

# KIC 008504570

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008504570-01	OBS	7048.01	4.007704	134.801034	167746.3	5.481	6964.2	6556.5	1.63	7162	99.53	1974.57
008504570-02	OBS	No	4.007708	132.796836	50865.3	5.383	2119.3	1717.3	1.63	7162	42.24	1974.57

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008504570-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
008504570-02	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.

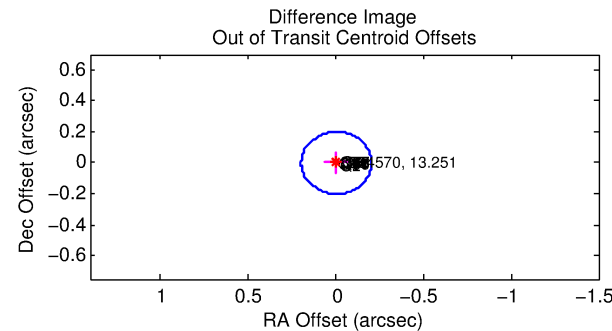
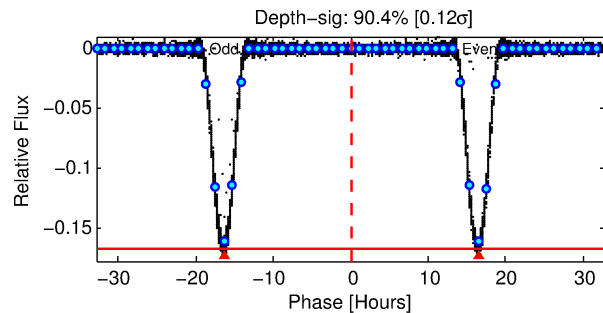
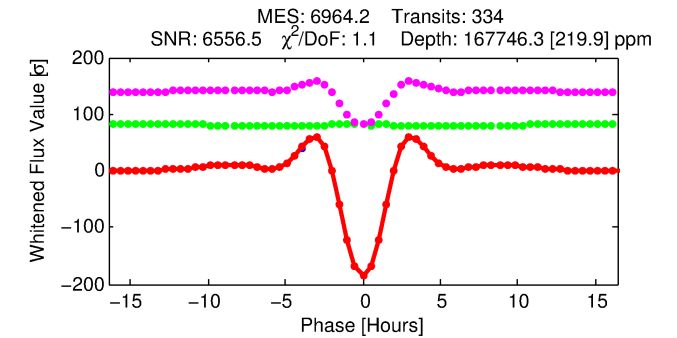
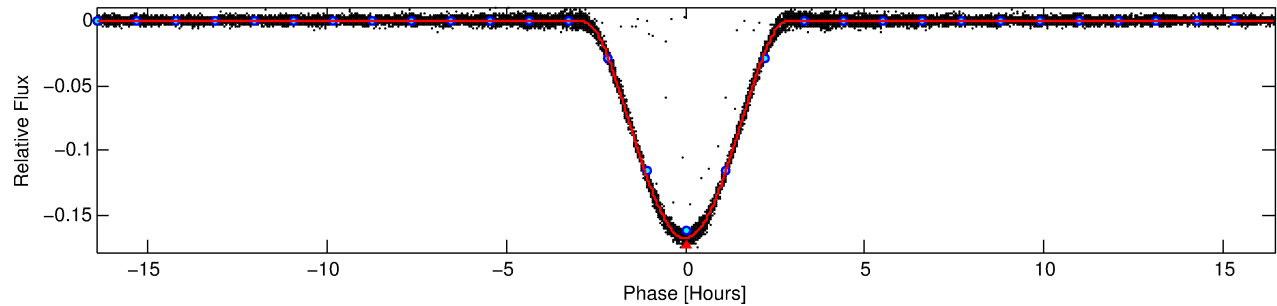
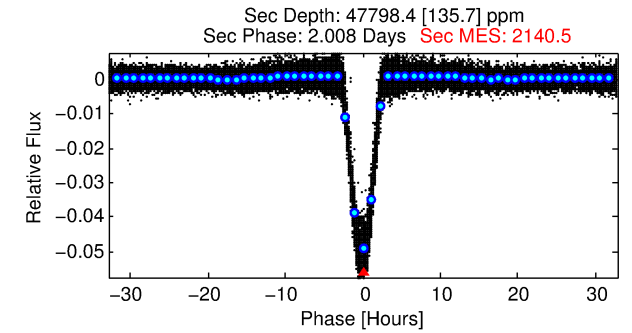
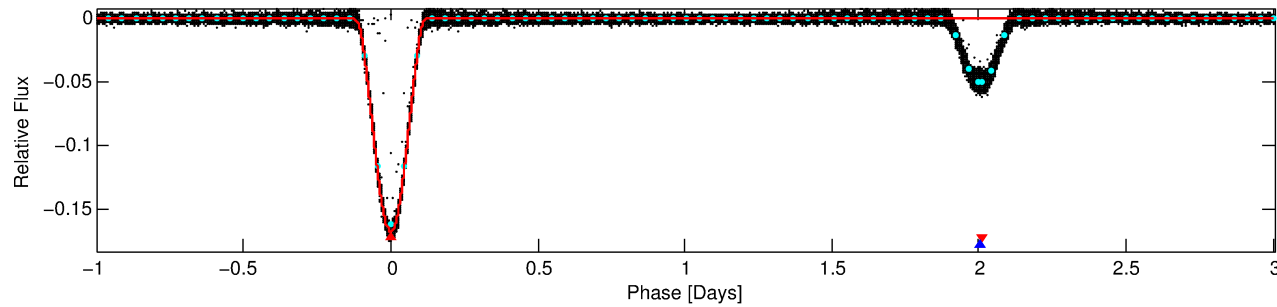
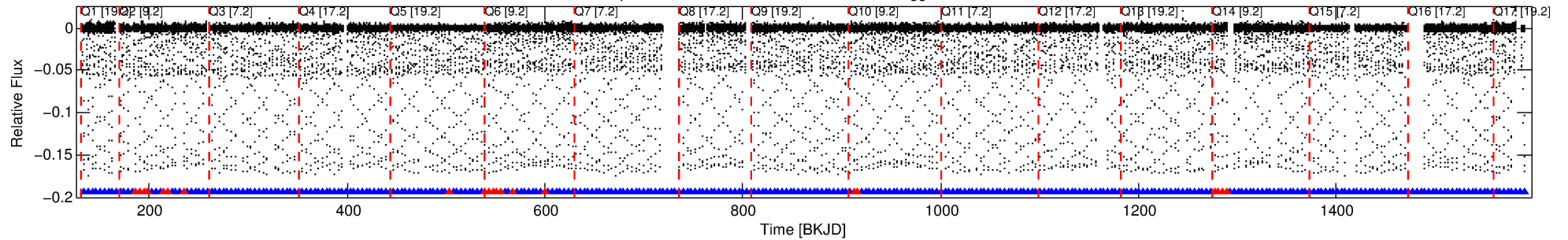
## Ephemeris Match Information For 008504570-01

No Significant Match Found

# DV One-Page Summary

KIC: 8504570 Candidate: 1 of 2 Period: 4.008 d  
KOI: K07048.01 Corr: 0.997

Kp: 13.25 R\*: 1.63 Rs Teff: 7162.0 K Logg: 4.18 Fe/H: -0.020



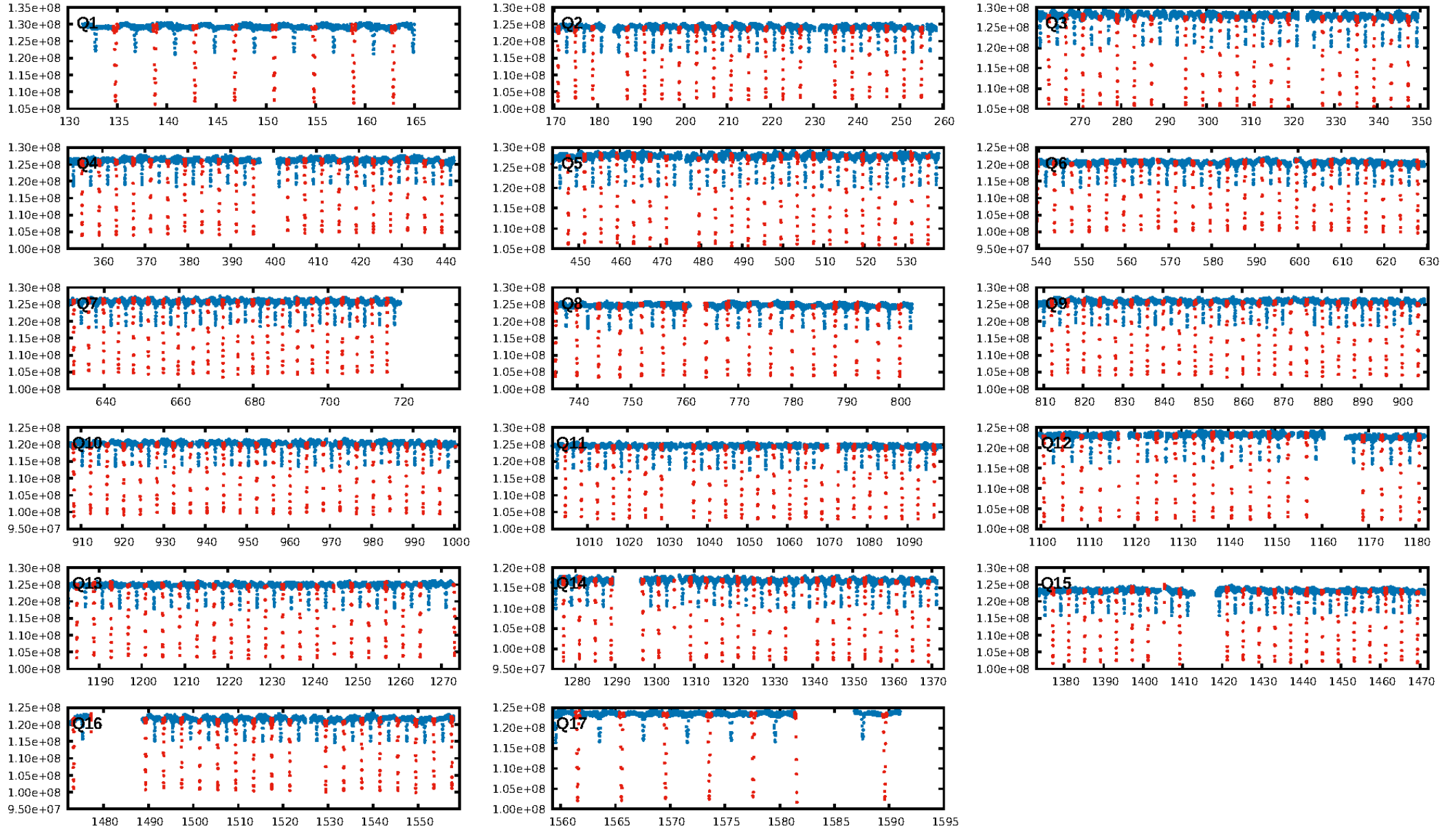
## DV Fit Results:

Period = 4.00770 [0.00000] d  
Epoch = 134.8010 [0.0000] BKJD  
Rp/R\* = 0.5592 [0.0505]  
a/R\* = 7.21 [0.08]  
b = 0.90 [0.07]  
Seff = 1974.57 [841.91]  
Teff = 1700 [181] K  
Rp = 99.53 [34.51] Re  
a = 0.0564 [0.0155] AU  
Ag = 8.43 [3.64] [2.04 $\sigma$ ]  
Teffp = 4478 [276] K [8.42 $\sigma$ ]

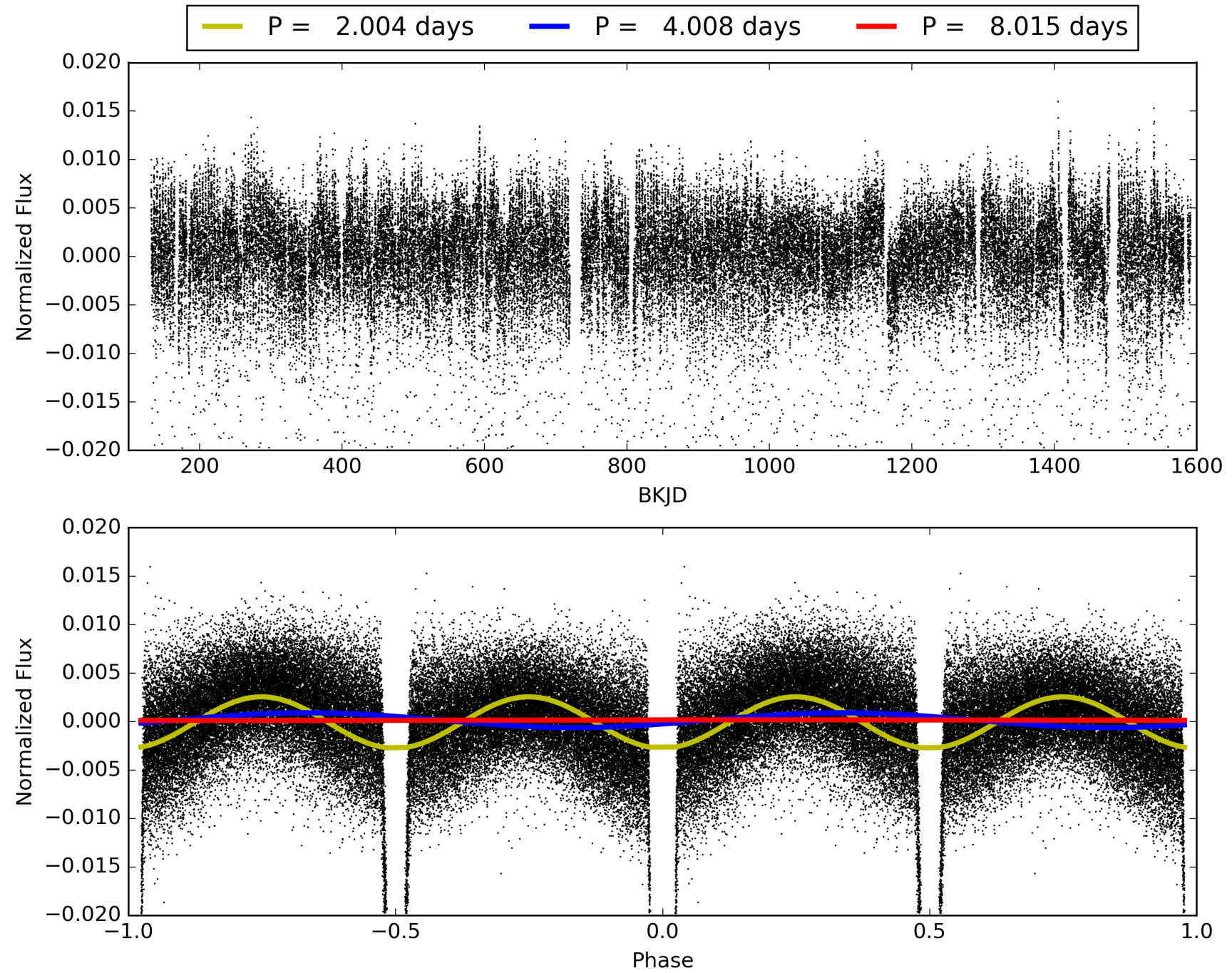
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.93 [298/319]  
GhostDiagnostic-chr: 2.297  
Centroid-sig: 1.2%  
Centroid-so: 0.177 arcsec [425.78 $\sigma$ ]  
OotOffset-rm: 0.004 arcsec [0.06 $\sigma$ ]  
KicOffset-rm: 0.165 arcsec [2.34 $\sigma$ ]  
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 008504570-01, PDC Light Curves

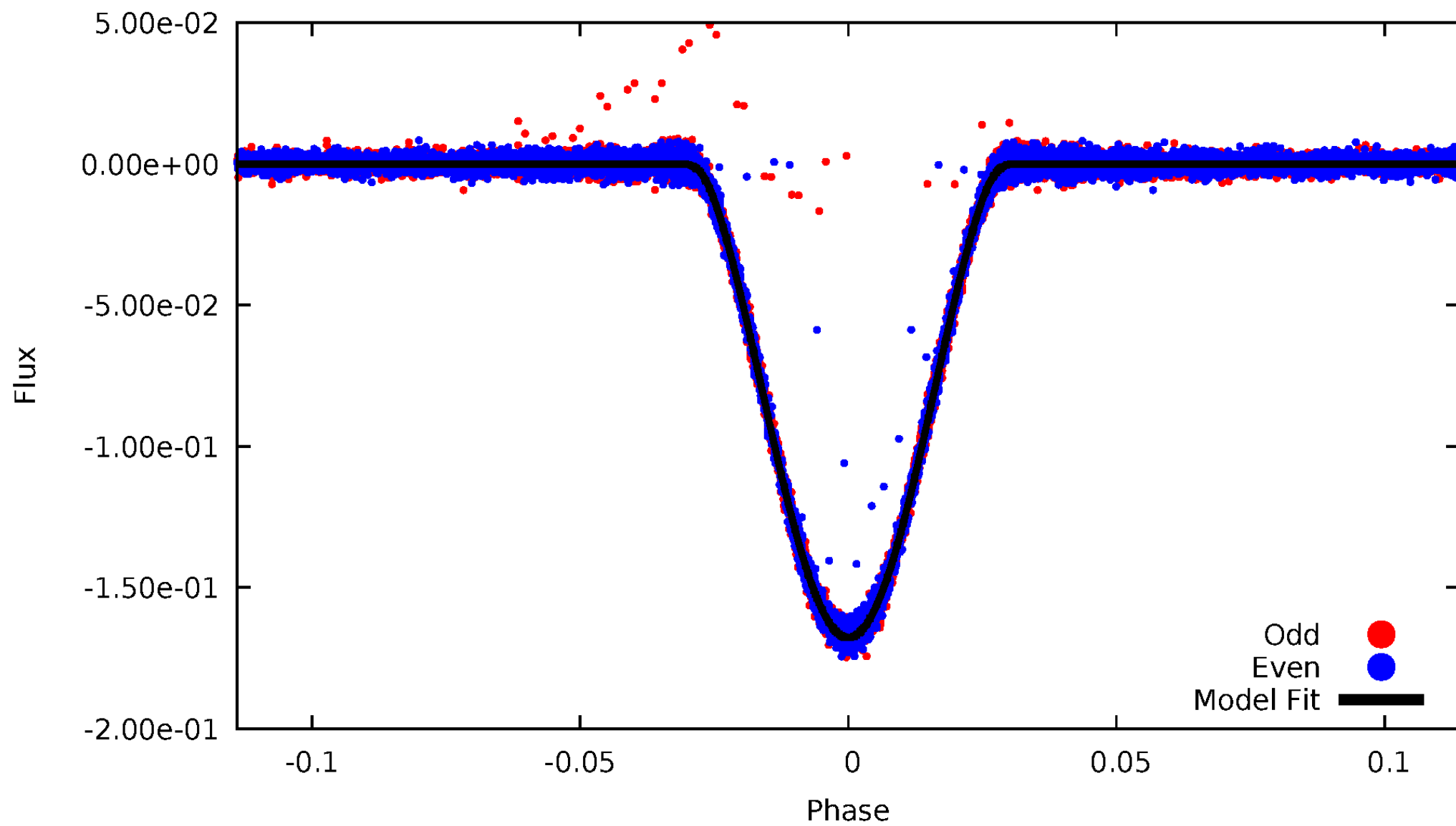


TCE 008504570-01



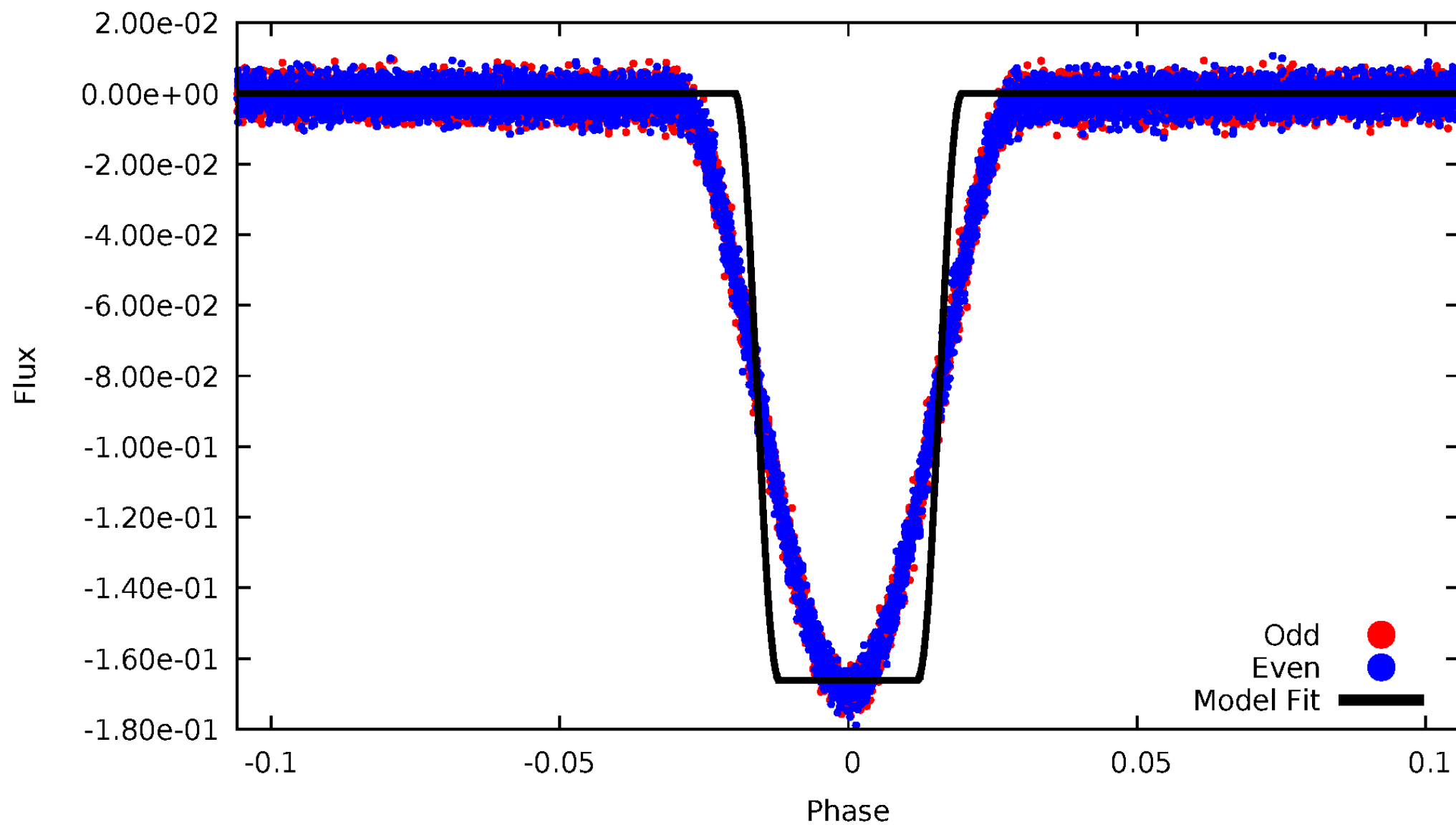
# DV Odd/Even

TCE 008504570-01



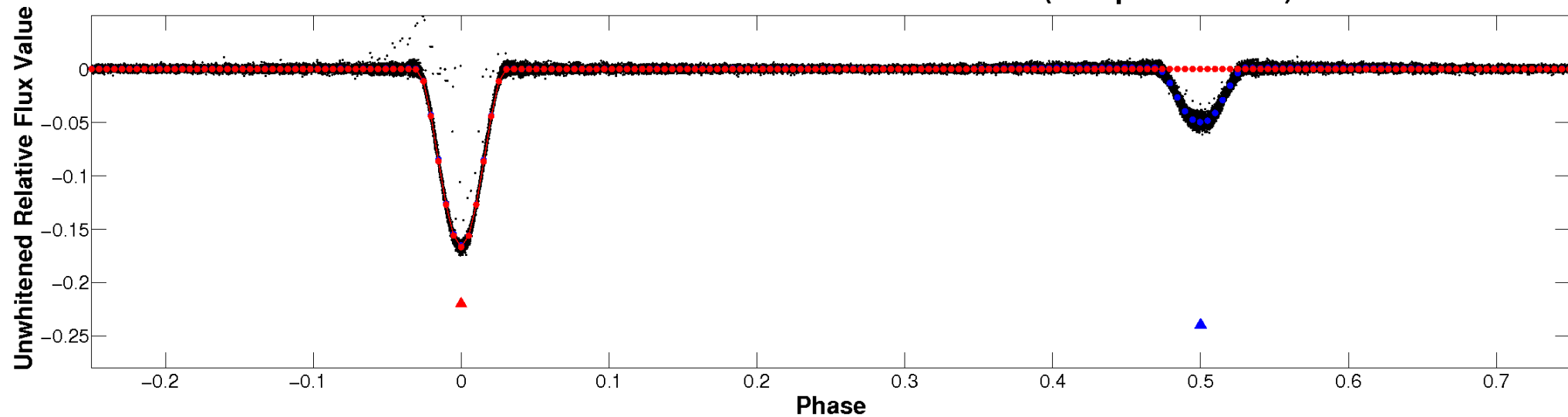
# ALT Odd/Even

TCE 008504570-01

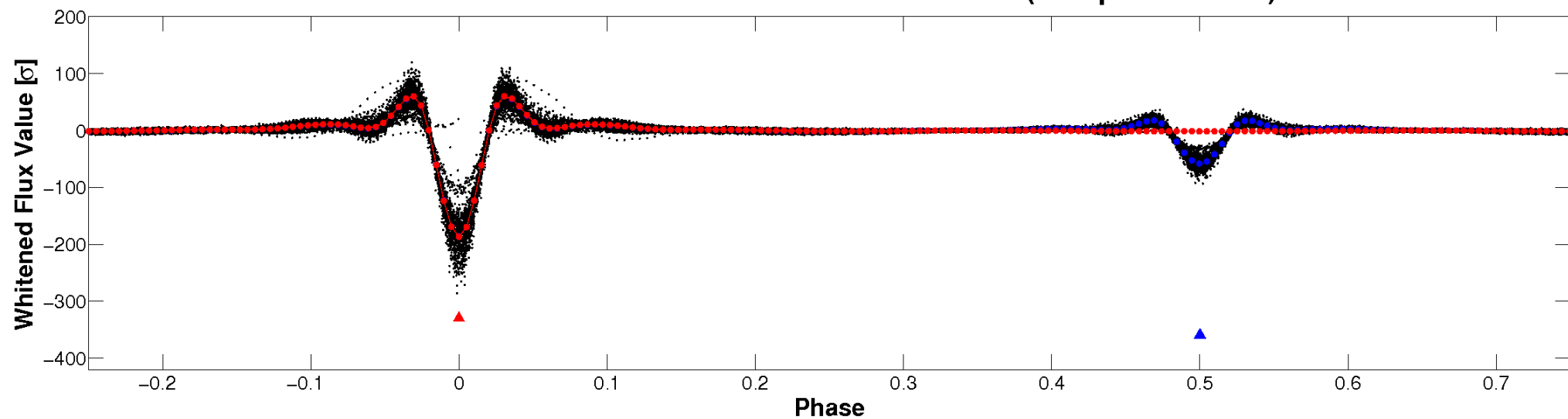


# Non-Whitened Vs. Whitened Light Curve

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

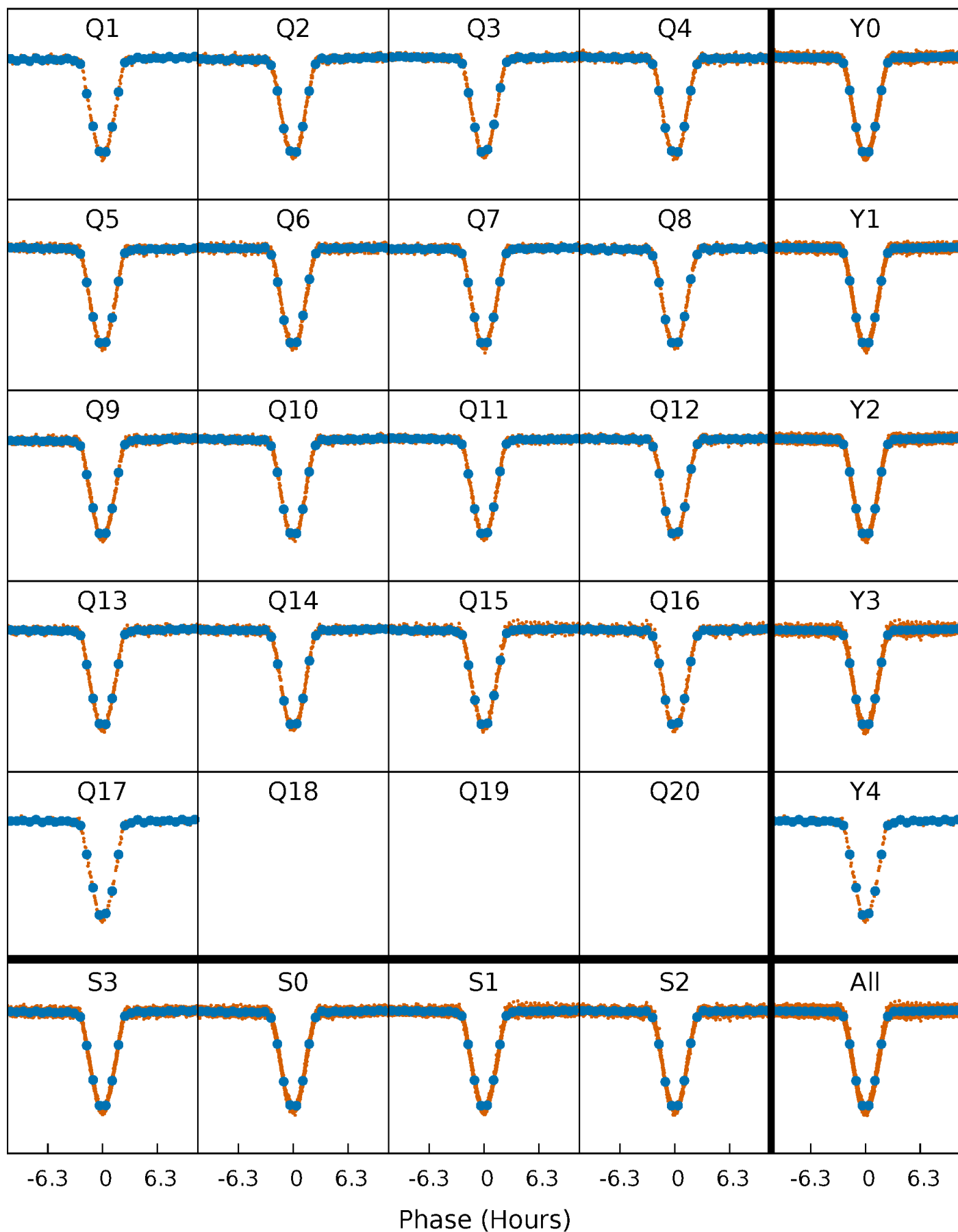


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

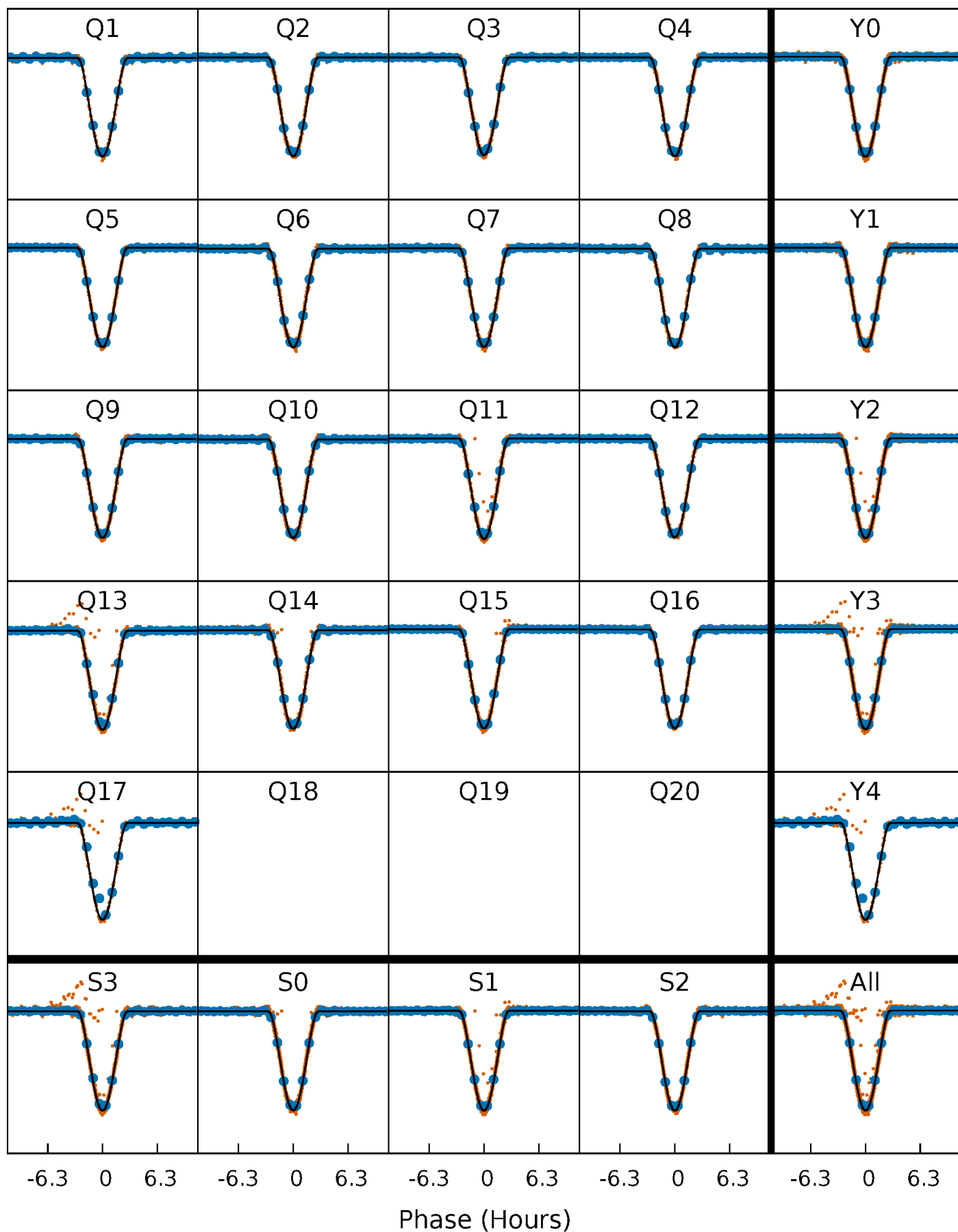
TCE 008504570-01   P= 4.007704 Days    $T_0=134.801034$  (BKJD)





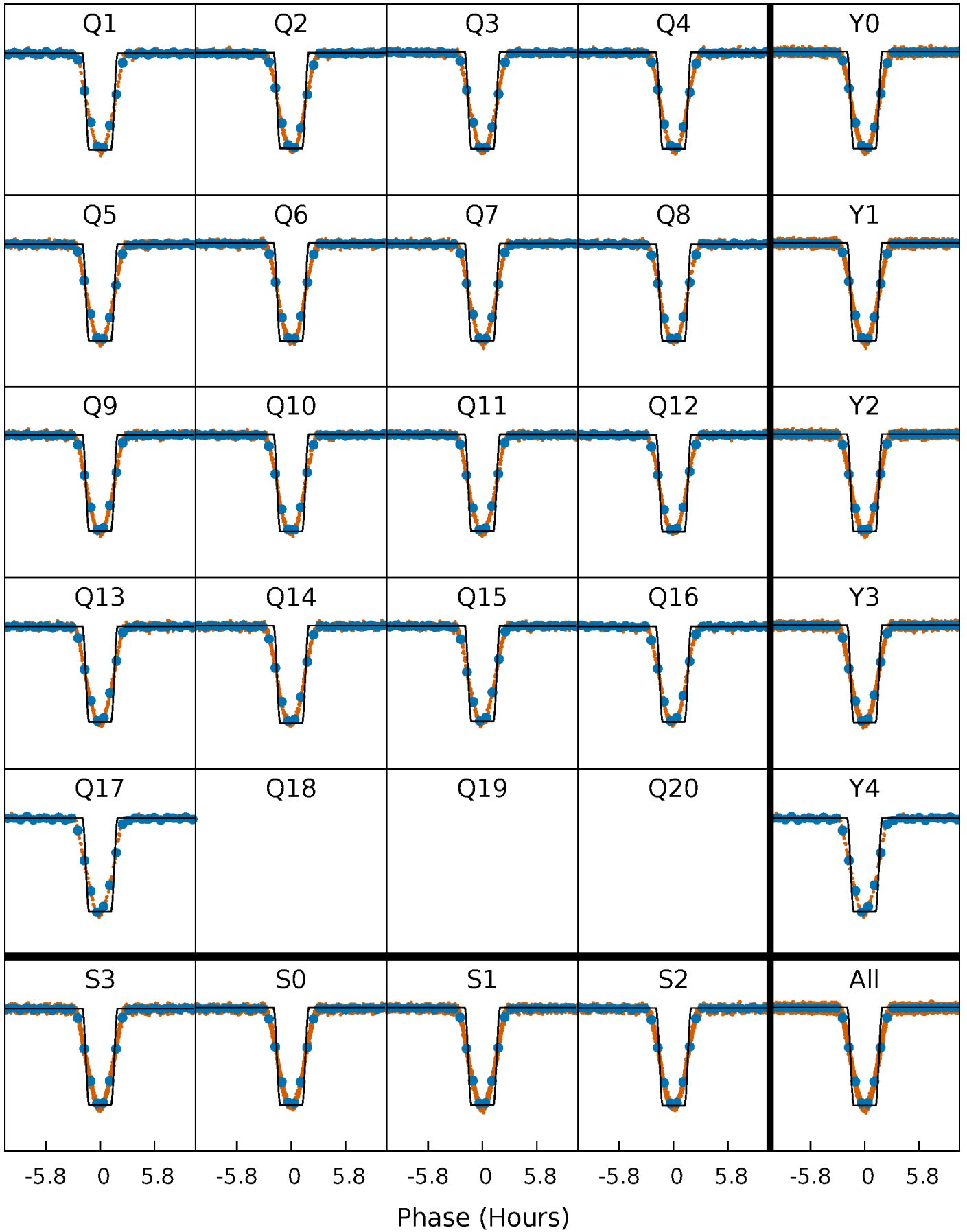
# DV Quarter-Phased Transit Curves

TCE 008504570-01 P= 4.007704 Days  $T_0=134.801034$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

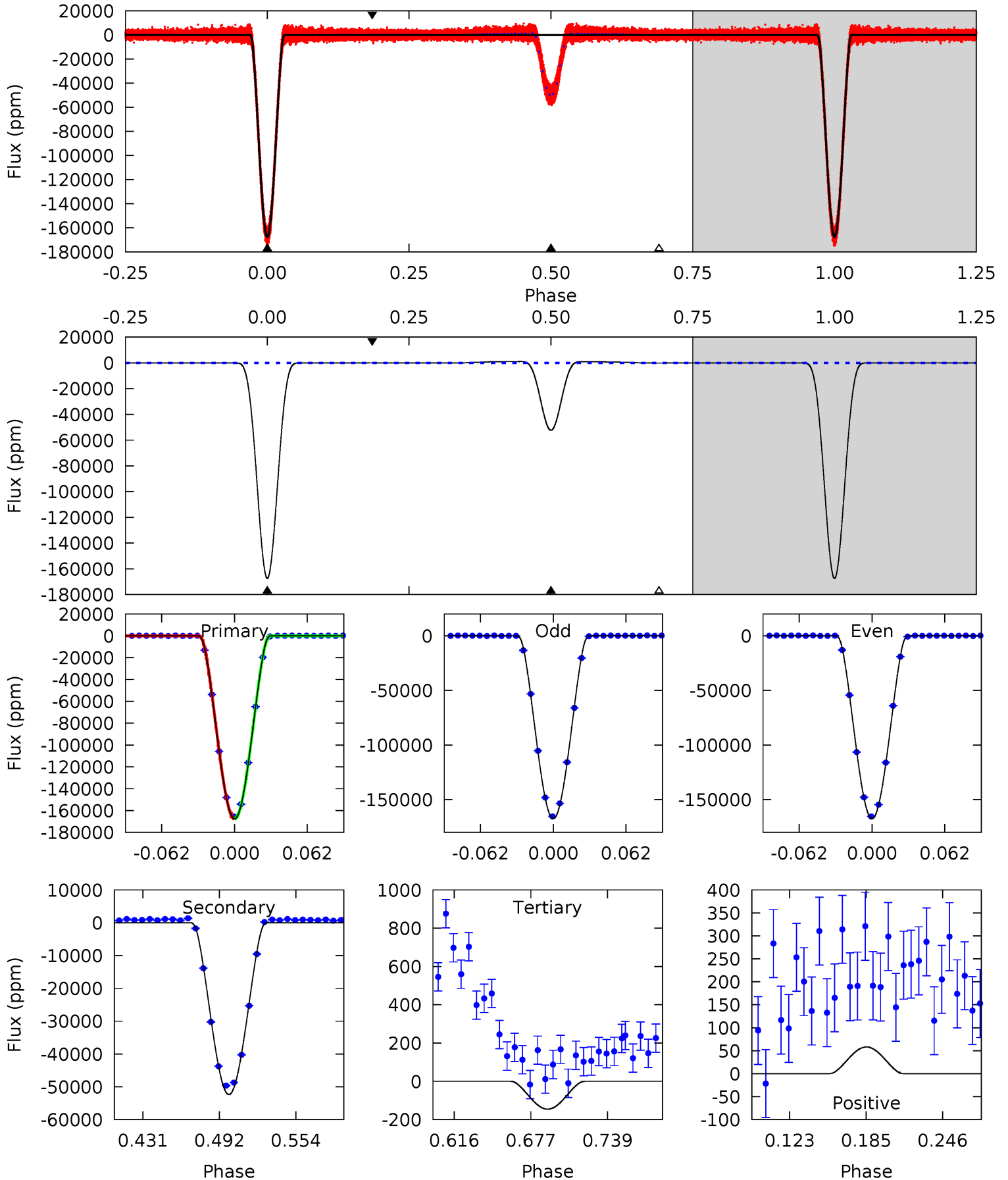
TCE 008504570-01   P= 4.007722 Days    $T_0=134.797817$  (BKJD)



# DV Model-Shift Uniqueness Test

008504570-01, P = 4.007704 Days, E = 130.793330 Days

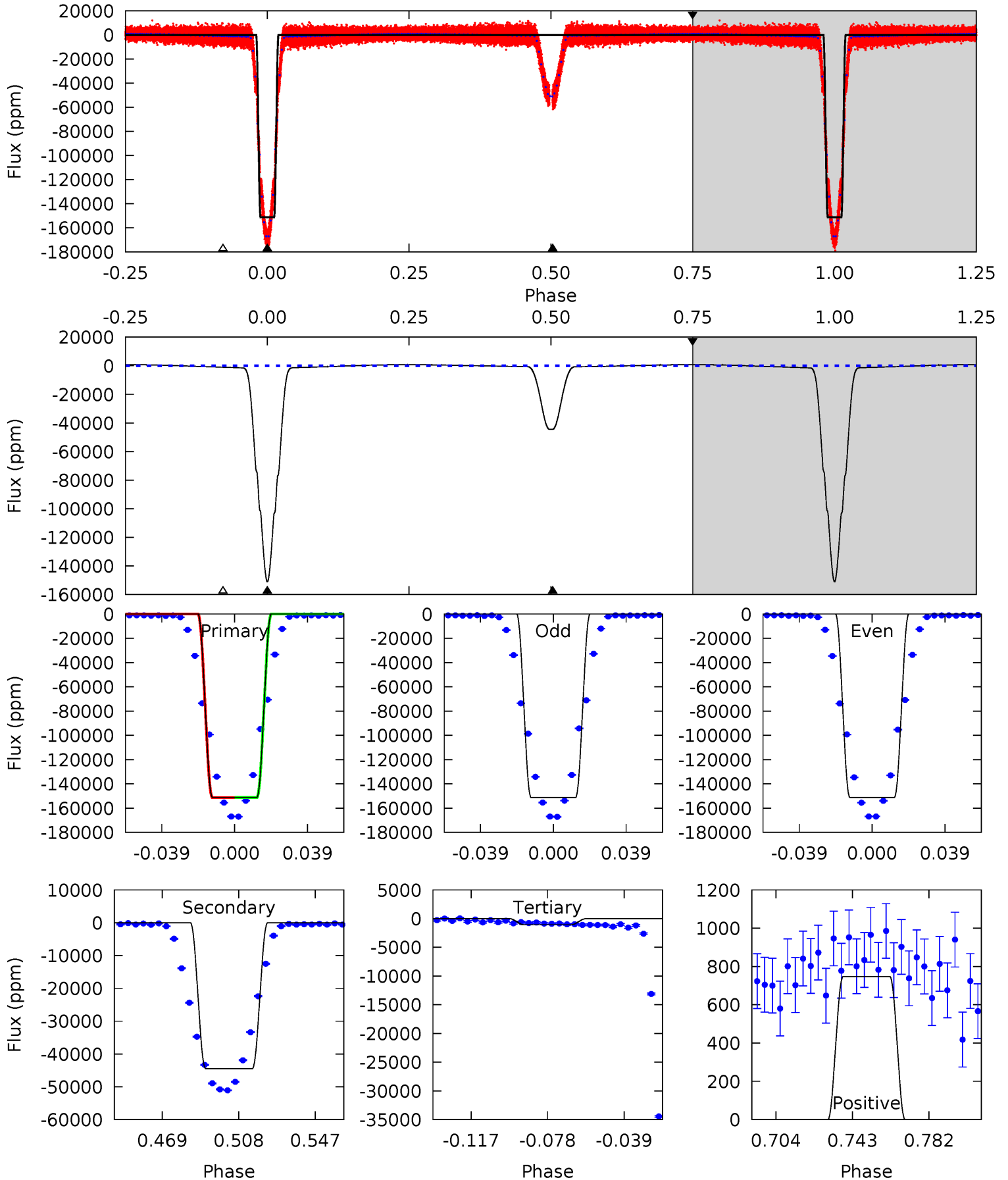
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5822	1821	5.06	2.02	4.67	1.87	11.4	5817	5820	1816	1819	0.91	0.98	0.01	0.21



# Alt Model-Shift Uniqueness Test

008504570-01, P = 4.007722 Days, E = 130.790095 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
2320	682.4	16.3	11.5	4.76	2.06	9.68	2303	2308	666.1	670.9	1.03	1.00	0.00	1.31



### Stellar Parameters For KIC 008504570

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7162^{+200}_{-300}$	$4.185^{+0.105}_{-0.210}$	$-0.020^{+0.200}_{-0.350}$	$1.631^{+0.546}_{-0.294}$	$1.484^{+0.218}_{-0.218}$	$0.482^{+0.250}_{-0.262}$
	+3%/-4%	+3%/-5%	+1000%/-1750%	+33%/-18%	+15%/-15%	+52%/-54%
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 008504570-01 / KOI 7048.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-52359 \pm 29$	$102.63^{+18.76}_{-14.90}$	$2400^{+207}_{-142}$	$4695^{+209}_{-197}$	$9.134^{+2.994}_{-2.519}$
Alt.	$-44446 \pm 65$	$73.30^{+16.04}_{-12.03}$	$2394^{+192}_{-144}$	$5173^{+390}_{-282}$	$15^{+6}_{-5}$

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

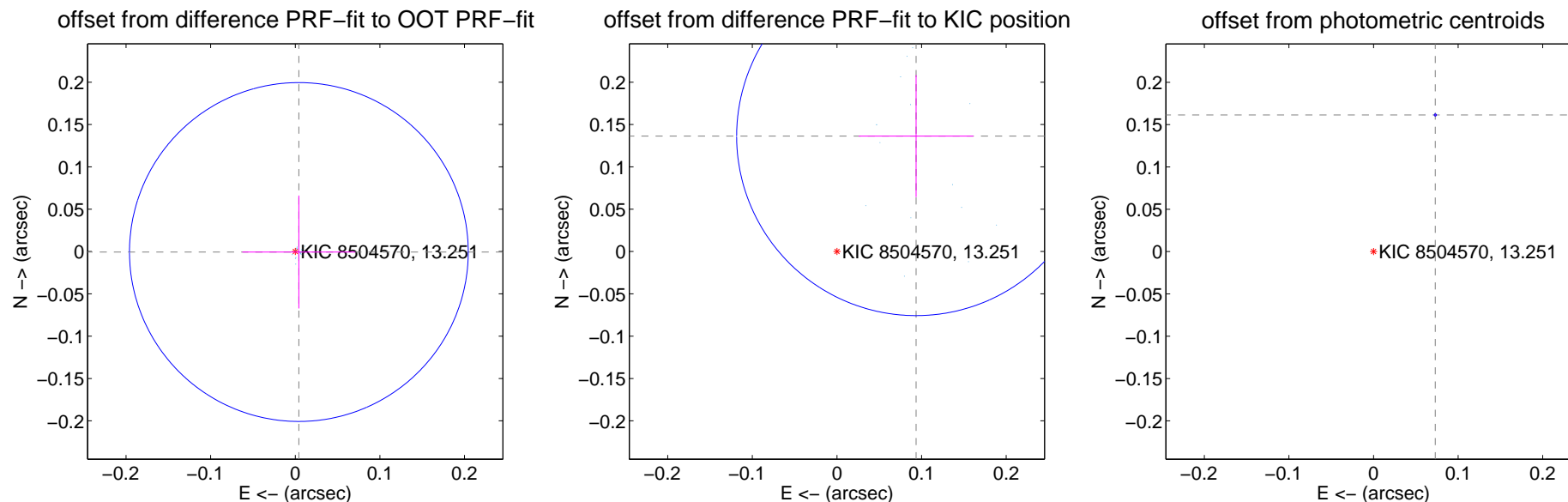
## DV Centroid Data

Supplemental centroid analysis for 008504570-01. Kepler magnitude: 13.25. Transit SNR 6556.49

There are 17 quarters with good PRF difference image offsets

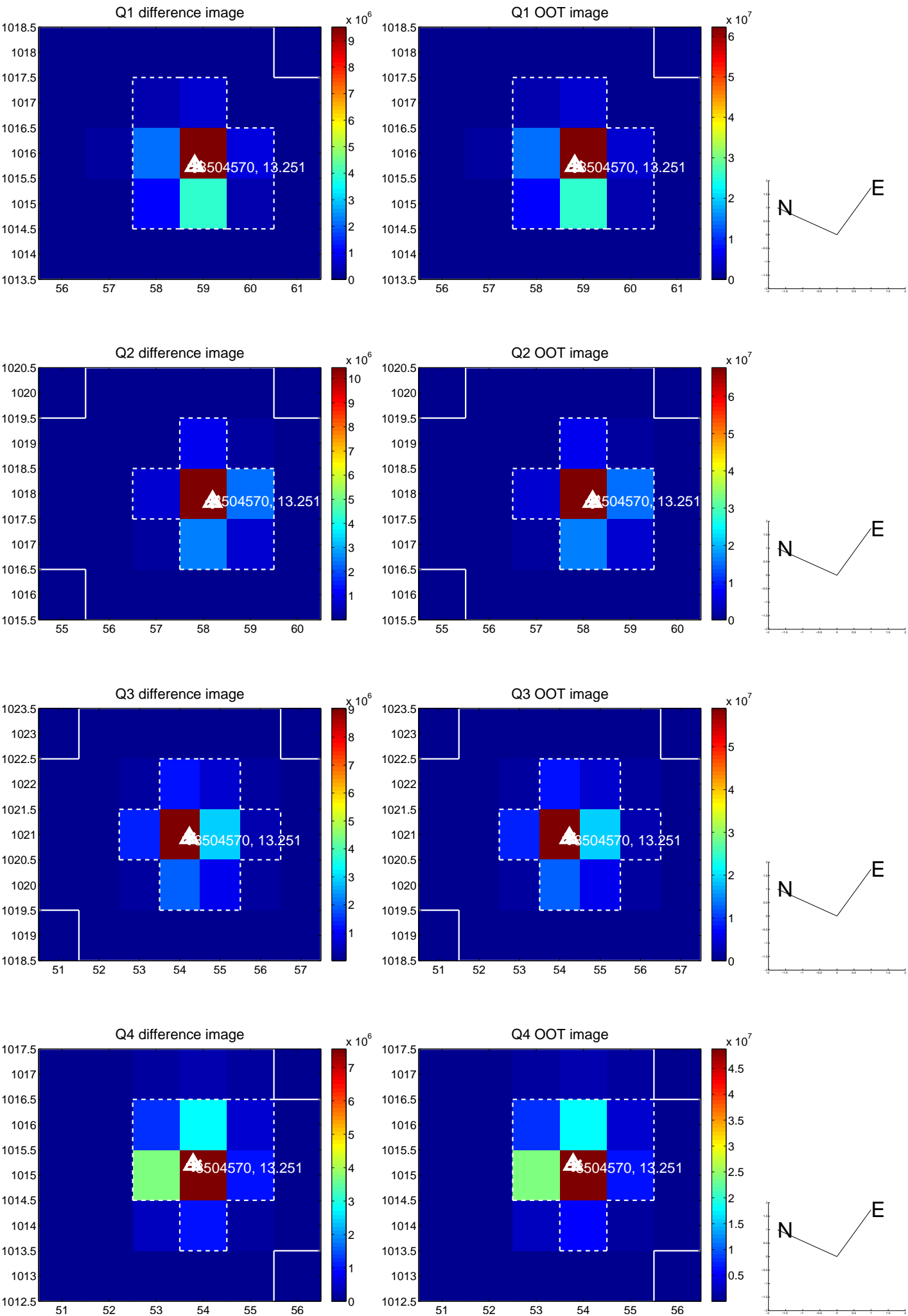
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.004 \pm 0.067$	0.06	$-0.004 \pm 0.067$	$-0.001 \pm 0.067$
PRF-fit source offset from KIC position	$0.165 \pm 0.071$	2.34	$-0.093 \pm 0.068$	$0.136 \pm 0.072$
photometric centroid source offset	$0.18 \pm 0.00$	425.78	$-0.07 \pm 0.00$	$0.16 \pm 0.00$

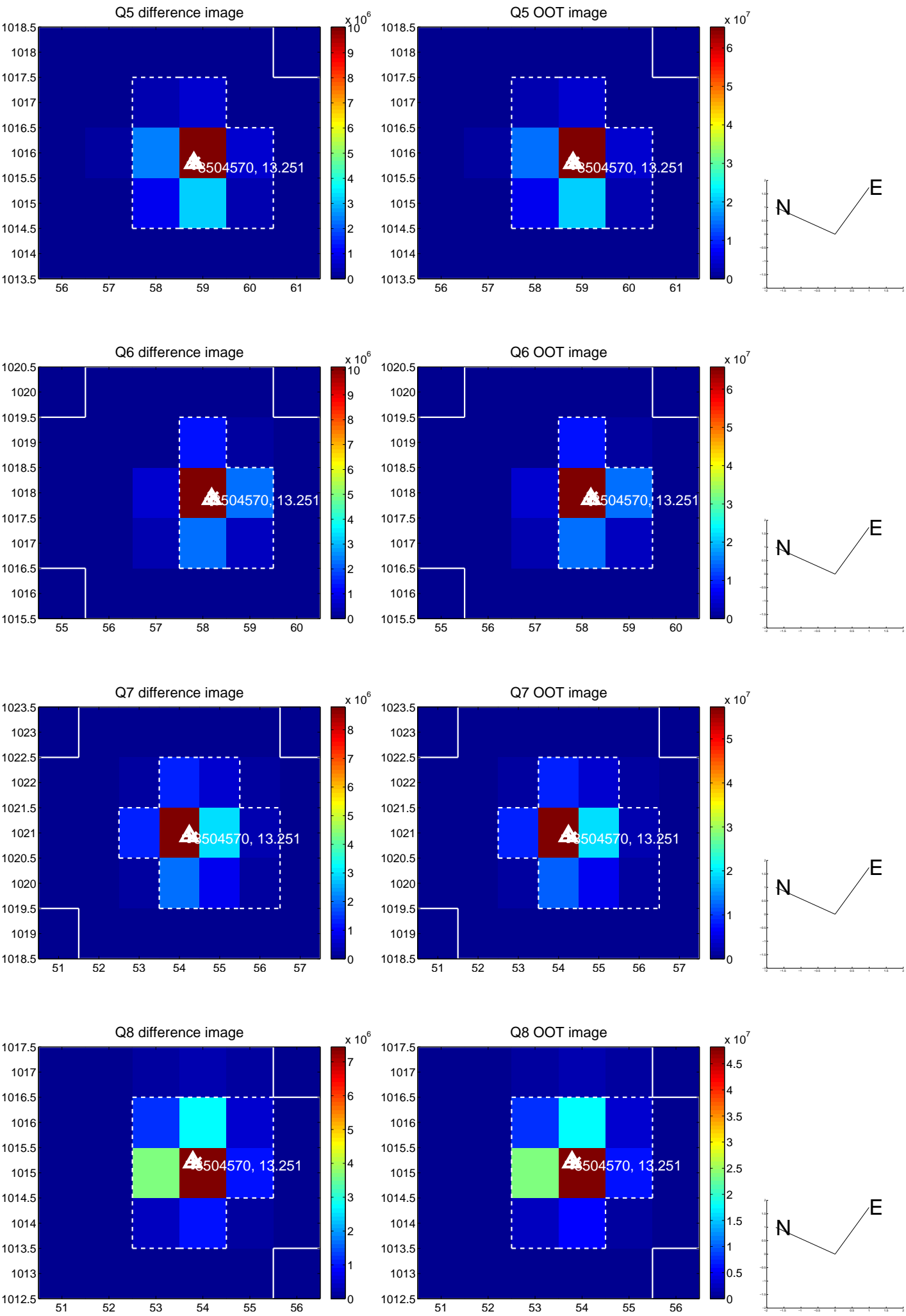


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

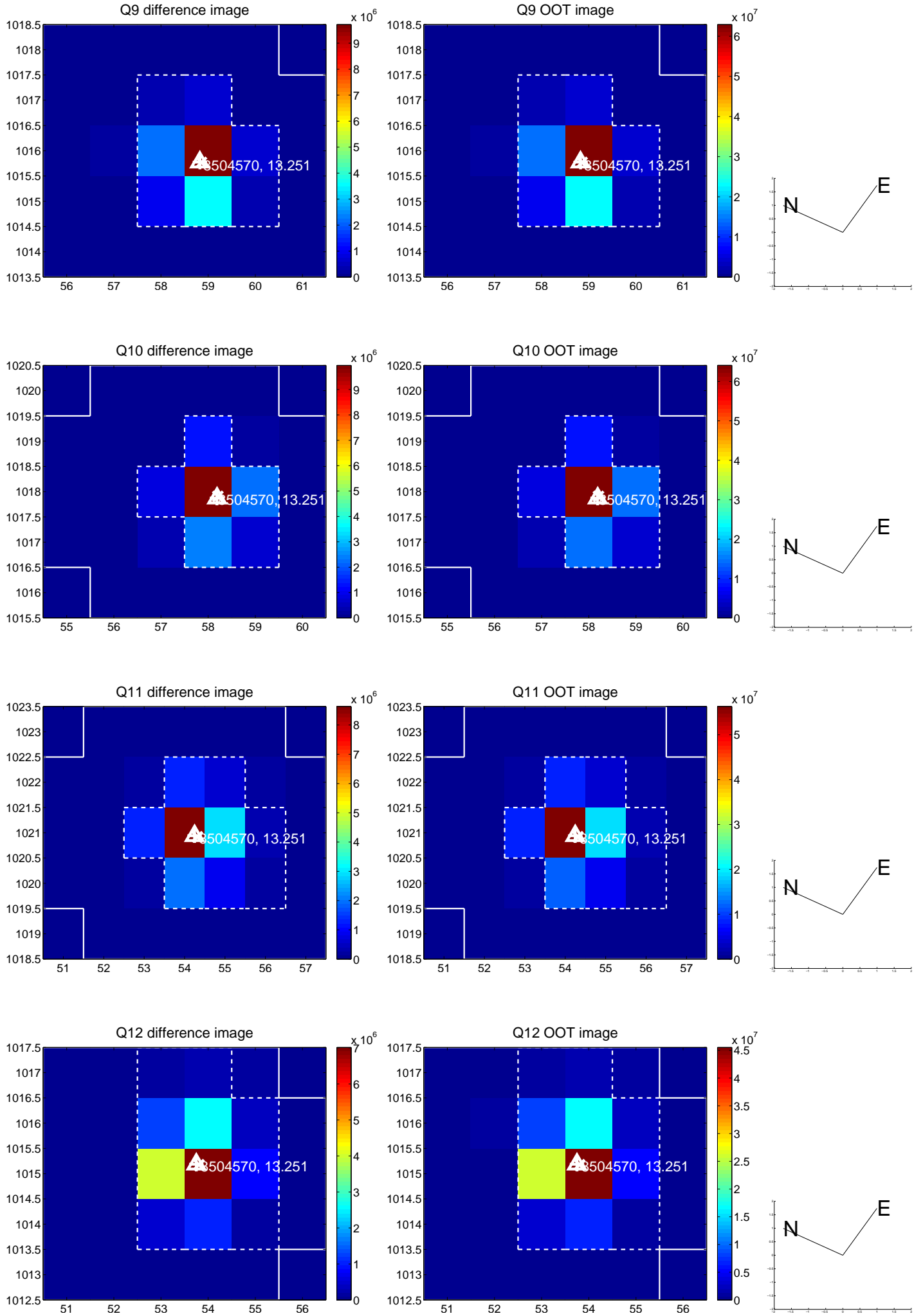


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

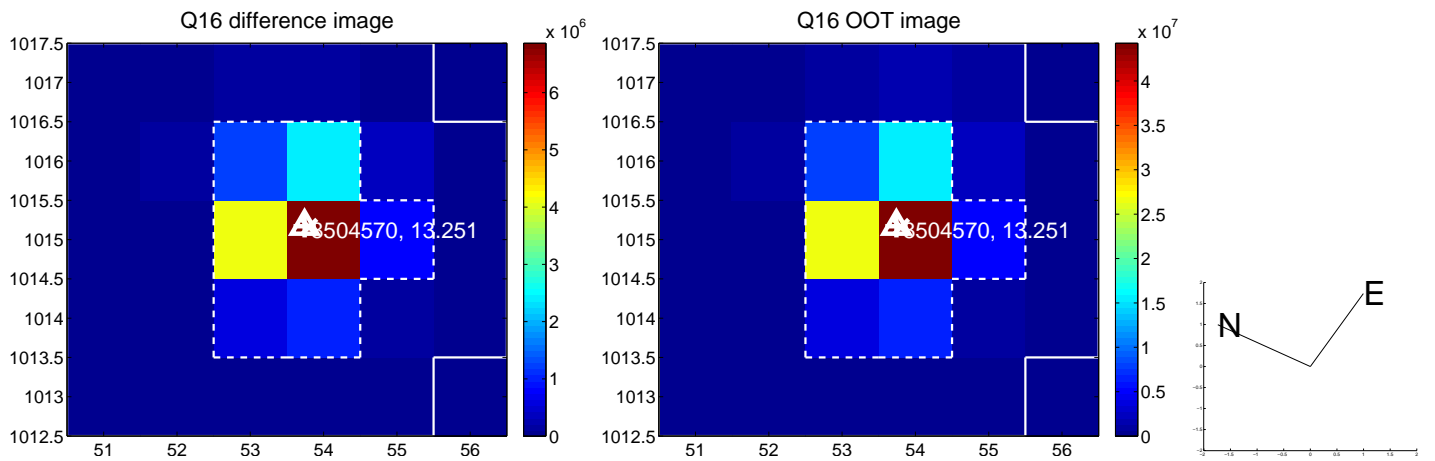
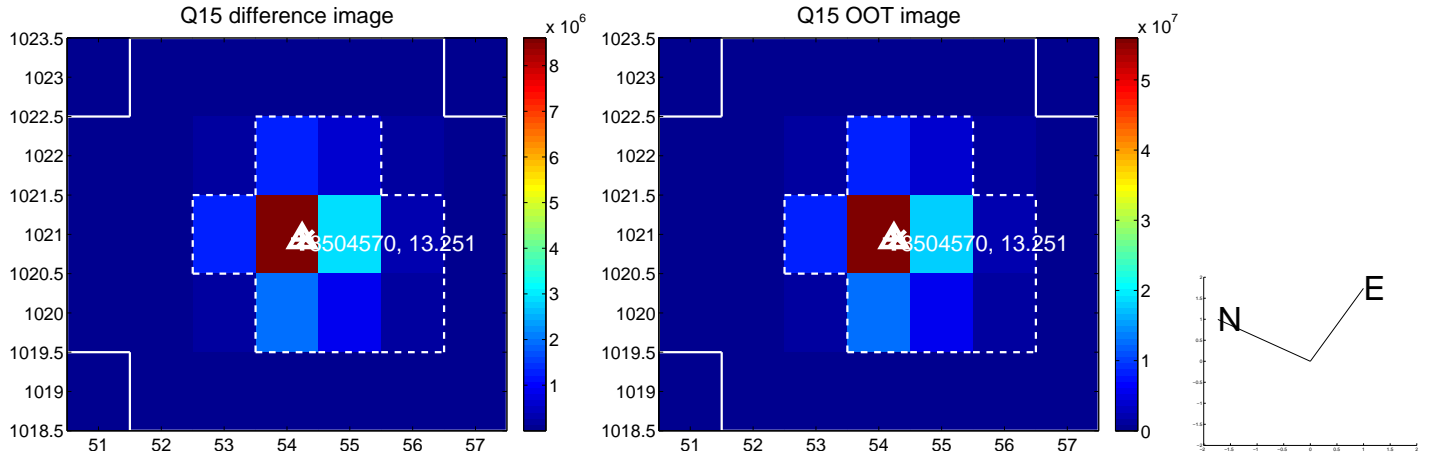
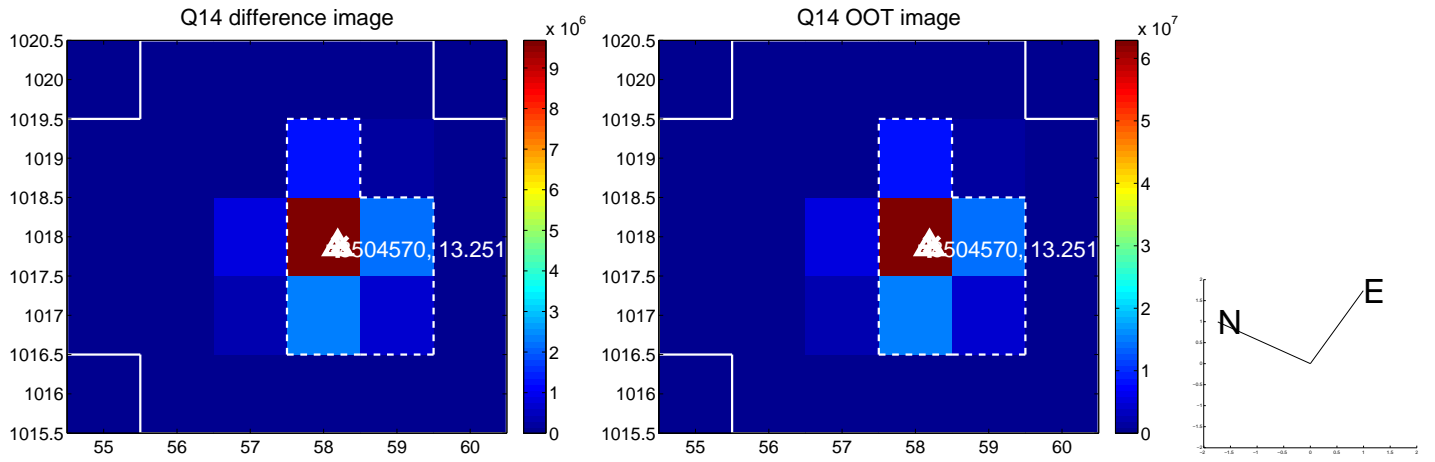
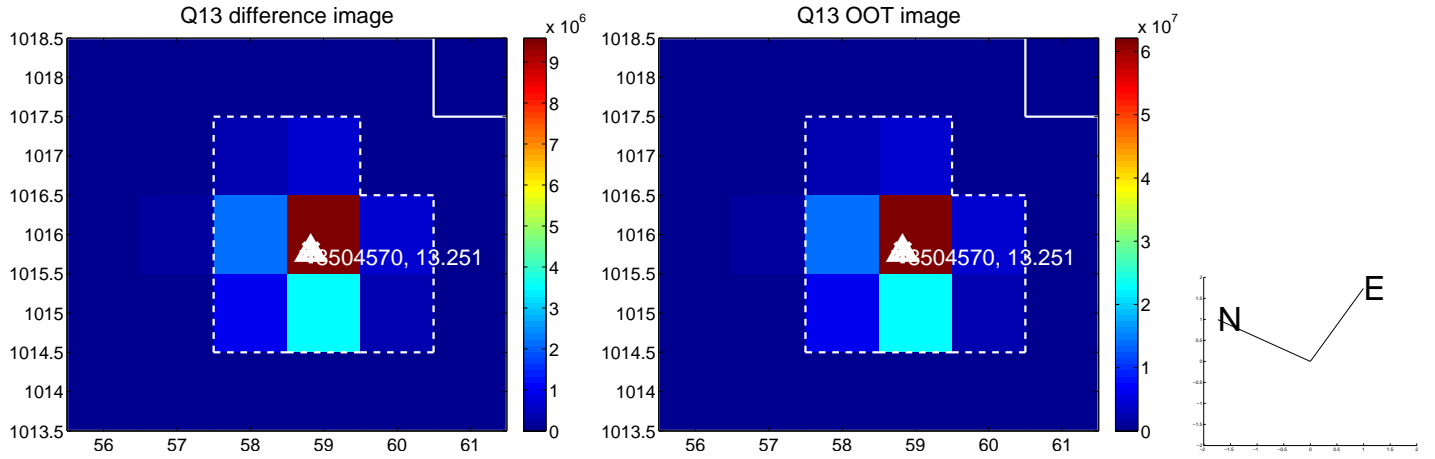




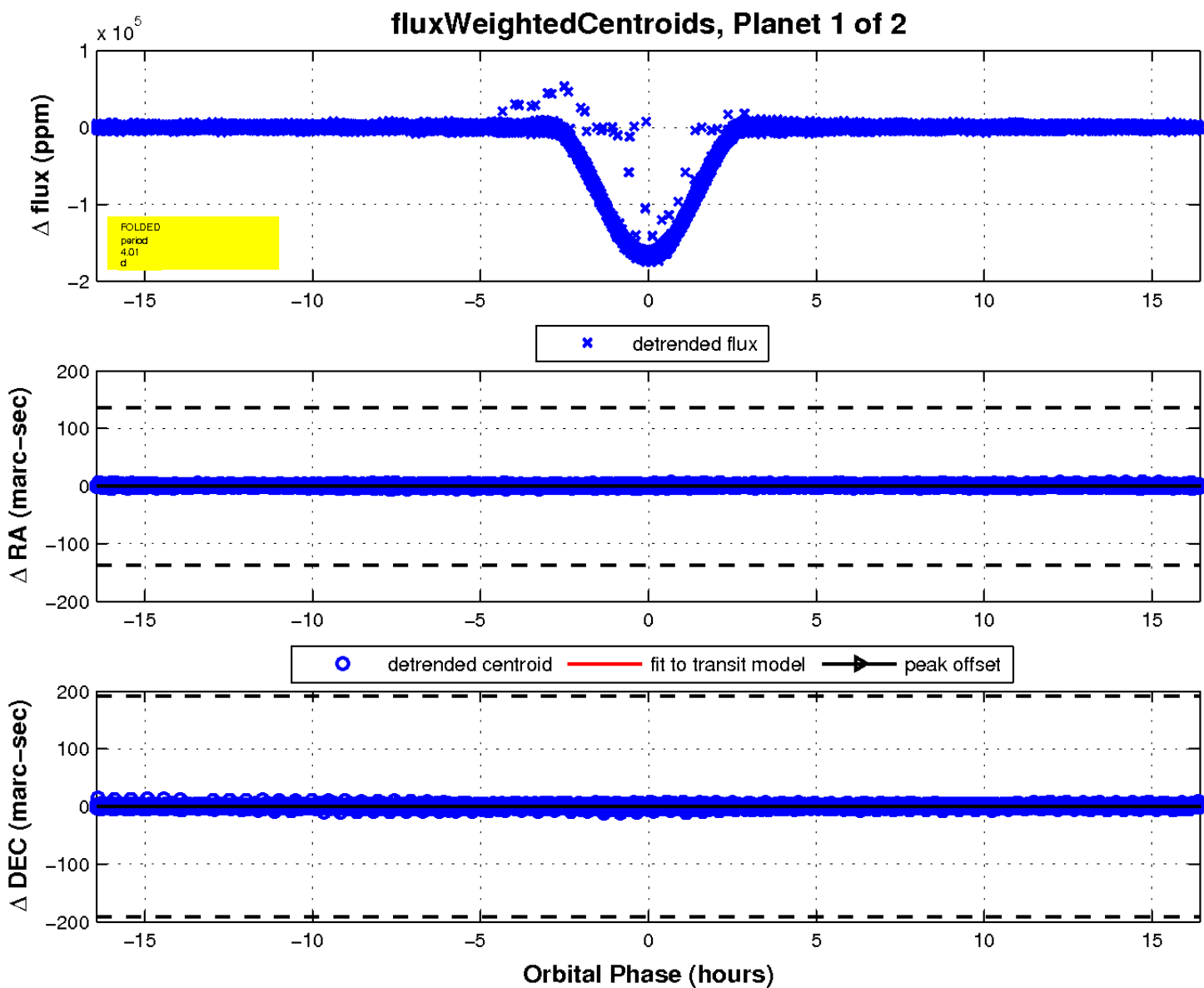
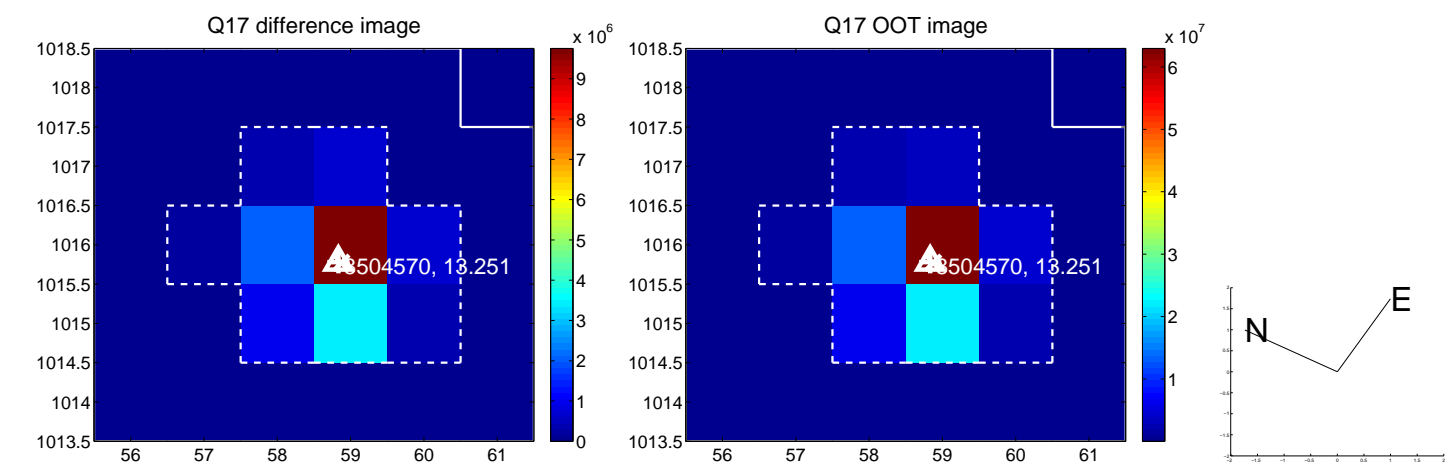
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

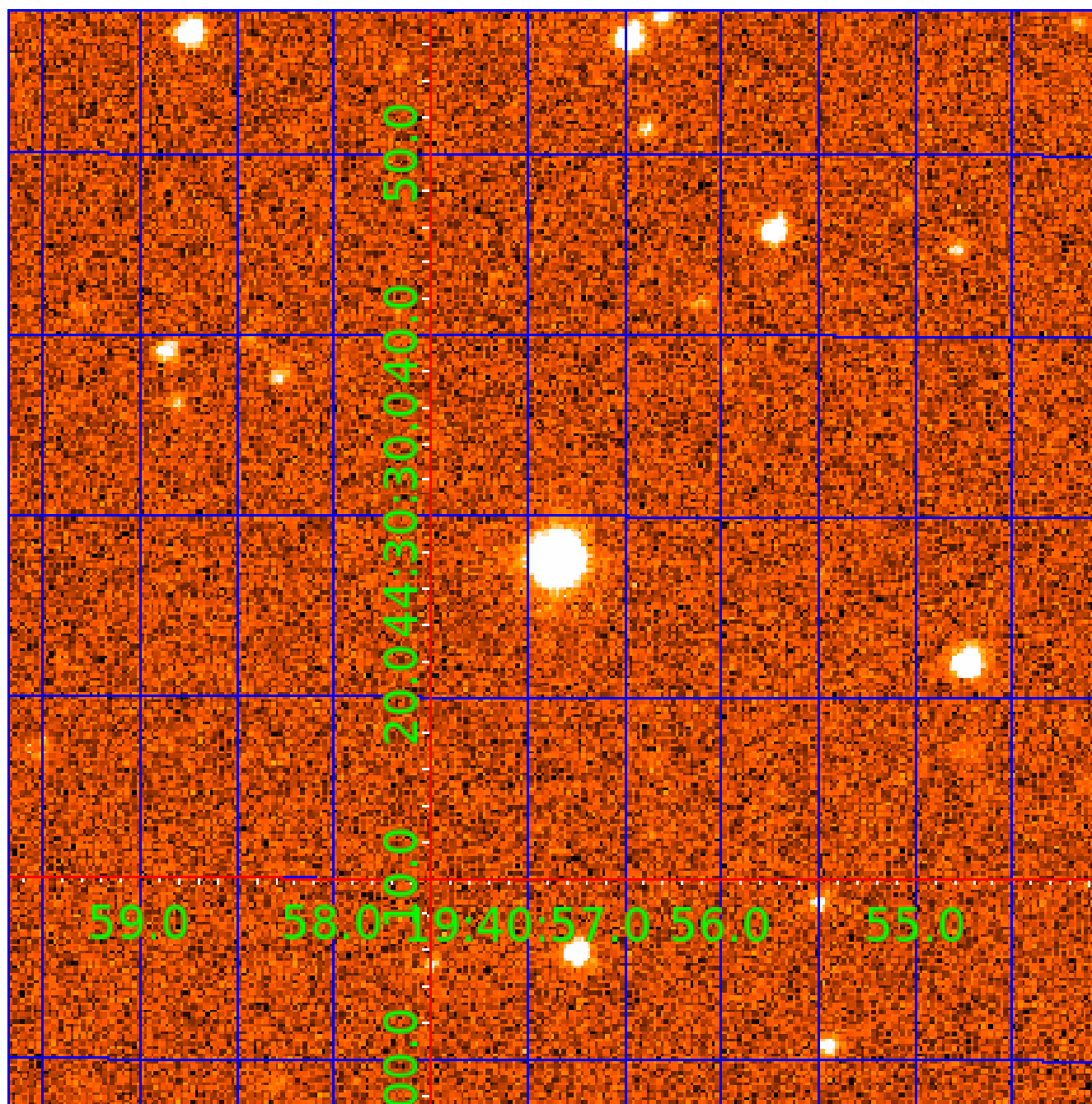


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination



# KIC 008504570

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008504570-01	OBS	7048.01	4.007704	134.801034	167746.3	5.481	6964.2	6556.5	1.63	7162	99.53	1974.57
008504570-02	OBS	No	4.007708	132.796836	50865.3	5.383	2119.3	1717.3	1.63	7162	42.24	1974.57

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008504570-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
008504570-02	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.

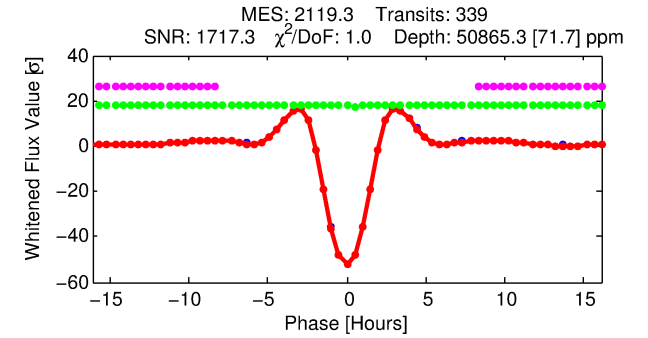
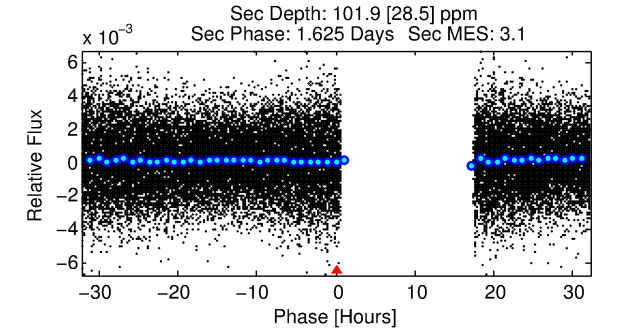
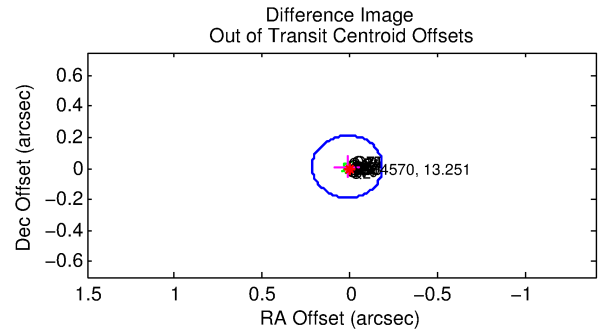
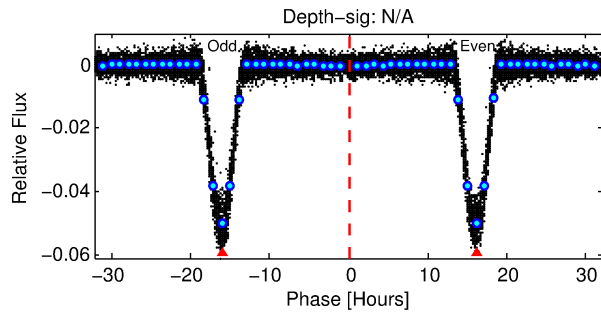
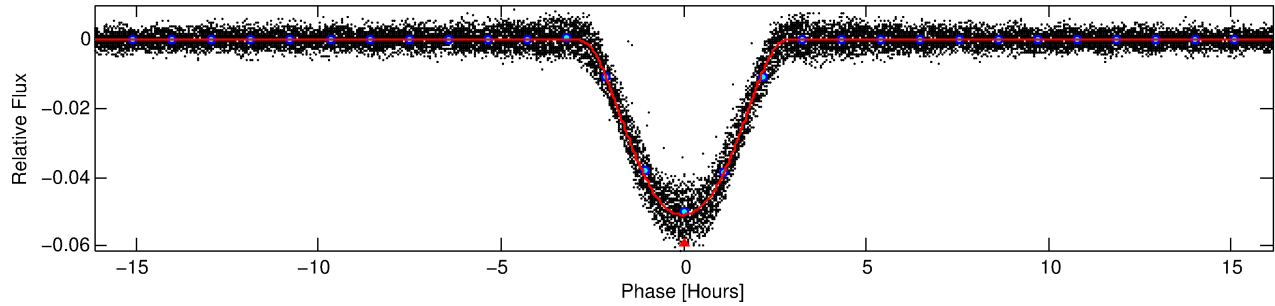
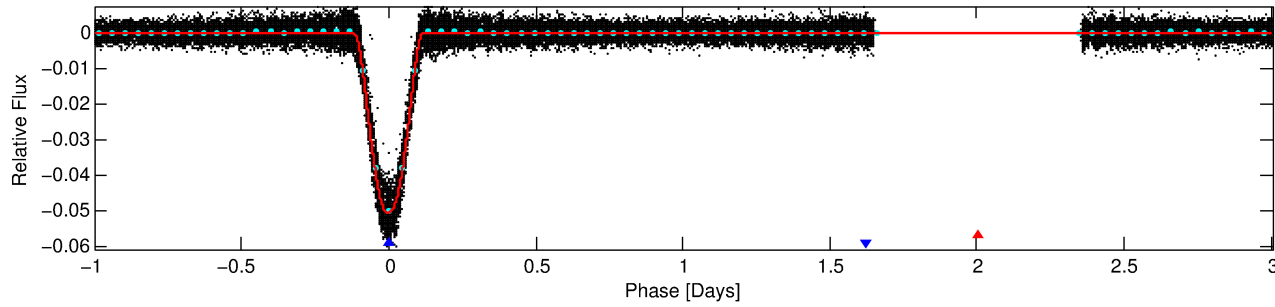
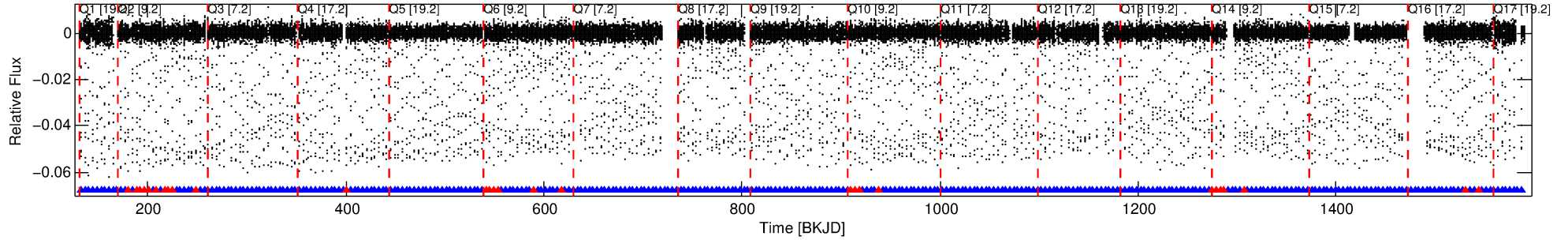
## Ephemeris Match Information For 008504570-02

No Significant Match Found

# DV One-Page Summary

KIC: 8504570 Candidate: 2 of 2 Period: 4.008 d  
KOI: K07048 Corr: No Ephemeris Match

Kp: 13.25 R\*: 1.63 Rs Teff: 7162.0 K Logg: 4.18 Fe/H: -0.020



## DV Fit Results:

Period = 4.00771 [0.00000] d  
Epoch = 132.7968 [0.0001] BKJD  
Rp/R\* = 0.2373 [0.0013]  
a/R\* = 5.44 [0.01]  
b = 0.80 [0.00]  
Seff = 1974.57 [841.91]  
Teq = 1700 [181] K  
Rp = 42.24 [14.14] Re  
a = 0.0564 [0.0155] AU  
Ag = 0.10 [0.05] [-18.73σ]  
Teffp = 1477 [120] K [-1.02σ]

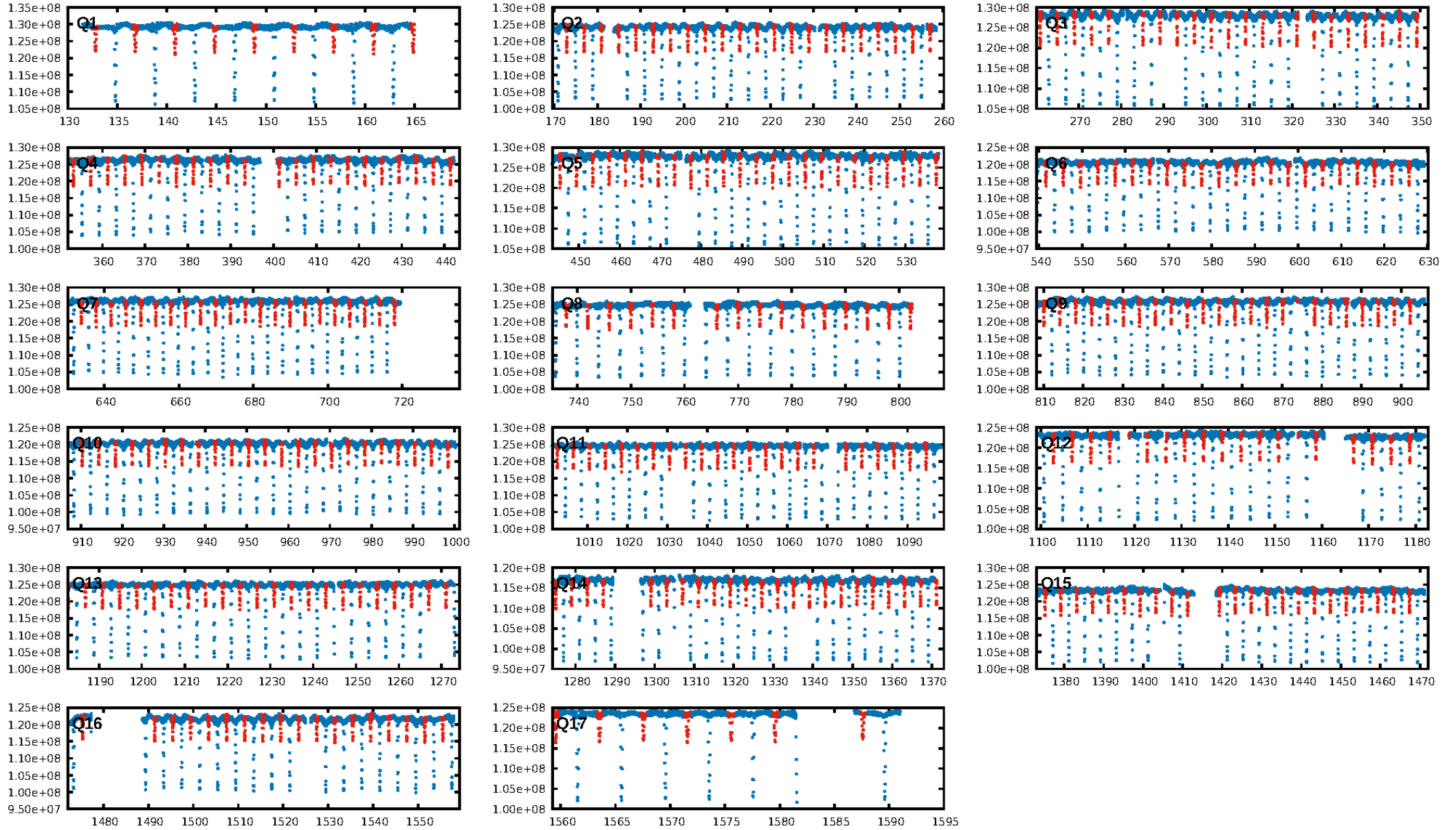
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.91 [295/323]  
GhostDiagnostic-chr: 1.755  
Centroid-sig: 0.0%  
Centroid-so: 0.181 arcsec [156.44σ]  
OotOffset-rm: 0.020 arcsec [0.30σ]  
KicOffset-rm: 0.157 arcsec [2.17σ]  
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: 30-Jan-2016 10:26:47 Z

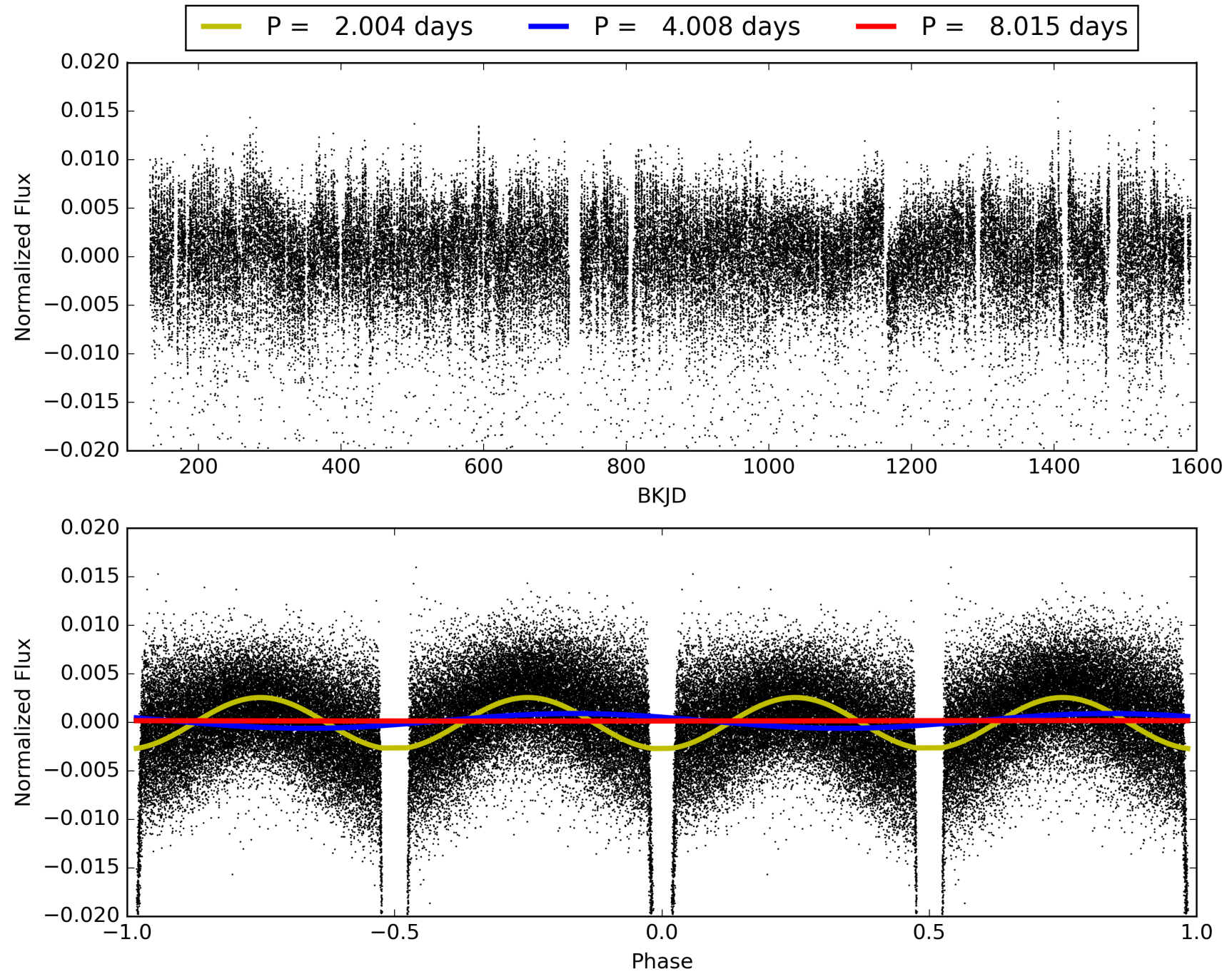
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008504570-02, PDC Light Curves





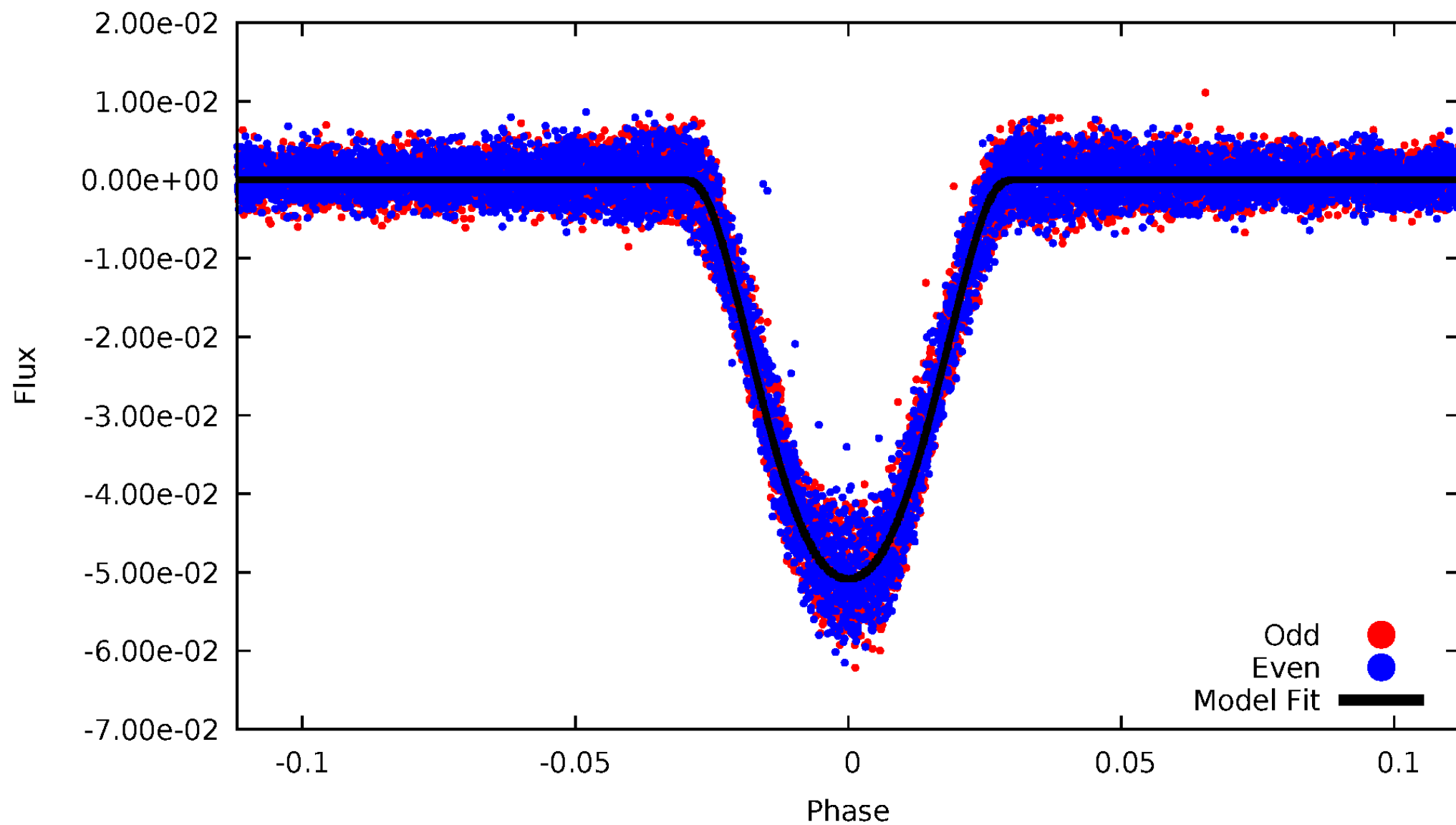
TCE 008504570-02





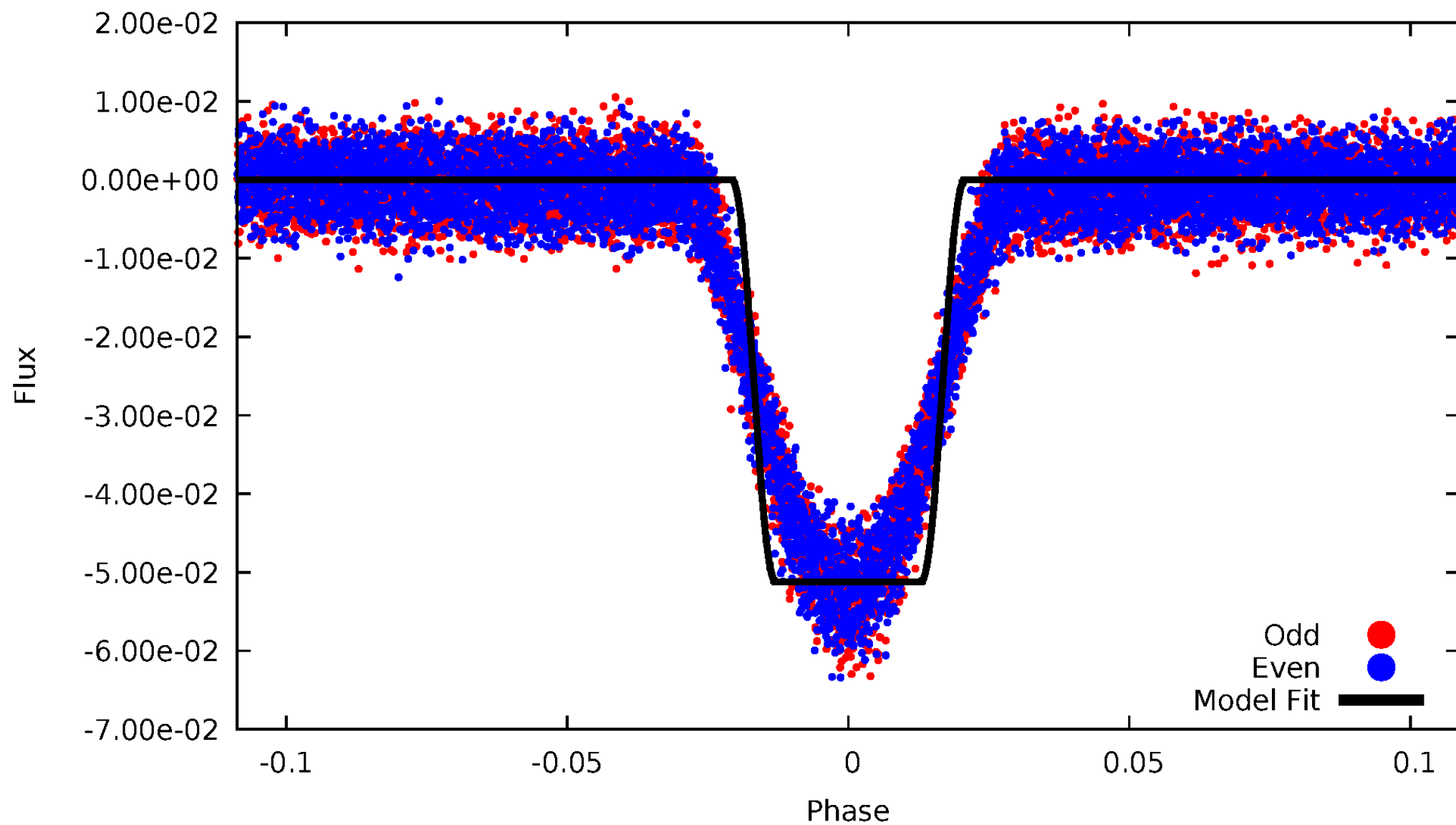
# DV Odd/Even

TCE 008504570-02



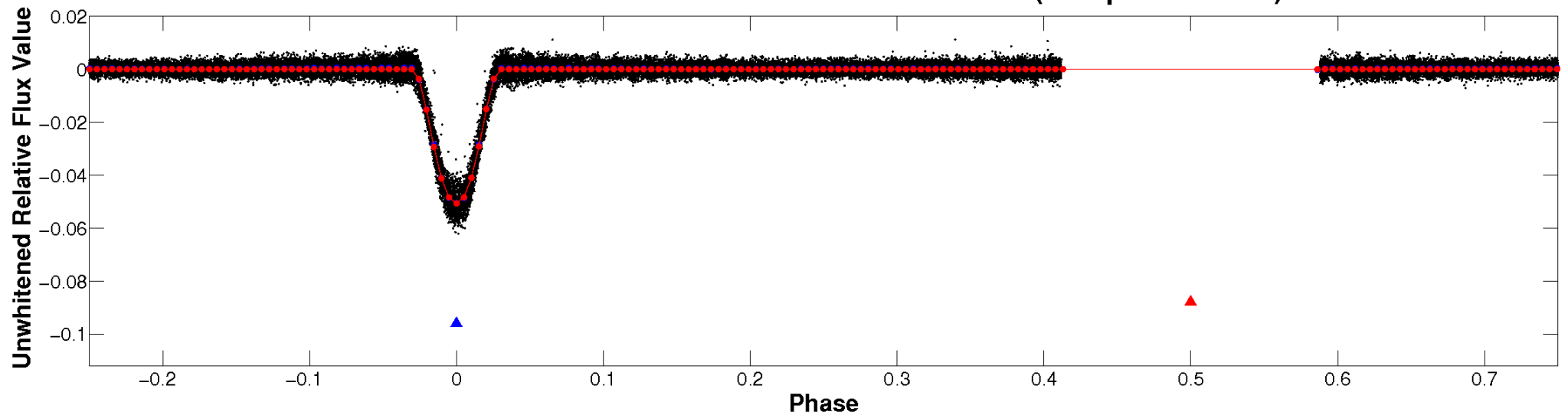
# ALT Odd/Even

TCE 008504570-02

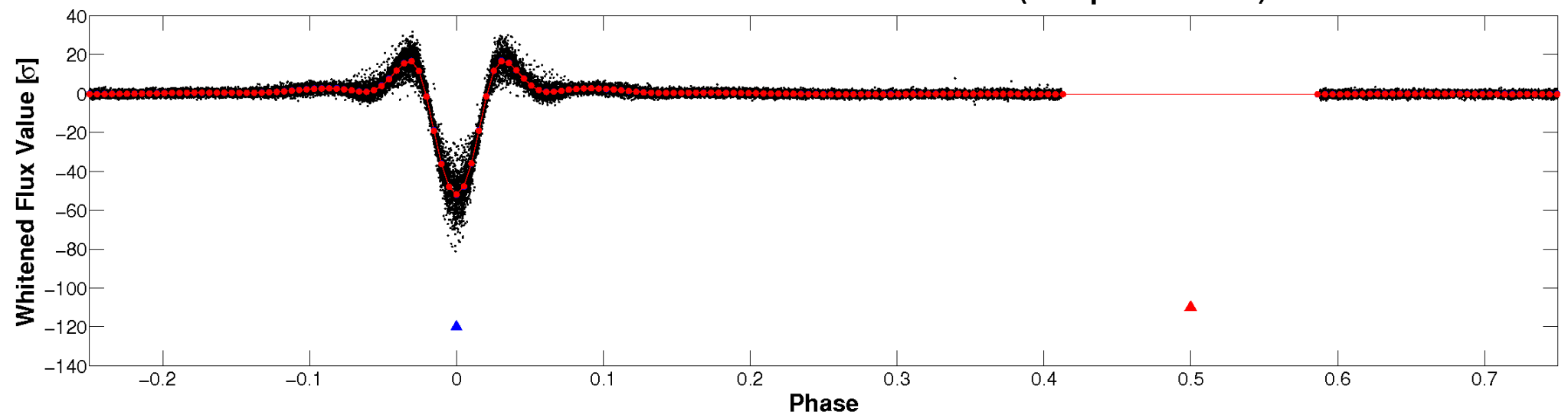


# Non-Whitened Vs. Whitened Light Curve

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

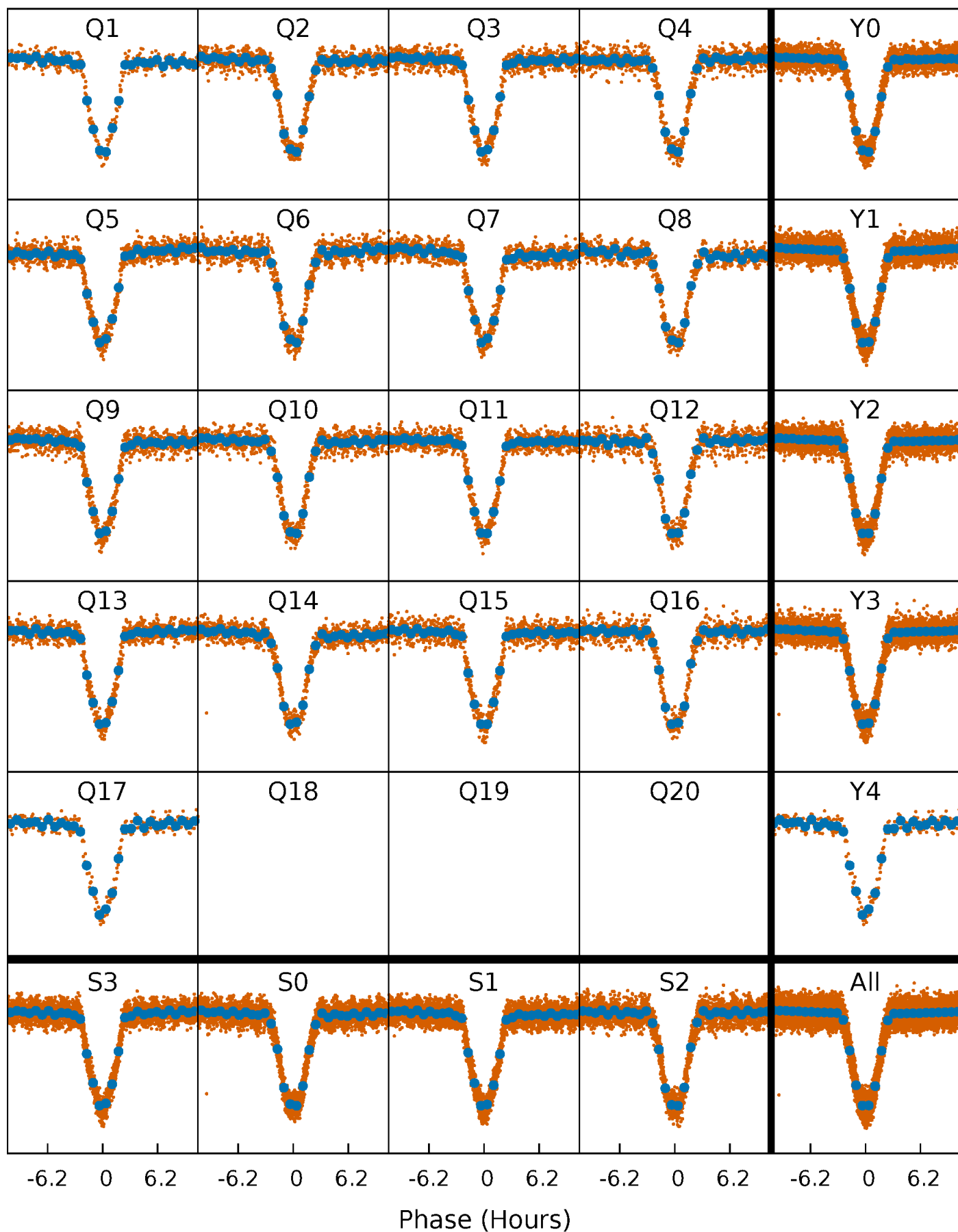


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



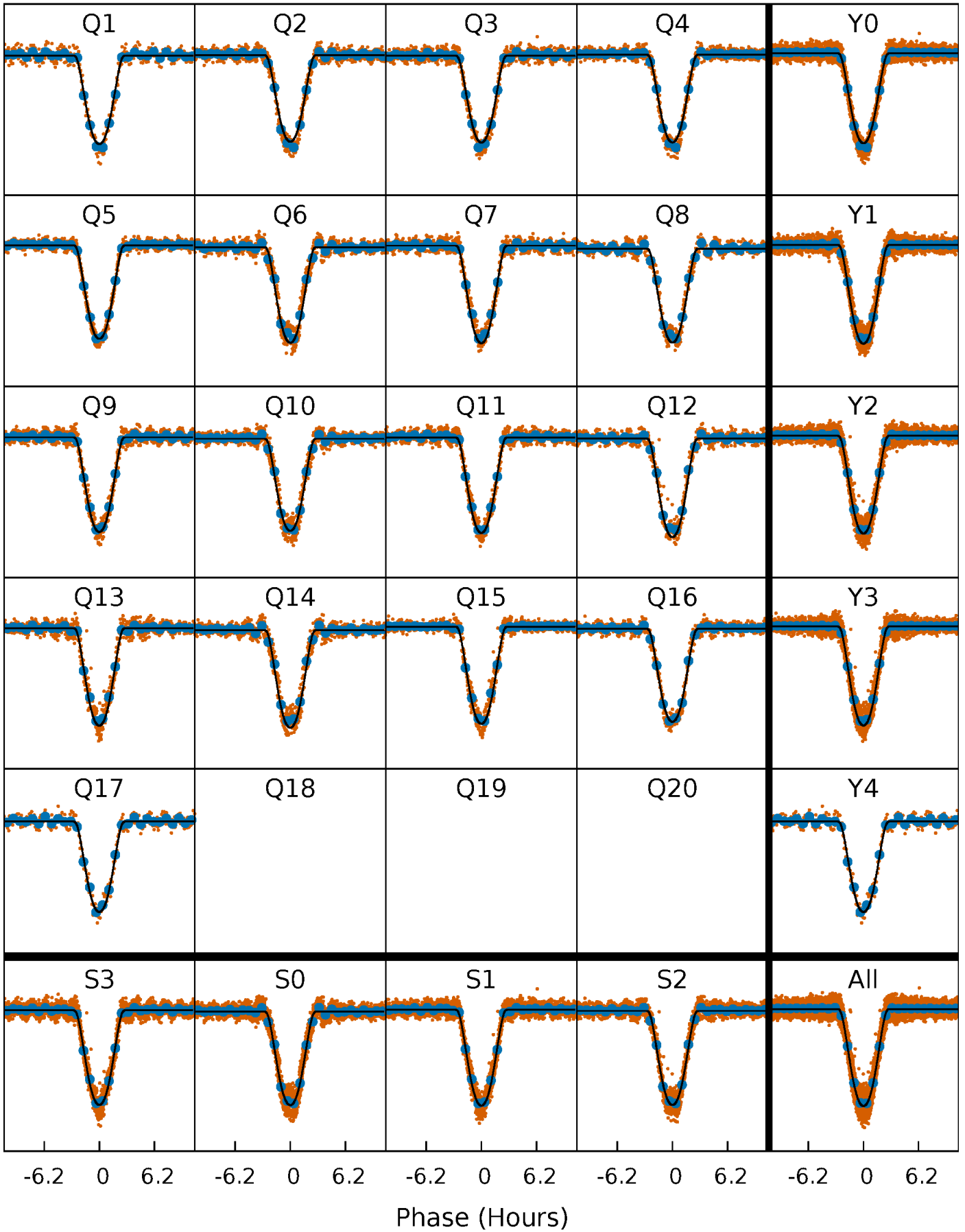
# PDC Quarter-Phased Transit Curves

TCE 008504570-02   P= 4.007708 Days    $T_0=132.796836$  (BKJD)



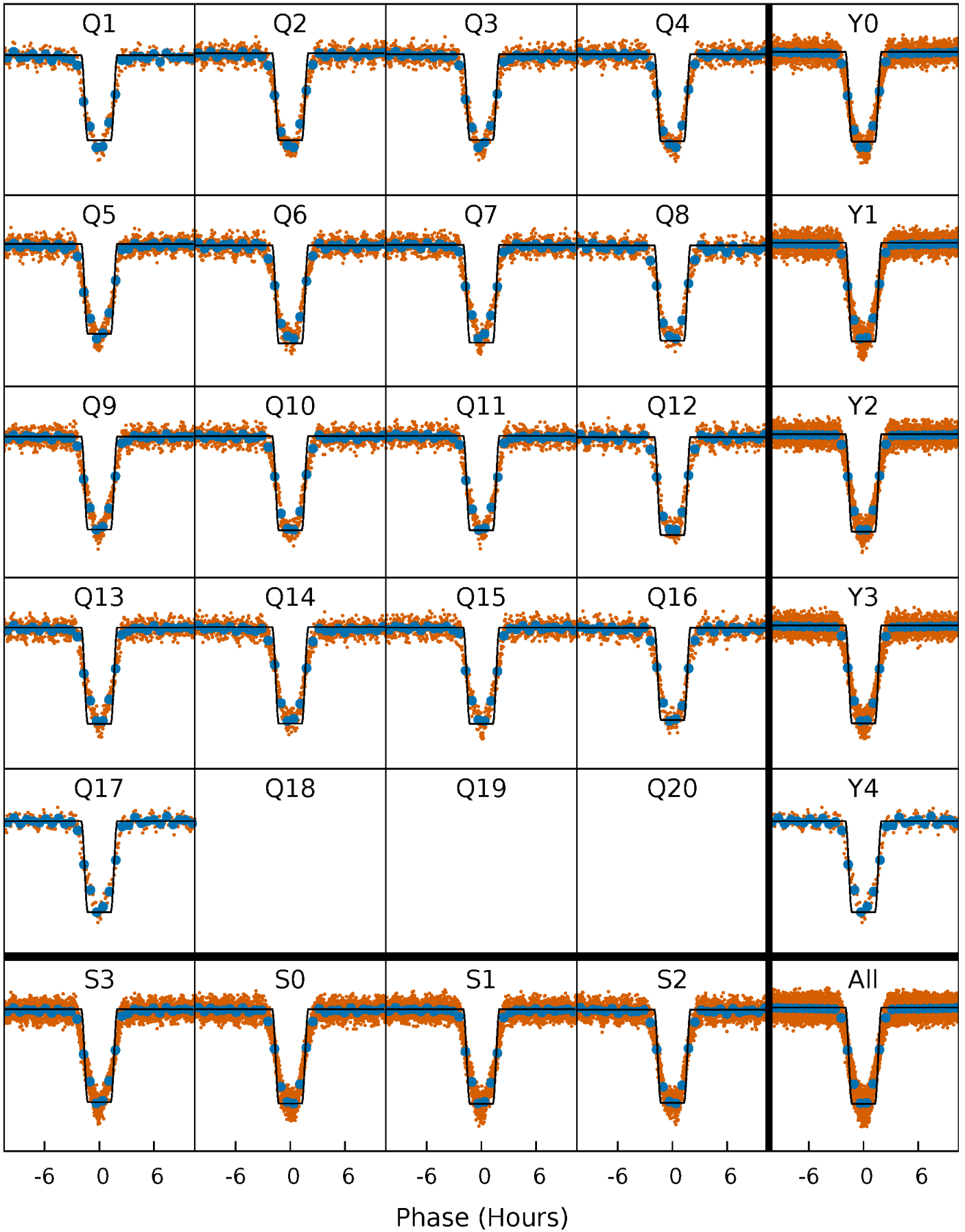
# DV Quarter-Phased Transit Curves

TCE 008504570-02   P= 4.007708 Days    $T_0=132.796836$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

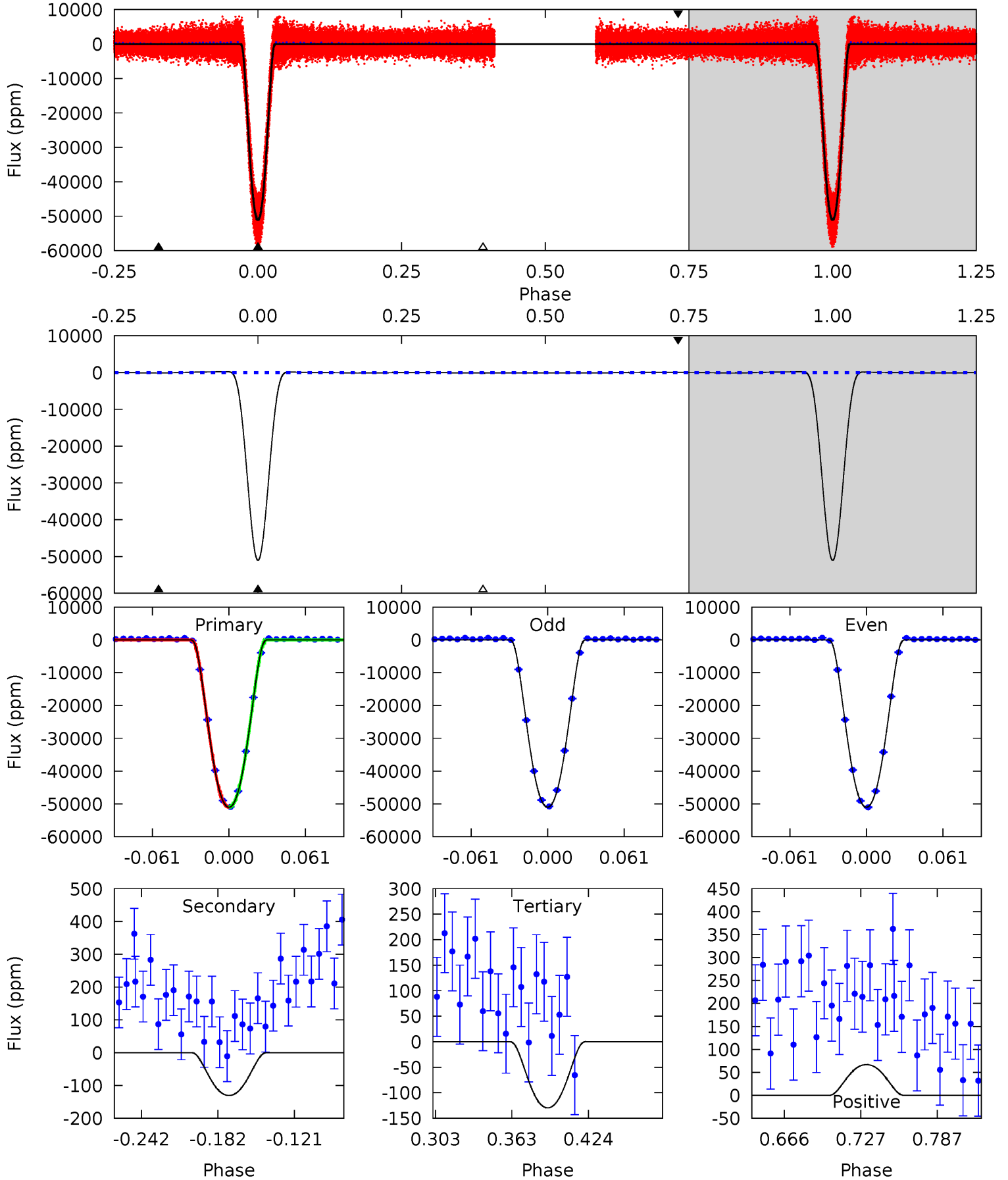
TCE 008504570-02     $P = 4.007693$  Days     $T_0 = 132.799808$  (BKJD)



# DV Model-Shift Uniqueness Test

008504570-02, P = 4.007708 Days, E = 128.789128 Days

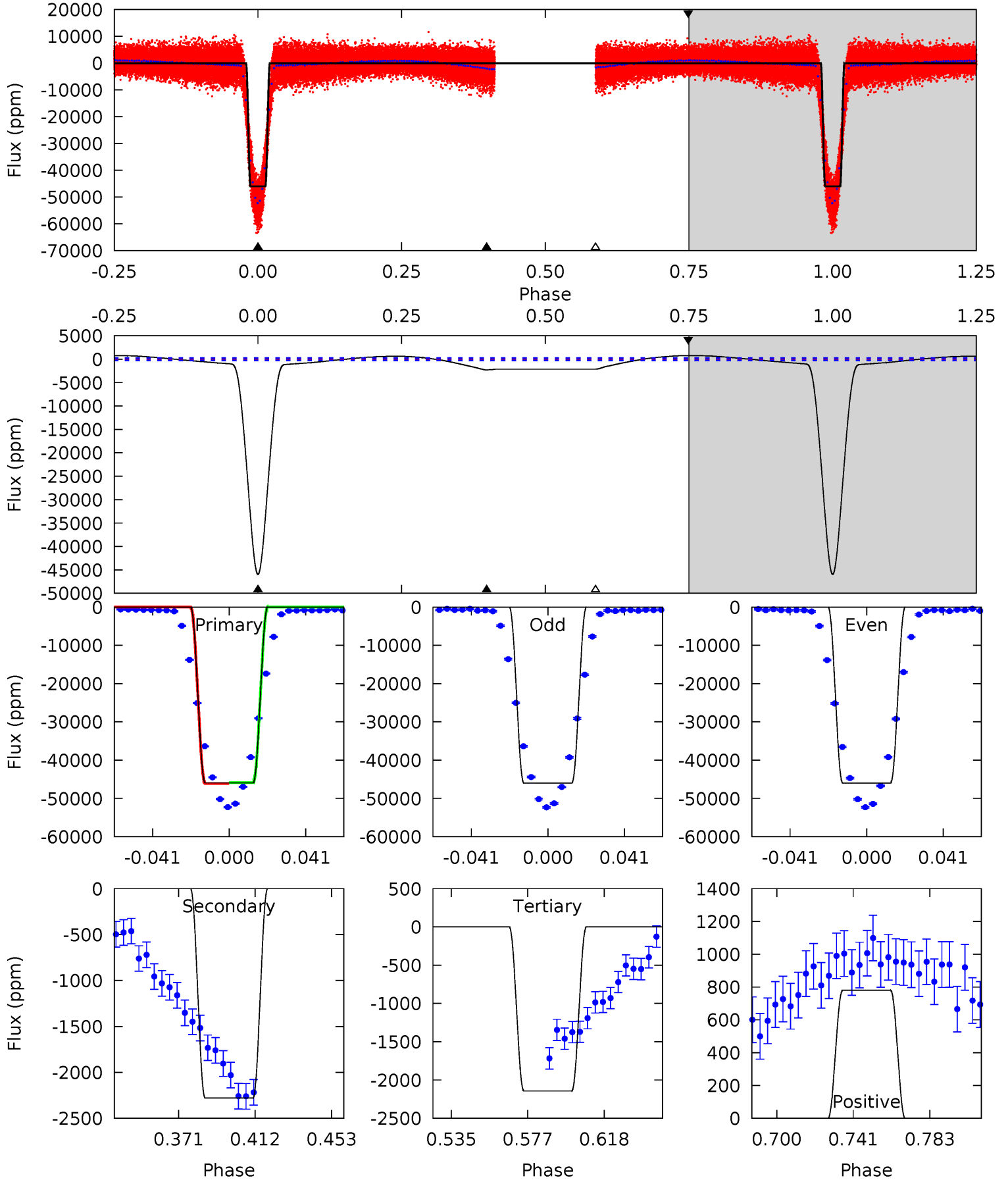
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1793	4.58	4.55	2.34	4.67	1.88	3.14	1788	1790	0.03	2.24	0.39	1.01	0.00	0



# Alt Model-Shift Uniqueness Test

008504570-02, P = 4.007693 Days, E = 128.792115 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
832.1	41.3	38.8	14.1	4.75	2.04	12.3	793.3	818.0	2.47	27.1	0.13	1.01	0.02	1.79





### Stellar Parameters For KIC 008504570

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7162^{+200}_{-300}$	$4.185^{+0.105}_{-0.210}$	$-0.020^{+0.200}_{-0.350}$	$1.631^{+0.546}_{-0.294}$	$1.484^{+0.218}_{-0.218}$	$0.482^{+0.250}_{-0.262}$
	+3%/-4%	+3%/-5%	+1000%/-1750%	+33%/-18%	+15%/-15%	+52%/-54%
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 008504570-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-130 \pm 28$	$43.13^{+7.53}_{-4.31}$	$2406^{+183}_{-157}$	$-2558^{+142}_{-150}$	$0.114^{+0.048}_{-0.034}$
Alt.	$-2280 \pm 55$	$40.99^{+7.84}_{-4.32}$	$2400^{+199}_{-147}$	$3589^{+73}_{-98}$	$2.316^{+0.528}_{-0.614}$

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

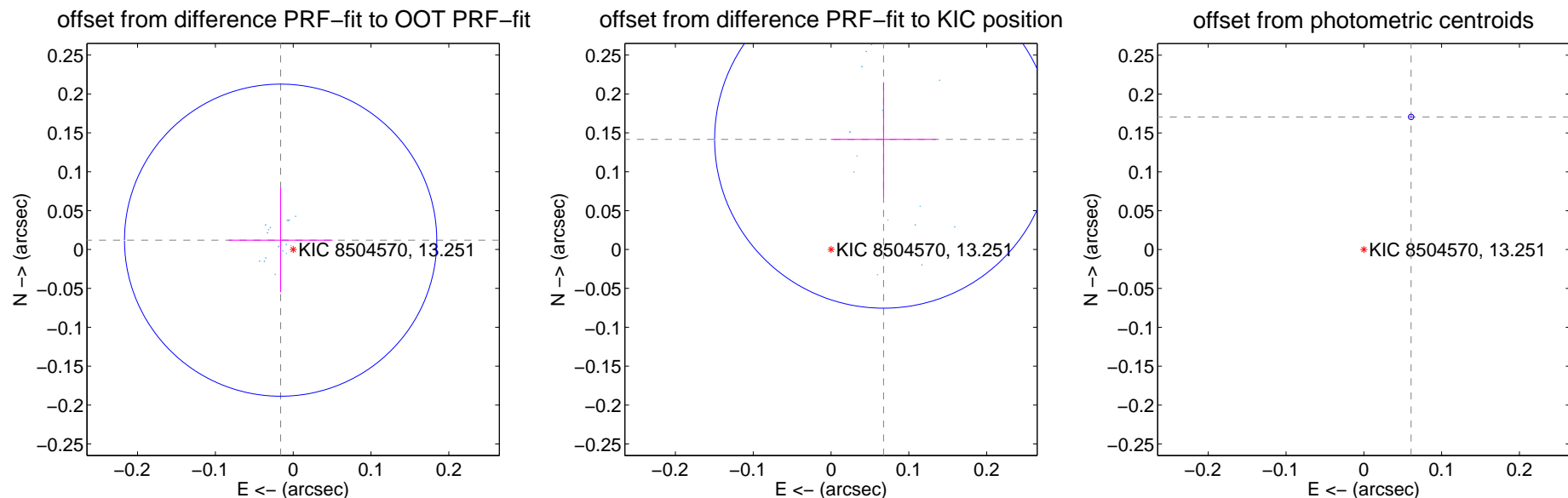
## DV Centroid Data

Supplemental centroid analysis for 008504570-02. Kepler magnitude: 13.25. Transit SNR 1717.26

There are 17 quarters with good PRF difference image offsets

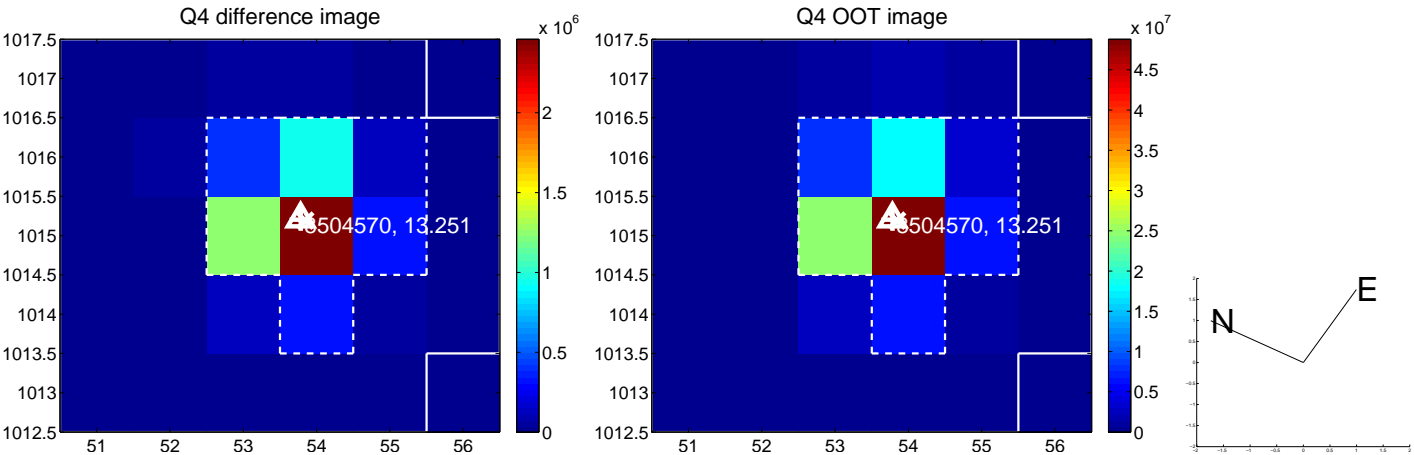
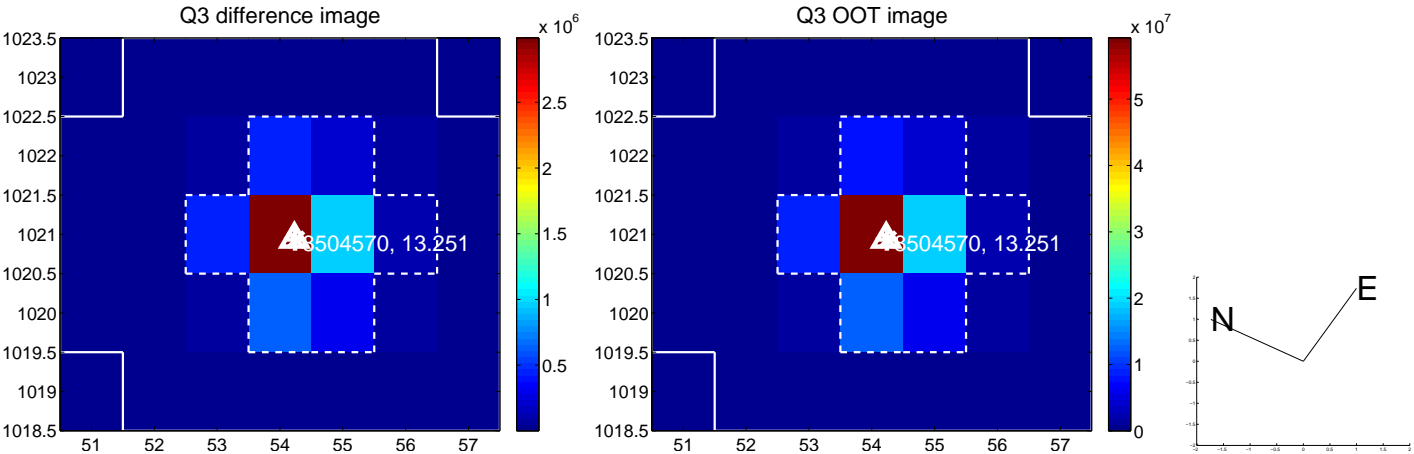
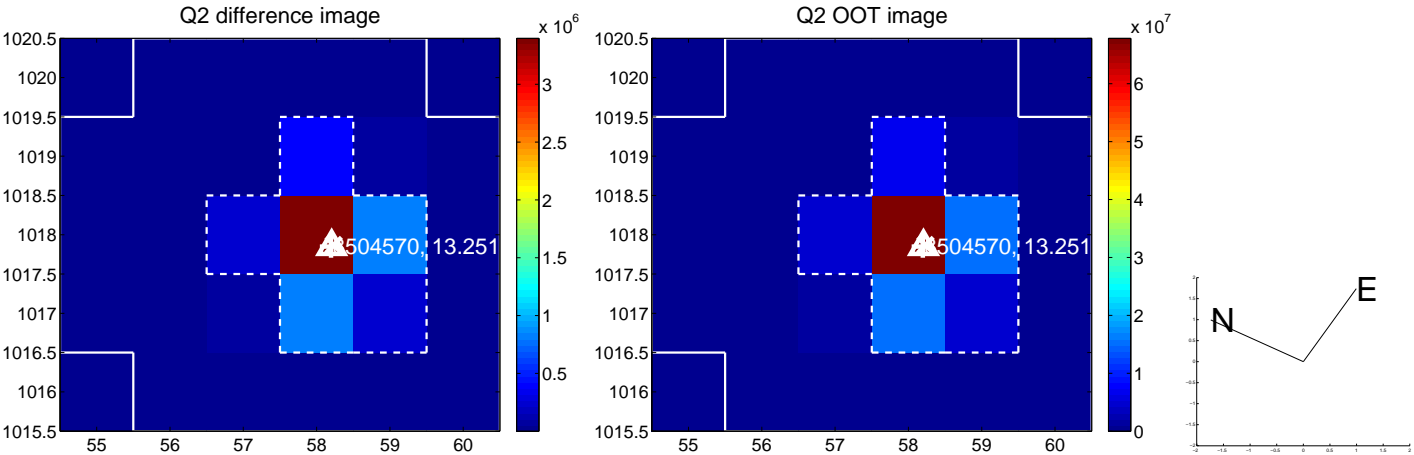
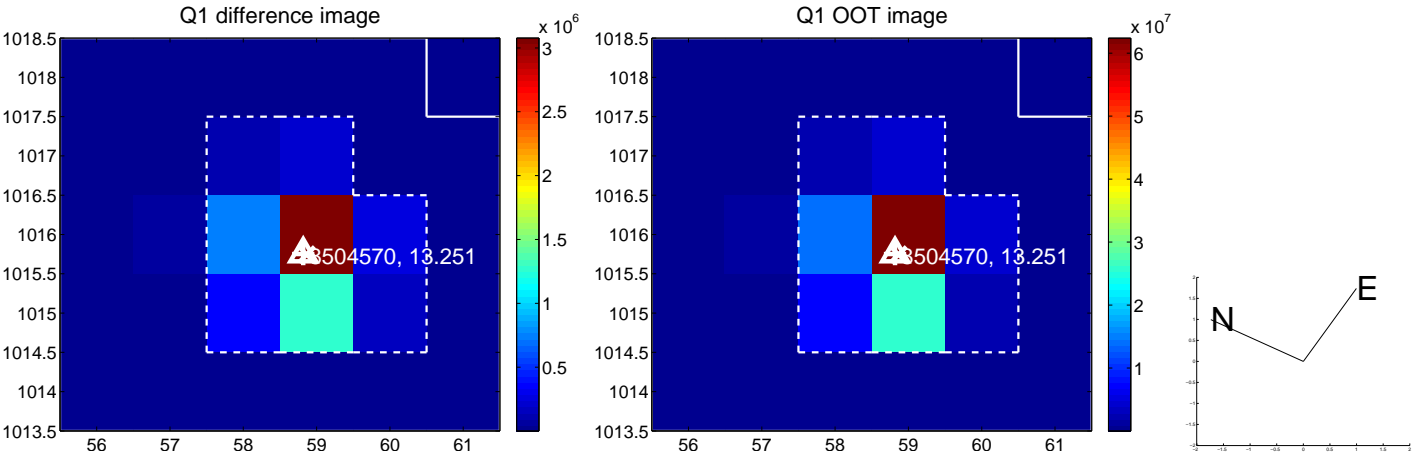
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.020 \pm 0.067$	0.30	$0.016 \pm 0.067$	$0.012 \pm 0.067$
PRF-fit source offset from KIC position	$0.157 \pm 0.072$	2.17	$-0.068 \pm 0.068$	$0.142 \pm 0.073$
photometric centroid source offset	$0.18 \pm 0.00$	156.44	$-0.06 \pm 0.00$	$0.17 \pm 0.00$

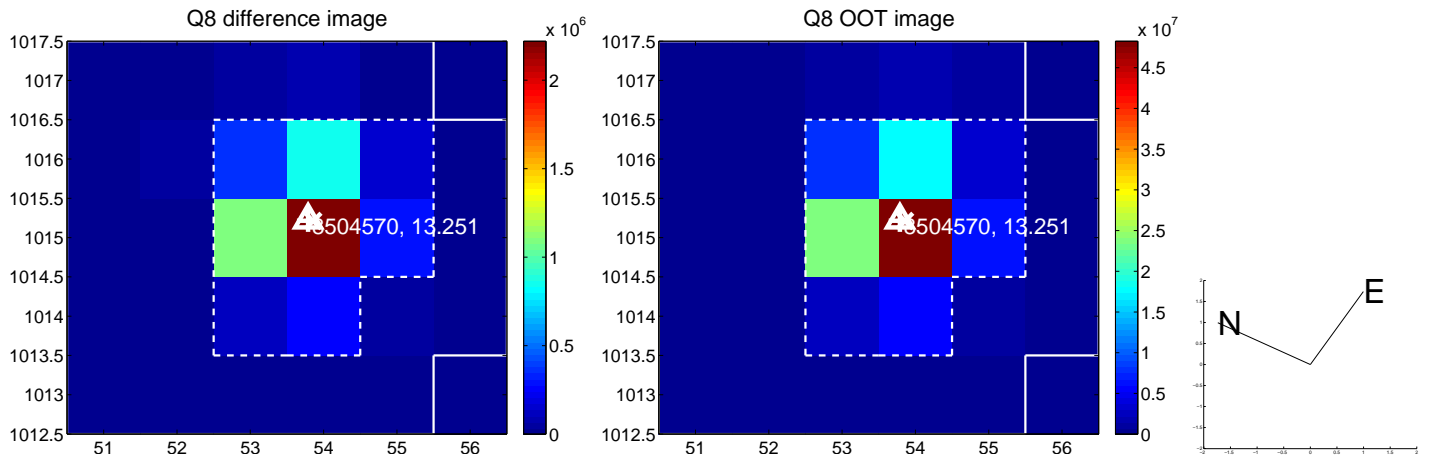
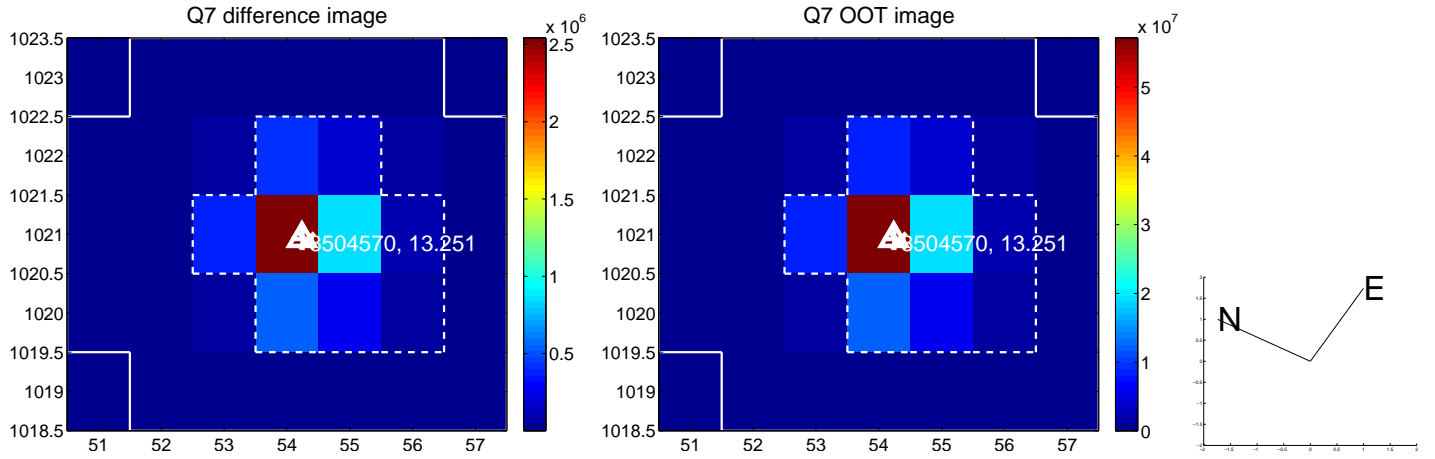
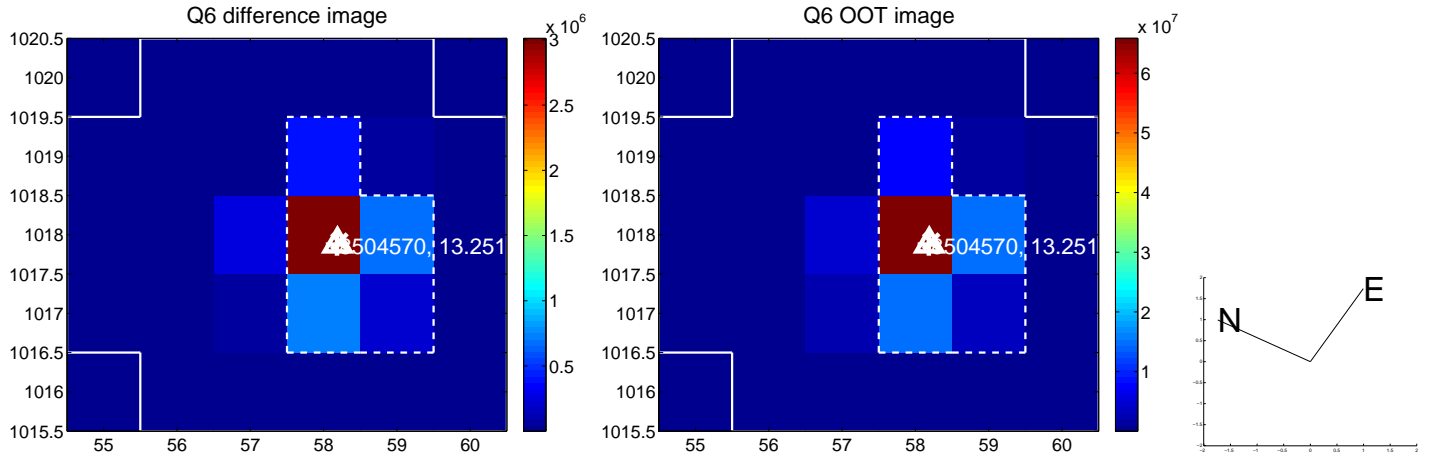
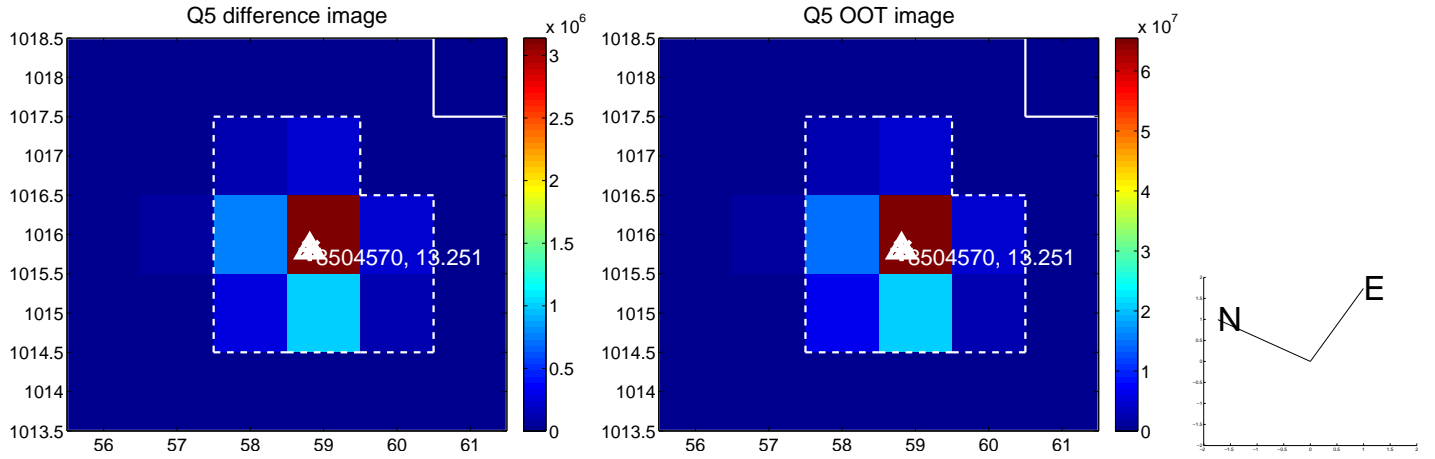


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

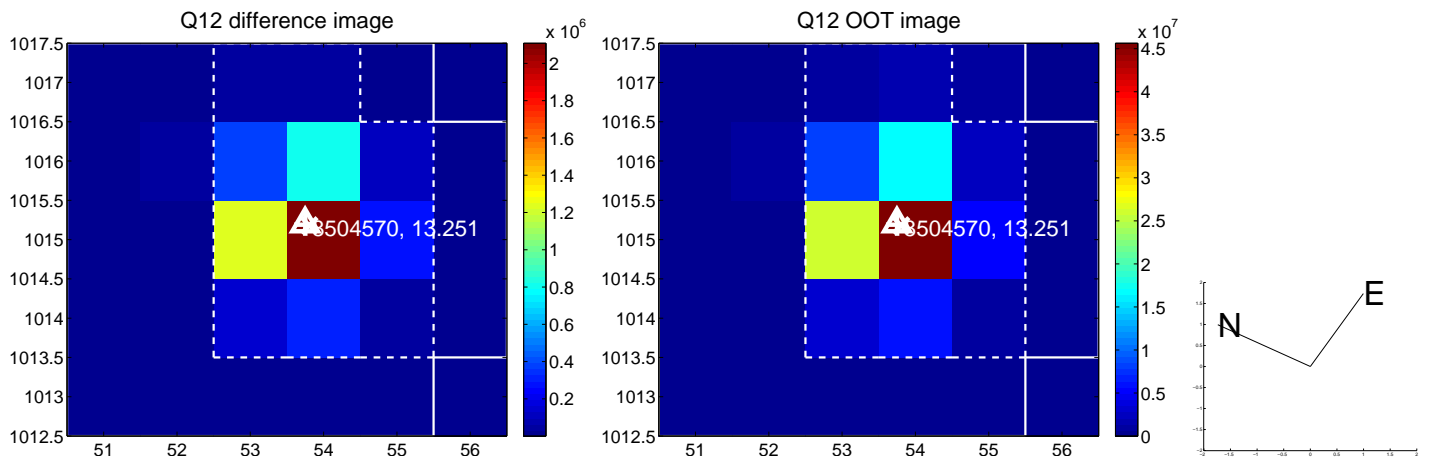
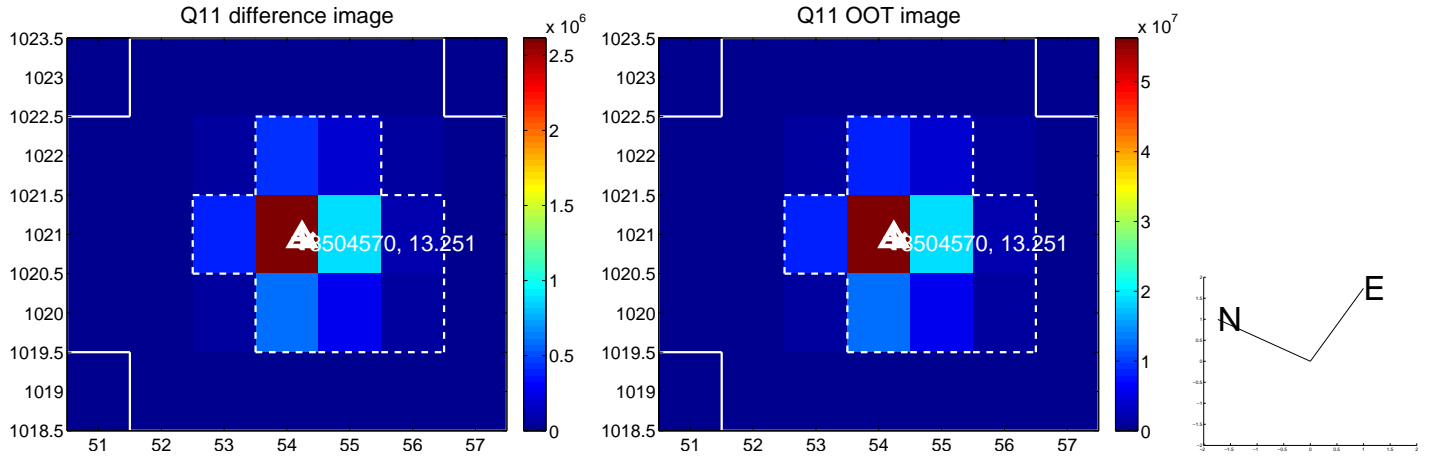
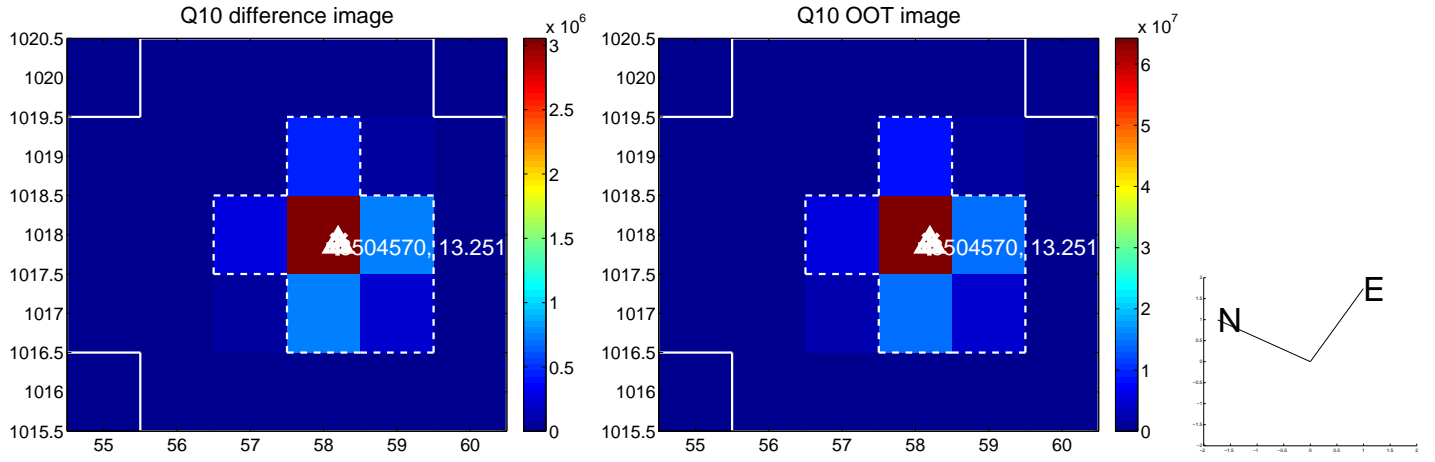
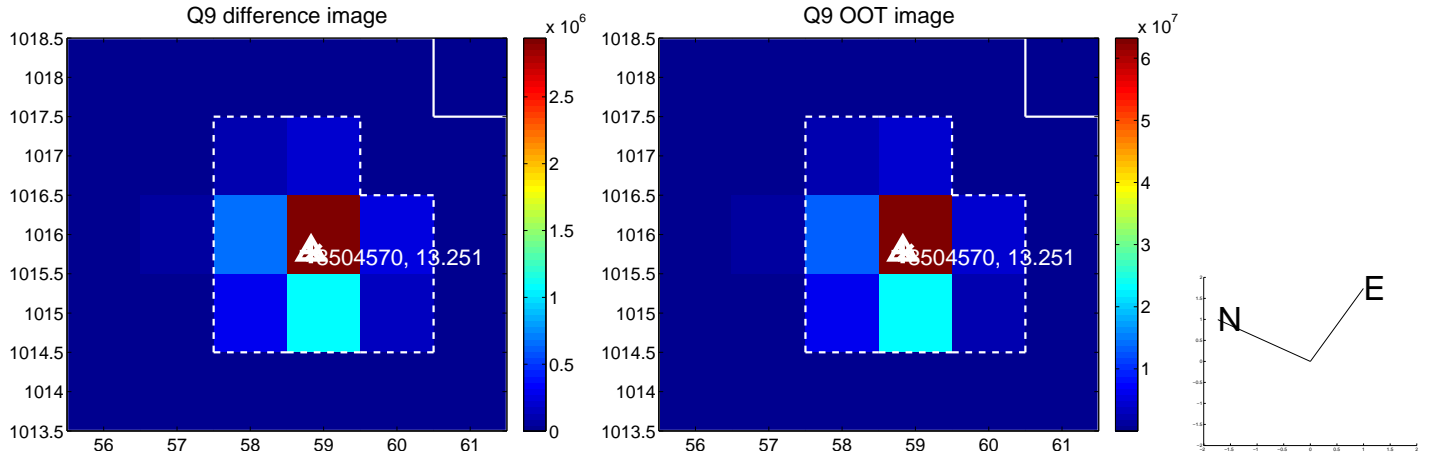
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



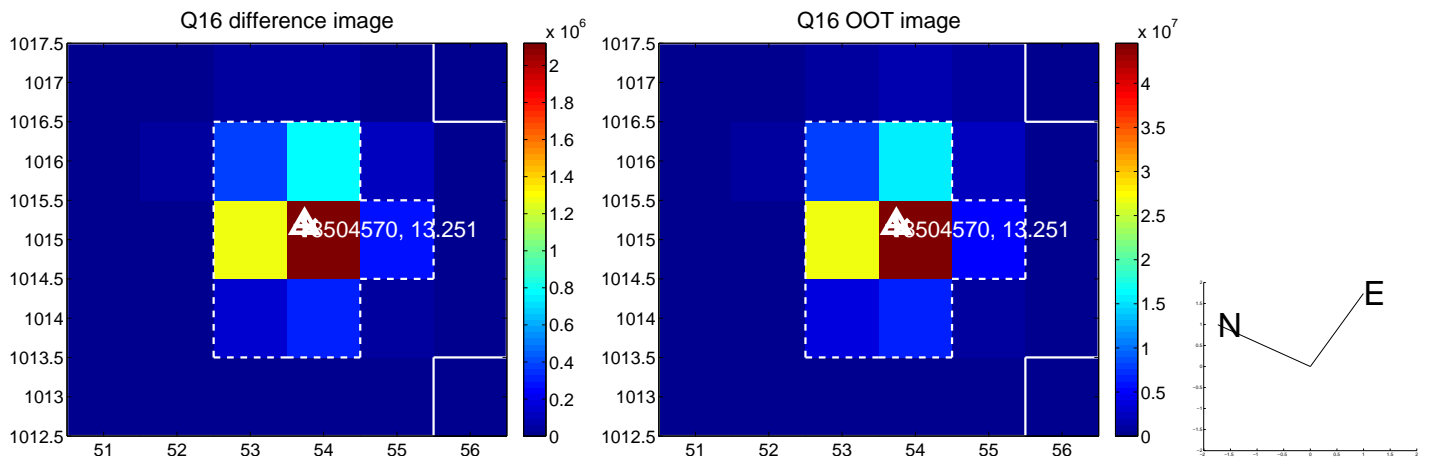
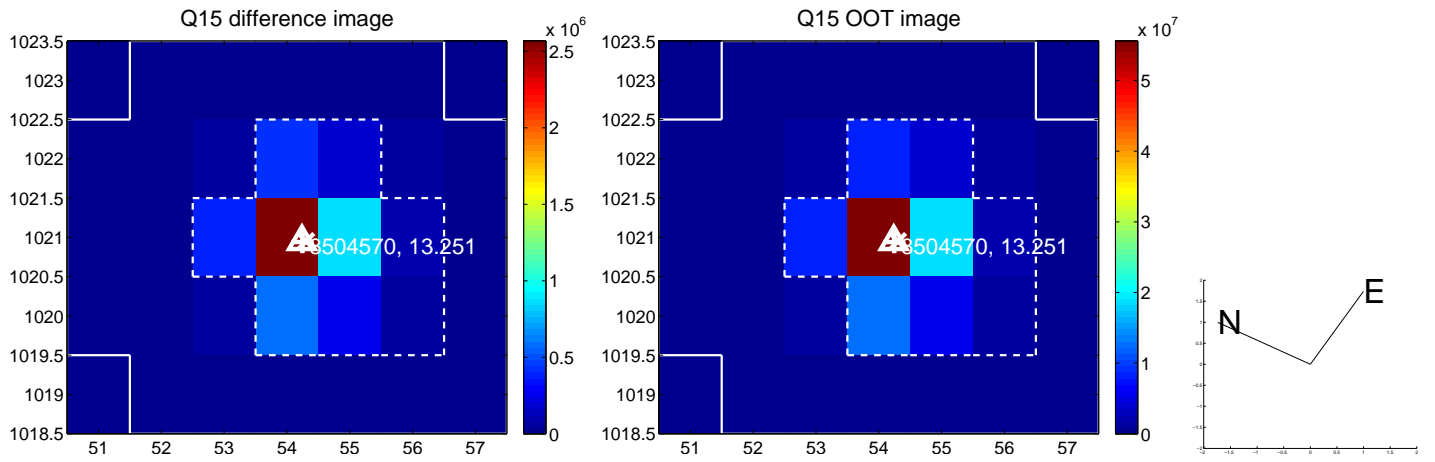
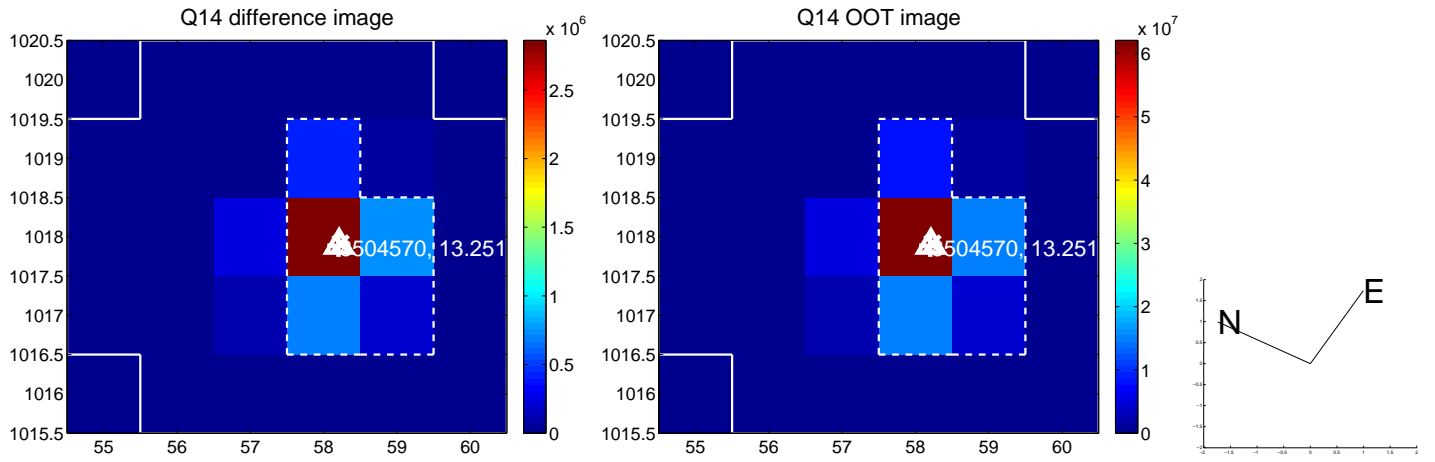
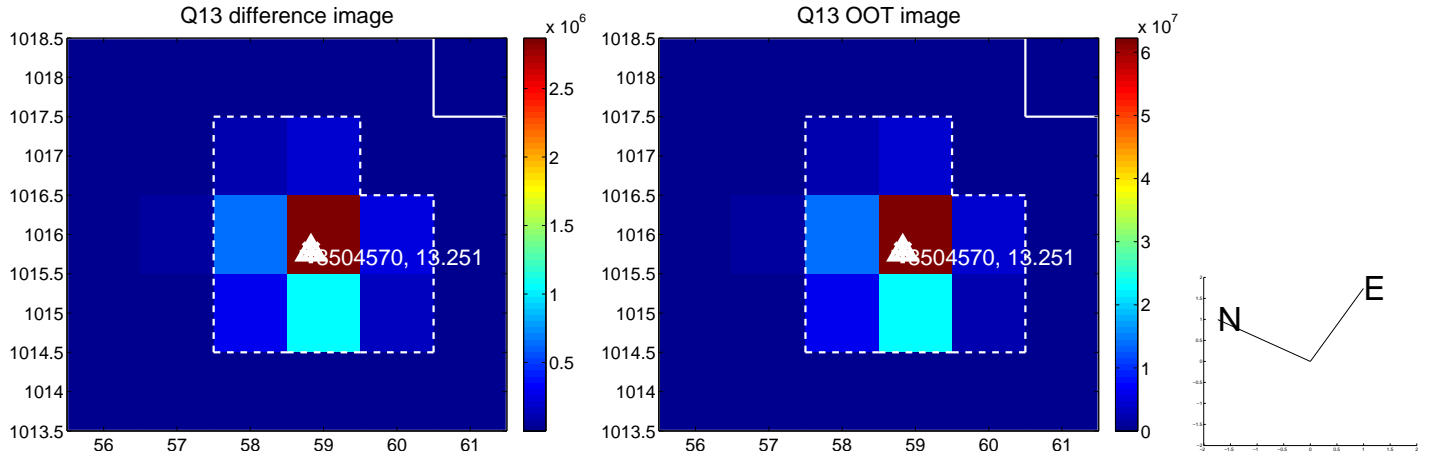
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



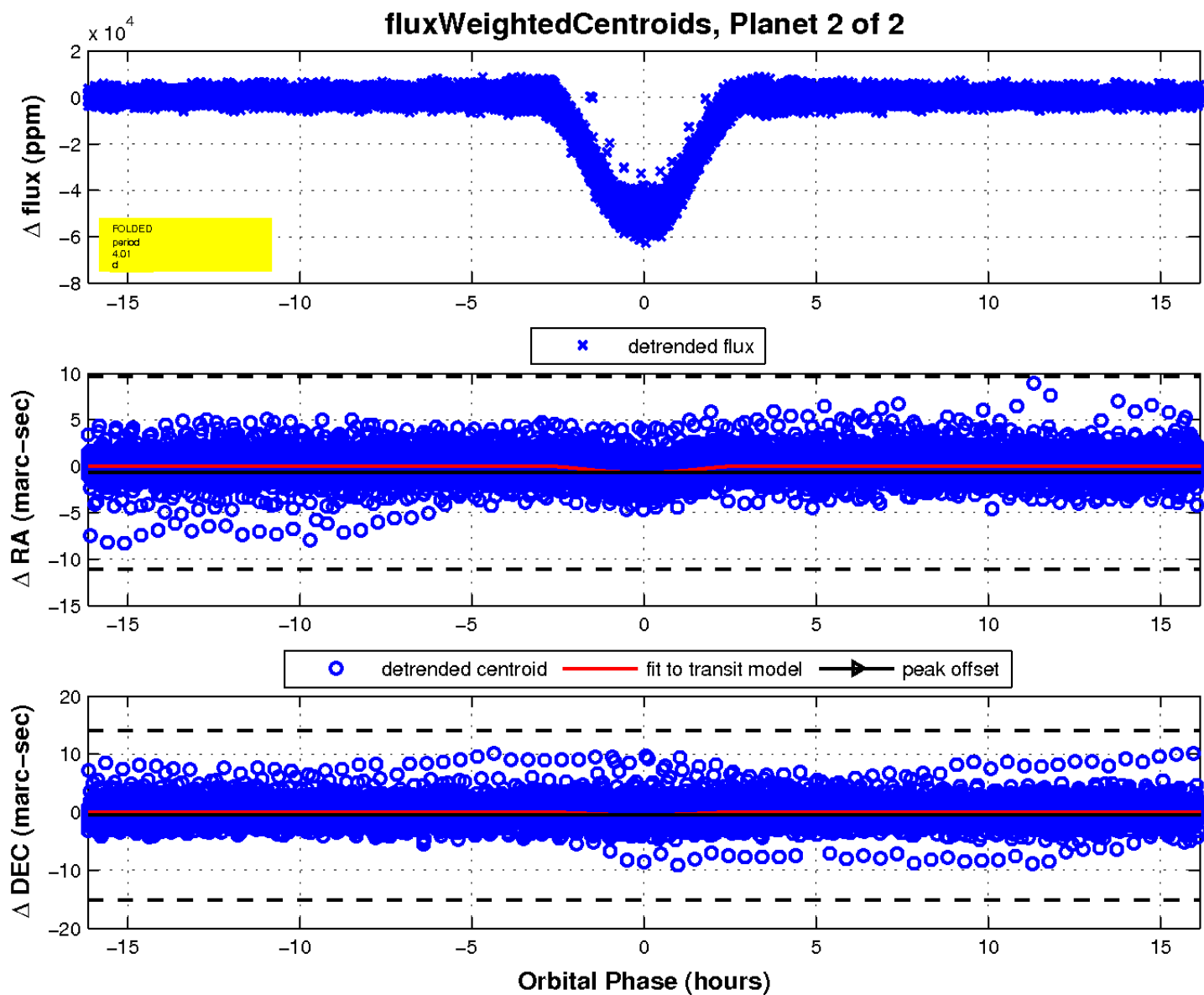
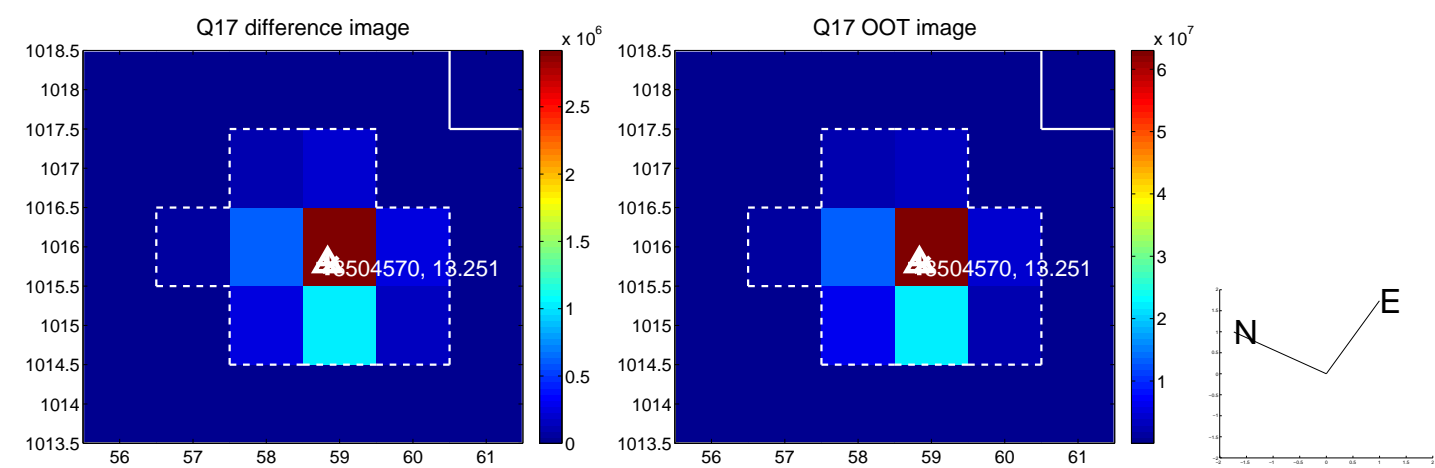
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

