

# KIC 004352168

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004352168-01	OBS	6404.01	10.643712	134.943832	435672.4	3.500	23640.1	-1.0	0.69	5282	37.87	49.15
004352168-02	OBS	No	10.643748	139.209866	119892.5	4.607	6592.2	4209.6	0.69	5282	30.25	49.15

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004352168-01	OBS	FP	0.00	0	1	0	0	<del>MOD_SEC_ALT</del> <del>MOD_ODDEVEN_ALT</del> <del>HAS_SEC_TCE</del> <del>CENT_NOFITS</del>
004352168-02	OBS	FP	0.00	1	1	0	0	<del>IS_SEC_TCE</del>

**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 004352168-01

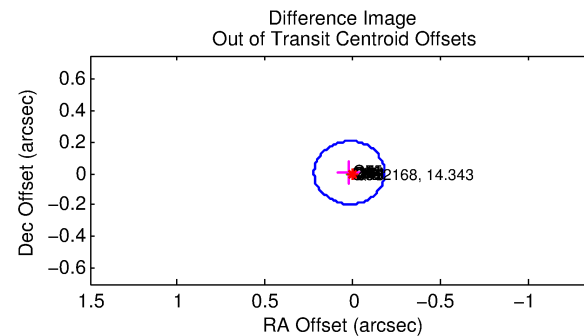
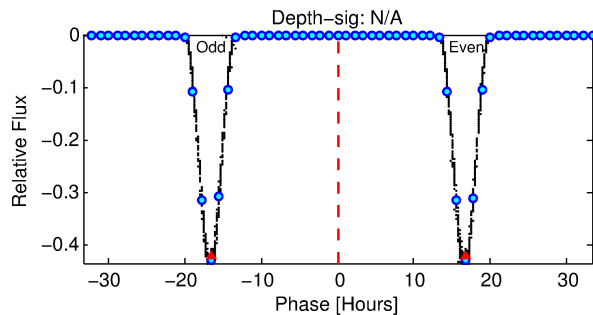
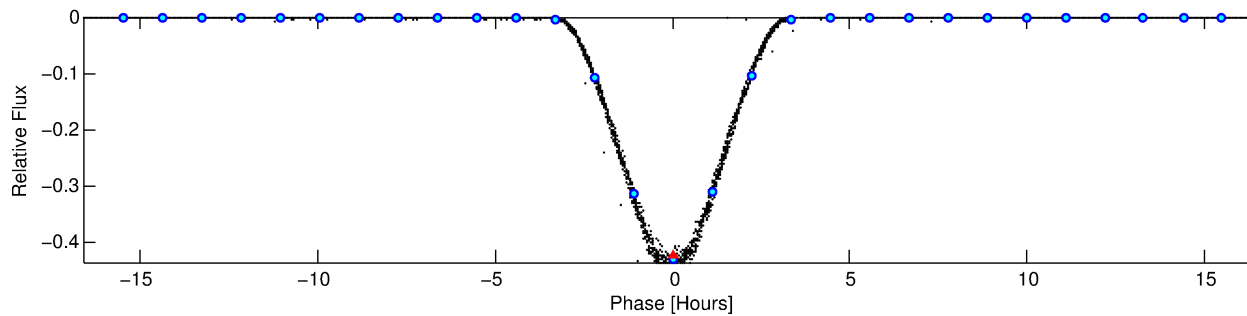
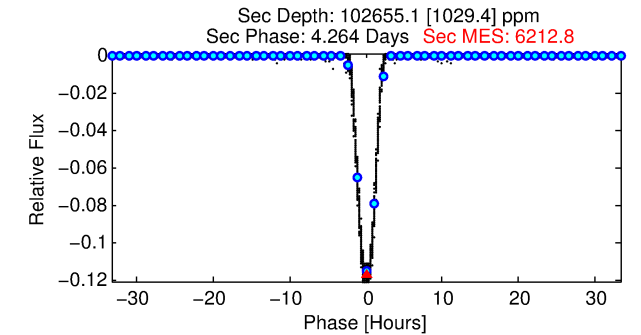
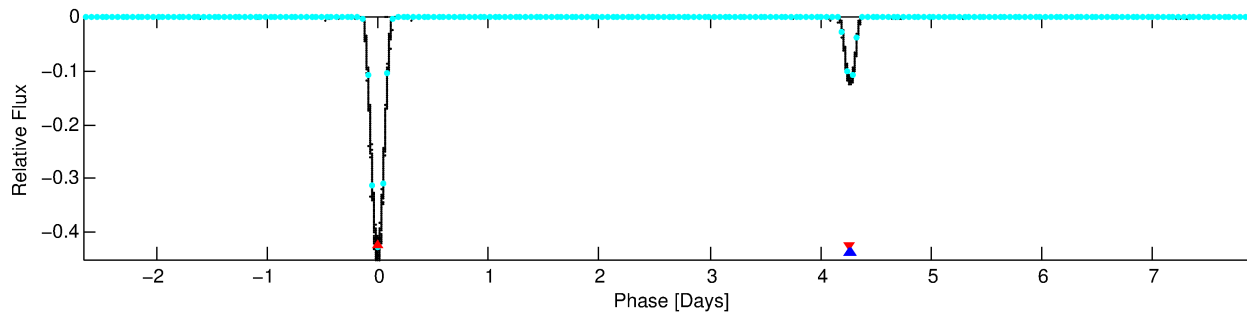
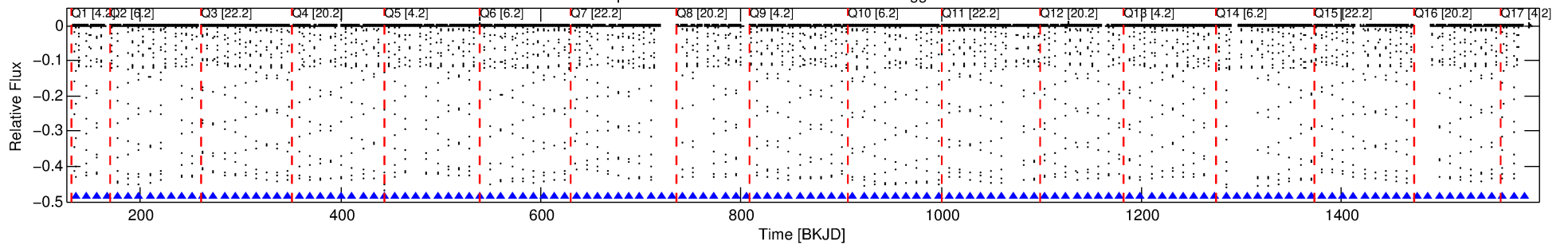
No Significant Match Found

# DV One-Page Summary

KIC: 4352168 Candidate: 1 of 2 Period: 10.644 d

KOI: K06404 Corr: No Ephemeris Match

Kp: 14.34 R\*: 0.69 Rs Teff: 5282.0 K Logg: 4.58 Fe/H: -0.700



## TPS TCE Results:

Period = 10.64371 d  
Epoch = 134.9438 BKJD

DV fit results are unavailable

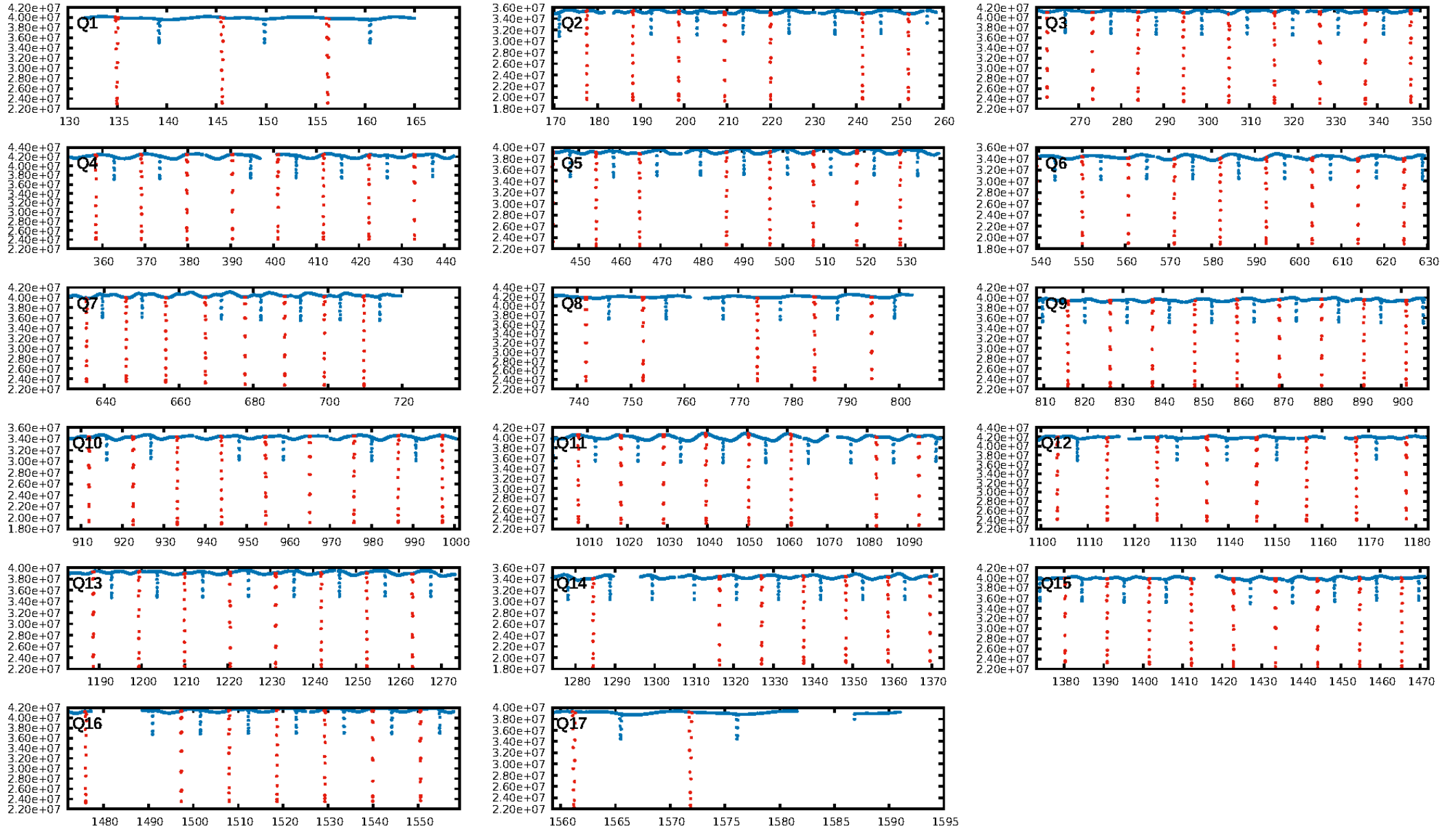
## DV Diagnostic Results:

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 [118/118]  
GhostDiagnostic-chr: 0.3865  
Centroid-sig: N/A  
Centroid-so: 0.083 arcsec [191.06σ]  
OotOffset-rm: 0.022 arcsec [0.33σ]  
KicOffset-rm: 0.103 arcsec [1.42σ]  
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]

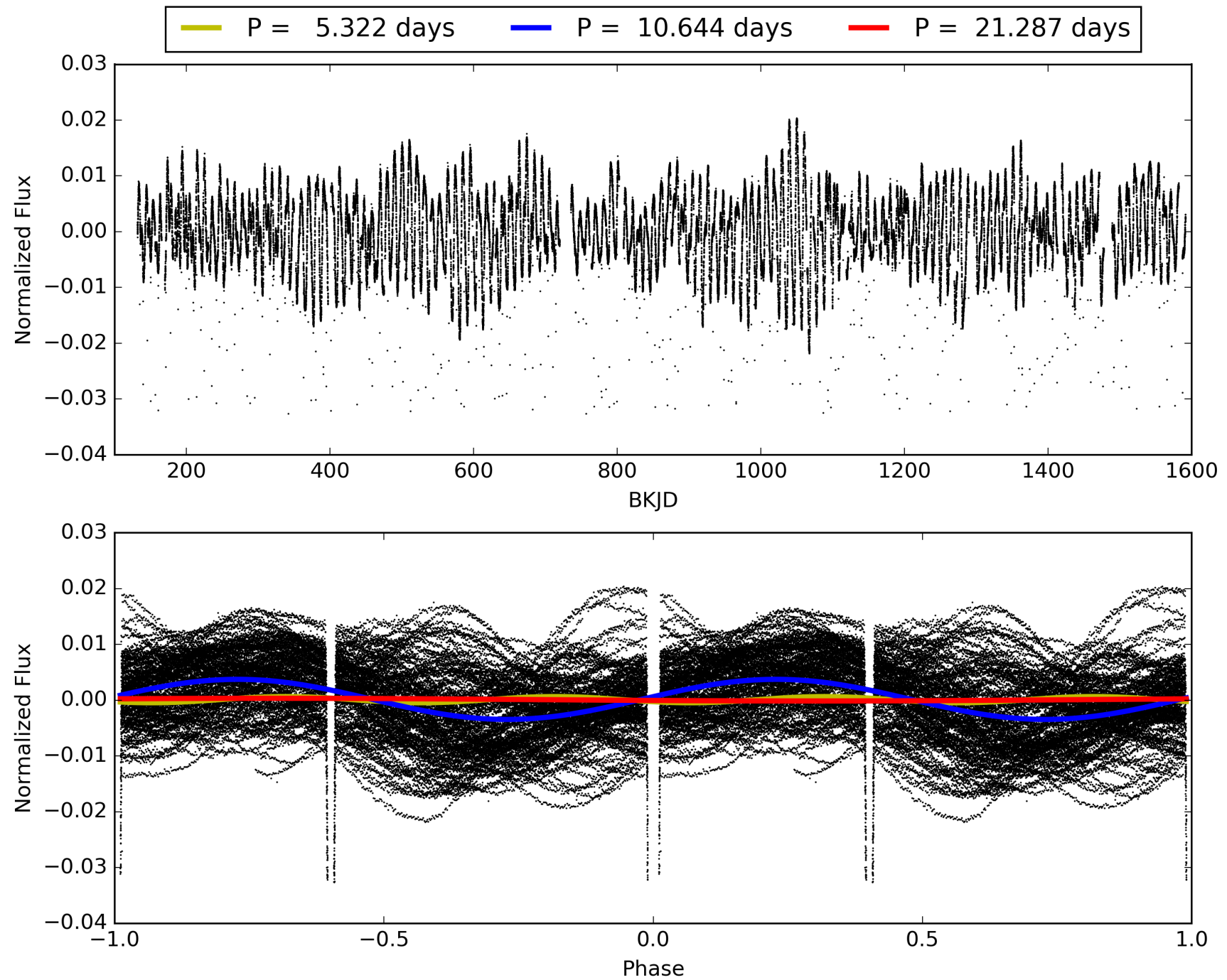
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:12:27 Z

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

# TCE 004352168-01, PDC Light Curves

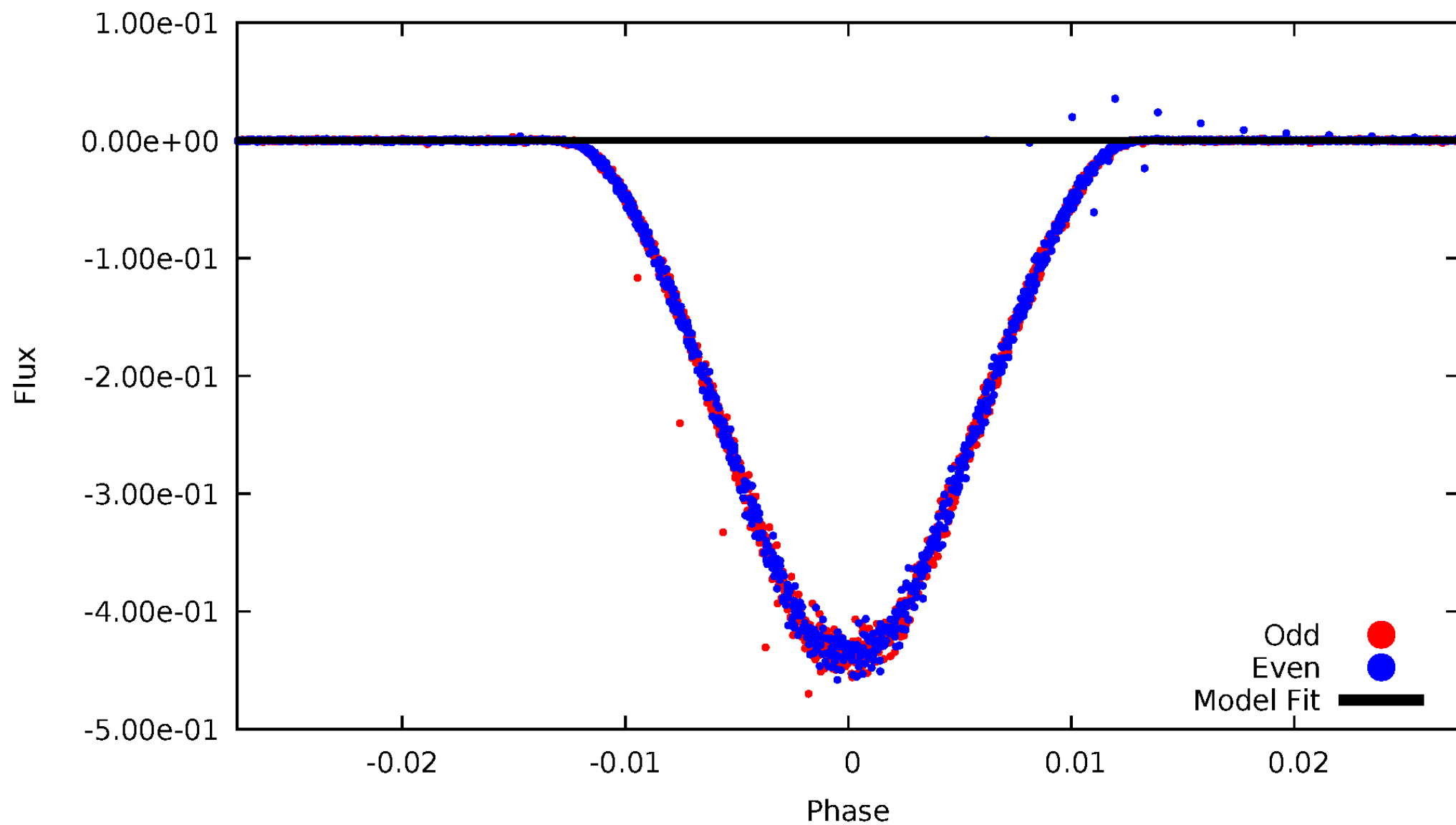


TCE 004352168-01



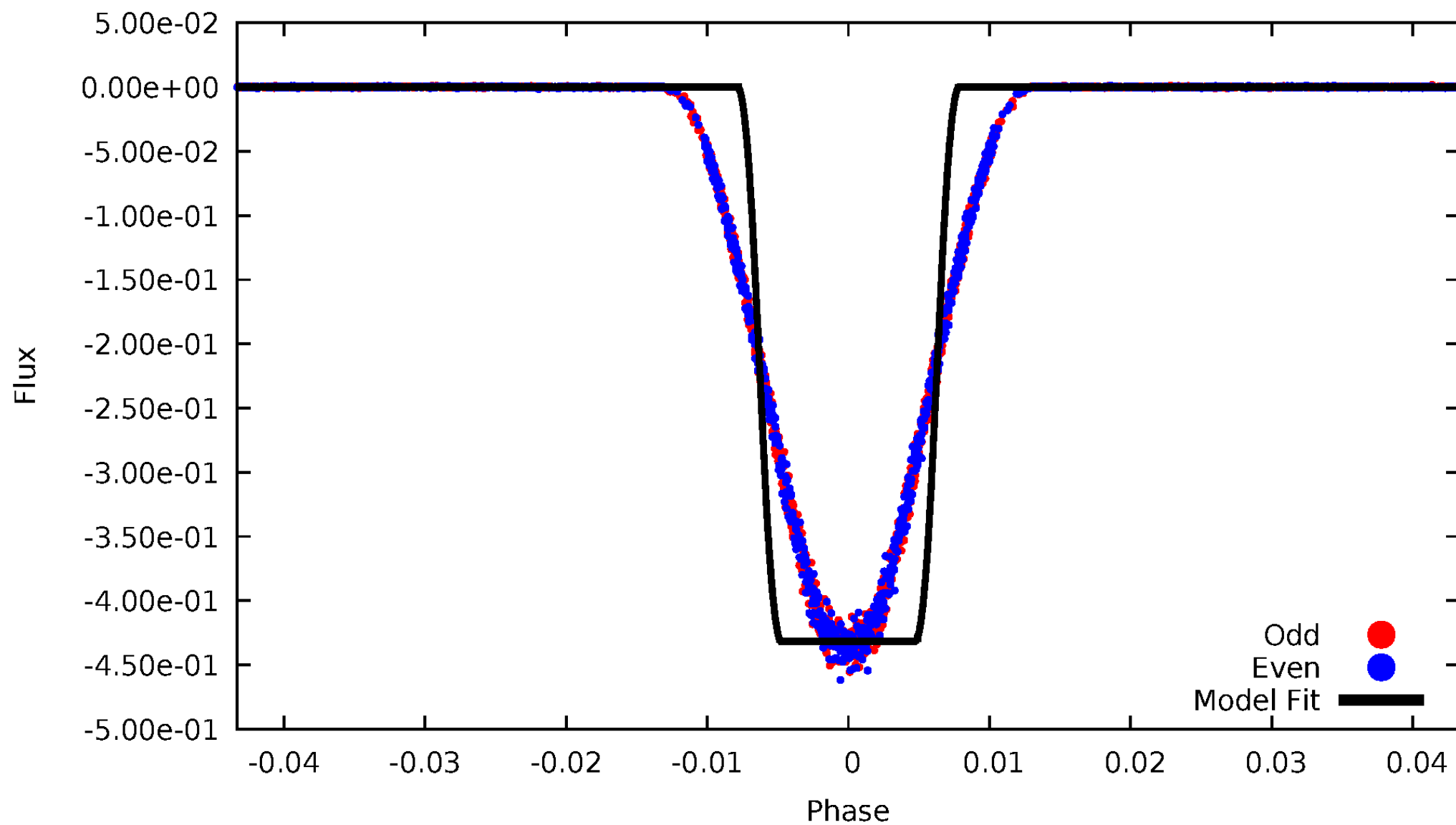
# DV Odd/Even

TCE 004352168-01



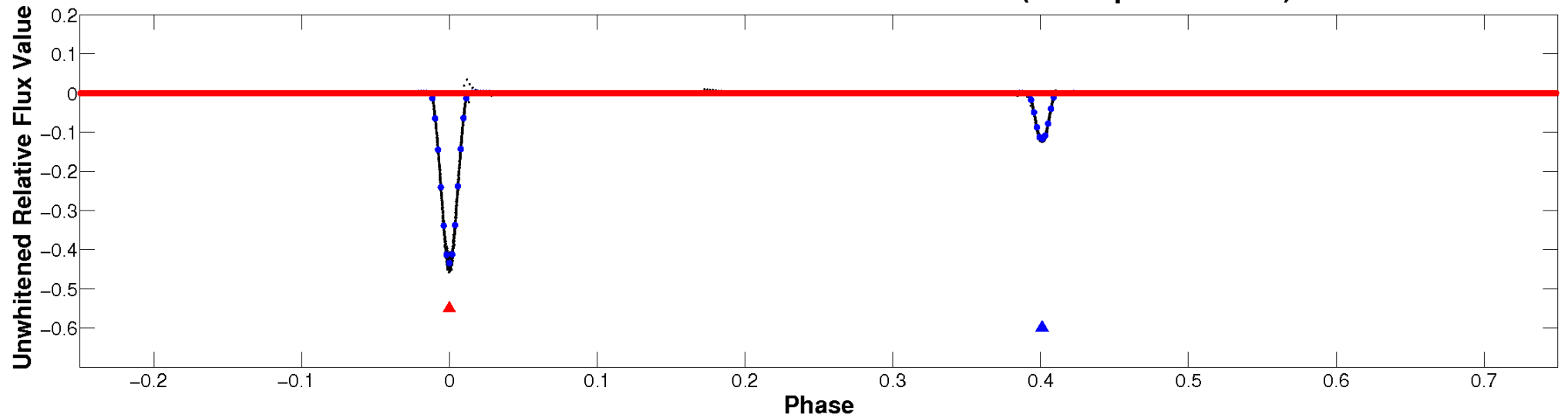
# ALT Odd/Even

TCE 004352168-01



# Non-Whitened Vs. Whitened Light Curve

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

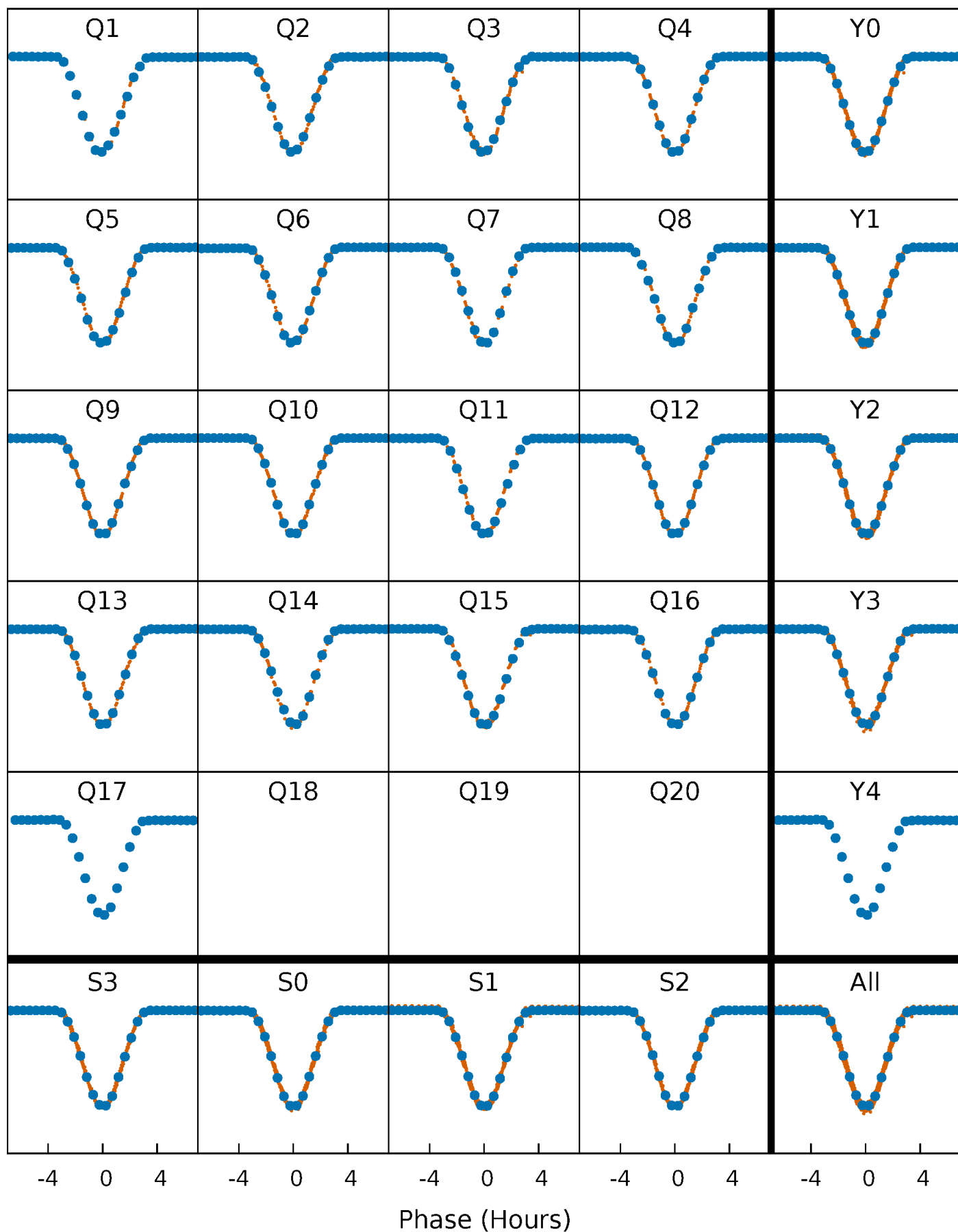


**Planet 1 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



# PDC Quarter-Phased Transit Curves

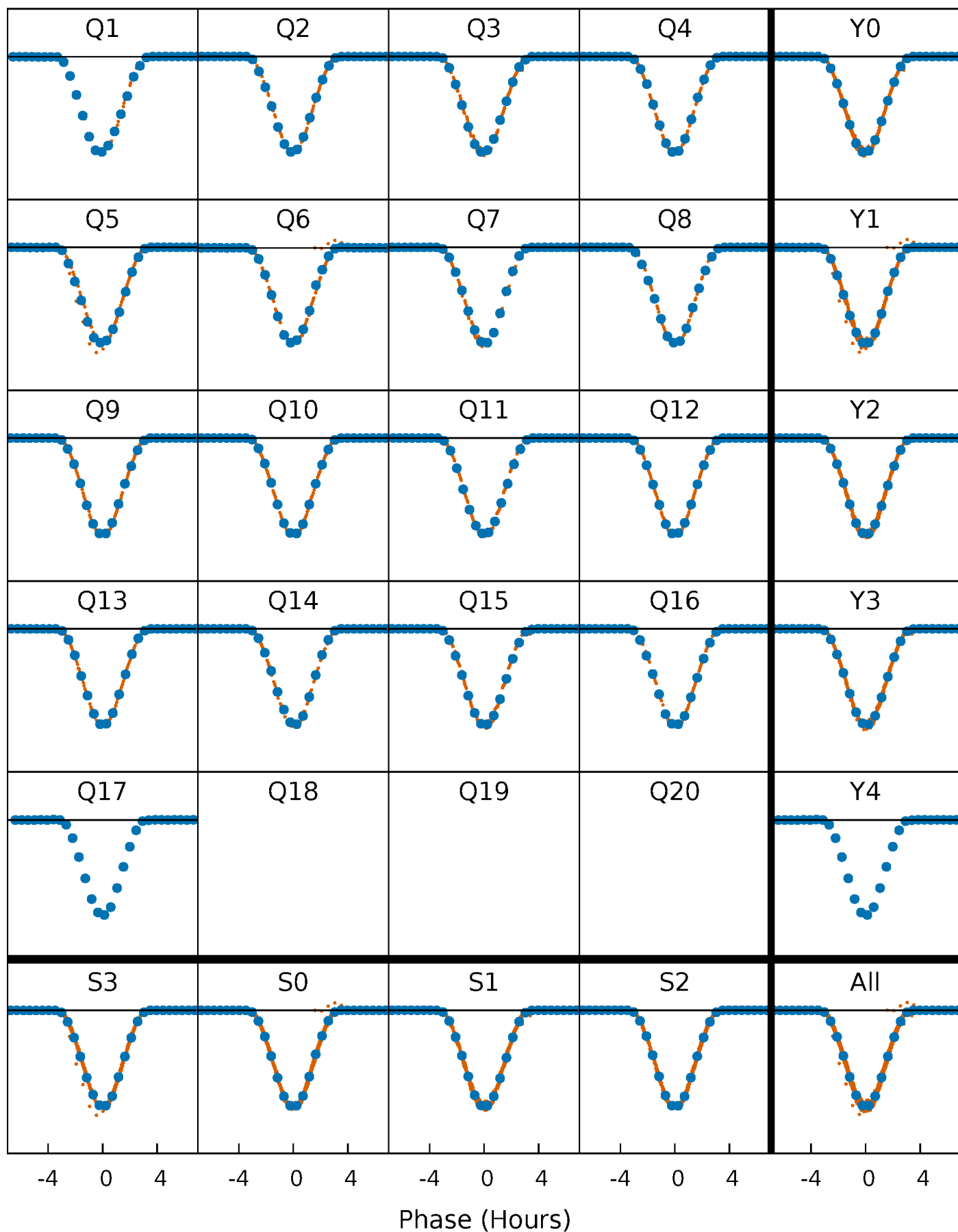
TCE 004352168-01 P= 10.643712 Days  $T_0=134.943832$  (BKJD)





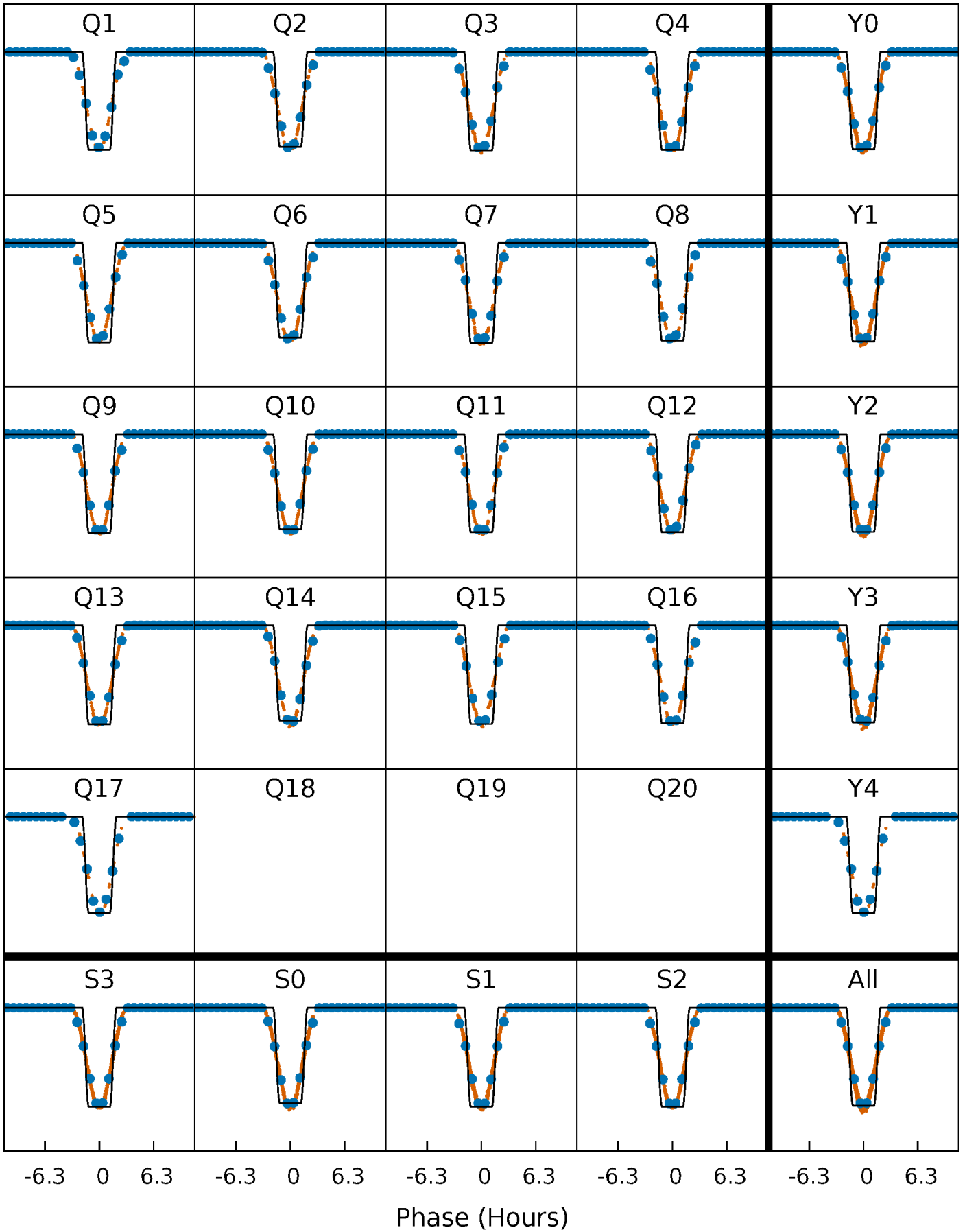
# DV Quarter-Phased Transit Curves

TCE 004352168-01 P= 10.643712 Days  $T_0=134.943832$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

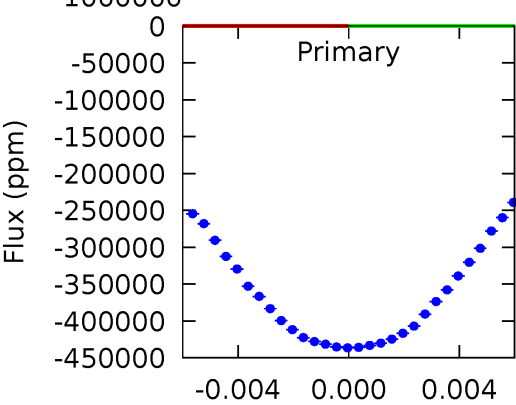
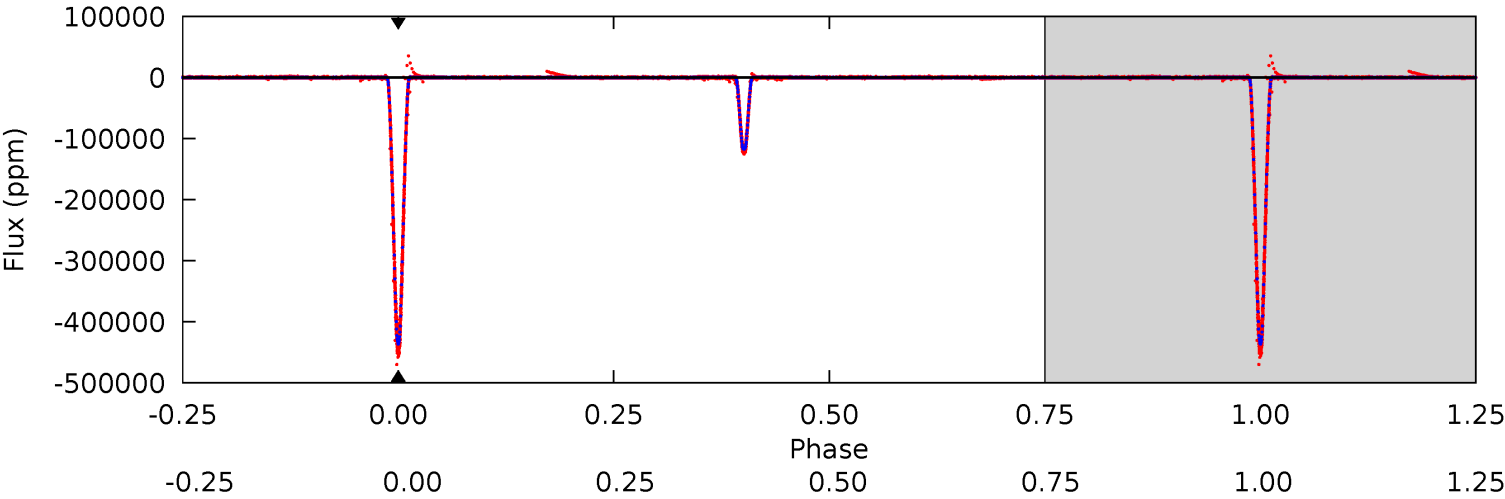
TCE 004352168-01 P= 10.643712 Days  $T_0=134.944526$  (BKJD)



# DV Model-Shift Uniqueness Test

004352168-01, P = 10.643712 Days, E = 124.300120 Days

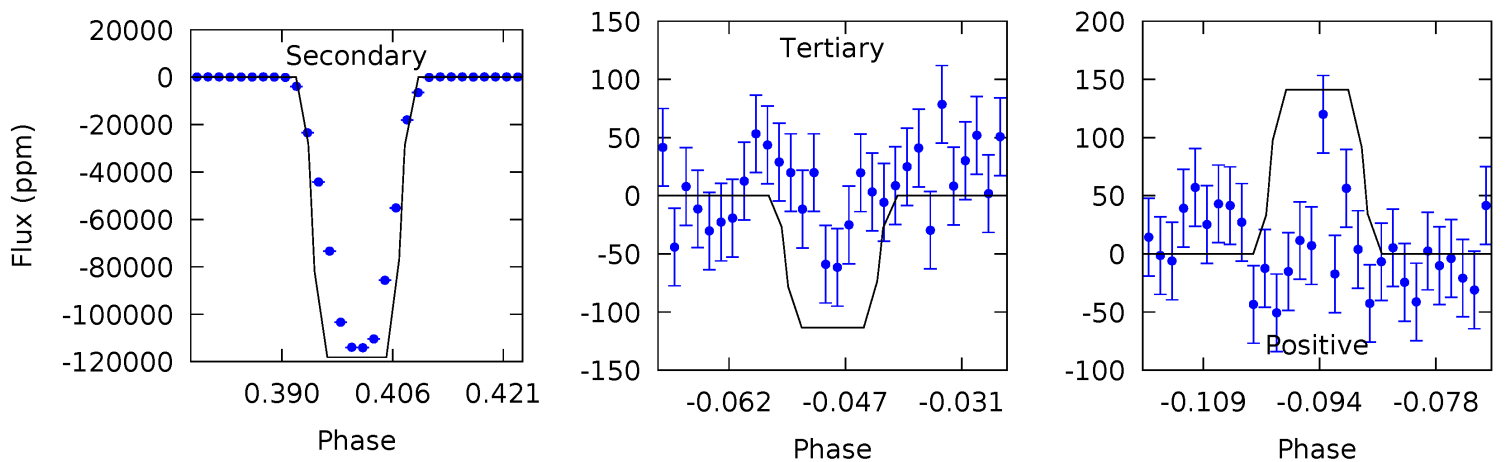
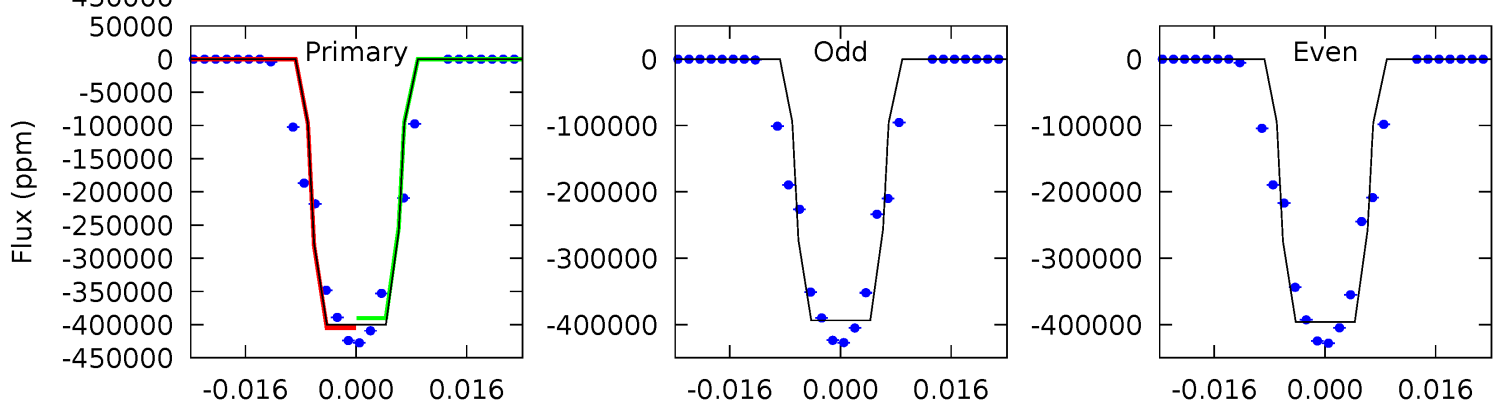
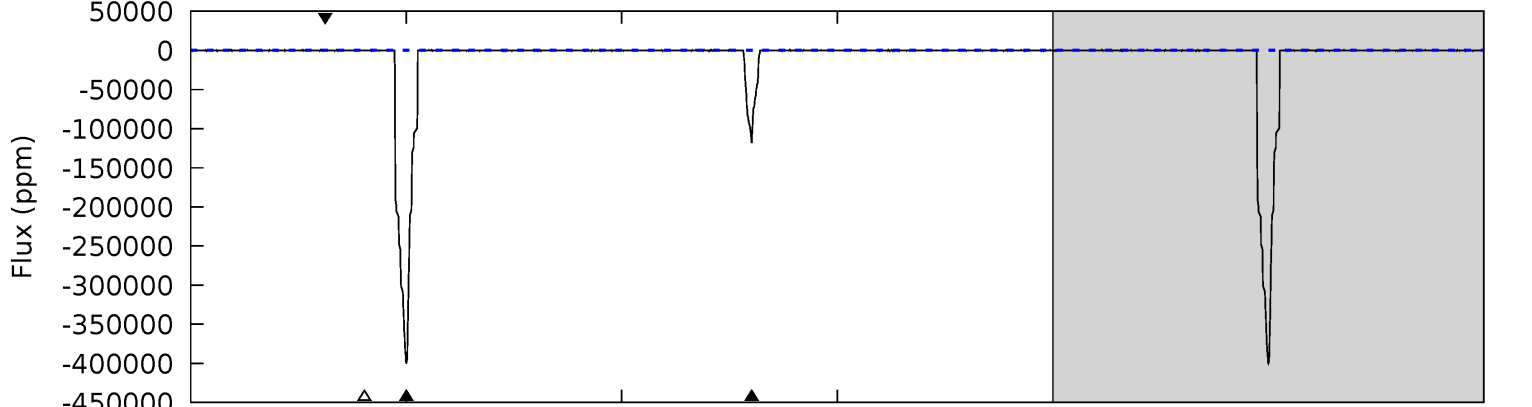
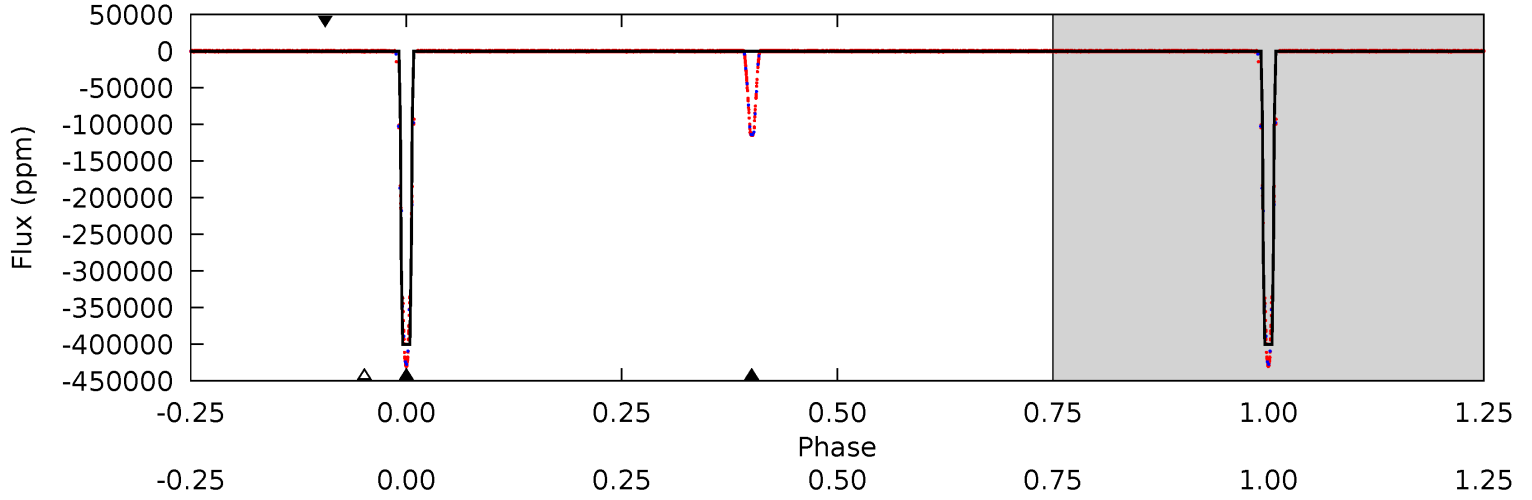
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

004352168-01, P = 10.643712 Days, E = 124.300814 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
12213	3607	3.46	4.31	4.94	2.42	1.21	12209	12209	3603	3602	39.4	1.00	0.00	0



### Stellar Parameters For KIC 004352168

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5282^{+159}_{-159}$	$4.578^{+0.084}_{-0.052}$	$-0.700^{+0.300}_{-0.300}$	$0.694^{+0.072}_{-0.072}$	$0.665^{+0.077}_{-0.033}$	$2.798^{+0.908}_{-0.576}$
	+3%/-3%	+2%/-1%	+43%/-43%	+10%/-10%	+12%/-5%	+32%/-21%
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 004352168-01 / KOI 6404.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$0 \pm 1000000$	$36.84^{+8.15}_{-7.35}$	$936^{+39}_{-37}$	$-2240^{+6771}_{-2091}$	$-2.392^{+324.317}_{-261.057}$
Alt.	$-118137 \pm 33$	$49.61^{+8.15}_{-7.63}$	$936^{+37}_{-39}$	$4164^{+275}_{-226}$	$207^{+82}_{-51}$

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

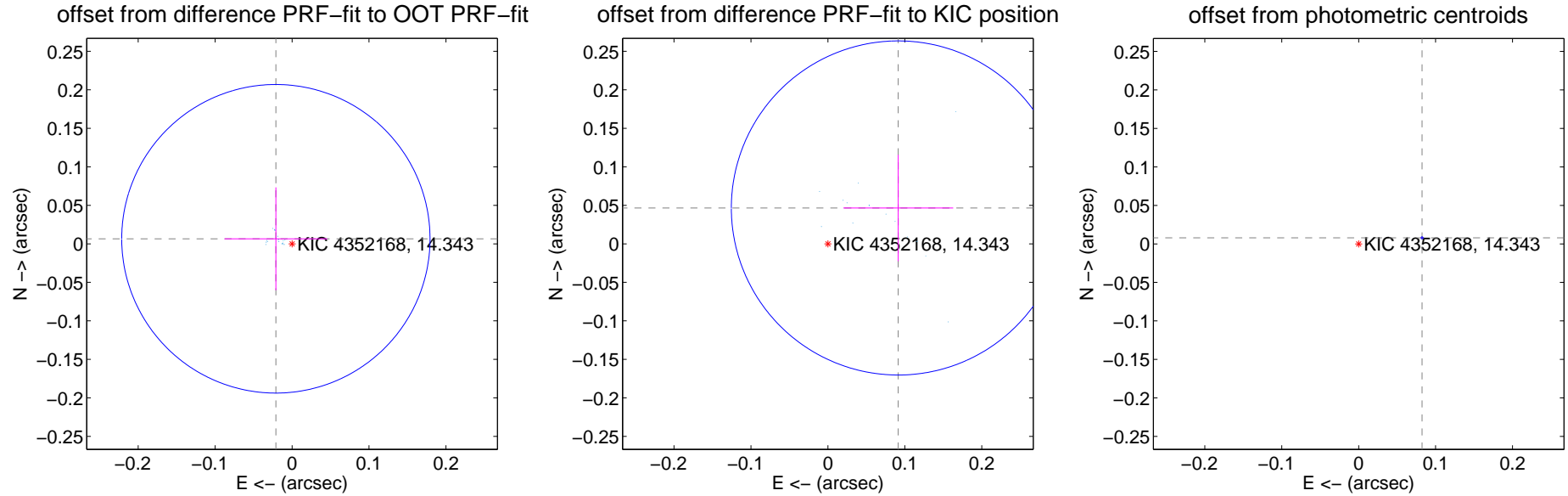
## DV Centroid Data

Supplemental centroid analysis for 004352168-01. Kepler magnitude: 14.34. Transit SNR -1.00

There are 17 quarters with good PRF difference image offsets

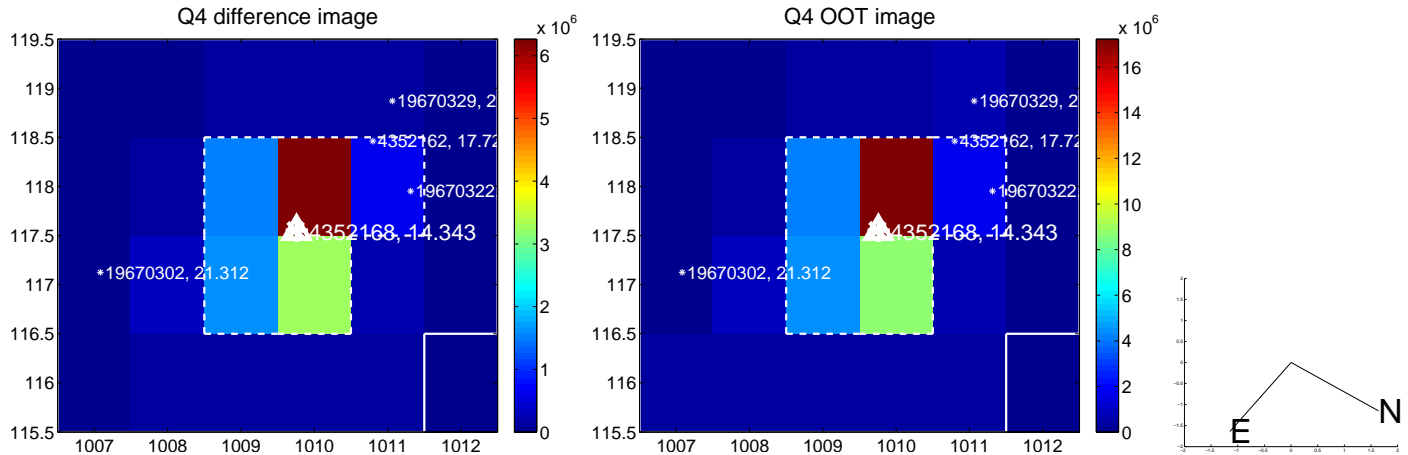
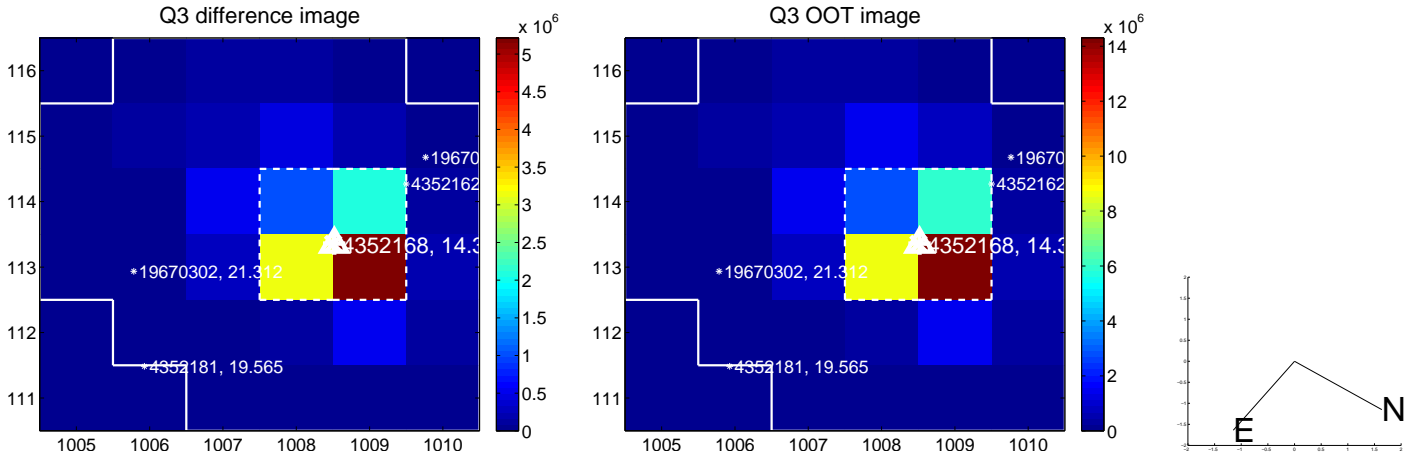
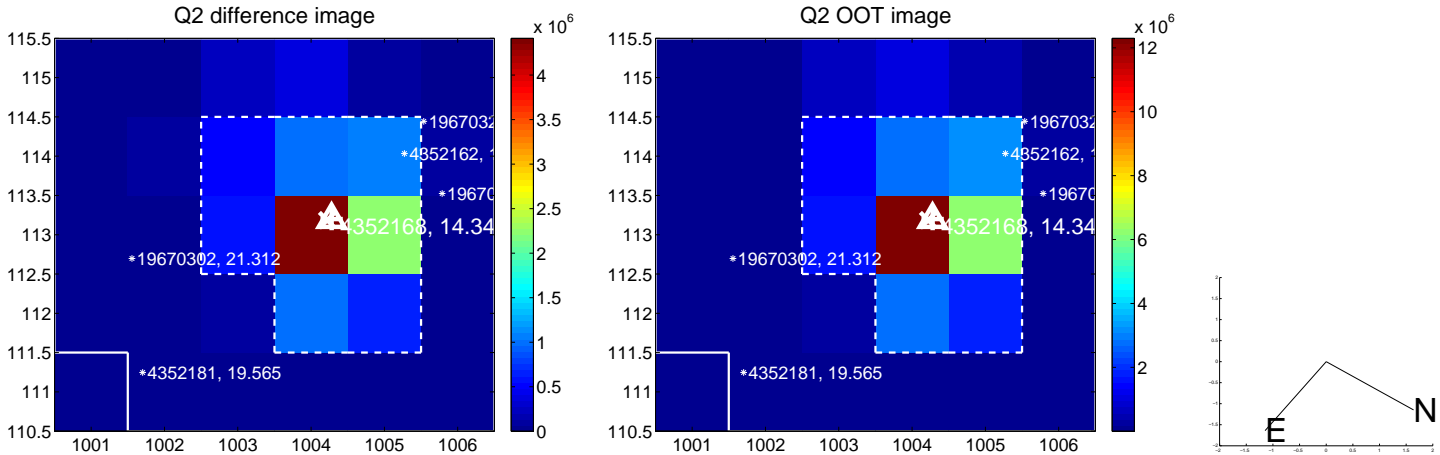
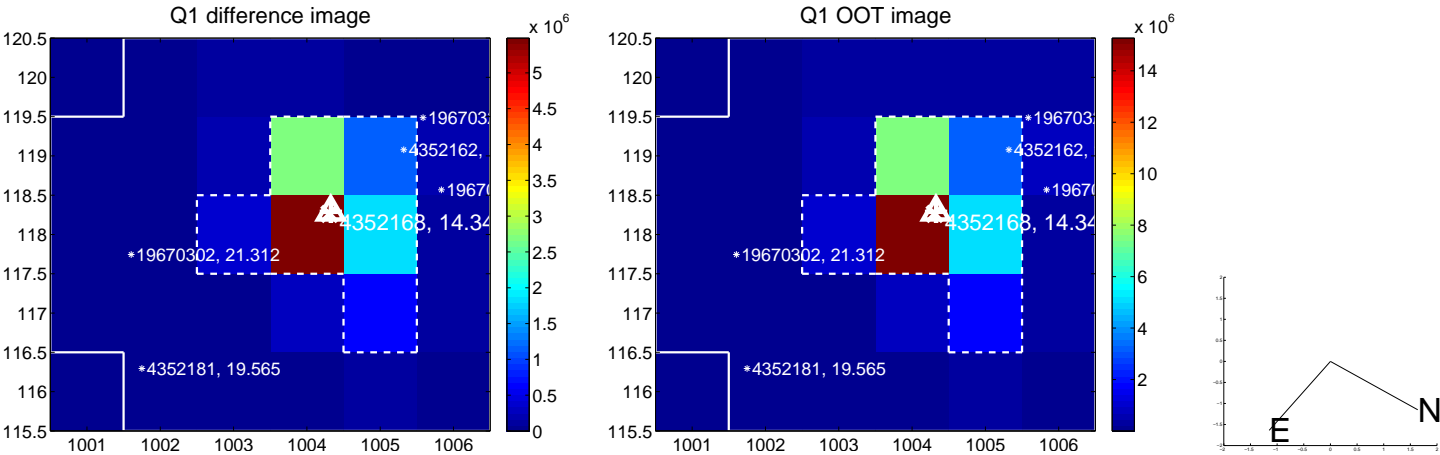
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.022 \pm 0.067$	0.33	$0.021 \pm 0.067$	$0.007 \pm 0.067$
PRF-fit source offset from KIC position	$0.103 \pm 0.072$	1.42	$-0.091 \pm 0.071$	$0.047 \pm 0.069$
photometric centroid source offset	$0.08 \pm 0.00$	191.06	$-0.08 \pm 0.00$	$0.01 \pm 0.00$

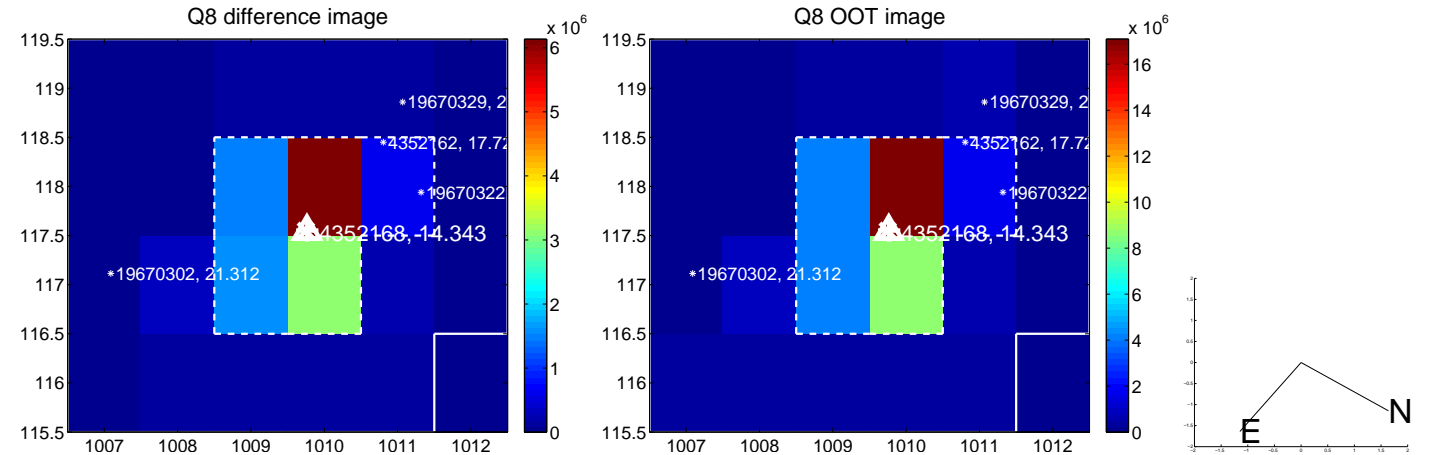
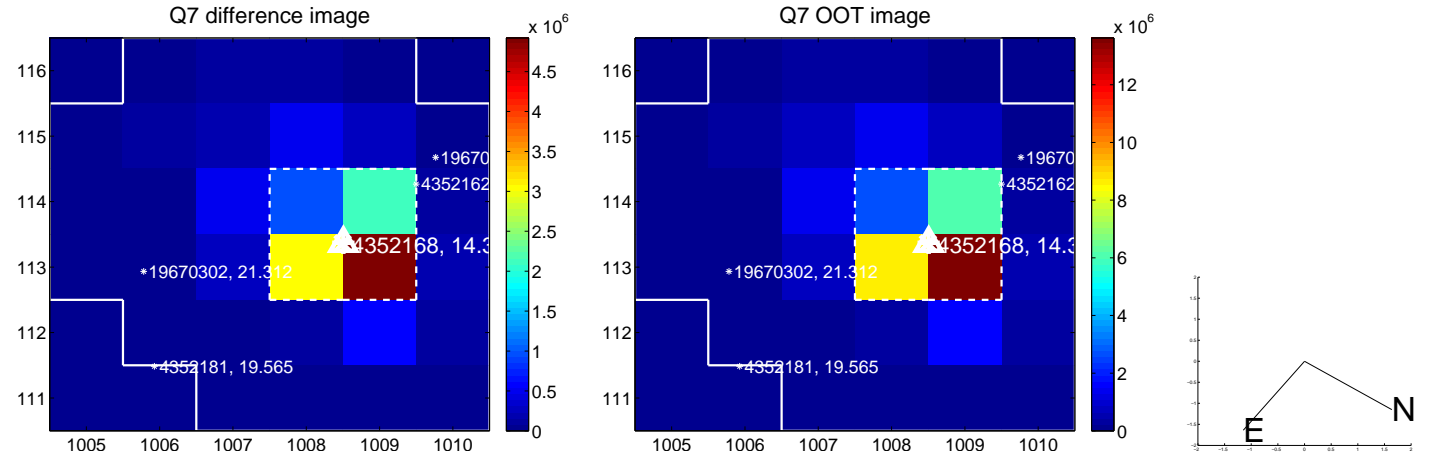
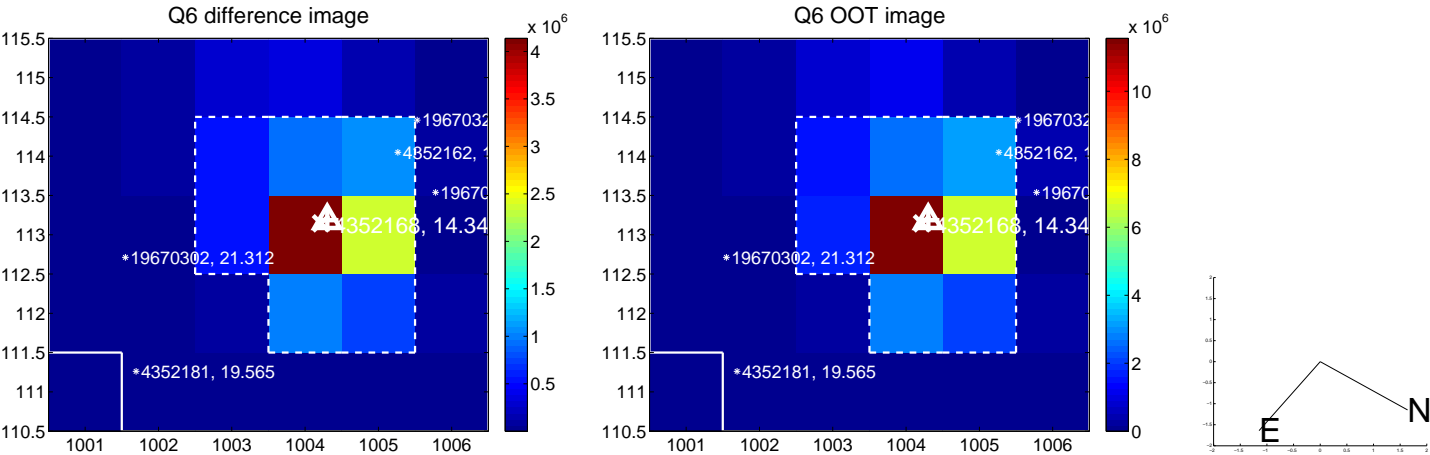
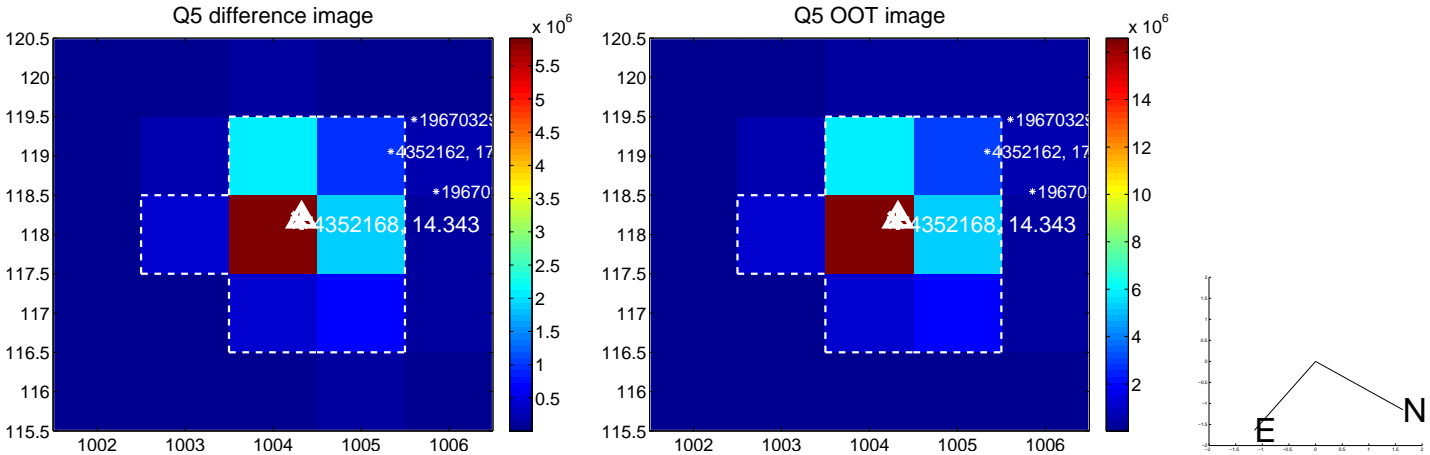


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

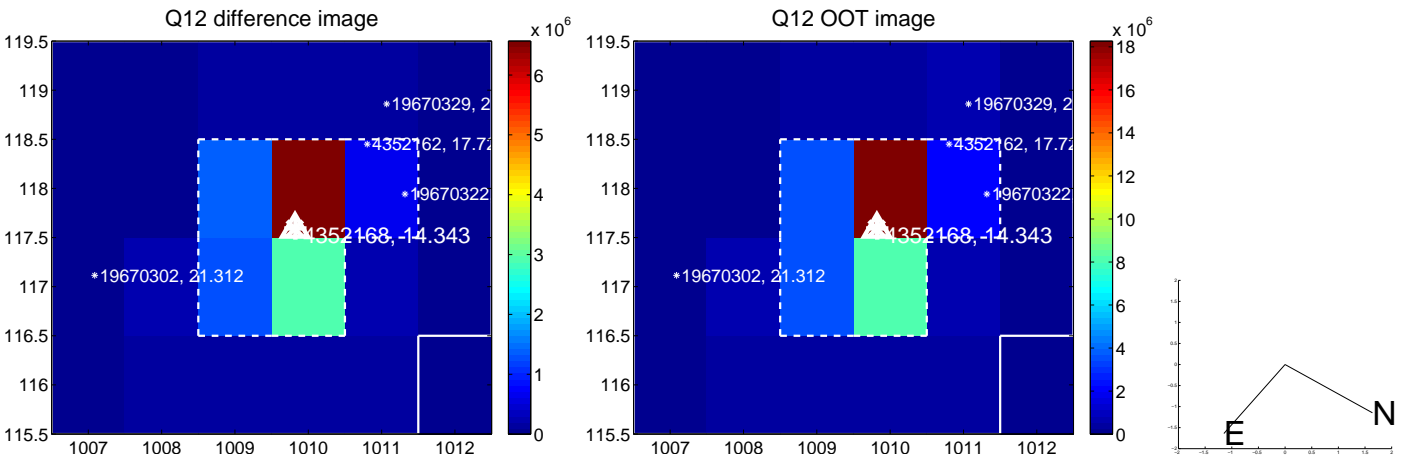
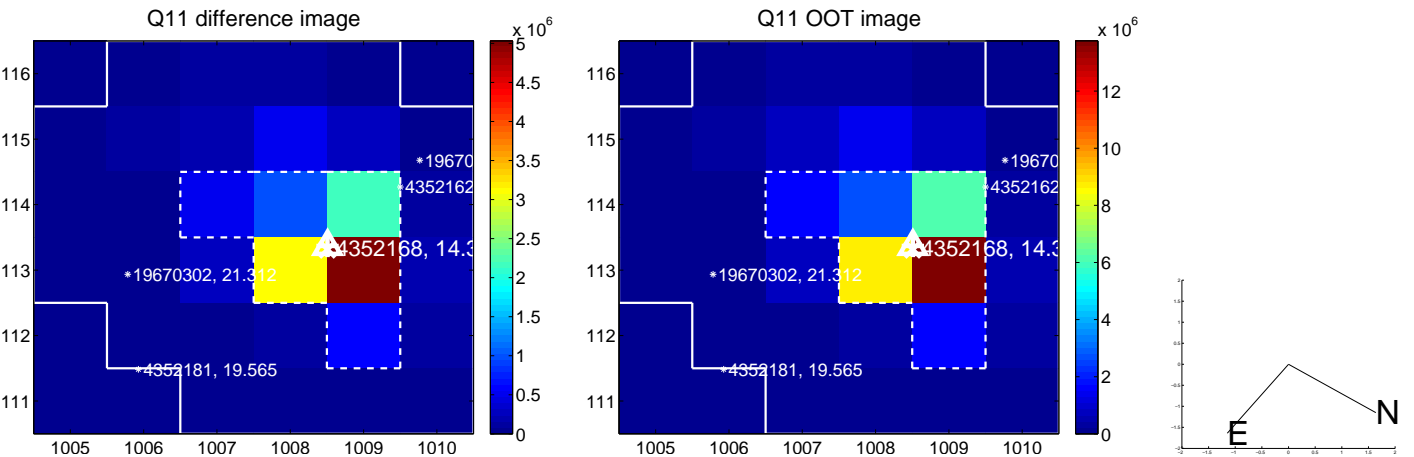
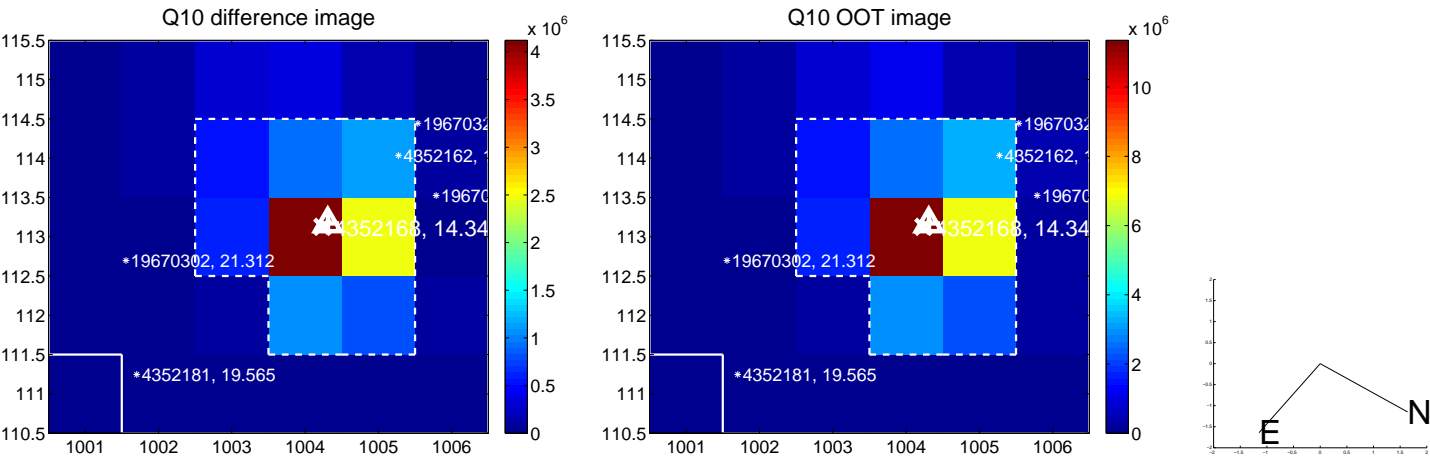
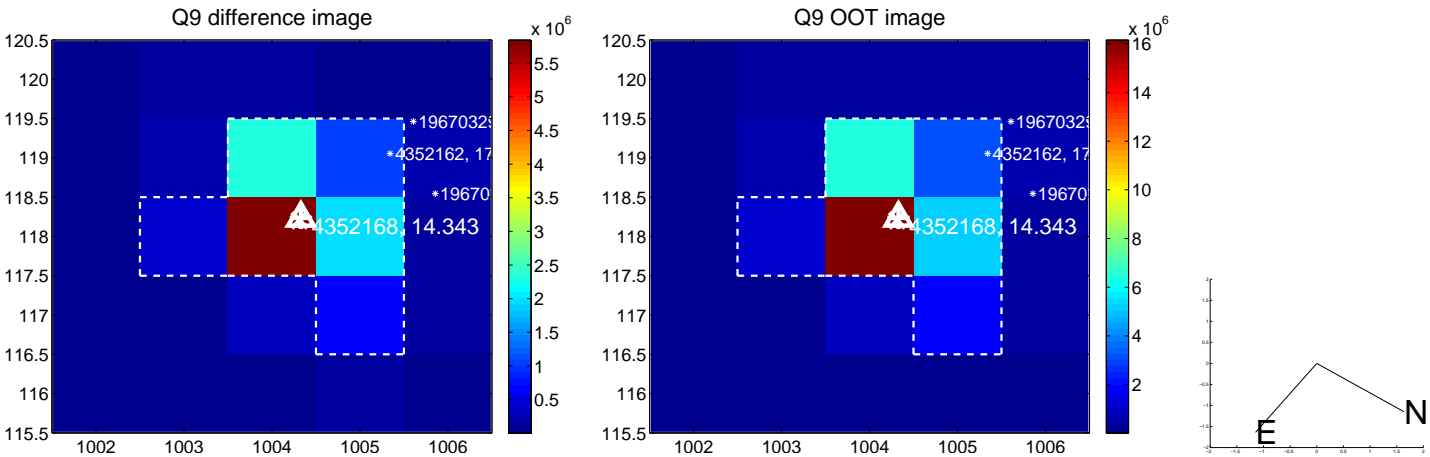


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

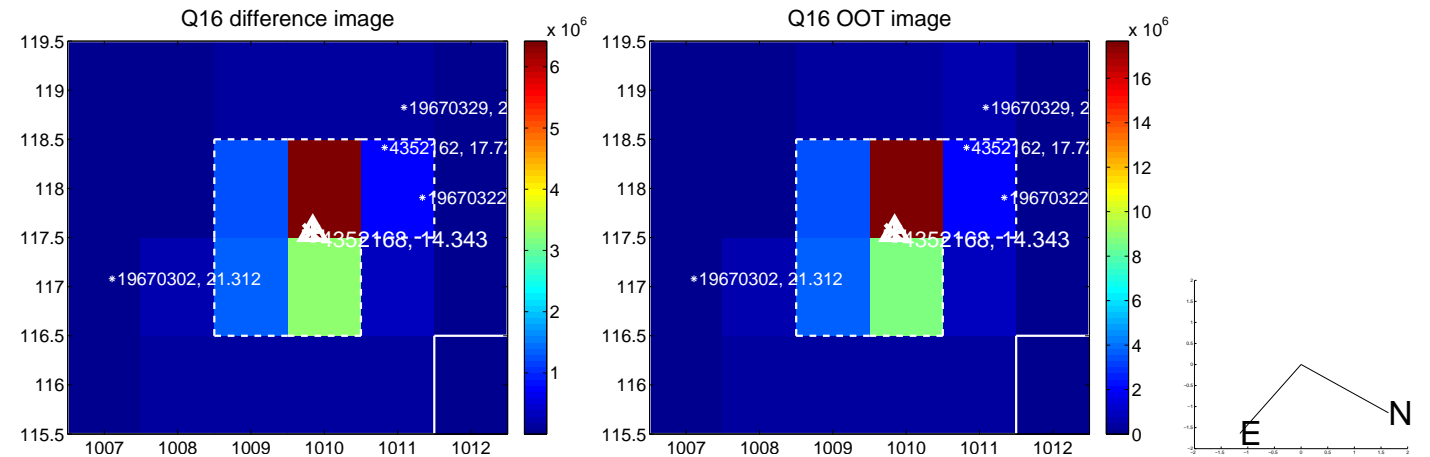
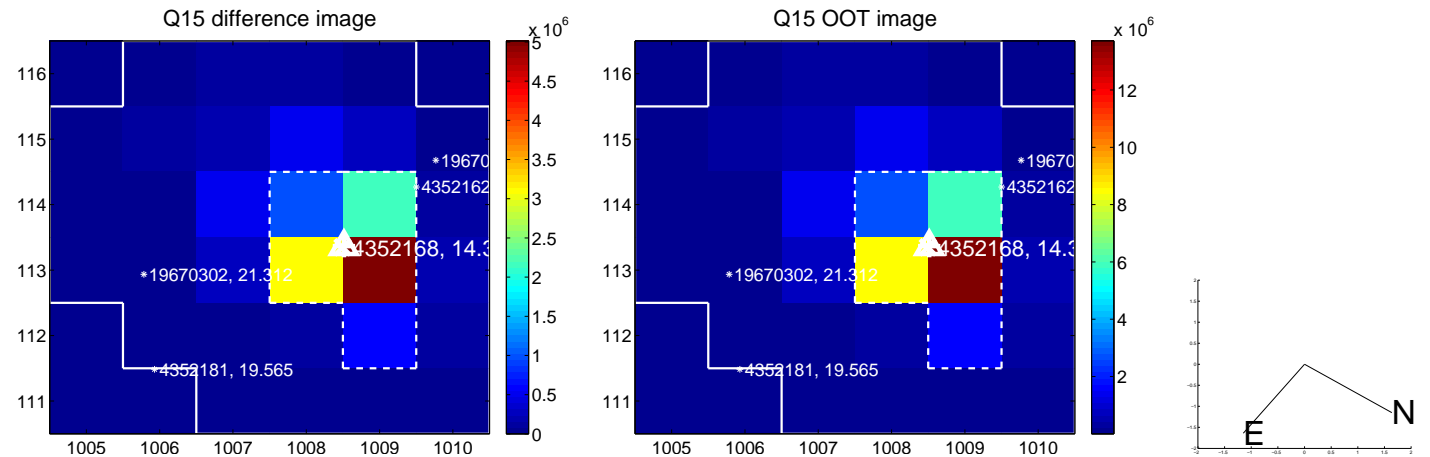
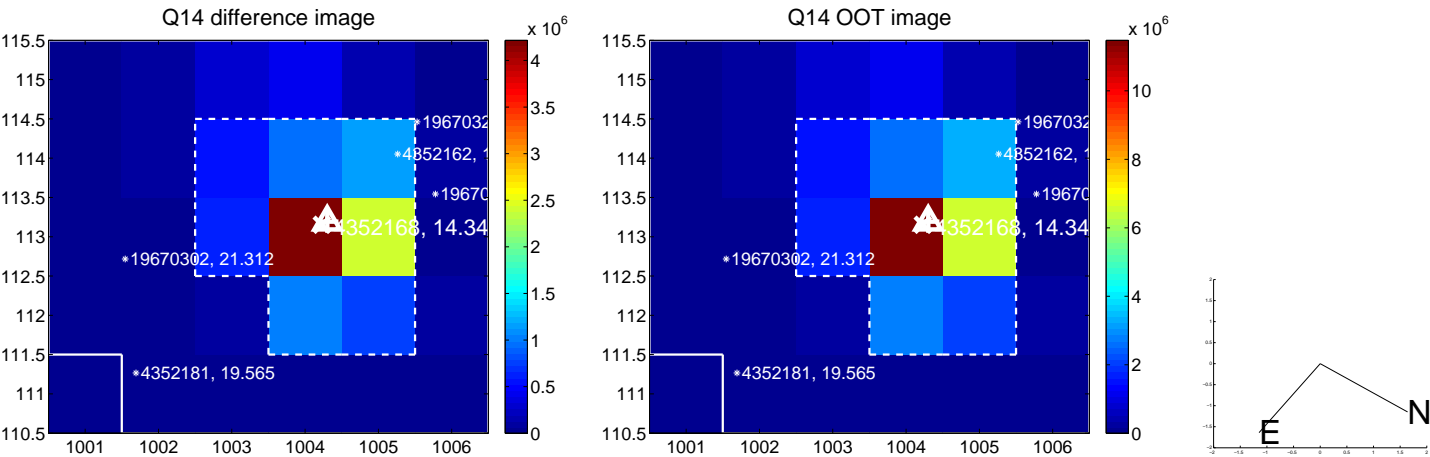
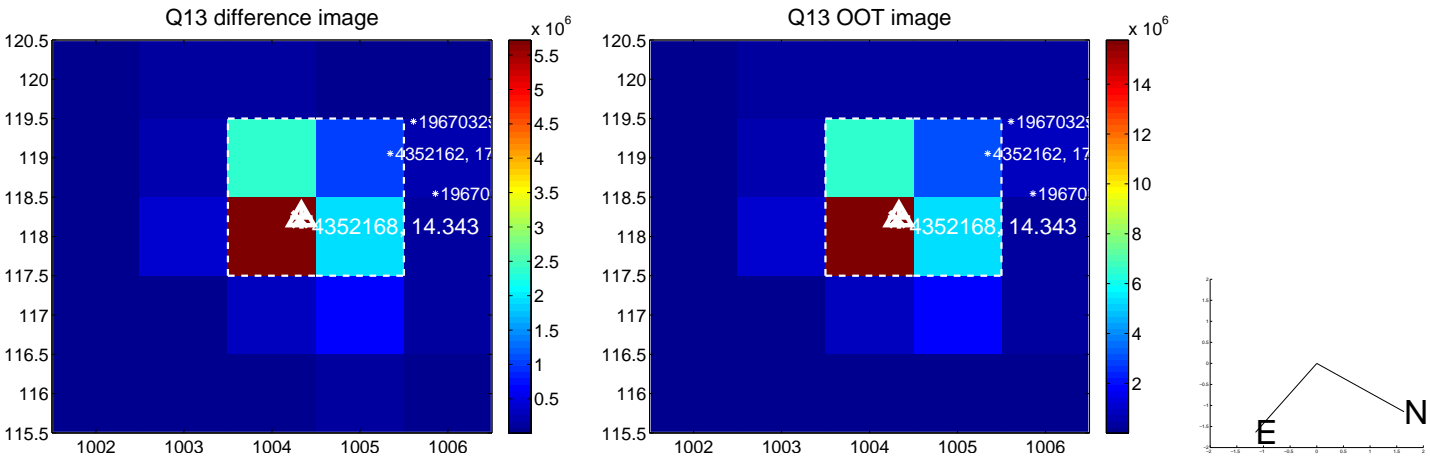




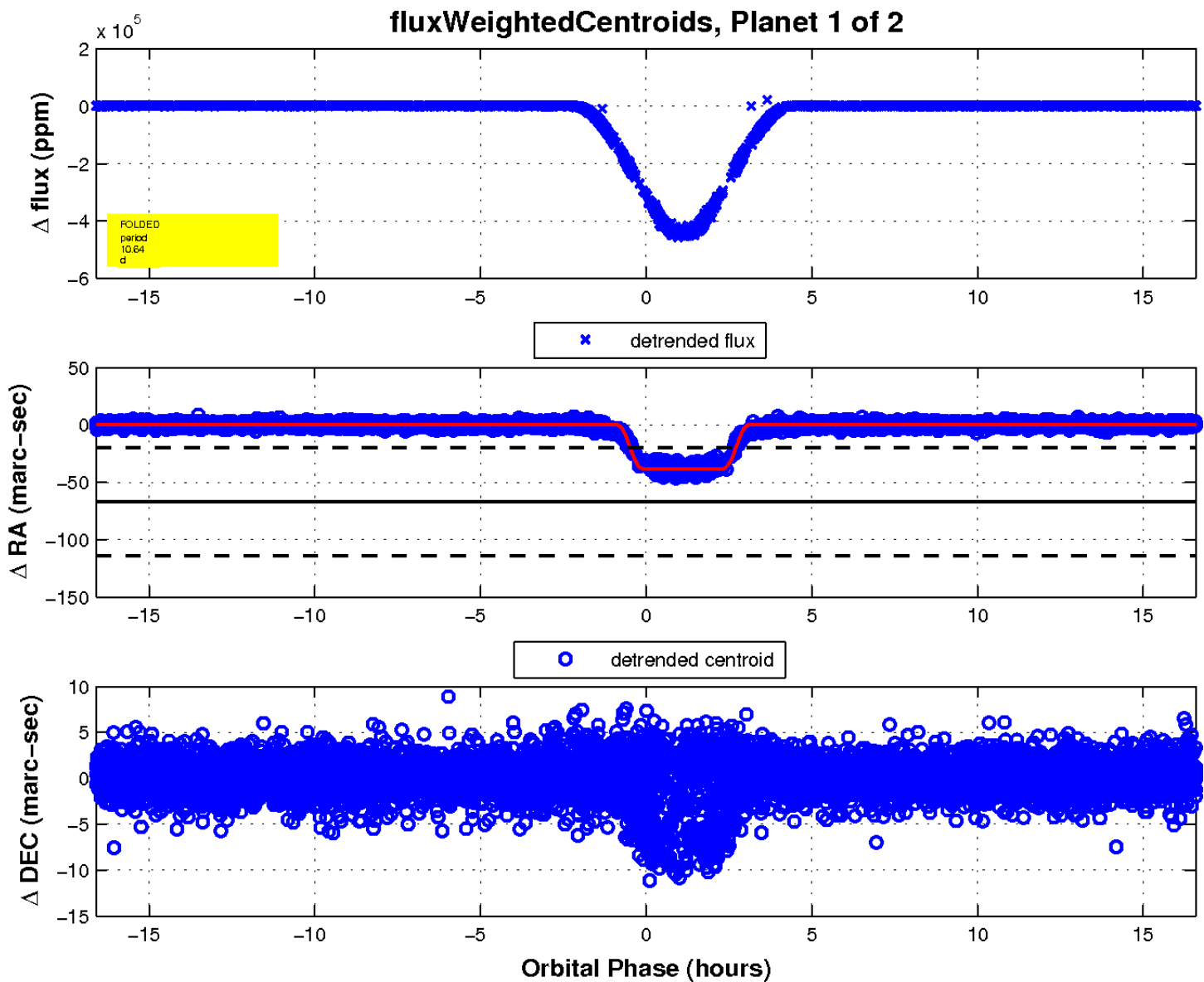
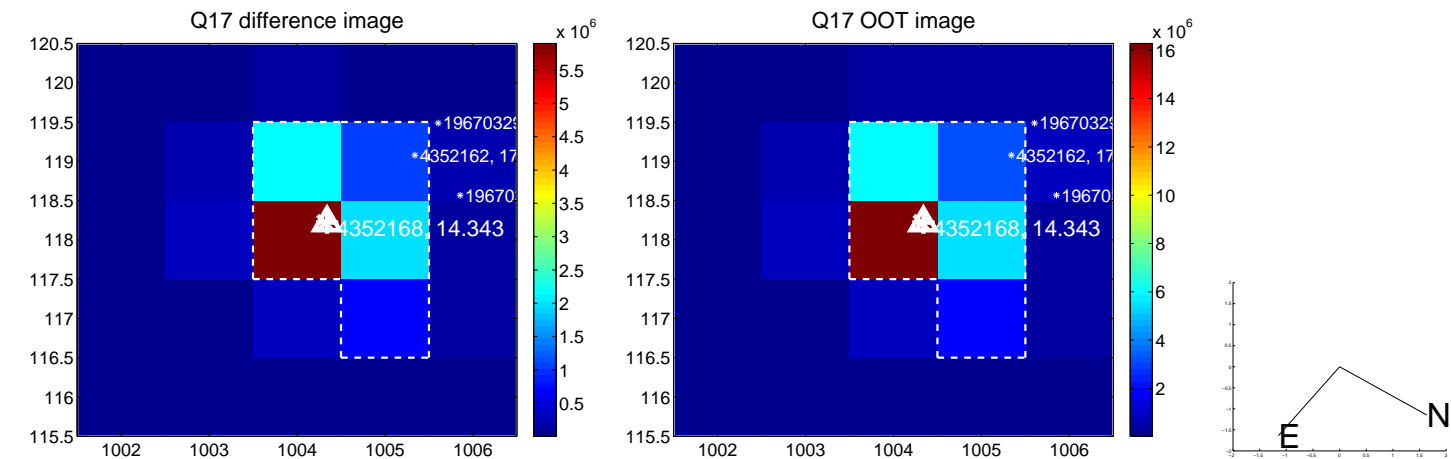
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

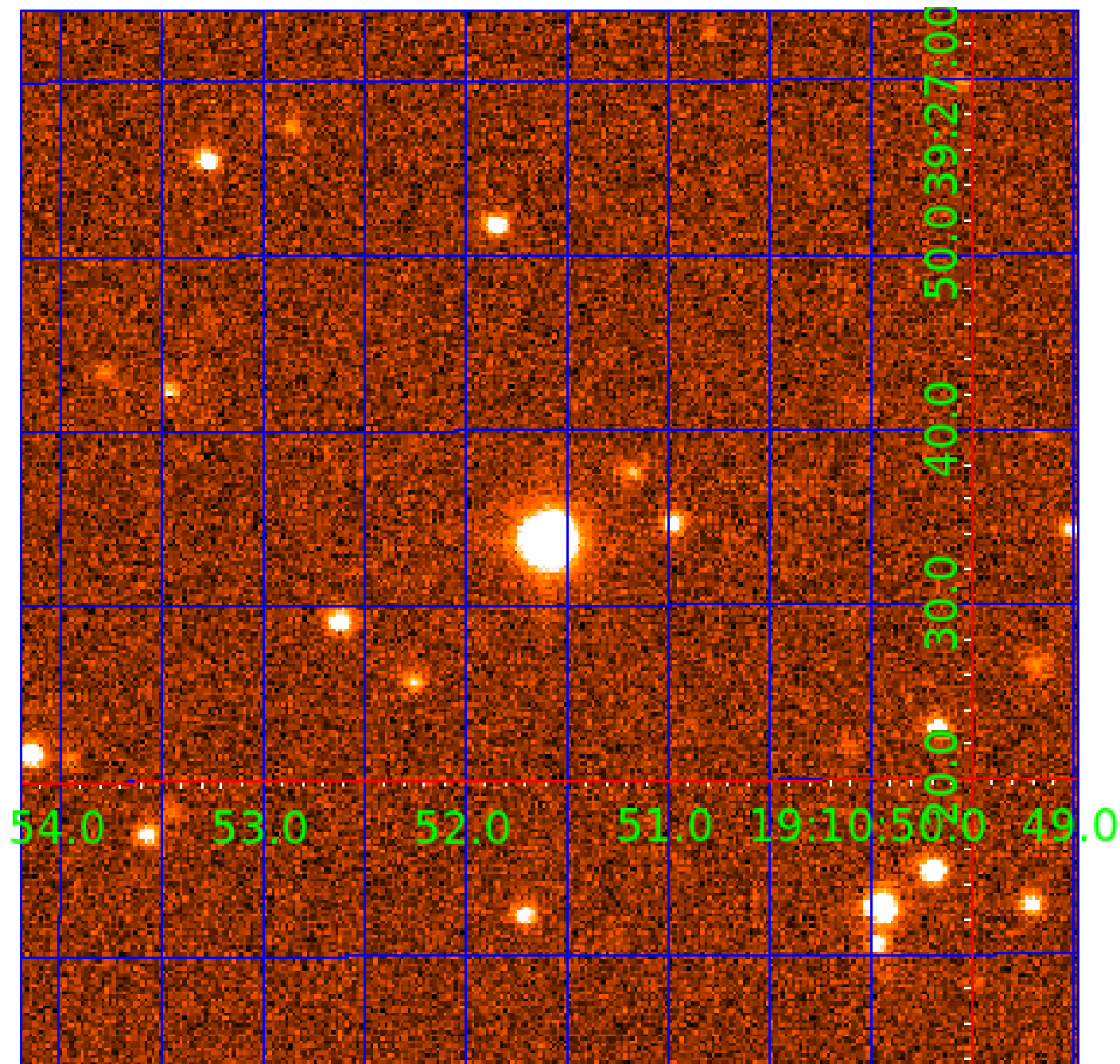


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination



# KIC 004352168

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004352168-01	OBS	6404.01	10.643712	134.943832	435672.4	3.500	23640.1	-1.0	0.69	5282	37.87	49.15
004352168-02	OBS	No	10.643748	139.209866	119892.5	4.607	6592.2	4209.6	0.69	5282	30.25	49.15

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004352168-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_ALT—MOD_ODDEVEN_ALT—HAS_SEC_TCE—CENT_NOFITS
004352168-02	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 004352168-02

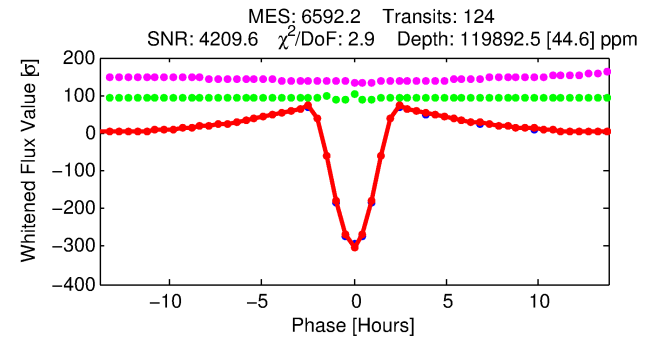
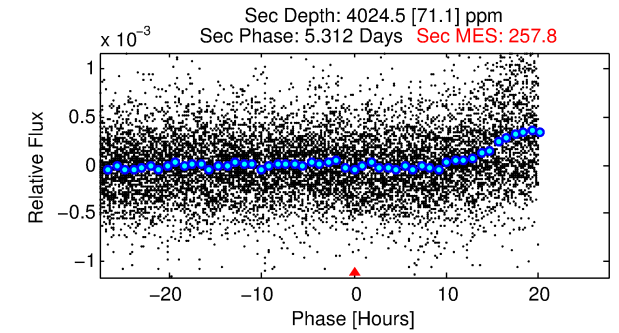
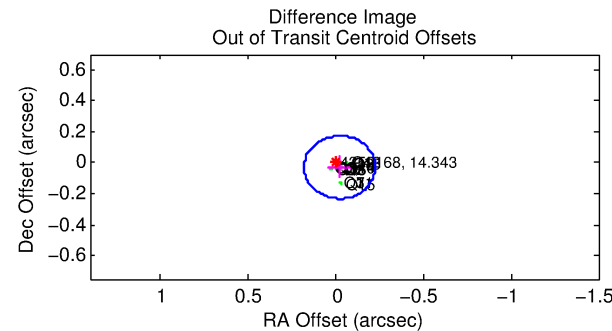
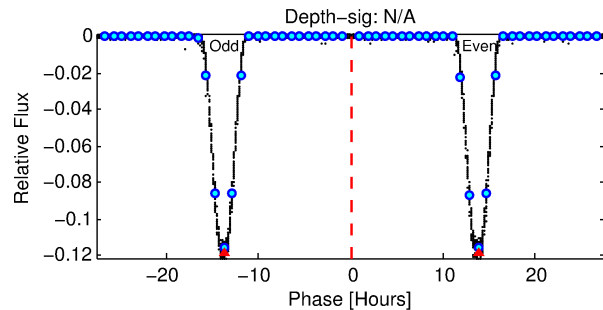
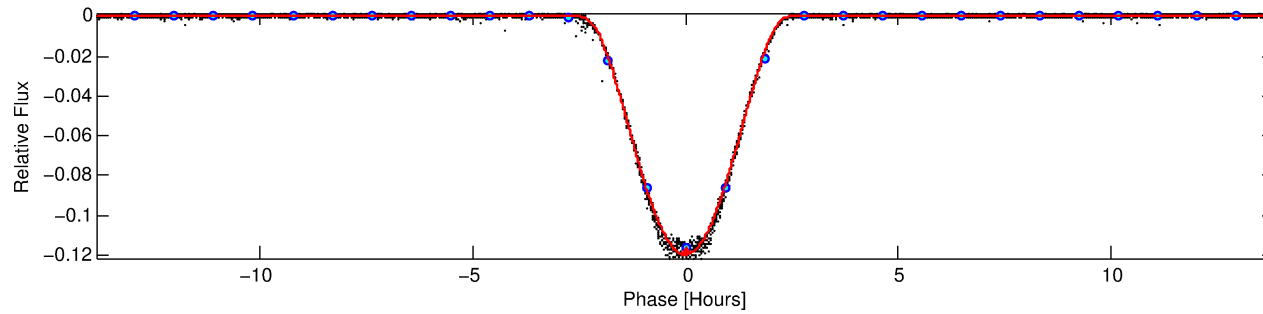
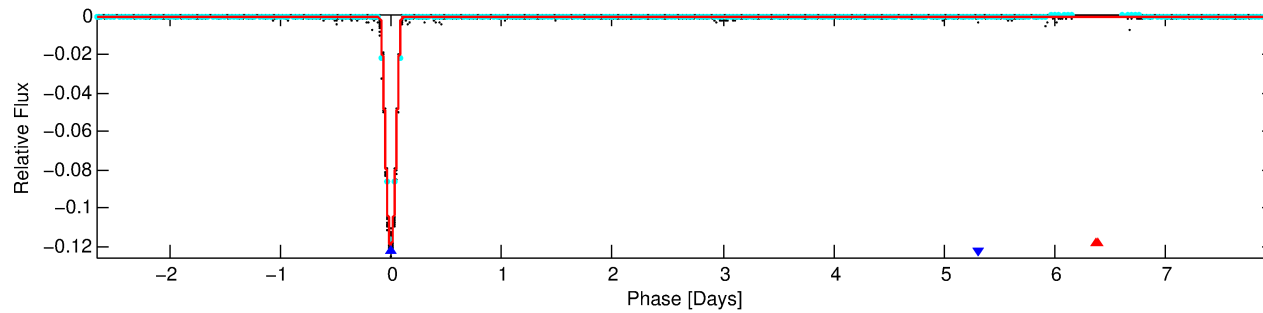
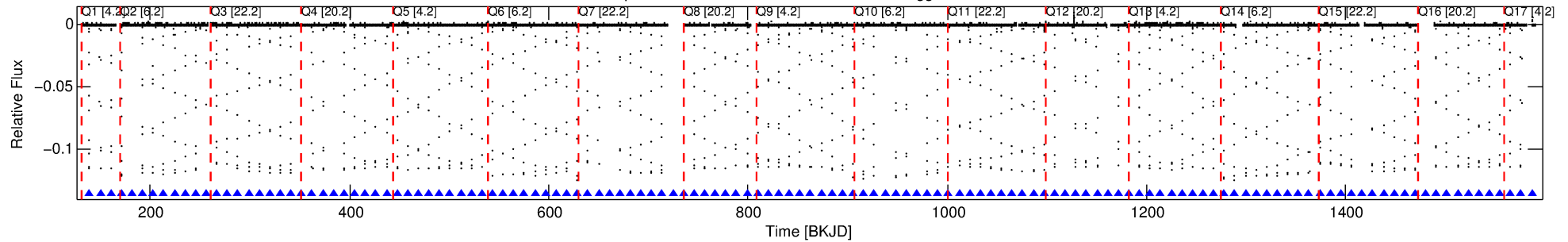
No Significant Match Found

# DV One-Page Summary

KIC: 4352168 Candidate: 2 of 2 Period: 10.644 d

KOI: K06404 Corr: No Ephemeris Match

Kp: 14.34 R\*: 0.69 Rs Teff: 5282.0 K Logg: 4.58 Fe/H: -0.700



## DV Fit Results:

Period = 10.64375 [0.00000] d  
Epoch = 139.2099 [0.0000] BKJD  
Rp/R\* = 0.3994 [0.0032]  
a/R\* = 20.39 [0.01]  
b = 0.79 [0.01]  
Seff = 49.15 [9.31]  
Teff = 675 [32] K  
Rp = 30.25 [3.15] Re  
a = 0.0827 [0.0078] AU  
Ag = 16.54 [2.45] [6.34σ]  
Teffp = 2105 [65] K [19.84σ]

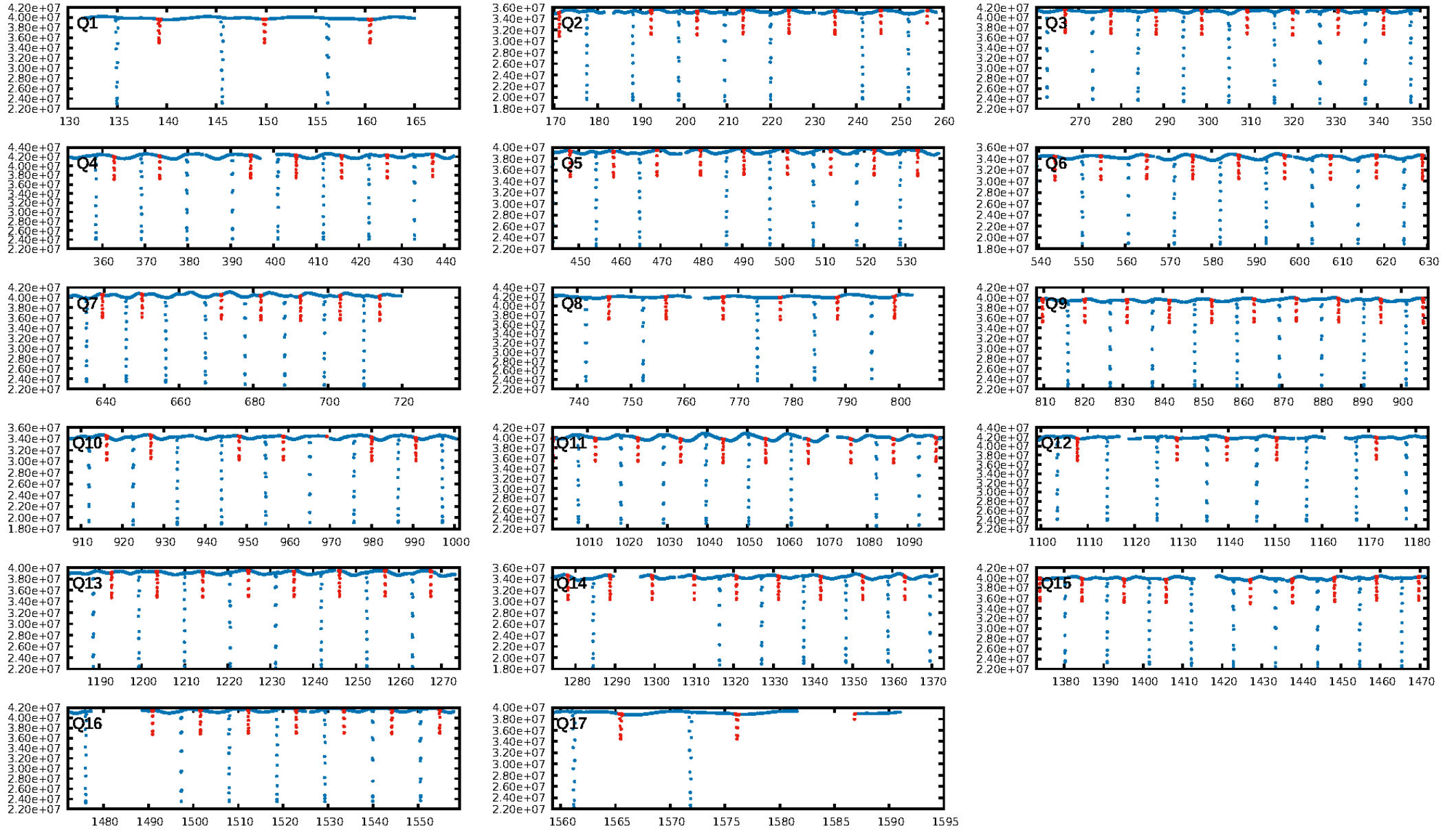
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [118/118]  
GhostDiagnostic-chr: 2.324  
Centroid-sig: N/A  
Centroid-so: 0.175 arcsec [111.45σ]  
OotOffset-rm: 0.037 arcsec [0.55σ]  
KicOffset-rm: 0.135 arcsec [1.91σ]  
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]

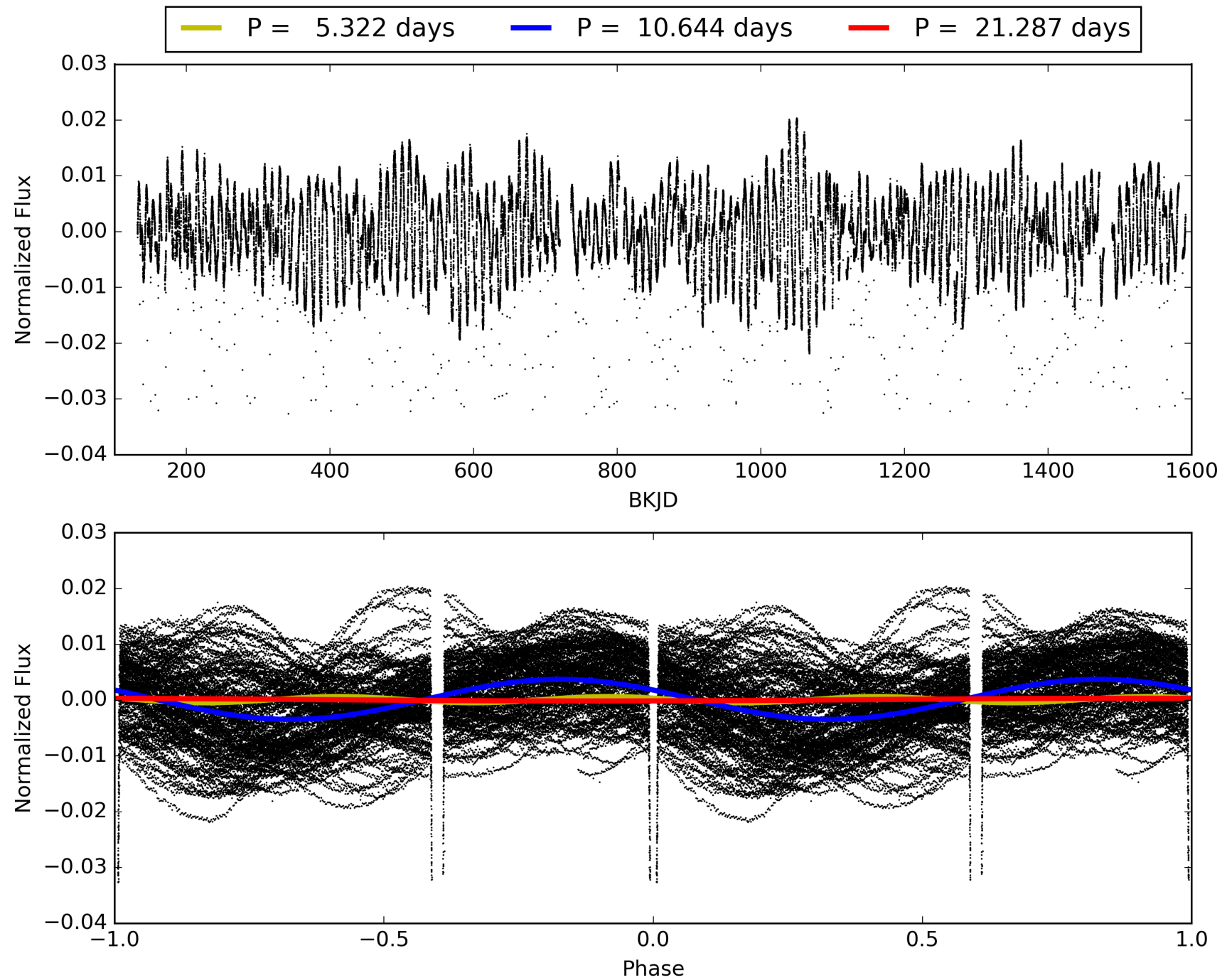
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:12:31 Z

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

# TCE 004352168-02, PDC Light Curves



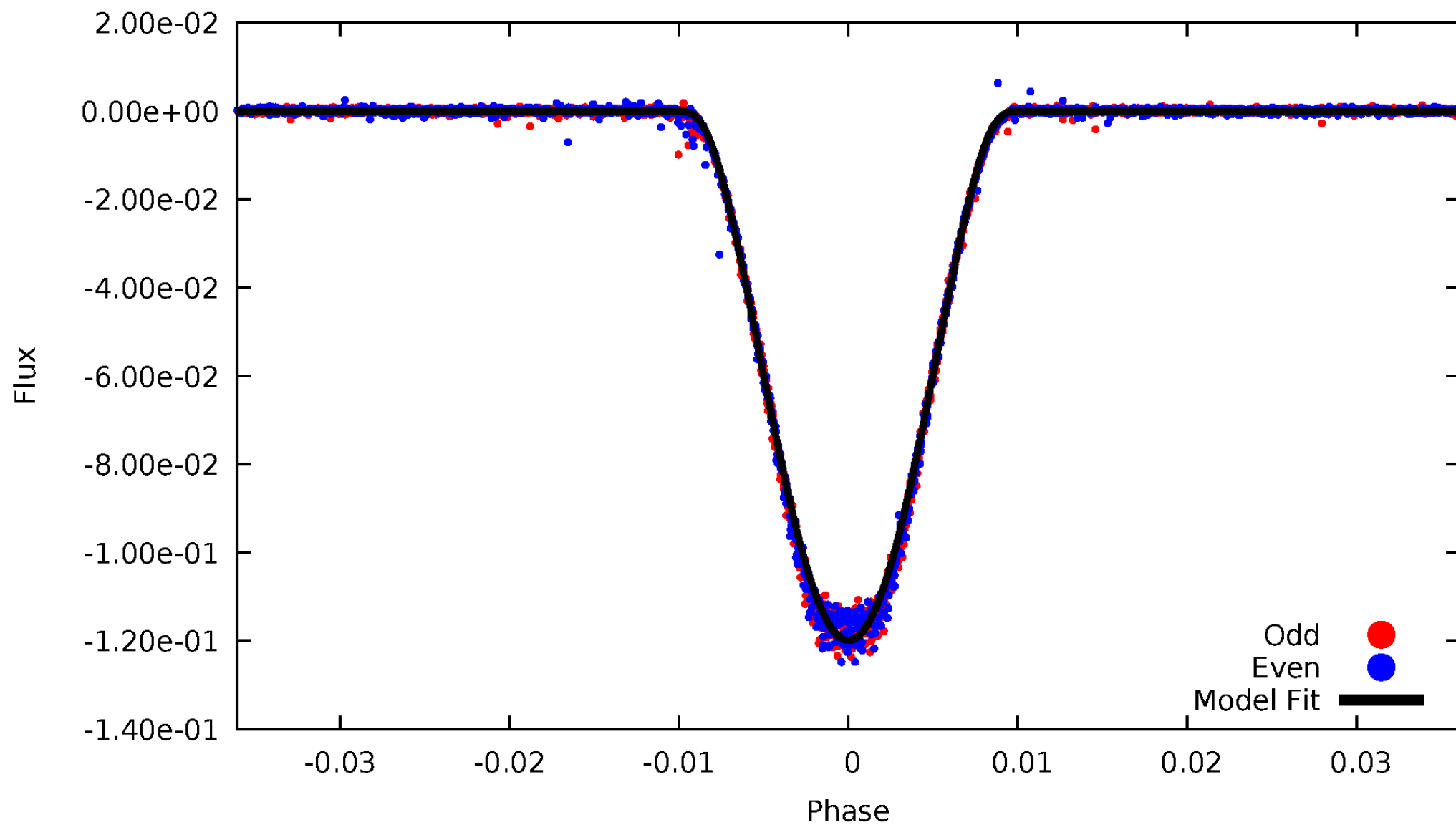
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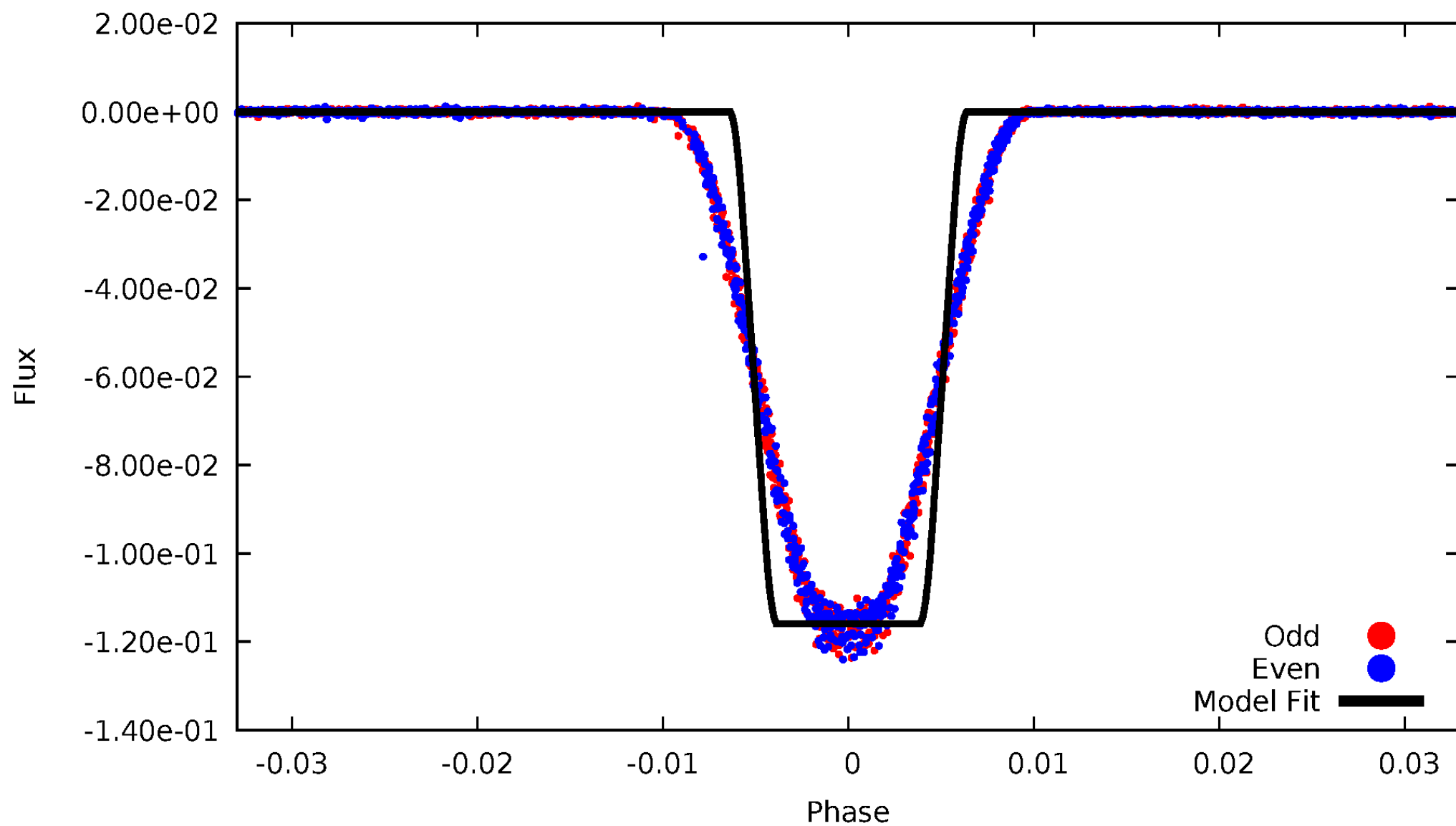
# DV Odd/Even

TCE 004352168-02



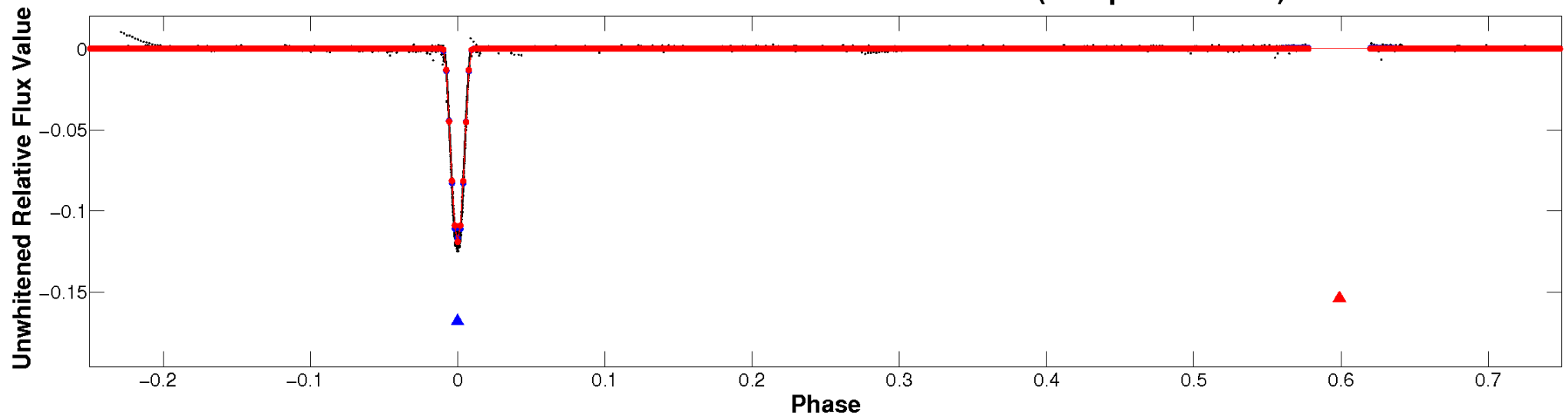
# ALT Odd/Even

TCE 004352168-02

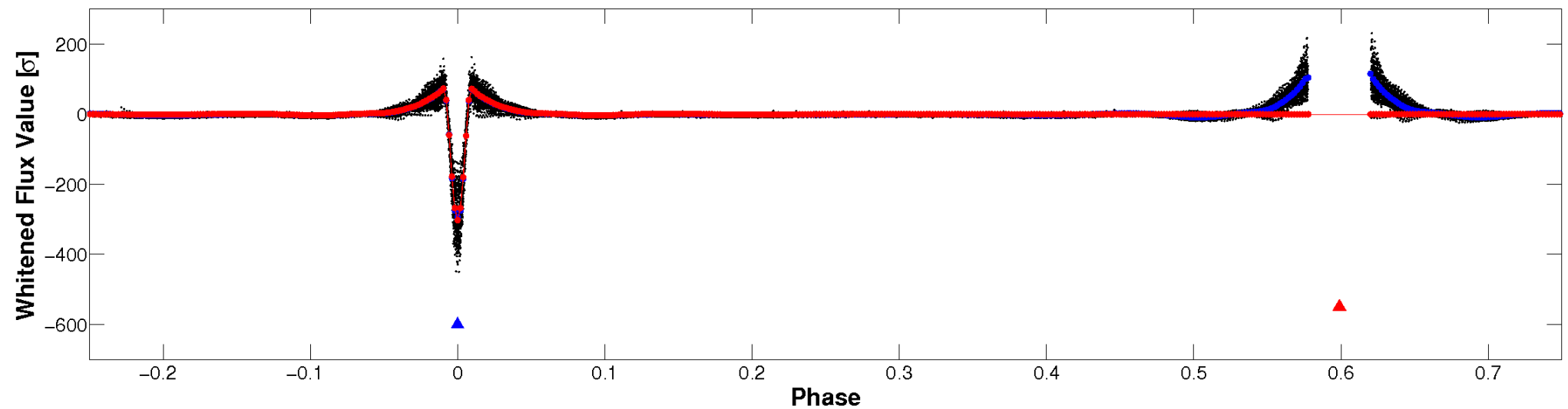


# Non-Whitened Vs. Whitened Light Curve

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

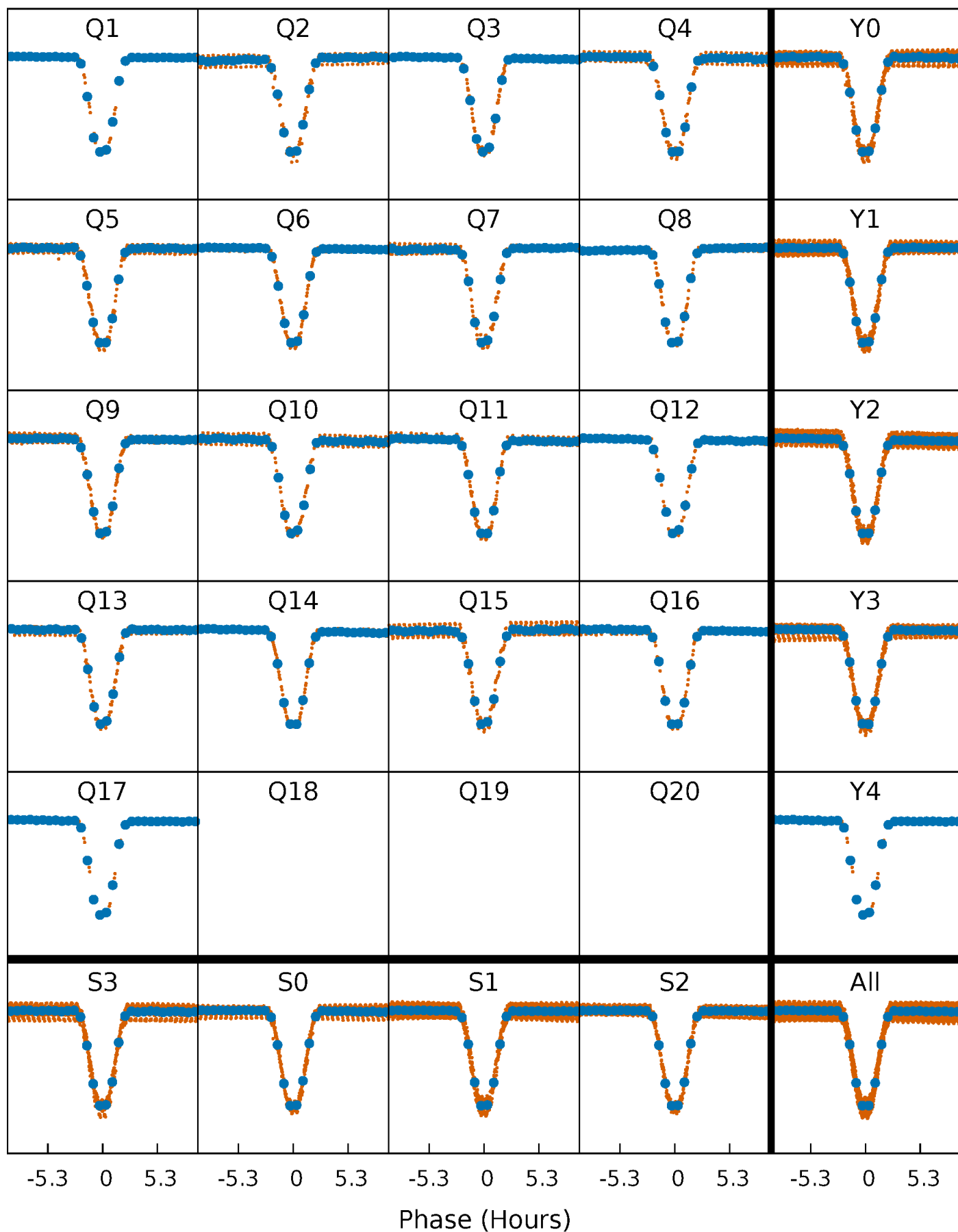


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



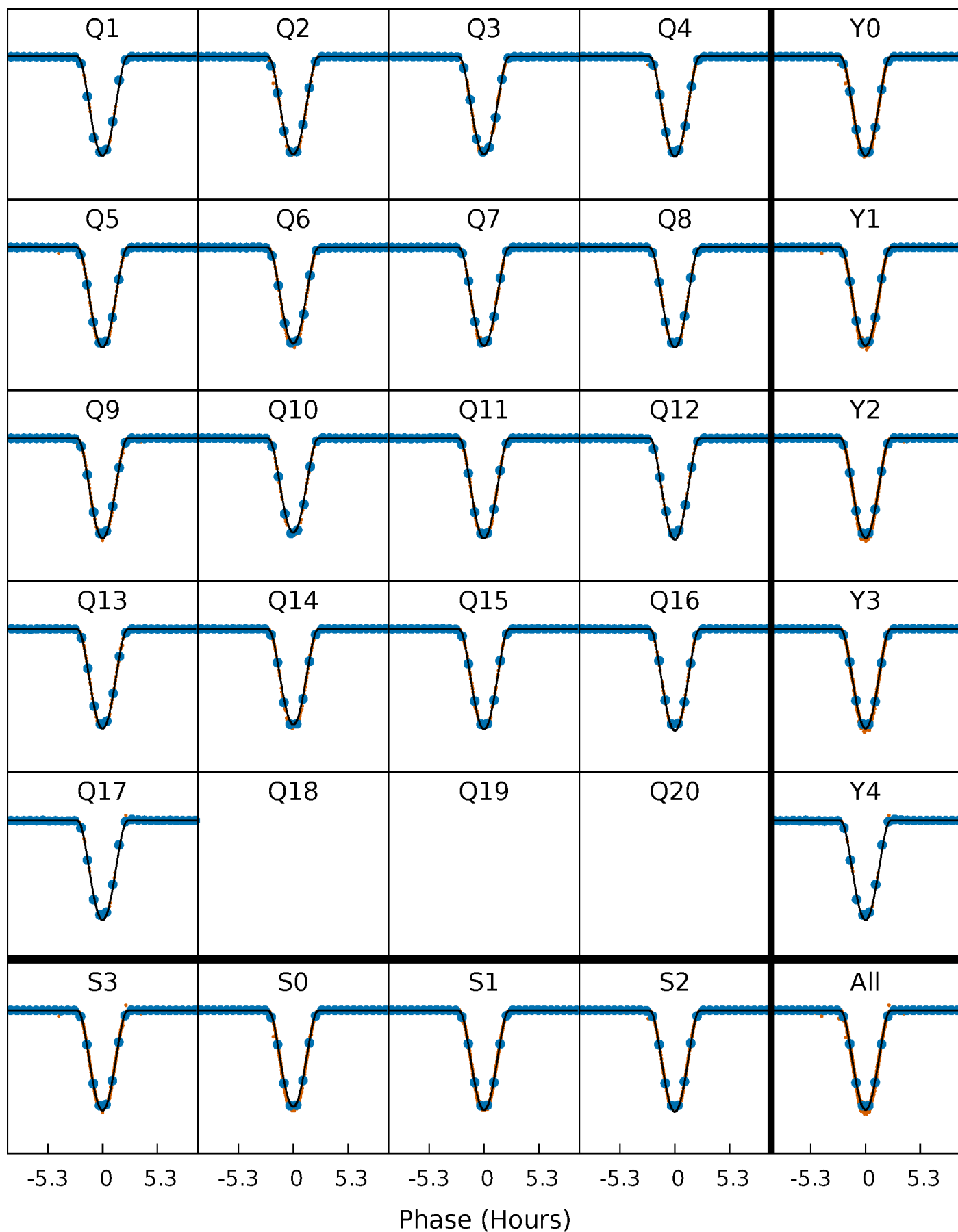
# PDC Quarter-Phased Transit Curves

TCE 004352168-02   P= 10.643748 Days    $T_0=139.209866$  (BKJD)



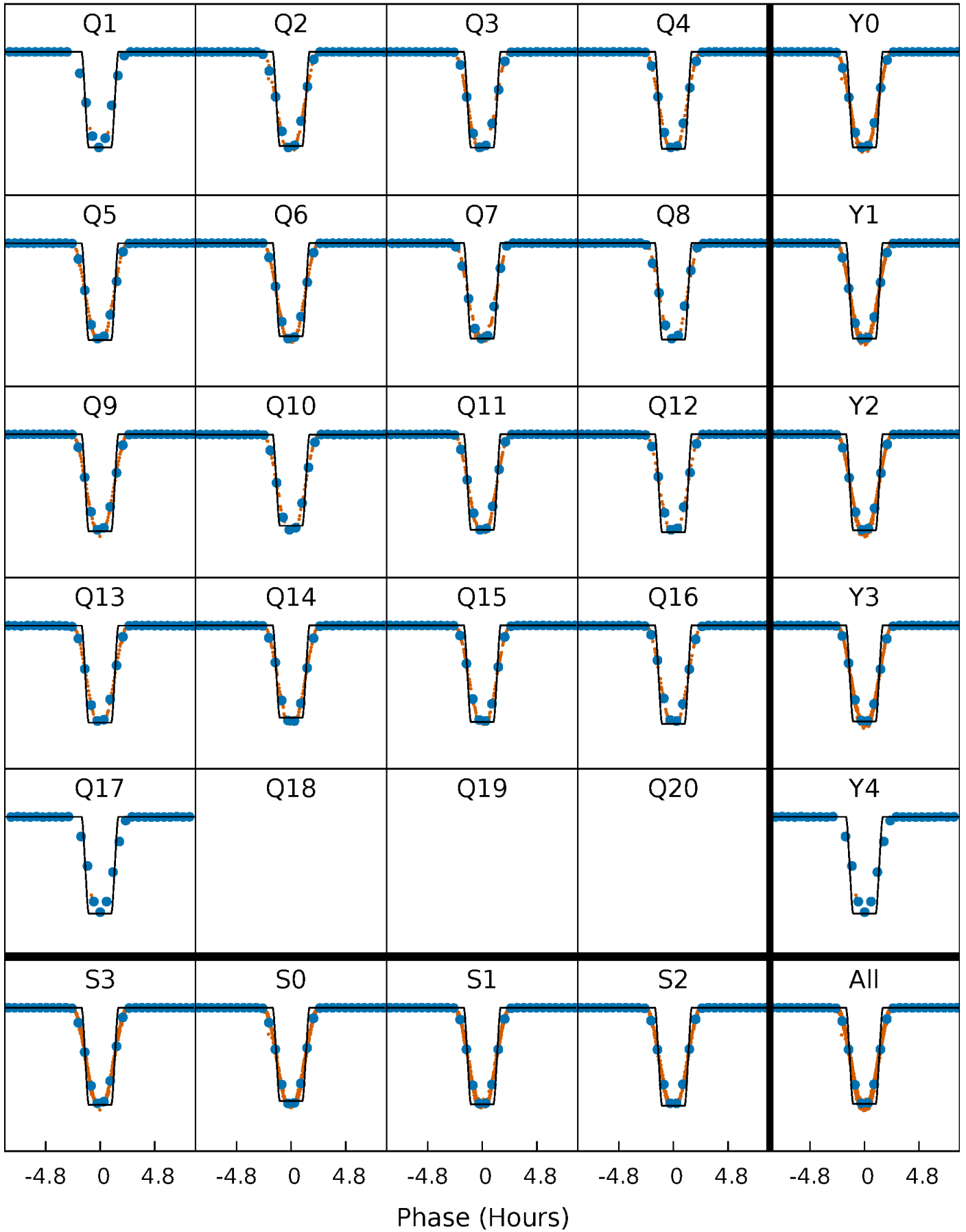
# DV Quarter-Phased Transit Curves

TCE 004352168-02 P= 10.643748 Days  $T_0=139.209866$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

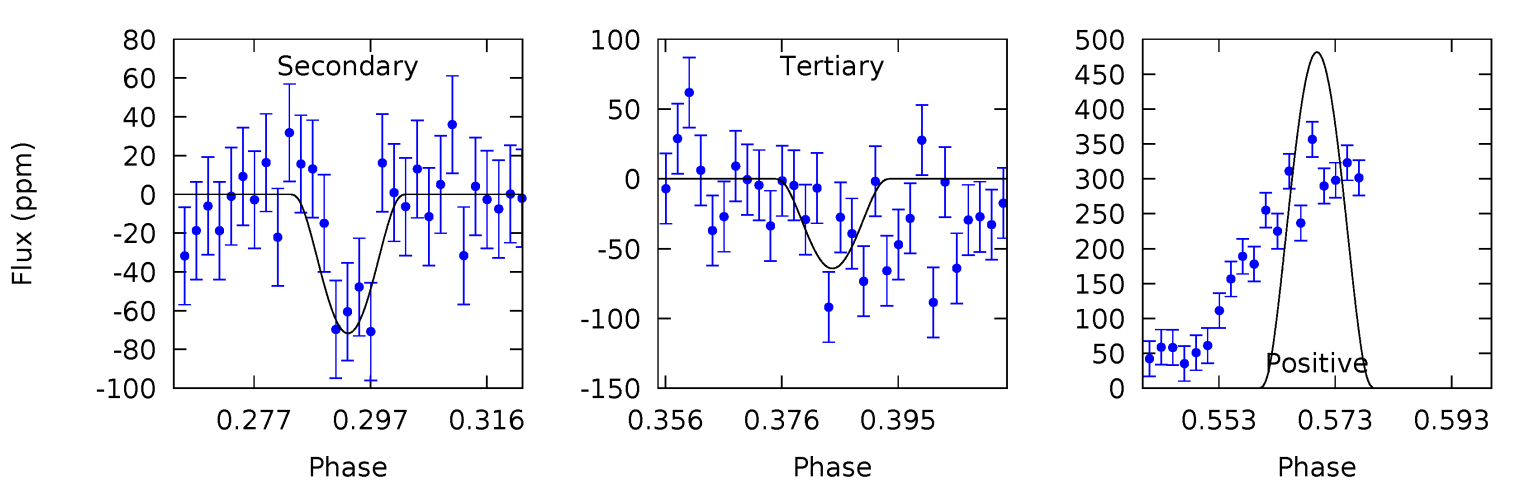
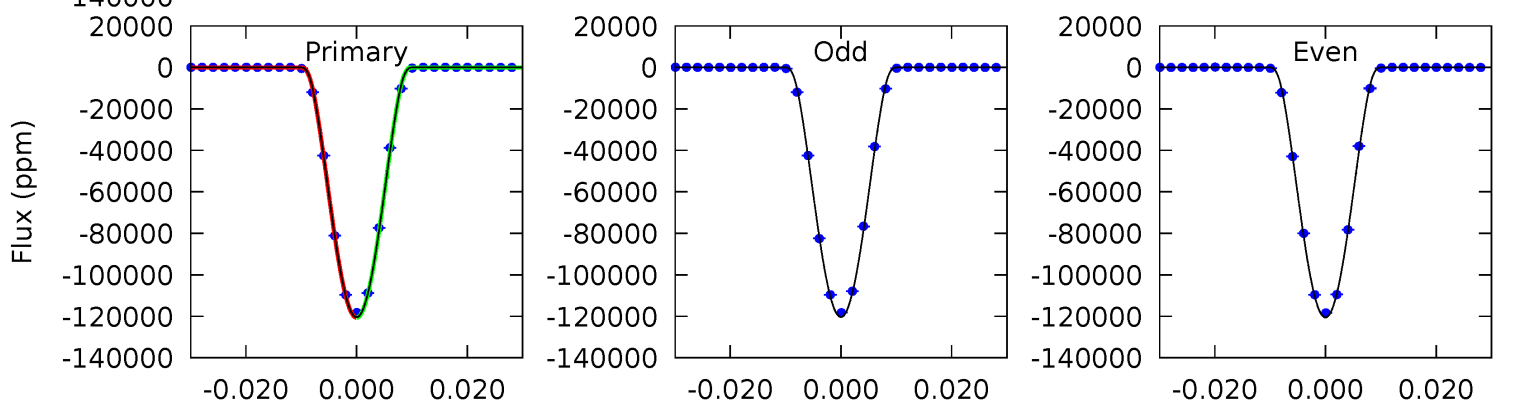
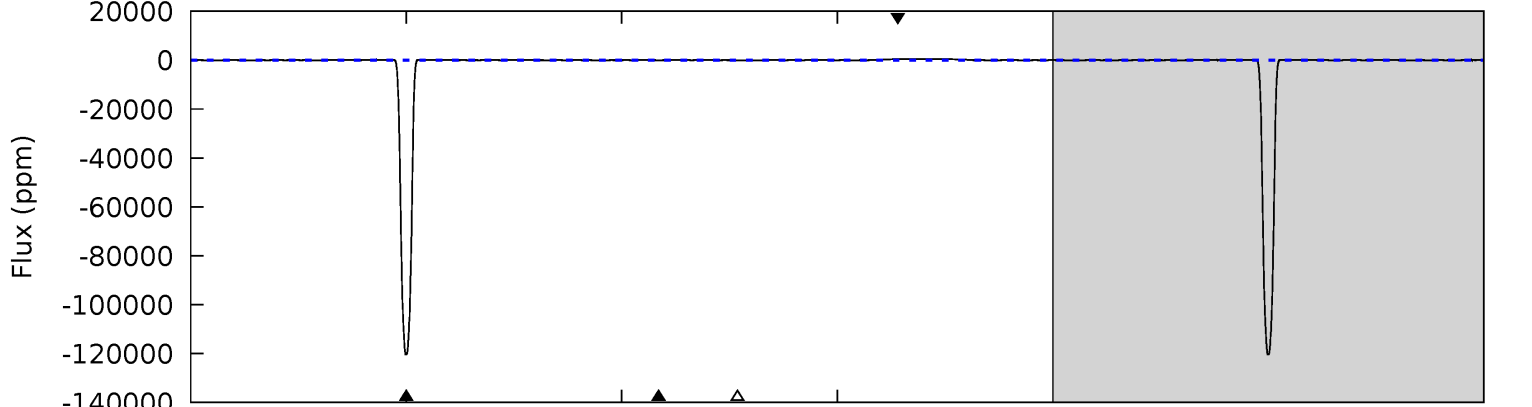
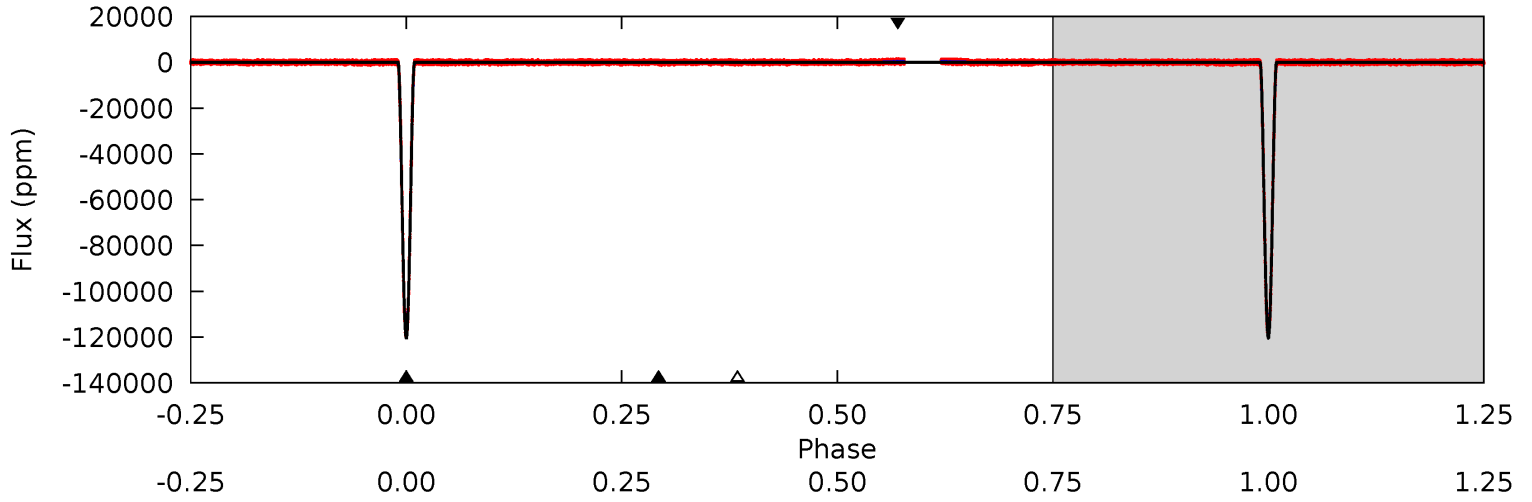
TCE 004352168-02 P= 10.643710 Days  $T_0=139.212536$  (BKJD)



# DV Model-Shift Uniqueness Test

004352168-02, P = 10.643748 Days, E = 128.566118 Days

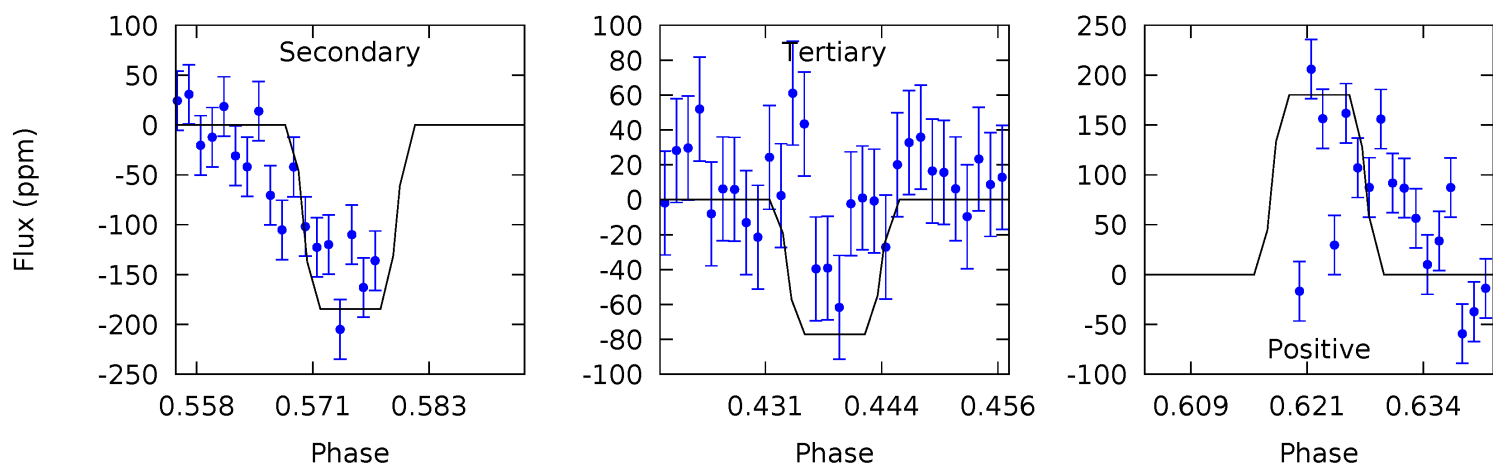
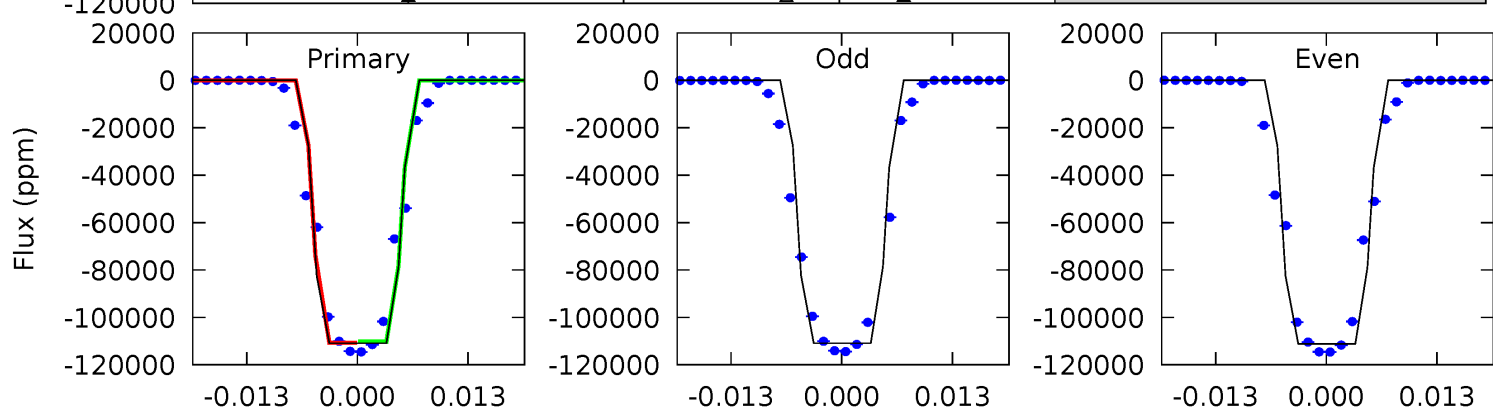
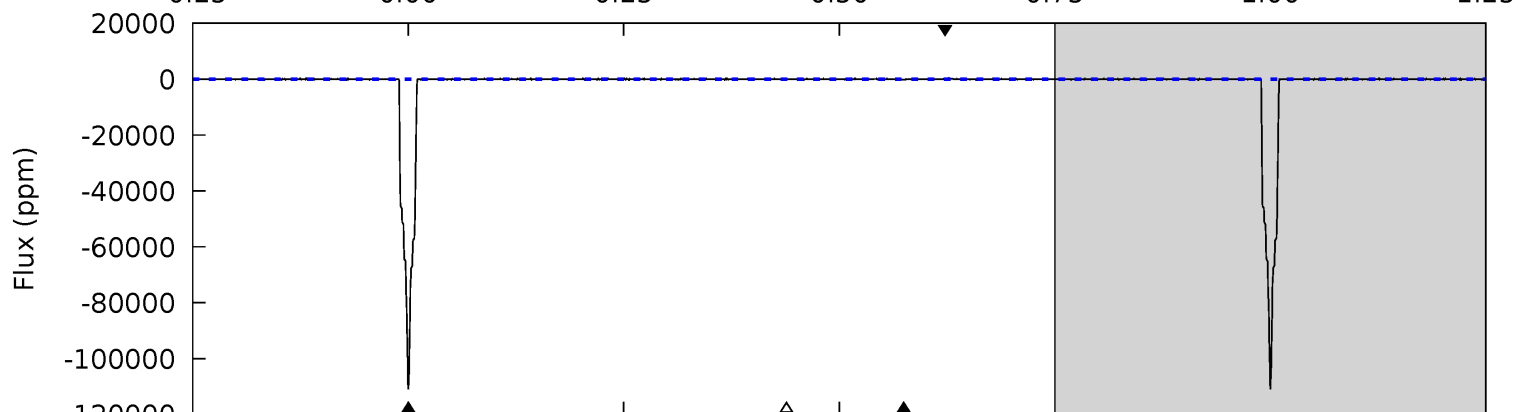
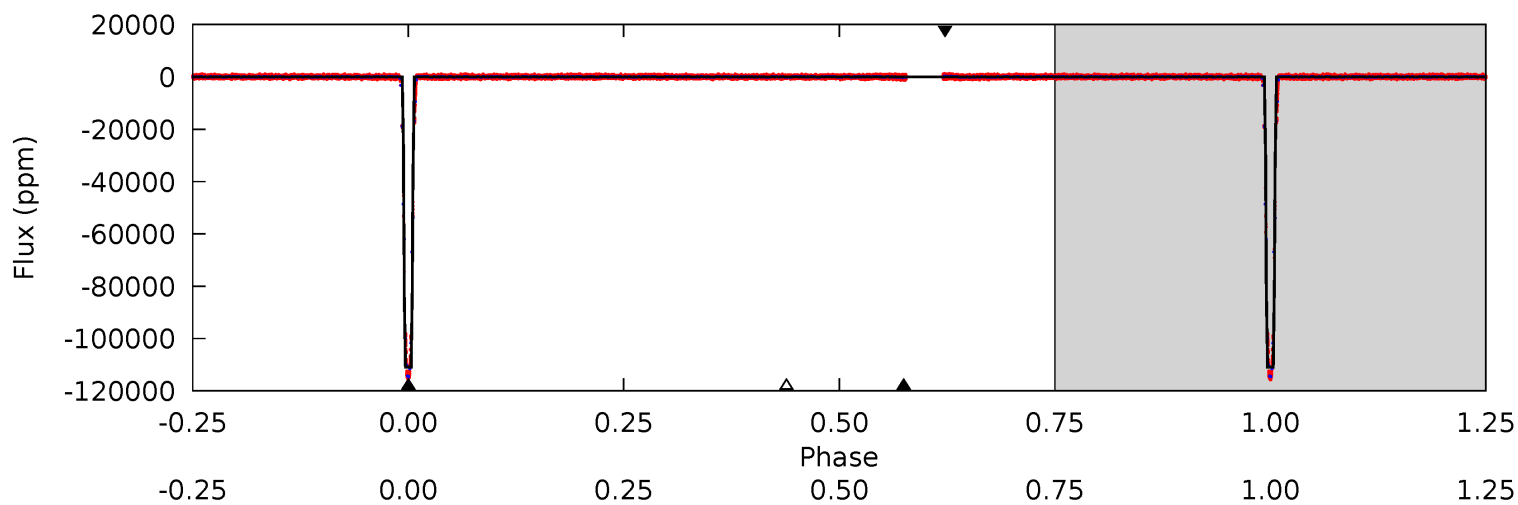
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10202	6.07	5.44	40.8	4.89	2.33	8.06	10197	10161	0.63	-34.7	9.24	1.01	0.00	0



# Alt Model-Shift Uniqueness Test

004352168-02, P = 10.643710 Days, E = 128.568826 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
5038	8.39	3.51	8.19	4.98	2.49	1.23	5034	5030	4.89	0.21	7.48	1.00	0.00	0





### Stellar Parameters For KIC 004352168

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5282^{+159}_{-159}$	$4.578^{+0.084}_{-0.052}$	$-0.700^{+0.300}_{-0.300}$	$0.694^{+0.072}_{-0.072}$	$0.665^{+0.077}_{-0.033}$	$2.798^{+0.908}_{-0.576}$
	+3%/-3%	+2%/-1%	+43%/-43%	+10%/-10%	+12%/-5%	+32%/-21%
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 004352168-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-72 \pm 12$	$30.13^{+1.85}_{-1.75}$	$936^{+38}_{-35}$	$-1097^{+2658}_{-458}$	$0.300^{+0.064}_{-0.056}$
Alt.	$-185 \pm 22$	$25.73^{+1.50}_{-1.60}$	$938^{+36}_{-36}$	$1973^{+42}_{-45}$	$1.065^{+0.186}_{-0.145}$

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

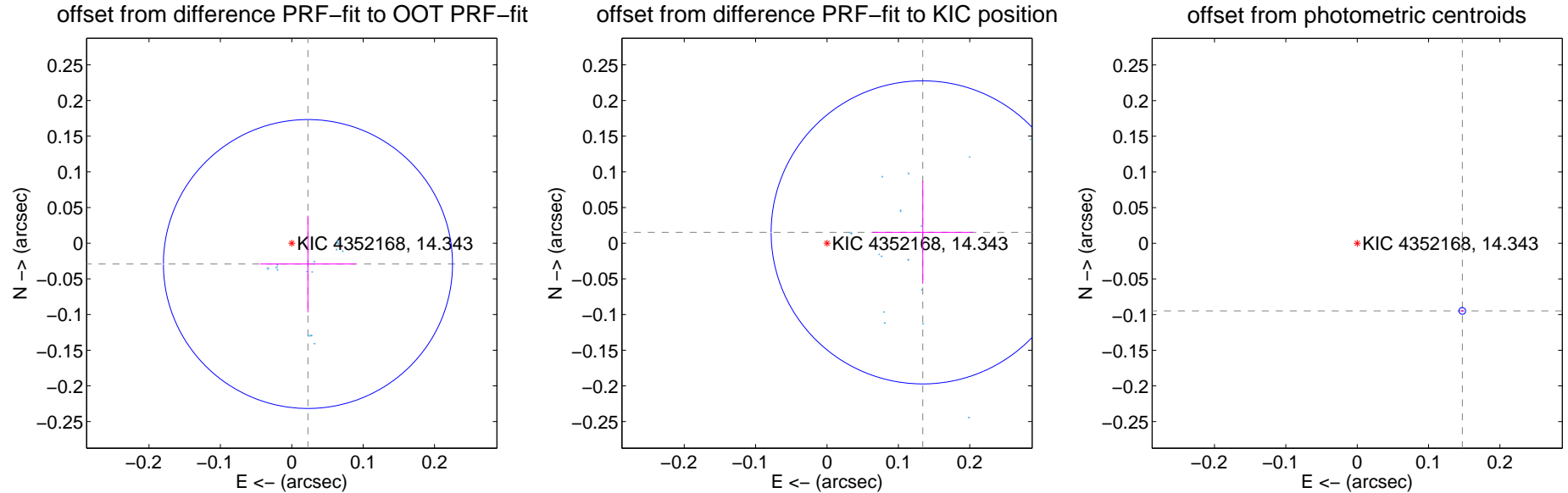
## DV Centroid Data

Supplemental centroid analysis for 004352168-02. Kepler magnitude: 14.34. Transit SNR 4209.57

There are 17 quarters with good PRF difference image offsets

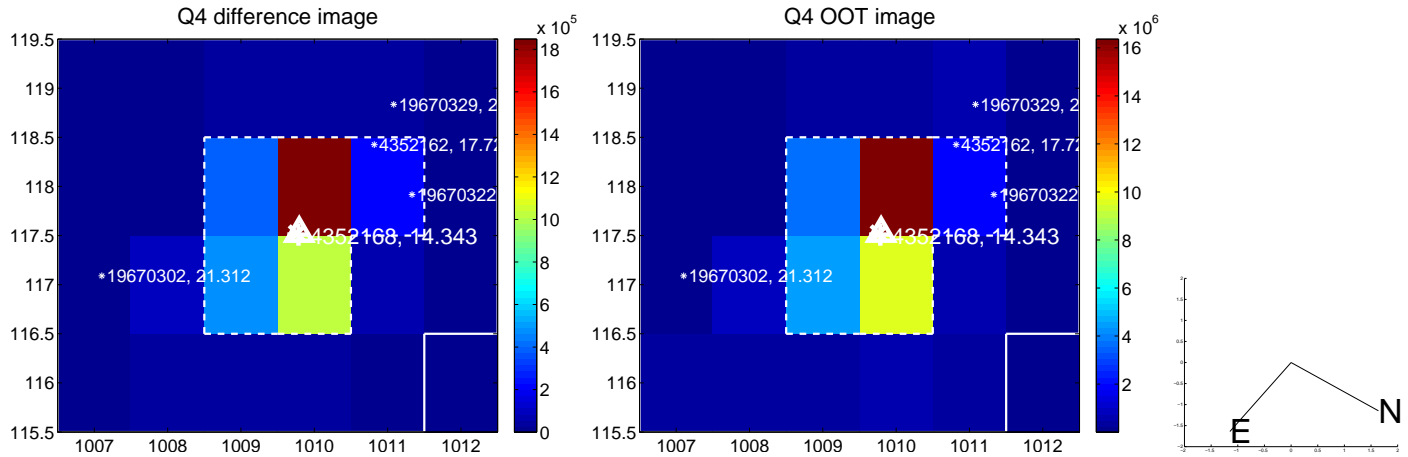
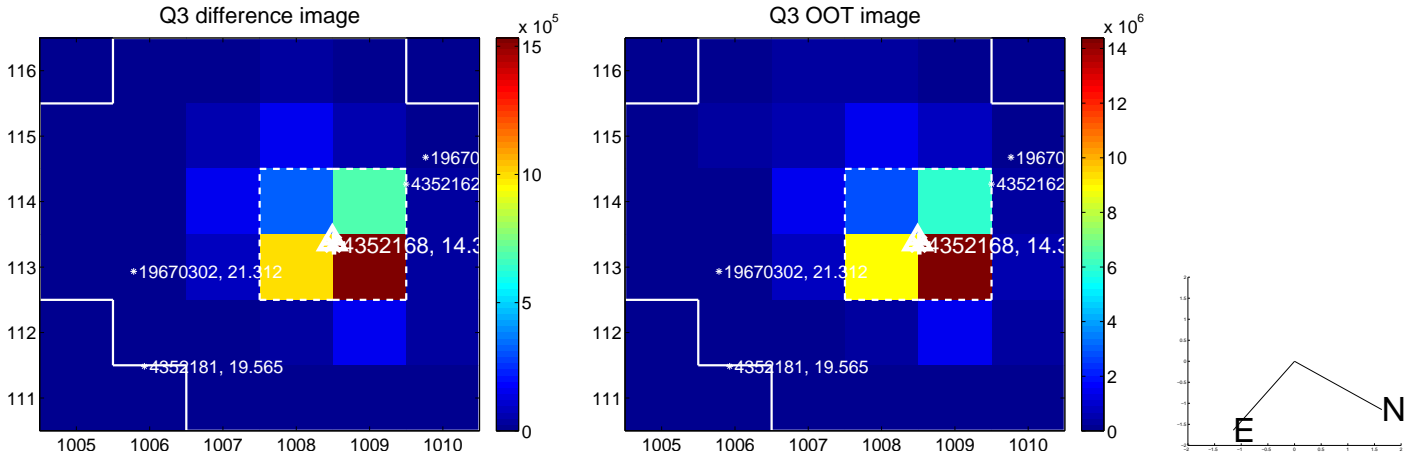
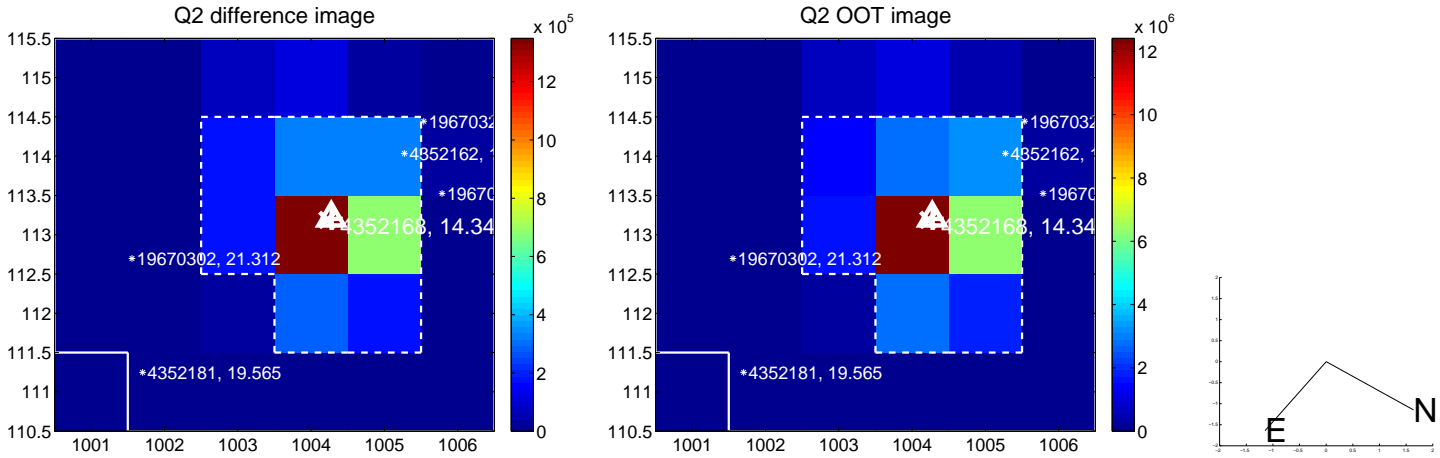
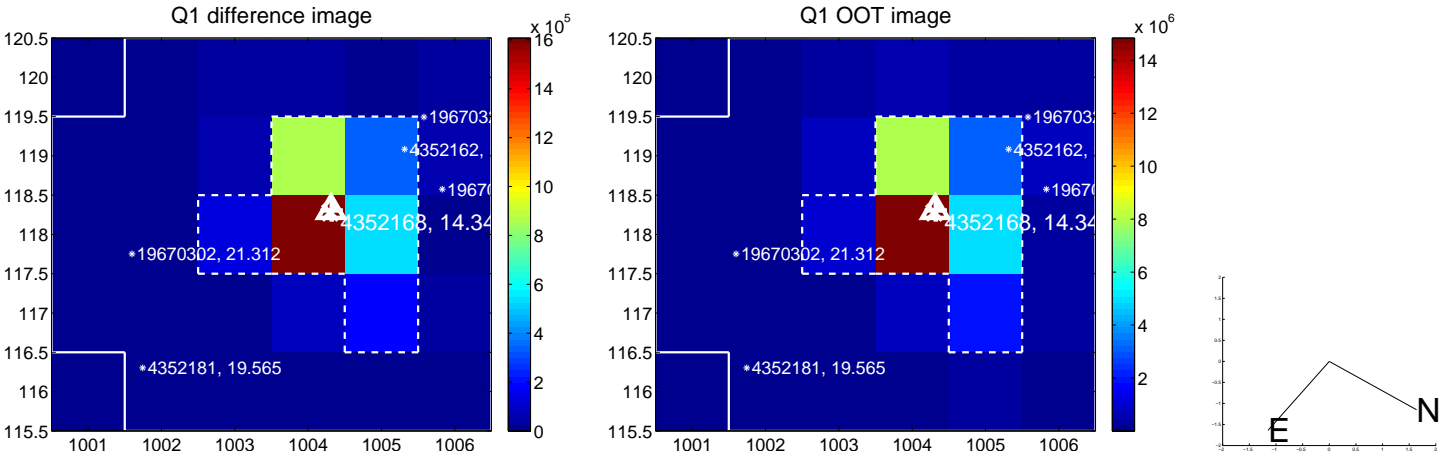
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.037 \pm 0.067$	0.55	$-0.023 \pm 0.067$	$-0.029 \pm 0.068$
PRF-fit source offset from KIC position	$0.135 \pm 0.071$	1.91	$-0.134 \pm 0.070$	$0.015 \pm 0.072$
photometric centroid source offset	$0.18 \pm 0.00$	111.45	$-0.15 \pm 0.00$	$-0.09 \pm 0.00$

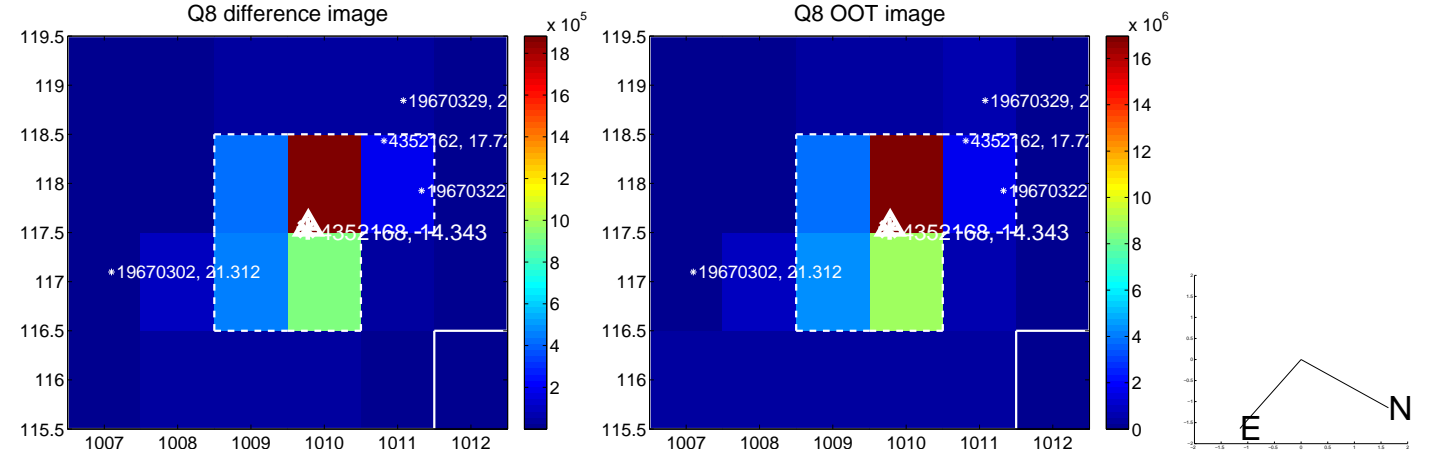
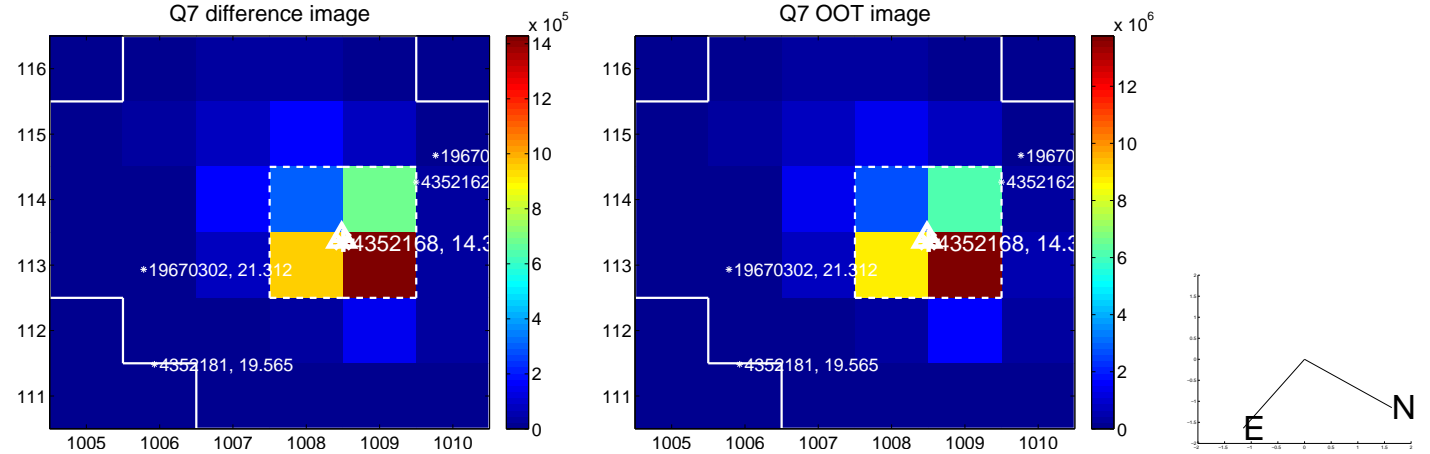
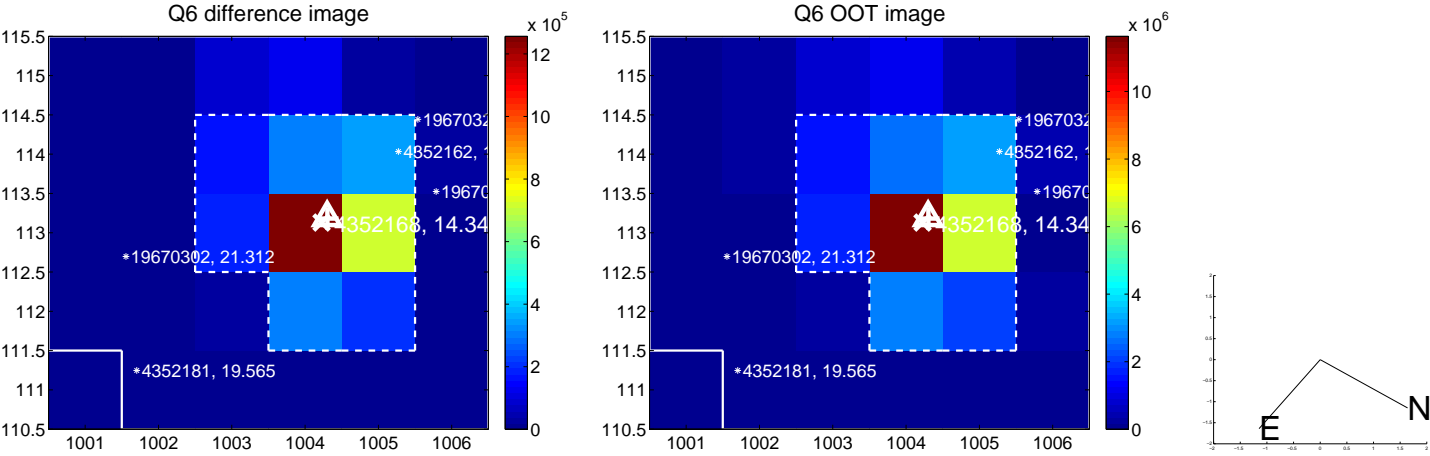
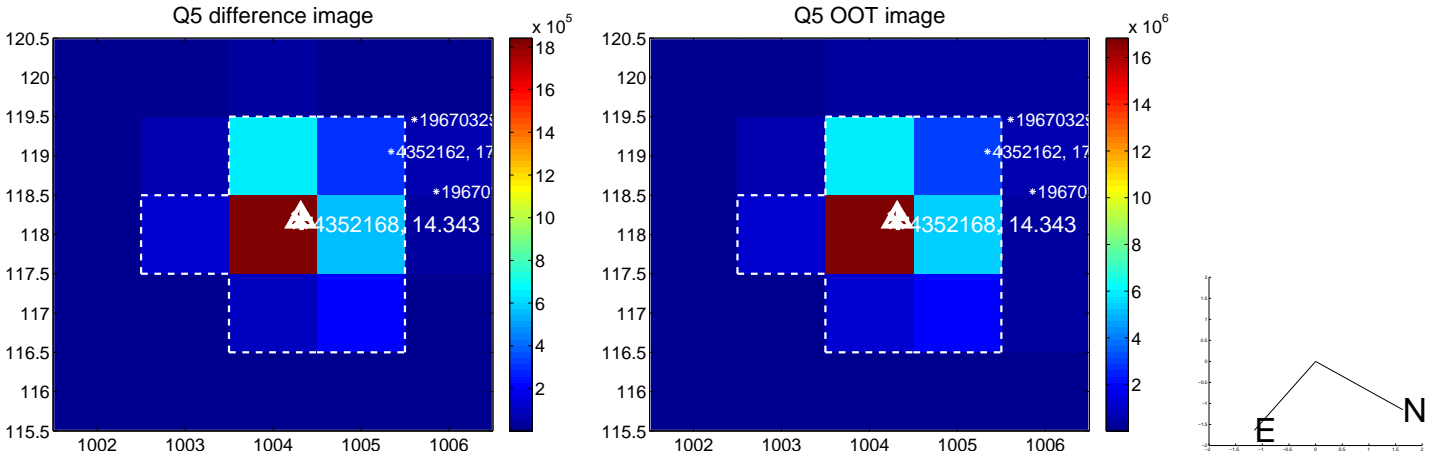


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

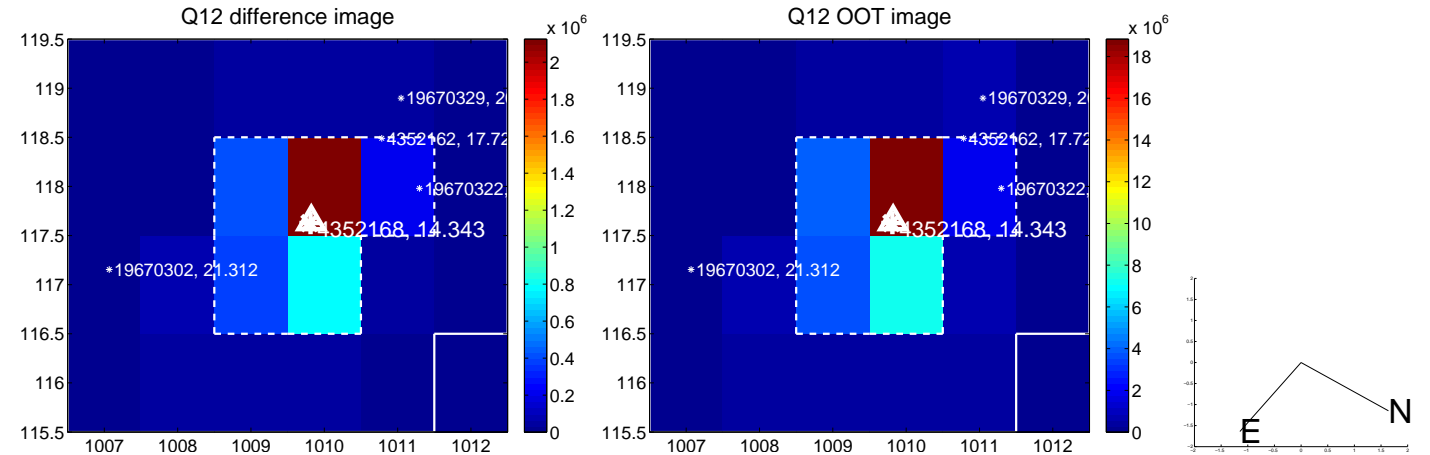
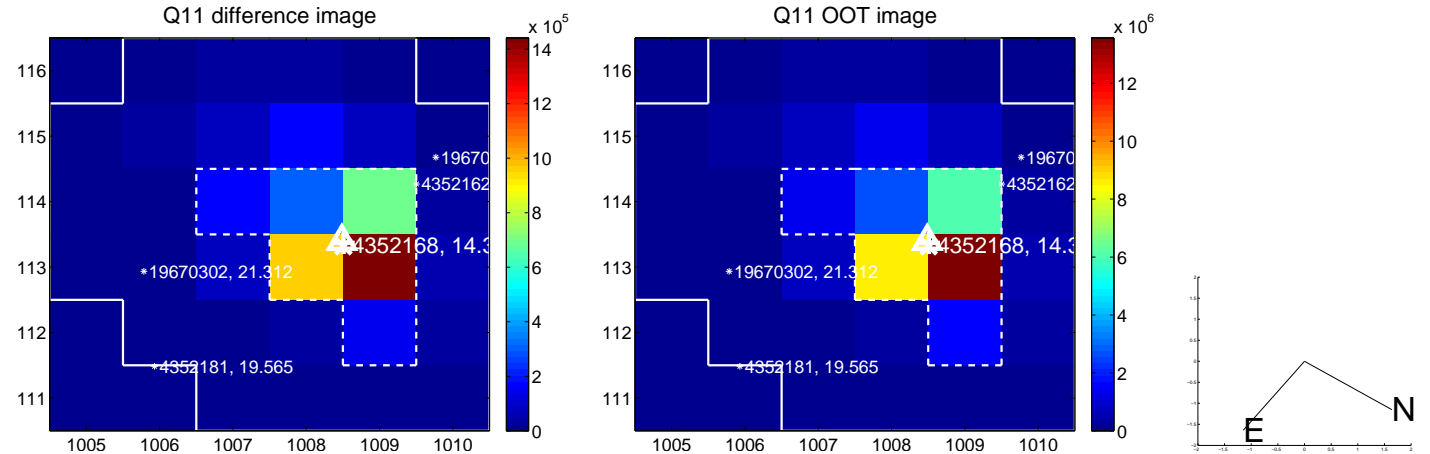
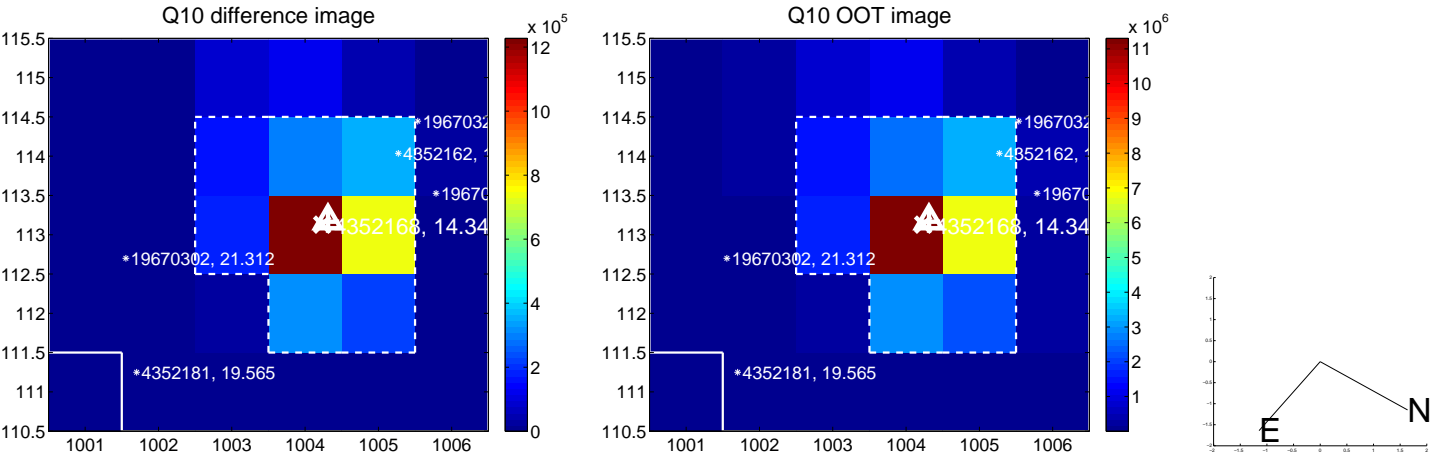
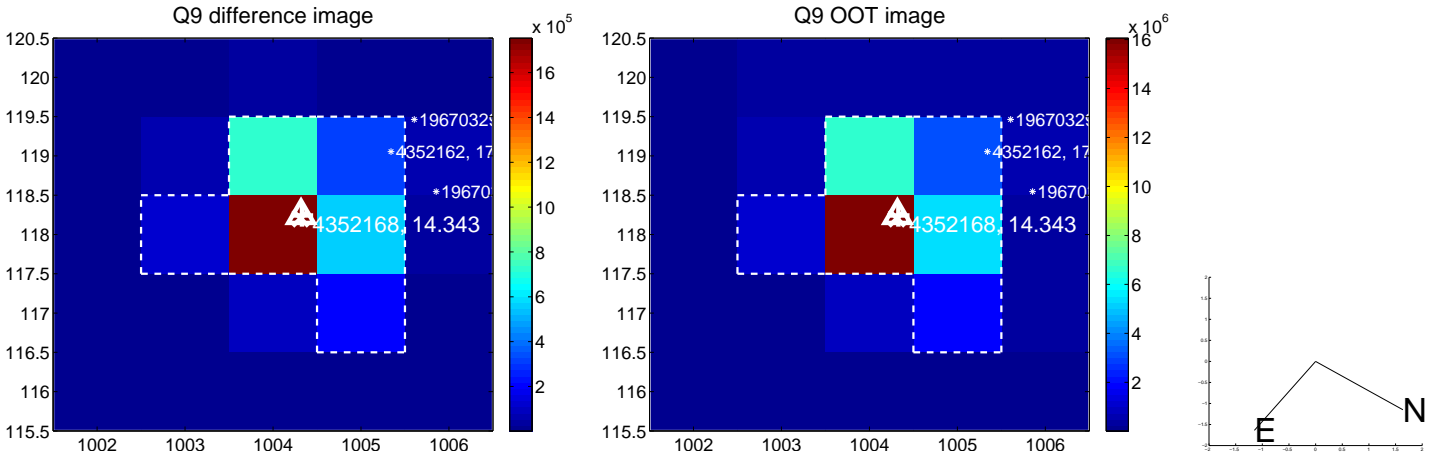
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



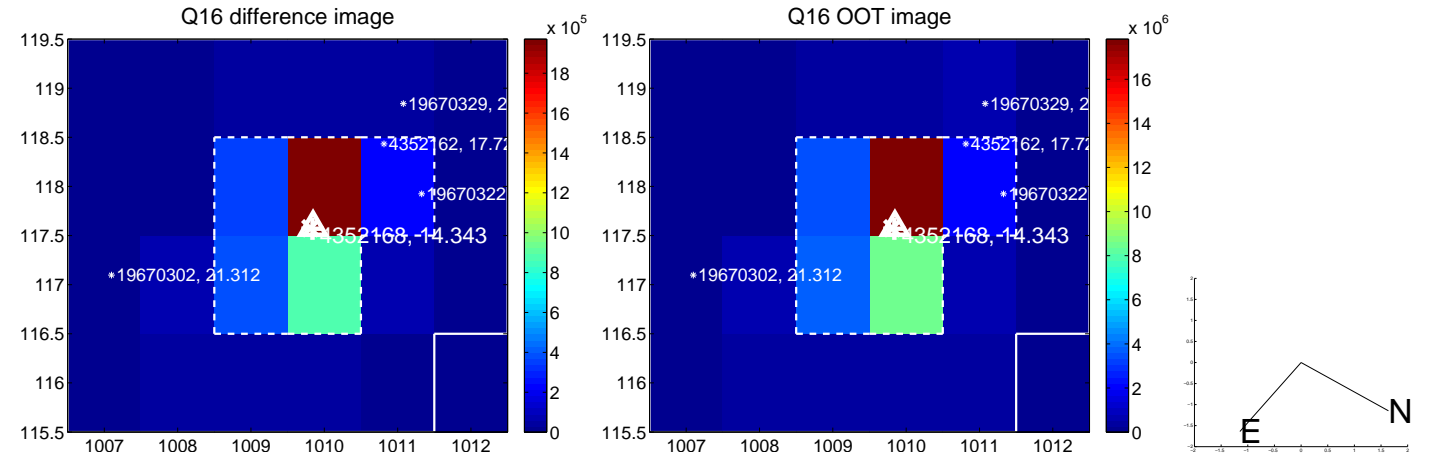
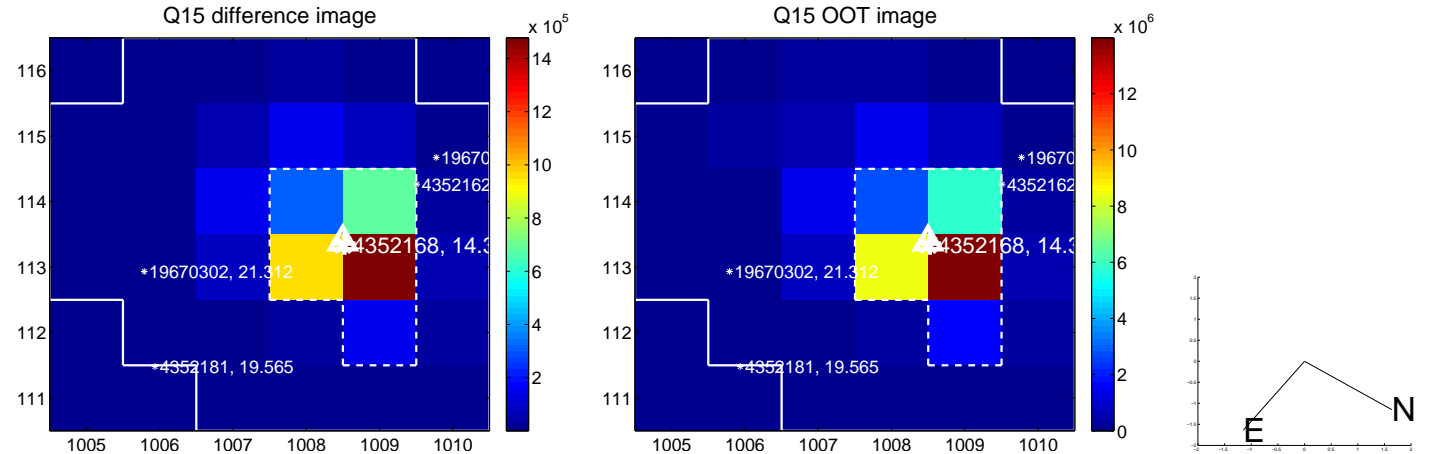
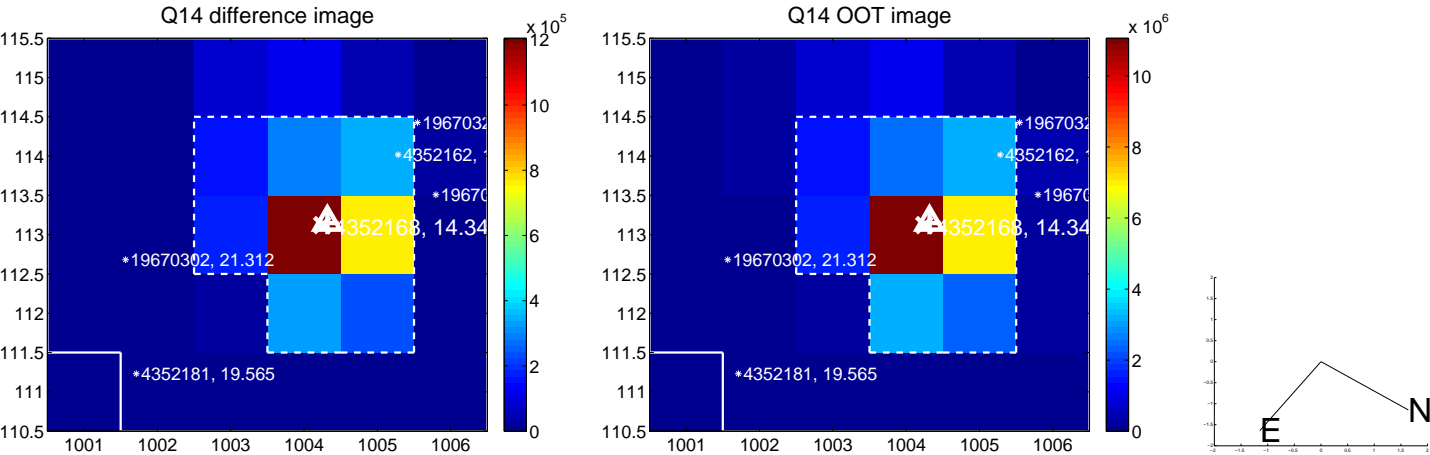
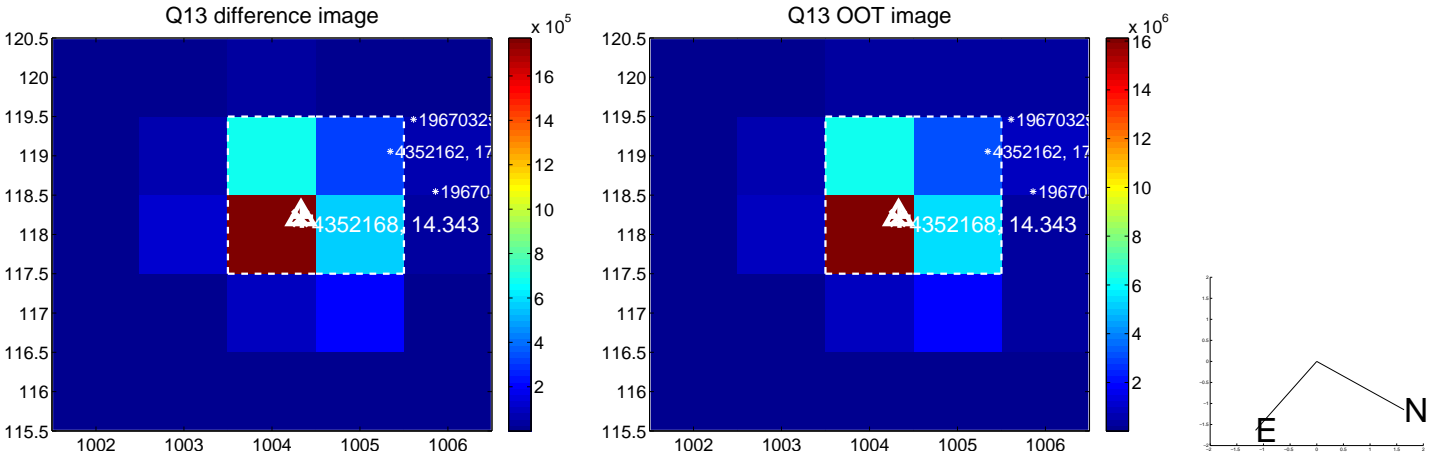
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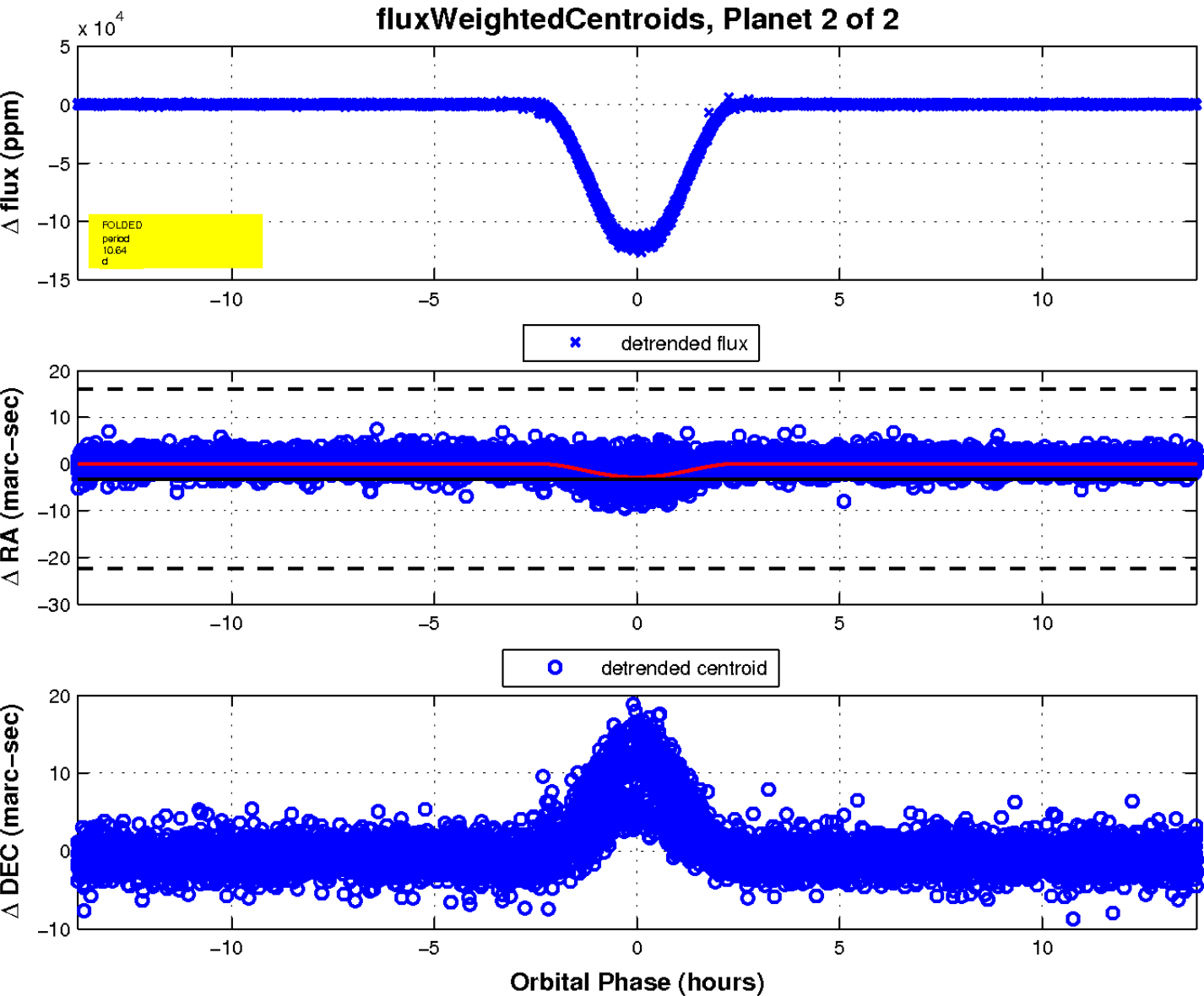
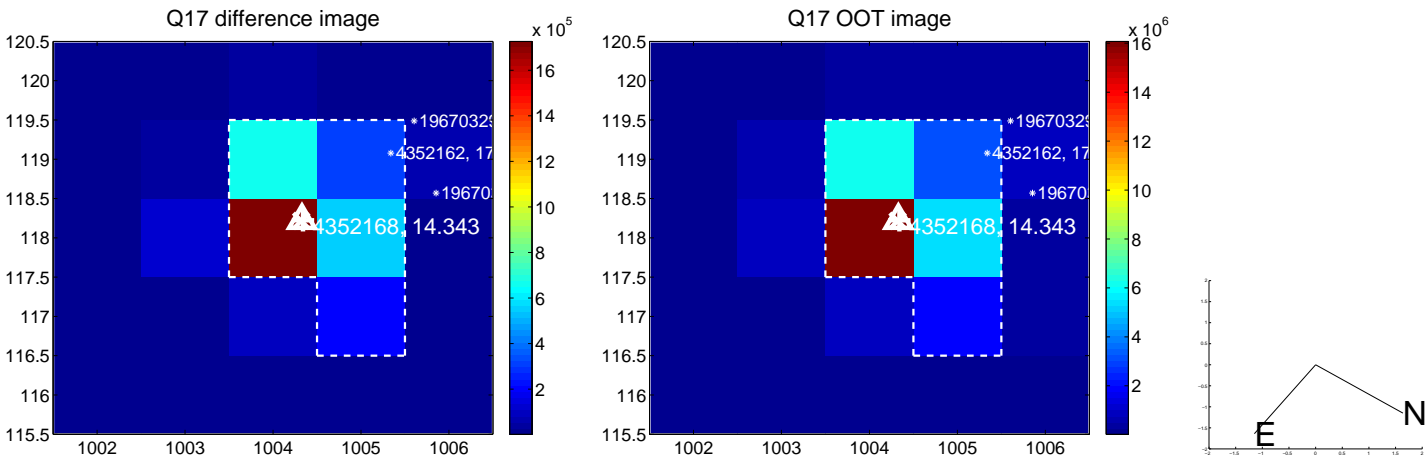
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white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination

