

# KIC 006610837

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006610837-01	OBS	No	597.878107	379.675301	291.3	13.327	11.2	2.2	0.33	3408	0.57	0.01
006610837-02	OBS	No	590.043050	360.119292	1172.1	4.276	7.4	7.5	0.33	3408	1.17	0.01

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006610837-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
006610837-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—CENT_FEW_MEAS

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

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

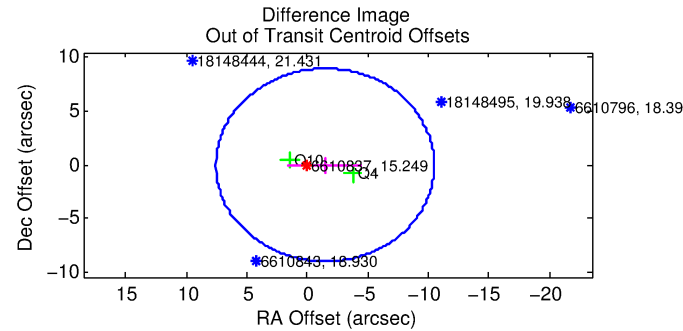
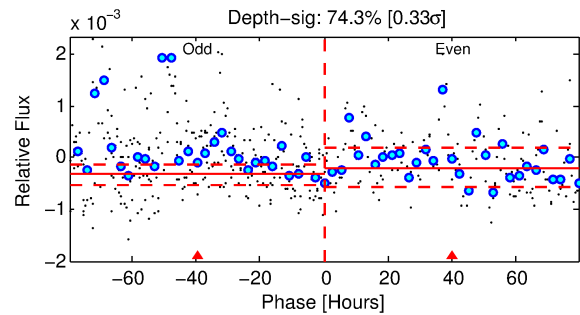
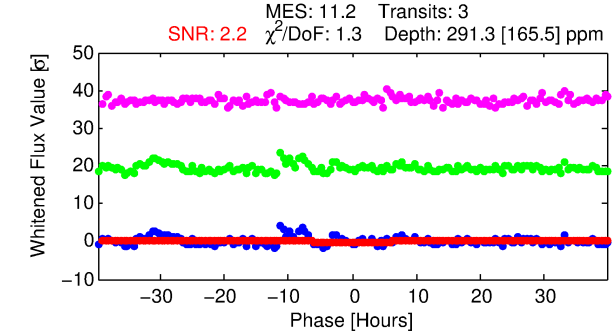
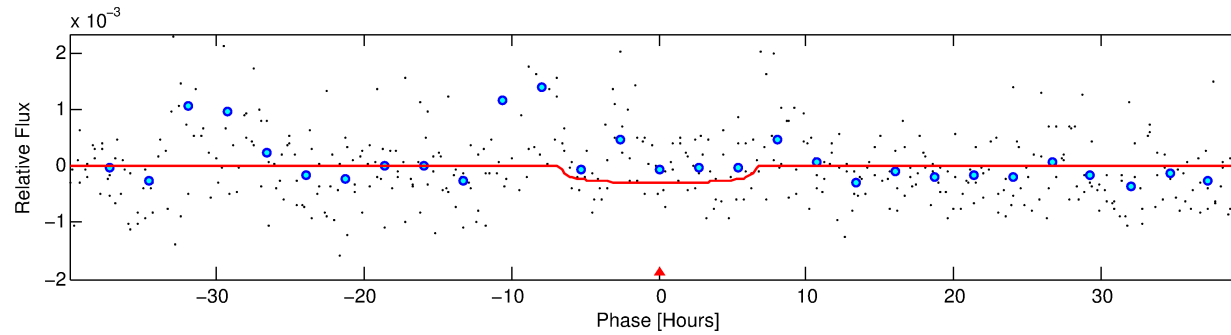
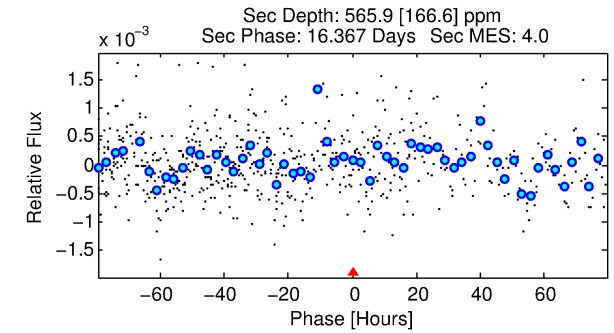
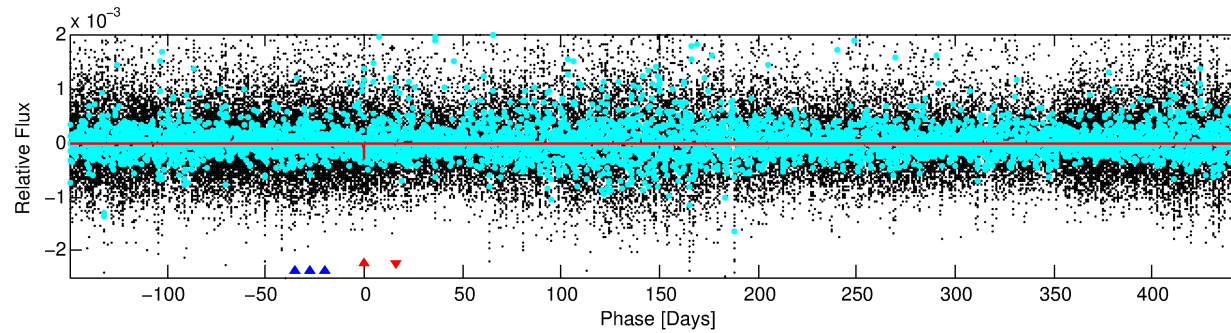
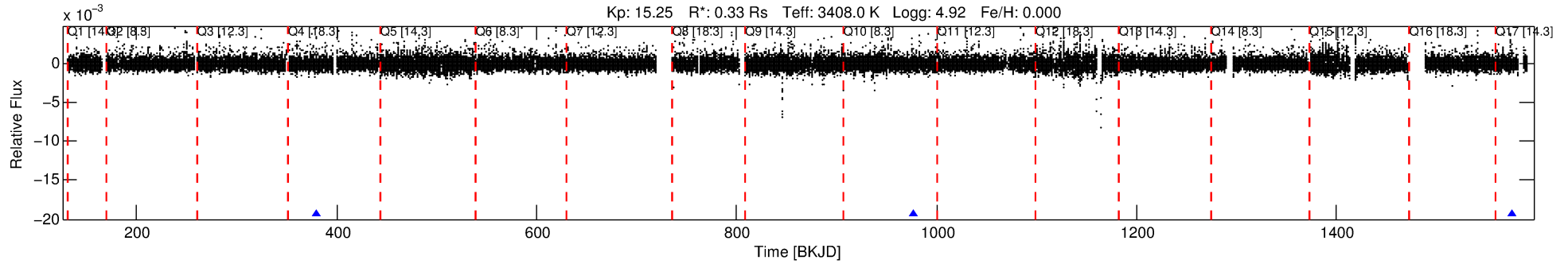
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## Ephemeris Match Information For 006610837-01

No Significant Match Found

# DV One-Page Summary

KIC: 6610837 Candidate: 1 of 2 Period: 597.878 d



## DV Fit Results:

Period = 597.87811 [0.03827] d  
Epoch = 379.6753 [0.0516] BKJD  
Rp/R\* = 0.0160 [0.0528]  
a/R\* = 294.86 [4122.21]  
b = 0.54 [18.36]  
Seff = 0.01 [0.00]  
Teq = 88 [2] K  
Rp = 0.57 [1.87] Re  
a = 0.9529 [0.0762] AU  
Ag = 874716.33 [5772270.38] [0.15 $\sigma$ ]  
Teffp = 4152 [6849] K [0.59 $\sigma$ ]

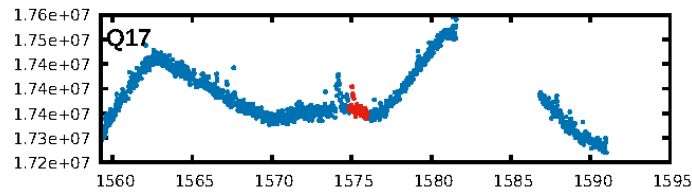
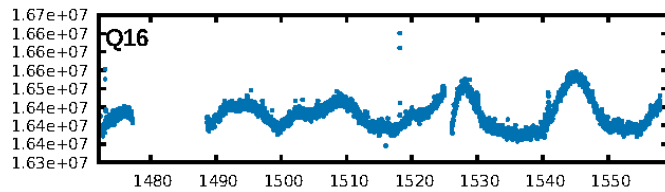
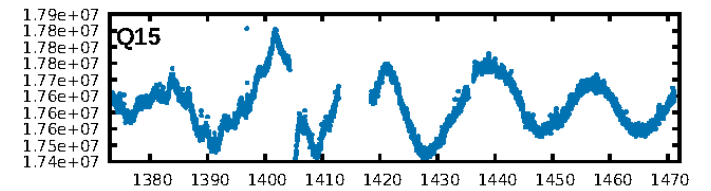
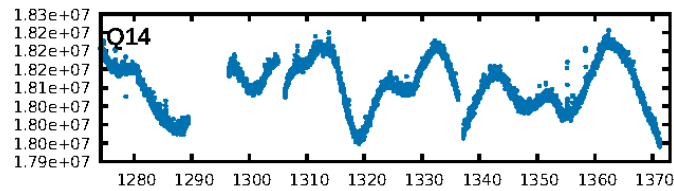
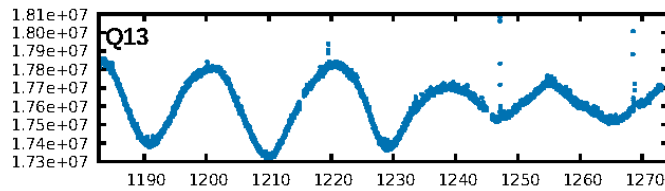
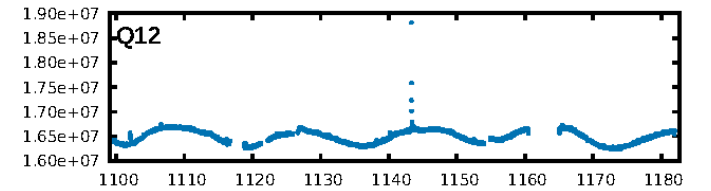
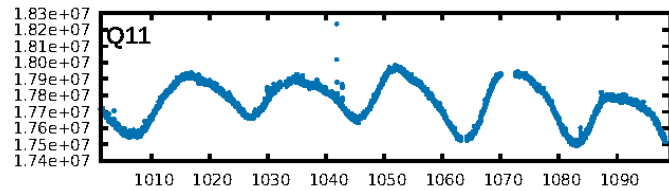
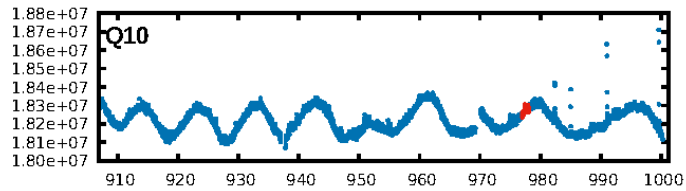
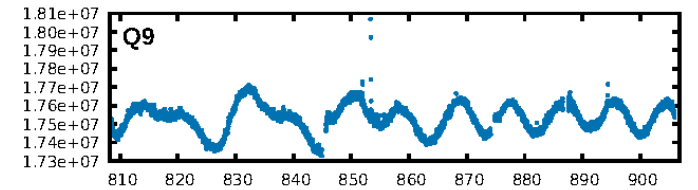
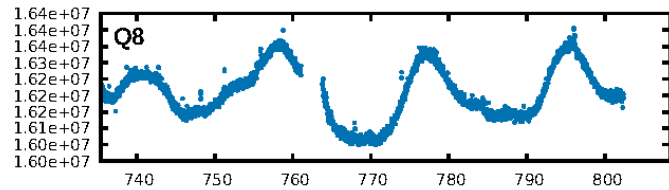
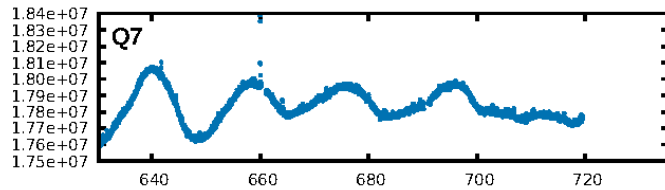
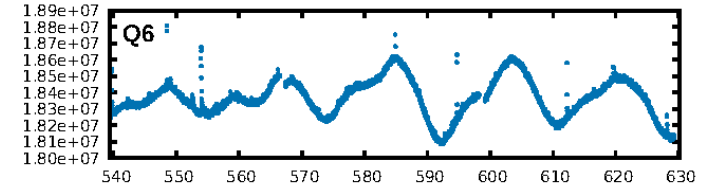
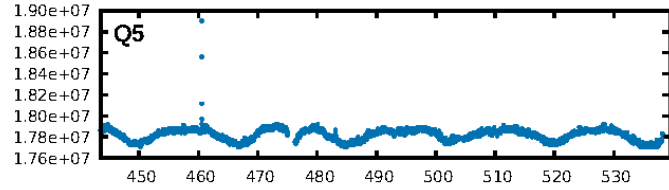
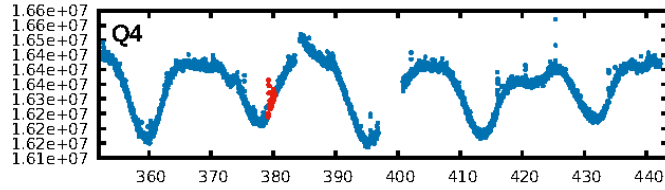
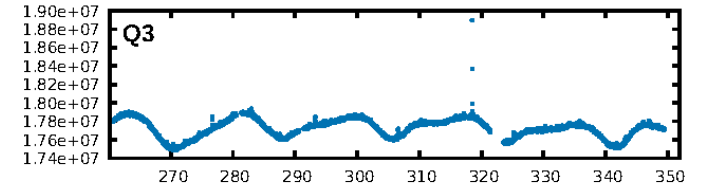
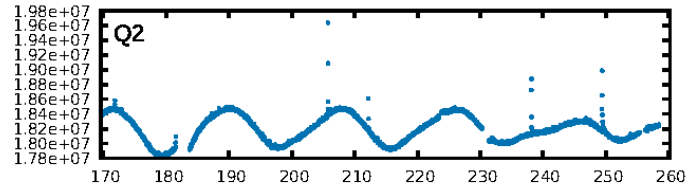
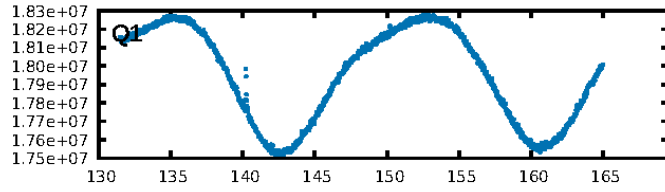
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [13.43 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 2.3%  
ModelChiSquareGof-sig: 92.5%  
Bootstrap-pfa: 1.92e-11  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: 0.1774  
Centroid-sig: 13.5%  
Centroid-so: 2.386 arcsec [0.99 $\sigma$ ]  
OotOffset-rm: 1.463 arcsec [0.49 $\sigma$ ]  
OotOffset-st: 1/0/1/0 [2]  
KicOffset-rm: 1.828 arcsec [0.60 $\sigma$ ]  
KicOffset-st: 1/0/1/0 [2]  
DiffImageQuality-fgm: 0.00 [0/2]  
DiffImageOverlap-fno: 1.00 [3/3]

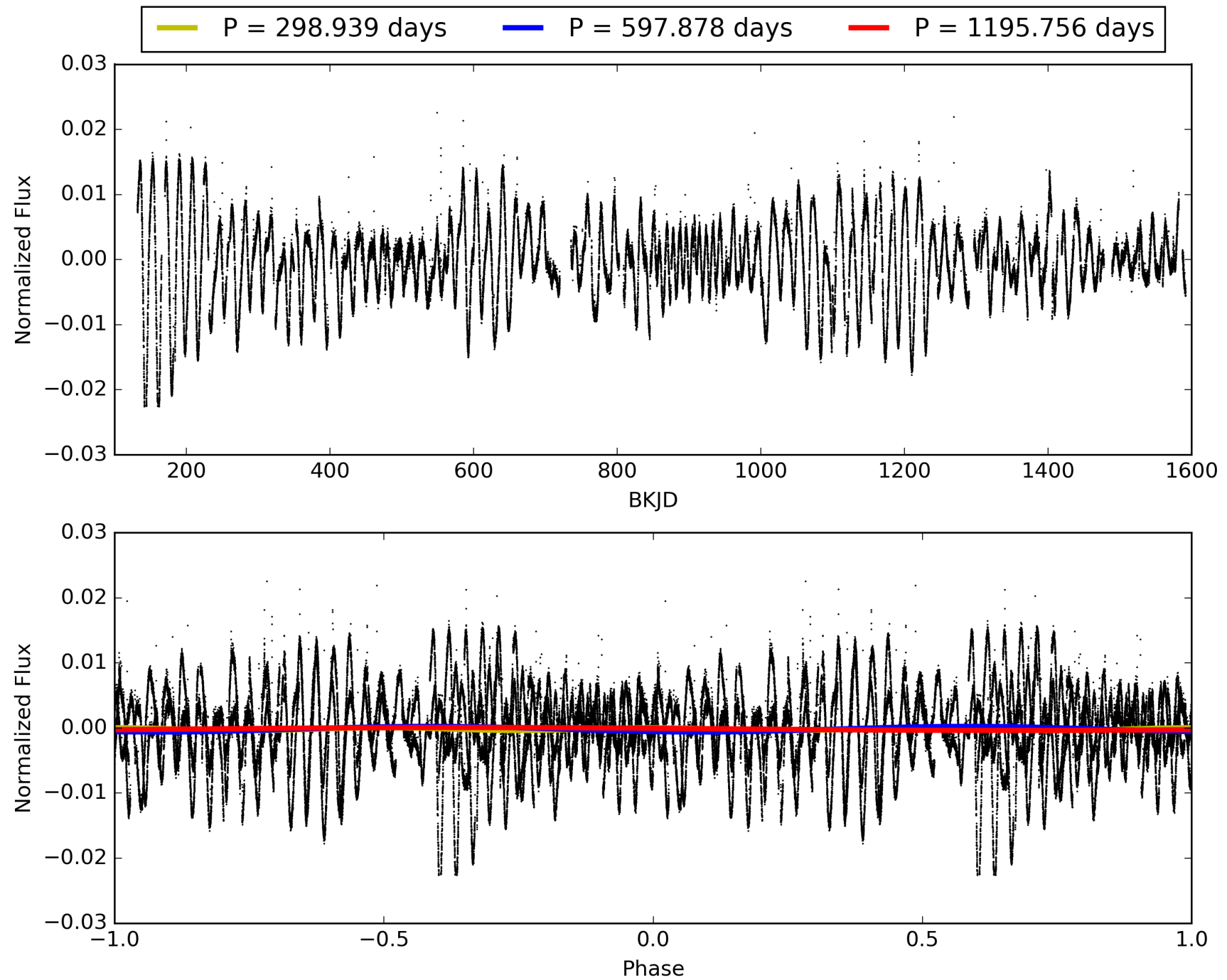
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006610837-01, PDC Light Curves

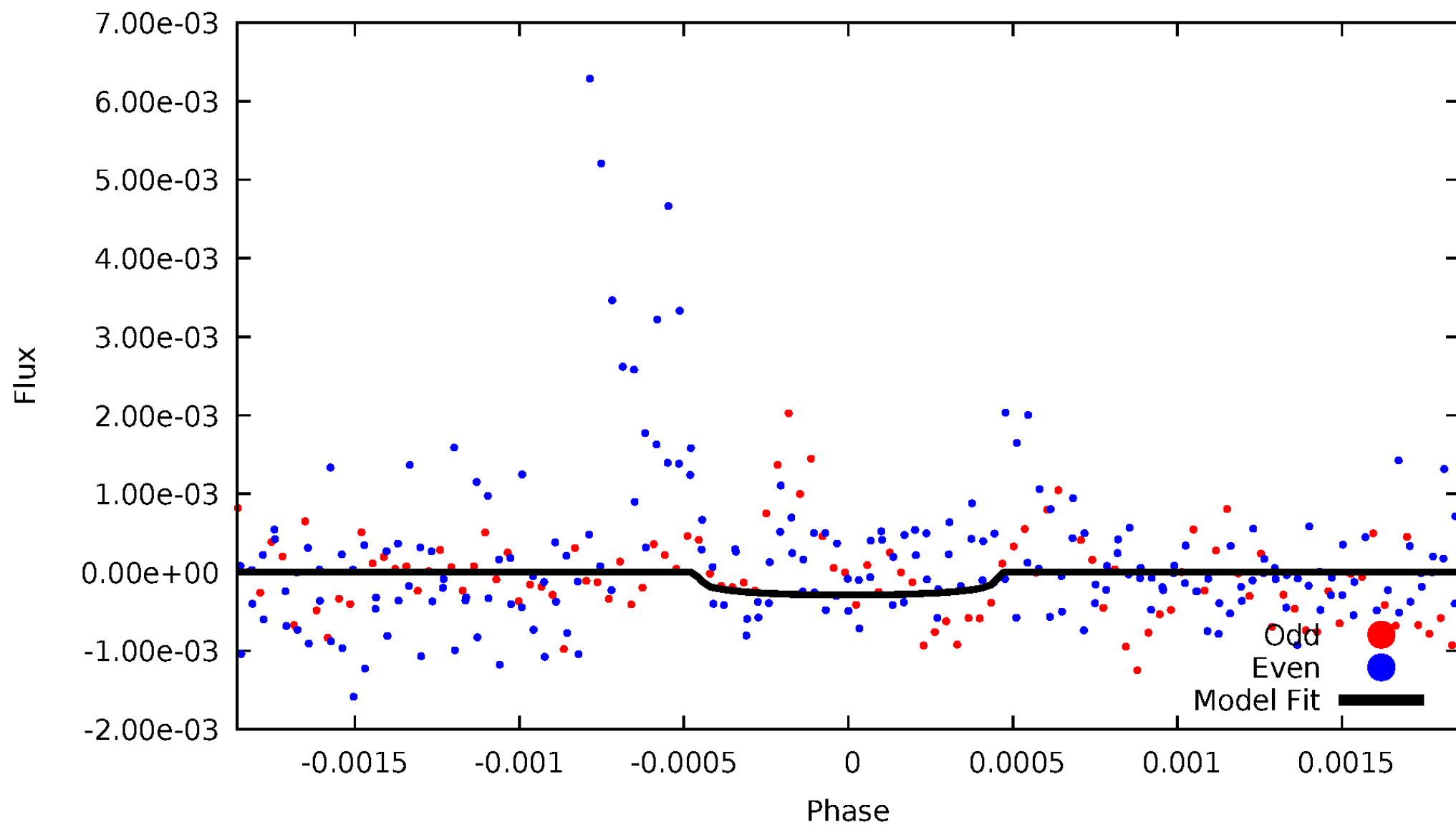


# TCE 006610837-01



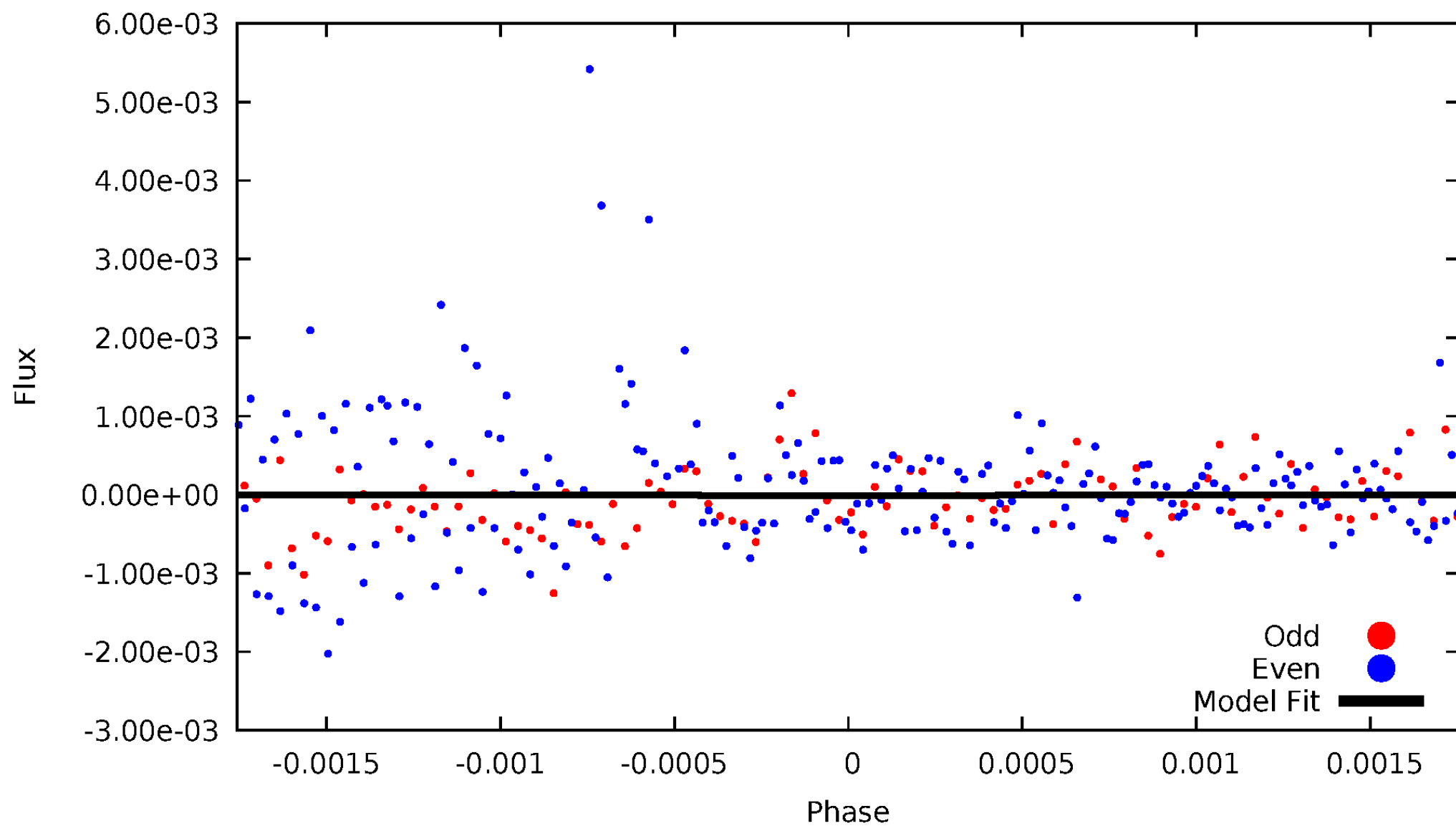
# DV Odd/Even

TCE 006610837-01



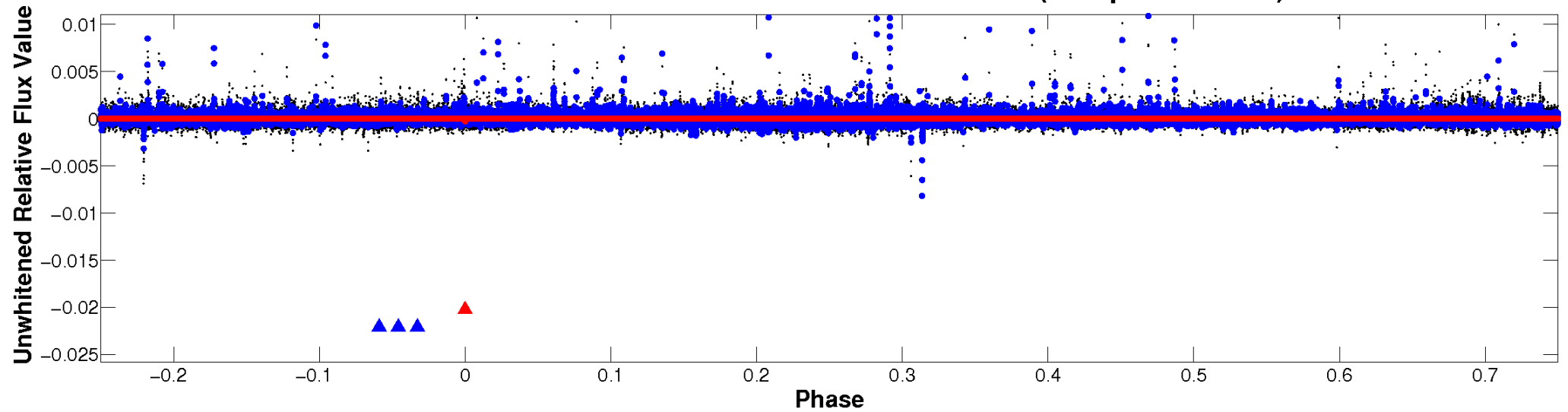
# ALT Odd/Even

TCE 006610837-01

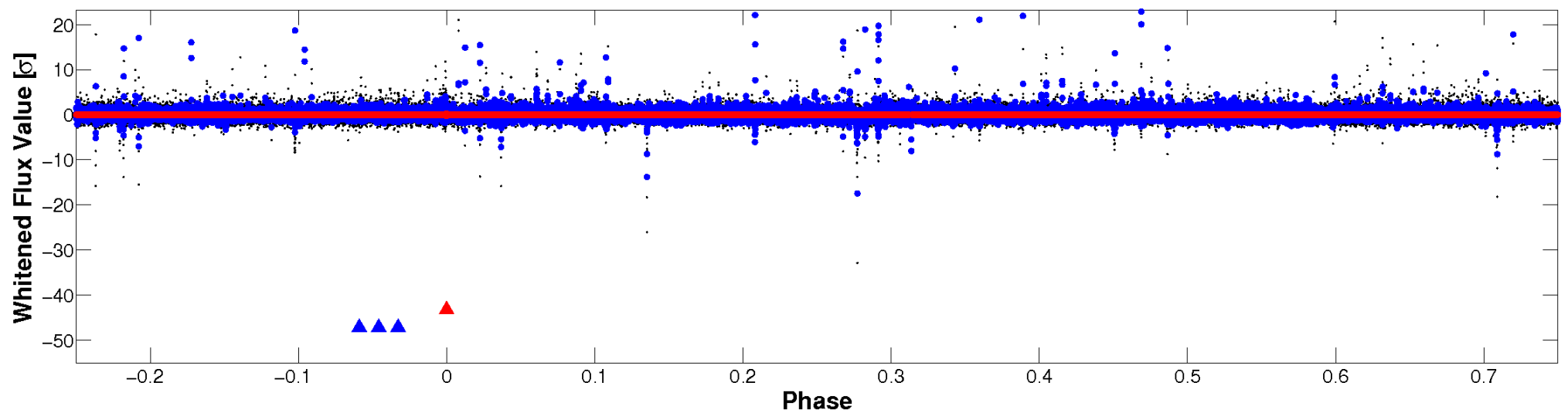


# Non-Whitened Vs. Whitened Light Curve

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

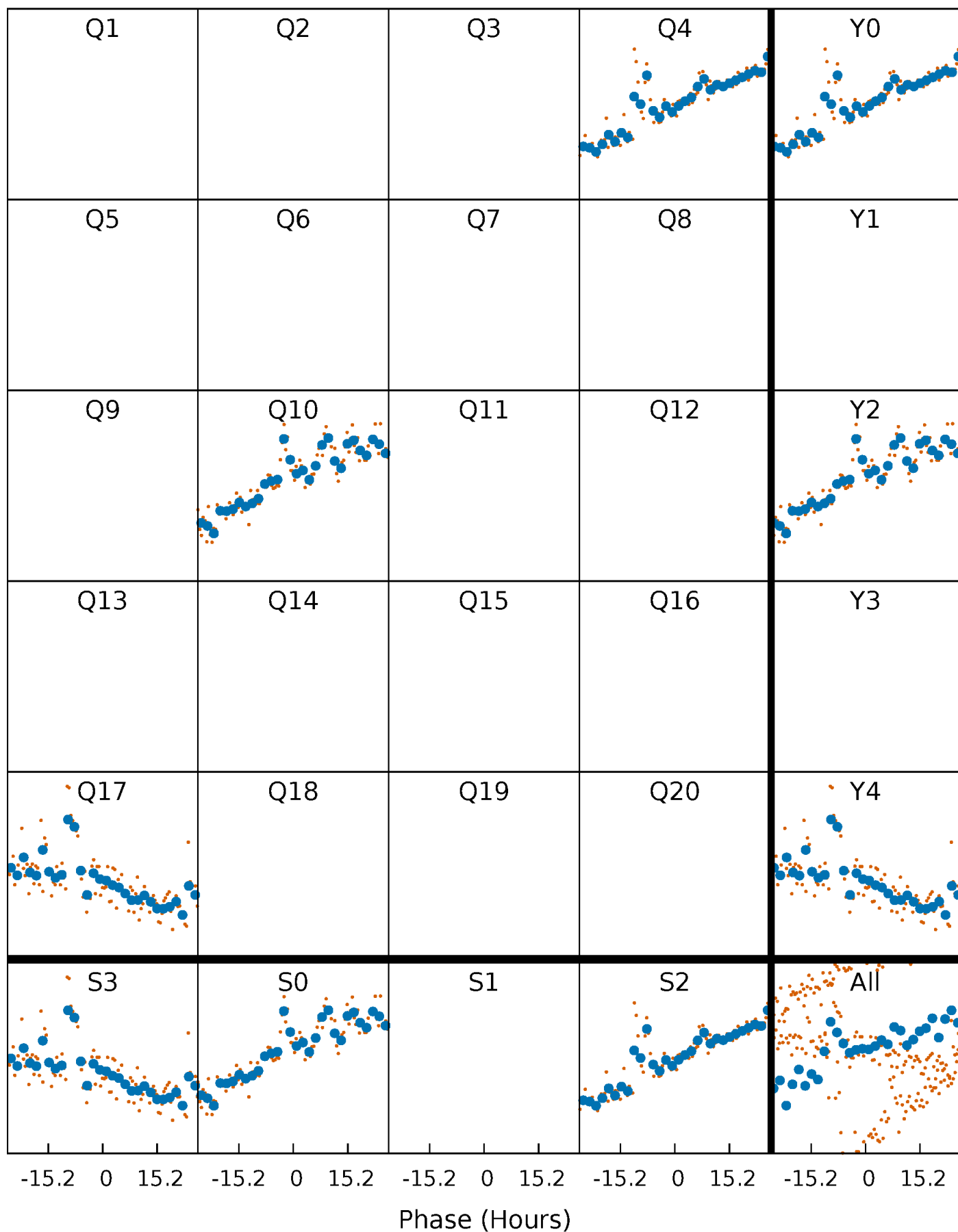


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

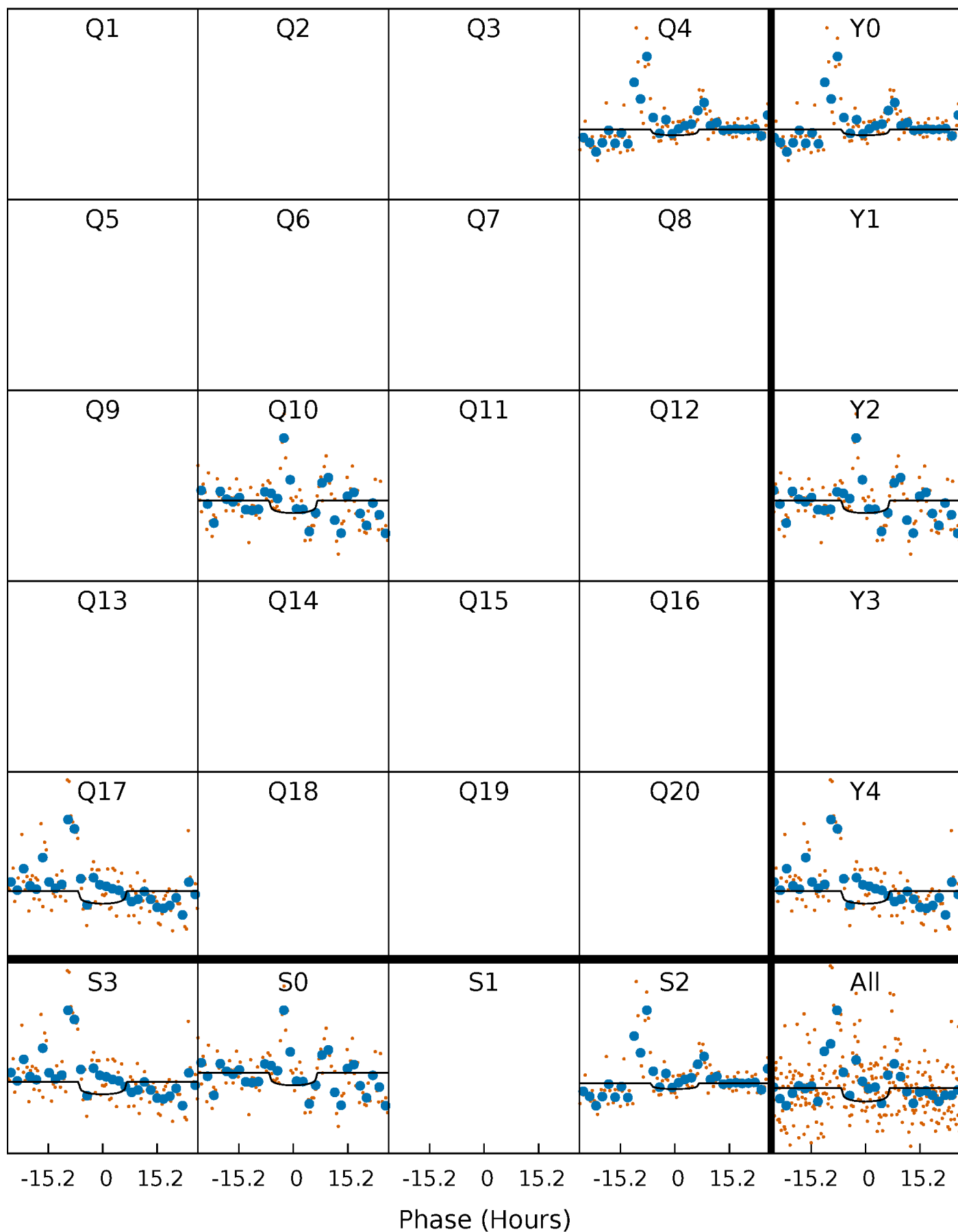
TCE 006610837-01 P=597.878107 Days  $T_0=379.675301$  (BKJD)





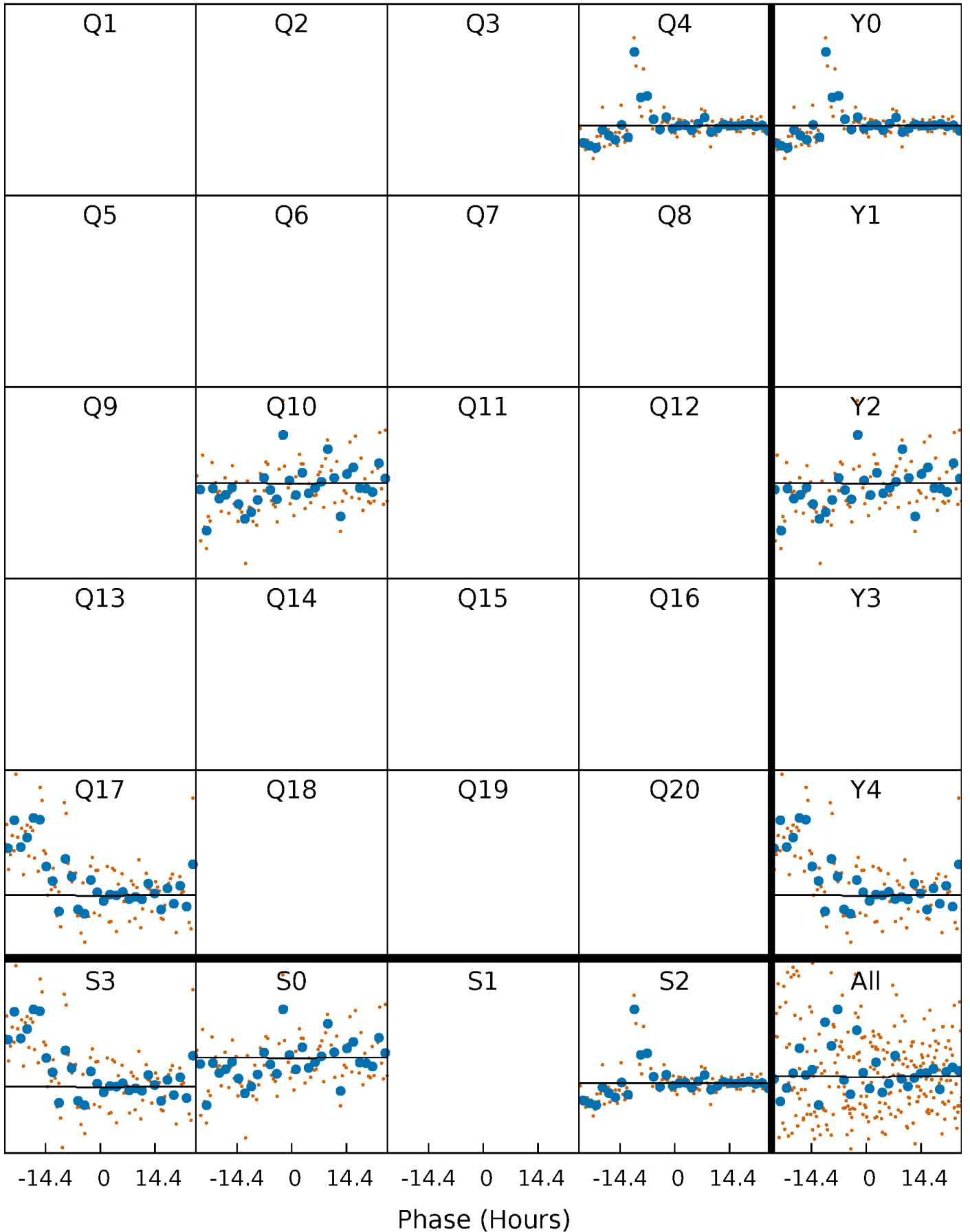
# DV Quarter-Phased Transit Curves

TCE 006610837-01 P=597.878107 Days  $T_0=379.675301$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

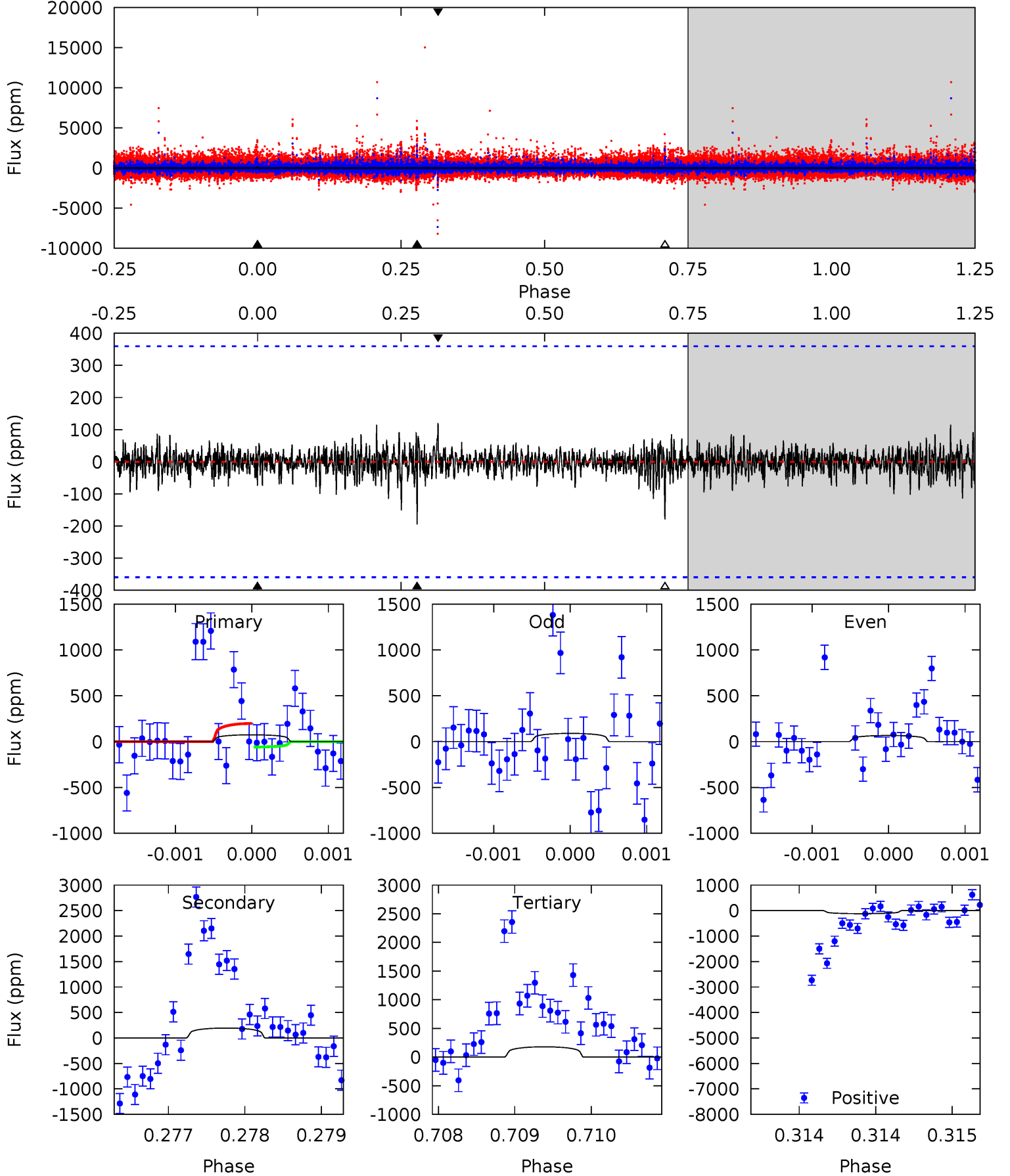
TCE 006610837-01 P=597.872343 Days  $T_0=379.670217$  (BKJD)



# DV Model-Shift Uniqueness Test

006610837-01,  $P = 597.878107$  Days,  $E = 379.675301$  Days

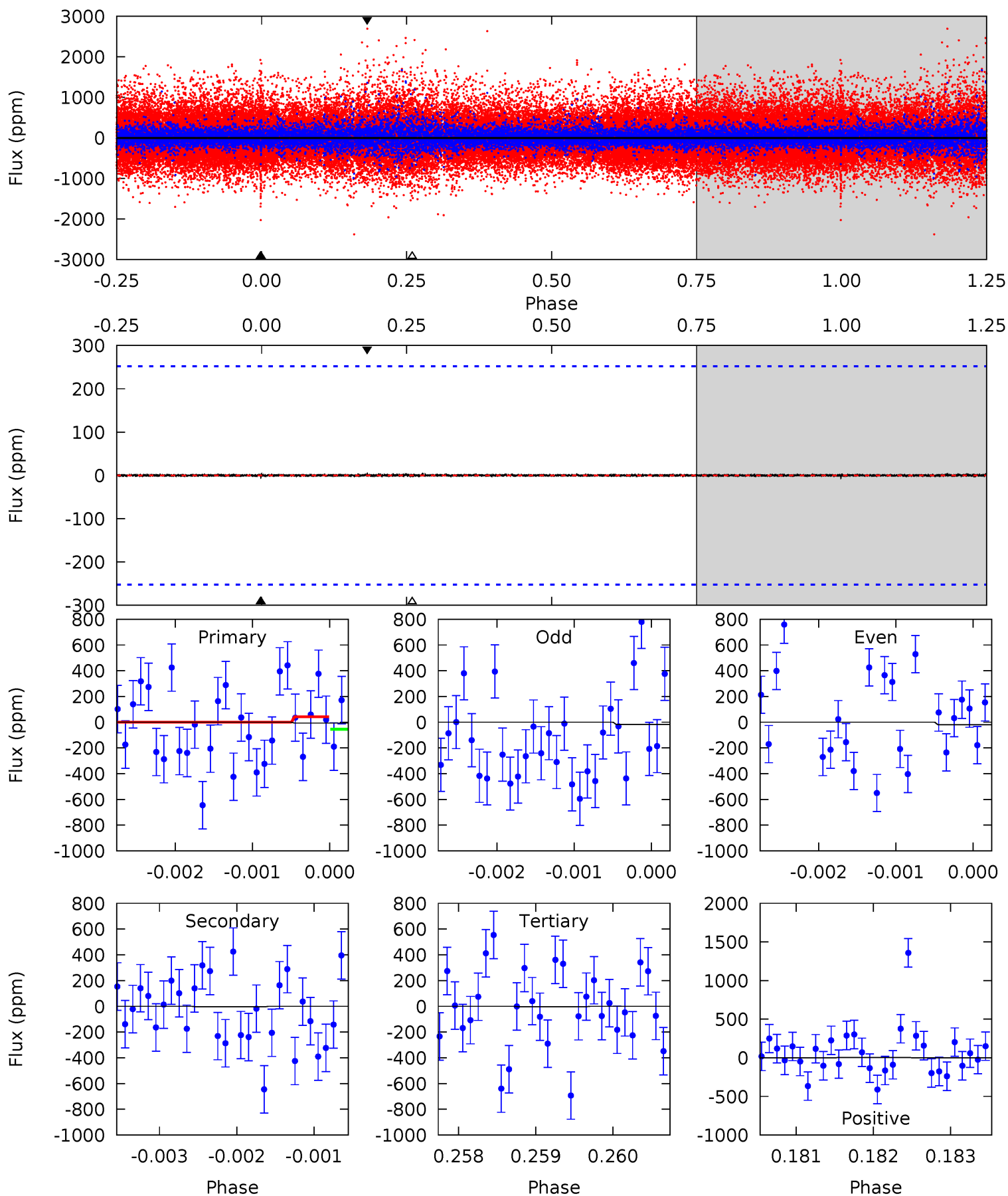
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.12	2.96	2.72	1.84	5.46	3.31	0.43	-1.60	-0.71	0.23	1.12	0.13	0.83	0.38	1.05



# Alt Model-Shift Uniqueness Test

006610837-01, P = 597.872343 Days, E = 379.670217 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
0.15	0.08	0.06	0.10	5.47	3.31	0.02	0.09	0.05	0.02	-0.02	0.02	-0.68	0.40	0.14



### Stellar Parameters For KIC 006610837

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3408^{+44}_{-40}$	$4.923^{+0.046}_{-0.032}$	$0.000^{+0.100}_{-0.100}$	$0.325^{+0.035}_{-0.035}$	$0.322^{+0.044}_{-0.040}$	$13.220^{+3.166}_{-1.910}$
	+1%/-1%	+1%/-1%	+inf%/-inf%	+11%/-11%	+14%/-12%	+24%/-14%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 006610837-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-195 \pm 66$	$1.49^{+1.59}_{-1.06}$	$122^{+3}_{-3}$	$2500^{+993}_{-405}$	$43867^{+430475}_{-34728}$
Alt.	$-4 \pm 46$	$1.29^{+1.44}_{-0.87}$	$122^{+3}_{-3}$	$1645^{+773}_{-3898}$	$729^{+30768}_{-17400}$

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

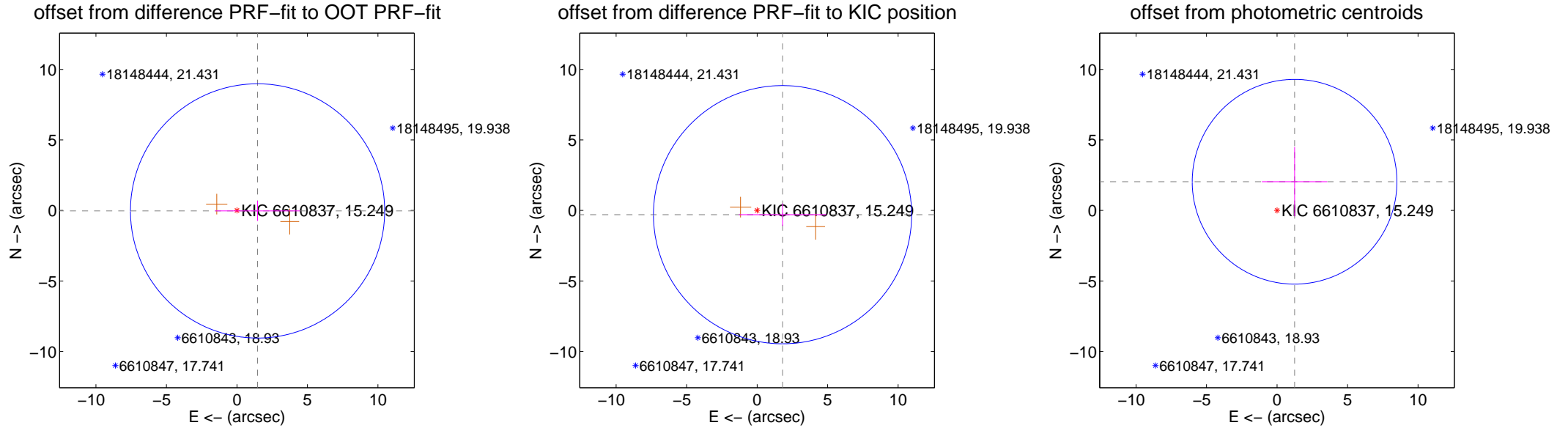
## DV Centroid Data

Supplemental centroid analysis for 006610837-01. Kepler magnitude: 15.25. Transit SNR 2.24

There are 0 quarters with good PRF difference image offsets

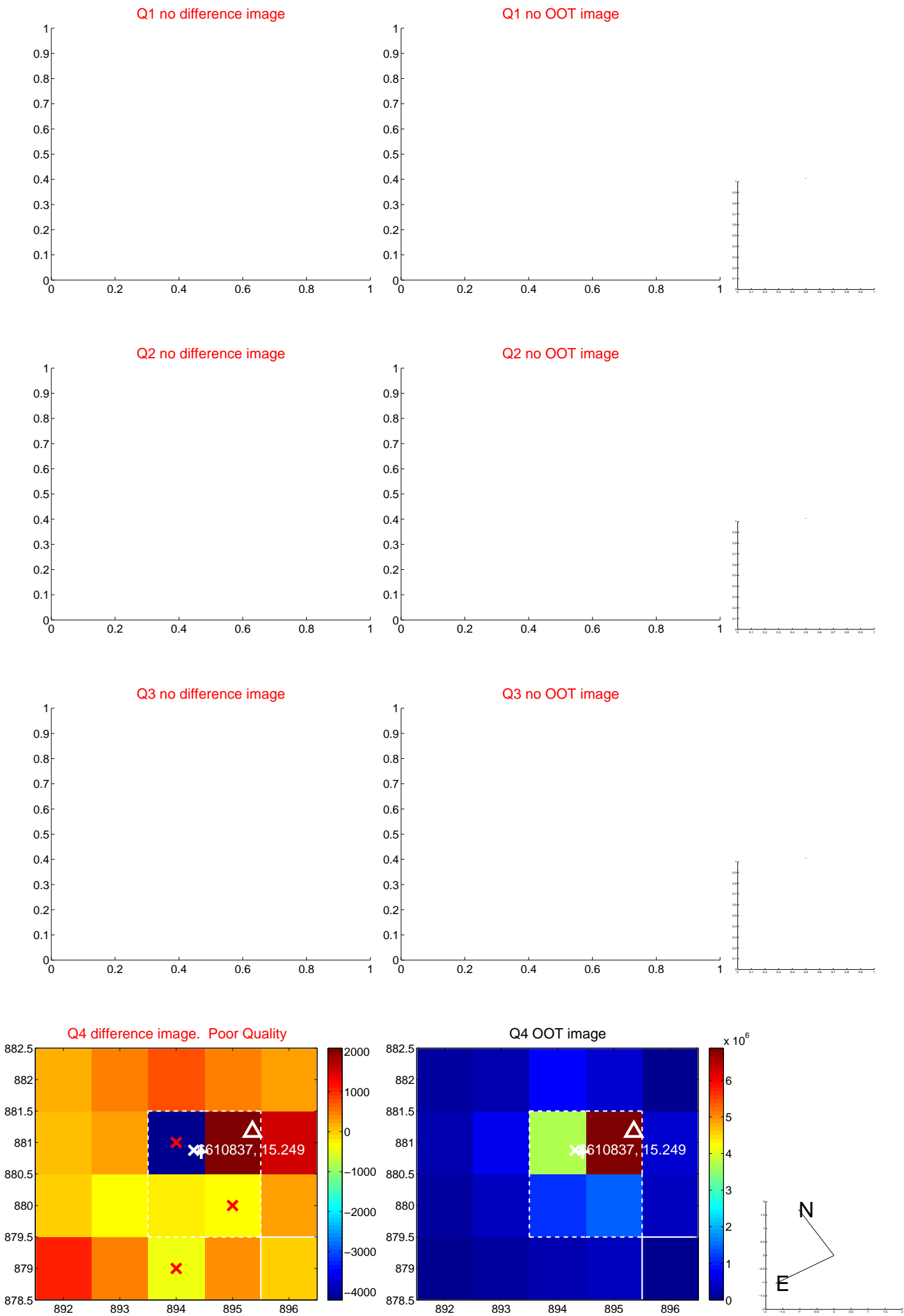
The direct PRF centroid is offset from the target star catalog position by about 0.33 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.463 \pm 3.005$	0.49	$-1.462 \pm 3.006$	$-0.032 \pm 0.706$
PRF-fit source offset from KIC position	$1.828 \pm 3.052$	0.60	$-1.803 \pm 3.091$	$-0.300 \pm 0.791$
photometric centroid source offset	$2.39 \pm 2.42$	0.99	$-1.24 \pm 2.32$	$2.04 \pm 2.46$



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.

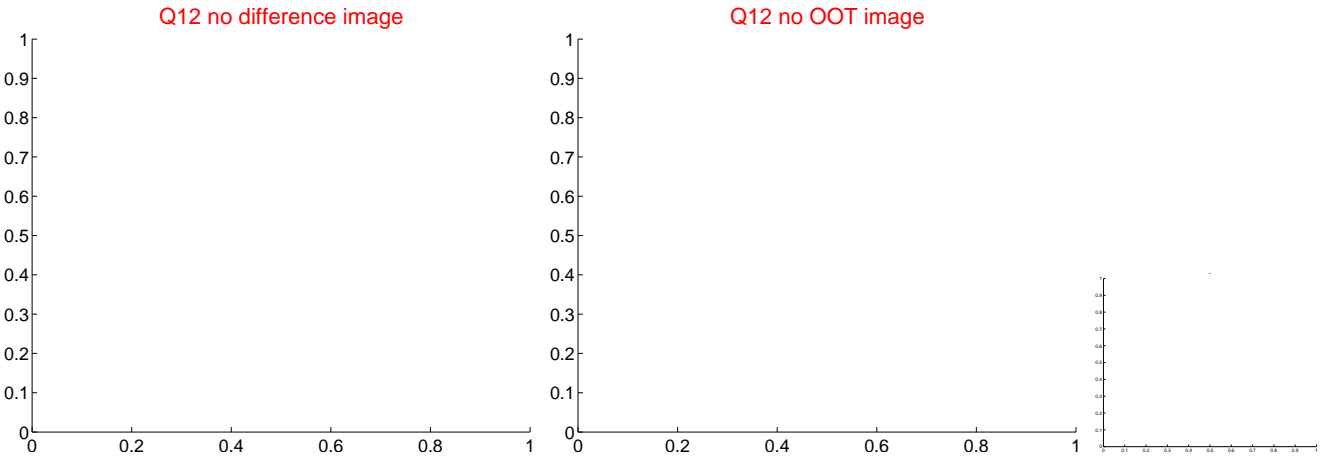
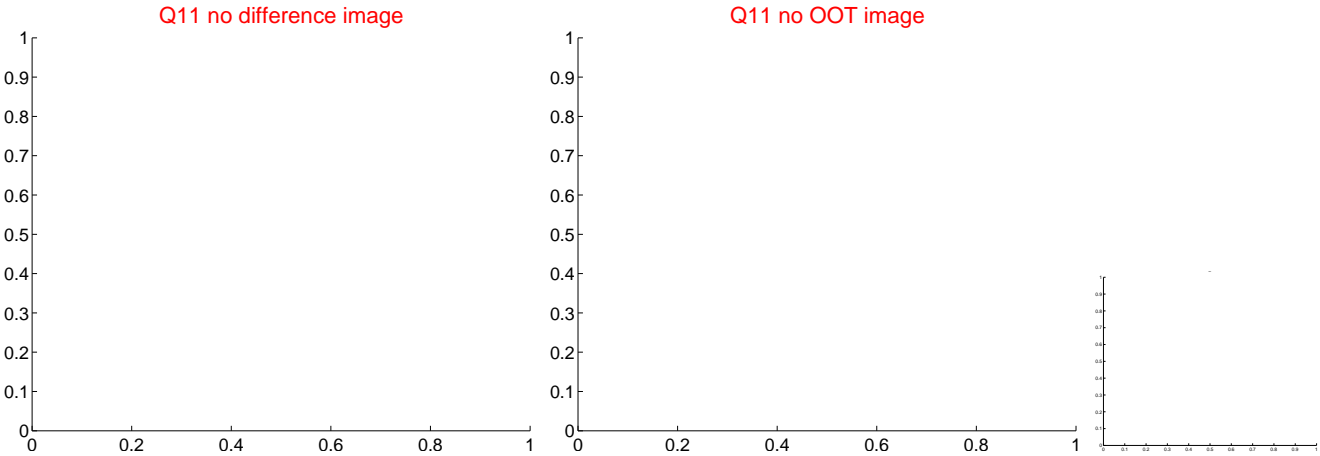
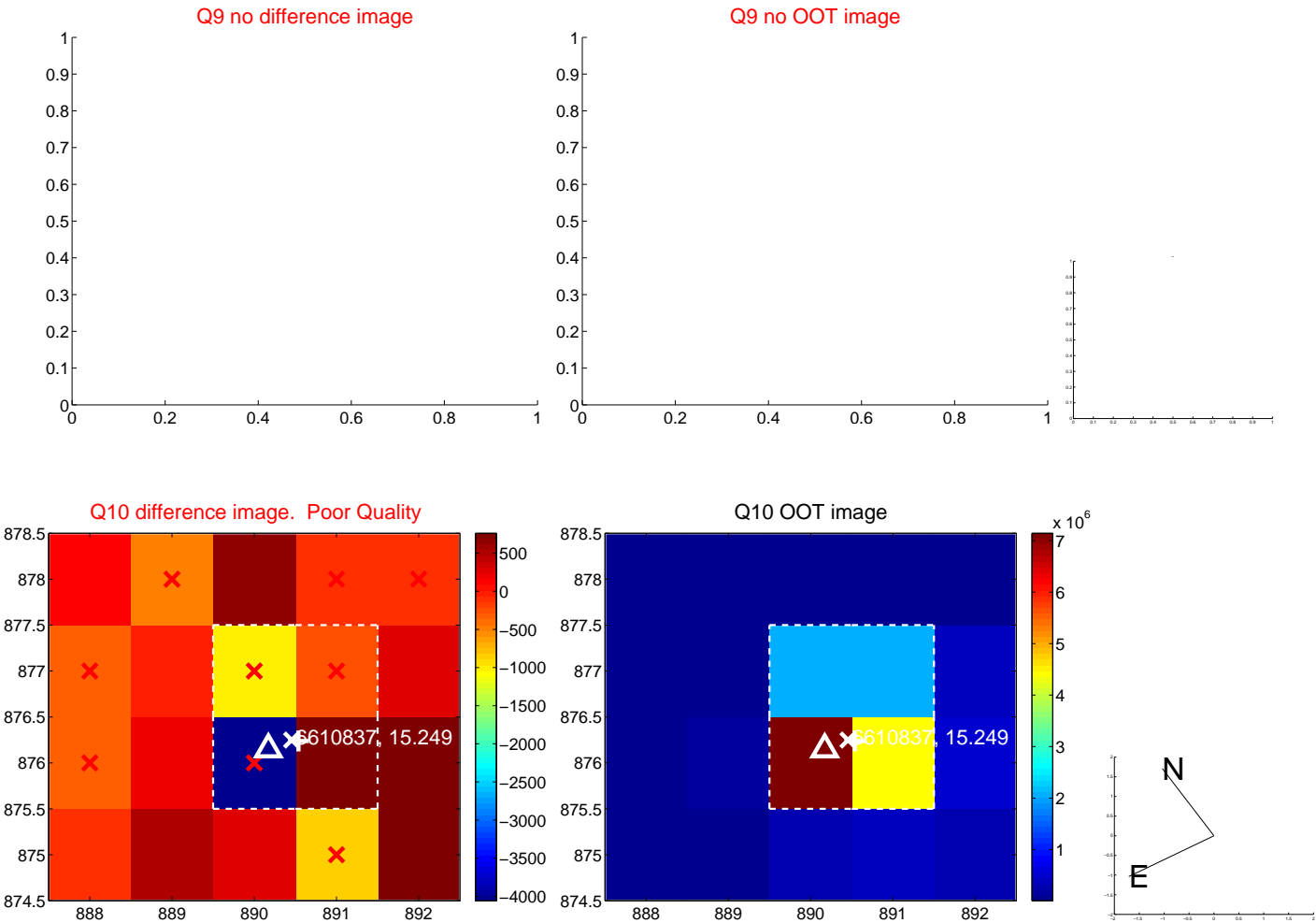


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





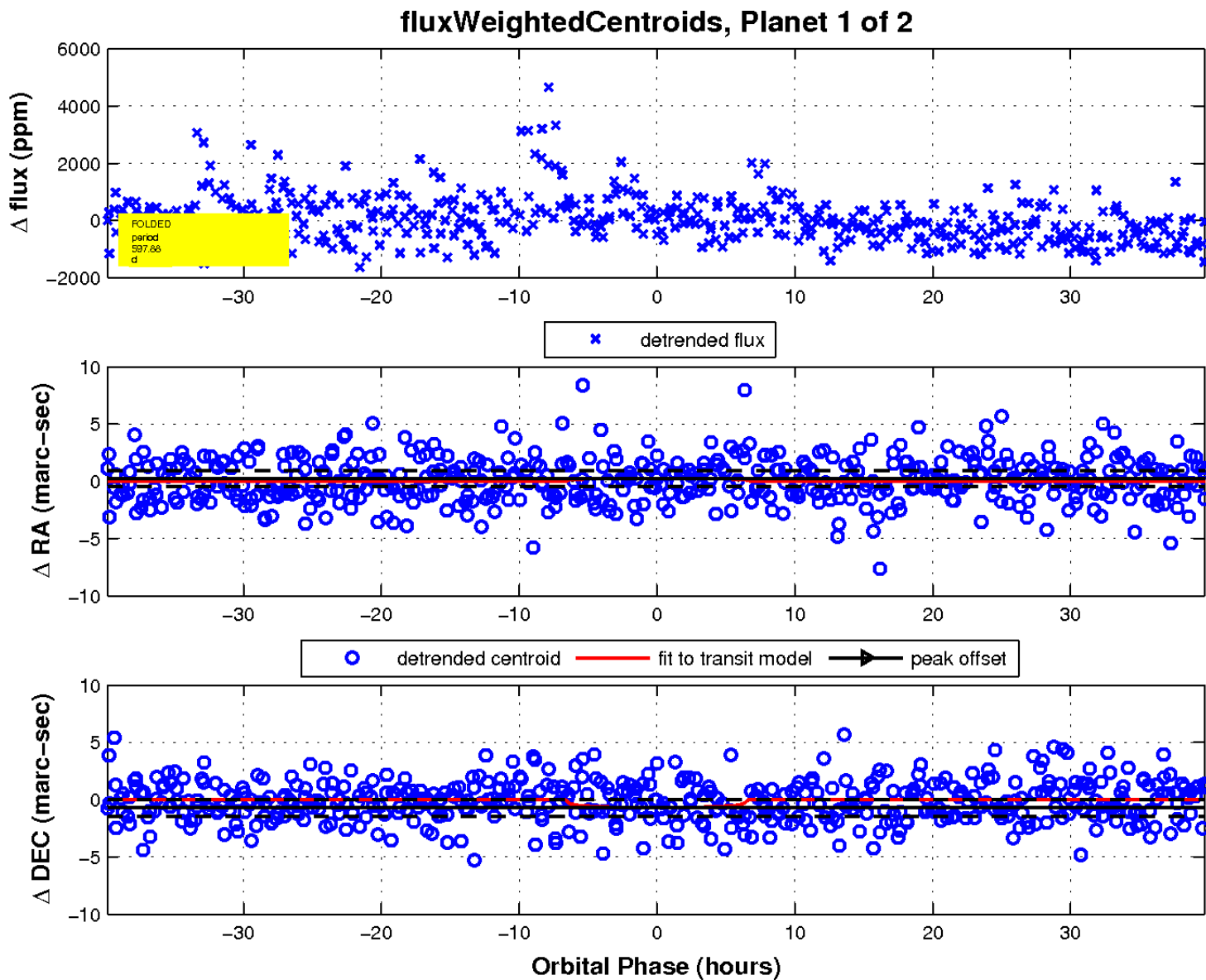
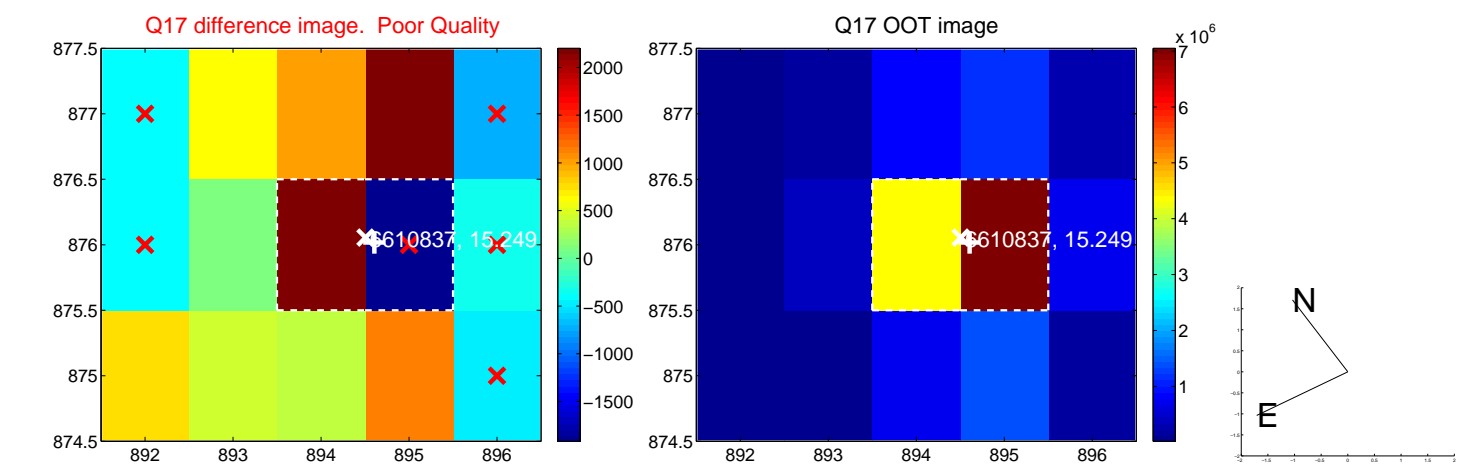
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

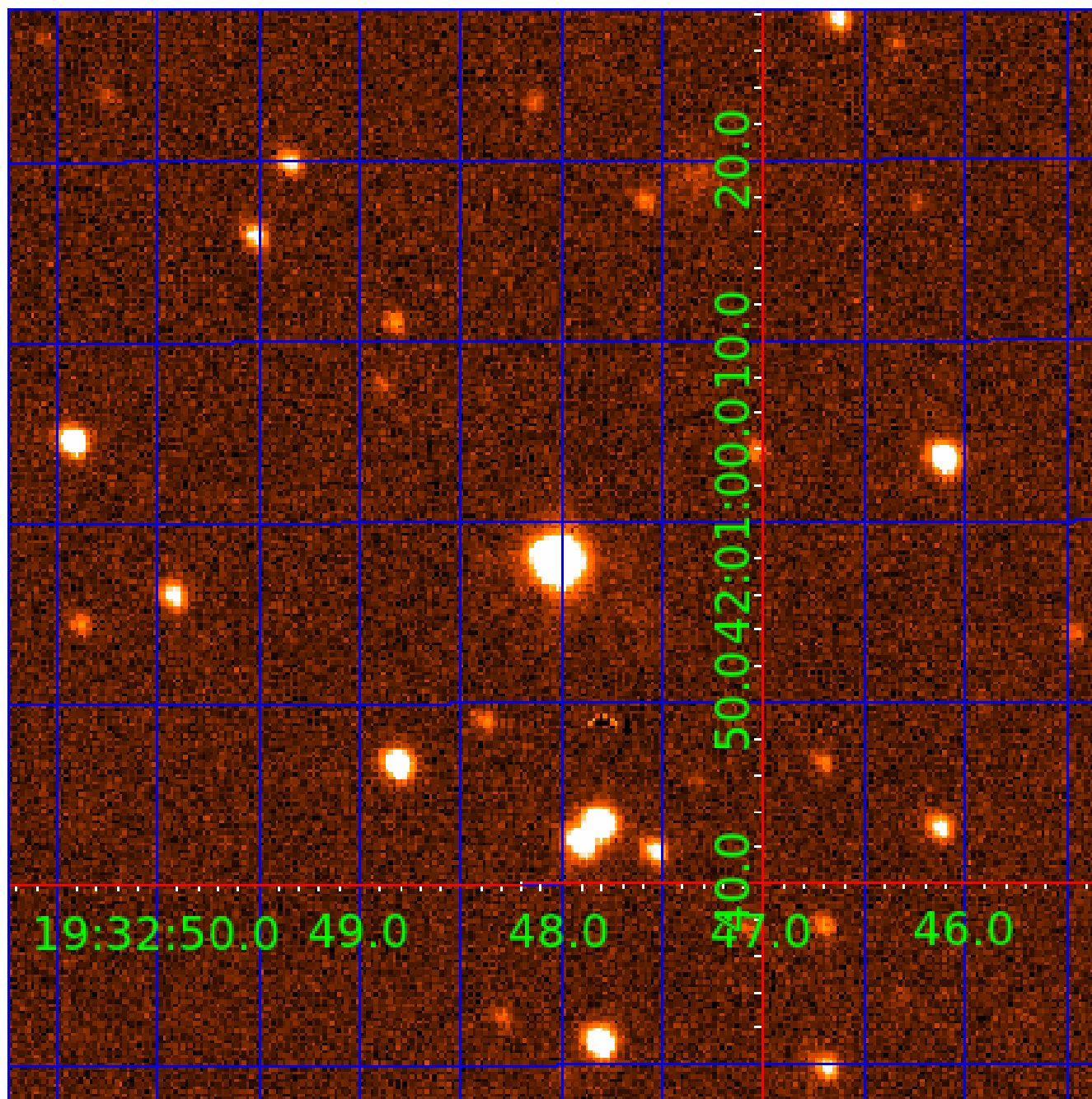


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 006610837

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006610837-01	OBS	No	597.878107	379.675301	291.3	13.327	11.2	2.2	0.33	3408	0.57	0.01
006610837-02	OBS	No	590.043050	360.119292	1172.1	4.276	7.4	7.5	0.33	3408	1.17	0.01

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006610837-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
006610837-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—CENT_FEW_MEAS

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

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

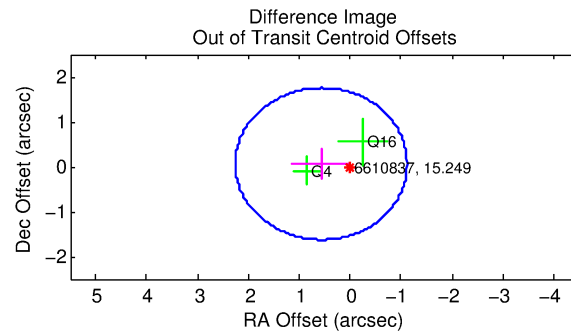
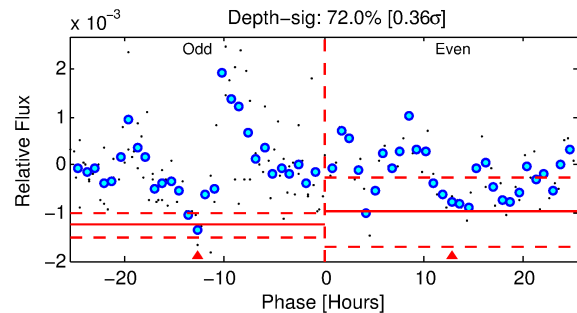
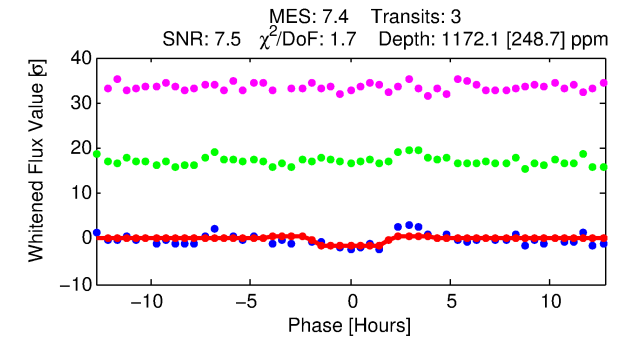
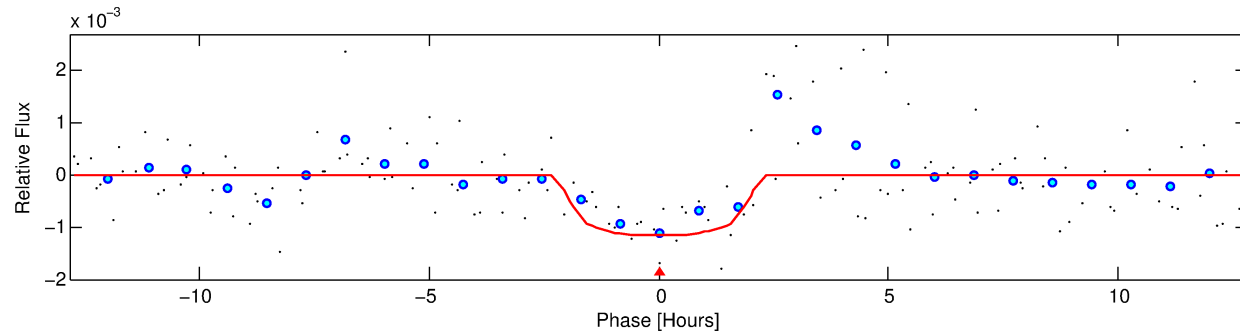
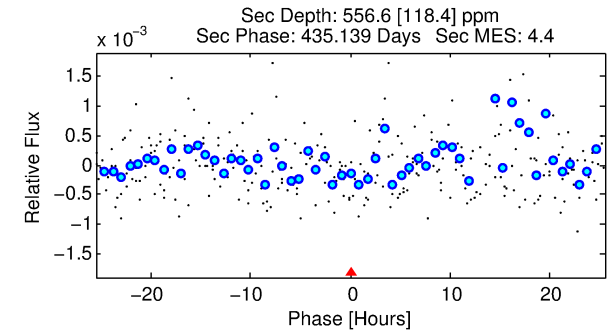
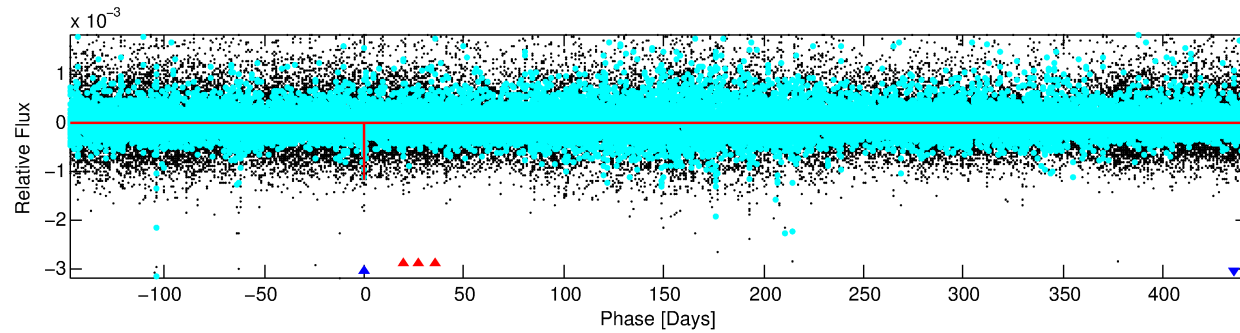
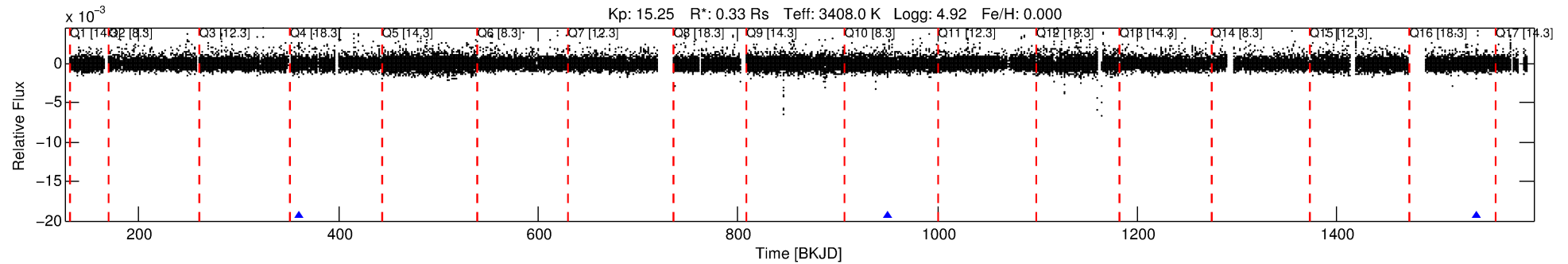
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006610837-02

No Significant Match Found

# DV One-Page Summary

KIC: 6610837 Candidate: 2 of 2 Period: 590.043 d



## DV Fit Results:

Period = 590.04305 [0.00806] d  
Epoch = 360.1193 [0.0114] BKJD  
Rp/R\* = 0.0329 [0.1529]  
a/R\* = 854.36 [16984.23]  
b = 0.64 [18.40]  
Seff = 0.01 [0.00]  
Teq = 88 [2] K  
Rp = 1.17 [5.42] Re  
a = 0.9445 [0.0756] AU  
Ag = 201123.83 [1872365.15] [0.11 $\sigma$ ]  
Teffp = 2888 [6720] K [0.42 $\sigma$ ]

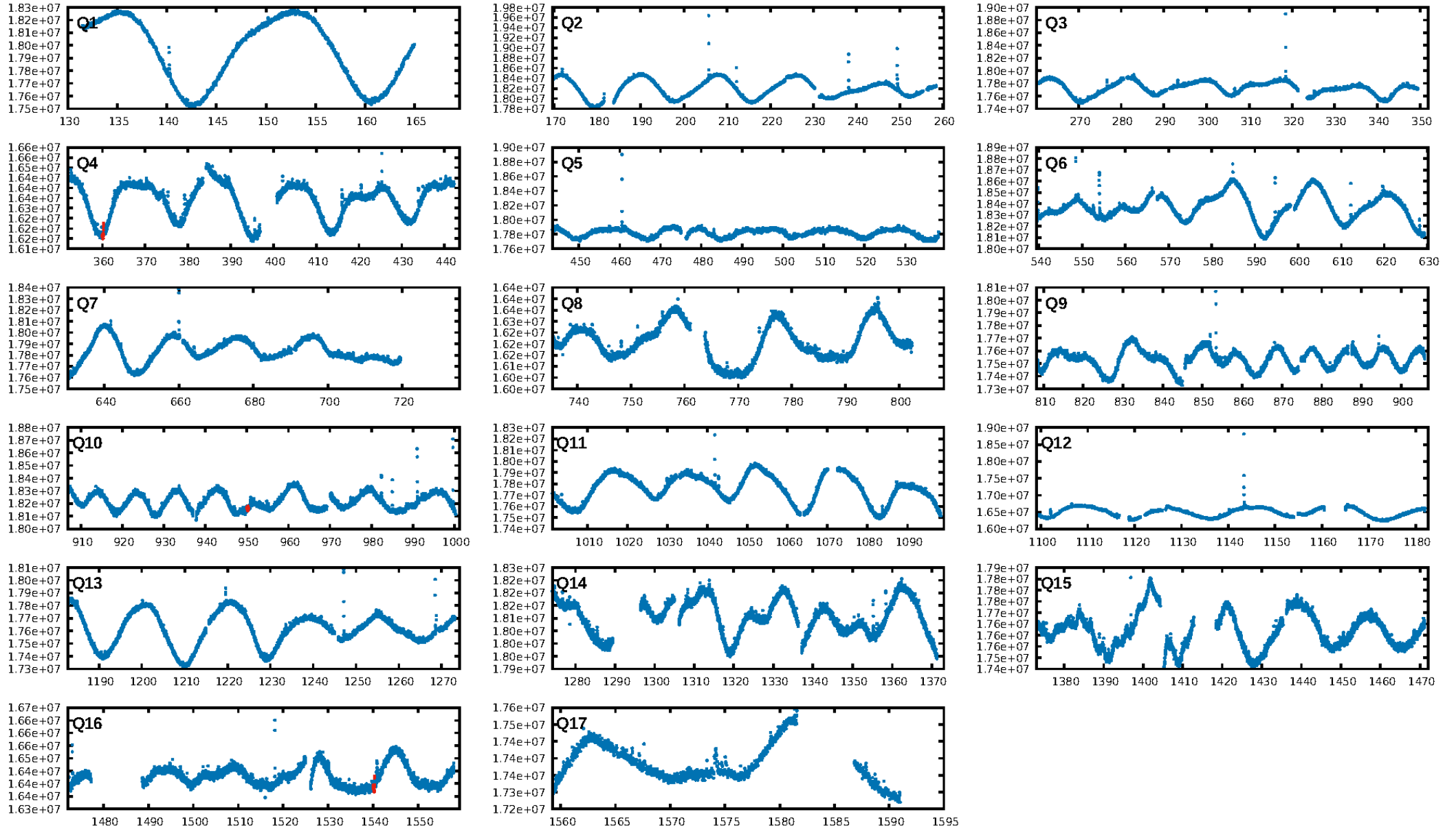
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [13.43 $\sigma$ ]  
ModelChiSquare2-sig: 57.8%  
ModelChiSquareGof-sig: 95.6%  
**Bootstrap-pfa: 3.83e-08**  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: 0.5997**  
Centroid-sig: 34.4%  
Centroid-so: 1.133 arcsec [1.01 $\sigma$ ]  
OotOffset-rm: 0.571 arcsec [1.01 $\sigma$ ]  
OotOffset-st: 0/0/2/0 [2]  
KicOffset-rm: 0.348 arcsec [0.69 $\sigma$ ]  
KicOffset-st: 0/0/2/0 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [3/3]

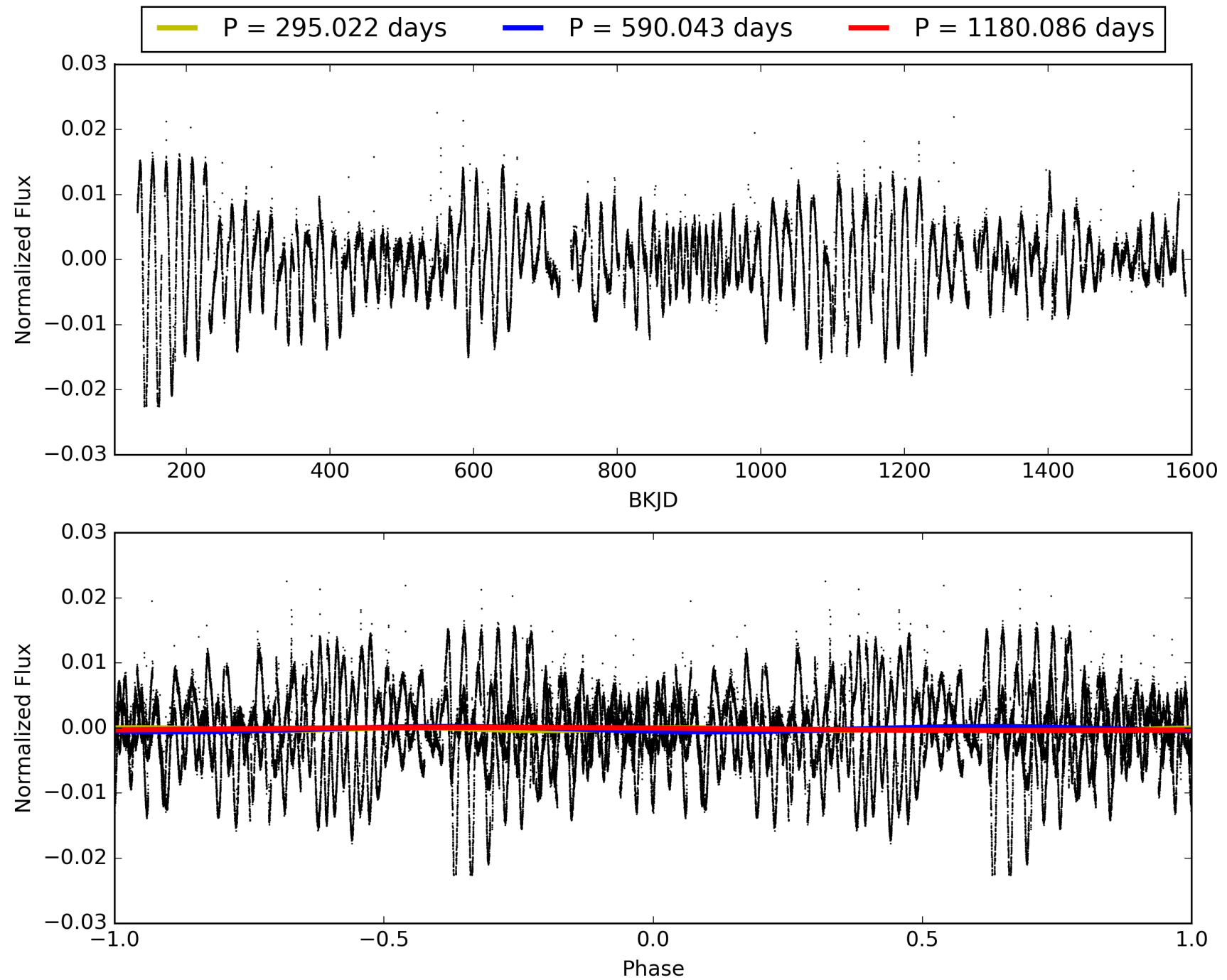
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 006610837-02, PDC Light Curves



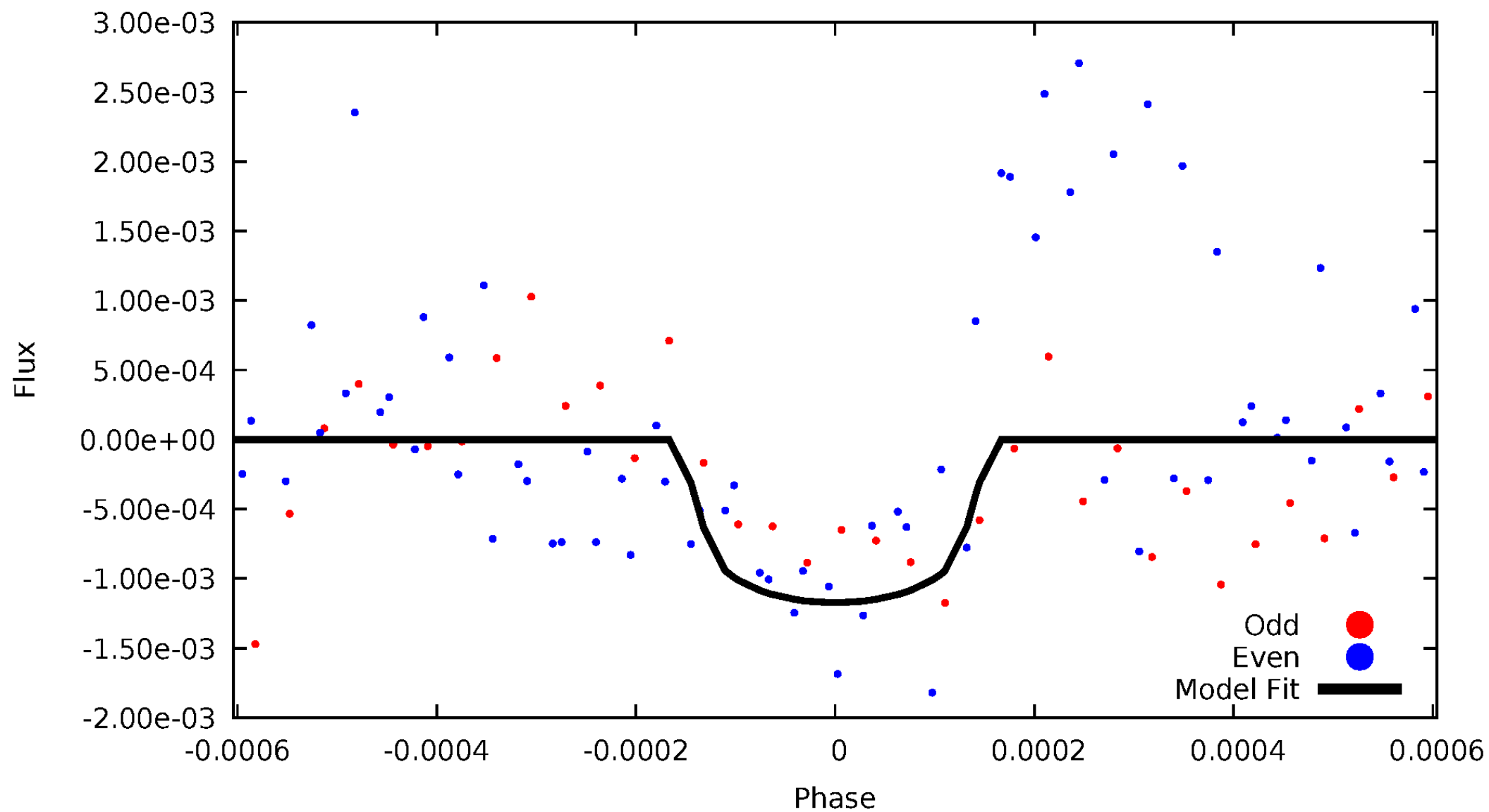
# TCE 006610837-02





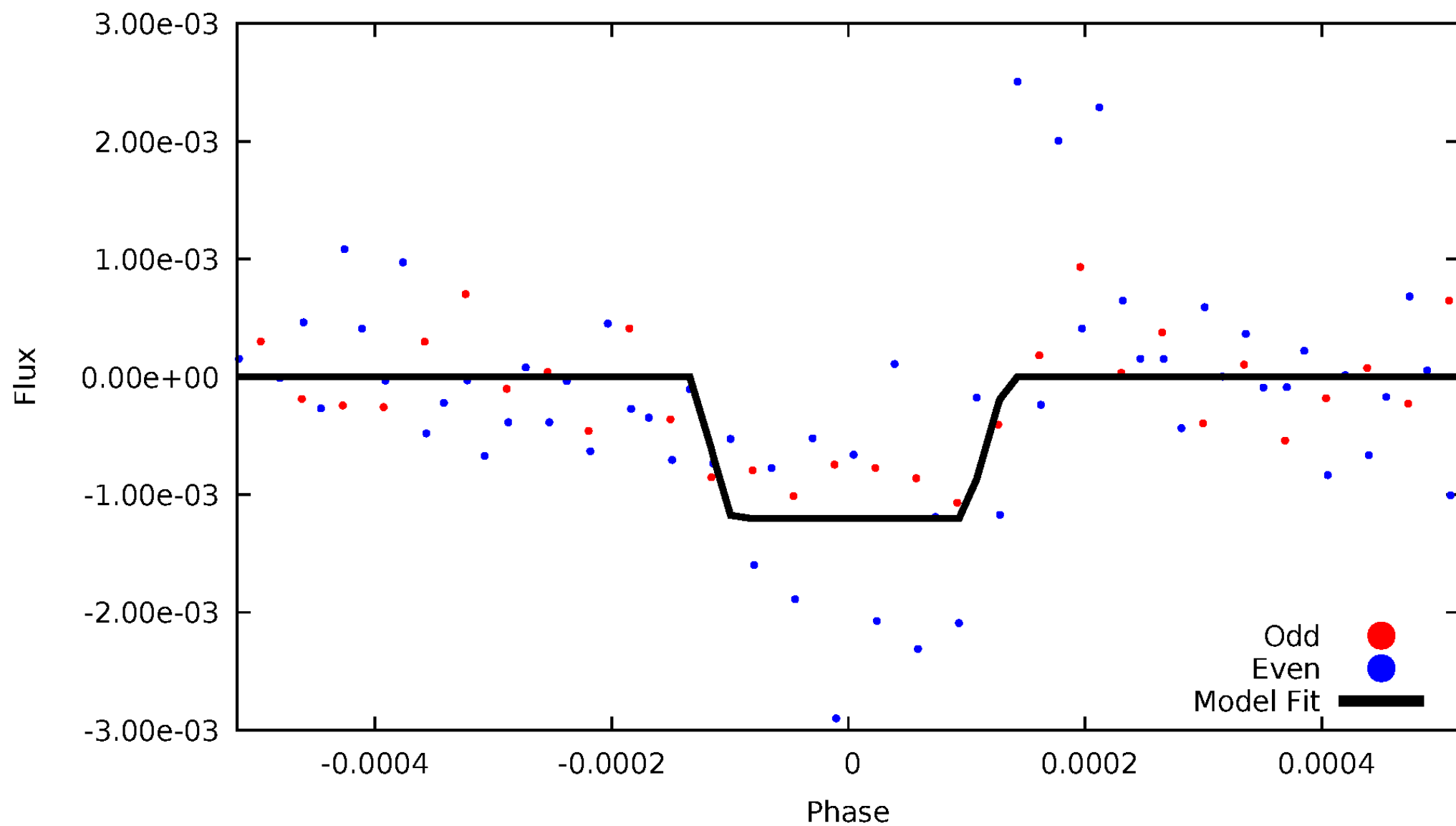
# DV Odd/Even

TCE 006610837-02



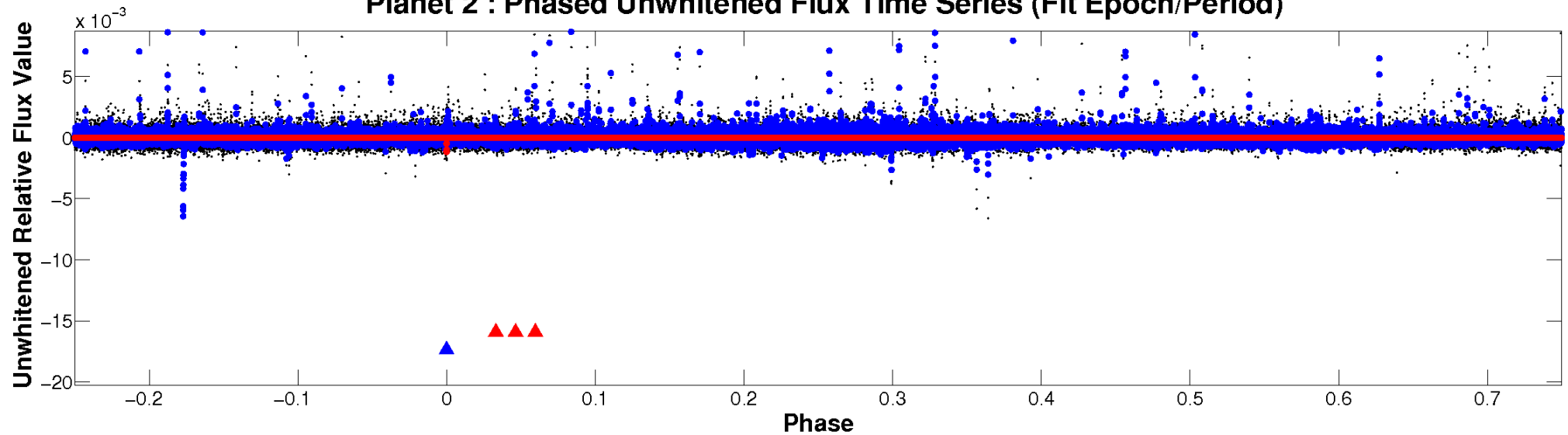
# ALT Odd/Even

TCE 006610837-02

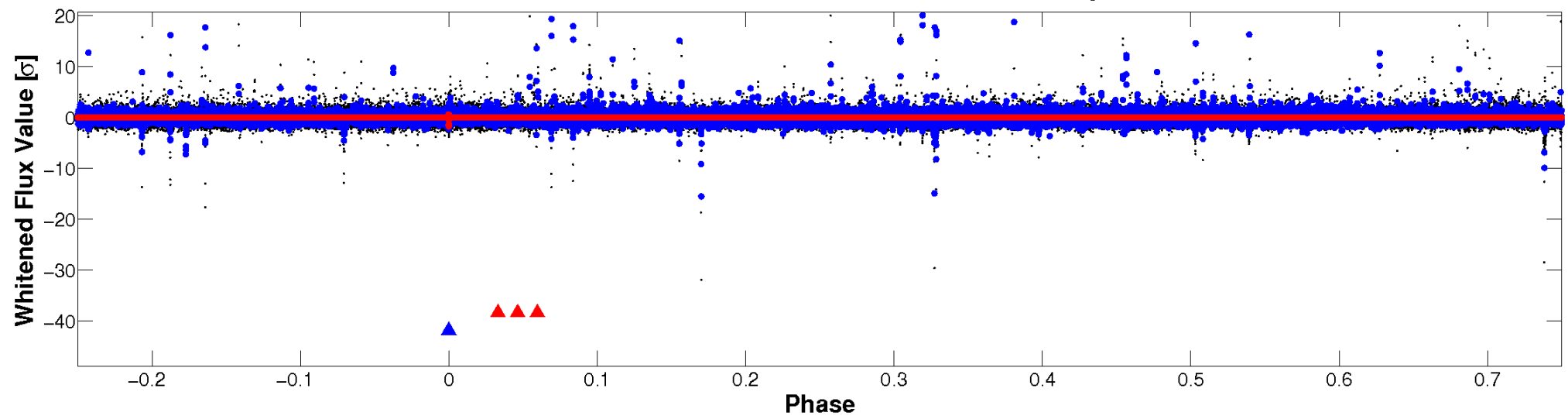


# Non-Whitened Vs. Whitened Light Curve

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

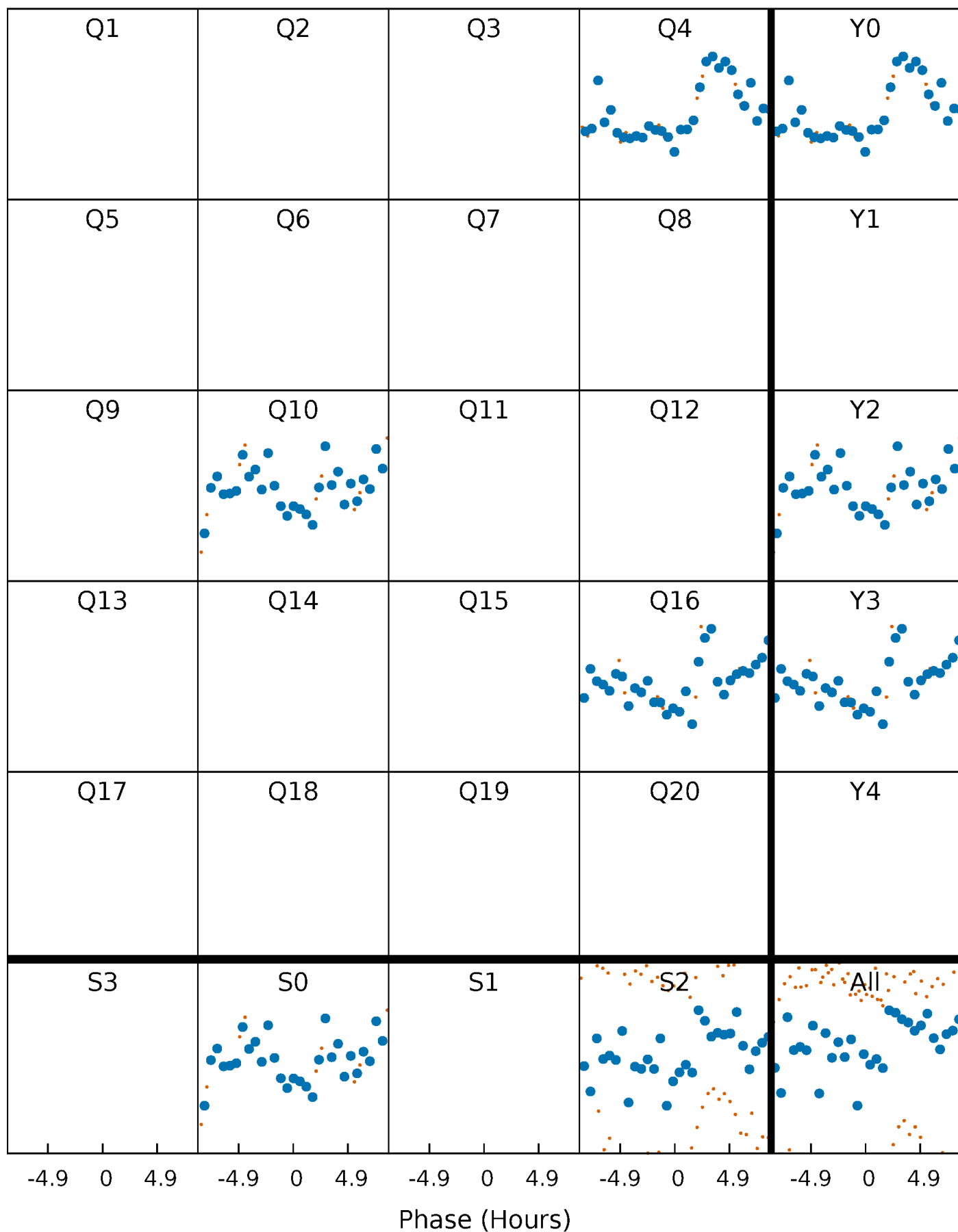


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



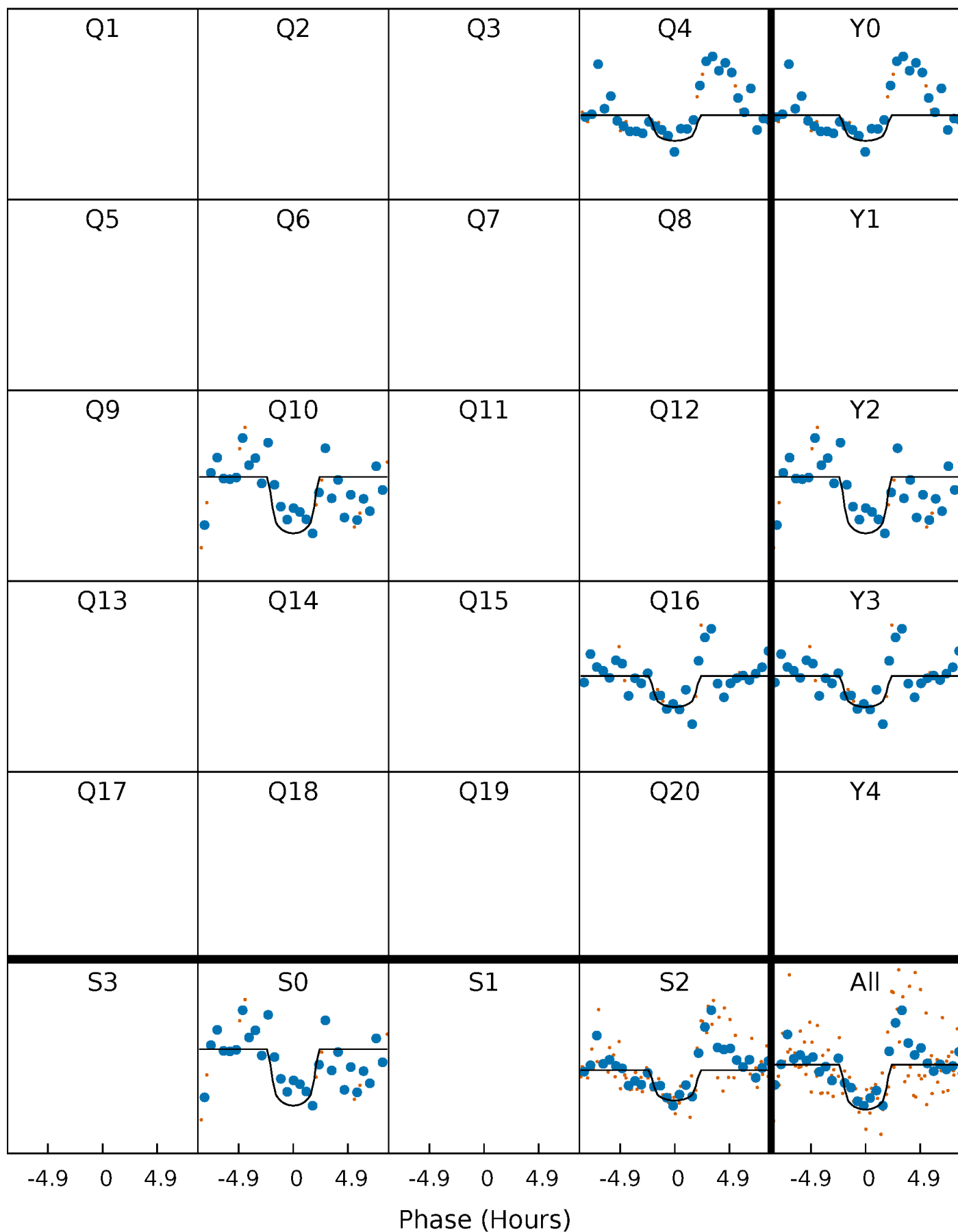
# PDC Quarter-Phased Transit Curves

TCE 006610837-02 P=590.043050 Days  $T_0=360.119292$  (BKJD)



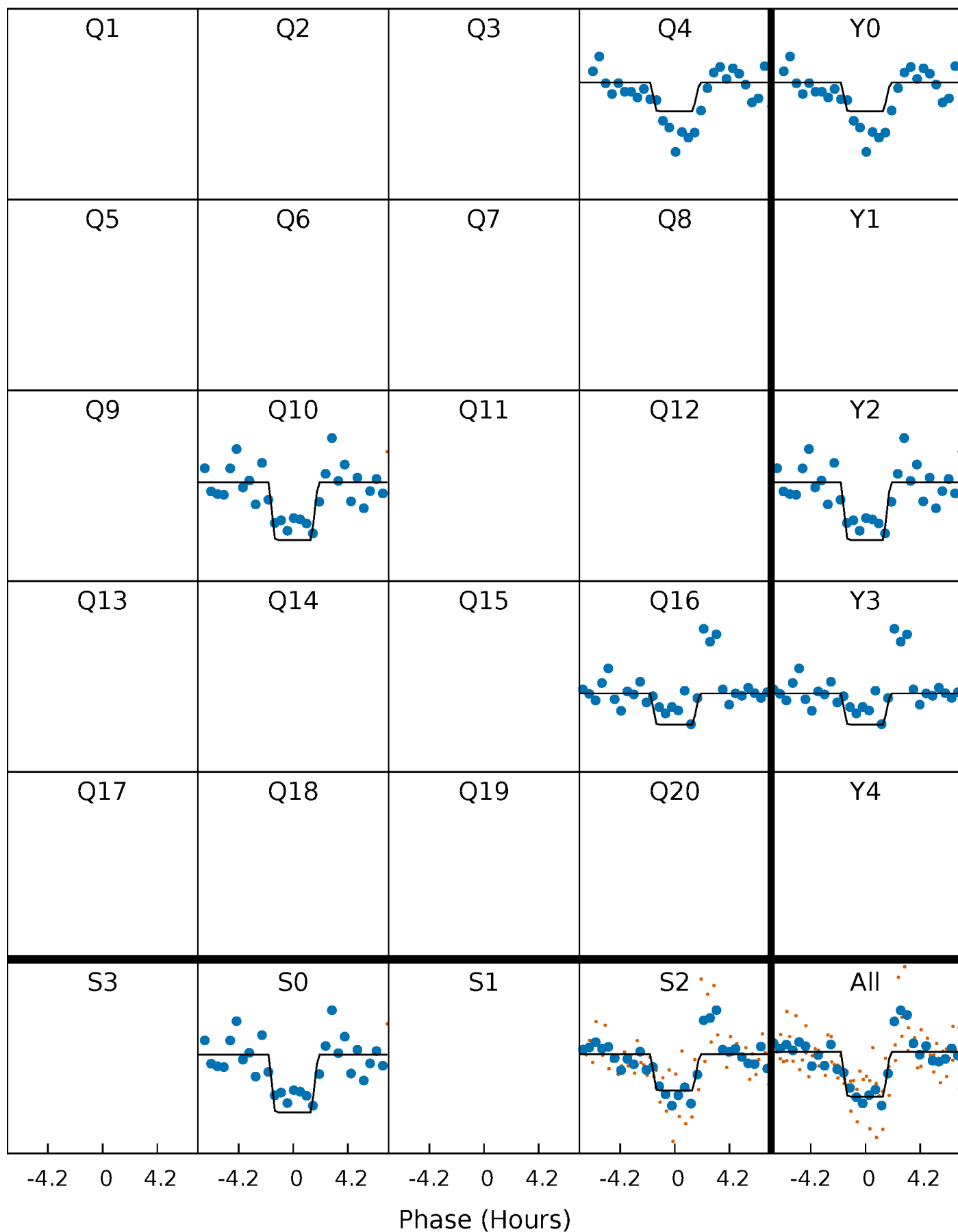
# DV Quarter-Phased Transit Curves

TCE 006610837-02 P=590.043050 Days  $T_0=360.119292$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

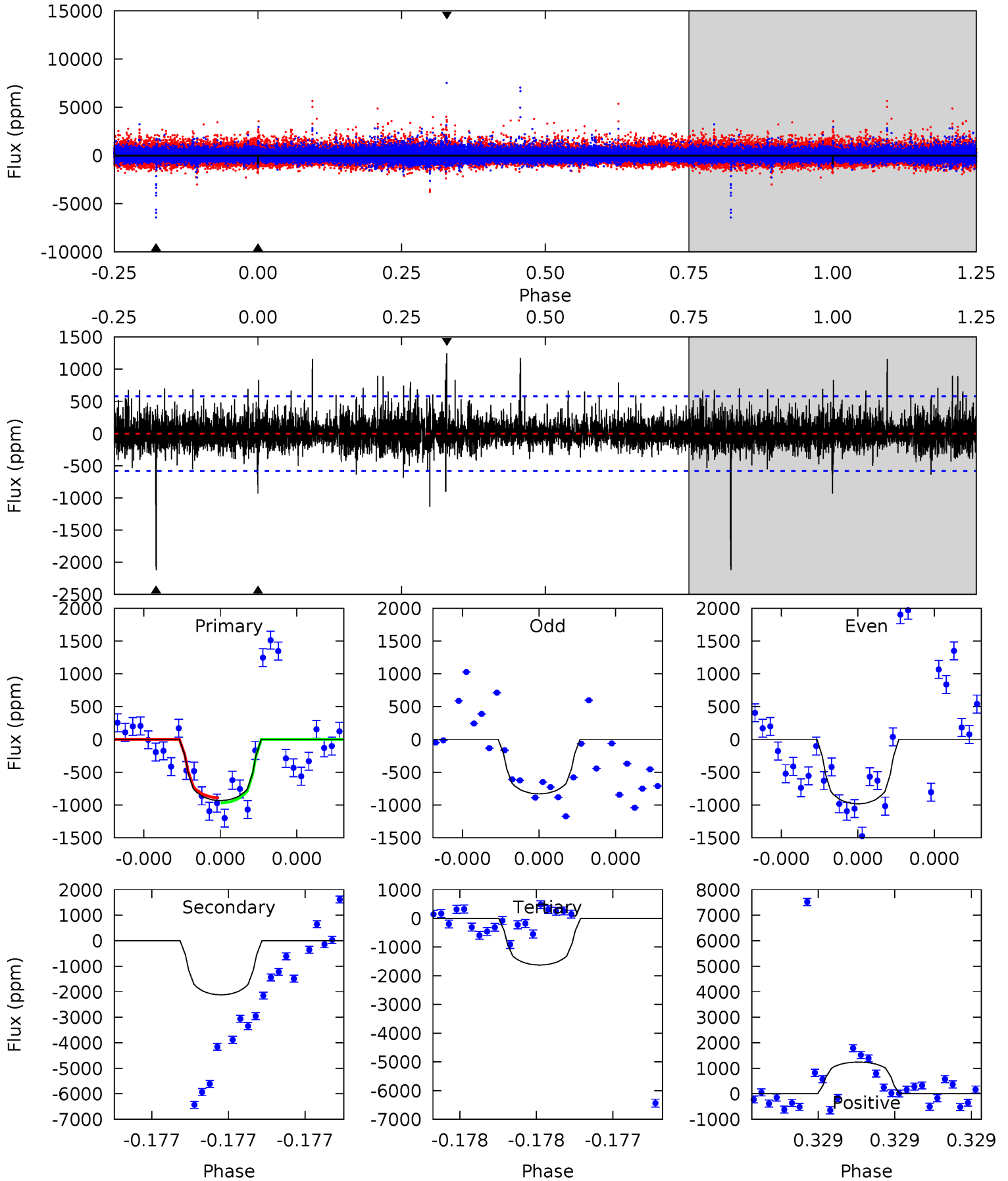
TCE 006610837-02 P=590.046290 Days  $T_0=360.126859$  (BKJD)



# DV Model-Shift Uniqueness Test

006610837-02, P = 590.043050 Days, E = 360.119292 Days

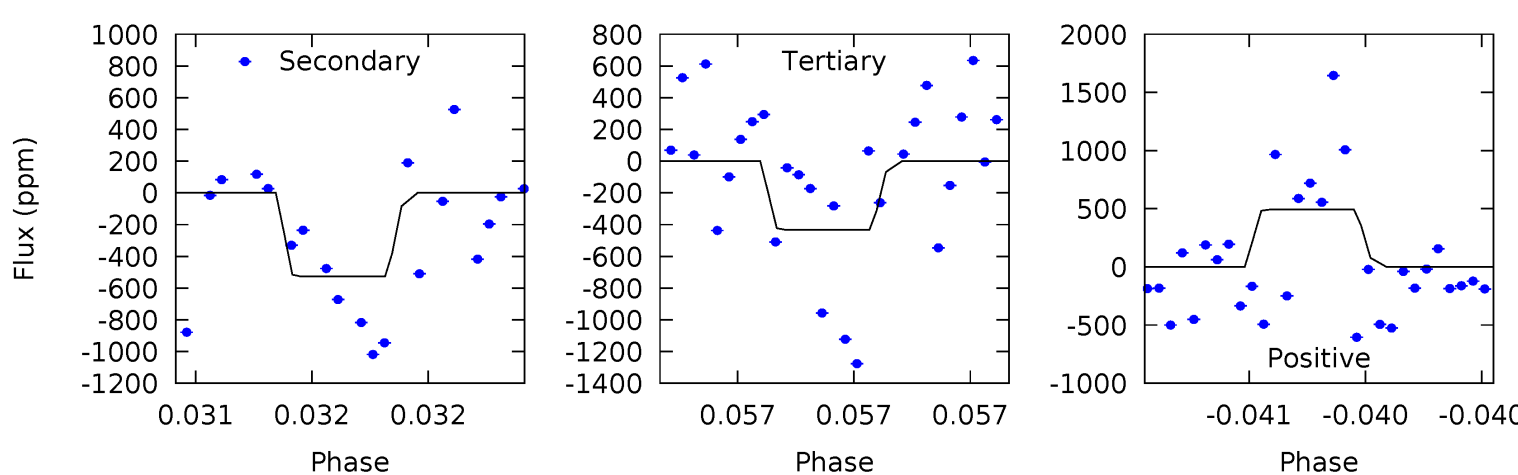
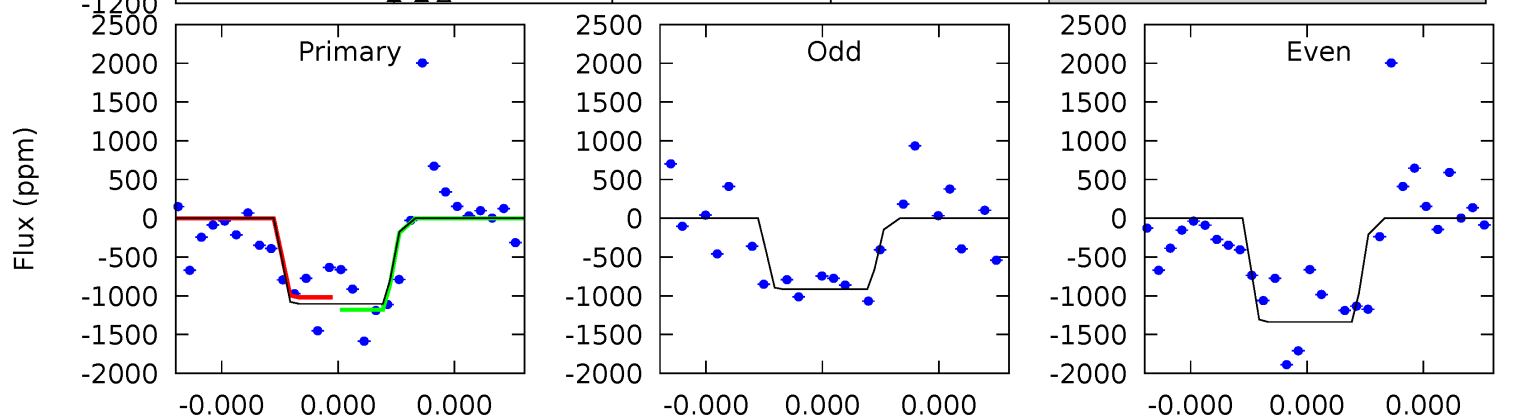
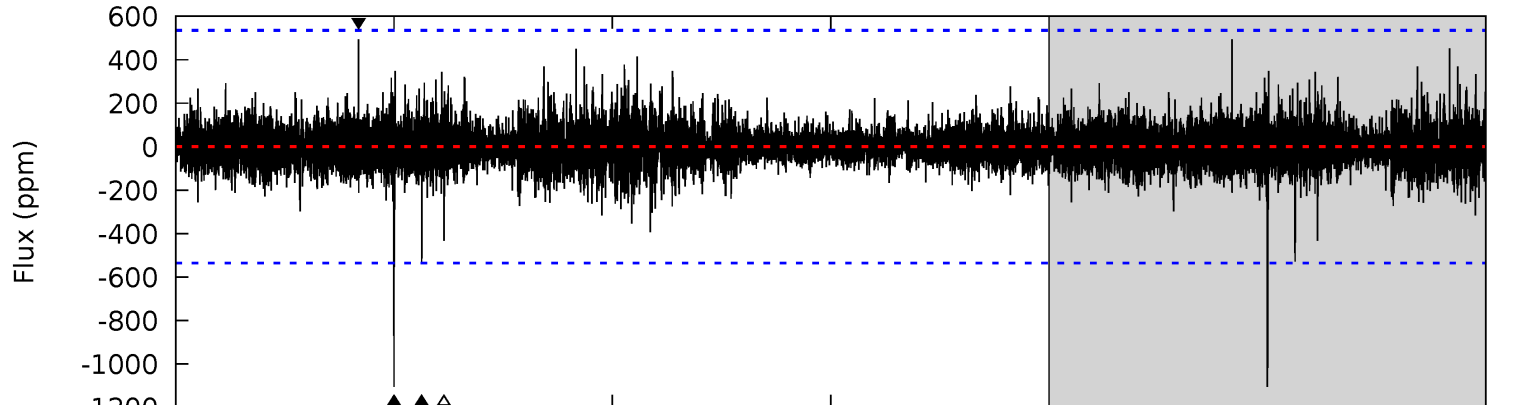
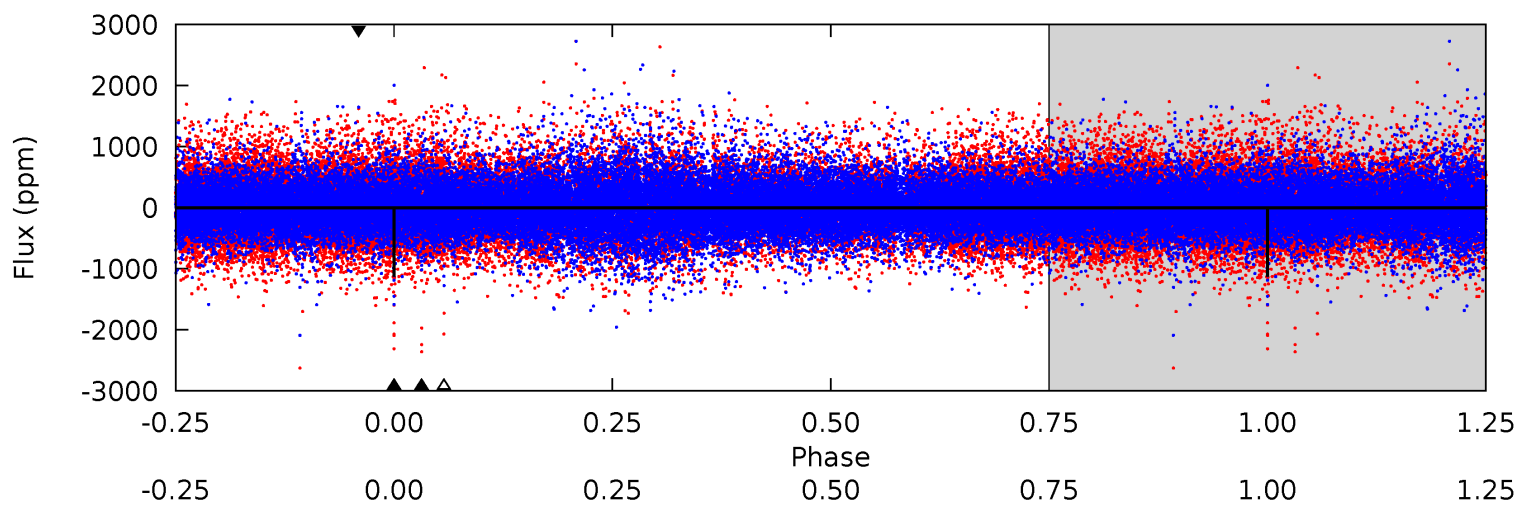
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.10	20.7	15.9	12.1	5.66	3.61	1.61	-6.75	-3.04	4.86	8.58	0.48	1.12	0.37	0.37



# Alt Model-Shift Uniqueness Test

006610837-02, P = 590.046290 Days, E = 360.126859 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	5.62	4.61	5.26	5.70	3.67	0.74	7.15	6.50	1.01	0.36	2.11	1.31	0.31	0





### Stellar Parameters For KIC 006610837

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3408^{+44}_{-40}$	$4.923^{+0.046}_{-0.032}$	$0.000^{+0.100}_{-0.100}$	$0.325^{+0.035}_{-0.035}$	$0.322^{+0.044}_{-0.040}$	$13.220^{+3.166}_{-1.910}$
	+1%/-1%	+1%/-1%	+inf%/-inf%	+11%/-11%	+14%/-12%	+24%/-14%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 006610837-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-2121 \pm 102$	$3.91^{+4.45}_{-2.59}$	$123^{+3}_{-3}$	$2668^{+975}_{-439}$	$69796^{+528239}_{-54841}$
Alt.	$-528 \pm 94$	$4.13^{+4.09}_{-2.97}$	$123^{+3}_{-3}$	$2238^{+825}_{-309}$	$15612^{+186560}_{-11741}$

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

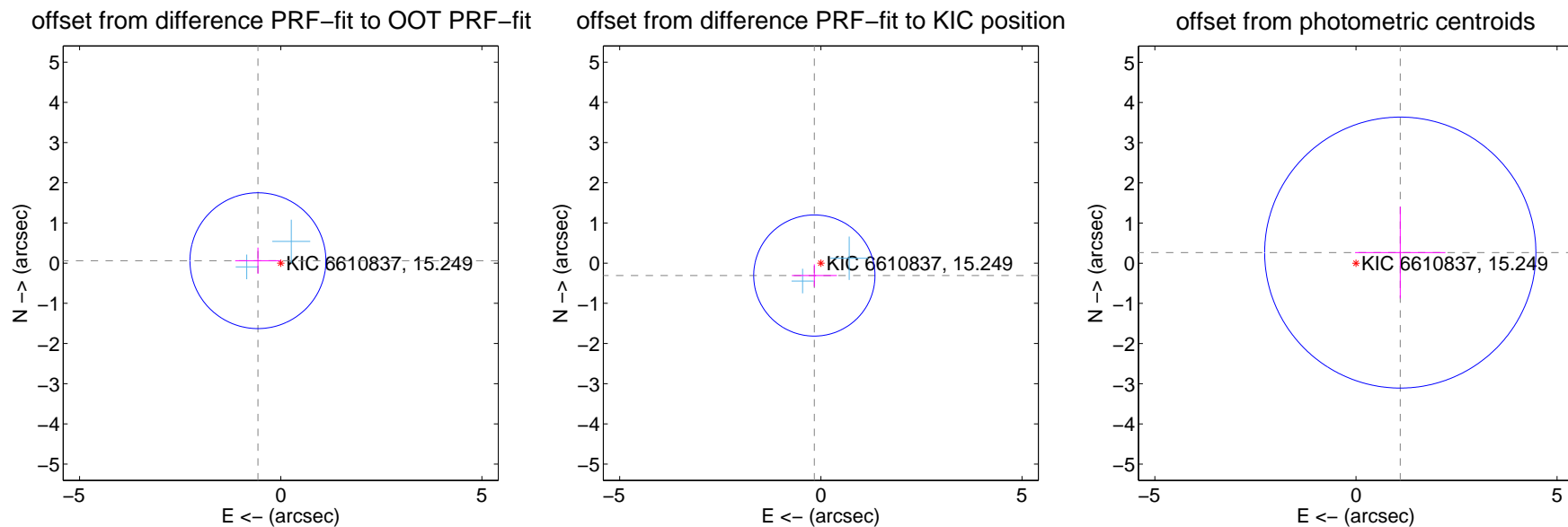
## DV Centroid Data

Supplemental centroid analysis for 006610837-02. Kepler magnitude: 15.25. Transit SNR 7.55

There are 2 quarters with good PRF difference image offsets

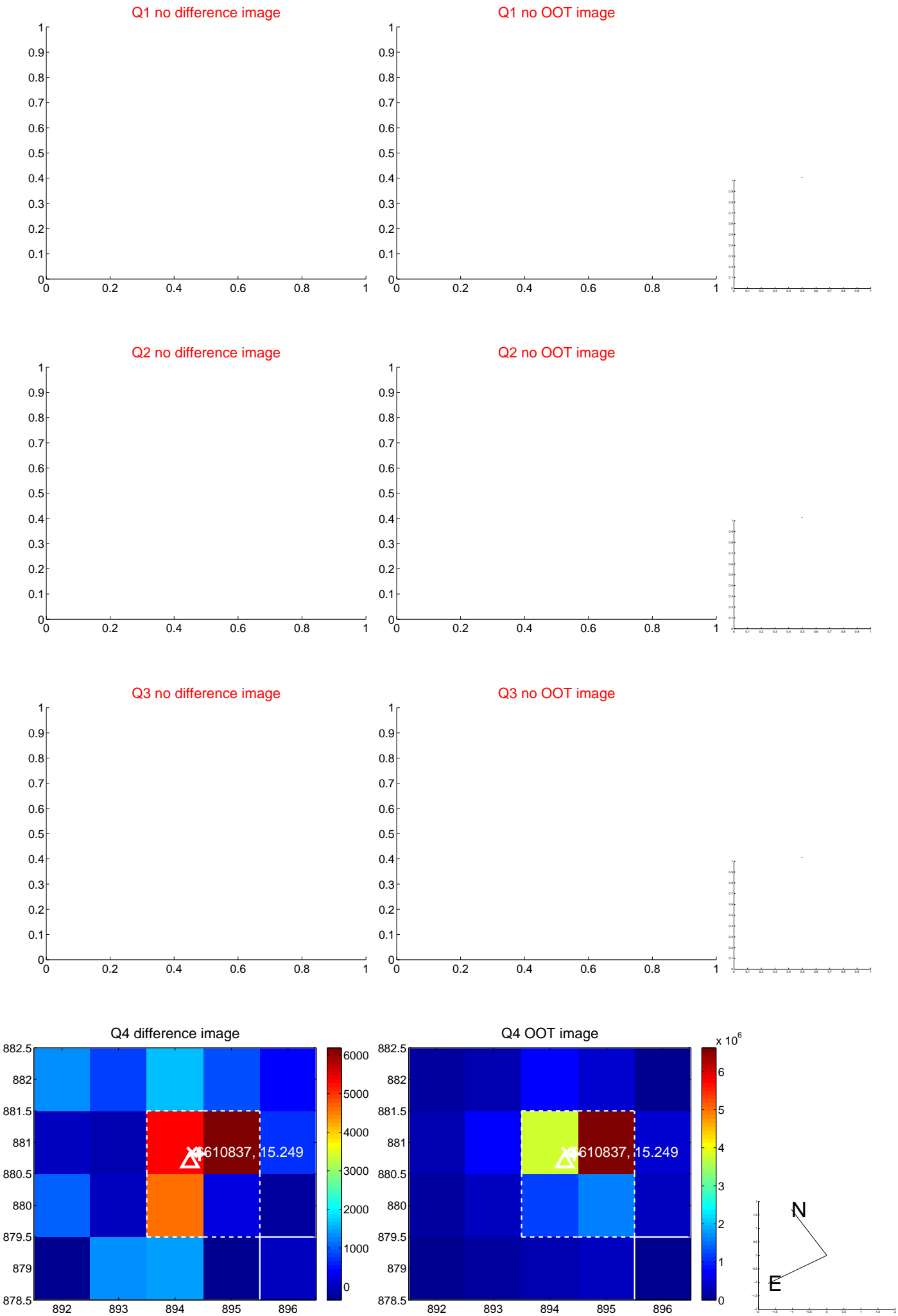
The direct PRF centroid is offset from the target star catalog position by about 0.61 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.571 \pm 0.563$	1.01	$0.567 \pm 0.565$	$0.061 \pm 0.325$
PRF-fit source offset from KIC position	$0.348 \pm 0.502$	0.69	$0.162 \pm 0.559$	$-0.308 \pm 0.279$
photometric centroid source offset	$1.13 \pm 1.12$	1.01	$-1.10 \pm 1.12$	$0.26 \pm 1.14$



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.

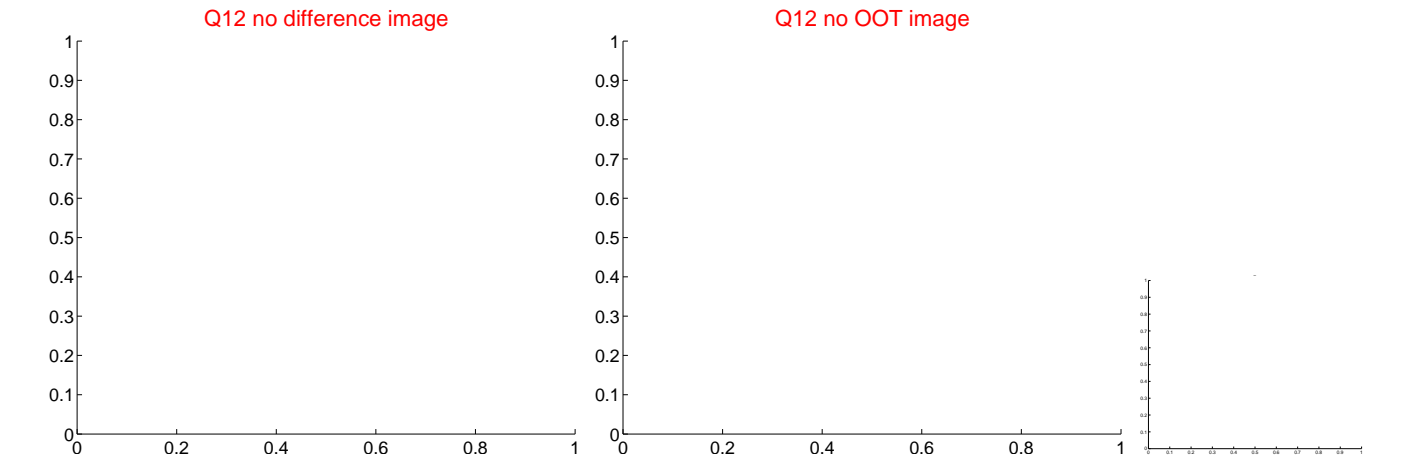
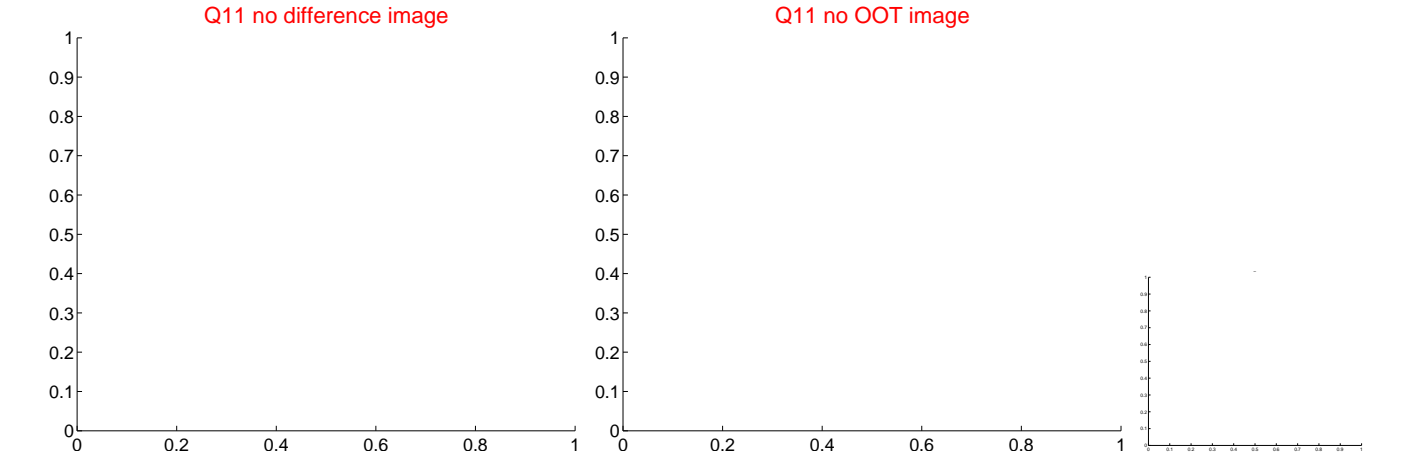
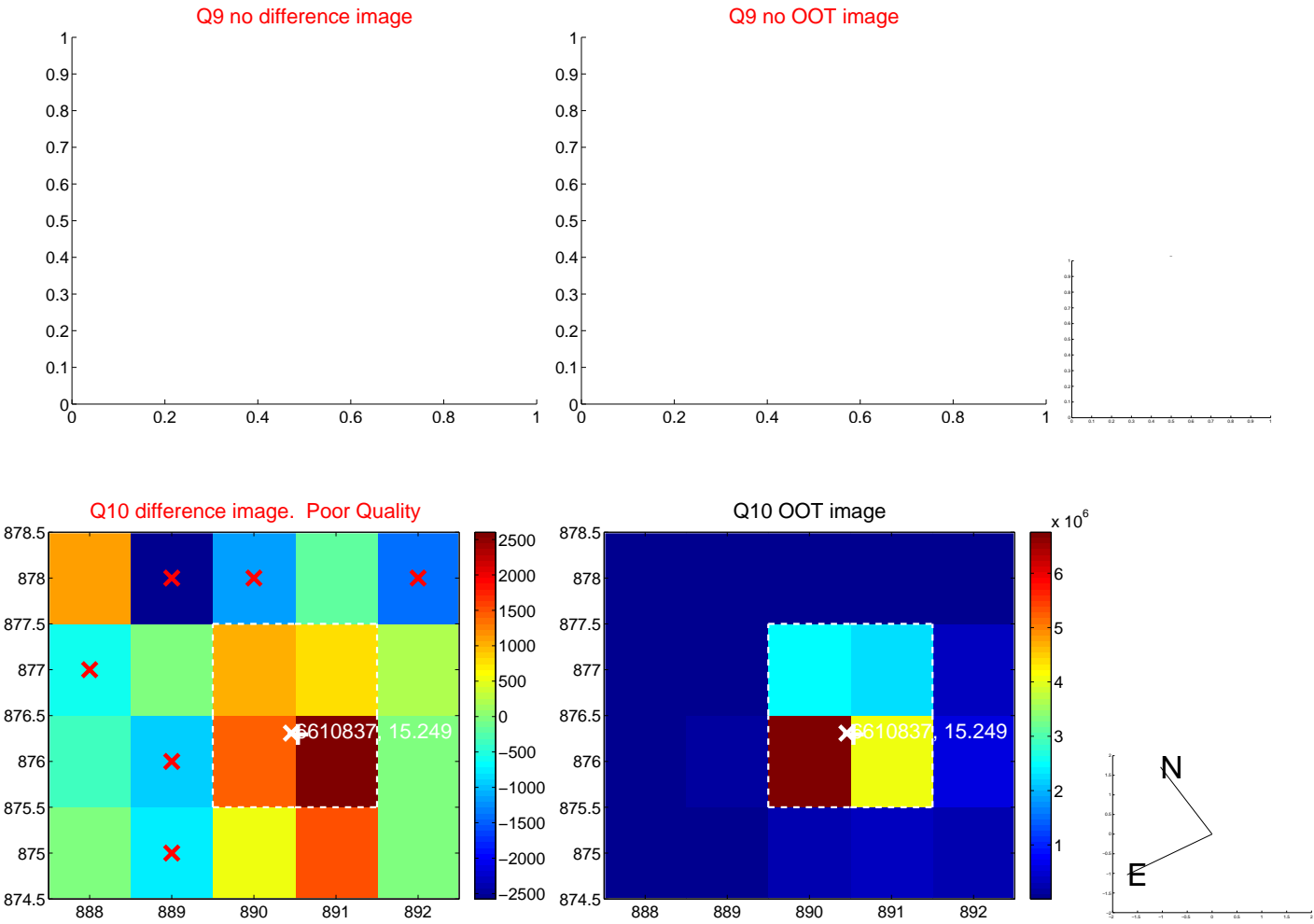
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



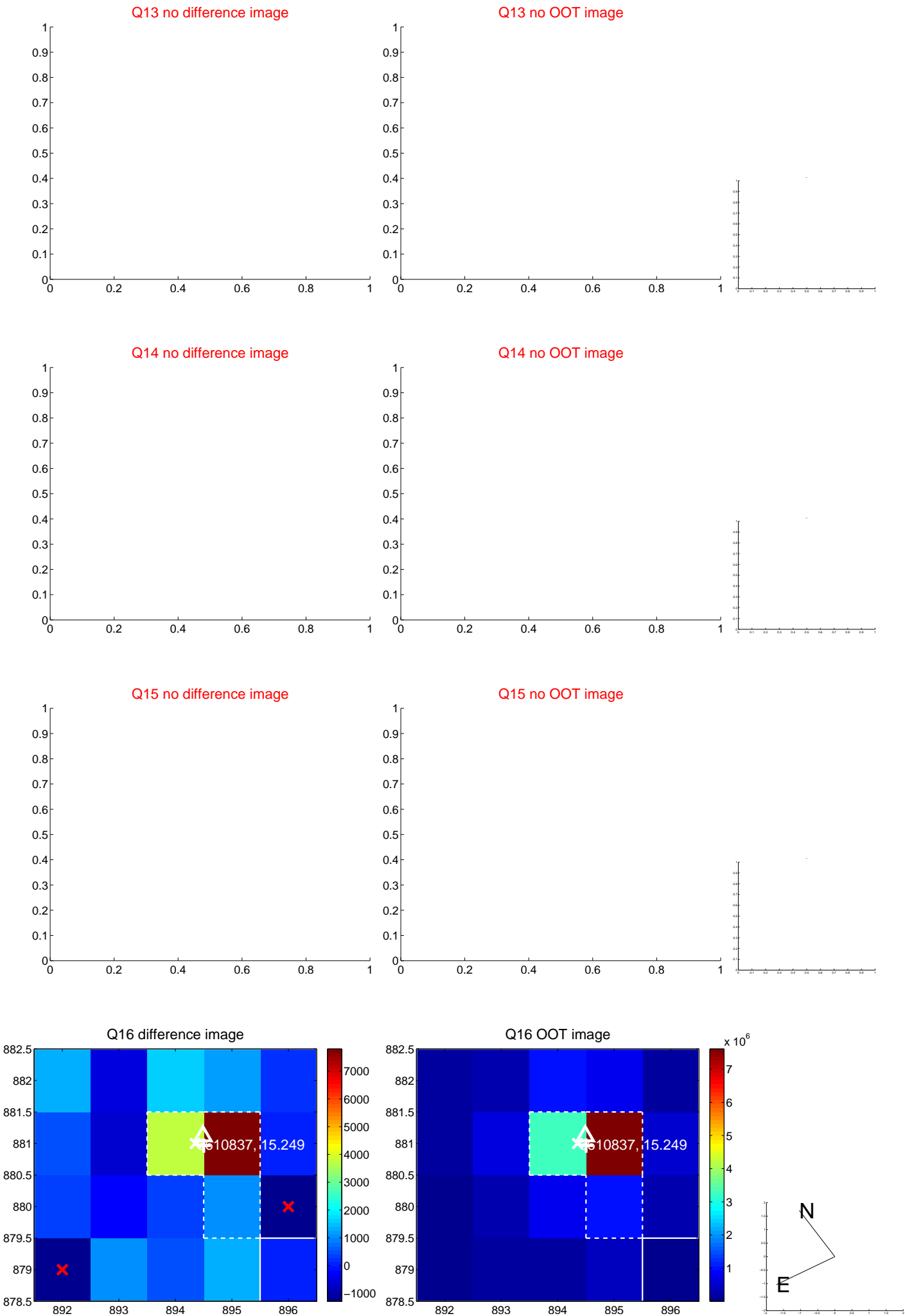
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



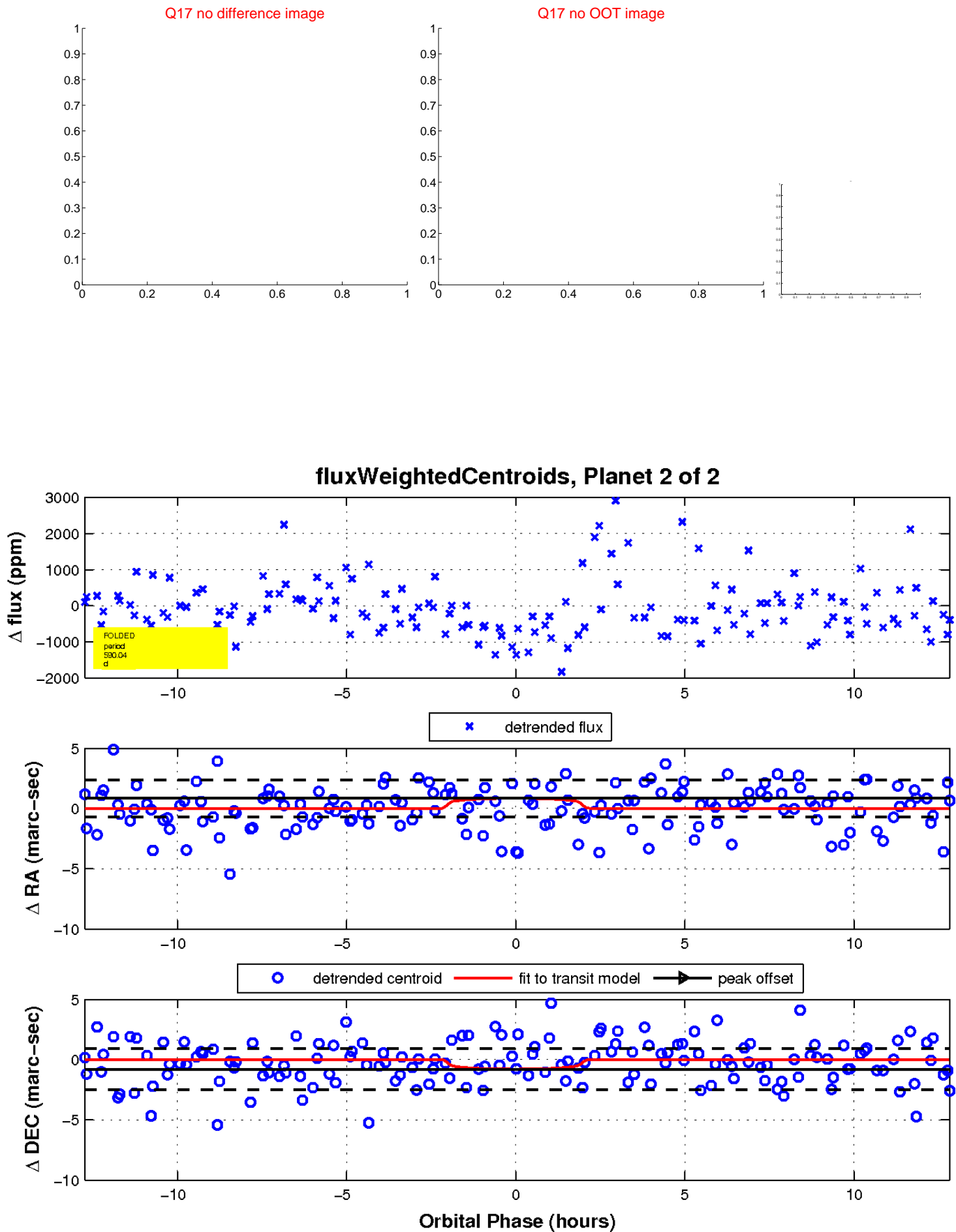
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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



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



UKIRT Image

Declination

