

# KIC 004847371

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004847371-01	OBS	No	0.508309	131.942855	44.3	1.037	14.3	15.6	1.05	6817	0.82	15178.32
004847371-02	OBS	No	0.508295	131.617169	14.1	2.510	8.4	6.0	1.05	6817	0.40	15178.86

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004847371-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_SATURATED
004847371-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_SATURATED

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

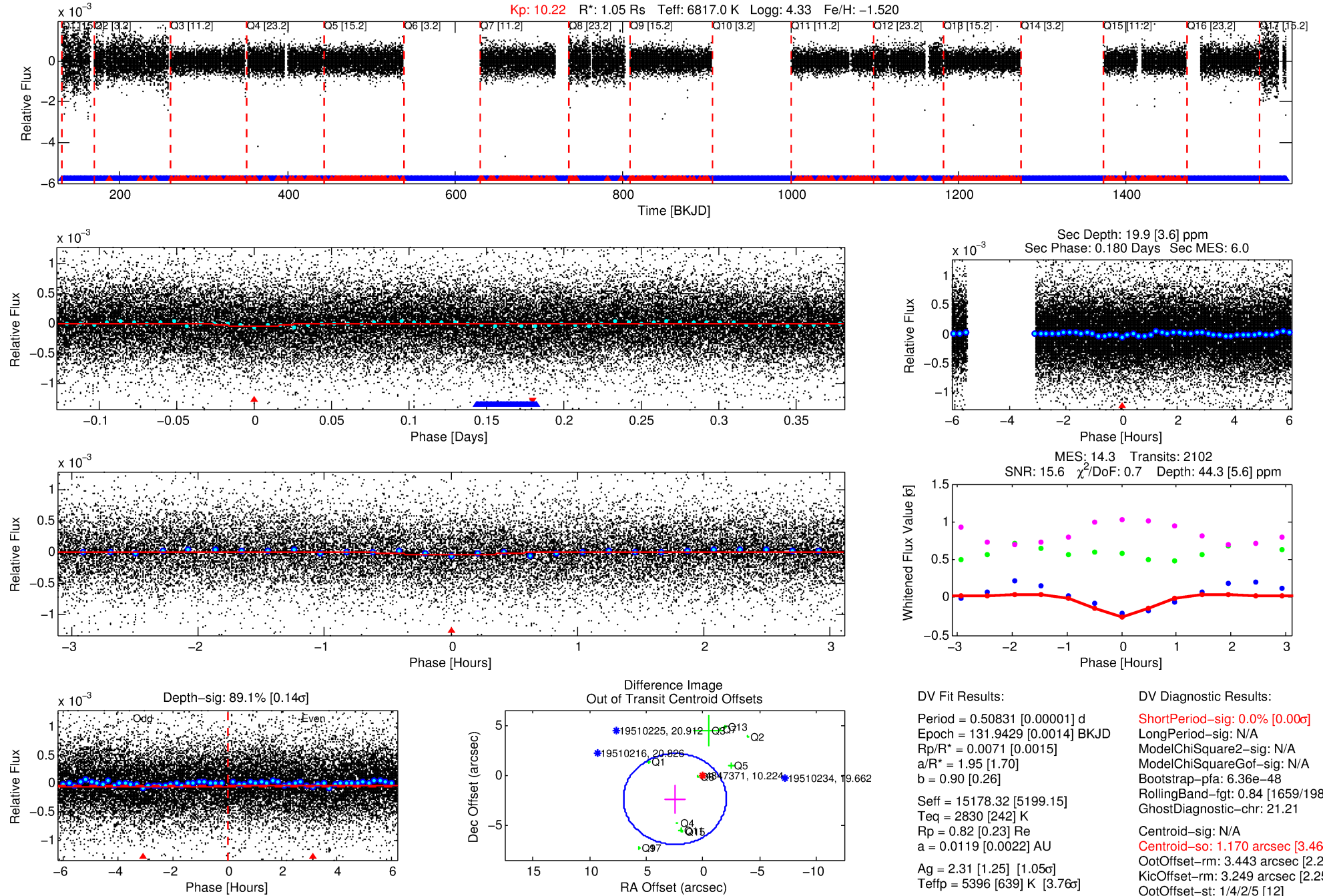
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004847371-01

No Significant Match Found

# DV One-Page Summary

KIC: 4847371 Candidate: 1 of 2 Period: 0.508 d



## DV Fit Results:

Period = 0.50831 [0.00001] d  
Epoch = 131.9429 [0.0014] BKJD  
Rp/R\* = 0.0071 [0.0015]  
a/R\* = 1.95 [1.70]  
b = 0.90 [0.26]  
Seff = 15178.32 [5199.15]  
Teff = 2830 [242] K  
Rp = 0.82 [0.23] Re  
a = 0.0119 [0.0022] AU  
Ag = 2.31 [1.25] [1.05σ]  
Teffp = 5396 [639] K [3.76σ]

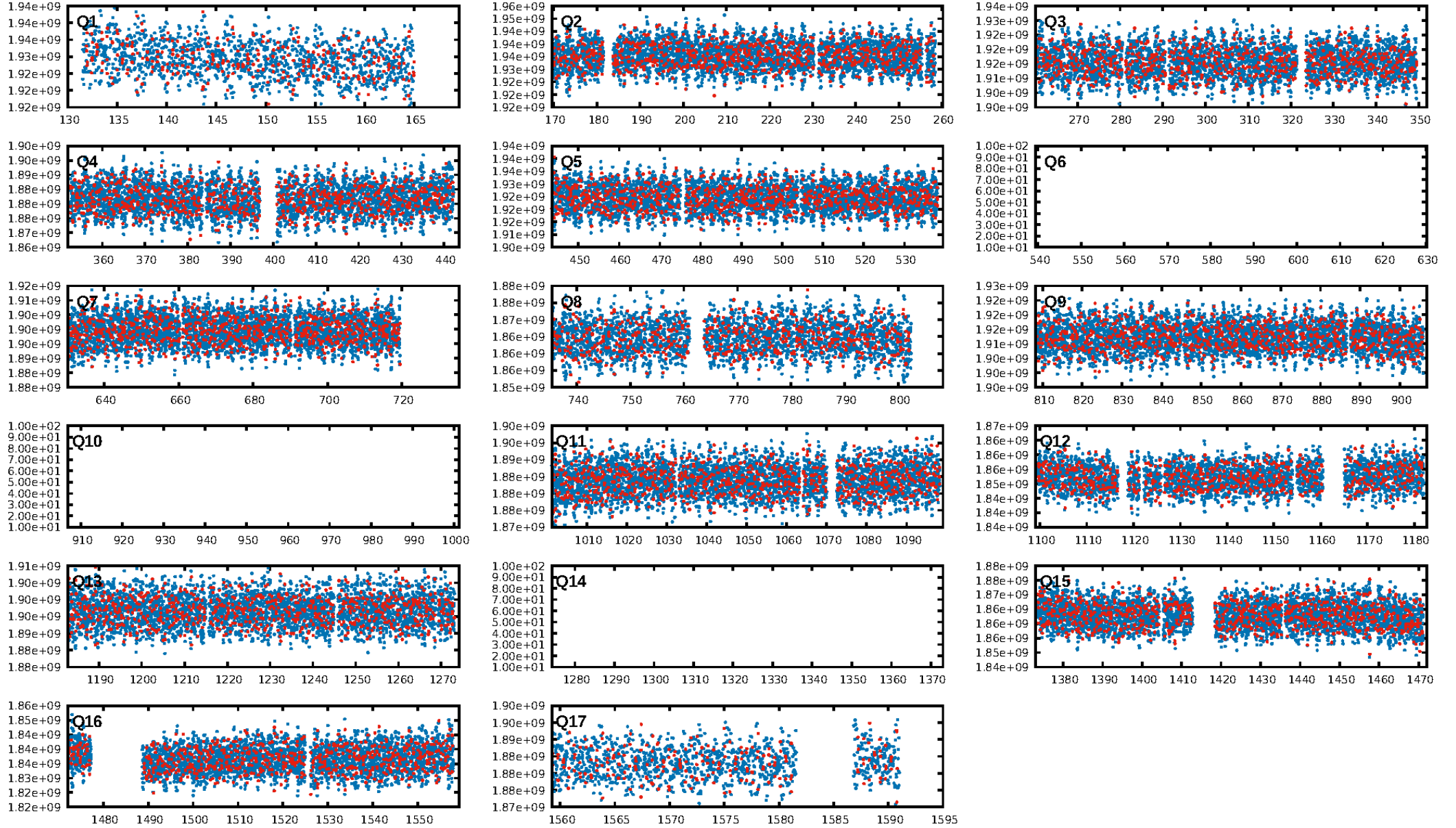
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 6.36e-48  
RollingBand-fgt: 0.84 [1659/1984]  
GhostDiagnostic-chr: 21.21  
Centroid-sig: N/A  
Centroid-so: 1.170 arcsec [3.46σ]  
OotOffset-rm: 3.443 arcsec [2.27σ]  
KicOffset-rm: 3.249 arcsec [2.25σ]  
OotOffset-st: 1/4/2/5 [12]  
KicOffset-st: 1/4/2/5 [12]  
DiffImageQuality-fgm: 0.33 [4/12]  
DiffImageOverlap-fno: 0.00 [0/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 13:49:00 Z

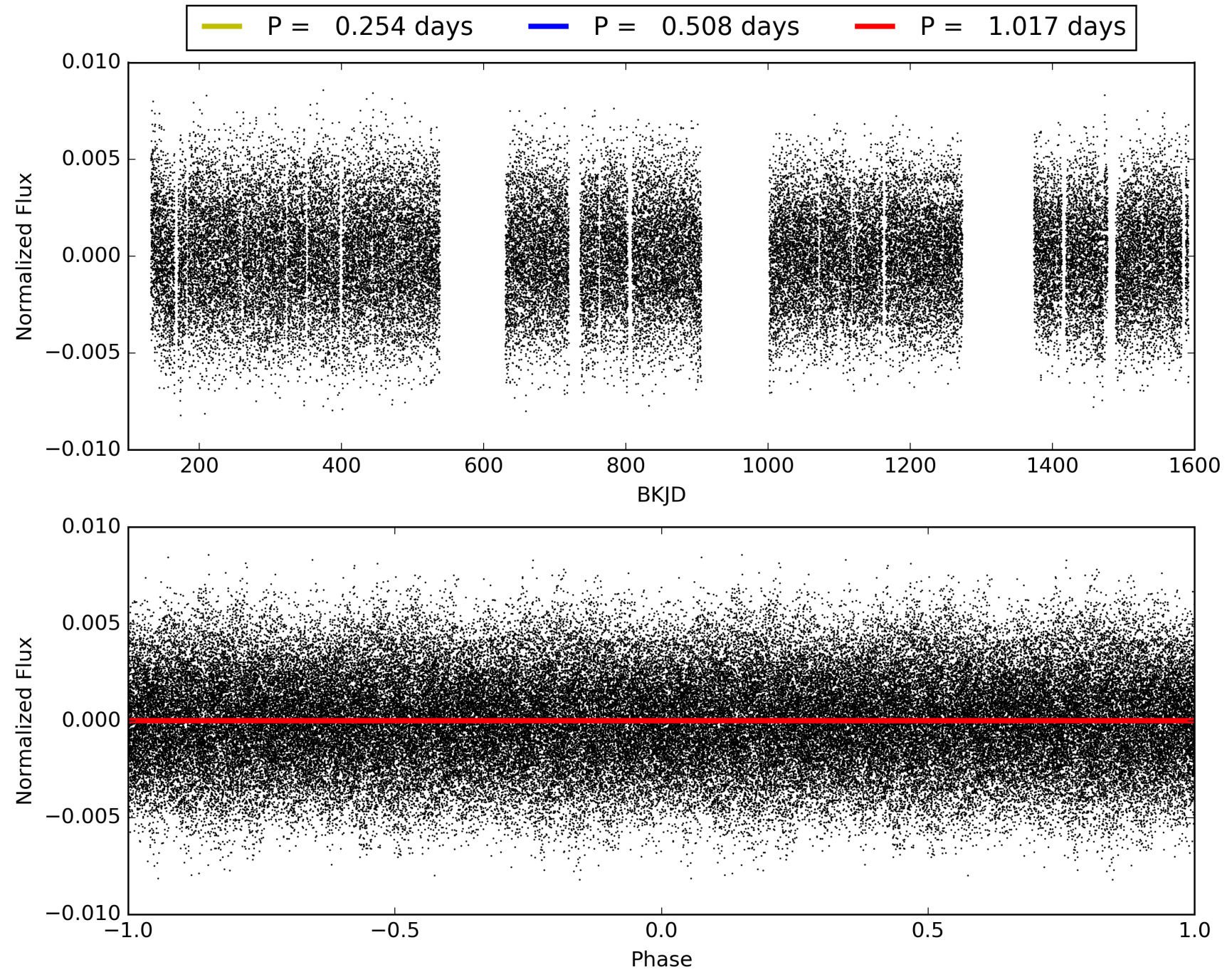
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004847371-01, PDC Light Curves



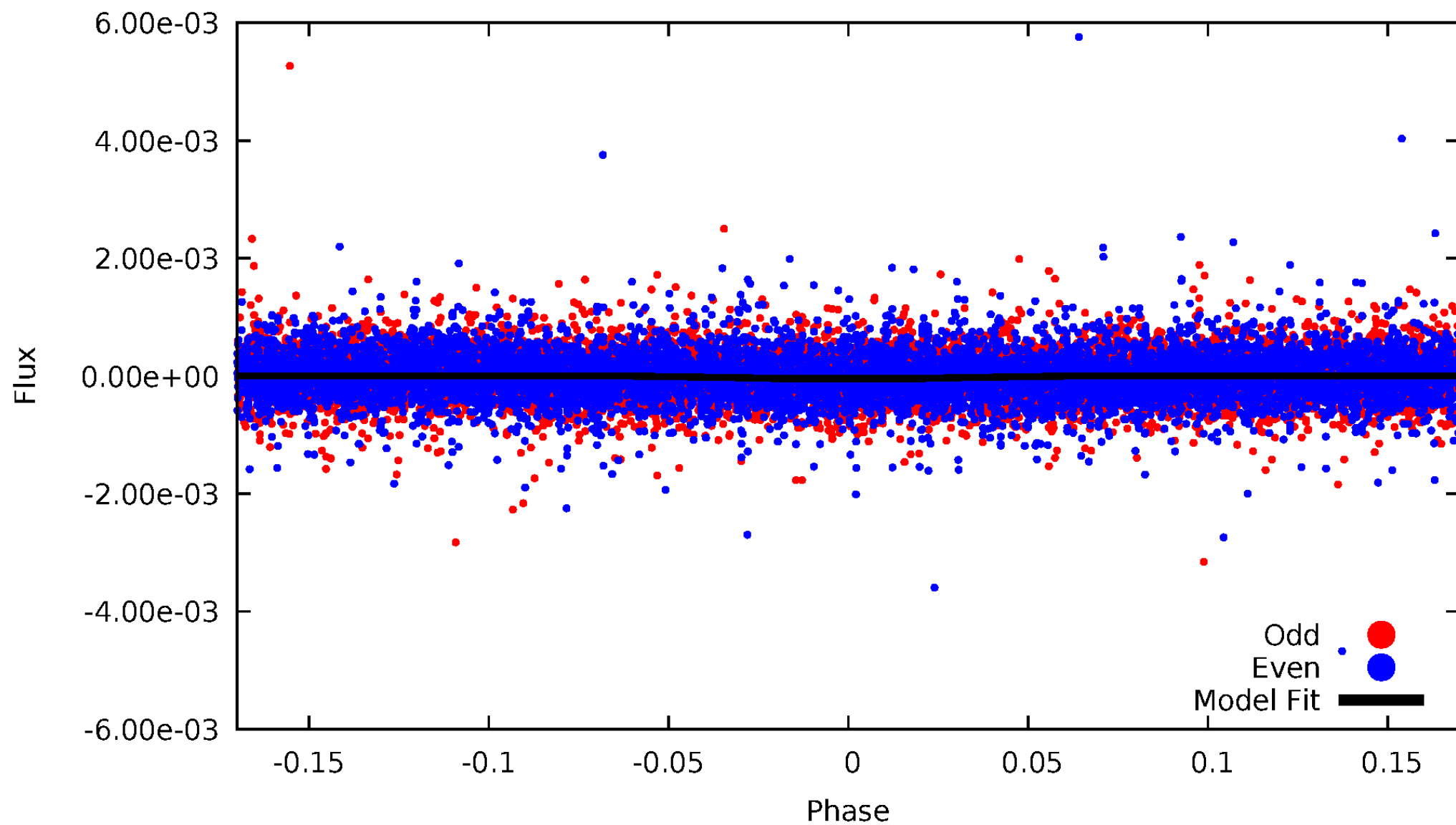


TCE 004847371-01



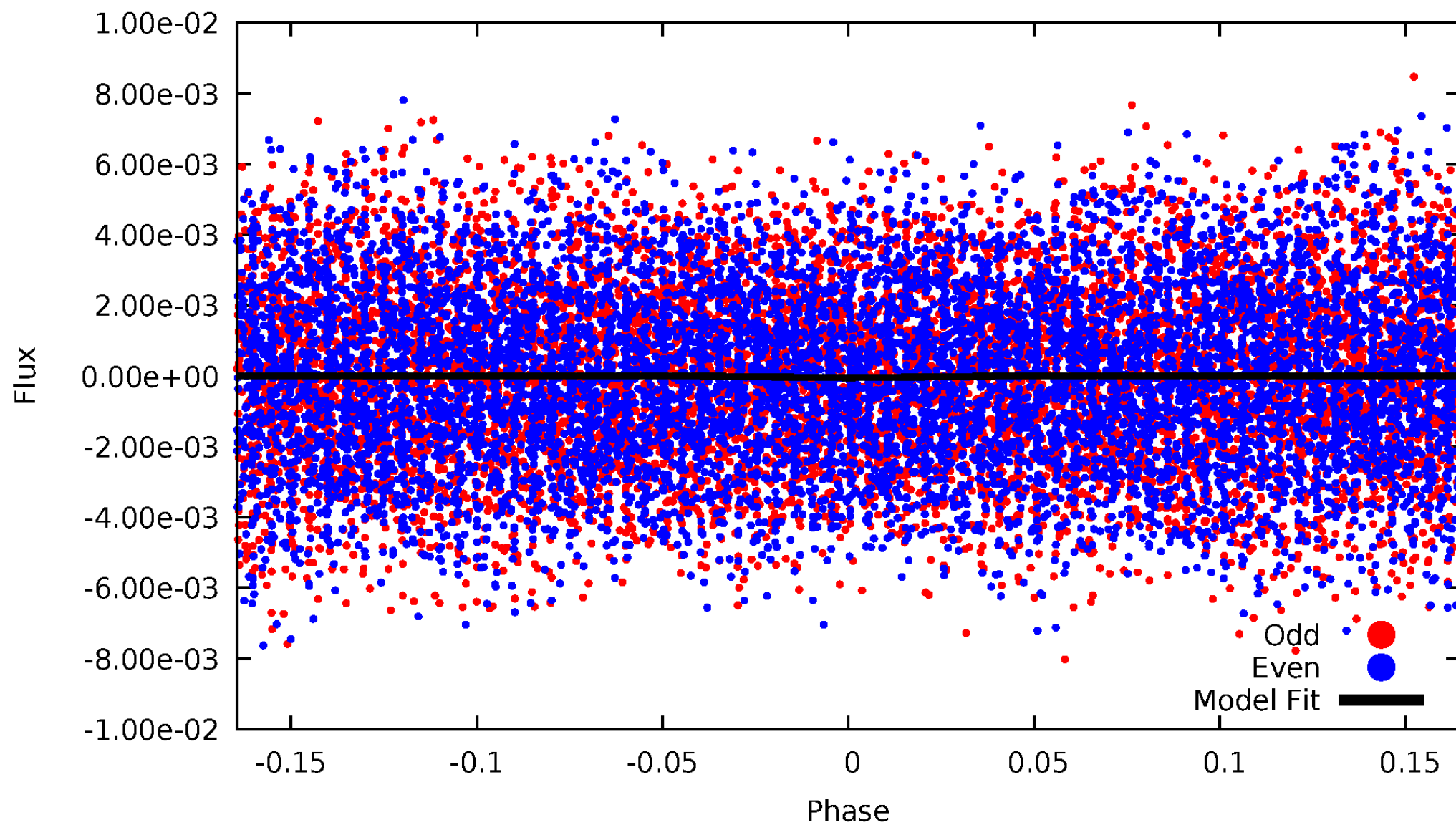
# DV Odd/Even

TCE 004847371-01



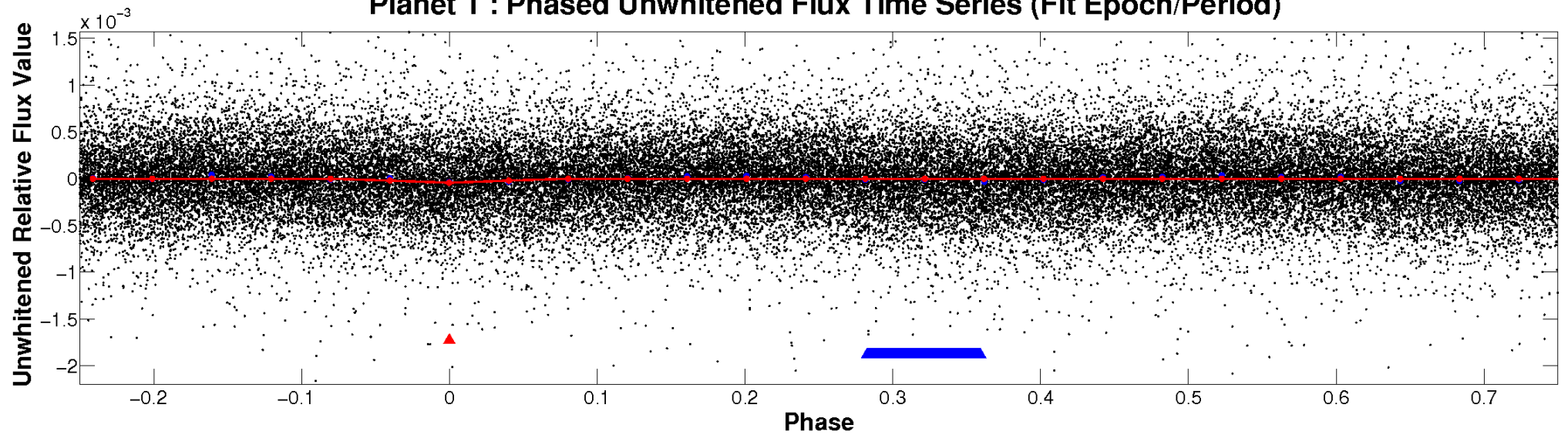
# ALT Odd/Even

TCE 004847371-01

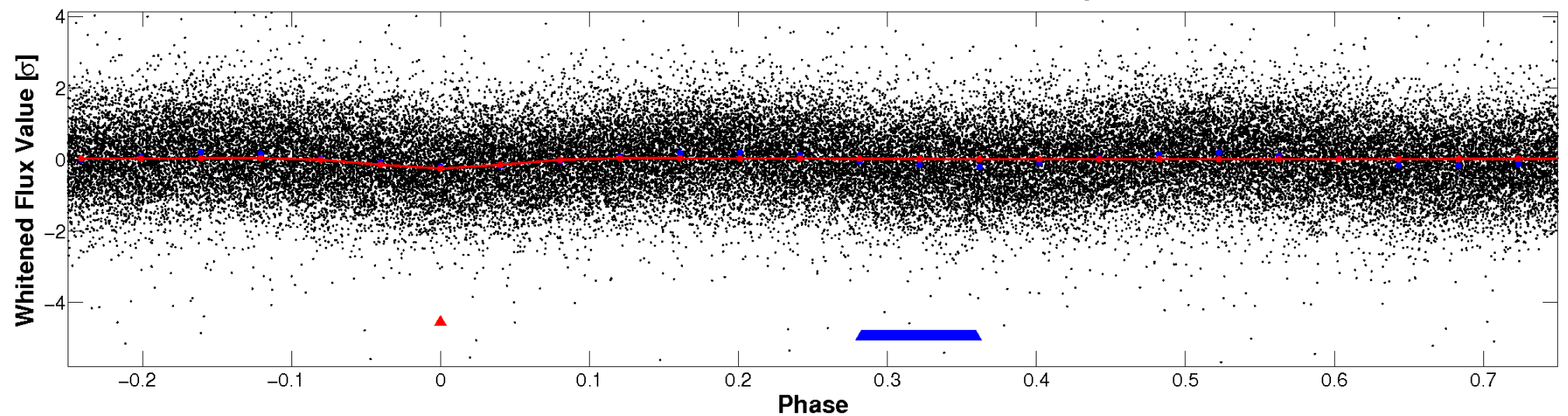


# Non-Whitened Vs. Whitened Light Curve

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



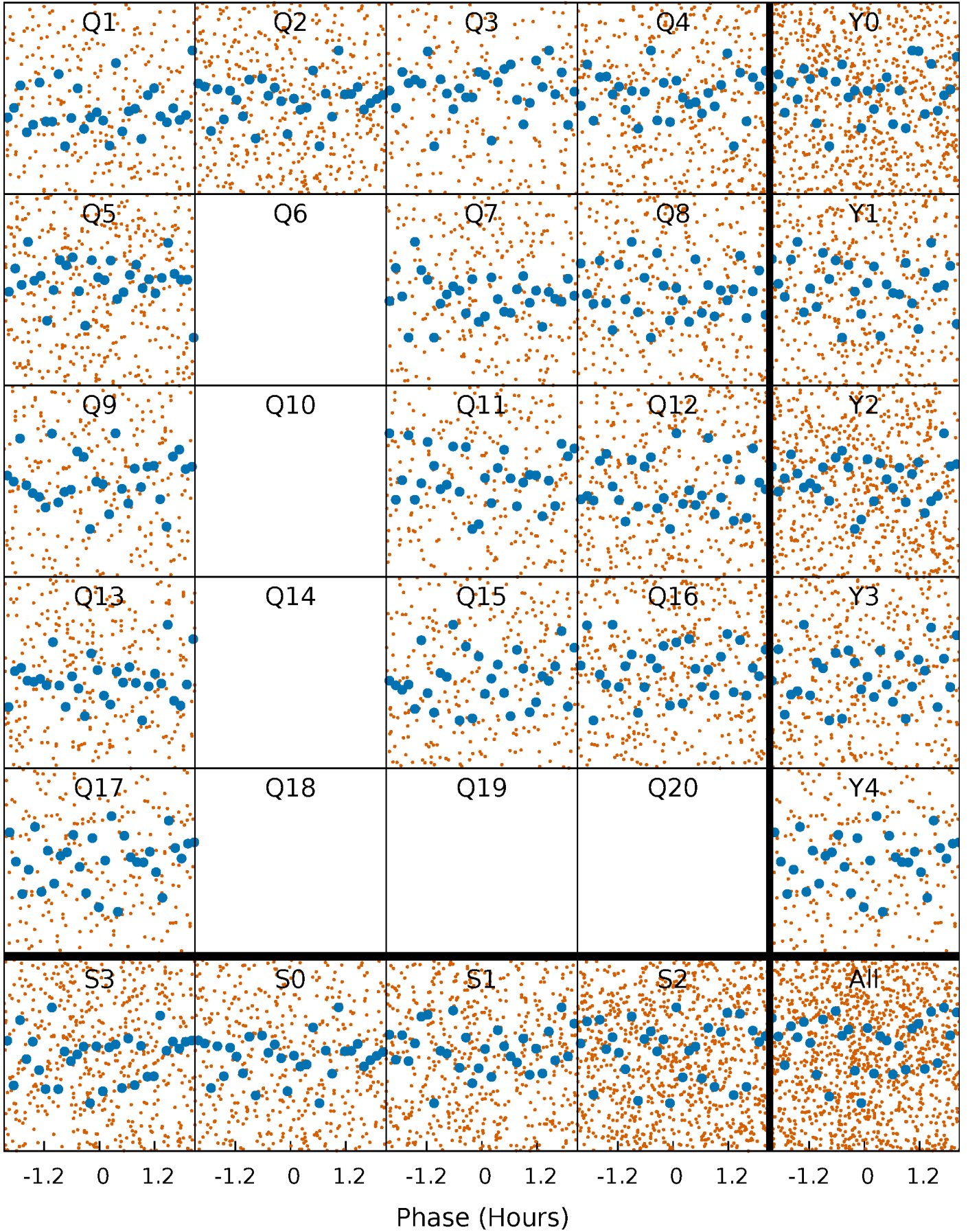
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

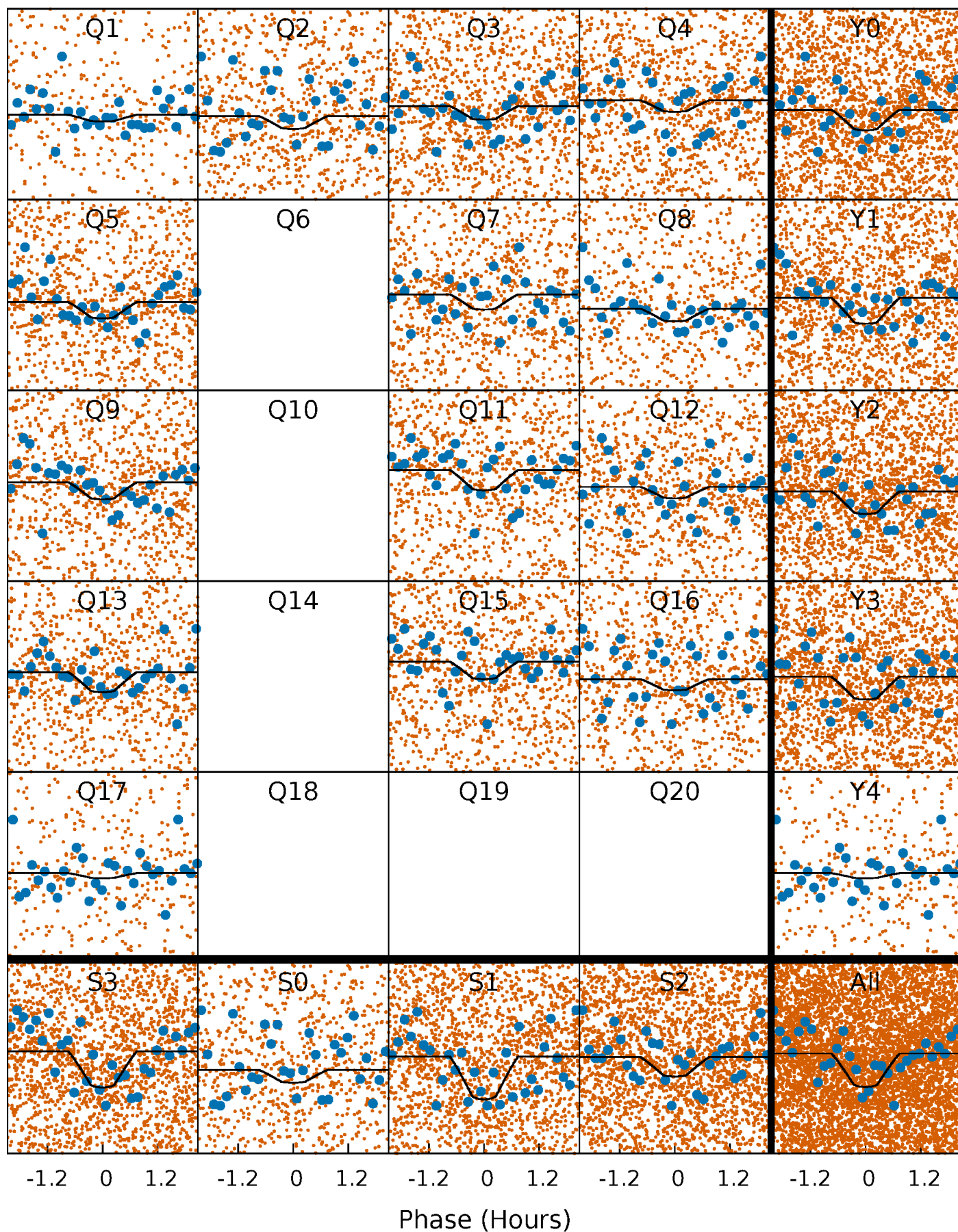
TCE 004847371-01   P= 0.508309 Days    $T_0=131.942855$  (BKJD)





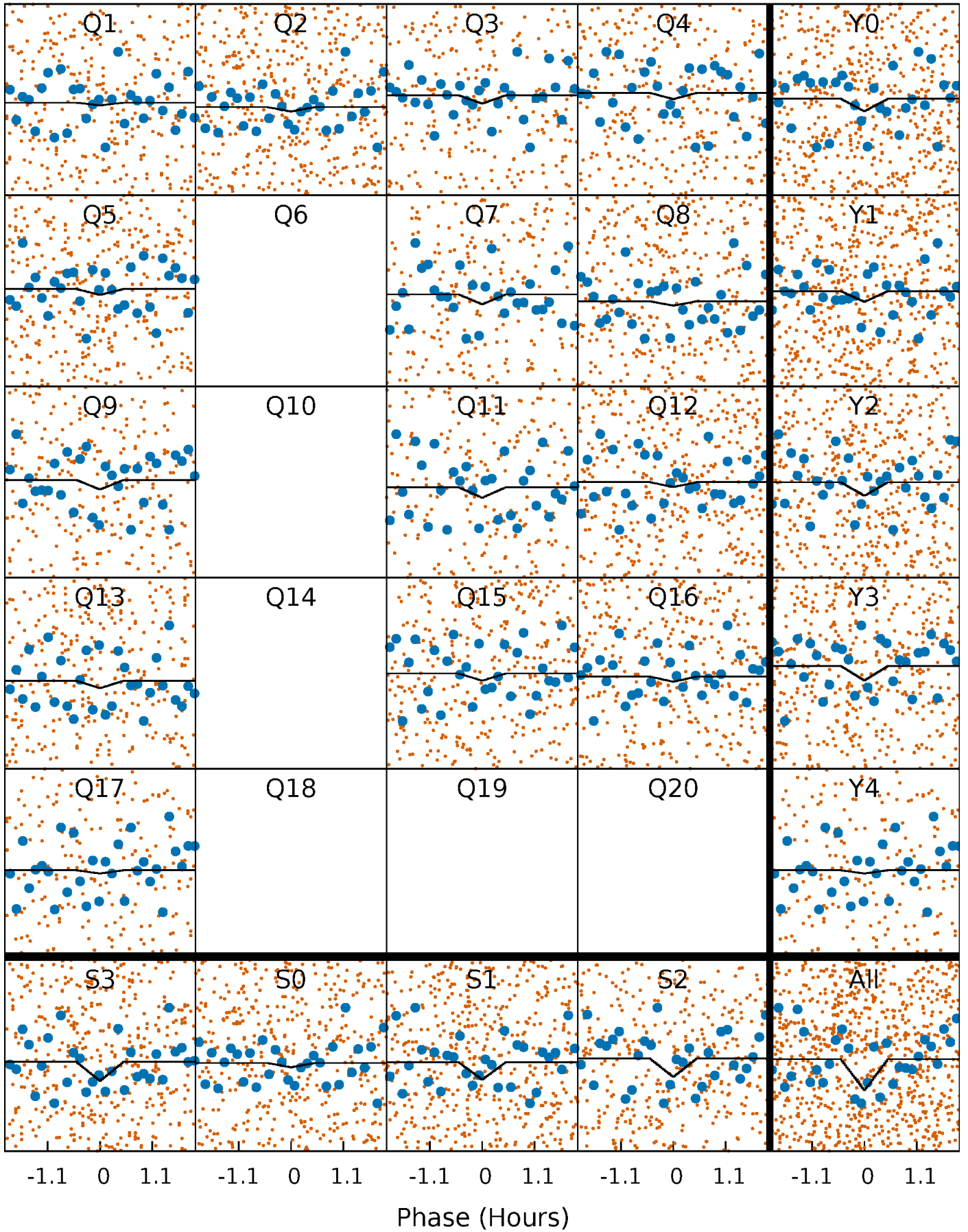
# DV Quarter-Phased Transit Curves

TCE 004847371-01   P= 0.508309 Days    $T_0=131.942855$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

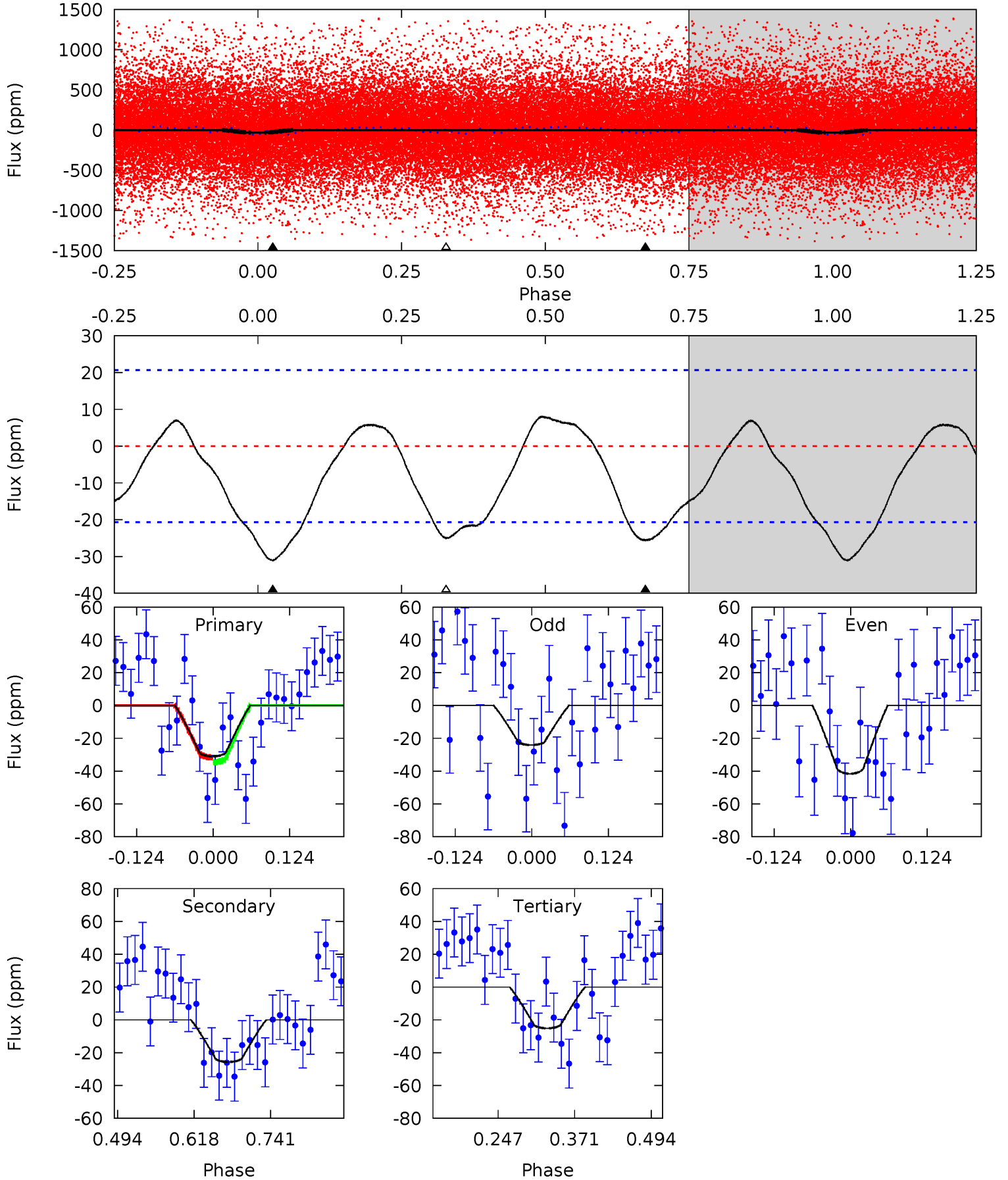
TCE 004847371-01 P= 0.508310 Days  $T_0=131.941183$  (BKJD)



# DV Model-Shift Uniqueness Test

004847371-01, P = 0.508309 Days, E = 131.434546 Days

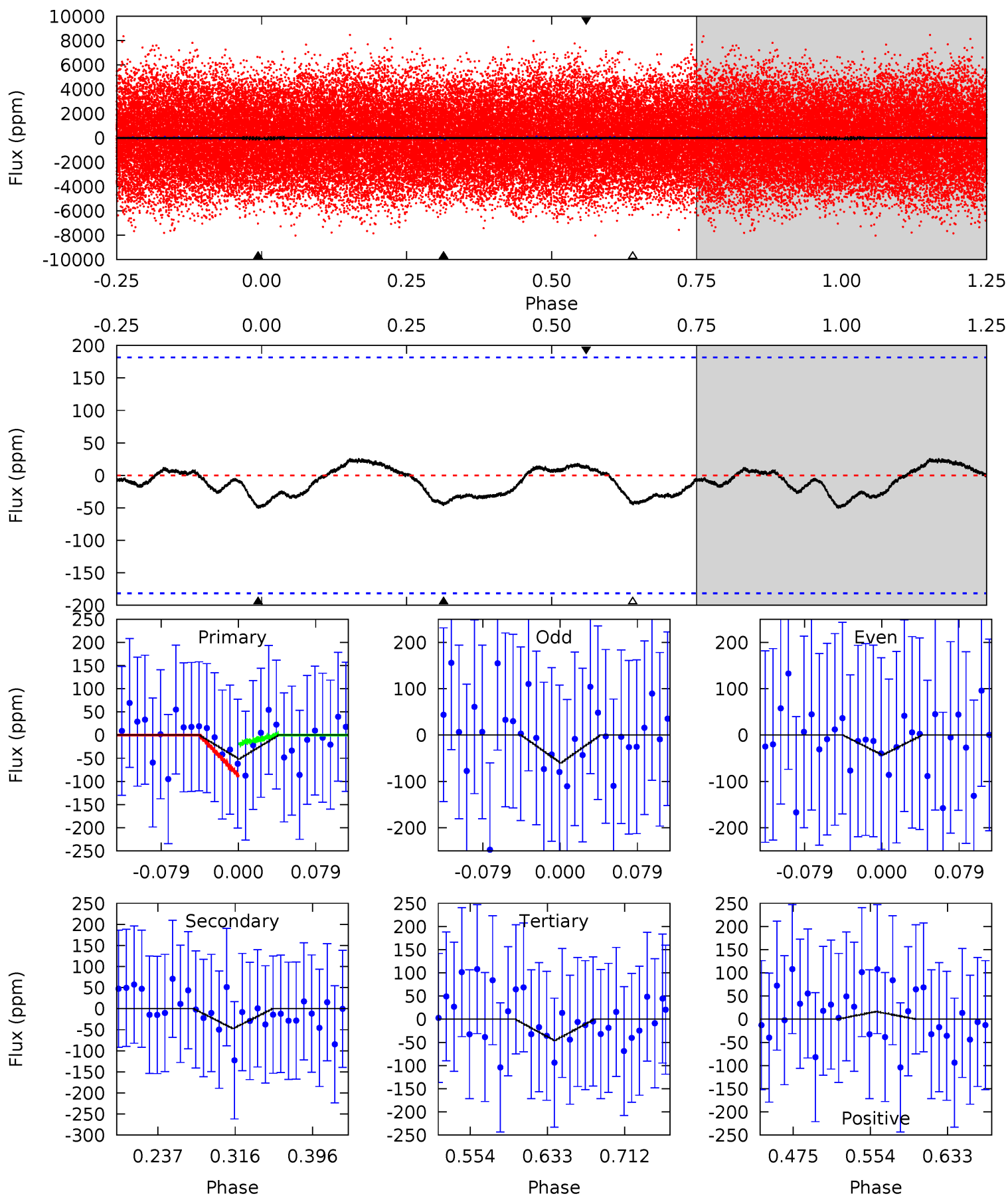
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.80	5.61	5.50	0	4.52	1.54	2.43	1.30	6.80	0.11	5.61	1.92	0.79	0.21	0.33



# Alt Model-Shift Uniqueness Test

004847371-01, P = 0.508310 Days, E = 131.432873 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
1.30	1.19	1.16	0.41	4.61	1.76	0.46	0.14	0.89	0.03	0.78	0.22	0.57	0.34	0.88





### Stellar Parameters For KIC 004847371

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6817^{+214}_{-262}$	$4.330^{+0.182}_{-0.149}$	$-1.520^{+0.300}_{-0.250}$	$1.050^{+0.197}_{-0.177}$	$0.858^{+0.080}_{-0.055}$	$1.044^{+0.831}_{-0.432}$
	+3%/-4%	+4%/-3%	+20%/-16%	+19%/-17%	+9%/-6%	+80%/-41%
Source	KIC0	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 004847371-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-26 \pm 5$	$0.81^{+0.20}_{-0.16}$	$3949^{+250}_{-257}$	$5589^{+770}_{-575}$	$3.060^{+1.846}_{-1.209}$
Alt.	$-47 \pm 39$	$0.82^{+0.20}_{-0.18}$	$3955^{+241}_{-261}$	$6515^{+1611}_{-2494}$	$5.200^{+6.364}_{-4.387}$

$T_{\text{max}}$  = 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

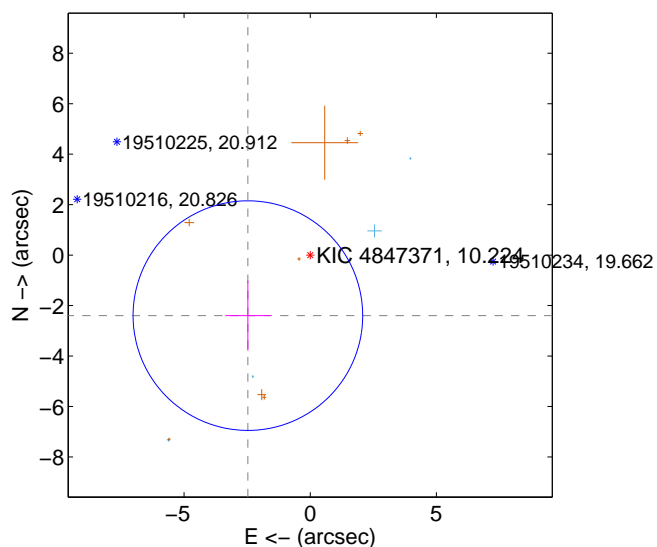
Supplemental centroid analysis for 004847371-01. **Kepler magnitude: 10.22.** Transit SNR 15.59

There are 4 quarters with good PRF difference image offsets

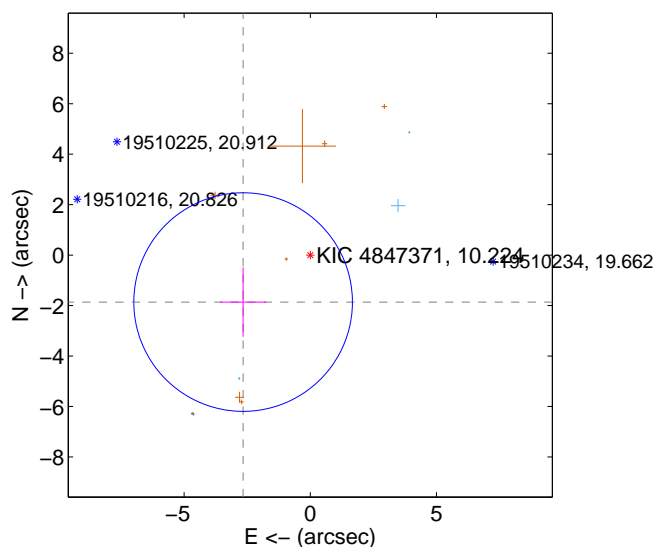
The direct PRF centroid is offset from the target star catalog position by about 1.37 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.443 \pm 1.517$	2.27	$2.471 \pm 0.897$	$-2.399 \pm 1.388$
PRF-fit source offset from KIC position	$3.249 \pm 1.444$	2.25	$2.662 \pm 0.912$	$-1.862 \pm 1.376$
photometric centroid source offset	$1.17 \pm 0.34$	<b>3.46</b>	$0.15 \pm 0.25$	$1.16 \pm 0.34$

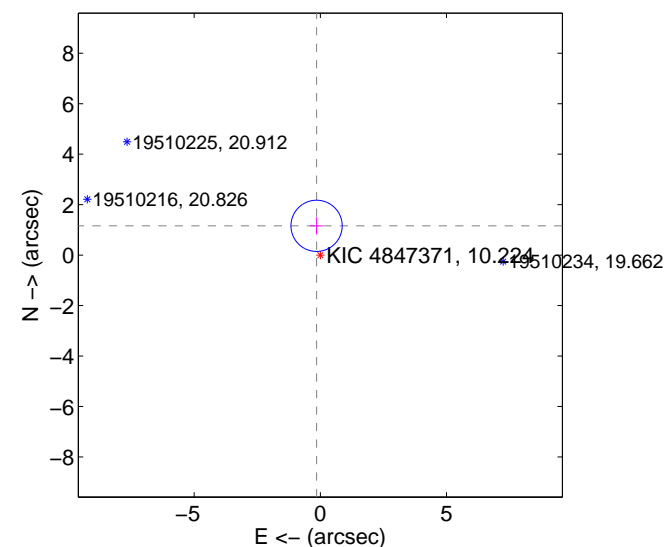
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

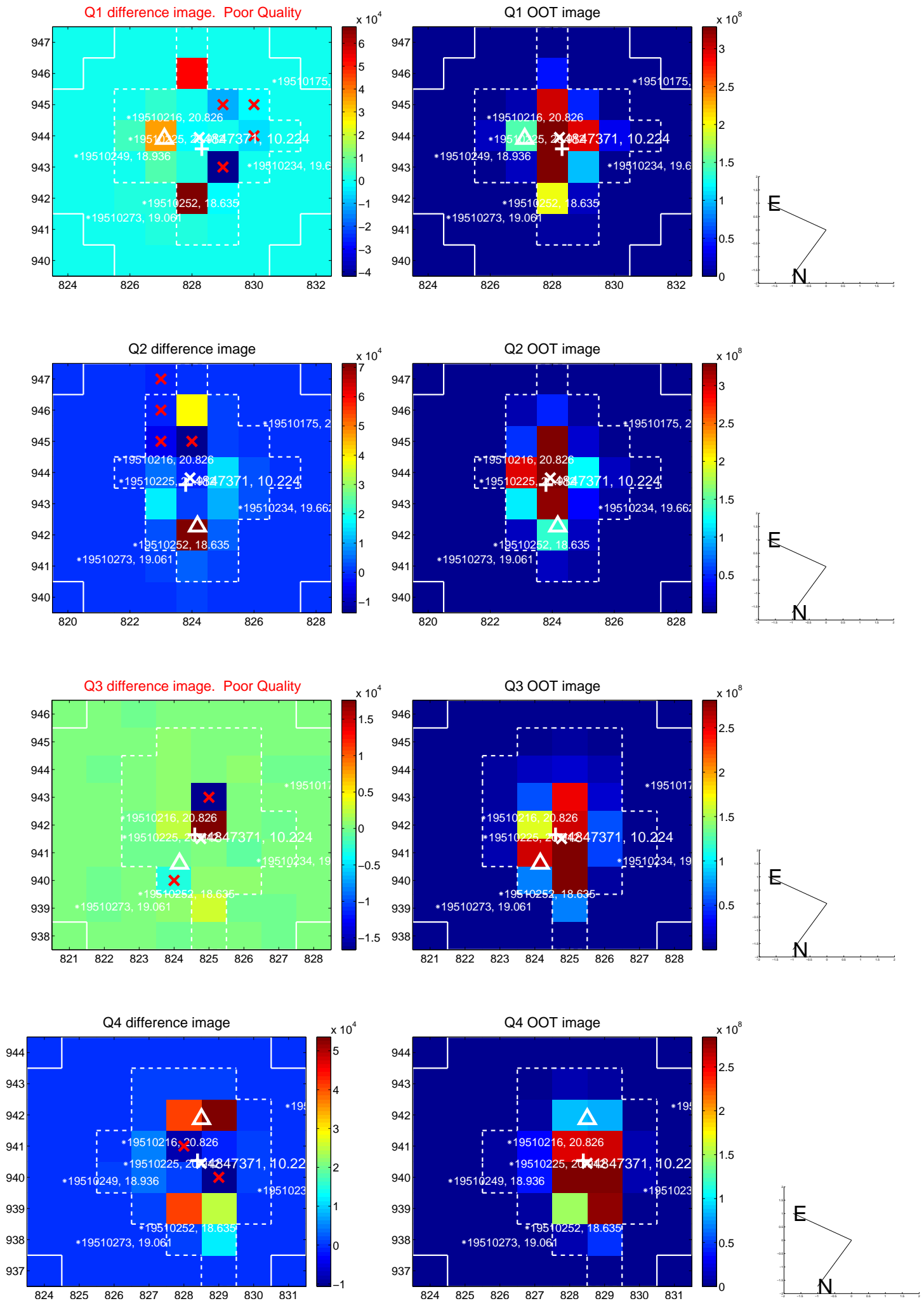


offset from photometric centroids

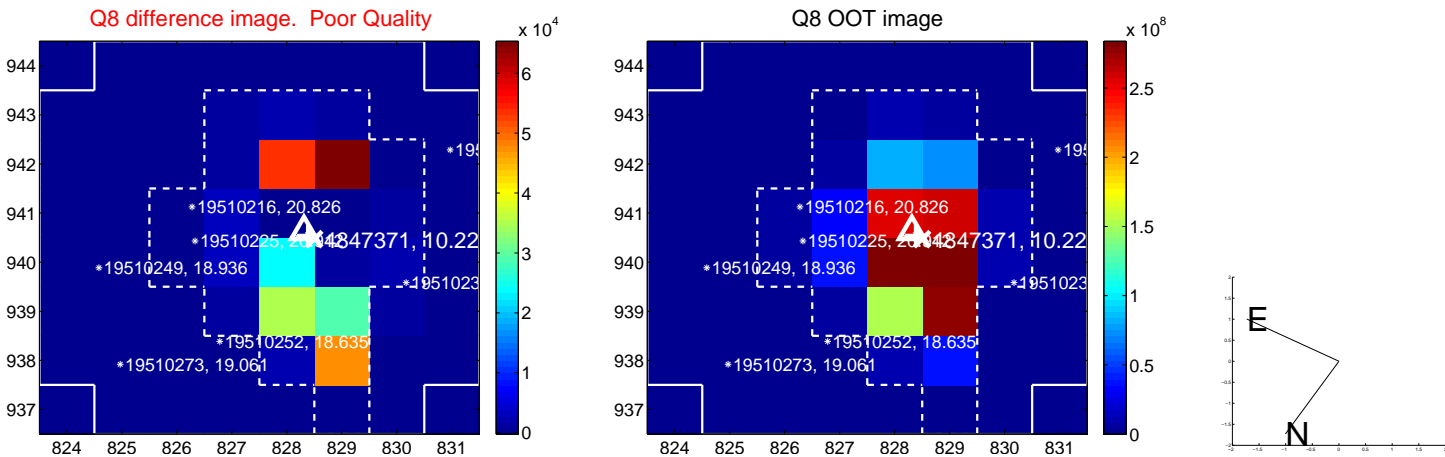
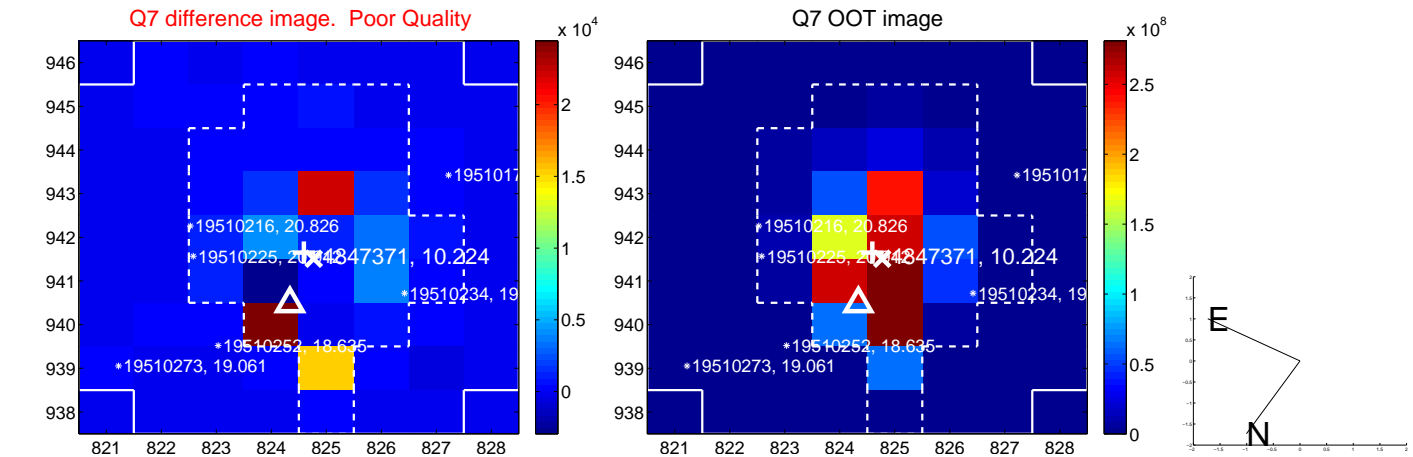
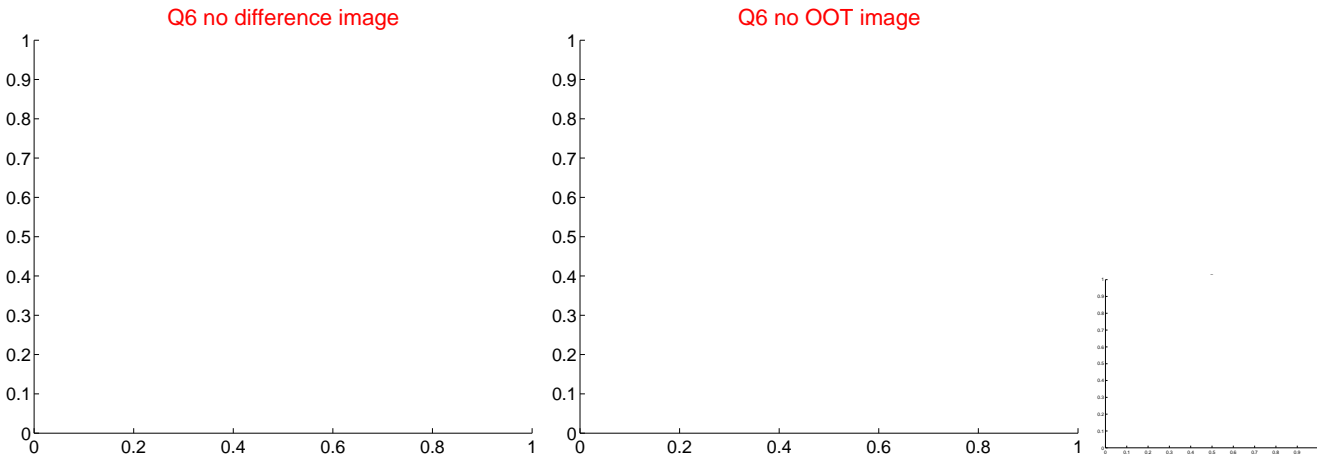
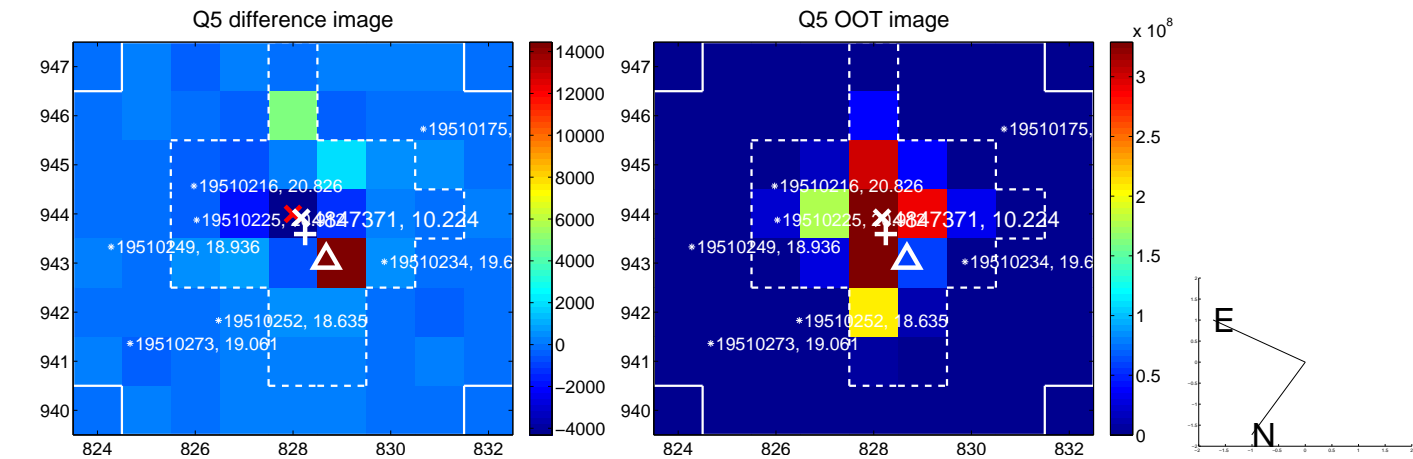


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

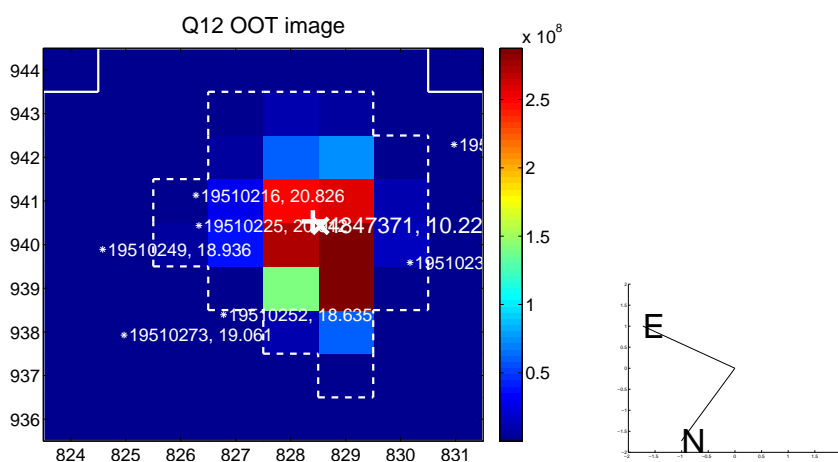
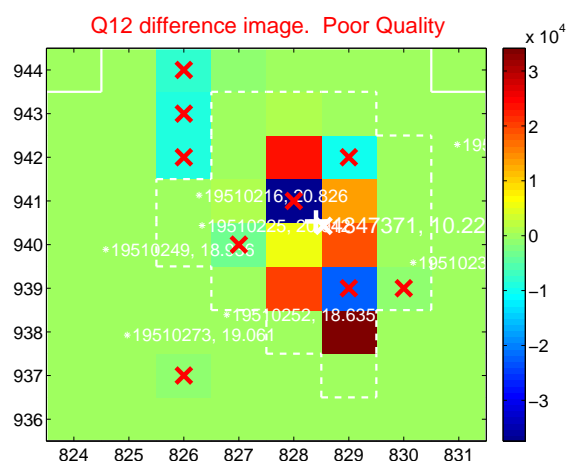
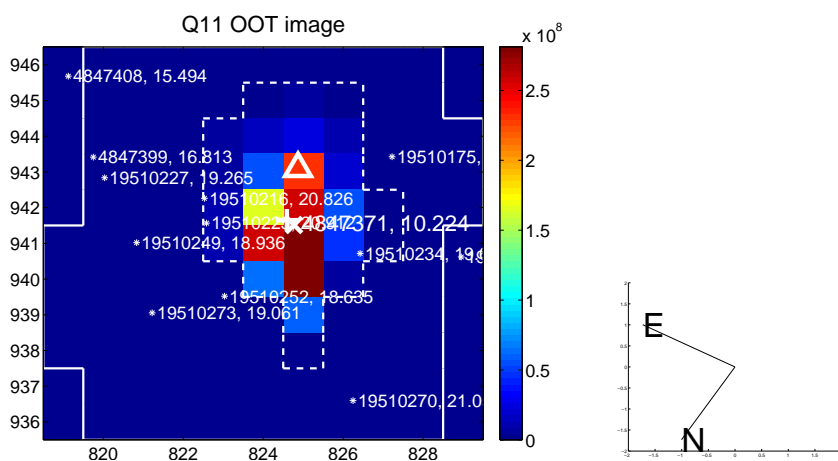
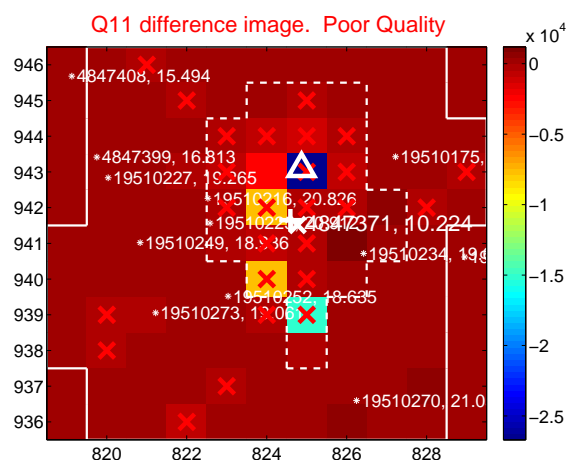
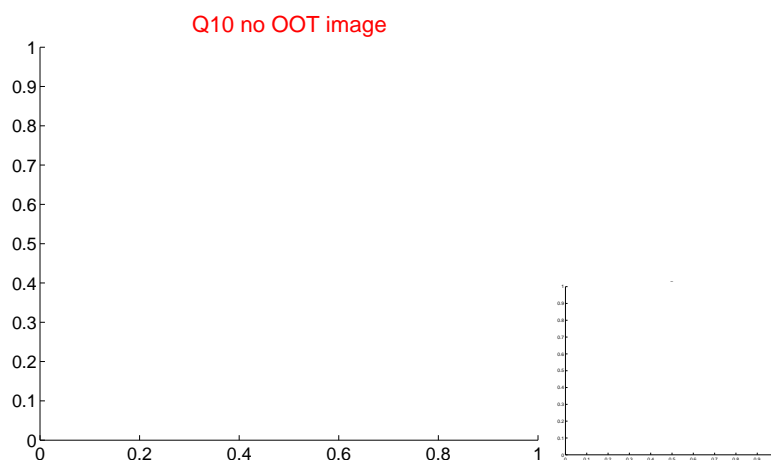
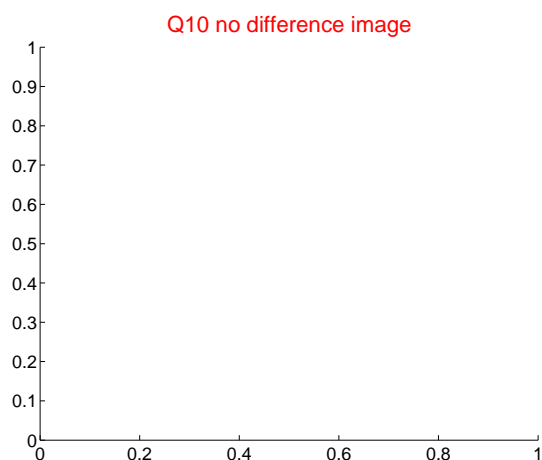
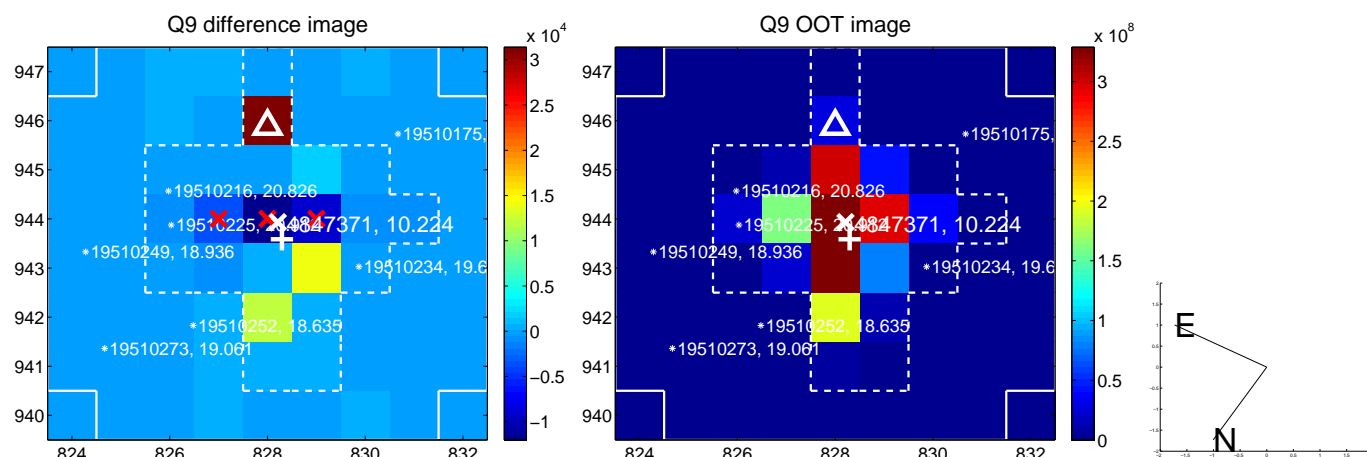


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

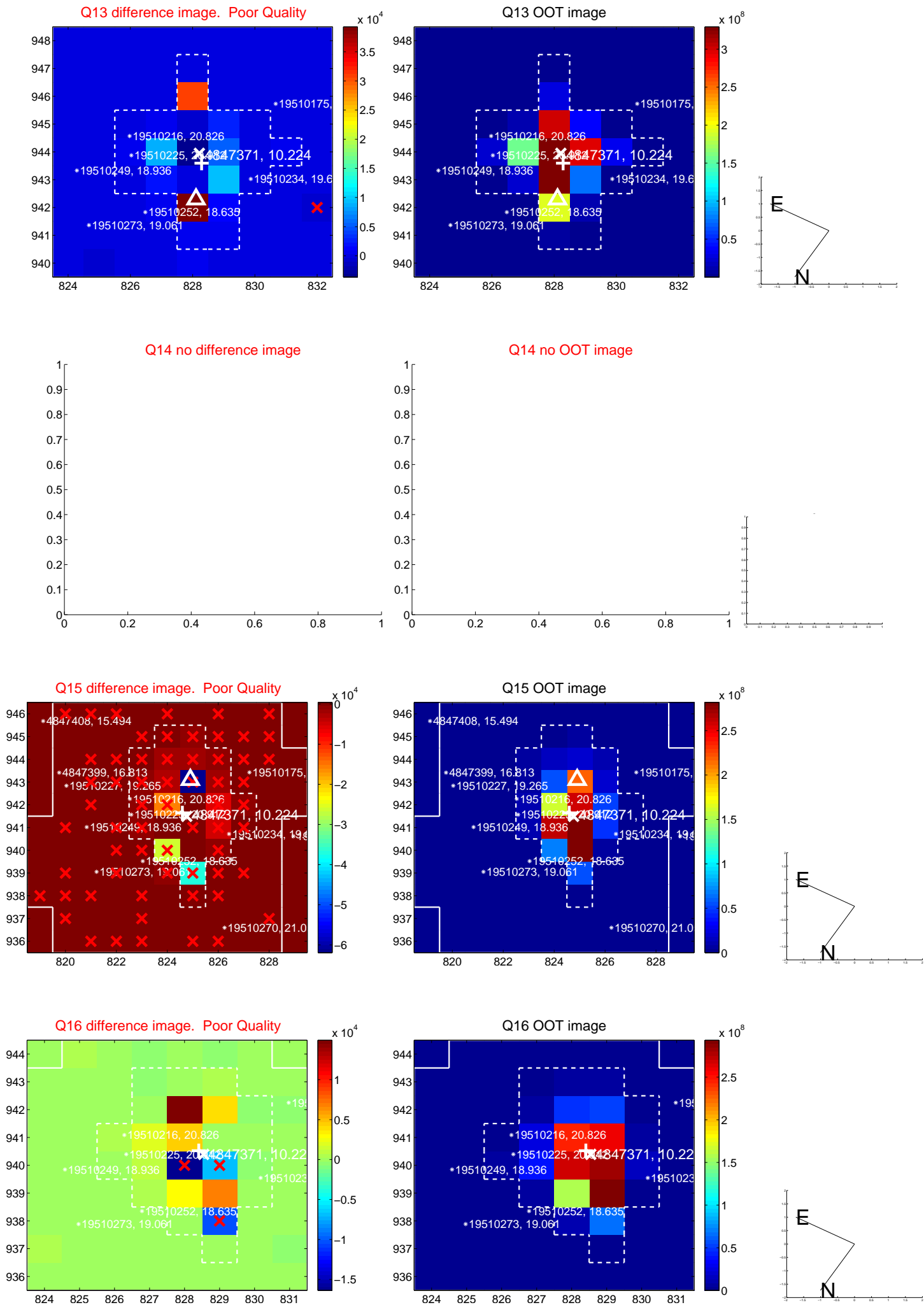




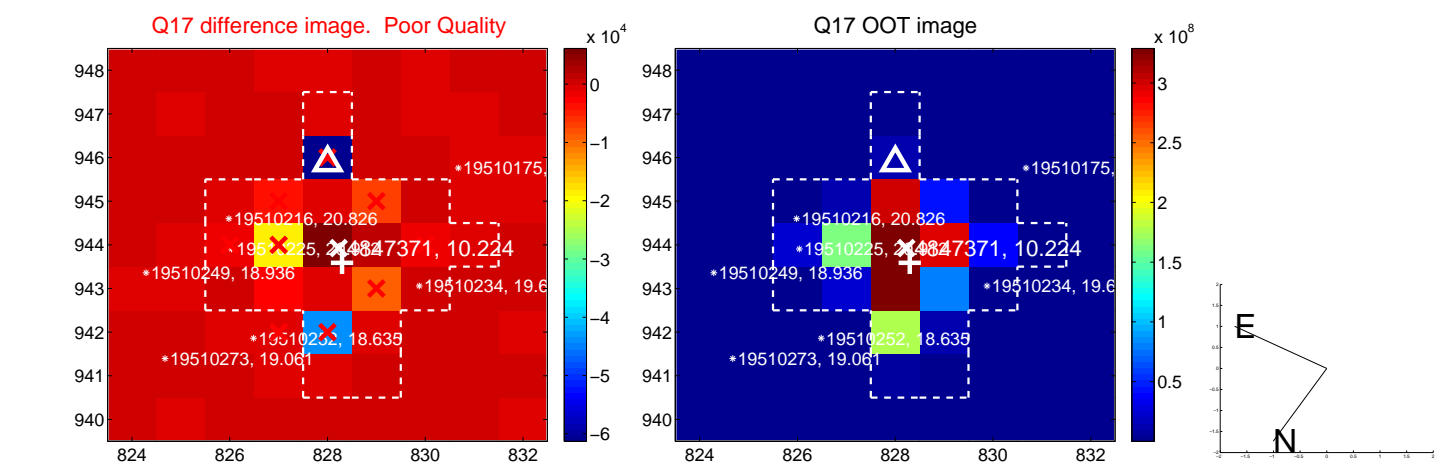
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



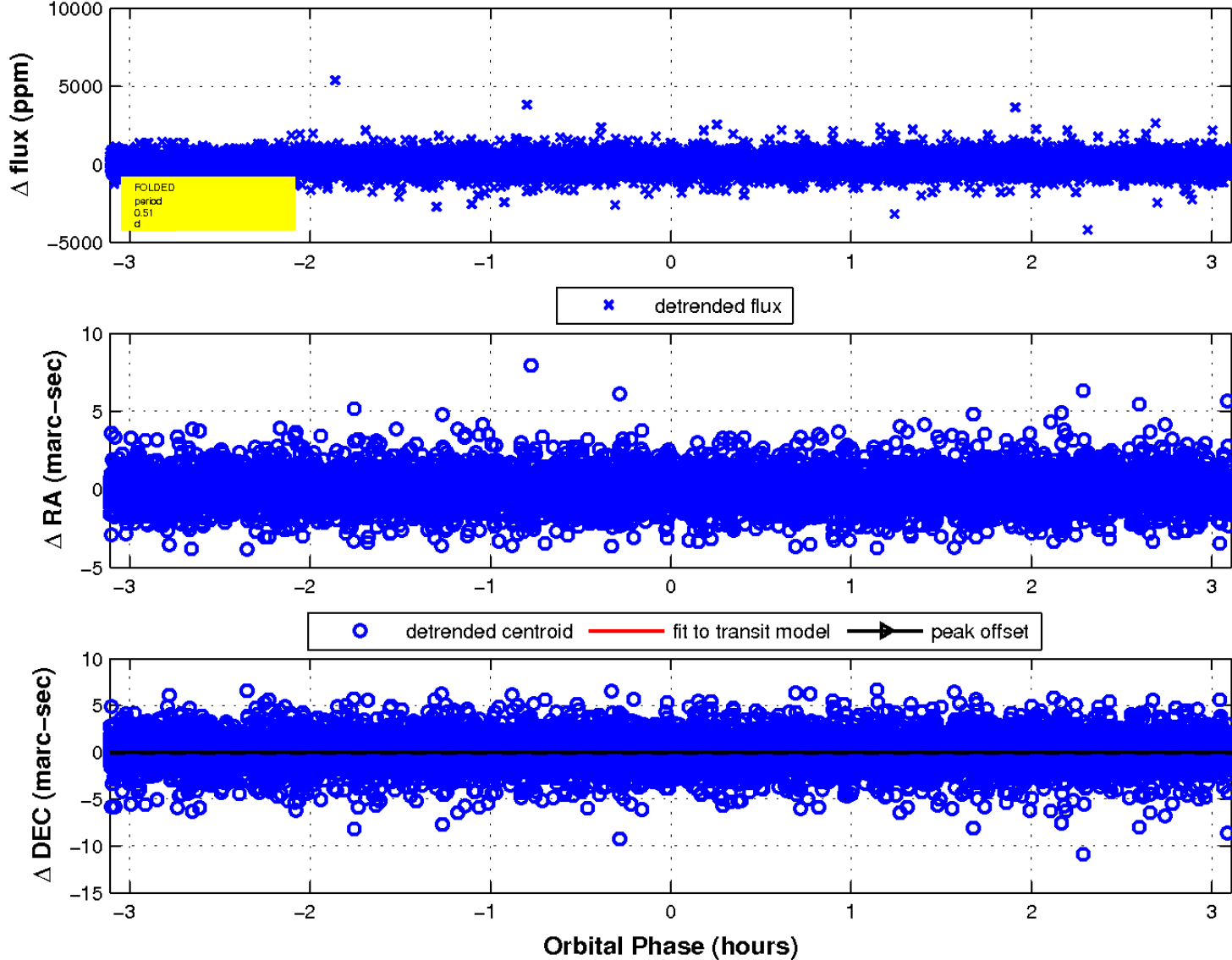
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



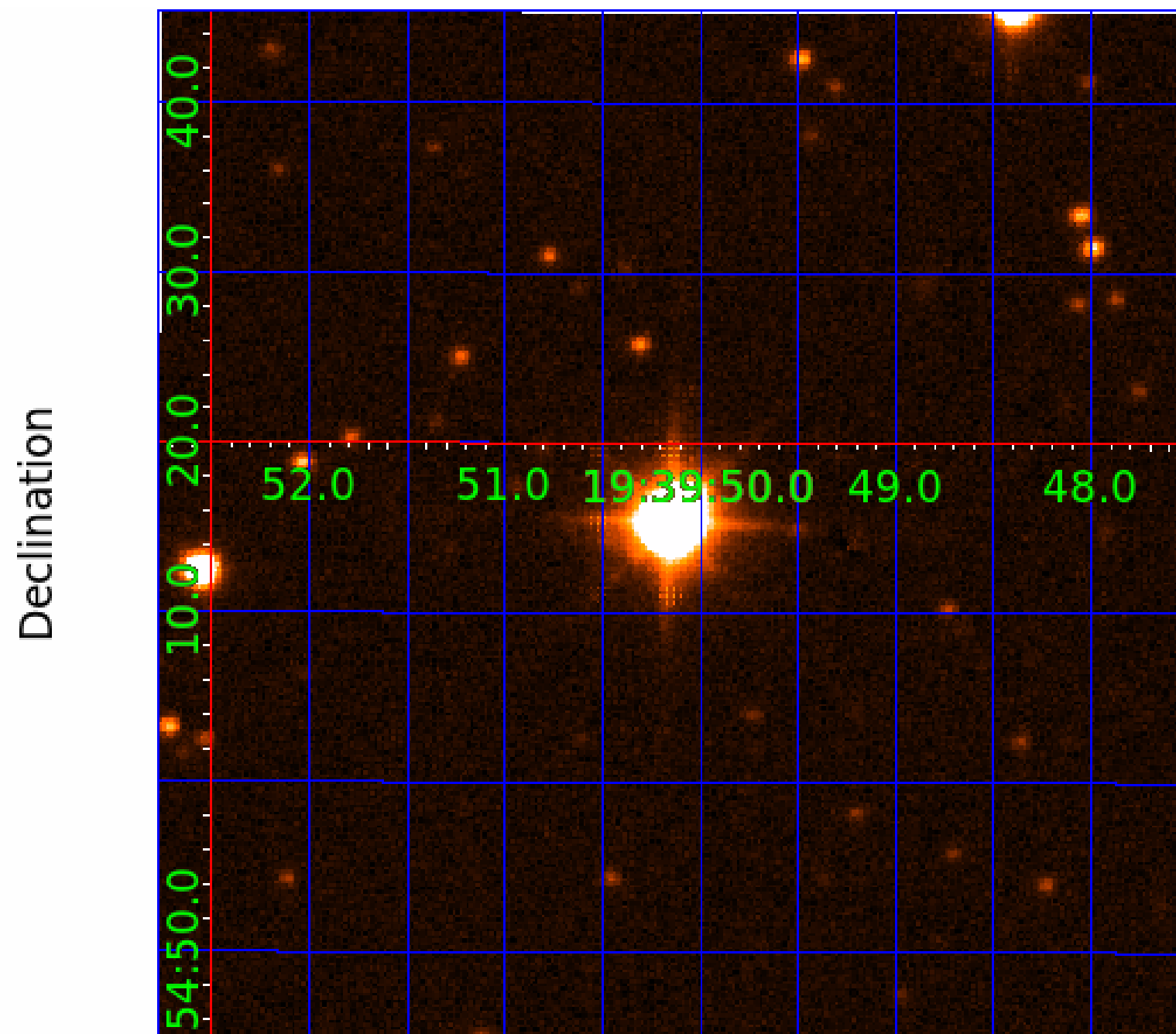
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 2



UKIRT Image





# KIC 004847371

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004847371-01	OBS	No	0.508309	131.942855	44.3	1.037	14.3	15.6	1.05	6817	0.82	15178.32
004847371-02	OBS	No	0.508295	131.617169	14.1	2.510	8.4	6.0	1.05	6817	0.40	15178.86

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004847371-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_SATURATED
004847371-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—SAME_NTL_PERIOD—CENT_SATURATED

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

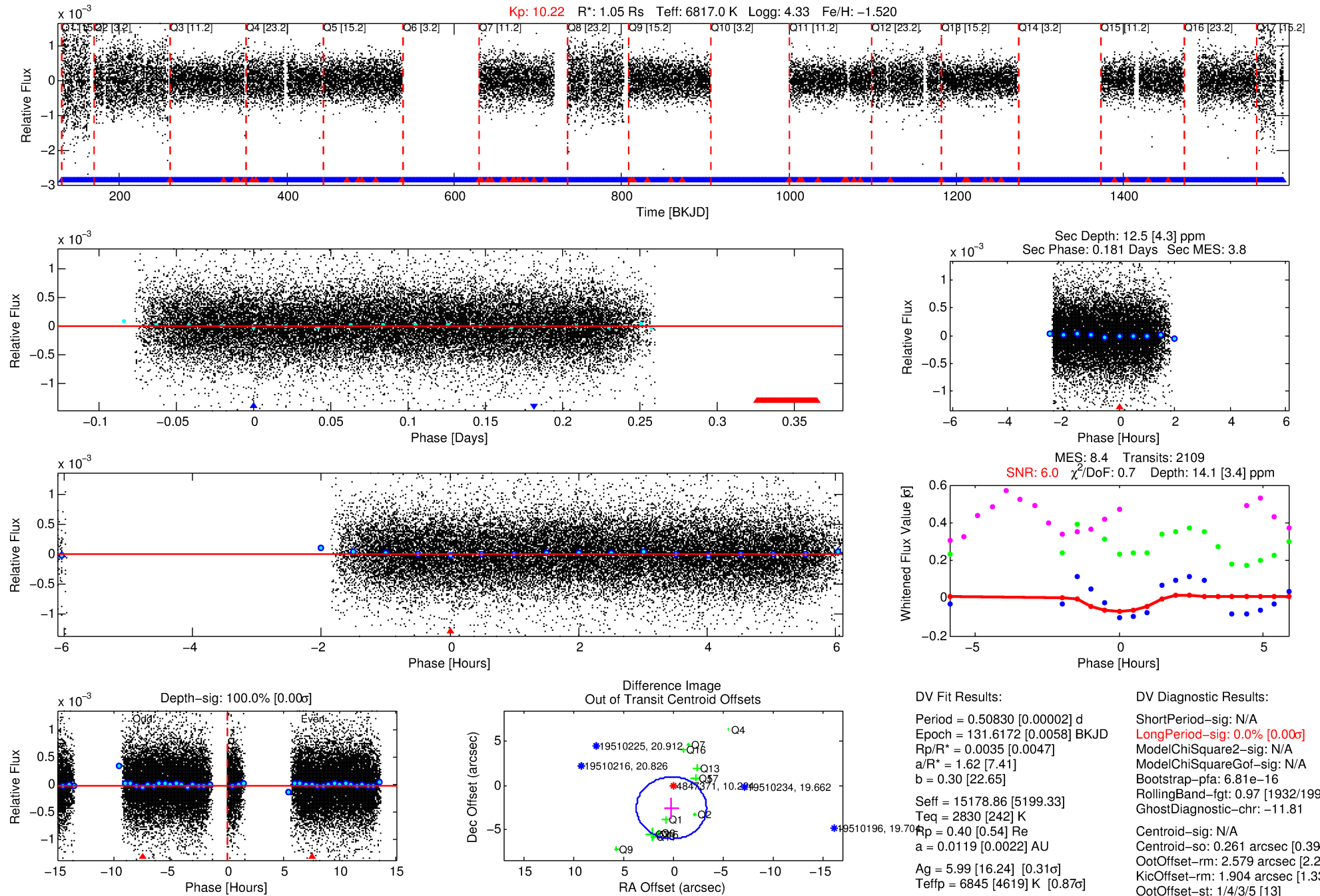
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004847371-02

No Significant Match Found

# DV One-Page Summary

KIC: 4847371 Candidate: 2 of 2 Period: 0.508 d



## DV Fit Results:

Period = 0.50830 [0.00002] d  
Epoch = 131.6172 [0.0058] BKJD  
Rp/R\* = 0.0035 [0.0047]  
a/R\* = 1.62 [7.41]  
b = 0.30 [22.65]  
Seff = 15178.86 [5199.33]  
Teq = 2830 [242] K  
Rp = 0.40 [0.54] Re  
a = 0.0119 [0.0022] AU  
Ag = 5.99 [16.24] [0.31σ]  
Teffp = 6845 [4619] K [0.87σ]

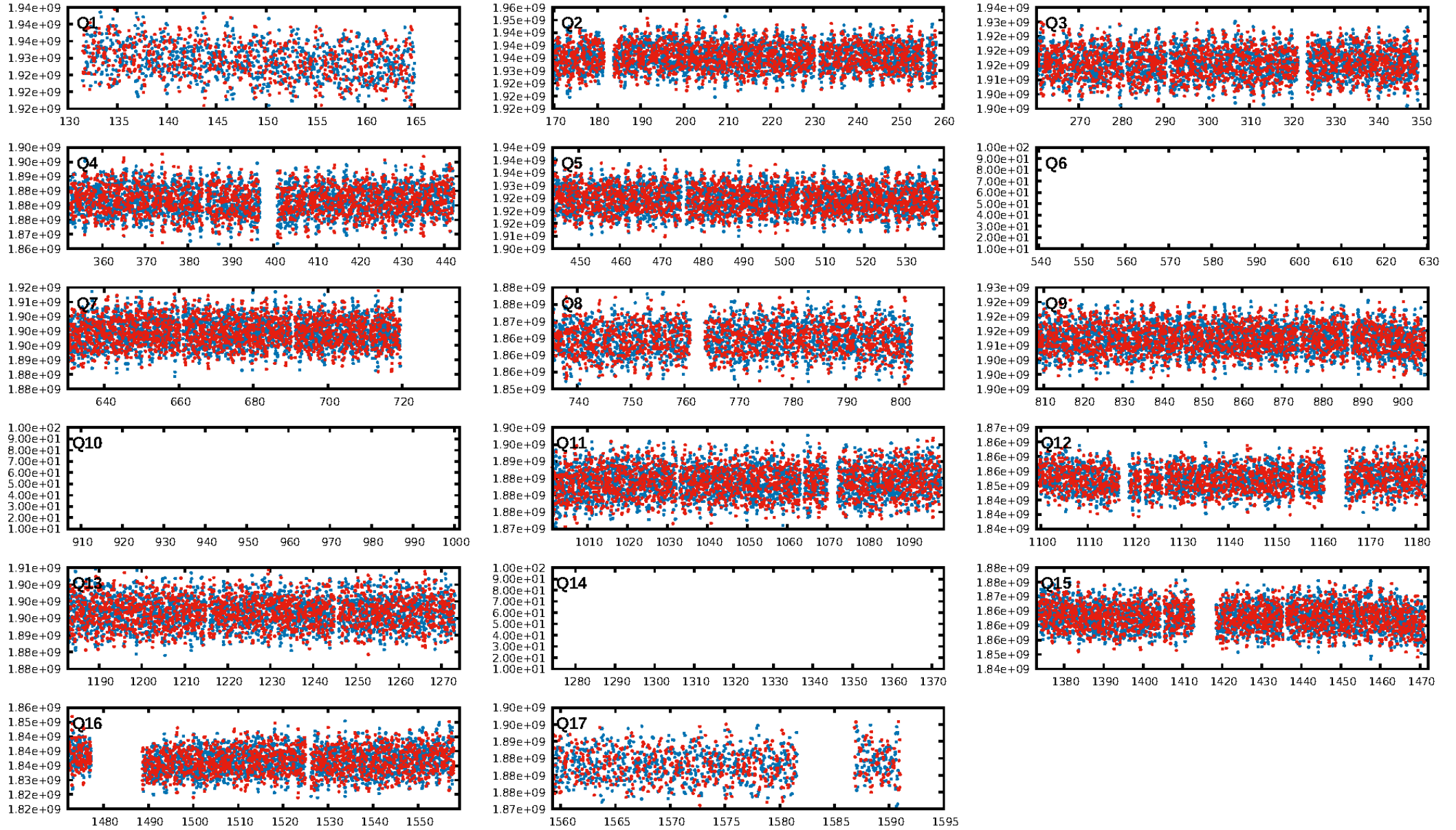
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 6.81e-16  
RollingBand-fgt: 0.97 [1932/1990]  
GhostDiagnostic-chr: -11.81  
Centroid-sig: N/A  
Centroid-so: 0.261 arcsec [0.39σ]  
OotOffset-rm: 2.579 arcsec [2.20σ]  
KicOffset-rm: 1.904 arcsec [1.33σ]  
OotOffset-st: 1/4/3/5 [13]  
KicOffset-st: 1/4/3/5 [13]  
DiffImageQuality-fgm: 0.15 [2/13]  
DiffImageOverlap-fno: 0.00 [0/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 13:49:11 Z

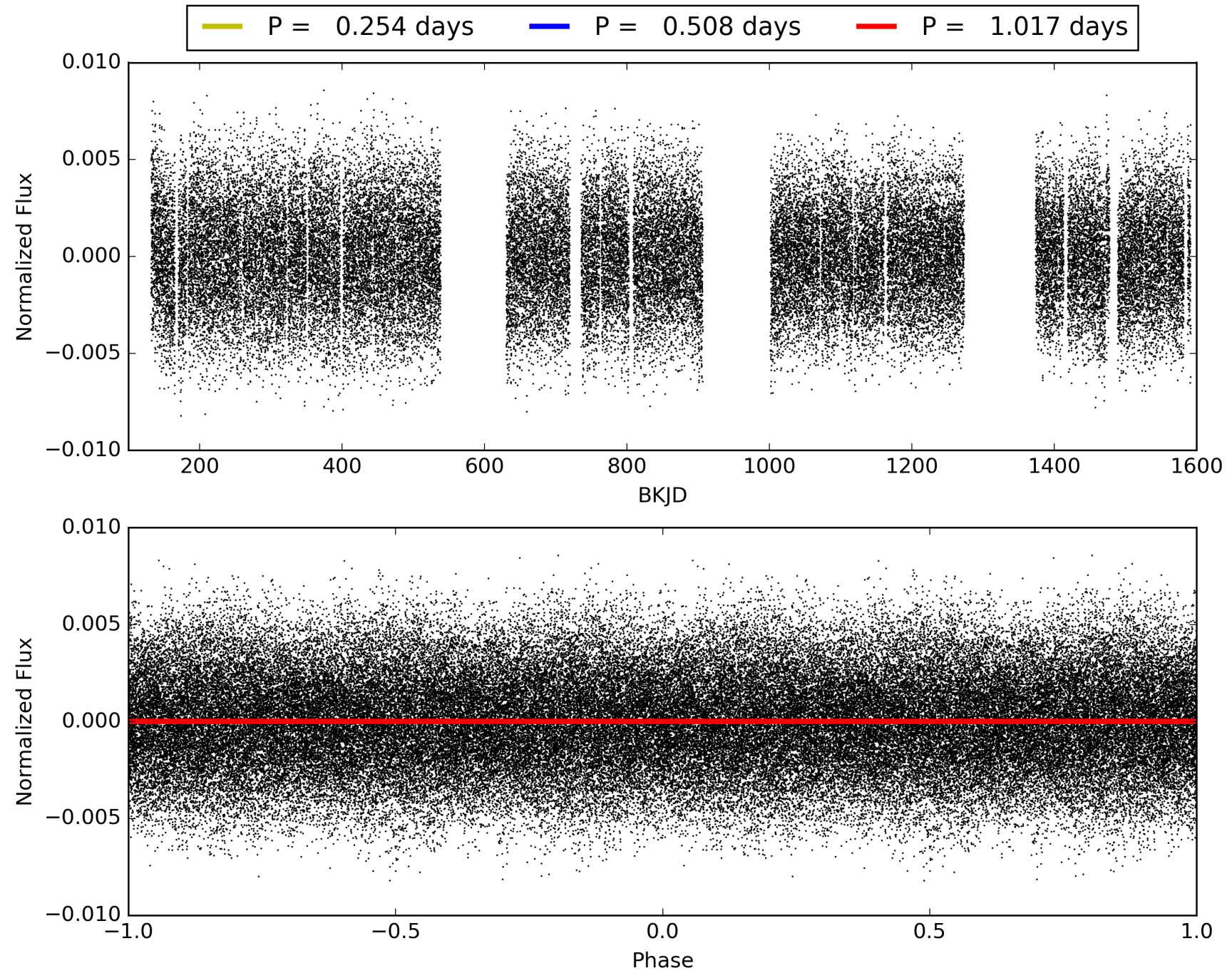
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004847371-02, PDC Light Curves





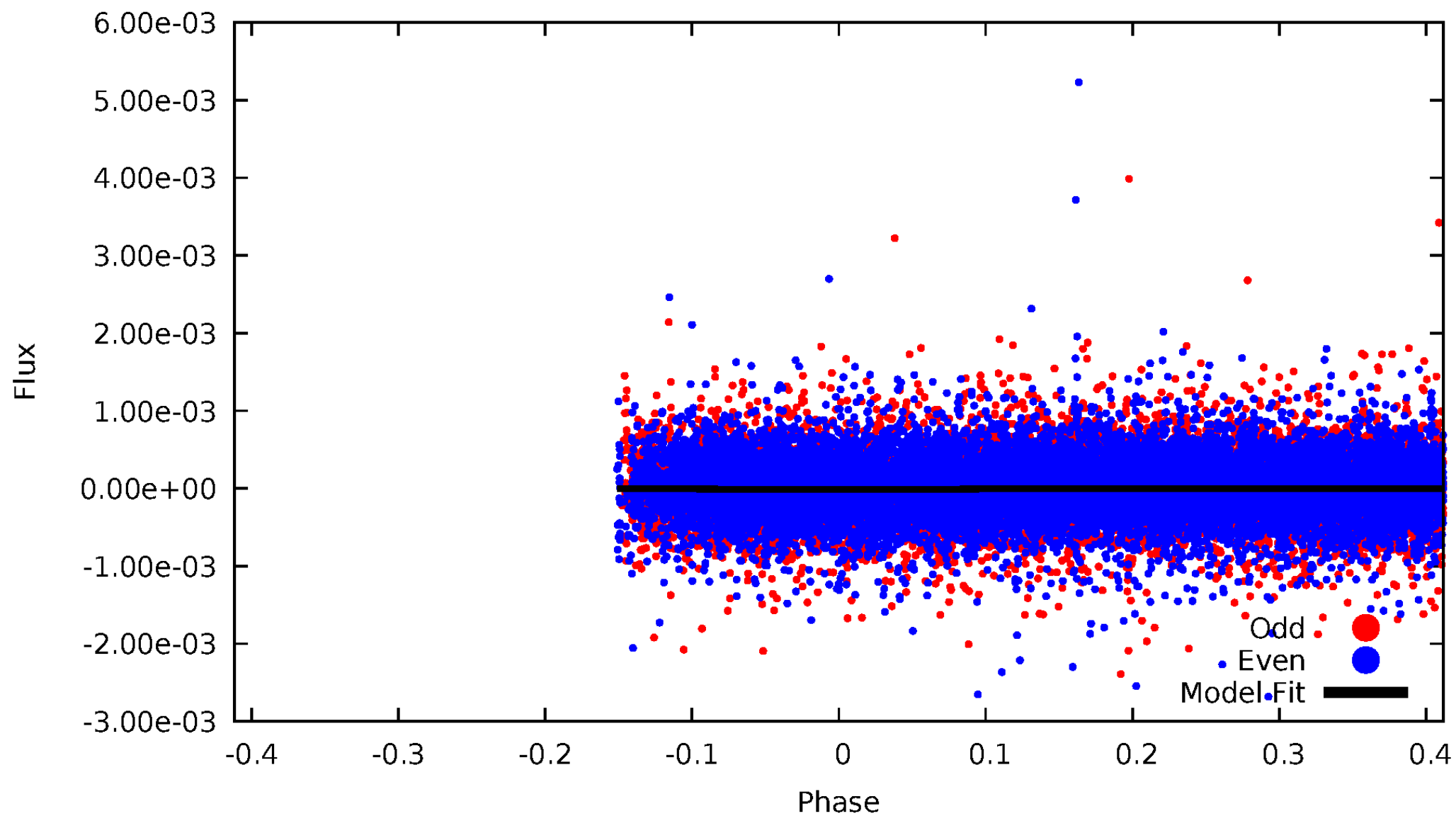
# TCE 004847371-02





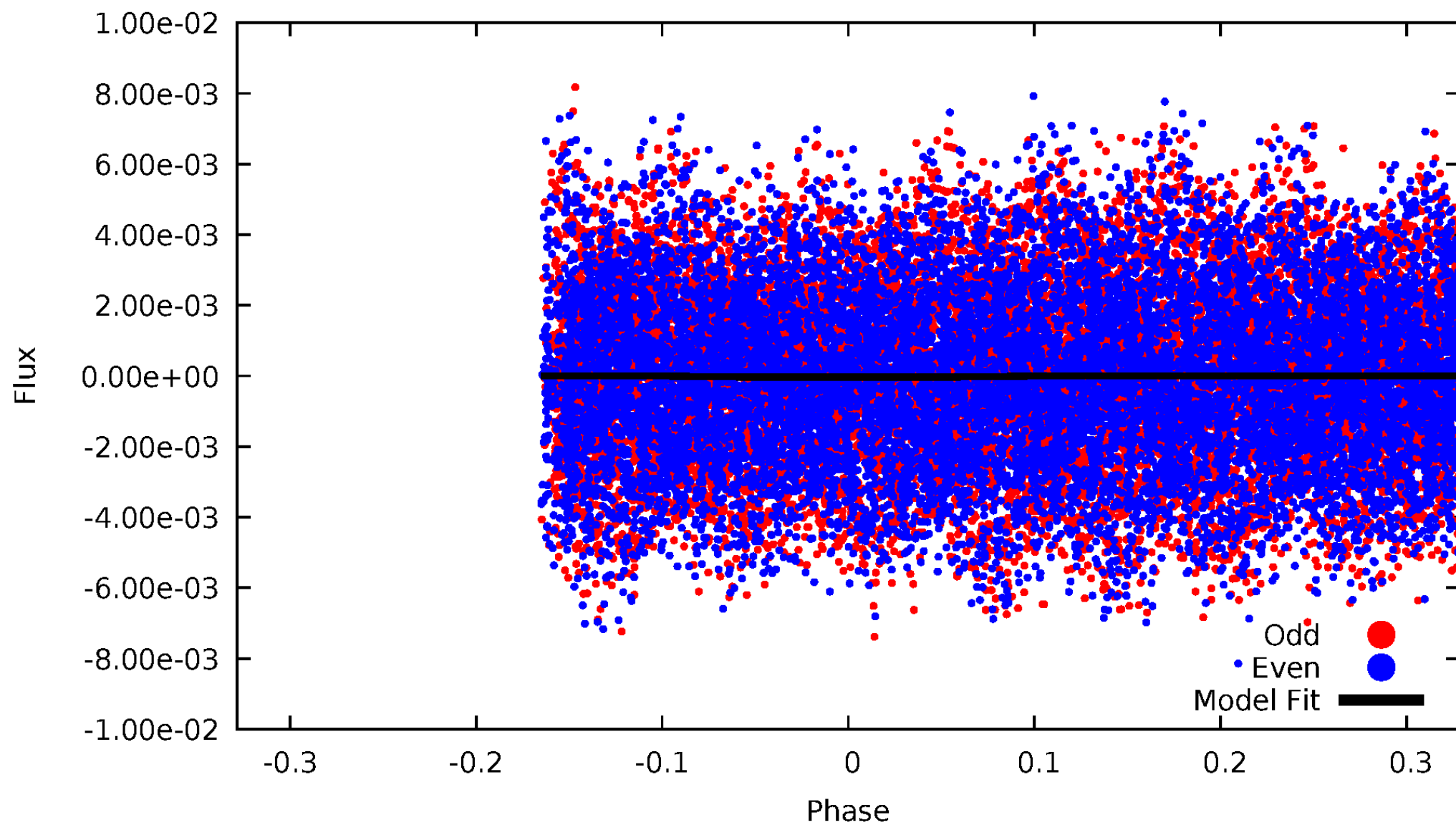
# DV Odd/Even

TCE 004847371-02



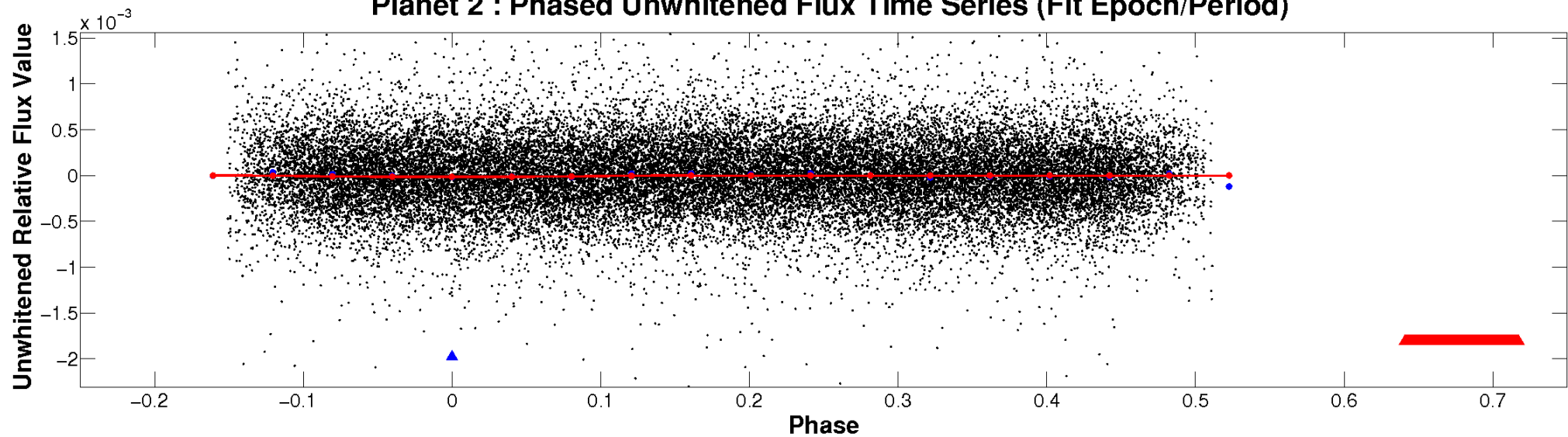
# ALT Odd/Even

TCE 004847371-02

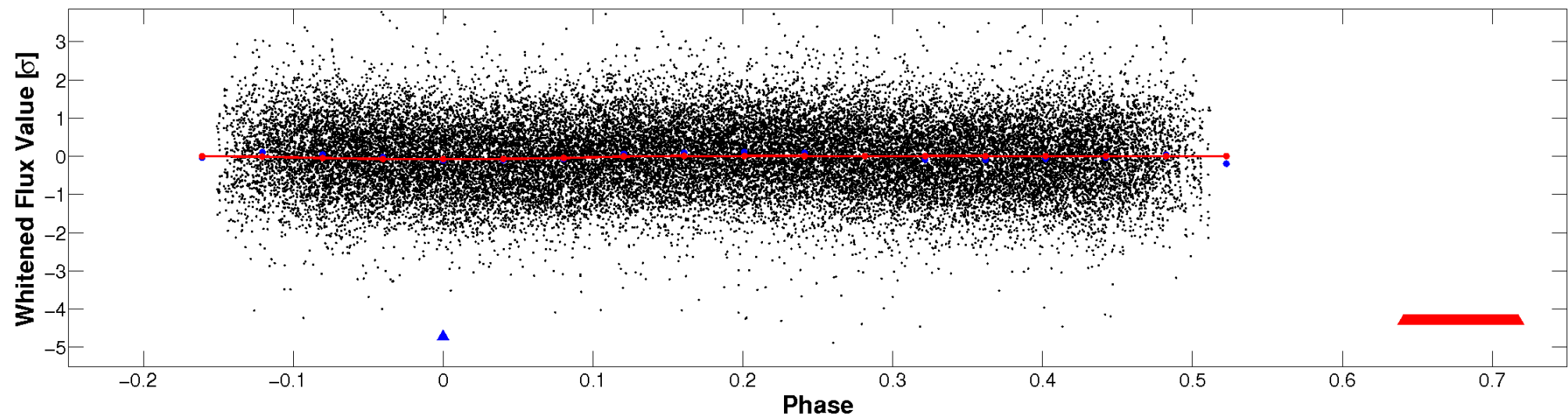


# Non-Whitened Vs. Whitened Light Curve

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

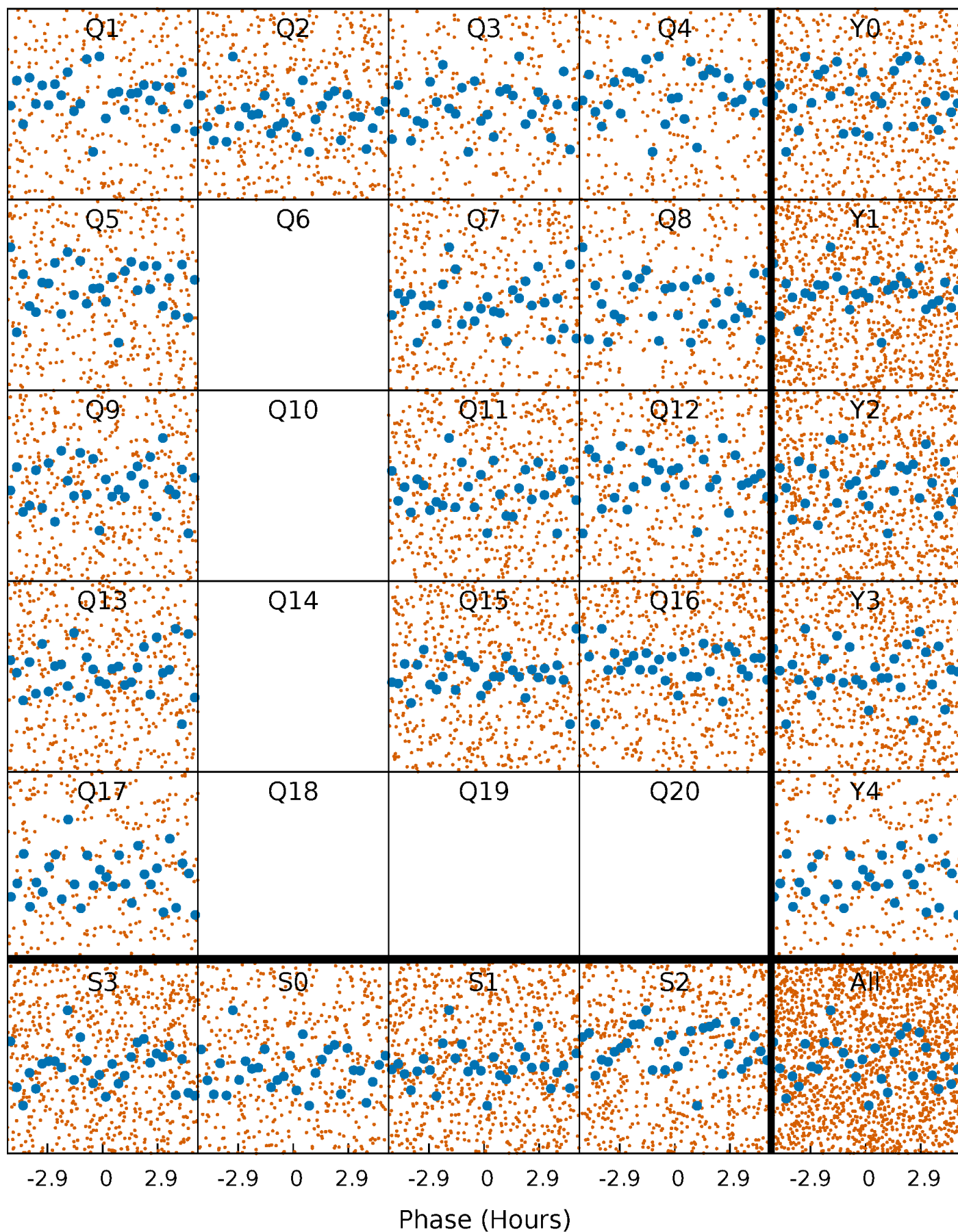


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



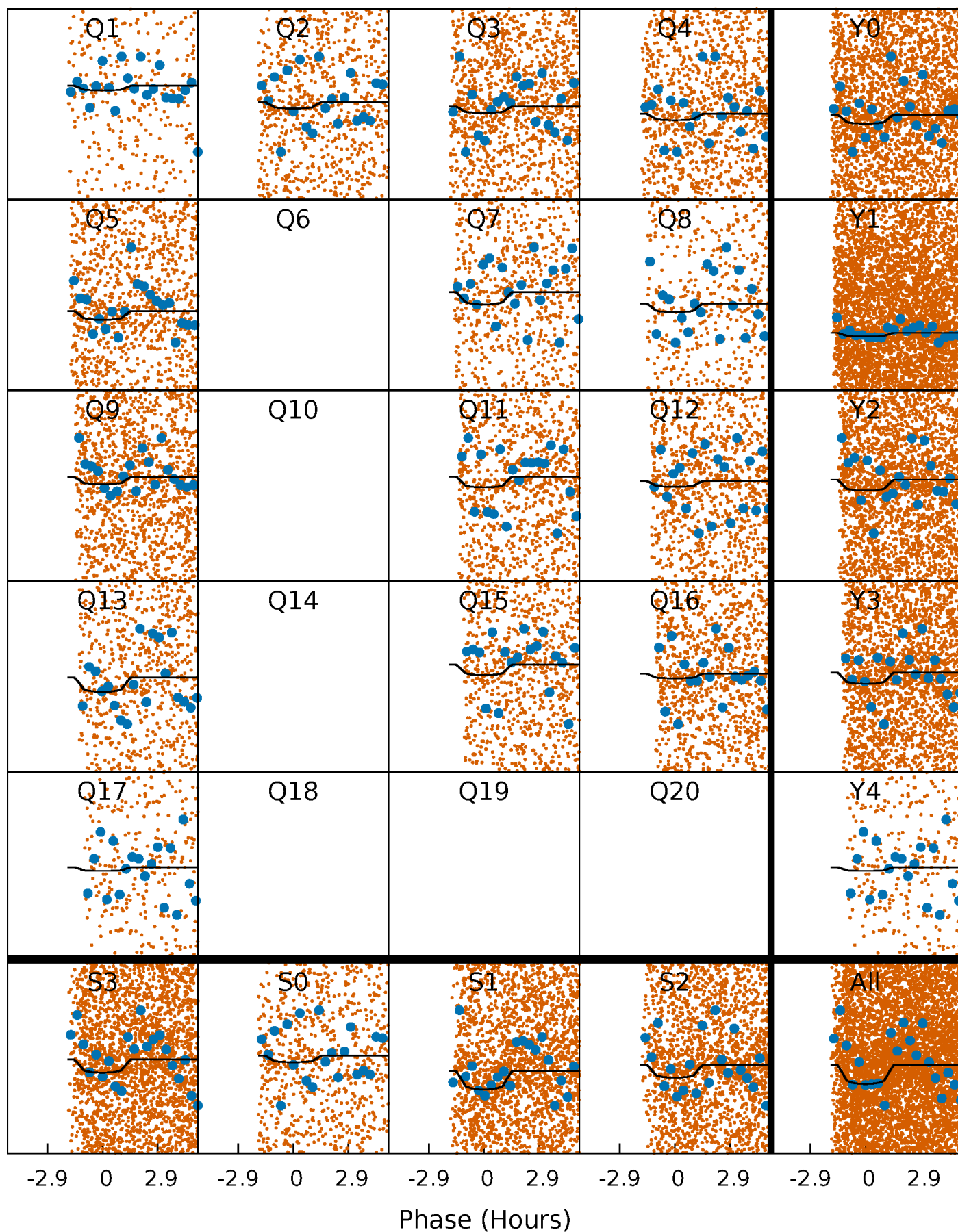
# PDC Quarter-Phased Transit Curves

TCE 004847371-02   P= 0.508295 Days    $T_0=131.617169$  (BKJD)



# DV Quarter-Phased Transit Curves

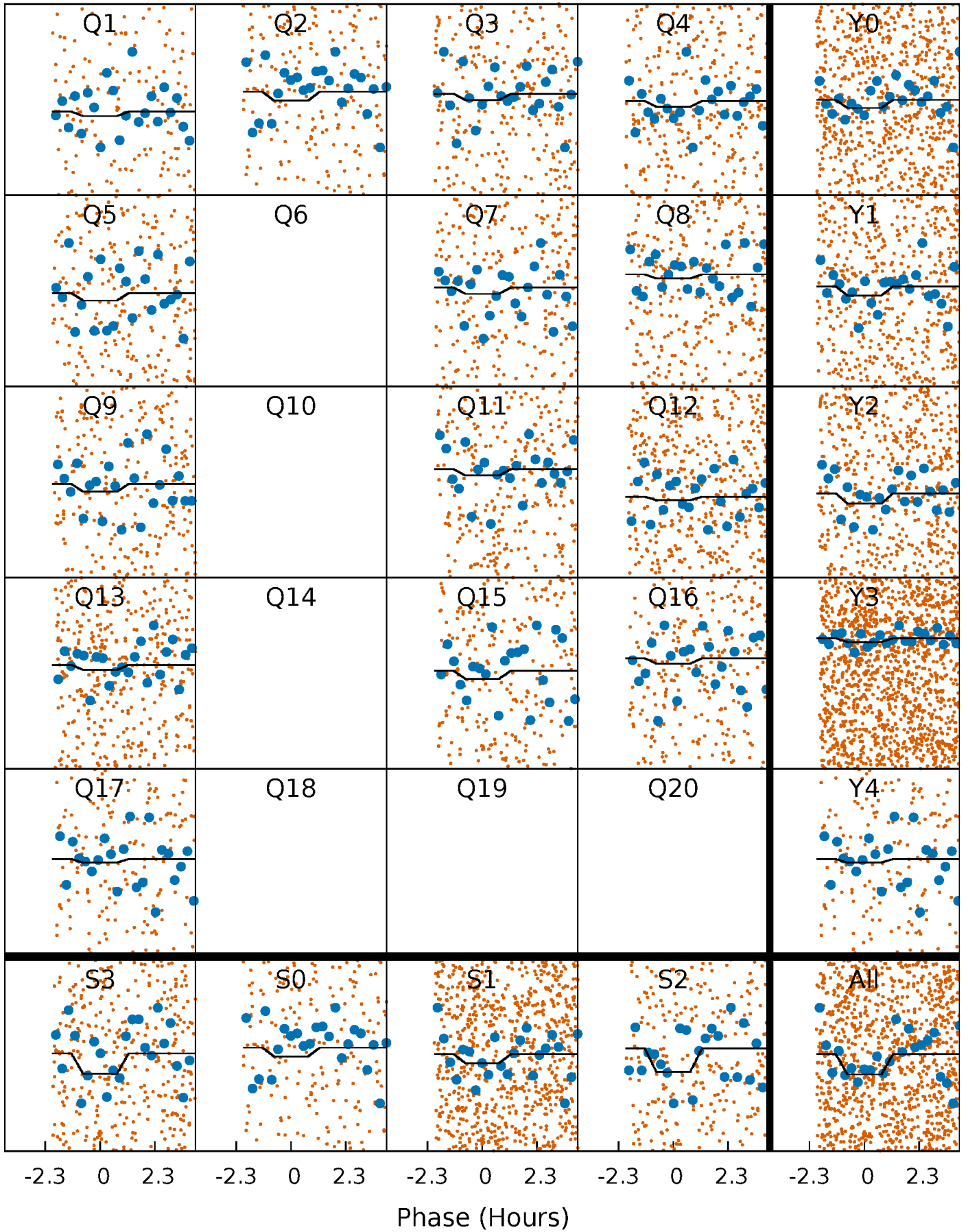
TCE 004847371-02   P= 0.508295 Days    $T_0=131.617169$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 004847371-02   P= 0.508306 Days    $T_0=131.623066$  (BKJD)

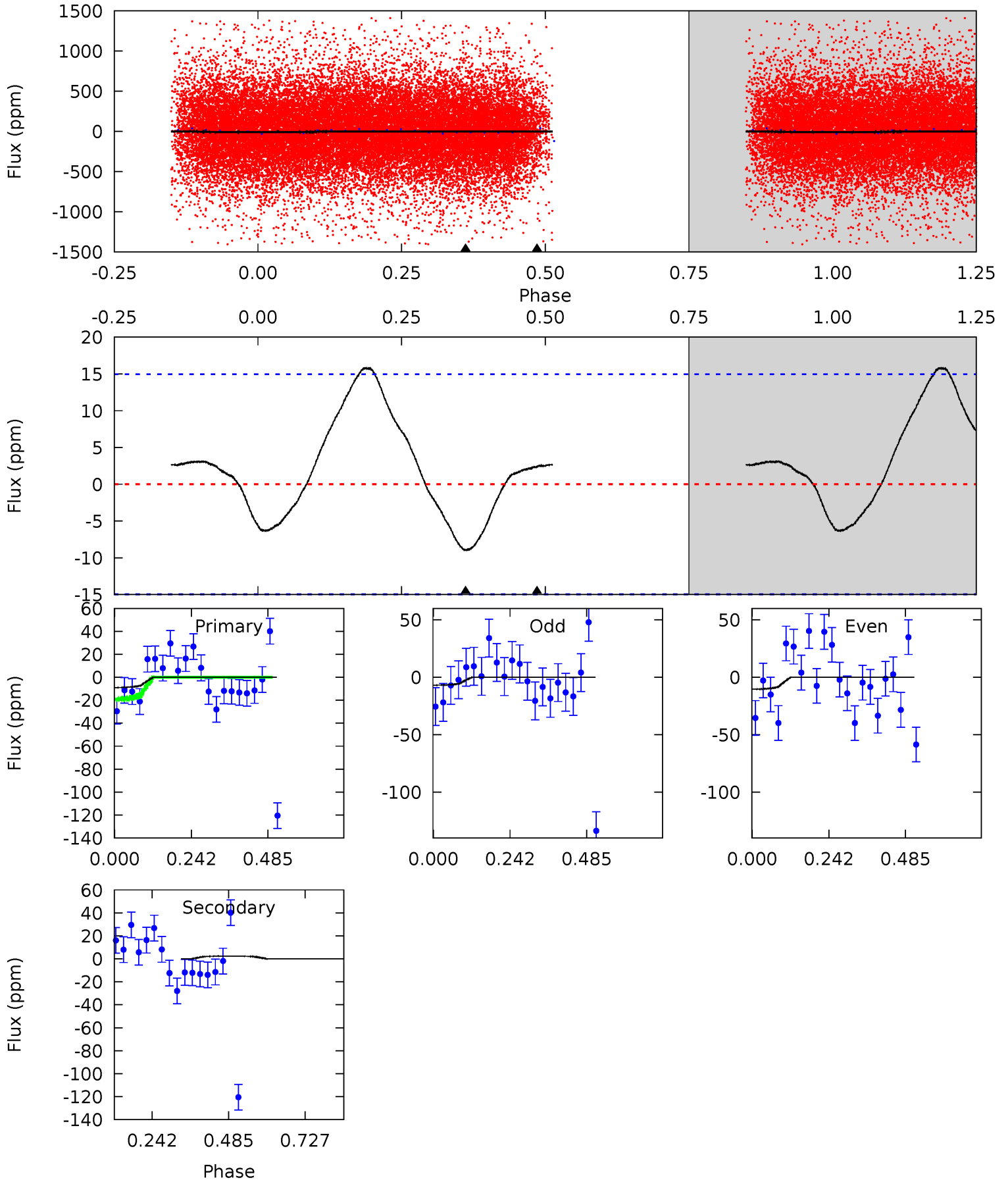




# DV Model-Shift Uniqueness Test

004847371-02, P = 0.508295 Days, E = 131.108874 Days

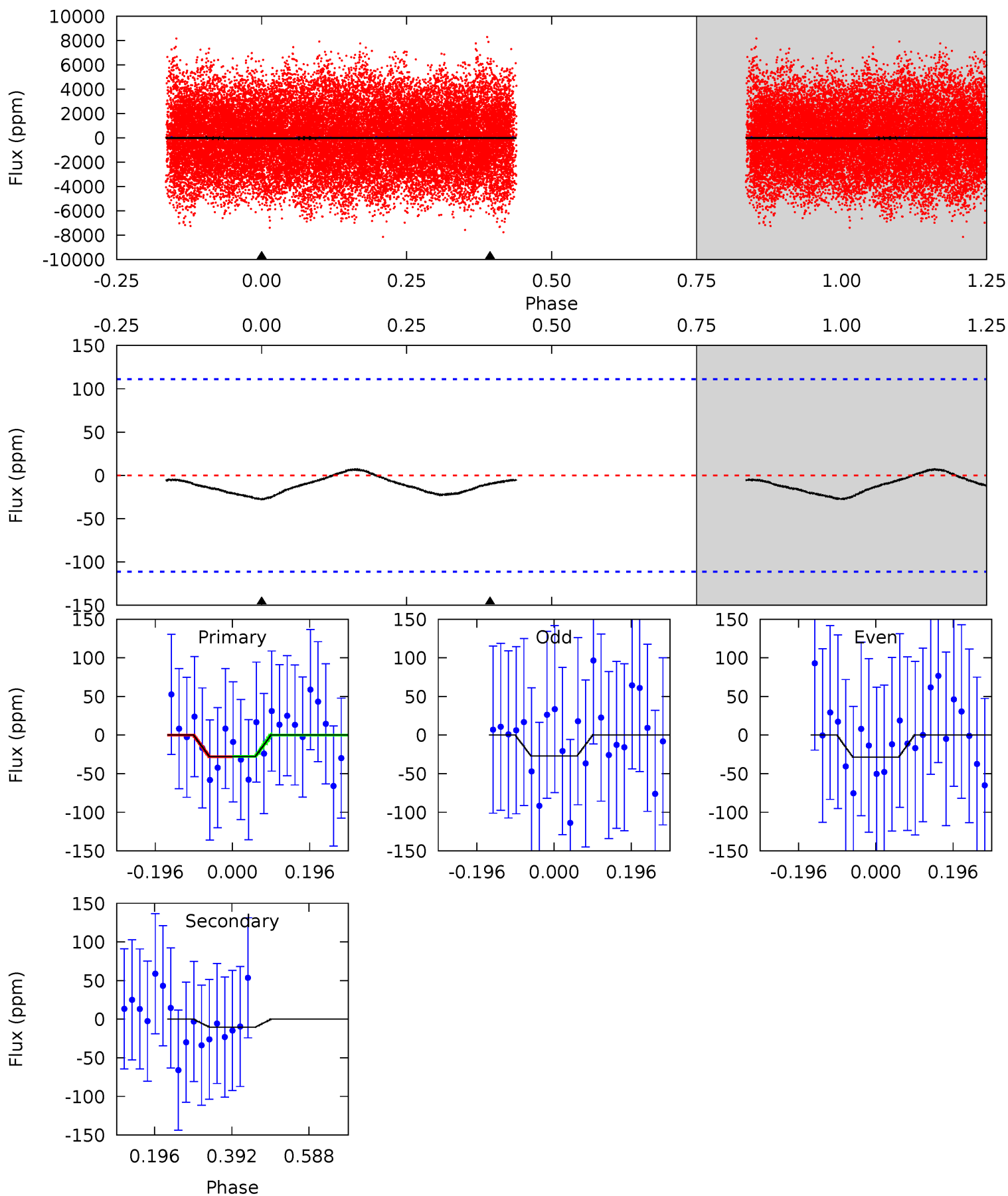
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.62	-0.69	0	0	4.38	1.17	1.05	2.62	2.62	-0.69	-0.69	0.51	0.95	0.64	2.82



# Alt Model-Shift Uniqueness Test

004847371-02, P = 0.508306 Days, E = 131.114760 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
1.11	0.41	0	0	4.42	1.29	0.17	1.11	1.11	0.41	0.41	0.03	1.11	0.21	0.01



### Stellar Parameters For KIC 004847371

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6817^{+214}_{-262}$	$4.330^{+0.182}_{-0.149}$	$-1.520^{+0.300}_{-0.250}$	$1.050^{+0.197}_{-0.177}$	$0.858^{+0.080}_{-0.055}$	$1.044^{+0.831}_{-0.432}$
	+3%/-4%	+4%/-3%	+20%/-16%	+19%/-17%	+9%/-6%	+80%/-41%
Source	KIC0	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 004847371-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$2 \pm 3$	$0.55^{+0.50}_{-0.37}$	$3924^{+244}_{-254}$	$-4214^{+1047}_{-1969}$	$-0.392^{+0.563}_{-3.535}$
Alt.	$-10 \pm 25$	$0.70^{+0.53}_{-0.44}$	$3927^{+276}_{-248}$	$4022^{+3786}_{-9696}$	$0.849^{+10.101}_{-3.403}$

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

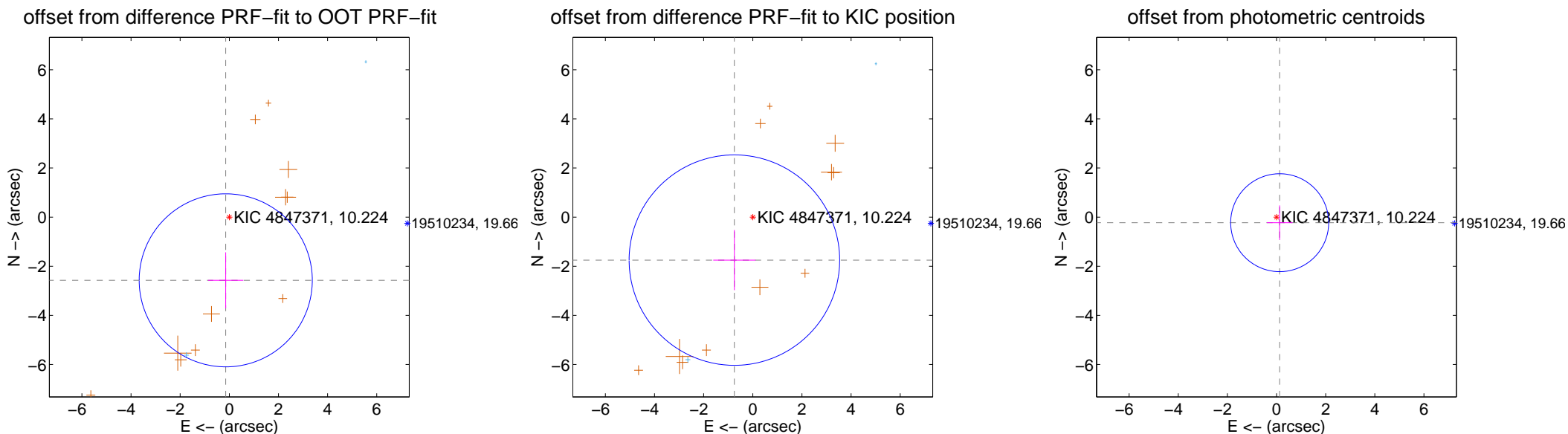
## DV Centroid Data

Supplemental centroid analysis for 004847371-02. **Kepler magnitude: 10.22.** Transit SNR 5.97

**There are 2 quarters with good PRF difference image offsets**

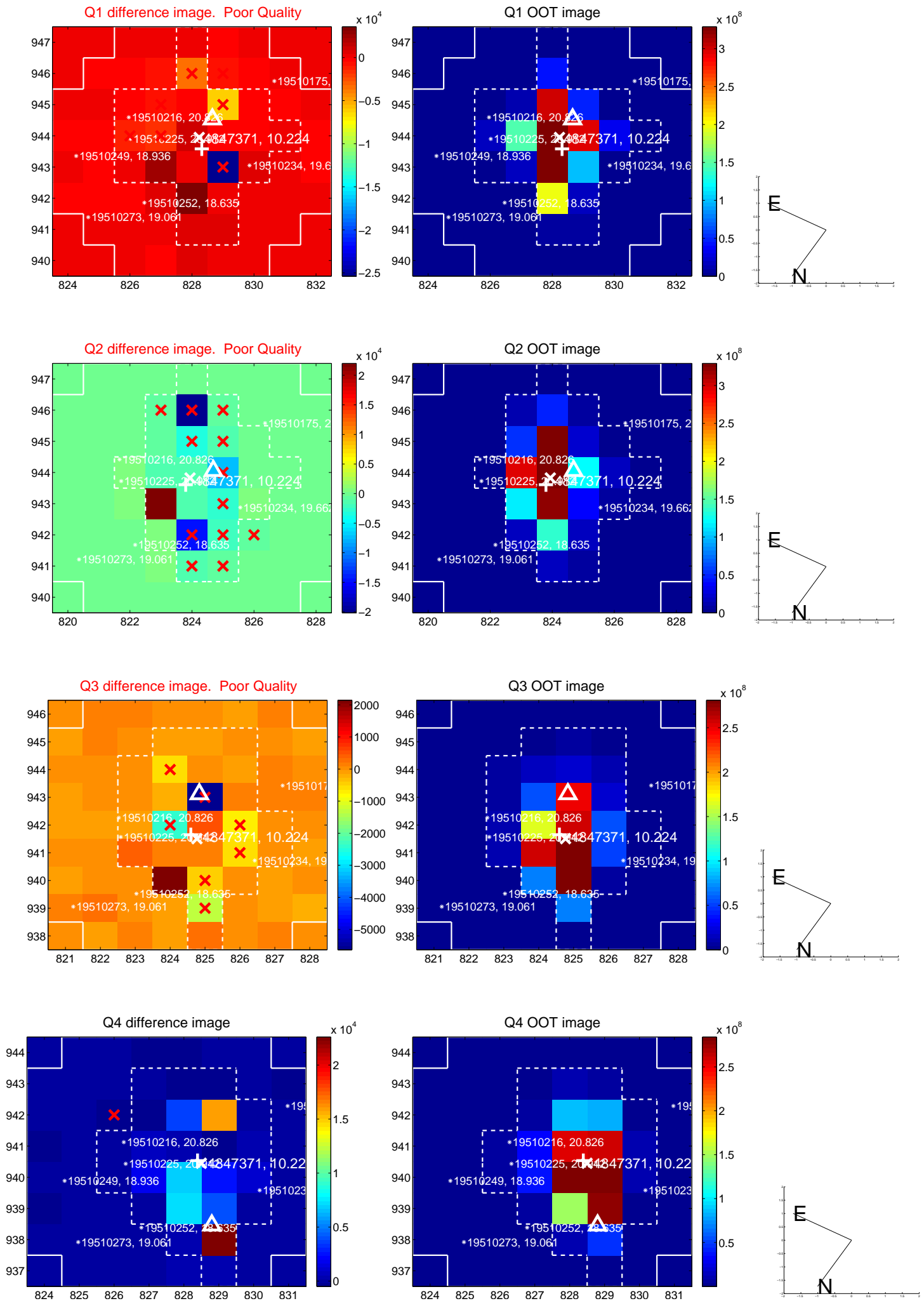
The direct PRF centroid is offset from the target star catalog position by about 1.37 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.579 \pm 1.175$	2.20	$0.146 \pm 0.716$	$-2.575 \pm 1.143$
PRF-fit source offset from KIC position	$1.904 \pm 1.428$	1.33	$0.749 \pm 0.862$	$-1.751 \pm 1.225$
photometric centroid source offset	$0.26 \pm 0.66$	0.39	$-0.13 \pm 0.52$	$-0.23 \pm 0.70$



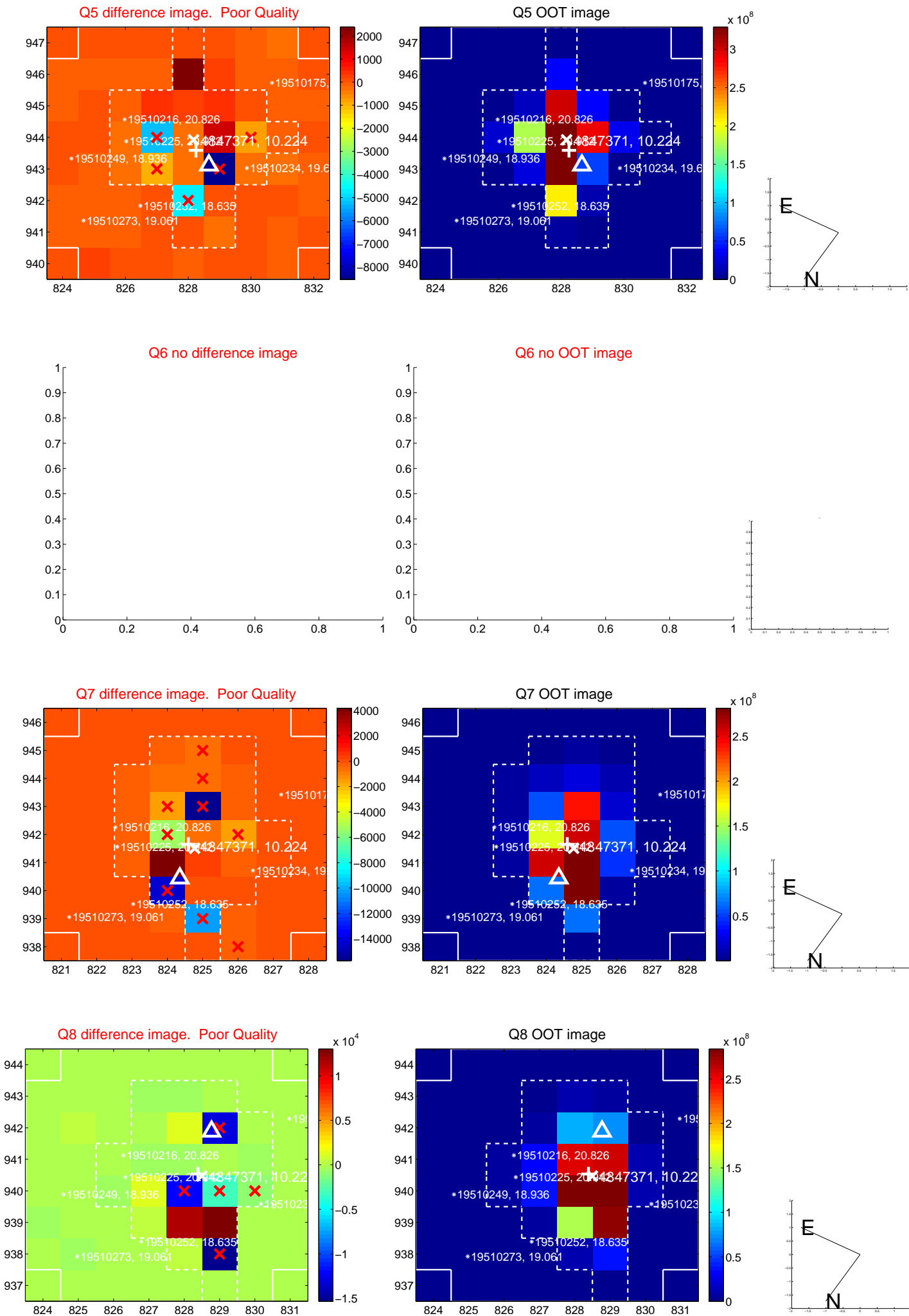
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

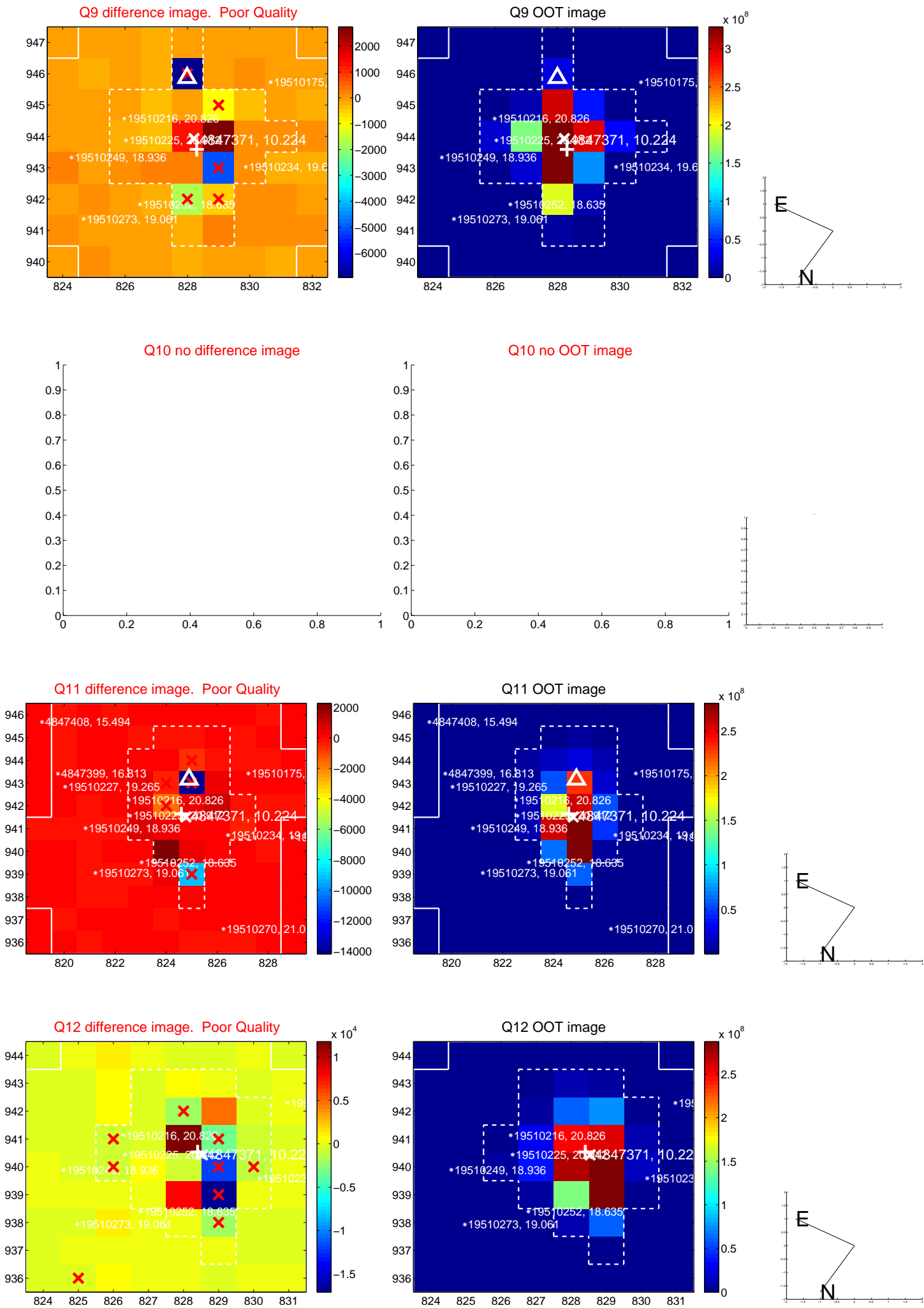




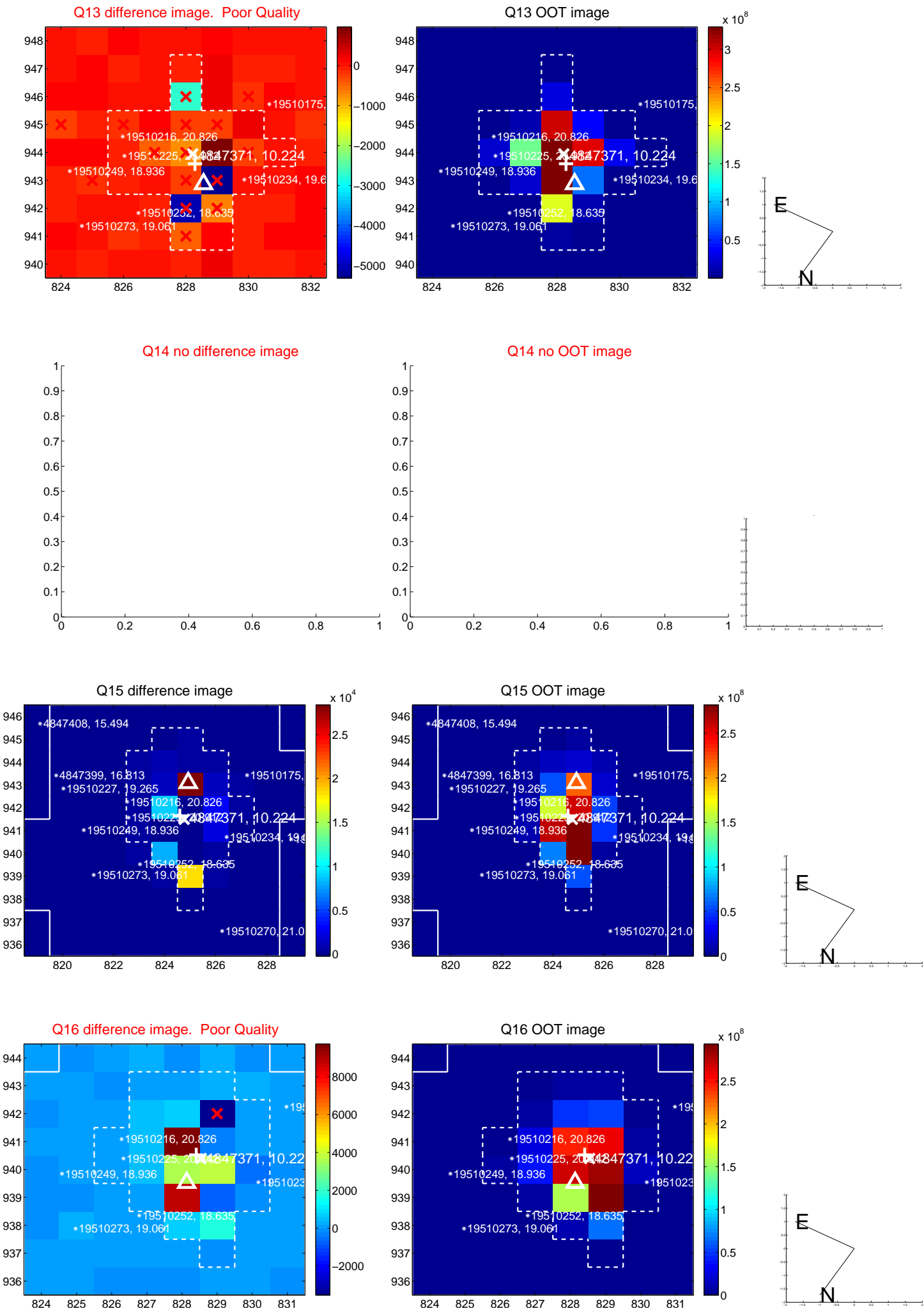
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



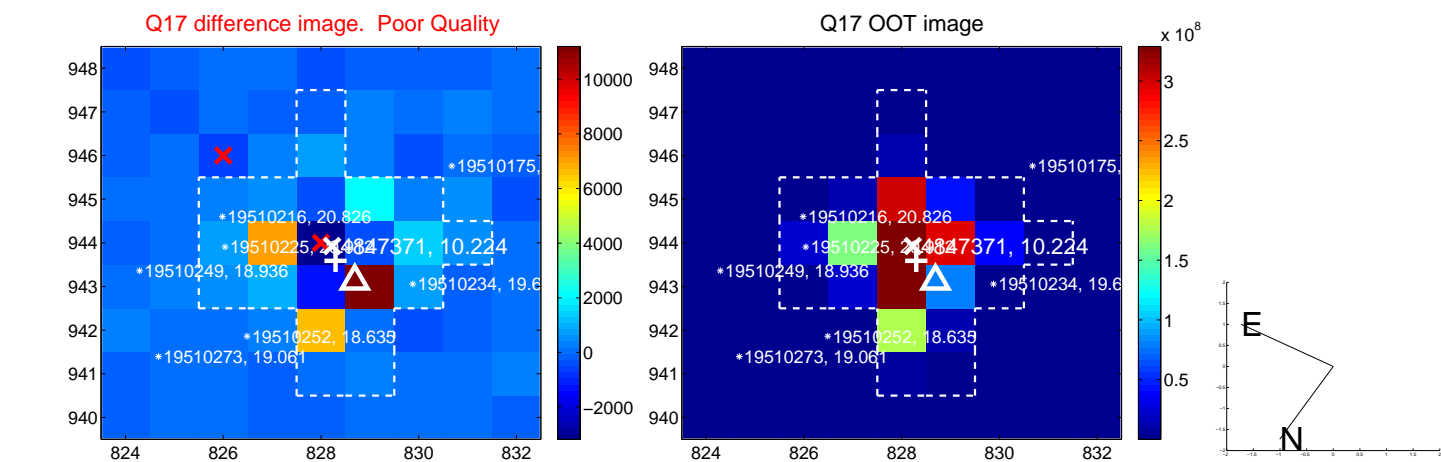
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



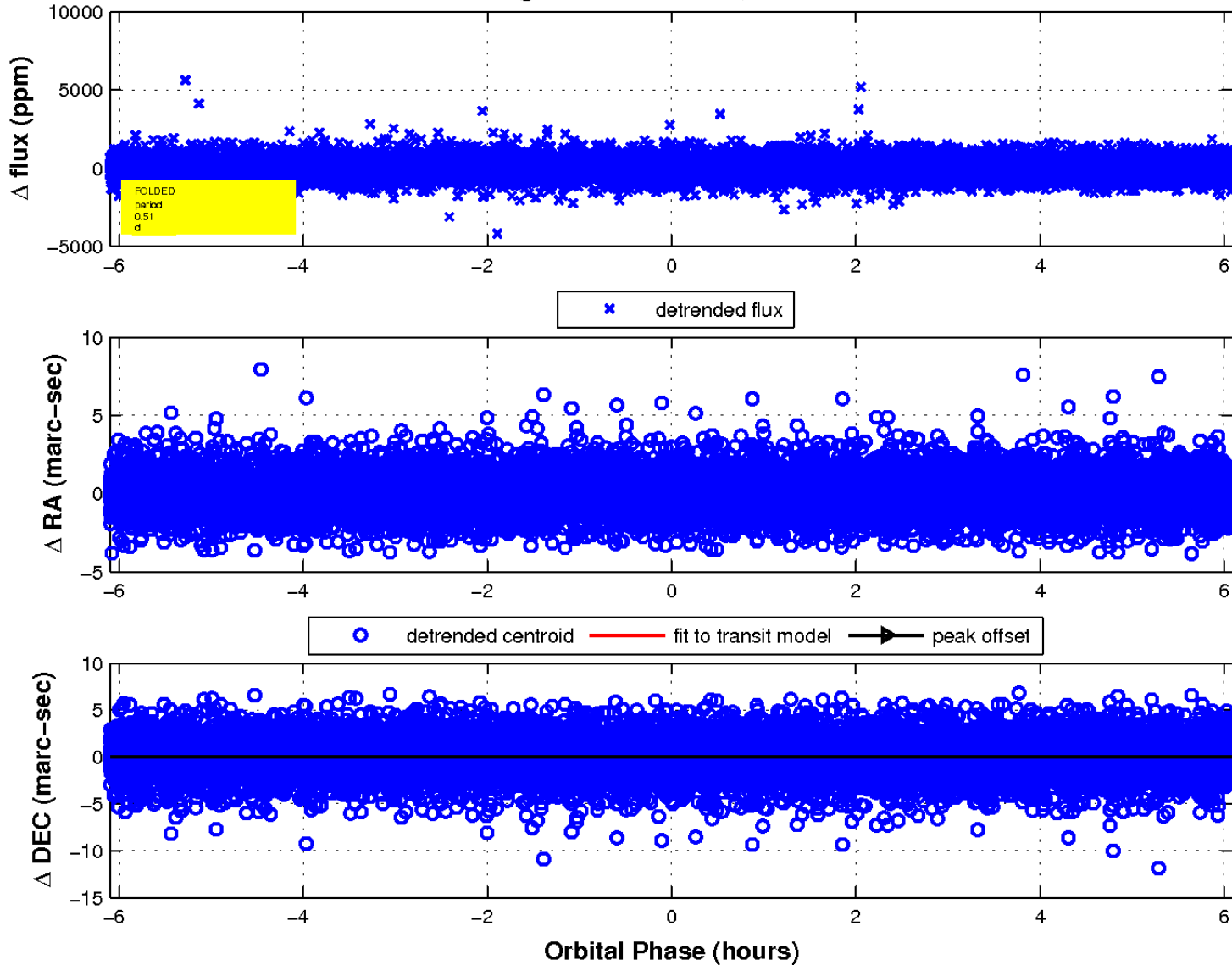
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

