

# KIC 004049124

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004049124-01	OBS	5994.01	4.804470	136.004659	132140.4	3.526	8550.1	5668.9	0.81	5561	30.91	199.19
004049124-02	OBS	No	4.804471	133.616749	6250.7	3.443	425.9	419.5	0.81	5561	7.64	199.19

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004049124-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_DV—HAS_SEC_TCE
004049124-02	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.

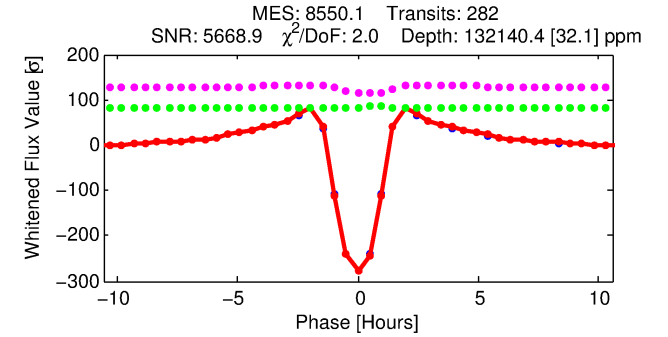
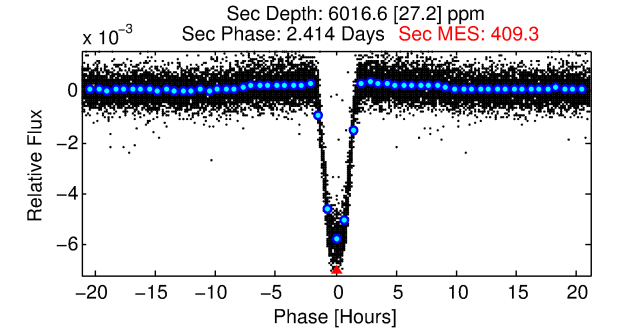
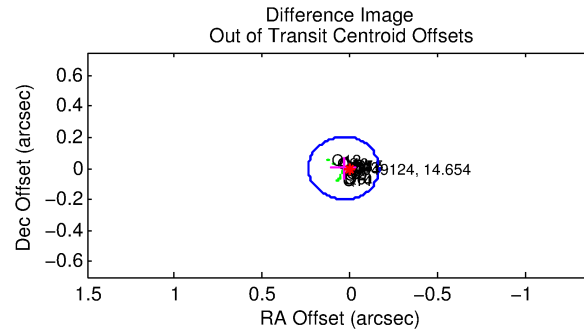
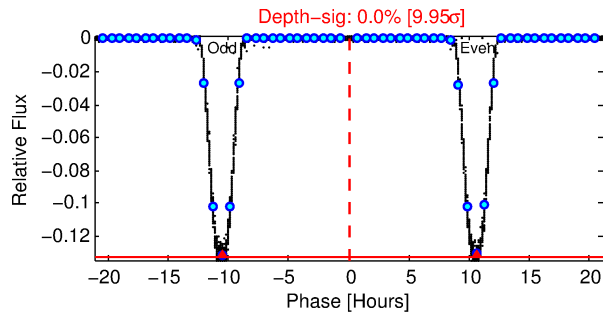
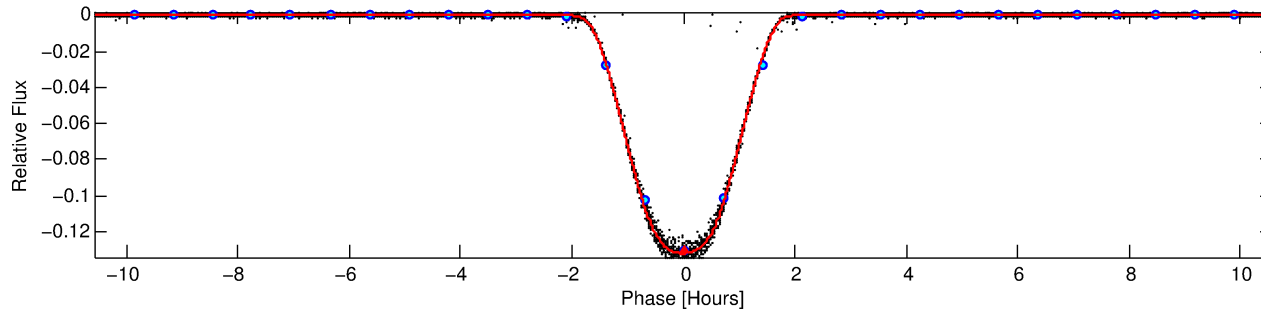
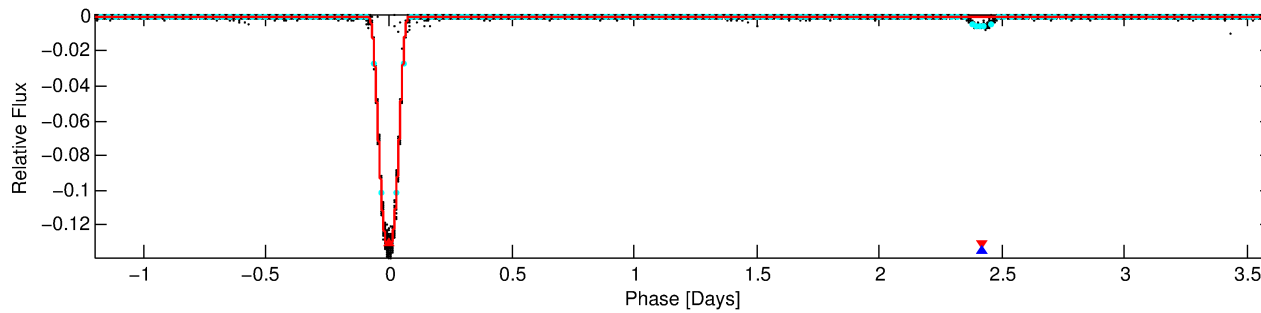
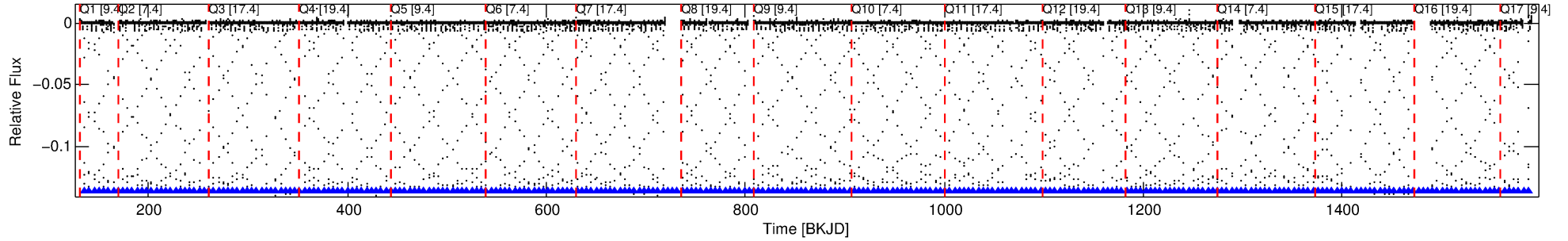
## Ephemeris Match Information For 004049124-01

No Significant Match Found

# DV One-Page Summary

KIC: 4049124 Candidate: 1 of 2 Period: 4.804 d  
KOI: K05994.01 Corr: 1.000

Kp: 14.65 R\*: 0.81 Rs Teff: 5561.0 K Logg: 4.56 Fe/H: -0.220



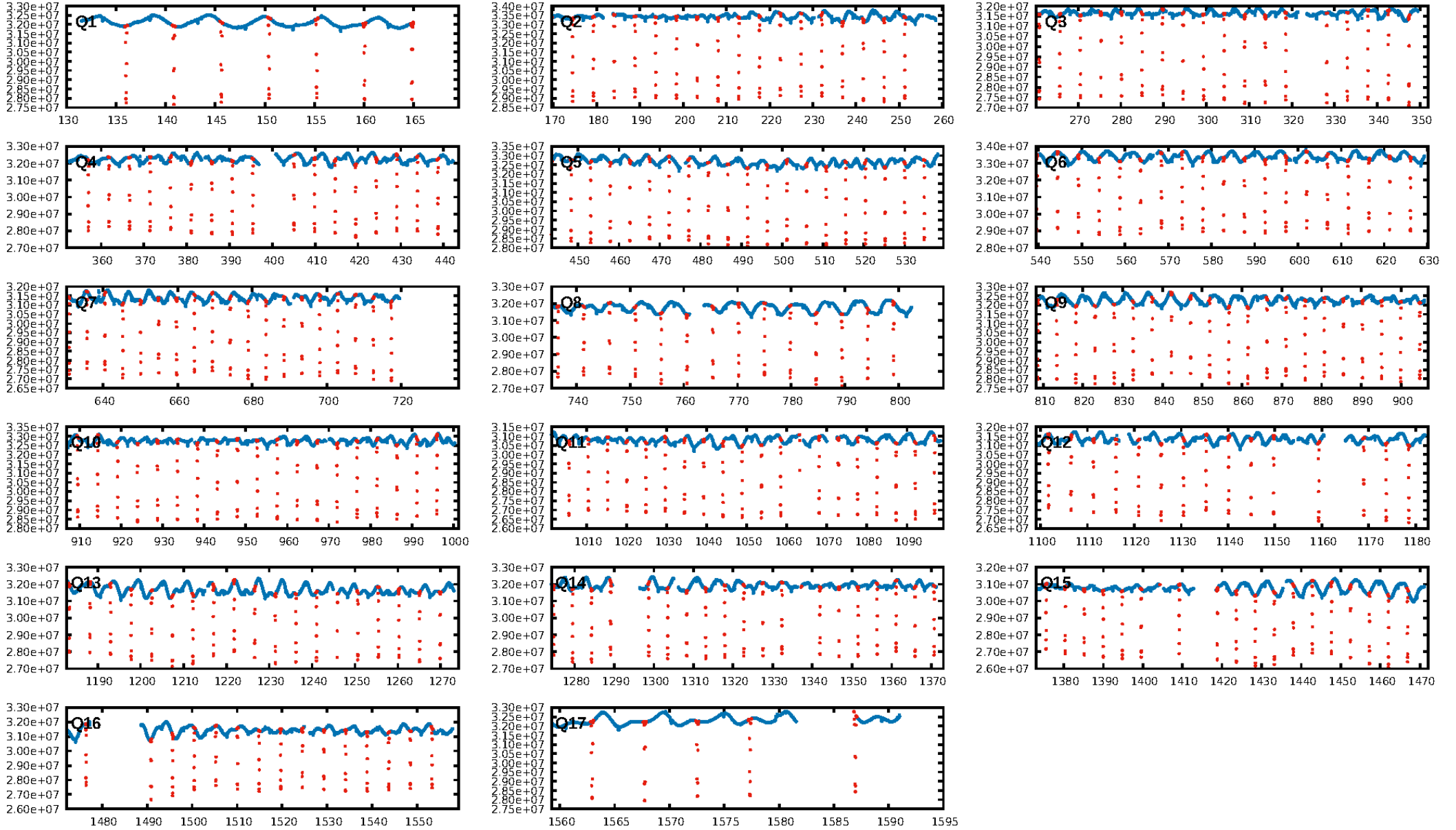
## DV Fit Results:

Period = 4.80447 [0.00000] d  
Epoch = 136.0047 [0.0000] BKJD  
Rp/R\* = 0.3501 [0.0001]  
a/R\* = 12.79 [0.00]  
b = 0.57 [0.00]  
Seff = 199.19 [60.46]  
Teff = 958 [73] K  
Rp = 30.91 [7.07] Re  
a = 0.0531 [0.0102] AU  
Ag = 9.75 [2.72] [3.22σ]  
Teffp = 2617 [79] K [15.49σ]

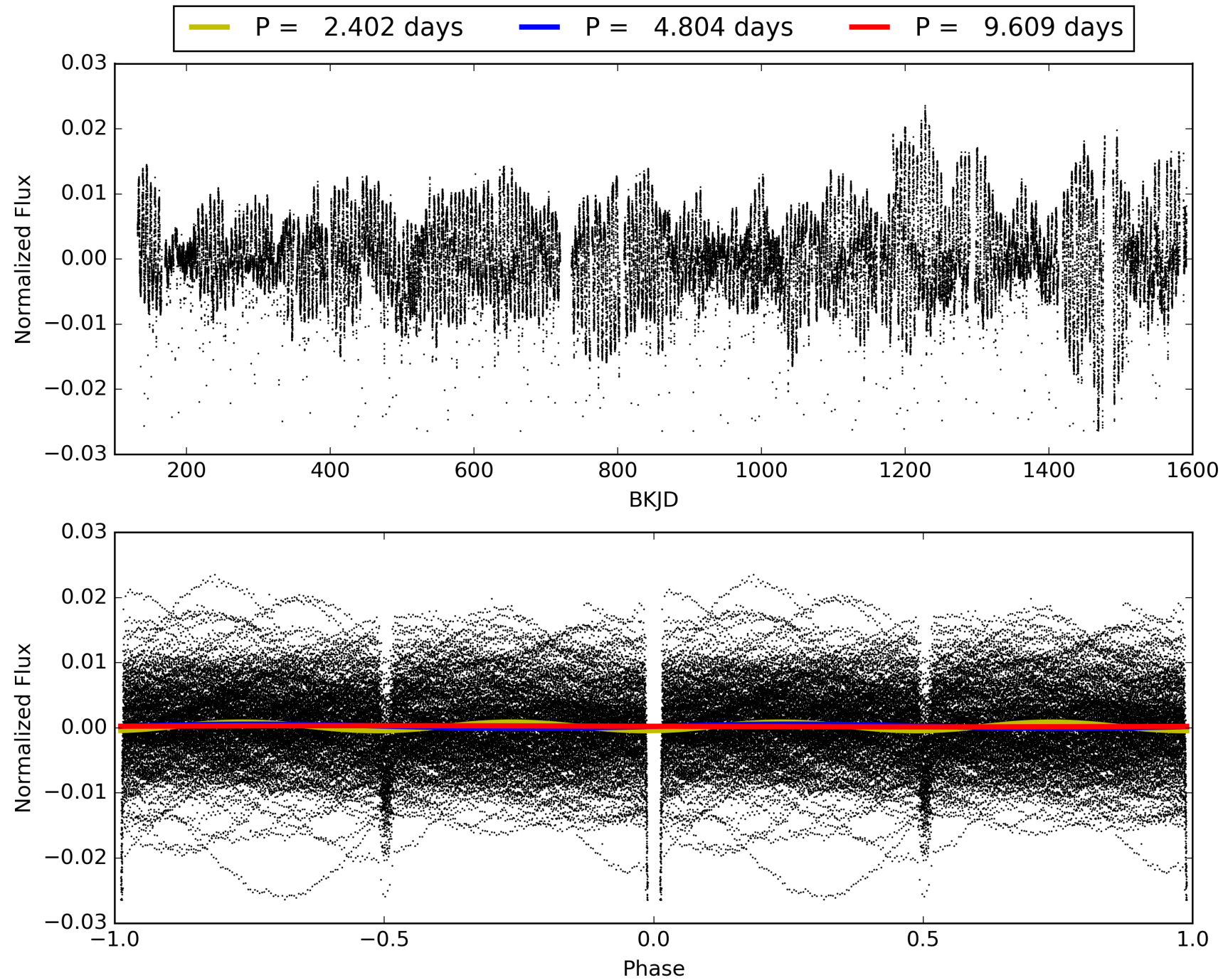
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [270/270]  
GhostDiagnostic-chr: 3.463  
Centroid-sig: 0.0%  
Centroid-so: 0.416 arcsec [338.38σ]  
OotOffset-rm: 0.038 arcsec [0.56σ]  
KicOffset-rm: 0.150 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]

# TCE 004049124-01, PDC Light Curves

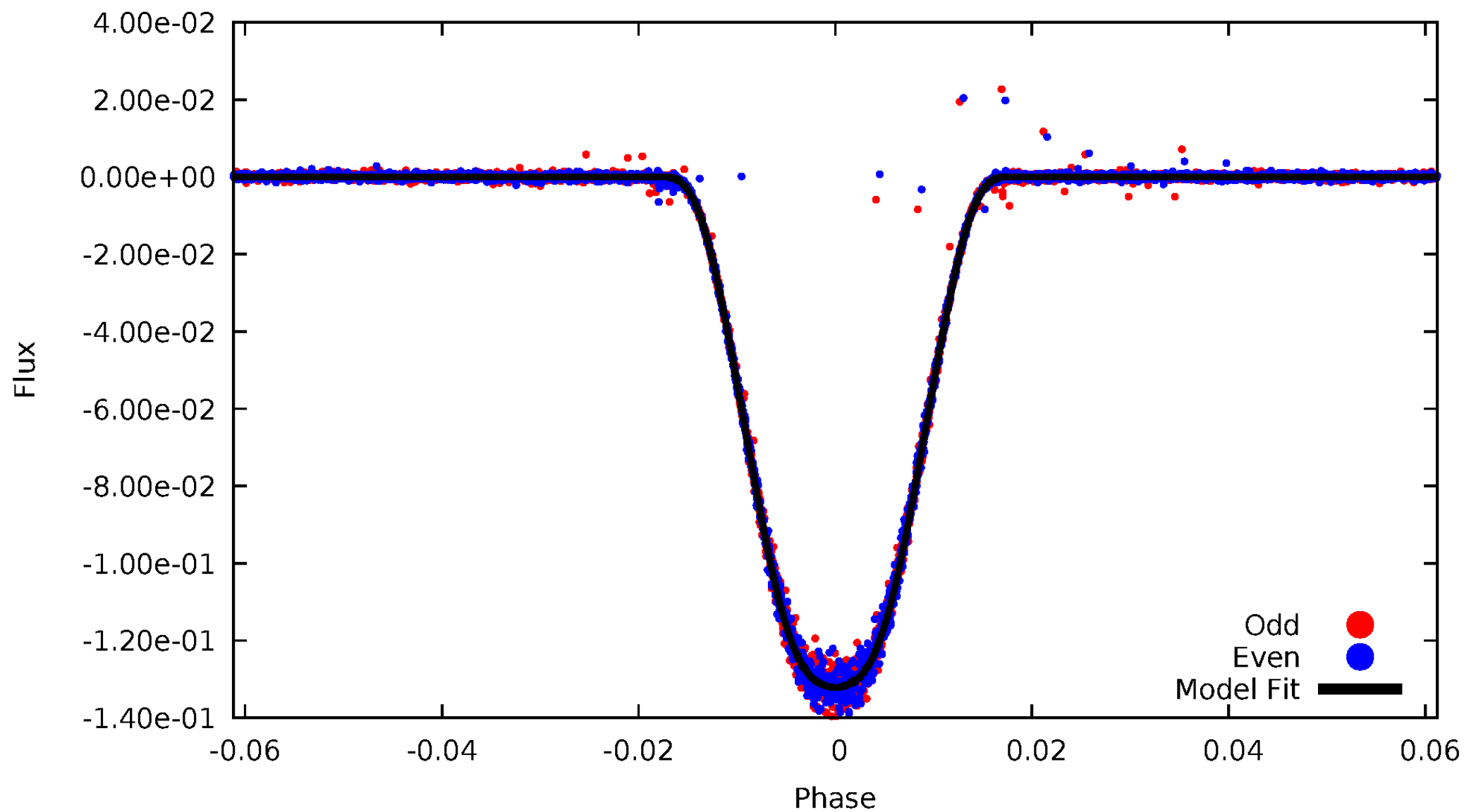


TCE 004049124-01



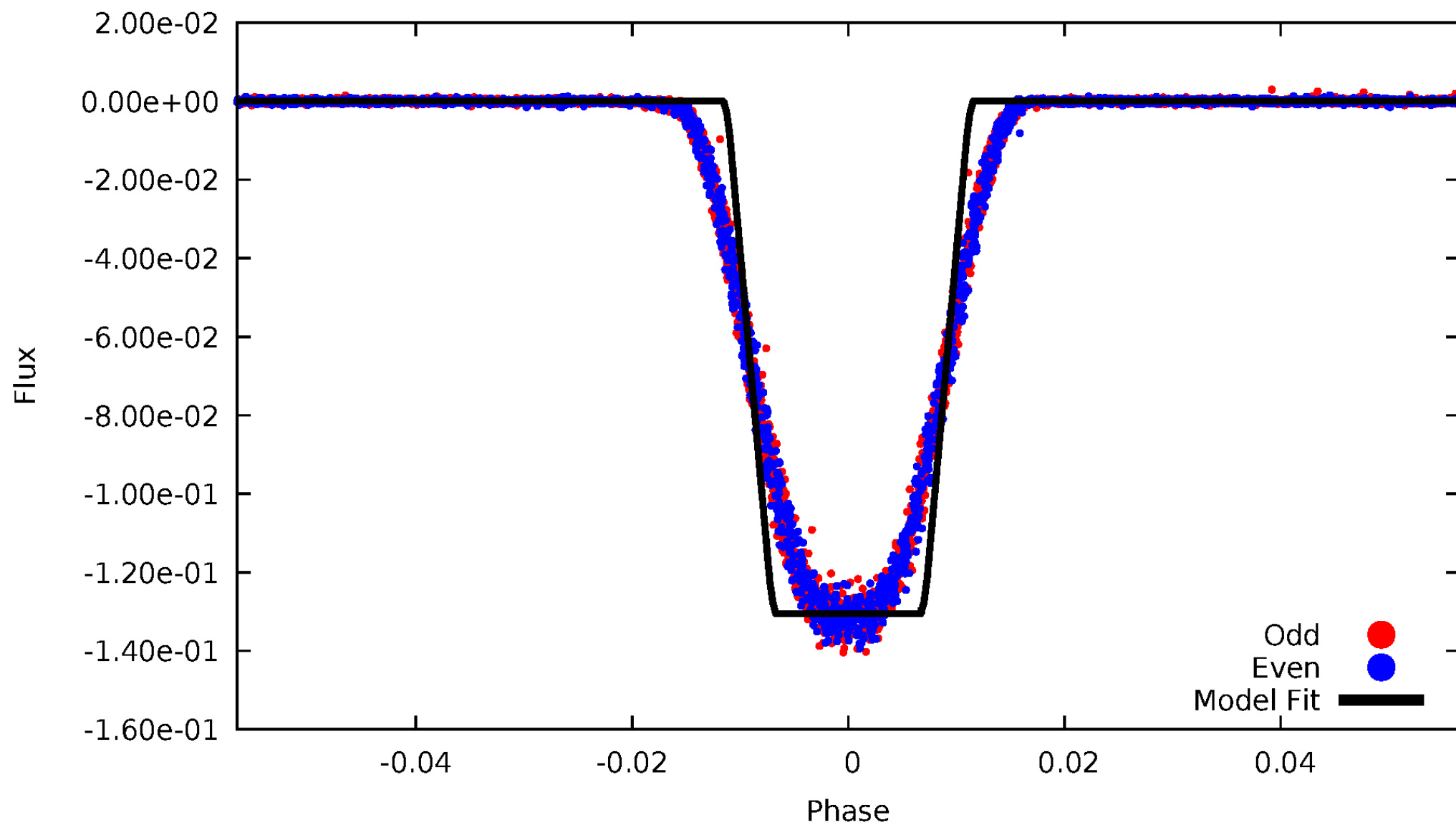
# DV Odd/Even

TCE 004049124-01



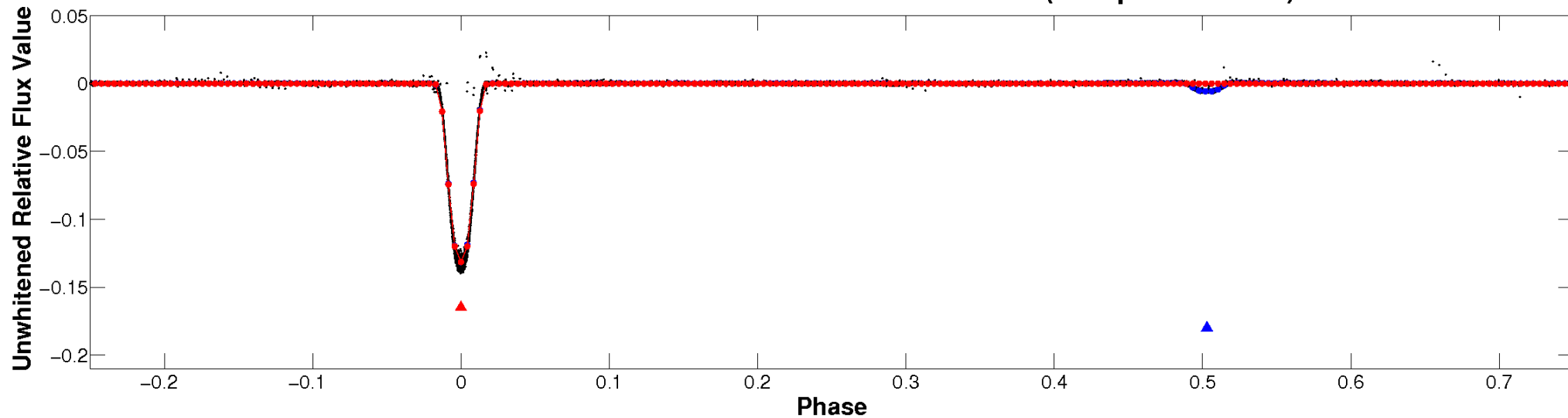
# ALT Odd/Even

TCE 004049124-01

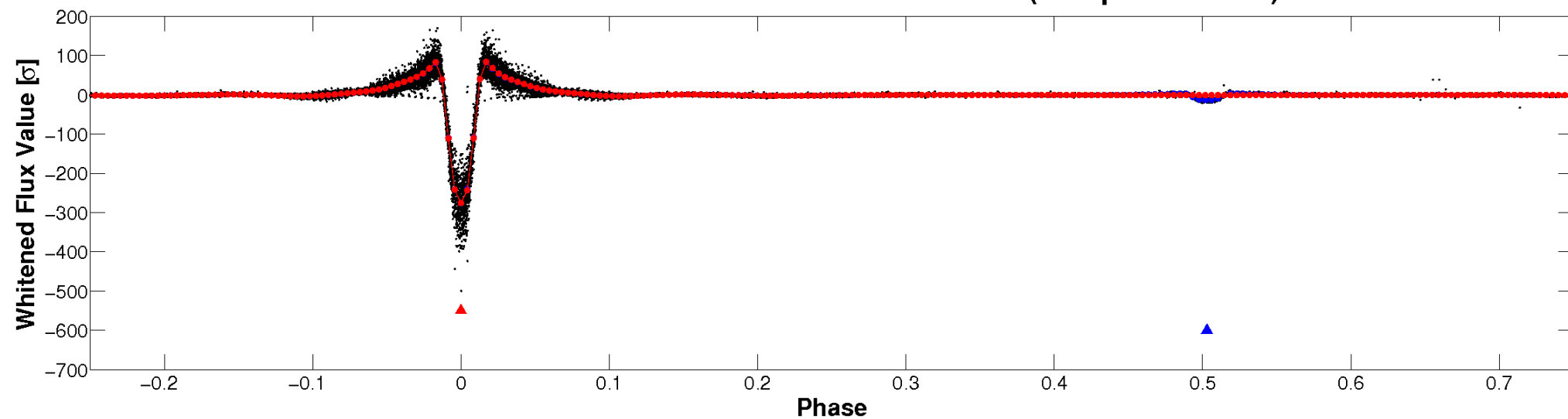


# Non-Whitened Vs. Whitened Light Curve

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

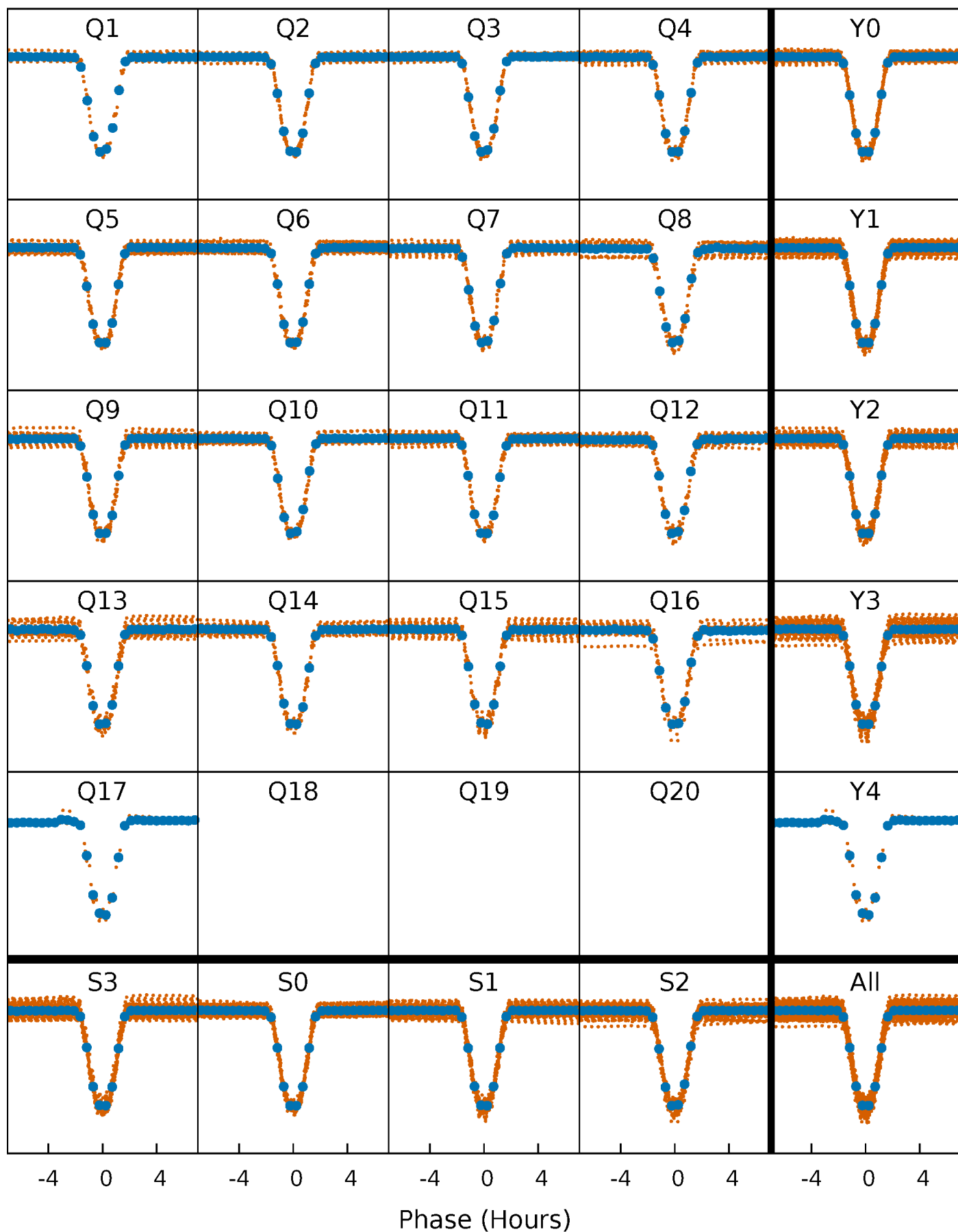


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

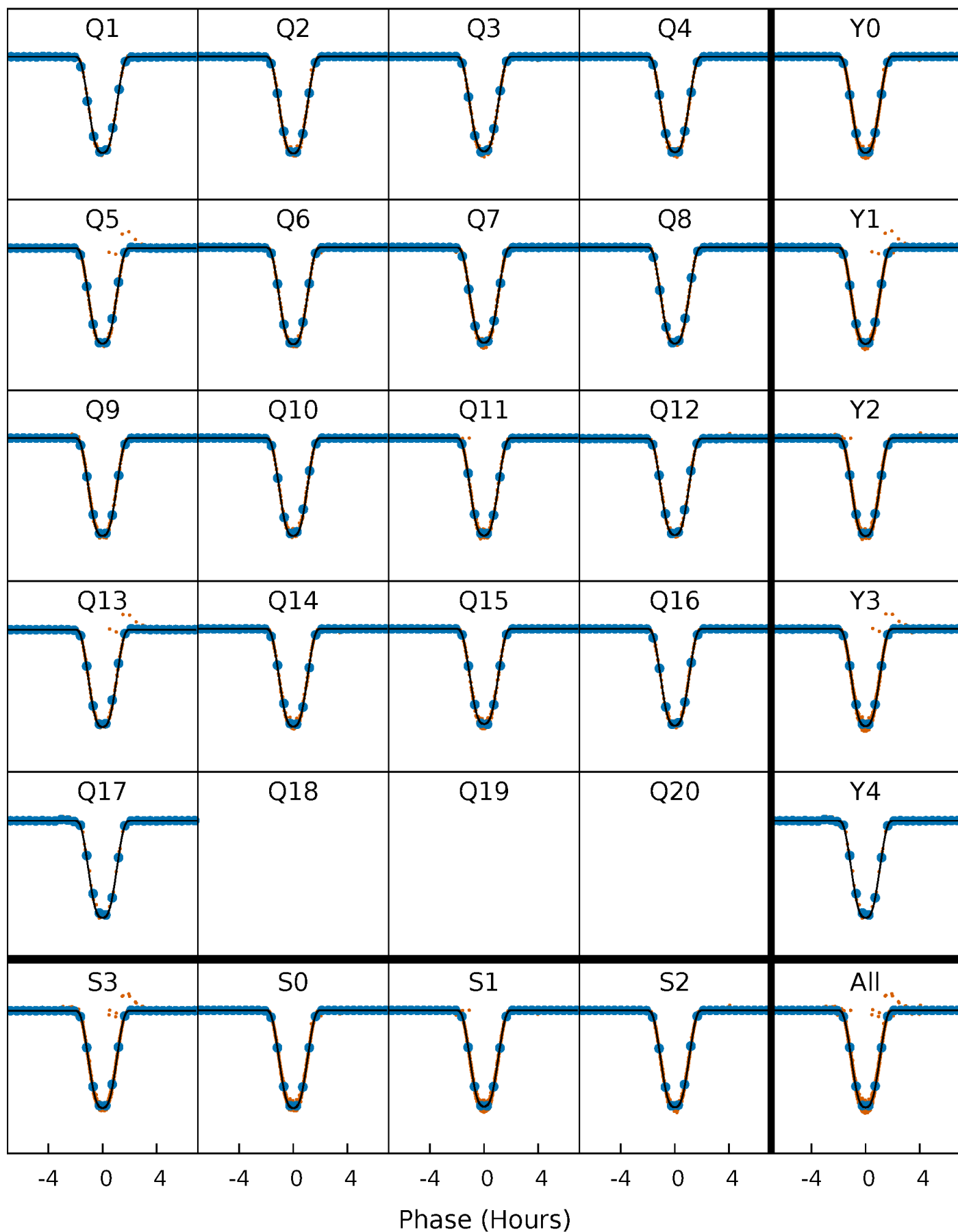
TCE 004049124-01   P= 4.804470 Days    $T_0=136.004659$  (BKJD)





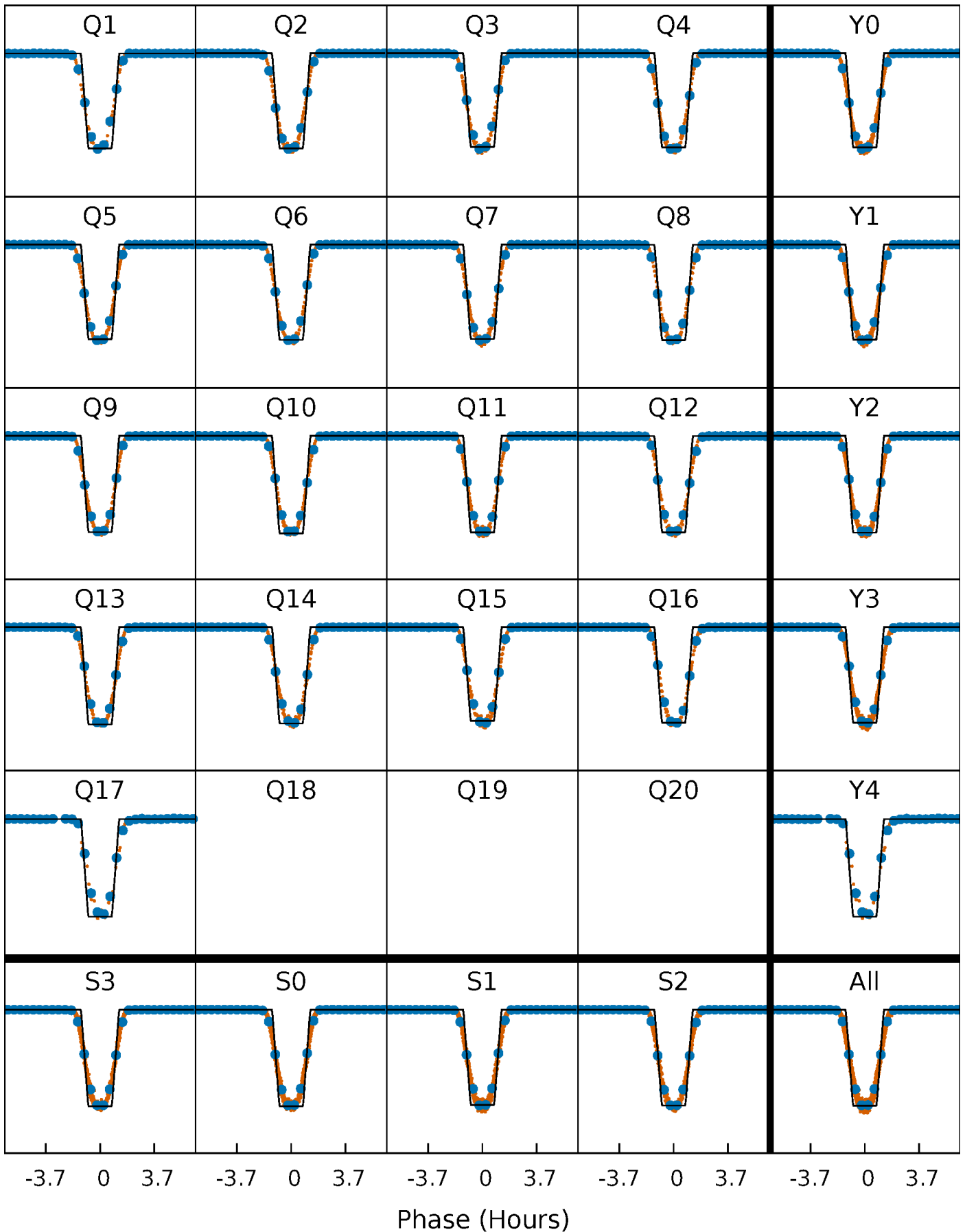
# DV Quarter-Phased Transit Curves

TCE 004049124-01   P= 4.804470 Days    $T_0=136.004659$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

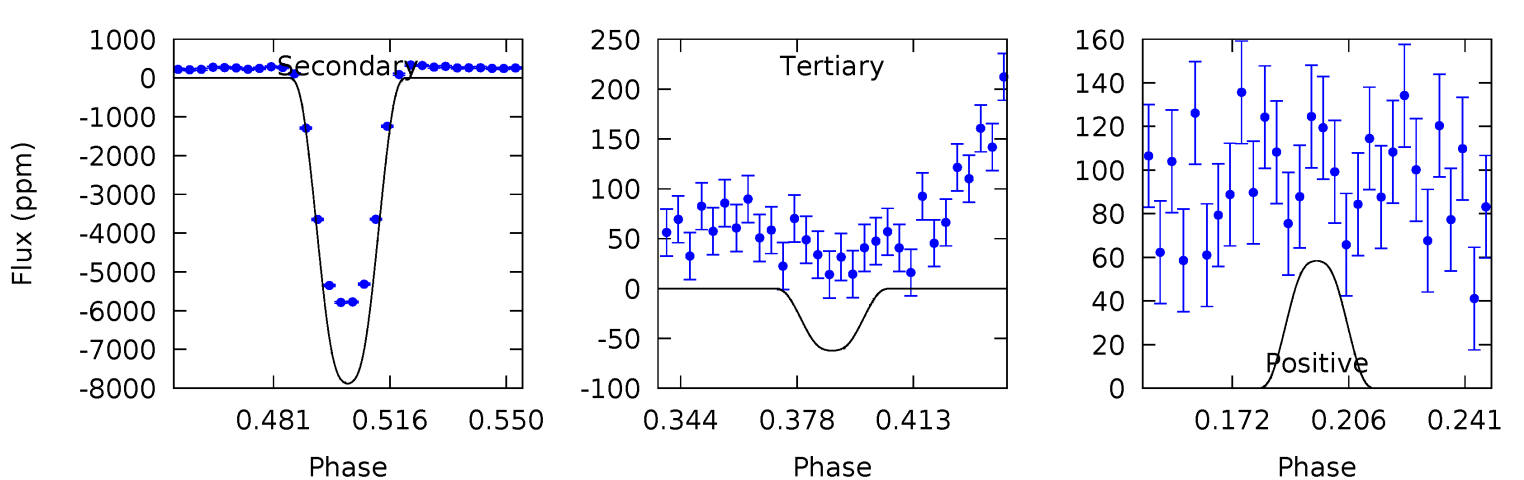
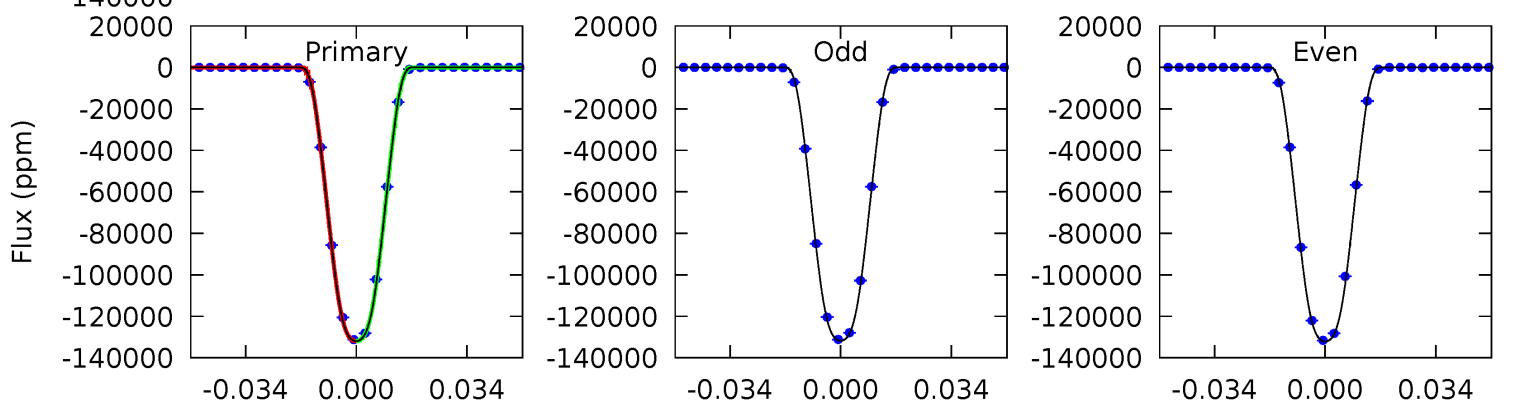
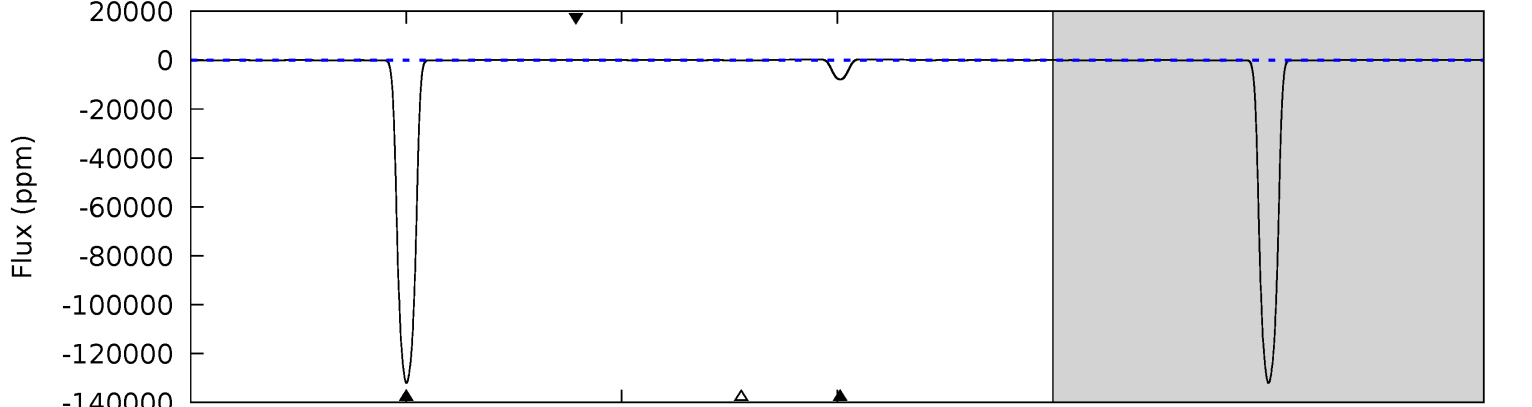
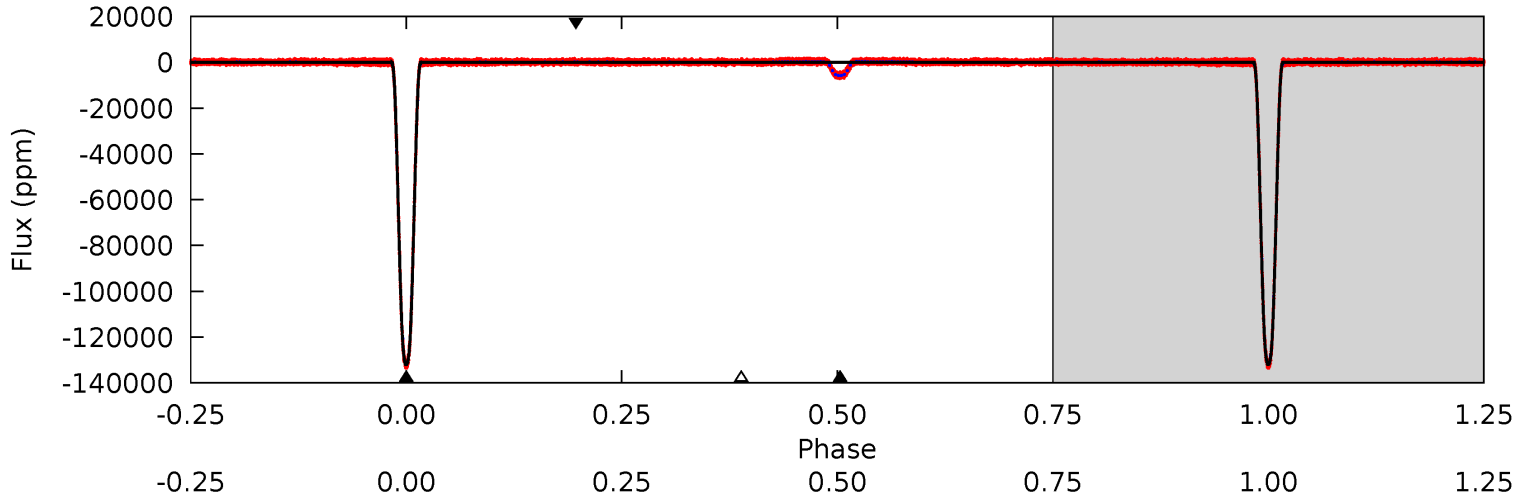
TCE 004049124-01   P= 4.804449 Days    $T_0=136.007710$  (BKJD)



# DV Model-Shift Uniqueness Test

004049124-01, P = 4.804470 Days, E = 131.200189 Days

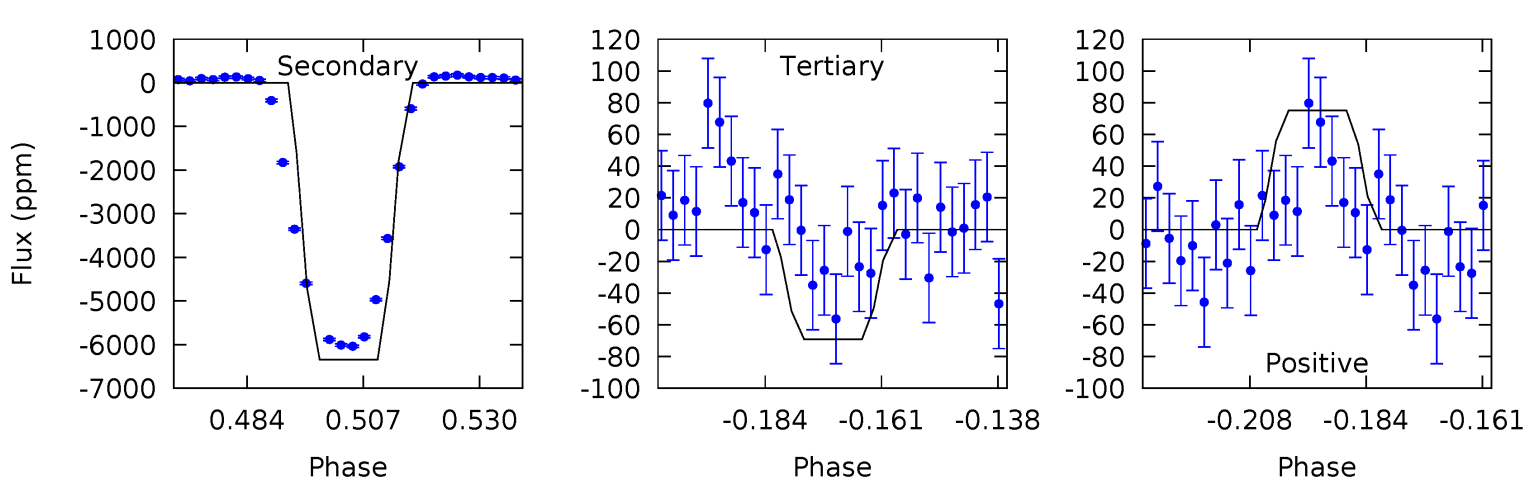
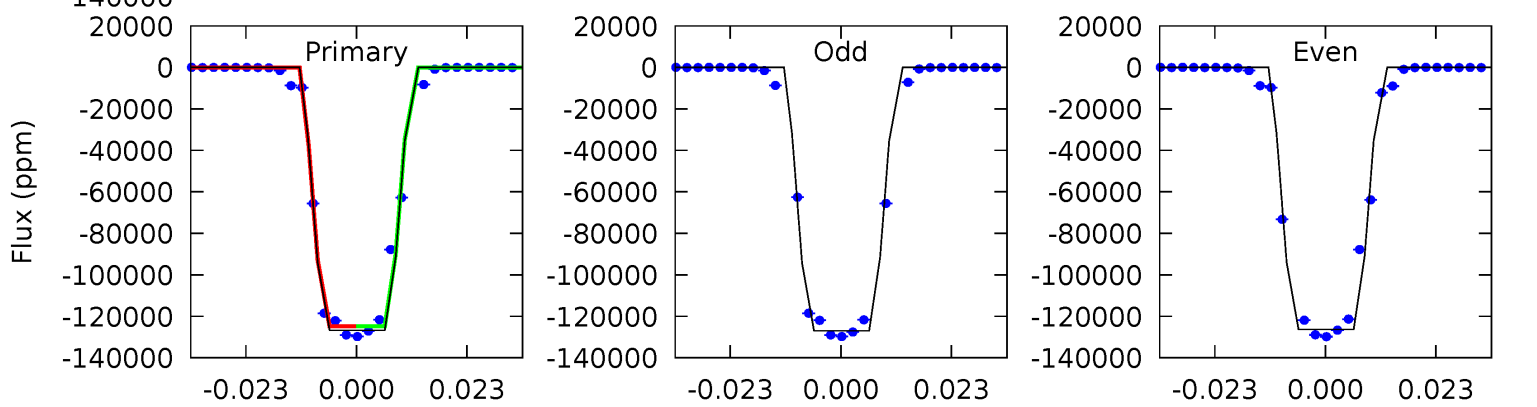
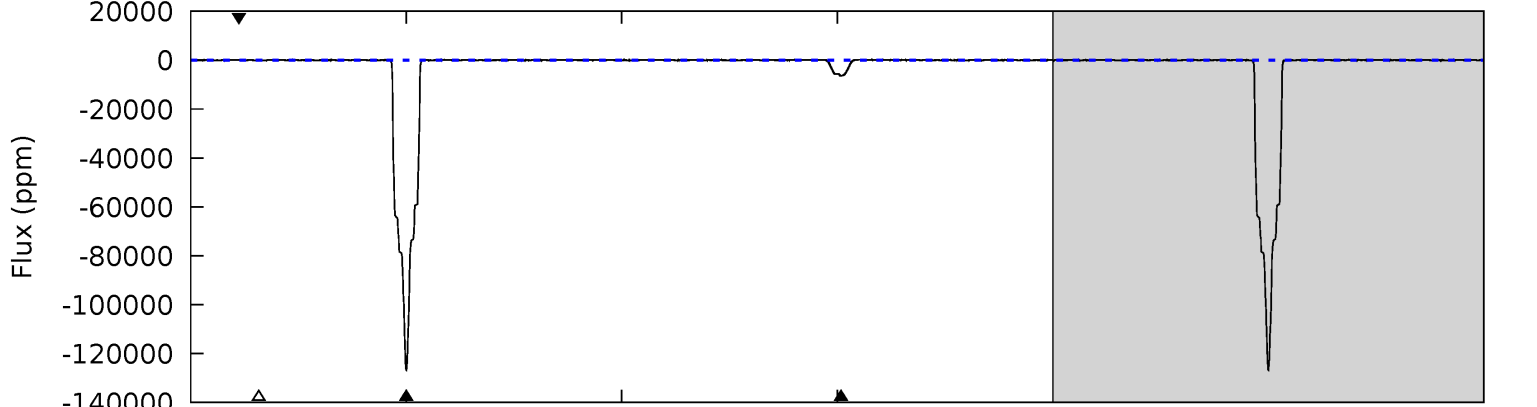
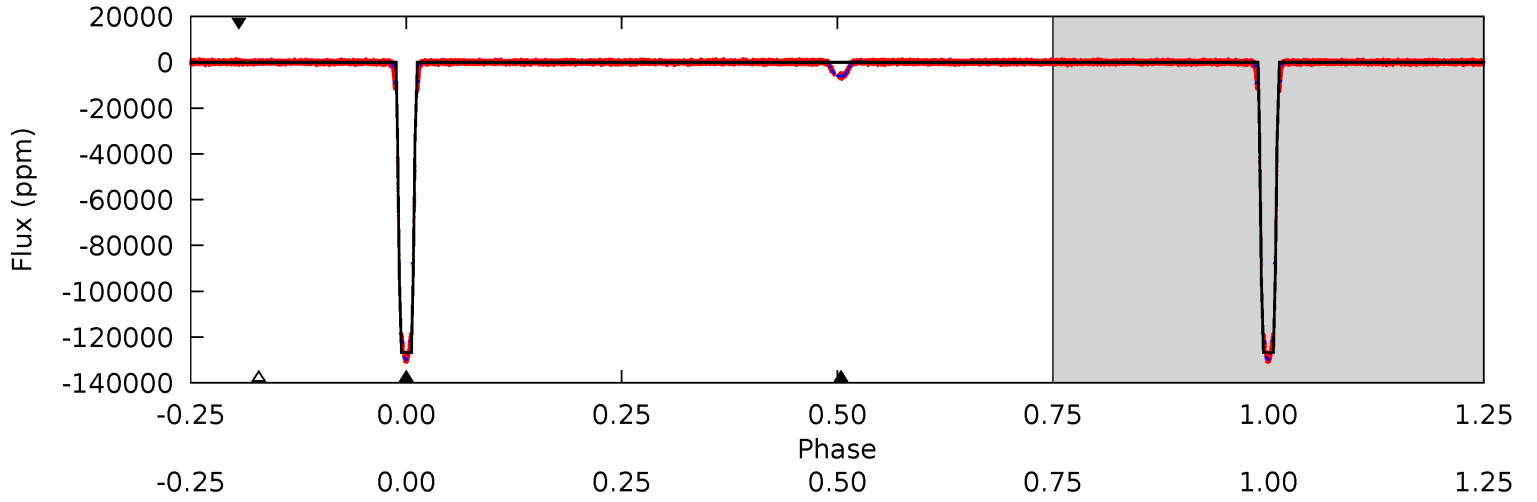
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12687	757.4	5.99	5.62	4.78	2.12	6.85	12681	12682	751.4	751.8	19.0	0.99	0.00	0



# Alt Model-Shift Uniqueness Test

004049124-01, P = 4.804449 Days, E = 131.203261 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
5768	288.9	3.15	3.42	4.86	2.27	1.38	5765	5765	285.7	285.5	14.9	1.00	0.00	0



### Stellar Parameters For KIC 004049124

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5561^{+167}_{-167}$	$4.558^{+0.048}_{-0.152}$	$-0.220^{+0.300}_{-0.300}$	$0.809^{+0.185}_{-0.074}$	$0.864^{+0.091}_{-0.091}$	$2.300^{+0.487}_{-0.961}$
	+3%/-3%	+1%/-3%	+136%/-136%	+23%/-9%	+11%/-11%	+21%/-42%
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 004049124-01 / KOI 5994.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-7880 \pm 10$	$31.46^{+4.06}_{-1.90}$	$1359^{+78}_{-59}$	$3323^{+68}_{-69}$	$12^{+1}_{-2}$
Alt.	$-6346 \pm 22$	$32.36^{+4.02}_{-1.91}$	$1358^{+77}_{-58}$	$3188^{+56}_{-70}$	$9.233^{+1.040}_{-1.606}$

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

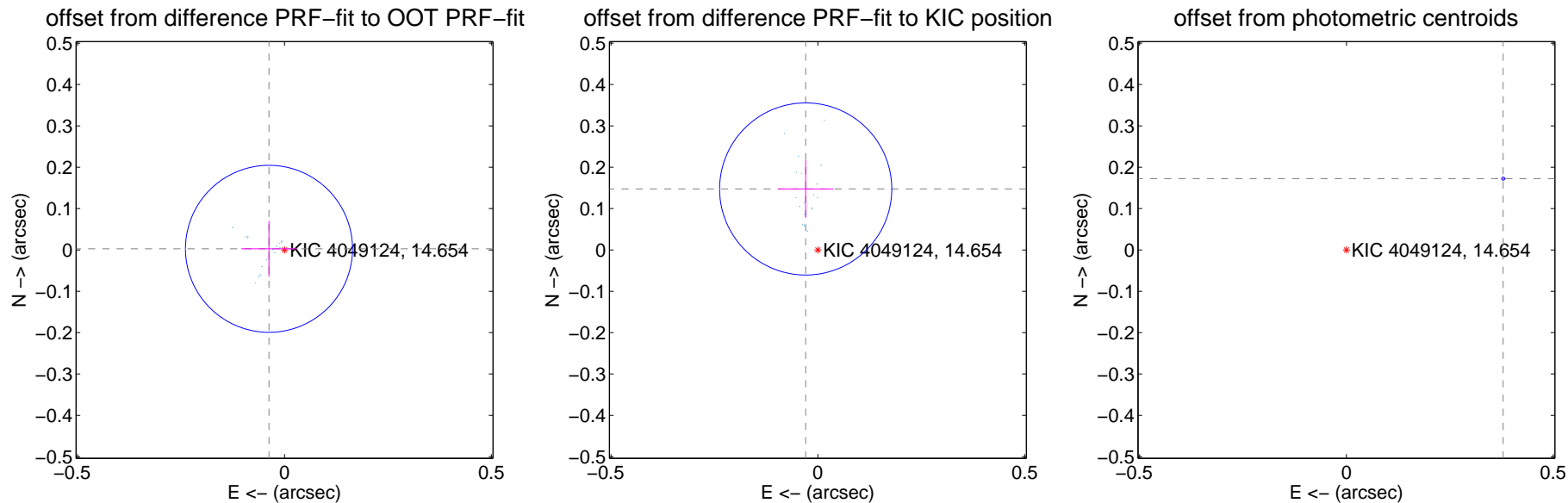
## DV Centroid Data

Supplemental centroid analysis for 004049124-01. Kepler magnitude: 14.65. Transit SNR 5668.93

There are 17 quarters with good PRF difference image offsets

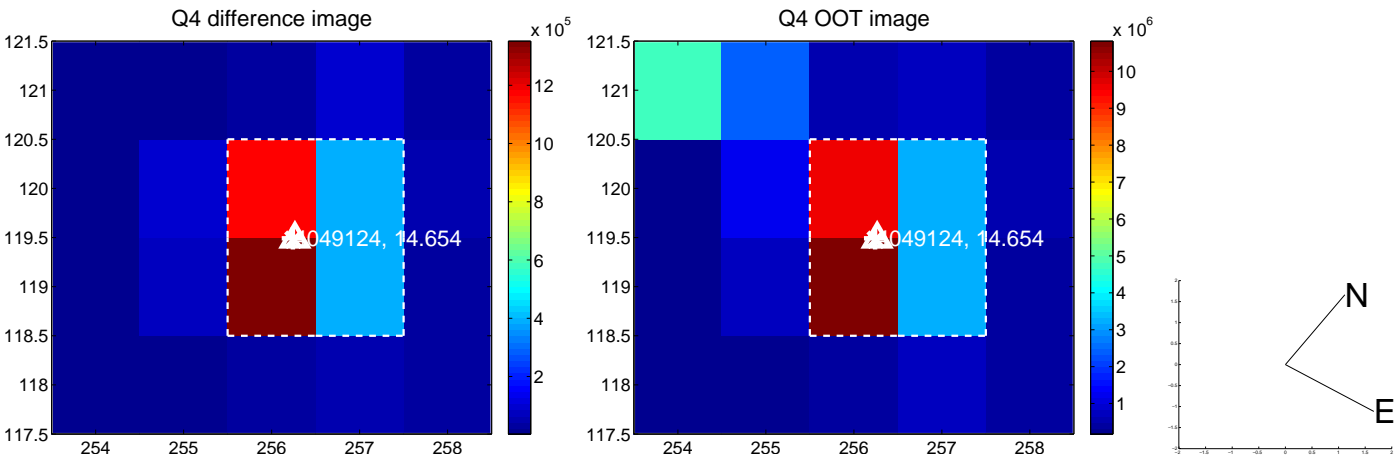
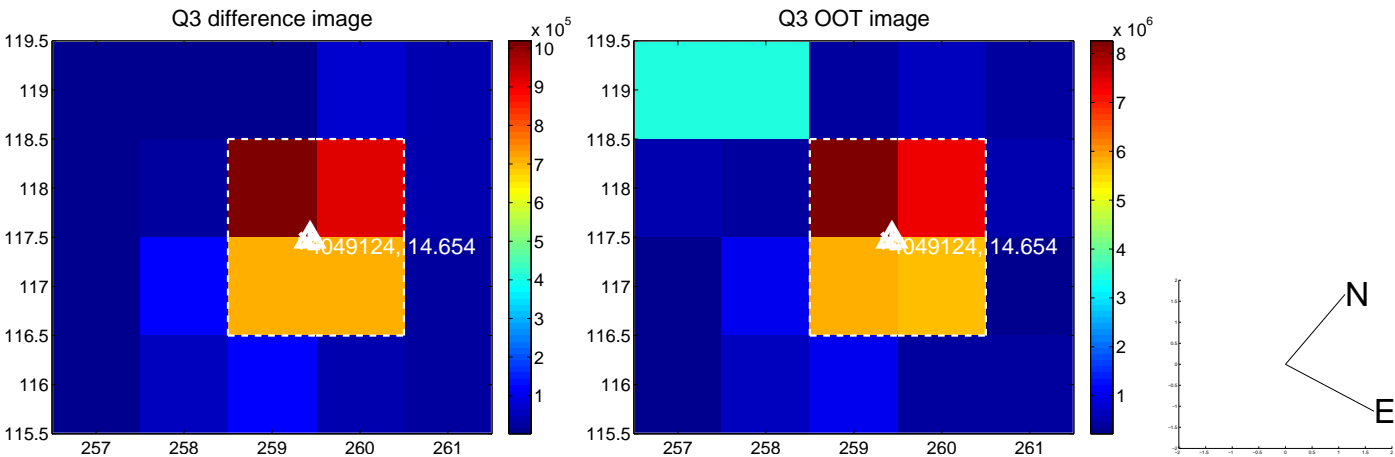
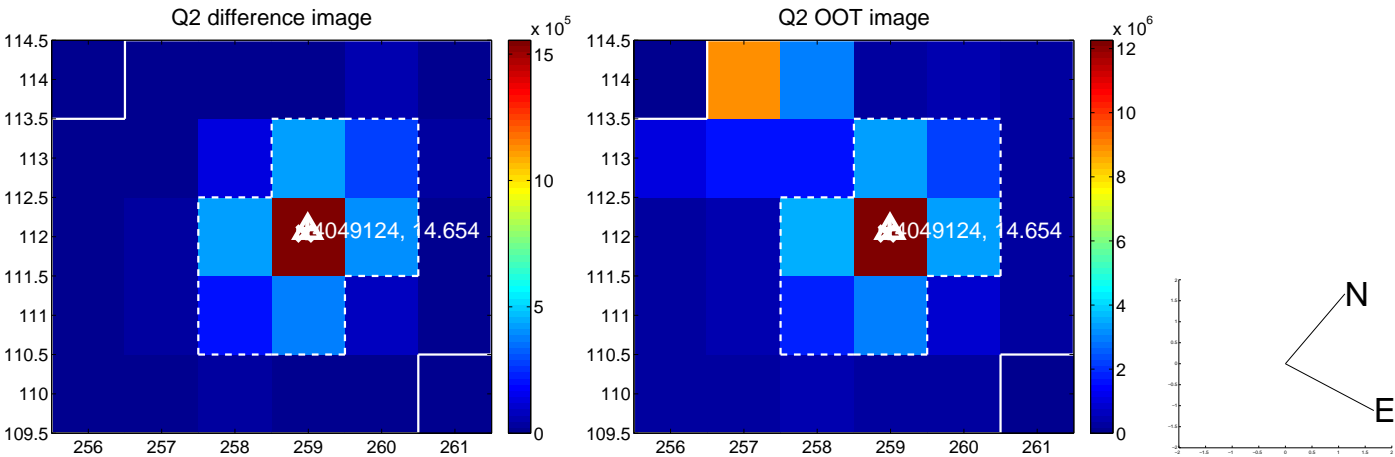
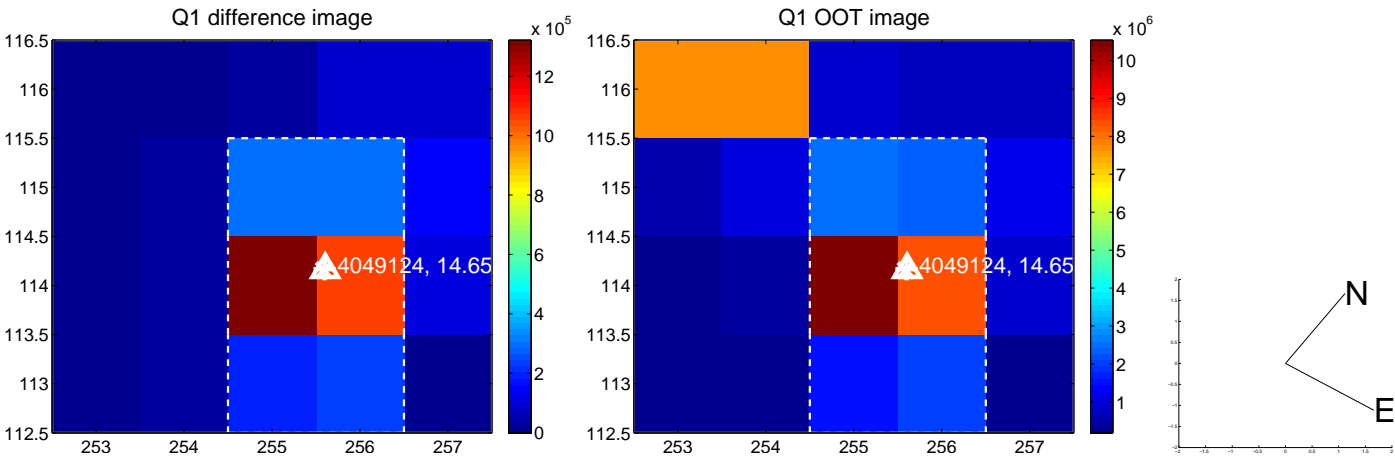
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.038 \pm 0.067$	0.56	$0.038 \pm 0.067$	$0.003 \pm 0.067$
PRF-fit source offset from KIC position	$0.150 \pm 0.069$	2.17	$0.029 \pm 0.067$	$0.147 \pm 0.069$
photometric centroid source offset	$0.42 \pm 0.00$	<b>338.38</b>	$-0.38 \pm 0.00$	$0.17 \pm 0.00$

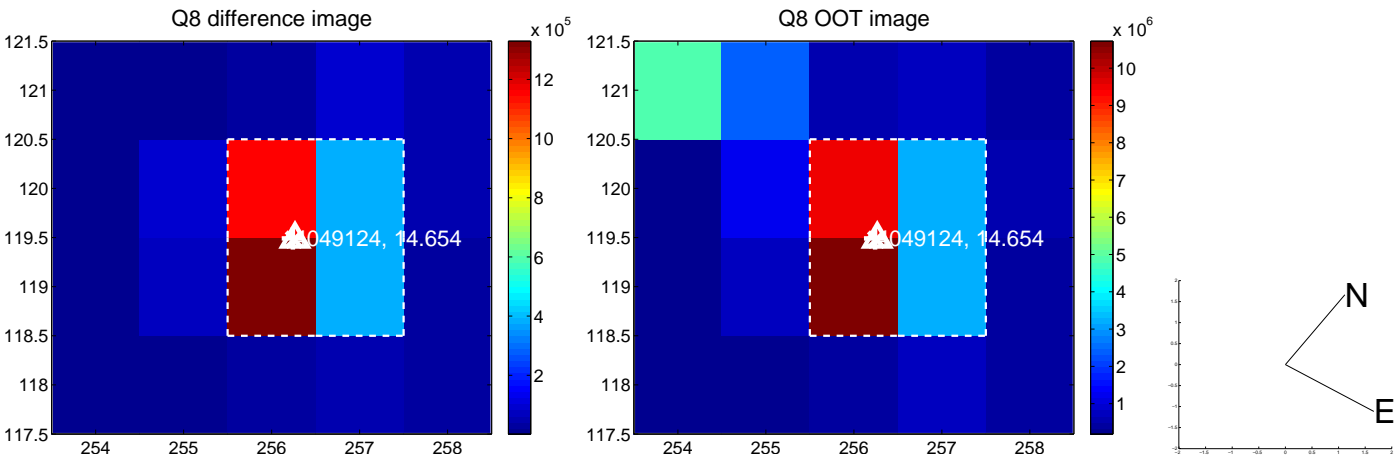
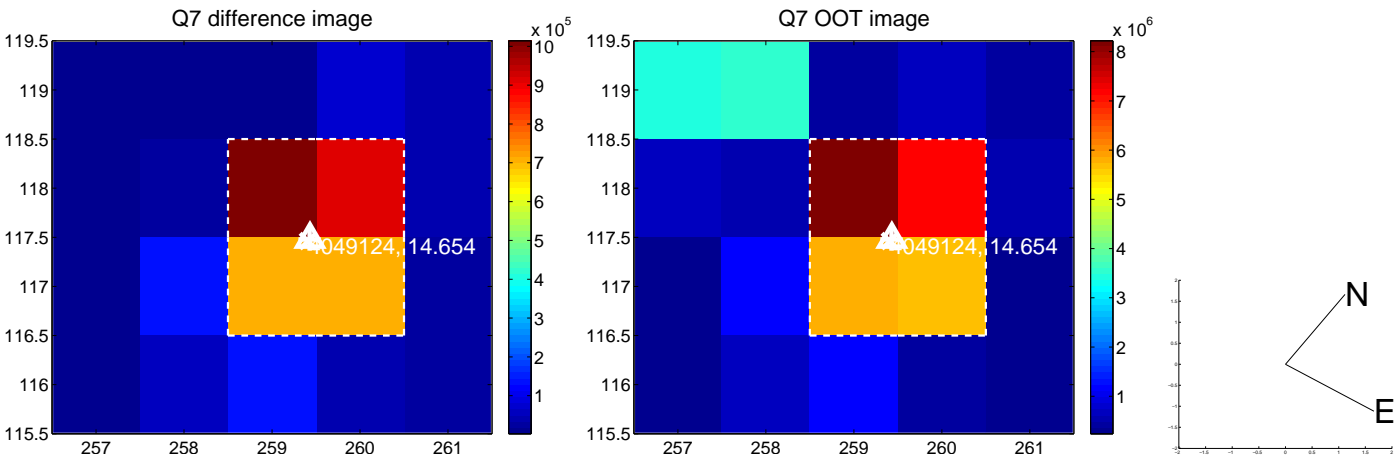
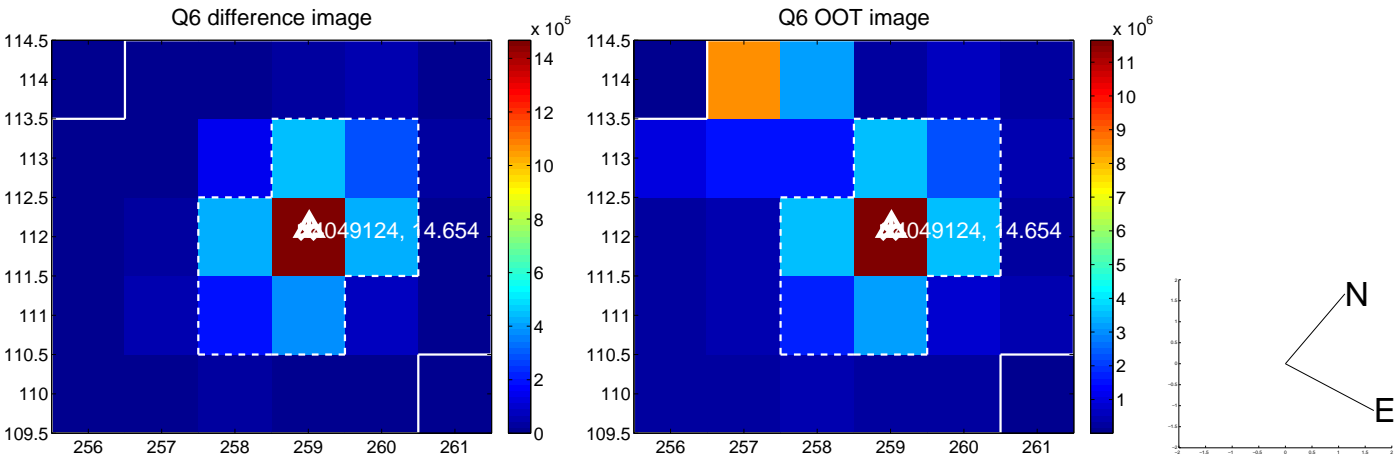
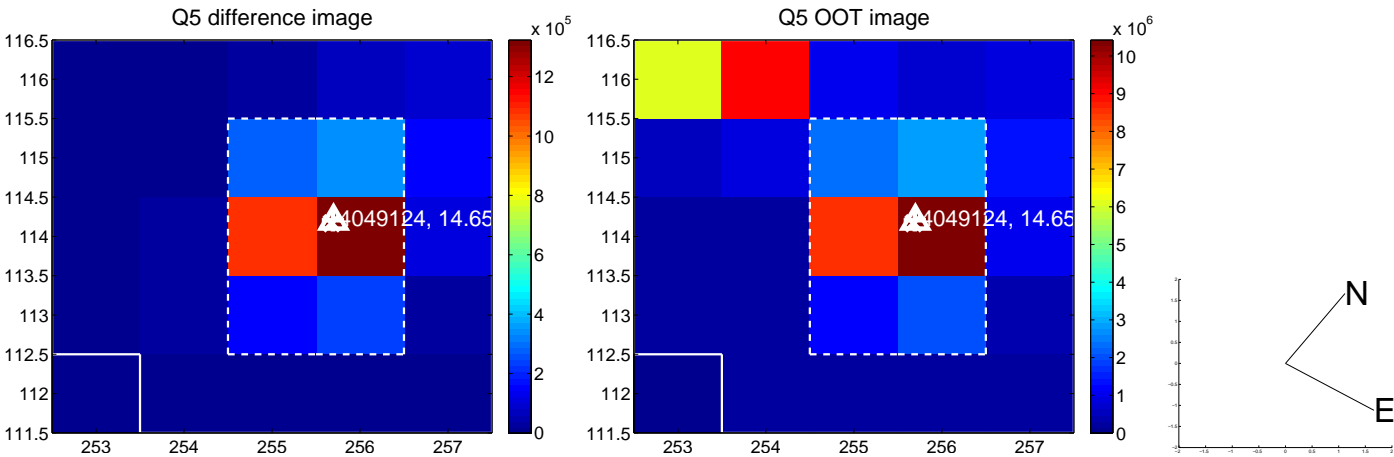


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

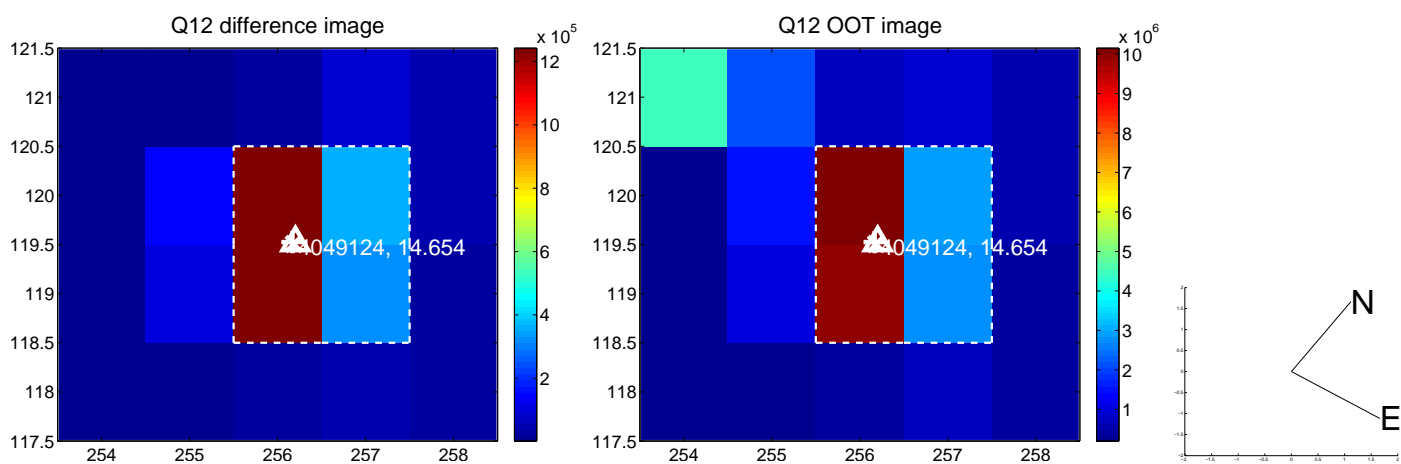
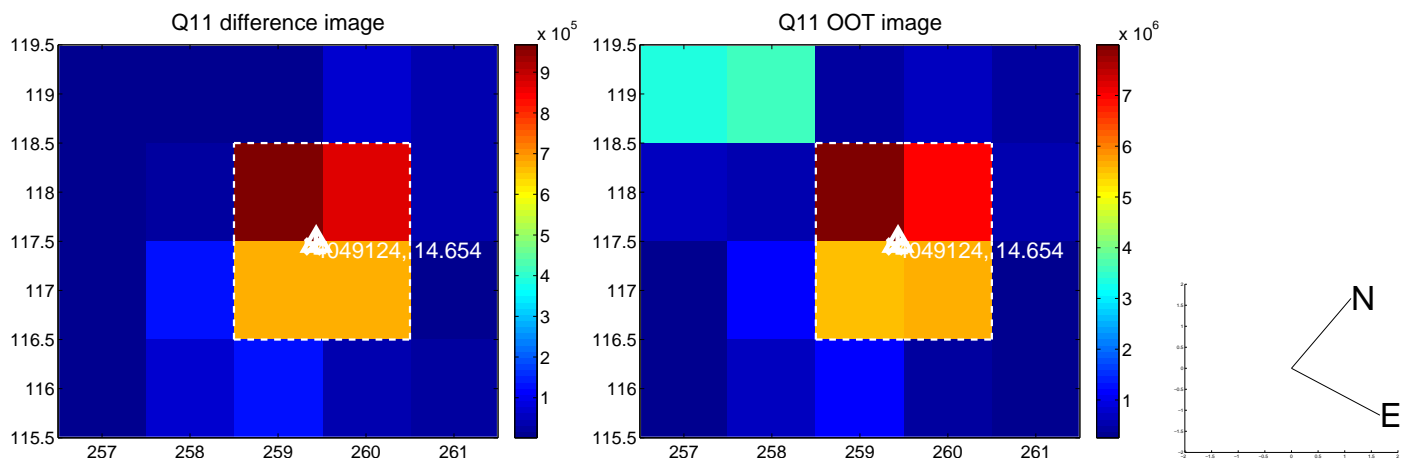
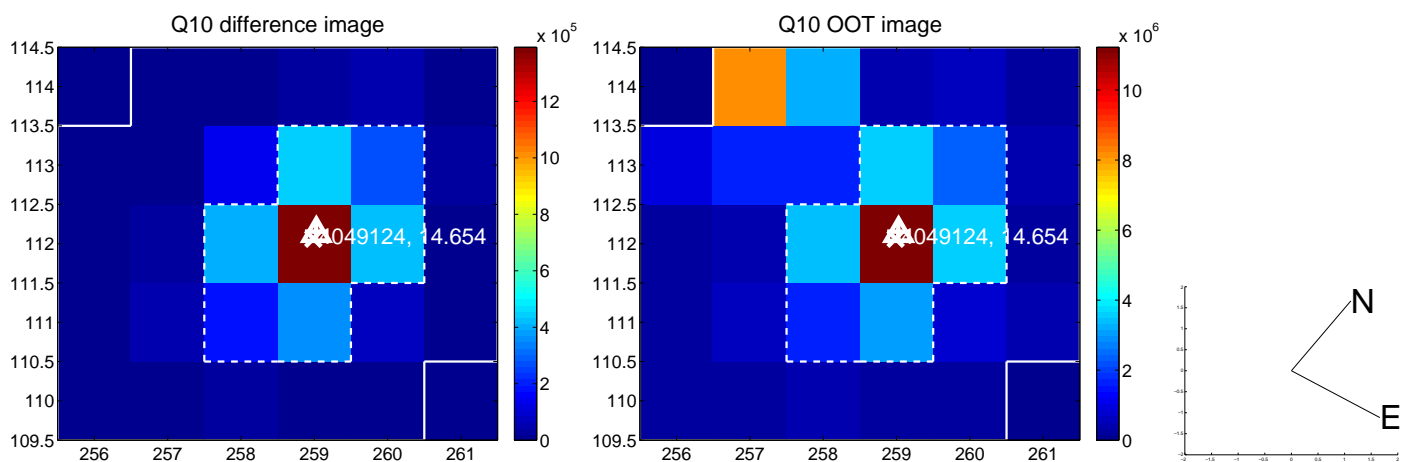
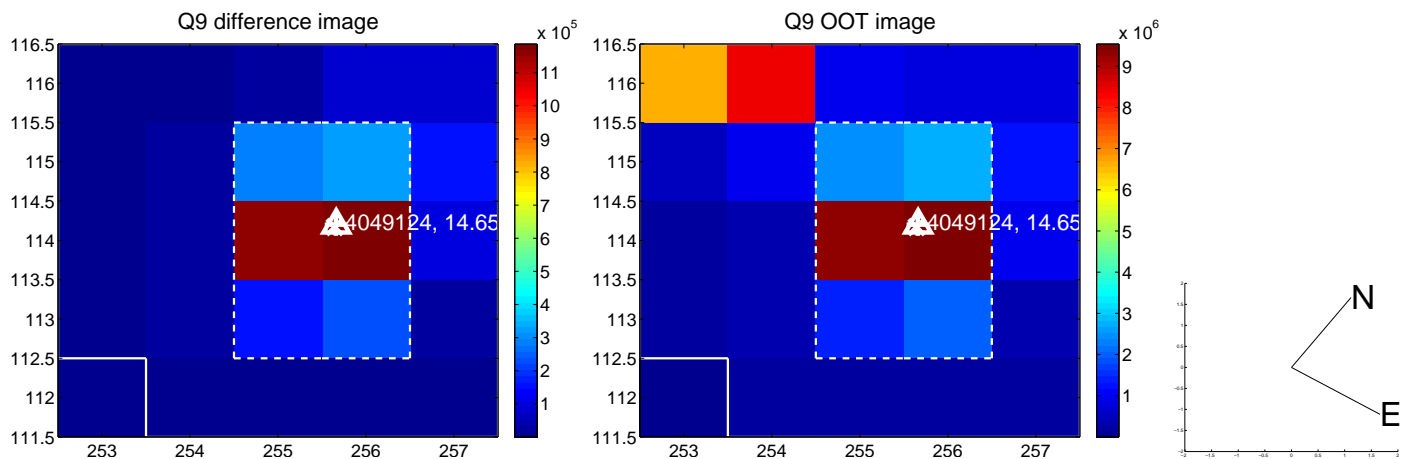


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

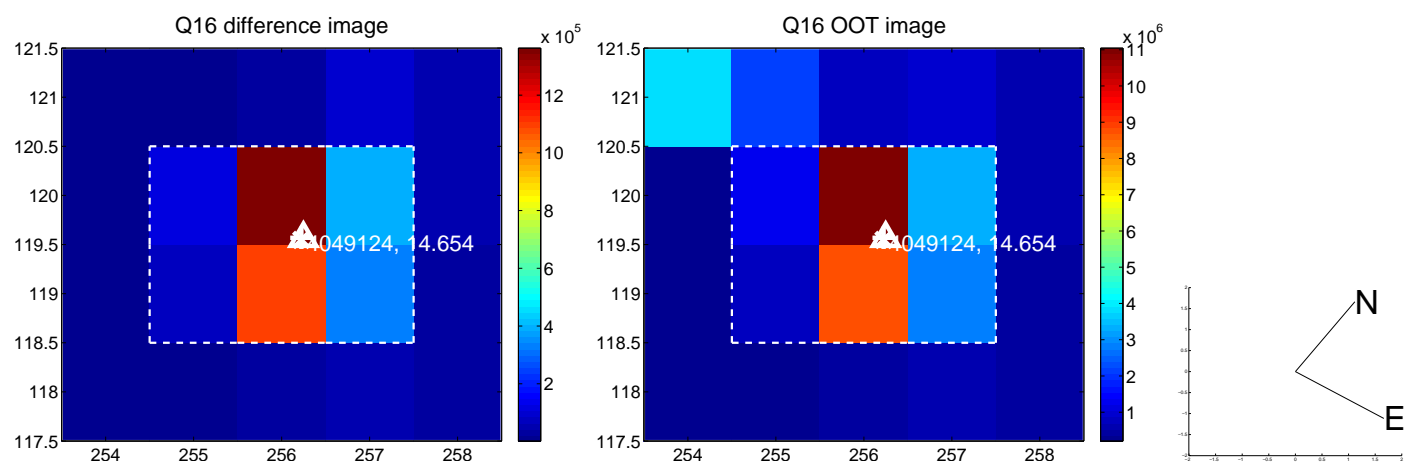
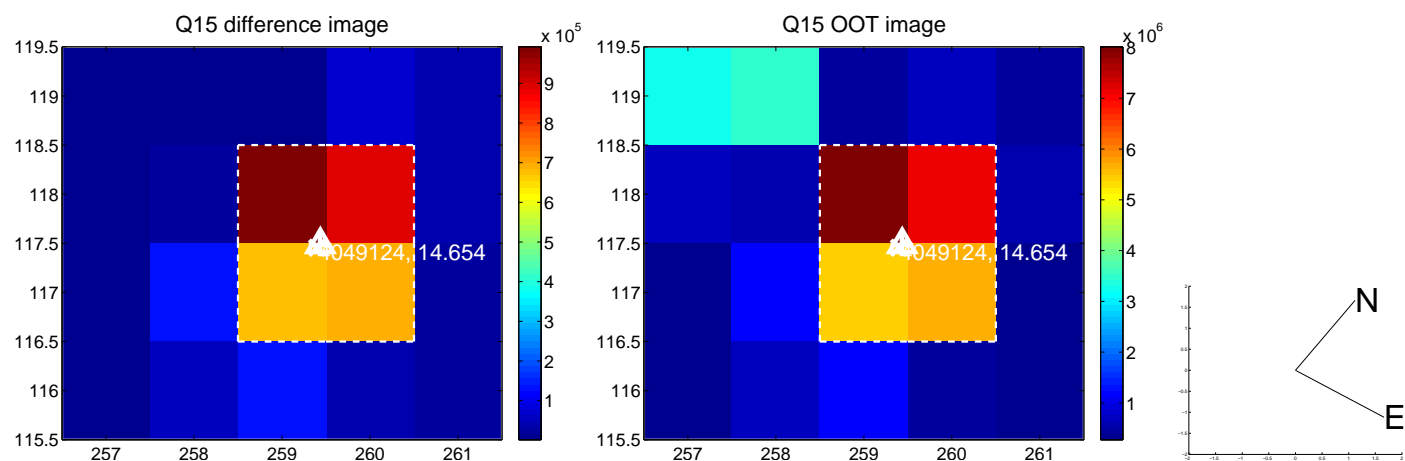
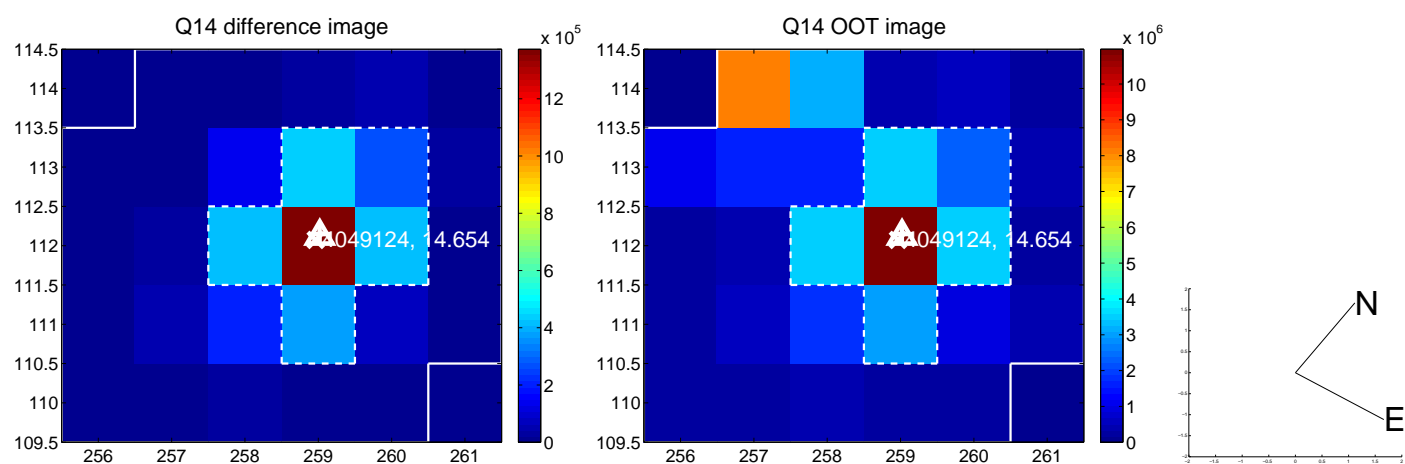
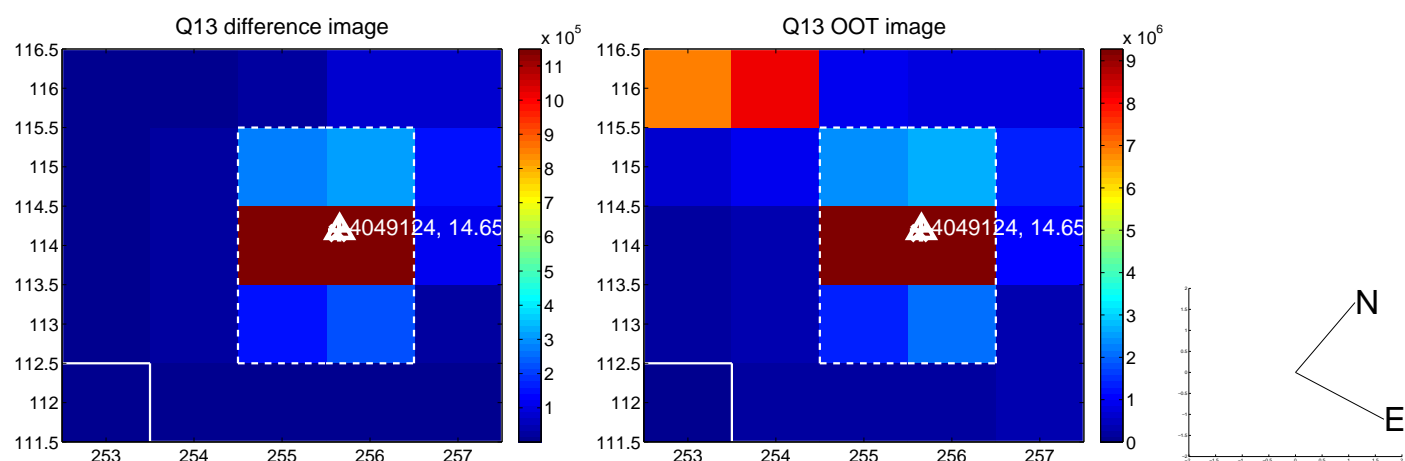




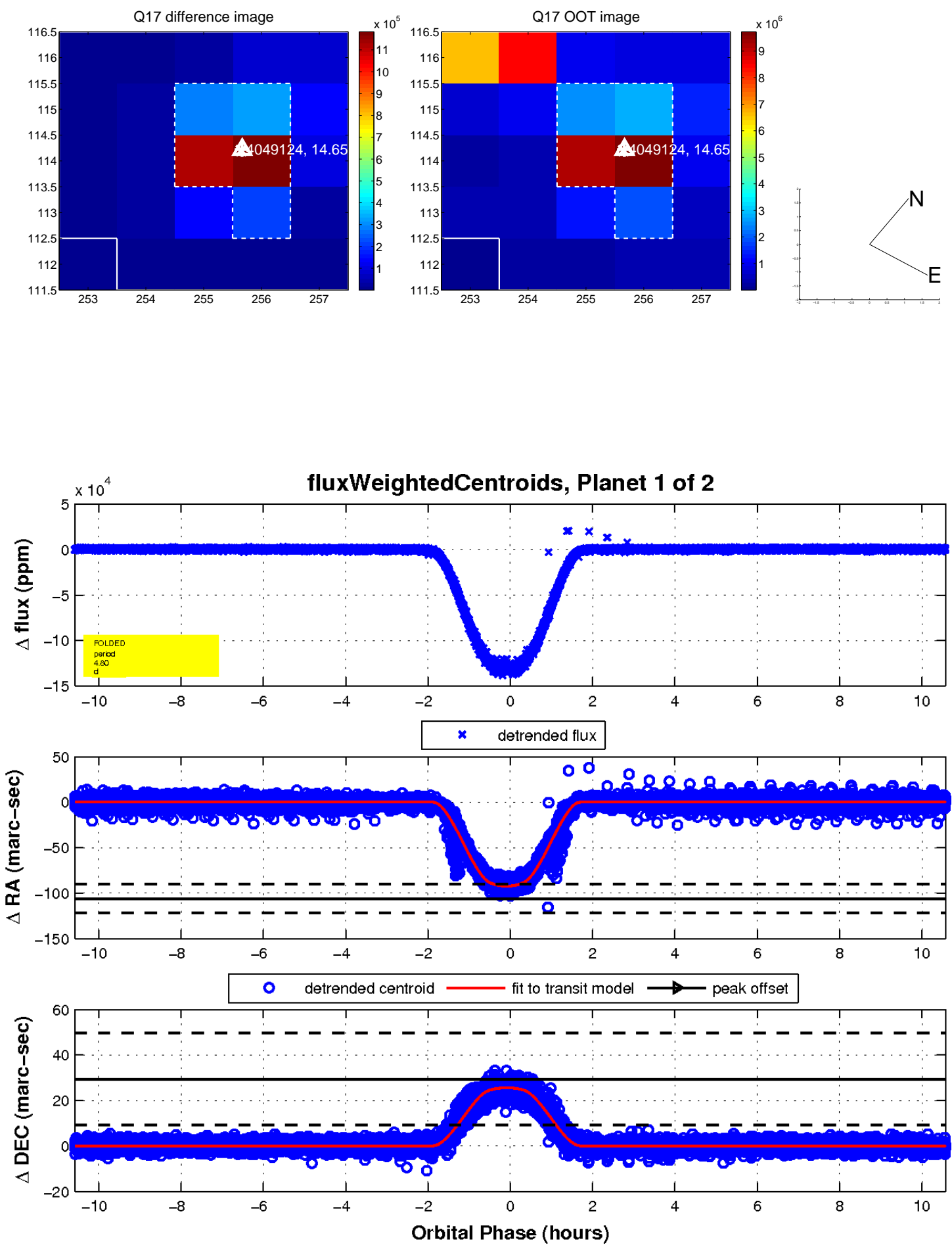
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



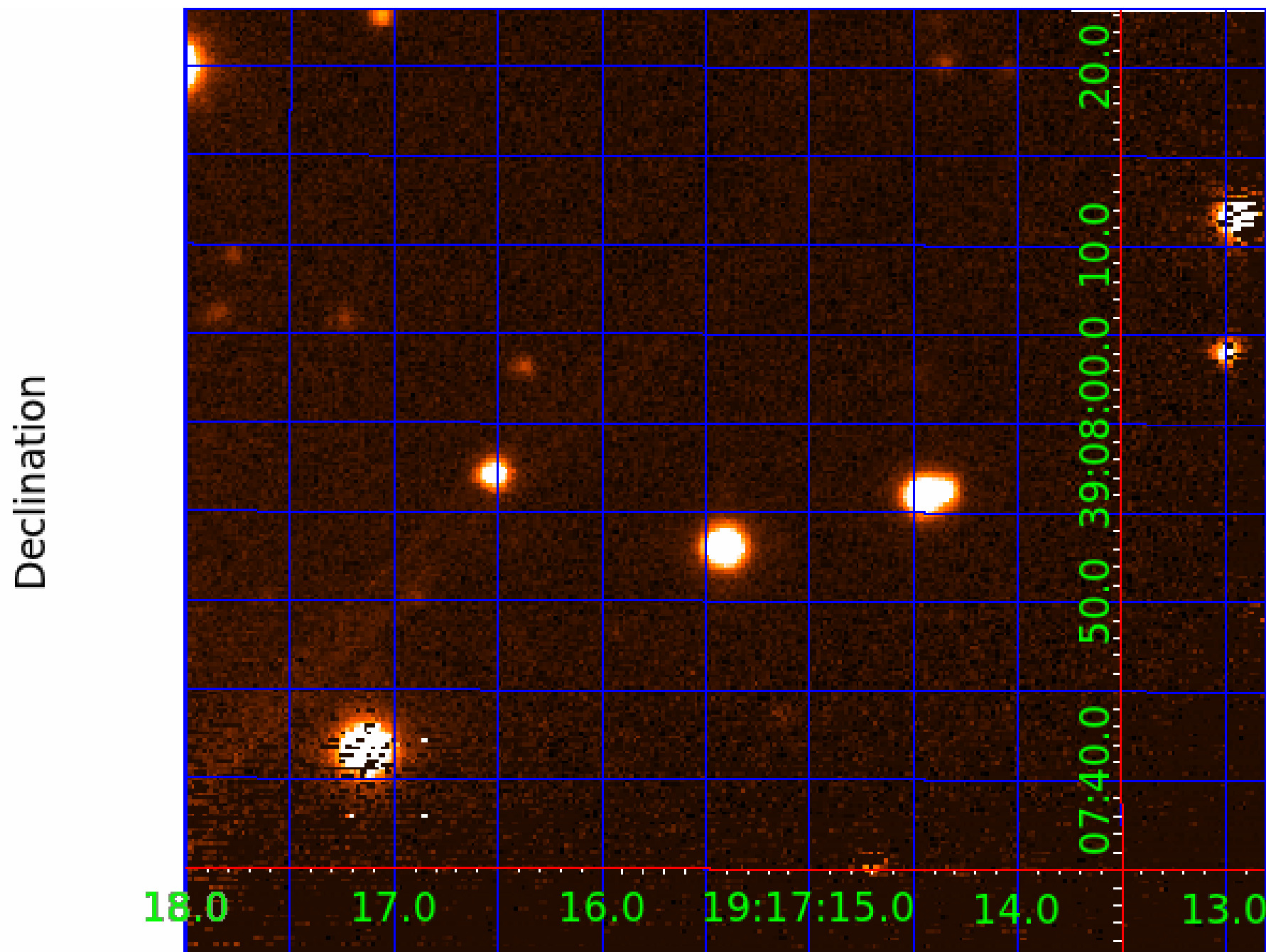
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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



UKIRT Image



# KIC 004049124

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004049124-01	OBS	5994.01	4.804470	136.004659	132140.4	3.526	8550.1	5668.9	0.81	5561	30.91	199.19
004049124-02	OBS	No	4.804471	133.616749	6250.7	3.443	425.9	419.5	0.81	5561	7.64	199.19

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004049124-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_DV—HAS_SEC_TCE
004049124-02	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.

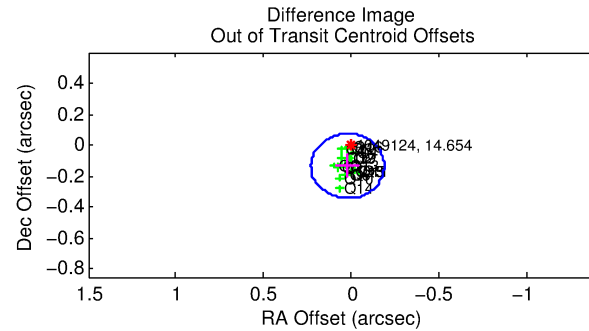
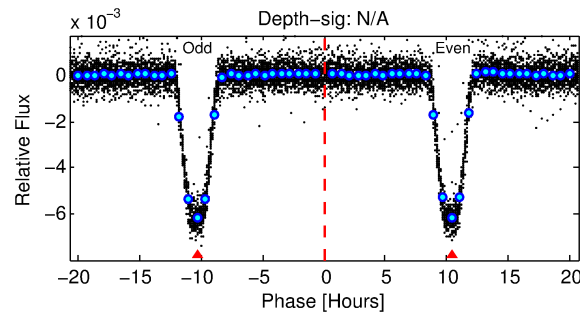
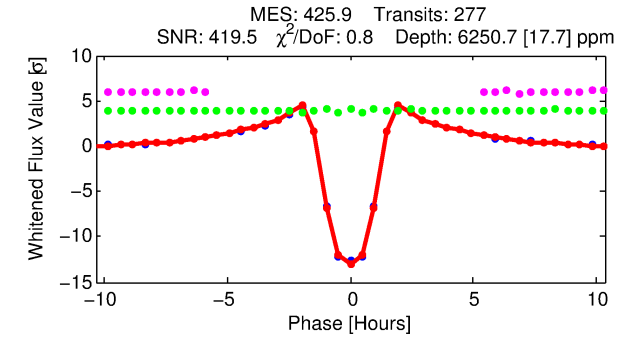
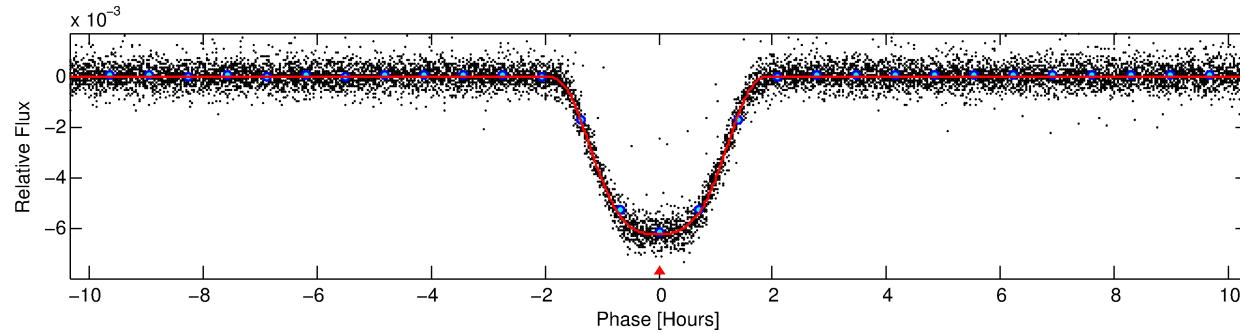
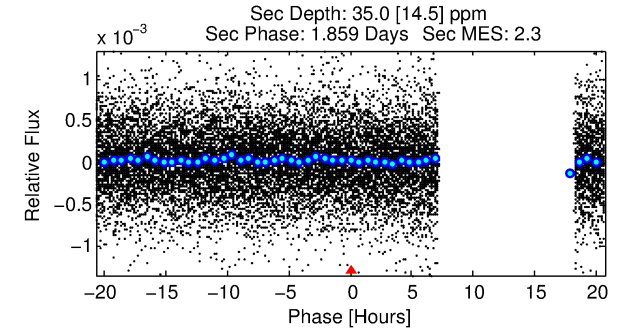
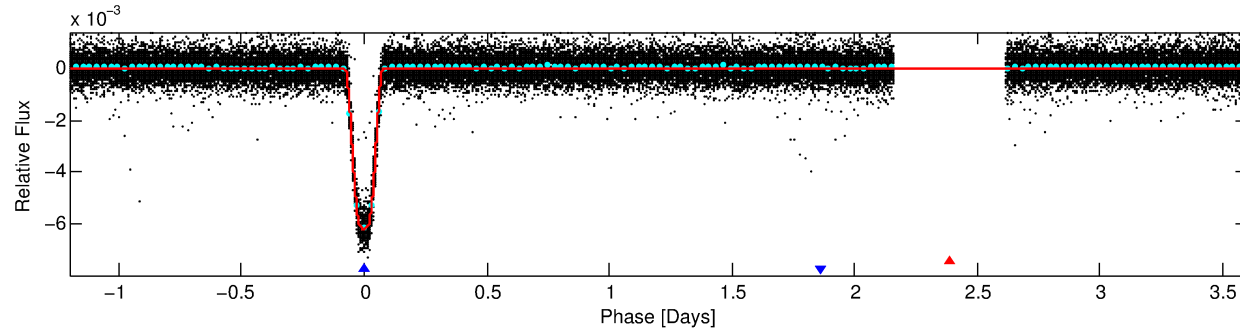
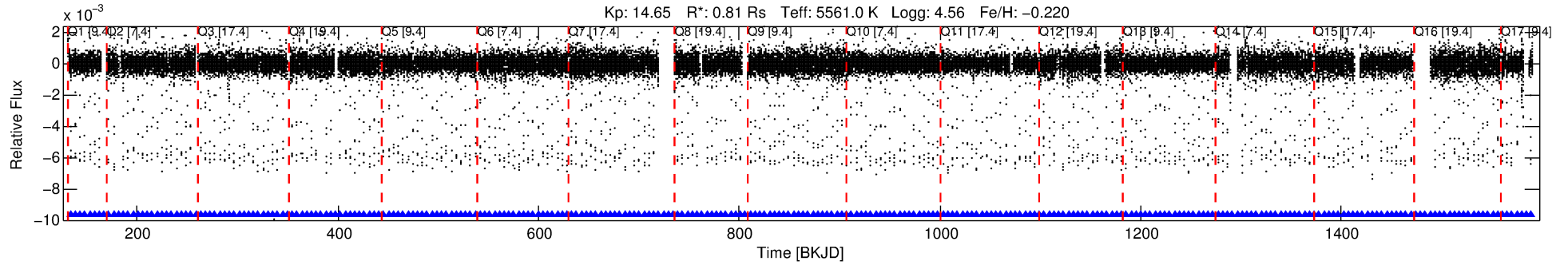
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004049124-02

No Significant Match Found

# DV One-Page Summary

KIC: 4049124 Candidate: 2 of 2 Period: 4.804 d  
KOI: K05994 Corr: No Ephemeris Match



## DV Fit Results:

Period = 4.80447 [0.00000] d  
Epoch = 133.6167 [0.0001] BKJD  
Rp/R\* = 0.0865 [0.0002]  
a/R\* = 6.68 [0.03]  
b = 0.89 [0.00]  
Seff = 199.19 [60.46]  
Teq = 958 [73] K  
Rp = 7.64 [1.75] Re  
a = 0.0531 [0.0102] AU  
Ag = 0.93 [0.46] [-0.15 $\sigma$ ]  
Teffp = 1455 [157] K [2.88 $\sigma$ ]

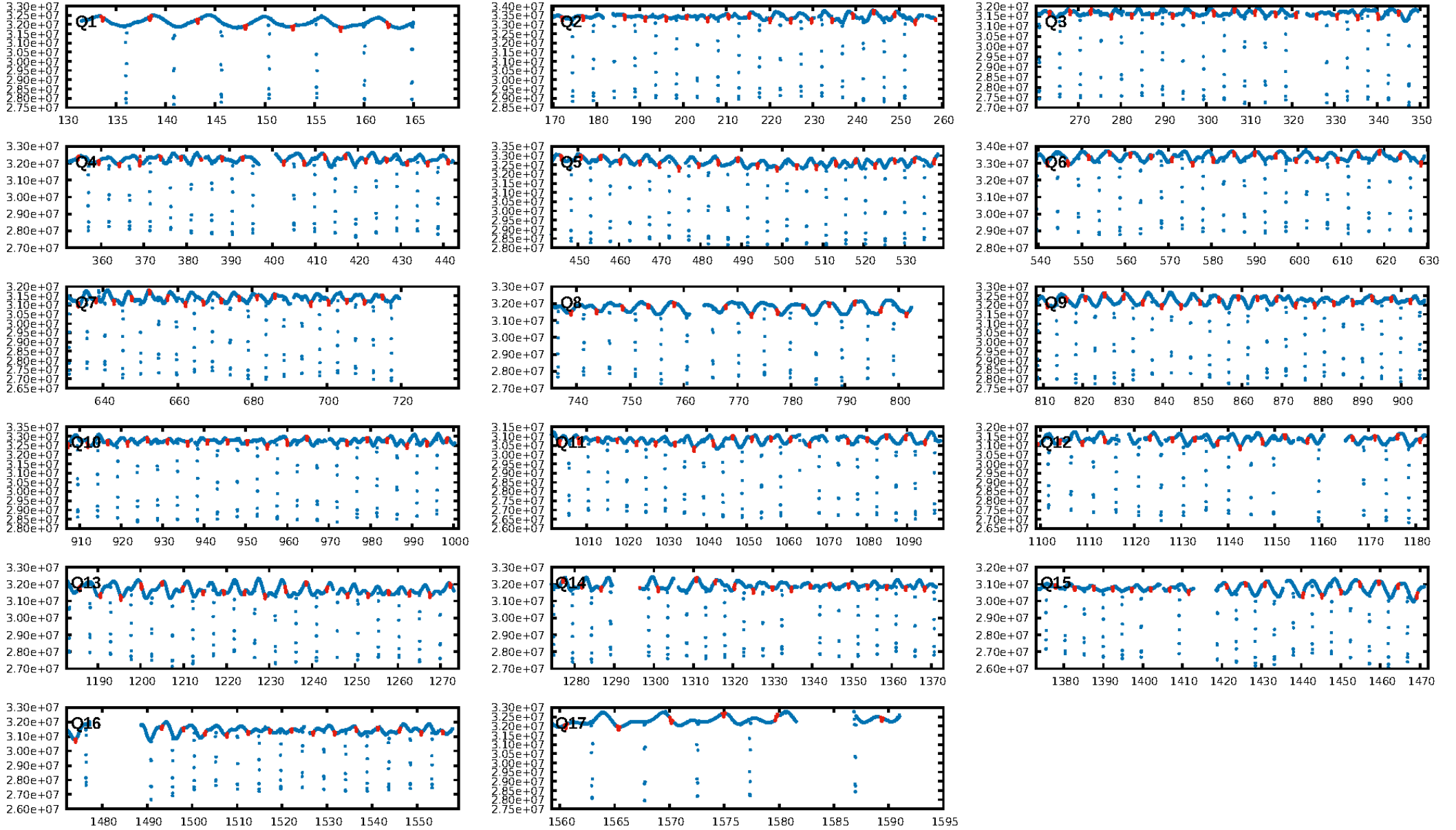
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [264/264]  
GhostDiagnostic-chr: 3.037  
Centroid-sig: 0.0%  
Centroid-so: 0.435 arcsec [17.47 $\sigma$ ]  
OotOffset-rm: 0.136 arcsec [1.95 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-rm: 0.017 arcsec [0.25 $\sigma$ ]  
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: 02-Feb-2016 00:01:08 Z

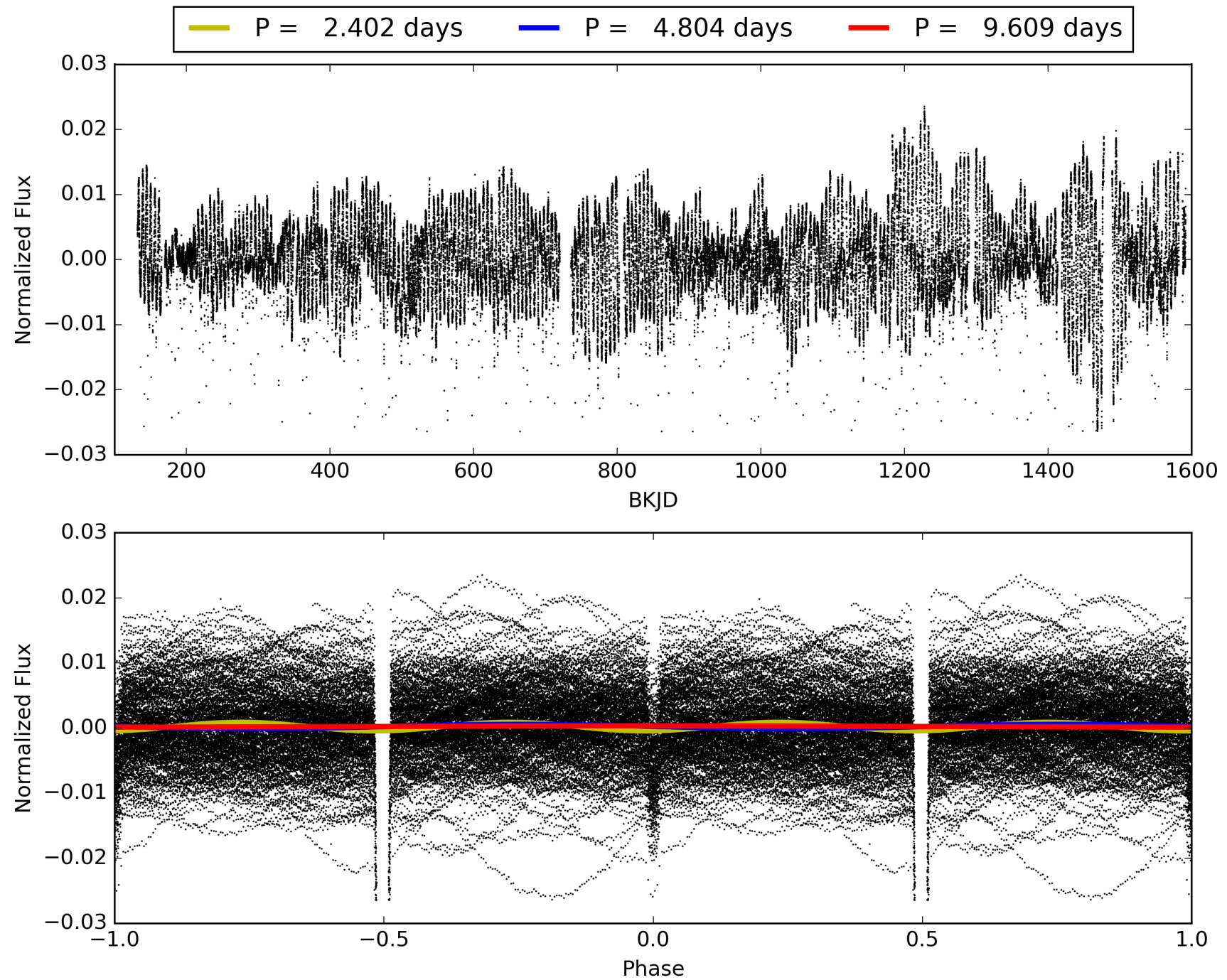
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004049124-02, PDC Light Curves





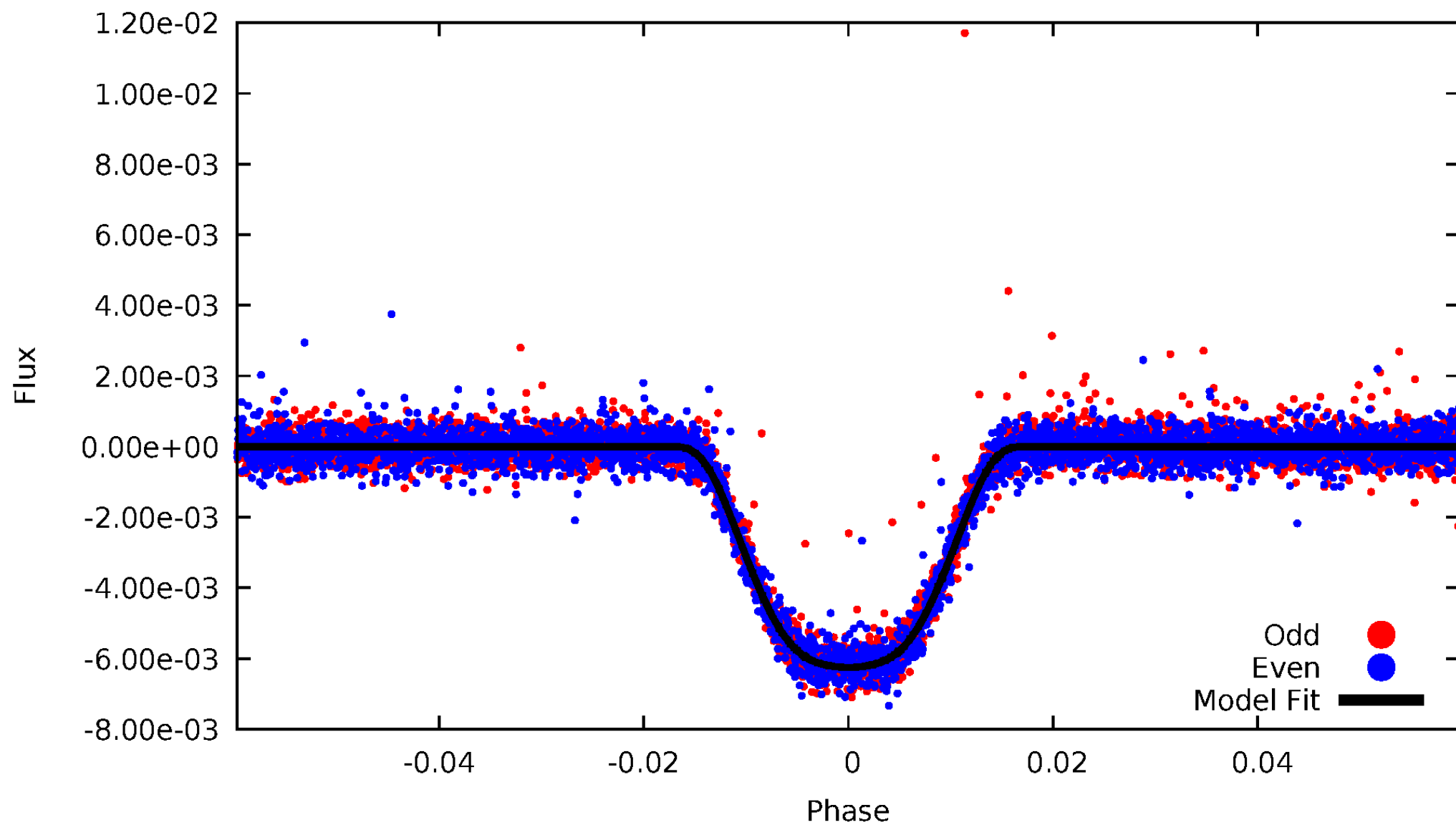
TCE 004049124-02





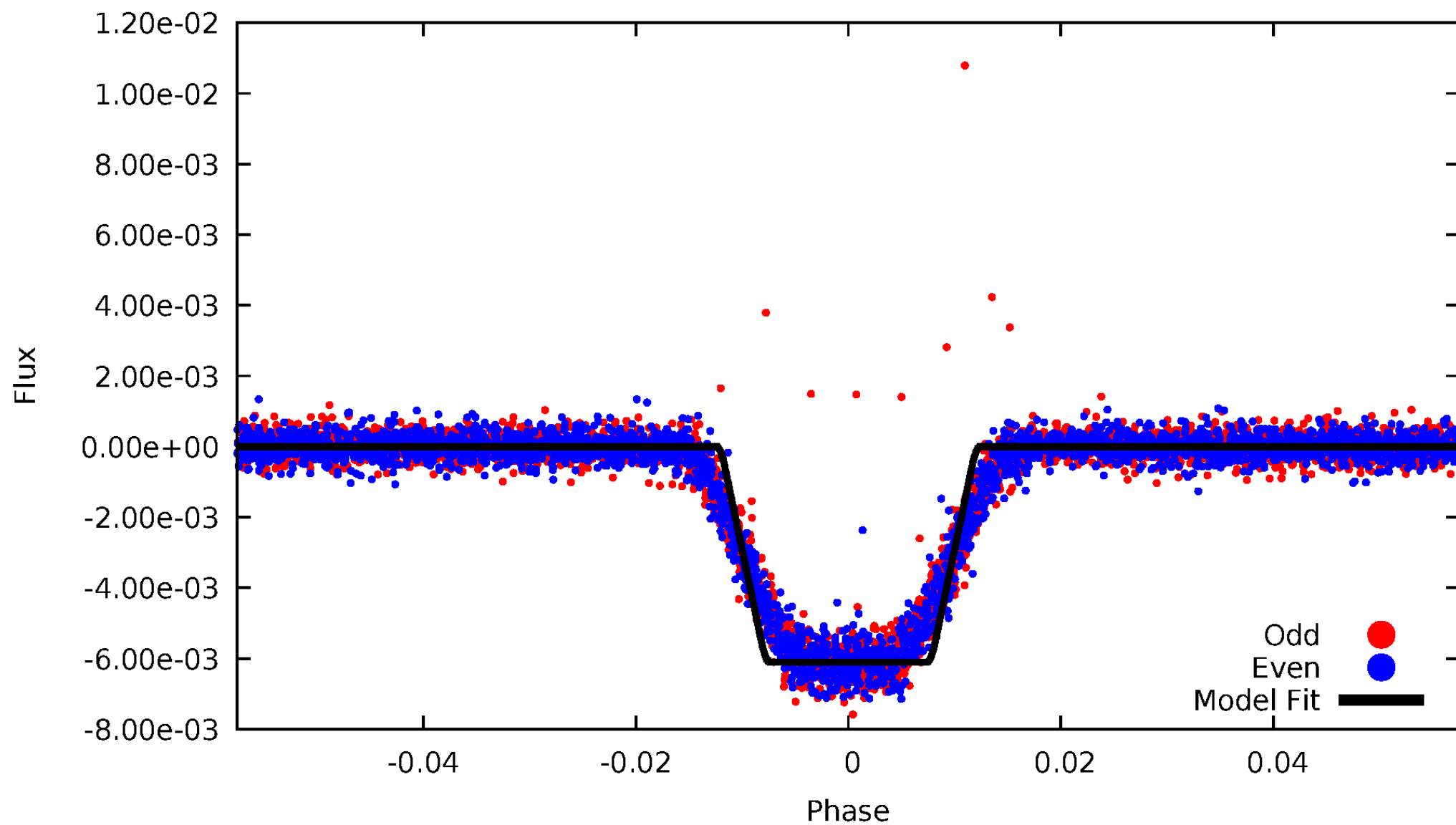
# DV Odd/Even

TCE 004049124-02



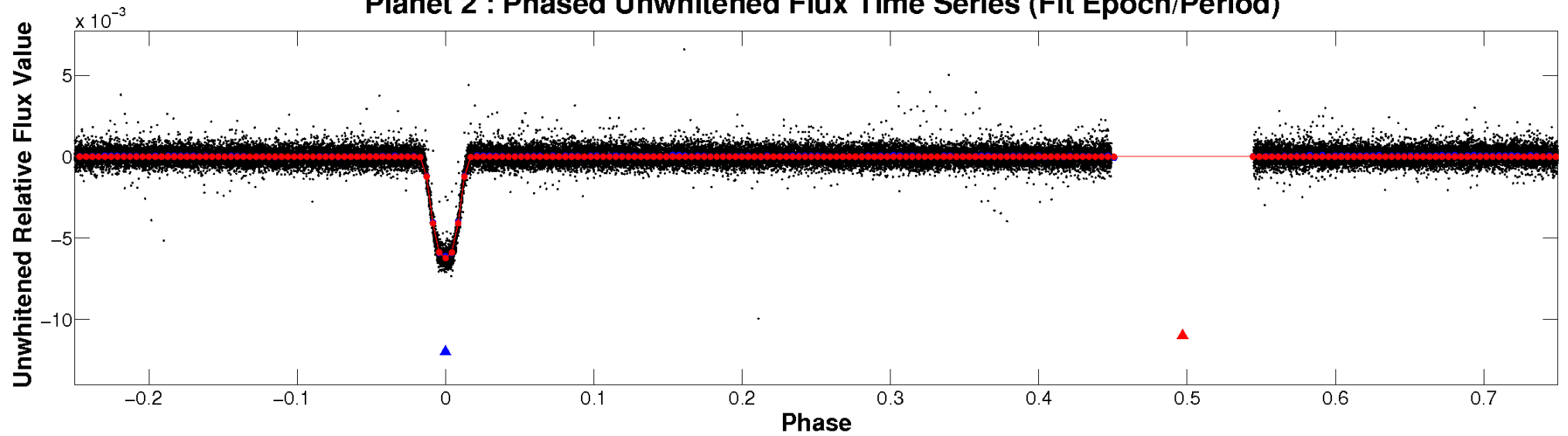
# ALT Odd/Even

TCE 004049124-02

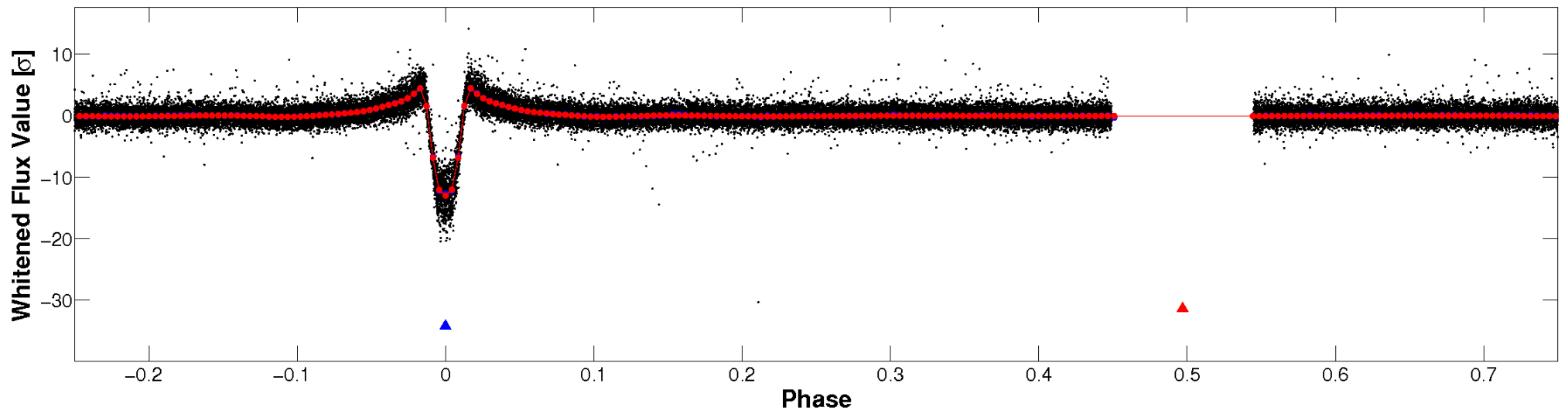


# Non-Whitened Vs. Whitened Light Curve

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

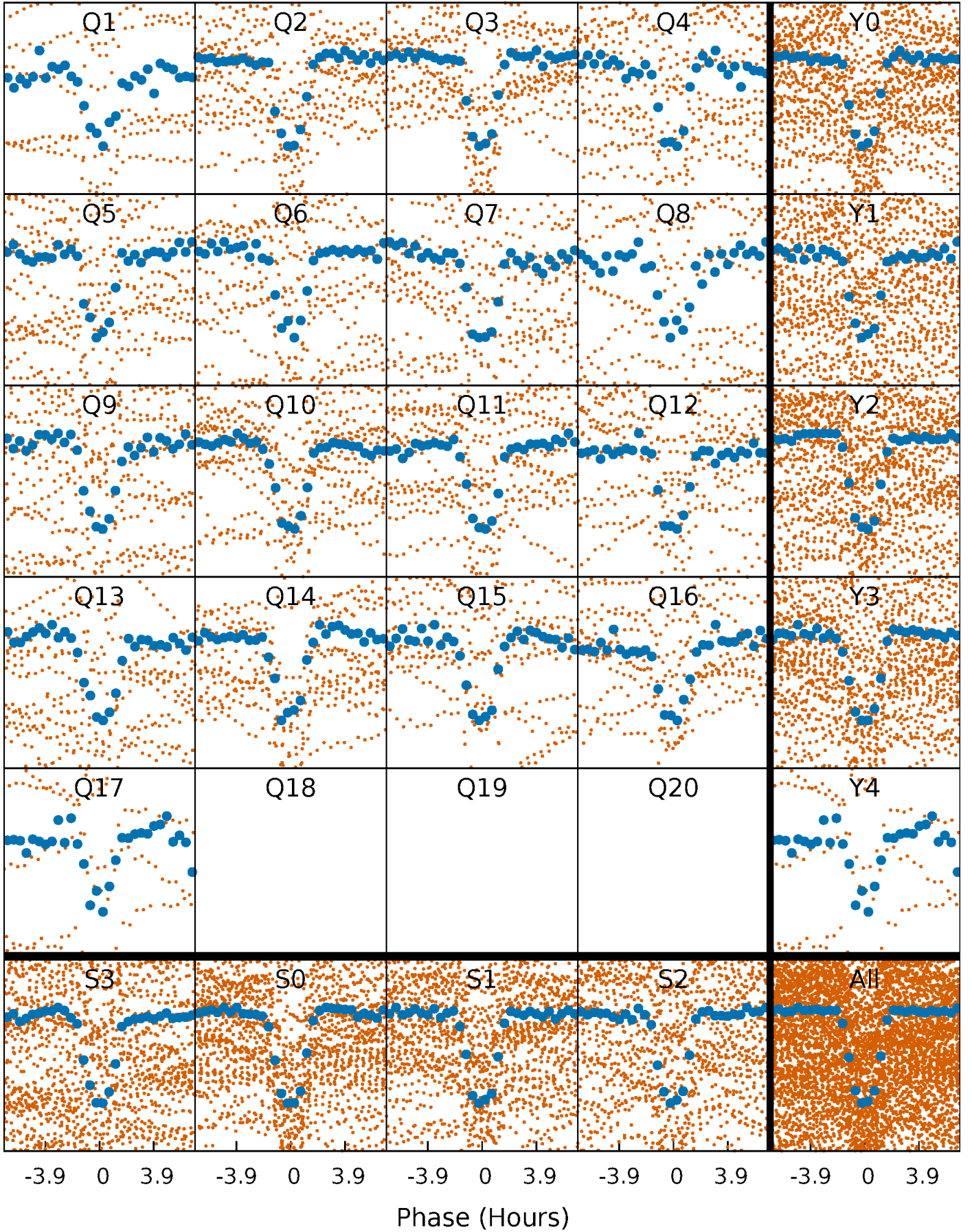


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



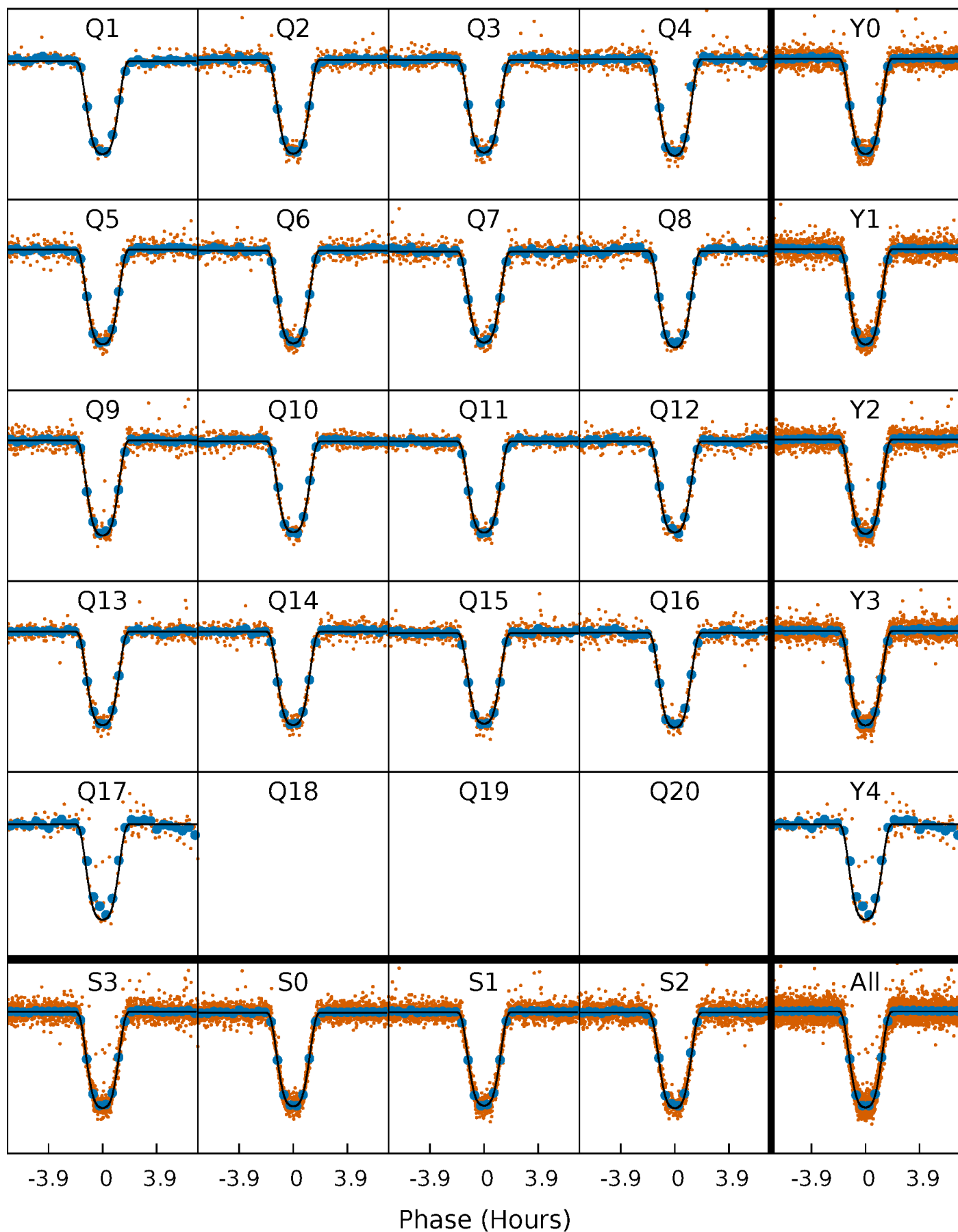
# PDC Quarter-Phased Transit Curves

TCE 004049124-02   P= 4.804471 Days    $T_0=133.616749$  (BKJD)



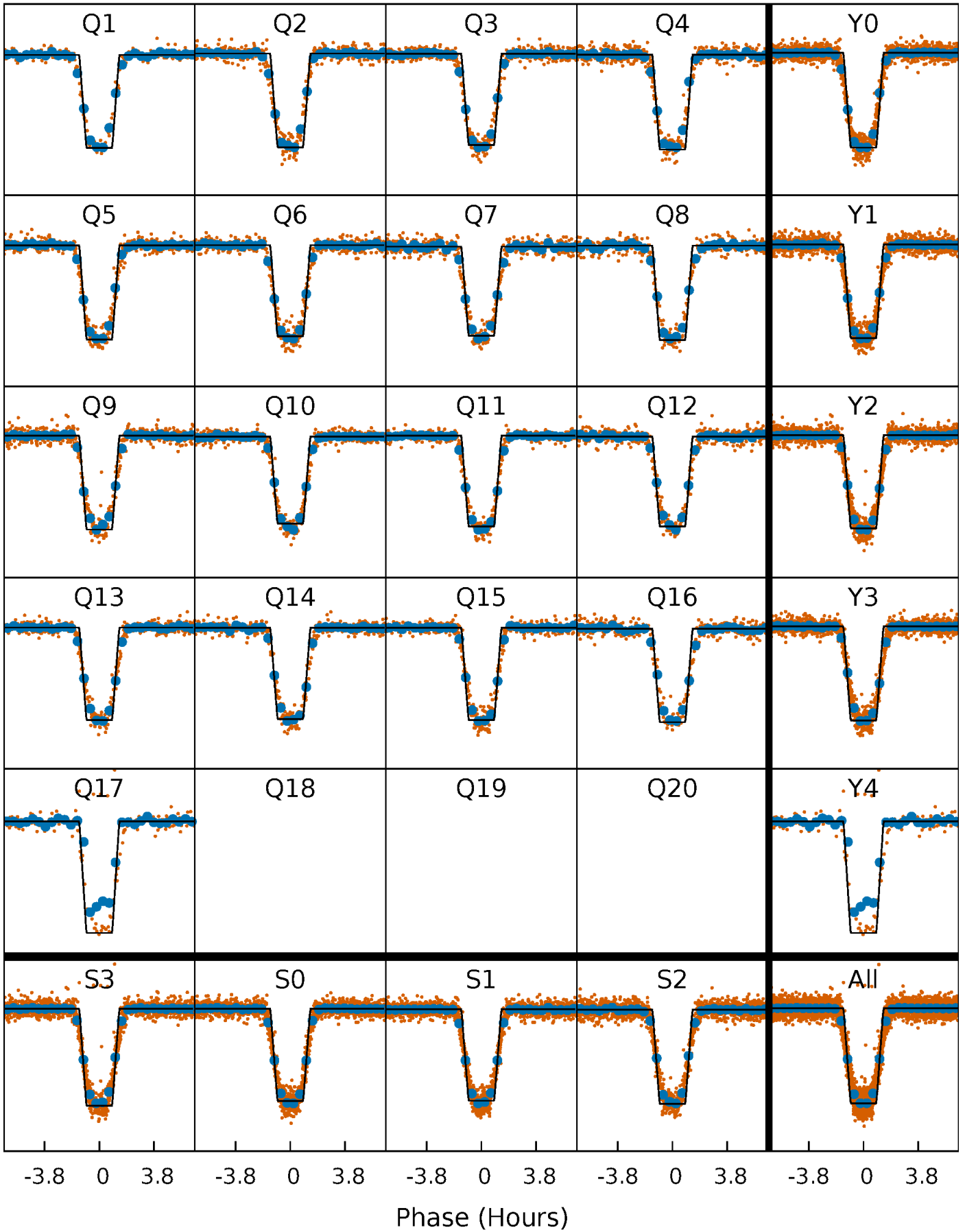
# DV Quarter-Phased Transit Curves

TCE 004049124-02   P= 4.804471 Days    $T_0=133.616749$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

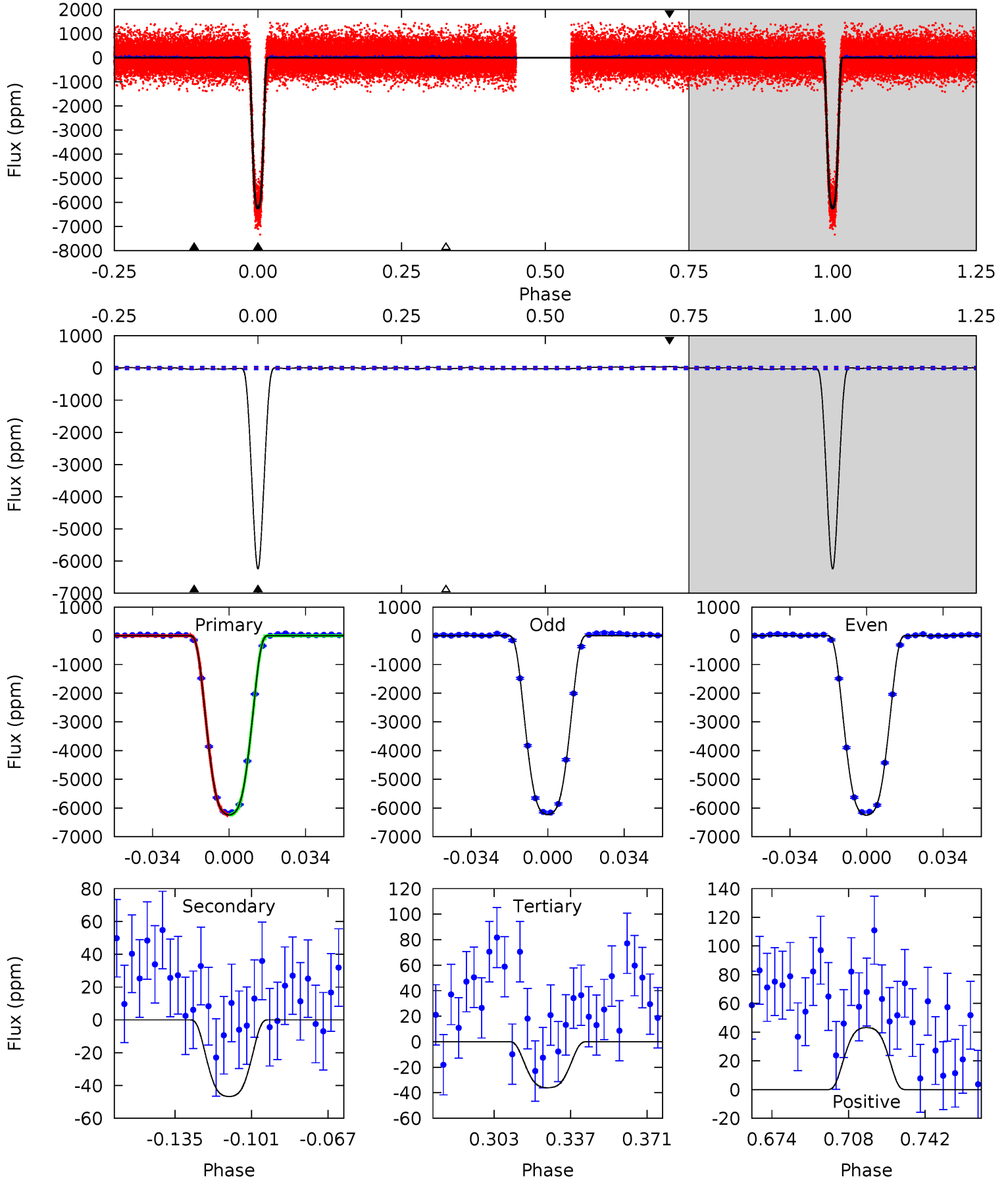
TCE 004049124-02 P= 4.804449 Days  $T_0=133.619890$  (BKJD)



# DV Model-Shift Uniqueness Test

004049124-02, P = 4.804471 Days, E = 128.812278 Days

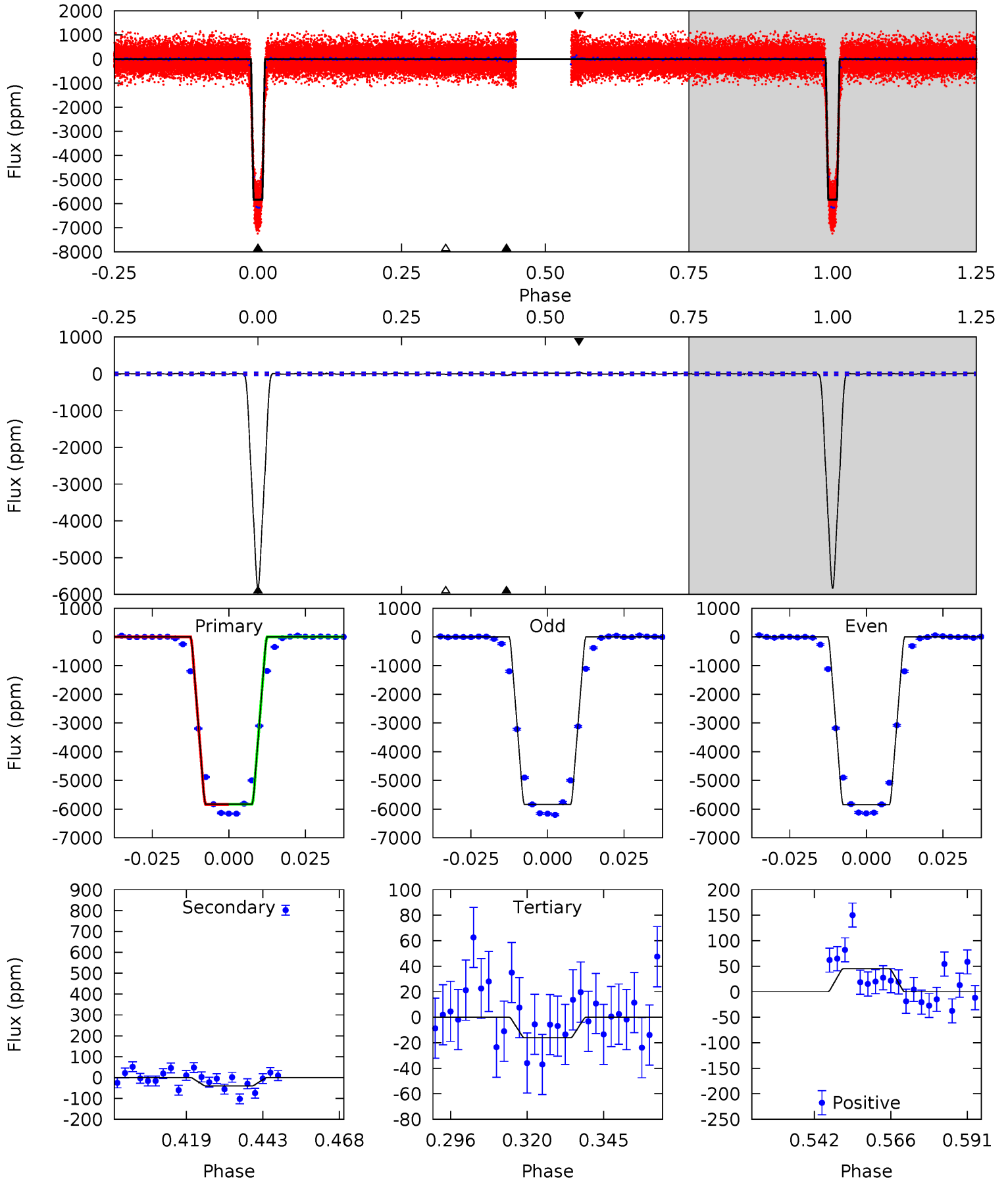
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
770.0	5.77	4.45	5.34	4.79	2.12	2.19	765.6	764.7	1.32	0.43	1.23	0.99	0.01	0.50



# Alt Model-Shift Uniqueness Test

004049124-02, P = 4.804449 Days, E = 128.815441 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
747.0	5.16	2.06	5.78	4.85	2.25	0.94	745.0	741.3	3.10	-0.62	0.53	0.99	0.01	0.45





### Stellar Parameters For KIC 004049124

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5561^{+167}_{-167}$	$4.558^{+0.048}_{-0.152}$	$-0.220^{+0.300}_{-0.300}$	$0.809^{+0.185}_{-0.074}$	$0.864^{+0.091}_{-0.091}$	$2.300^{+0.487}_{-0.961}$
	+3%/-3%	+1%/-3%	+136%/-136%	+23%/-9%	+11%/-11%	+21%/-42%
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 004049124-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-47 \pm 8$	$7.74^{+0.96}_{-0.46}$	$1359^{+76}_{-59}$	$2339^{+77}_{-72}$	$1.139^{+0.274}_{-0.261}$
Alt.	$-40 \pm 8$	$7.00^{+0.83}_{-0.44}$	$1359^{+79}_{-54}$	$2369^{+74}_{-88}$	$1.211^{+0.301}_{-0.281}$

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

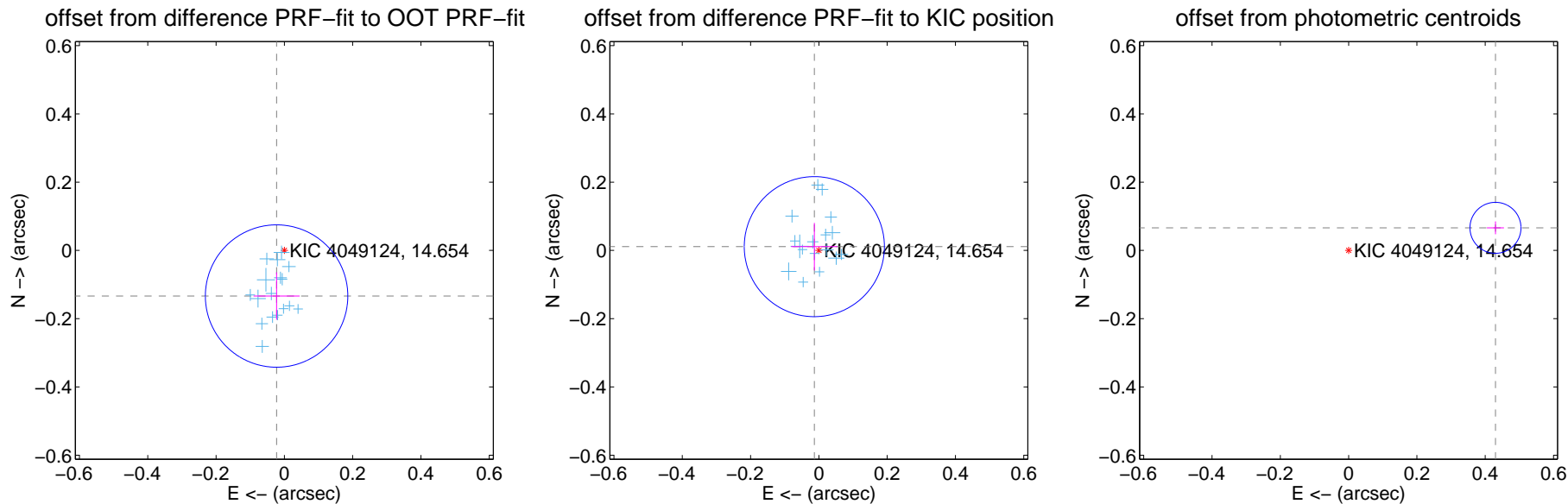
## DV Centroid Data

Supplemental centroid analysis for 004049124-02. Kepler magnitude: 14.65. Transit SNR 419.48

There are 17 quarters with good PRF difference image offsets

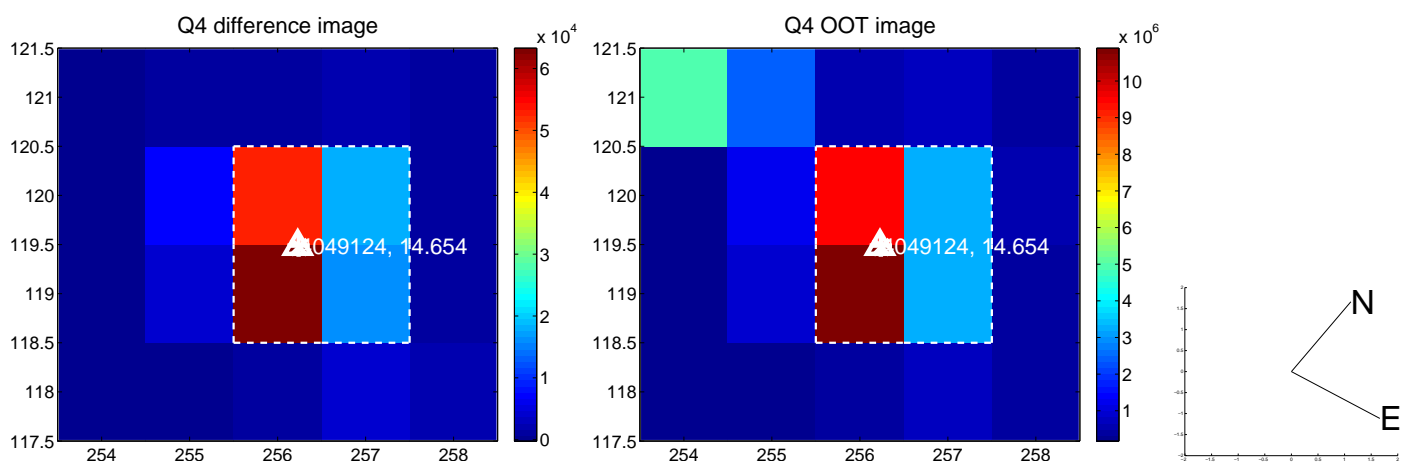
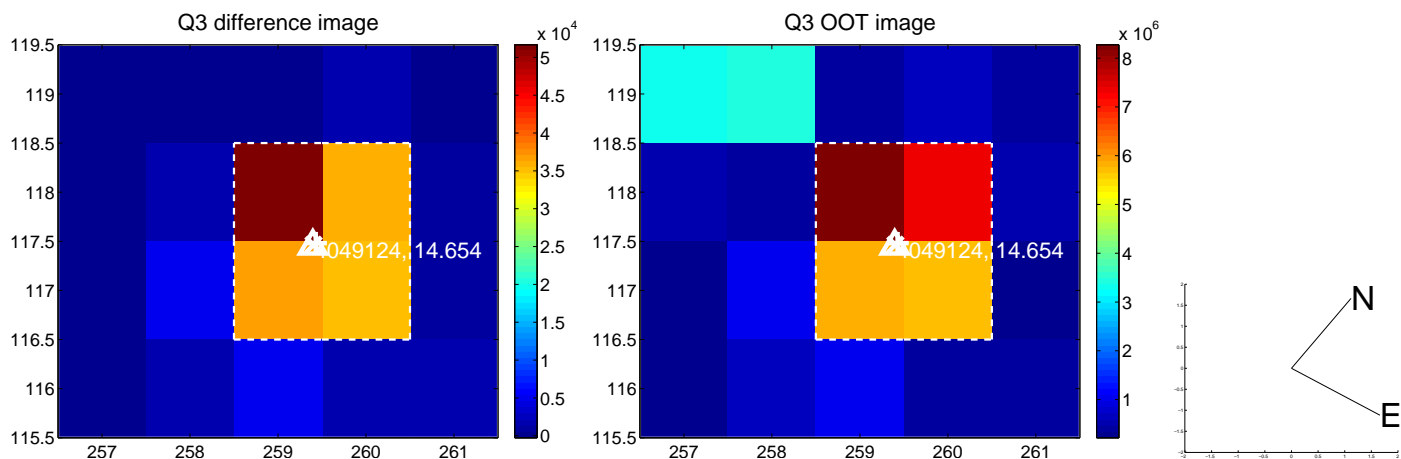
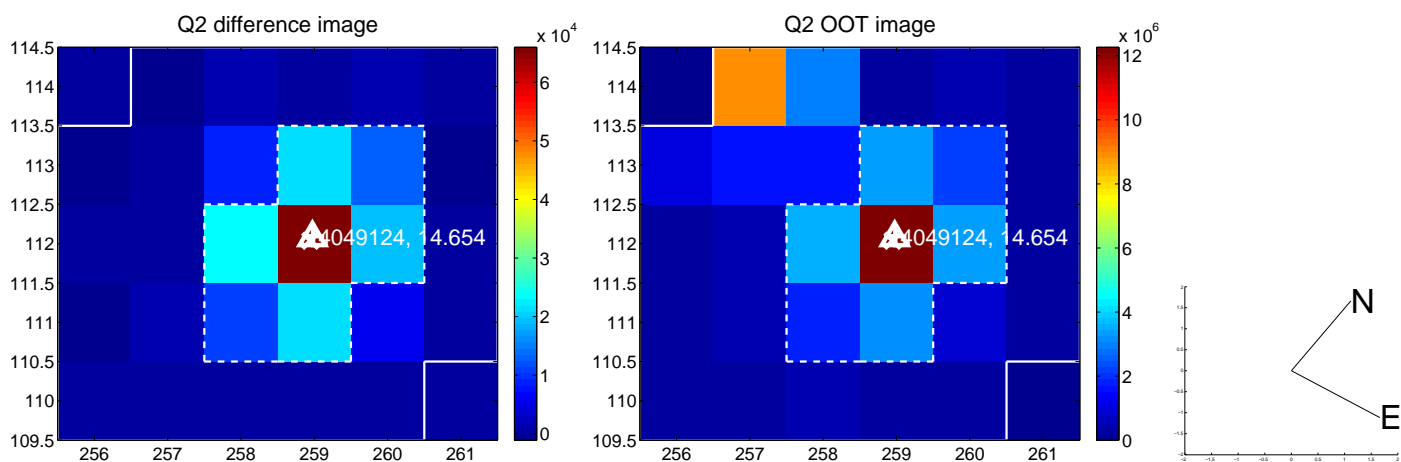
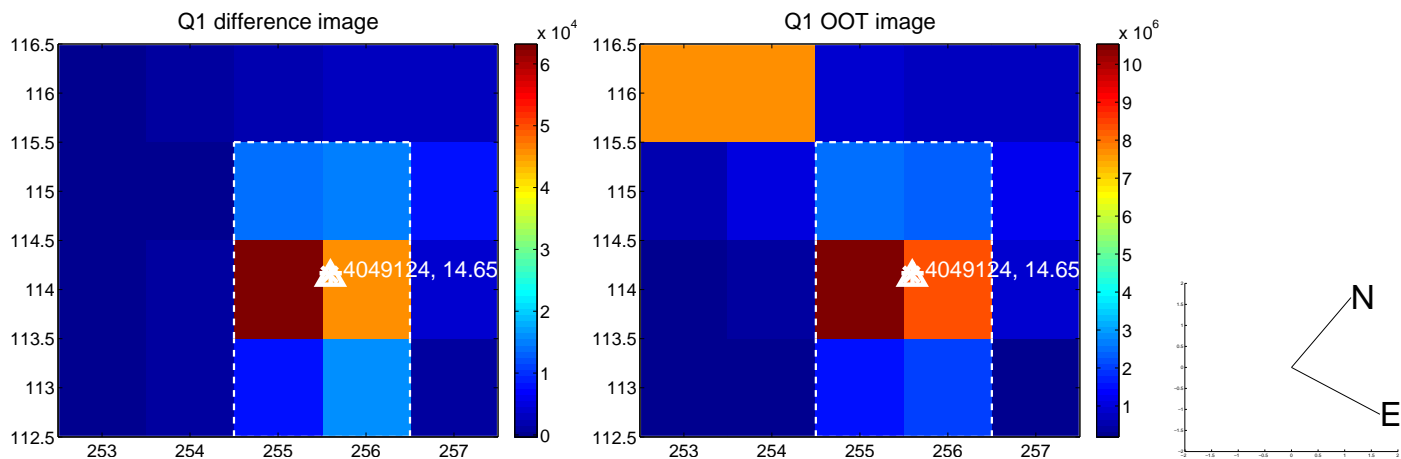
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.136 \pm 0.070$	1.95	$0.023 \pm 0.067$	$-0.134 \pm 0.070$
PRF-fit source offset from KIC position	$0.017 \pm 0.068$	0.25	$0.013 \pm 0.068$	$0.011 \pm 0.069$
photometric centroid source offset	$0.44 \pm 0.02$	17.47	$-0.43 \pm 0.03$	$0.07 \pm 0.02$

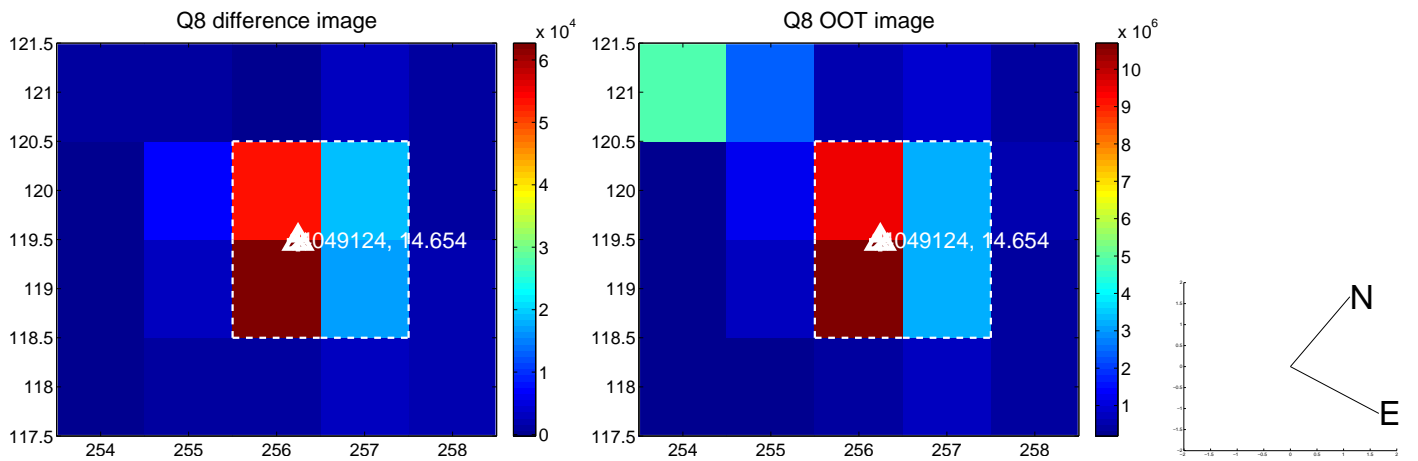
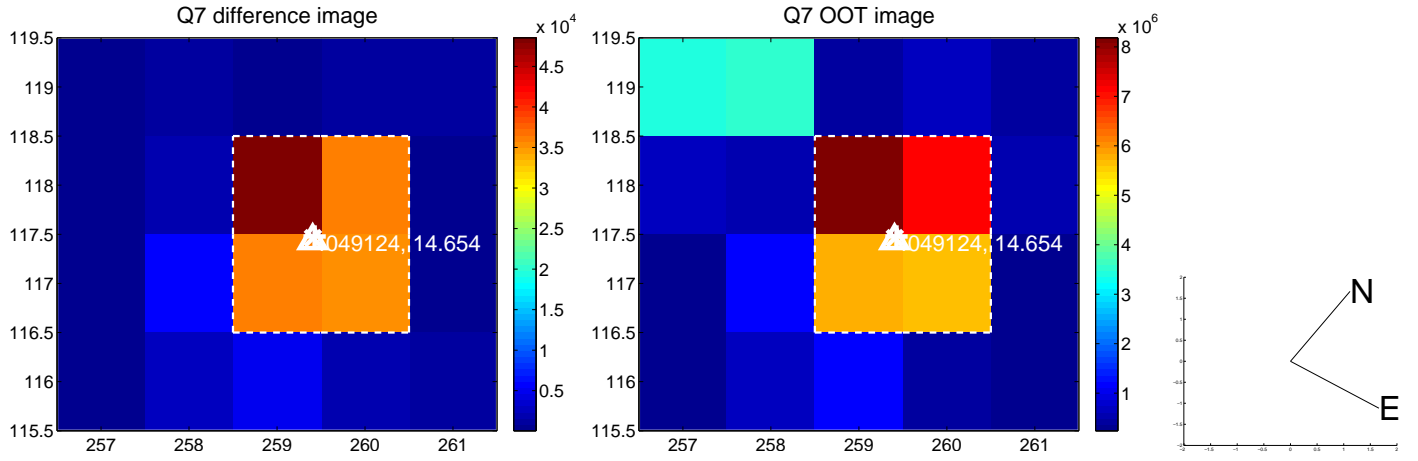
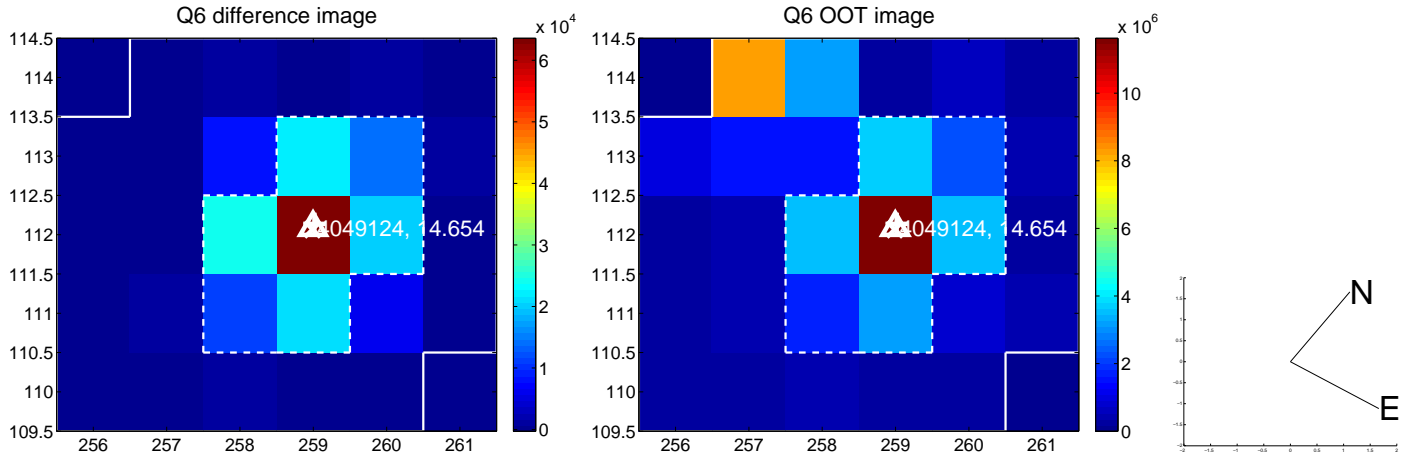
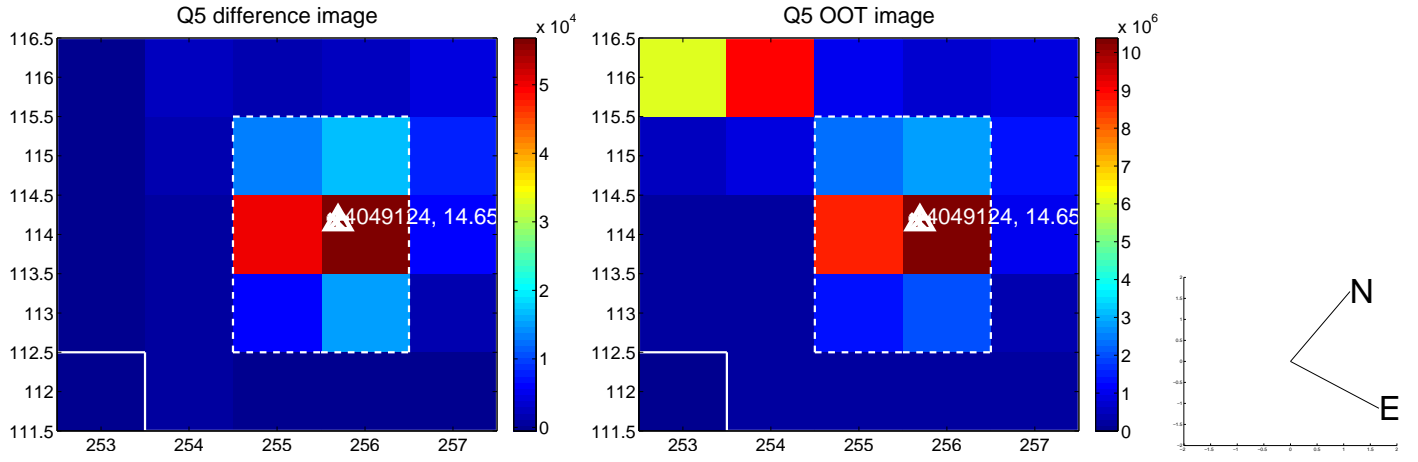


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

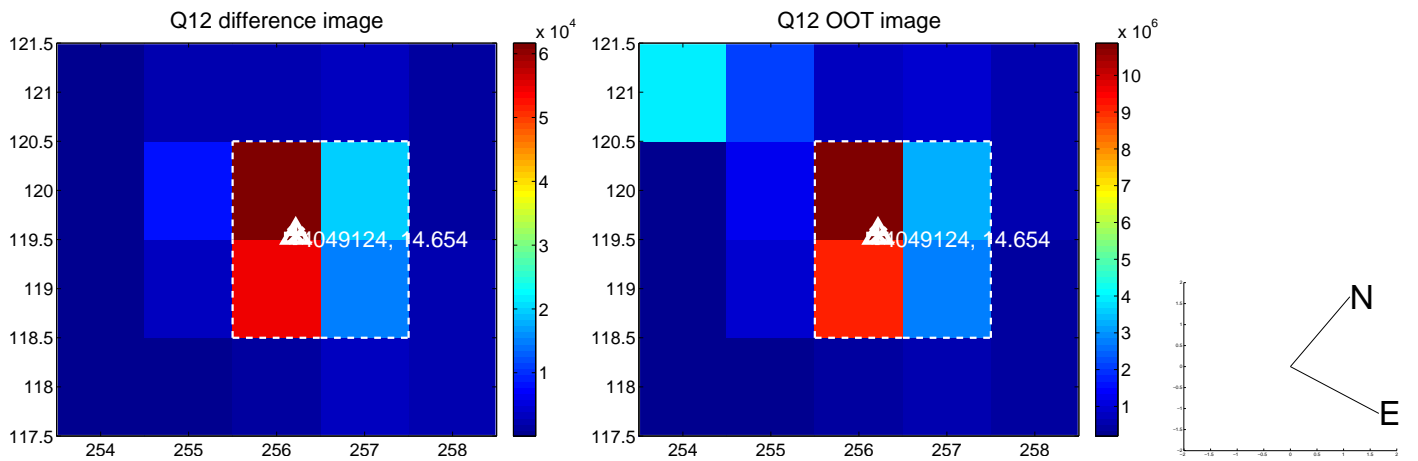
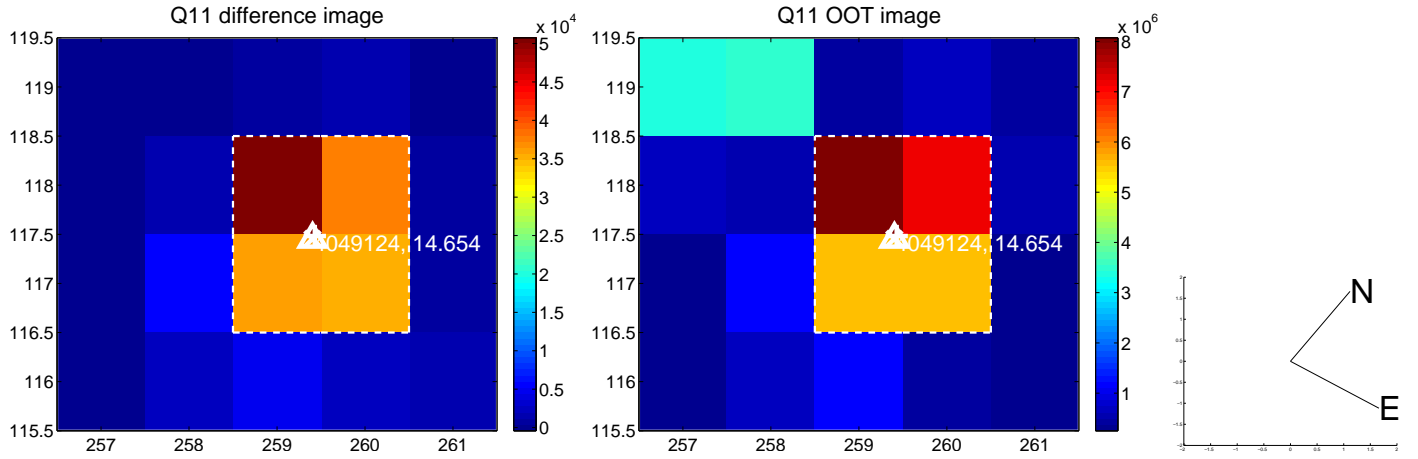
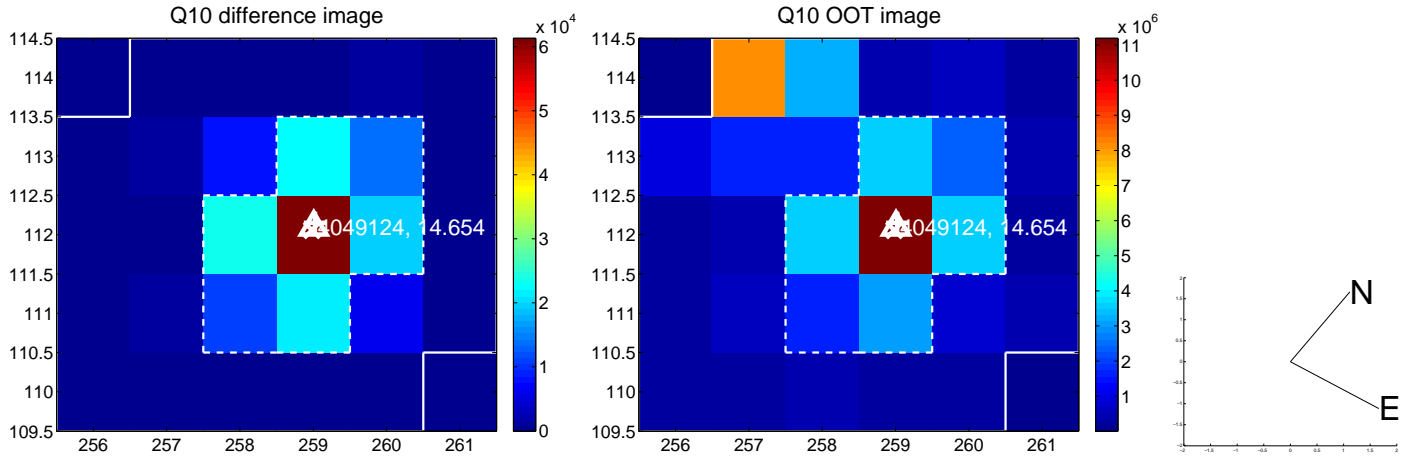
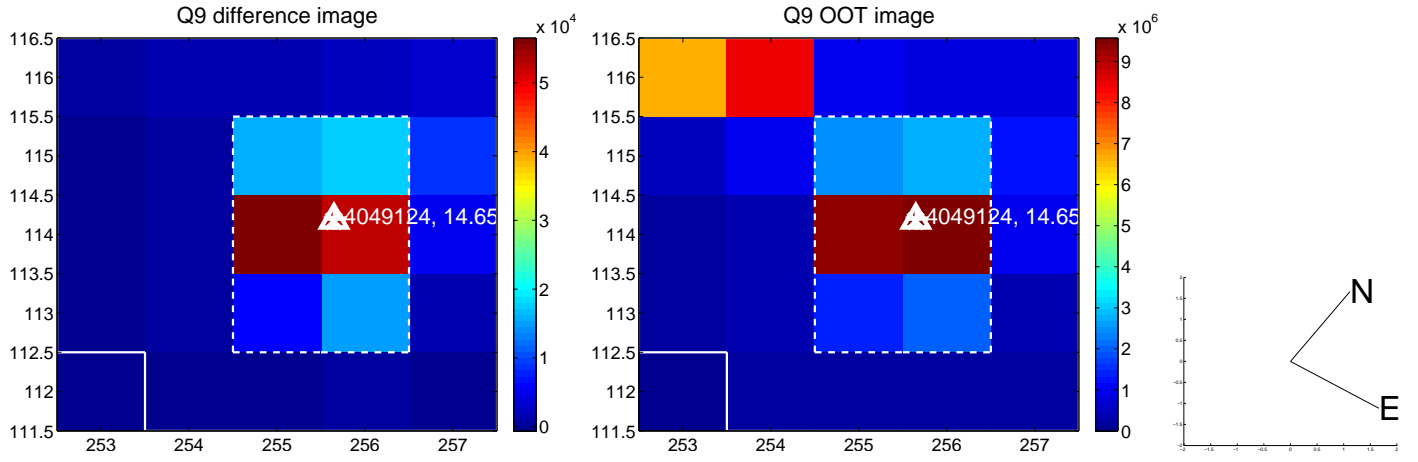
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



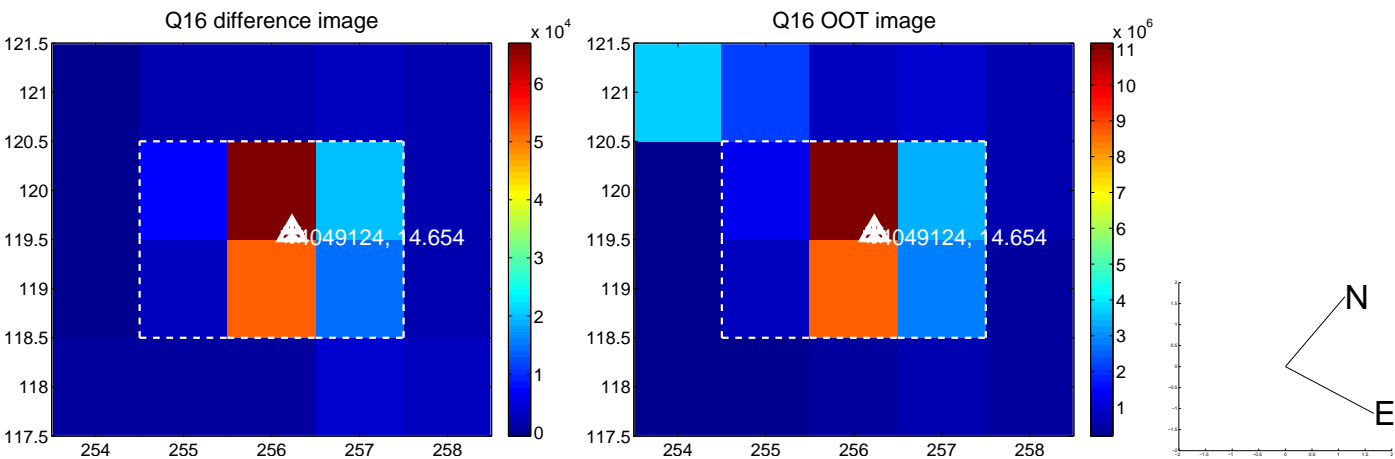
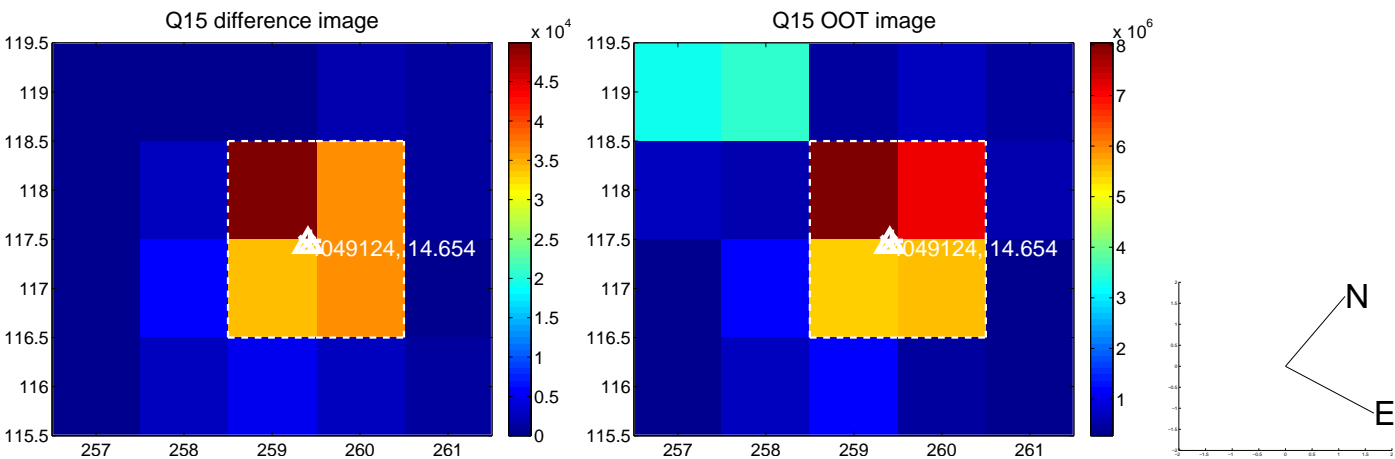
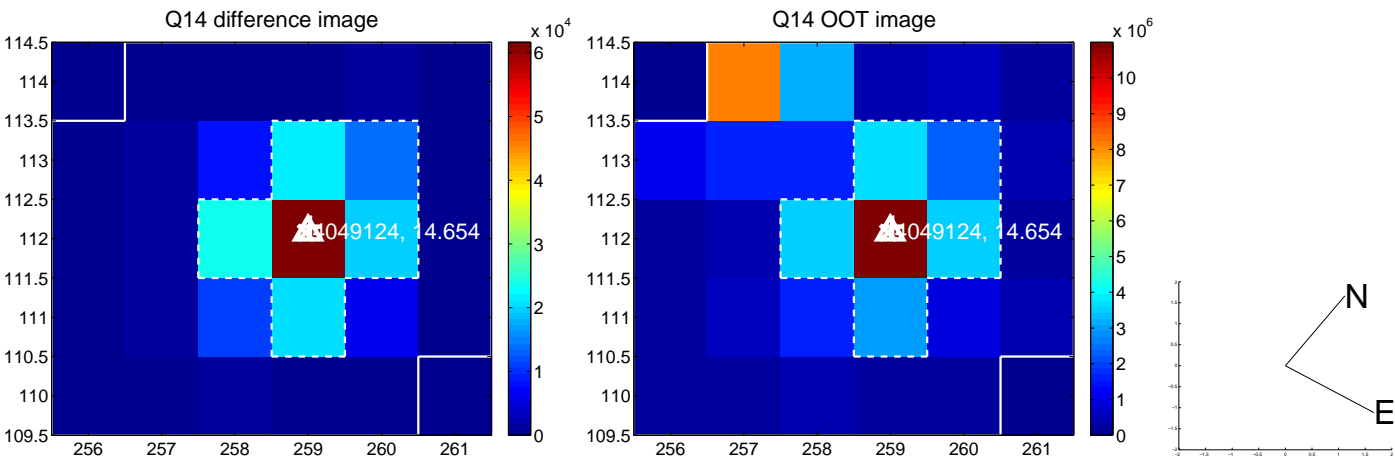
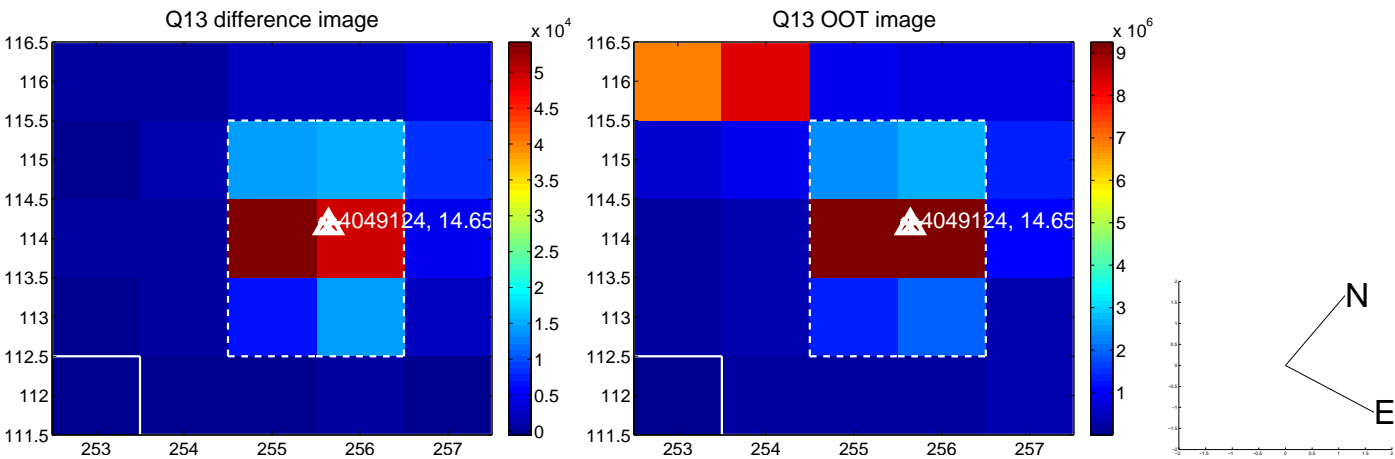
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



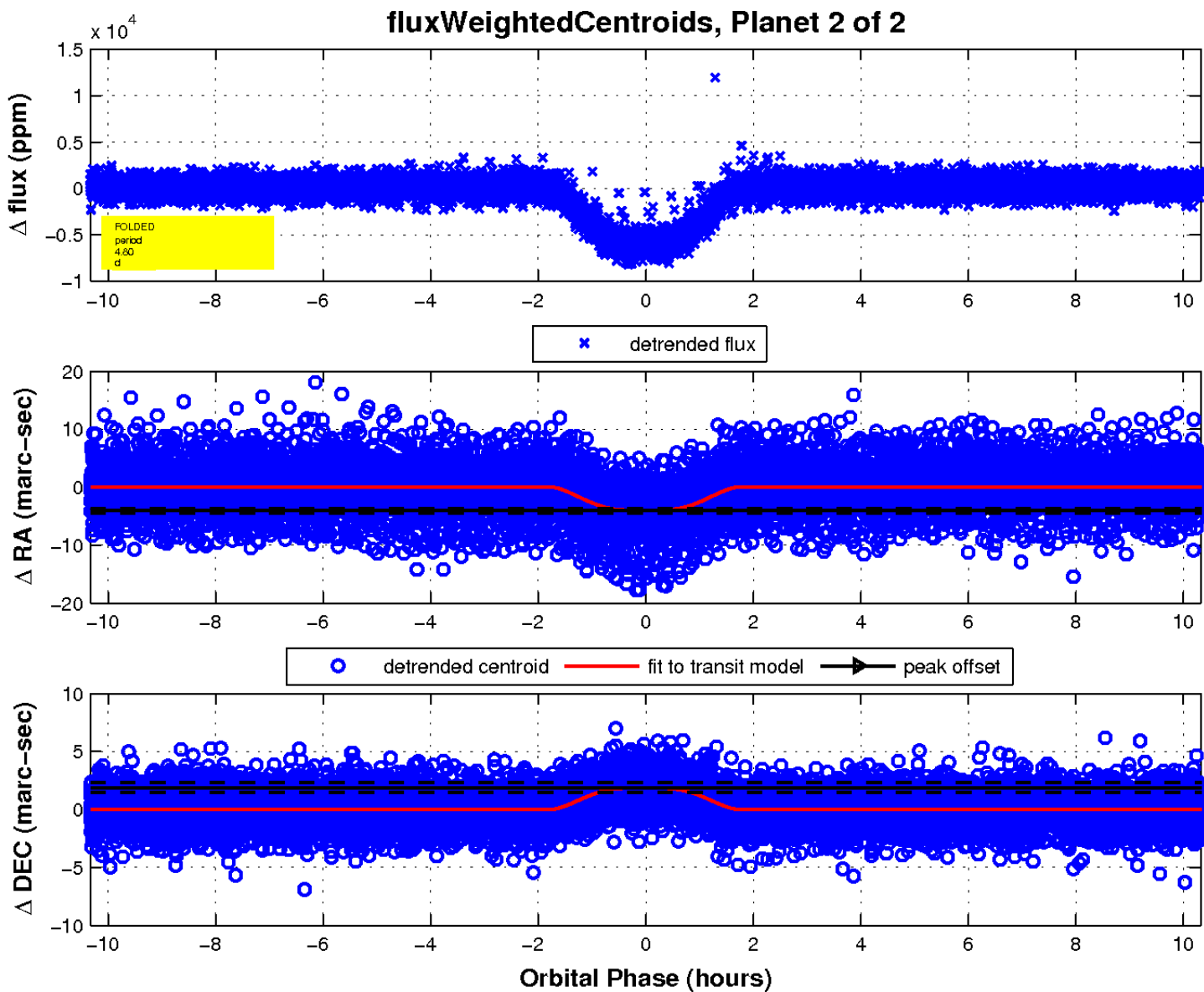
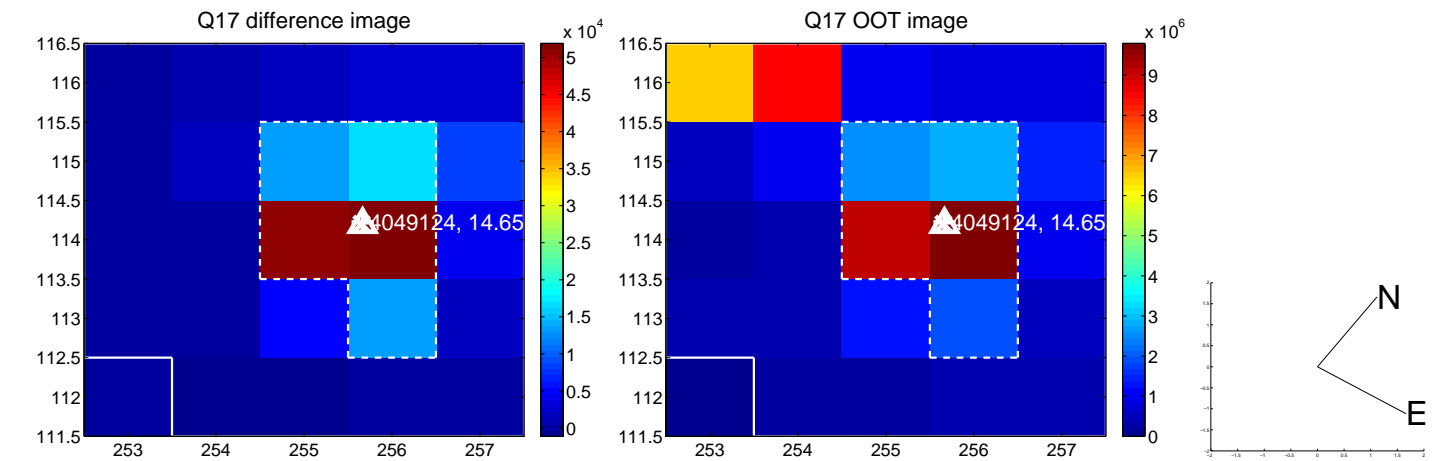
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image

