

# KIC 009899421

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009899421-01	OBS	7246.01	1.332535	132.065166	77.2	2.797	12.4	10.7	12.58	4601	13.61	0.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009899421-01	OBS	FP	0.00	0	0	1	1	PLANET_IN_STAR—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 009899421-01

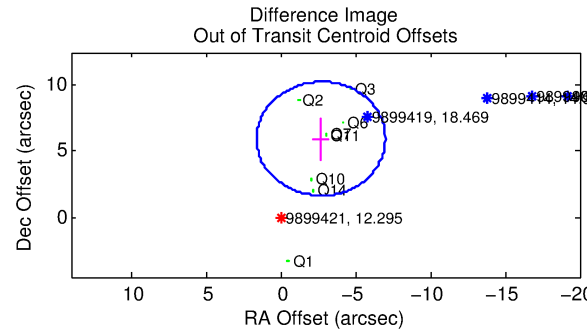
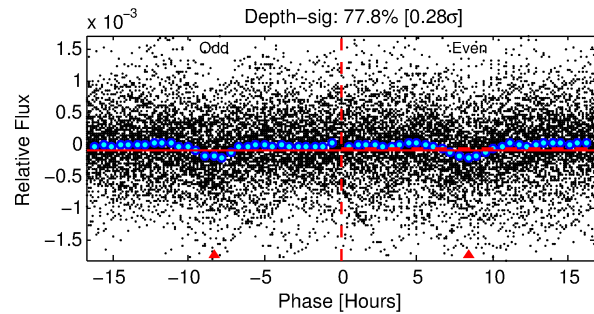
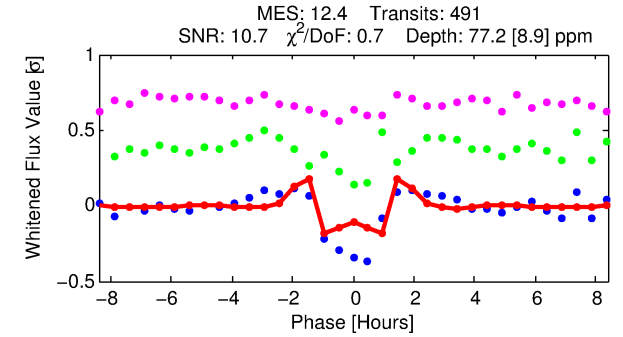
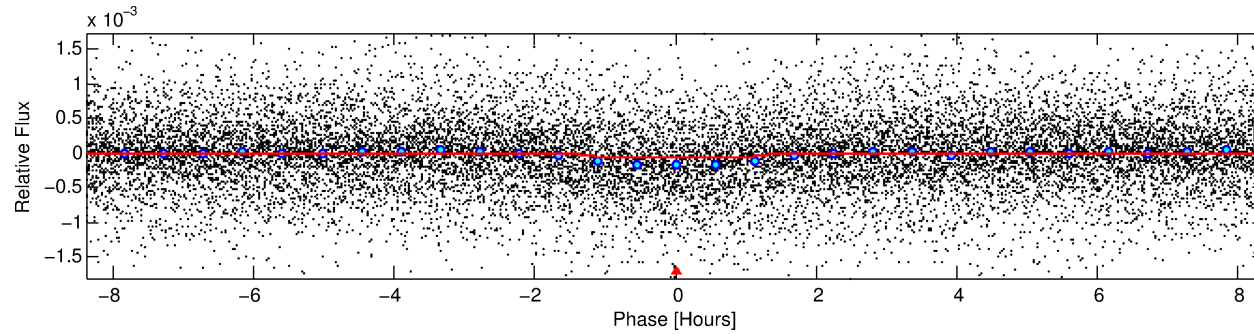
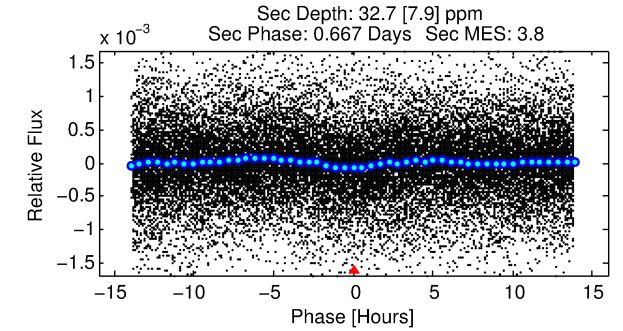
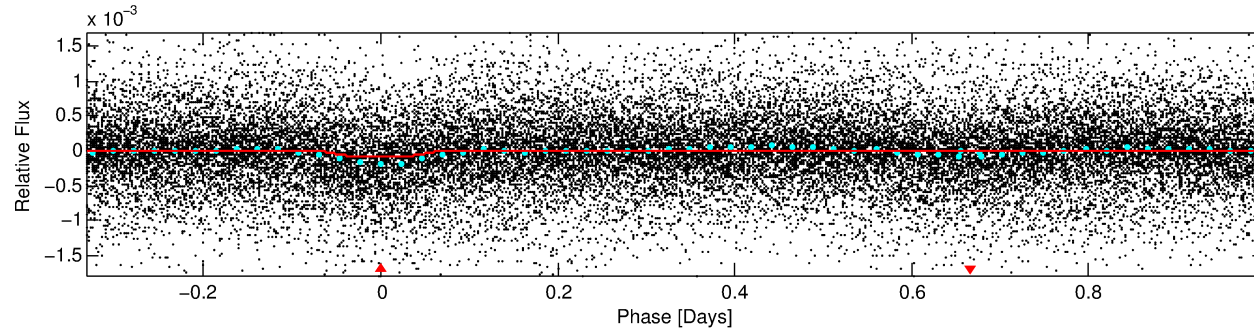
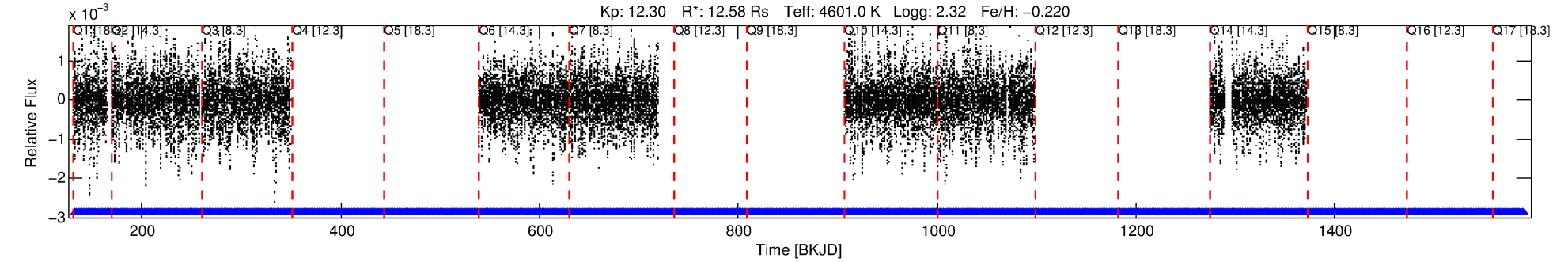
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
009899421-01	9899421	BR-Cyg-pri	9899416	1:1	53.4	4	12	10.03	12.30	8686.60	Direct-PRF	0	1.82	1.10

**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: 9899421 Candidate: 1 of 1 Period: 1.333 d  
KOI: K07246.01 Corr: 0.956

Kp: 12.30 R\*: 12.58 Rs Teff: 4601.0 K Logg: 2.32 Fe/H: -0.220



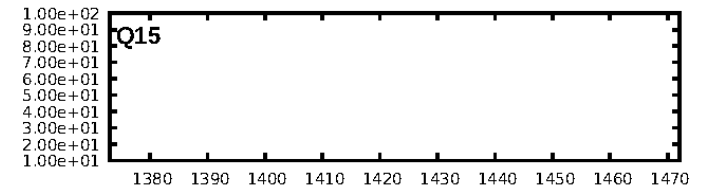
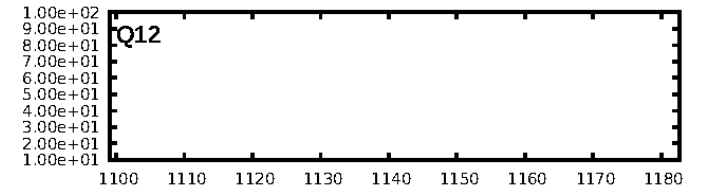
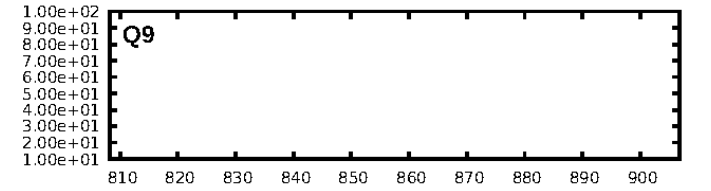
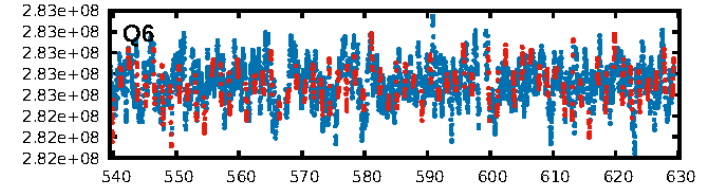
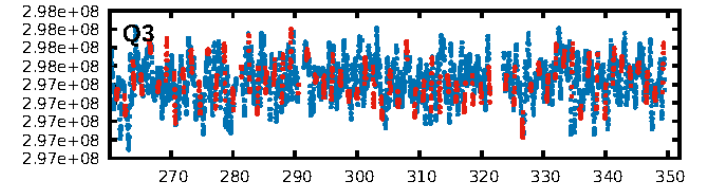
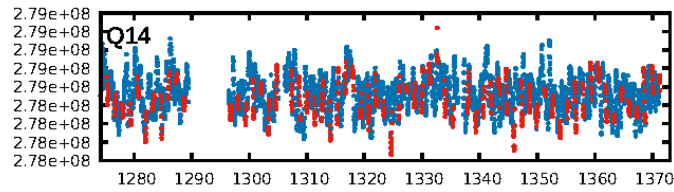
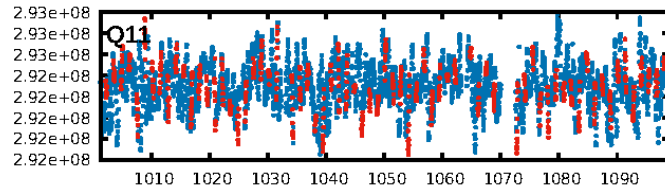
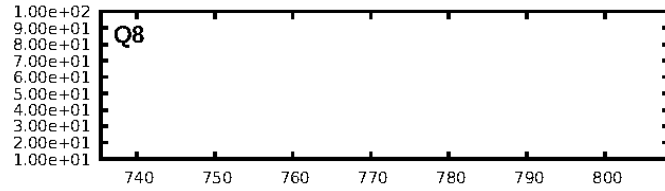
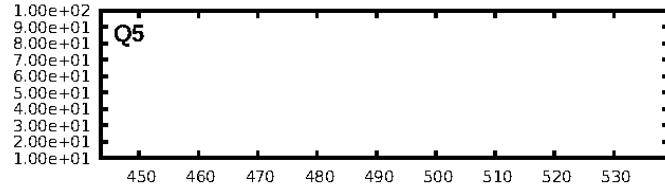
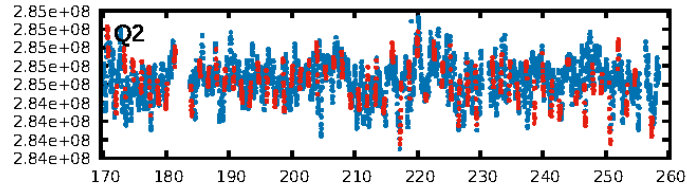
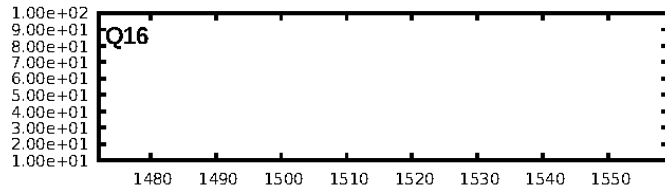
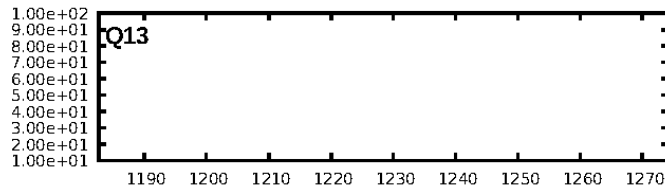
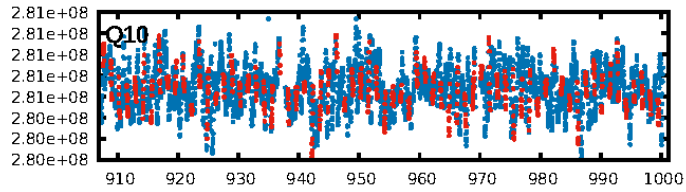
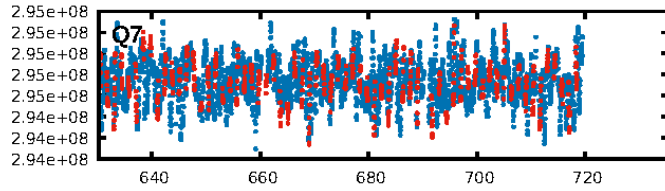
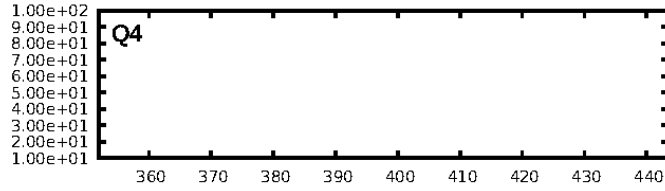
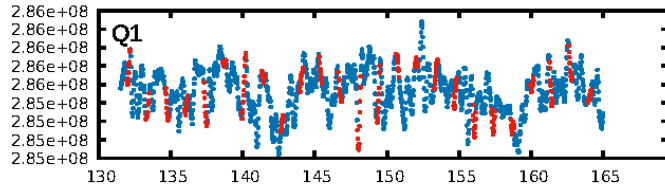
## DV Fit Results:

Period = 1.33253 [0.00001] d  
Epoch = 132.0652 [0.0012] BKJD  
Rp/R\* = 0.0099 [0.0021]  
a/R\* = 1.91 [1.10]  
b = 0.90 [0.17]  
Seff = N/A  
Teq = N/A  
Rp = 13.61 [3.34] Re  
a = N/A  
Ag = N/A  
Teffp = N/A

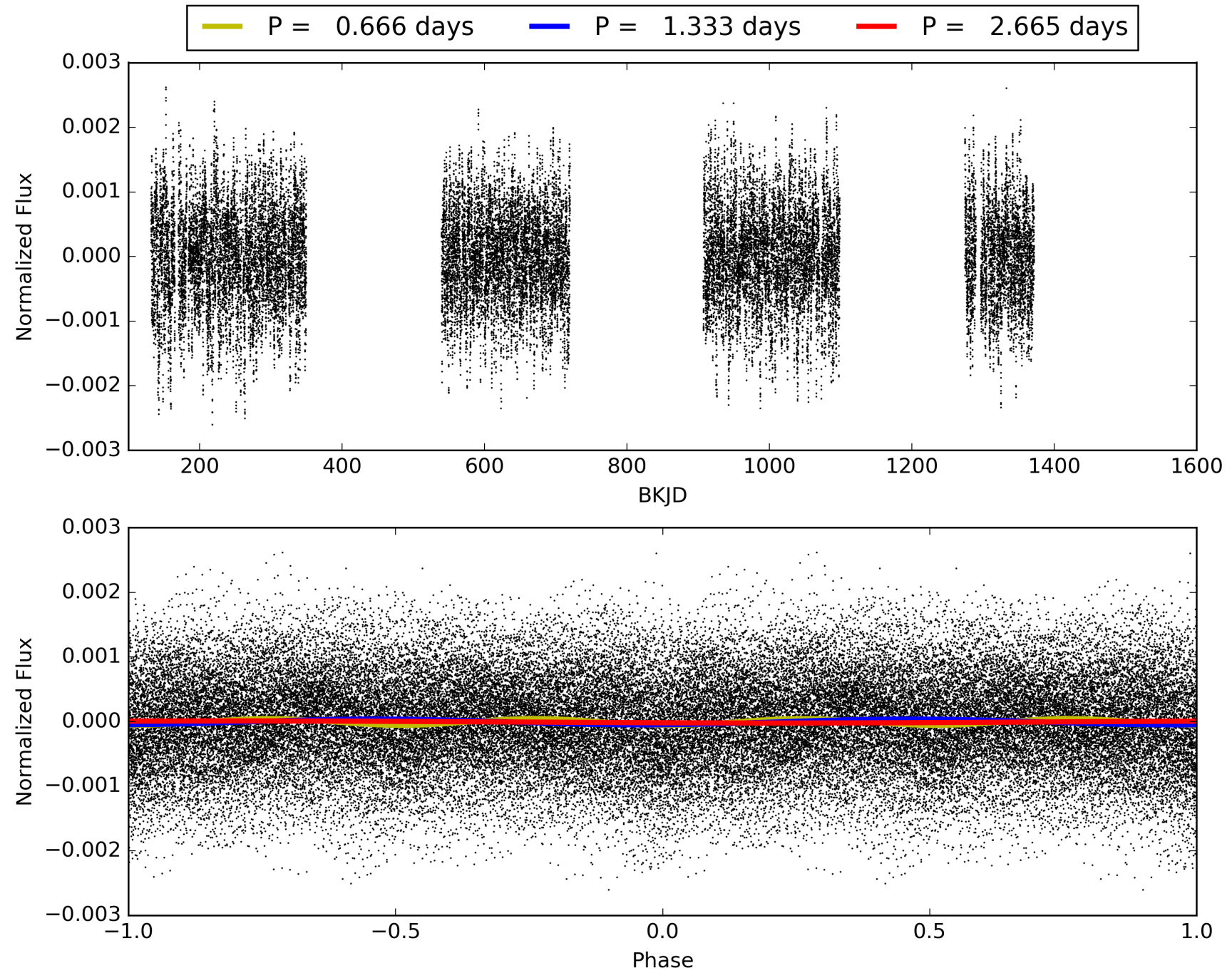
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 6.06e-35  
RollingBand-fgt: 1.00 [466/466]  
GhostDiagnostic-chr: 0.03795  
Centroid-sig: 0.0%  
Centroid-so: 1.863 arcsec [6.69σ]  
OotOffset-rm: 6.547 arcsec [4.56σ]  
KicOffset-rm: 6.448 arcsec [4.48σ]  
OotOffset-st: 4/3/0/1 [8]  
KicOffset-st: 4/3/0/1 [8]  
DiffImageQuality-fgm: 0.12 [1/8]  
DiffImageOverlap-fno: 1.00 [8/8]

# TCE 009899421-01, PDC Light Curves



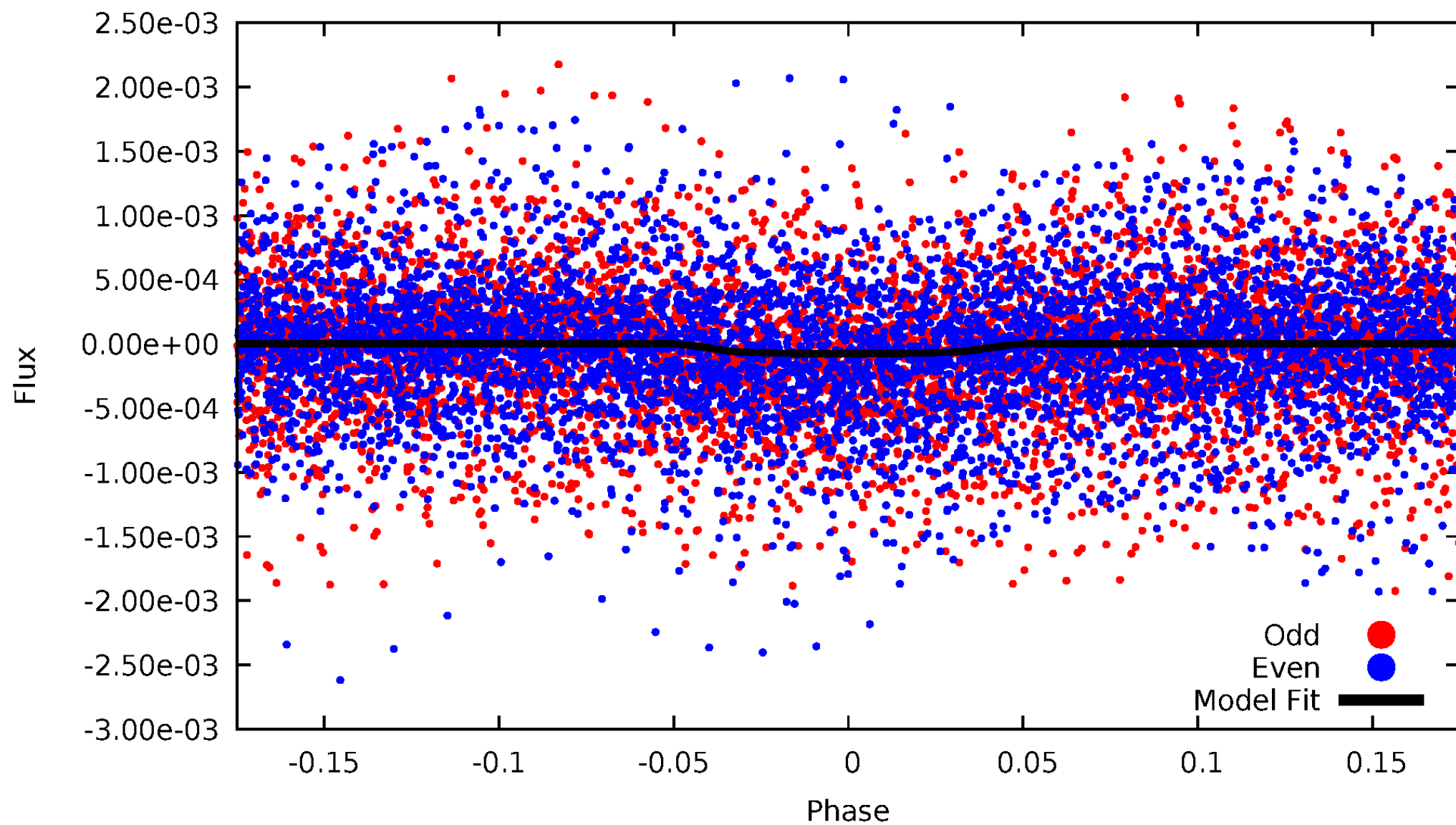
TCE 009899421-01





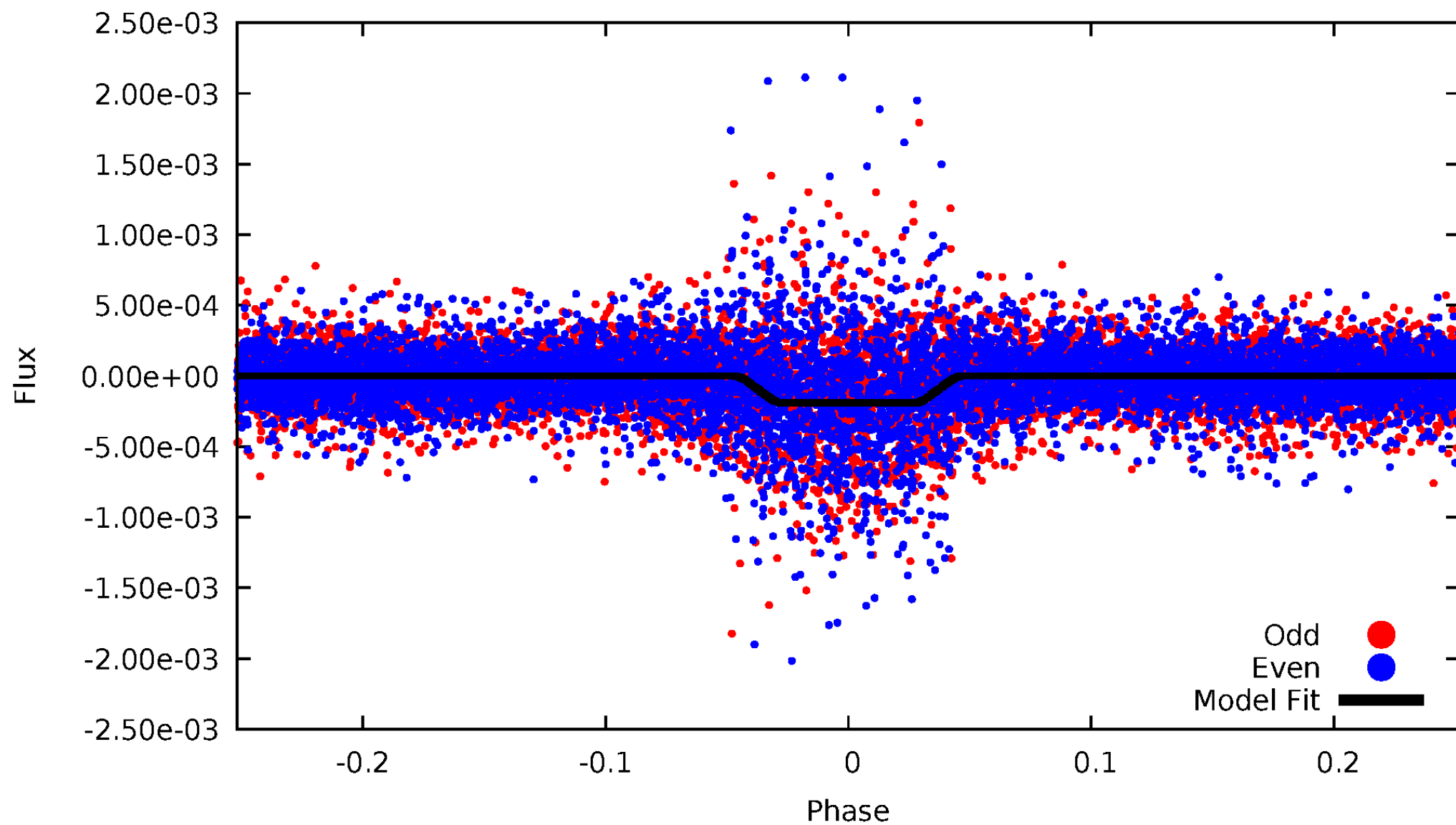
# DV Odd/Even

TCE 009899421-01



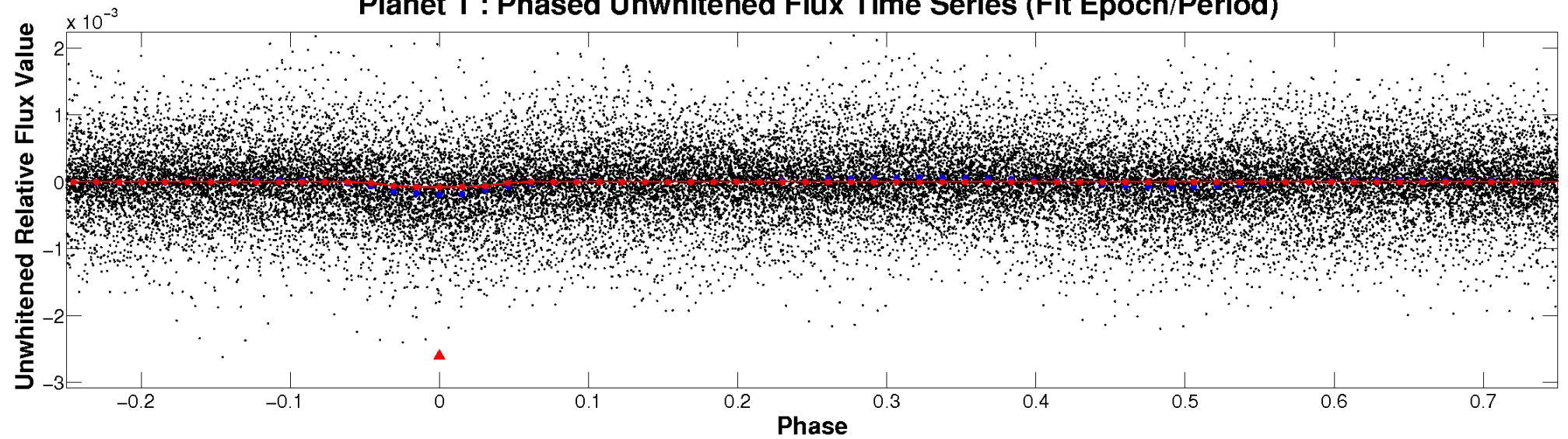
# ALT Odd/Even

TCE 009899421-01

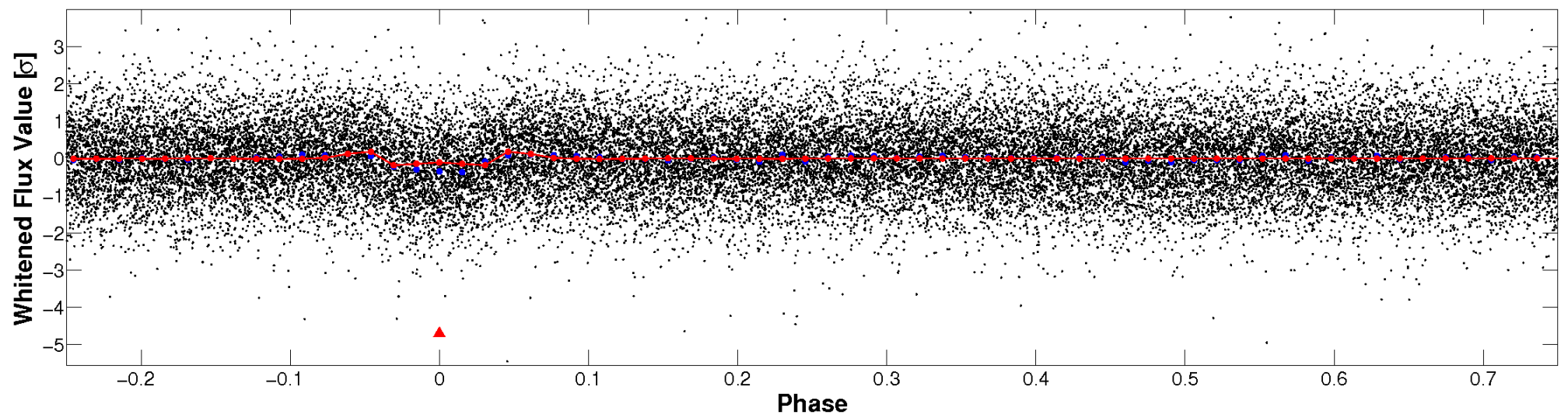


# Non-Whitened Vs. Whitened Light Curve

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

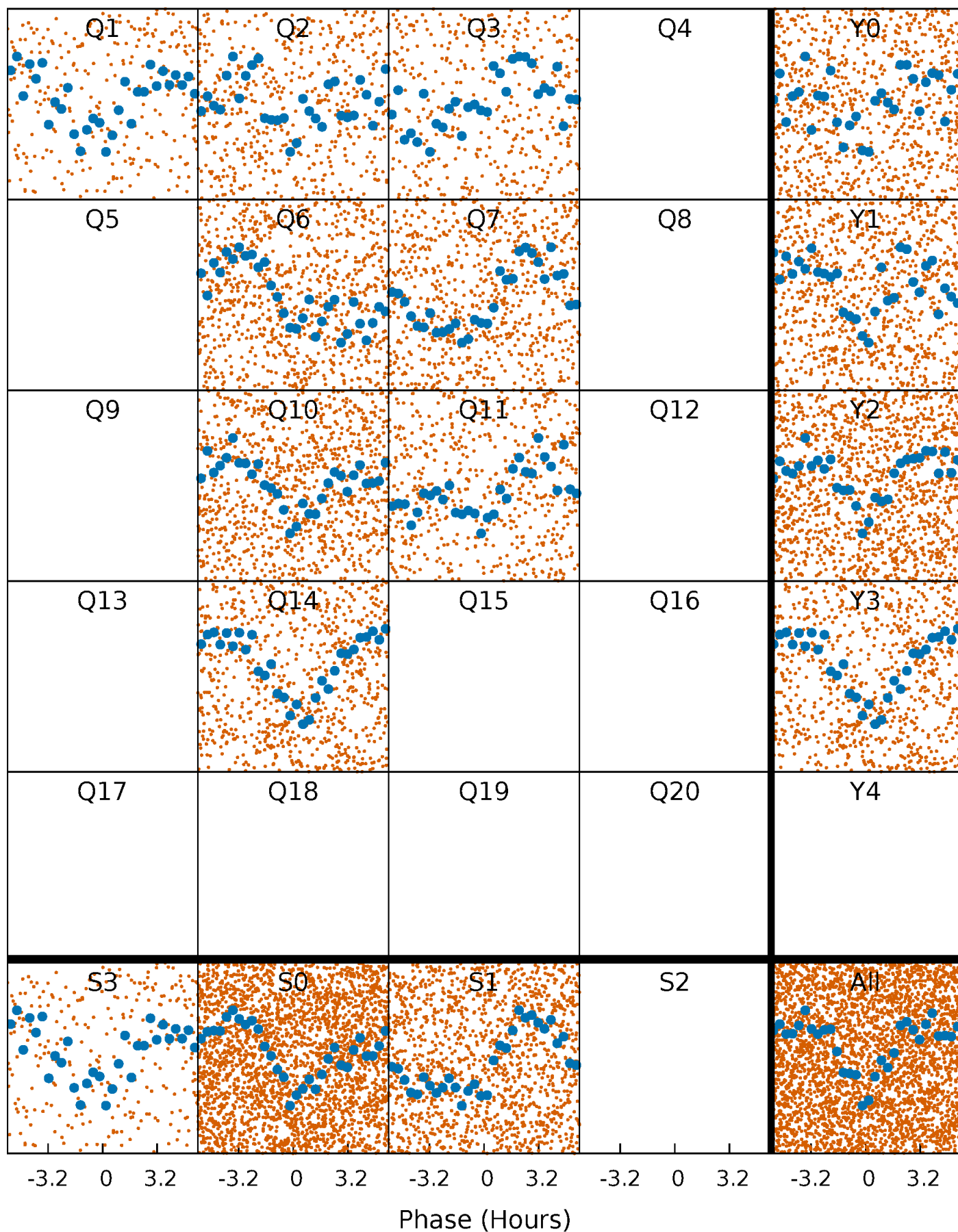


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

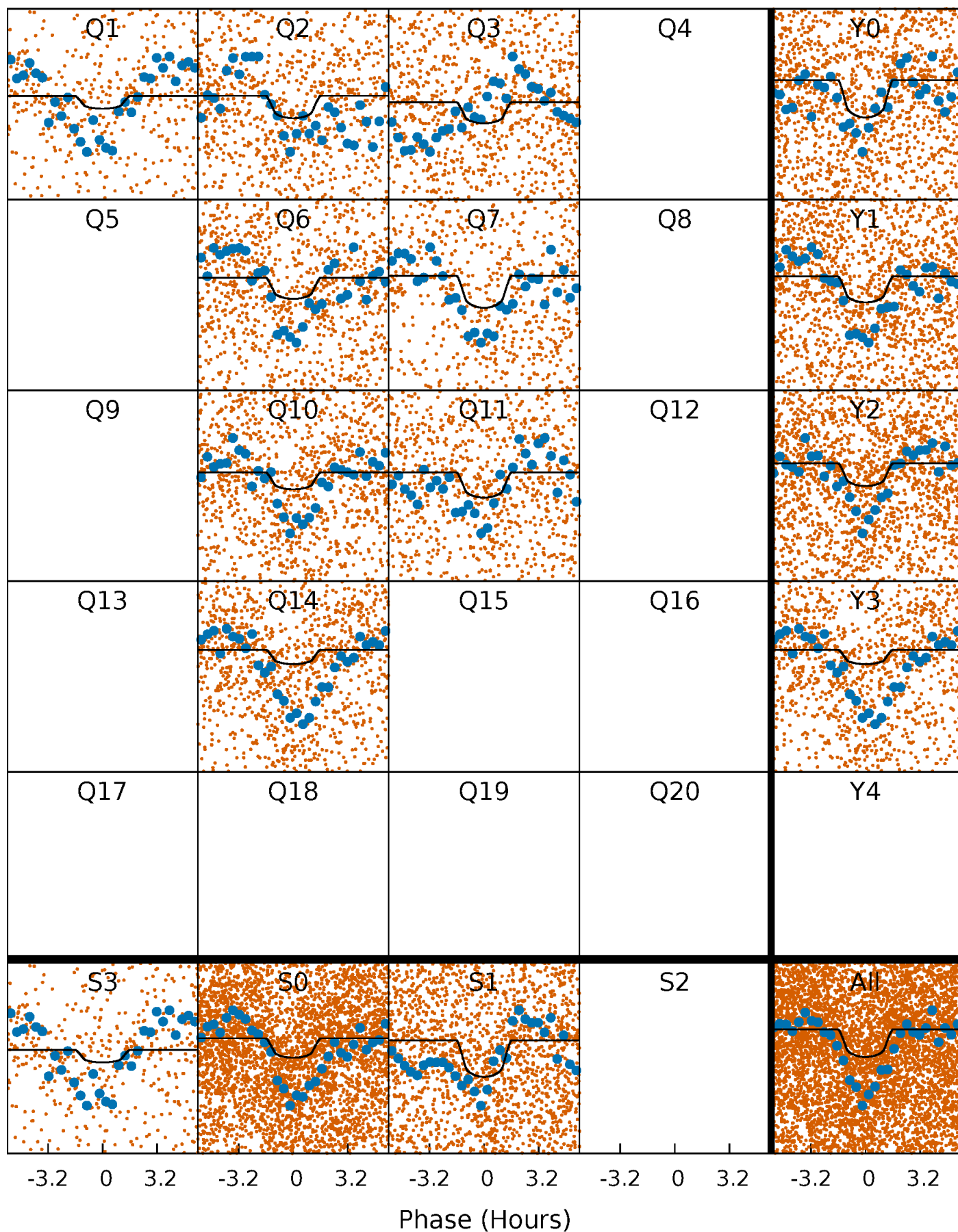
TCE 009899421-01   P= 1.332535 Days    $T_0=132.065166$  (BKJD)





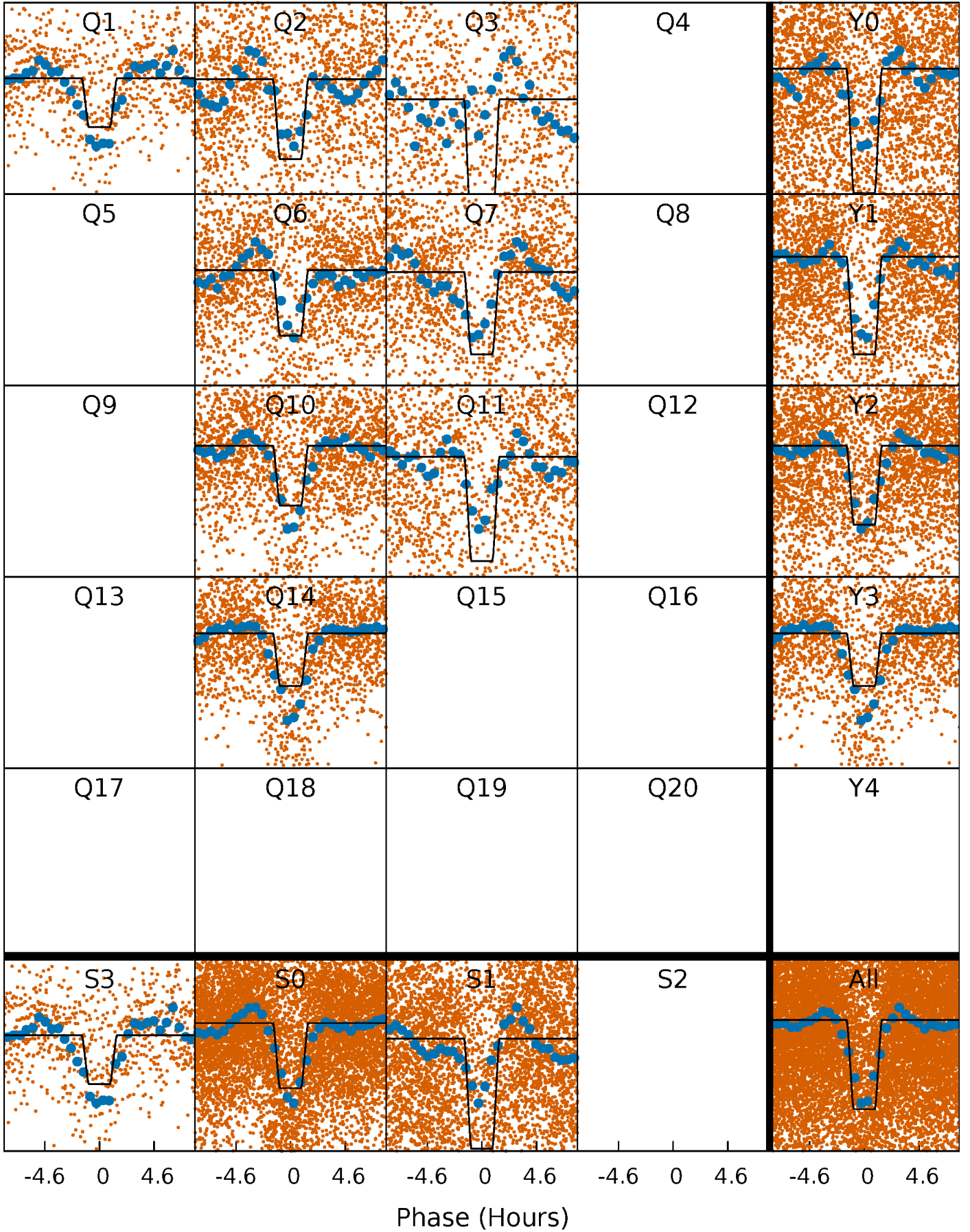
# DV Quarter-Phased Transit Curves

TCE 009899421-01 P= 1.332535 Days  $T_0=132.065166$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

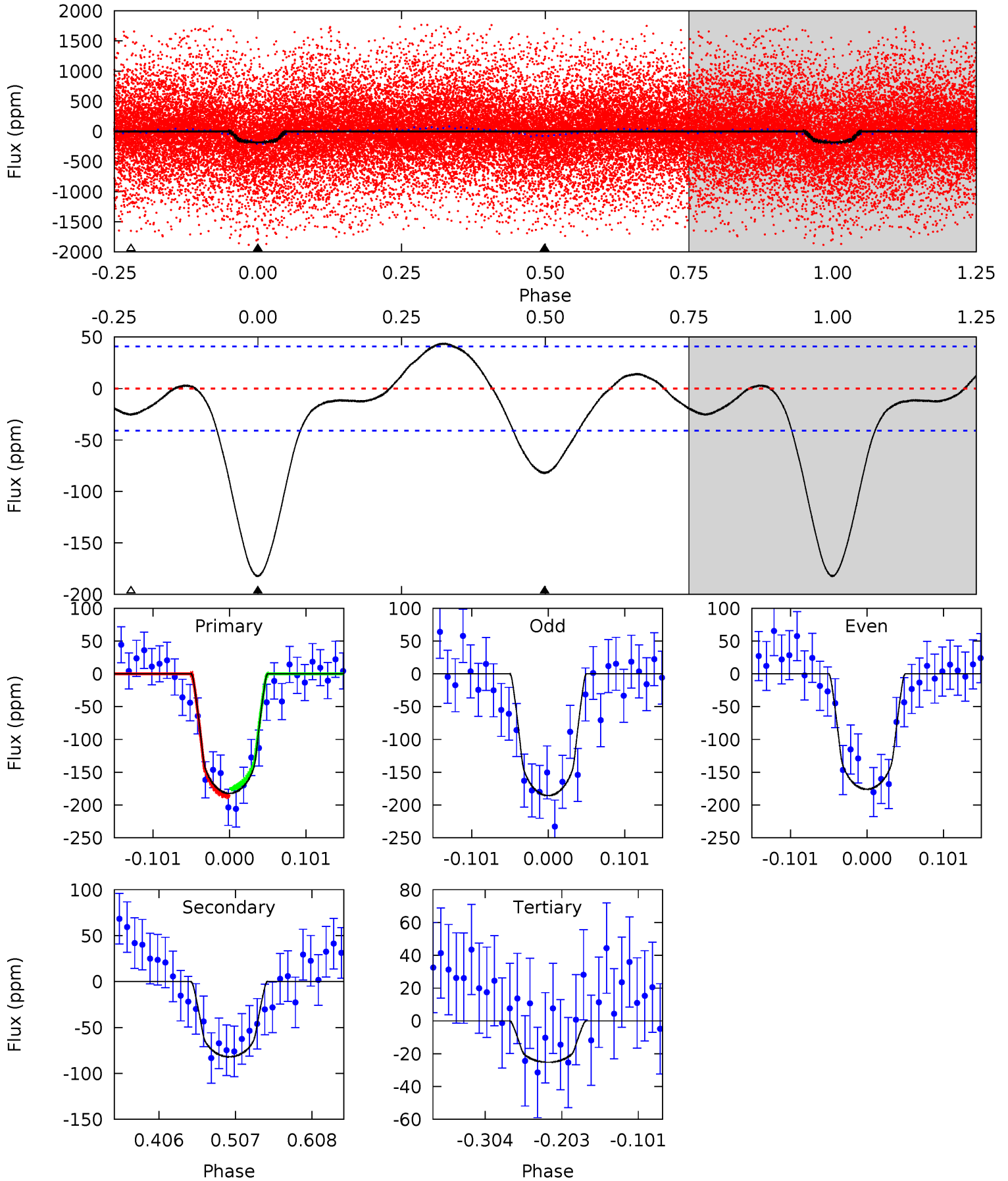
TCE 009899421-01   P= 1.332562 Days    $T_0=132.048455$  (BKJD)



# DV Model-Shift Uniqueness Test

009899421-01, P = 1.332535 Days, E = 130.732631 Days

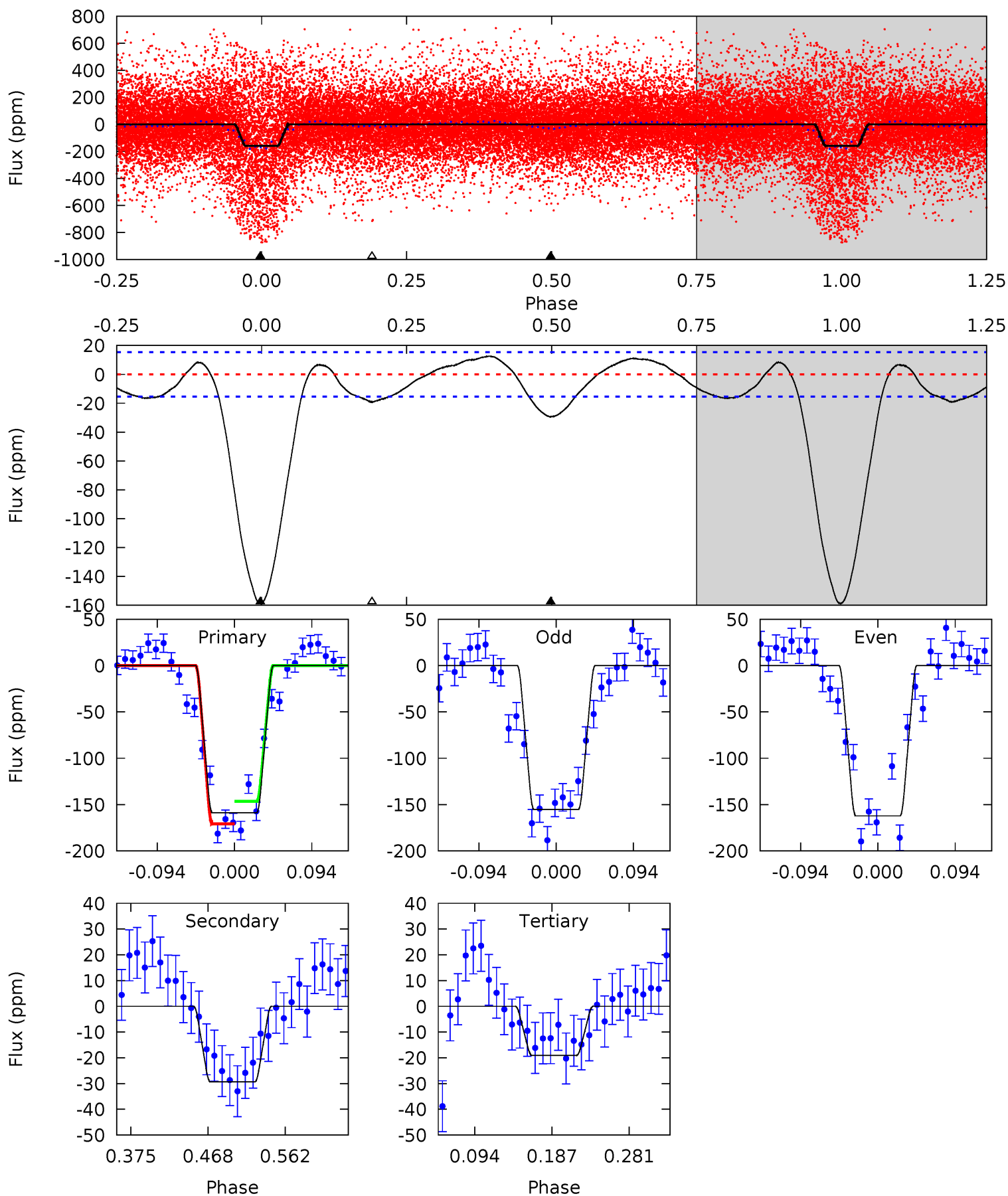
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
20.3	9.15	2.82	0	4.56	1.64	2.18	17.5	20.3	6.33	9.15	0.54	1.09	0.19	0.65



# Alt Model-Shift Uniqueness Test

009899421-01, P = 1.332562 Days, E = 130.715893 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
47.1	8.71	5.67	0	4.58	1.68	3.02	41.5	47.1	3.04	8.71	1.02	1.02	0.07	3.64





### Stellar Parameters For KIC 009899421

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4601^{+64}_{-46}$	$2.321^{+0.030}_{-0.027}$	$-0.220^{+0.150}_{-0.100}$	$12.581^{+1.596}_{-1.306}$	$1.209^{+0.382}_{-0.206}$	$0.001^{+0.000}_{-0.000}$
	+1%/-1%	+1%/-1%	+68%/-45%	+13%/-10%	+32%/-17%	+16%/-13%
Source	SPE74	AST9	SPE74	DSEP		

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

### Secondary Eclipse Parameters for KIC 009899421-01 / KOI 7246.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-82 \pm 9$	$13.70^{+3.08}_{-3.10}$	$6348^{+132}_{-136}$	$-4397^{+805}_{-288}$	$0.152^{+0.099}_{-0.050}$
Alt.	$-29 \pm 3$	$19.38^{+3.12}_{-3.09}$	$6345^{+143}_{-135}$	$-4979^{+112}_{-110}$	$0.028^{+0.012}_{-0.007}$

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

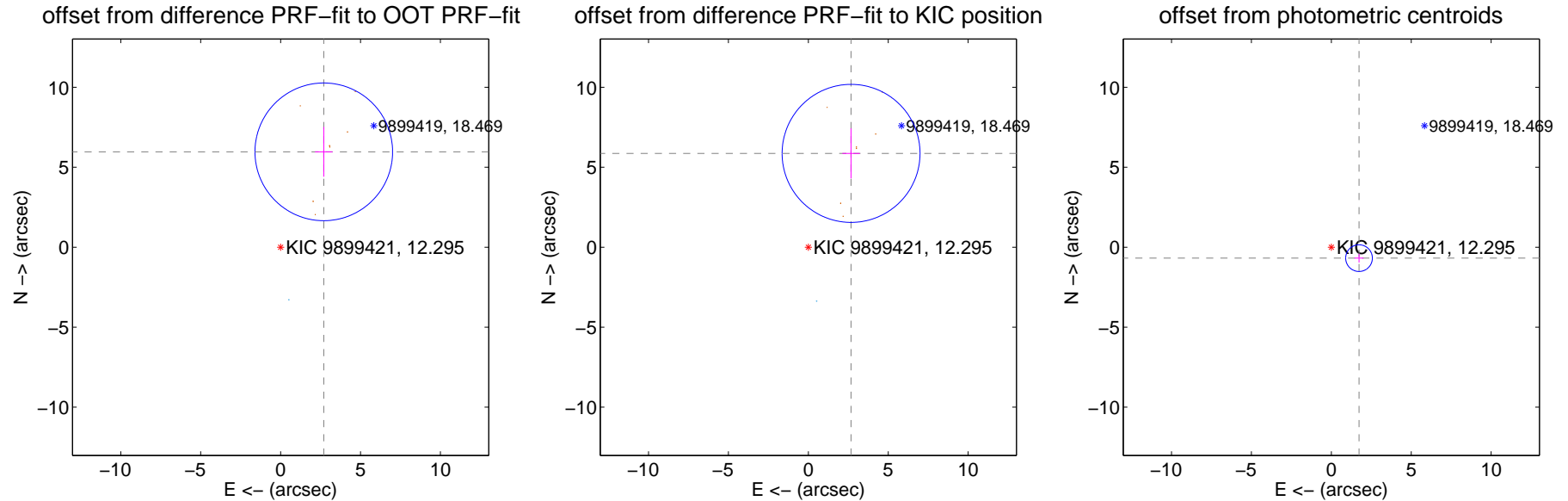
## DV Centroid Data

Supplemental centroid analysis for 009899421-01. Kepler magnitude: 12.29. Transit SNR 10.67

There are 1 quarters with good PRF difference image offsets

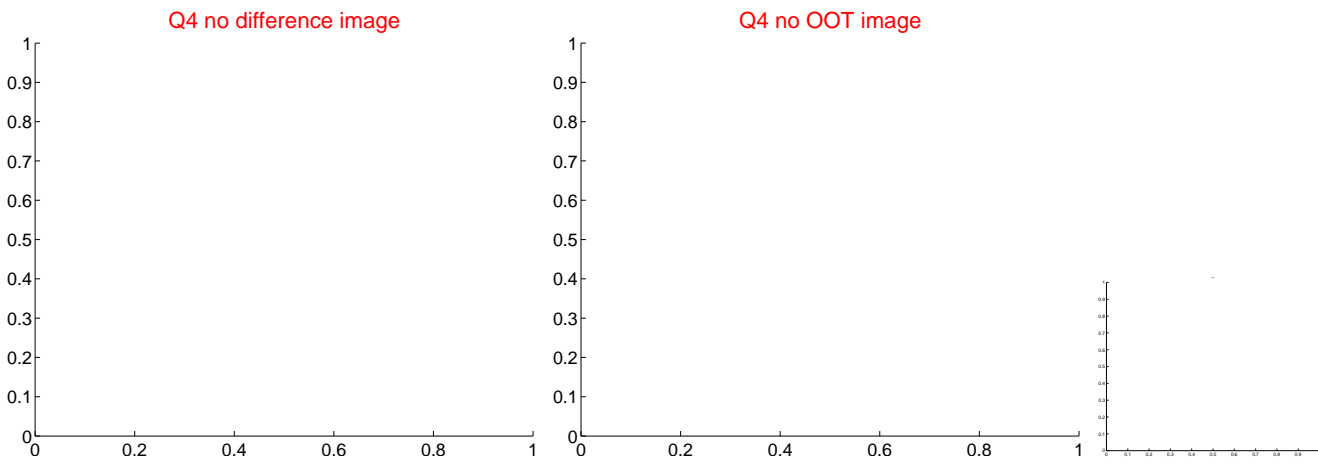
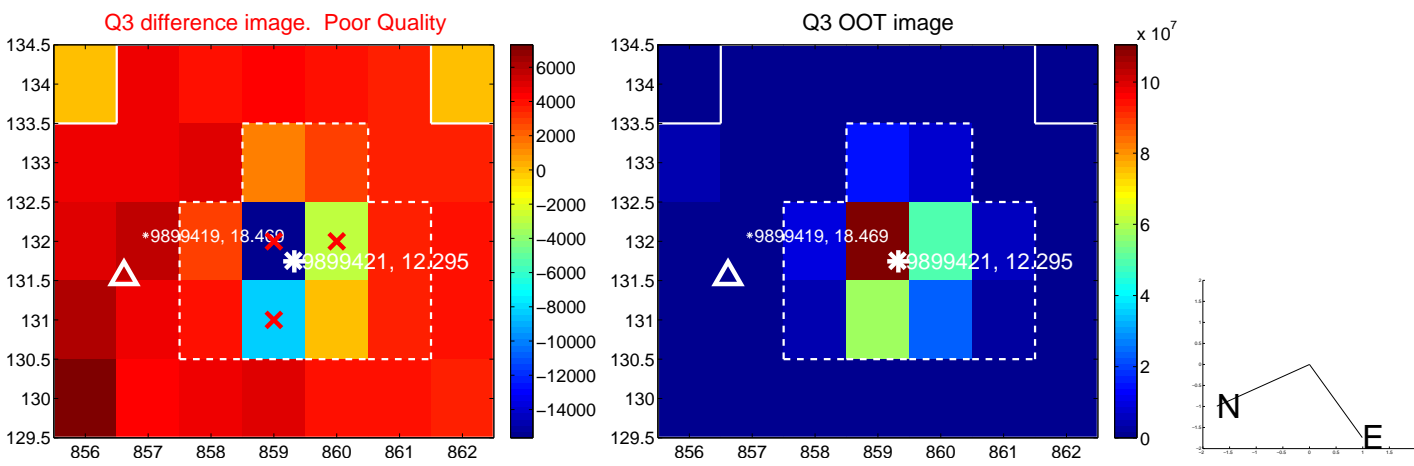
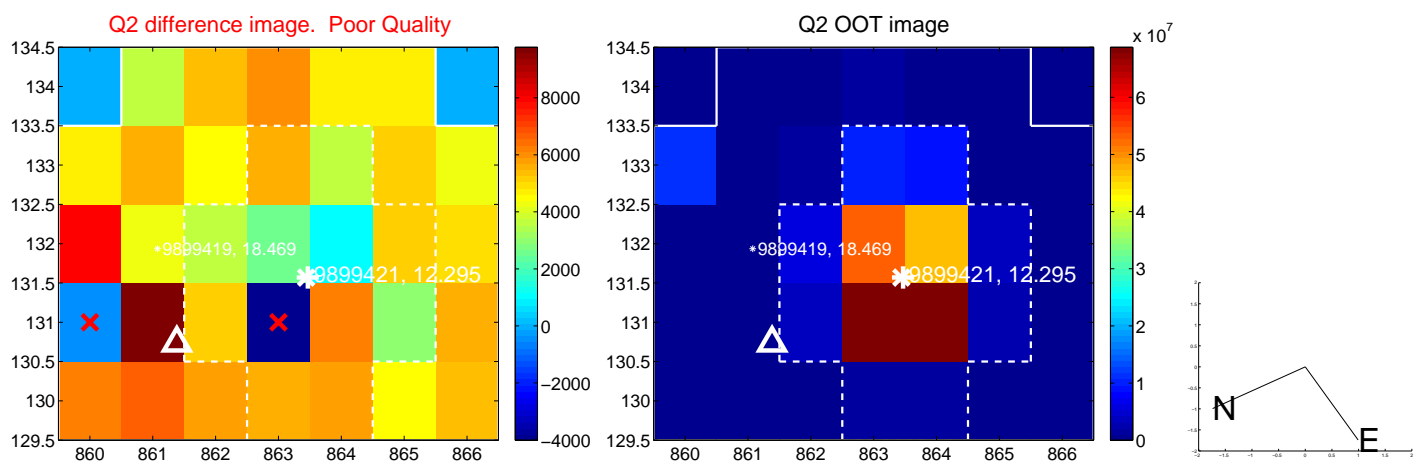
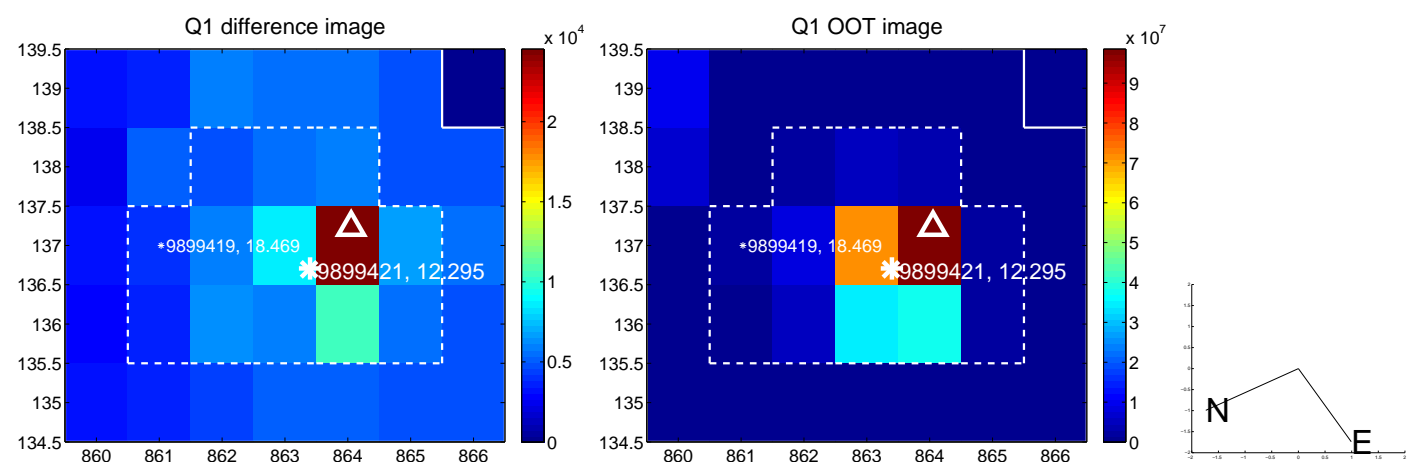
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$6.547 \pm 1.435$	4.56	$-2.702 \pm 0.545$	$5.964 \pm 1.556$
PRF-fit source offset from KIC position	$6.448 \pm 1.439$	4.48	$-2.675 \pm 0.548$	$5.867 \pm 1.561$
photometric centroid source offset	$1.86 \pm 0.28$	6.69	$-1.73 \pm 0.28$	$-0.68 \pm 0.27$



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.

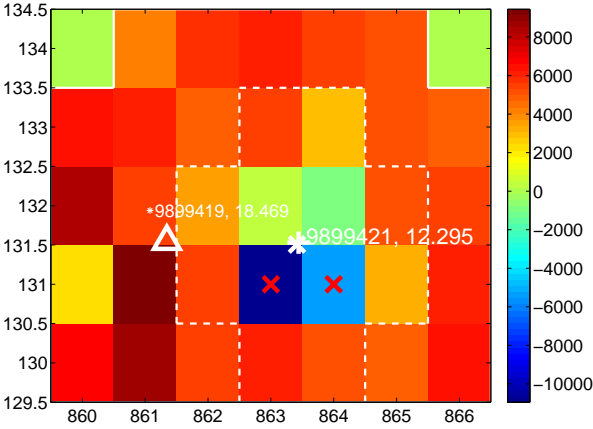
Q5 no difference image



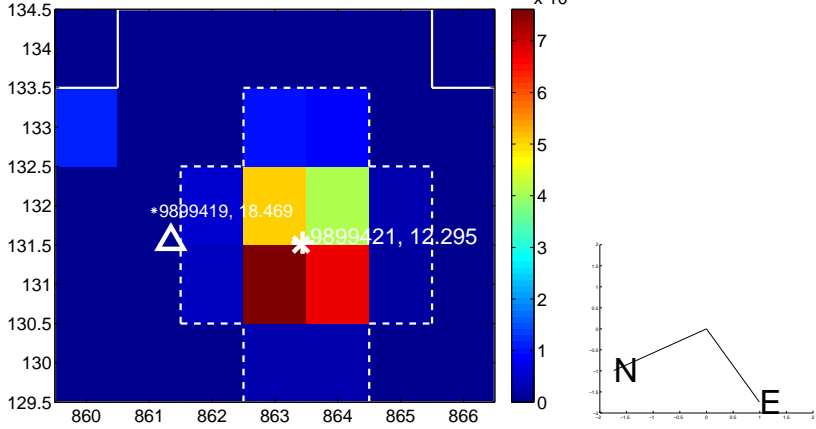
Q5 no OOT image



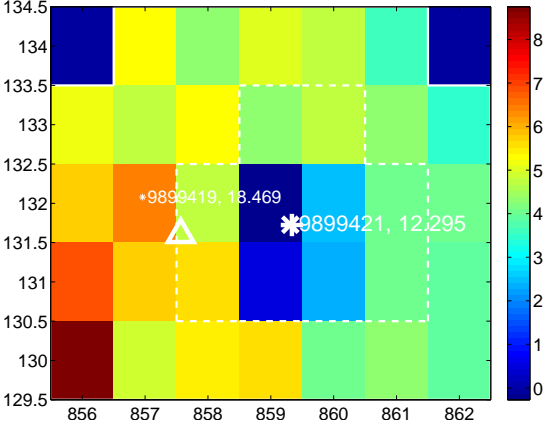
Q6 difference image. Poor Quality



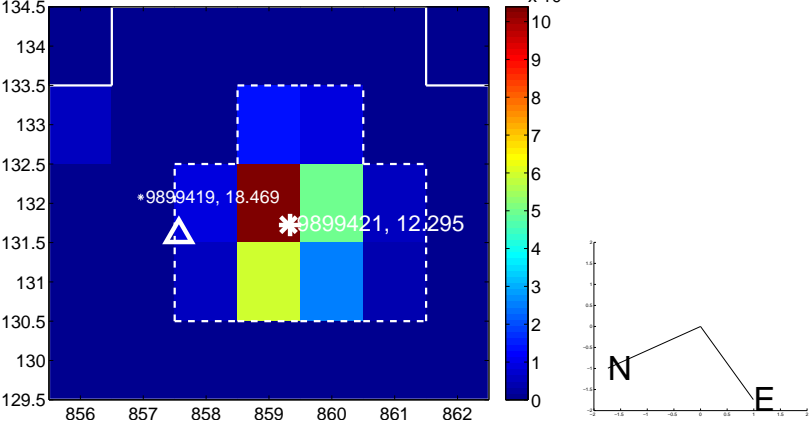
Q6 OOT image



Q7 difference image. Poor Quality



Q7 OOT image



Q8 no difference image

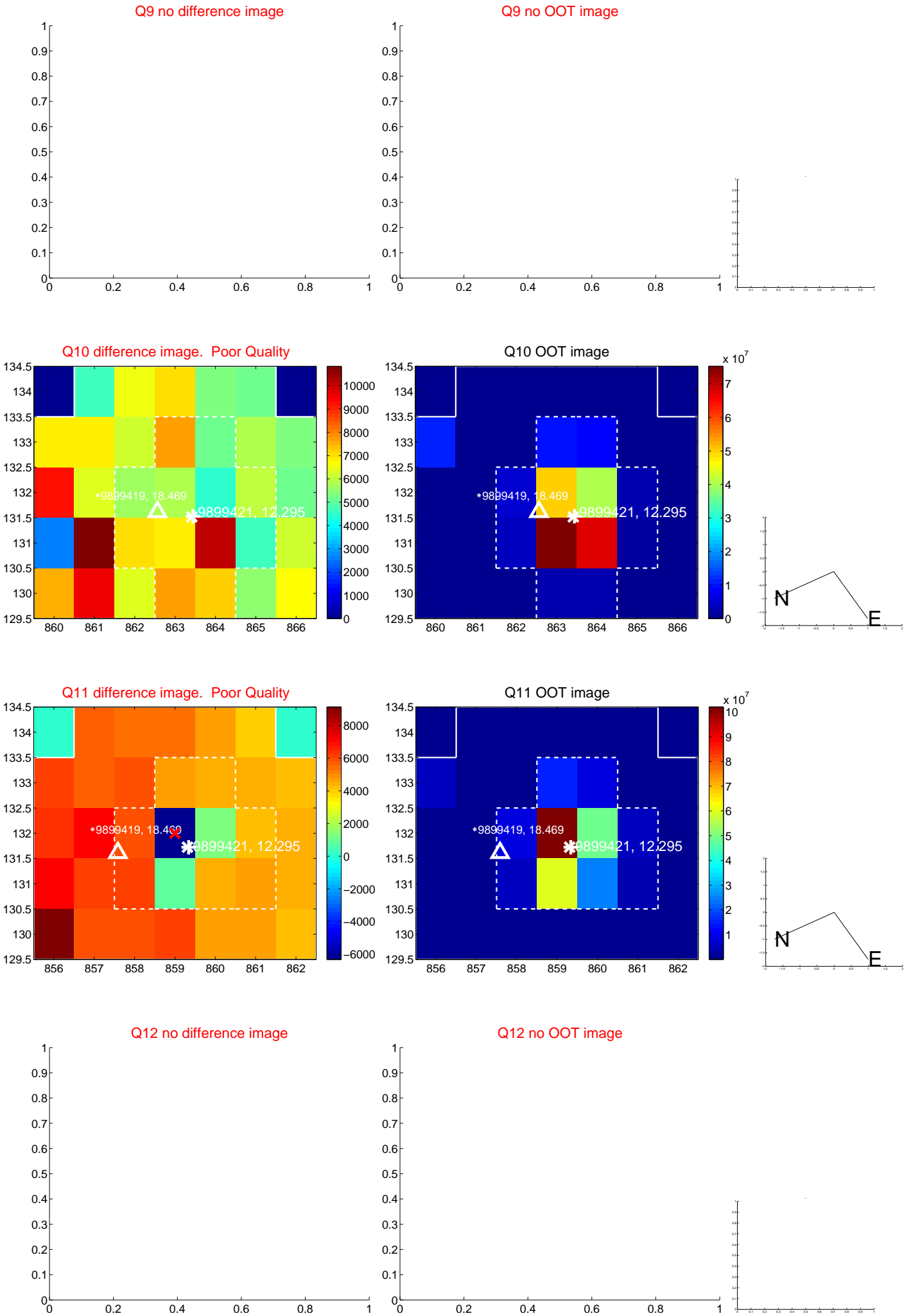


Q8 no OOT image

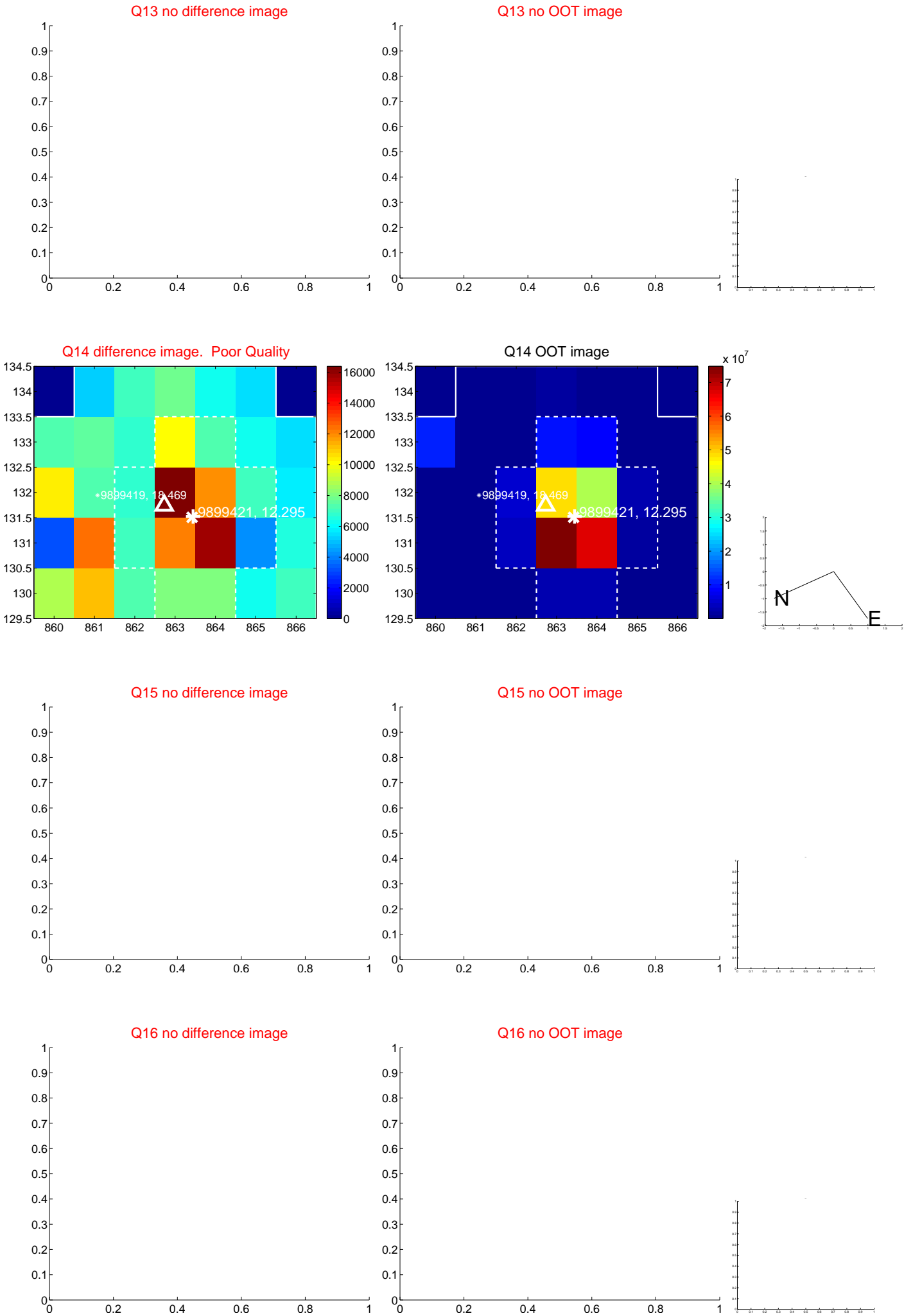




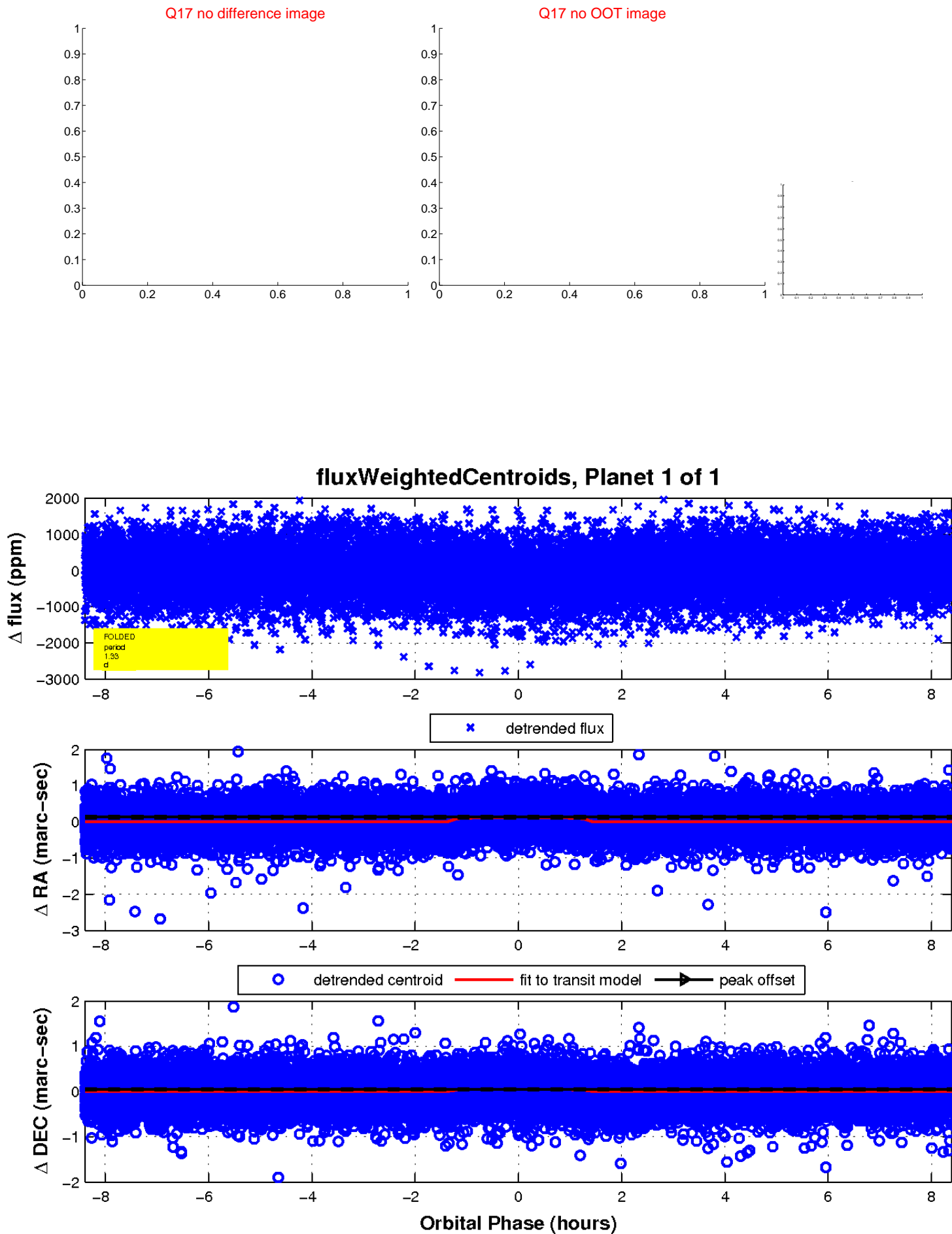
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.



UKIRT Image

