

# KIC 005181804

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005181804-01	OBS	3638.01	4.350464	132.271434	49657.4	2.561	1089.4	962.0	1.42	6585	43.95	1111.17
005181804-02	OBS	No	4.350472	134.538413	3181.6	2.383	60.5	67.5	1.42	6585	11.71	1111.16

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005181804-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_KIC_POS
005181804-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—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.

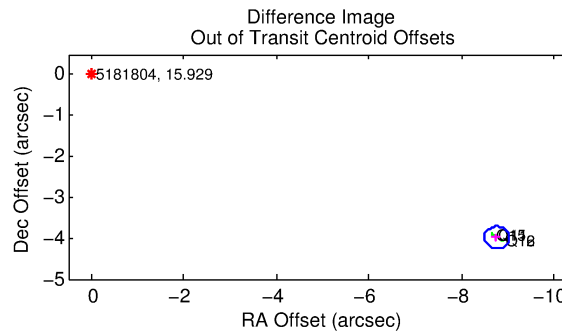
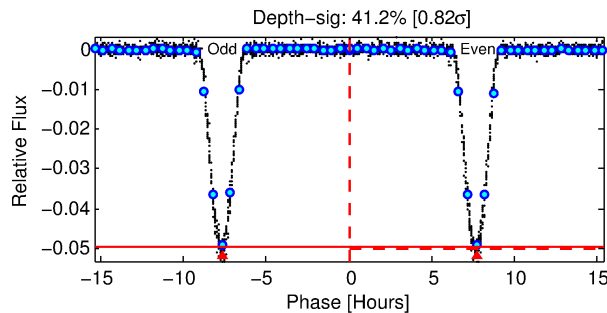
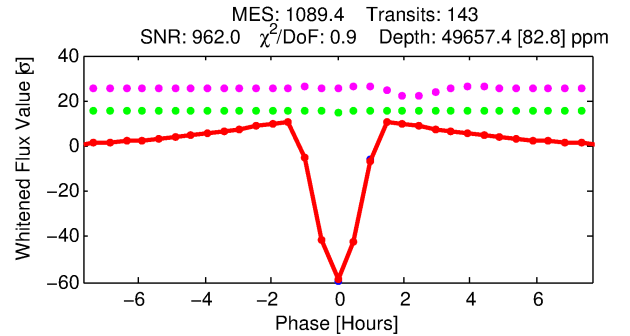
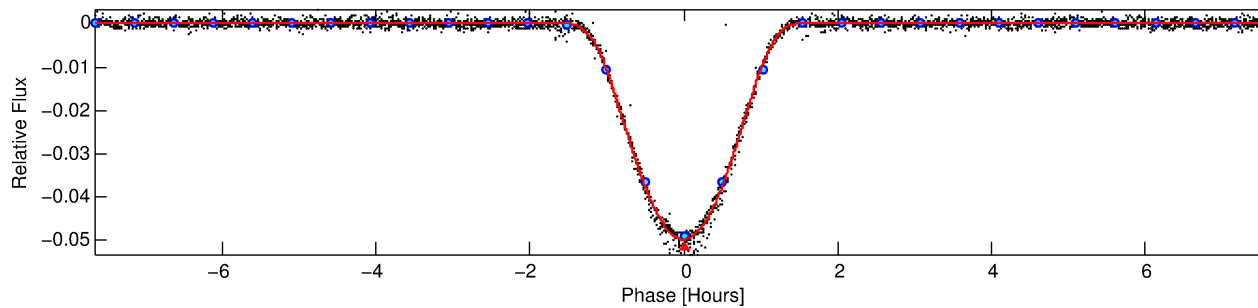
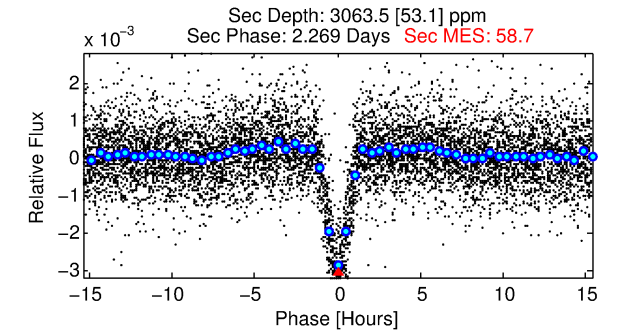
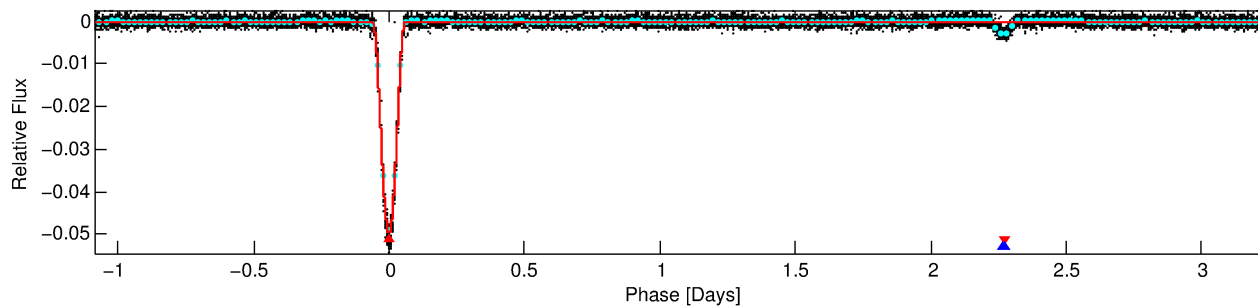
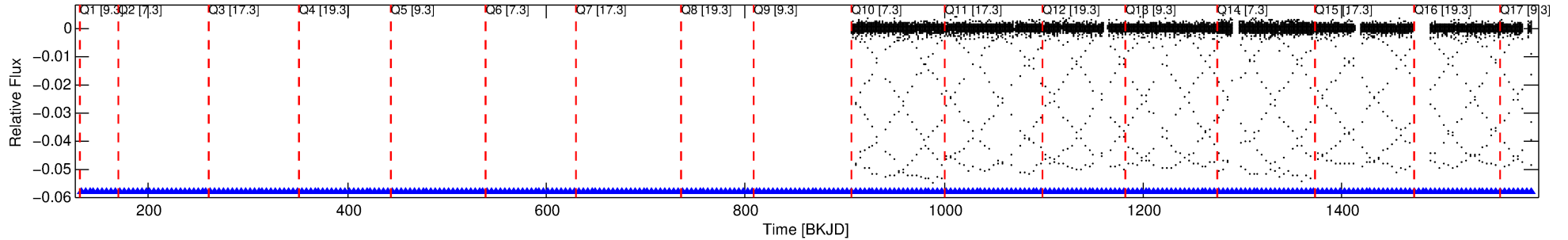
## Ephemeris Match Information For 005181804-01

No Significant Match Found

# DV One-Page Summary

KIC: 5181804 Candidate: 1 of 2 Period: 4.350 d  
KOI: K03638.01 Corr: 0.994

Kp: 15.93 R\*: 1.42 Rs Teff: 6585.0 K Logg: 4.21 Fe/H: -0.300



## DV Fit Results:

Period = 4.35046 [0.00000] d  
Epoch = 132.2714 [0.0001] BKJD  
Rp/R\* = 0.2844 [0.0094]  
a/R\* = 11.92 [0.05]  
b = 0.90 [0.02]  
Seff = 1111.17 [404.48]  
Teq = 1472 [134] K  
Rp = 43.95 [12.69] Re  
a = 0.0551 [0.0129] AU  
Ag = 2.65 [0.89] [1.85σ]  
Teffp = 2905 [123] K [7.89σ]

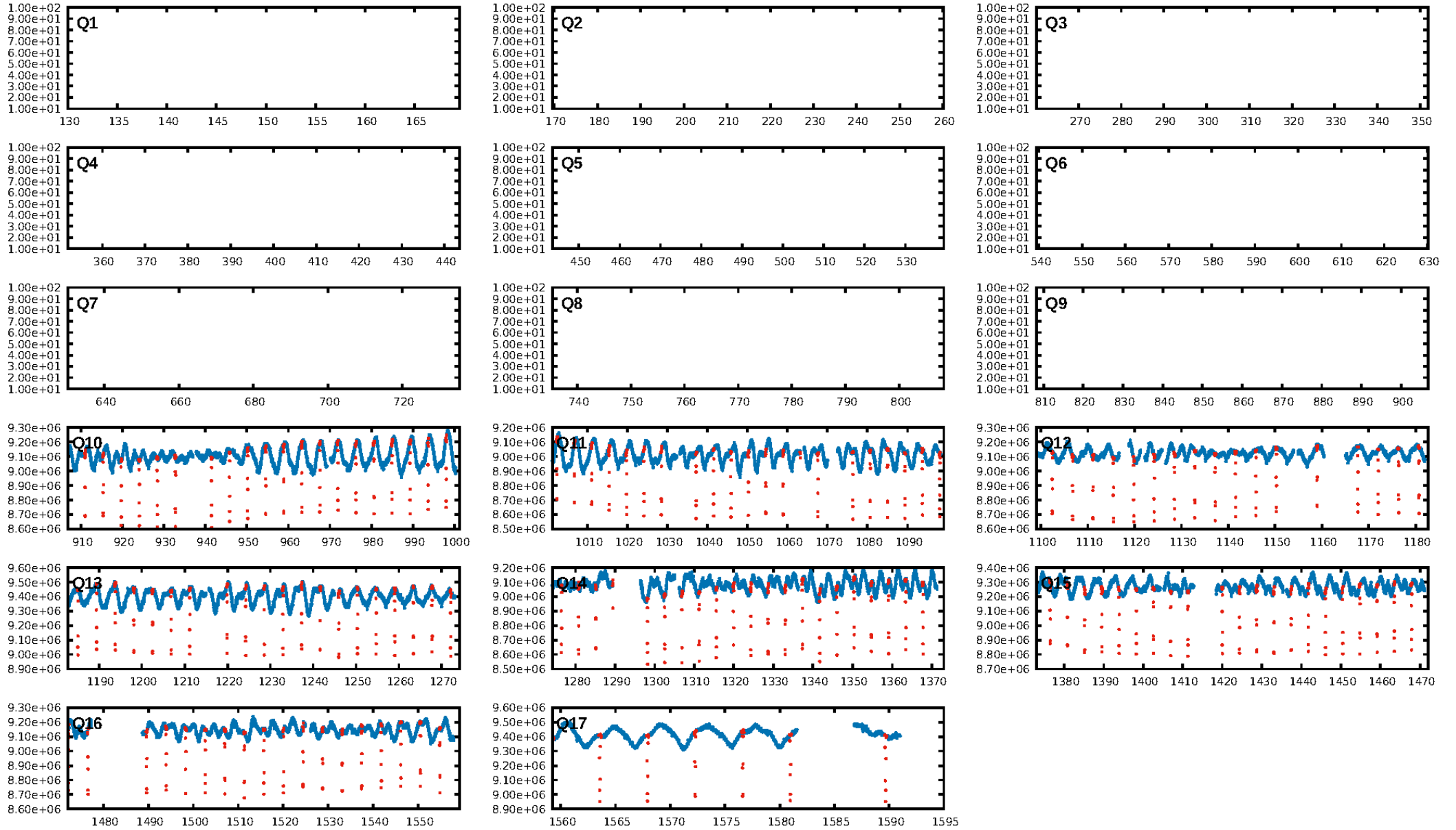
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [136/136]  
GhostDiagnostic-chr: 11.72  
Centroid-sig: 0.0%  
Centroid-so: 2.312 arcsec [380.48σ]  
OotOffset-rm: 9.621 arcsec [106.27σ]  
KicOffset-rm: 0.166 arcsec [2.32σ]  
OotOffset-st: 0/2/2/0 [4]  
KicOffset-st: 2/2/2/2 [8]  
DiffImageQuality-fgm: 1.00 [8/8]  
DiffImageOverlap-fno: 1.00 [8/8]

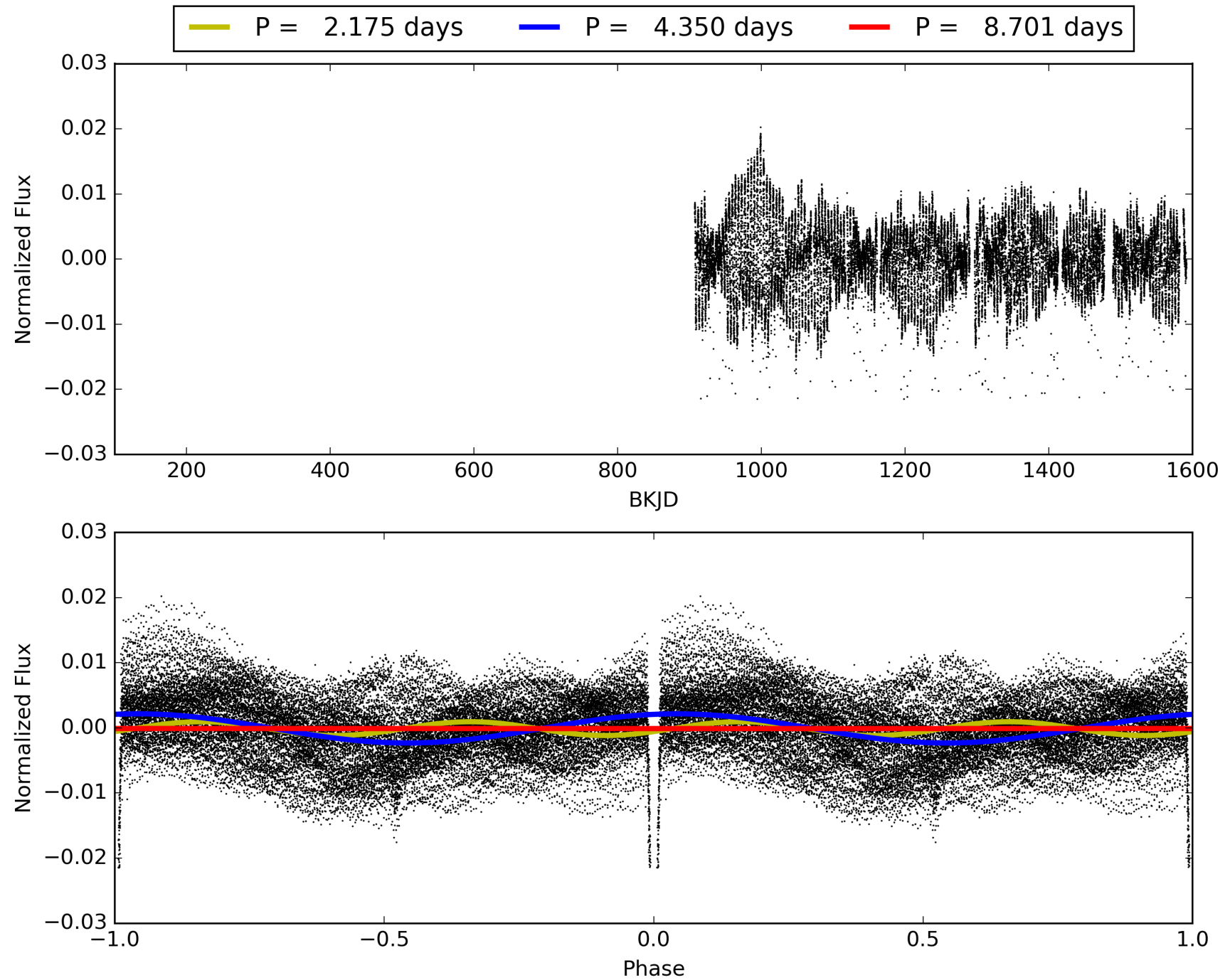
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 16:43:04 Z

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

# TCE 005181804-01, PDC Light Curves

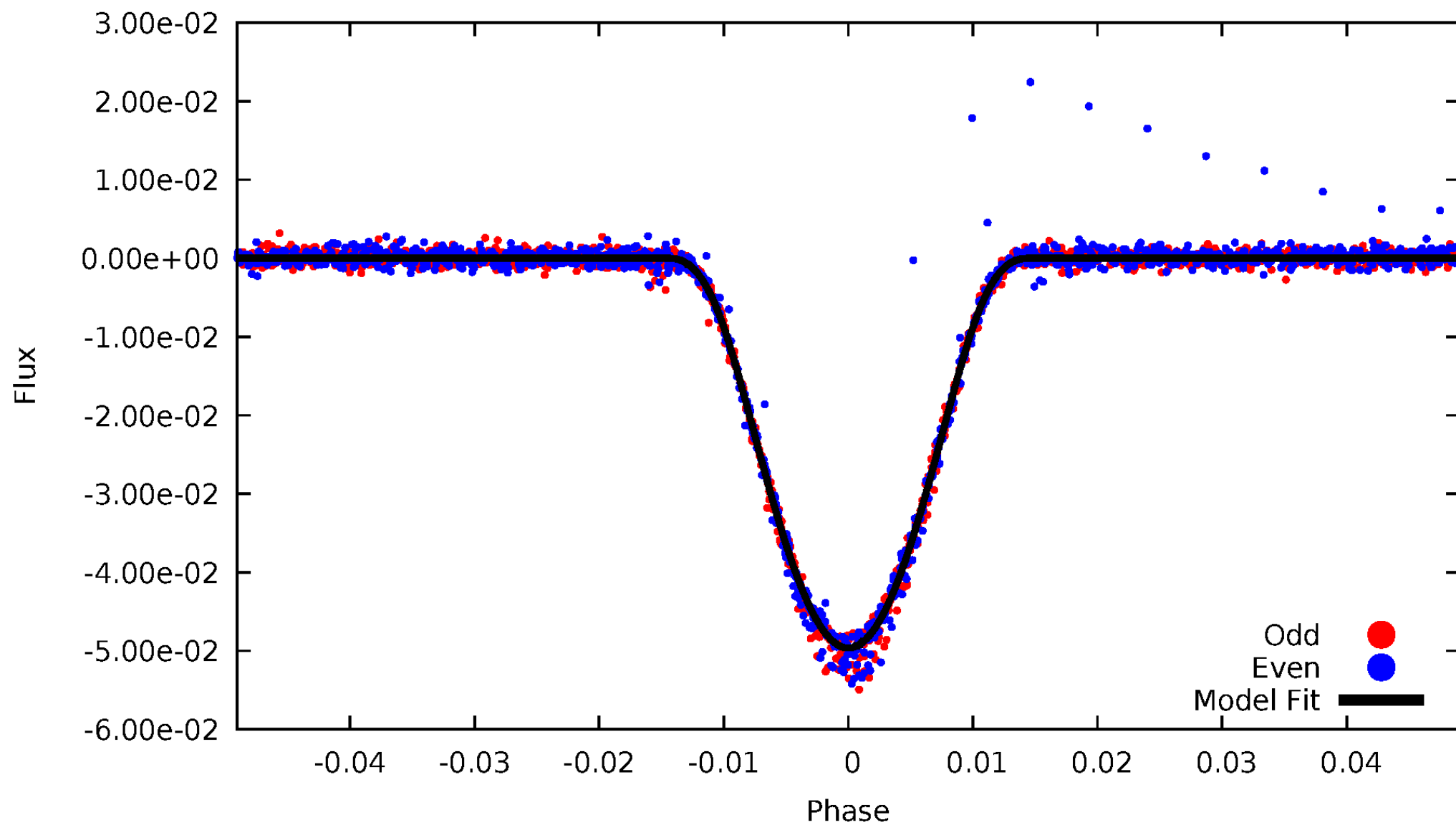


TCE 005181804-01



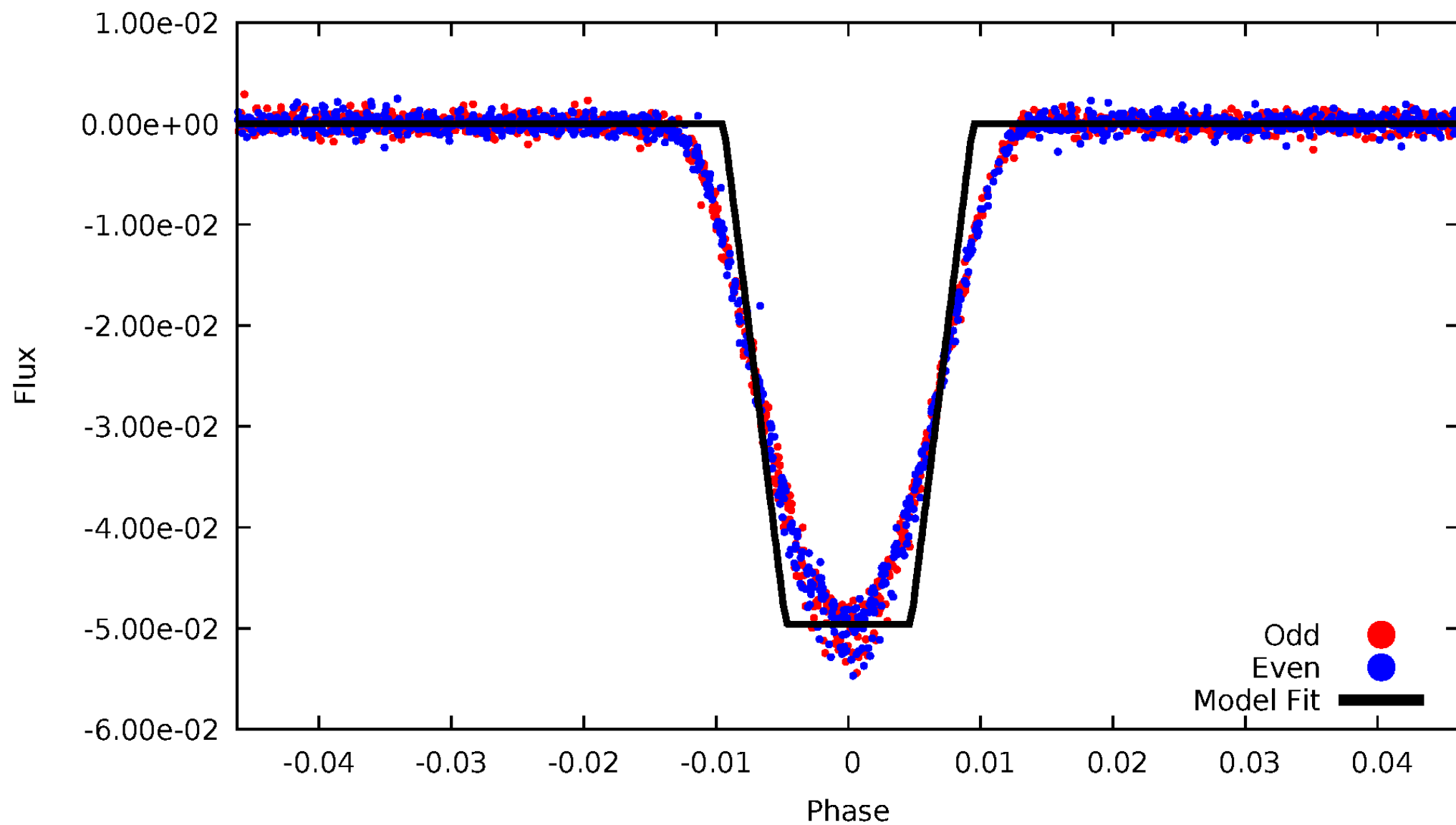
# DV Odd/Even

TCE 005181804-01



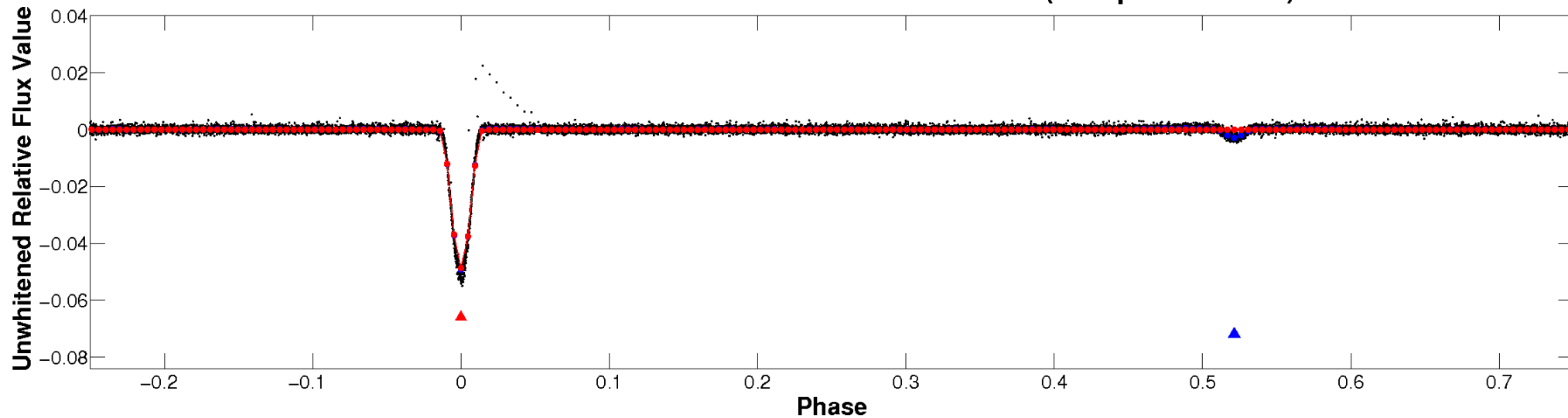
# ALT Odd/Even

TCE 005181804-01

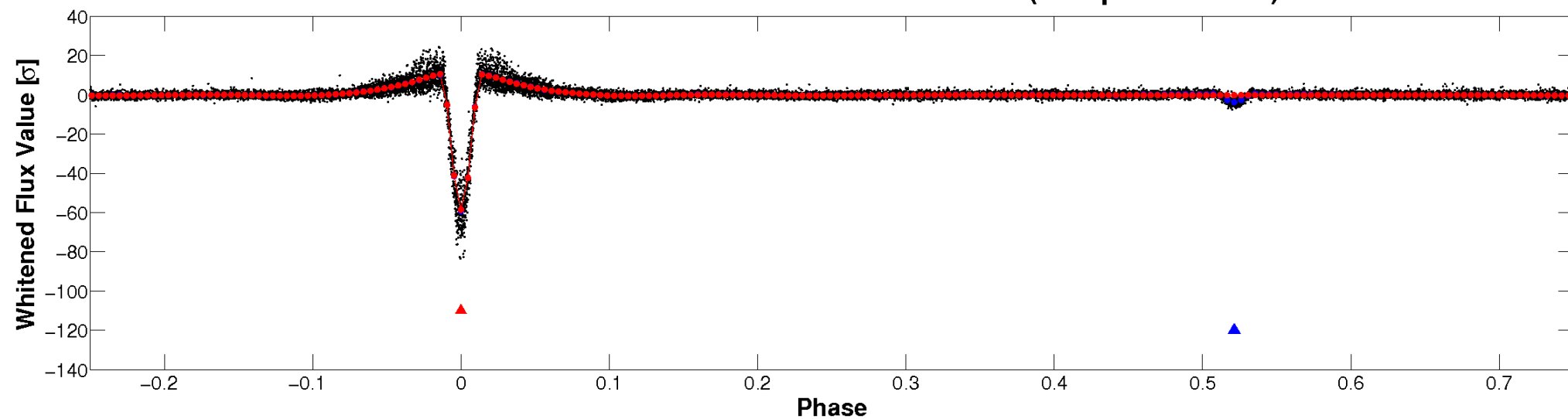


# Non-Whitened Vs. Whitened Light Curve

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

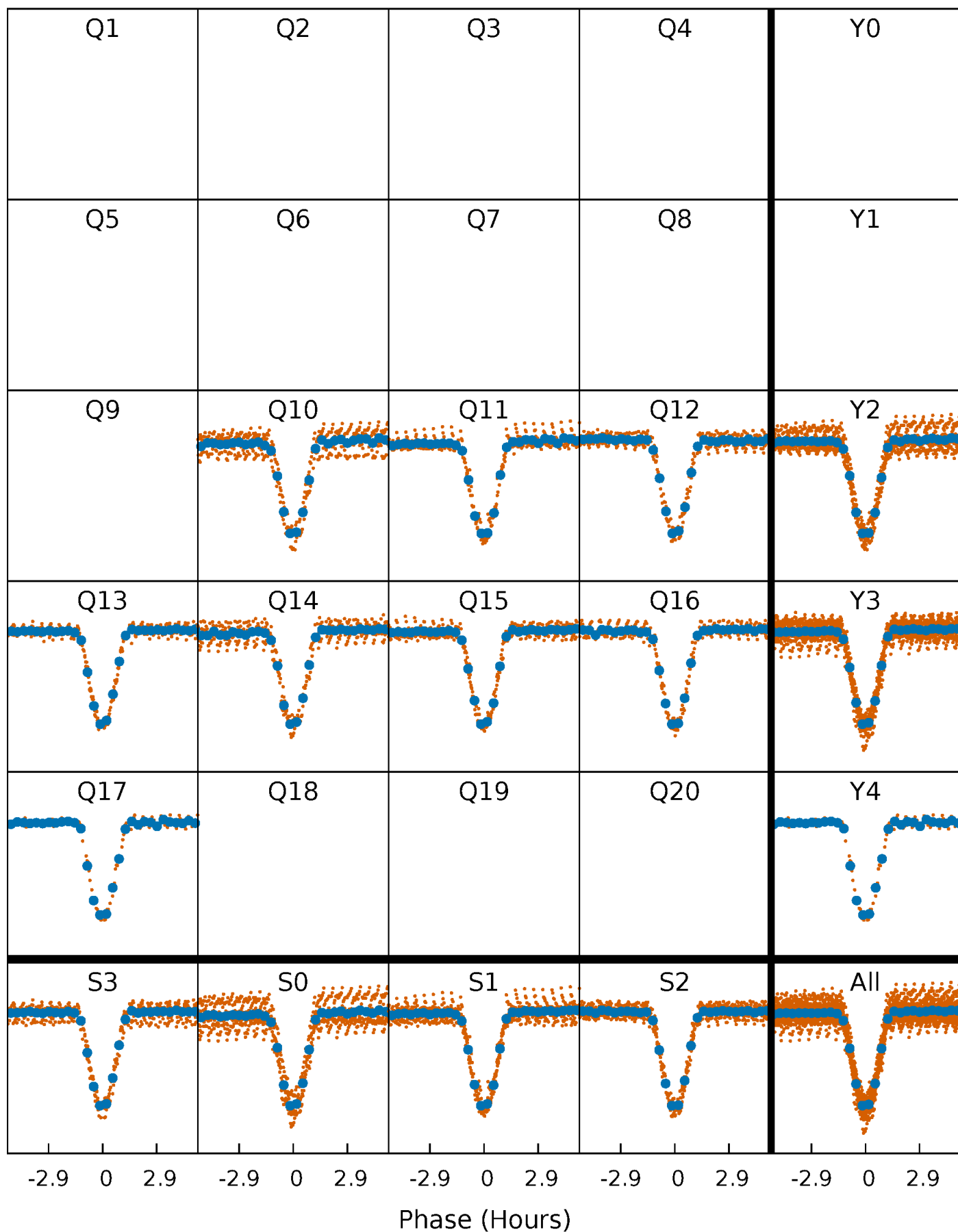


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

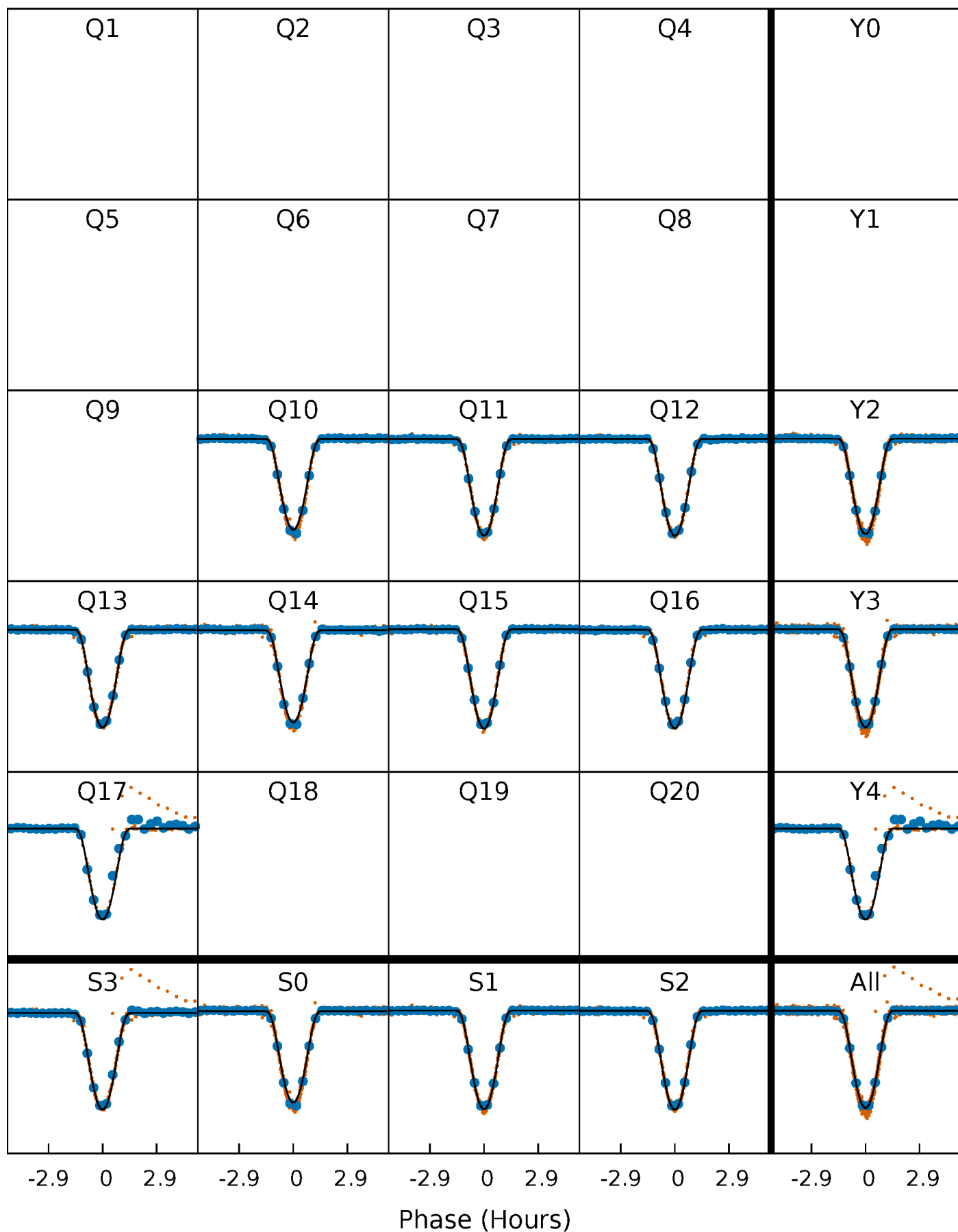
TCE 005181804-01 P= 4.350464 Days  $T_0=132.271434$  (BKJD)





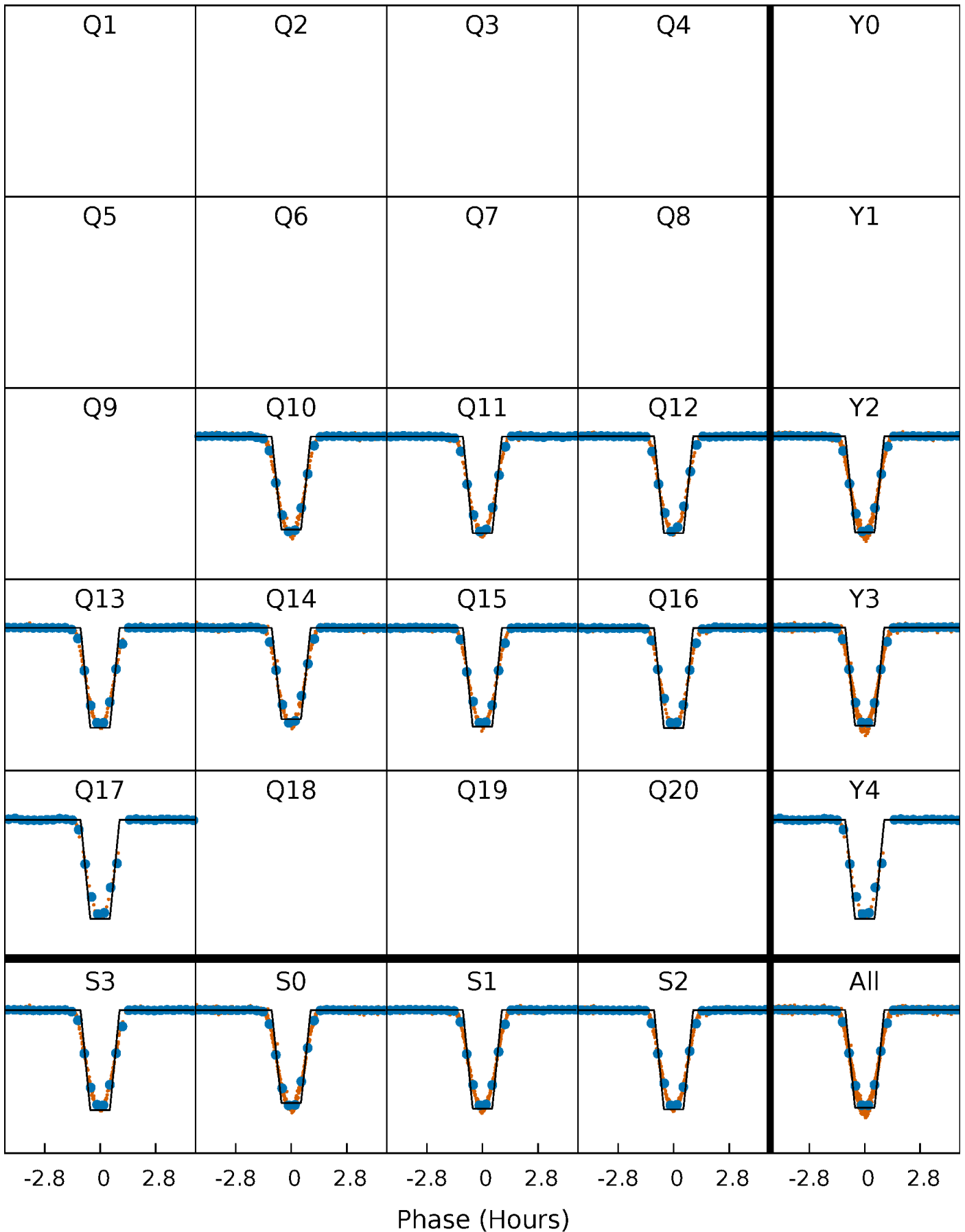
# DV Quarter-Phased Transit Curves

TCE 005181804-01 P= 4.350464 Days  $T_0=132.271434$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

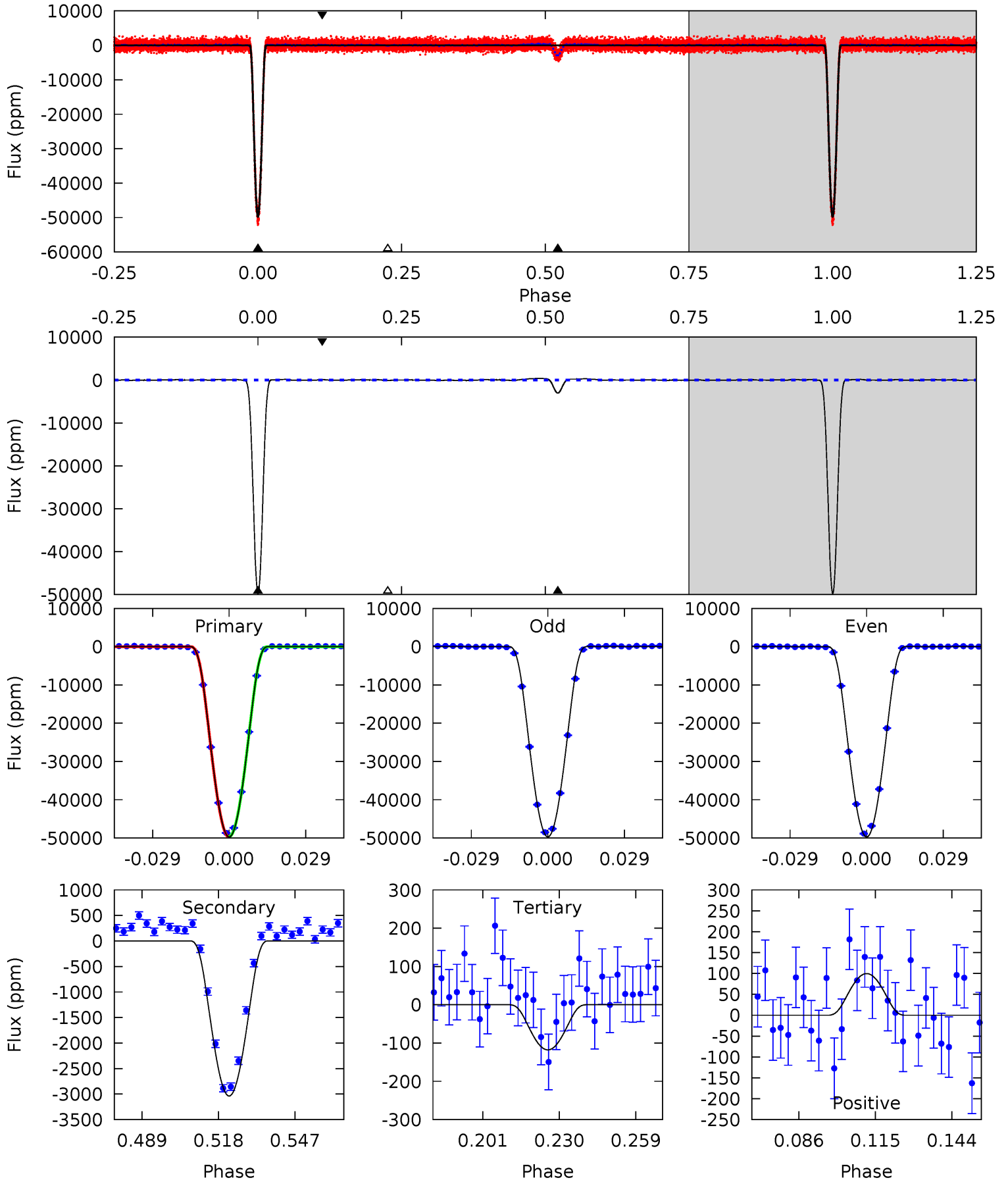
TCE 005181804-01   P= 4.350449 Days    $T_0=132.275457$  (BKJD)



# DV Model-Shift Uniqueness Test

005181804-01, P = 4.350464 Days, E = 132.271434 Days

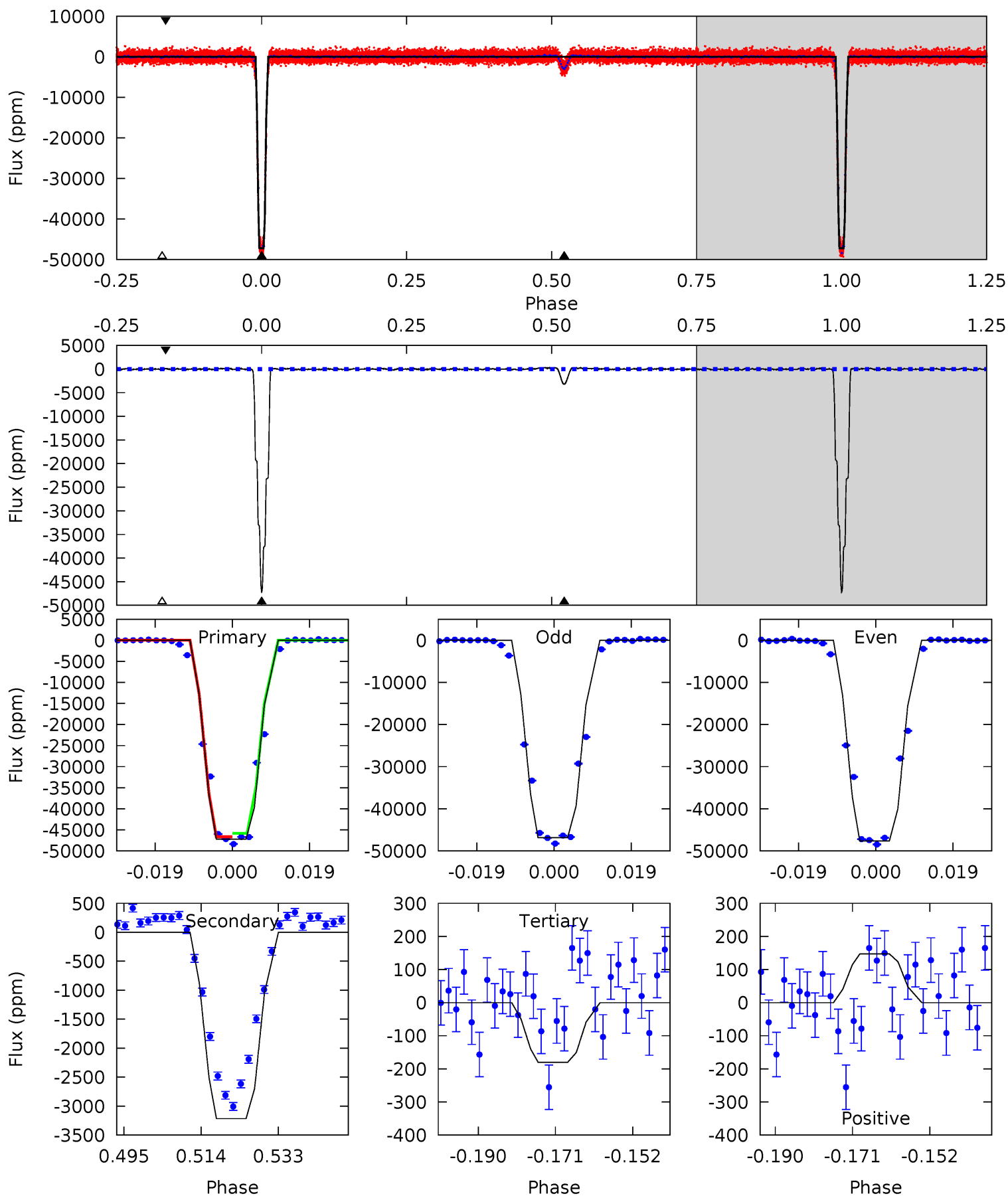
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2003	122.3	4.74	4.02	4.82	2.19	3.59	1998	1998	117.6	118.3	0.62	1.00	0.01	3.93



# Alt Model-Shift Uniqueness Test

005181804-01, P = 4.350449 Days, E = 132.275457 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
1085	74.0	4.14	3.38	4.90	2.34	1.67	1081	1082	69.8	70.6	8.89	1.00	0.01	7.86



### Stellar Parameters For KIC 005181804

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6585^{+185}_{-254}$	$4.208^{+0.175}_{-0.175}$	$-0.300^{+0.250}_{-0.300}$	$1.416^{+0.406}_{-0.332}$	$1.185^{+0.185}_{-0.185}$	$0.588^{+0.532}_{-0.279}$
	+3%/-4%	+4%/-4%	+83%/-100%	+29%/-23%	+16%/-16%	+90%/-47%
Source	KIC0	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 005181804-01 / KOI 3638.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-3037 \pm 25$	$44.24^{+7.35}_{-6.27}$	$2052^{+164}_{-145}$	$3344^{+75}_{-89}$	$2.627^{+0.814}_{-0.643}$
Alt.	$-3217 \pm 43$	$34.60^{+5.87}_{-4.38}$	$2063^{+156}_{-150}$	$3680^{+92}_{-101}$	$4.447^{+1.367}_{-1.026}$

$T_{max}$  = 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

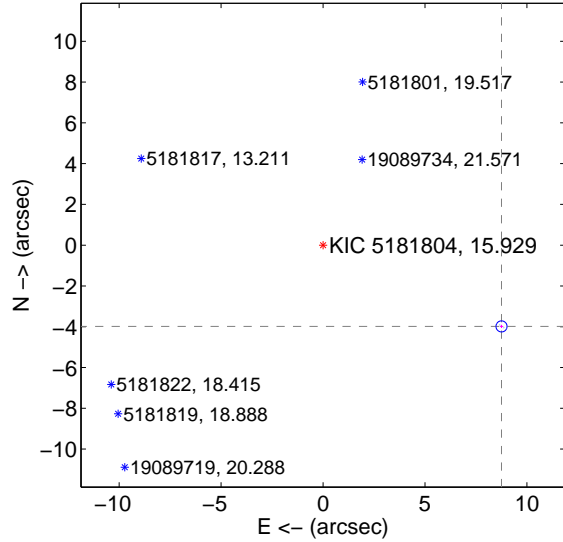
Supplemental centroid analysis for 005181804-01. Kepler magnitude: 15.93. Transit SNR 961.96

There are 8 quarters with good PRF difference image offsets

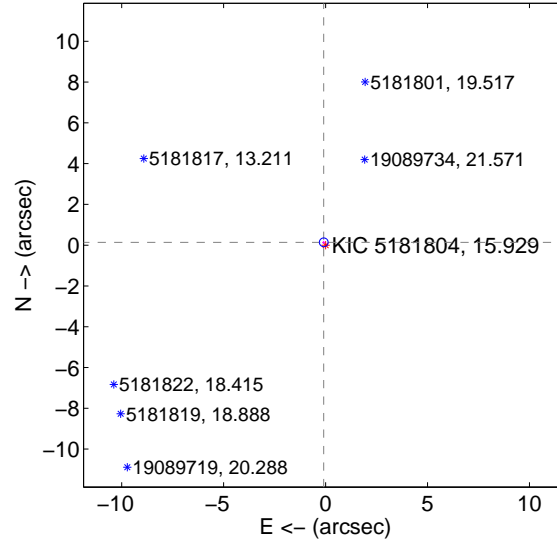
The OOT PRF centroid is offset from the target star catalog position by about 9.87 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$9.621 \pm 0.091$	106.27	$-8.756 \pm 0.083$	$-3.986 \pm 0.077$
PRF-fit source offset from KIC position	$0.166 \pm 0.072$	2.32	$0.090 \pm 0.072$	$0.140 \pm 0.072$
photometric centroid source offset	$2.31 \pm 0.01$	380.48	$2.08 \pm 0.01$	$1.00 \pm 0.00$

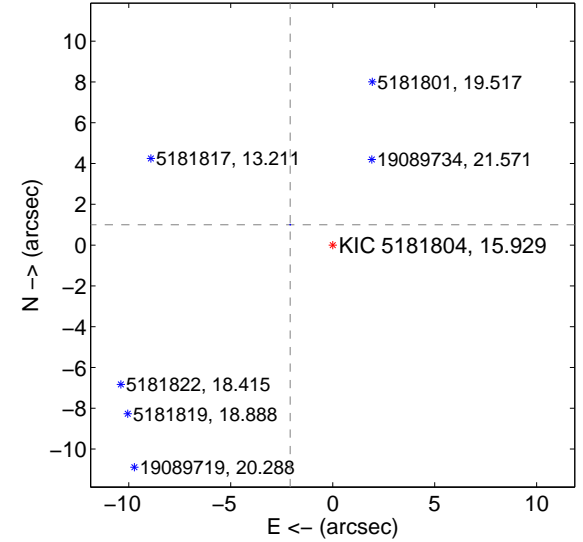
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids



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

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

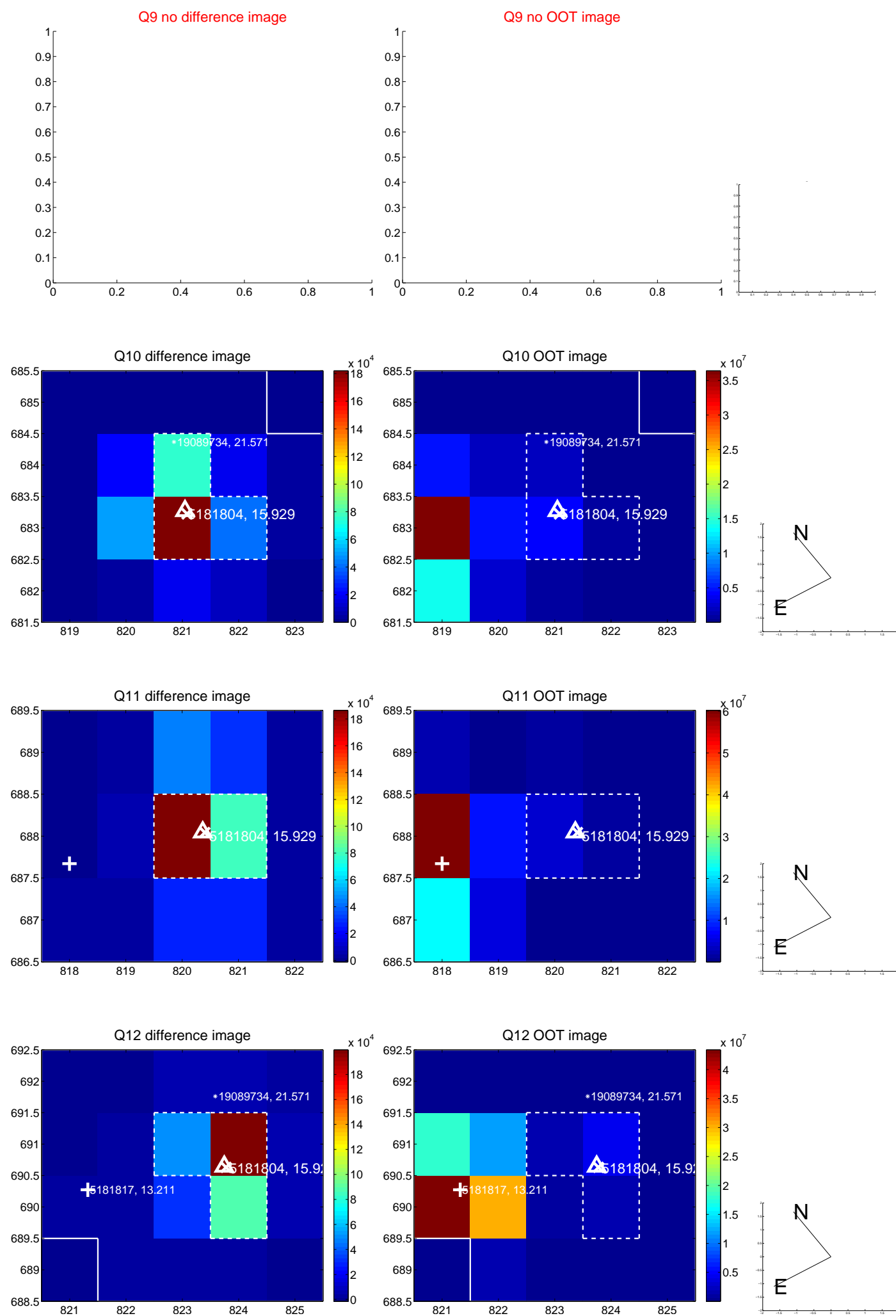


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

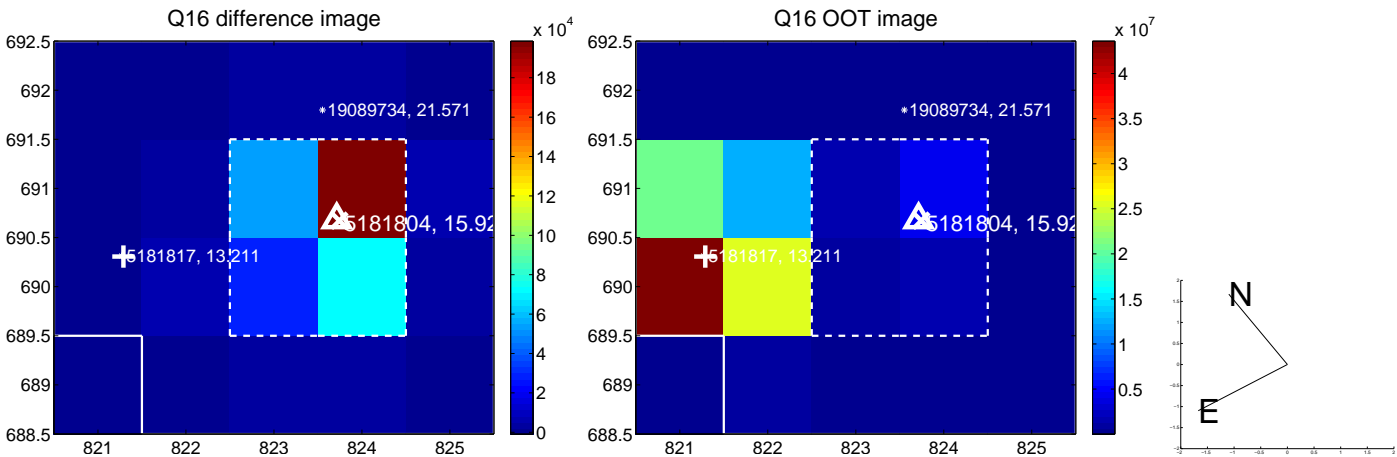
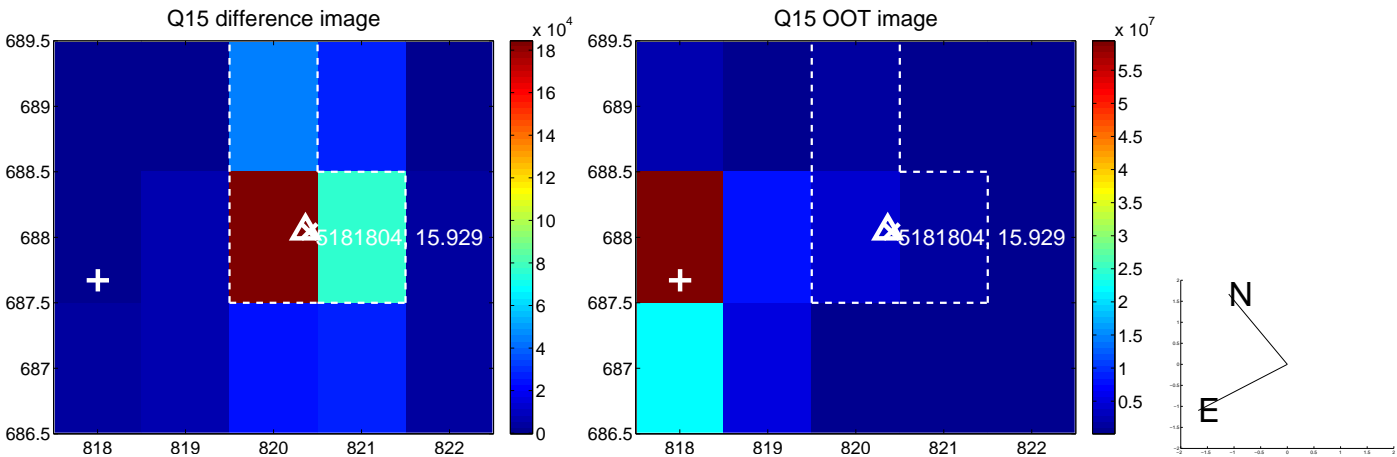
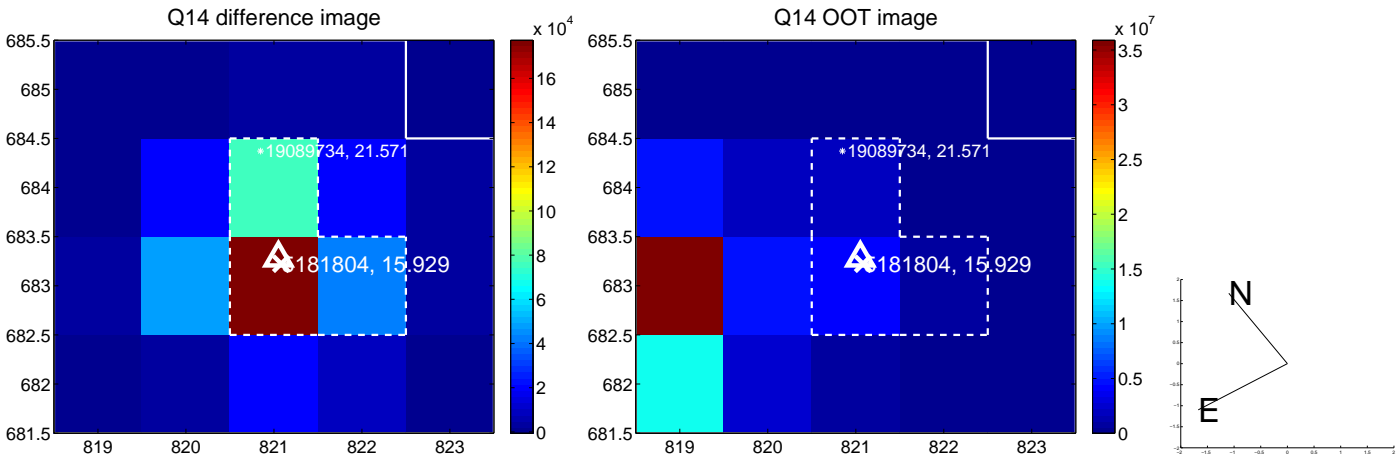
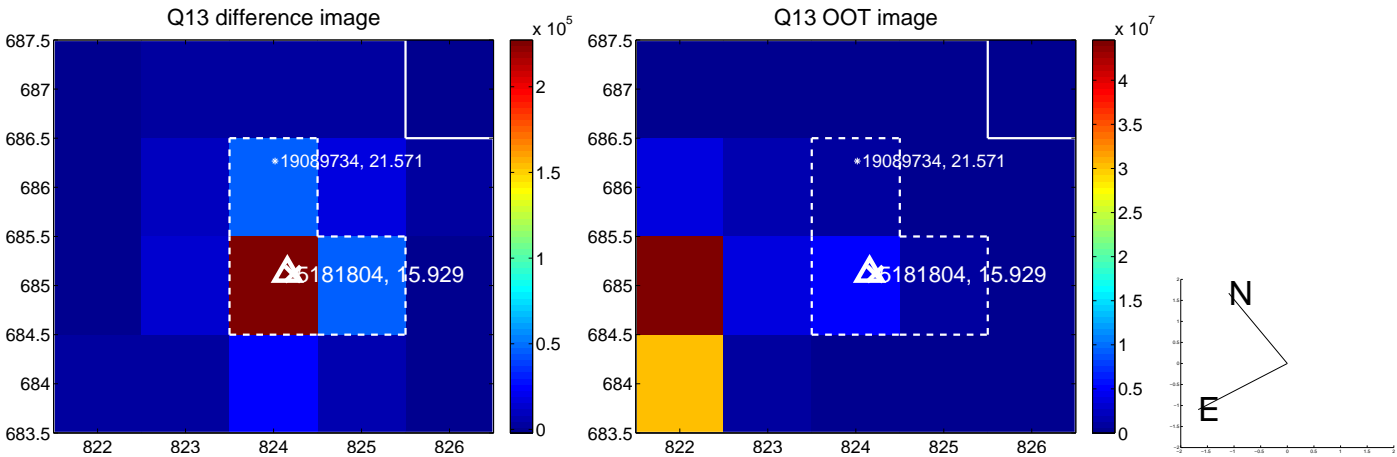




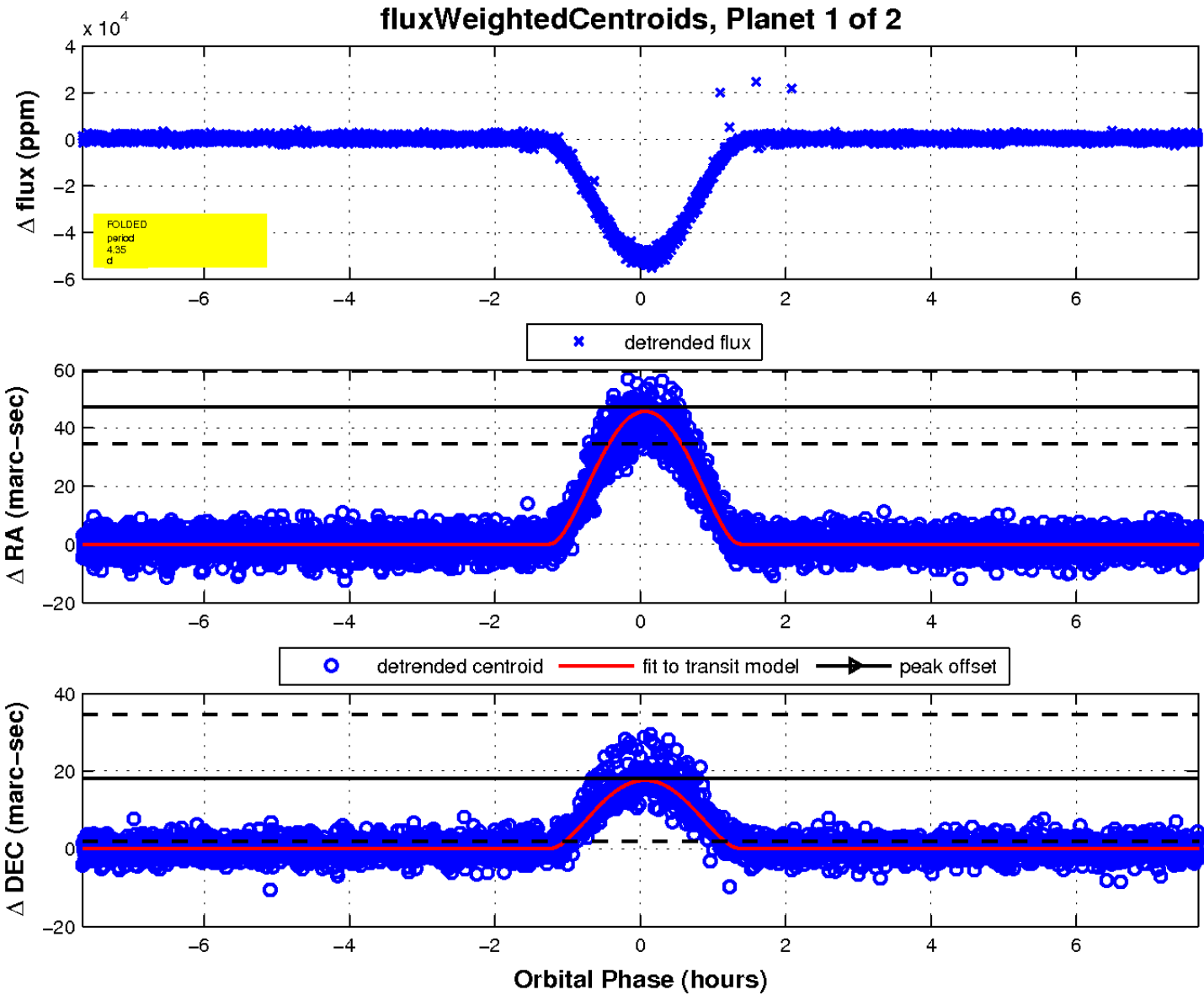
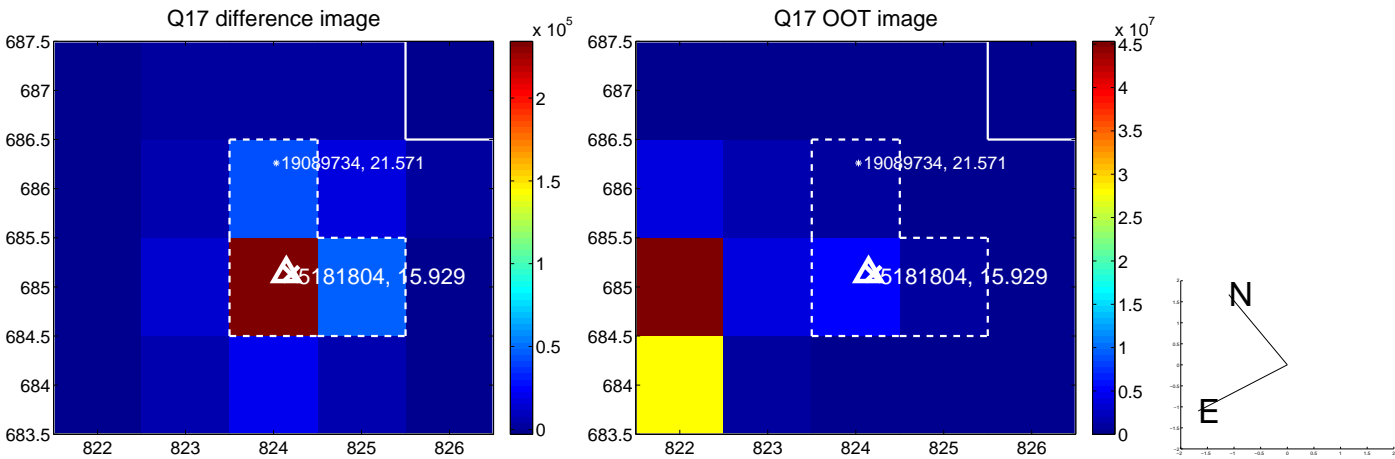
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

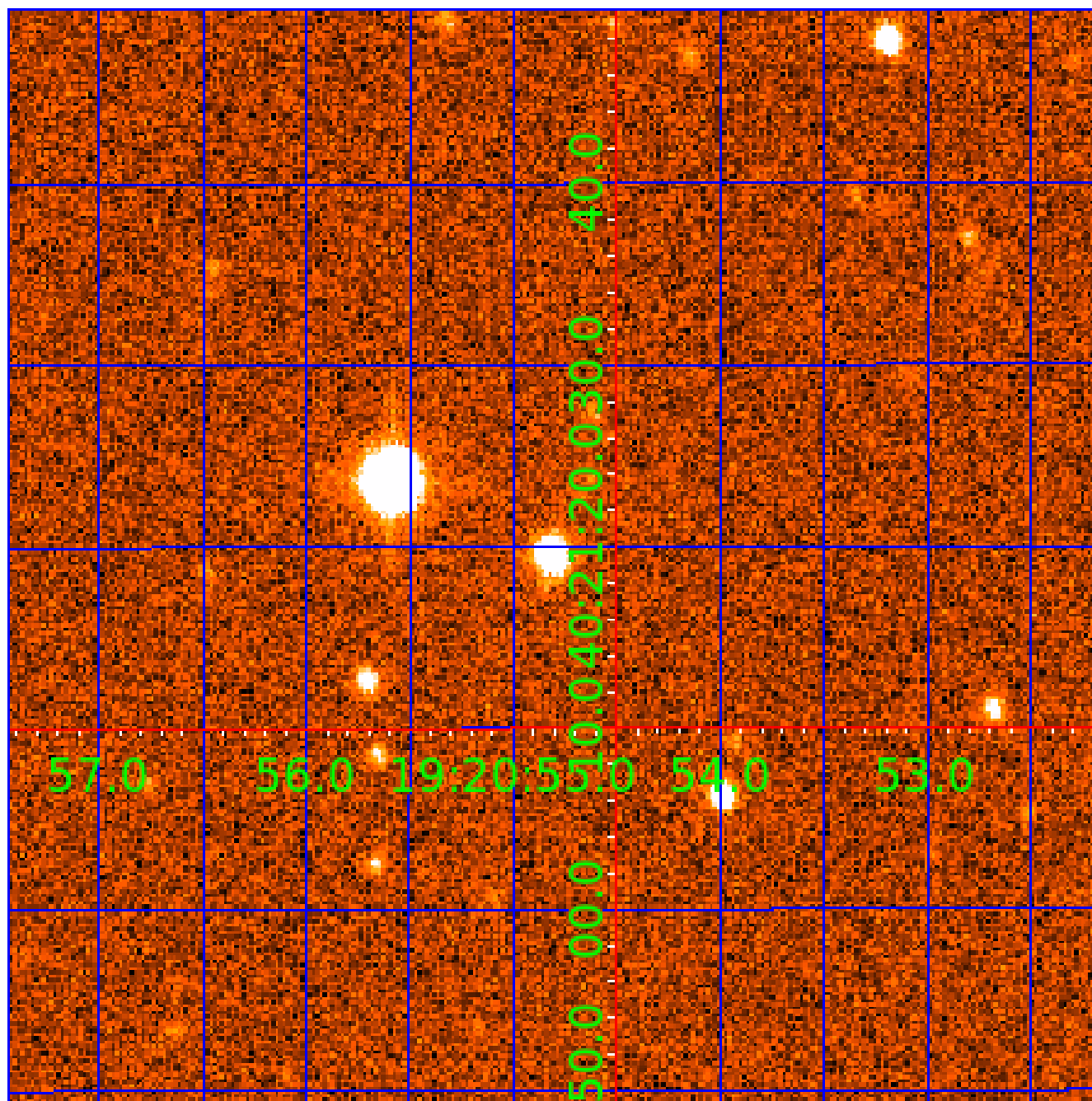


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 005181804

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005181804-01	OBS	3638.01	4.350464	132.271434	49657.4	2.561	1089.4	962.0	1.42	6585	43.95	1111.17
005181804-02	OBS	No	4.350472	134.538413	3181.6	2.383	60.5	67.5	1.42	6585	11.71	1111.16

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005181804-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_KIC_POS
005181804-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—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.

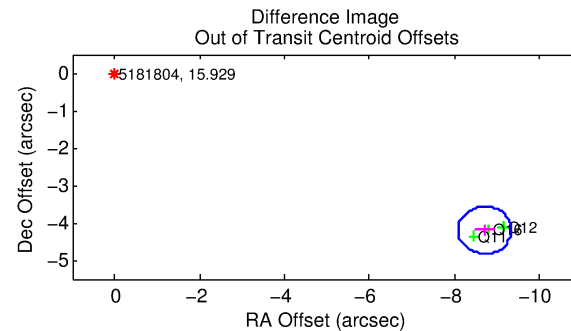
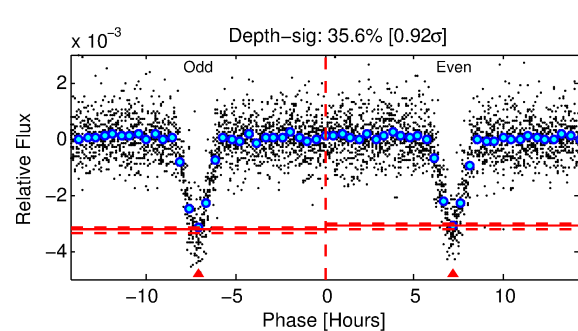
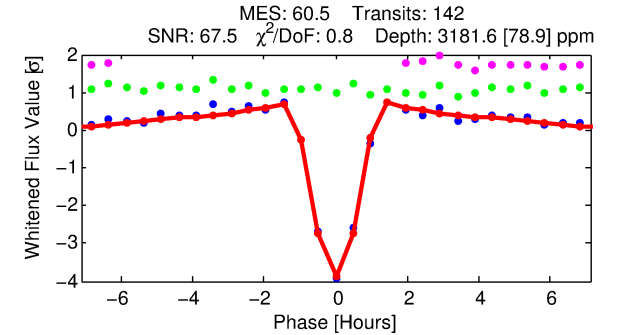
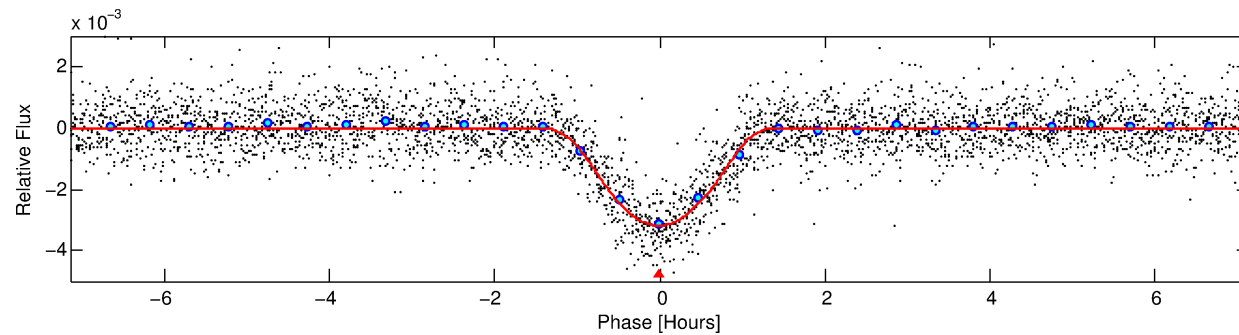
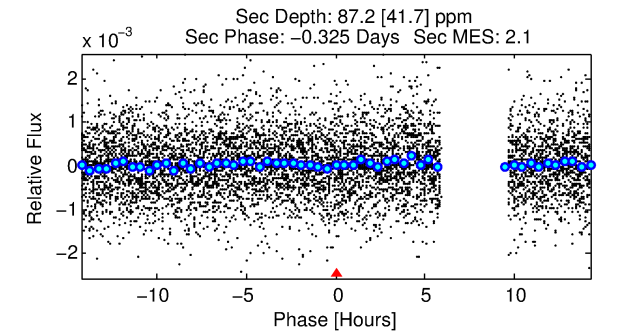
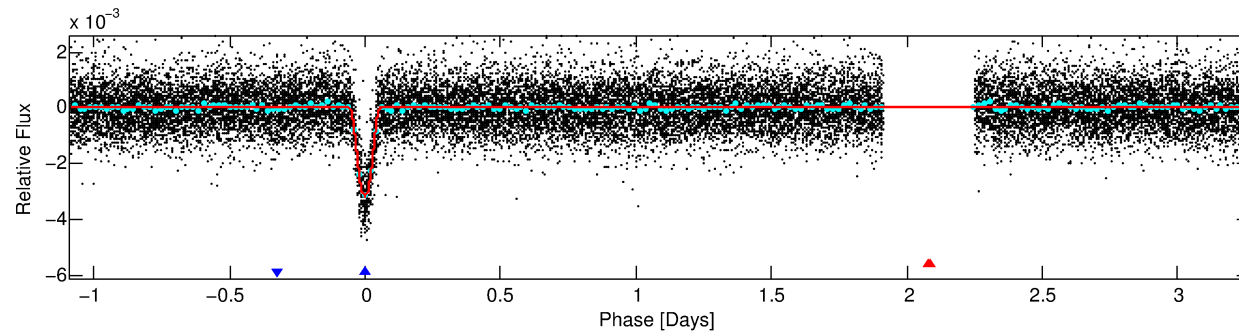
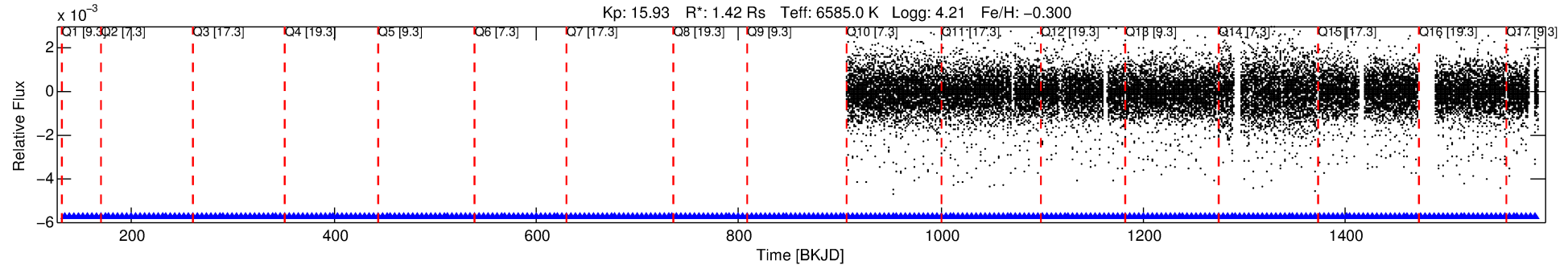
## Ephemeris Match Information For 005181804-02

No Significant Match Found

# DV One-Page Summary

KIC: 5181804 Candidate: 2 of 2 Period: 4.350 d  
KOI: K03638 Corr: No Ephemeris Match

Kp: 15.93 R\*: 1.42 Rs Teff: 6585.0 K Logg: 4.21 Fe/H: -0.300



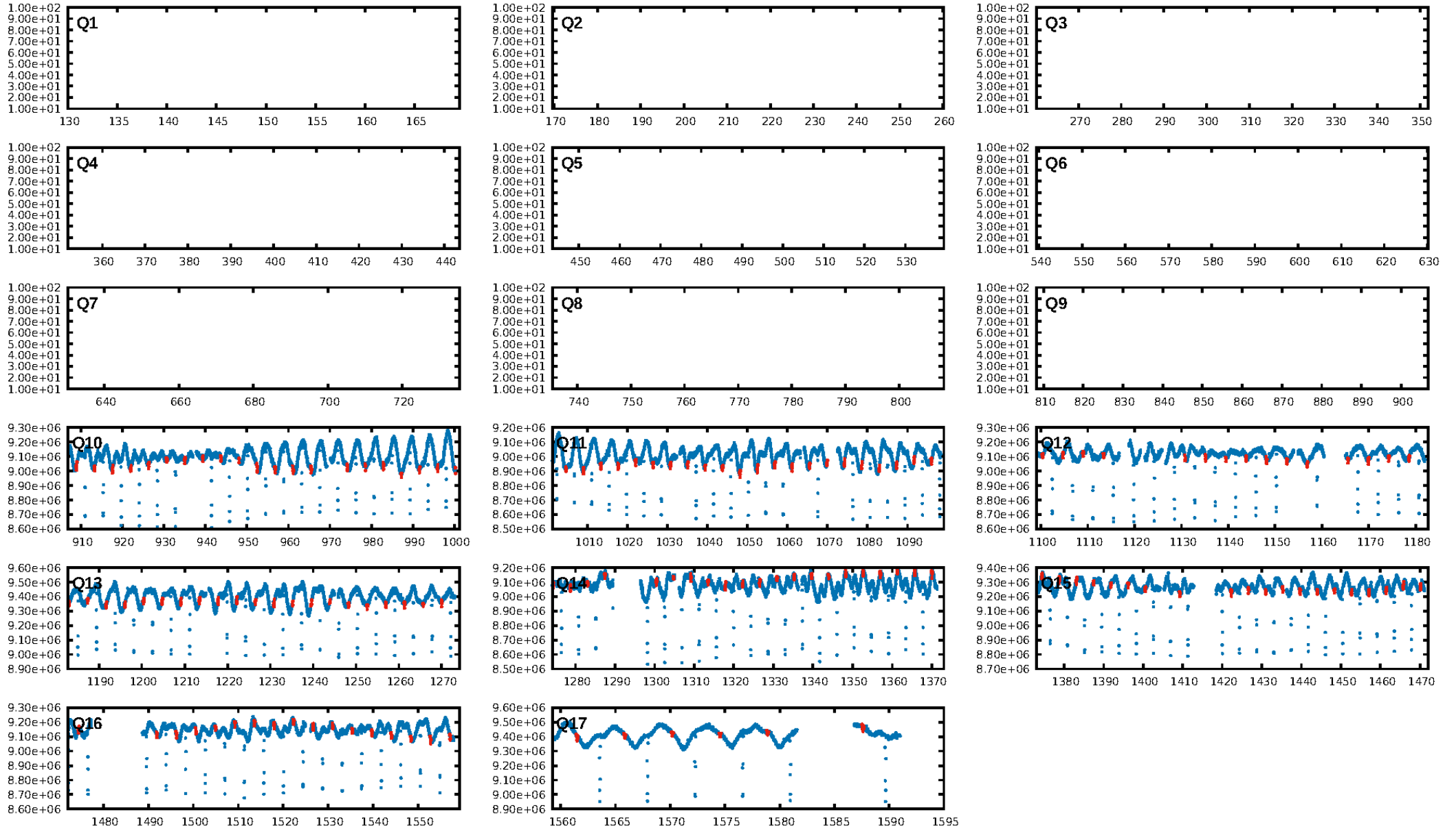
## DV Fit Results:

Period = 4.35047 [0.00000] d  
Epoch = 134.5384 [0.0009] BKJD  
Rp/R\* = 0.0758 [0.0196]  
a/R\* = 6.60 [0.62]  
b = 0.97 [0.04]  
Seff = 1111.16 [404.48]  
Teff = 1472 [134] K  
Rp = 11.71 [4.53] Re  
a = 0.0551 [0.0129] AU  
Ag = 1.06 [0.83] [0.08σ]  
Teffp = 2312 [417] K [1.92σ]

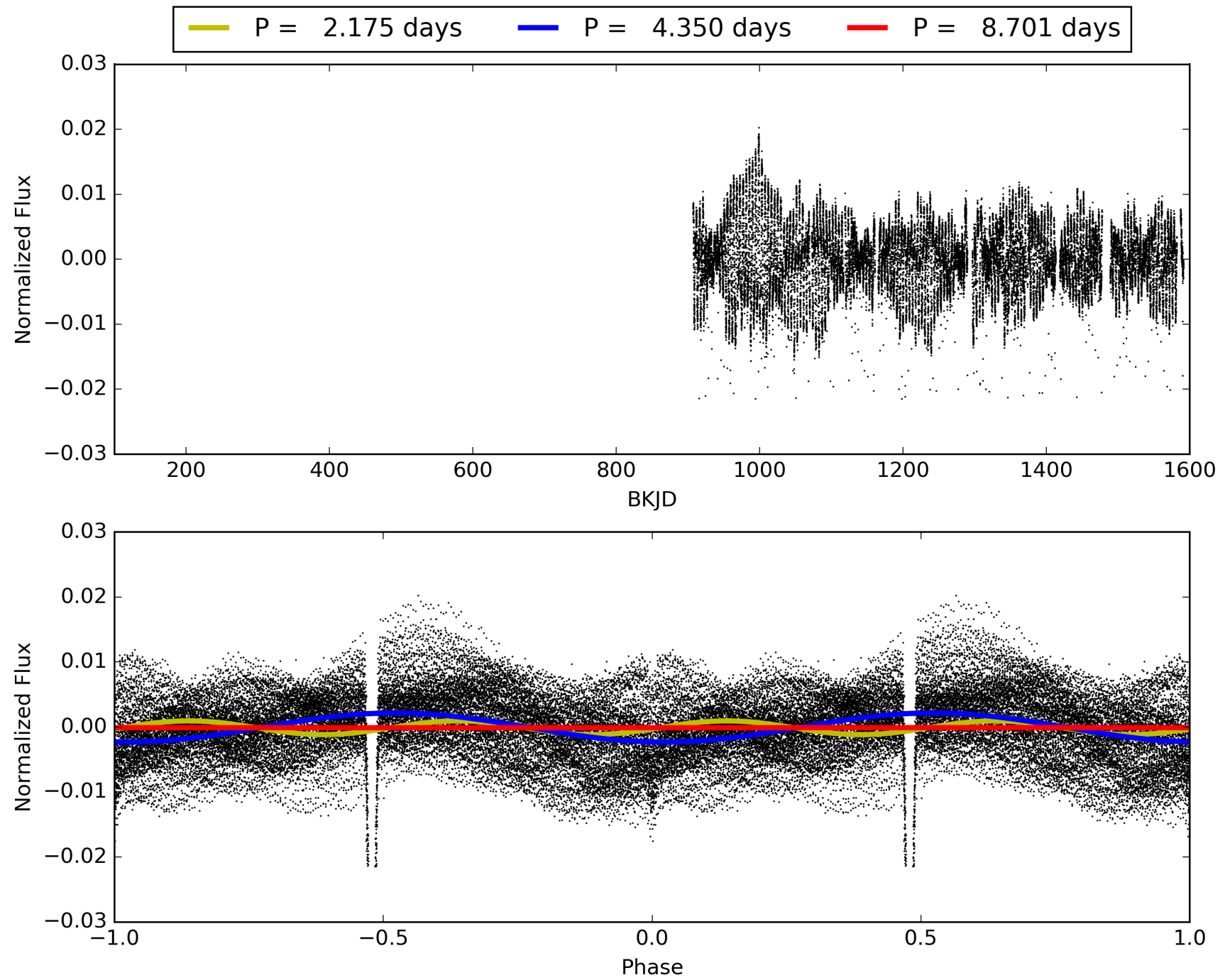
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 95.5%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [136/136]  
GhostDiagnostic-chr: 4.952  
Centroid-sig: 0.0%  
Centroid-so: 2.398 arcsec [25.65σ]  
OotOffset-rm: 9.681 arcsec [46.05σ]  
KicOffset-rm: 0.129 arcsec [1.46σ]  
OotOffset-st: 0.1/2/0 [3]  
KicOffset-st: 2/2/2/2 [8]  
DiffImageQuality-fgm: 1.00 [8/8]  
DiffImageOverlap-fno: 1.00 [8/8]

# TCE 005181804-02, PDC Light Curves



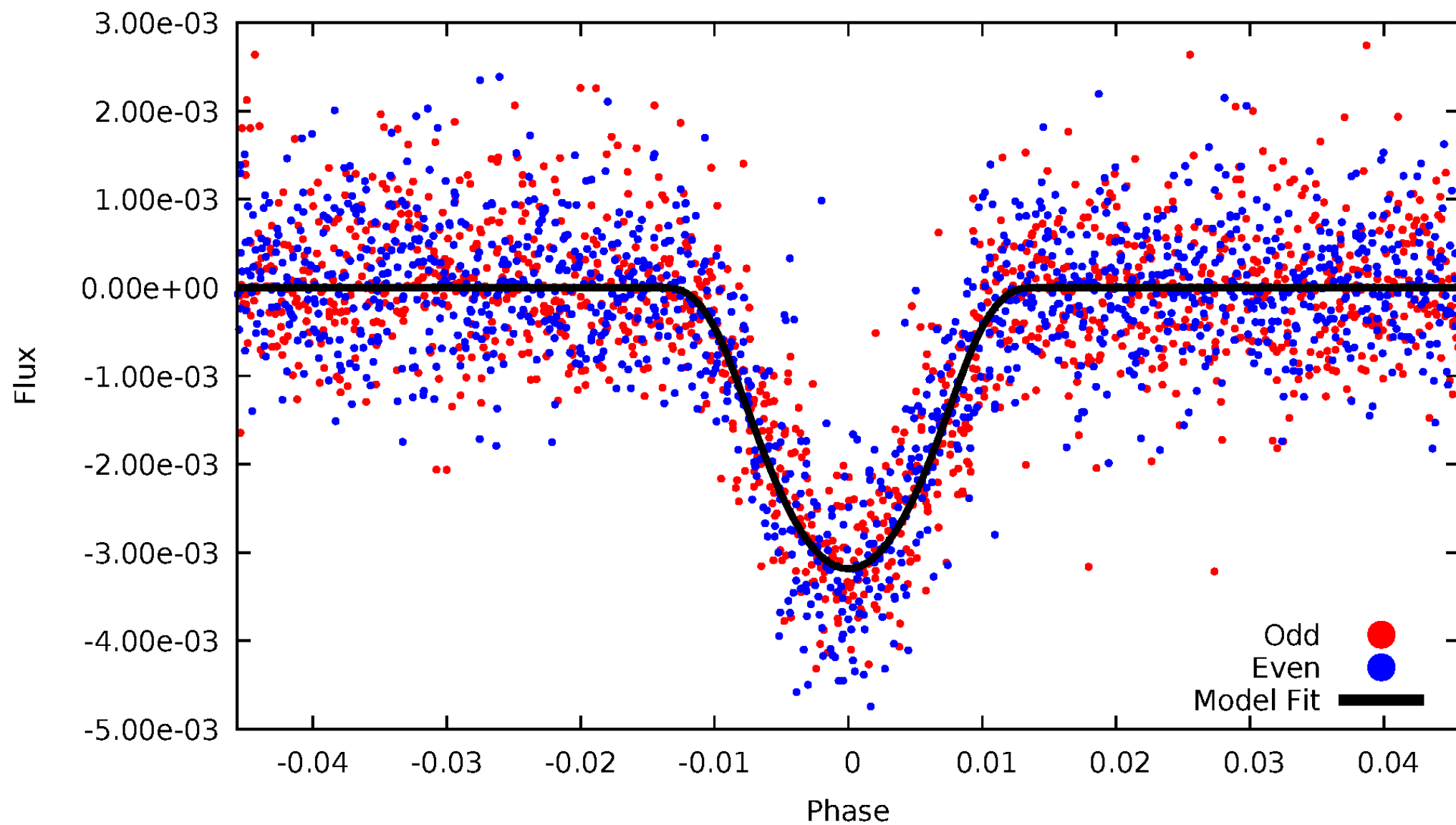
TCE 005181804-02





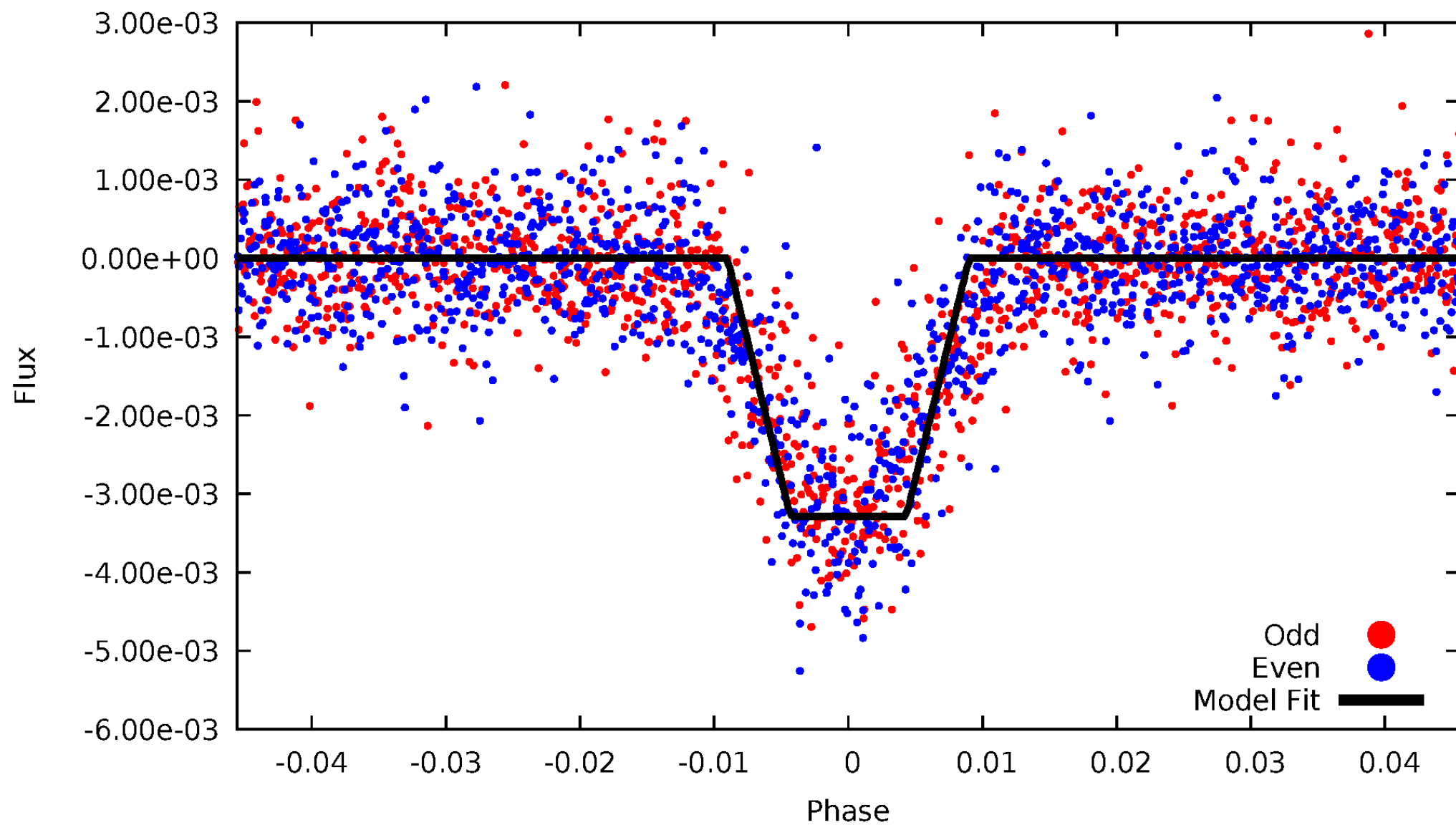
# DV Odd/Even

TCE 005181804-02



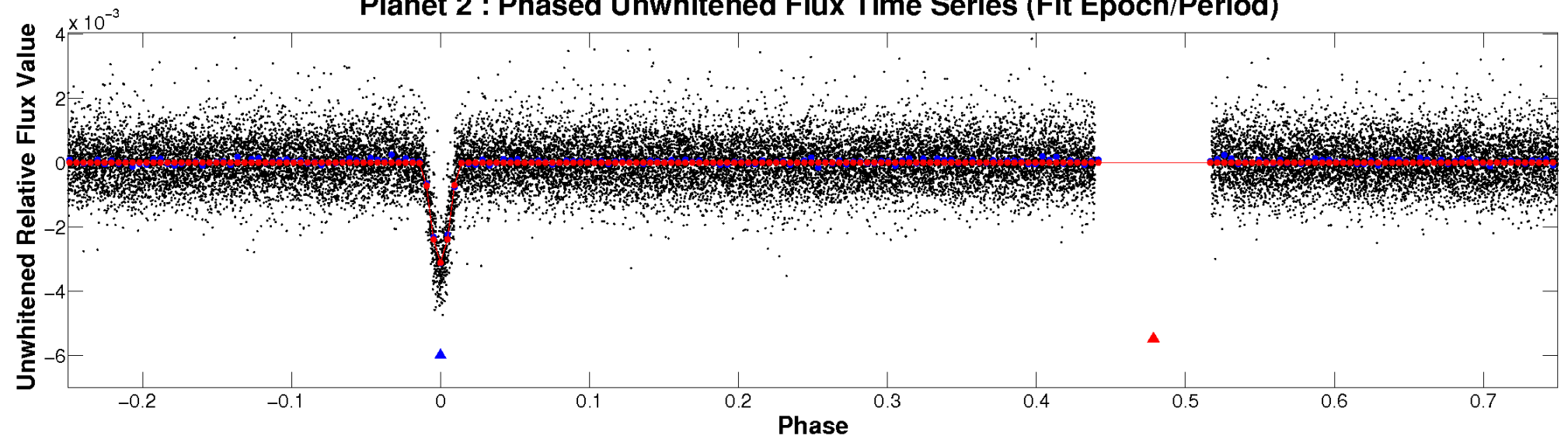
# ALT Odd/Even

TCE 005181804-02

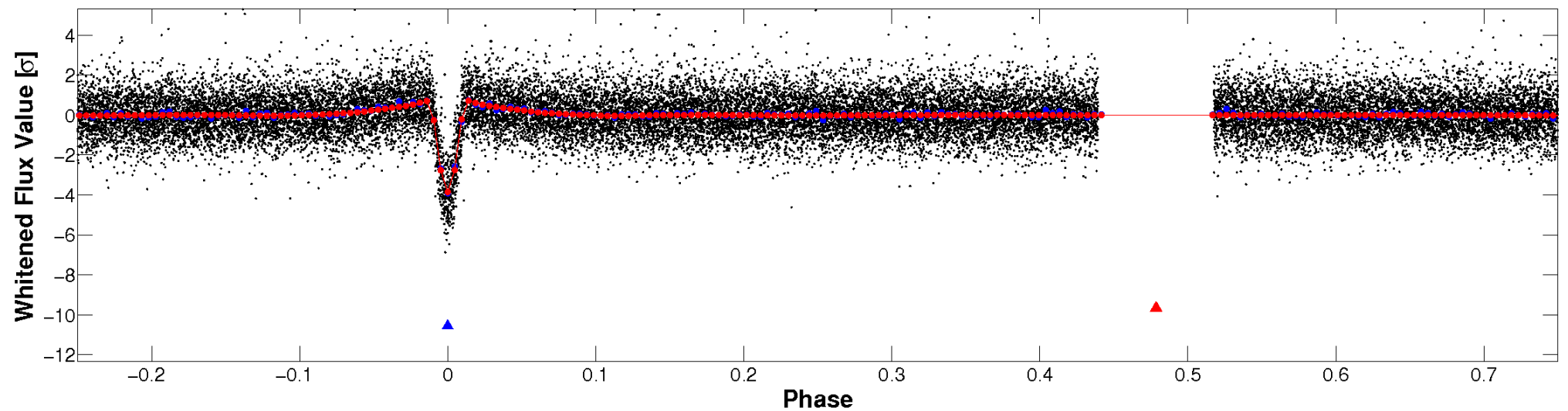


# Non-Whitened Vs. Whitened Light Curve

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

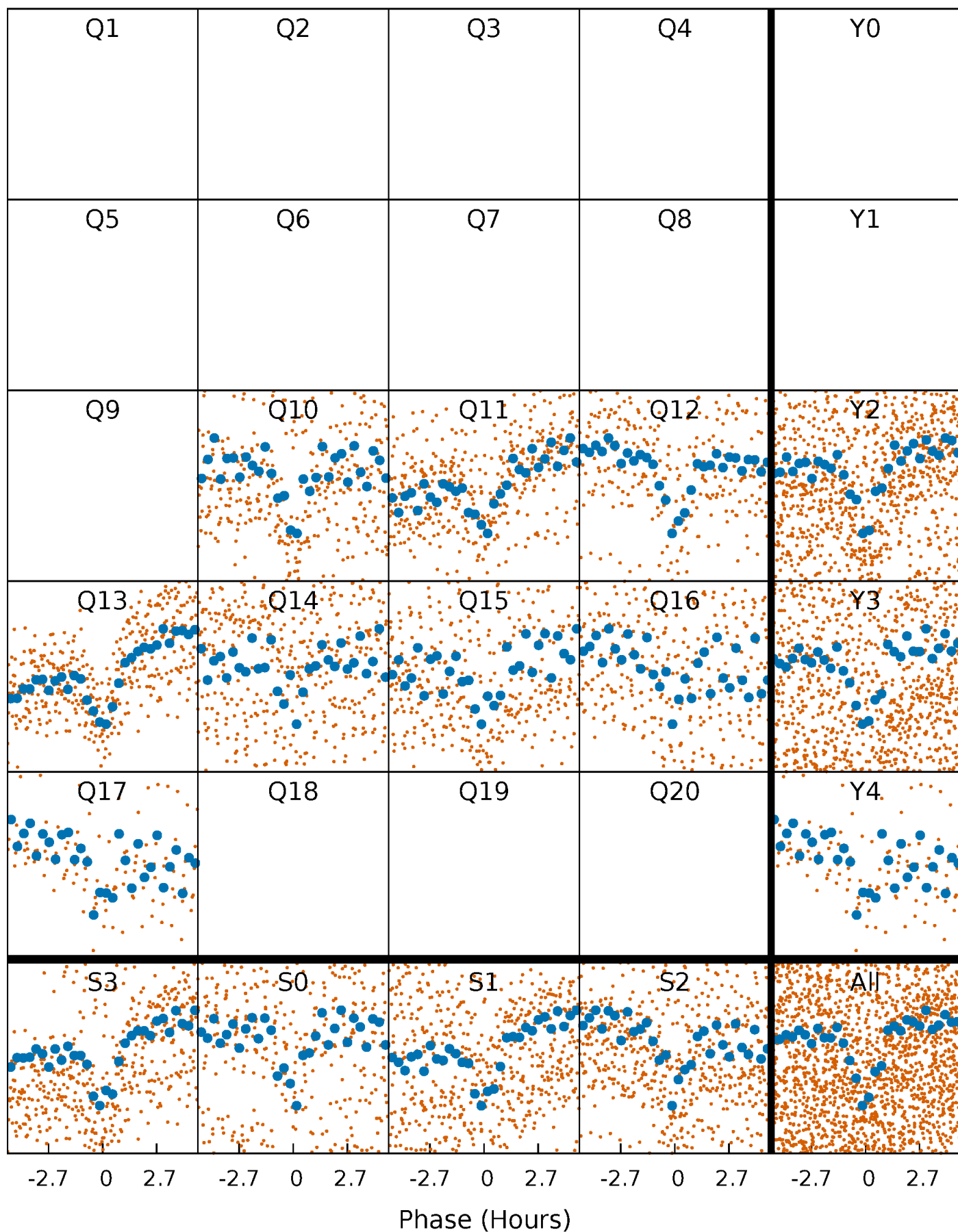


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



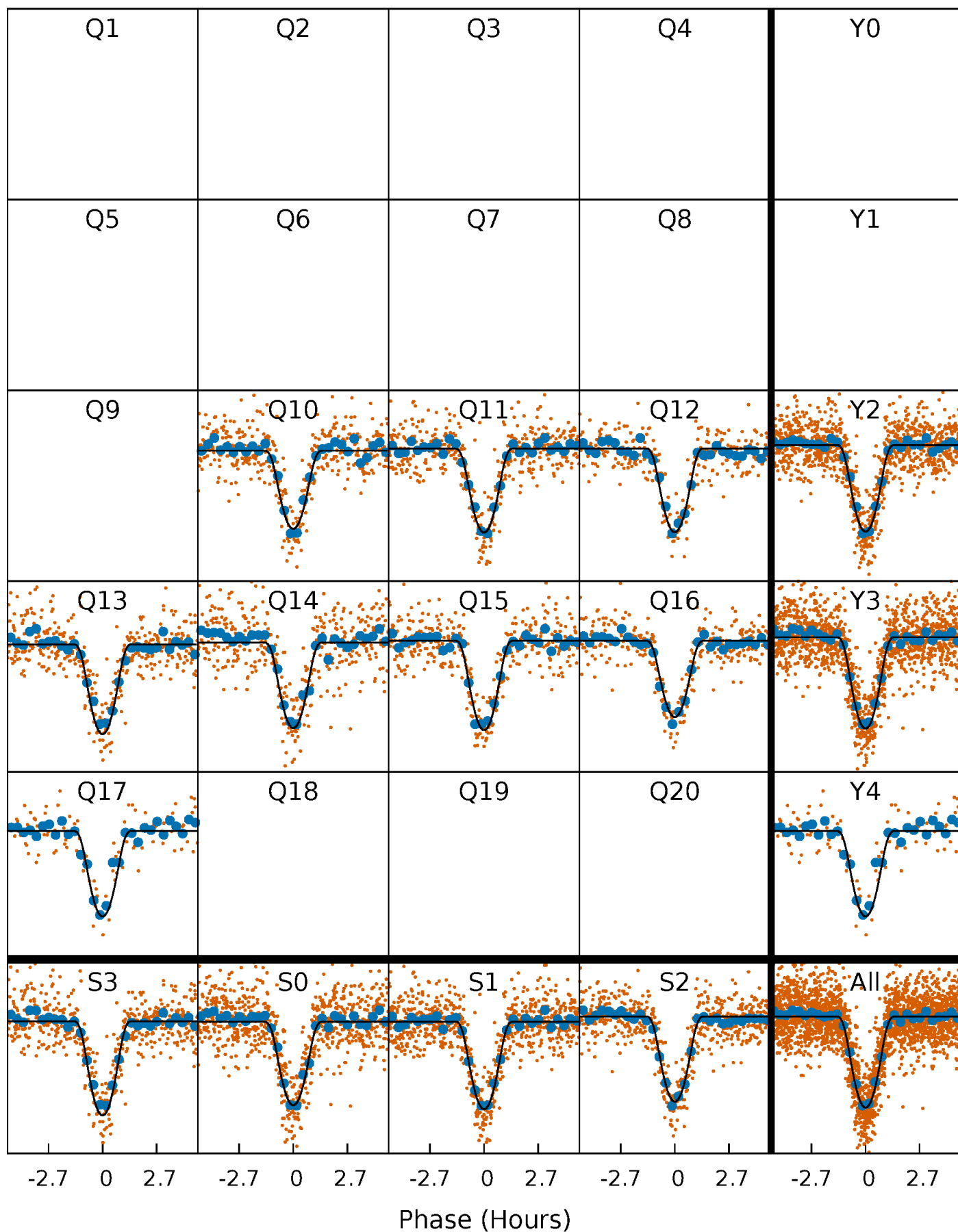
# PDC Quarter-Phased Transit Curves

TCE 005181804-02   P= 4.350472 Days    $T_0=134.538413$  (BKJD)



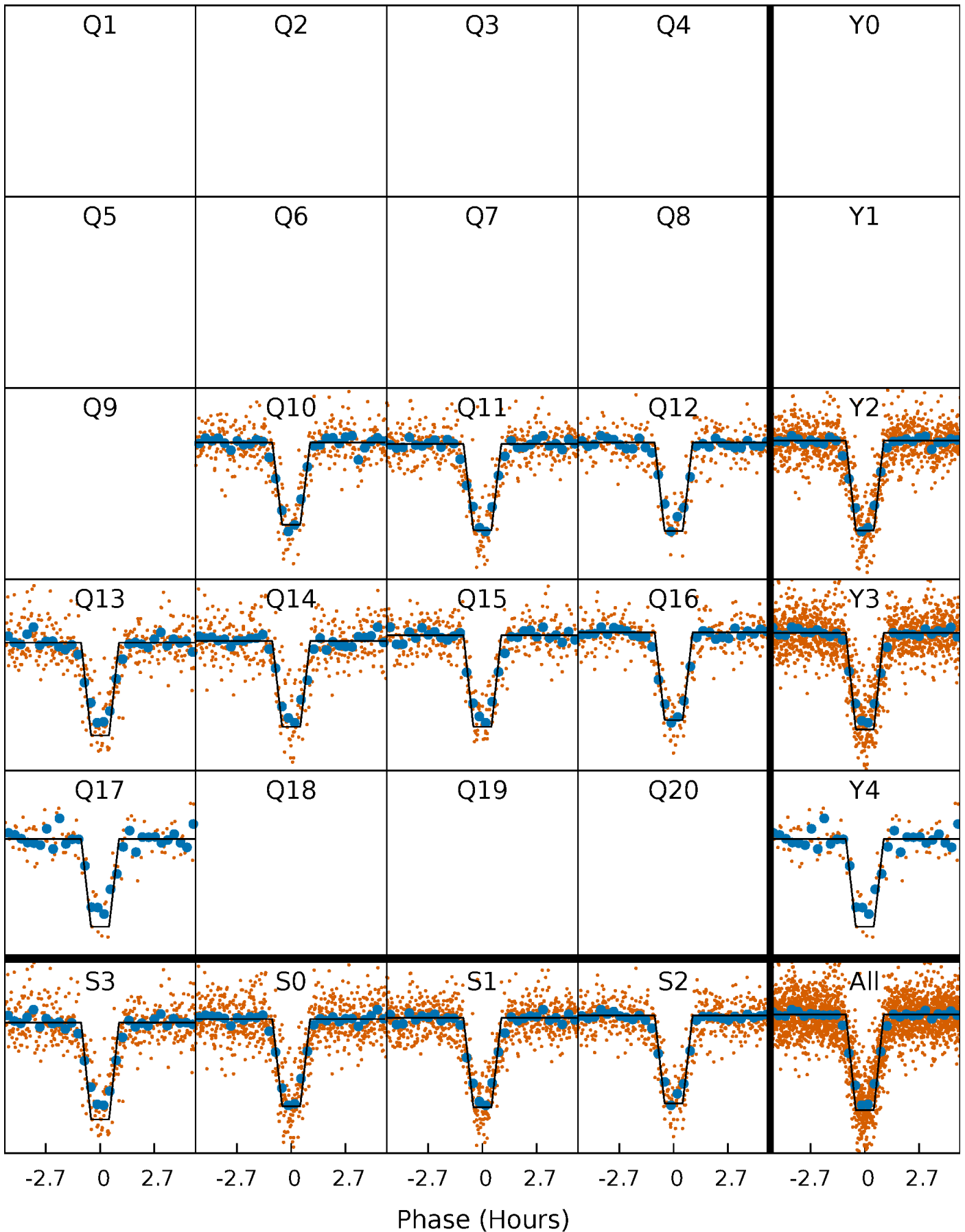
# DV Quarter-Phased Transit Curves

TCE 005181804-02   P= 4.350472 Days    $T_0=134.538413$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

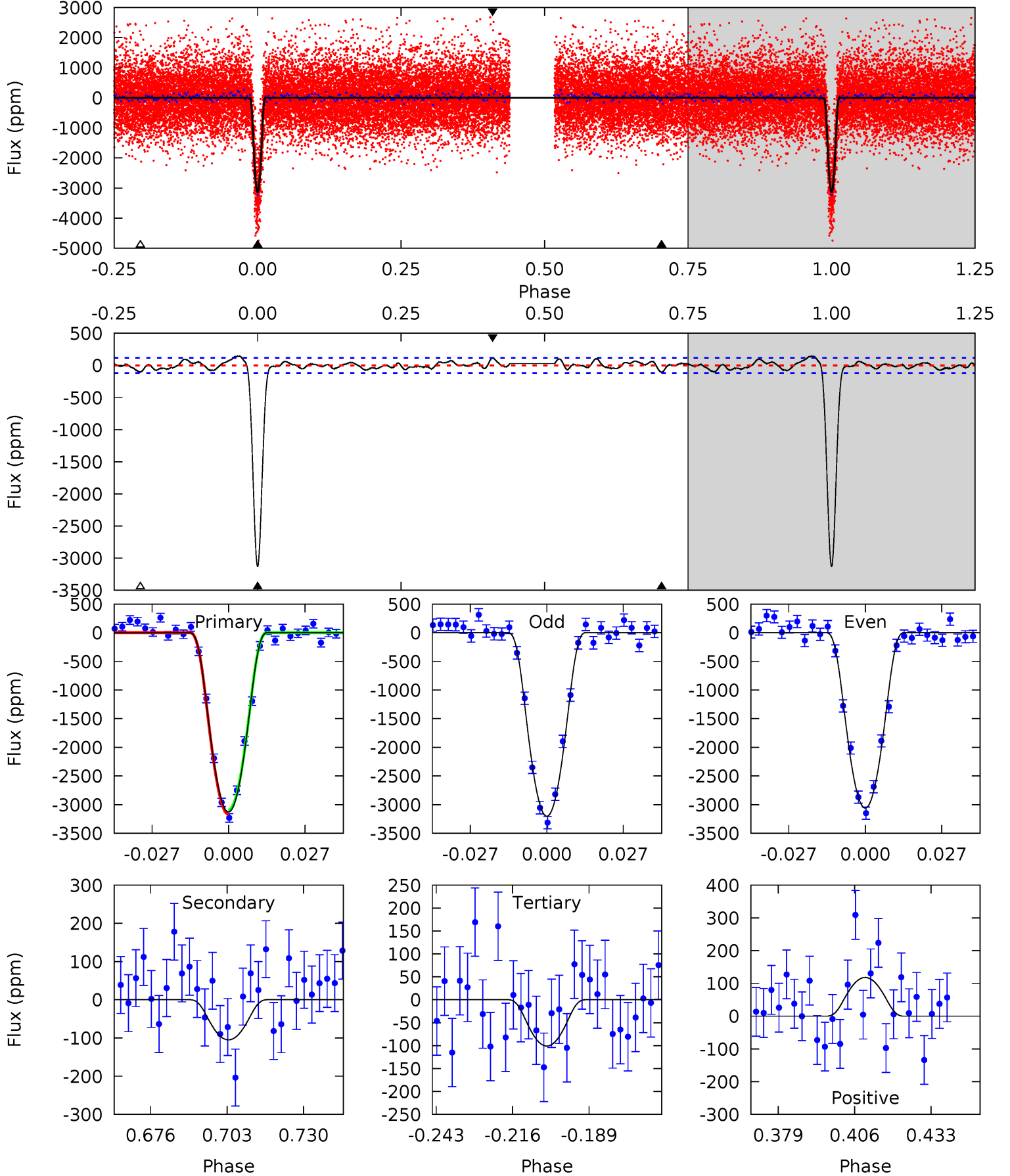
TCE 005181804-02     $P = 4.350433$  Days     $T_0 = 134.548277$  (BKJD)



# DV Model-Shift Uniqueness Test

005181804-02, P = 4.350472 Days, E = 134.538413 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
128.1	4.30	4.13	4.83	4.83	2.21	1.90	123.9	123.2	0.17	-0.53	2.92	0.98	0.04	1.43

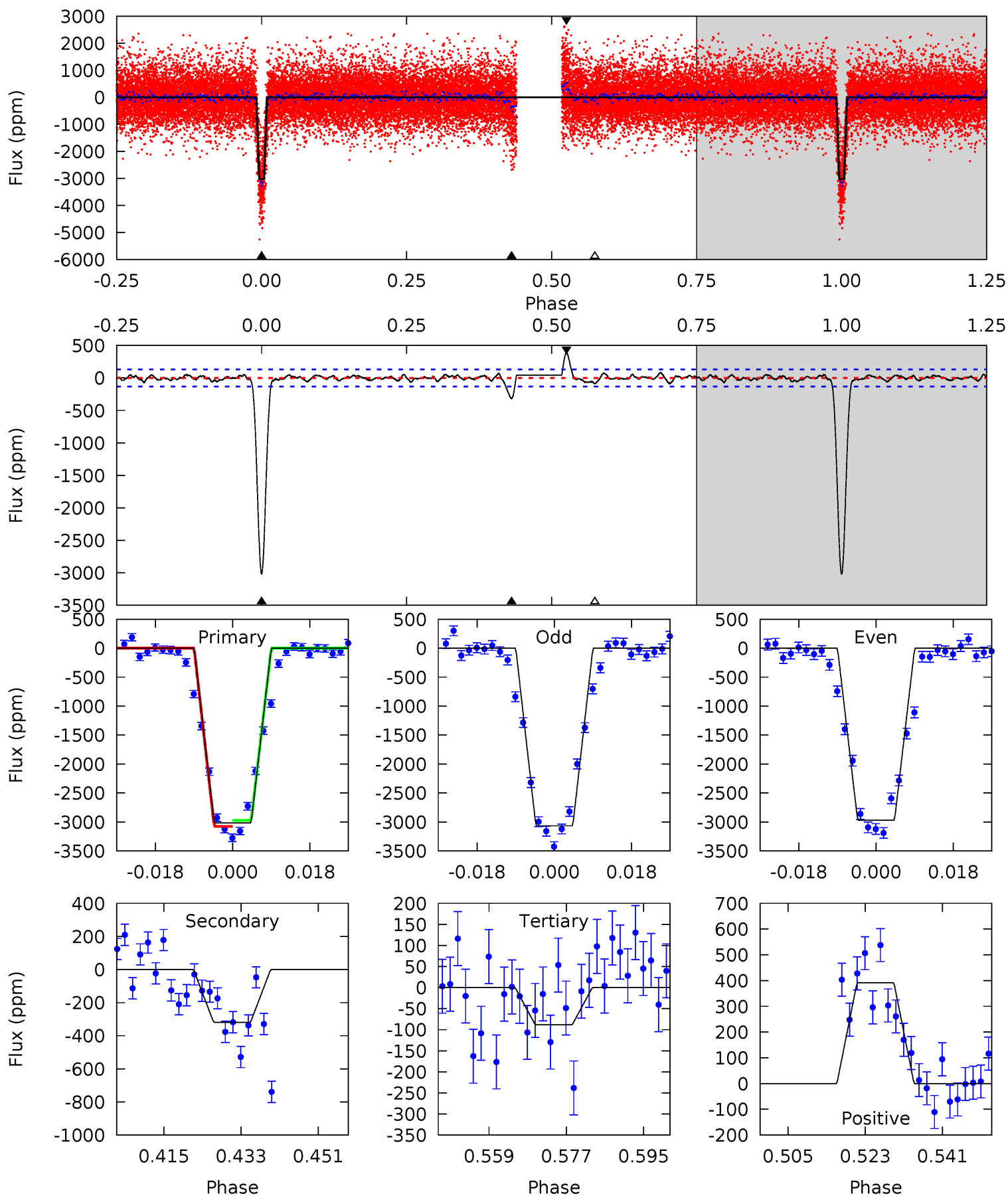




# Alt Model-Shift Uniqueness Test

005181804-02, P = 4.350433 Days, E = 134.548277 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
112.1	11.8	3.29	14.5	4.91	2.36	1.82	108.8	97.5	8.54	-2.72	1.78	0.98	0.11	1.96





### Stellar Parameters For KIC 005181804

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6585^{+185}_{-254}$	$4.208^{+0.175}_{-0.175}$	$-0.300^{+0.250}_{-0.300}$	$1.416^{+0.406}_{-0.332}$	$1.185^{+0.185}_{-0.185}$	$0.588^{+0.532}_{-0.279}$
	+3%/-4%	+4%/-4%	+83%/-100%	+29%/-23%	+16%/-16%	+90%/-47%
Source	KIC0	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 005181804-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-105 \pm 24$	$11.82^{+3.68}_{-3.21}$	$2047^{+148}_{-141}$	$2921^{+338}_{-313}$	$1.269^{+1.168}_{-0.600}$
Alt.	$-319 \pm 27$	$8.81^{+3.62}_{-3.24}$	$2058^{+158}_{-144}$	$3952^{+702}_{-398}$	$6.811^{+10.157}_{-3.327}$

$T_{max}$  = 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

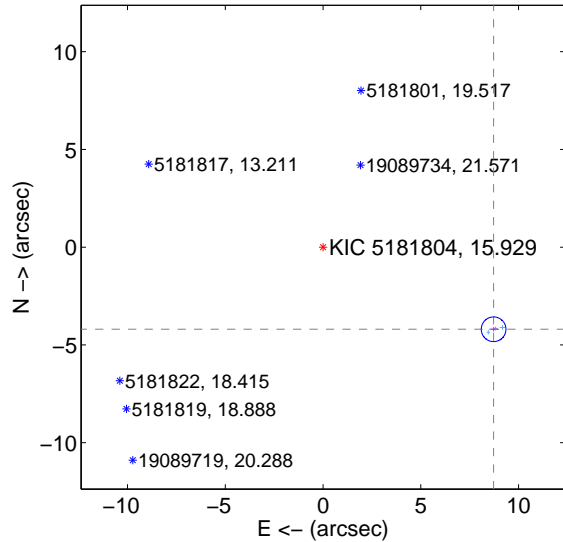
Supplemental centroid analysis for 005181804-02. Kepler magnitude: 15.93. Transit SNR 67.54

There are 8 quarters with good PRF difference image offsets

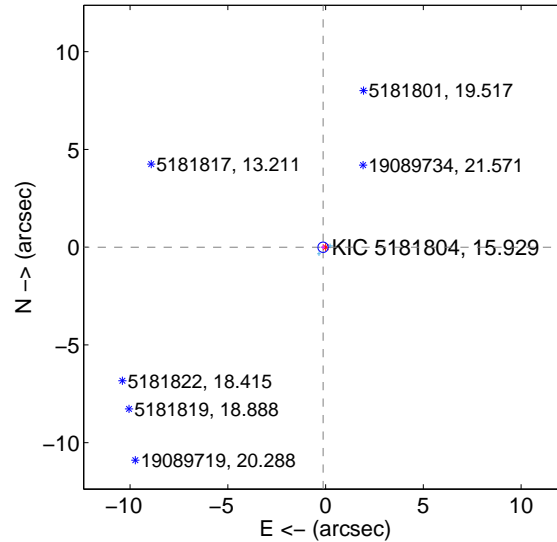
The OOT PRF centroid is offset from the target star catalog position by about 9.87 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$9.681 \pm 0.210$	46.05	$-8.723 \pm 0.227$	$-4.198 \pm 0.109$
PRF-fit source offset from KIC position	$0.129 \pm 0.088$	1.46	$0.129 \pm 0.088$	$-0.005 \pm 0.103$
photometric centroid source offset	$2.40 \pm 0.09$	25.65	$2.22 \pm 0.10$	$0.90 \pm 0.07$

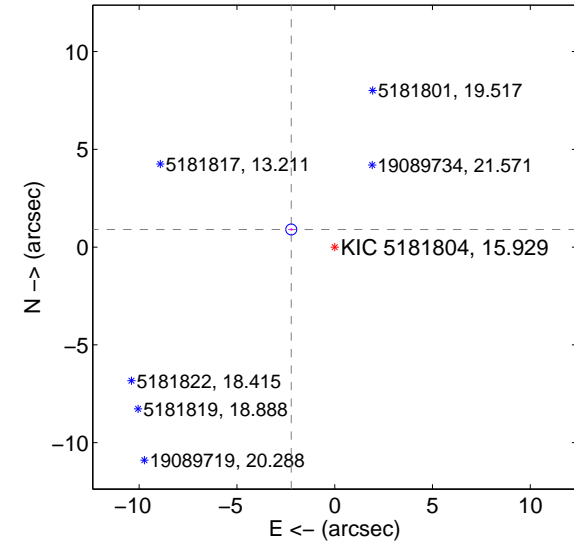
offset from difference PRF-fit to OOT PRF-fit



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.

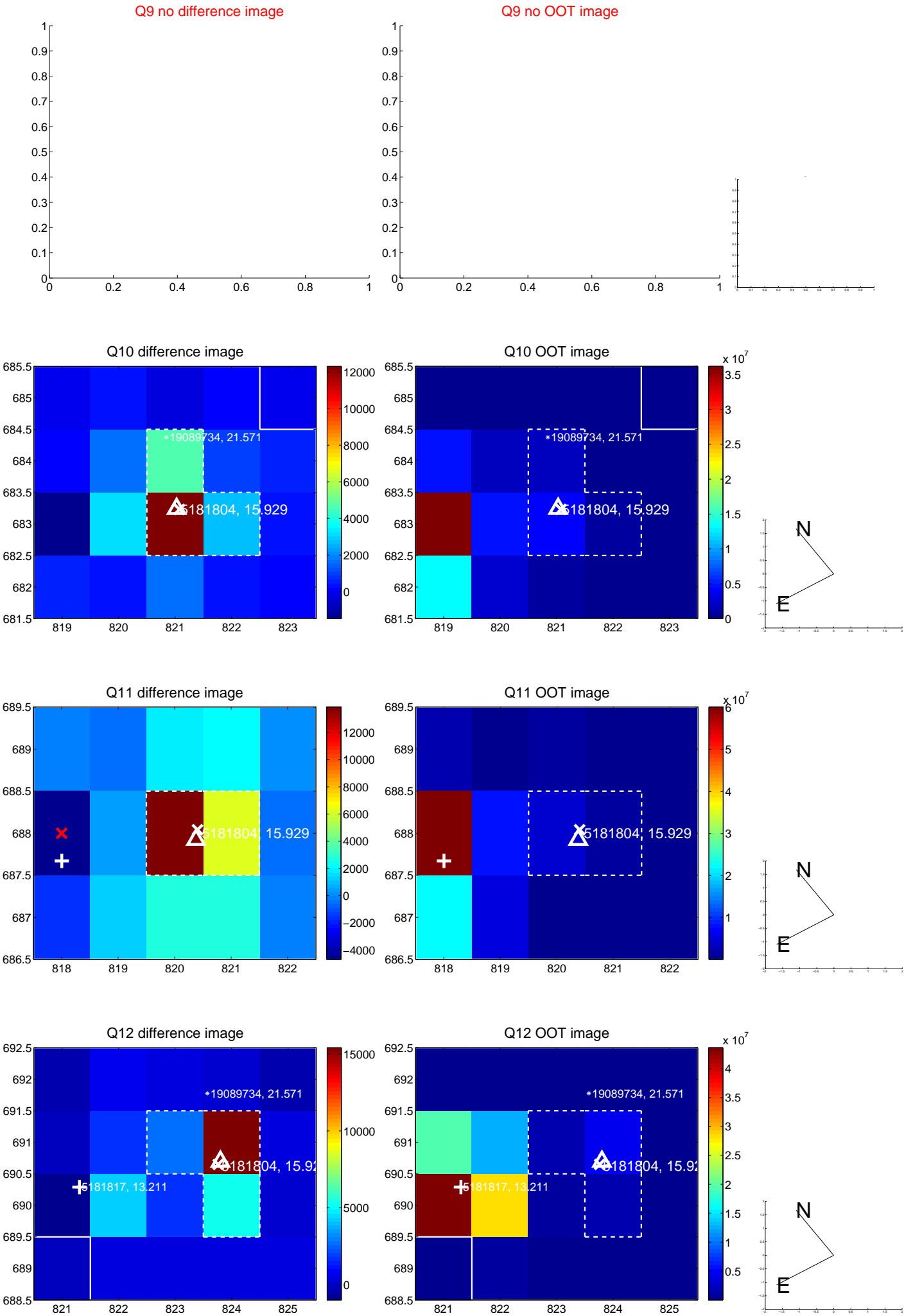
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



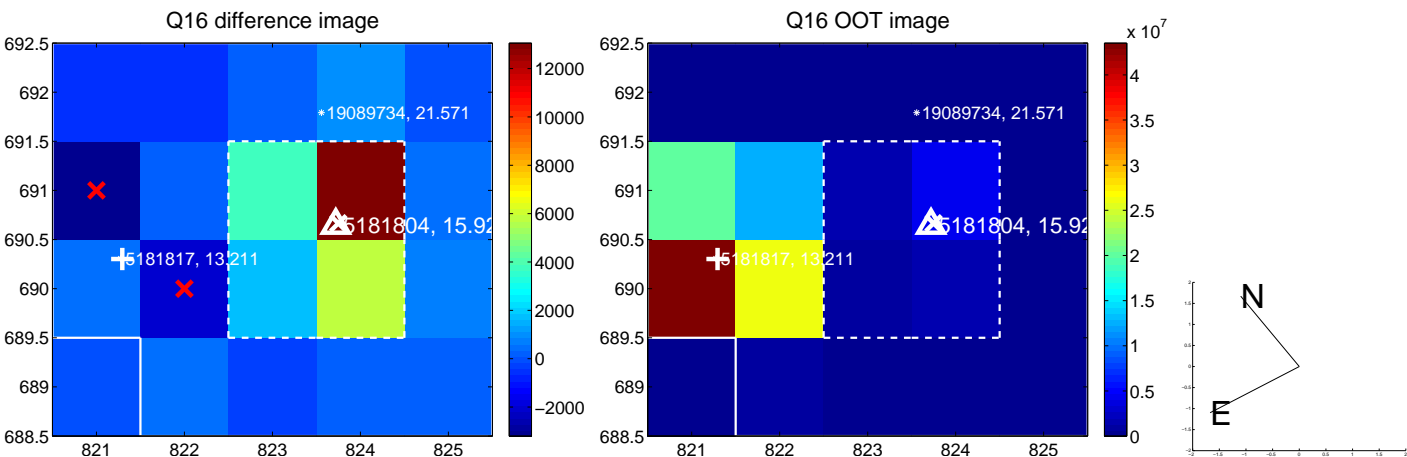
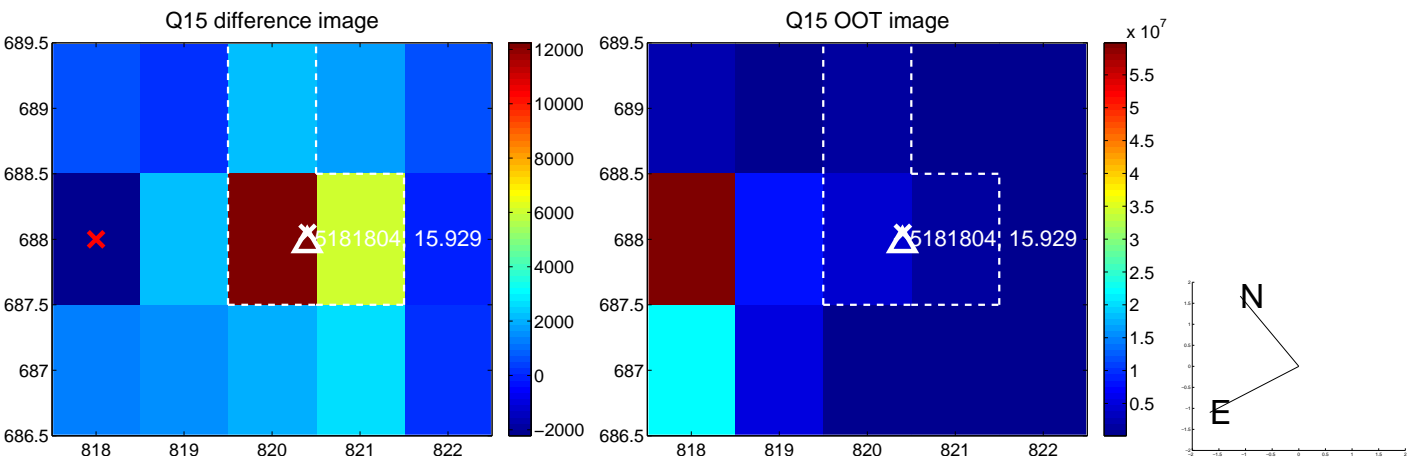
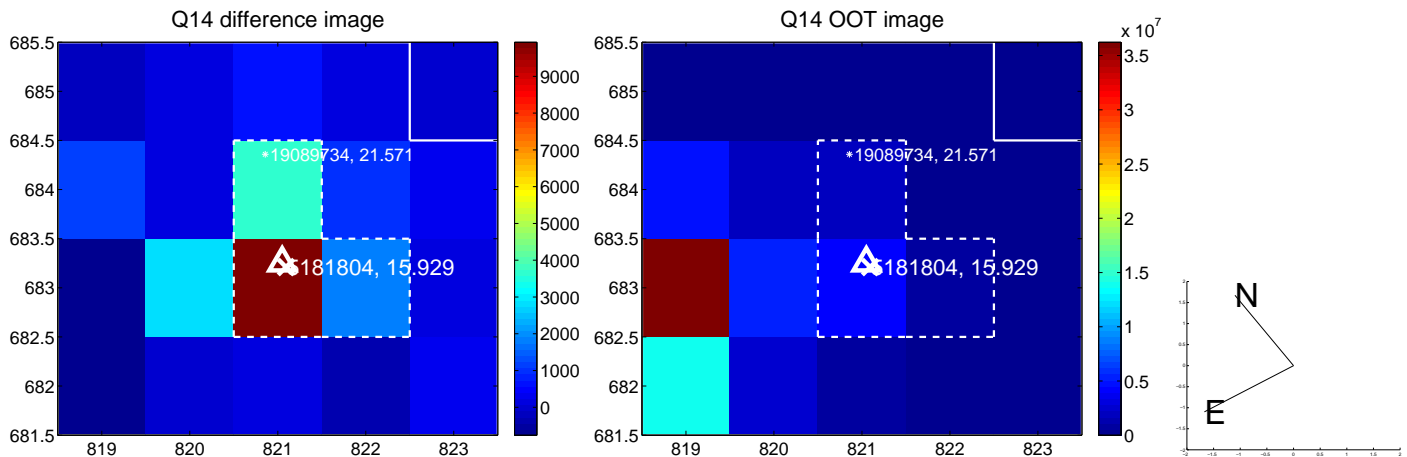
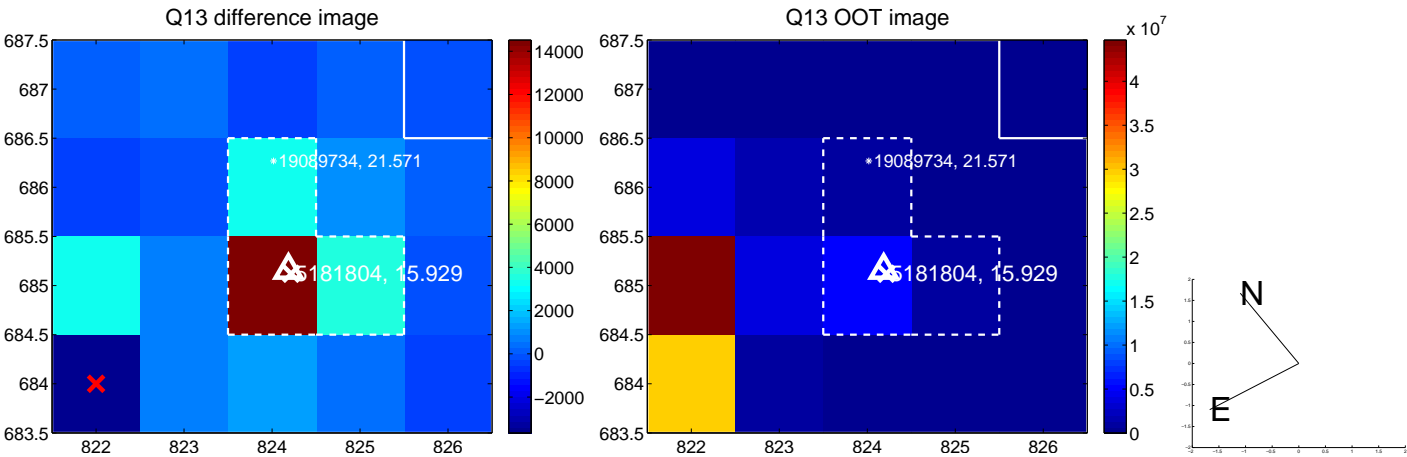
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



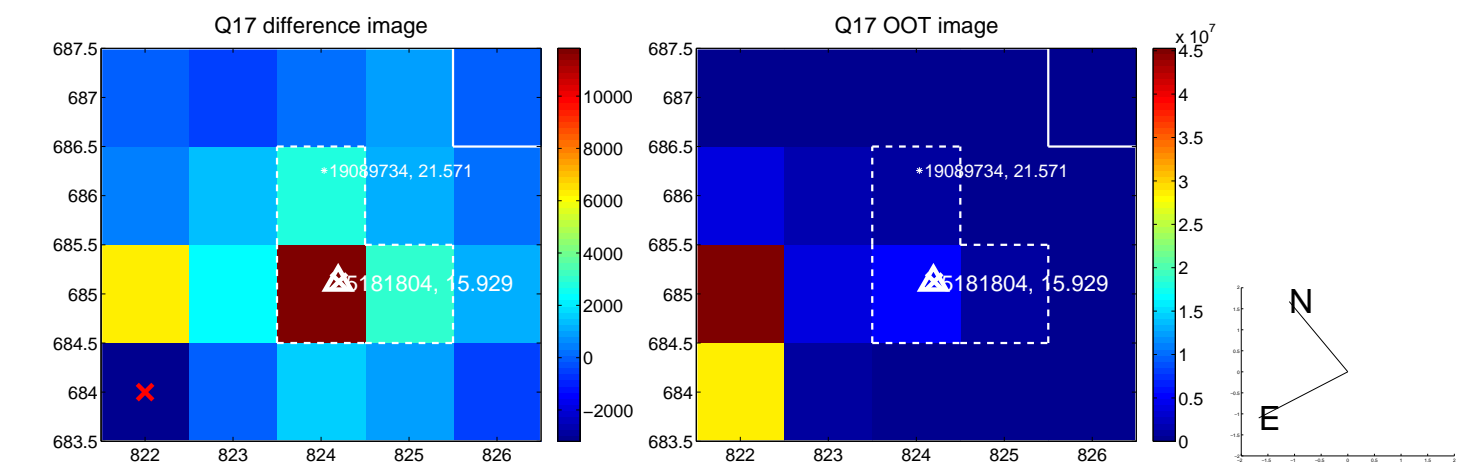
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



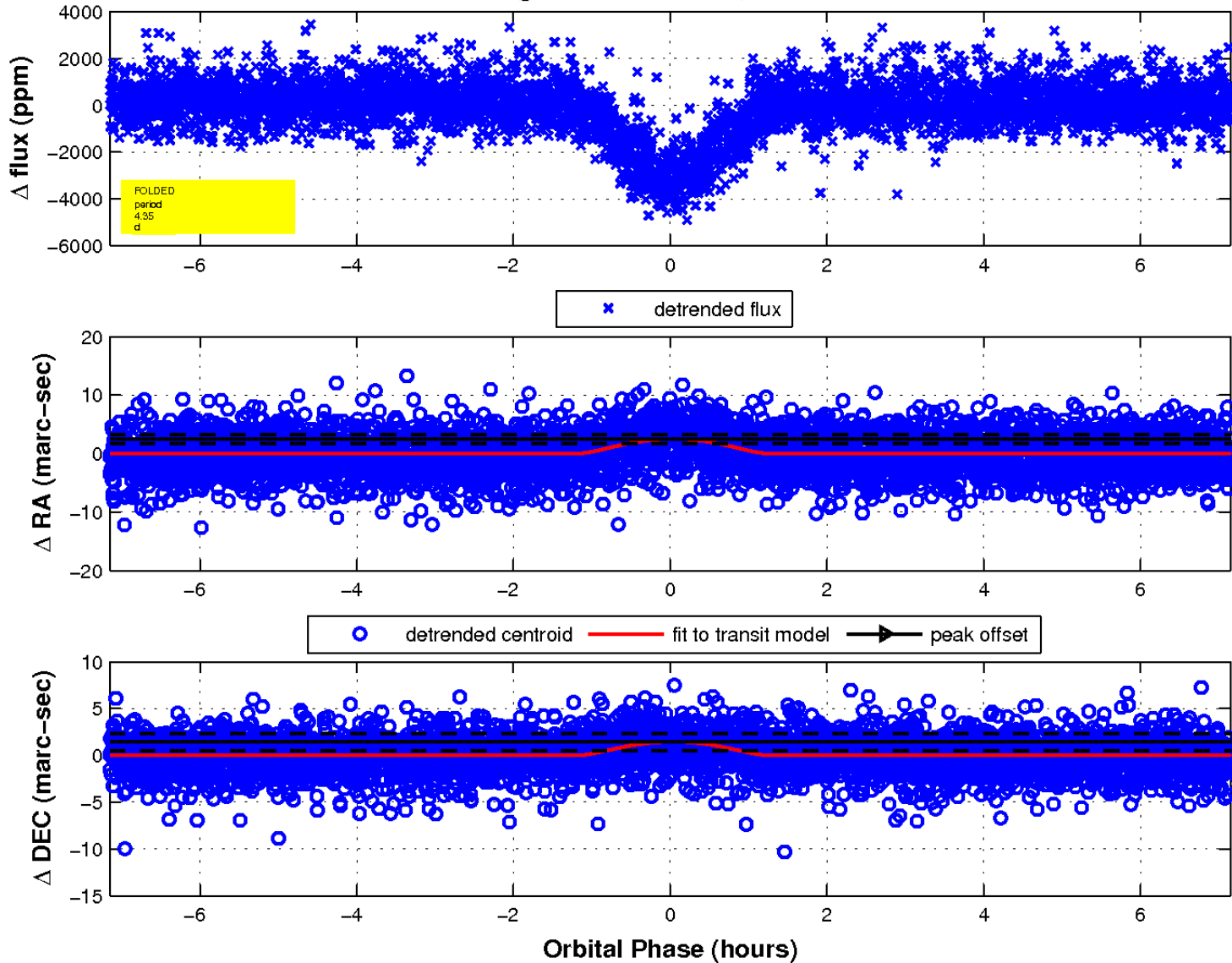
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

