

# KIC 008228396

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008228396-01	OBS	No	374.167285	259.550769	1339.6	61.216	11.5	16.9	0.92	5945	6.39	0.98

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008228396-01	OBS	FP	0.00	1	0	0	1	INDIV_TRANS_MARSHALL_SKYE—ALL_TRANS_CHASES—CENT_FEW_DIFFS—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.

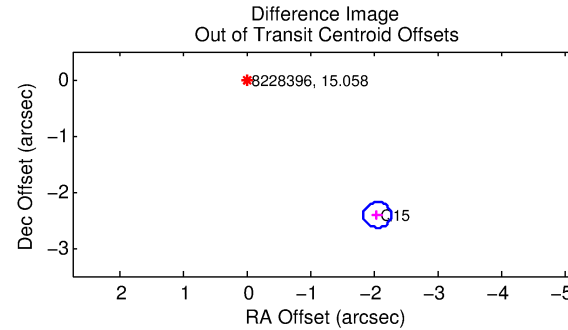
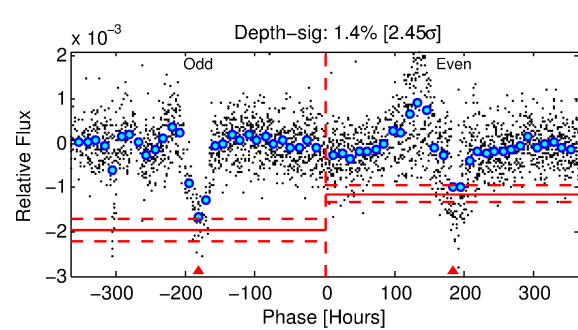
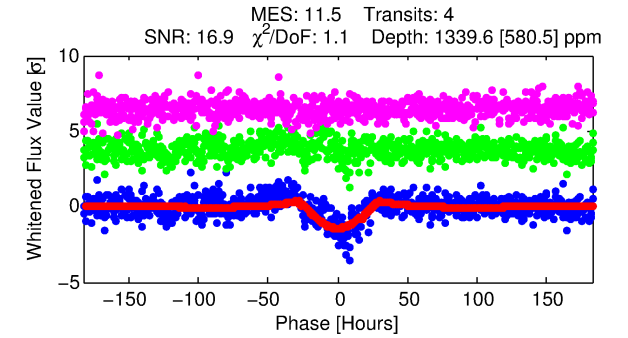
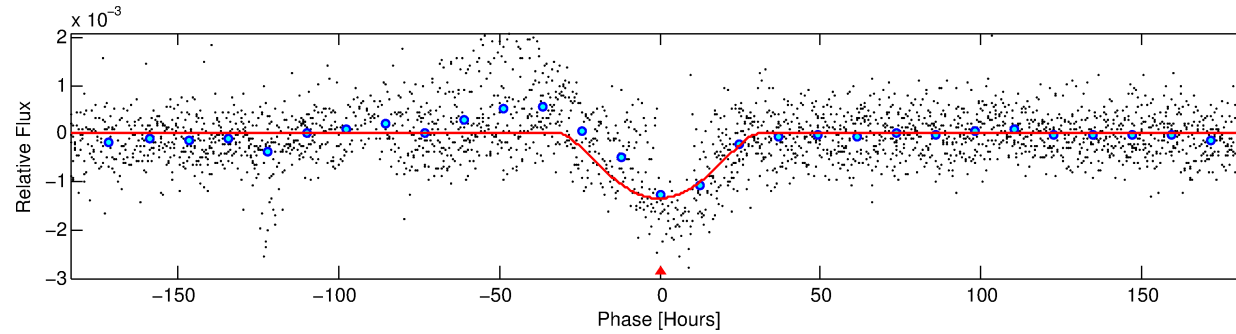
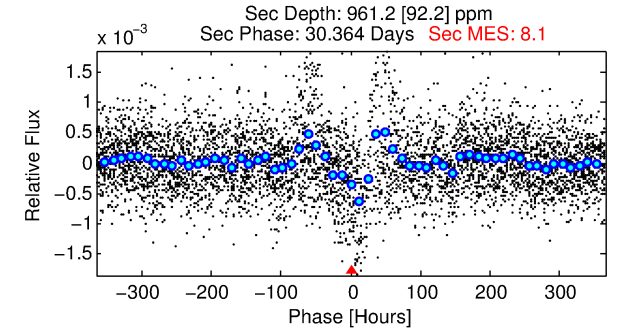
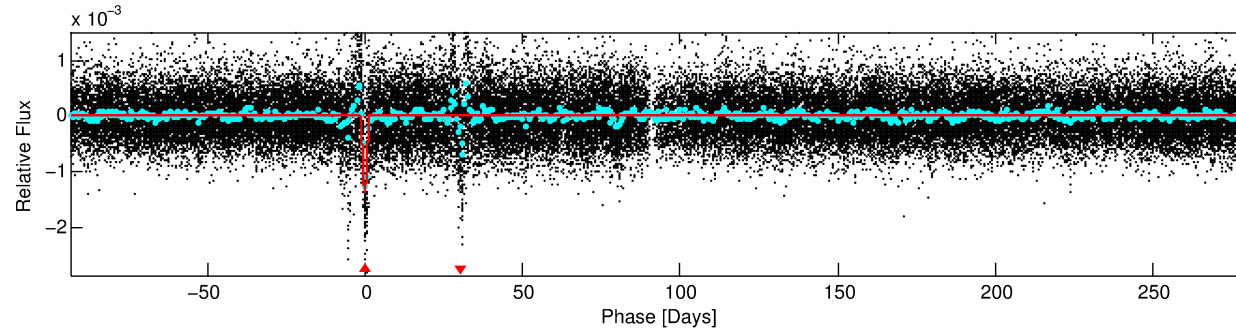
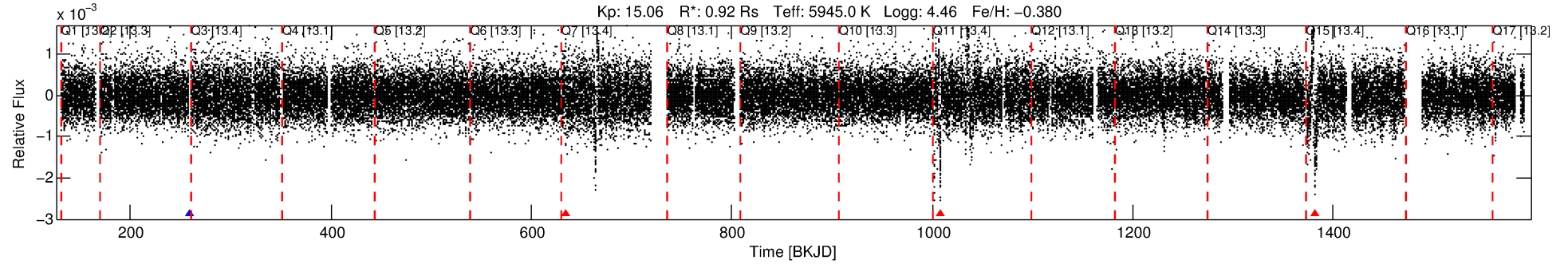
## Ephemeris Match Information For 008228396-01

TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $\prime$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
008228396-01	8228396	008295843-01	8295843	1:1	969.0	-243	4	15.96	15.06	2.10	Col-Anomaly	1	2.63	1.52

**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: 8228396 Candidate: 1 of 1 Period: 374.167 d



## DV Fit Results:

Period = 374.16729 [0.02879] d  
Epoch = 259.5508 [0.0570] BKJD  
Rp/R\* = 0.0637 [0.0947]  
a/R\* = 16.96 [5.61]  
b = 1.00 [0.15]  
Seff = 0.98 [0.35]  
Teq = 254 [23] K  
Rp = 6.39 [9.66] Re  
a = 0.9801 [0.2278] AU  
Ag = 12456.27 [37288.86] [0.33σ]  
Teff = 4148 [3087] K [1.26σ]

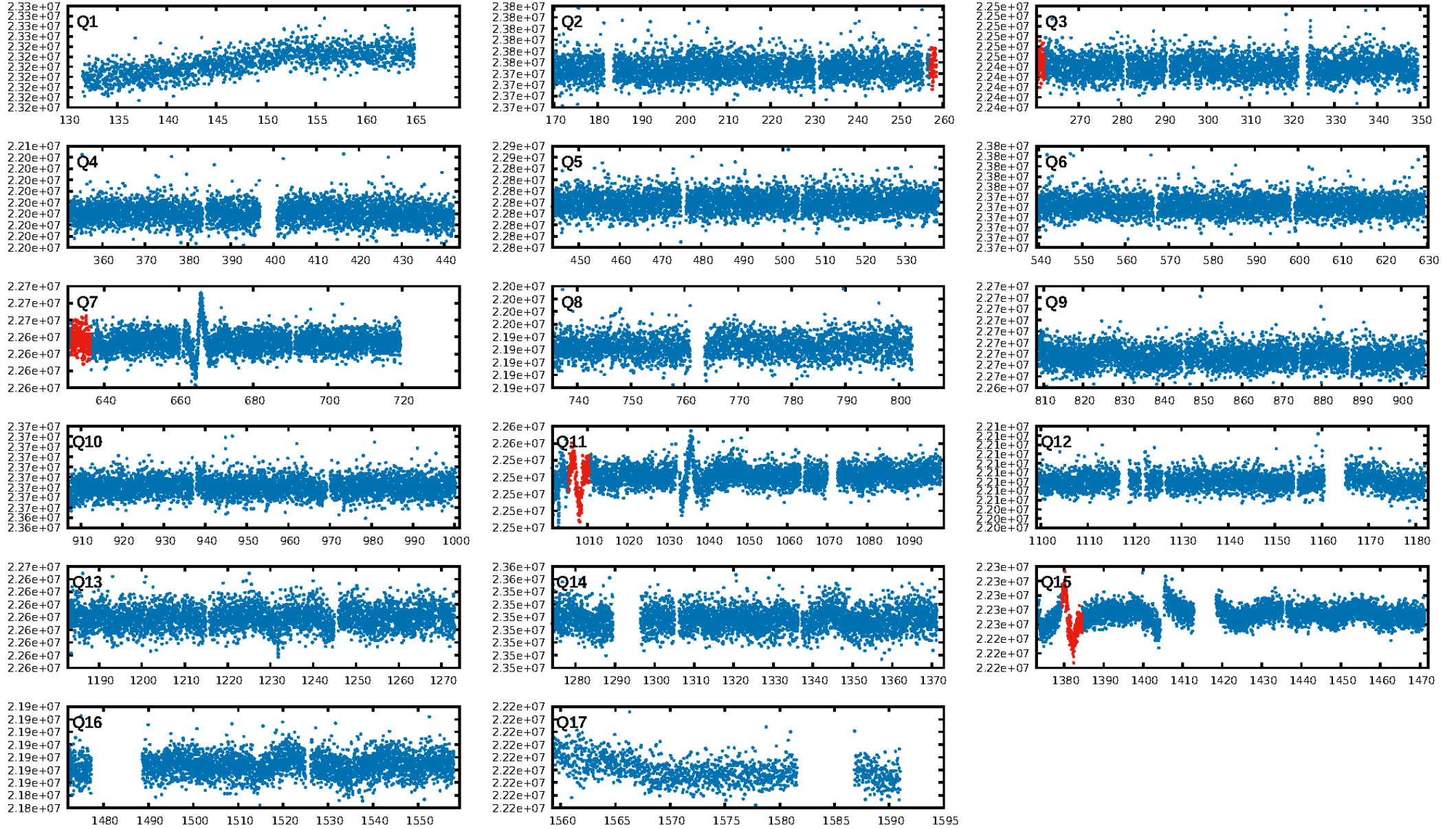
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGoF-sig: 100.0%  
Bootstrap-pfa: 4.10e-22  
RollingBand-fgt: 0.25 [1/4]  
GhostDiagnostic-chr: 0.3117  
Centroid-sig: 21.2%  
Centroid-so: 1.232 arcsec [1.14σ]  
OotOffset-rm: 3.161 arcsec [42.45σ]  
KicOffset-rm: 3.322 arcsec [44.58σ]  
OotOffset-st: 0/1/0/0 [1]  
KicOffset-st: 0/1/0/0 [1]  
DiffImageQuality-fgm: 0.00 [0/1]  
DiffImageOverlap-fno: 1.00 [1/1]

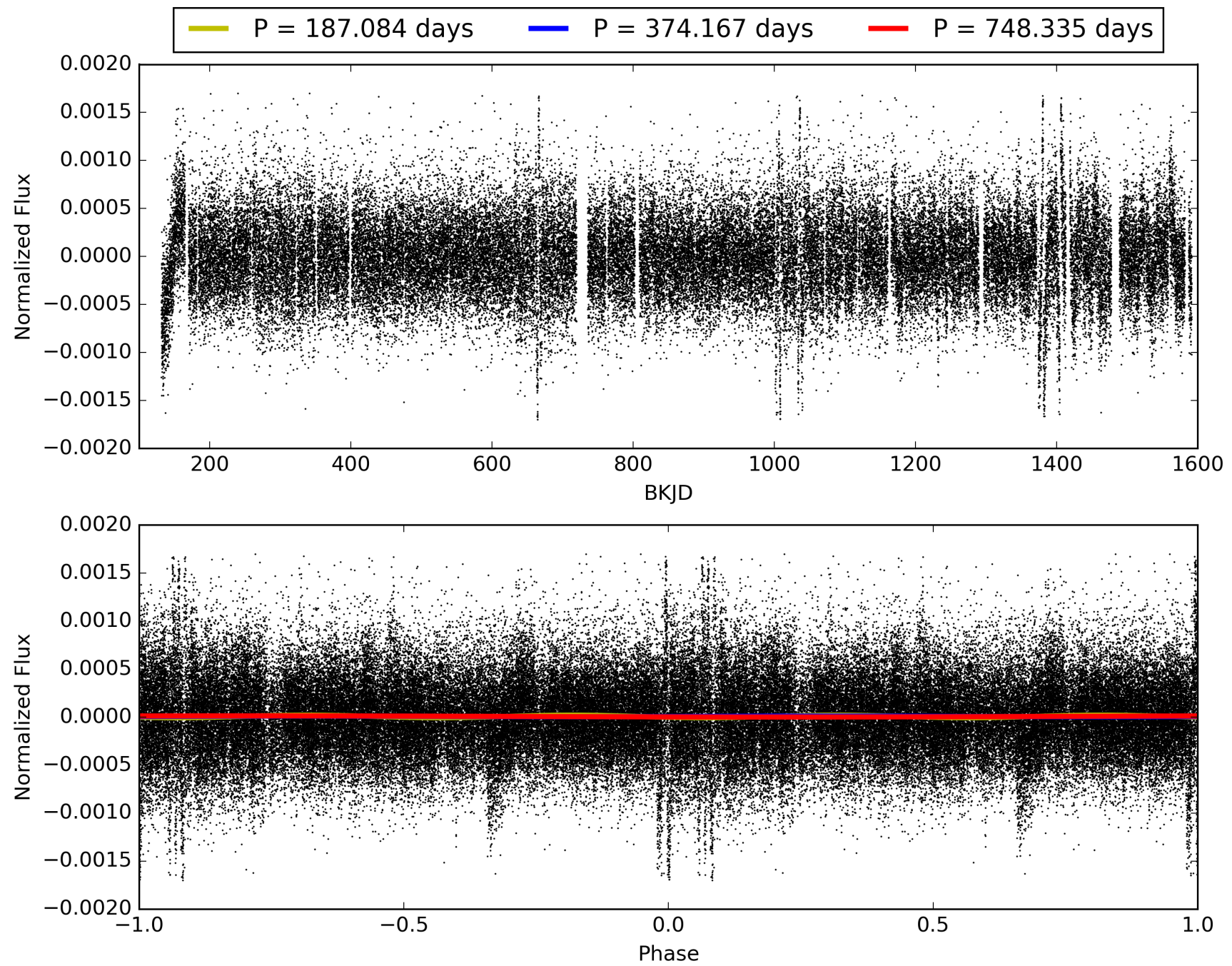
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 14:19:18 Z

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

# TCE 008228396-01, PDC Light Curves

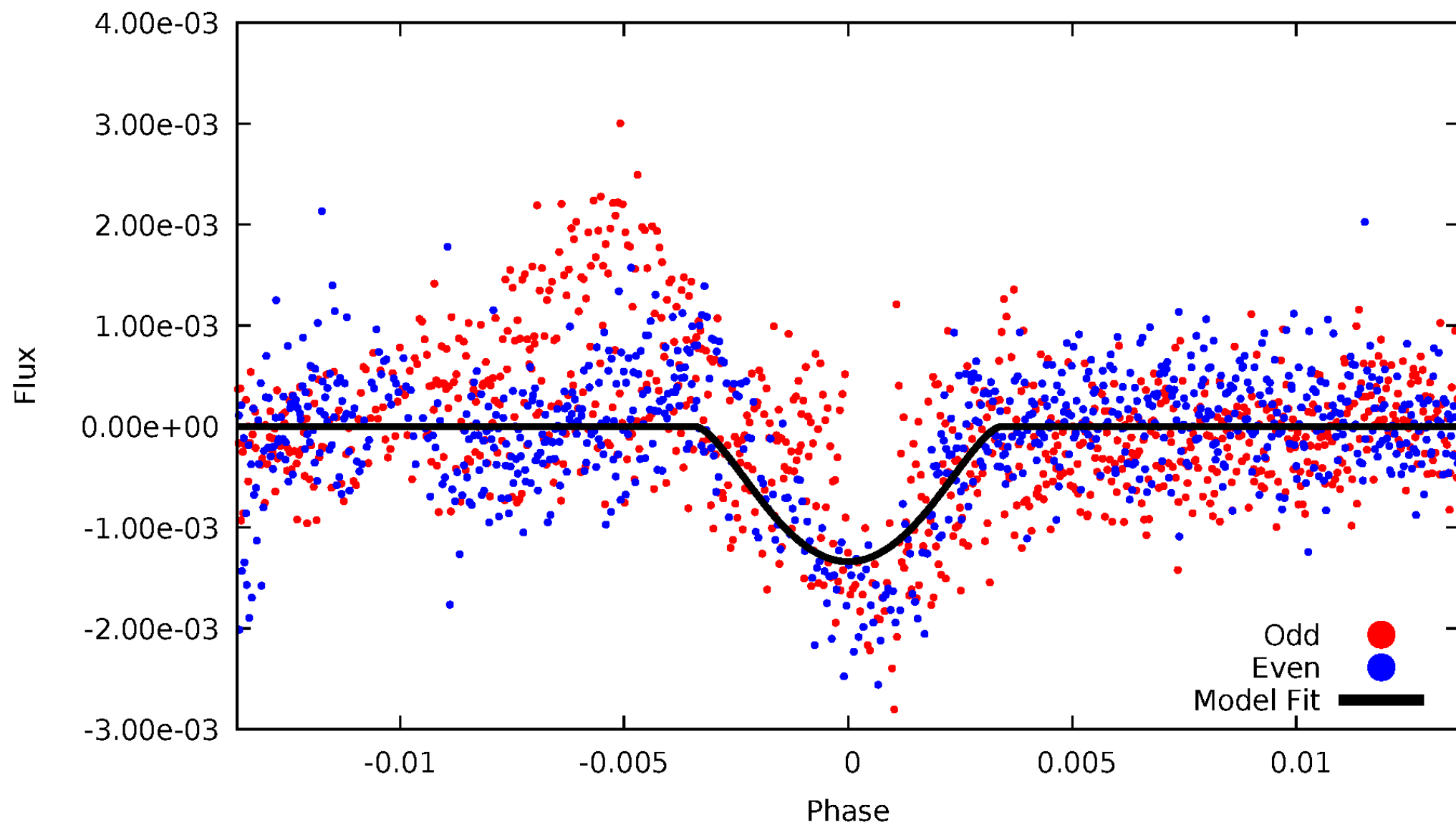


TCE 008228396-01



# DV Odd/Even

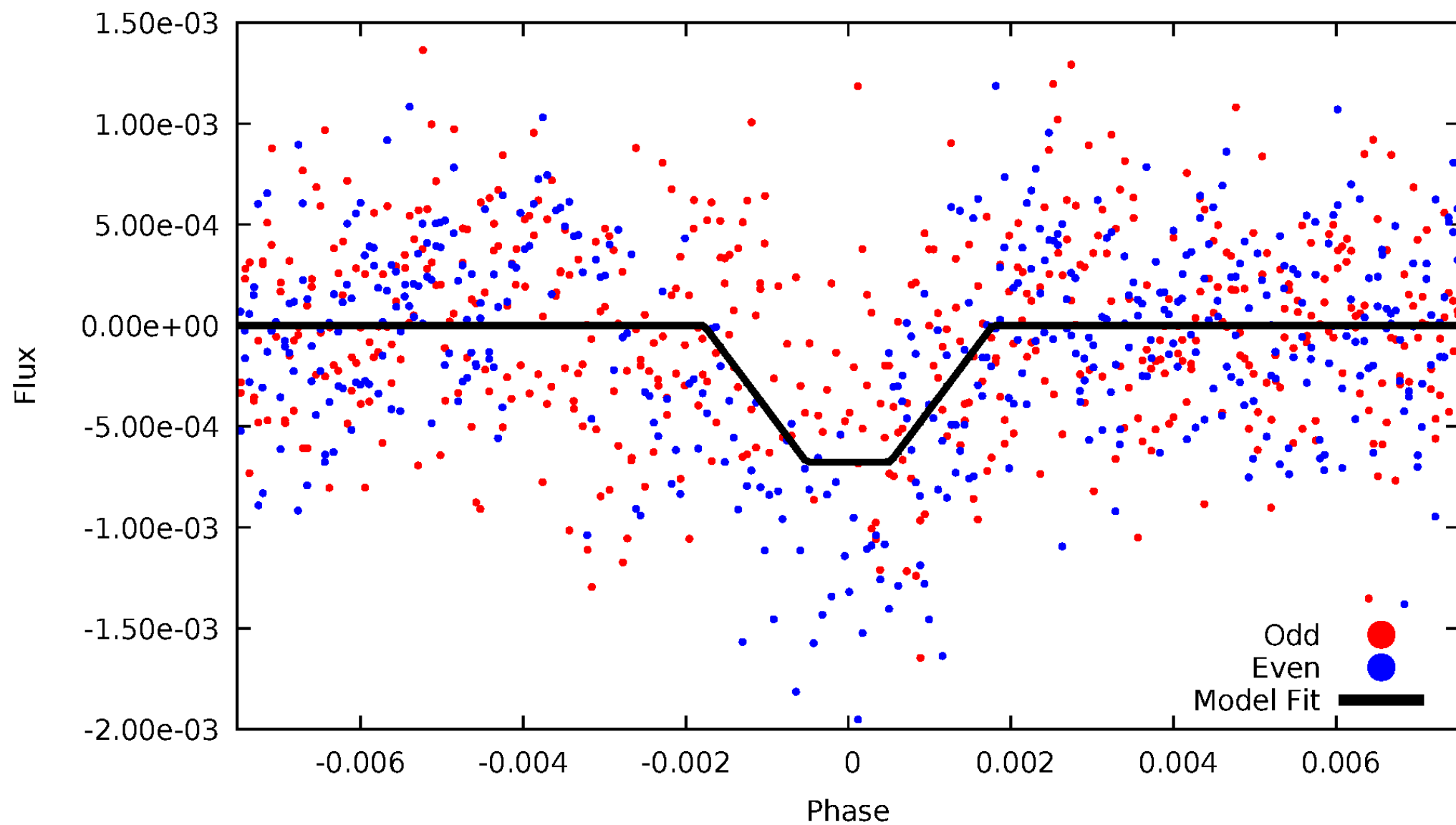
TCE 008228396-01





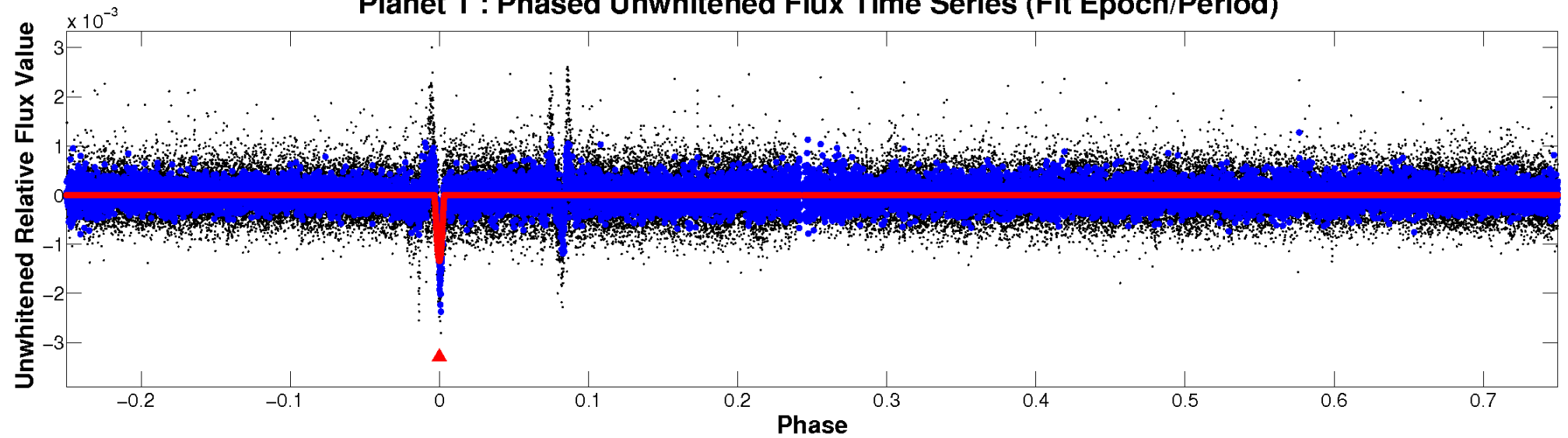
# ALT Odd/Even

TCE 008228396-01

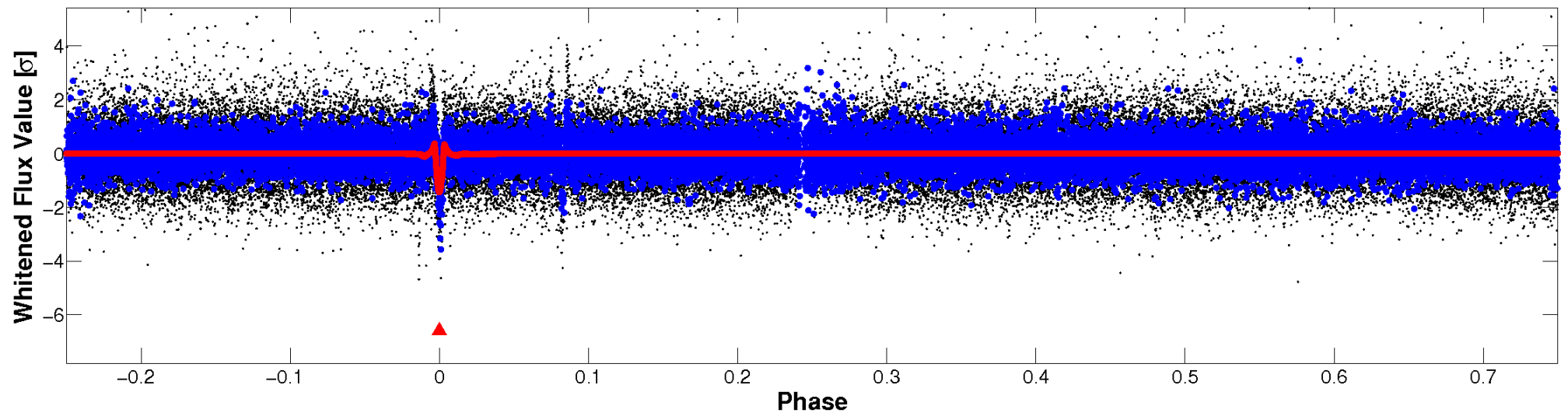


# Non-Whitened Vs. Whitened Light Curve

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

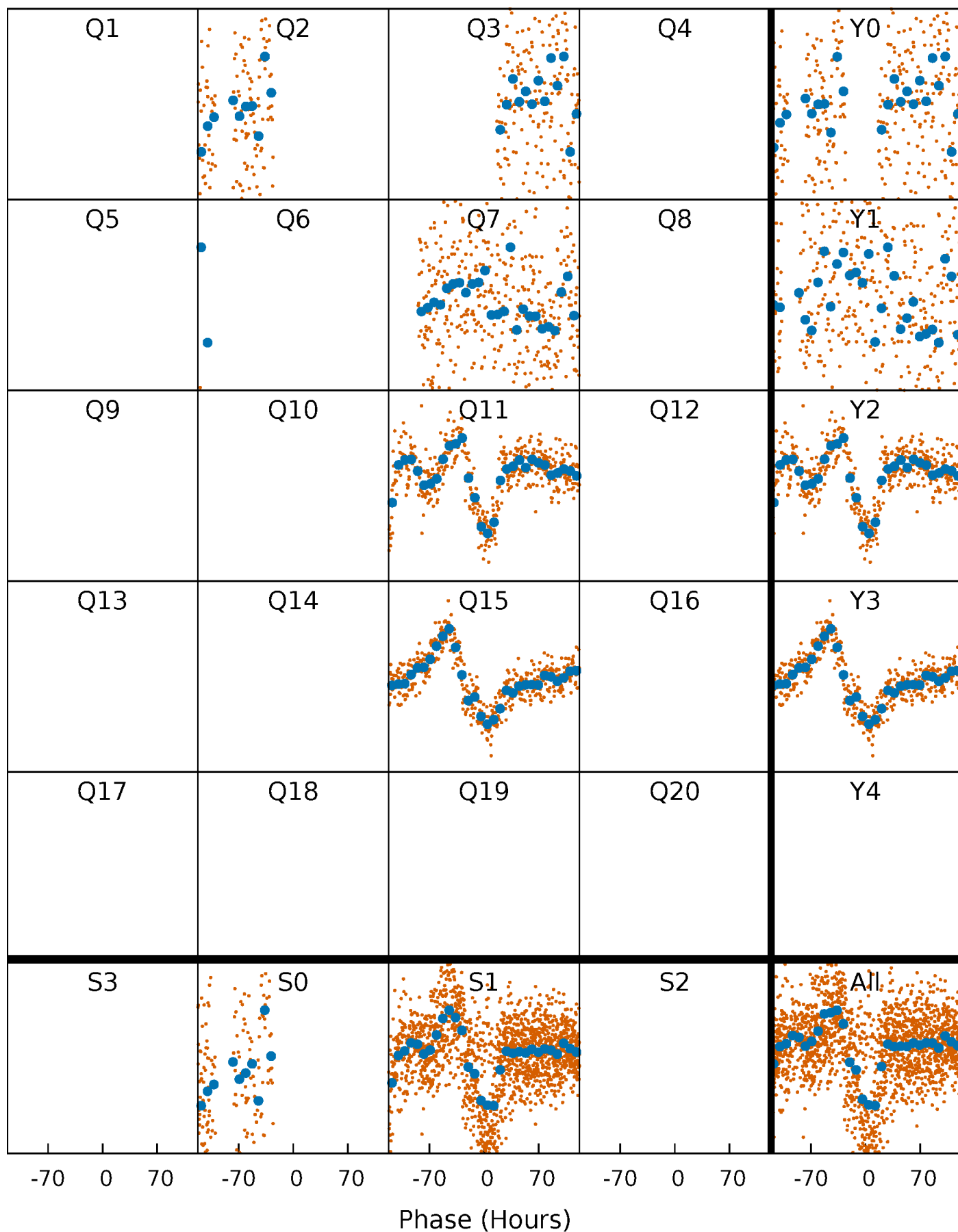


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

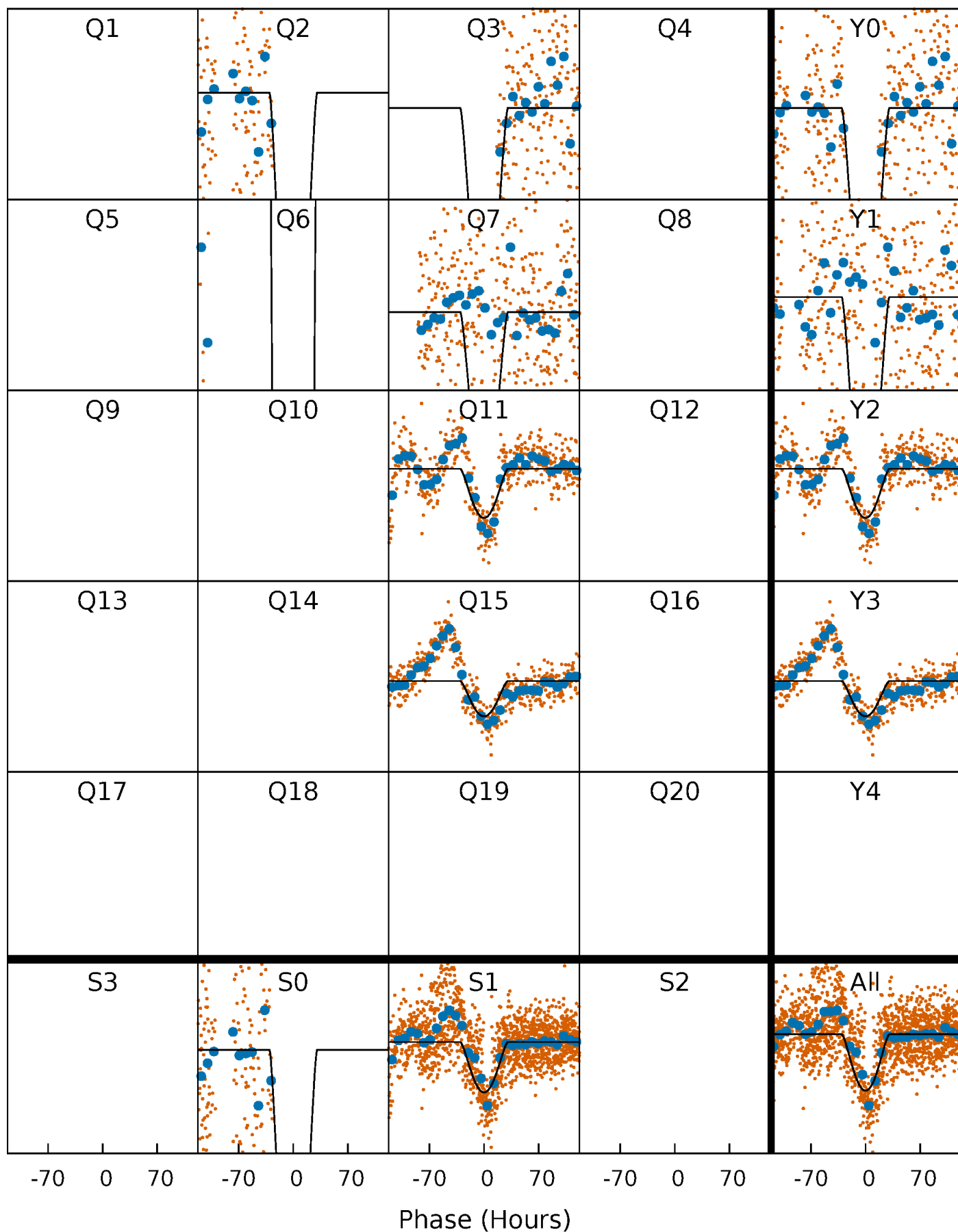
TCE 008228396-01   P=374.167285 Days    $T_0=259.550769$  (BKJD)





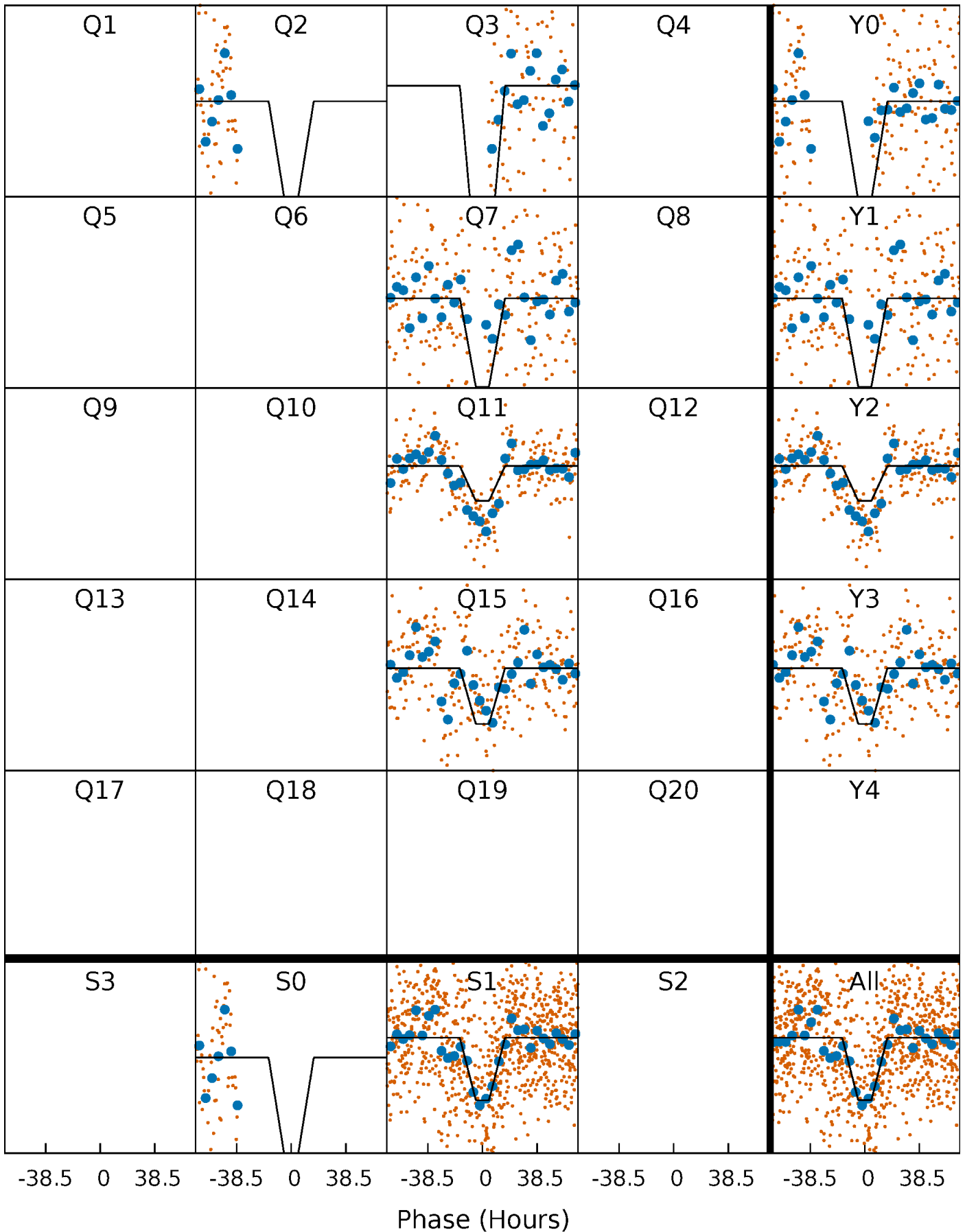
# DV Quarter-Phased Transit Curves

TCE 008228396-01 P=374.167285 Days  $T_0=259.550769$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

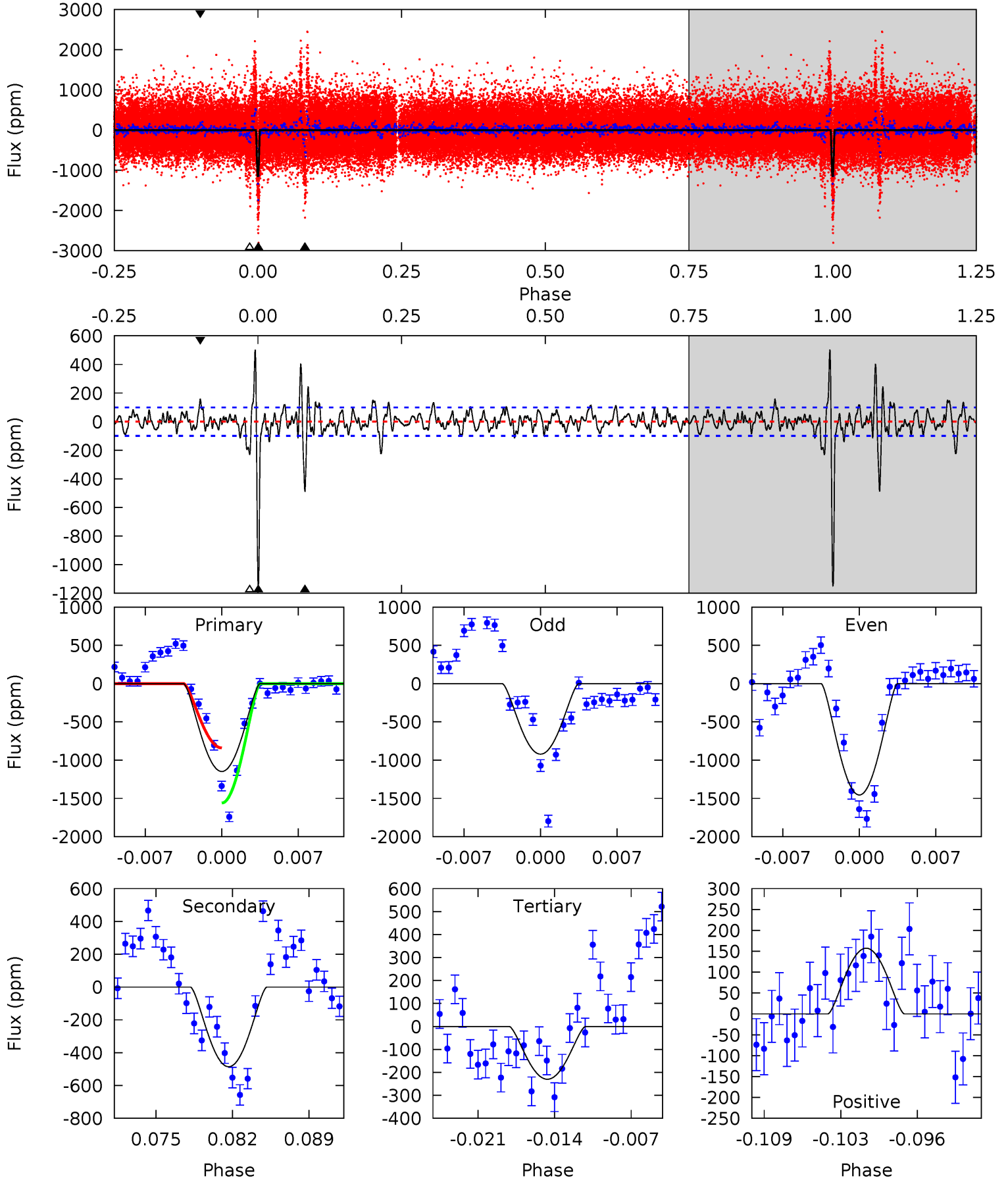
TCE 008228396-01 P=374.015882 Days  $T_0=260.058453$  (BKJD)



# DV Model-Shift Uniqueness Test

008228396-01, P = 374.167285 Days, E = 259.550769 Days

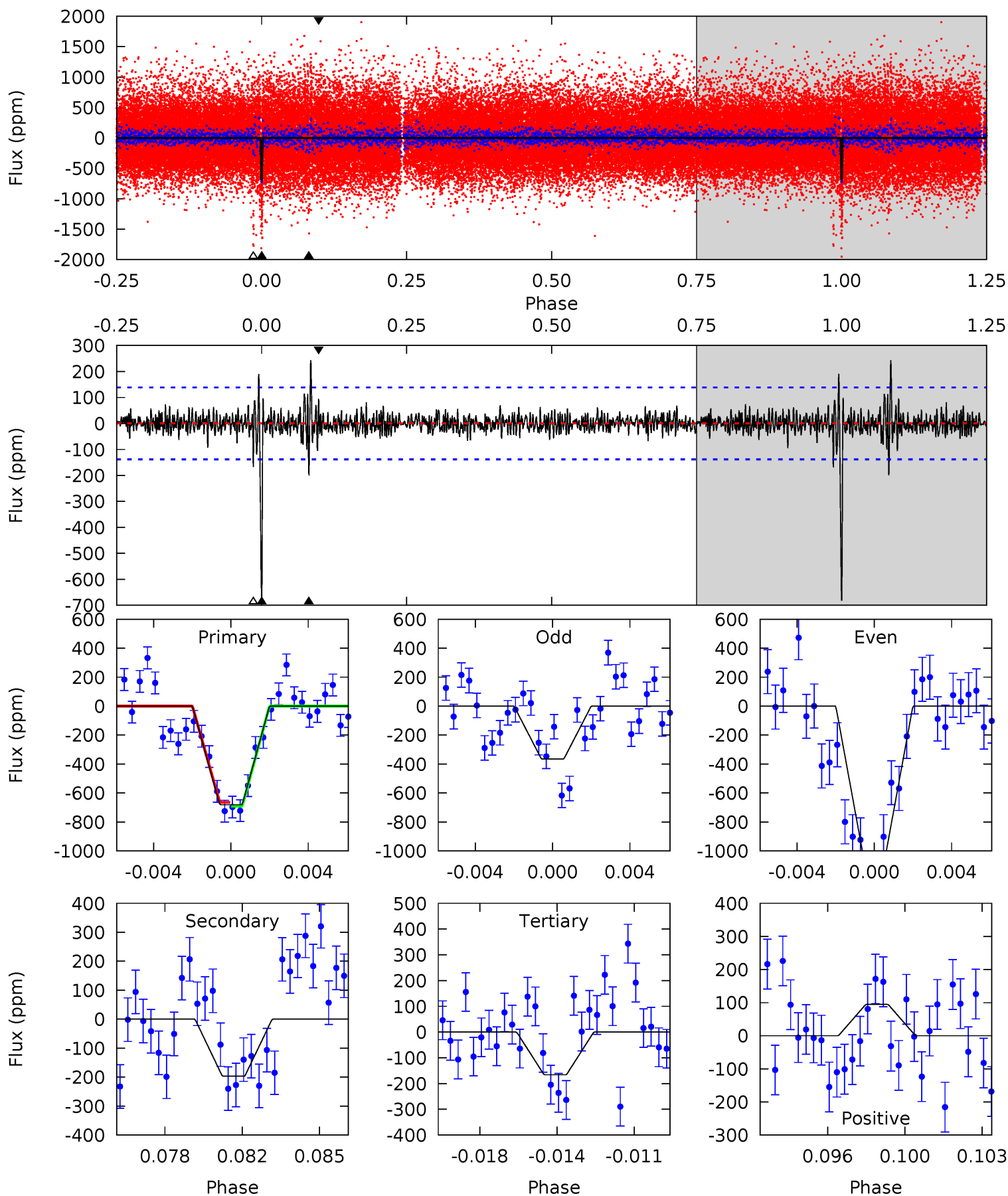
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
58.8	24.9	11.8	8.05	5.10	2.70	2.97	47.0	50.7	13.1	16.8	13.4	0.84	0.30	18.1



# Alt Model-Shift Uniqueness Test

008228396-01, P = 374.015882 Days, E = 260.058453 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
25.7	7.43	6.25	3.57	5.22	2.92	1.06	19.5	22.1	1.18	3.87	12.5	1.52	0.26	0.49



### Stellar Parameters For KIC 008228396

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5945^{+160}_{-178}$	$4.464^{+0.084}_{-0.182}$	$-0.380^{+0.300}_{-0.300}$	$0.919^{+0.256}_{-0.110}$	$0.898^{+0.110}_{-0.090}$	$1.630^{+0.572}_{-0.826}$
	+3%/-3%	+2%/-4%	+79%/-79%	+28%/-12%	+12%/-10%	+35%/-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 008228396-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-486 \pm 20$	$9.03^{+8.59}_{-5.82}$	$360^{+22}_{-19}$	$3506^{+1488}_{-641}$	$3246^{+20410}_{-2423}$
Alt.	$-197 \pm 26$	$7.82^{+8.05}_{-5.29}$	$358^{+24}_{-18}$	$3149^{+1462}_{-535}$	$1711^{+14390}_{-1303}$

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

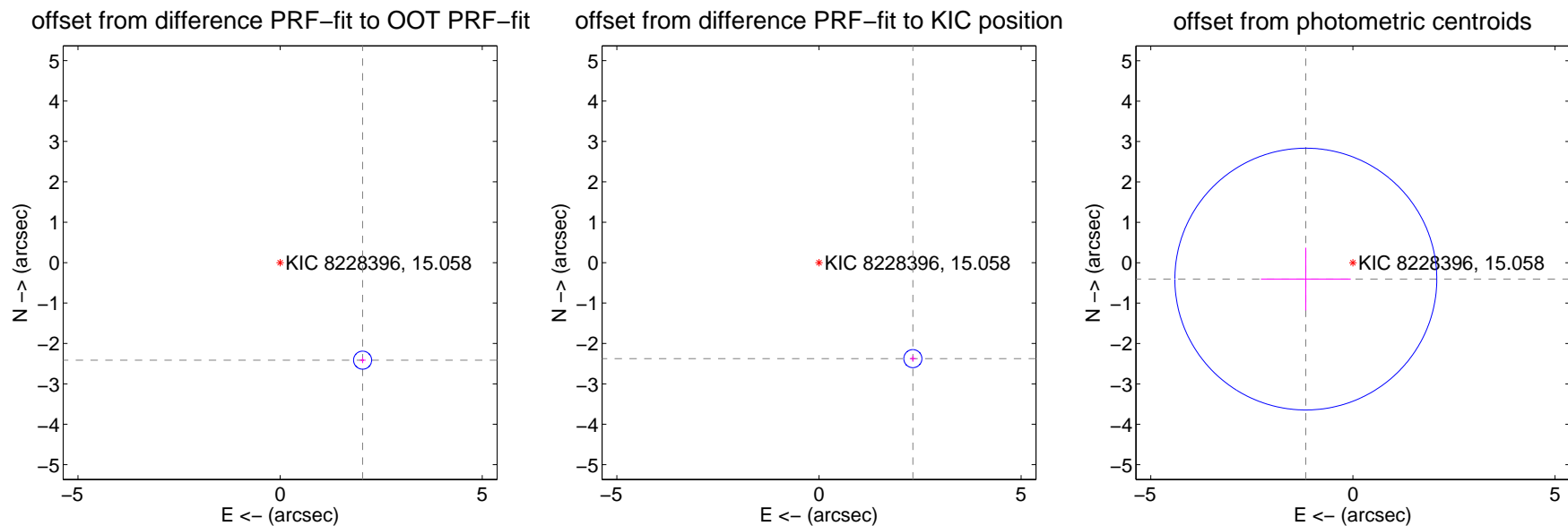
## DV Centroid Data

Supplemental centroid analysis for 008228396-01. Kepler magnitude: 15.06. Transit SNR 16.86

There are 0 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.28 arcsec

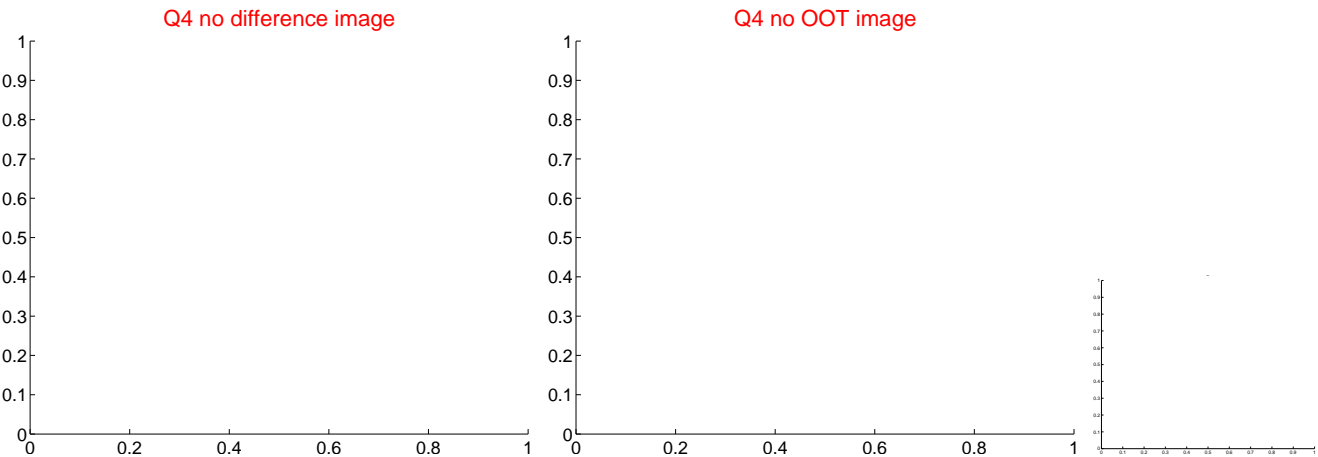
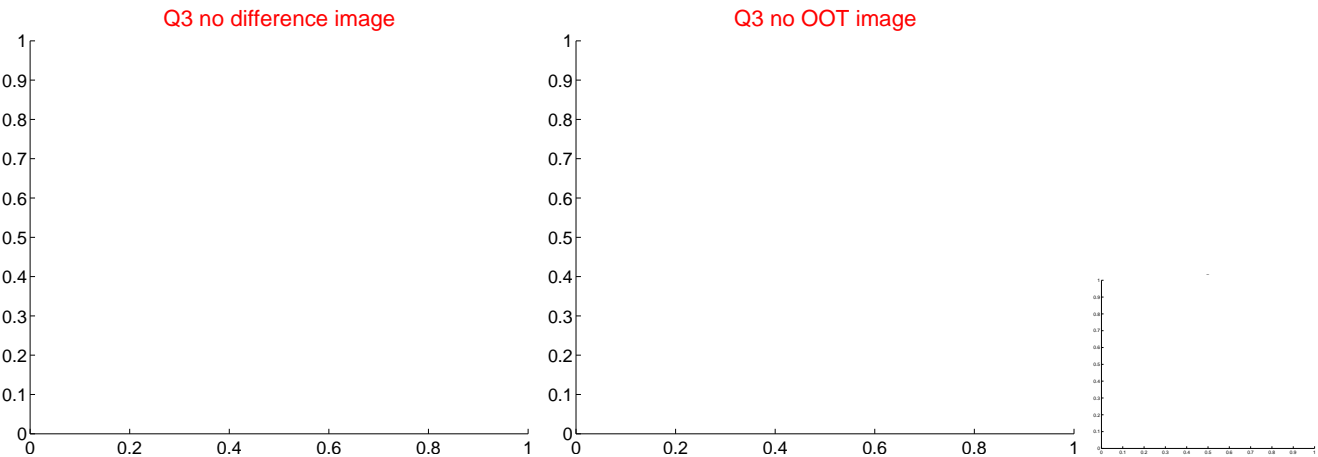
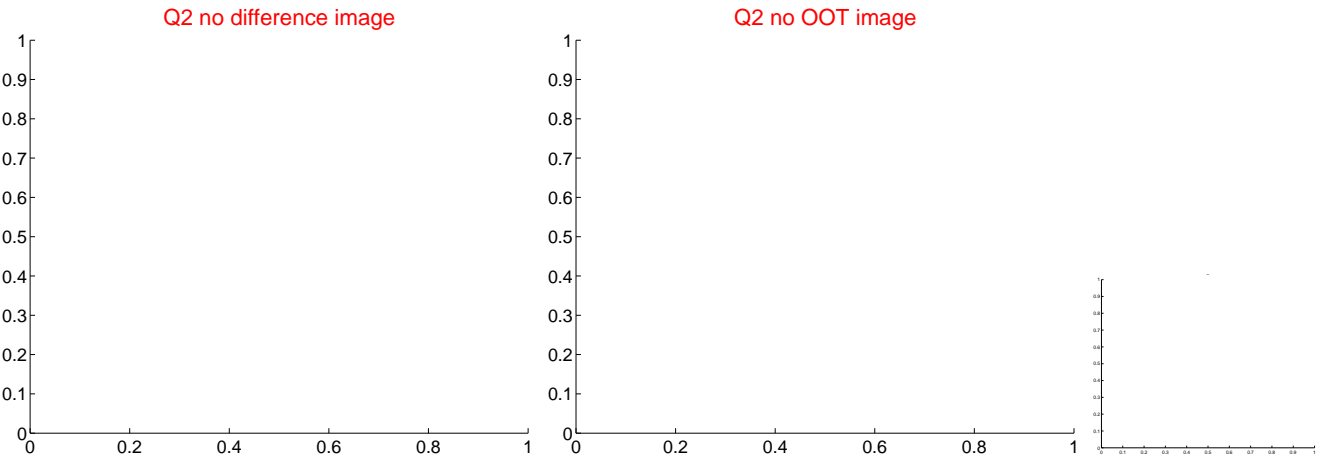
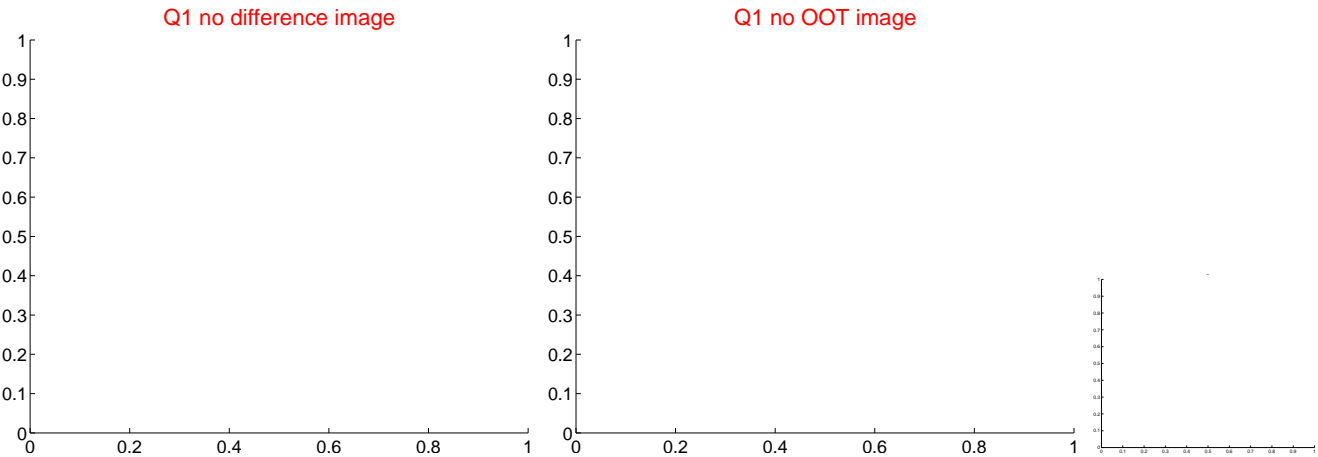
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.161 \pm 0.074$	42.45	$-2.041 \pm 0.075$	$-2.413 \pm 0.074$
PRF-fit source offset from KIC position	$3.322 \pm 0.075$	44.58	$-2.322 \pm 0.075$	$-2.376 \pm 0.074$
photometric centroid source offset	$1.23 \pm 1.08$	1.14	$1.16 \pm 1.11$	$-0.41 \pm 0.78$



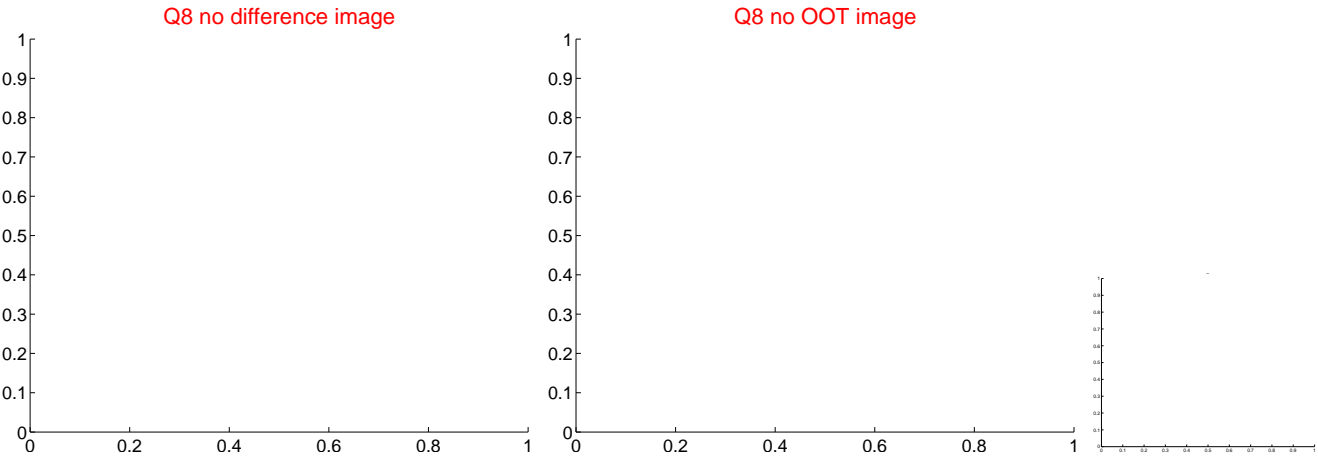
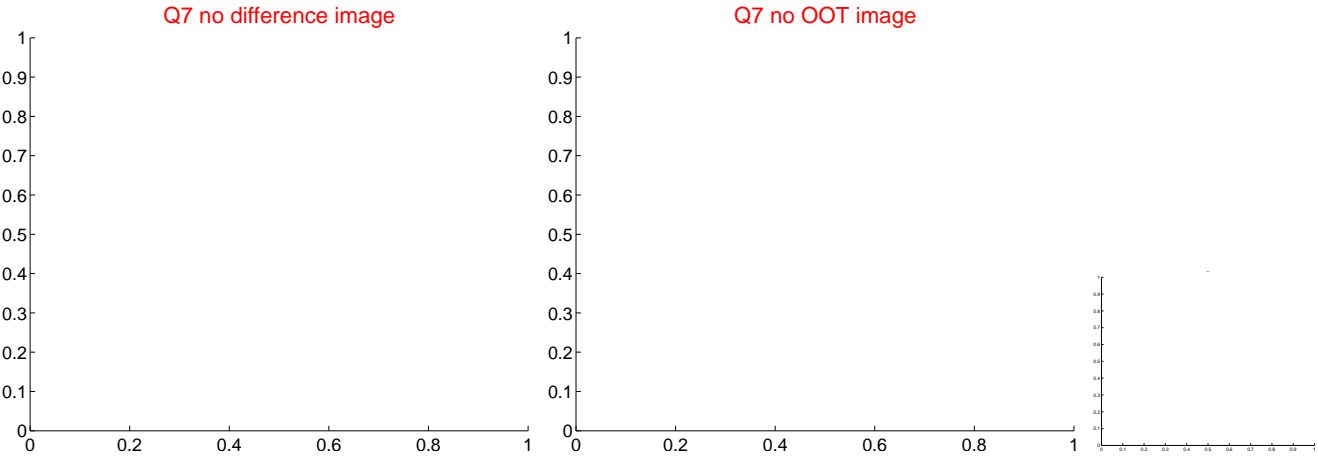
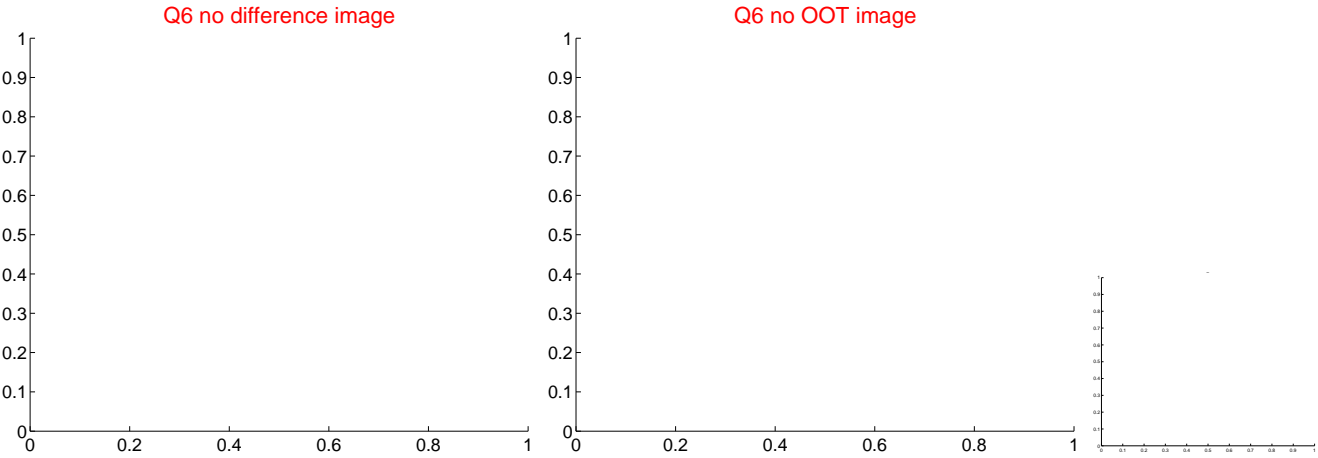
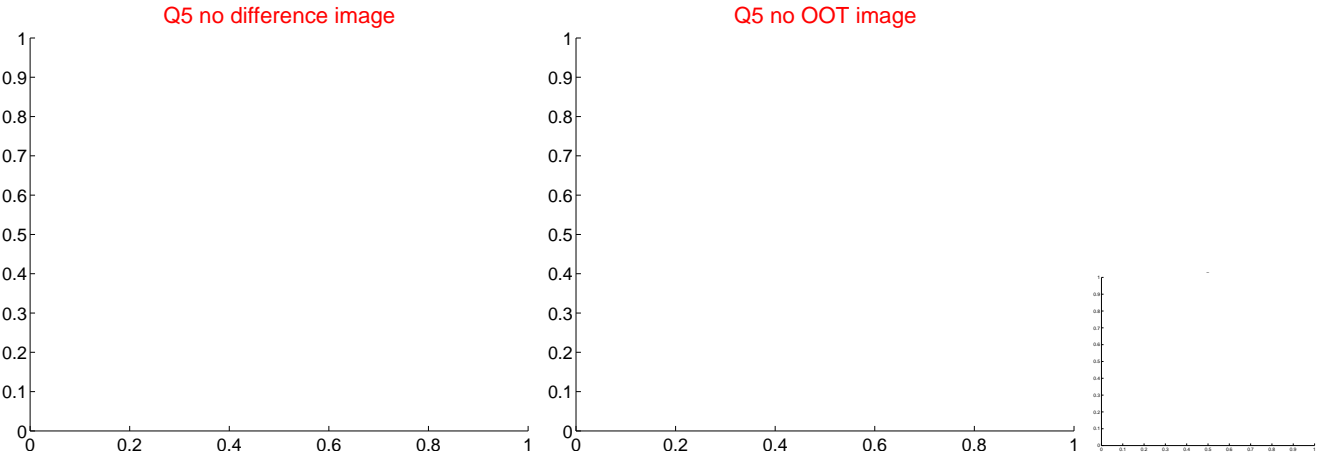
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



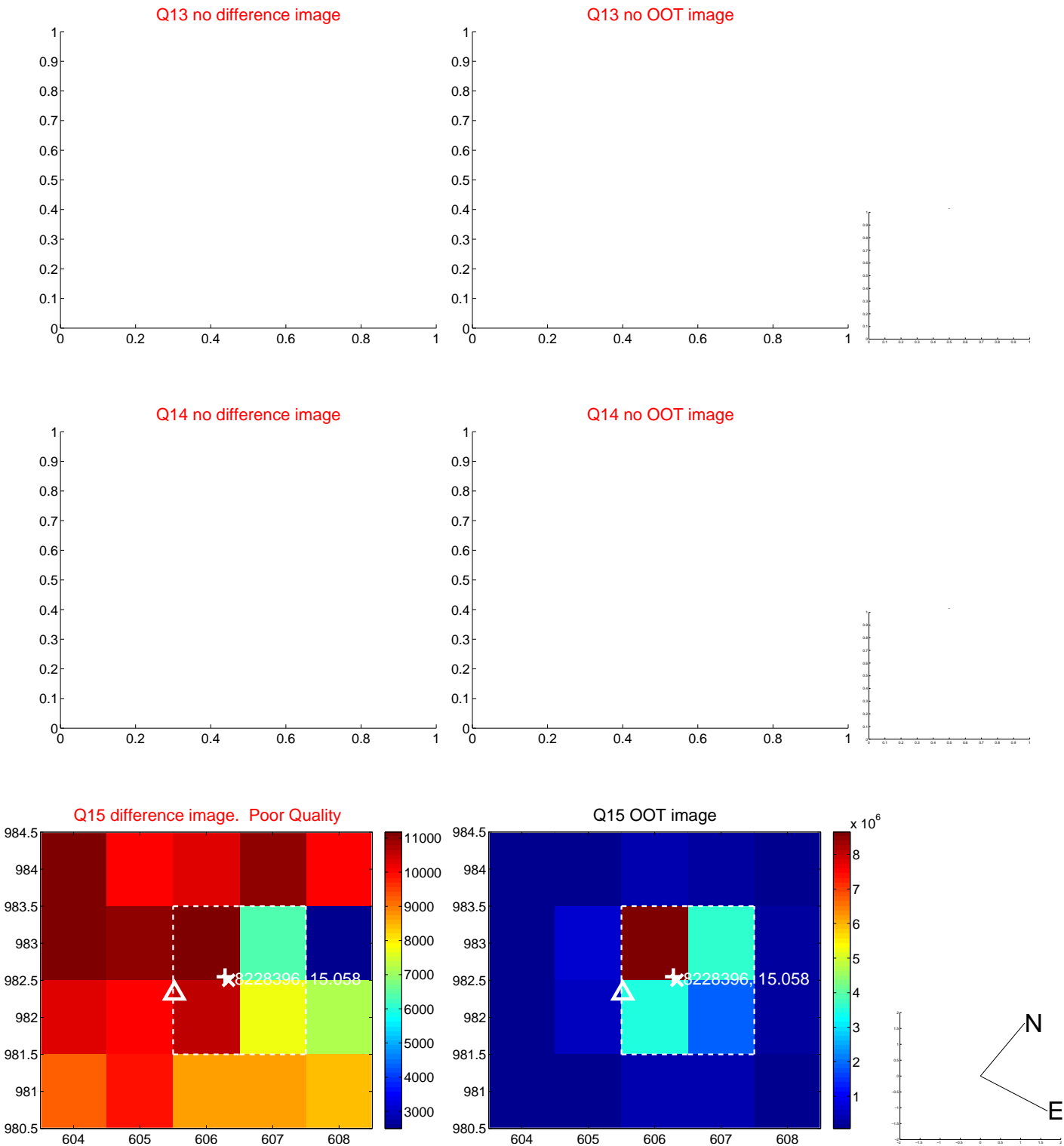
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



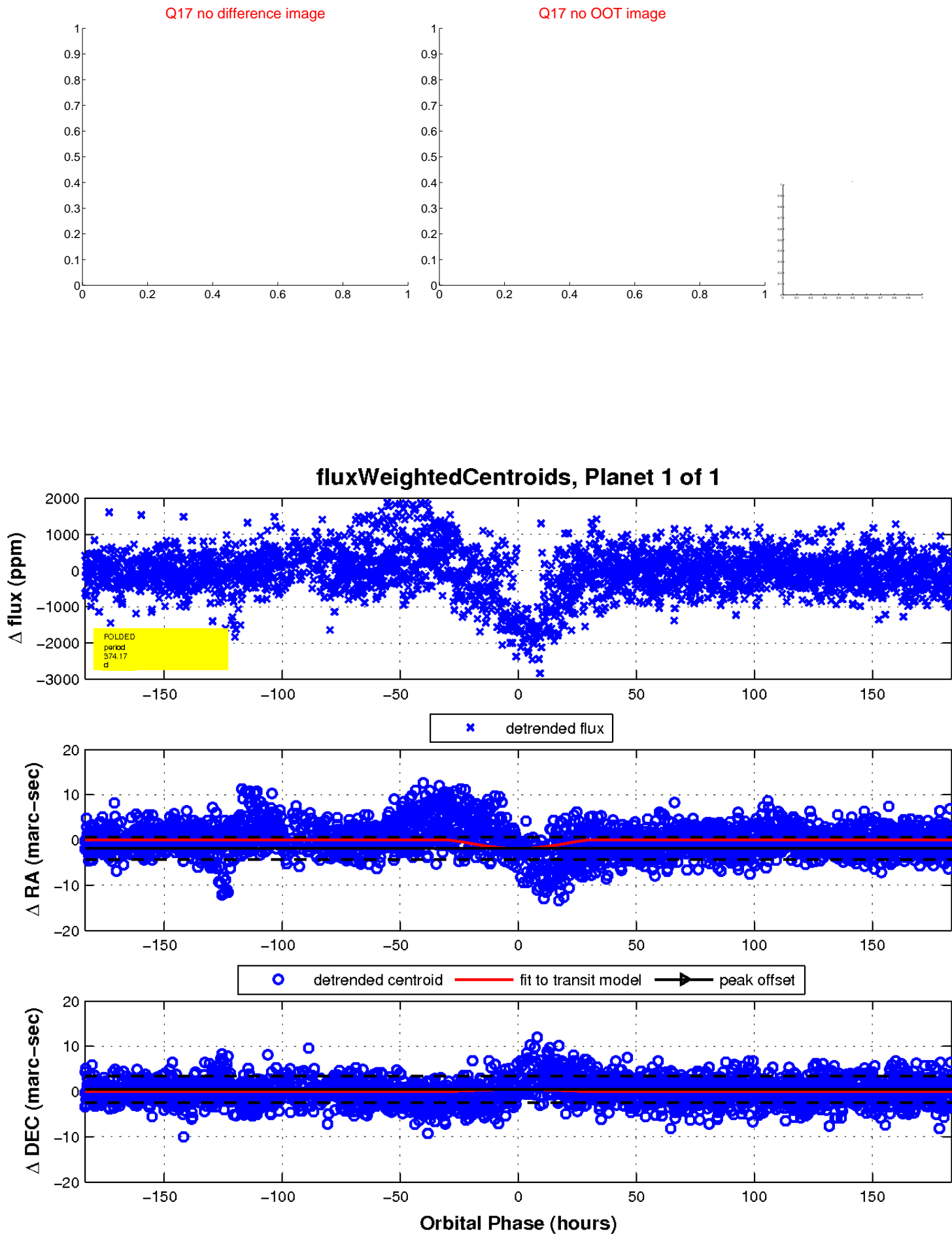
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

Declination

