

# KIC 009970776

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009970776-01	OBS	No	368.743879	233.449299	812.3	39.562	7.6	10.3	1.06	6113	5.79	1.43

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009970776-01	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—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.

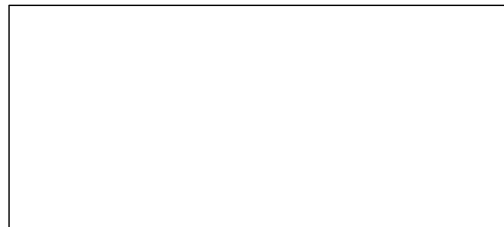
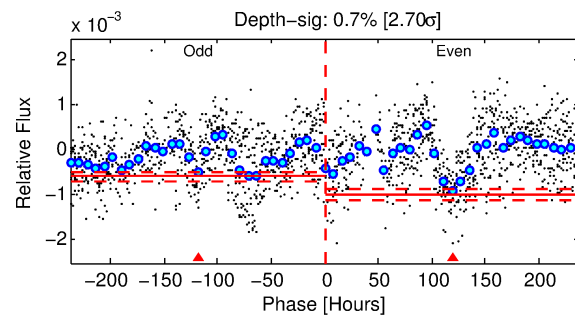
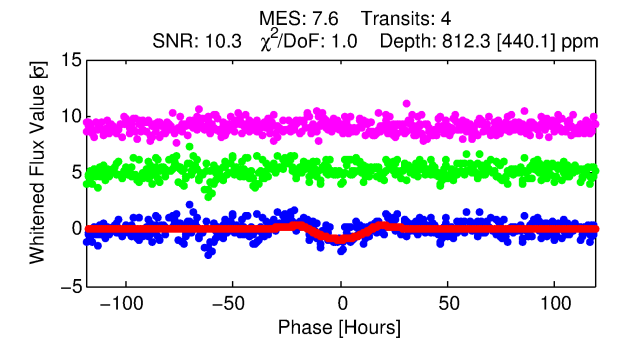
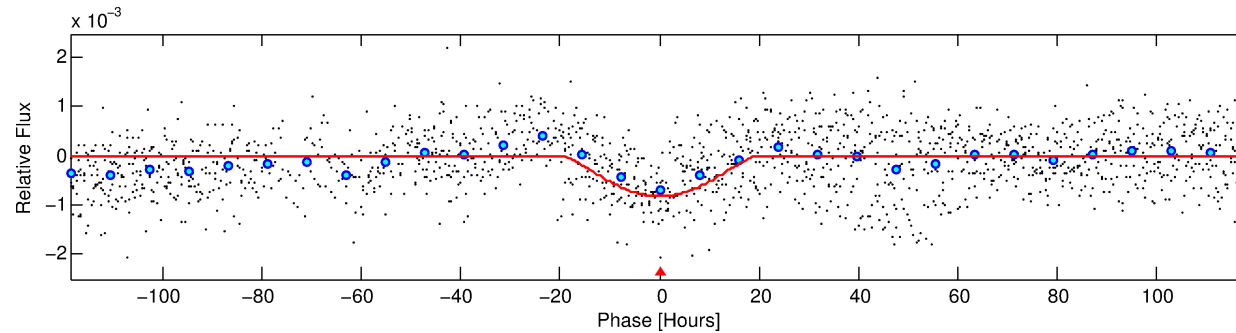
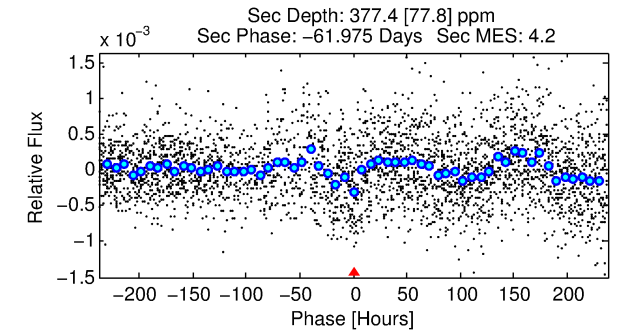
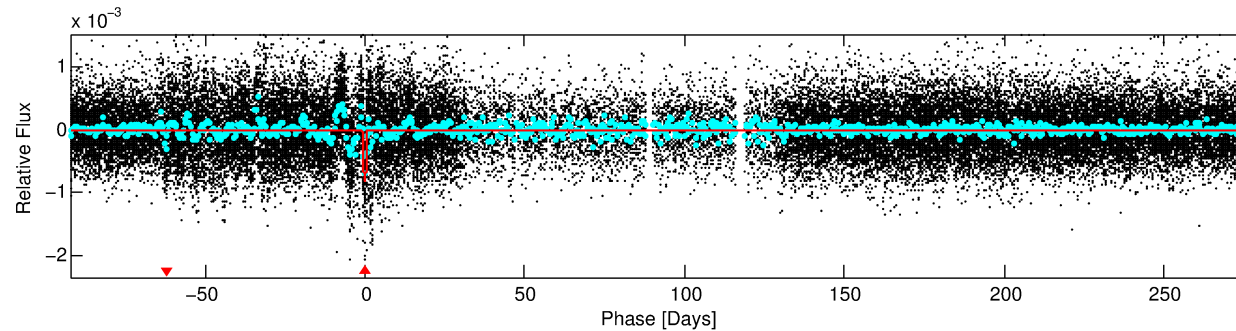
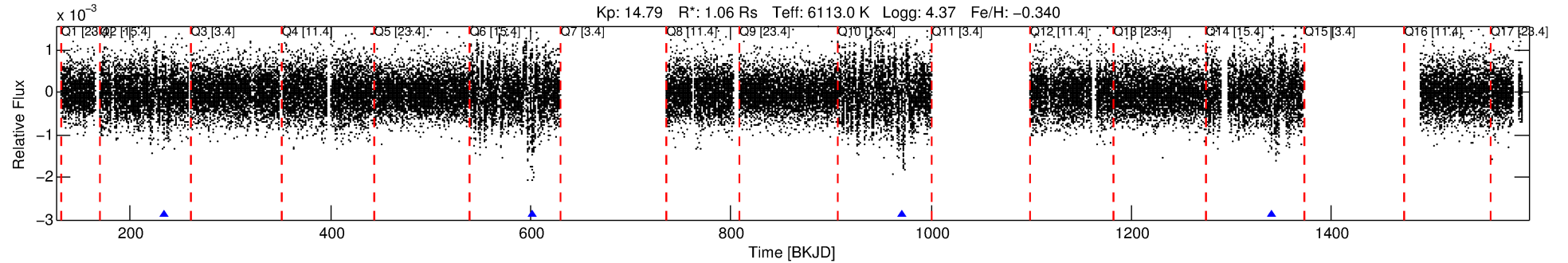
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009970776-01

No Significant Match Found

# DV One-Page Summary

KIC: 9970776 Candidate: 1 of 1 Period: 368.744 d



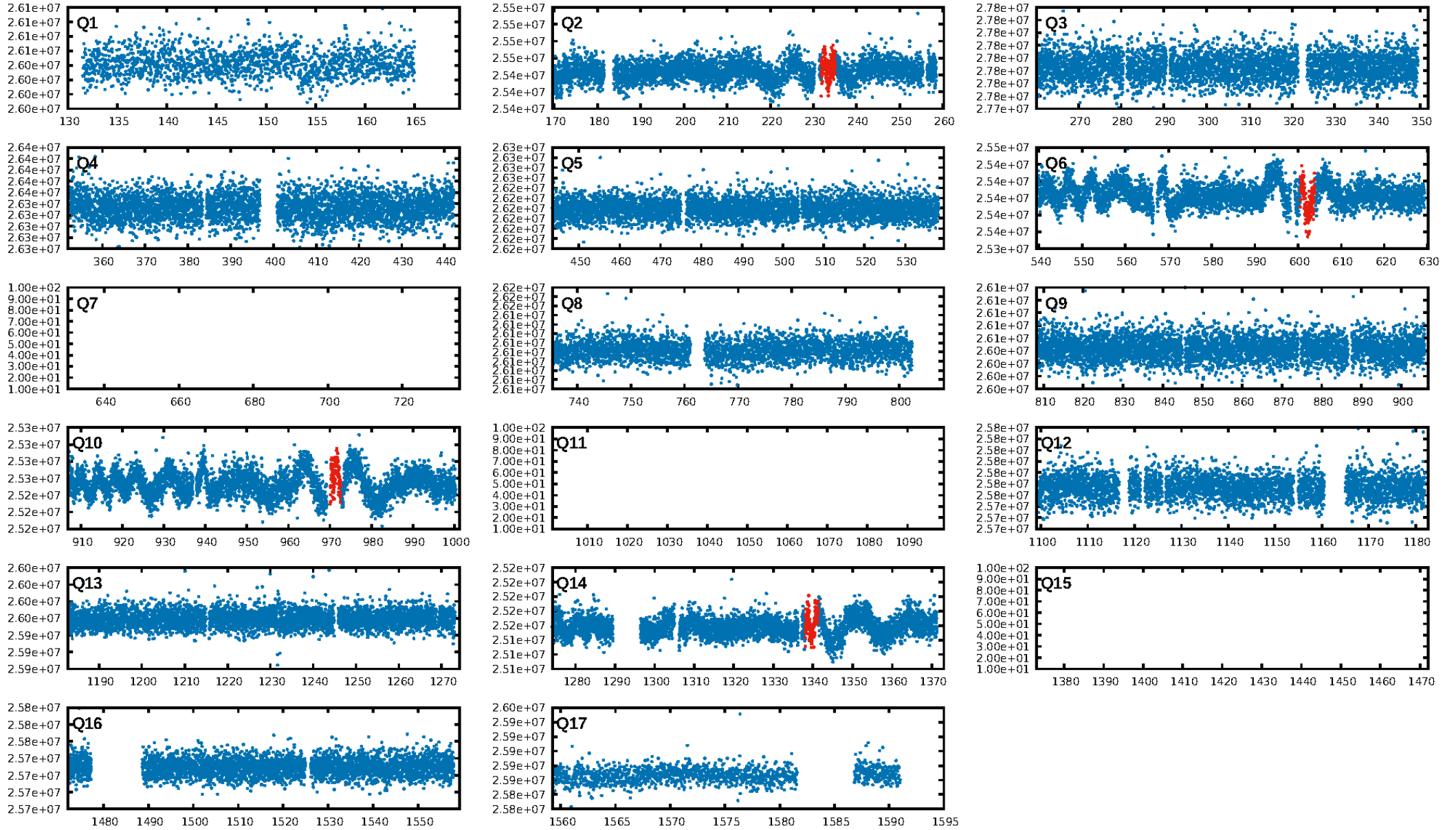
## DV Fit Results:

Period = 368.74388 [0.02936] d  
Epoch = 233.4493 [0.0493] BKJD  
Rp/R\* = 0.0501 [0.1042]  
a/R\* = 22.84 [11.59]  
b = 1.00 [0.17]  
Seff = 1.43 [0.54]  
Teq = 279 [26] K  
Rp = 5.79 [12.16] Re  
a = 0.9909 [0.2407] AU  
Ag = 6081.90 [25434.12] [0.24σ]  
Teffp = 3808 [3970] K [0.89σ]

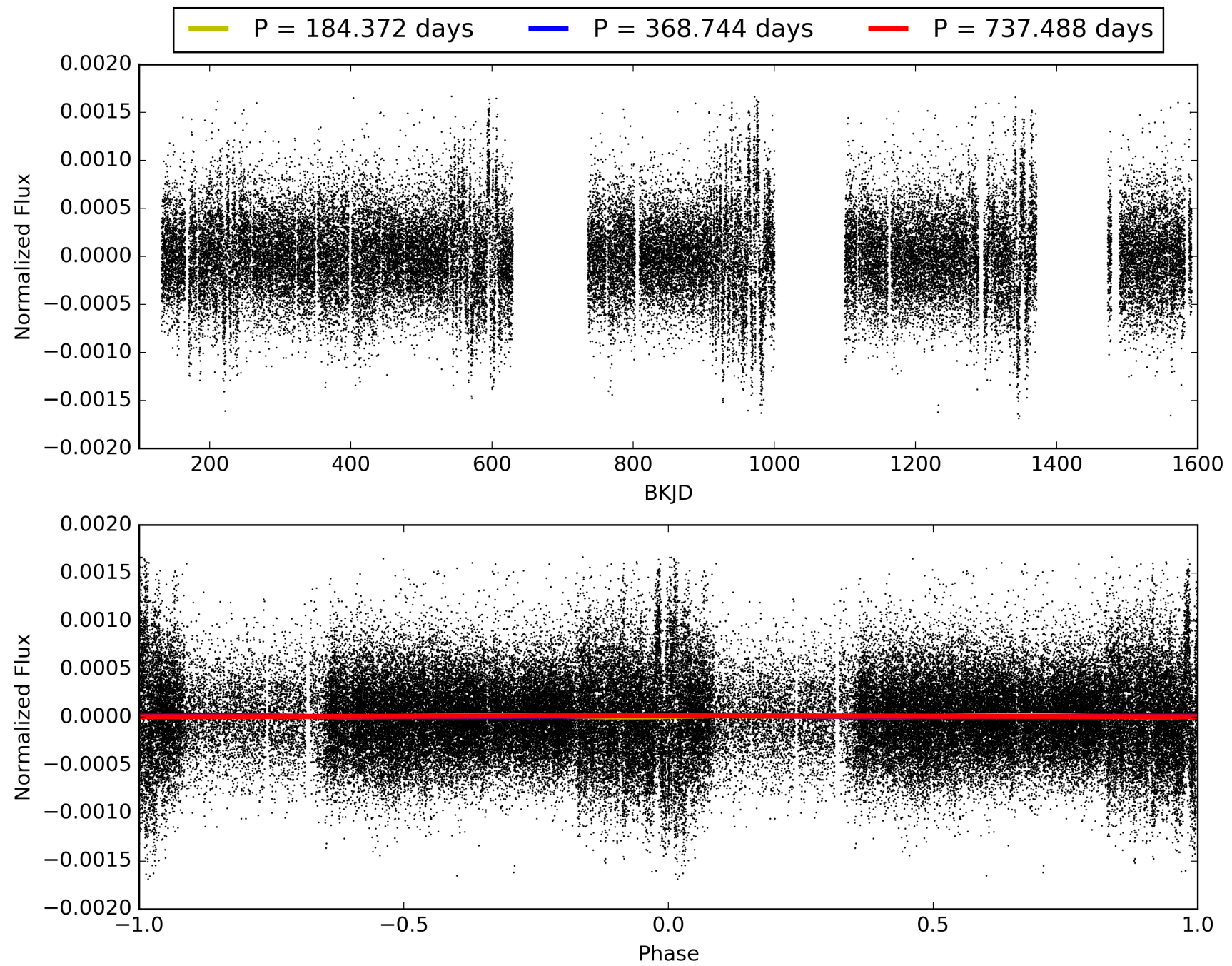
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 59.6%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 4.13e-12**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -0.4679  
Centroid-sig: 0.5%  
Centroid-so: 3.863 arcsec [2.55σ]  
OotOffset-rm: N/A  
KicOffset-rm: N/A  
OotOffset-st: 0/0/0/0 [0]  
KicOffset-st: 0/0/0/0 [0]  
DiffImageQuality-fgm: N/A  
DiffImageOverlap-fno: N/A

# TCE 009970776-01, PDC Light Curves

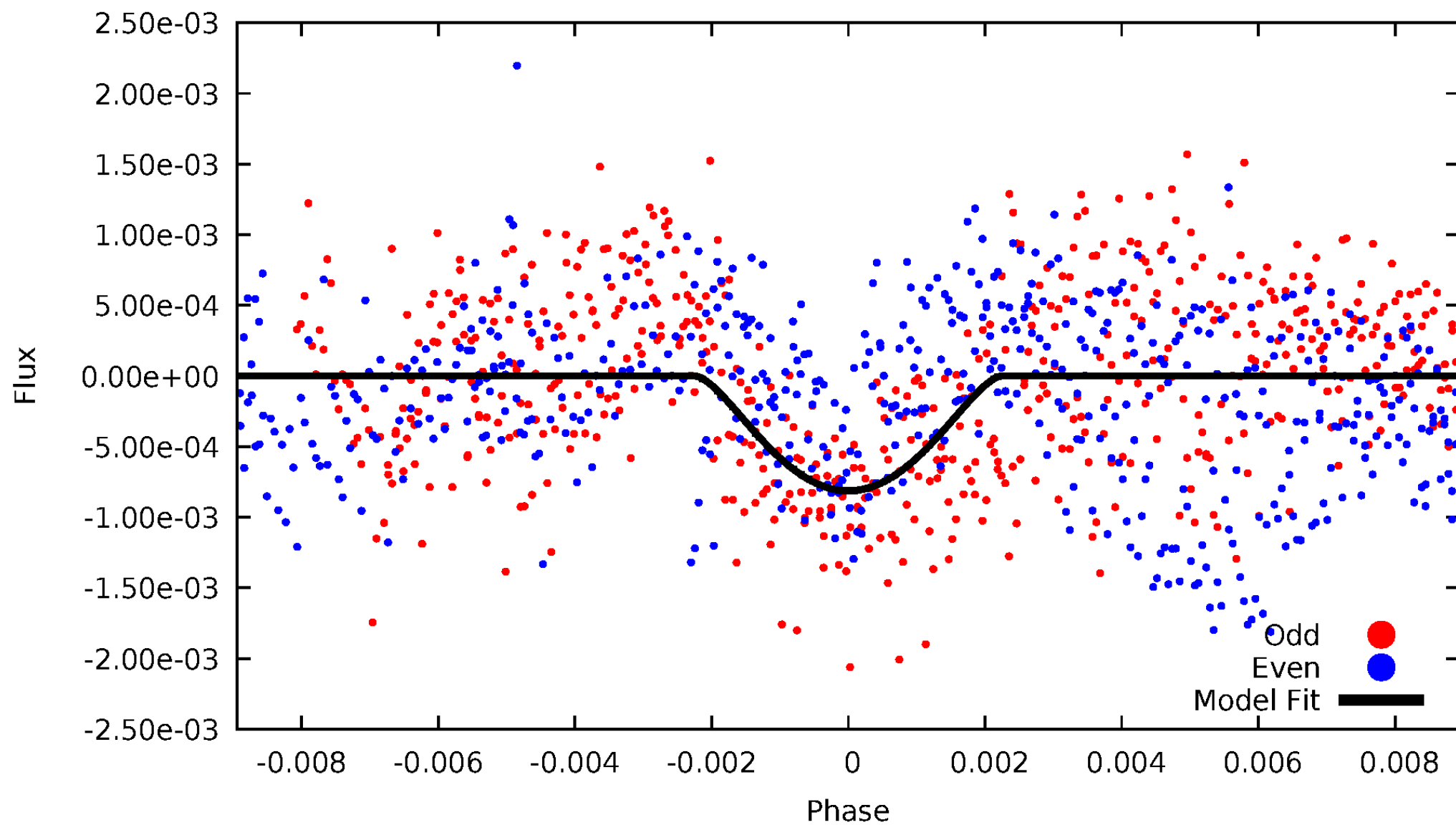


TCE 009970776-01



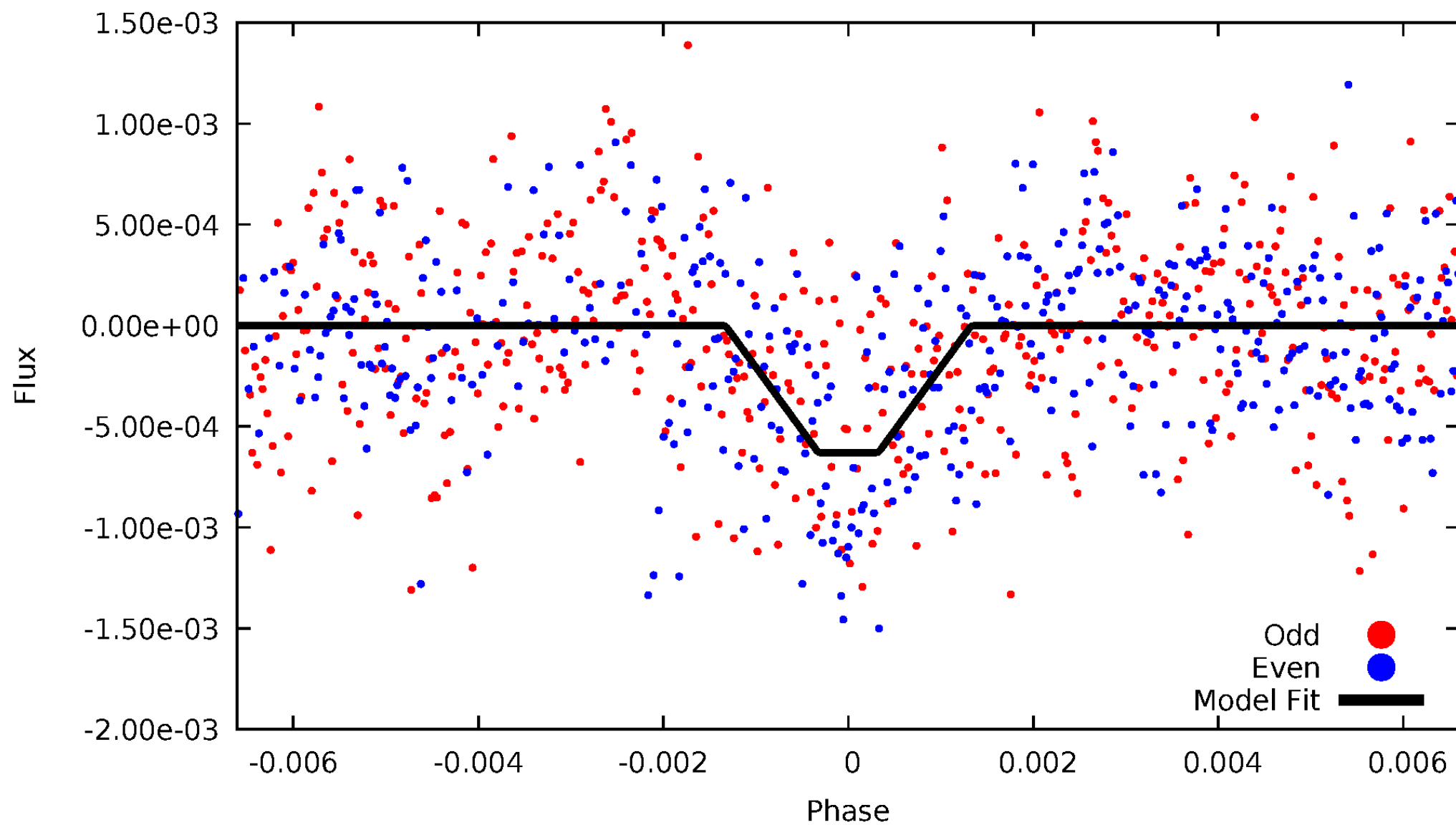
# DV Odd/Even

TCE 009970776-01



# ALT Odd/Even

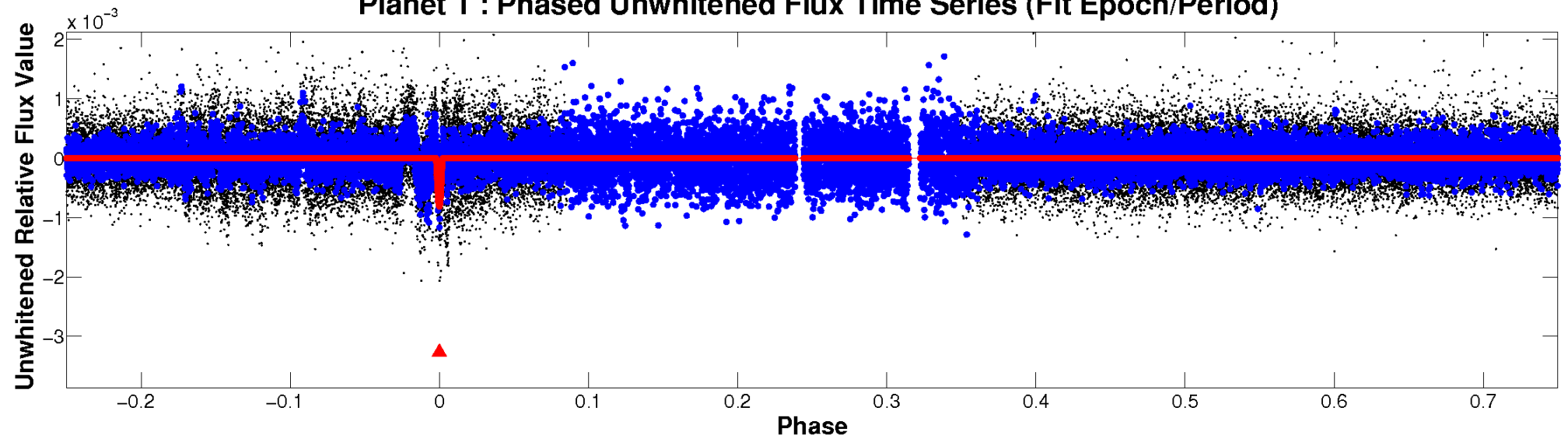
TCE 009970776-01



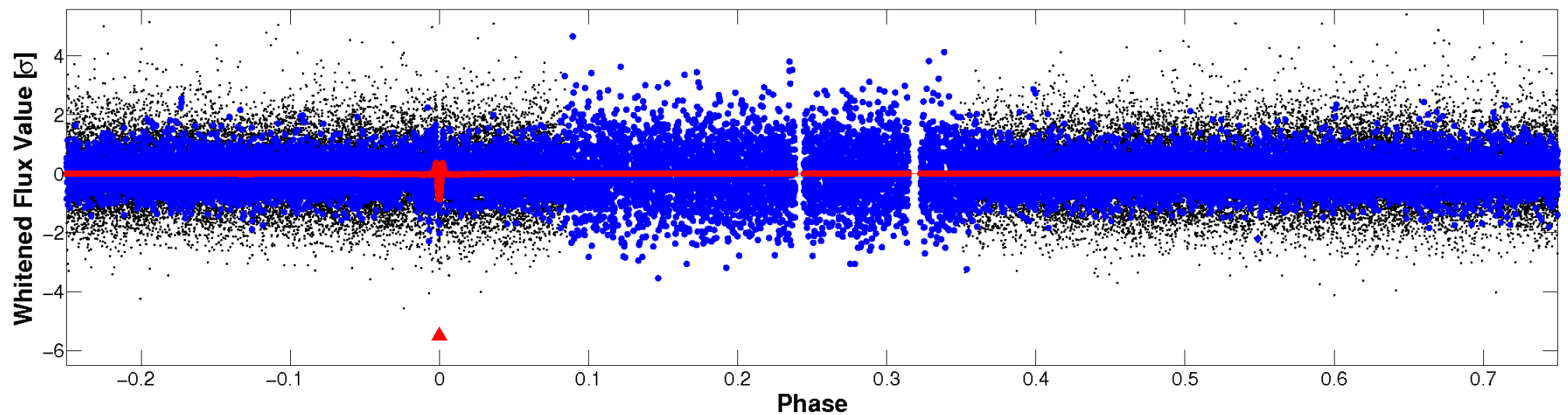


# Non-Whitened Vs. Whitened Light Curve

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

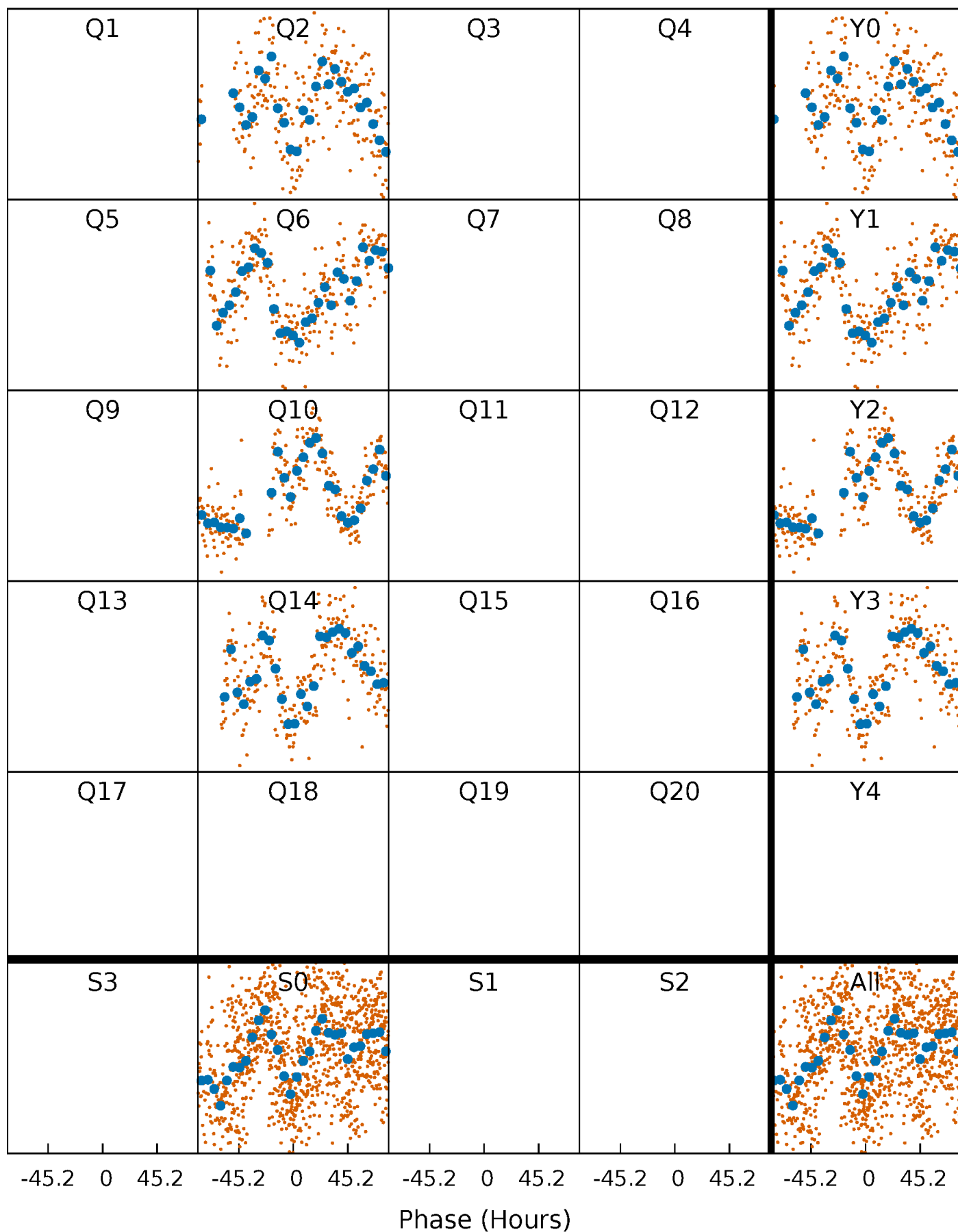


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

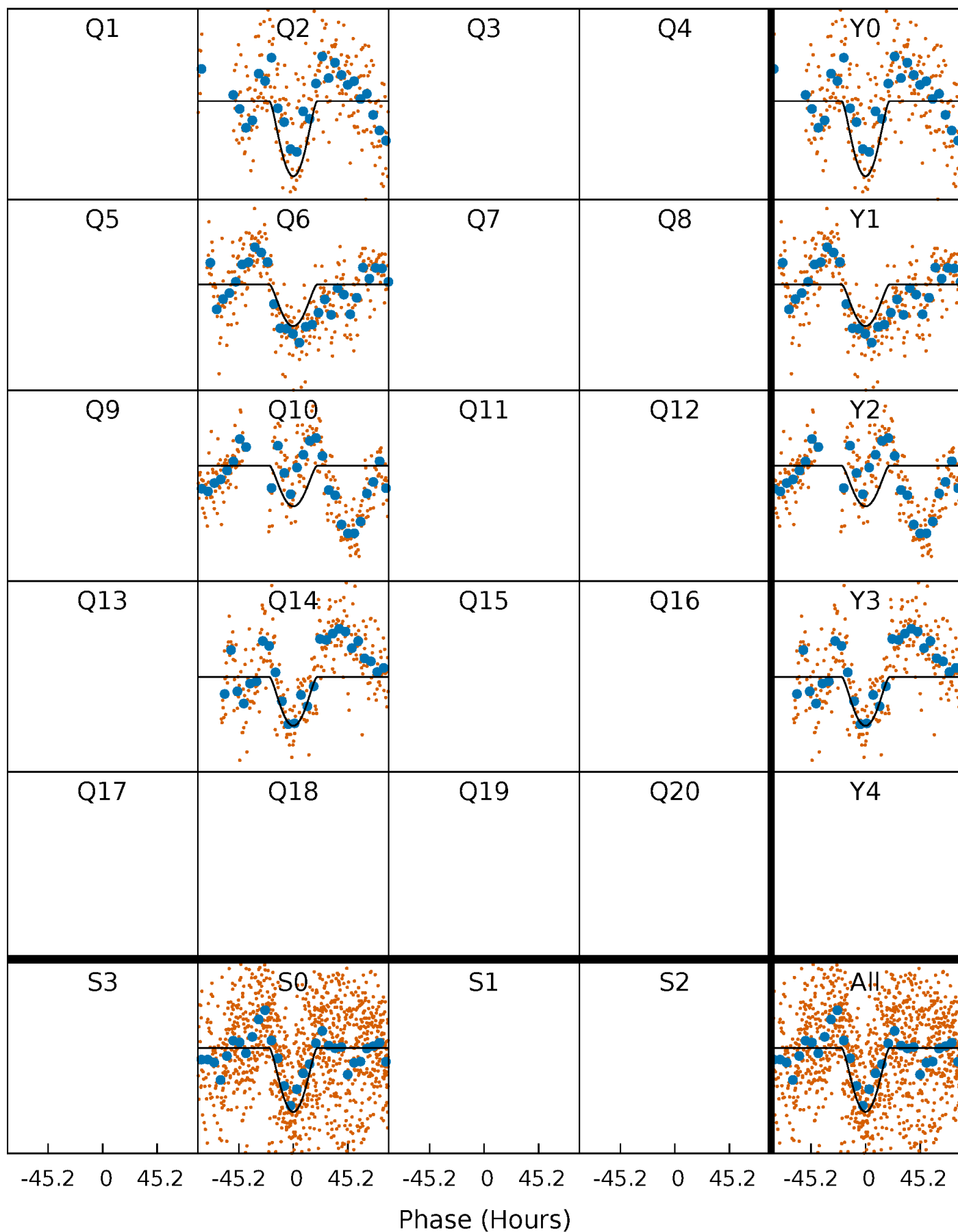
TCE 009970776-01 P=368.743879 Days  $T_0=233.449299$  (BKJD)





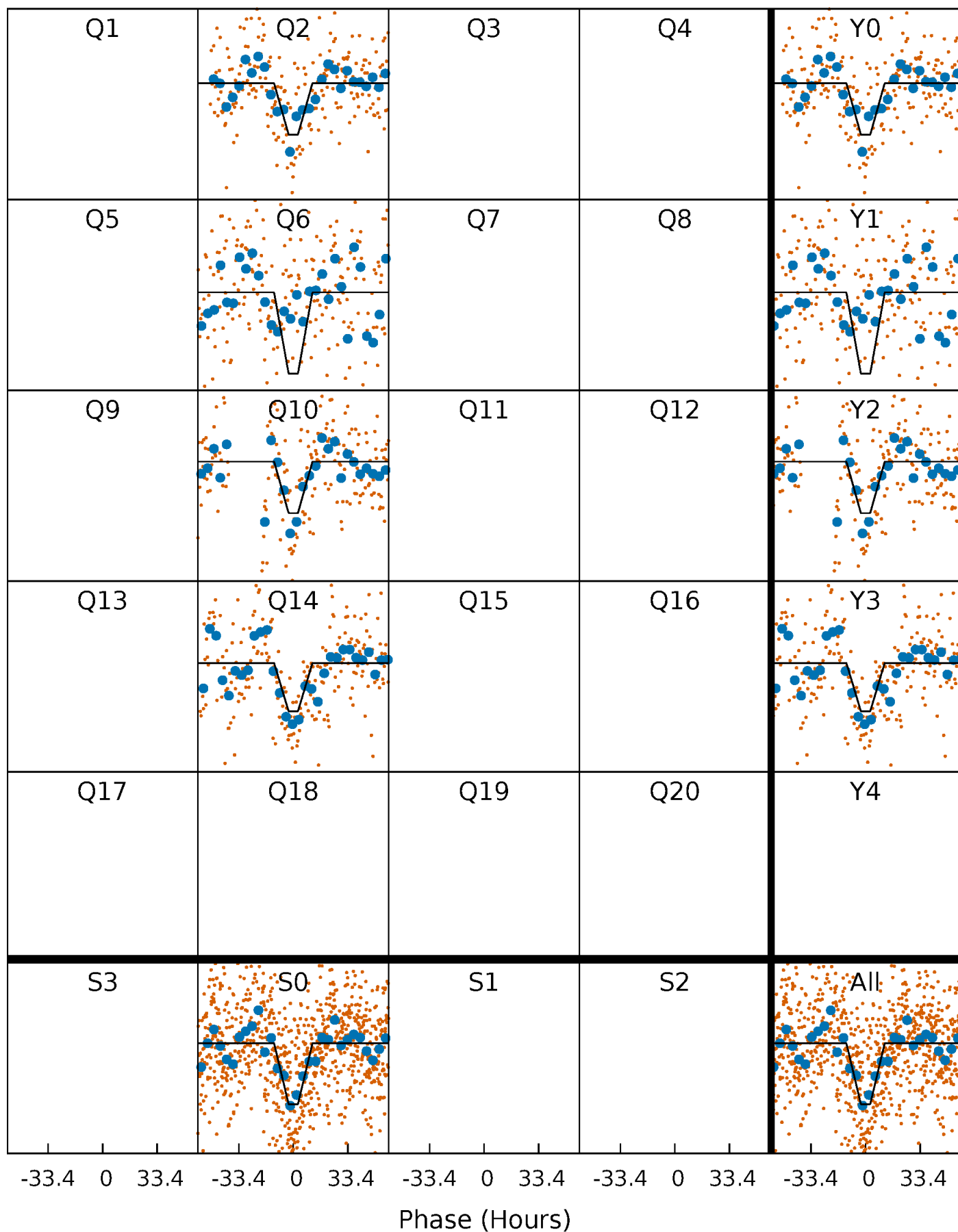
# DV Quarter-Phased Transit Curves

TCE 009970776-01 P=368.743879 Days  $T_0=233.449299$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

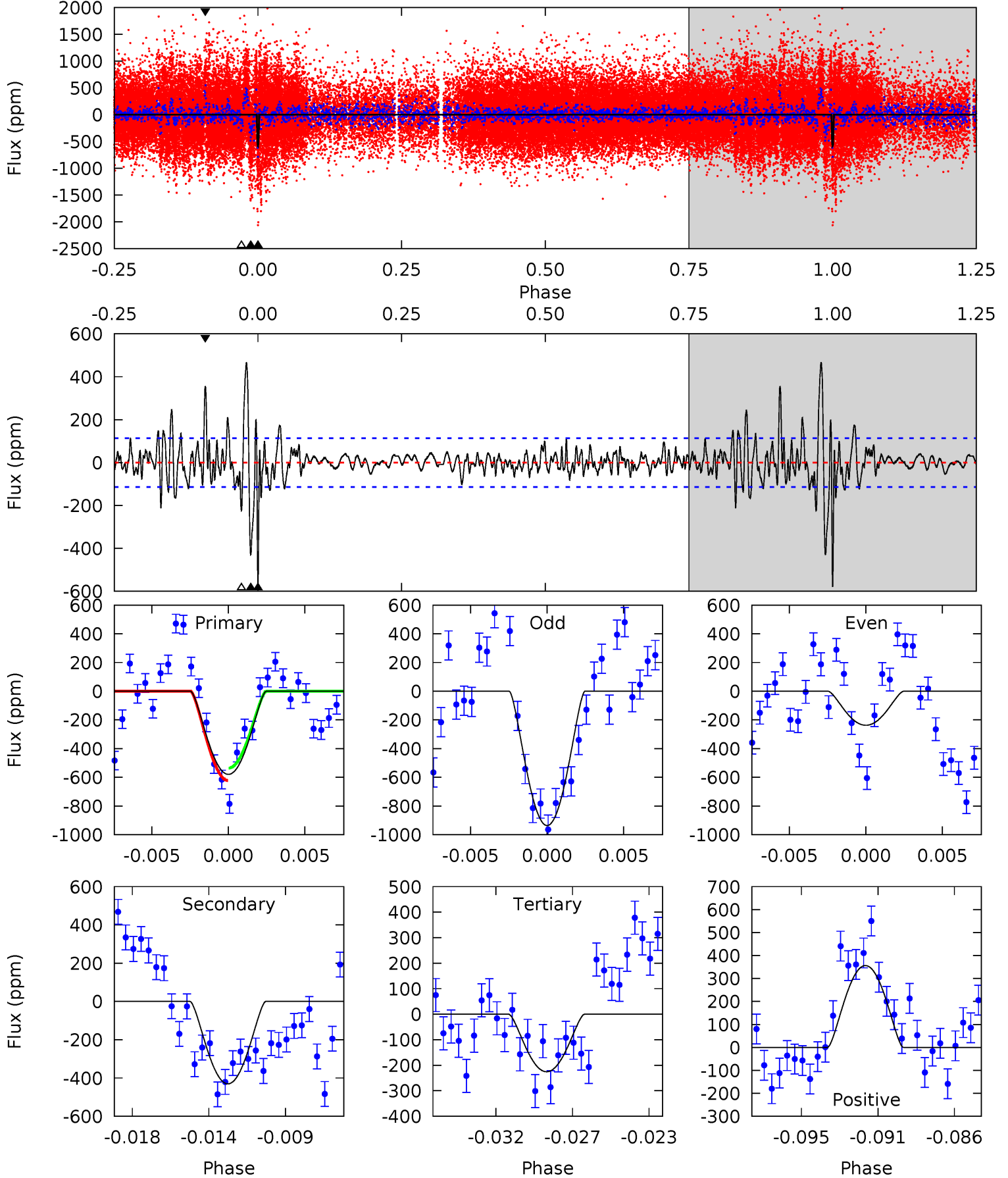
TCE 009970776-01 P=368.689534 Days  $T_0=233.506498$  (BKJD)



# DV Model-Shift Uniqueness Test

009970776-01, P = 368.743879 Days, E = 233.449299 Days

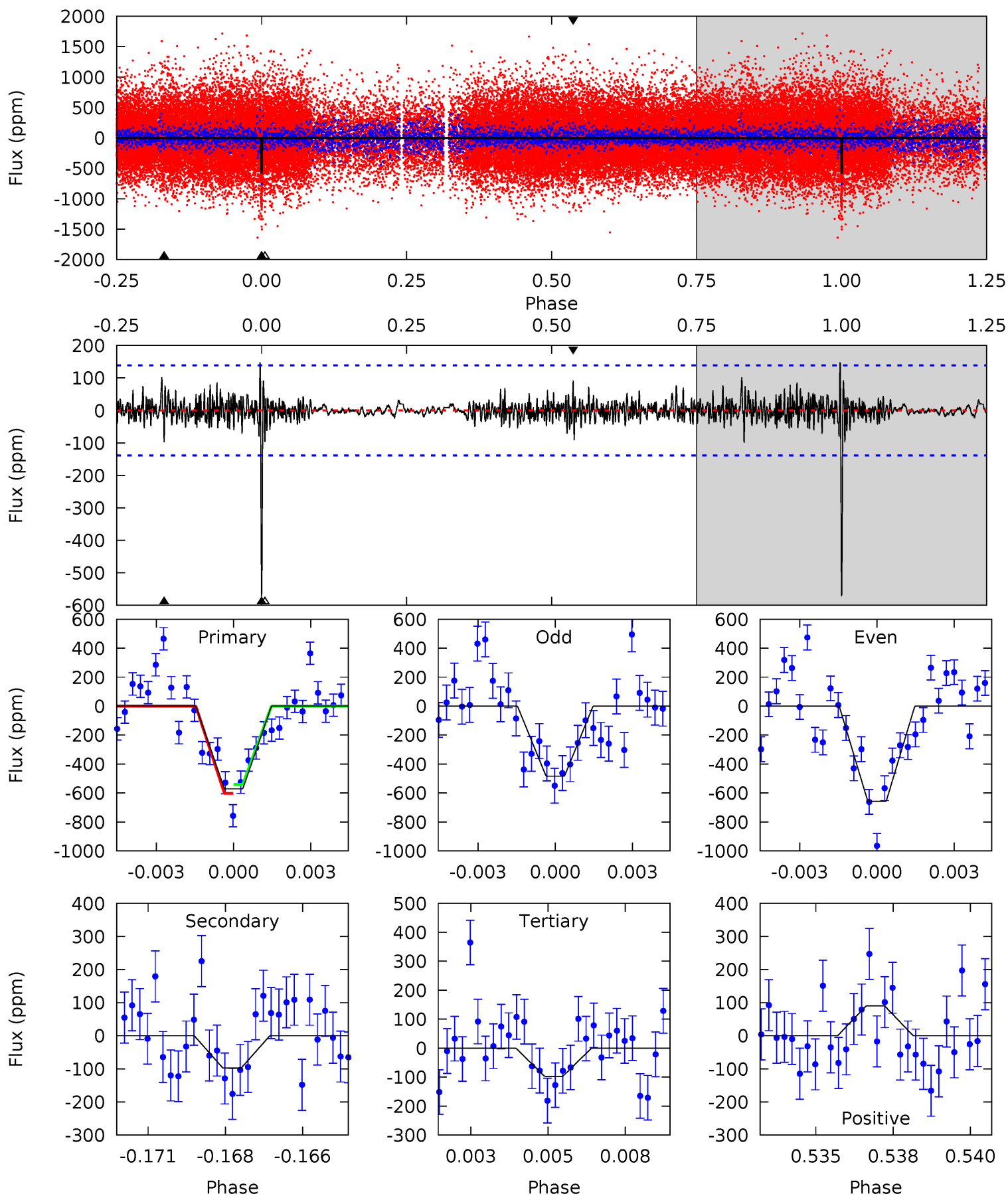
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
26.4	19.6	10.3	16.2	5.18	2.84	3.30	16.1	10.2	9.32	3.37	15.9	1.07	0.45	1.97



# Alt Model-Shift Uniqueness Test

009970776-01, P = 368.689534 Days, E = 233.506498 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
21.7	3.71	3.69	3.44	5.27	3.00	0.91	18.0	18.3	0.02	0.28	3.32	0.87	0.21	1.16



### Stellar Parameters For KIC 009970776

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6113^{+192}_{-213}$	$4.367^{+0.128}_{-0.192}$	$-0.340^{+0.300}_{-0.300}$	$1.060^{+0.307}_{-0.165}$	$0.953^{+0.140}_{-0.102}$	$1.129^{+0.670}_{-0.572}$
	+3%/-3%	+3%/-4%	+88%/-88%	+29%/-16%	+15%/-11%	+59%/-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 009970776-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-430 \pm 22$	$11.36^{+10.07}_{-7.73}$	$393^{+29}_{-23}$	$3369^{+1754}_{-560}$	$1786^{+15948}_{-1299}$
Alt.	$-98 \pm 26$	$9.47^{+9.48}_{-6.49}$	$393^{+27}_{-25}$	$2848^{+1262}_{-463}$	$567^{+5273}_{-430}$

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

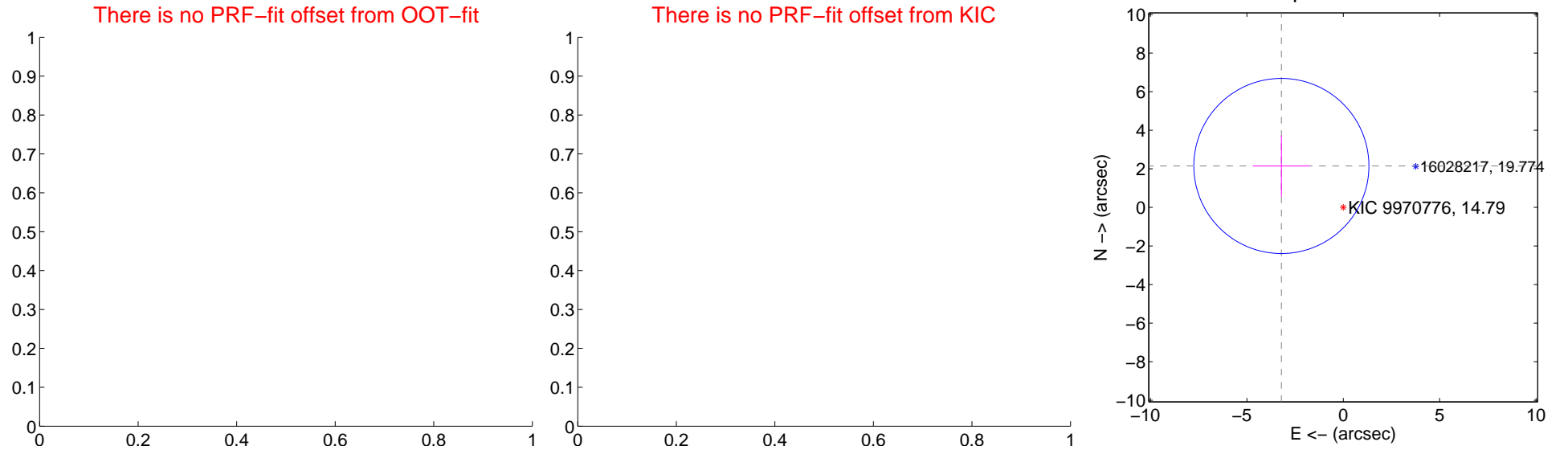
## DV Centroid Data

Supplemental centroid analysis for 009970776-01. Kepler magnitude: 14.79. Transit SNR 10.31

There are 0 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	—	—	—	—
photometric centroid source offset	$3.86 \pm 1.51$	2.55	$3.21 \pm 1.48$	$2.15 \pm 1.58$



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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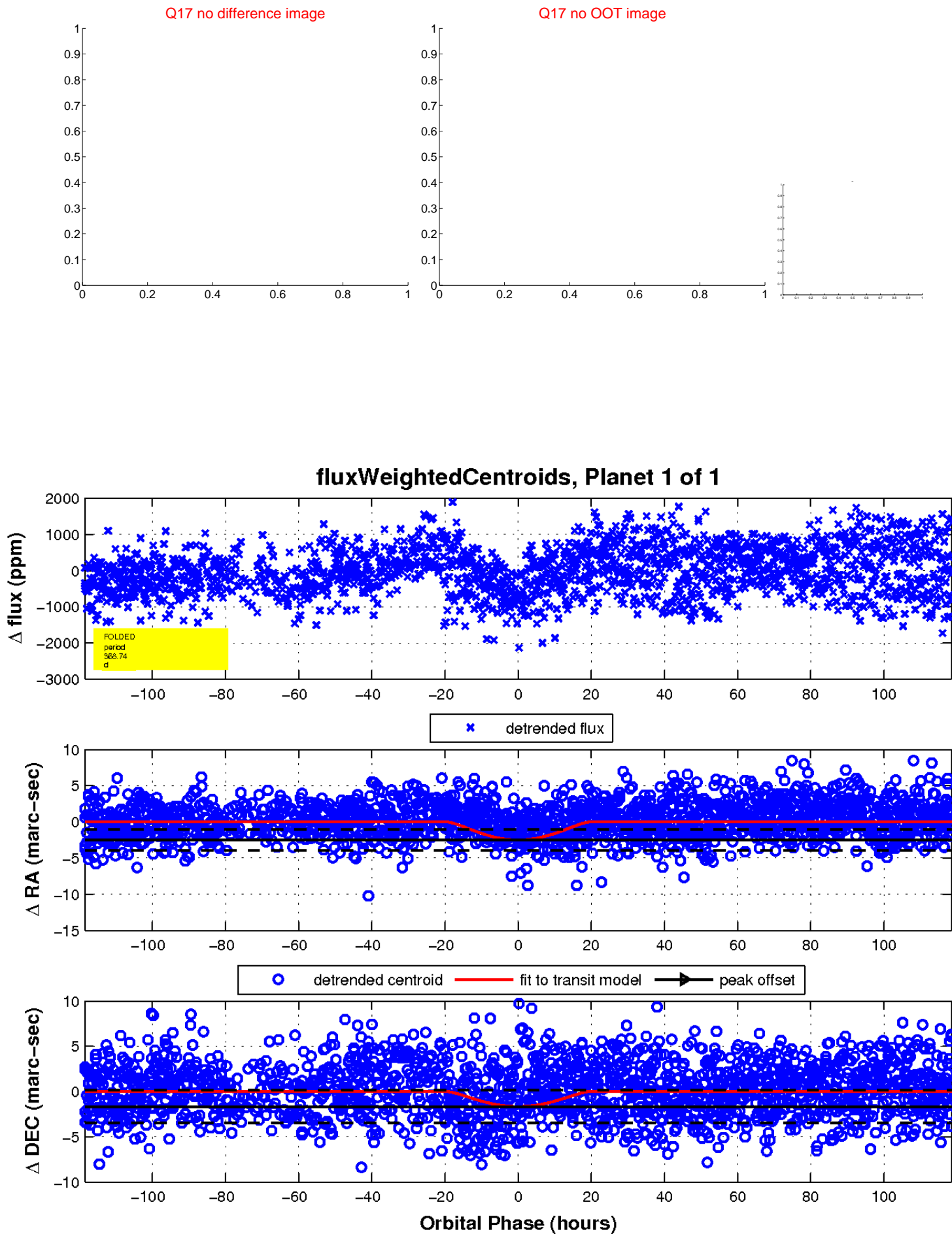
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UKIRT Image

Declination

