

# KIC 010152836

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010152836-01	OBS	3952.01	220.930178	277.111155	74244.8	11.688	919.6	818.3	0.94	5893	25.65	1.89
010152836-02	OBS	No	220.929185	240.818378	2461.1	7.380	59.8	57.4	0.94	5893	5.28	1.89

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010152836-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
010152836-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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.

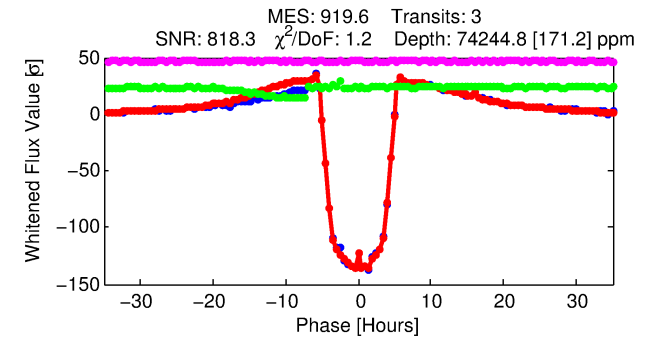
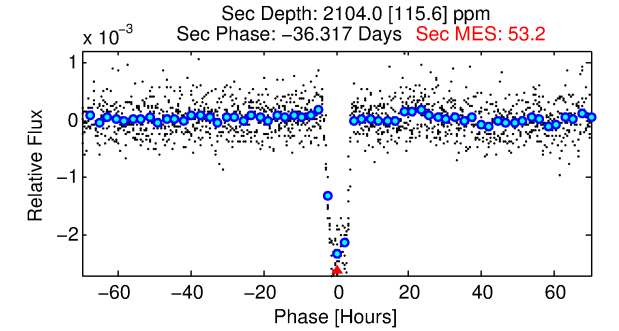
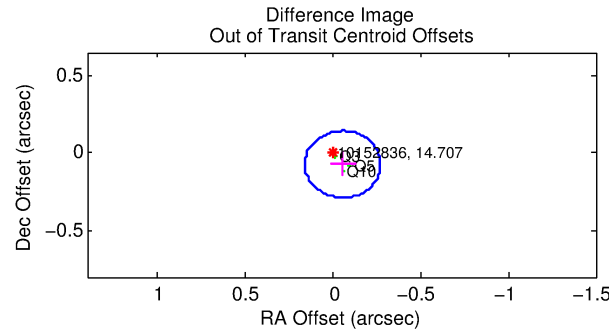
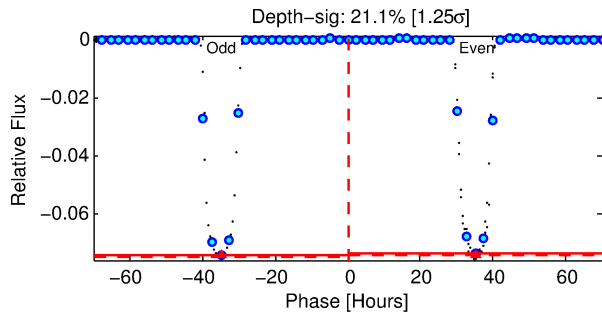
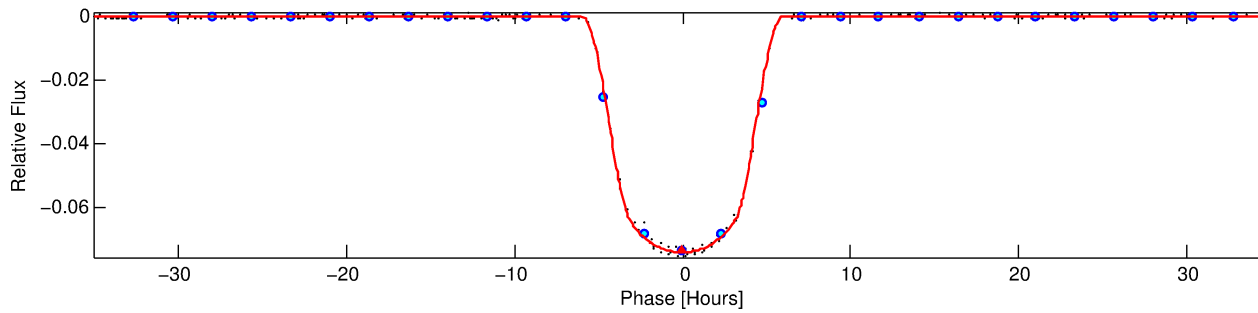
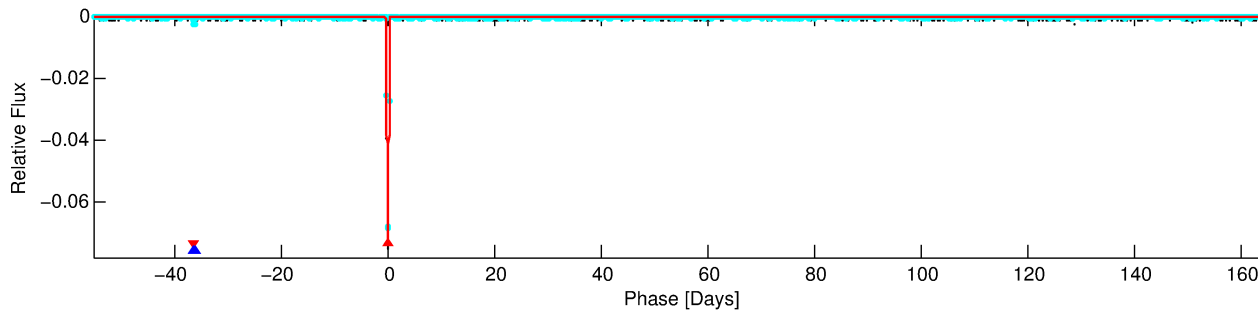
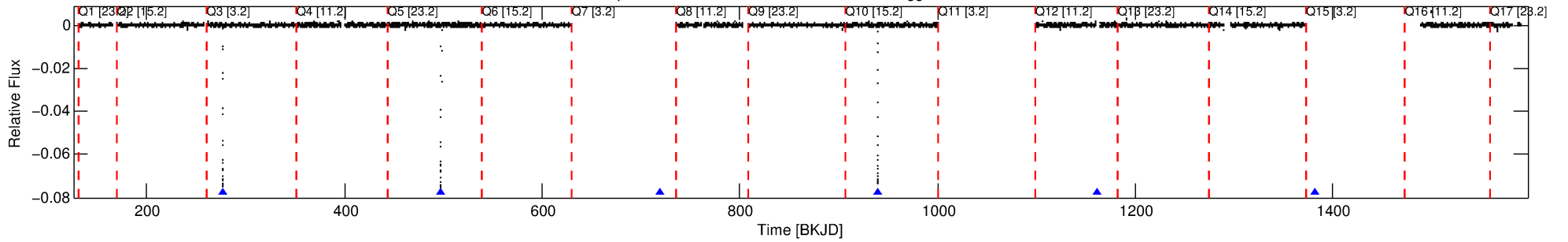
## Ephemeris Match Information For 010152836-01

No Significant Match Found

# DV One-Page Summary

KIC: 10152836 Candidate: 1 of 2 Period: 220.930 d  
KOI: K03952 Corr: No Ephemeris Match

Kp: 14.71 R\*: 0.94 Rs Teff: 5893.0 K Logg: 4.48 Fe/H: -0.120



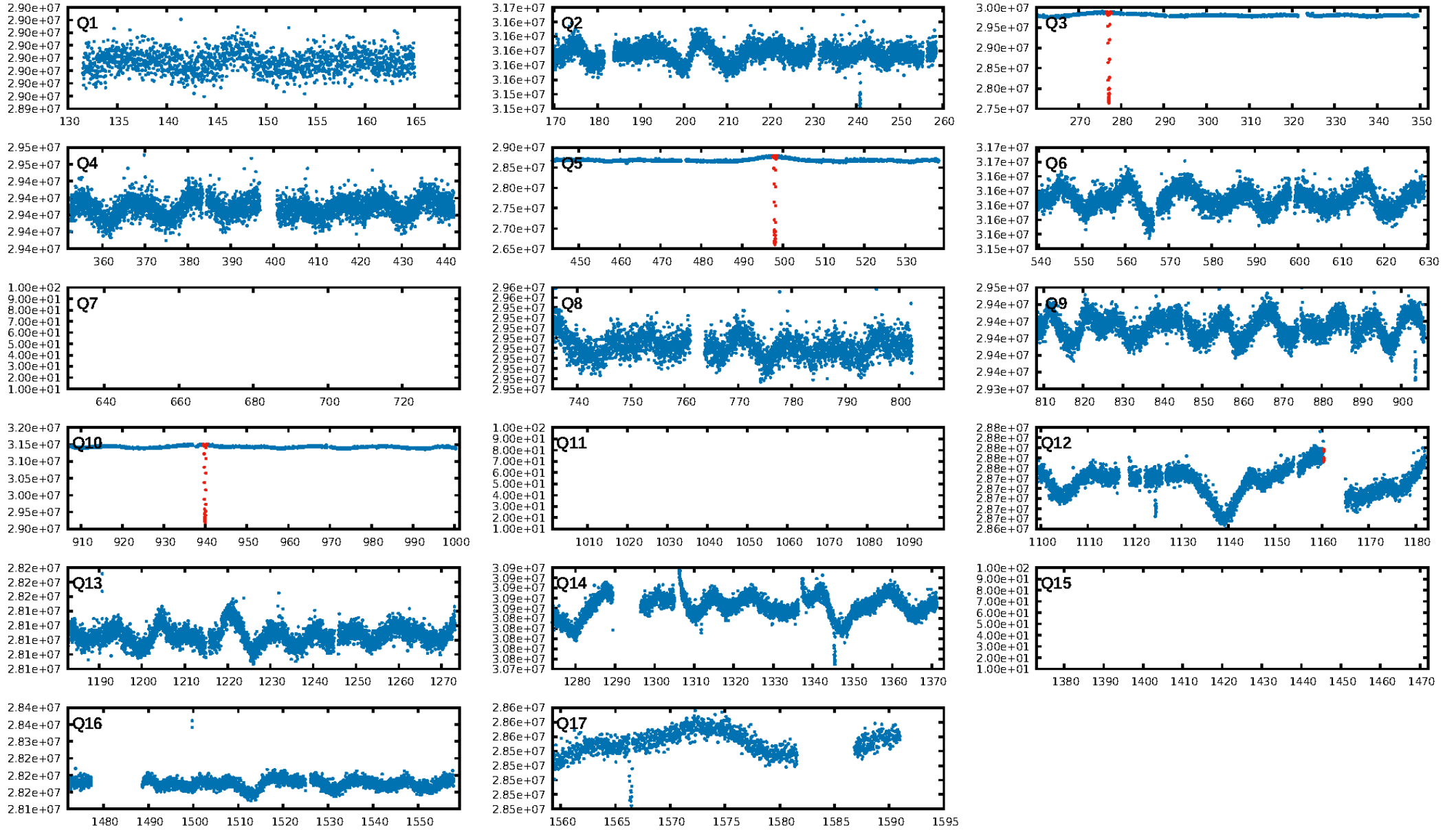
## DV Fit Results:

Period = 220.93018 [0.00018] d  
Epoch = 277.1112 [0.0003] BKJD  
Rp/R\* = 0.2498 [0.0004]  
a/R\* = 178.61 [0.86]  
b = 0.18 [0.03]  
Seff = 1.89 [0.75]  
Teq = 299 [30] K  
Rp = 25.65 [7.85] Re  
a = 0.7111 [0.1842] AU  
Ag = 889.67 [340.65] [2.61σ]  
Teffp = 2525 [83] K [25.24σ]

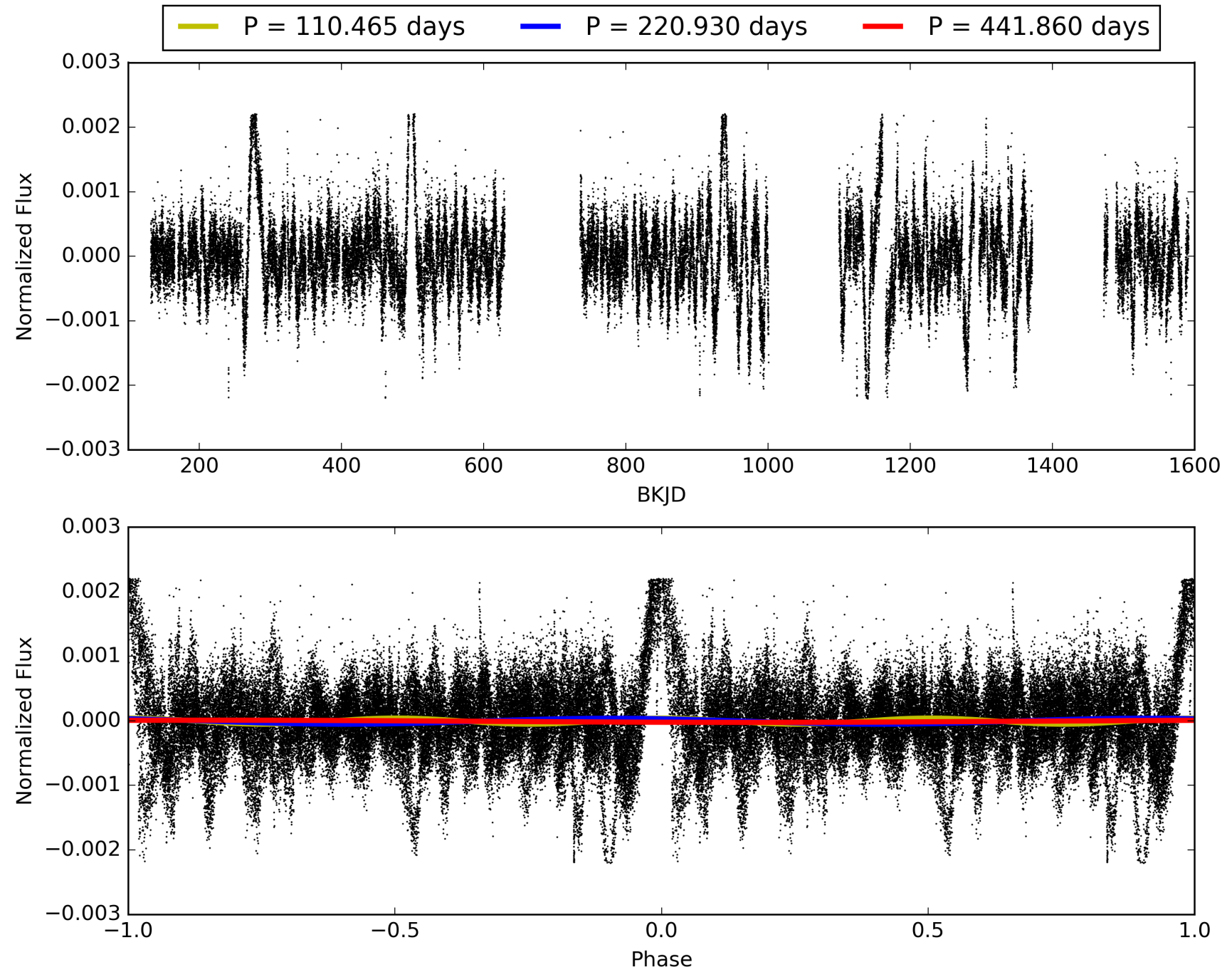
## DV Diagnostic Results:

ShortPeriod-sig: 0.1% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 69.1%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 5.212  
Centroid-sig: 0.0%  
Centroid-so: 0.305 arcsec [33.83σ]  
OotOffset-rm: 0.092 arcsec [1.28σ]  
OotOffset-st: 1/1/0/1 [3]  
KicOffset-rm: 0.118 arcsec [1.50σ]  
KicOffset-st: 1/1/0/1 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 010152836-01, PDC Light Curves

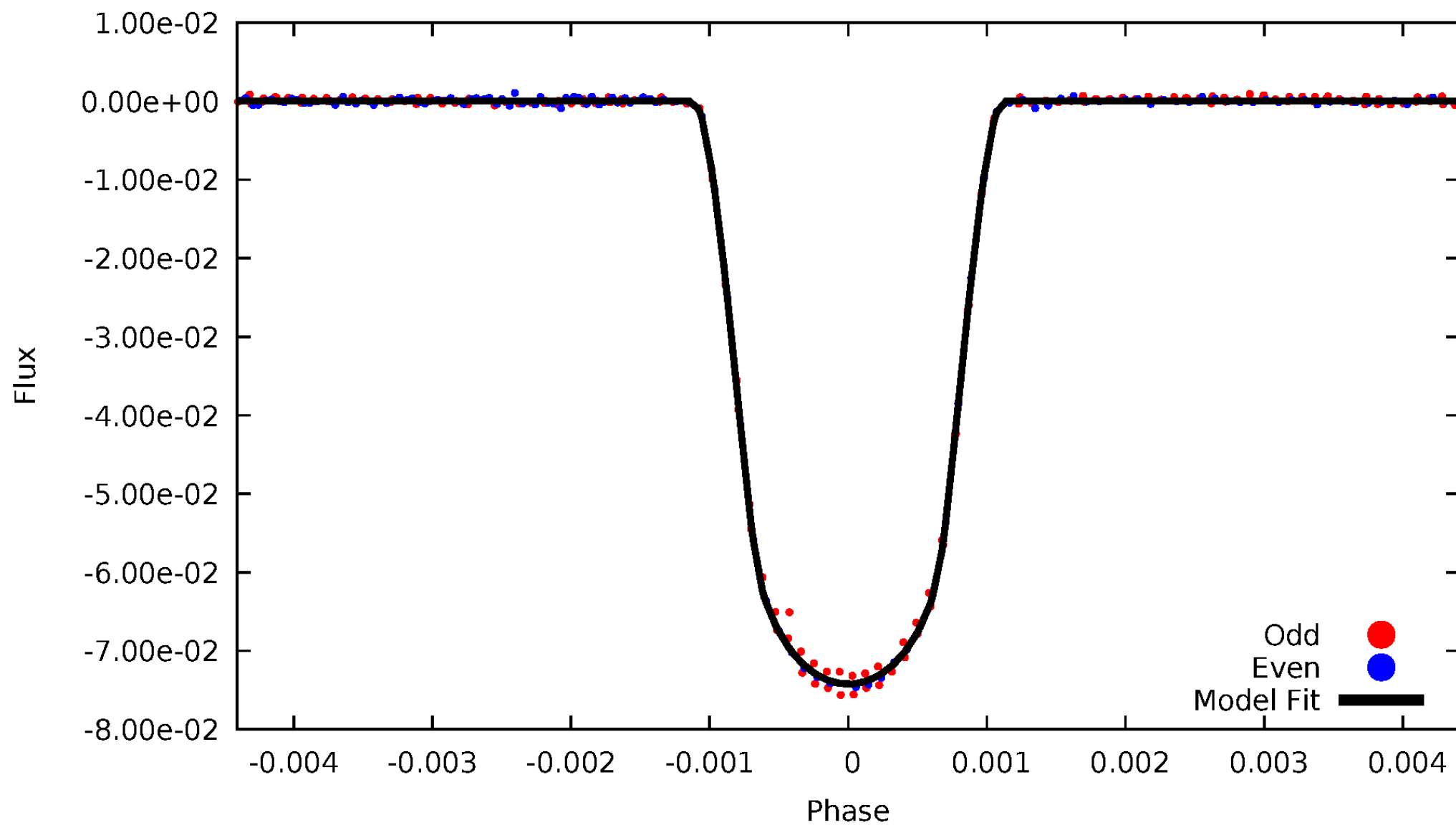


# TCE 010152836-01



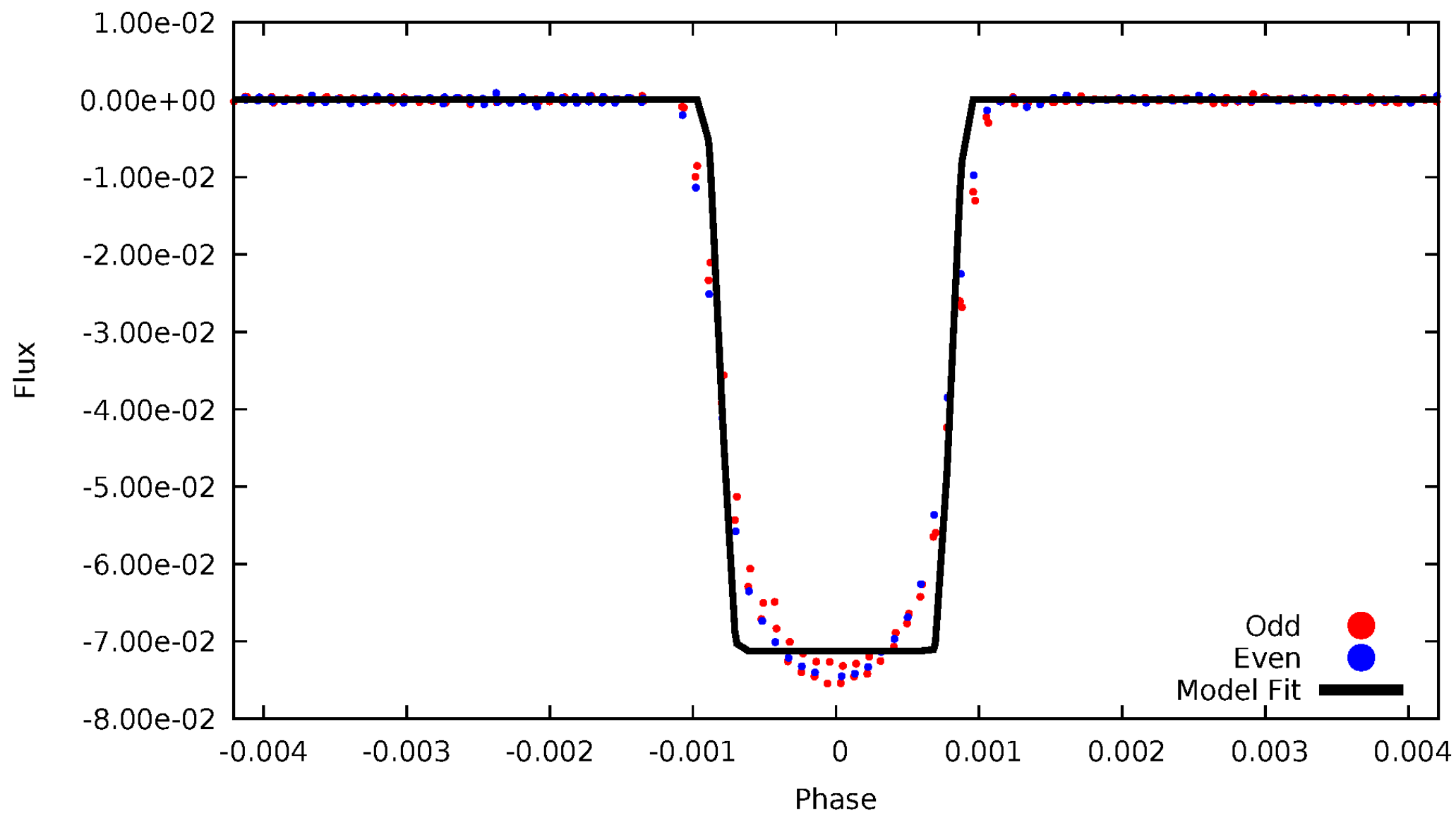
# DV Odd/Even

TCE 010152836-01



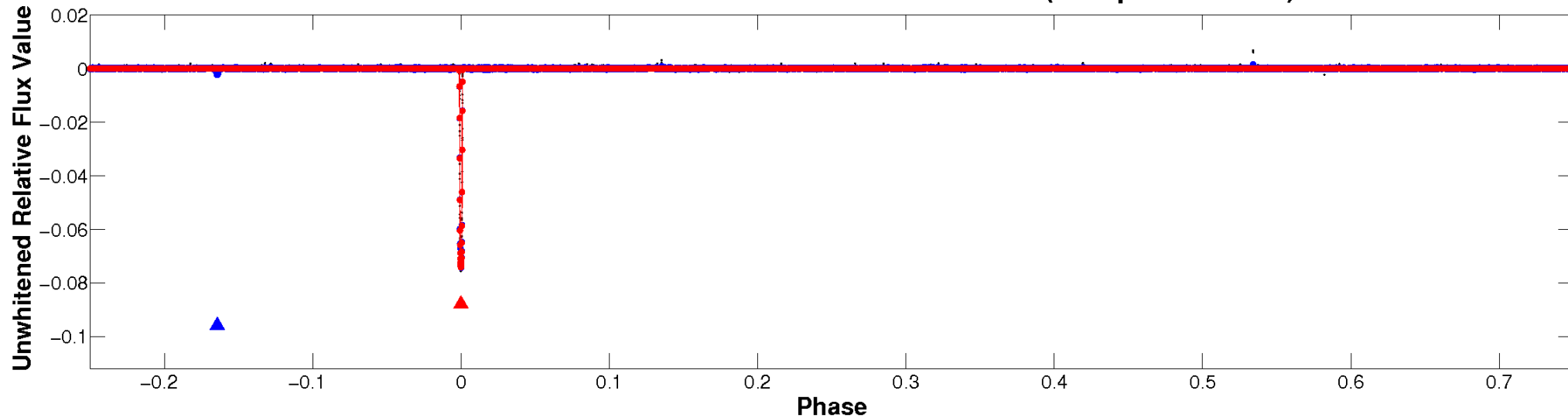
# ALT Odd/Even

TCE 010152836-01

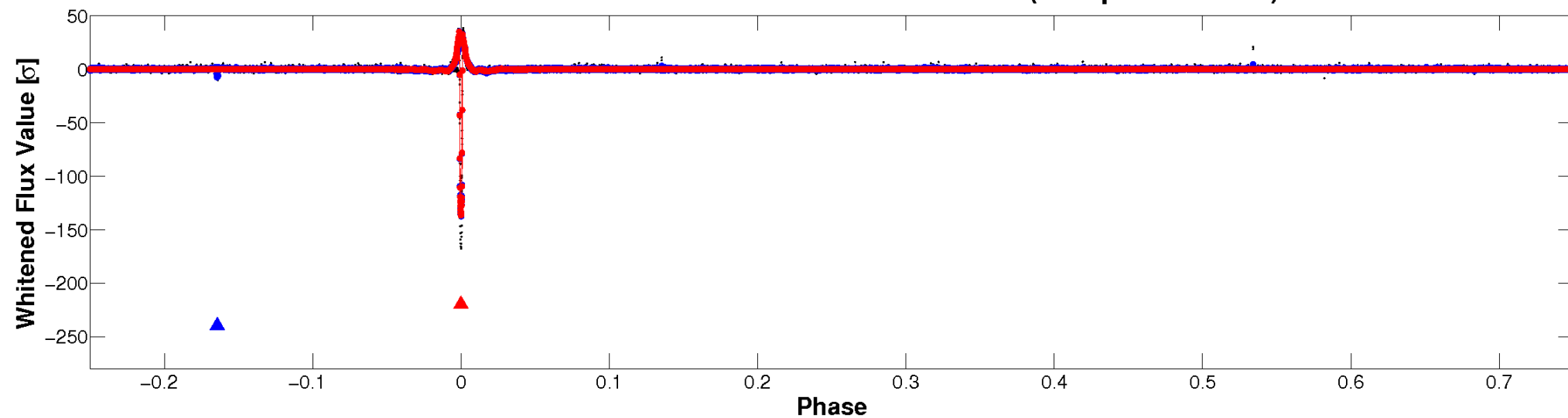


# Non-Whitened Vs. Whitened Light Curve

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

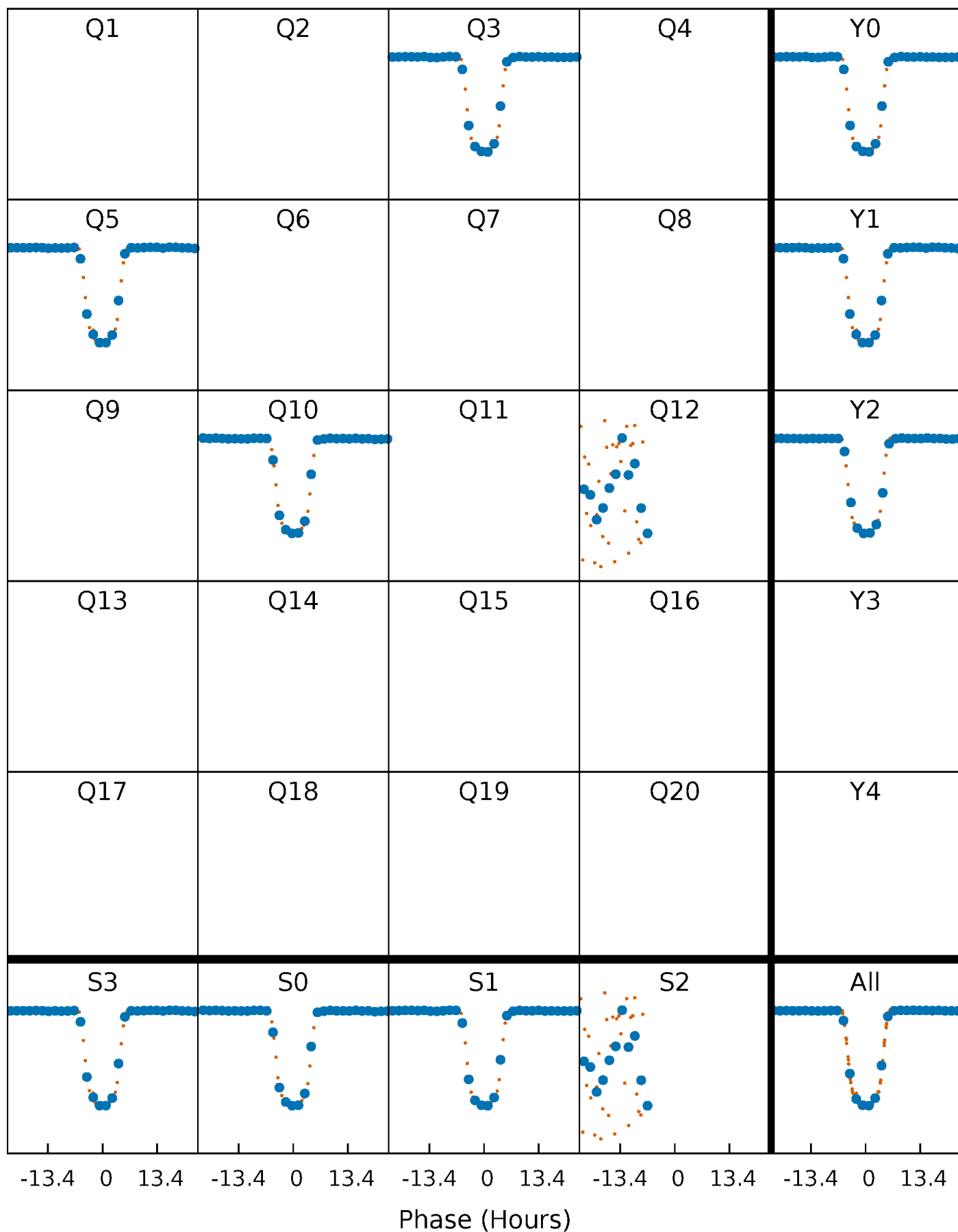


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

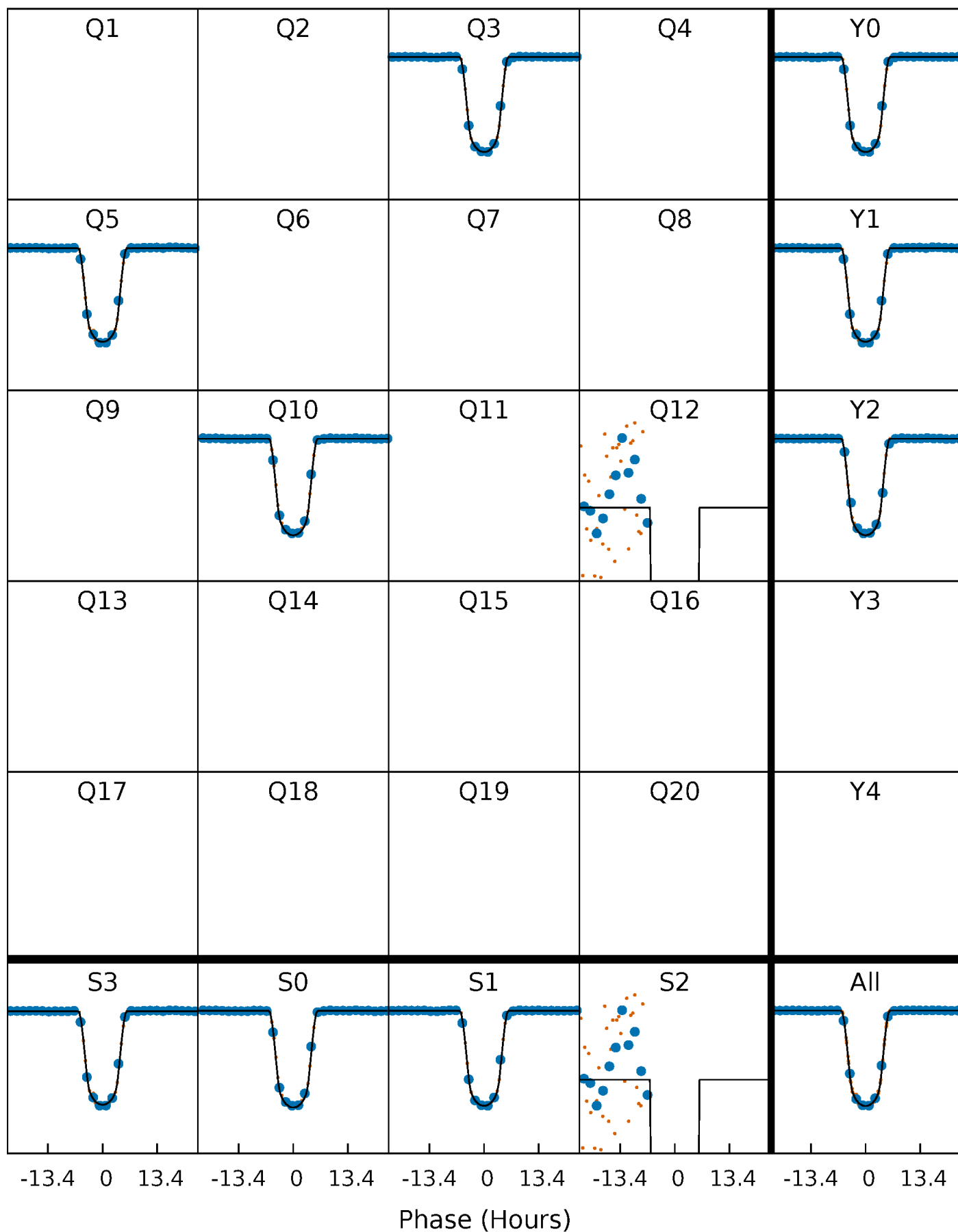
TCE 010152836-01 P=220.930178 Days  $T_0=277.111155$  (BKJD)





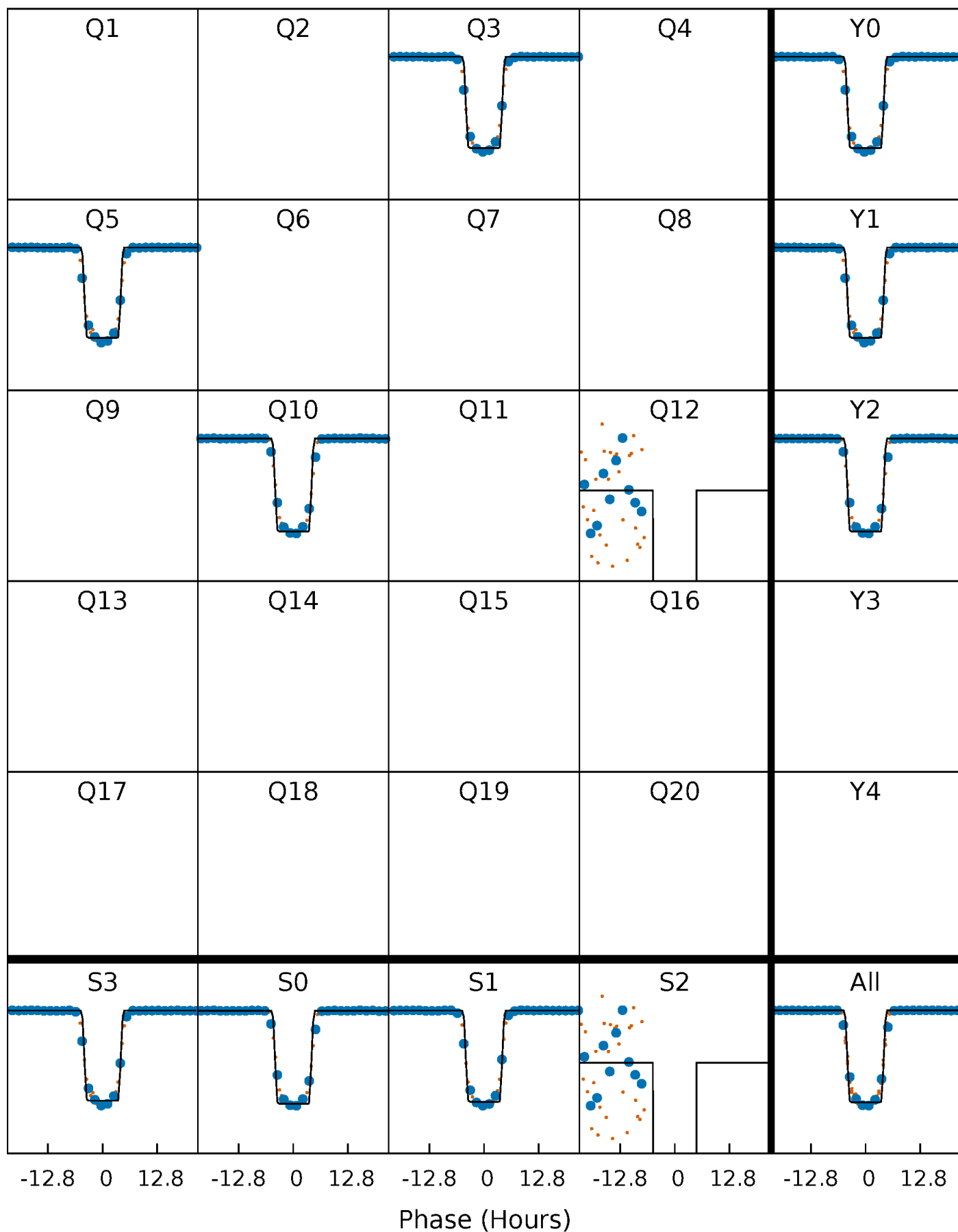
# DV Quarter-Phased Transit Curves

TCE 010152836-01 P=220.930178 Days  $T_0=277.111155$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

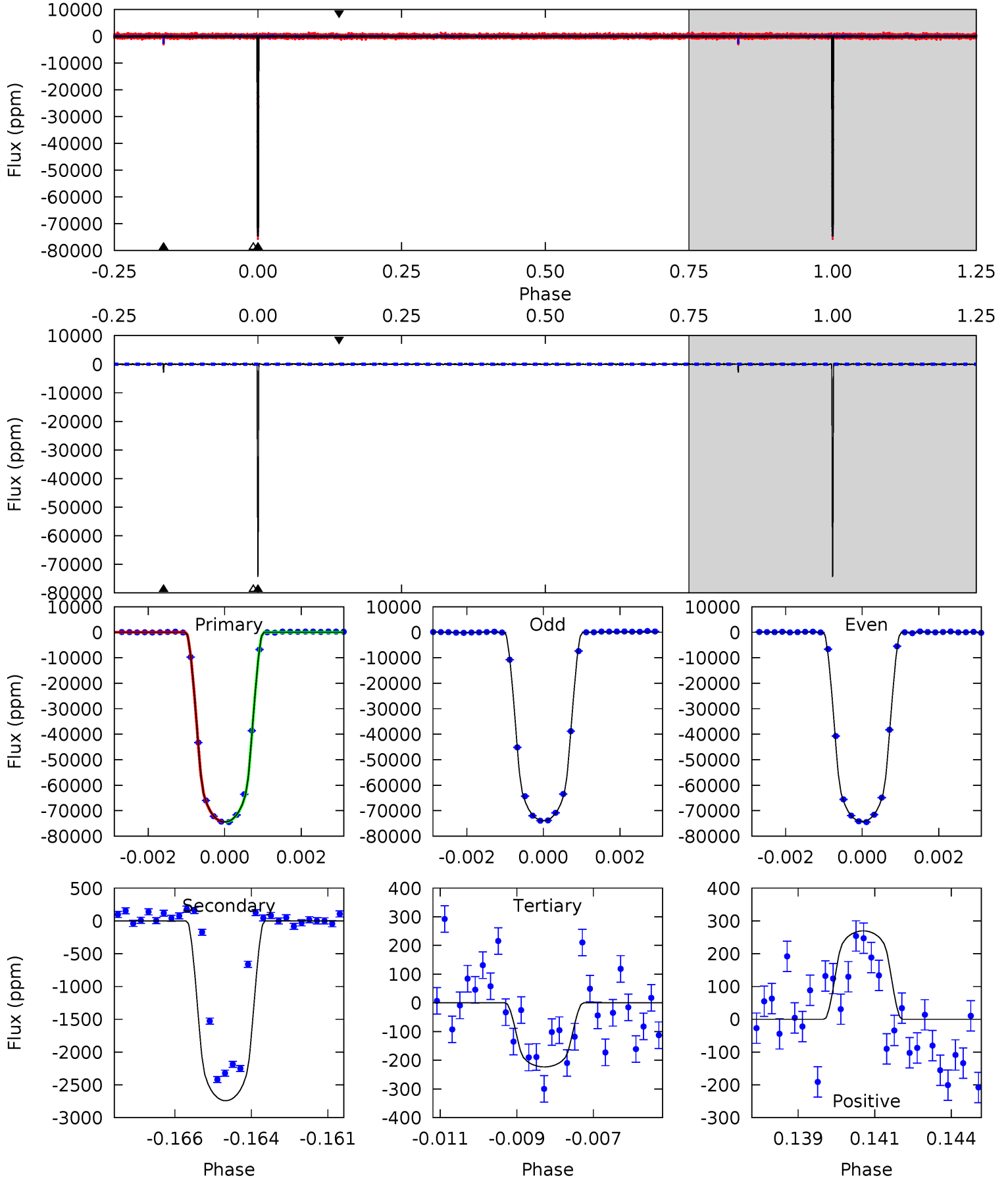
TCE 010152836-01 P=220.927651 Days  $T_0=277.114493$  (BKJD)



# DV Model-Shift Uniqueness Test

010152836-01, P = 220.930178 Days, E = 56.180977 Days

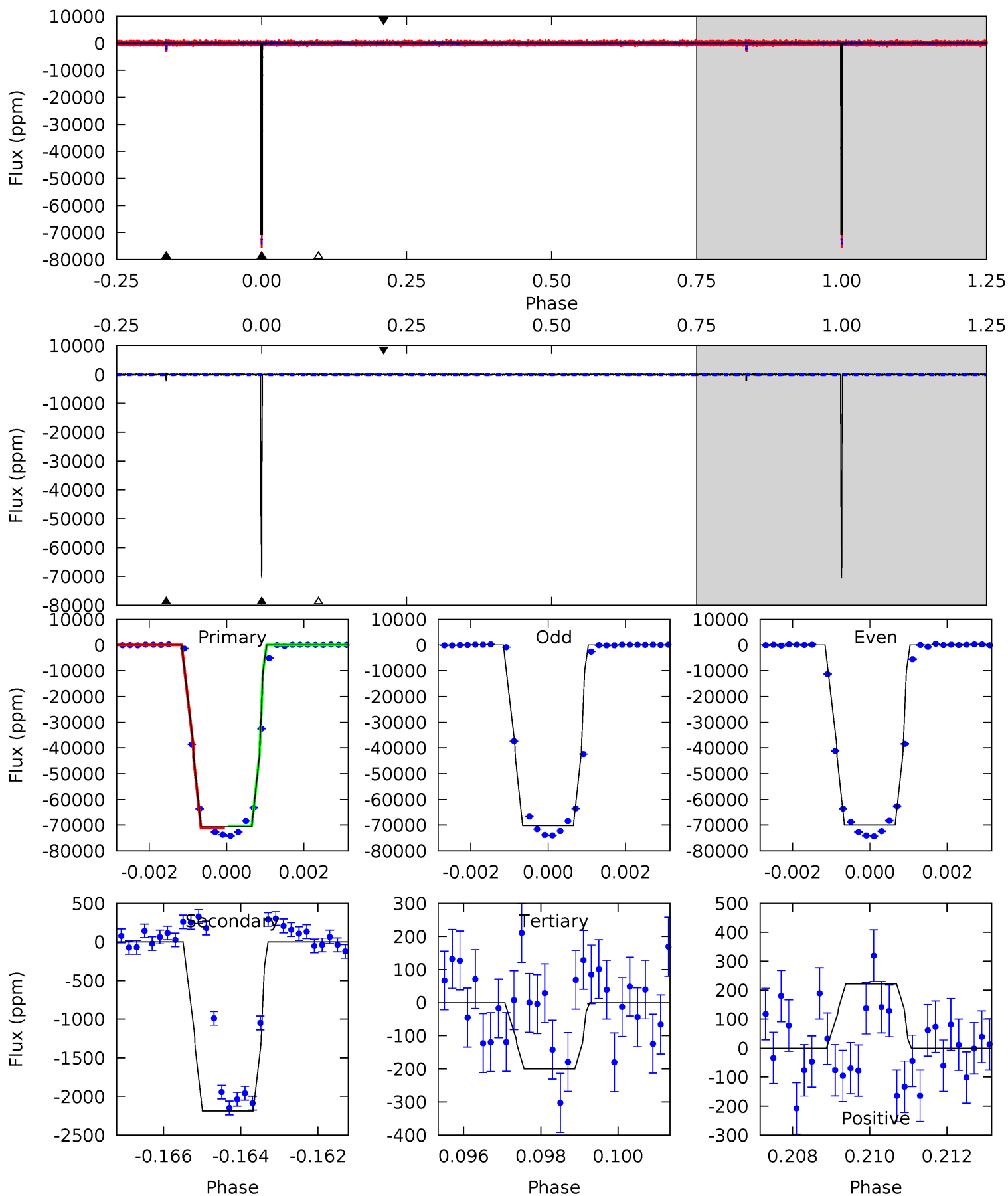
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1952	71.9	5.85	7.07	5.31	3.06	1.63	1946	1945	66.0	64.8	4.54	1.00	0.00	1.41



# Alt Model-Shift Uniqueness Test

010152836-01, P = 220.927651 Days, E = 56.186842 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
1422	44.1	4.03	4.46	5.34	3.11	1.02	1418	1417	40.0	39.6	2.84	1.00	0.00	7.39



### Stellar Parameters For KIC 010152836

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5893^{+159}_{-176}$	$4.483^{+0.065}_{-0.208}$	$-0.120^{+0.300}_{-0.300}$	$0.941^{+0.288}_{-0.115}$	$0.981^{+0.120}_{-0.120}$	$1.660^{+0.456}_{-0.860}$
	+3%/-3%	+1%/-5%	+250%/-250%	+31%/-12%	+12%/-12%	+27%/-52%
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 010152836-01 / KOI 3952.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-2741 \pm 38$	$26.39^{+4.14}_{-2.28}$	$426^{+29}_{-21}$	$3269^{+56}_{-64}$	$1088^{+181}_{-266}$
Alt.	$-2189 \pm 50$	$27.87^{+4.57}_{-2.03}$	$424^{+29}_{-19}$	$3100^{+50}_{-53}$	$773^{+112}_{-180}$

$T_{max}$  = 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

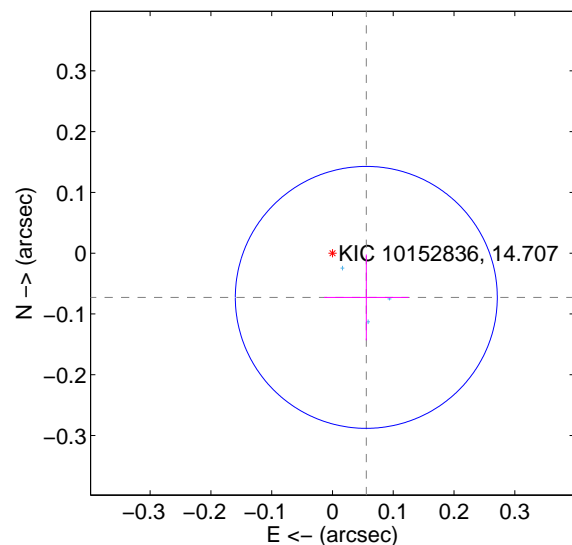
Supplemental centroid analysis for 010152836-01. Kepler magnitude: 14.71. Transit SNR 818.29

There are 3 quarters with good PRF difference image offsets

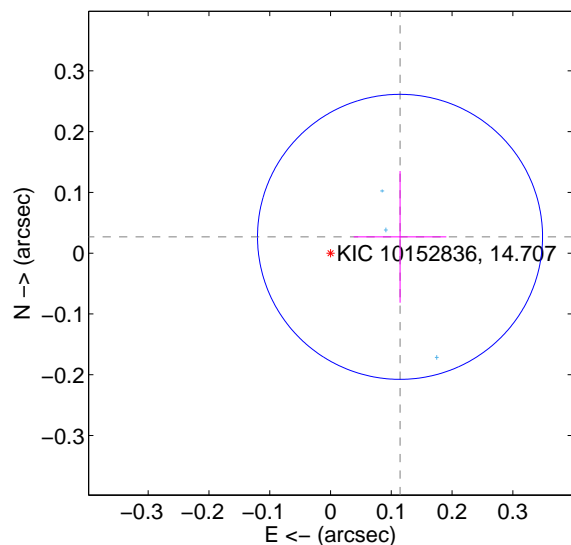
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.092 \pm 0.072$	1.28	$-0.056 \pm 0.069$	$-0.073 \pm 0.071$
PRF-fit source offset from KIC position	$0.118 \pm 0.078$	1.50	$-0.114 \pm 0.076$	$0.027 \pm 0.108$
photometric centroid source offset	$0.30 \pm 0.01$	33.83	$-0.28 \pm 0.01$	$-0.12 \pm 0.01$

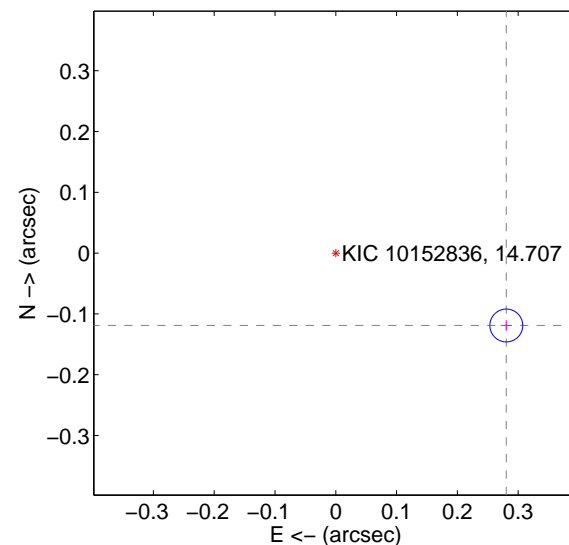
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

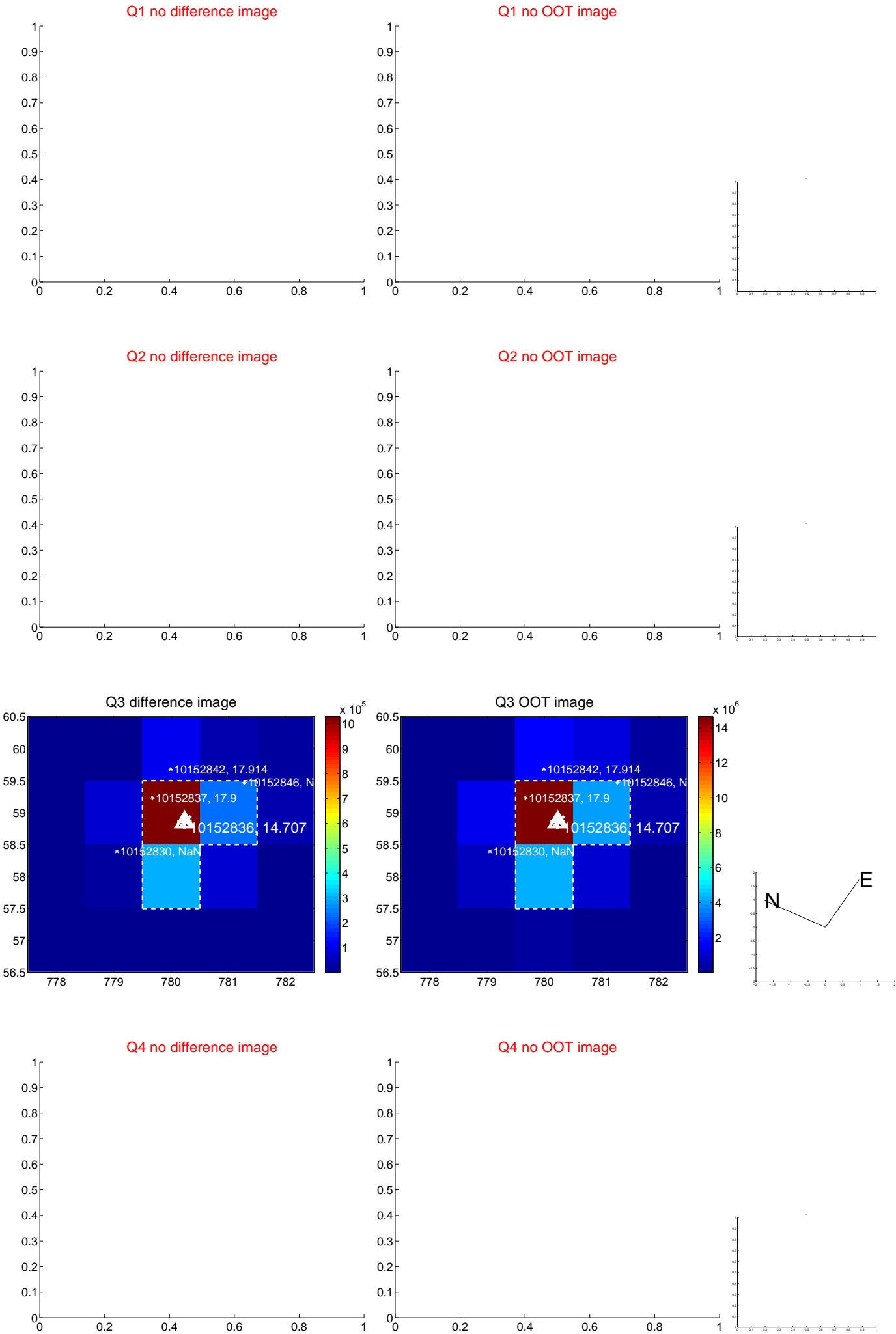


offset from photometric centroids

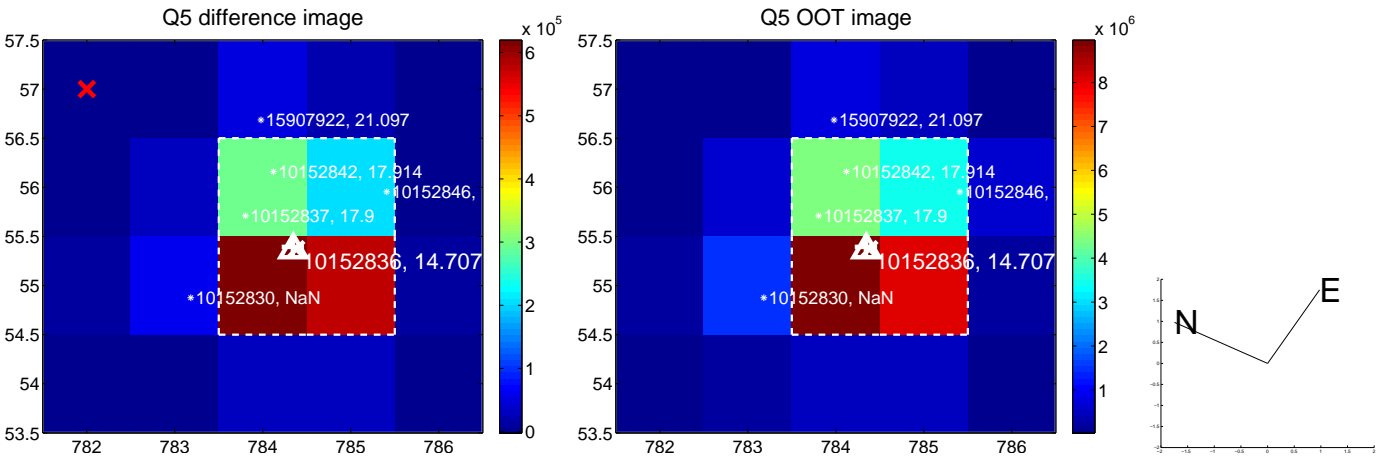


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

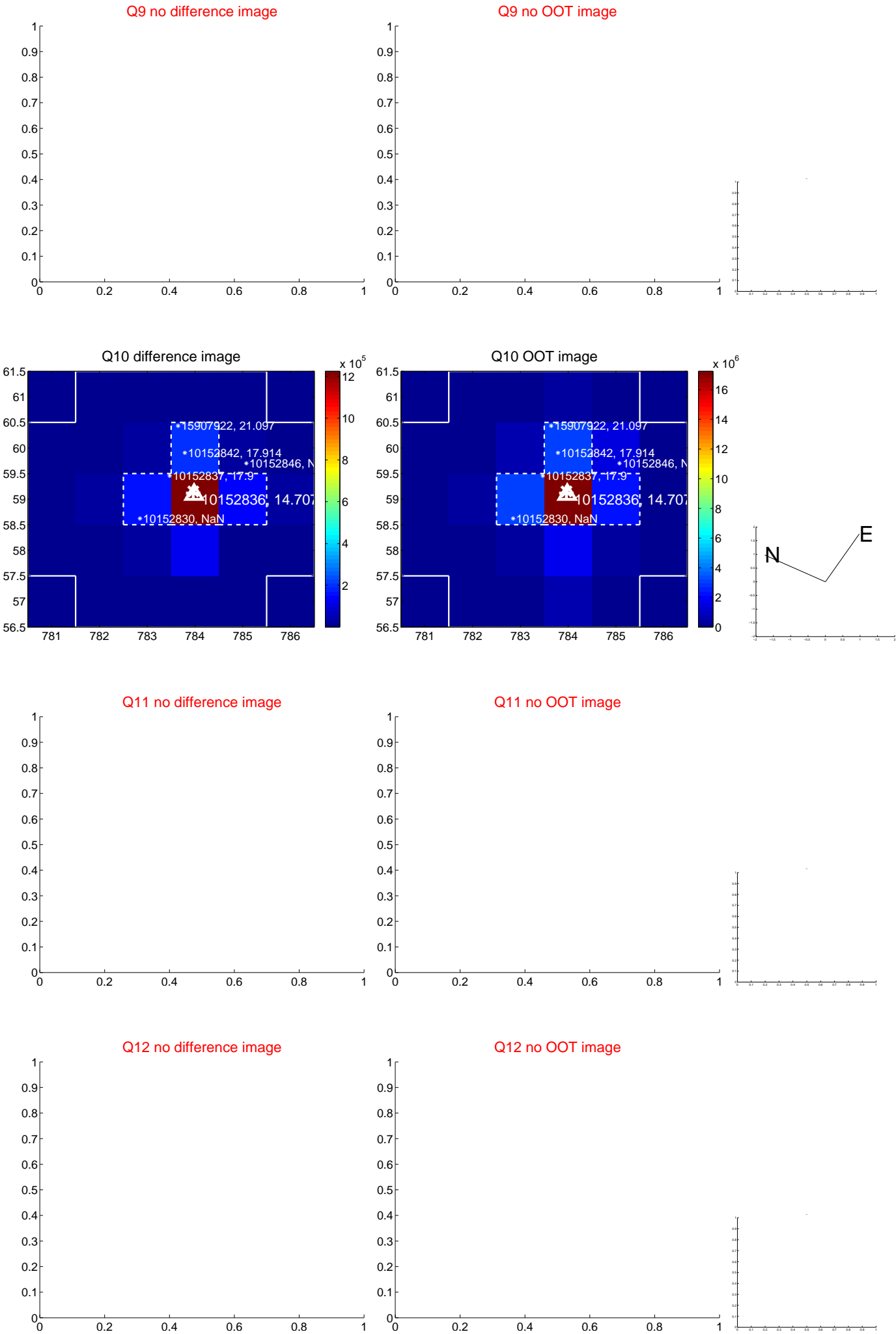


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





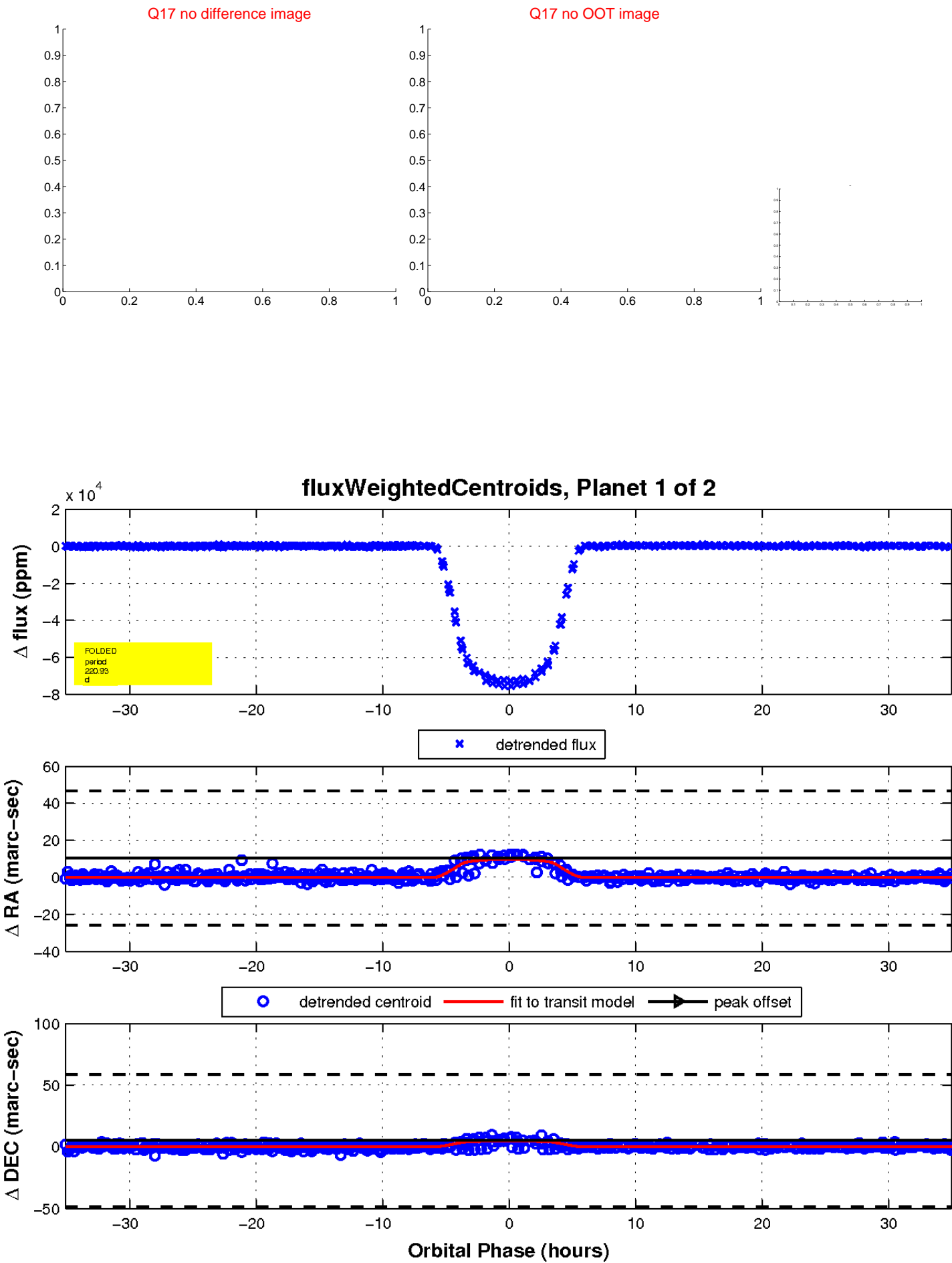
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

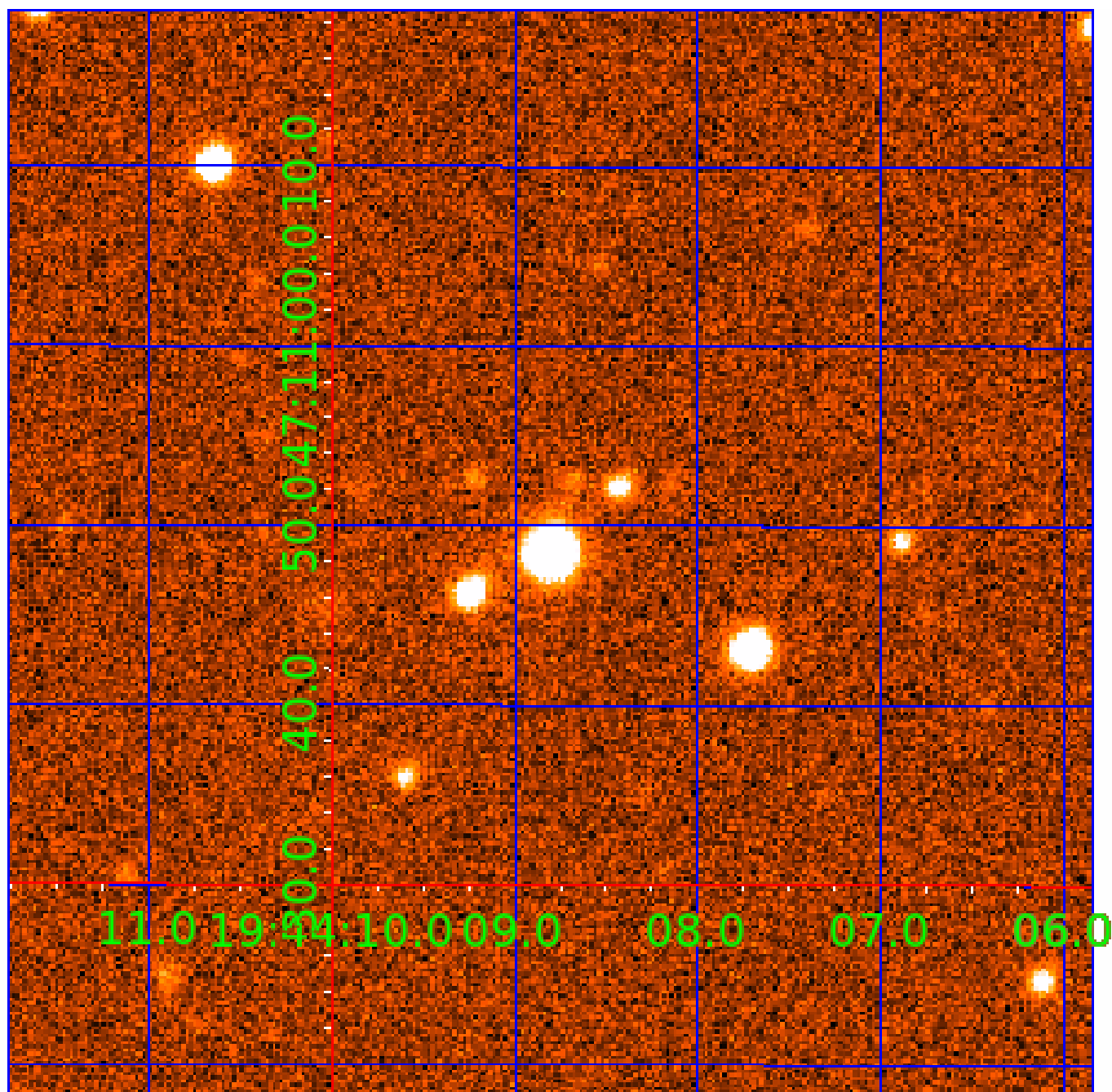


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010152836

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010152836-01	OBS	3952.01	220.930178	277.111155	74244.8	11.688	919.6	818.3	0.94	5893	25.65	1.89
010152836-02	OBS	No	220.929185	240.818378	2461.1	7.380	59.8	57.4	0.94	5893	5.28	1.89

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010152836-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
010152836-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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.

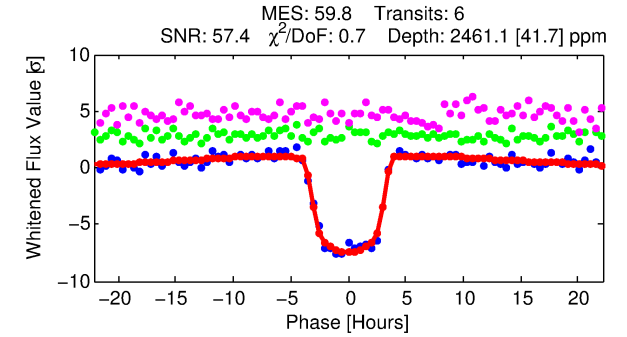
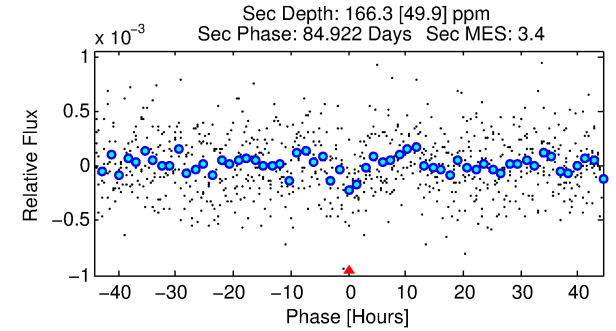
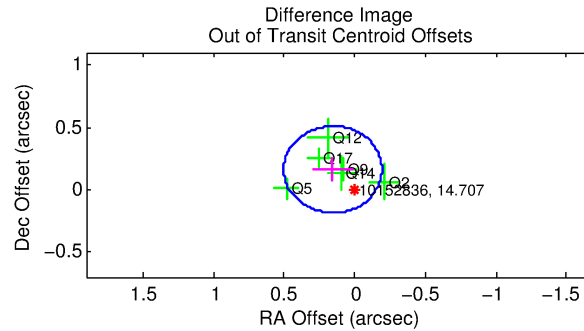
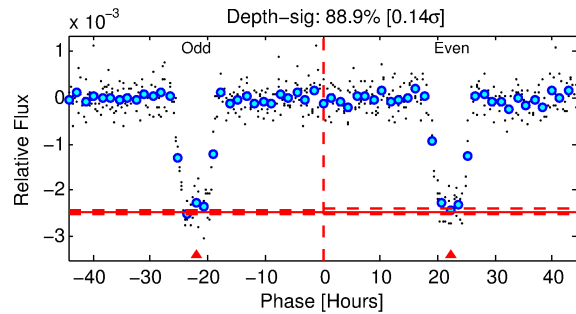
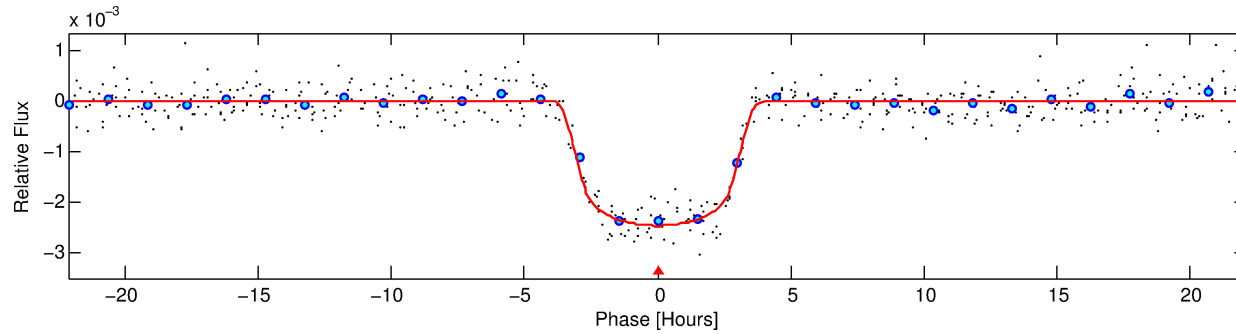
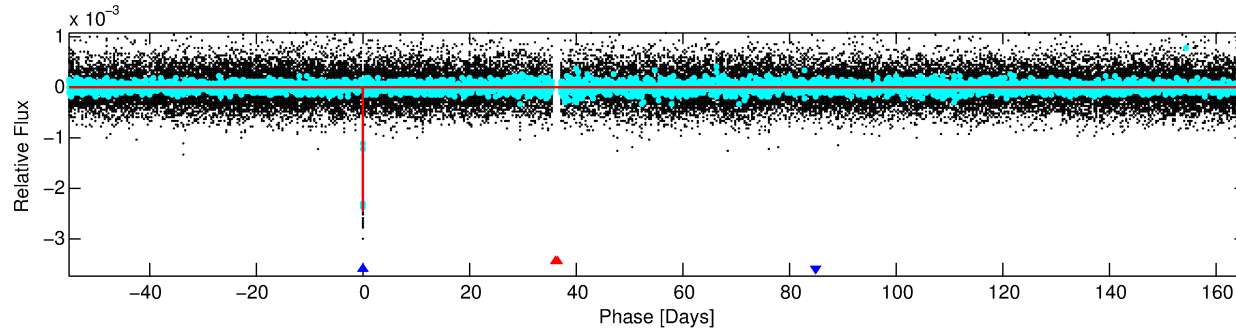
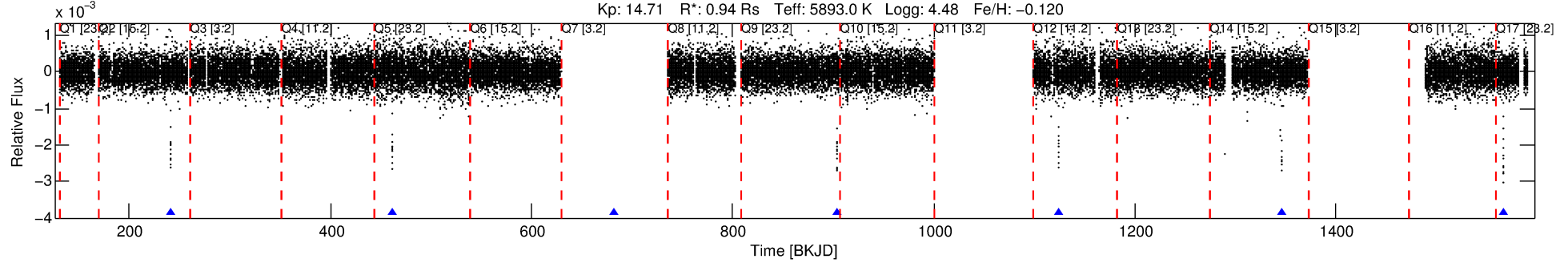
## Ephemeris Match Information For 010152836-02

No Significant Match Found

# DV One-Page Summary

KIC: 10152836 Candidate: 2 of 2 Period: 220.929 d  
KOI: K03952.01 Corr: 0.951

Kp: 14.71 R\*: 0.94 Rs Teff: 5893.0 K Logg: 4.48 Fe/H: -0.120



## DV Fit Results:

Period = 220.92919 [0.00059] d  
Epoch = 240.8184 [0.0023] BKJD  
Rp/R\* = 0.0515 [0.0011]  
a/R\* = 145.24 [12.57]  
b = 0.84 [0.03]  
Seff = 1.89 [0.75]  
Teq = 299 [30] K  
Rp = 5.28 [1.62] Re  
a = 0.7111 [0.1842] AU  
Ag = 1657.45 [804.37] [2.06σ]  
Teffp = 2950 [240] K [10.95σ]

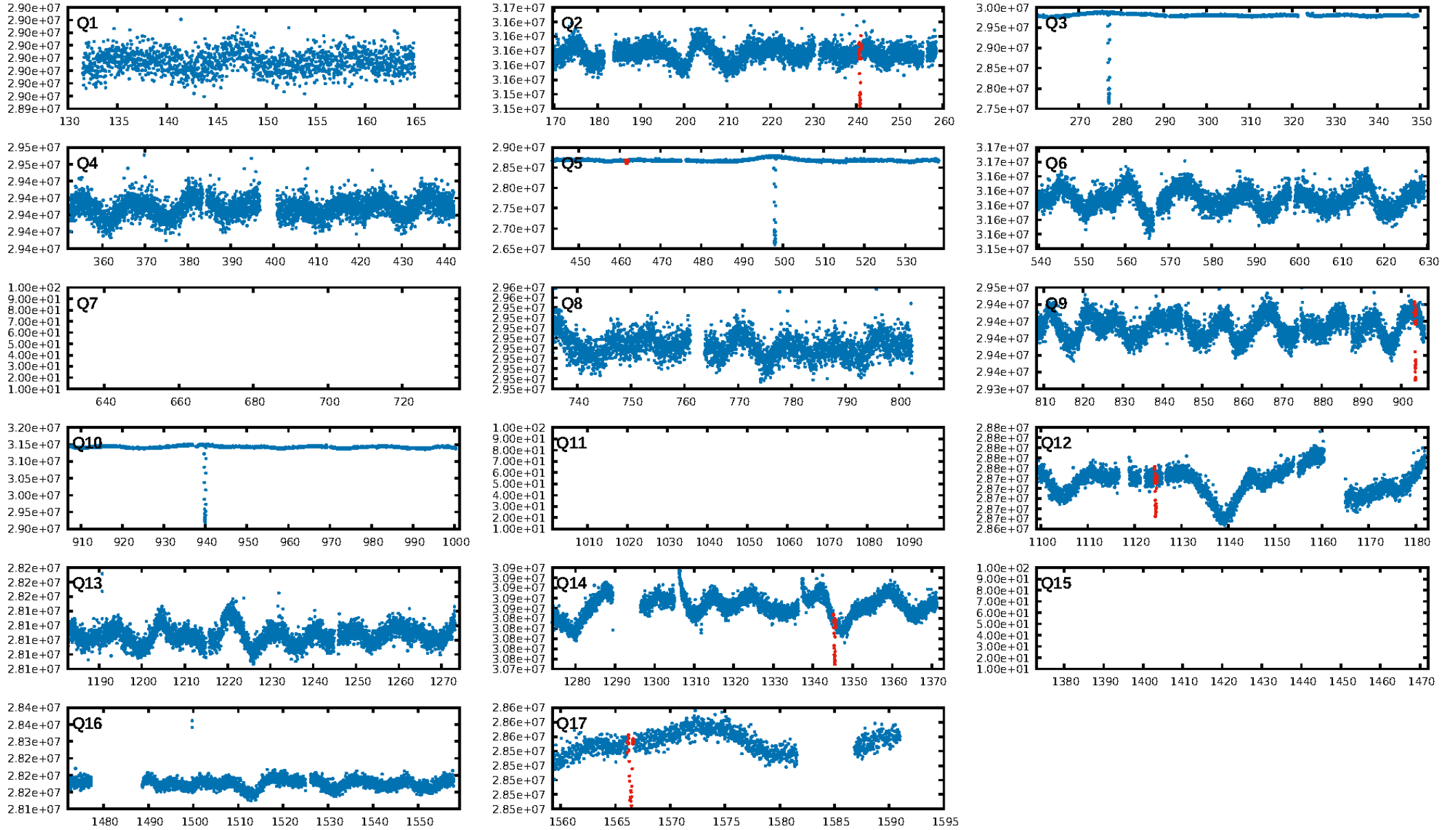
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.1% [0.00σ]  
ModelChiSquare2-sig: 28.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 6.625  
Centroid-sig: 96.3%  
Centroid-so: 0.138 arcsec [0.64σ]  
OotOffset-rm: 0.224 arcsec [1.93σ]  
OotOffset-st: 2/0/1/3 [6]  
KicOffset-rm: 0.309 arcsec [3.01σ]  
KicOffset-st: 2/0/1/3 [6]  
DiffImageQuality-fgm: 1.00 [6/6]  
DiffImageOverlap-fno: 1.00 [6/6]

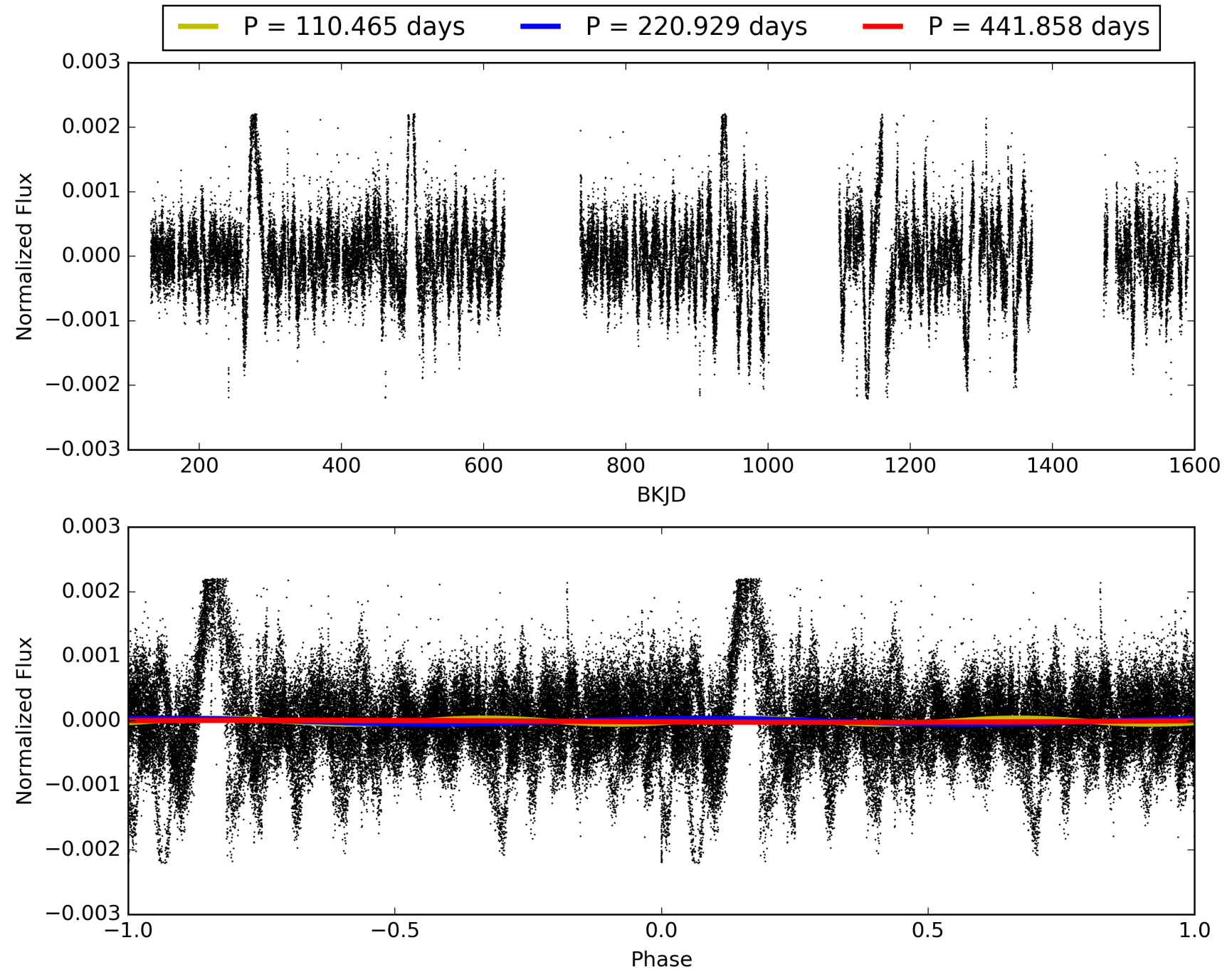
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 00:27:00 Z

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

# TCE 010152836-02, PDC Light Curves



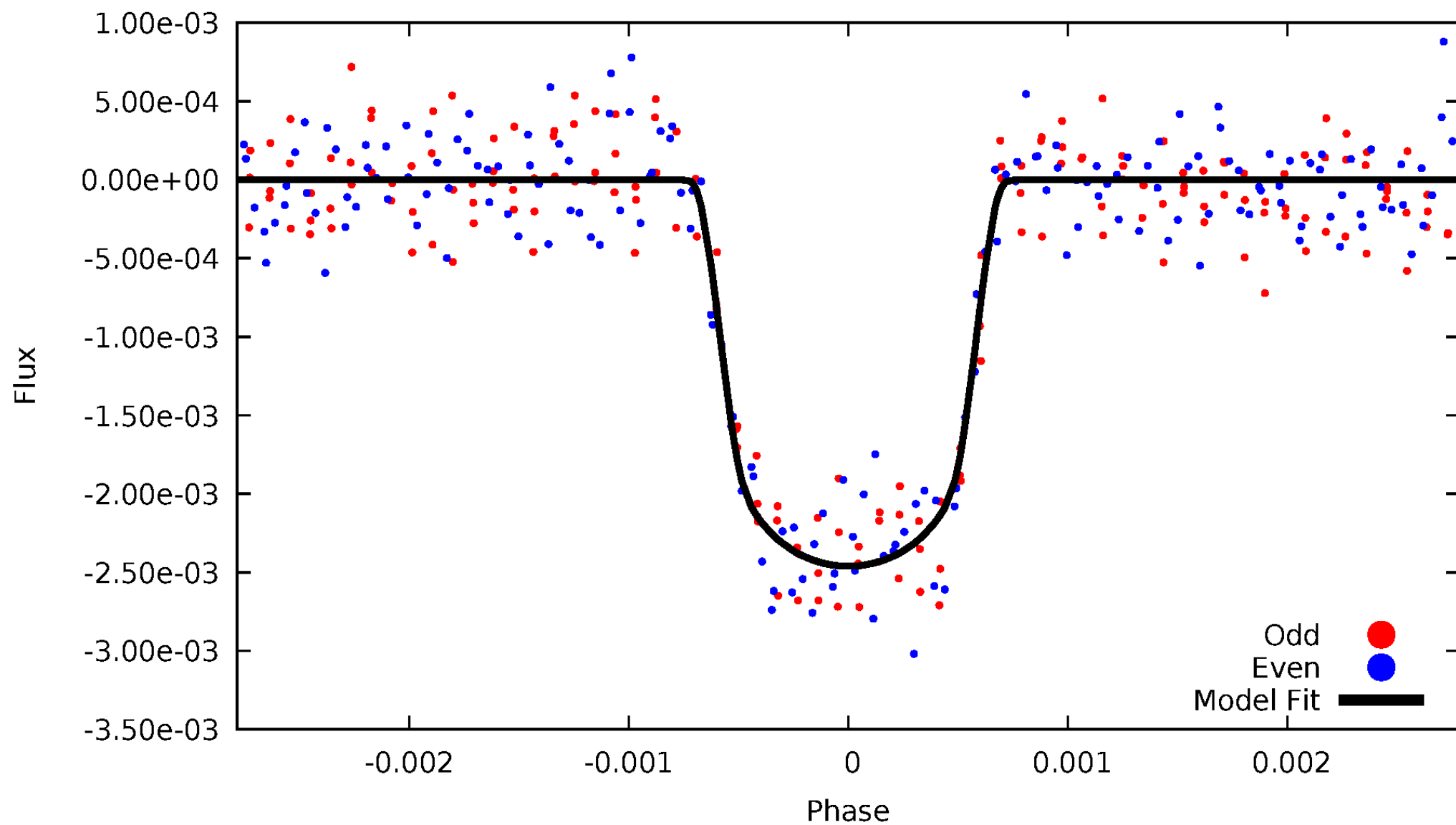
# TCE 010152836-02





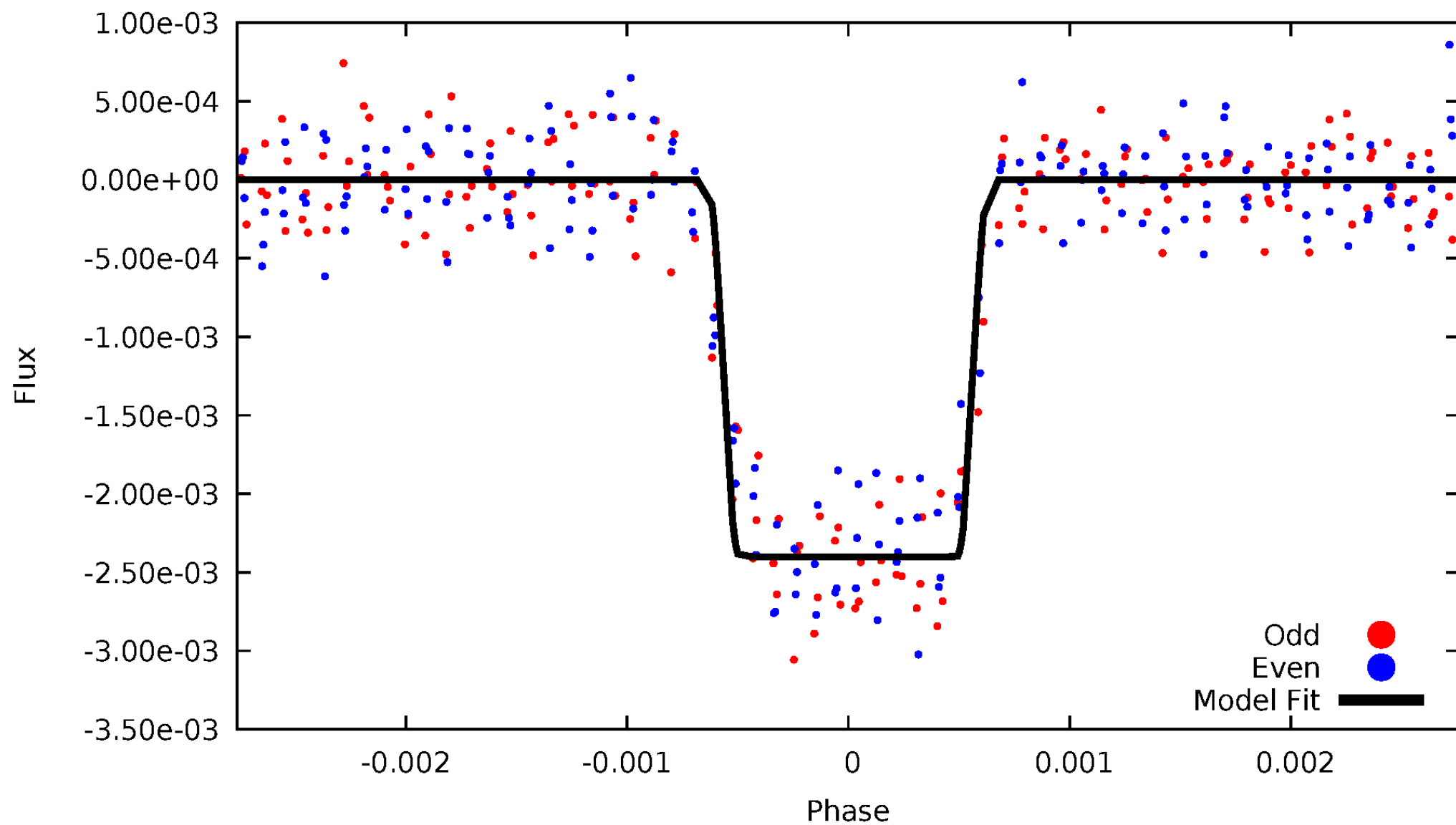
# DV Odd/Even

TCE 010152836-02



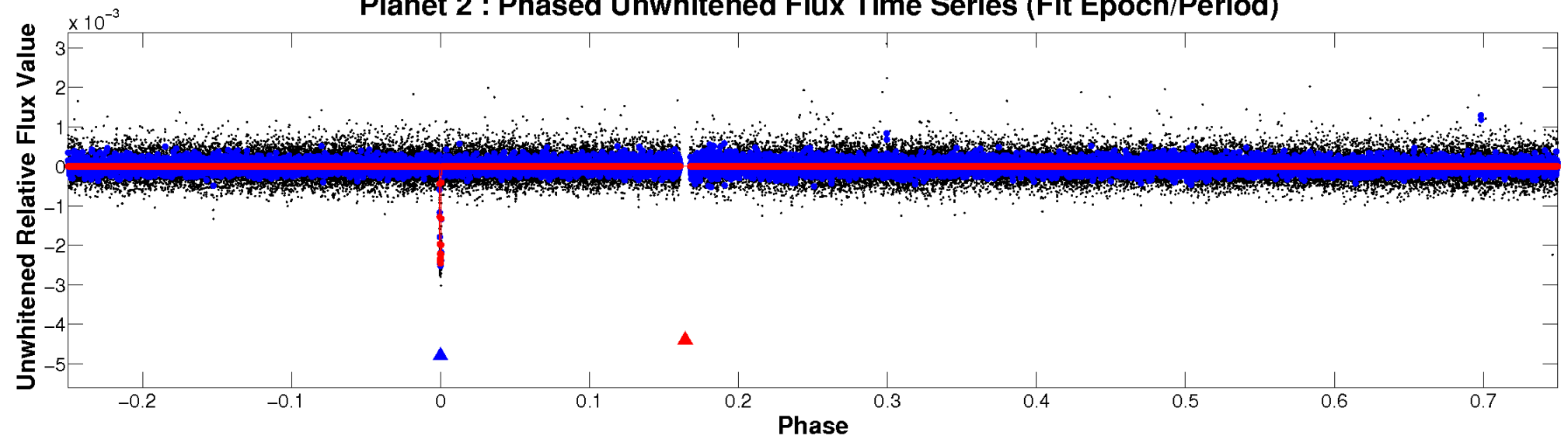
# ALT Odd/Even

TCE 010152836-02

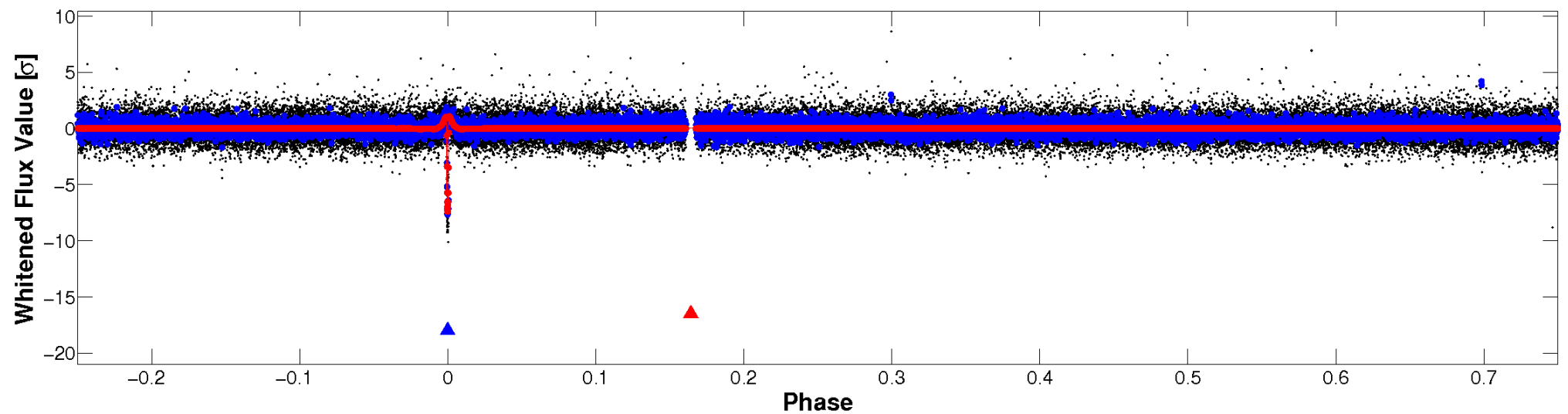


# Non-Whitened Vs. Whitened Light Curve

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

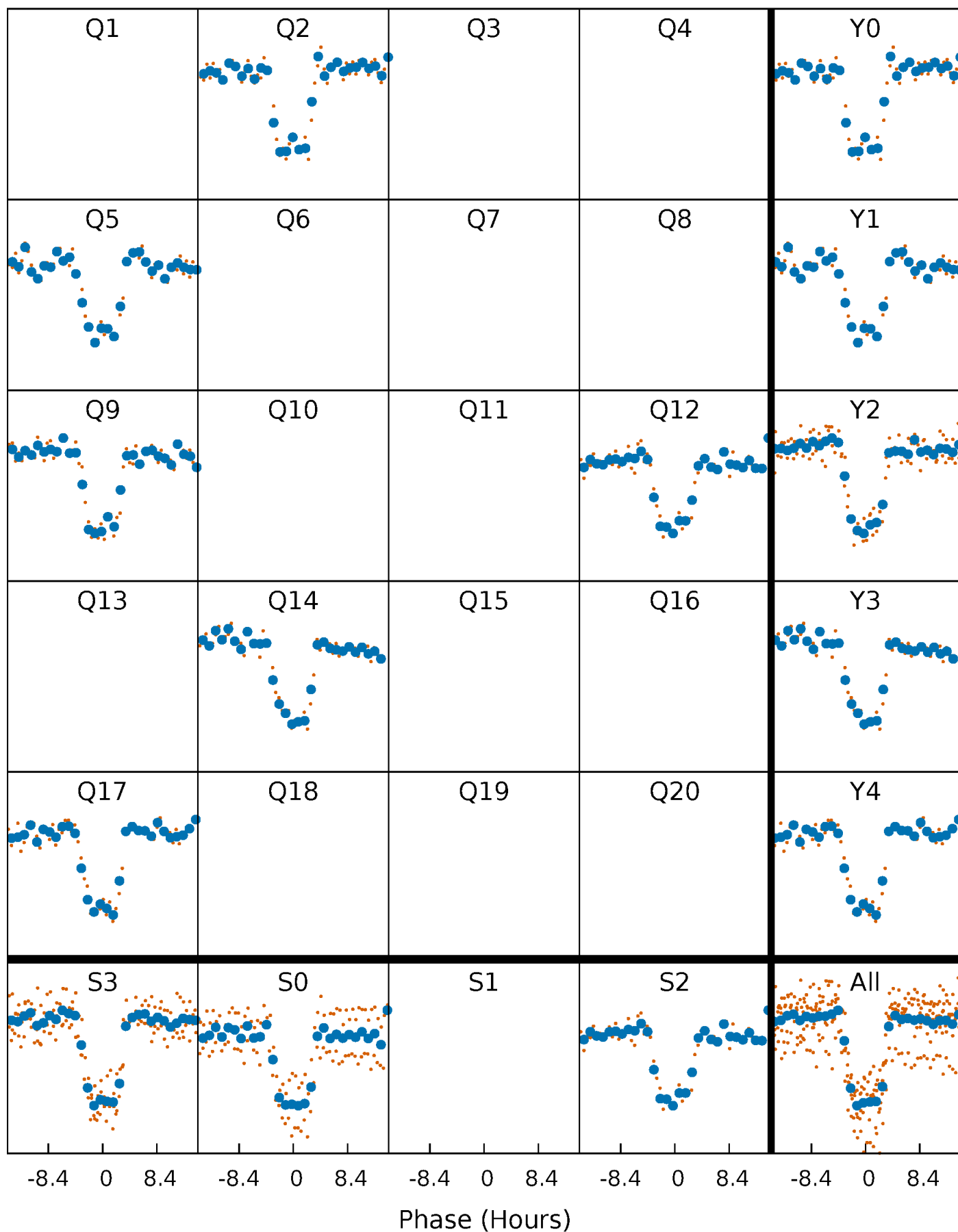


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



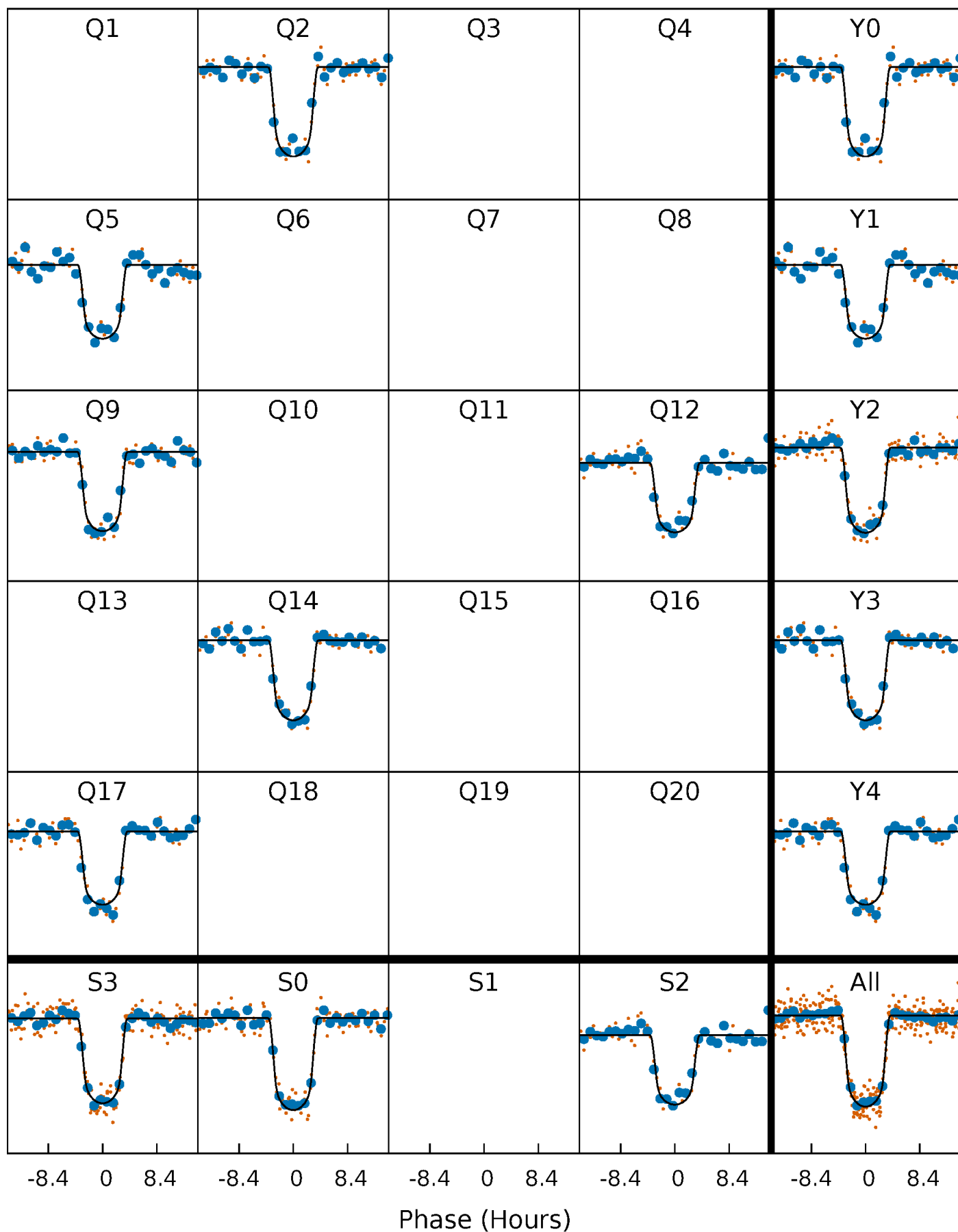
# PDC Quarter-Phased Transit Curves

TCE 010152836-02     $P=220.929185$  Days     $T_0=240.818378$  (BKJD)



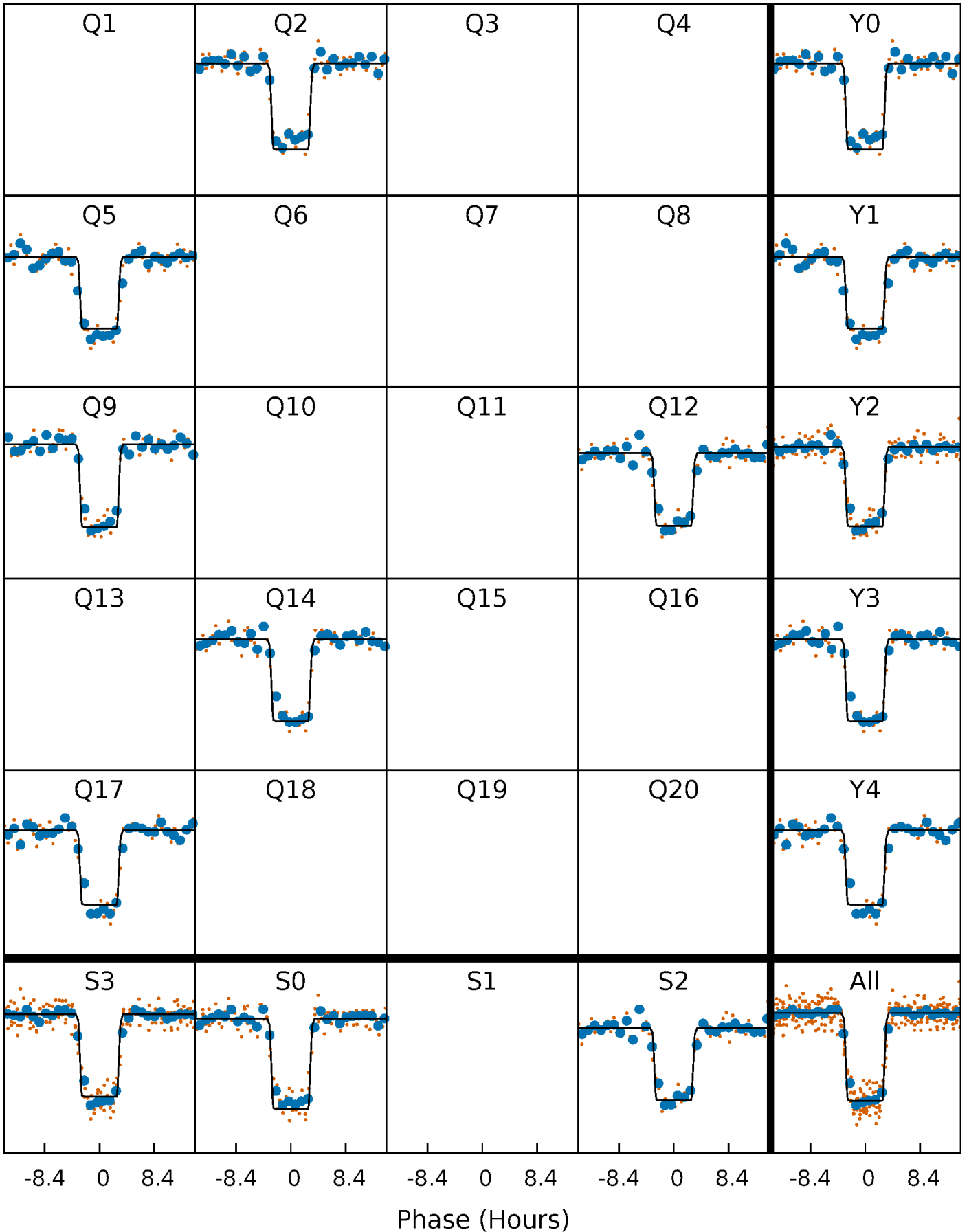
# DV Quarter-Phased Transit Curves

TCE 010152836-02 P=220.929185 Days  $T_0=240.818378$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

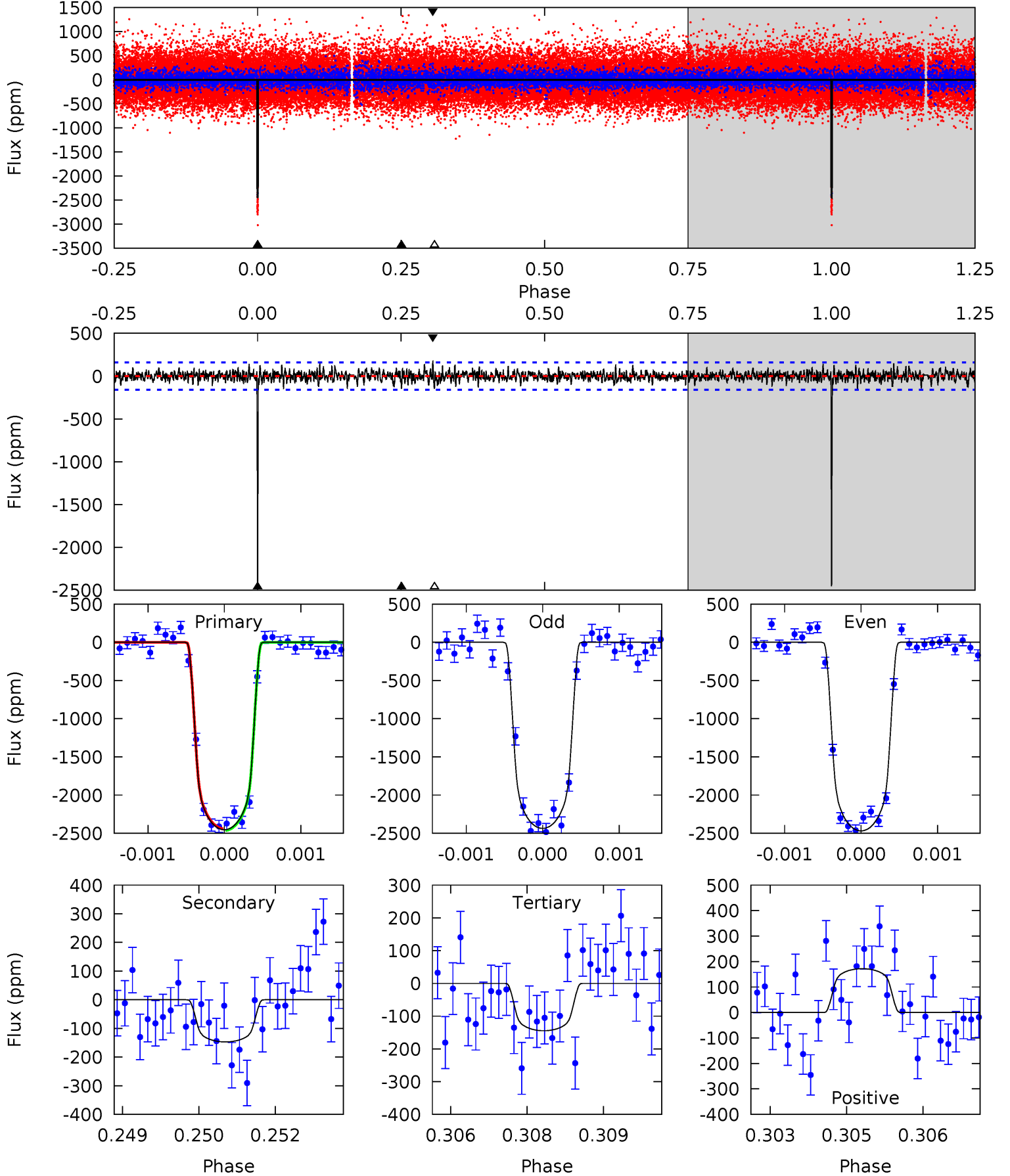
TCE 010152836-02     $P=220.927651$  Days     $T_0=240.823603$  (BKJD)



# DV Model-Shift Uniqueness Test

010152836-02,  $P = 220.929185$  Days,  $E = 19.889193$  Days

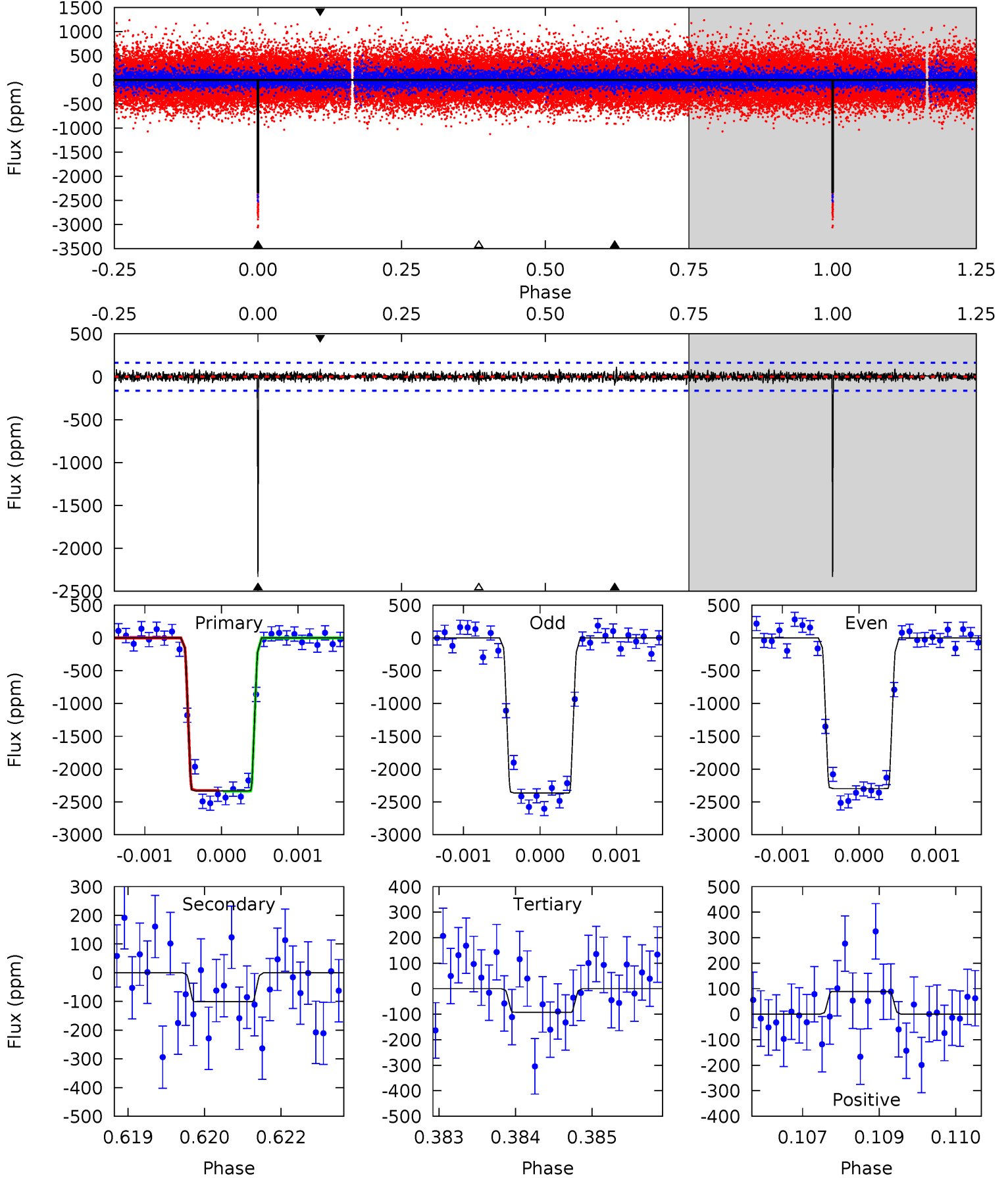
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
83.0	4.98	4.89	5.82	5.38	3.18	1.39	78.1	77.2	0.08	-0.85	0.55	1.01	0.07	0.35



# Alt Model-Shift Uniqueness Test

010152836-02, P = 220.927651 Days, E = 19.895952 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
76.9	3.32	3.05	2.94	5.41	3.22	0.79	73.9	74.0	0.27	0.39	1.13	1.03	0.05	0.23





### Stellar Parameters For KIC 010152836

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5893^{+159}_{-176}$	$4.483^{+0.065}_{-0.208}$	$-0.120^{+0.300}_{-0.300}$	$0.941^{+0.288}_{-0.115}$	$0.981^{+0.120}_{-0.120}$	$1.660^{+0.456}_{-0.860}$
	+3%/-3%	+1%/-5%	+250%/-250%	+31%/-12%	+12%/-12%	+27%/-52%
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 010152836-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-147 \pm 30$	$5.45^{+0.93}_{-0.48}$	$426^{+34}_{-22}$	$3383^{+121}_{-127}$	$1298^{+442}_{-366}$
Alt.	$-101 \pm 30$	$5.15^{+0.85}_{-0.46}$	$425^{+29}_{-21}$	$3243^{+146}_{-166}$	$993^{+438}_{-329}$

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

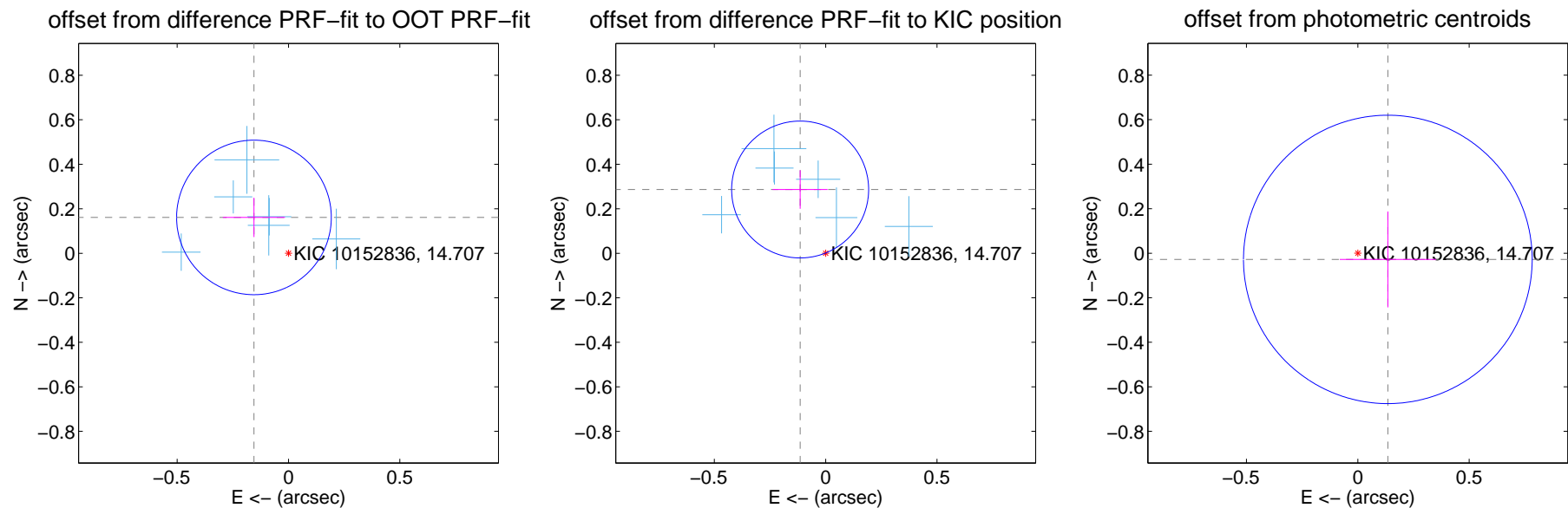
## DV Centroid Data

Supplemental centroid analysis for 010152836-02. Kepler magnitude: 14.71. Transit SNR 57.37

There are 6 quarters with good PRF difference image offsets

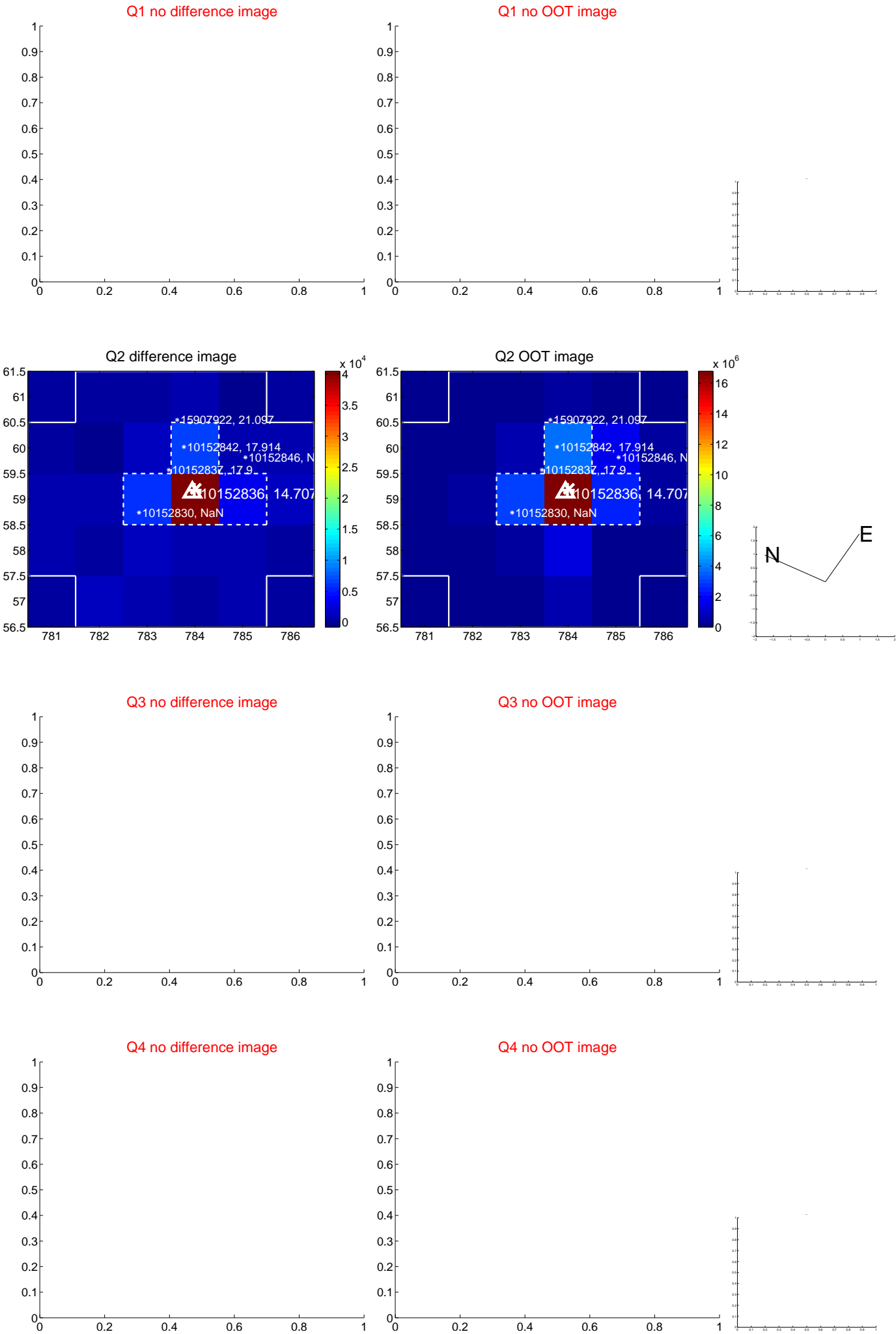
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.224 \pm 0.116$	1.93	$0.155 \pm 0.139$	$0.161 \pm 0.088$
PRF-fit source offset from KIC position	<b><math>0.309 \pm 0.103</math></b>	<b>3.01</b>	$0.115 \pm 0.123$	$0.287 \pm 0.086$
photometric centroid source offset	$0.14 \pm 0.22$	0.64	$-0.13 \pm 0.22$	$-0.03 \pm 0.22$

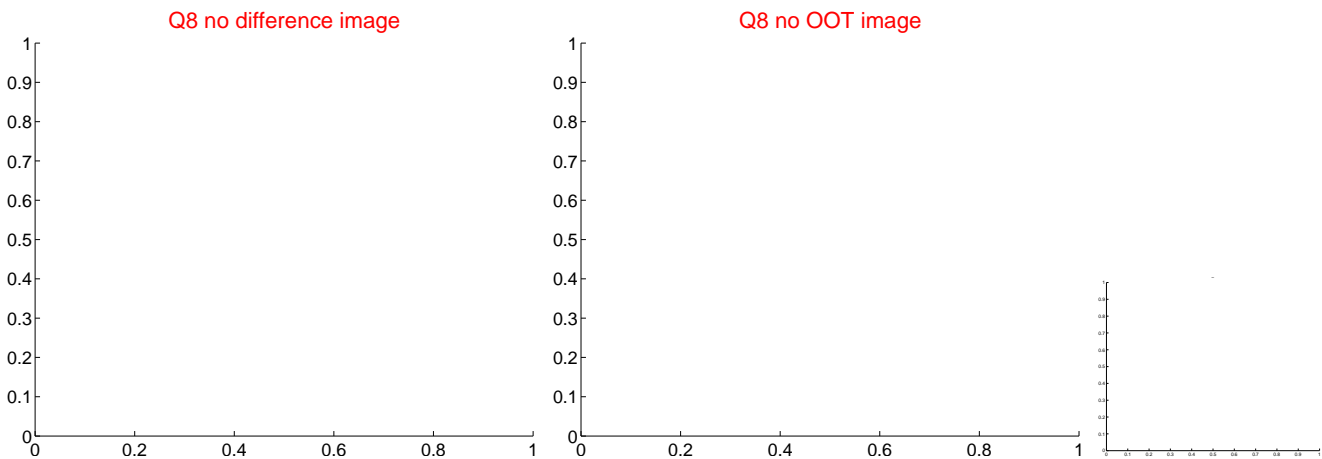
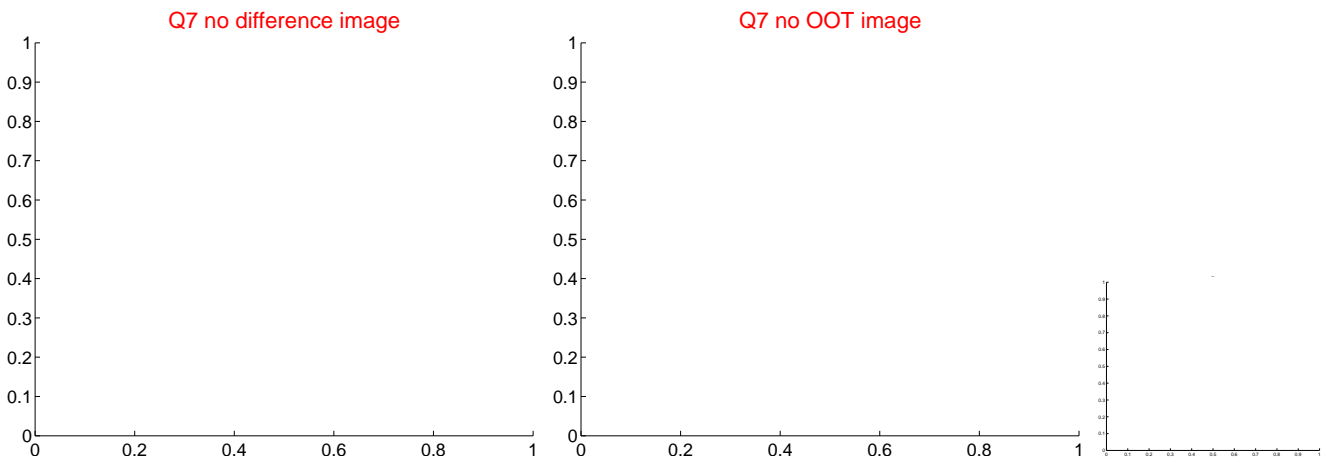
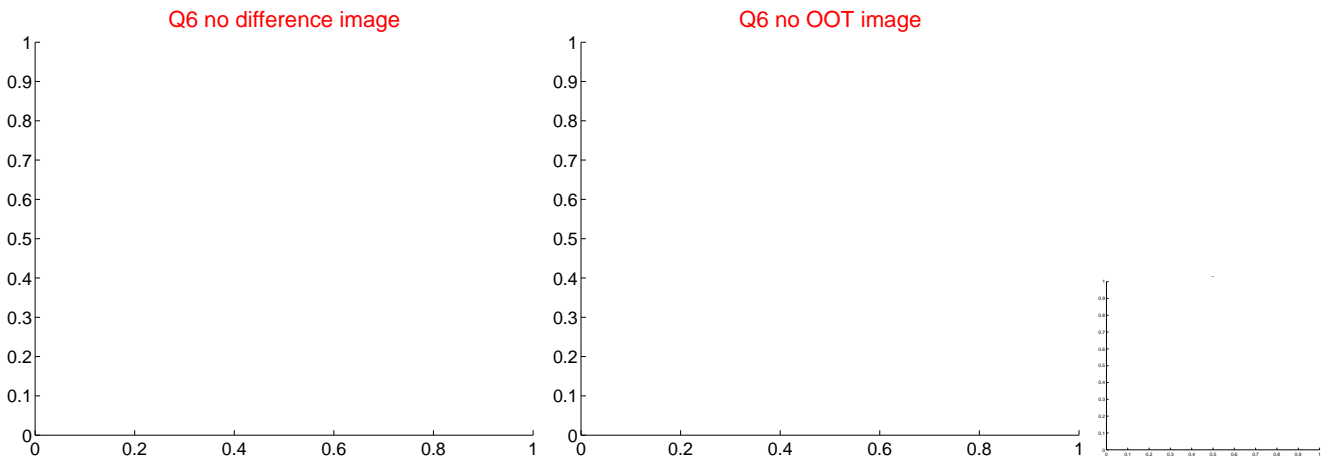
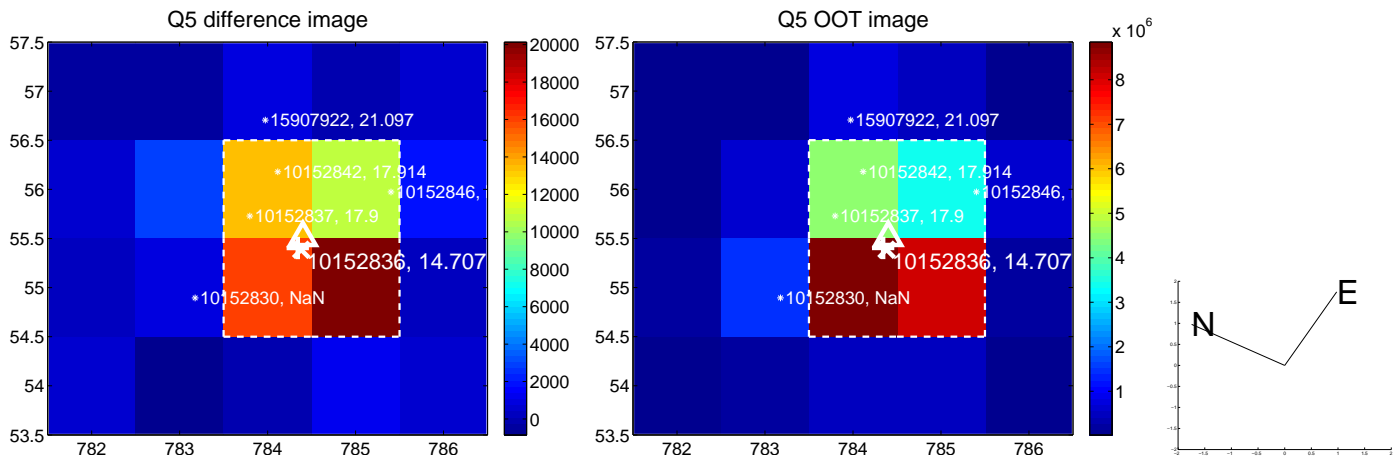


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

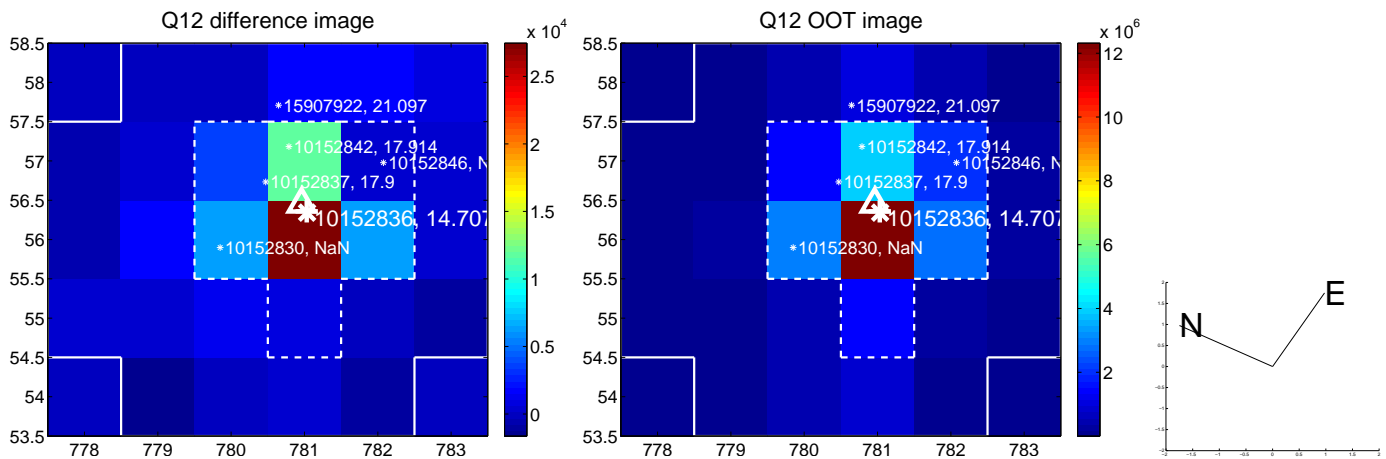
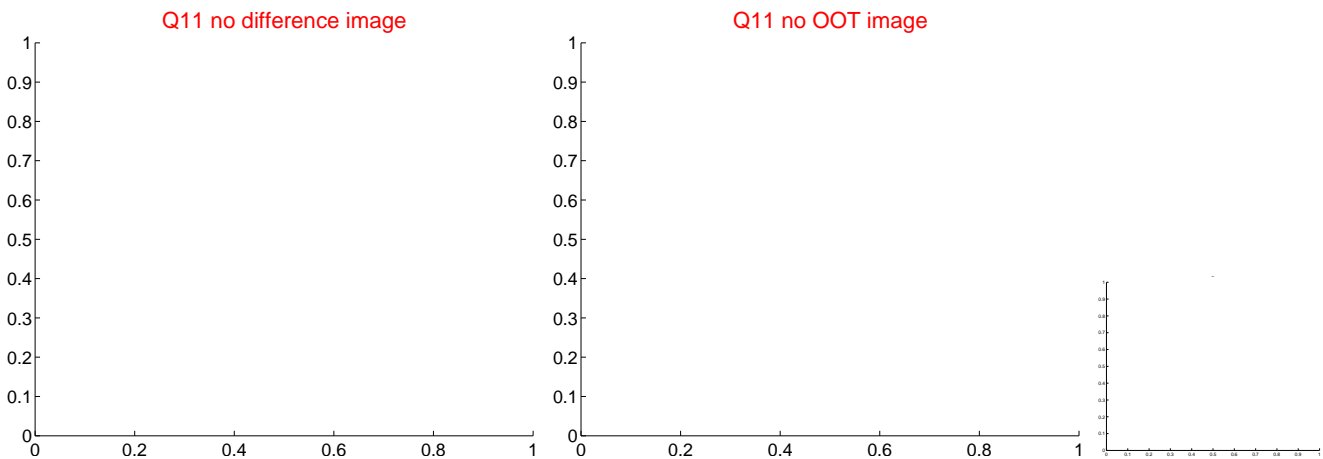
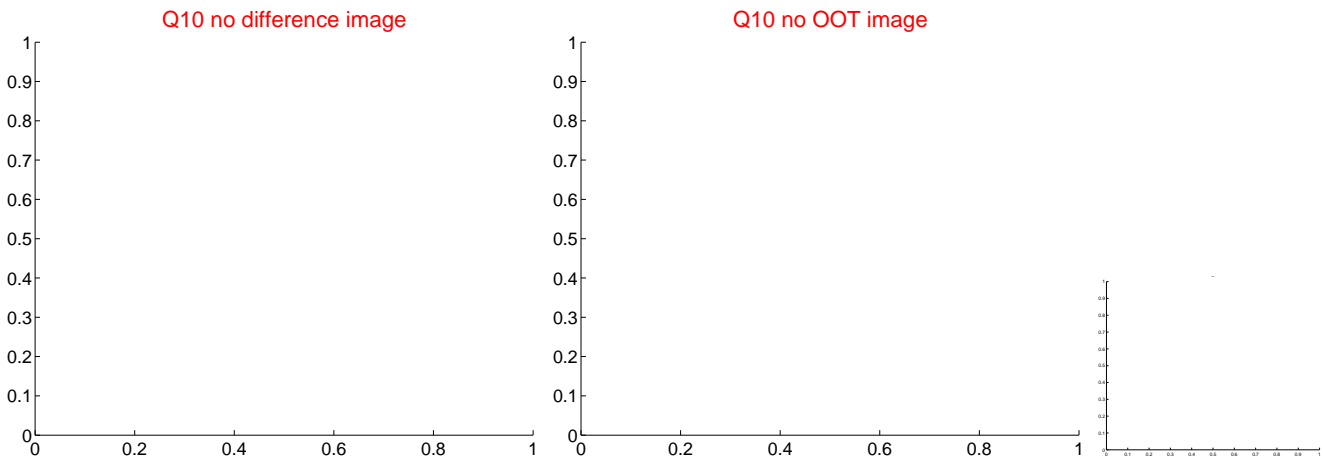
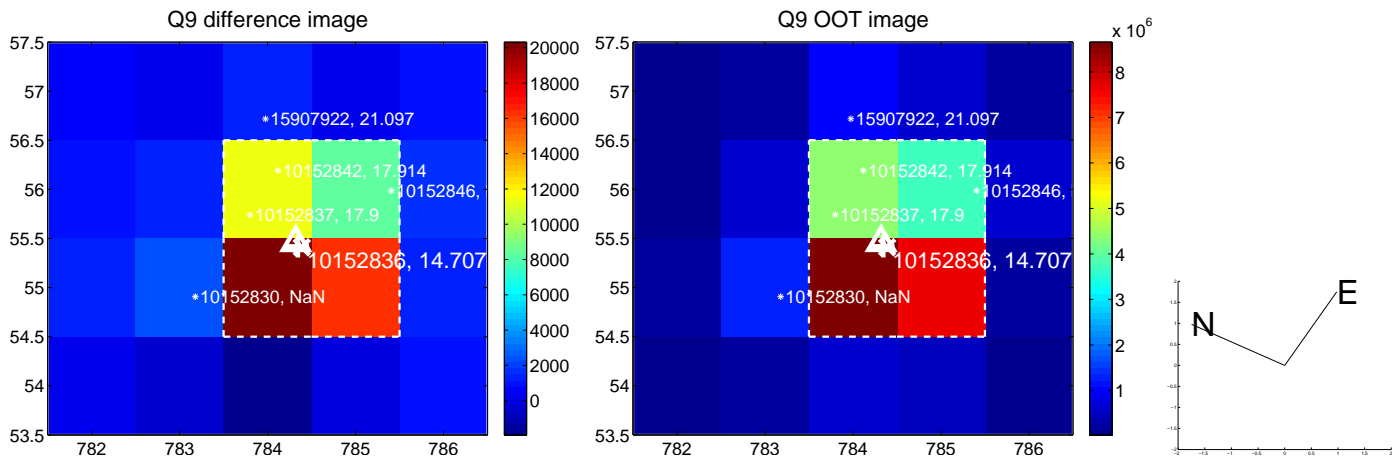
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



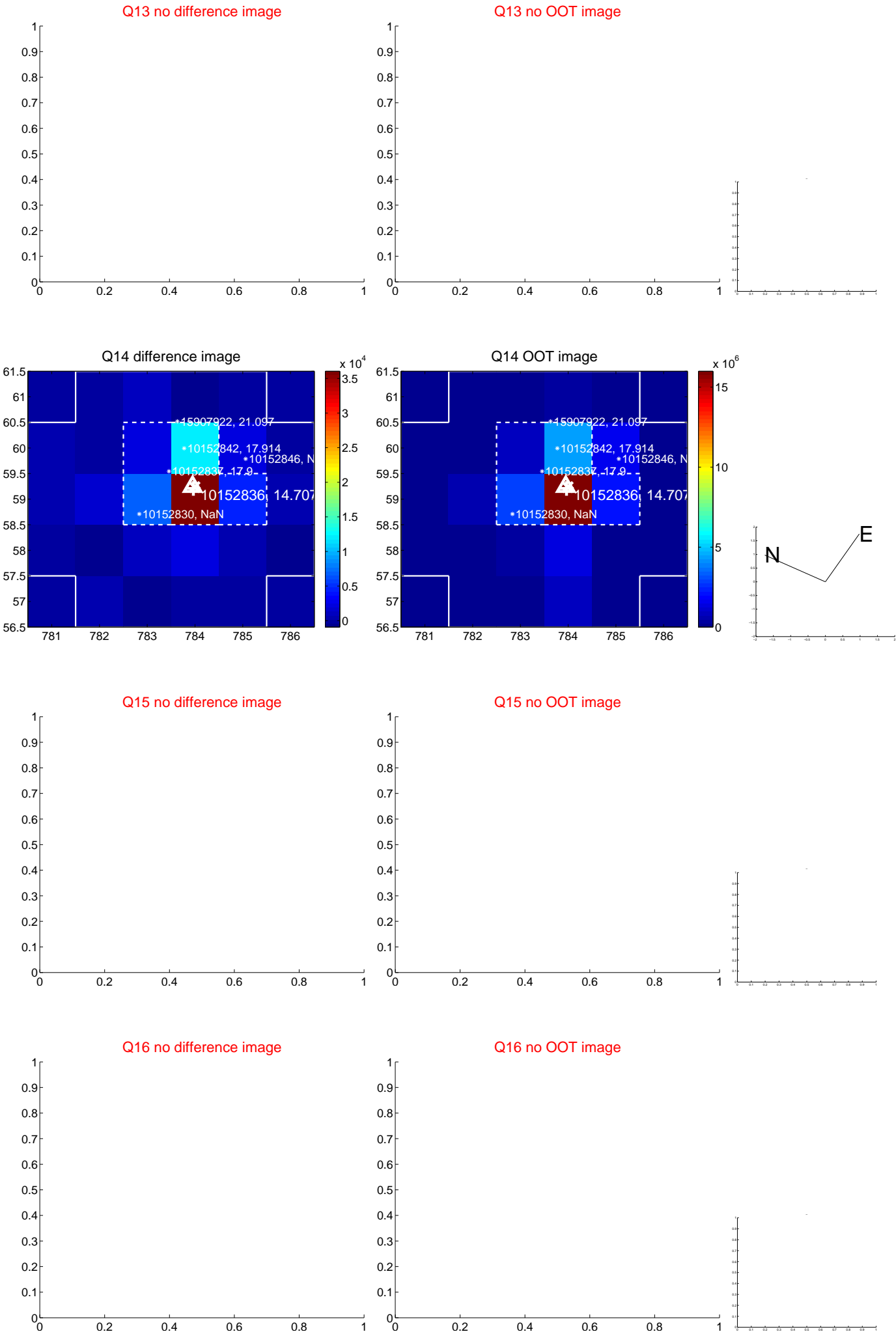
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



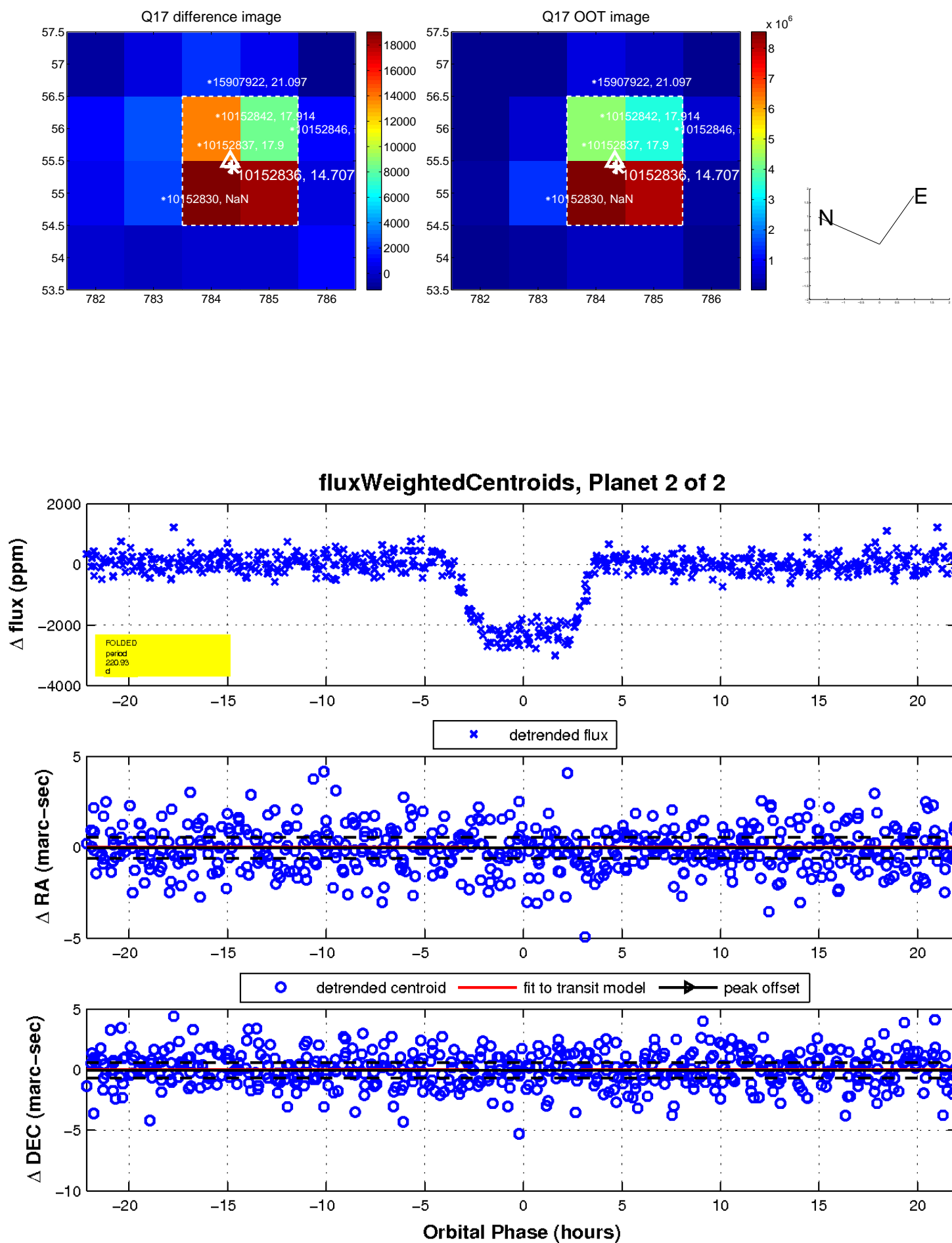
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

