

# KIC 009406941

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009406941-01	OBS	No	378.259634	360.213352	280.5	15.224	8.1	7.4	1.64	6167	3.20	3.19

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009406941-01	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—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.

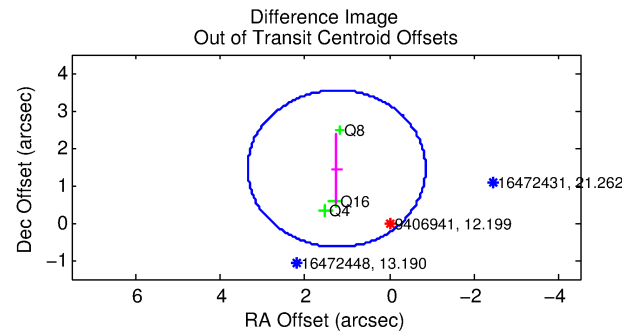
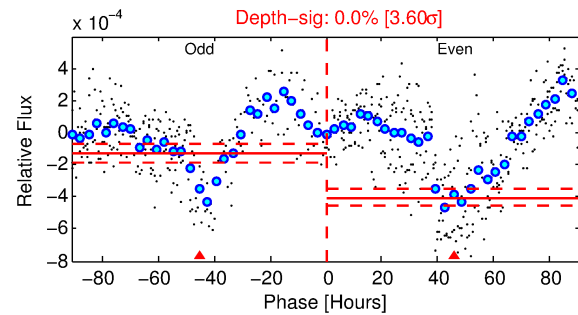
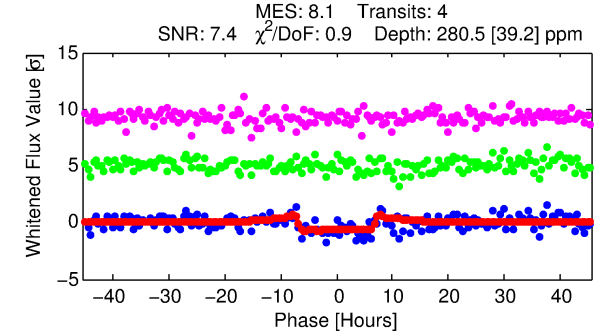
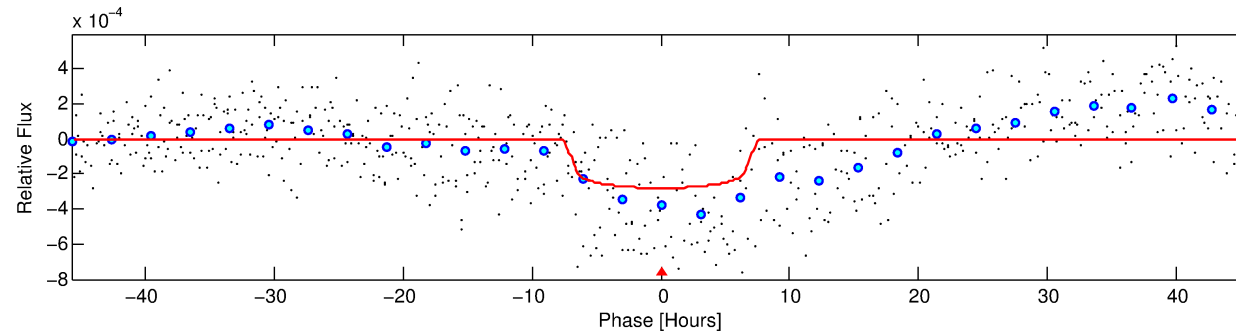
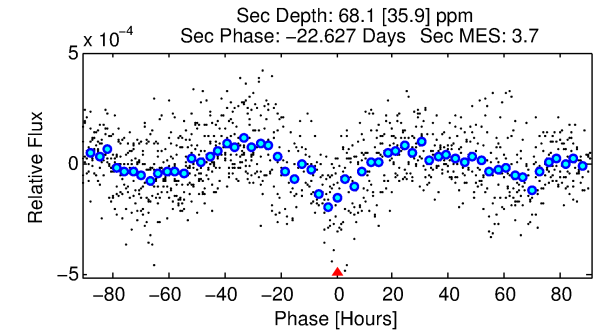
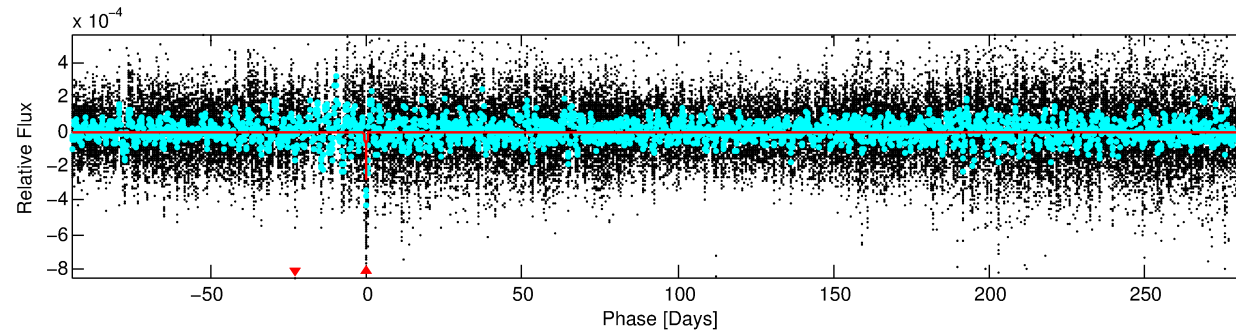
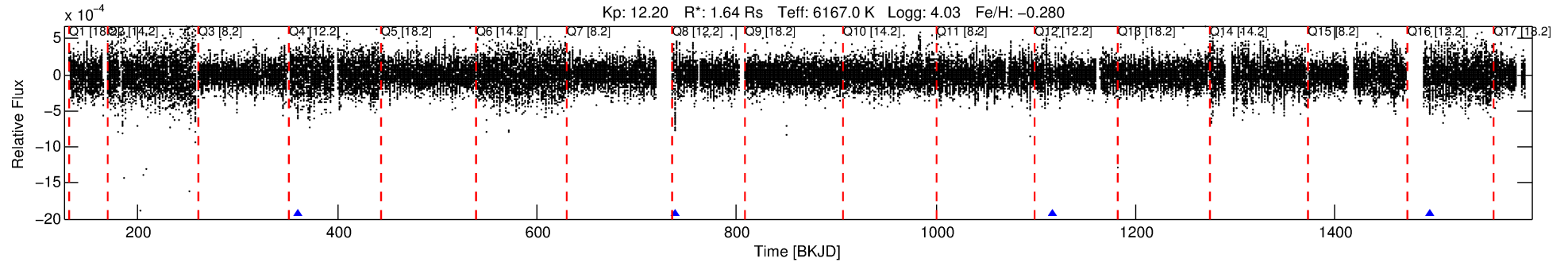
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009406941-01

No Significant Match Found

# DV One-Page Summary

KIC: 9406941 Candidate: 1 of 1 Period: 378.260 d



## DV Fit Results:

Period = 378.25963 [0.00860] d  
Epoch = 360.2134 [0.0148] BKJD  
Rp/R\* = 0.0179 [0.0018]  
a/R\* = 92.77 [30.54]  
b = 0.89 [0.08]  
Seff = 3.20 [1.98]  
Teq = 341 [53] K  
Rp = 3.20 [1.25] Re  
a = 1.0438 [0.3878] AU  
Ag = 3984.05 [3285.23] [1.21σ]  
Teffp = 4188 [608] K [6.31σ]

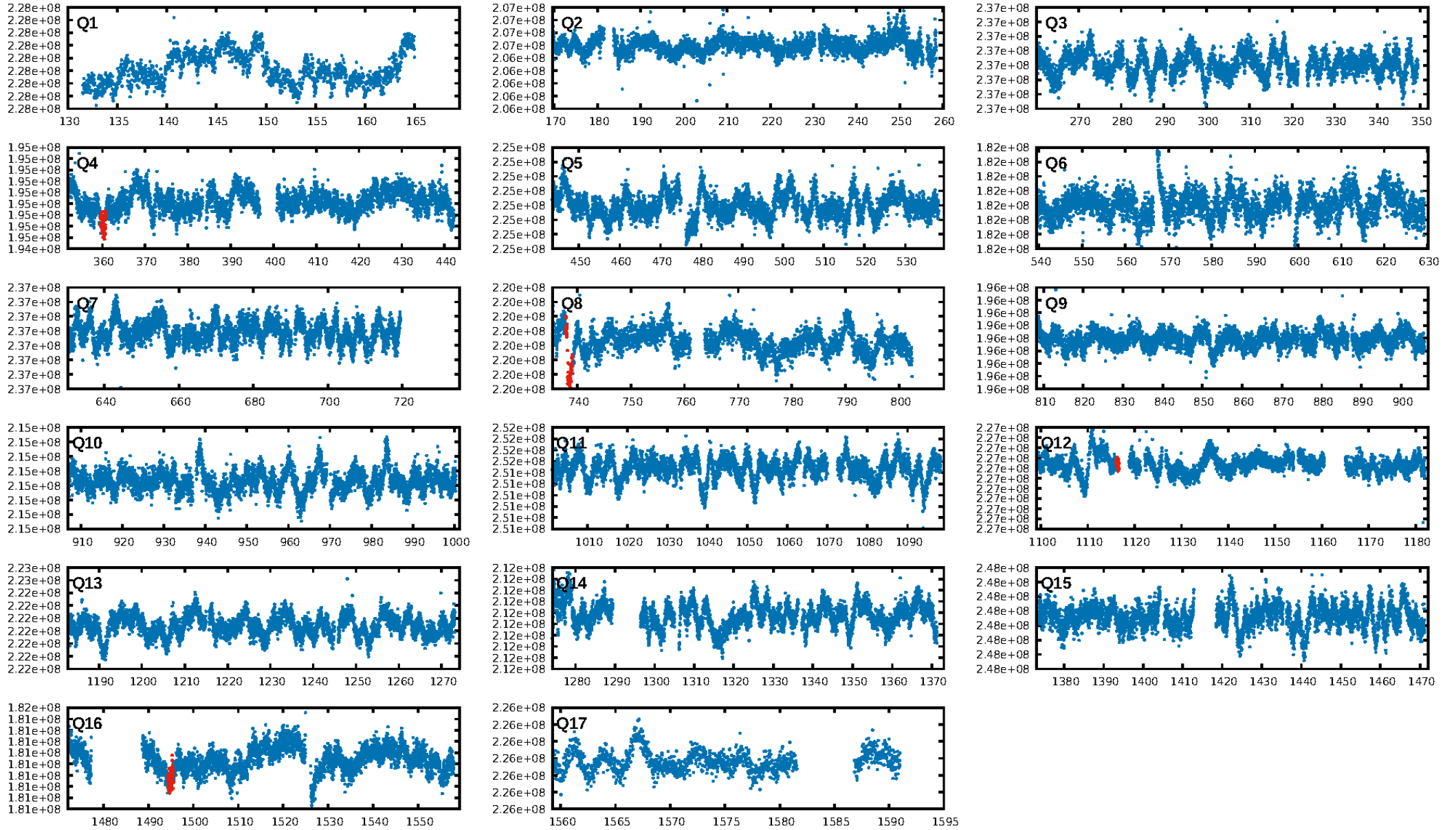
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.7%  
ModelChiSquareGof-sig: 99.9%  
**Bootstrap-pfa: 1.11e-09**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -1.939  
Centroid-sig: 0.4%  
**Centroid-so: 2.309 arcsec [3.39σ]**  
OotOffset-rm: 1.908 arcsec [2.73σ]  
**KicOffset-rm: 3.313 arcsec [17.25σ]**  
OotOffset-st: 0/0/3/0 [3]  
KicOffset-st: 0/0/3/0 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

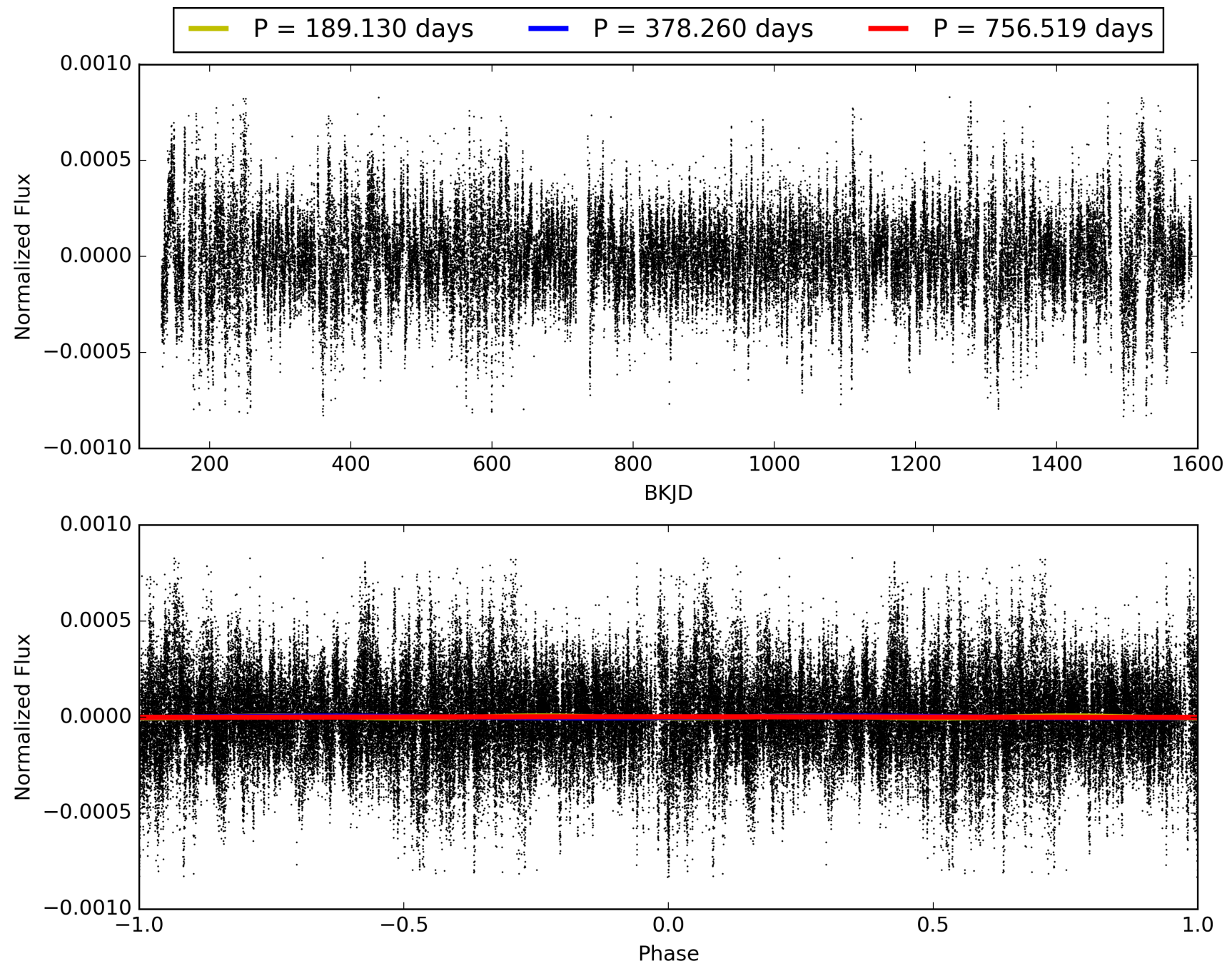
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 13:21:26 Z

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

# TCE 009406941-01, PDC Light Curves

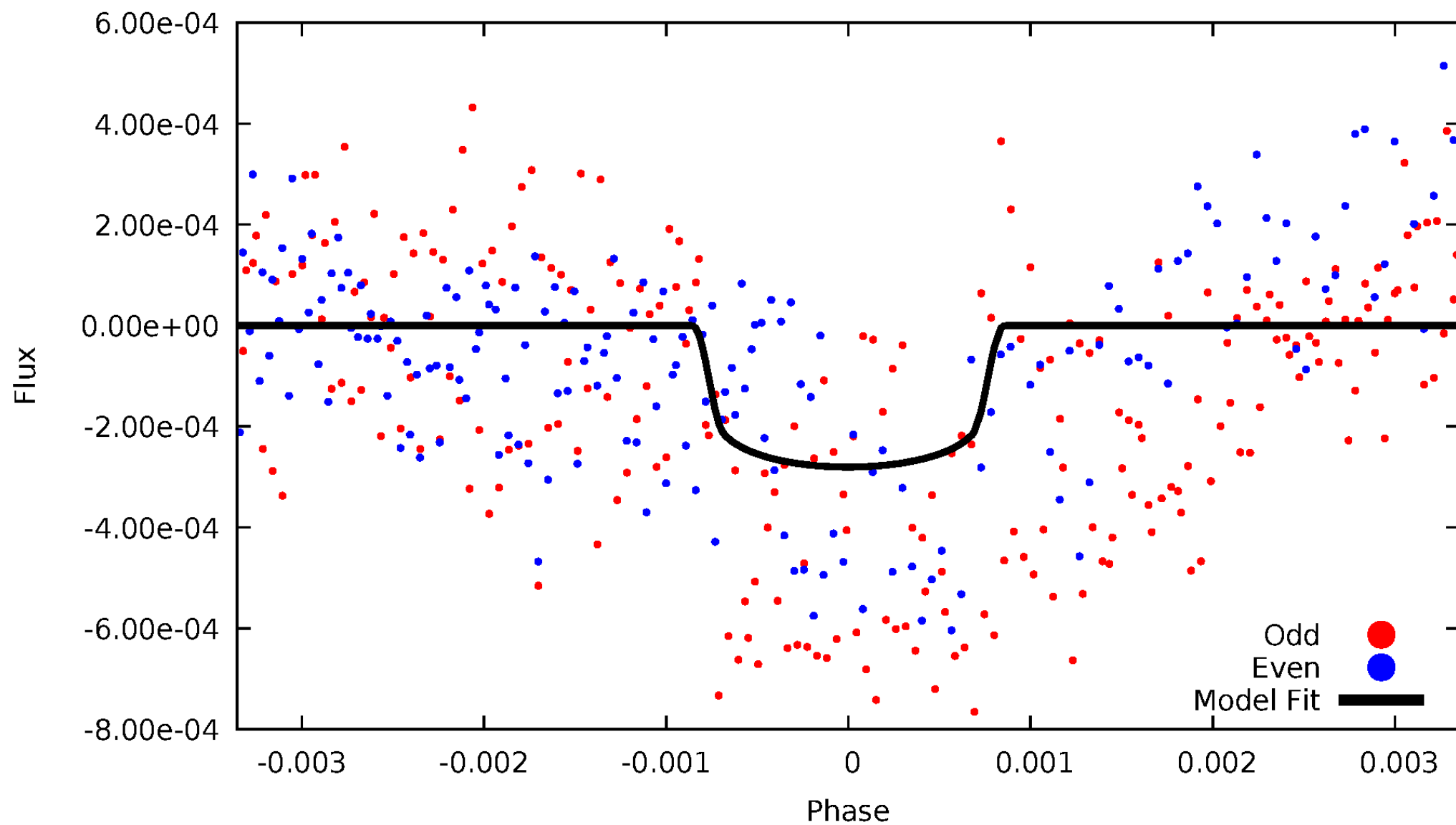


TCE 009406941-01



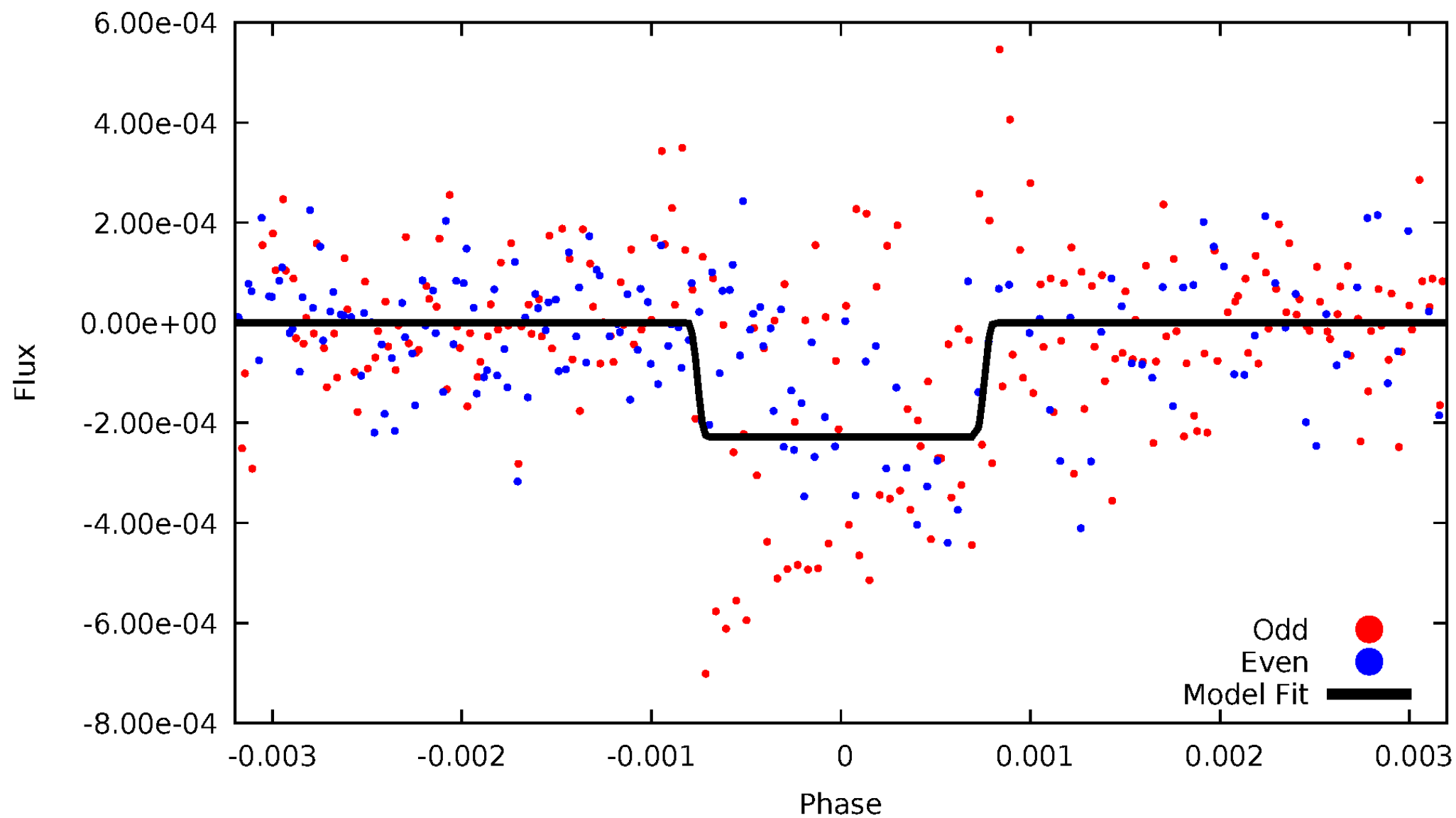
# DV Odd/Even

TCE 009406941-01

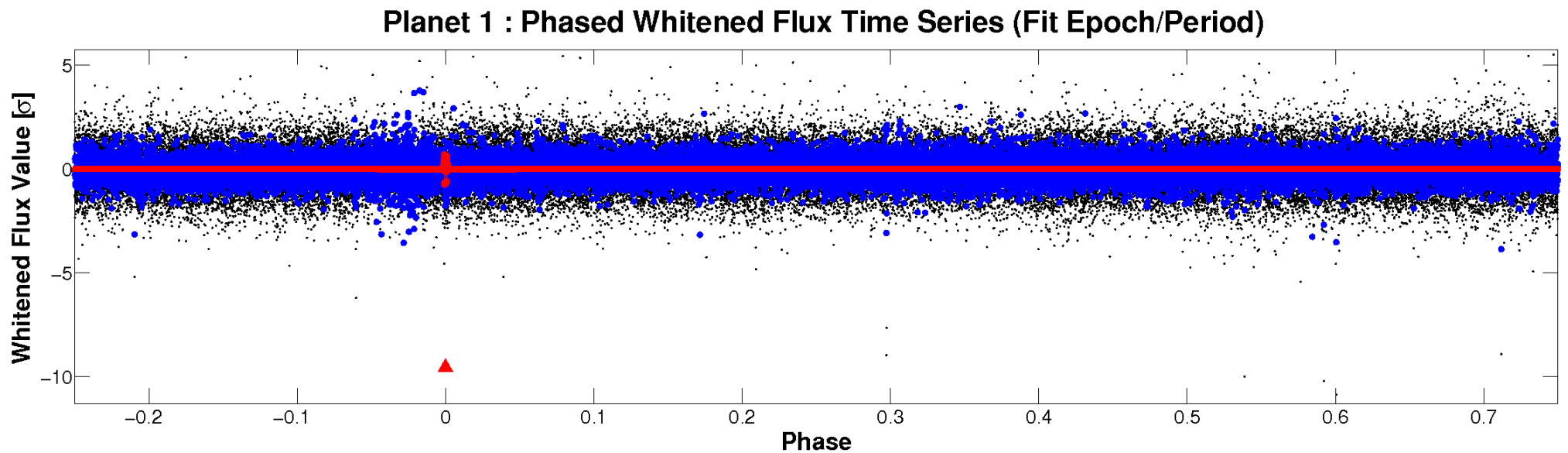
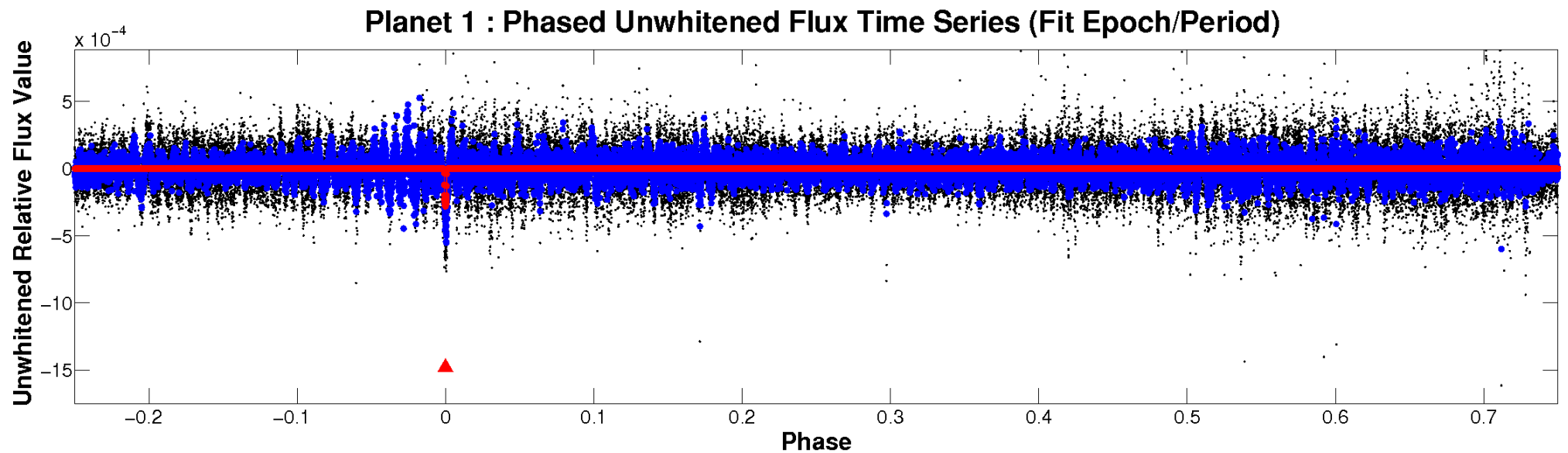


# ALT Odd/Even

TCE 009406941-01



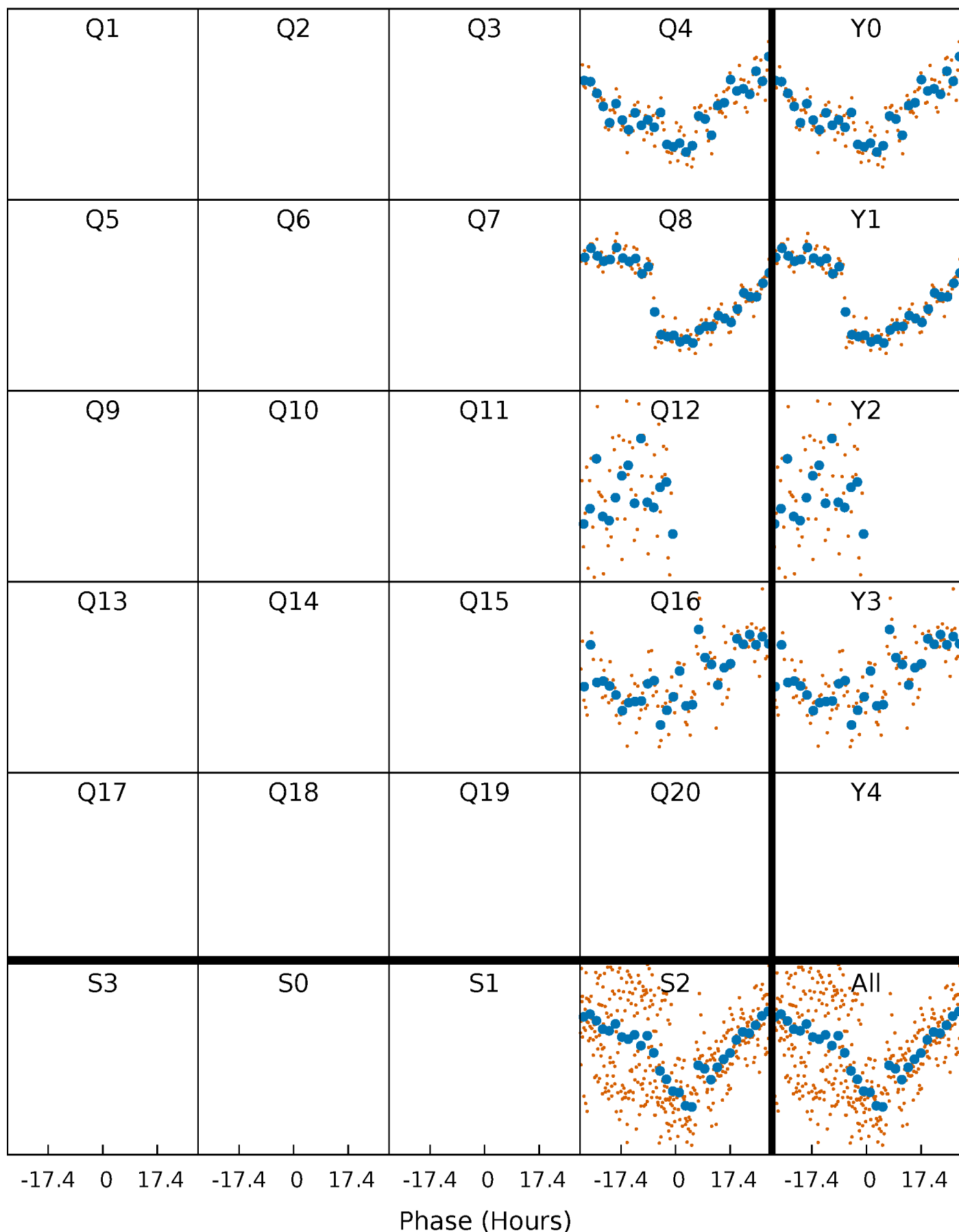
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

TCE 009406941-01 P=378.259634 Days  $T_0=360.213352$  (BKJD)





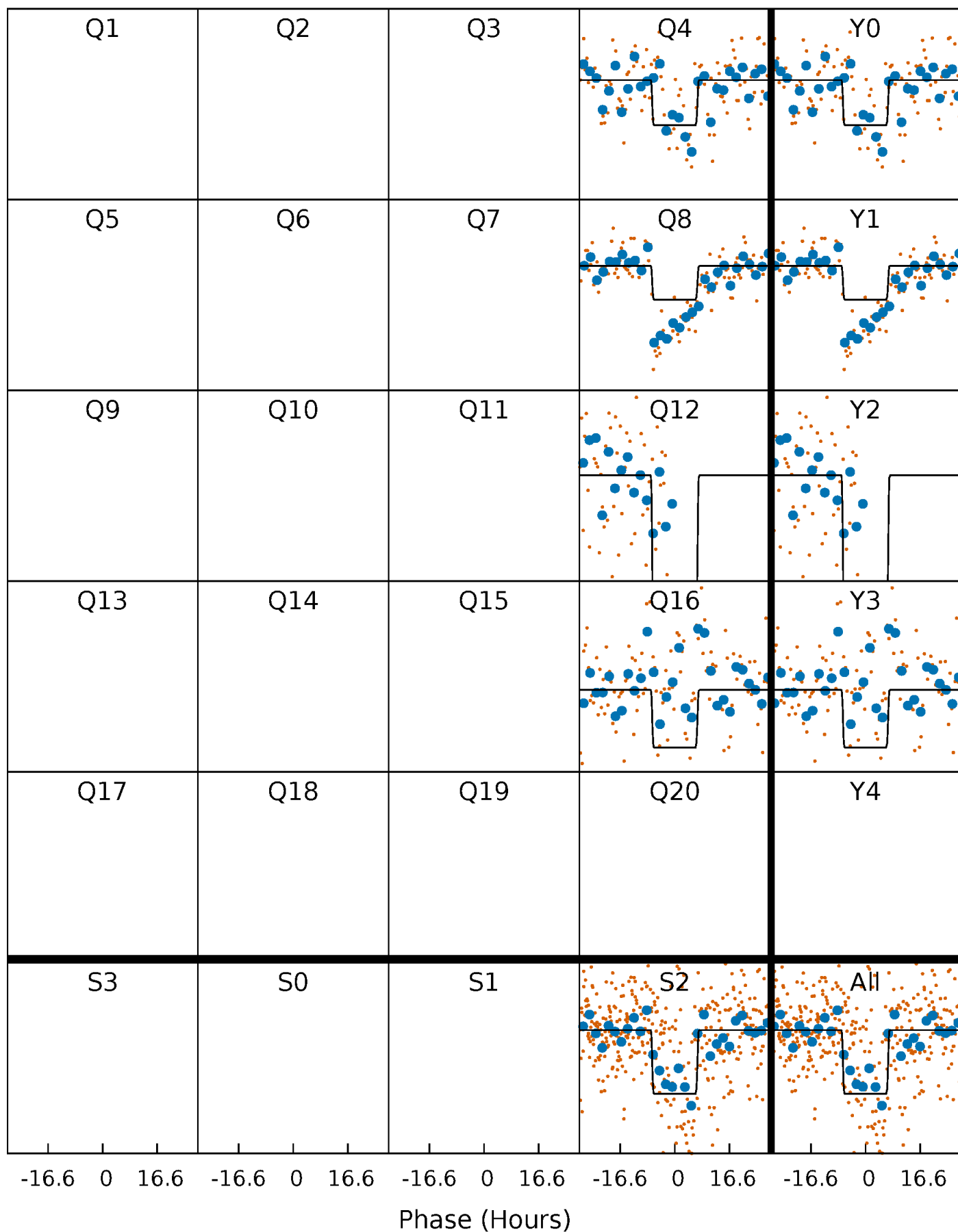
# DV Quarter-Phased Transit Curves

TCE 009406941-01 P=378.259634 Days  $T_0=360.213352$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

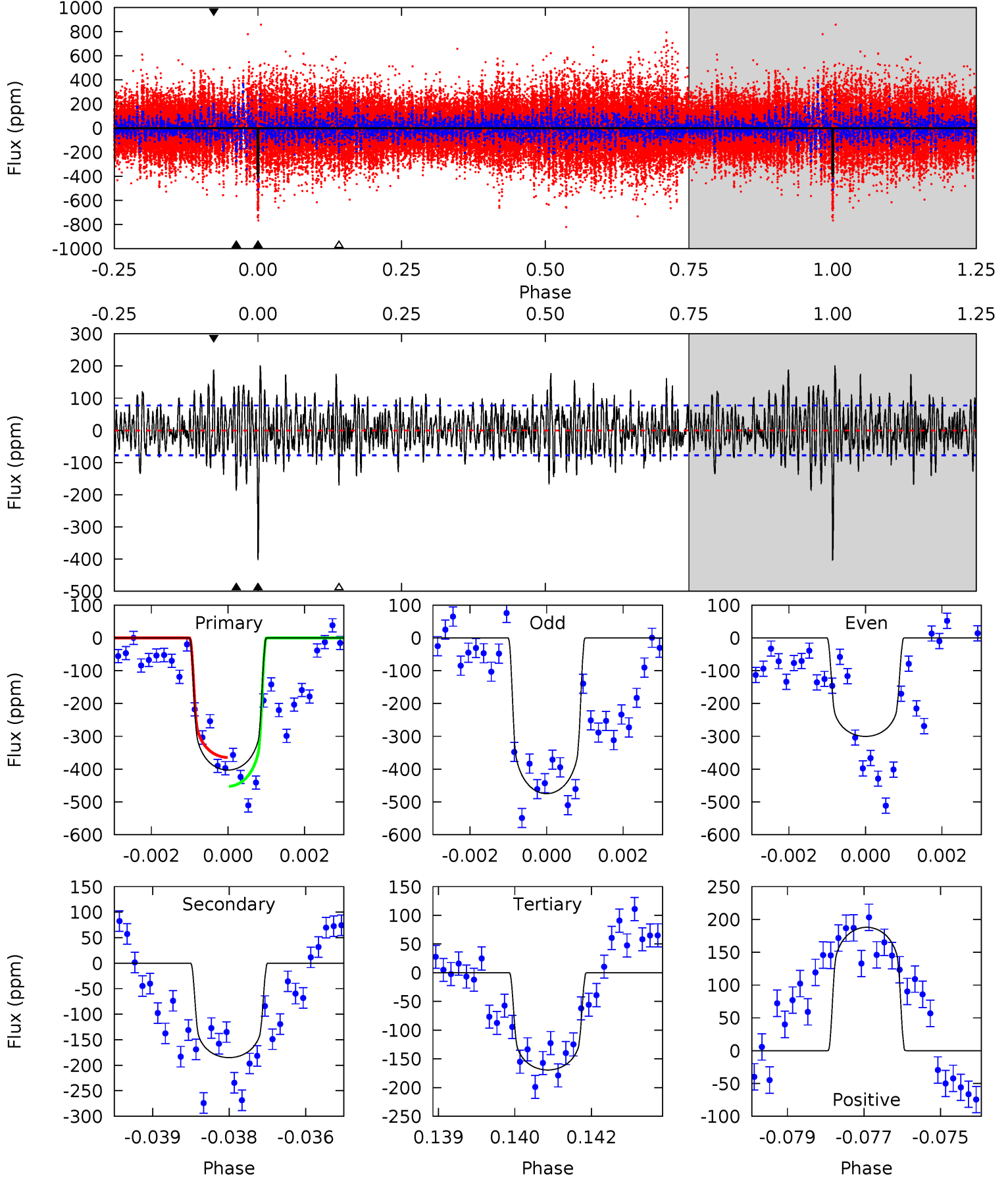
TCE 009406941-01 P=378.259252 Days  $T_0=360.214518$  (BKJD)



# DV Model-Shift Uniqueness Test

009406941-01, P = 378.259634 Days, E = 360.213352 Days

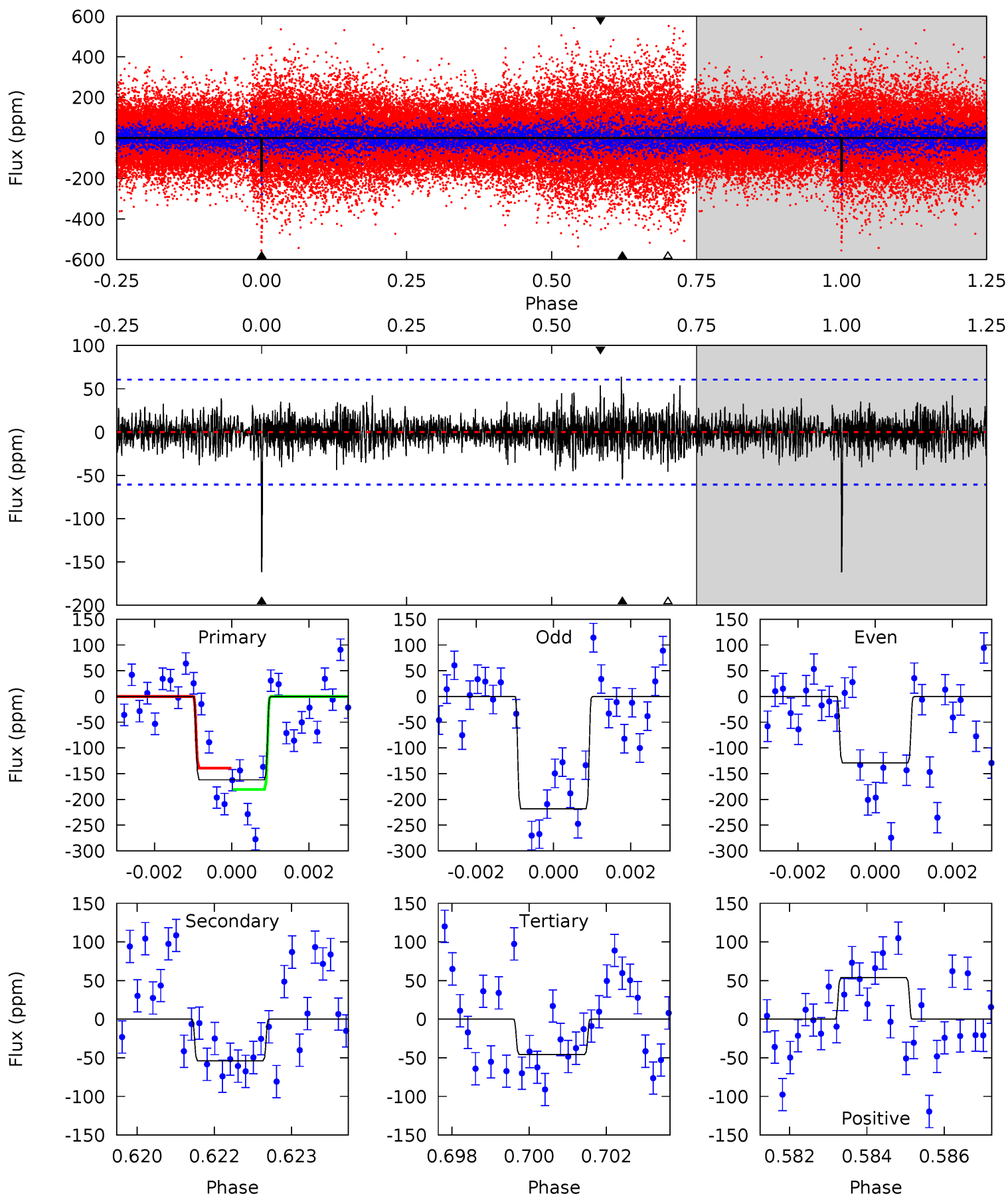
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
27.8	12.8	11.7	13.0	5.36	3.14	3.75	16.1	14.8	1.08	-0.20	5.91	1.02	0.33	3.04



# Alt Model-Shift Uniqueness Test

009406941-01, P = 378.259252 Days, E = 360.214518 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
14.3	4.78	4.05	4.76	5.36	3.15	1.11	10.3	9.57	0.73	0.02	3.97	1.53	0.28	1.84



### Stellar Parameters For KIC 009406941

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6167^{+219}_{-219}$	$4.034^{+0.357}_{-0.153}$	$-0.280^{+0.300}_{-0.300}$	$1.639^{+0.411}_{-0.617}$	$1.060^{+0.175}_{-0.157}$	$0.339^{+0.900}_{-0.143}$
	+4%/-4%	+9%/-4%	+107%/-107%	+25%/-38%	+17%/-15%	+265%/-42%
Source	PHO54	PHO54	PHO54	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 009406941-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-185 \pm 14$	$3.10^{+0.64}_{-0.63}$	$472^{+37}_{-49}$	$5416^{+366}_{-294}$	$11526^{+6648}_{-3455}$
Alt.	$-54 \pm 11$	$2.64^{+0.55}_{-0.59}$	$472^{+38}_{-46}$	$4478^{+320}_{-315}$	$4547^{+3292}_{-1524}$

$T_{\text{max}}$  = 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

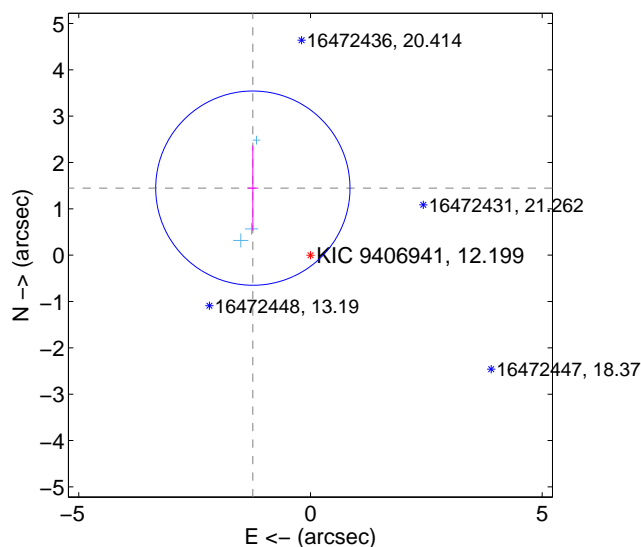
Supplemental centroid analysis for 009406941-01. Kepler magnitude: 12.20. Transit SNR 7.41

There are 3 quarters with good PRF difference image offsets

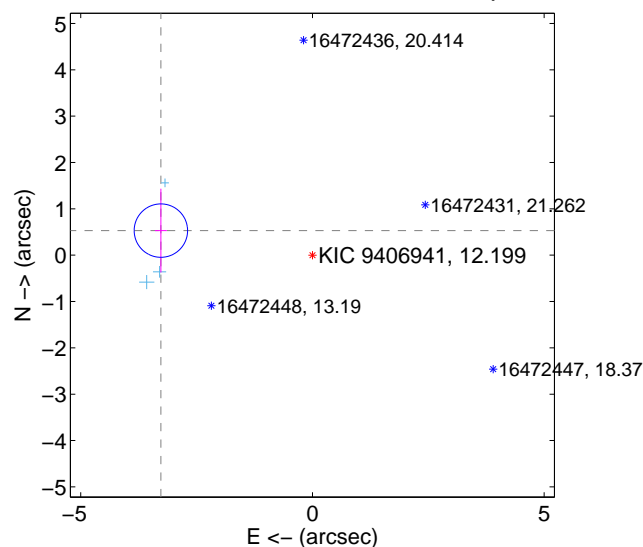
The OOT PRF centroid is offset from the target star catalog position by about 2.23 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.908 \pm 0.699$	2.73	$1.244 \pm 0.115$	$1.447 \pm 0.916$
PRF-fit source offset from KIC position	<b>3.313 <math>\pm</math> 0.192</b>	<b>17.25</b>	$3.271 \pm 0.128$	$0.530 \pm 0.904$
photometric centroid source offset	<b>2.31 <math>\pm</math> 0.68</b>	<b>3.39</b>	$1.65 \pm 0.74$	$-1.62 \pm 0.61$

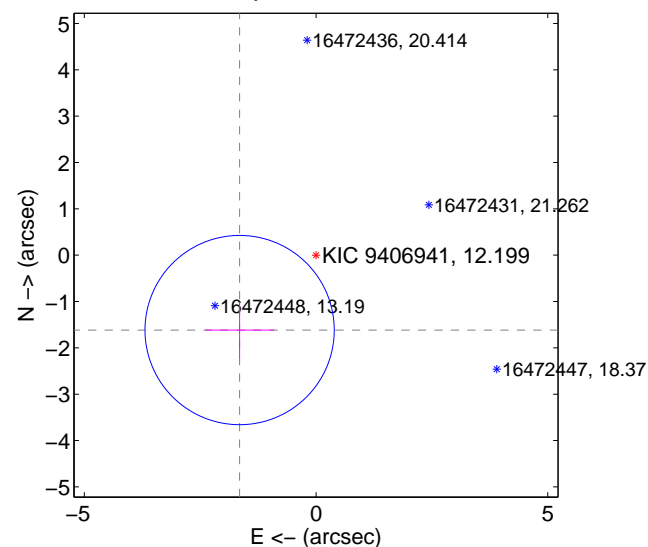
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

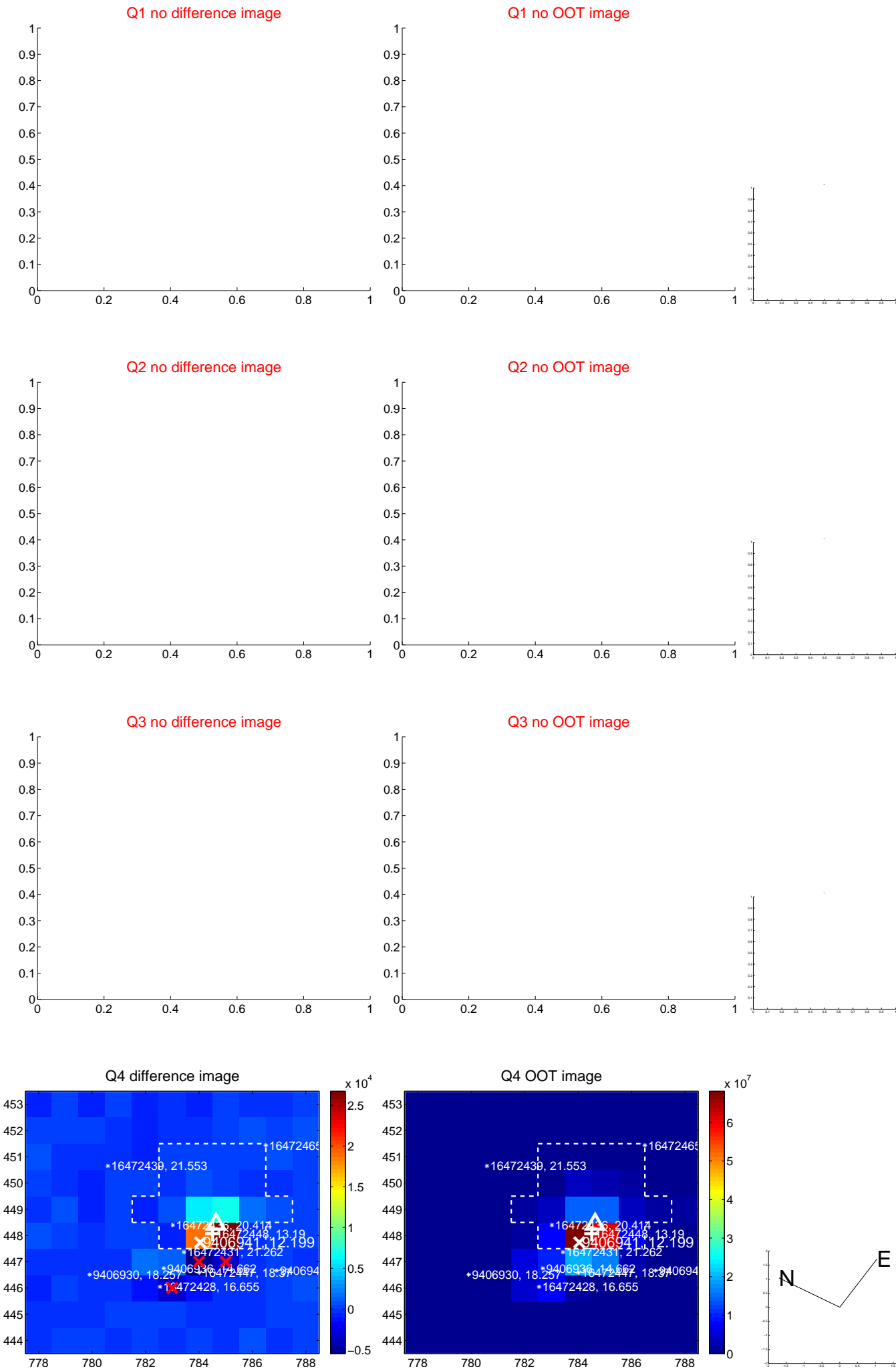


offset from photometric centroids



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 no difference image



Q6 no OOT image



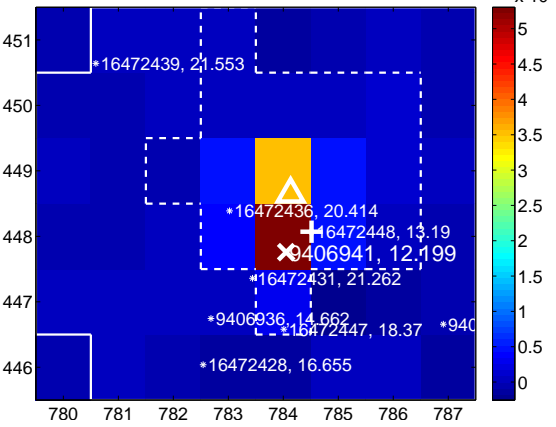
Q7 no difference image



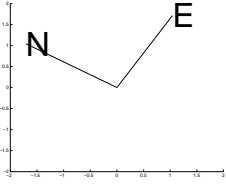
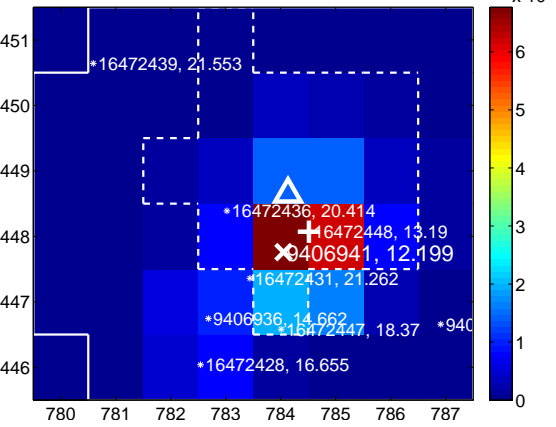
Q7 no OOT image



Q8 difference image



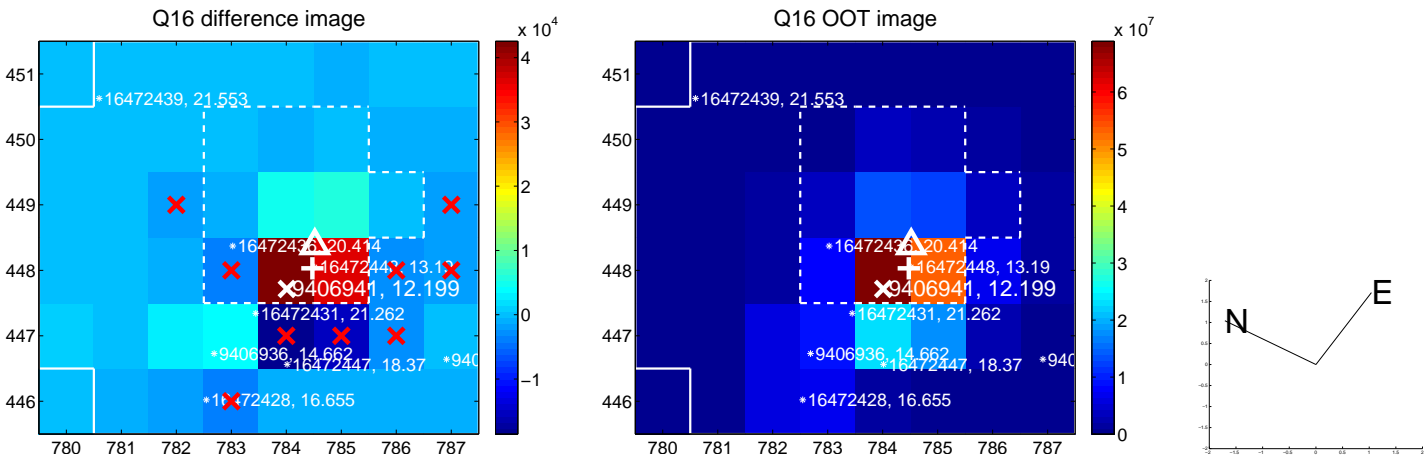
Q8 OOT image



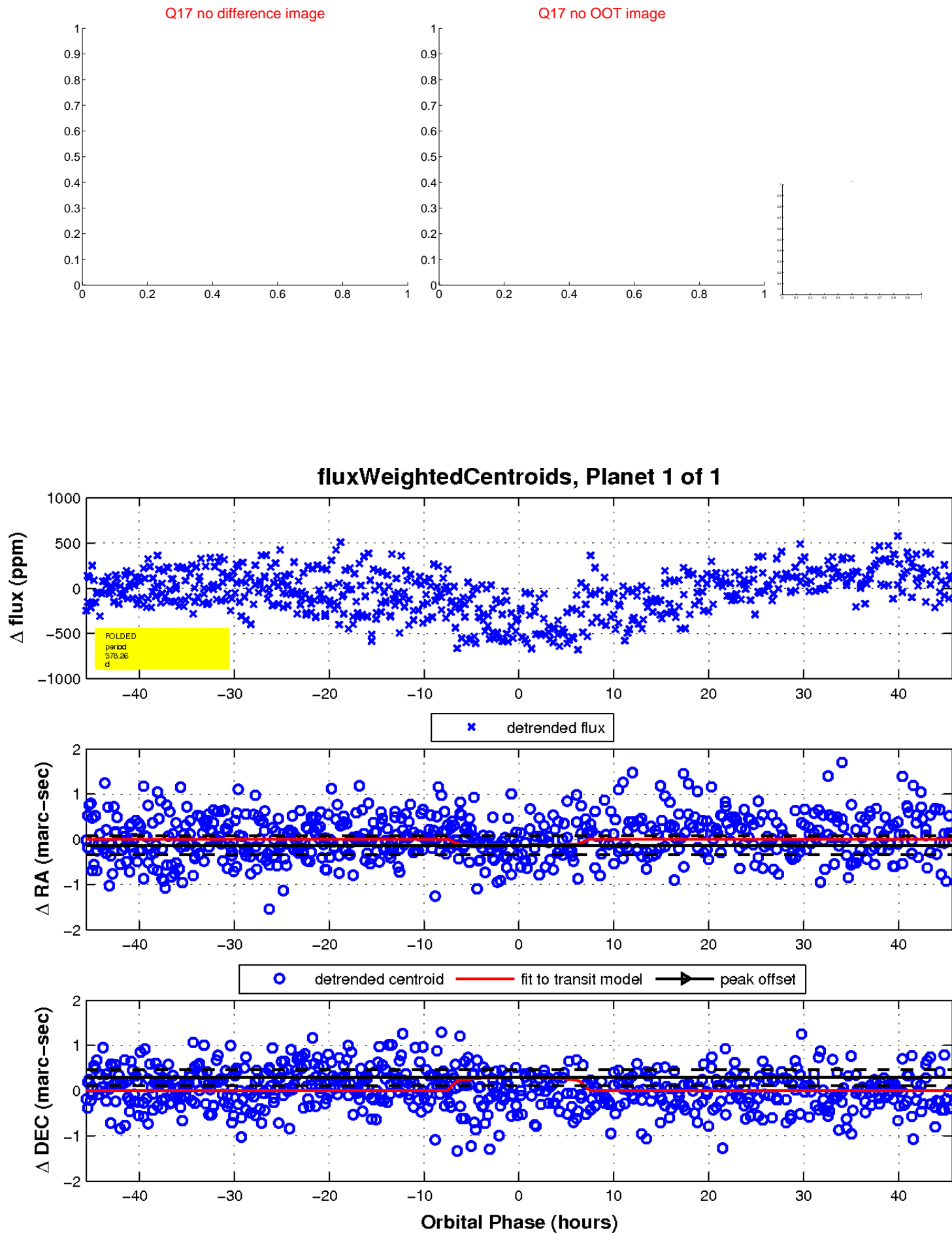
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.



UKIRT Image

