

# KIC 004663623

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004663623-01	OBS	No	358.076606	487.766297	126916.6	73.013	350.6	565.0	9.71	4798	334.89	29.28
004663623-02	OBS	No	358.076843	308.238492	3444.6	62.257	14.2	37.5	9.71	4798	74.69	29.28

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004663623-01	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—CENT_FEW_DIFFS
004663623-02	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—SAME_NTL_PERIOD—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.

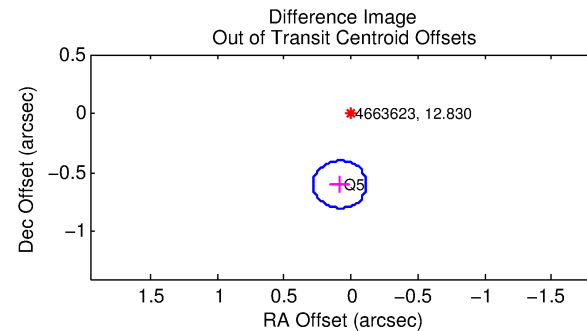
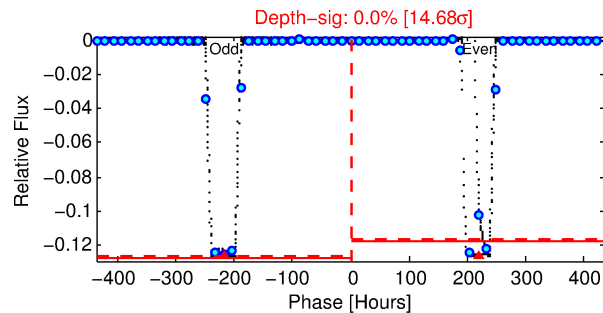
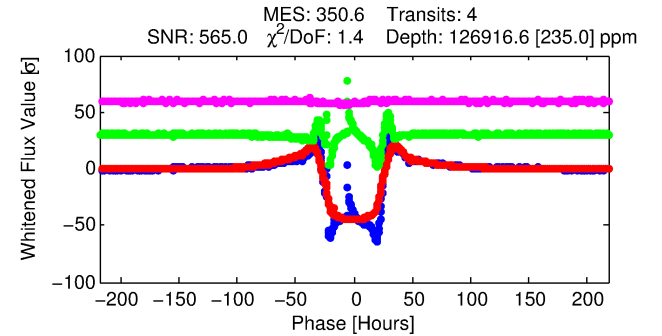
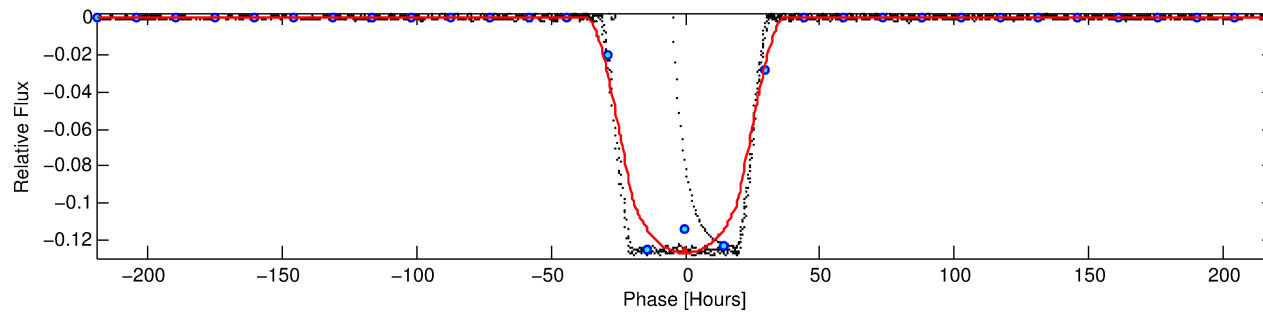
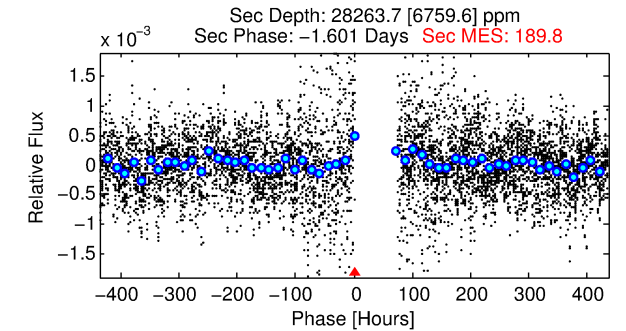
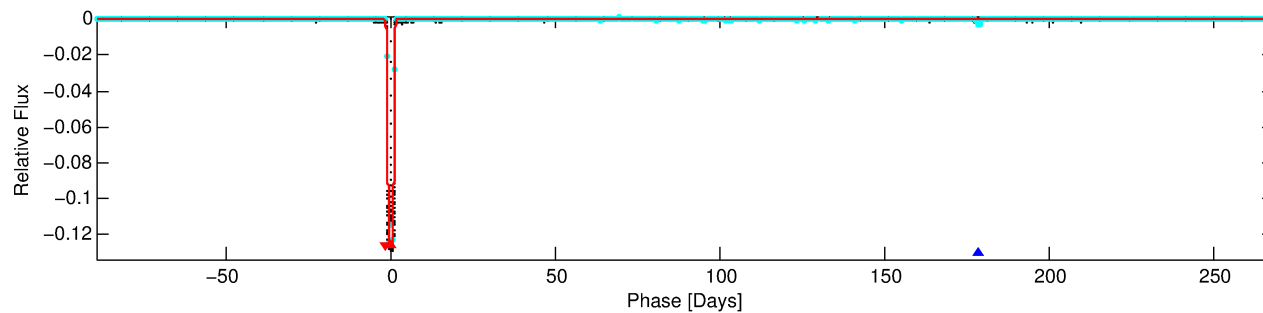
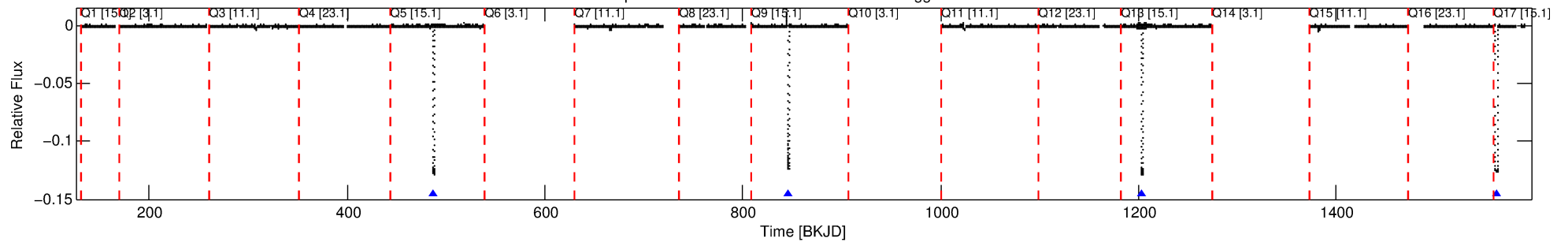
## Ephemeris Match Information For 004663623-01

No Significant Match Found

# DV One-Page Summary

KIC: 4663623 Candidate: 1 of 2 Period: 358.077 d

Kp: 12.83 R\*: 9.71 Rs Teff: 4798.0 K Logg: 2.76 Fe/H: 0.080



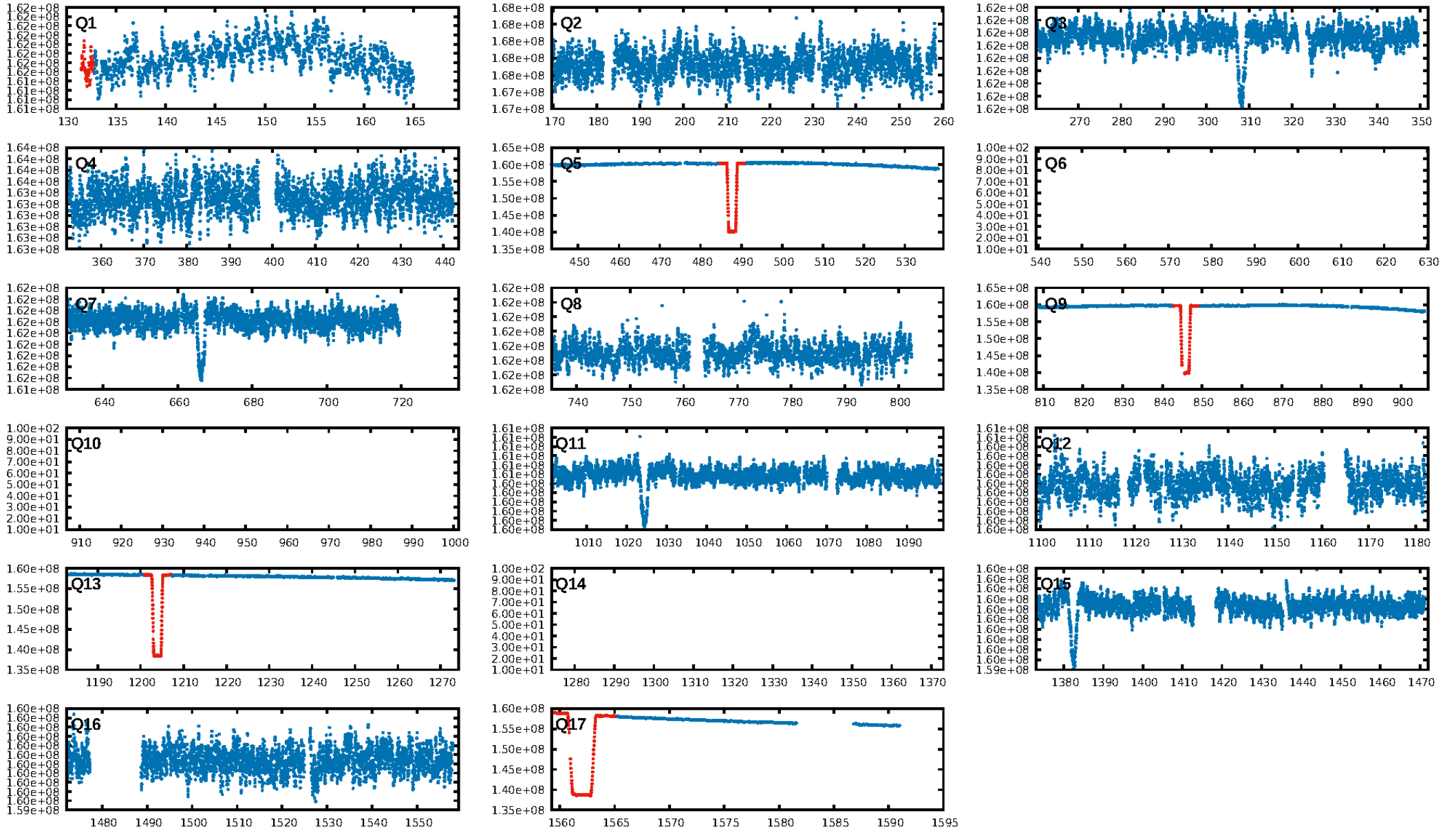
## DV Fit Results:

Period = 358.07661 [0.00100] d  
Epoch = 487.7663 [0.0017] BKJD  
Rp/R\* = 0.3162 [0.0004]  
a/R\* = 49.32 [0.12]  
b = 0.00 [164.55]  
Seff = 29.28 [10.46]  
Teff = 593 [53] K  
Rp = 334.89 [106.99] Re  
a = 1.2361 [0.3138] AU  
Ag = 211.85 [89.61] [2.35σ]  
Teffp = 3499 [220] K [12.86σ]

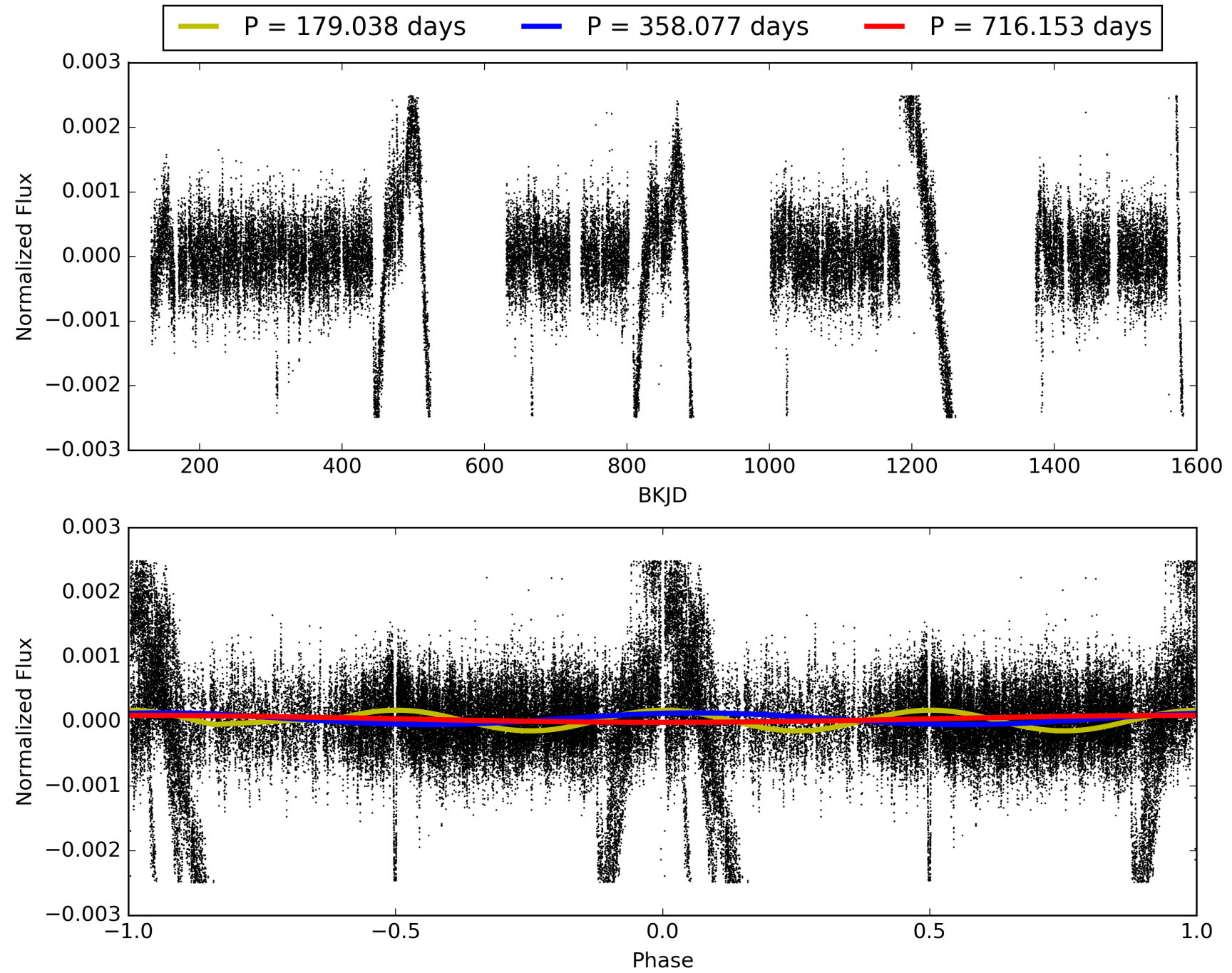
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGoF-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.009  
Centroid-sig: 0.0%  
Centroid-so: 0.452 arcsec [169.56σ]  
OotOffset-rm: 0.606 arcsec [9.09σ]  
KicOffset-rm: 0.036 arcsec [0.54σ]  
OotOffset-st: 0/0/0/1 [1]  
KicOffset-st: 0/0/0/1 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 1.00 [1/1]

# TCE 004663623-01, PDC Light Curves

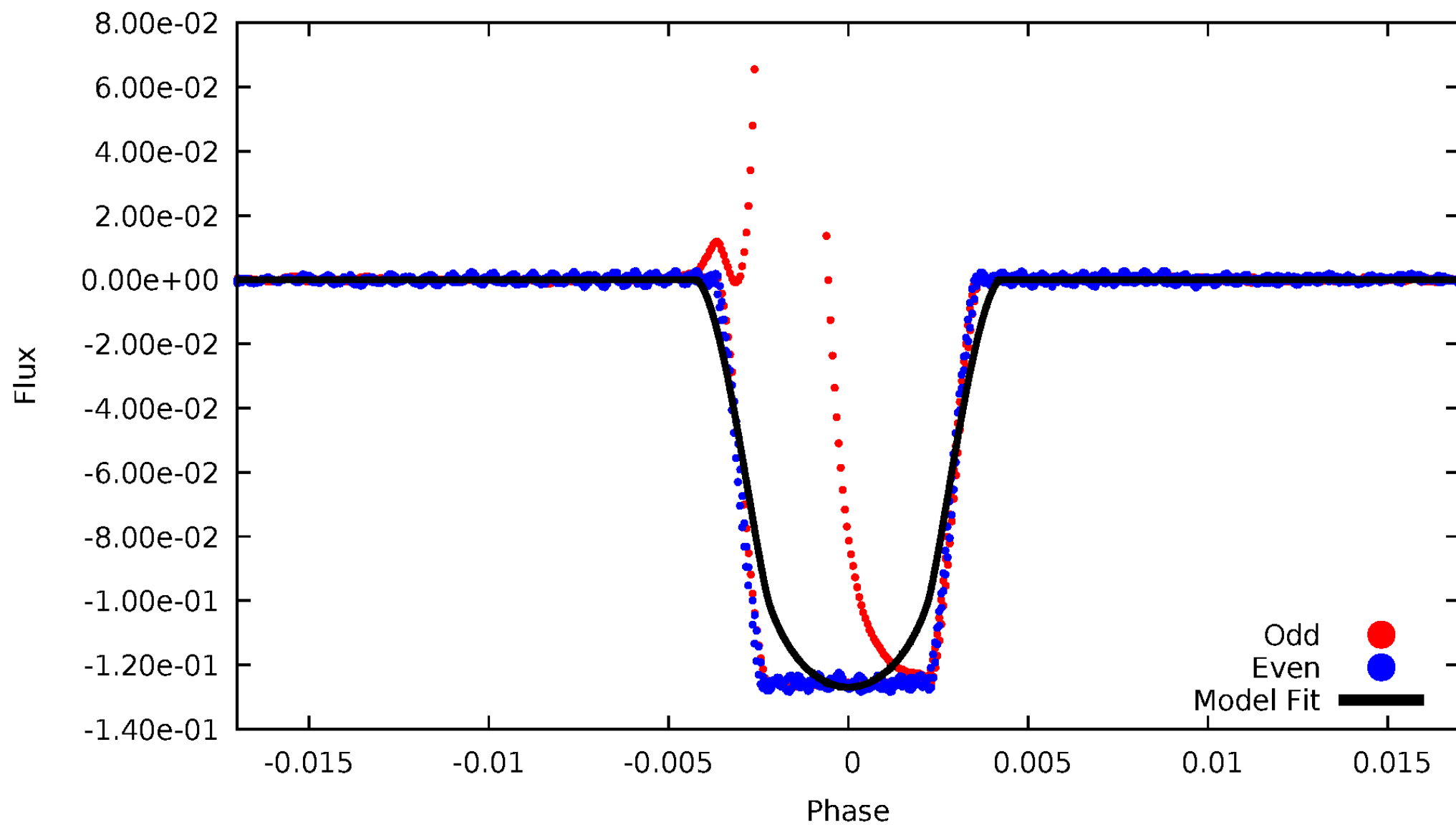


TCE 004663623-01



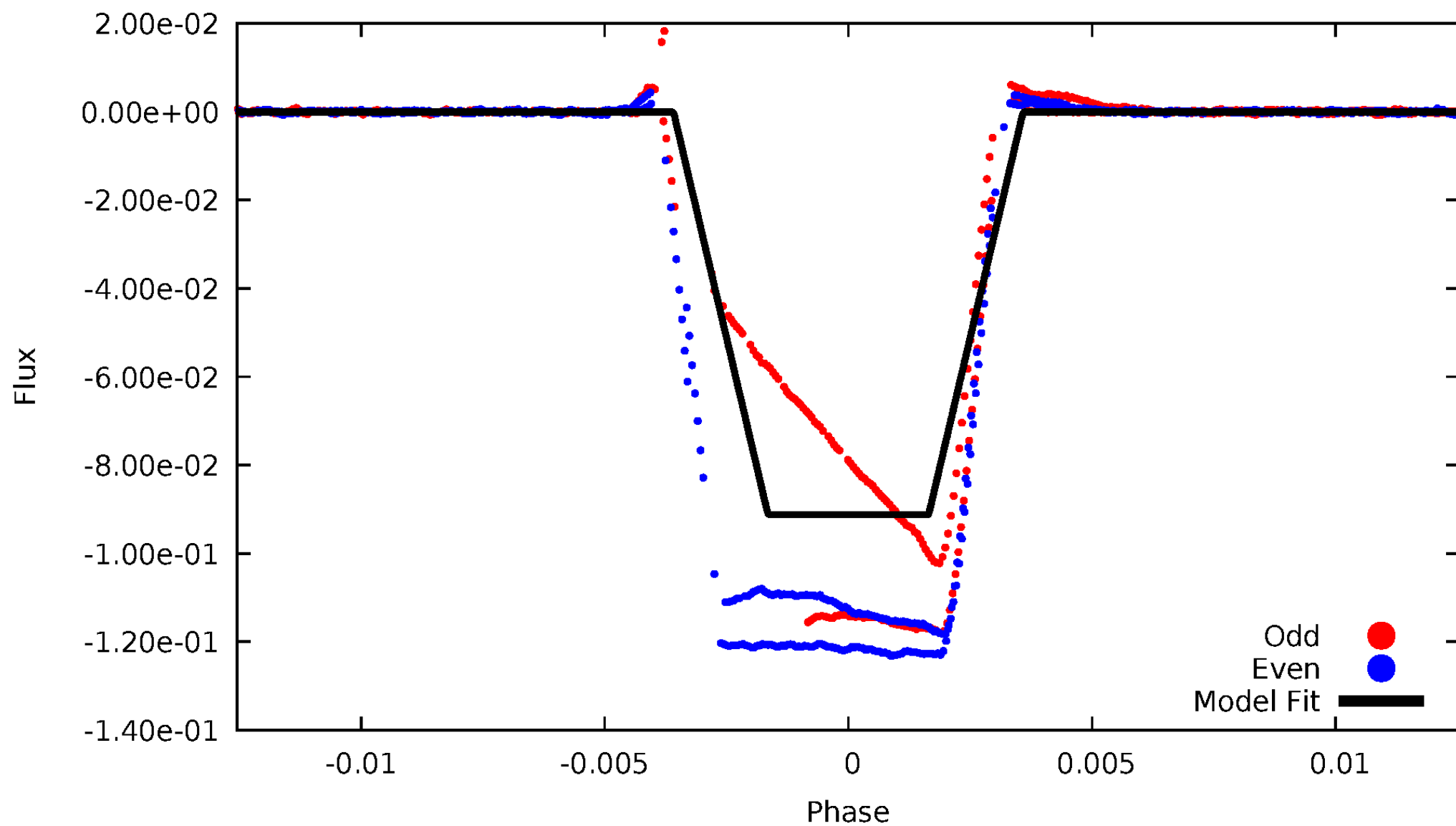
# DV Odd/Even

TCE 004663623-01



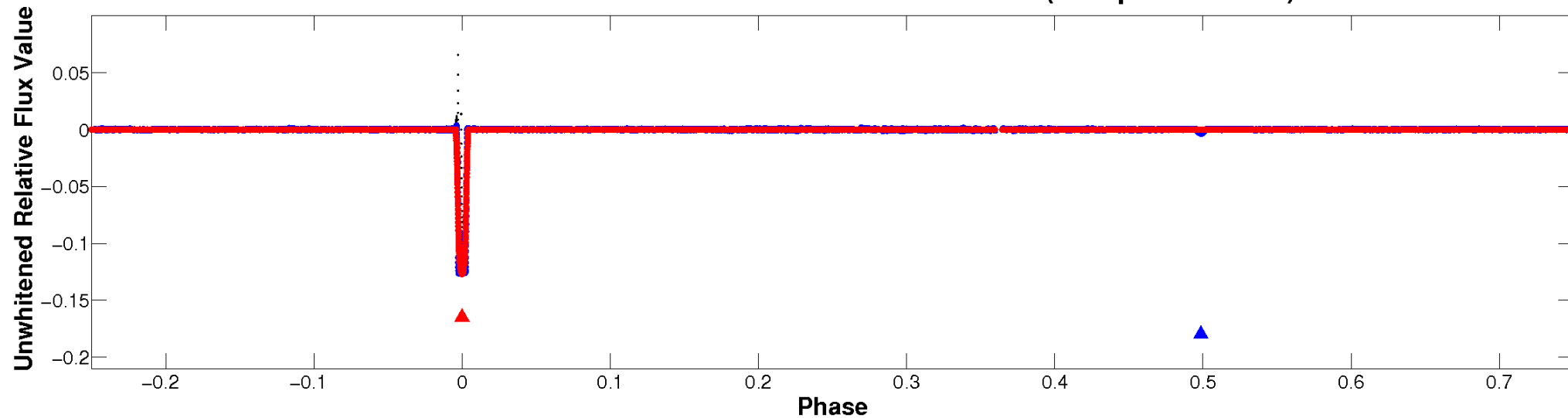
# ALT Odd/Even

TCE 004663623-01

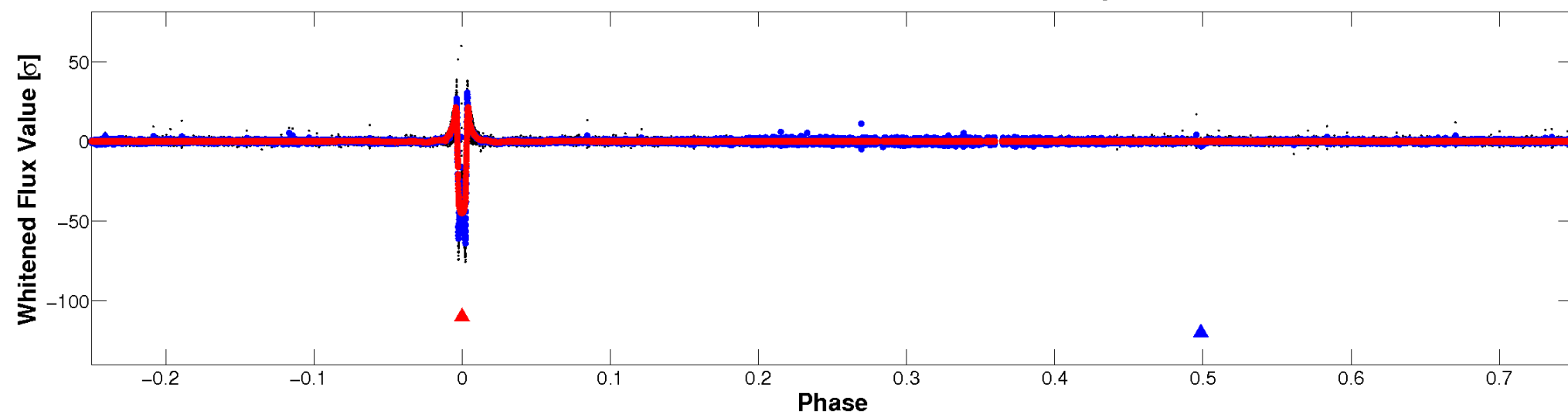


# Non-Whitened Vs. Whitened Light Curve

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

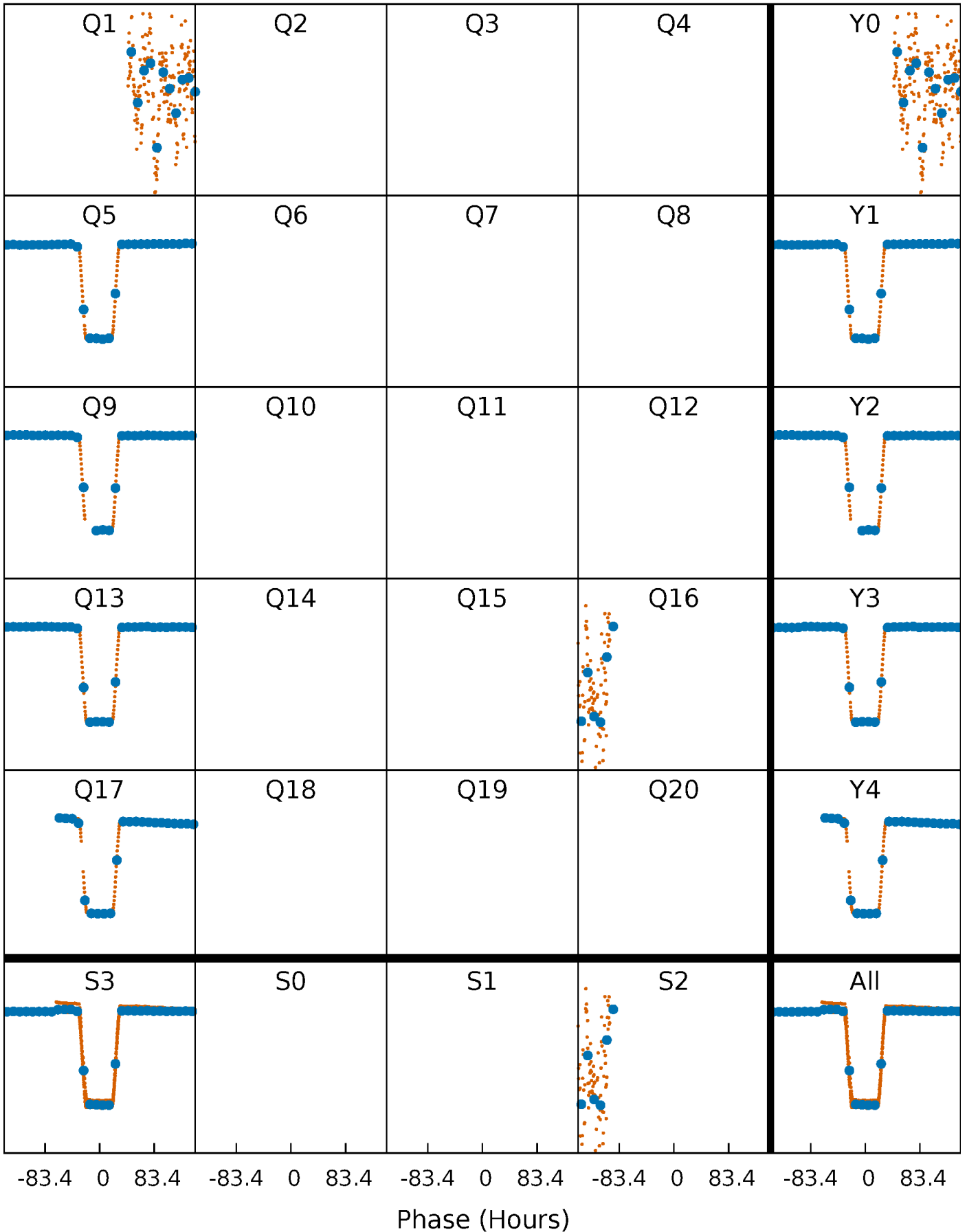


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

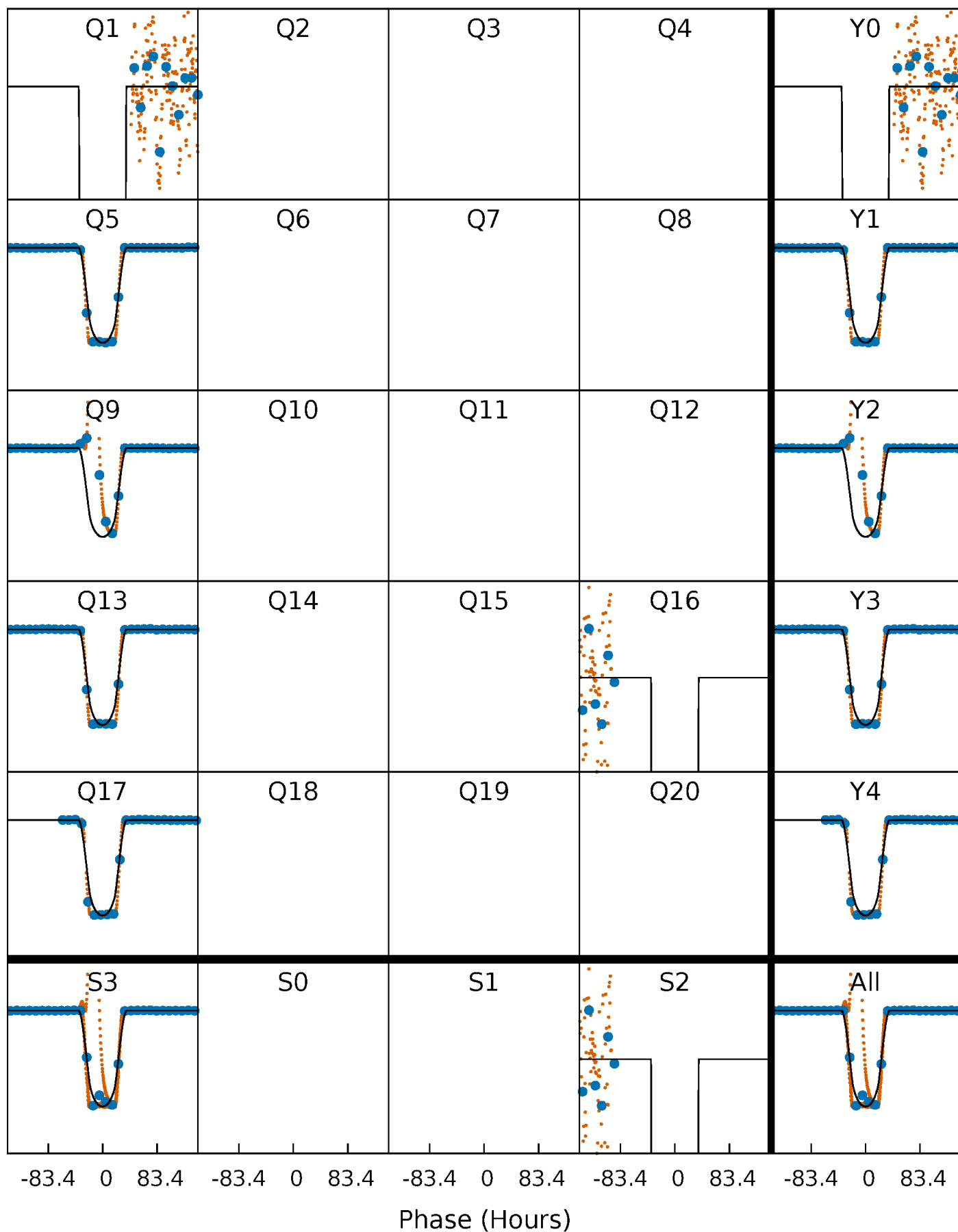
TCE 004663623-01 P=358.076606 Days  $T_0=487.766297$  (BKJD)





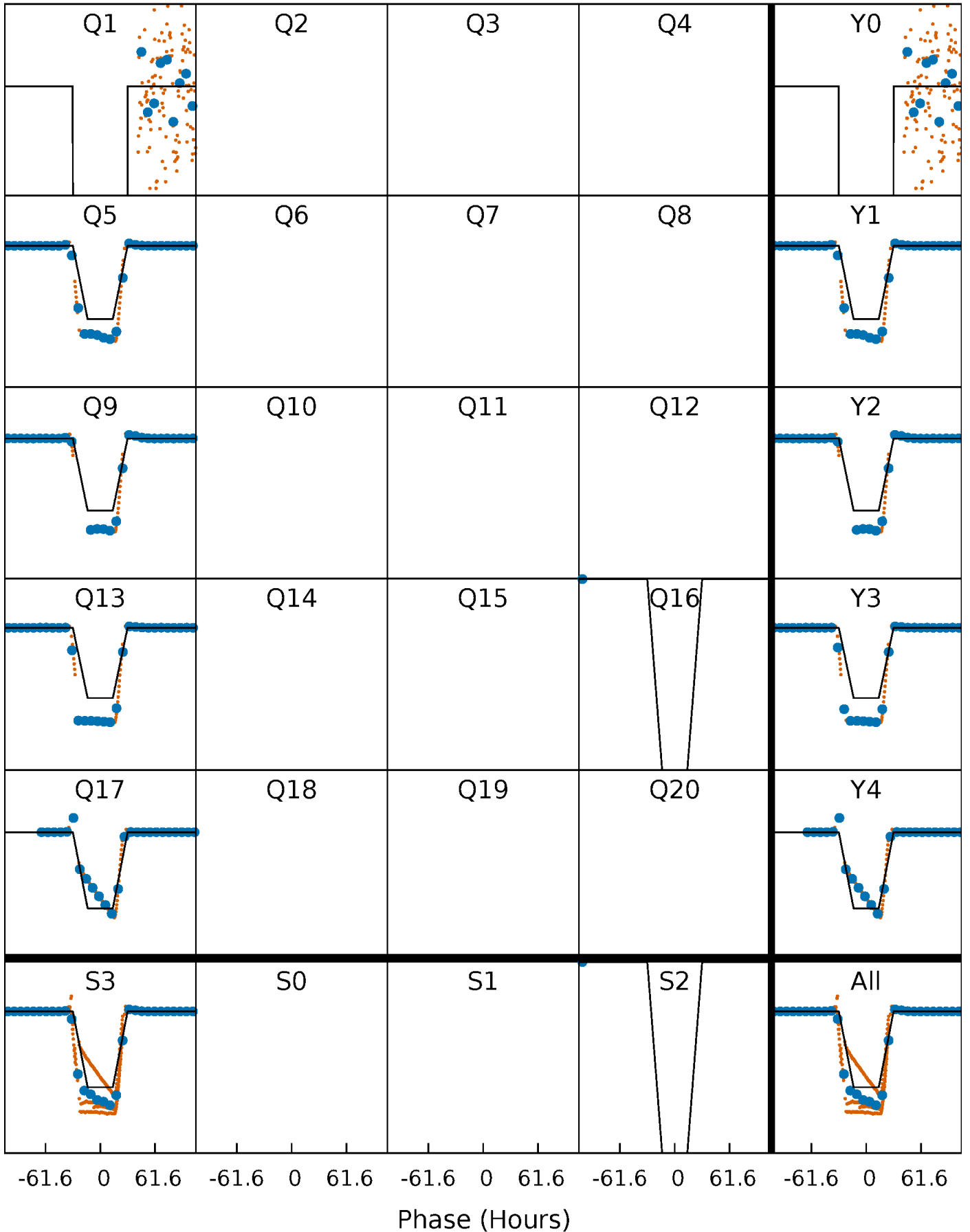
# DV Quarter-Phased Transit Curves

TCE 004663623-01 P=358.076606 Days  $T_0=487.766297$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

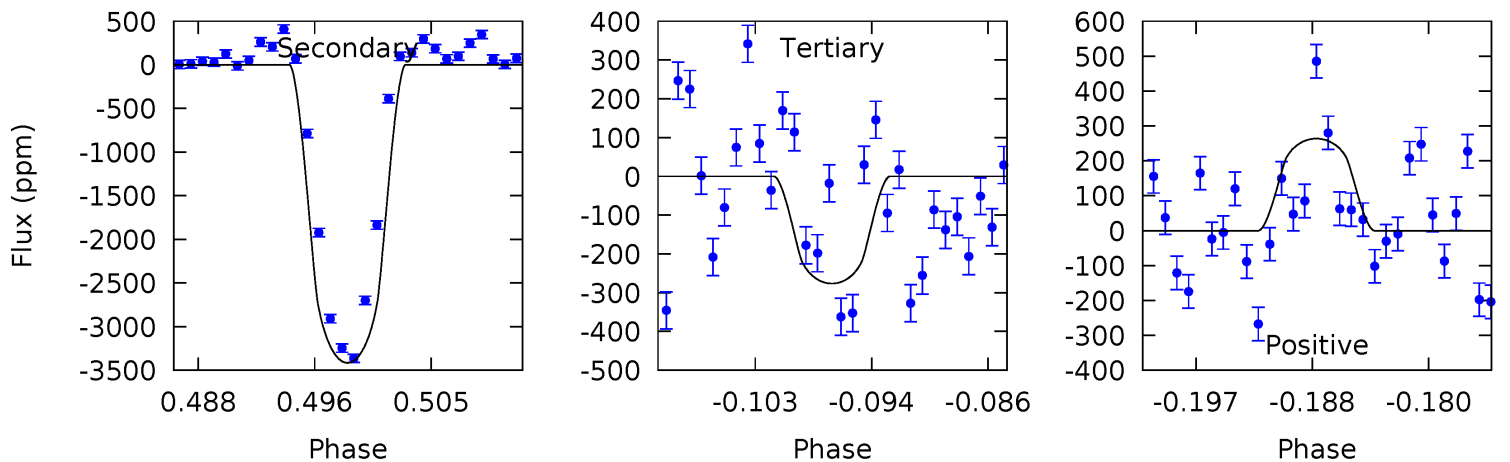
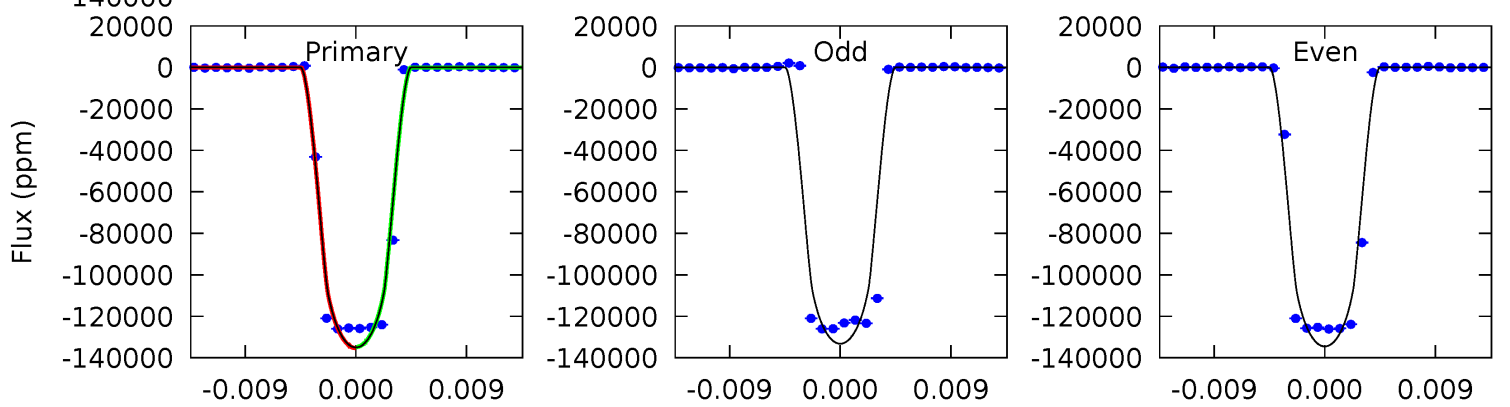
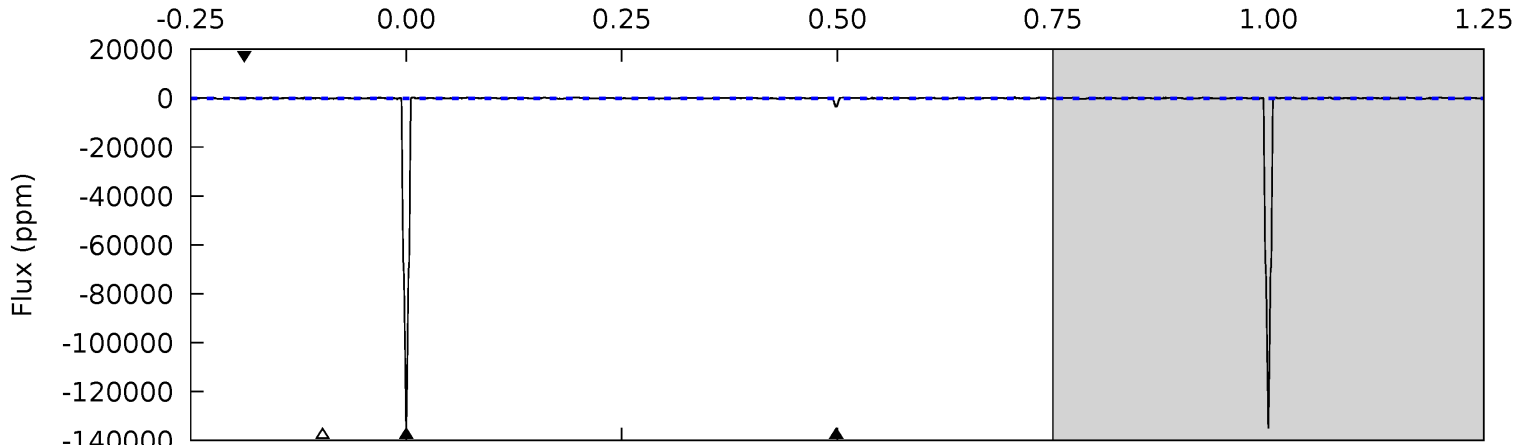
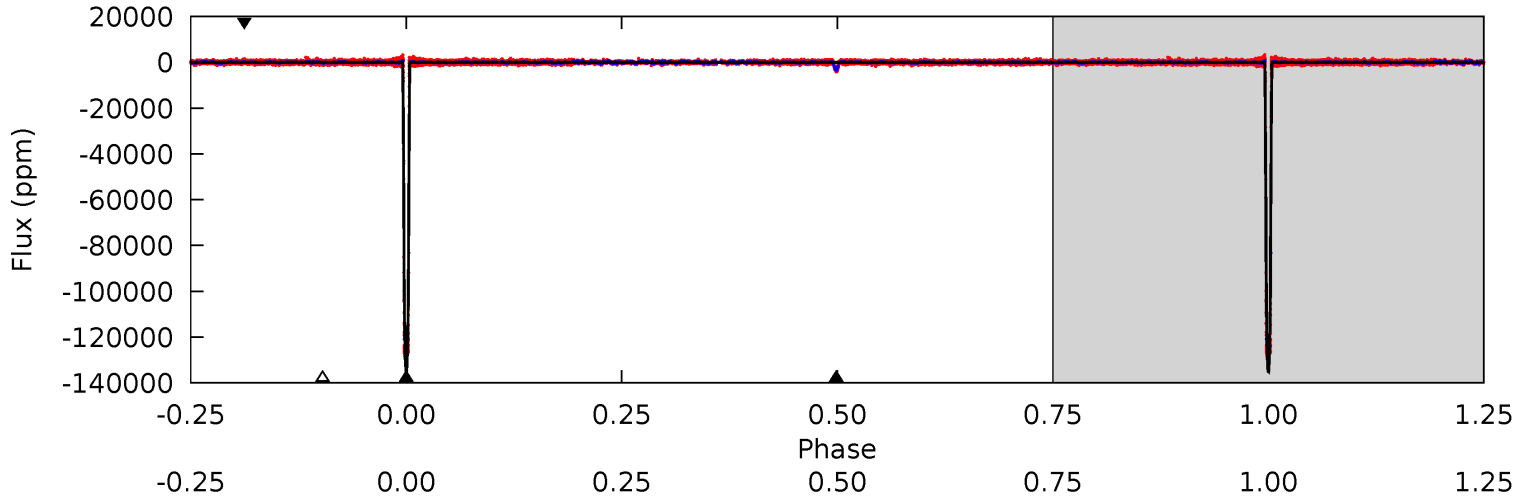
TCE 004663623-01 P=358.104950 Days  $T_0=487.835931$  (BKJD)



# DV Model-Shift Uniqueness Test

004663623-01, P = 358.076606 Days, E = 129.689691 Days

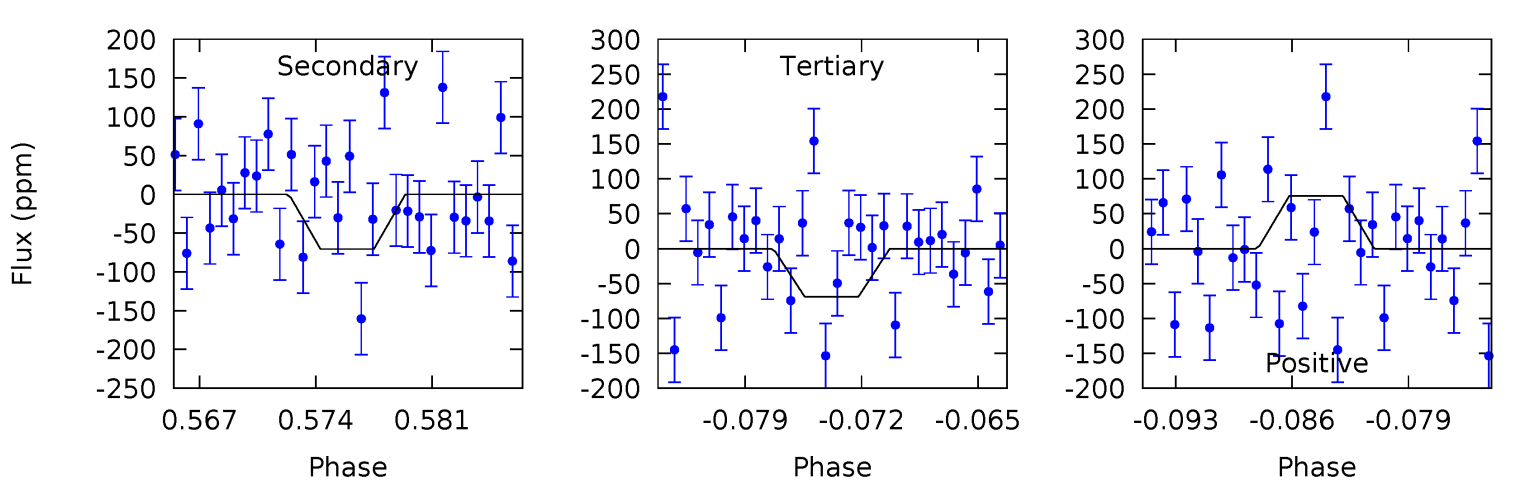
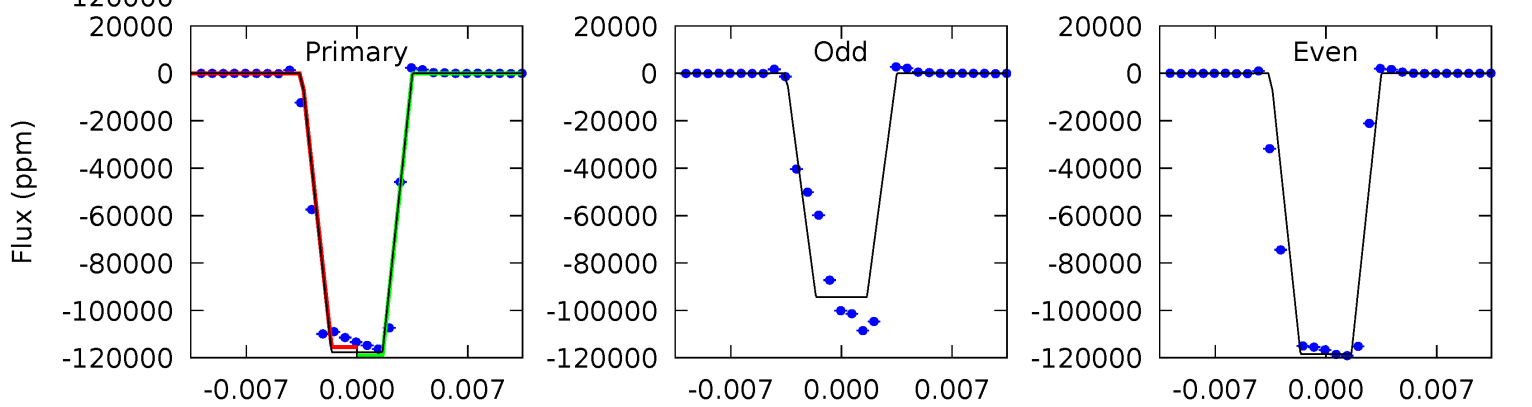
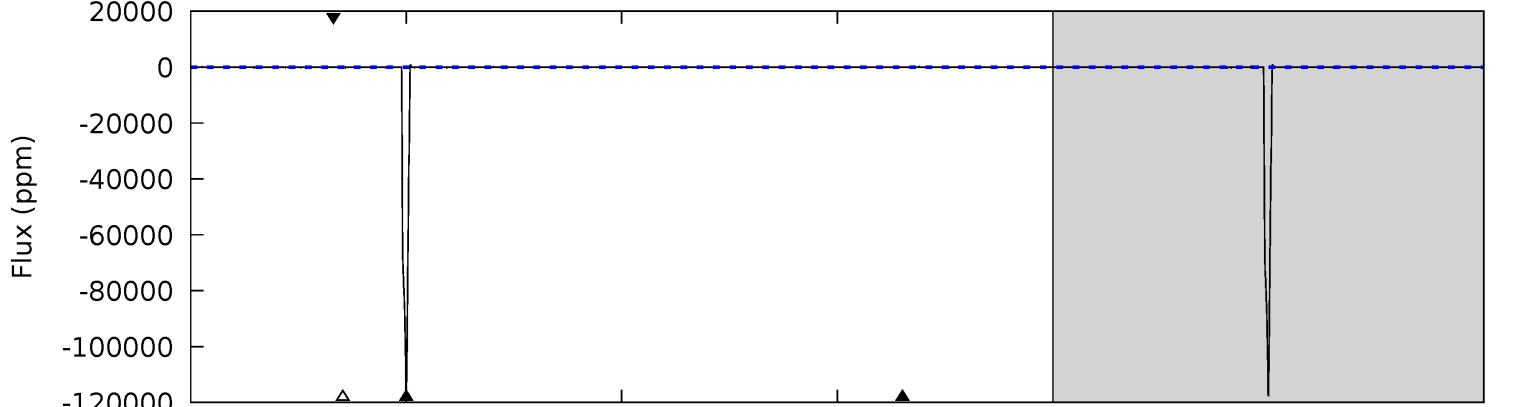
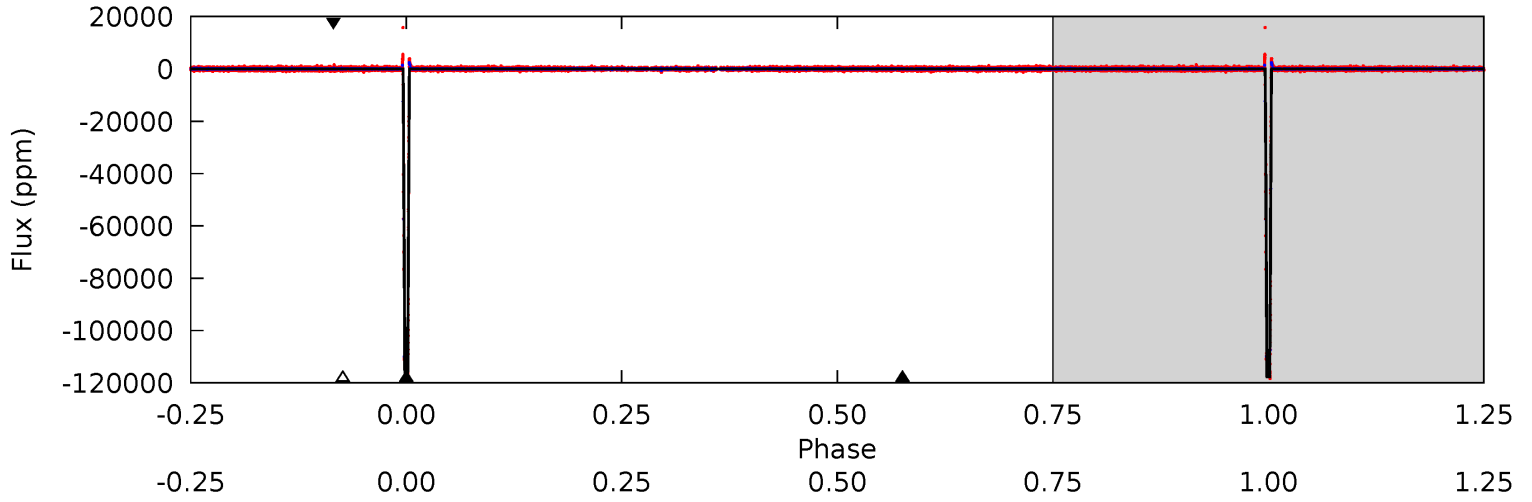
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5792	146.5	11.9	11.3	5.06	2.63	4.39	5781	5781	134.7	135.2	29.2	0.93	0.00	10.5



# Alt Model-Shift Uniqueness Test

004663623-01, P = 358.104950 Days, E = 129.730981 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
5445	3.26	3.20	3.50	5.09	2.69	0.82	5442	5441	0.06	-0.24	663.2	0.94	0.01	0



### Stellar Parameters For KIC 004663623

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4798^{+57}_{-92}$	$2.757^{+0.180}_{-0.120}$	$0.080^{+0.150}_{-0.200}$	$9.707^{+2.068}_{-3.101}$	$1.964^{+0.846}_{-0.769}$	$0.003^{+0.004}_{-0.001}$
	+1%/-2%	+7%/-4%	+188%/-250%	+21%/-32%	+43%/-39%	+123%/-35%
Source	SPE74	SPE74	SPE74	DSEP		

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

### Secondary Eclipse Parameters for KIC 004663623-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-3415 \pm 23$	$343.27^{+49.48}_{-62.69}$	$823^{+45}_{-51}$	$2766^{+22}_{-35}$	$26^{+7}_{-5}$
Alt.	$-70 \pm 22$	$329.53^{+50.17}_{-60.86}$	$823^{+49}_{-51}$	$1693^{+90}_{-157}$	$0.585^{+0.256}_{-0.209}$

$T_{\text{max}}$  = 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

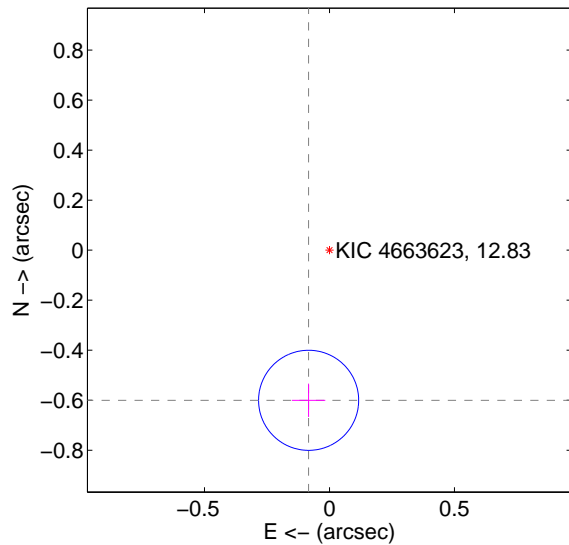
Supplemental centroid analysis for 004663623-01. Kepler magnitude: 12.83. Transit SNR 564.96

There are 1 quarters with good PRF difference image offsets

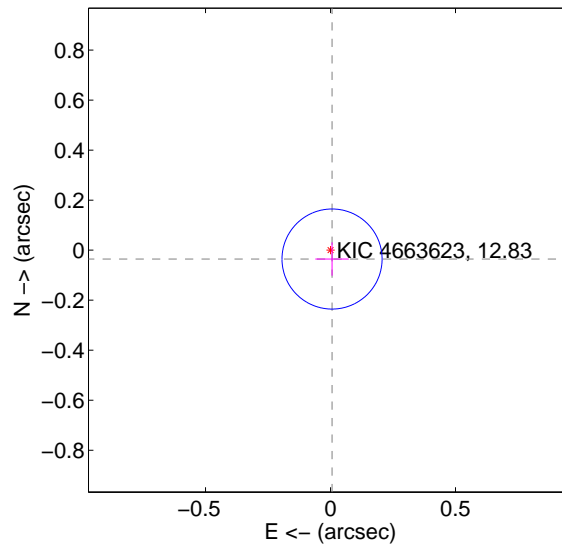
The direct PRF centroid is offset from the target star catalog position by about 0.57 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.606 \pm 0.067$	9.09	$0.083 \pm 0.067$	$-0.600 \pm 0.067$
PRF-fit source offset from KIC position	$0.036 \pm 0.067$	0.54	$-0.006 \pm 0.067$	$-0.035 \pm 0.067$
photometric centroid source offset	$0.45 \pm 0.00$	169.56	$0.15 \pm 0.00$	$0.43 \pm 0.00$

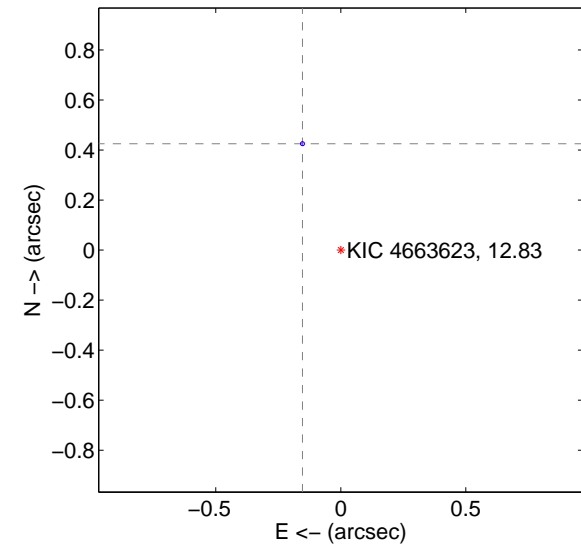
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids

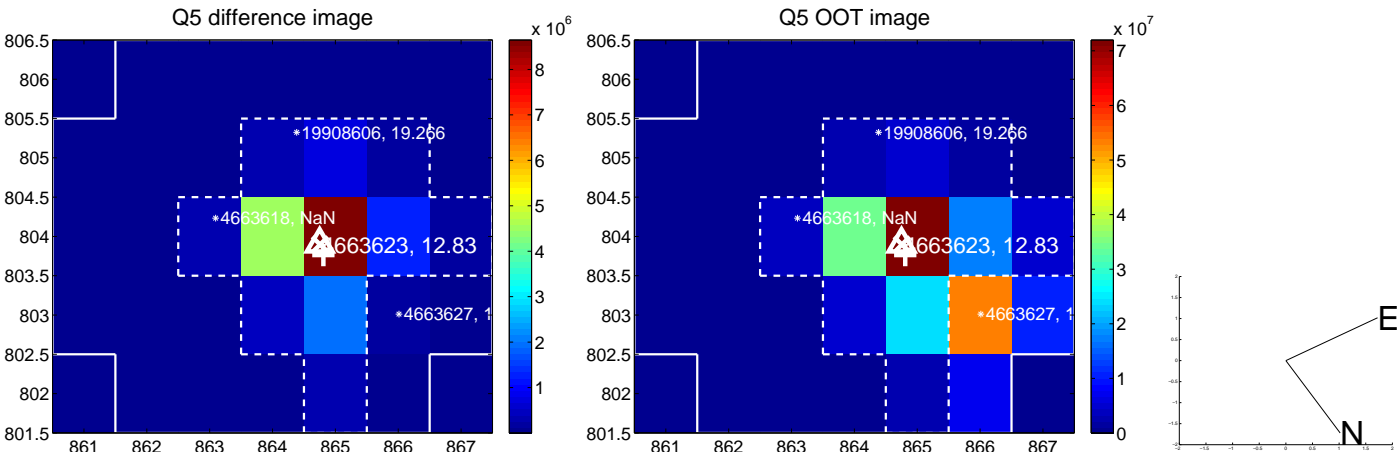


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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





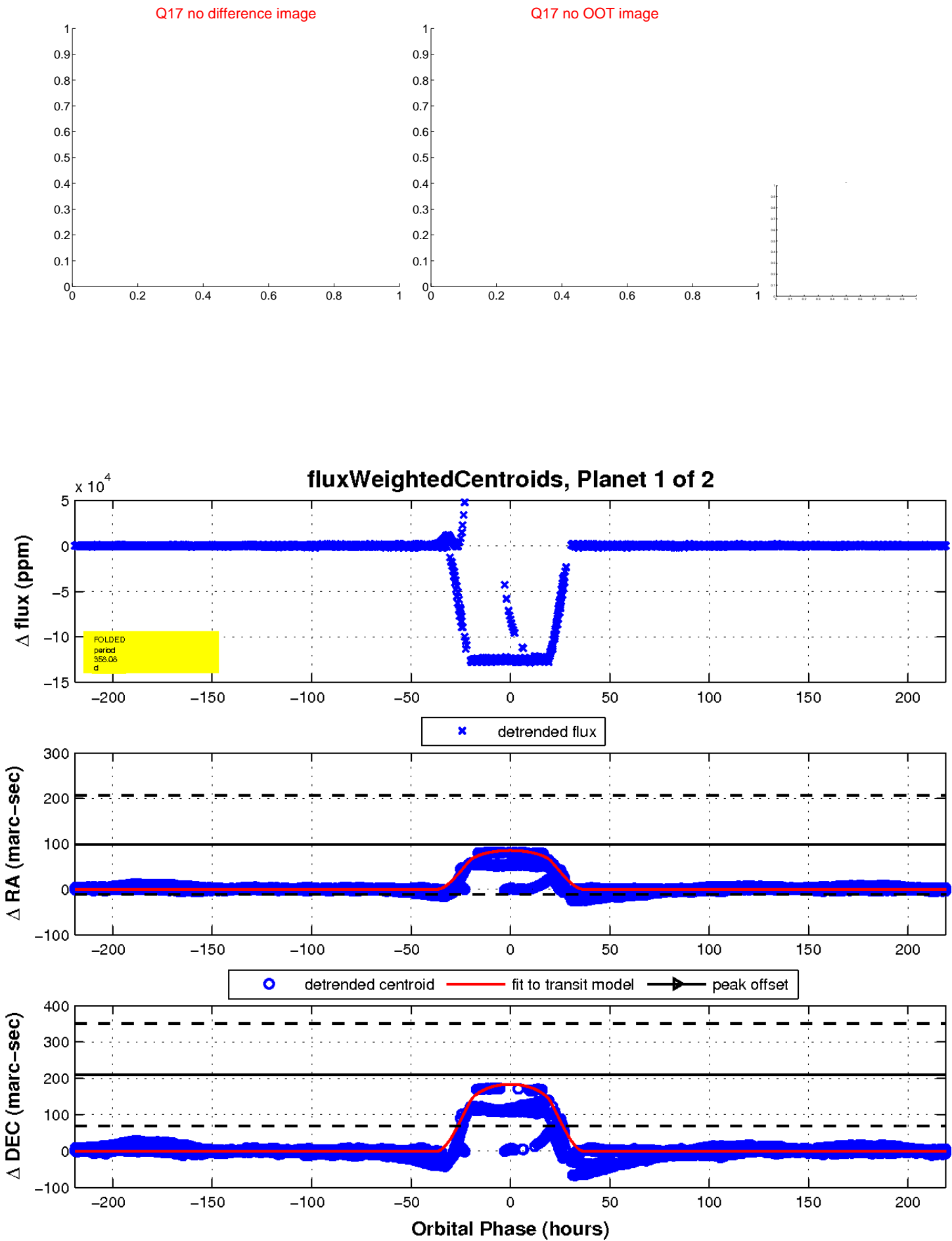
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



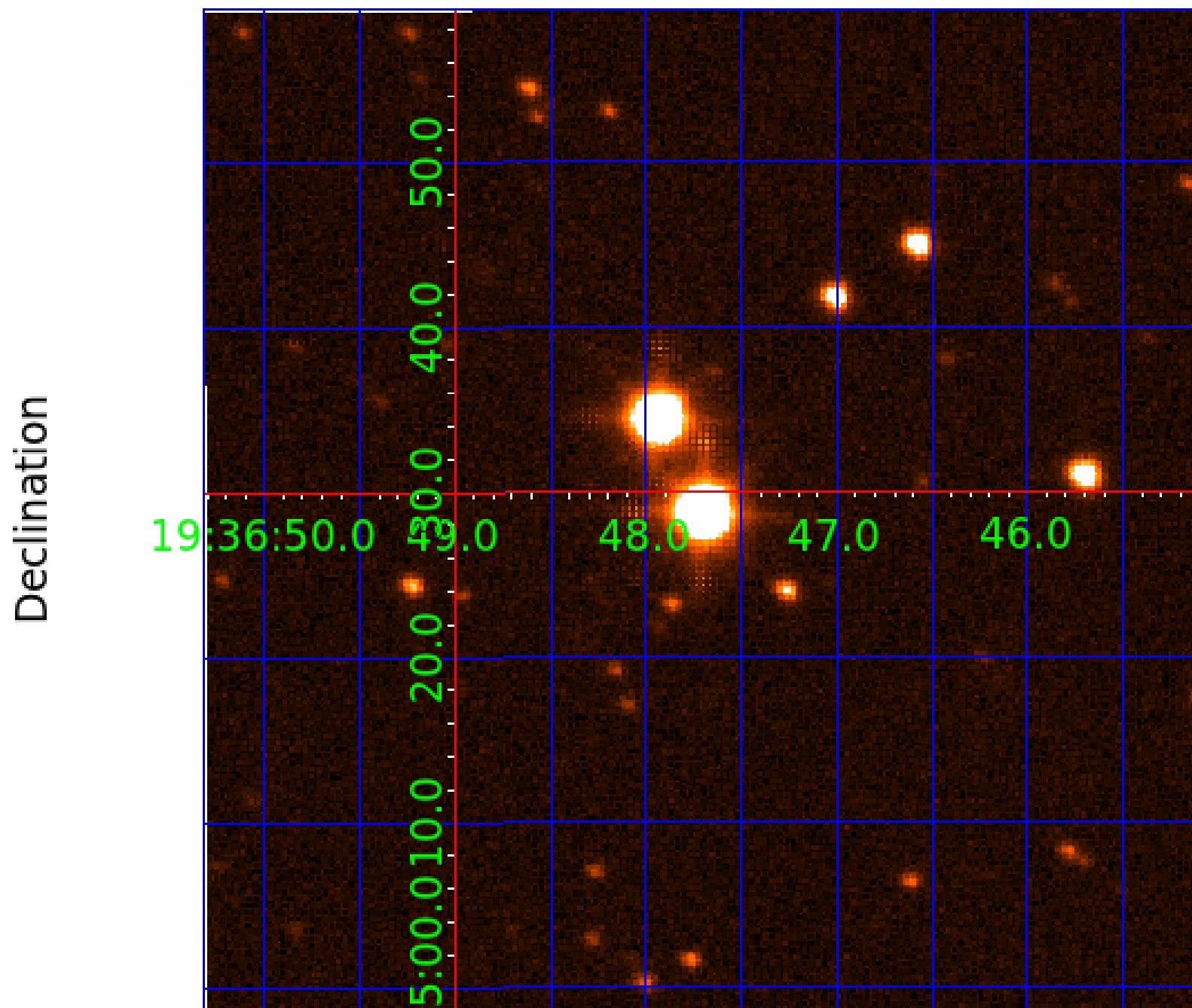
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 004663623

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004663623-01	OBS	No	358.076606	487.766297	126916.6	73.013	350.6	565.0	9.71	4798	334.89	29.28
004663623-02	OBS	No	358.076843	308.238492	3444.6	62.257	14.2	37.5	9.71	4798	74.69	29.28

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004663623-01	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—CENT_FEW_DIFFS
004663623-02	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—SAME_NTL_PERIOD—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.

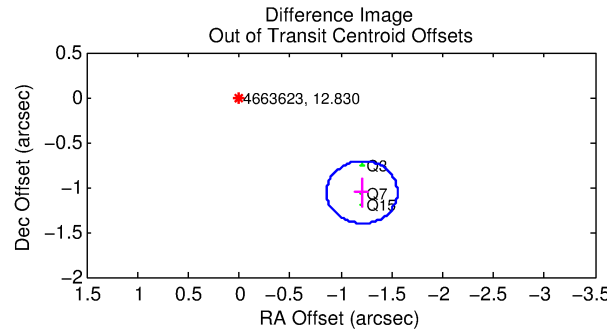
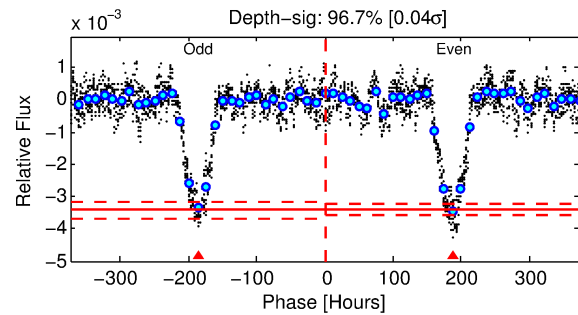
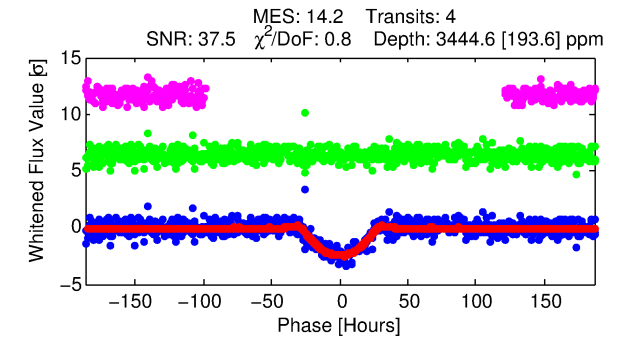
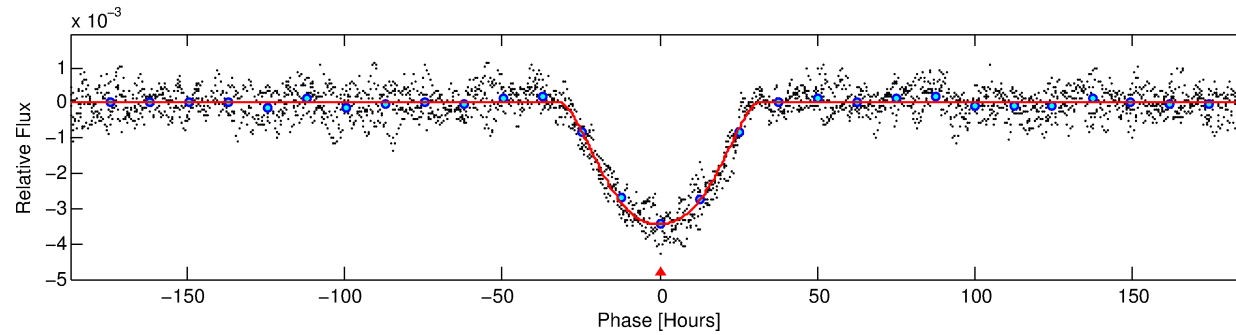
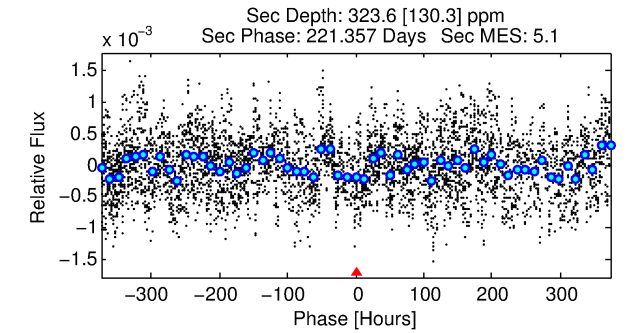
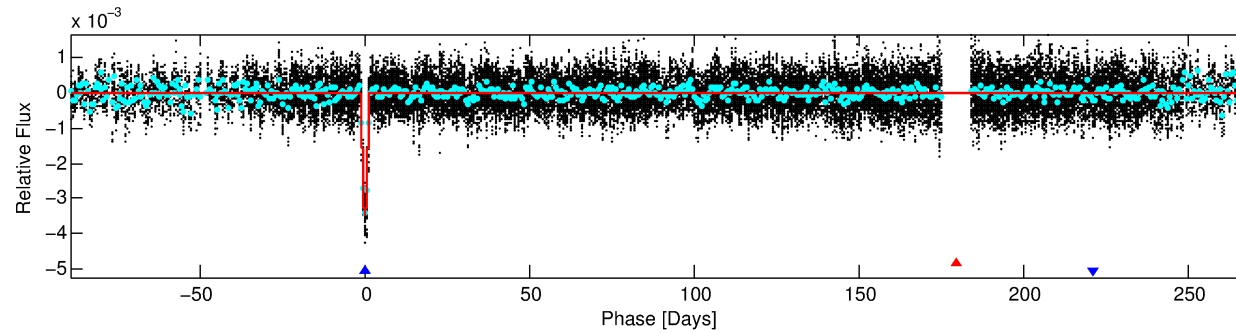
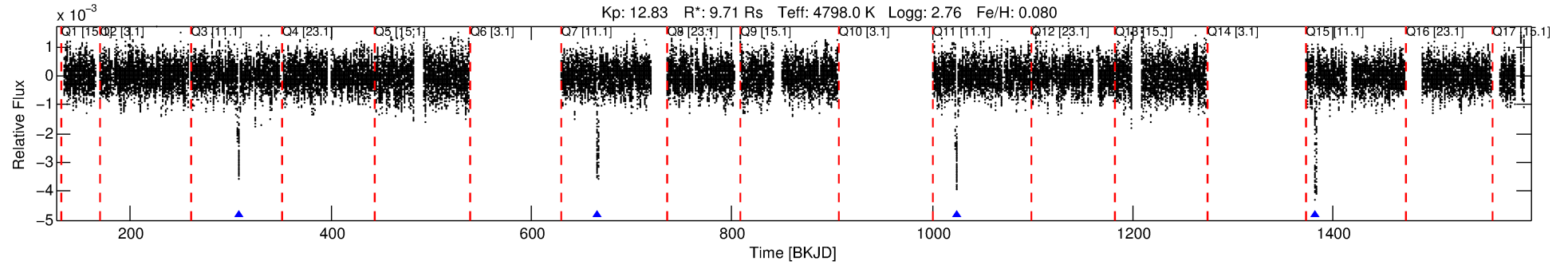
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004663623-02

No Significant Match Found

# DV One-Page Summary

KIC: 4663623 Candidate: 2 of 2 Period: 358.077 d



## DV Fit Results:

Period = 358.07684 [0.01737] d  
Epoch = 308.2385 [0.0332] BKJD  
Rp/R\* = 0.0705 [0.0052]  
a/R\* = 22.96 [1.25]  
b = 0.93 [0.02]  
Seff = 29.28 [10.46]  
Teq = 593 [53] K  
Rp = 74.69 [24.48] Re  
a = 1.2362 [0.3138] AU  
Ag = 48.77 [26.95] [1.77σ]  
Teffp = 2423 [264] K [6.80σ]

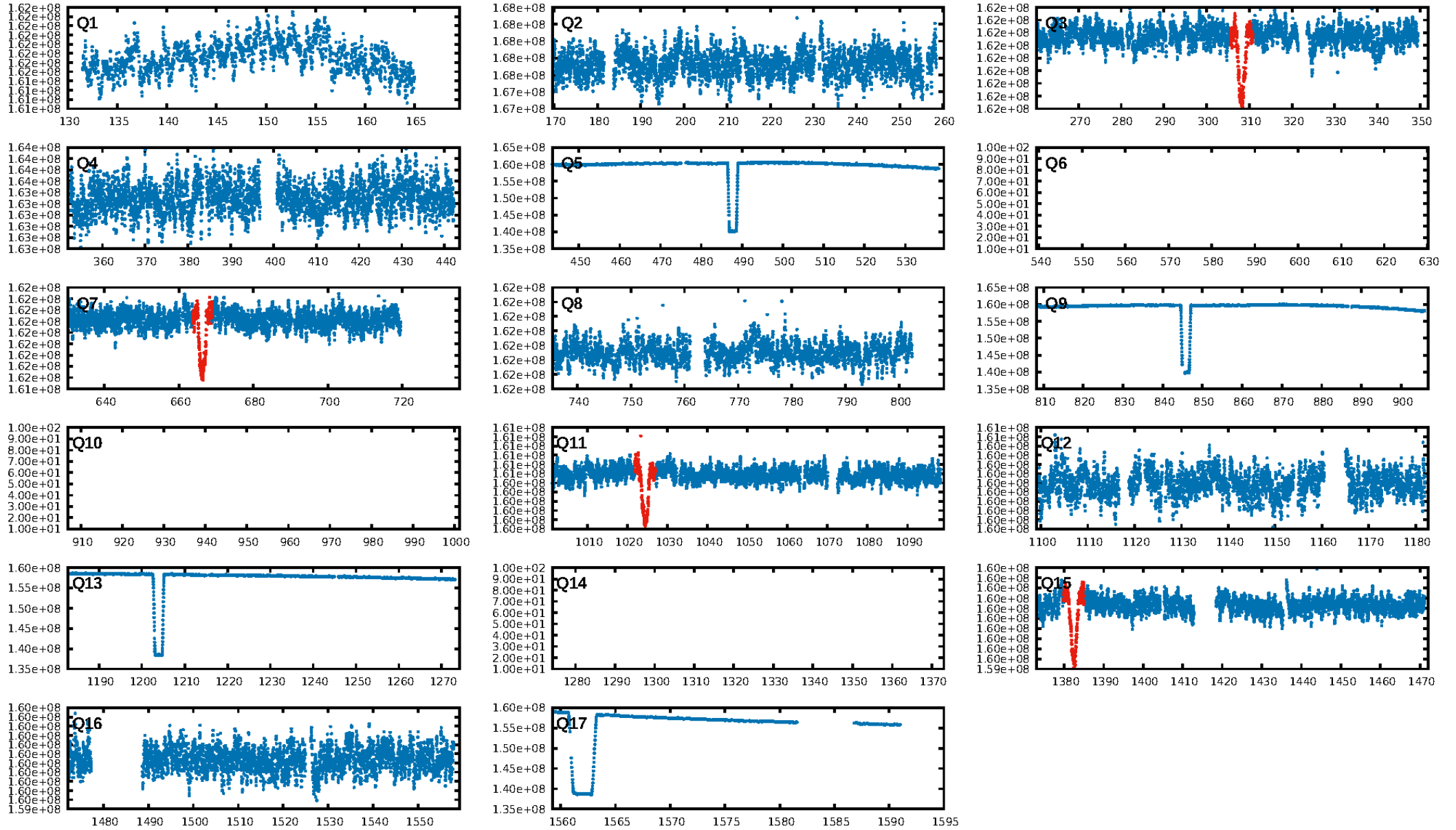
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 48.8%  
ModelChiSquareGoF-sig: 100.0%  
Bootstrap-pfa: 1.39e-21  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -14.23  
Centroid-sig: 0.0%  
Centroid-so: 1.428 arcsec [11.99σ]  
OotOffset-rm: 1.605 arcsec [13.84σ]  
KicOffset-rm: 0.193 arcsec [1.86σ]  
OotOffset-st: 0/3/0/0 [3]  
KicOffset-st: 0/3/0/0 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

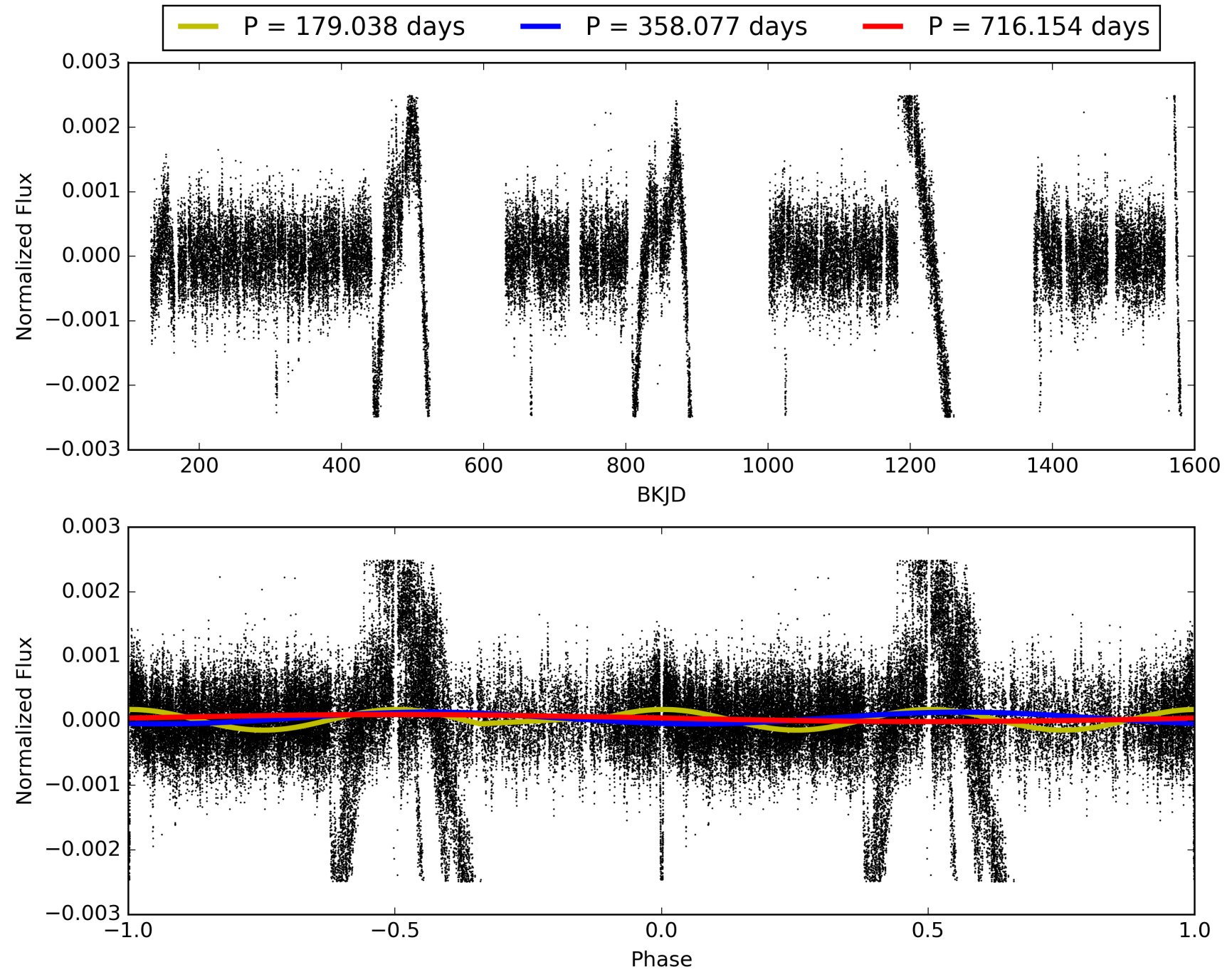
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 08:37:10 Z

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

# TCE 004663623-02, PDC Light Curves



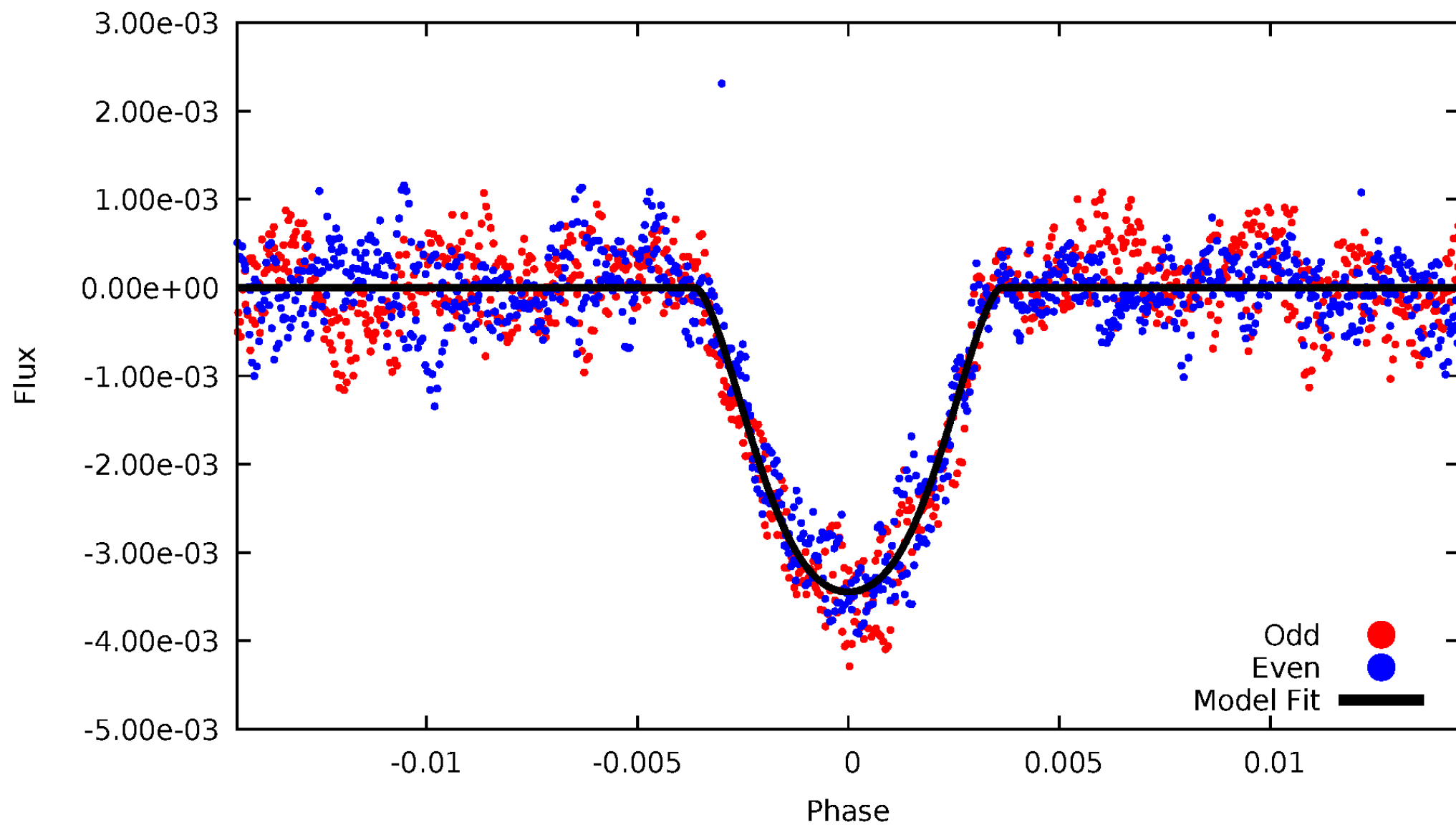
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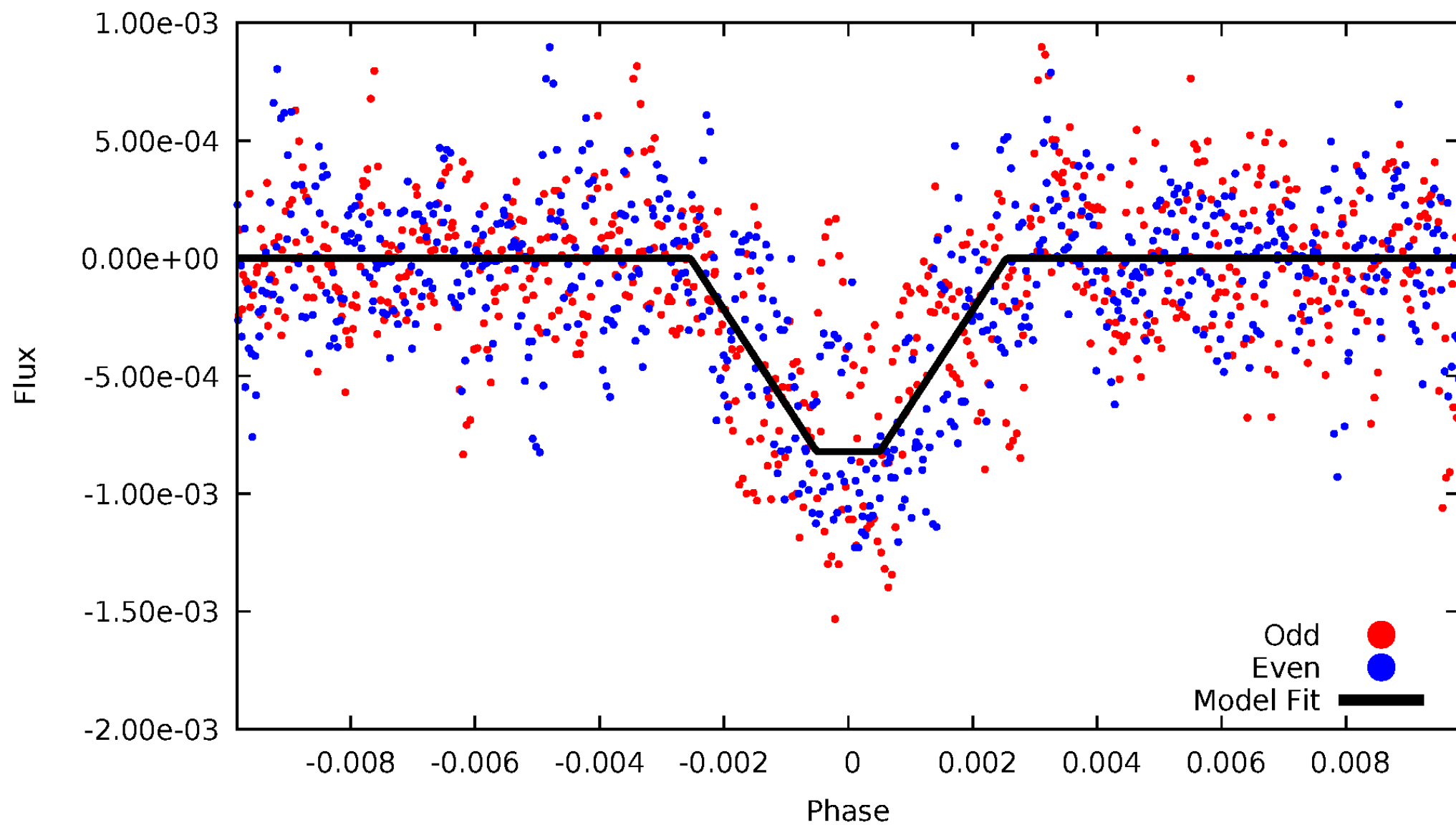
# DV Odd/Even

TCE 004663623-02



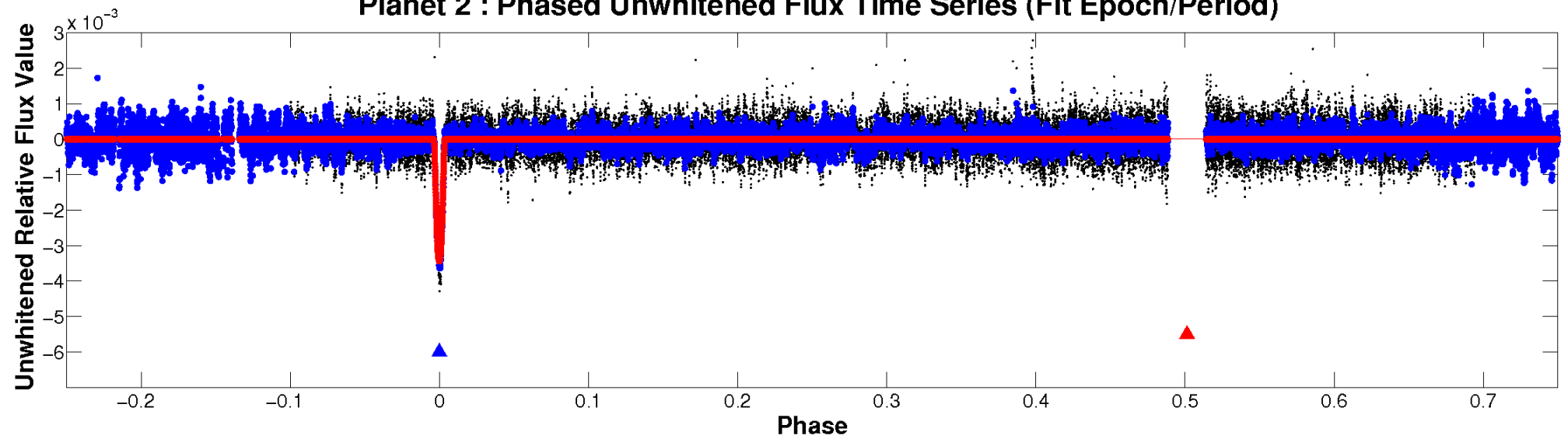
# ALT Odd/Even

TCE 004663623-02

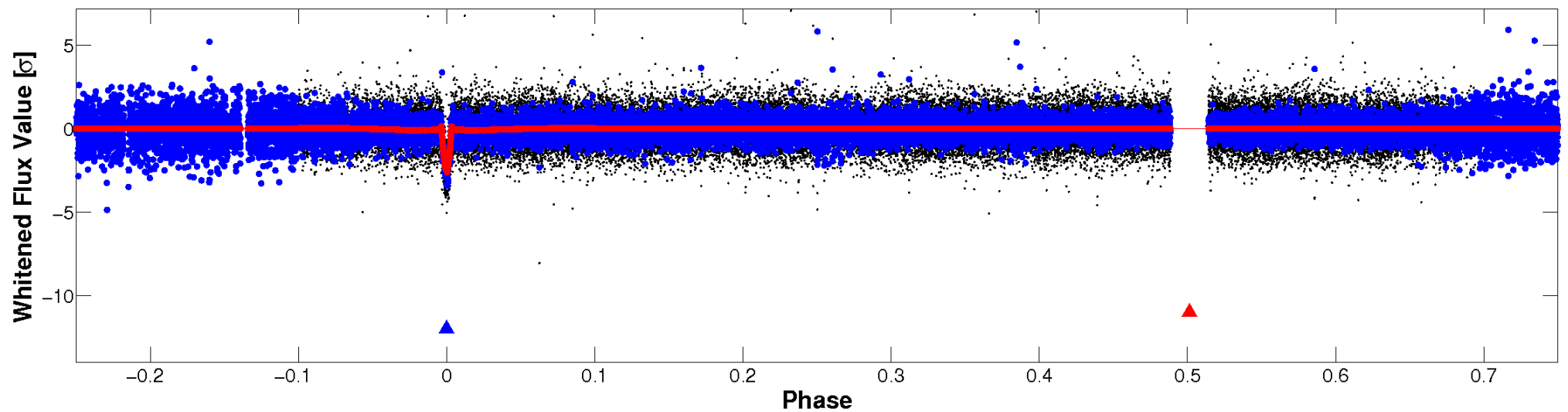


# Non-Whitened Vs. Whitened Light Curve

## Planet 2 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

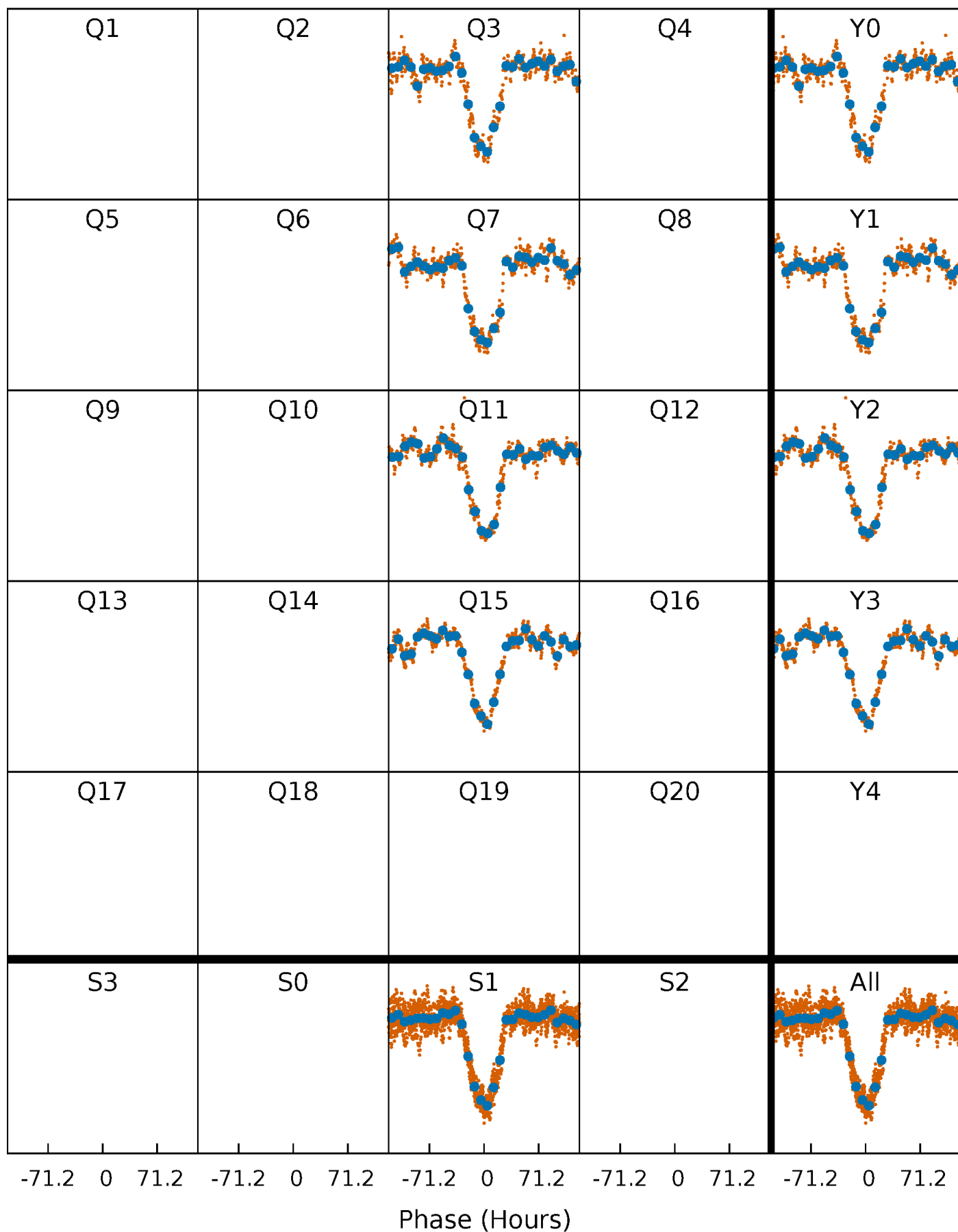


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



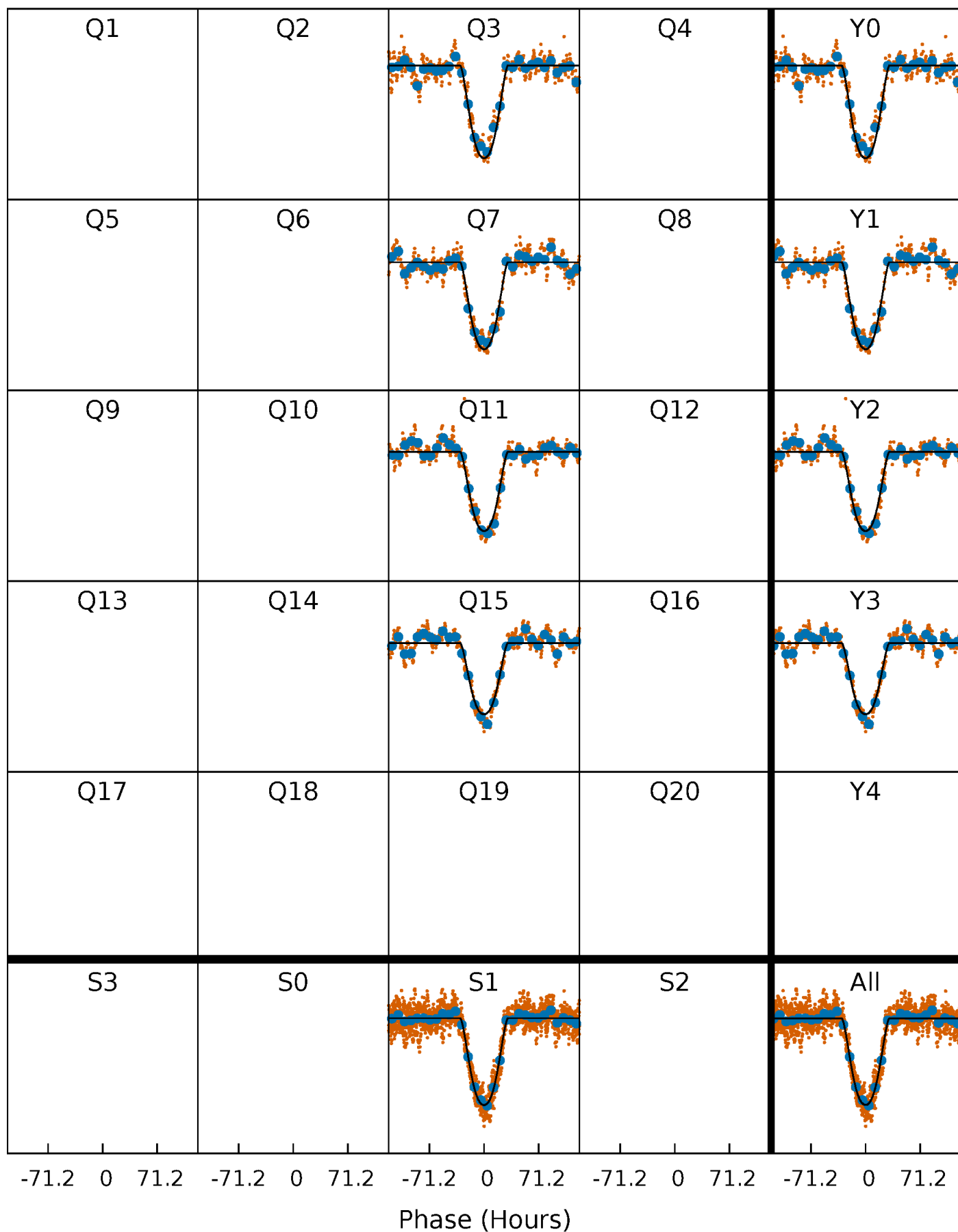
# PDC Quarter-Phased Transit Curves

TCE 004663623-02 P=358.076843 Days  $T_0=308.238492$  (BKJD)



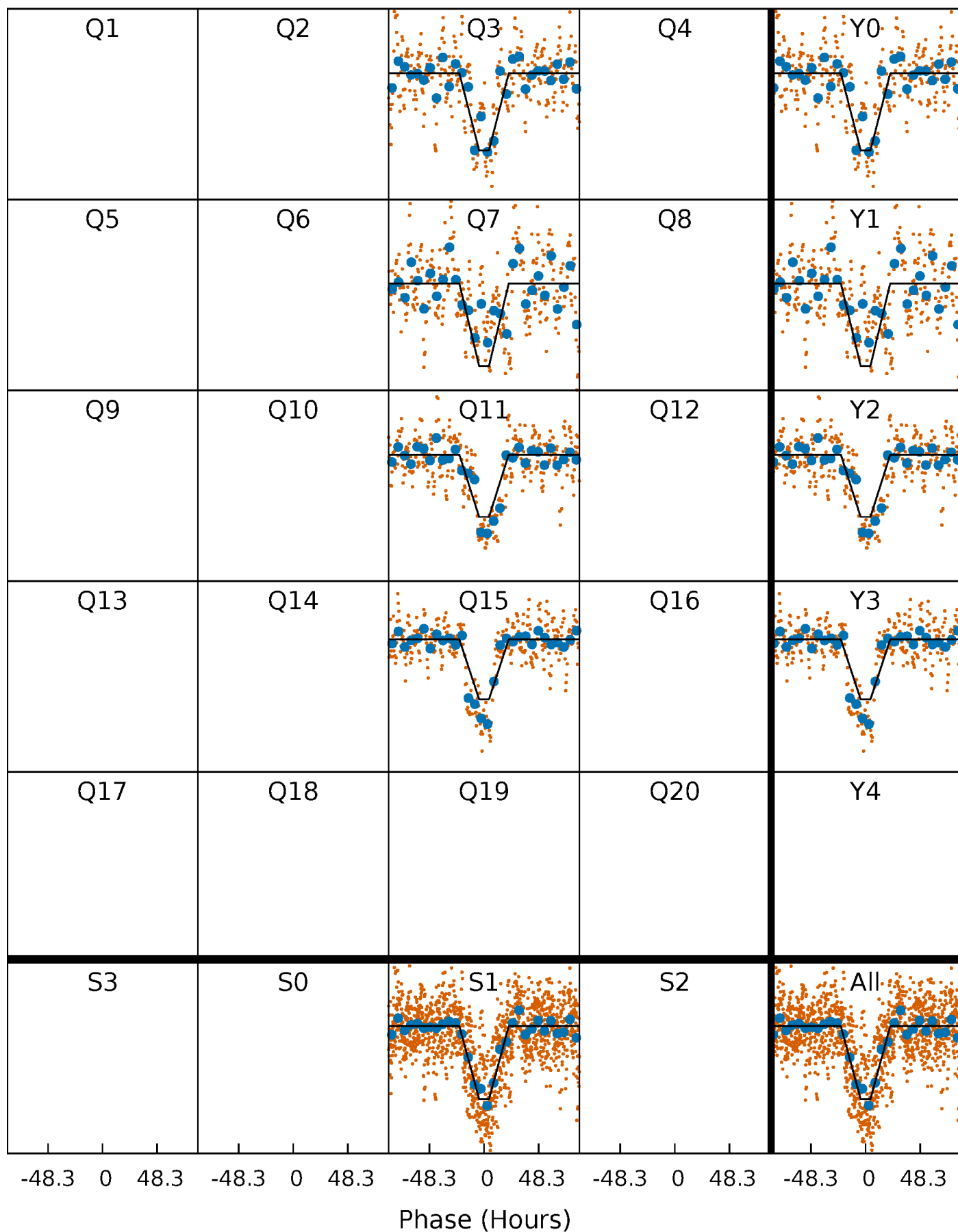
# DV Quarter-Phased Transit Curves

TCE 004663623-02     $P=358.076843$  Days     $T_0=308.238492$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

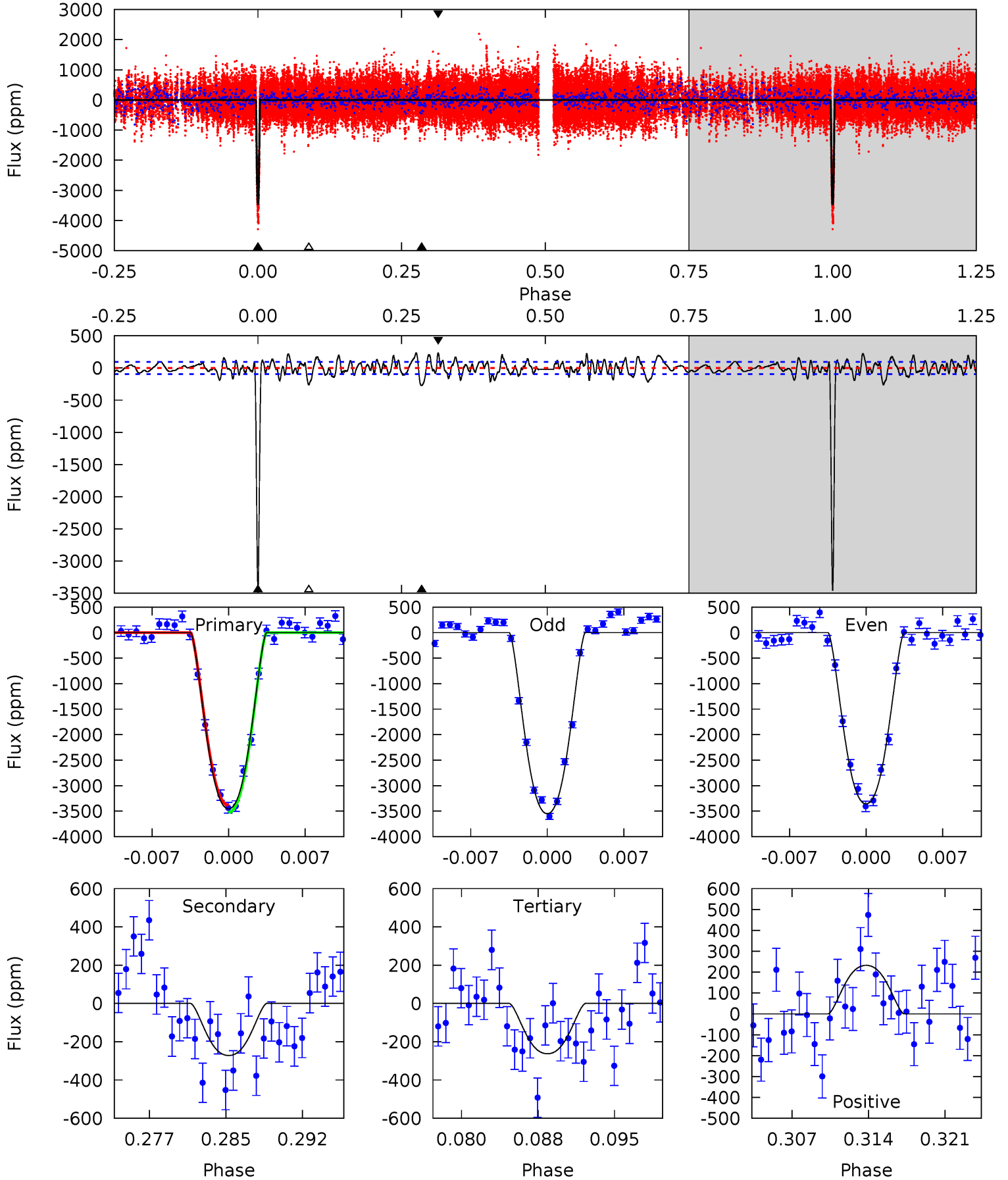
TCE 004663623-02     $P=358.132195$  Days     $T_0=308.159128$  (BKJD)



# DV Model-Shift Uniqueness Test

004663623-02, P = 358.076843 Days, E = 308.238492 Days

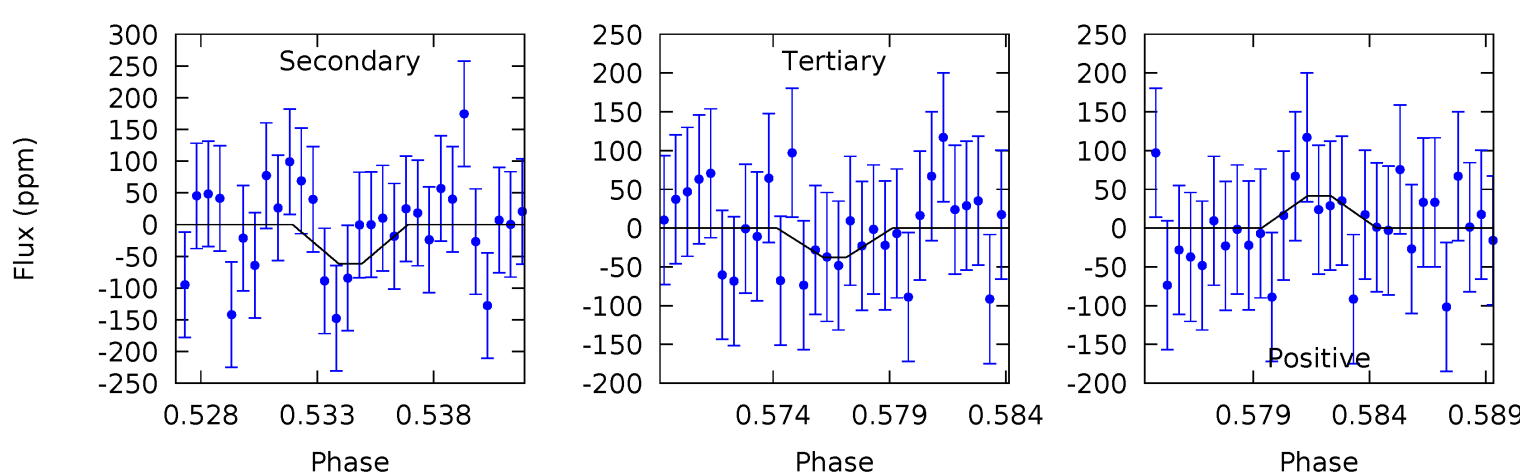
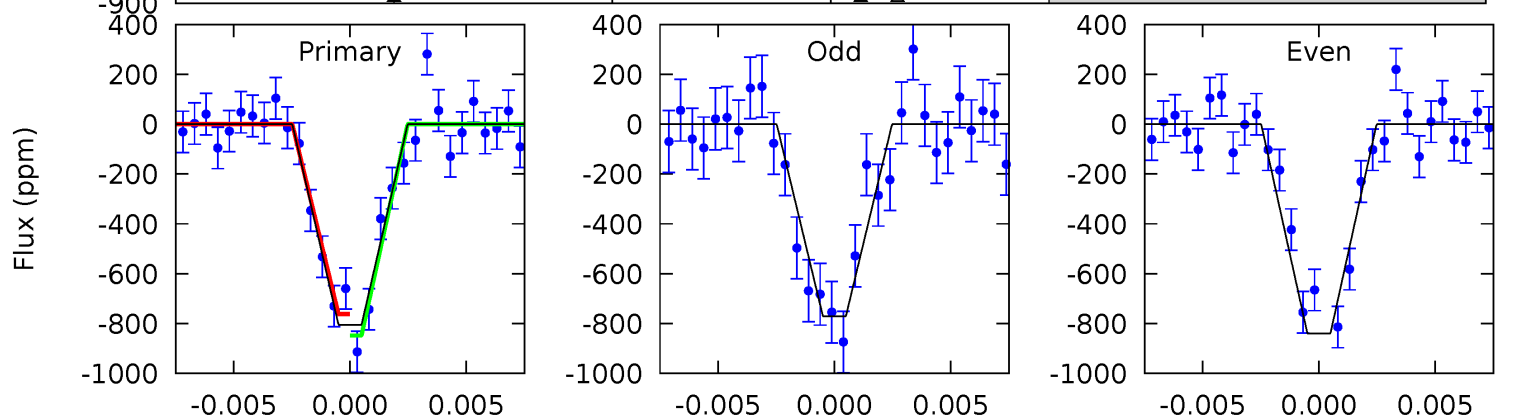
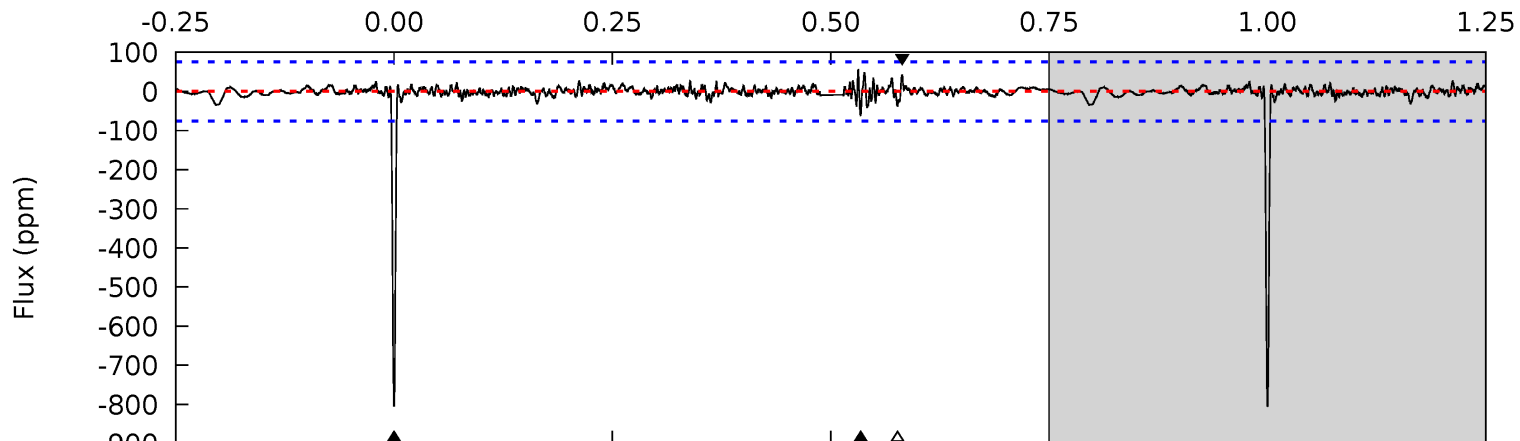
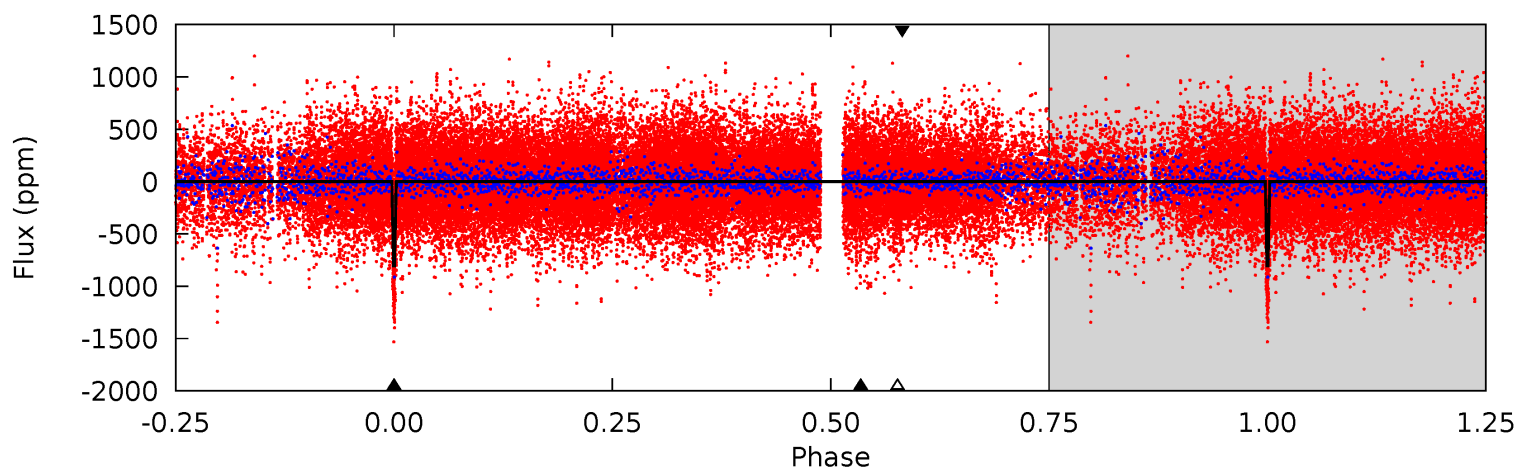
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
183.0	14.4	13.9	12.3	5.09	2.68	4.76	169.1	170.7	0.49	2.10	5.09	1.00	0.06	3.69



# Alt Model-Shift Uniqueness Test

004663623-02, P = 358.132195 Days, E = 308.159128 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
54.9	4.21	2.57	2.84	5.15	2.80	0.66	52.3	52.0	1.64	1.37	2.37	0.96	0.06	2.94





### Stellar Parameters For KIC 004663623

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4798^{+57}_{-92}$	$2.757^{+0.180}_{-0.120}$	$0.080^{+0.150}_{-0.200}$	$9.707^{+2.068}_{-3.101}$	$1.964^{+0.846}_{-0.769}$	$0.003^{+0.004}_{-0.001}$
	+1%/-2%	+7%/-4%	+188%/-250%	+21%/-32%	+43%/-39%	+123%/-35%
Source	SPE74	SPE74	SPE74	DSEP		

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

### Secondary Eclipse Parameters for KIC 004663623-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-272 \pm 19$	$76.32^{+13.11}_{-14.66}$	$824^{+45}_{-60}$	$2947^{+73}_{-74}$	$42^{+15}_{-11}$
Alt.	$-62 \pm 15$	$30.31^{+7.88}_{-7.06}$	$822^{+45}_{-57}$	$3070^{+217}_{-171}$	$60^{+36}_{-24}$

$T_{\text{max}}$  = 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

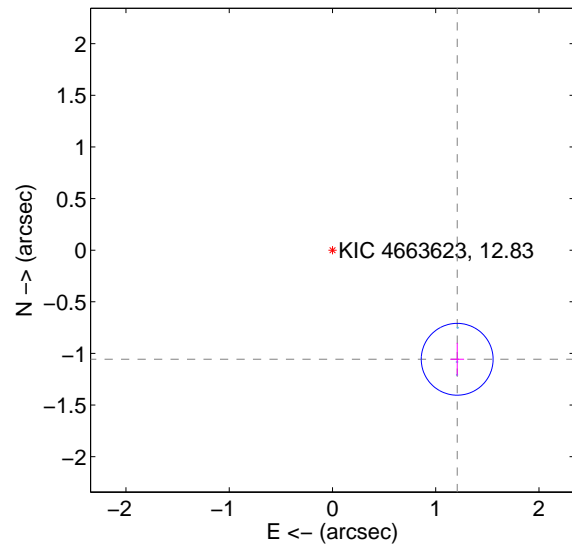
Supplemental centroid analysis for 004663623-02. Kepler magnitude: 12.83. Transit SNR 37.54

There are 3 quarters with good PRF difference image offsets

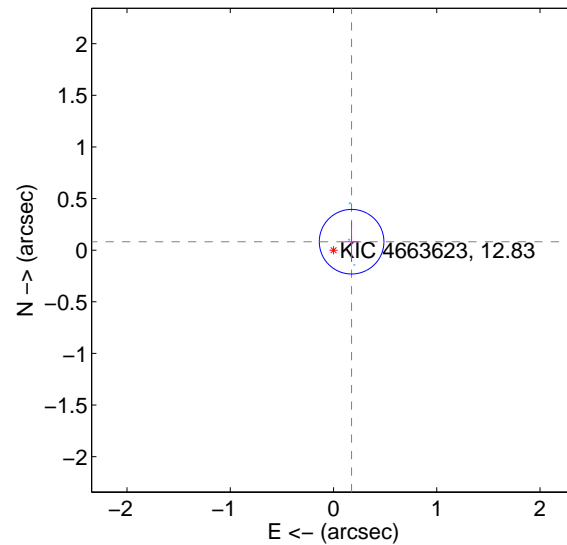
The direct PRF centroid is offset from the target star catalog position by about 1.46 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.605 \pm 0.116$	13.84	$-1.208 \pm 0.067$	$-1.057 \pm 0.159$
PRF-fit source offset from KIC position	$0.193 \pm 0.104$	1.86	$-0.175 \pm 0.069$	$0.082 \pm 0.196$
photometric centroid source offset	$1.43 \pm 0.12$	11.99	$0.67 \pm 0.07$	$1.26 \pm 0.13$

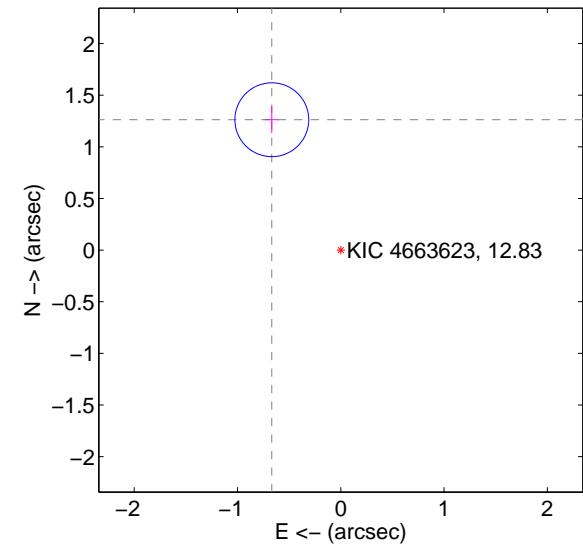
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

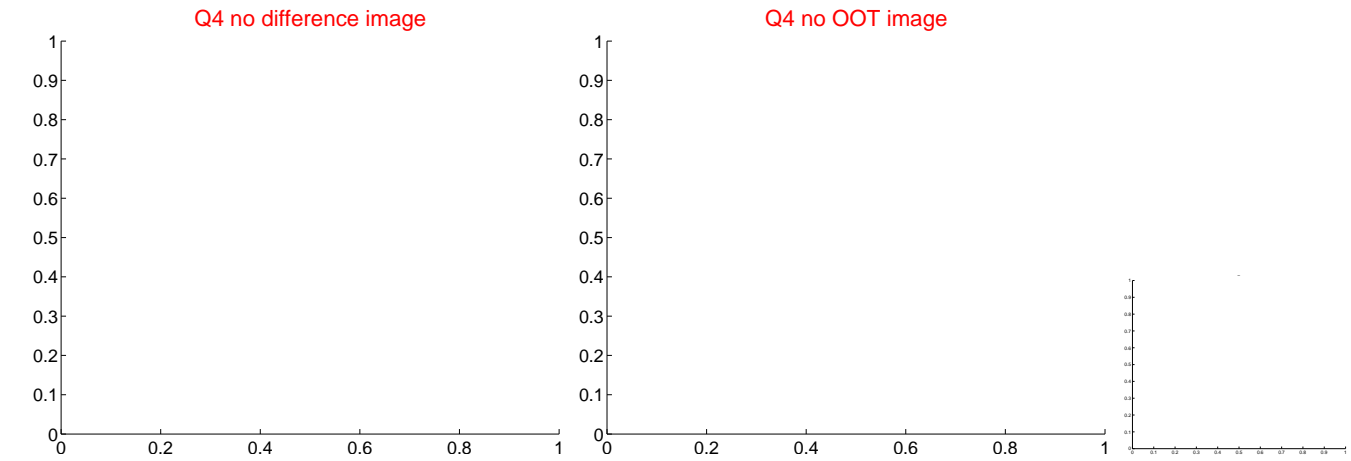
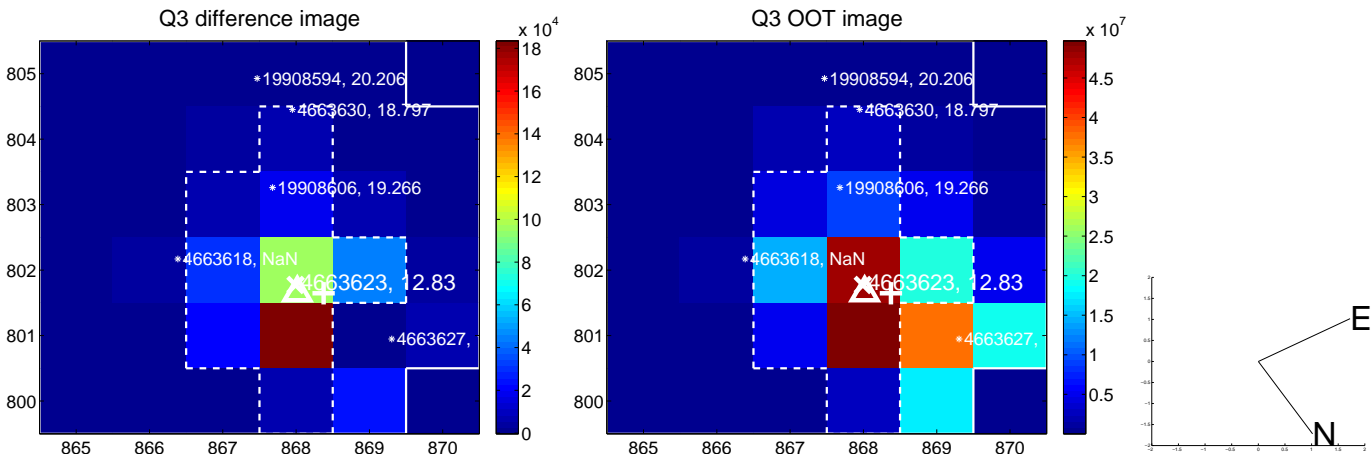
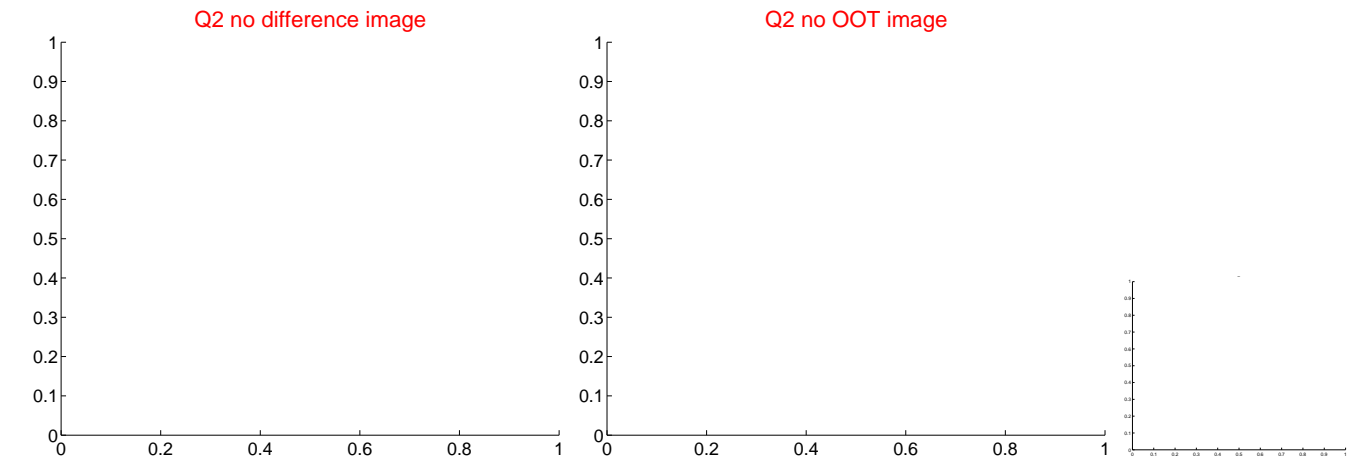
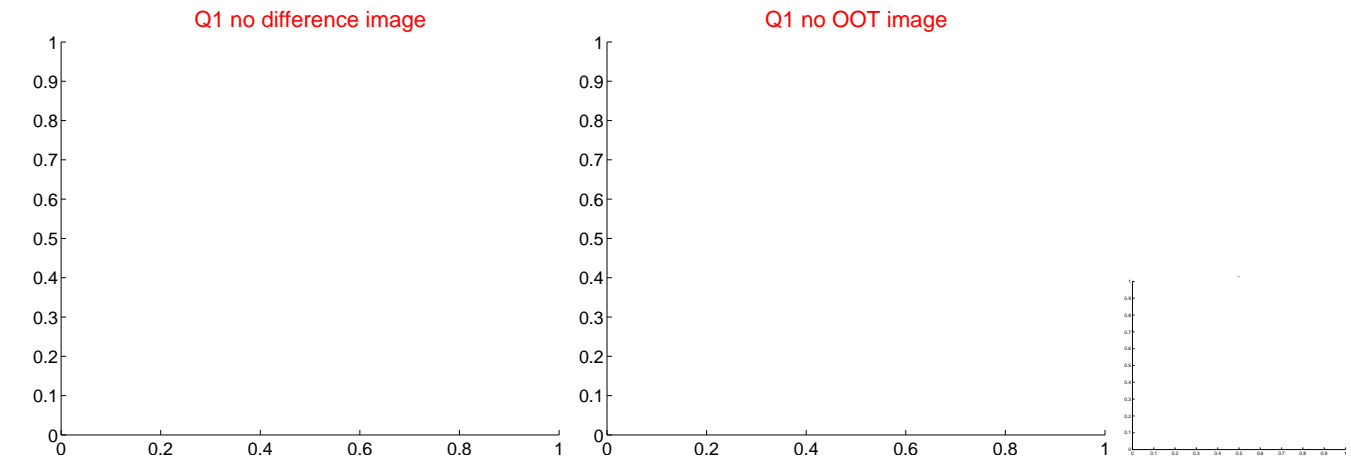


offset from photometric centroids

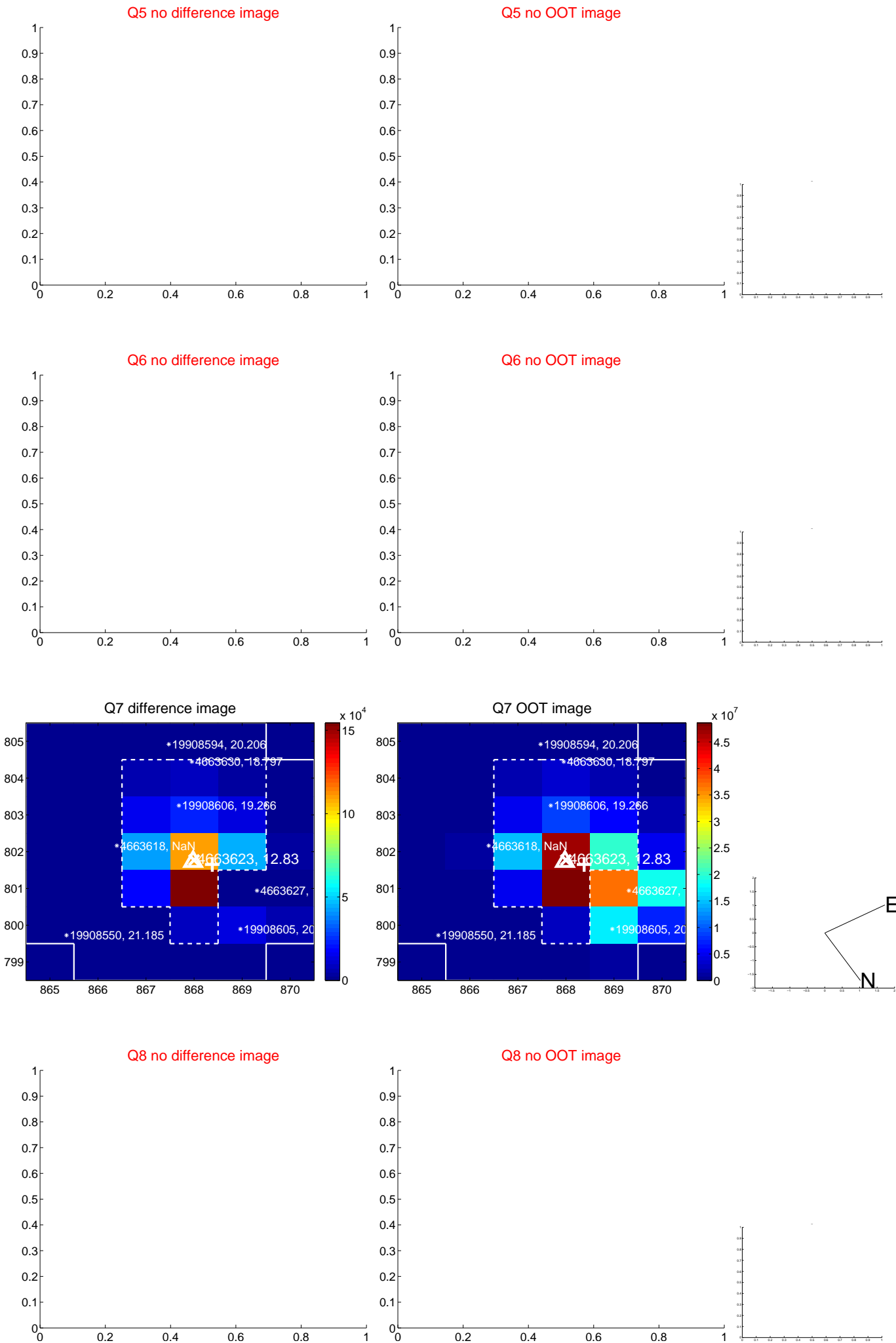


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



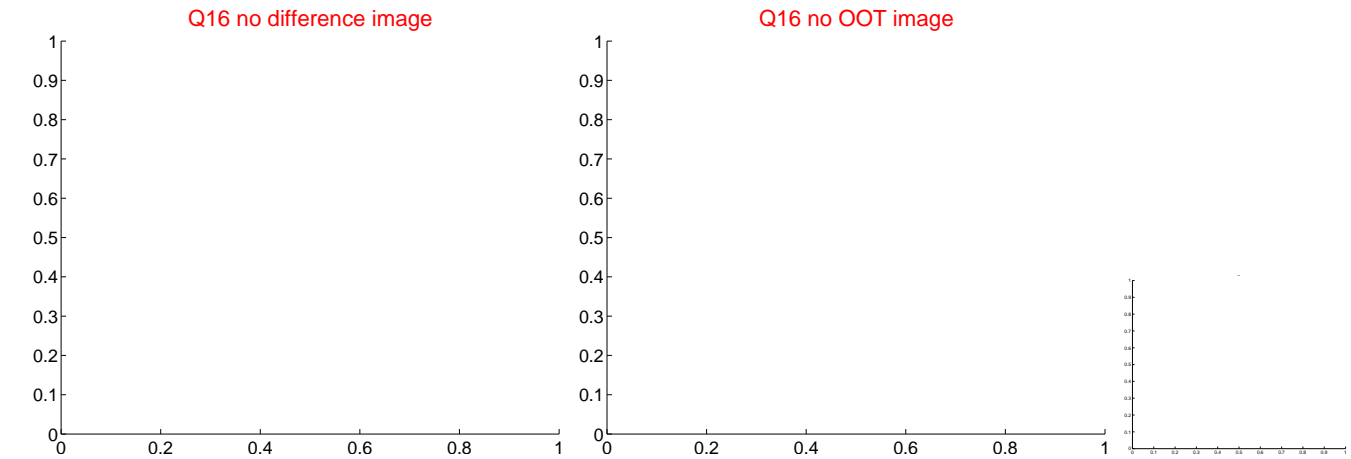
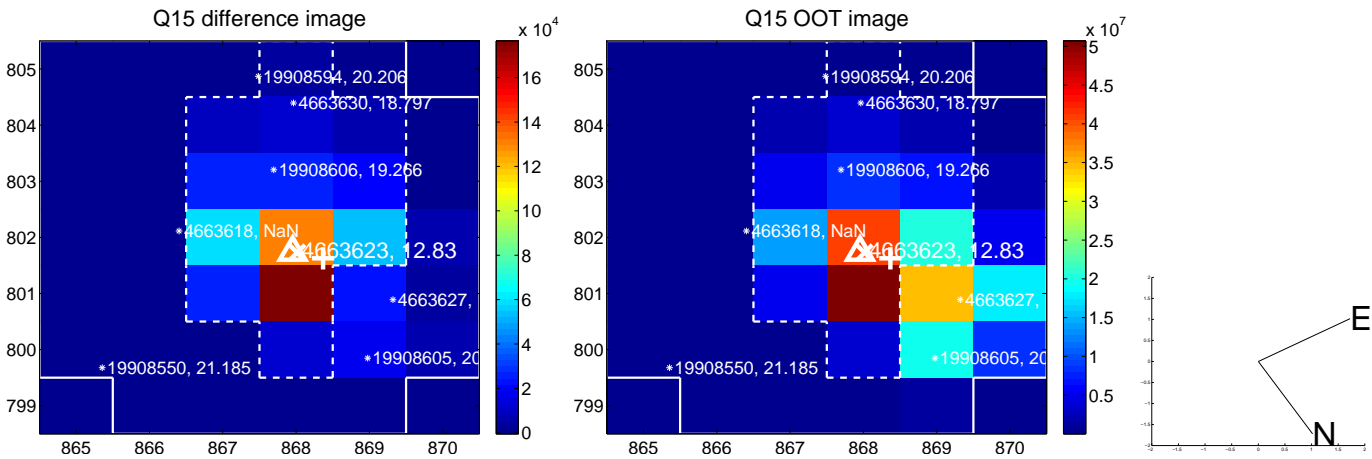
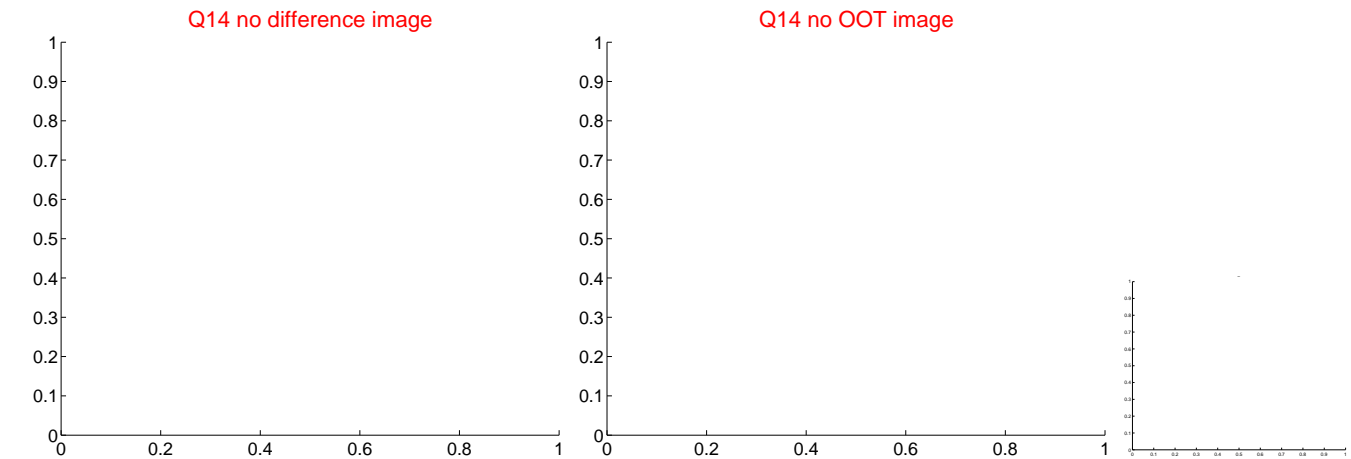
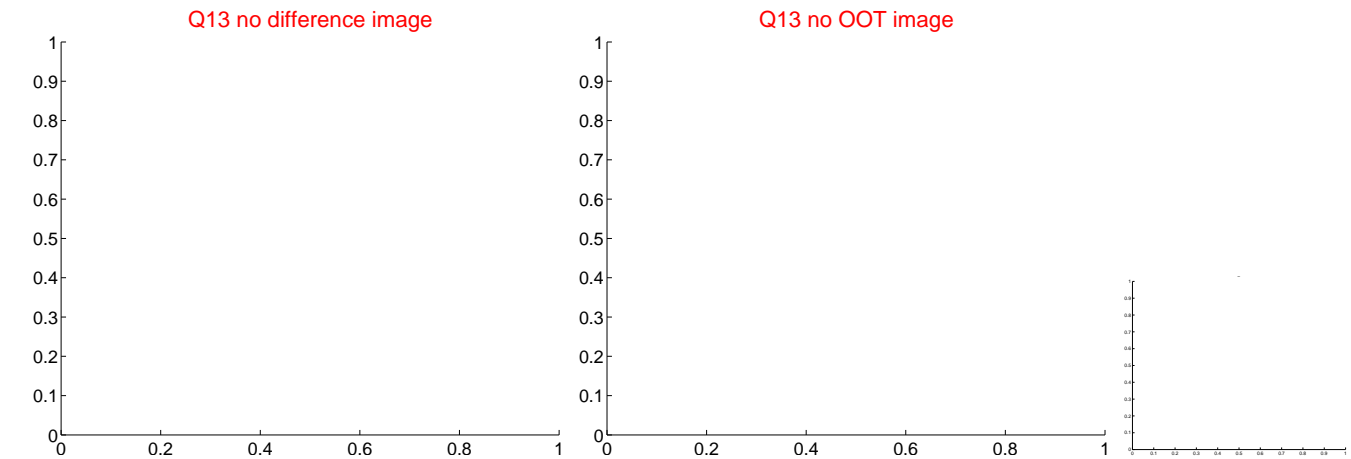
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



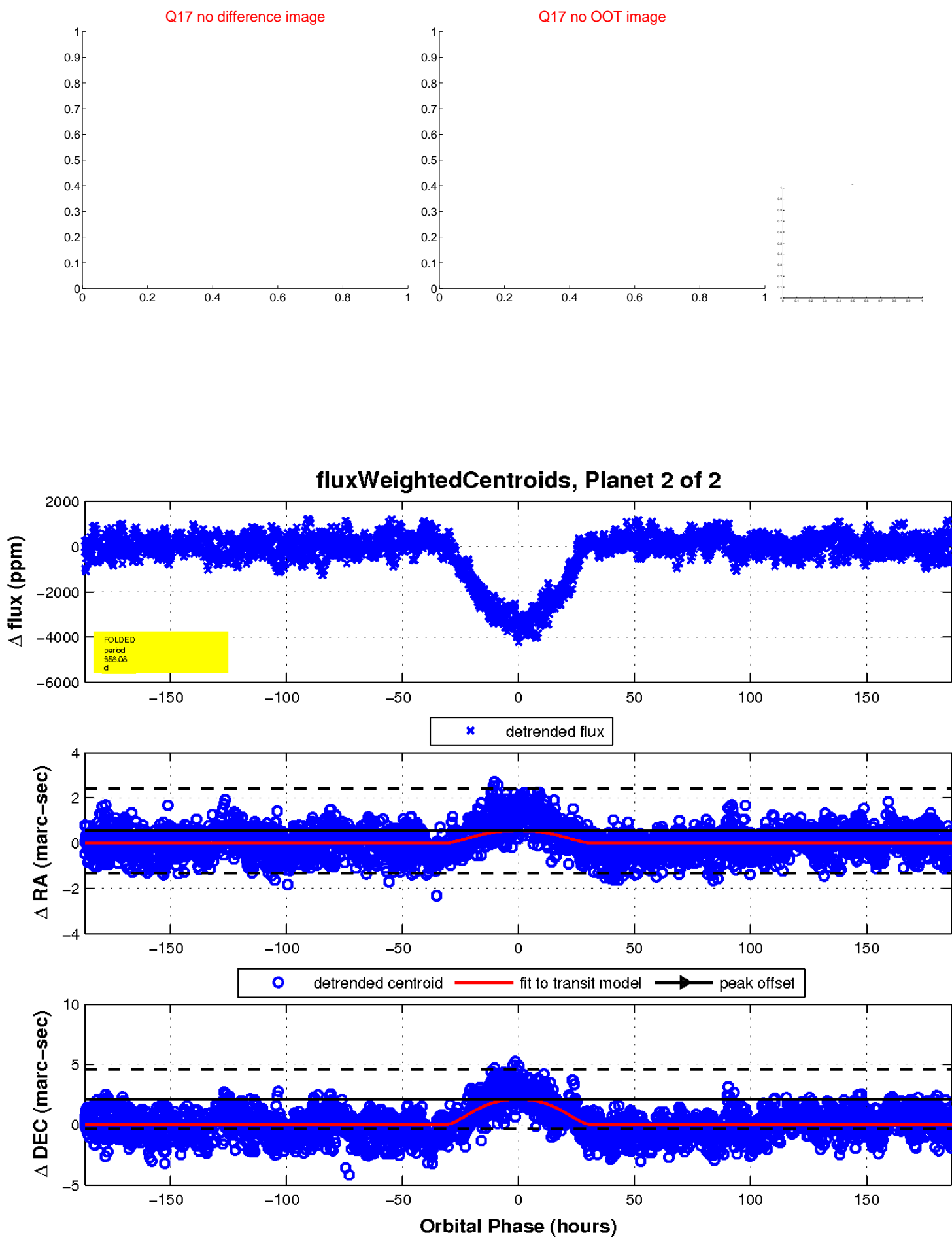
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white ×: 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

