

# KIC 003964545

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003964545-01	OBS	3542.01	3.012475	132.247057	200326.9	3.317	8185.4	5538.6	1.09	6015	73.70	879.75
003964545-02	OBS	No	3.012477	133.752825	24731.6	3.156	1099.5	1031.1	1.09	6015	28.22	879.75

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003964545-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_KIC_POS
003964545-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_KIC_POS

**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.

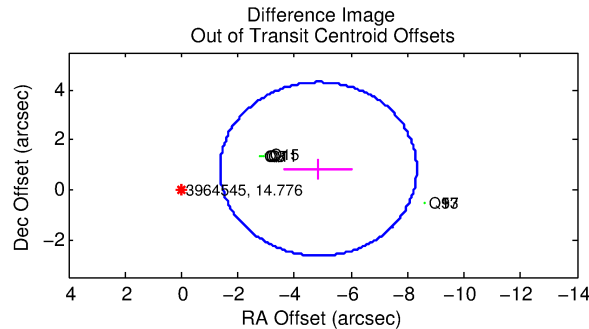
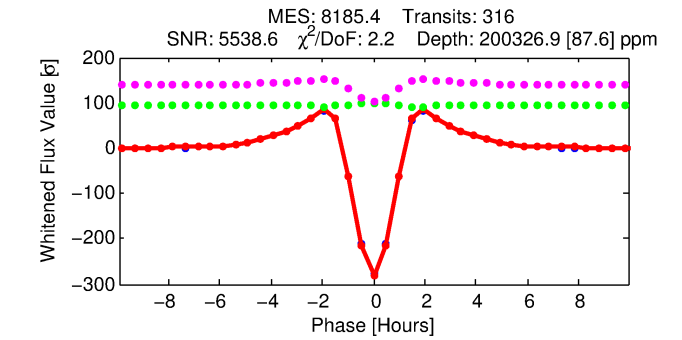
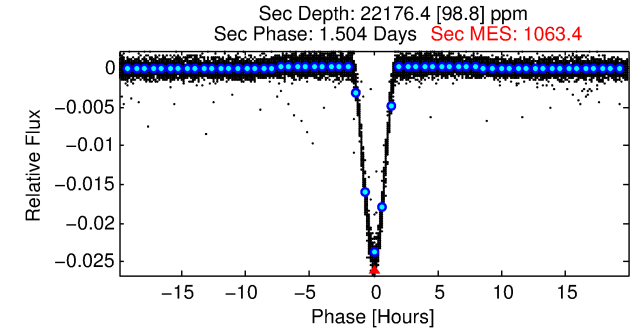
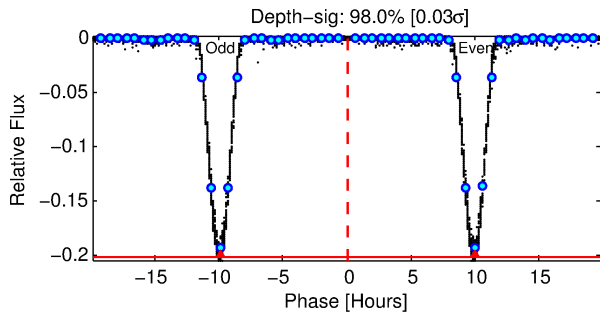
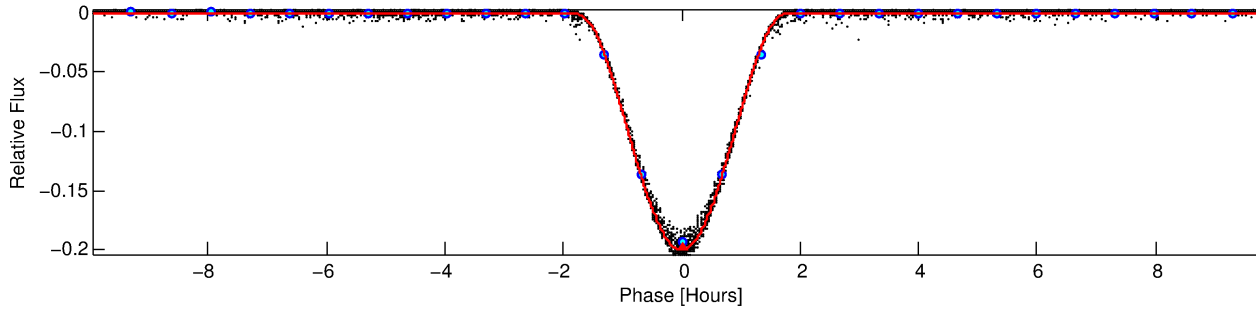
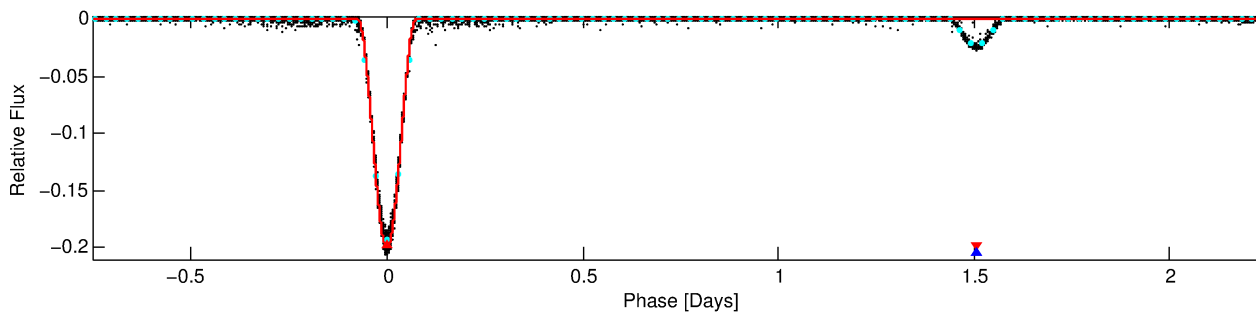
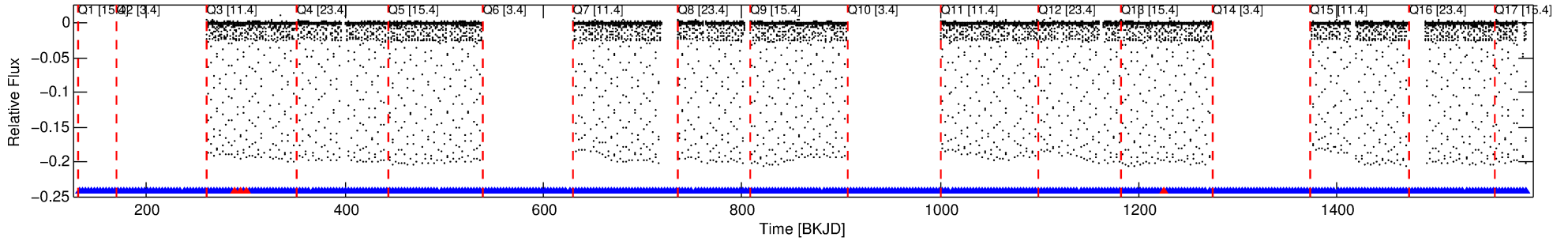
## Ephemeris Match Information For 003964545-01

No Significant Match Found

# DV One-Page Summary

KIC: 3964545 Candidate: 1 of 2 Period: 3.012 d  
KOI: K03542.01 Corr: 0.997

Kp: 14.78 R\*: 1.09 Rs Teff: 6015.0 K Logg: 4.33 Fe/H: -0.340



## DV Fit Results:

Period = 3.01247 [0.00000] d  
Epoch = 132.2471 [0.0000] BKJD  
Rp/R\* = 0.6207 [0.0117]  
a/R\* = 9.45 [0.03]  
b = 0.90 [0.02]  
Seff = 879.75 [322.56]  
Teff = 1389 [127] K  
Rp = 73.70 [21.65] Re  
a = 0.0397 [0.0095] AU  
Ag = 3.54 [1.21] [2.11σ]  
Teffp = 2946 [108] K [9.35σ]

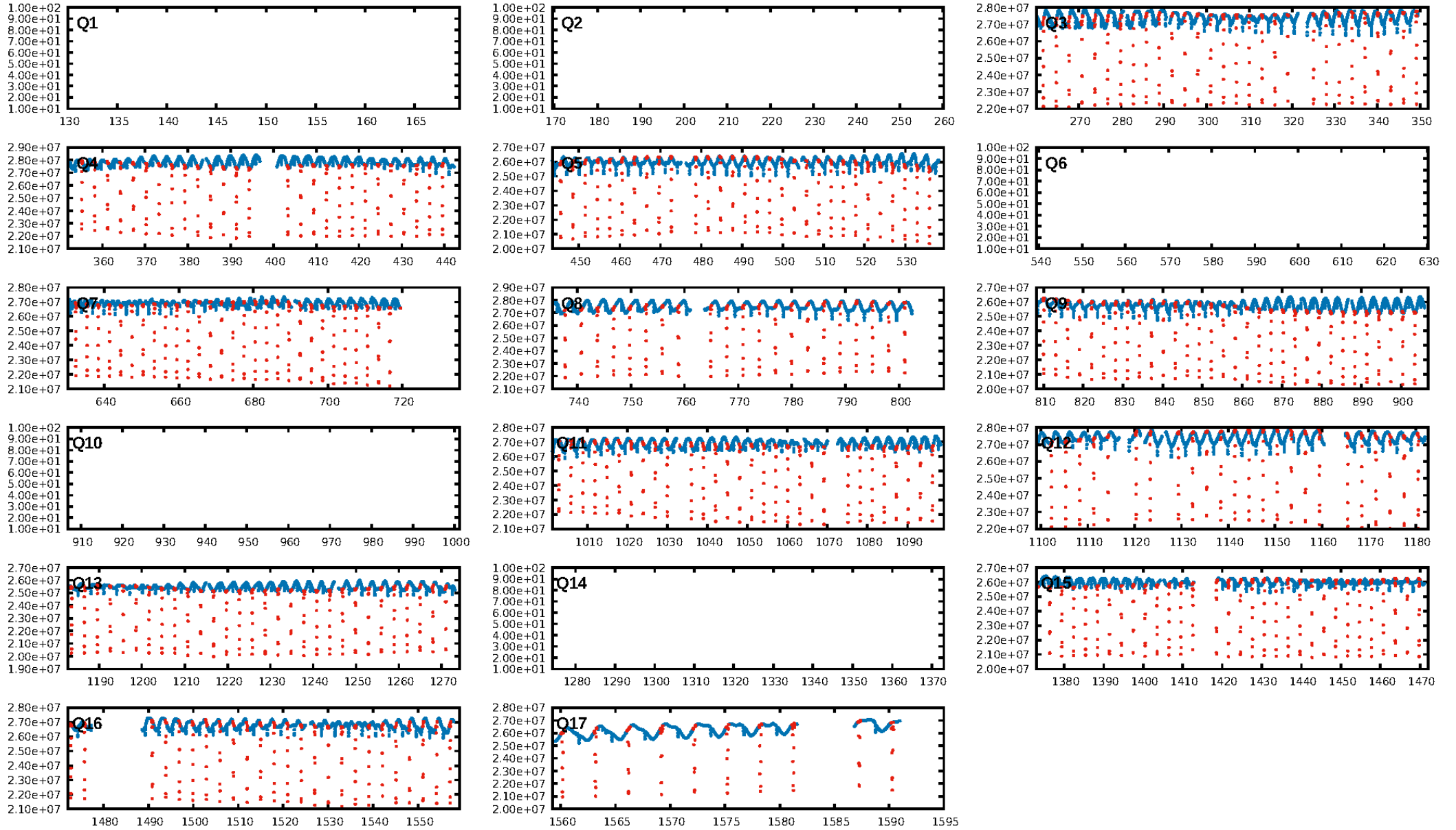
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.99 [302/306]  
GhostDiagnostic-chr: 3.359  
Centroid-sig: 0.0%  
Centroid-so: 3.231 arcsec [2402.56σ]  
OotOffset-rm: 4.915 arcsec [4.24σ]  
KicOffset-rm: 0.105 arcsec [1.52σ]  
OotOffset-st: 0/4/0/4 [8]  
KicOffset-st: 0/4/4/4 [12]  
DiffImageQuality-fgm: 1.00 [12/12]  
DiffImageOverlap-fno: 1.00 [12/12]

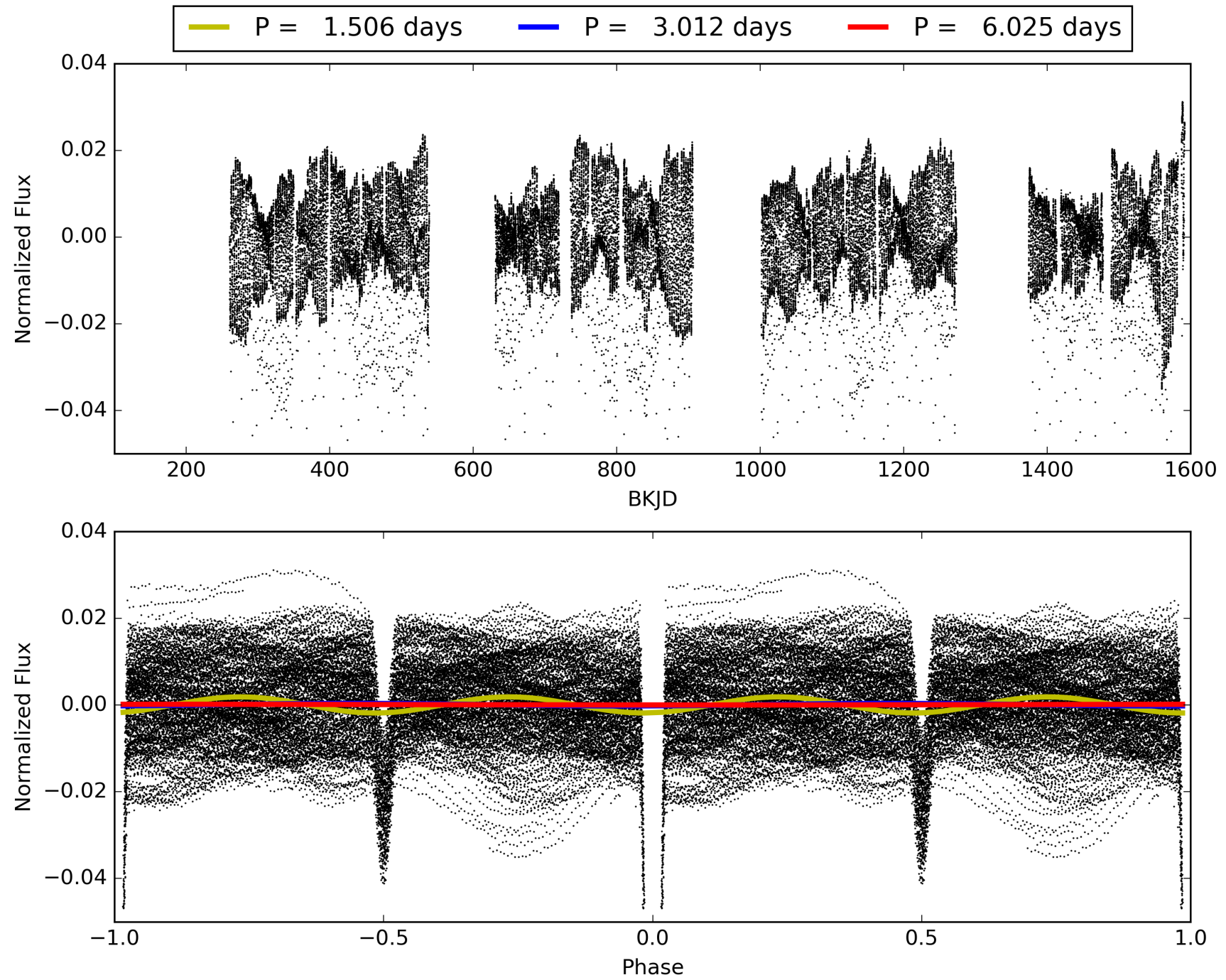
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 21:54:09 Z

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

# TCE 003964545-01, PDC Light Curves

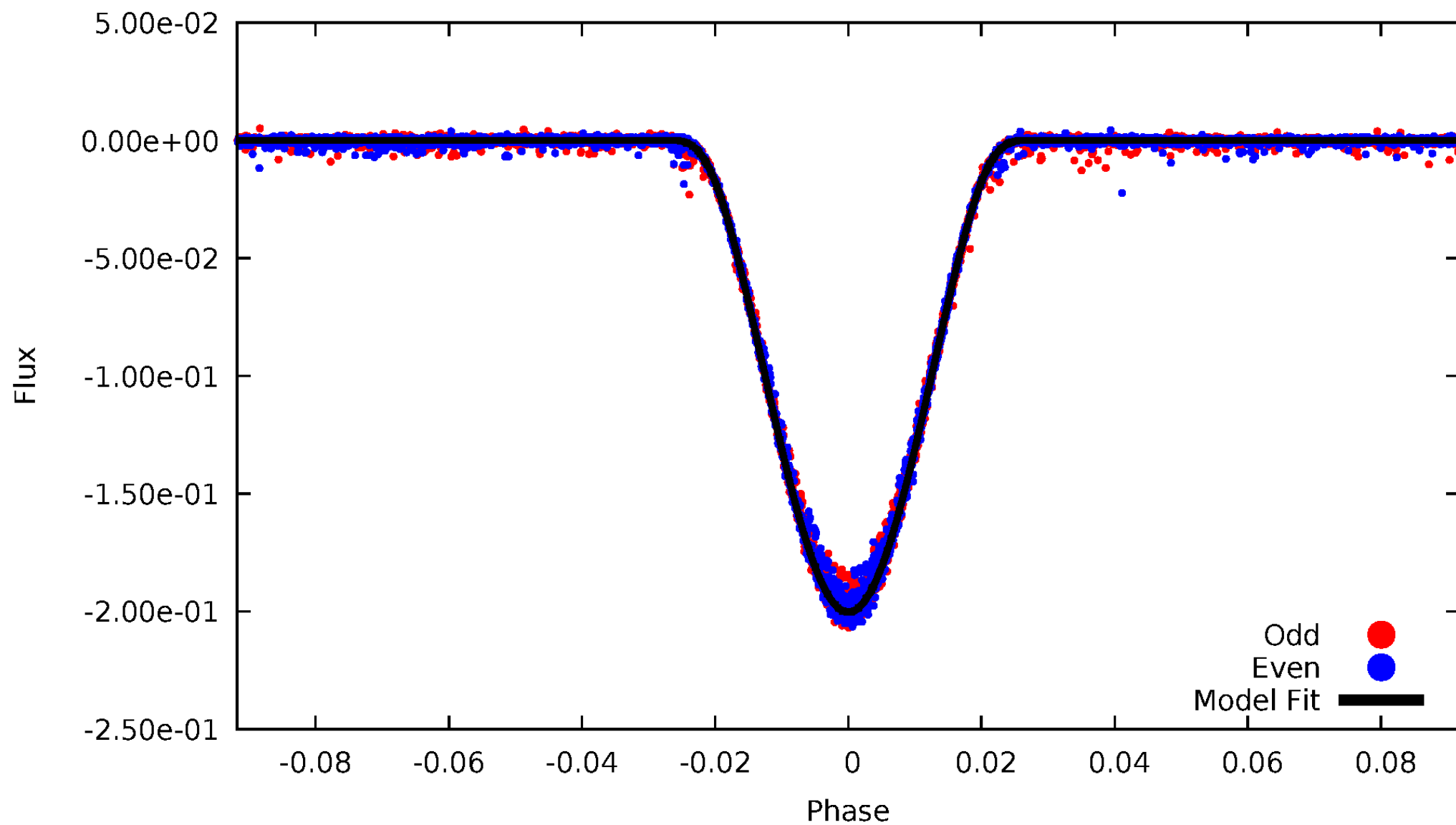


TCE 003964545-01



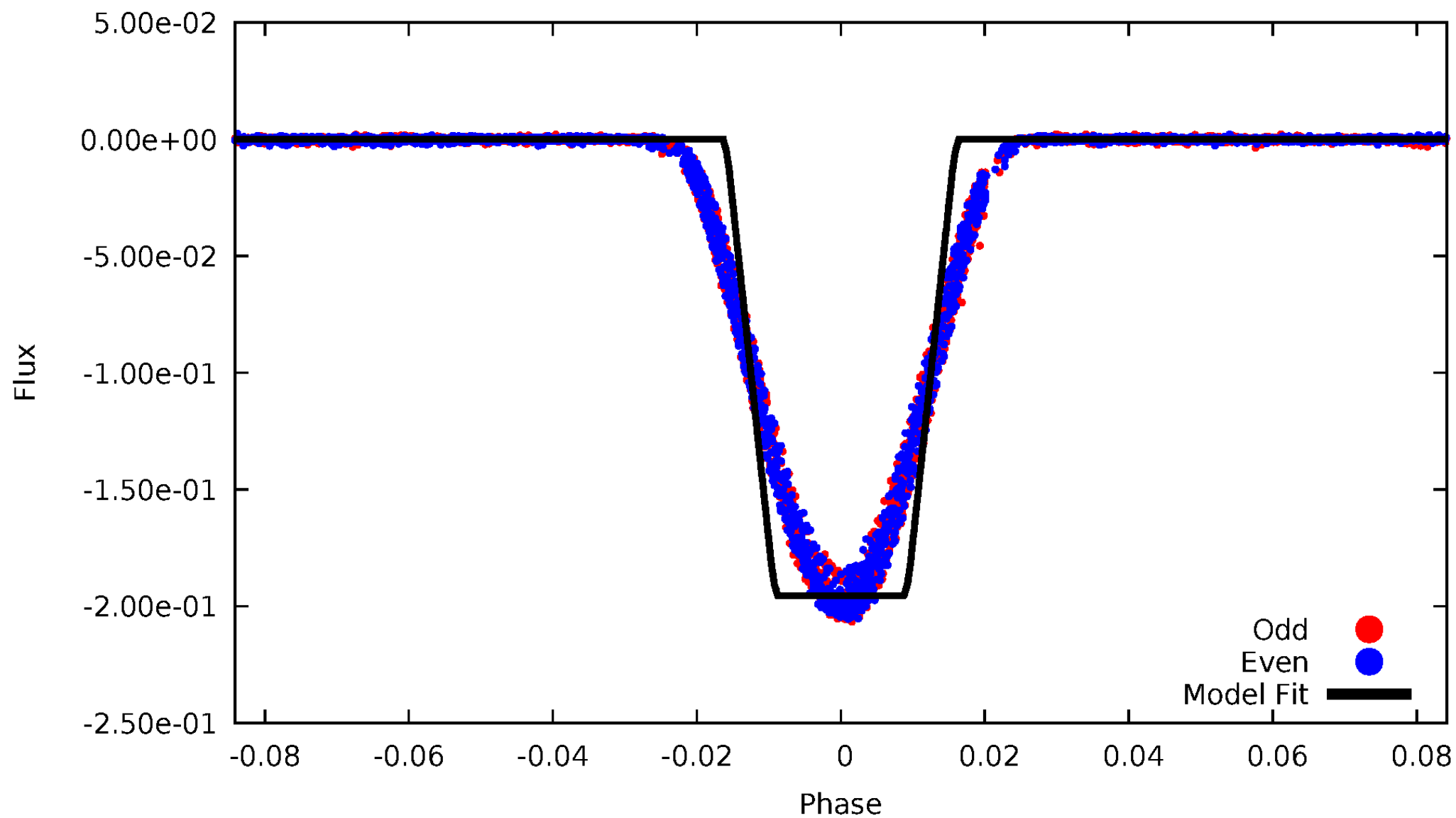
# DV Odd/Even

TCE 003964545-01



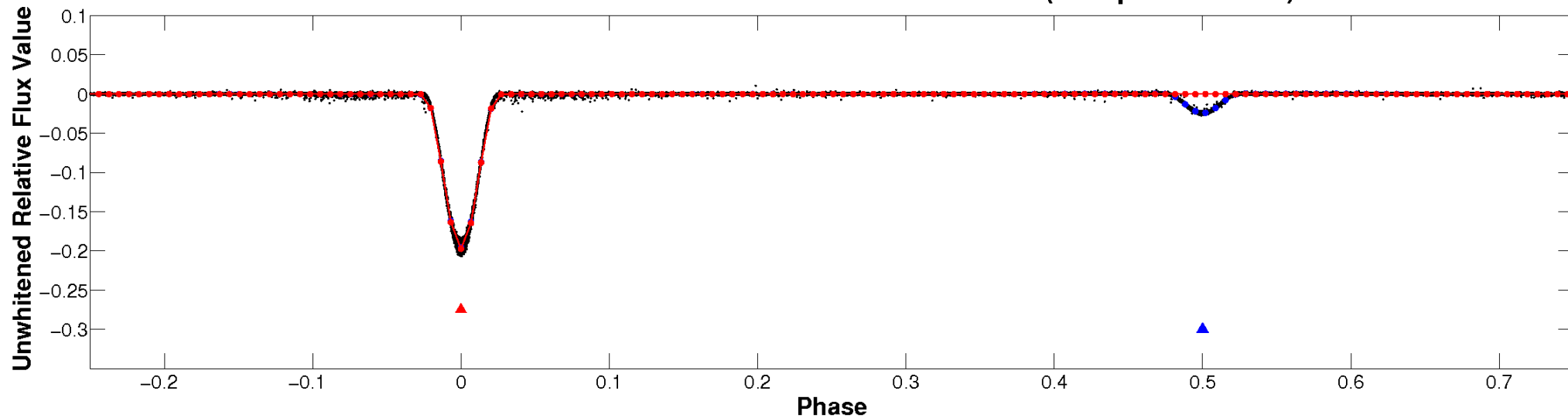
# ALT Odd/Even

TCE 003964545-01

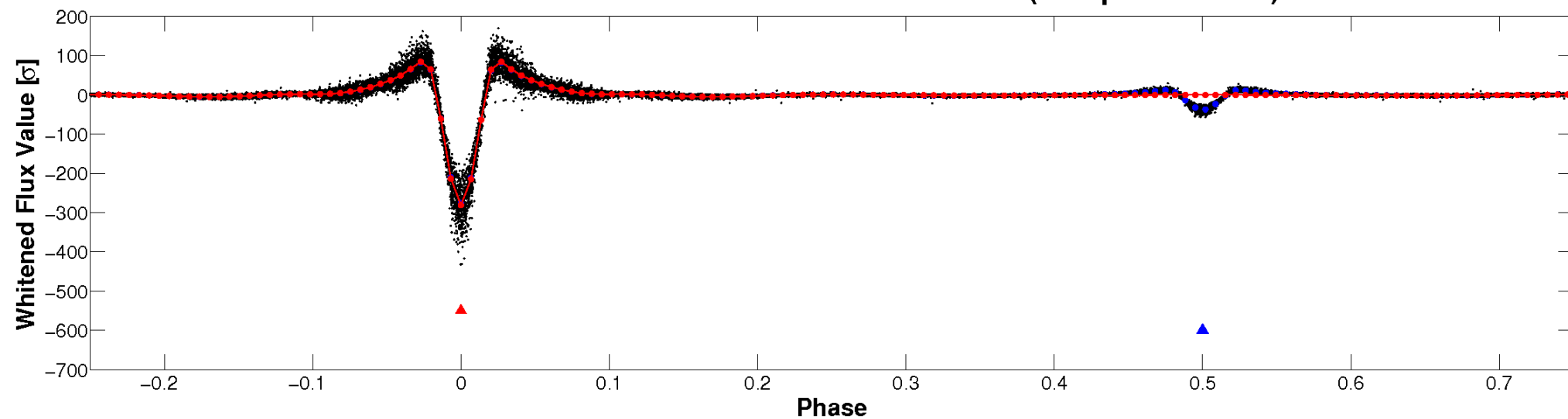


# Non-Whitened Vs. Whitened Light Curve

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

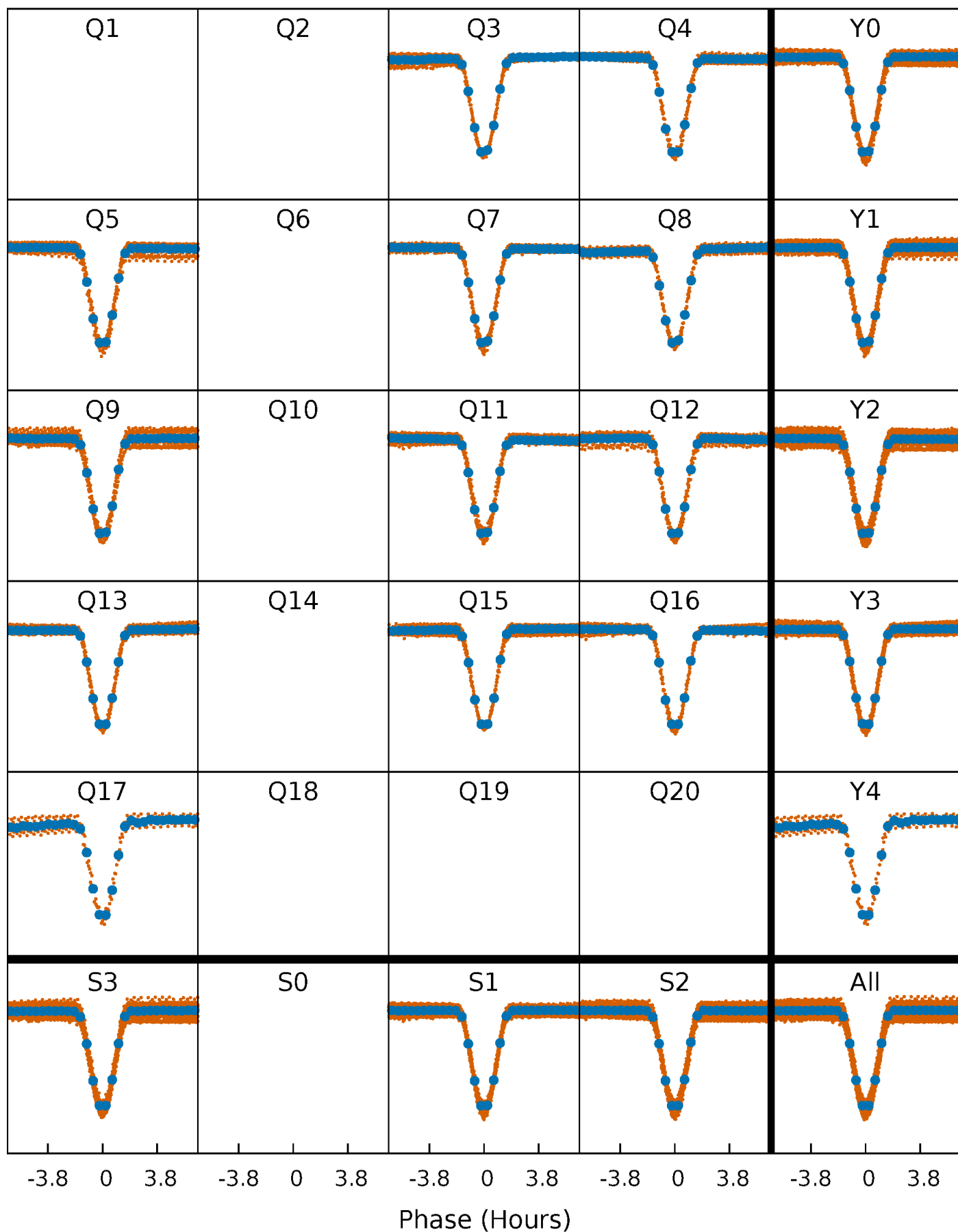


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

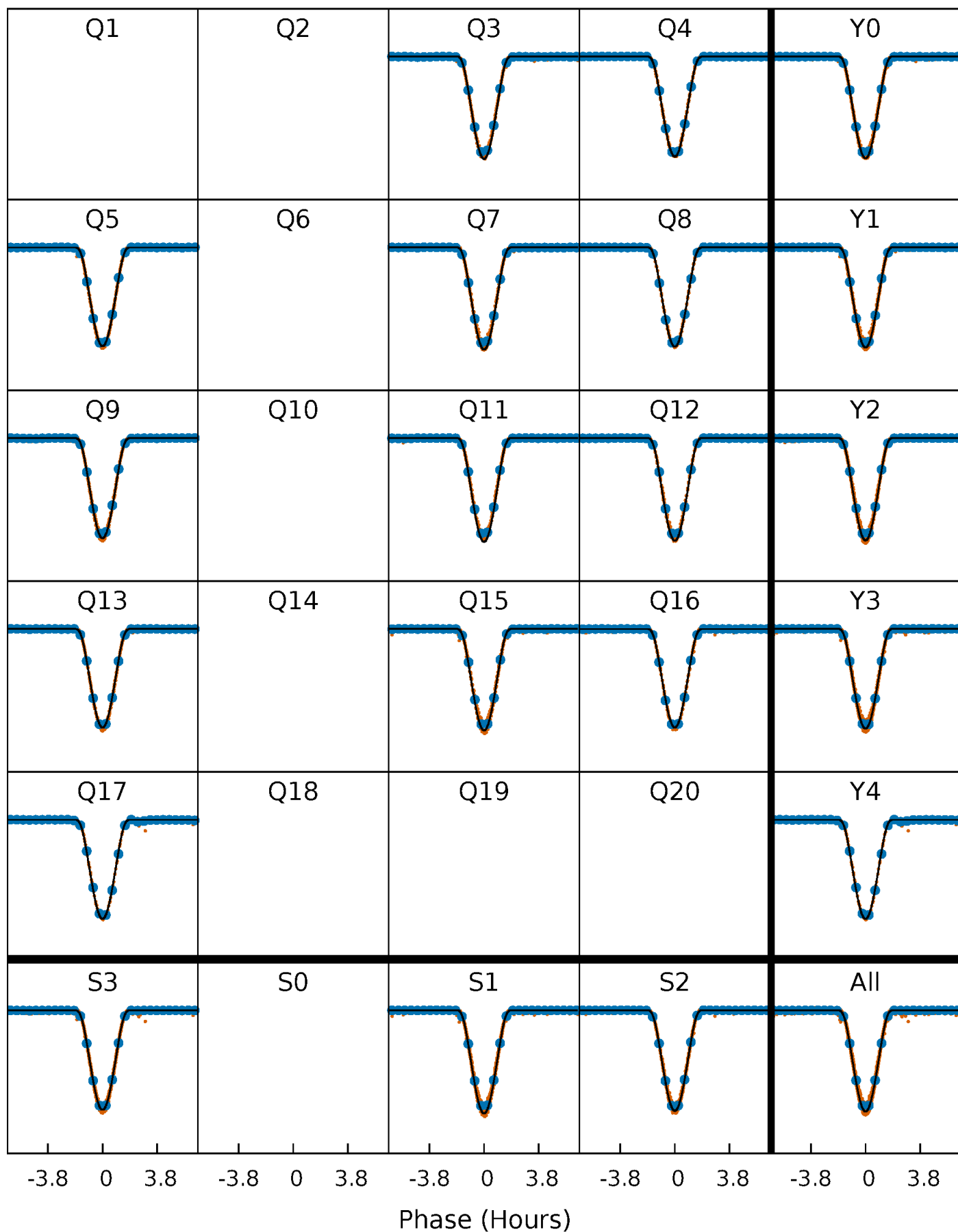
TCE 003964545-01 P= 3.012475 Days  $T_0=132.247057$  (BKJD)





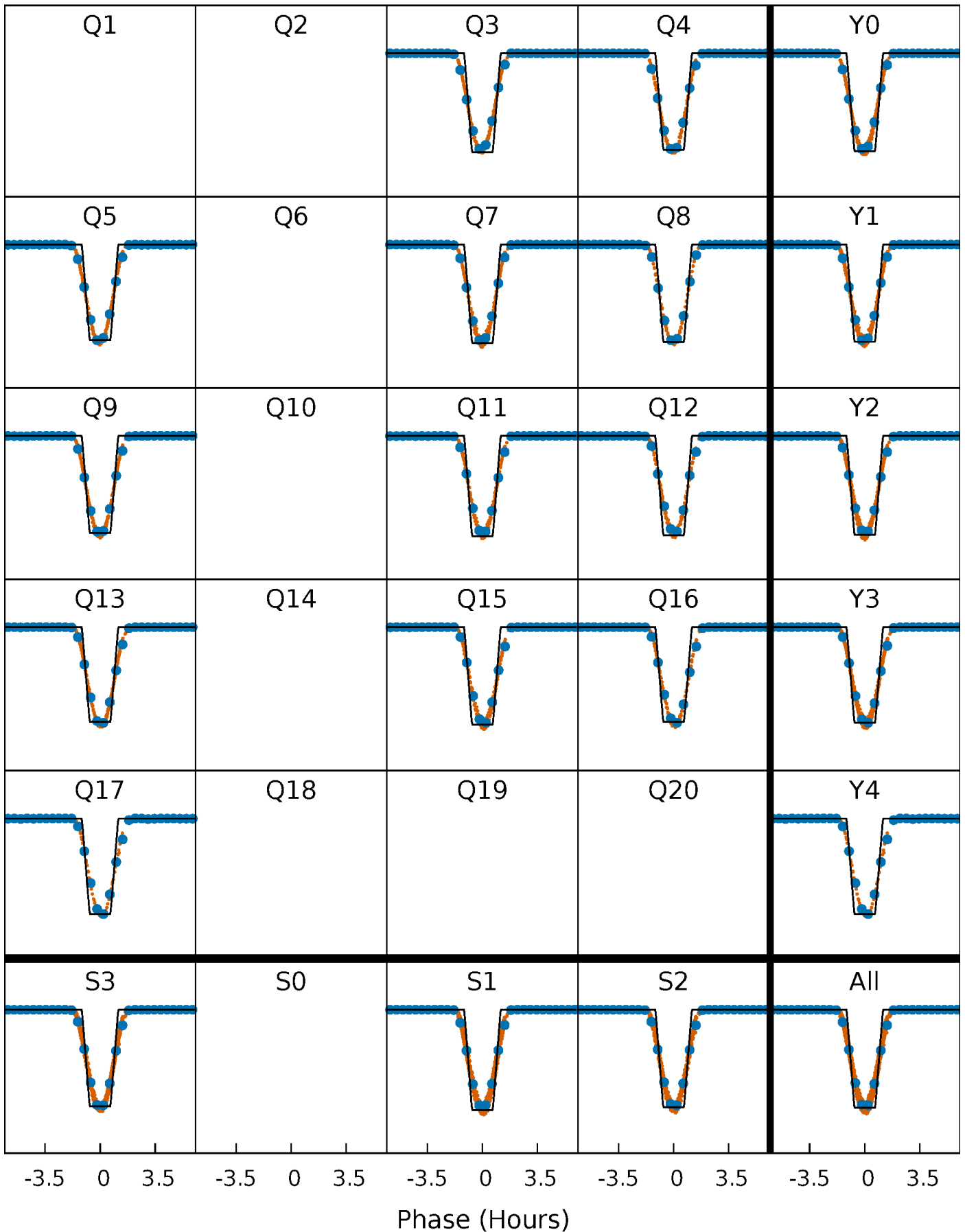
# DV Quarter-Phased Transit Curves

TCE 003964545-01 P= 3.012475 Days  $T_0=132.247057$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

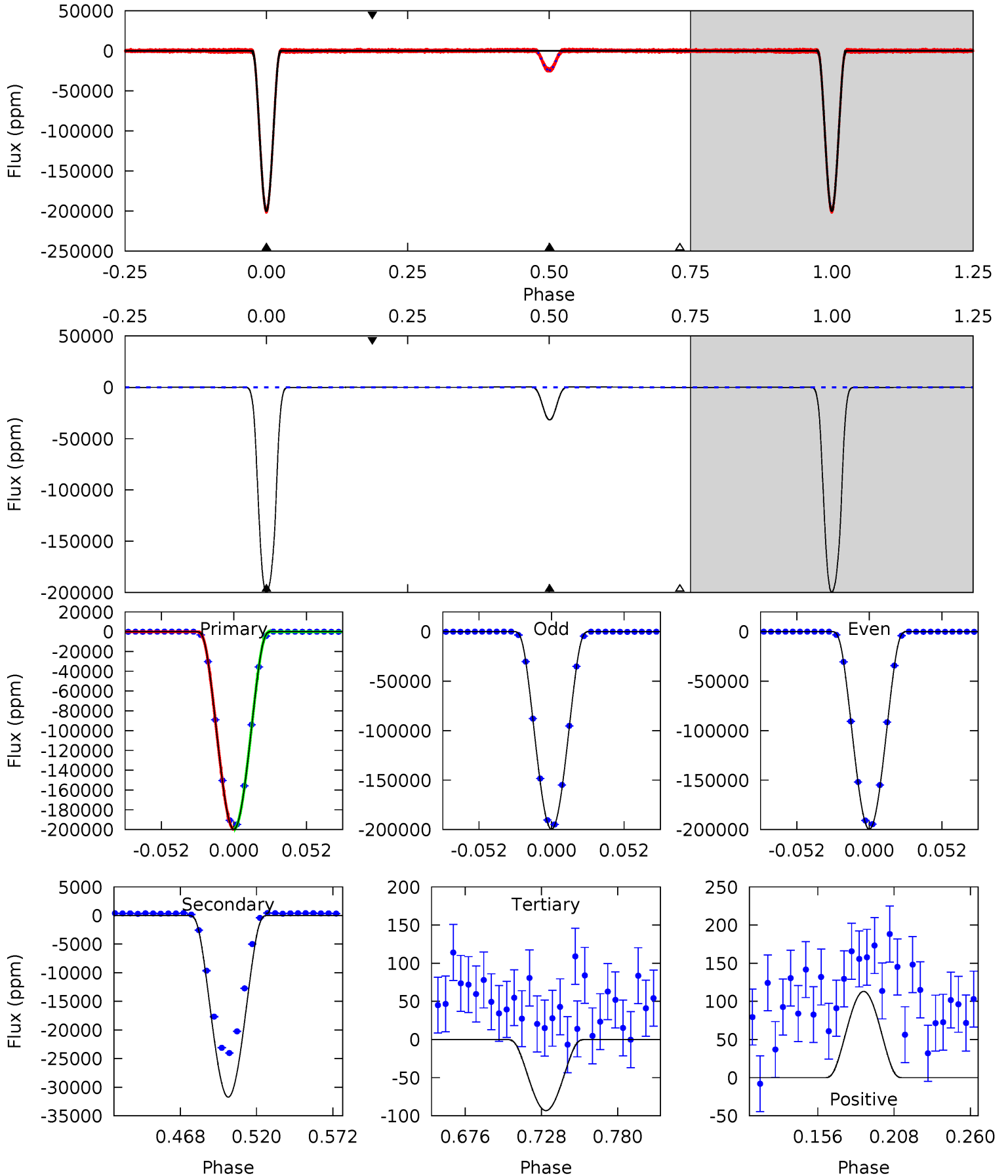
TCE 003964545-01 P= 3.012462 Days  $T_0=132.250030$  (BKJD)



# DV Model-Shift Uniqueness Test

003964545-01, P = 3.012475 Days, E = 132.247057 Days

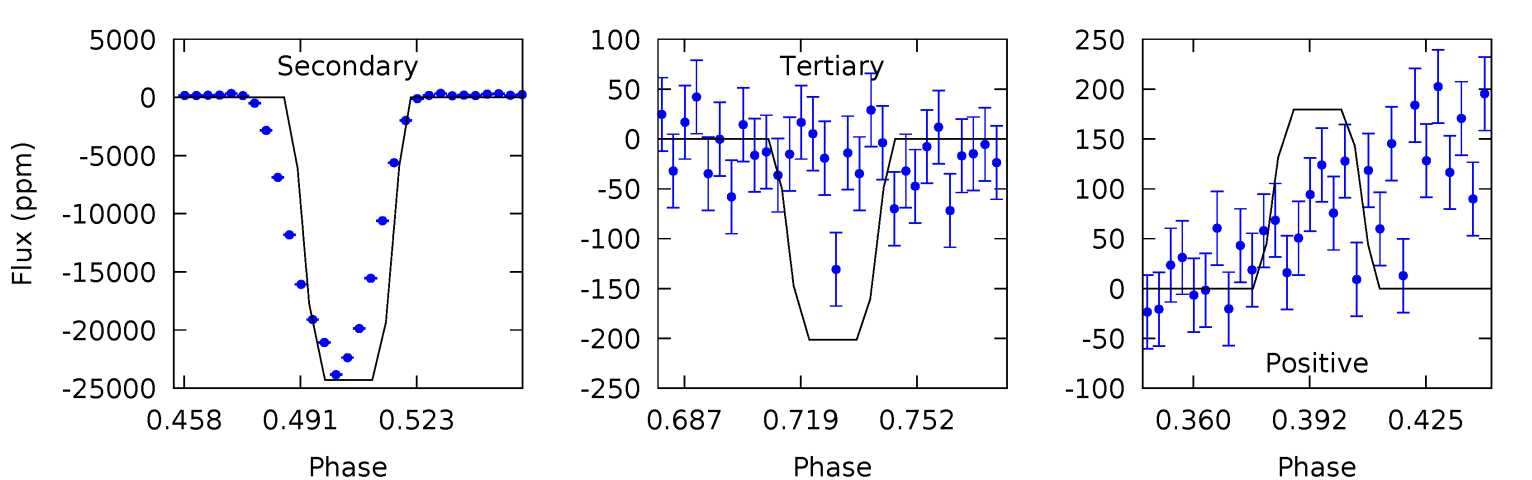
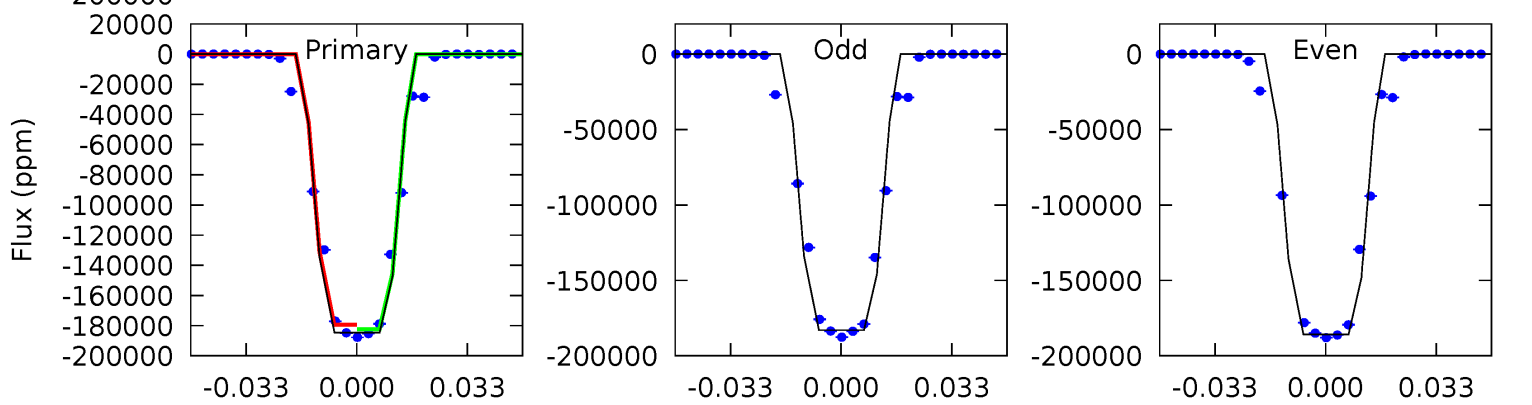
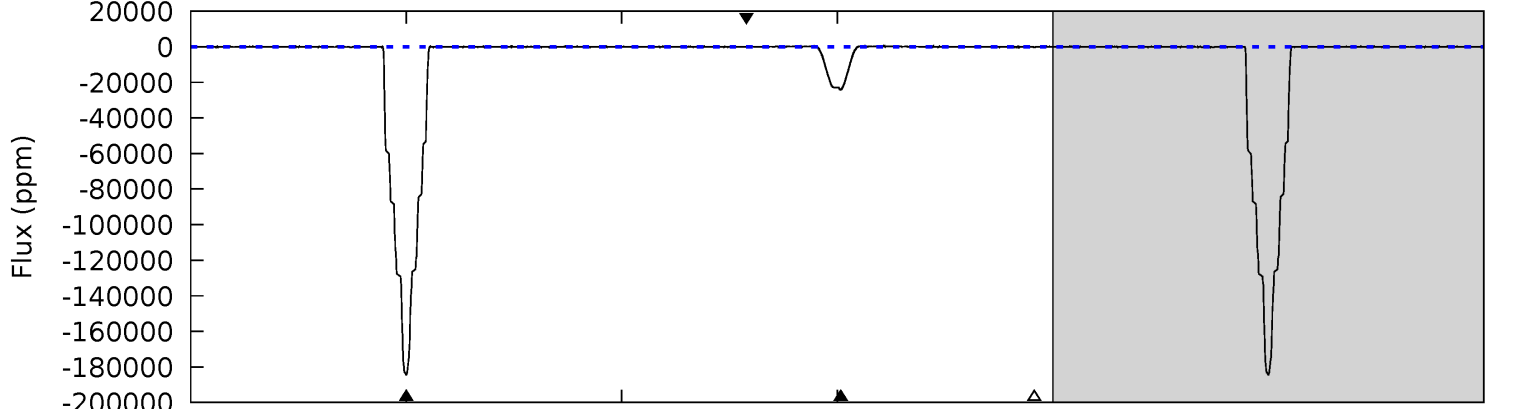
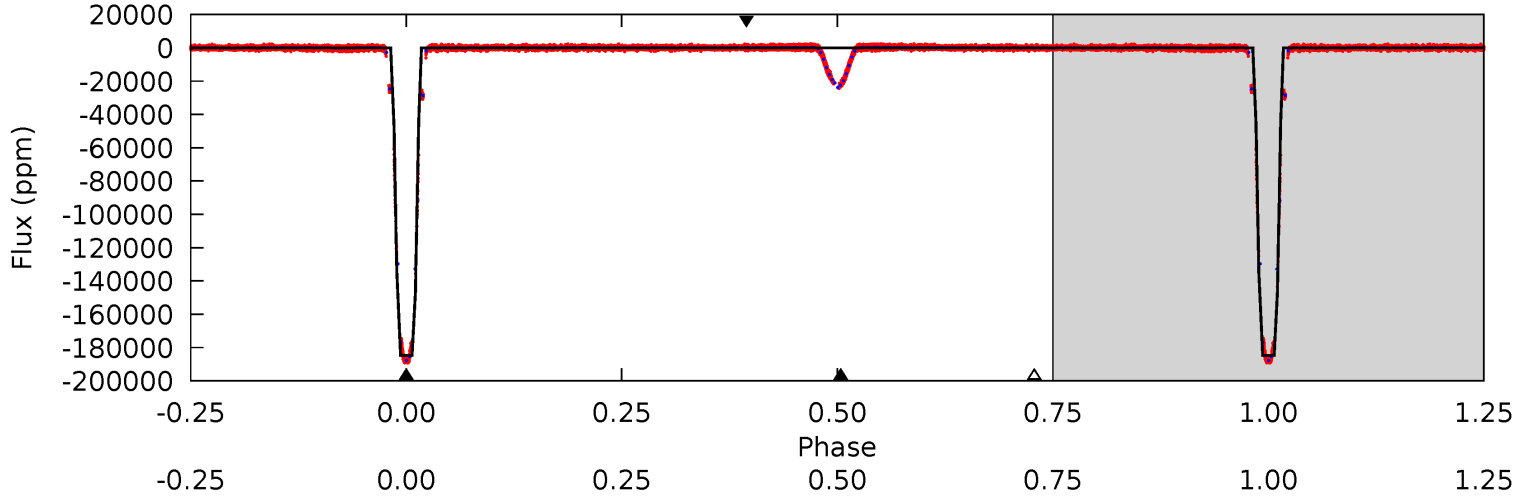
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13153	2090	6.14	7.44	4.70	1.94	10.2	13147	13146	2084	2083	0.31	0.99	0.00	3.11



# Alt Model-Shift Uniqueness Test

003964545-01, P = 3.012462 Days, E = 132.250030 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
4378	575.4	4.77	4.26	4.79	2.14	2.05	4373	4374	570.6	571.2	35.0	1.00	0.00	0



### Stellar Parameters For KIC 003964545

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6015^{+190}_{-212}$	$4.329^{+0.162}_{-0.180}$	$-0.340^{+0.300}_{-0.300}$	$1.088^{+0.319}_{-0.213}$	$0.920^{+0.131}_{-0.095}$	$1.006^{+0.892}_{-0.506}$
	+3%/-4%	+4%/-4%	+88%/-88%	+29%/-20%	+14%/-10%	+89%/-50%
Source	KIC0	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 003964545-01 / KOI 3542.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-31738 \pm 15$	$73.36^{+11.07}_{-8.07}$	$1931^{+155}_{-118}$	$3639^{+86}_{-93}$	$5.318^{+1.297}_{-1.262}$
Alt.	$-24273 \pm 42$	$52.55^{+9.25}_{-5.54}$	$1947^{+154}_{-125}$	$3908^{+89}_{-95}$	$7.818^{+1.798}_{-1.963}$

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

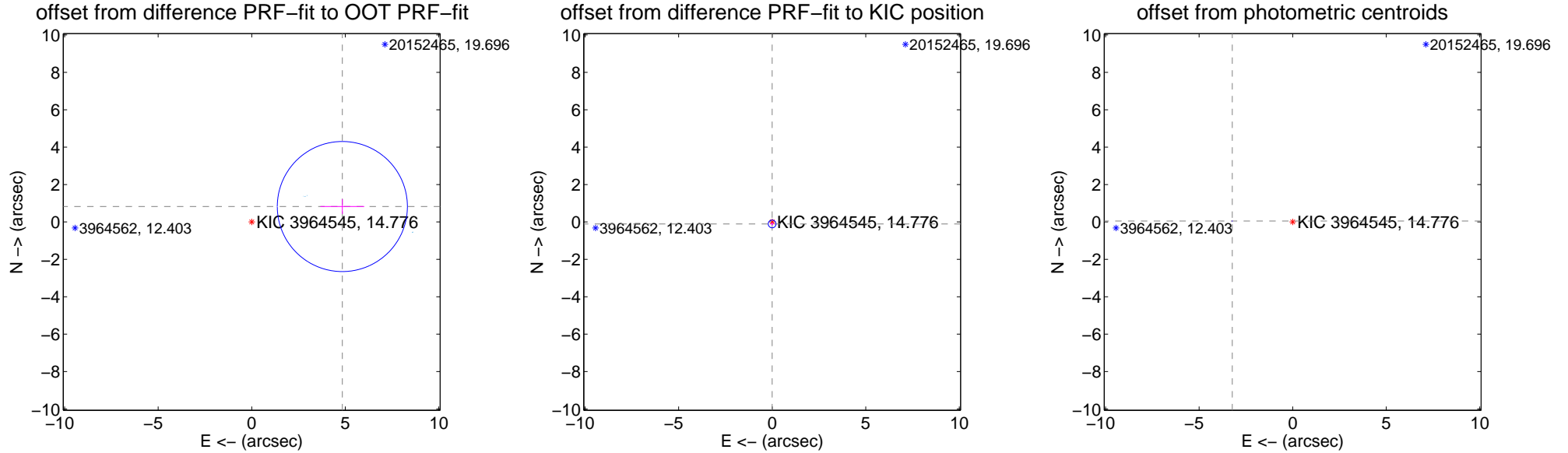
## DV Centroid Data

Supplemental centroid analysis for 003964545-01. Kepler magnitude: 14.78. Transit SNR 5538.55

There are 12 quarters with good PRF difference image offsets

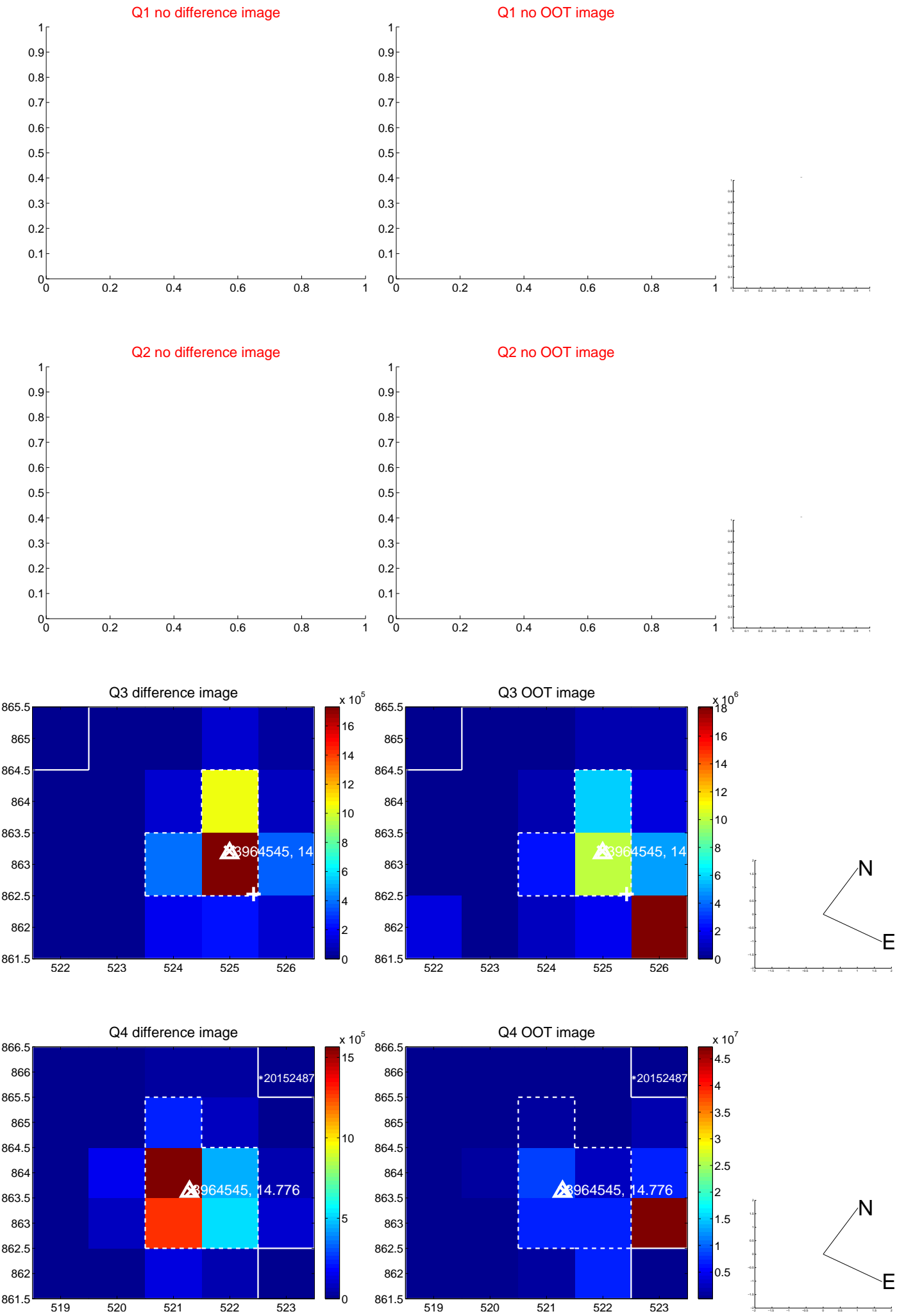
The OOT PRF centroid is offset from the target star catalog position by about 8.72 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.915 \pm 1.159$	4.24	$-4.845 \pm 1.174$	$0.825 \pm 0.398$
PRF-fit source offset from KIC position	$0.105 \pm 0.069$	1.52	$0.004 \pm 0.069$	$-0.105 \pm 0.069$
photometric centroid source offset	$3.23 \pm 0.00$	2402.56	$3.23 \pm 0.00$	$0.05 \pm 0.00$

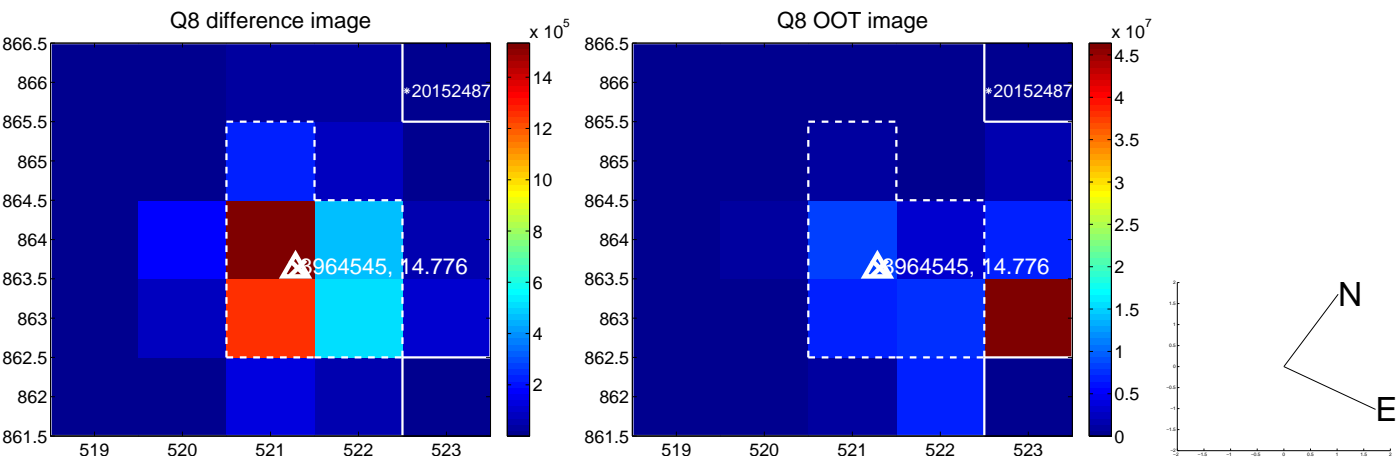
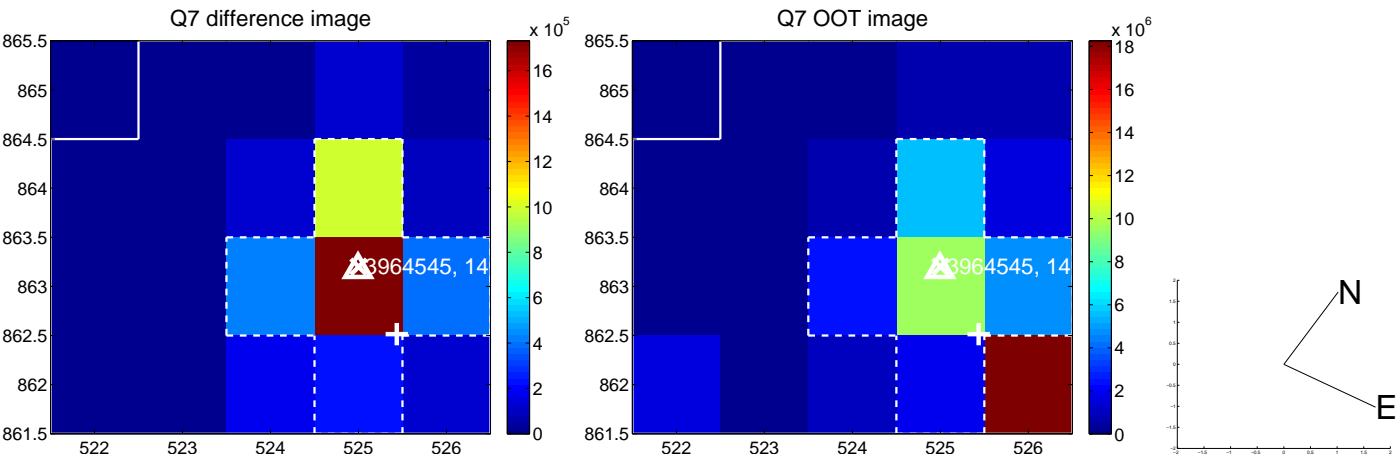
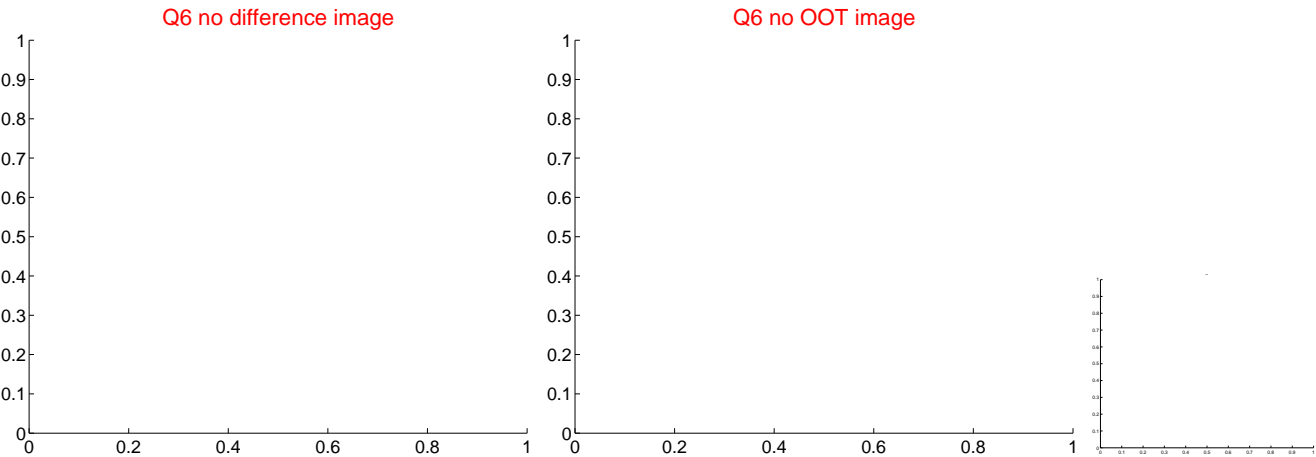
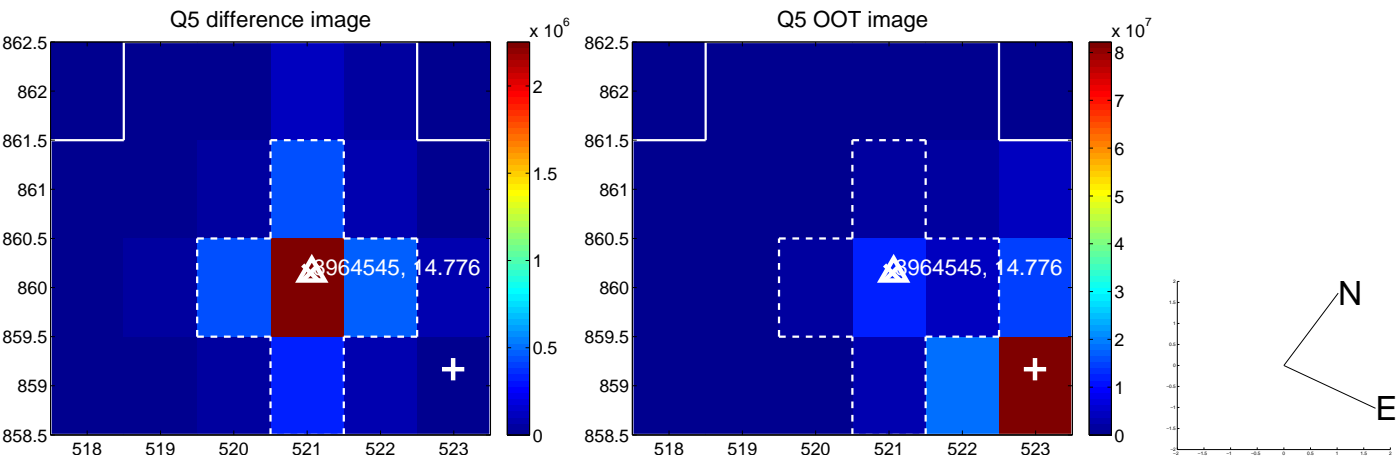


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

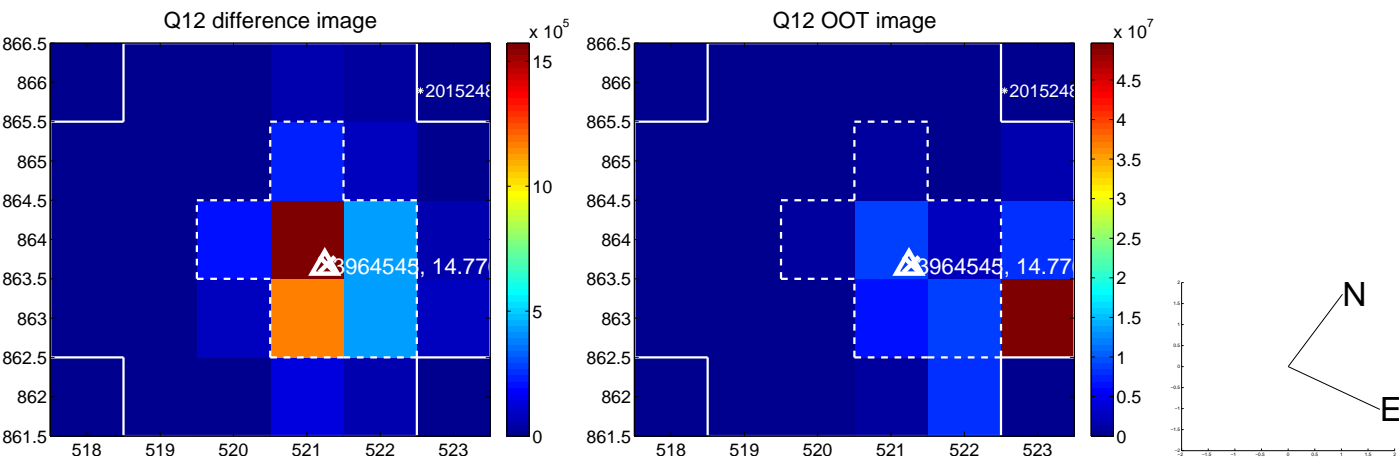
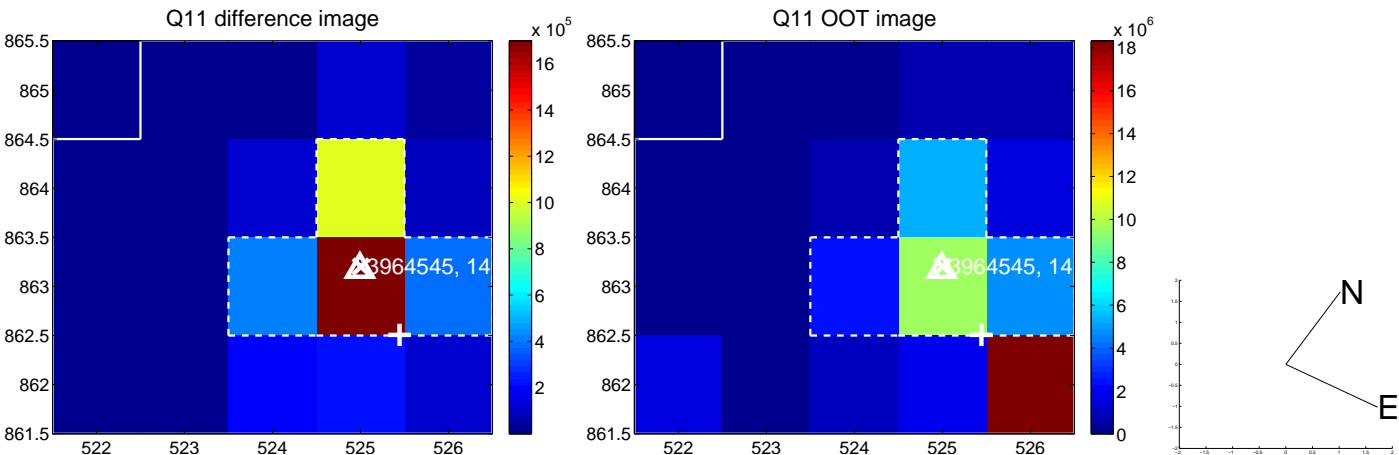
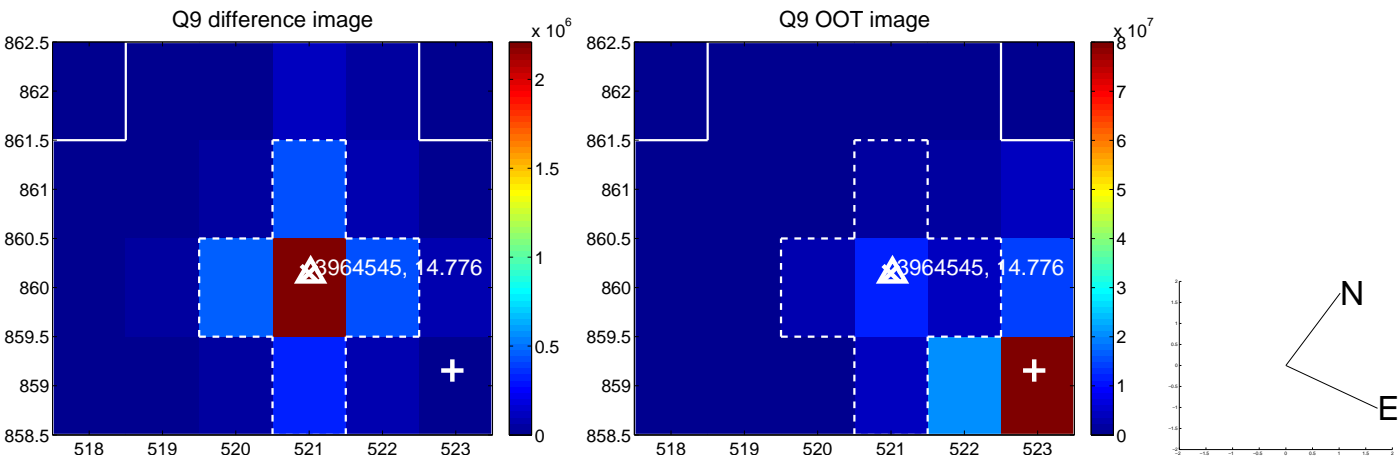


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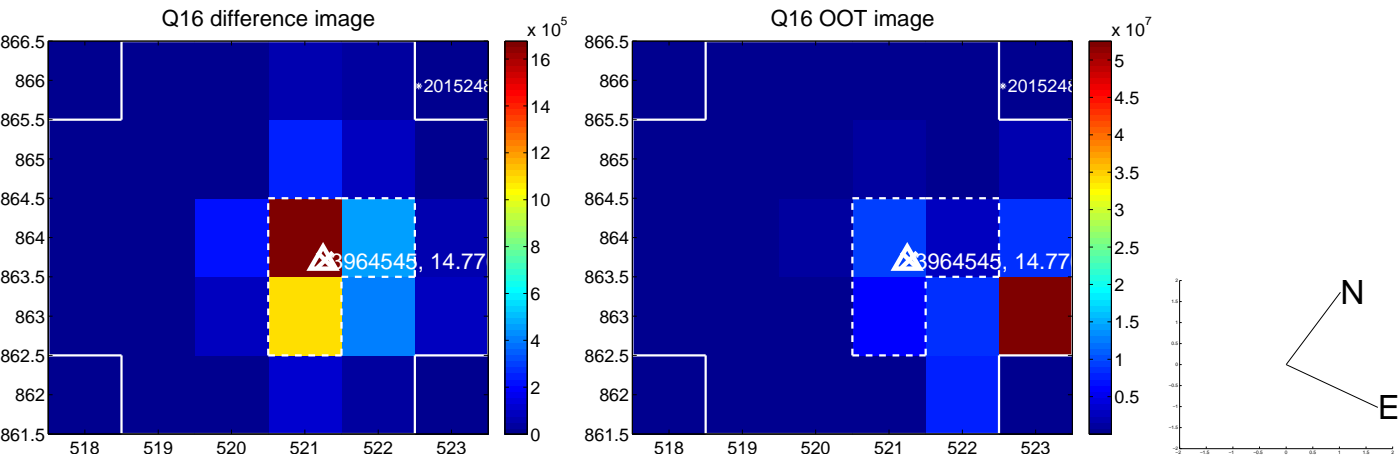
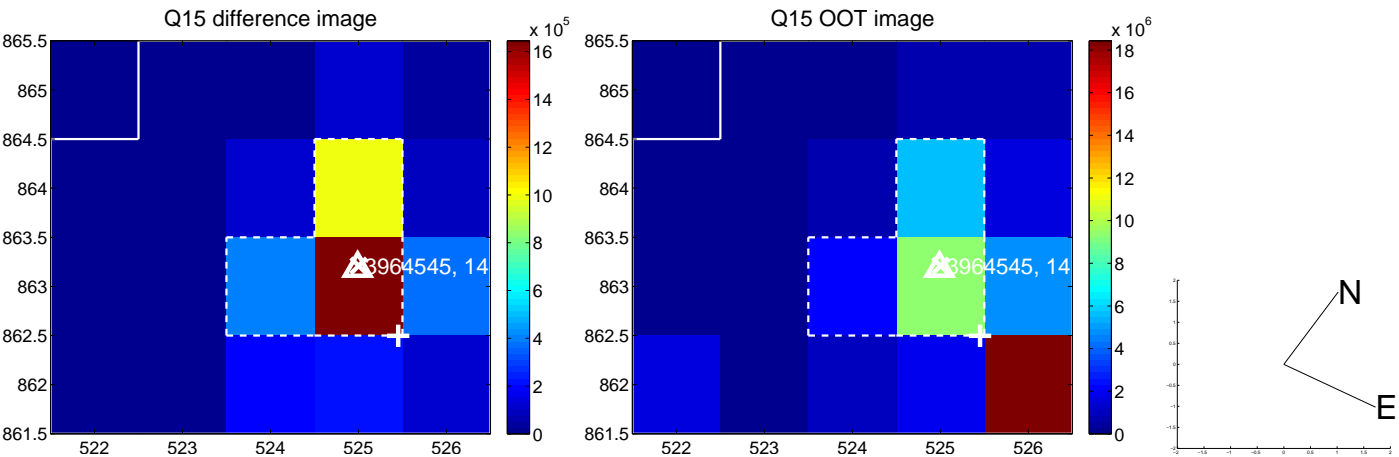
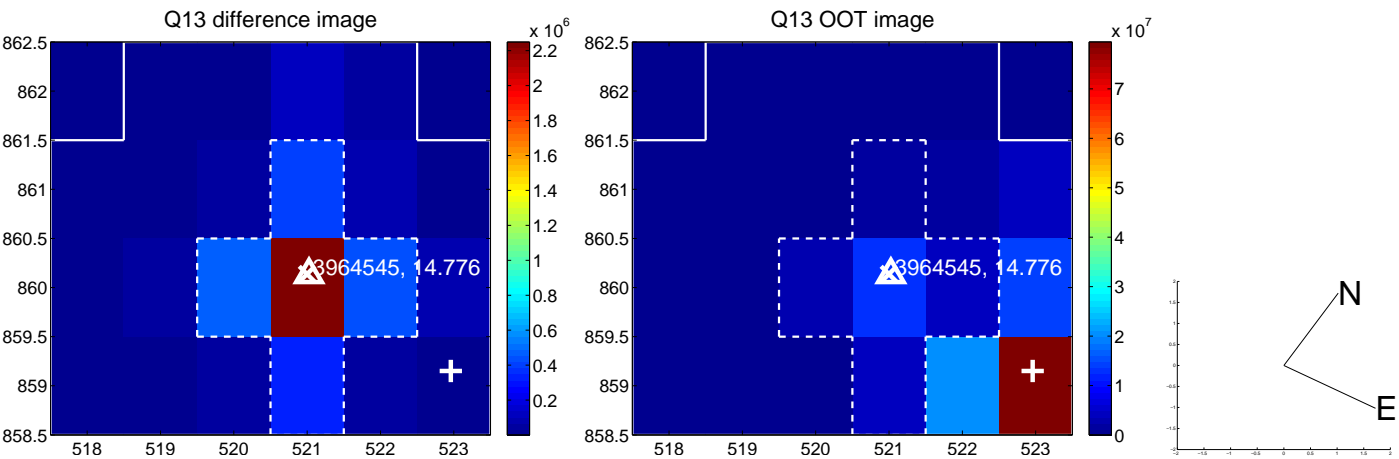




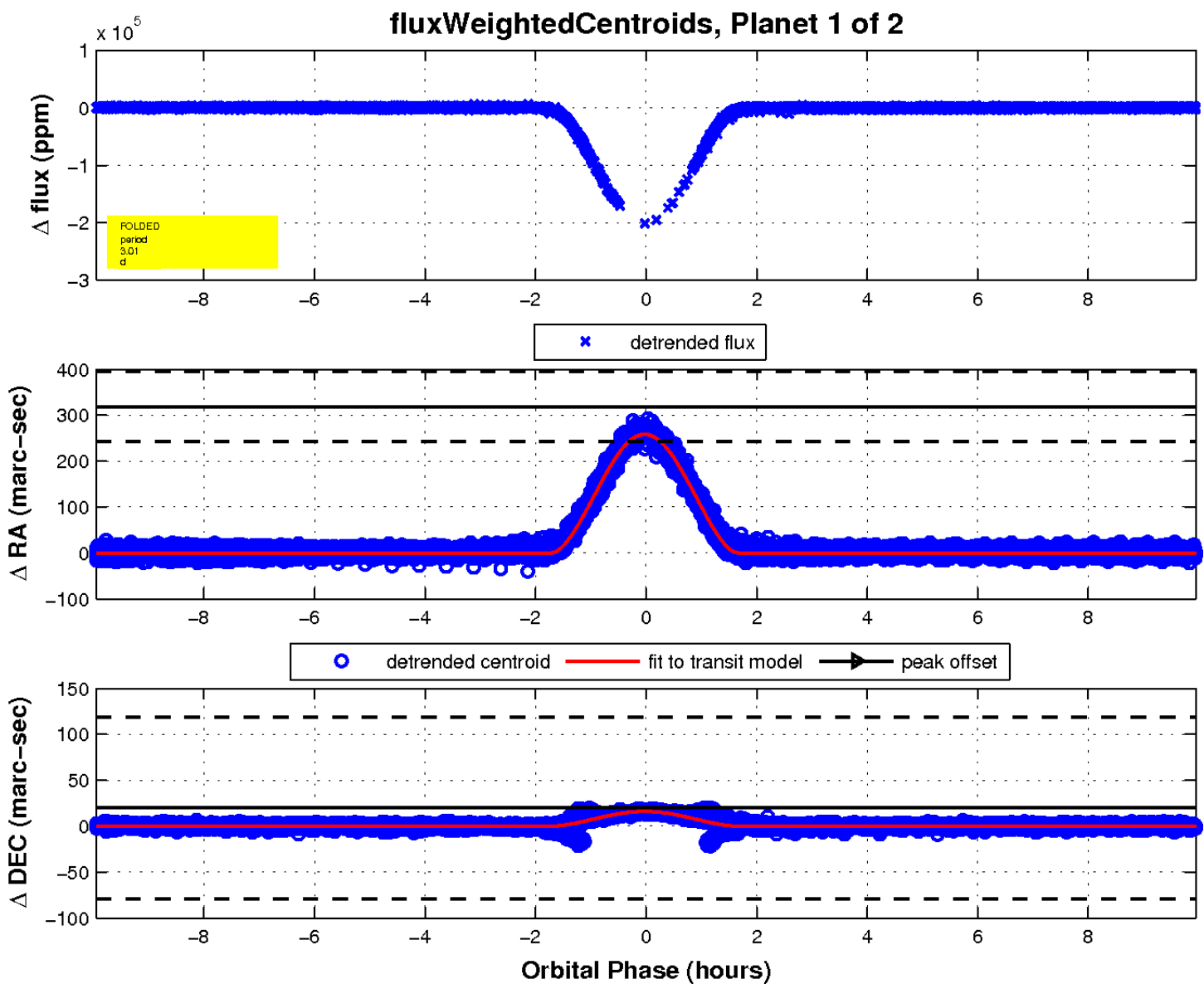
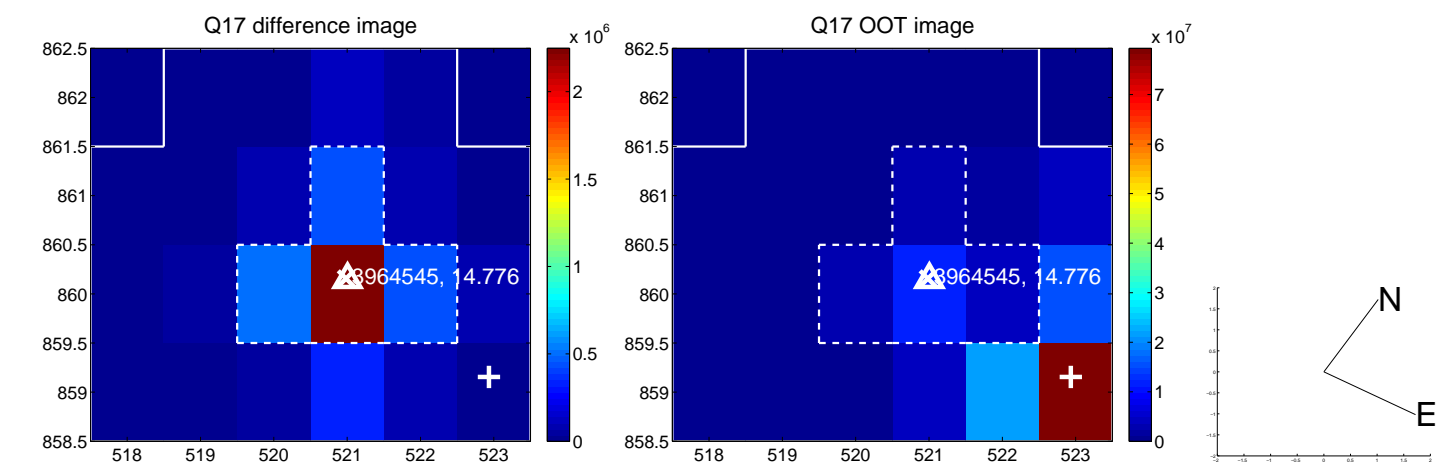
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white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

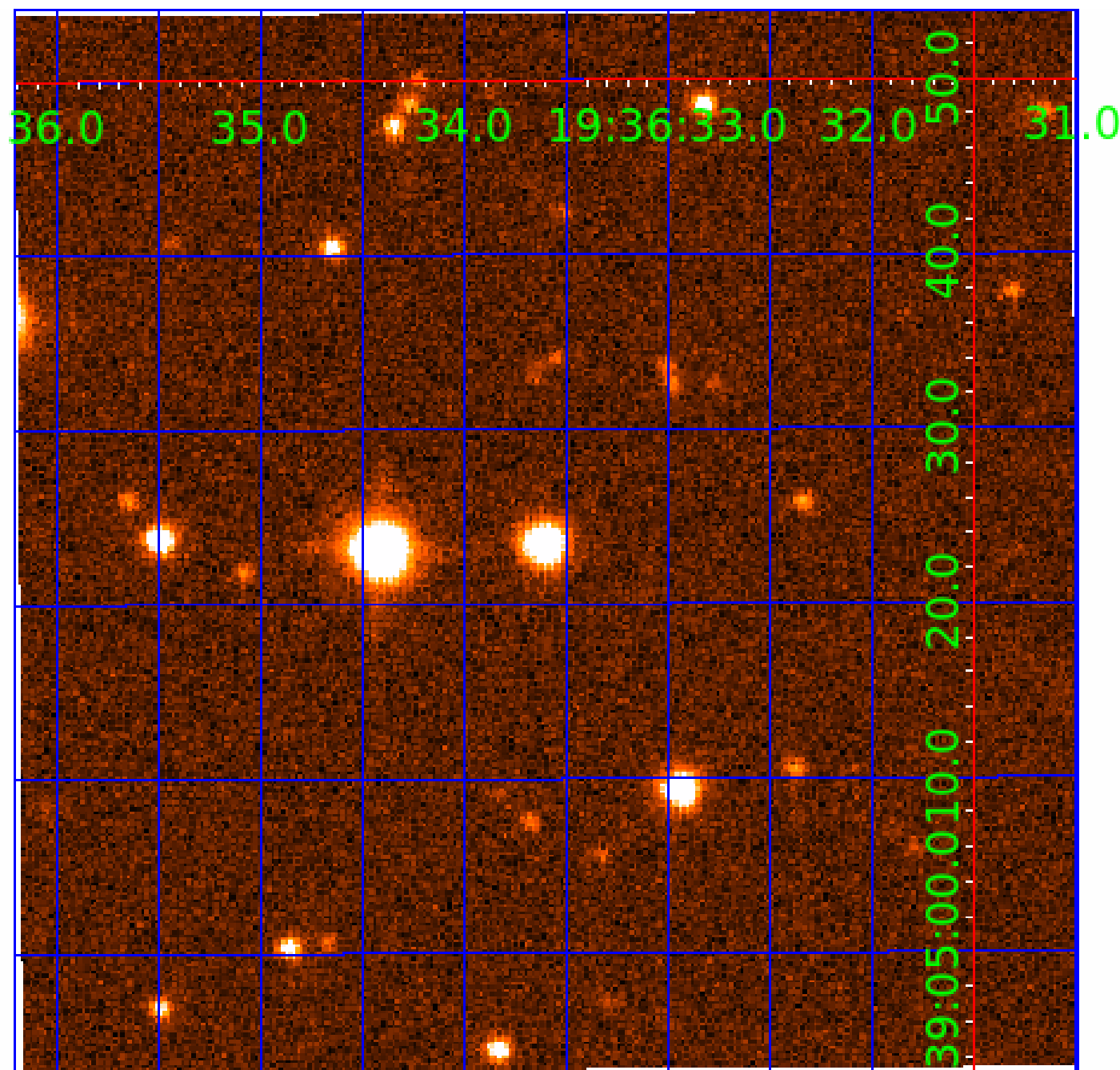


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 003964545

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003964545-01	OBS	3542.01	3.012475	132.247057	200326.9	3.317	8185.4	5538.6	1.09	6015	73.70	879.75
003964545-02	OBS	No	3.012477	133.752825	24731.6	3.156	1099.5	1031.1	1.09	6015	28.22	879.75

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003964545-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_KIC_POS
003964545-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_KIC_POS

**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 003964545-02

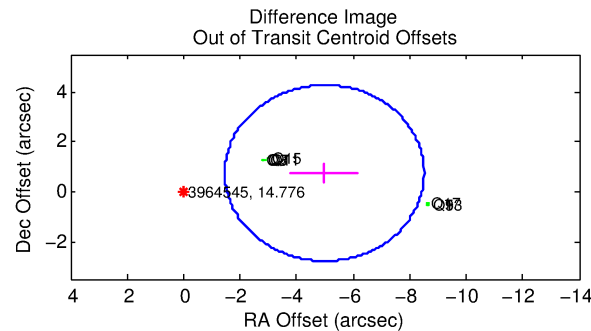
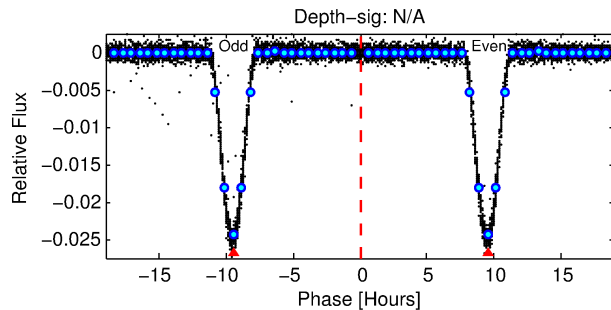
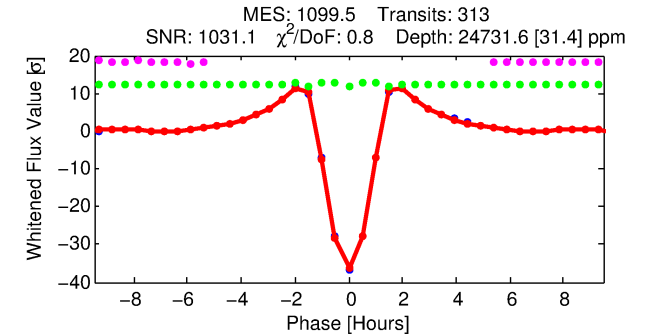
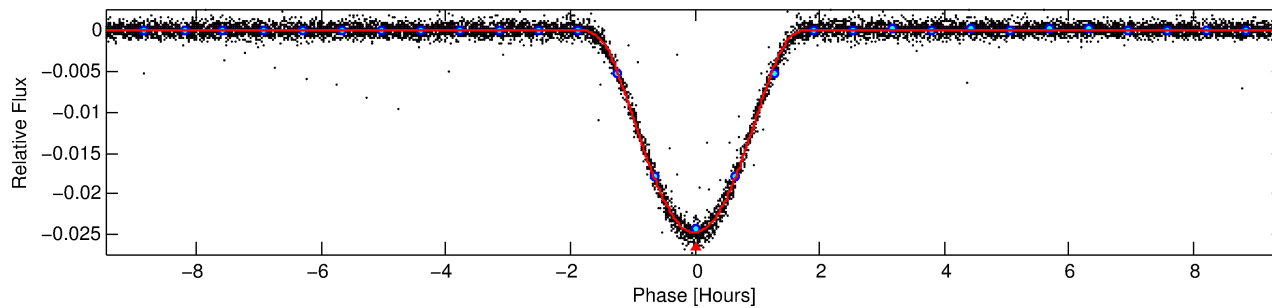
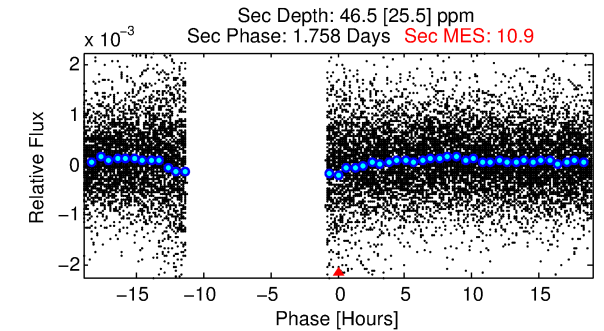
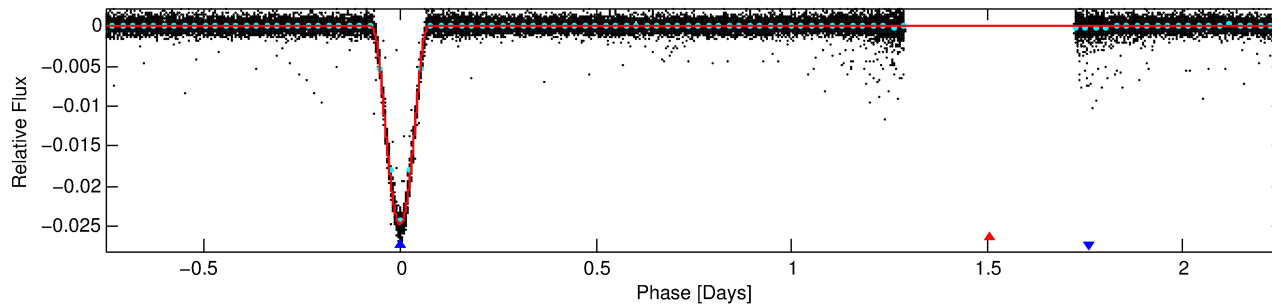
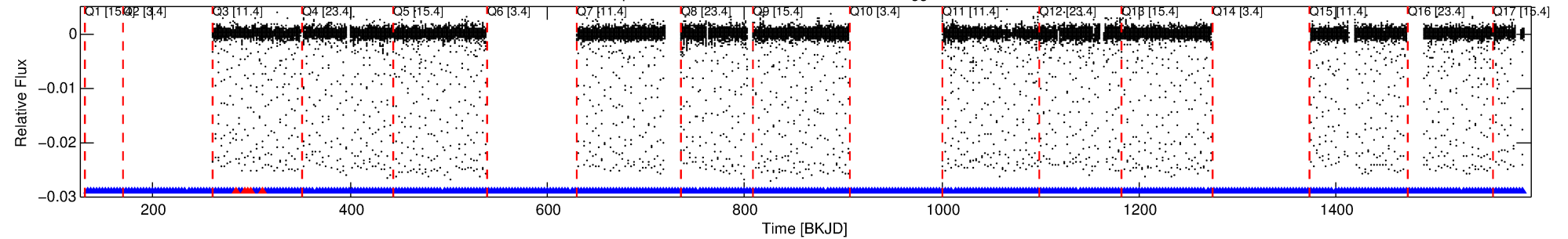
No Significant Match Found

# DV One-Page Summary

KIC: 3964545 Candidate: 2 of 2 Period: 3.012 d

KOI: K03542 Corr: No Ephemeris Match

Kp: 14.78 R\*: 1.09 Rs Teff: 6015.0 K Logg: 4.33 Fe/H: -0.340



## DV Fit Results:

Period = 3.01248 [0.00000] d  
Epoch = 133.7528 [0.0000] BKJD  
Rp/R\* = 0.2377 [0.0102]  
a/R\* = 5.62 [0.02]  
b = 0.98 [0.01]  
Seff = 879.75 [322.56]  
Teff = 1389 [127] K  
Rp = 28.22 [8.36] Re  
a = 0.0397 [0.0095] AU  
Ag = 0.05 [0.03] [-28.82σ]  
Teffp = 1019 [146] K [-1.91σ]

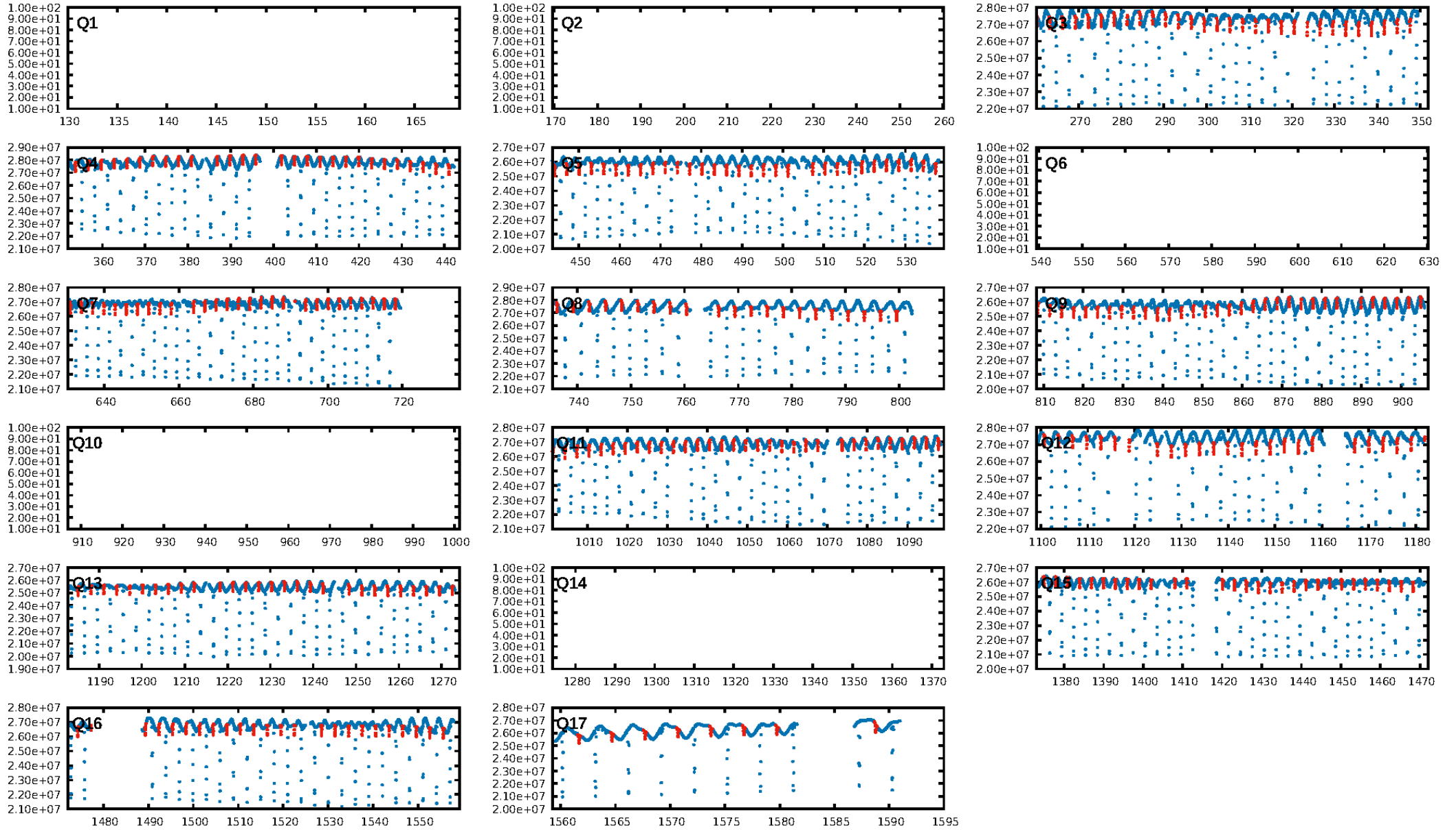
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.98 [300/305]  
GhostDiagnostic-chr: 3.178  
Centroid-sig: 0.0%  
Centroid-so: 4.365 arcsec [411.93σ]  
OotOffset-rm: 5.042 arcsec [4.29σ]  
KicOffset-rm: 0.182 arcsec [2.28σ]  
OotOffset-st: 0/4/0/4 [8]  
KicOffset-st: 0/4/4/4 [12]  
DiffImageQuality-fgm: 1.00 [12/12]  
DiffImageOverlap-fno: 1.00 [12/12]

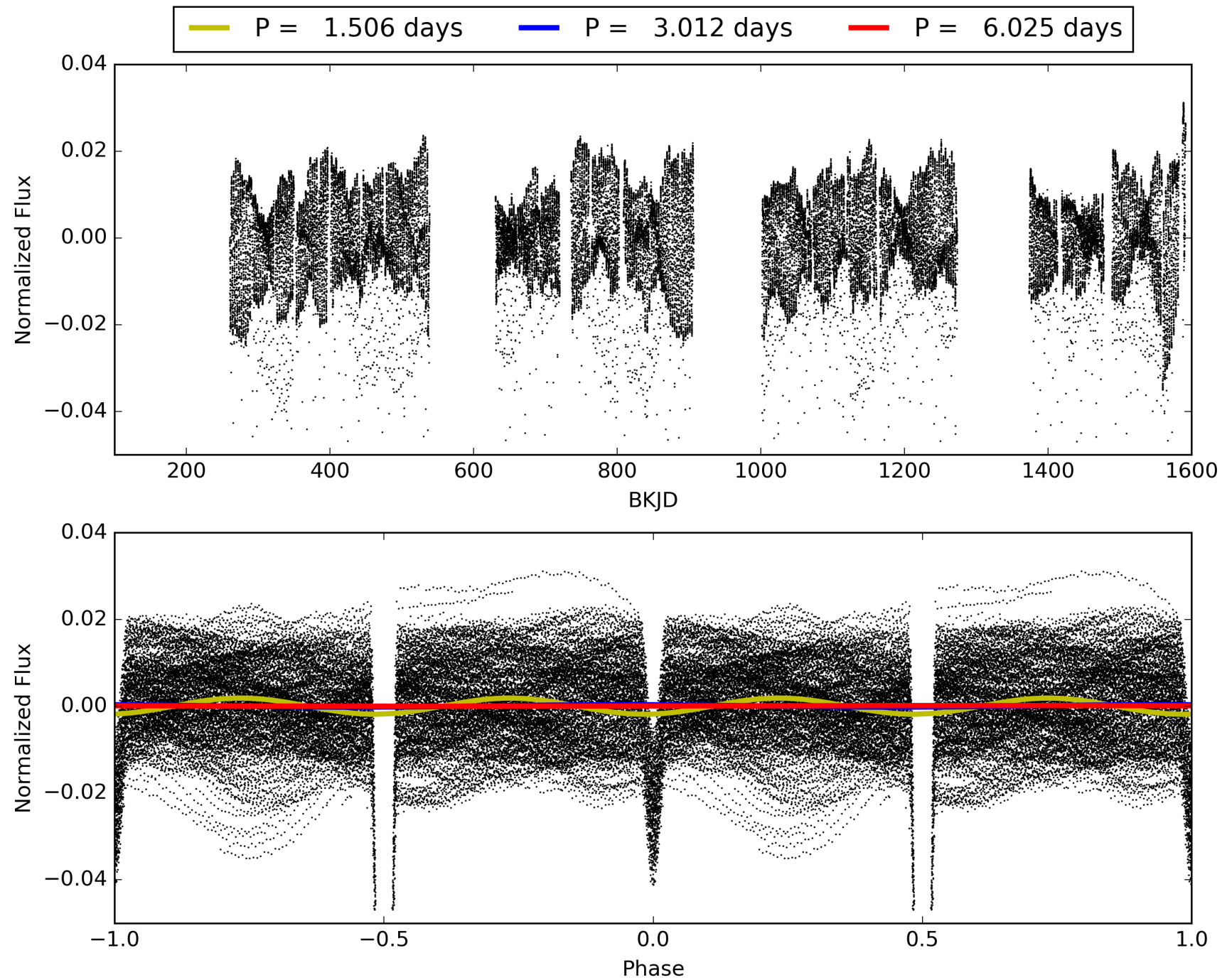
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 21:54:15 Z

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

# TCE 003964545-02, PDC Light Curves



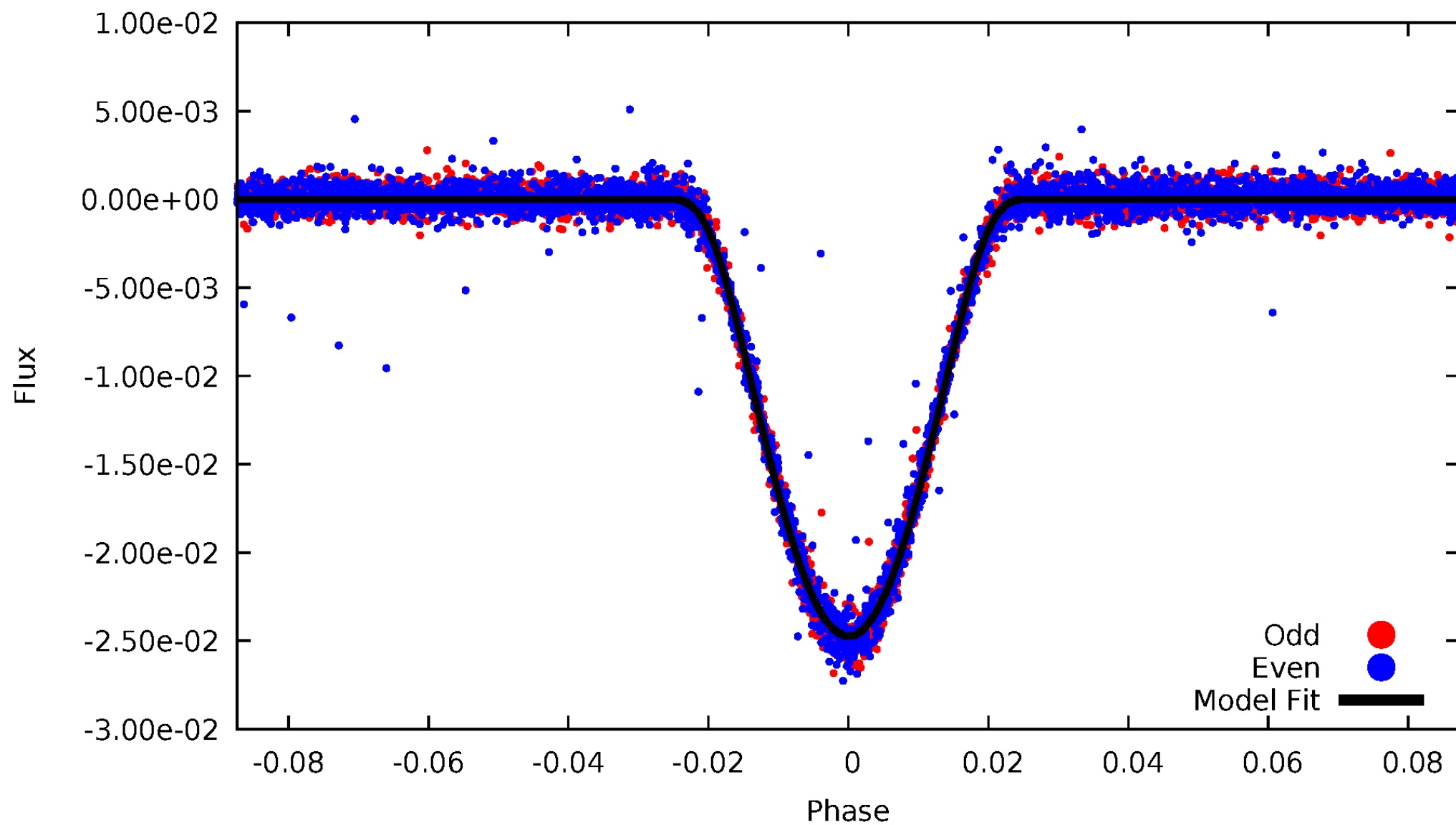
TCE 003964545-02





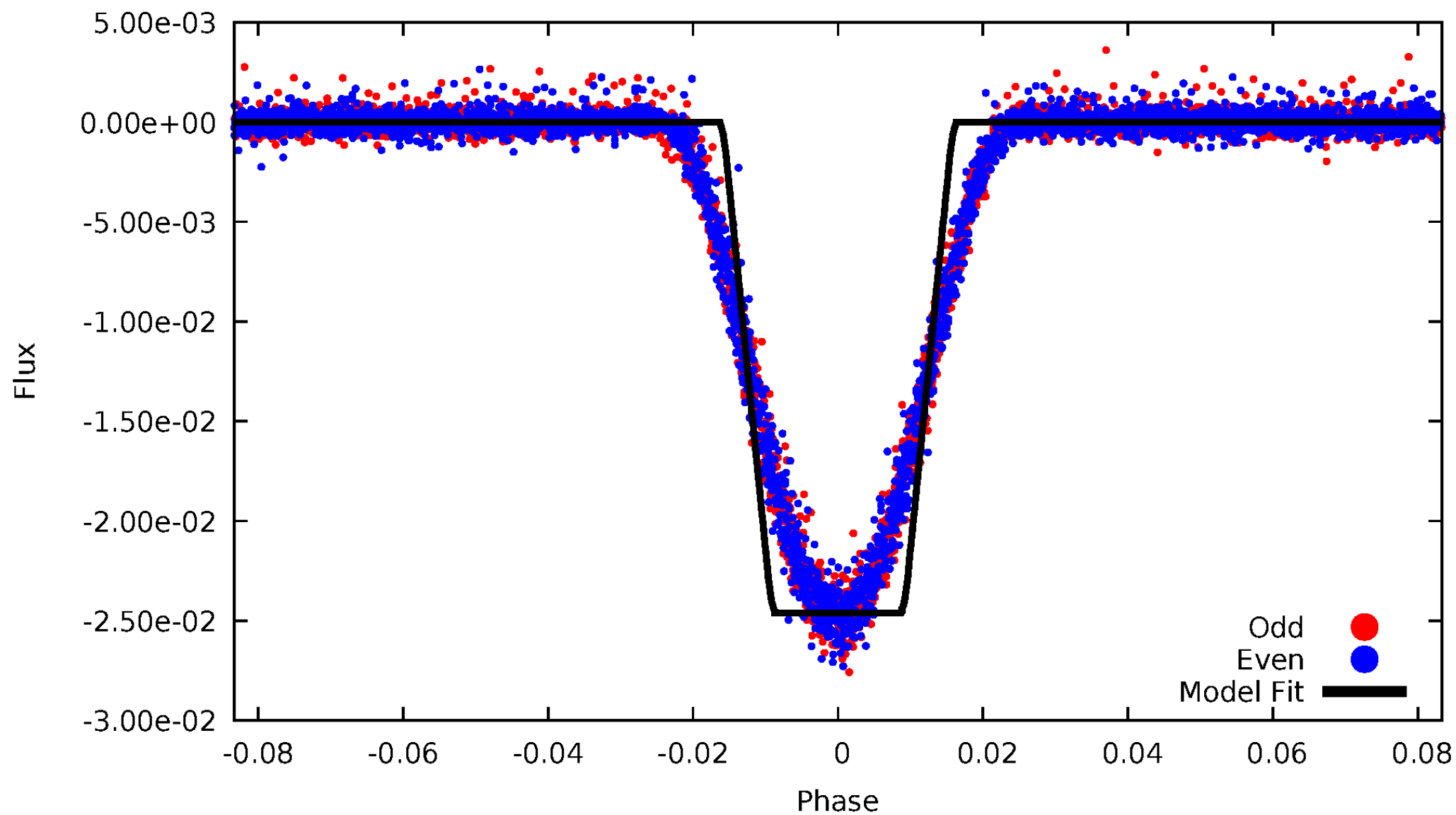
# DV Odd/Even

TCE 003964545-02



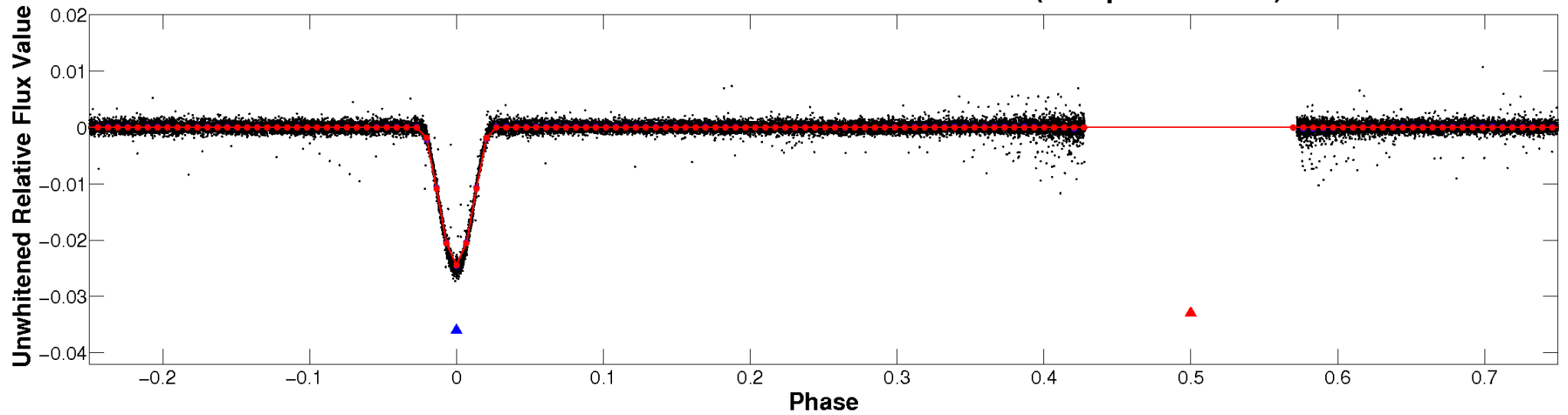
# ALT Odd/Even

TCE 003964545-02

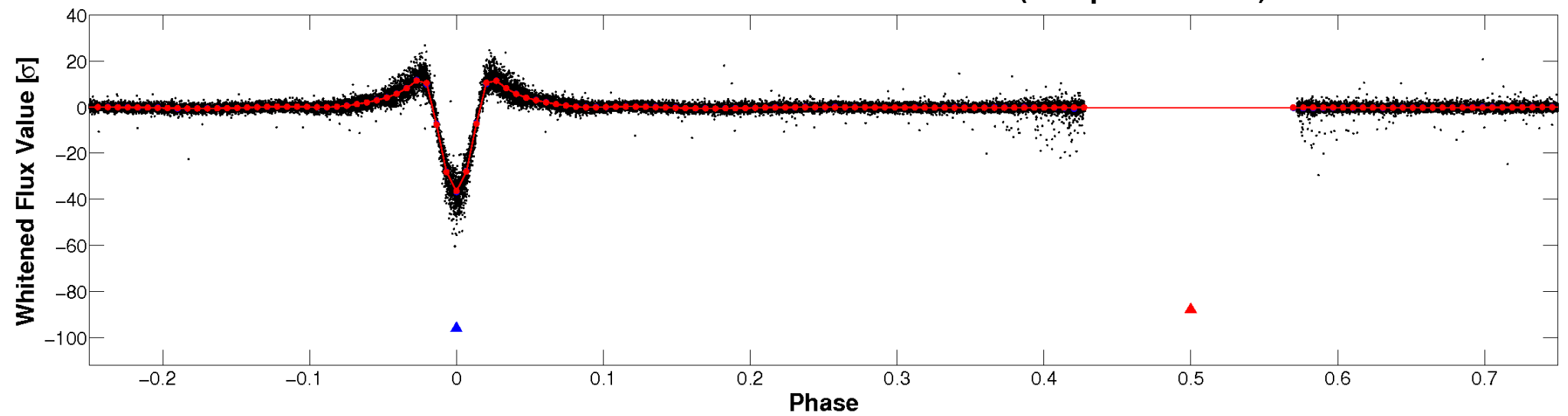


# Non-Whitened Vs. Whitened Light Curve

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

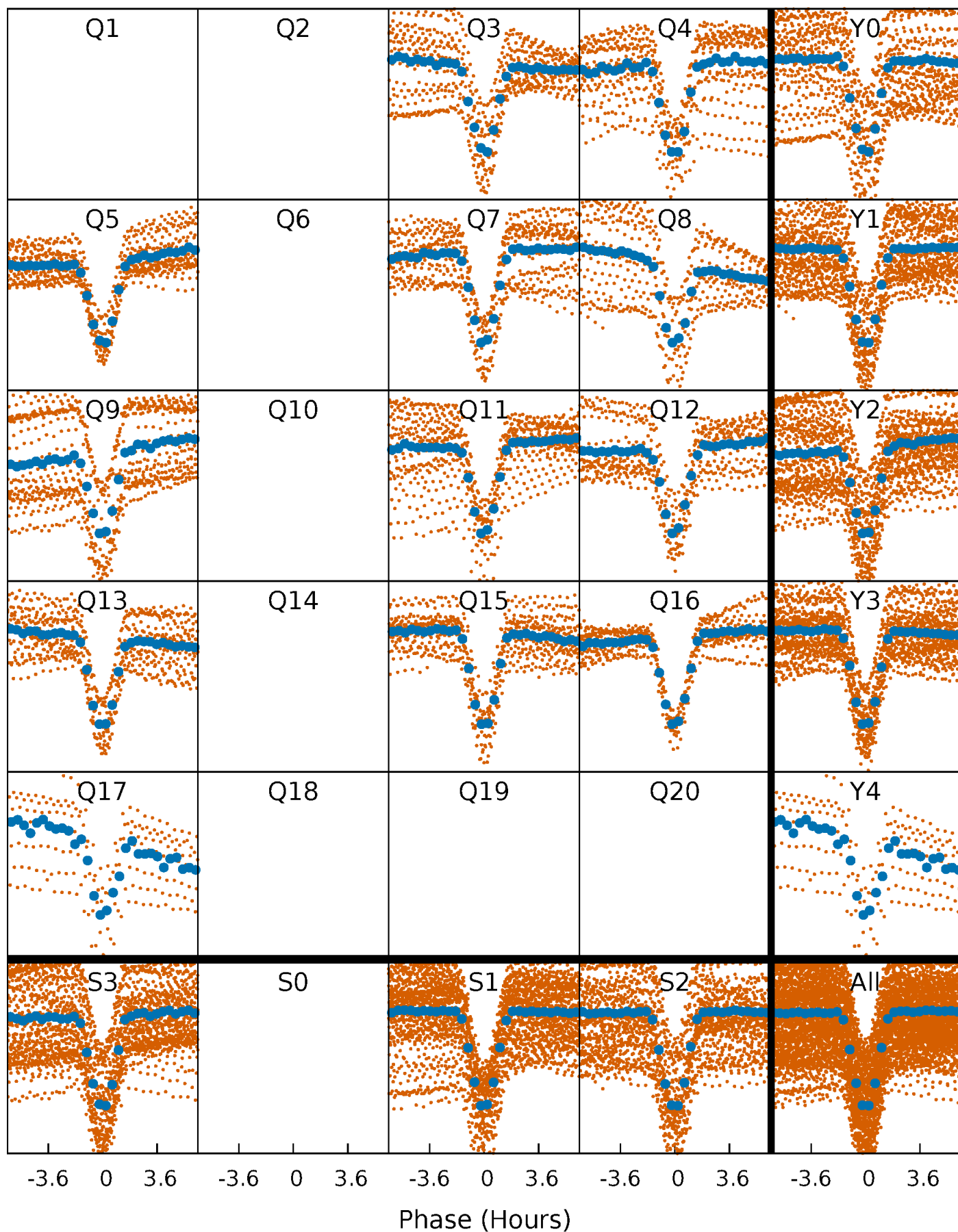


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



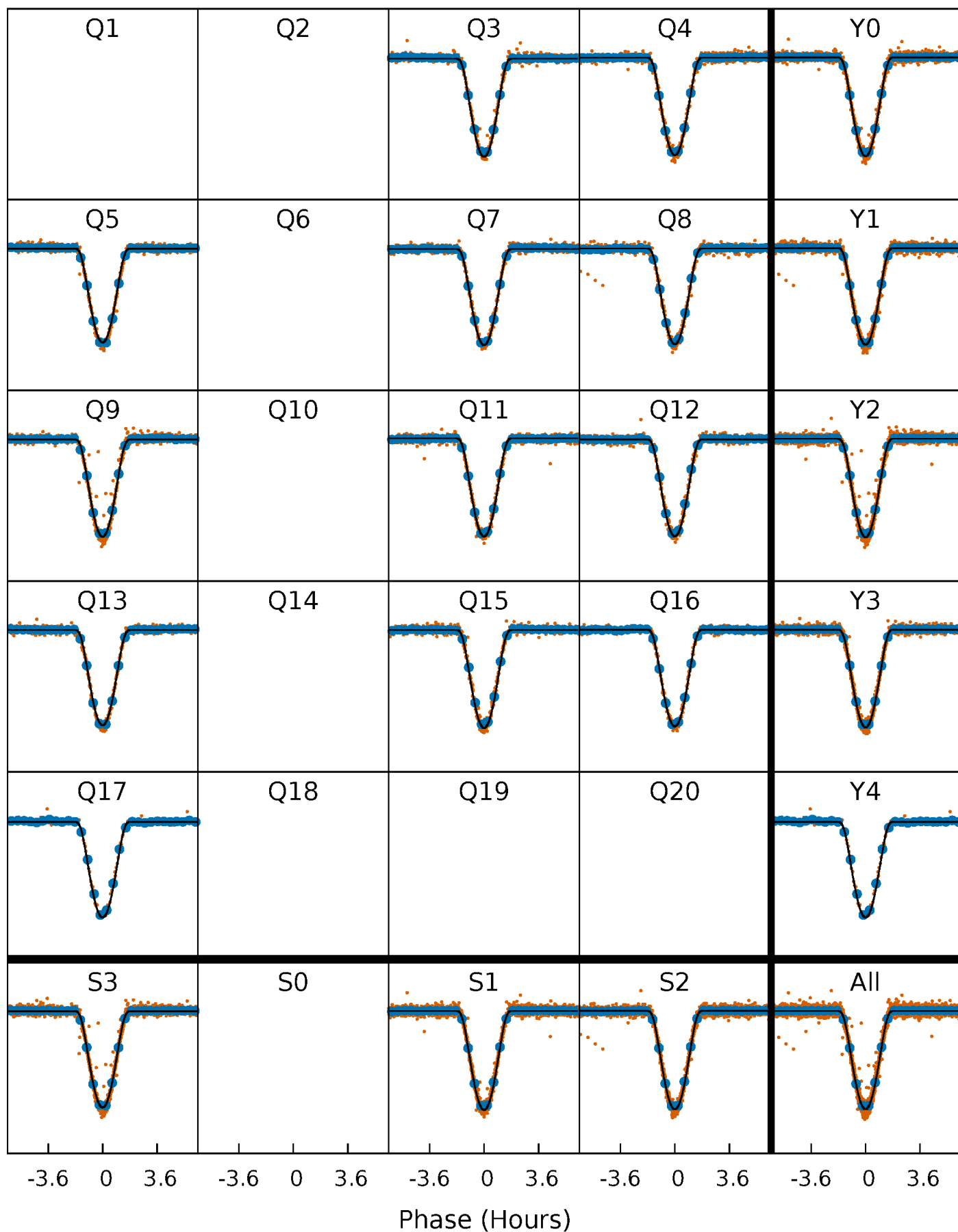
# PDC Quarter-Phased Transit Curves

TCE 003964545-02   P= 3.012477 Days    $T_0=133.752825$  (BKJD)



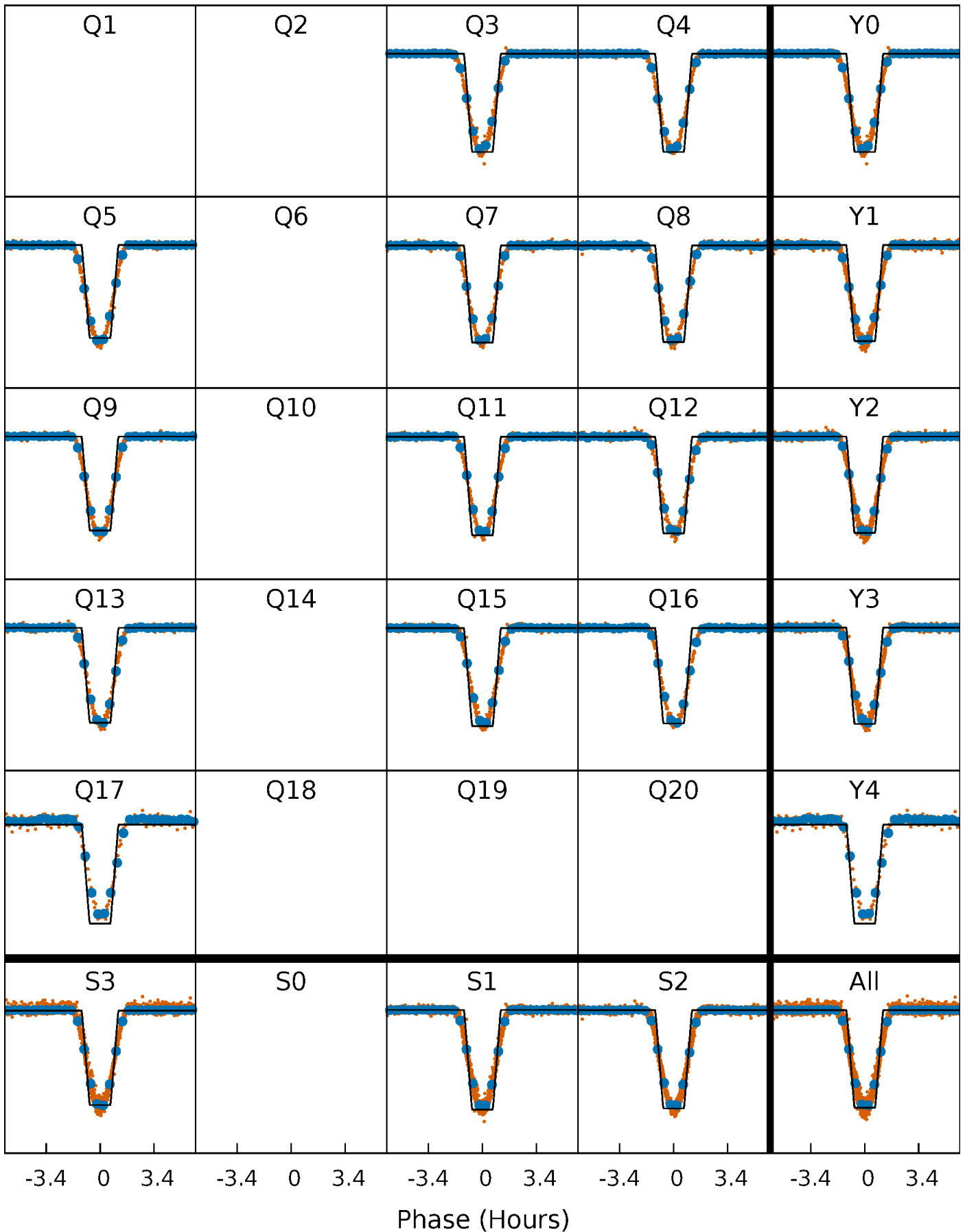
# DV Quarter-Phased Transit Curves

TCE 003964545-02   P= 3.012477 Days    $T_0=133.752825$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

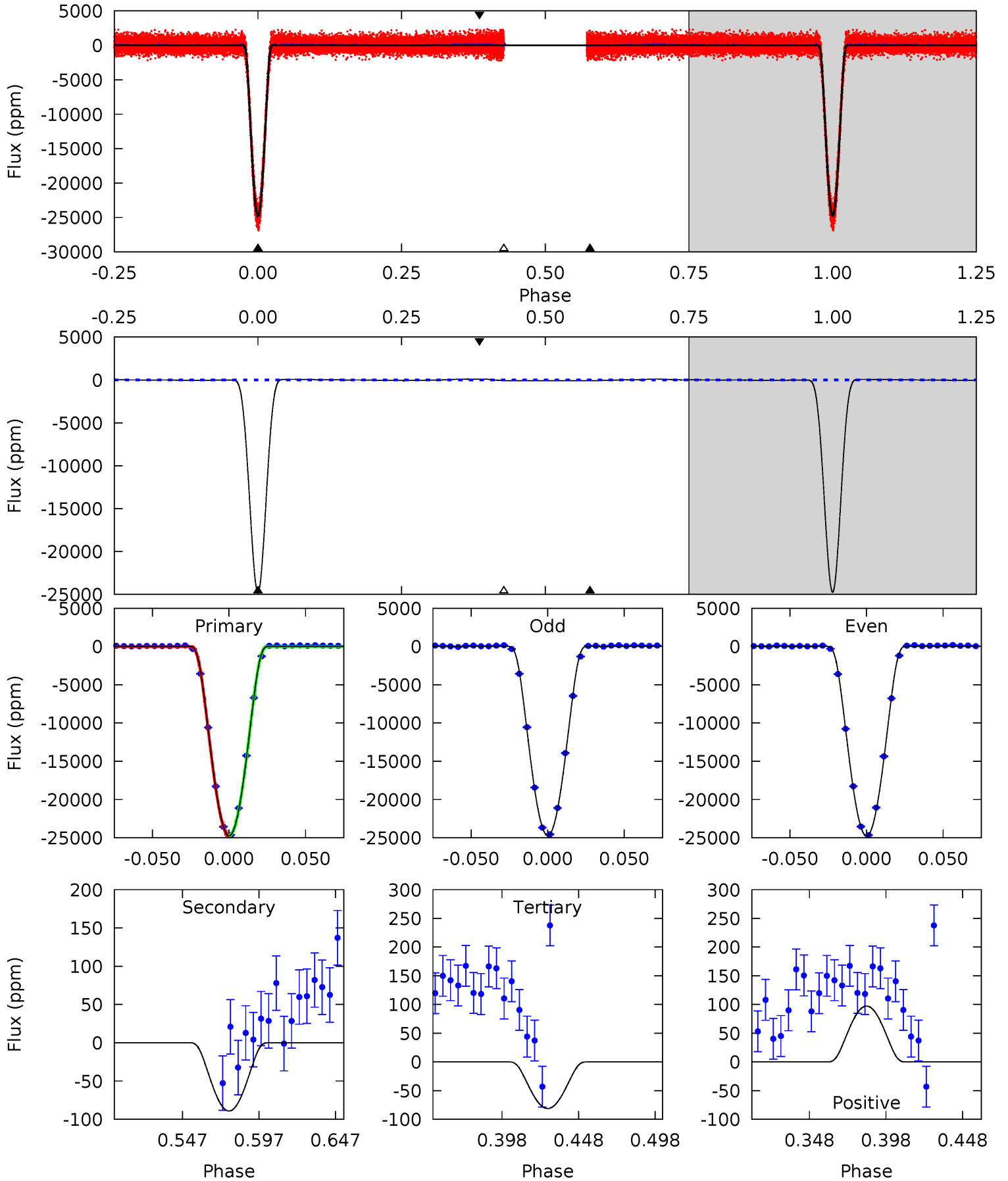
TCE 003964545-02   P= 3.012462 Days    $T_0=133.756195$  (BKJD)



# DV Model-Shift Uniqueness Test

003964545-02, P = 3.012477 Days, E = 133.752825 Days

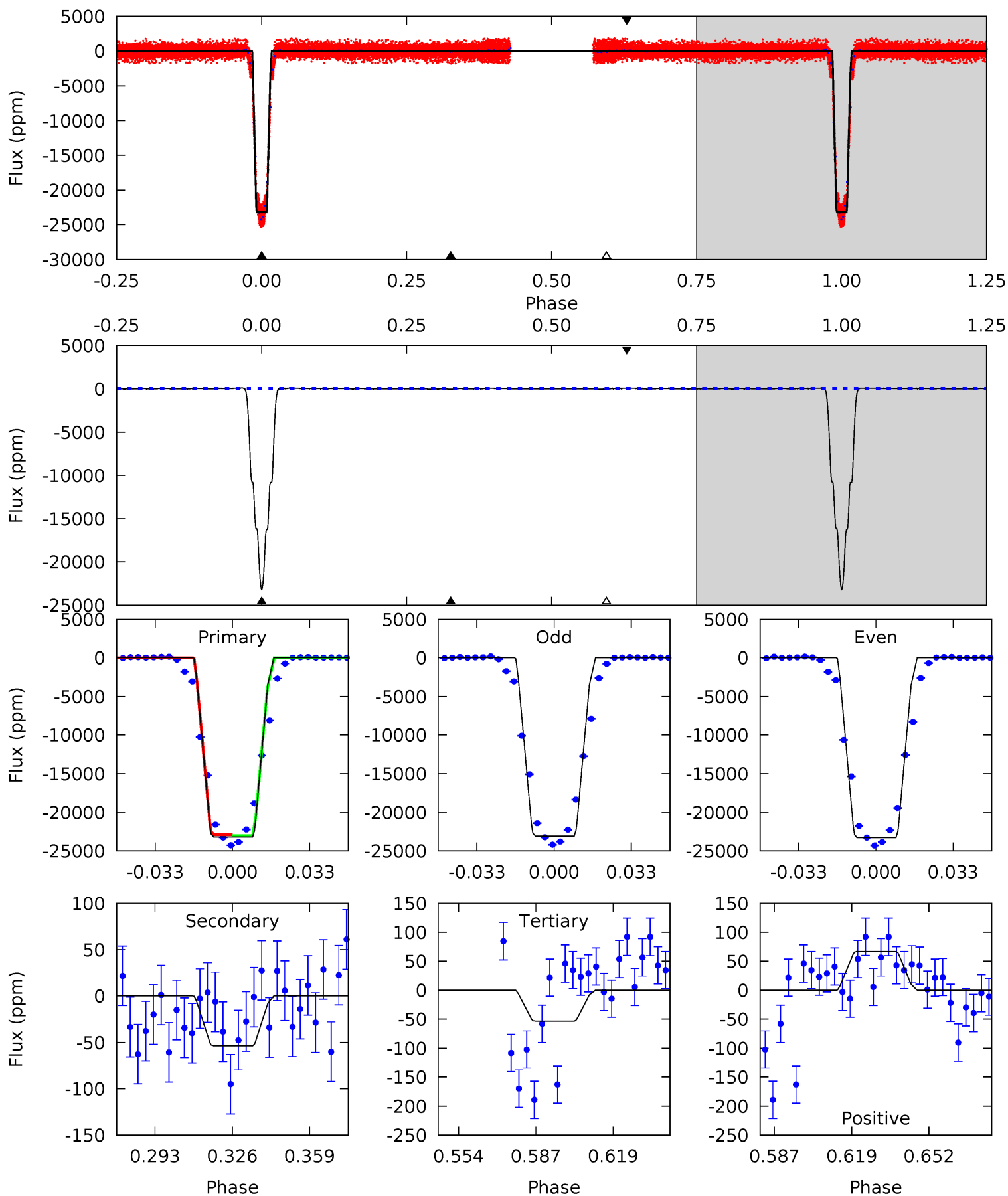
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2012	7.26	6.60	7.91	4.71	1.96	3.73	2006	2004	0.65	-0.65	2.64	1.00	0.00	1.61



# Alt Model-Shift Uniqueness Test

003964545-02, P = 3.012462 Days, E = 133.756195 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
1430	3.31	3.29	4.13	4.79	2.14	1.53	1427	1426	0.02	-0.82	6.72	1.00	0.00	4.62





### Stellar Parameters For KIC 003964545

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6015^{+190}_{-212}$	$4.329^{+0.162}_{-0.180}$	$-0.340^{+0.300}_{-0.300}$	$1.088^{+0.319}_{-0.213}$	$0.920^{+0.131}_{-0.095}$	$1.006^{+0.892}_{-0.506}$
	+3%/-4%	+4%/-4%	+88%/-88%	+29%/-20%	+14%/-10%	+89%/-50%
Source	KIC0	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 003964545-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-89 \pm 12$	$28.30^{+4.56}_{-3.24}$	$1942^{+143}_{-124}$	$-2347^{+99}_{-111}$	$0.096^{+0.033}_{-0.025}$
Alt.	$-54 \pm 16$	$18.52^{+3.50}_{-2.27}$	$1940^{+153}_{-135}$	$-2302^{+174}_{-133}$	$0.125^{+0.070}_{-0.044}$

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

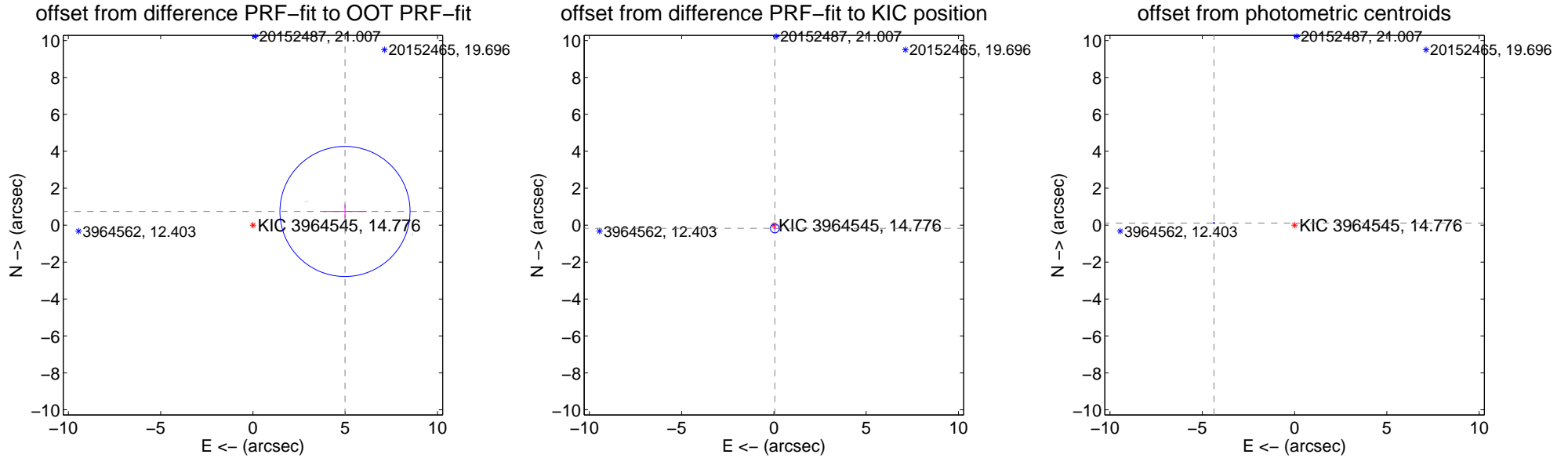
## DV Centroid Data

Supplemental centroid analysis for 003964545-02. Kepler magnitude: 14.78. Transit SNR 1031.06

There are 12 quarters with good PRF difference image offsets

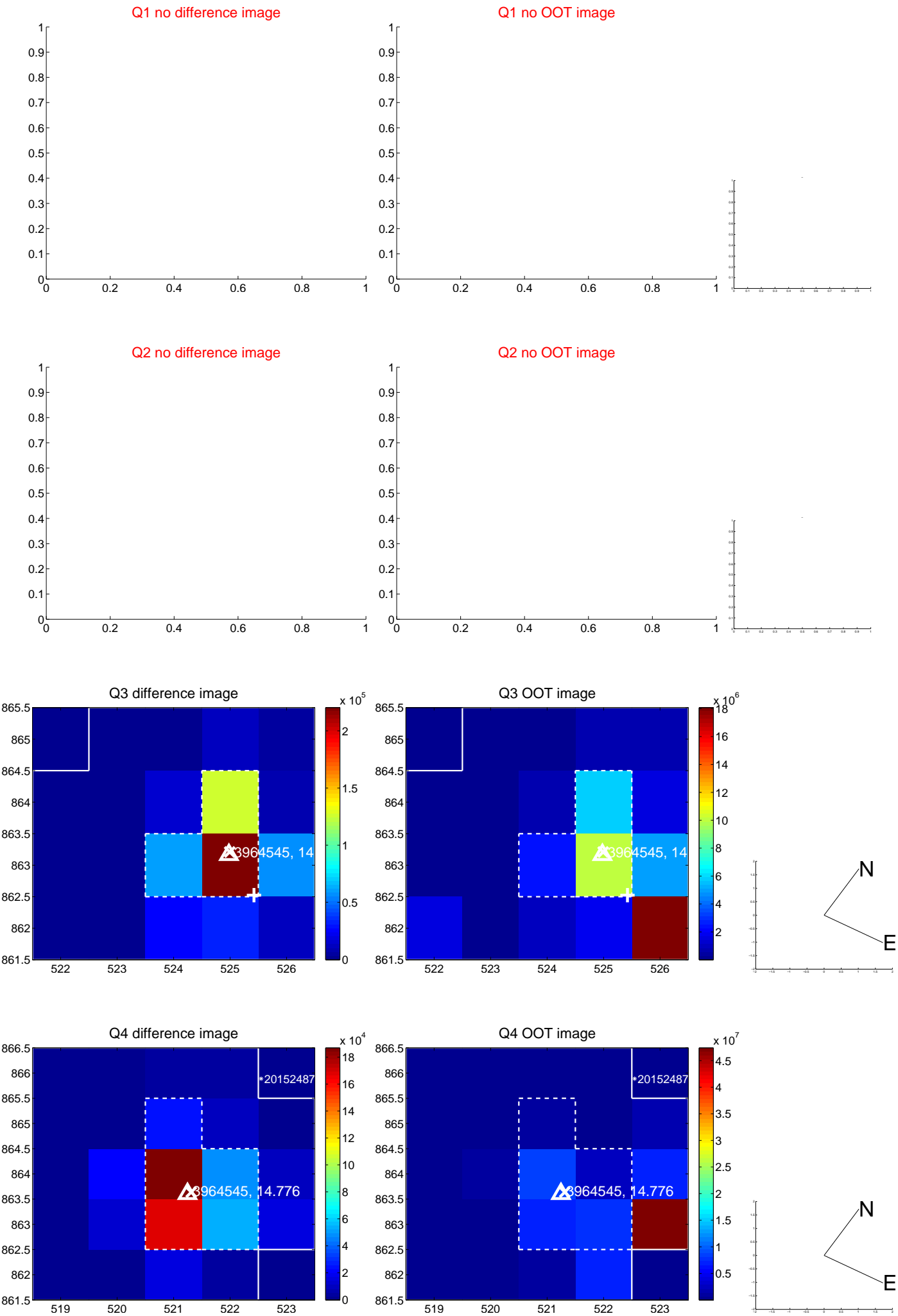
The OOT PRF centroid is offset from the target star catalog position by about 8.71 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$5.042 \pm 1.175$	4.29	$-4.987 \pm 1.186$	$0.742 \pm 0.372$
PRF-fit source offset from KIC position	$0.182 \pm 0.080$	2.28	$-0.049 \pm 0.072$	$-0.175 \pm 0.078$
photometric centroid source offset	$4.37 \pm 0.01$	411.93	$4.36 \pm 0.01$	$0.11 \pm 0.00$

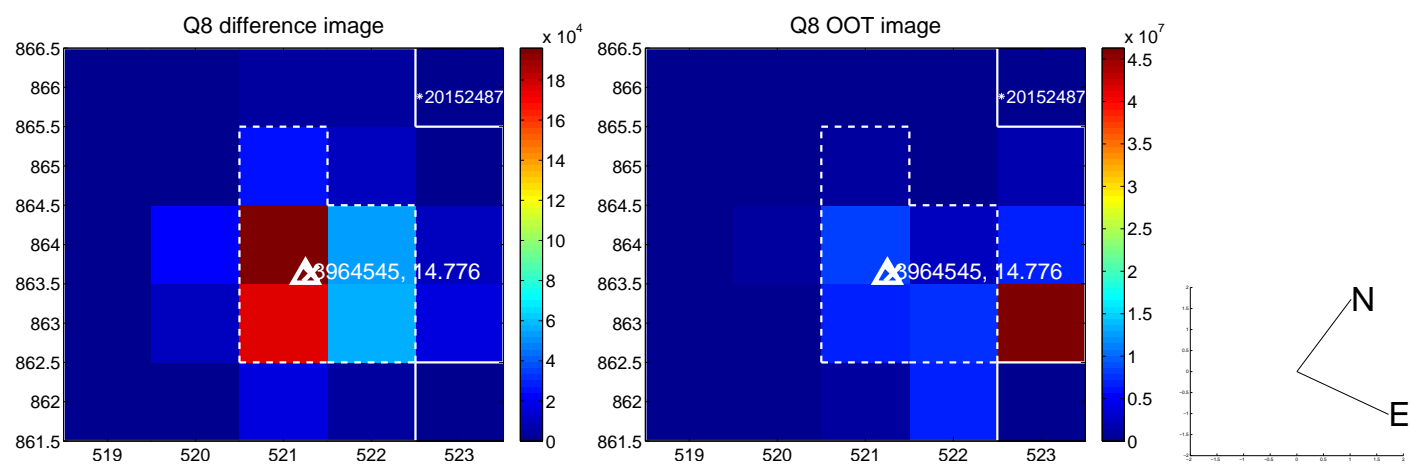
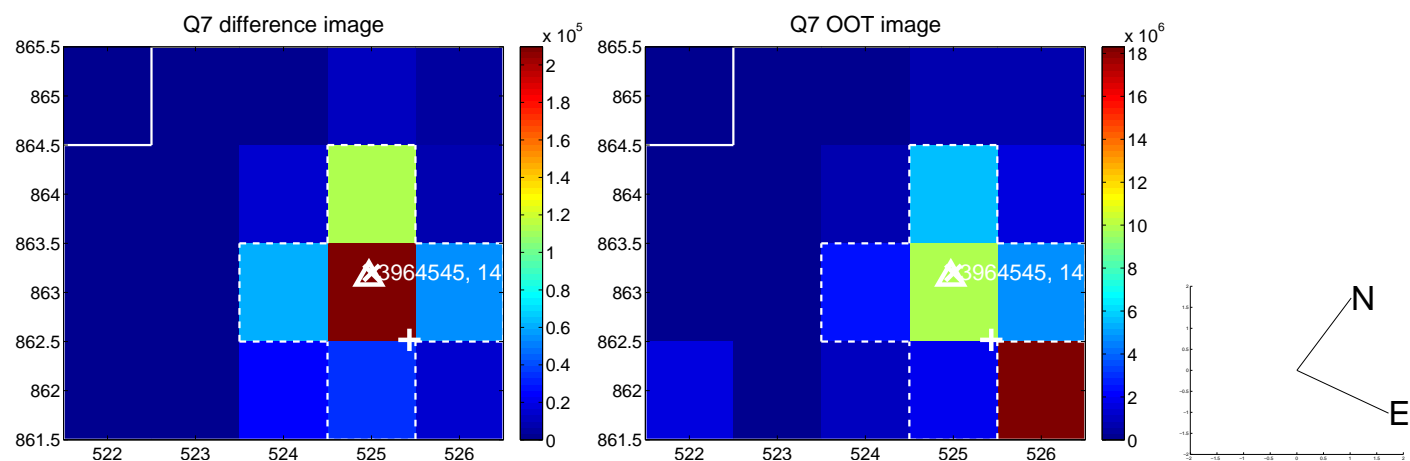
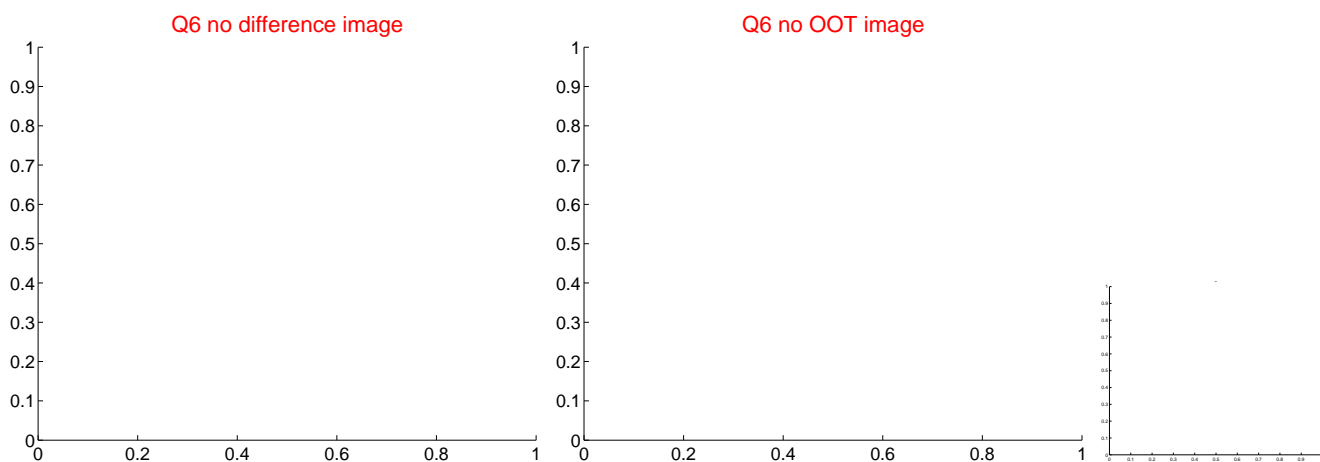
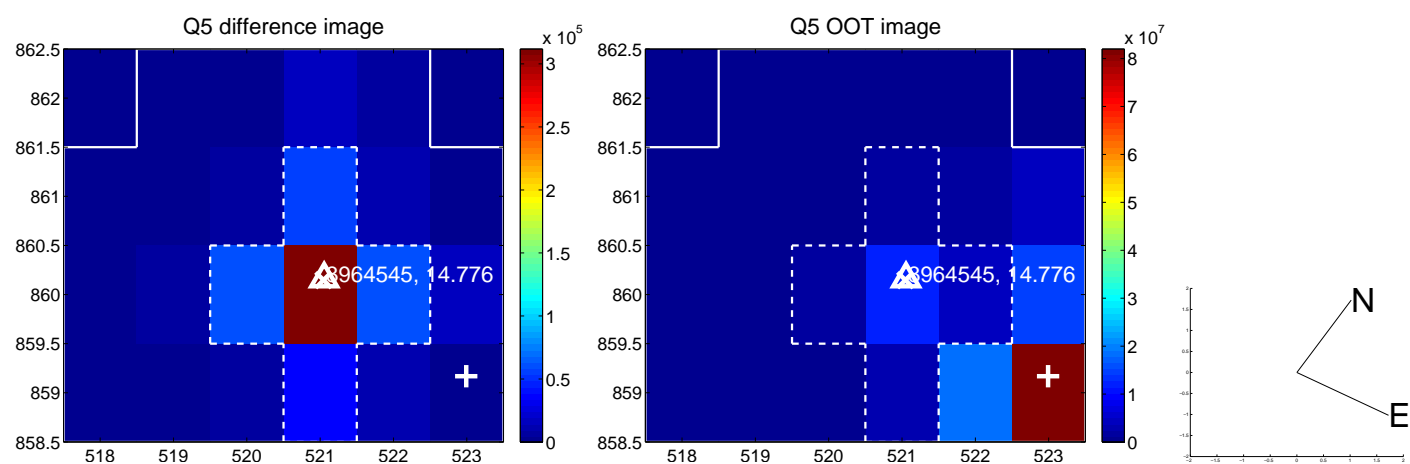


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

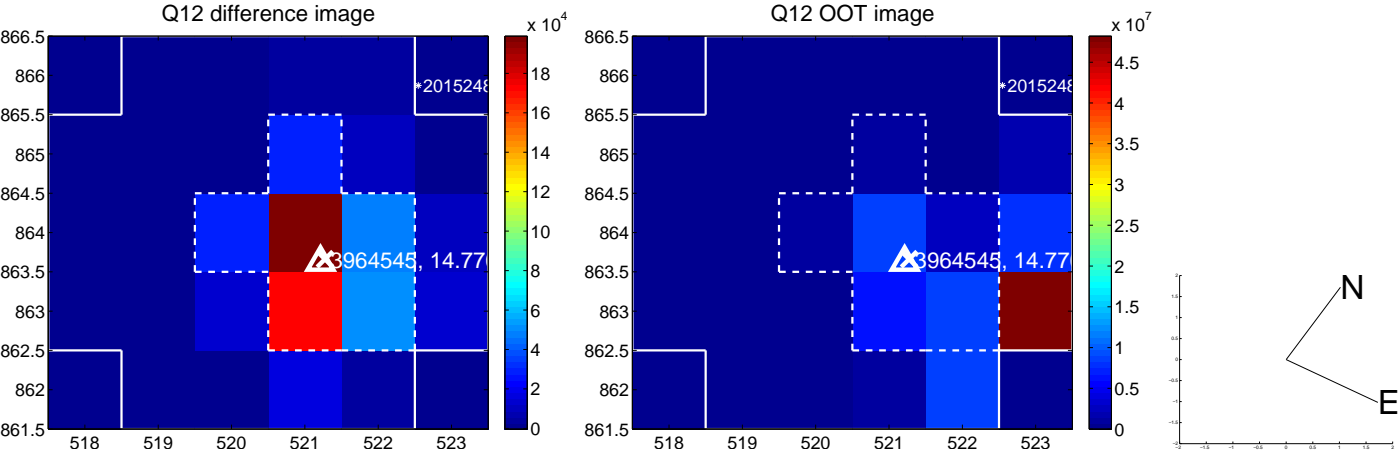
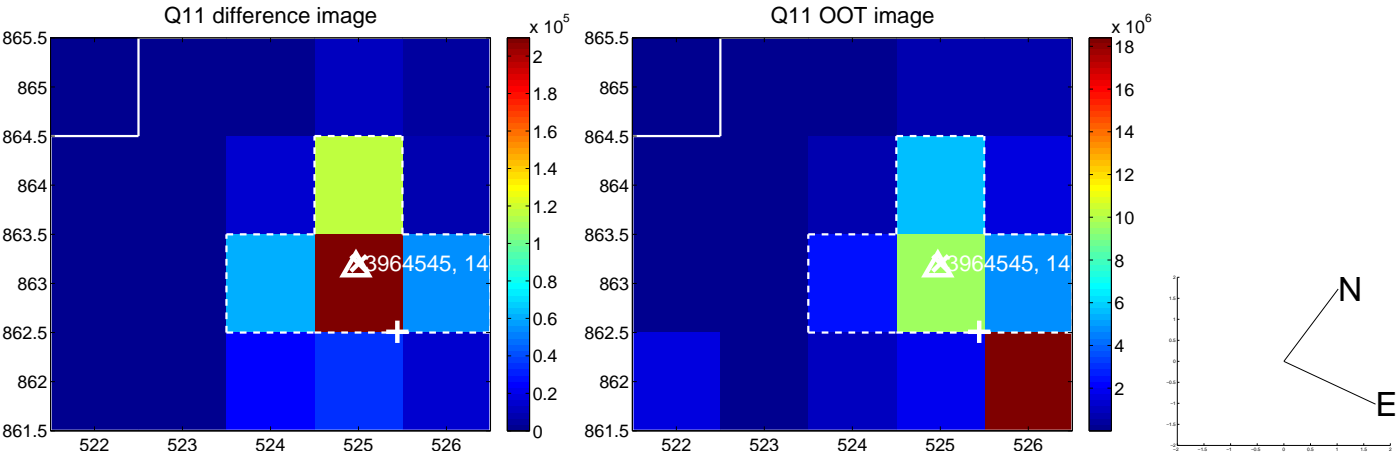
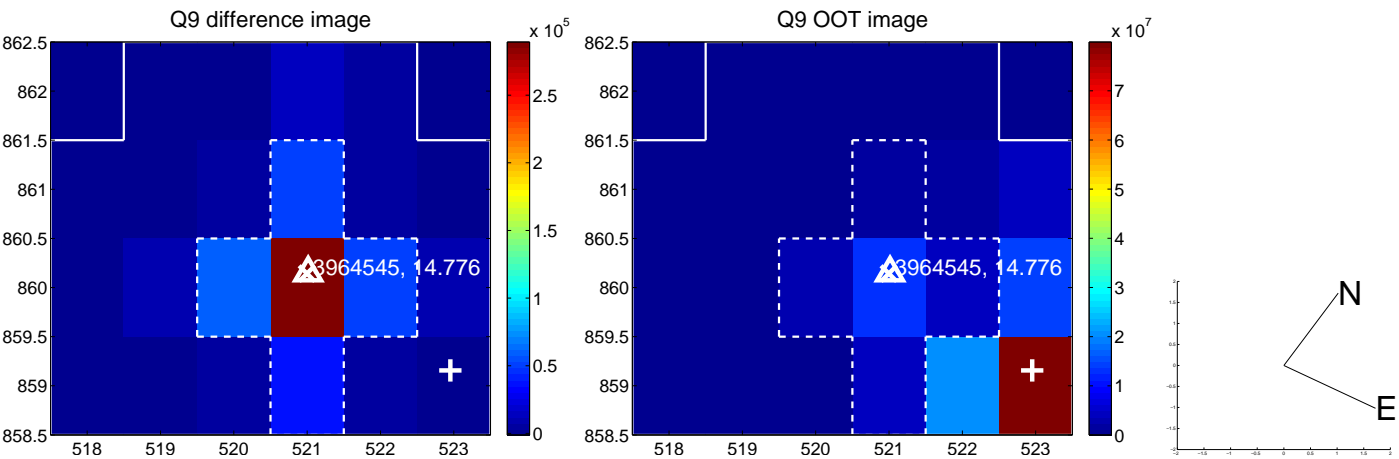
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



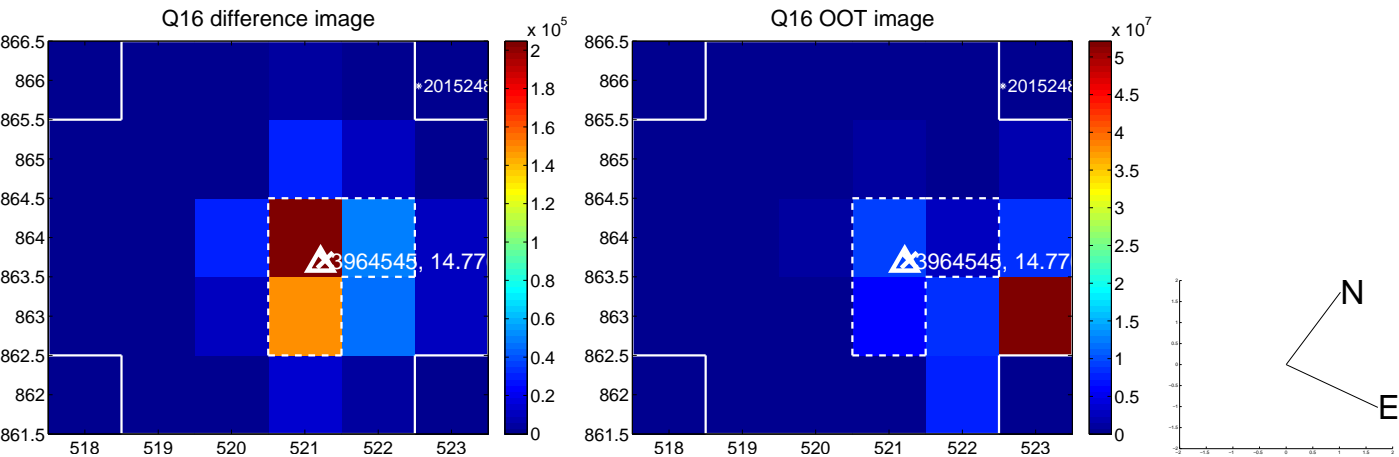
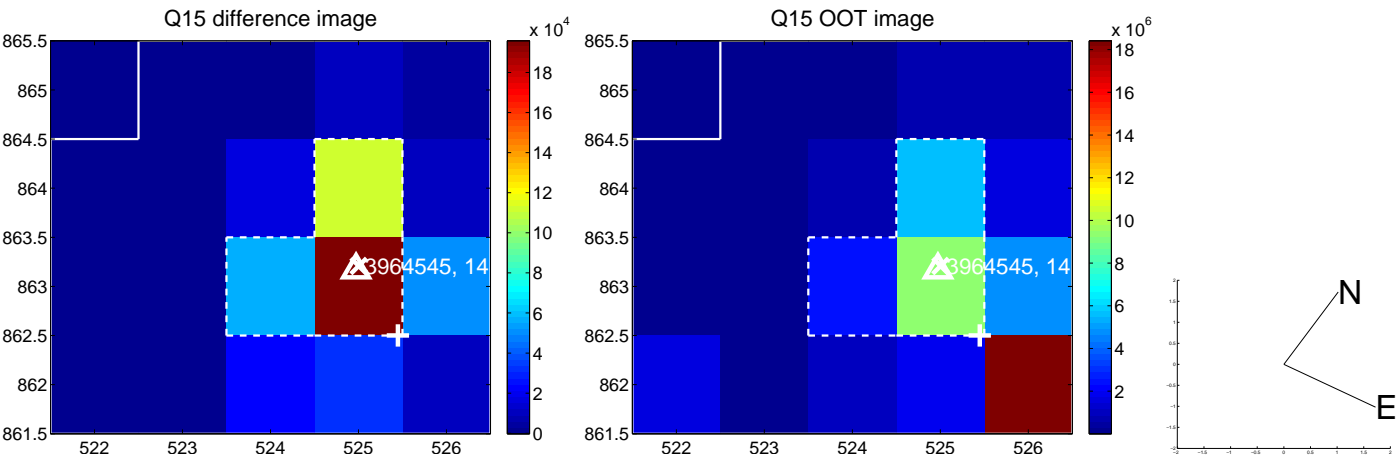
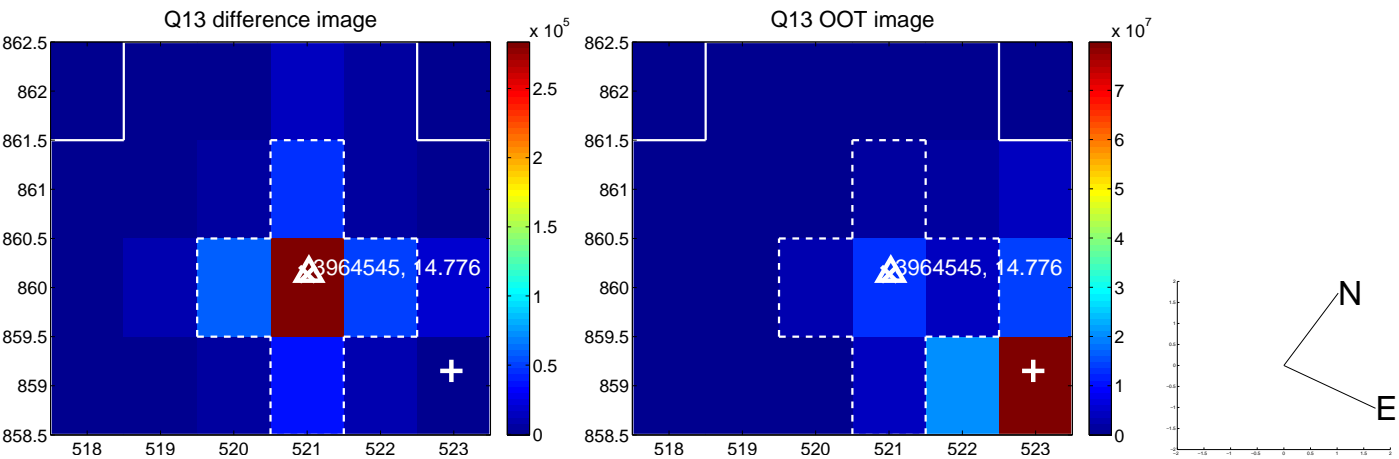
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



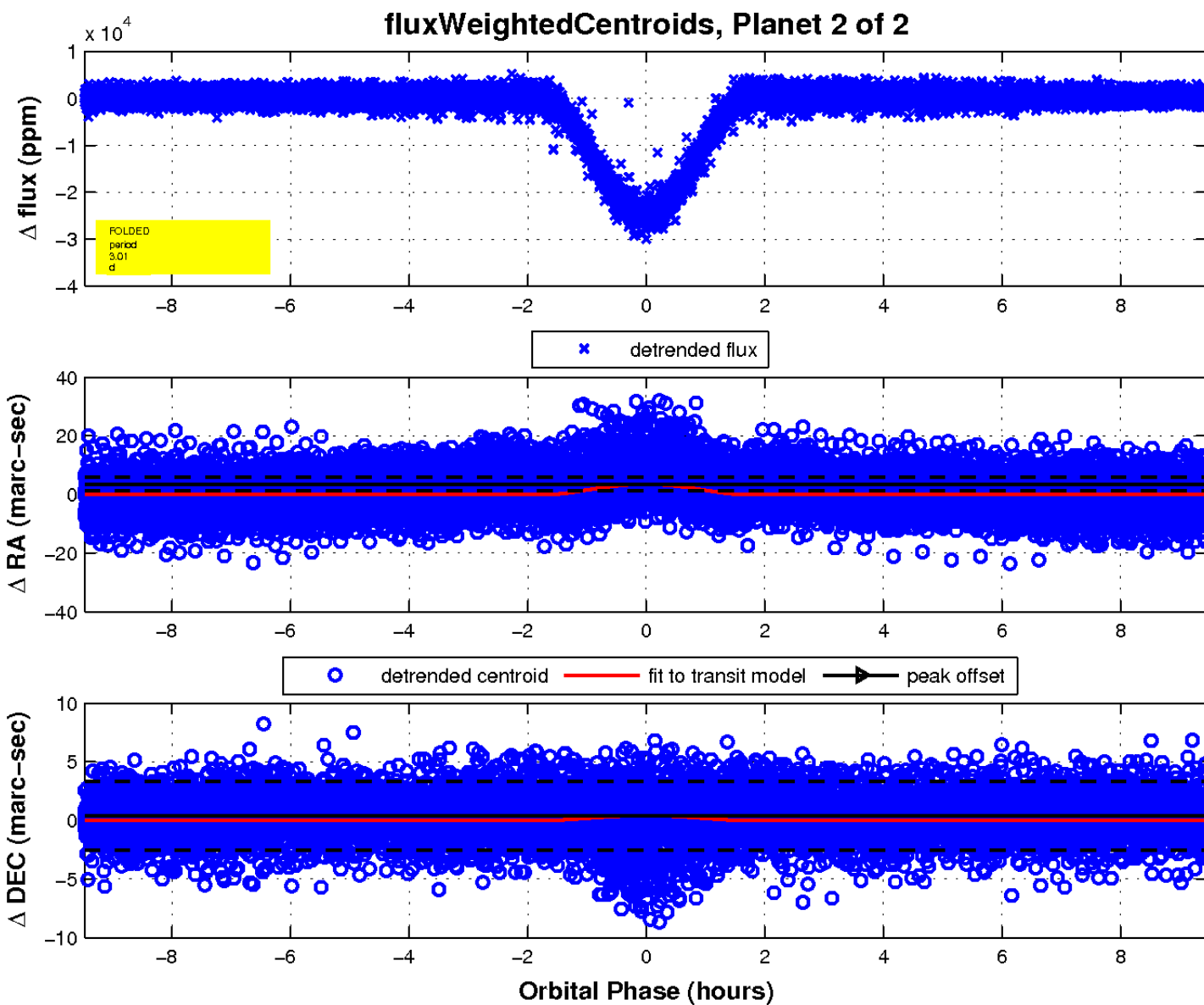
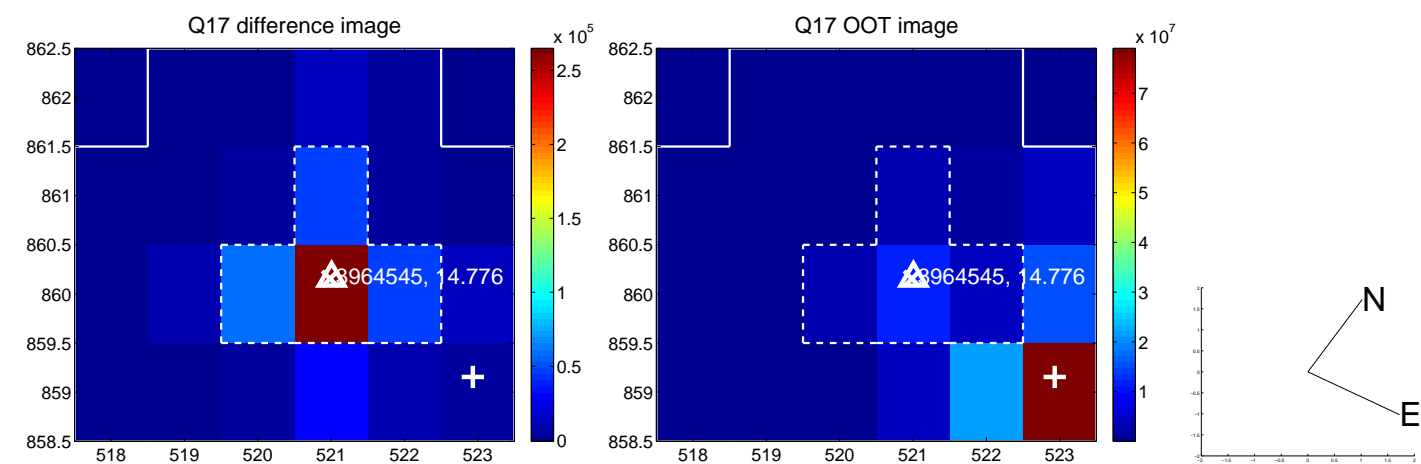
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

