

# KIC 003634051

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003634051-01	OBS	6103.01	453.543243	360.059836	864.3	17.110	35.4	36.2	3.01	5874	9.41	5.46
003634051-02	OBS	6103.02	122.806262	179.311837	301.5	1.953	9.4	11.3	3.01	5874	5.64	31.16

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003634051-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—CENT_FEW_DIFFS
003634051-02	OBS	PC	0.76	0	0	0	0	NO_COMMENT

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

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

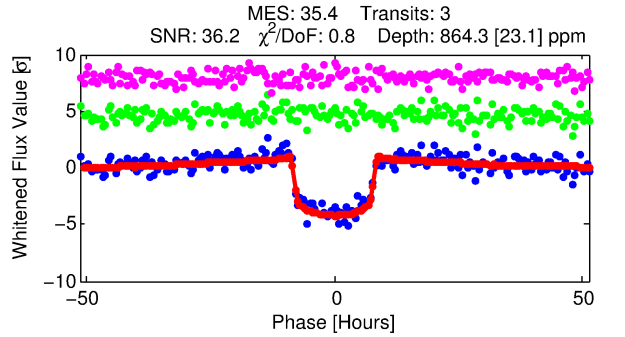
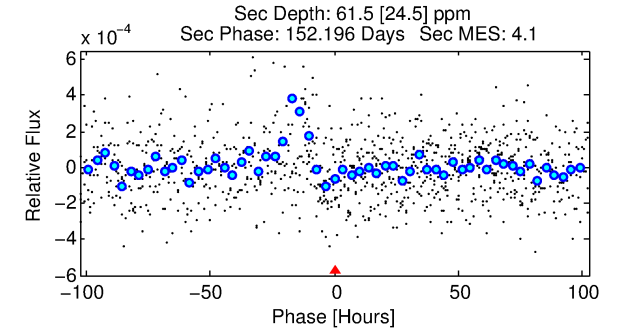
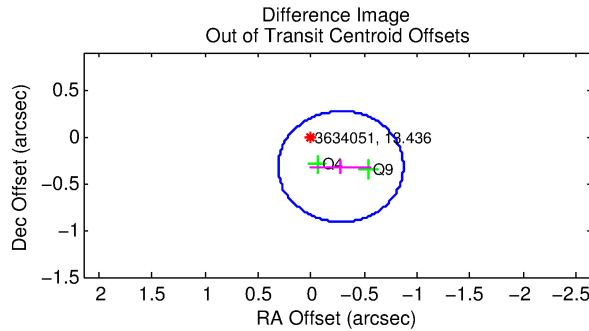
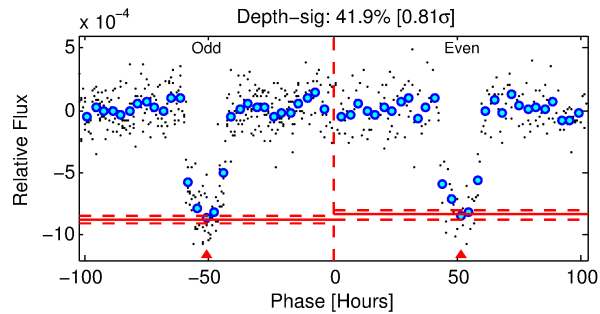
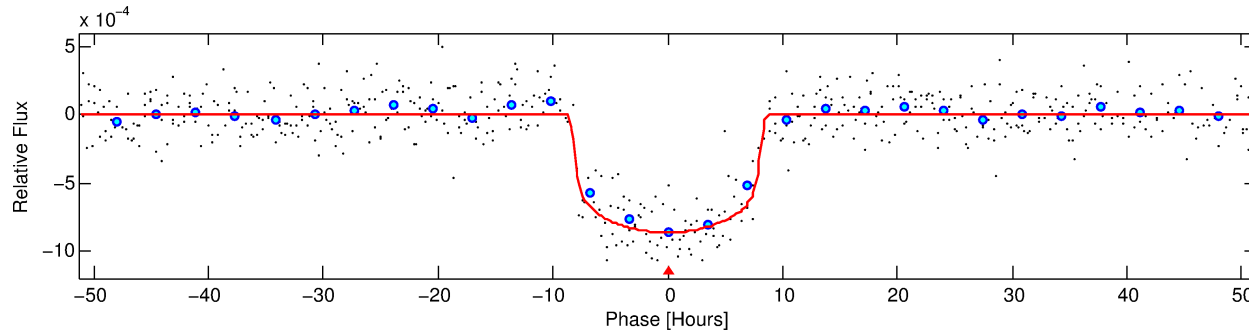
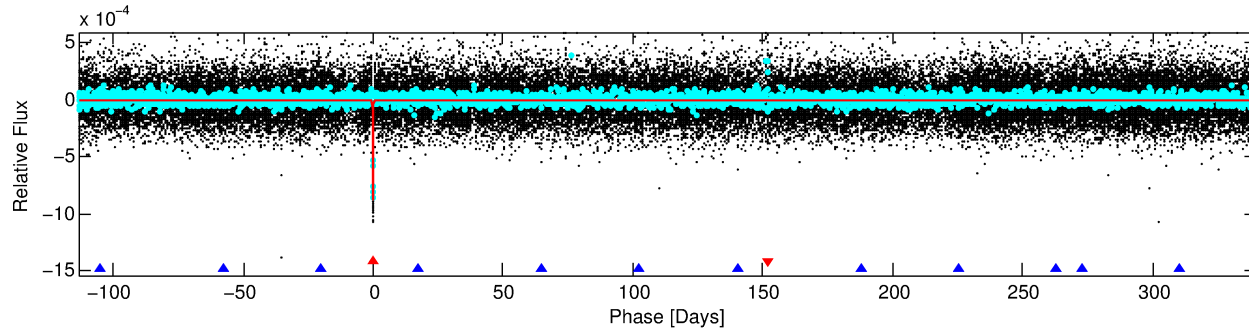
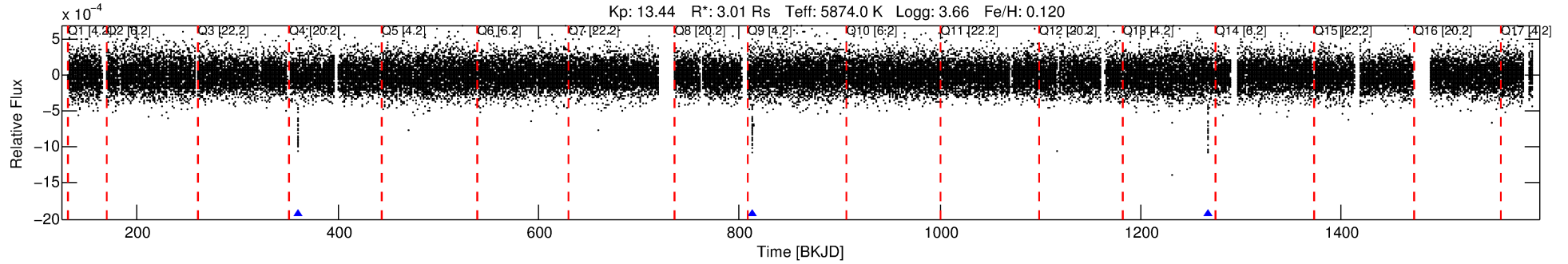
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003634051-01

No Significant Match Found

# DV One-Page Summary

KIC: 3634051 Candidate: 1 of 2 Period: 453.543 d  
KOI: K06103.01 Corr: 0.996



## DV Fit Results:

Period = 453.54324 [0.00381] d  
Epoch = 360.0598 [0.0046] BKJD  
Rp/R\* = 0.0287 [0.0015]  
a/R\* = 154.35 [34.26]  
b = 0.69 [0.17]  
Seff = 5.46 [3.55]  
Teq = 390 [63] K  
Rp = 9.41 [4.21] Re  
a = 1.3287 [0.5487] AU  
Ag = 674.12 [517.32] [1.30 $\sigma$ ]  
Teffp = 3071 [320] K [8.23 $\sigma$ ]

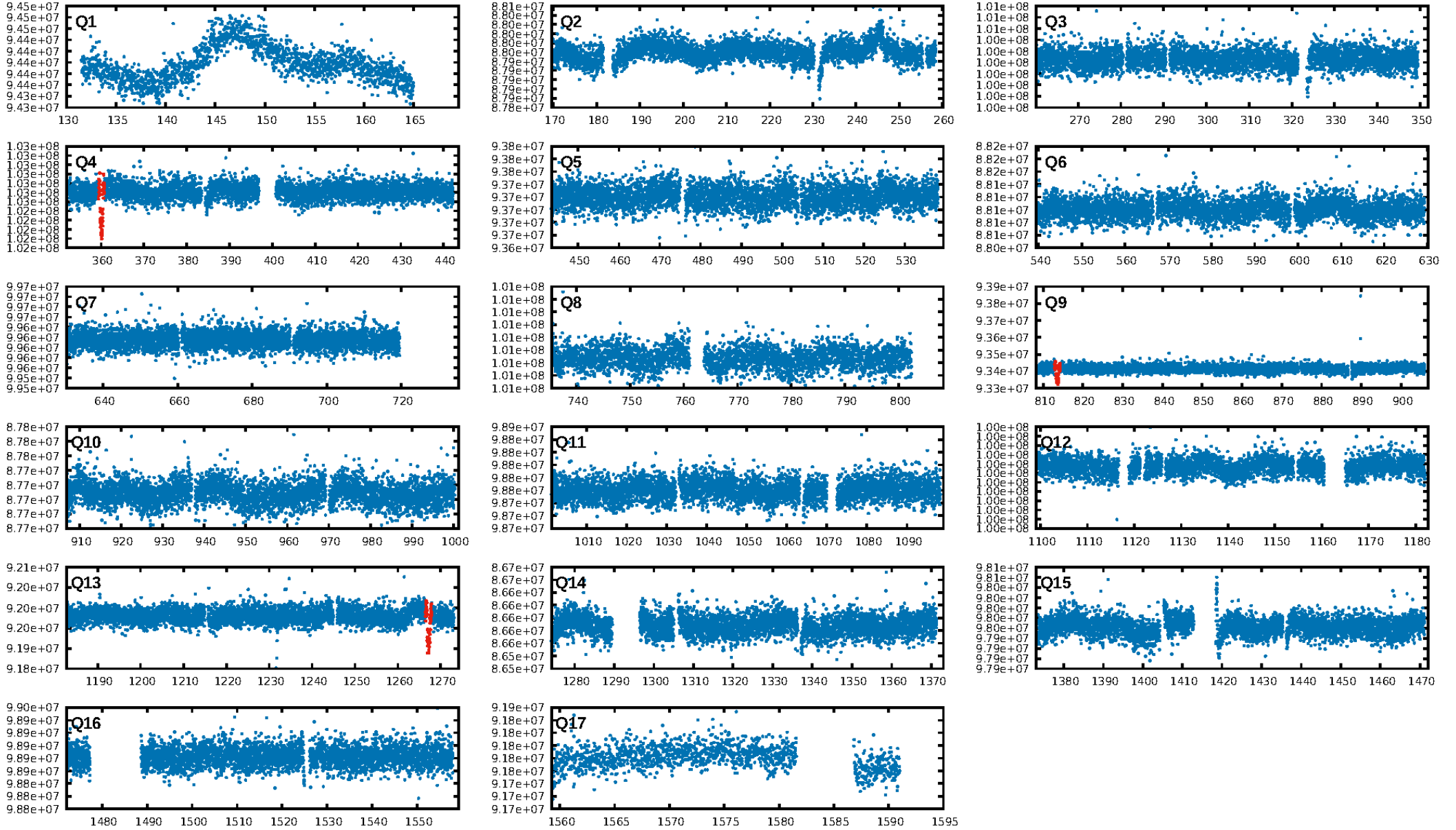
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [460.92 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 69.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 4.70e-117  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 4.594  
Centroid-sig: 43.8%  
Centroid-so: 0.276 arcsec [0.67 $\sigma$ ]  
OotOffset-rm: 0.424 arcsec [2.15 $\sigma$ ]  
KicOffset-rm: 0.289 arcsec [1.25 $\sigma$ ]  
OotOffset-st: 0/0/1/1 [2]  
KicOffset-st: 0/0/1/1 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [2/2]

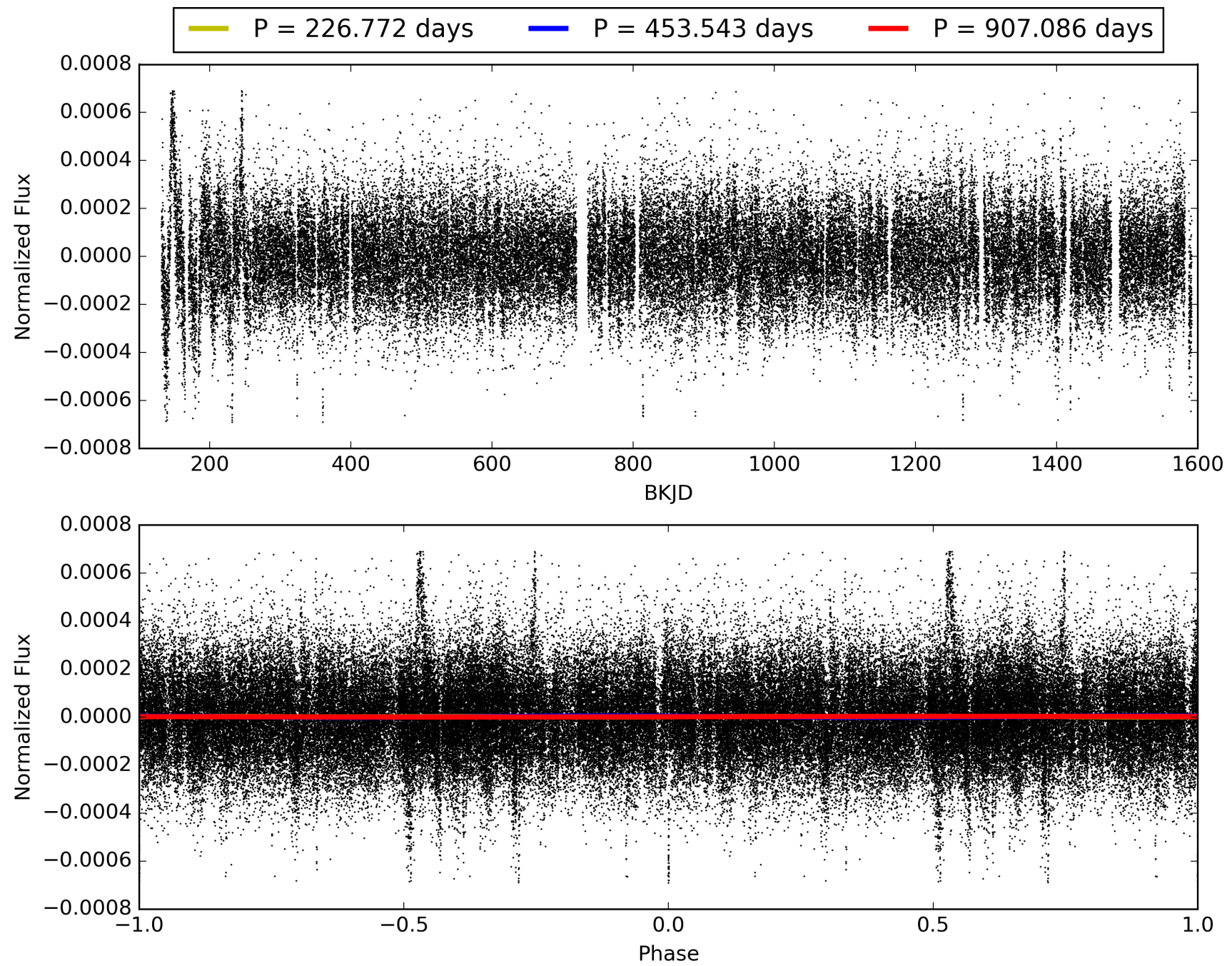
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 18:24:51 Z

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

# TCE 003634051-01, PDC Light Curves

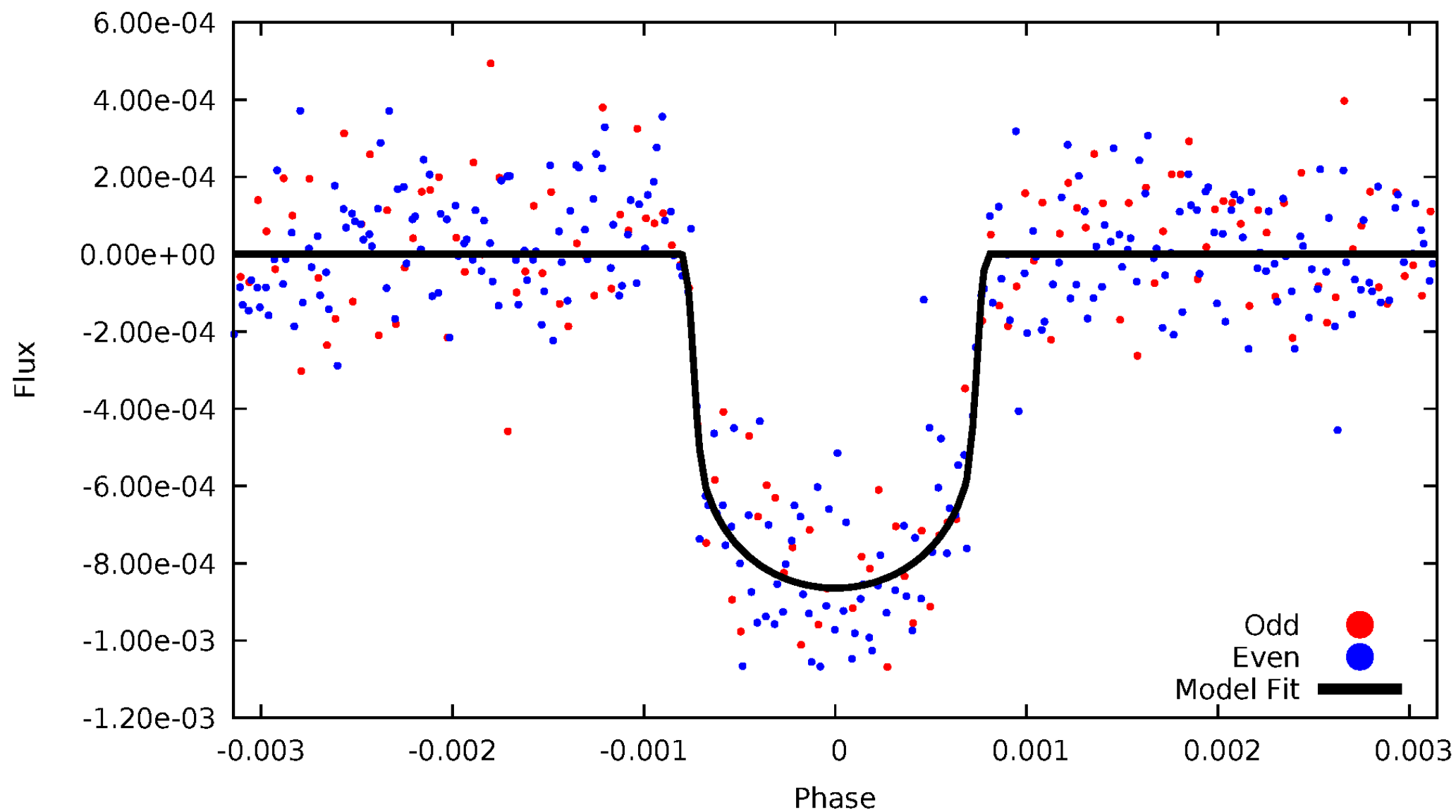


TCE 003634051-01



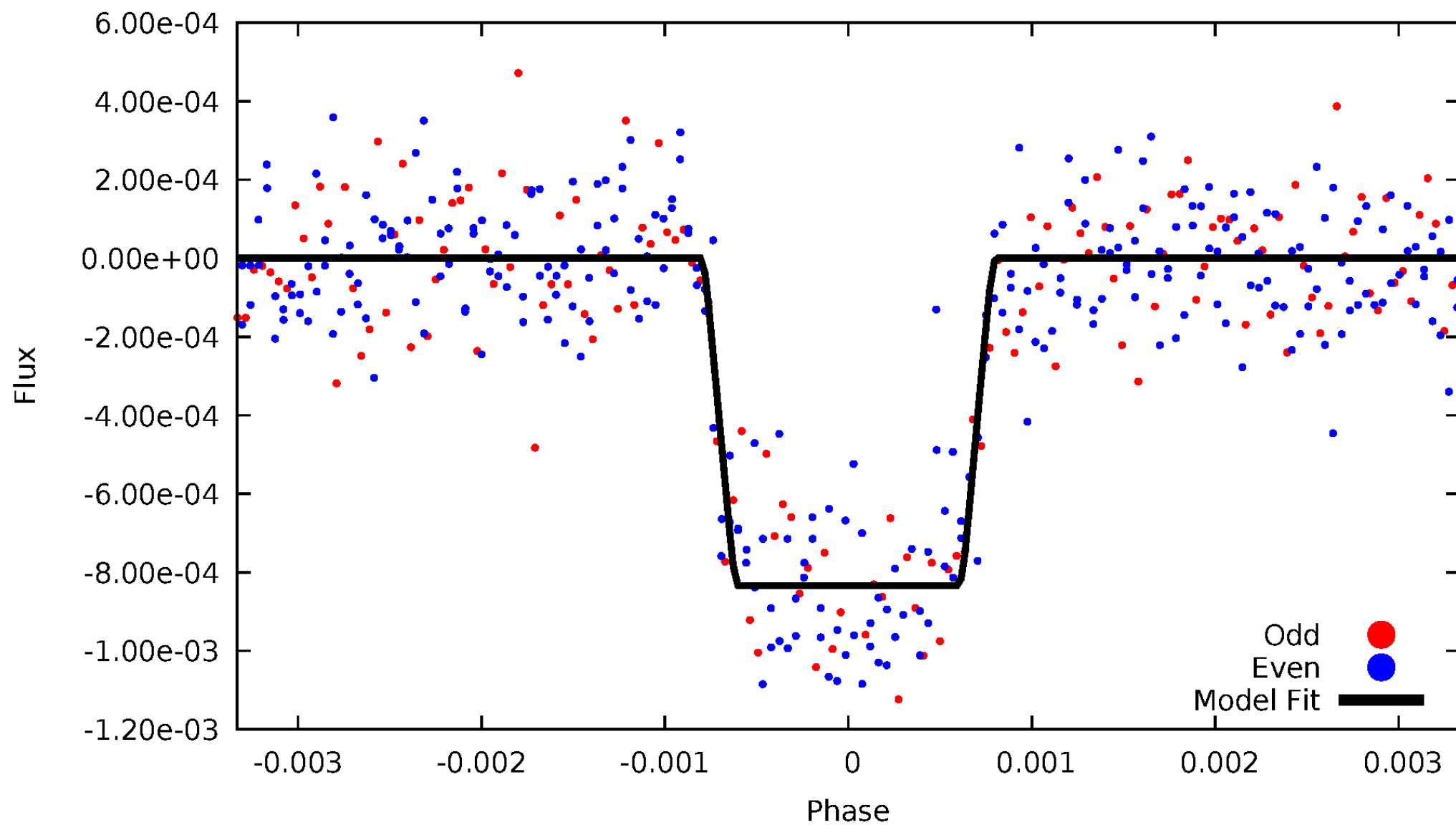
# DV Odd/Even

TCE 003634051-01



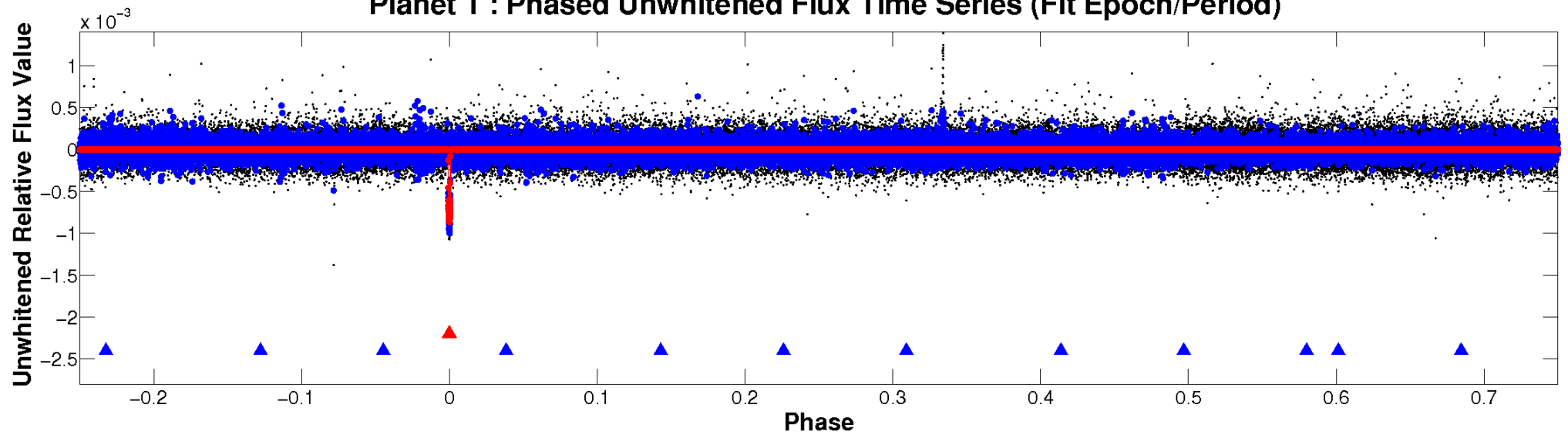
# ALT Odd/Even

TCE 003634051-01

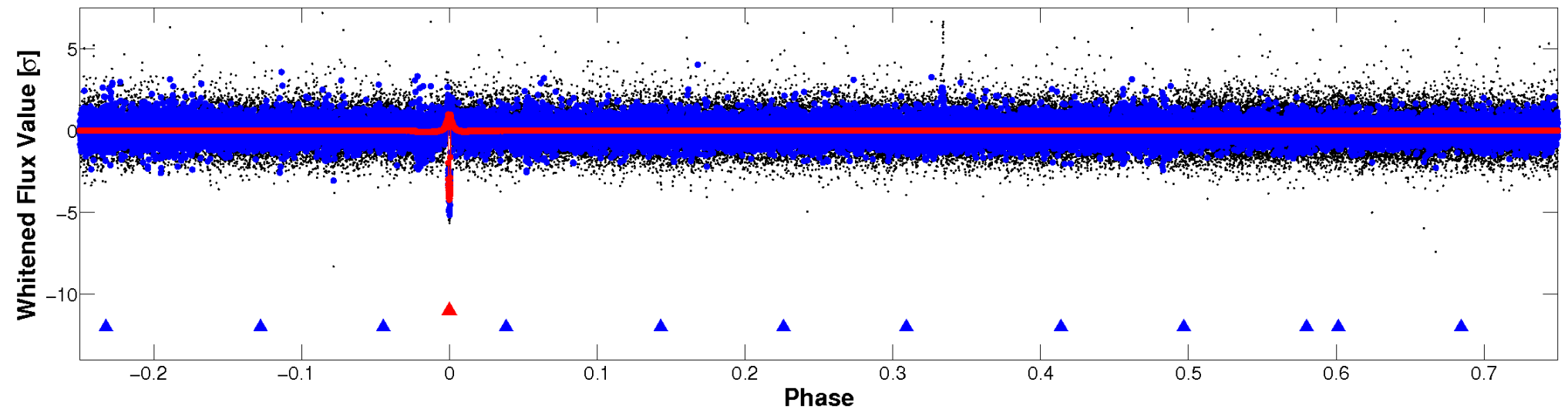


# Non-Whitened Vs. Whitened Light Curve

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



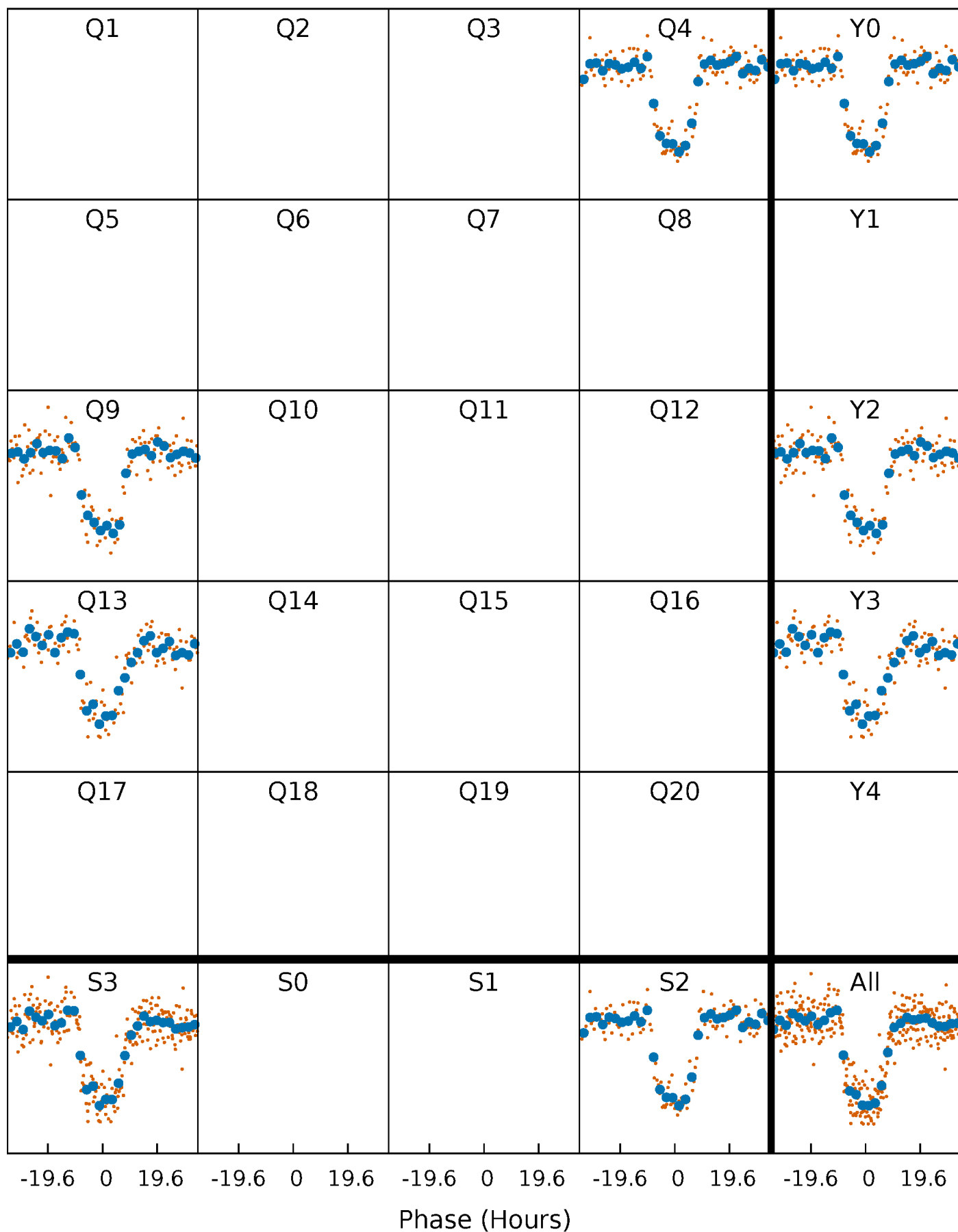
Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

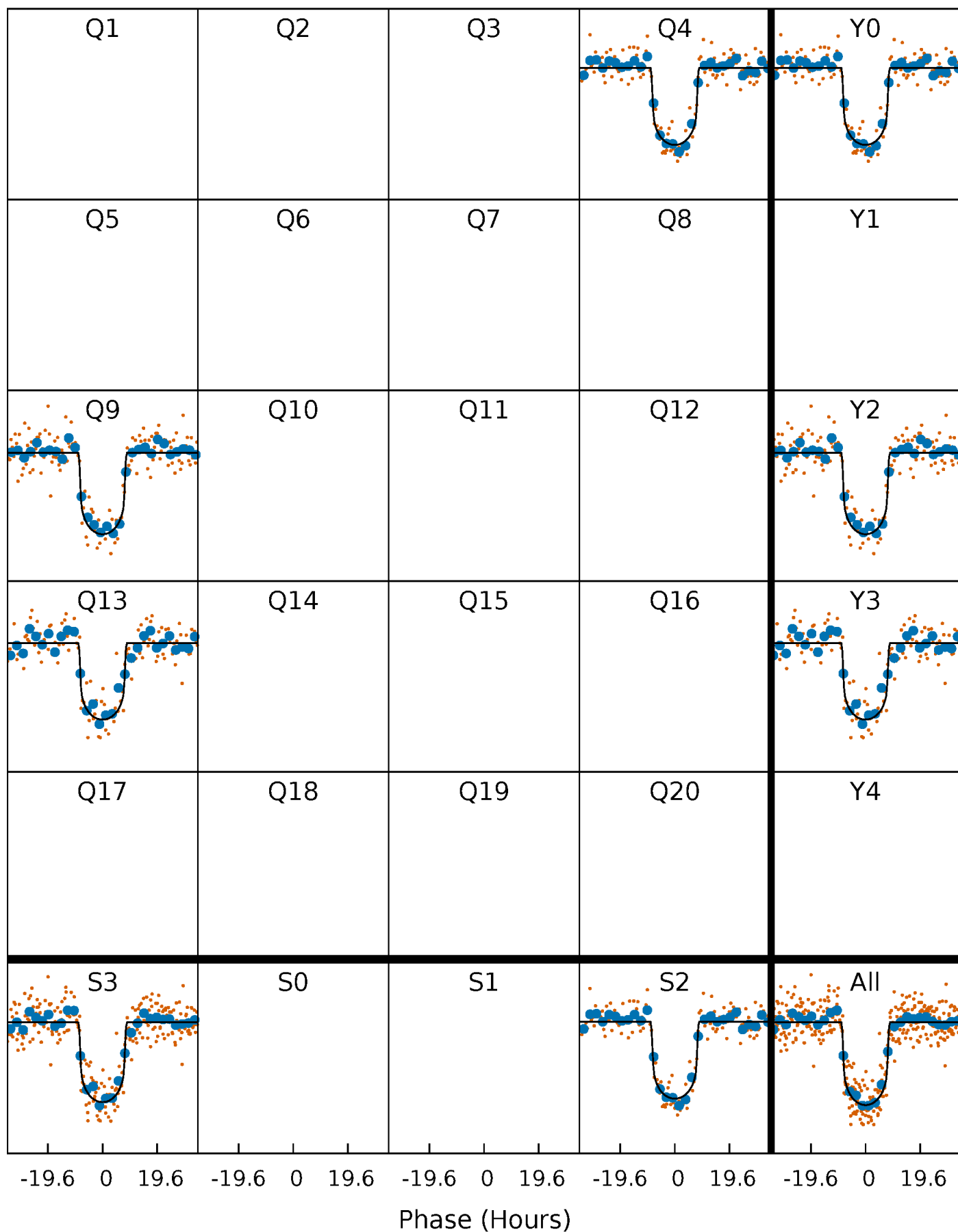
TCE 003634051-01 P=453.543243 Days  $T_0=360.059836$  (BKJD)





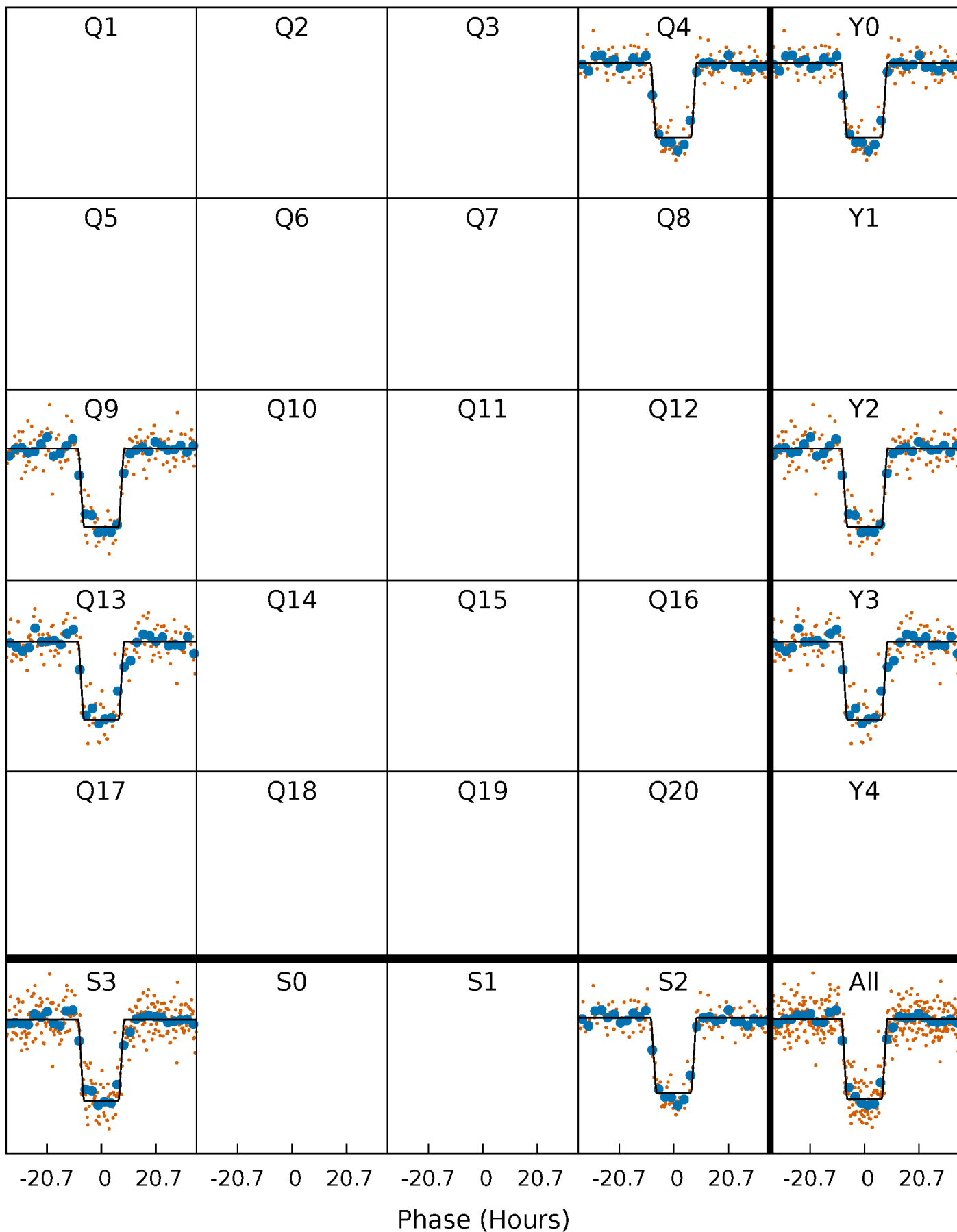
# DV Quarter-Phased Transit Curves

TCE 003634051-01 P=453.543243 Days  $T_0=360.059836$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

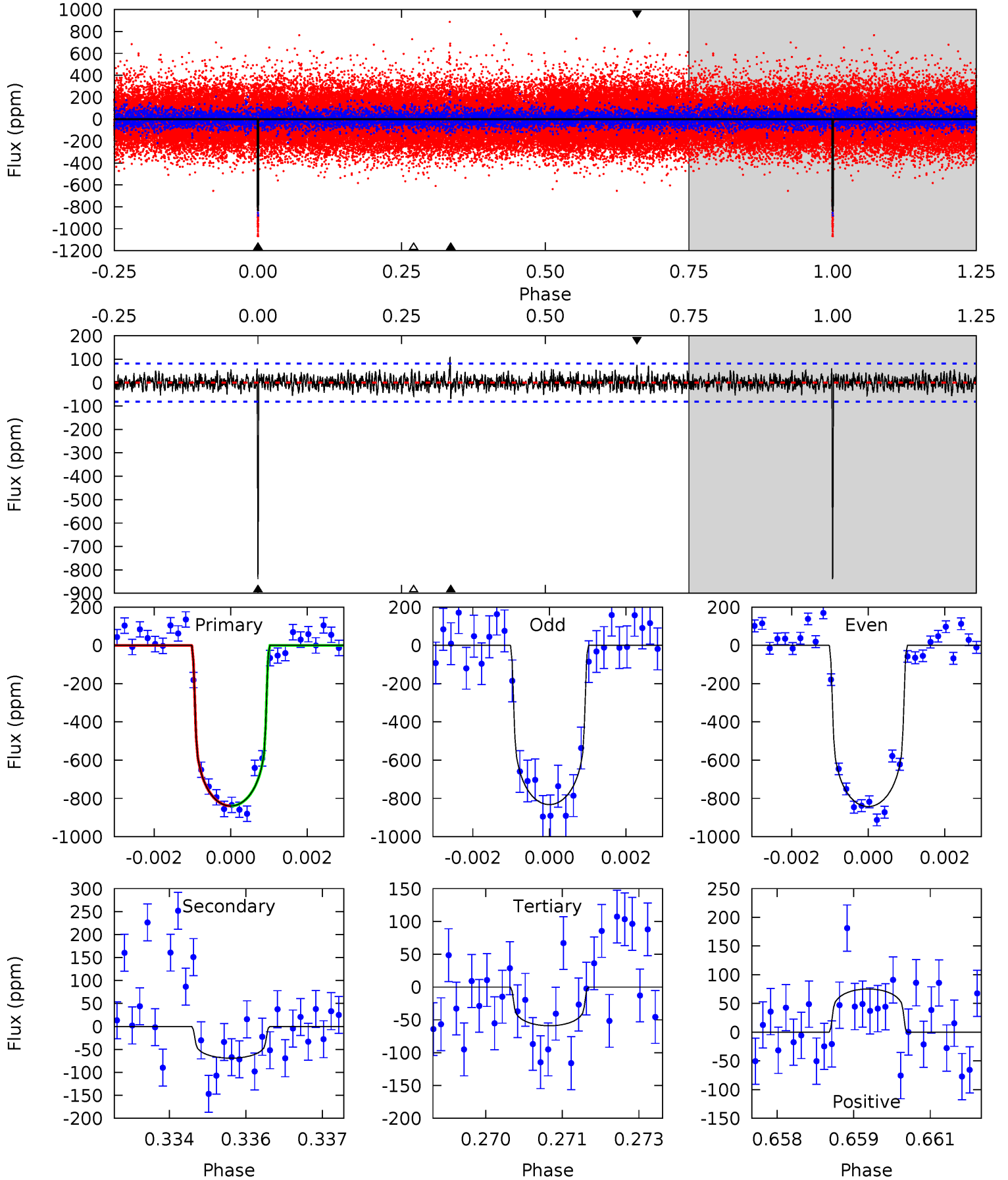
TCE 003634051-01 P=453.536487 Days  $T_0=360.065678$  (BKJD)



# DV Model-Shift Uniqueness Test

003634051-01, P = 453.543243 Days, E = 360.059836 Days

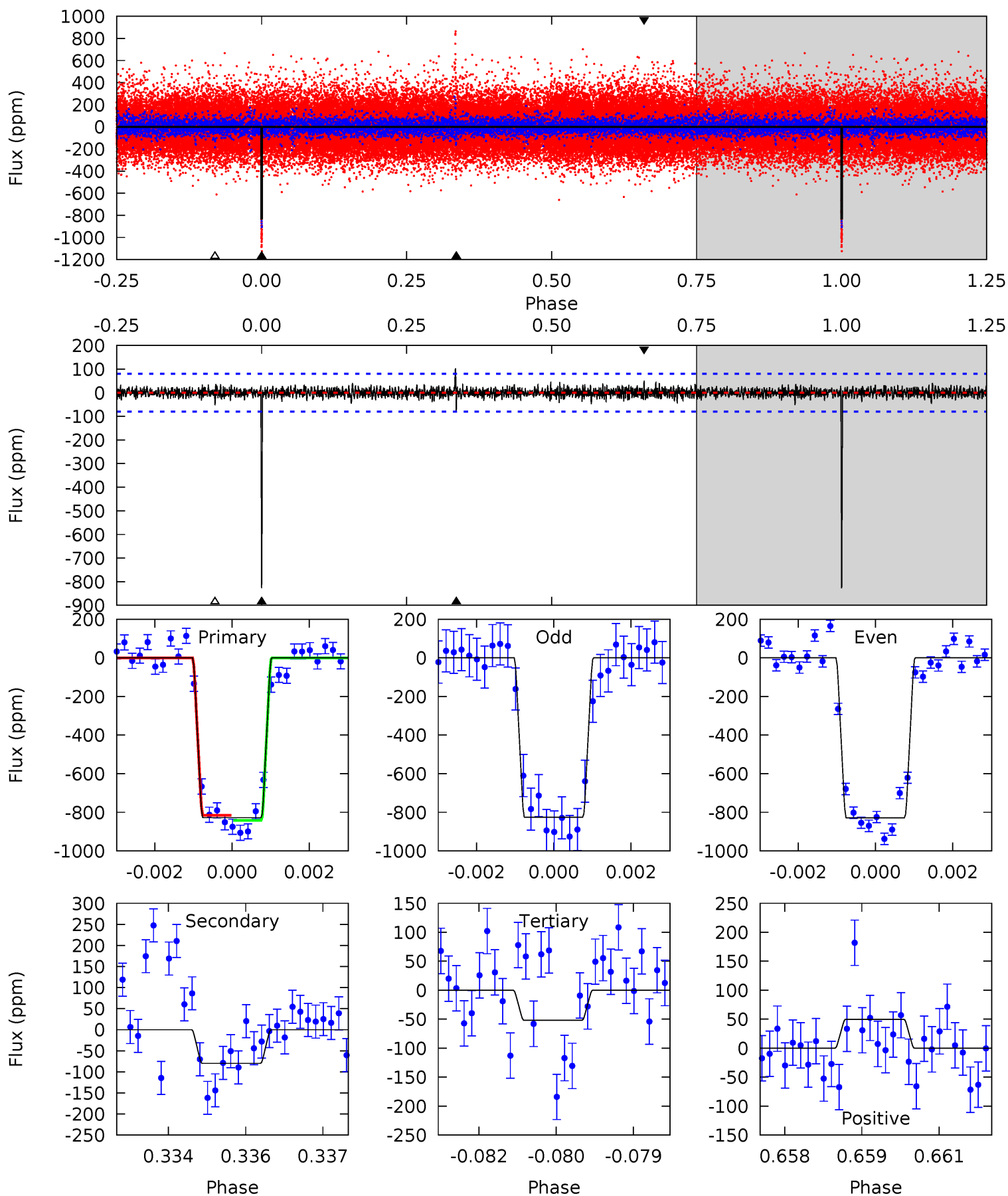
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
55.5	4.57	3.90	4.97	5.37	3.16	1.29	51.6	50.5	0.67	-0.40	0.32	1.01	0.11	0.01



# Alt Model-Shift Uniqueness Test

003634051-01, P = 453.536487 Days, E = 360.065678 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
55.4	5.34	3.46	3.33	5.37	3.16	0.85	52.0	52.1	1.88	2.02	0.09	0.99	0.11	0.89



### Stellar Parameters For KIC 003634051

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5874^{+87}_{-79}$	$3.664^{+0.375}_{-0.125}$	$0.120^{+0.150}_{-0.150}$	$3.006^{+0.572}_{-1.335}$	$1.519^{+0.150}_{-0.376}$	$0.079^{+0.251}_{-0.030}$
	+1%/-1%	+10%/-3%	+125%/-125%	+19%/-44%	+10%/-25%	+319%/-38%
Source	SPE90	FLK73	SPE90	DSEP		

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

### Secondary Eclipse Parameters for KIC 003634051-01 / KOI 6103.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-69 \pm 15$	$9.03^{+1.51}_{-2.16}$	$535^{+35}_{-59}$	$3600^{+148}_{-158}$	$825^{+506}_{-267}$
Alt.	$-80 \pm 15$	$9.11^{+1.37}_{-2.00}$	$537^{+32}_{-56}$	$3680^{+131}_{-134}$	$930^{+521}_{-268}$

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

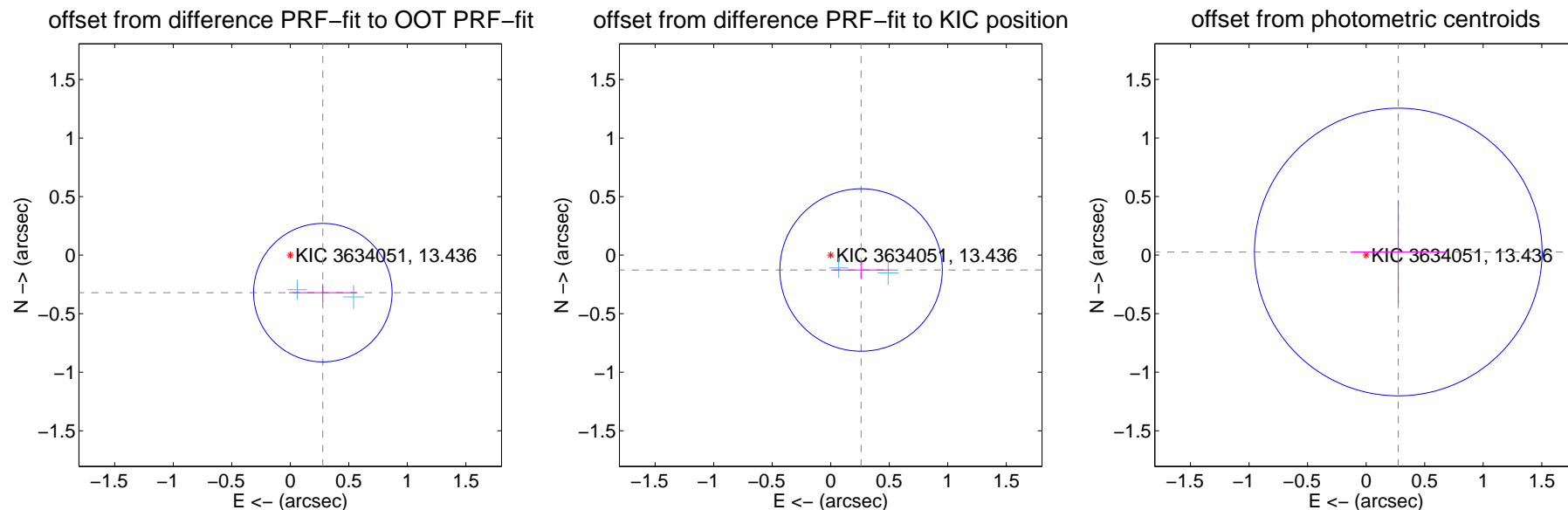
## DV Centroid Data

Supplemental centroid analysis for 003634051-01. Kepler magnitude: 13.44. Transit SNR 36.18

There are 2 quarters with good PRF difference image offsets

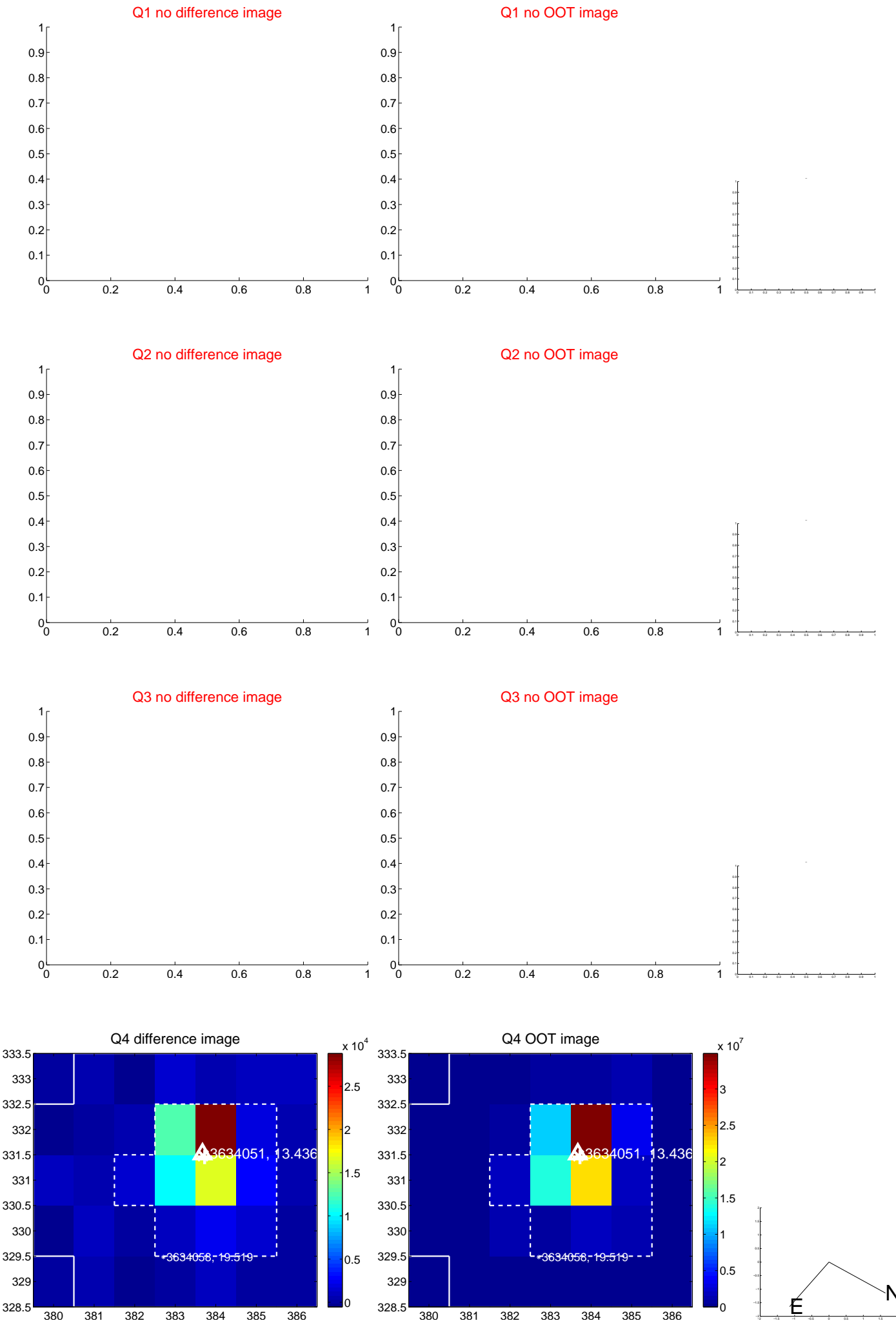
The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.424 \pm 0.197$	2.15	$-0.278 \pm 0.288$	$-0.320 \pm 0.075$
PRF-fit source offset from KIC position	$0.289 \pm 0.231$	1.25	$-0.259 \pm 0.255$	$-0.127 \pm 0.071$
photometric centroid source offset	$0.28 \pm 0.41$	0.67	$-0.27 \pm 0.41$	$0.03 \pm 0.43$



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.

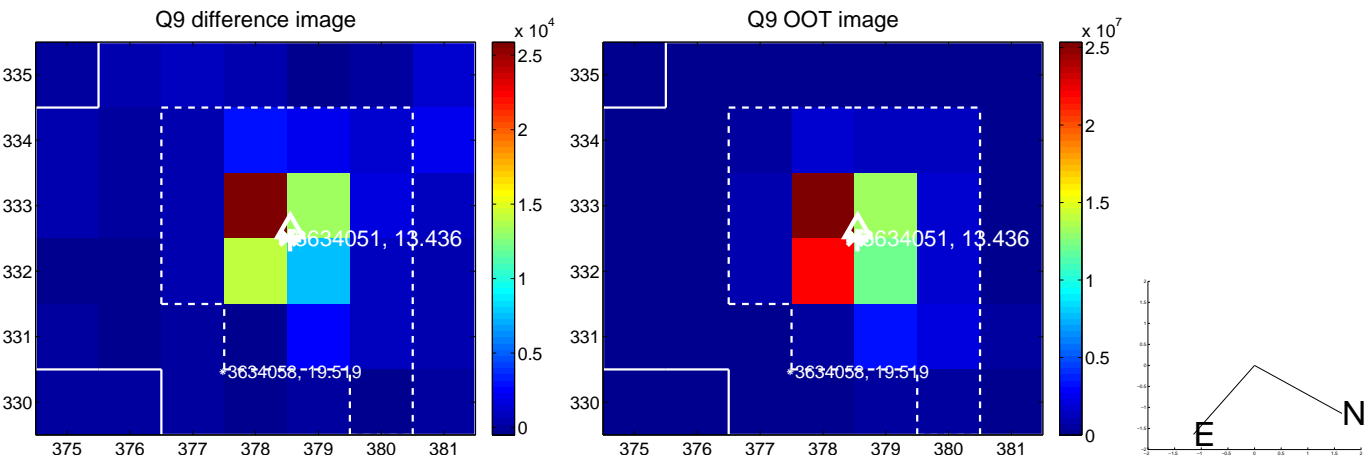




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



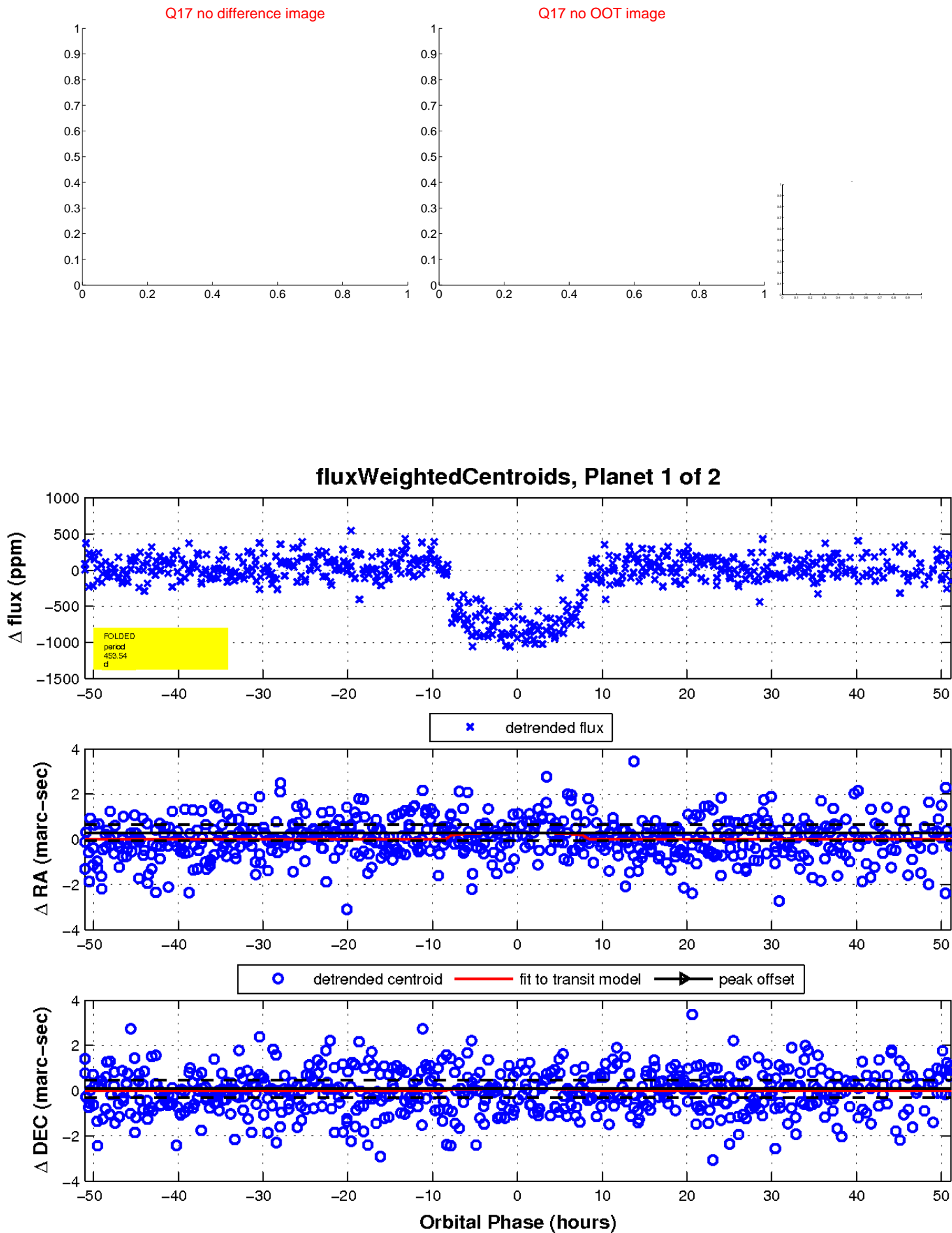
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

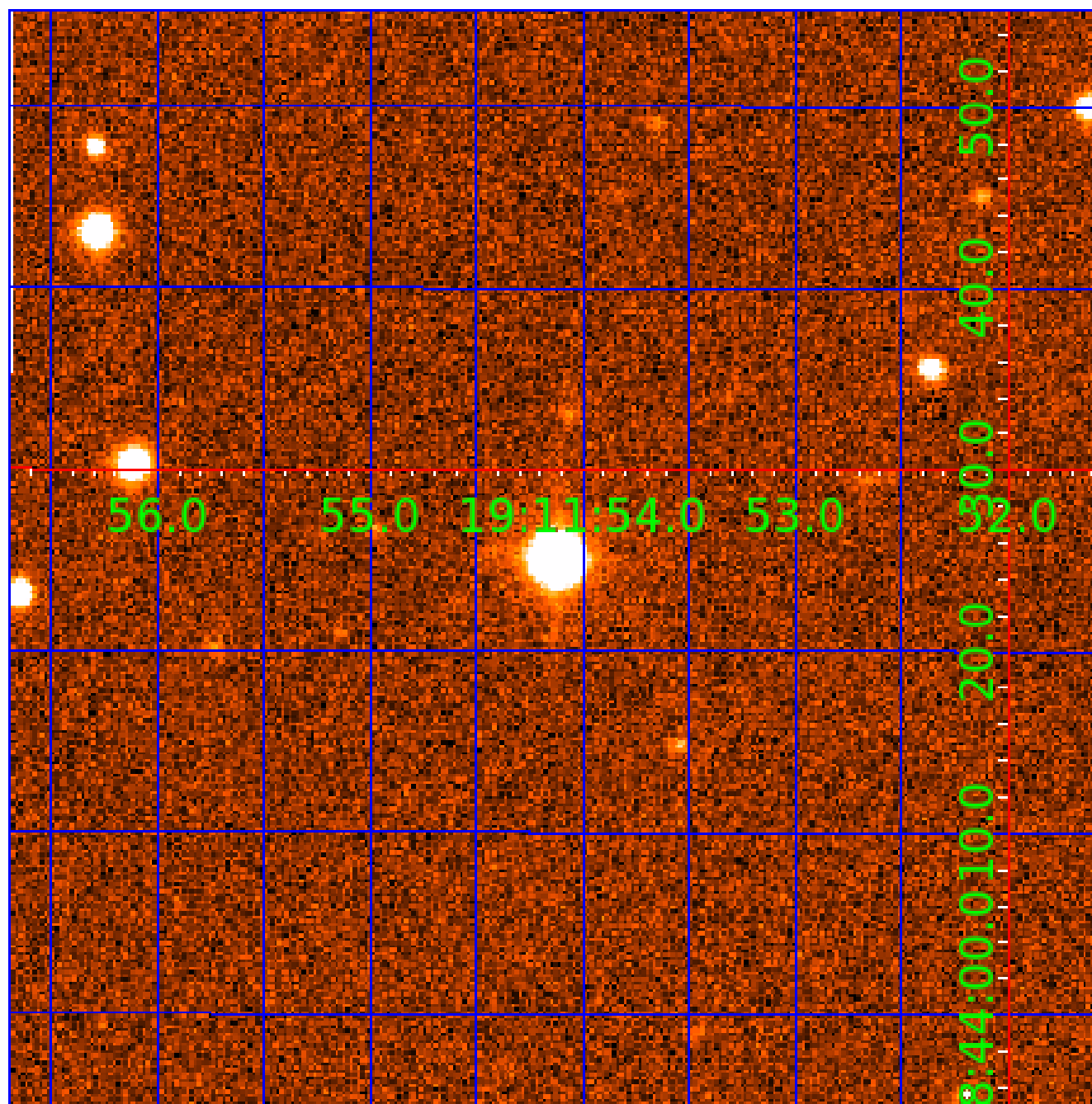


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 003634051

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003634051-01	OBS	6103.01	453.543243	360.059836	864.3	17.110	35.4	36.2	3.01	5874	9.41	5.46
003634051-02	OBS	6103.02	122.806262	179.311837	301.5	1.953	9.4	11.3	3.01	5874	5.64	31.16

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003634051-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—CENT_FEW_DIFFS
003634051-02	OBS	PC	0.76	0	0	0	0	NO_COMMENT

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

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

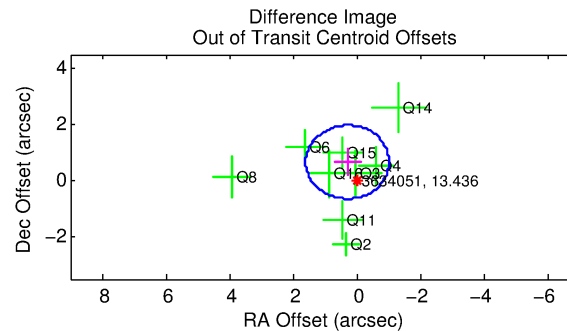
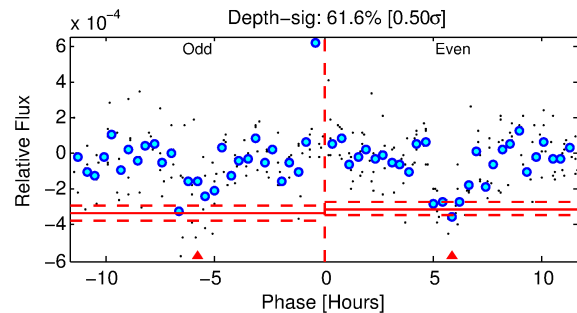
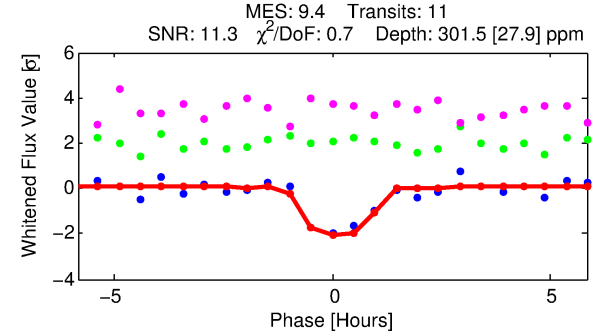
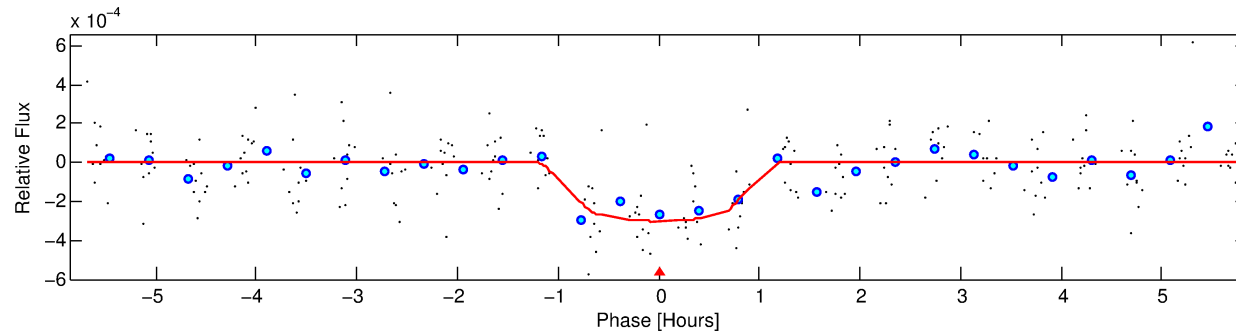
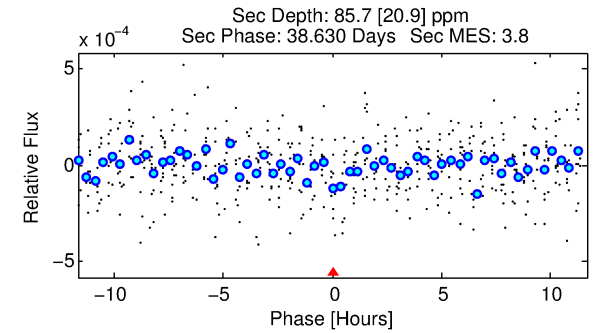
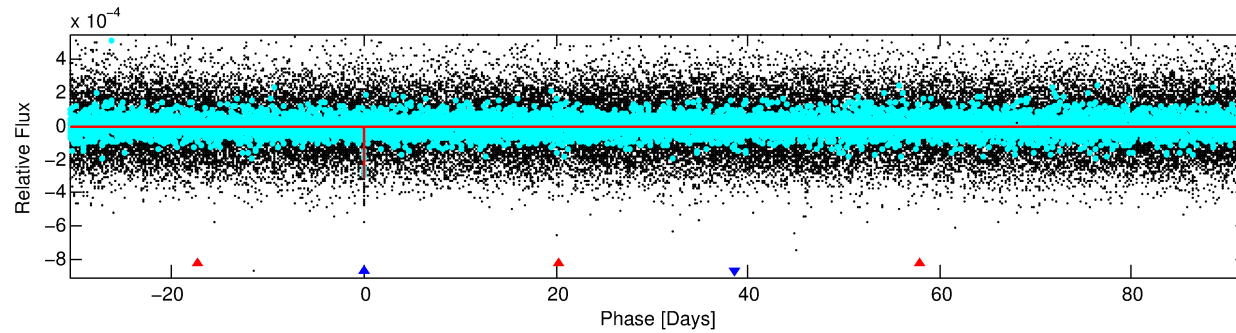
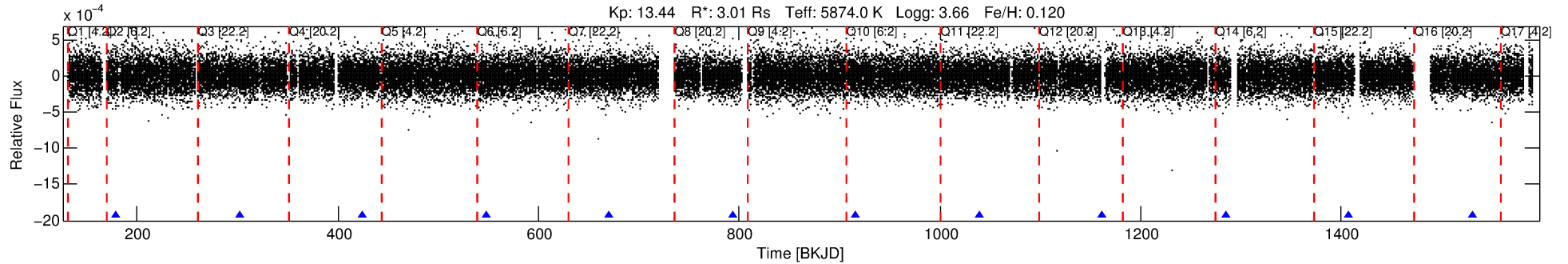
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003634051-02

No Significant Match Found

# DV One-Page Summary

KIC: 3634051 Candidate: 2 of 2 Period: 122.806 d  
KOI: K06103.02 Corr: 0.973



## DV Fit Results:

Period = 122.80626 [0.00064] d  
Epoch = 179.3118 [0.0042] BKJD  
Rp/R\* = 0.0172 [0.0161]  
a/R\* = 341.42 [1450.05]  
b = 0.73 [2.79]  
Seff = 31.16 [20.26]  
Teq = 602 [98] K  
Rp = 5.64 [5.84] Re  
a = 0.5561 [0.2296] AU  
Ag = 458.52 [914.84] [0.50σ]  
Teffp = 4310 [2035] K [1.82σ]

## DV Diagnostic Results:

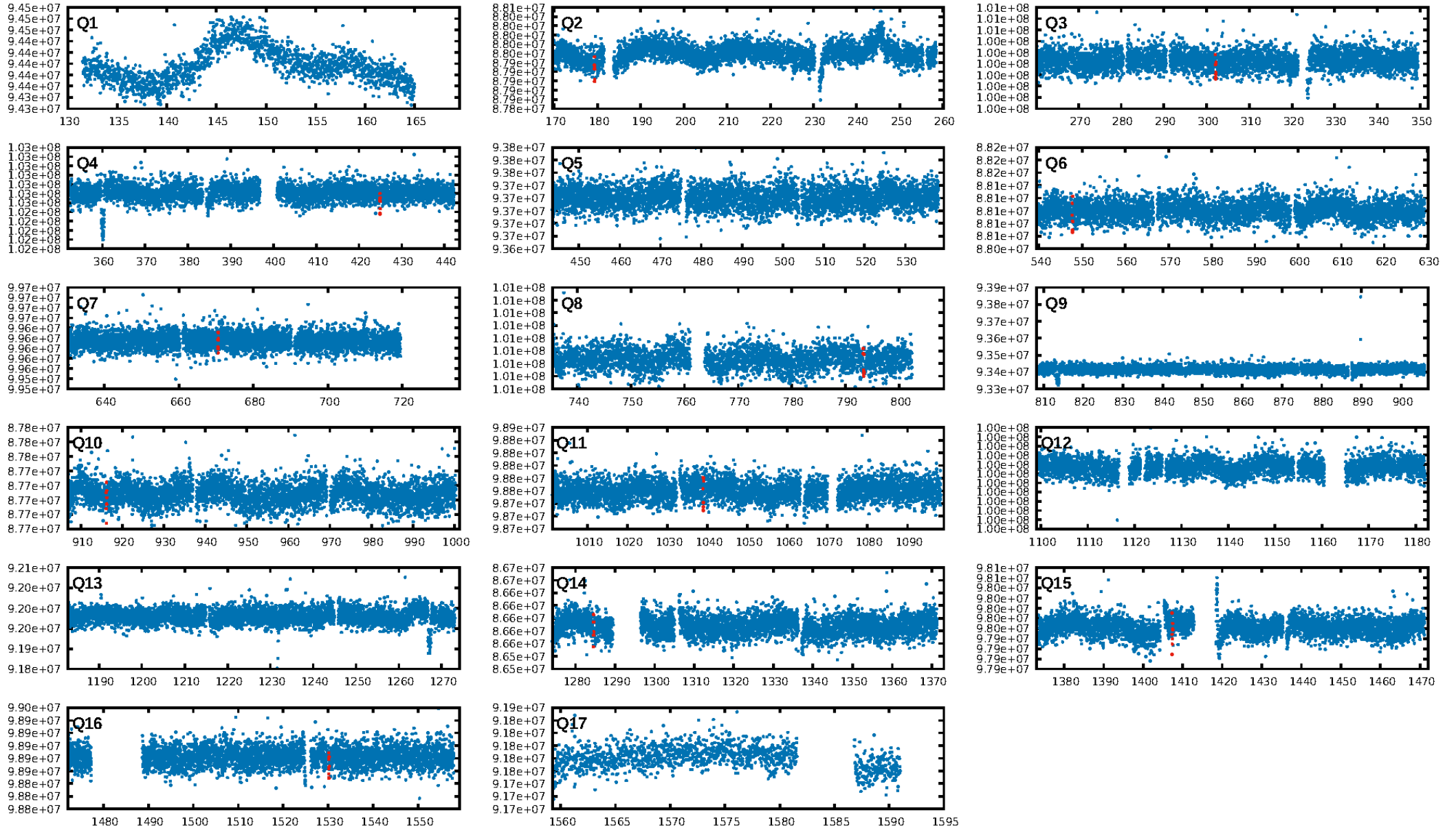
ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [460.92σ]  
ModelChiSquare2-sig: 74.3%  
ModelChiSquareGof-sig: 99.9%  
Bootstrap-pfa: 4.95e-21  
RollingBand-fgt: 1.00 [11/11]  
GhostDiagnostic-chr: -16.5  
Centroid-sig: 94.8%  
Centroid-so: 0.123 arcsec [0.09σ]  
OotOffset-rm: 0.725 arcsec [1.66σ]  
KicOffset-rm: 0.905 arcsec [1.94σ]  
OotOffset-st: 3/3/3/0 [9]  
KicOffset-st: 3/3/3/0 [9]  
DiffImageQuality-fgm: 0.89 [8/9]  
DiffImageOverlap-fno: 1.00 [11/11]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 18:25:03 Z

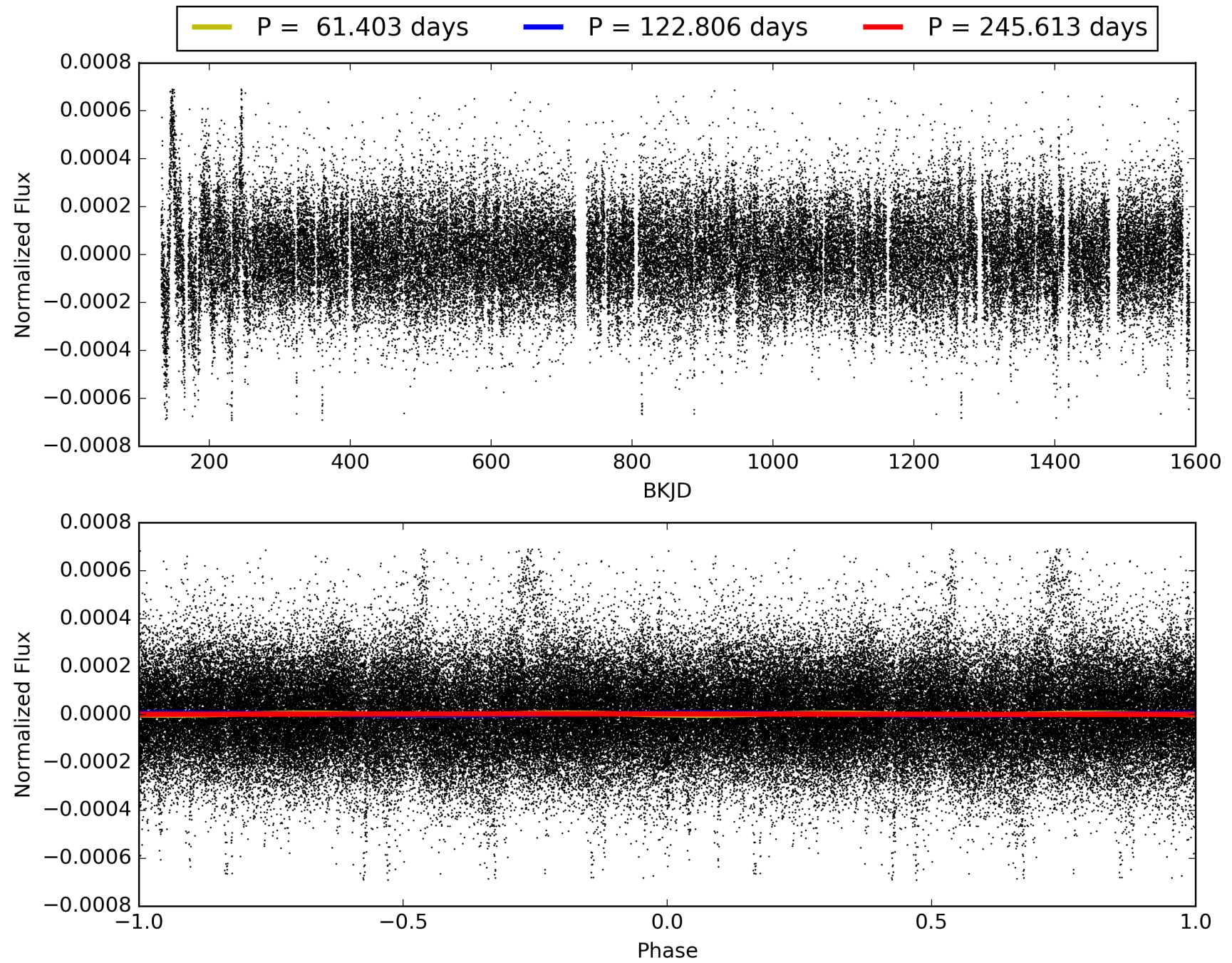
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 003634051-02, PDC Light Curves

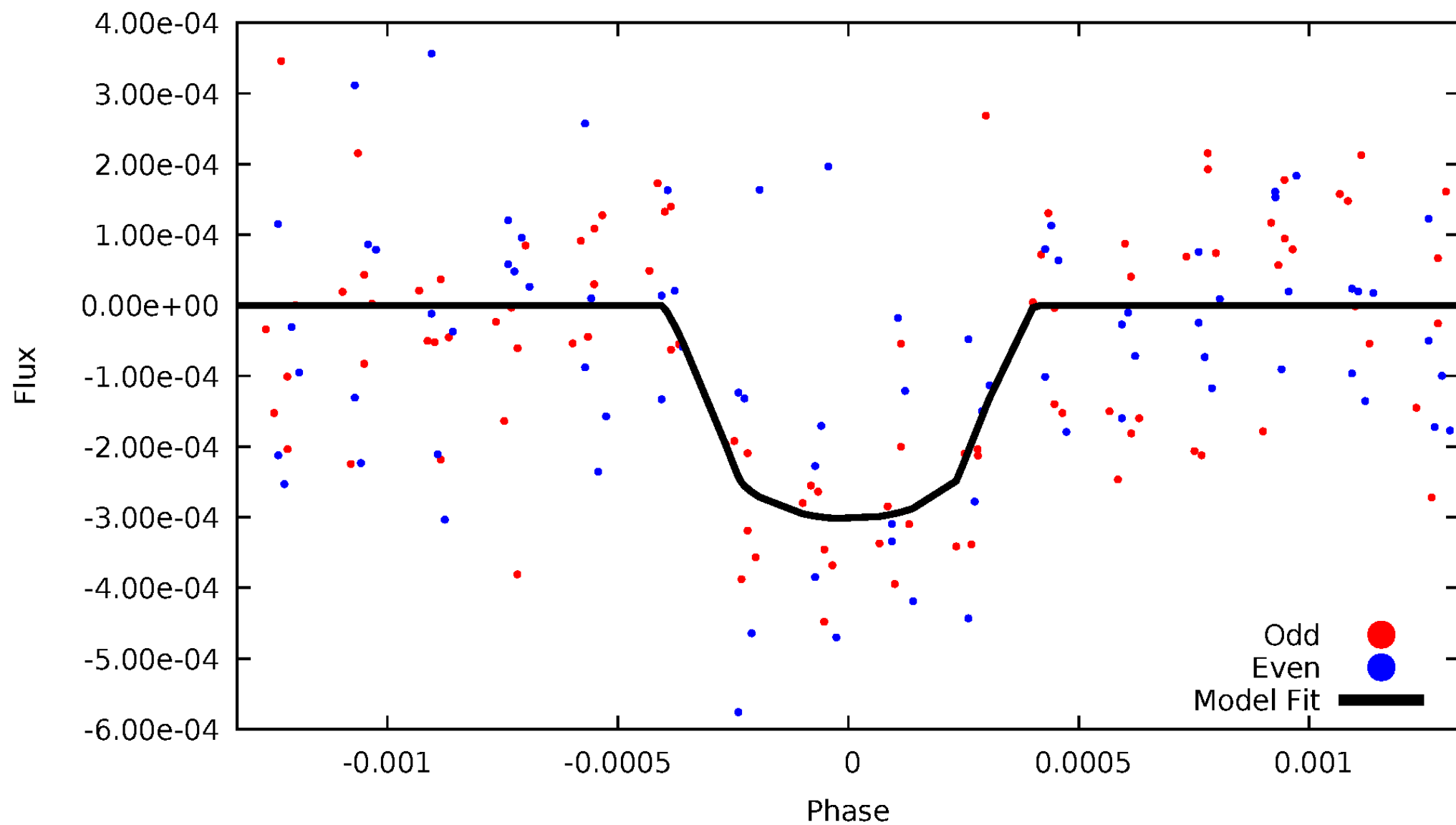


TCE 003634051-02



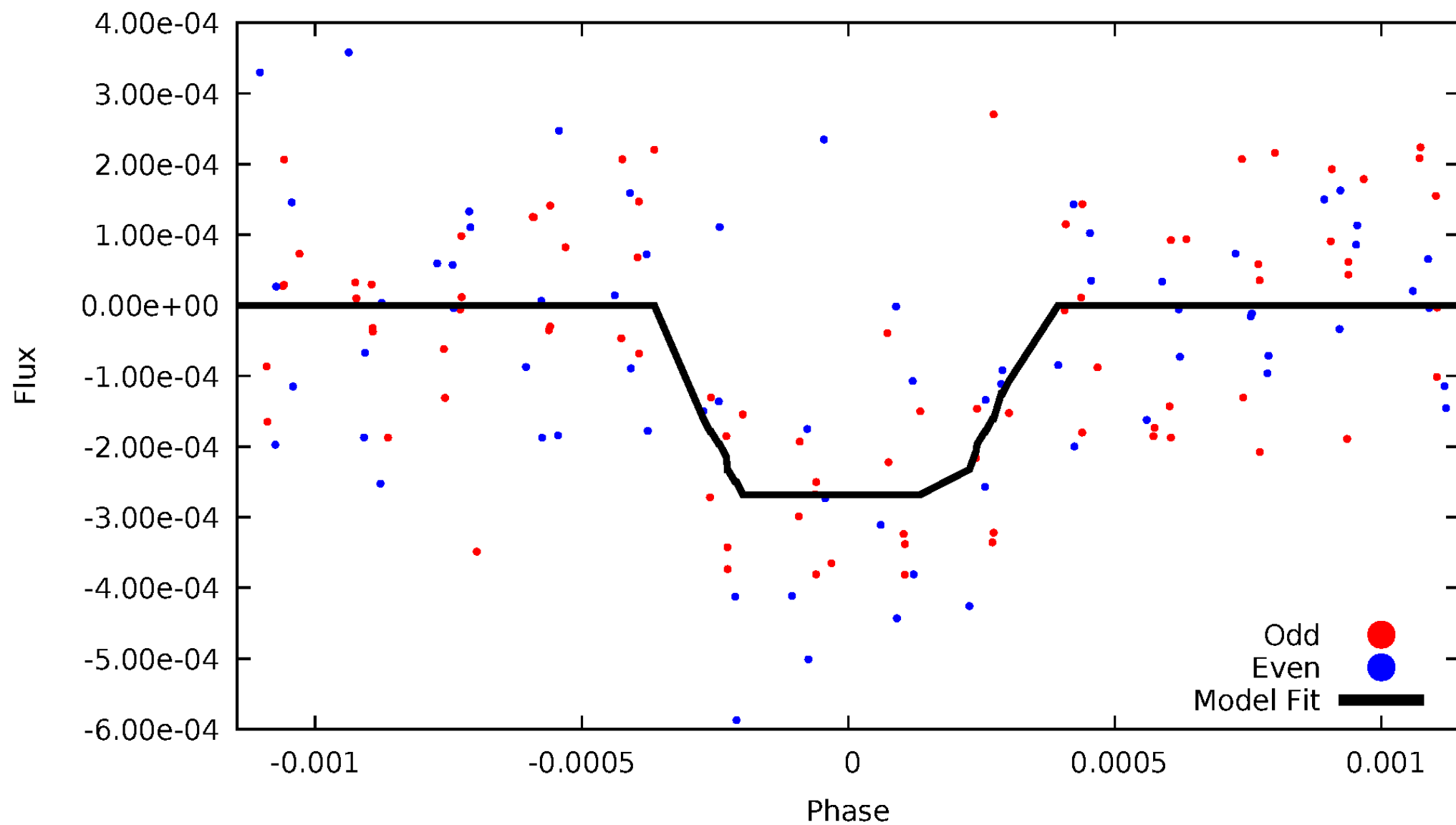
# DV Odd/Even

TCE 003634051-02



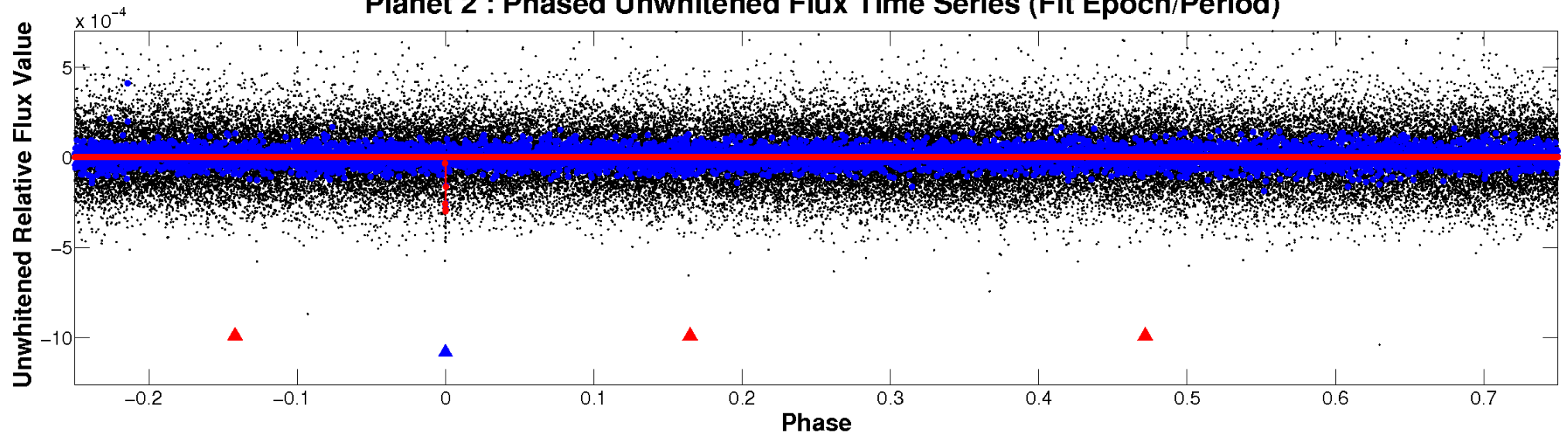
# ALT Odd/Even

TCE 003634051-02

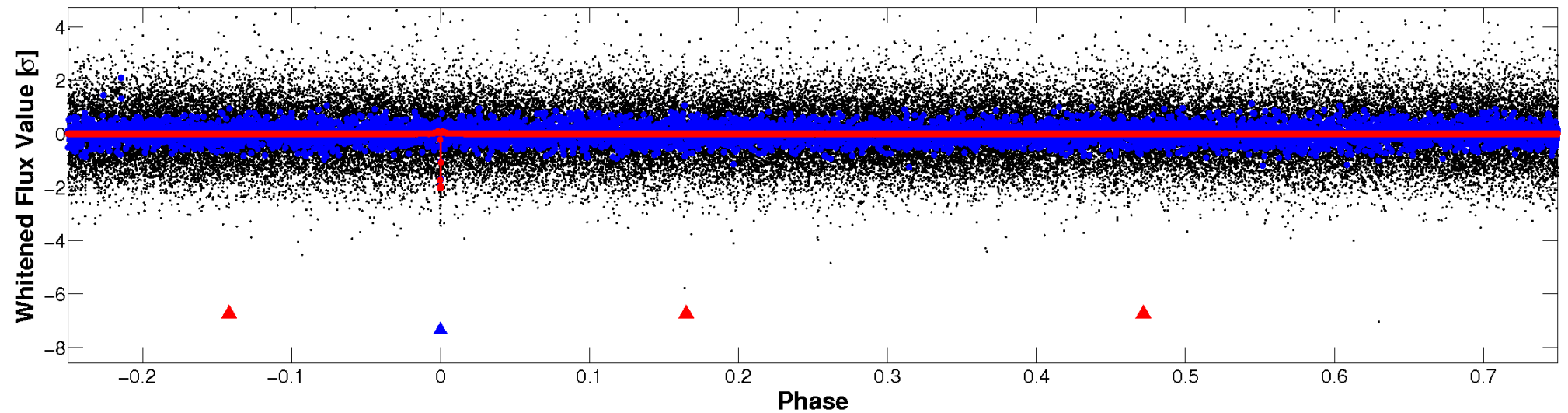


# Non-Whitened Vs. Whitened Light Curve

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

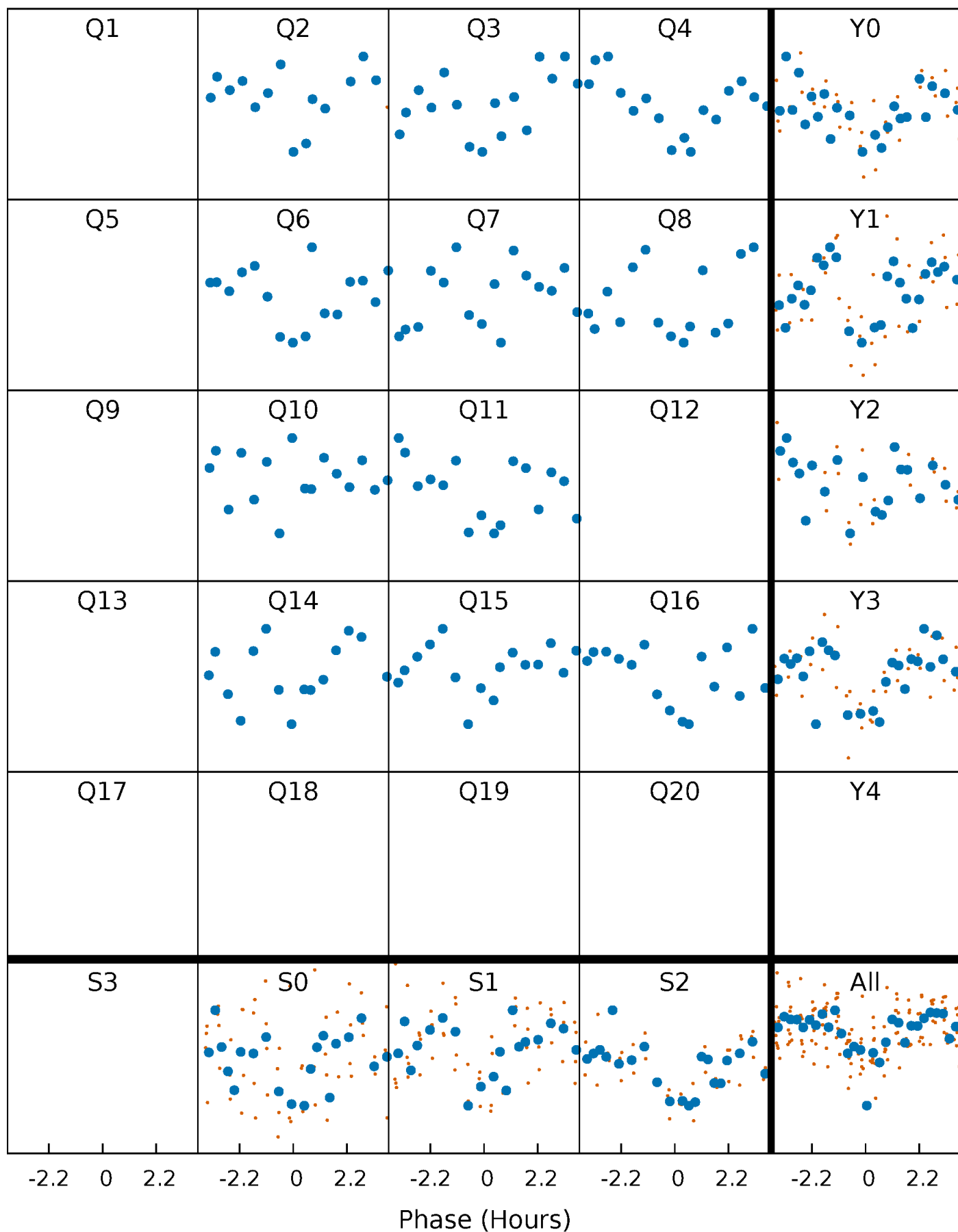


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



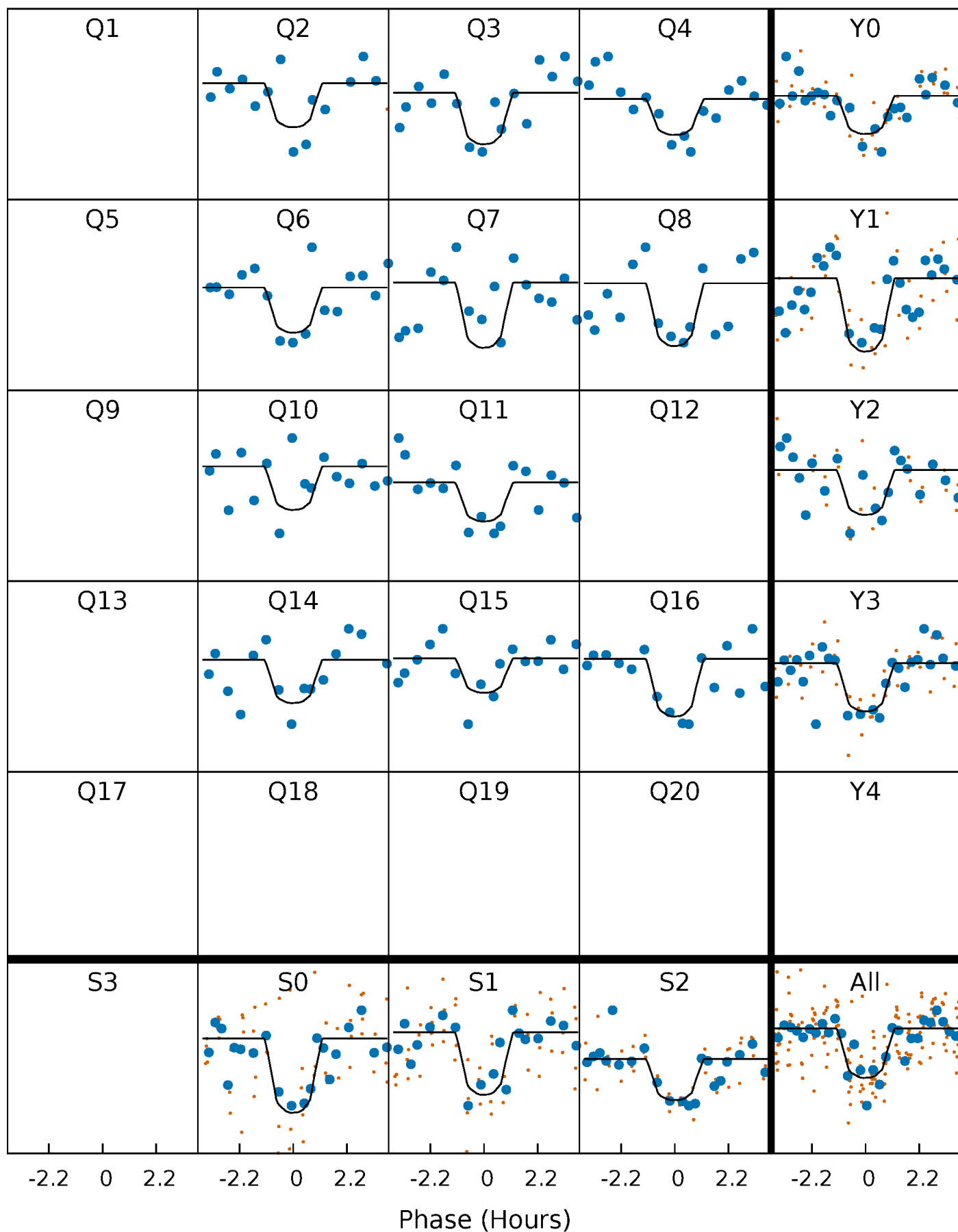
# PDC Quarter-Phased Transit Curves

TCE 003634051-02 P=122.806262 Days  $T_0=179.311837$  (BKJD)



# DV Quarter-Phased Transit Curves

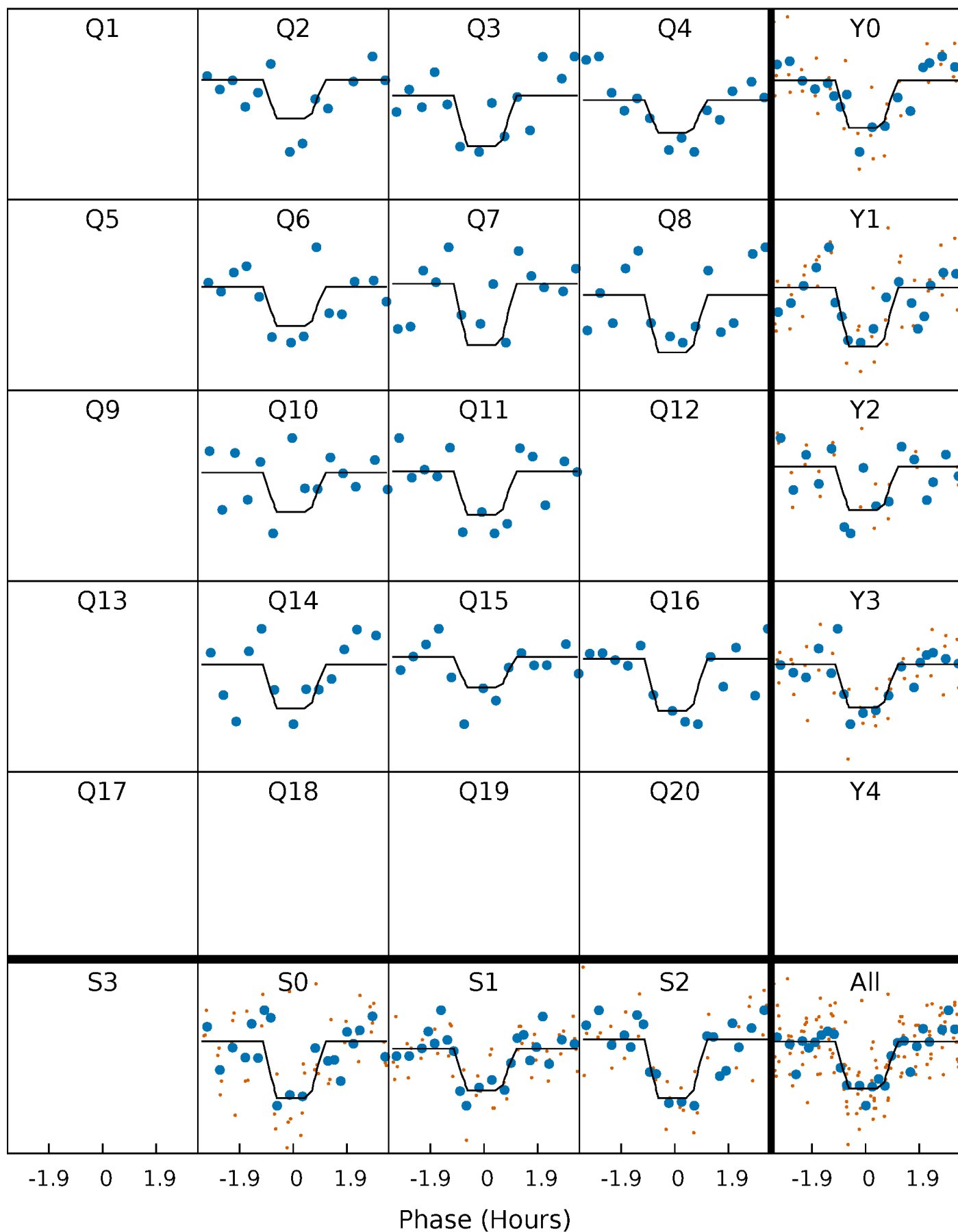
TCE 003634051-02 P=122.806262 Days  $T_0=179.311837$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

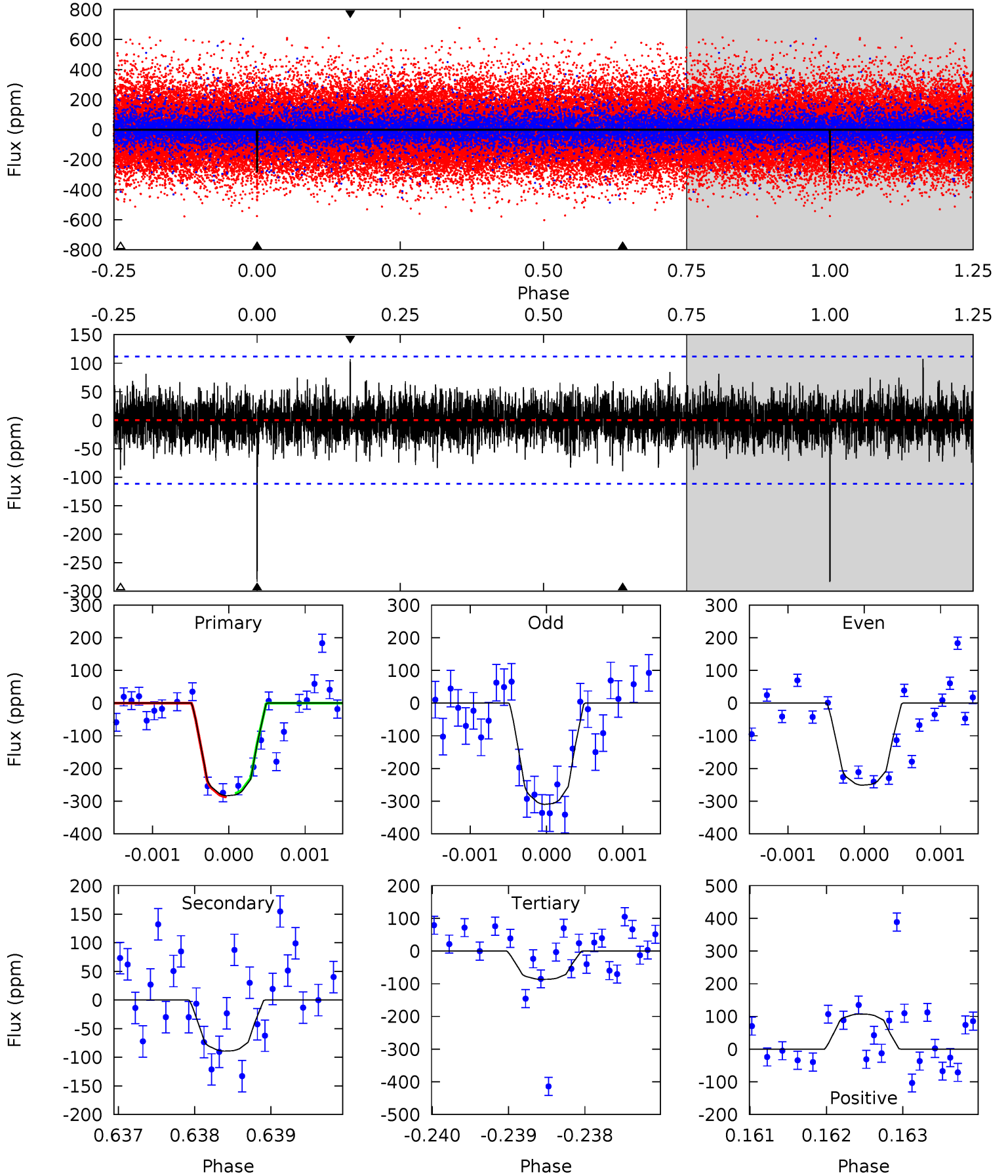
TCE 003634051-02 P=122.805310 Days  $T_0=179.317853$  (BKJD)



# DV Model-Shift Uniqueness Test

003634051-02,  $P = 122.806262$  Days,  $E = 56.505575$  Days

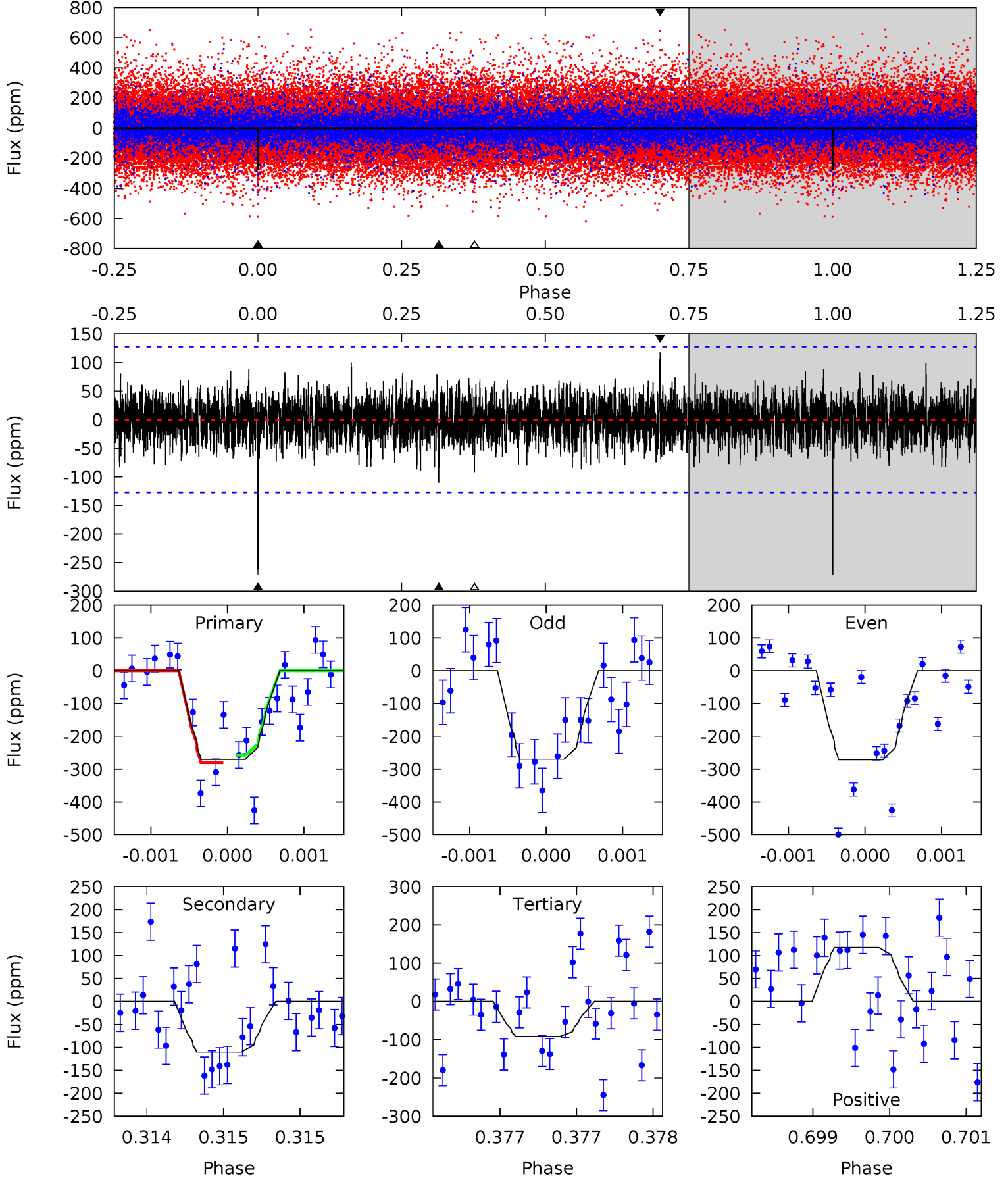
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.9	4.39	4.27	5.27	5.49	3.34	1.18	9.67	8.67	0.12	-0.88	1.43	0.97	0.27	0.25



# Alt Model-Shift Uniqueness Test

003634051-02, P = 122.805310 Days, E = 56.512543 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
11.8	4.81	4.00	5.14	5.55	3.44	1.14	7.81	6.67	0.81	-0.34	0.02	0.98	0.30	0.49



### Stellar Parameters For KIC 003634051

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5874^{+87}_{-79}$	$3.664^{+0.375}_{-0.125}$	$0.120^{+0.150}_{-0.150}$	$3.006^{+0.572}_{-1.335}$	$1.519^{+0.150}_{-0.376}$	$0.079^{+0.251}_{-0.030}$
	+1%/-1%	+10%/-3%	+125%/-125%	+19%/-44%	+10%/-25%	+319%/-38%
Source	SPE90	FLK73	SPE90	DSEP		

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

### Secondary Eclipse Parameters for KIC 003634051-02 / KOI 6103.02

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-89 \pm 20$	$5.77^{+4.89}_{-3.71}$	$836^{+48}_{-87}$	$4338^{+2560}_{-819}$	$433^{+2763}_{-309}$
Alt.	$-110 \pm 23$	$5.94^{+5.04}_{-3.74}$	$832^{+52}_{-87}$	$4467^{+2223}_{-802}$	$530^{+2888}_{-377}$

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

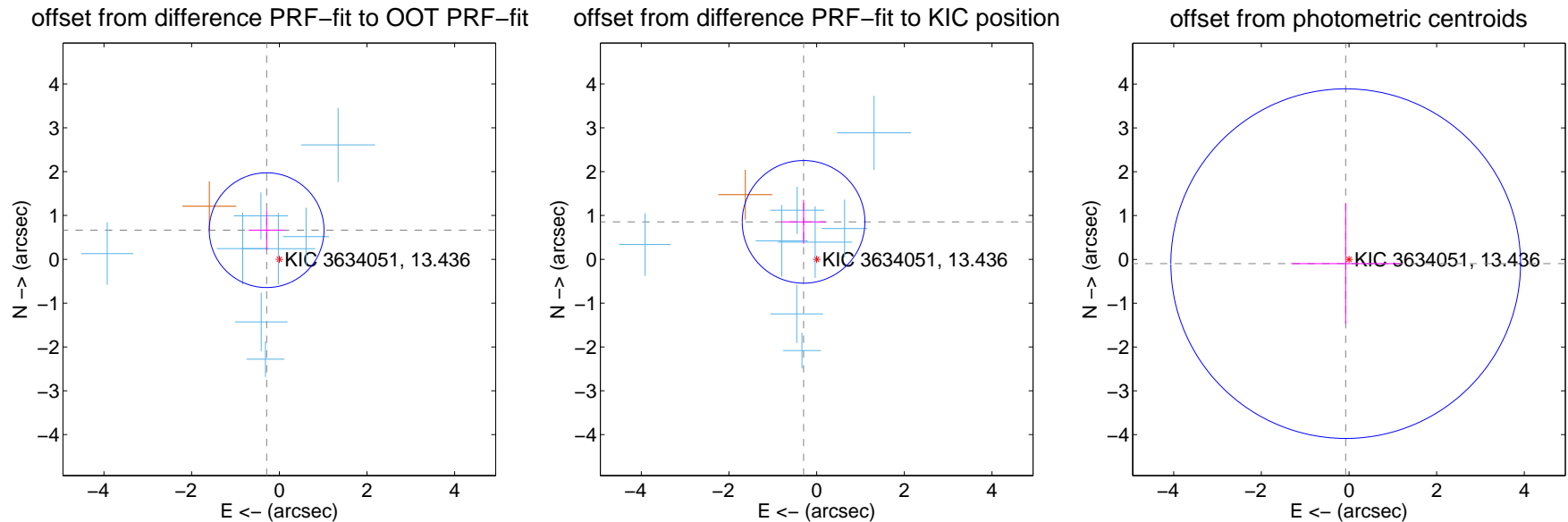
## DV Centroid Data

Supplemental centroid analysis for 003634051-02. Kepler magnitude: 13.44. Transit SNR 11.28

There are 8 quarters with good PRF difference image offsets

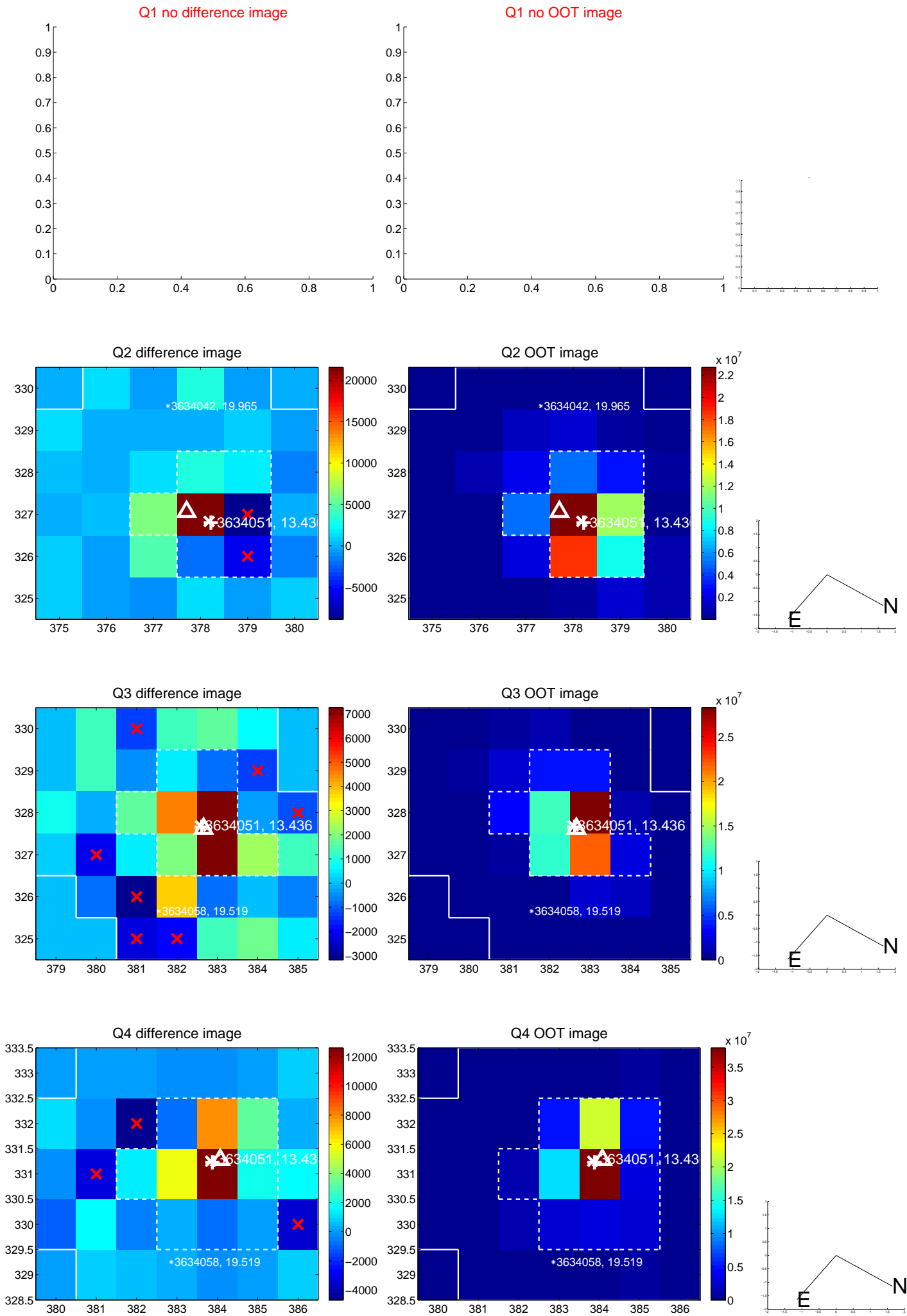
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.725 \pm 0.436$	1.66	$0.289 \pm 0.411$	$0.665 \pm 0.450$
PRF-fit source offset from KIC position	$0.905 \pm 0.467$	1.94	$0.299 \pm 0.511$	$0.855 \pm 0.501$
photometric centroid source offset	$0.12 \pm 1.33$	0.09	$0.08 \pm 1.25$	$-0.10 \pm 1.38$

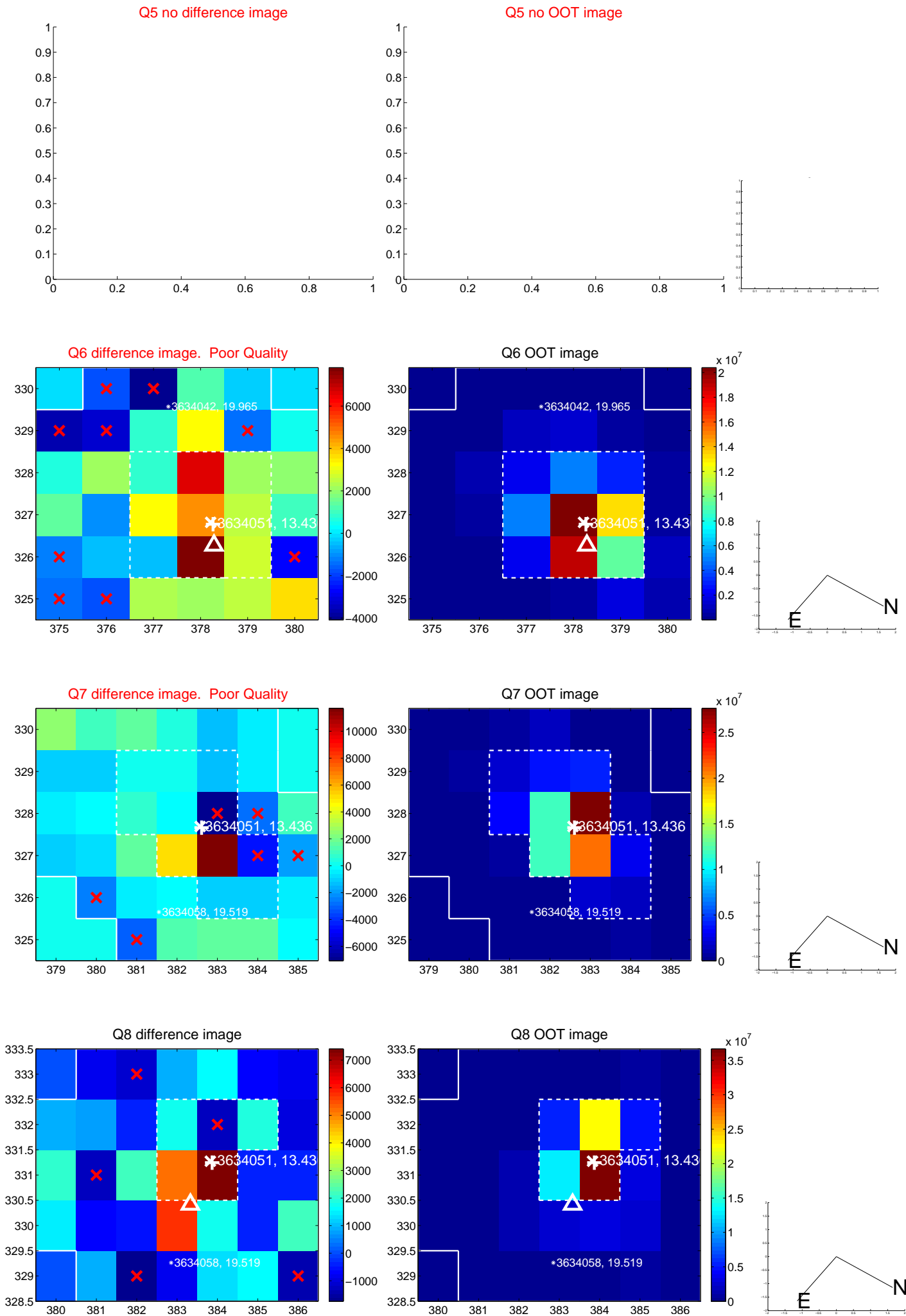


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

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



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

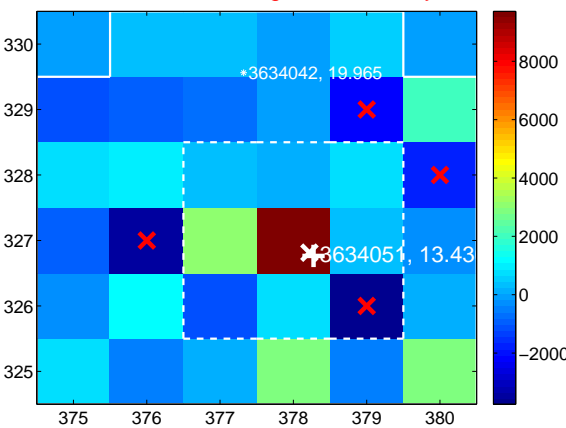
Q9 no difference image



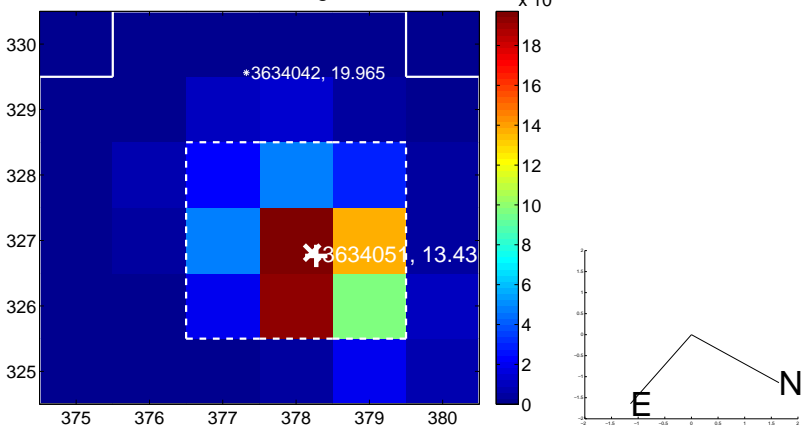
Q9 no OOT image



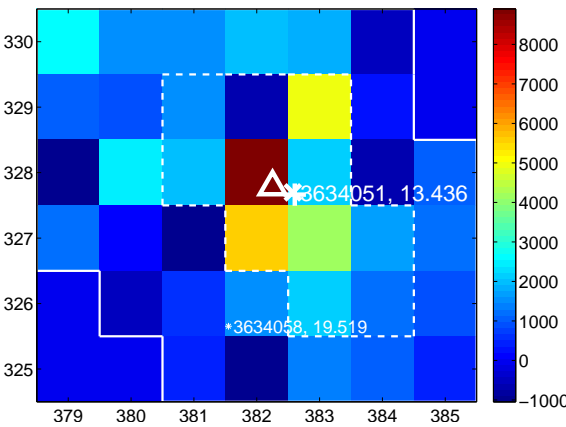
Q10 difference image. Poor Quality



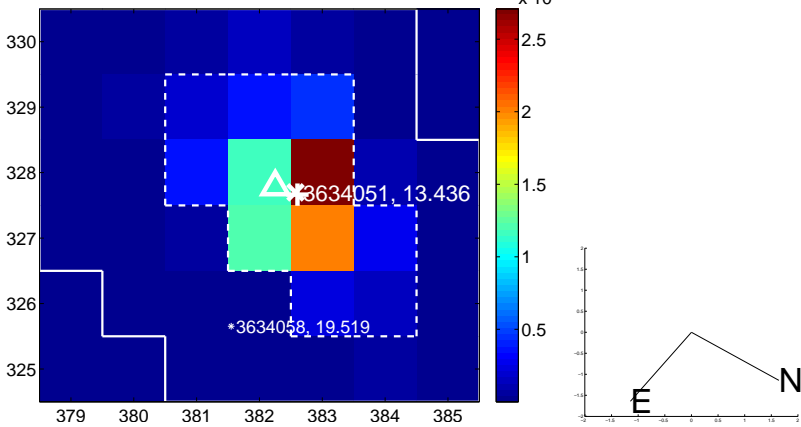
Q10 OOT image



Q11 difference image



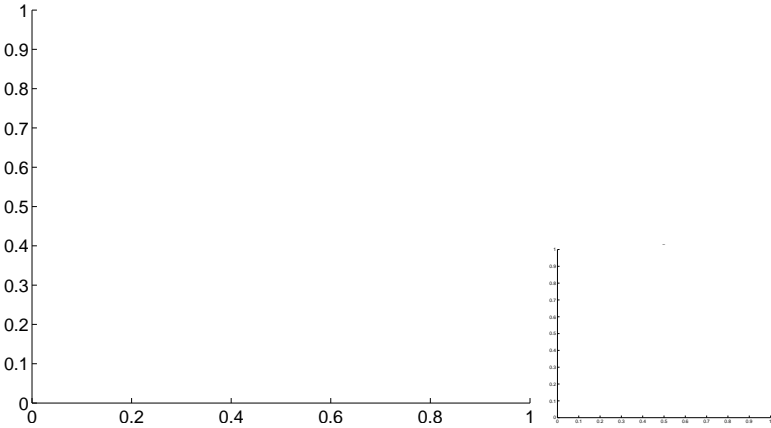
Q11 OOT image



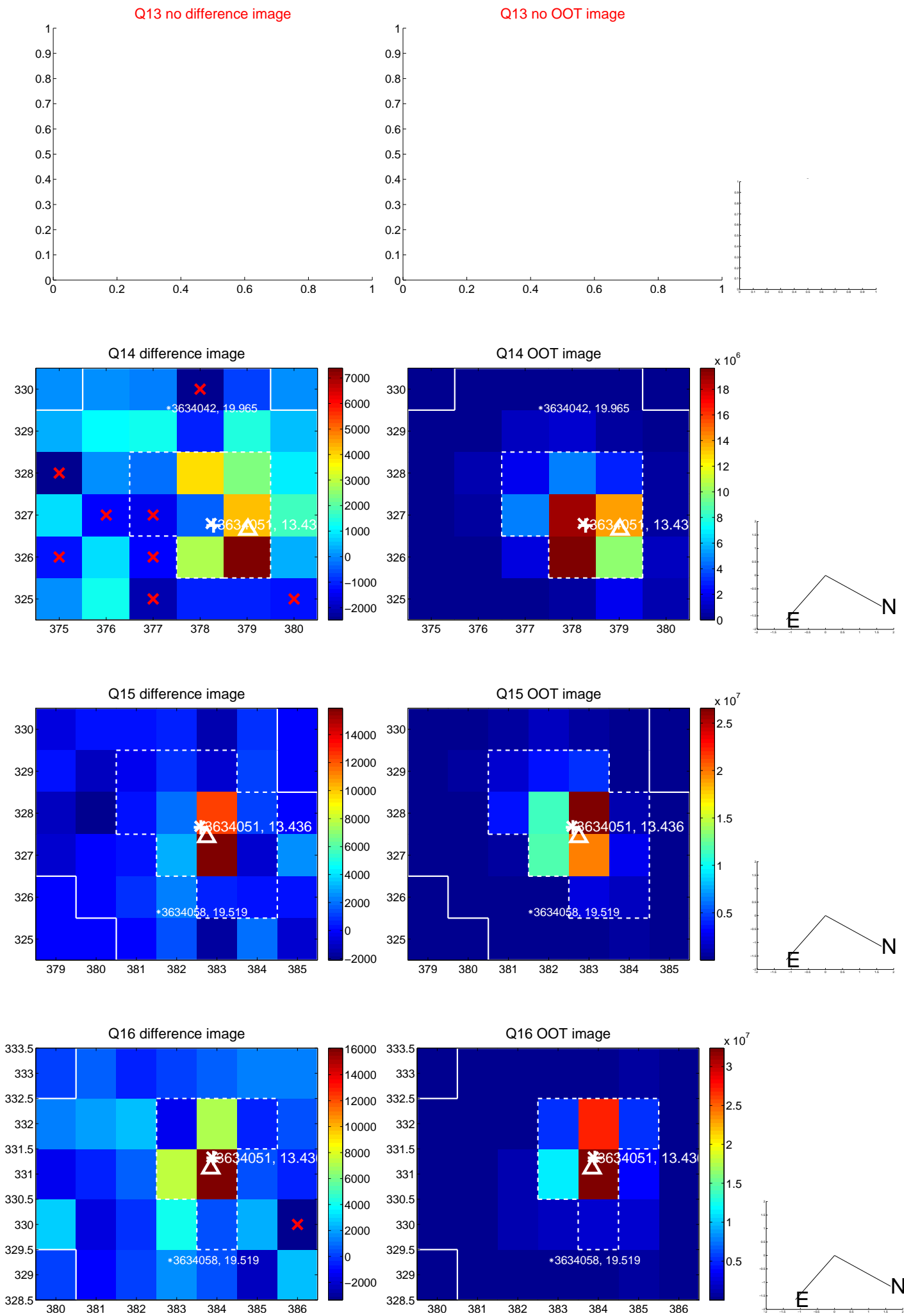
Q12 no difference image



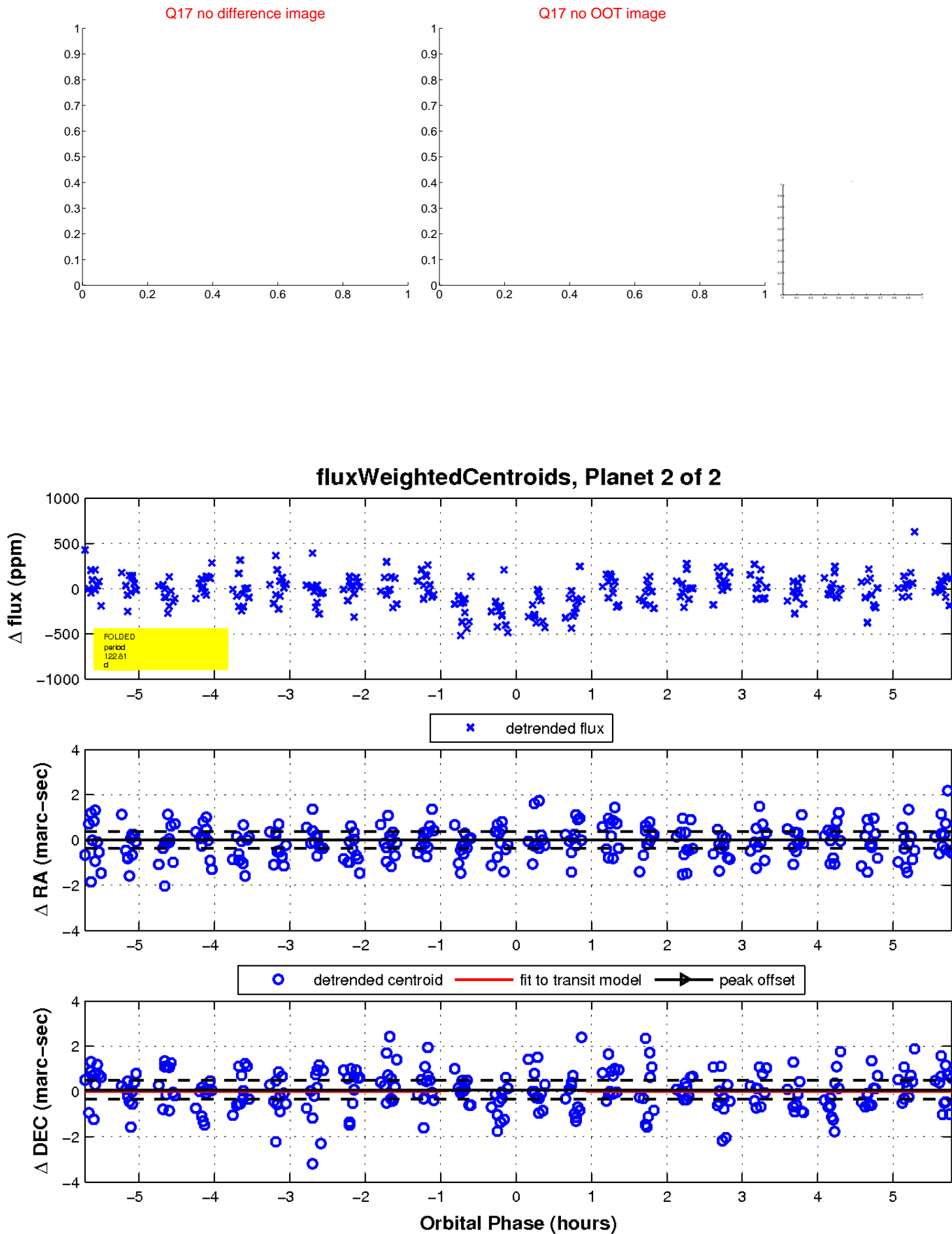
Q12 no OOT image



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



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



UKIRT Image

Declination

