

# KIC 010004738

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010004738-01	OBS	1598.01	56.475867	143.810251	1078.6	6.041	57.0	56.7	0.84	5497	3.26	7.16
010004738-02	OBS	1598.02	92.874705	145.936455	659.6	7.600	30.3	30.1	0.84	5497	2.69	3.69
010004738-03	OBS	1598.03	13.930664	134.429353	178.6	2.416	12.7	13.8	0.84	5497	1.38	46.27

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010004738-01	OBS	PC	0.99	0	0	0	0	NO_COMMENT
010004738-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT
010004738-03	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

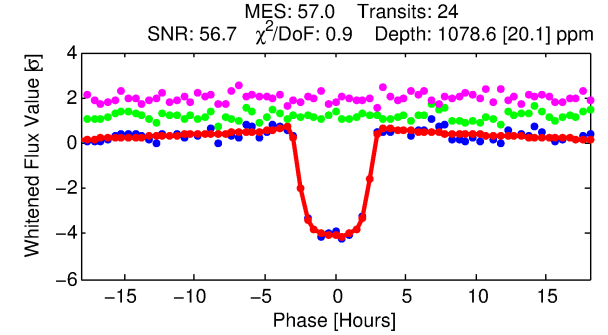
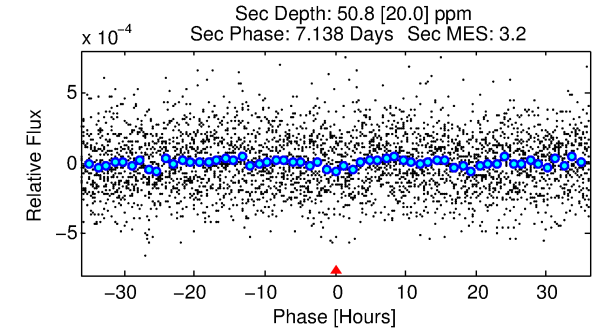
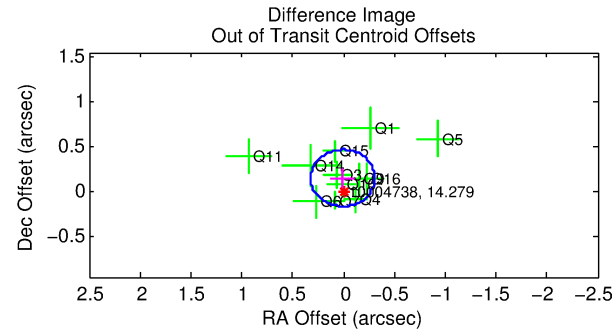
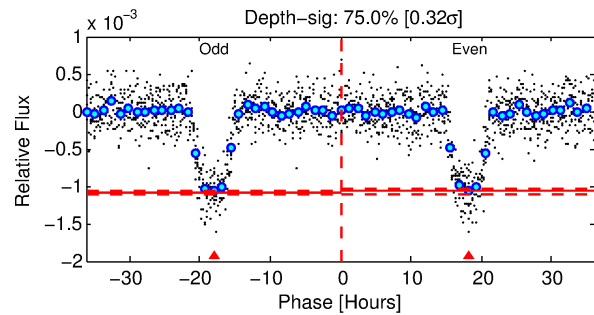
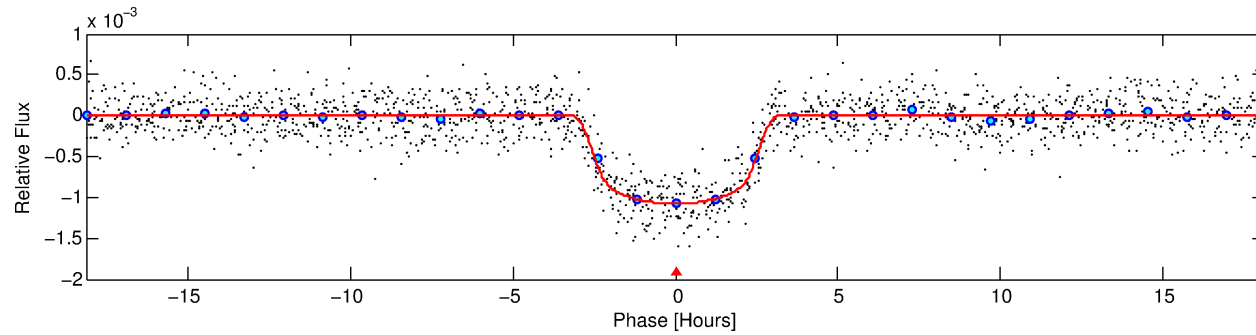
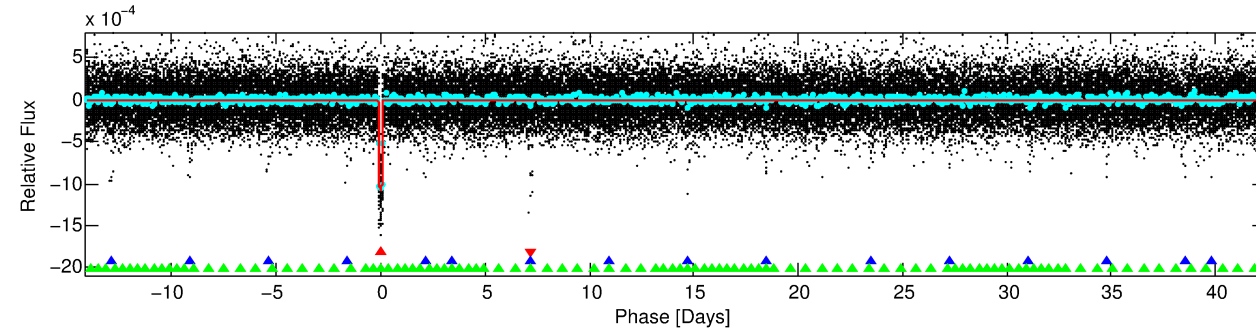
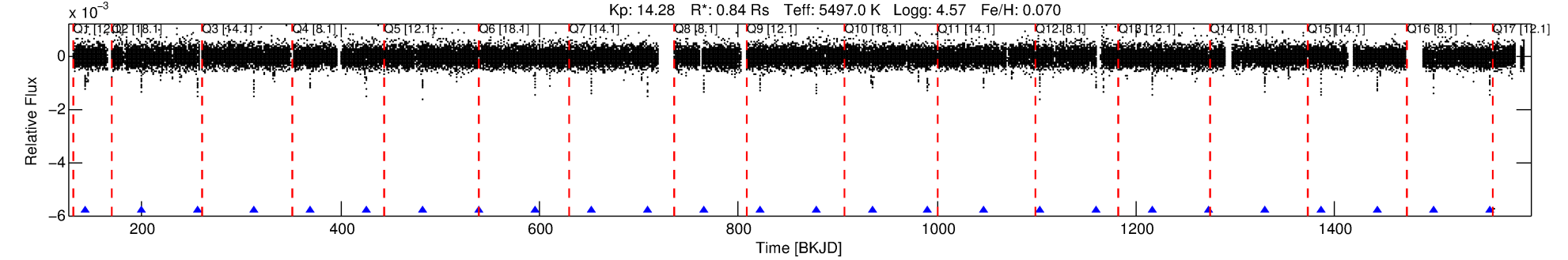
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010004738-01

No Significant Match Found

# DV One-Page Summary

KIC: 10004738 Candidate: 1 of 3 Period: 56.476 d  
KOI: K01598.01 Name: Kepler-310c Corr: 0.990



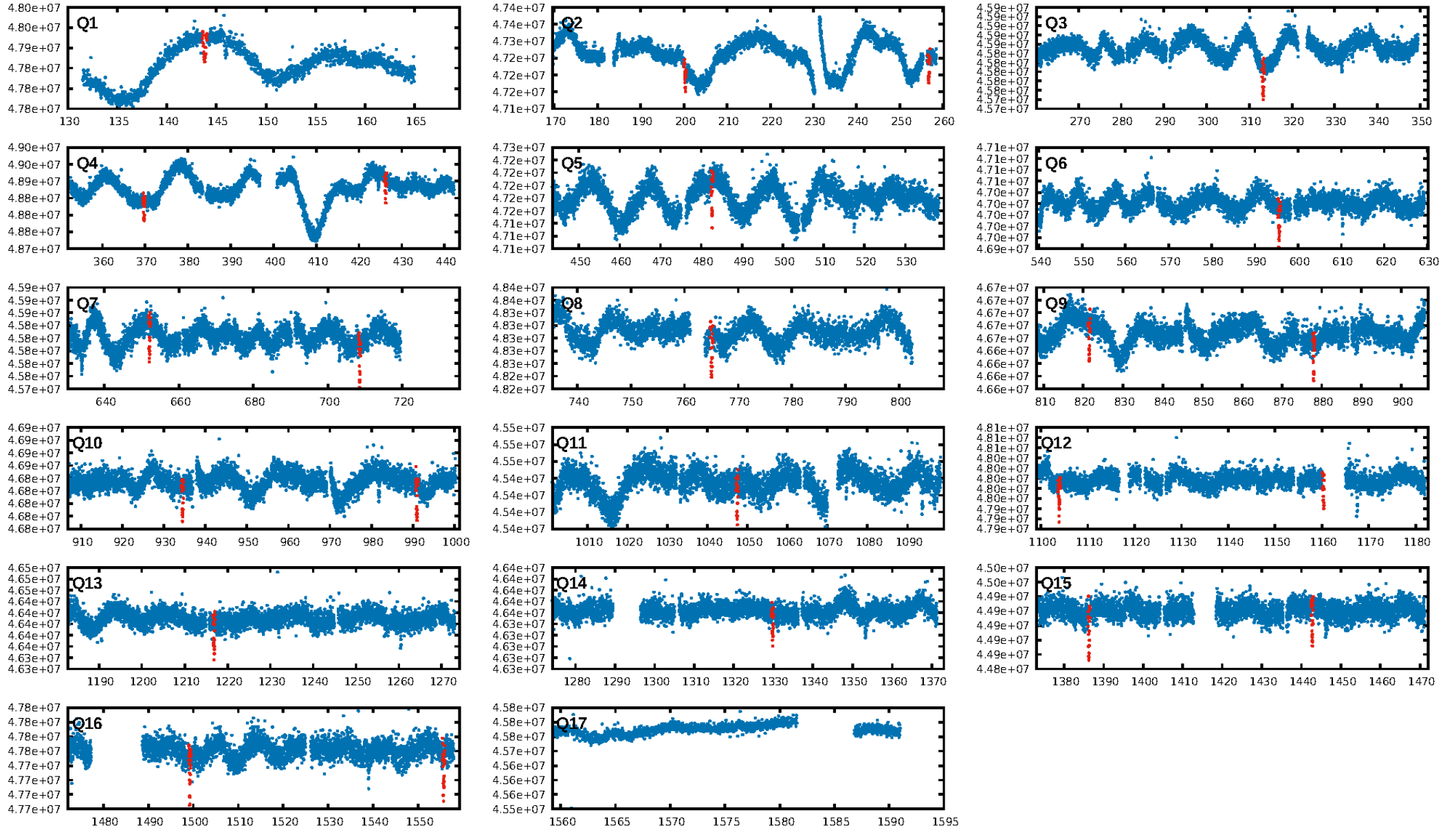
## DV Fit Results:

Period = 56.47587 [0.00014] d  
Epoch = 143.8103 [0.0021] BKJD  
Rp/R\* = 0.0356 [0.0009]  
a/R\* = 38.53 [3.58]  
b = 0.88 [0.02]  
Seff = 7.16 [0.89]  
Teq = 417 [13] K  
Rp = 3.26 [0.27] Re  
a = 0.2836 [0.0201] AU  
Ag = 212.18 [87.28] [2.42σ]  
Teffp = 2461 [247] K [8.27σ]

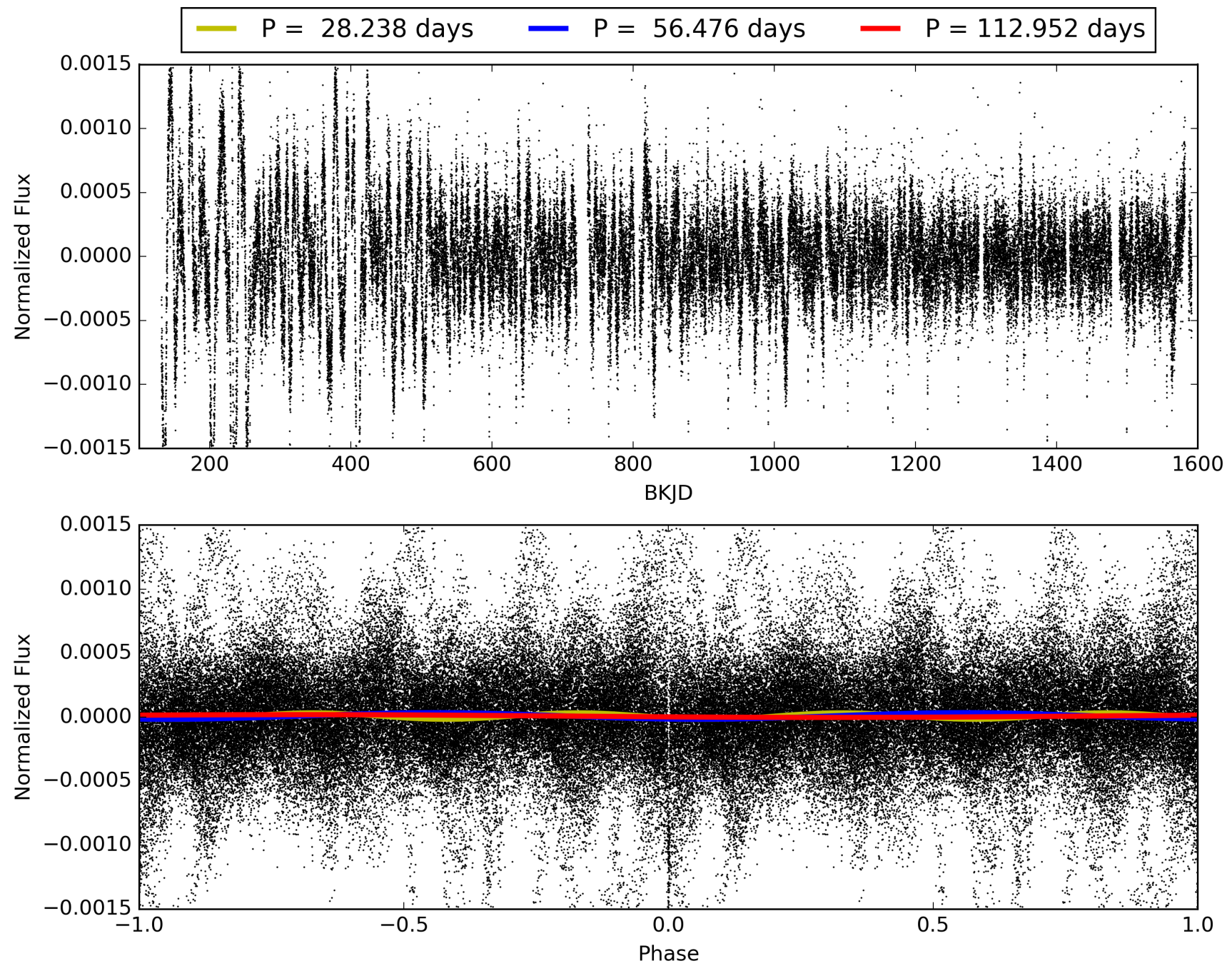
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [156.94σ]  
LongPeriod-sig: 100.0% [89.98σ]  
ModelChiSquare2-sig: 62.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [23/23]  
GhostDiagnostic-chr: 12.79  
Centroid-sig: 52.8%  
Centroid-so: 0.144 arcsec [0.81σ]  
OotOffset-rm: 0.152 arcsec [1.45σ]  
OotOffset-st: 3/4/2/3 [12]  
KicOffset-rm: 0.382 arcsec [3.82σ]  
KicOffset-st: 3/4/2/3 [12]  
DiffImageQuality-fgm: 1.00 [12/12]  
DiffImageOverlap-fno: 0.83 [10/12]

# TCE 010004738-01, PDC Light Curves

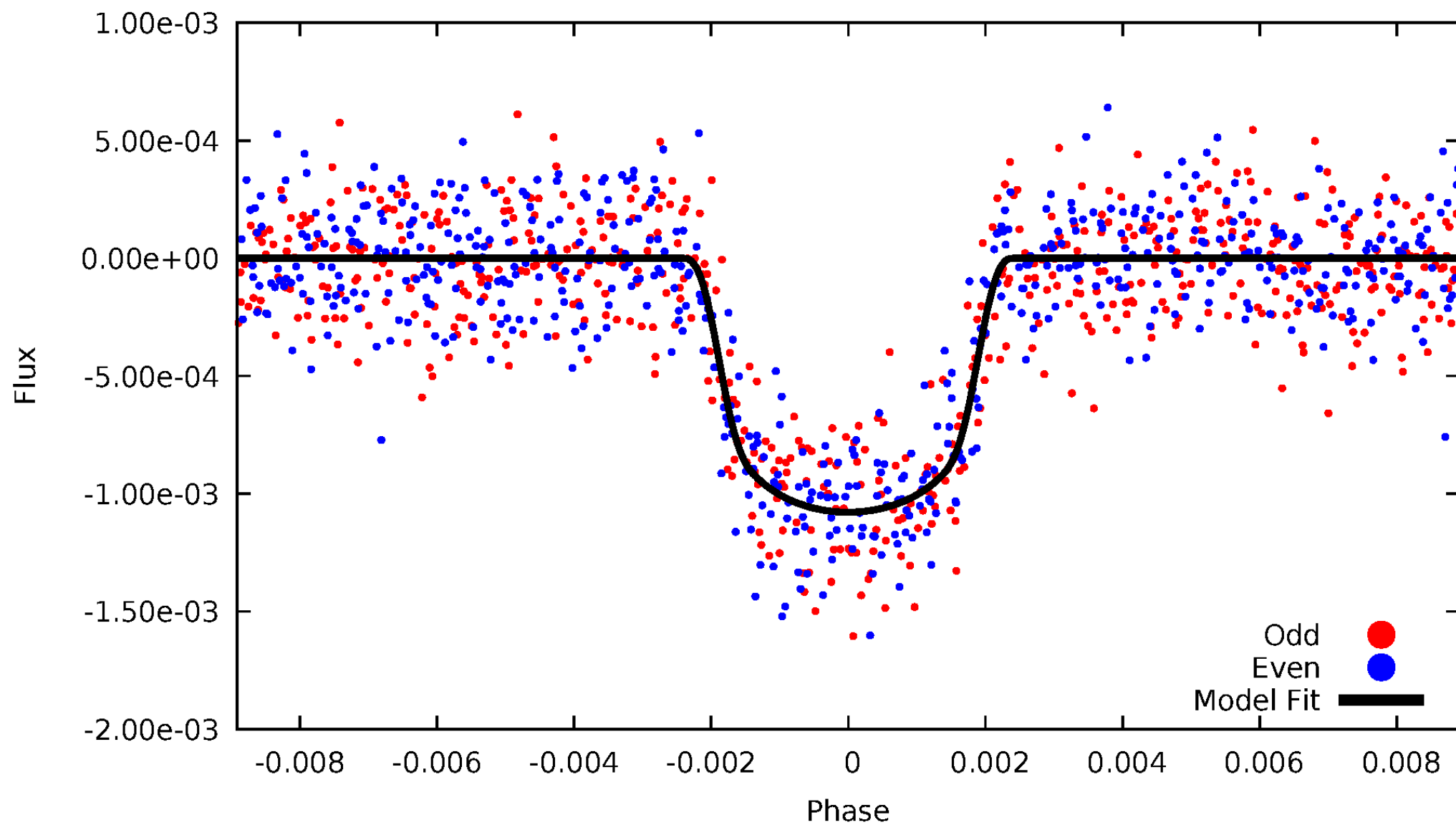


TCE 010004738-01



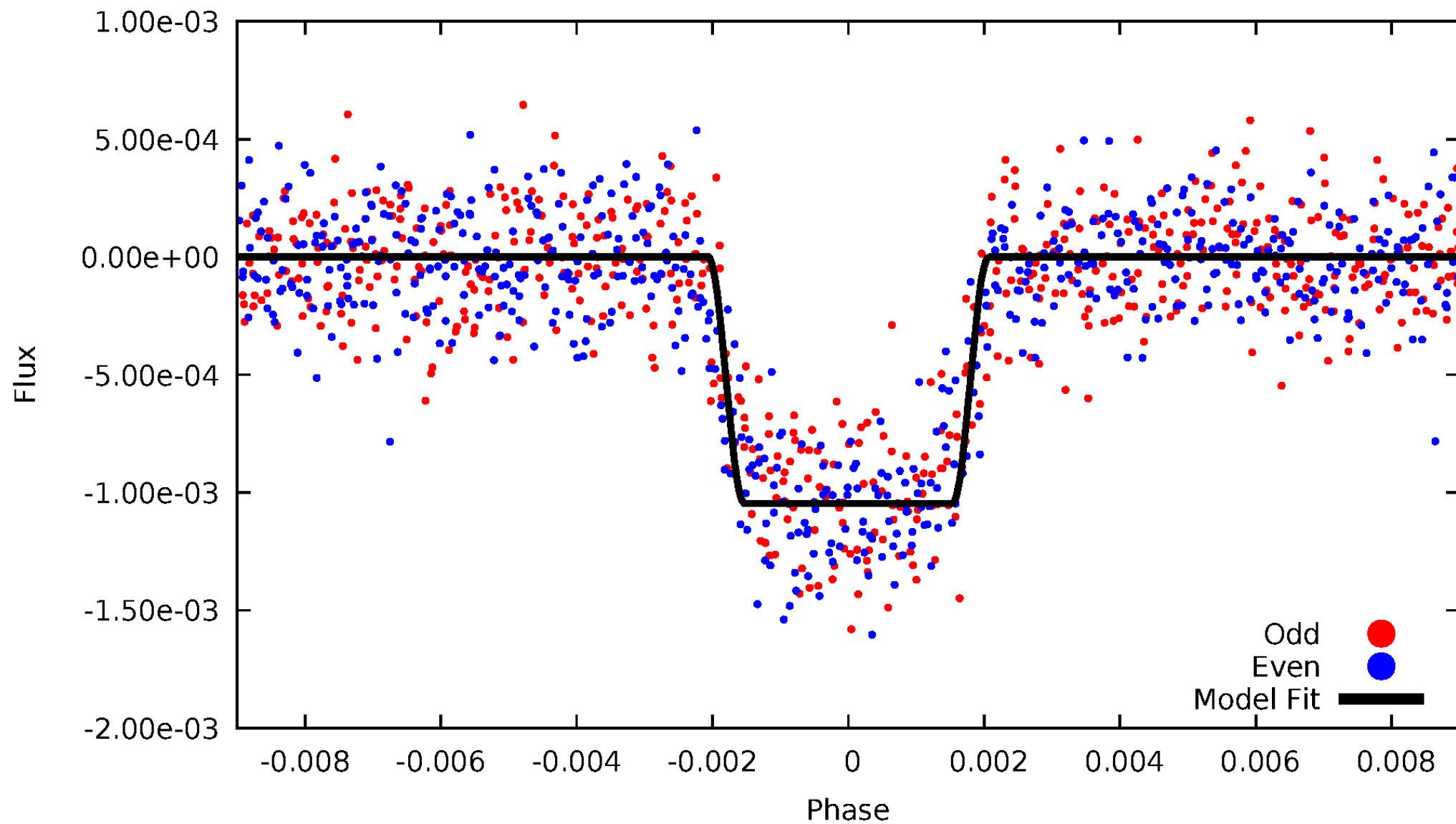
# DV Odd/Even

TCE 010004738-01



# ALT Odd/Even

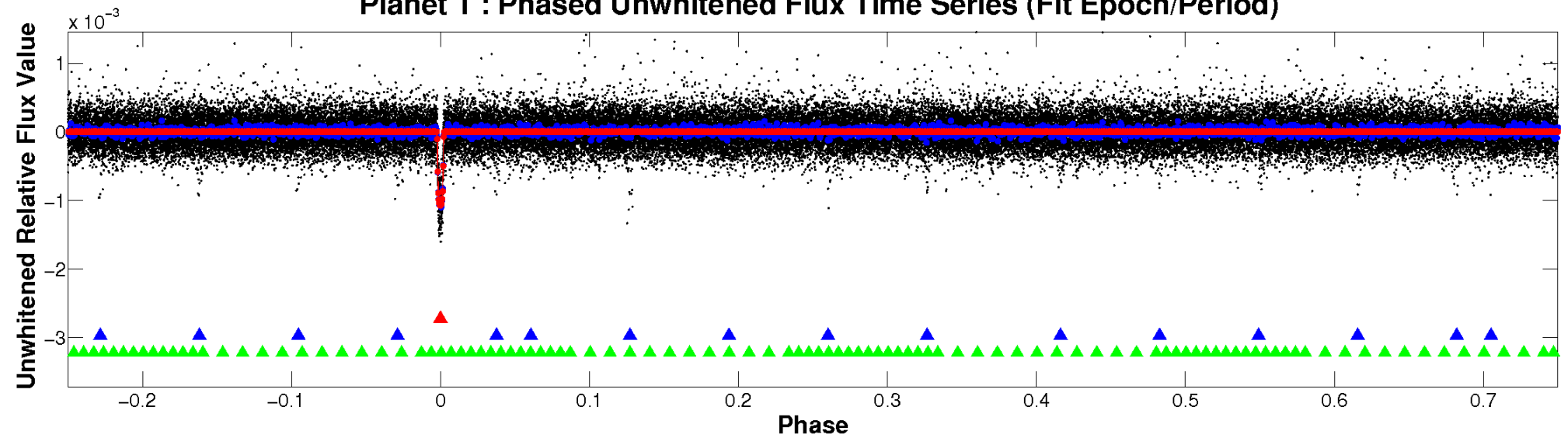
TCE 010004738-01



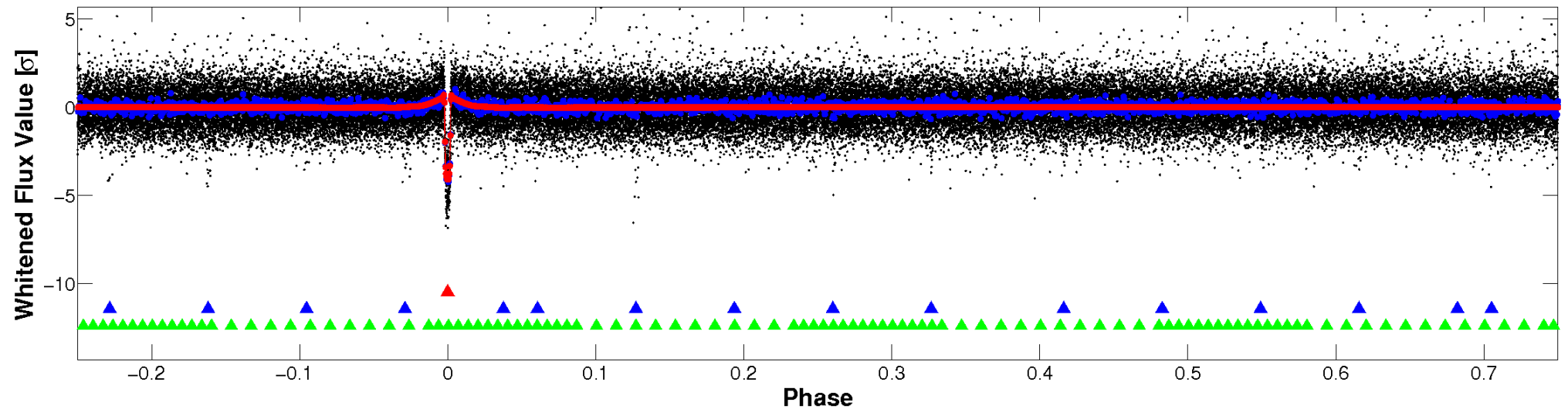


# Non-Whitened Vs. Whitened Light Curve

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

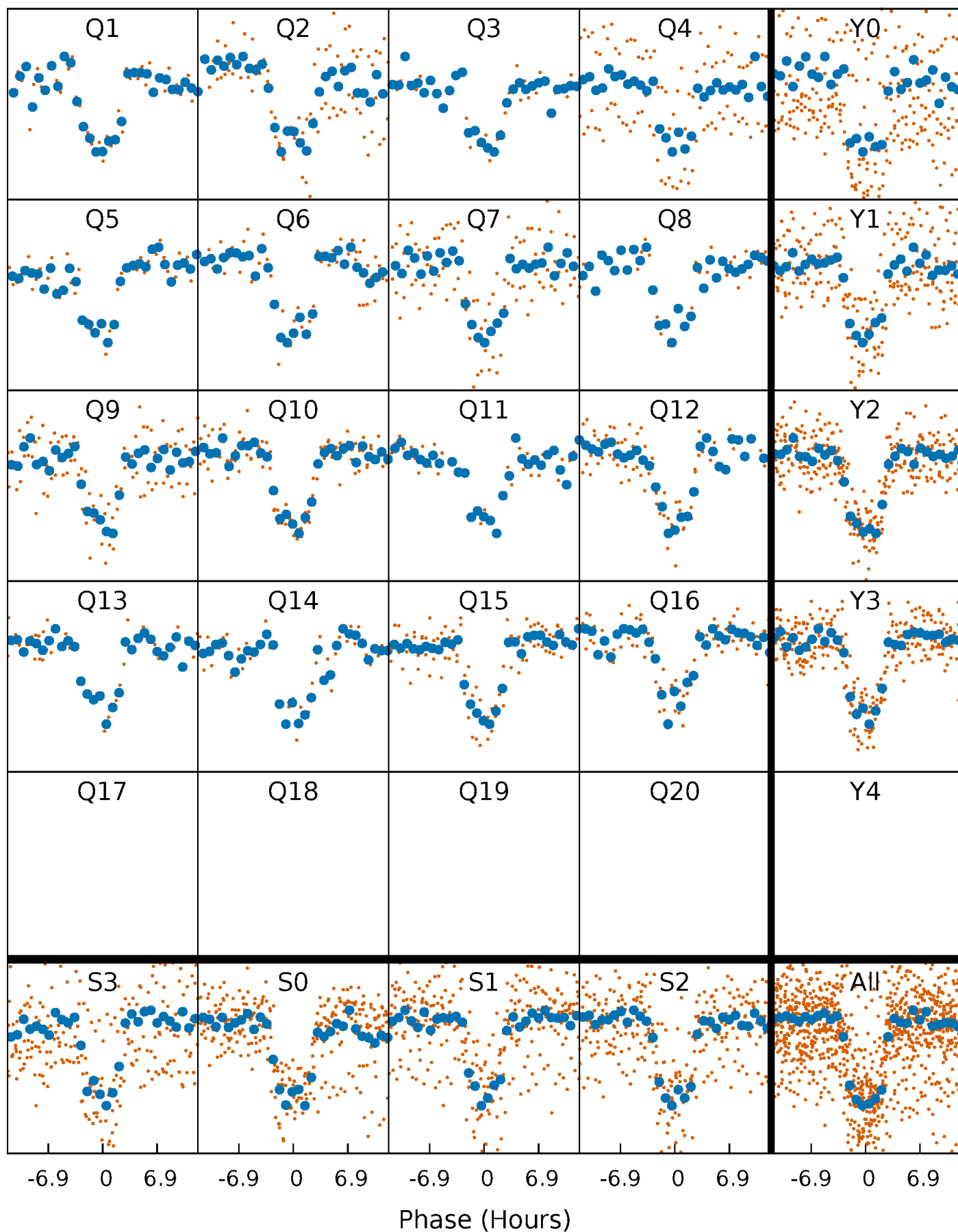


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

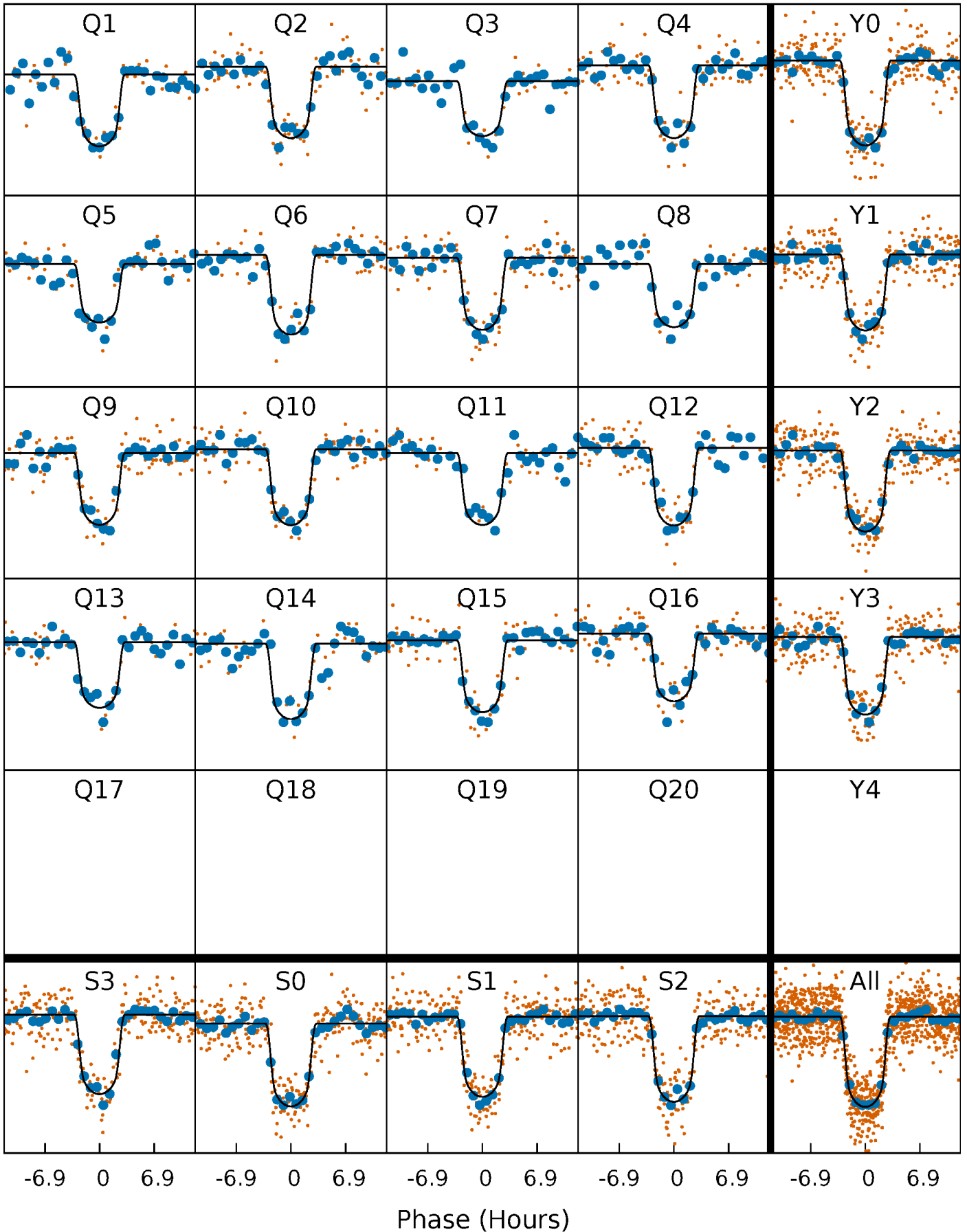
TCE 010004738-01 P= 56.475867 Days  $T_0=143.810251$  (BKJD)





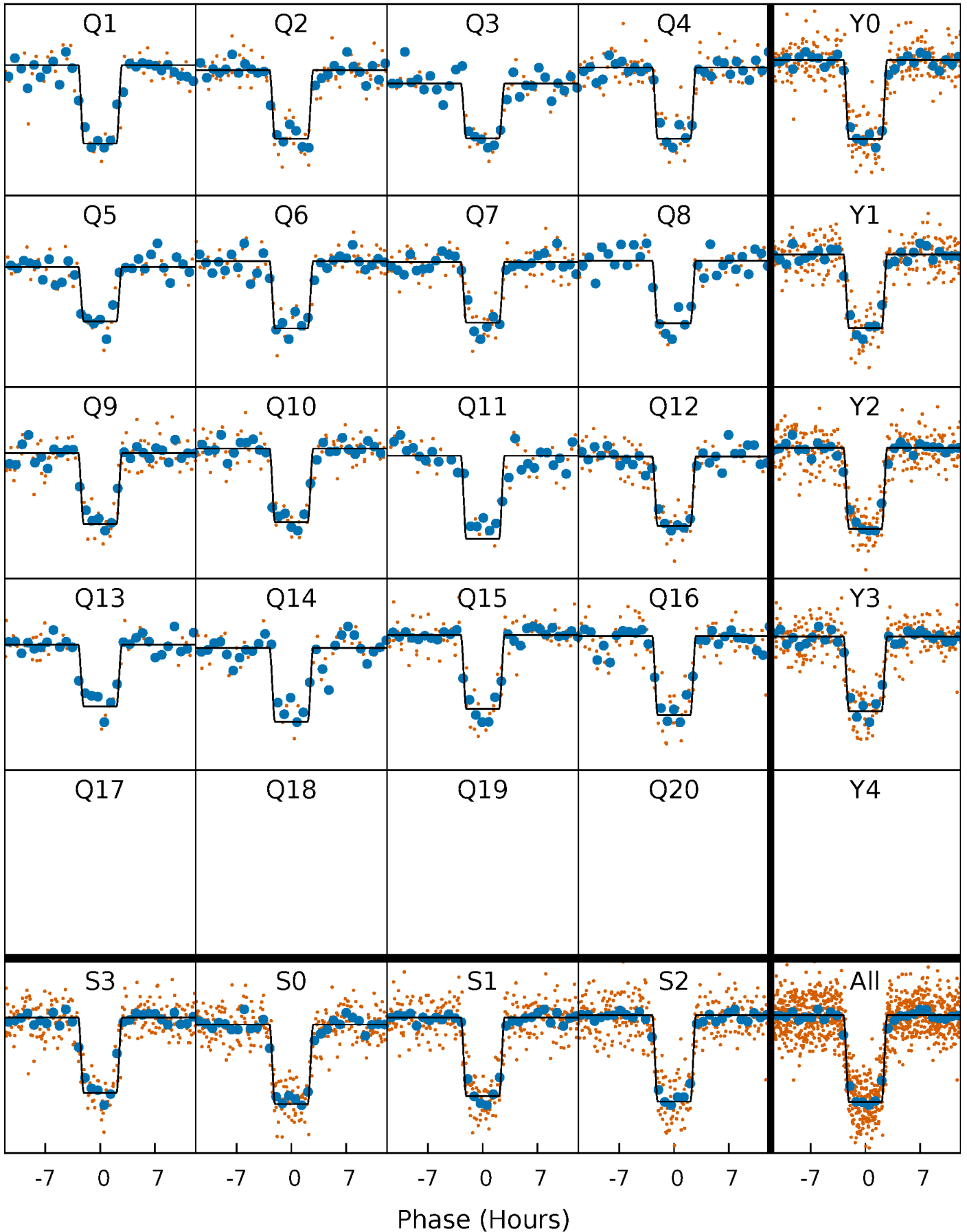
# DV Quarter-Phased Transit Curves

TCE 010004738-01 P= 56.475867 Days  $T_0=143.810251$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

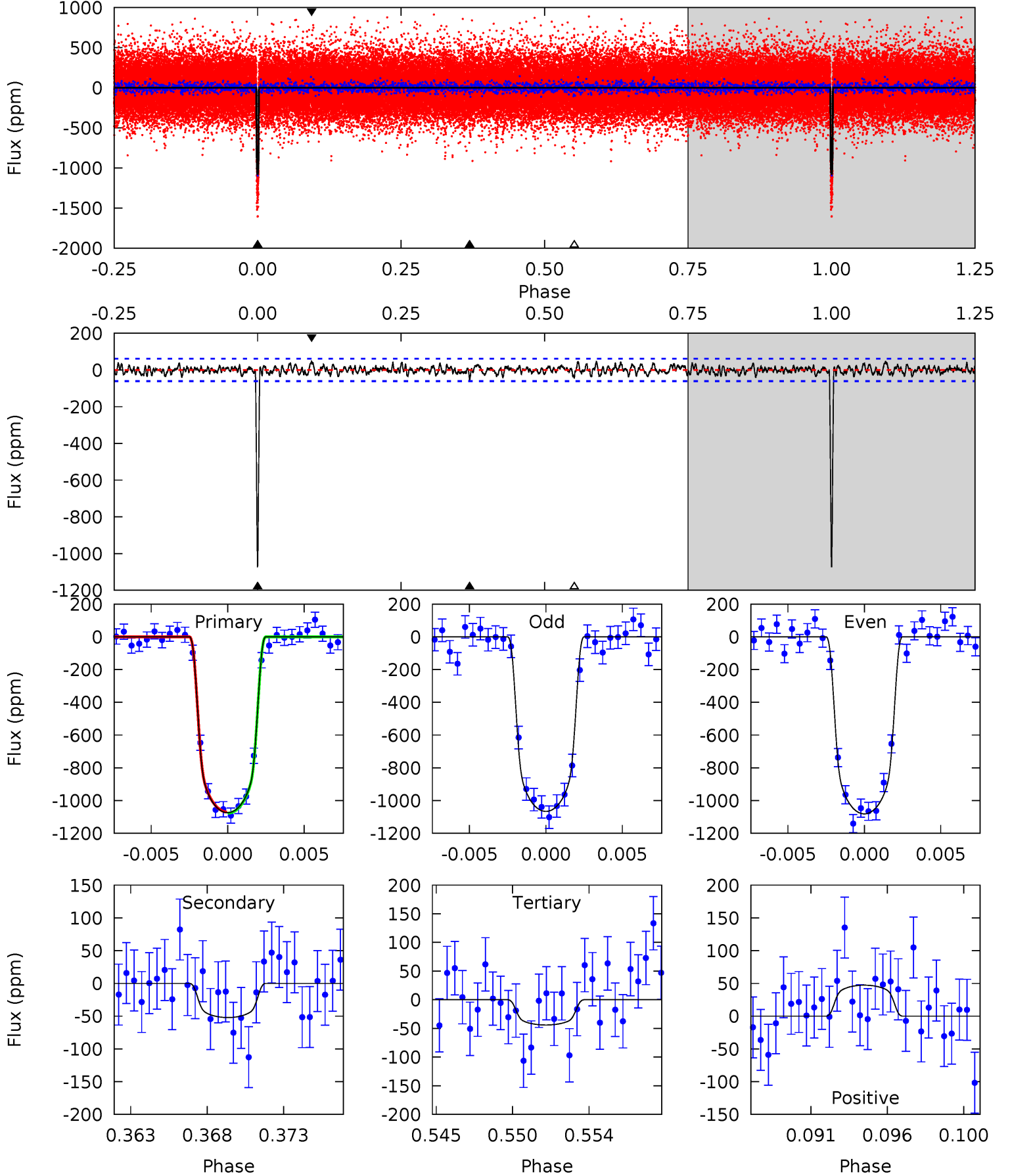
TCE 010004738-01 P= 56.476185 Days  $T_0=143.806510$  (BKJD)



# DV Model-Shift Uniqueness Test

010004738-01, P = 56.475867 Days, E = 87.334384 Days

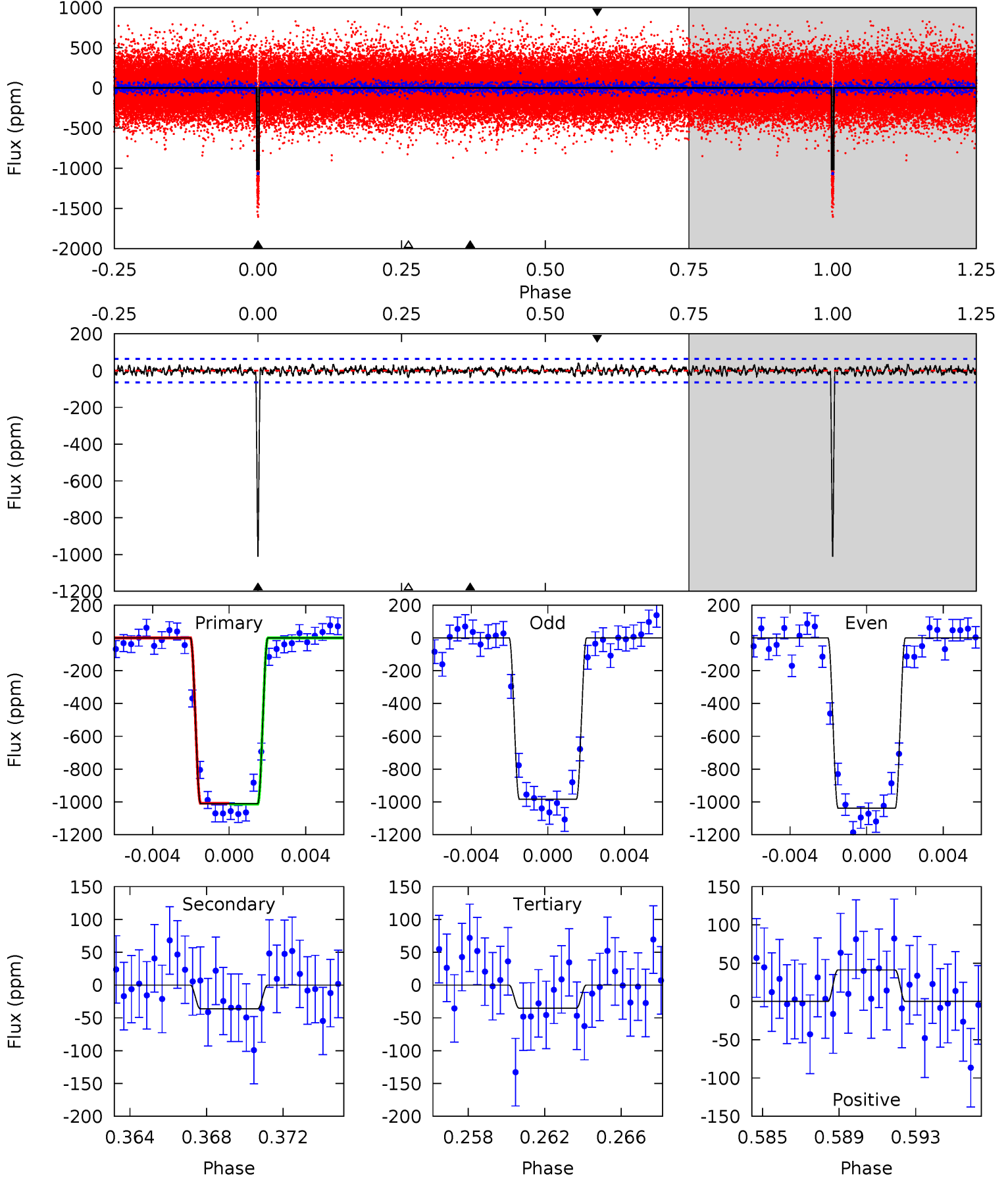
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
91.1	4.42	3.73	4.01	5.17	2.82	1.36	87.4	87.1	0.69	0.41	0.64	1.02	0.04	0.28



# Alt Model-Shift Uniqueness Test

010004738-01, P = 56.476185 Days, E = 87.330325 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
81.8	2.93	2.85	3.33	5.20	2.87	0.99	78.9	78.4	0.08	-0.39	2.26	1.02	0.04	0.18



### Stellar Parameters For KIC 010004738

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5497^{+74}_{-82}$	$4.570^{+0.014}_{-0.063}$	$0.070^{+0.150}_{-0.200}$	$0.839^{+0.065}_{-0.035}$	$0.952^{+0.034}_{-0.067}$	$2.272^{+0.162}_{-0.423}$
	+1%/-1%	+0%/-1%	+214%/-286%	+8%/-4%	+4%/-7%	+7%/-19%
Source	SPE90	SPE90	SPE90	DSEP		

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

### Secondary Eclipse Parameters for KIC 010004738-01 / KOI 1598.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-52 \pm 12$	$3.29^{+0.16}_{-0.13}$	$587^{+12}_{-10}$	$3088^{+108}_{-117}$	$205^{+56}_{-48}$
Alt.	$-36 \pm 12$	$3.00^{+0.15}_{-0.12}$	$588^{+12}_{-11}$	$3012^{+136}_{-166}$	$172^{+61}_{-57}$

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

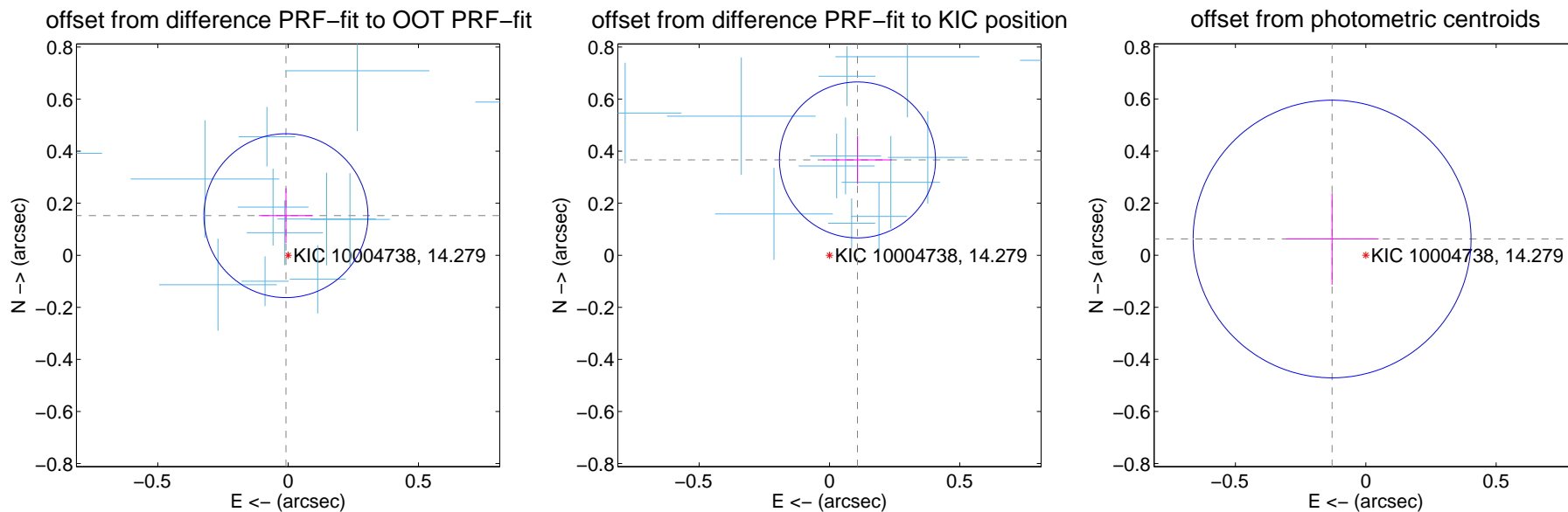
## DV Centroid Data

Supplemental centroid analysis for 010004738-01. Kepler magnitude: 14.28. Transit SNR 56.67

There are 12 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.28 arcsec

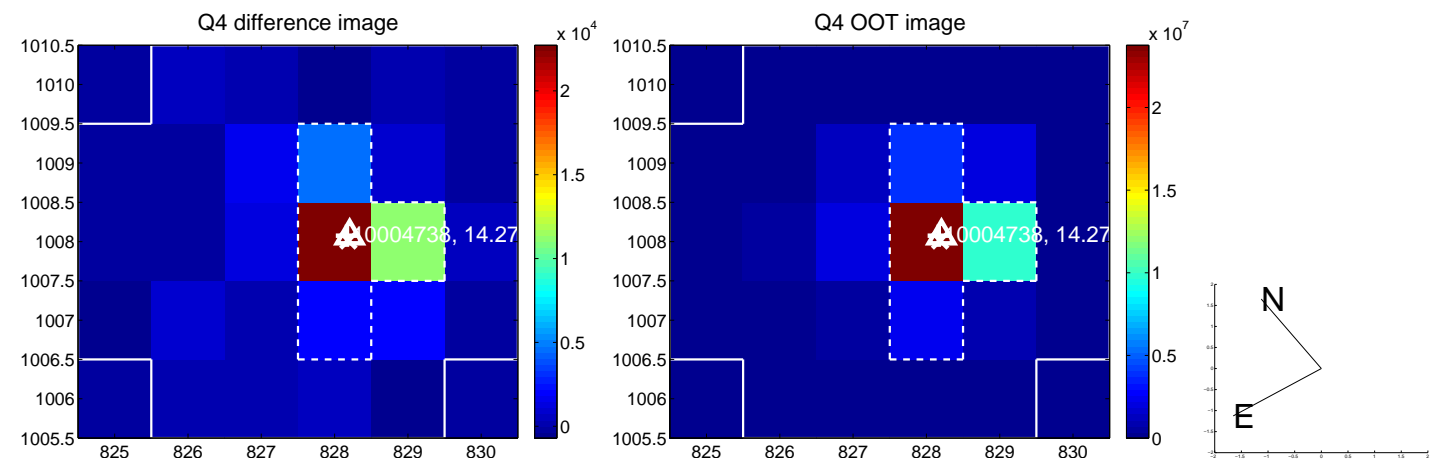
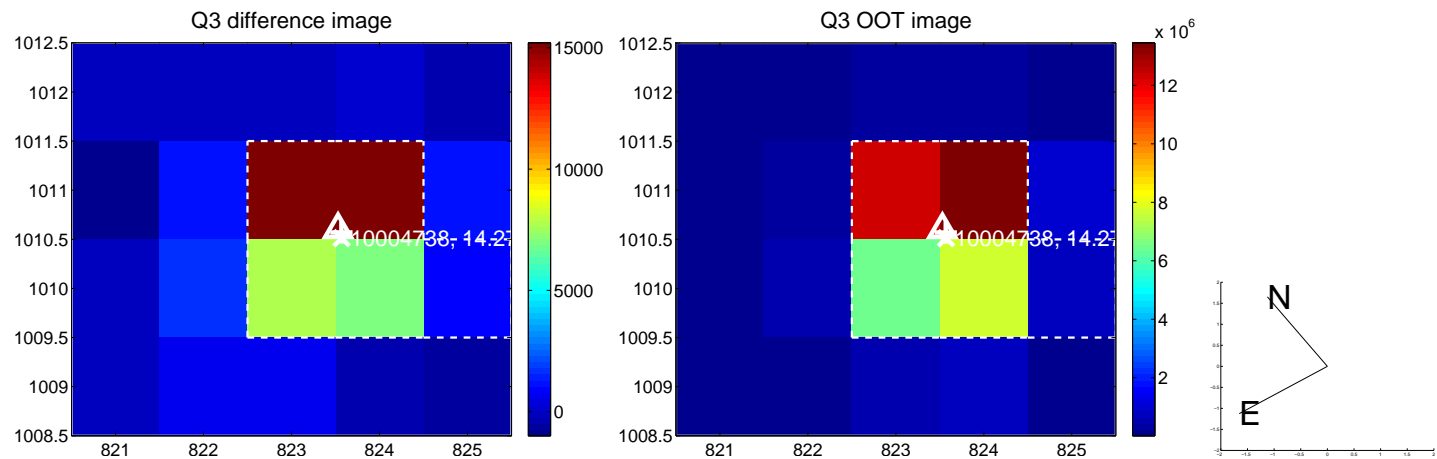
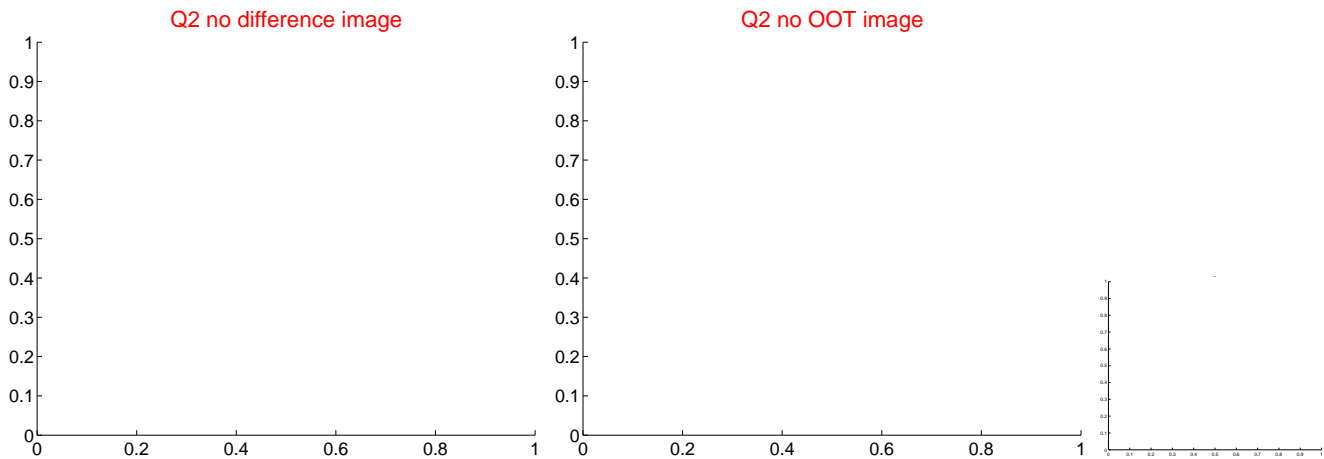
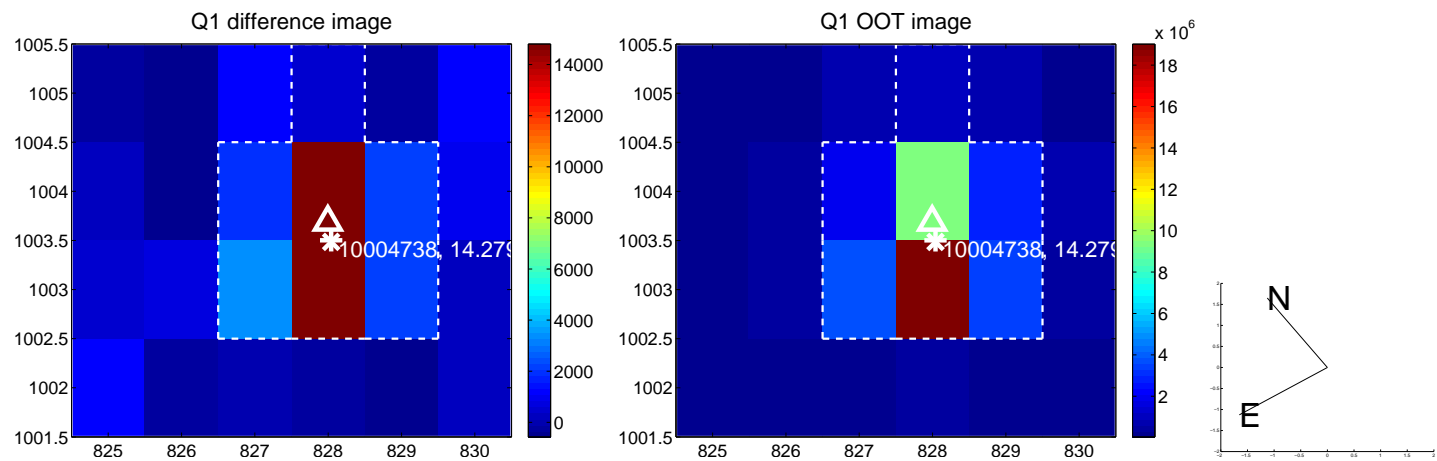
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.152 \pm 0.105$	1.45	$0.008 \pm 0.103$	$0.152 \pm 0.105$
PRF-fit source offset from KIC position	$0.382 \pm 0.100$	3.82	$-0.107 \pm 0.132$	$0.366 \pm 0.092$
photometric centroid source offset	$0.14 \pm 0.18$	0.81	$0.13 \pm 0.18$	$0.06 \pm 0.18$



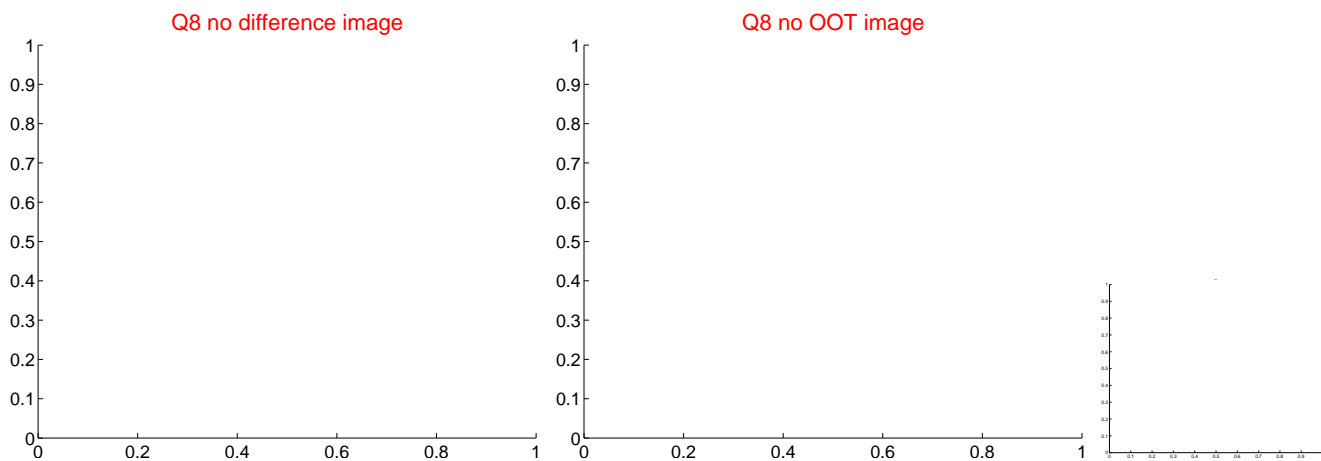
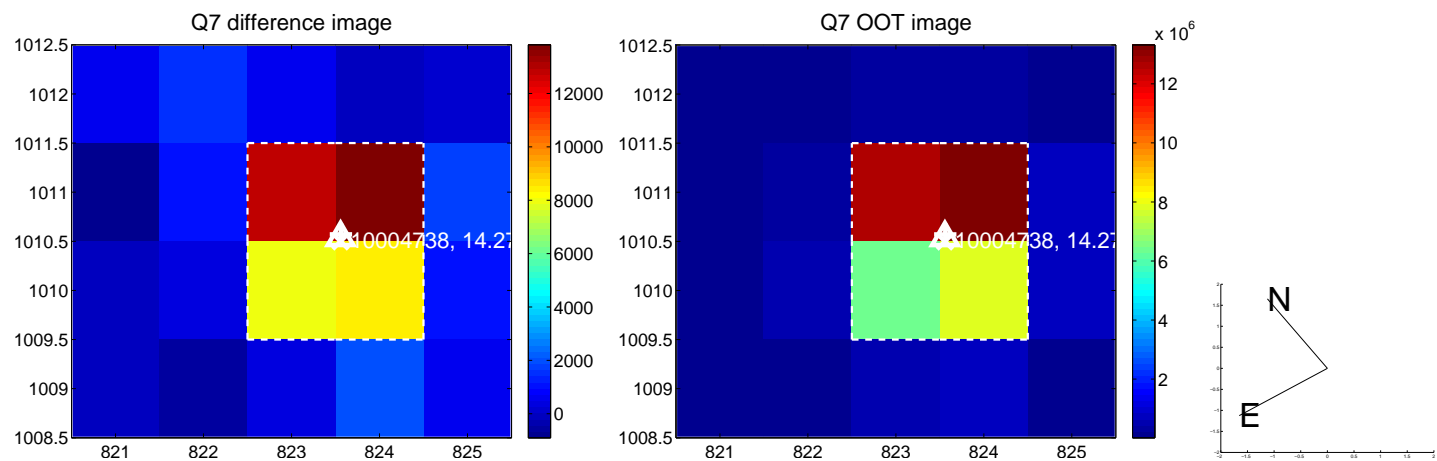
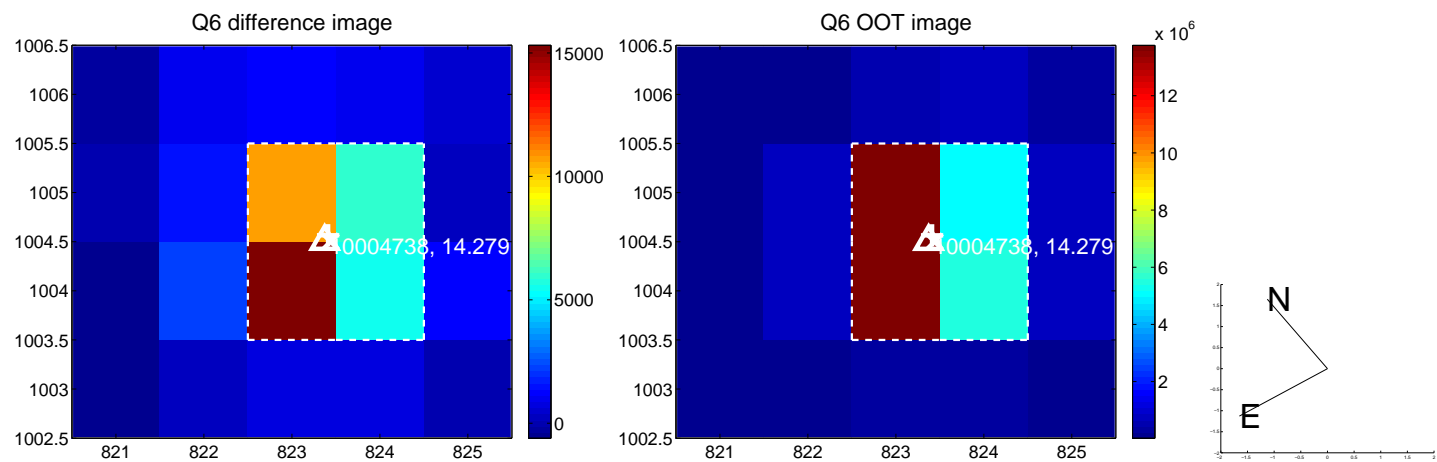
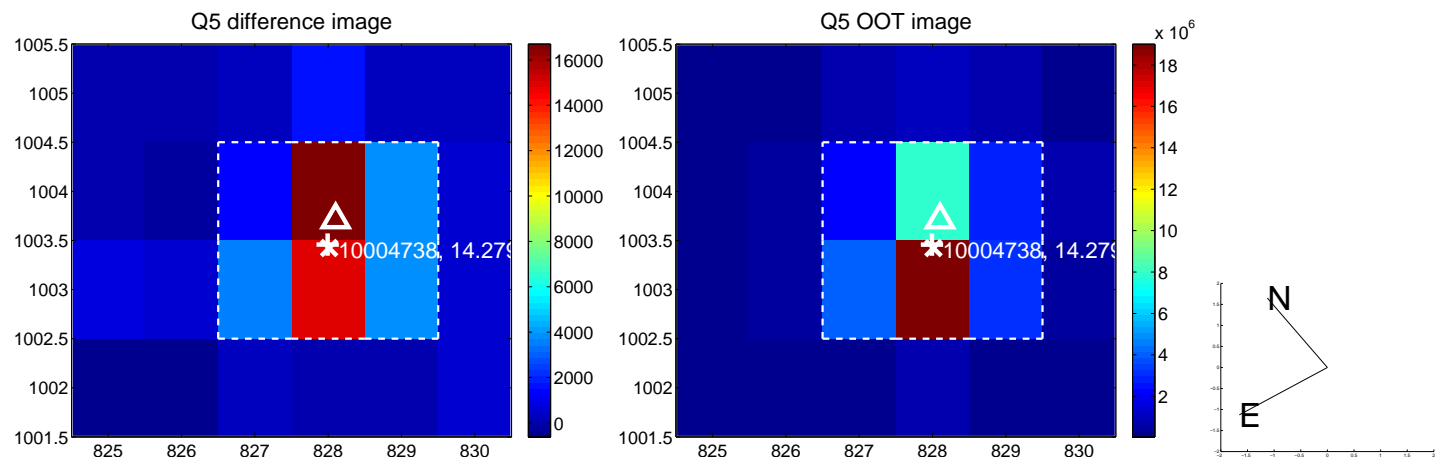
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



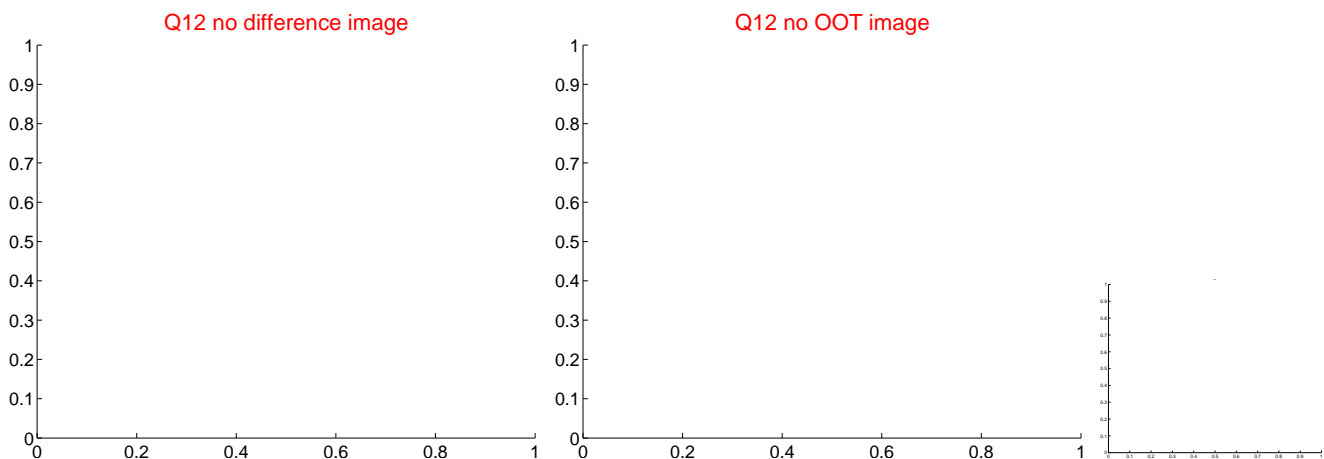
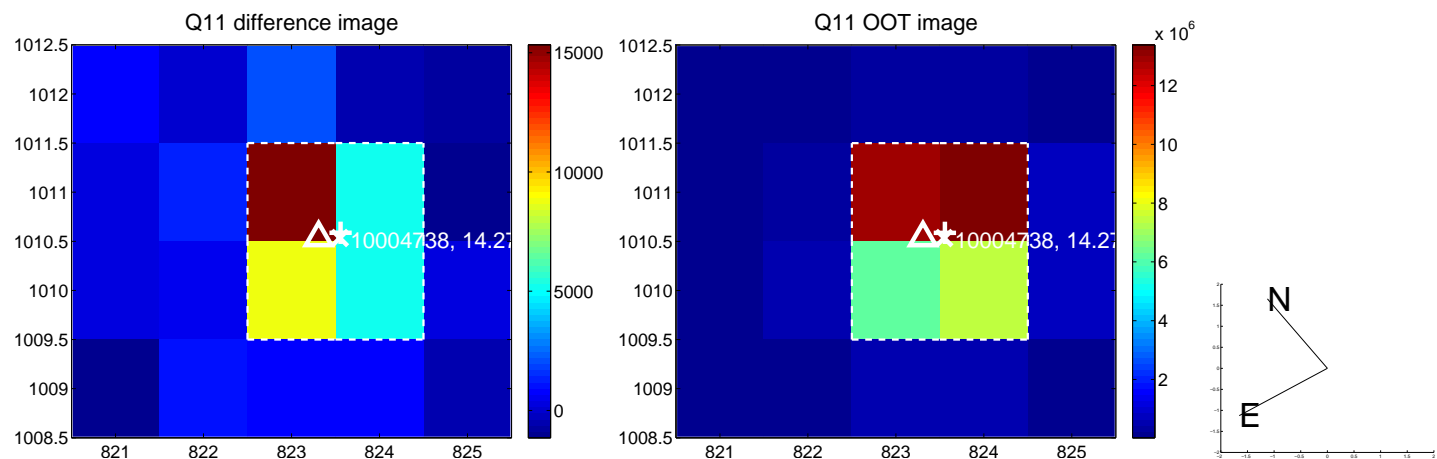
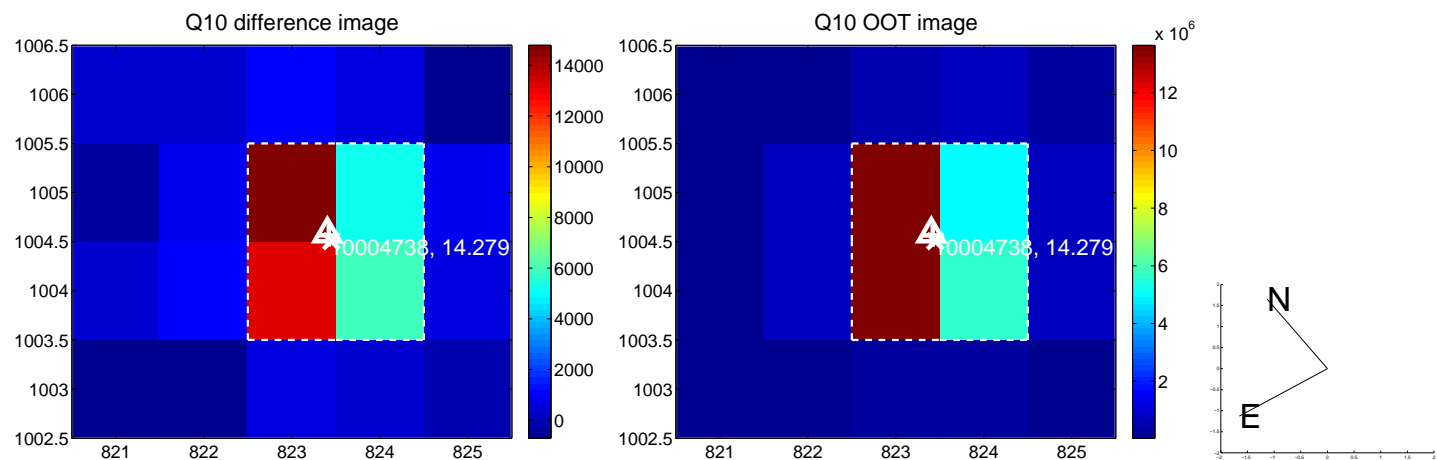
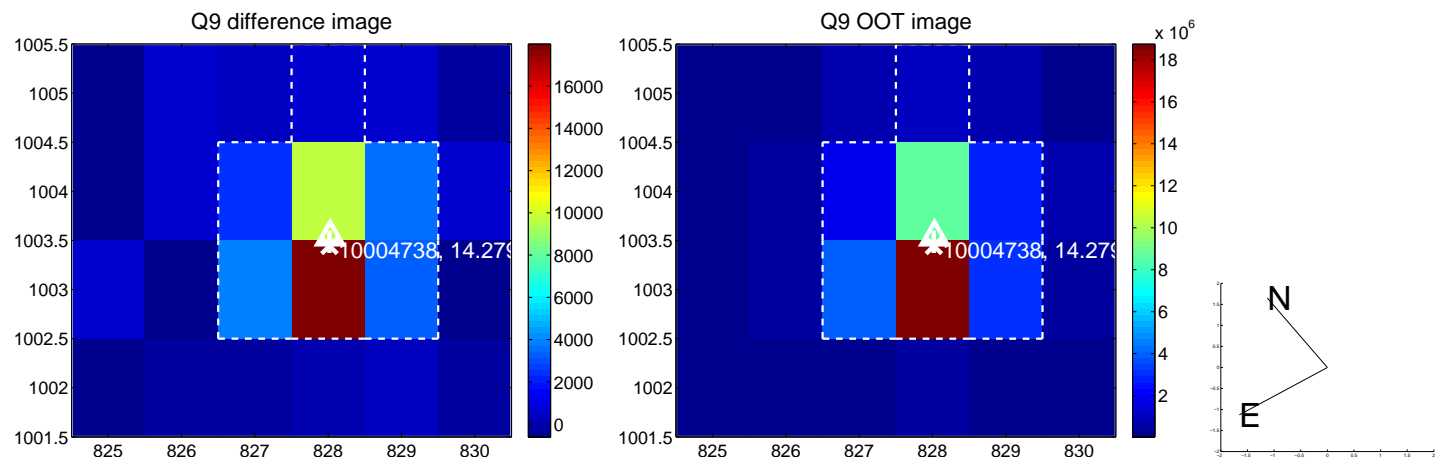
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



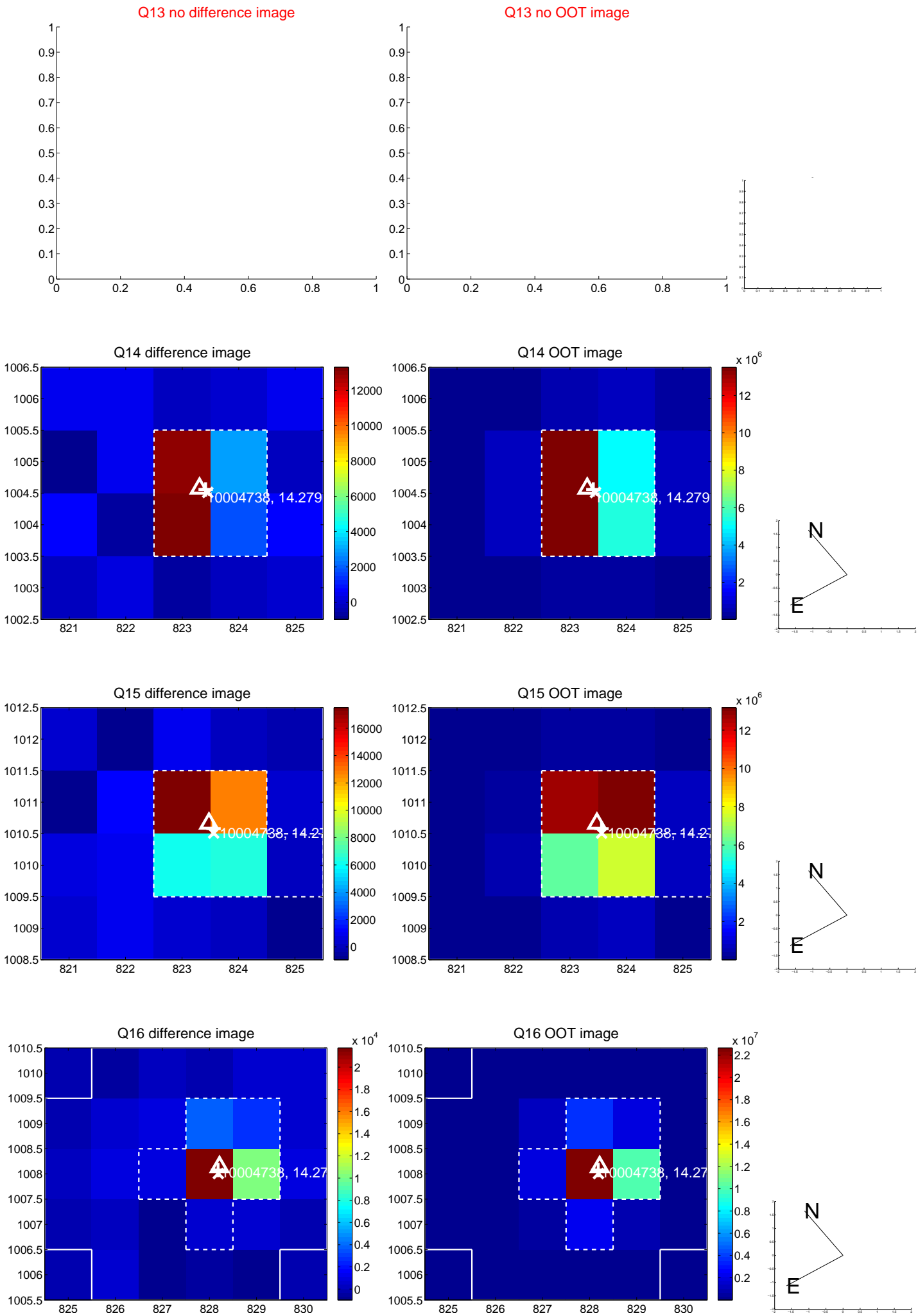
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



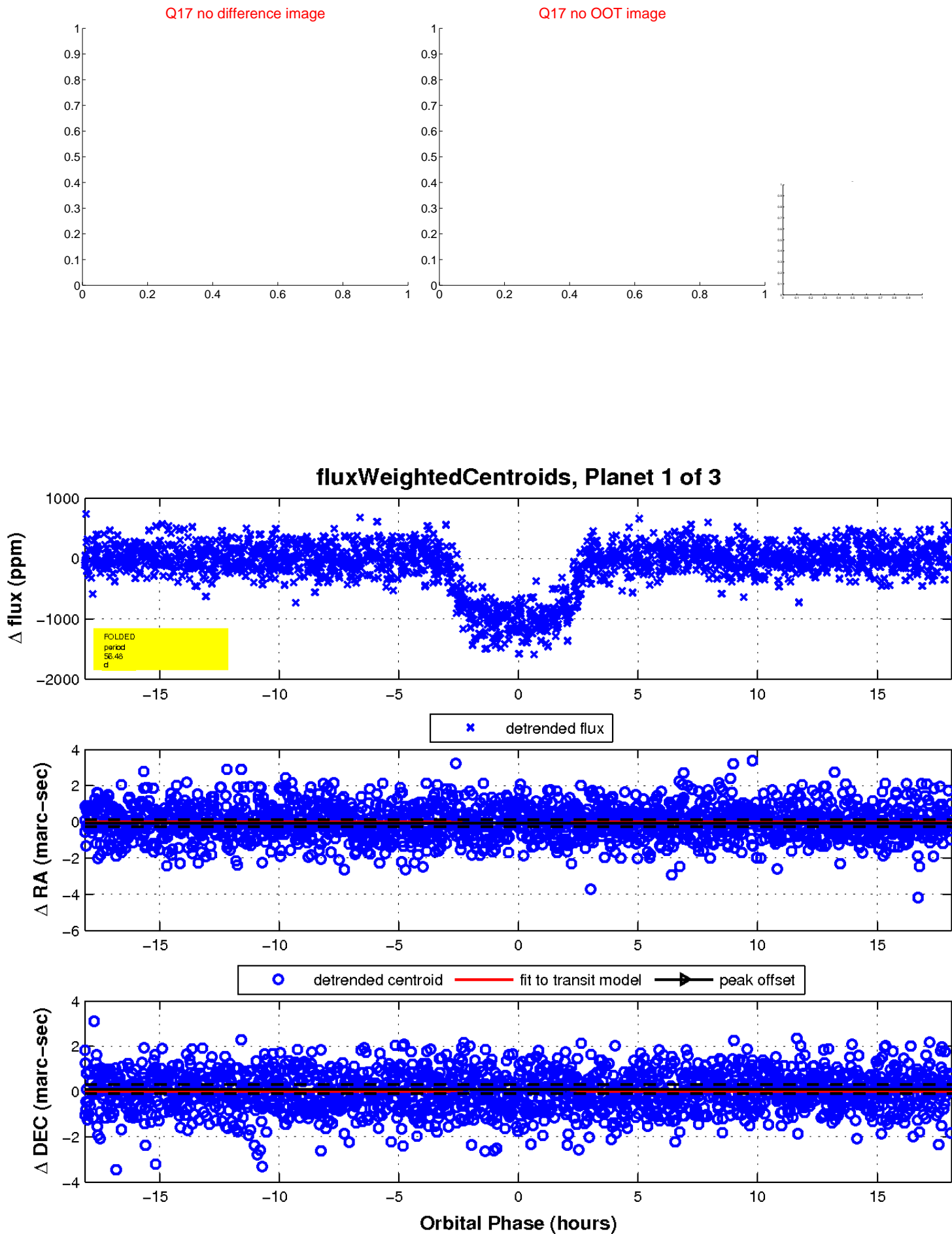
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

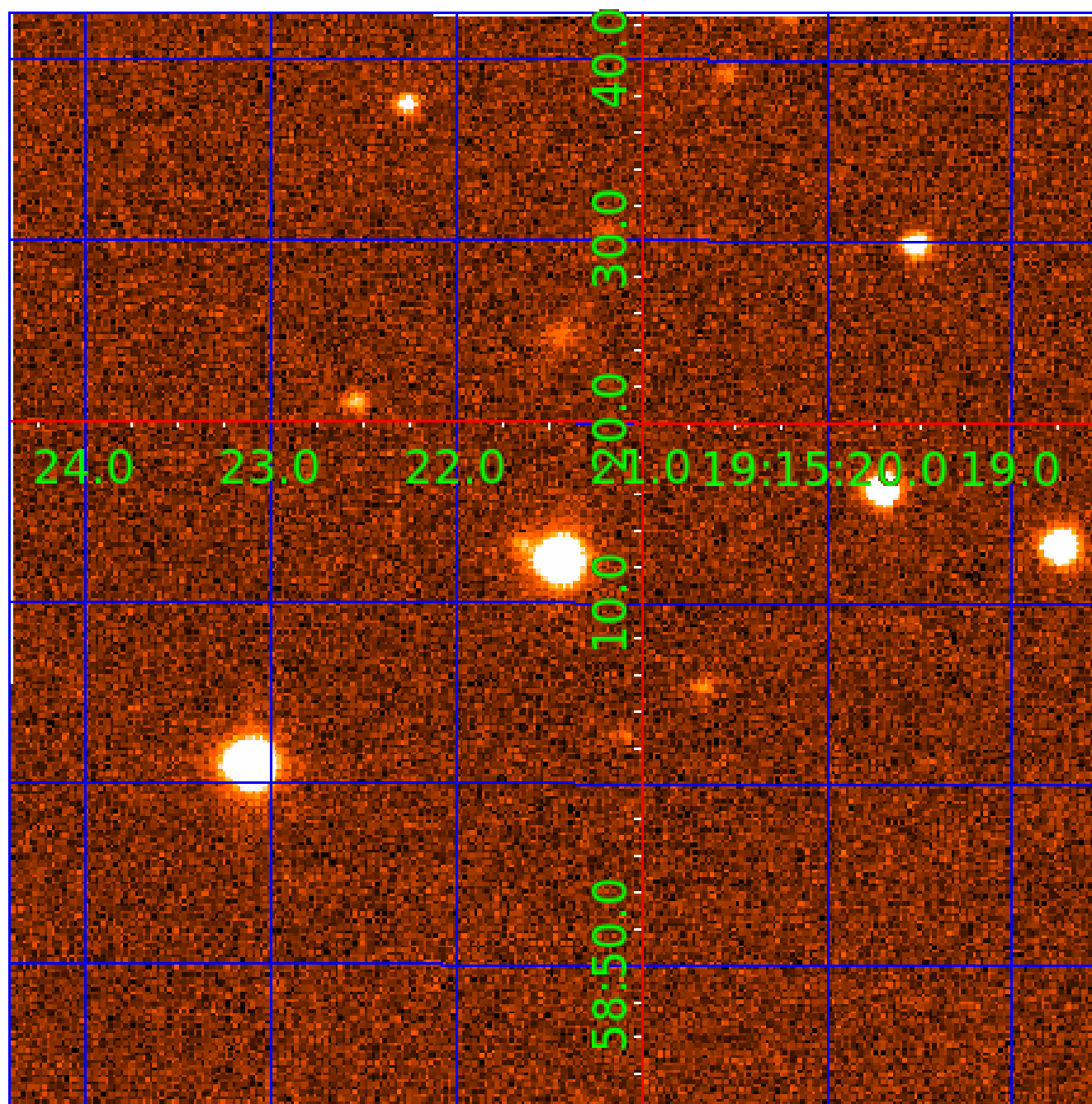


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 010004738

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010004738-01	OBS	1598.01	56.475867	143.810251	1078.6	6.041	57.0	56.7	0.84	5497	3.26	7.16
010004738-02	OBS	1598.02	92.874705	145.936455	659.6	7.600	30.3	30.1	0.84	5497	2.69	3.69
010004738-03	OBS	1598.03	13.930664	134.429353	178.6	2.416	12.7	13.8	0.84	5497	1.38	46.27

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010004738-01	OBS	PC	0.99	0	0	0	0	NO_COMMENT
010004738-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT
010004738-03	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

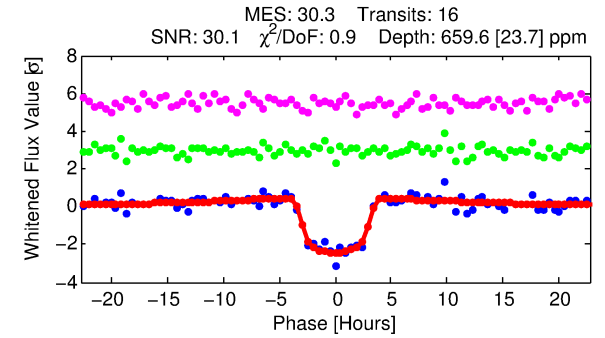
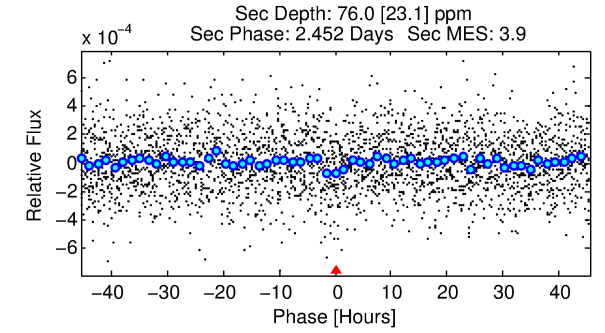
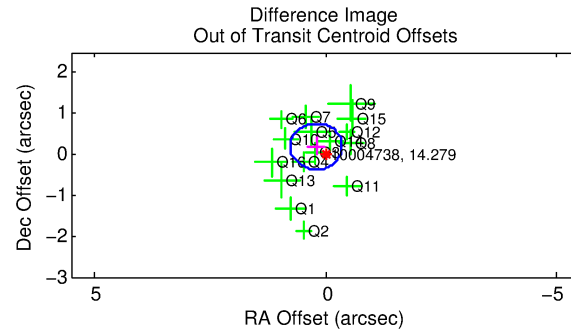
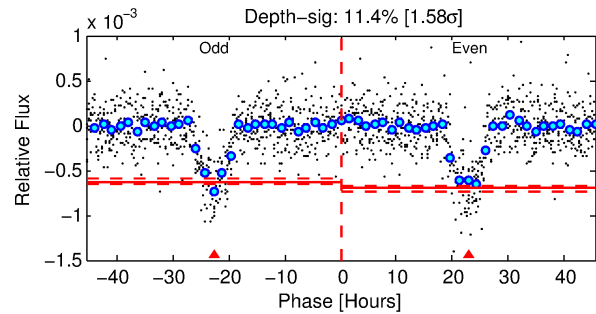
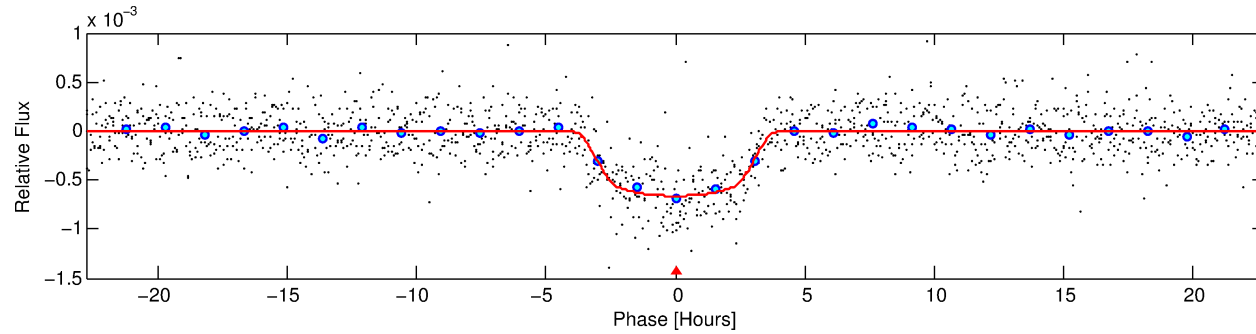
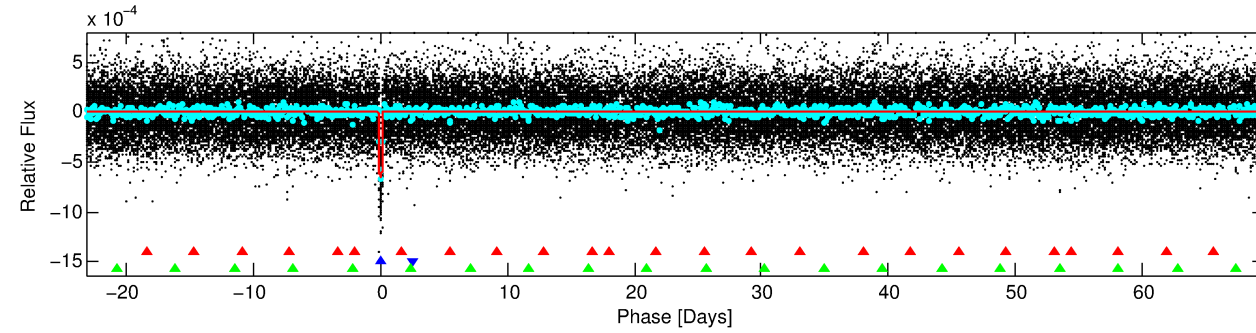
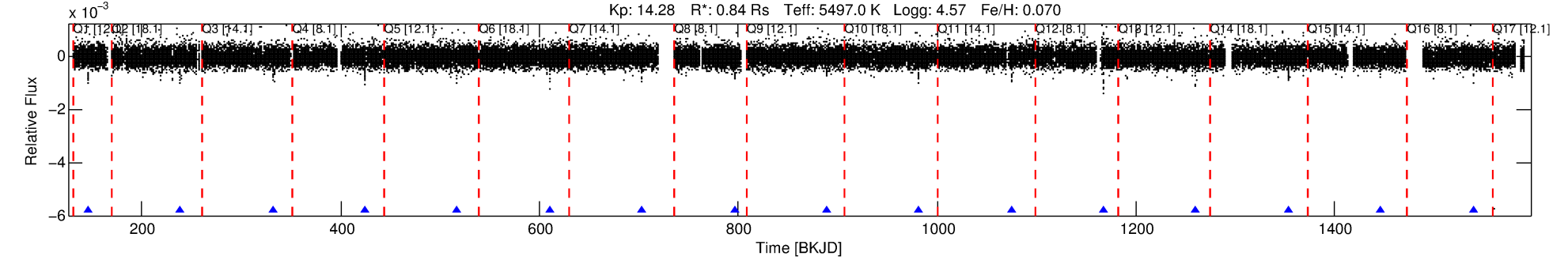
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010004738-02

No Significant Match Found

# DV One-Page Summary

KIC: 10004738 Candidate: 2 of 3 Period: 92.875 d  
KOI: K01598.02 Name: Kepler-310d Corr: 0.963



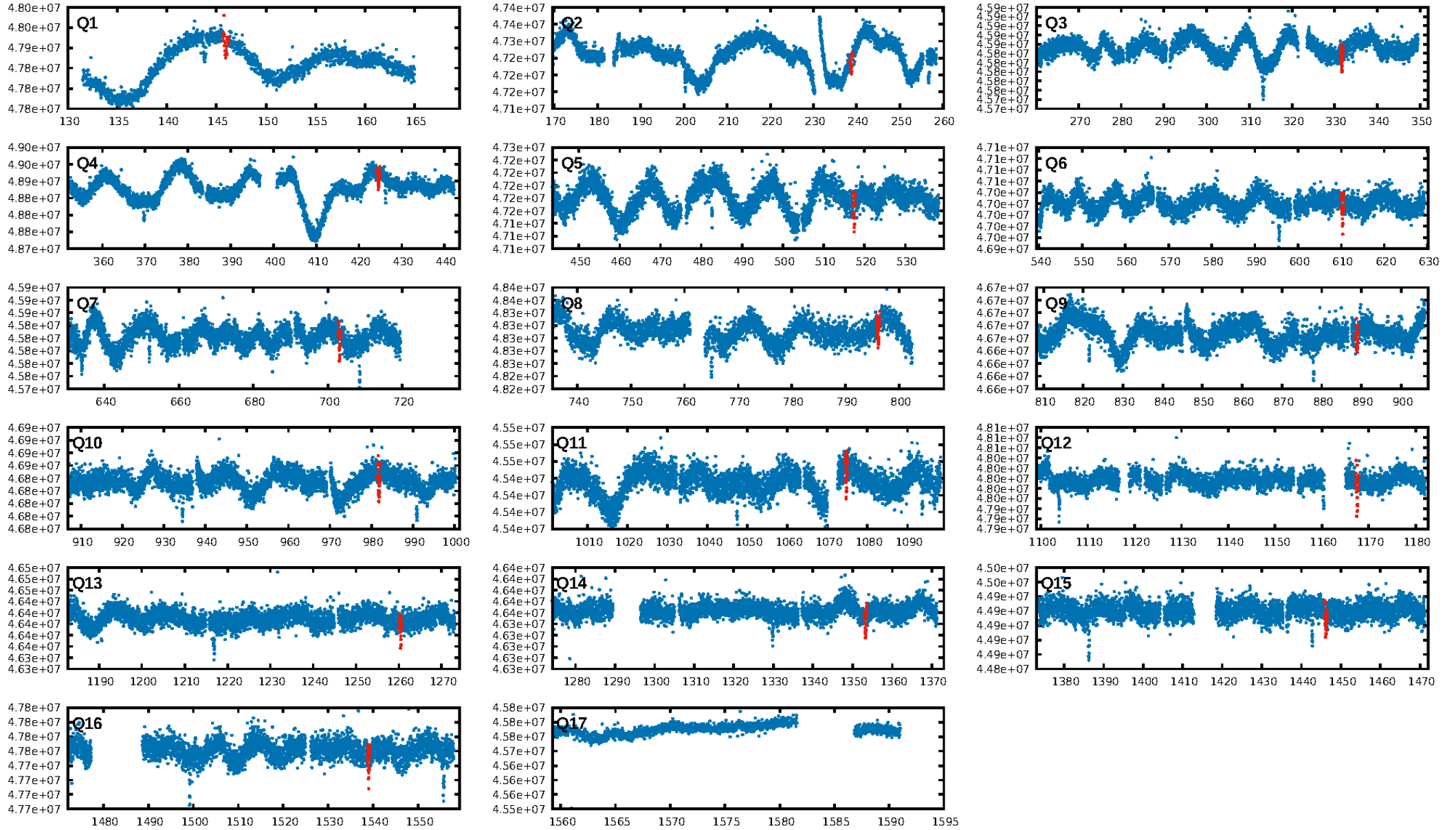
## DV Fit Results:

Period = 92.87471 [0.00053] d  
Epoch = 145.9365 [0.0050] BKJD  
Rp/R\* = 0.0294 [0.0010]  
a/R\* = 40.92 [4.71]  
b = 0.93 [0.02]  
Seff = 3.69 [0.46]  
Teff = 353 [11] K  
Rp = 2.69 [0.23] Re  
a = 0.3952 [0.0280] AU  
Ag = 902.34 [297.74] [3.03 $\sigma$ ]  
Teffp = 2994 [237] K [11.12 $\sigma$ ]

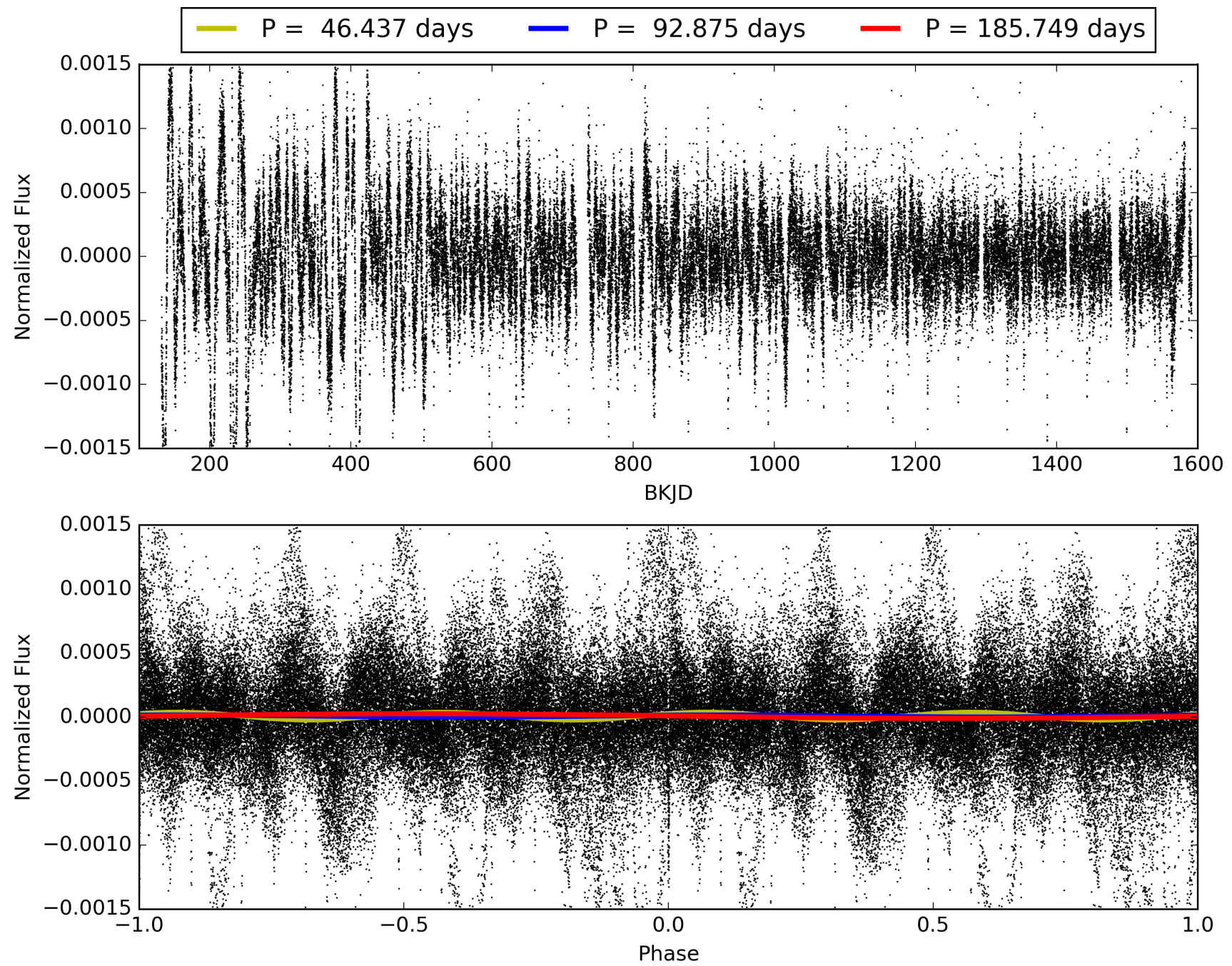
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [89.98 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 30.3%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 4.54e-173  
RollingBand-fgt: 1.00 [15/15]  
GhostDiagnostic-chr: 2.109  
Centroid-sig: 5.7%  
Centroid-so: 0.619 arcsec [1.90 $\sigma$ ]  
OotOffset-rm: 0.278 arcsec [1.48 $\sigma$ ]  
KicOffset-rm: 0.460 arcsec [2.15 $\sigma$ ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 1.00 [16/16]  
DiffImageOverlap-fno: 1.00 [16/16]

# TCE 010004738-02, PDC Light Curves

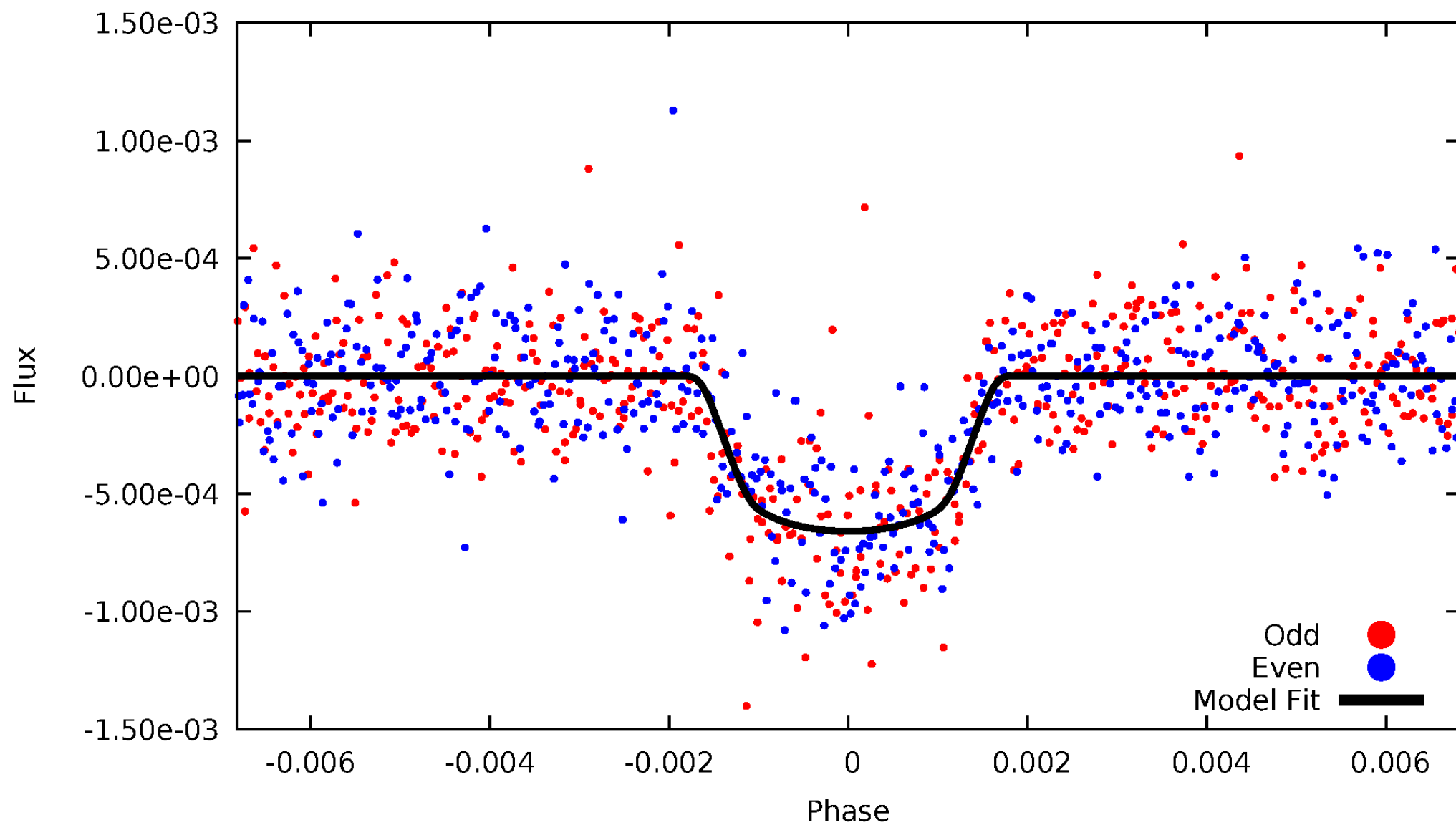


TCE 010004738-02



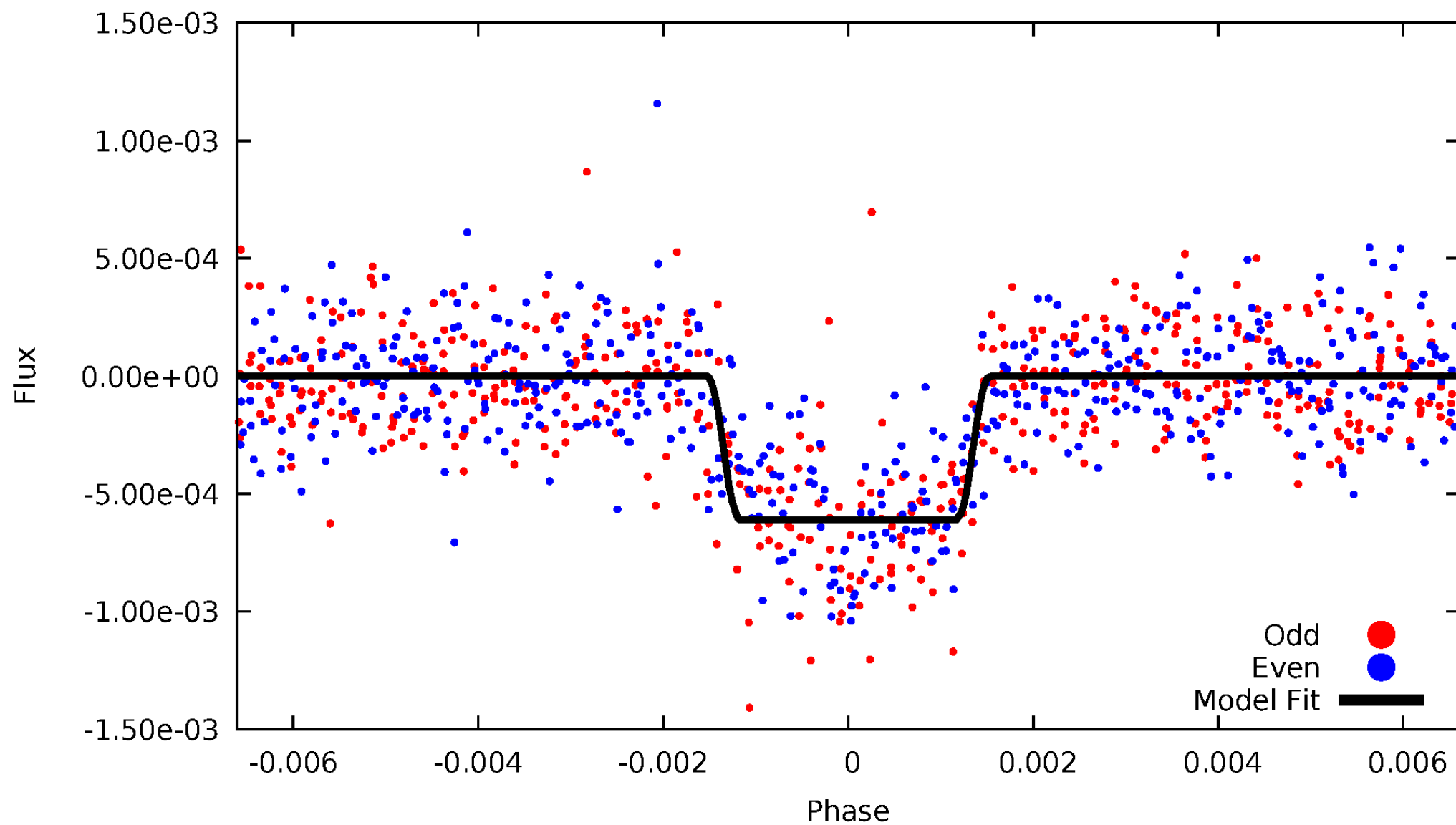
# DV Odd/Even

TCE 010004738-02



# ALT Odd/Even

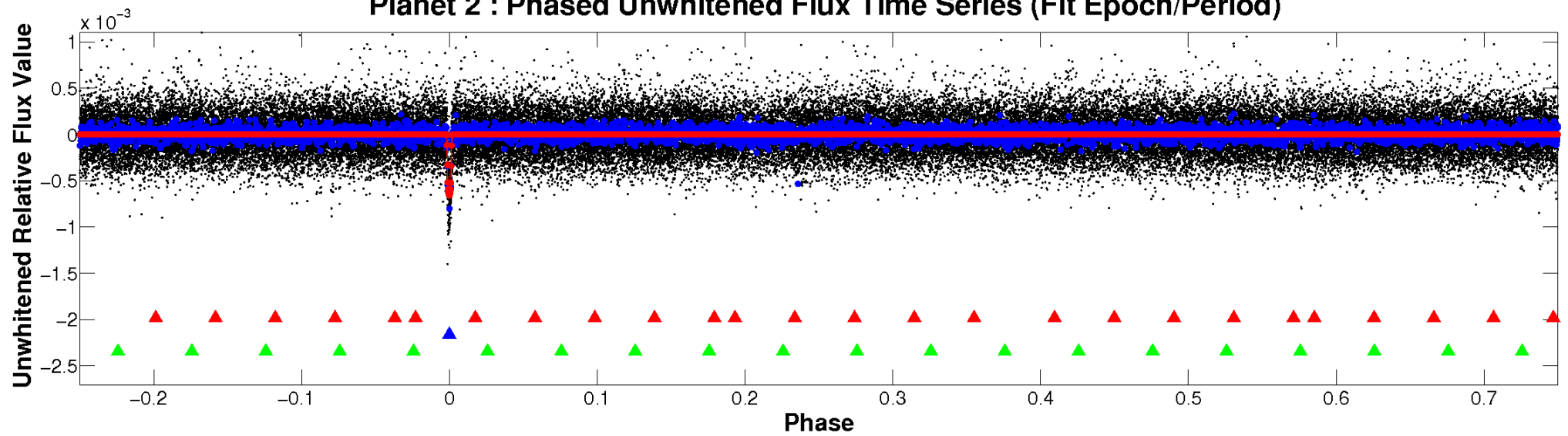
TCE 010004738-02



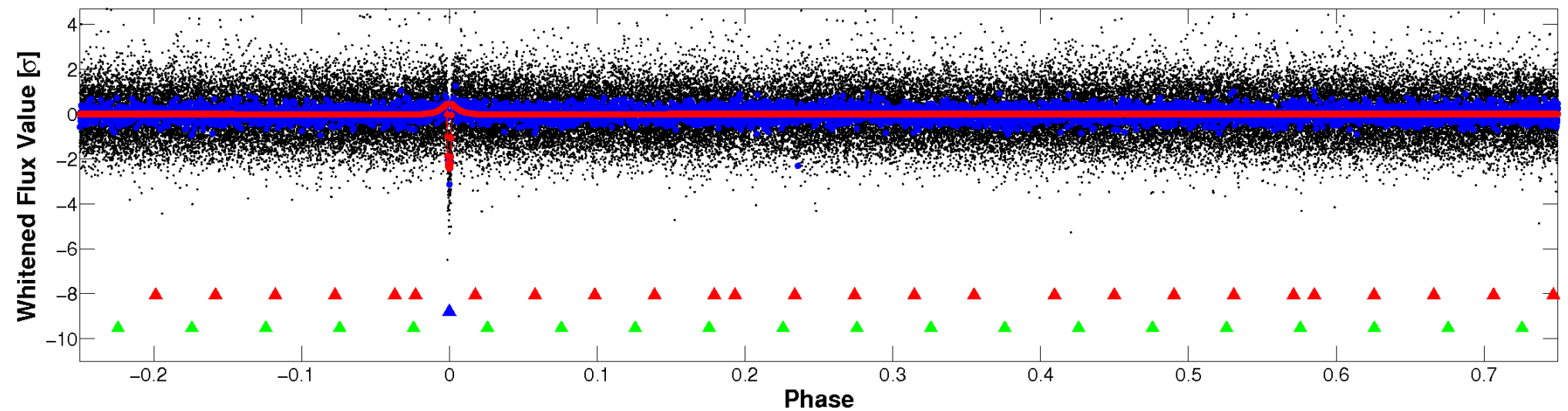


# Non-Whitened Vs. Whitened Light Curve

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

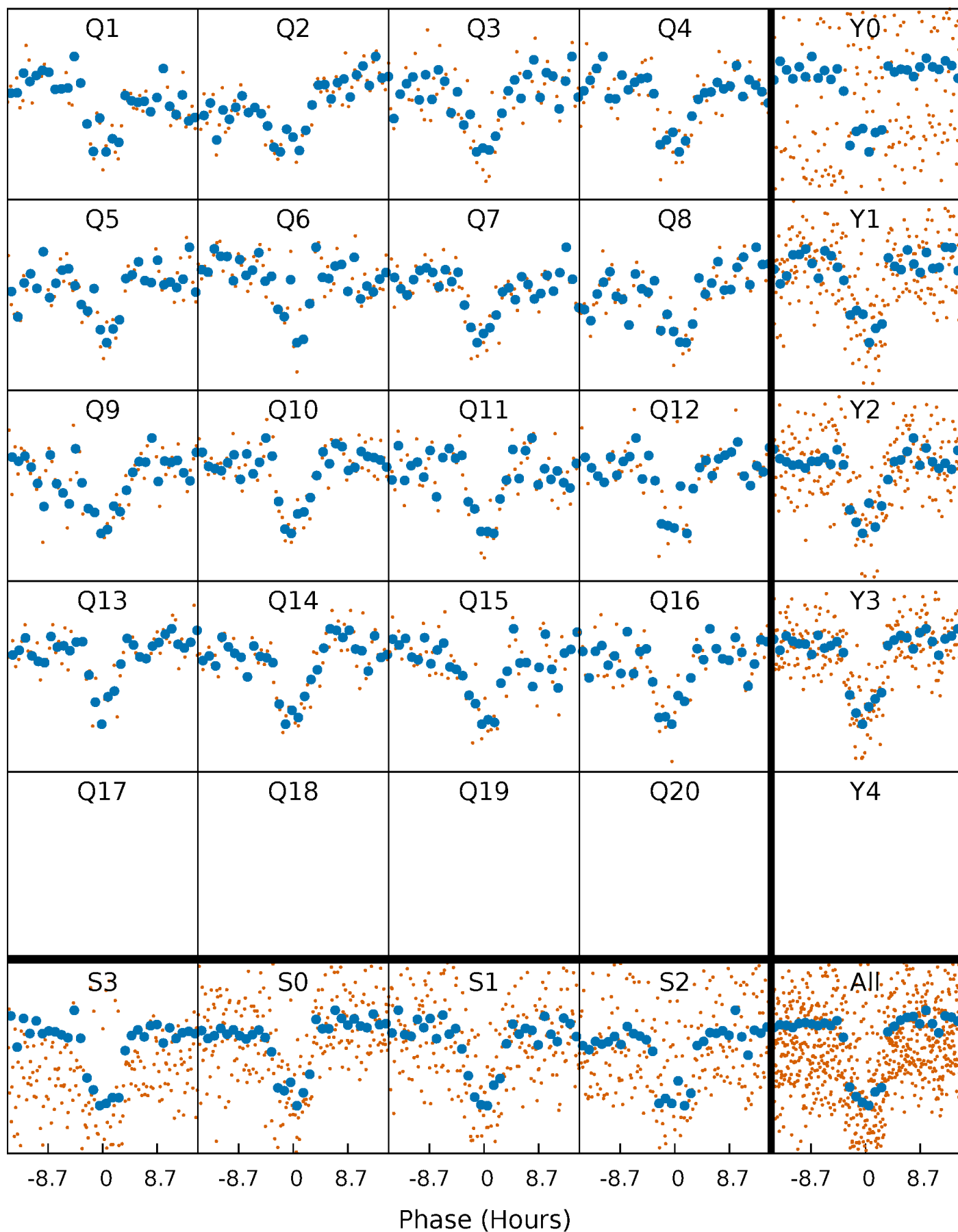


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



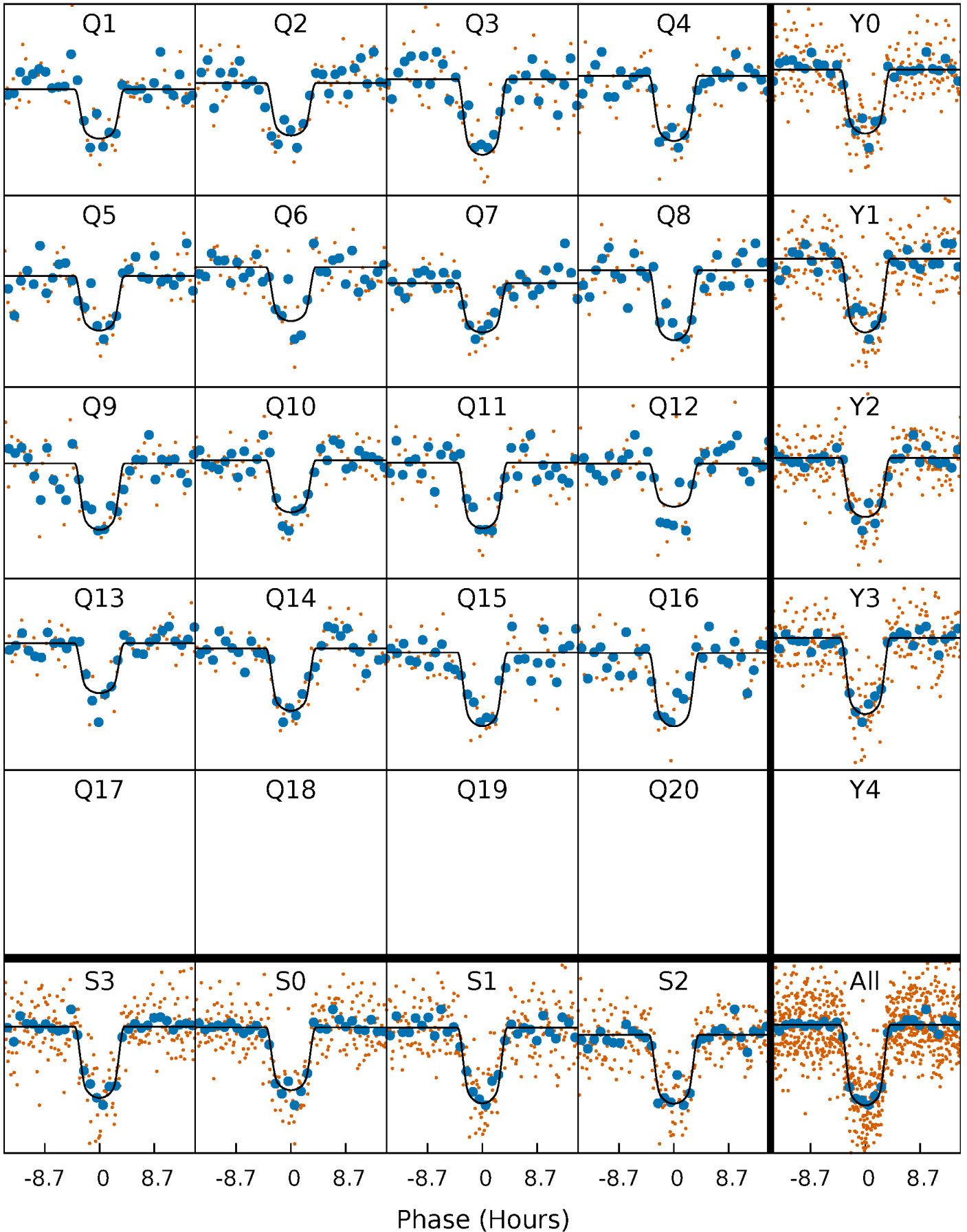
# PDC Quarter-Phased Transit Curves

TCE 010004738-02     $P = 92.874705$  Days     $T_0 = 145.936455$  (BKJD)



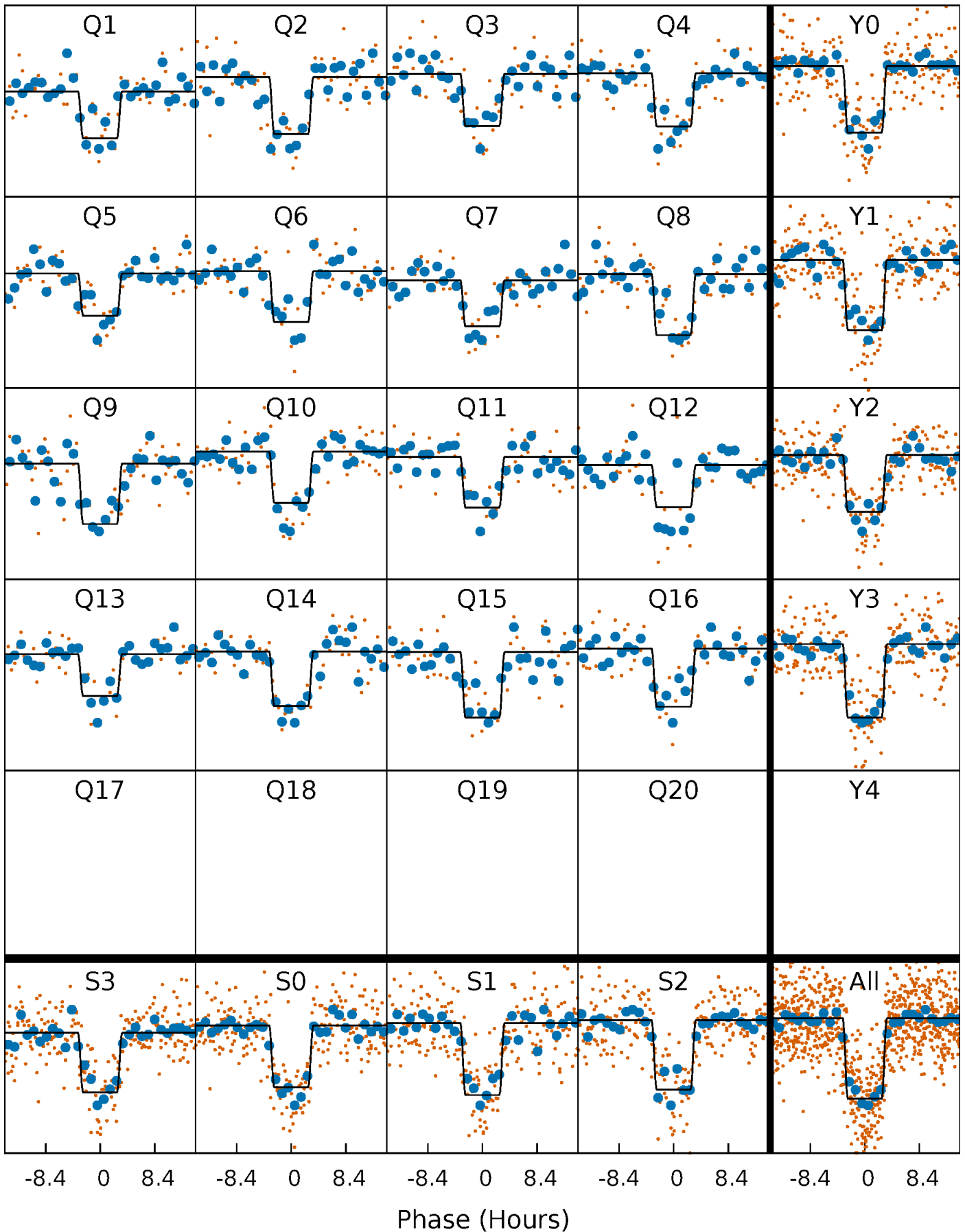
# DV Quarter-Phased Transit Curves

TCE 010004738-02     $P = 92.874705$  Days     $T_0 = 145.936455$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

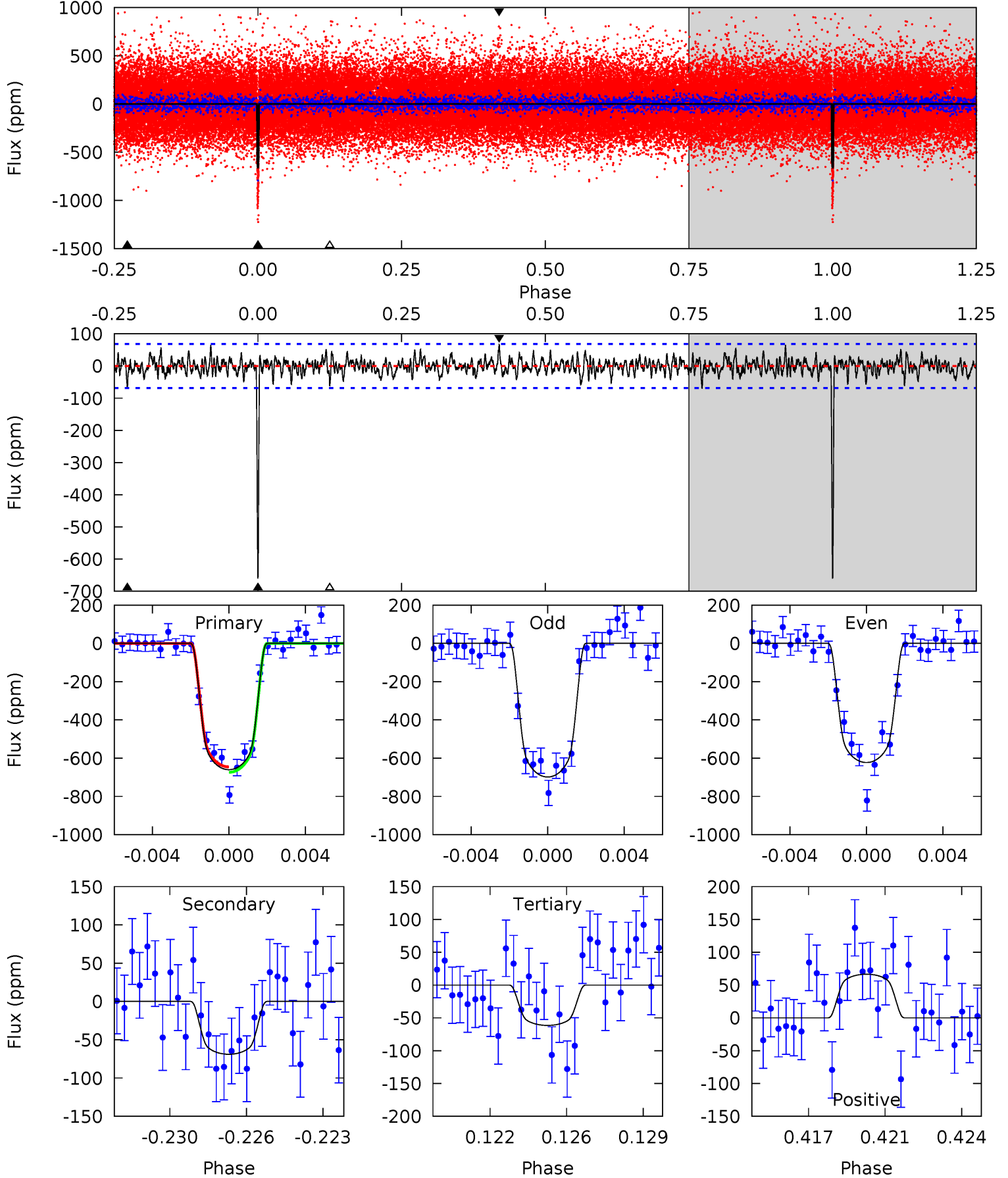
TCE 010004738-02 P= 92.873159 Days  $T_0=145.946877$  (BKJD)



# DV Model-Shift Uniqueness Test

010004738-02, P = 92.874705 Days, E = 53.061750 Days

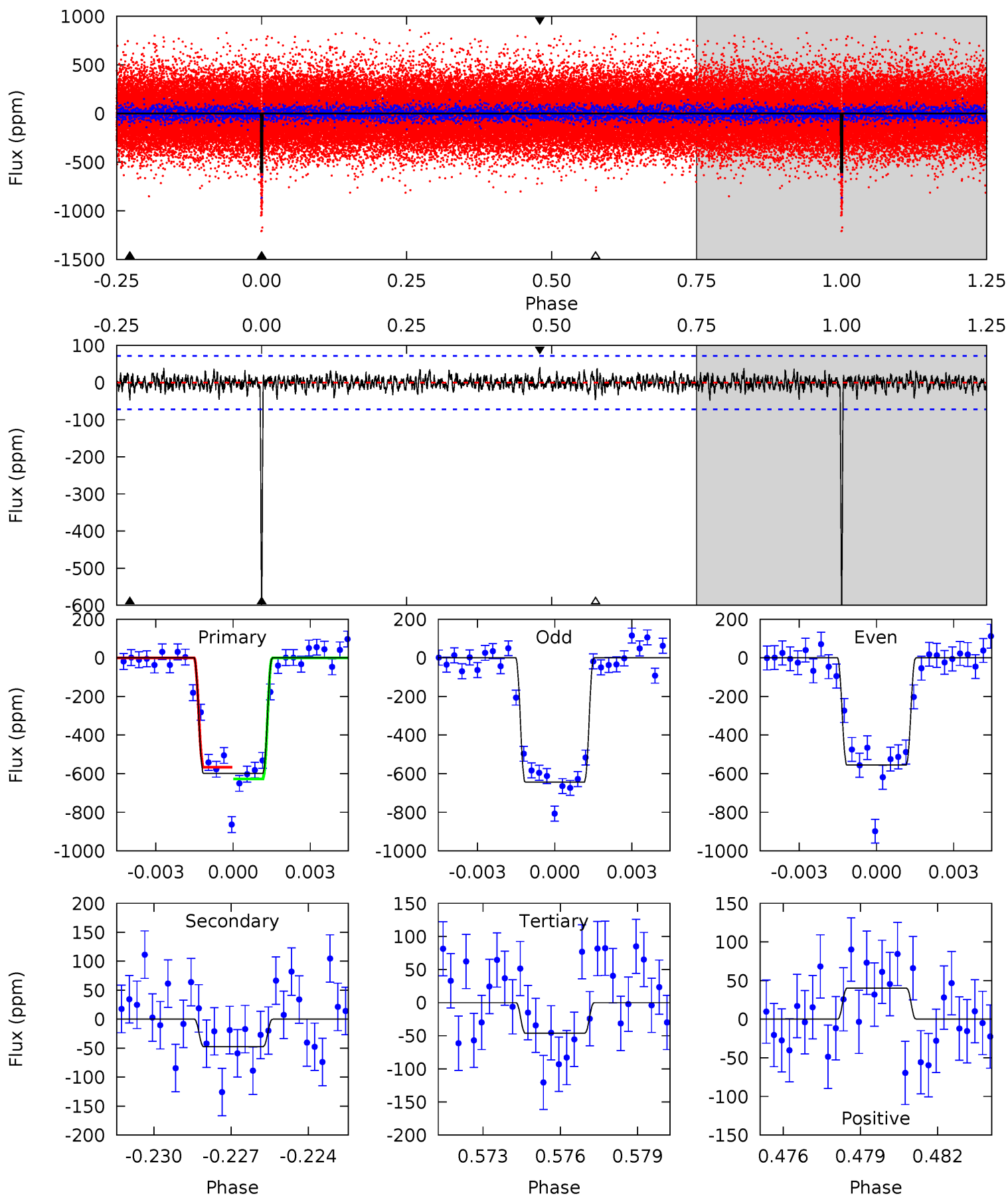
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
50.5	5.28	4.70	5.09	5.22	2.91	1.43	45.8	45.4	0.57	0.19	2.90	1.00	0.09	1.09



# Alt Model-Shift Uniqueness Test

010004738-02, P = 92.873159 Days, E = 53.073718 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
43.6	3.47	3.38	2.94	5.25	2.96	0.90	40.3	40.7	0.09	0.53	3.21	1.02	0.06	2.21





### Stellar Parameters For KIC 010004738

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5497^{+74}_{-82}$	$4.570^{+0.014}_{-0.063}$	$0.070^{+0.150}_{-0.200}$	$0.839^{+0.065}_{-0.035}$	$0.952^{+0.034}_{-0.067}$	$2.272^{+0.162}_{-0.423}$
	+1%/-1%	+0%/-1%	+214%/-286%	+8%/-4%	+4%/-7%	+7%/-19%
Source	SPE90	SPE90	SPE90	DSEP		

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

### Secondary Eclipse Parameters for KIC 010004738-02 / KOI 1598.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-69 \pm 13$	$2.73^{+0.15}_{-0.14}$	$498^{+12}_{-10}$	$3424^{+106}_{-125}$	$792^{+154}_{-169}$
Alt.	$-48 \pm 14$	$2.29^{+0.13}_{-0.13}$	$498^{+11}_{-9}$	$3405^{+150}_{-170}$	$760^{+240}_{-220}$

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

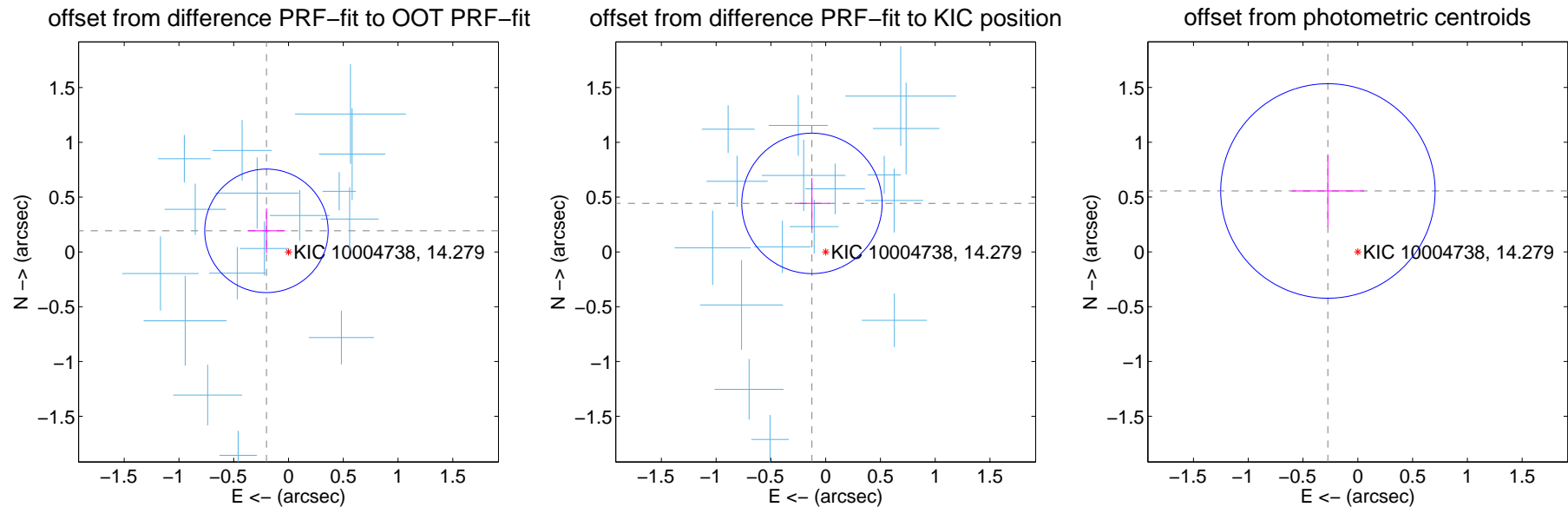
## DV Centroid Data

Supplemental centroid analysis for 010004738-02. Kepler magnitude: 14.28. Transit SNR 30.08

There are 16 quarters with good PRF difference image offsets

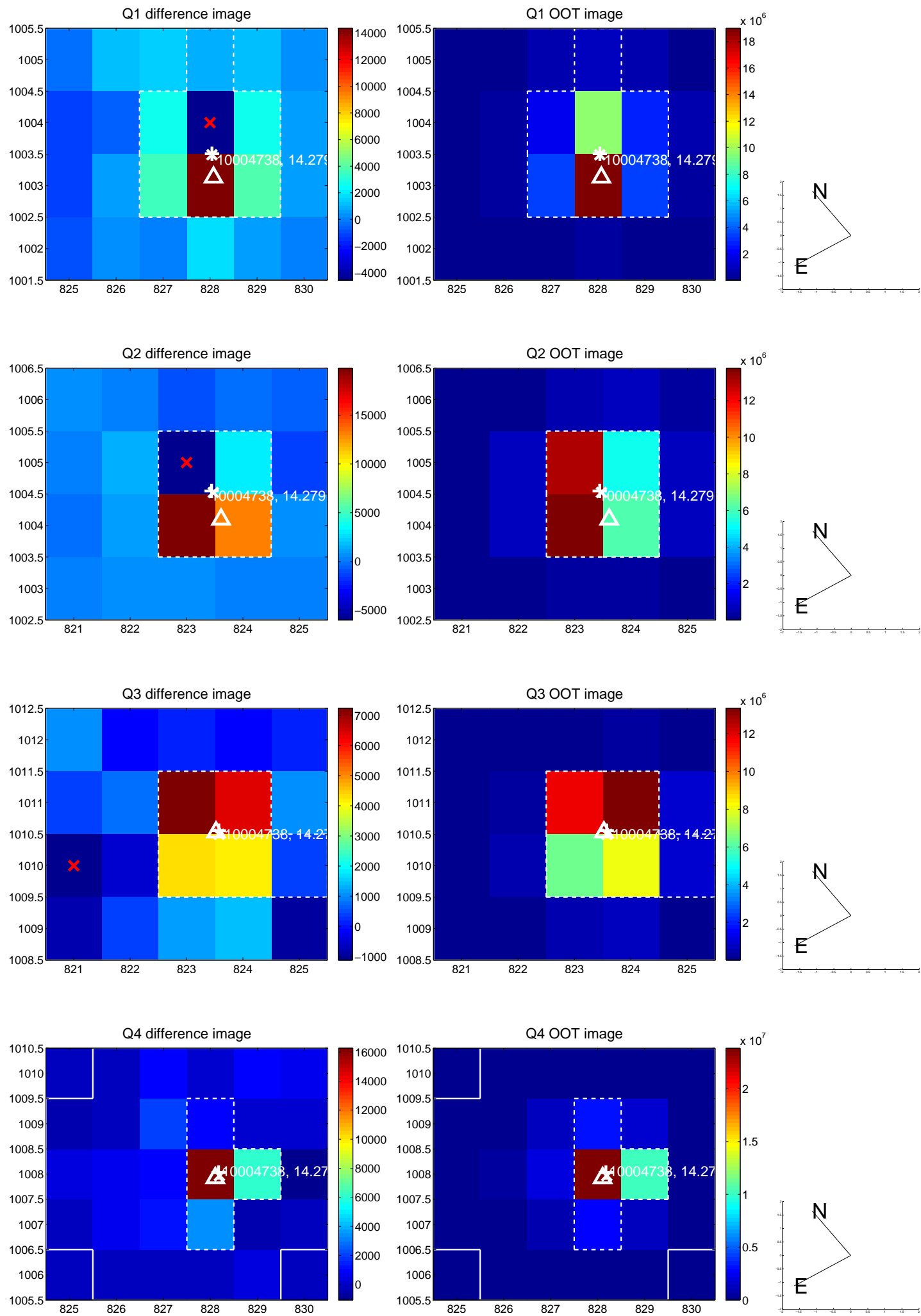
The direct PRF centroid is offset from the target star catalog position by about 0.27 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.278 \pm 0.188$	1.48	$0.201 \pm 0.171$	$0.192 \pm 0.205$
PRF-fit source offset from KIC position	$0.460 \pm 0.214$	2.15	$0.125 \pm 0.161$	$0.443 \pm 0.231$
photometric centroid source offset	$0.62 \pm 0.33$	1.90	$0.27 \pm 0.33$	$0.56 \pm 0.33$

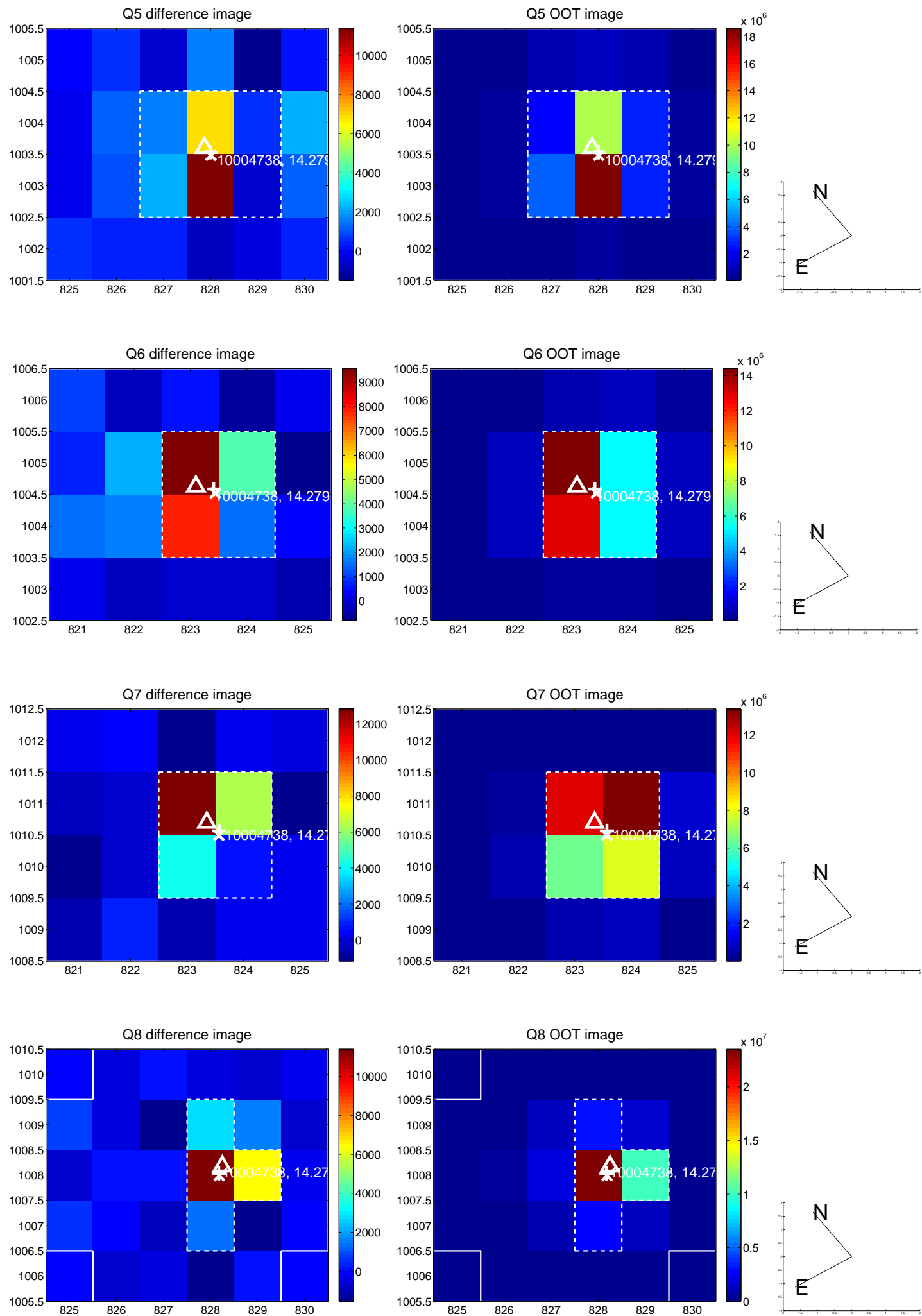


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

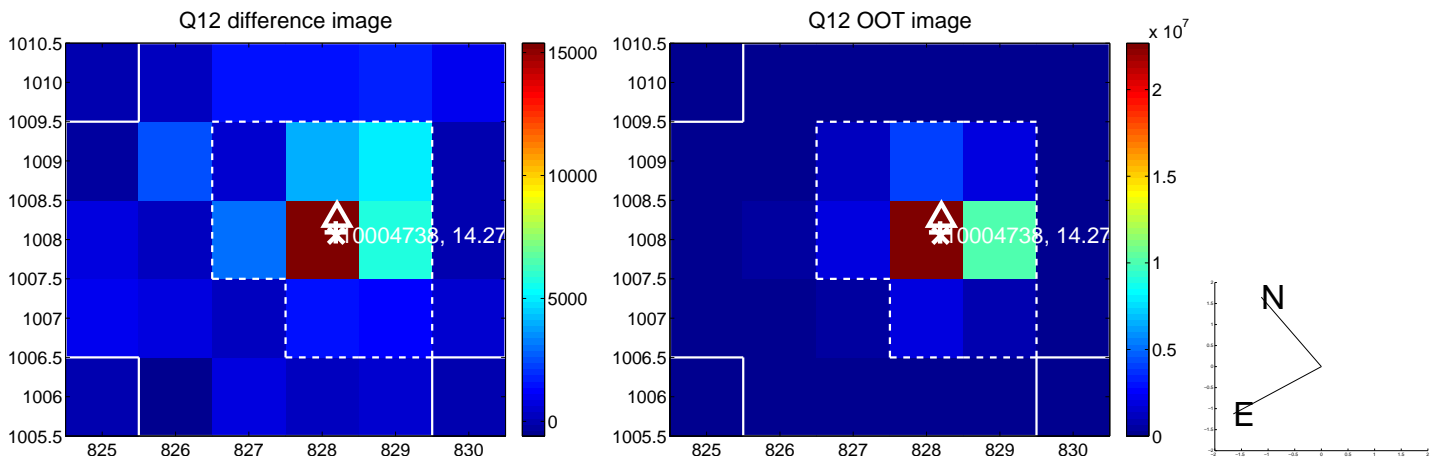
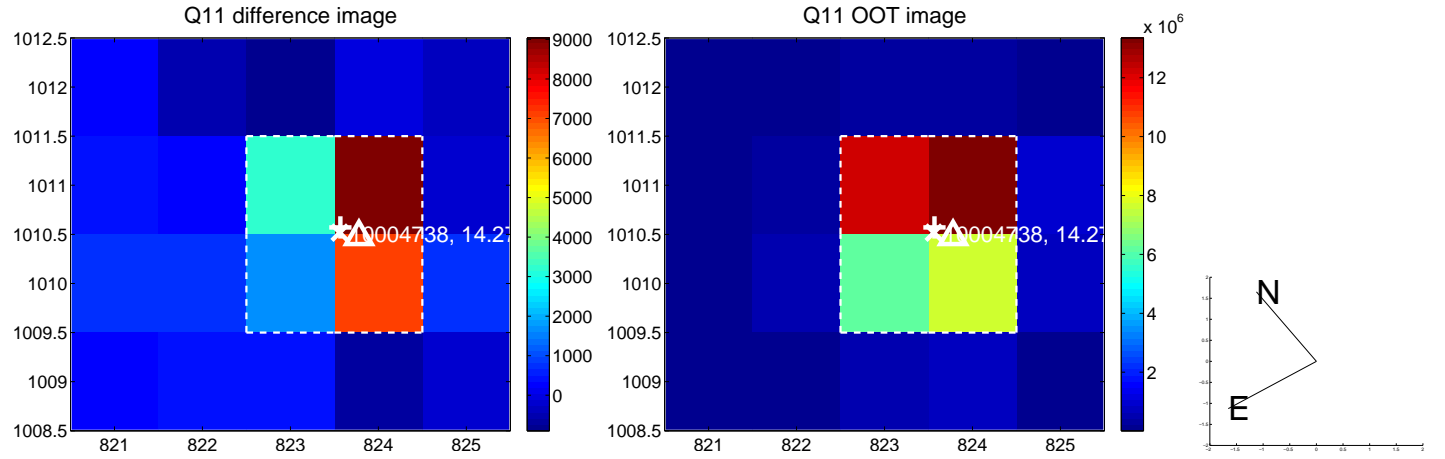
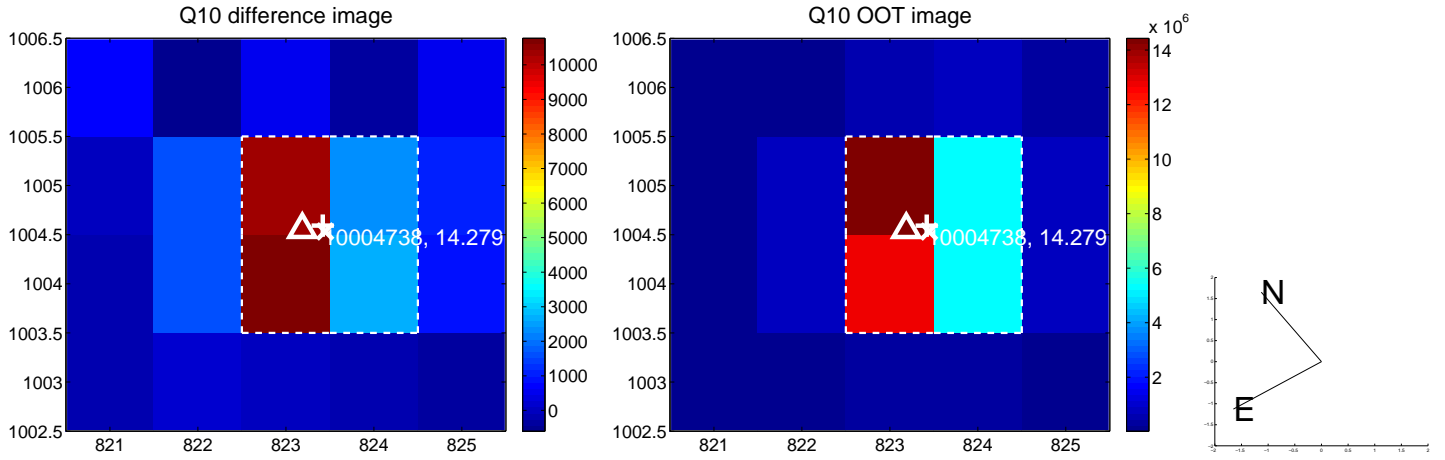
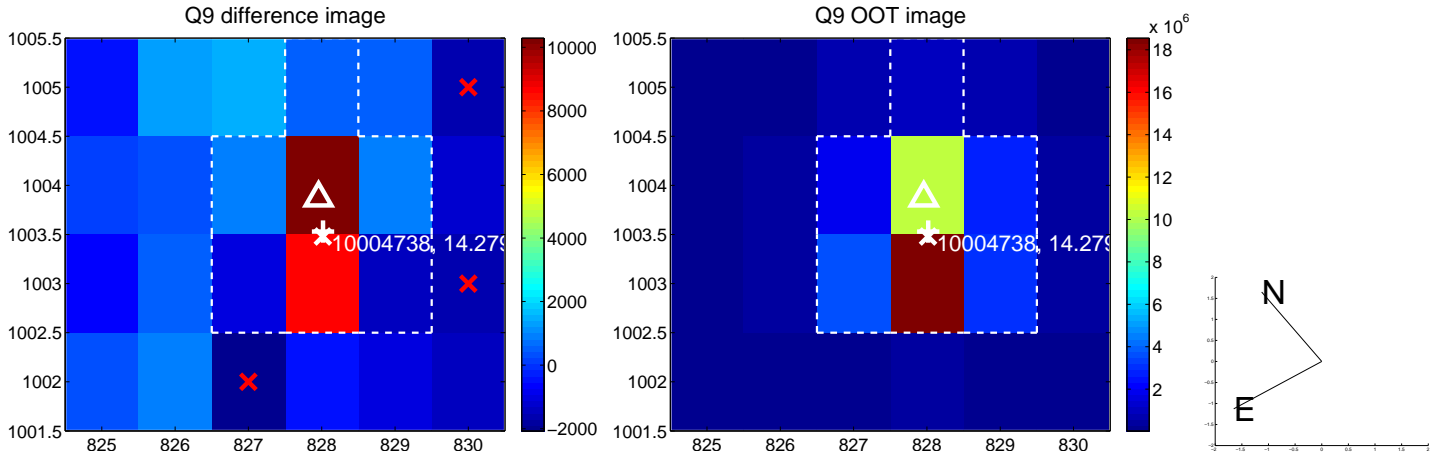
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



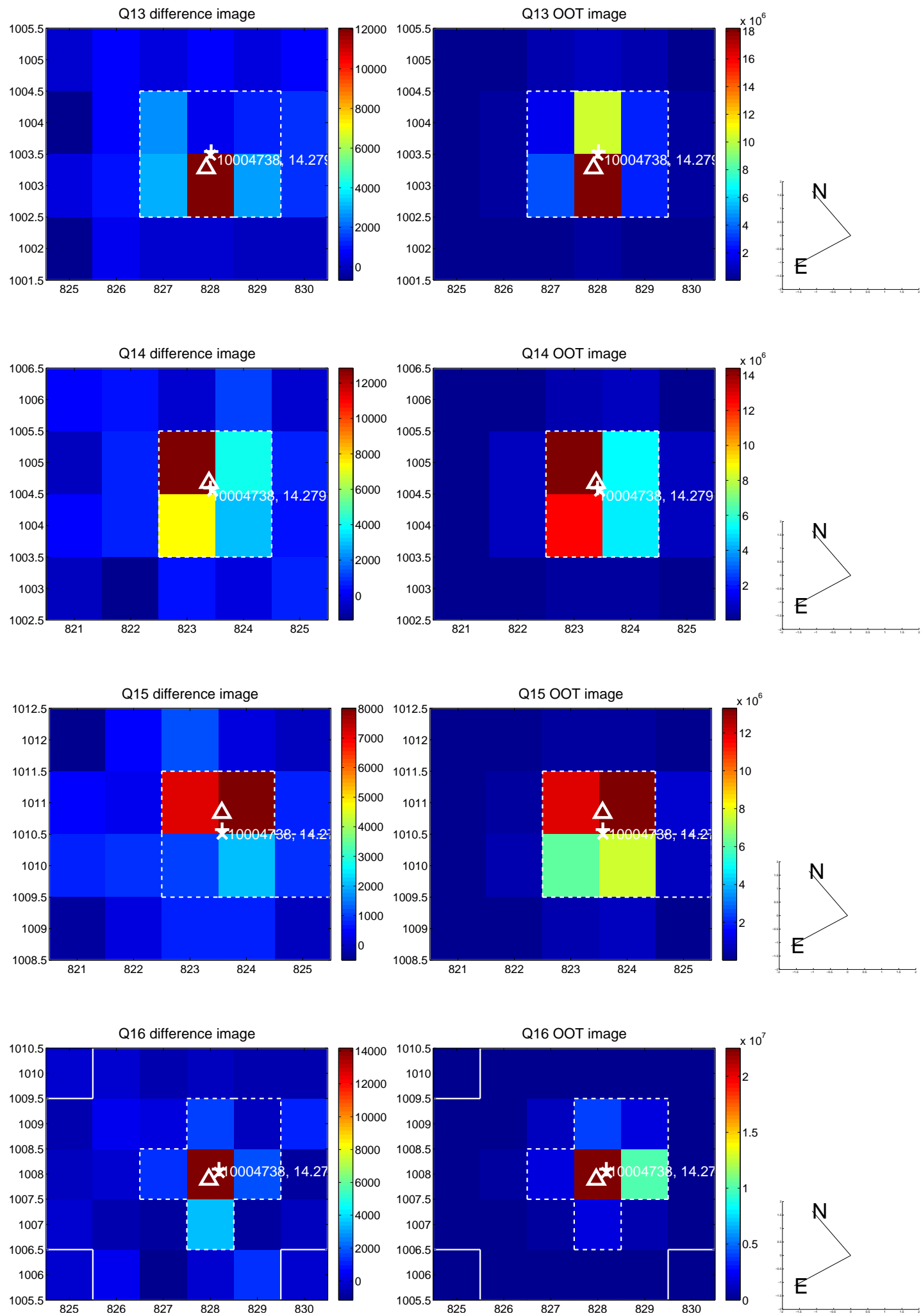
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



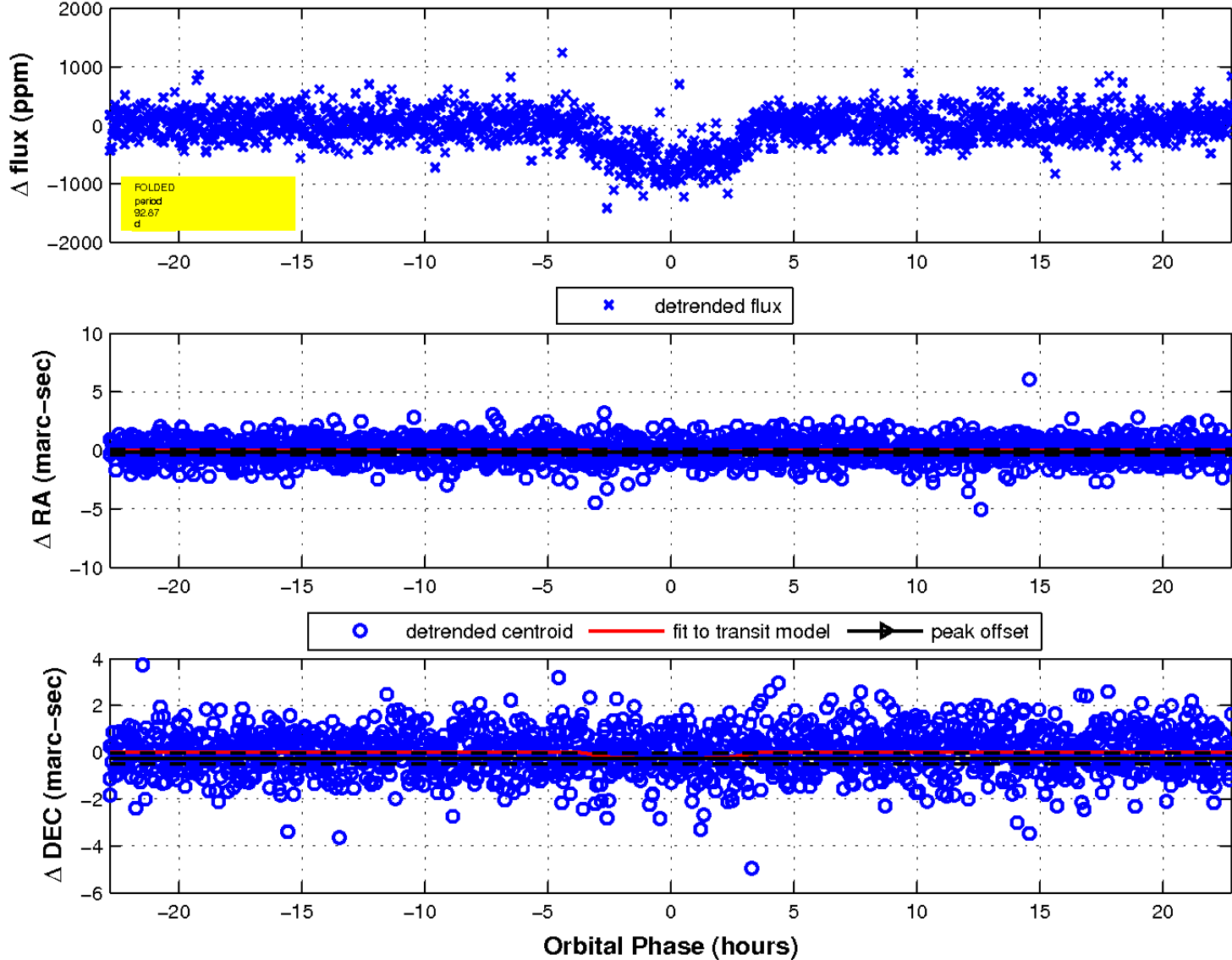
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

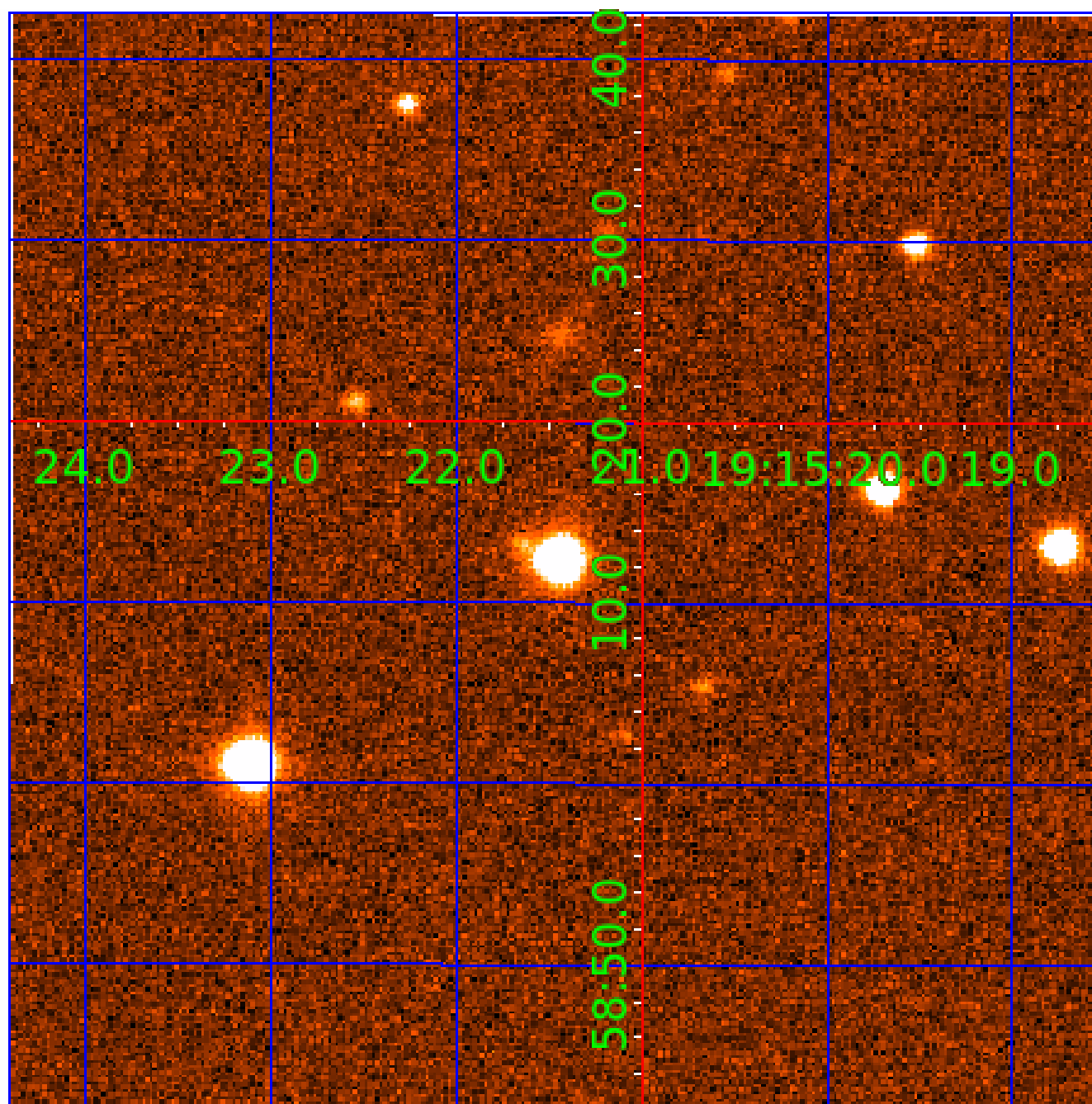


fluxWeightedCentroids, Planet 2 of 3



UKIRT Image

Declination





# KIC 010004738

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010004738-01	OBS	1598.01	56.475867	143.810251	1078.6	6.041	57.0	56.7	0.84	5497	3.26	7.16
010004738-02	OBS	1598.02	92.874705	145.936455	659.6	7.600	30.3	30.1	0.84	5497	2.69	3.69
010004738-03	OBS	1598.03	13.930664	134.429353	178.6	2.416	12.7	13.8	0.84	5497	1.38	46.27

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010004738-01	OBS	PC	0.99	0	0	0	0	NO_COMMENT
010004738-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT
010004738-03	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

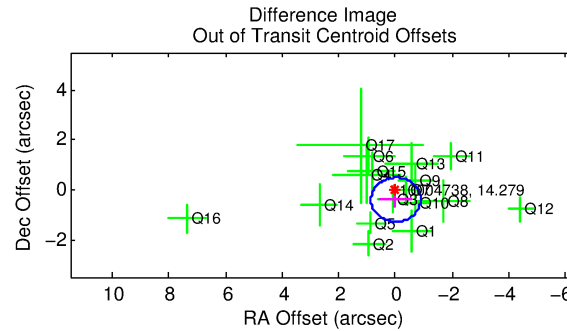
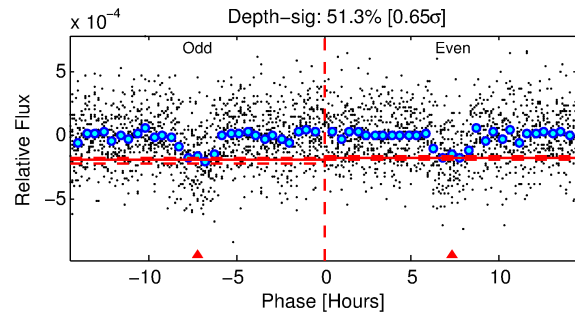
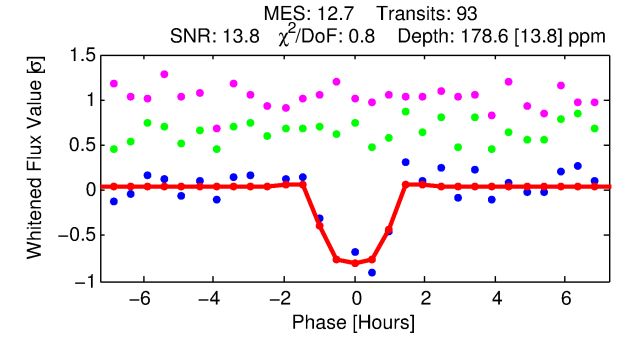
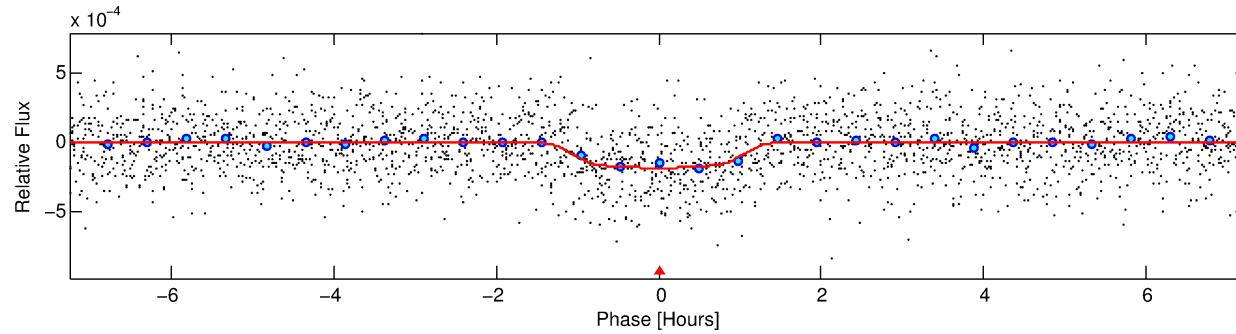
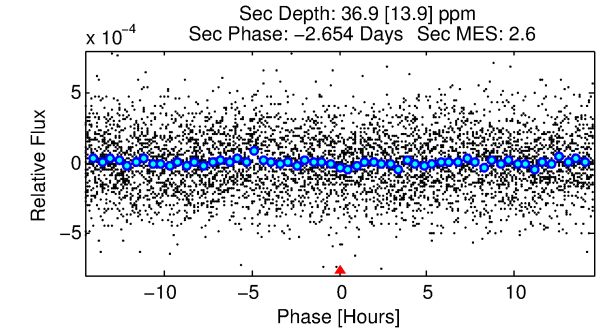
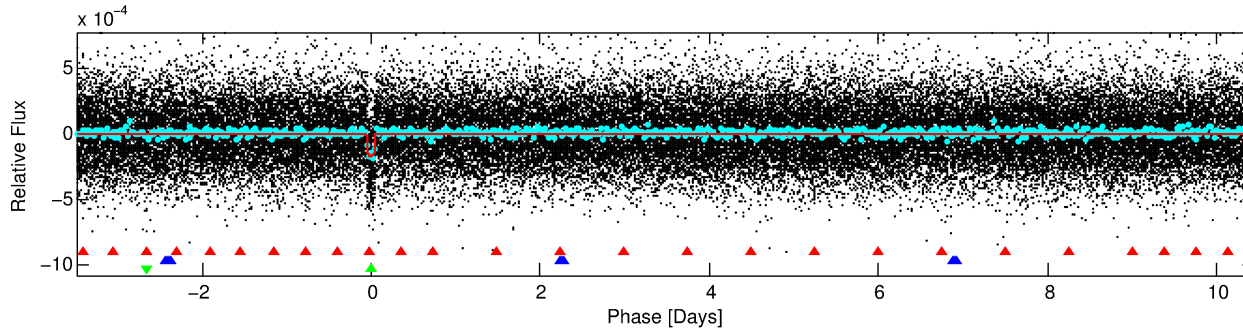
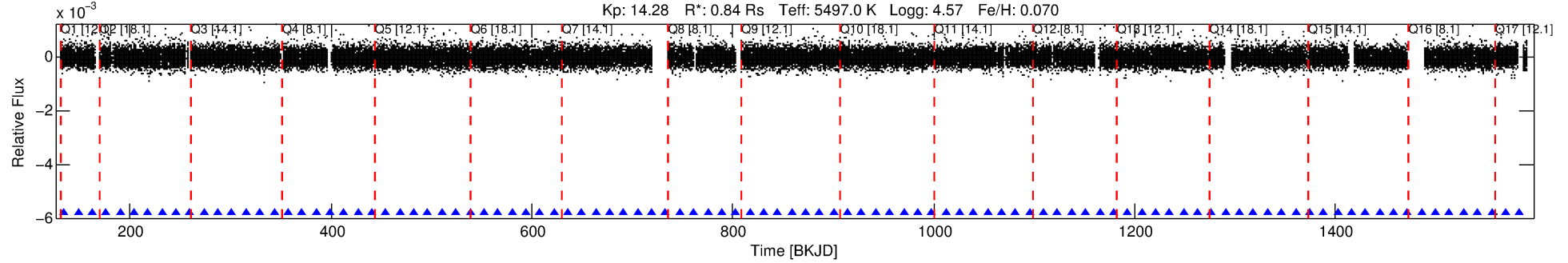
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010004738-03

No Significant Match Found

# DV One-Page Summary

KIC: 10004738 Candidate: 3 of 3 Period: 13.931 d  
KOI: K01598.03 Name: Kepler-310b Corr: 0.933



## DV Fit Results:

Period = 13.93066 [0.00007] d  
Epoch = 134.4294 [0.0041] BKJD  
Rp/R\* = 0.0151 [0.0056]  
a/R\* = 18.65 [30.92]  
b = 0.92 [0.27]  
Seff = 46.27 [5.78]  
Teq = 665 [21] K  
Rp = 1.38 [0.52] Re  
a = 0.1116 [0.0079] AU  
Ag = 131.79 [109.79] [1.19σ]  
Teffp = 3484 [721] K [3.91σ]

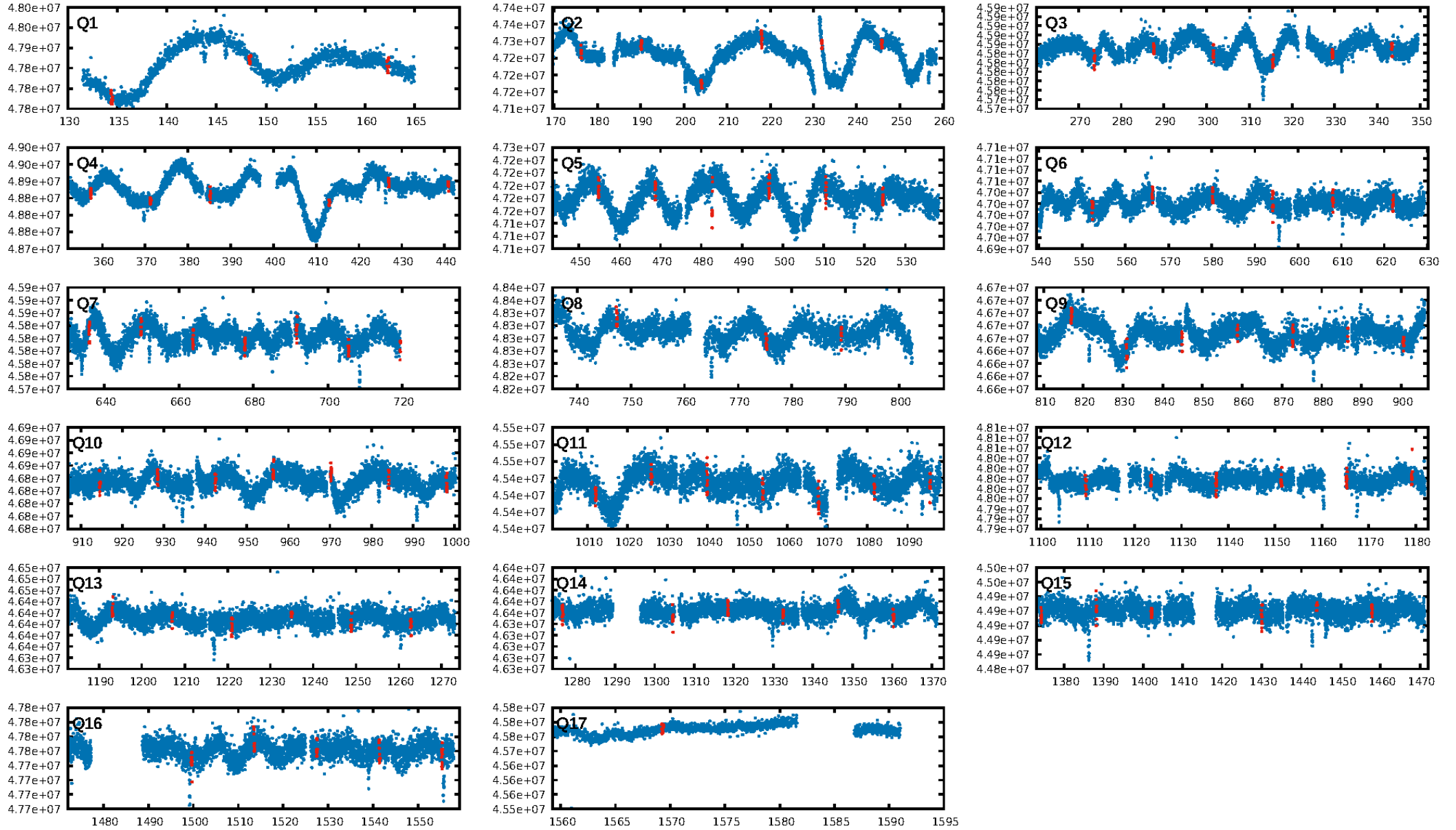
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [156.94σ]  
ModelChiSquare2-sig: 96.2%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 3.21e-35  
RollingBand-fgt: 1.00 [89/89]  
GhostDiagnostic-chr: 2.815  
Centroid-sig: 18.3%  
Centroid-so: 0.748 arcsec [0.91σ]  
OotOffset-rm: 0.398 arcsec [1.36σ]  
KicOffset-rm: 0.224 arcsec [0.65σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.76 [13/17]  
DiffImageOverlap-fno: 1.00 [17/17]

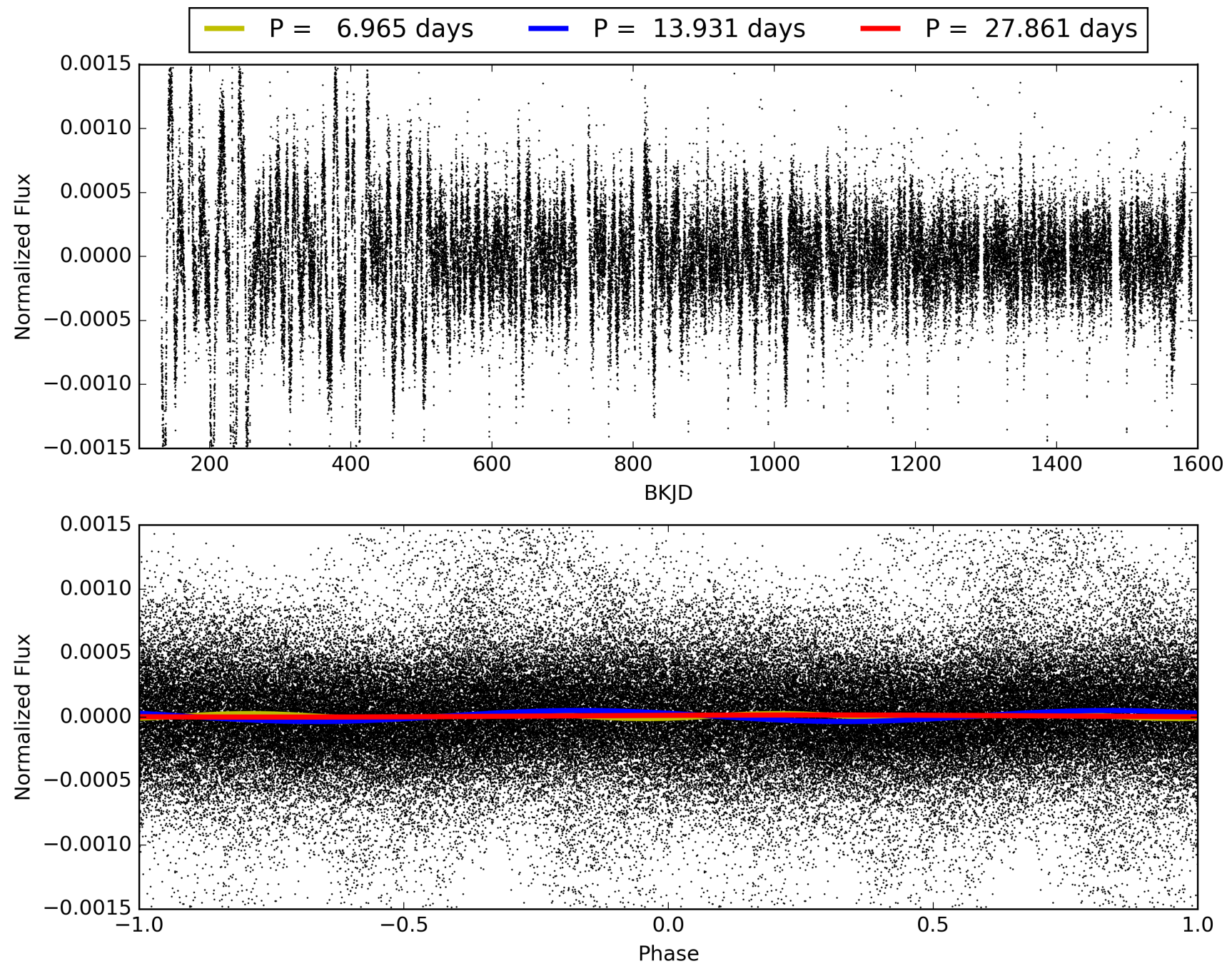
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 03:54:33 Z

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

# TCE 010004738-03, PDC Light Curves

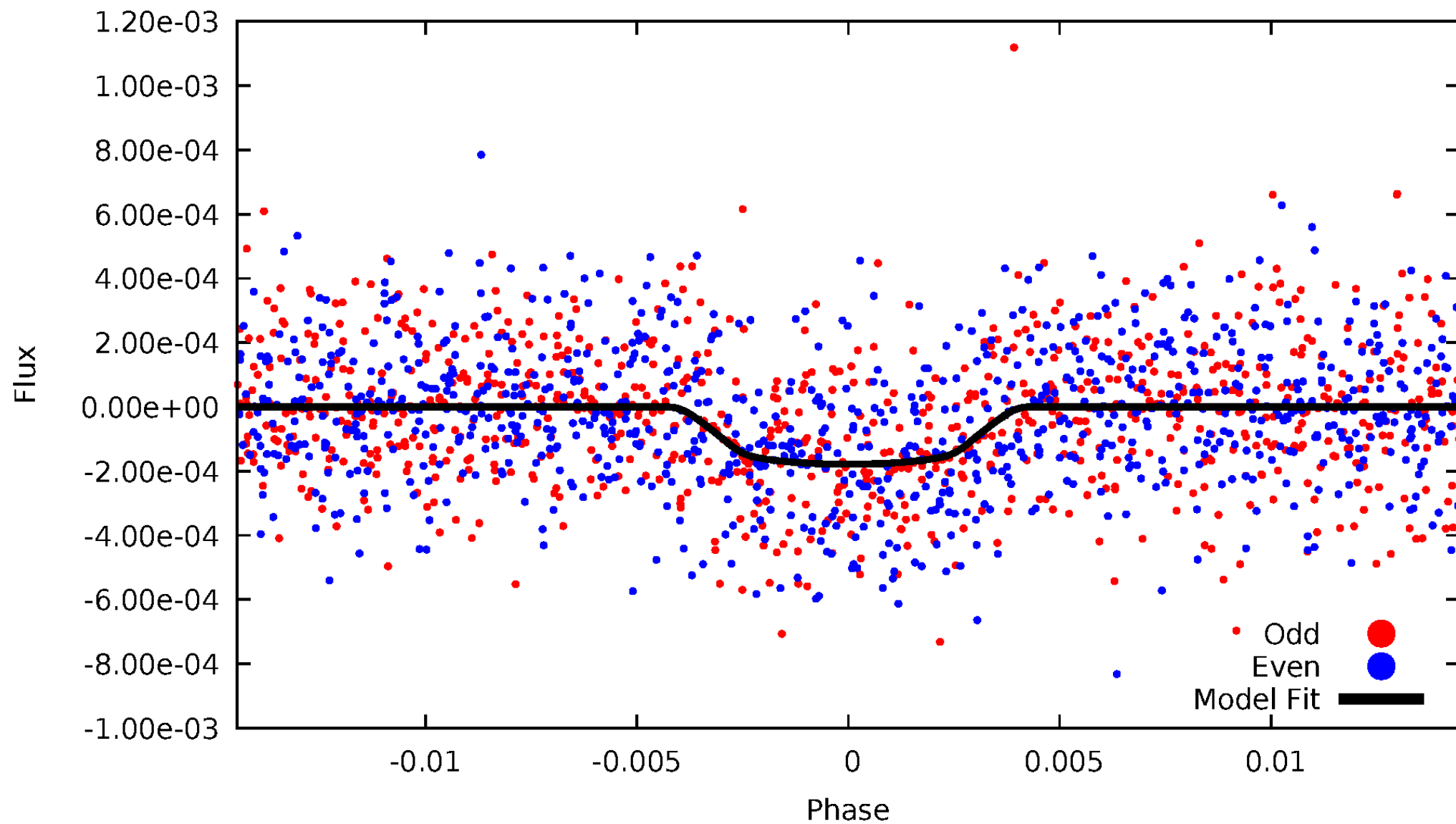


TCE 010004738-03



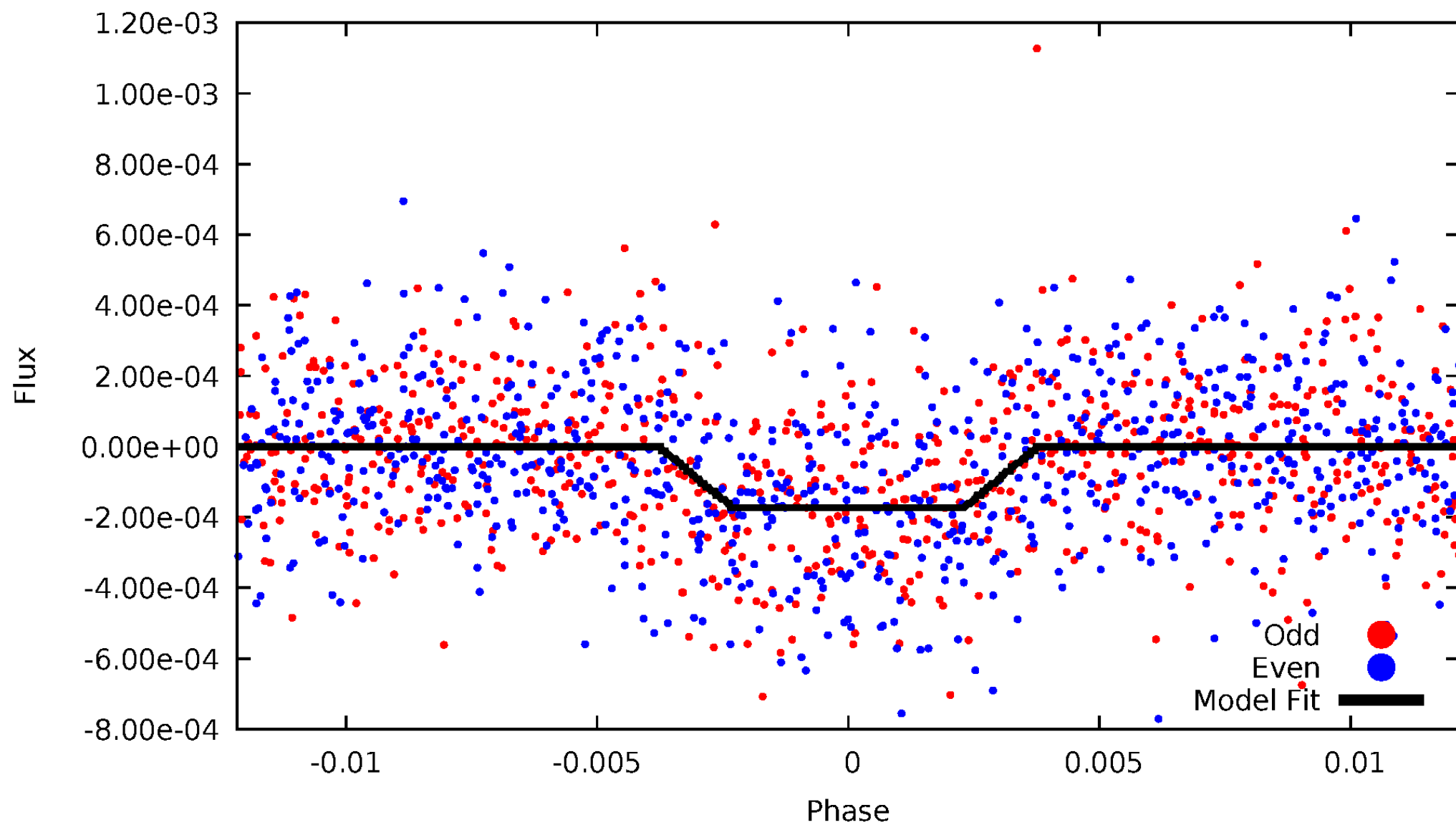
# DV Odd/Even

TCE 010004738-03



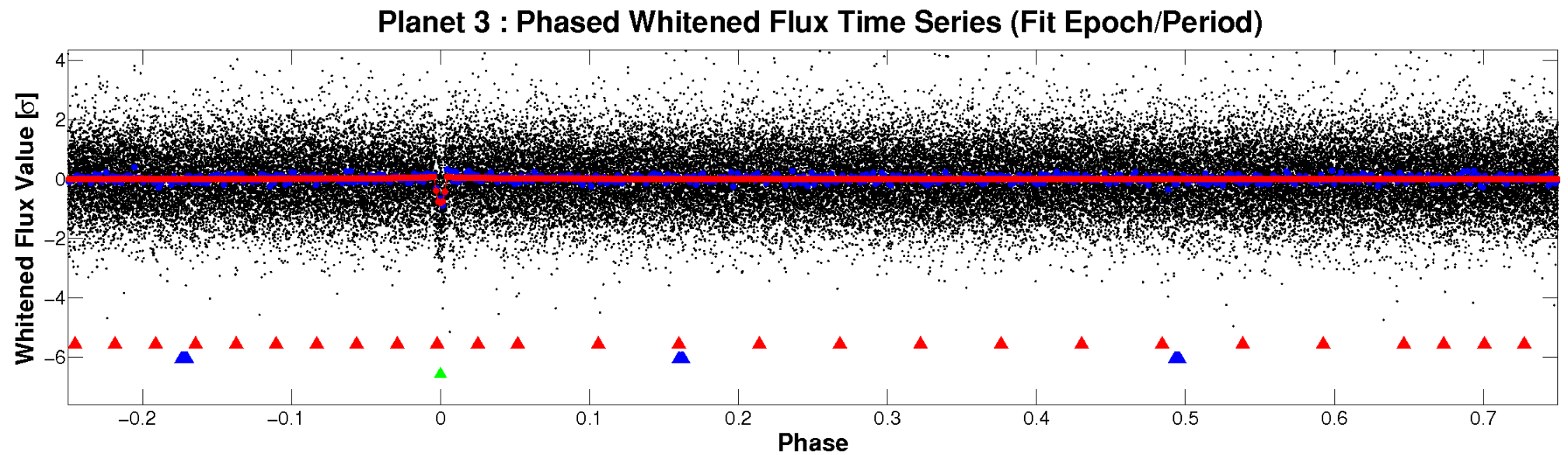
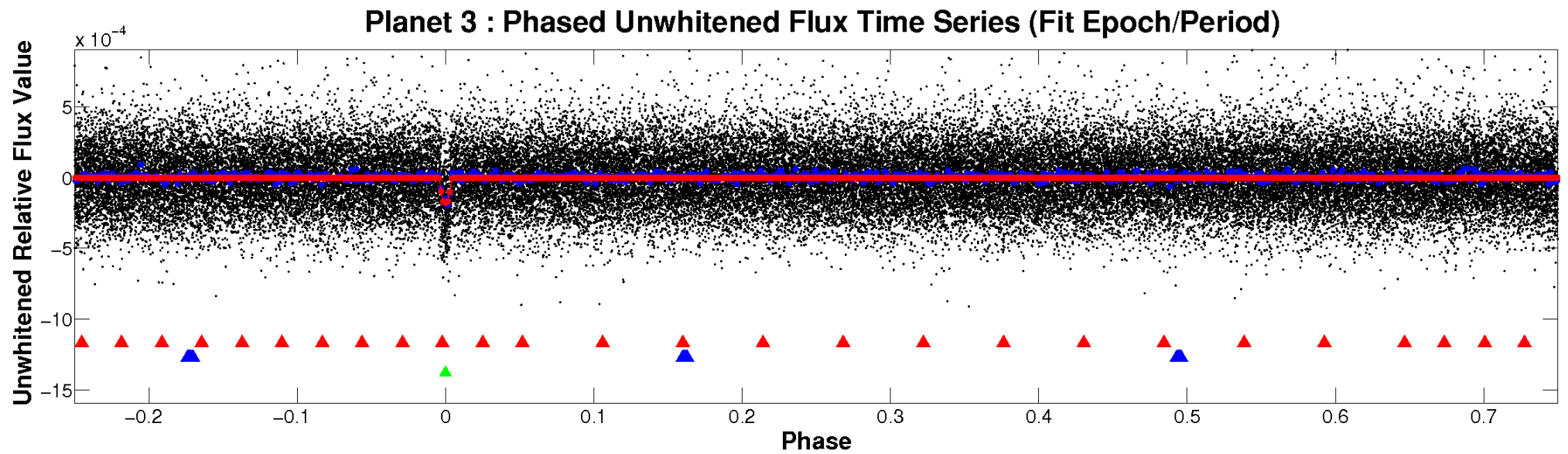
# ALT Odd/Even

TCE 010004738-03



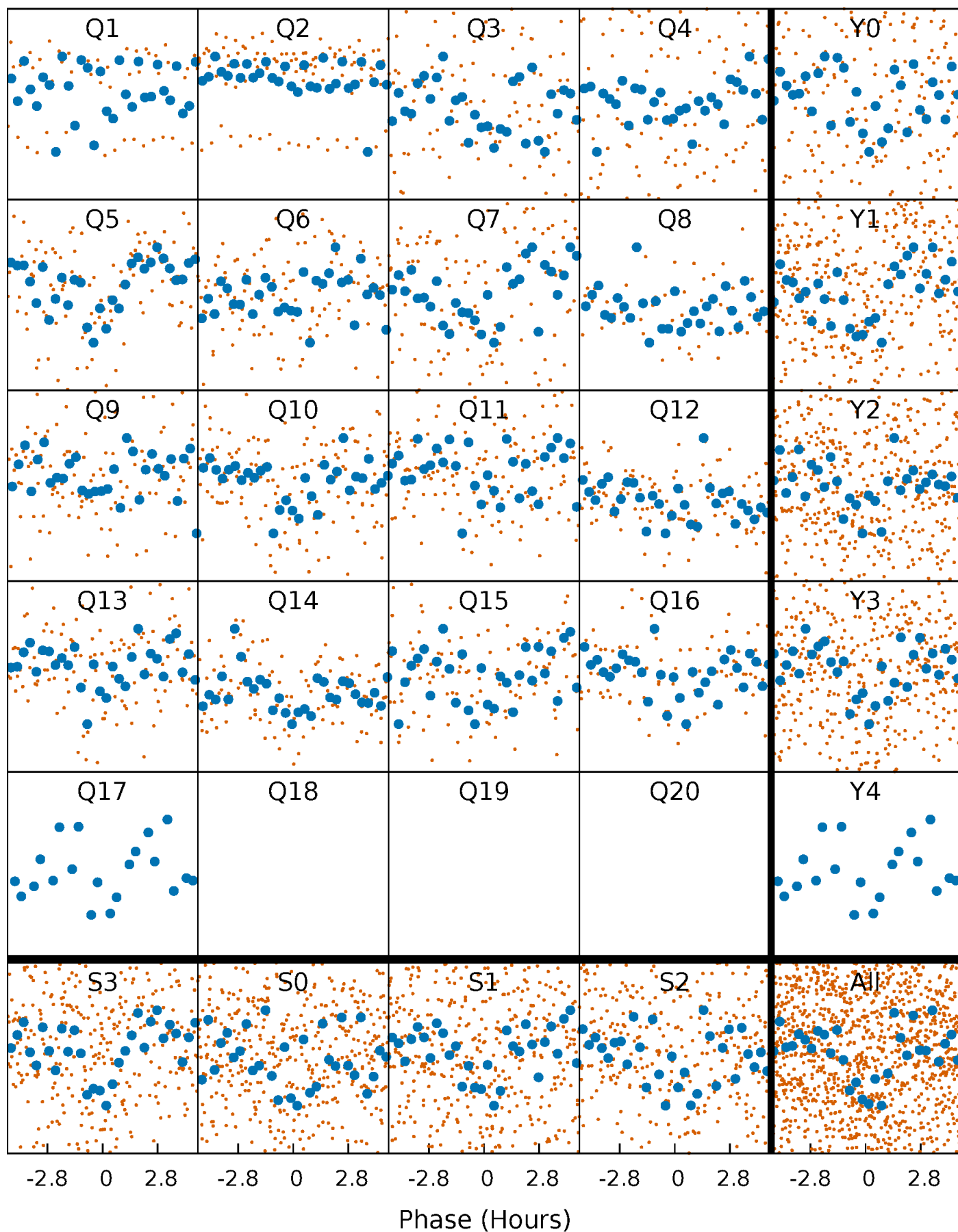


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

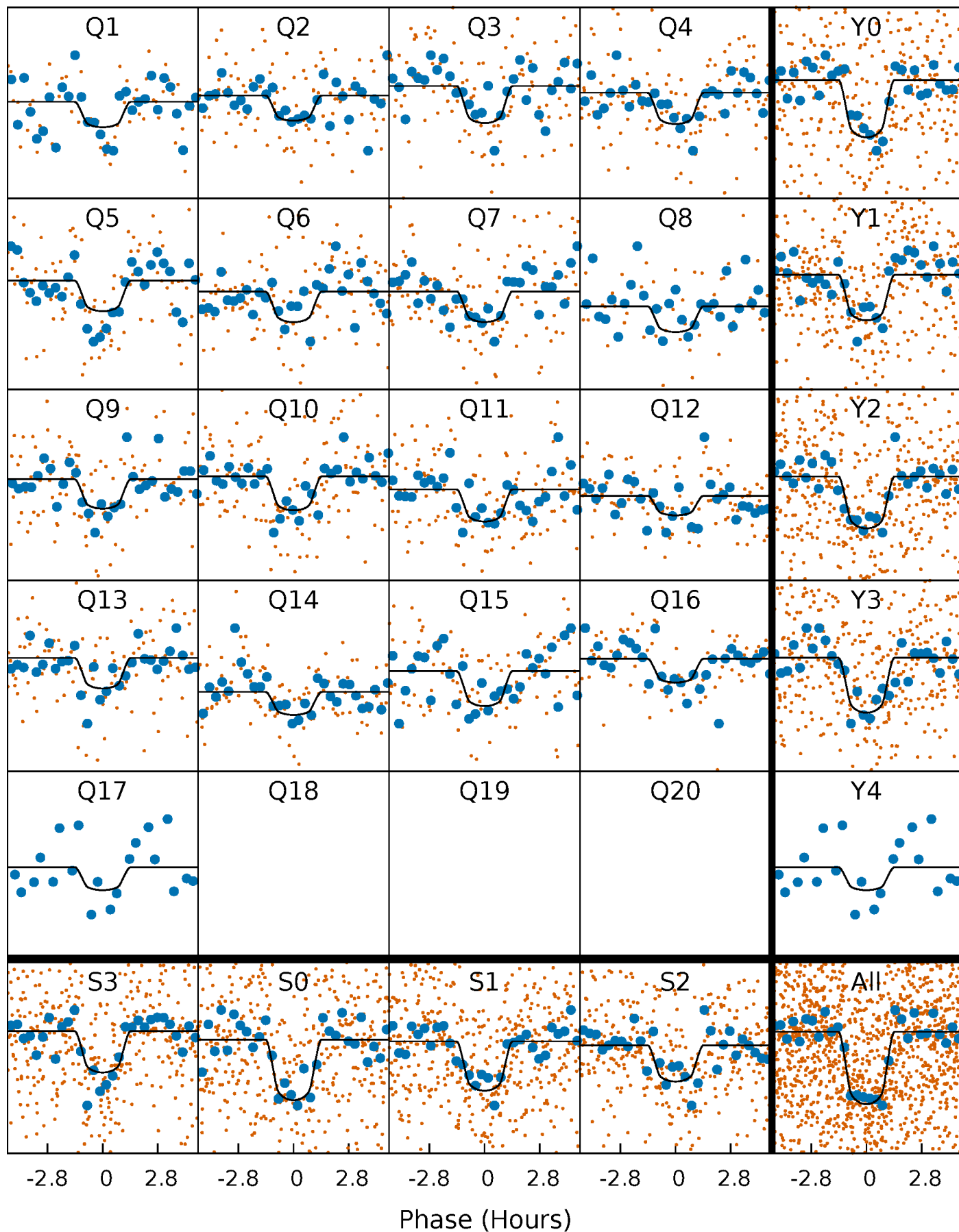
TCE 010004738-03 P= 13.930664 Days  $T_0=134.429353$  (BKJD)





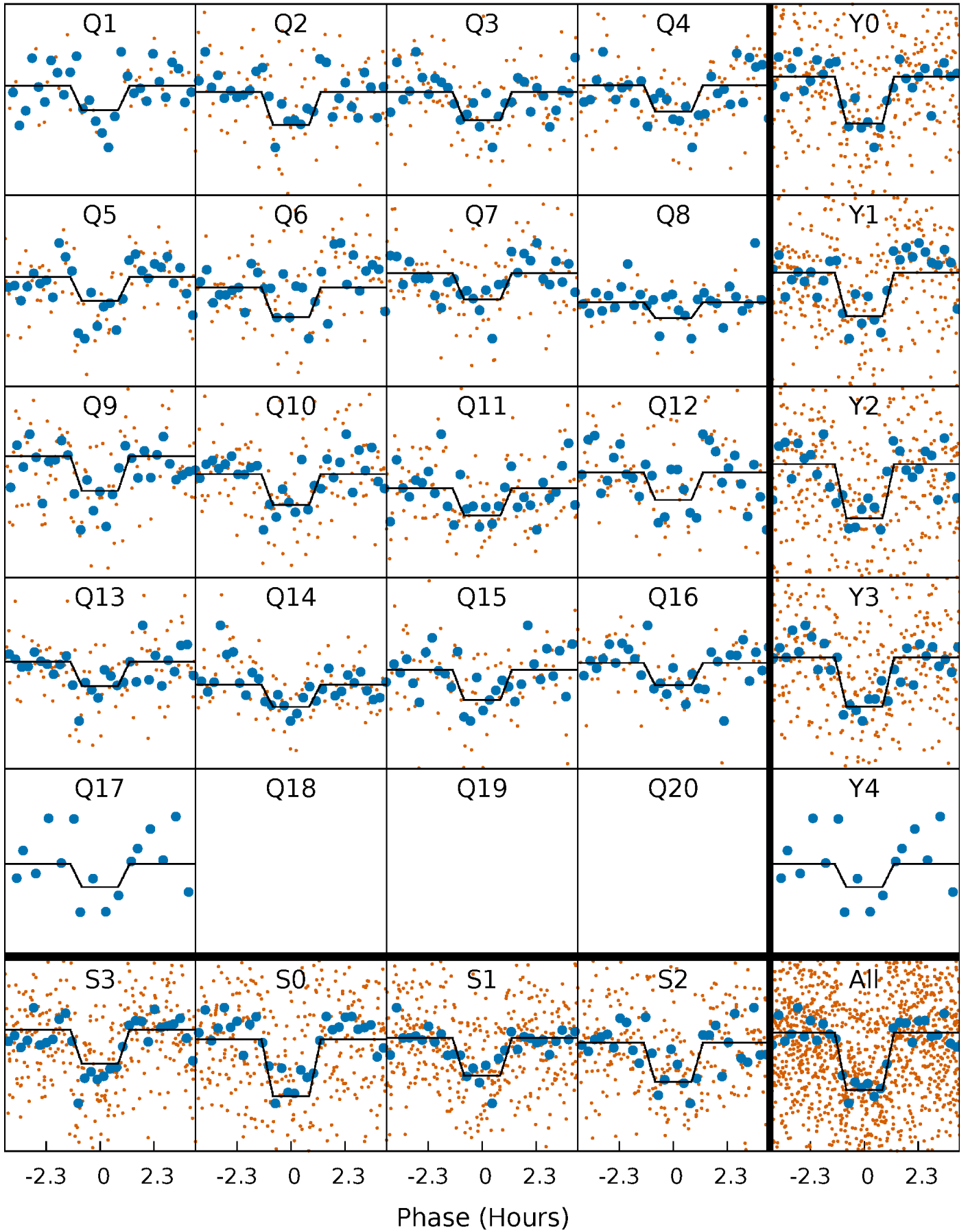
# DV Quarter-Phased Transit Curves

TCE 010004738-03 P= 13.930664 Days  $T_0=134.429353$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

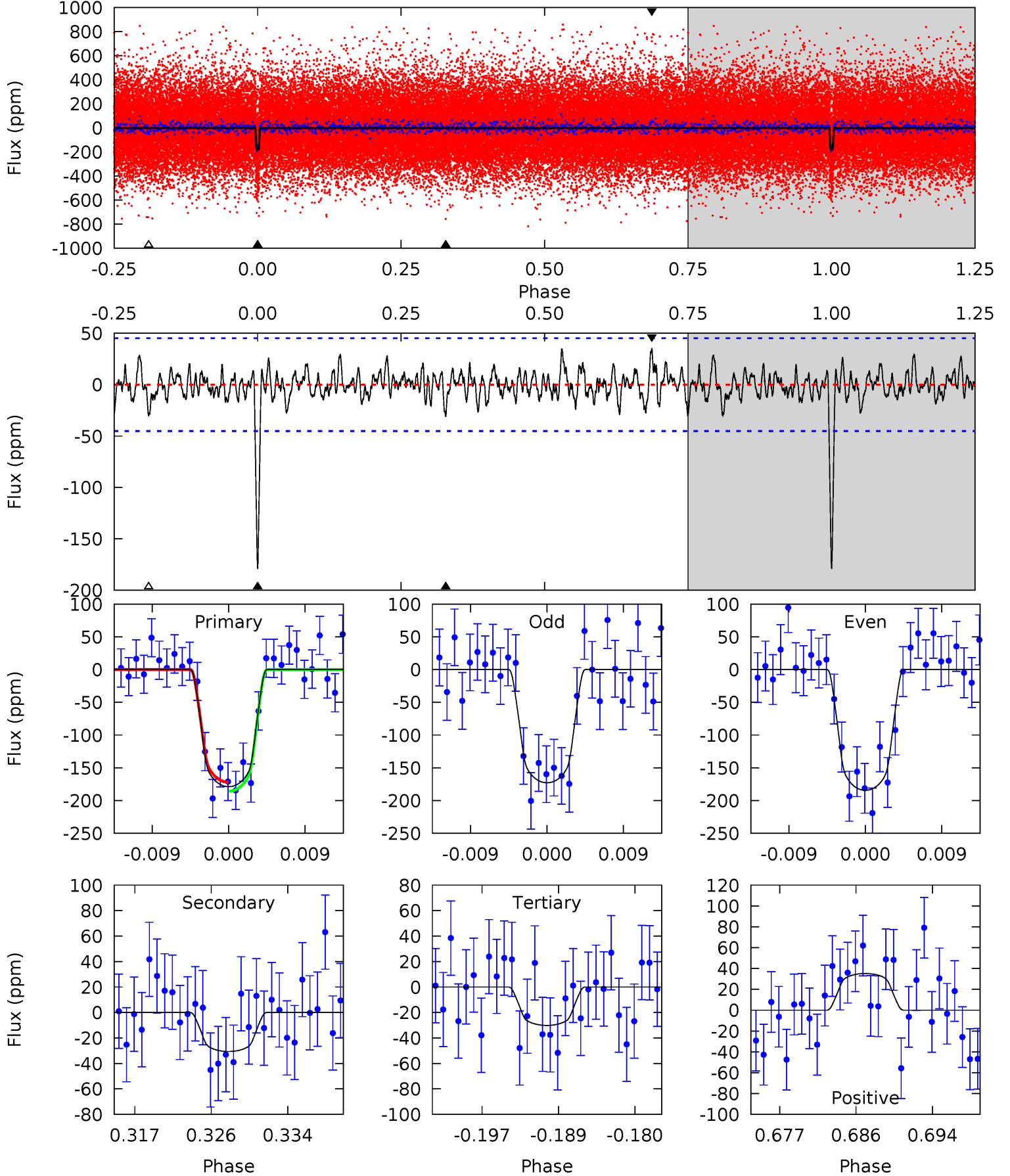
TCE 010004738-03 P= 13.930673 Days  $T_0=134.431011$  (BKJD)



# DV Model-Shift Uniqueness Test

010004738-03,  $P = 13.930664$  Days,  $E = 120.498689$  Days

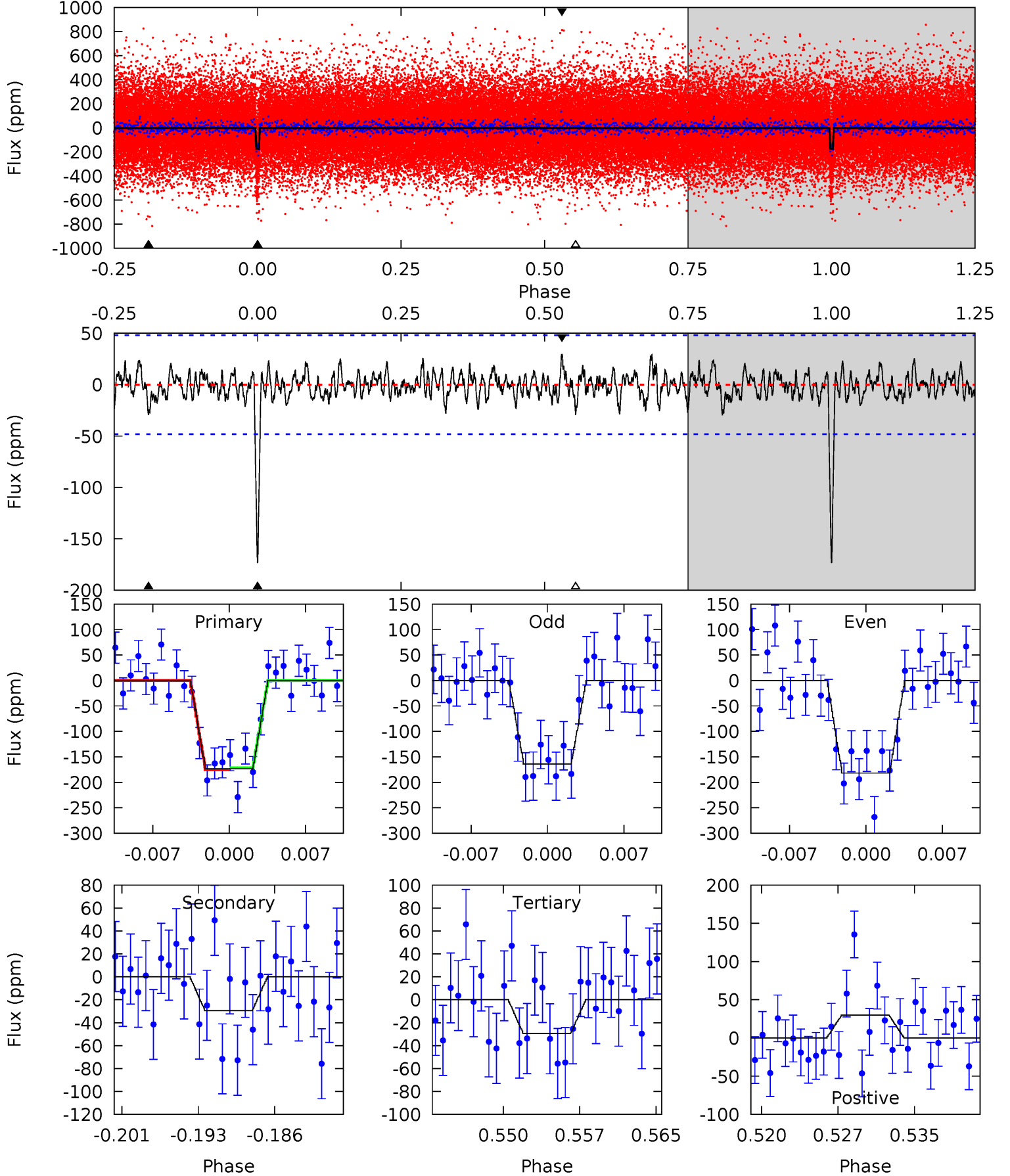
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
20.0	3.43	3.37	3.94	5.06	2.63	1.21	16.6	16.1	0.05	-0.51	0.65	0.99	0.16	0.77



# Alt Model-Shift Uniqueness Test

010004738-03,  $P = 13.930673$  Days,  $E = 120.500338$  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
18.3	3.11	3.11	3.15	5.08	2.68	1.05	15.2	15.2	0.00	-0.04	0.94	0.94	0.15	0.19



### Stellar Parameters For KIC 010004738

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5497^{+74}_{-82}$	$4.570^{+0.014}_{-0.063}$	$0.070^{+0.150}_{-0.200}$	$0.839^{+0.065}_{-0.035}$	$0.952^{+0.034}_{-0.067}$	$2.272^{+0.162}_{-0.423}$
	+1%/-1%	+0%/-1%	+214%/-286%	+8%/-4%	+4%/-7%	+7%/-19%
Source	SPE90	SPE90	SPE90	DSEP		

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

### Secondary Eclipse Parameters for KIC 010004738-03 / KOI 1598.03

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-31 \pm 9$	$1.41^{+0.48}_{-0.55}$	$938^{+21}_{-20}$	$3717^{+694}_{-403}$	$104^{+167}_{-52}$
Alt.	$-29 \pm 9$	$1.20^{+0.52}_{-0.48}$	$939^{+20}_{-18}$	$3914^{+849}_{-539}$	$138^{+261}_{-82}$

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

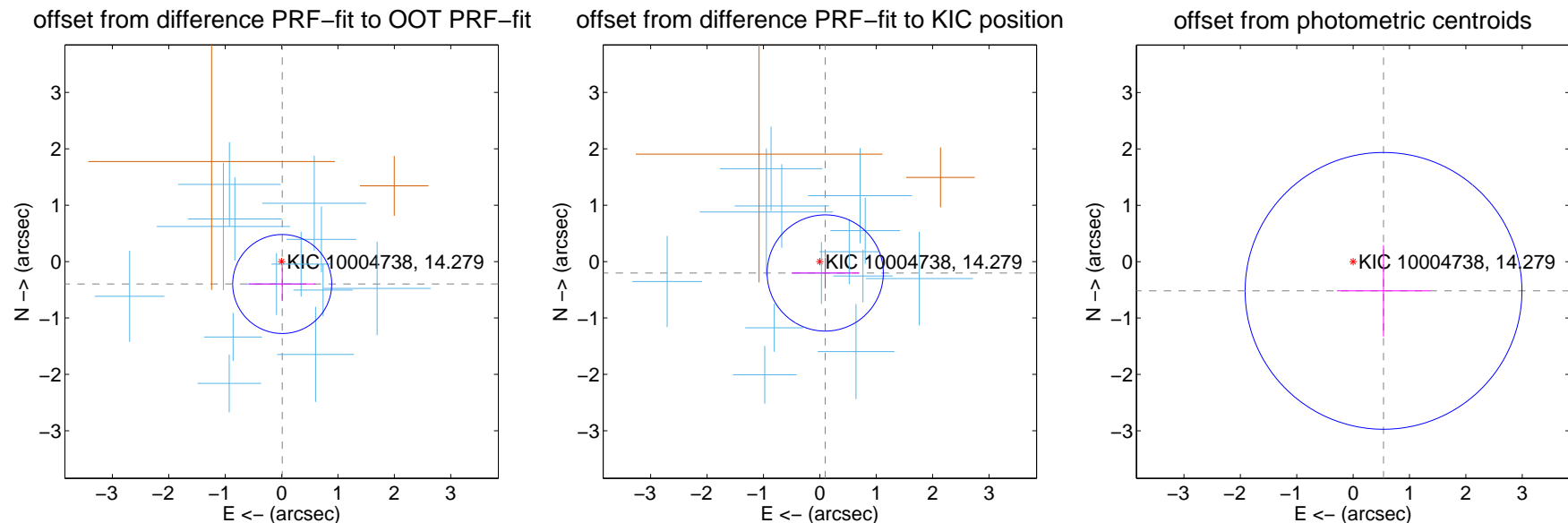
## DV Centroid Data

Supplemental centroid analysis for 010004738-03. Kepler magnitude: 14.28. Transit SNR 13.84

There are 13 quarters with good PRF difference image offsets

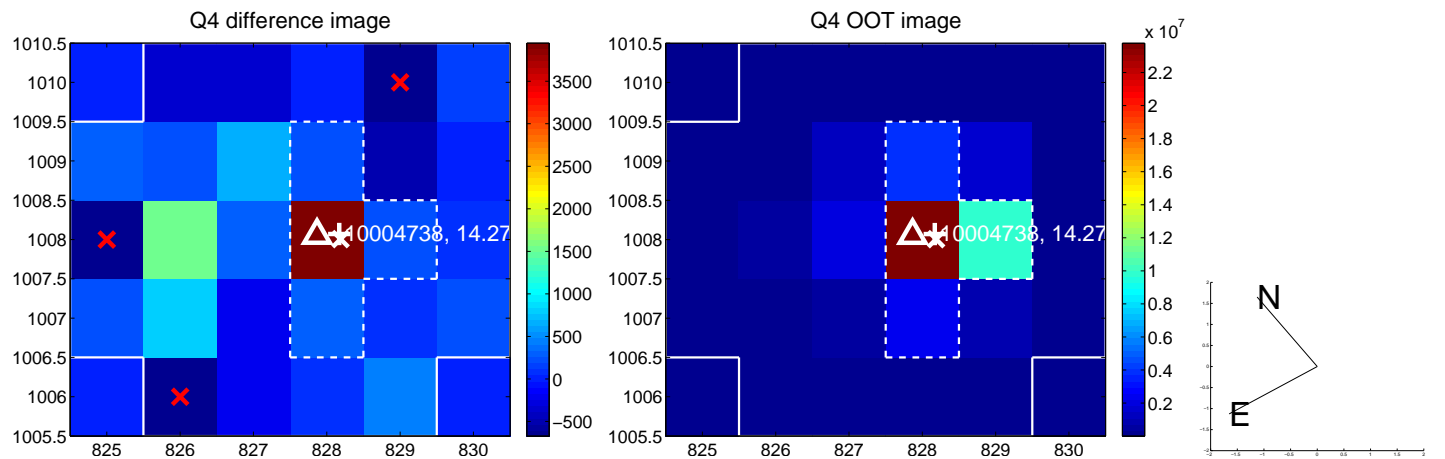
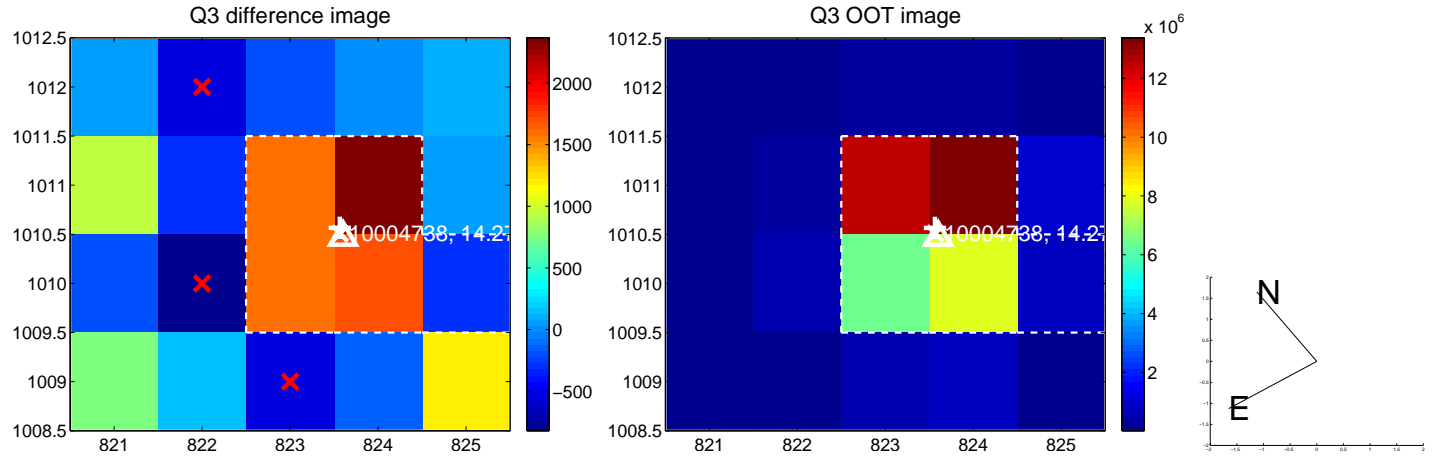
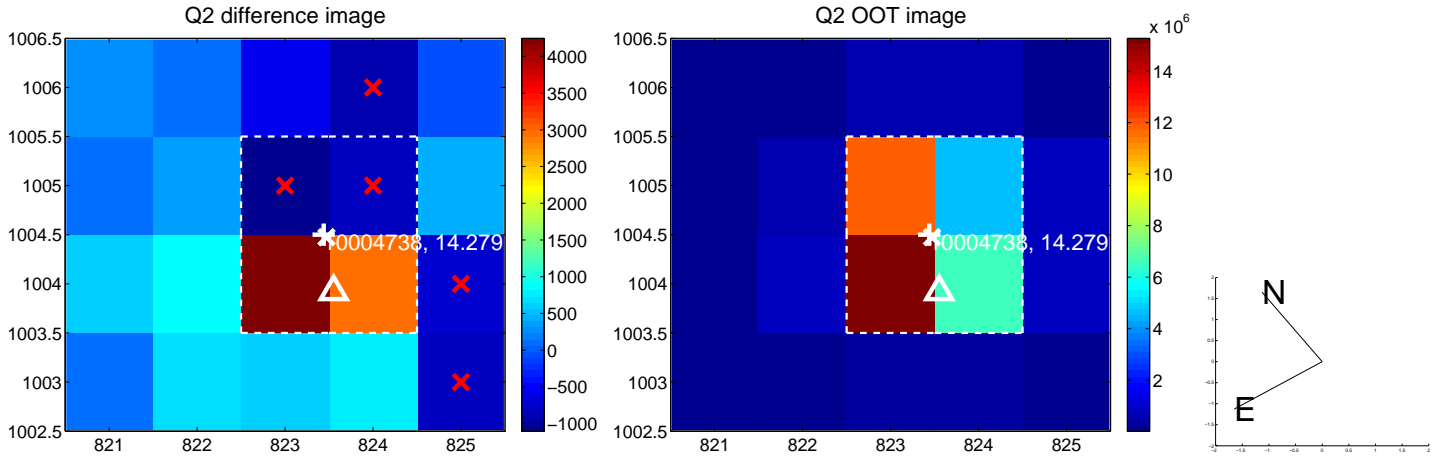
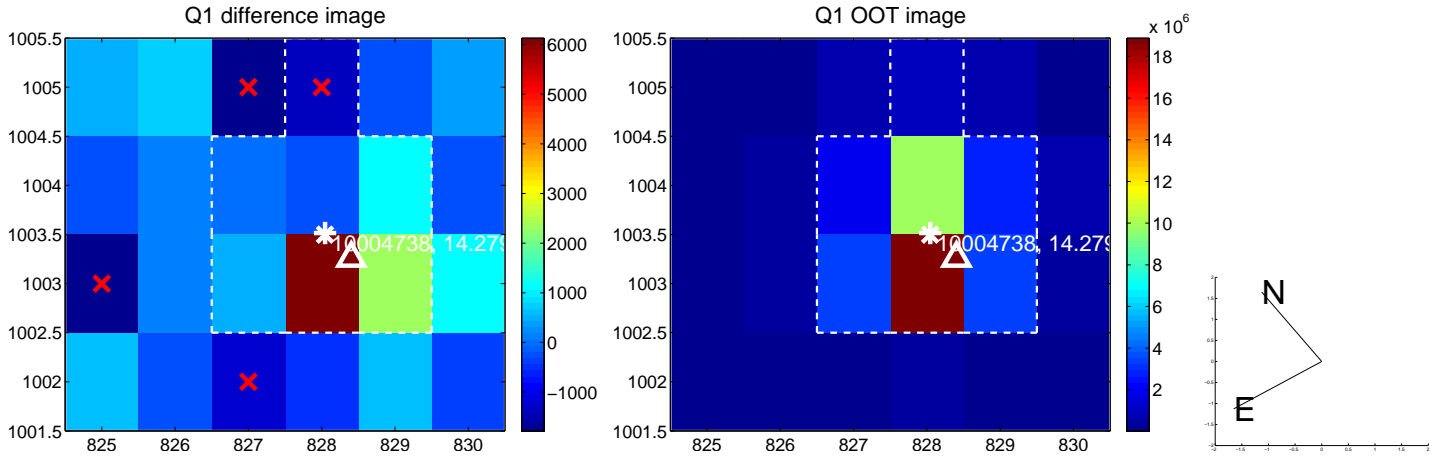
The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.398 \pm 0.293$	1.36	$-0.011 \pm 0.591$	$-0.397 \pm 0.293$
PRF-fit source offset from KIC position	$0.224 \pm 0.343$	0.65	$-0.096 \pm 0.596$	$-0.202 \pm 0.274$
photometric centroid source offset	$0.75 \pm 0.82$	0.91	$-0.54 \pm 0.83$	$-0.52 \pm 0.81$

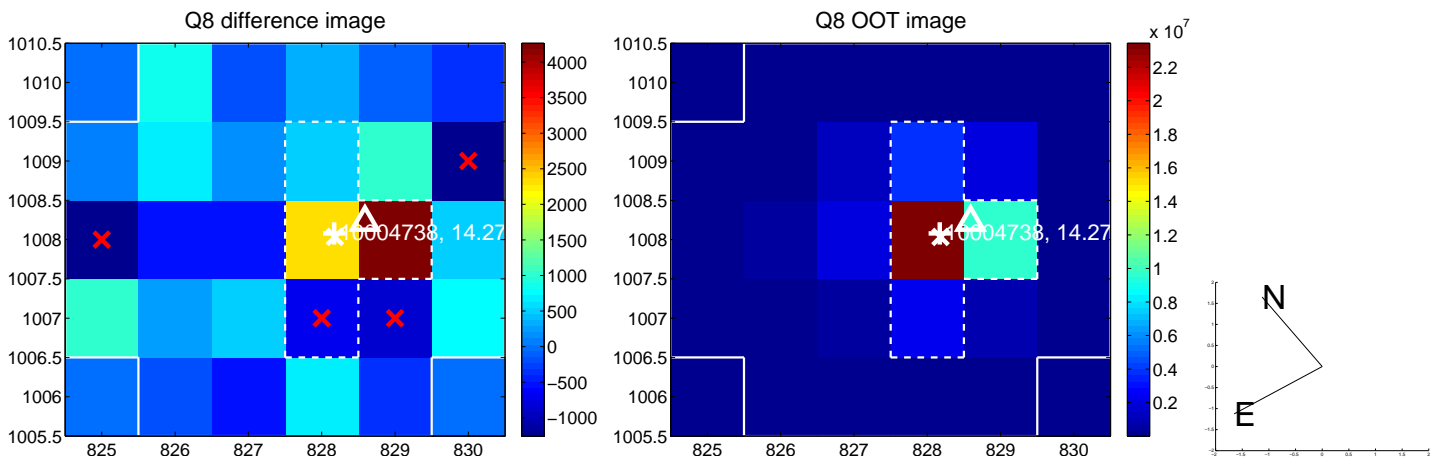
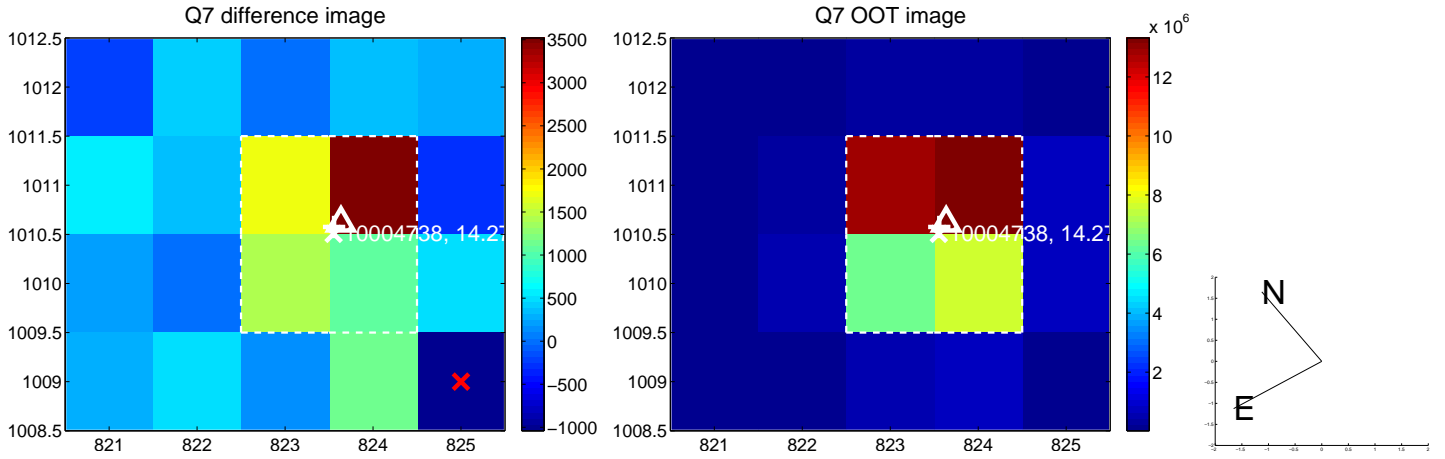
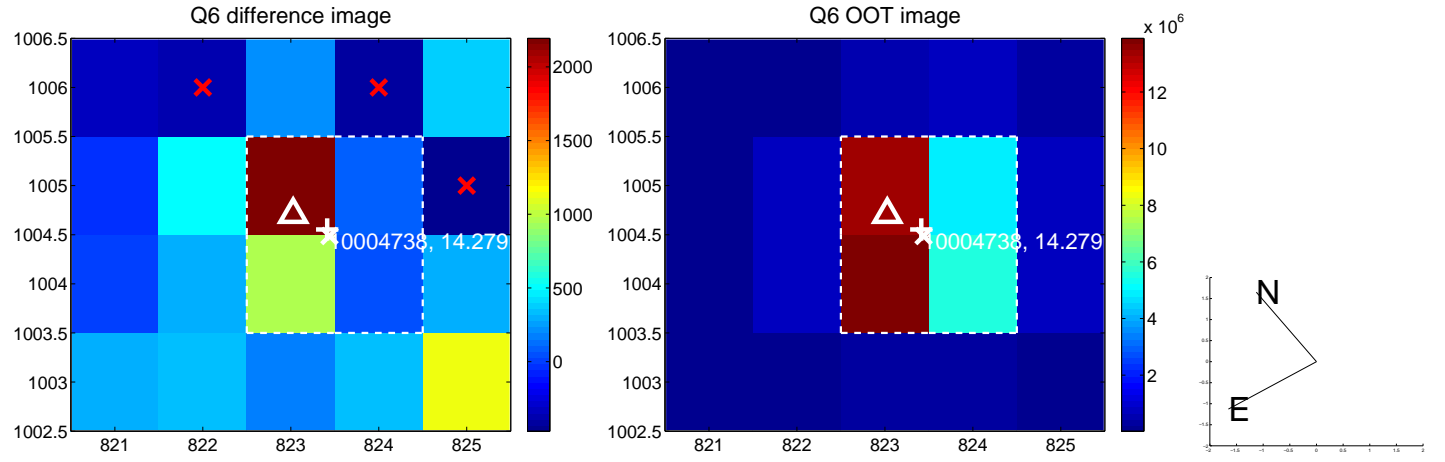
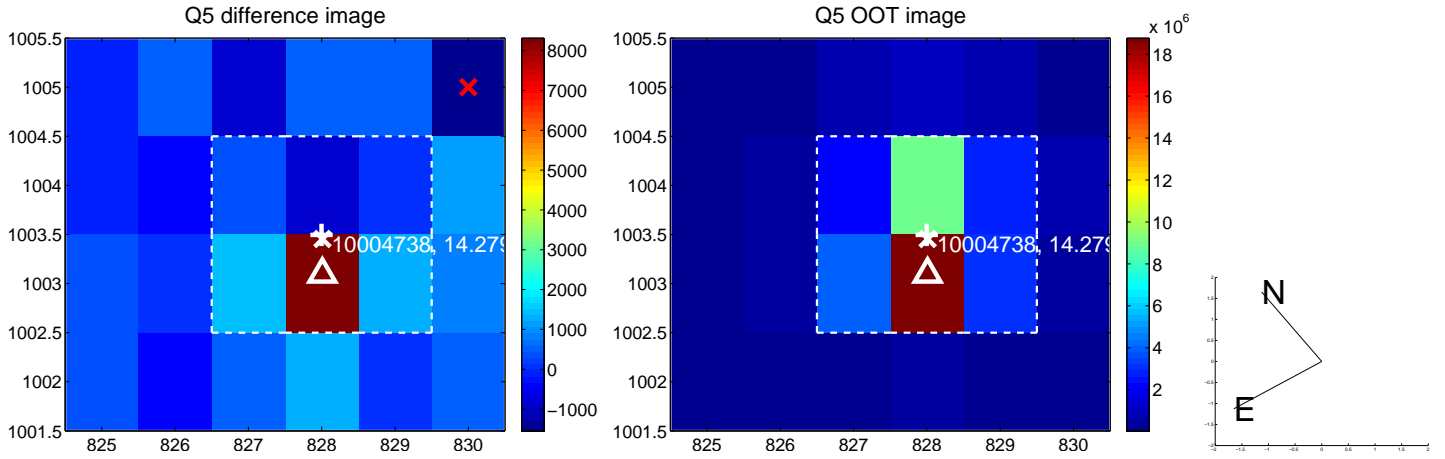


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

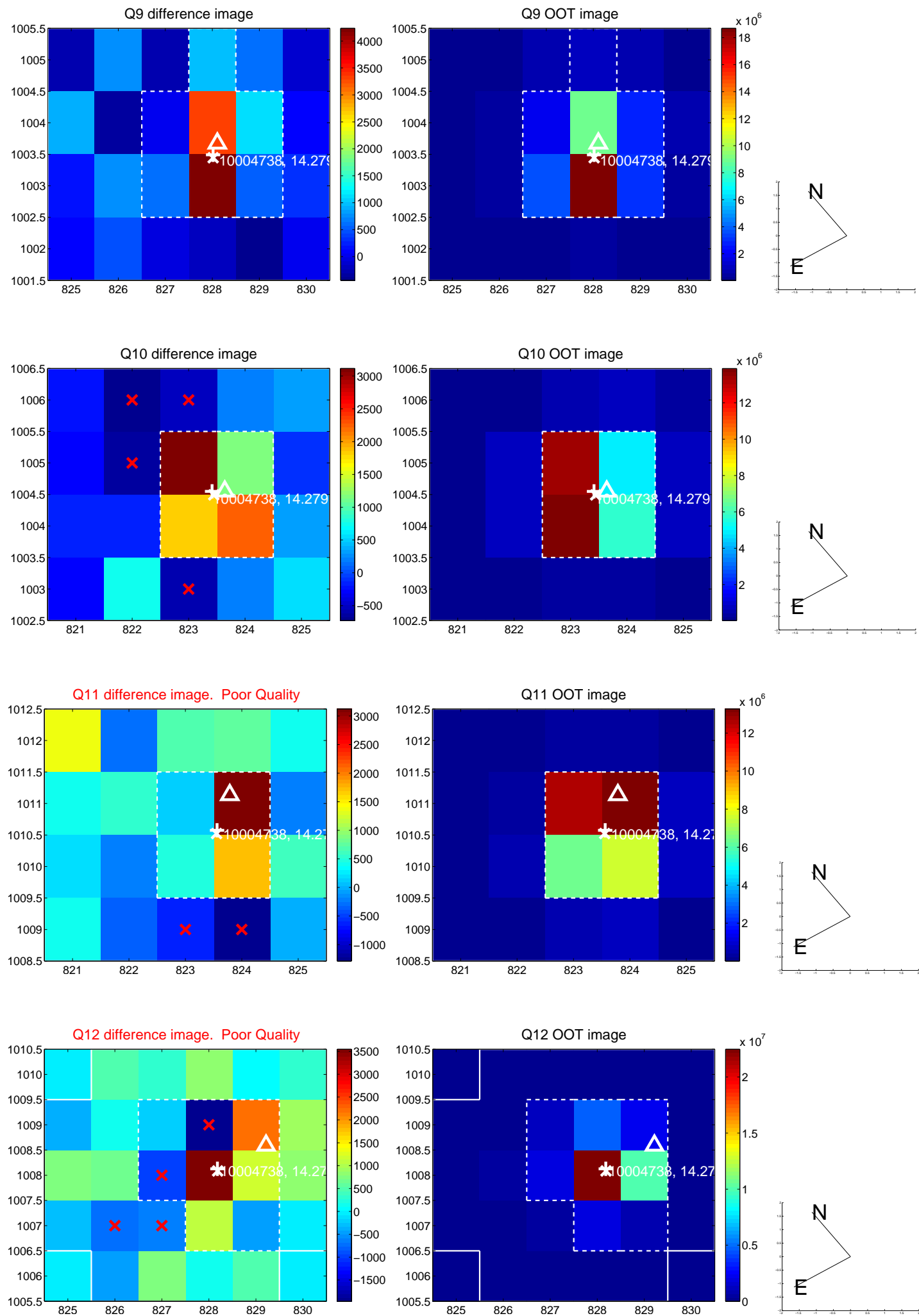


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

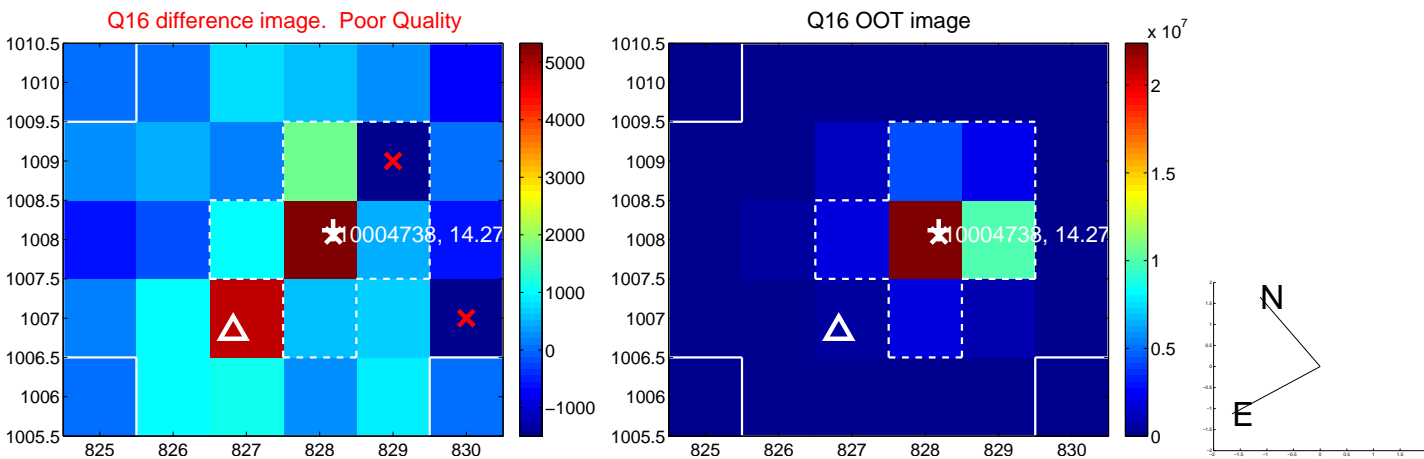
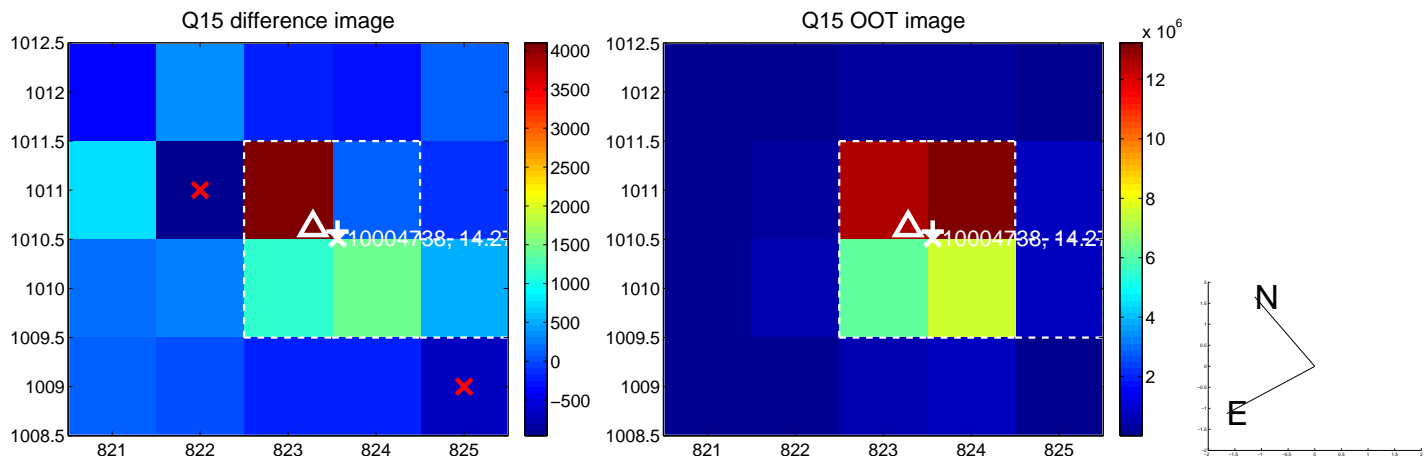
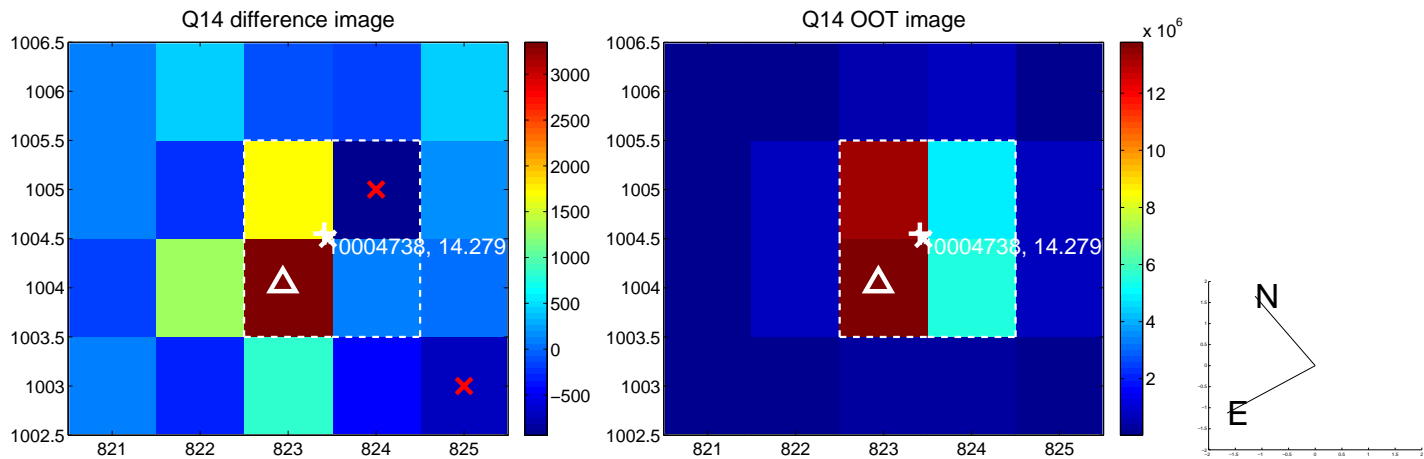
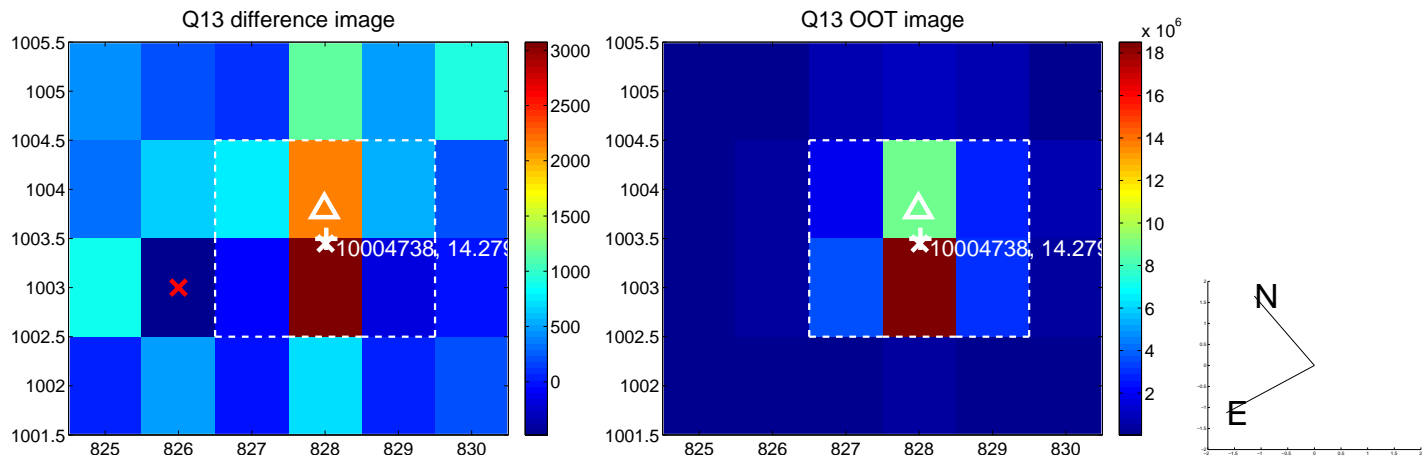




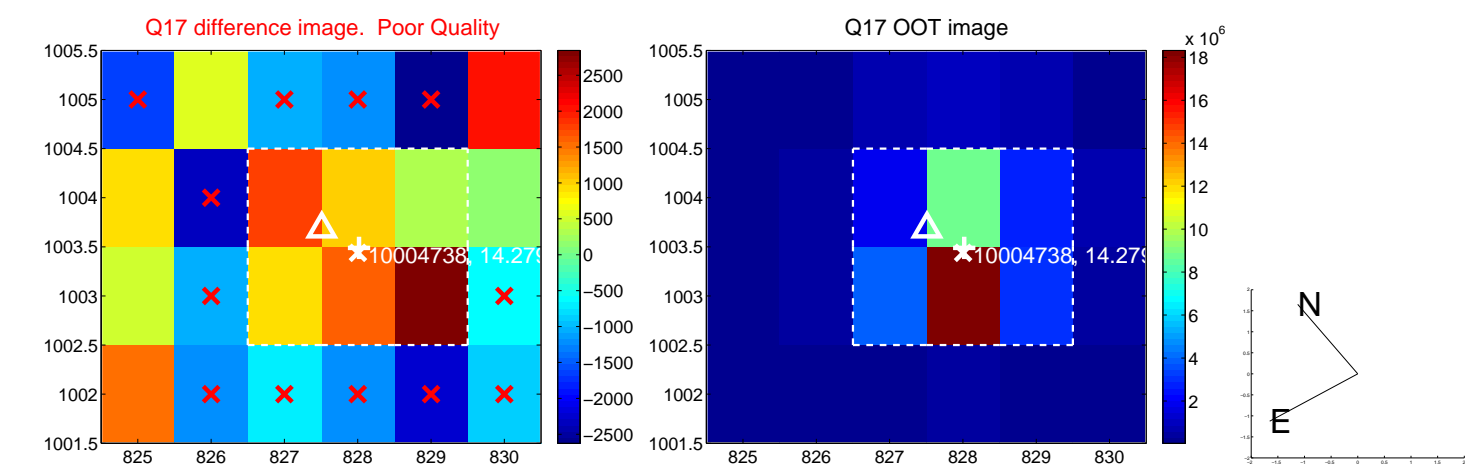
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



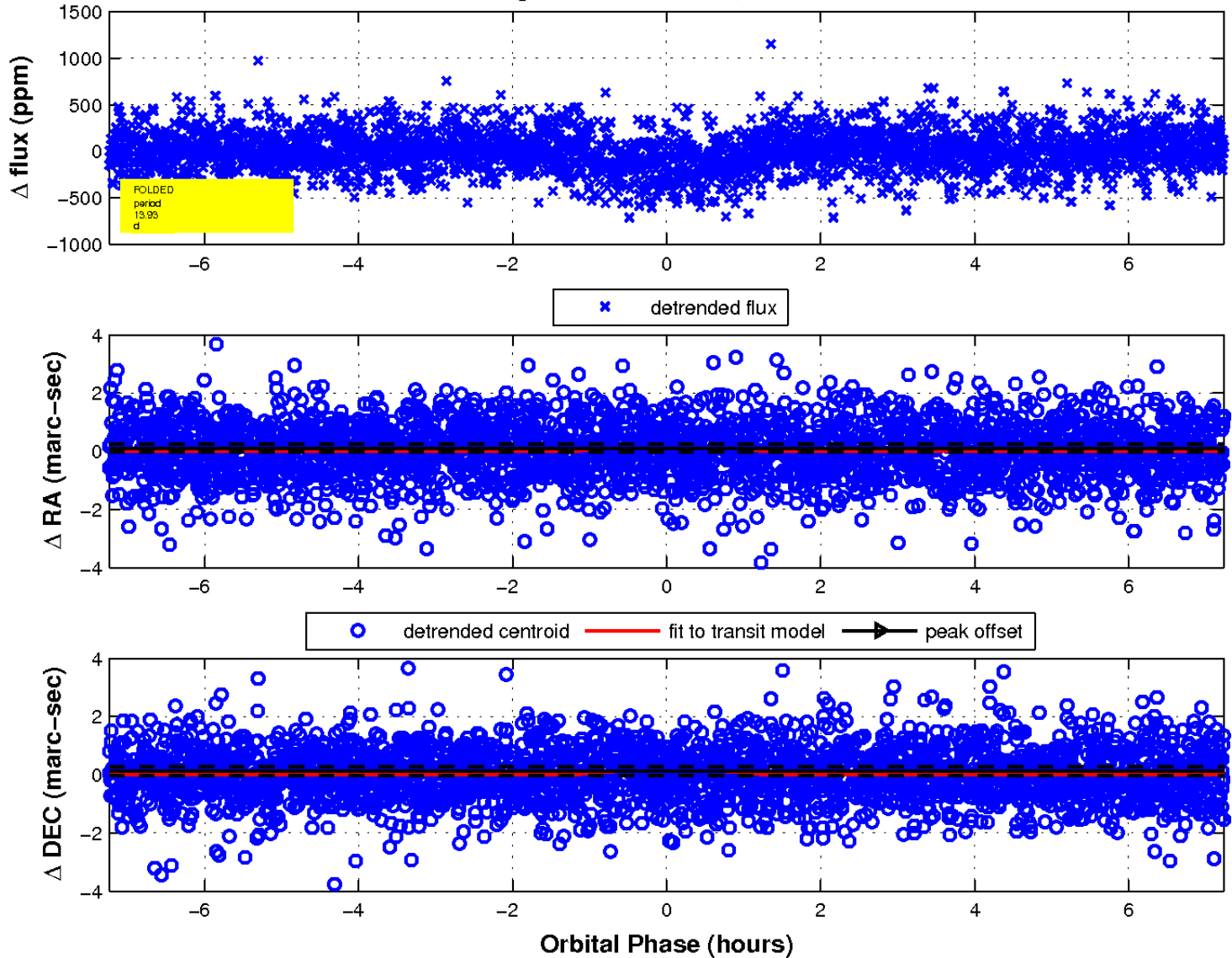
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 3 of 3



UKIRT Image

Declination

