

# KIC 008396113

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008396113-01	OBS	No	604.560633	172.802703	1537.8	1.913	15.7	7.0	1.12	5918	4.60	0.76
008396113-02	OBS	No	584.569785	380.465302	1176.0	5.308	11.1	4.8	1.12	5918	3.88	0.80
008396113-03	OBS	No	230.609277	163.432204	1127.2	3.607	10.1	7.1	1.12	5918	4.26	2.75

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008396113-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008396113-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008396113-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_KIC_POS

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

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

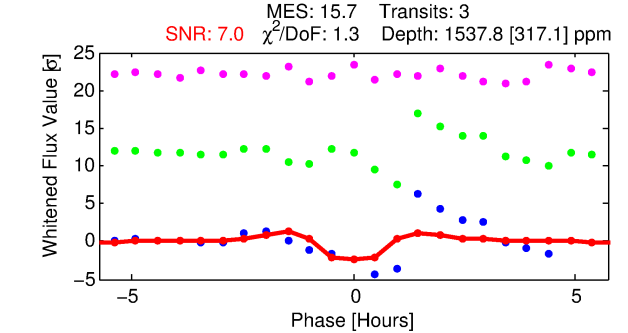
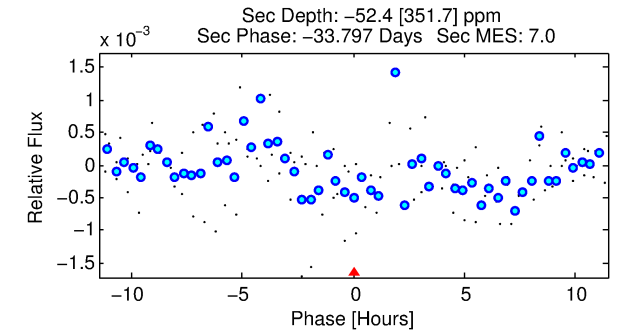
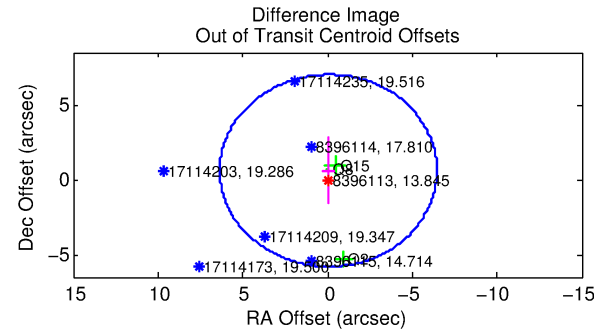
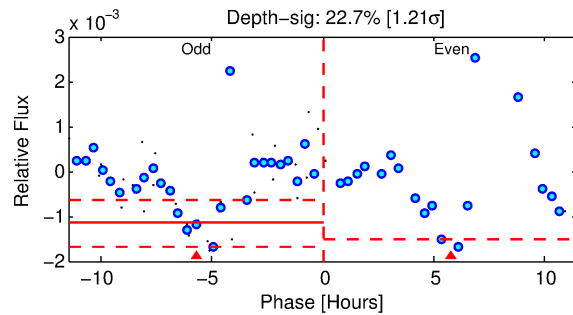
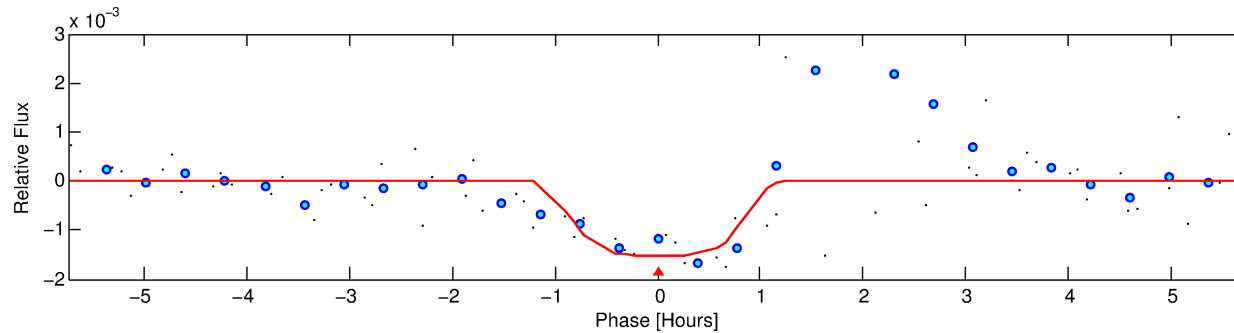
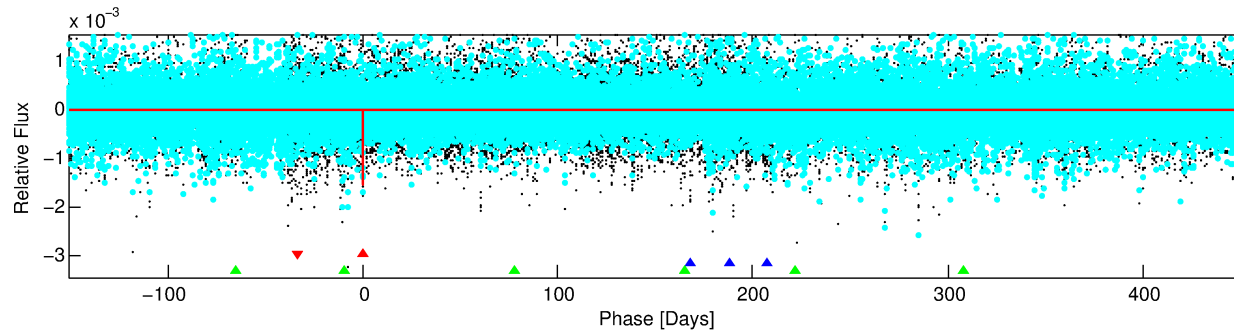
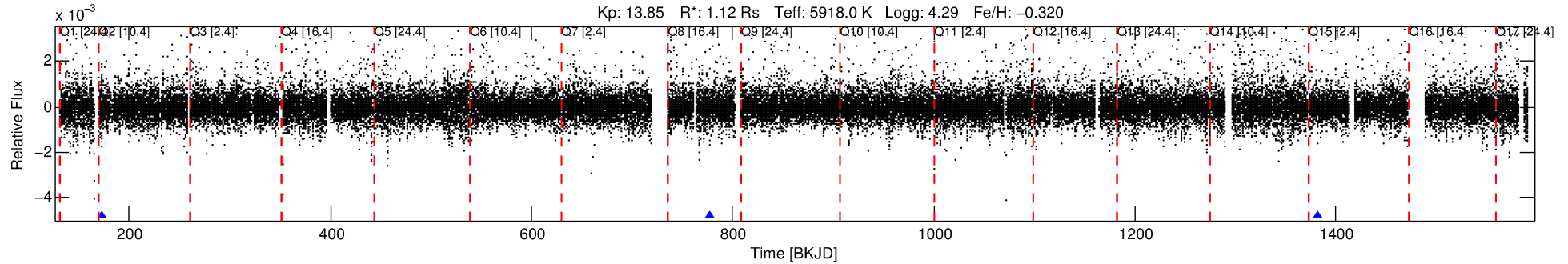
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008396113-01

No Significant Match Found

# DV One-Page Summary

KIC: 8396113 Candidate: 1 of 3 Period: 604.561 d



## DV Fit Results:

Period = 604.56063 [0.00525] d  
Epoch = 172.8027 [0.0069] BKJD  
Rp/R\* = 0.0375 [0.0771]  
a/R\* = 2065.92 [19864.84]  
b = 0.59 [10.96]  
Seff = 0.76 [0.28]  
Teq = 238 [22] K  
Rp = 4.60 [9.54] Re  
a = 1.3487 [0.3193] AU  
Ag = N/A  
Teffp = N/A

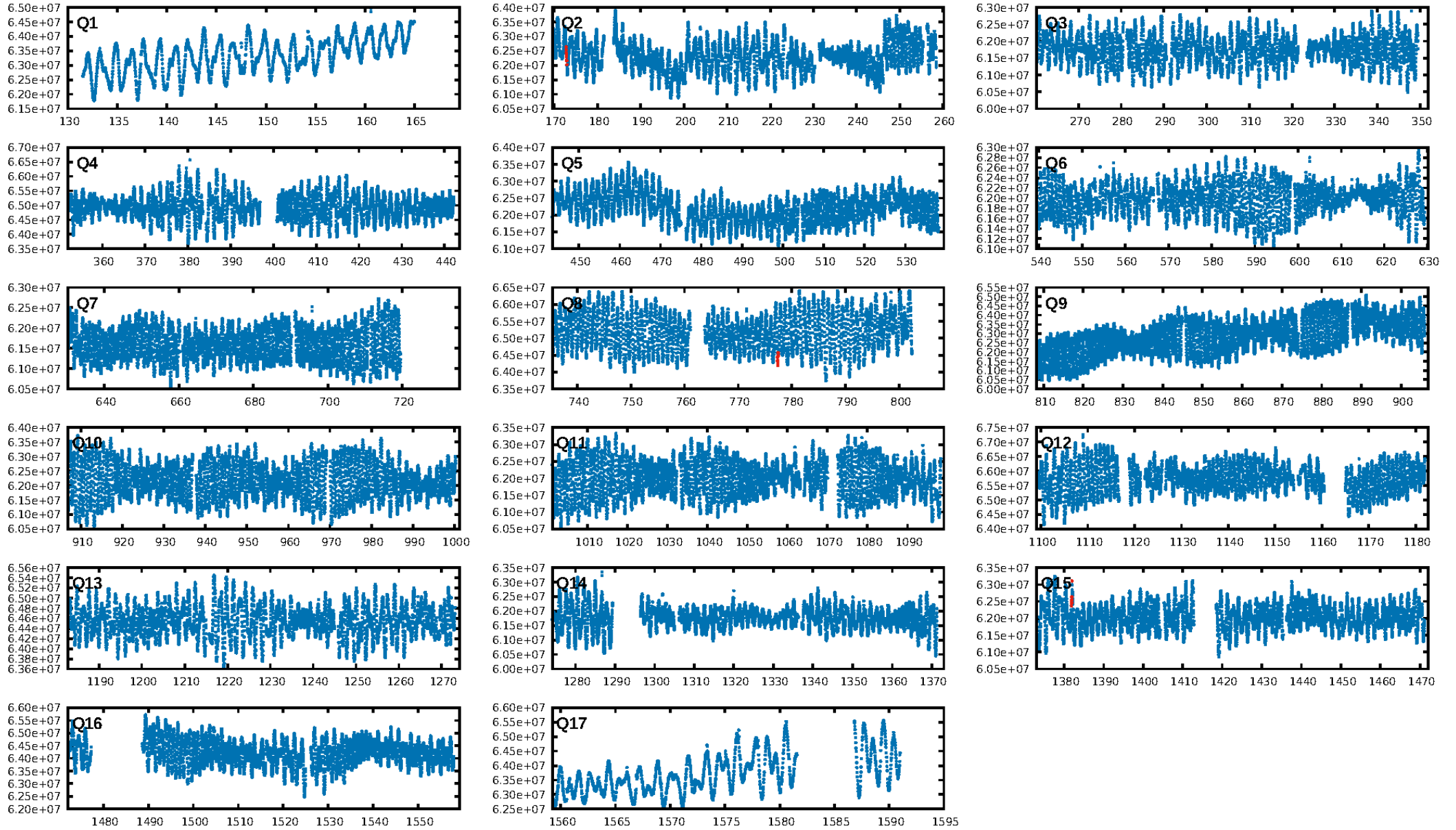
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [85.03 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 9.6%  
ModelChiSquareGof-sig: 81.0%  
**Bootstrap-pfa: 2.29e-12**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 8.132  
Centroid-sig: 86.3%  
Centroid-so: 1.557 arcsec [1.53 $\sigma$ ]  
OotOffset-rm: 0.605 arcsec [0.28 $\sigma$ ]  
KicOffset-rm: 0.191 arcsec [0.11 $\sigma$ ]  
OotOffset-st: 1/1/1/0 [3]  
KicOffset-st: 1/1/1/0 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

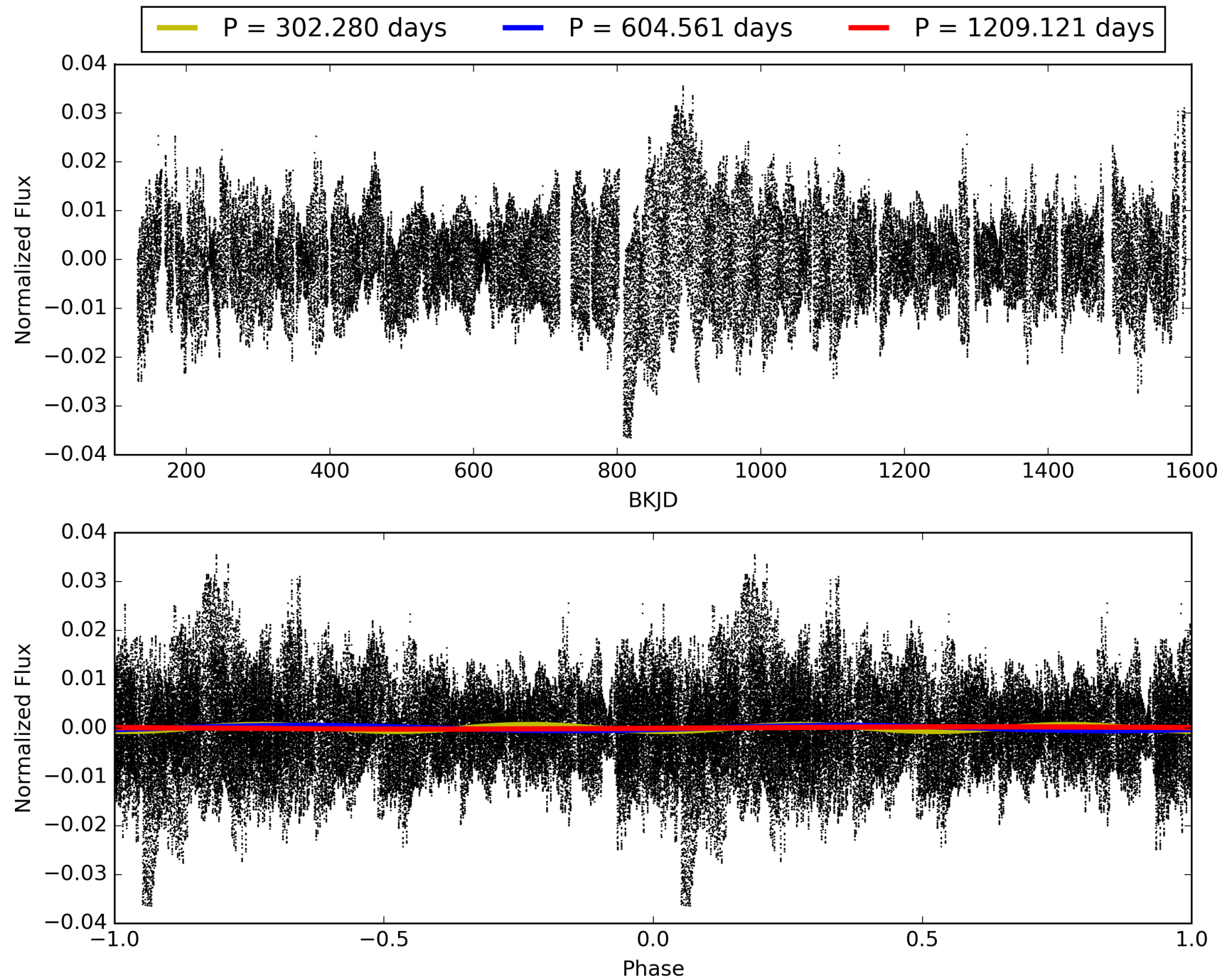
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 01:58:32 Z

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

# TCE 008396113-01, PDC Light Curves

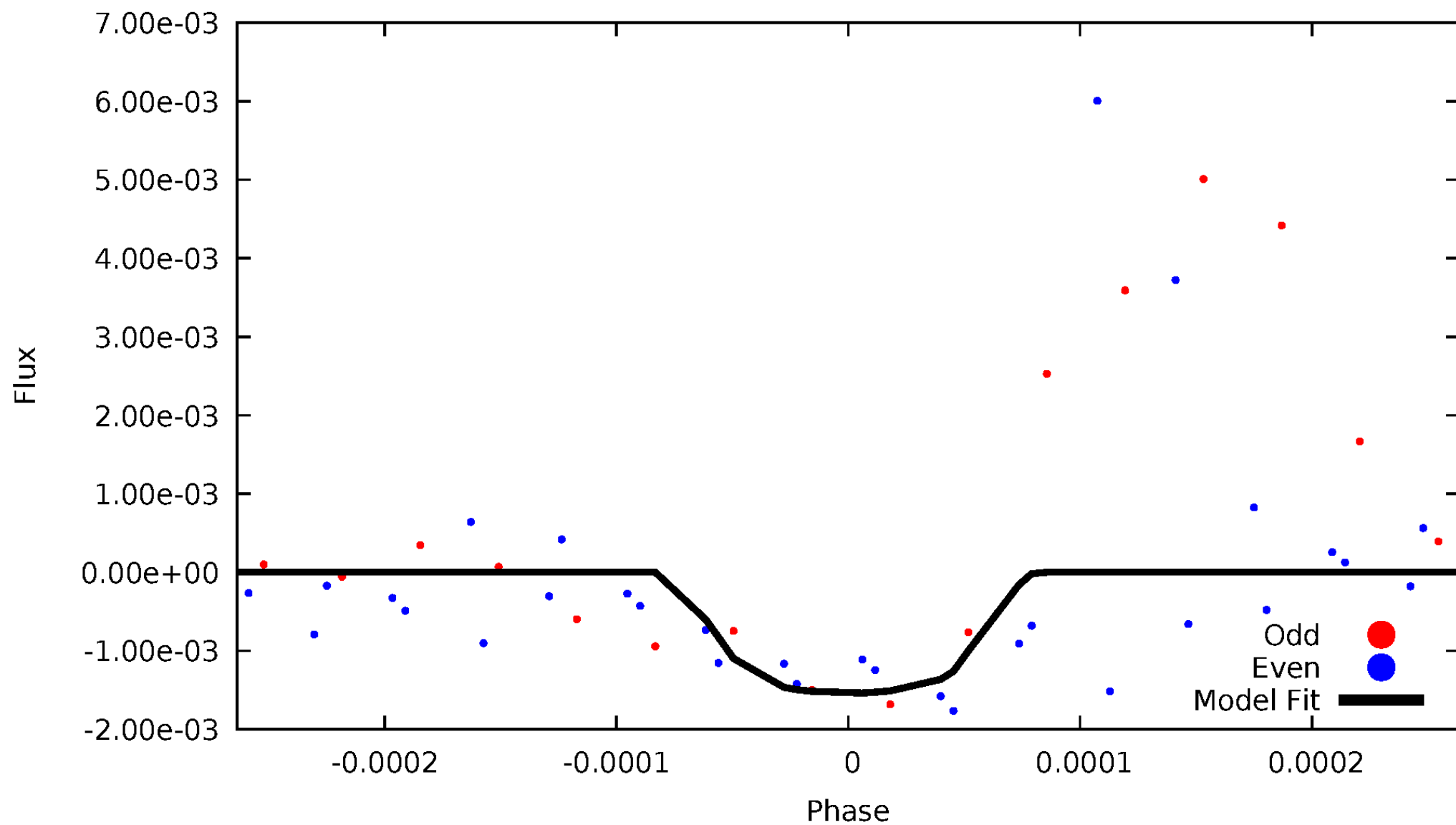


# TCE 008396113-01



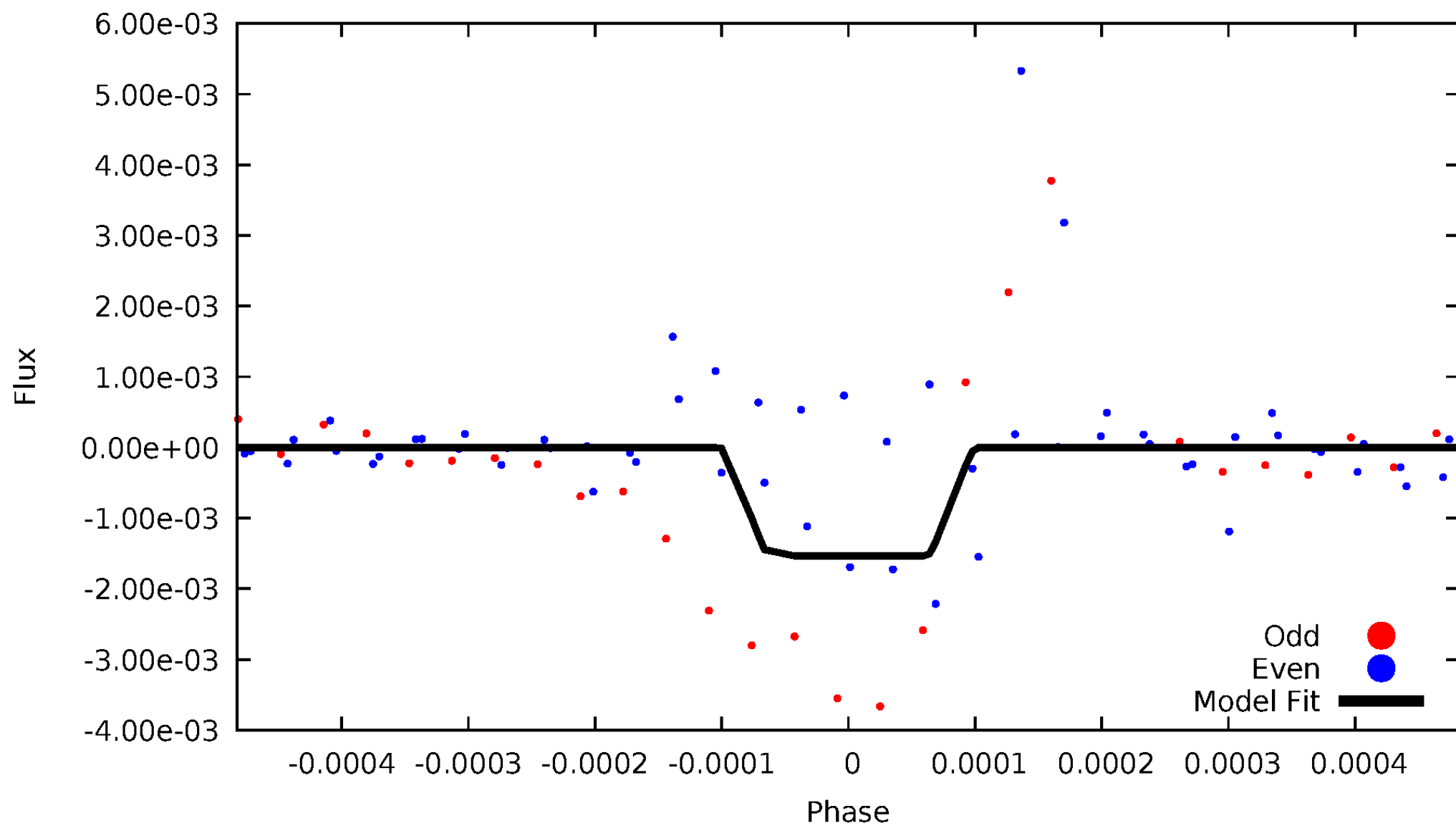
# DV Odd/Even

TCE 008396113-01



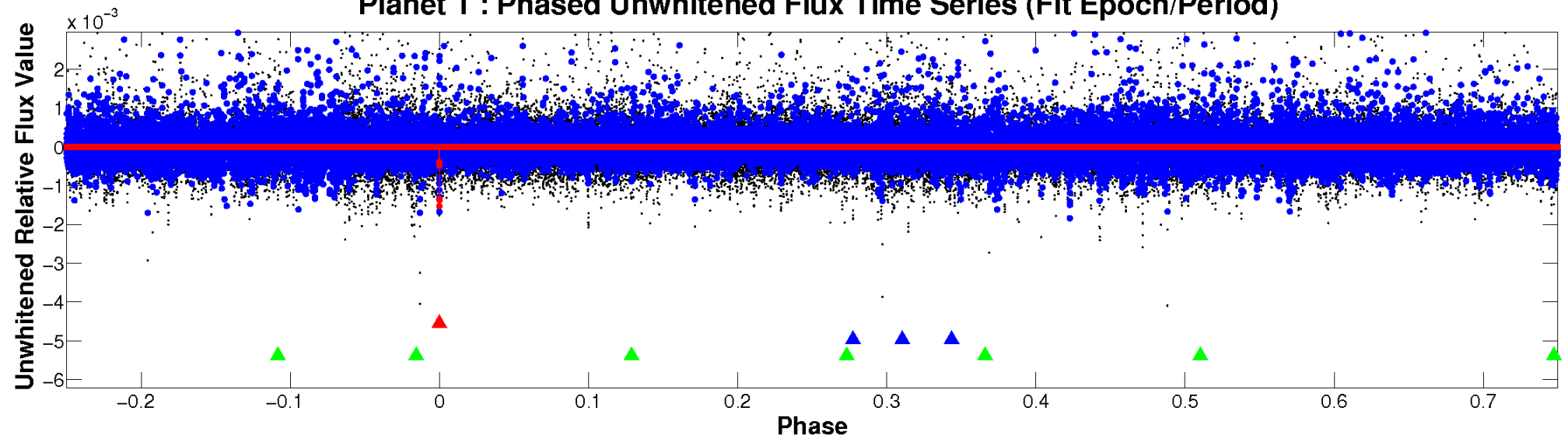
# ALT Odd/Even

TCE 008396113-01

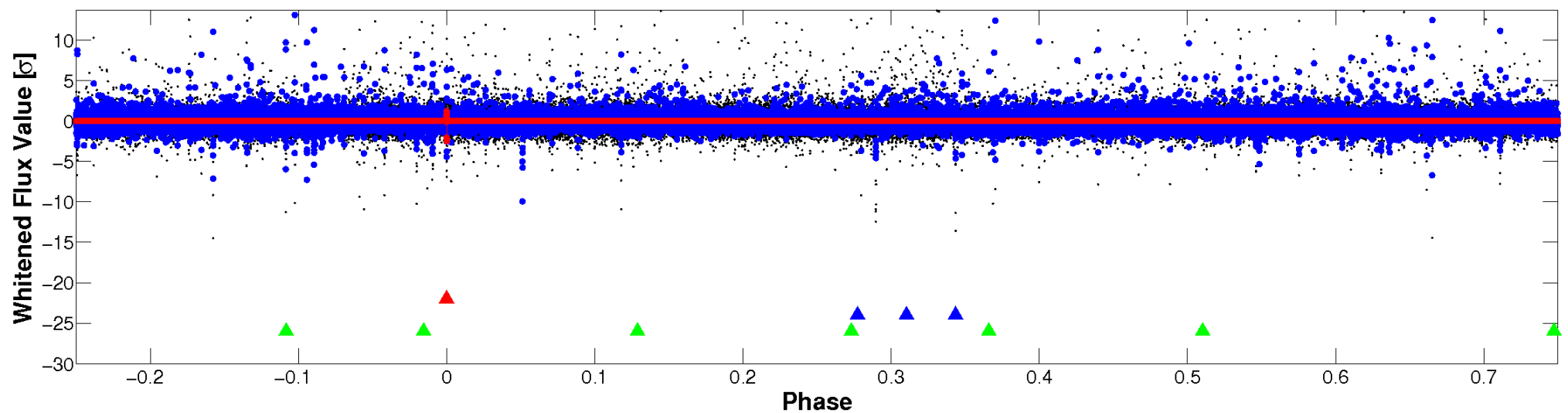


# Non-Whitened Vs. Whitened Light Curve

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

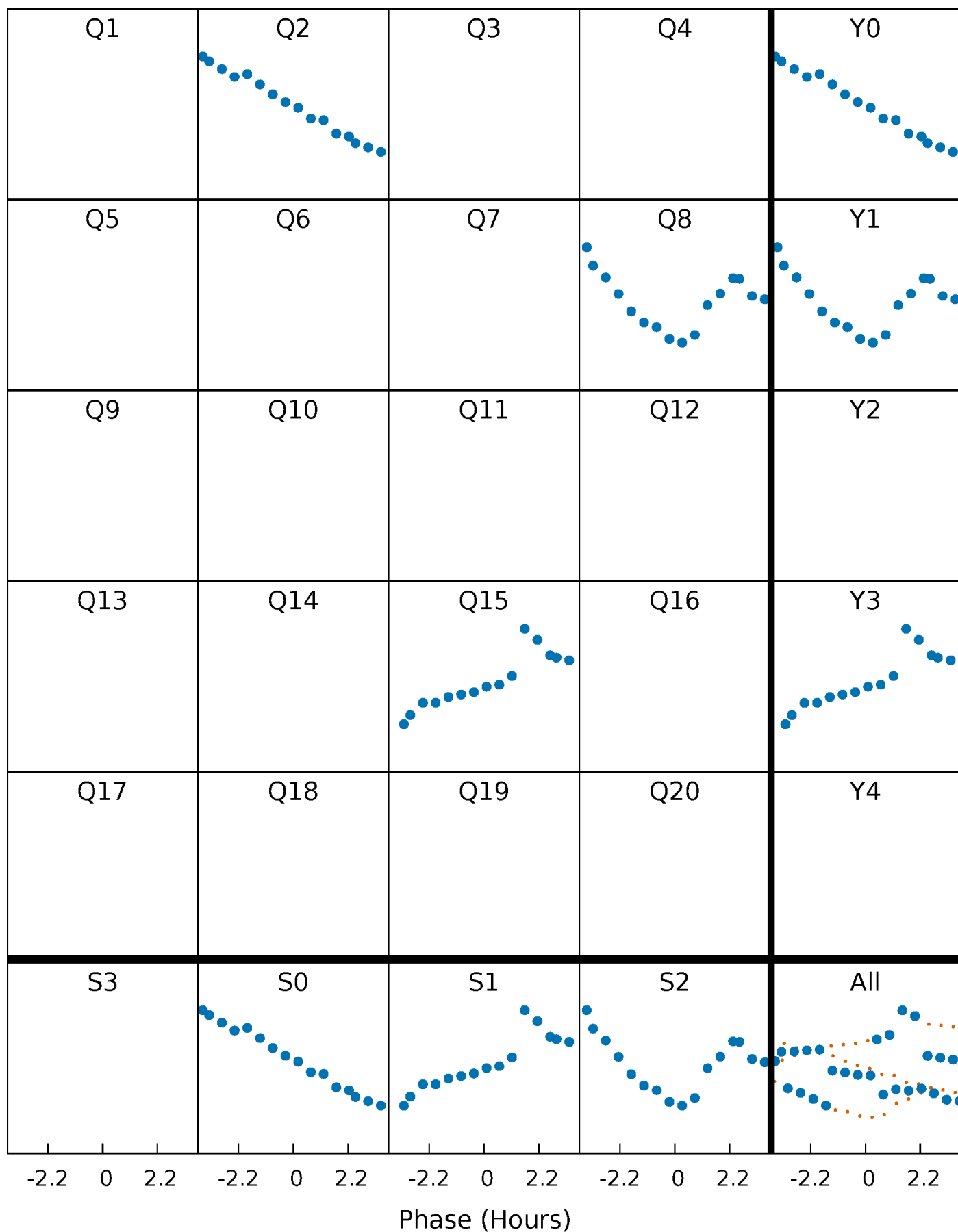


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

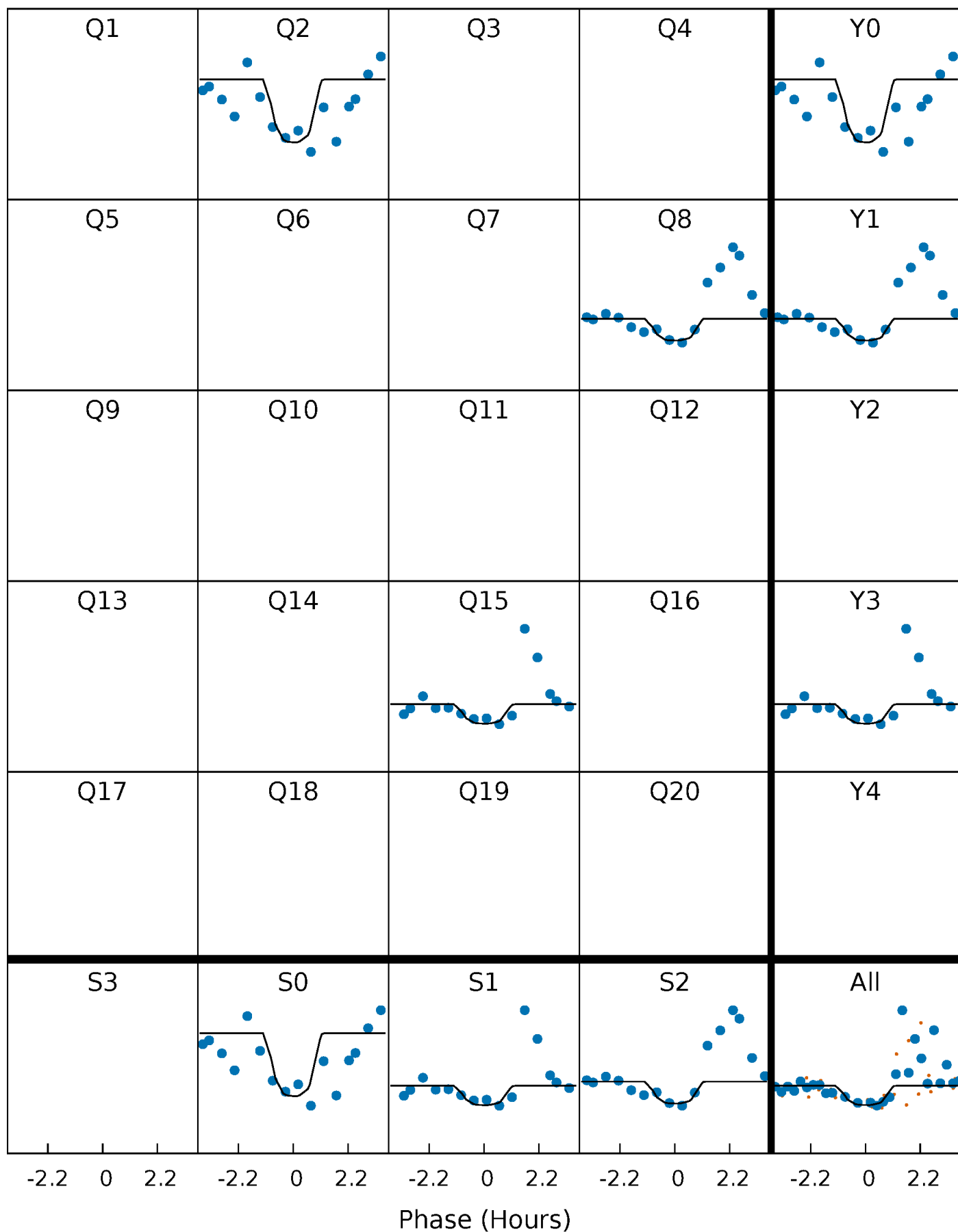
TCE 008396113-01 P=604.560633 Days  $T_0=172.802703$  (BKJD)





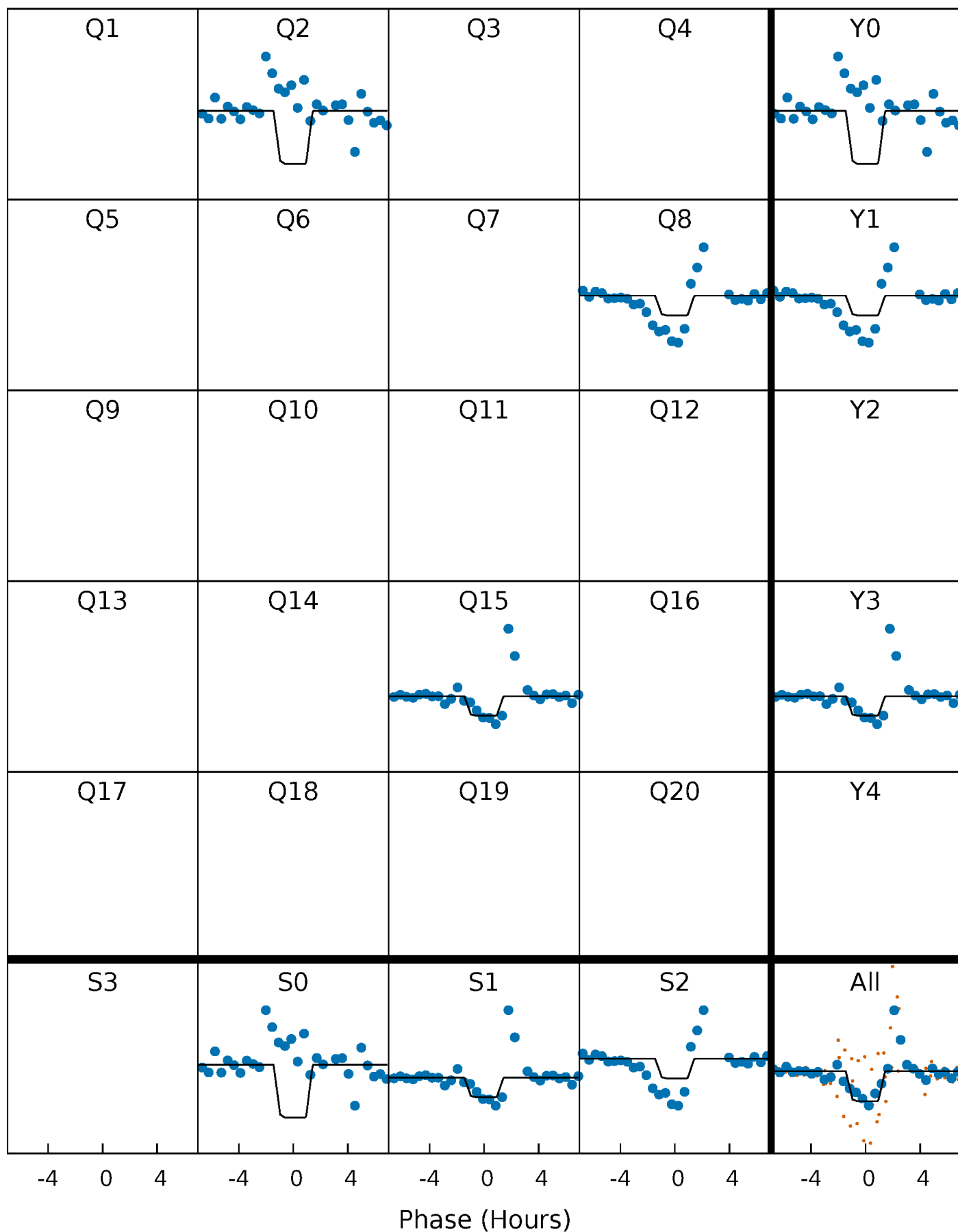
# DV Quarter-Phased Transit Curves

TCE 008396113-01 P=604.560633 Days  $T_0=172.802703$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

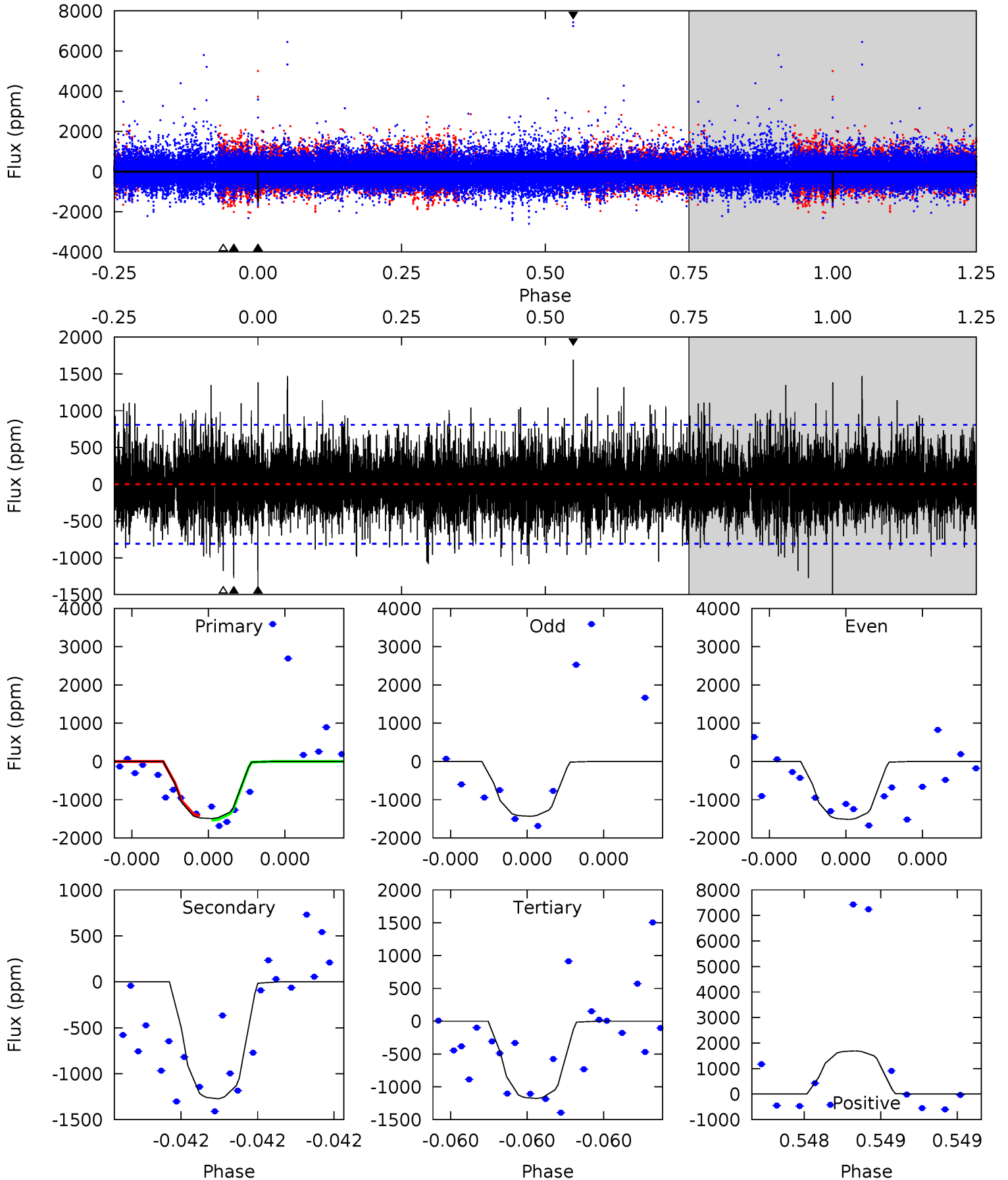
TCE 008396113-01 P=604.547306 Days  $T_0=172.811780$  (BKJD)



# DV Model-Shift Uniqueness Test

008396113-01, P = 604.560633 Days, E = 172.802703 Days

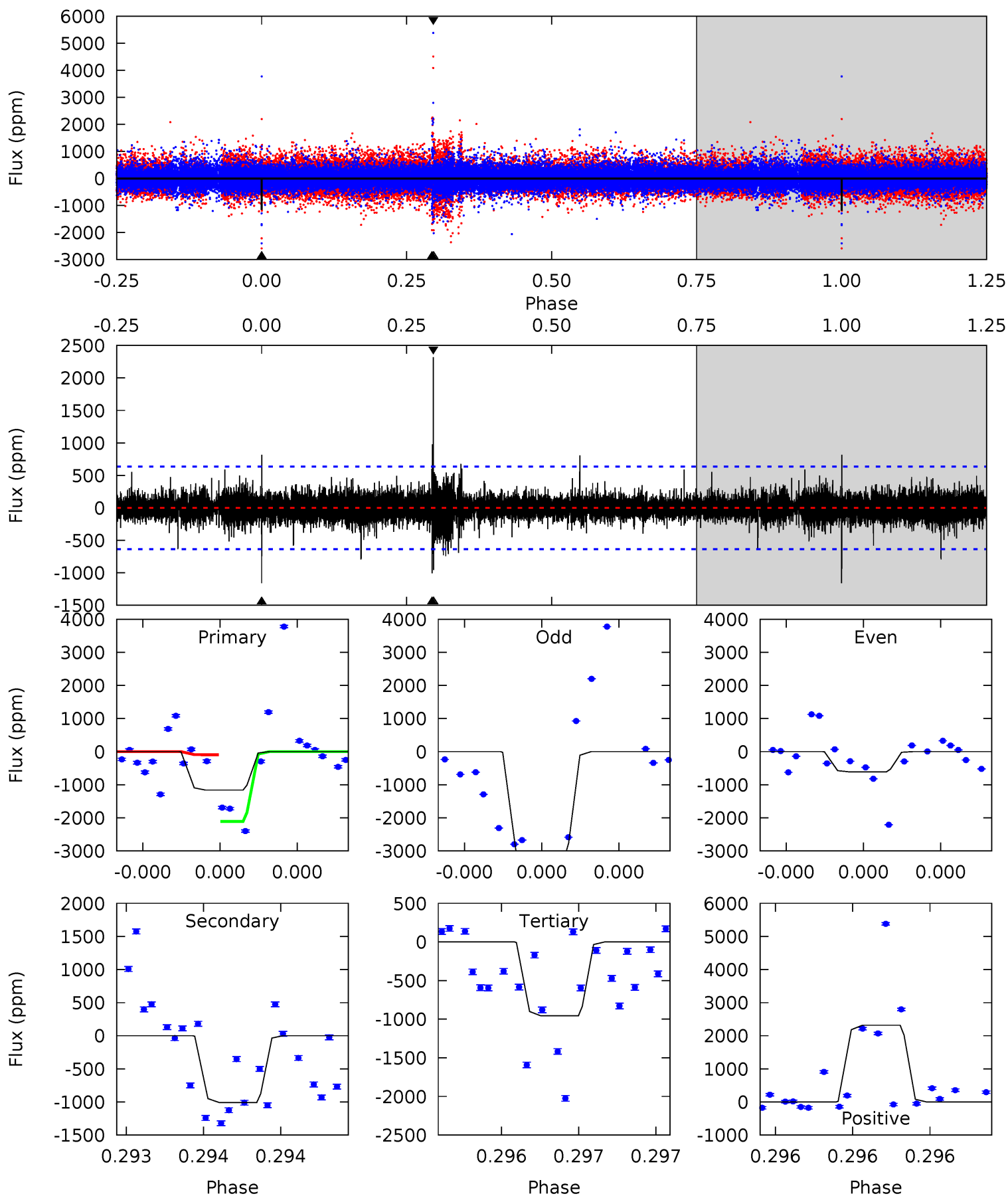
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.7	9.13	8.45	12.1	5.79	3.81	1.96	2.25	-1.43	0.68	-3.00	0.26	1.03	0.53	0.43



# Alt Model-Shift Uniqueness Test

008396113-01, P = 604.547306 Days, E = 172.811780 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
10.5	9.09	8.62	20.9	5.73	3.72	1.07	1.85	-10.4	0.47	-11.8	15.1	0.91	0.67	9.17



### Stellar Parameters For KIC 008396113

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5918^{+158}_{-175}$	$4.289^{+0.195}_{-0.175}$	$-0.320^{+0.300}_{-0.300}$	$1.123^{+0.309}_{-0.253}$	$0.896^{+0.129}_{-0.086}$	$0.890^{+1.006}_{-0.405}$
	+3%/-3%	+5%/-4%	+94%/-94%	+28%/-23%	+14%/-10%	+113%/-45%
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 008396113-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1273 \pm 139$	$8.71^{+7.91}_{-5.86}$	$332^{+26}_{-23}$	$4374^{+3127}_{-838}$	$16852^{+145989}_{-12191}$
Alt.	$-1009 \pm 111$	$8.53^{+8.70}_{-5.67}$	$331^{+24}_{-21}$	$4203^{+2513}_{-831}$	$13676^{+100537}_{-10266}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{obs}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

## DV Centroid Data

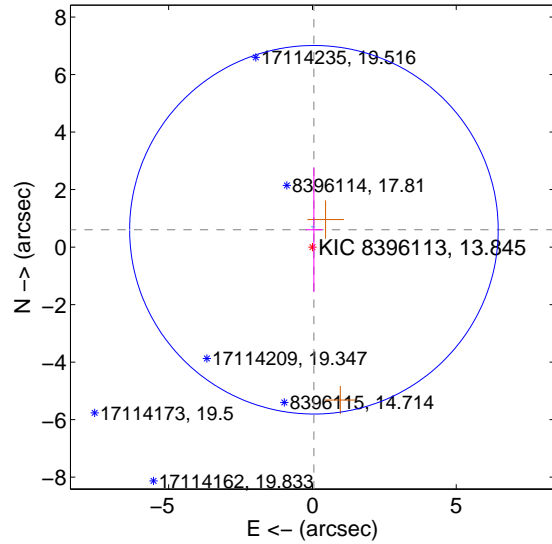
Supplemental centroid analysis for 008396113-01. Kepler magnitude: 13.85. Transit SNR 6.95

There are 1 quarters with good PRF difference image offsets

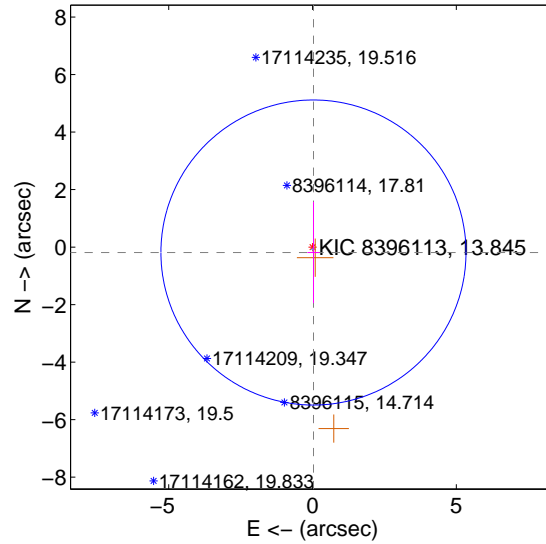
The direct PRF centroid is offset from the target star catalog position by about 1.38 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.605 \pm 2.136$	0.28	$-0.052 \pm 0.287$	$0.603 \pm 2.165$
PRF-fit source offset from KIC position	$0.191 \pm 1.768$	0.11	$-0.032 \pm 0.209$	$-0.188 \pm 1.760$
photometric centroid source offset	$1.56 \pm 1.01$	1.53	$1.12 \pm 0.65$	$-1.08 \pm 1.30$

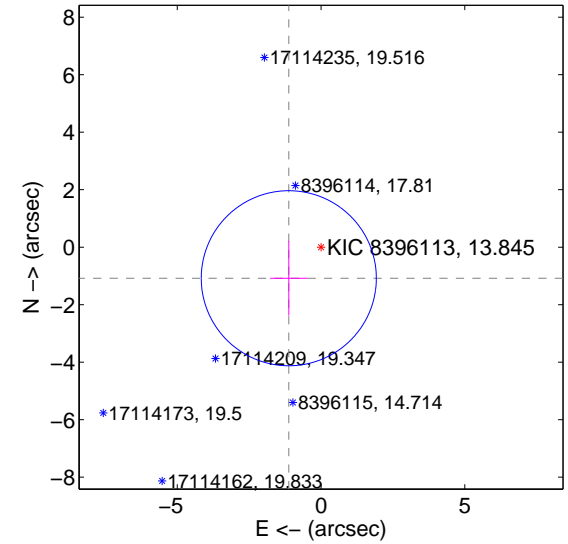
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



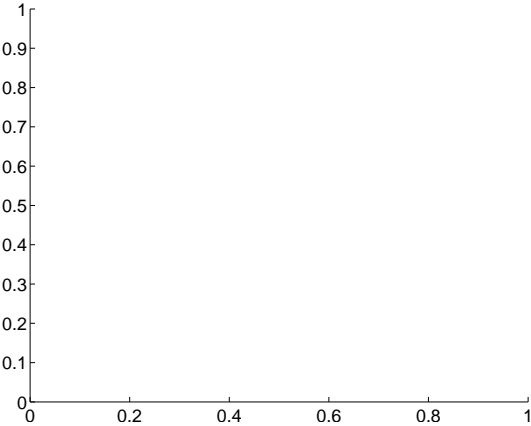
offset from photometric centroids



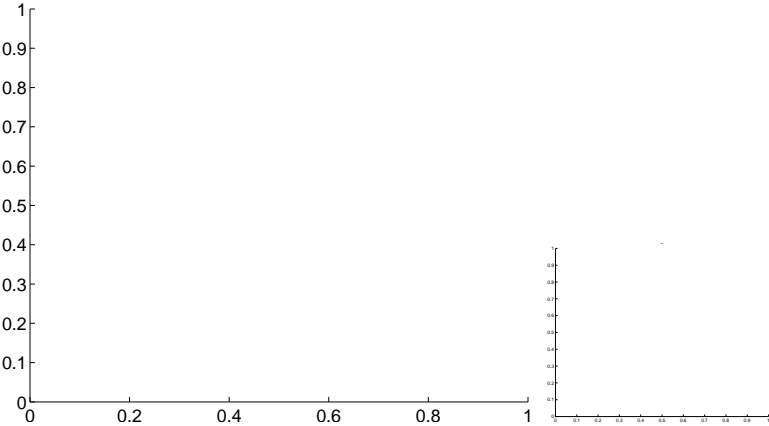
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

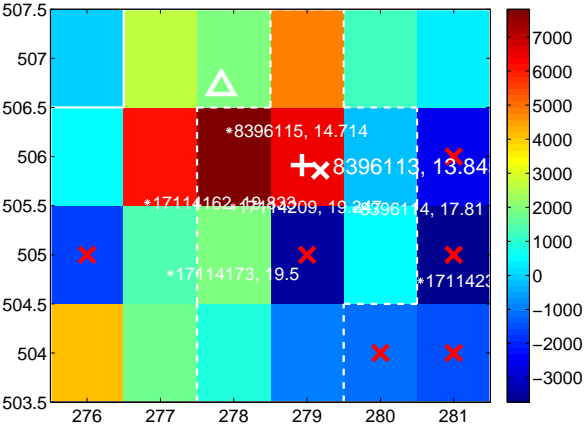
Q1 no difference image



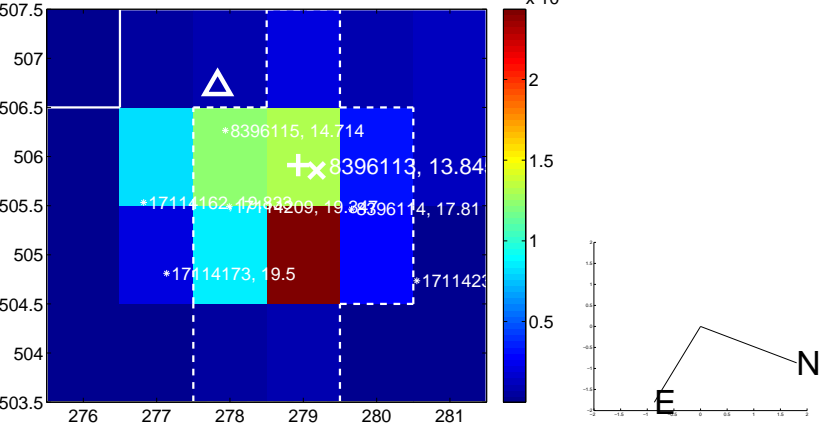
Q1 no OOT image



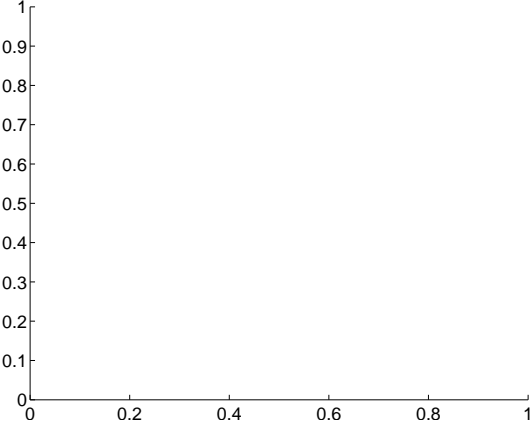
Q2 difference image. Poor Quality



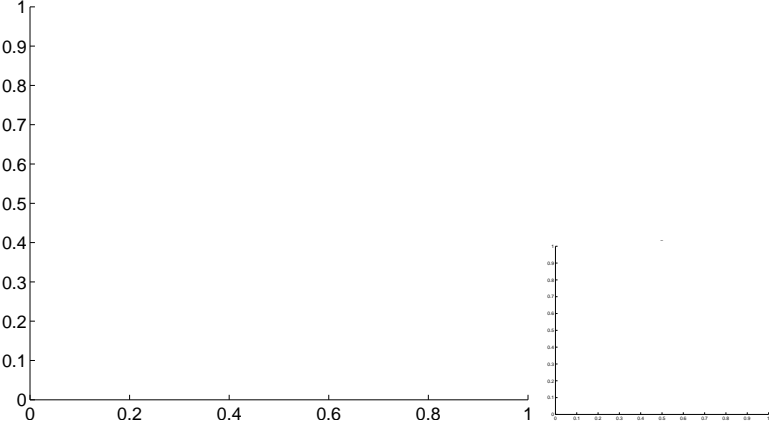
Q2 OOT image



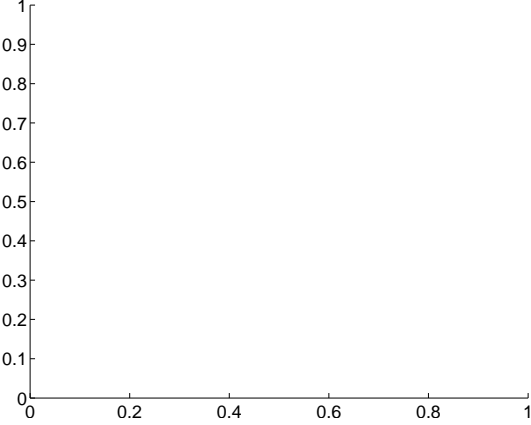
Q3 no difference image



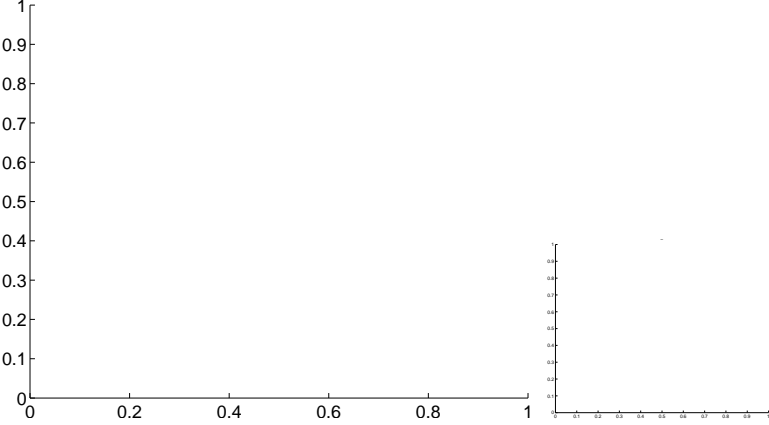
Q3 no OOT image



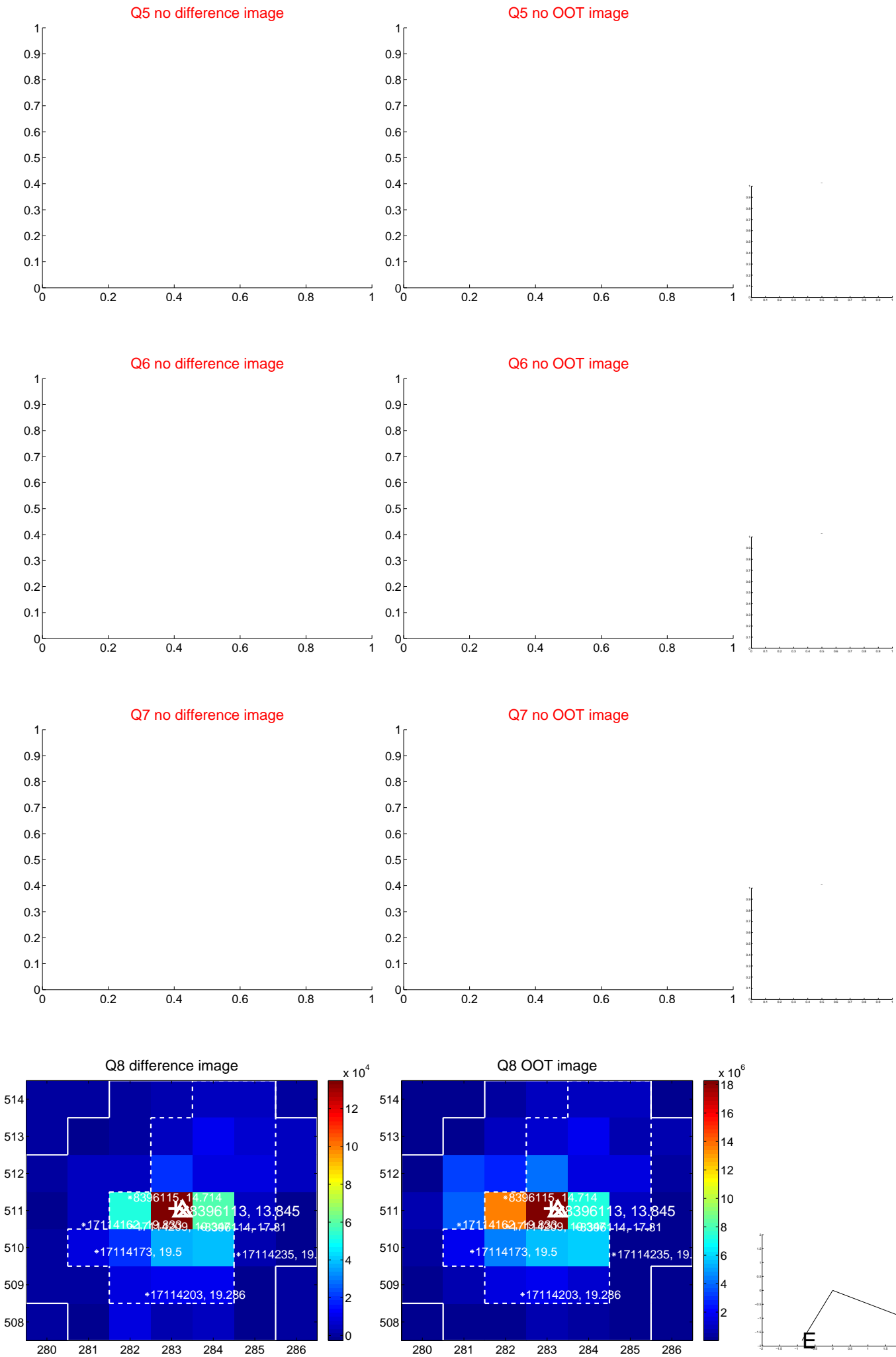
Q4 no difference image



Q4 no OOT image



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

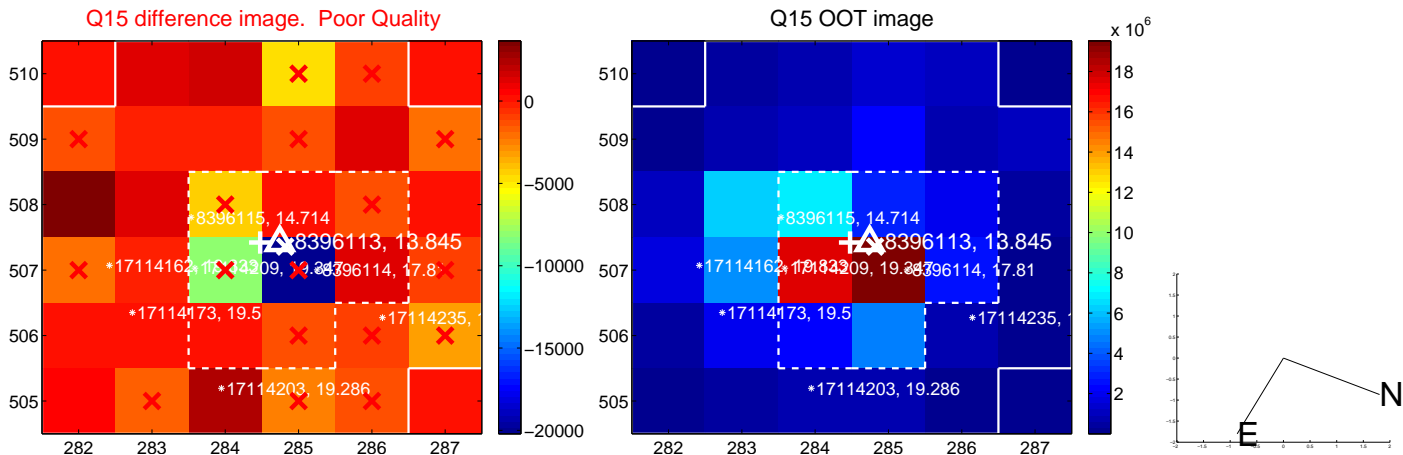




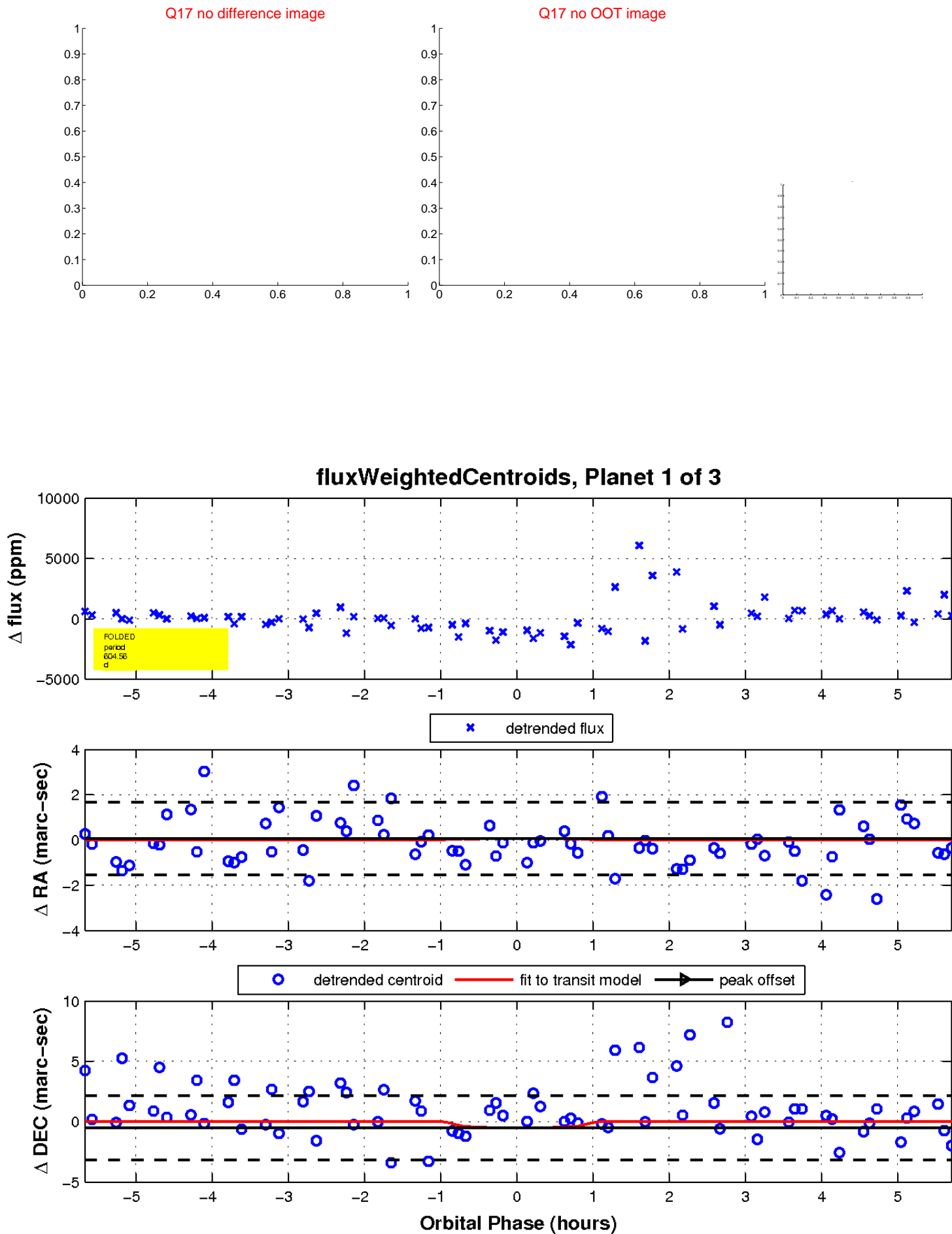
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



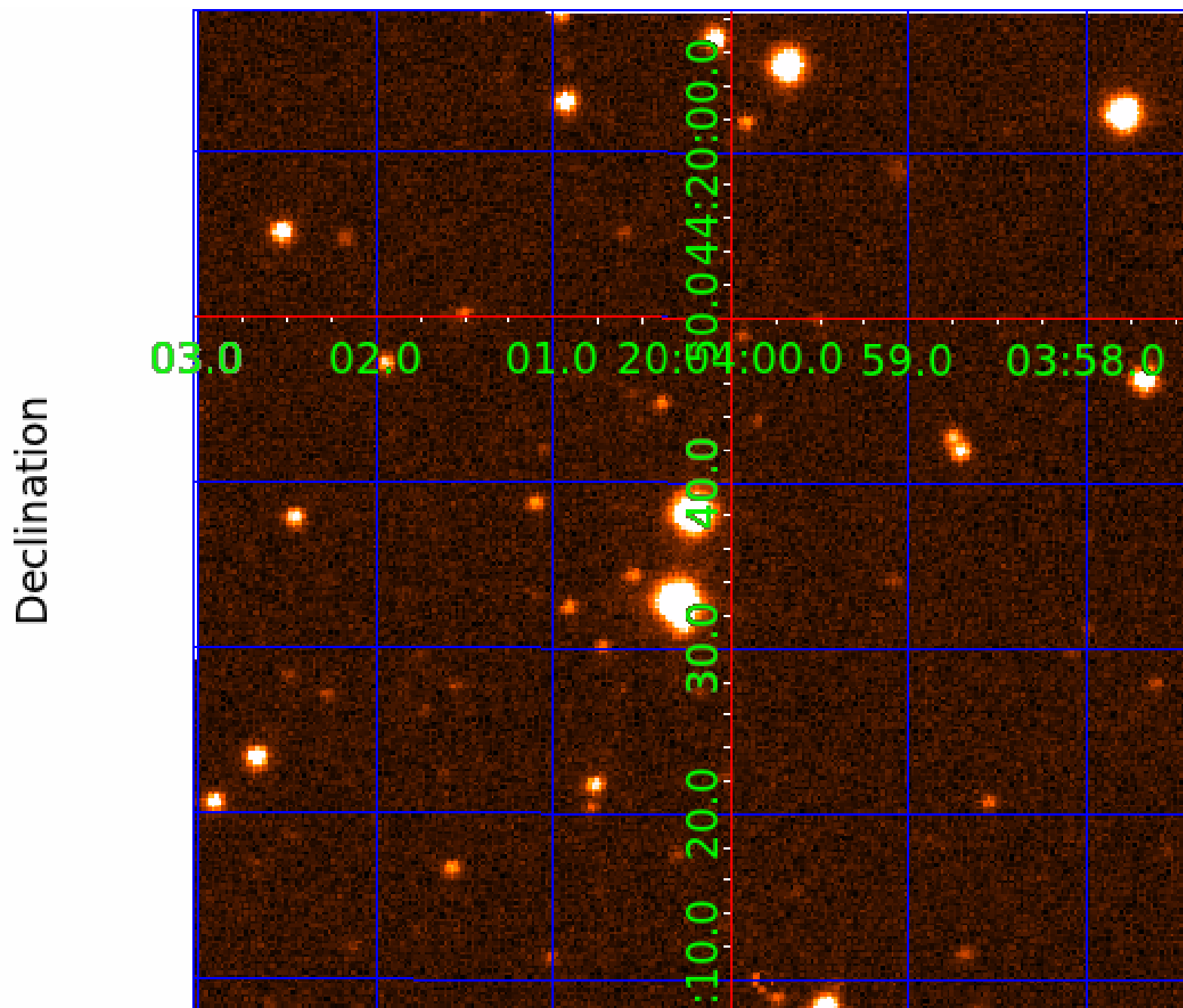
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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



UKIRT Image



# KIC 008396113

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008396113-01	OBS	No	604.560633	172.802703	1537.8	1.913	15.7	7.0	1.12	5918	4.60	0.76
008396113-02	OBS	No	584.569785	380.465302	1176.0	5.308	11.1	4.8	1.12	5918	3.88	0.80
008396113-03	OBS	No	230.609277	163.432204	1127.2	3.607	10.1	7.1	1.12	5918	4.26	2.75

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008396113-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008396113-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008396113-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_KIC_POS

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

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

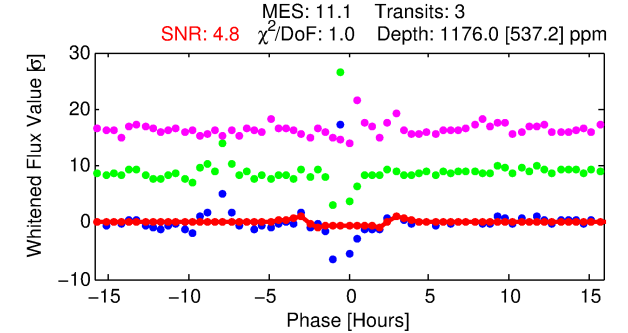
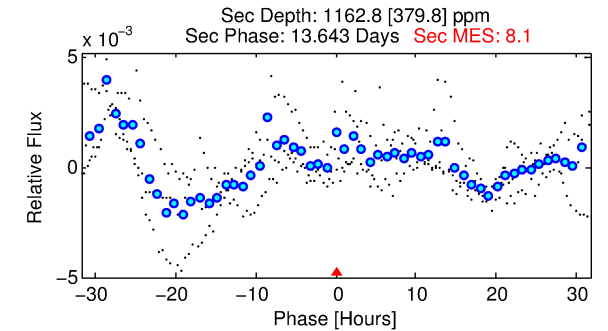
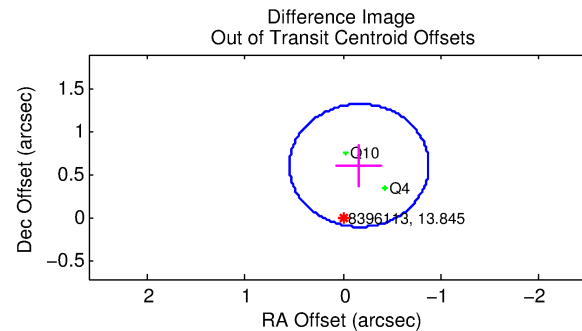
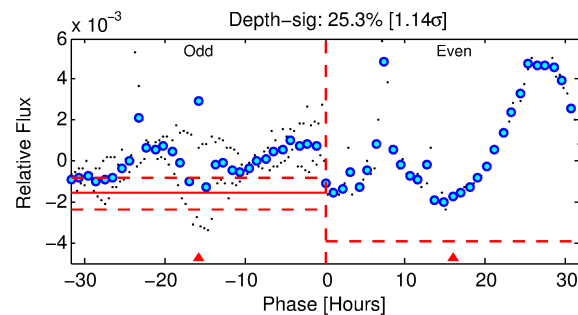
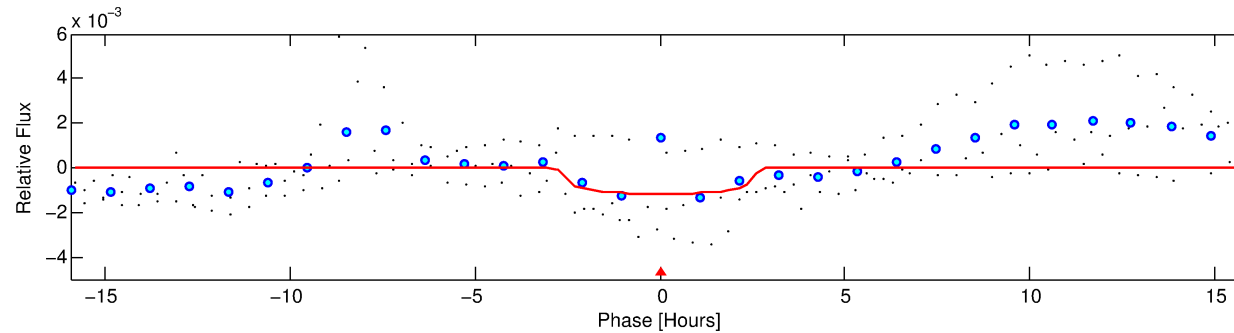
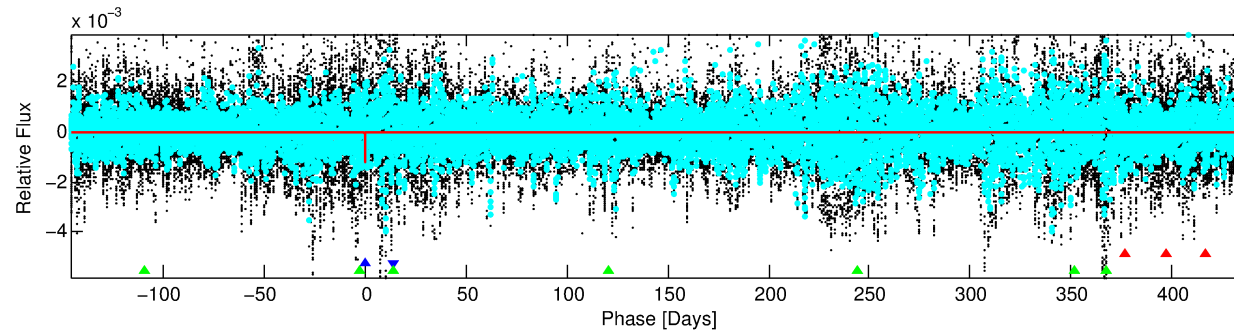
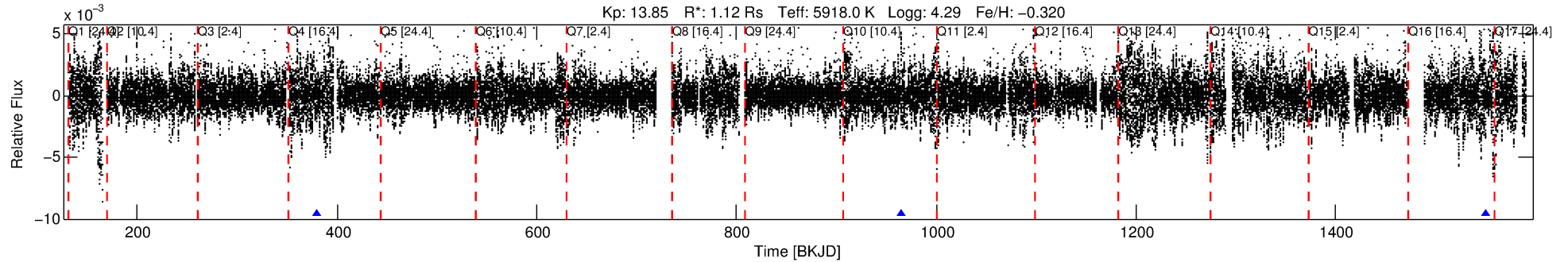
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008396113-02

No Significant Match Found

# DV One-Page Summary

KIC: 8396113 Candidate: 2 of 3 Period: 584.570 d



## DV Fit Results:

Period = 584.56978 [0.00991] d  
Epoch = 380.4653 [0.0142] BKJD  
Rp/R\* = 0.0317 [0.0561]  
a/R\* = 823.45 [6701.41]  
b = 0.33 [22.38]  
Seff = 0.80 [0.30]  
Teq = 241 [22] K  
Rp = 3.88 [6.96] Re  
a = 1.3188 [0.3122] AU  
Ag = 73743.86 [263438.19] [0.28 $\sigma$ ]  
Teffp = 6138 [5459] K [1.08 $\sigma$ ]

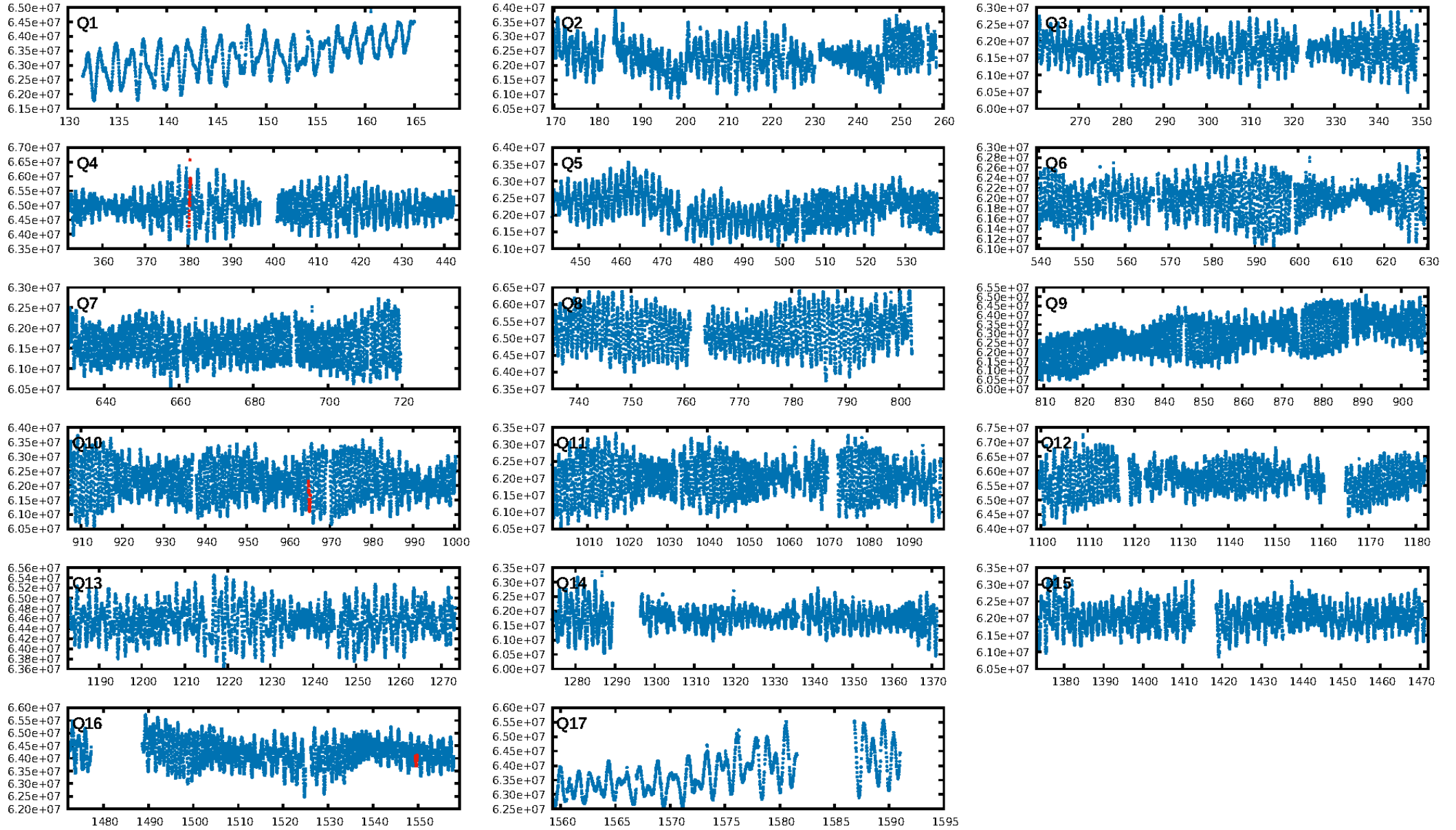
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [1323.65 $\sigma$ ]  
LongPeriod-sig: 100.0% [85.03 $\sigma$ ]  
ModelChiSquare2-sig: 39.7%  
ModelChiSquareGof-sig: 98.4%  
**Bootstrap-pfa: 4.17e-08**  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: -0.2703**  
Centroid-sig: 51.7%  
Centroid-so: 1.175 arcsec [1.37 $\sigma$ ]  
OotOffset-rm: 0.635 arcsec [2.68 $\sigma$ ]  
OotOffset-st: 1/0/1/0 [2]  
KicOffset-rm: 0.205 arcsec [0.82 $\sigma$ ]  
KicOffset-st: 1/0/1/0 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [2/2]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 01:58:50 Z

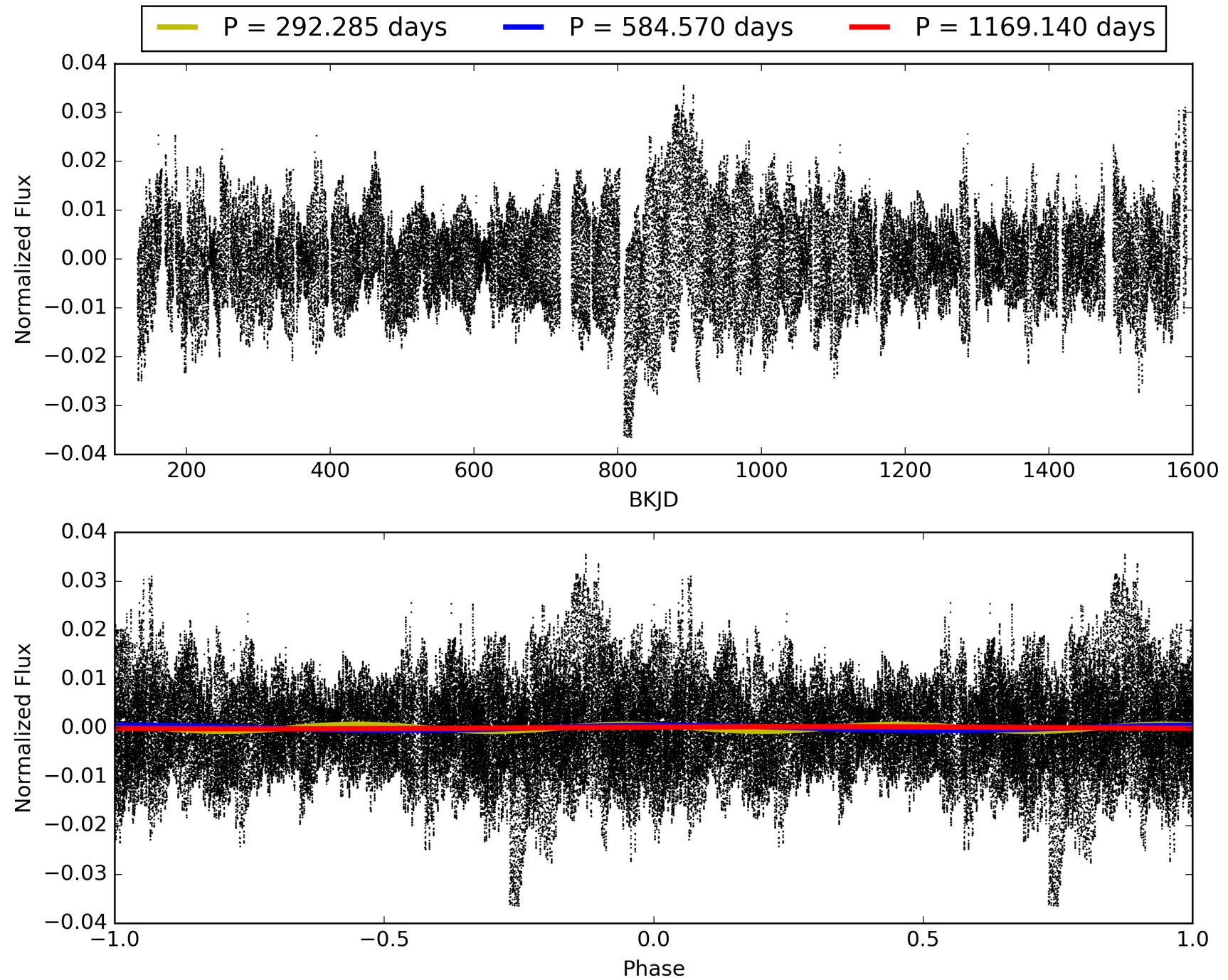
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008396113-02, PDC Light Curves





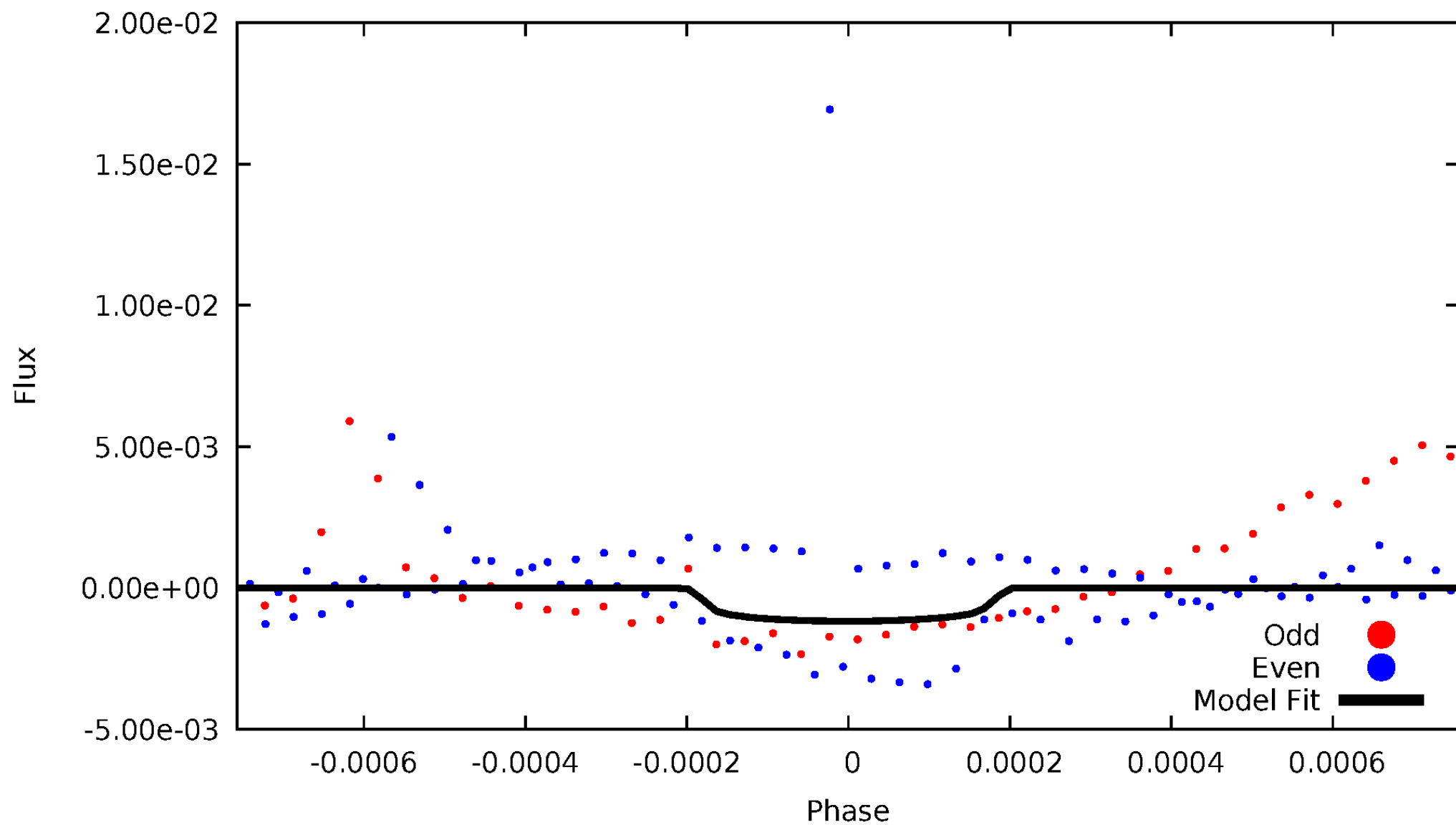
TCE 008396113-02





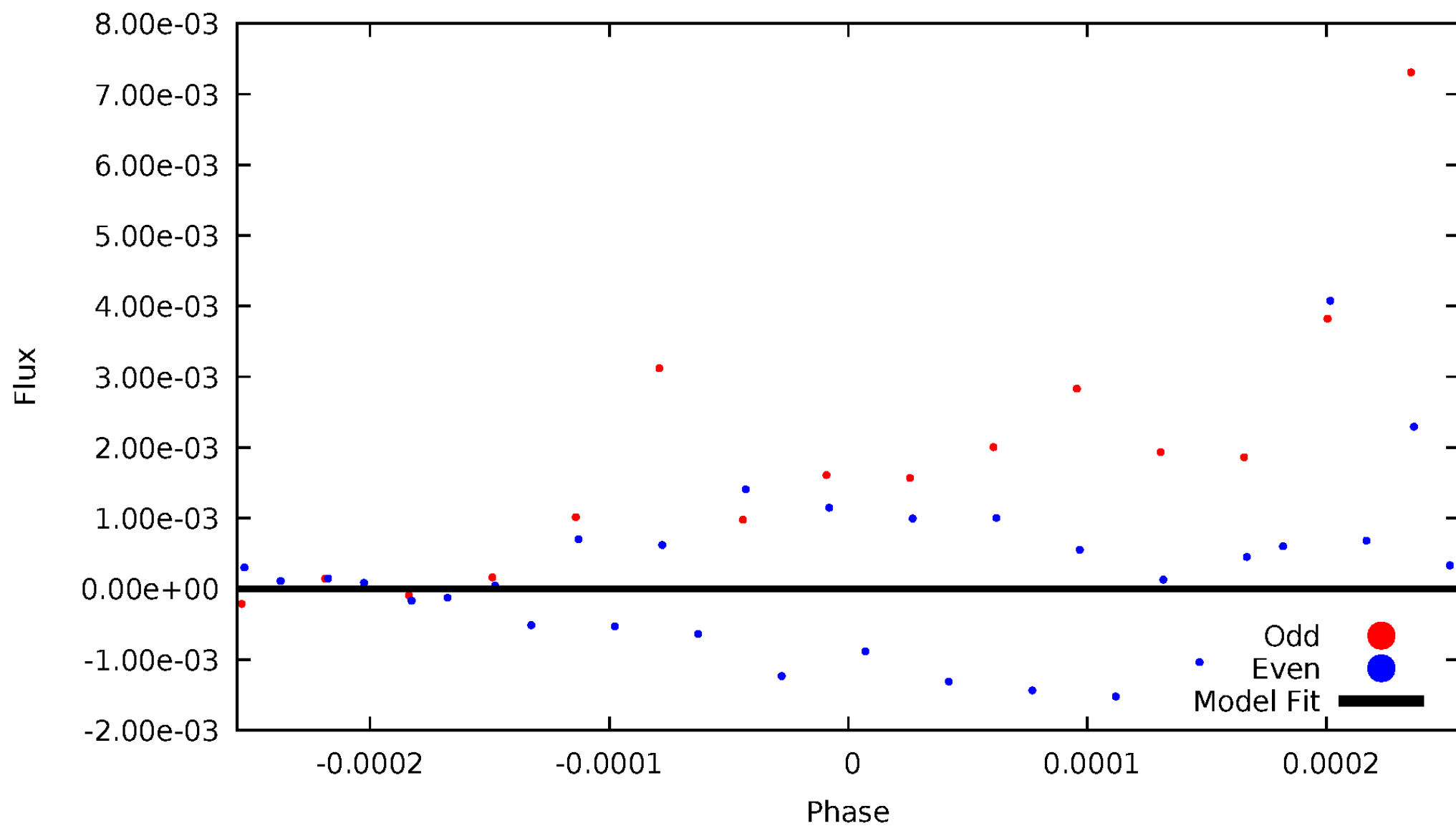
# DV Odd/Even

TCE 008396113-02



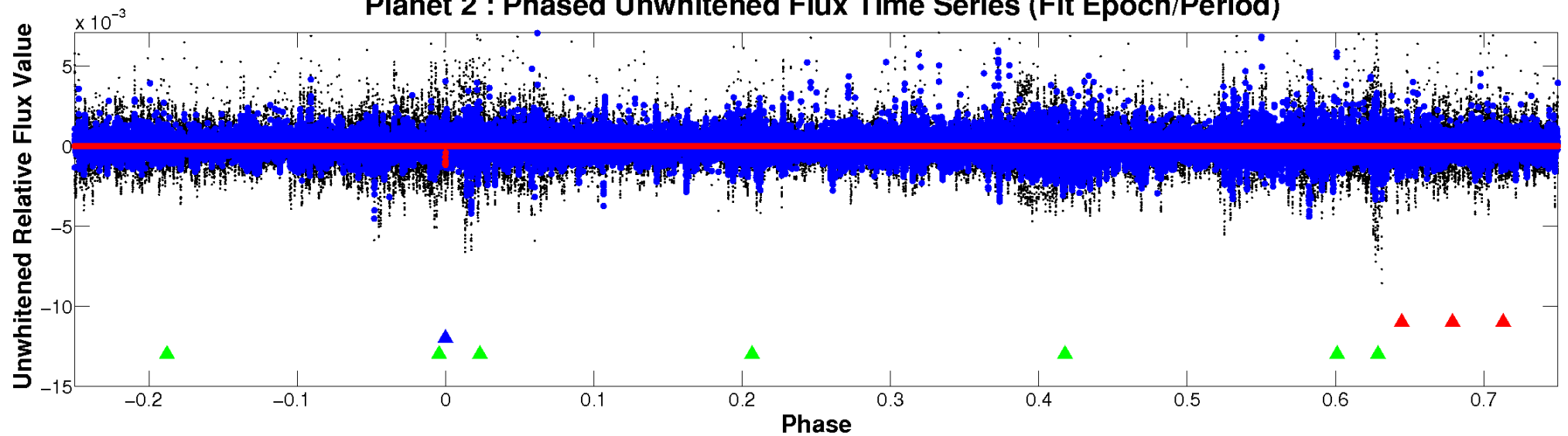
# ALT Odd/Even

TCE 008396113-02

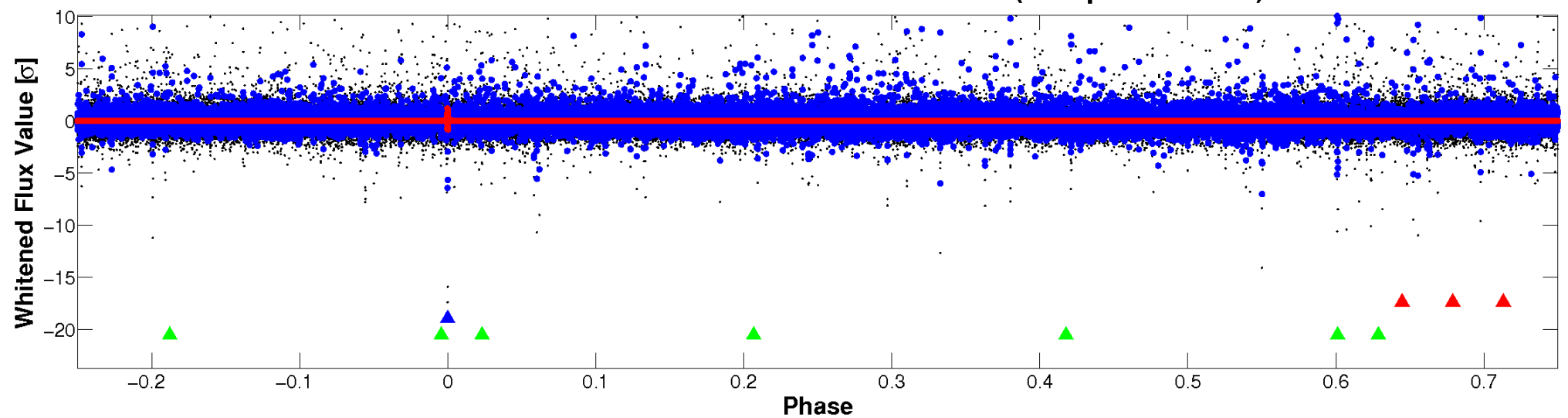


# Non-Whitened Vs. Whitened Light Curve

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

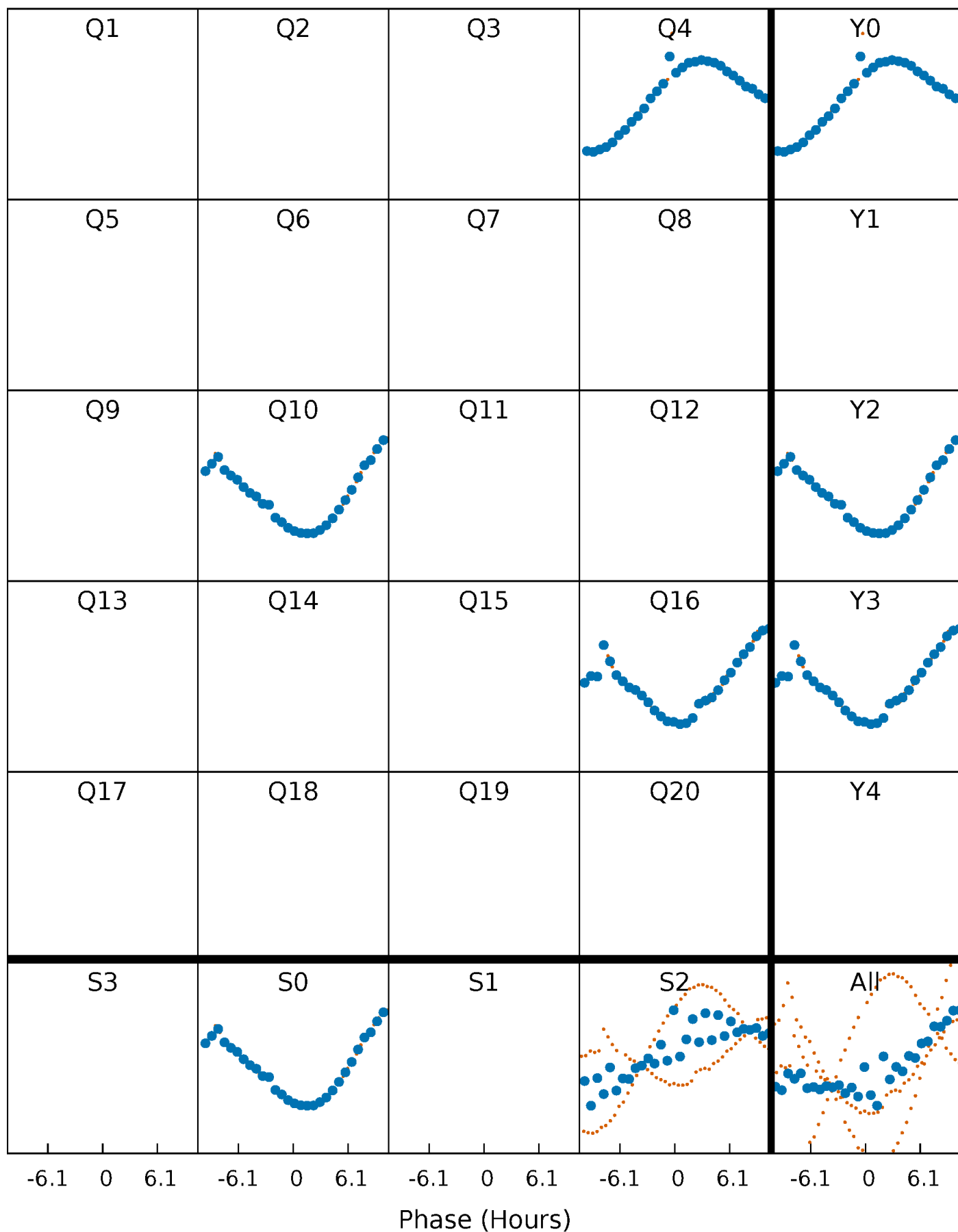


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



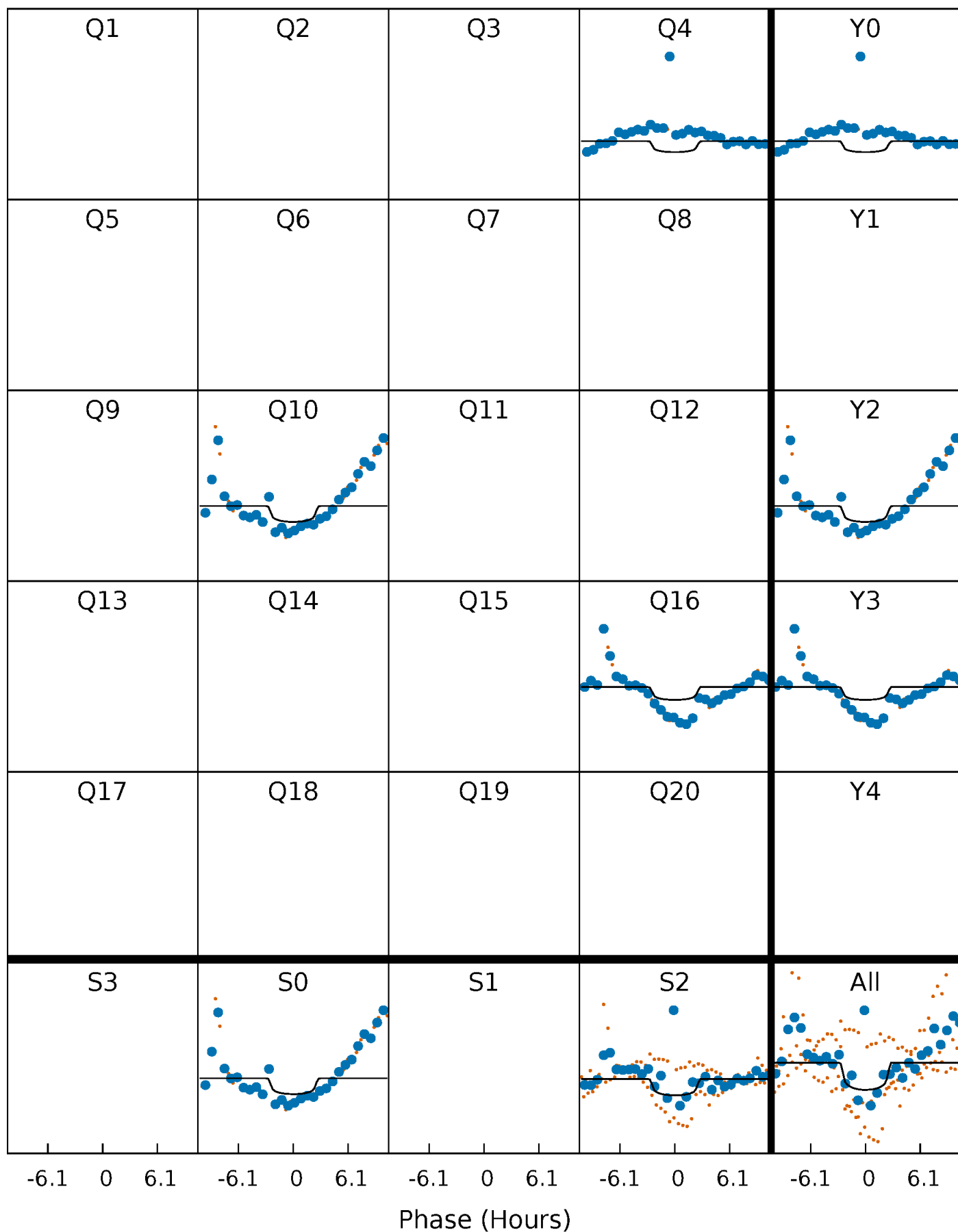
# PDC Quarter-Phased Transit Curves

TCE 008396113-02 P=584.569785 Days  $T_0=380.465302$  (BKJD)



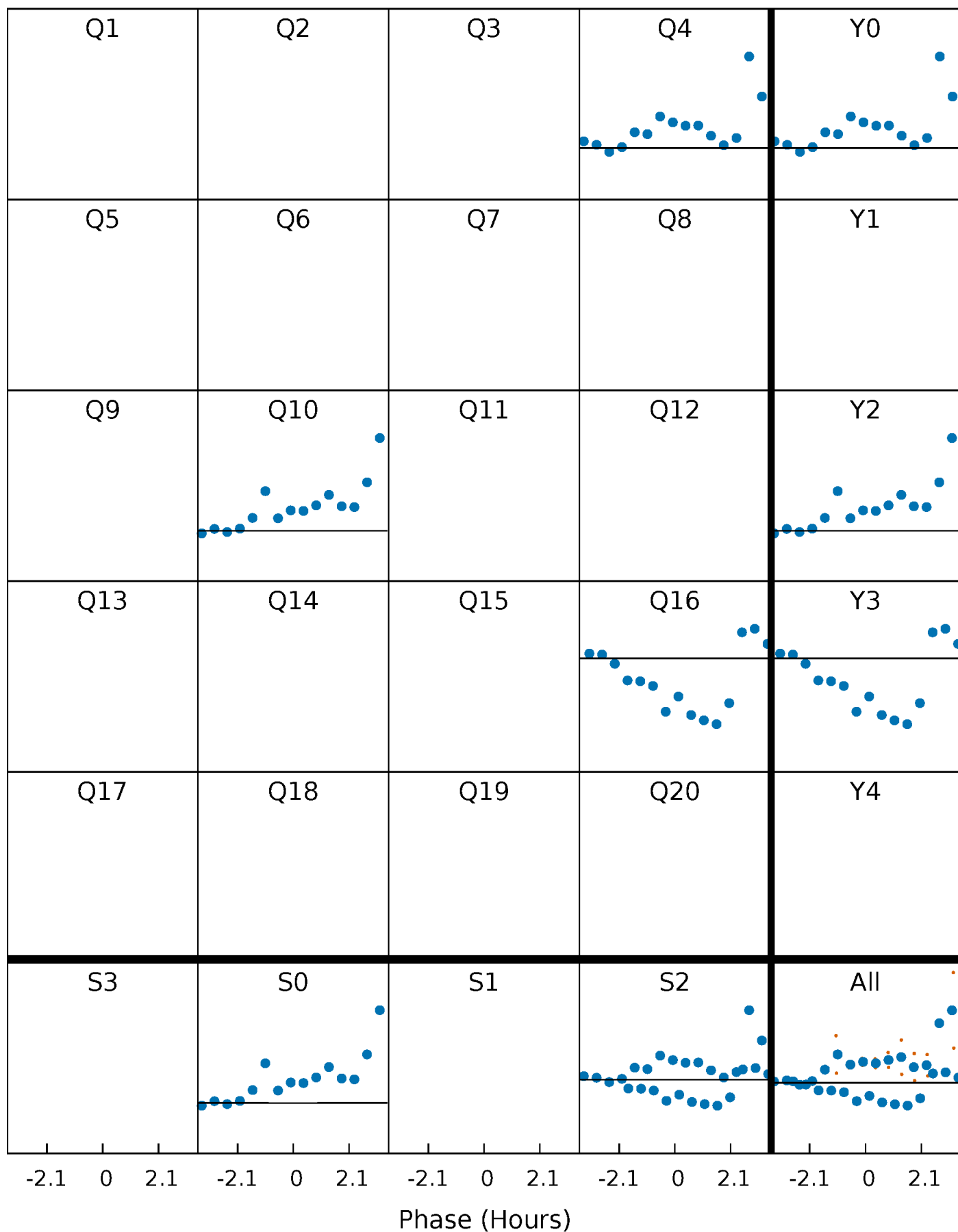
# DV Quarter-Phased Transit Curves

TCE 008396113-02 P=584.569785 Days  $T_0=380.465302$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

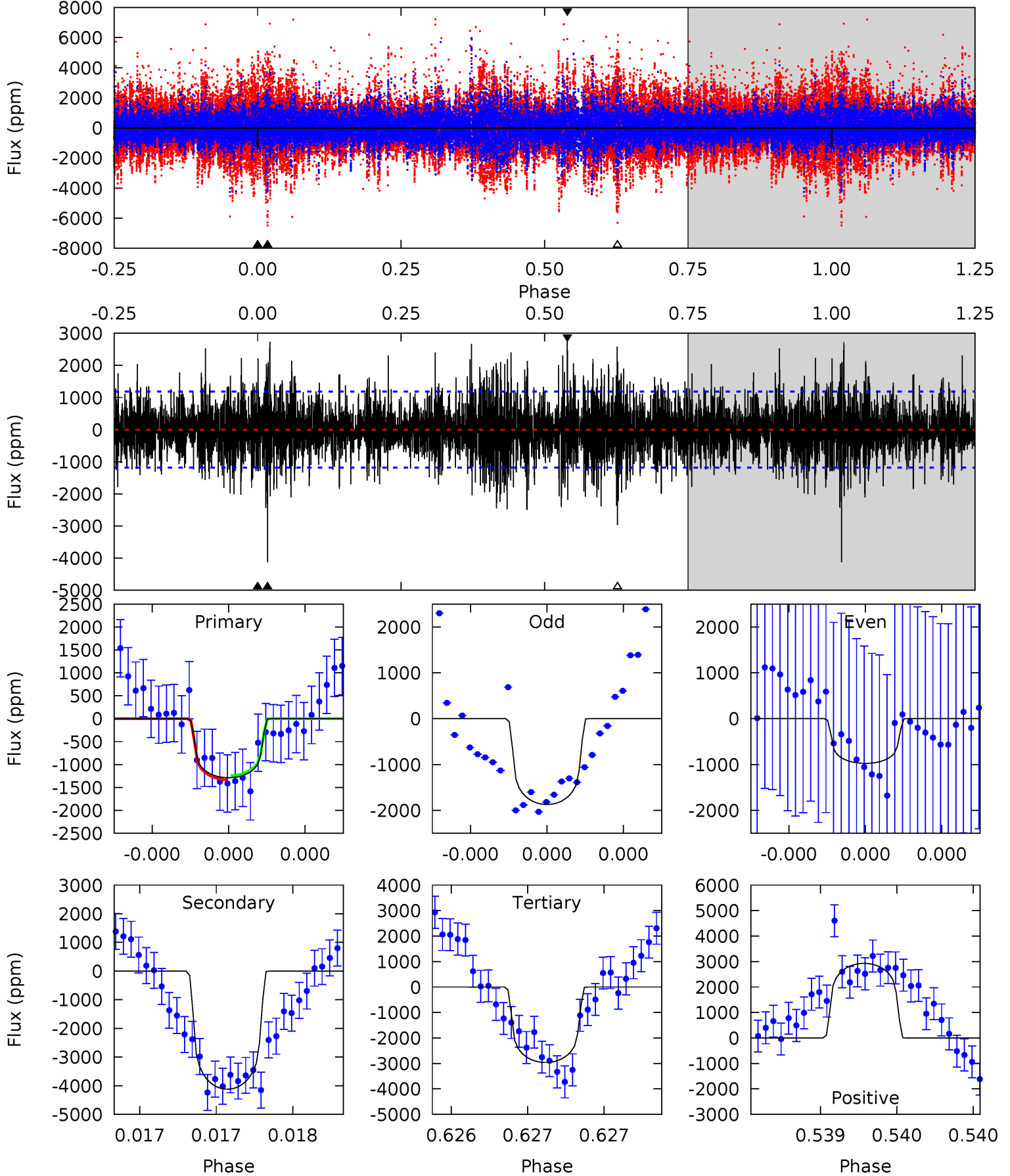
TCE 008396113-02 P=585.060501 Days  $T_0=379.475852$  (BKJD)



# DV Model-Shift Uniqueness Test

008396113-02, P = 584.569785 Days, E = 380.465302 Days

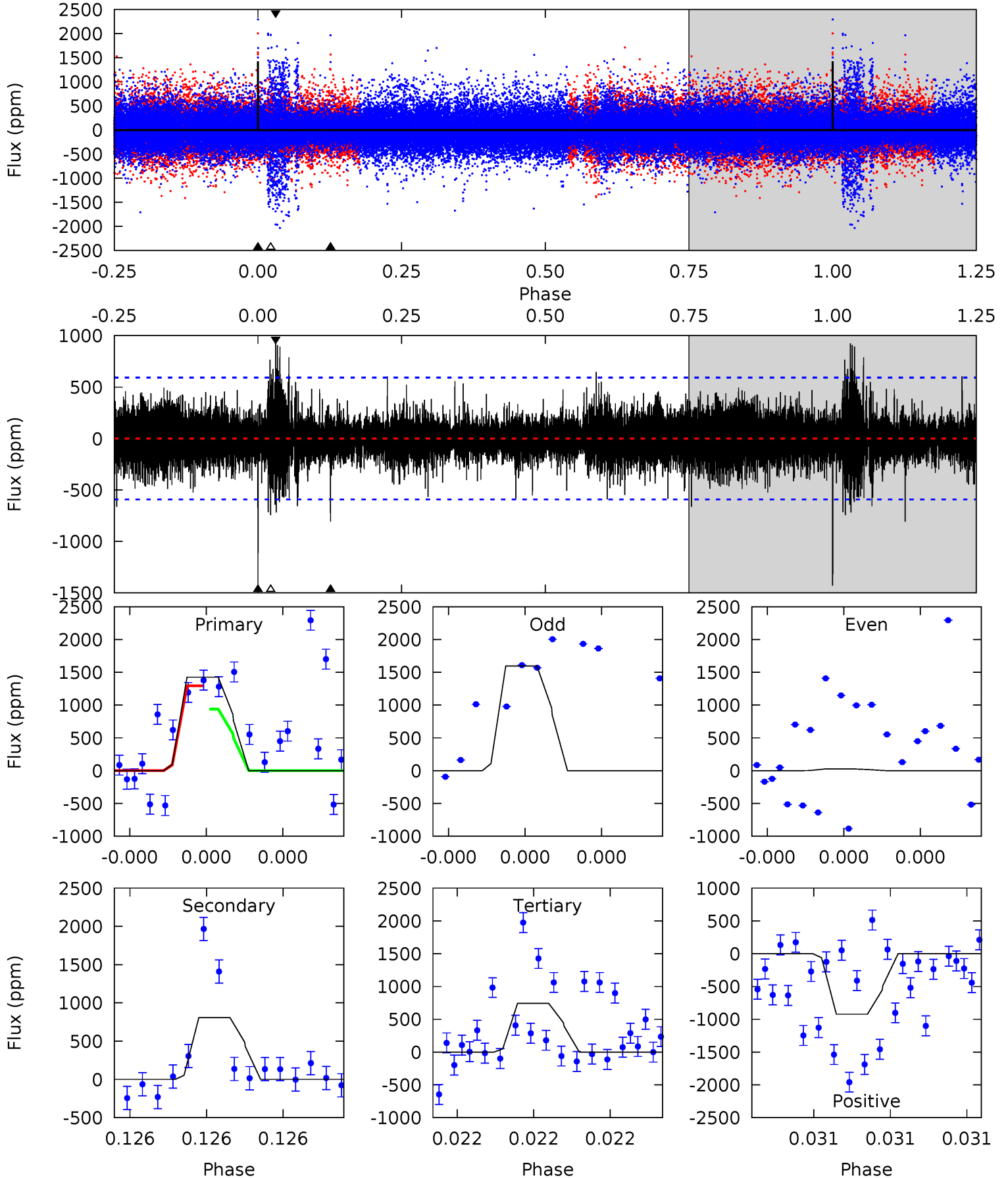
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.10	19.5	14.0	13.9	5.61	3.54	3.28	-7.95	-7.79	5.49	5.65	2.01	0.30	0.42	0.21



# Alt Model-Shift Uniqueness Test

008396113-02, P = 585.060501 Days, E = 379.475852 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	7.85	7.23	8.97	5.75	3.75	1.29	6.63	4.90	0.62	-1.12	8.09	0.45	0.39	1.84





### Stellar Parameters For KIC 008396113

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$5918^{+158}_{-175}$	$4.289^{+0.195}_{-0.175}$	$-0.320^{+0.300}_{-0.300}$	$1.123^{+0.309}_{-0.253}$	$0.896^{+0.129}_{-0.086}$	$0.890^{+1.006}_{-0.405}$
	+3%/-3%	+5%/-4%	+94%/-94%	+28%/-23%	+14%/-10%	+113%/-45%
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 008396113-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-4120 \pm 211$	$6.64^{+6.40}_{-4.23}$	$337^{+26}_{-22}$	$6519^{+6394}_{-1780}$	$91543^{+618278}_{-68086}$
Alt.	$-808 \pm 103$	$5.12^{+5.46}_{-3.75}$	$336^{+29}_{-25}$	$4994^{+5235}_{-1193}$	$29092^{+387517}_{-22335}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{obs}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

## DV Centroid Data

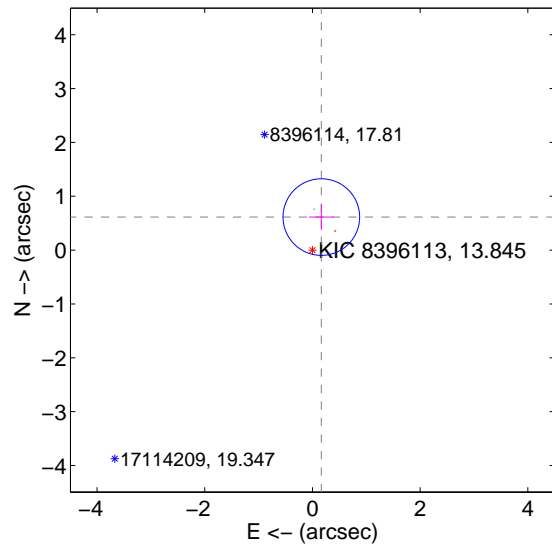
Supplemental centroid analysis for 008396113-02. Kepler magnitude: 13.85. Transit SNR 4.84

There are 1 quarters with good PRF difference image offsets

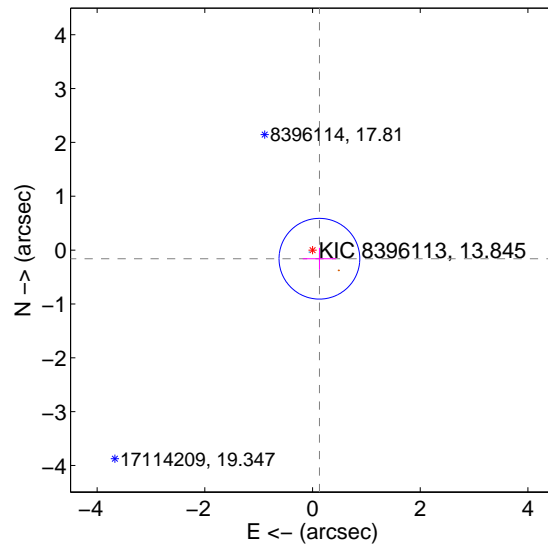
The direct PRF centroid is offset from the target star catalog position by about 0.80 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.635 \pm 0.237$	2.68	$-0.165 \pm 0.226$	$0.613 \pm 0.238$
PRF-fit source offset from KIC position	$0.205 \pm 0.250$	0.82	$-0.128 \pm 0.311$	$-0.160 \pm 0.202$
photometric centroid source offset	$1.18 \pm 0.86$	1.37	$1.12 \pm 0.66$	$-0.36 \pm 1.89$

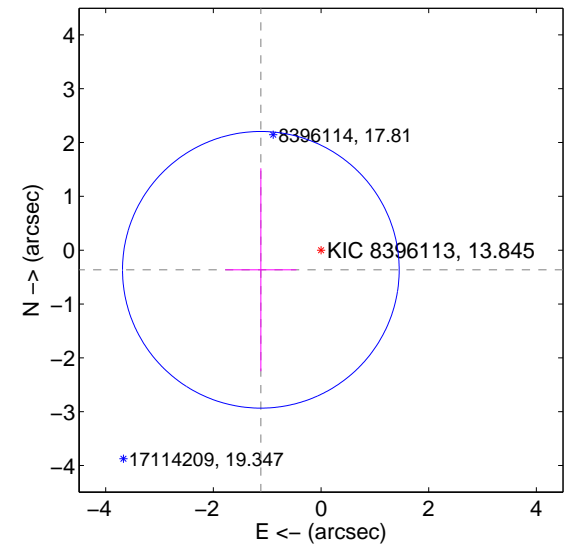
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

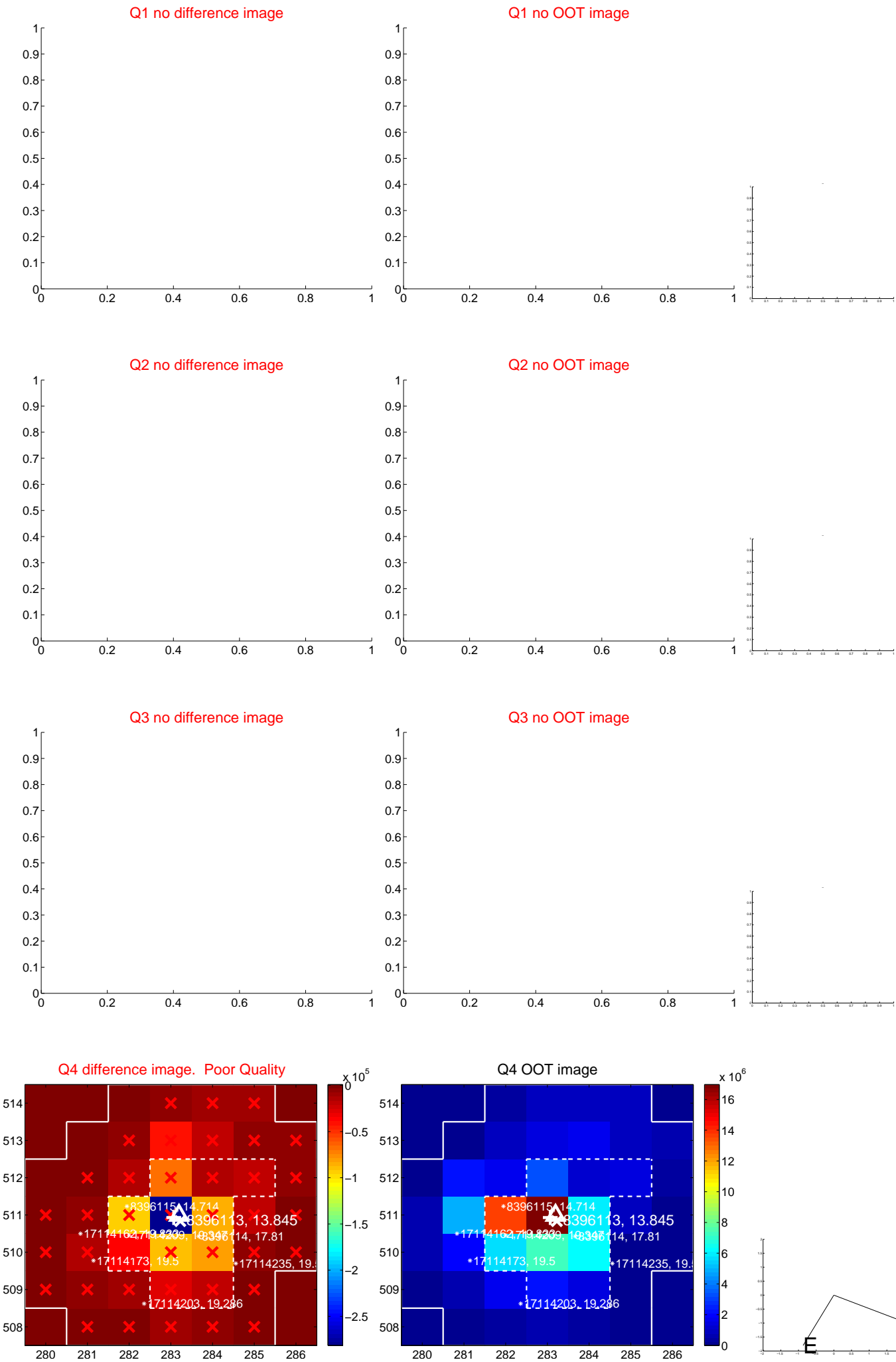


offset from photometric centroids



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.

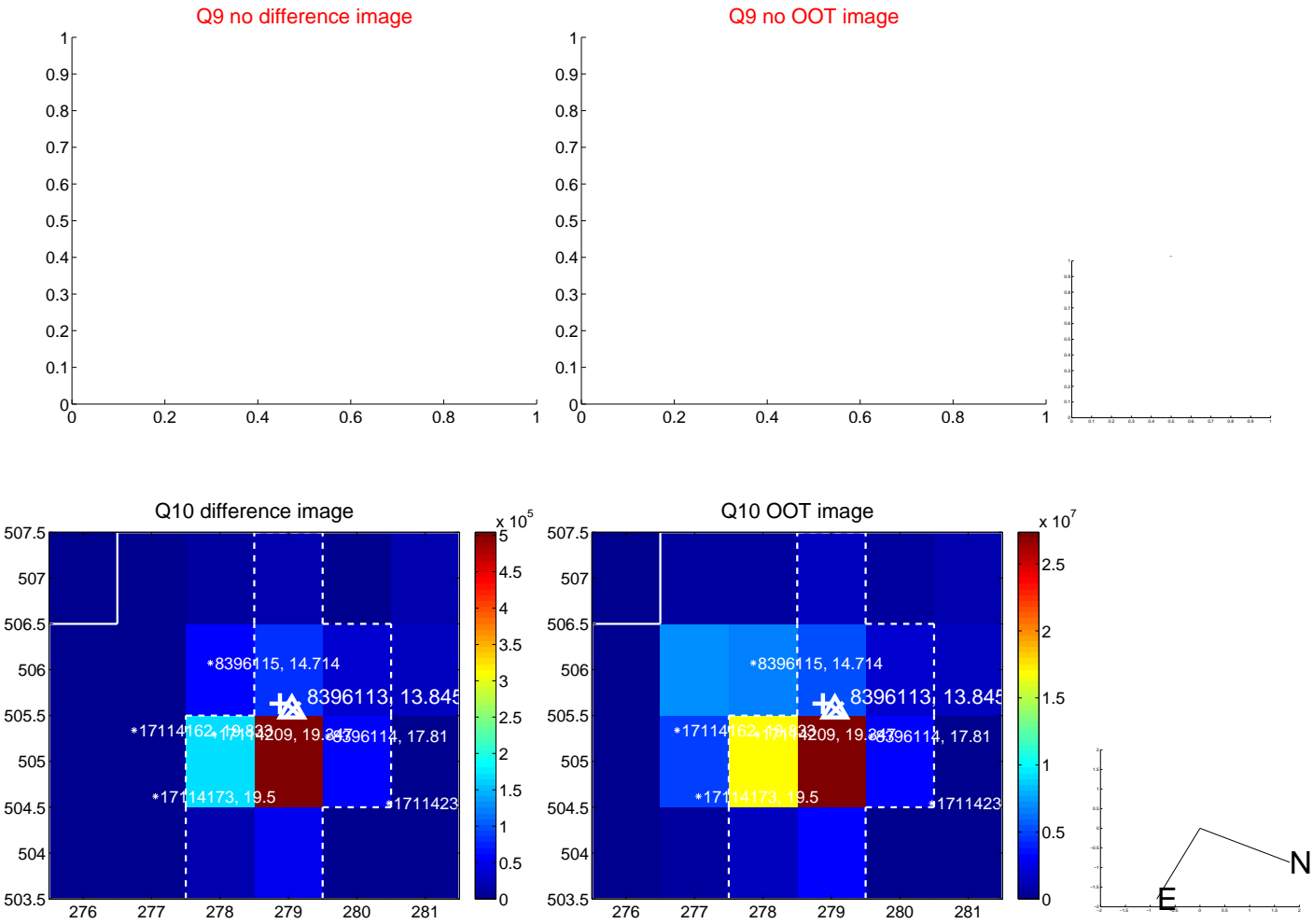
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



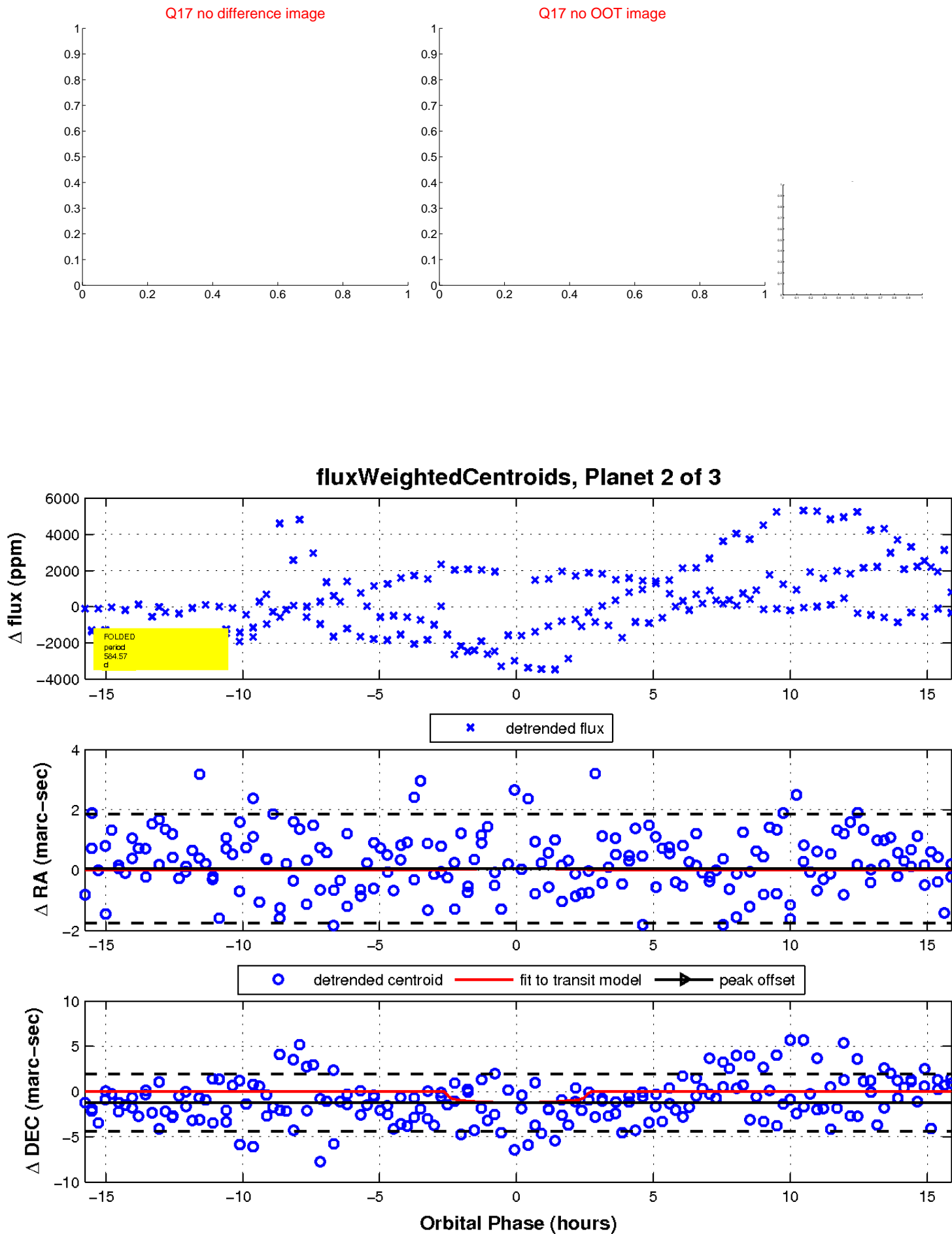
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



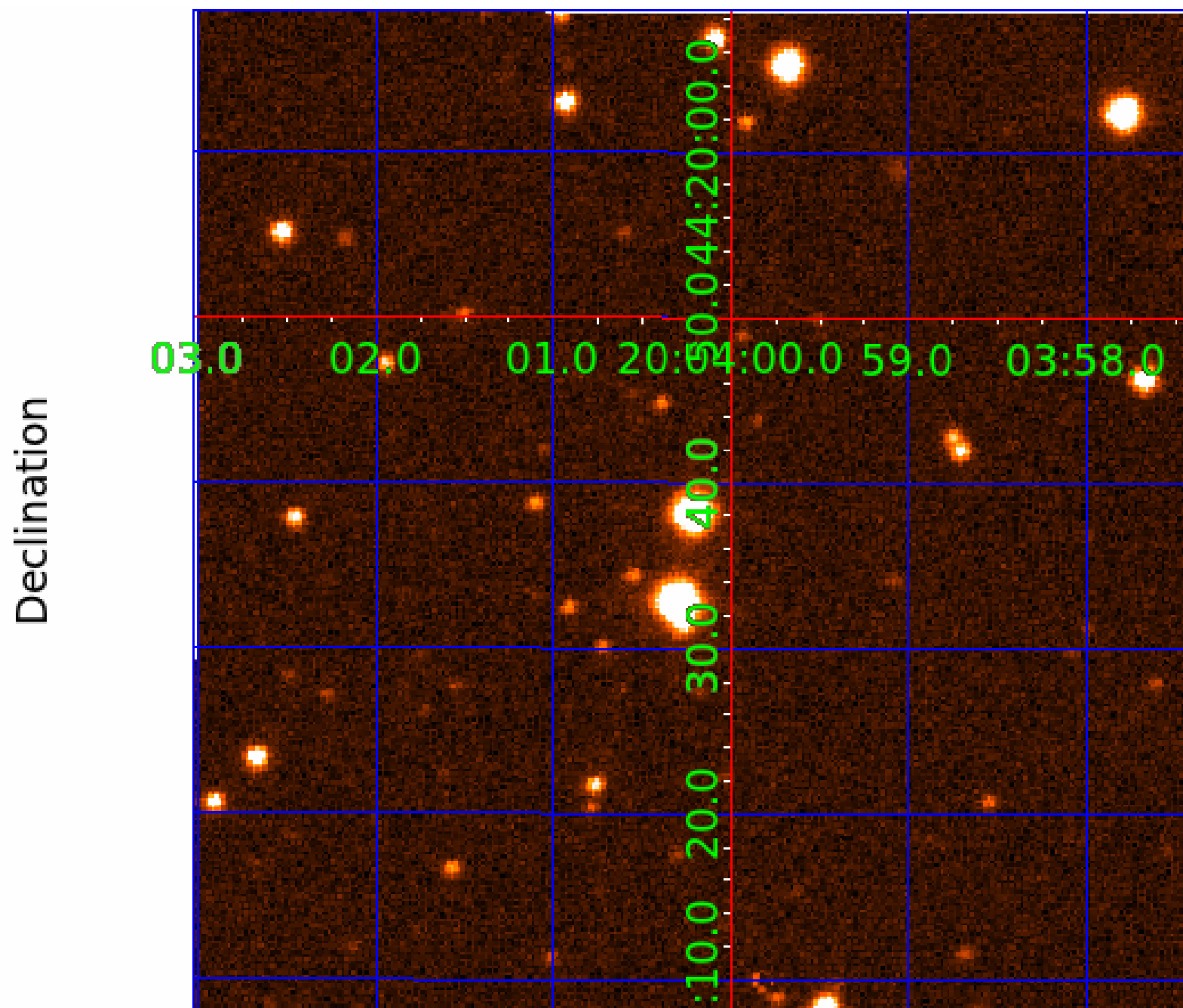
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image





# KIC 008396113

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008396113-01	OBS	No	604.560633	172.802703	1537.8	1.913	15.7	7.0	1.12	5918	4.60	0.76
008396113-02	OBS	No	584.569785	380.465302	1176.0	5.308	11.1	4.8	1.12	5918	3.88	0.80
008396113-03	OBS	No	230.609277	163.432204	1127.2	3.607	10.1	7.1	1.12	5918	4.26	2.75

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008396113-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
008396113-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008396113-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—MOD_TER_DV—INCONSISTENT_TRANS—CENT_KIC_POS

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

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

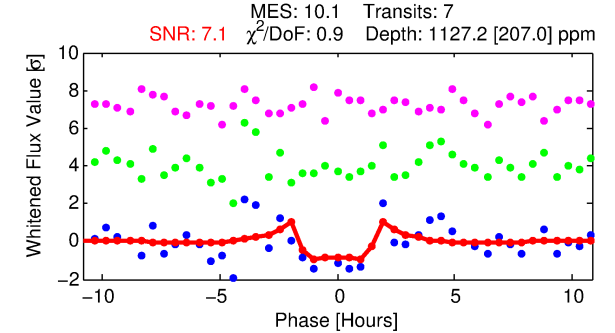
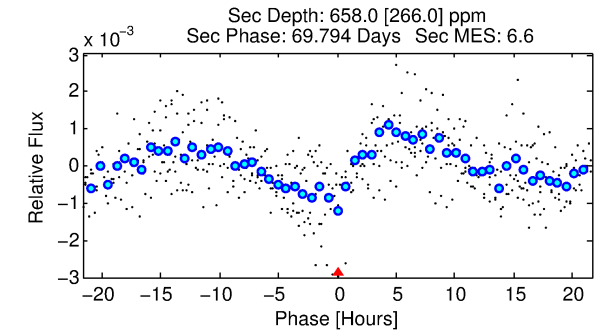
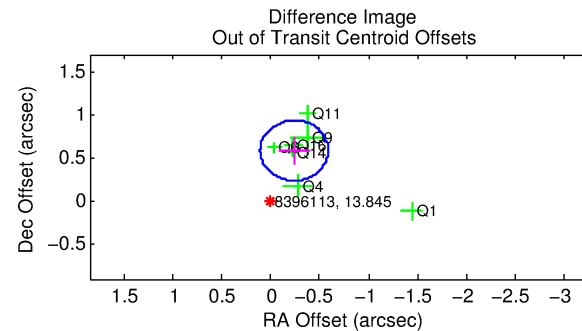
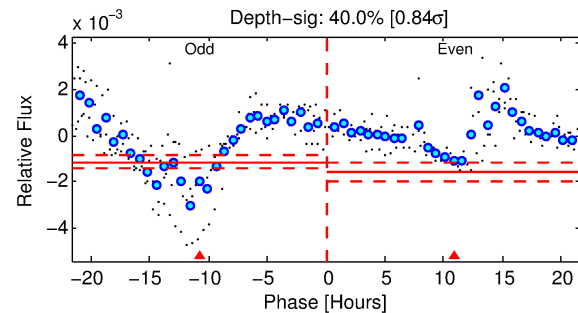
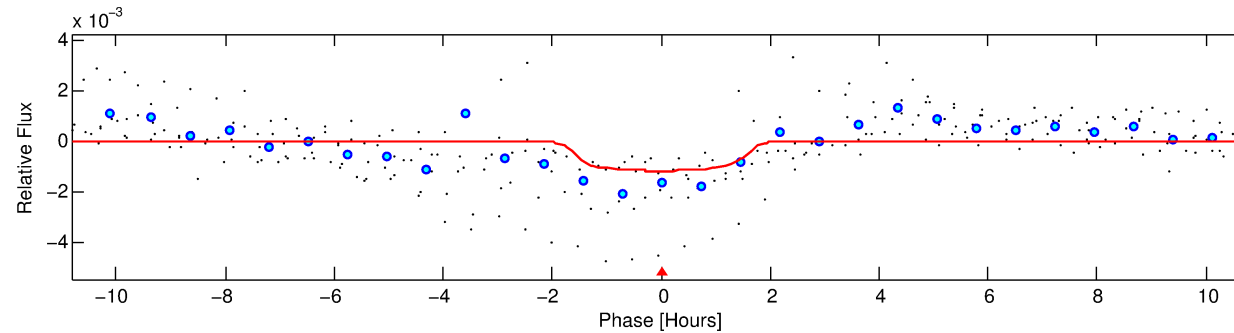
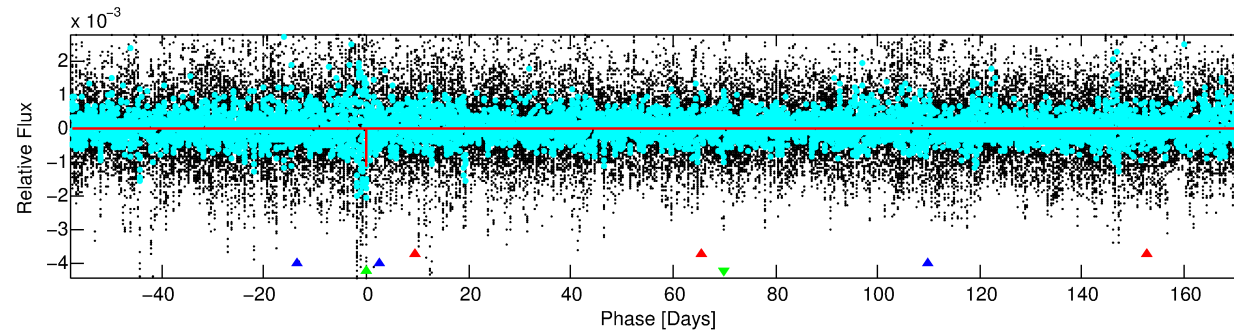
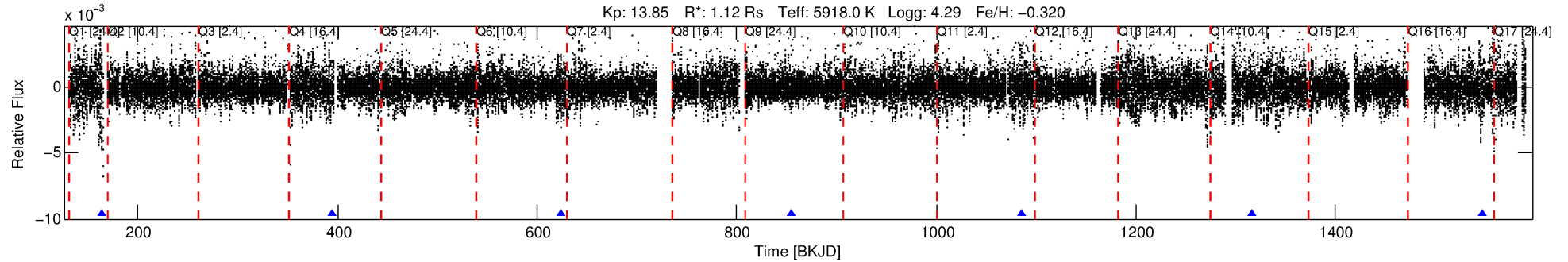
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008396113-03

No Significant Match Found

# DV One-Page Summary

KIC: 8396113 Candidate: 3 of 3 Period: 230.609 d



## DV Fit Results:

Period = 230.60928 [0.00162] d  
Epoch = 163.4322 [0.0058] BKJD  
Rp/R\* = 0.0348 [0.0083]  
a/R\* = 295.74 [278.89]  
b = 0.84 [0.34]  
Seff = 2.75 [1.02]  
Teq = 328 [30] K  
Rp = 4.26 [1.55] Re  
a = 0.7094 [0.1679] AU  
Ag = 10035.22 [7205.95] [1.39σ]  
Teffp = 5083 [810] K [5.87σ]

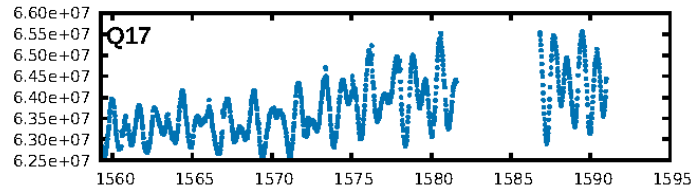
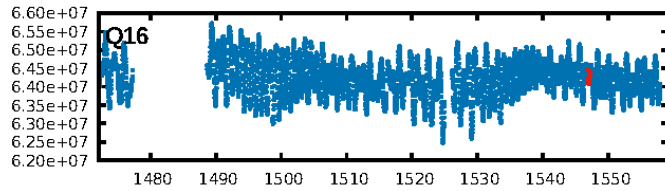
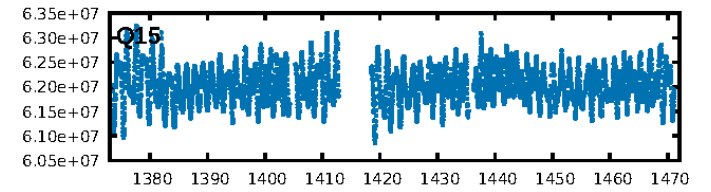
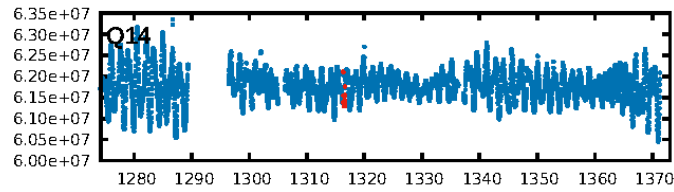
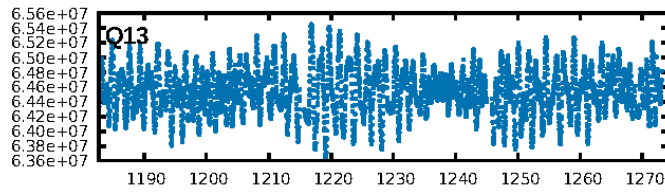
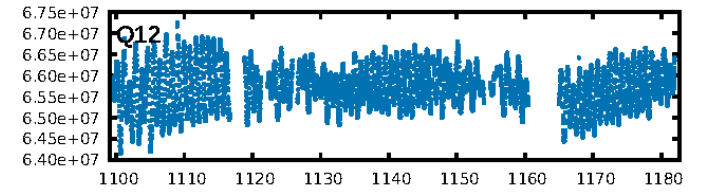
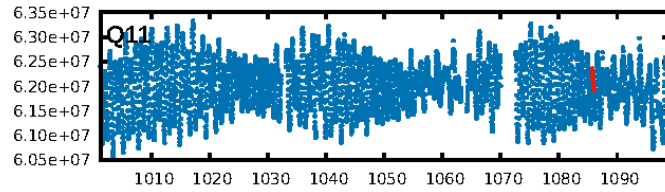
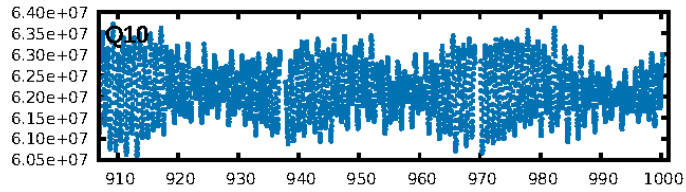
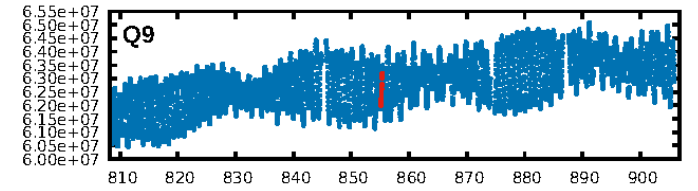
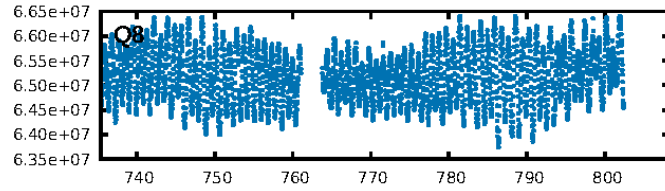
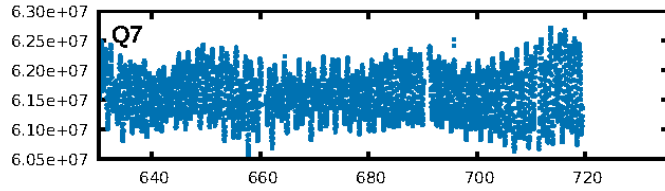
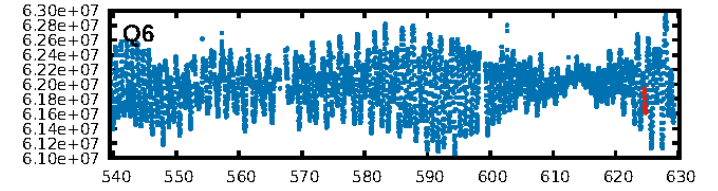
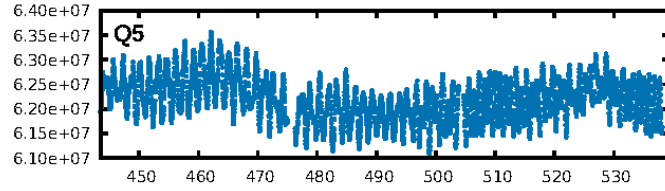
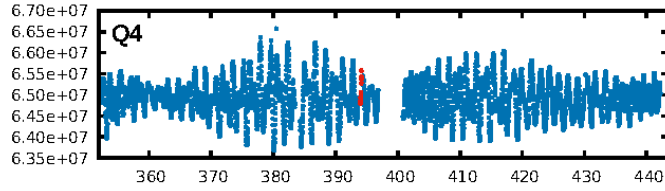
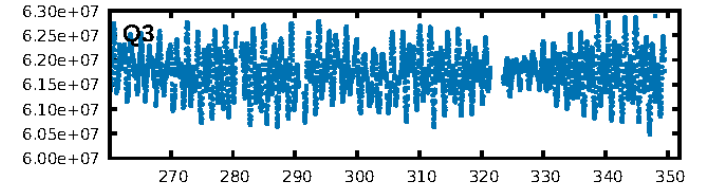
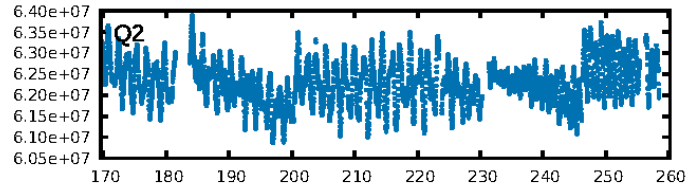
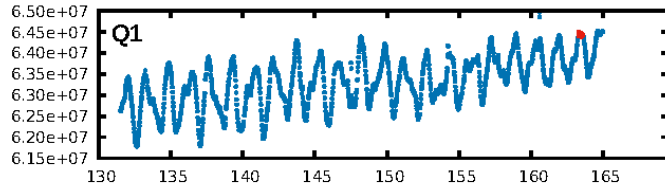
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [1323.65σ]  
ModelChiSquare2-sig: 48.8%  
ModelChiSquareGof-sig: 97.7%  
Bootstrap-pfa: 4.42e-09  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: -0.4582  
Centroid-sig: 1.0%  
Centroid-so: 0.407 arcsec [0.62σ]  
OotOffset-rm: 0.633 arcsec [5.46σ]  
KicOffset-rm: 0.283 arcsec [1.57σ]  
OotOffset-st: 2/1/2/2 [7]  
KicOffset-st: 2/1/2/2 [7]  
DiffImageQuality-fgm: 0.71 [5/7]  
DiffImageOverlap-fno: 1.00 [7/7]

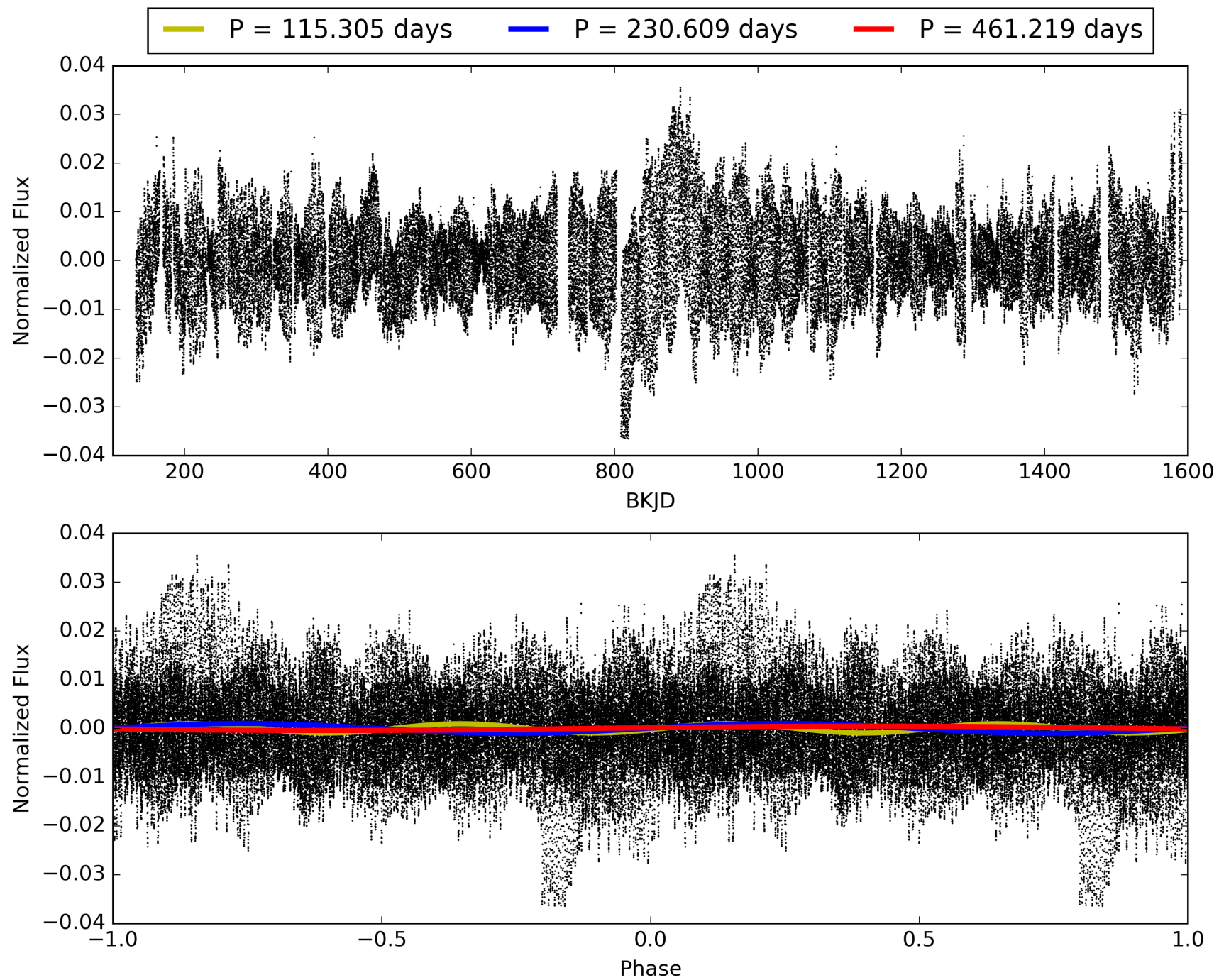
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 01:59:03 Z

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

# TCE 008396113-03, PDC Light Curves

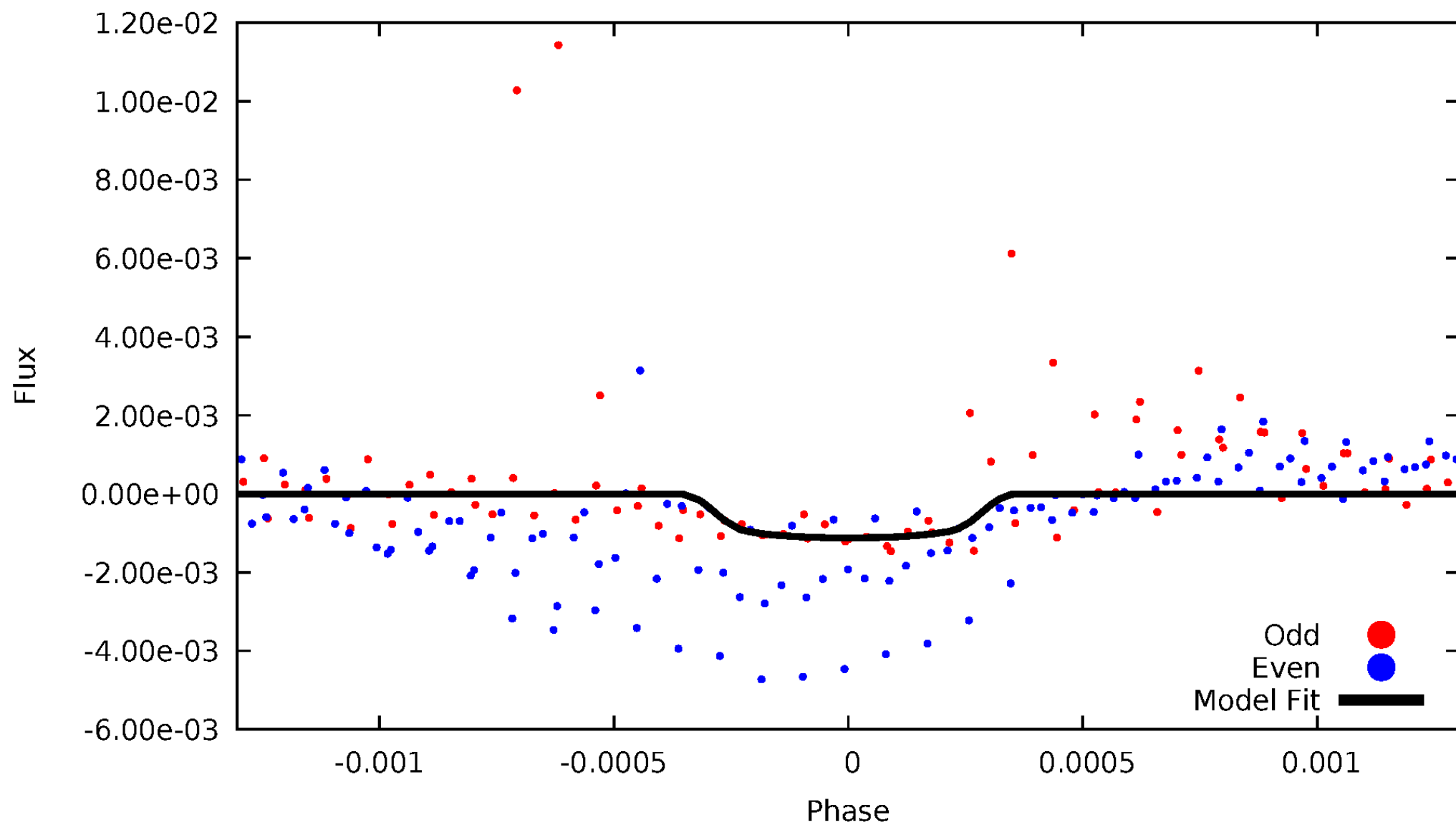


# TCE 008396113-03



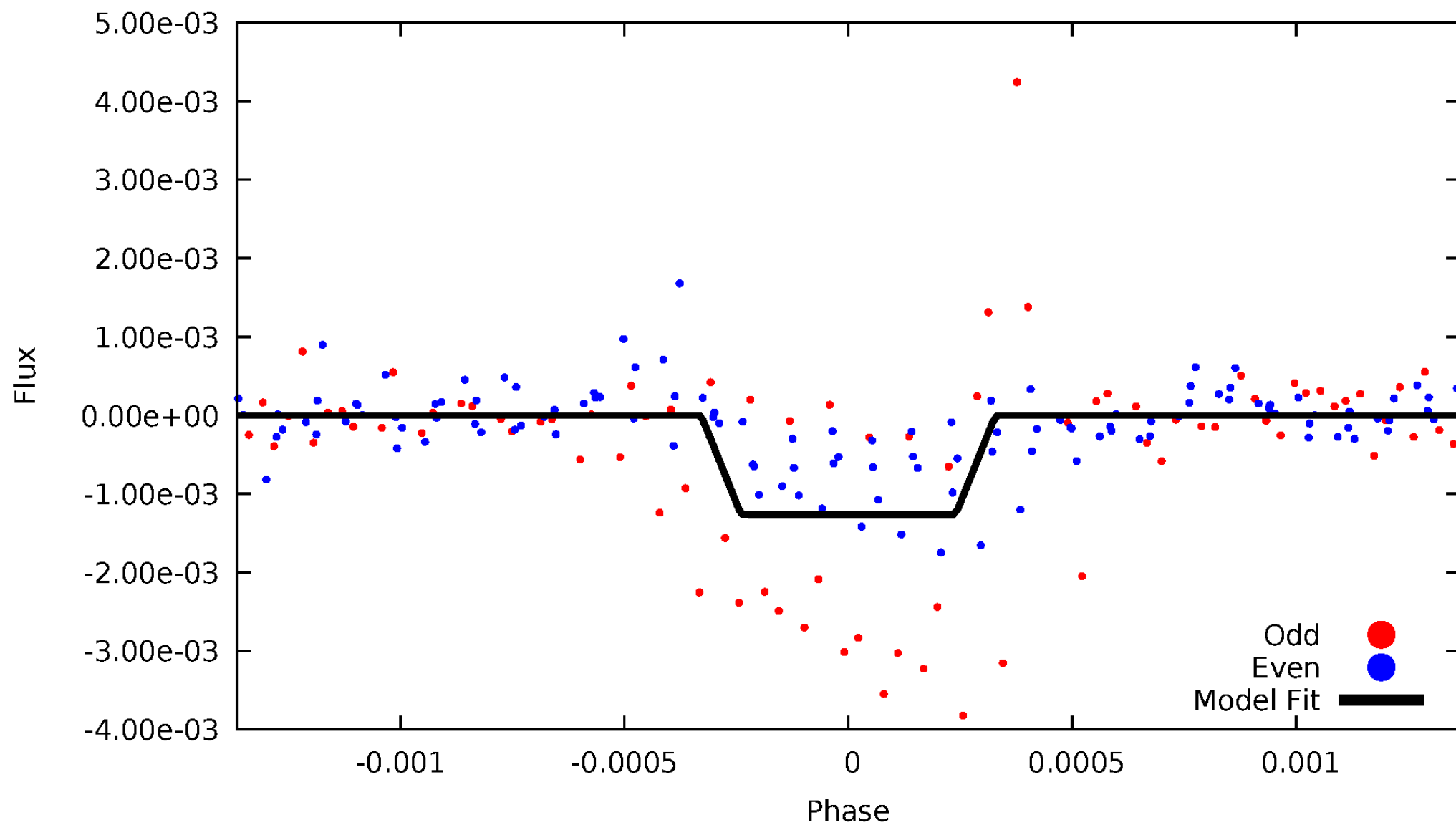
# DV Odd/Even

TCE 008396113-03



# ALT Odd/Even

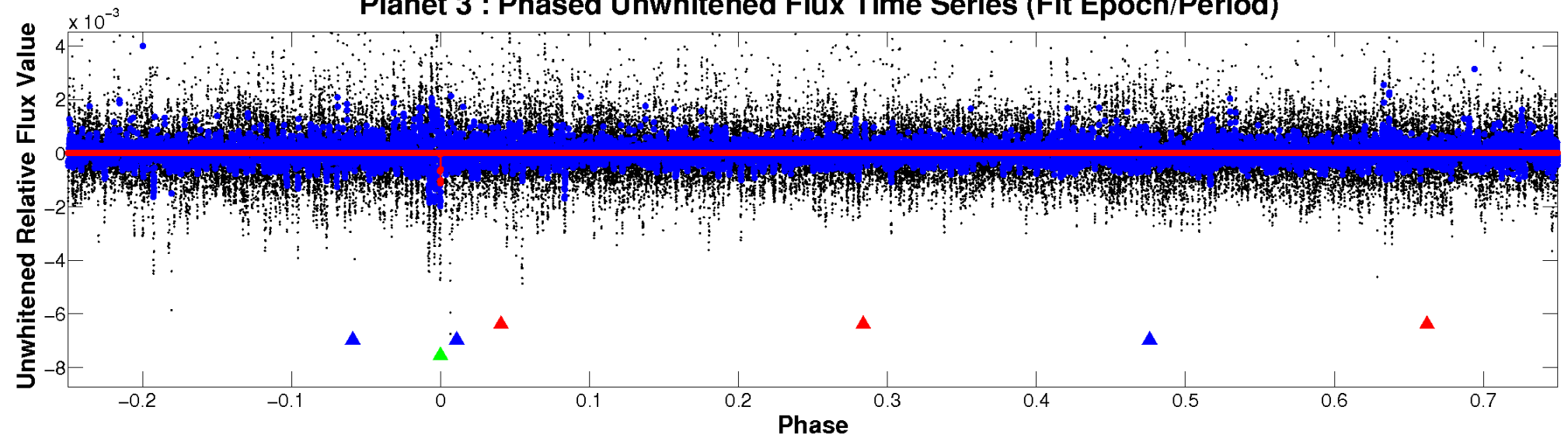
TCE 008396113-03



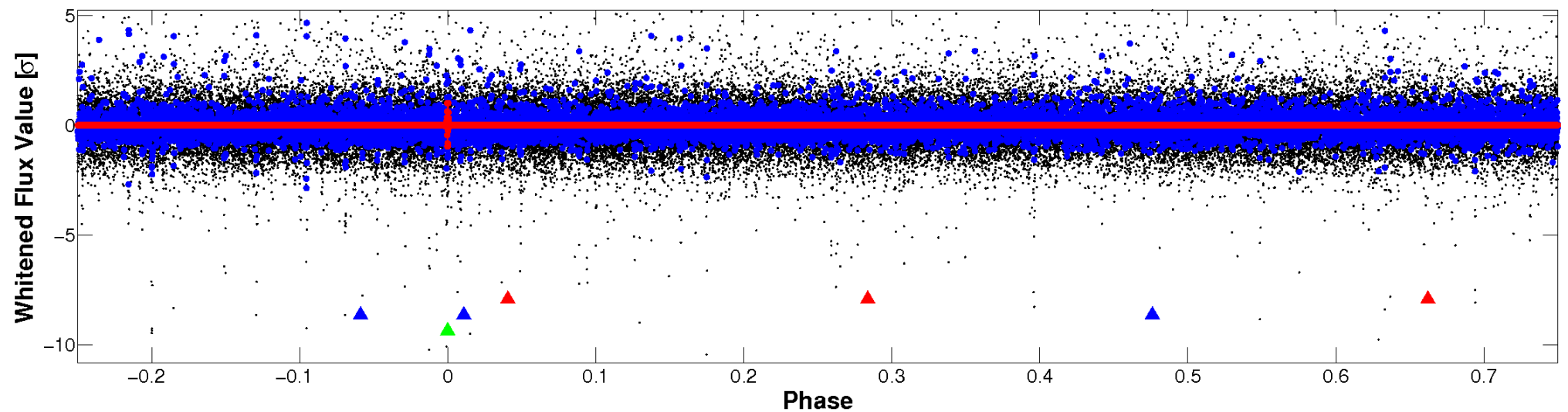


# Non-Whitened Vs. Whitened Light Curve

## Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

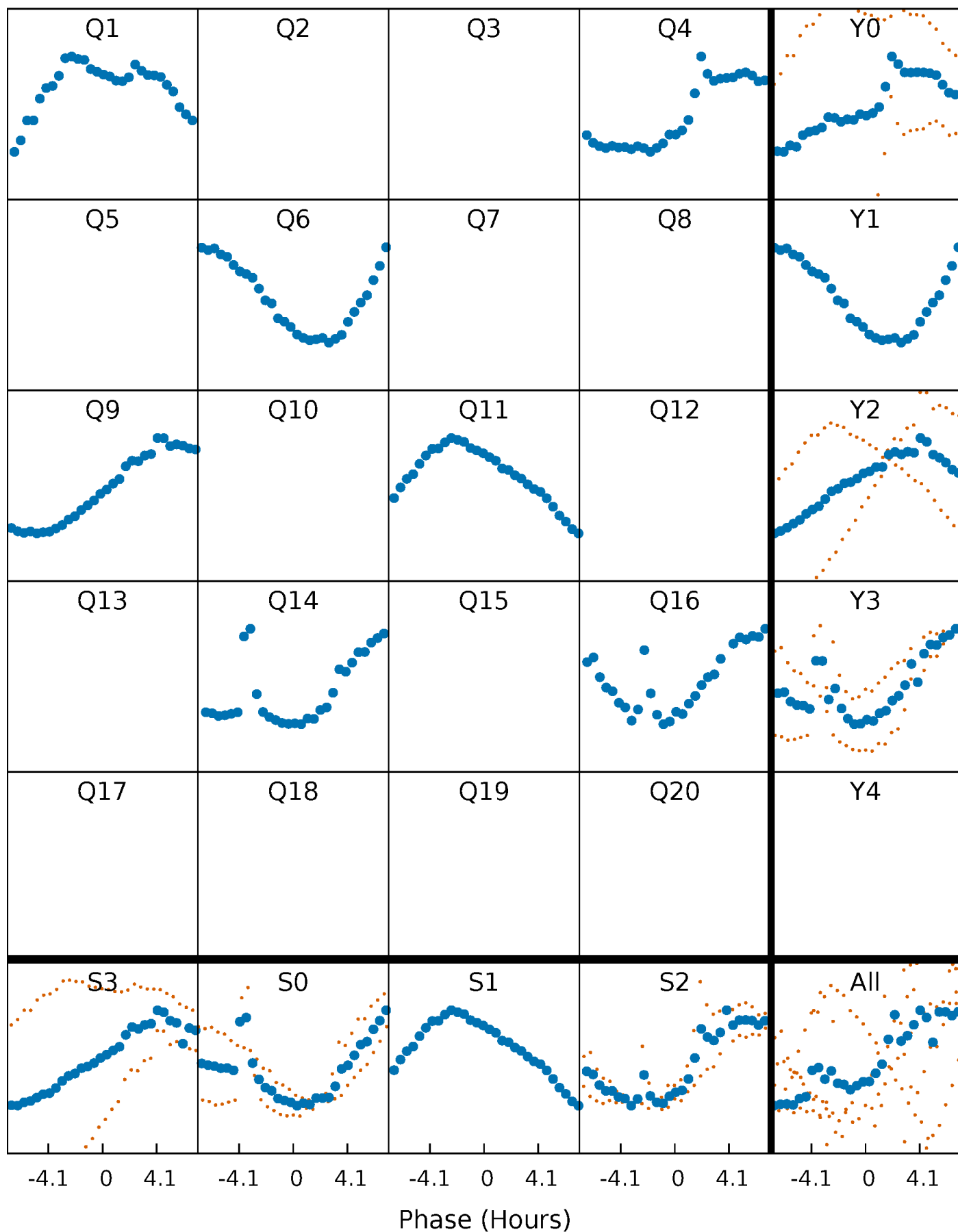


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

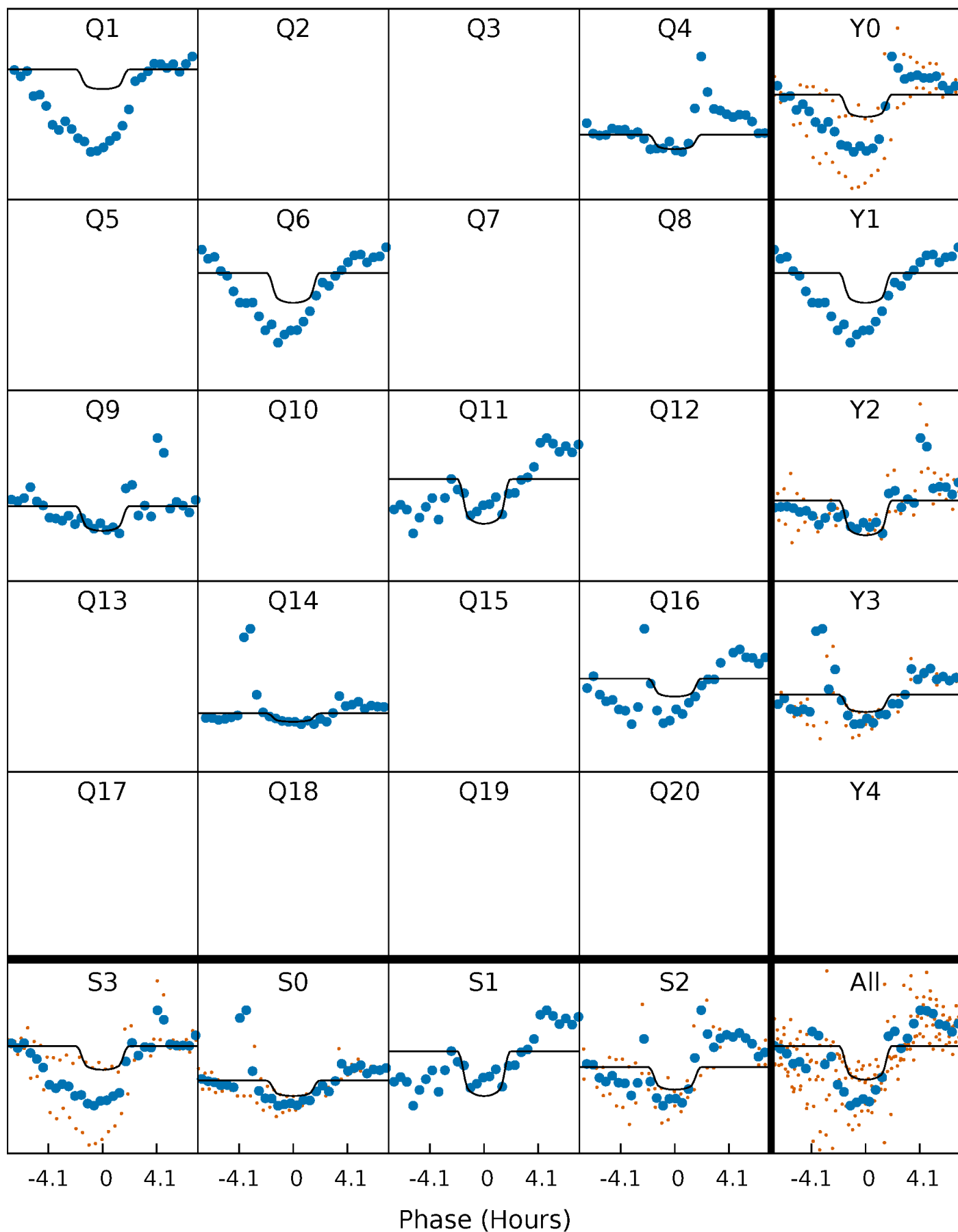
TCE 008396113-03 P=230.609277 Days  $T_0=163.432204$  (BKJD)





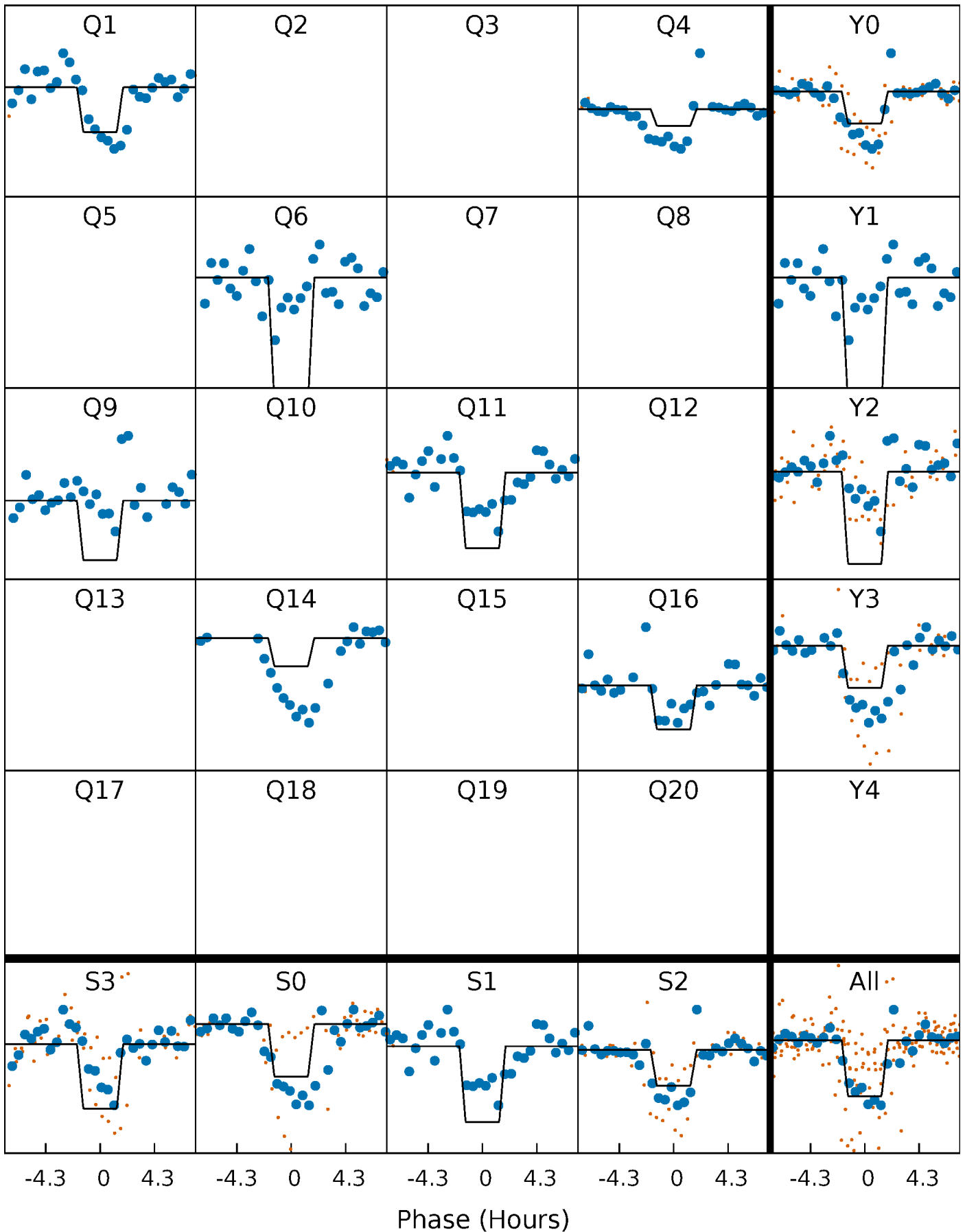
# DV Quarter-Phased Transit Curves

TCE 008396113-03 P=230.609277 Days  $T_0=163.432204$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

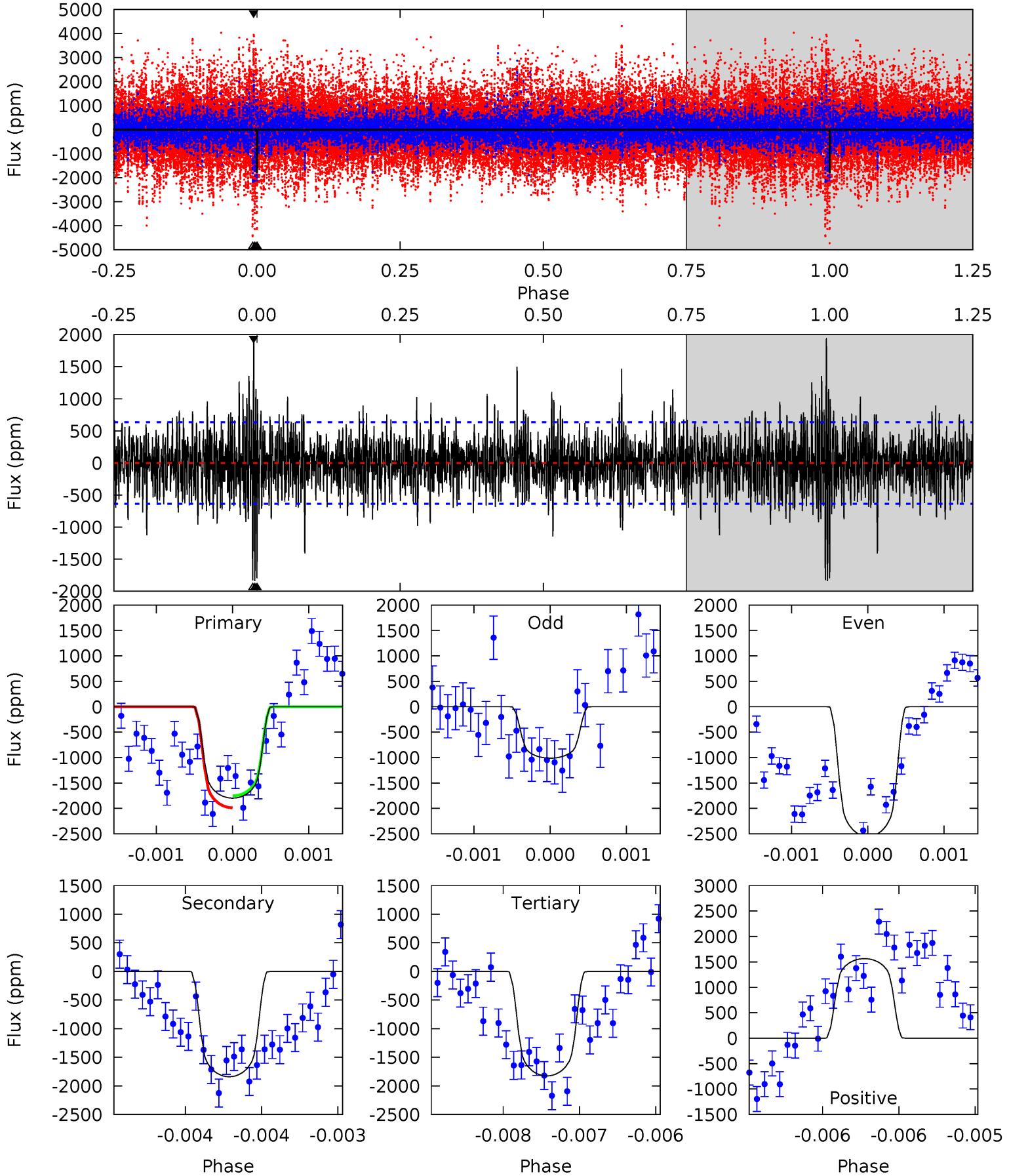
TCE 008396113-03 P=230.611548 Days  $T_0=163.423445$  (BKJD)



# DV Model-Shift Uniqueness Test

008396113-03, P = 230.609277 Days, E = 163.432204 Days

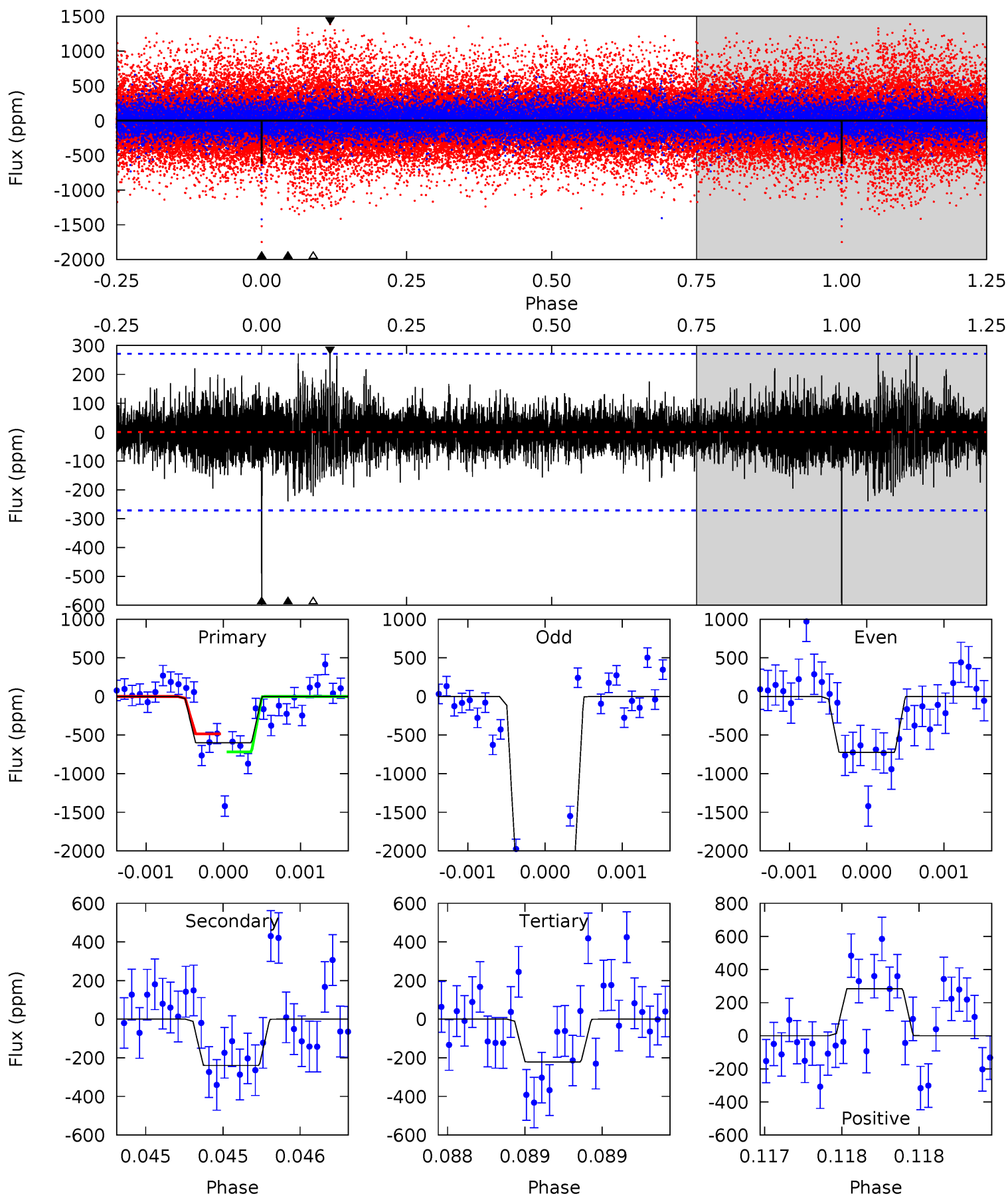
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.6	15.9	15.8	13.5	5.51	3.38	3.05	-0.24	2.03	0.12	2.39	6.79	1.47	0.51	1.03



# Alt Model-Shift Uniqueness Test

008396113-03, P = 230.611548 Days, E = 163.423445 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.2	4.88	4.50	5.79	5.53	3.41	1.10	7.71	6.43	0.38	-0.91	18.9	1.55	0.32	0



### Stellar Parameters For KIC 008396113

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5918^{+158}_{-175}$	$4.289^{+0.195}_{-0.175}$	$-0.320^{+0.300}_{-0.300}$	$1.123^{+0.309}_{-0.253}$	$0.896^{+0.129}_{-0.086}$	$0.890^{+1.006}_{-0.405}$
	+3%/-3%	+5%/-4%	+94%/-94%	+28%/-23%	+14%/-10%	+113%/-45%
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 008396113-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-1840 \pm 115$	$4.31^{+1.22}_{-1.11}$	$459^{+33}_{-33}$	$6543^{+1122}_{-685}$	$28061^{+23739}_{-10820}$
Alt.	$-240 \pm 49$	$4.32^{+1.24}_{-1.12}$	$459^{+31}_{-34}$	$4171^{+462}_{-337}$	$3543^{+3065}_{-1509}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{obs}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

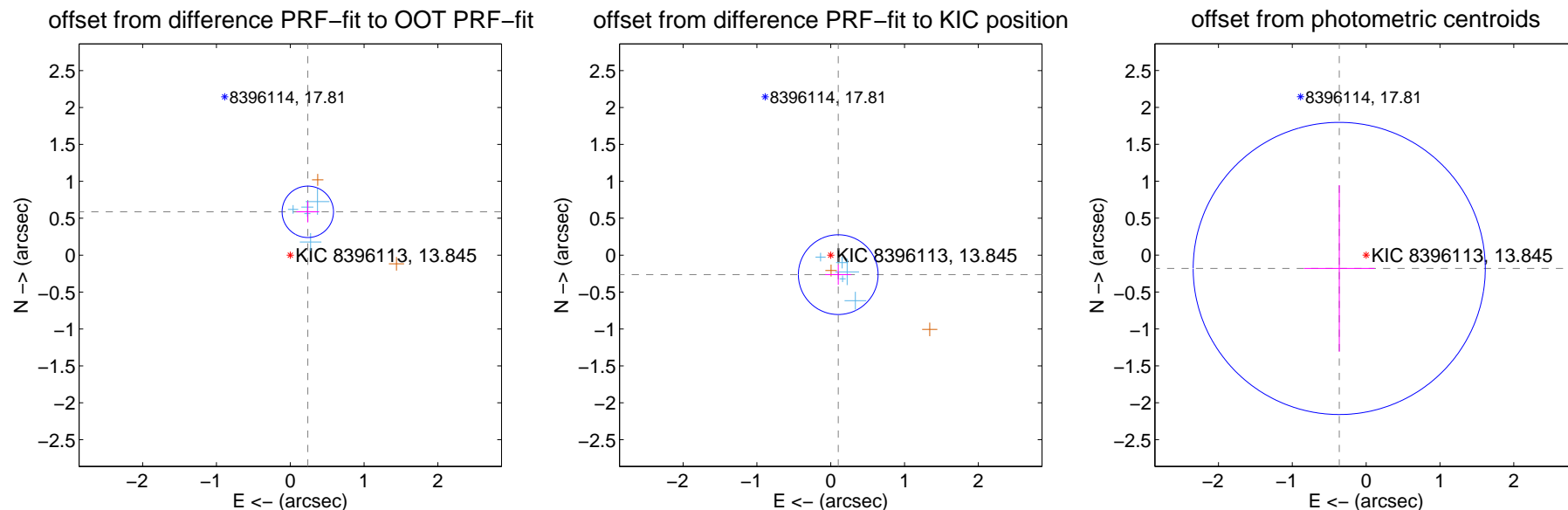
## DV Centroid Data

Supplemental centroid analysis for 008396113-03. Kepler magnitude: 13.85. Transit SNR 7.08

There are 5 quarters with good PRF difference image offsets

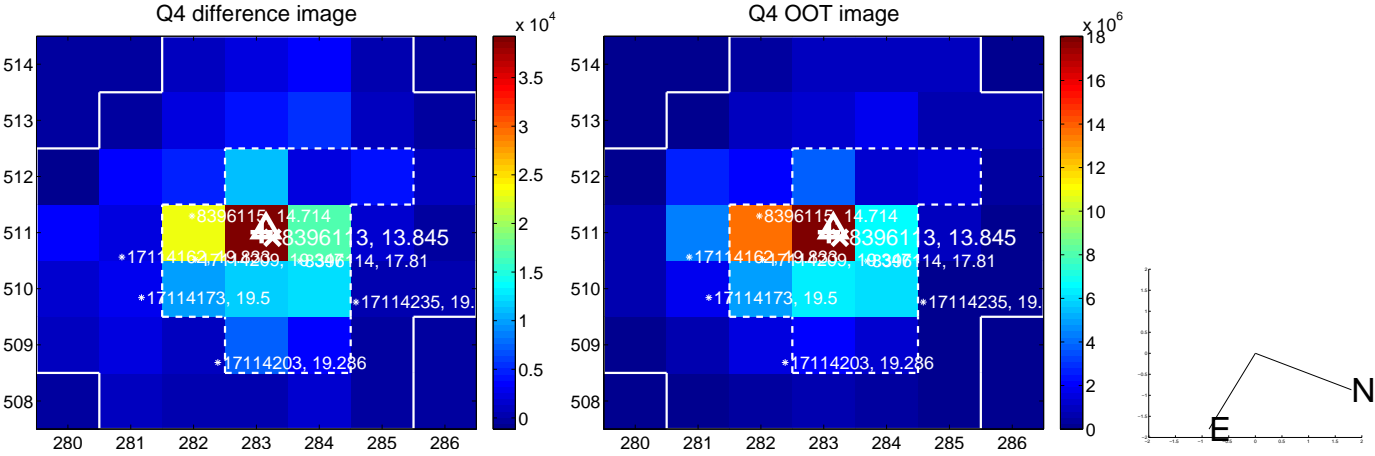
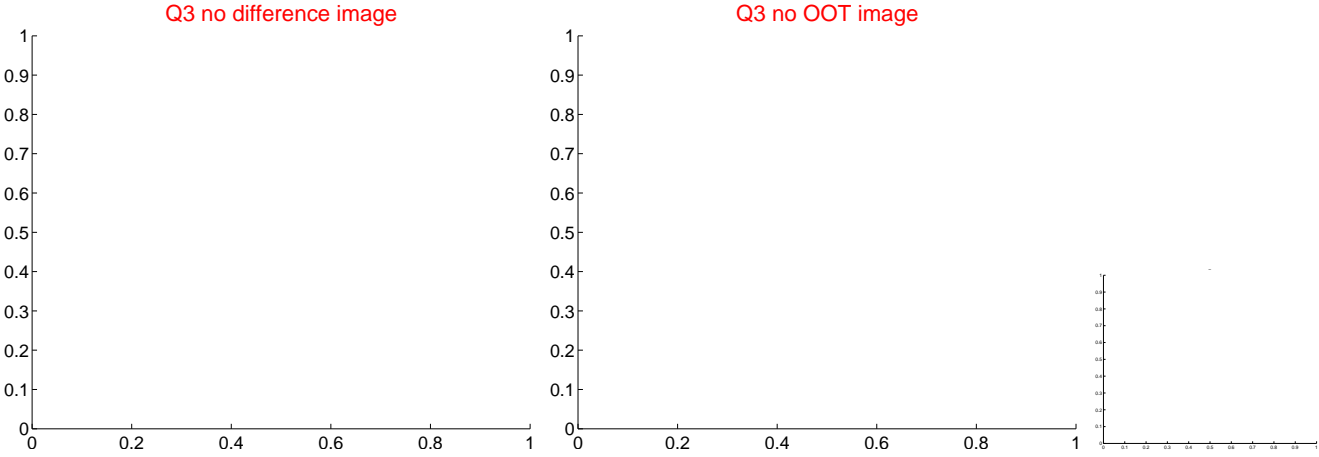
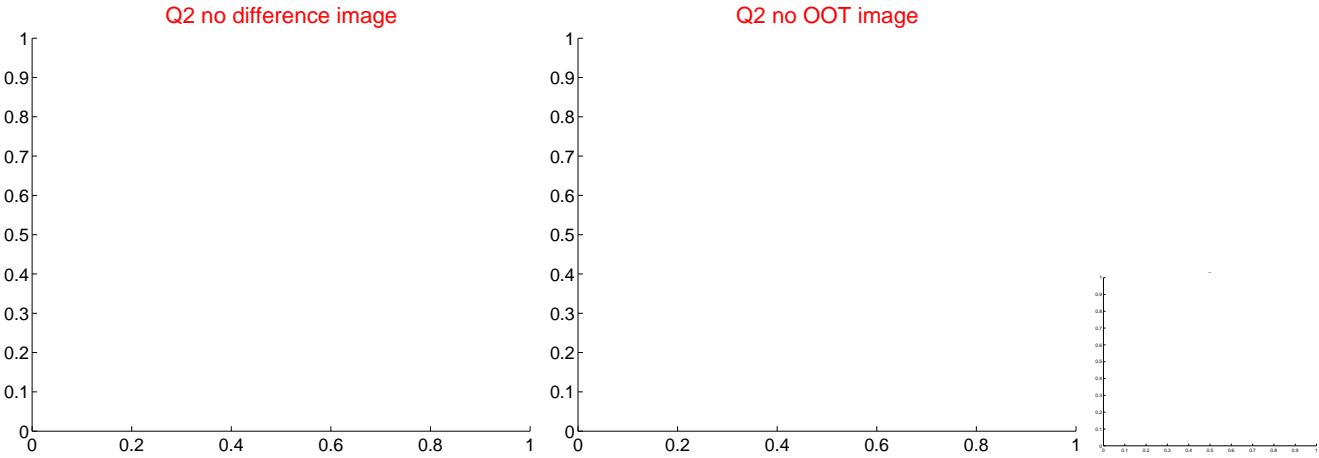
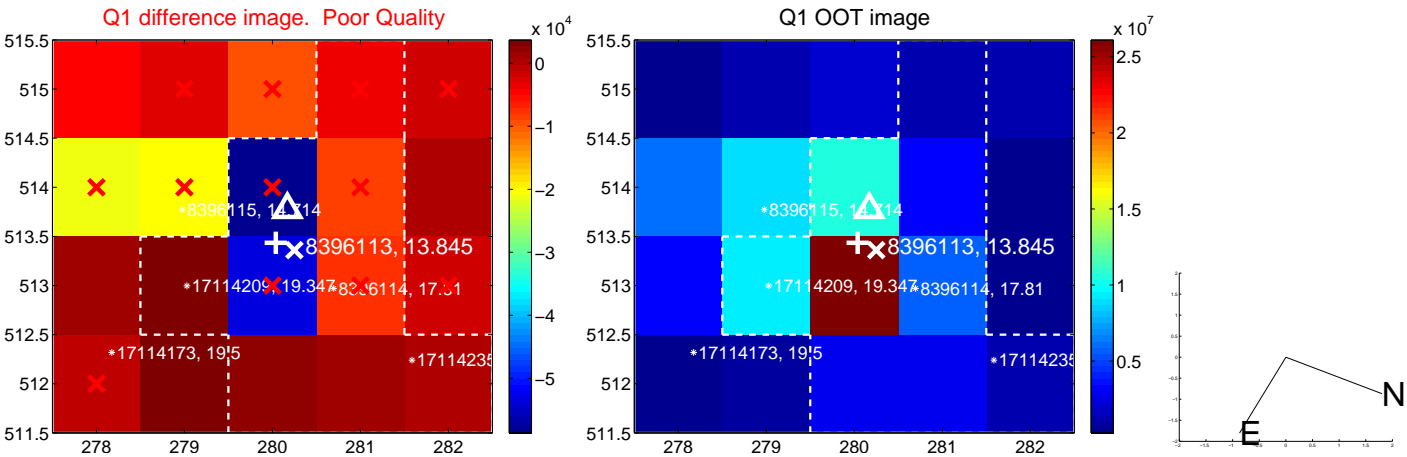
The direct PRF centroid is offset from the target star catalog position by about 0.76 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>0.633 \pm 0.116</math></b>	<b>5.46</b>	$-0.238 \pm 0.155$	$0.587 \pm 0.144$
PRF-fit source offset from KIC position	$0.283 \pm 0.180$	1.57	$-0.102 \pm 0.176$	$-0.264 \pm 0.136$
photometric centroid source offset	$0.41 \pm 0.66$	0.62	$0.36 \pm 0.48$	$-0.18 \pm 1.13$

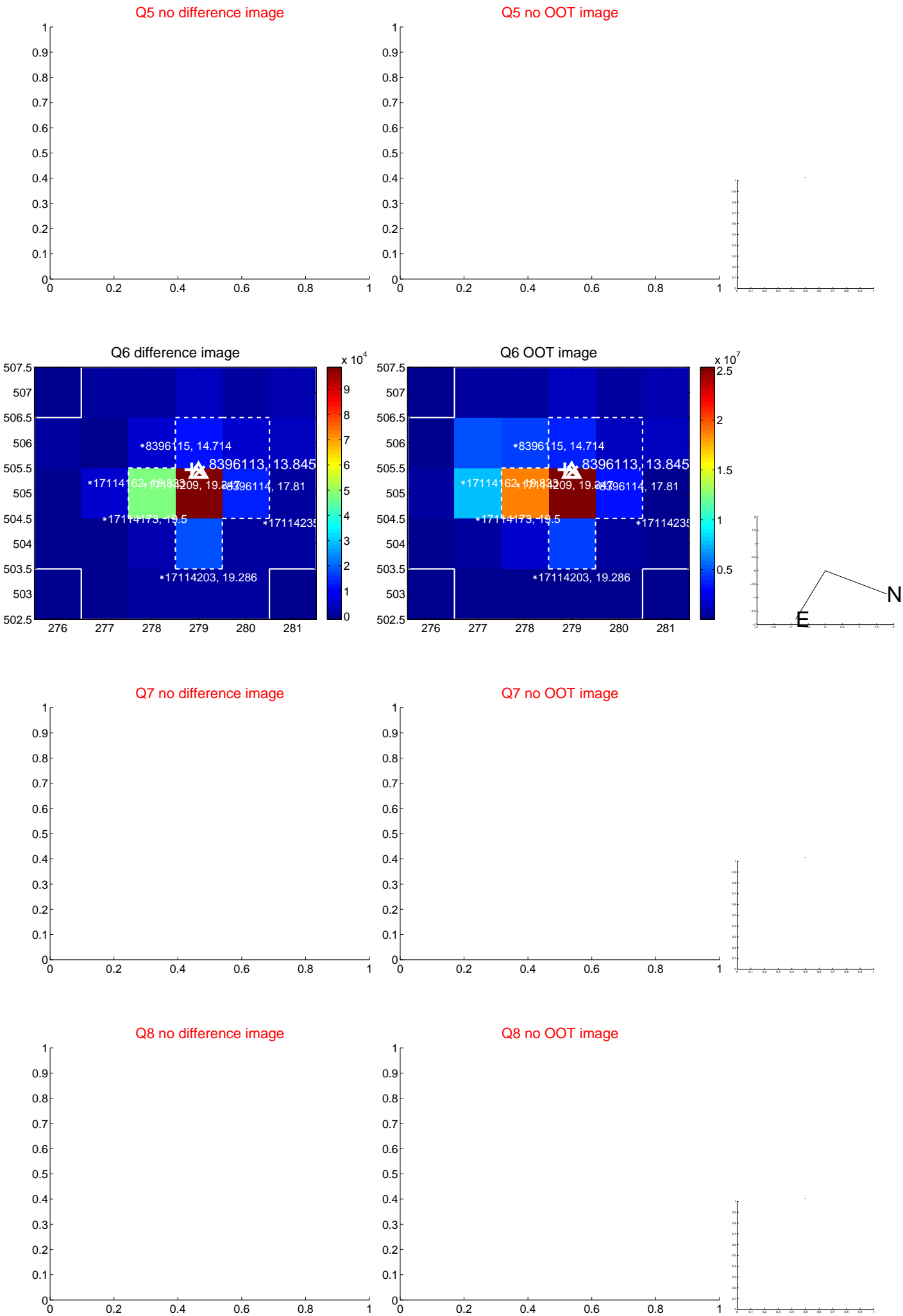


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

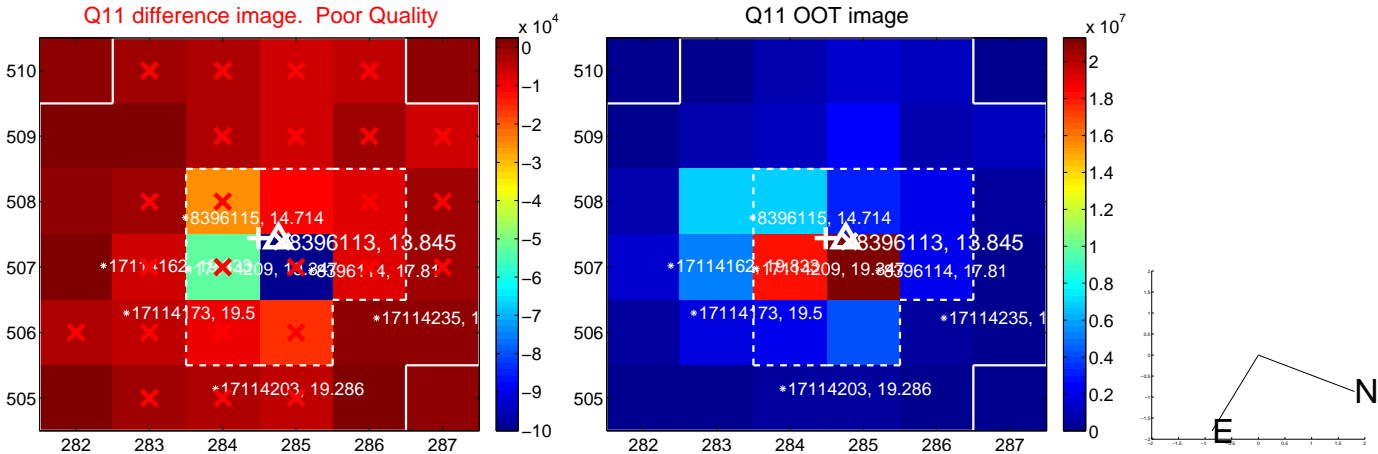
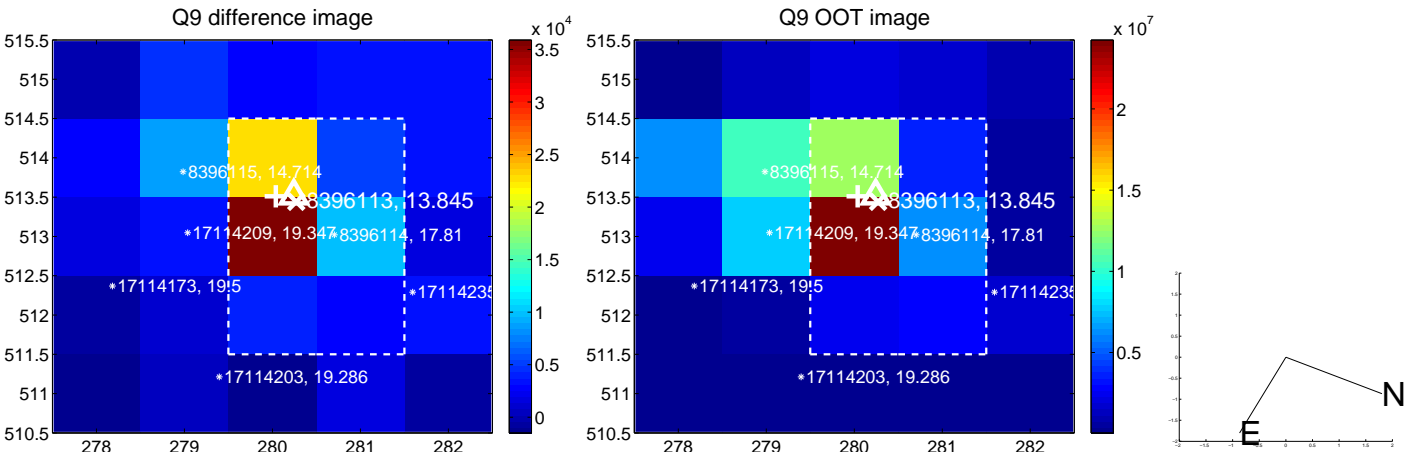


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

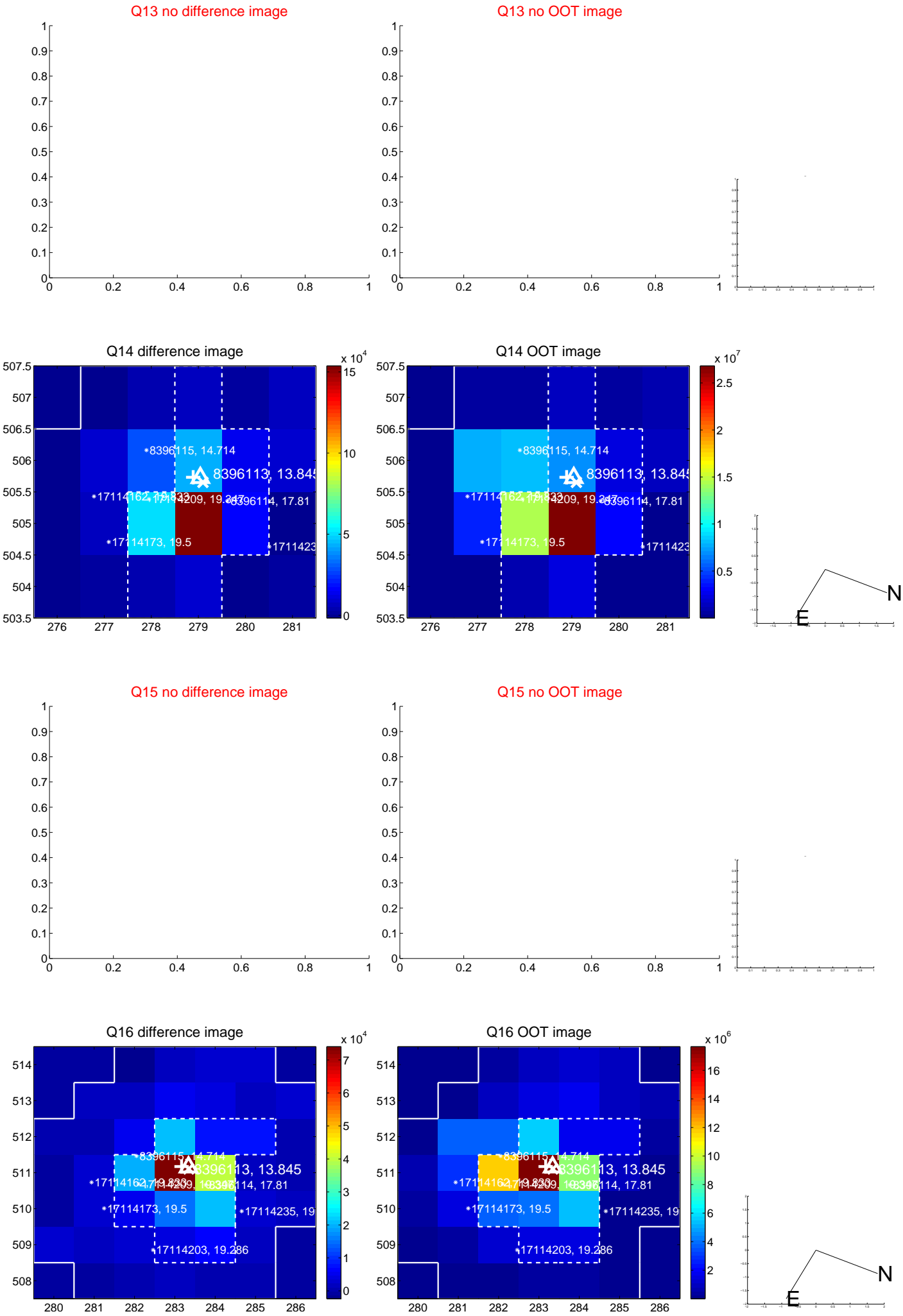




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



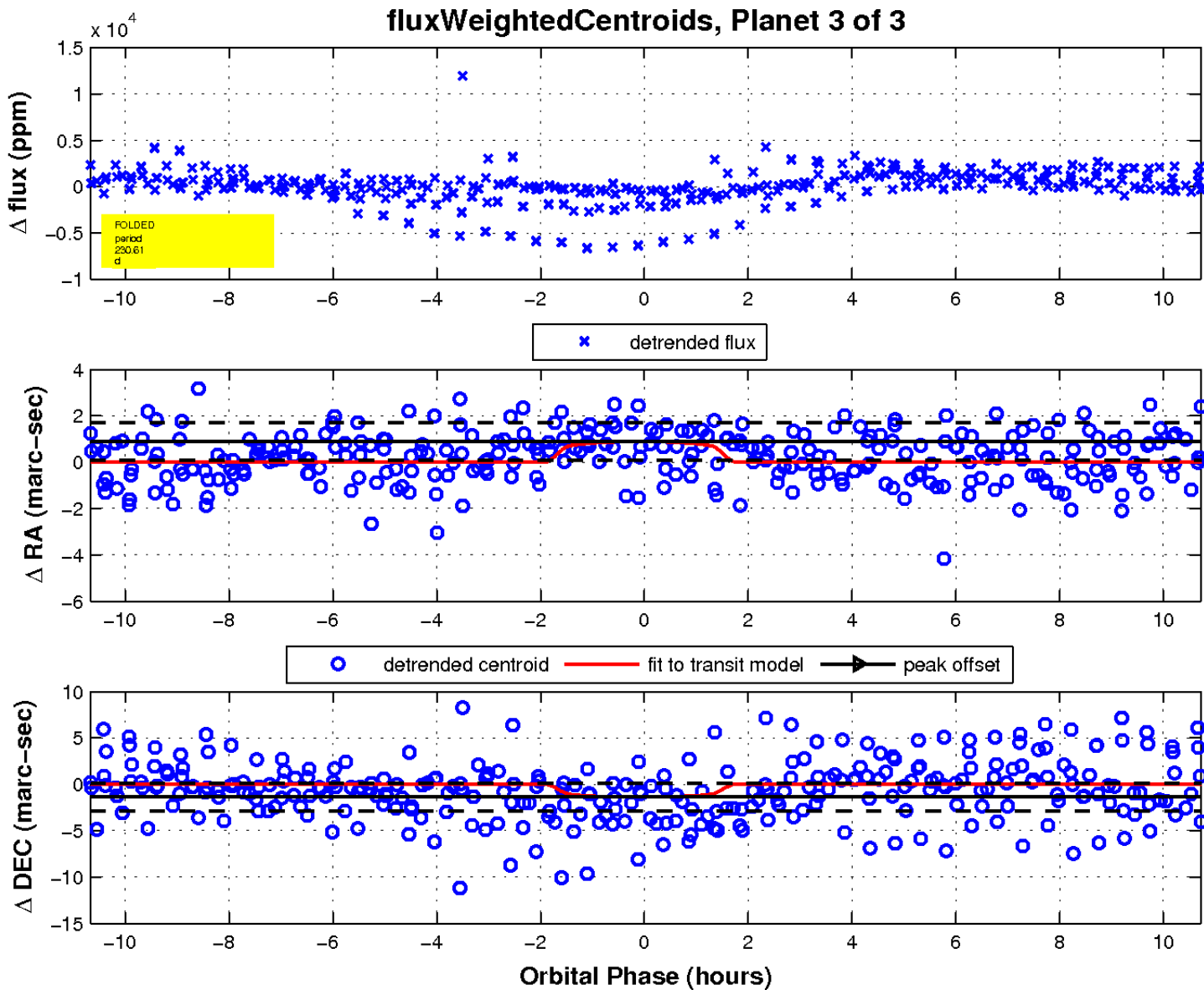
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

Q17 no difference image

Q17 no OOT image



UKIRT Image

