

# KIC 010904857

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010904857-01	OBS	0194.01	3.120832	133.224000	16370.1	2.224	1089.1	954.1	1.00	6122	14.29	682.78
010904857-02	OBS	No	3.120838	131.675928	299.6	1.880	19.1	21.7	1.00	6122	2.03	682.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010904857-01	OBS	PC	0.80	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—PLANET_OCCULT_ALT—HAS_SEC_TCE
010904857-02	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.

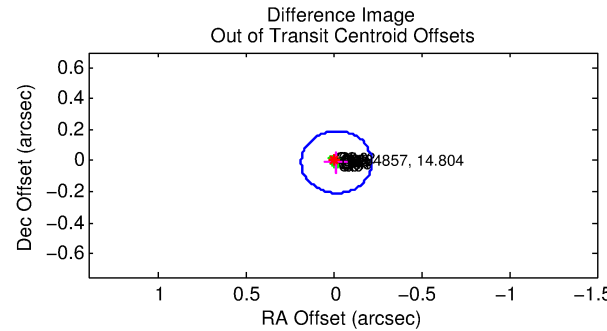
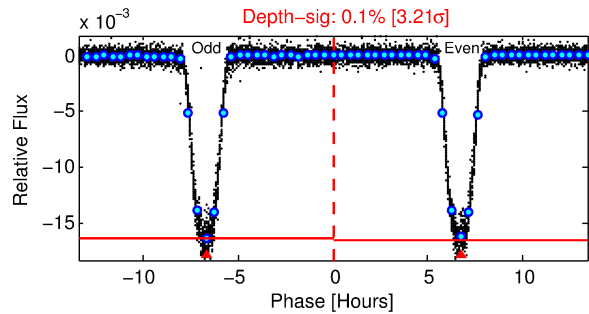
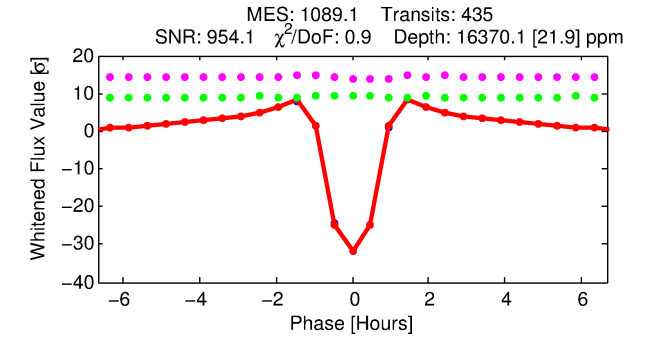
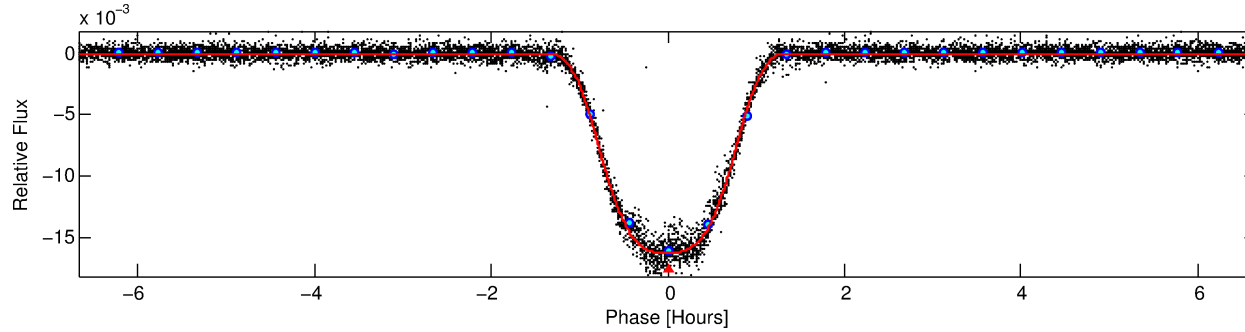
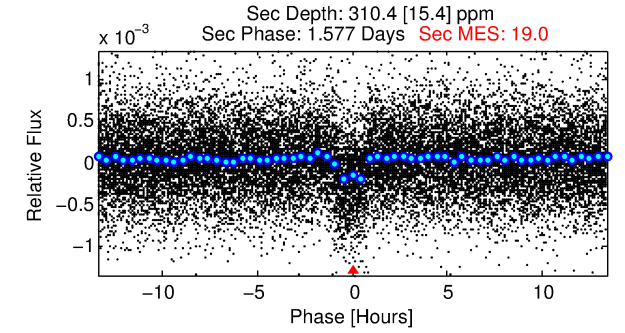
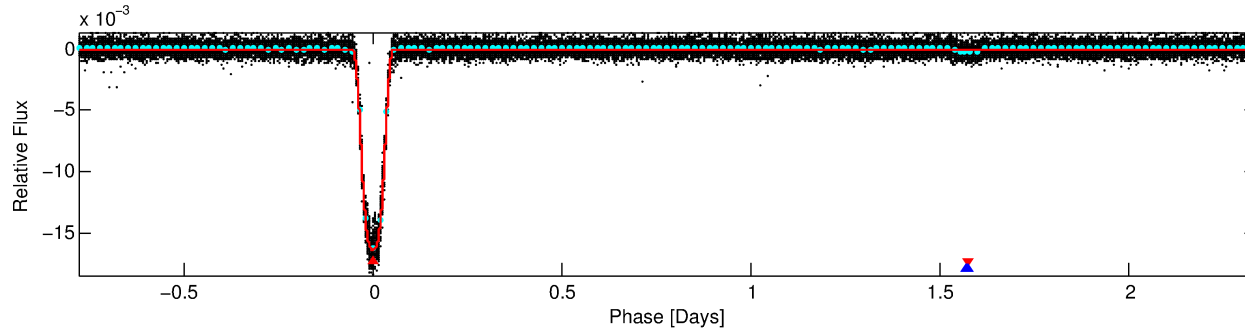
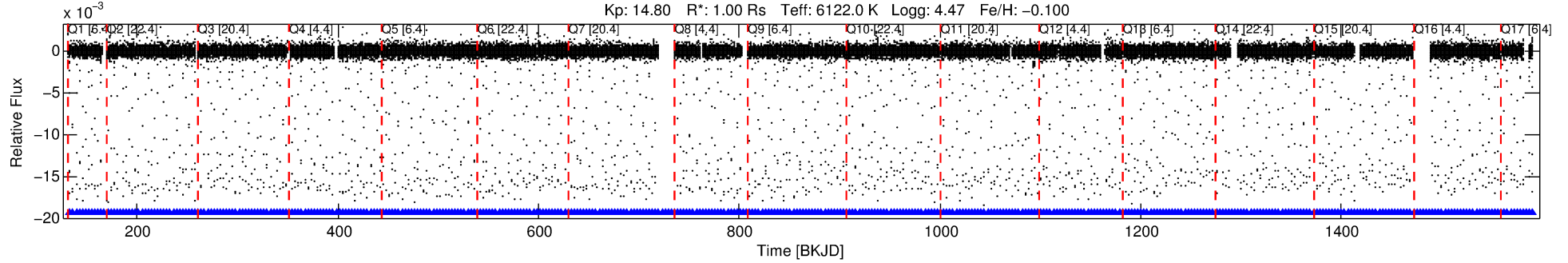
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010904857-01

No Significant Match Found

# DV One-Page Summary

KIC: 10904857 Candidate: 1 of 2 Period: 3.121 d  
KOI: K00194.01 Corr: 0.990



## DV Fit Results:

Period = 3.12083 [0.00000] d  
Epoch = 133.2240 [0.0000] BKJD  
Rp/R\* = 0.1315 [0.0002]  
a/R\* = 8.53 [0.03]  
b = 0.81 [0.00]  
Seff = 682.78 [275.50]  
Teff = 1303 [131] K  
Rp = 14.30 [4.48] Re  
a = 0.0428 [0.0112] AU  
Ag = 1.53 [0.59] [0.90 $\sigma$ ]  
Teffp = 2241 [79] K [6.12 $\sigma$ ]

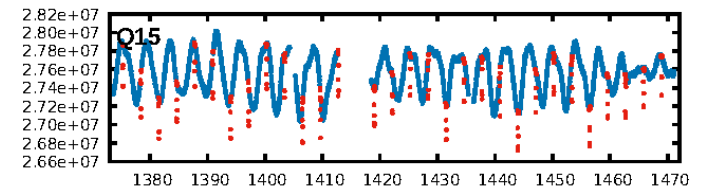
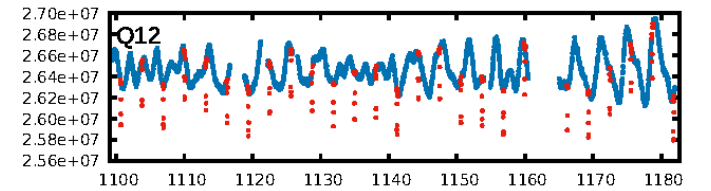
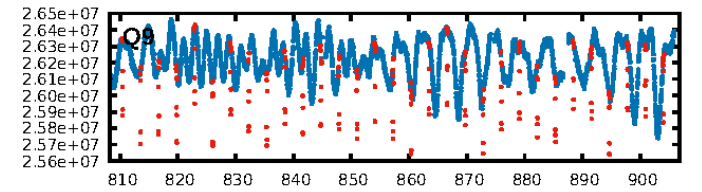
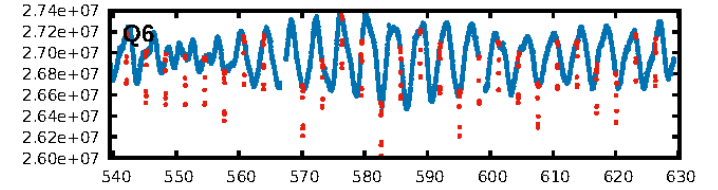
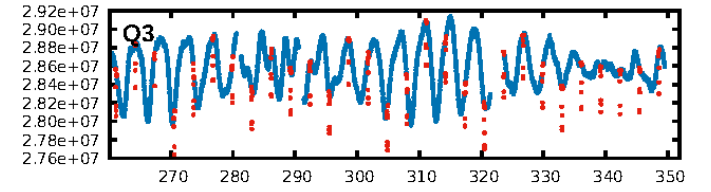
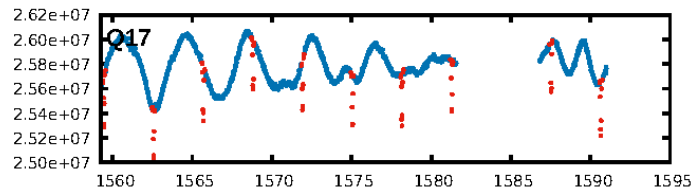
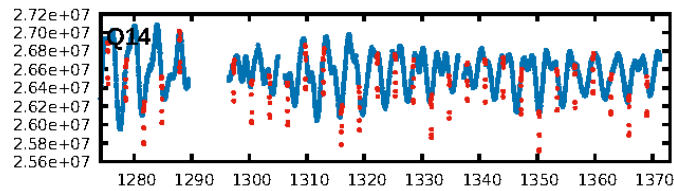
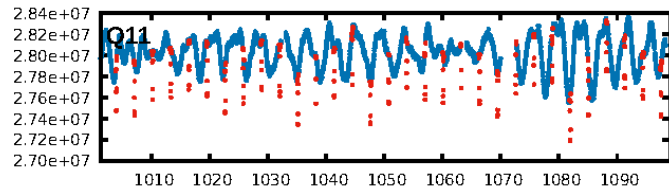
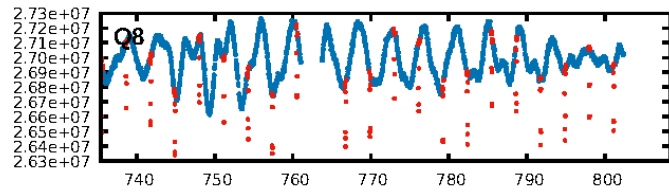
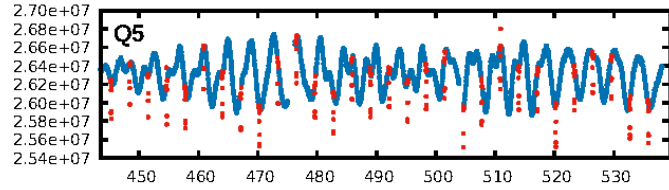
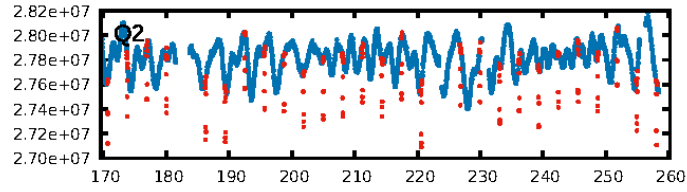
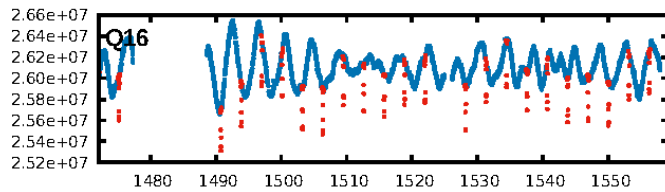
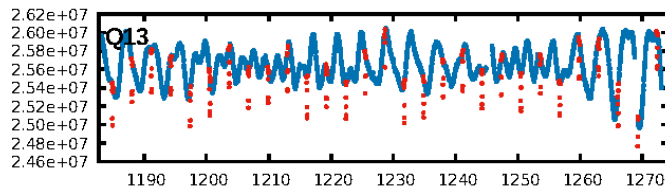
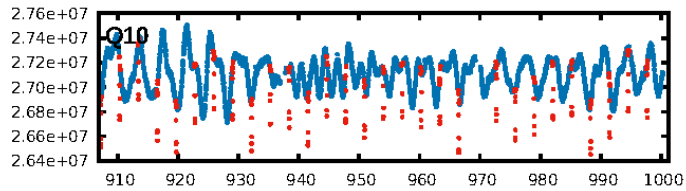
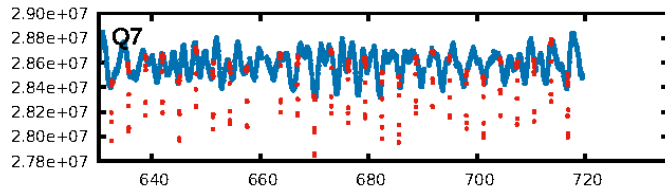
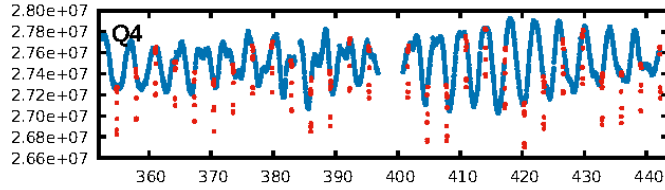
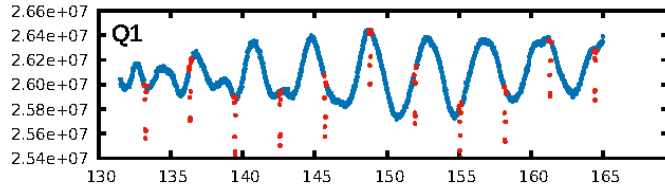
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [414/414]  
GhostDiagnostic-chr: 2.507  
Centroid-sig: 0.0%  
Centroid-so: 0.178 arcsec [17.60 $\sigma$ ]  
OotOffset-rm: 0.017 arcsec [0.26 $\sigma$ ]  
KicOffset-rm: 0.119 arcsec [1.76 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

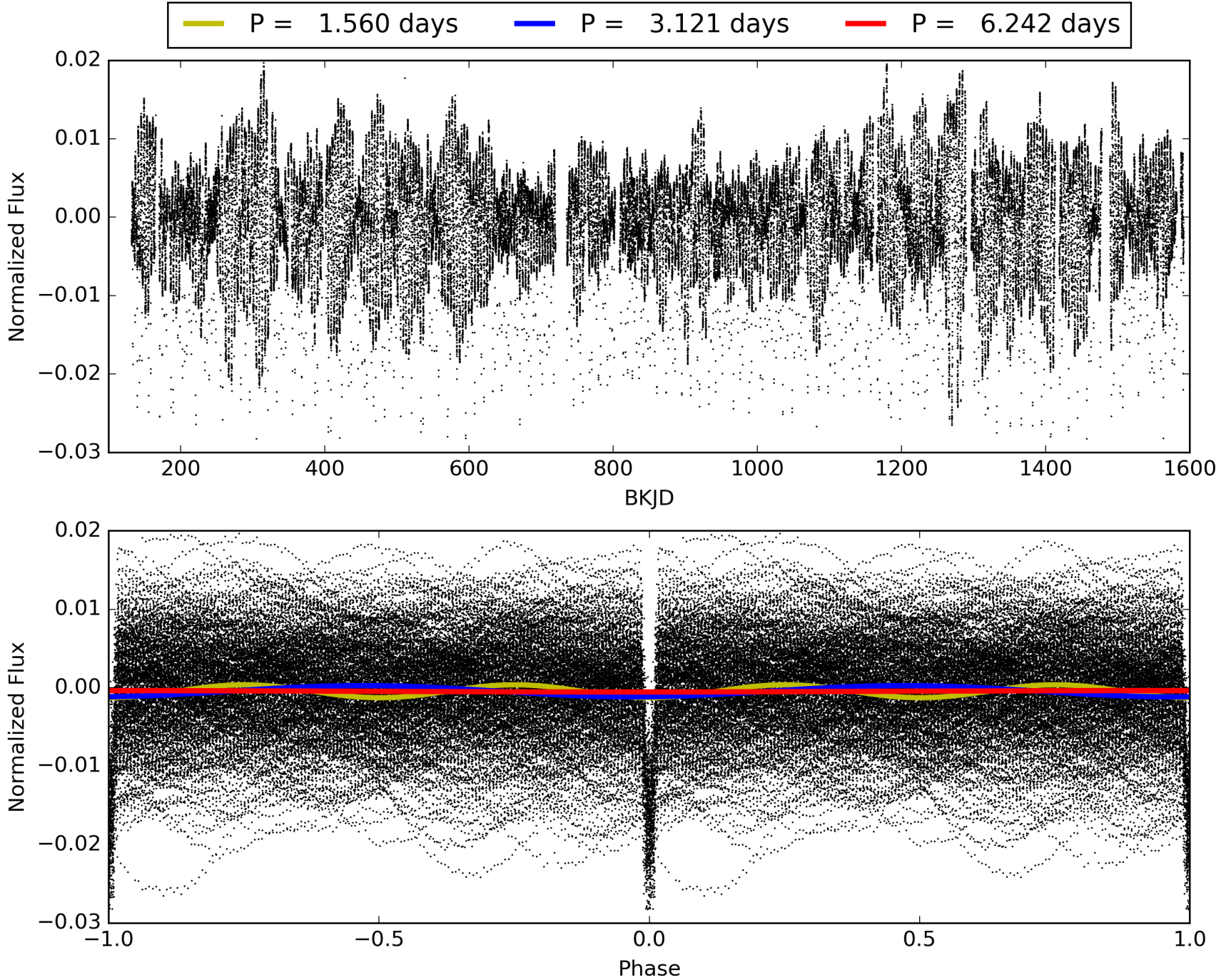
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 21:18:42 Z

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

# TCE 010904857-01, PDC Light Curves

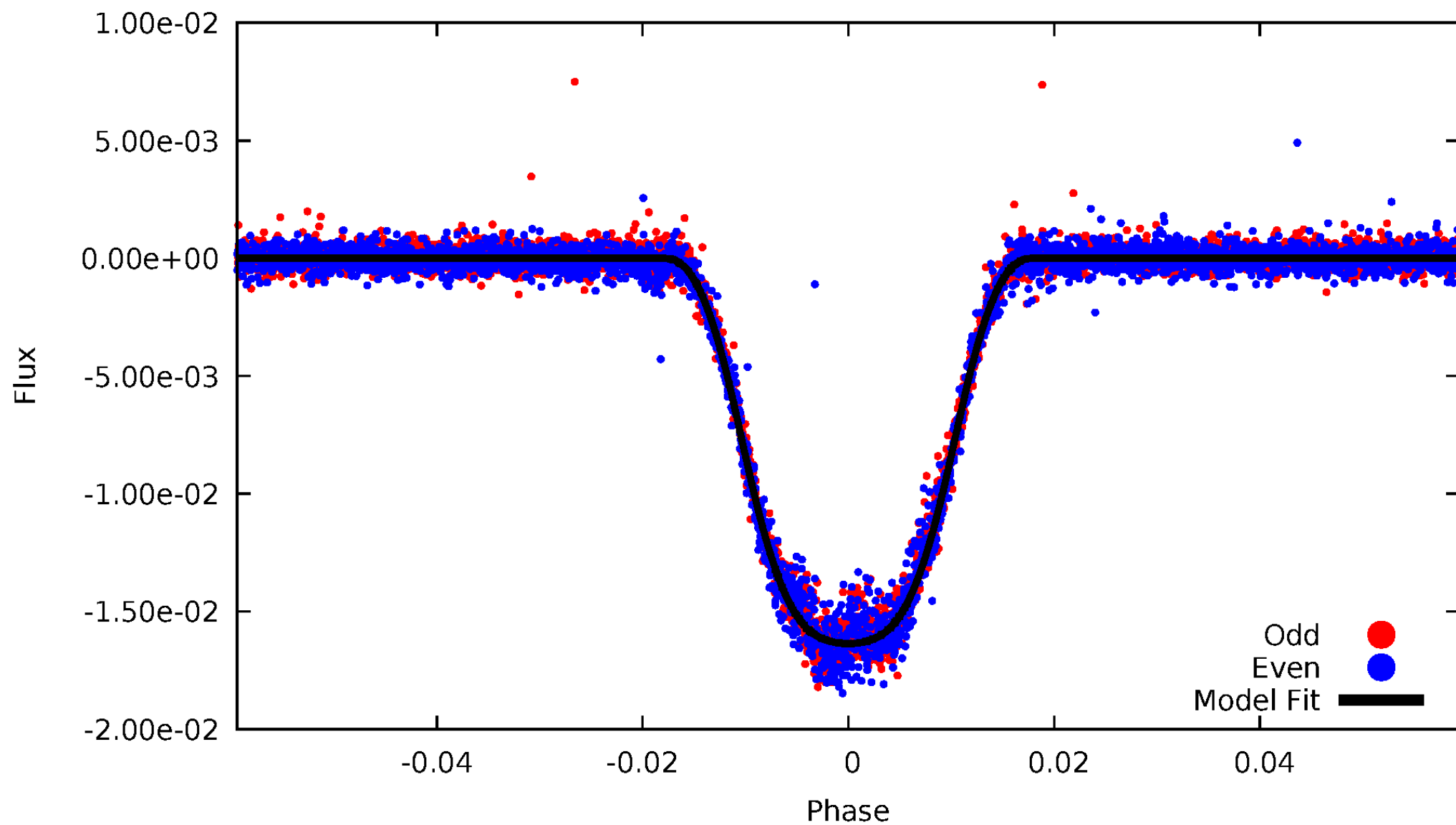


TCE 010904857-01



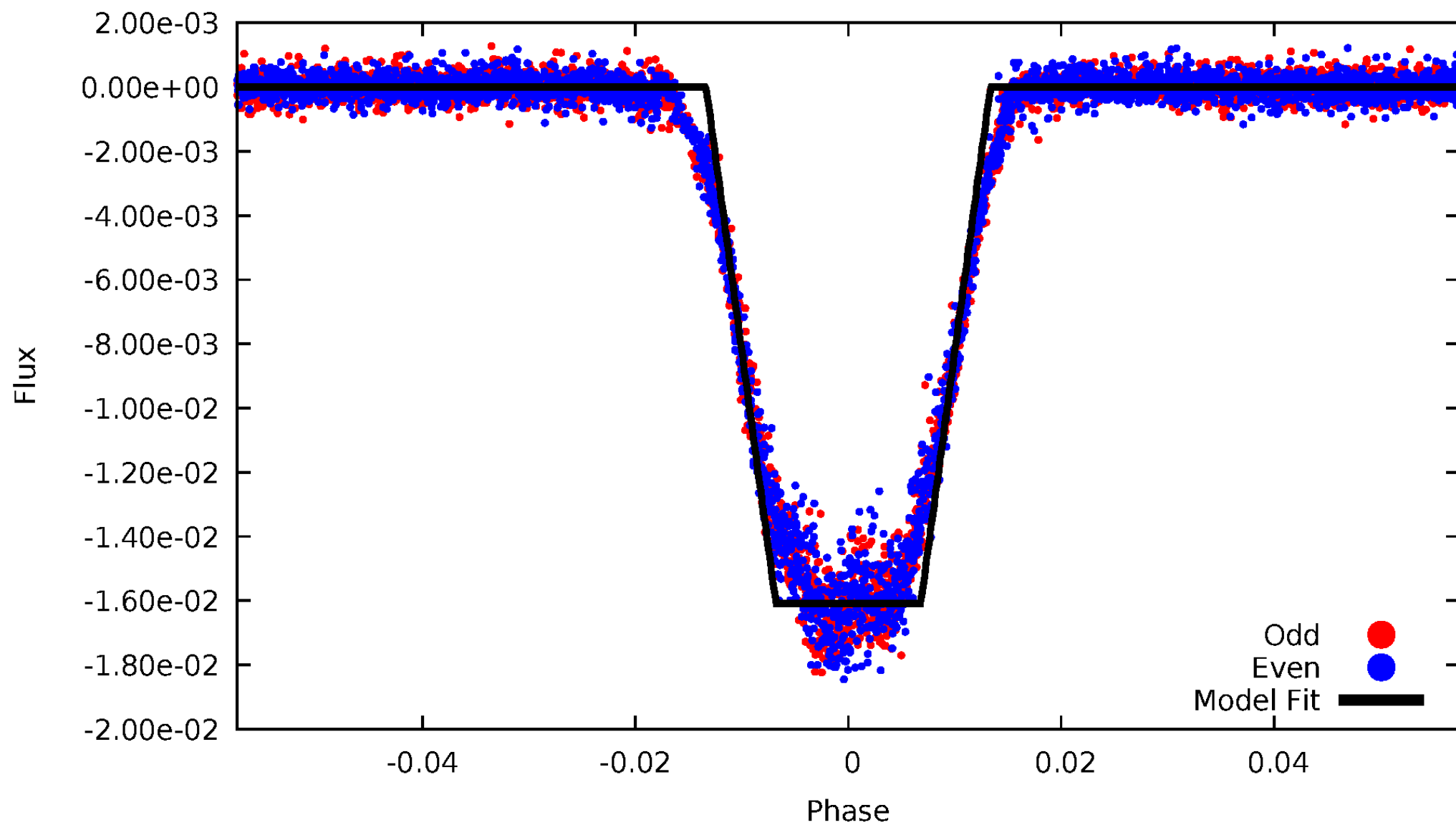
# DV Odd/Even

TCE 010904857-01



# ALT Odd/Even

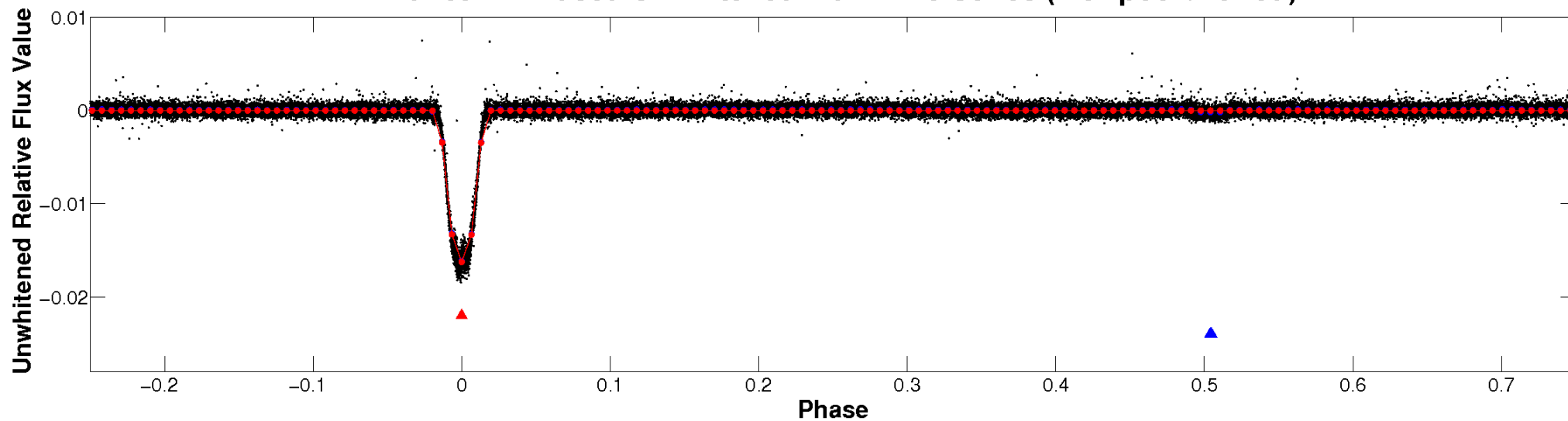
TCE 010904857-01



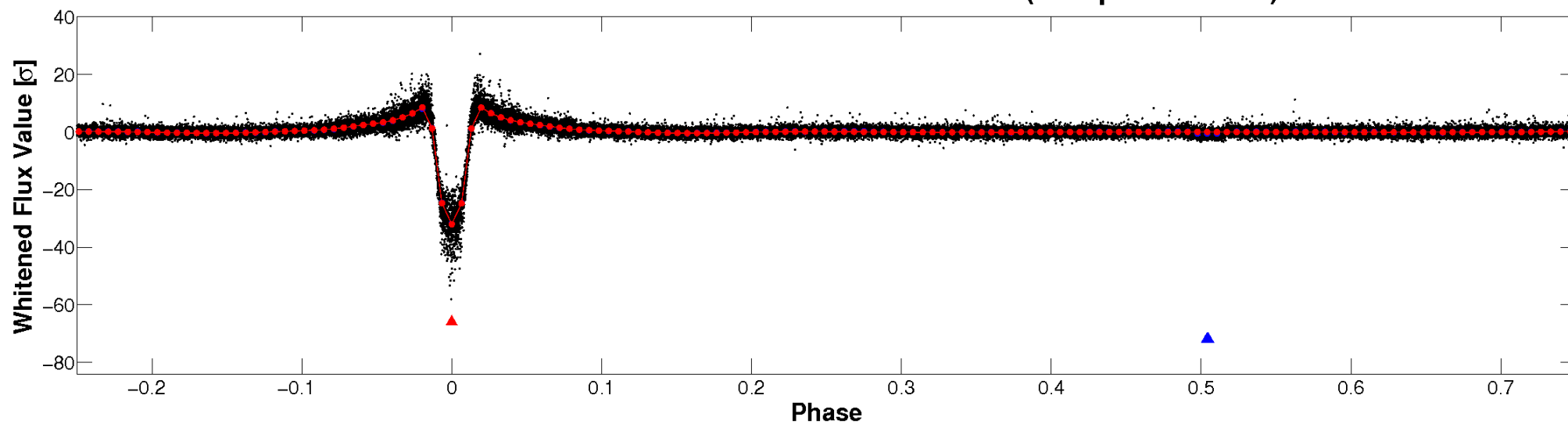


# Non-Whitened Vs. Whitened Light Curve

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

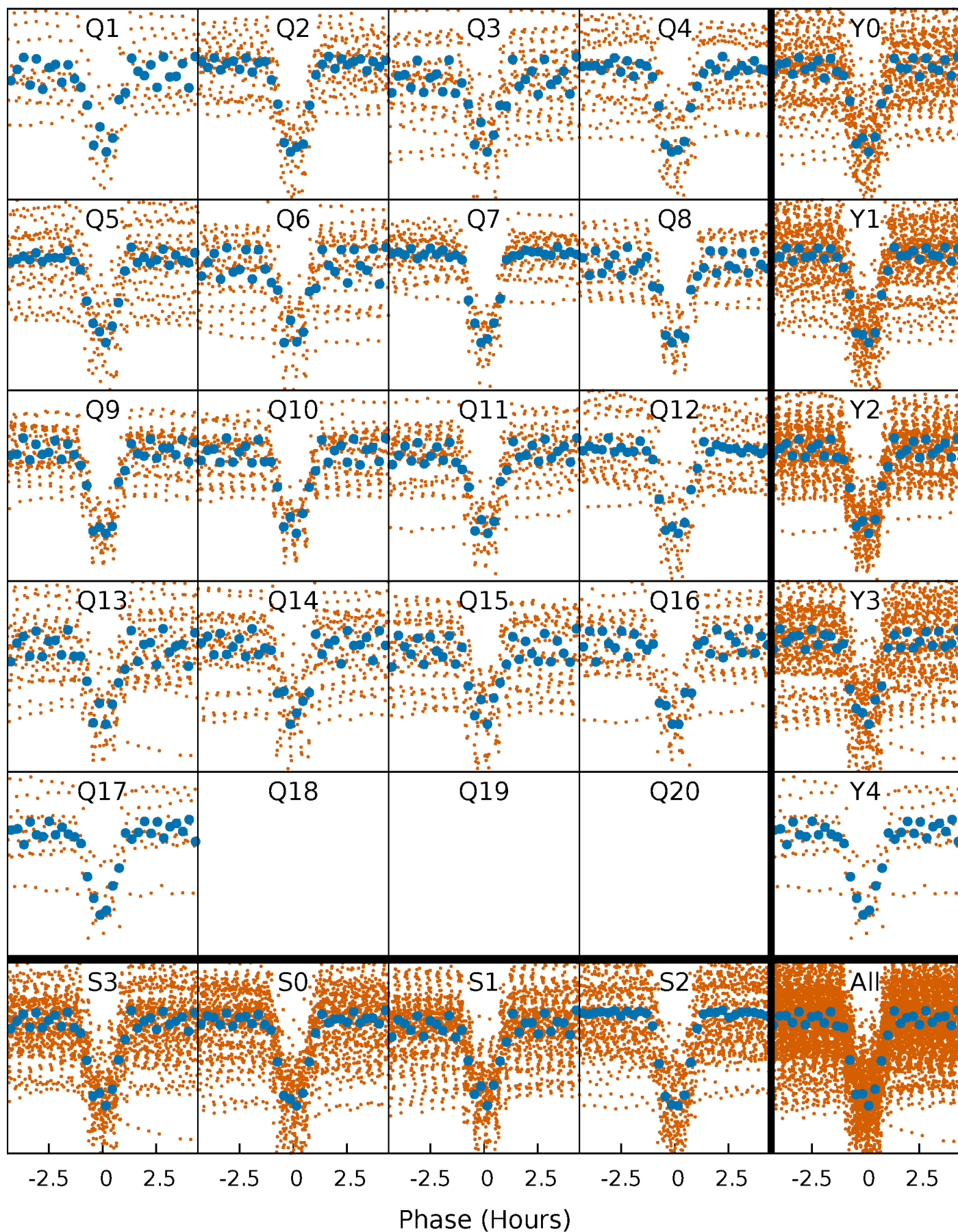


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

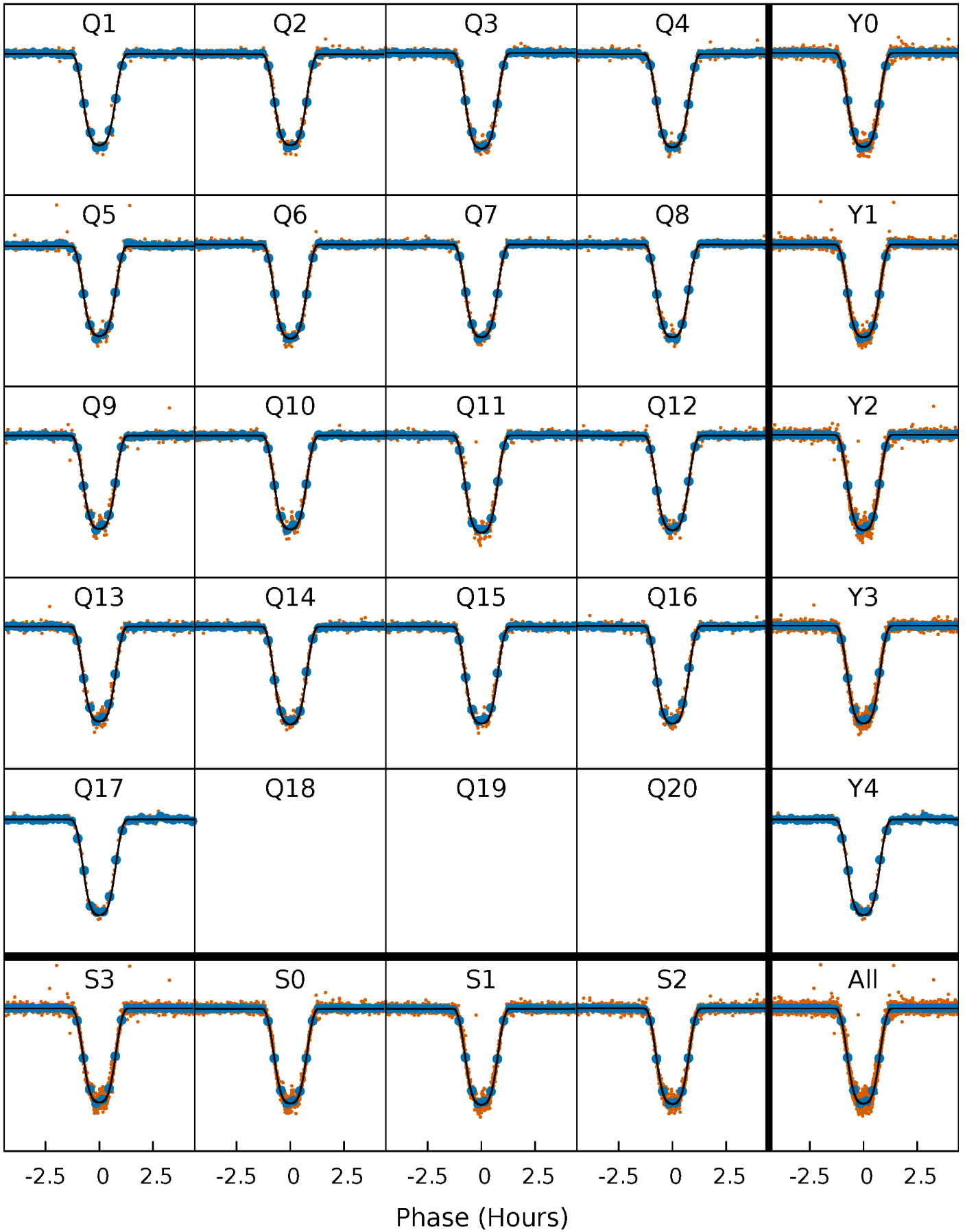
TCE 010904857-01   P= 3.120832 Days    $T_0=133.224000$  (BKJD)





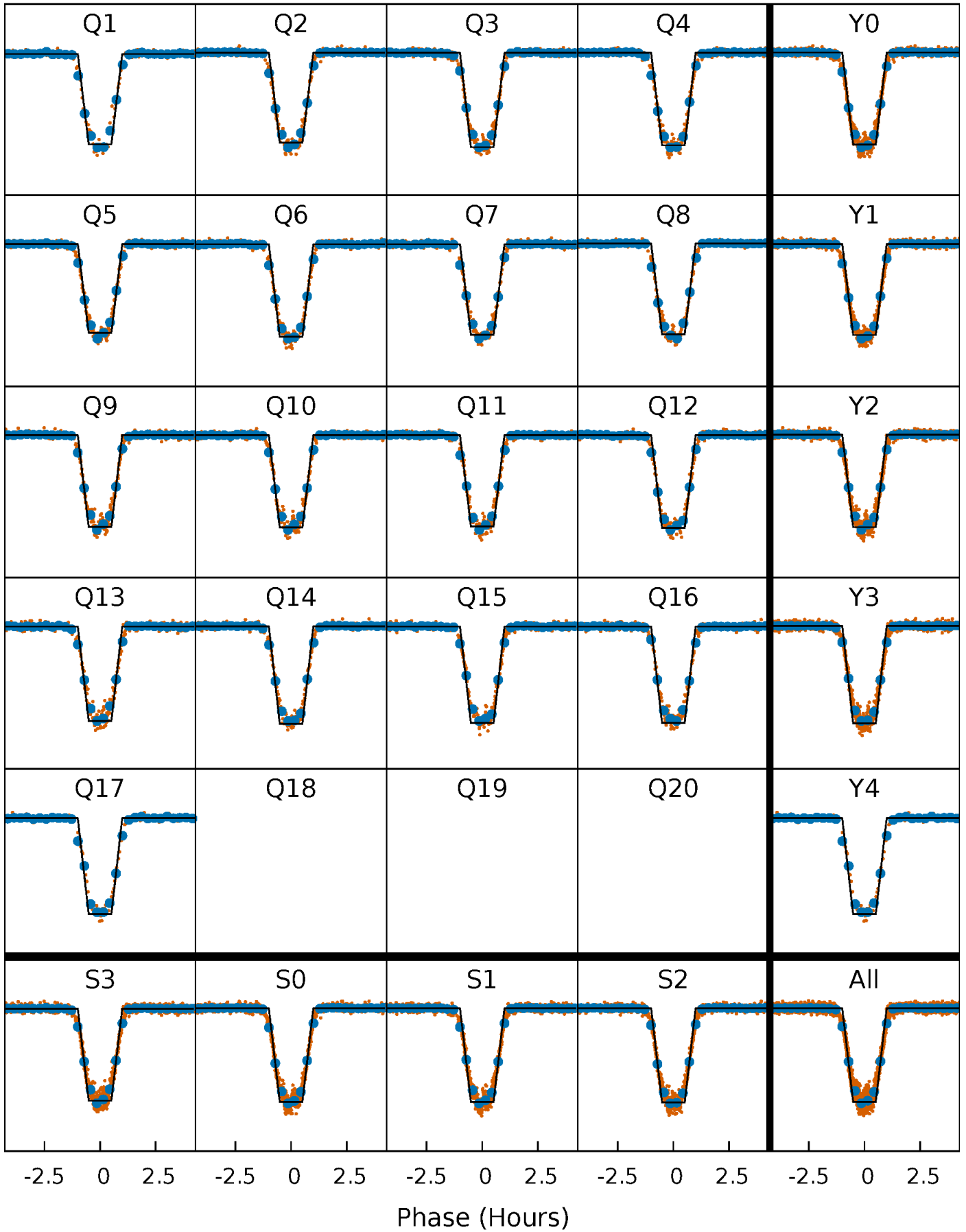
# DV Quarter-Phased Transit Curves

TCE 010904857-01 P= 3.120832 Days  $T_0=133.224000$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

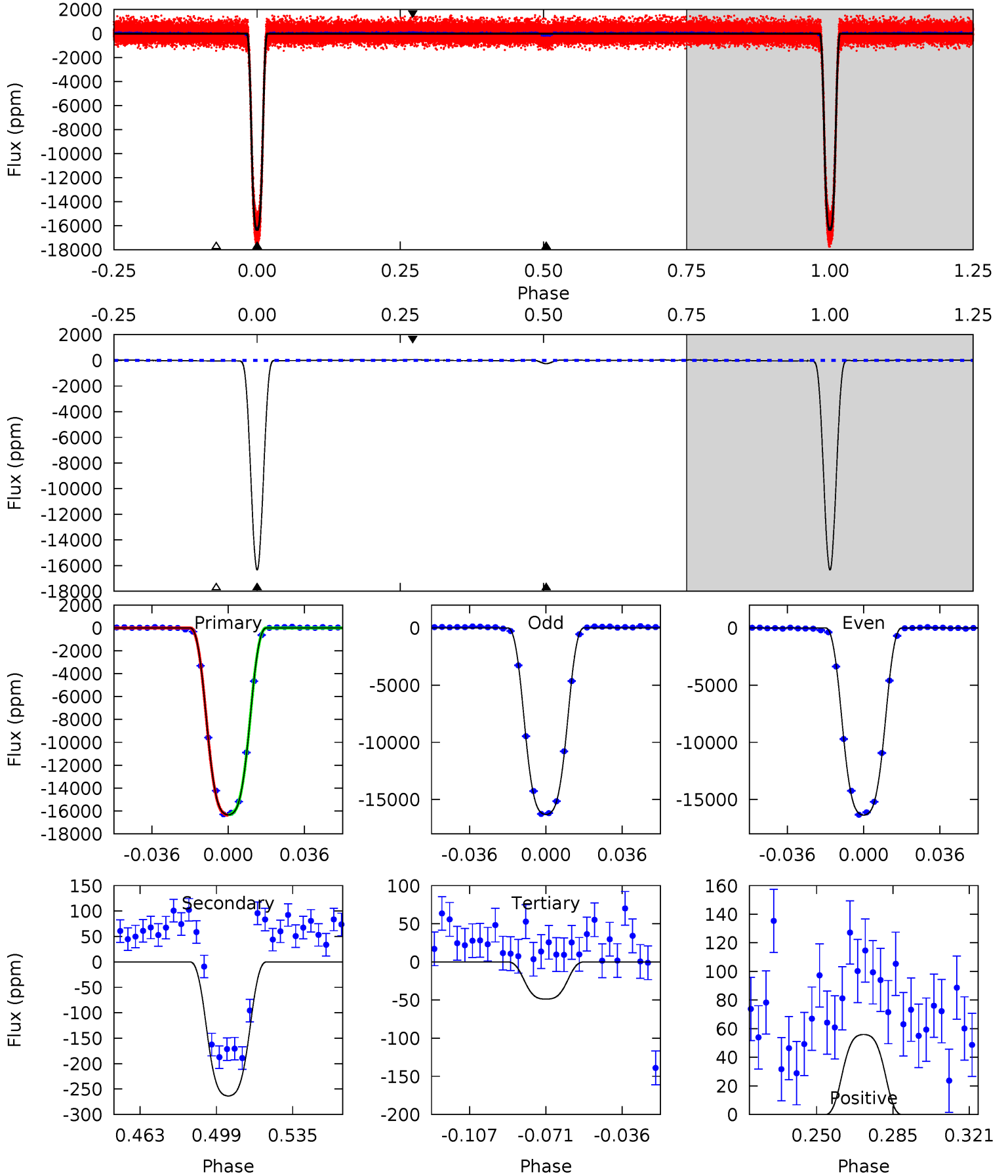
TCE 010904857-01   P= 3.120826 Days    $T_0=133.225286$  (BKJD)



# DV Model-Shift Uniqueness Test

010904857-01, P = 3.120832 Days, E = 130.103168 Days

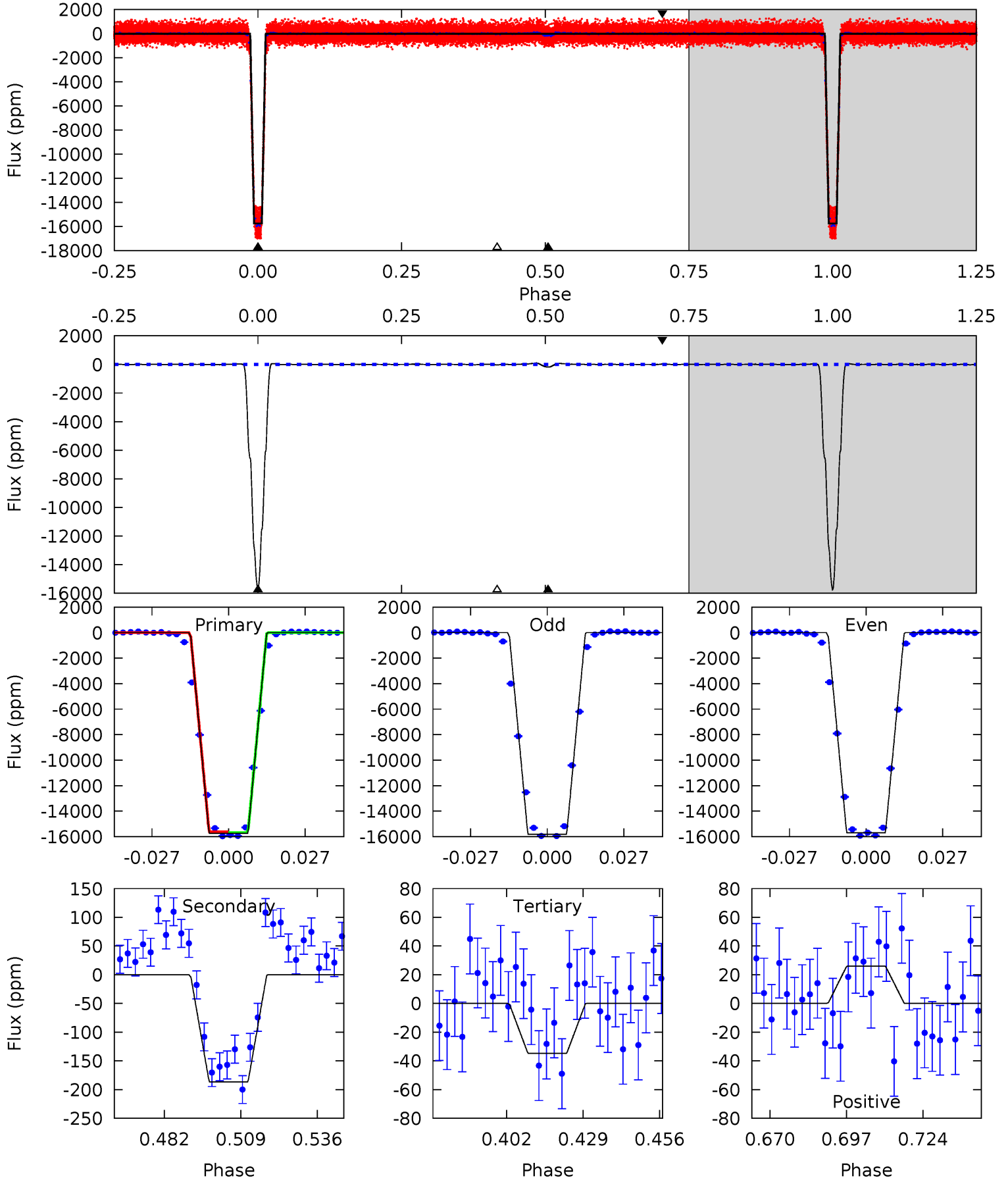
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2037	32.9	6.09	6.97	4.78	2.10	2.71	2031	2030	26.8	25.9	3.25	1.00	0.00	2.69



# Alt Model-Shift Uniqueness Test

010904857-01, P = 3.120826 Days, E = 130.104460 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
1697	20.1	3.74	2.79	4.83	2.21	1.46	1693	1694	16.4	17.3	5.58	1.00	0.01	0



### Stellar Parameters For KIC 010904857

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6122^{+165}_{-201}$	$4.471^{+0.052}_{-0.208}$	$-0.100^{+0.250}_{-0.350}$	$0.996^{+0.312}_{-0.104}$	$1.070^{+0.137}_{-0.137}$	$1.526^{+0.419}_{-0.790}$
	+3%/-3%	+1%/-5%	+250%/-350%	+31%/-10%	+13%/-13%	+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 010904857-01 / KOI 0194.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-264 \pm 8$	$14.60^{+2.59}_{-1.04}$	$1857^{+136}_{-87}$	$2752^{+52}_{-60}$	$1.217^{+0.165}_{-0.300}$
Alt.	$-186 \pm 9$	$14.31^{+2.24}_{-1.24}$	$1864^{+137}_{-94}$	$2614^{+62}_{-70}$	$0.898^{+0.160}_{-0.217}$

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

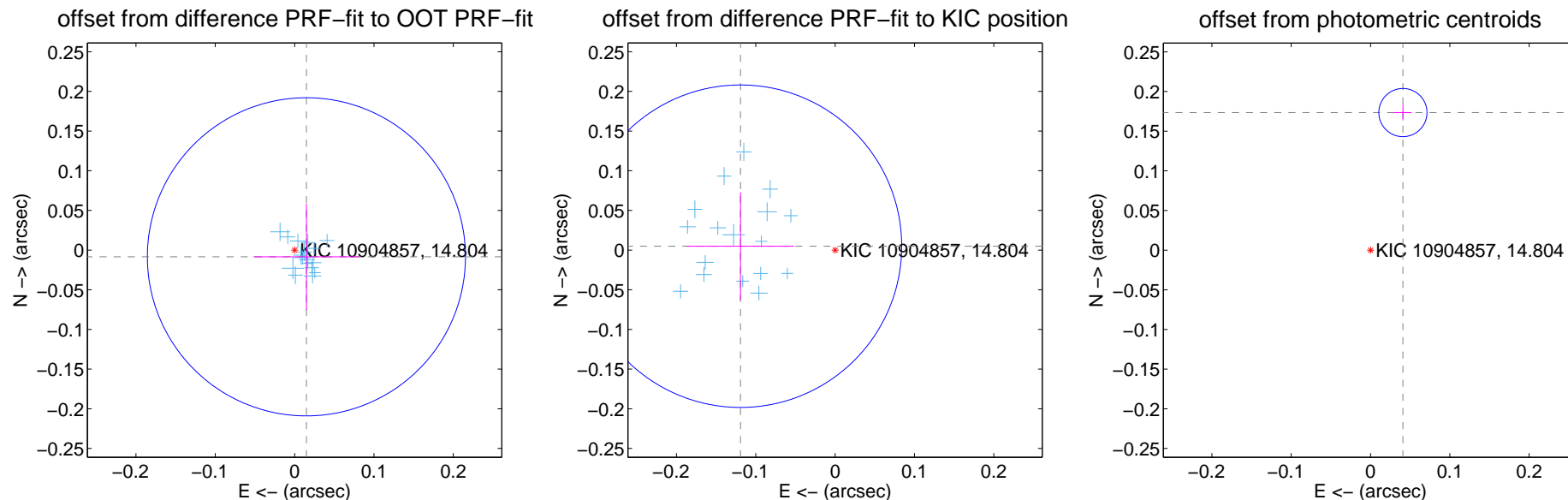
## DV Centroid Data

Supplemental centroid analysis for 010904857-01. Kepler magnitude: 14.80. Transit SNR 954.06

There are 17 quarters with good PRF difference image offsets

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

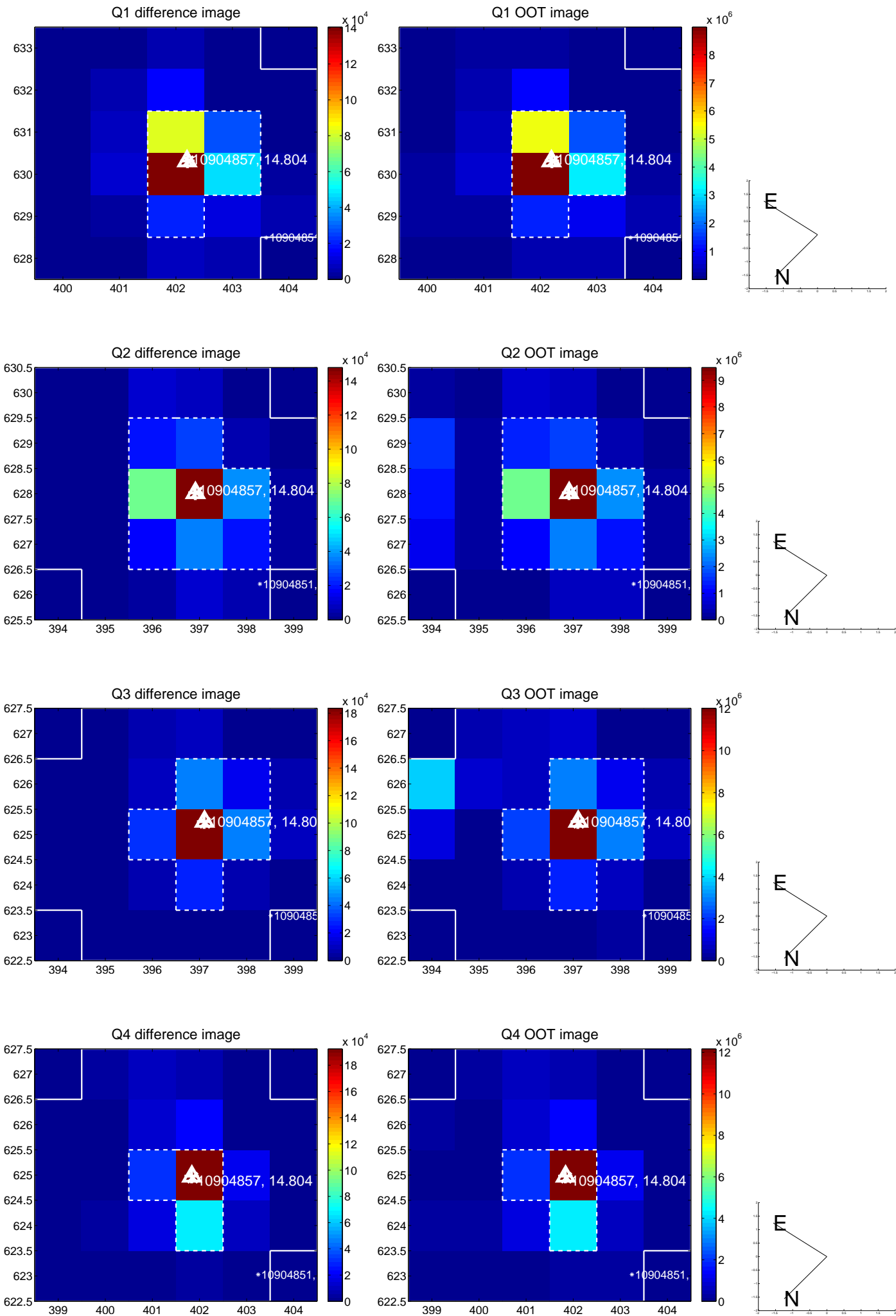
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.017 \pm 0.067$	0.26	$-0.015 \pm 0.067$	$-0.008 \pm 0.067$
PRF-fit source offset from KIC position	$0.119 \pm 0.068$	1.76	$0.119 \pm 0.068$	$0.005 \pm 0.068$
photometric centroid source offset	$0.18 \pm 0.01$	17.60	$-0.04 \pm 0.01$	$0.17 \pm 0.01$



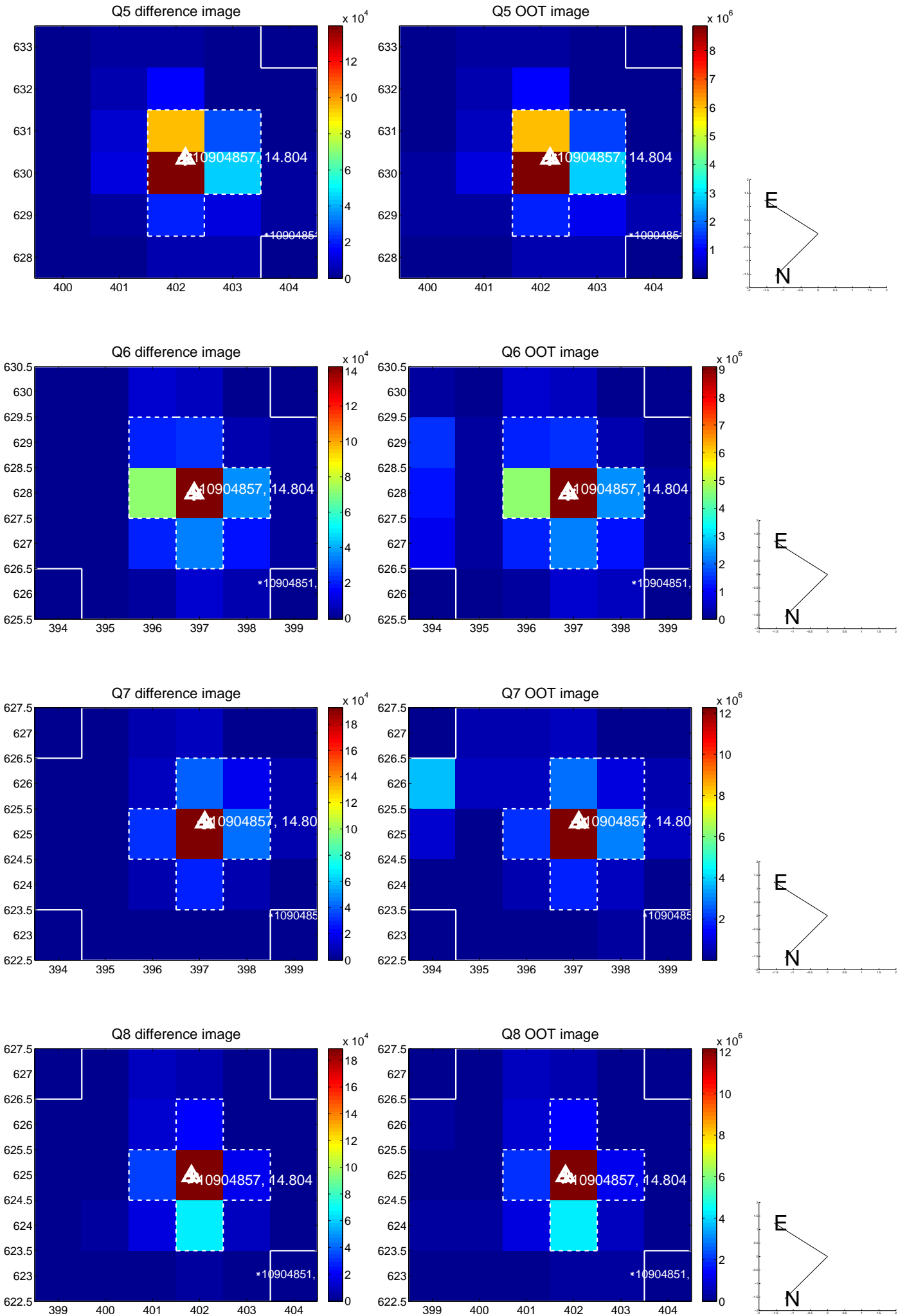
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



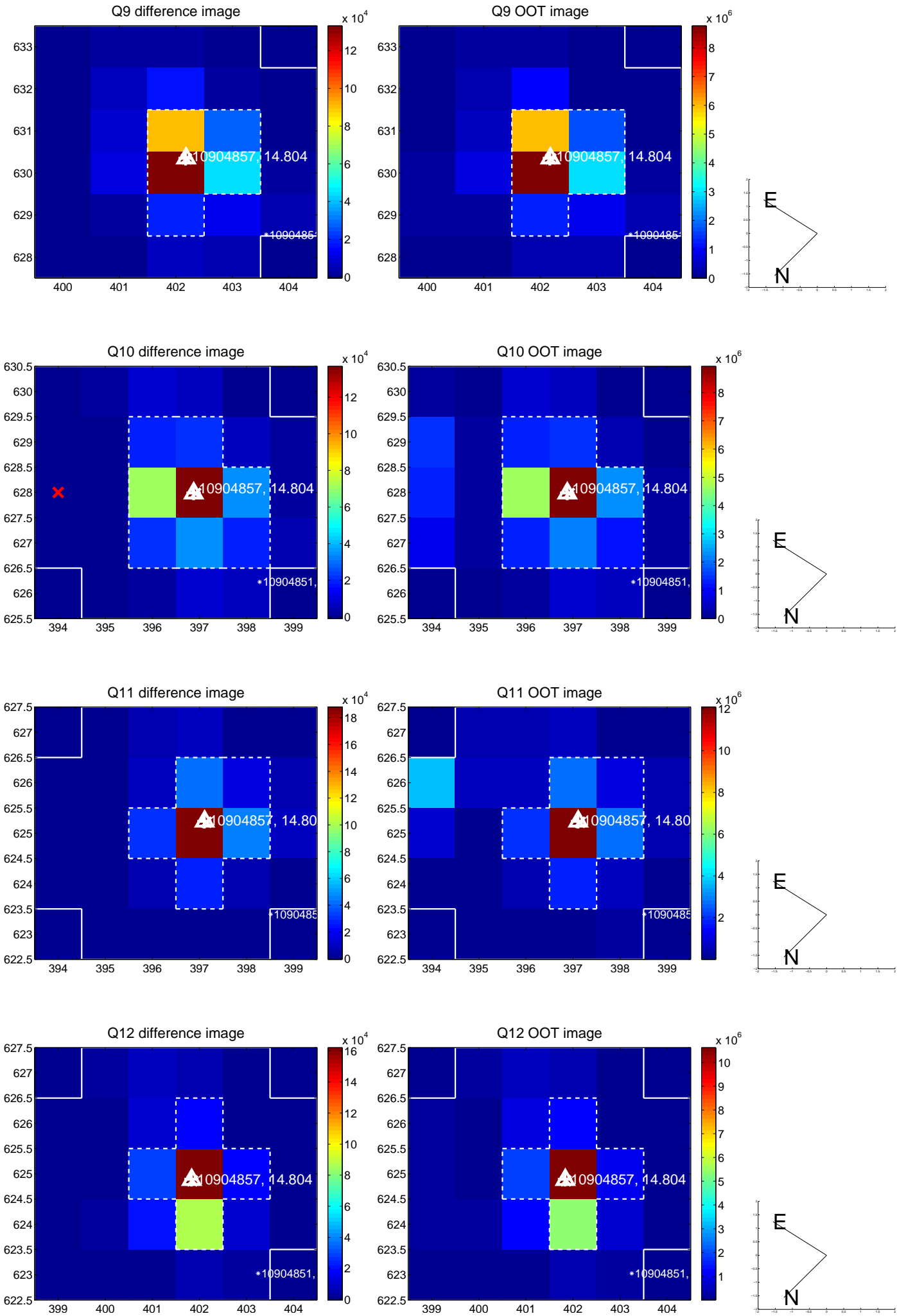
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



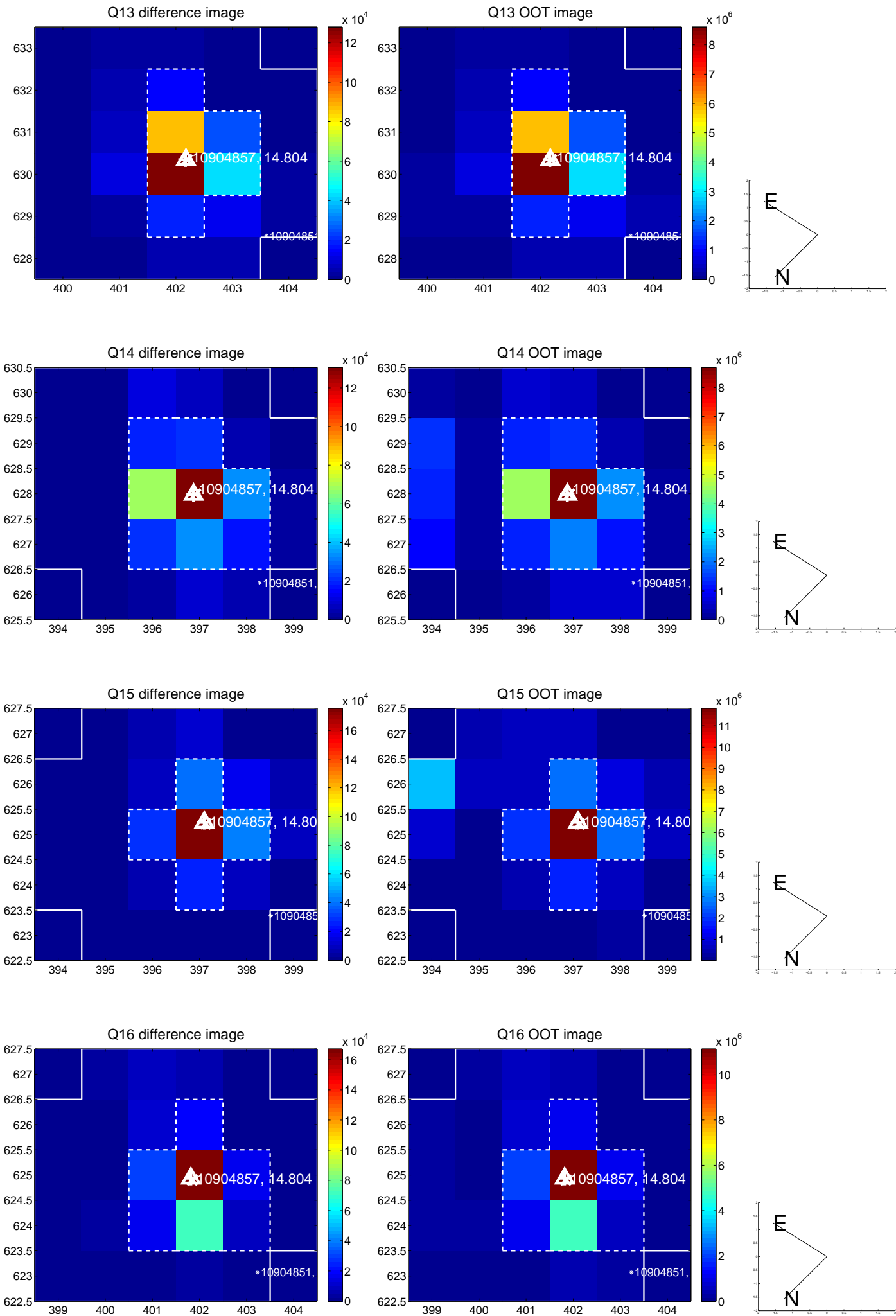
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



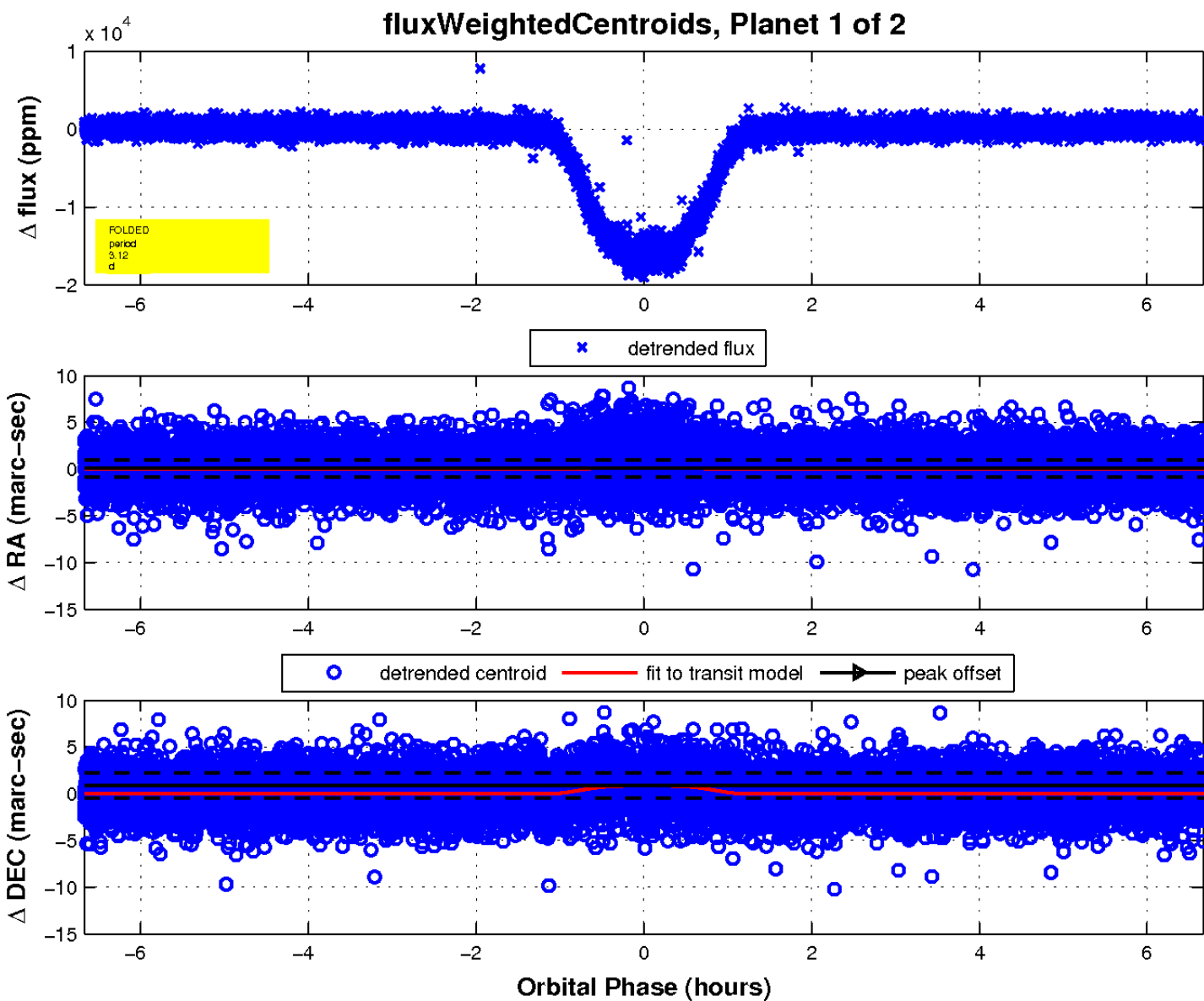
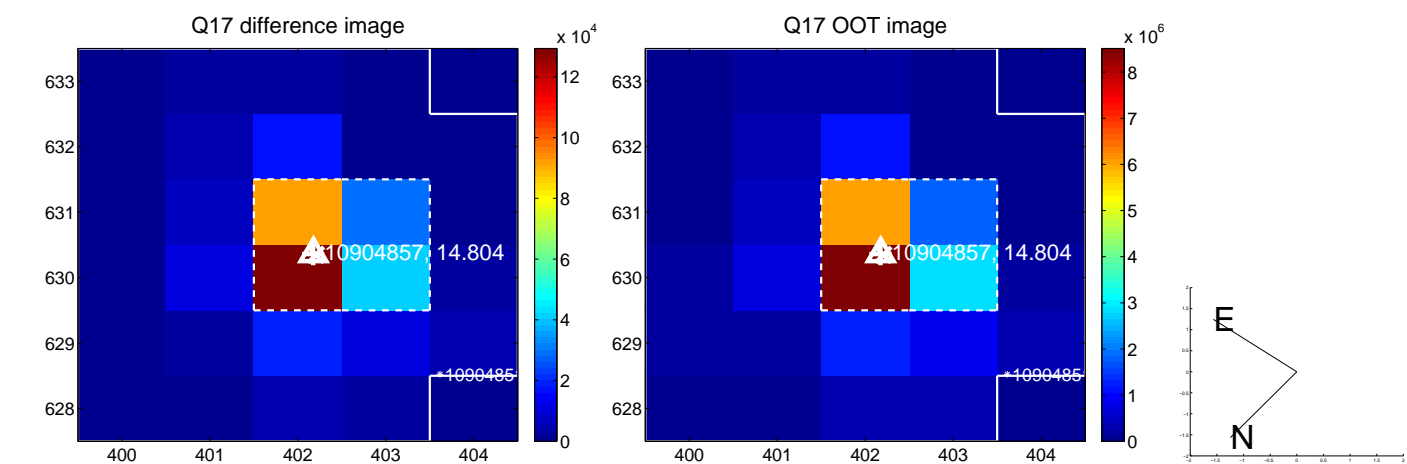
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

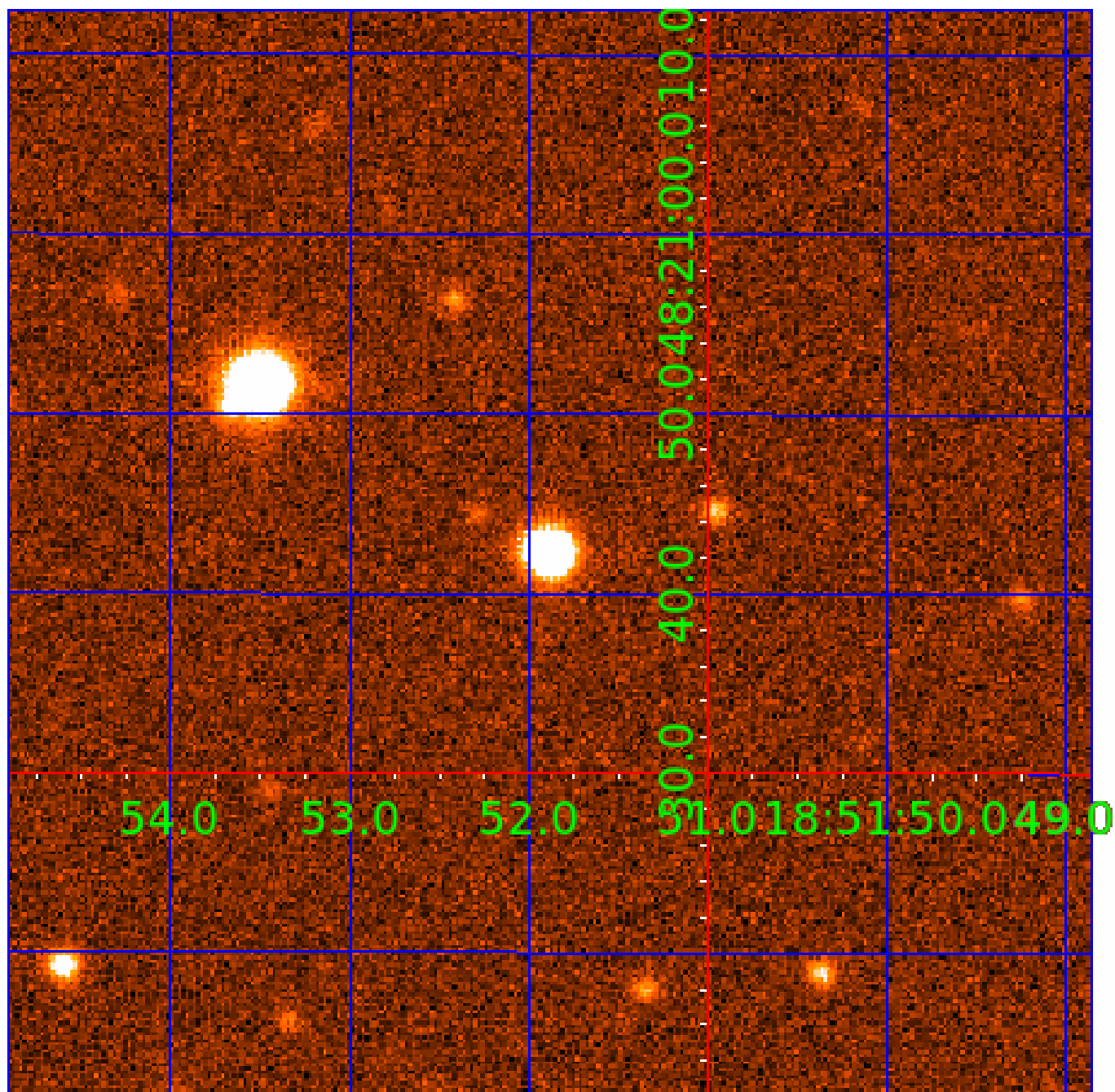


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 010904857

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010904857-01	OBS	0194.01	3.120832	133.224000	16370.1	2.224	1089.1	954.1	1.00	6122	14.29	682.78
010904857-02	OBS	No	3.120838	131.675928	299.6	1.880	19.1	21.7	1.00	6122	2.03	682.78

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010904857-01	OBS	PC	0.80	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—PLANET_OCCULT_ALT—HAS_SEC_TCE
010904857-02	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.

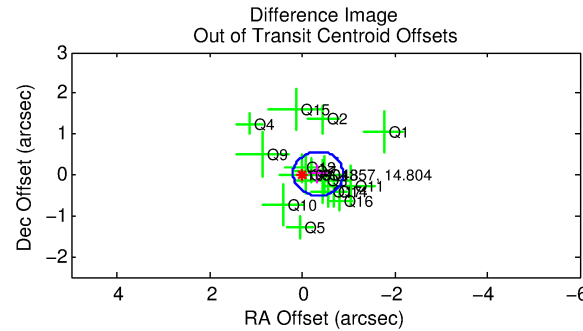
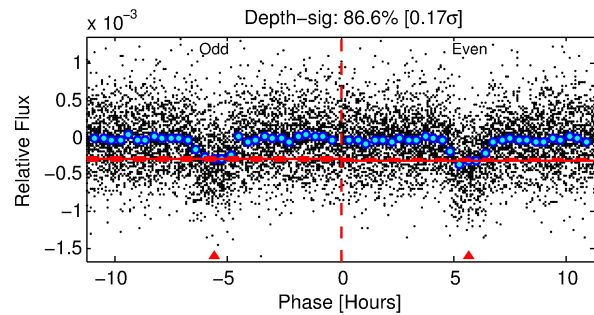
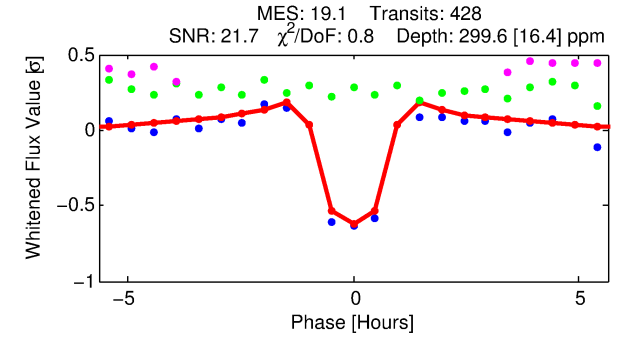
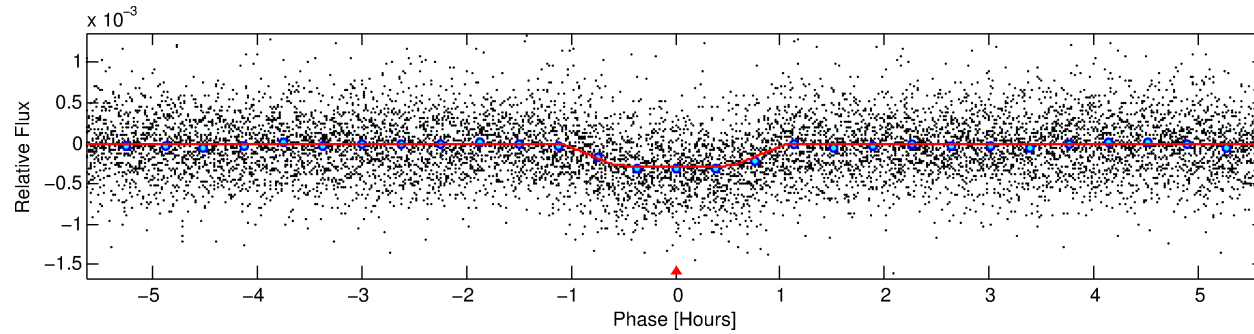
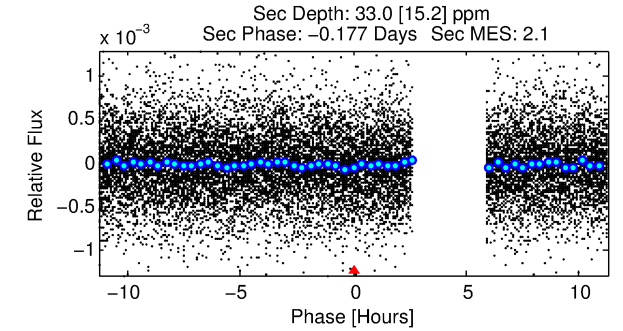
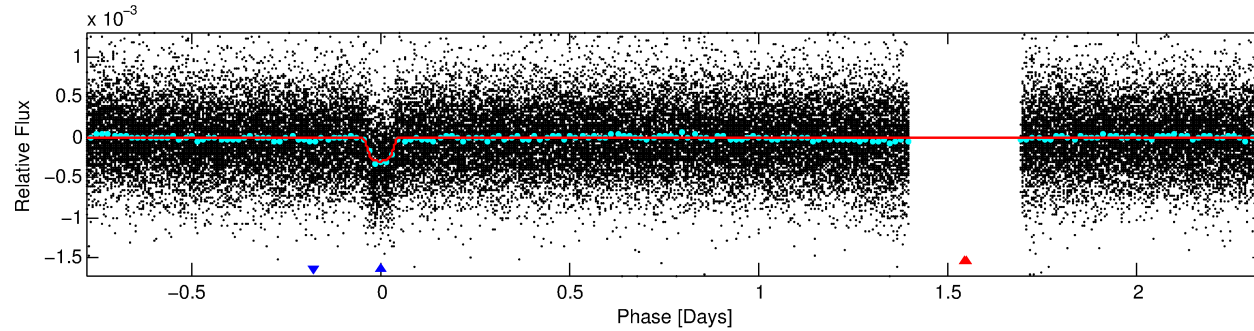
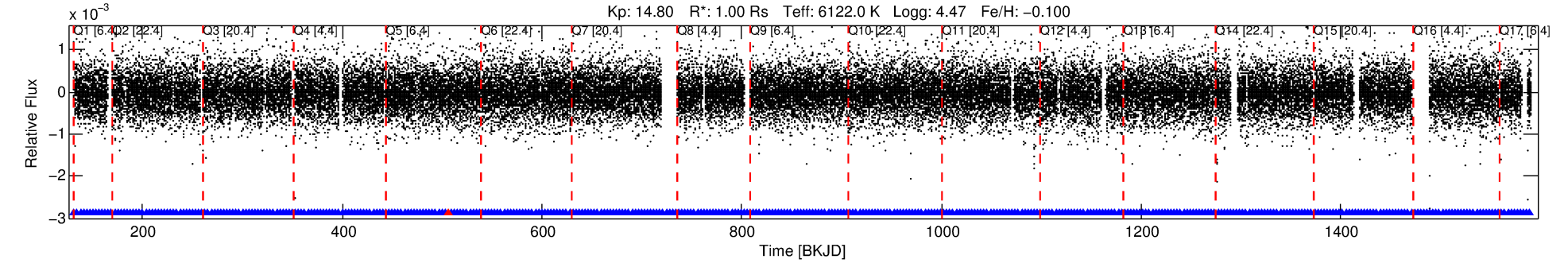
## Ephemeris Match Information For 010904857-02

No Significant Match Found

# DV One-Page Summary

KIC: 10904857 Candidate: 2 of 2 Period: 3.121 d

KOI: K00194 Corr: No Ephemeris Match



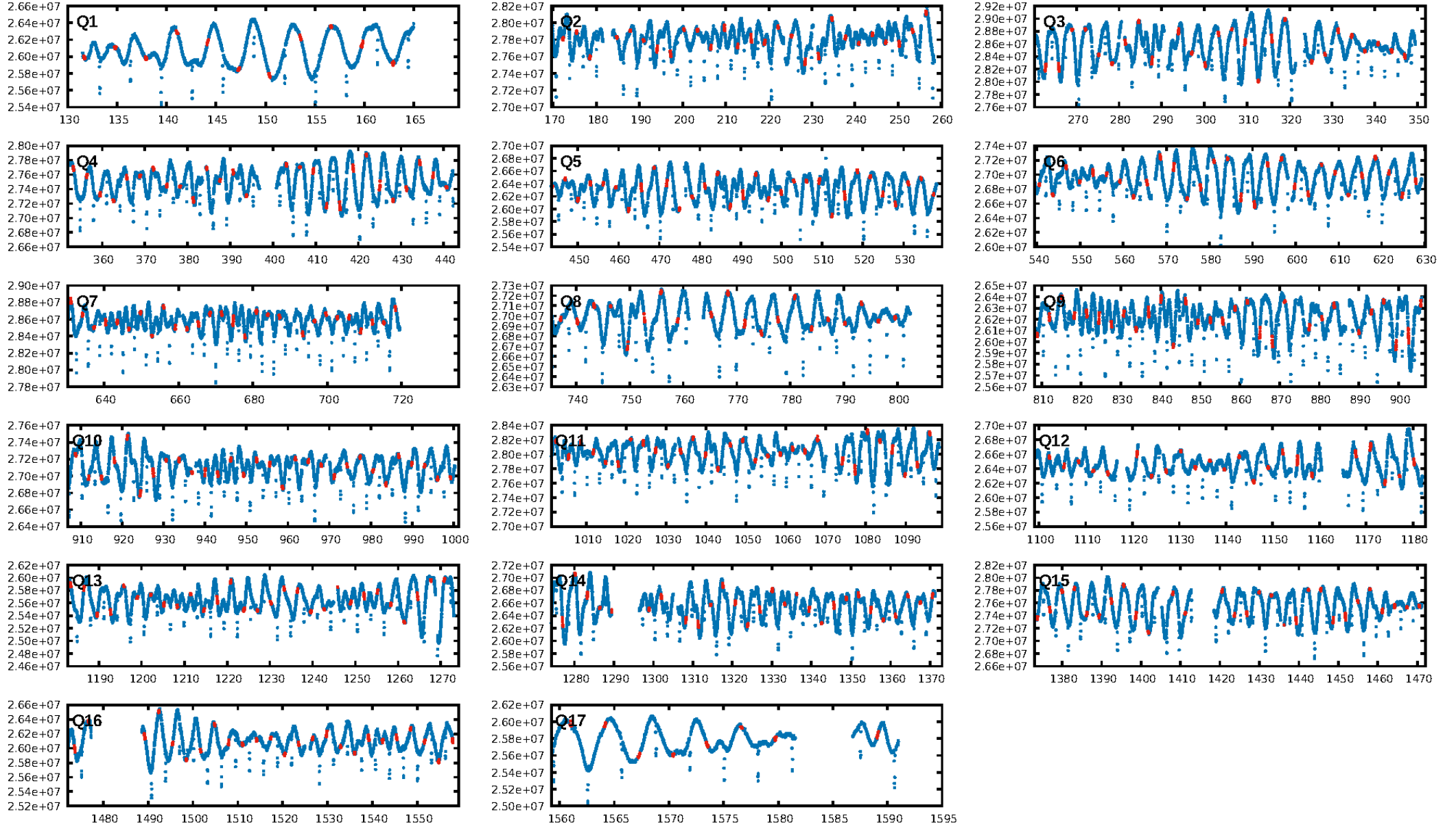
## DV Fit Results:

Period = 3.12084 [0.00001] d  
Epoch = 131.6759 [0.0012] BKJD  
Rp/R\* = 0.0187 [0.0040]  
a/R\* = 6.14 [6.57]  
b = 0.90 [0.24]  
Seff = 682.78 [275.50]  
Teff = 1303 [131] K  
Rp = 2.03 [0.77] Re  
a = 0.0428 [0.0112] AU  
Ag = 8.04 [5.90] [1.19σ]  
Teffp = 3393 [544] K [3.74σ]

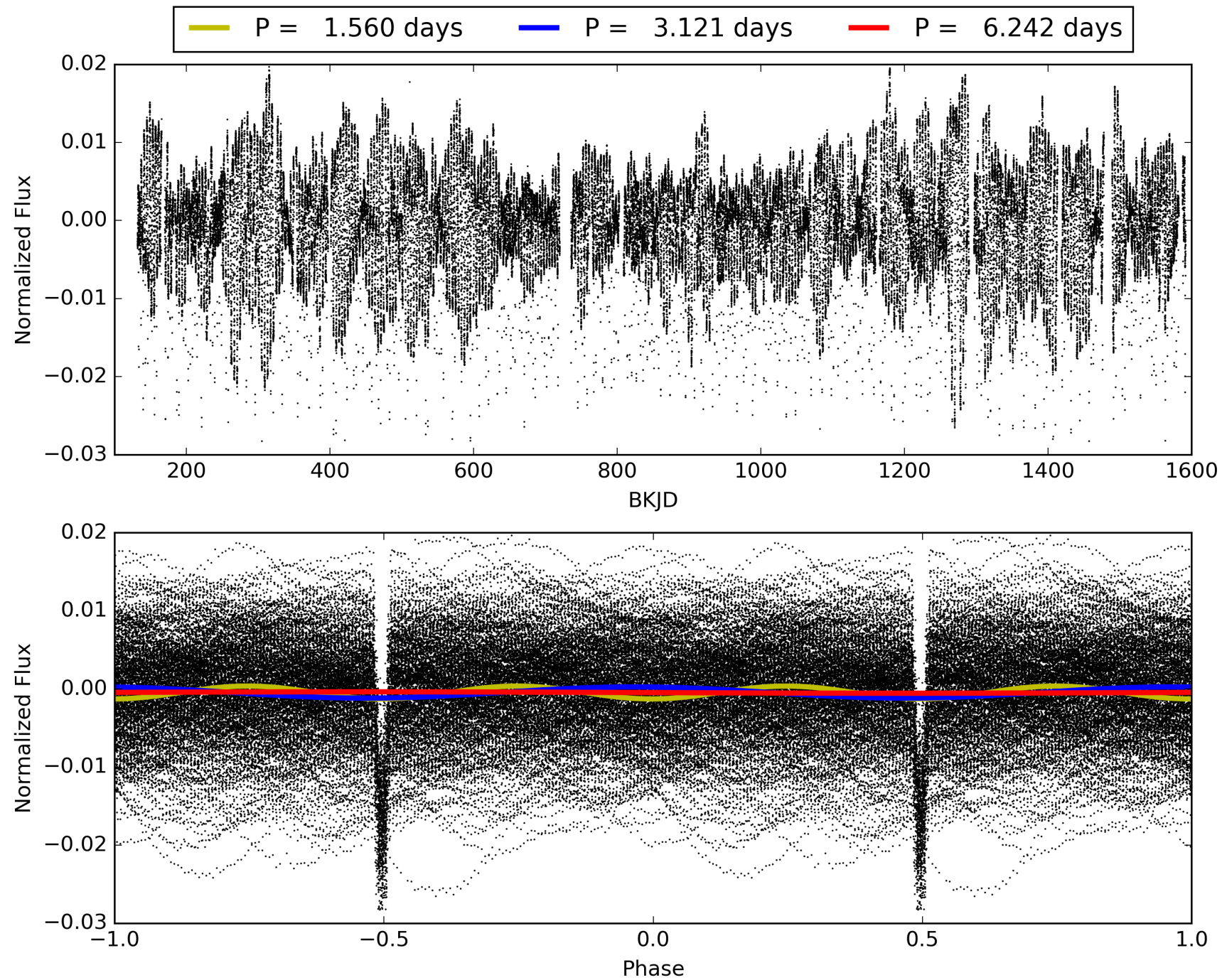
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.96e-75  
RollingBand-fgt: 1.00 [408/409]  
GhostDiagnostic-chr: 2.594  
Centroid-sig: 2.7%  
Centroid-so: 0.983 arcsec [1.87σ]  
OotOffset-rm: 0.339 arcsec [1.88σ]  
KicOffset-rm: 0.204 arcsec [1.10σ]  
OotOffset-st: 3/4/4/5 [16]  
KicOffset-st: 3/4/4/5 [16]  
DiffImageQuality-fgm: 0.94 [15/16]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 010904857-02, PDC Light Curves



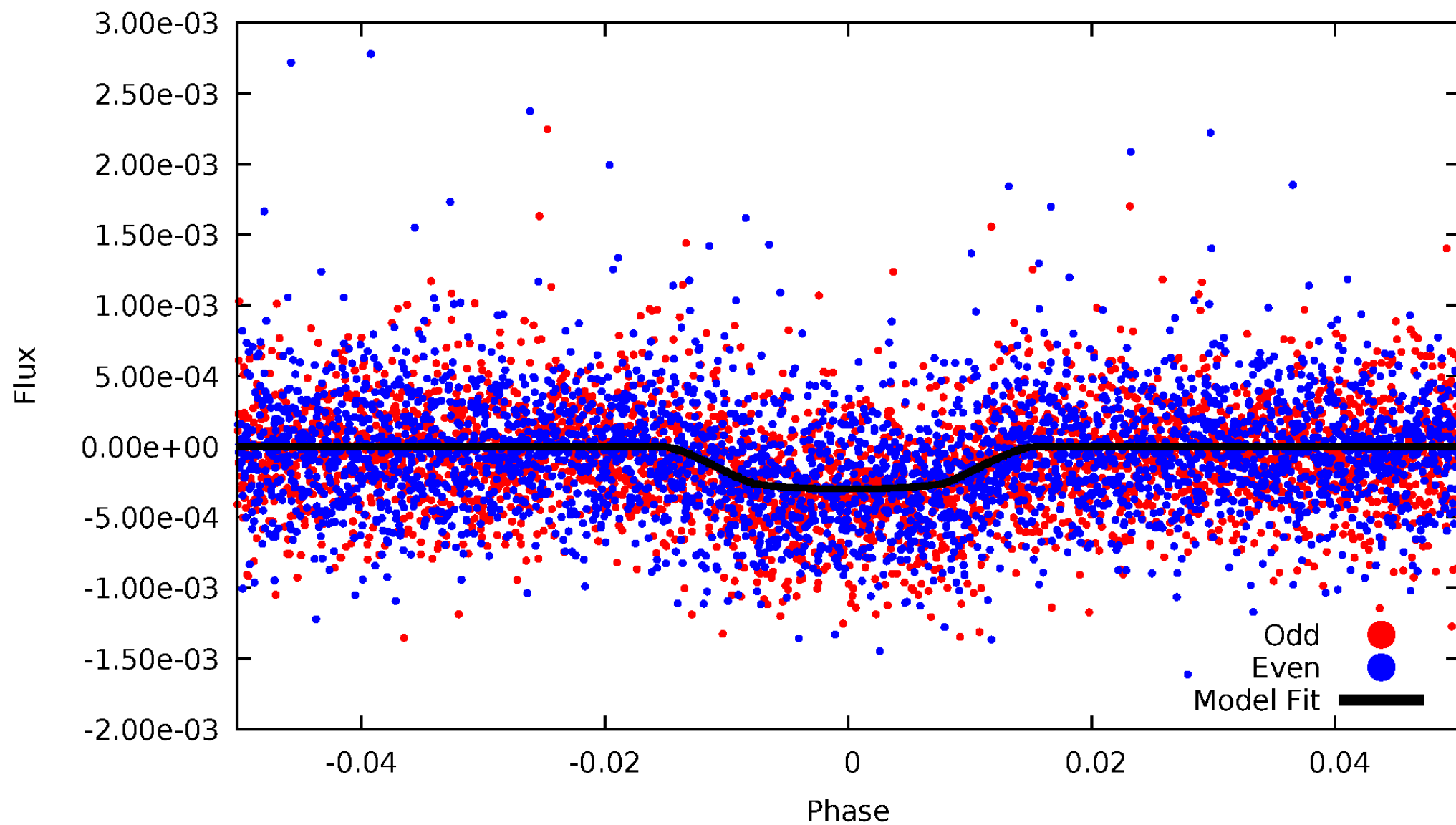
TCE 010904857-02





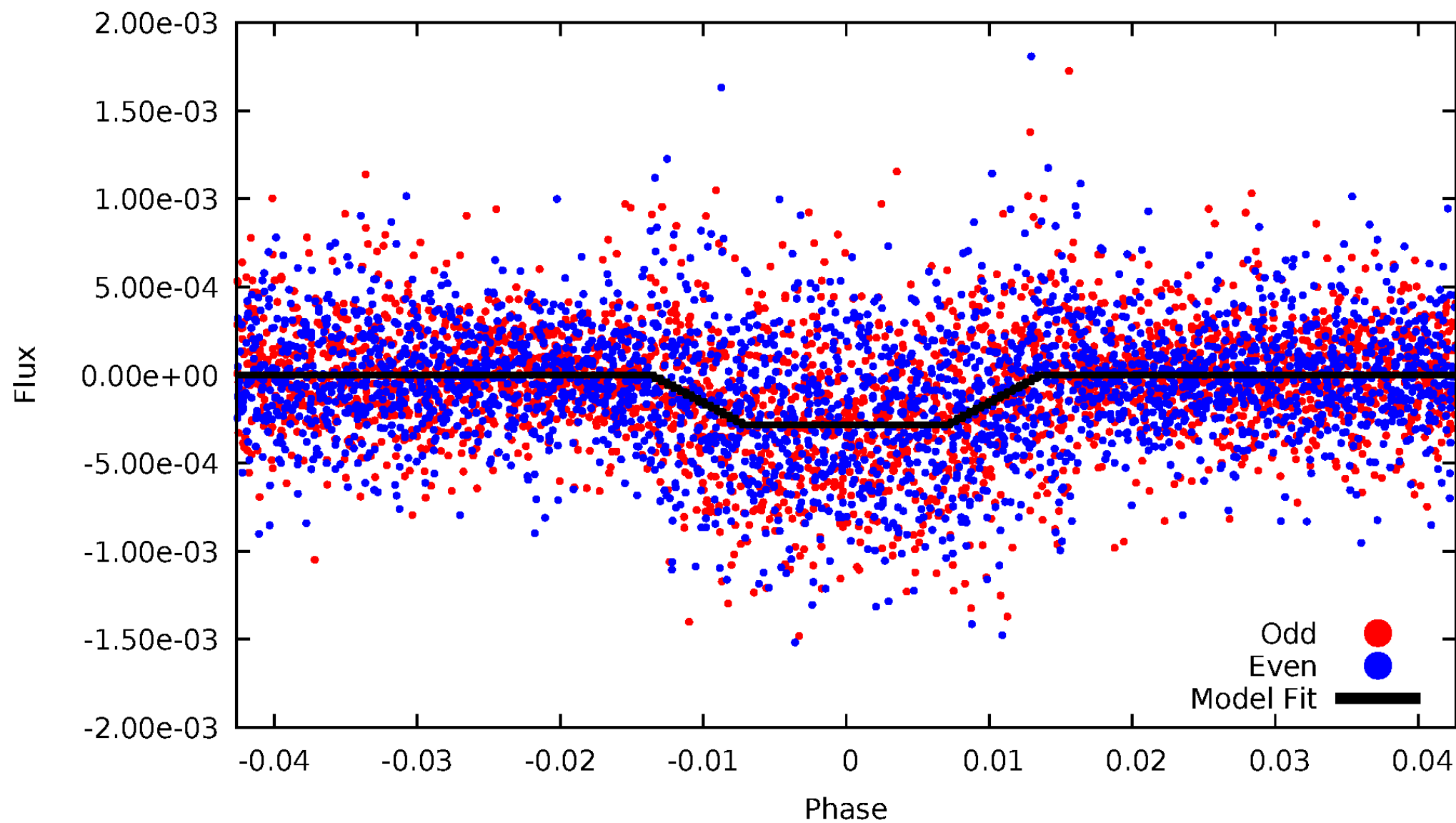
# DV Odd/Even

TCE 010904857-02



# ALT Odd/Even

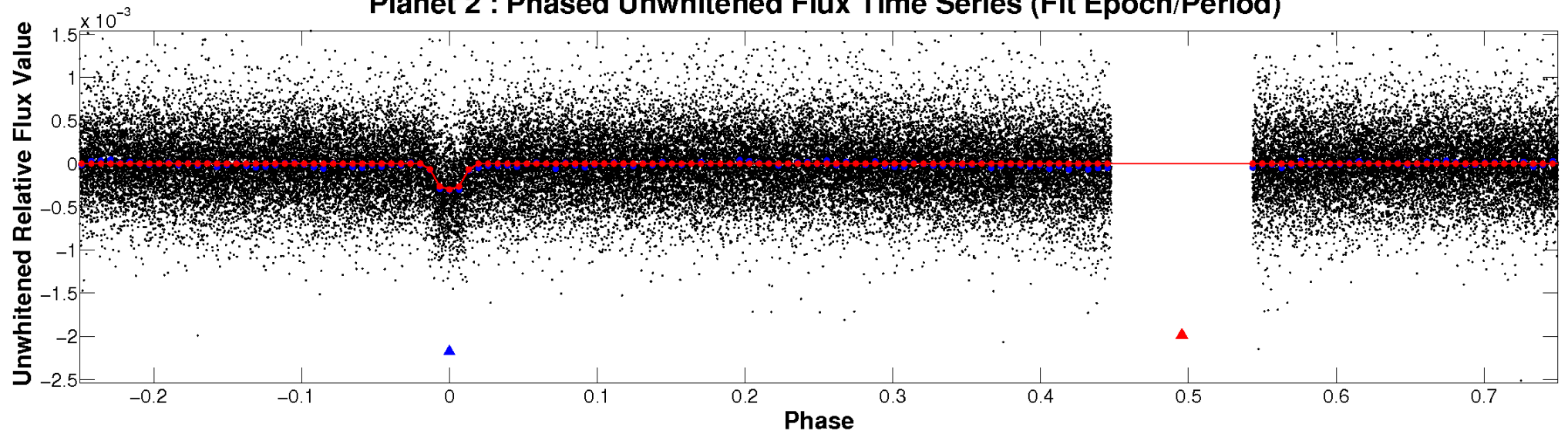
TCE 010904857-02



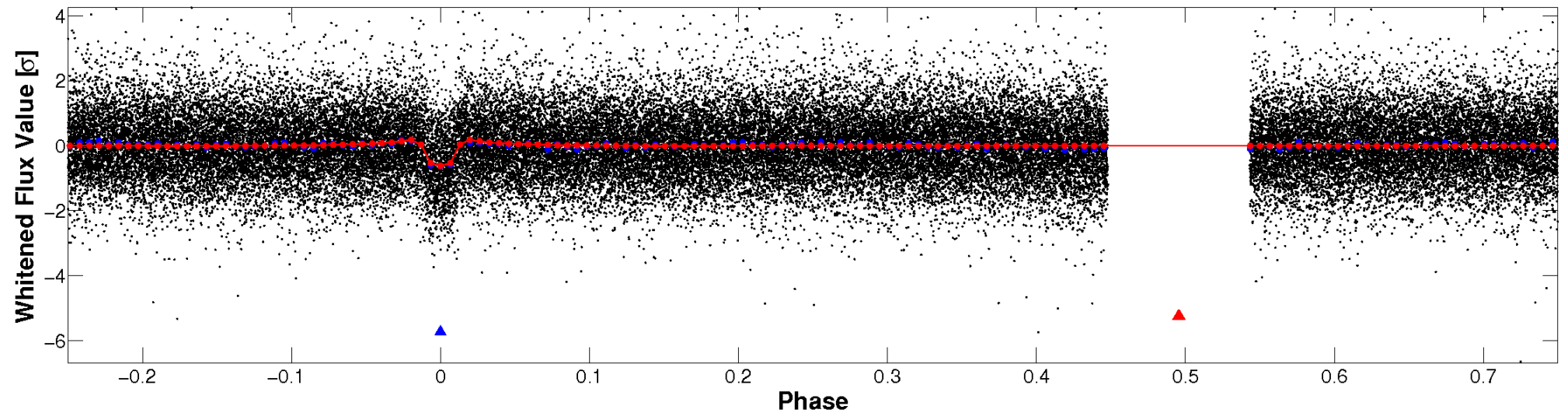


# Non-Whitened Vs. Whitened Light Curve

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

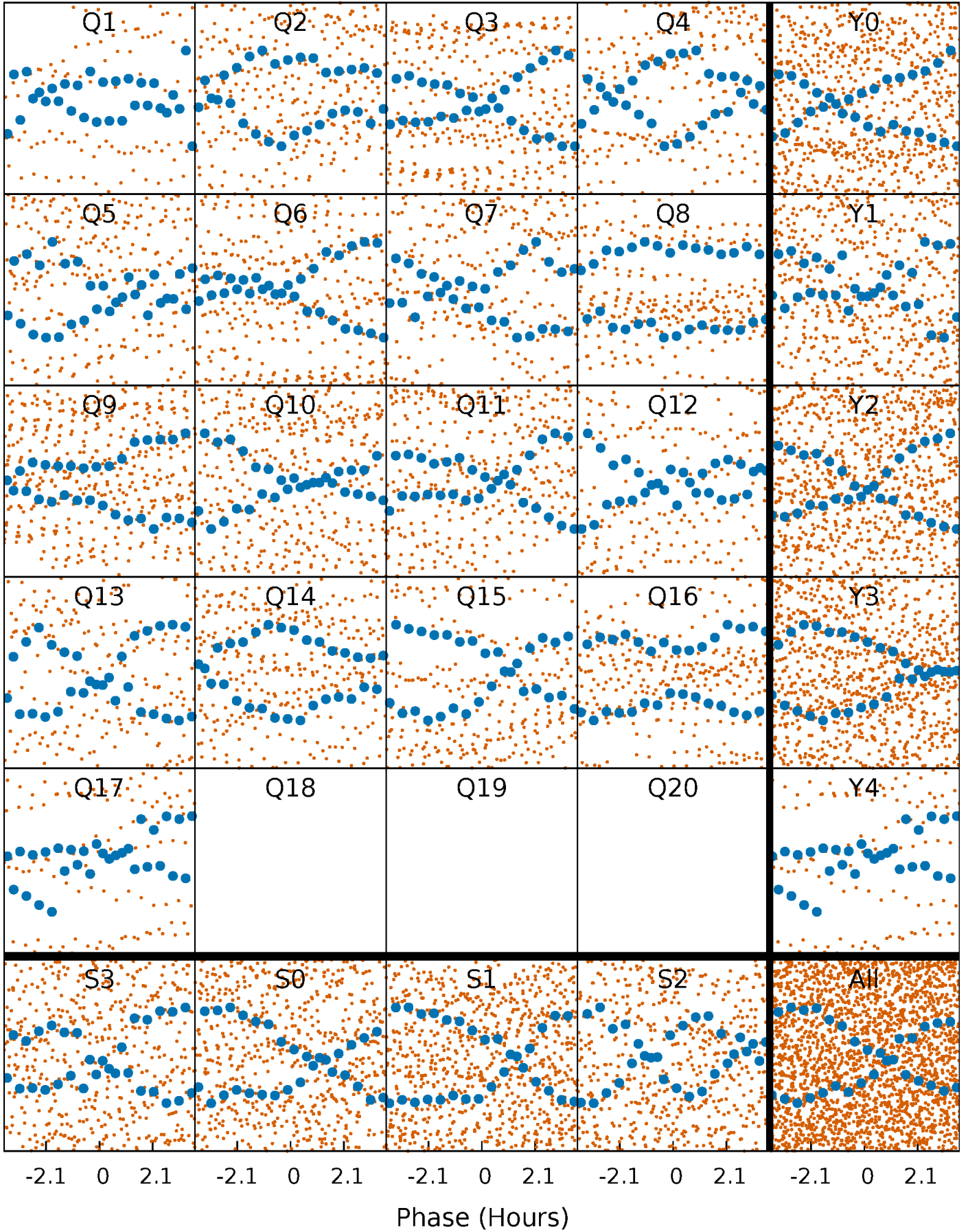


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



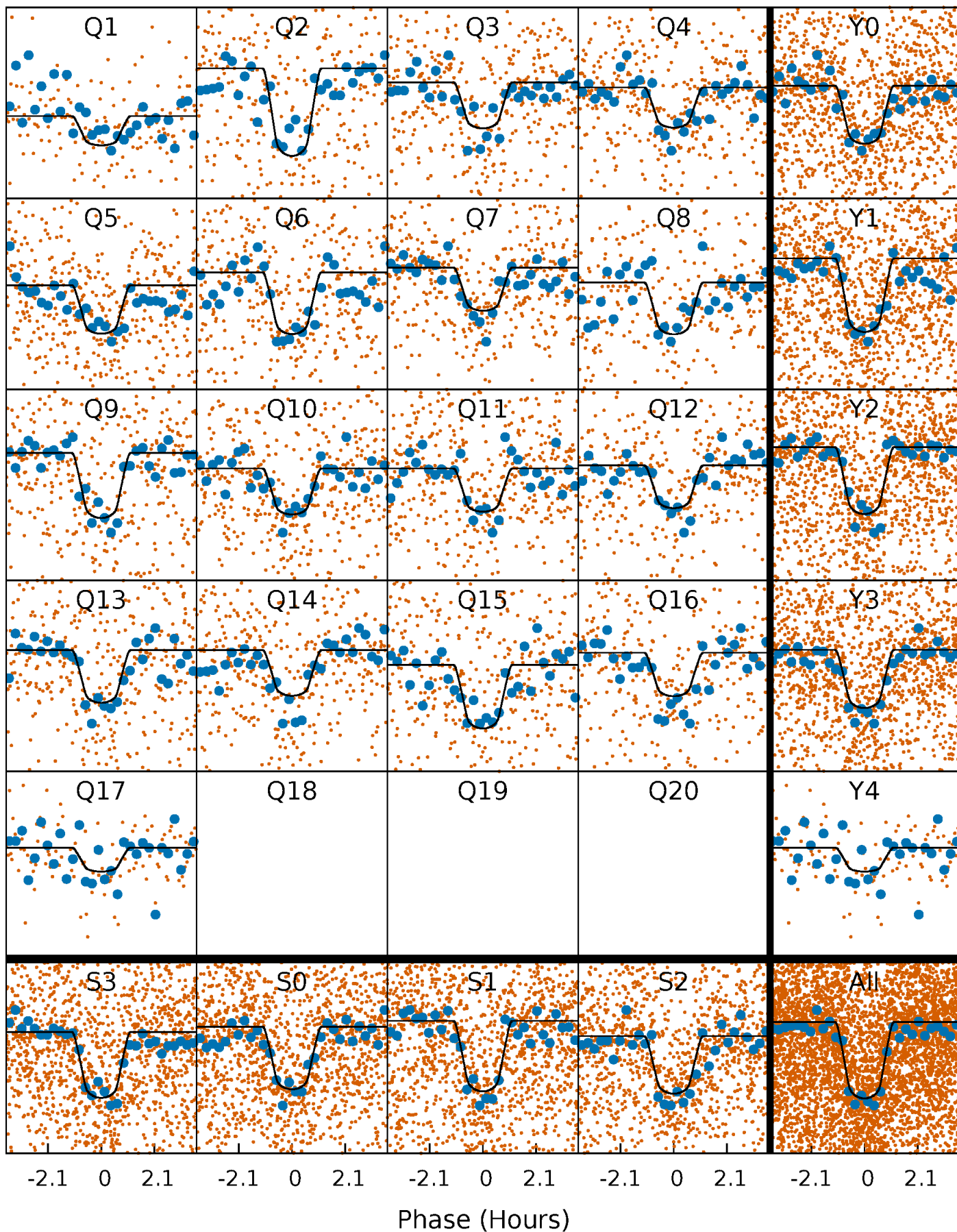
# PDC Quarter-Phased Transit Curves

TCE 010904857-02    P= 3.120838 Days     $T_0=131.675928$  (BKJD)



# DV Quarter-Phased Transit Curves

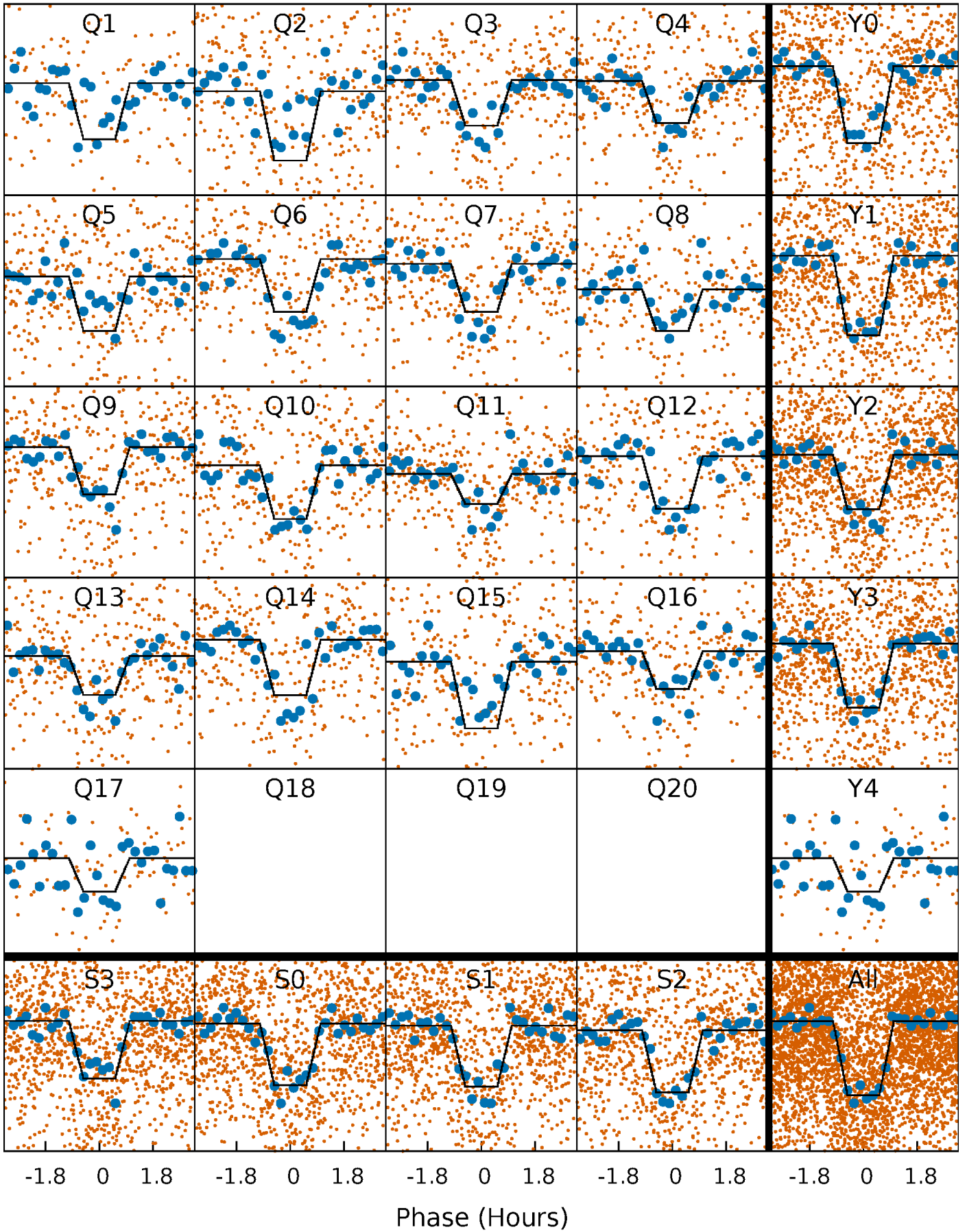
TCE 010904857-02   P= 3.120838 Days    $T_0=131.675928$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

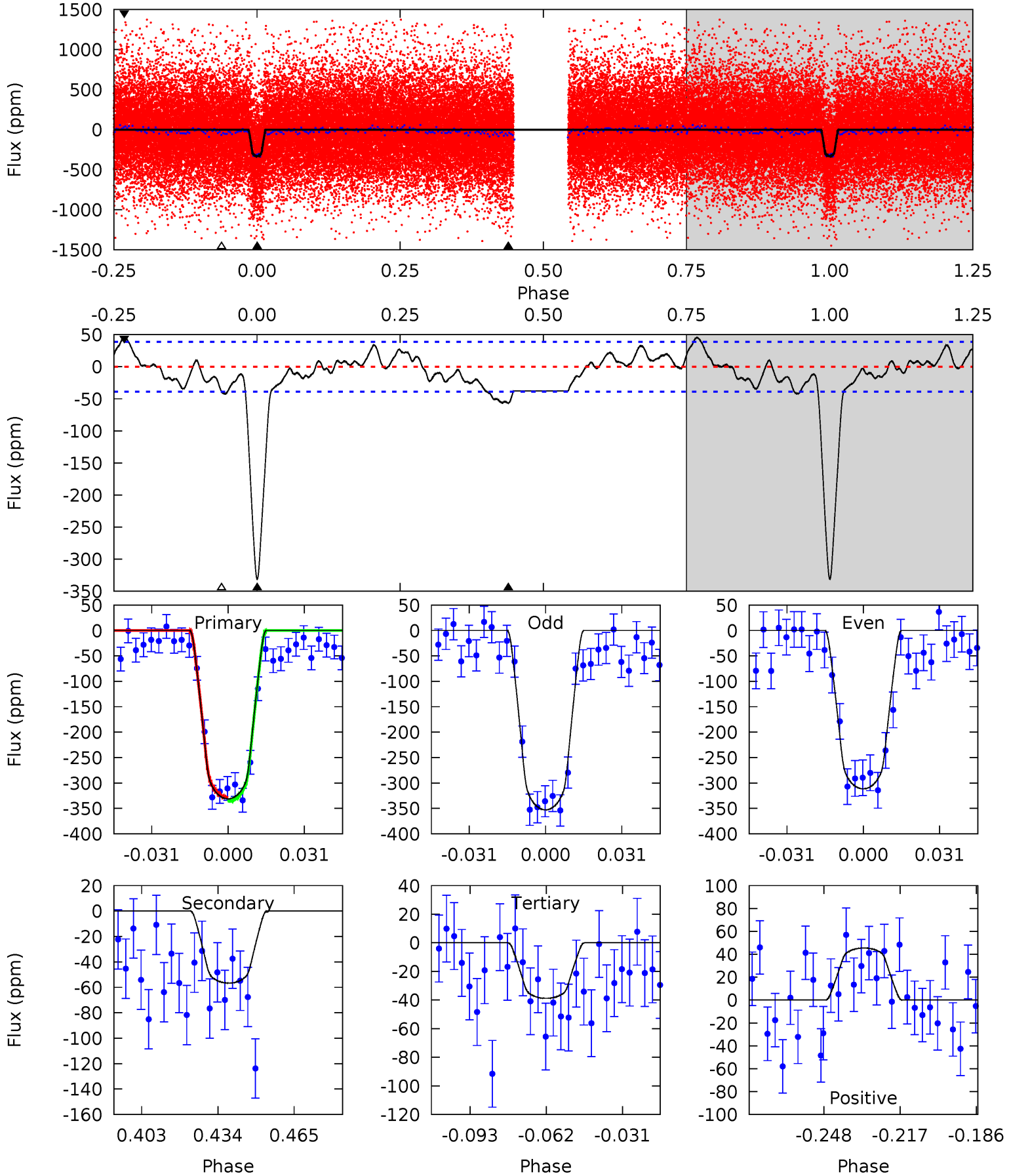
TCE 010904857-02     $P = 3.120854$  Days     $T_0 = 131.672060$  (BKJD)



# DV Model-Shift Uniqueness Test

010904857-02, P = 3.120838 Days, E = 128.555090 Days

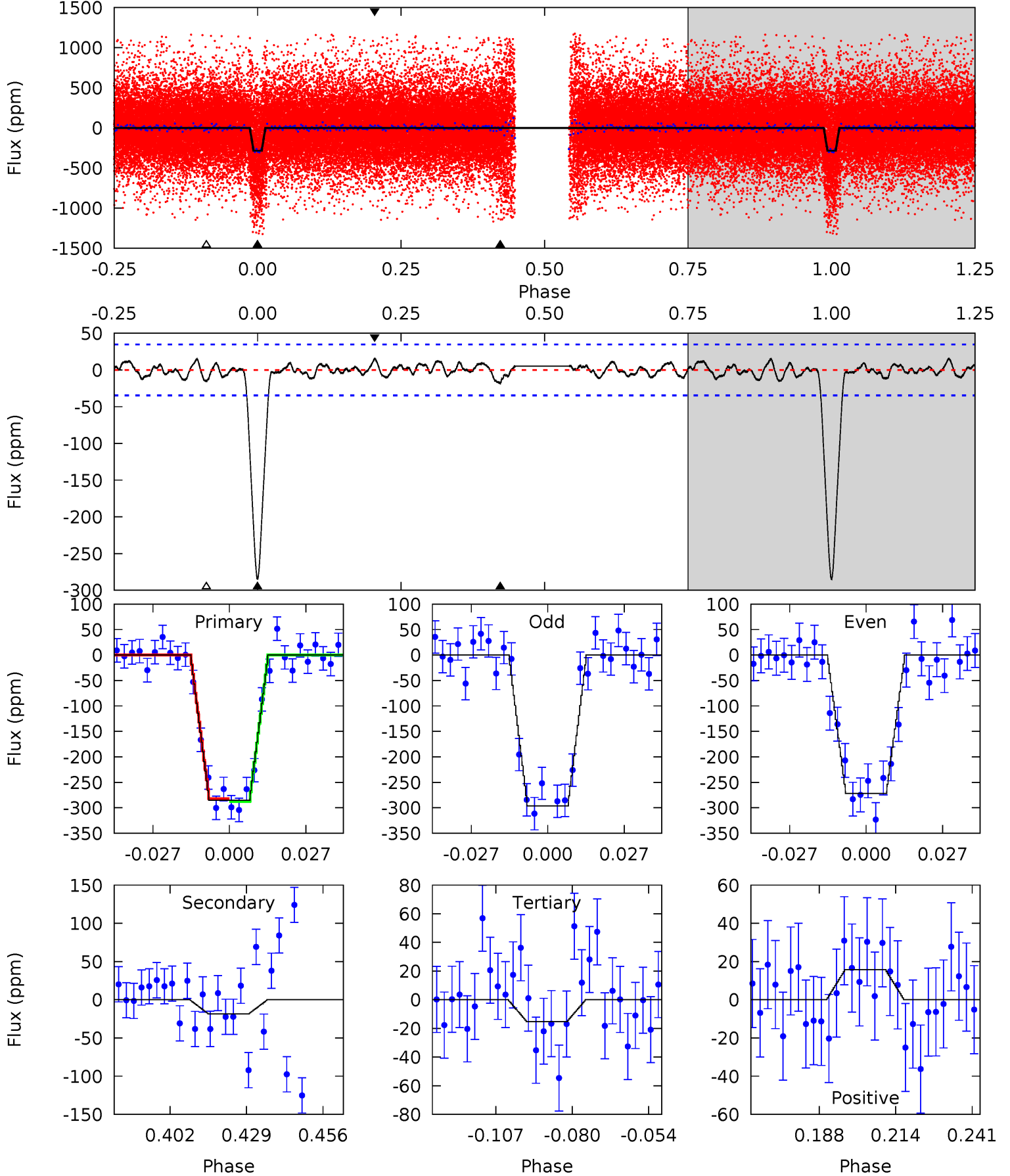
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
40.9	7.01	4.80	5.62	4.80	2.16	2.30	36.1	35.3	2.21	1.39	2.55	1.02	0.12	0.45



# Alt Model-Shift Uniqueness Test

010904857-02, P = 3.120854 Days, E = 128.551206 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
39.8	2.57	2.12	2.19	4.83	2.21	0.88	37.6	37.6	0.45	0.38	1.70	1.04	0.05	0.42





### Stellar Parameters For KIC 010904857

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6122^{+165}_{-201}$	$4.471^{+0.052}_{-0.208}$	$-0.100^{+0.250}_{-0.350}$	$0.996^{+0.312}_{-0.104}$	$1.070^{+0.137}_{-0.137}$	$1.526^{+0.419}_{-0.790}$
	+3%/-3%	+1%/-5%	+250%/-350%	+31%/-10%	+13%/-13%	+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 010904857-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-57 \pm 8$	$2.12^{+0.59}_{-0.47}$	$1857^{+133}_{-90}$	$4117^{+415}_{-313}$	$12^{+8}_{-5}$
Alt.	$-18 \pm 7$	$1.90^{+0.50}_{-0.51}$	$1864^{+125}_{-93}$	$3519^{+451}_{-342}$	$4.961^{+4.937}_{-2.336}$

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

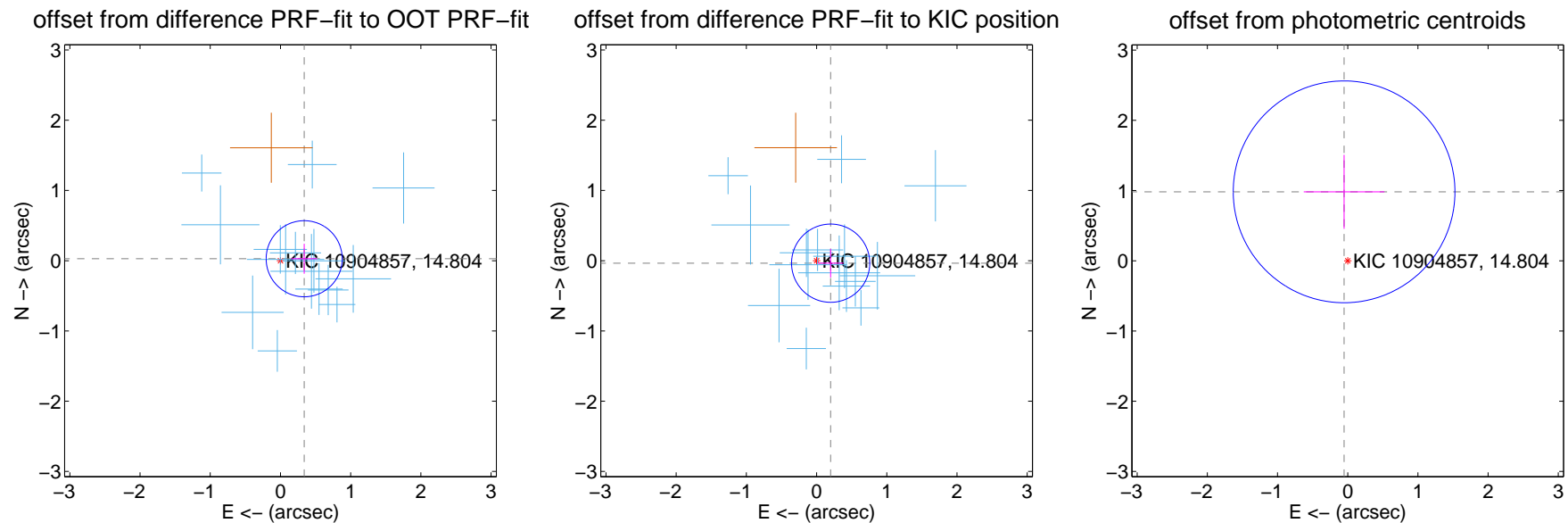
## DV Centroid Data

Supplemental centroid analysis for 010904857-02. Kepler magnitude: 14.80. Transit SNR 21.66

There are 15 quarters with good PRF difference image offsets

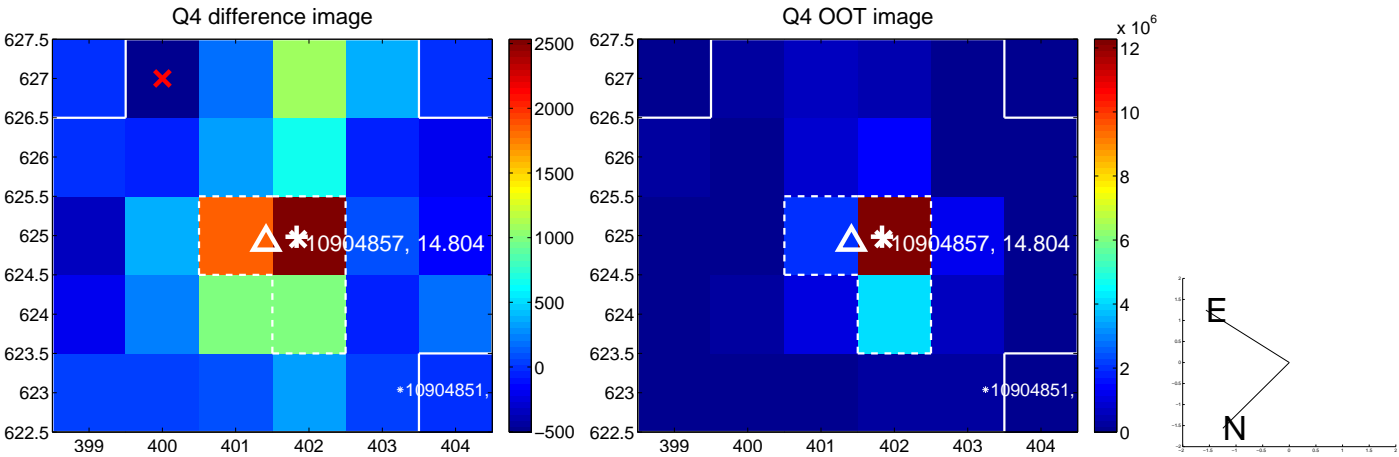
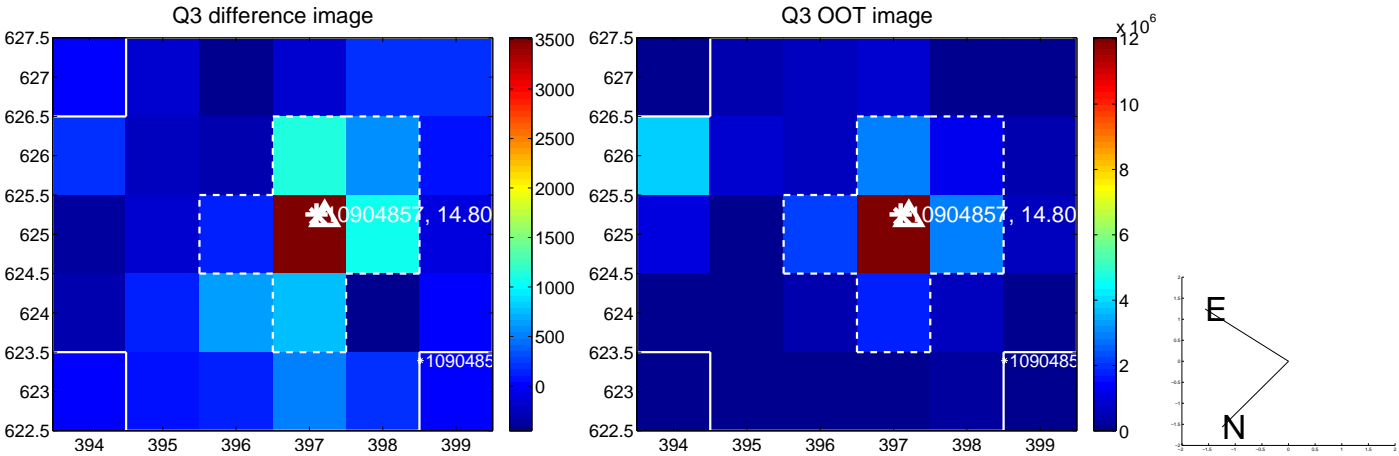
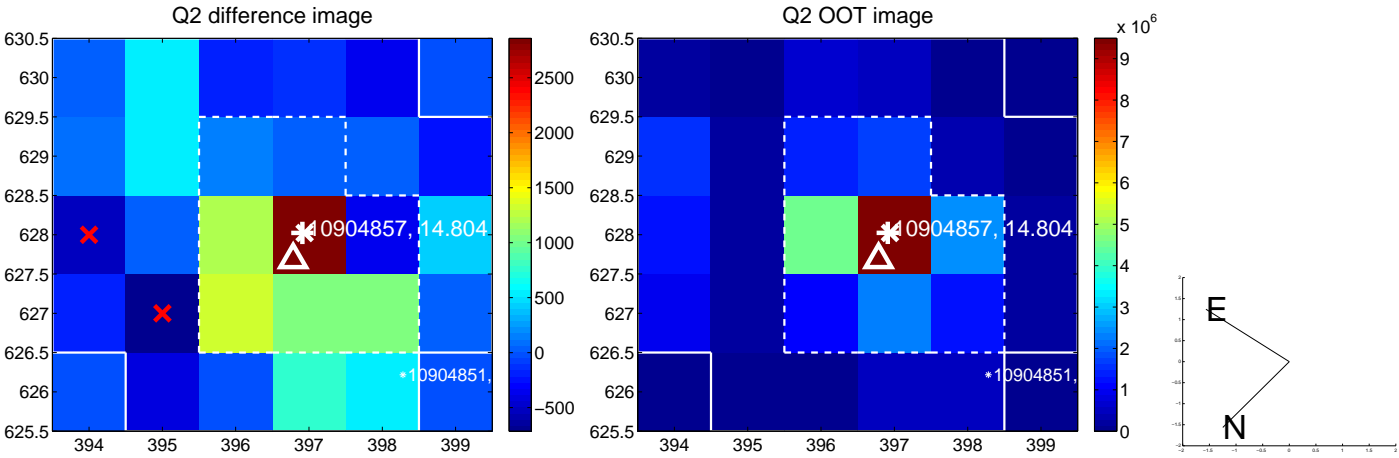
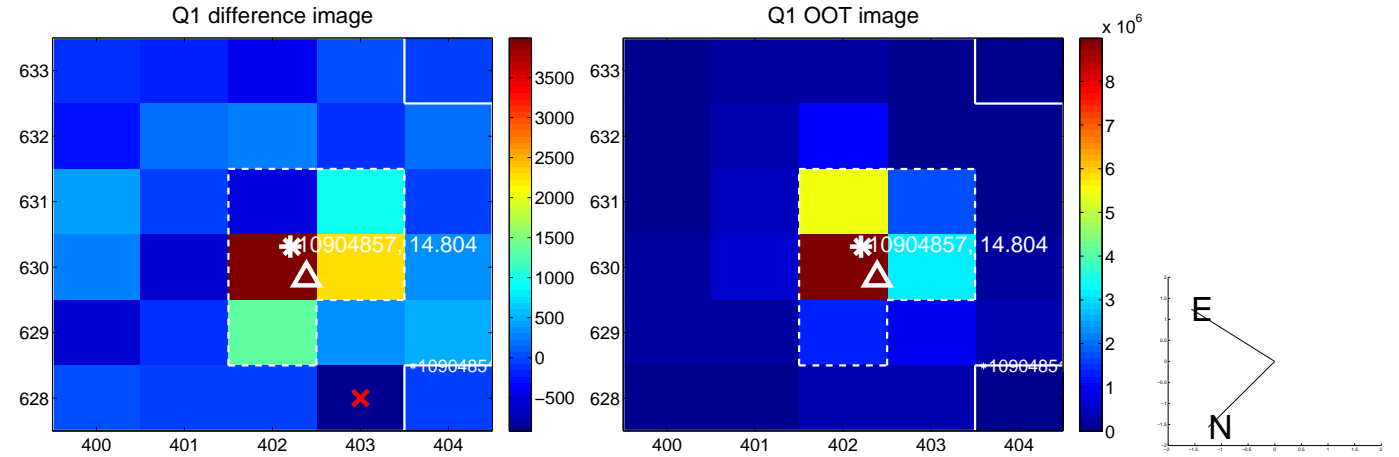
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.339 \pm 0.181$	1.88	$-0.338 \pm 0.184$	$0.028 \pm 0.213$
PRF-fit source offset from KIC position	$0.204 \pm 0.186$	1.10	$-0.201 \pm 0.181$	$-0.035 \pm 0.203$
photometric centroid source offset	$0.98 \pm 0.53$	1.87	$0.05 \pm 0.58$	$0.98 \pm 0.53$

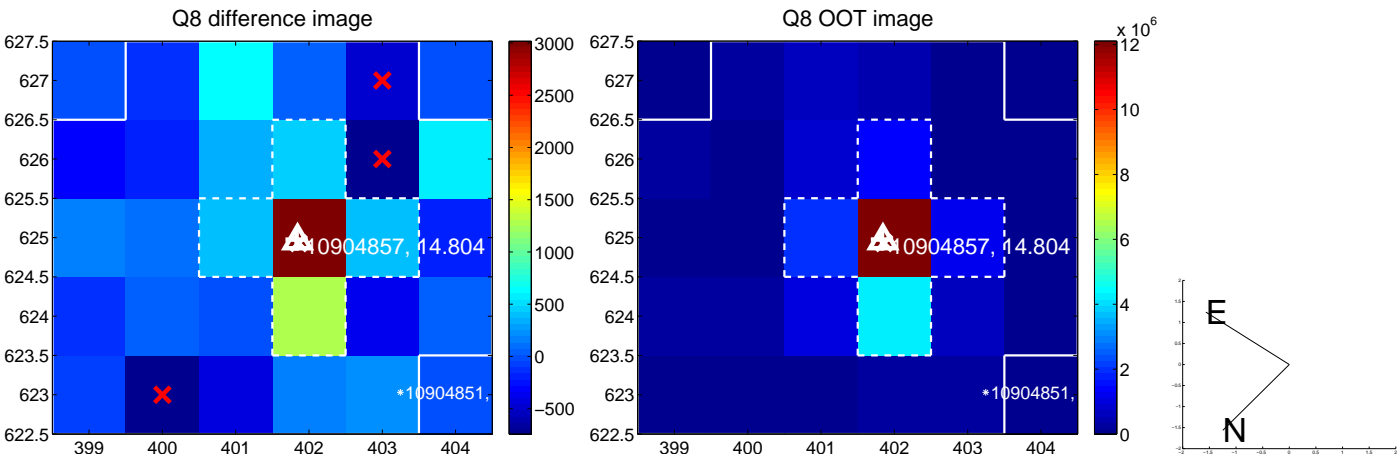
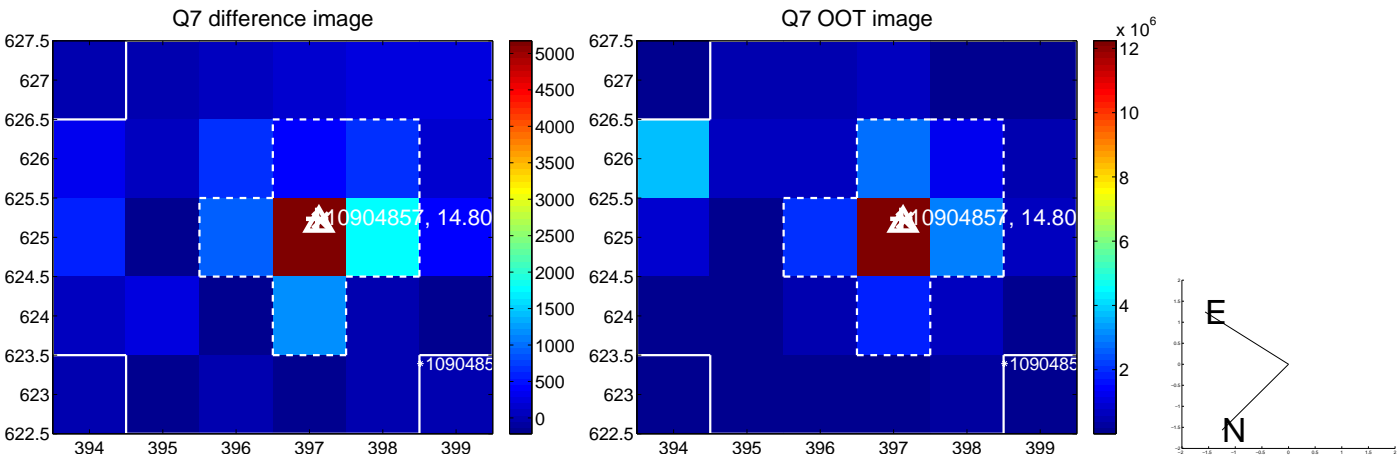
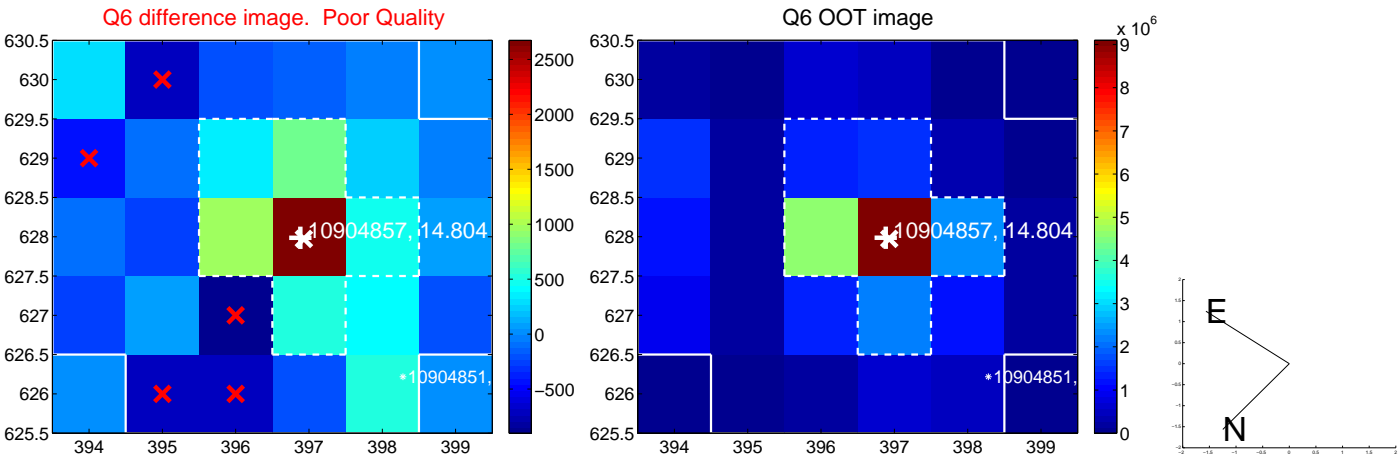
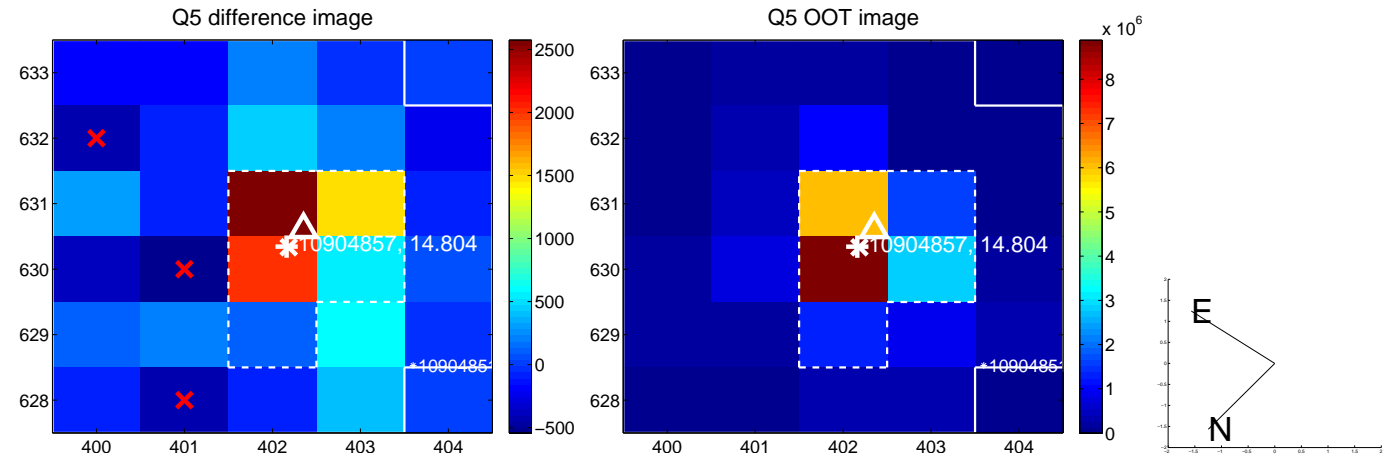


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

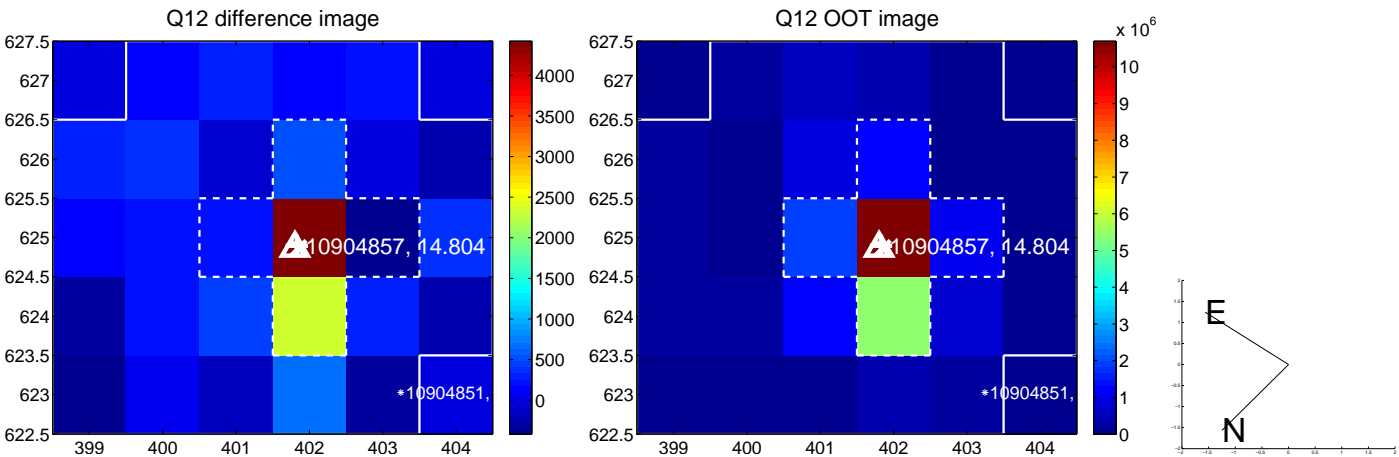
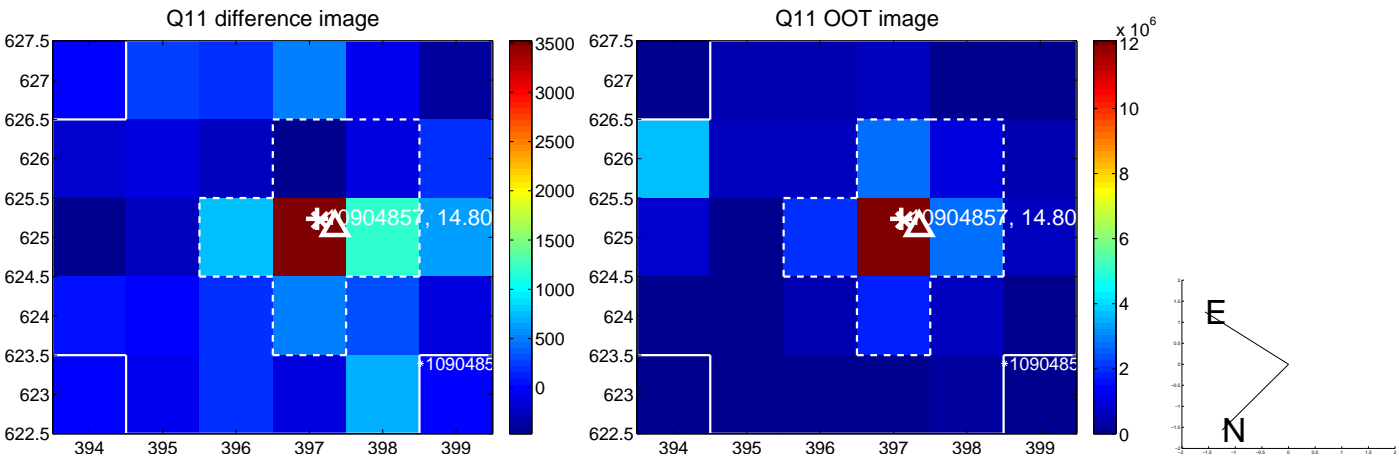
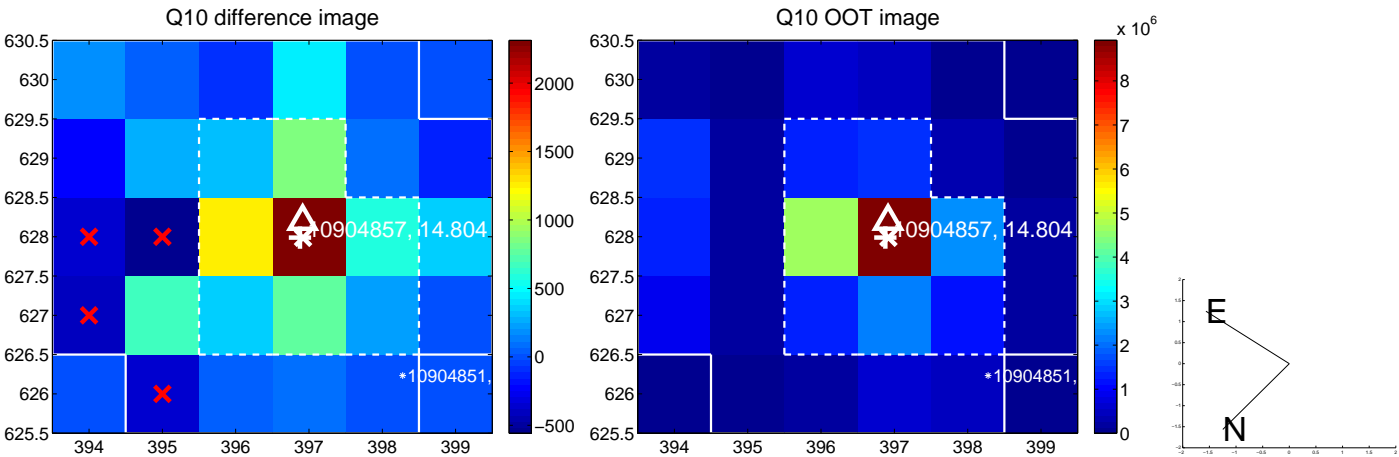
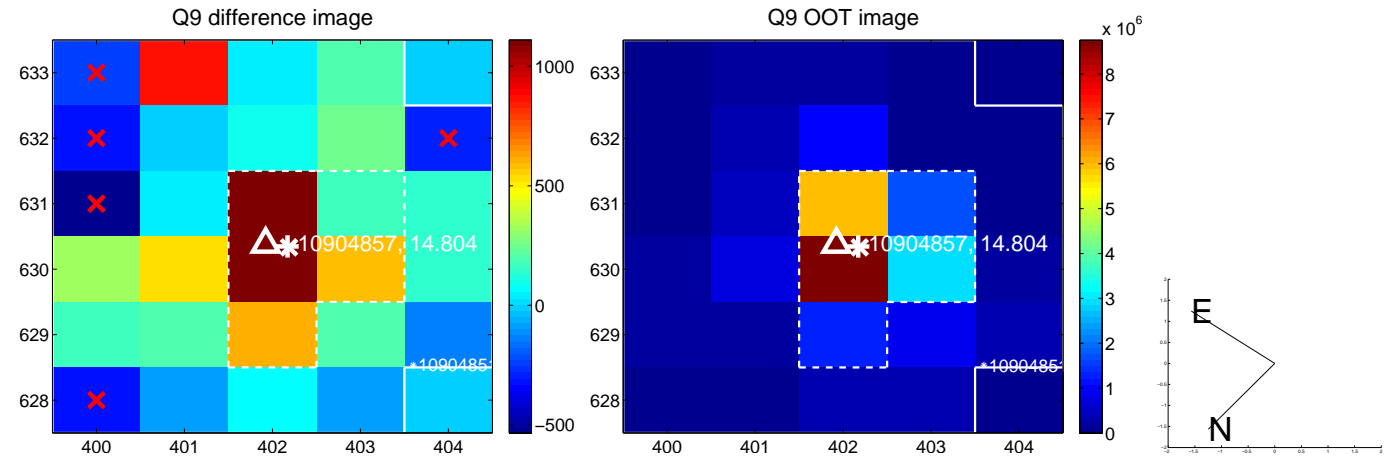
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



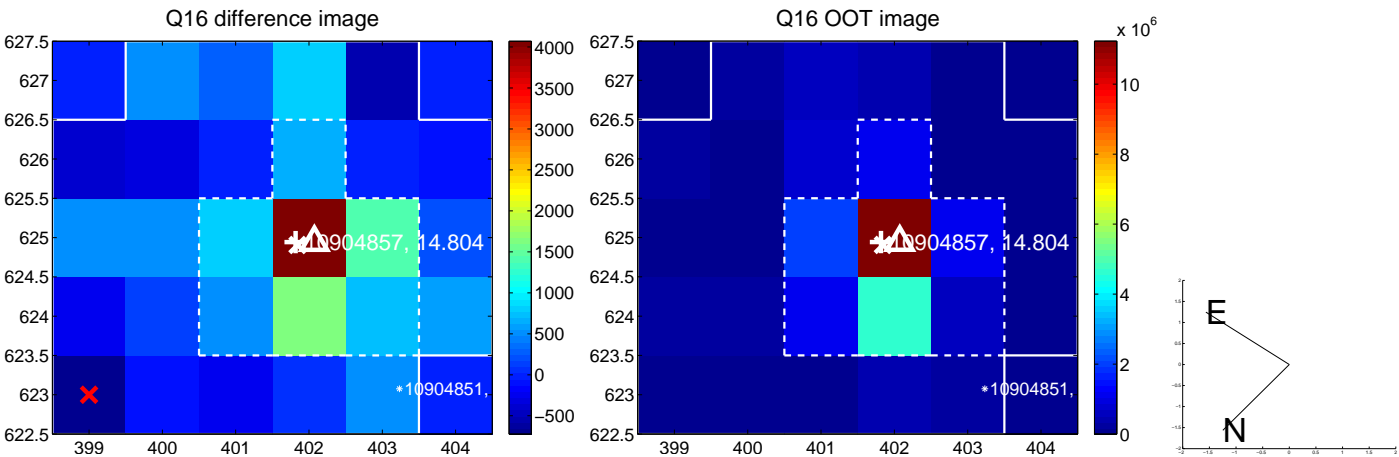
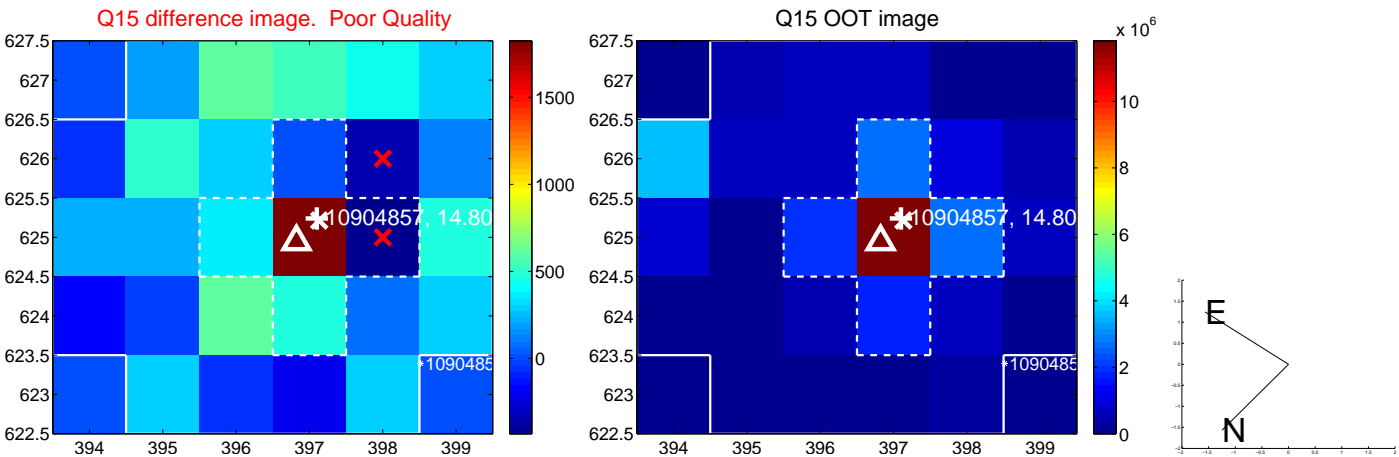
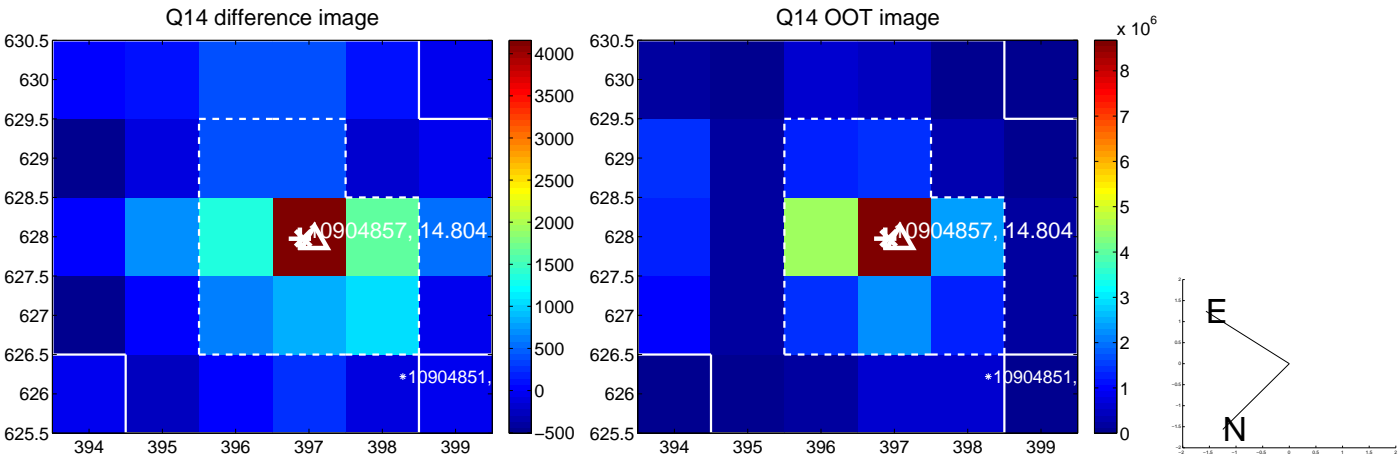
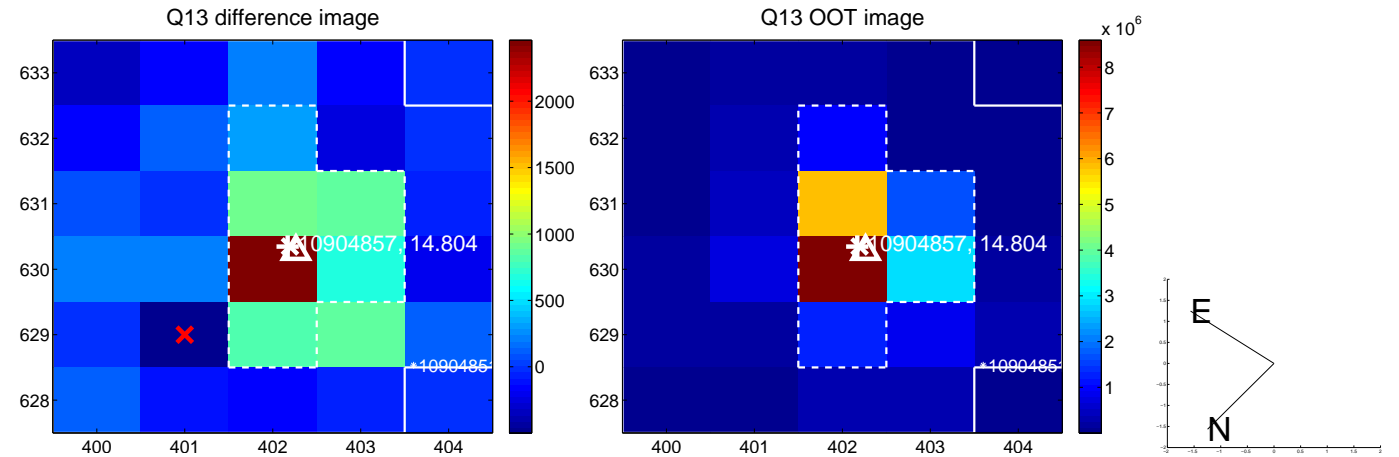
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.







# UKIRT Image

Declination

