

# KIC 009872831

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009872831-01	OBS	4230.01	5.495403	133.651906	83.2	2.521	12.6	13.4	1.39	6157	1.47	662.92

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009872831-01	OBS	PC	0.88	0	0	0	0	NO_COMMENT

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

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

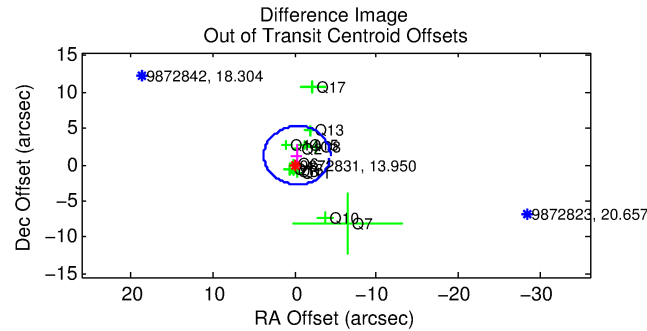
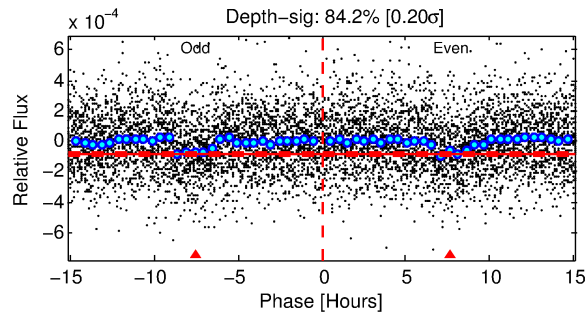
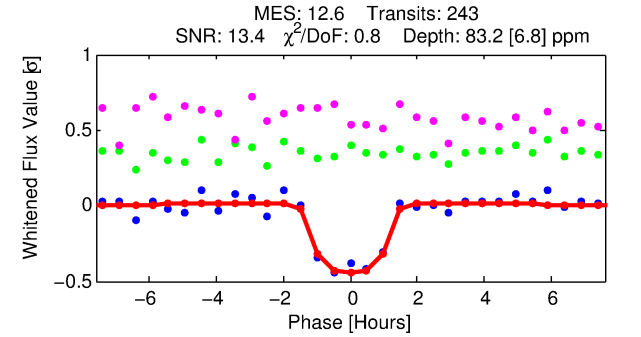
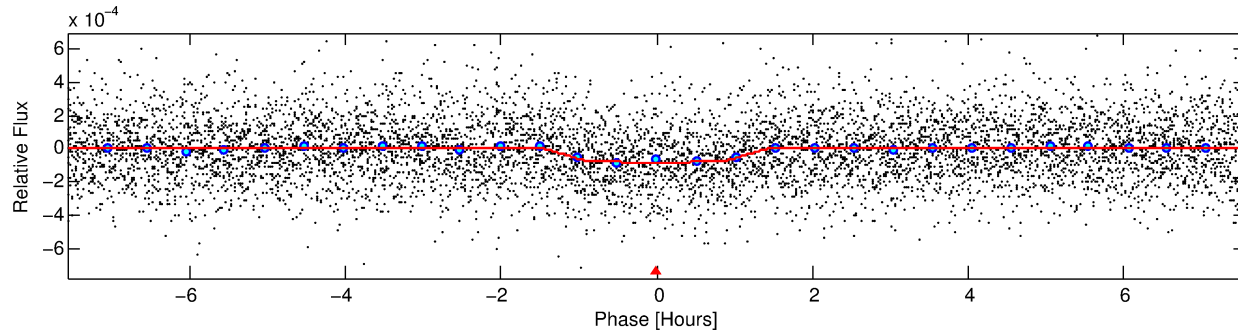
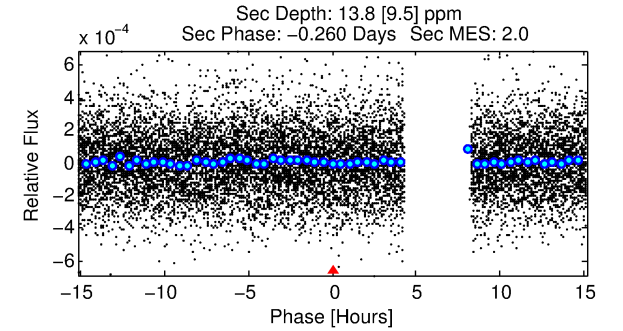
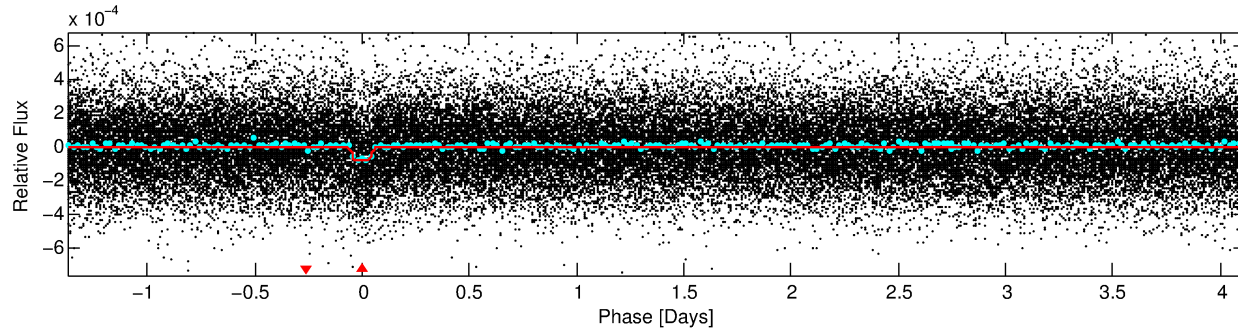
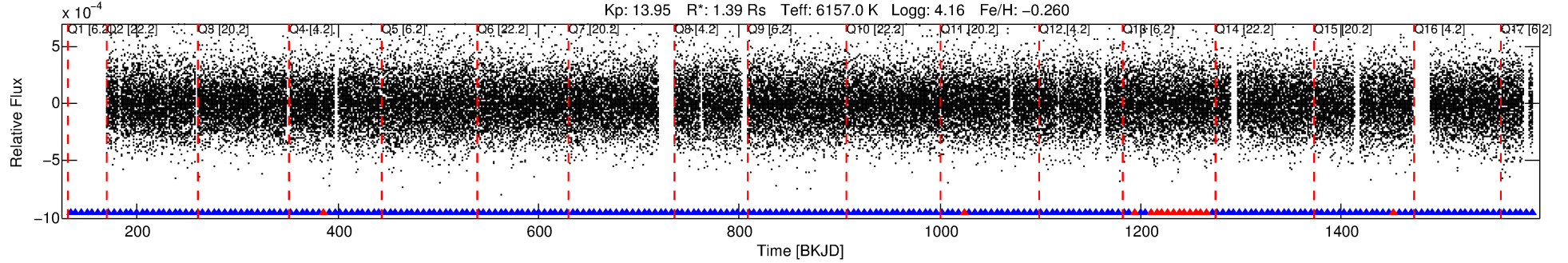
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009872831-01

No Significant Match Found

# DV One-Page Summary

KIC: 9872831 Candidate: 1 of 1 Period: 5.495 d  
KOI: K04230.01 Corr: 0.943



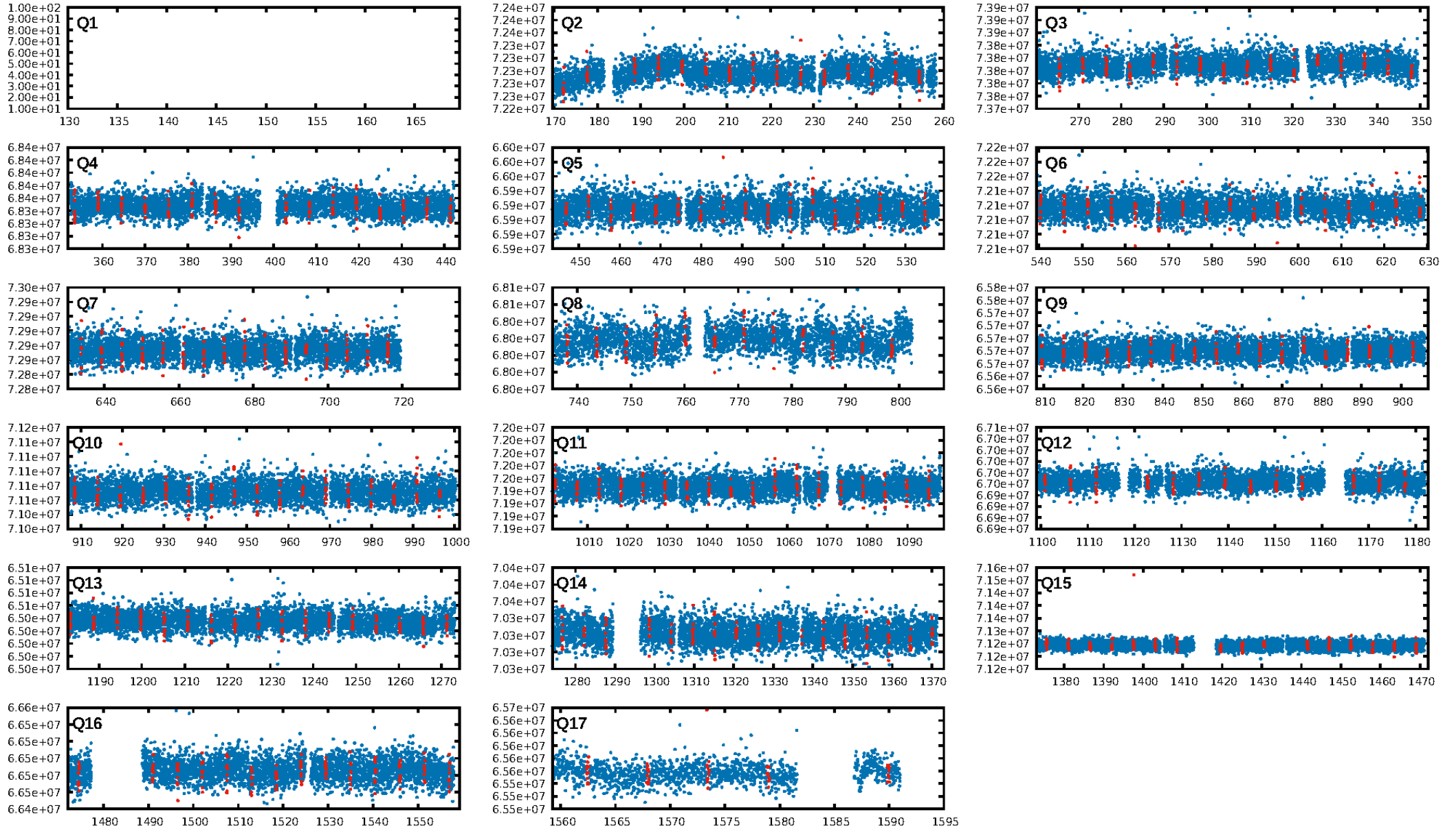
## DV Fit Results:

Period = 5.49540 [0.00003] d  
Epoch = 133.6519 [0.0037] BKJD  
Rp/R\* = 0.0097 [0.0048]  
a/R\* = 8.23 [21.45]  
b = 0.88 [0.67]  
Seff = 662.92 [308.03]  
Teq = 1294 [150] K  
Rp = 1.47 [0.83] Re  
a = 0.0613 [0.0167] AU  
Ag = 13.16 [16.86] [0.72σ]  
Teffp = 3810 [1156] K [2.16σ]

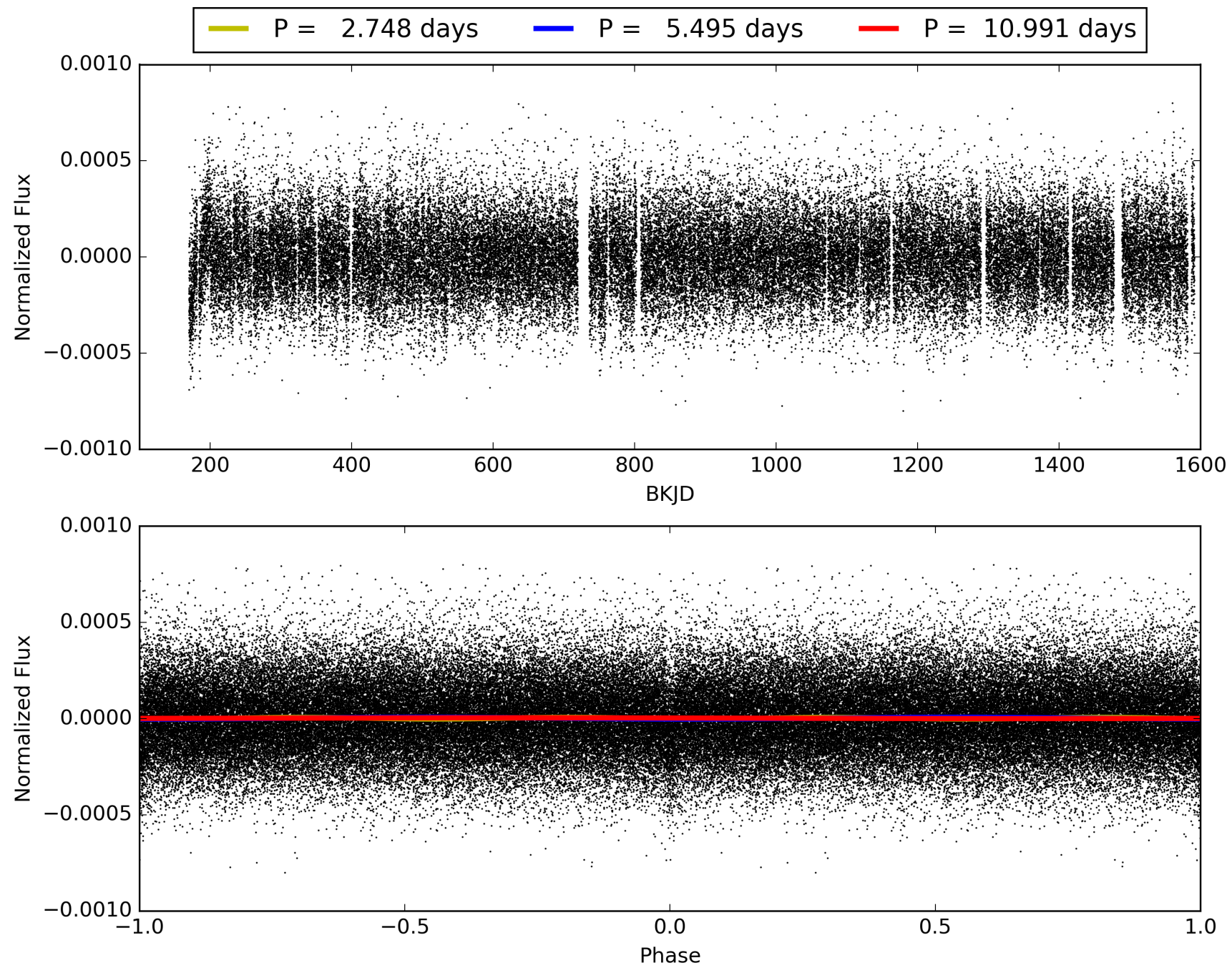
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.15e-35  
RollingBand-fgt: 0.94 [223/238]  
GhostDiagnostic-chr: 3.895  
Centroid-sig: 0.0%  
Centroid-so: 2.481 arcsec [2.37σ]  
OotOffset-rm: 1.320 arcsec [0.98σ]  
KicOffset-rm: 1.414 arcsec [1.12σ]  
OotOffset-st: 4/4/2/2 [12]  
KicOffset-st: 4/4/2/2 [12]  
DiffImageQuality-fgm: 0.58 [7/12]  
DiffImageOverlap-fno: 1.00 [16/16]

# TCE 009872831-01, PDC Light Curves

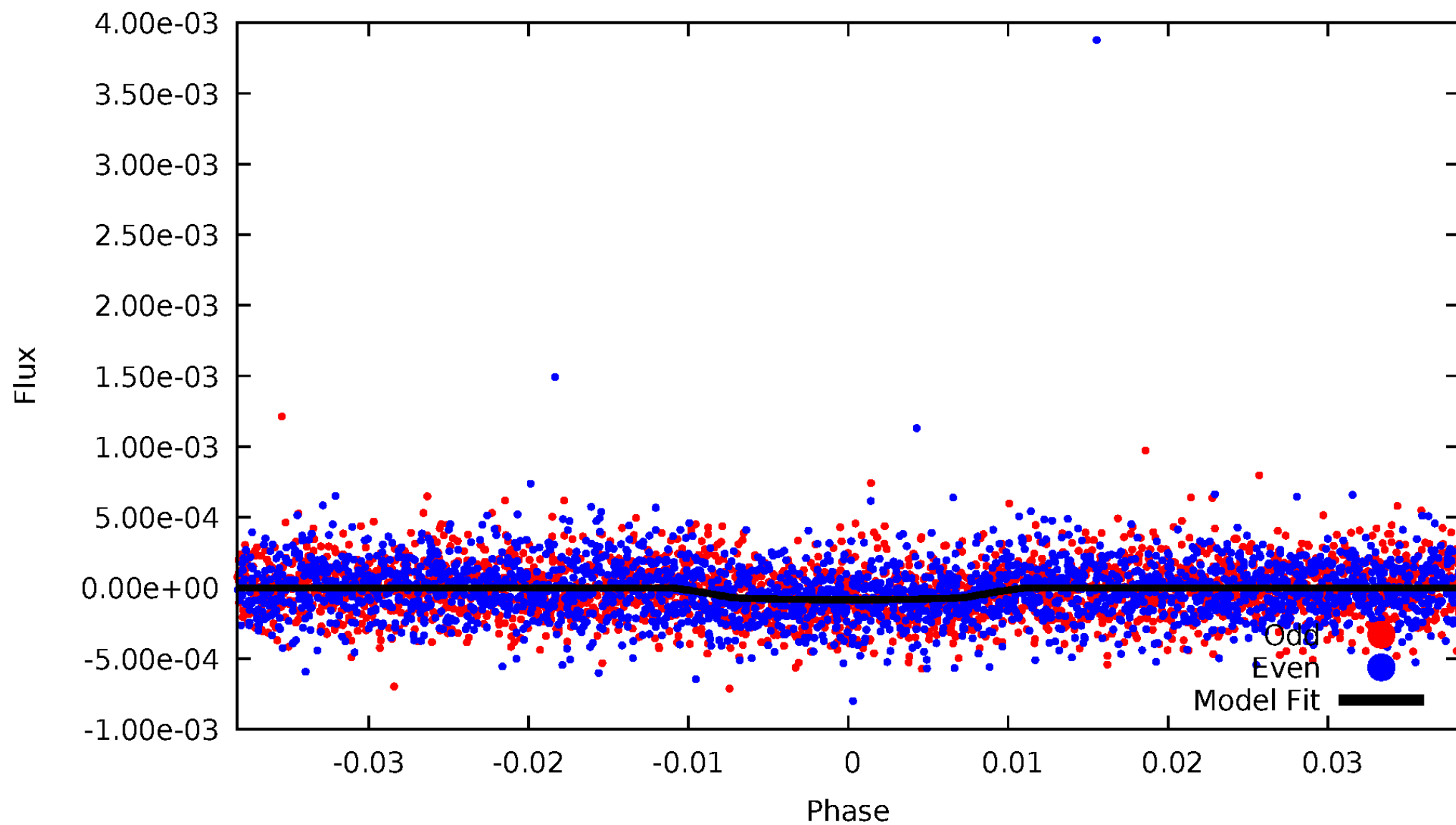


TCE 009872831-01



# DV Odd/Even

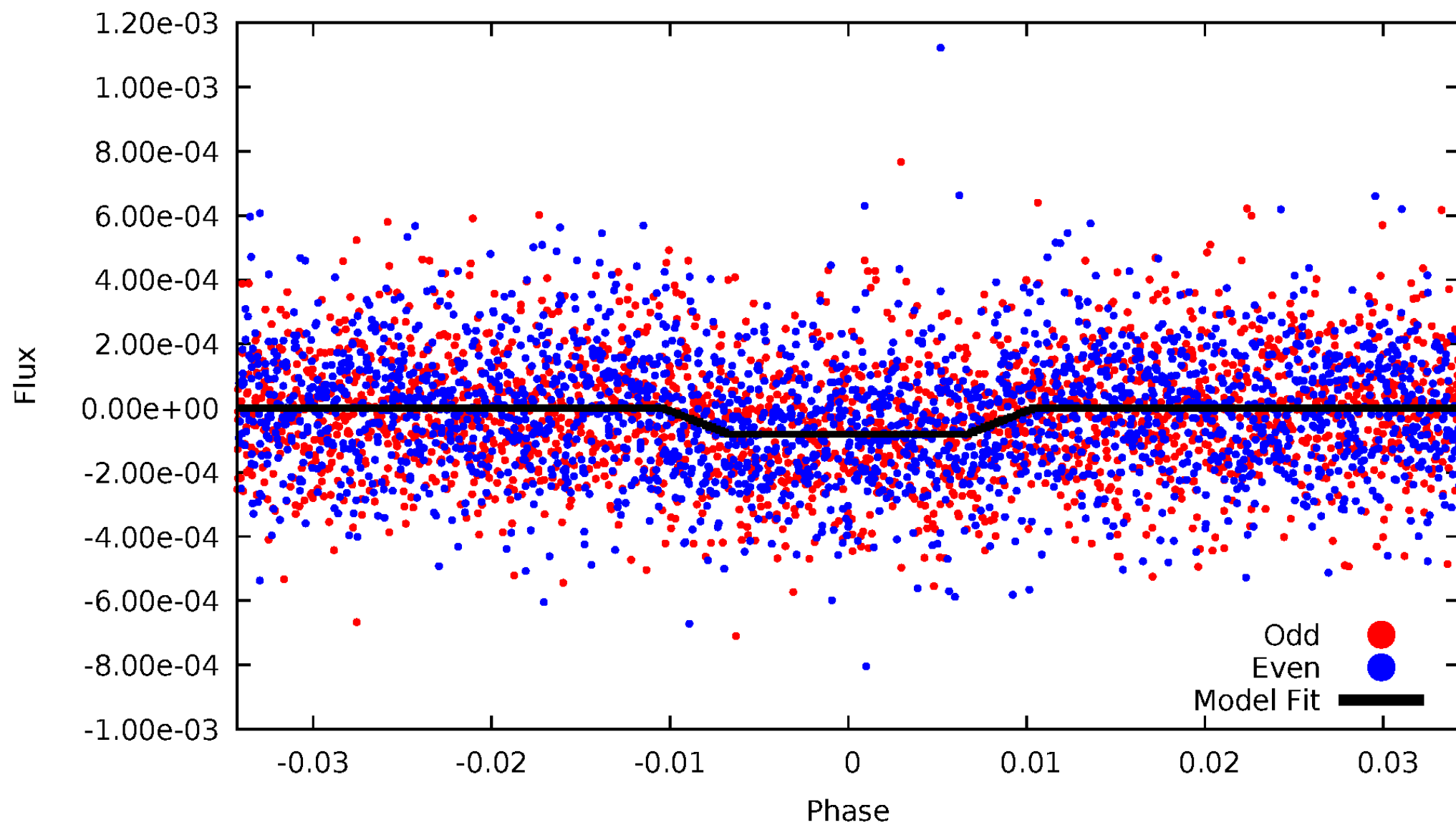
TCE 009872831-01





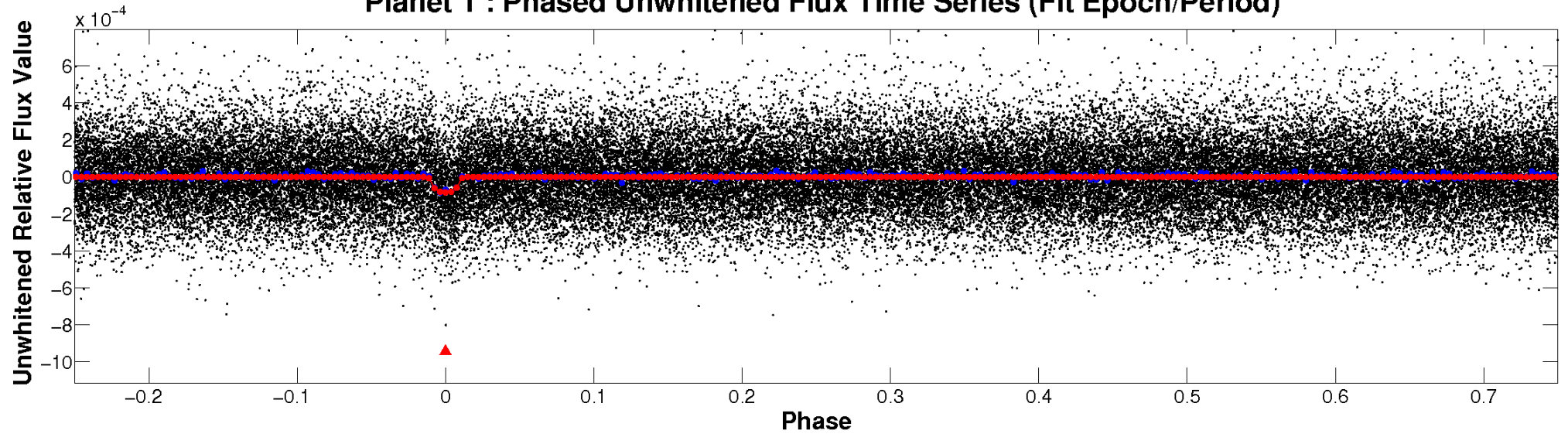
# ALT Odd/Even

TCE 009872831-01

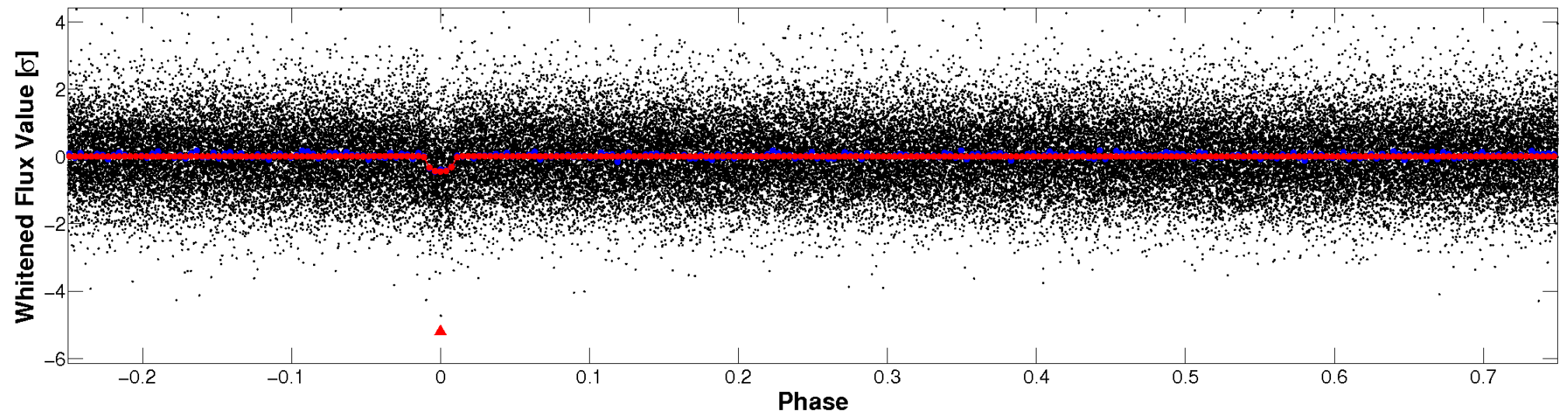


# Non-Whitened Vs. Whitened Light Curve

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

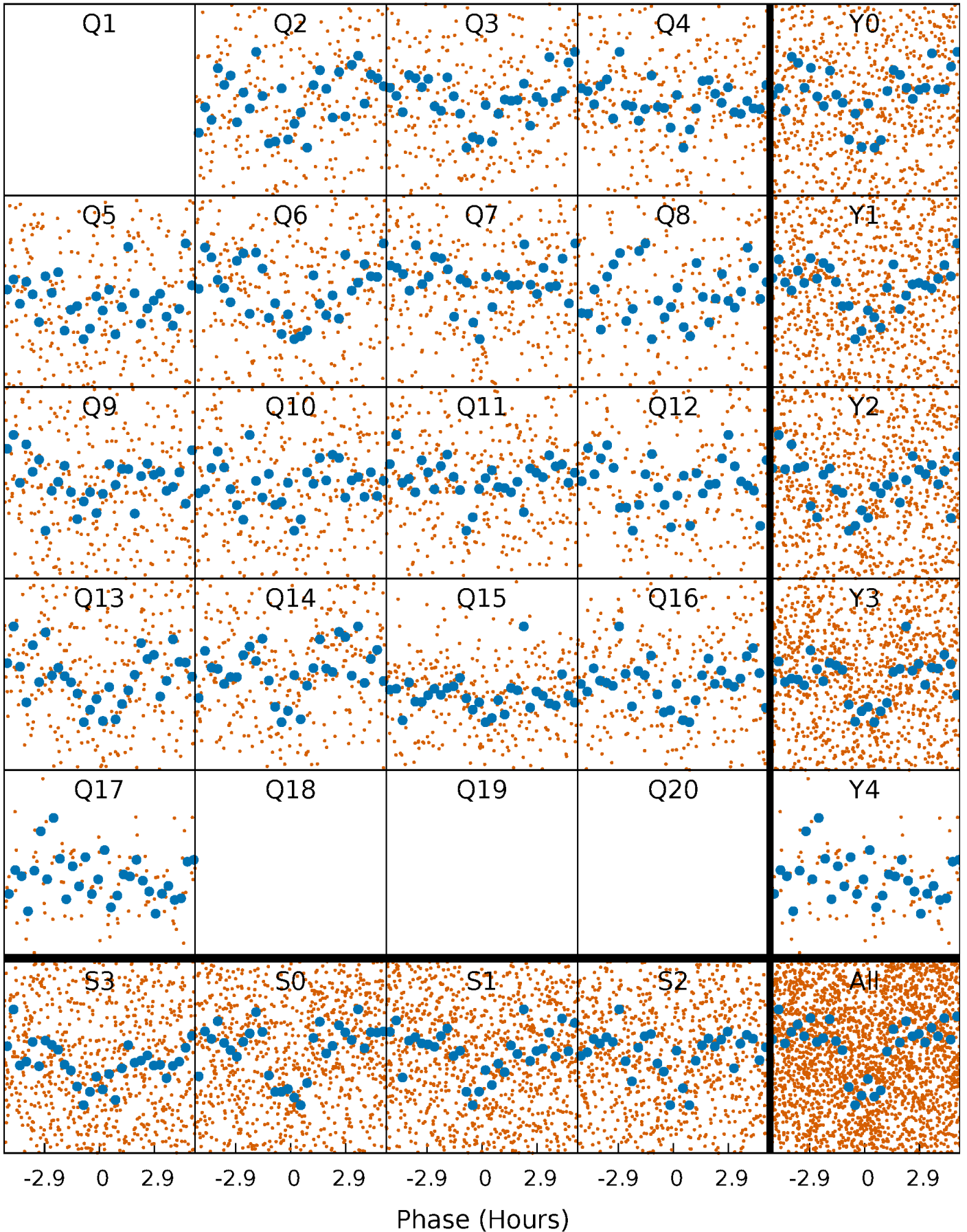


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

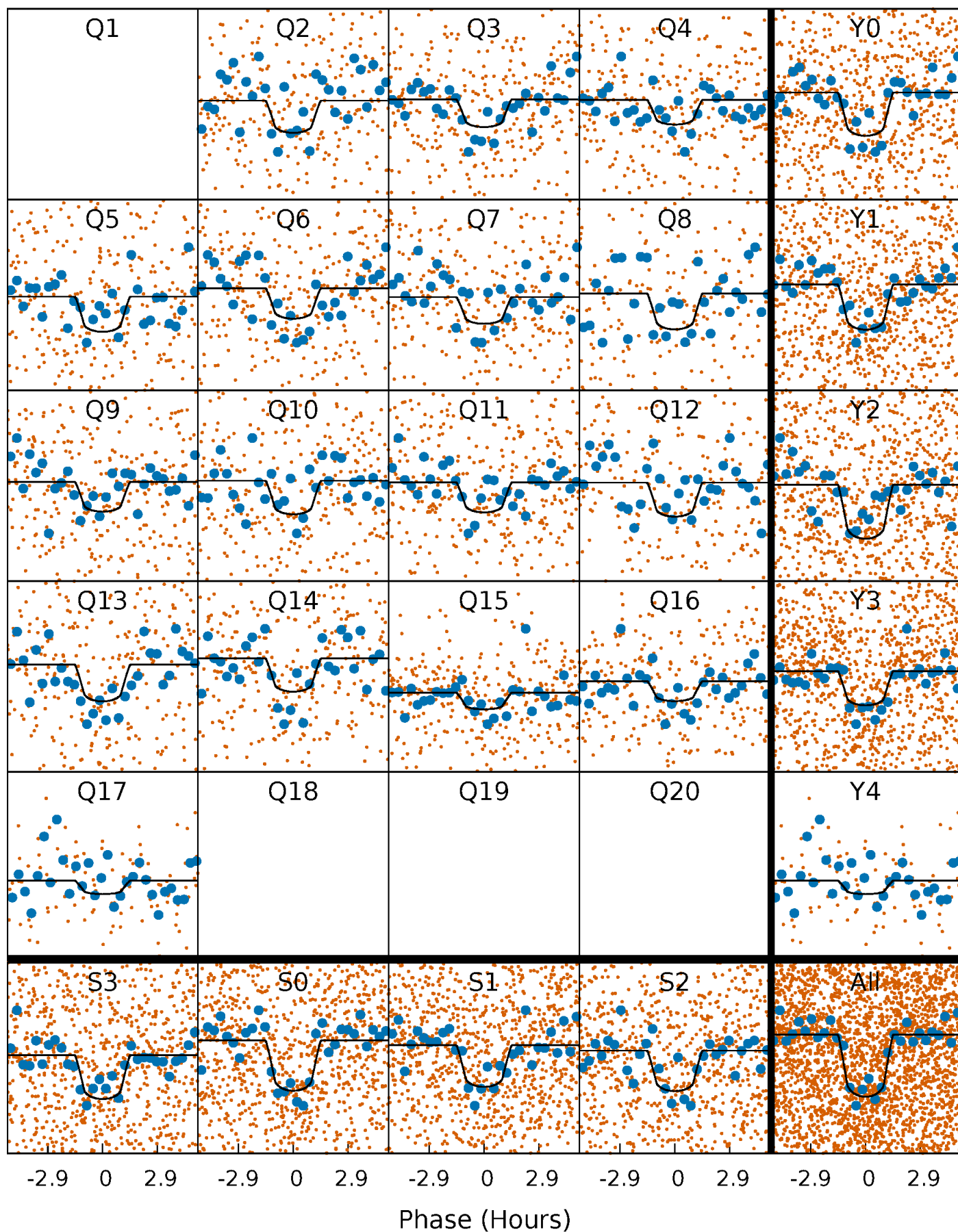
TCE 009872831-01 P= 5.495403 Days  $T_0=133.651906$  (BKJD)





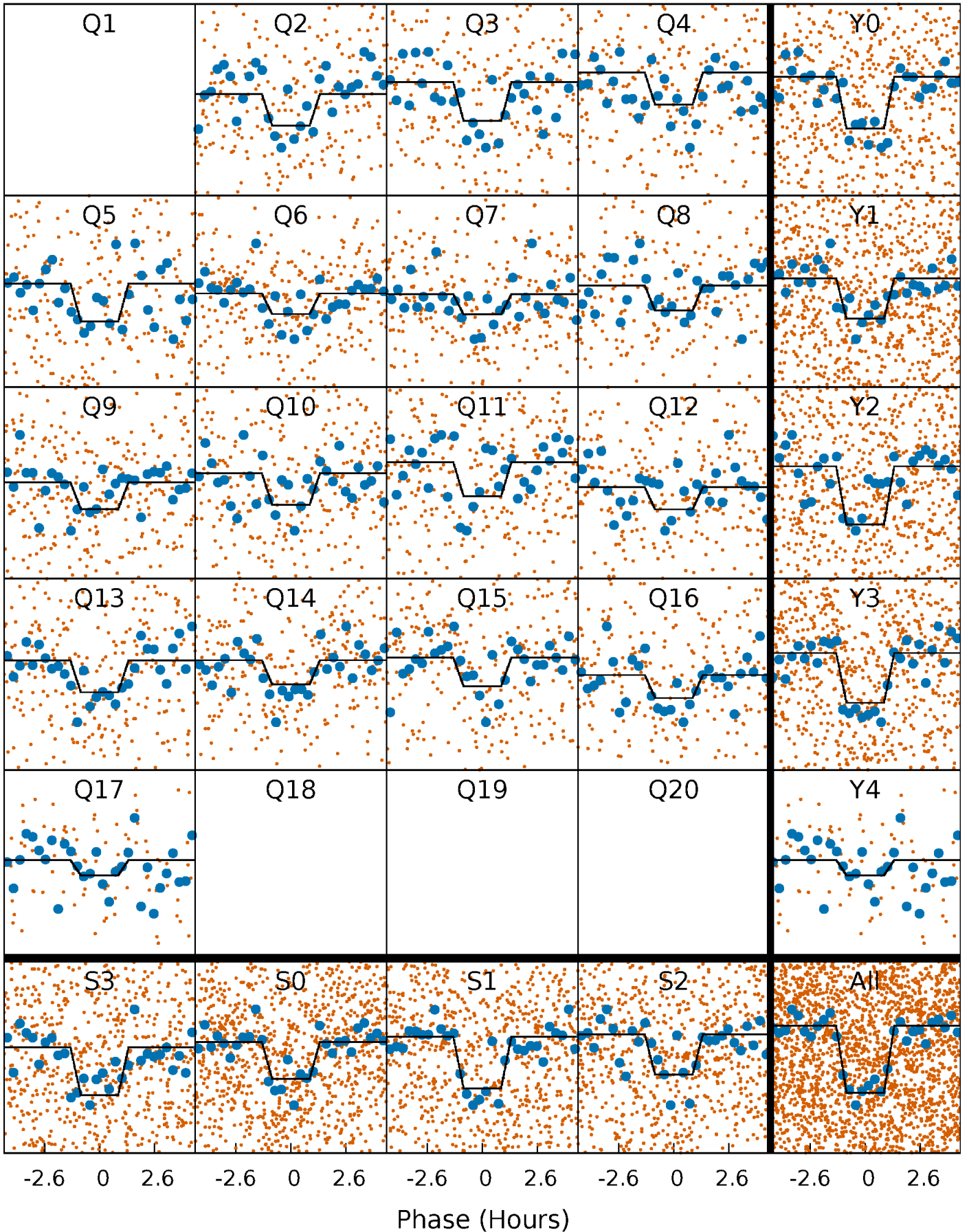
# DV Quarter-Phased Transit Curves

TCE 009872831-01 P= 5.495403 Days  $T_0=133.651906$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

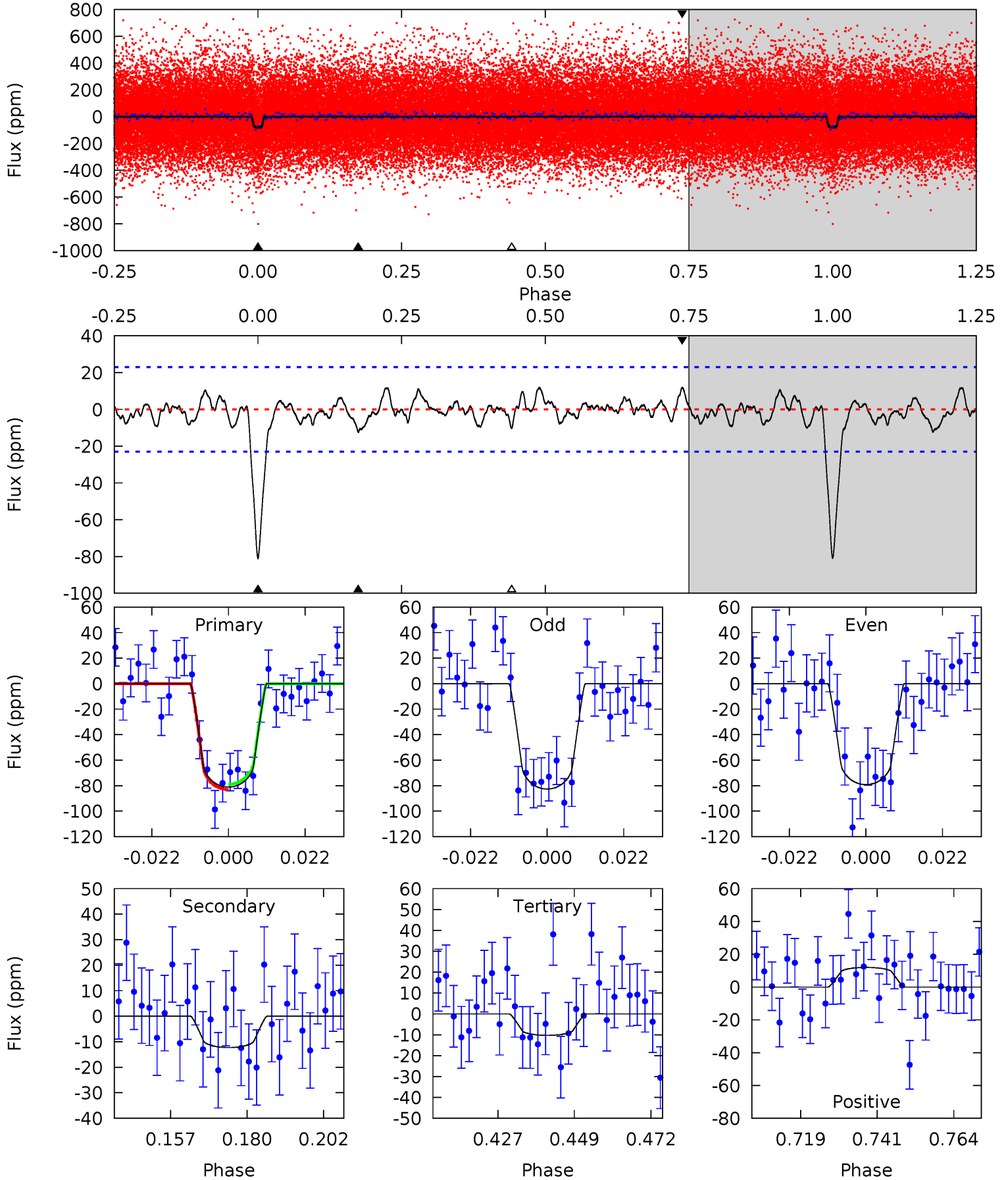
TCE 009872831-01 P= 5.495476 Days  $T_0=133.642332$  (BKJD)



# DV Model-Shift Uniqueness Test

009872831-01, P = 5.495403 Days, E = 133.651906 Days

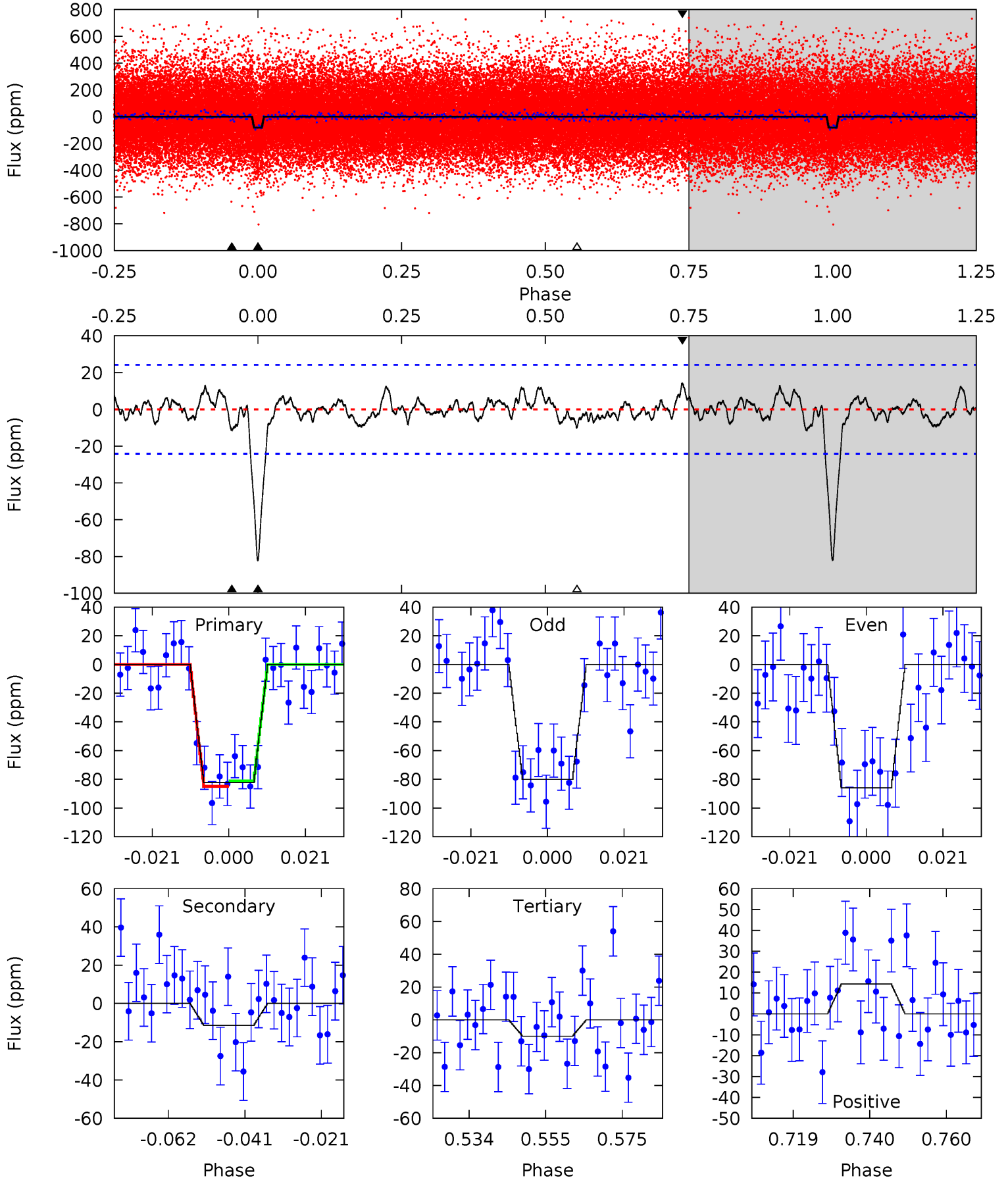
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.2	2.60	2.18	2.53	4.87	2.28	0.95	15.0	14.6	0.43	0.07	0.36	0.90	0.13	0.44



# Alt Model-Shift Uniqueness Test

009872831-01, P = 5.495476 Days, E = 133.642332 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
16.6	2.31	2.01	2.89	4.89	2.32	0.93	14.6	13.7	0.30	-0.59	0.60	0.92	0.15	0.39



### Stellar Parameters For KIC 009872831

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6157^{+197}_{-241}$	$4.159^{+0.258}_{-0.172}$	$-0.260^{+0.300}_{-0.300}$	$1.392^{+0.388}_{-0.388}$	$1.020^{+0.173}_{-0.129}$	$0.533^{+0.840}_{-0.251}$
	+3%/-4%	+6%/-4%	+115%/-115%	+28%/-28%	+17%/-13%	+158%/-47%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 009872831-01 / KOI 4230.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-12 \pm 5$	$1.46^{+0.79}_{-0.69}$	$1791^{+151}_{-148}$	$3978^{+1095}_{-588}$	$12^{+32}_{-7}$
Alt.	$-11 \pm 5$	$1.33^{+0.86}_{-0.61}$	$1788^{+149}_{-150}$	$3993^{+1108}_{-636}$	$13^{+33}_{-8}$

$T_{\text{max}}$  = 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

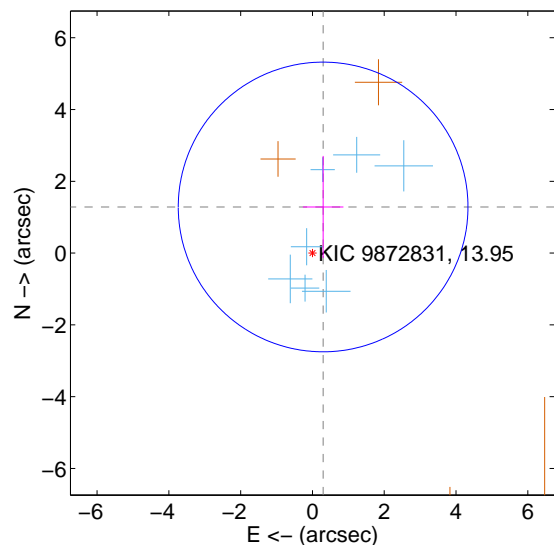
Supplemental centroid analysis for 009872831-01. Kepler magnitude: 13.95. Transit SNR 13.39

There are 7 quarters with good PRF difference image offsets

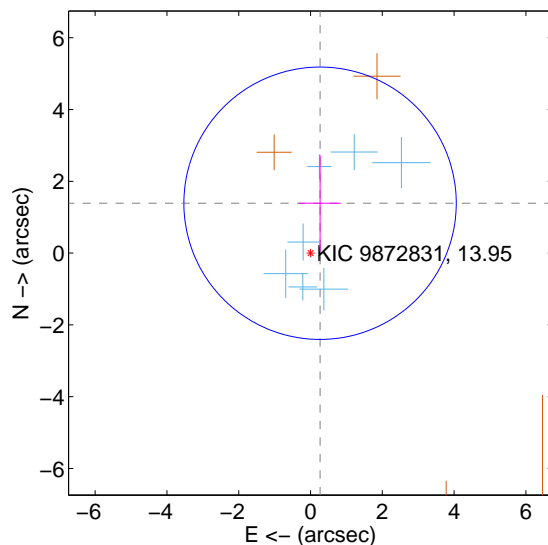
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.320 \pm 1.345$	0.98	$-0.298 \pm 0.565$	$1.286 \pm 1.421$
PRF-fit source offset from KIC position	$1.414 \pm 1.265$	1.12	$-0.266 \pm 0.590$	$1.389 \pm 1.346$
photometric centroid source offset	$2.48 \pm 1.05$	2.37	$0.64 \pm 1.18$	$-2.40 \pm 1.04$

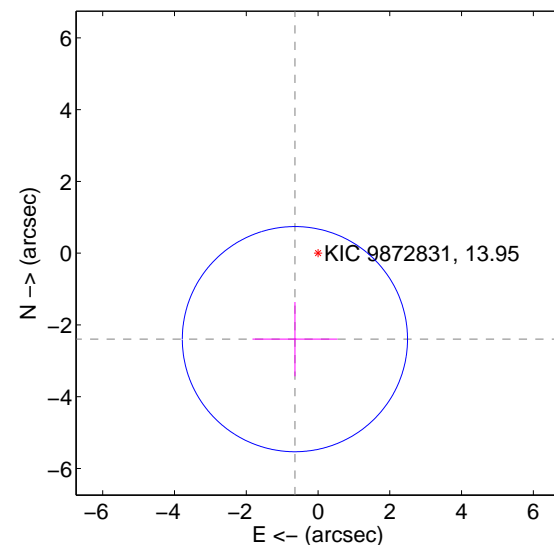
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

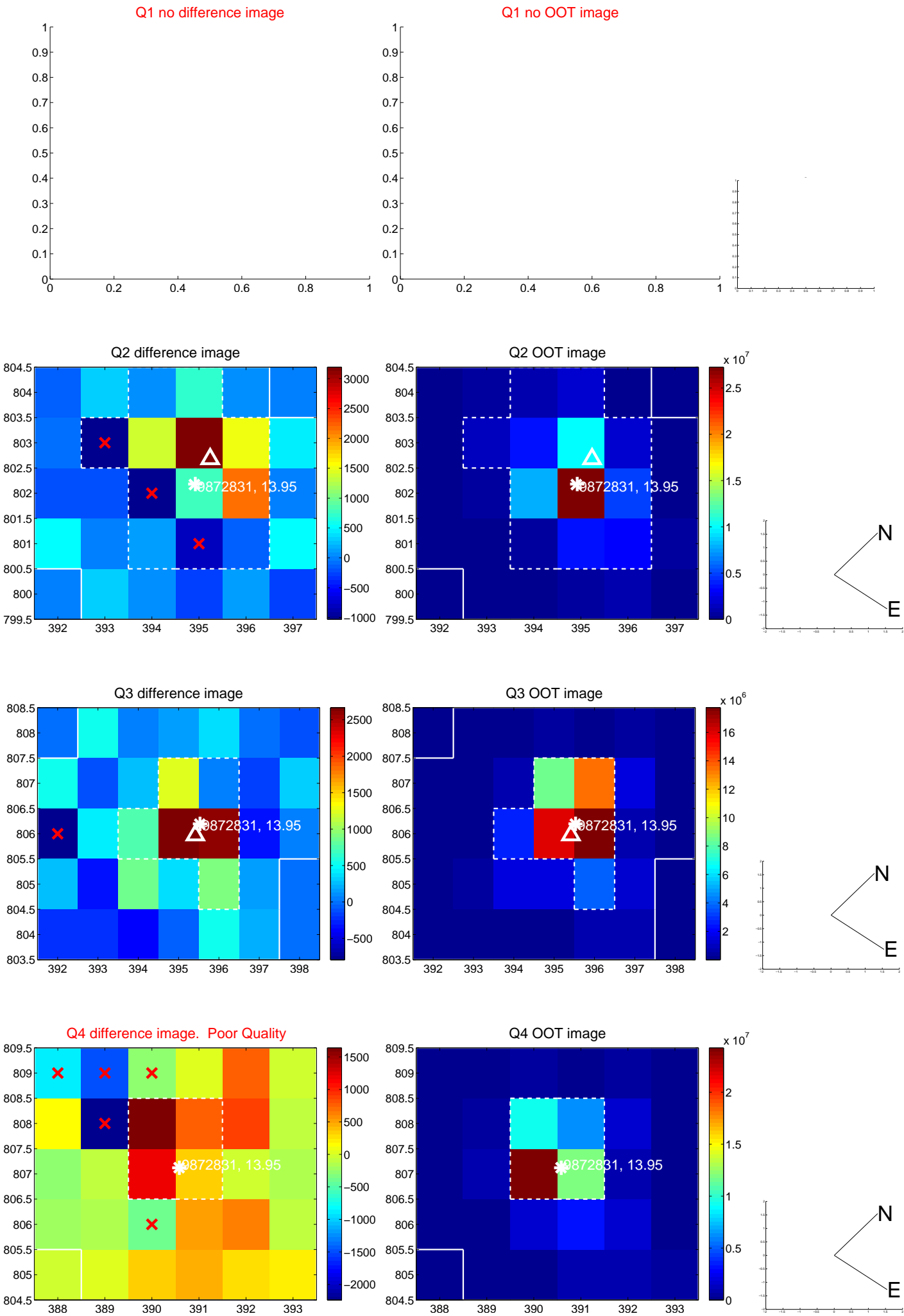


offset from photometric centroids

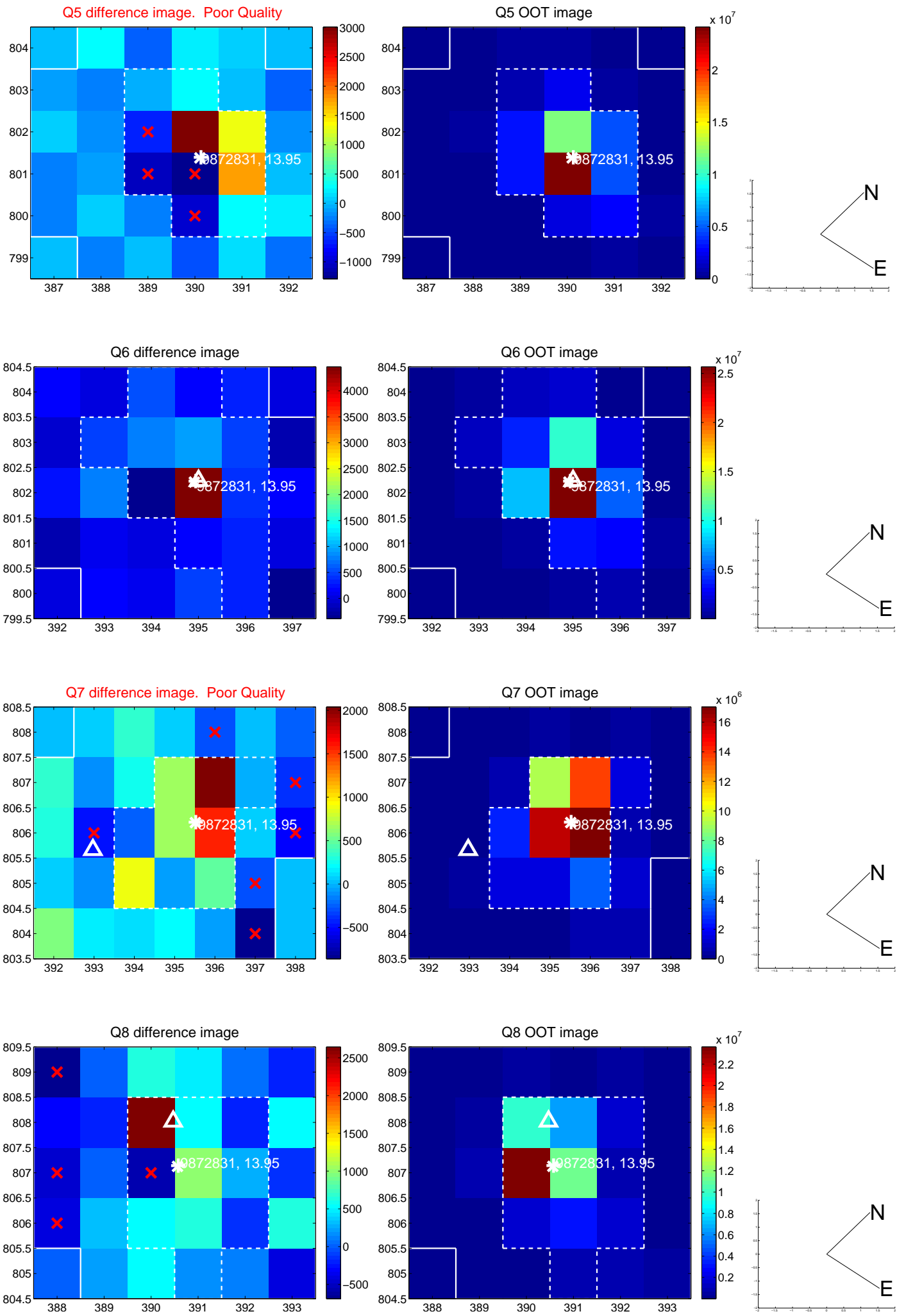


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

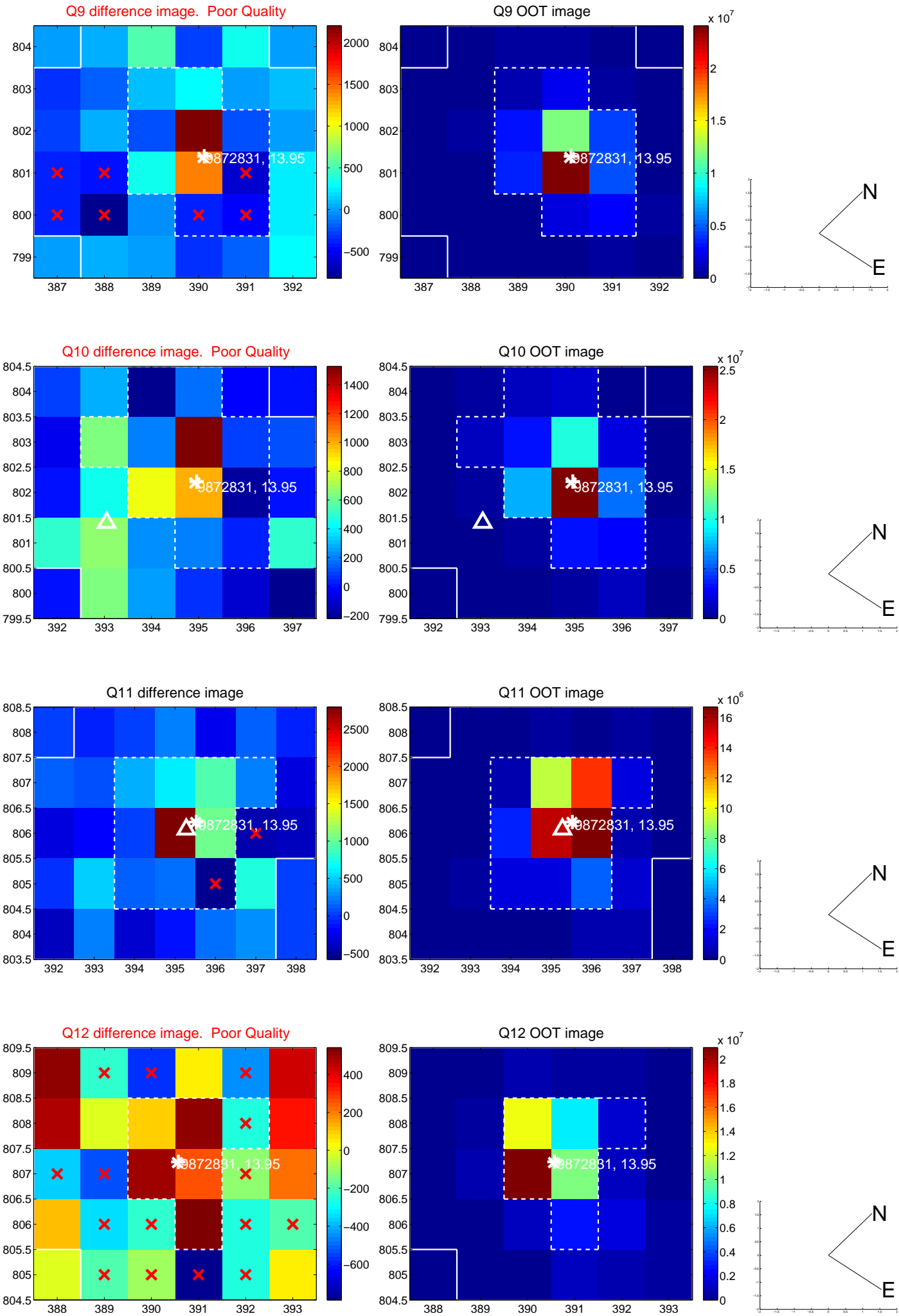
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



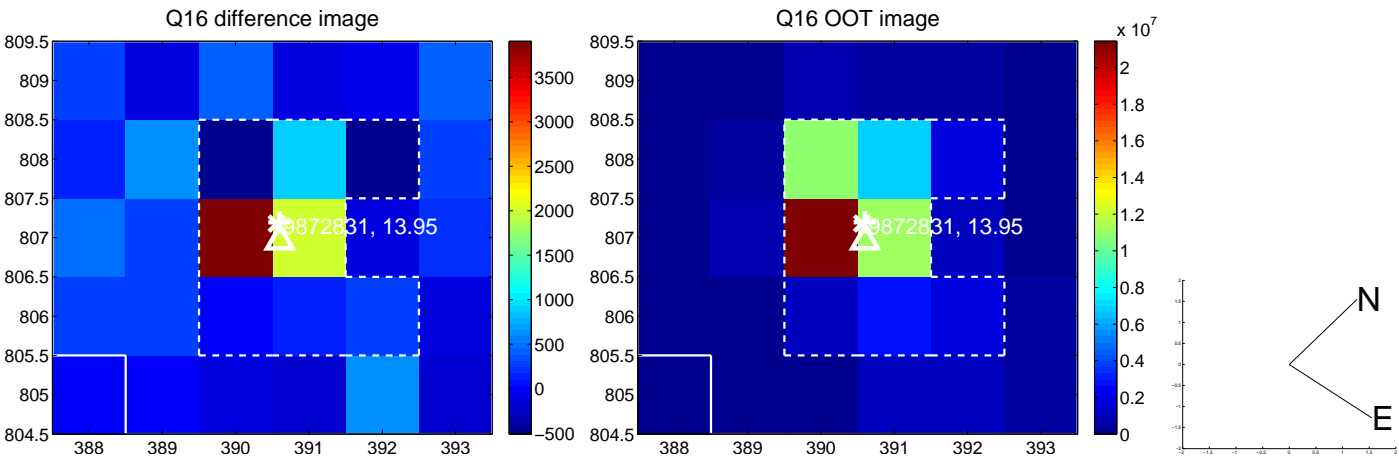
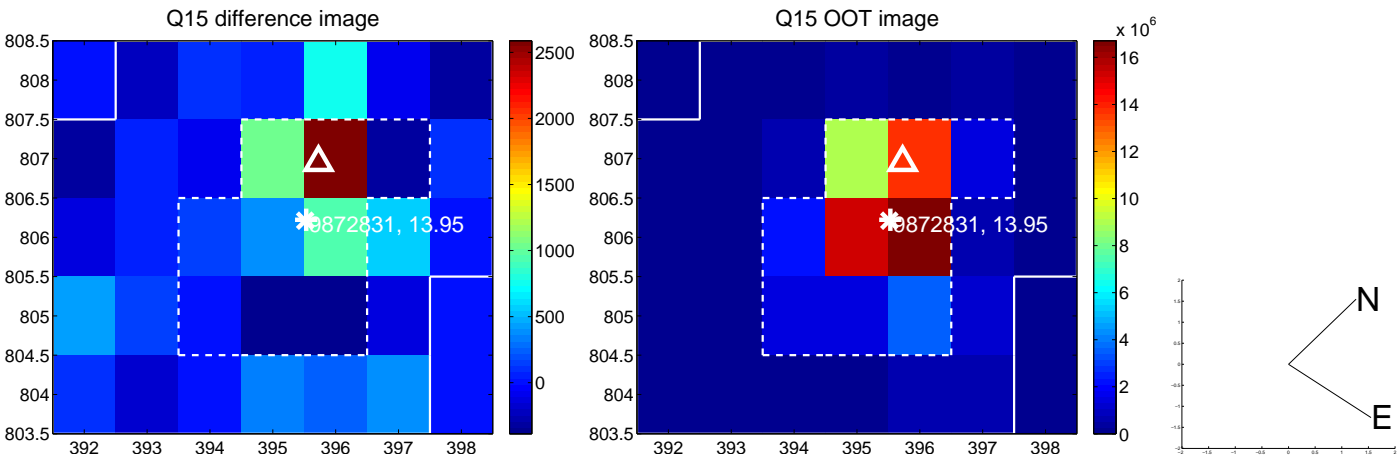
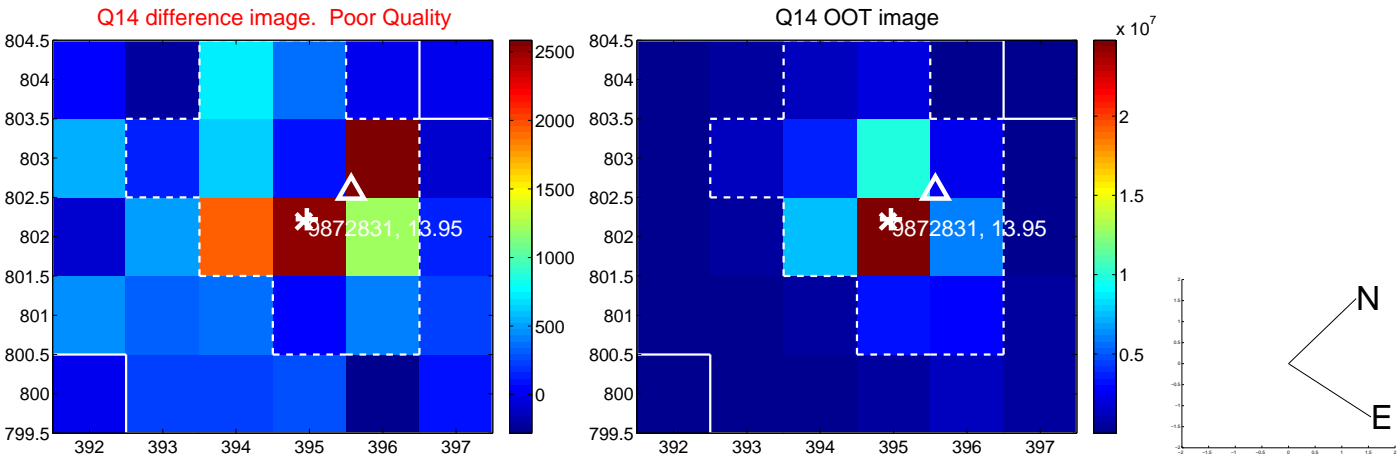
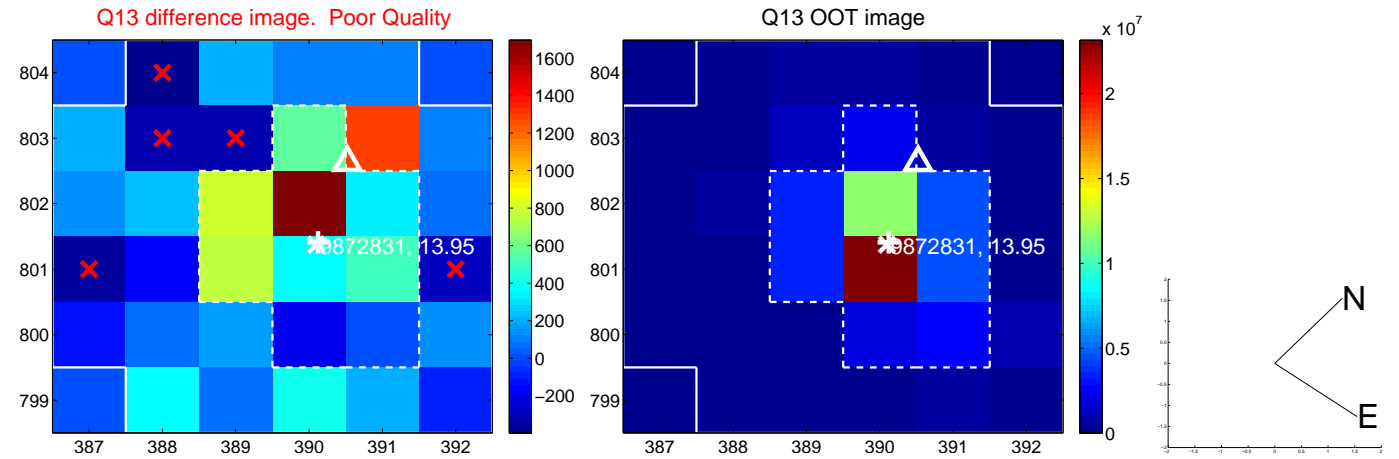
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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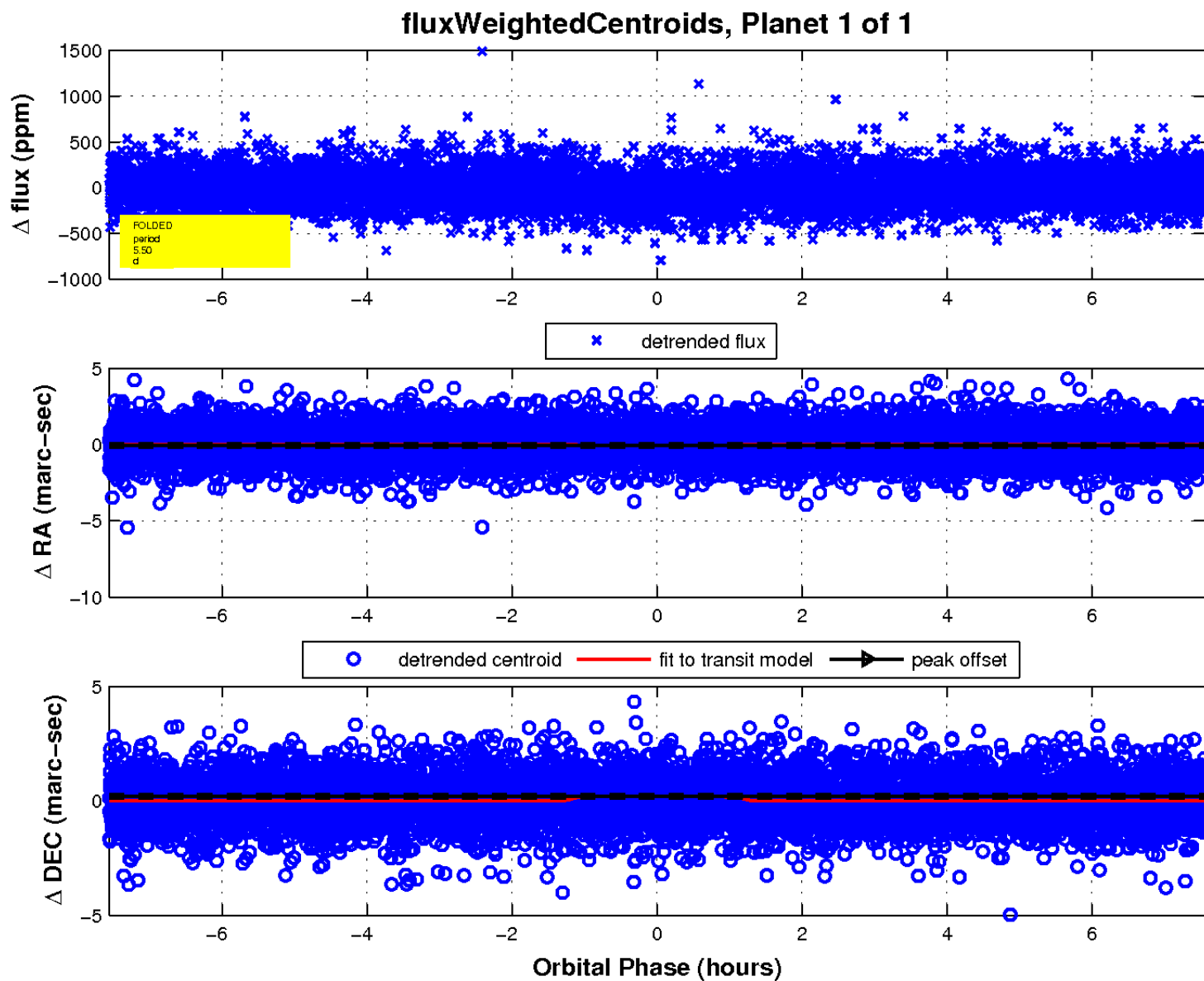
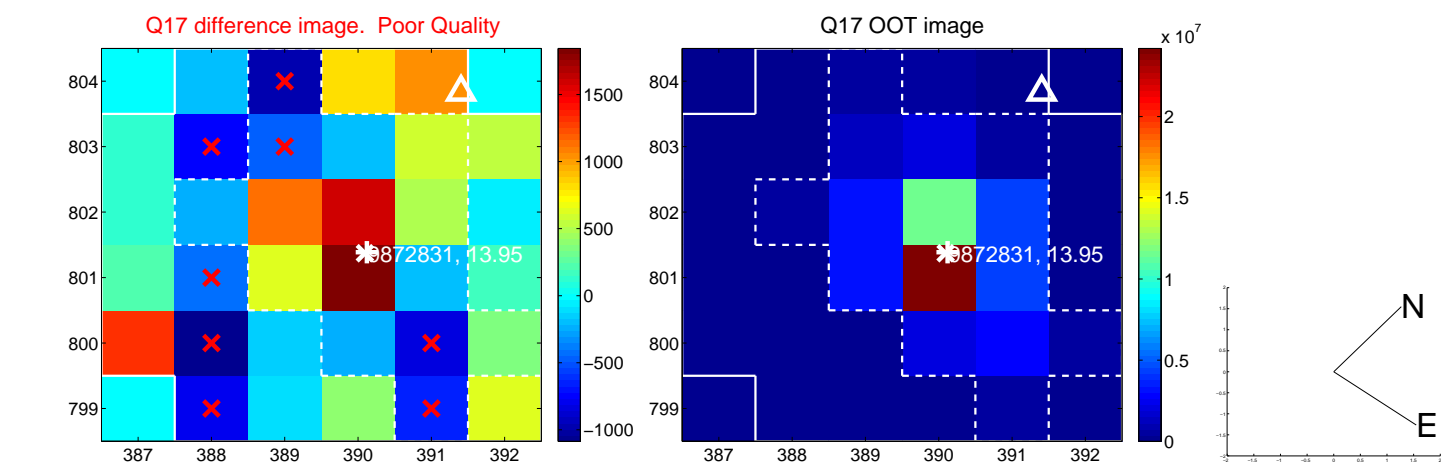


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



UKIRT Image

Declination

