

# KIC 007051180

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007051180-01	OBS	0064.01	1.951086	132.178463	1128.2	1.645	248.5	246.6	2.43	5302	9.88	3827.18
007051180-02	OBS	No	1.951116	133.142431	52.3	1.794	12.7	12.5	2.43	5302	2.12	3827.10

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007051180-01	OBS	PC	1.00	0	1	0	0	MOD_SEC_DV—PLANET_OCCULT_DV—MOD_SEC_ALT—PLANET_OCCULT_ALT—HAS_SEC_TCE
007051180-02	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.

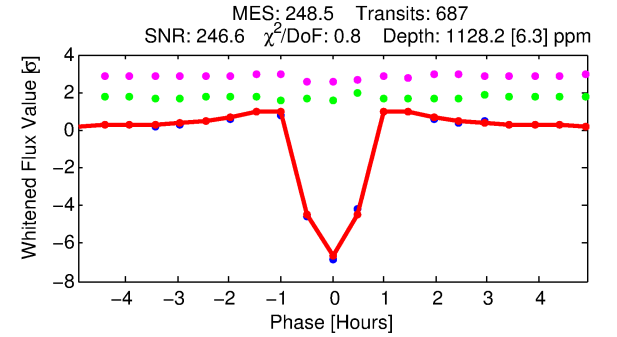
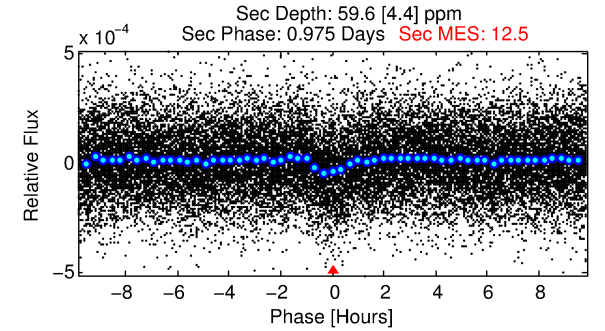
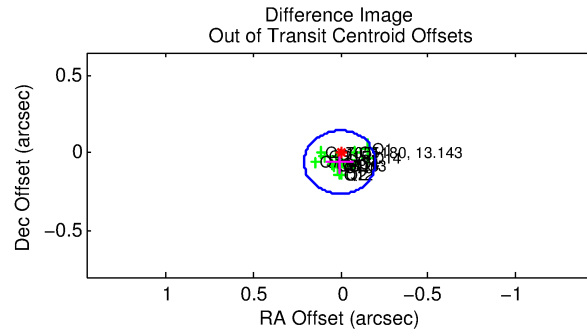
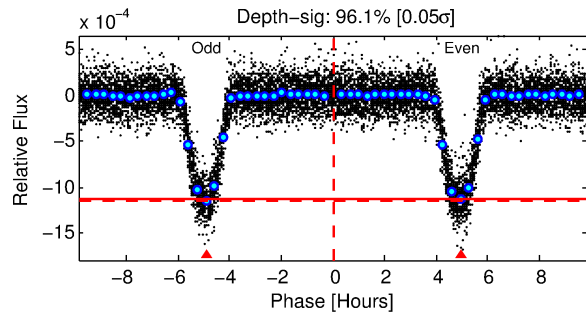
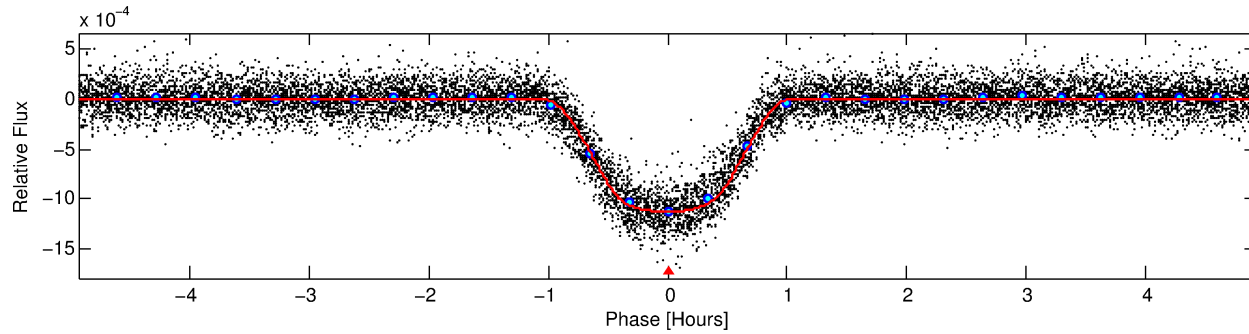
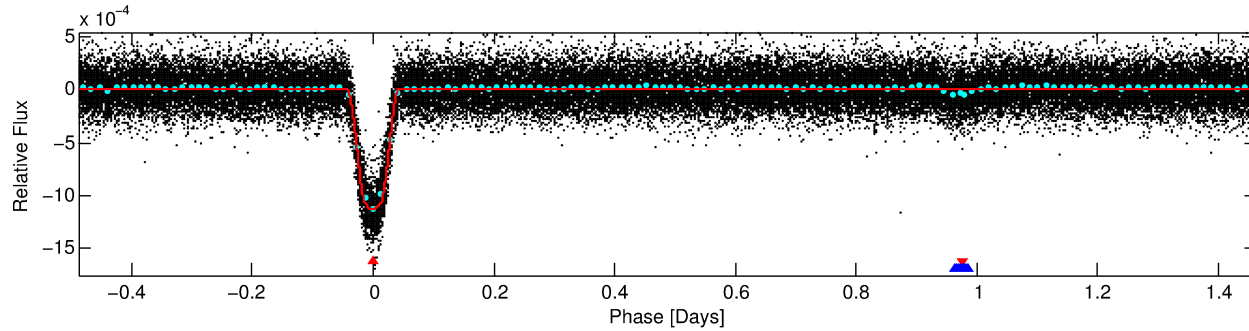
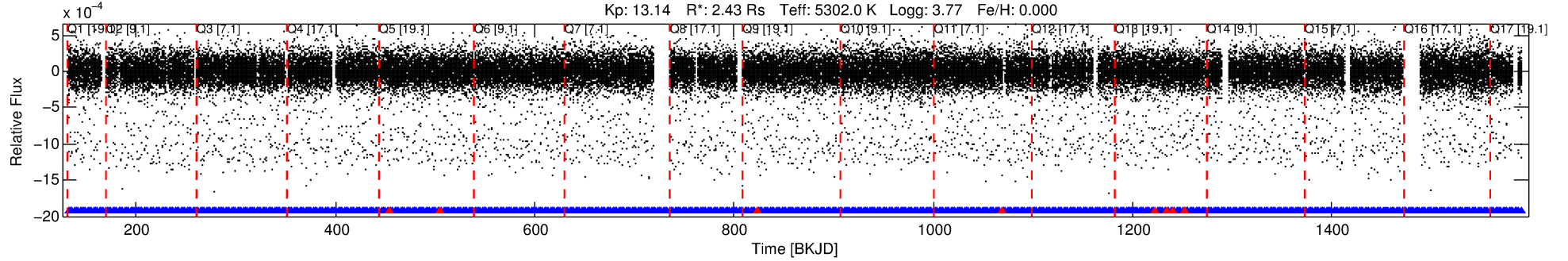
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007051180-01

No Significant Match Found

# DV One-Page Summary

KIC: 7051180 Candidate: 1 of 2 Period: 1.951 d  
KOI: K00064.01 Corr: 0.983



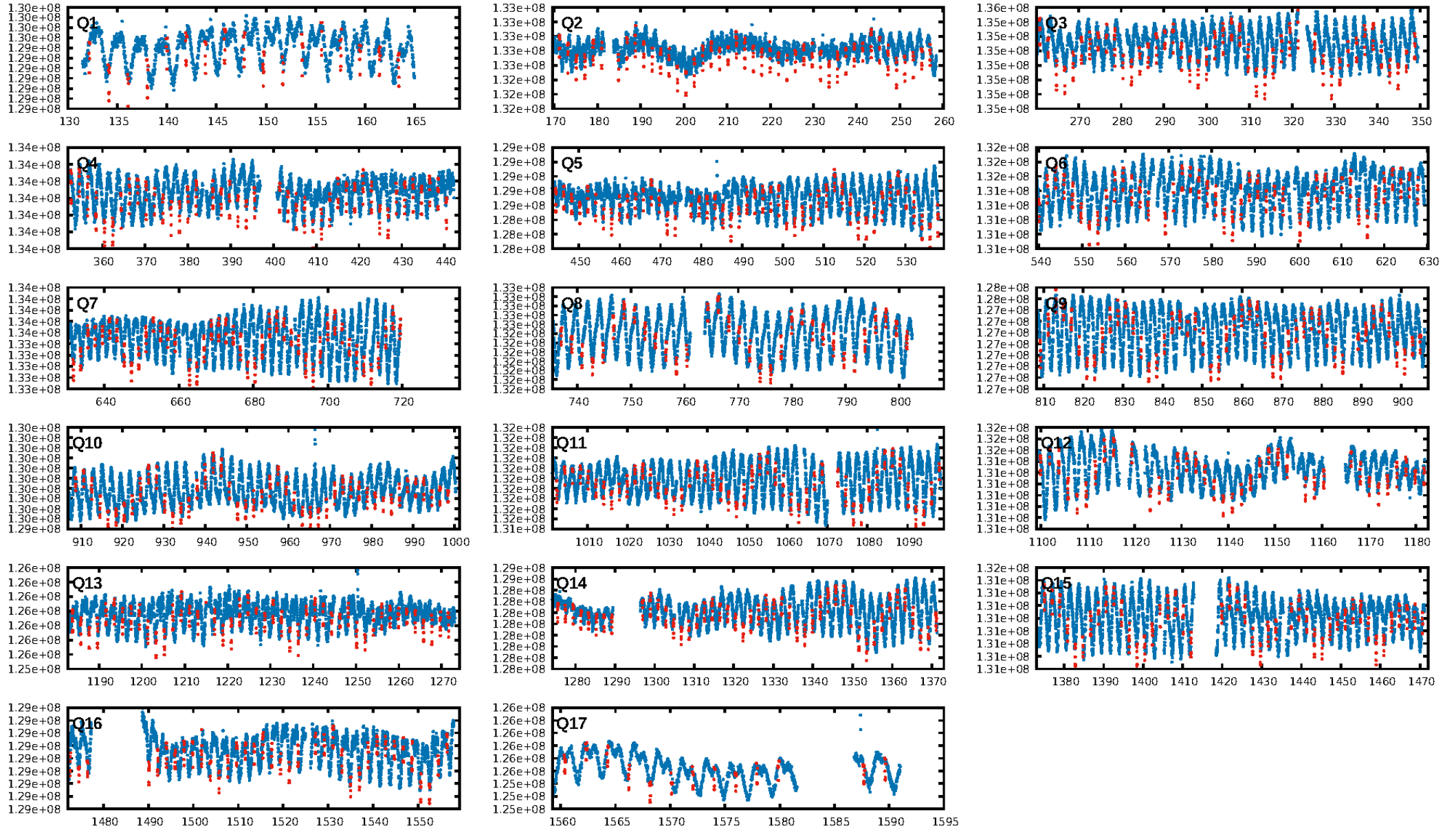
## DV Fit Results:

Period = 1.95109 [0.00000] d  
Epoch = 132.1785 [0.0001] BKJD  
Rp/R\* = 0.0373 [0.0005]  
a/R\* = 4.77 [0.22]  
b = 0.90 [0.01]  
Seff = 3827.18 [531.33]  
Teq = 2006 [70] K  
Rp = 9.87 [1.20] Re  
a = 0.0330 [0.0031] AU  
Ag = 0.37 [0.05] [-11.94 $\sigma$ ]  
Teffp = 2412 [61] K [4.37 $\sigma$ ]

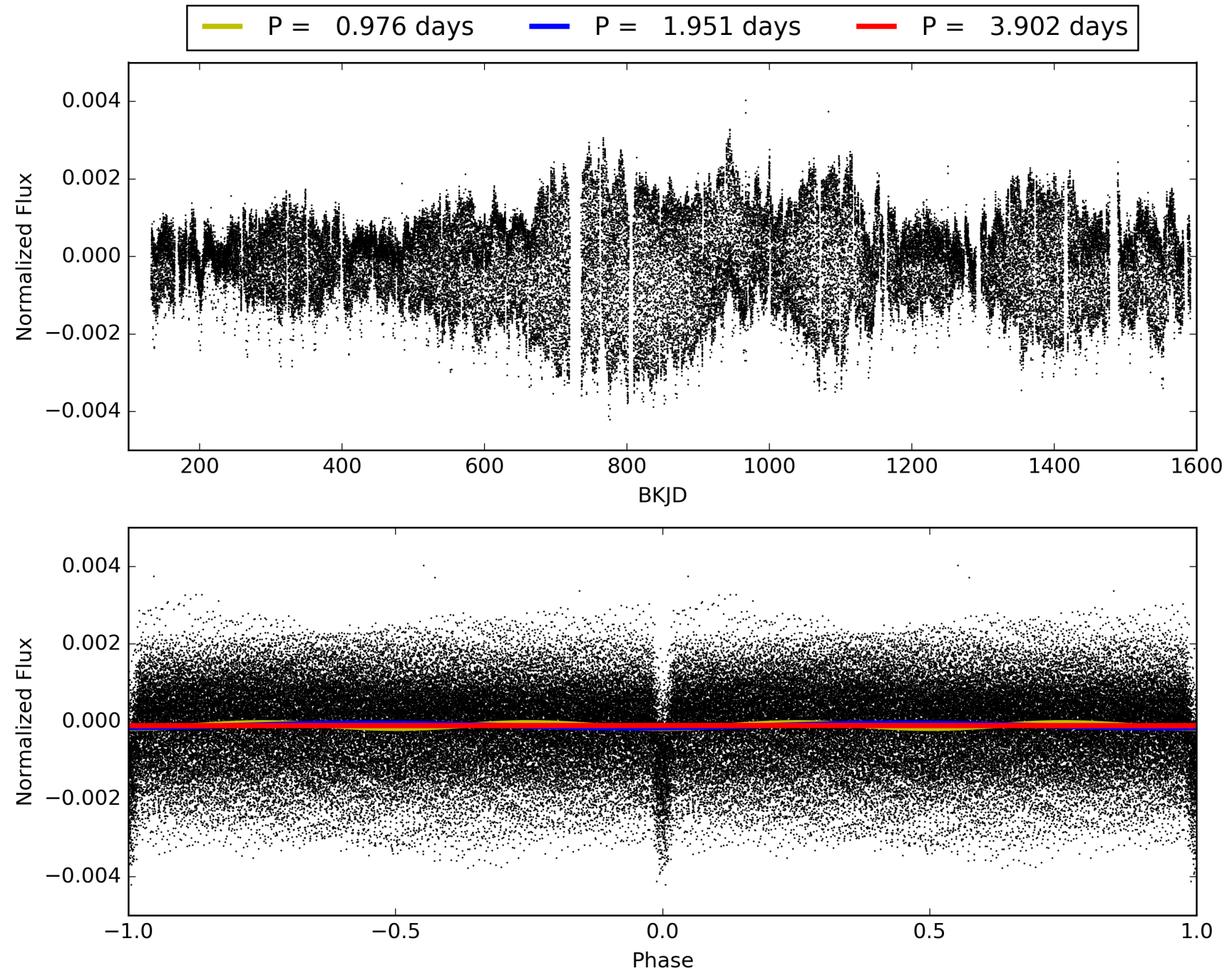
## DV Diagnostic Results:

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: 0.99 [649/657]  
GhostDiagnostic-chr: 4.398  
Centroid-sig: 0.0%  
Centroid-so: 0.269 arcsec [9.00 $\sigma$ ]  
OotOffset-rm: 0.059 arcsec [0.87 $\sigma$ ]  
KicOffset-rm: 0.188 arcsec [2.74 $\sigma$ ]  
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]

# TCE 007051180-01, PDC Light Curves

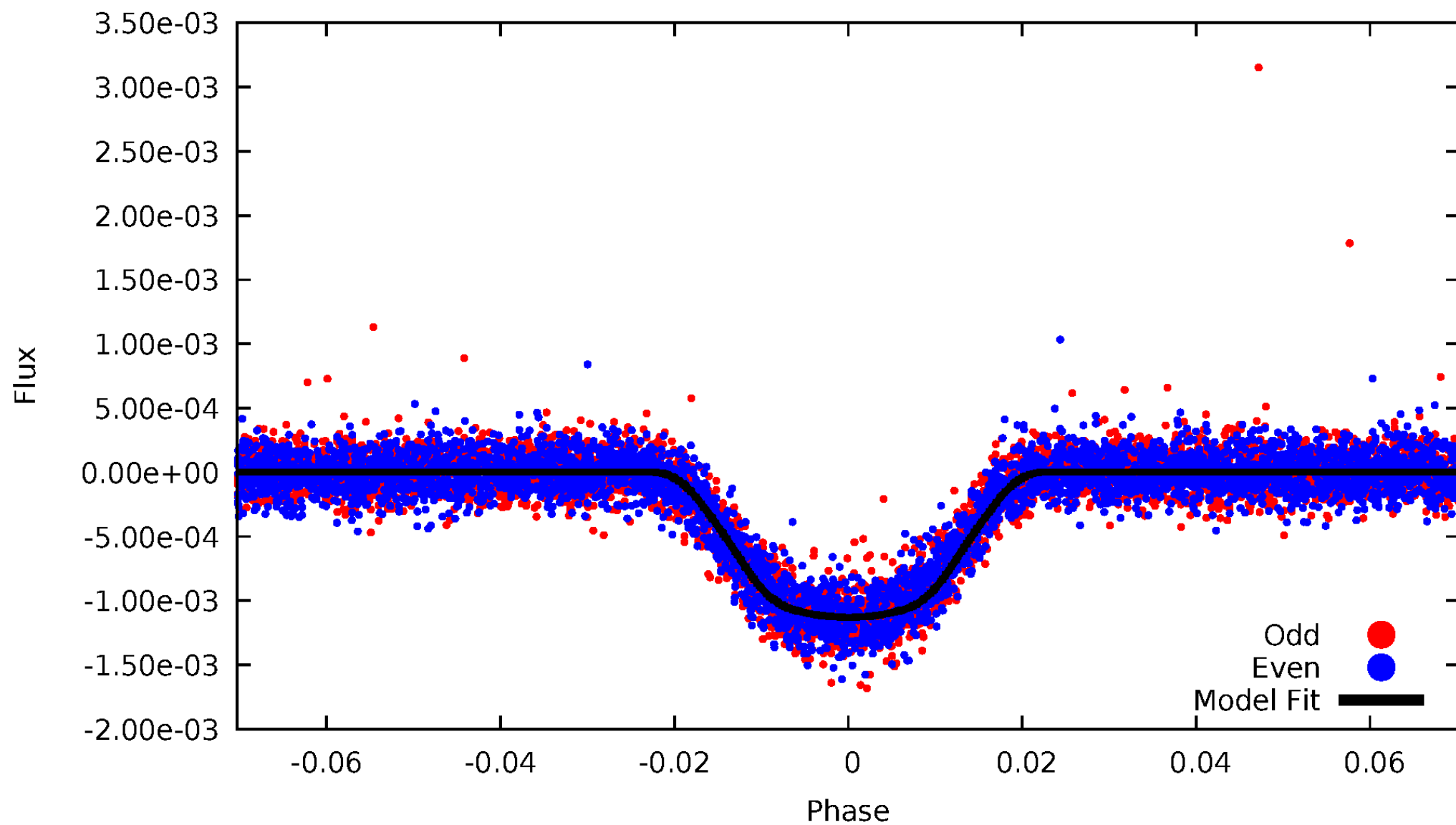


TCE 007051180-01



# DV Odd/Even

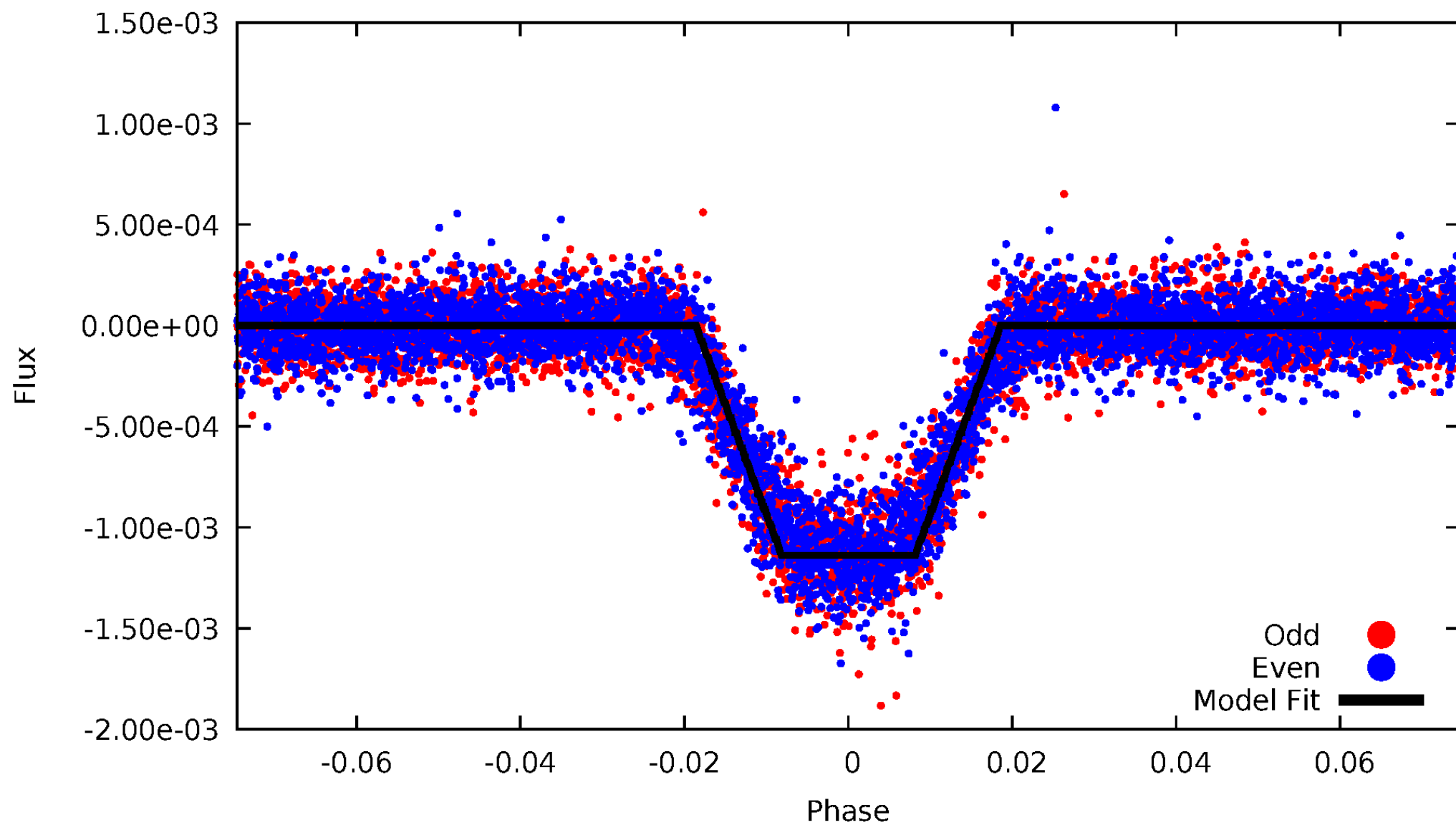
TCE 007051180-01





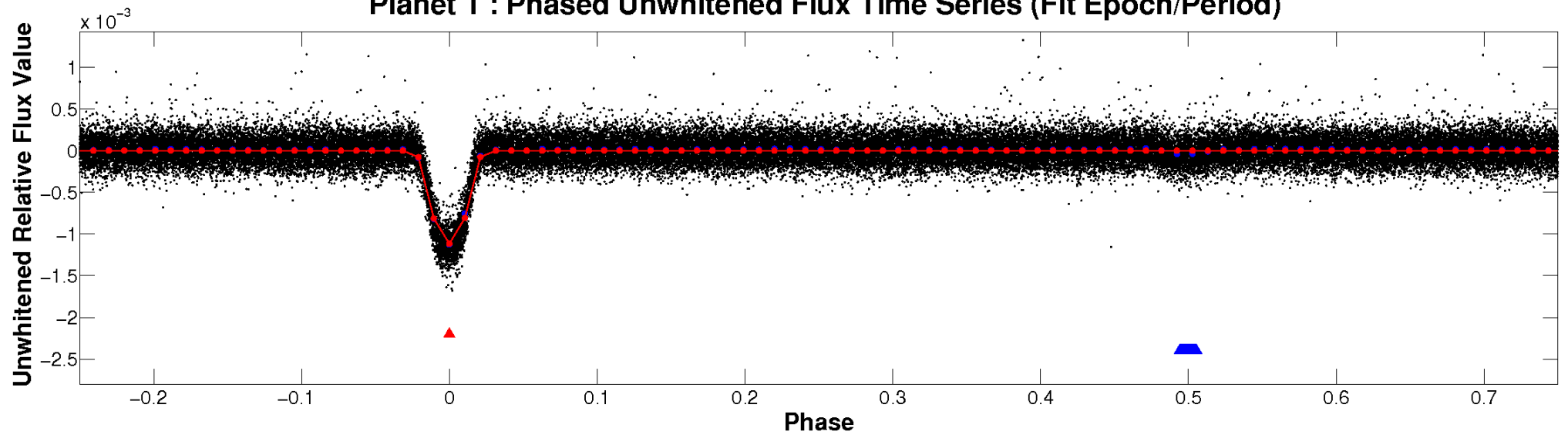
# ALT Odd/Even

TCE 007051180-01

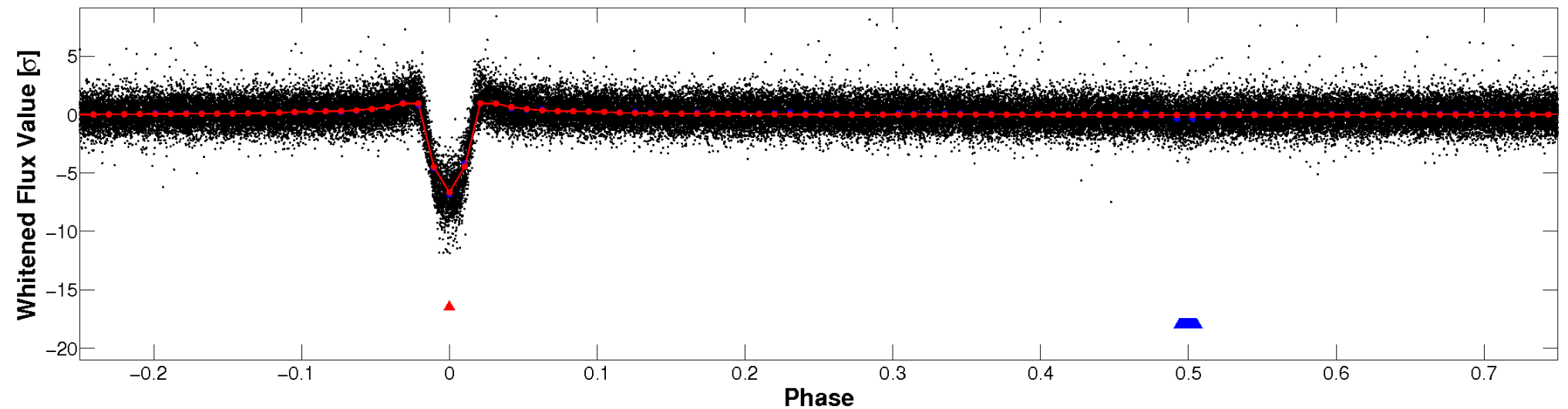


# Non-Whitened Vs. Whitened Light Curve

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

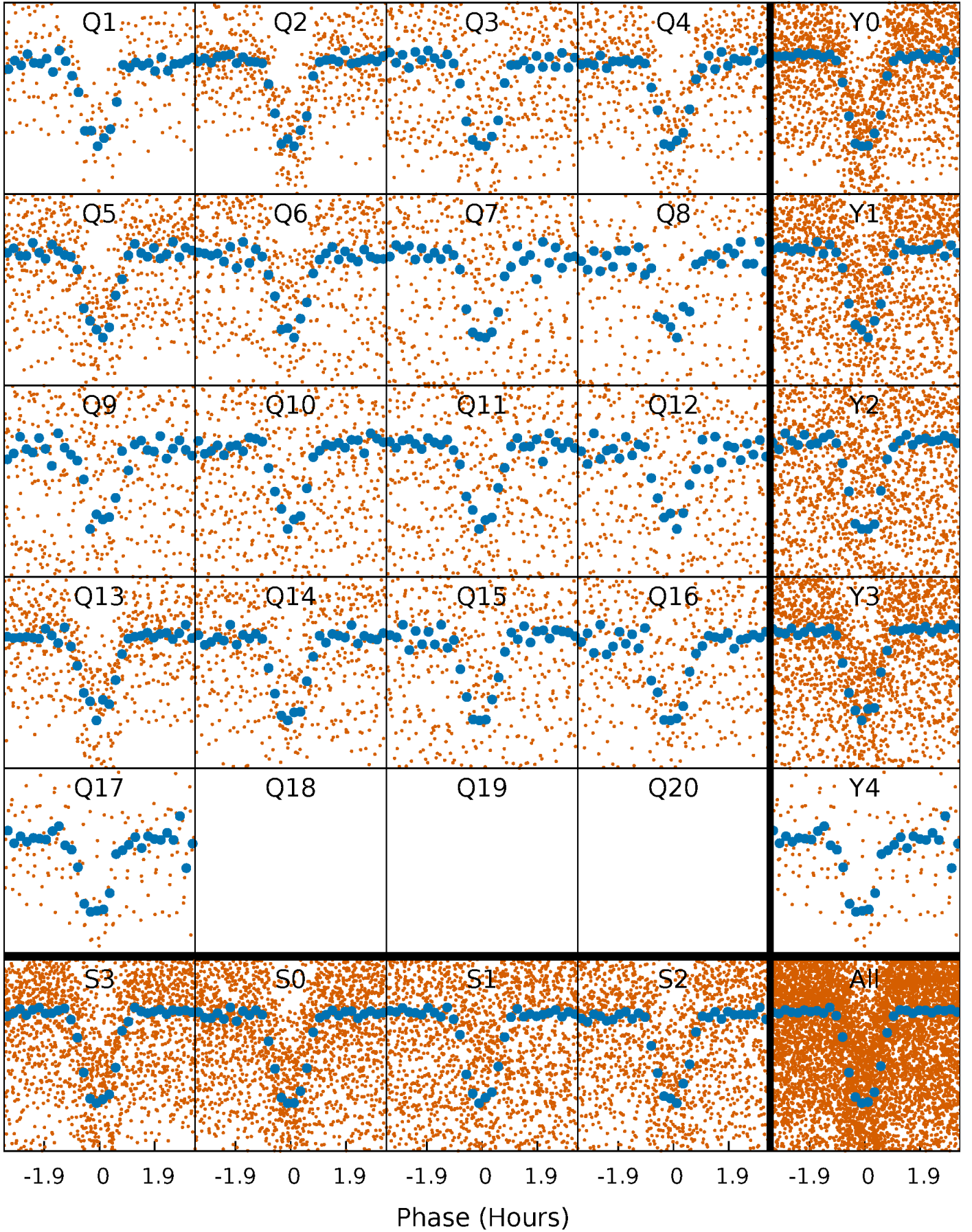


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

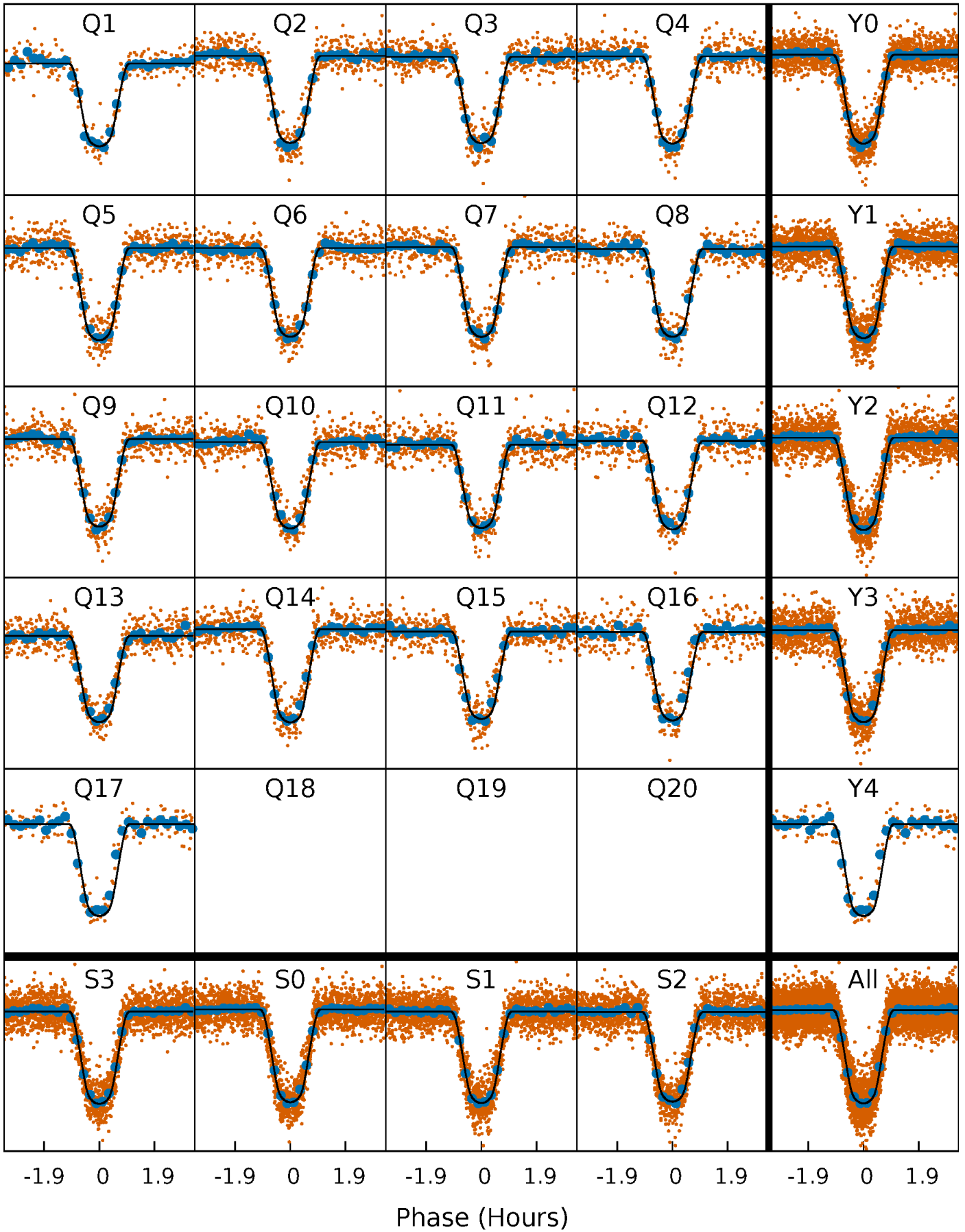
TCE 007051180-01 P= 1.951086 Days  $T_0=132.178463$  (BKJD)





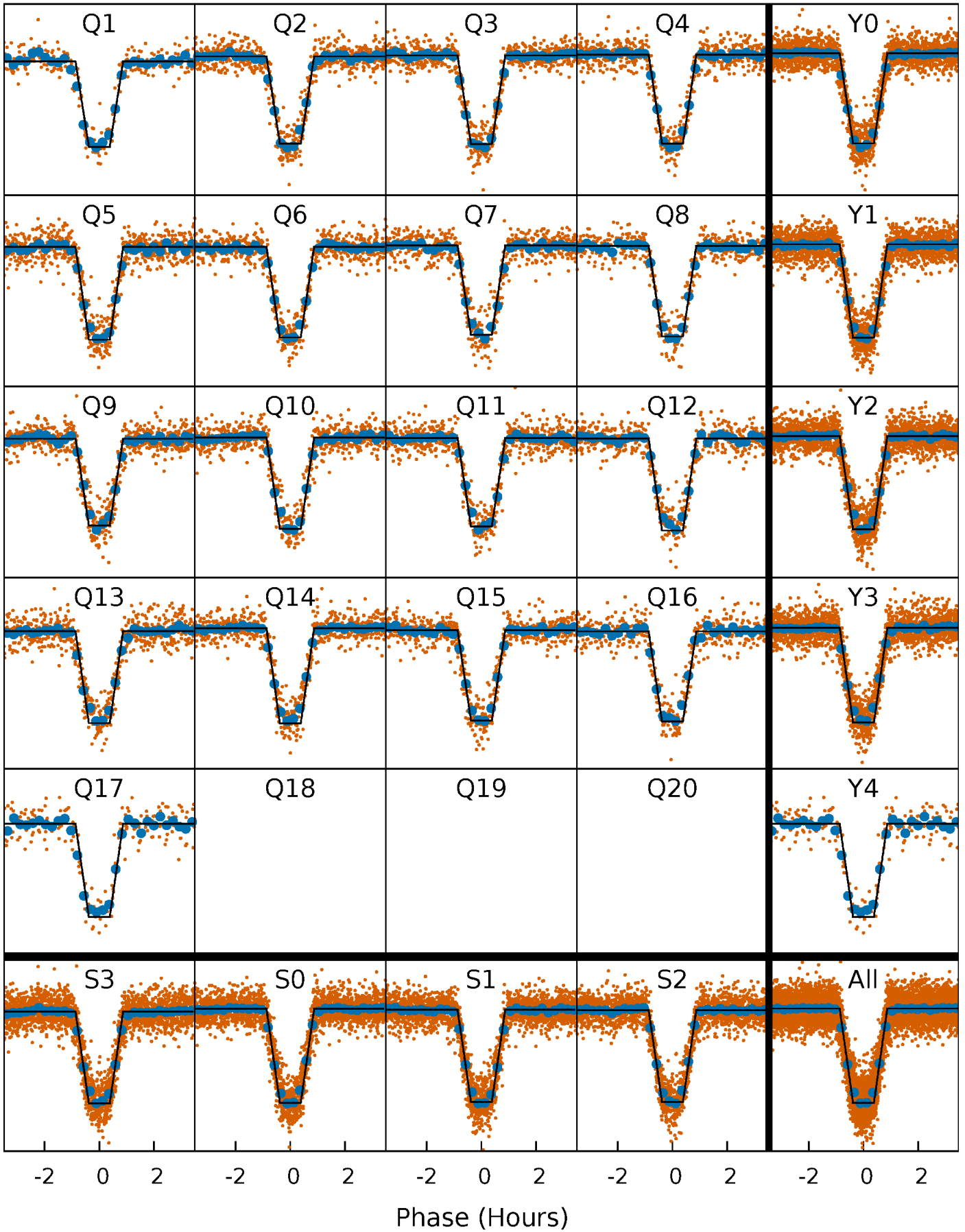
# DV Quarter-Phased Transit Curves

TCE 007051180-01   P= 1.951086 Days    $T_0=132.178463$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

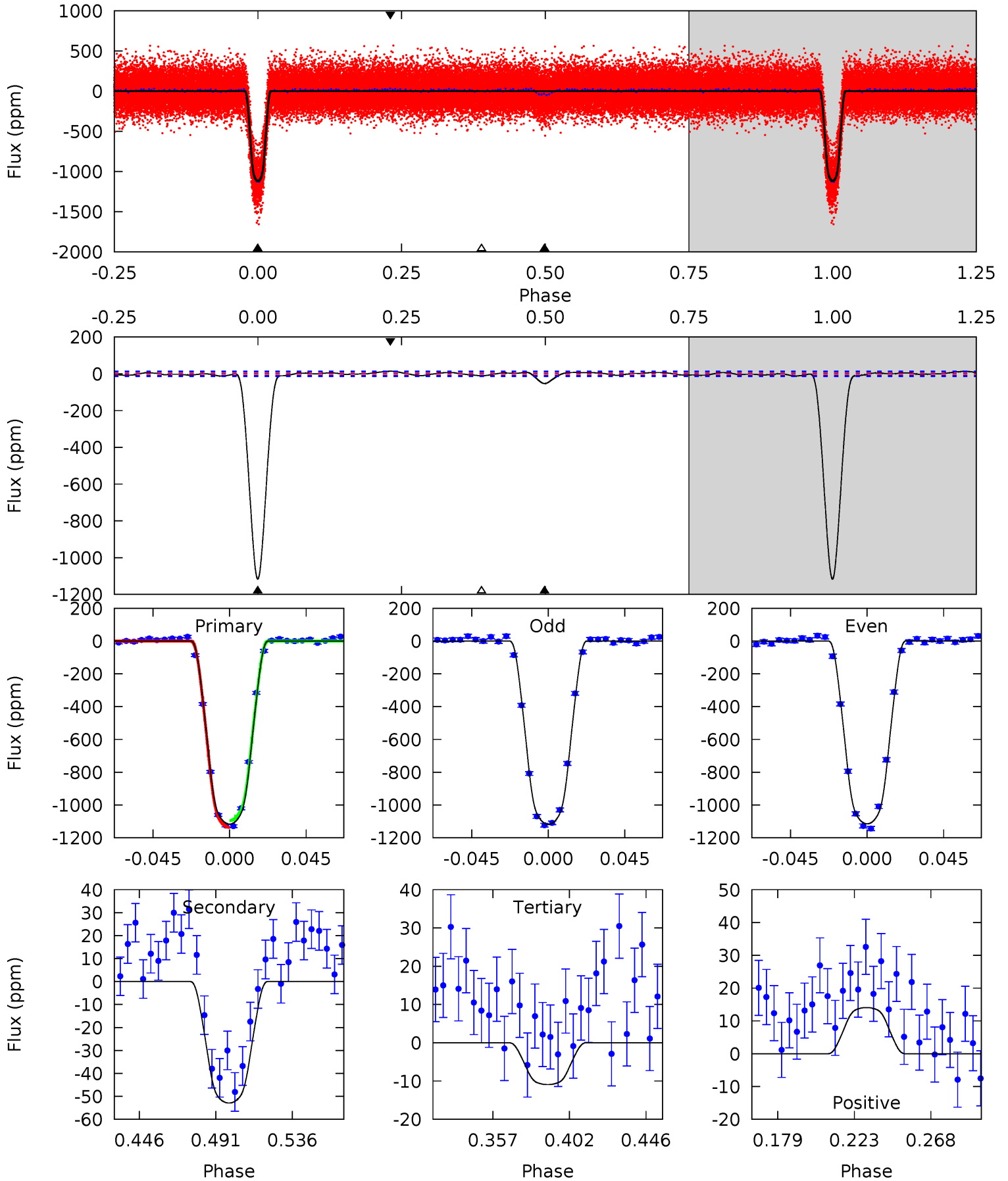
TCE 007051180-01 P= 1.951083 Days  $T_0=132.178922$  (BKJD)



# DV Model-Shift Uniqueness Test

007051180-01, P = 1.951086 Days, E = 130.227377 Days

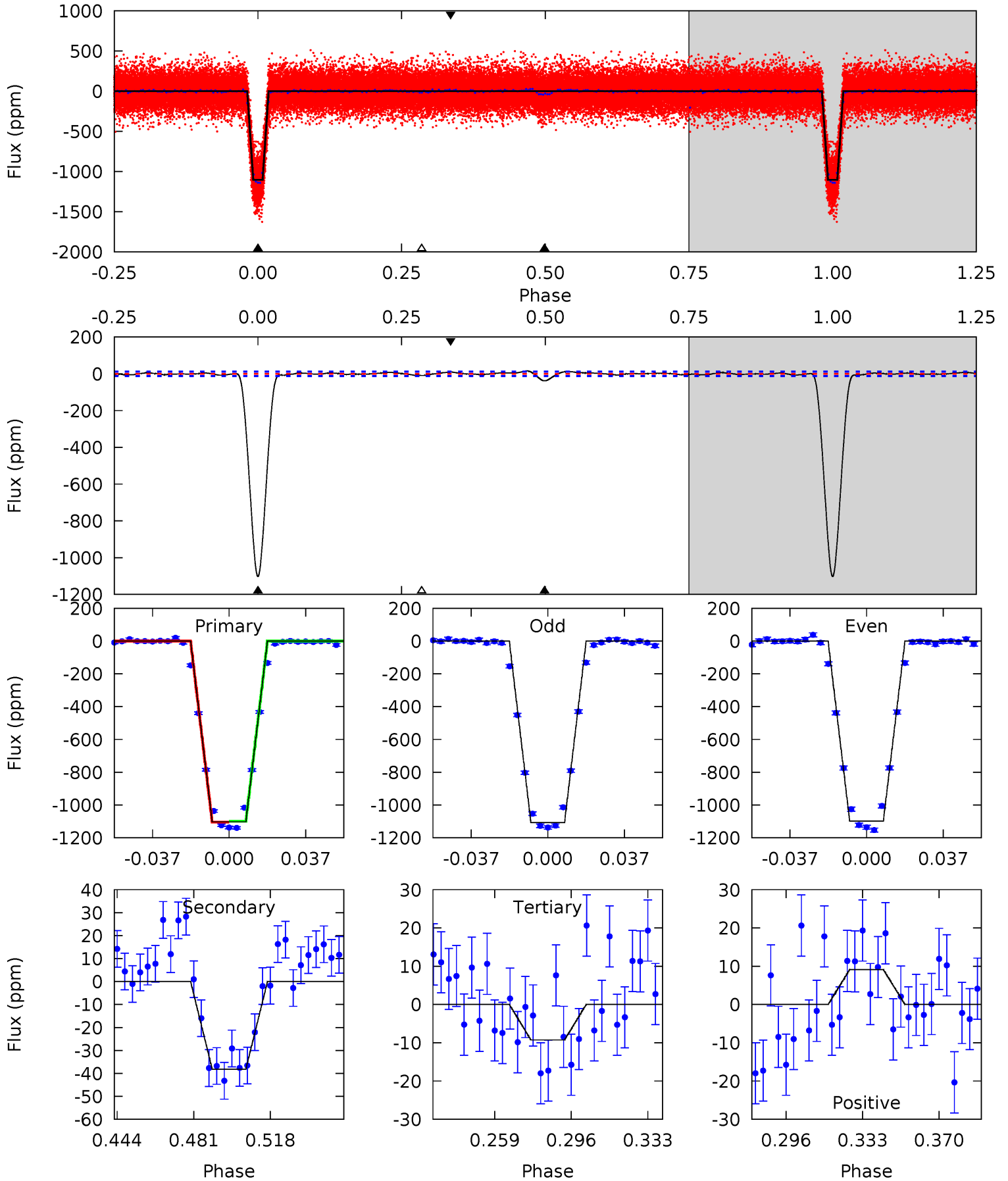
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
434.2	20.6	4.25	5.47	4.73	2.01	2.22	430.0	428.8	16.3	15.1	0.60	1.00	0.01	8.08



# Alt Model-Shift Uniqueness Test

007051180-01, P = 1.951083 Days, E = 130.227839 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
434.7	15.1	3.65	3.59	4.77	2.09	1.69	431.0	431.1	11.4	11.5	1.63	1.01	0.01	1.00



### Stellar Parameters For KIC 007051180

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5302^{+71}_{-87}$	$3.768^{+0.060}_{-0.045}$	$0.000^{+0.100}_{-0.100}$	$2.426^{+0.181}_{-0.293}$	$1.258^{+0.070}_{-0.151}$	$0.124^{+0.037}_{-0.018}$
	+1%/-2%	+2%/-1%	+inf%/-inf%	+7%/-12%	+6%/-12%	+30%/-14%
Source	SPE8	AST8	SPE8	DSEP		

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

### Secondary Eclipse Parameters for KIC 007051180-01 / KOI 0064.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-53 \pm 3$	$9.86^{+0.46}_{-0.65}$	$2791^{+73}_{-73}$	$2209^{+191}_{-3976}$	$0.329^{+0.036}_{-0.032}$
Alt.	$-38 \pm 3$	$8.92^{+0.41}_{-0.59}$	$2794^{+65}_{-74}$	$-1982^{+4129}_{-345}$	$0.290^{+0.034}_{-0.031}$

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



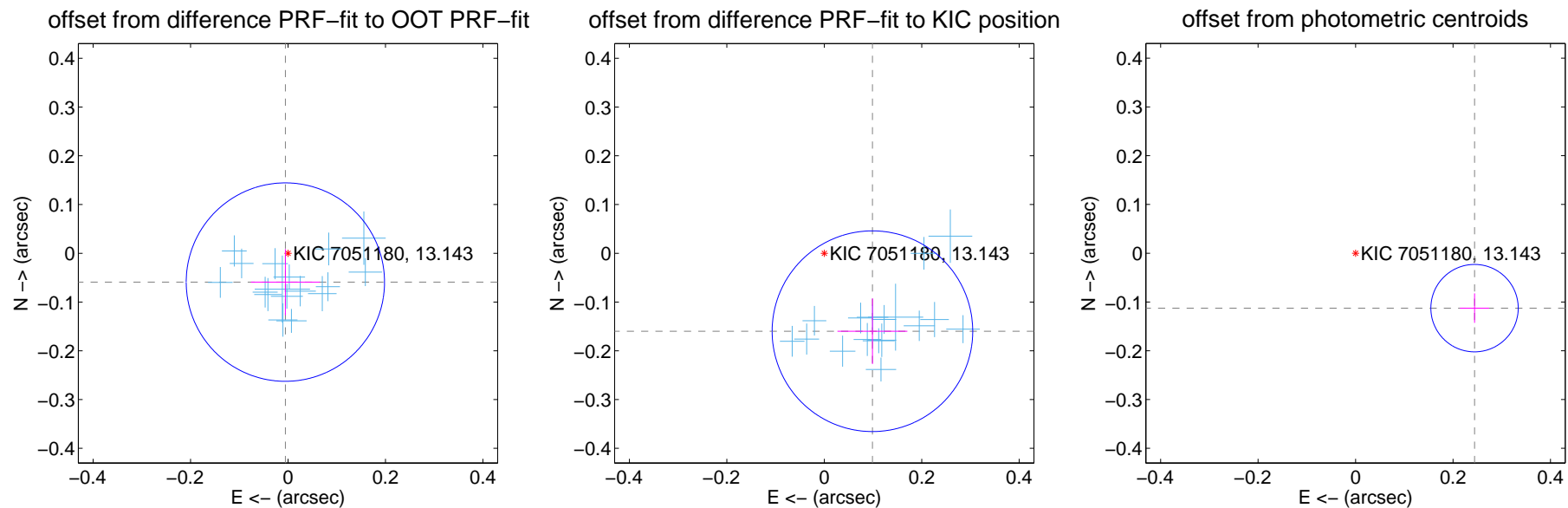
## DV Centroid Data

Supplemental centroid analysis for 007051180-01. Kepler magnitude: 13.14. Transit SNR 246.56

There are 17 quarters with good PRF difference image offsets

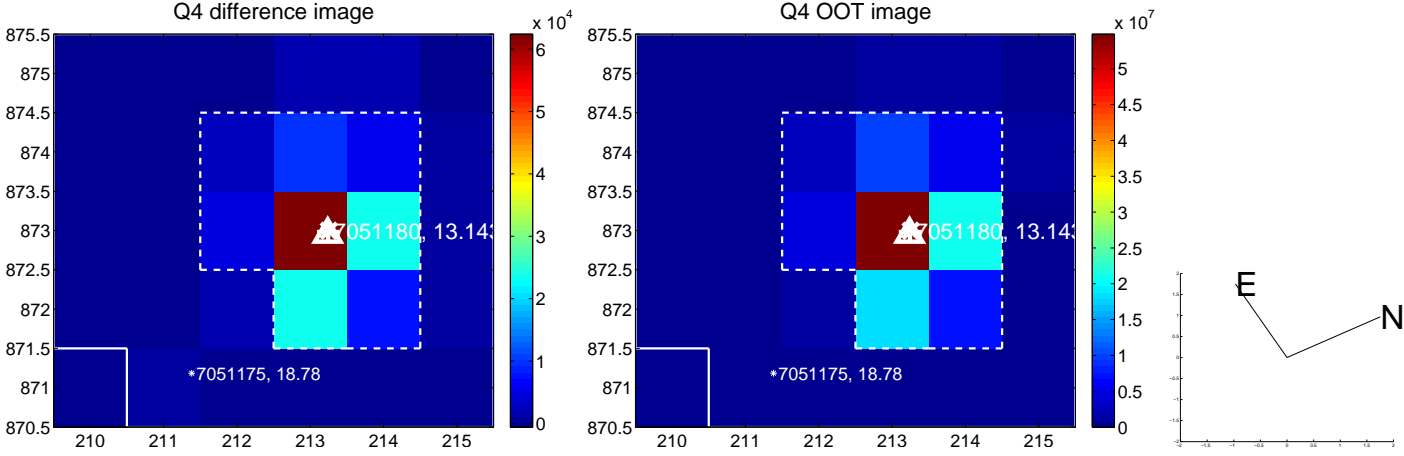
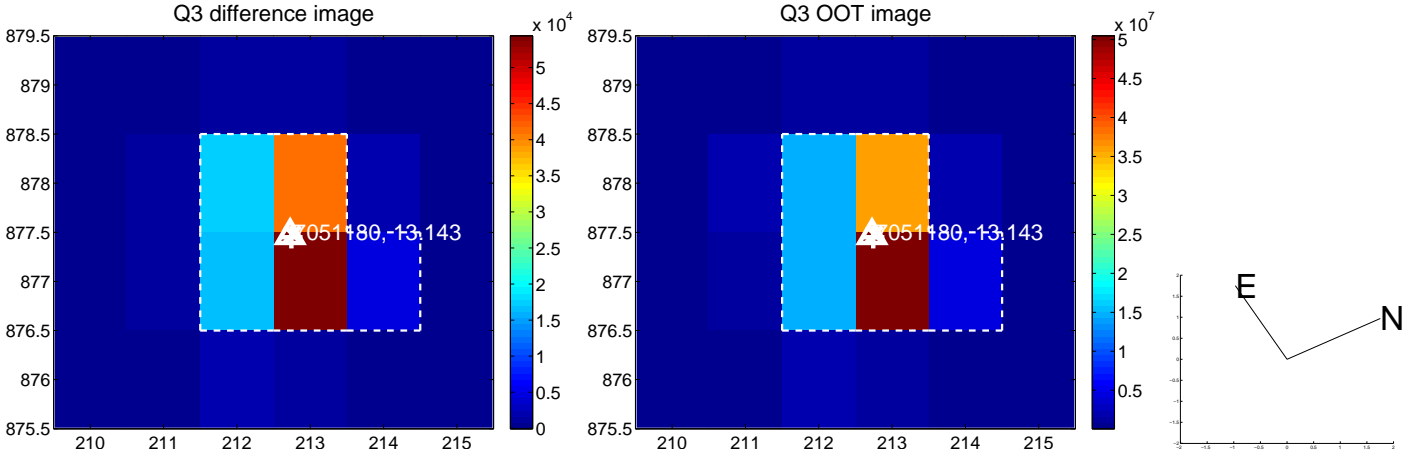
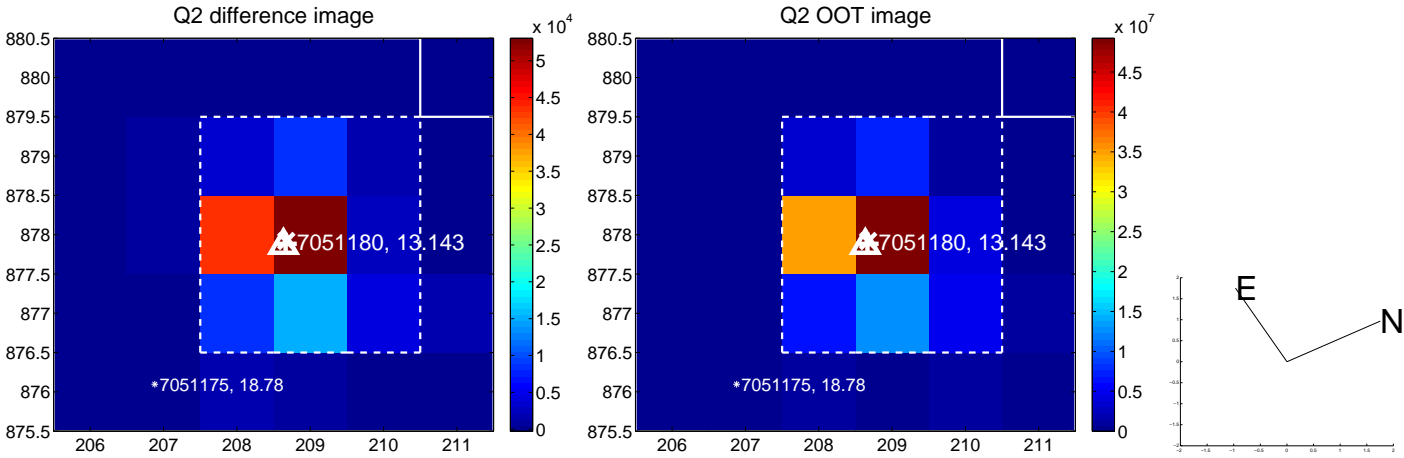
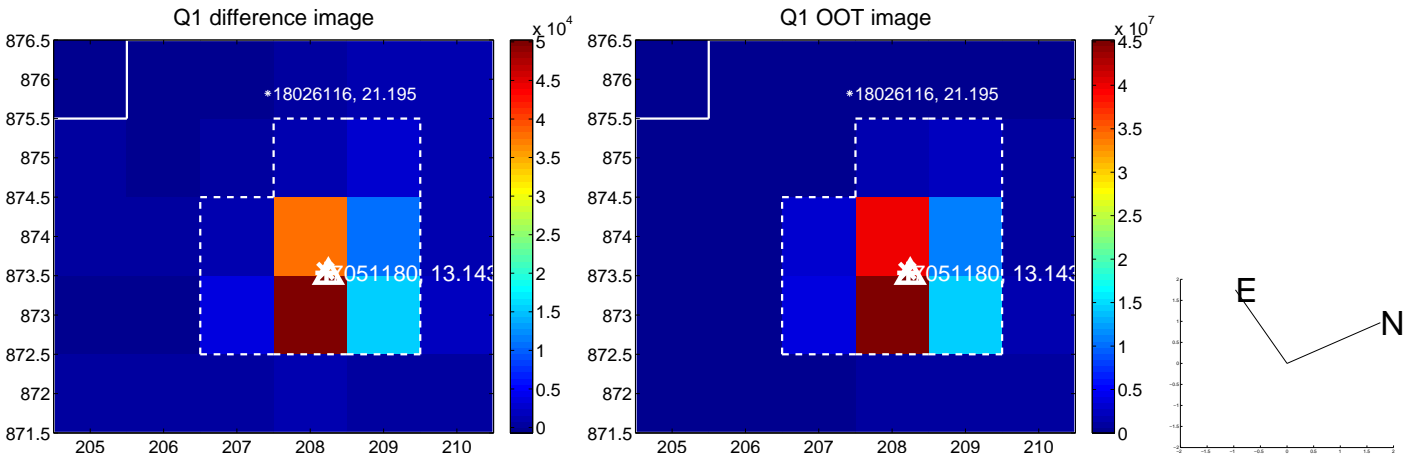
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.059 \pm 0.068$	0.87	$0.005 \pm 0.071$	$-0.059 \pm 0.068$
PRF-fit source offset from KIC position	$0.188 \pm 0.069$	2.74	$-0.099 \pm 0.072$	$-0.160 \pm 0.067$
photometric centroid source offset	$0.27 \pm 0.03$	9.00	$-0.24 \pm 0.03$	$-0.11 \pm 0.03$

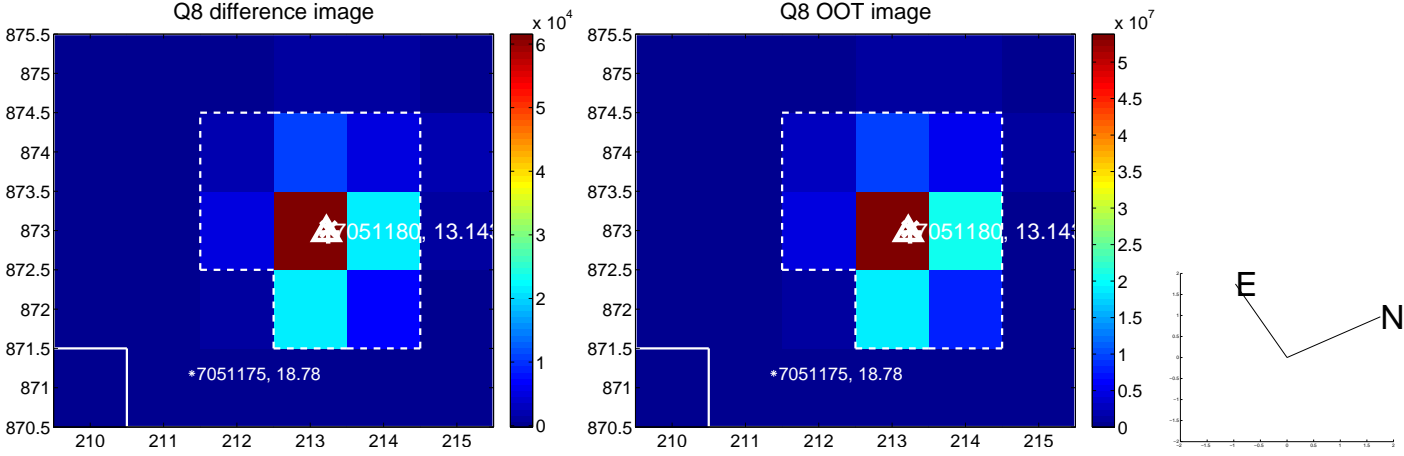
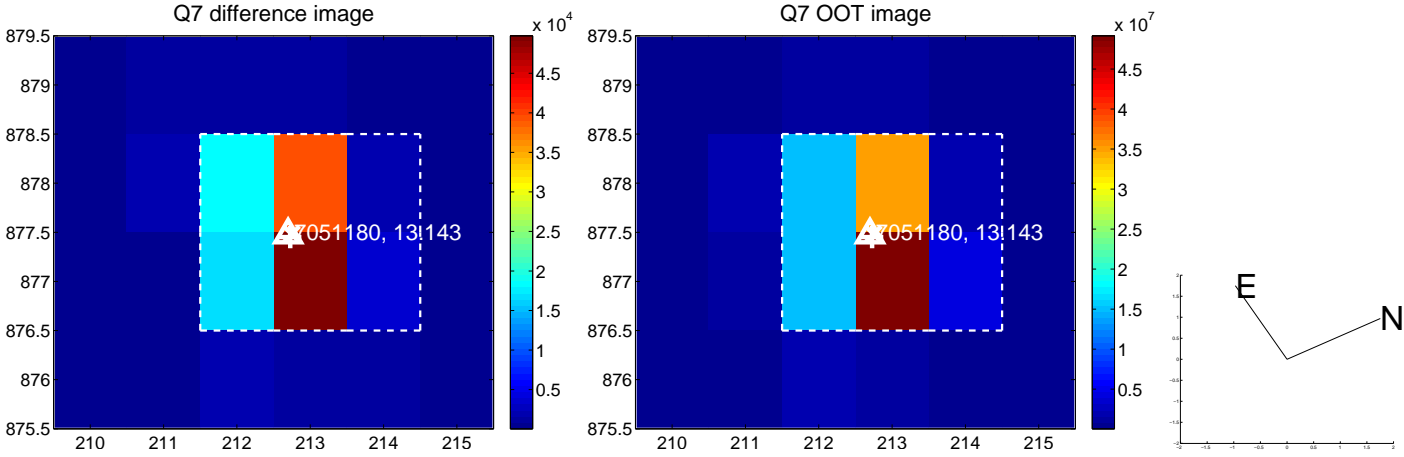
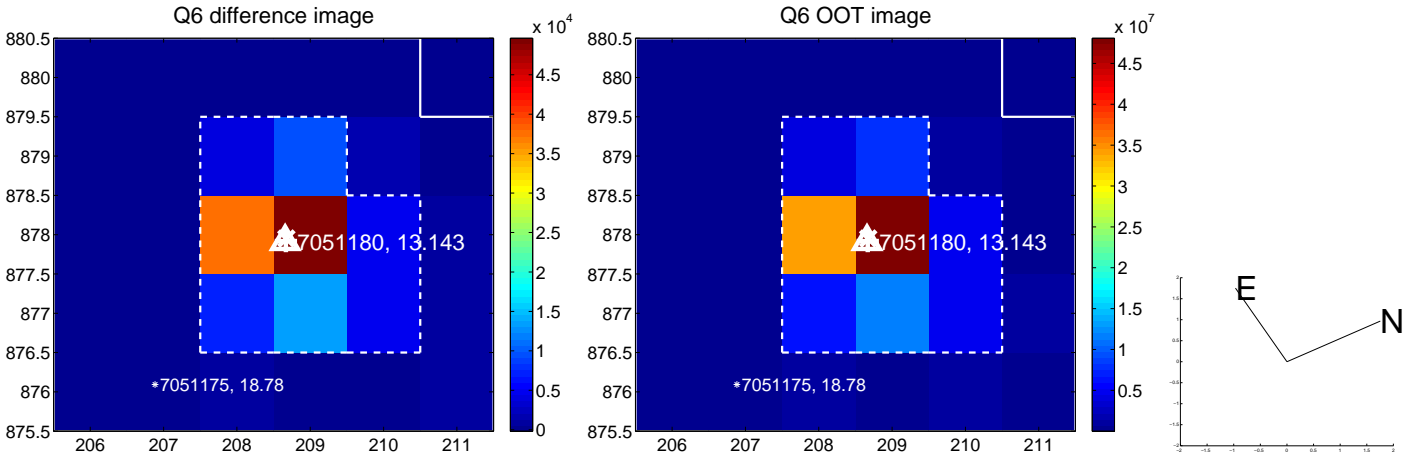
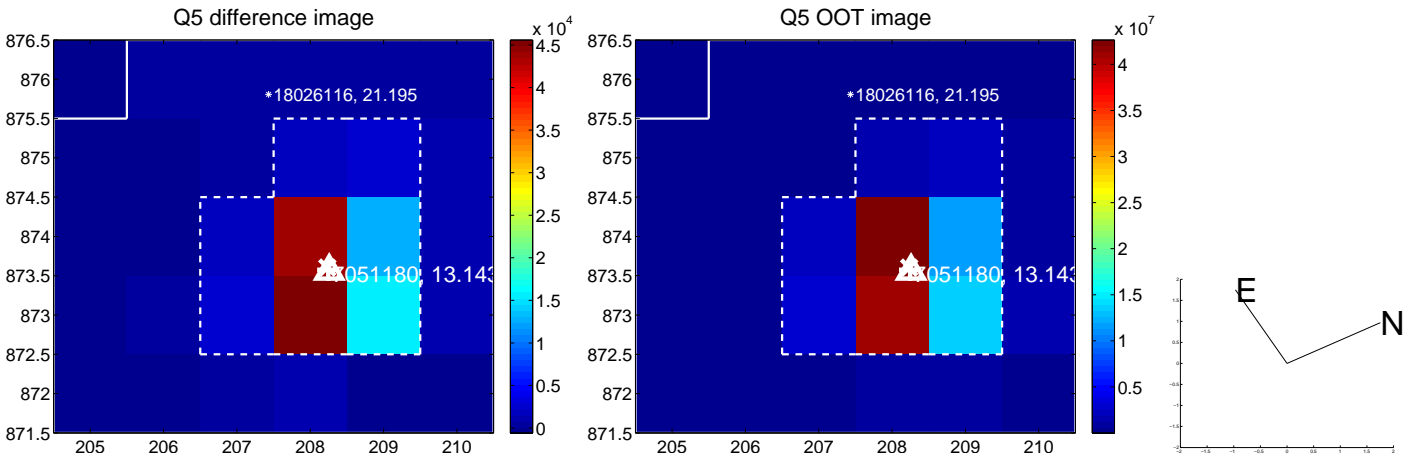


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

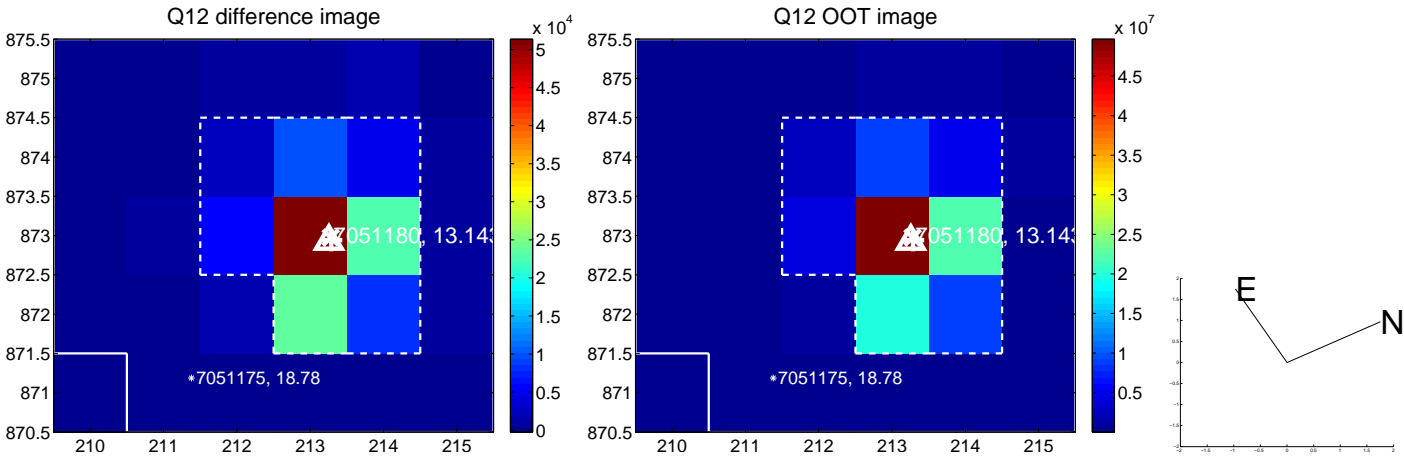
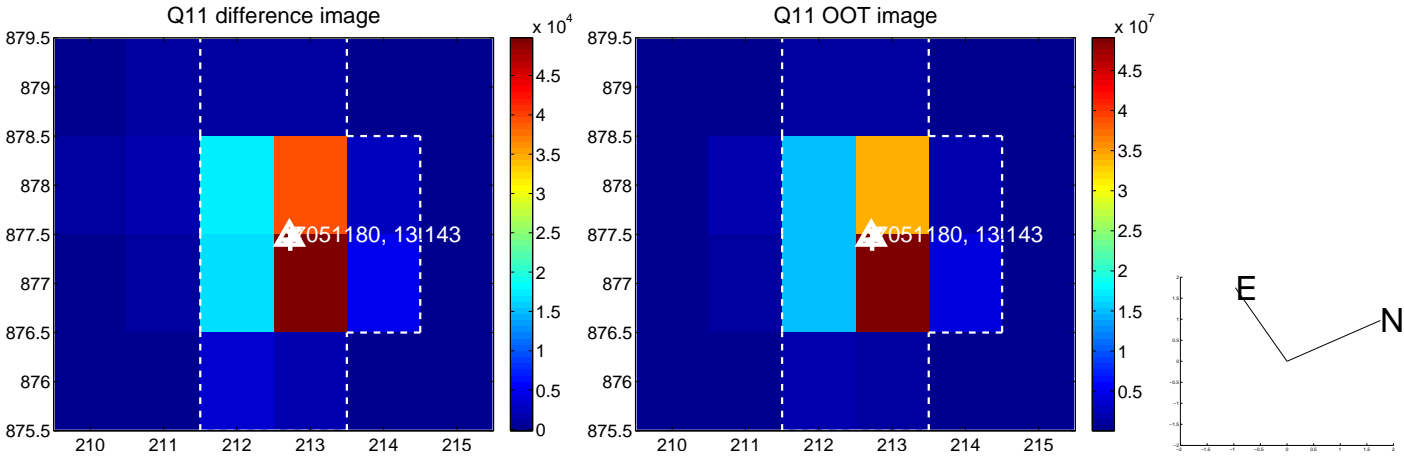
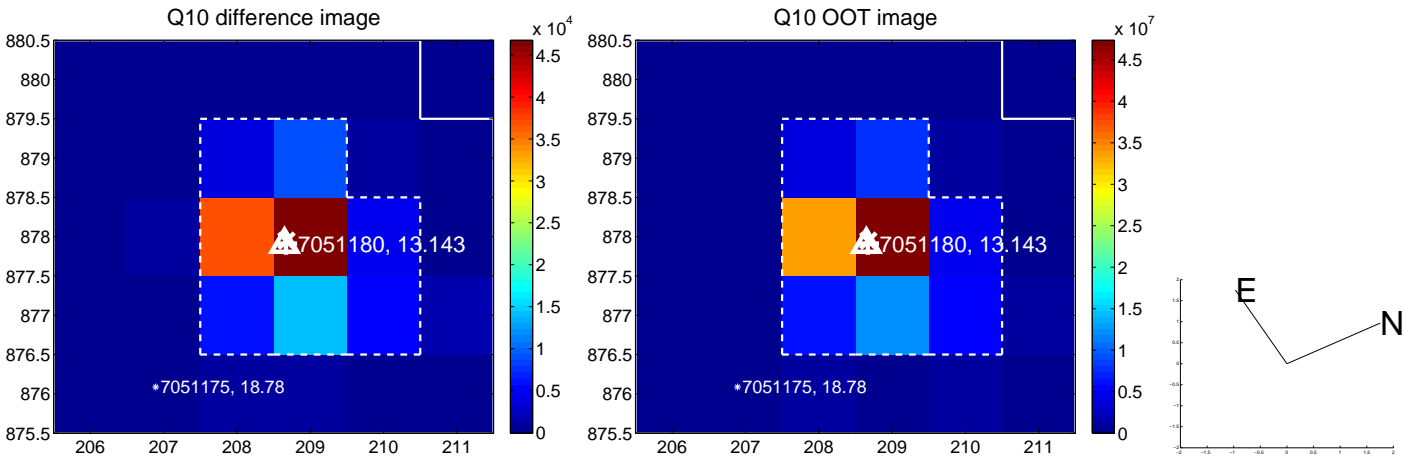
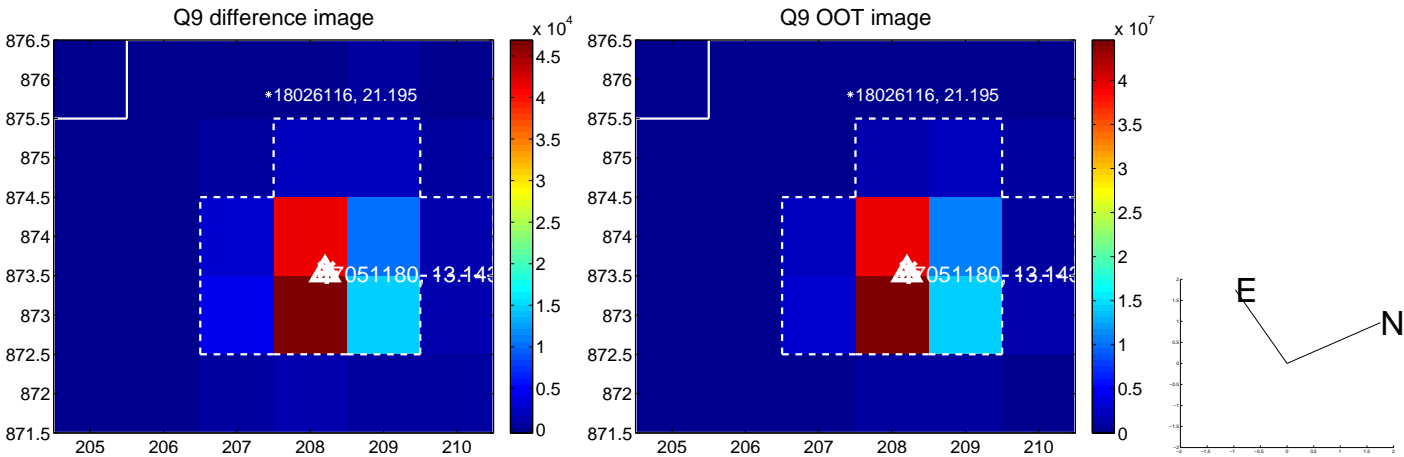
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



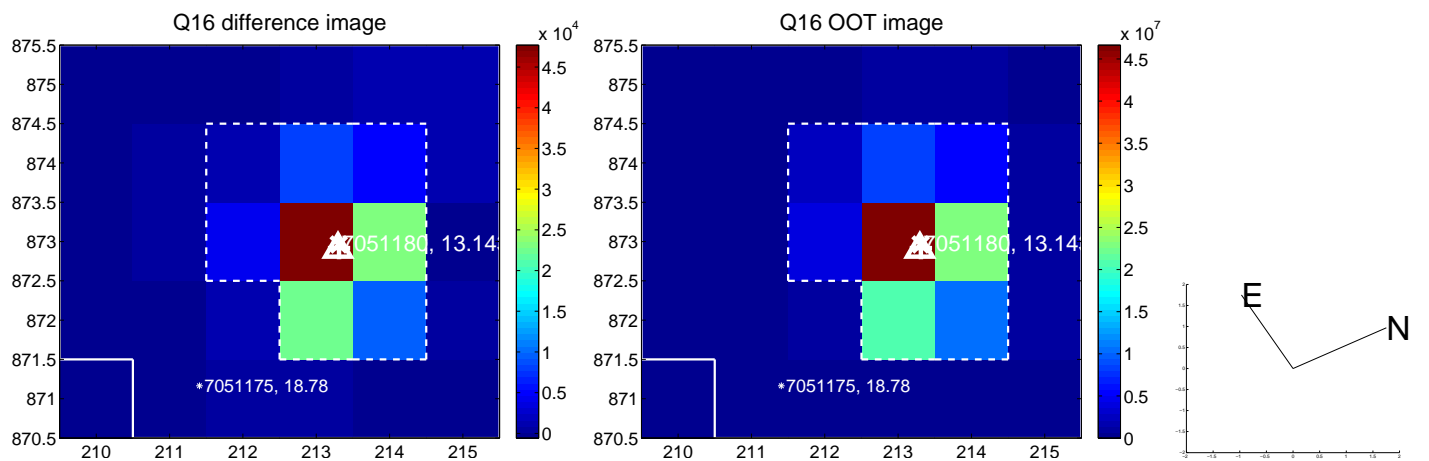
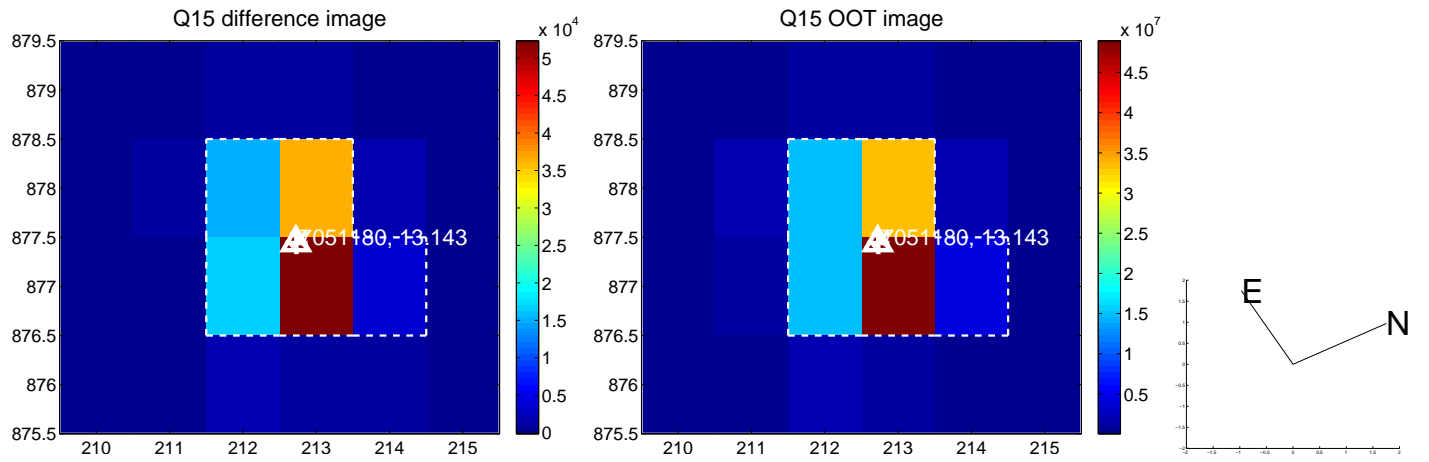
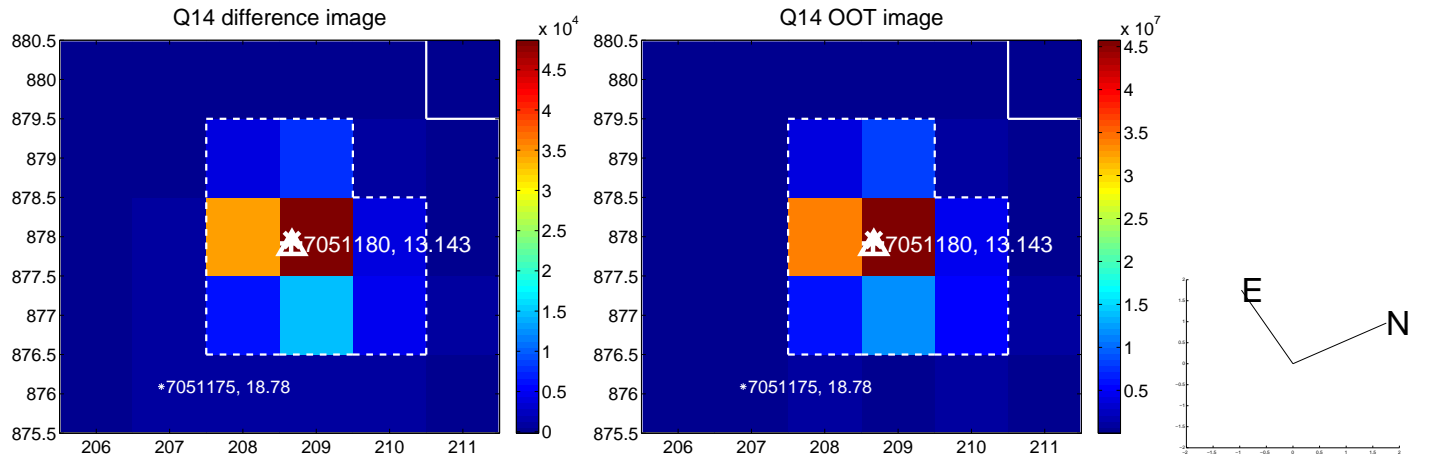
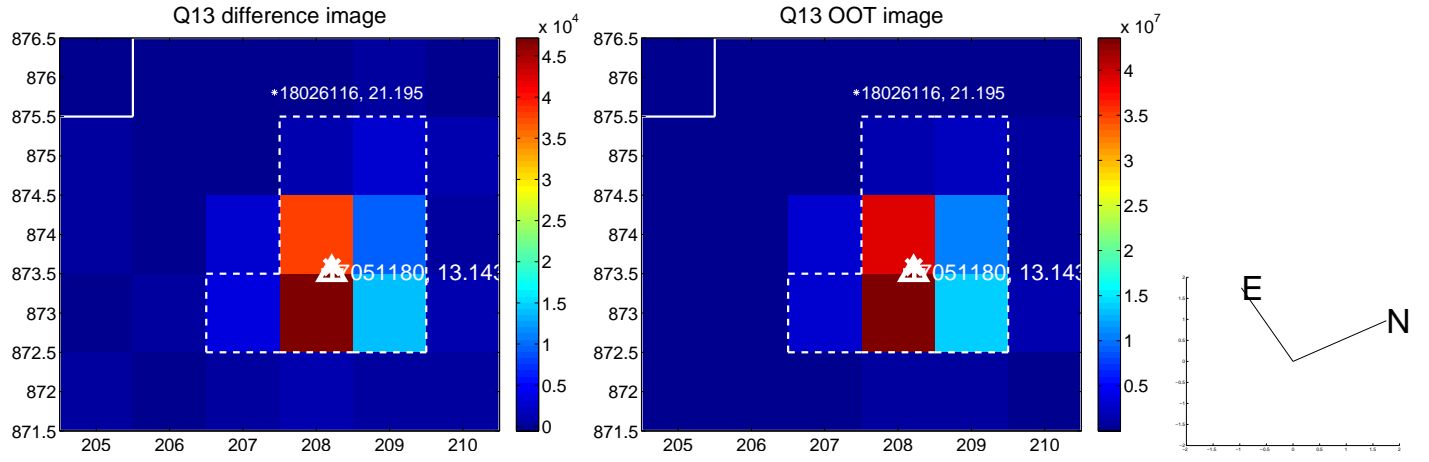
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

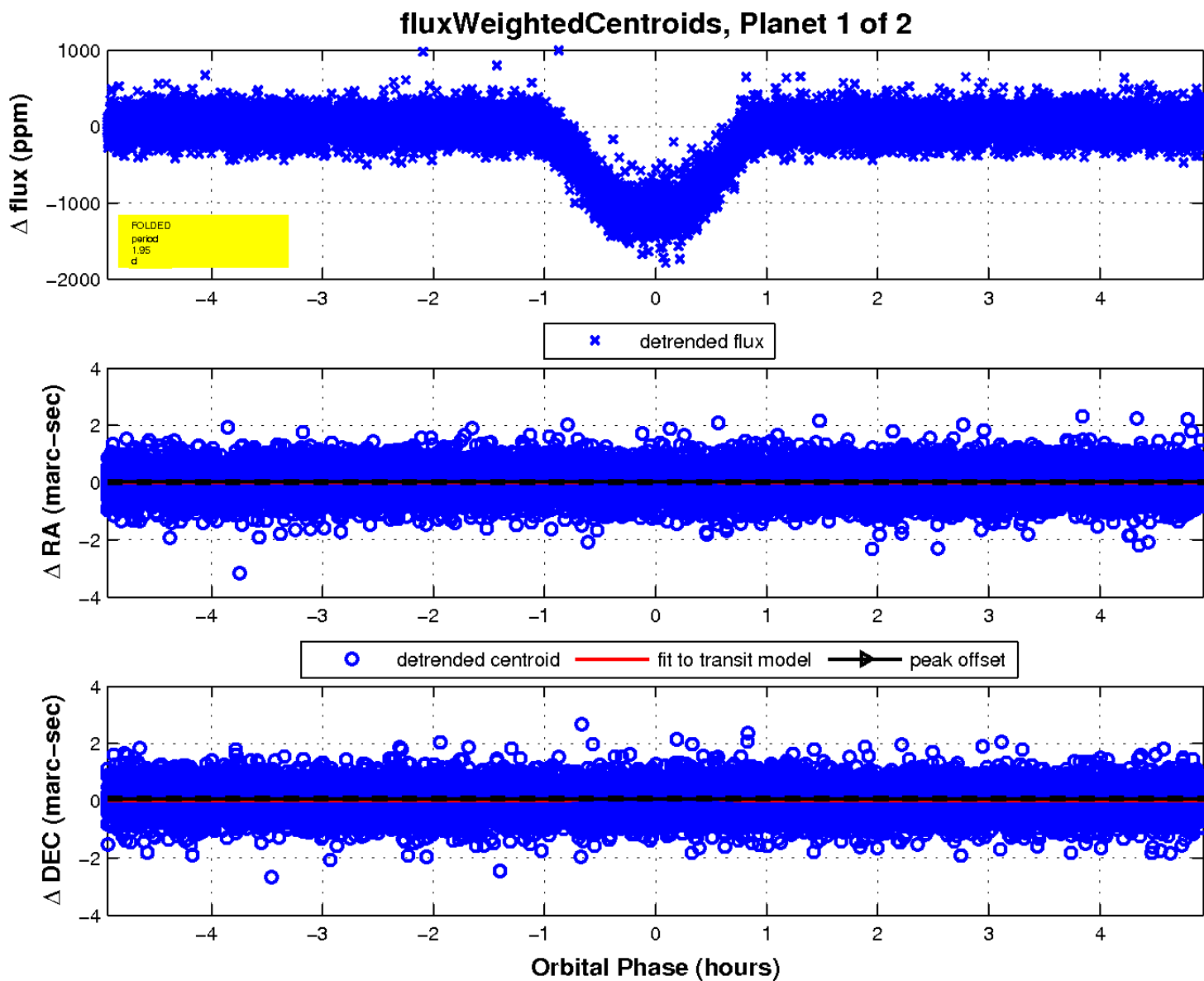
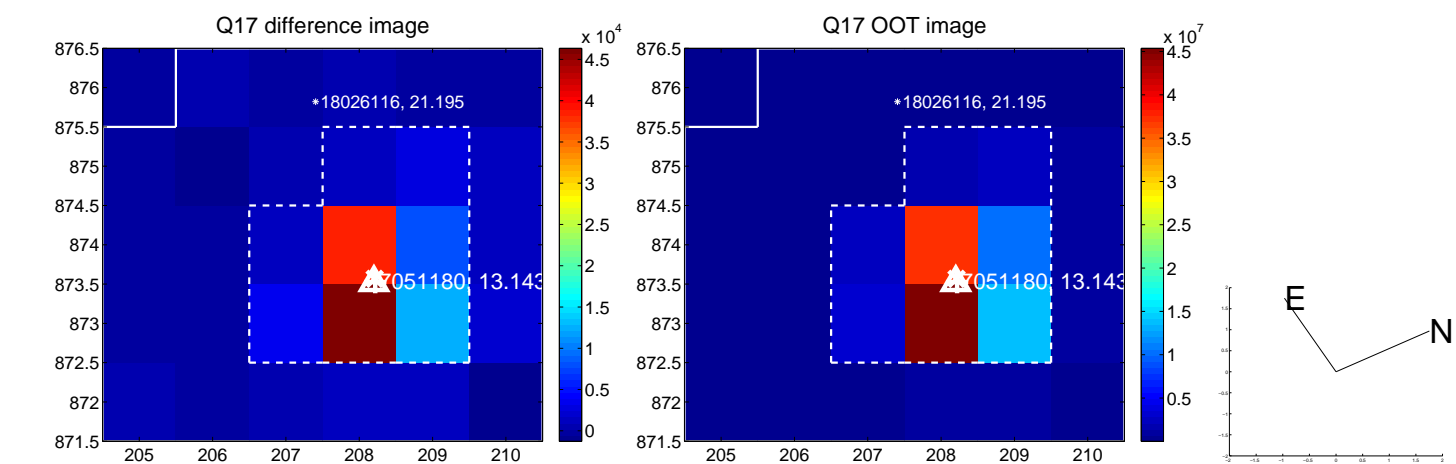


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



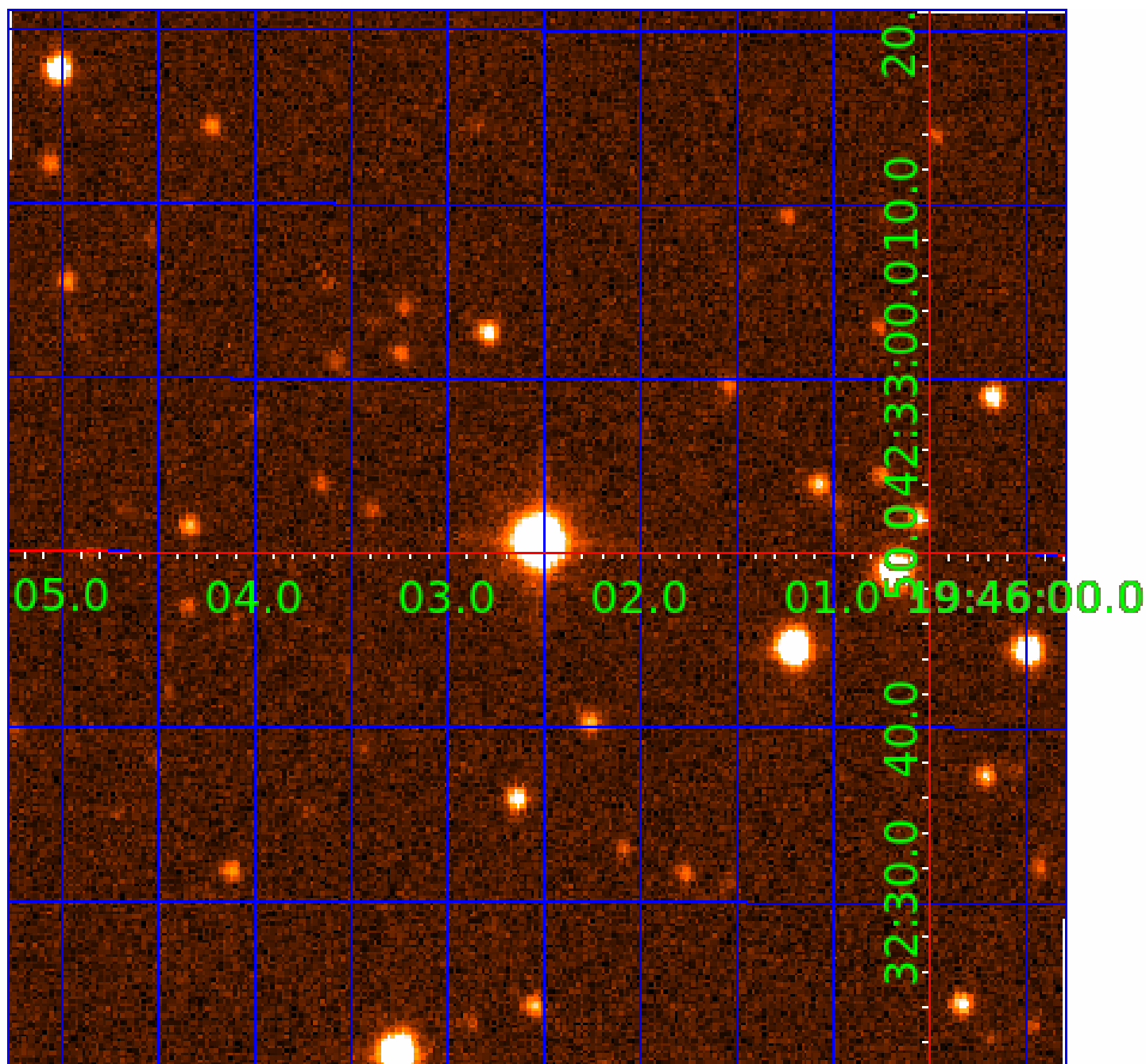


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 007051180

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007051180-01	OBS	0064.01	1.951086	132.178463	1128.2	1.645	248.5	246.6	2.43	5302	9.88	3827.18
007051180-02	OBS	No	1.951116	133.142431	52.3	1.794	12.7	12.5	2.43	5302	2.12	3827.10

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007051180-01	OBS	PC	1.00	0	1	0	0	MOD_SEC_DV—PLANET_OCCULT_DV—MOD_SEC_ALT—PLANET_OCCULT_ALT—HAS_SEC_TCE
007051180-02	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.

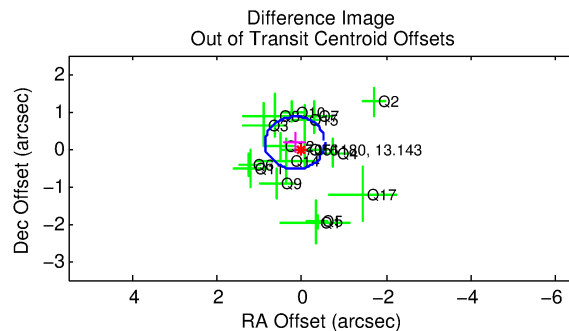
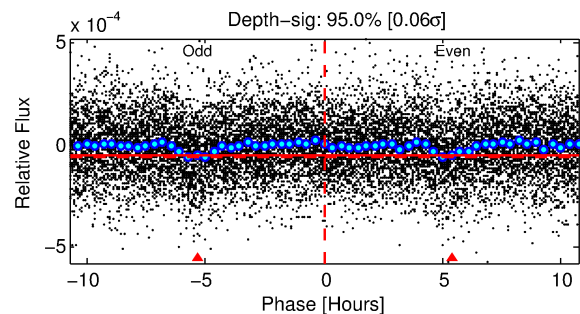
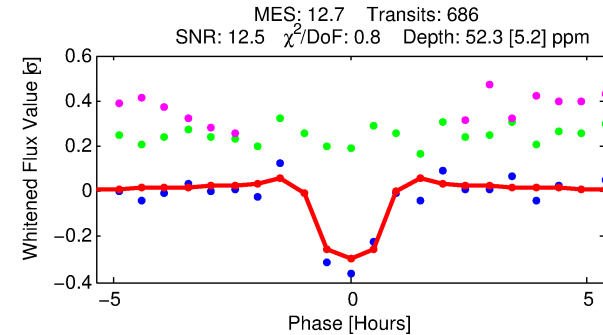
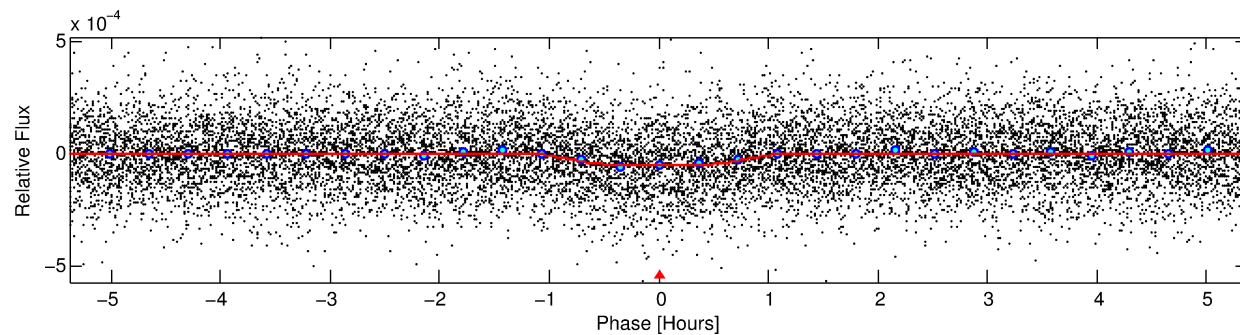
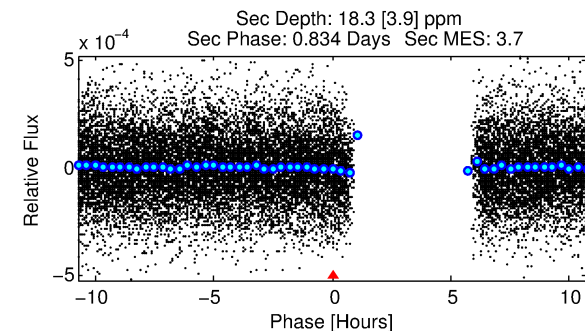
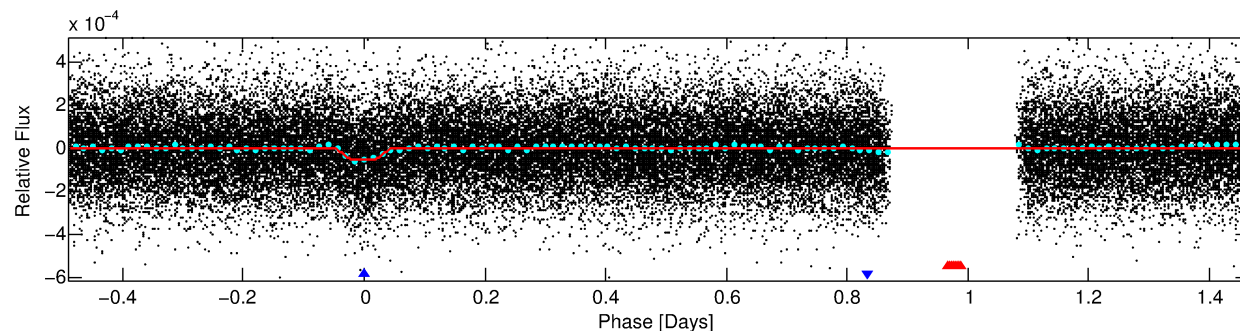
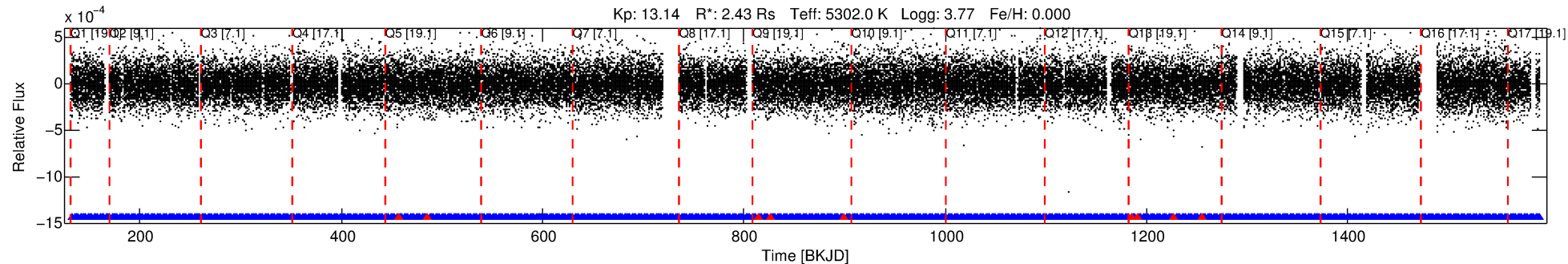
## Ephemeris Match Information For 007051180-02

No Significant Match Found

# DV One-Page Summary

KIC: 7051180 Candidate: 2 of 2 Period: 1.951 d  
KOI: K00064 Corr: No Ephemeris Match

Kp: 13.14 R\*: 2.43 Rs Teff: 5302.0 K Logg: 3.77 Fe/H: 0.000



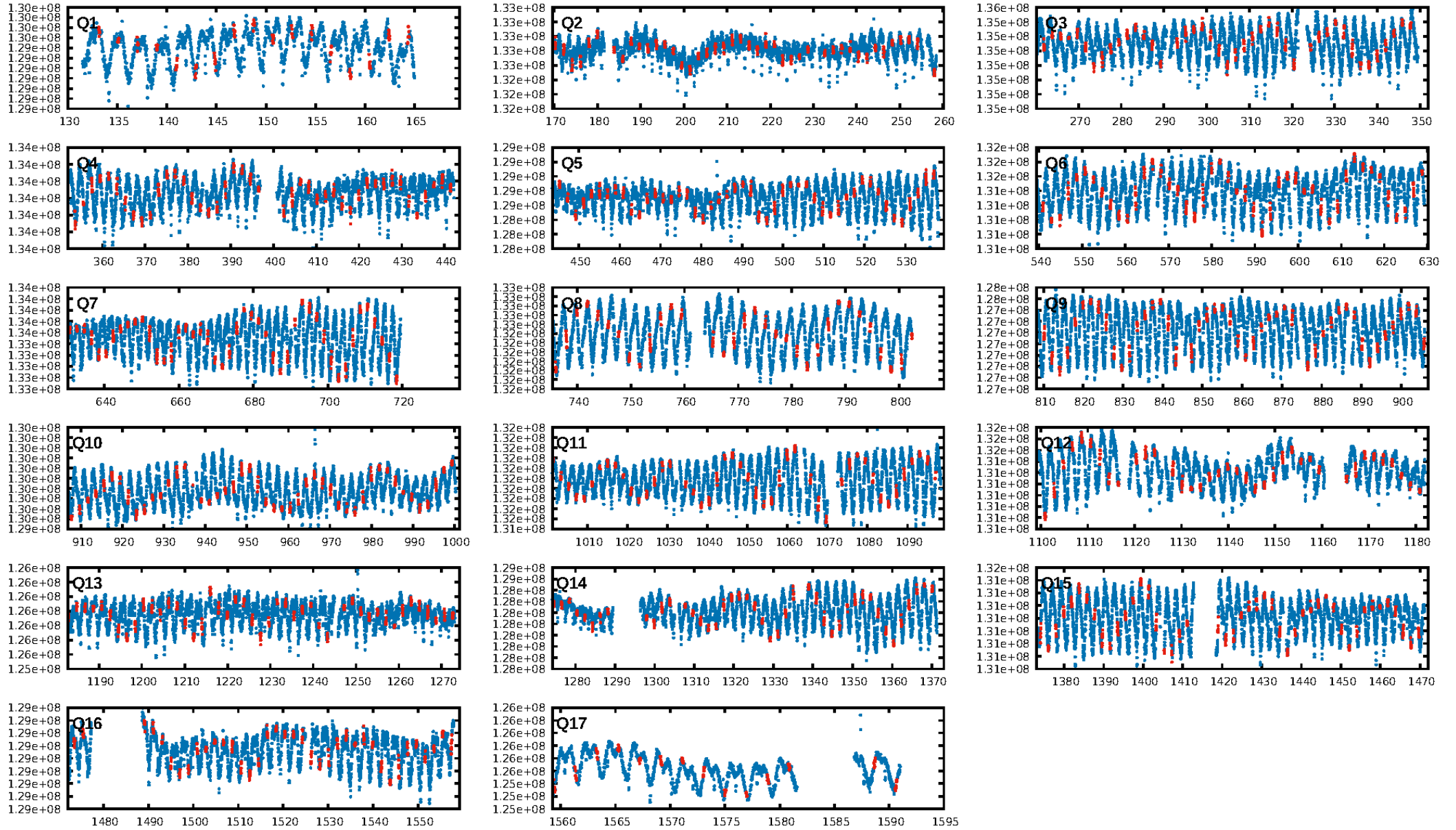
## DV Fit Results:

Period = 1.95112 [0.00001] d  
Epoch = 133.1424 [0.0019] BKJD  
Rp/R\* = 0.0080 [0.0036]  
a/R\* = 3.87 [7.00]  
b = 0.90 [0.42]  
Seff = 3827.10 [531.32]  
Teff = 2006 [70] K  
Rp = 2.12 [0.99] Re  
a = 0.0330 [0.0031] AU  
Ag = 2.43 [2.27] [0.63σ]  
Teffp = 3874 [897] K [2.08σ]

## DV Diagnostic Results:

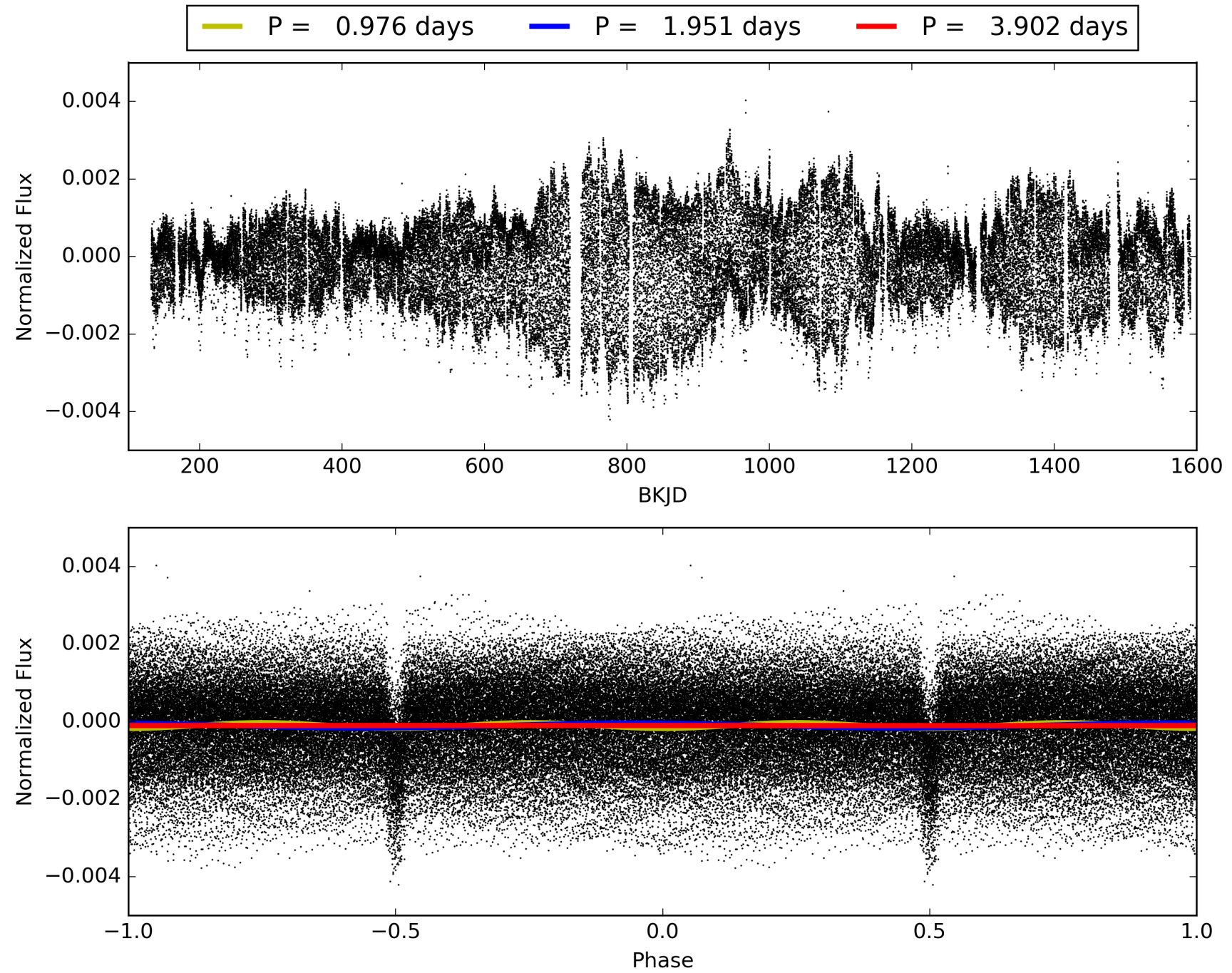
ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 9.63e-34  
RollingBand-fgt: 0.99 [646/655]  
GhostDiagnostic-chr: -2.317  
Centroid-sig: 2.0%  
Centroid-so: 0.949 arcsec [1.63σ]  
OotOffset-rm: 0.224 arcsec [0.96σ]  
KicOffset-rm: 0.077 arcsec [0.33σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 1.00 [16/16]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 007051180-02, PDC Light Curves



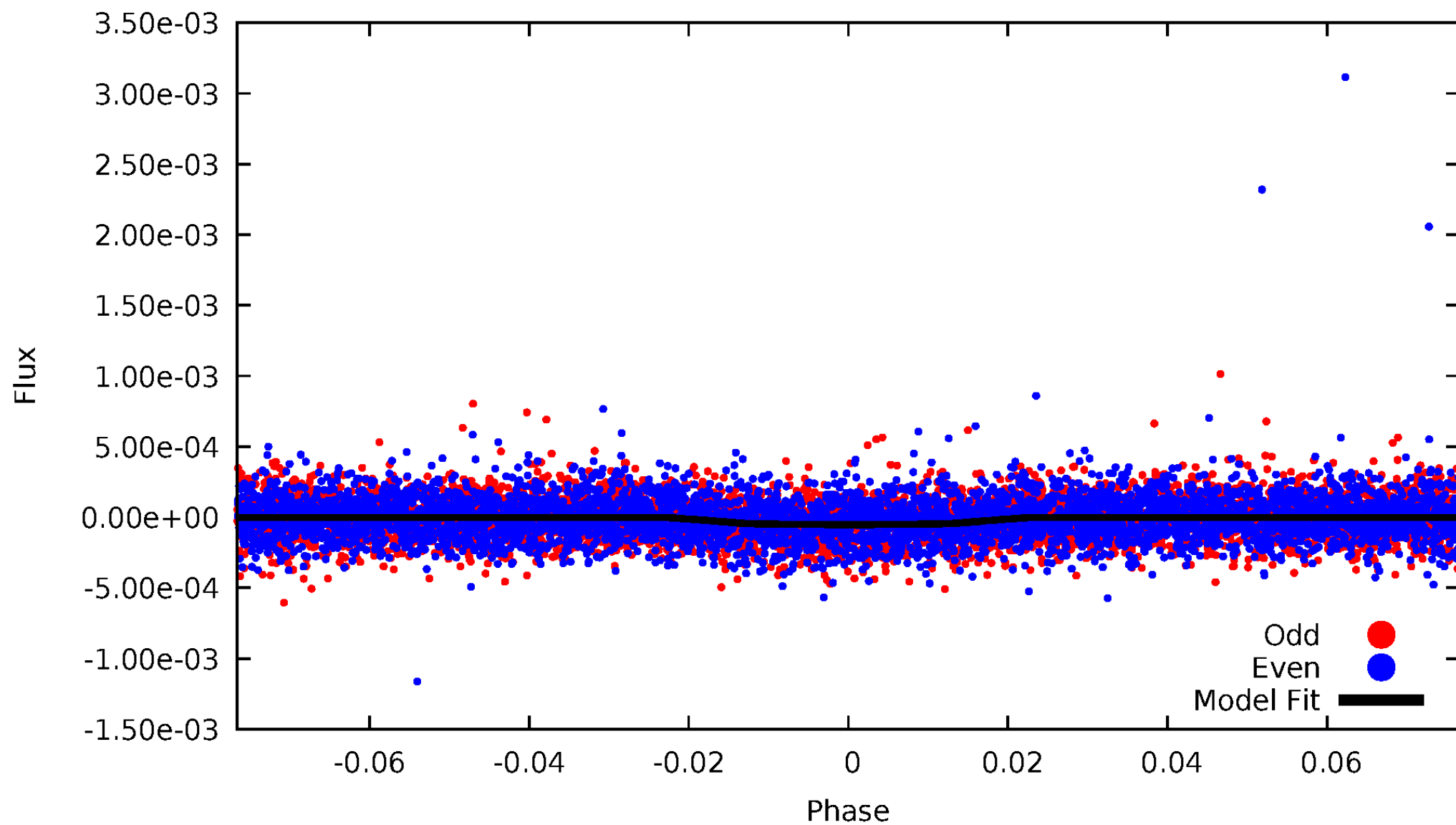


TCE 007051180-02



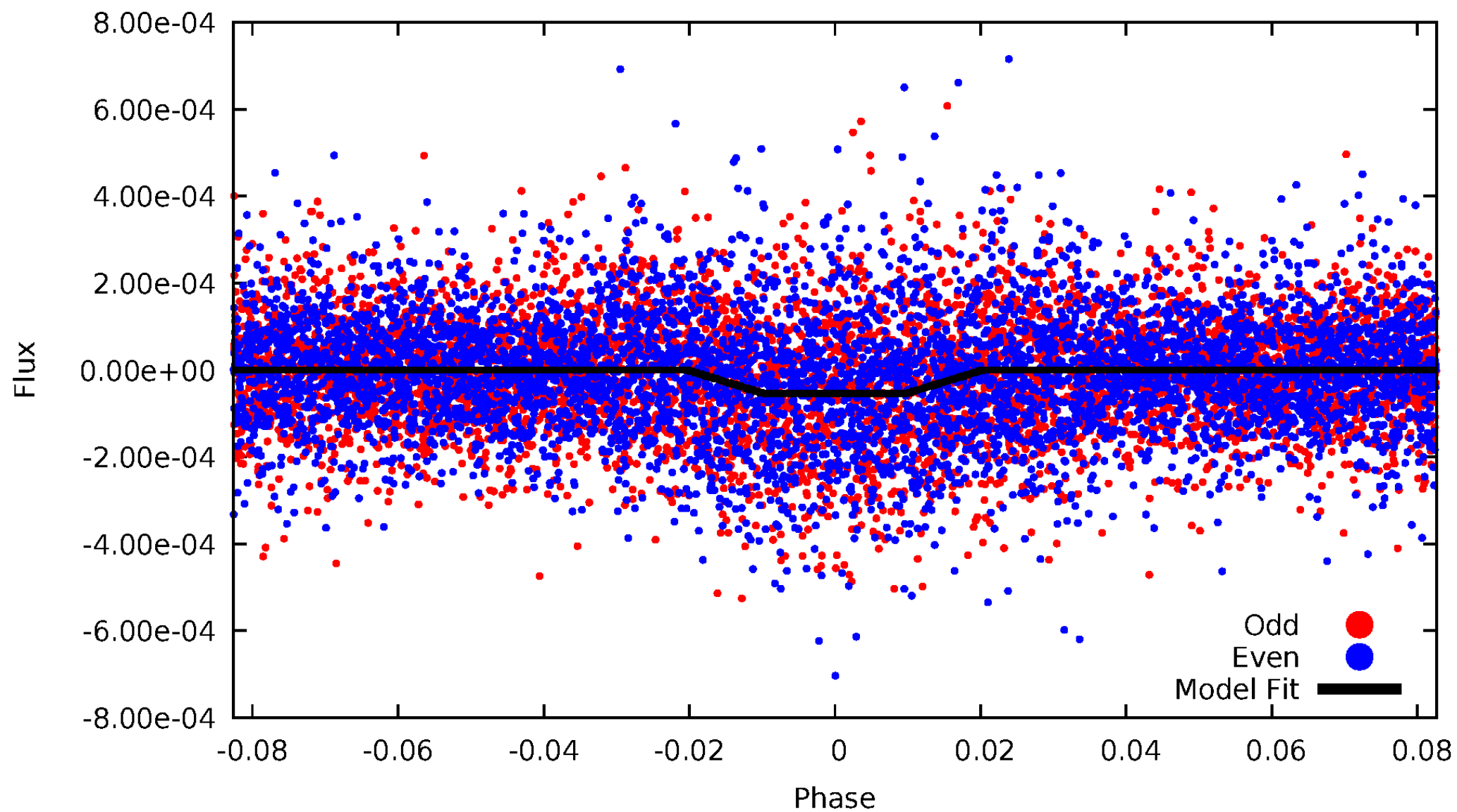
# DV Odd/Even

TCE 007051180-02



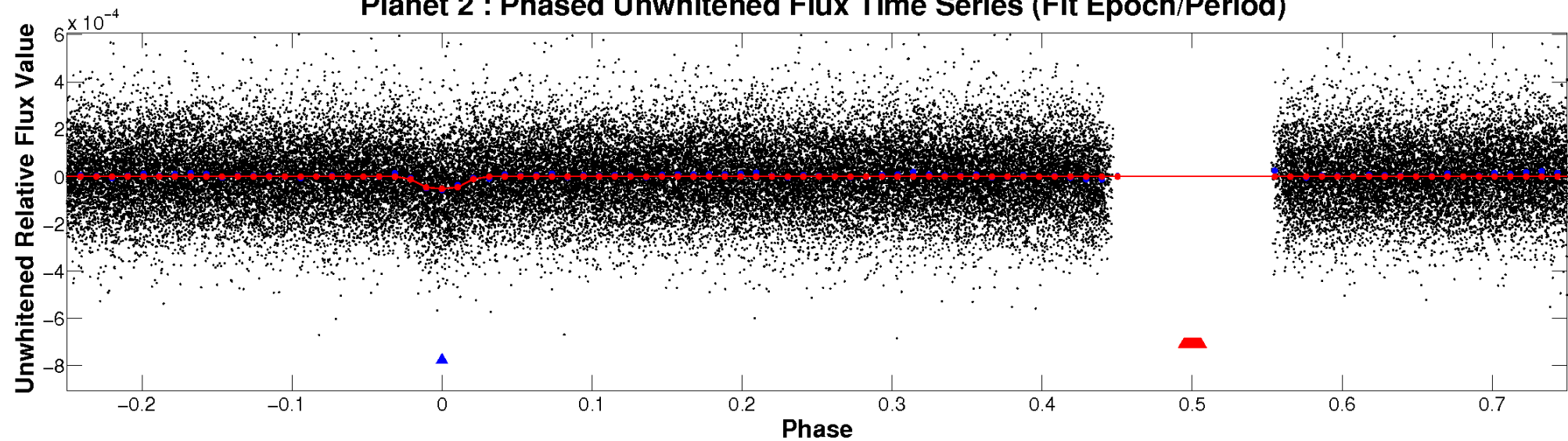
# ALT Odd/Even

TCE 007051180-02

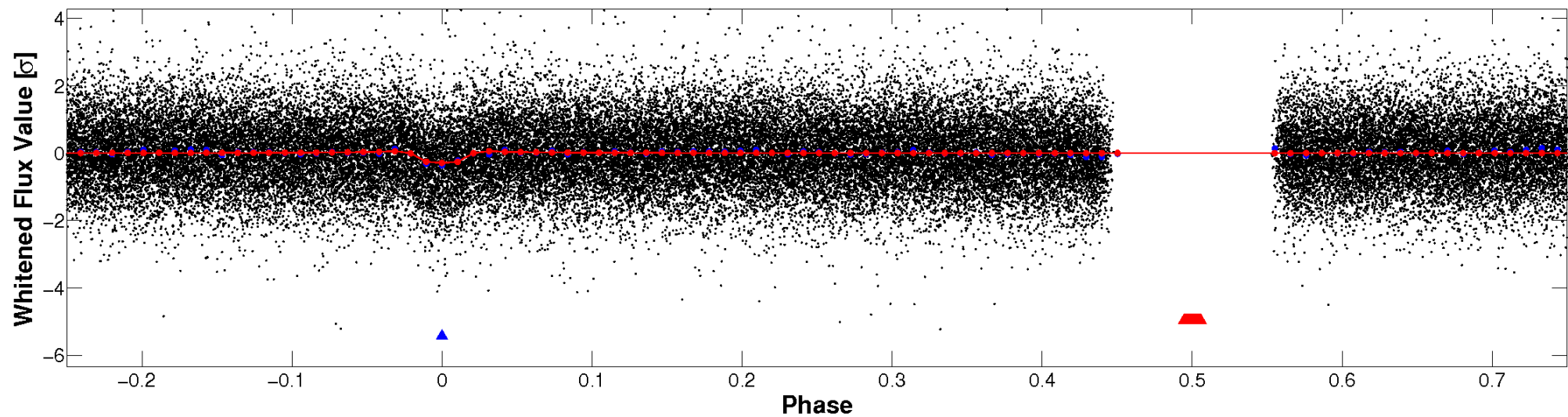


# Non-Whitened Vs. Whitened Light Curve

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

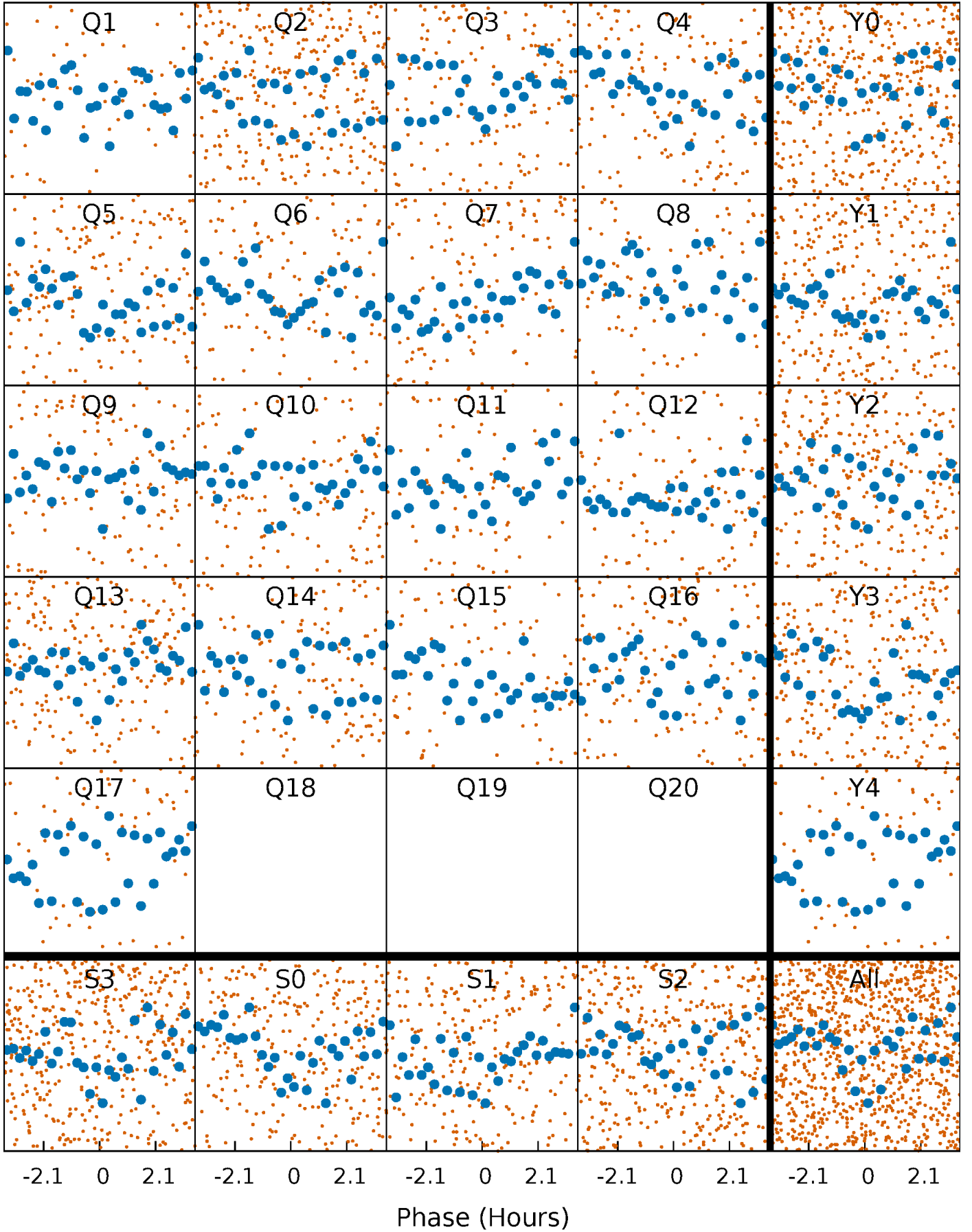


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

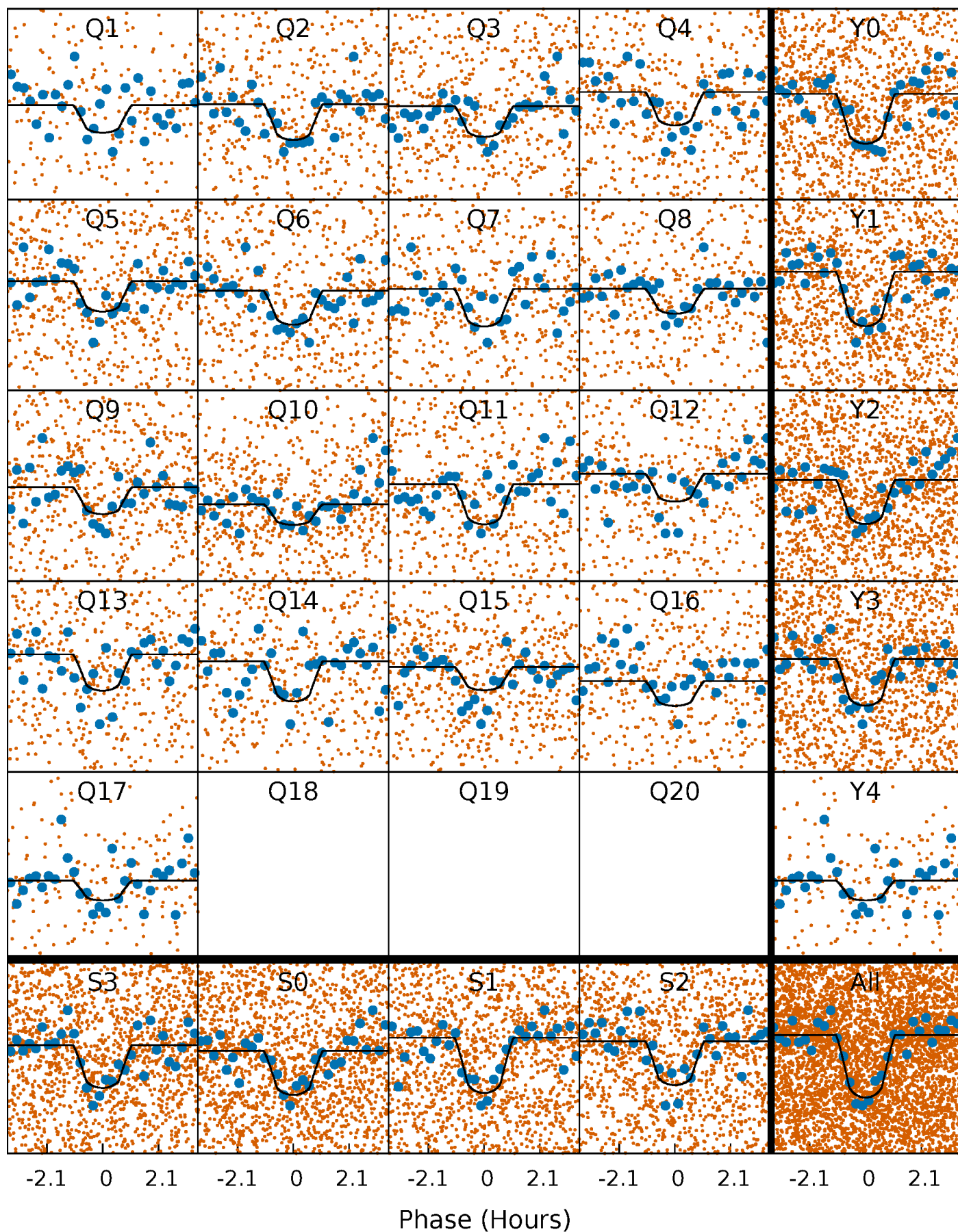
TCE 007051180-02 P= 1.951116 Days  $T_0=133.142431$  (BKJD)





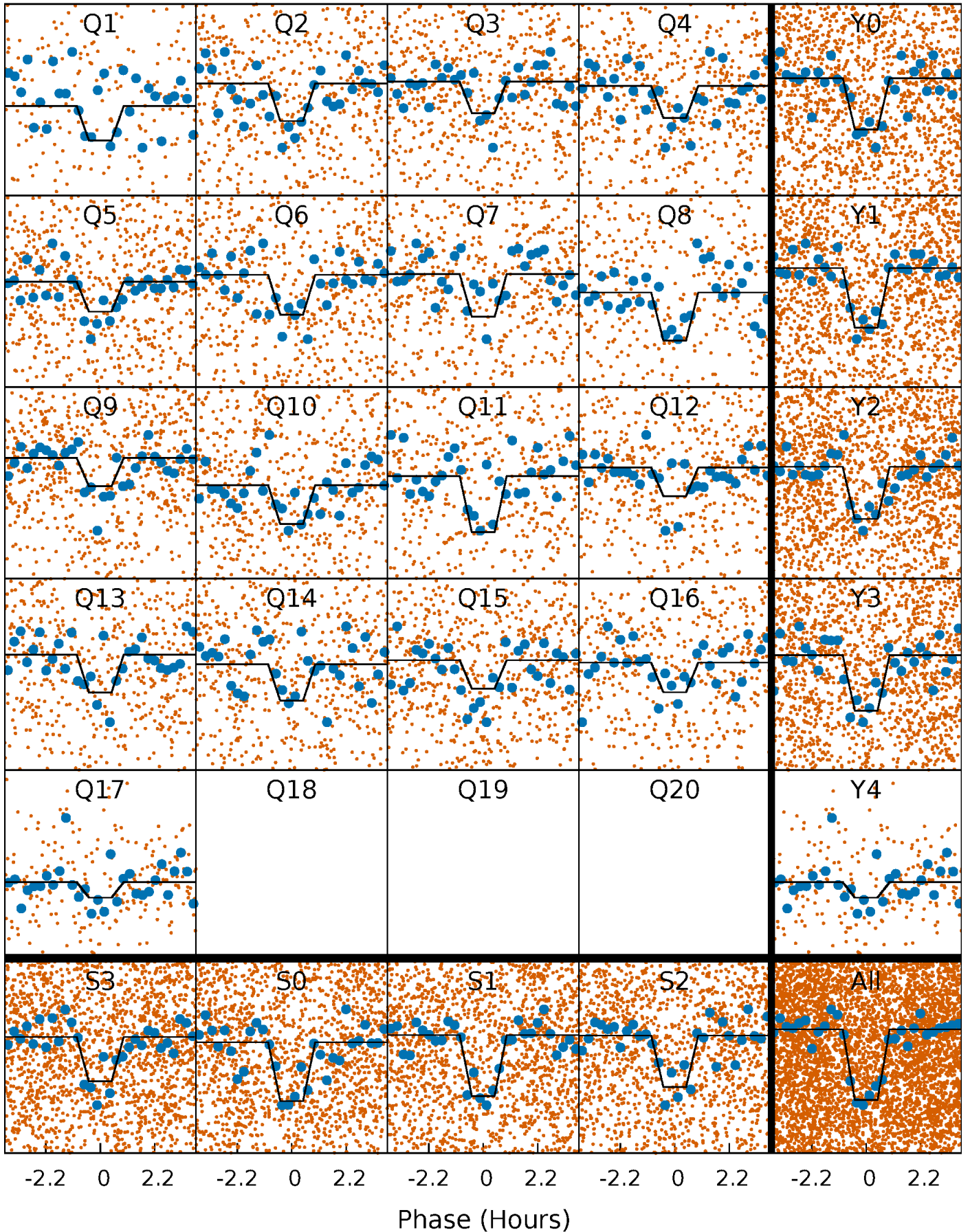
# DV Quarter-Phased Transit Curves

TCE 007051180-02 P= 1.951116 Days  $T_0=133.142431$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

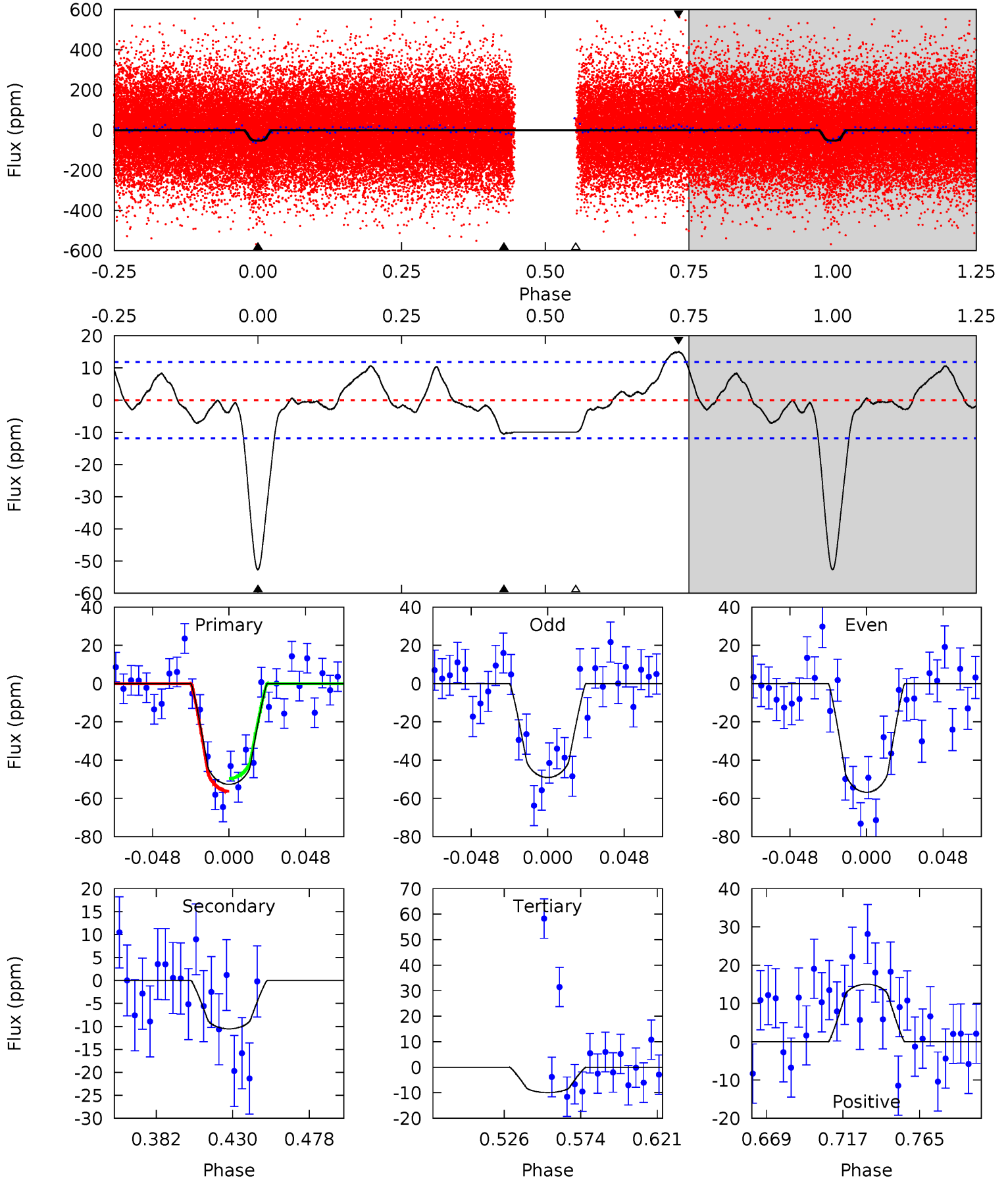
TCE 007051180-02 P= 1.951111 Days  $T_0=133.143230$  (BKJD)



# DV Model-Shift Uniqueness Test

007051180-02, P = 1.951116 Days, E = 131.191315 Days

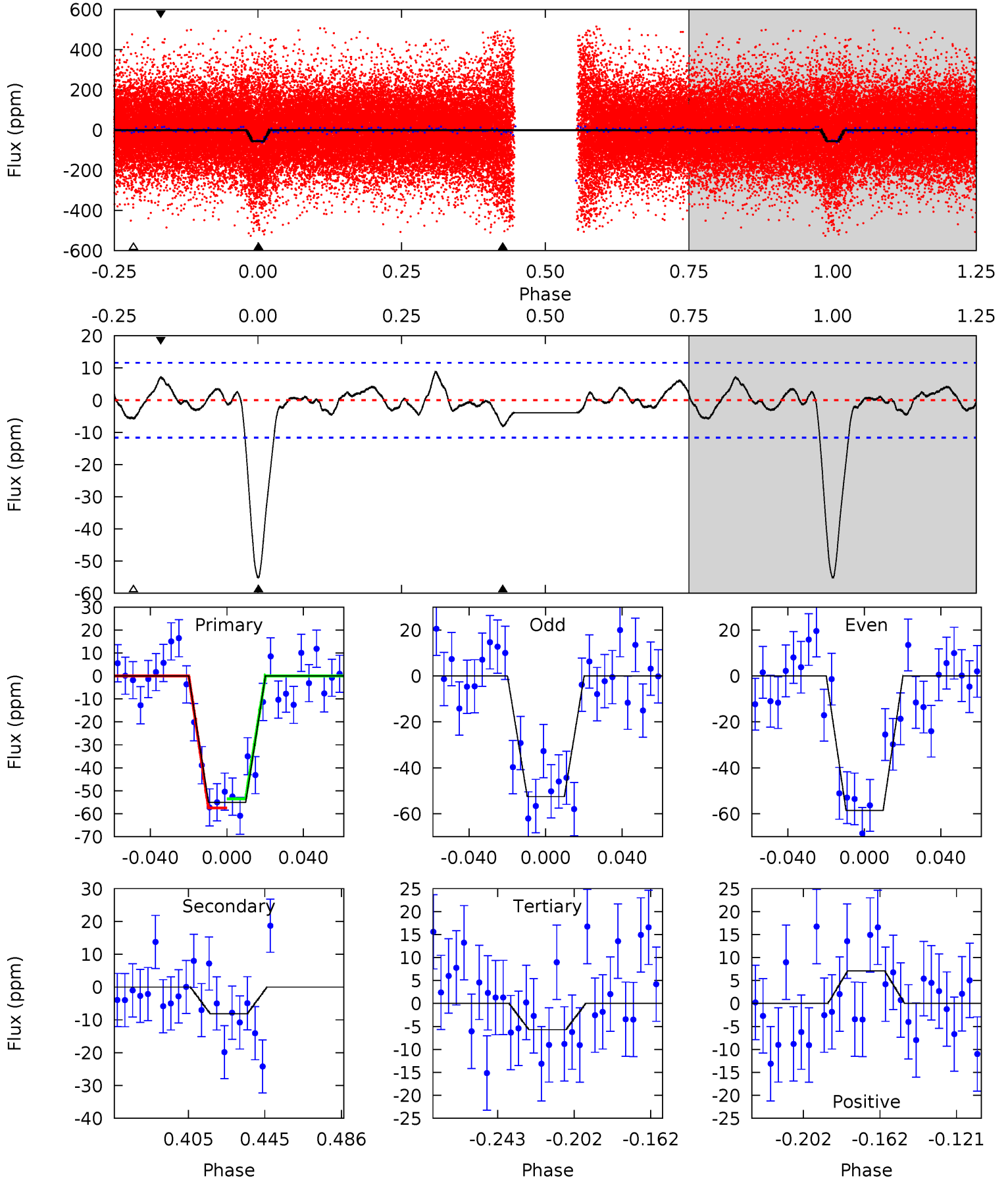
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
21.0	4.19	3.95	5.98	4.72	1.98	2.04	17.0	15.0	0.24	-1.79	1.54	1.02	0.22	1.34



# Alt Model-Shift Uniqueness Test

007051180-02, P = 1.951111 Days, E = 131.192119 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
22.5	3.32	2.33	2.90	4.75	2.05	1.15	20.2	19.6	0.99	0.42	1.19	1.13	0.14	0.84





### Stellar Parameters For KIC 007051180

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5302^{+71}_{-87}$	$3.768^{+0.060}_{-0.045}$	$0.000^{+0.100}_{-0.100}$	$2.426^{+0.181}_{-0.293}$	$1.258^{+0.070}_{-0.151}$	$0.124^{+0.037}_{-0.018}$
	+1%/-2%	+2%/-1%	+inf%/-inf%	+7%/-12%	+6%/-12%	+30%/-14%
Source	SPE8	AST8	SPE8	DSEP		

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

### Secondary Eclipse Parameters for KIC 007051180-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-11 \pm 3$	$2.11^{+0.93}_{-0.93}$	$2796^{+68}_{-71}$	$3595^{+925}_{-593}$	$1.407^{+2.983}_{-0.769}$
Alt.	$-8 \pm 2$	$1.93^{+0.91}_{-0.89}$	$2798^{+71}_{-75}$	$3519^{+1033}_{-669}$	$1.278^{+3.180}_{-0.749}$

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

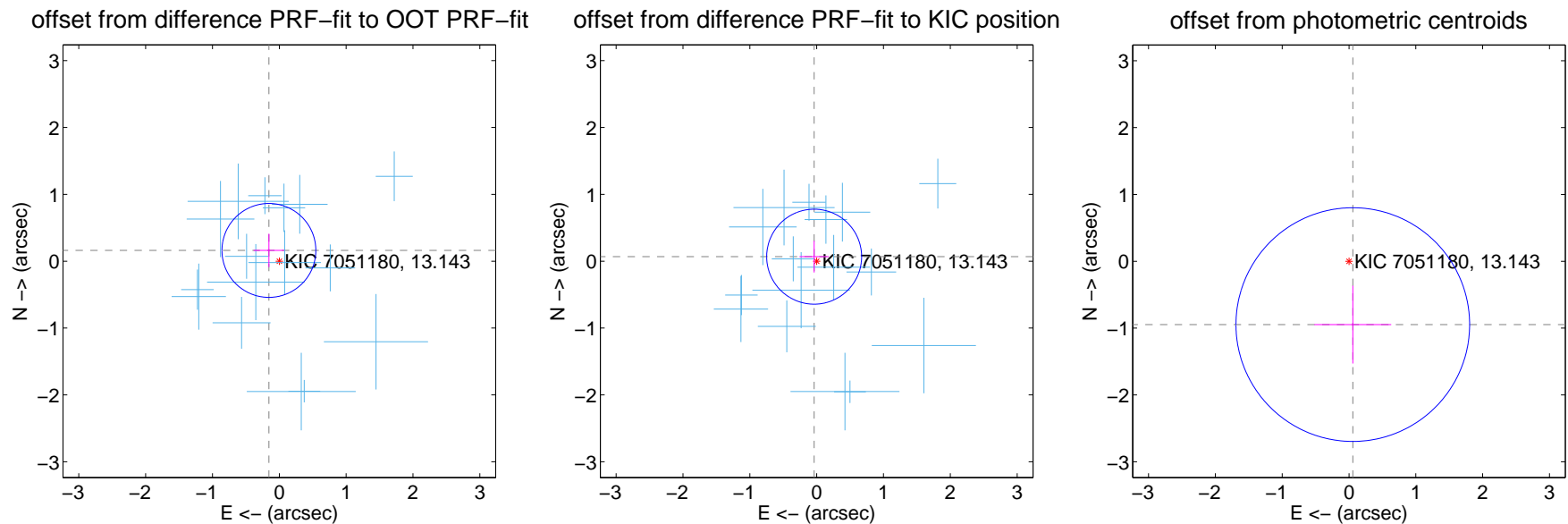
## DV Centroid Data

Supplemental centroid analysis for 007051180-02. Kepler magnitude: 13.14. Transit SNR 12.49

There are 16 quarters with good PRF difference image offsets

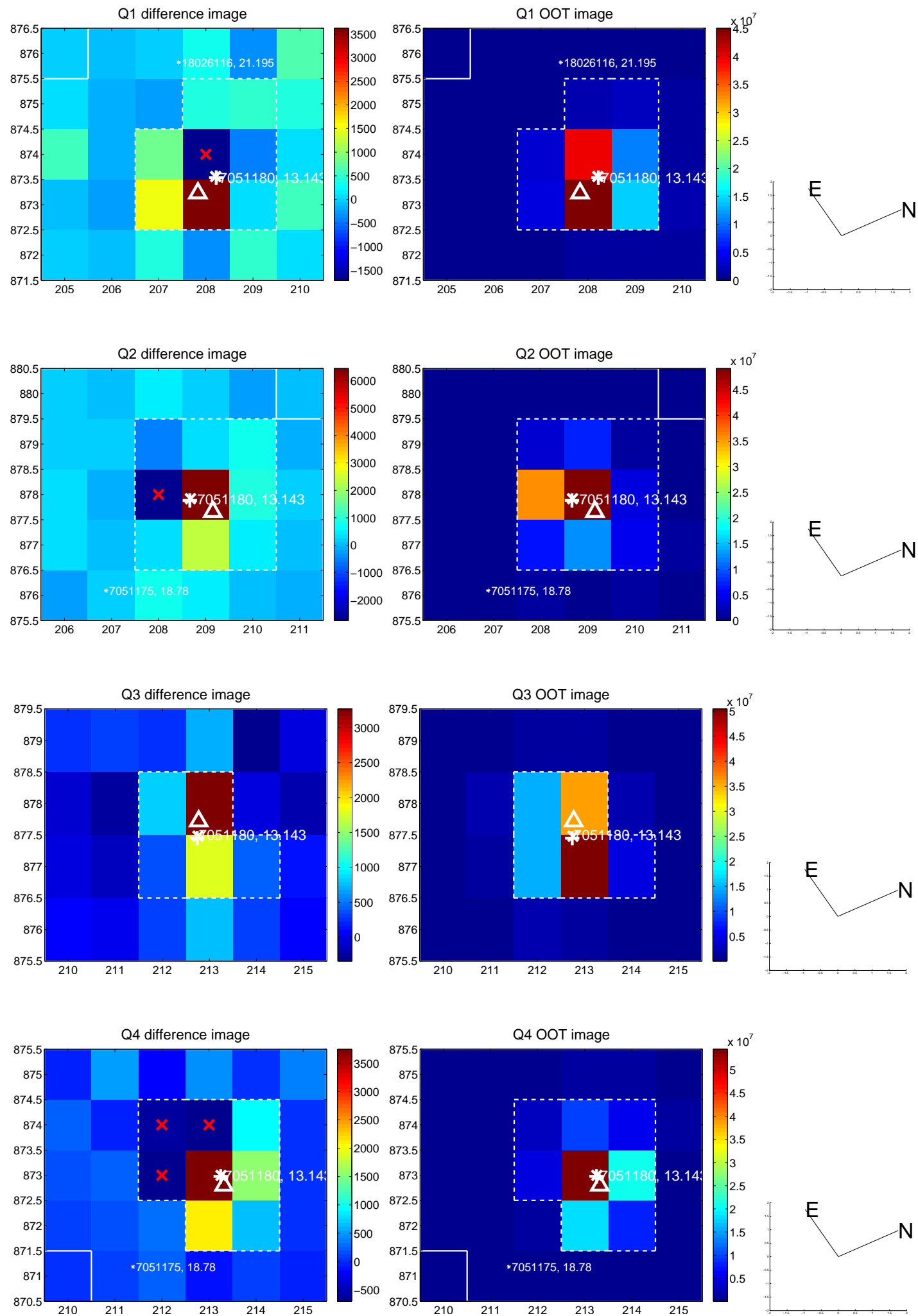
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.224 \pm 0.234$	0.96	$0.156 \pm 0.229$	$0.161 \pm 0.250$
PRF-fit source offset from KIC position	$0.077 \pm 0.237$	0.33	$0.037 \pm 0.218$	$0.068 \pm 0.237$
photometric centroid source offset	$0.95 \pm 0.58$	1.63	$-0.06 \pm 0.58$	$-0.95 \pm 0.58$



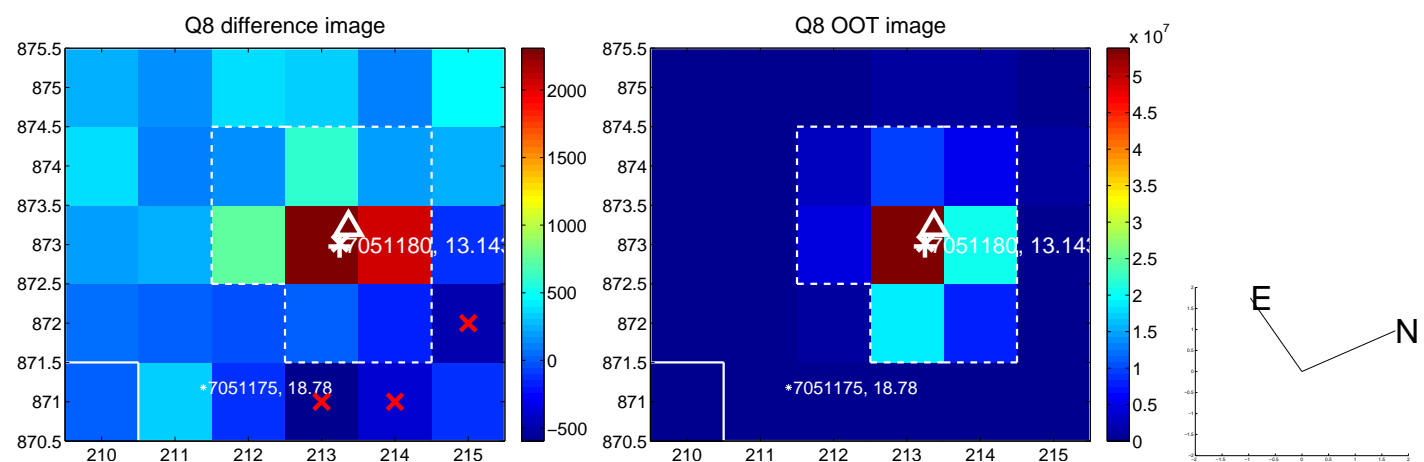
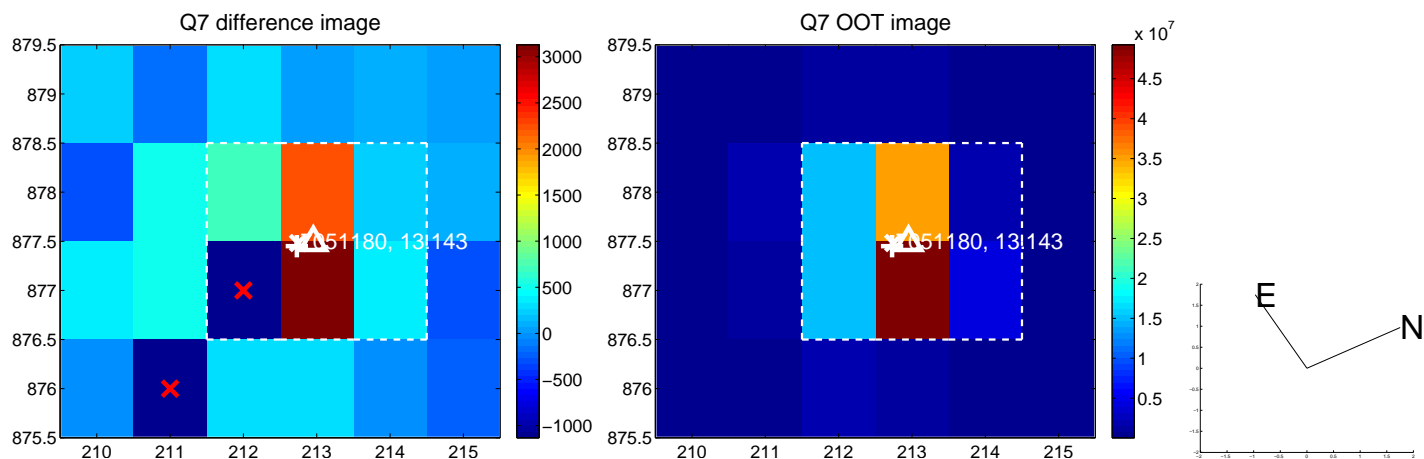
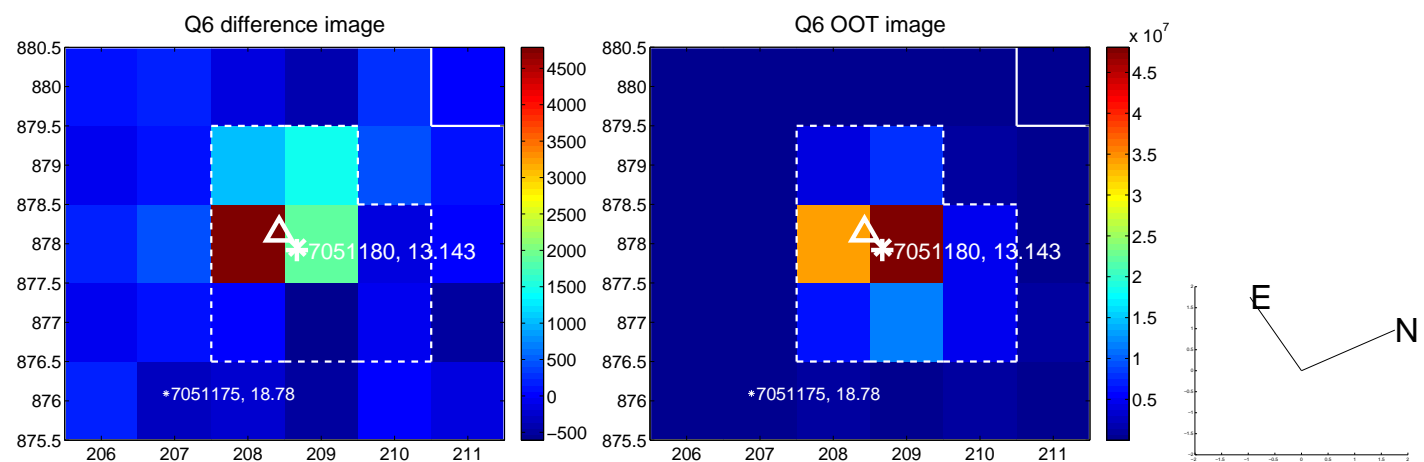
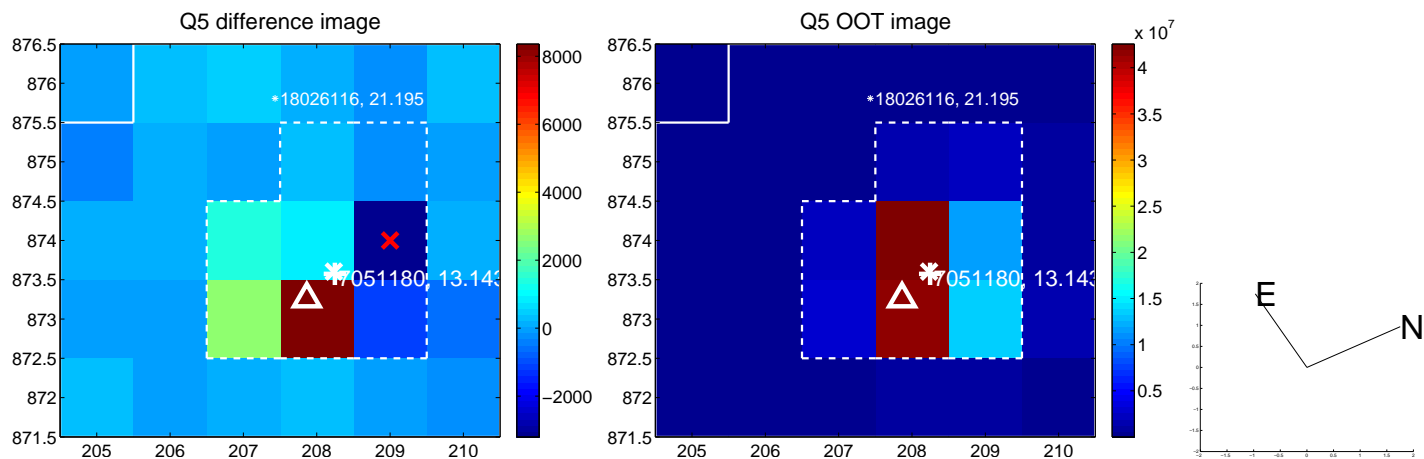
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

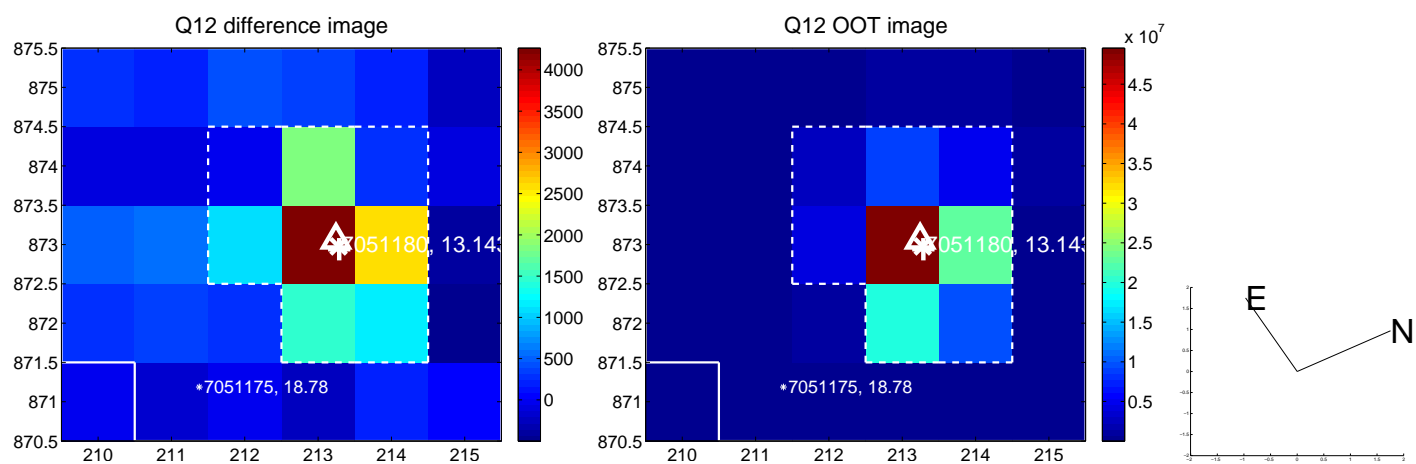
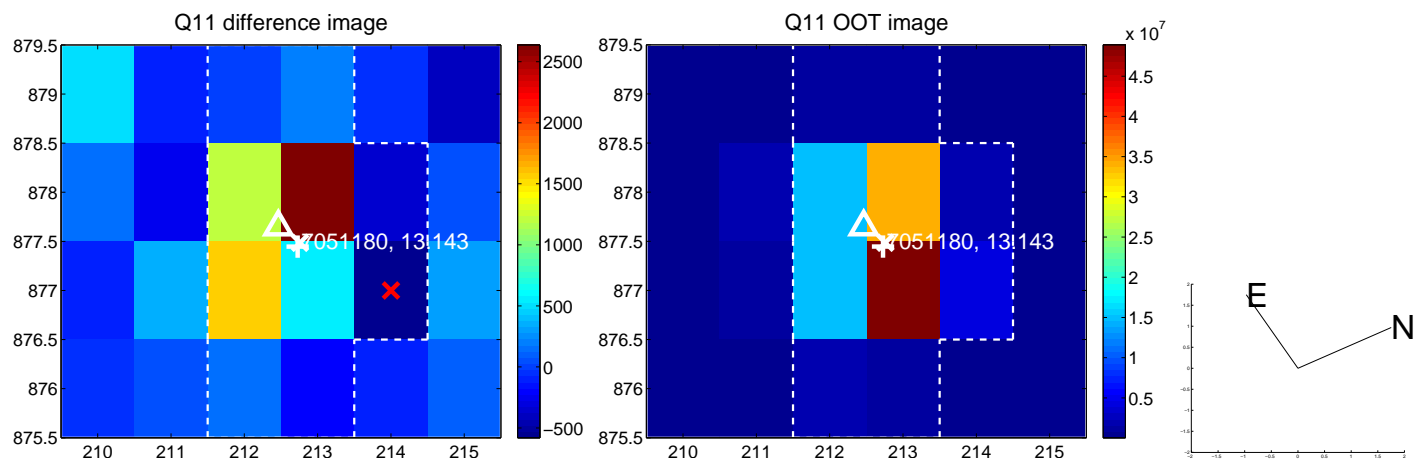
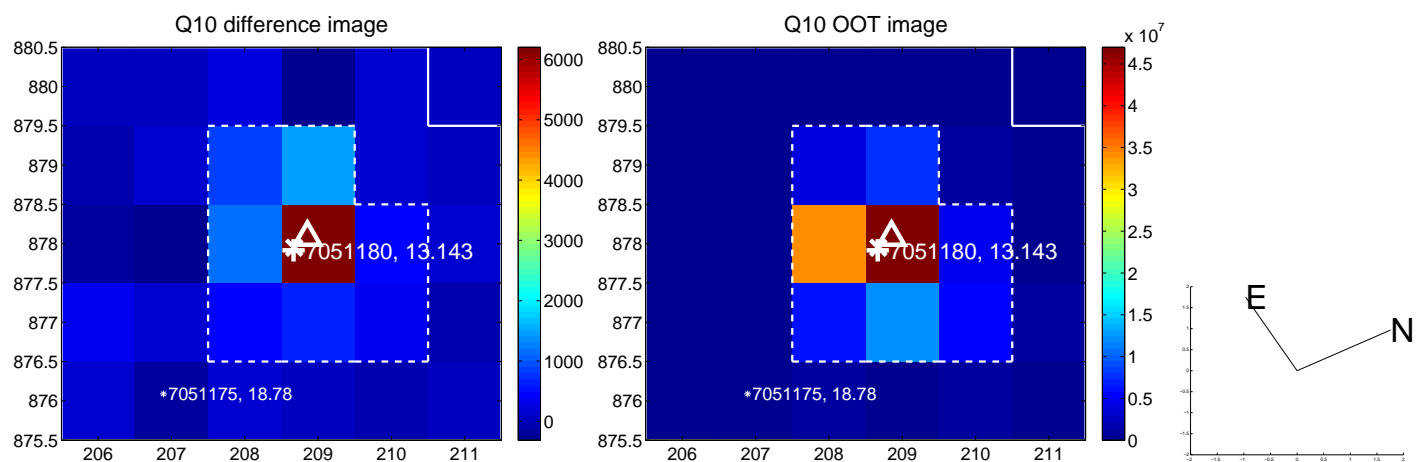
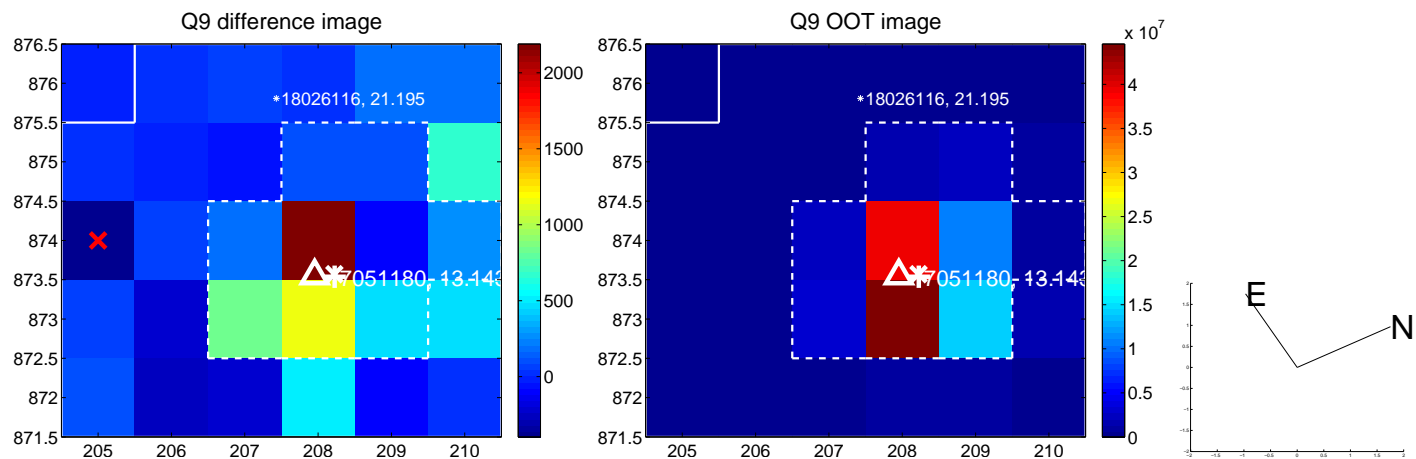




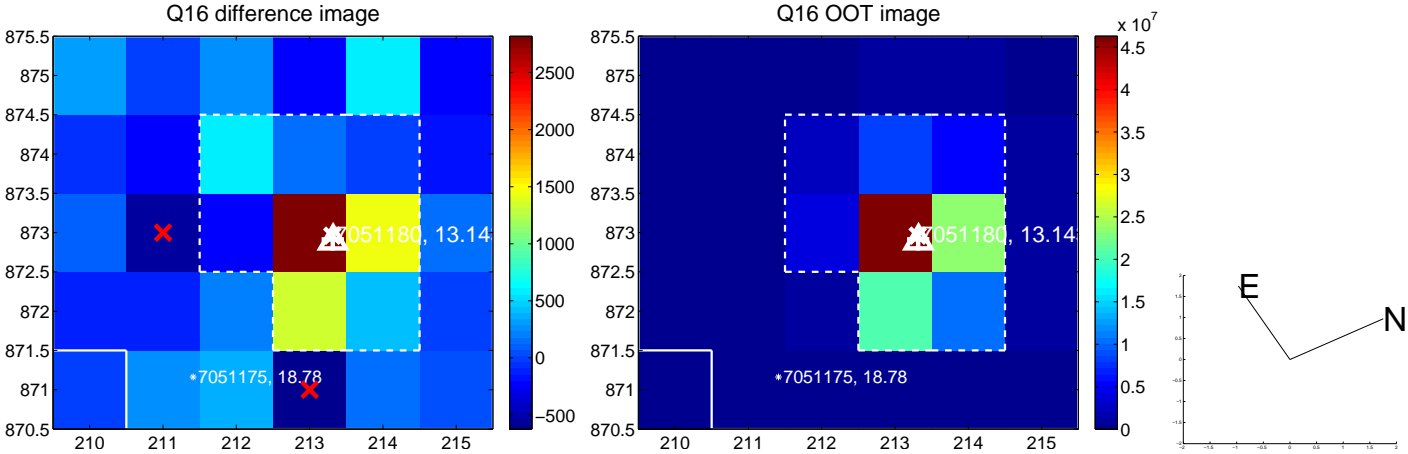
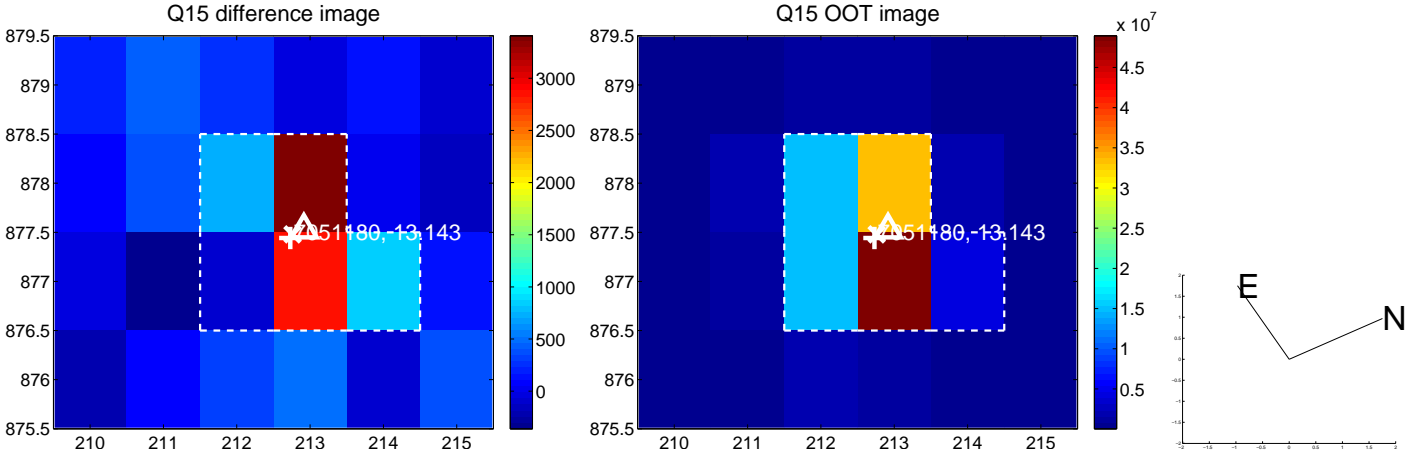
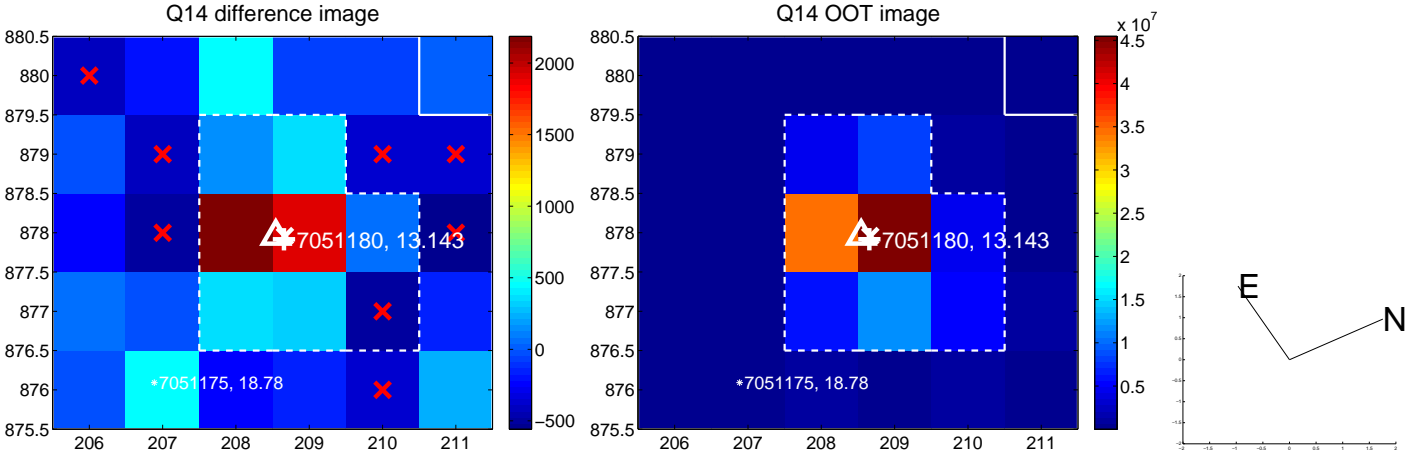
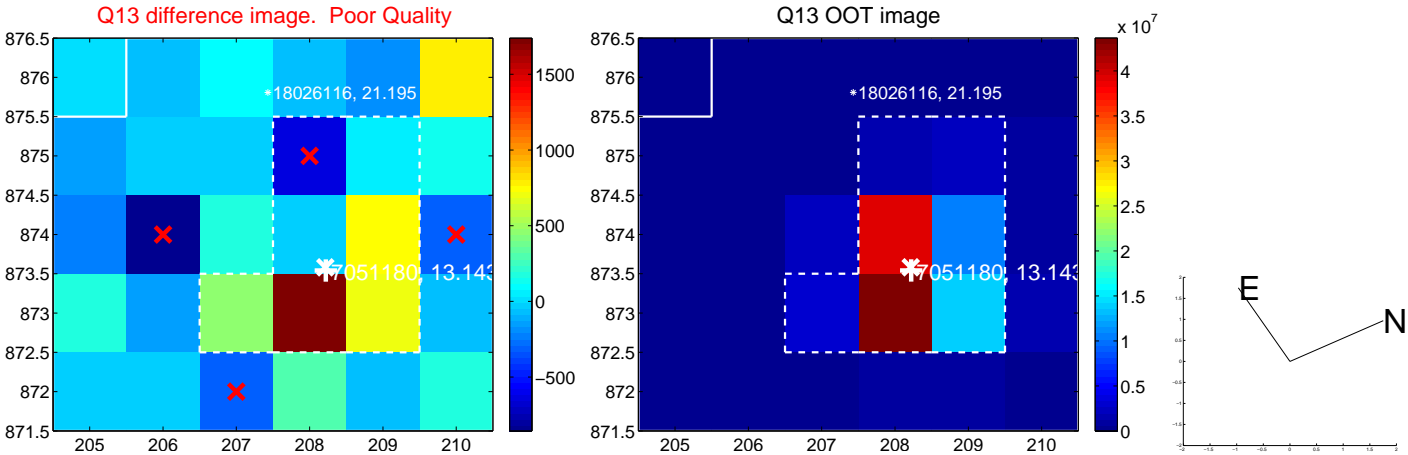
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



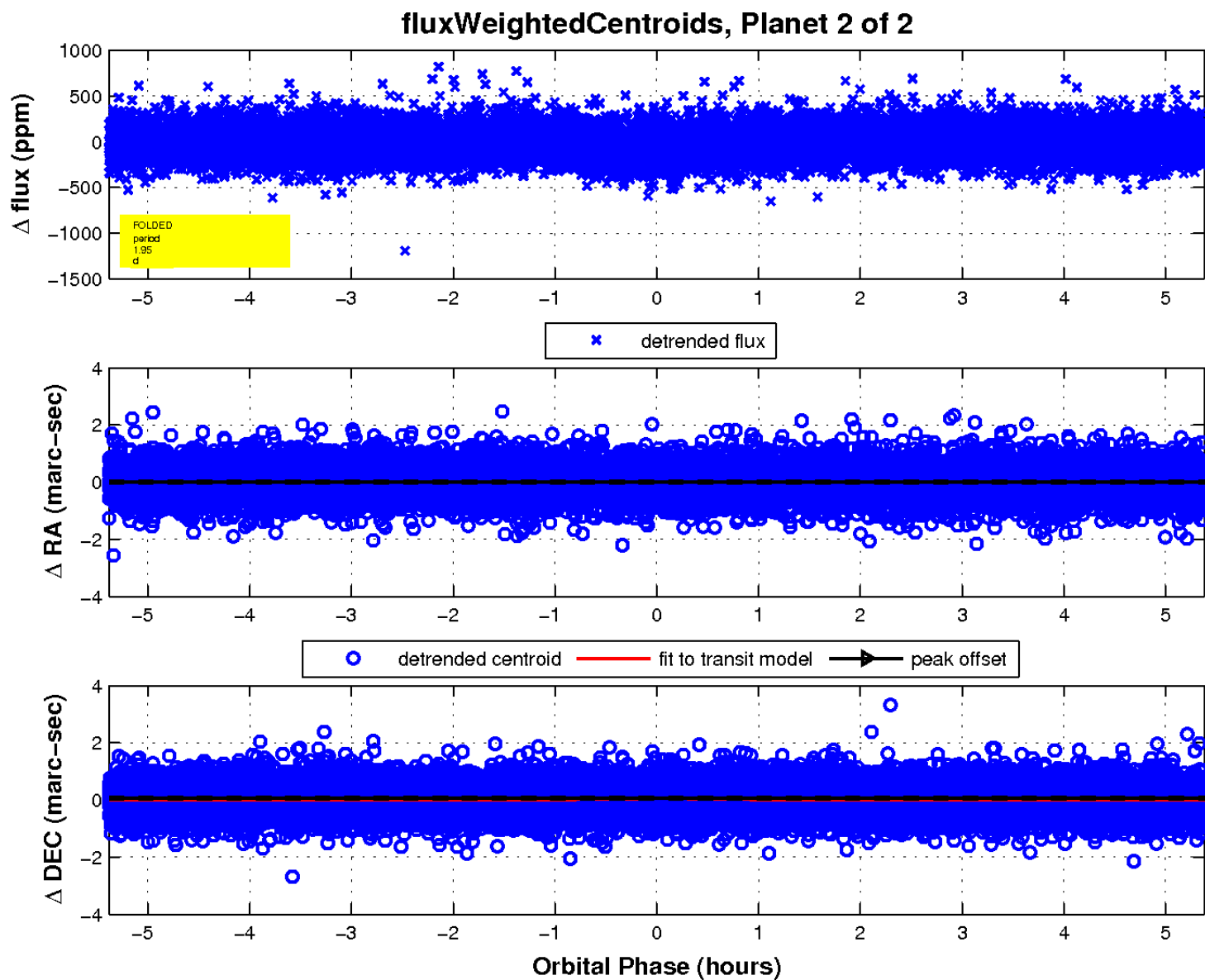
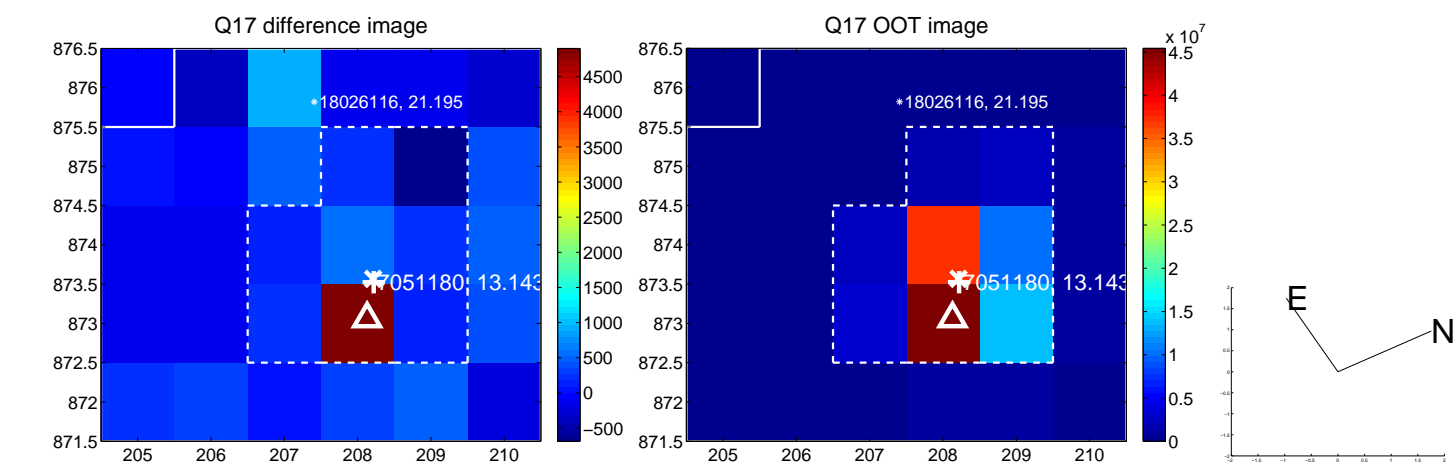
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



UKIRT Image

Declination

