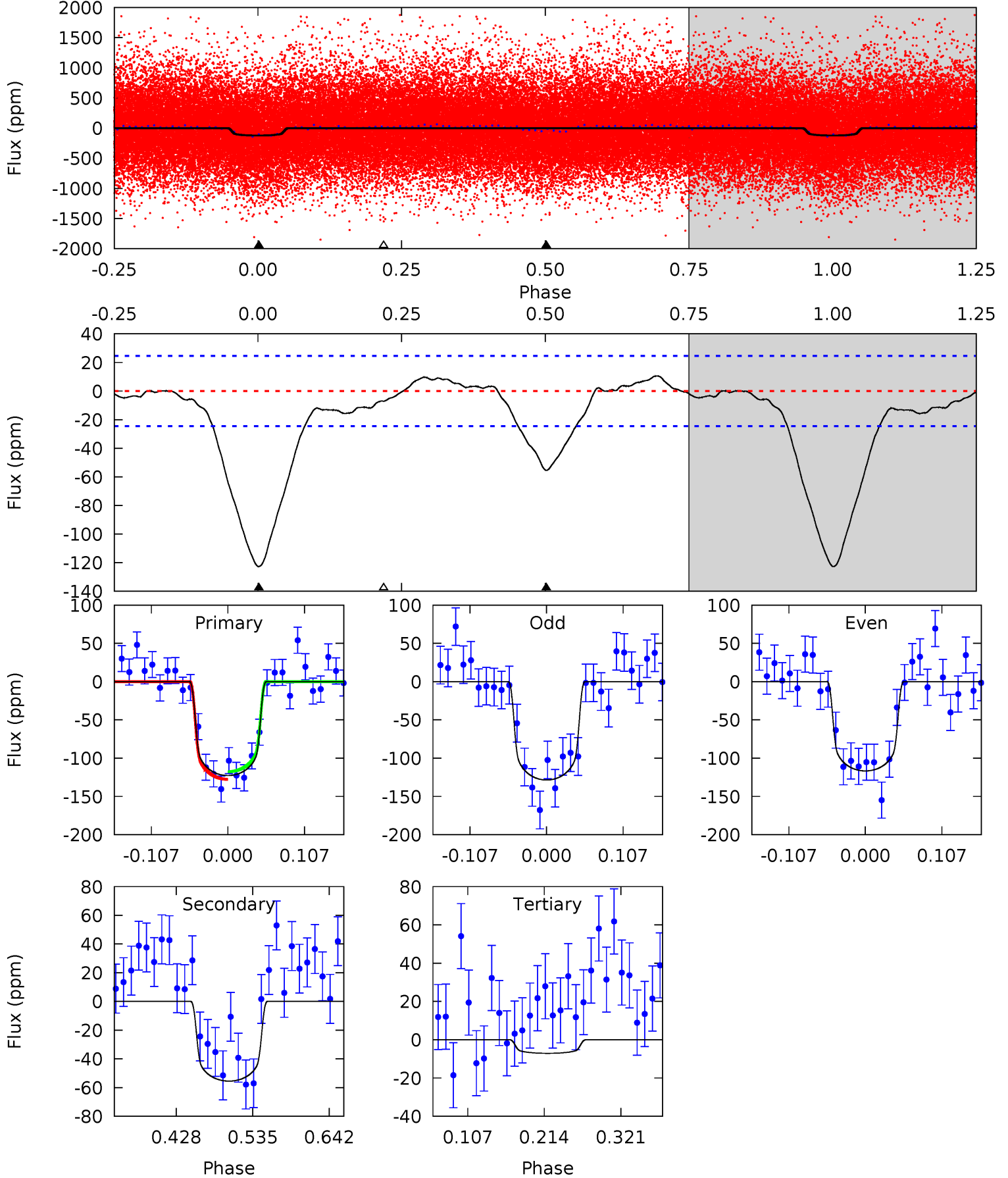




# DV Model-Shift Uniqueness Test

012257886-01, P = 2.615851 Days, E = 129.807429 Days

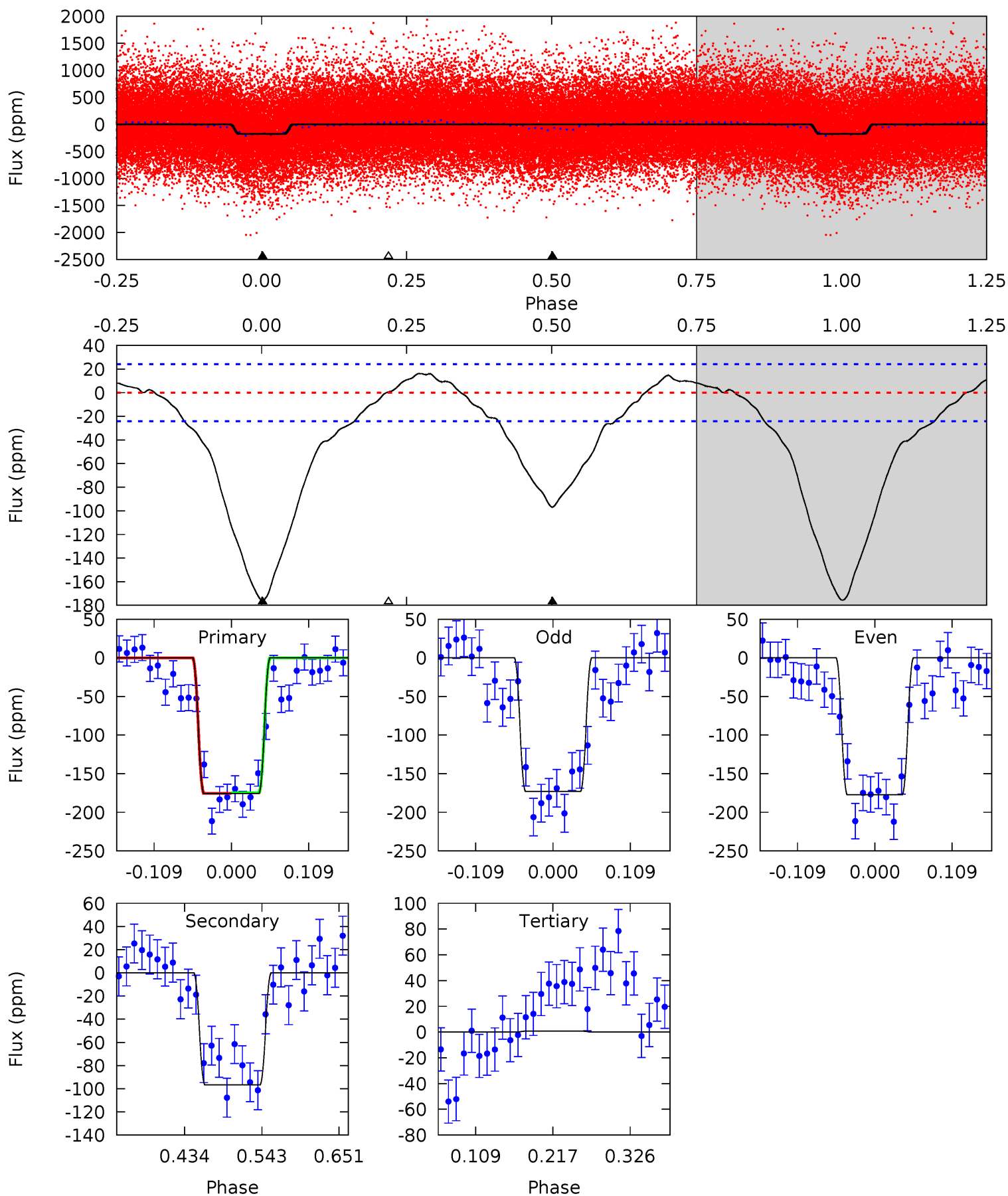
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
22.7	10.3	1.32	0	4.55	1.61	1.33	21.4	22.7	8.95	10.3	1.10	0.93	0.08	0.93



# Alt Model-Shift Uniqueness Test

012257886-01, P = 2.615891 Days, E = 129.796040 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
33.1	18.2	-0.14	0	4.55	1.60	2.82	33.2	33.1	18.4	18.2	0.41	1.00	0.08	0.06





### Stellar Parameters For KIC 012257886

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6131^{+164}_{-200}$	$4.497^{+0.052}_{-0.208}$	$-0.240^{+0.300}_{-0.300}$	$0.945^{+0.288}_{-0.096}$	$1.023^{+0.138}_{-0.138}$	$1.707^{+0.456}_{-0.859}$
	+3%/-3%	+1%/-5%	+125%/-125%	+30%/-10%	+13%/-13%	+27%/-50%
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 012257886-01 / KOI 4148.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-55 \pm 5$	$1.26^{+0.24}_{-0.21}$	$1940^{+139}_{-94}$	$4971^{+348}_{-318}$	$26^{+11}_{-8}$
Alt.	$-97 \pm 5$	$1.40^{+0.26}_{-0.21}$	$1935^{+141}_{-89}$	$5359^{+350}_{-314}$	$38^{+13}_{-11}$

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

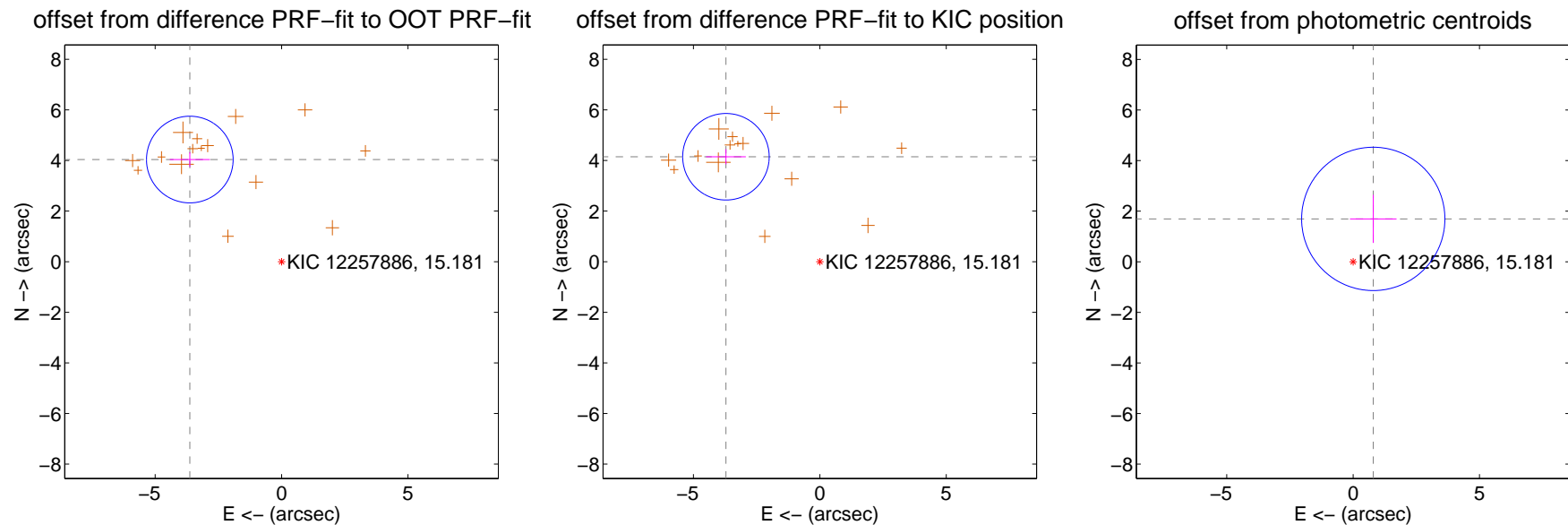
## DV Centroid Data

Supplemental centroid analysis for 012257886-01. Kepler magnitude: 15.18. Transit SNR 16.06

There are 0 quarters with good PRF difference image offsets

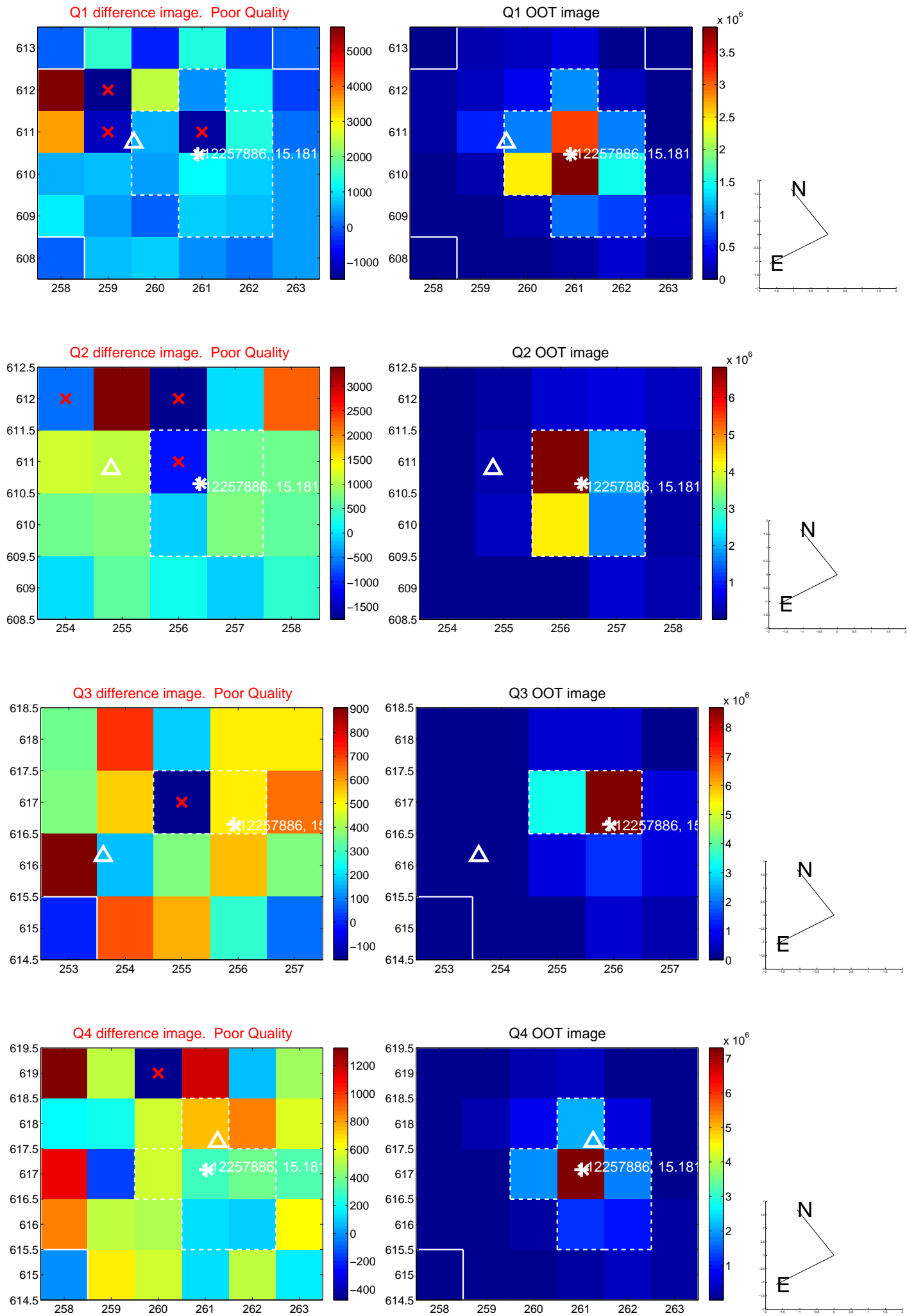
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	5.429 $\pm$ 0.571	9.51	3.629 $\pm$ 0.790	4.038 $\pm$ 0.291
PRF-fit source offset from KIC position	5.567 $\pm$ 0.570	9.77	3.713 $\pm$ 0.788	4.148 $\pm$ 0.297
photometric centroid source offset	1.87 $\pm$ 0.94	1.98	-0.80 $\pm$ 0.92	1.70 $\pm$ 0.95

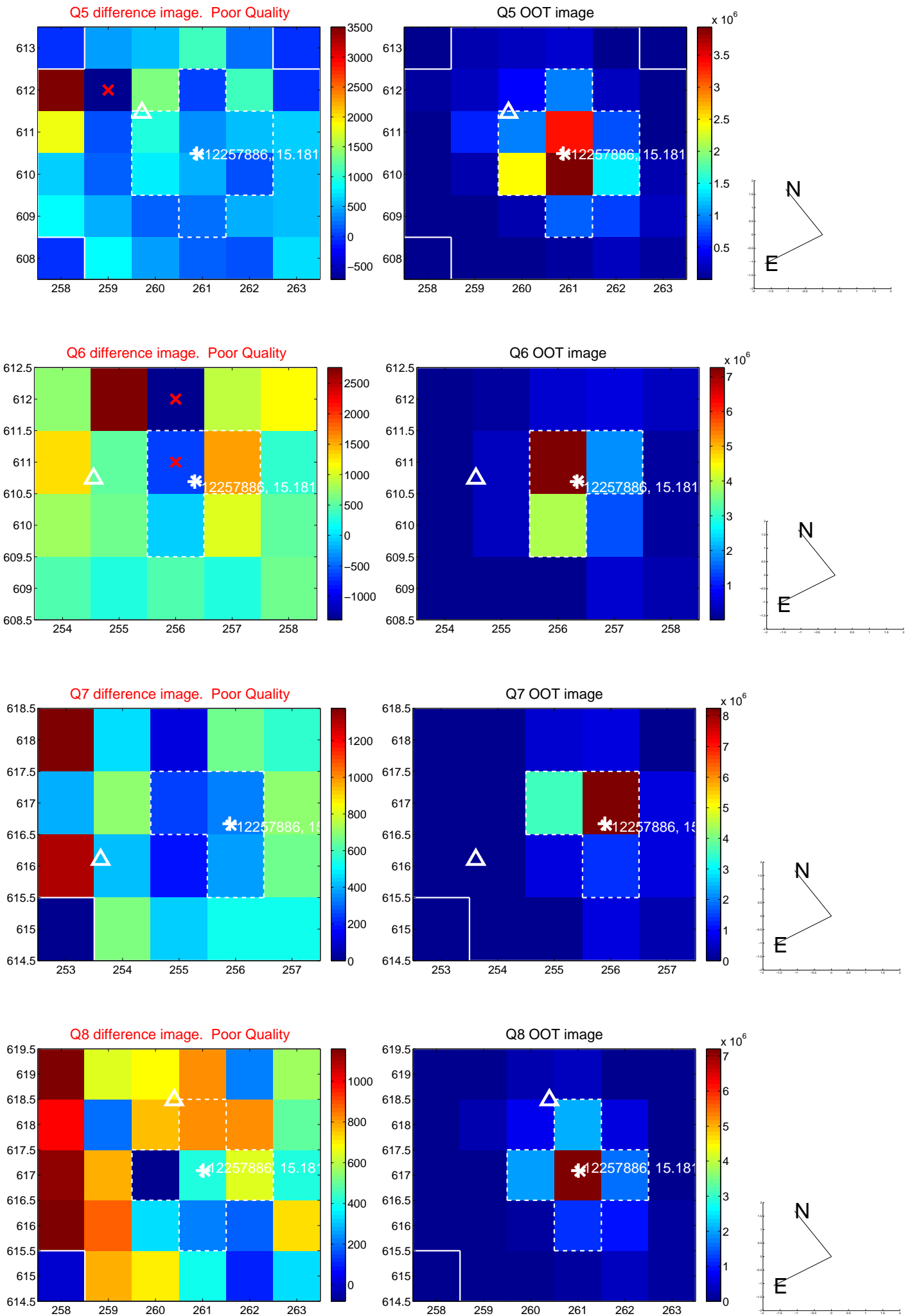


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

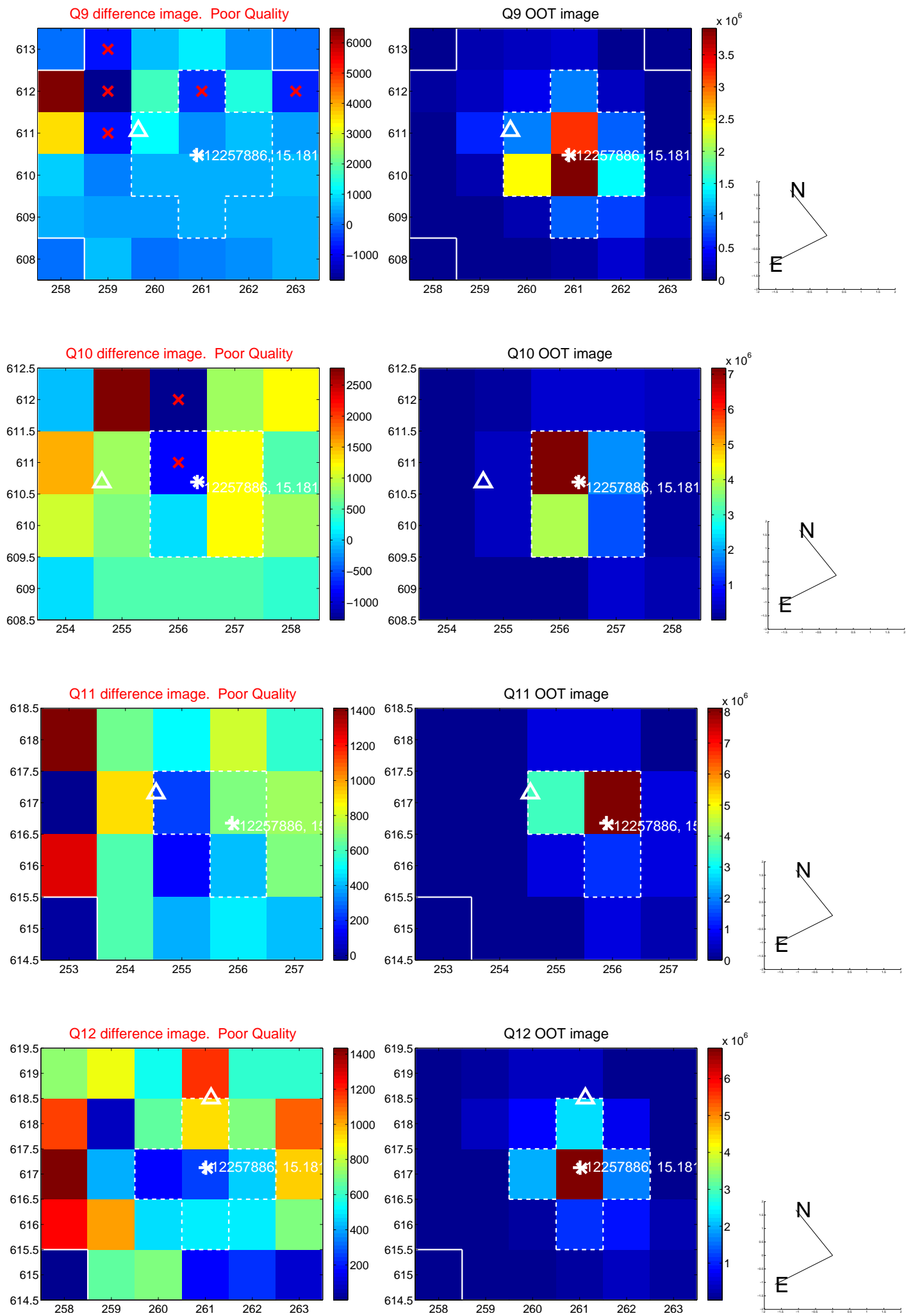


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

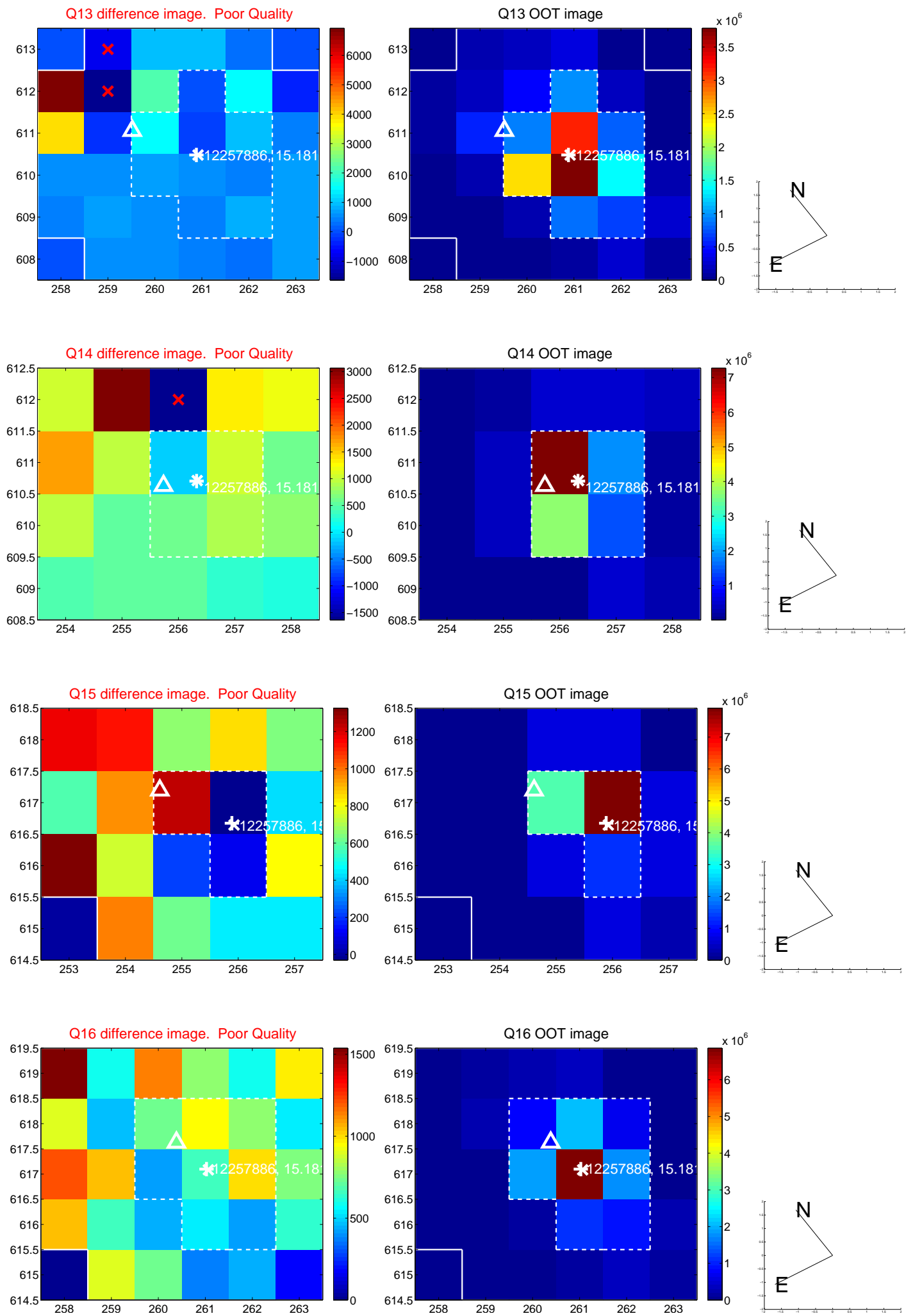




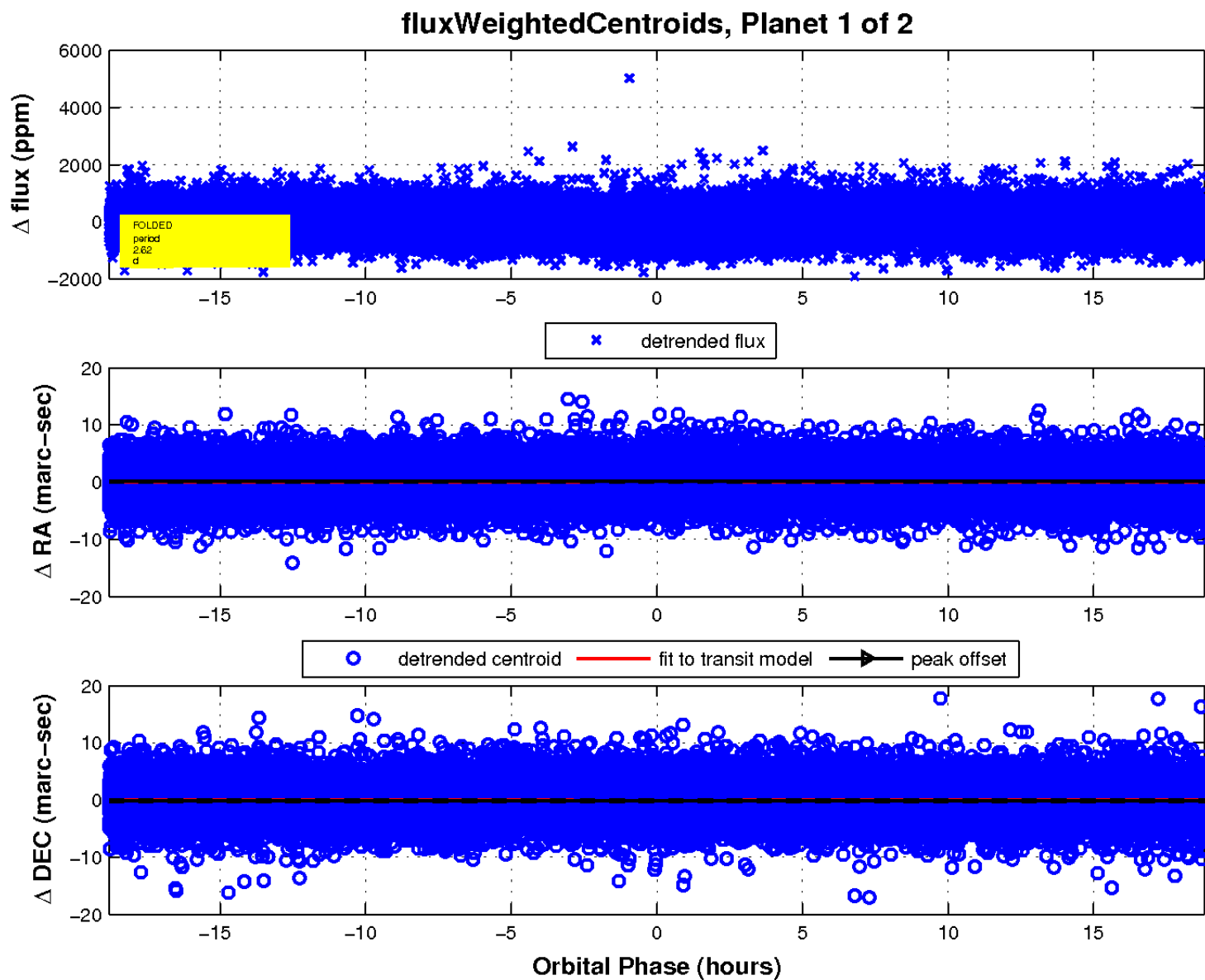
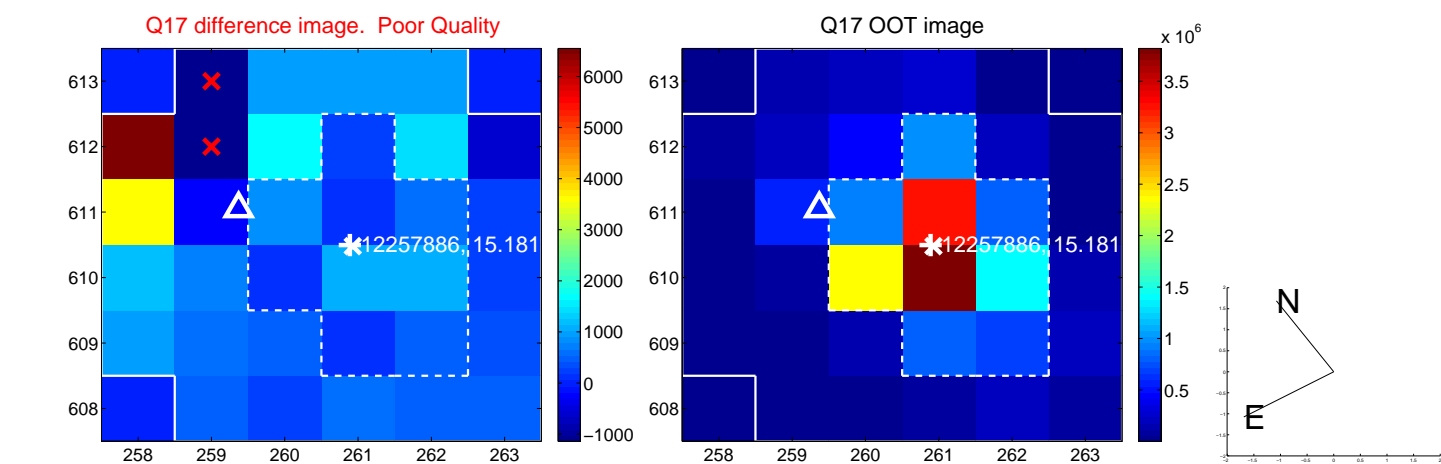
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

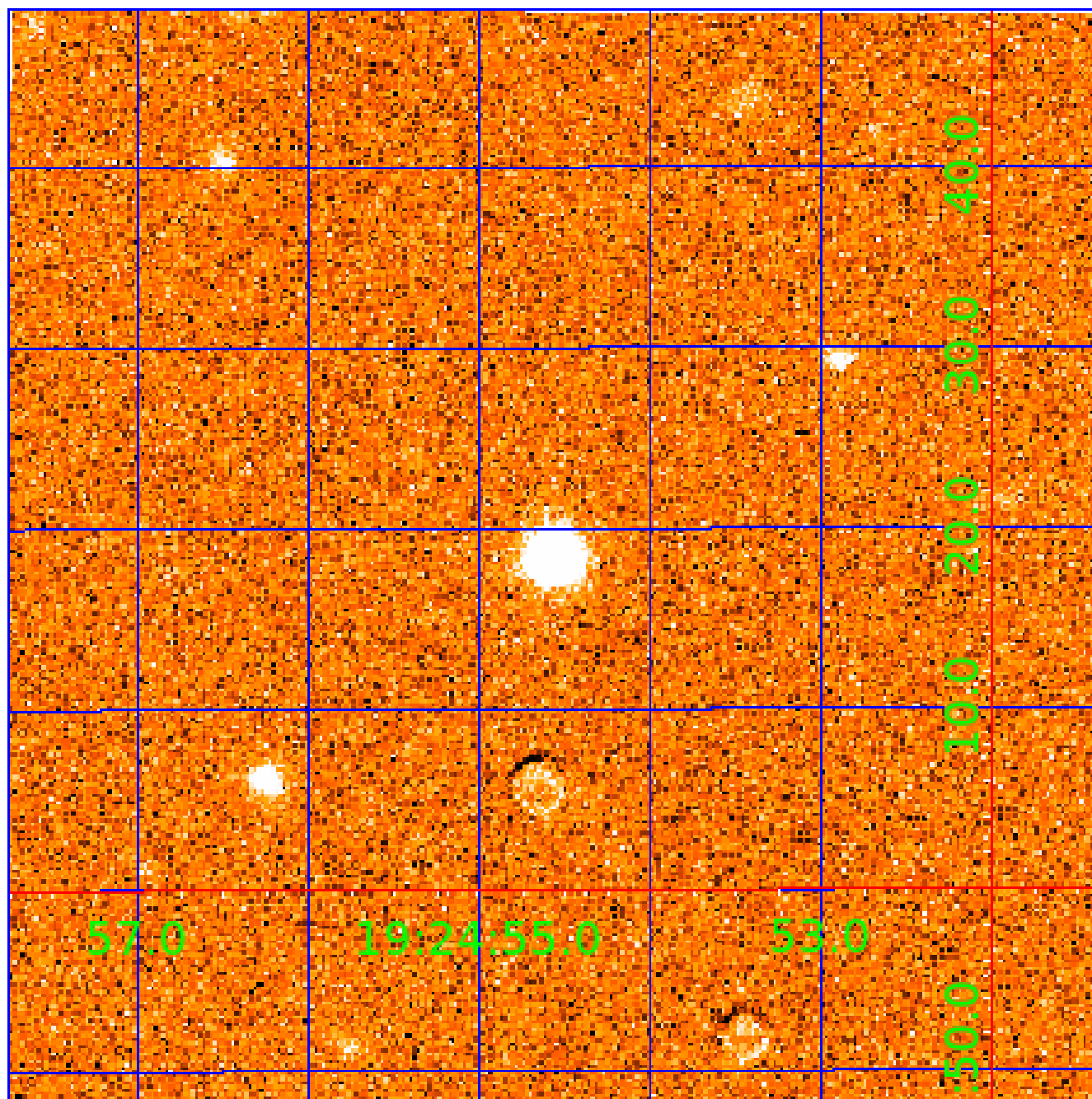


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination





# KIC 012257886

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012257886-01	OBS	4148.01	2.615851	132.423280	112.8	6.270	15.1	16.1	0.94	6131	1.21	806.29
012257886-02	OBS	No	2.616448	133.604527	30.6	12.824	7.8	6.1	0.94	6131	0.53	806.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012257886-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
012257886-02	OBS	FP	0.00	1	1	1	0	IS_SEC_TCE—CENT_RESOLVED_OFFSET

**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 012257886-02

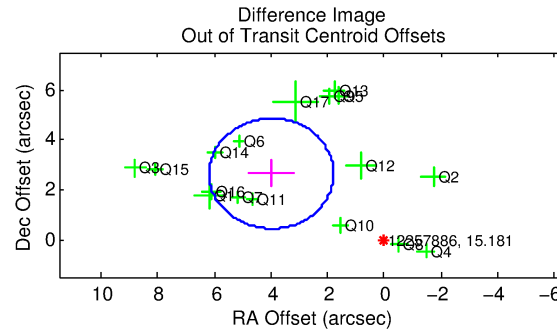
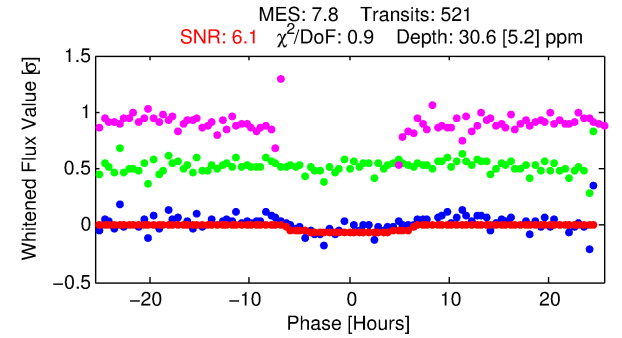
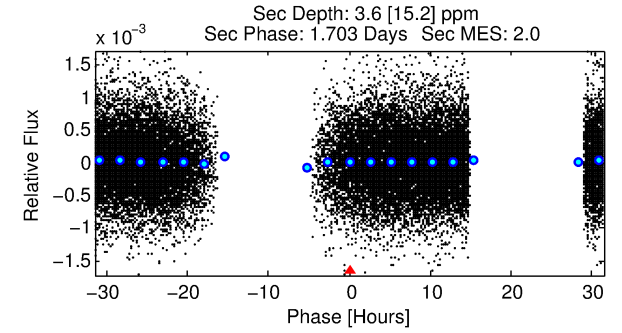
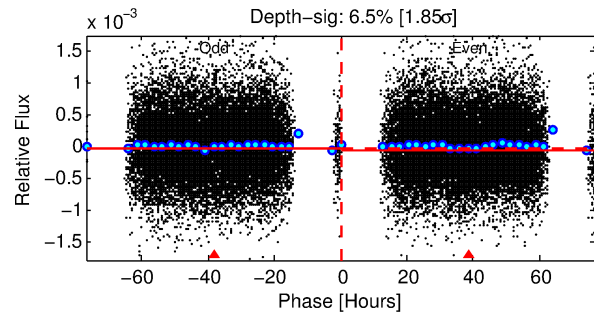
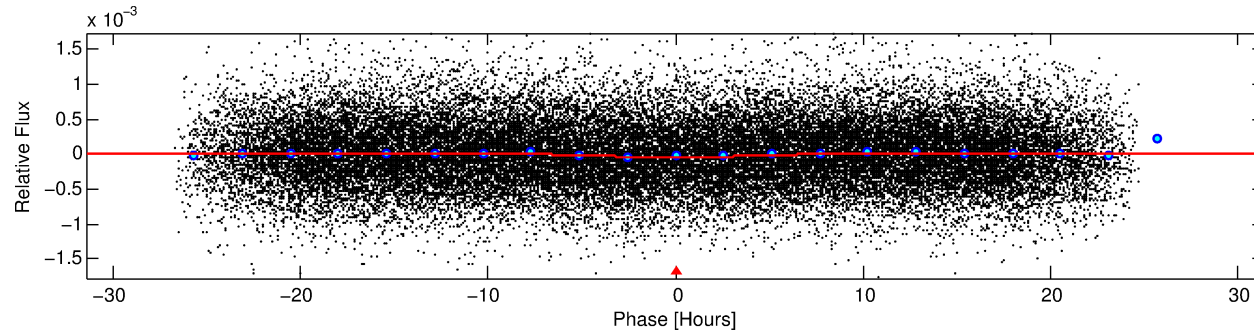
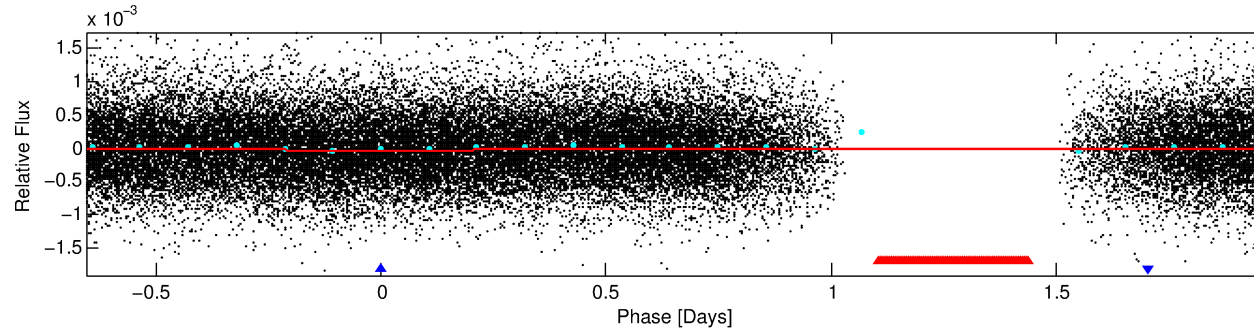
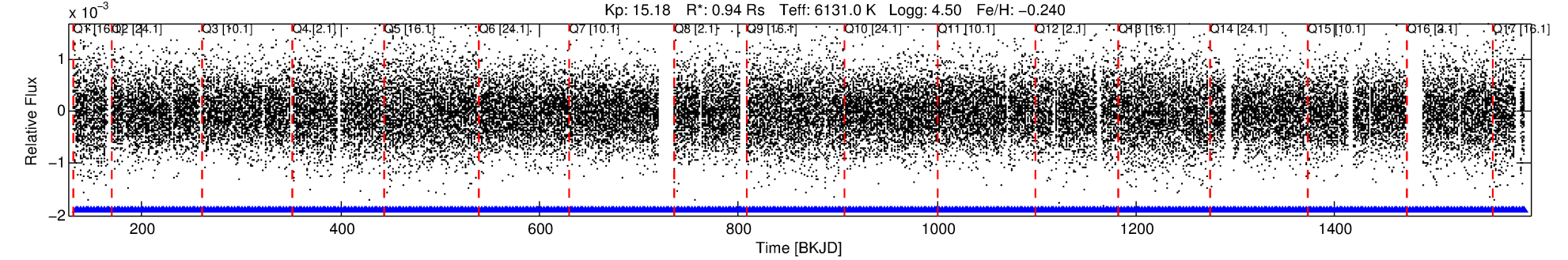
No Significant Match Found

# DV One-Page Summary

KIC: 12257886 Candidate: 2 of 2 Period: 2.616 d

KOI: K04148 Corr: No Ephemeris Match

Kp: 15.18 R\*: 0.94 Rs Teff: 6131.0 K Logg: 4.50 Fe/H: -0.240



## DV Fit Results:

Period = 2.61645 [0.00008] d  
Epoch = 133.6045 [0.0195] BKJD  
Rp/R\* = 0.0052 [0.0080]  
a/R\* = 1.59 [7.51]  
b = 0.40 [16.25]  
Seff = 806.04 [322.67]  
Teff = 1359 [136] K  
Rp = 0.53 [0.85] Re  
a = 0.0375 [0.0097] AU  
Ag = 9.92 [51.87] [0.17σ]  
Teffp = 3728 [4862] K [0.49σ]

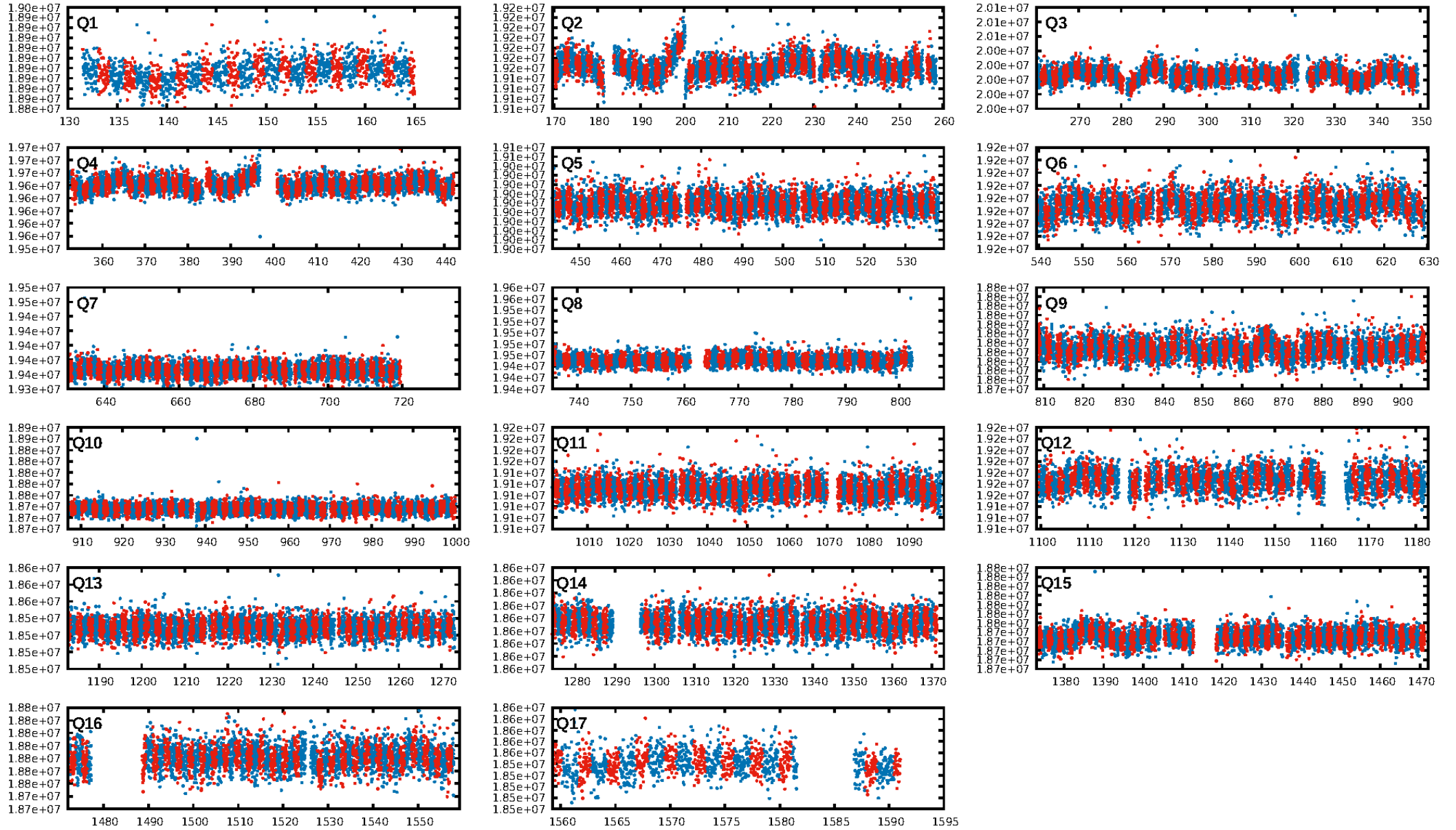
## DV Diagnostic Results:

ShortPeriod-sig: 0.1% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.20e-17  
RollingBand-fgt: 1.00 [497/497]  
GhostDiagnostic-chr: 0.9579  
Centroid-sig: 26.6%  
Centroid-so: 2.460 arcsec [1.04σ]  
OotOffset-rm: 4.783 arcsec [6.51σ]  
KicOffset-rm: 4.892 arcsec [6.74σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.00 [0/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 06:27:45 Z

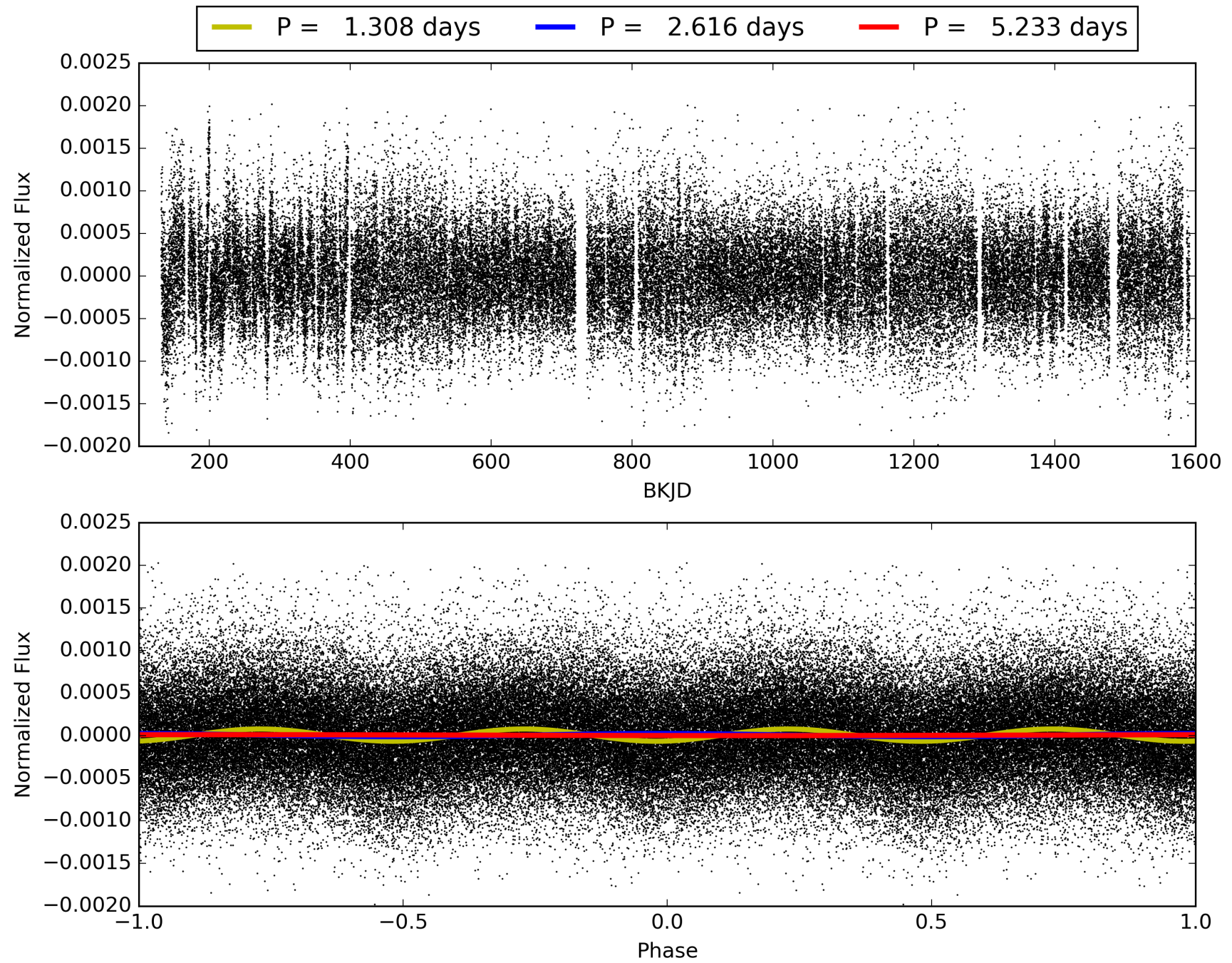
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 012257886-02, PDC Light Curves





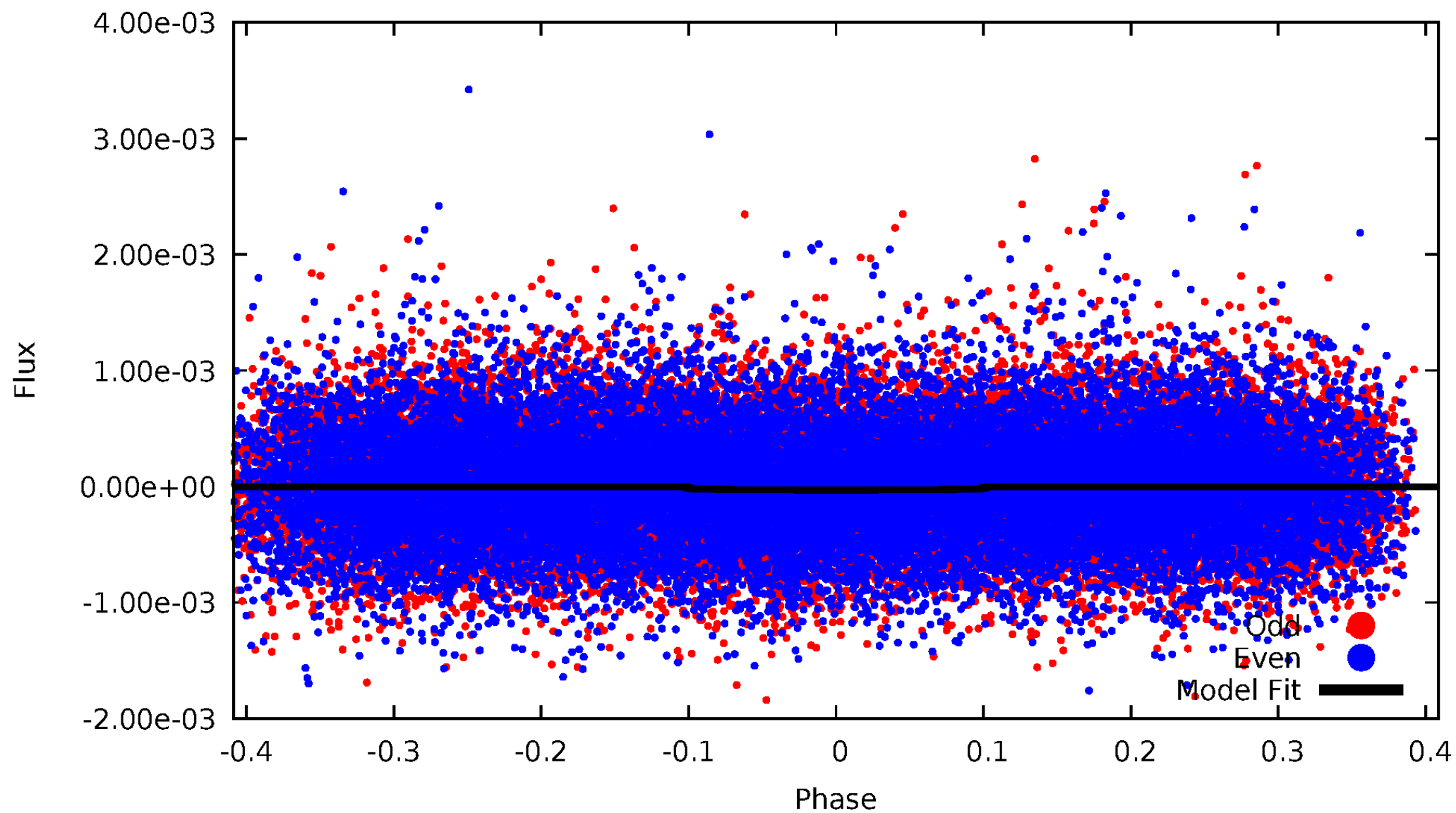
# TCE 012257886-02





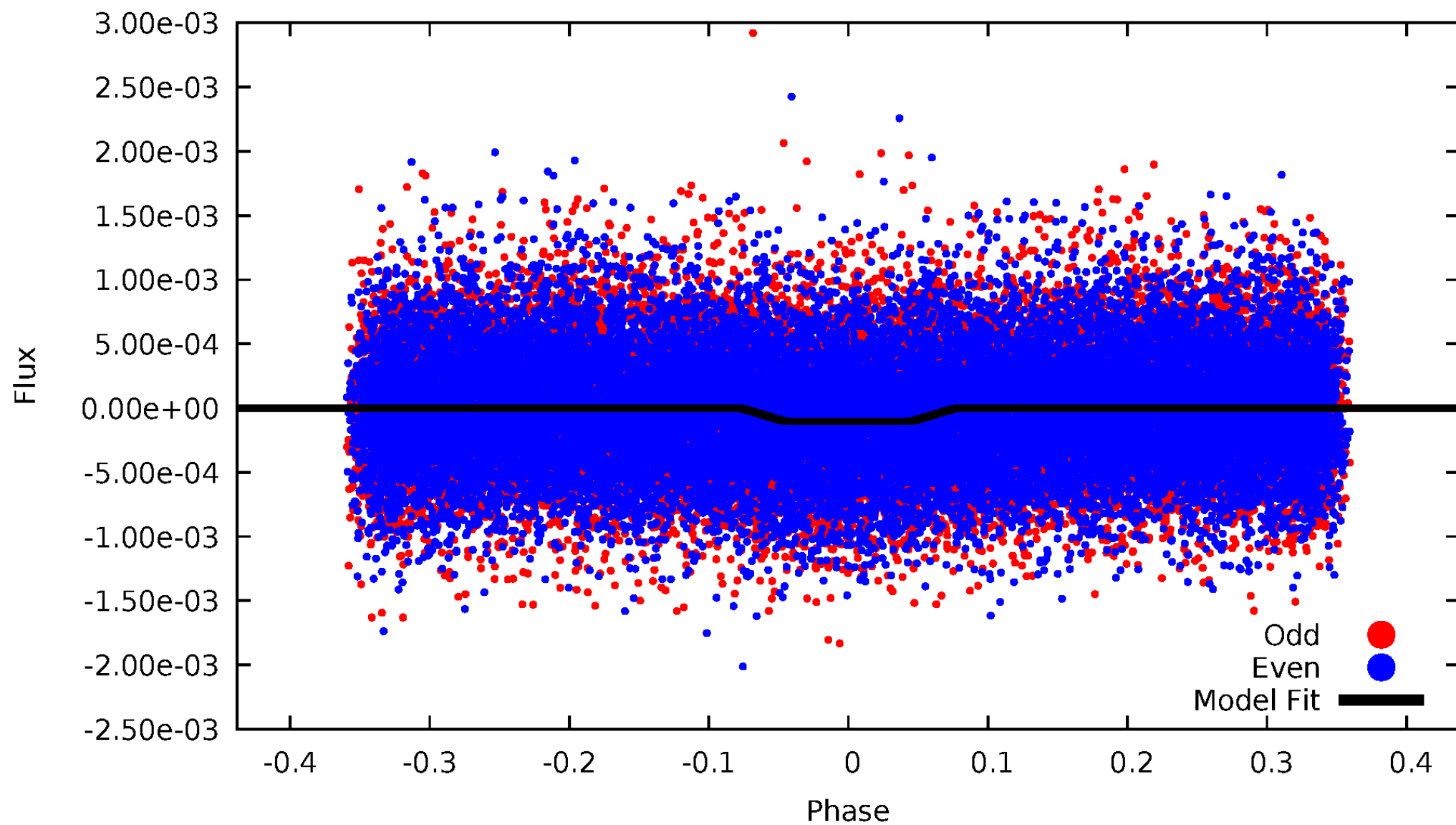
# DV Odd/Even

TCE 012257886-02



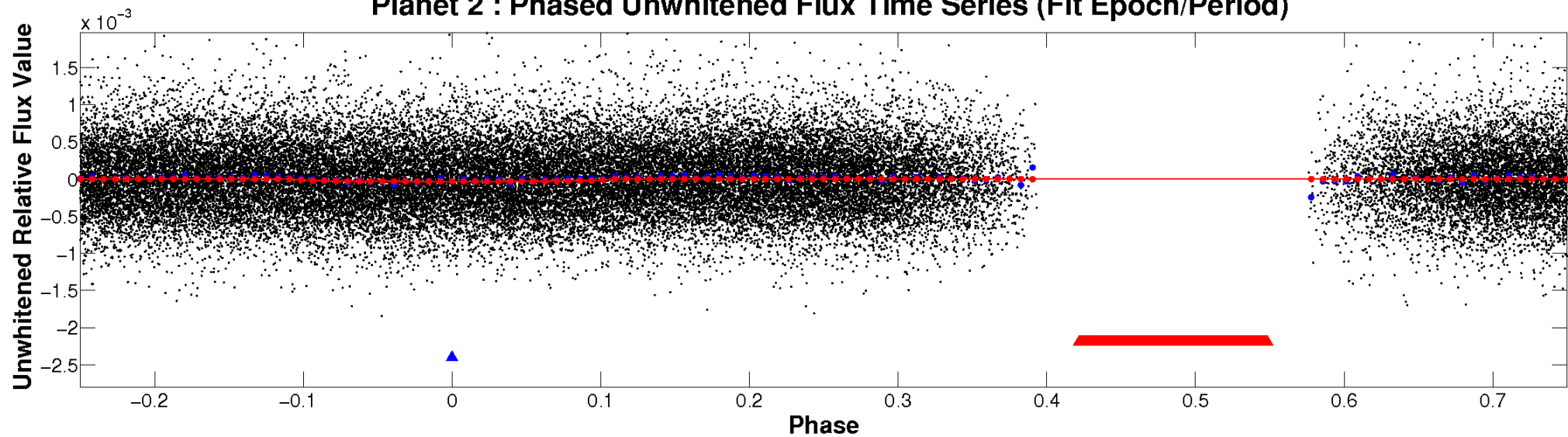
# ALT Odd/Even

TCE 012257886-02

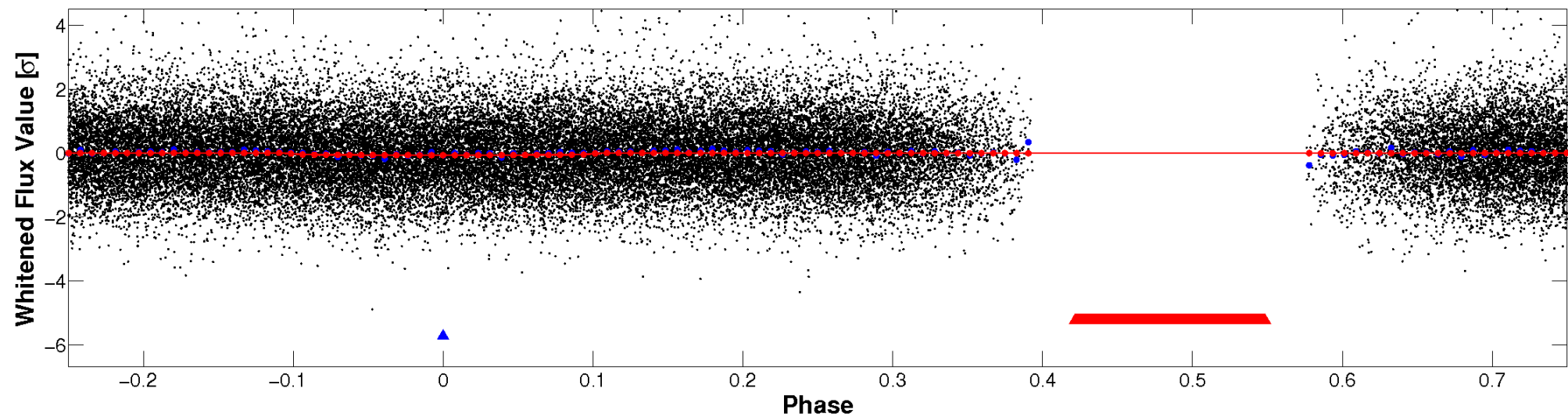


# Non-Whitened Vs. Whitened Light Curve

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

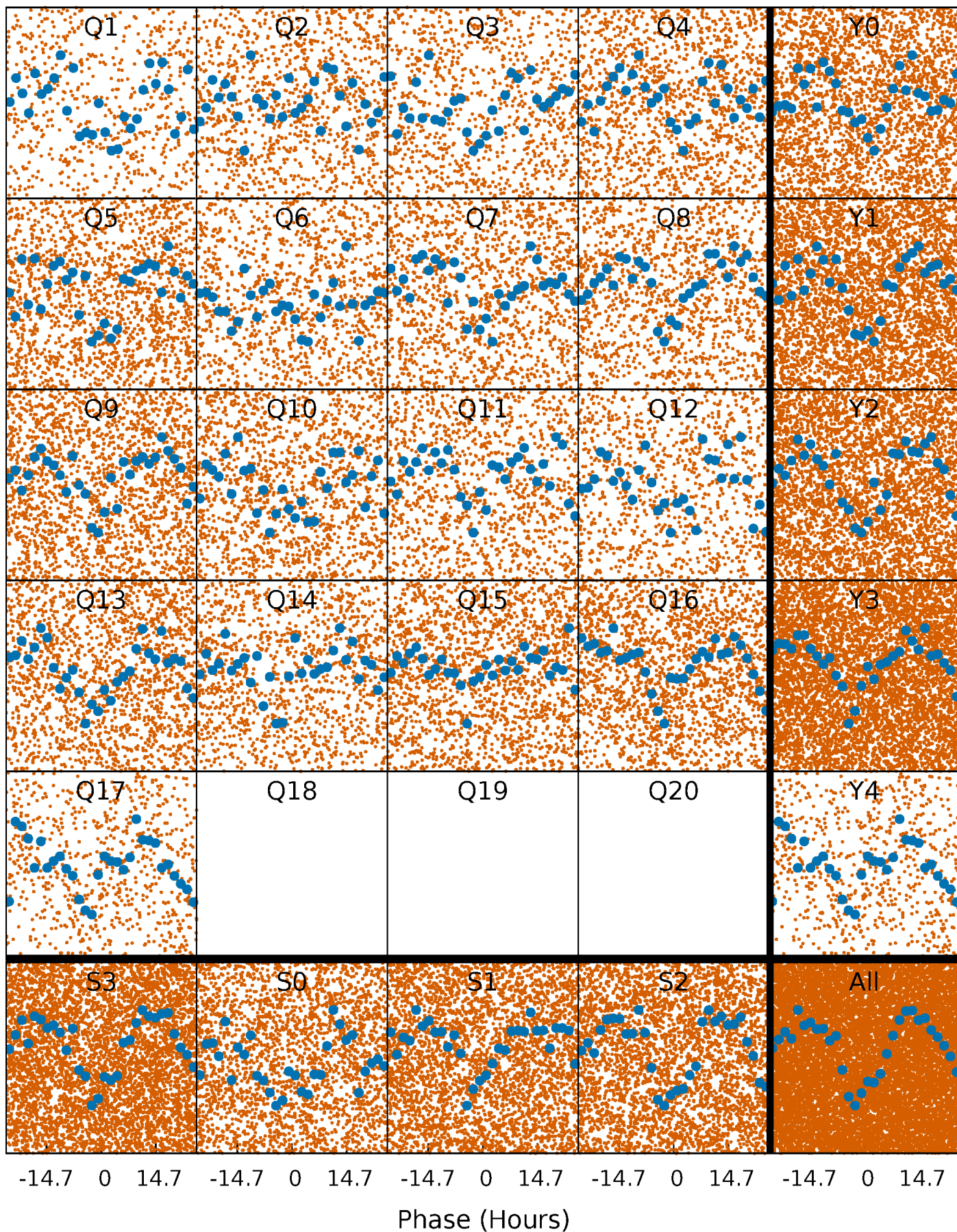


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

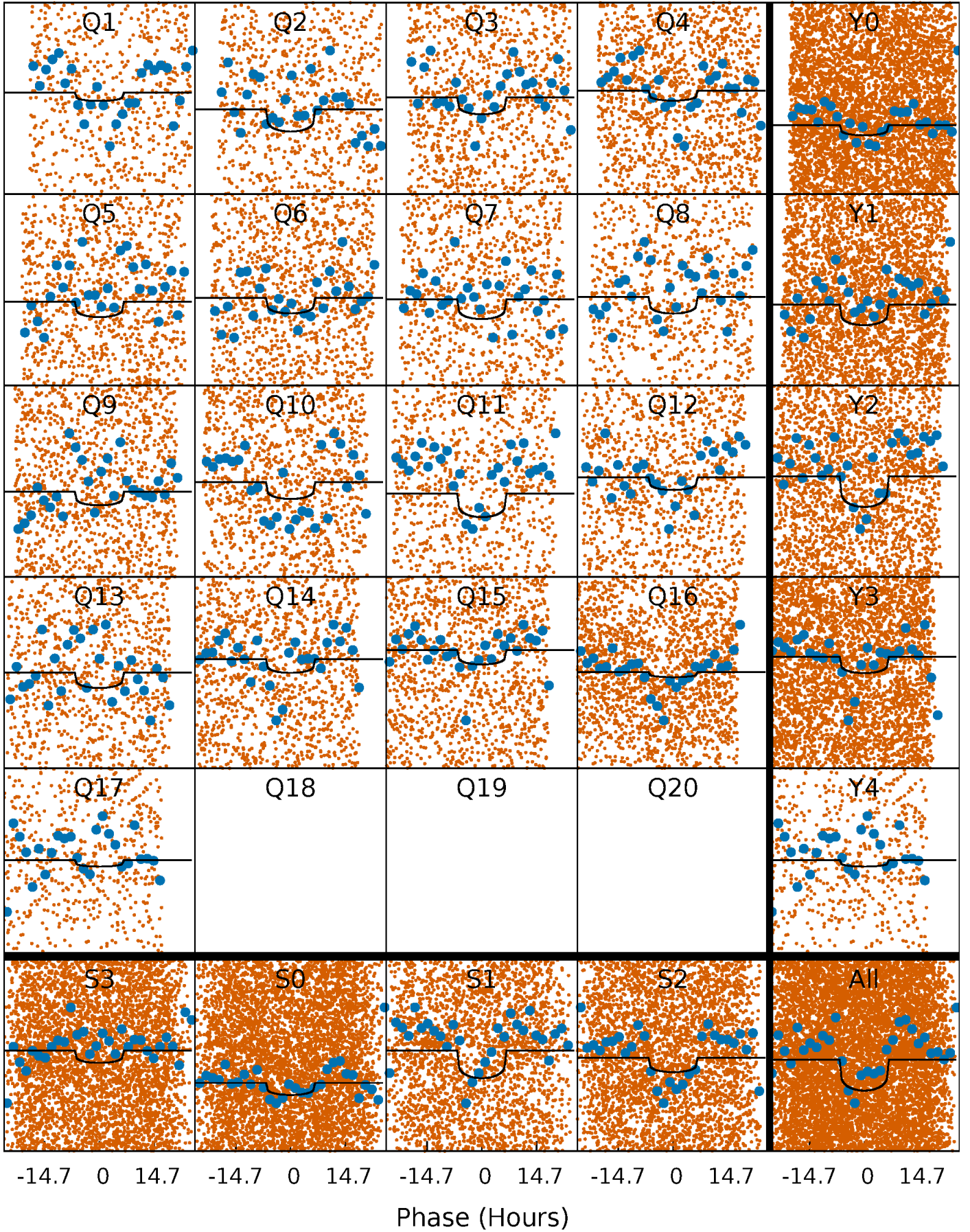
TCE 012257886-02 P= 2.616448 Days  $T_0=133.604527$  (BKJD)





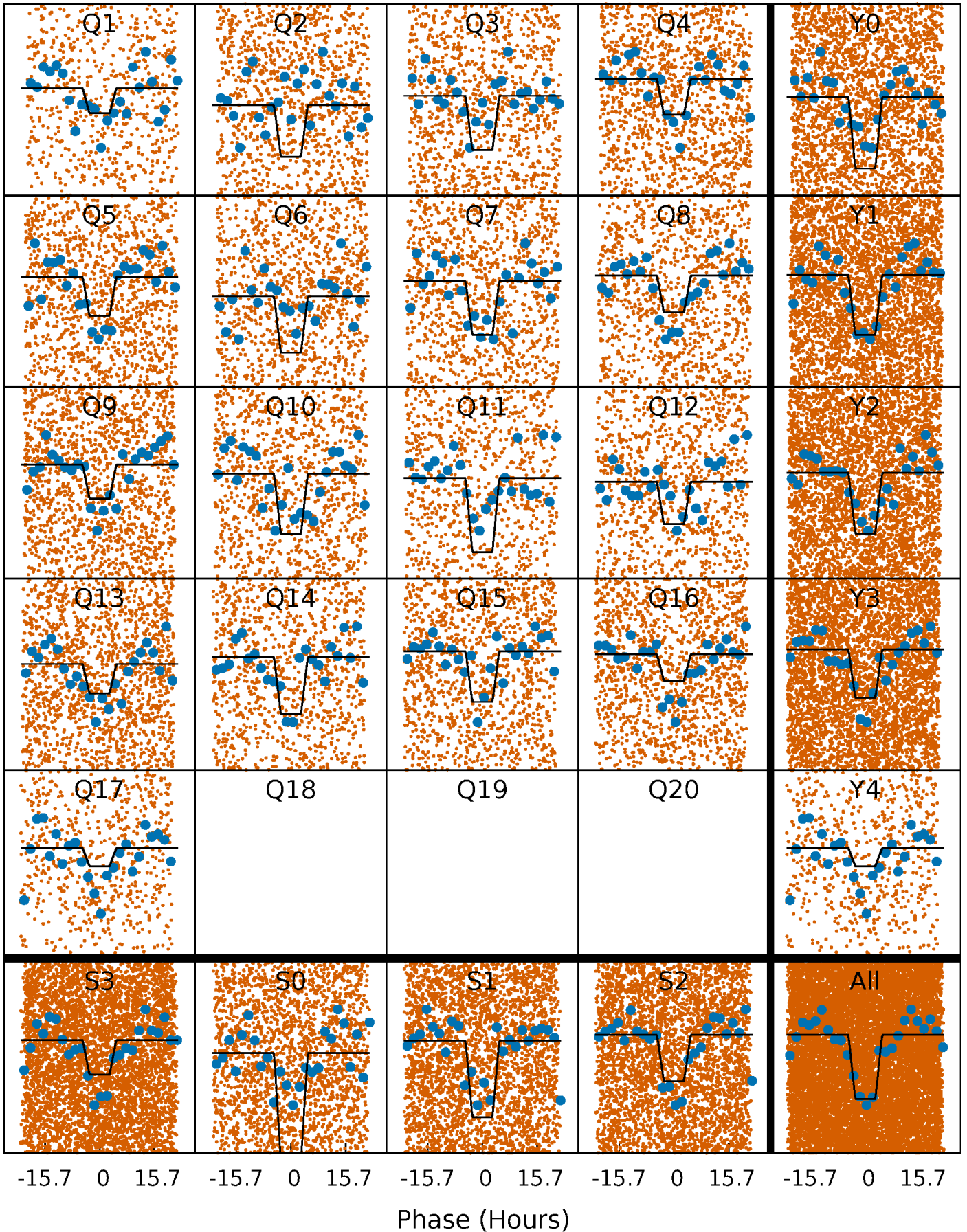
# DV Quarter-Phased Transit Curves

TCE 012257886-02   P= 2.616448 Days    $T_0=133.604527$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 012257886-02   P= 2.615981 Days    $T_0=133.696006$  (BKJD)

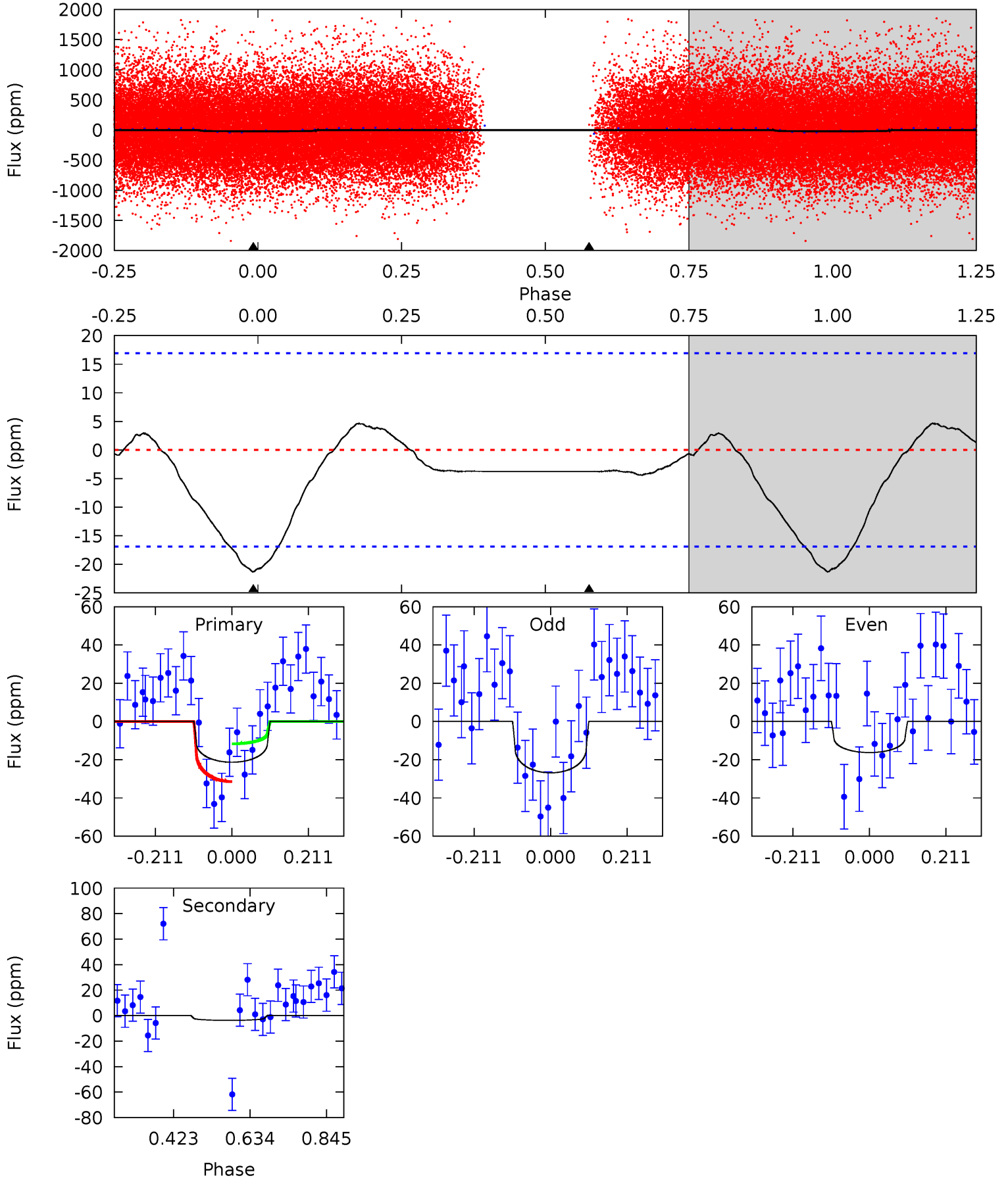




# DV Model-Shift Uniqueness Test

012257886-02, P = 2.616448 Days, E = 130.988079 Days

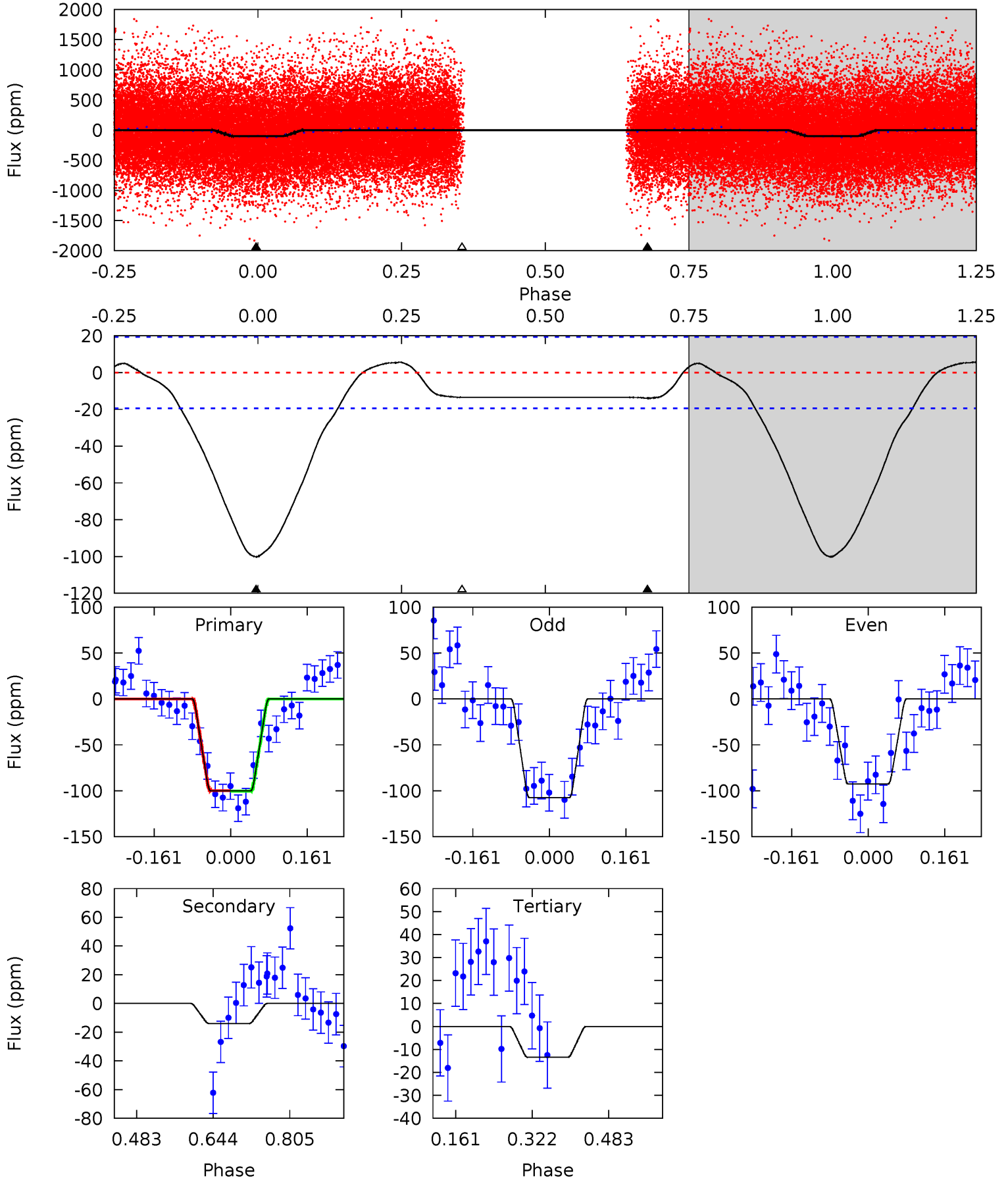
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.55	0.97	0	0	4.41	1.25	0.72	5.55	5.55	0.97	0.97	1.38	0.96	0.18	2.56



# Alt Model-Shift Uniqueness Test

012257886-02, P = 2.615981 Days, E = 131.080025 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
23.0	3.21	3.09	0	4.46	1.40	1.59	19.9	23.0	0.12	3.21	1.71	1.09	0.05	0.05



### Stellar Parameters For KIC 012257886

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6131^{+164}_{-200}$	$4.497^{+0.052}_{-0.208}$	$-0.240^{+0.300}_{-0.300}$	$0.945^{+0.288}_{-0.096}$	$1.023^{+0.138}_{-0.138}$	$1.707^{+0.456}_{-0.859}$
	+3%/-3%	+1%/-5%	+125%/-125%	+30%/-10%	+13%/-13%	+27%/-50%
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 012257886-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-4 \pm 4$	$0.85^{+0.77}_{-0.57}$	$1940^{+130}_{-99}$	$3203^{+1813}_{-5895}$	$2.416^{+25.884}_{-2.727}$
Alt.	$-14 \pm 4$	$1.18^{+0.84}_{-0.70}$	$1936^{+130}_{-90}$	$3862^{+1604}_{-685}$	$7.410^{+34.885}_{-5.149}$

$T_{max}$  = 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

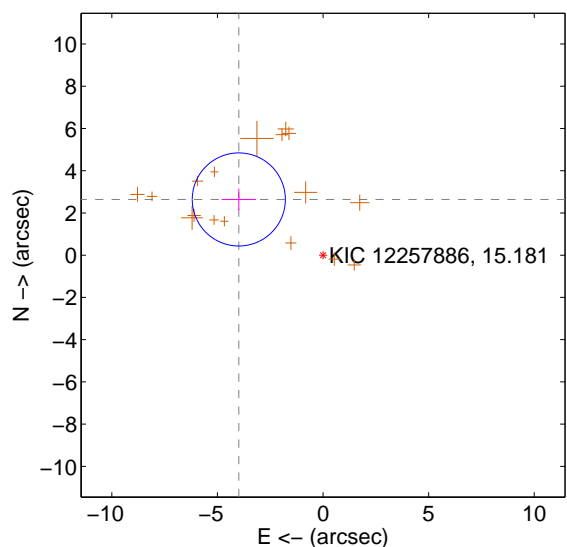
Supplemental centroid analysis for 012257886-02. Kepler magnitude: 15.18. Transit SNR 6.09

There are 0 quarters with good PRF difference image offsets

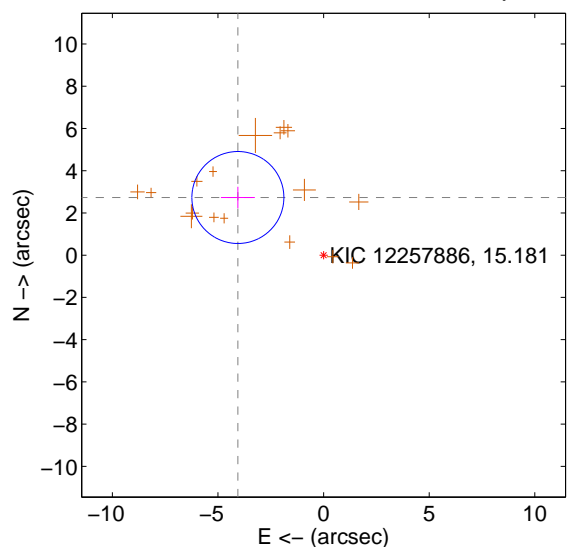
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.783 \pm 0.735$	6.51	$3.989 \pm 0.813$	$2.639 \pm 0.511$
PRF-fit source offset from KIC position	$4.892 \pm 0.726$	6.74	$4.059 \pm 0.805$	$2.731 \pm 0.510$
photometric centroid source offset	$2.46 \pm 2.36$	1.04	$-2.13 \pm 2.34$	$-1.23 \pm 2.44$

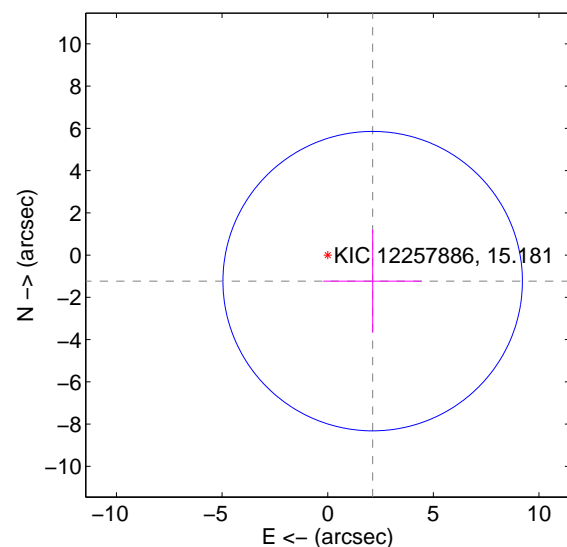
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

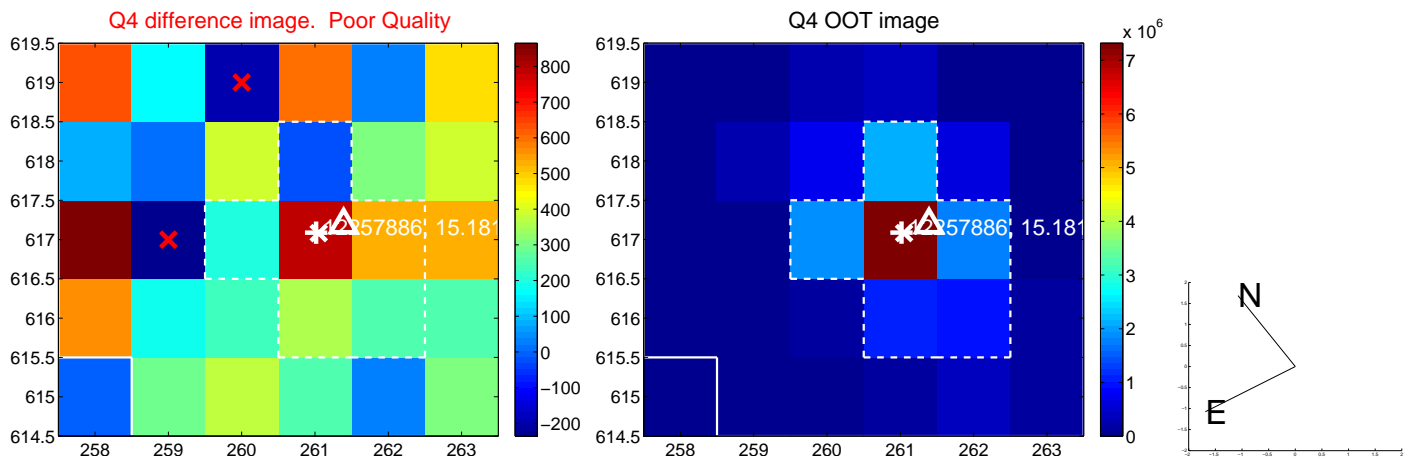
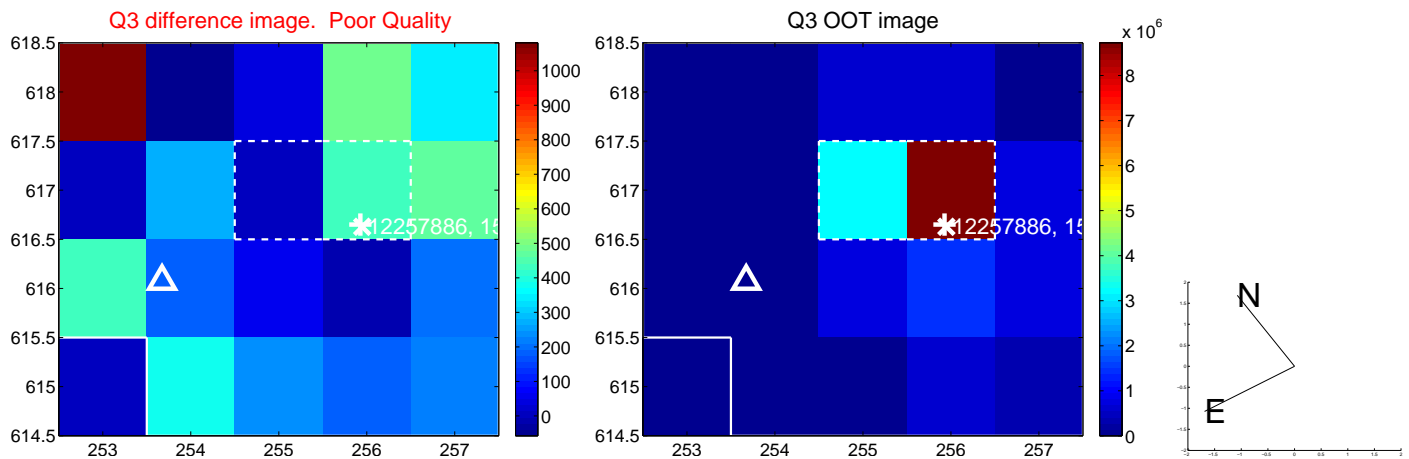
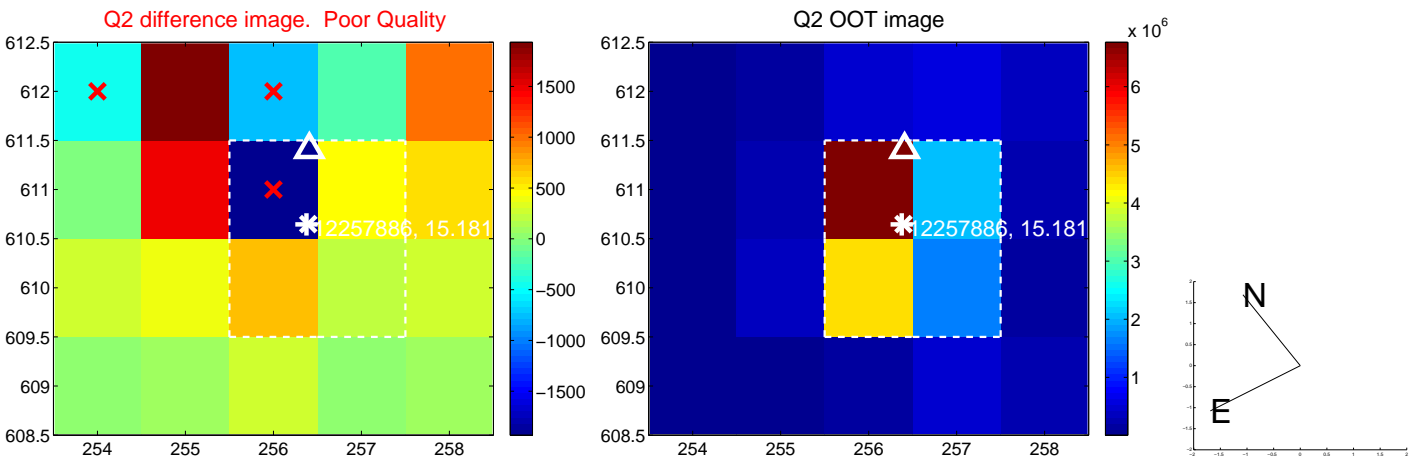
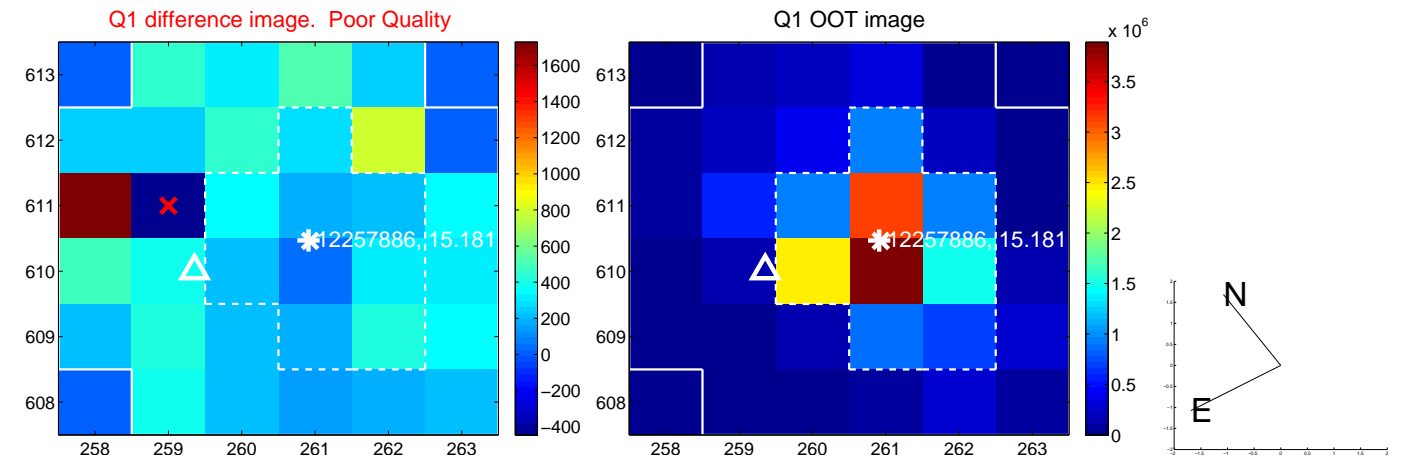


offset from photometric centroids

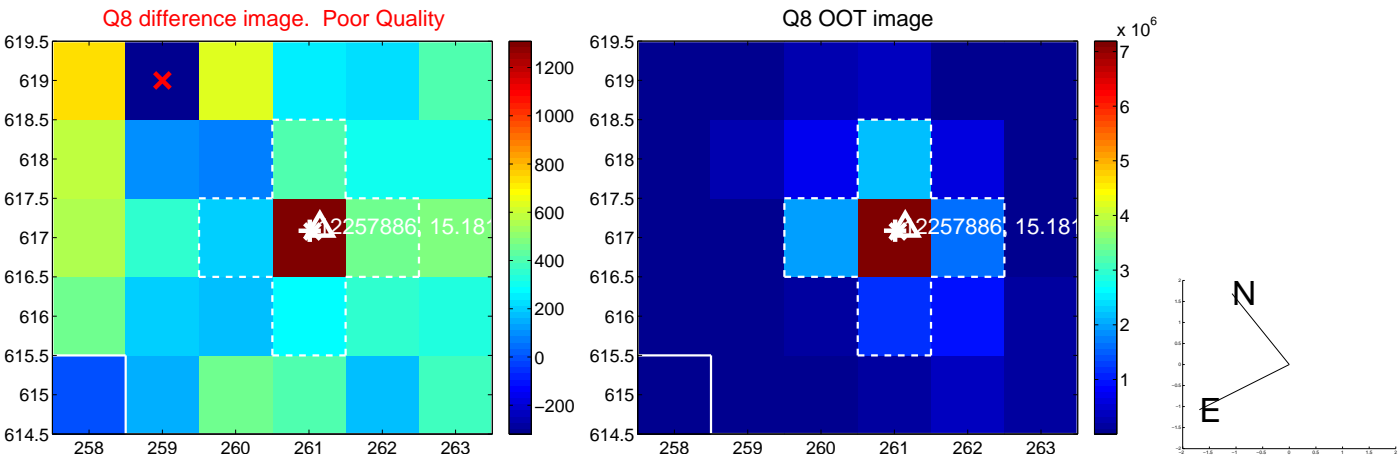
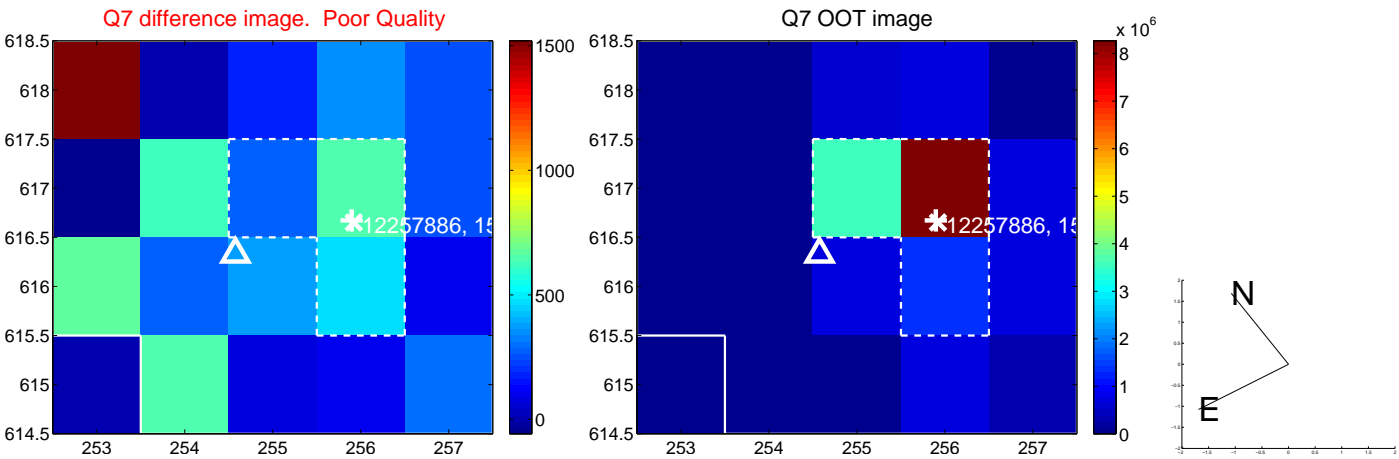
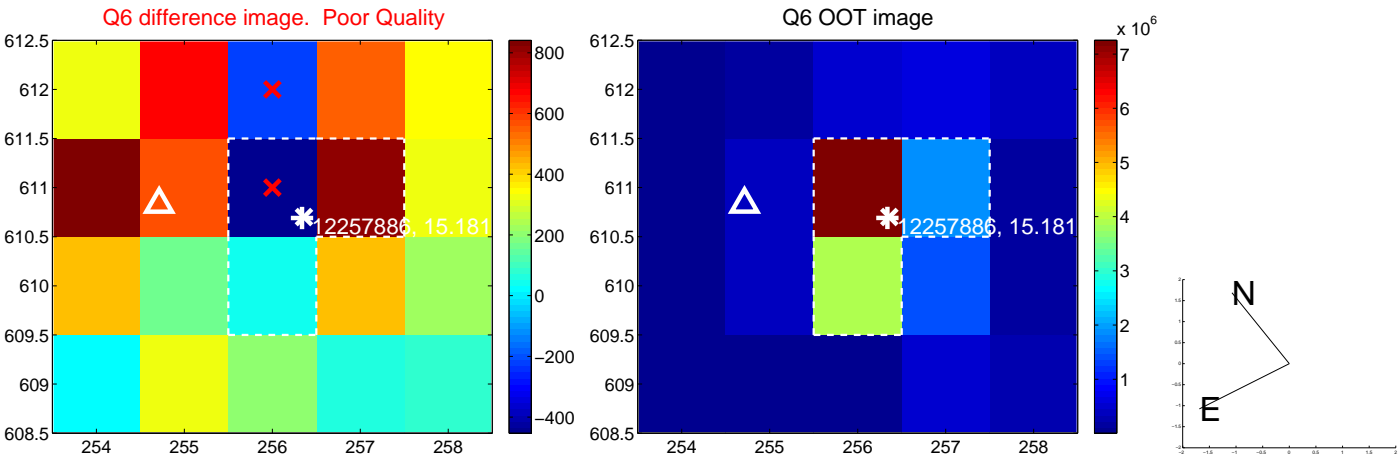
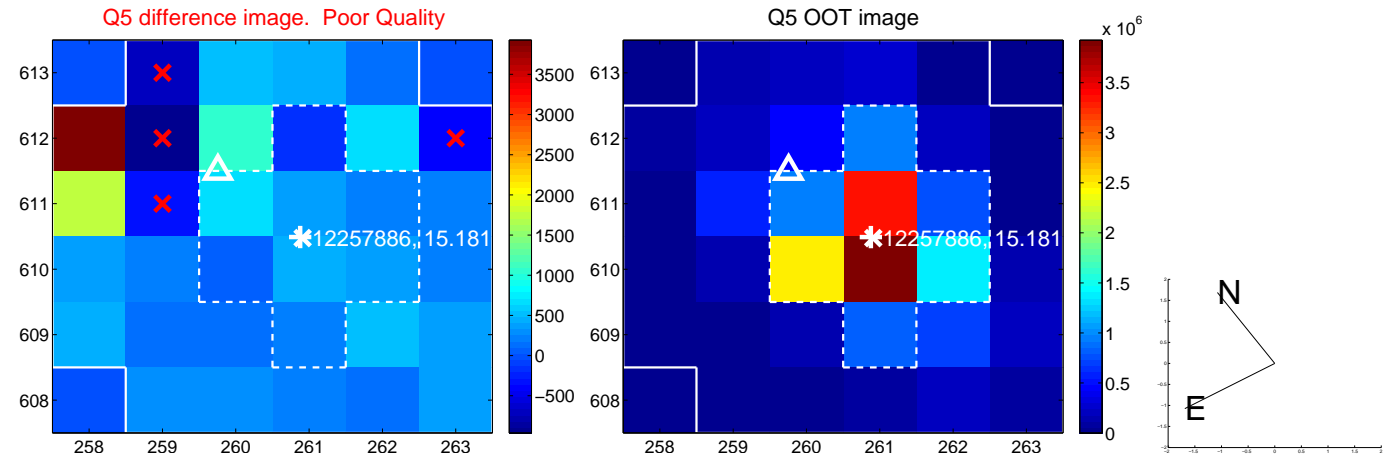


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

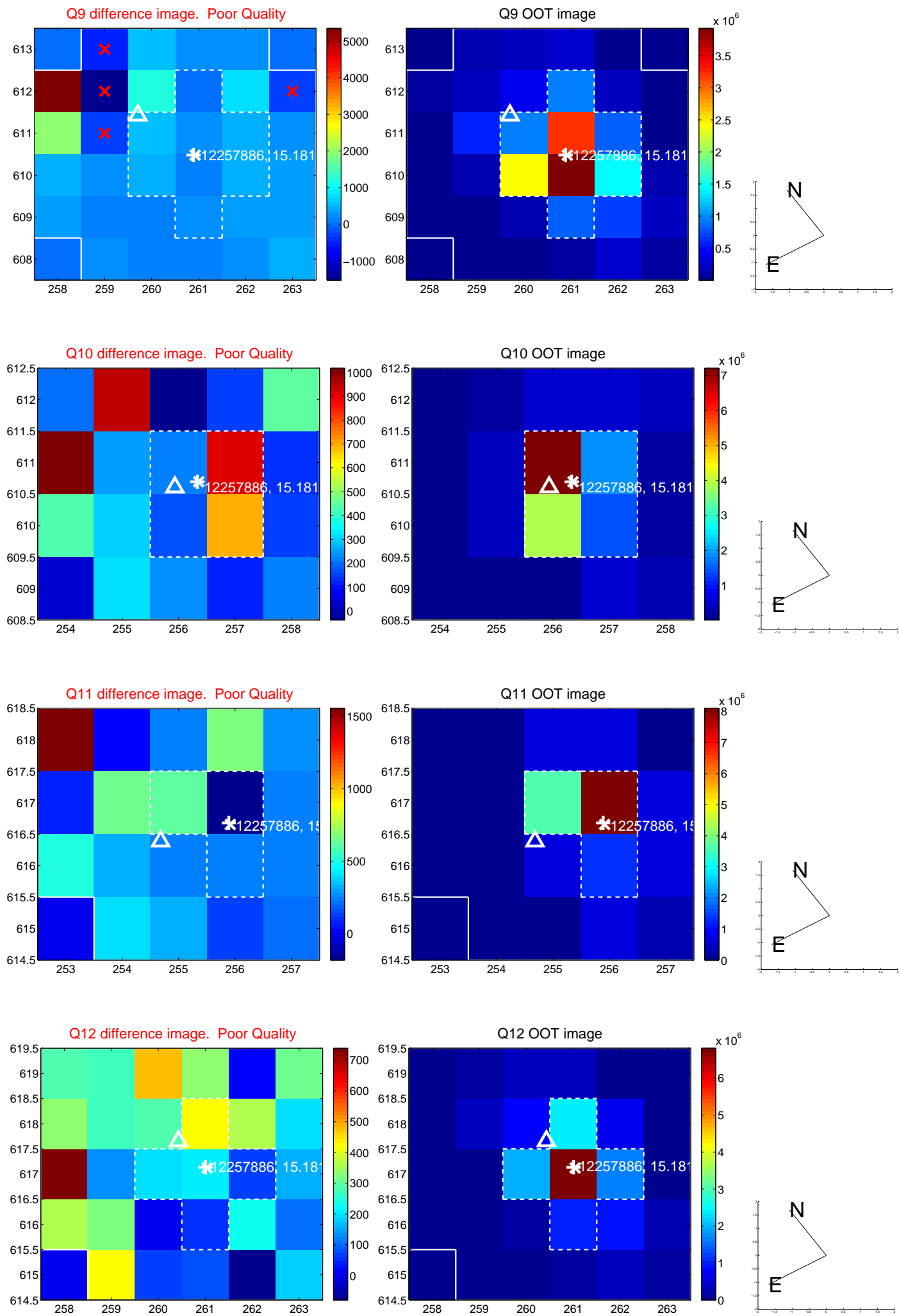


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

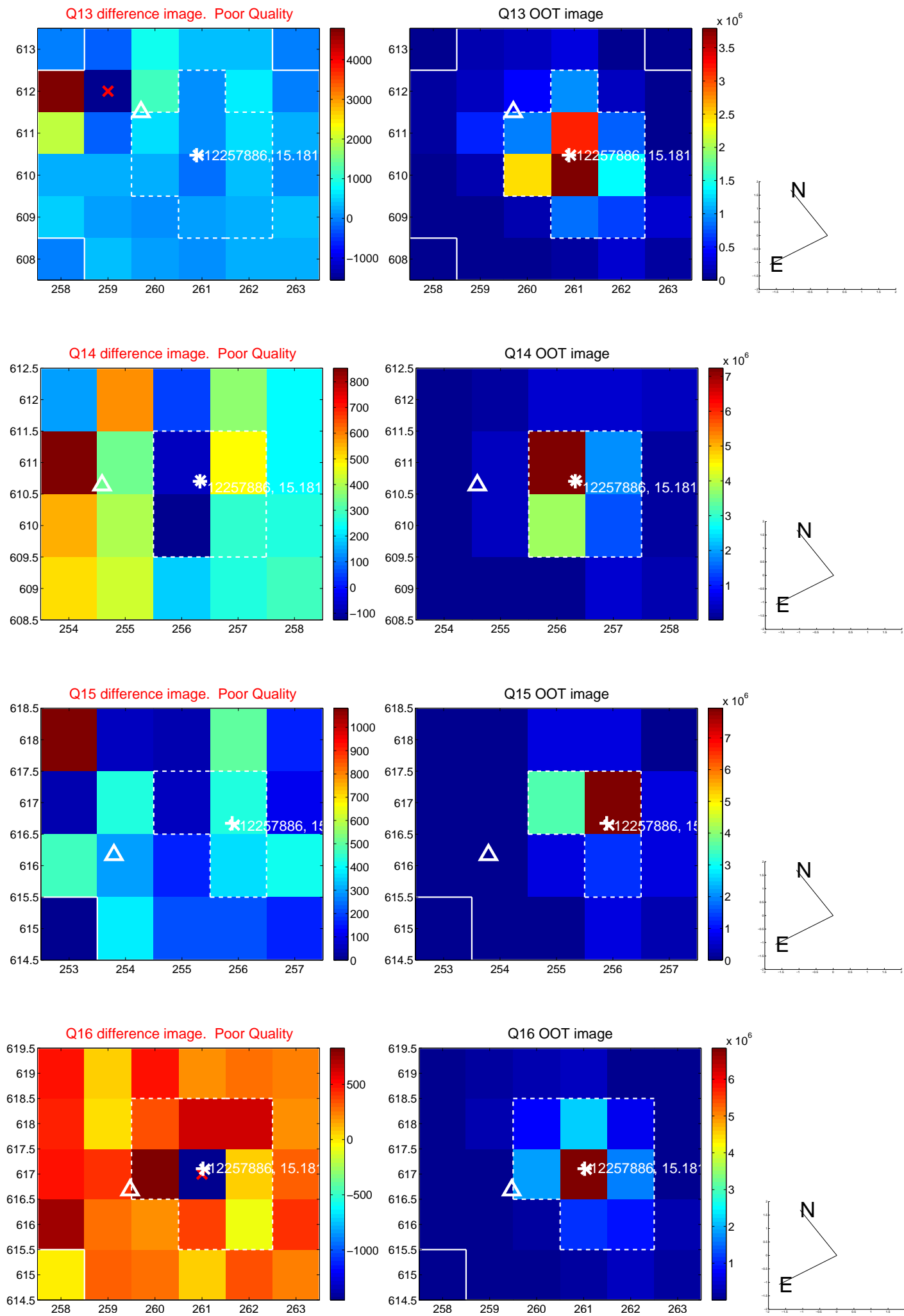




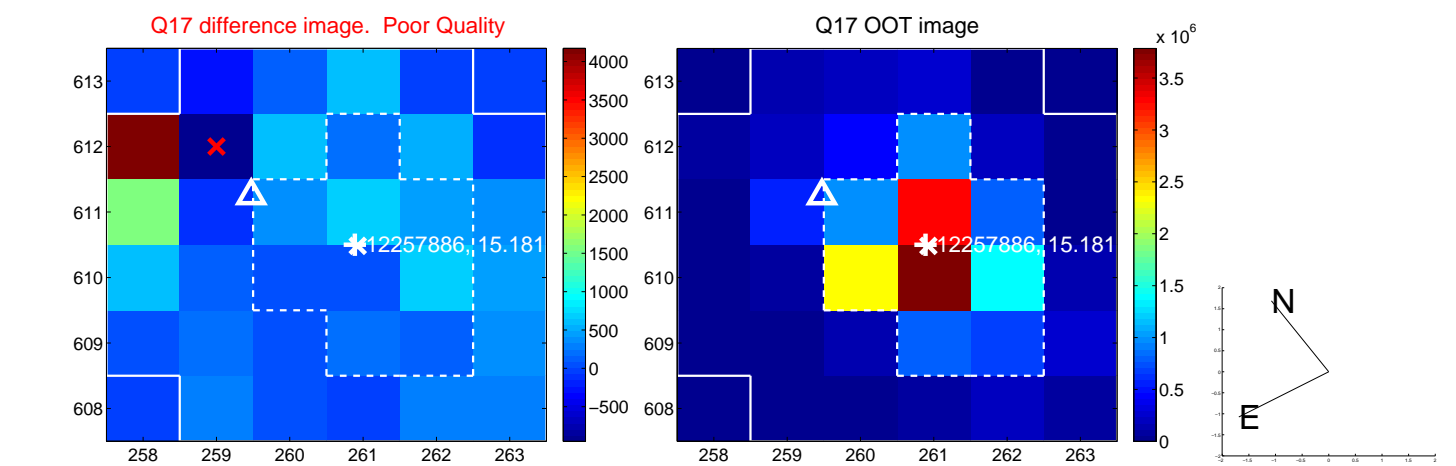
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



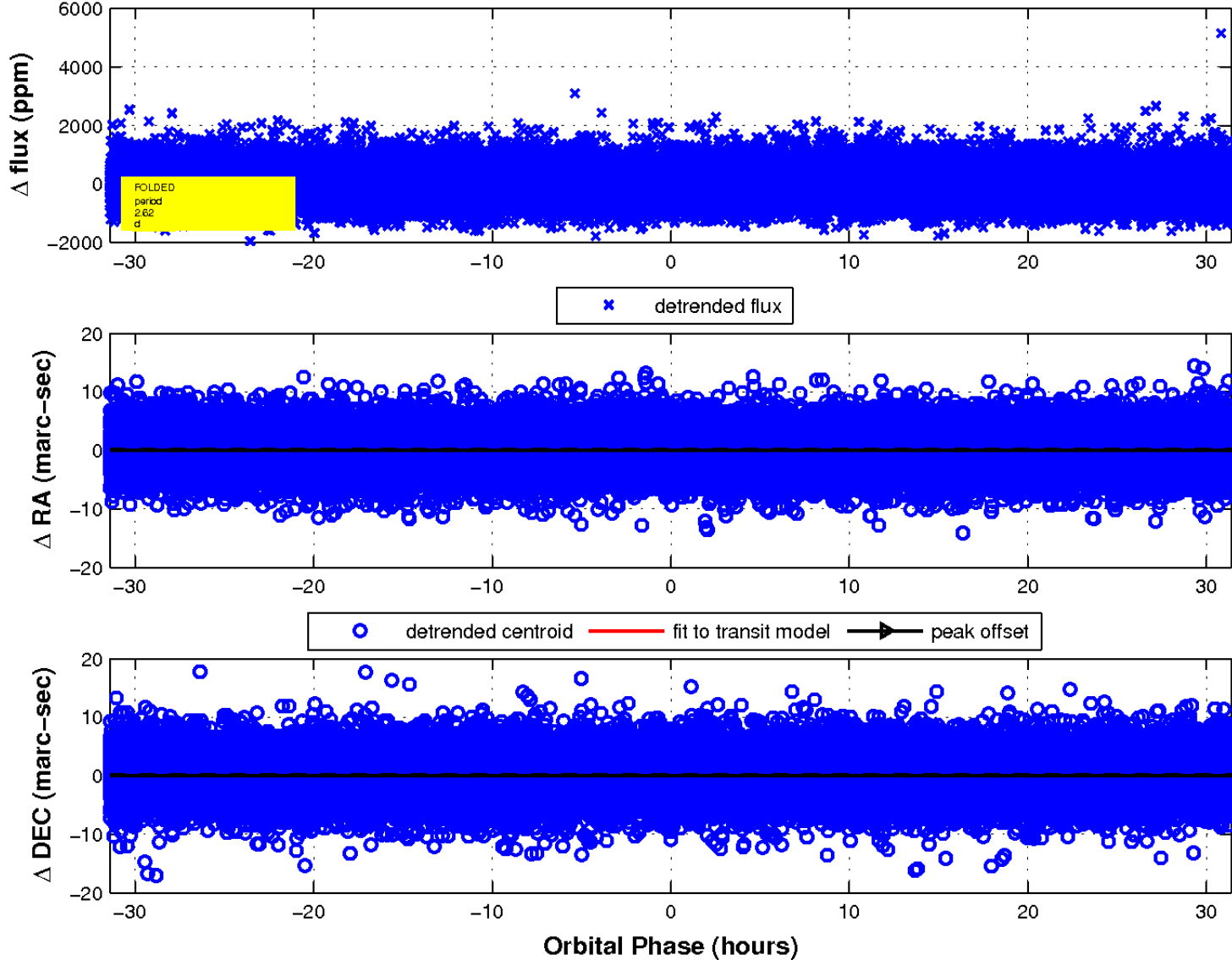
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



# UKIRT Image

Declination

