

# KIC 004168016

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004168016-01	OBS	No	176.721664	238.535520	623.7	5.958	18.8	7.2	0.89	5721	2.45	2.06

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004168016-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—INCONSISTENT_TRANS—CENT_KIC_POS

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

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

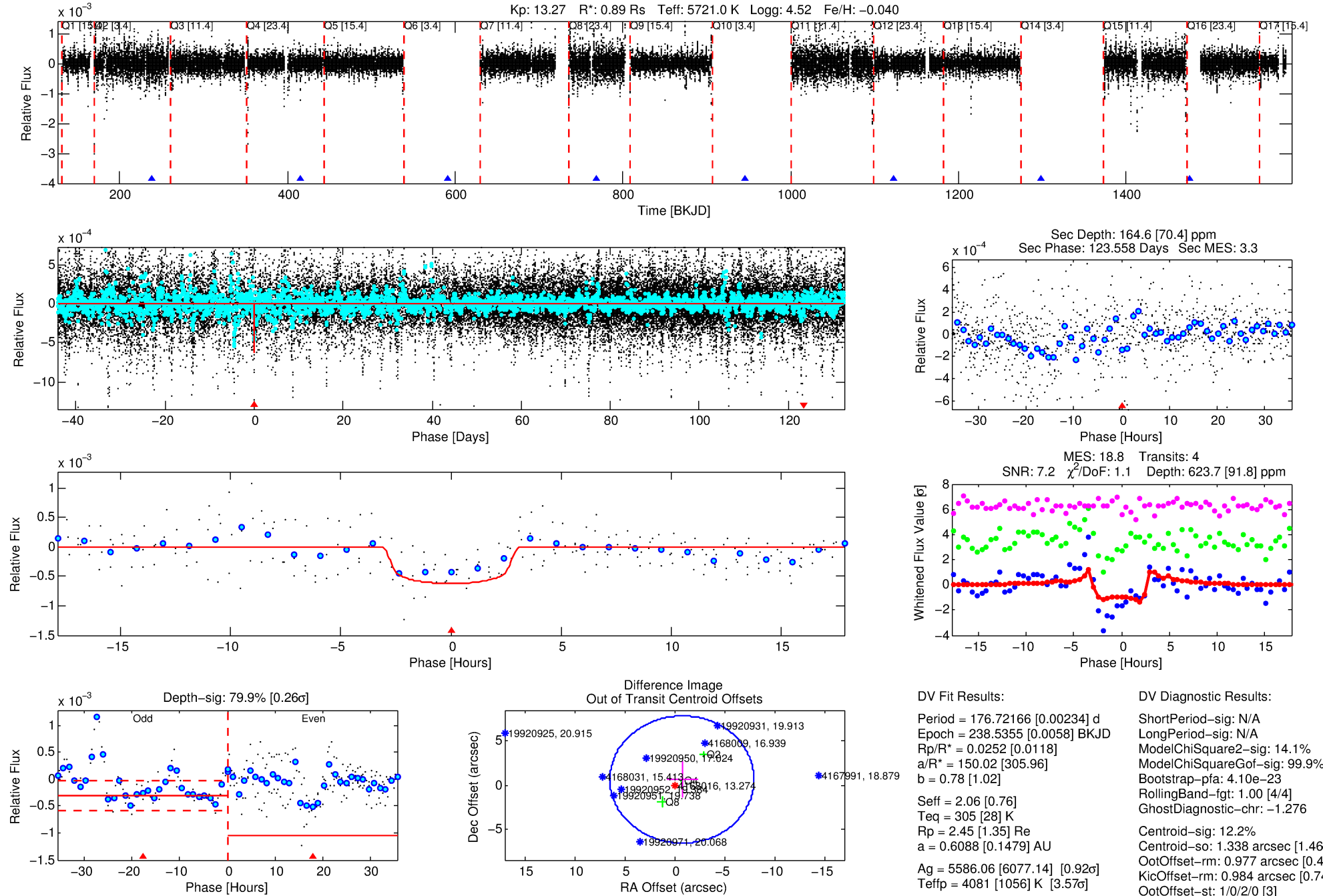
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004168016-01

No Significant Match Found

# DV One-Page Summary

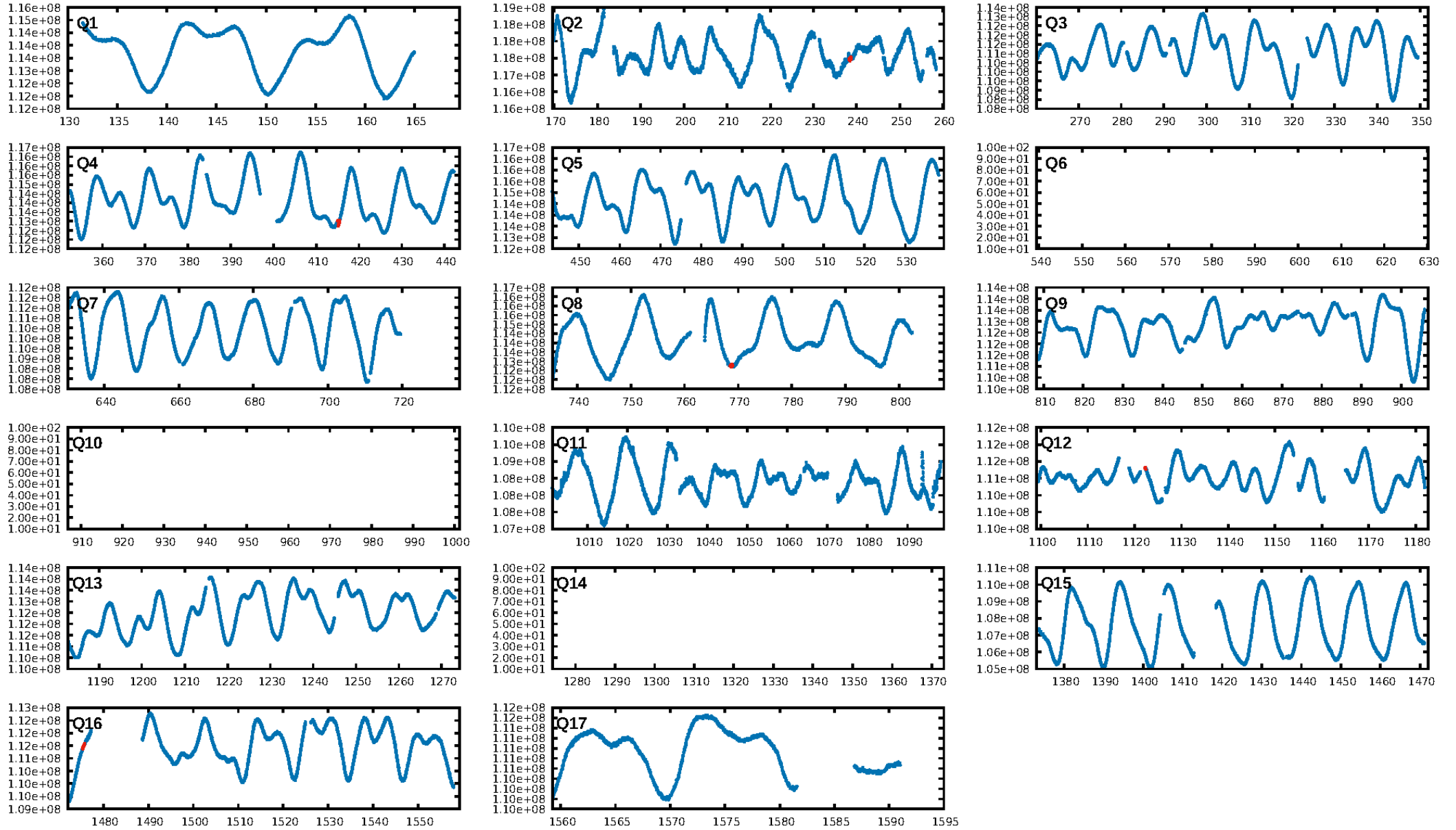
KIC: 4168016 Candidate: 1 of 1 Period: 176.722 d



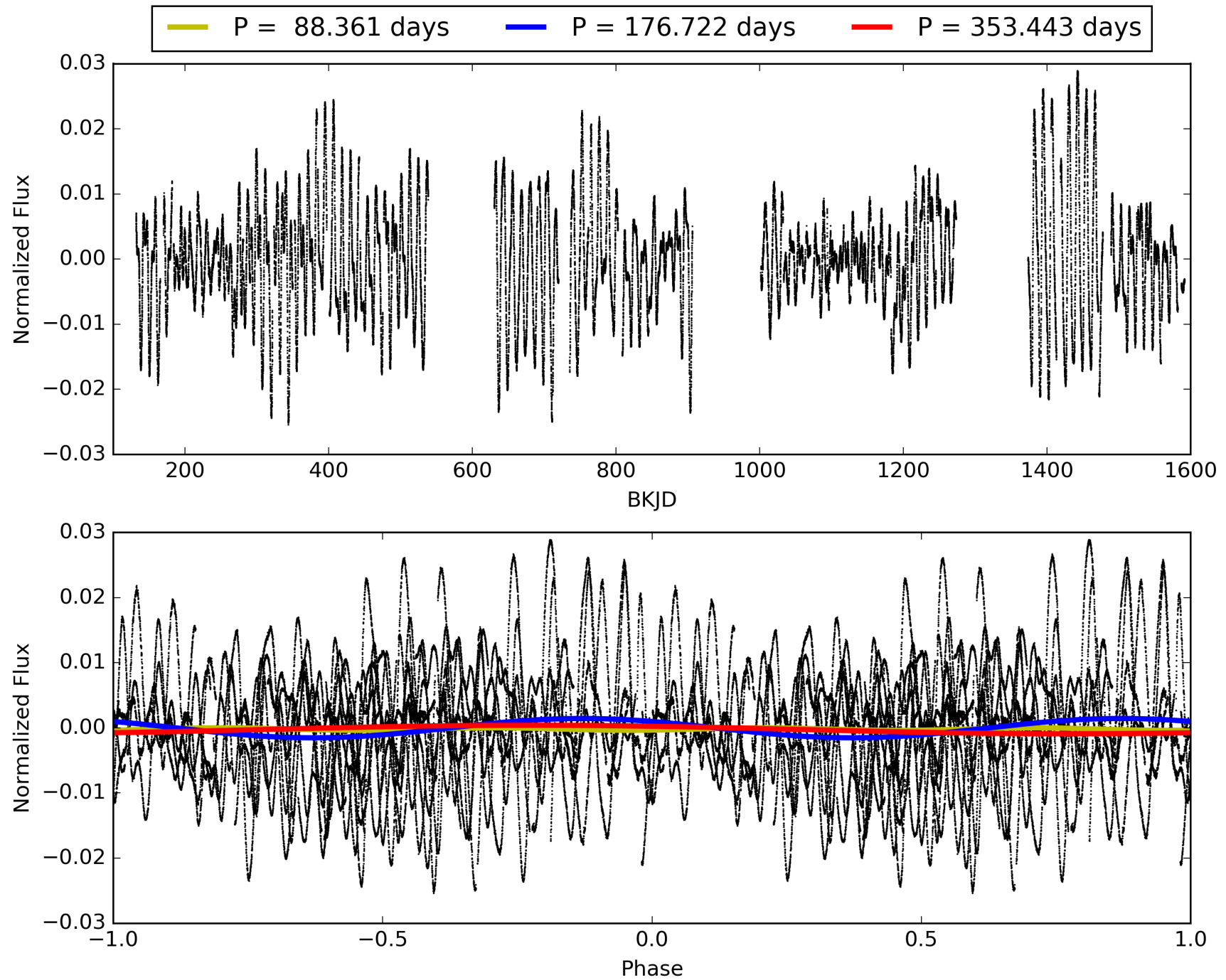
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 13:29:47 Z

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

# TCE 004168016-01, PDC Light Curves

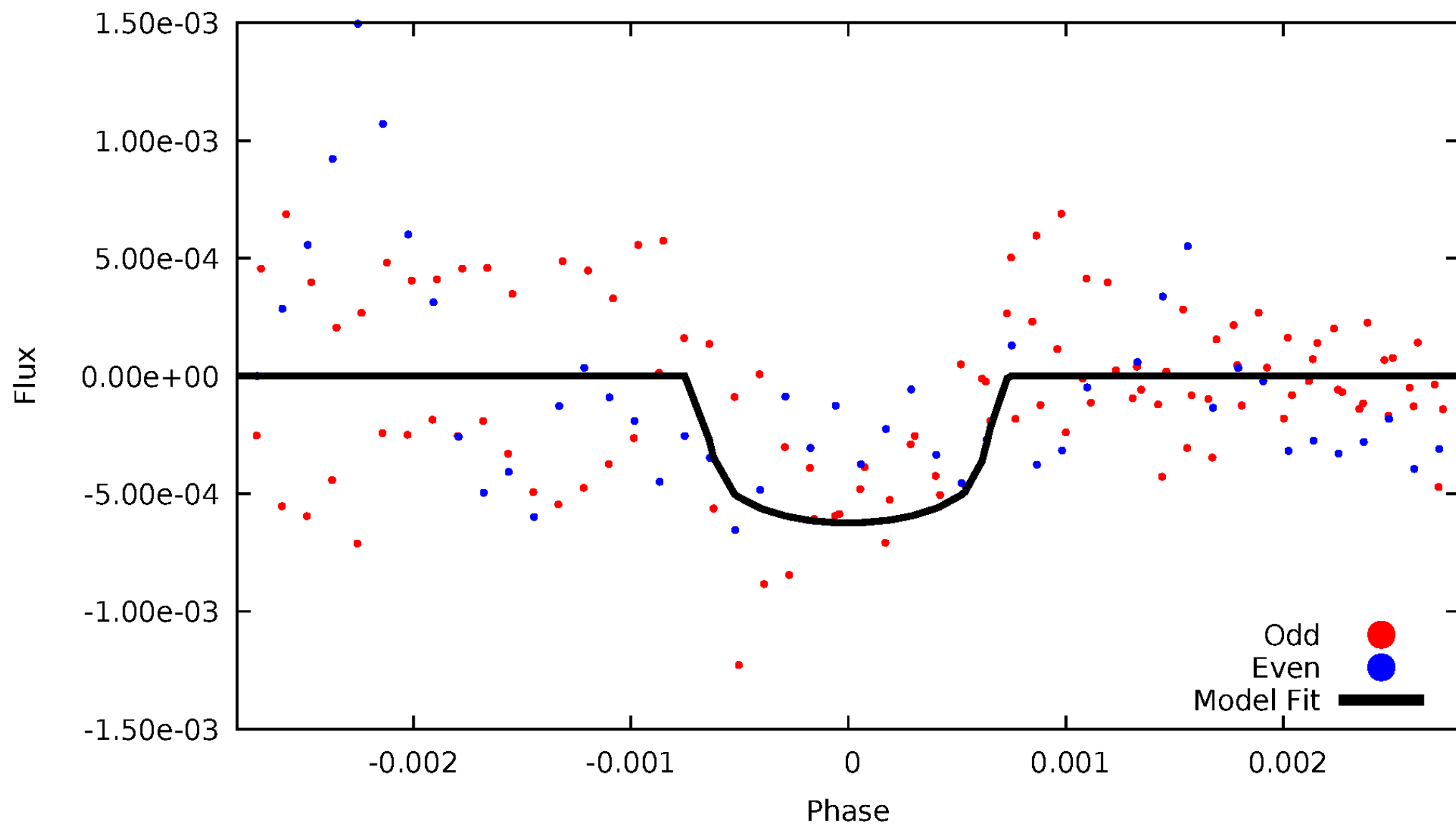


TCE 004168016-01



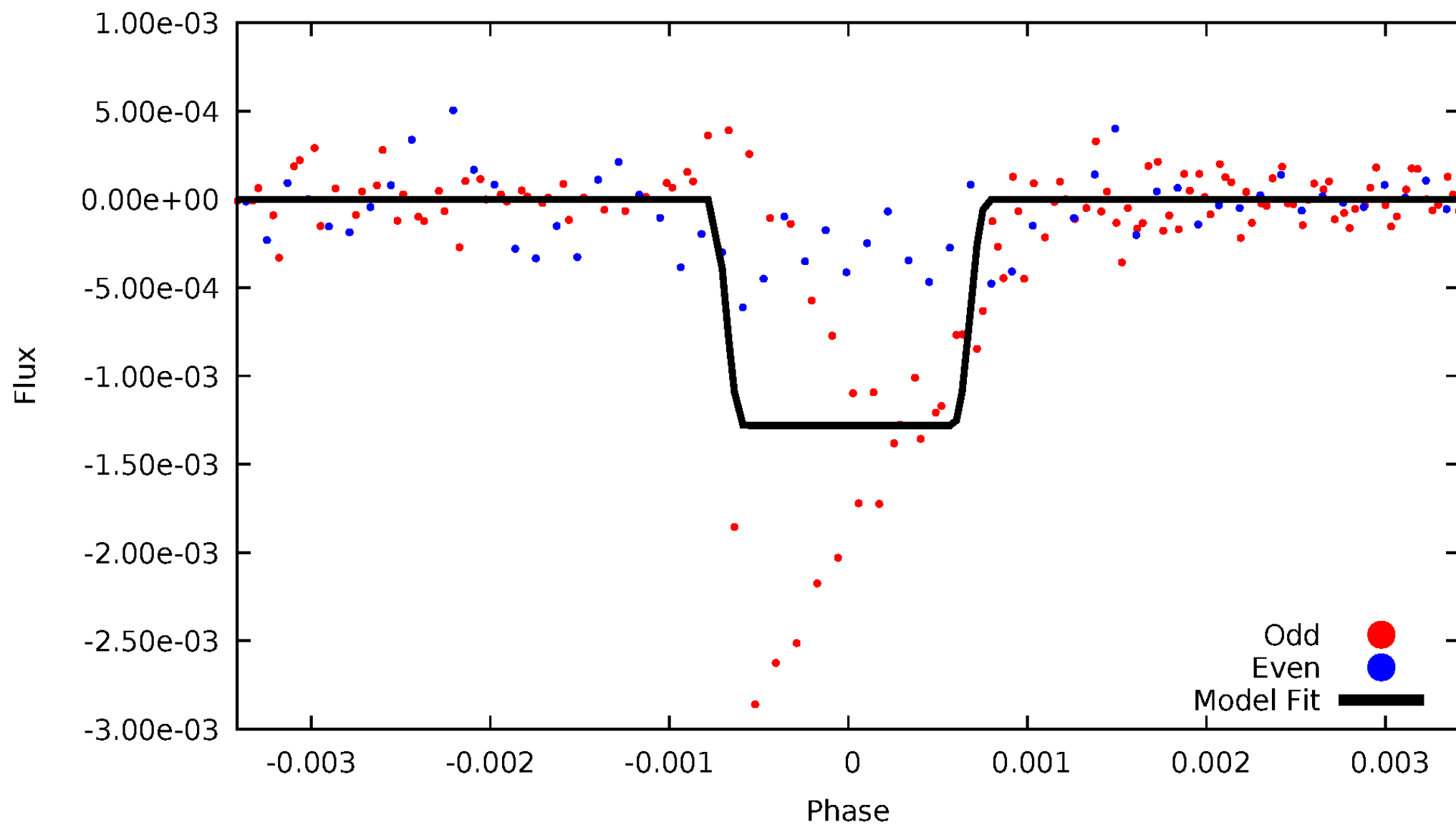
# DV Odd/Even

TCE 004168016-01



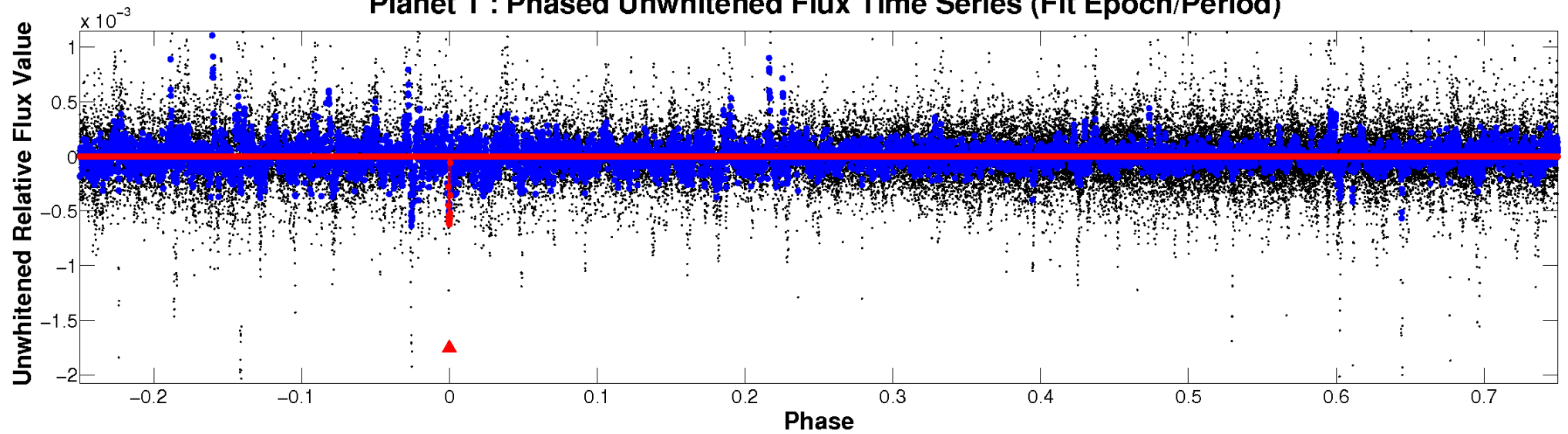
# ALT Odd/Even

TCE 004168016-01

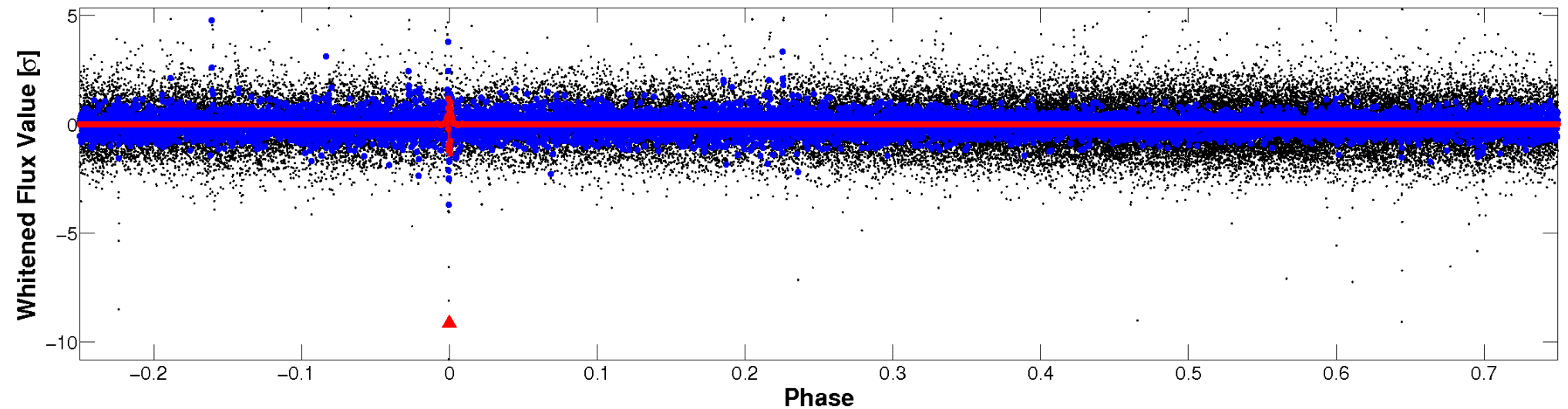


# Non-Whitened Vs. Whitened Light Curve

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

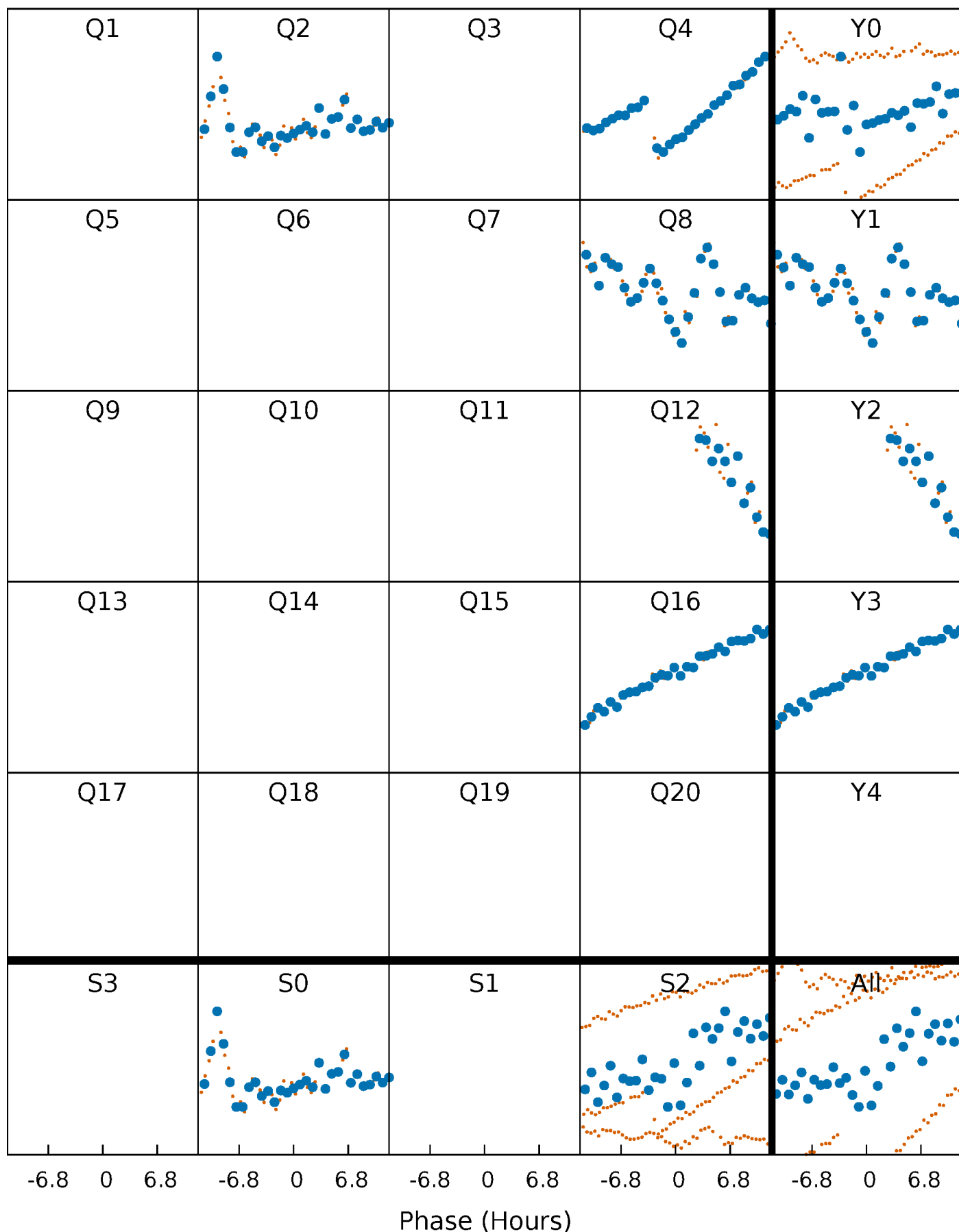


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

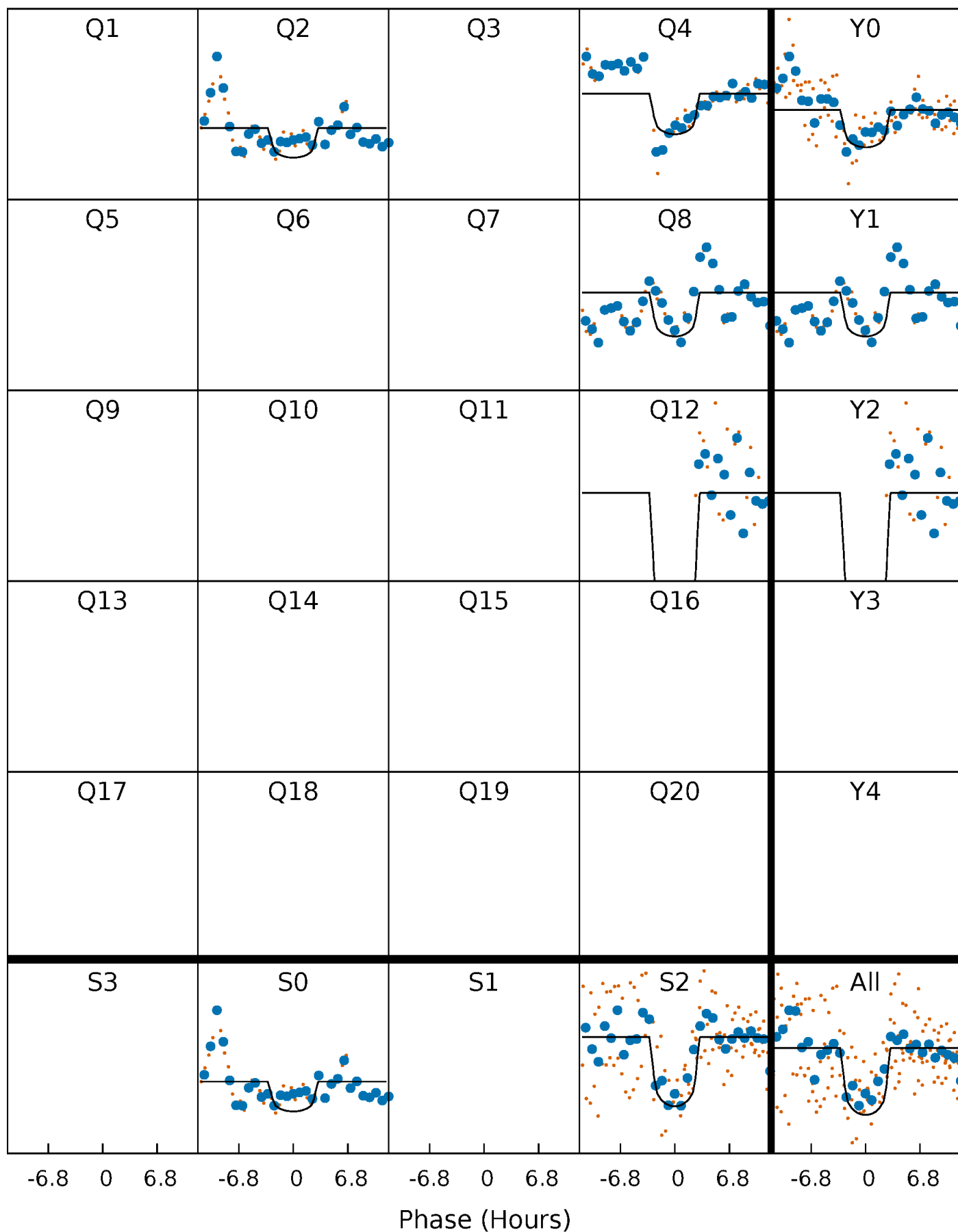
TCE 004168016-01 P=176.721665 Days  $T_0=238.535520$  (BKJD)





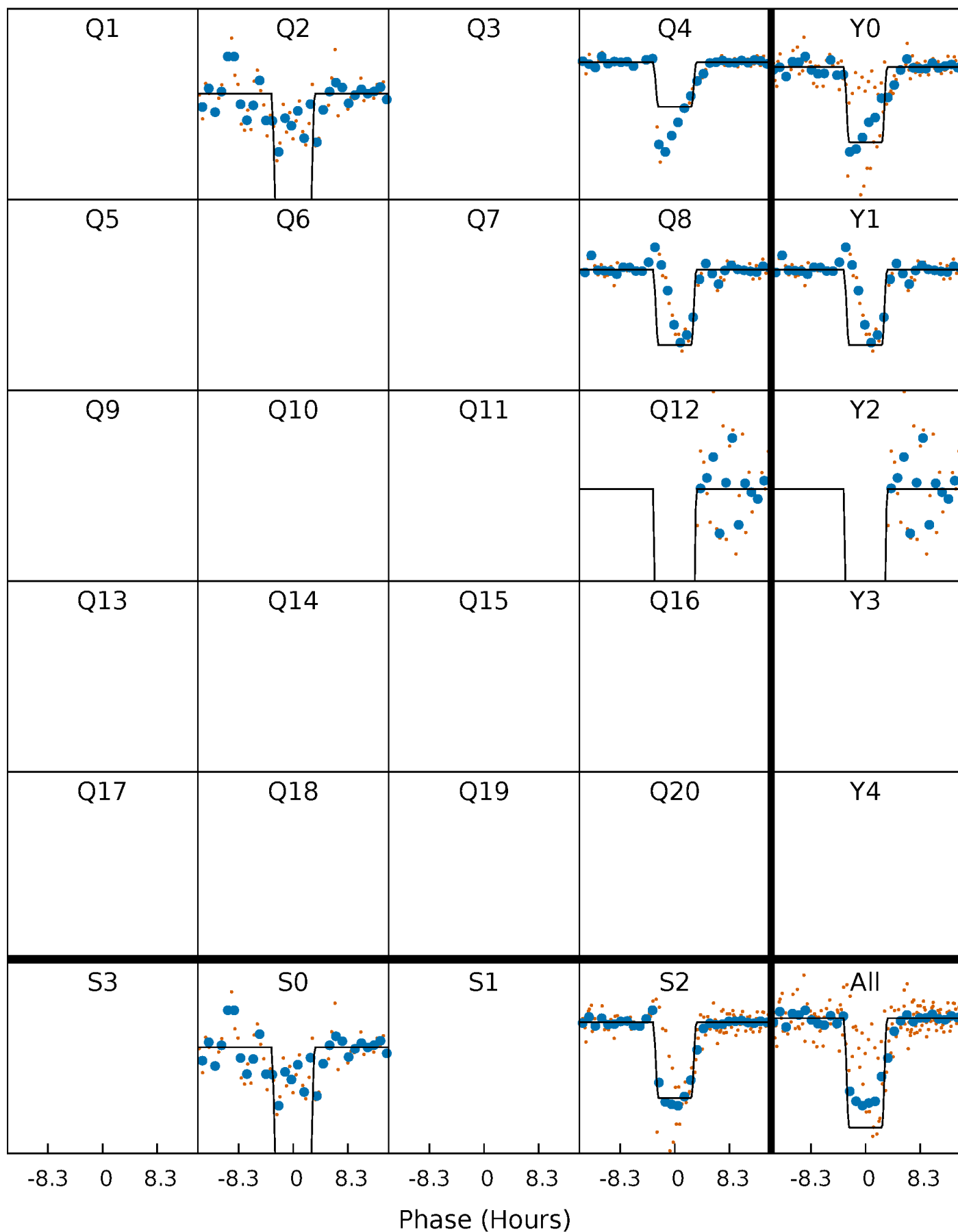
# DV Quarter-Phased Transit Curves

TCE 004168016-01 P=176.721665 Days  $T_0=238.535520$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

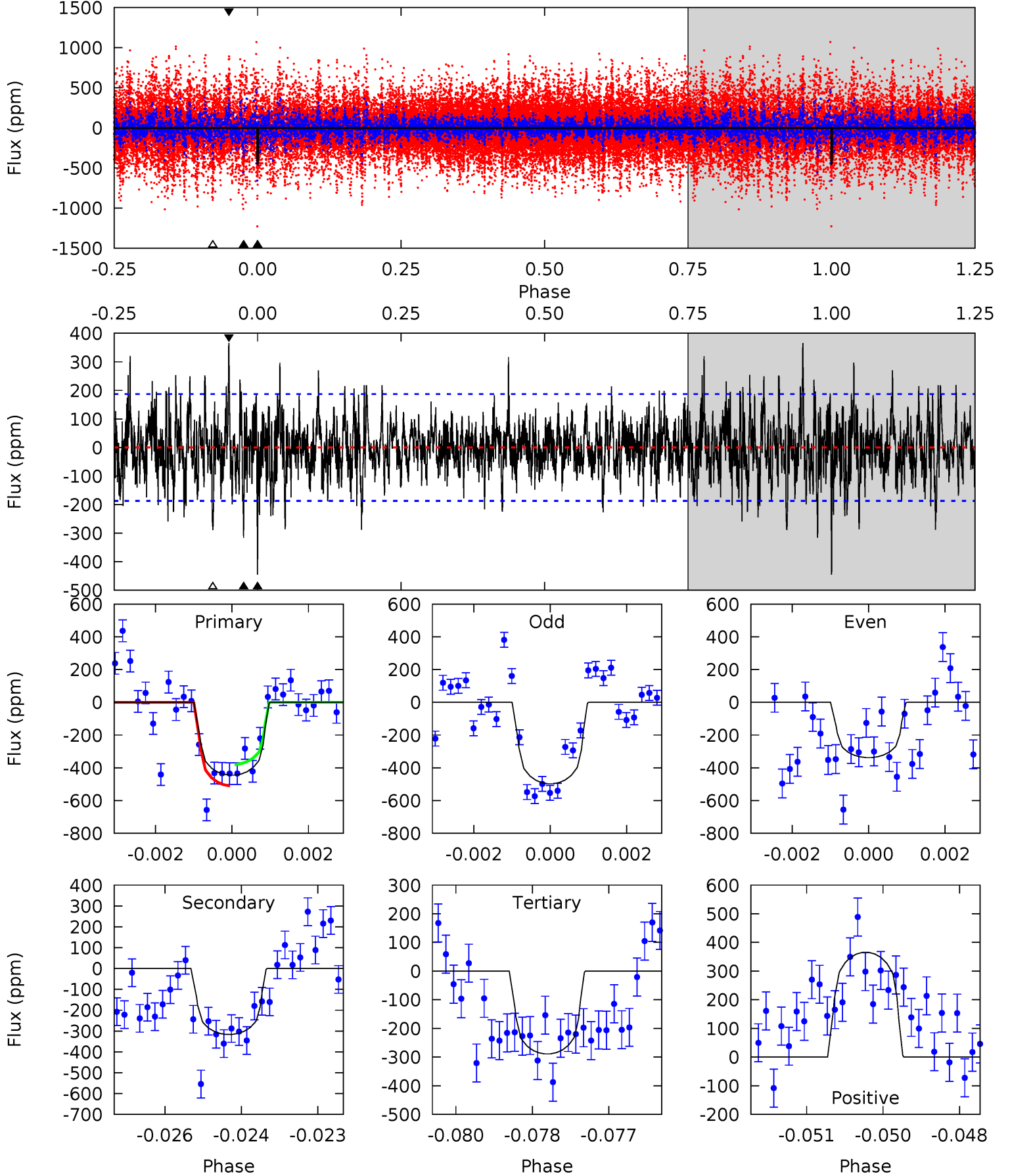
TCE 004168016-01 P=176.712538 Days  $T_0=238.547638$  (BKJD)



# DV Model-Shift Uniqueness Test

004168016-01,  $P = 176.721665$  Days,  $E = 61.813855$  Days

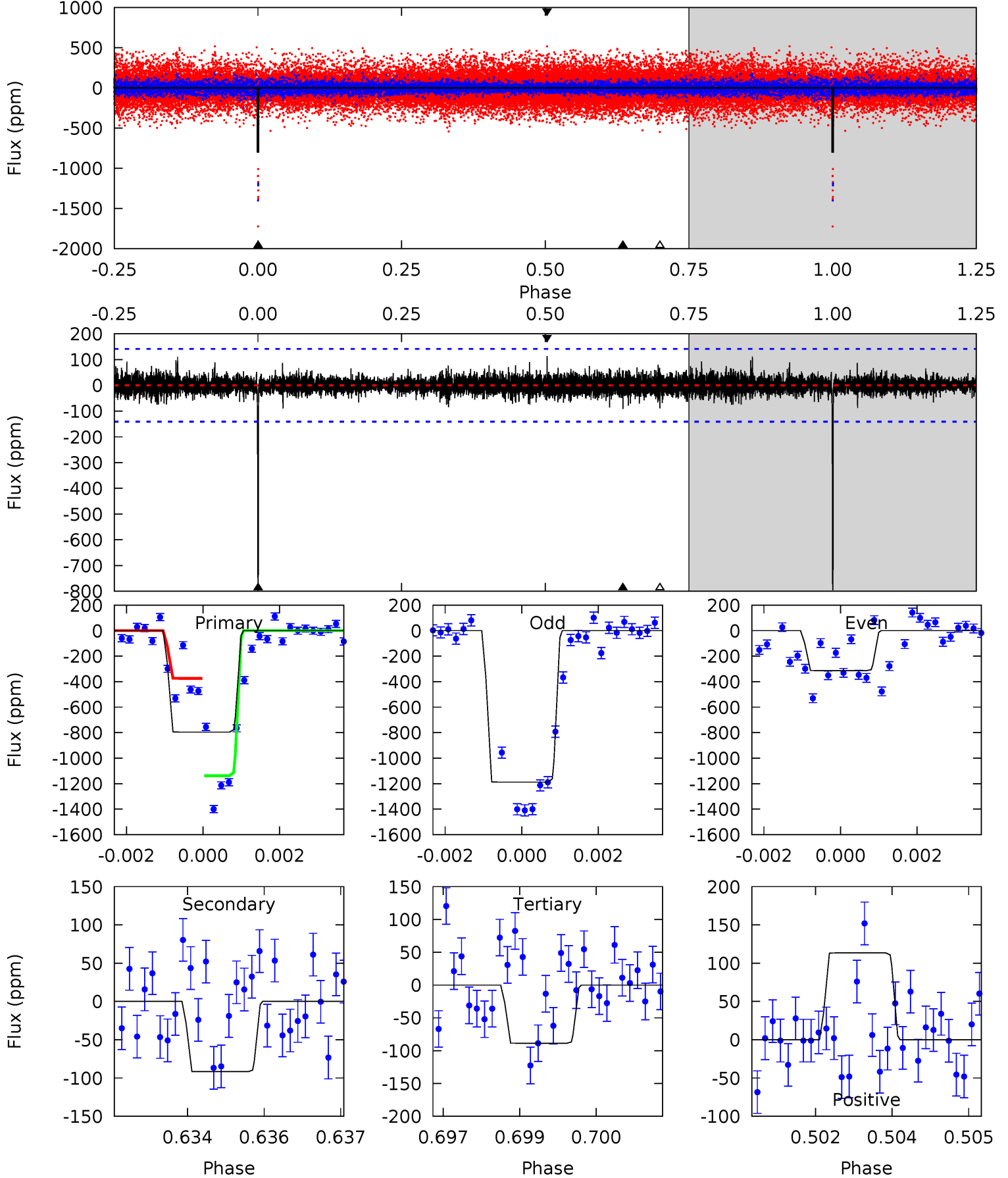
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.8	9.11	8.31	10.5	5.38	3.17	2.16	4.49	2.29	0.79	-1.41	2.13	1.00	0.45	1.87



# Alt Model-Shift Uniqueness Test

004168016-01, P = 176.712538 Days, E = 61.835100 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
30.3	3.49	3.38	4.32	5.38	3.17	0.81	26.9	26.0	0.11	-0.83	20.6	1.41	0.12	14.3



### Stellar Parameters For KIC 004168016

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5721^{+156}_{-156}$	$4.522^{+0.048}_{-0.192}$	$-0.040^{+0.250}_{-0.300}$	$0.891^{+0.258}_{-0.086}$	$0.964^{+0.103}_{-0.103}$	$1.919^{+0.385}_{-0.948}$
	+3%/-3%	+1%/-4%	+625%/-750%	+29%/-10%	+11%/-11%	+20%/-49%
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 004168016-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-317 \pm 35$	$2.51^{+1.32}_{-1.11}$	$435^{+30}_{-18}$	$4918^{+1589}_{-722}$	$9733^{+21817}_{-5430}$
Alt.	$-92 \pm 26$	$3.61^{+1.35}_{-1.14}$	$434^{+28}_{-19}$	$3451^{+506}_{-327}$	$1378^{+1754}_{-695}$

$T_{max}$  = 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

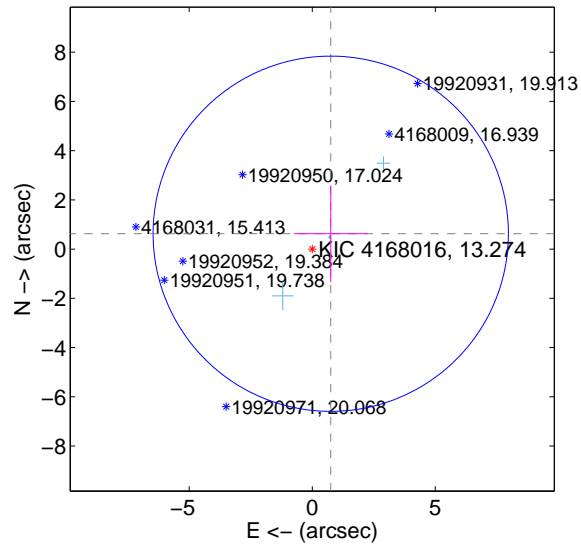
Supplemental centroid analysis for 004168016-01. Kepler magnitude: 13.27. Transit SNR 7.21

There are 3 quarters with good PRF difference image offsets

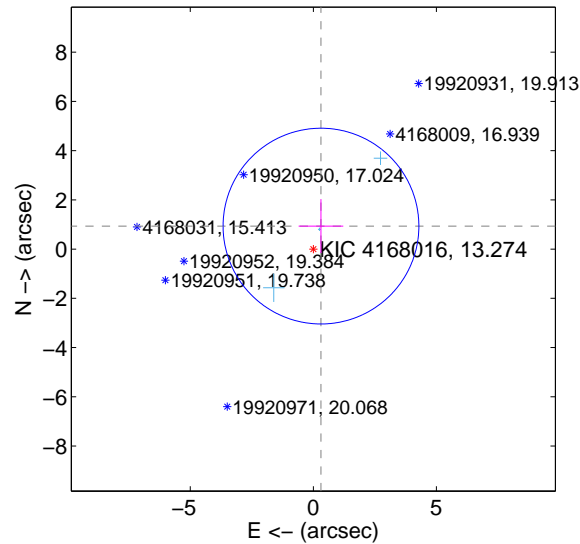
The direct PRF centroid is offset from the target star catalog position by about 0.53 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.977 \pm 2.405$	0.41	$-0.752 \pm 1.498$	$0.624 \pm 1.962$
PRF-fit source offset from KIC position	$0.984 \pm 1.326$	0.74	$-0.310 \pm 0.909$	$0.934 \pm 1.096$
photometric centroid source offset	$1.34 \pm 0.92$	1.46	$0.89 \pm 1.10$	$1.00 \pm 0.75$

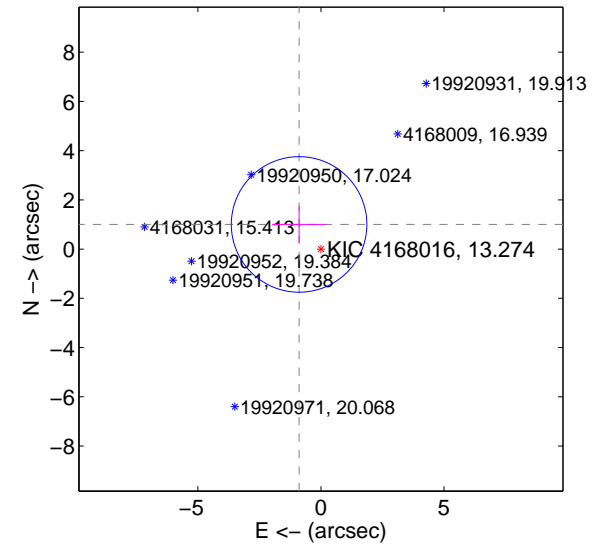
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

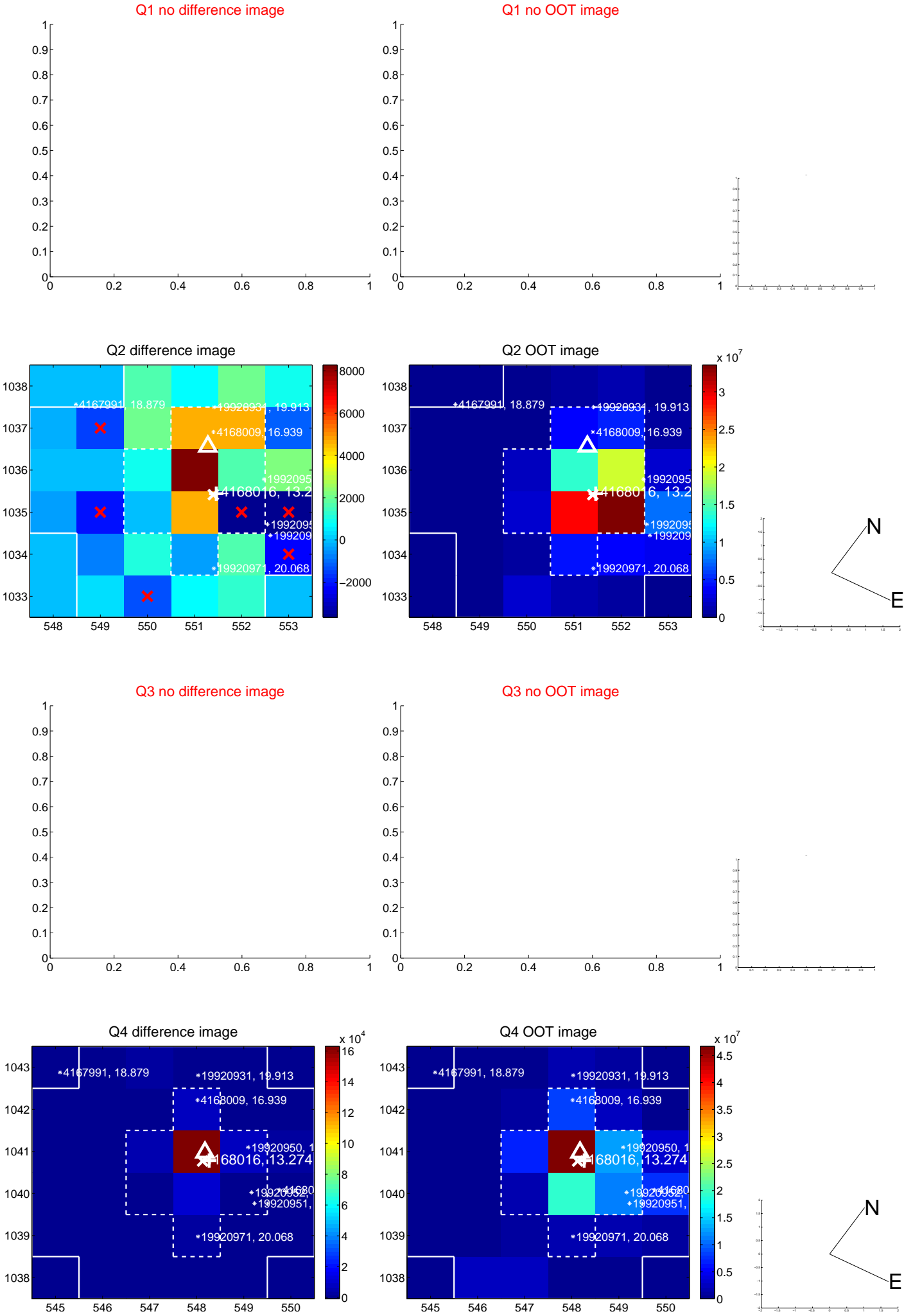


offset from photometric centroids

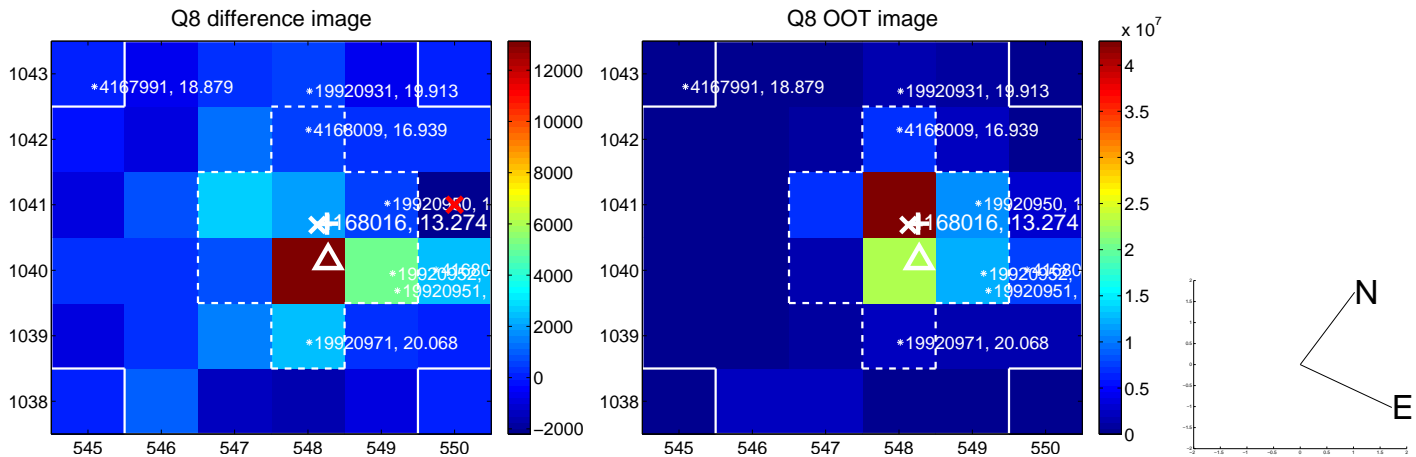


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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





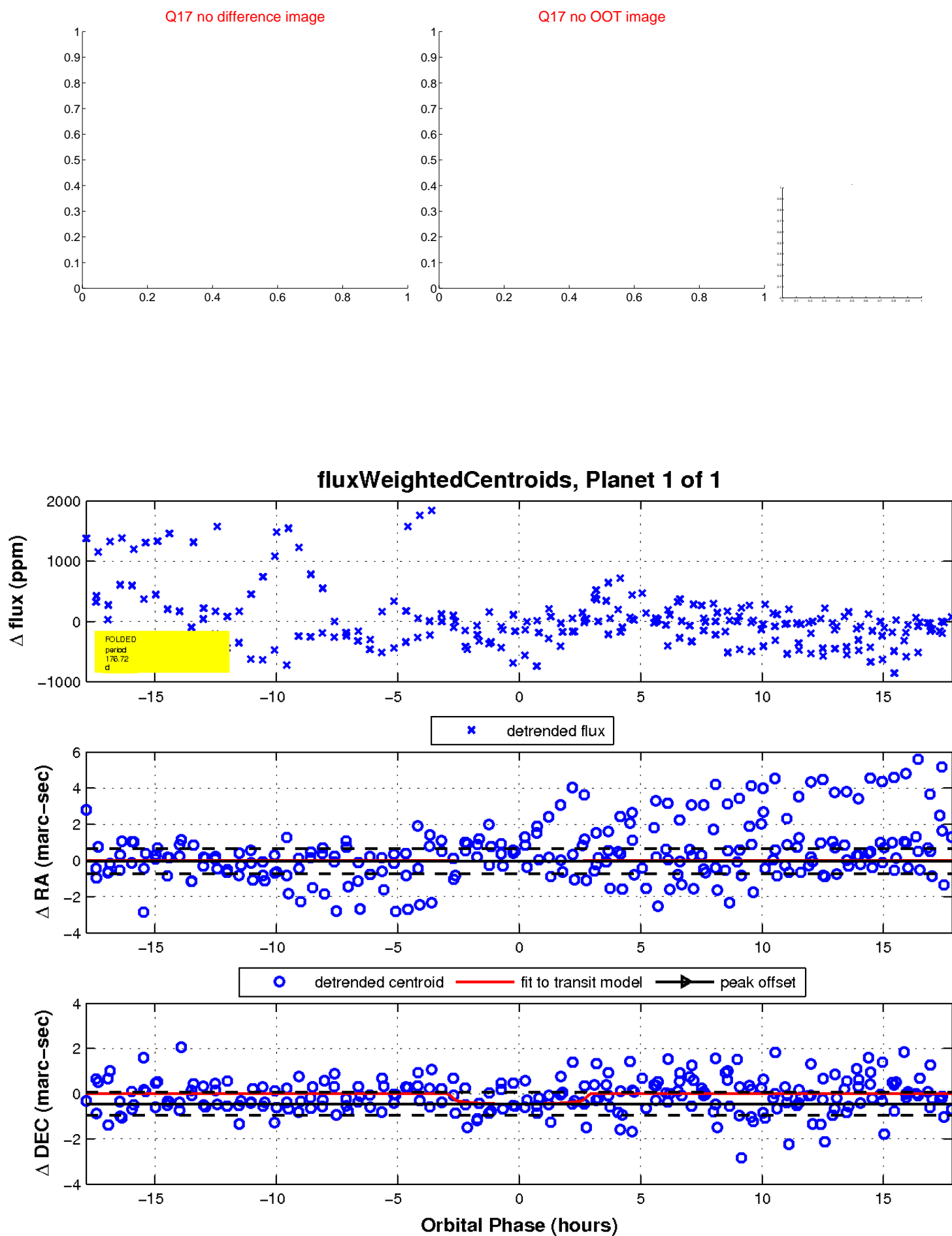
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

