

# KIC 009656397

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009656397-01	OBS	3543.01	204.744271	306.980785	386473.2	7.500	6095.6	-1.0	1.44	6517	57.57	6.32
009656397-02	OBS	No	204.737460	202.878608	338897.9	10.500	3948.5	-1.0	1.44	6517	40.82	6.32

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009656397-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—HAS_SEC_TCE—PERIOD_ALIAS_ALT—CENT_NOFITS
009656397-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_NOFITS

**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 009656397-01

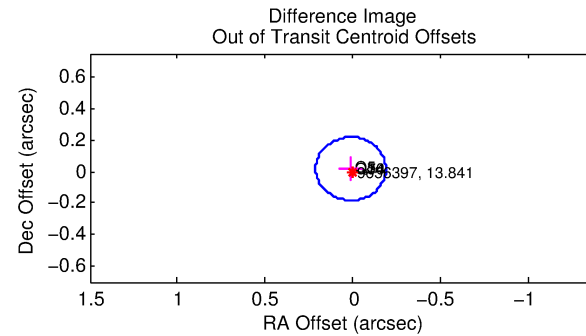
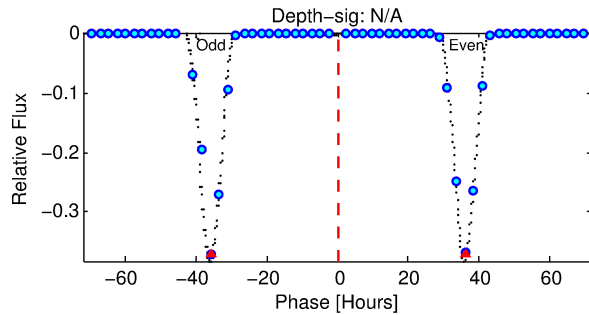
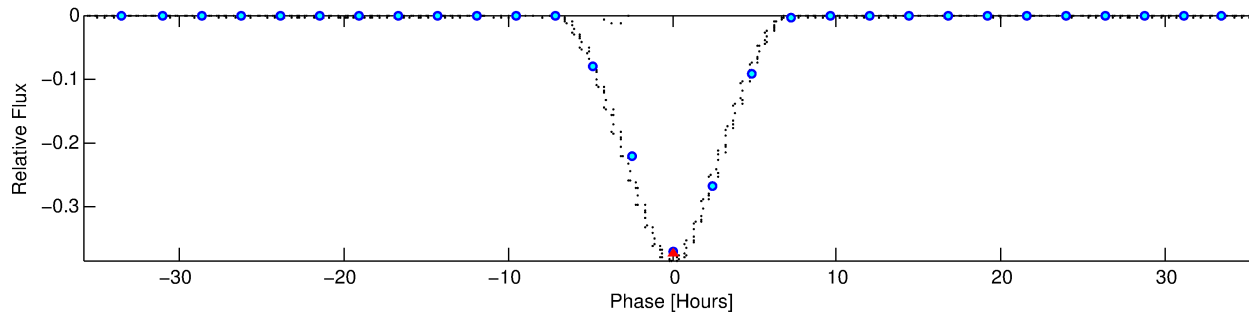
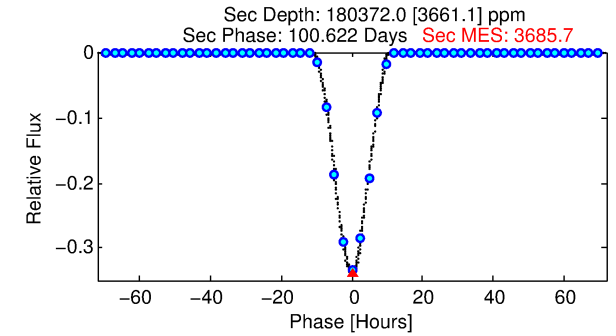
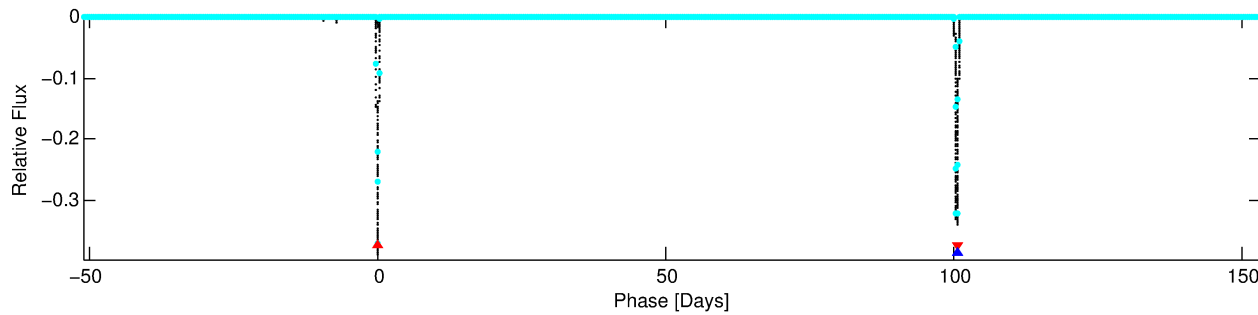
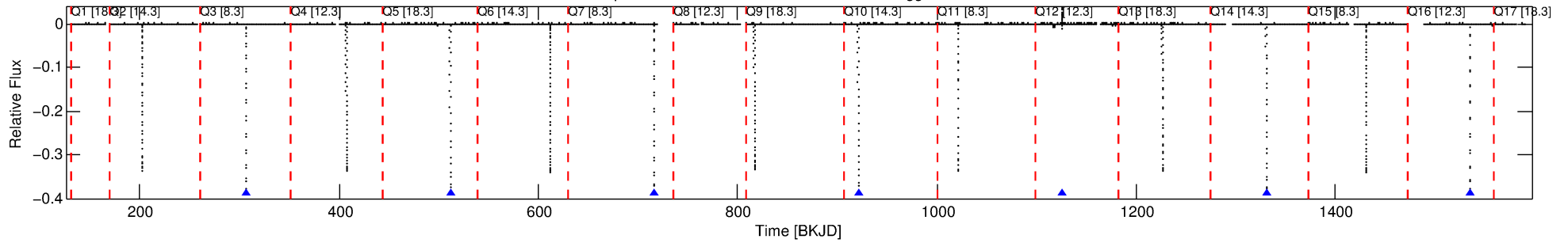
No Significant Match Found

# DV One-Page Summary

KIC: 9656397 Candidate: 1 of 2 Period: 204.744 d

KOI: K03543 Corr: No Ephemeris Match

Kp: 13.84 R\*: 1.44 Rs Teff: 6517.0 K Logg: 4.21 Fe/H: -0.120



## TPS TCE Results:

Period = 204.74427 d  
Epoch = 306.9808 BKJD

DV fit results are unavailable

## DV Diagnostic Results:

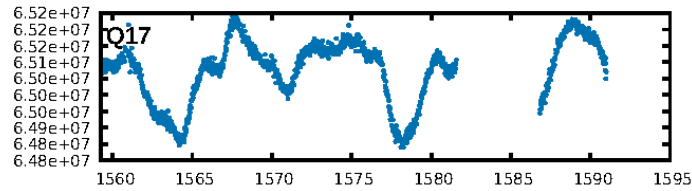
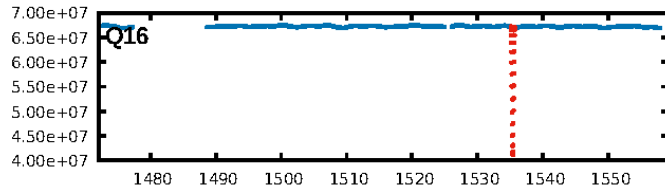
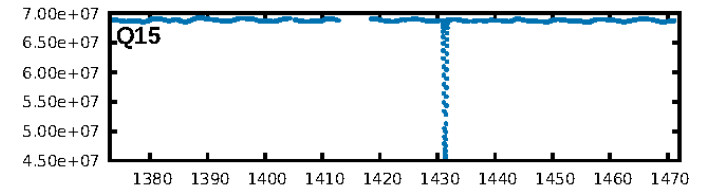
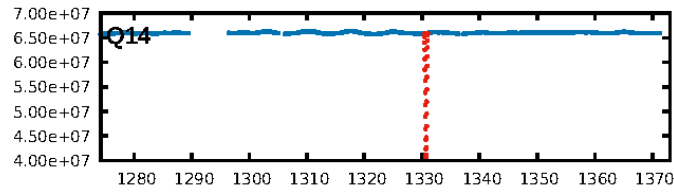
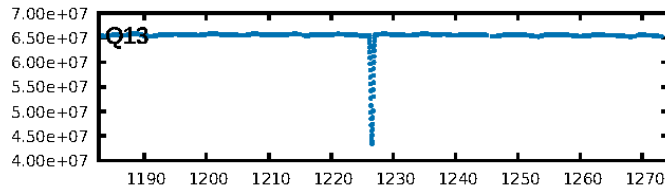
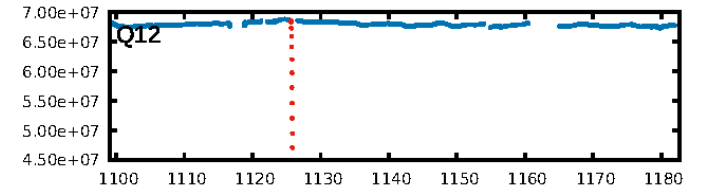
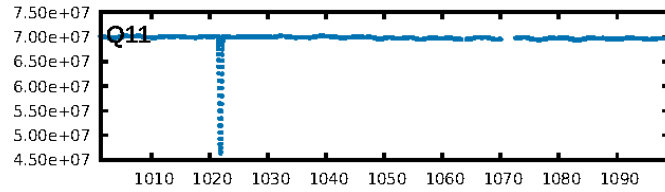
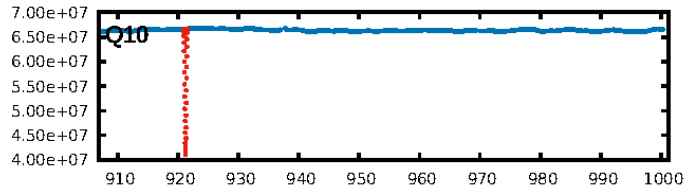
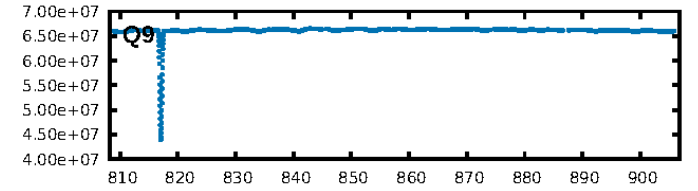
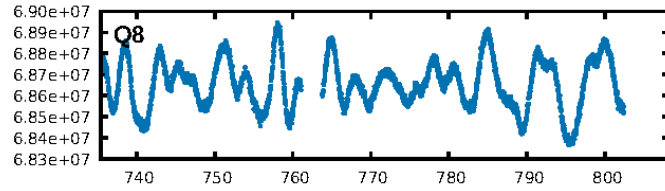
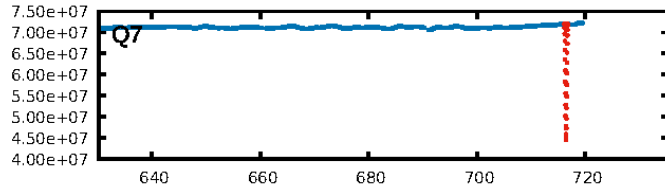
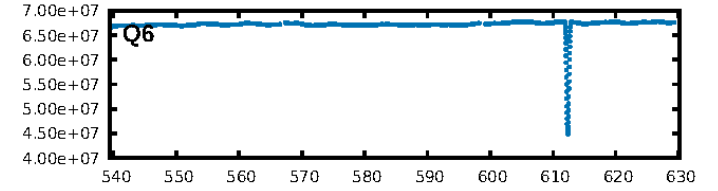
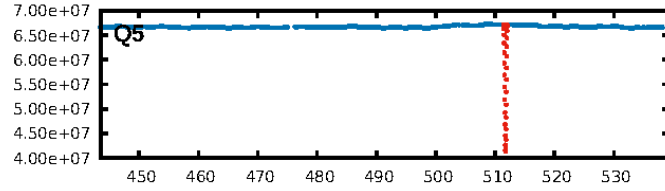
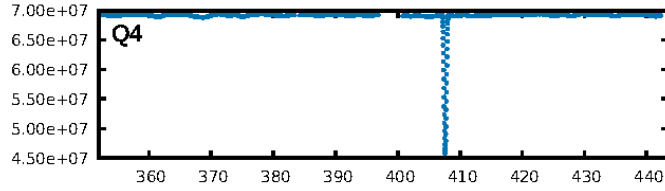
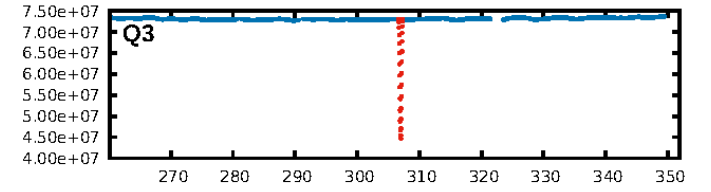
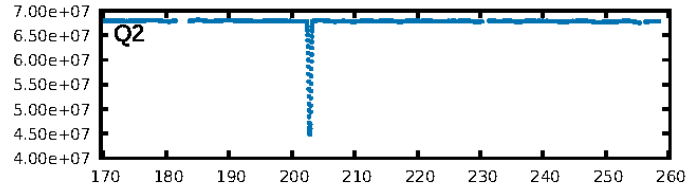
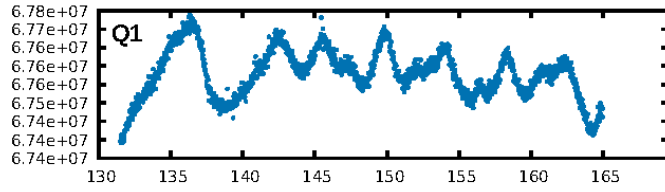
ShortPeriod-sig: 1.0% [0.01 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [7/7]  
GhostDiagnostic-chr: 1.839

Centroid-sig: 0.0%  
Centroid-so: 0.226 arcsec [296.61 $\sigma$ ]  
OotOffset-rm: 0.023 arcsec [0.34 $\sigma$ ]  
KicOffset-rm: 0.195 arcsec [2.85 $\sigma$ ]  
OotOffset-st: 2/2/1/1 [6]  
KicOffset-st: 2/2/1/1 [6]  
DiffImageQuality-fgm: 1.00 [6/6]  
DiffImageOverlap-fno: 1.00 [6/6]

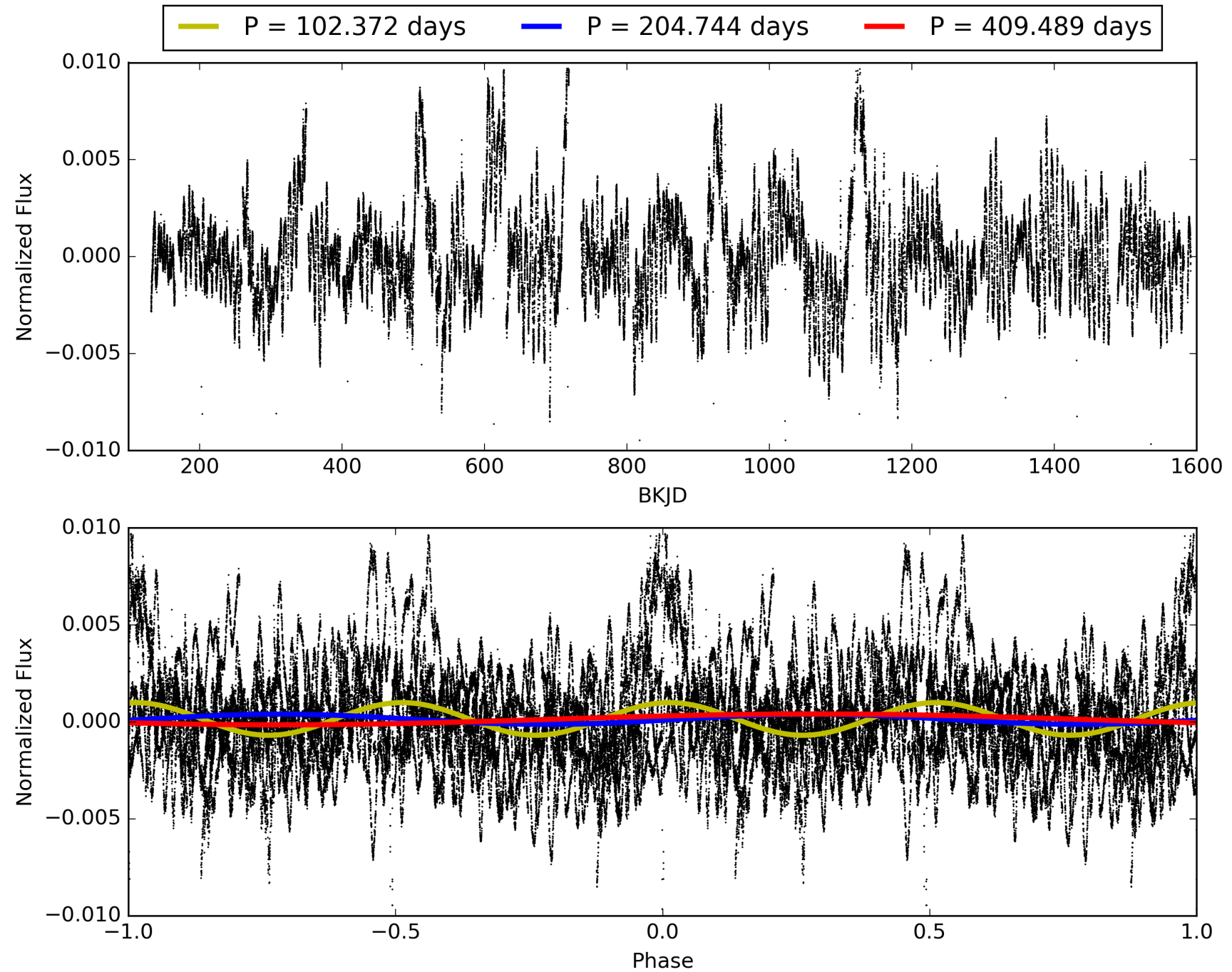
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 13:46:00 Z

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

# TCE 009656397-01, PDC Light Curves

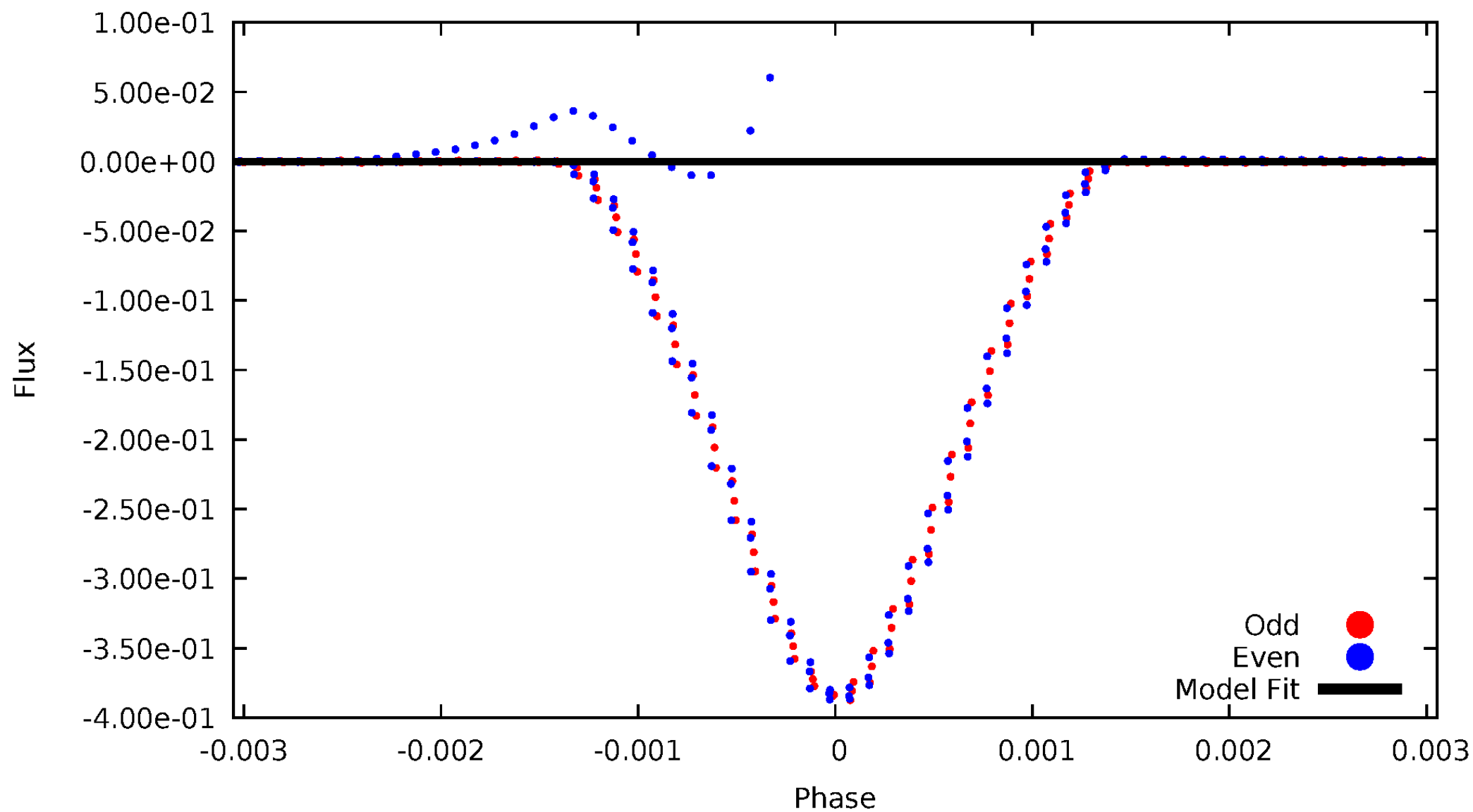


TCE 009656397-01



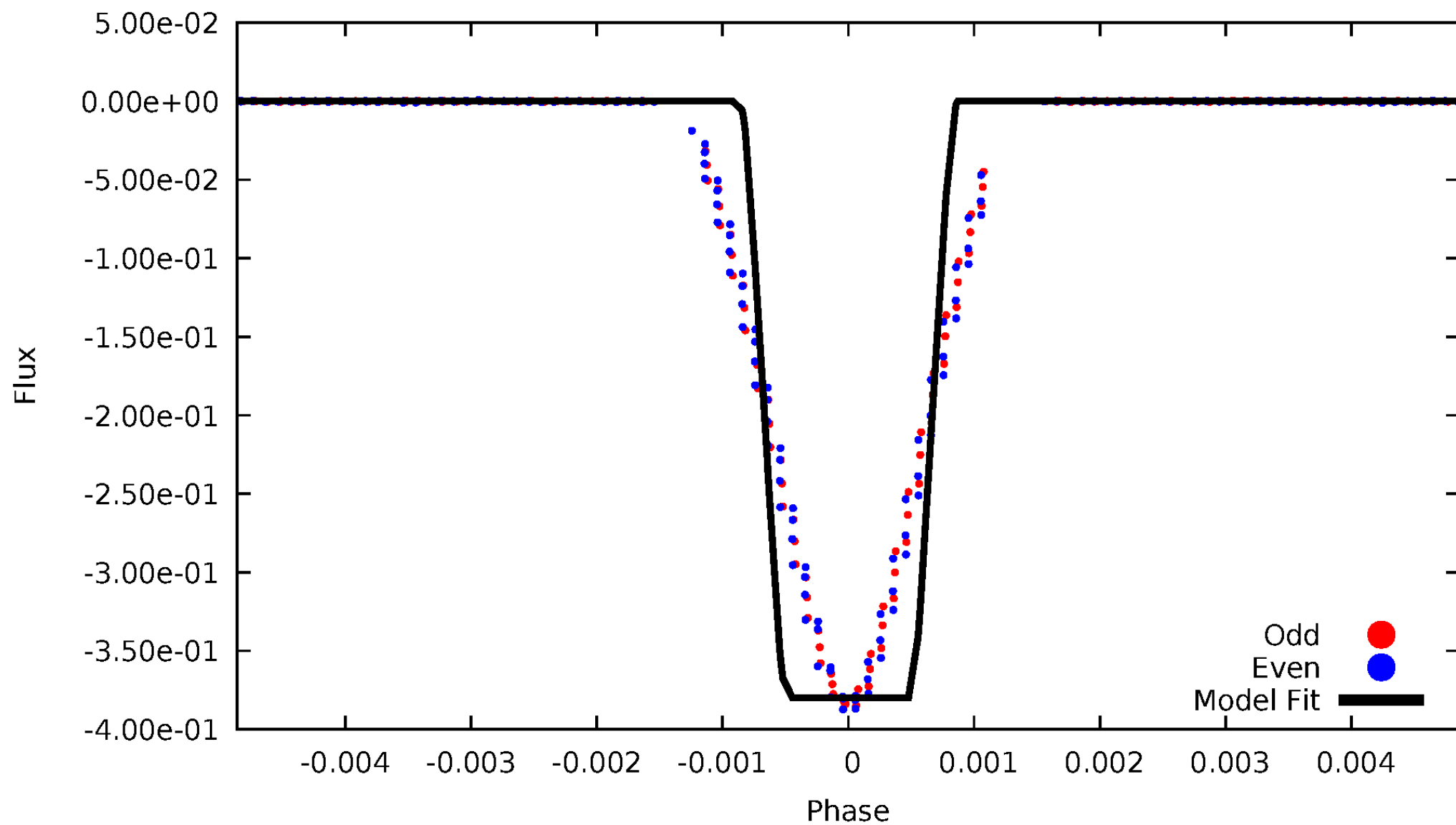
# DV Odd/Even

TCE 009656397-01



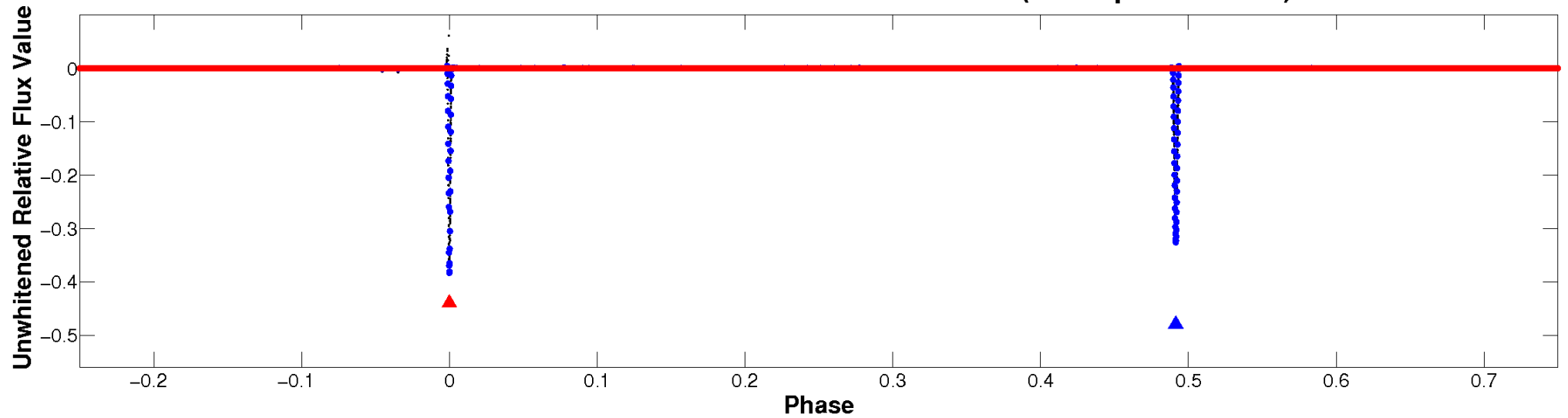
# ALT Odd/Even

TCE 009656397-01

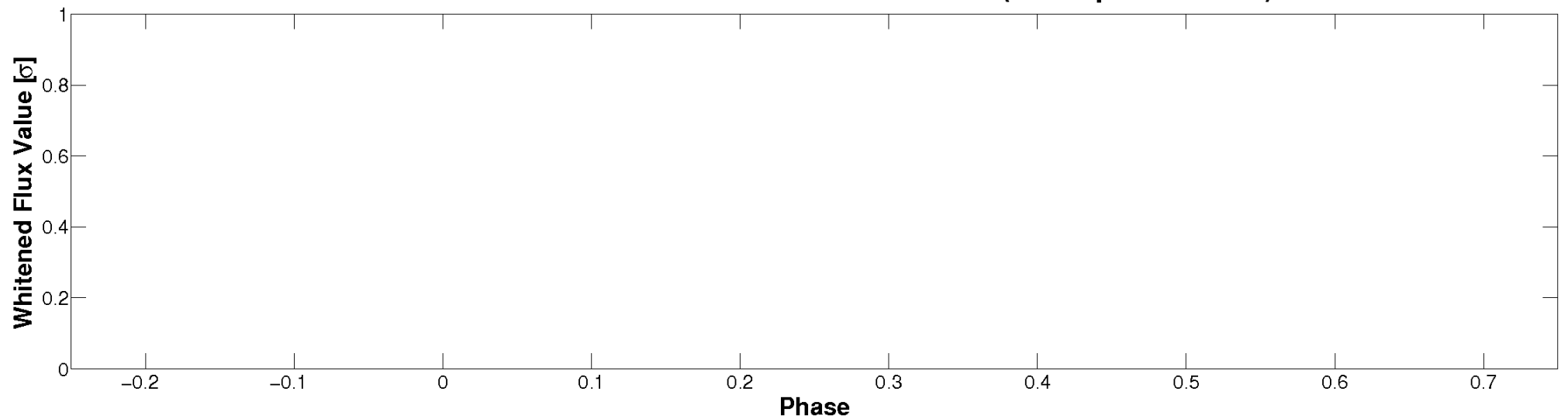


# Non-Whitened Vs. Whitened Light Curve

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

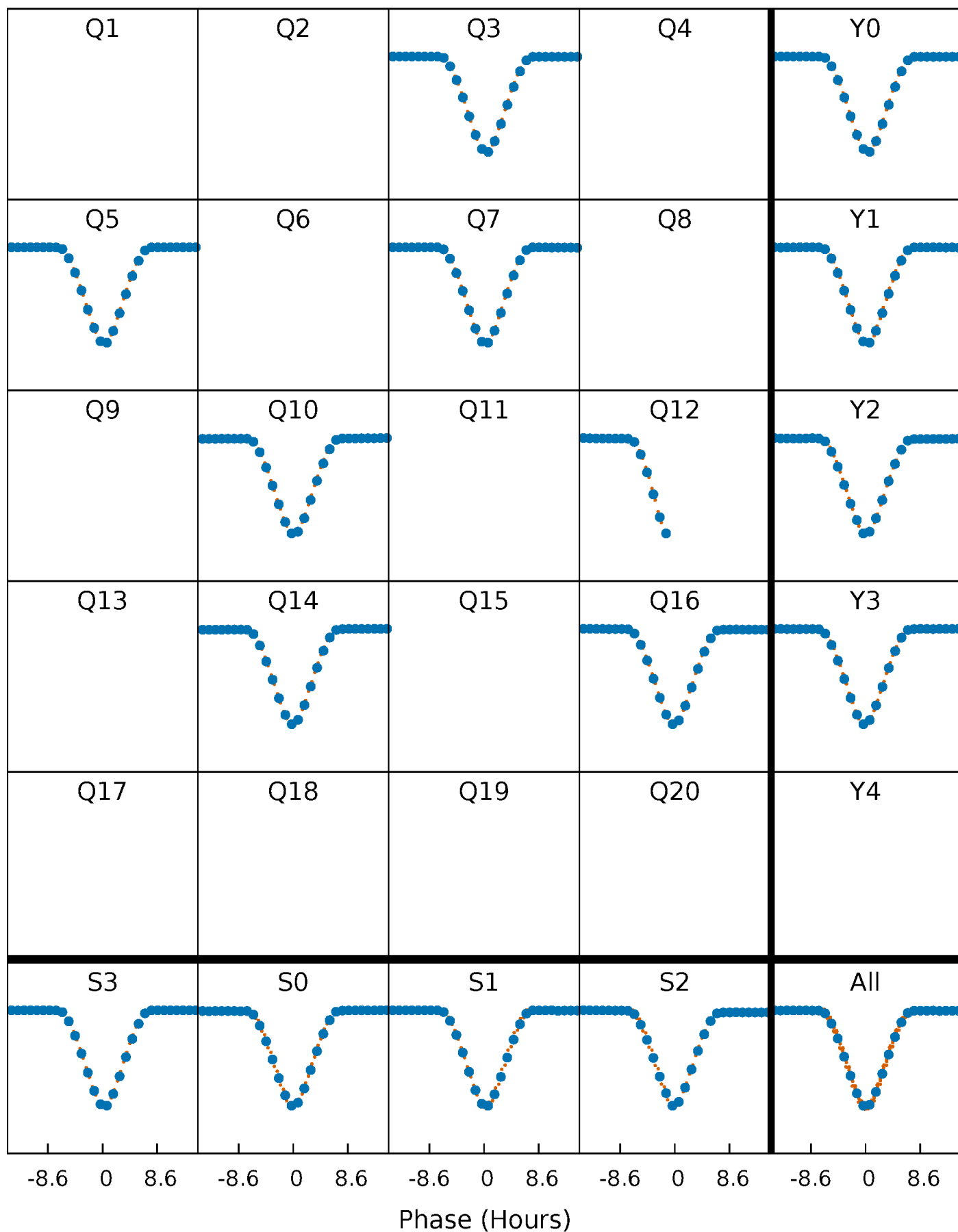


**Planet 1 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



# PDC Quarter-Phased Transit Curves

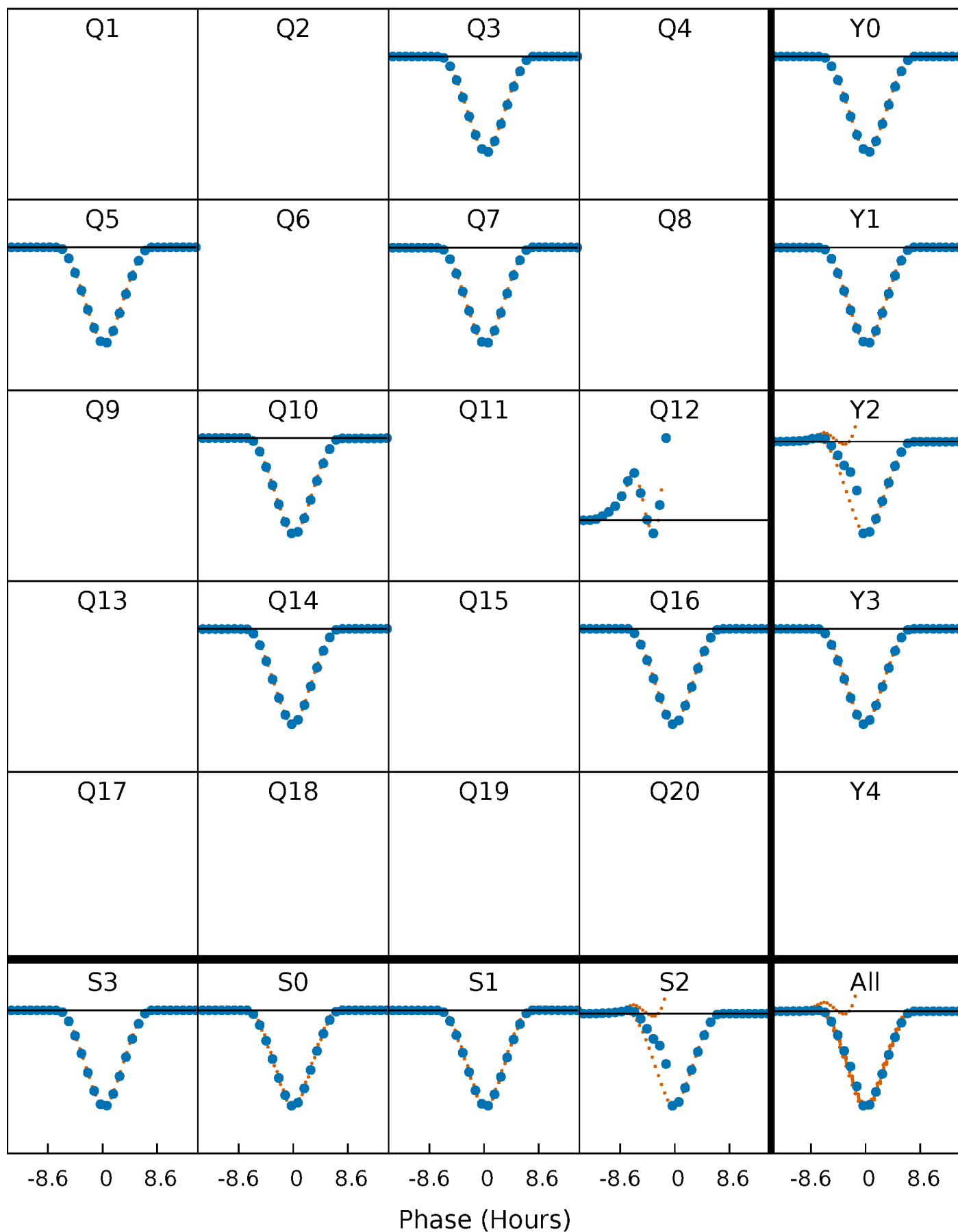
TCE 009656397-01 P=204.744271 Days  $T_0=306.980785$  (BKJD)





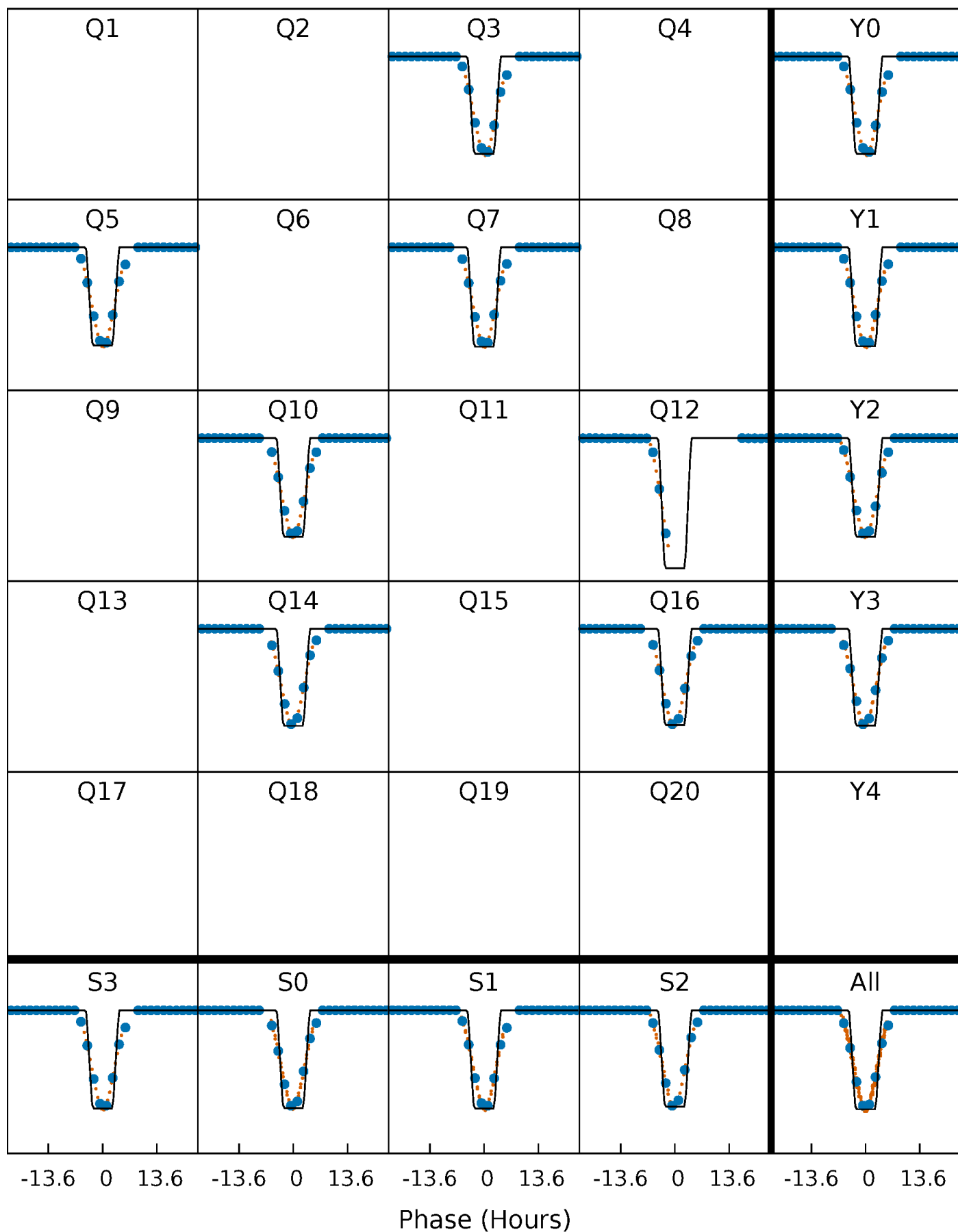
# DV Quarter-Phased Transit Curves

TCE 009656397-01   P=204.744271 Days    $T_0=306.980785$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

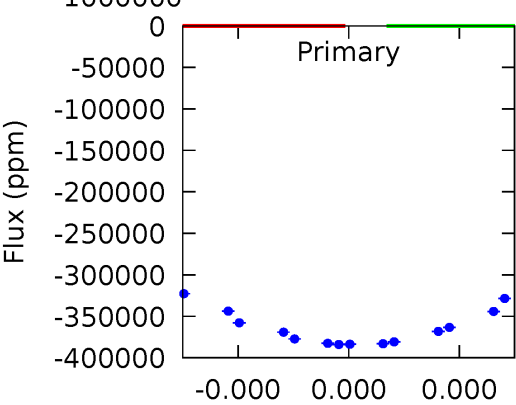
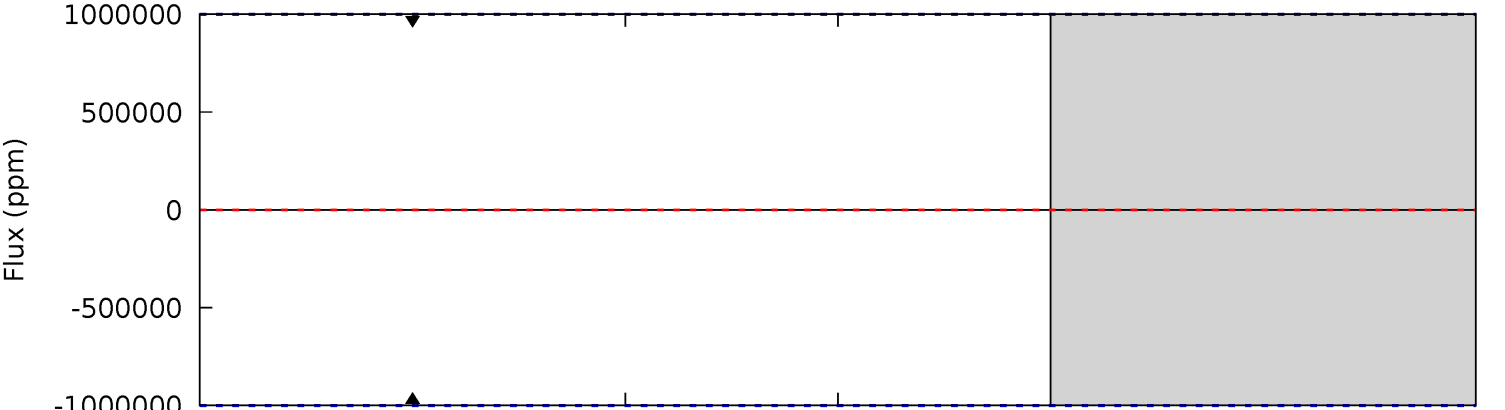
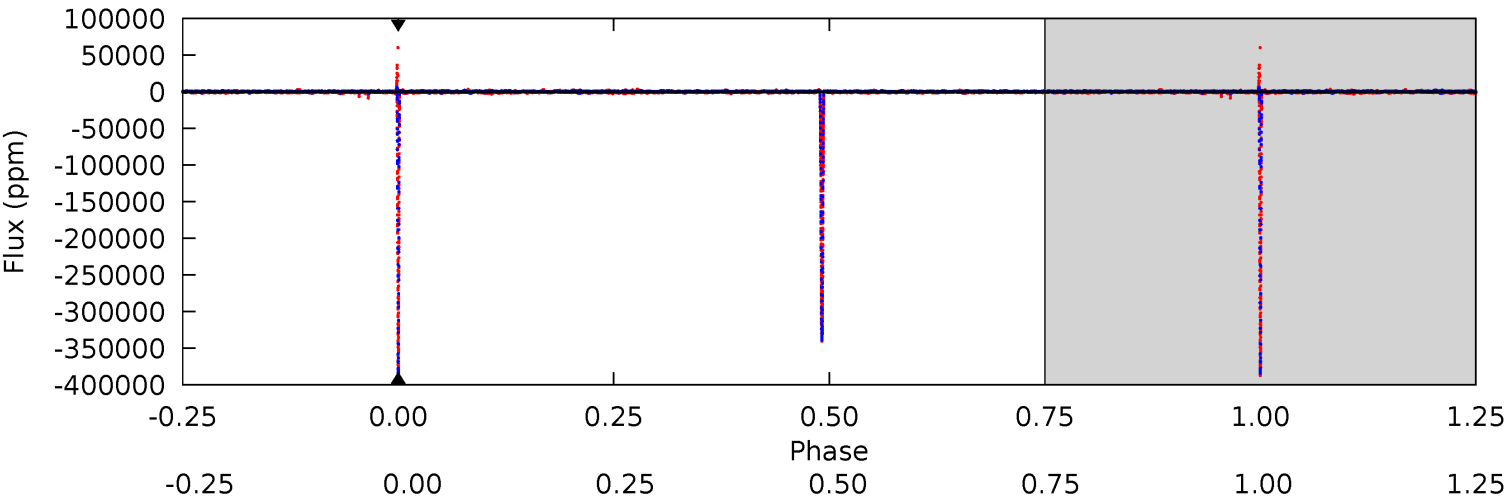
TCE 009656397-01 P=204.744271 Days  $T_0=306.983743$  (BKJD)



# DV Model-Shift Uniqueness Test

009656397-01, P = 204.744271 Days, E = 102.236514 Days

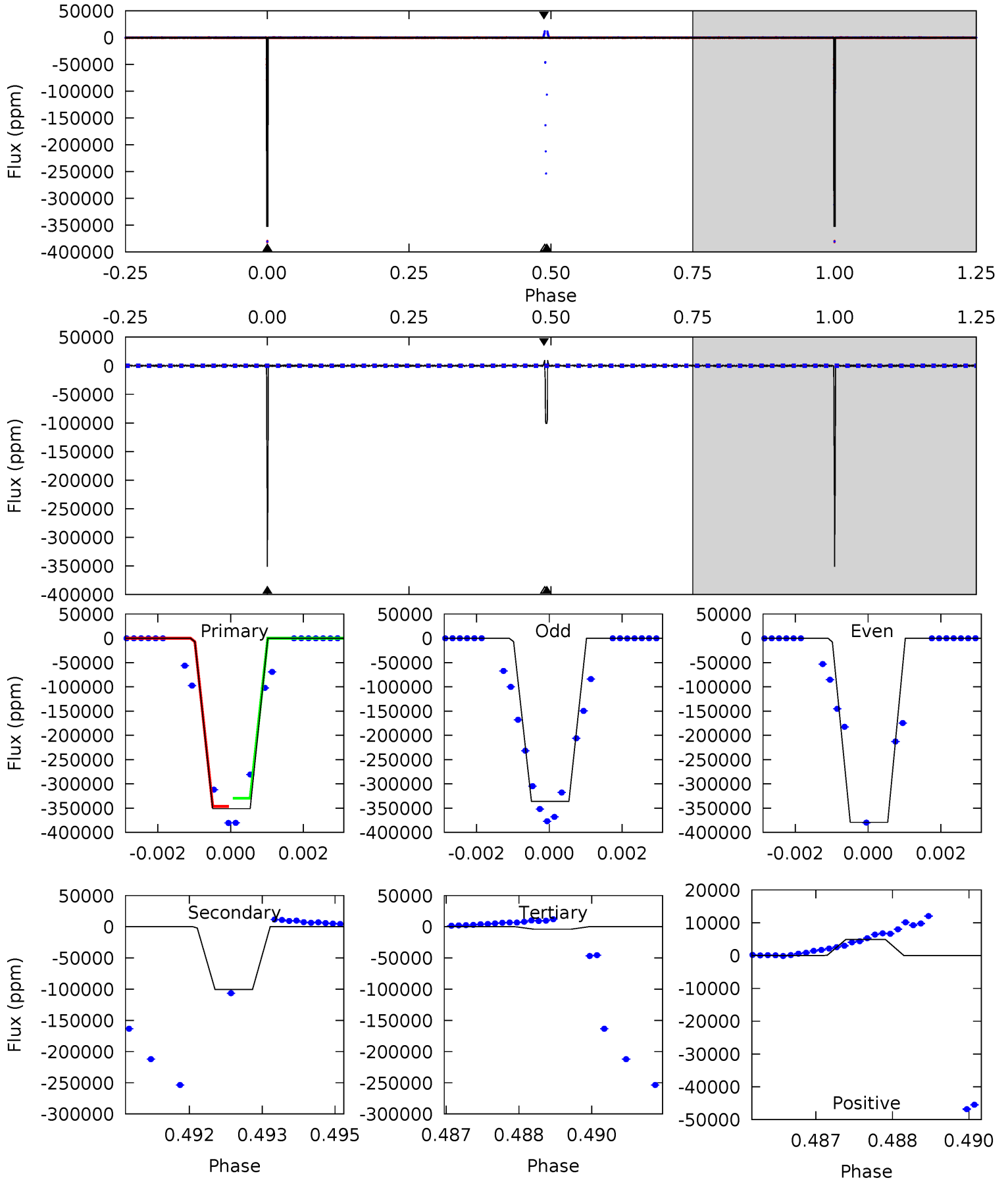
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

009656397-01, P = 204.744271 Days, E = 102.239472 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
935.2	267.8	10.6	13.1	5.35	3.14	1.62	924.6	922.0	257.2	254.7	89.2	0.99	0.03	0



### Stellar Parameters For KIC 009656397

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6517^{+155}_{-214}$	$4.211^{+0.153}_{-0.187}$	$-0.120^{+0.250}_{-0.300}$	$1.440^{+0.439}_{-0.293}$	$1.234^{+0.188}_{-0.188}$	$0.582^{+0.499}_{-0.283}$
	+2%/-3%	+4%/-4%	+208%/-250%	+30%/-20%	+15%/-15%	+86%/-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 009656397-01 / KOI 3543.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$57.71^{+19.89}_{-17.30}$	$563^{+44}_{-36}$	$-1945^{+8418}_{-3967}$	$-1.875^{+10892.674}_{-8712.684}$
Alt.	$-100577 \pm 376$	$95.99^{+23.99}_{-17.97}$	$564^{+43}_{-36}$	$4897^{+387}_{-328}$	$3485^{+1851}_{-1182}$

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

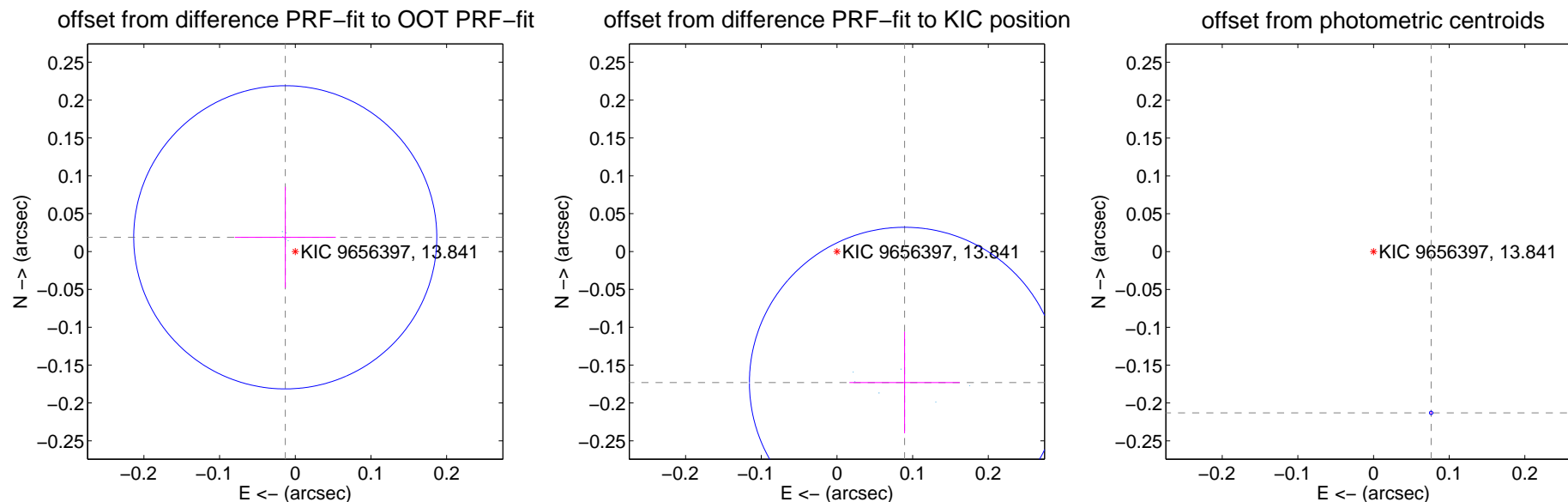
## DV Centroid Data

Supplemental centroid analysis for 009656397-01. Kepler magnitude: 13.84. Transit SNR -1.00

There are 6 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

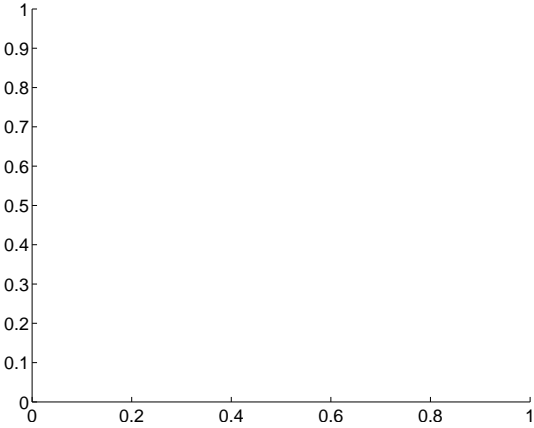
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.023 \pm 0.067$	0.34	$0.013 \pm 0.067$	$0.019 \pm 0.067$
PRF-fit source offset from KIC position	$0.195 \pm 0.068$	2.85	$-0.089 \pm 0.073$	$-0.173 \pm 0.067$
photometric centroid source offset	$0.23 \pm 0.00$	296.61	$-0.08 \pm 0.00$	$-0.21 \pm 0.00$



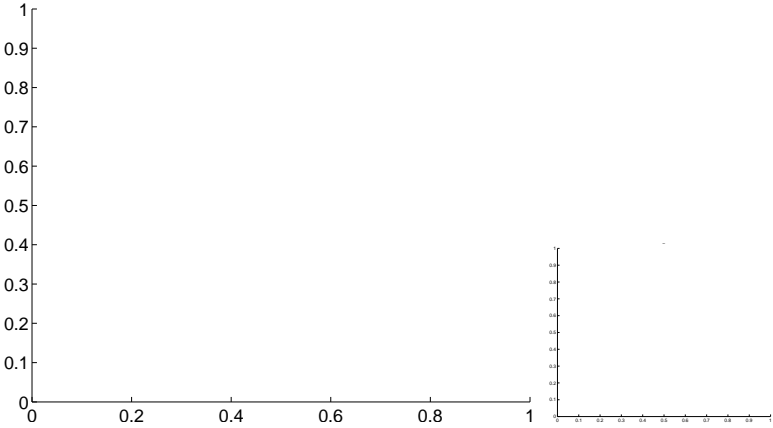
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

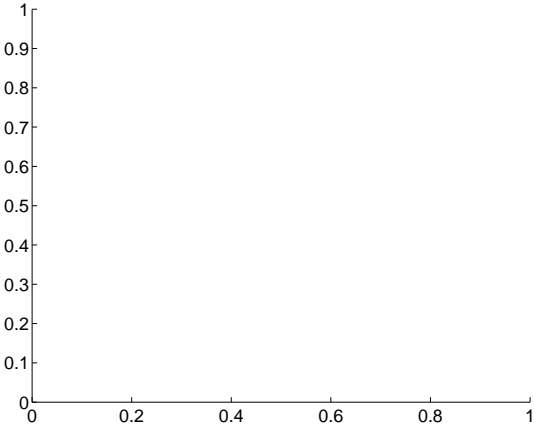
Q1 no difference image



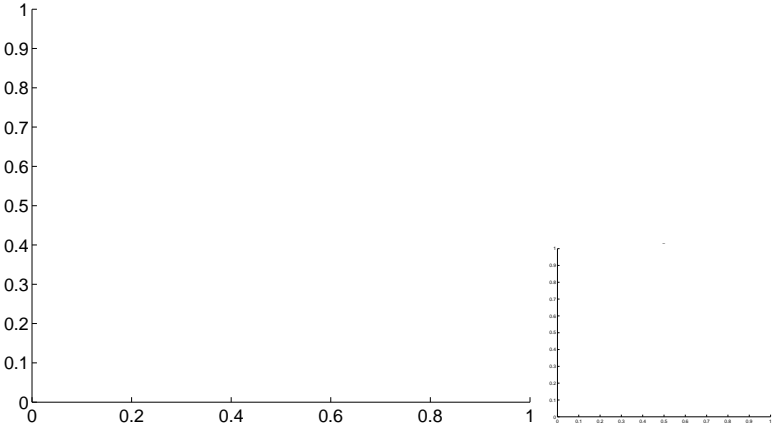
Q1 no OOT image



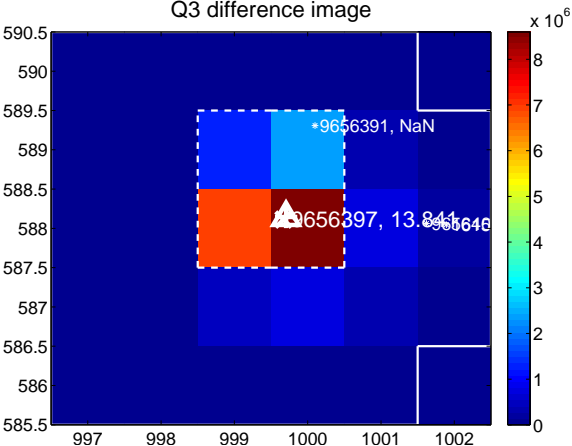
Q2 no difference image



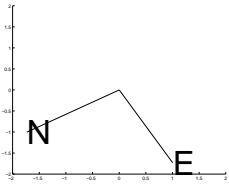
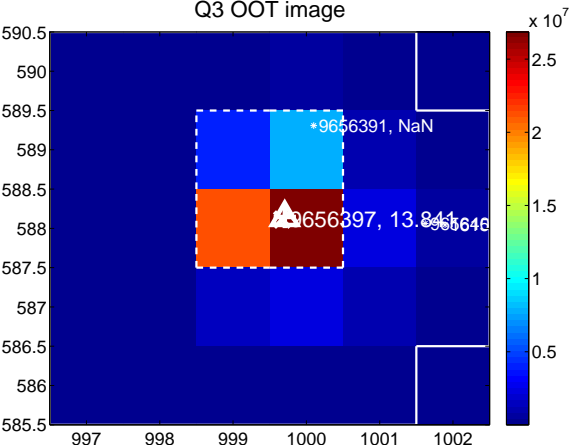
Q2 no OOT image



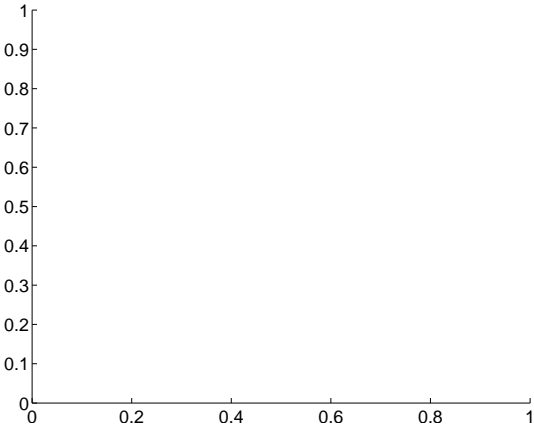
Q3 difference image



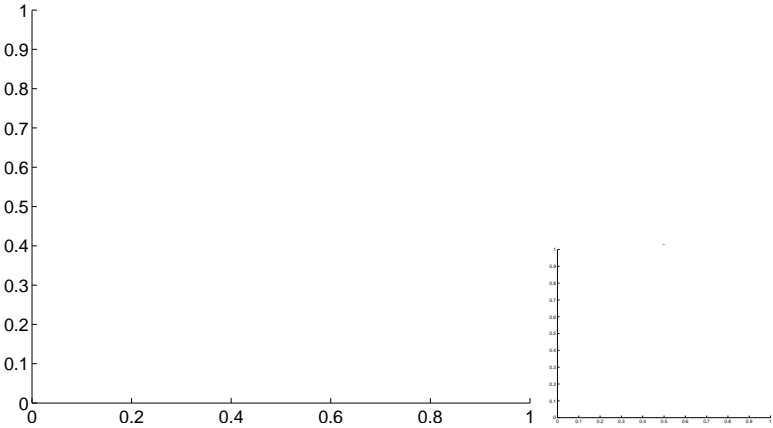
Q3 OOT image



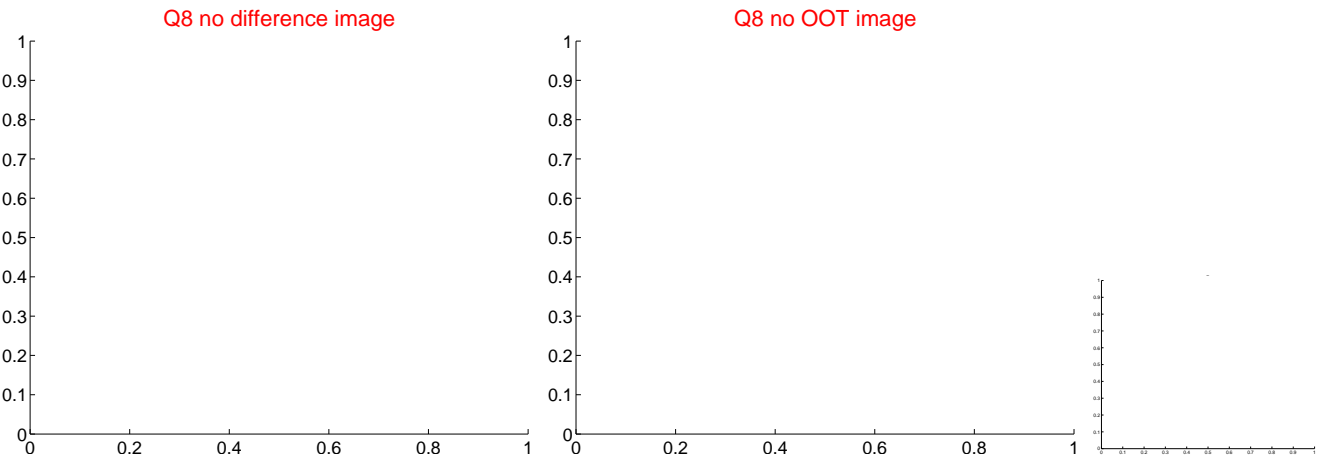
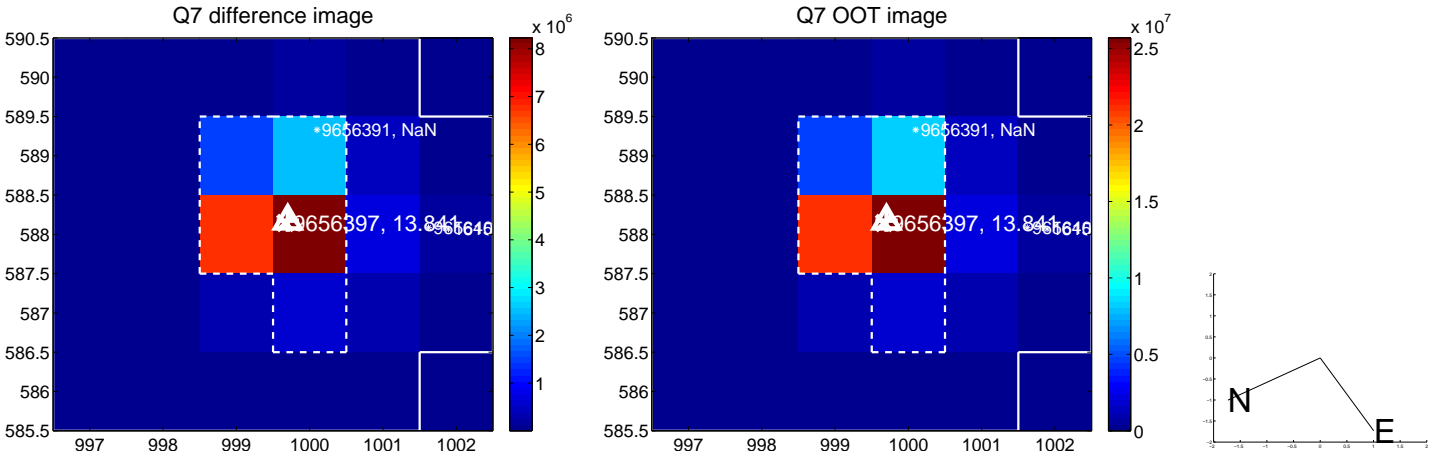
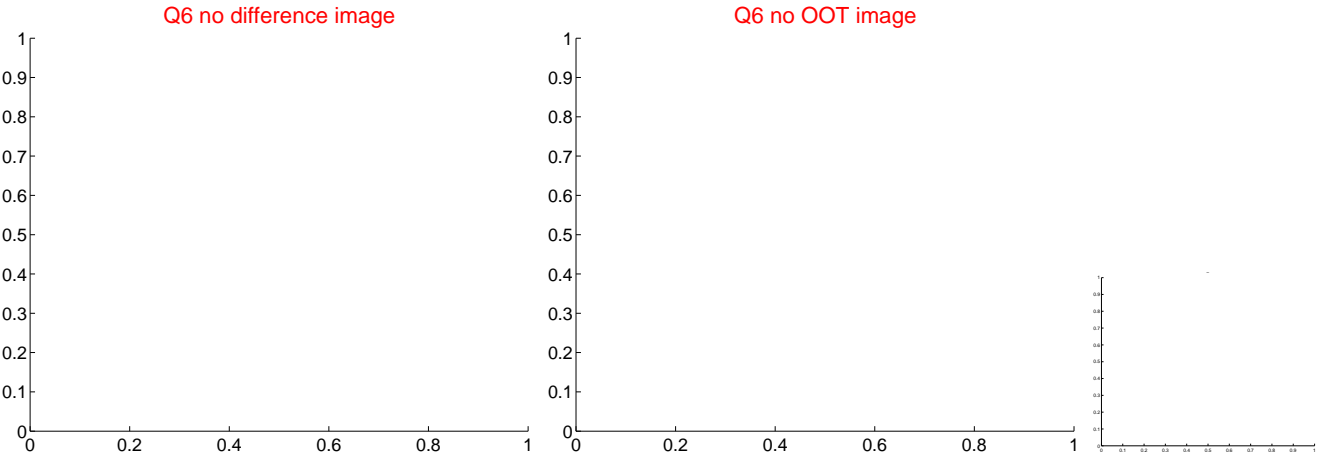
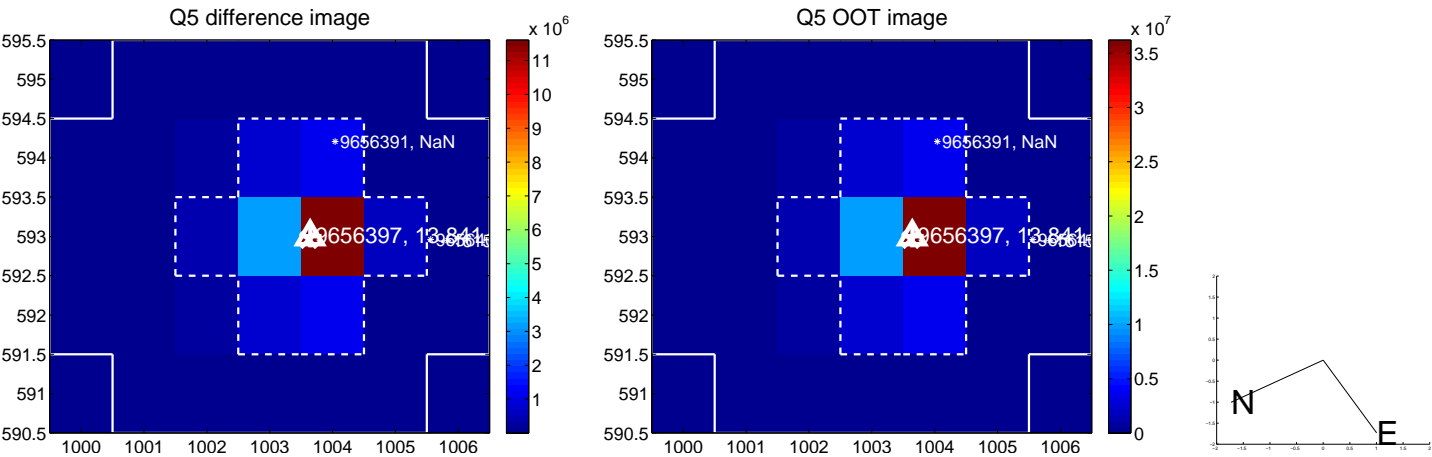
Q4 no difference image



Q4 no OOT image



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



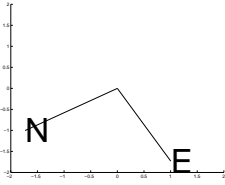
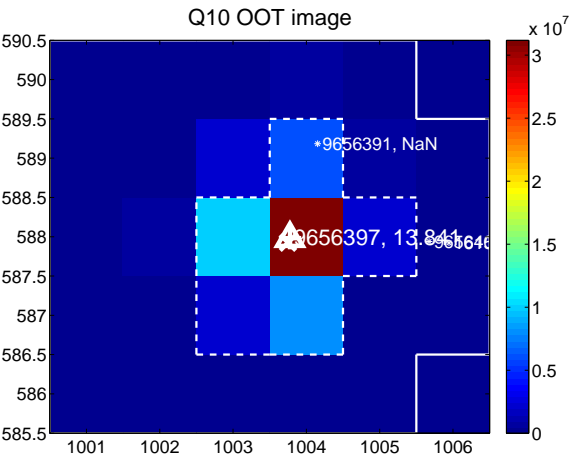
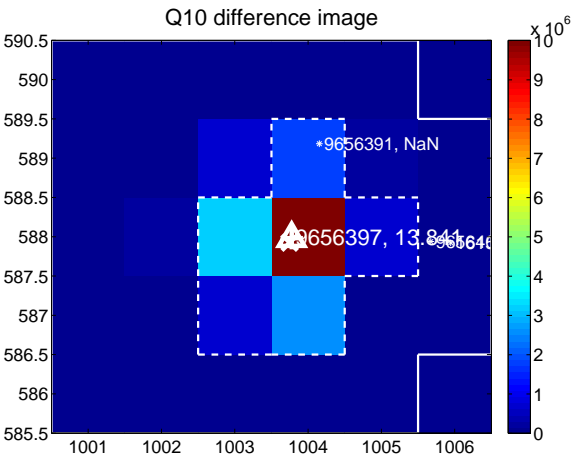
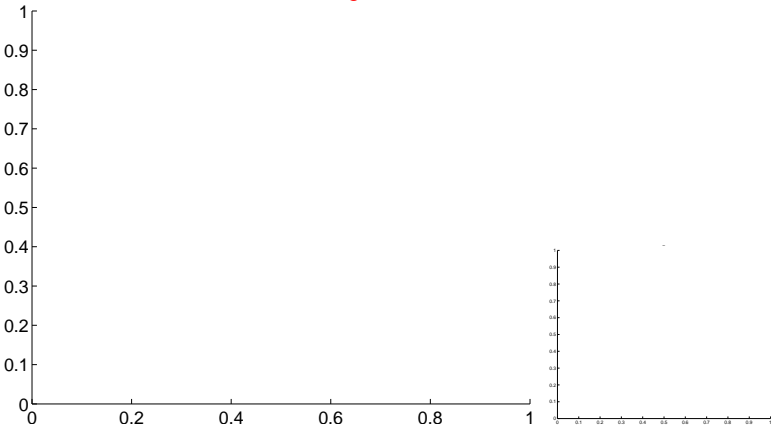


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

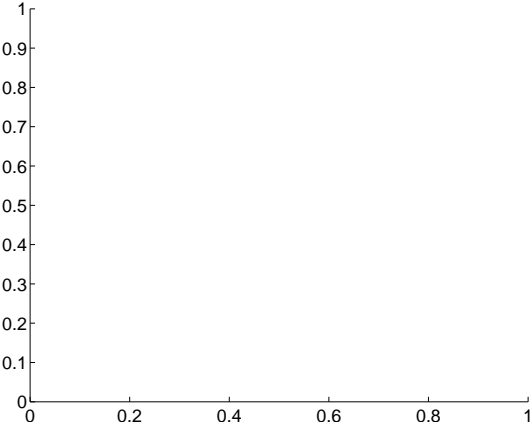
Q9 no difference image



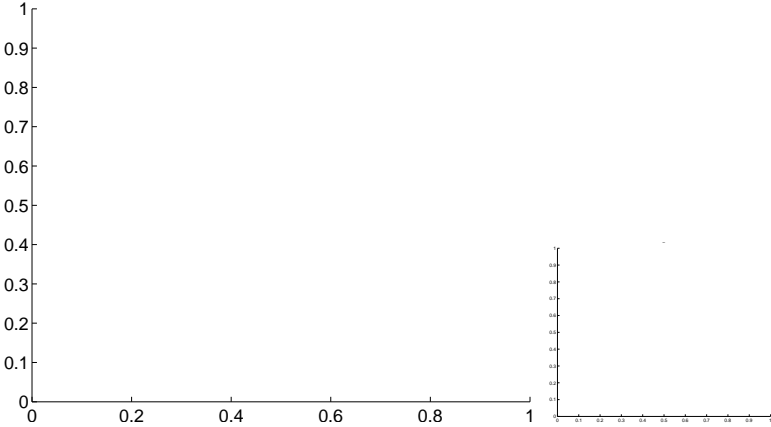
Q9 no OOT image



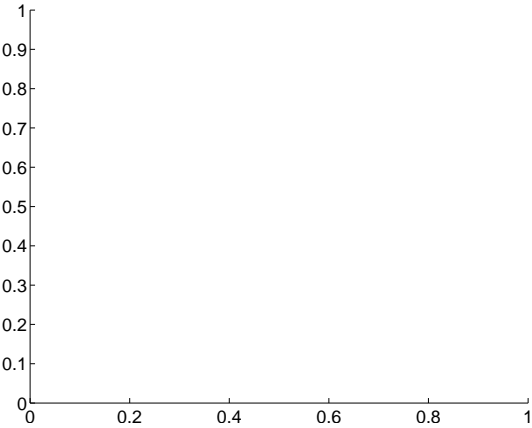
Q11 no difference image



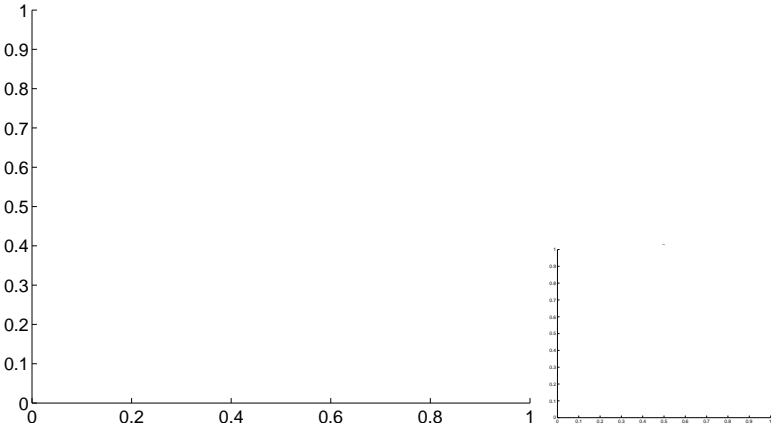
Q11 no OOT image



Q12 no difference image

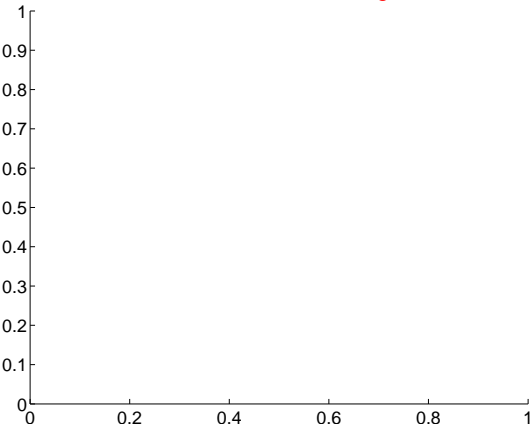


Q12 no OOT image

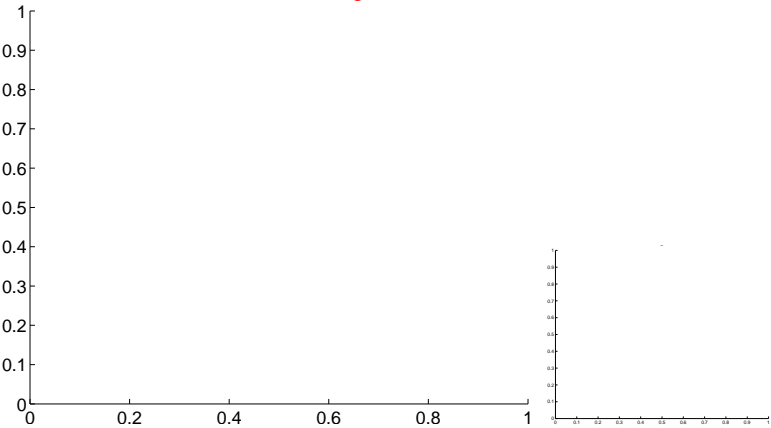


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

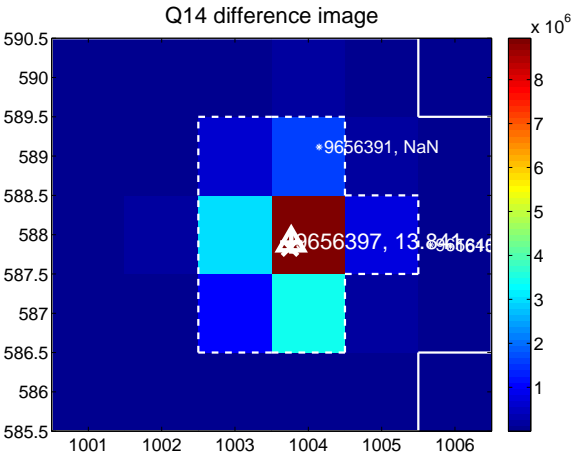
Q13 no difference image



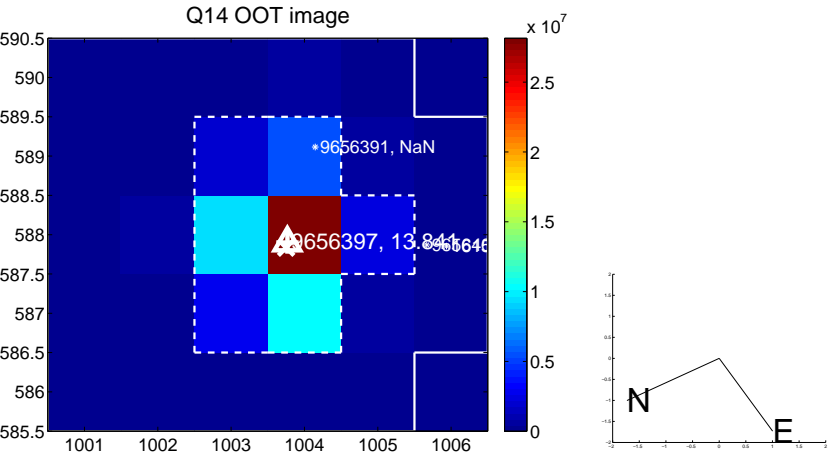
Q13 no OOT image



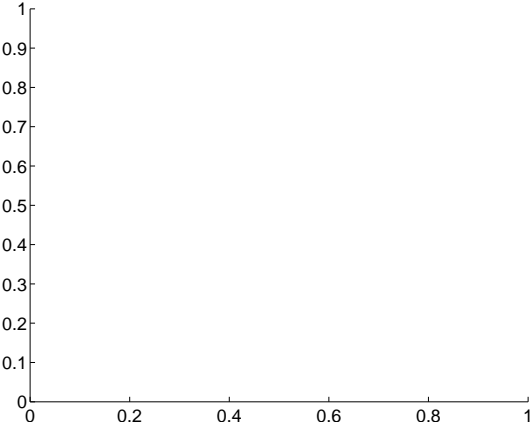
Q14 difference image



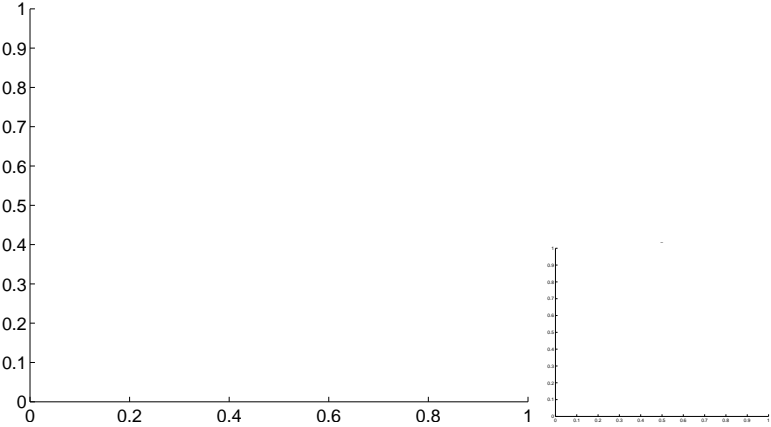
Q14 OOT image



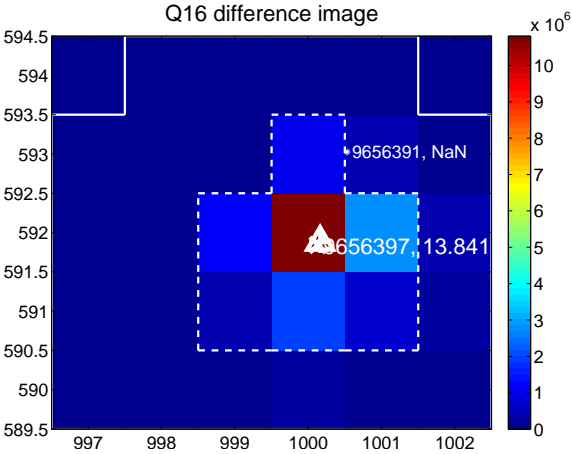
Q15 no difference image



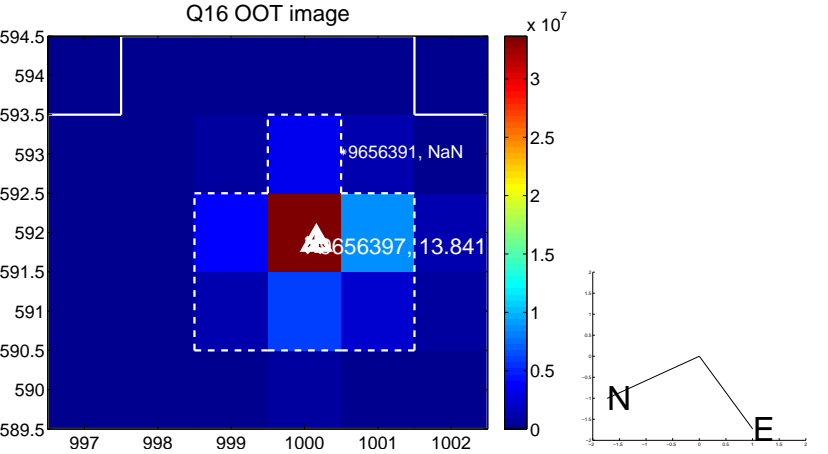
Q15 no OOT image



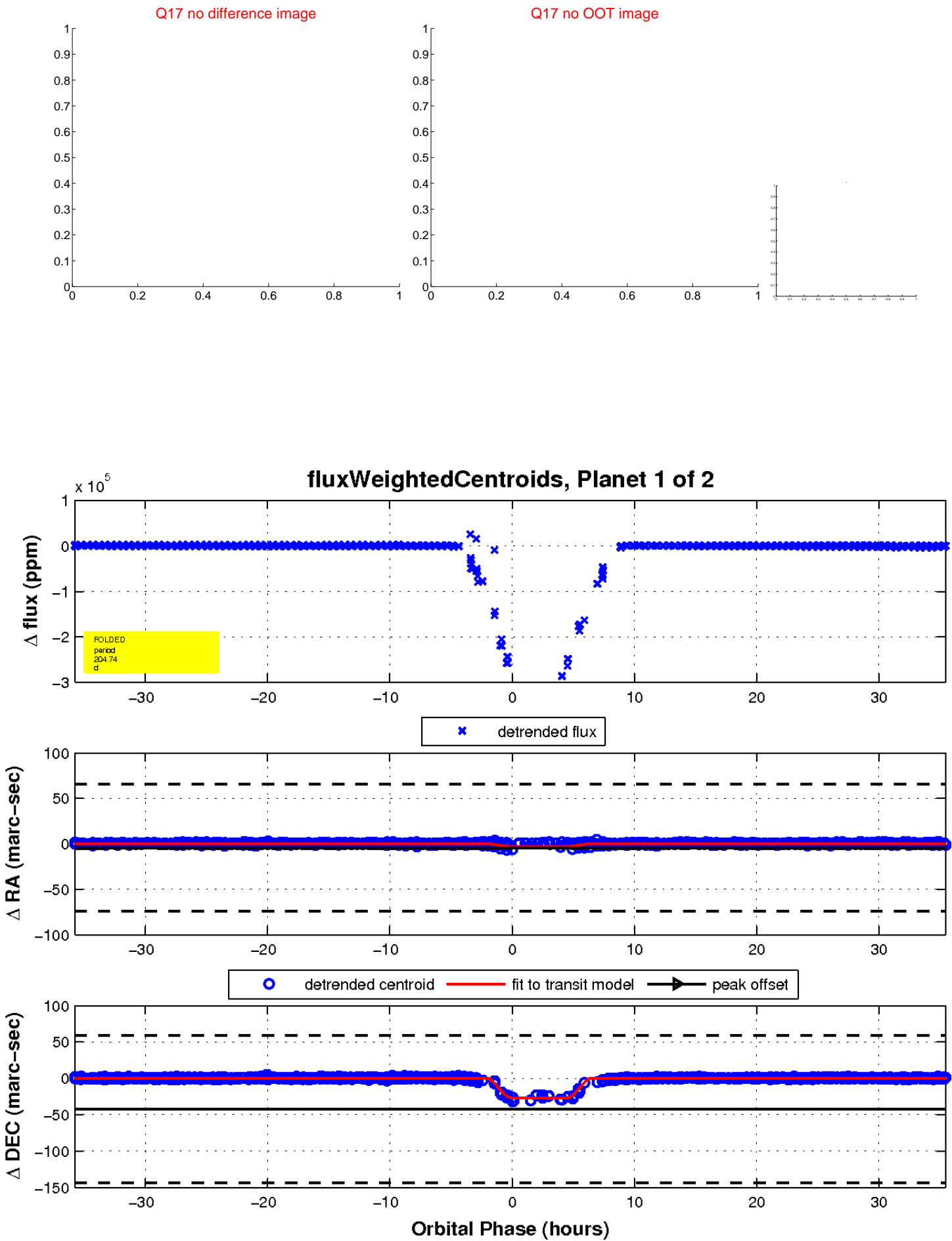
Q16 difference image



Q16 OOT image

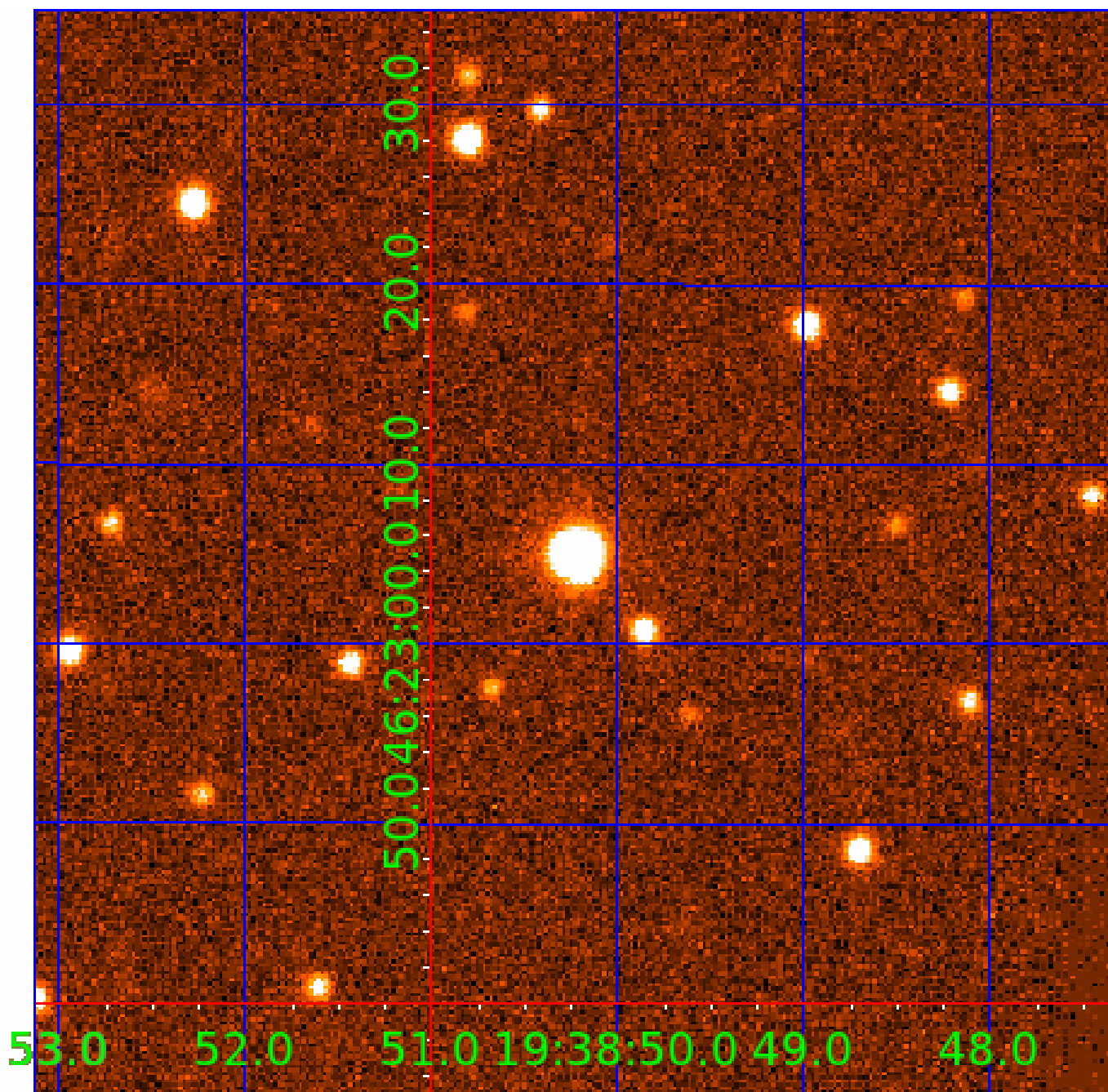


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009656397

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009656397-01	OBS	3543.01	204.744271	306.980785	386473.2	7.500	6095.6	-1.0	1.44	6517	57.57	6.32
009656397-02	OBS	No	204.737460	202.878608	338897.9	10.500	3948.5	-1.0	1.44	6517	40.82	6.32

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009656397-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—HAS_SEC_TCE—PERIOD_ALIAS_ALT—CENT_NOFITS
009656397-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_NOFITS

**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 009656397-02

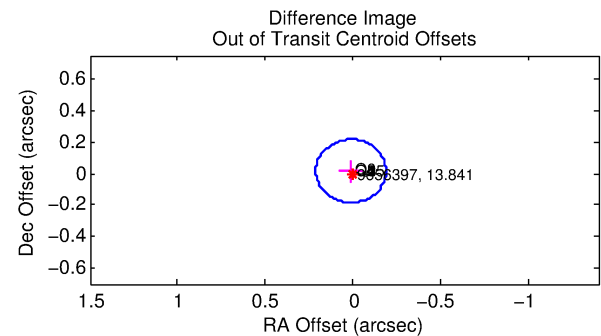
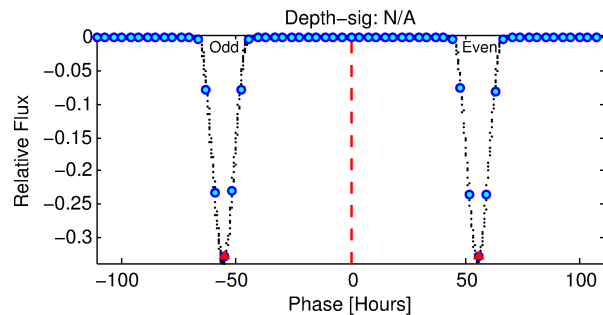
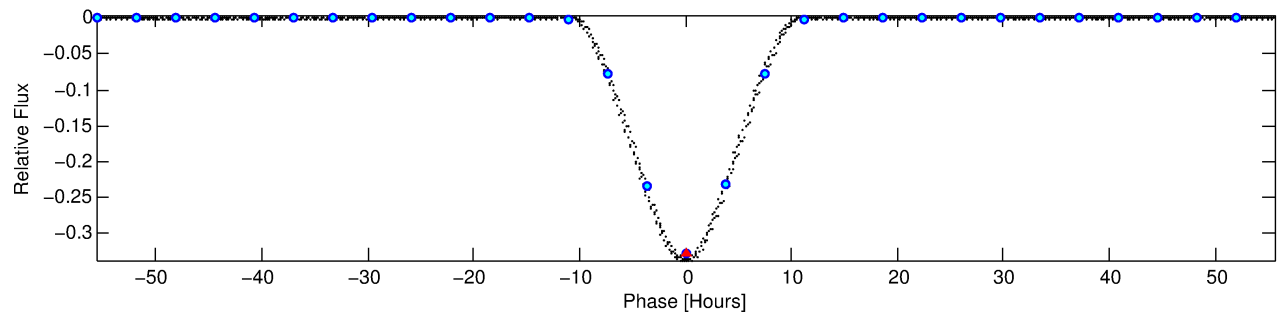
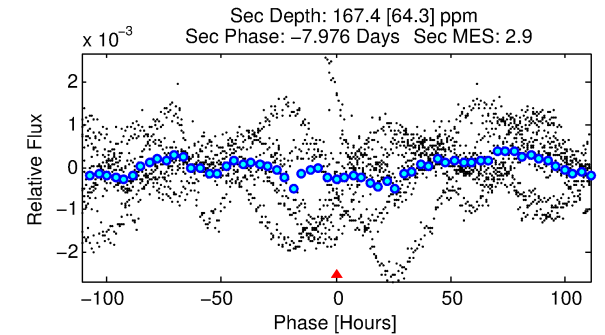
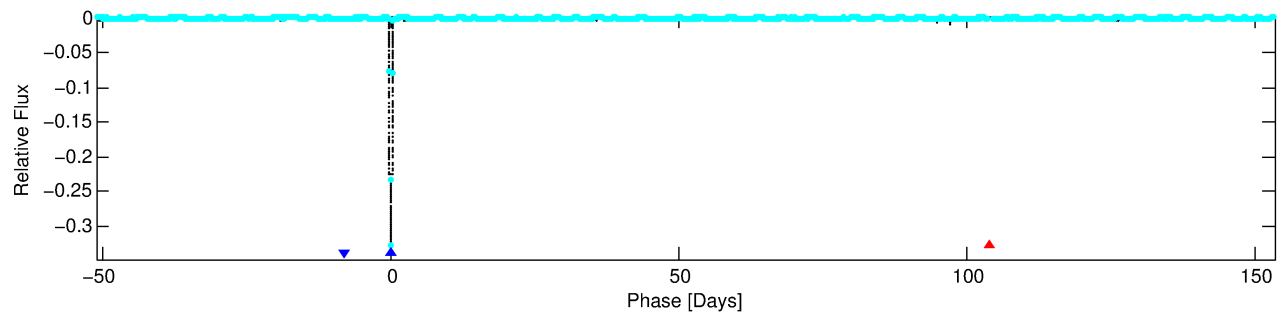
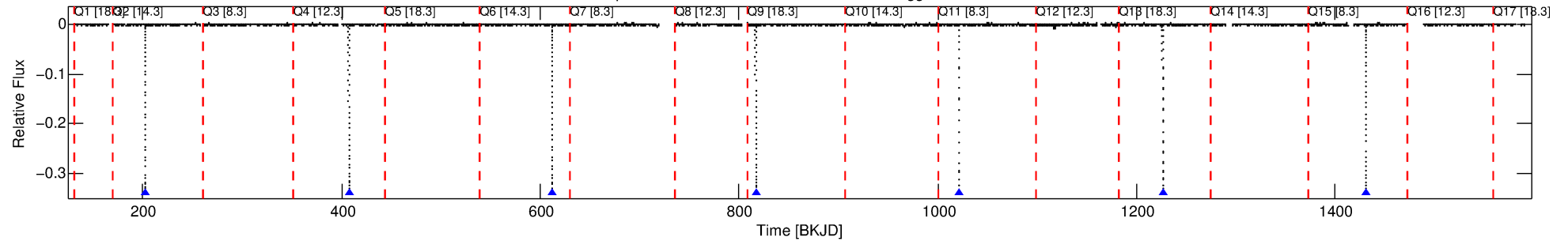
No Significant Match Found

# DV One-Page Summary

KIC: 9656397 Candidate: 2 of 2 Period: 204.737 d

KOI: K03543 Corr: No Ephemeris Match

Kp: 13.84 R\*: 1.44 Rs Teff: 6517.0 K Logg: 4.21 Fe/H: -0.120



## TPS TCE Results:

Period = 204.73746 d  
Epoch = 202.8786 BKJD

DV fit results are unavailable

## DV Diagnostic Results:

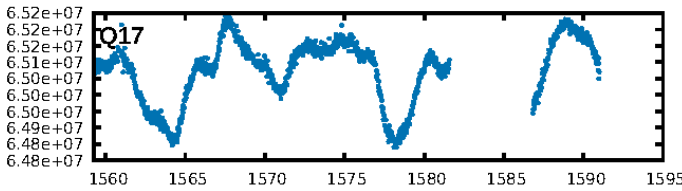
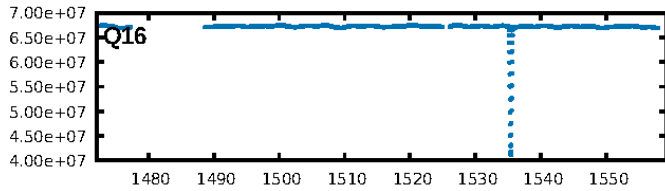
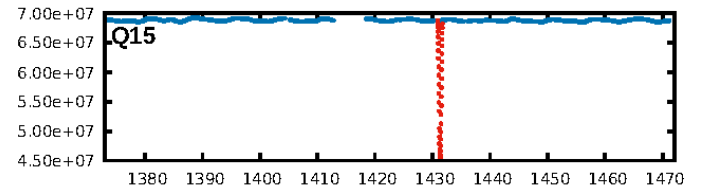
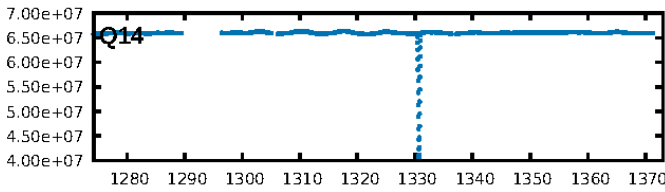
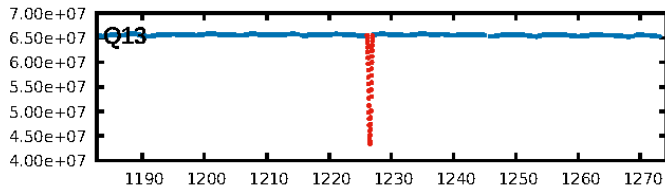
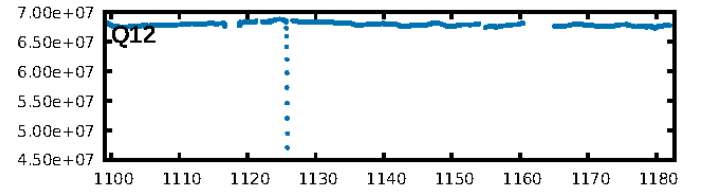
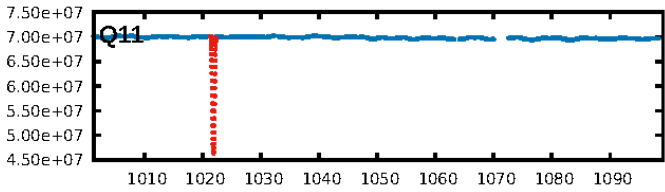
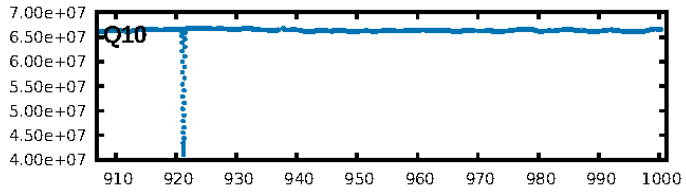
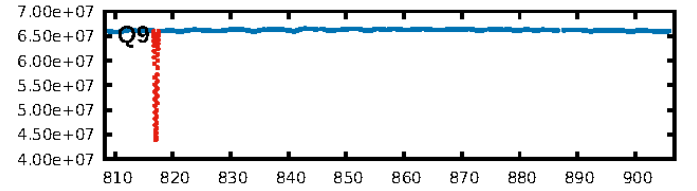
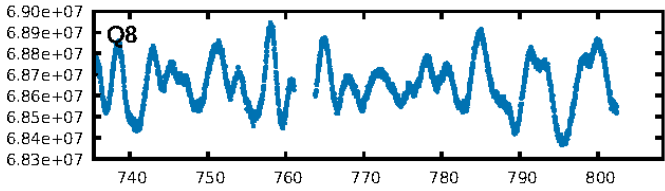
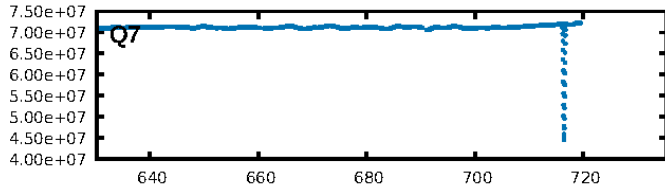
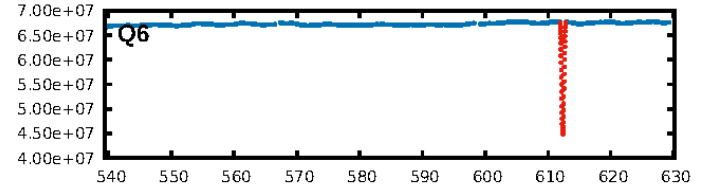
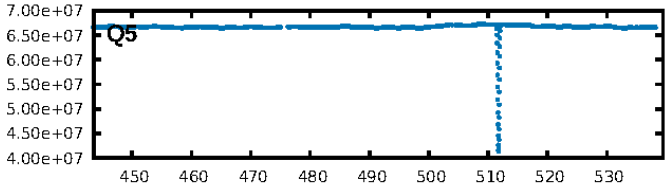
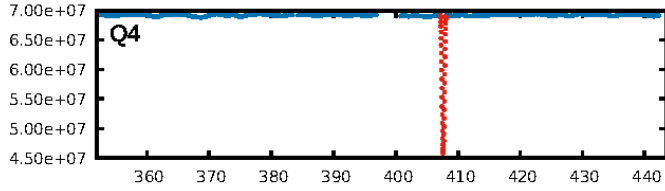
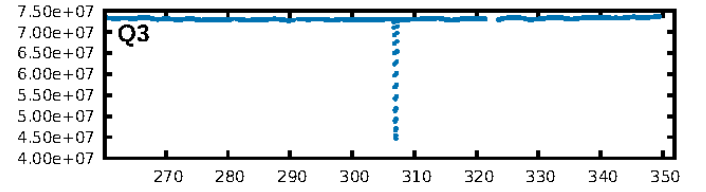
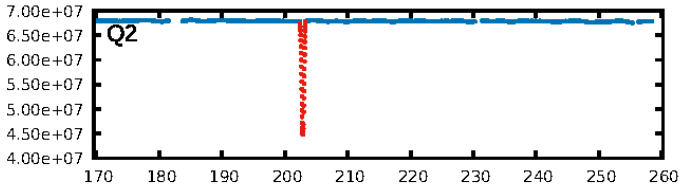
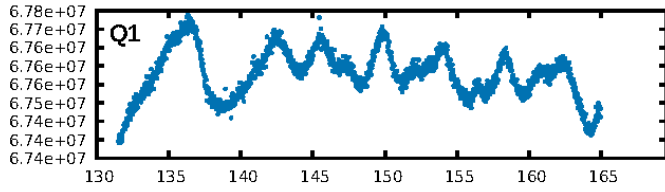
ShortPeriod-sig: N/A  
LongPeriod-sig: 1.0% [0.01σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [7/7]  
GhostDiagnostic-chr: 1.373

Centroid-sig: 0.0%  
Centroid-so: 0.211 arcsec [265.98σ]  
OotOffset-rm: 0.022 arcsec [0.32σ]  
KicOffset-rm: 0.211 arcsec [3.08σ]  
OotOffset-st: 2/1/1/1 [5]  
KicOffset-st: 2/1/1/1 [5]  
DiffImageQuality-fgm: 1.00 [5/5]  
DiffImageOverlap-fno: 1.00 [5/5]

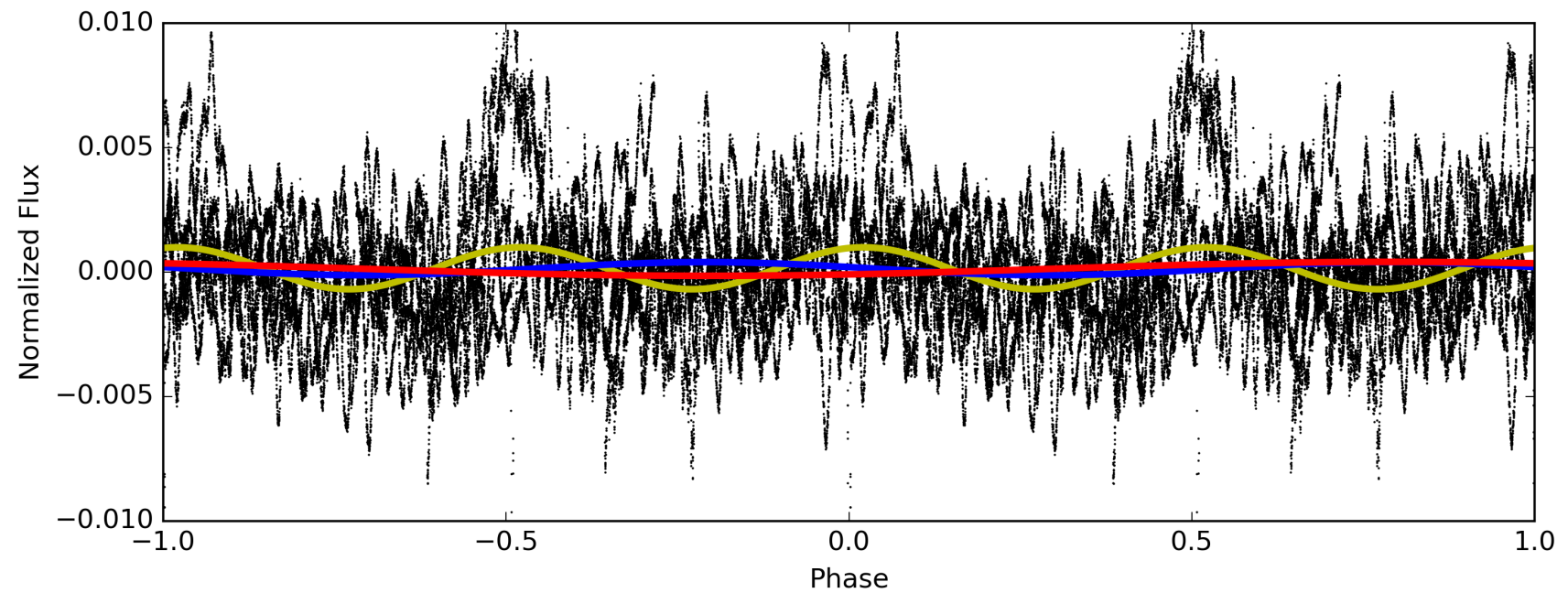
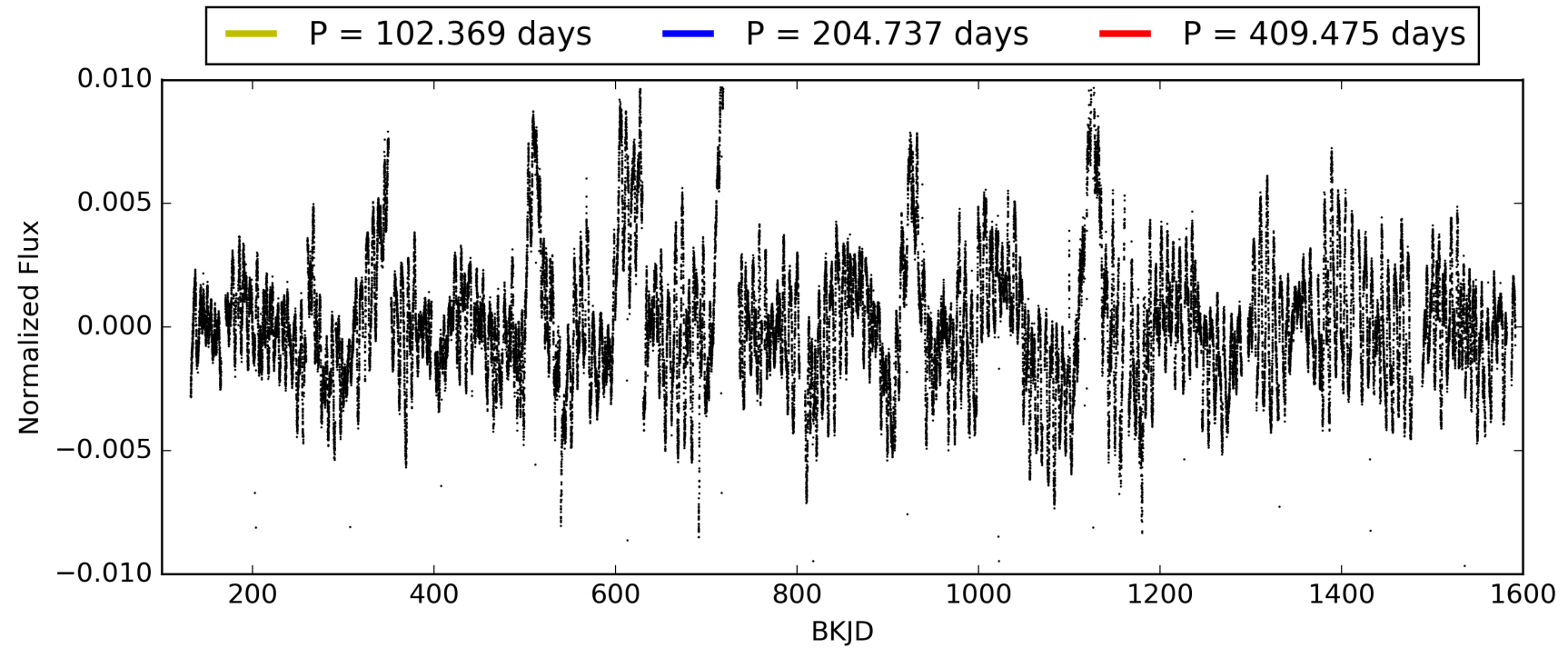
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 13:46:04 Z

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

## TCE 009656397-02, PDC Light Curves



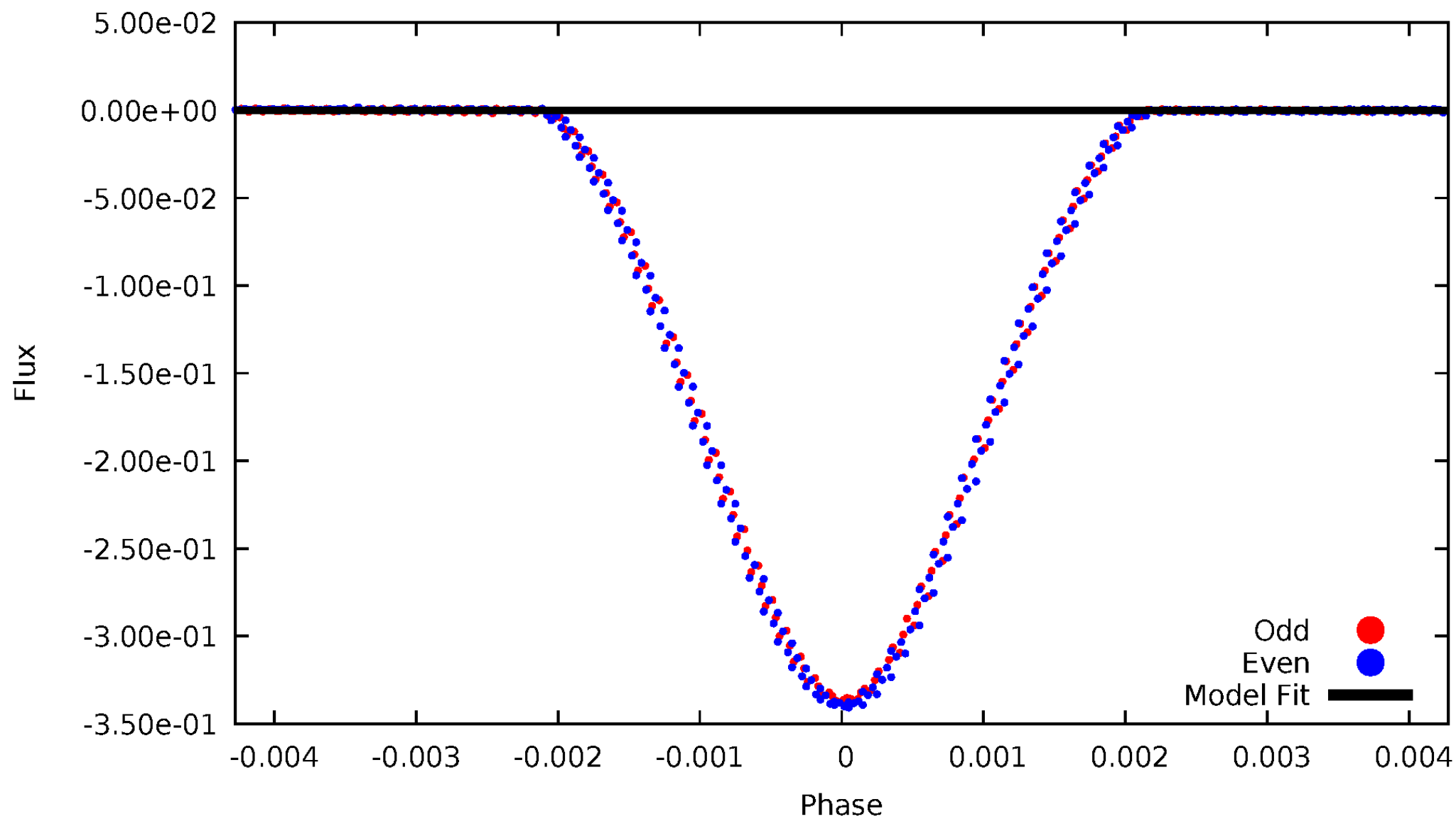
TCE 009656397-02





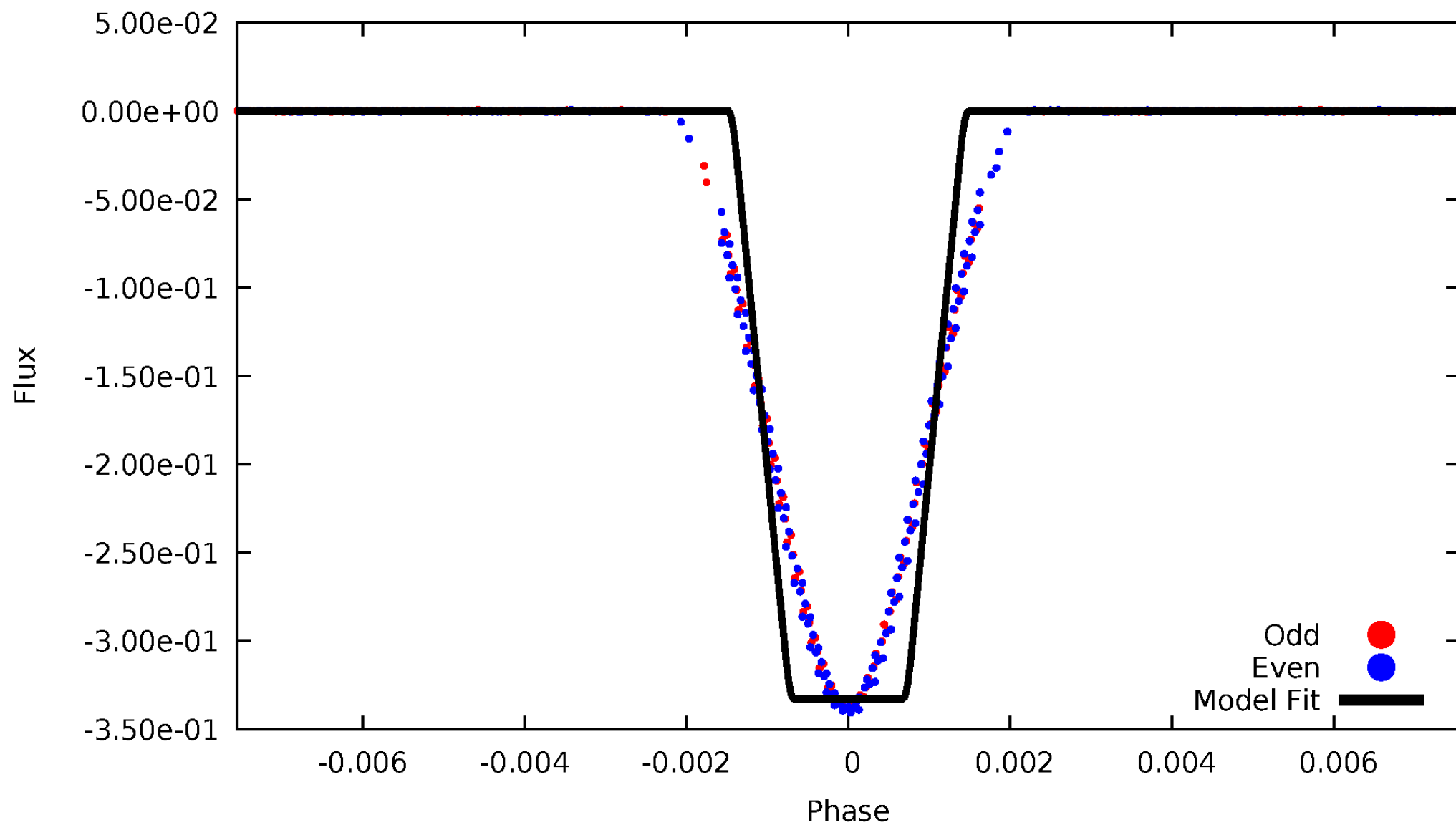
# DV Odd/Even

TCE 009656397-02



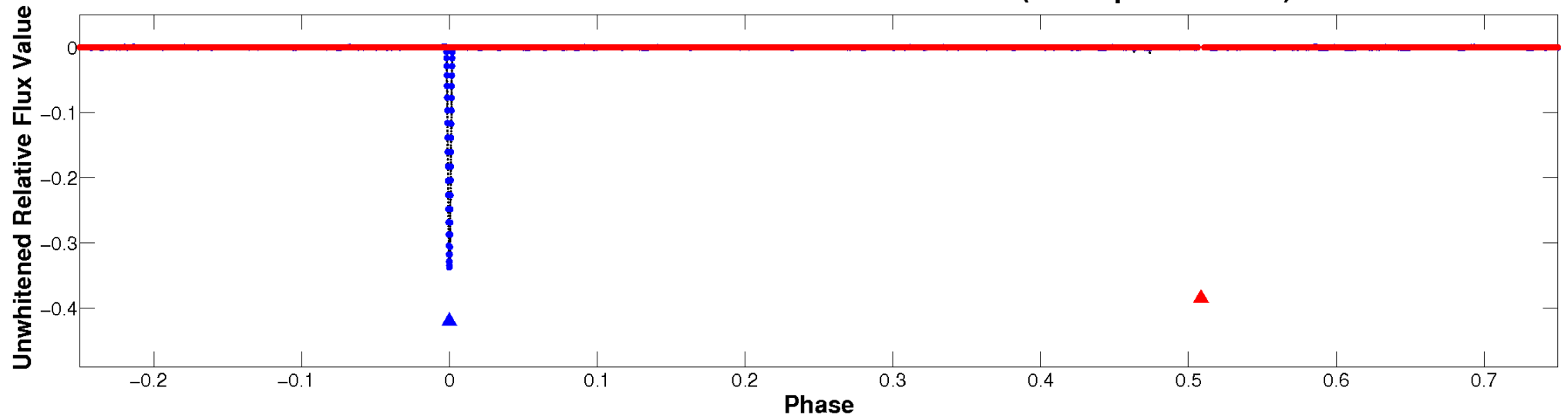
# ALT Odd/Even

TCE 009656397-02

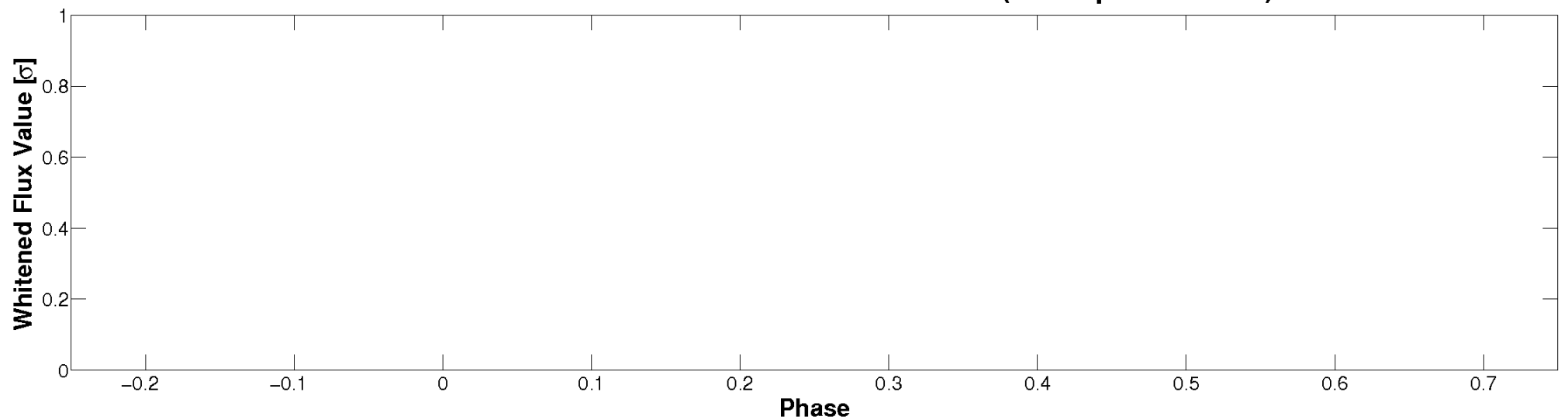


# Non-Whitened Vs. Whitened Light Curve

**Planet 2 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**

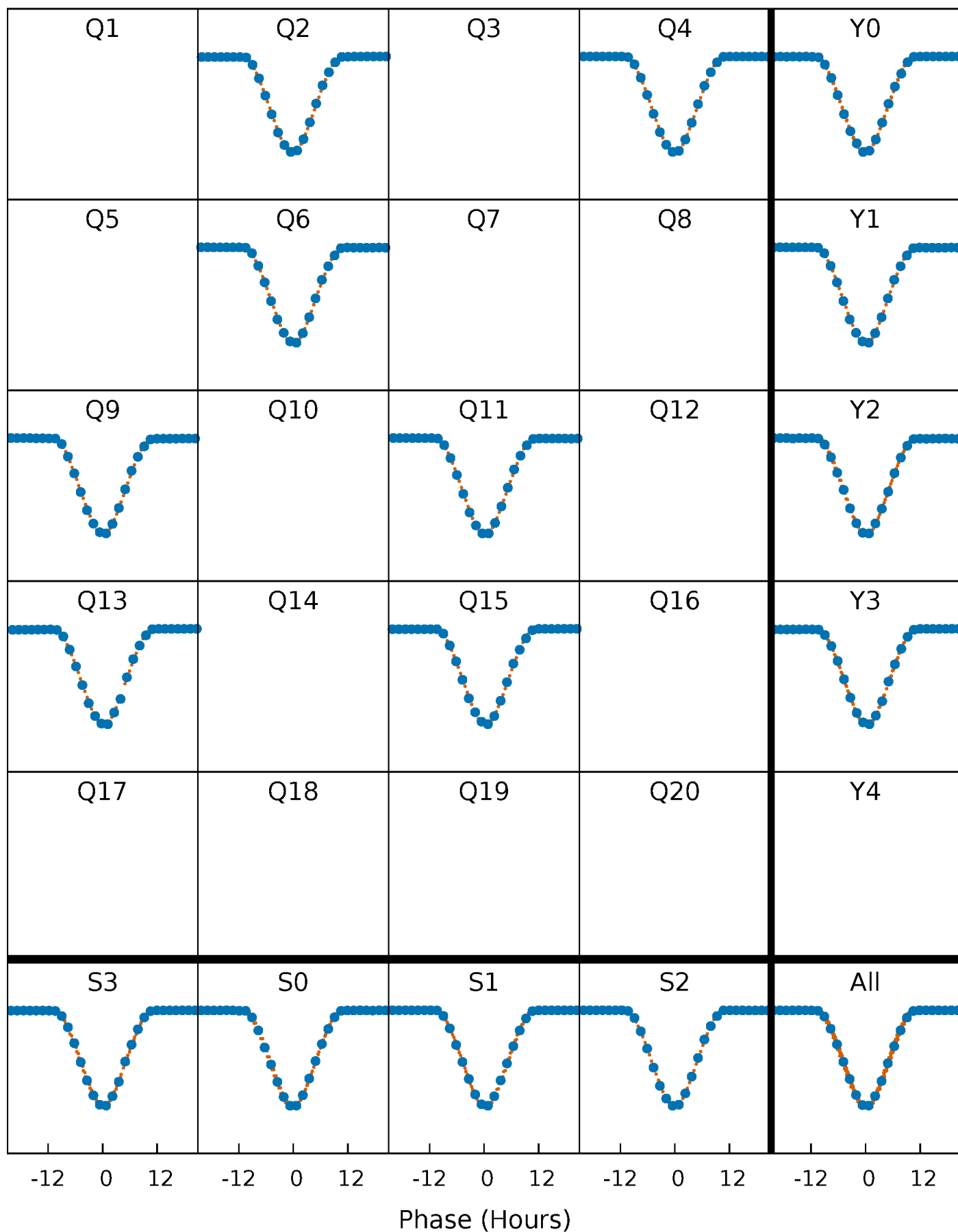


**Planet 2 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



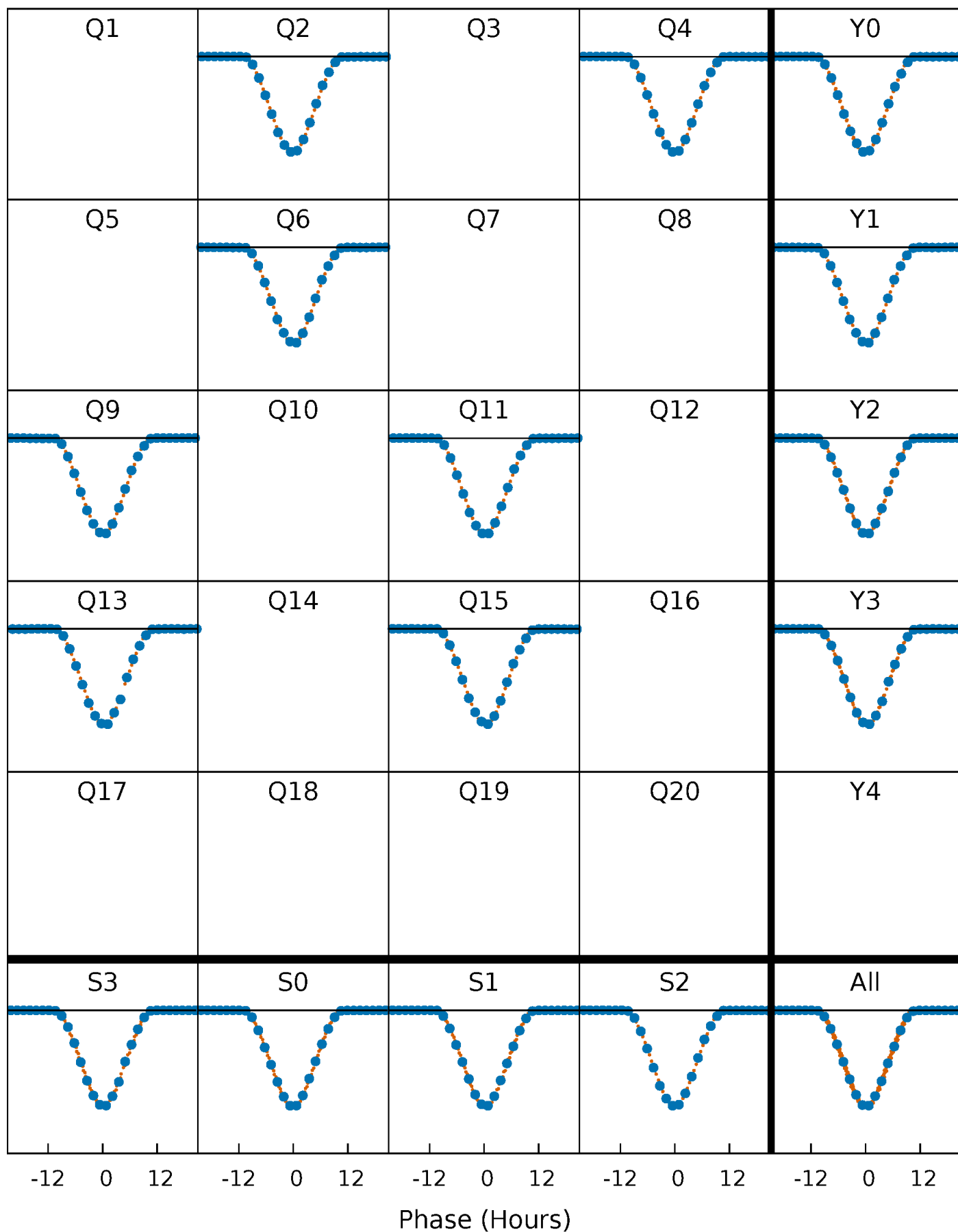
# PDC Quarter-Phased Transit Curves

TCE 009656397-02 P=204.737460 Days  $T_0=202.878608$  (BKJD)



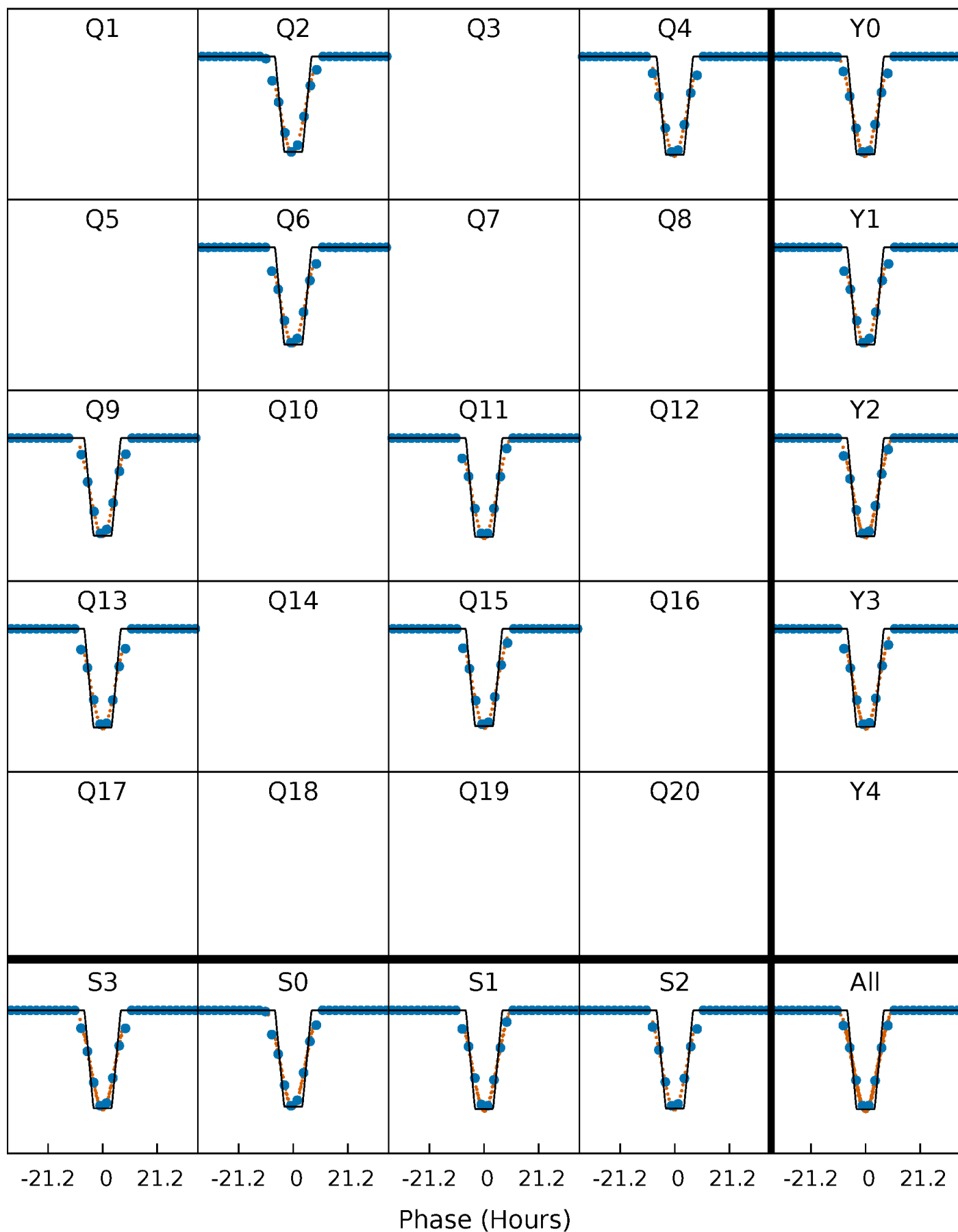
# DV Quarter-Phased Transit Curves

TCE 009656397-02   P=204.737460 Days    $T_0=202.878608$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

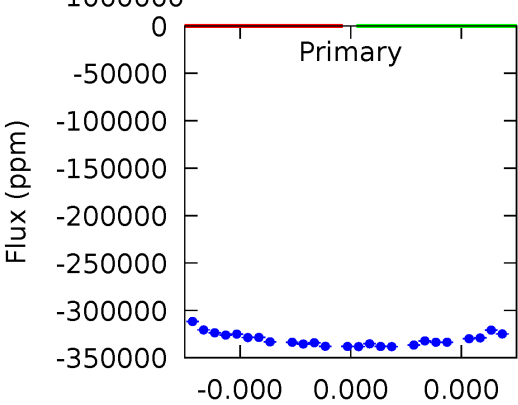
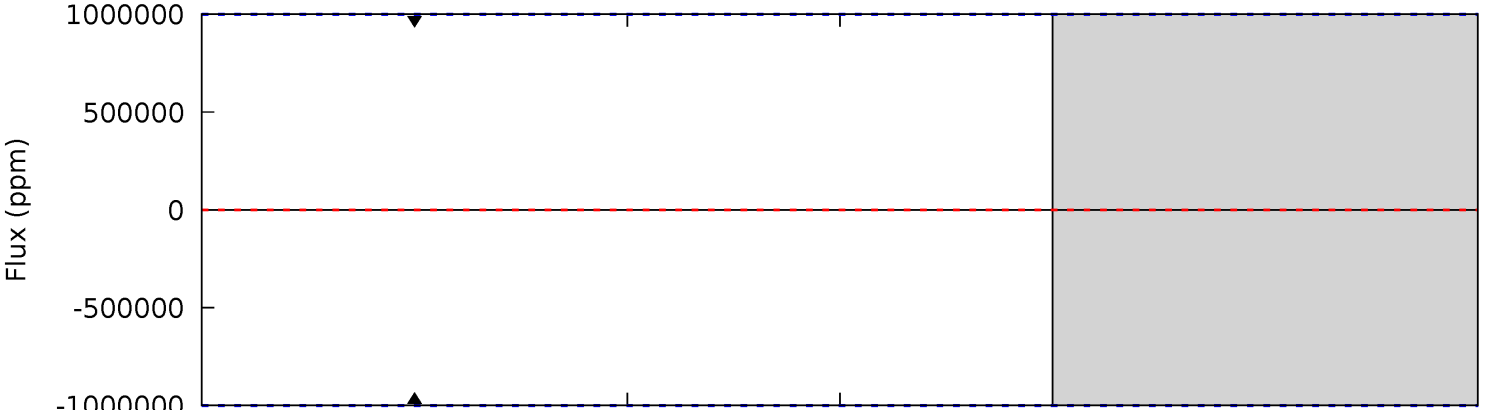
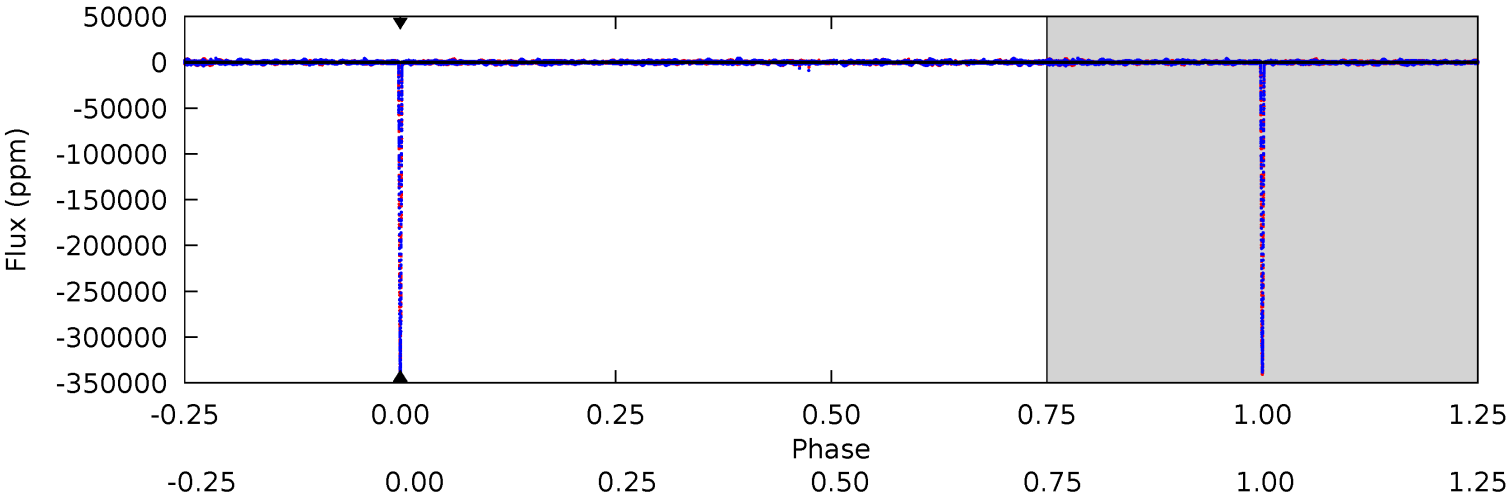
TCE 009656397-02 P=204.737460 Days  $T_0=202.882469$  (BKJD)



# DV Model-Shift Uniqueness Test

009656397-02, P = 204.737460 Days, E = 202.878608 Days

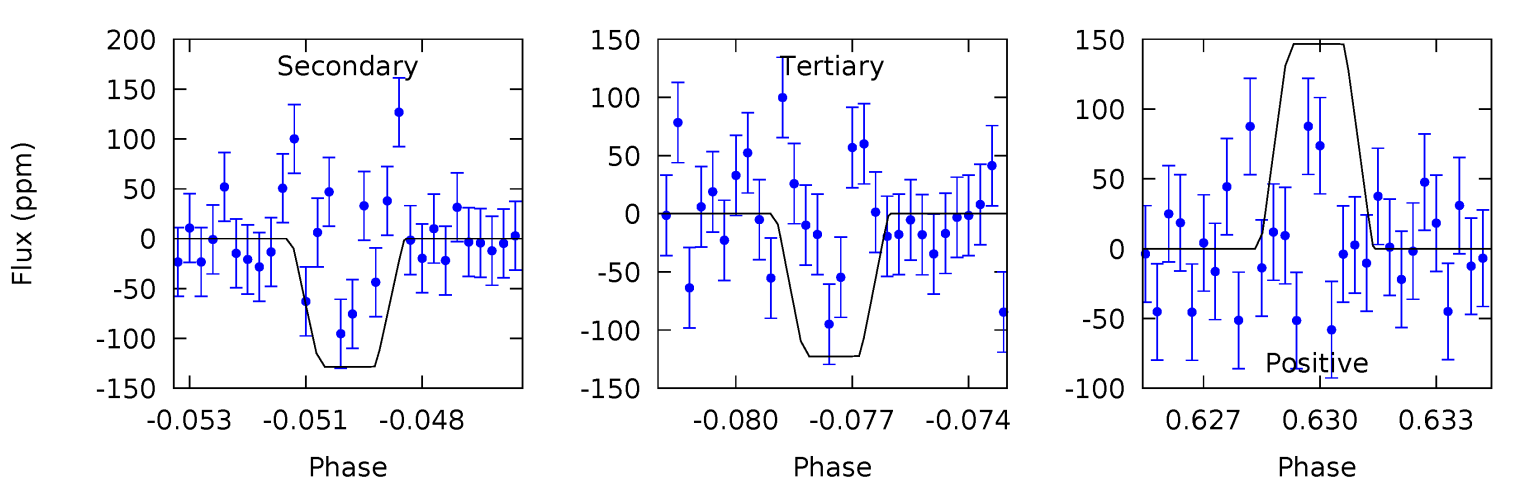
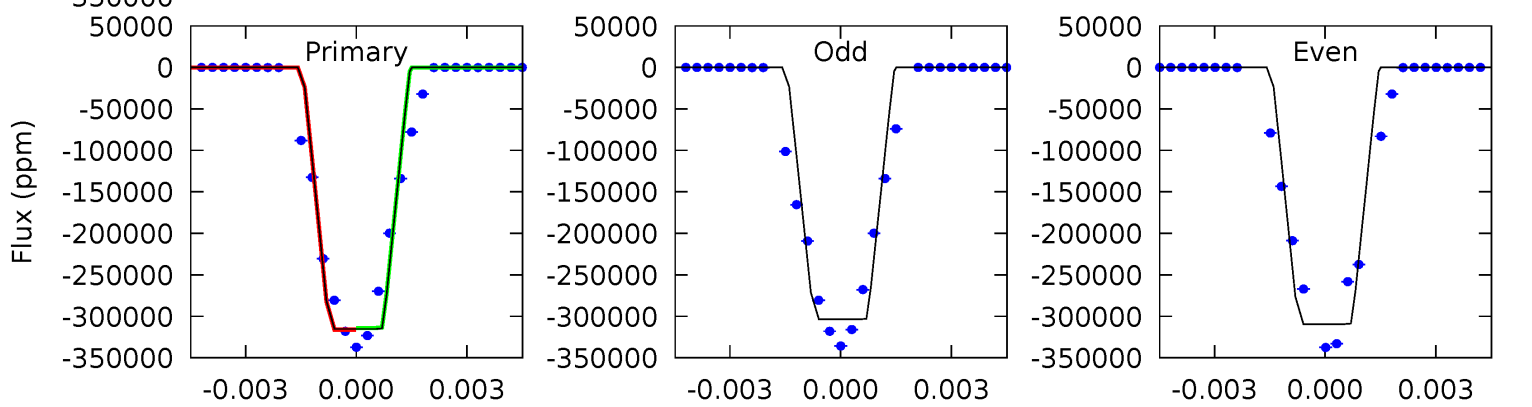
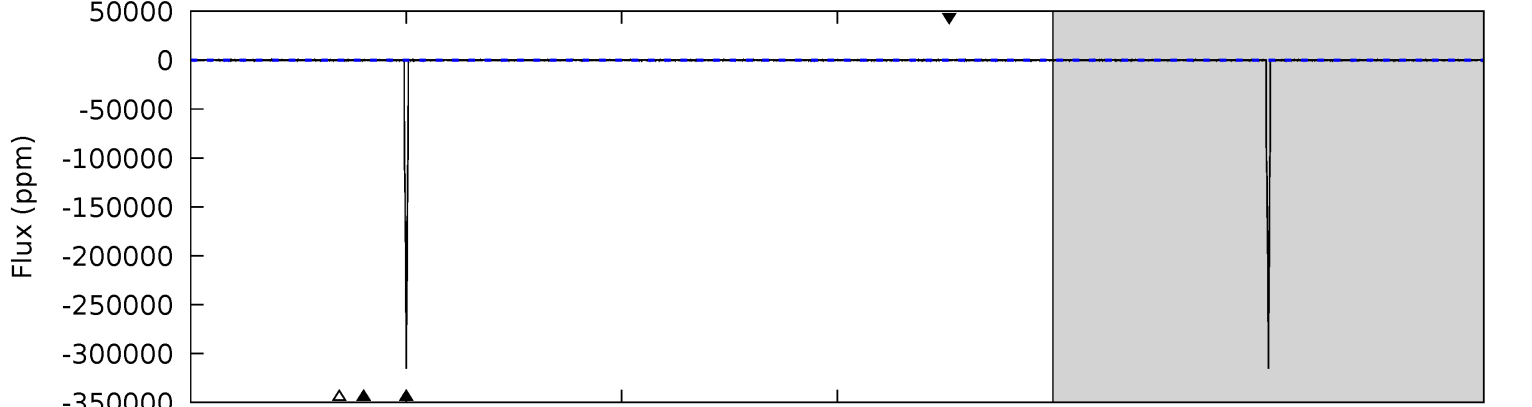
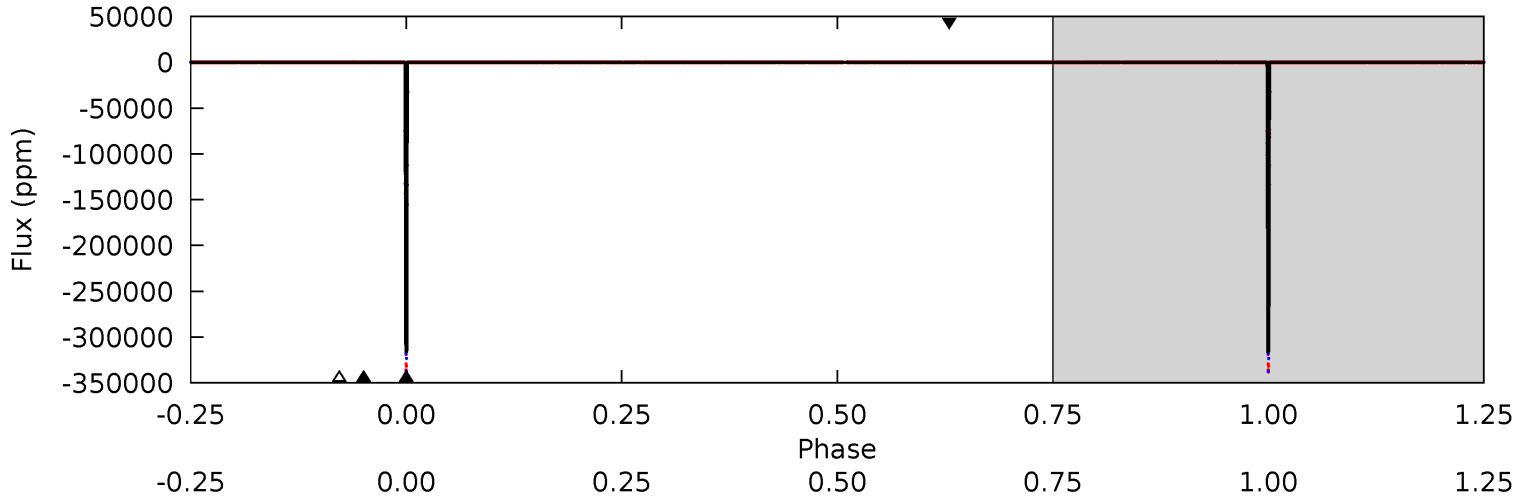
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

009656397-02, P = 204.737460 Days, E = 202.882469 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
10573	4.31	4.11	4.92	5.25	2.97	1.09	10569	10568	0.20	-0.61	120.9	1.00	0.00	30.7





### Stellar Parameters For KIC 009656397

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6517^{+155}_{-214}$	$4.211^{+0.153}_{-0.187}$	$-0.120^{+0.250}_{-0.300}$	$1.440^{+0.439}_{-0.293}$	$1.234^{+0.188}_{-0.188}$	$0.582^{+0.499}_{-0.283}$
	+2%/-3%	+4%/-4%	+208%/-250%	+30%/-20%	+15%/-15%	+86%/-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 009656397-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$40.21^{+18.38}_{-15.87}$	$567^{+42}_{-39}$	$3670^{+4379}_{-11094}$	$663^{+24704}_{-19852}$
Alt.	$-129 \pm 30$	$90.94^{+22.32}_{-18.95}$	$564^{+42}_{-36}$	$1914^{+90}_{-84}$	$4.481^{+3.018}_{-1.750}$

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

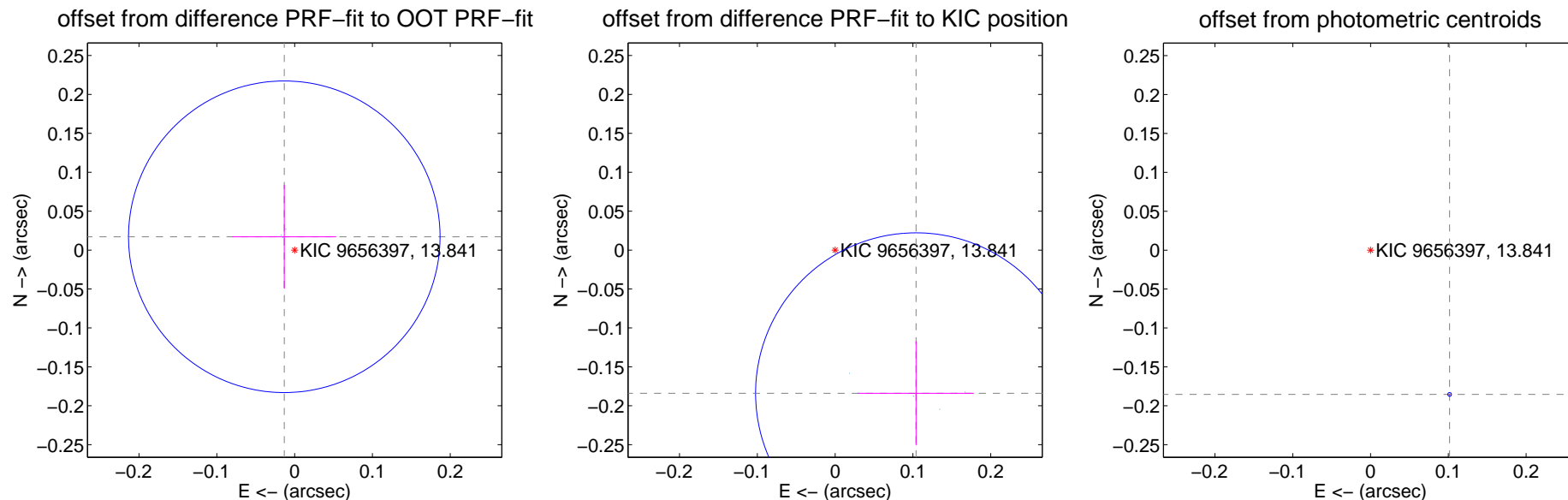
## DV Centroid Data

Supplemental centroid analysis for 009656397-02. Kepler magnitude: 13.84. Transit SNR -1.00

There are 5 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

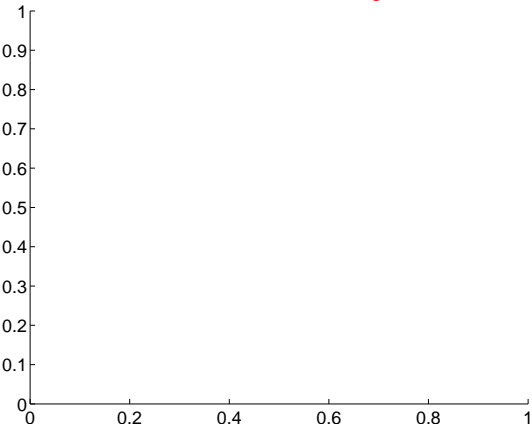
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.022 \pm 0.067$	0.32	$0.013 \pm 0.067$	$0.017 \pm 0.067$
PRF-fit source offset from KIC position	$0.211 \pm 0.069$	3.08	$-0.104 \pm 0.074$	$-0.184 \pm 0.067$
photometric centroid source offset	$0.21 \pm 0.00$	265.98	$-0.10 \pm 0.00$	$-0.19 \pm 0.00$



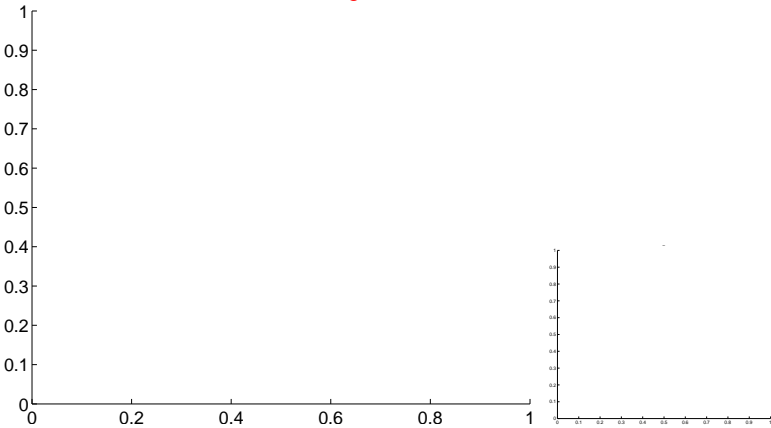
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

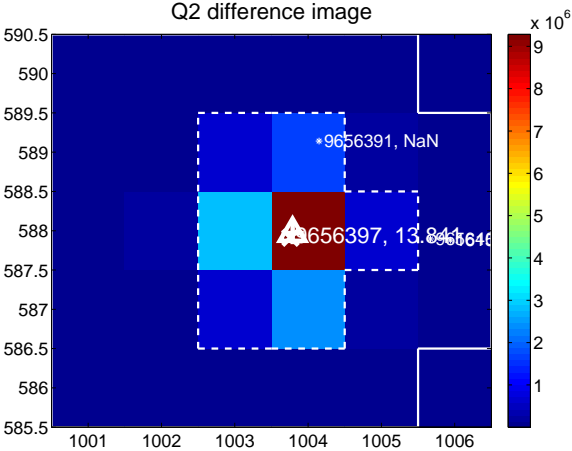
Q1 no difference image



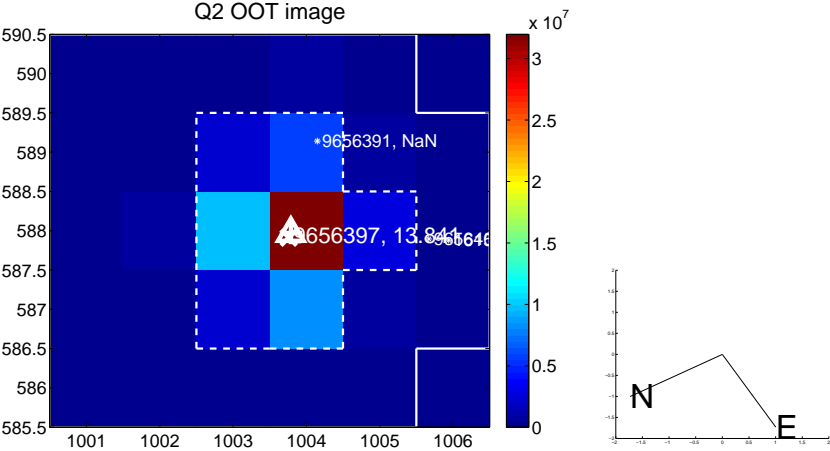
Q1 no OOT image



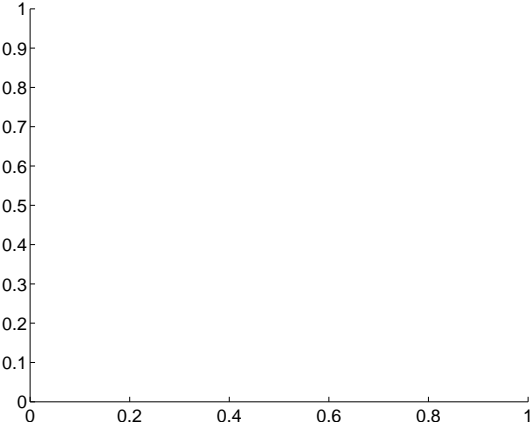
Q2 difference image



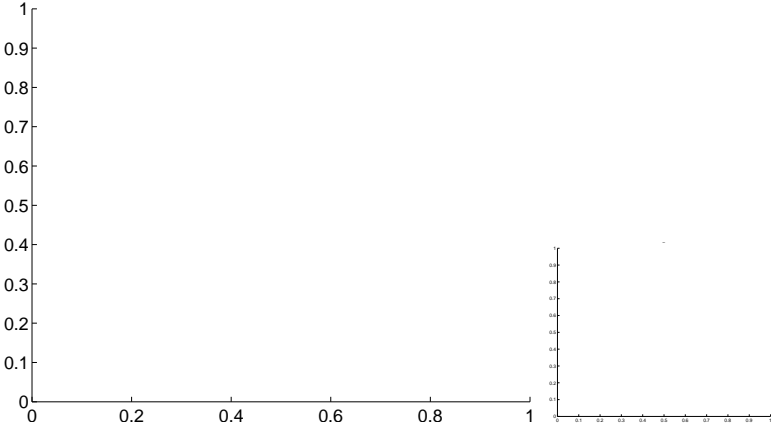
Q2 OOT image



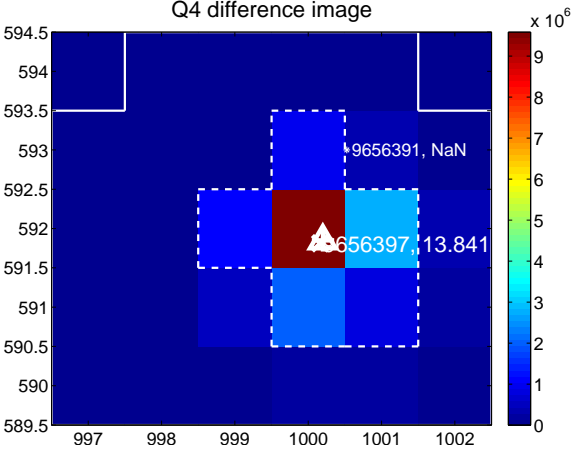
Q3 no difference image



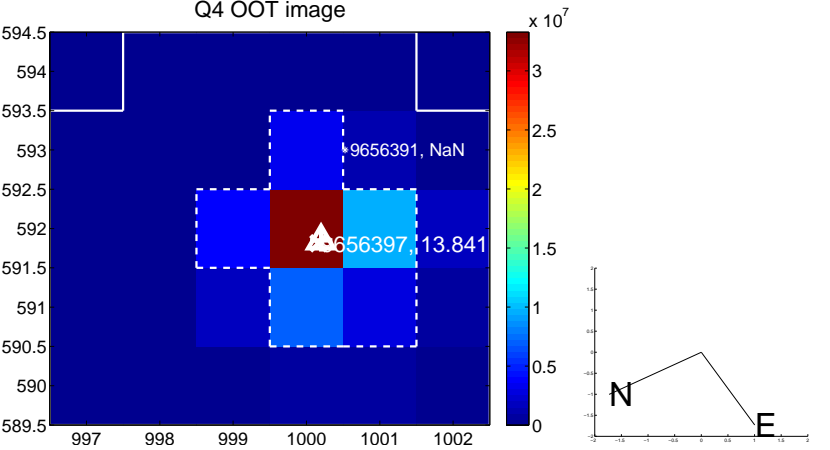
Q3 no OOT image



Q4 difference image

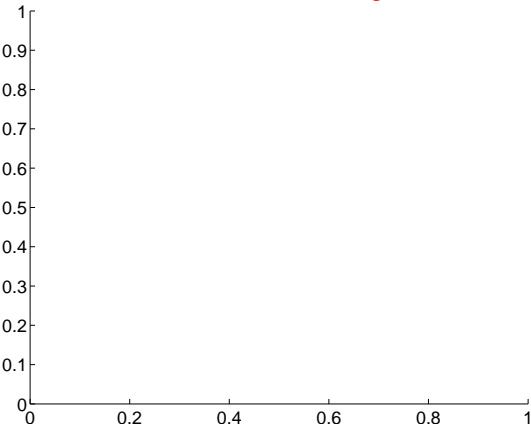


Q4 OOT image

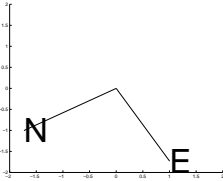
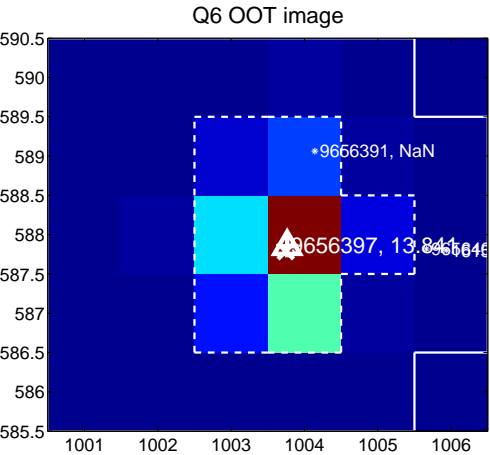
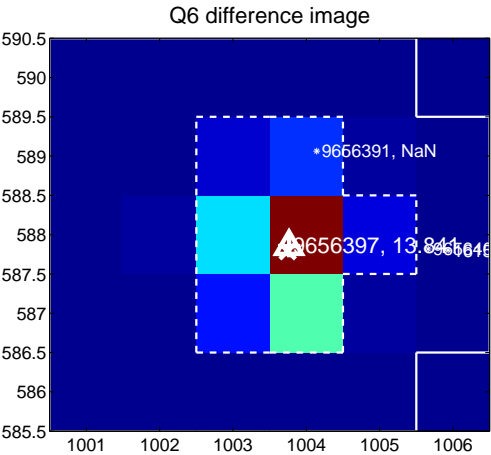
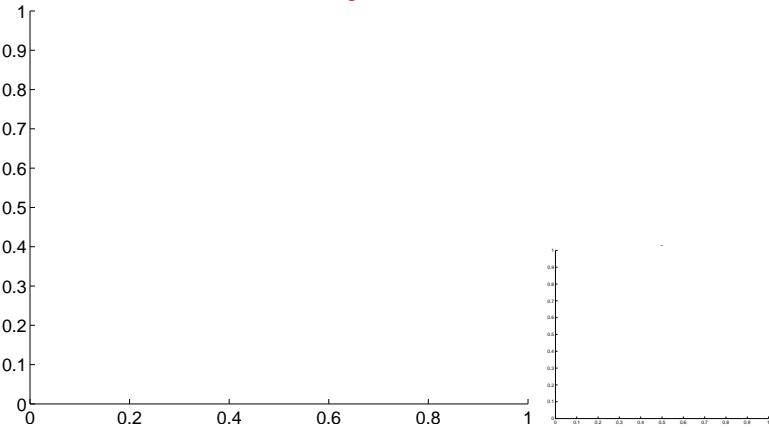


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

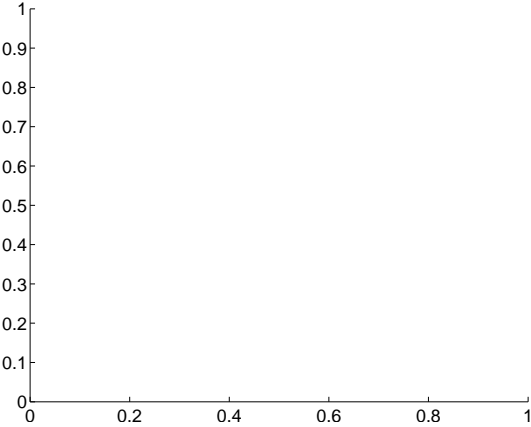
Q5 no difference image



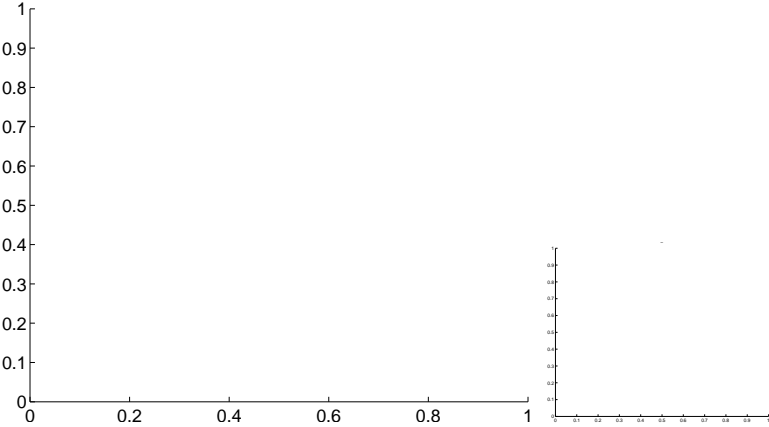
Q5 no OOT image



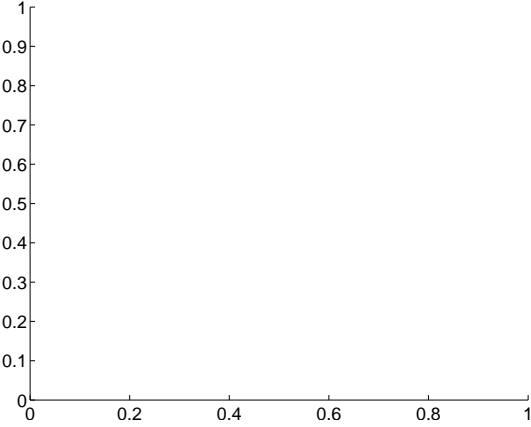
Q7 no difference image



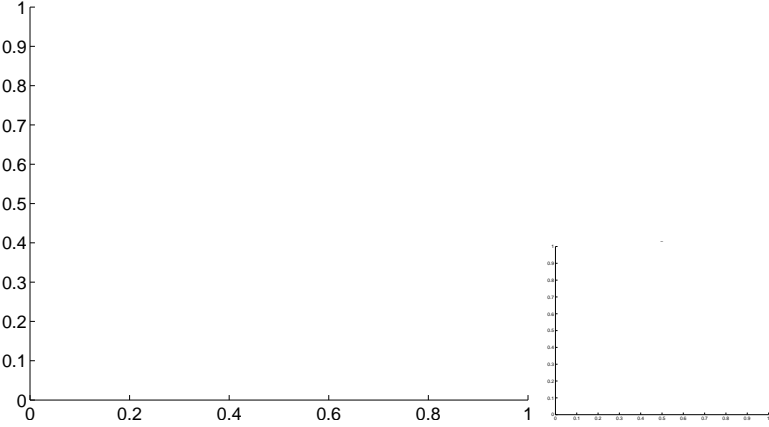
Q7 no OOT image



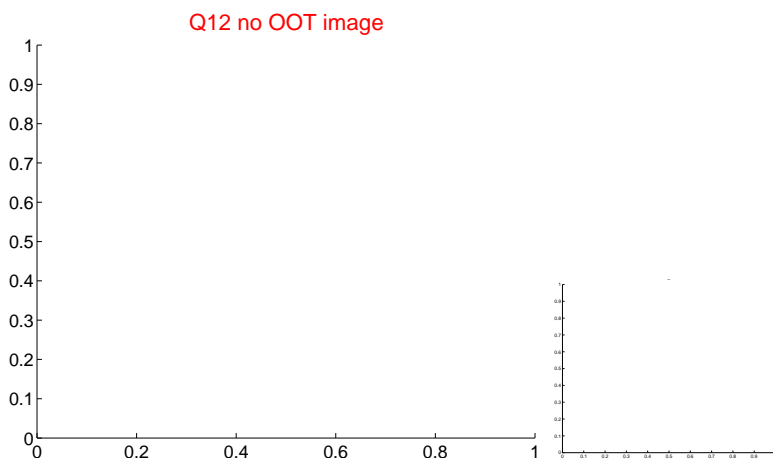
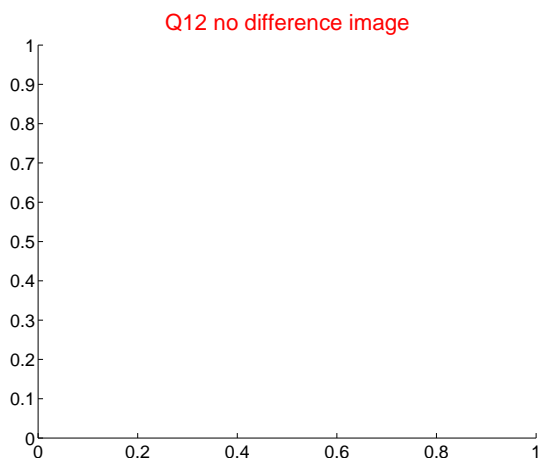
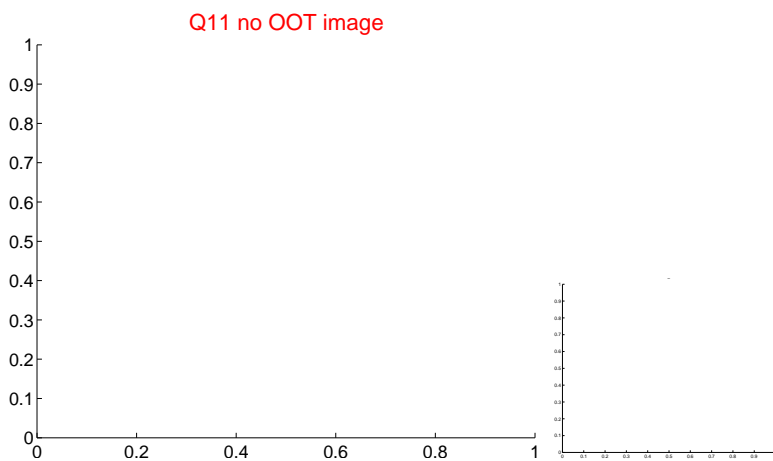
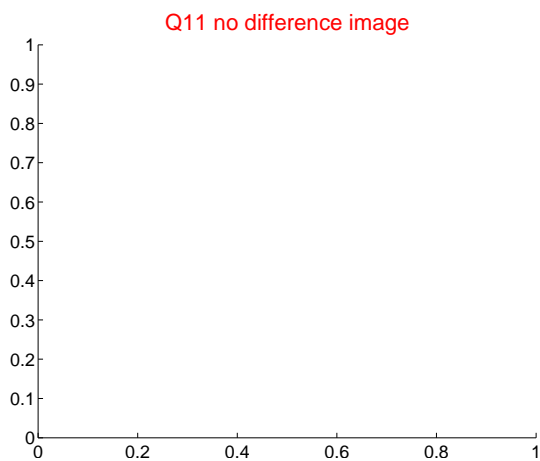
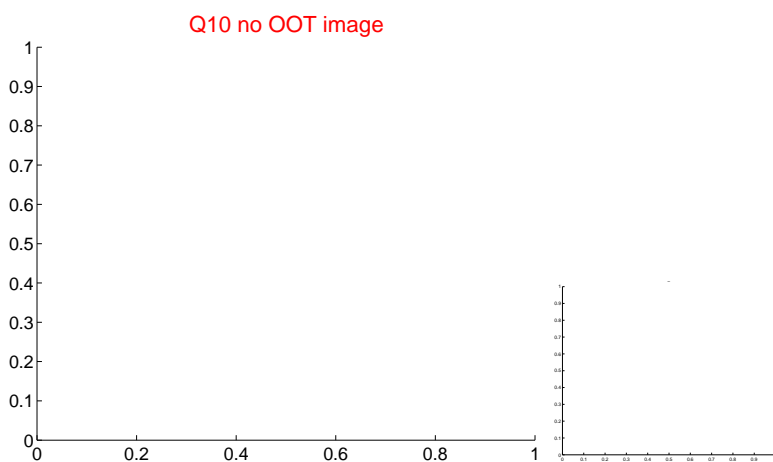
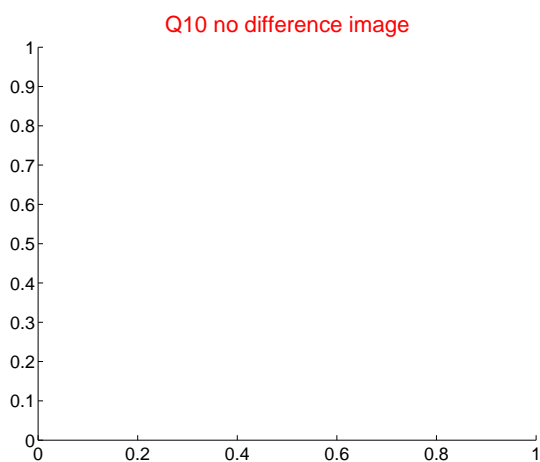
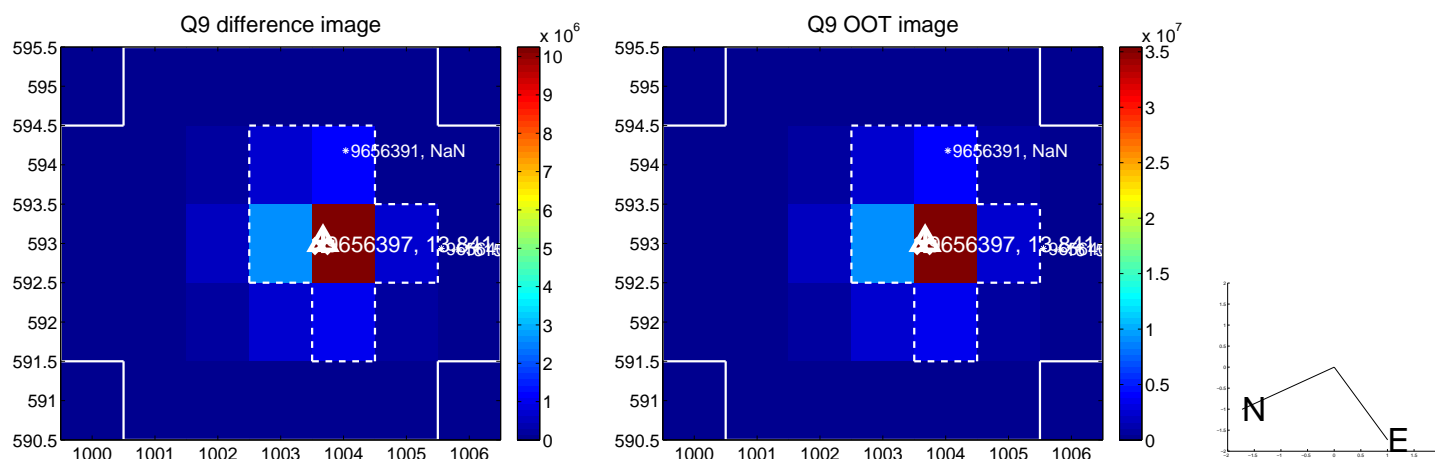
Q8 no difference image



Q8 no OOT image

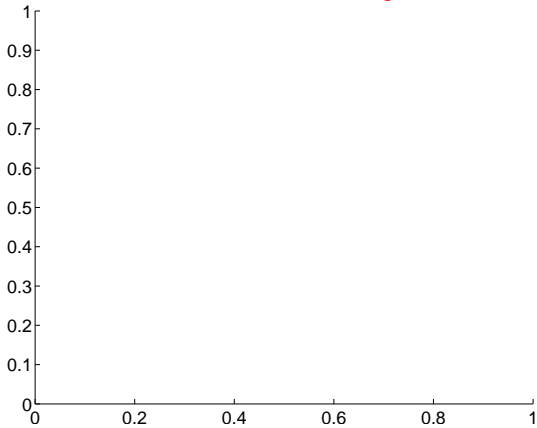


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value

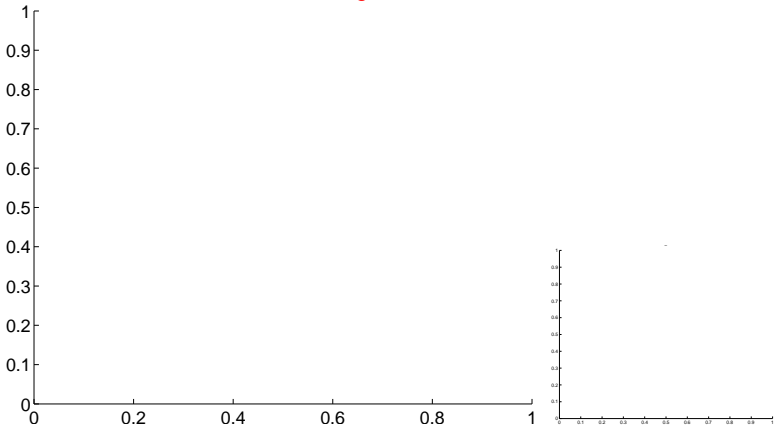


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

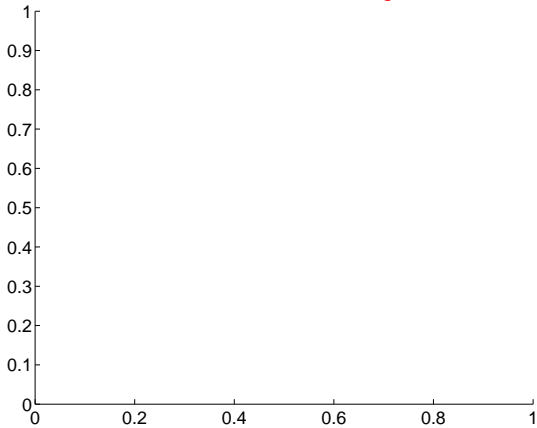
Q13 no difference image



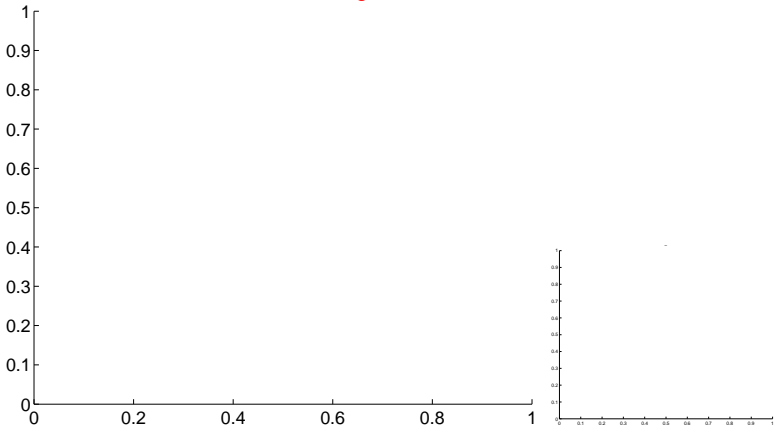
Q13 no OOT image



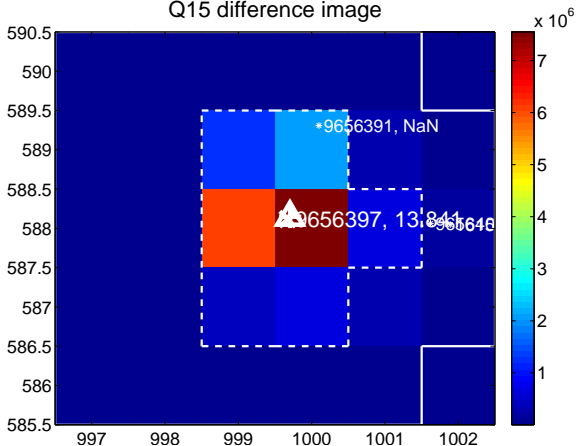
Q14 no difference image



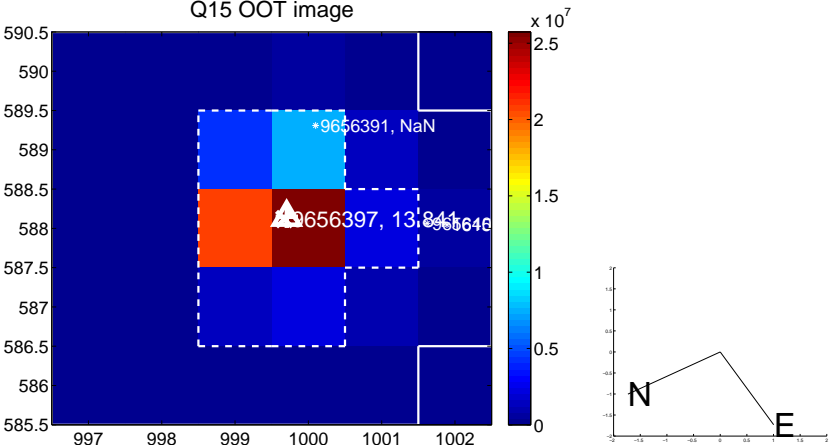
Q14 no OOT image



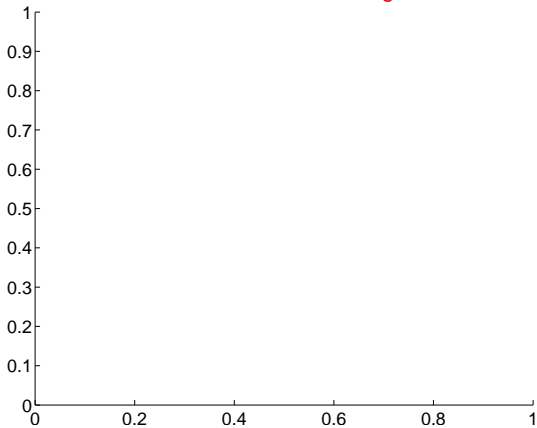
Q15 difference image



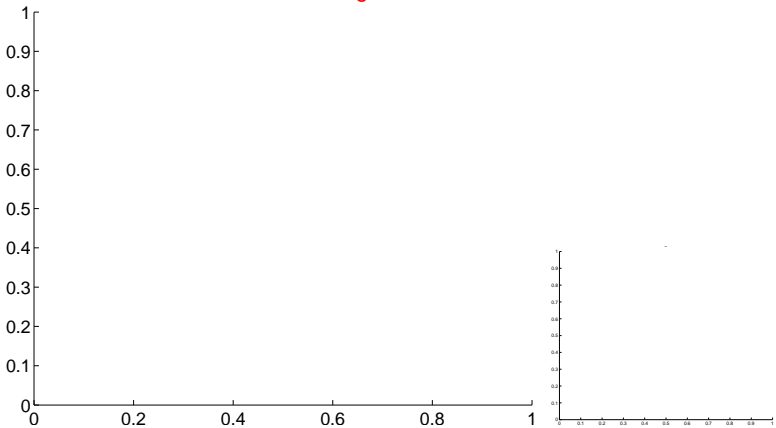
Q15 OOT image



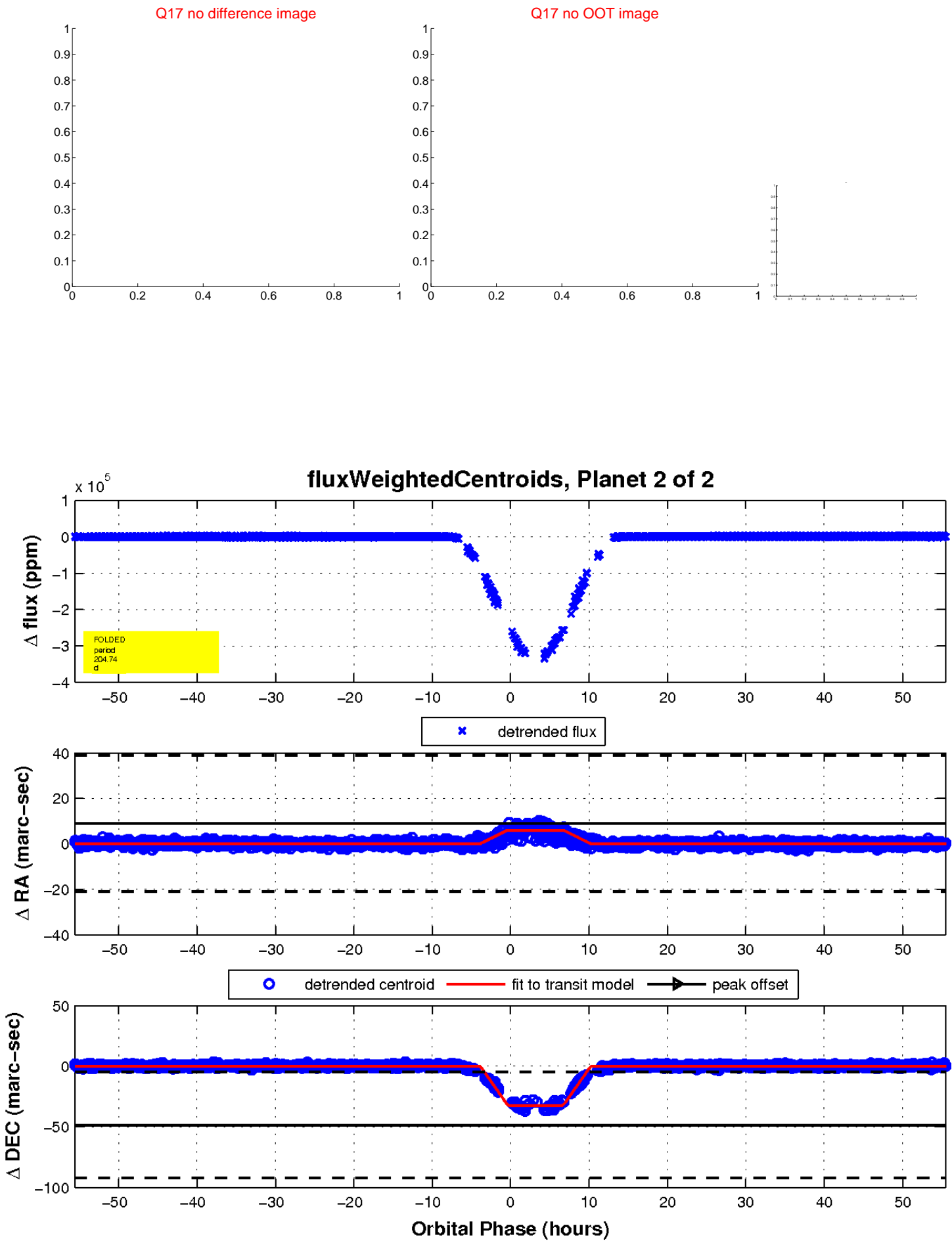
Q16 no difference image



Q16 no OOT image



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



UKIRT Image

Declination

