

# KIC 007416306

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007416306-01	OBS	5388.01	137.390166	158.968014	143.5	19.009	8.7	9.3	2.65	5425	3.53	16.90

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007416306-01	OBS	FP	0.09	1	0	0	0	INDIV_TRANS_SKYE—CENT_FEW_DIFFS

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

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

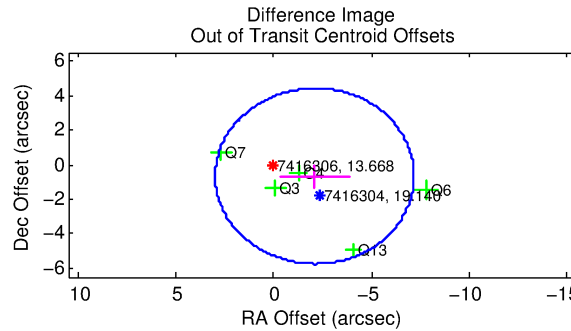
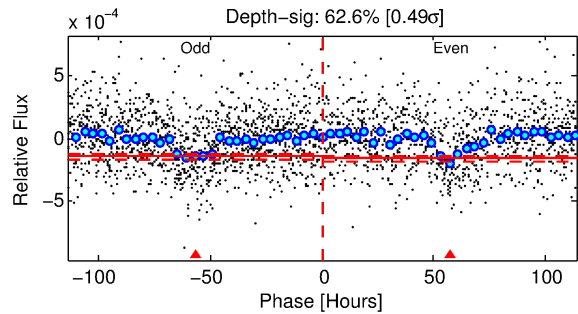
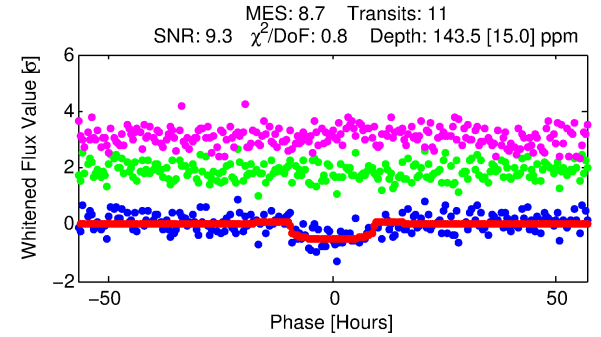
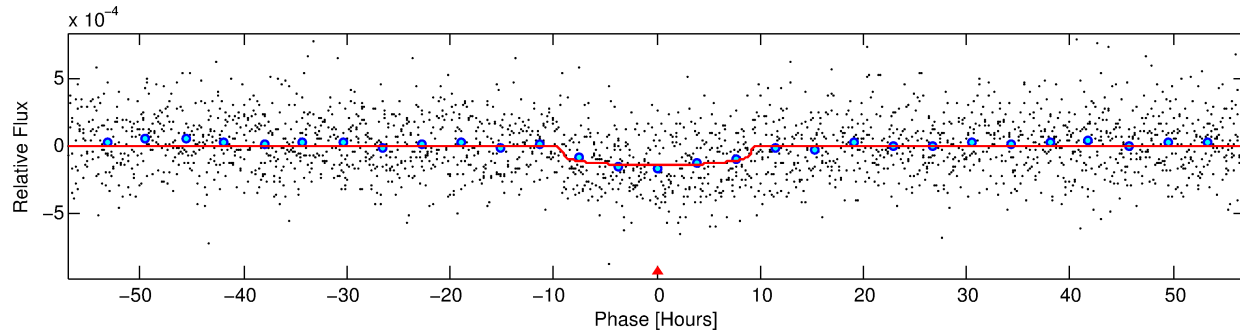
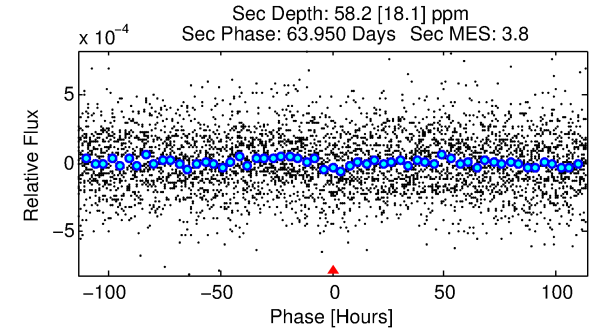
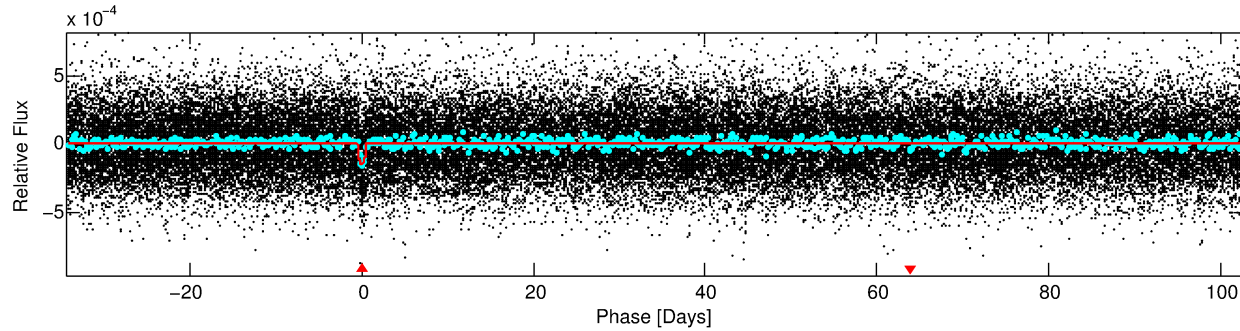
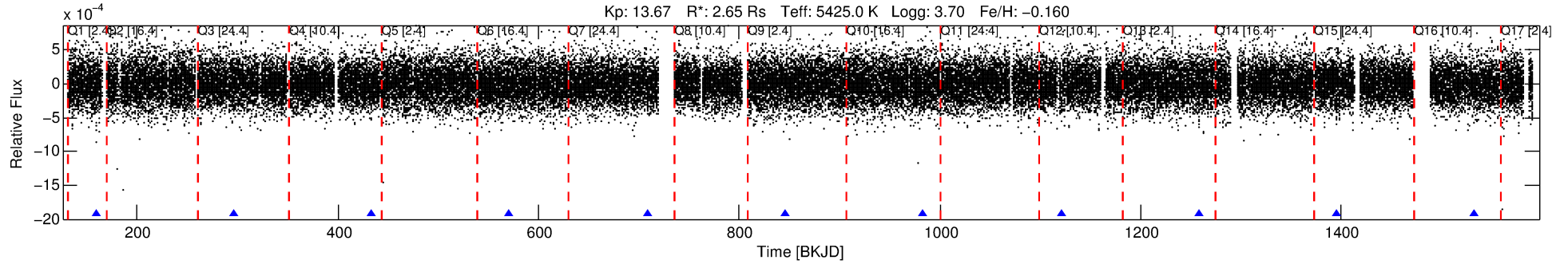
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007416306-01

No Significant Match Found

# DV One-Page Summary

KIC: 7416306 Candidate: 1 of 1 Period: 137.390 d  
KOI: K05388.01 Corr: 0.971



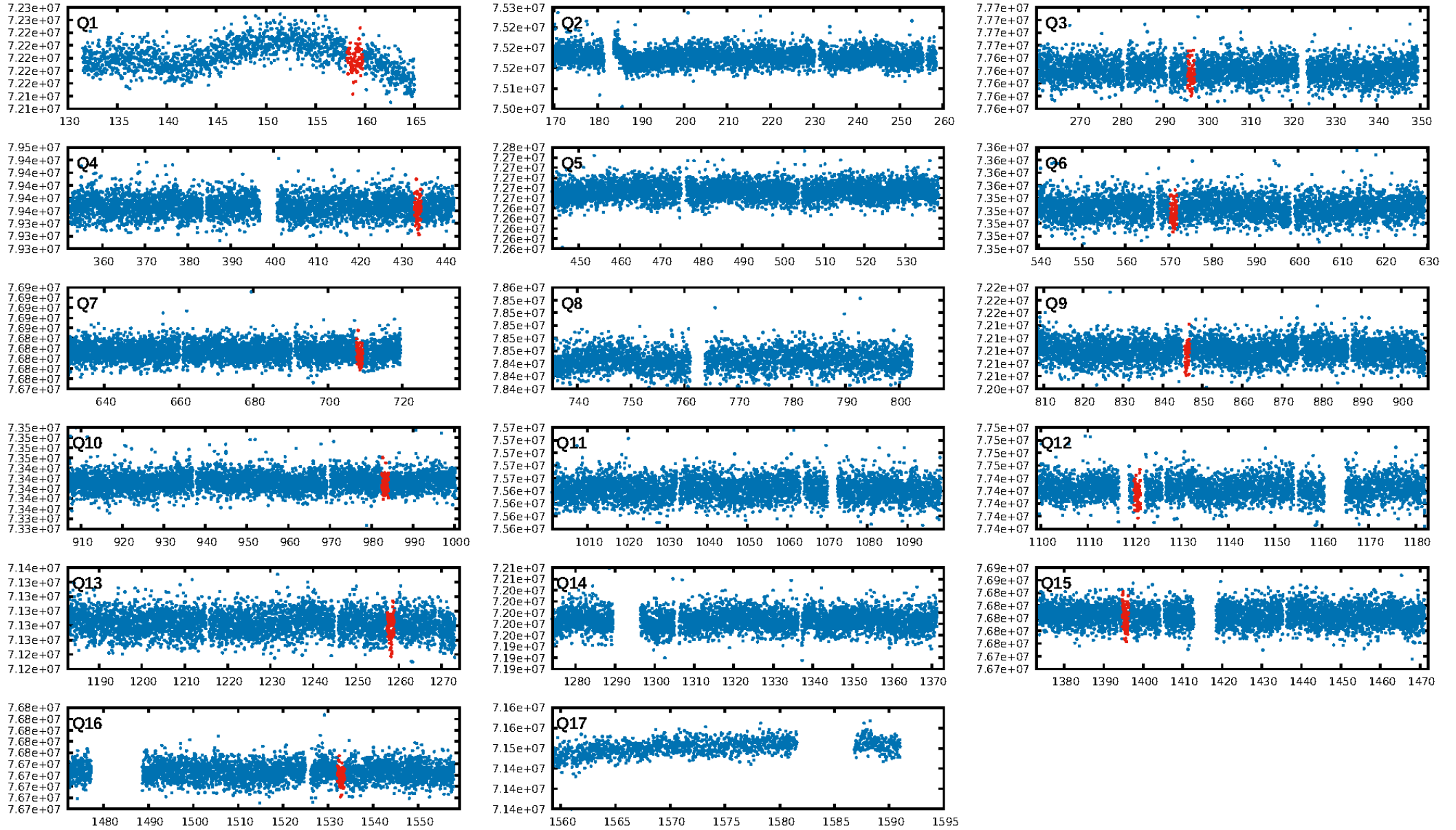
## DV Fit Results:

Period = 137.39017 [0.00406] d  
Epoch = 158.9680 [0.0246] BKJD  
Rp/R\* = 0.0122 [0.0033]  
a/R\* = 34.67 [39.68]  
b = 0.79 [0.54]  
Seff = 16.90 [21.69]  
Teff = 517 [166] K  
Rp = 3.53 [2.45] Re  
a = 0.5689 [0.4195] AU  
Ag = 832.99 [1185.23] [0.70σ]  
Teffp = 4294 [689] K [5.33σ]

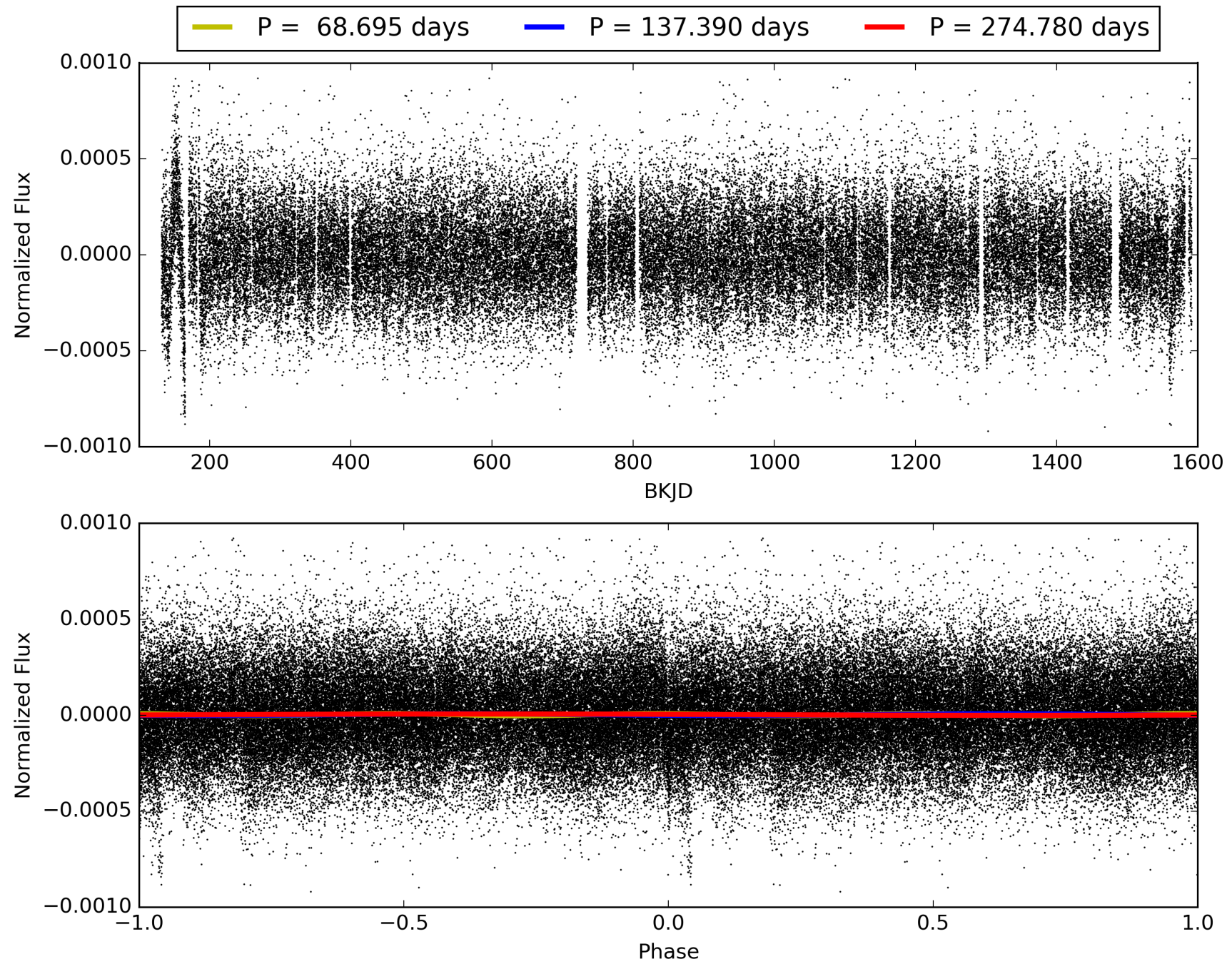
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 55.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.62e-17  
RollingBand-fgt: 1.00 [10/10]  
GhostDiagnostic-chr: -16.7  
Centroid-sig: 46.7%  
Centroid-so: 1.272 arcsec [0.97σ]  
OotOffset-rm: 2.196 arcsec [1.30σ]  
OotOffset-st: 1/2/1/1 [5]  
KicOffset-rm: 2.224 arcsec [1.23σ]  
KicOffset-st: 1/2/1/1 [5]  
DiffImageQuality-fgm: 0.60 [3/5]  
DiffImageOverlap-fno: 1.00 [7/7]

# TCE 007416306-01, PDC Light Curves

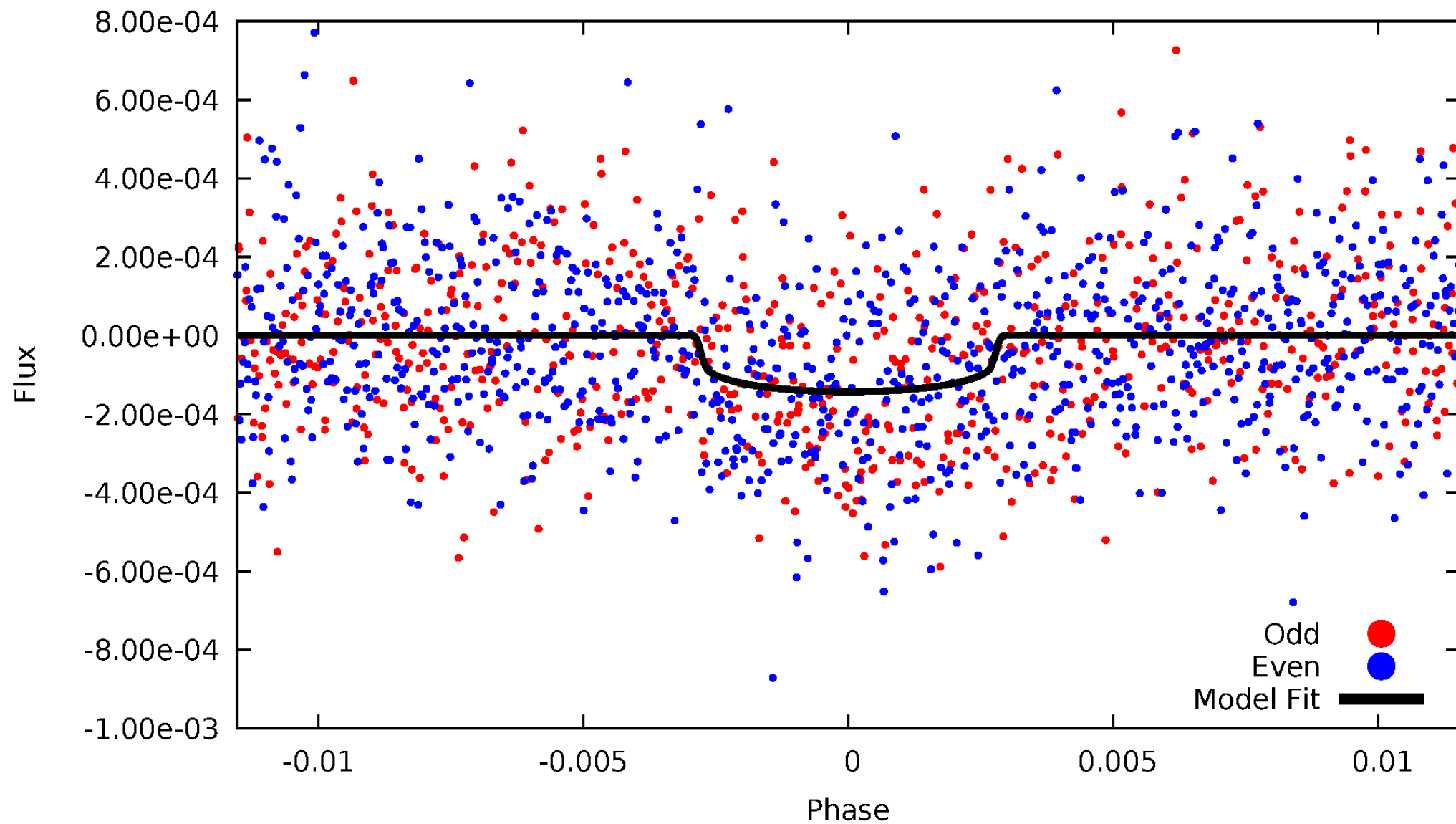


TCE 007416306-01



# DV Odd/Even

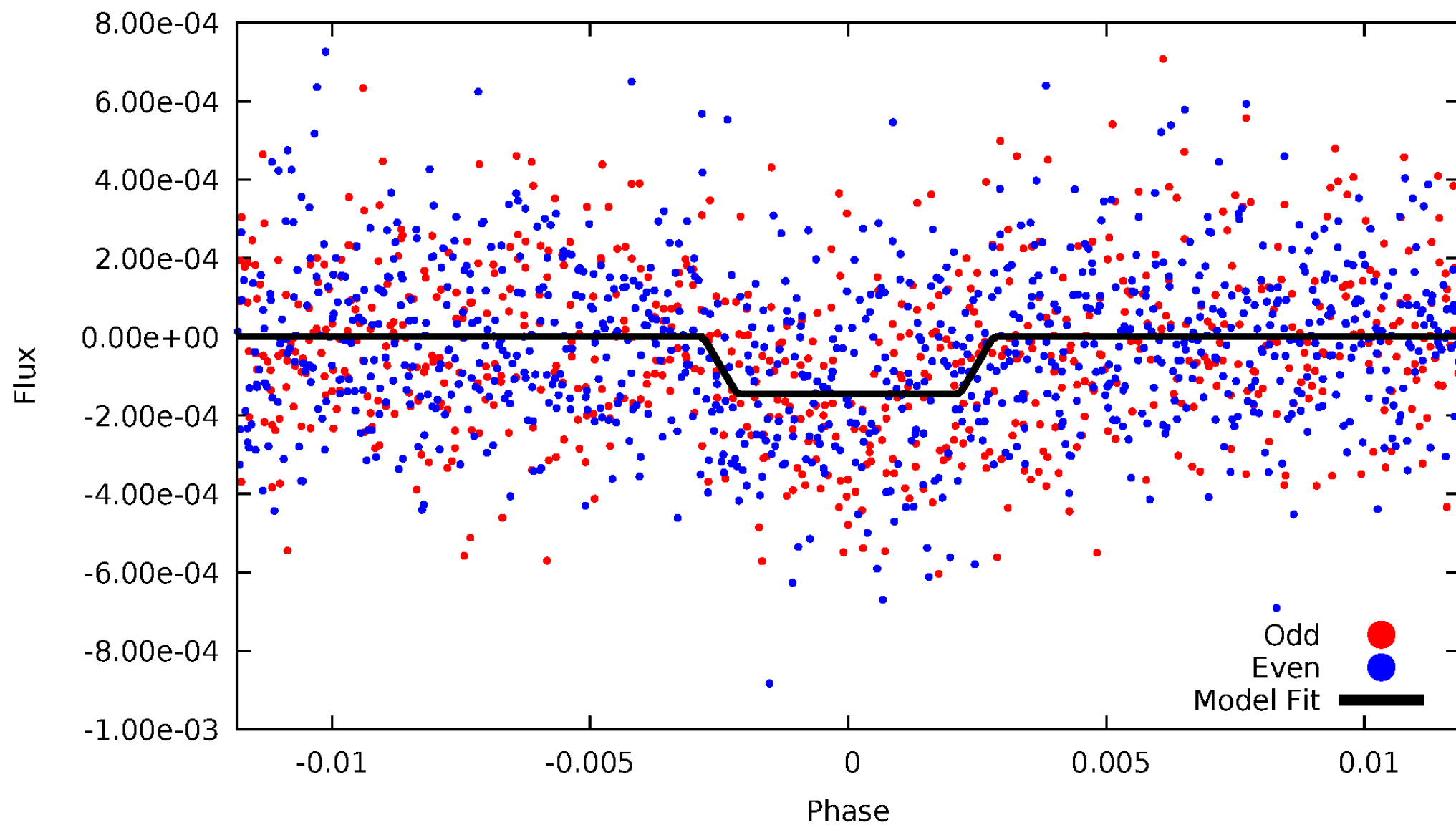
TCE 007416306-01





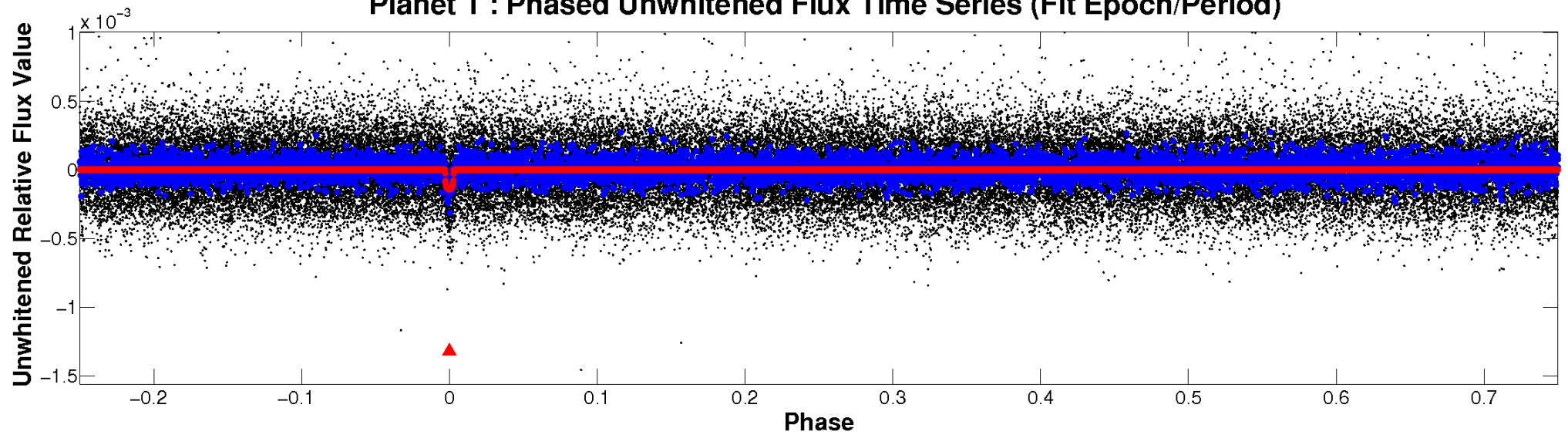
# ALT Odd/Even

TCE 007416306-01

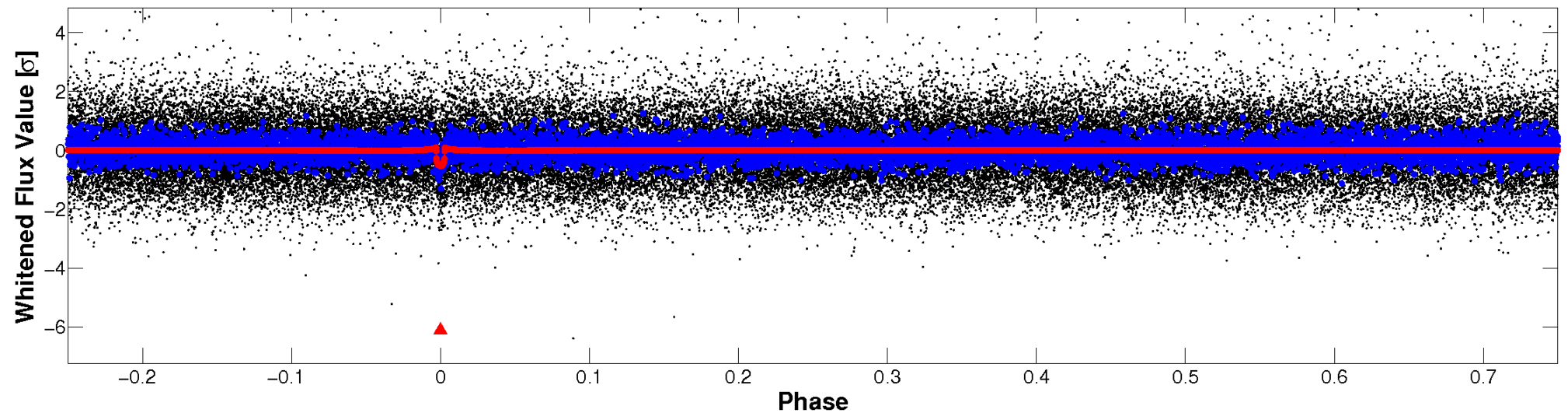


# Non-Whitened Vs. Whitened Light Curve

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

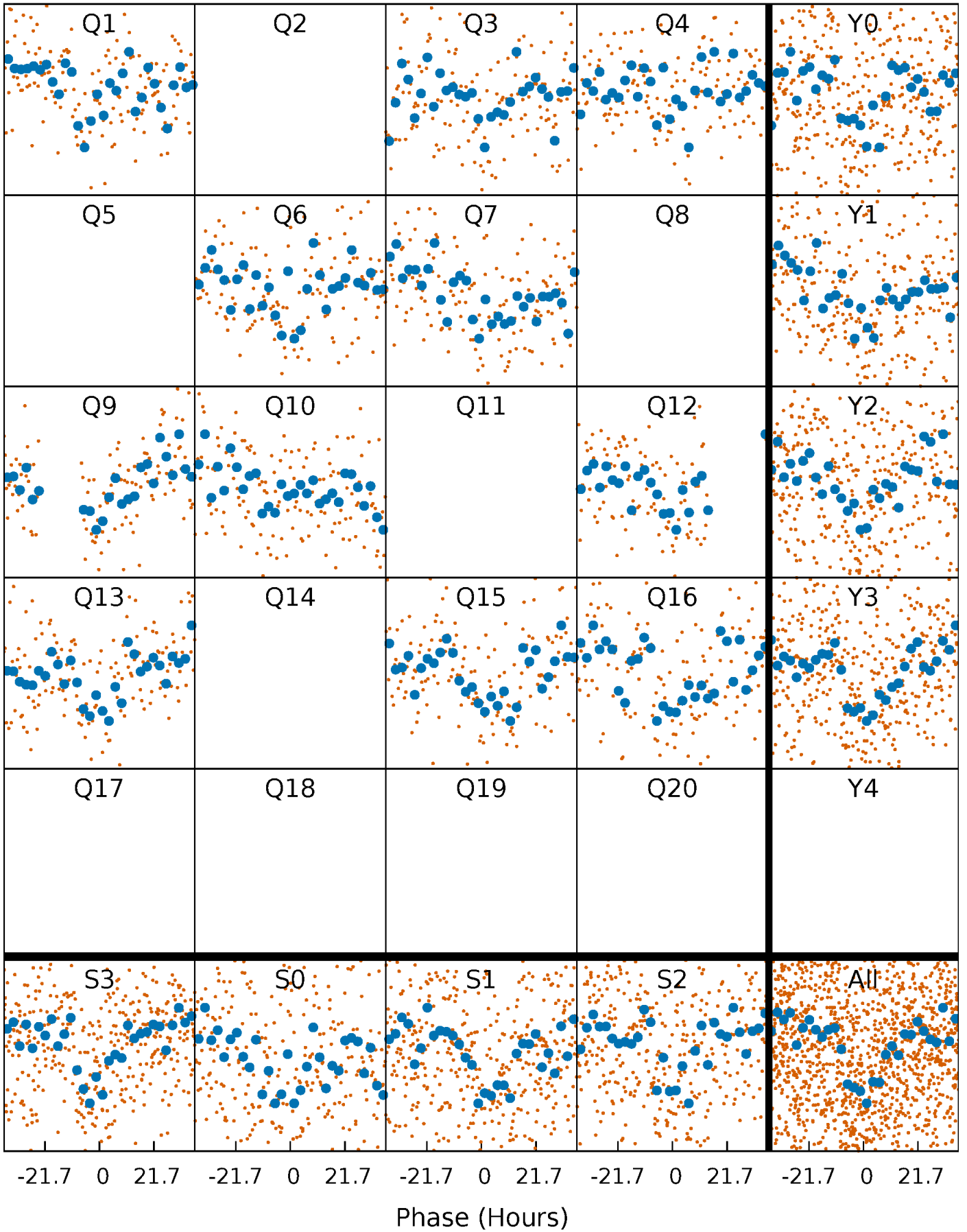


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

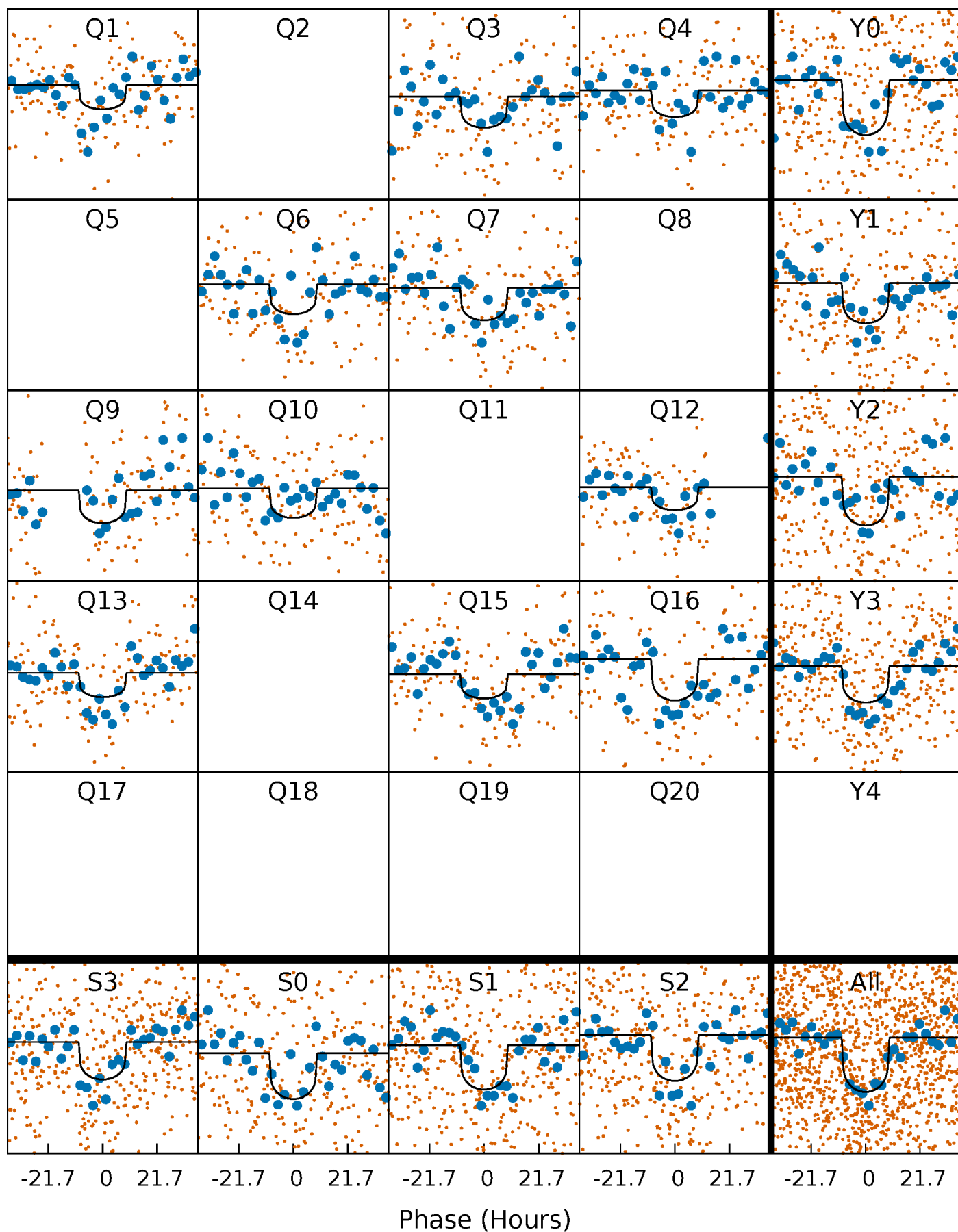
TCE 007416306-01 P=137.390166 Days  $T_0=158.968014$  (BKJD)





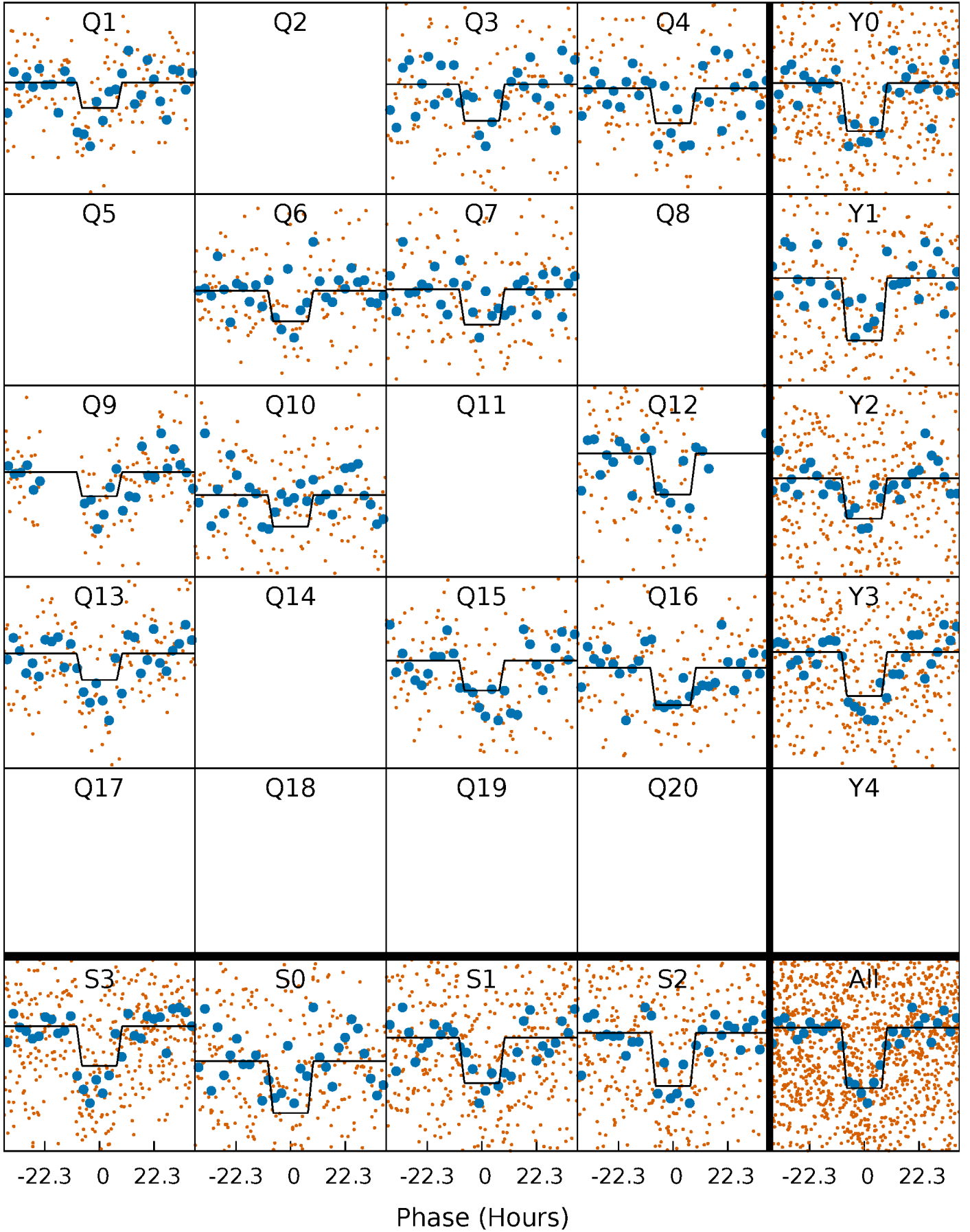
# DV Quarter-Phased Transit Curves

TCE 007416306-01 P=137.390166 Days  $T_0=158.968014$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

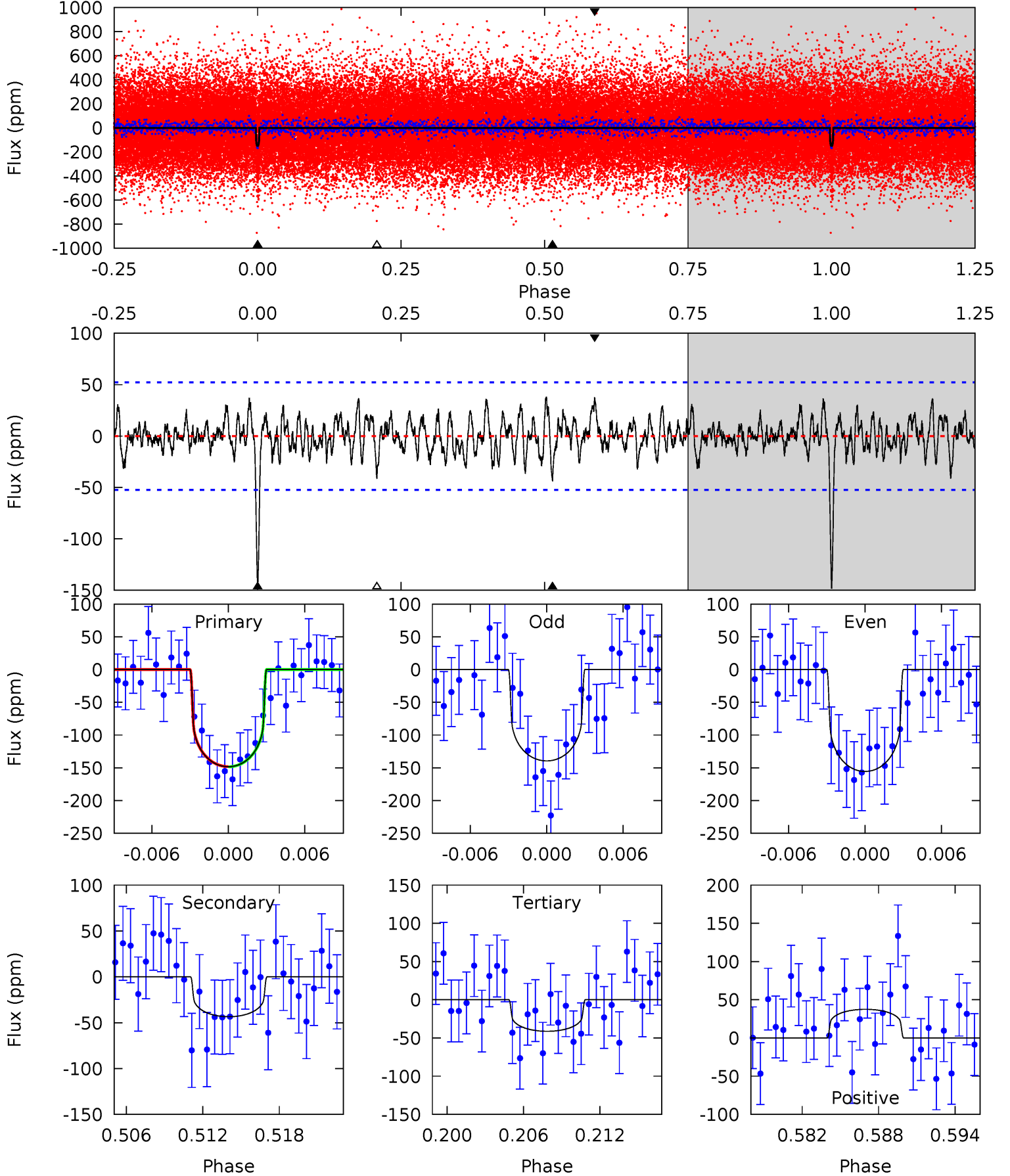
TCE 007416306-01 P=137.388446 Days  $T_0=158.981895$  (BKJD)



# DV Model-Shift Uniqueness Test

007416306-01,  $P = 137.390166$  Days,  $E = 21.577848$  Days

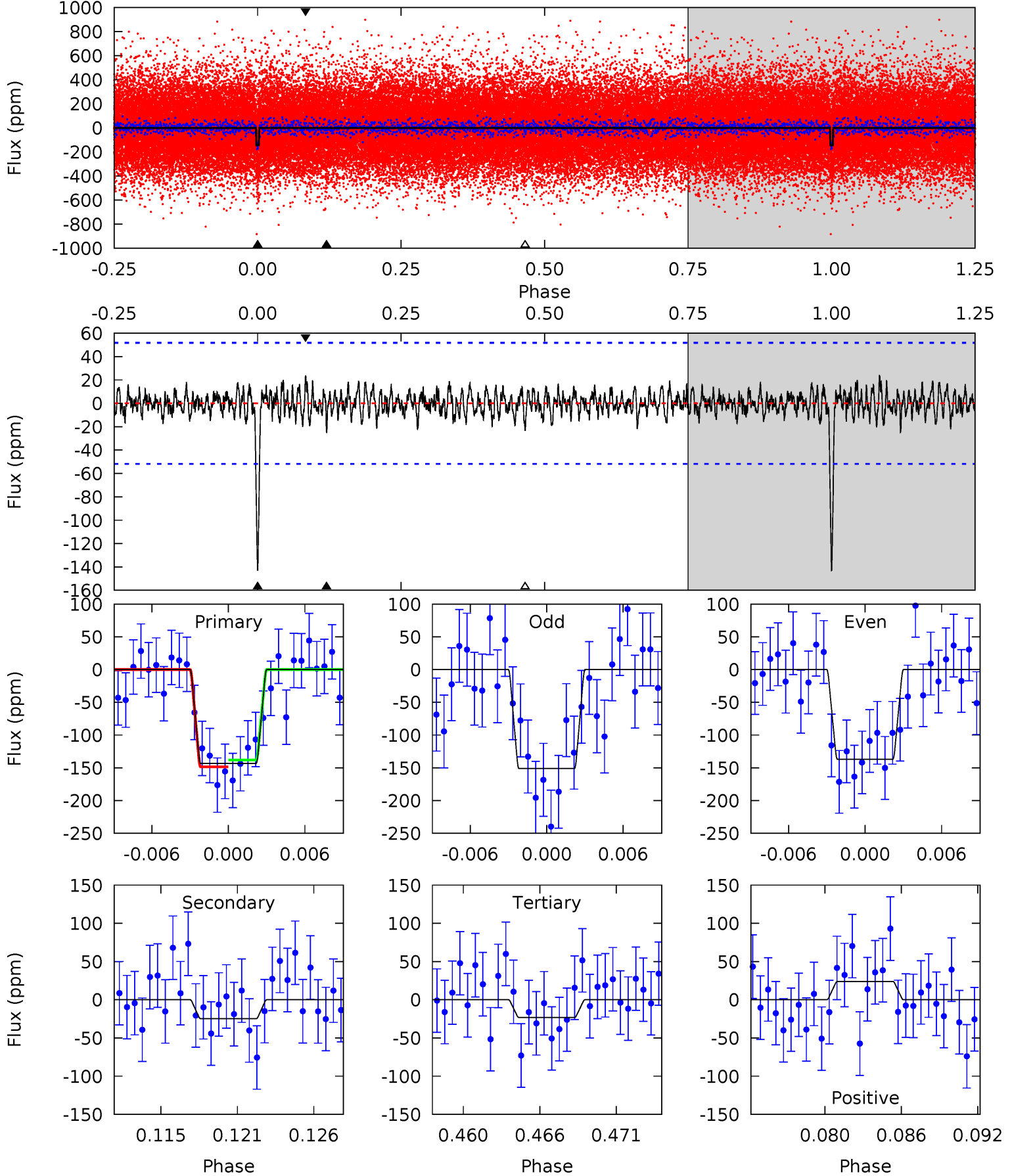
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.6	4.27	4.05	3.68	5.13	2.75	1.33	10.5	10.9	0.22	0.59	0.79	0.95	0.20	0.01



# Alt Model-Shift Uniqueness Test

007416306-01,  $P = 137.388446$  Days,  $E = 21.593449$  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
14.2	2.45	2.30	2.36	5.13	2.76	0.79	11.9	11.8	0.15	0.09	0.71	0.98	0.14	0.51



### Stellar Parameters For KIC 007416306

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5425^{+177}_{-145}$	$3.704^{+0.784}_{-0.196}$	$-0.160^{+0.350}_{-0.250}$	$2.655^{+0.783}_{-1.697}$	$1.304^{+0.183}_{-0.457}$	$0.098^{+1.670}_{-0.050}$
	+3%/-3%	+21%/-5%	+219%/-156%	+29%/-64%	+14%/-35%	+1703%/-51%
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 007416306-01 / KOI 5388.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-44 \pm 10$	$3.10^{+1.39}_{-1.29}$	$704^{+71}_{-118}$	$4207^{+656}_{-341}$	$762^{+1390}_{-391}$
Alt.	$-25 \pm 10$	$3.09^{+1.34}_{-1.32}$	$706^{+72}_{-131}$	$3871^{+491}_{-404}$	$464^{+846}_{-271}$

$T_{max}$  = 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

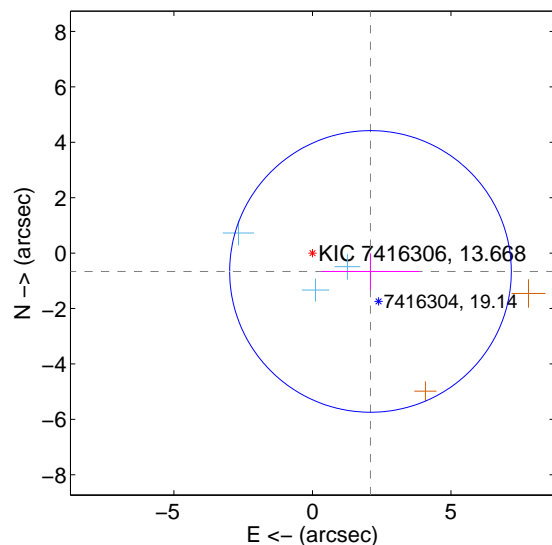
Supplemental centroid analysis for 007416306-01. Kepler magnitude: 13.67. Transit SNR 9.29

There are 3 quarters with good PRF difference image offsets

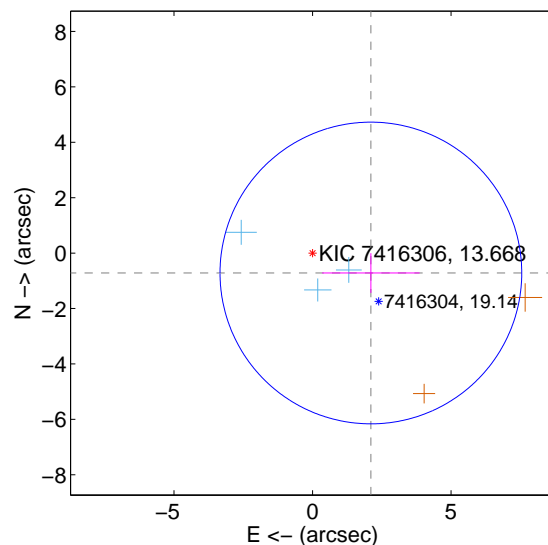
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.196 \pm 1.693$	1.30	$-2.094 \pm 1.764$	$-0.662 \pm 0.657$
PRF-fit source offset from KIC position	$2.224 \pm 1.814$	1.23	$-2.105 \pm 1.756$	$-0.718 \pm 0.716$
photometric centroid source offset	$1.27 \pm 1.31$	0.97	$-1.14 \pm 1.31$	$0.56 \pm 1.30$

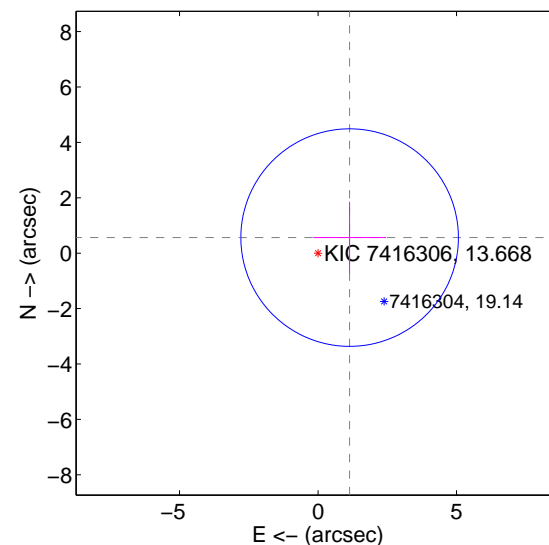
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

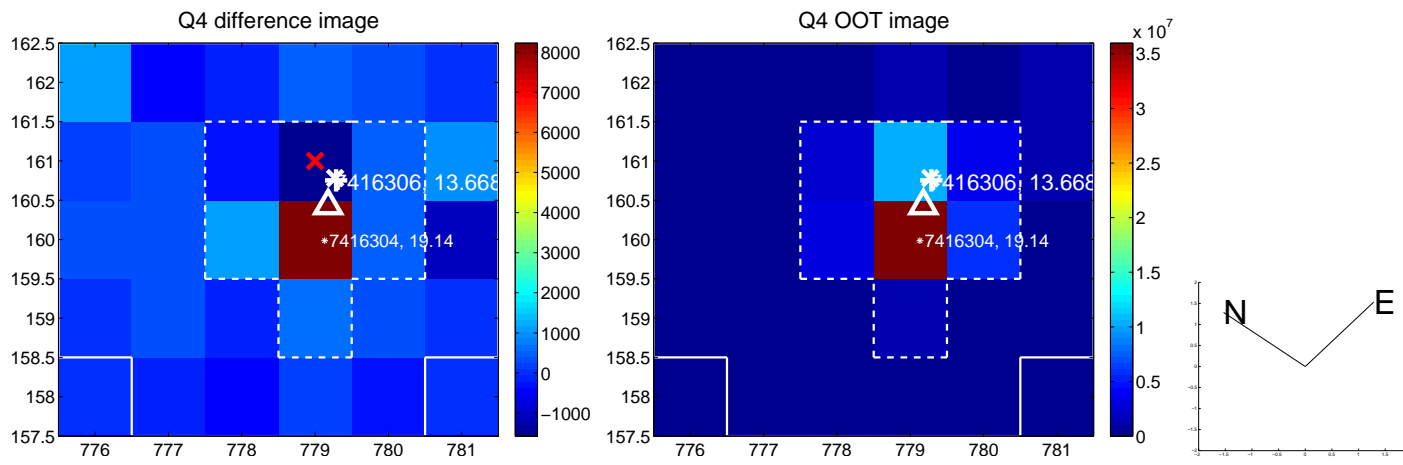
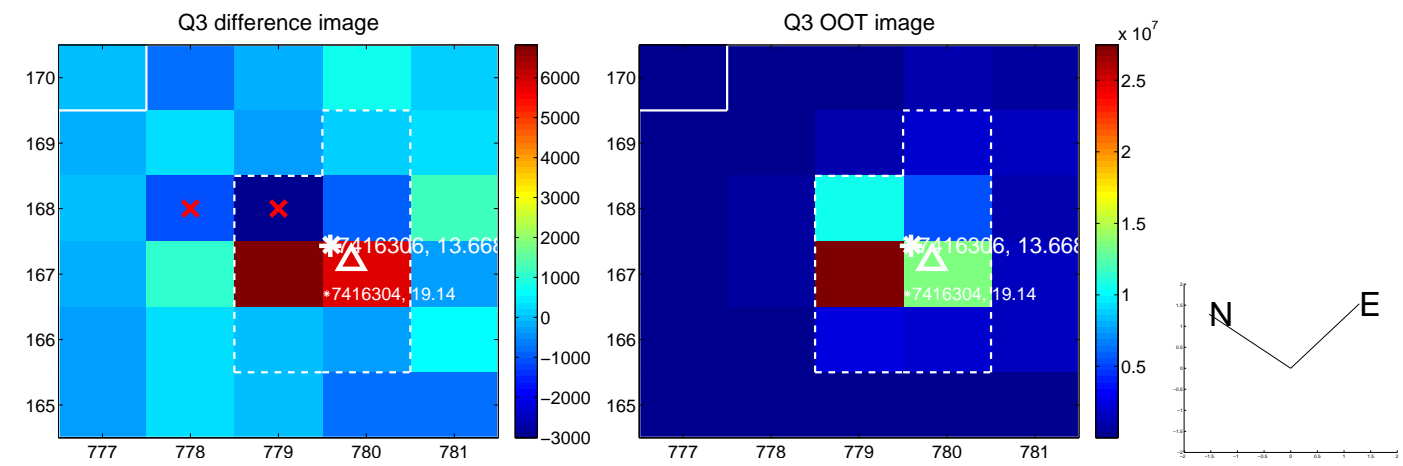
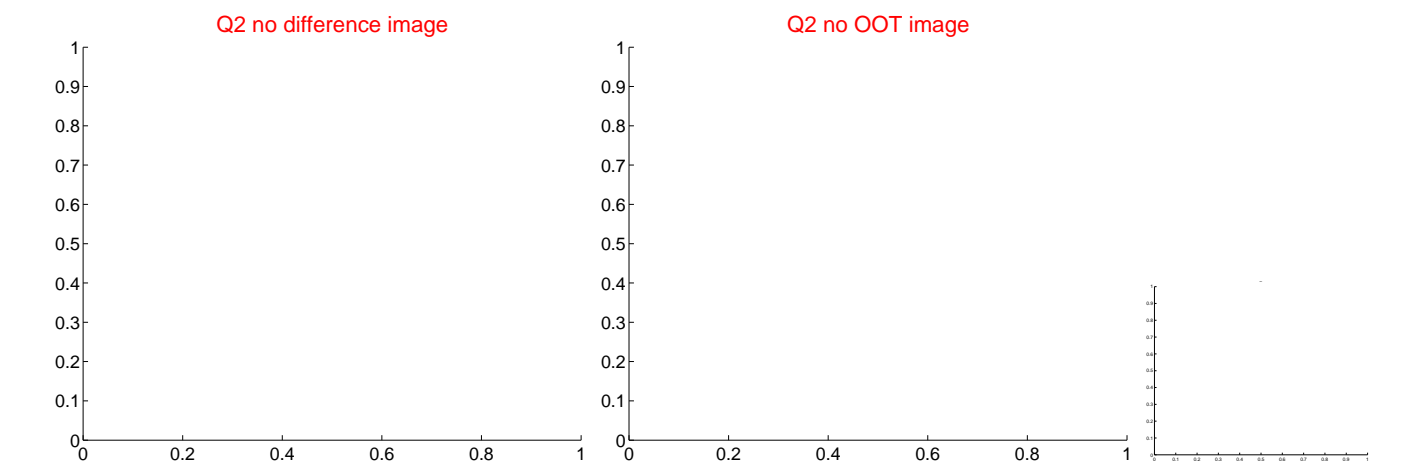
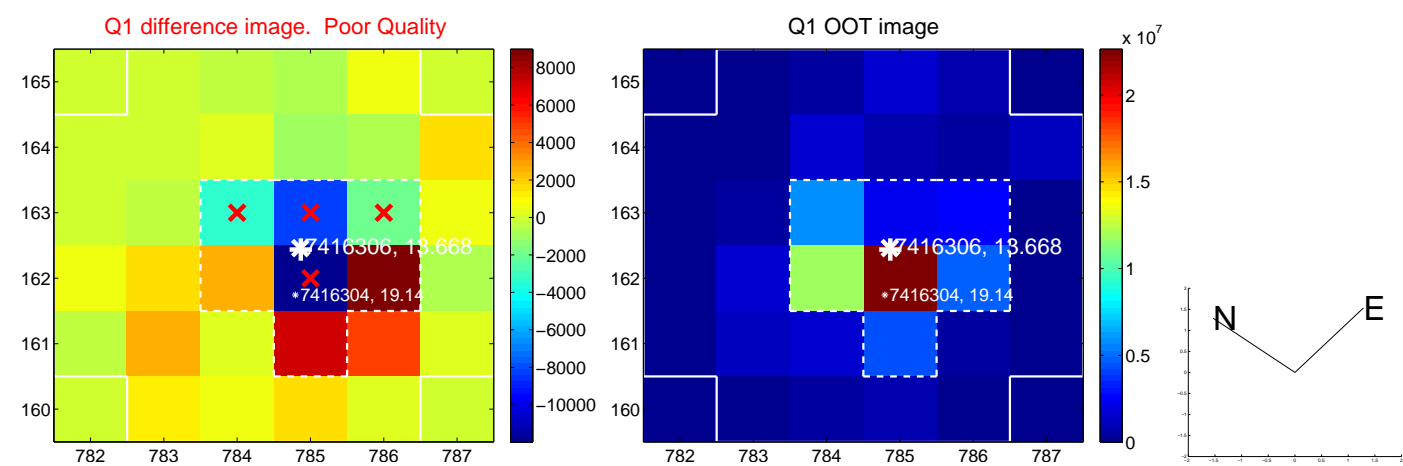


offset from photometric centroids



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.

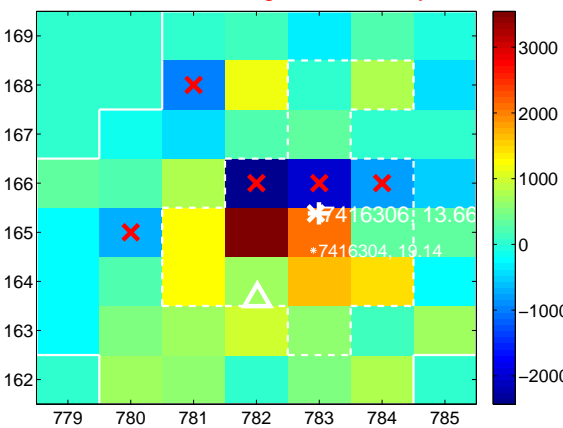
Q5 no difference image



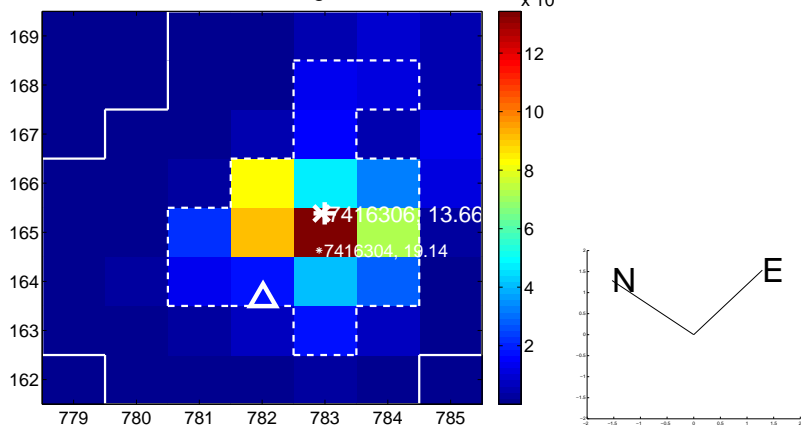
Q5 no OOT image



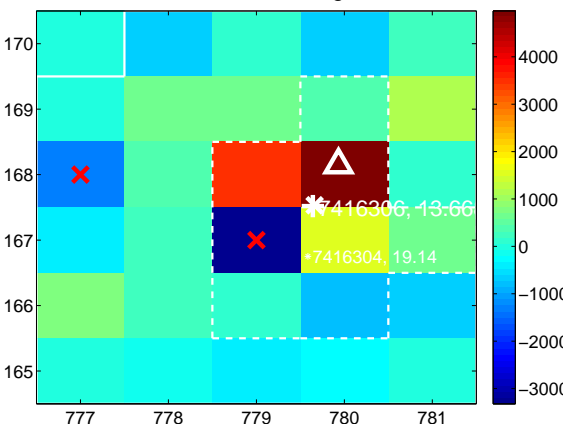
Q6 difference image. Poor Quality



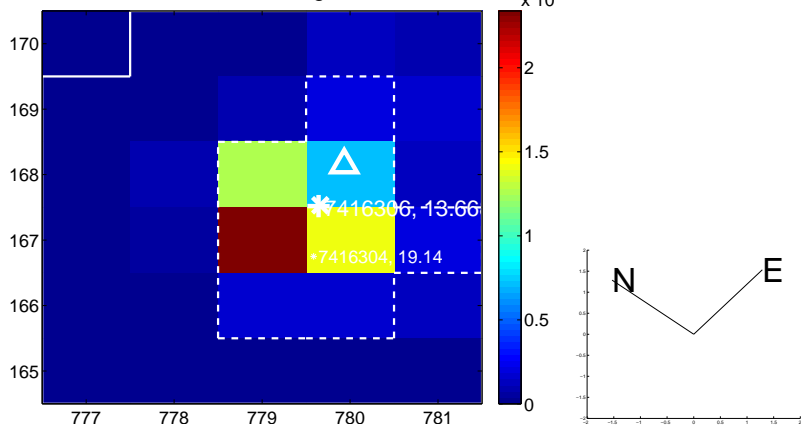
Q6 OOT image



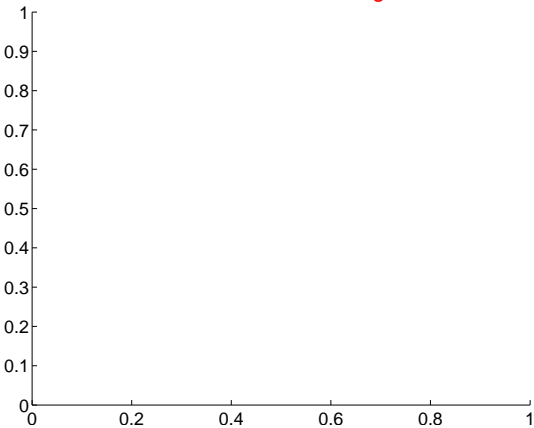
Q7 difference image



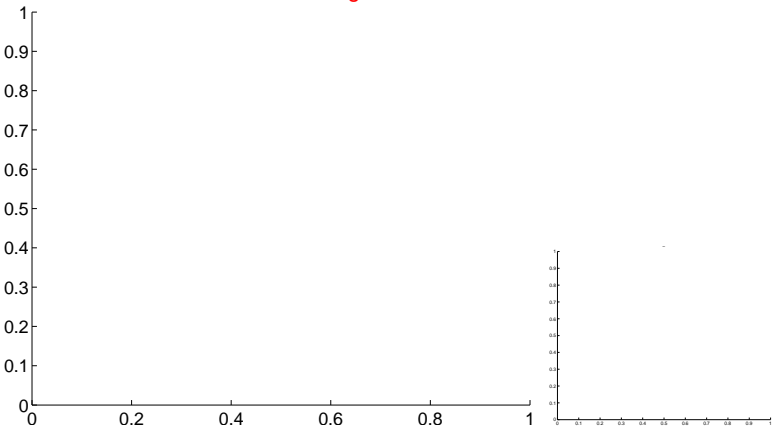
Q7 OOT image



Q8 no difference image



Q8 no OOT image



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

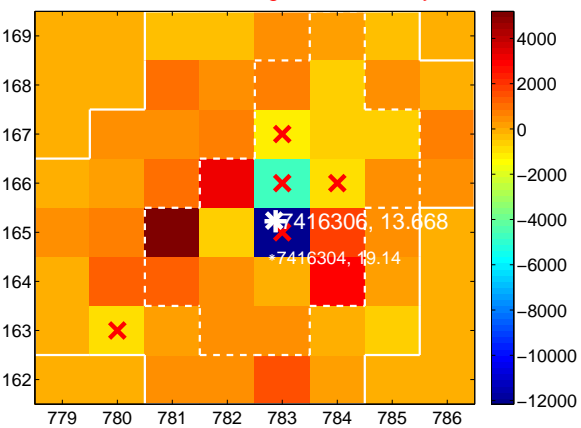
Q9 no difference image



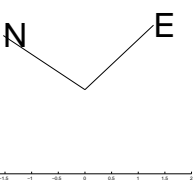
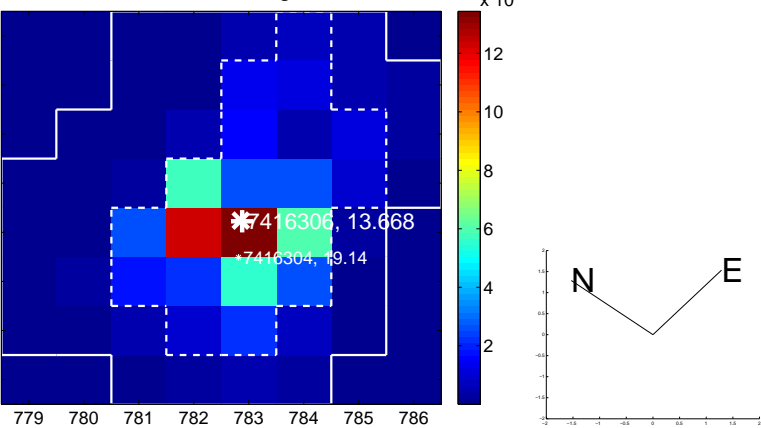
Q9 no OOT image



Q10 difference image. Poor Quality



Q10 OOT image



Q11 no difference image



Q11 no OOT image



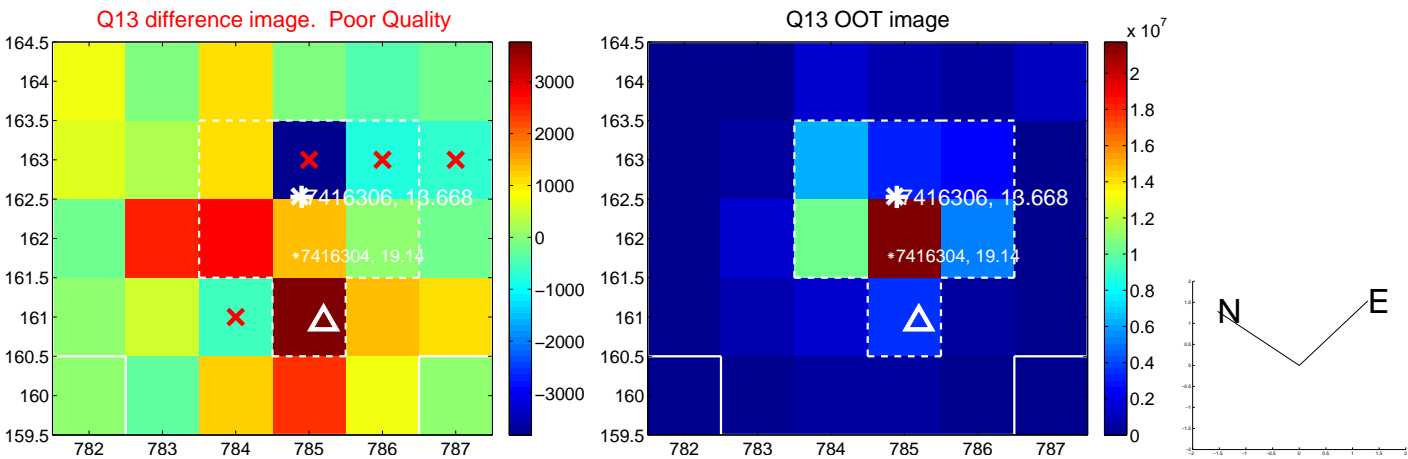
Q12 no difference image



Q12 no OOT image

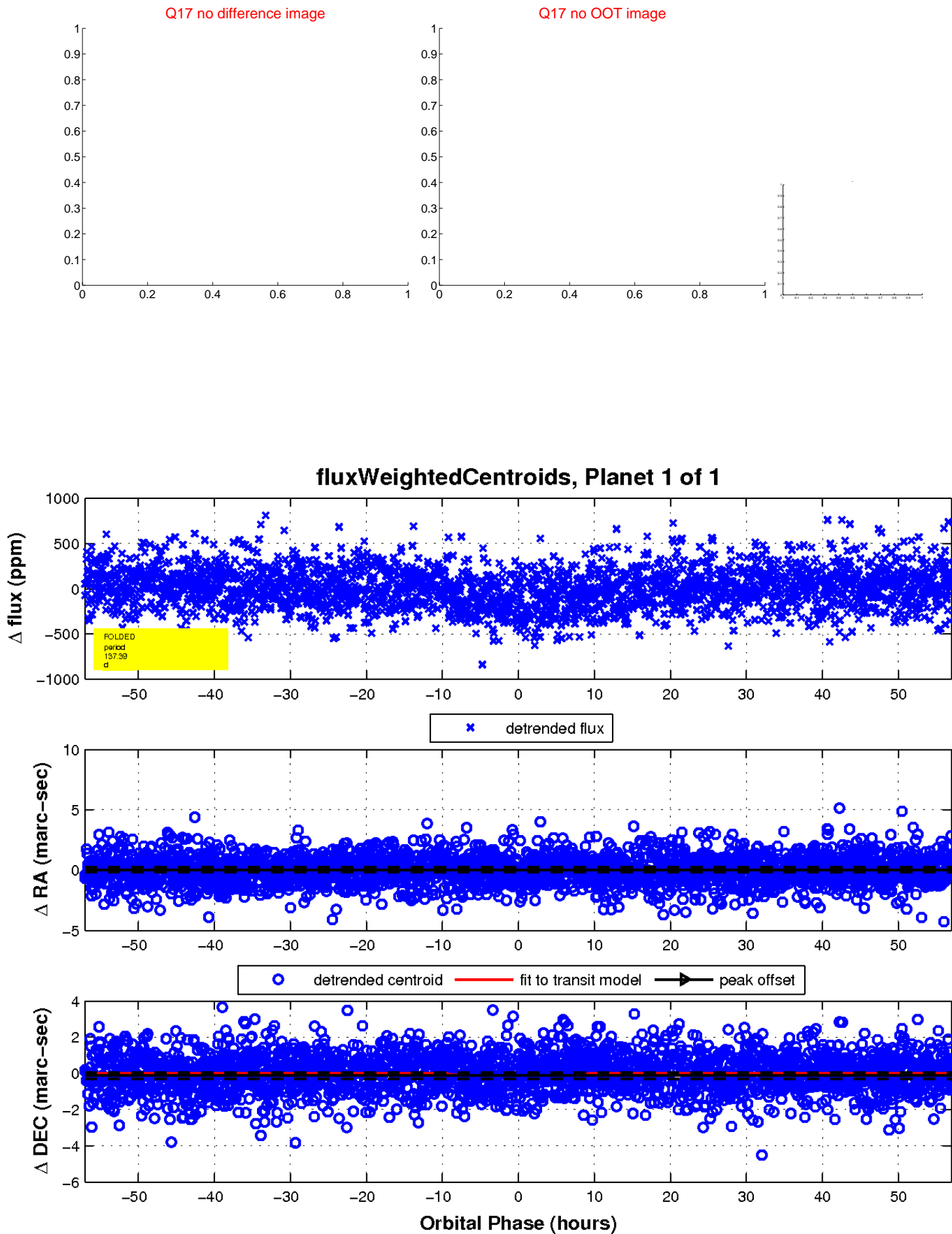


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.





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



# UKIRT Image

Declination

