

# KIC 009716302

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009716302-01	OBS	4142.01	1.332586	132.037896	305.4	4.195	13.5	14.9	0.75	5134	1.59	715.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009716302-01	OBS	FP	0.00	0	0	1	1	CENT_FEW_DIFFS—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.

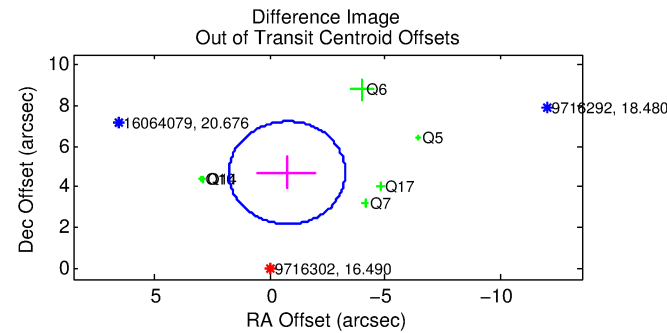
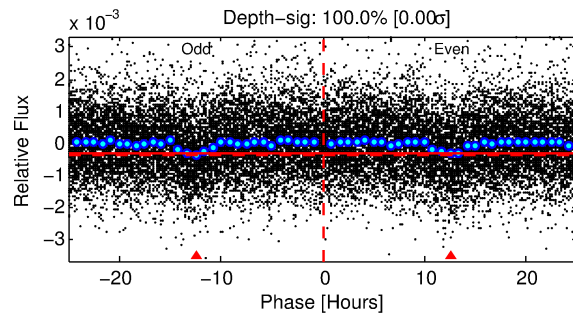
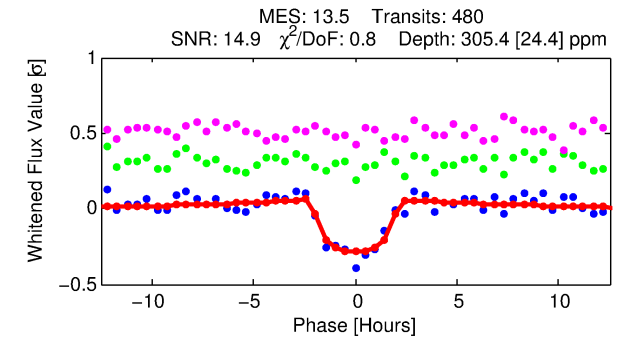
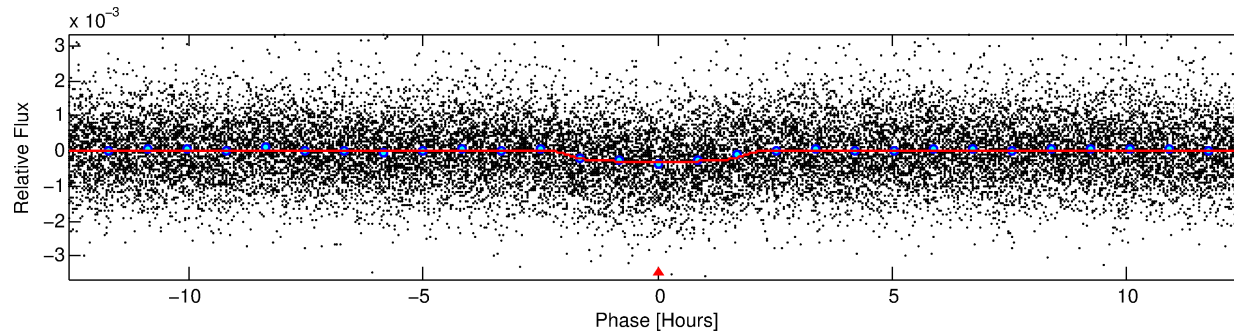
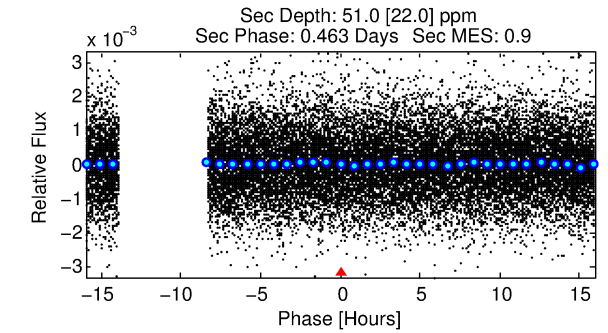
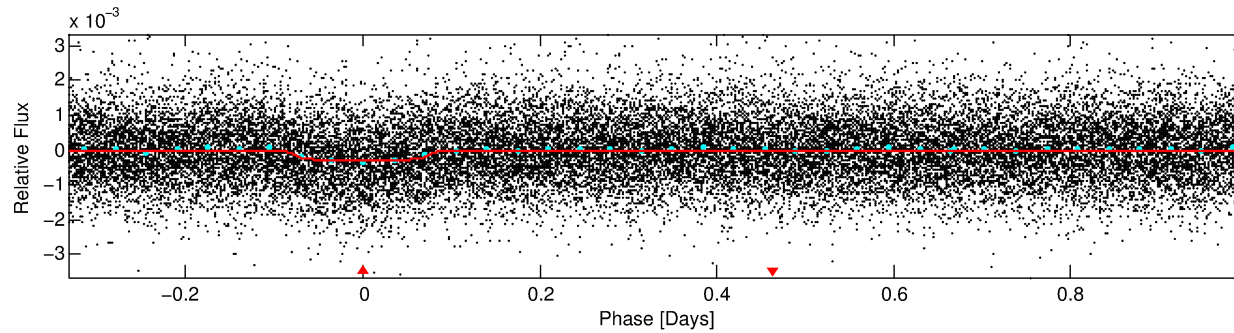
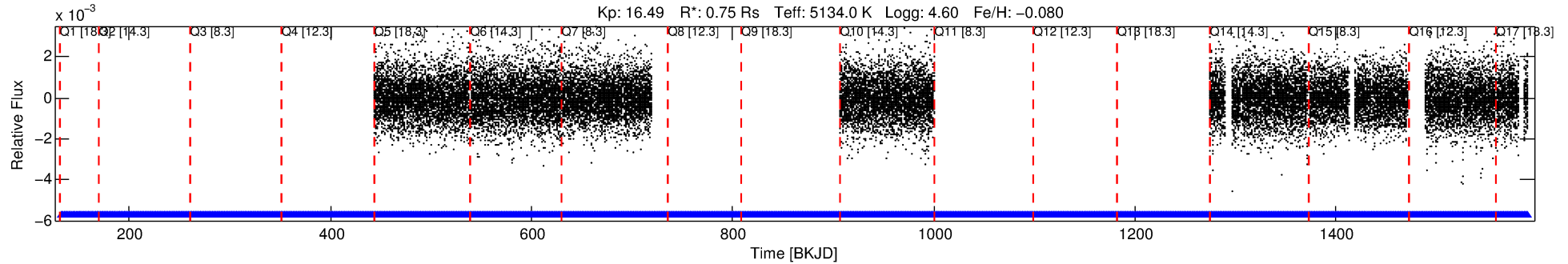
## Ephemeris Match Information For 009716302-01

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	$\sigma_P$	$\sigma_T$
009716302-01	9716302	BR-Cyg-pri	9899416	1:1	2638.5	663	5	10.03	16.49	2193.00	Col-Anomaly	0	1.38	0.78

**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: 9716302 Candidate: 1 of 1 Period: 1.333 d  
KOI: K04142.01 Corr: 0.957



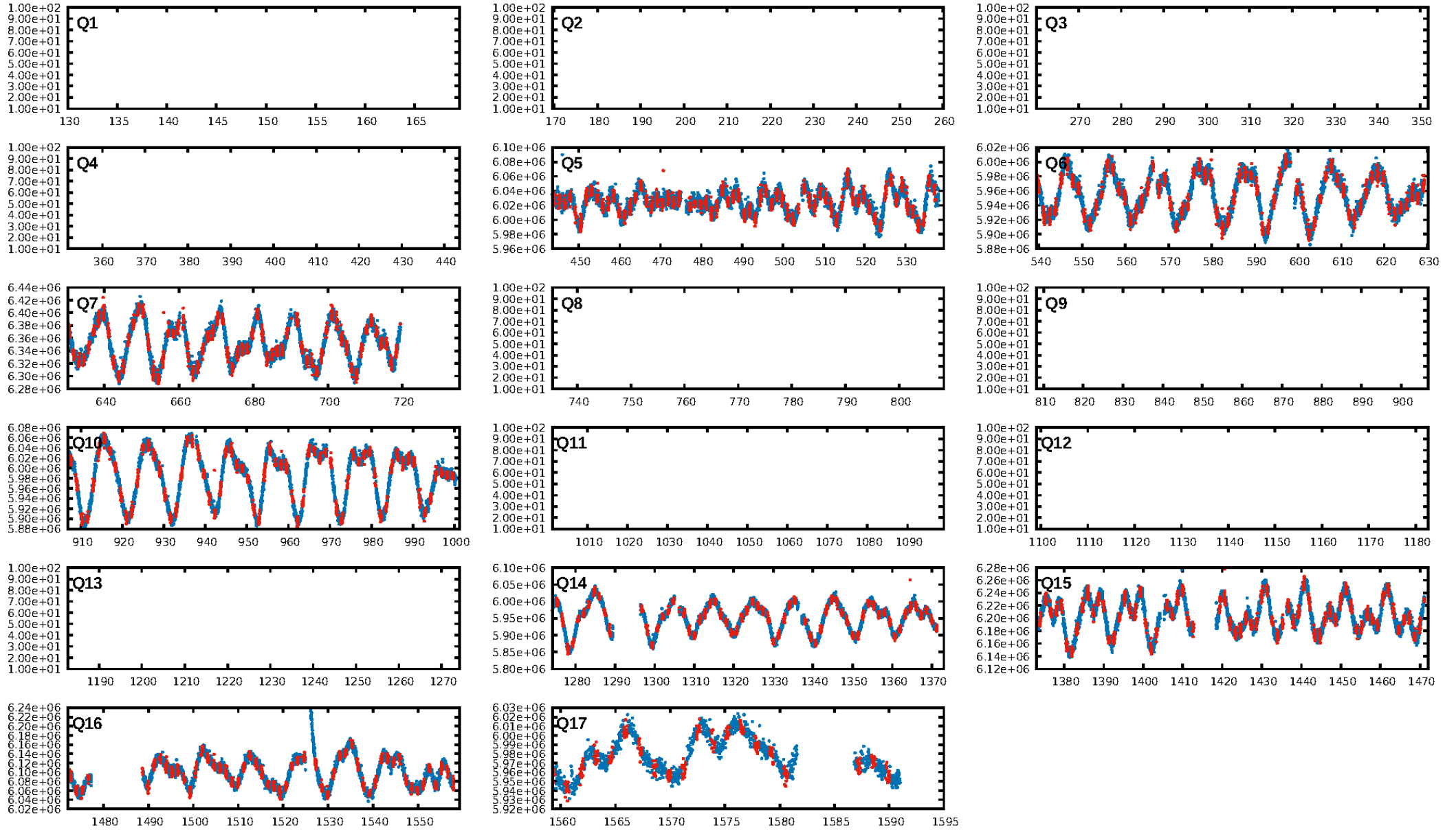
## DV Fit Results:

Period = 1.33259 [0.00001] d  
Epoch = 132.0379 [0.0032] BKJD  
Rp/R\* = 0.0194 [0.0043]  
a/R\* = 1.50 [0.73]  
b = 0.90 [0.19]  
Seff = 715.49 [150.67]  
Teq = 1319 [69] K  
Rp = 1.59 [0.41] Re  
a = 0.0222 [0.0025] AU  
Ag = 5.44 [3.46] [1.28σ]  
Teffp = 3114 [492] K [3.62σ]

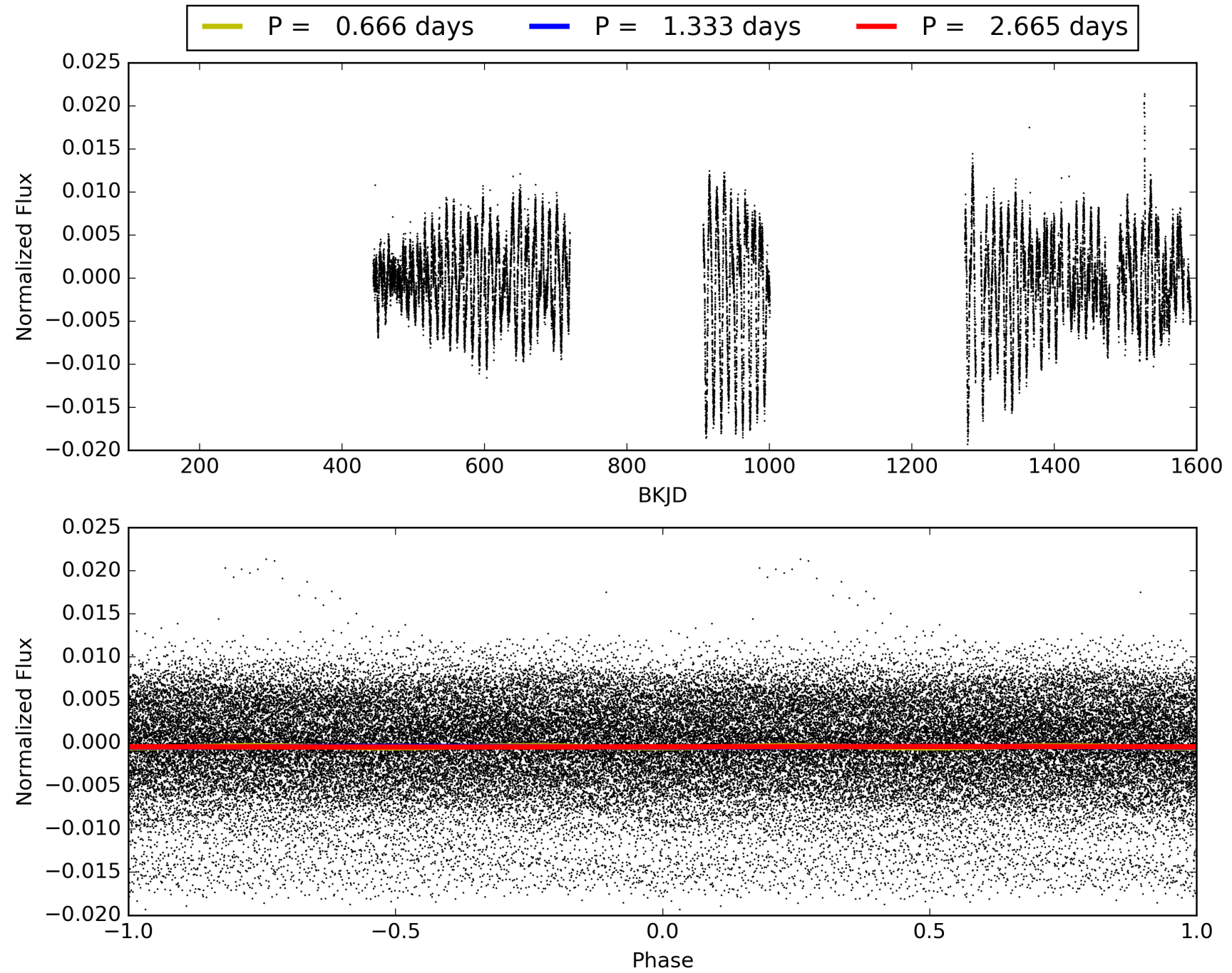
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.80e-39  
RollingBand-fgt: 1.00 [460/460]  
GhostDiagnostic-chr: 0.1705  
Centroid-sig: 0.0%  
Centroid-so: 5.516 arcsec [7.26σ]  
OotOffset-rm: 4.758 arcsec [5.67σ]  
KicOffset-rm: 4.781 arcsec [4.73σ]  
OotOffset-st: 3/1/0/2 [6]  
KicOffset-st: 3/1/0/2 [6]  
DiffImageQuality-fgm: 0.00 [0/6]  
DiffImageOverlap-fno: 1.00 [8/8]

# TCE 009716302-01, PDC Light Curves

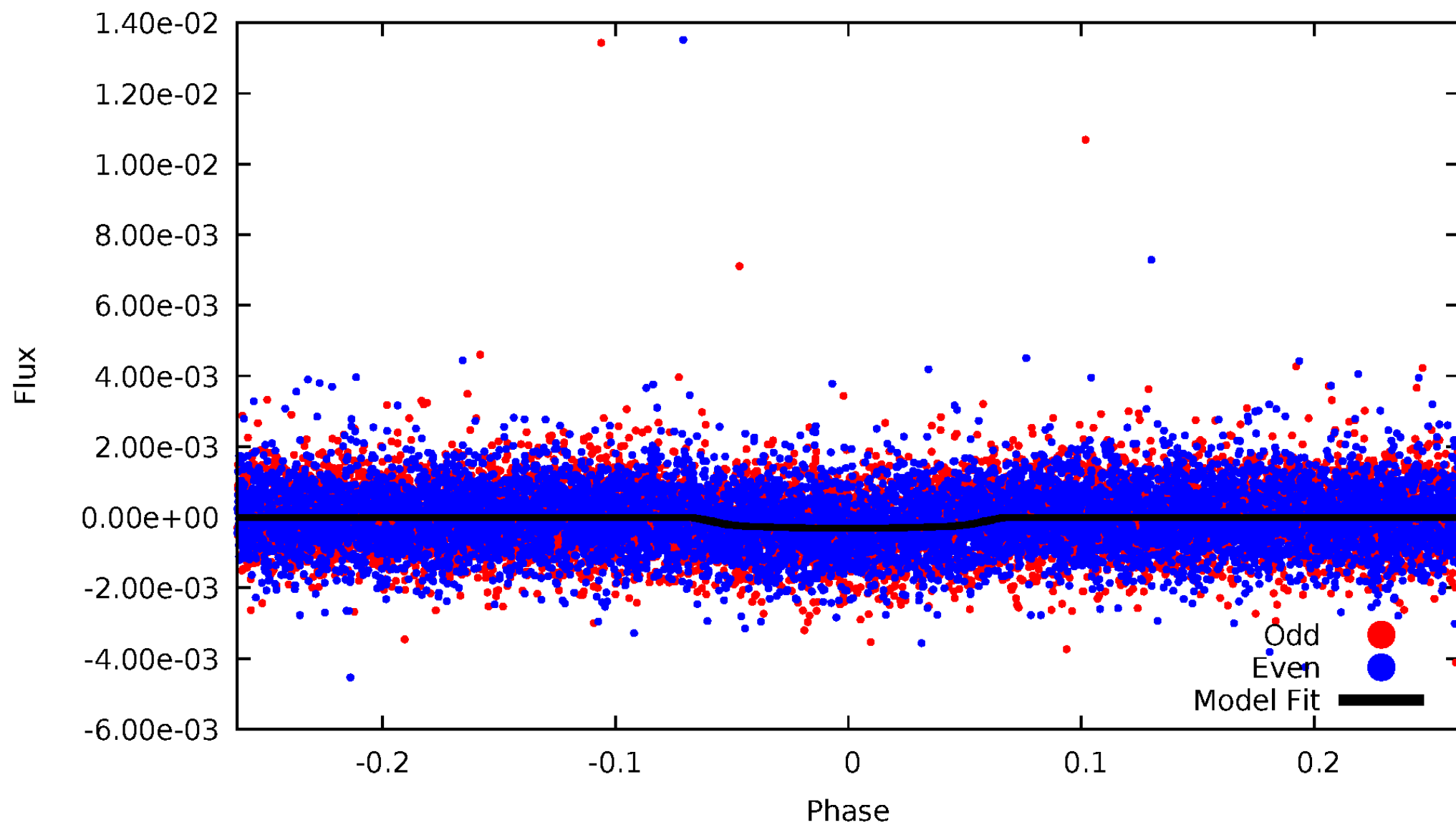


TCE 009716302-01



# DV Odd/Even

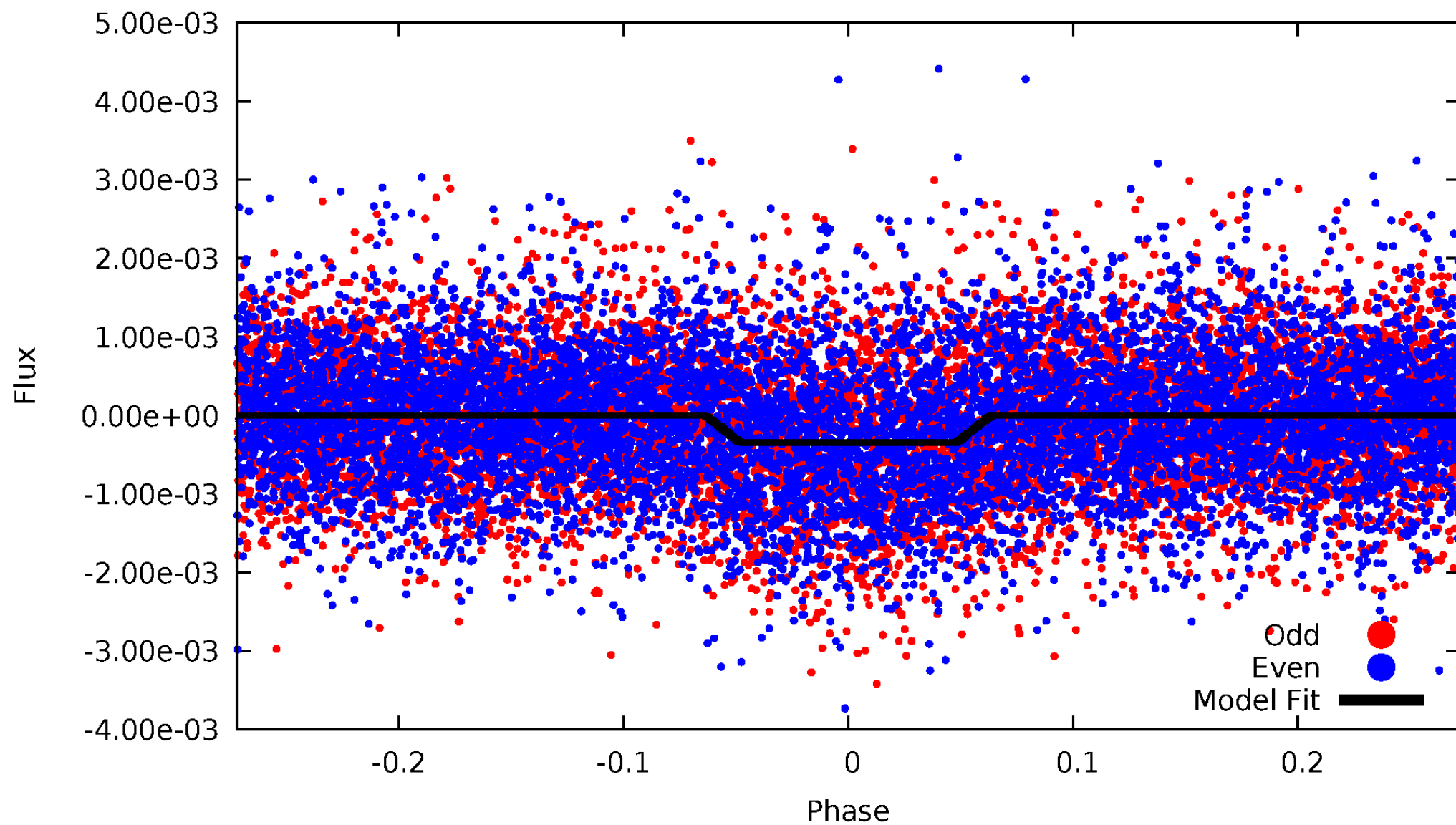
TCE 009716302-01





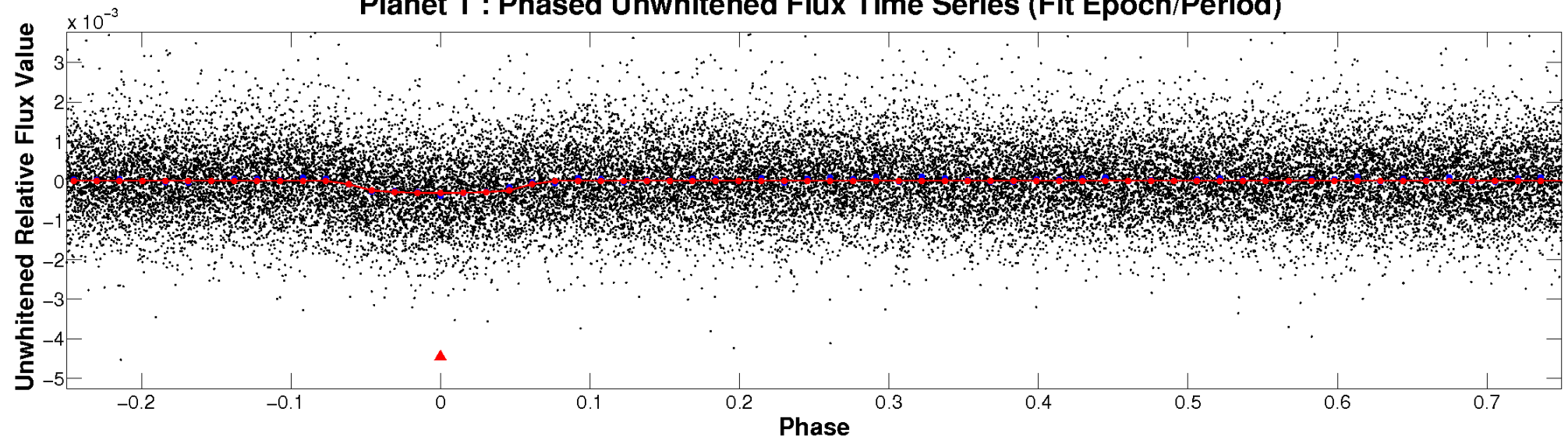
# ALT Odd/Even

TCE 009716302-01

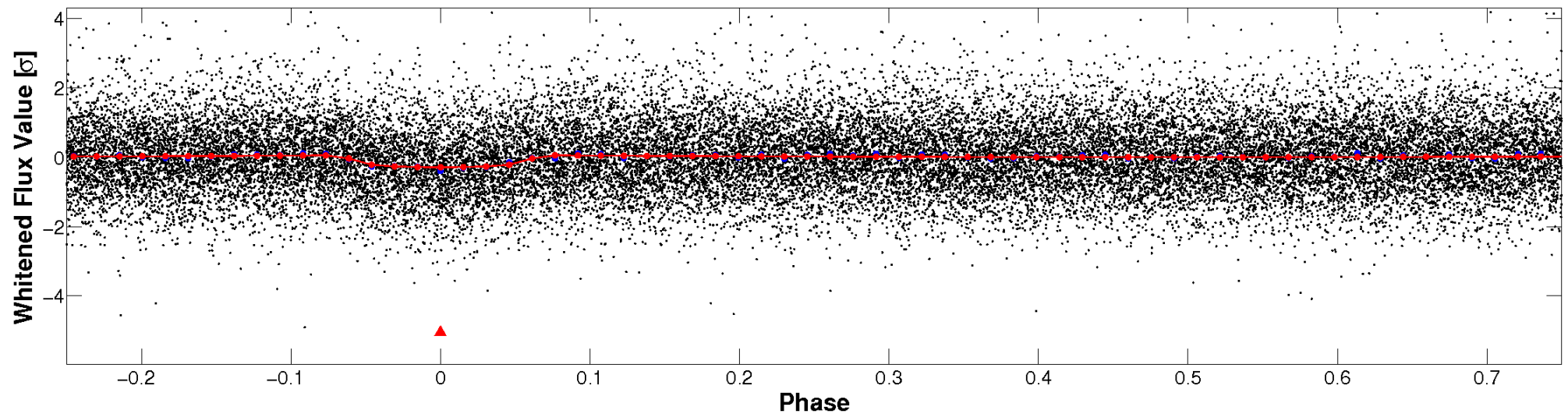


# Non-Whitened Vs. Whitened Light Curve

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

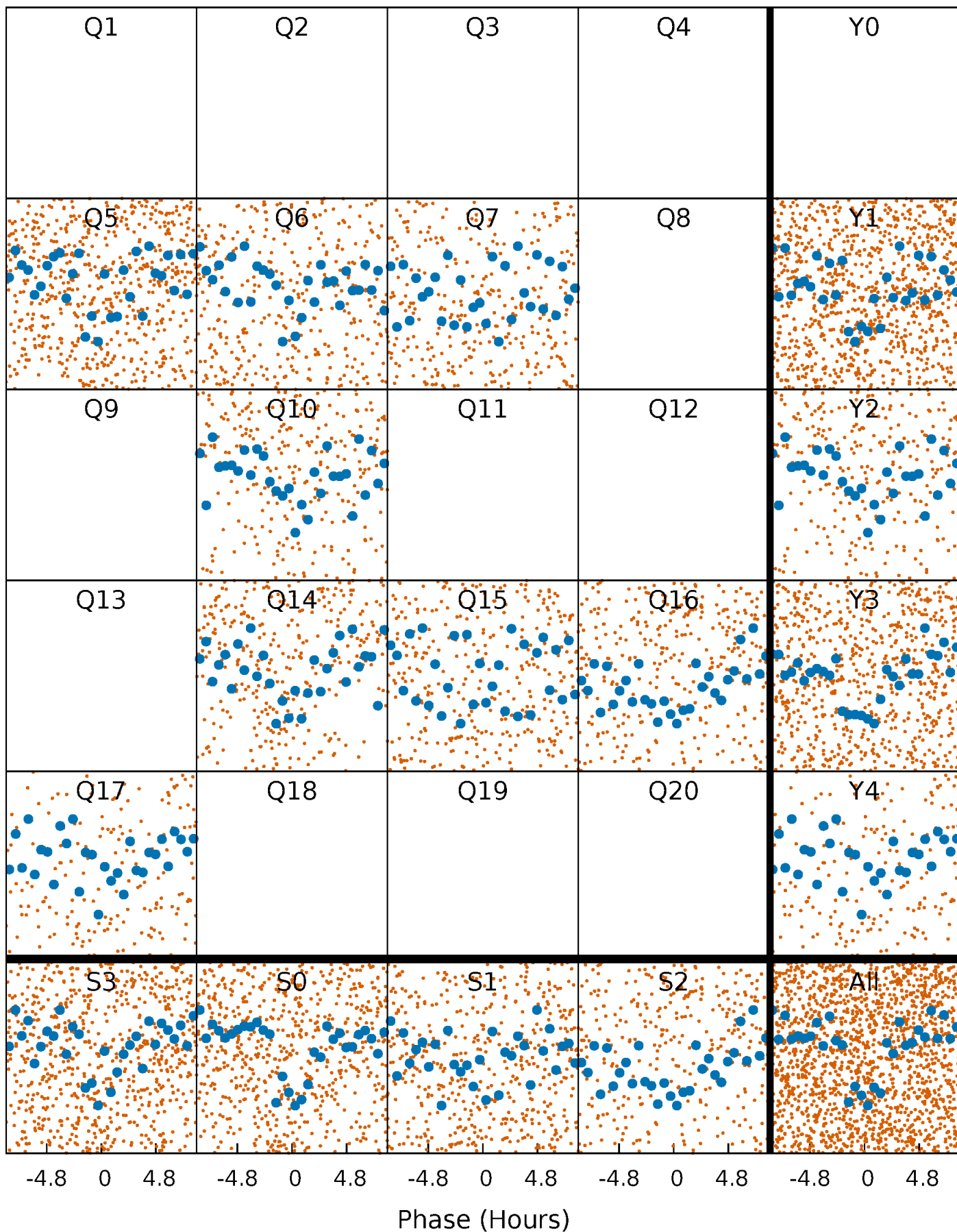


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

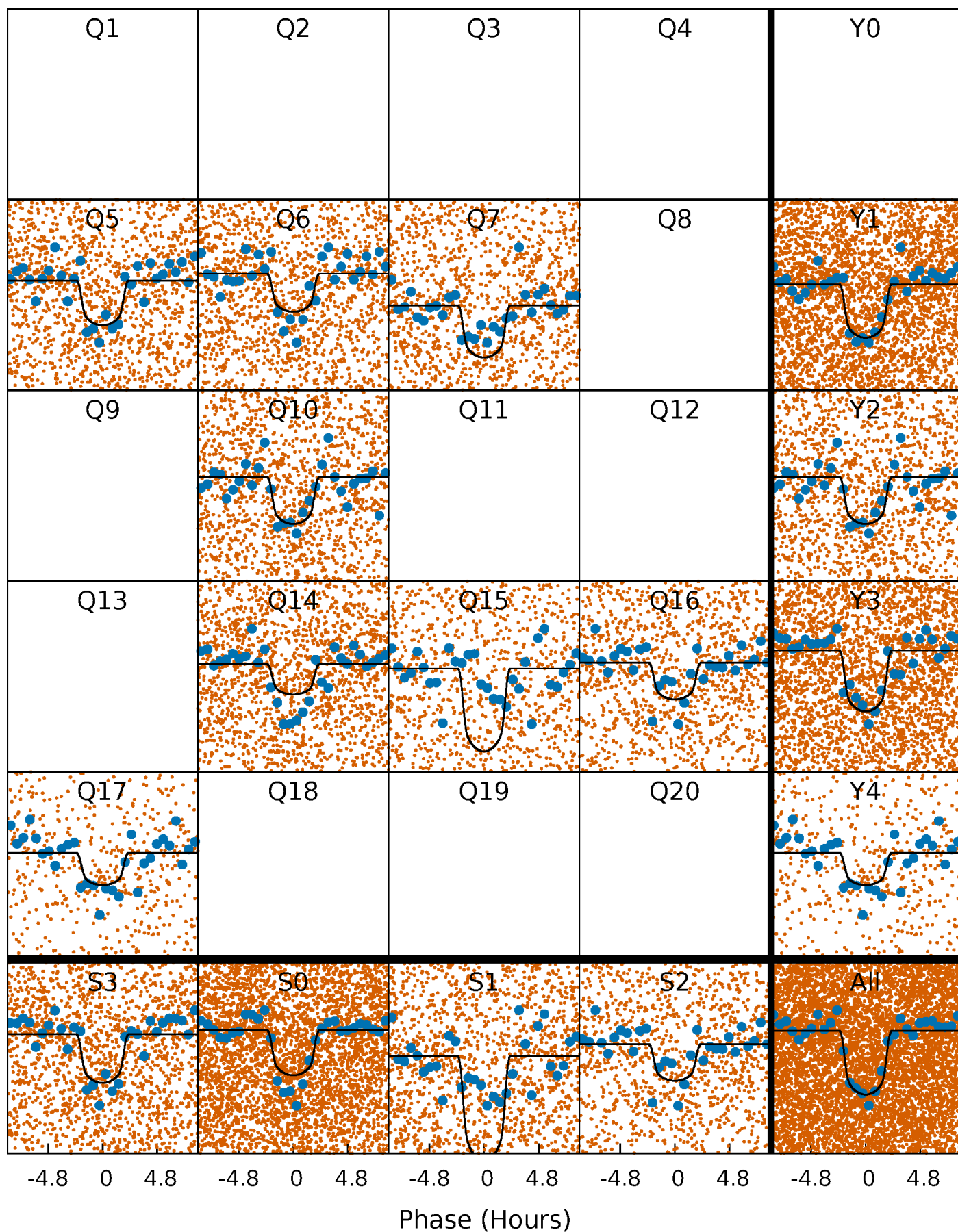
TCE 009716302-01 P= 1.332586 Days  $T_0=132.037896$  (BKJD)





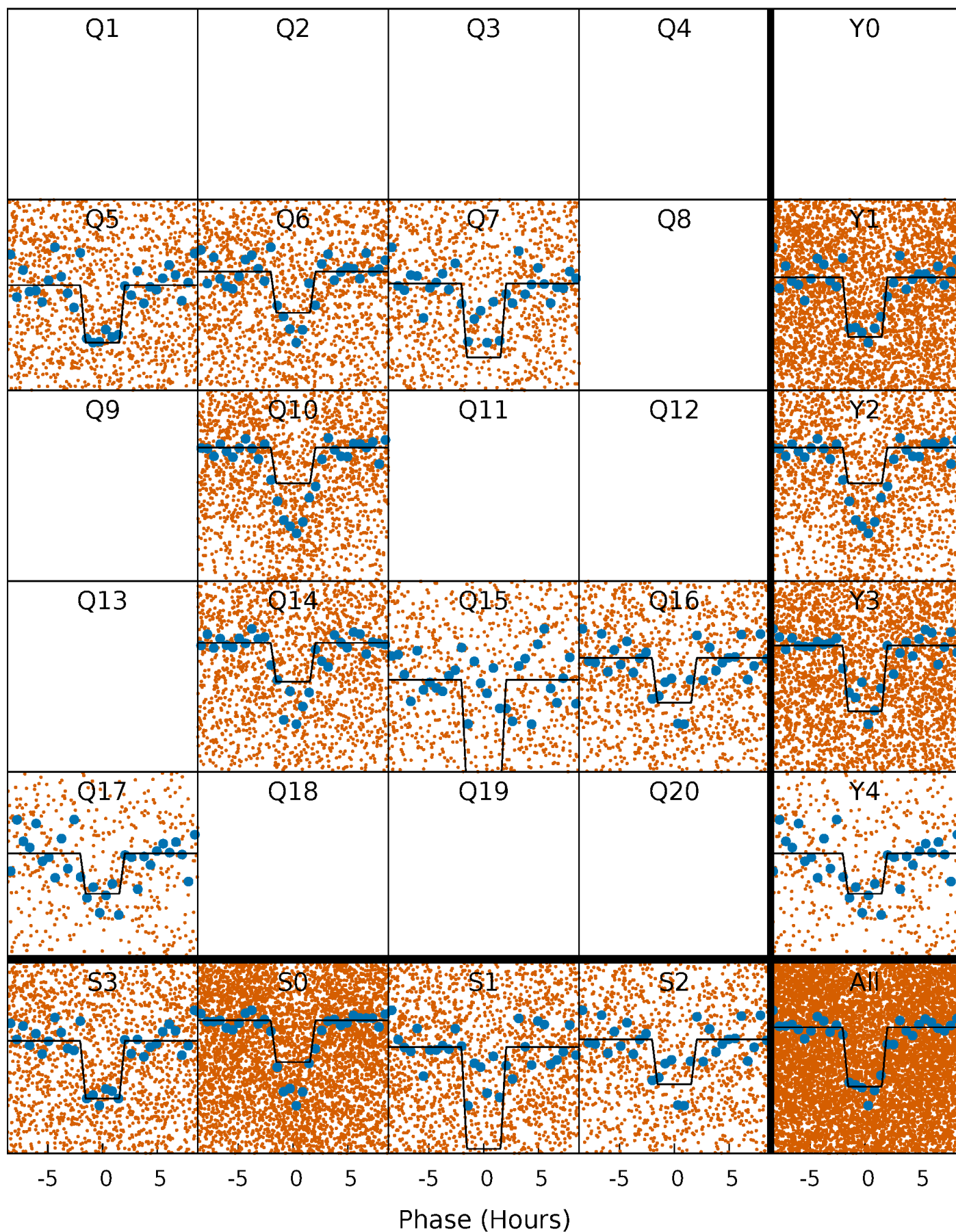
# DV Quarter-Phased Transit Curves

TCE 009716302-01 P= 1.332586 Days  $T_0=132.037896$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

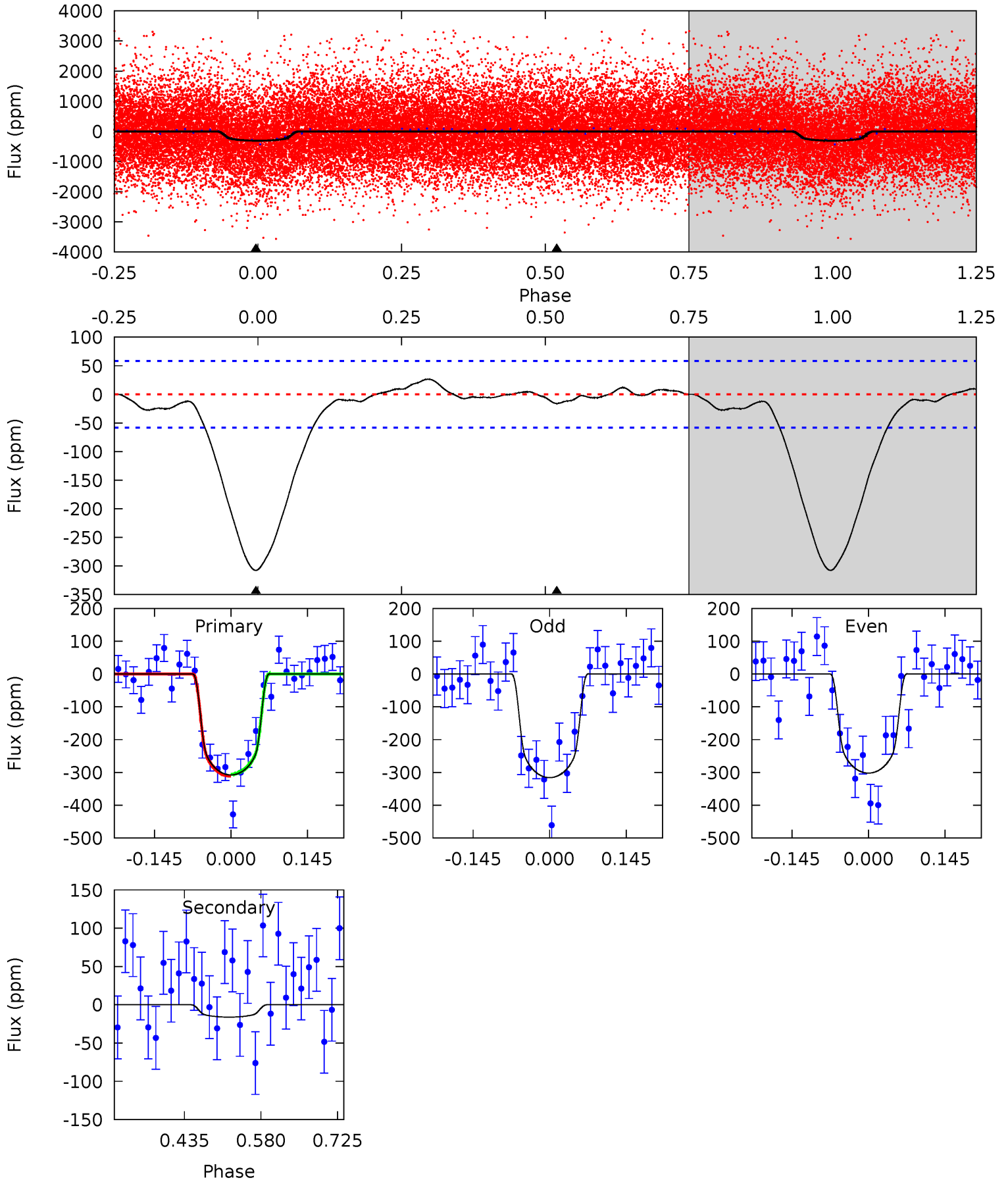
TCE 009716302-01   P= 1.332579 Days    $T_0=132.036820$  (BKJD)



# DV Model-Shift Uniqueness Test

009716302-01, P = 1.332586 Days, E = 132.037896 Days

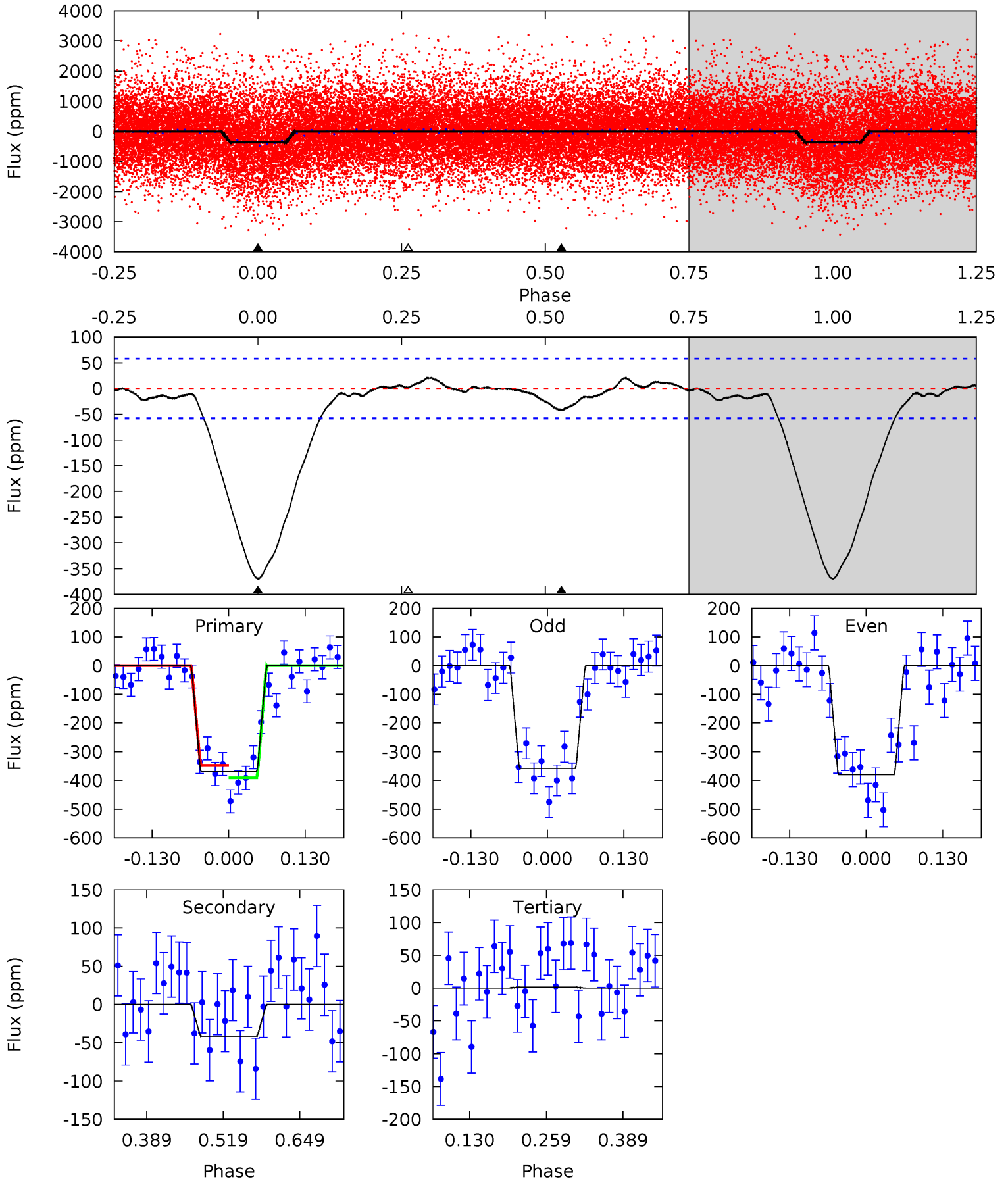
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
23.7	1.24	0	0	4.49	1.46	1.07	23.7	23.7	1.24	1.24	0.54	0.95	0.08	0.22



# Alt Model-Shift Uniqueness Test

009716302-01, P = 1.332579 Days, E = 132.036820 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
28.7	3.22	-0.11	0	4.51	1.52	0.84	28.8	28.7	3.34	3.22	0.85	0.93	0.05	1.67



### Stellar Parameters For KIC 009716302

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5134^{+179}_{-179}$	$4.599^{+0.033}_{-0.083}$	$-0.080^{+0.300}_{-0.300}$	$0.752^{+0.105}_{-0.065}$	$0.825^{+0.073}_{-0.090}$	$2.729^{+0.498}_{-0.728}$
	+3%/-3%	+1%/-2%	+375%/-375%	+14%/-9%	+9%/-11%	+18%/-27%
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 009716302-01 / KOI 4142.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-16 \pm 13$	$1.62^{+0.38}_{-0.34}$	$1862^{+81}_{-79}$	$2899^{+383}_{-4326}$	$1.651^{+1.819}_{-1.352}$
Alt.	$-41 \pm 13$	$1.56^{+0.33}_{-0.36}$	$1864^{+82}_{-74}$	$3408^{+386}_{-304}$	$4.396^{+3.869}_{-1.869}$

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



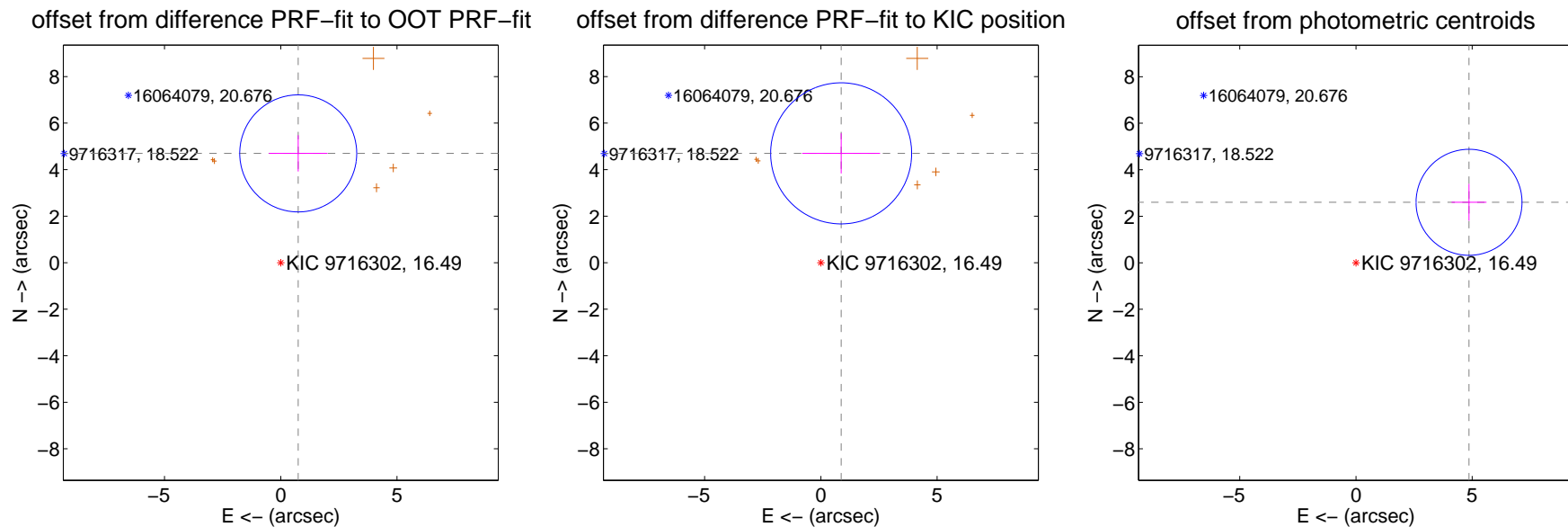
## DV Centroid Data

Supplemental centroid analysis for 009716302-01. Kepler magnitude: 16.49. Transit SNR 14.90

There are 0 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	4.758 $\pm$ 0.839	5.67	-0.752 $\pm$ 1.260	4.698 $\pm$ 0.780
PRF-fit source offset from KIC position	4.781 $\pm$ 1.011	4.73	-0.872 $\pm$ 1.675	4.700 $\pm$ 0.862
photometric centroid source offset	5.52 $\pm$ 0.76	7.26	-4.87 $\pm$ 0.75	2.60 $\pm$ 0.79

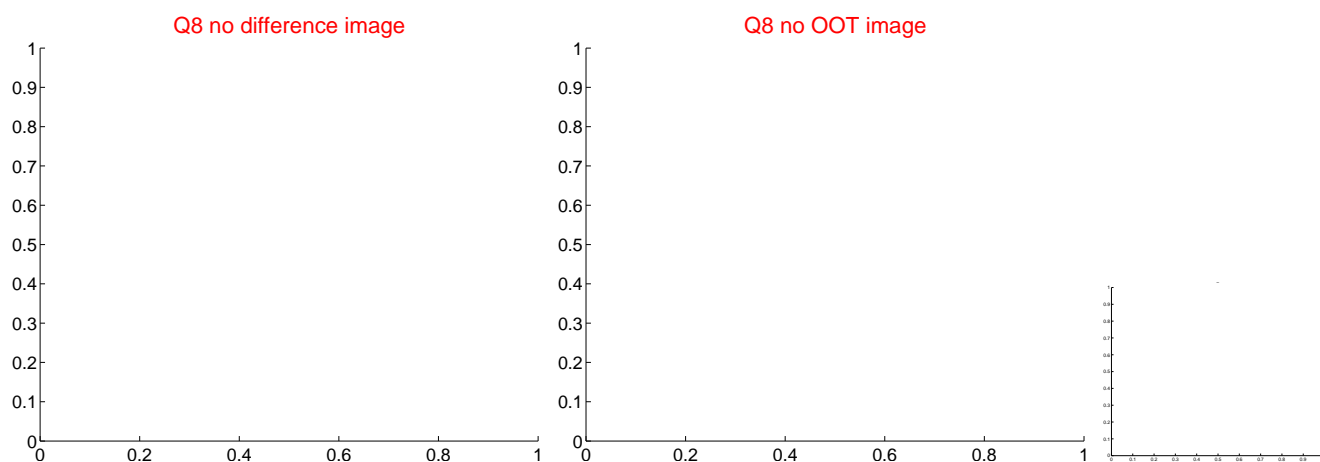
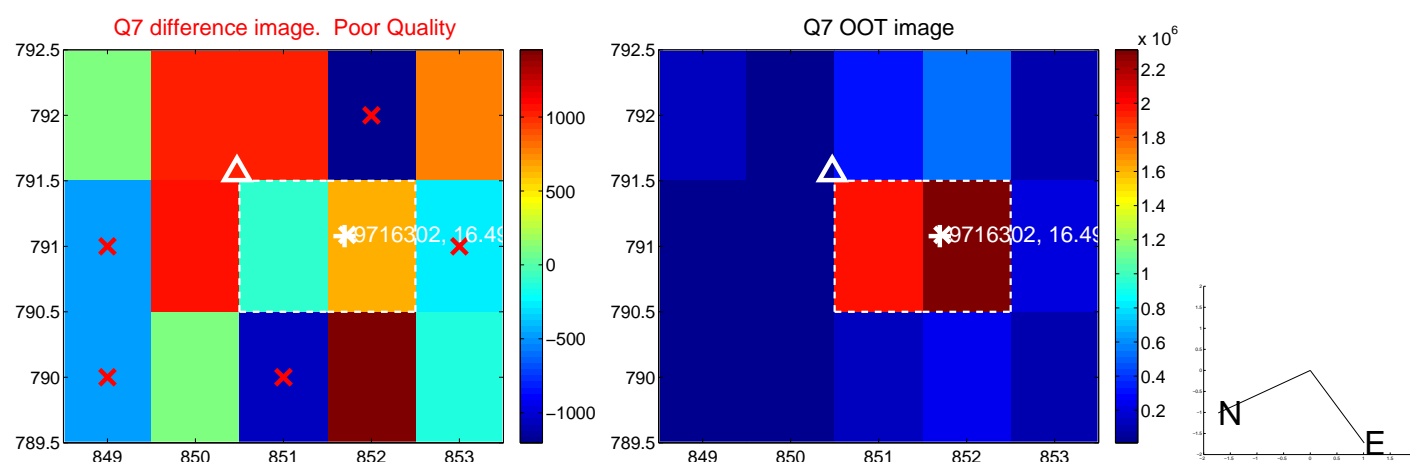
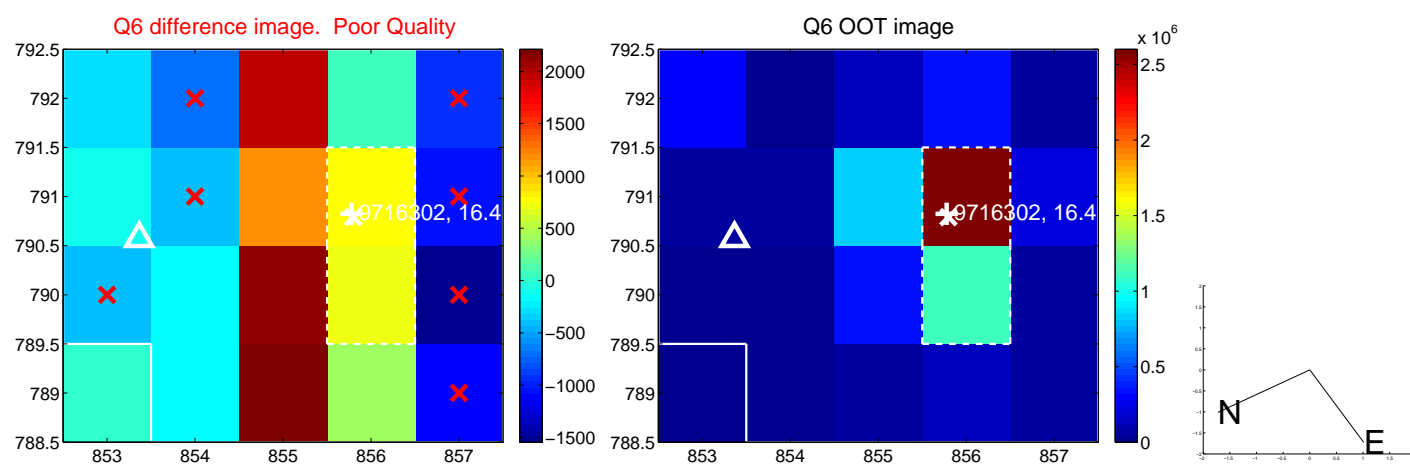
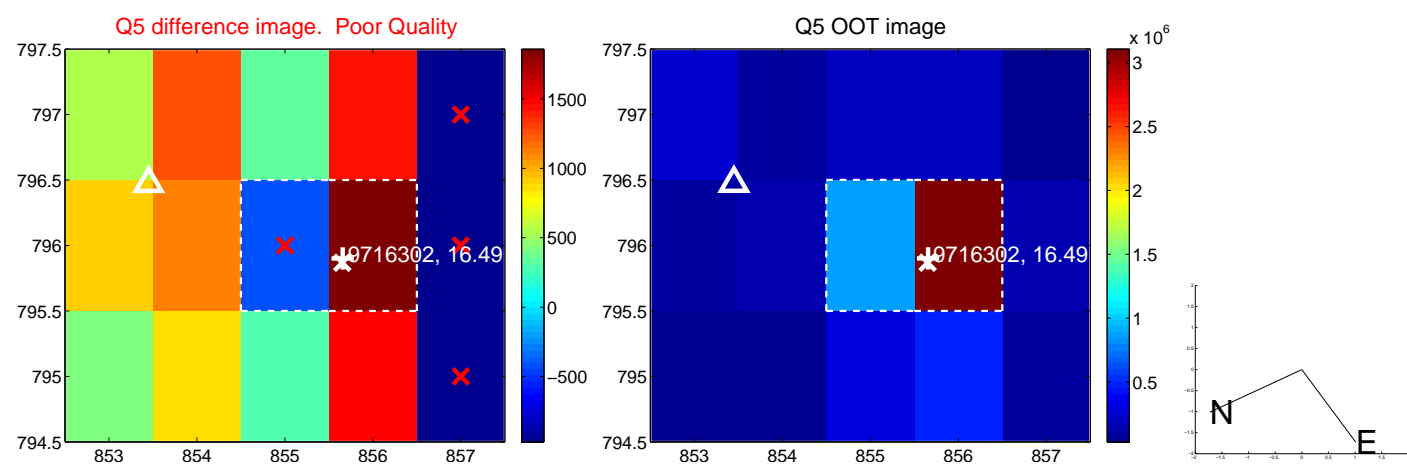


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

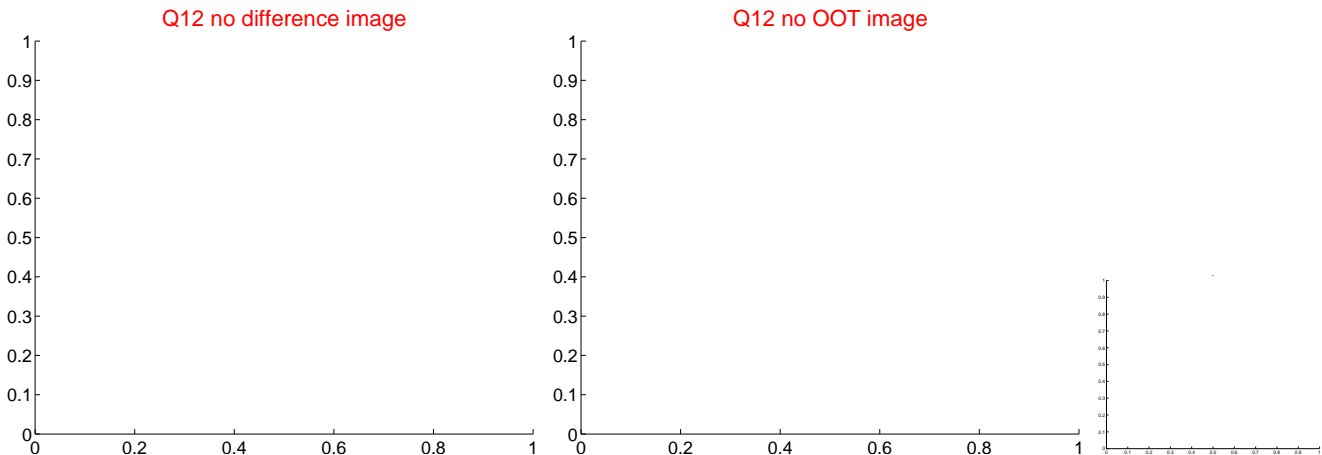
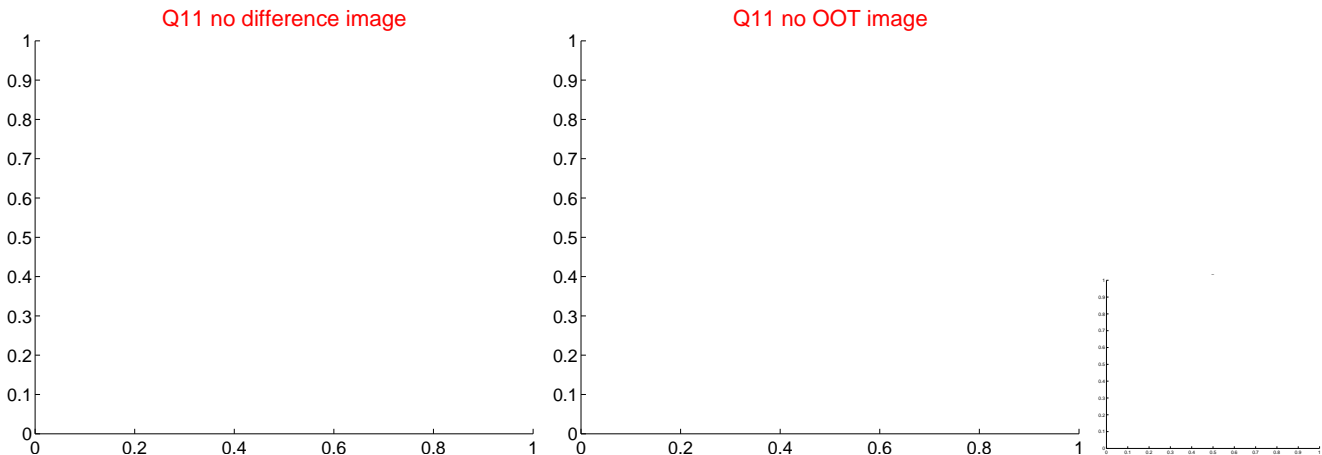
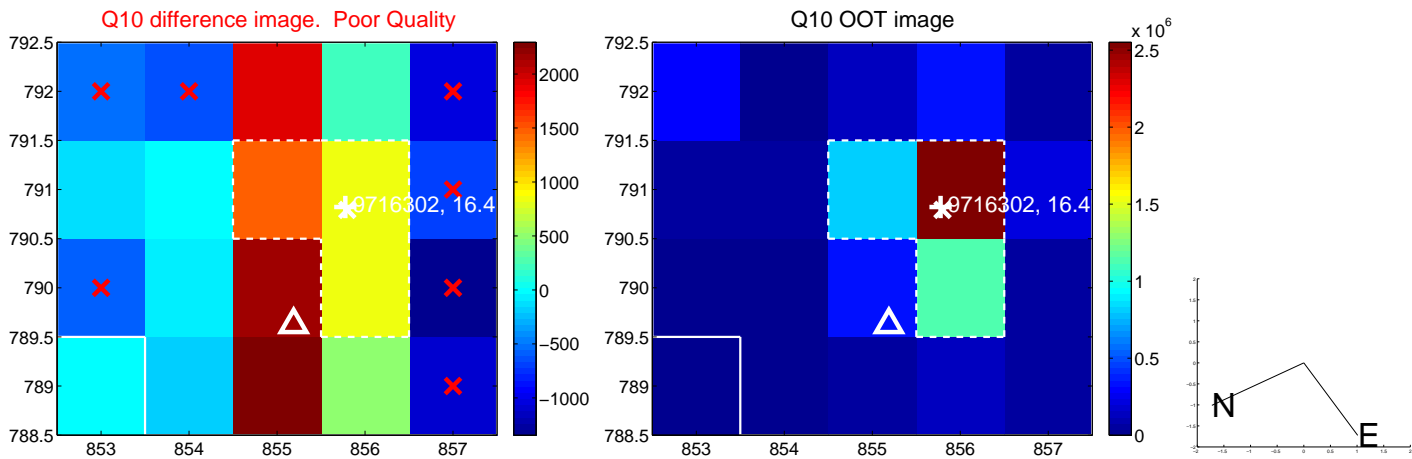
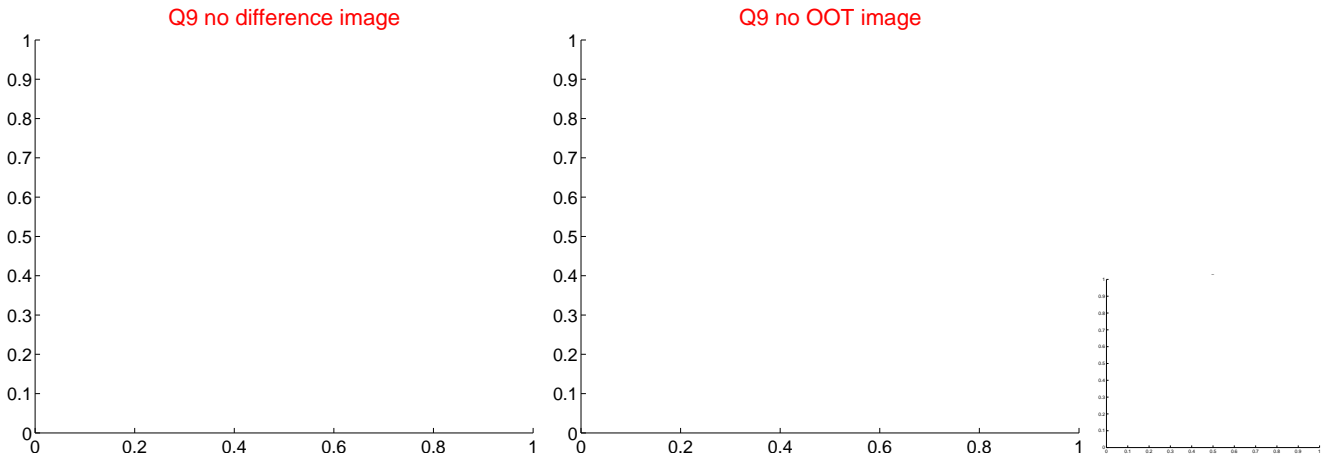
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



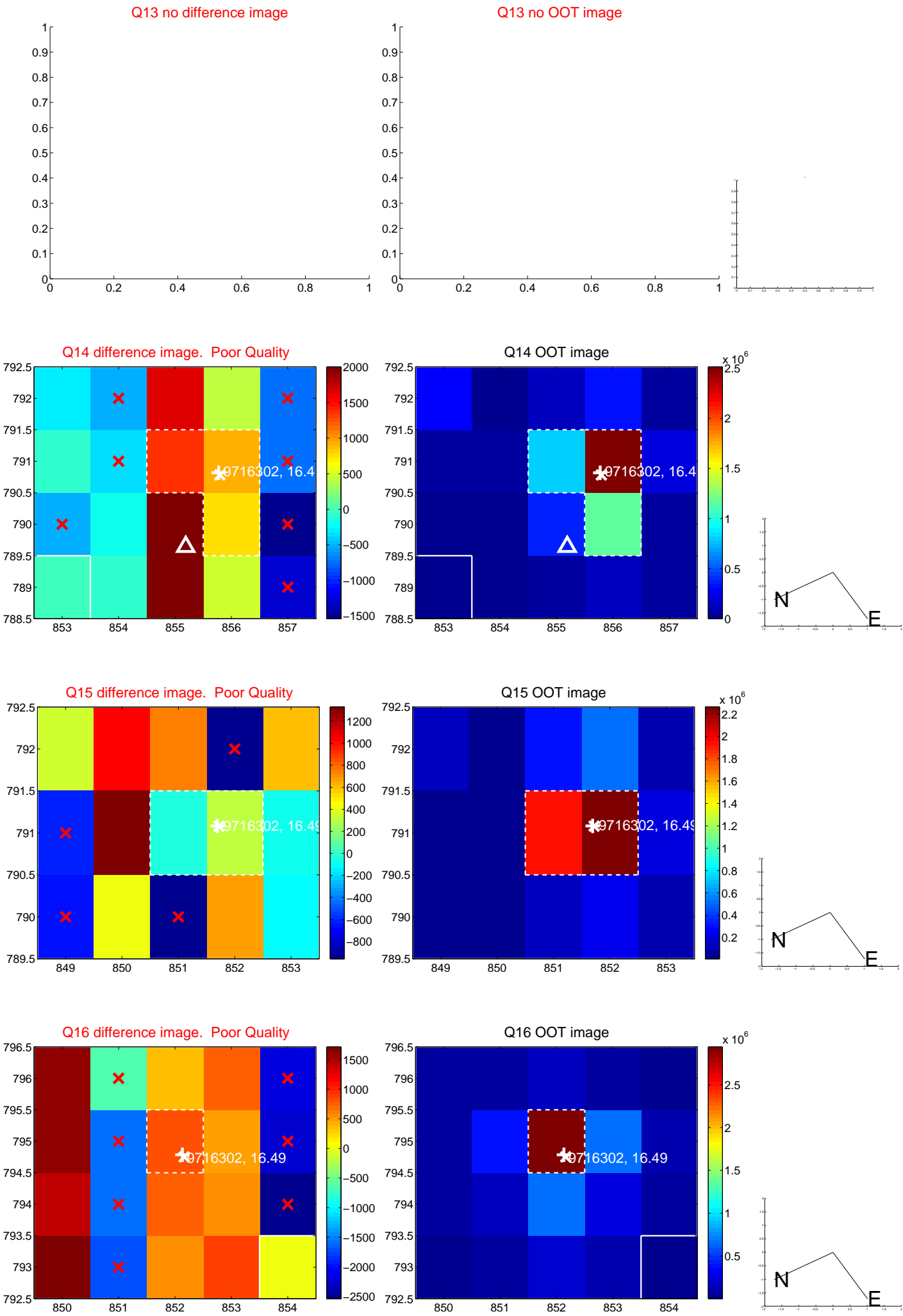
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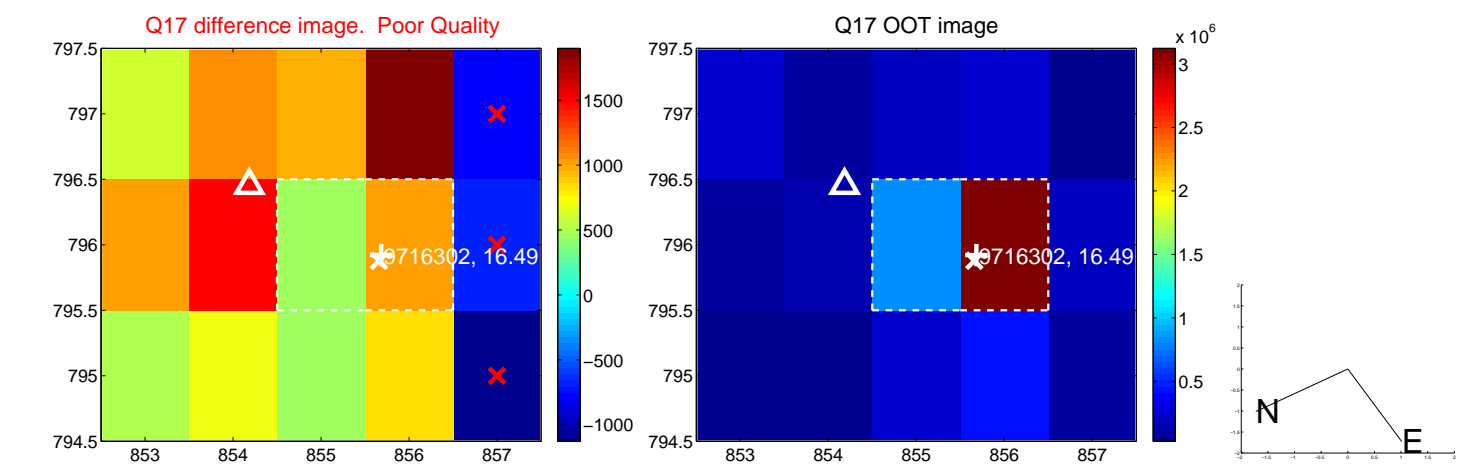


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

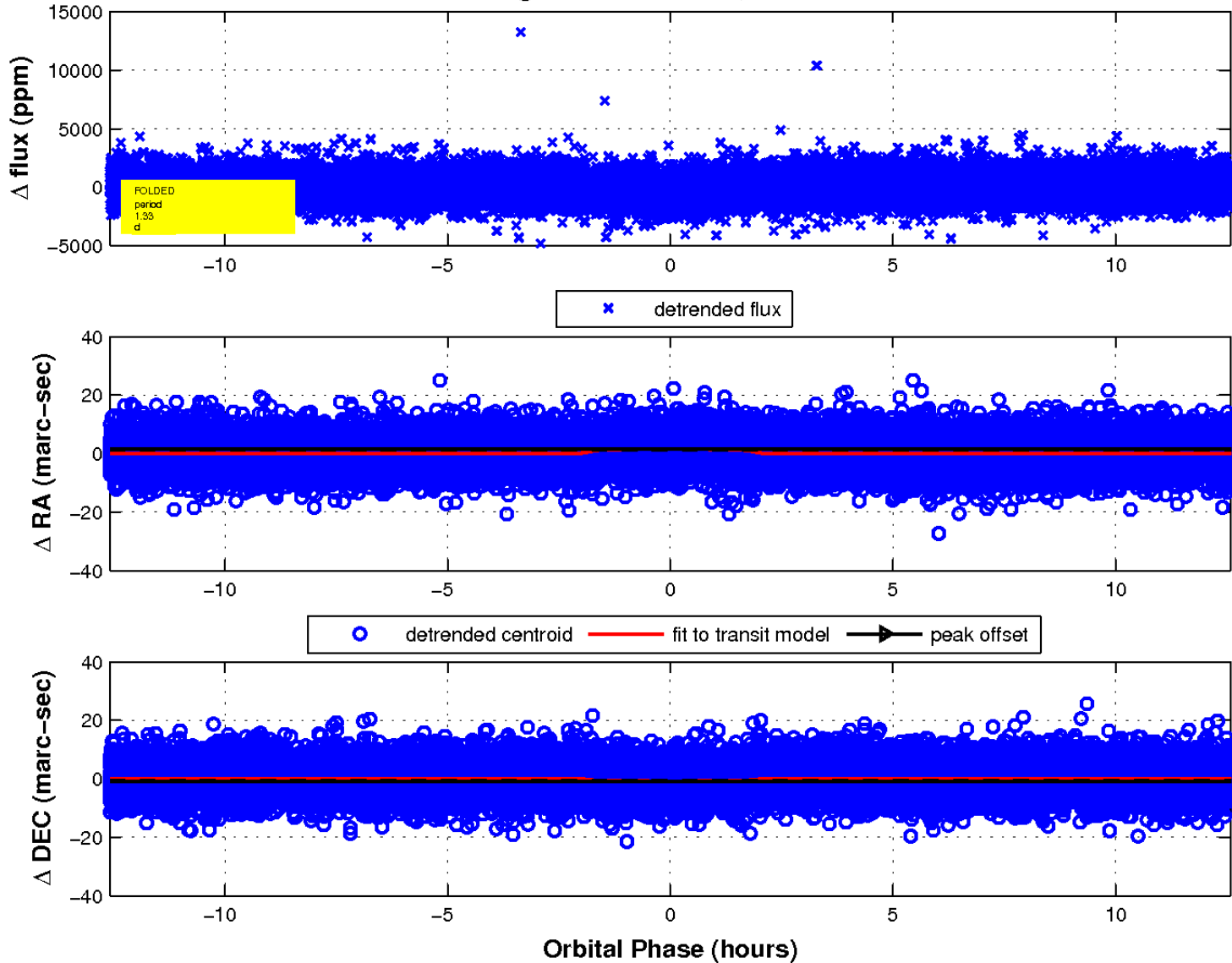




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 1



UKIRT Image

