

# KIC 012013490

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012013490-01	OBS	No	477.977800	276.336253	651.9	12.214	8.2	7.6	0.78	5496	2.13	0.38

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012013490-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—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.

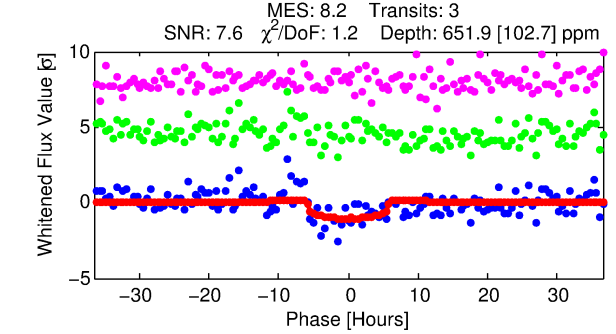
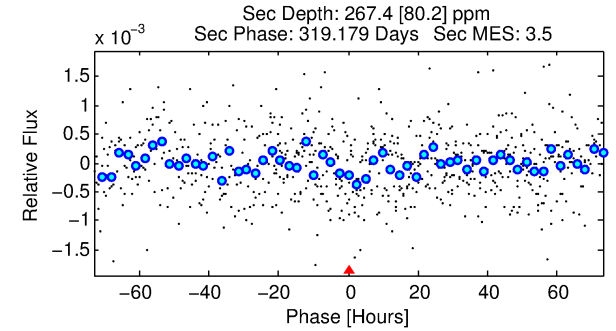
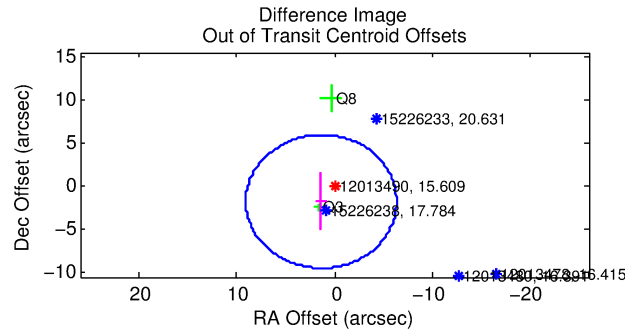
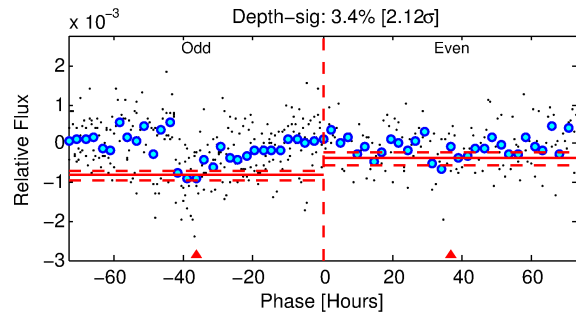
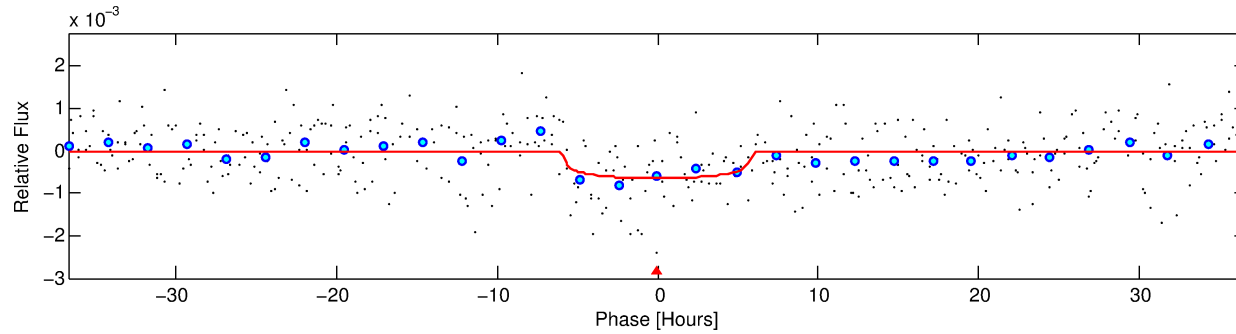
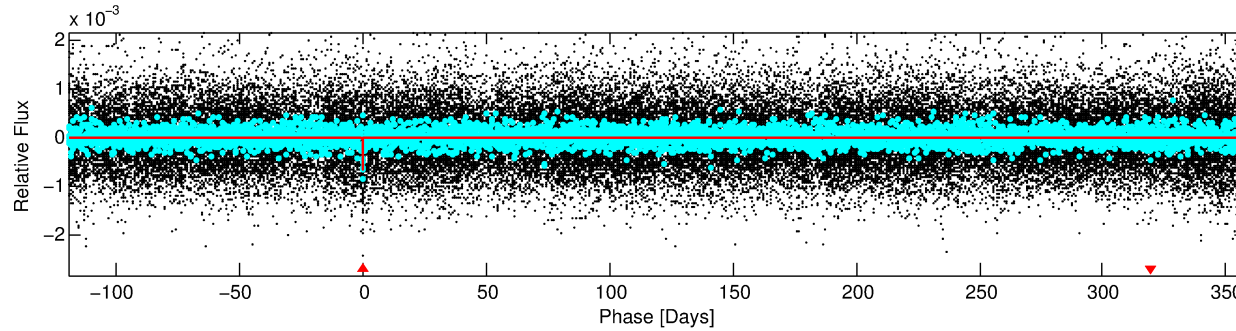
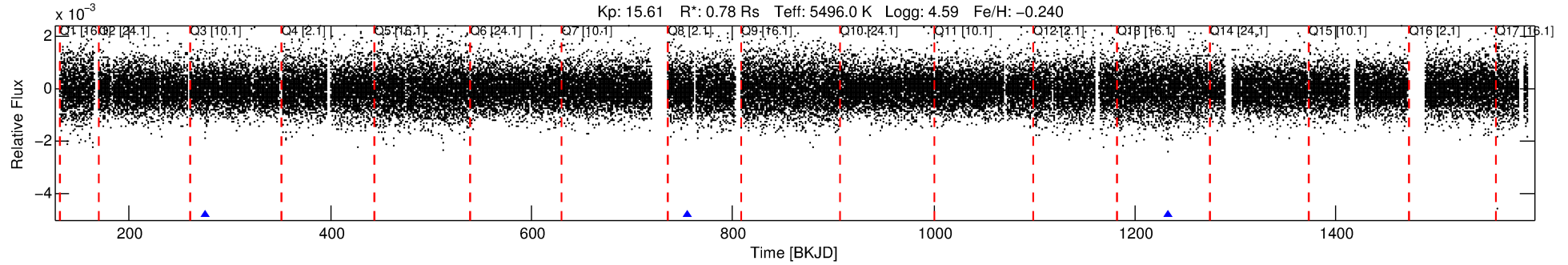
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 012013490-01

No Significant Match Found

# DV One-Page Summary

KIC: 12013490 Candidate: 1 of 1 Period: 477.978 d



## DV Fit Results:

Period = 477.97780 [0.02007] d  
Epoch = 276.3363 [0.0246] BKJD  
Rp/R\* = 0.0251 [0.0137]  
a/R\* = 219.07 [499.75]  
b = 0.72 [1.56]  
Seff = 0.38 [0.11]  
Teq = 200 [14] K  
Rp = 2.13 [1.24] Re  
a = 1.1373 [0.1994] AU  
Ag = 42115.35 [48864.64] [0.86σ]  
Teff = 4436 [1263] K [3.35σ]

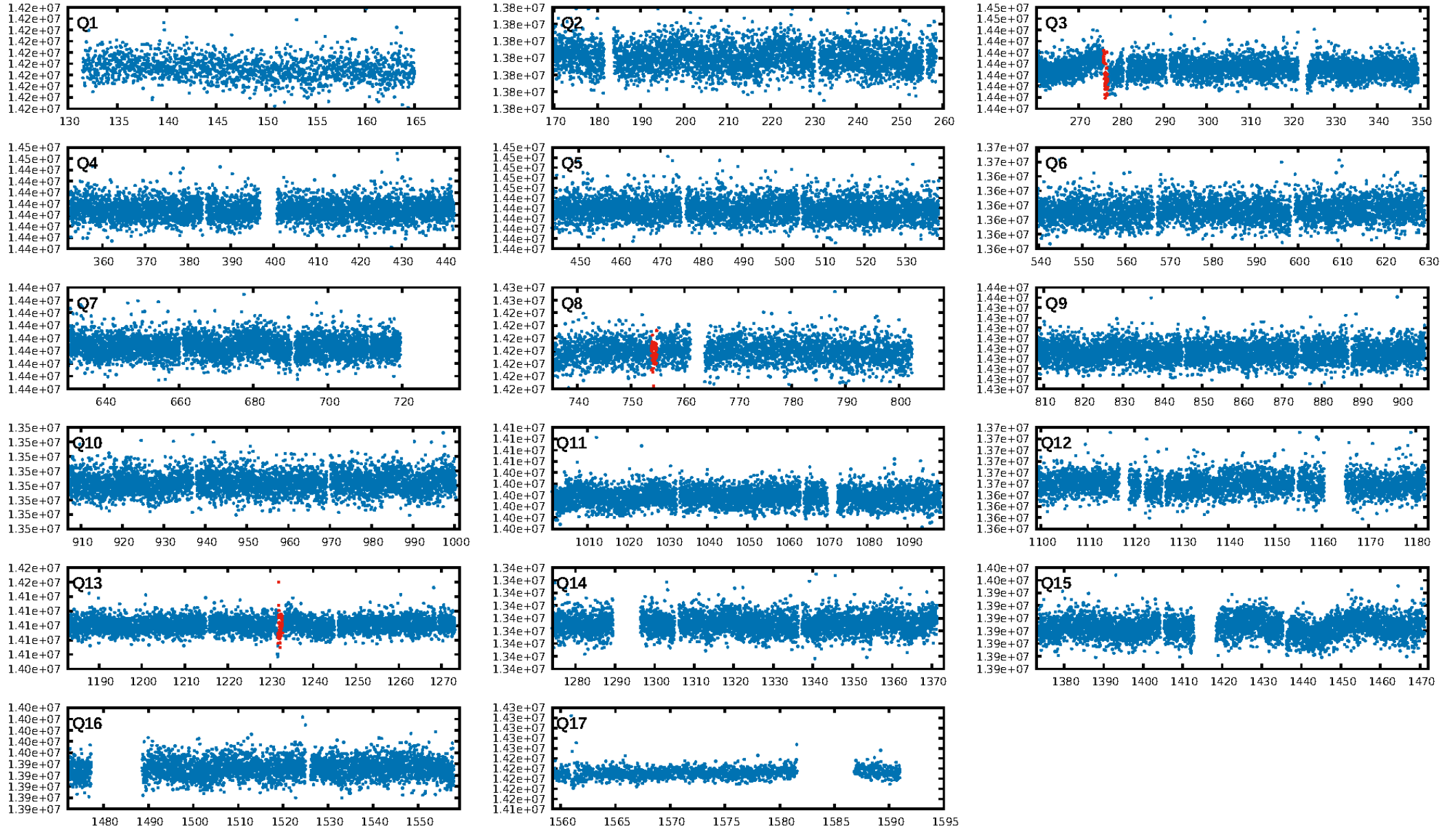
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 8.4%  
ModelChiSquareGof-sig: 90.1%  
**Bootstrap-pfa: 1.18e-12**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -10.01  
Centroid-sig: 22.4%  
Centroid-so: 2.301 arcsec [1.14σ]  
OotOffset-rm: 2.231 arcsec [0.87σ]  
KicOffset-rm: 2.389 arcsec [0.46σ]  
OotOffset-st: 0/1/1/0 [2]  
KicOffset-st: 0/1/1/0 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [2/2]

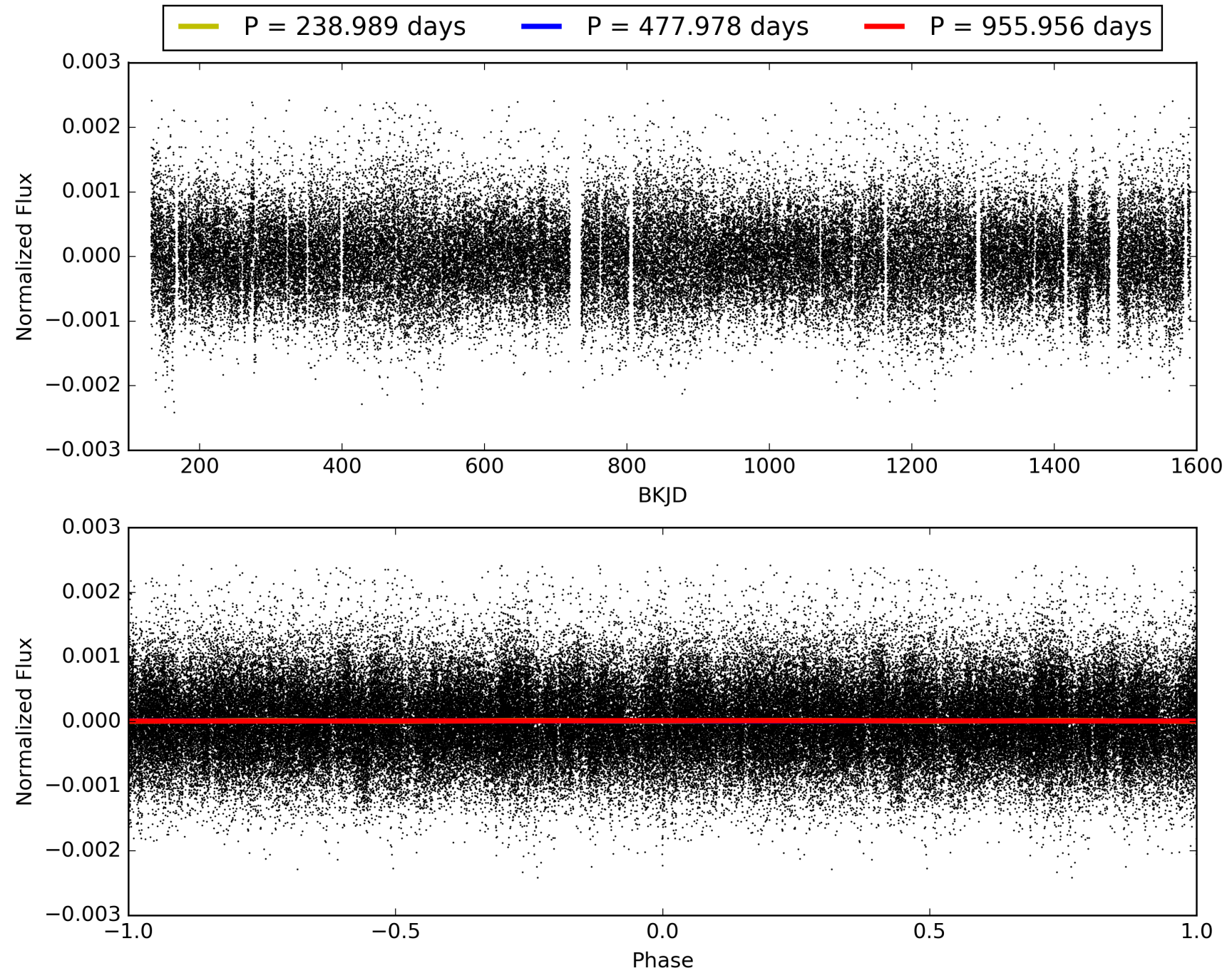
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 28-Jan-2016 20:03:53 Z

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

# TCE 012013490-01, PDC Light Curves

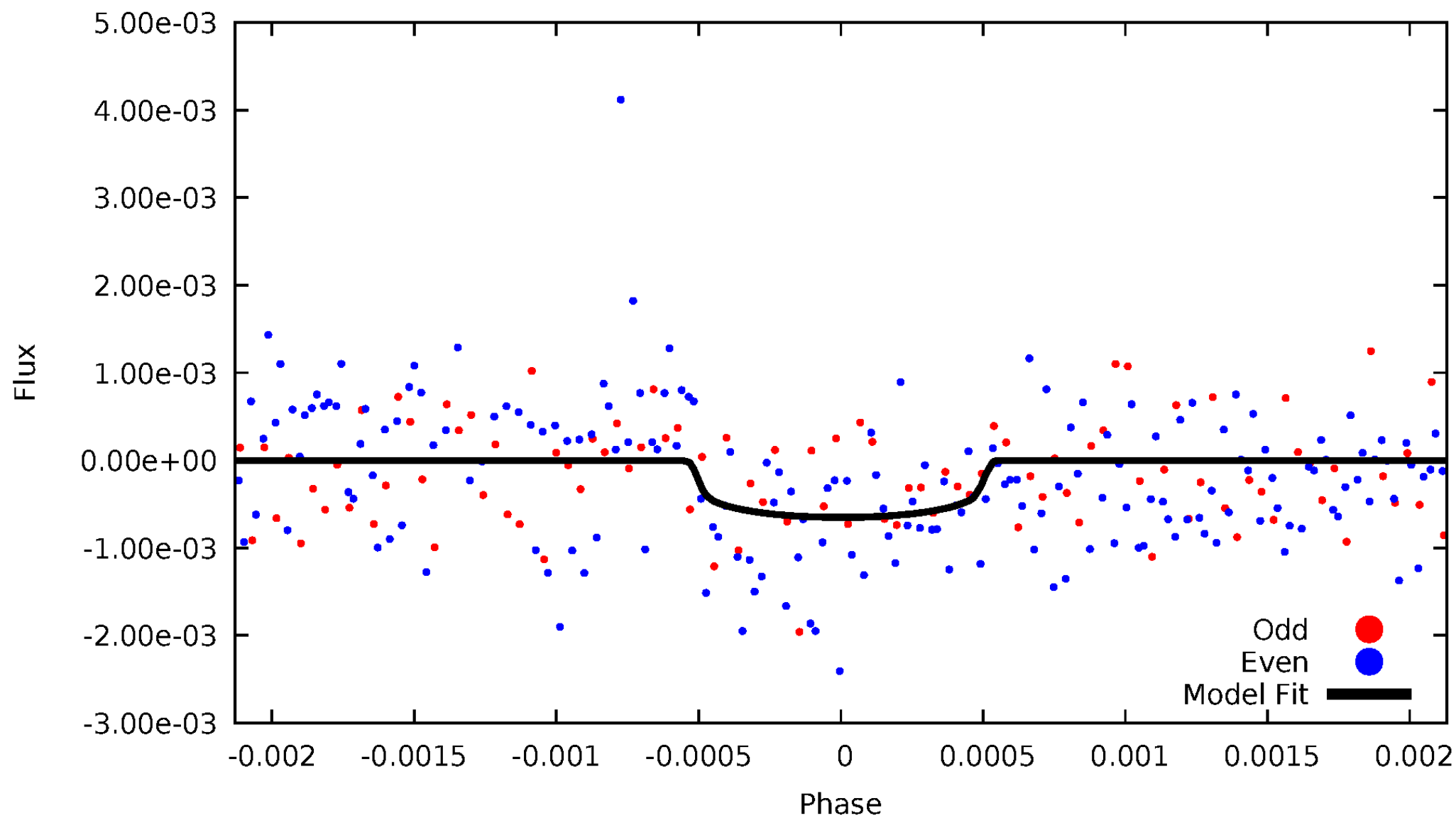


TCE 012013490-01



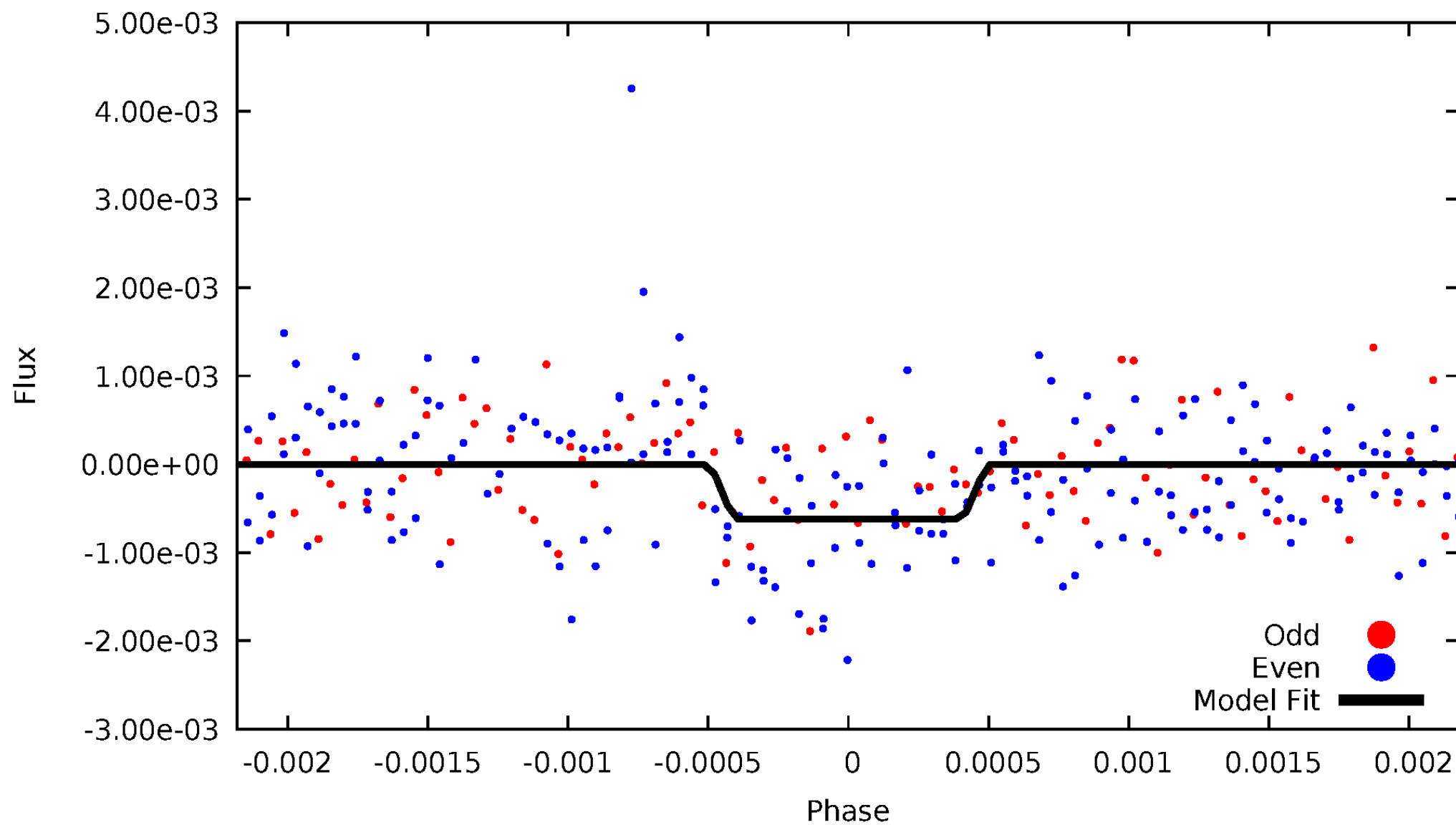
# DV Odd/Even

TCE 012013490-01



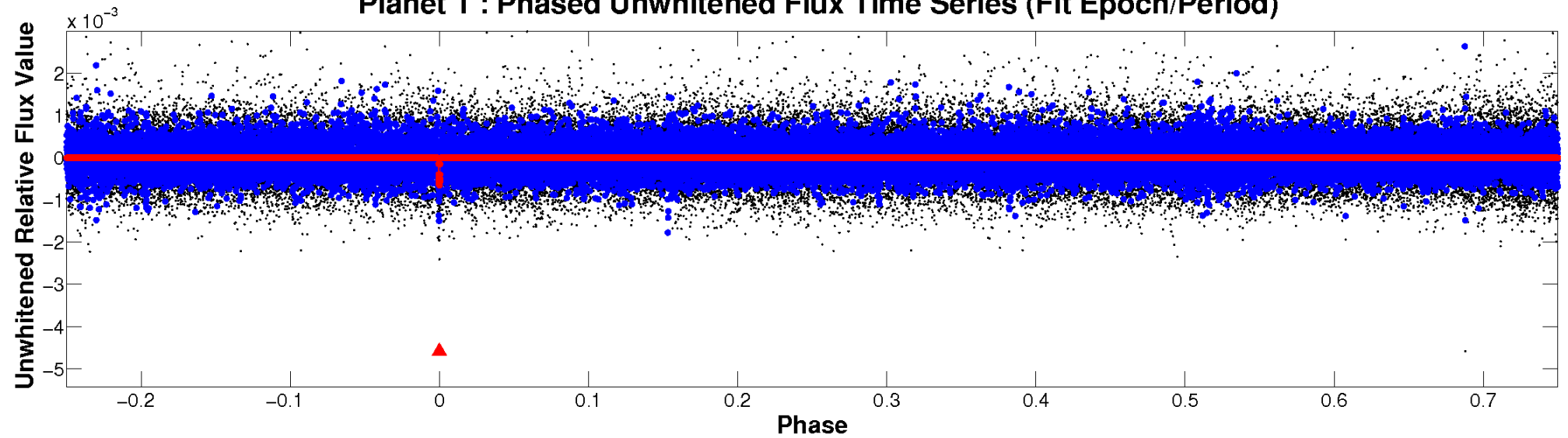
# ALT Odd/Even

TCE 012013490-01

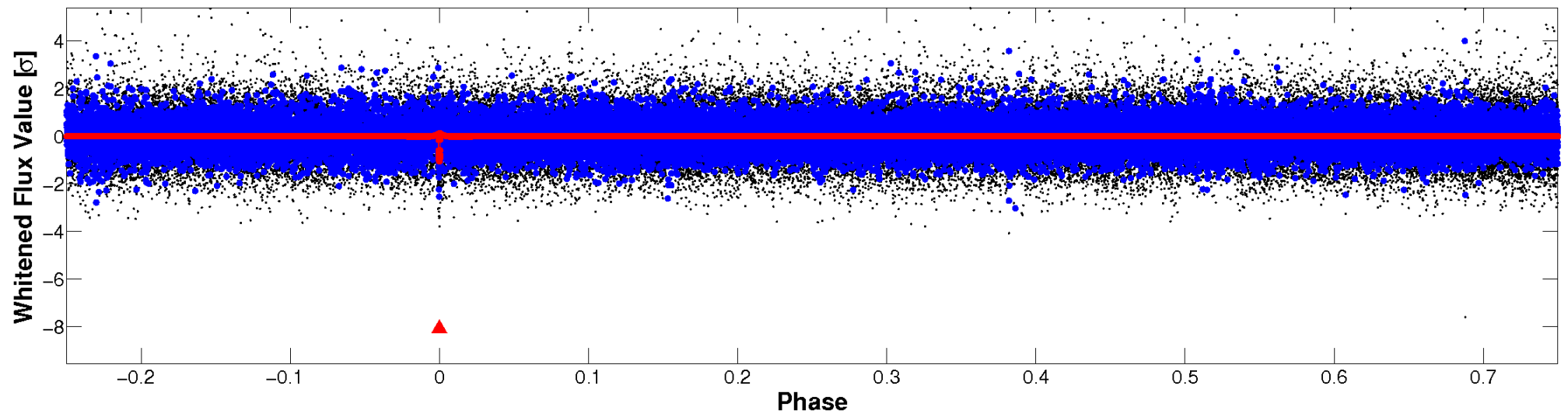


# Non-Whitened Vs. Whitened Light Curve

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

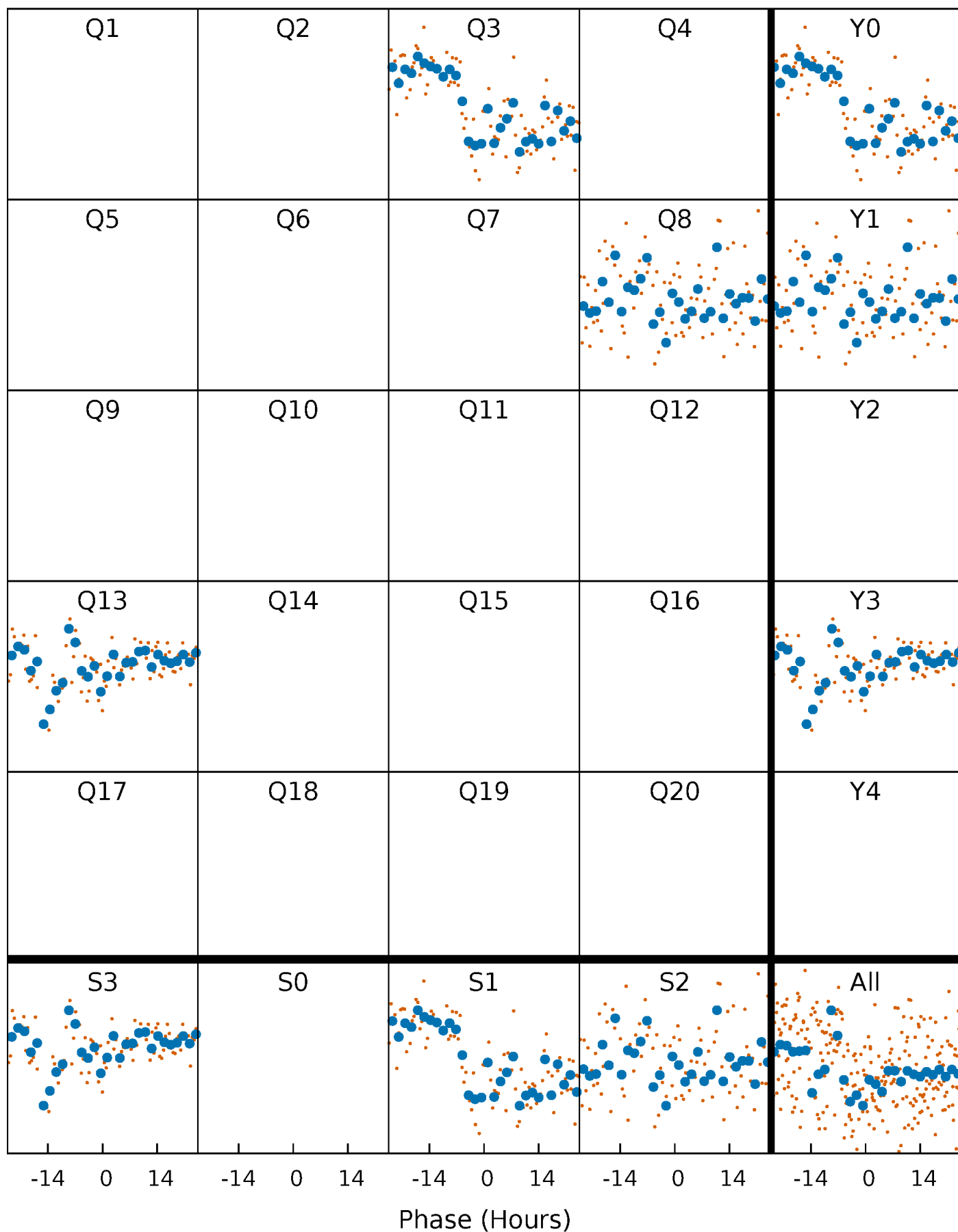


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

TCE 012013490-01 P=477.977800 Days  $T_0=276.336253$  (BKJD)



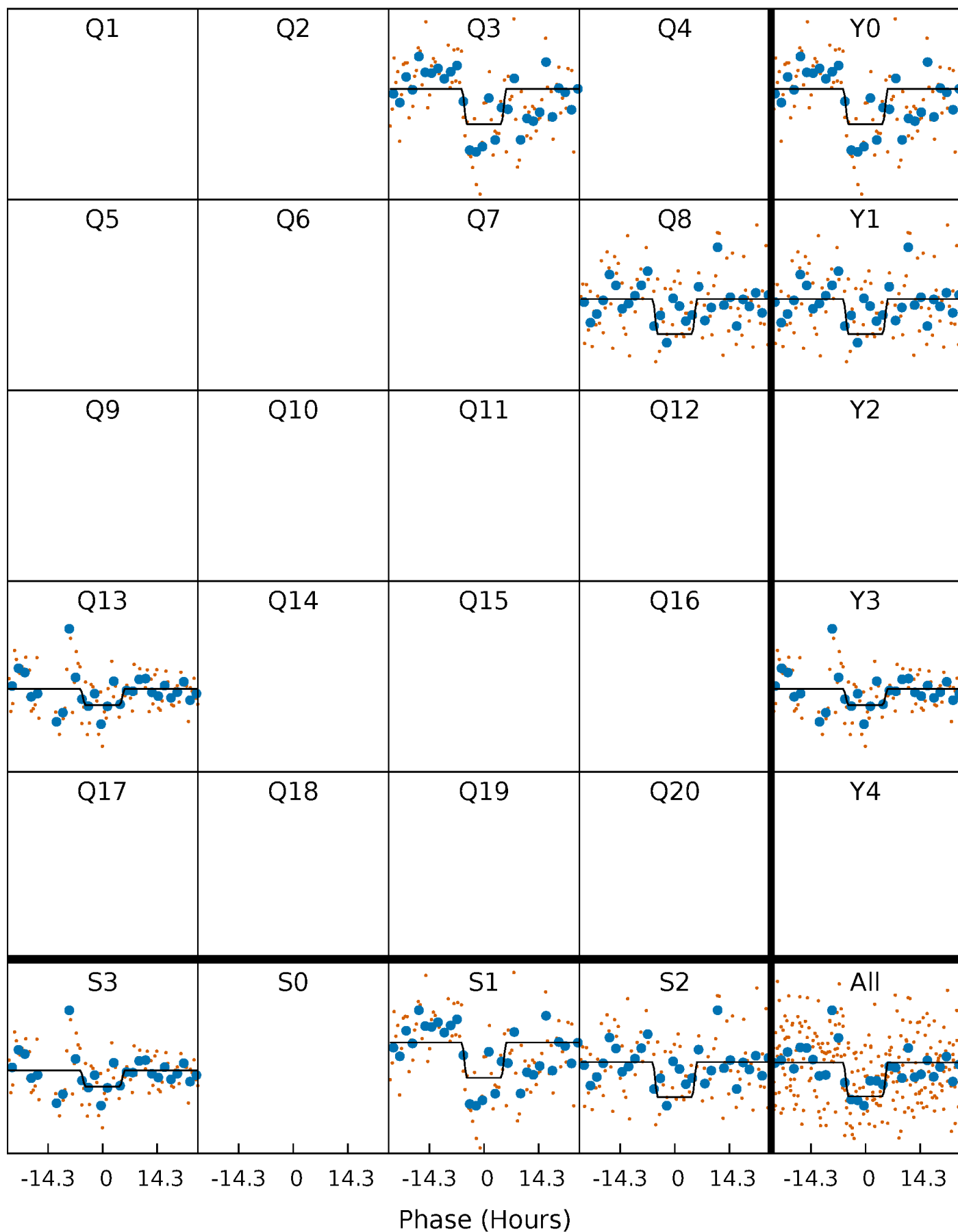
# DV Quarter-Phased Transit Curves

TCE 012013490-01     $P=477.977800$  Days     $T_0=276.336253$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

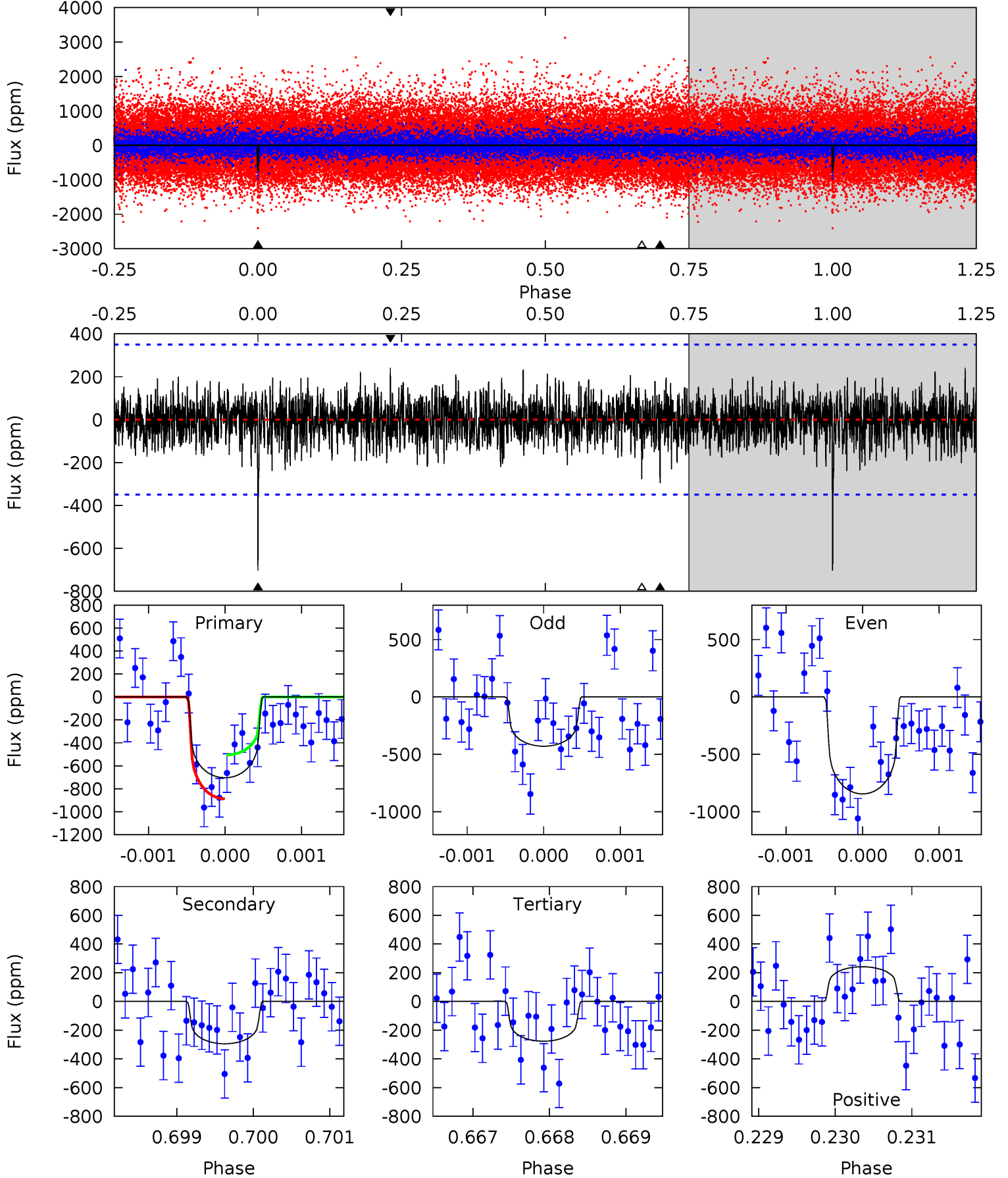
TCE 012013490-01 P=477.981835 Days  $T_0=276.327820$  (BKJD)



# DV Model-Shift Uniqueness Test

012013490-01,  $P = 477.977800$  Days,  $E = 276.336253$  Days

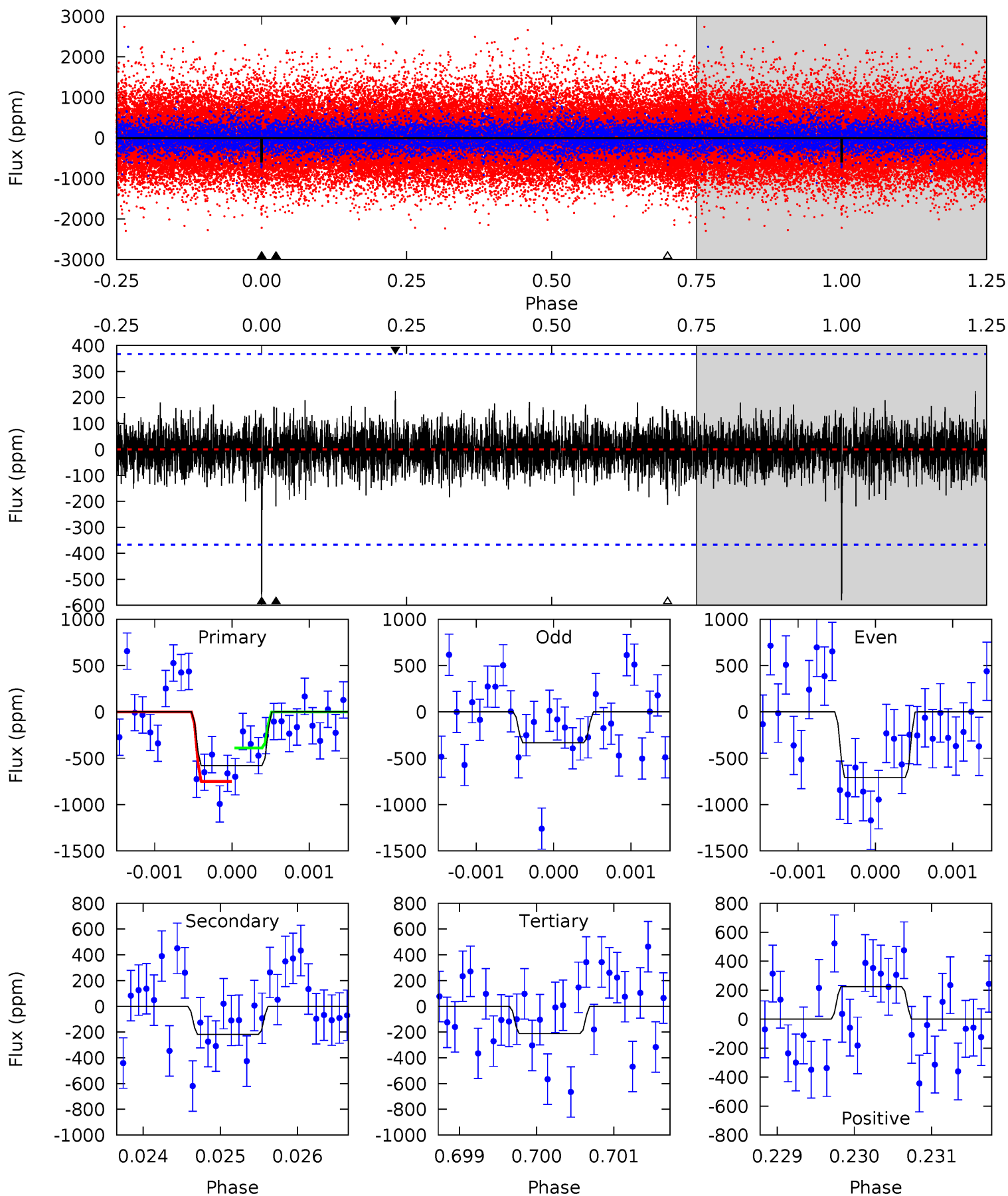
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.9	4.58	4.31	3.76	5.43	3.26	1.11	6.63	7.18	0.28	0.83	3.08	0.84	0.26	2.96



# Alt Model-Shift Uniqueness Test

012013490-01, P = 477.981835 Days, E = 276.327820 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
8.63	3.25	3.16	3.33	5.45	3.30	0.82	5.47	5.30	0.10	-0.08	2.65	0.99	0.28	2.68



### Stellar Parameters For KIC 012013490

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5496^{+166}_{-166}$	$4.592^{+0.034}_{-0.136}$	$-0.240^{+0.300}_{-0.300}$	$0.776^{+0.164}_{-0.070}$	$0.869^{+0.083}_{-0.100}$	$2.619^{+0.461}_{-1.010}$
	+3%/-3%	+1%/-3%	+125%/-125%	+21%/-9%	+10%/-12%	+18%/-39%
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 012013490-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-295 \pm 64$	$2.33^{+1.16}_{-1.27}$	$285^{+15}_{-11}$	$4579^{+1853}_{-689}$	$38678^{+139816}_{-22694}$
Alt.	$-219 \pm 67$	$2.29^{+1.20}_{-1.18}$	$285^{+15}_{-12}$	$4358^{+1648}_{-648}$	$30173^{+93655}_{-18622}$

$T_{max}$  = 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

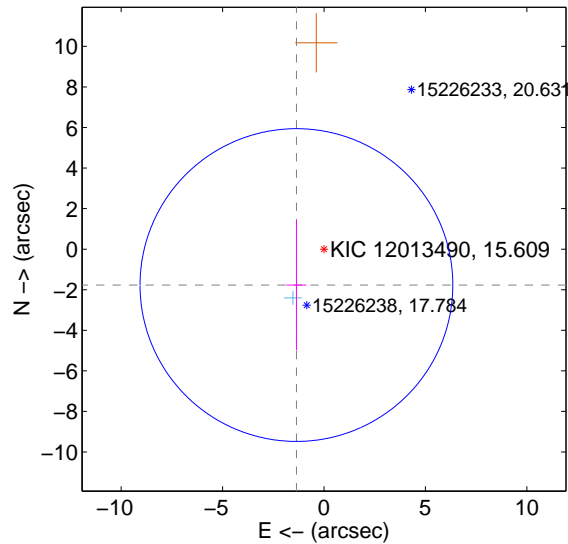
Supplemental centroid analysis for 012013490-01. Kepler magnitude: 15.61. Transit SNR 7.58

There are 1 quarters with good PRF difference image offsets

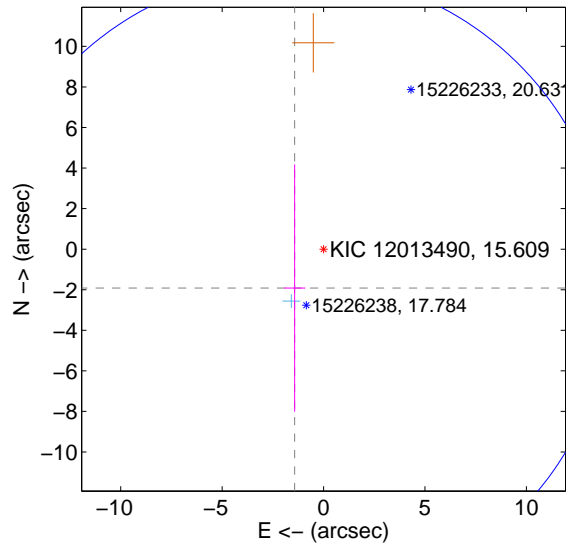
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.231 \pm 2.570$	0.87	$1.360 \pm 0.487$	$-1.769 \pm 3.220$
PRF-fit source offset from KIC position	$2.389 \pm 5.206$	0.46	$1.424 \pm 0.522$	$-1.918 \pm 6.099$
photometric centroid source offset	$2.30 \pm 2.02$	1.14	$-1.95 \pm 2.13$	$-1.21 \pm 1.70$

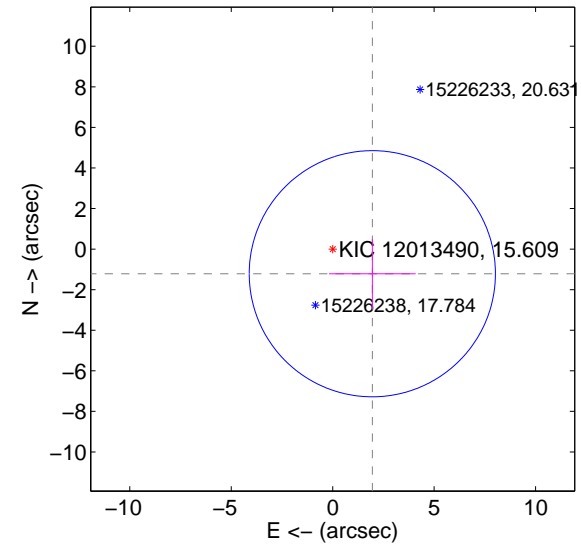
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



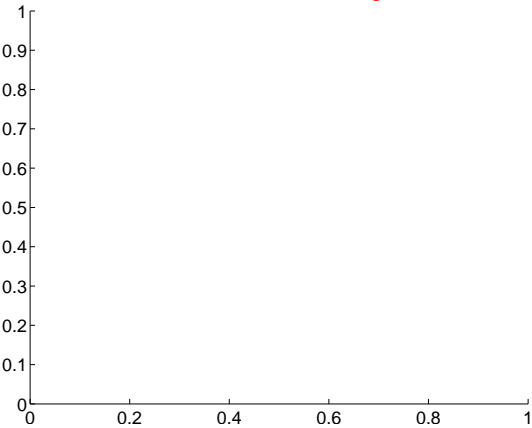
offset from photometric centroids



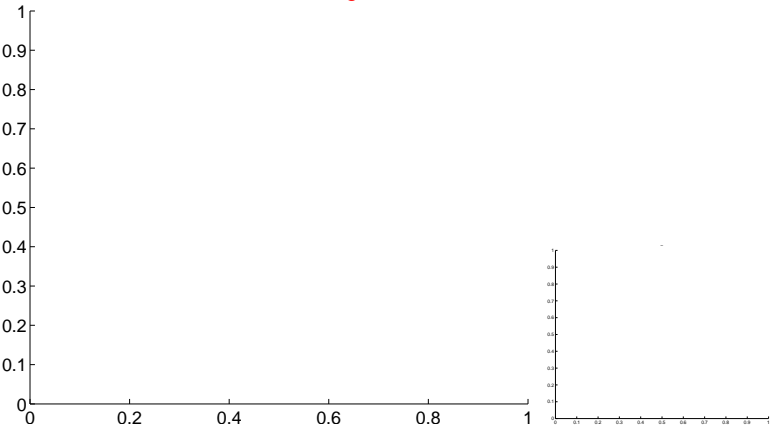
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

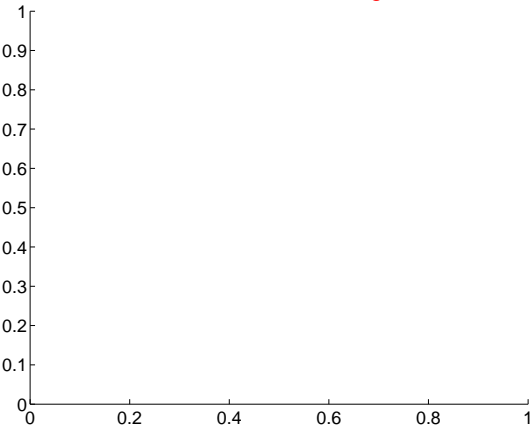
Q1 no difference image



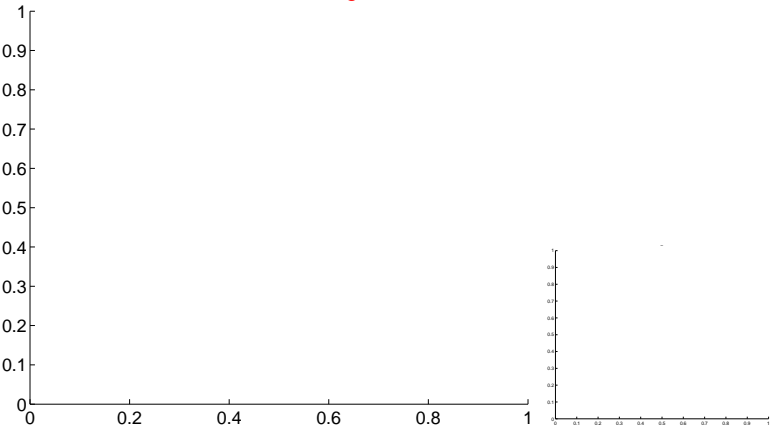
Q1 no OOT image



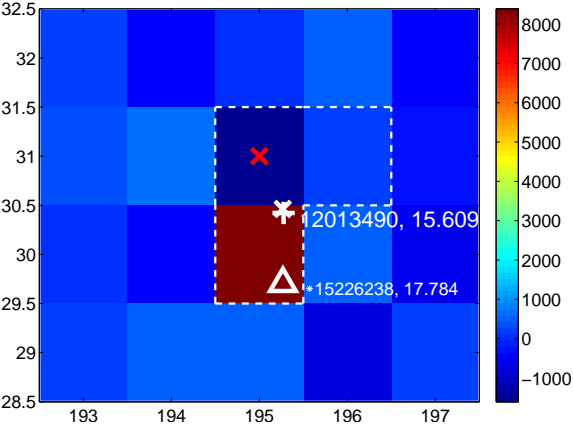
Q2 no difference image



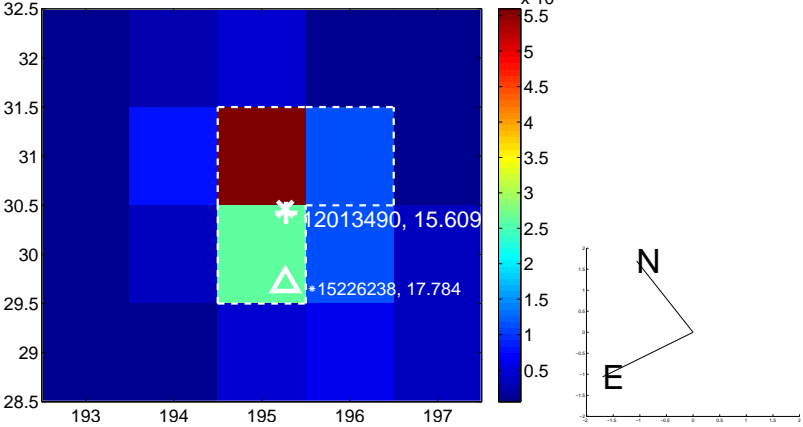
Q2 no OOT image



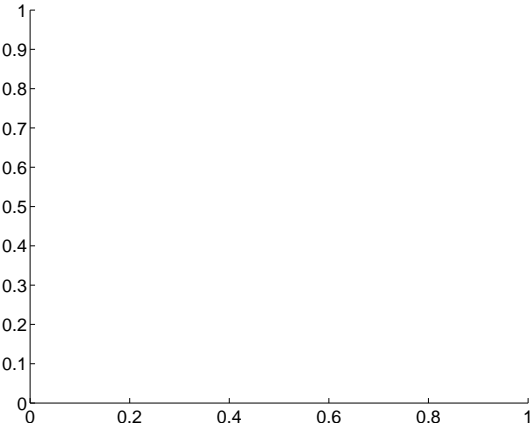
Q3 difference image



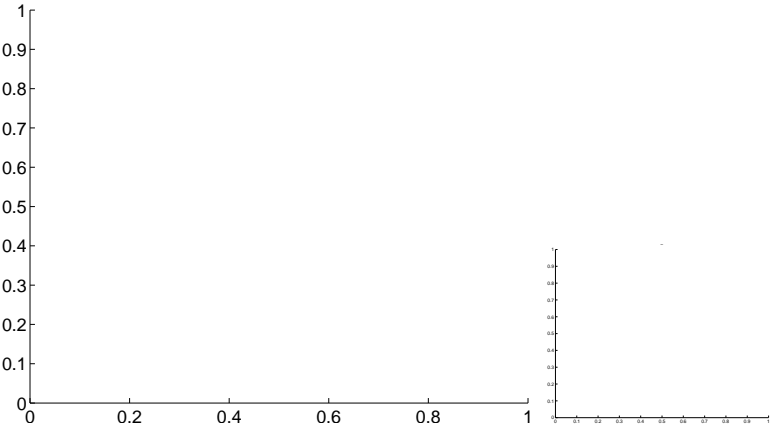
Q3 OOT image



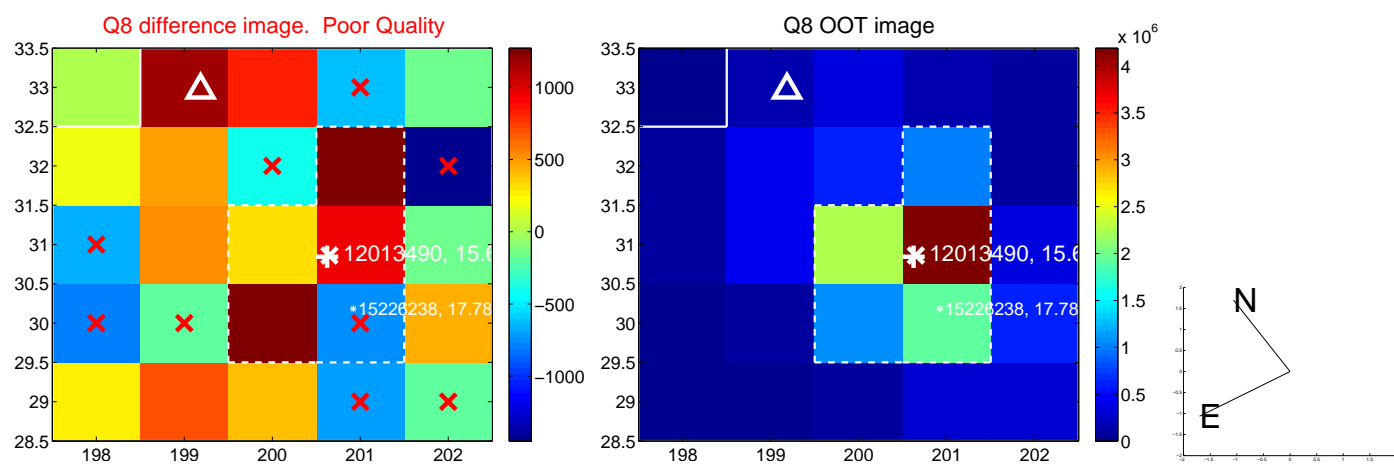
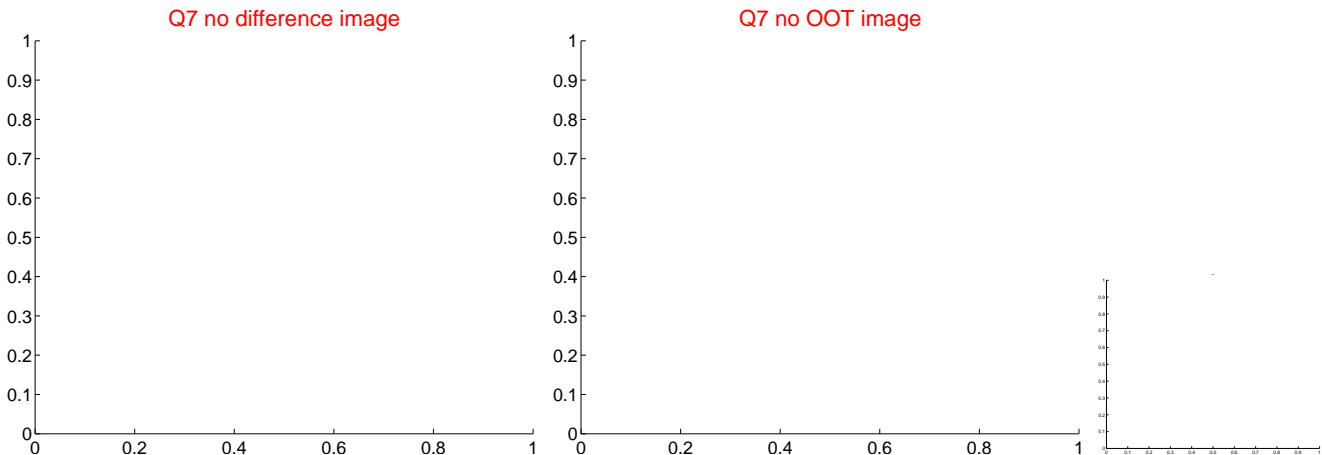
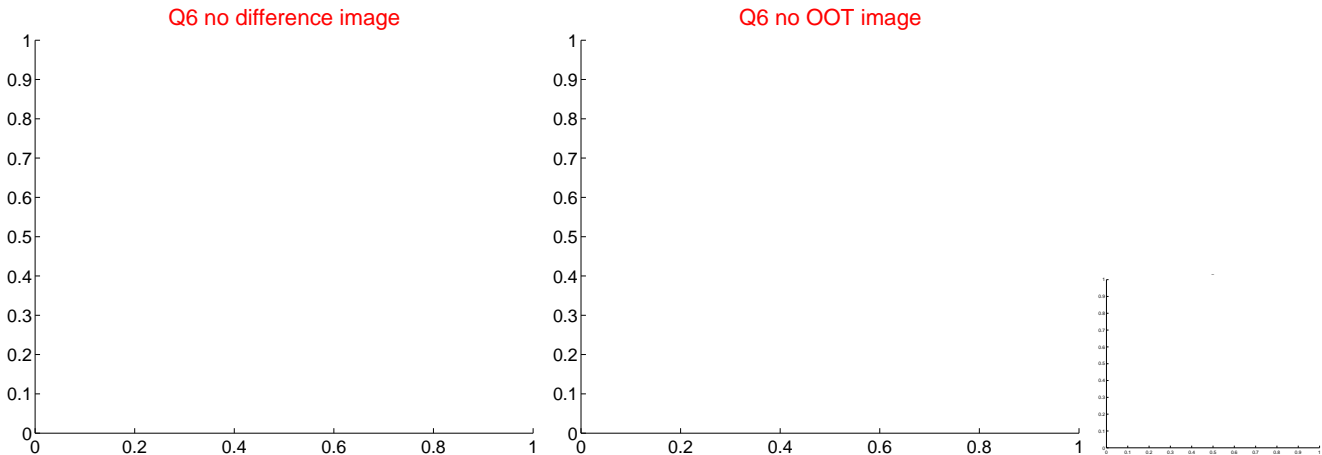
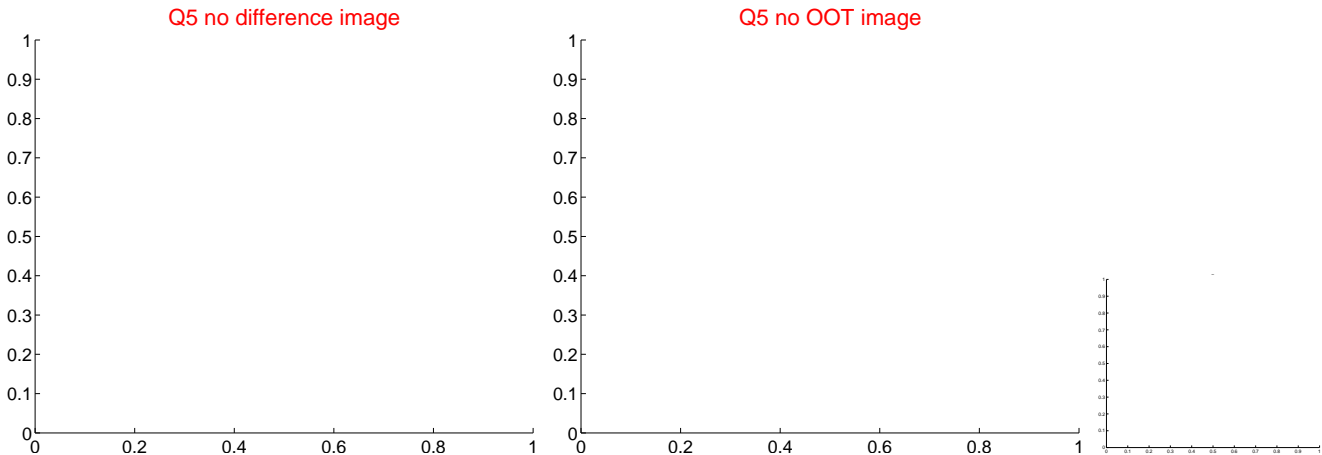
Q4 no difference image



Q4 no OOT image



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



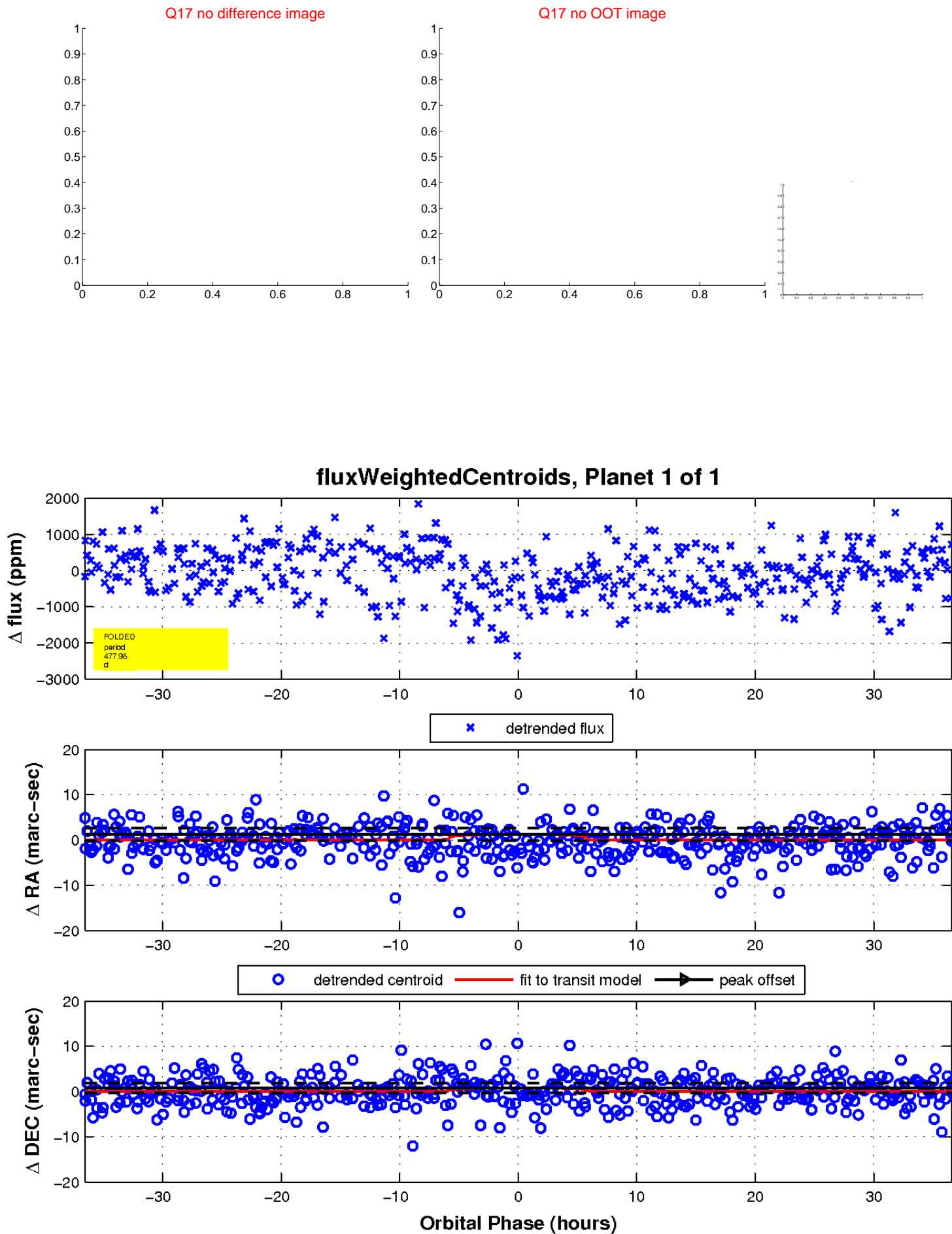
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.



UKIRT Image

Declination

