

# KIC 009636559

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009636559-01	OBS	3618.01	10.636305	139.783256	217168.7	5.181	1979.5	1734.7	1.34	6781	65.13	359.33
009636559-02	OBS	No	10.636308	134.440998	51949.4	6.279	572.8	554.2	1.34	6781	33.47	359.33

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009636559-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_KIC_POS
009636559-02	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.

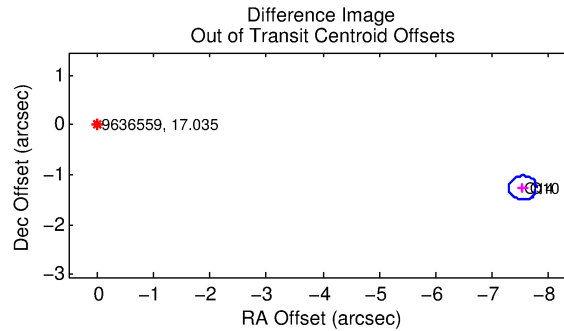
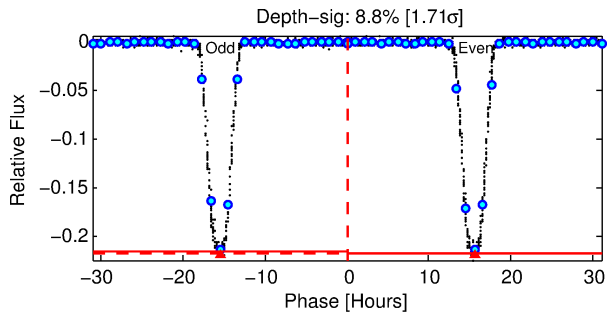
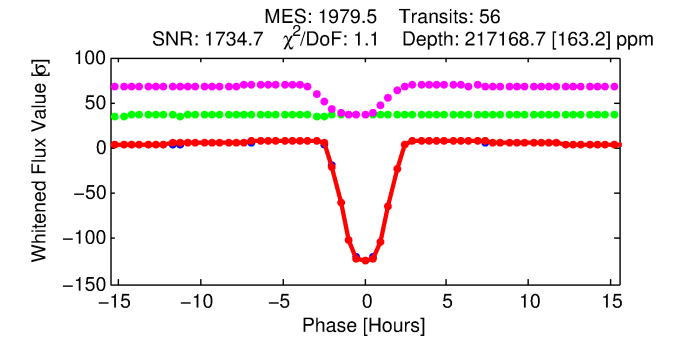
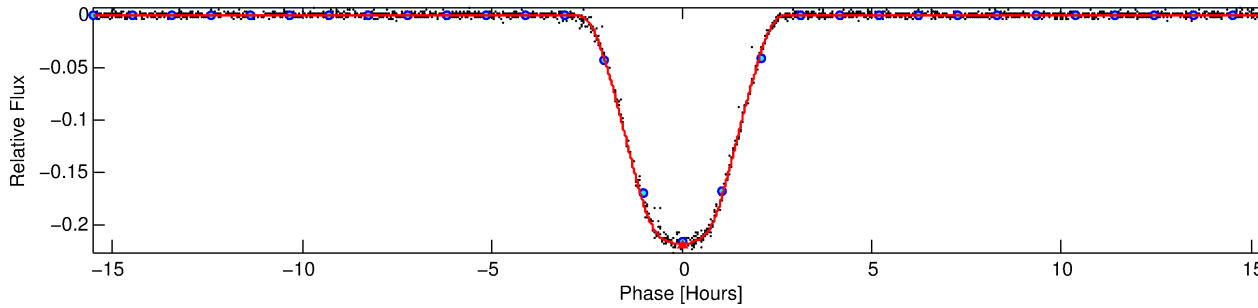
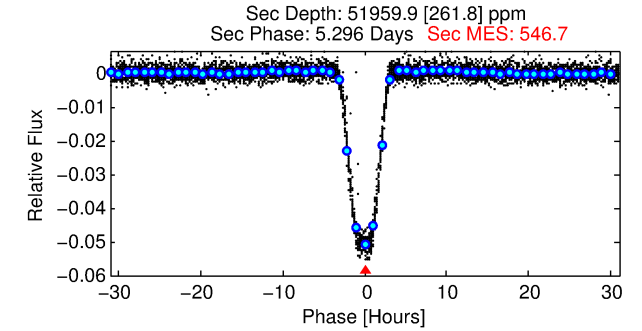
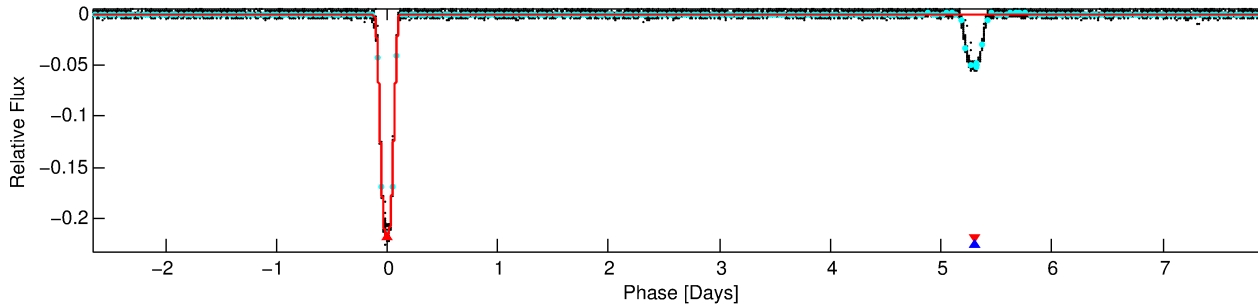
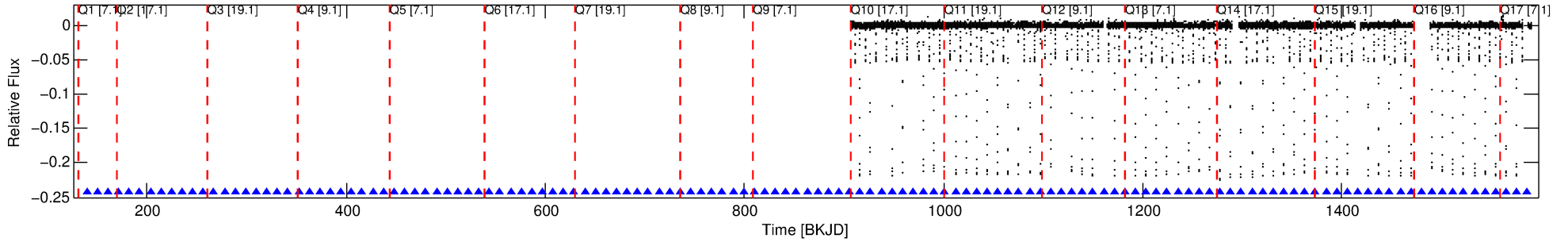
## Ephemeris Match Information For 009636559-01

No Significant Match Found

# DV One-Page Summary

KIC: 9636559 Candidate: 1 of 2 Period: 10.636 d  
KOI: K03618.01 Corr: 0.998

Kp: 17.03 R\*: 1.34 Rs Teff: 6781.0 K Logg: 4.22 Fe/H: -0.540



## DV Fit Results:

Period = 10.63630 [0.00000] d  
Epoch = 139.7833 [0.0002] BKJD  
Rp/R\* = 0.4438 [0.0003]  
a/R\* = 21.78 [0.03]  
b = 0.40 [0.00]  
Seff = 359.33 [127.96]  
Teq = 1110 [99] K  
Rp = 65.13 [17.29] Re  
a = 0.0977 [0.0217] AU  
Ag = 64.26 [20.67] [3.06σ]  
Teffp = 4860 [186] K [17.82σ]

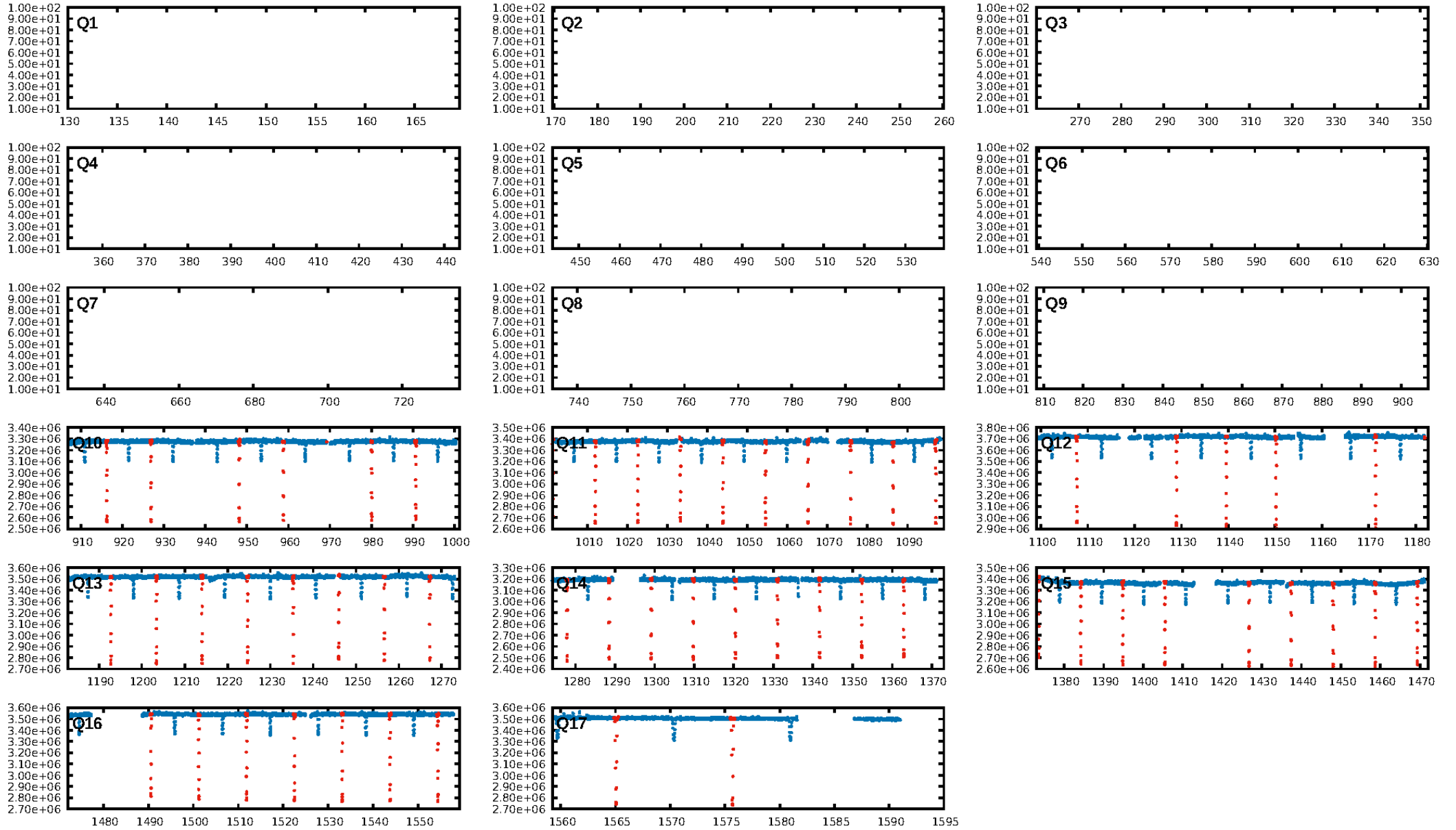
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [54/54]  
GhostDiagnostic-chr: 2.701  
Centroid-sig: 0.0%  
Centroid-so: 4.643 arcsec [2305.34σ]  
OotOffset-rm: 7.640 arcsec [94.16σ]  
KicOffset-rm: 0.355 arcsec [5.04σ]  
OotOffset-st: 2/0/0/0 [2]  
KicOffset-st: 2/2/2/2 [8]  
DiffImageQuality-fgm: 1.00 [8/8]  
DiffImageOverlap-fno: 1.00 [8/8]

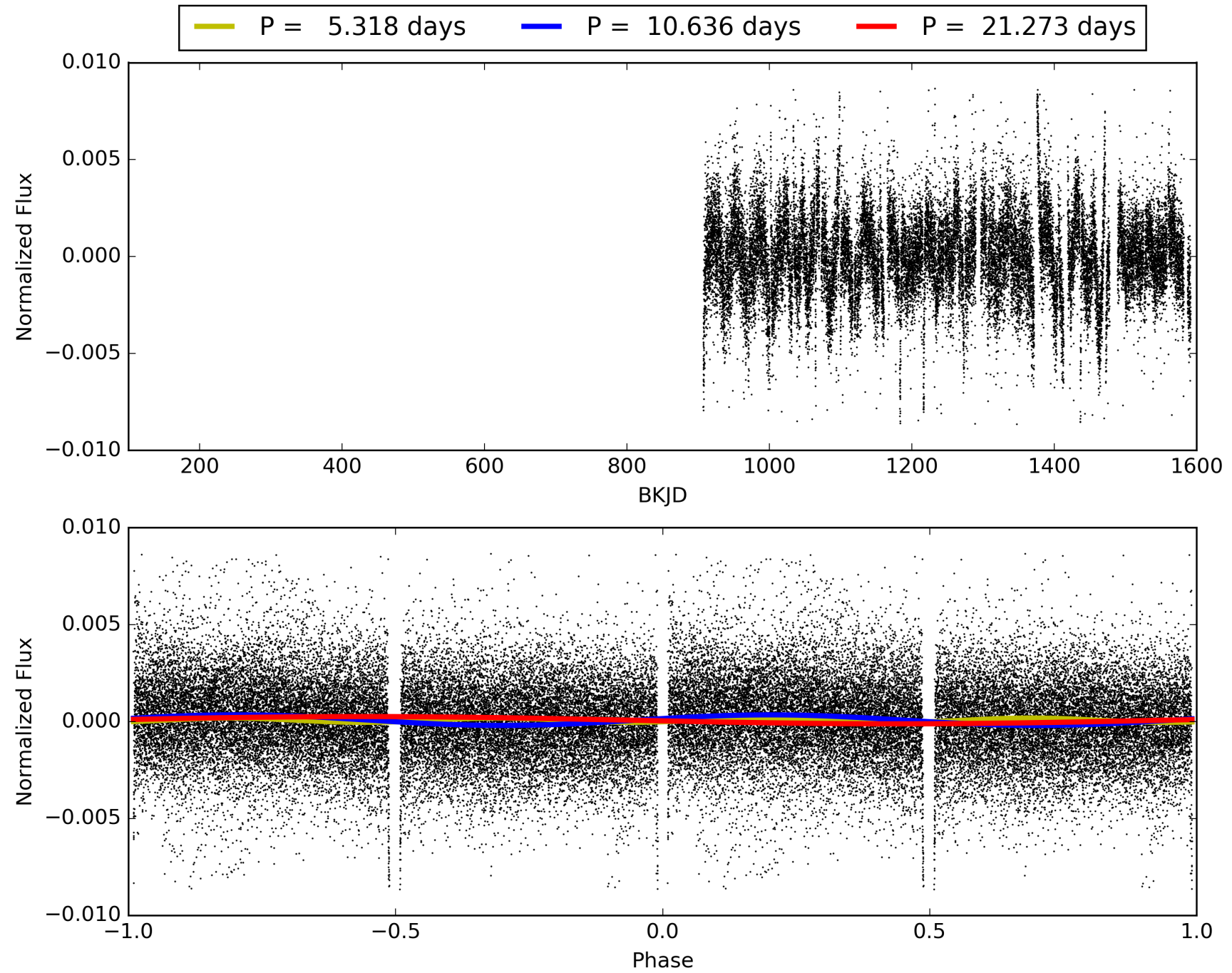
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 01:57:19 Z

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

# TCE 009636559-01, PDC Light Curves

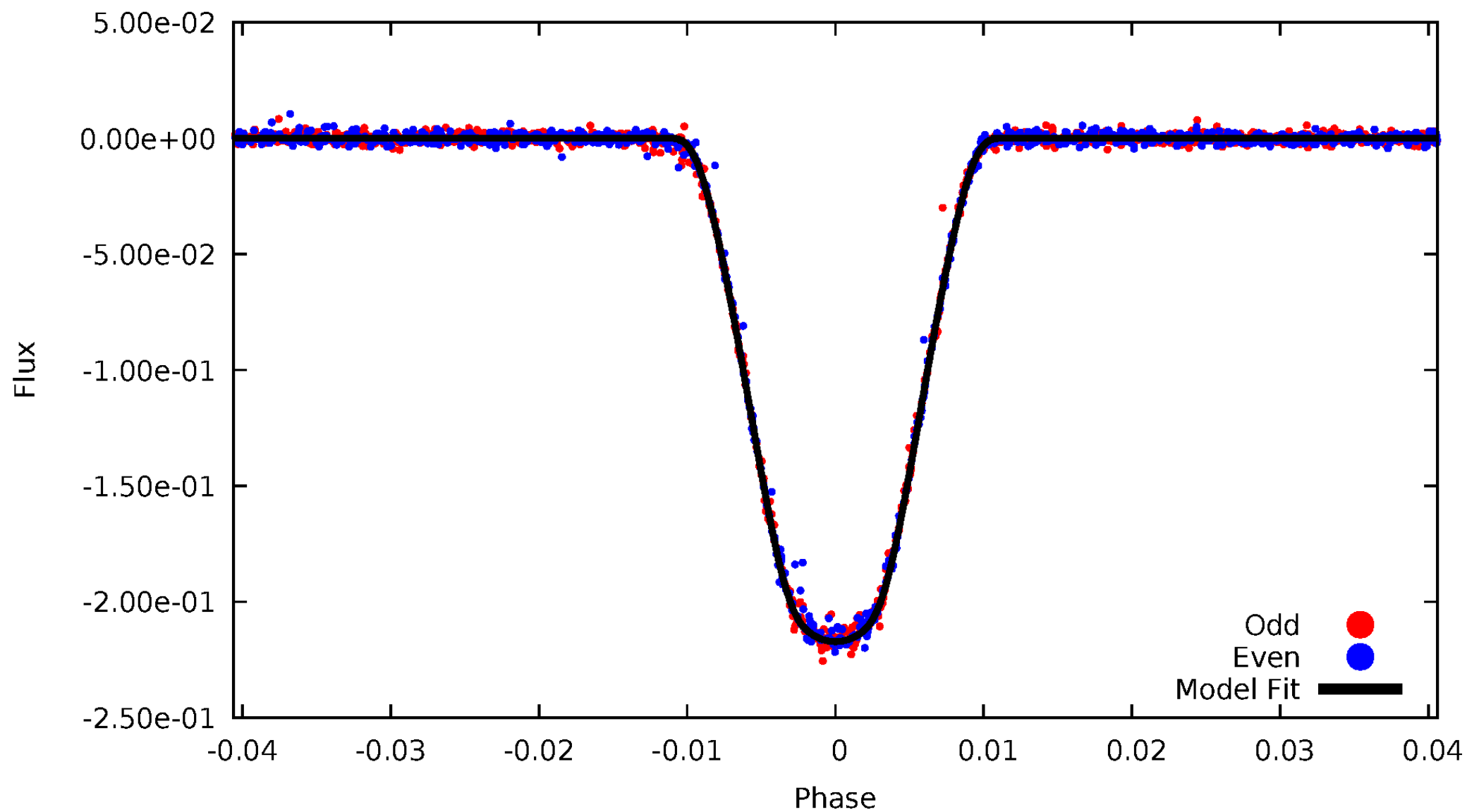


TCE 009636559-01



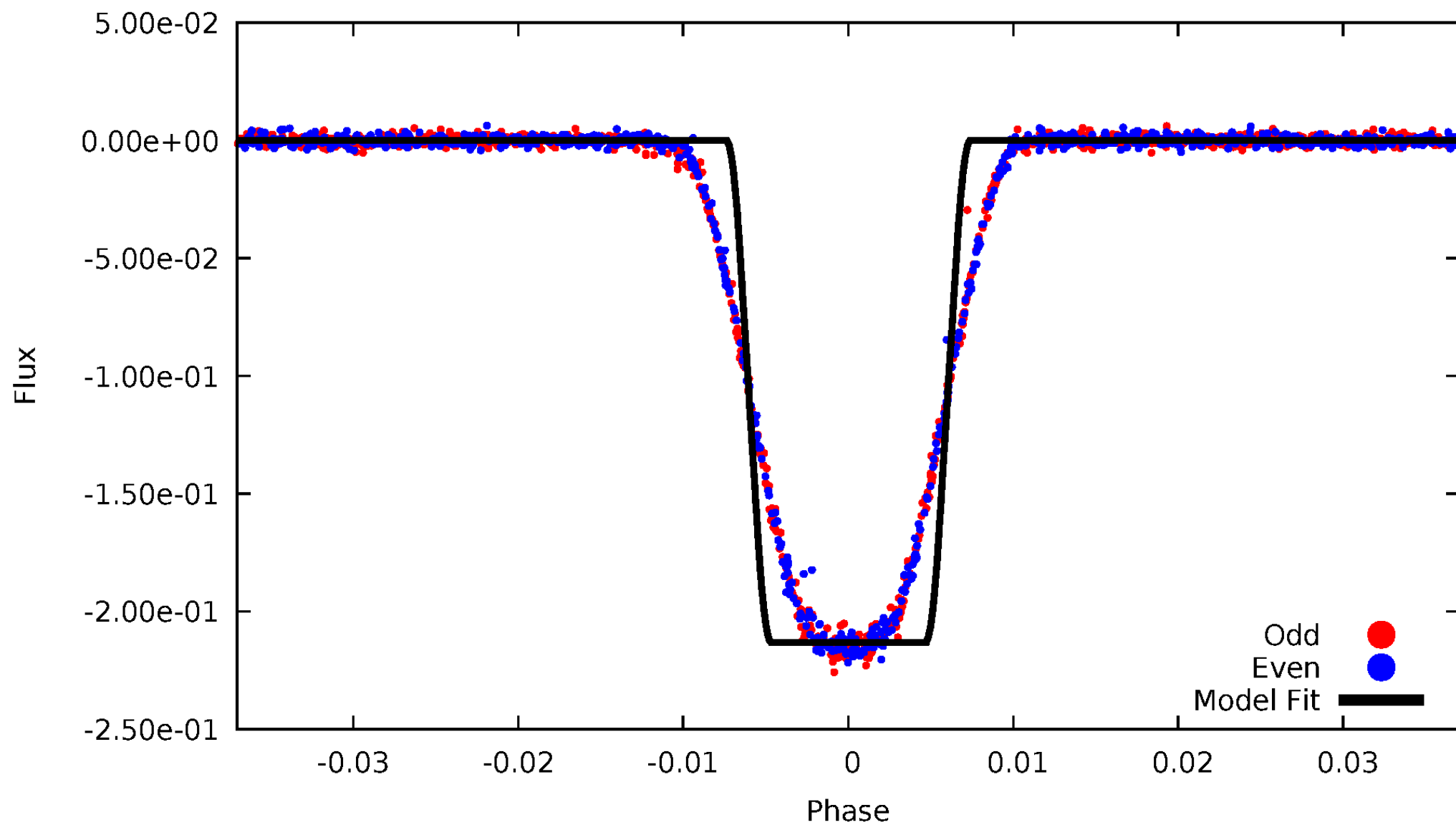
# DV Odd/Even

TCE 009636559-01



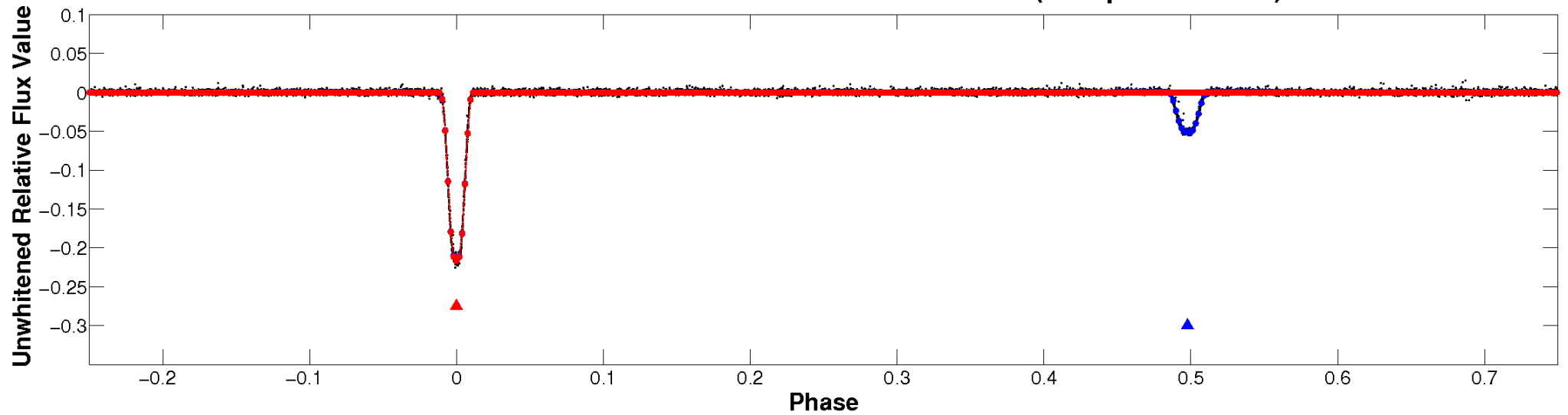
# ALT Odd/Even

TCE 009636559-01

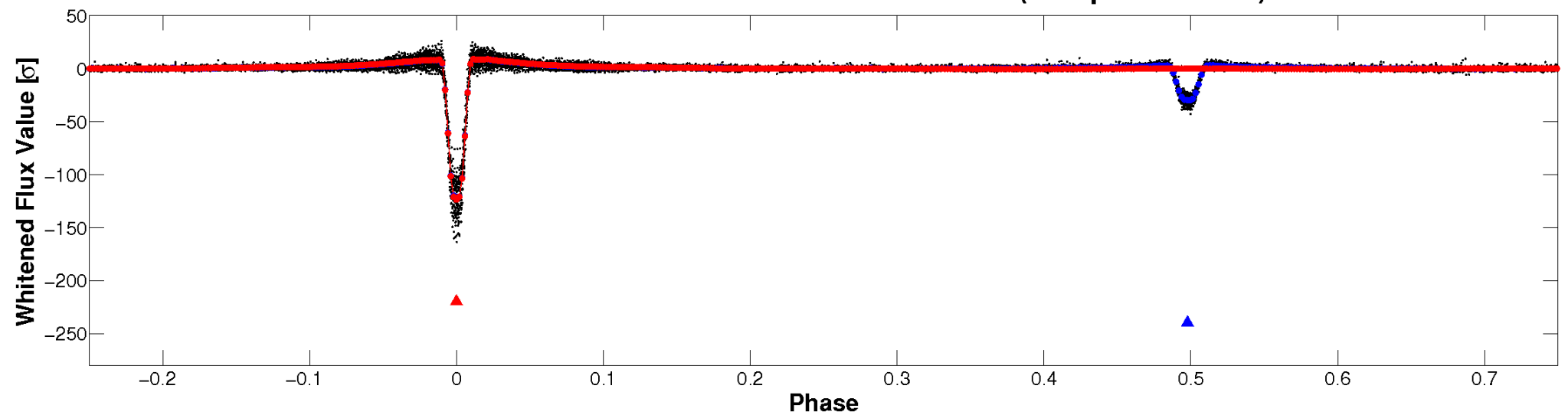


# Non-Whitened Vs. Whitened Light Curve

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

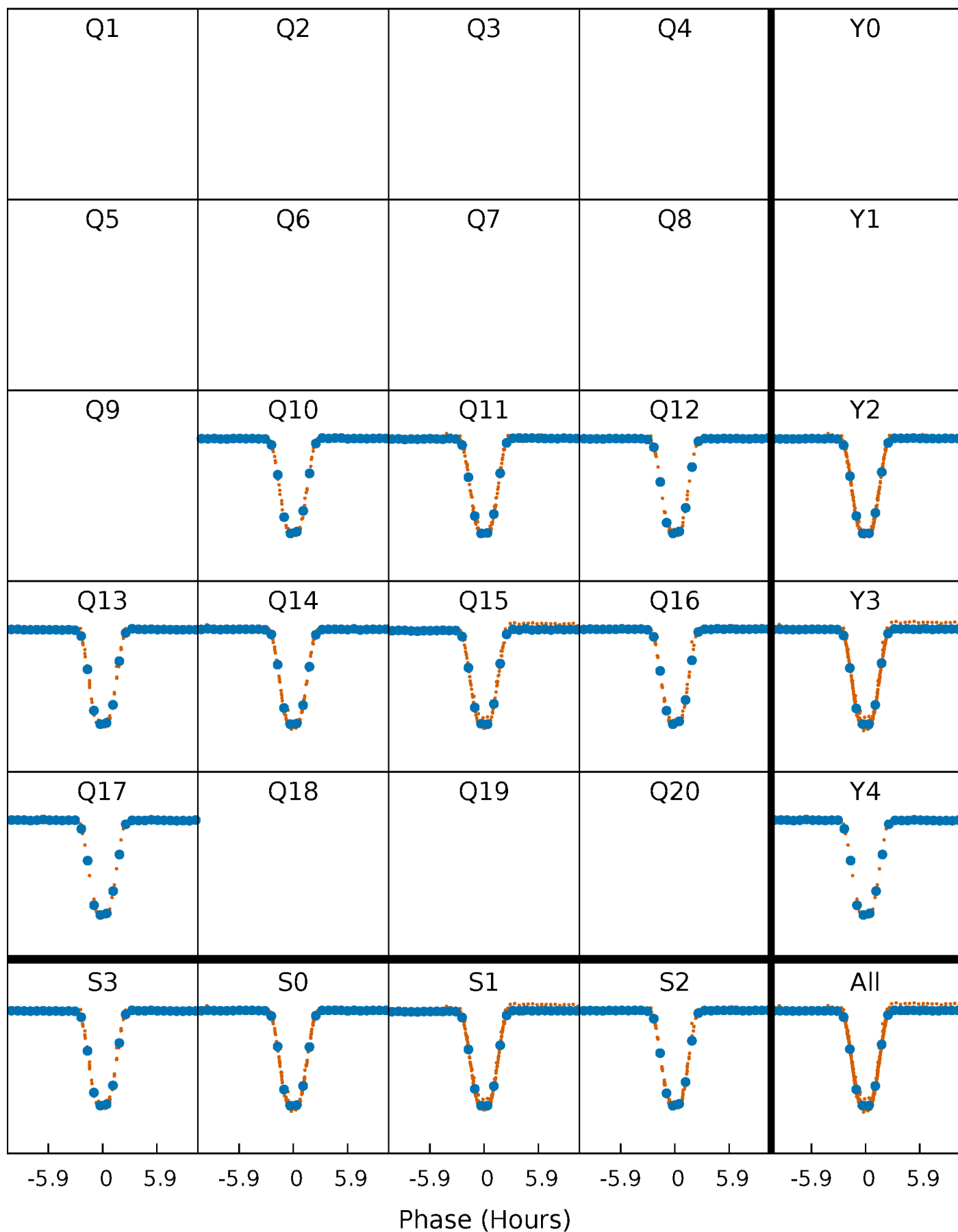


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

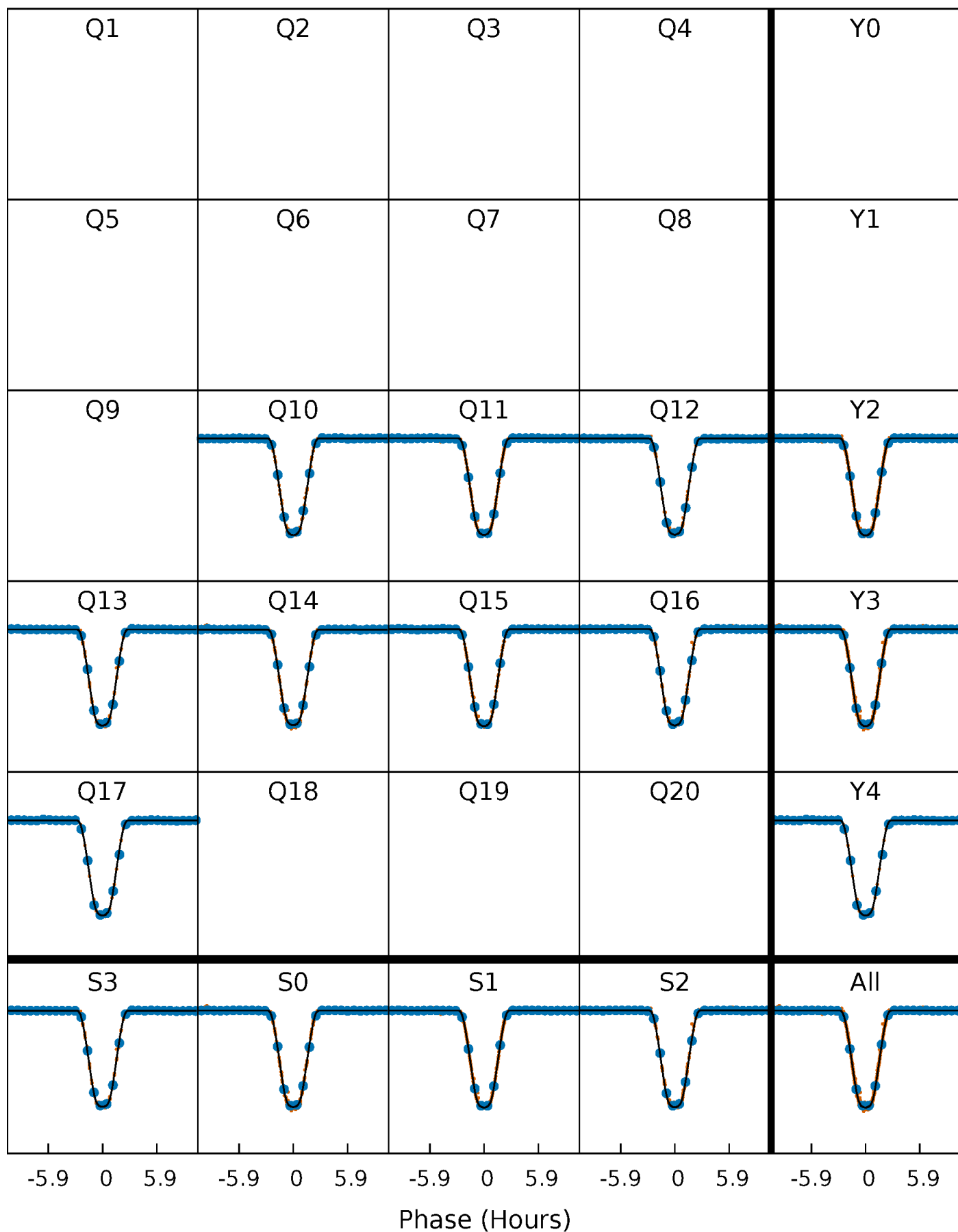
TCE 009636559-01 P= 10.636305 Days  $T_0=139.783256$  (BKJD)





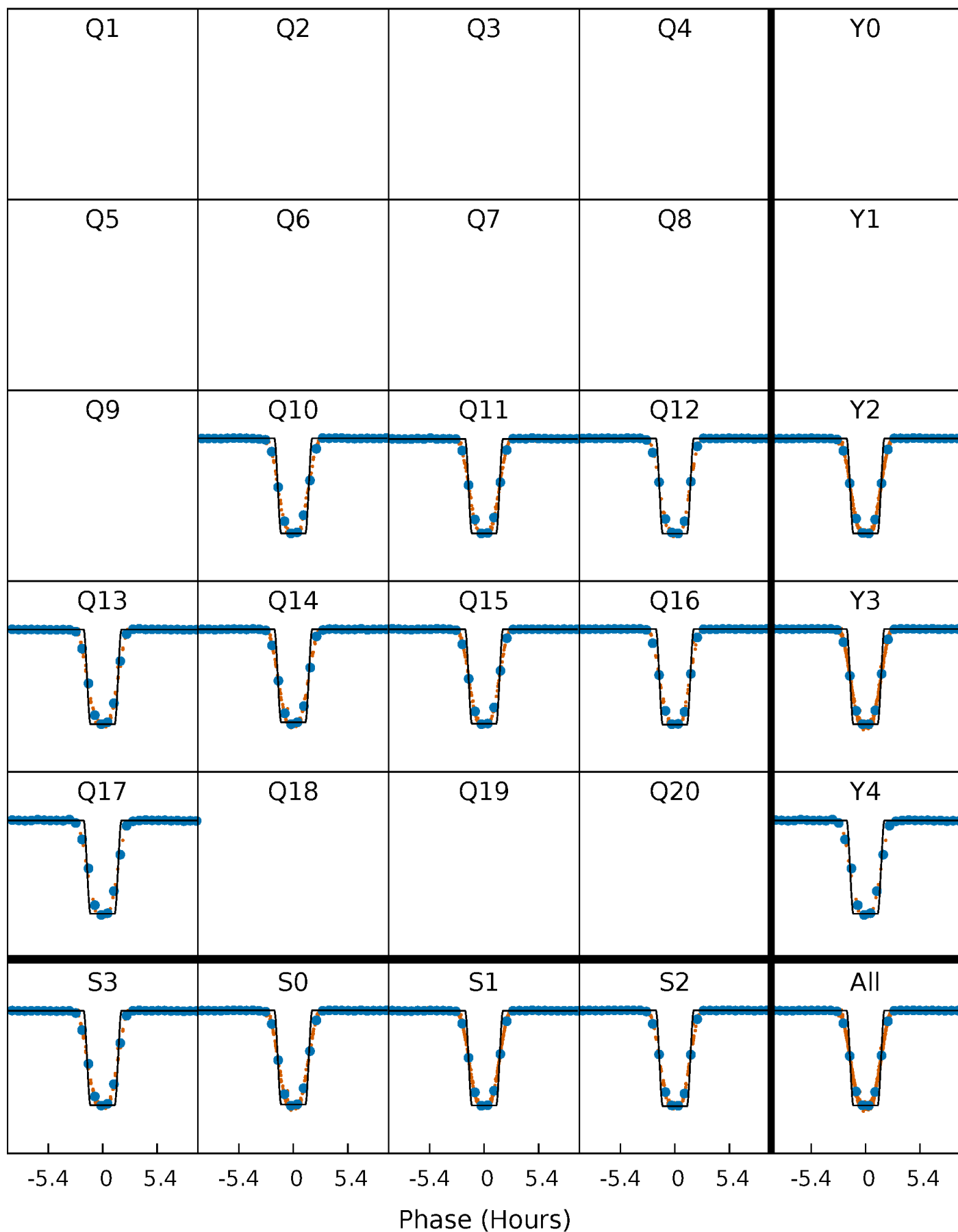
# DV Quarter-Phased Transit Curves

TCE 009636559-01 P= 10.636305 Days  $T_0=139.783256$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

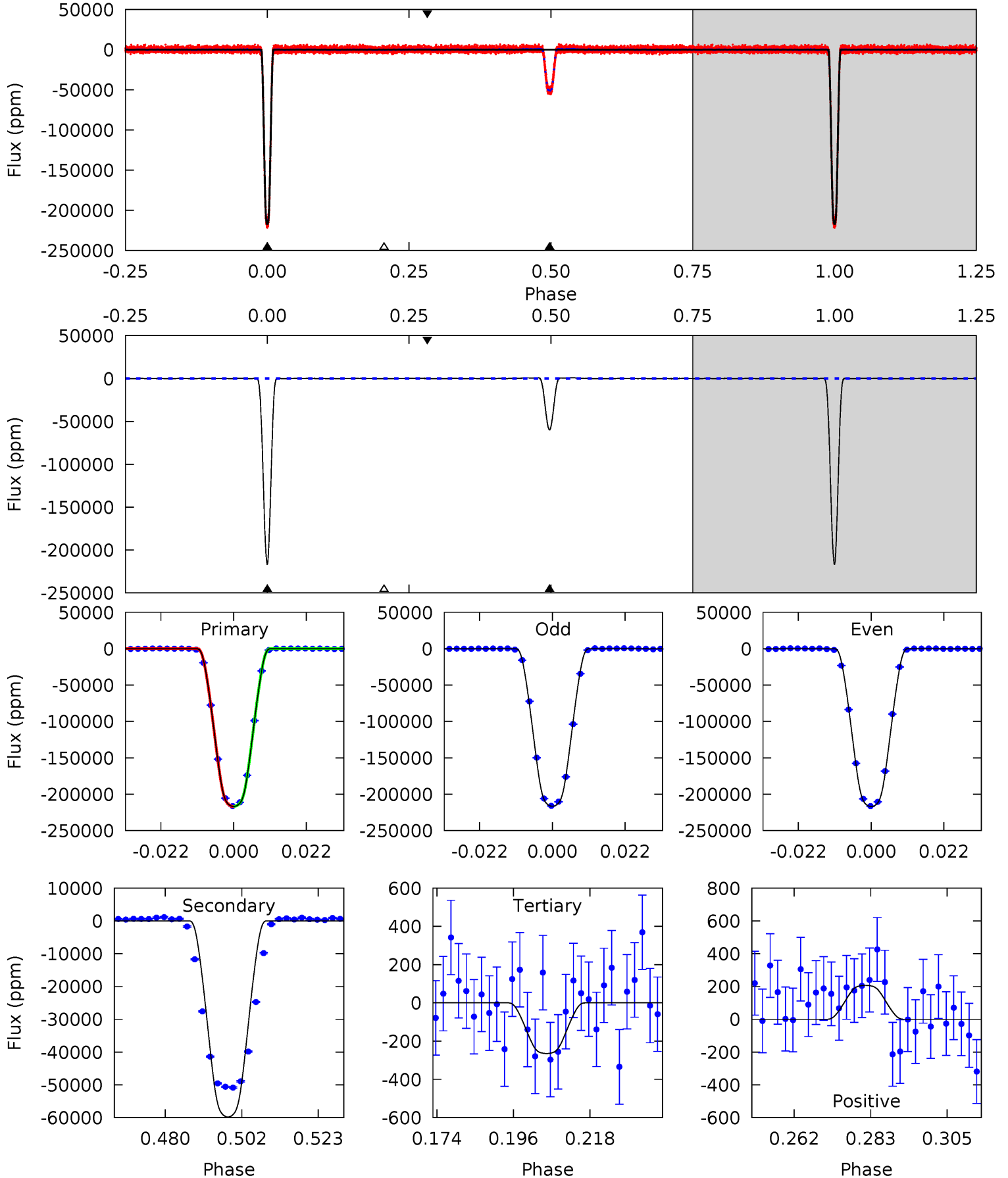
TCE 009636559-01 P= 10.636315 Days  $T_0=139.782137$  (BKJD)



# DV Model-Shift Uniqueness Test

009636559-01, P = 10.636305 Days, E = 139.783256 Days

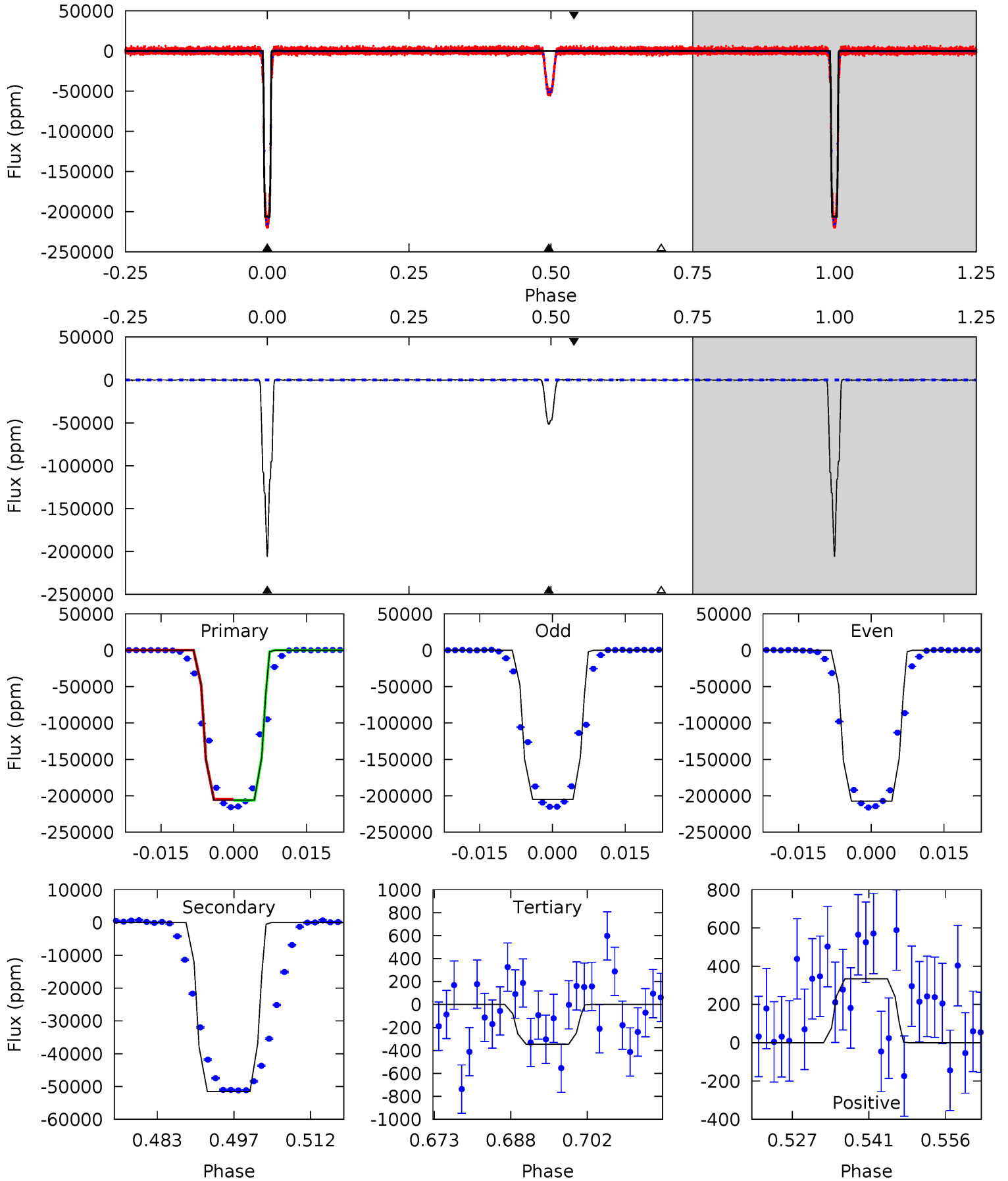
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3350	924.0	4.09	3.19	4.87	2.29	3.01	3346	3347	919.9	920.8	2.86	1.00	0.00	2.53



# Alt Model-Shift Uniqueness Test

009636559-01, P = 10.636315 Days, E = 139.782137 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
2097	525.1	3.53	3.40	4.95	2.44	1.31	2094	2094	521.5	521.7	13.2	1.00	0.00	0



### Stellar Parameters For KIC 009636559

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6781^{+212}_{-259}$	$4.221^{+0.175}_{-0.175}$	$-0.540^{+0.250}_{-0.300}$	$1.345^{+0.357}_{-0.292}$	$1.097^{+0.169}_{-0.138}$	$0.634^{+0.567}_{-0.301}$
	+3%/-4%	+4%/-4%	+46%/-56%	+27%/-22%	+15%/-13%	+89%/-47%
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 009636559-01 / KOI 3618.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-59798 \pm 65$	$65.50^{+9.07}_{-8.02}$	$1544^{+116}_{-102}$	$5149^{+127}_{-151}$	$78^{+22}_{-17}$
Alt.	$-51555 \pm 98$	$67.79^{+10.64}_{-8.18}$	$1551^{+119}_{-112}$	$4895^{+119}_{-130}$	$61^{+19}_{-14}$

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

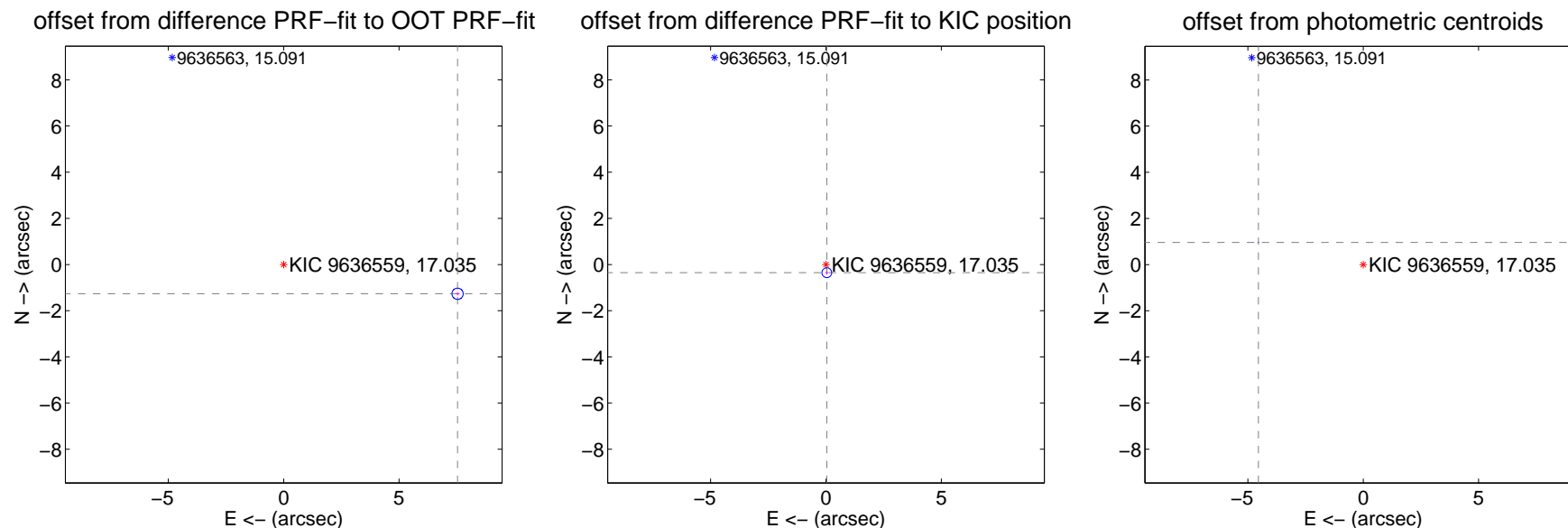
## DV Centroid Data

Supplemental centroid analysis for 009636559-01. Kepler magnitude: 17.04. Transit SNR 1734.74

There are 8 quarters with good PRF difference image offsets

The OOT PRF centroid is offset from the target star catalog position by about 7.57 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	$7.640 \pm 0.081$	94.16	$-7.535 \pm 0.082$	$-1.266 \pm 0.067$
PRF-fit source offset from KIC position	$0.355 \pm 0.071$	5.04	$-0.037 \pm 0.068$	$-0.354 \pm 0.071$
photometric centroid source offset	$4.64 \pm 0.00$	2305.34	$4.54 \pm 0.00$	$0.96 \pm 0.00$



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.

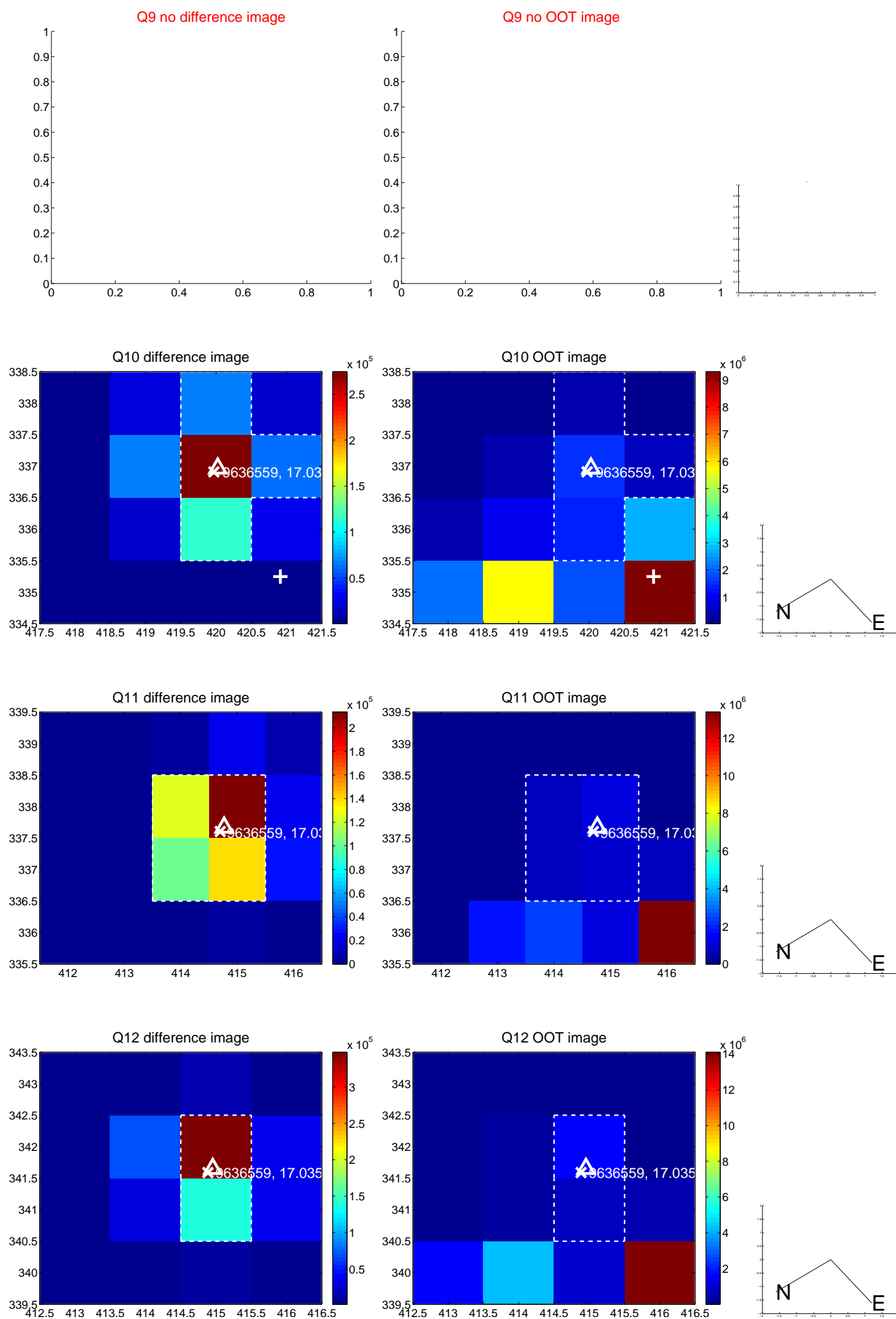


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

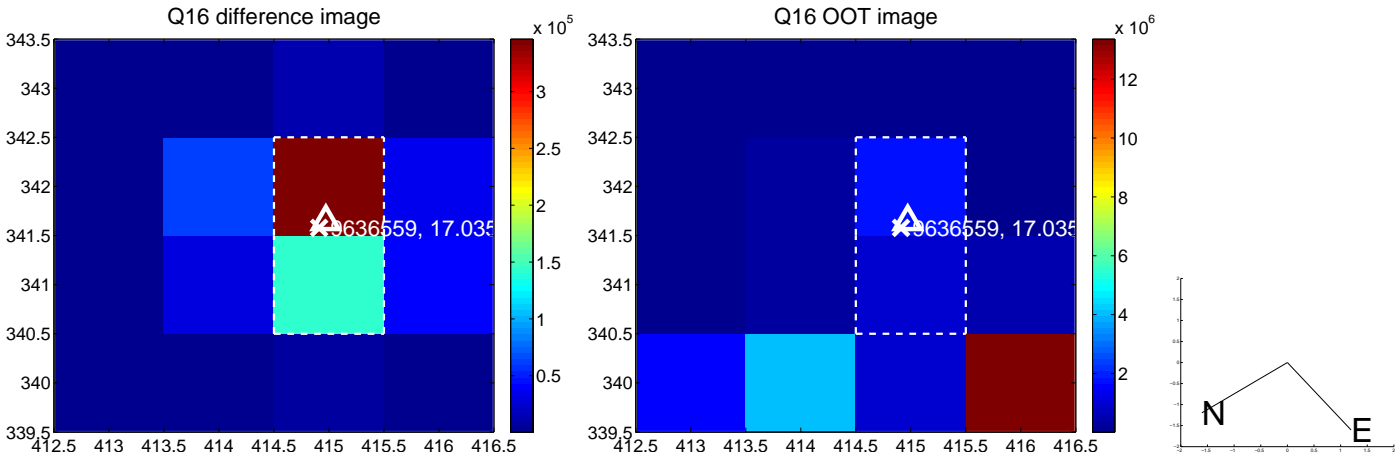
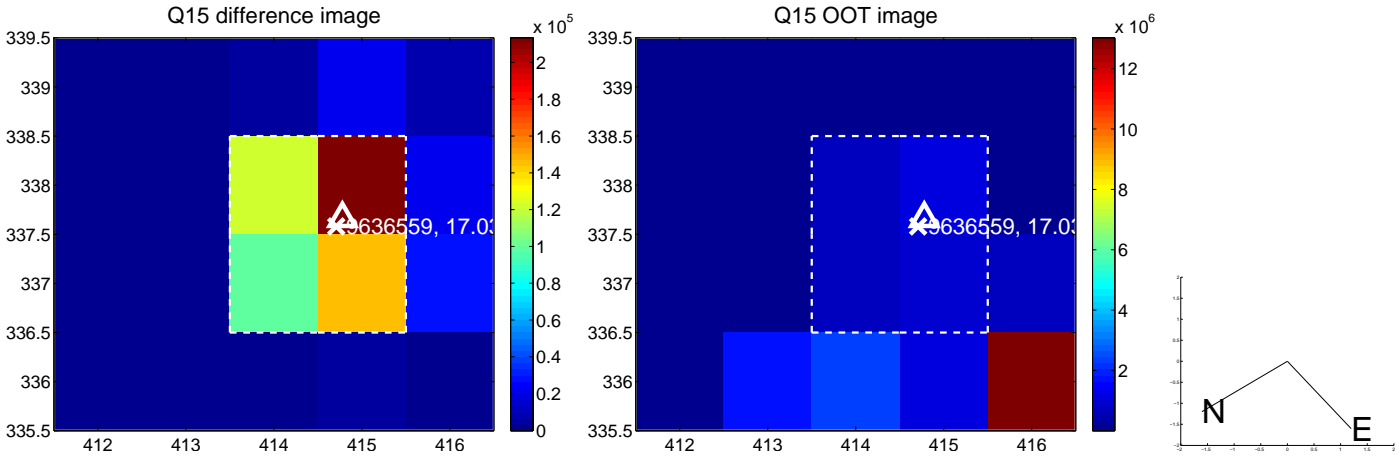
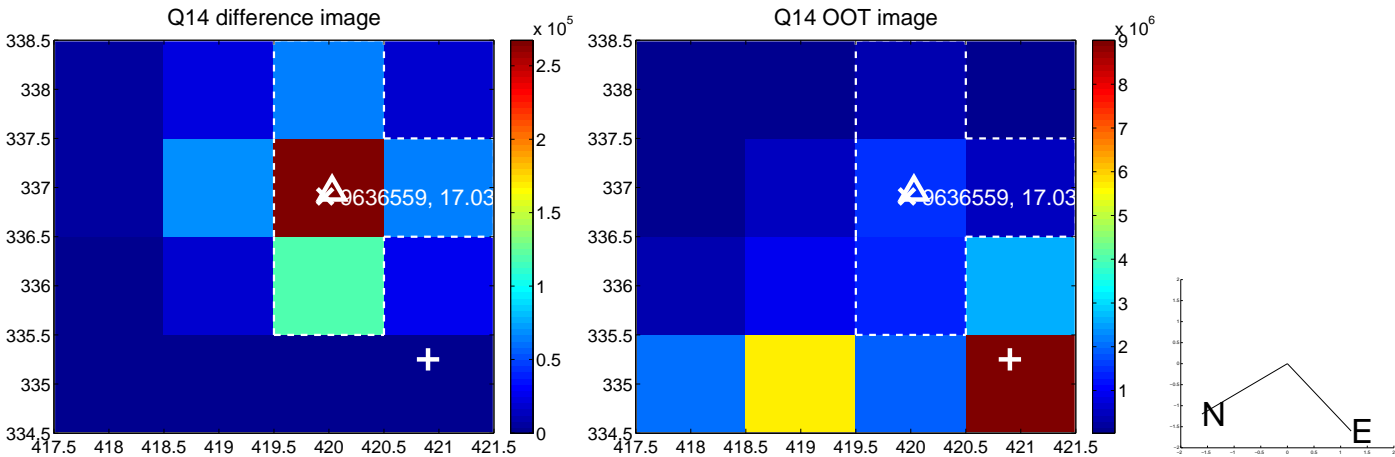
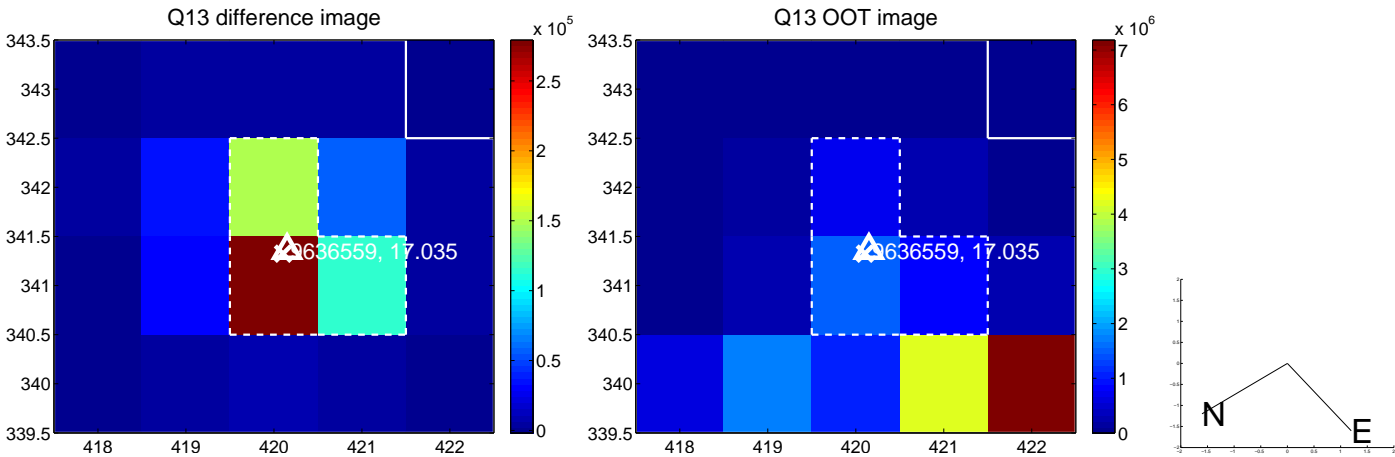




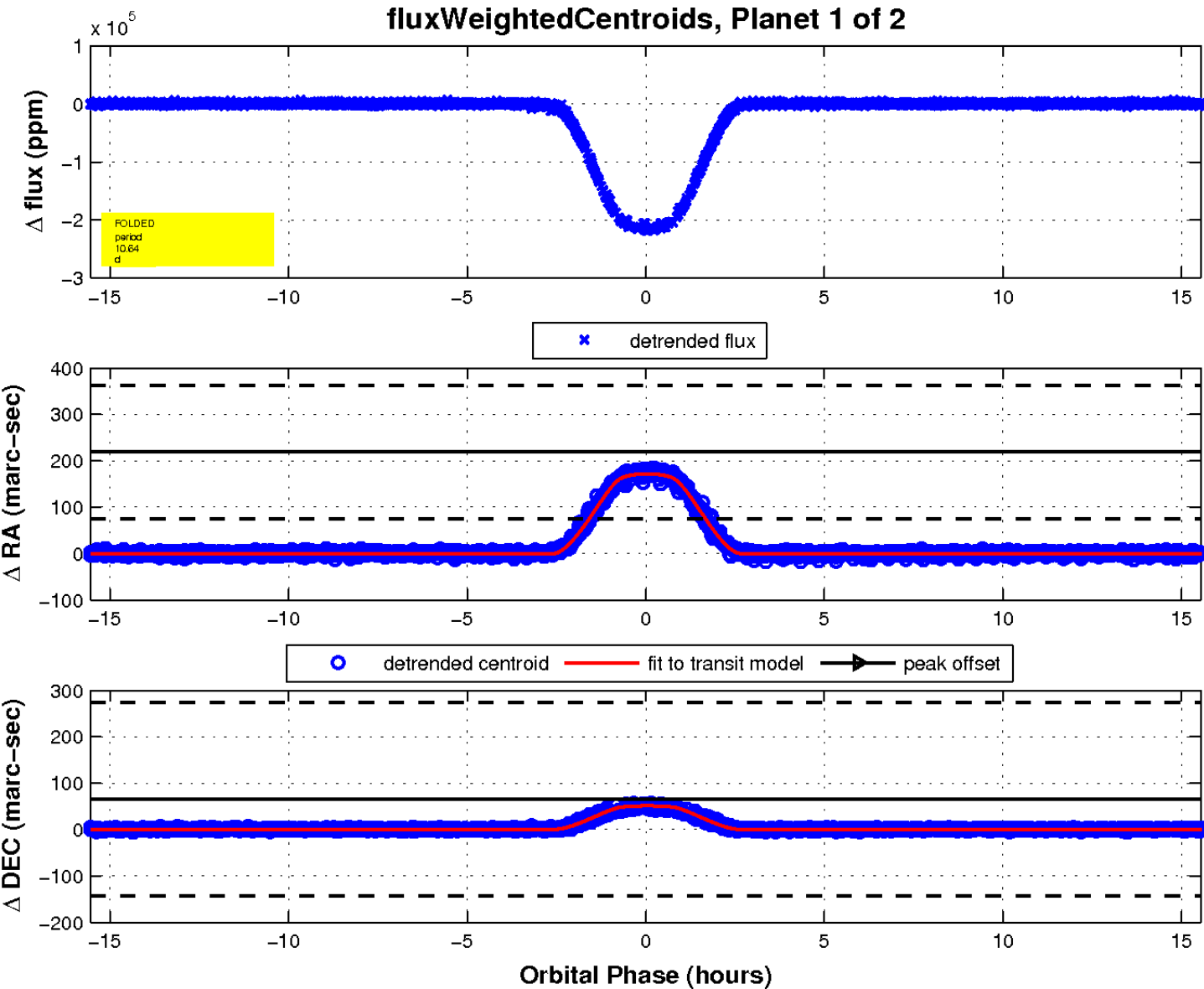
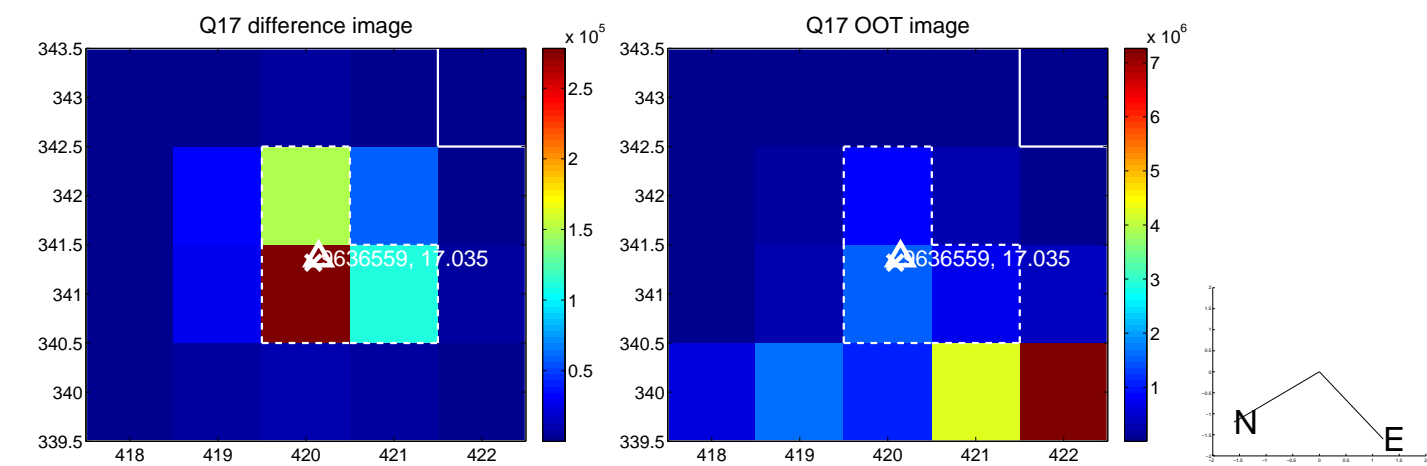
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

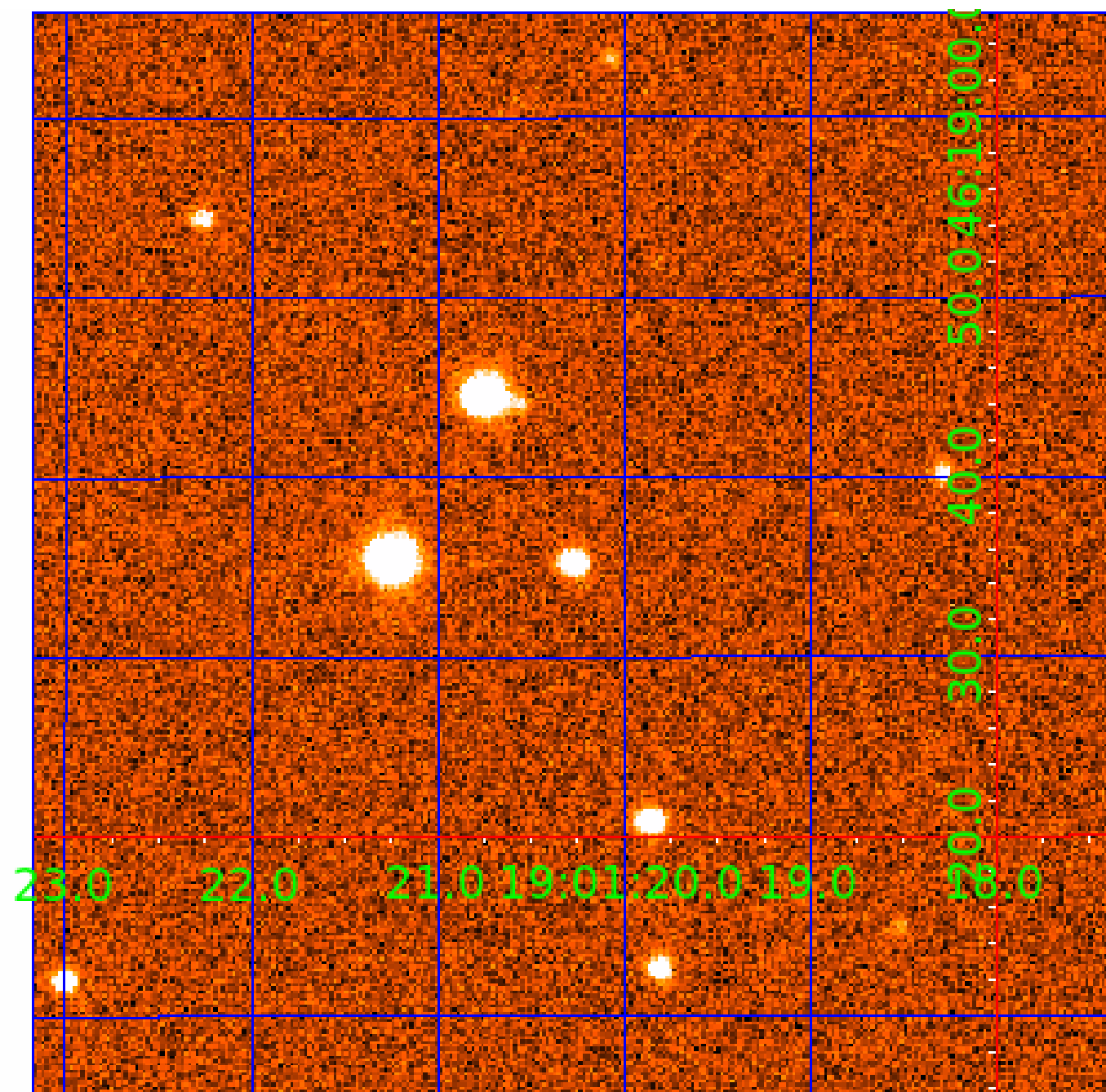


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009636559

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009636559-01	OBS	3618.01	10.636305	139.783256	217168.7	5.181	1979.5	1734.7	1.34	6781	65.13	359.33
009636559-02	OBS	No	10.636308	134.440998	51949.4	6.279	572.8	554.2	1.34	6781	33.47	359.33

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009636559-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_KIC_POS
009636559-02	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 009636559-02

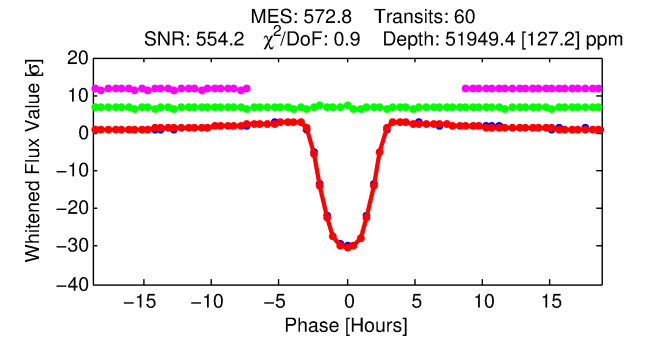
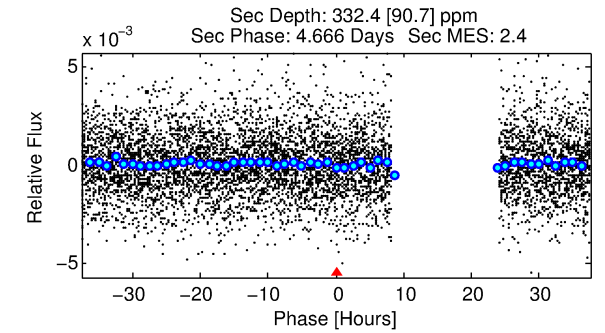
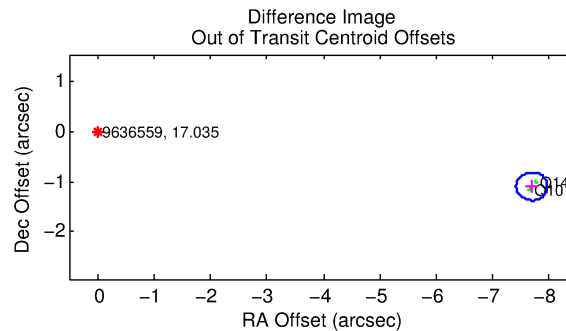
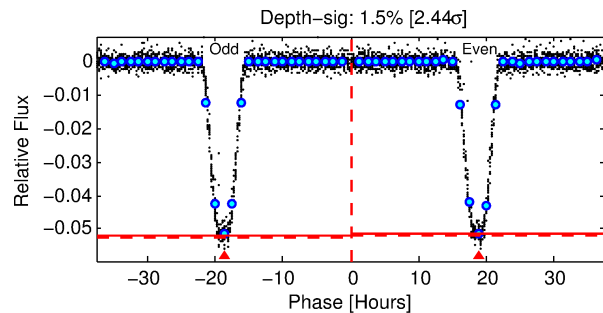
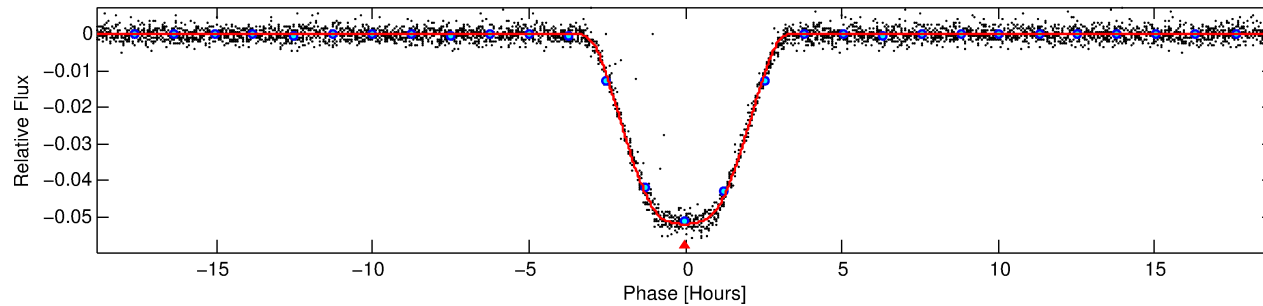
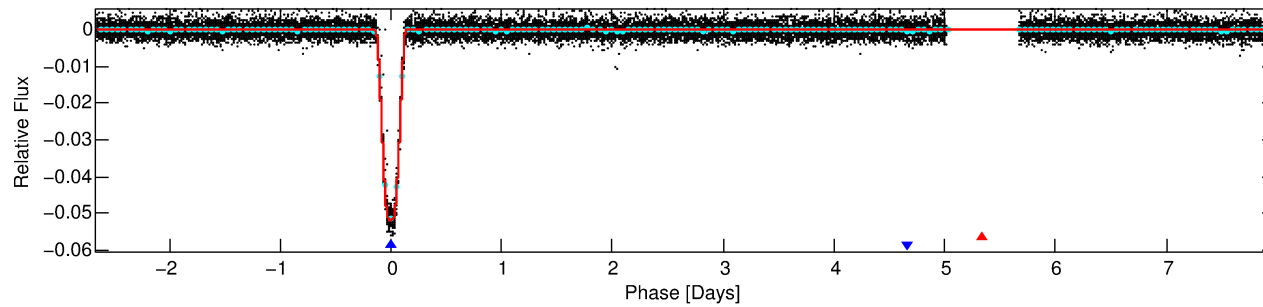
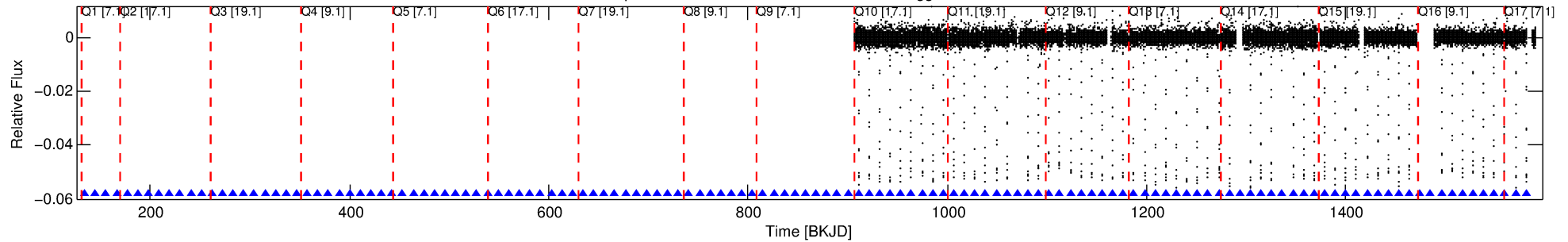
No Significant Match Found

# DV One-Page Summary

KIC: 9636559 Candidate: 2 of 2 Period: 10.636 d

KOI: K03618 Corr: No Ephemeris Match

Kp: 17.03 R\*: 1.34 Rs Teff: 6781.0 K Logg: 4.22 Fe/H: -0.540



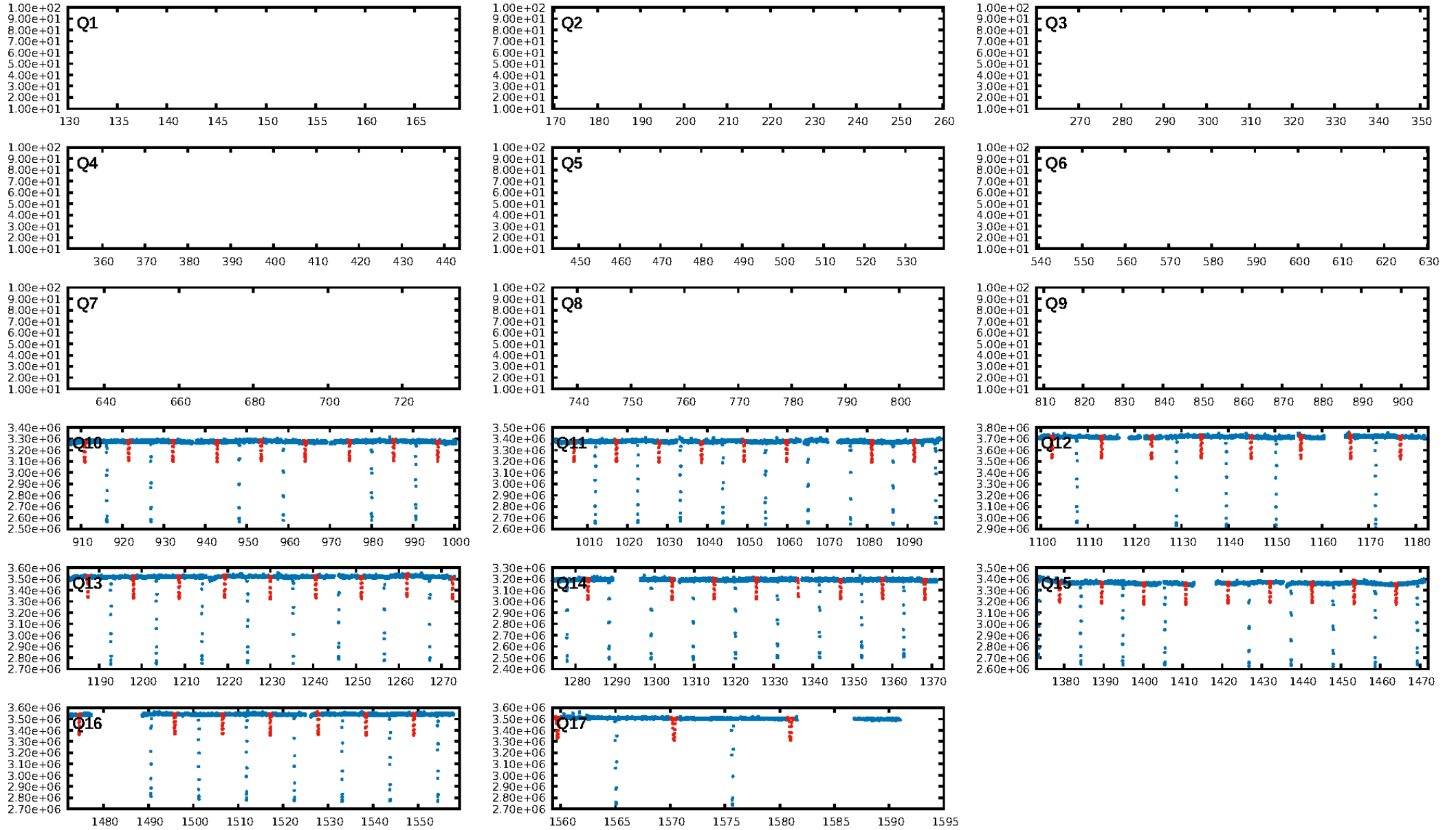
## DV Fit Results:

Period = 10.63631 [0.00001] d  
Epoch = 134.4410 [0.0007] BKJD  
Rp/R\* = 0.2281 [0.0004]  
a/R\* = 12.79 [0.05]  
b = 0.73 [0.00]  
Seff = 359.33 [127.96]  
Teq = 1110 [99] K  
Rp = 33.47 [8.88] Re  
a = 0.0977 [0.0217] AU  
Ag = 1.56 [0.66] [0.85σ]  
Teffp = 1917 [150] K [4.49σ]

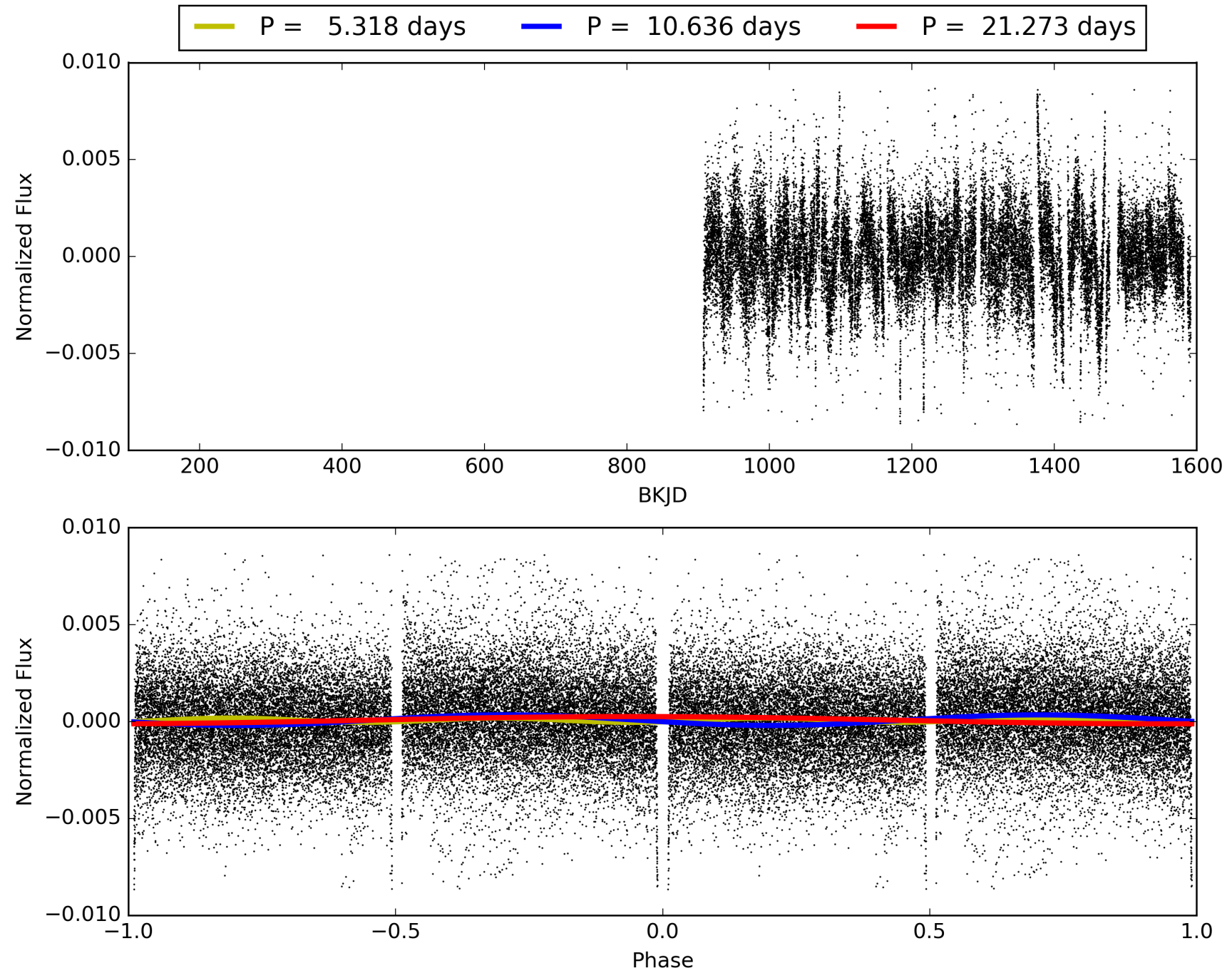
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [57/57]  
GhostDiagnostic-chr: 0.8195  
Centroid-sig: 0.0%  
Centroid-so: 4.681 arcsec [669.75σ]  
OotOffset-rm: 7.766 arcsec [82.98σ]  
KicOffset-rm: 0.310 arcsec [4.21σ]  
OotOffset-st: 2/0/0/0 [2]  
KicOffset-st: 2/2/2/2 [8]  
DiffImageQuality-fgm: 1.00 [8/8]  
DiffImageOverlap-fno: 1.00 [8/8]

# TCE 009636559-02, PDC Light Curves



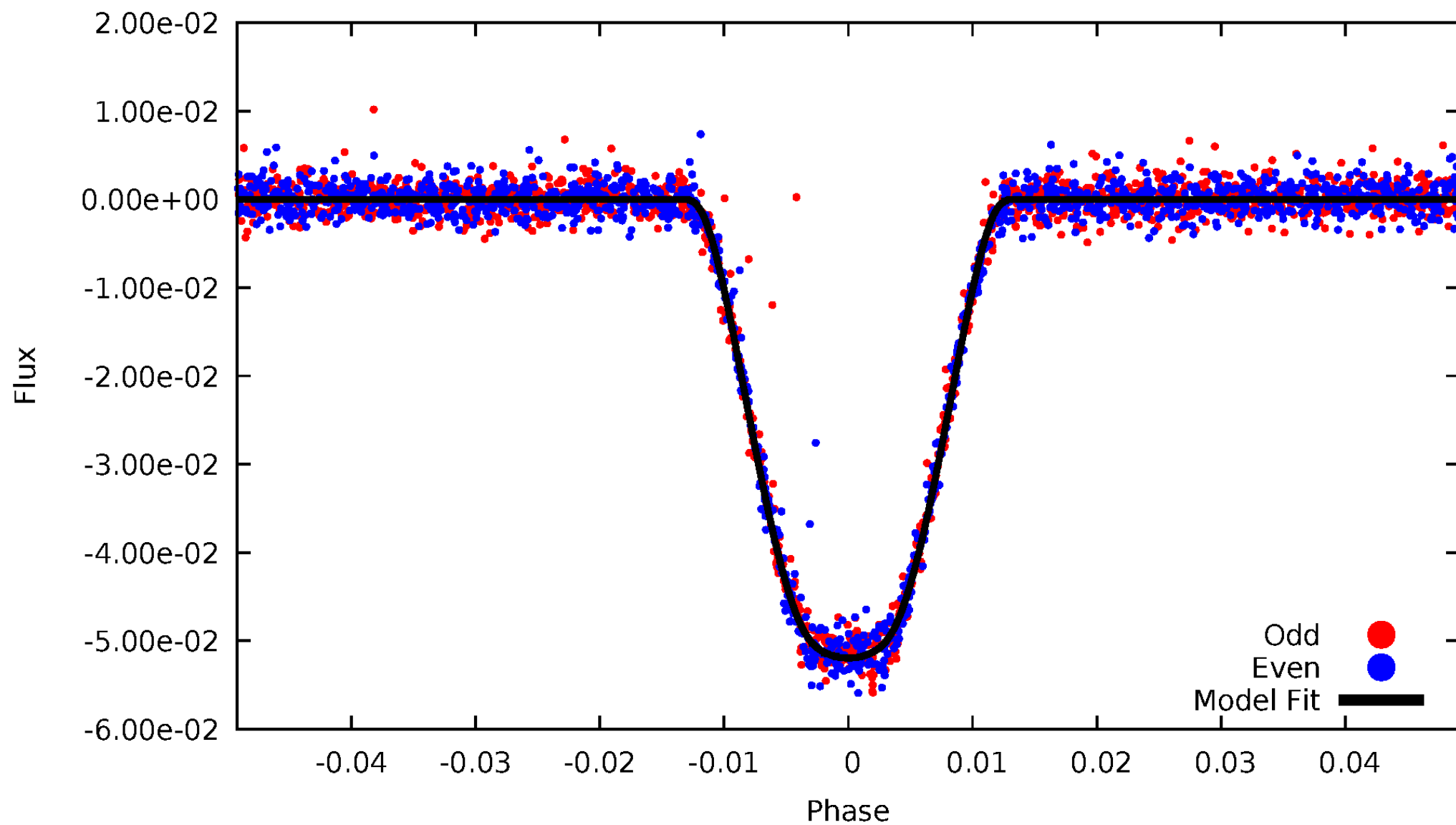
TCE 009636559-02





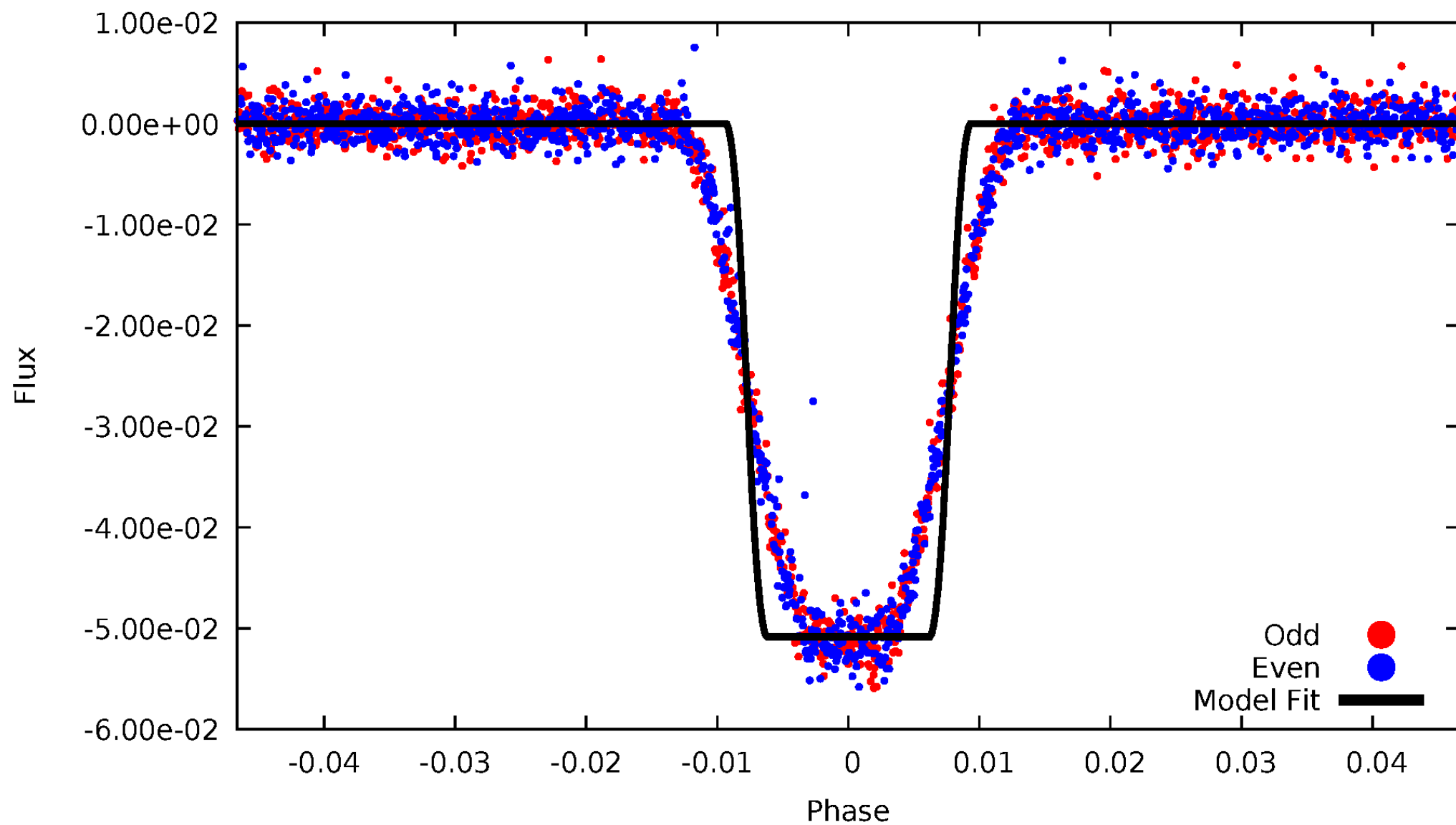
# DV Odd/Even

TCE 009636559-02



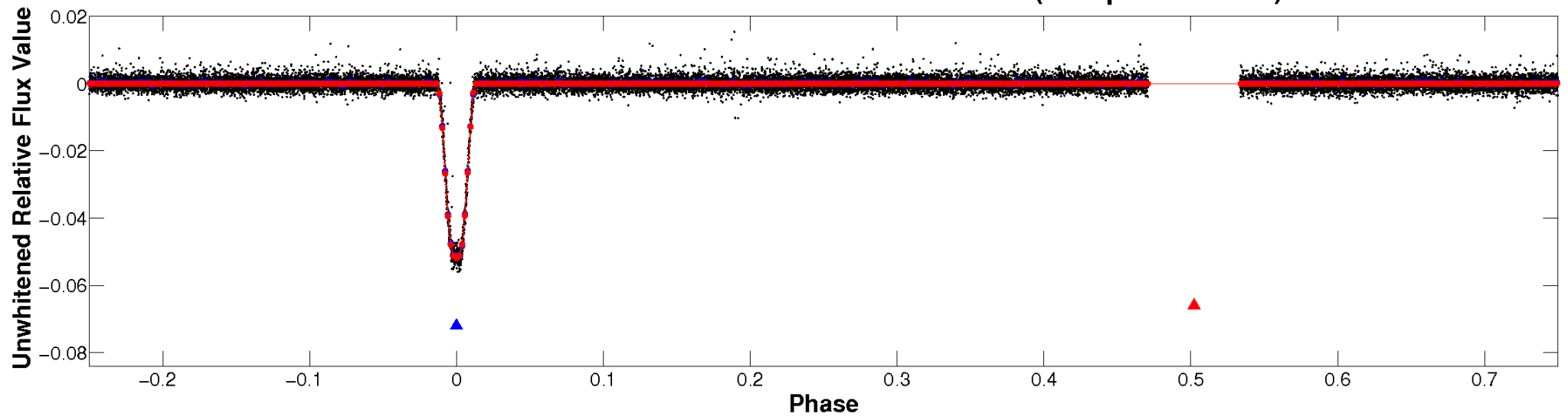
# ALT Odd/Even

TCE 009636559-02

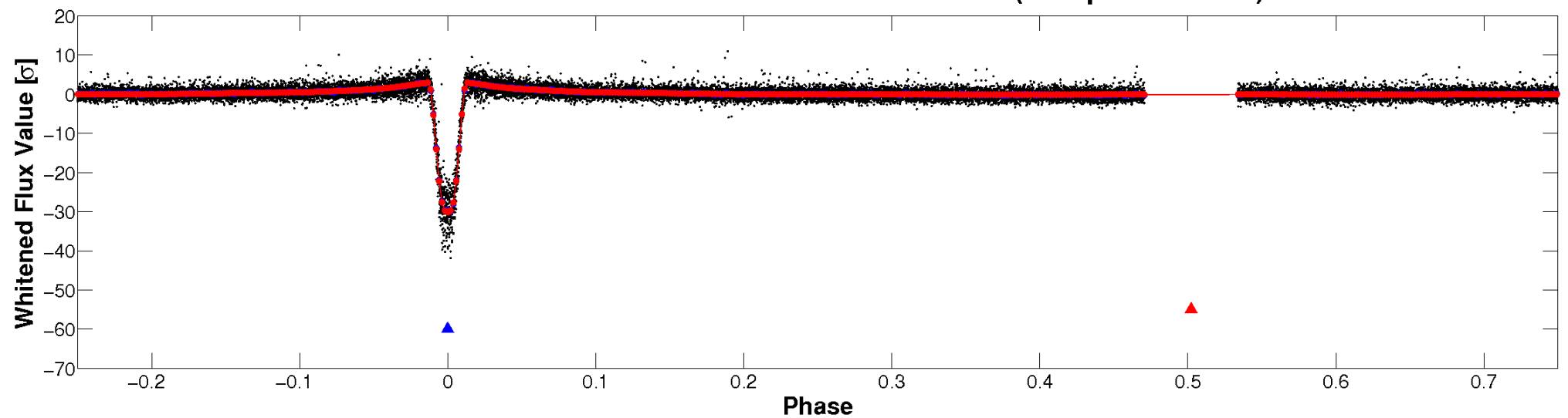


# Non-Whitened Vs. Whitened Light Curve

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

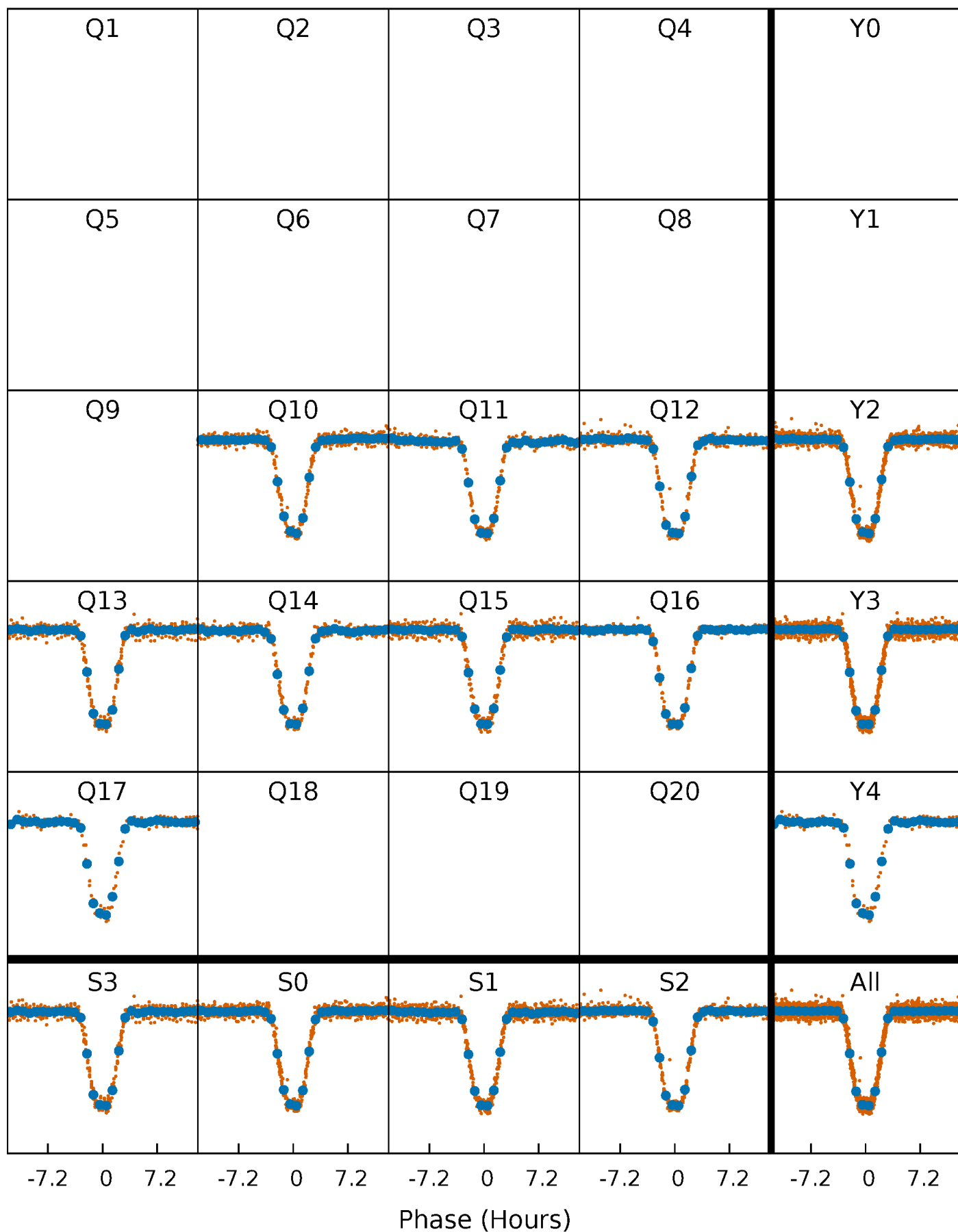


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



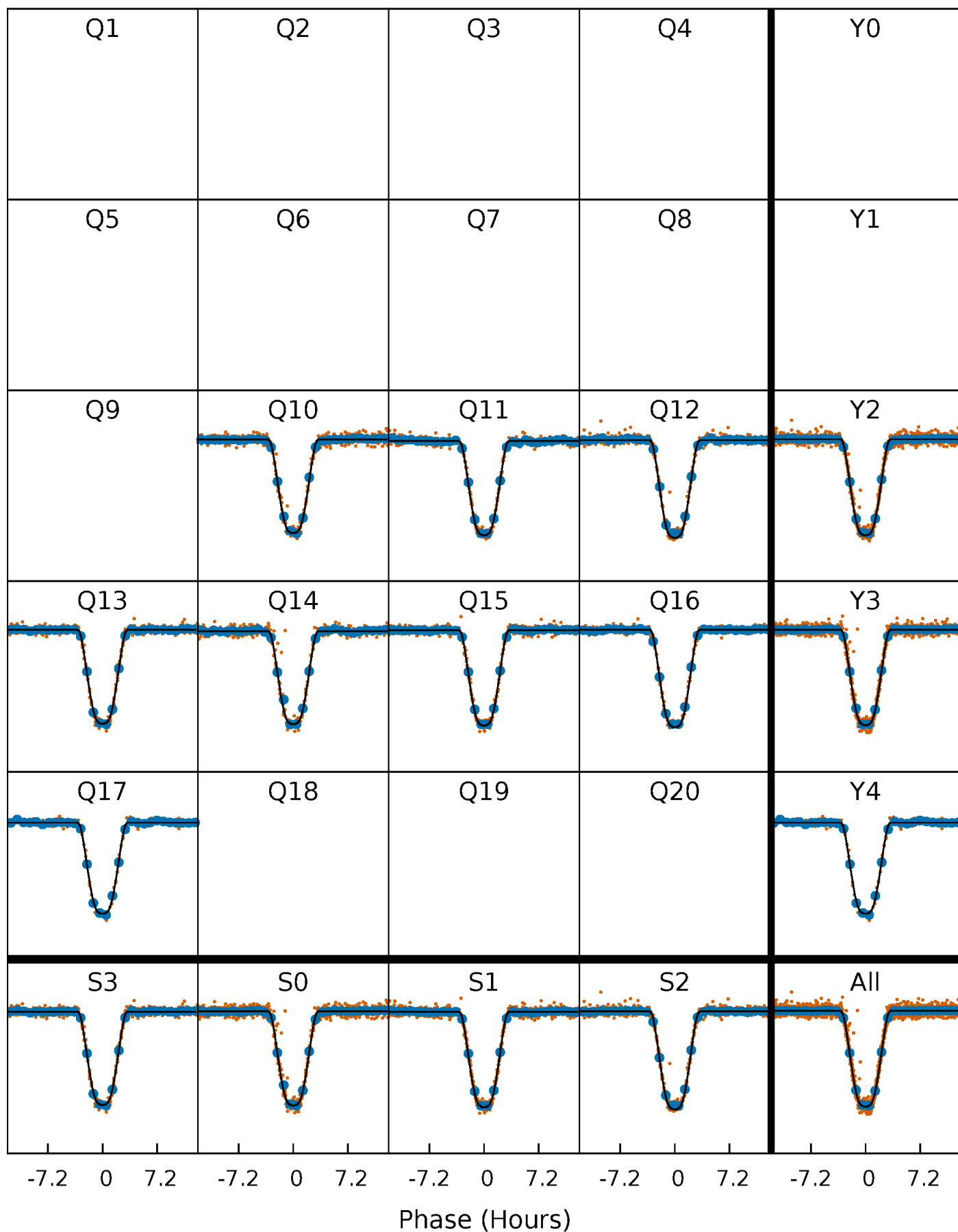
# PDC Quarter-Phased Transit Curves

TCE 009636559-02 P= 10.636308 Days  $T_0=134.440998$  (BKJD)



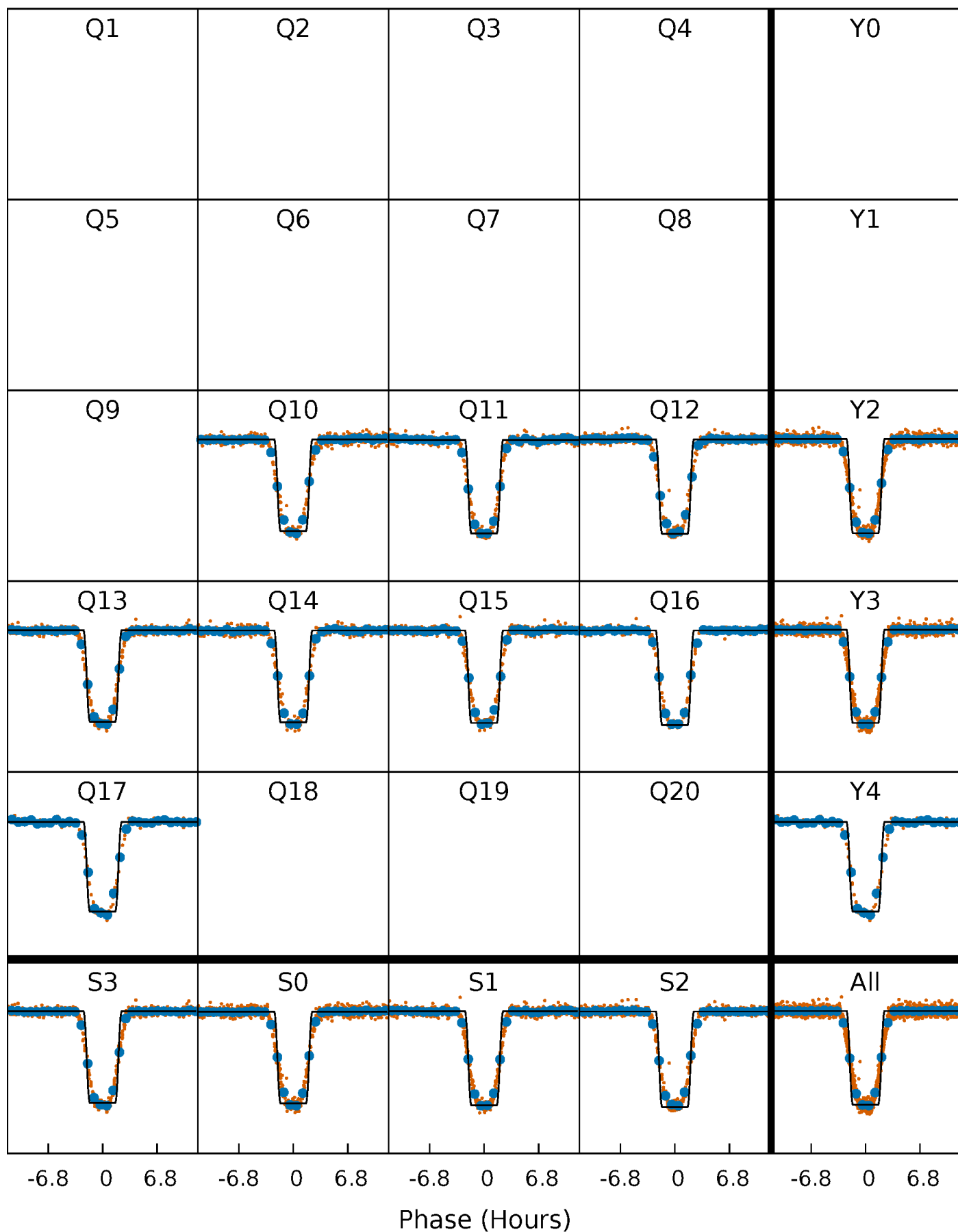
# DV Quarter-Phased Transit Curves

TCE 009636559-02 P= 10.636308 Days  $T_0=134.440998$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

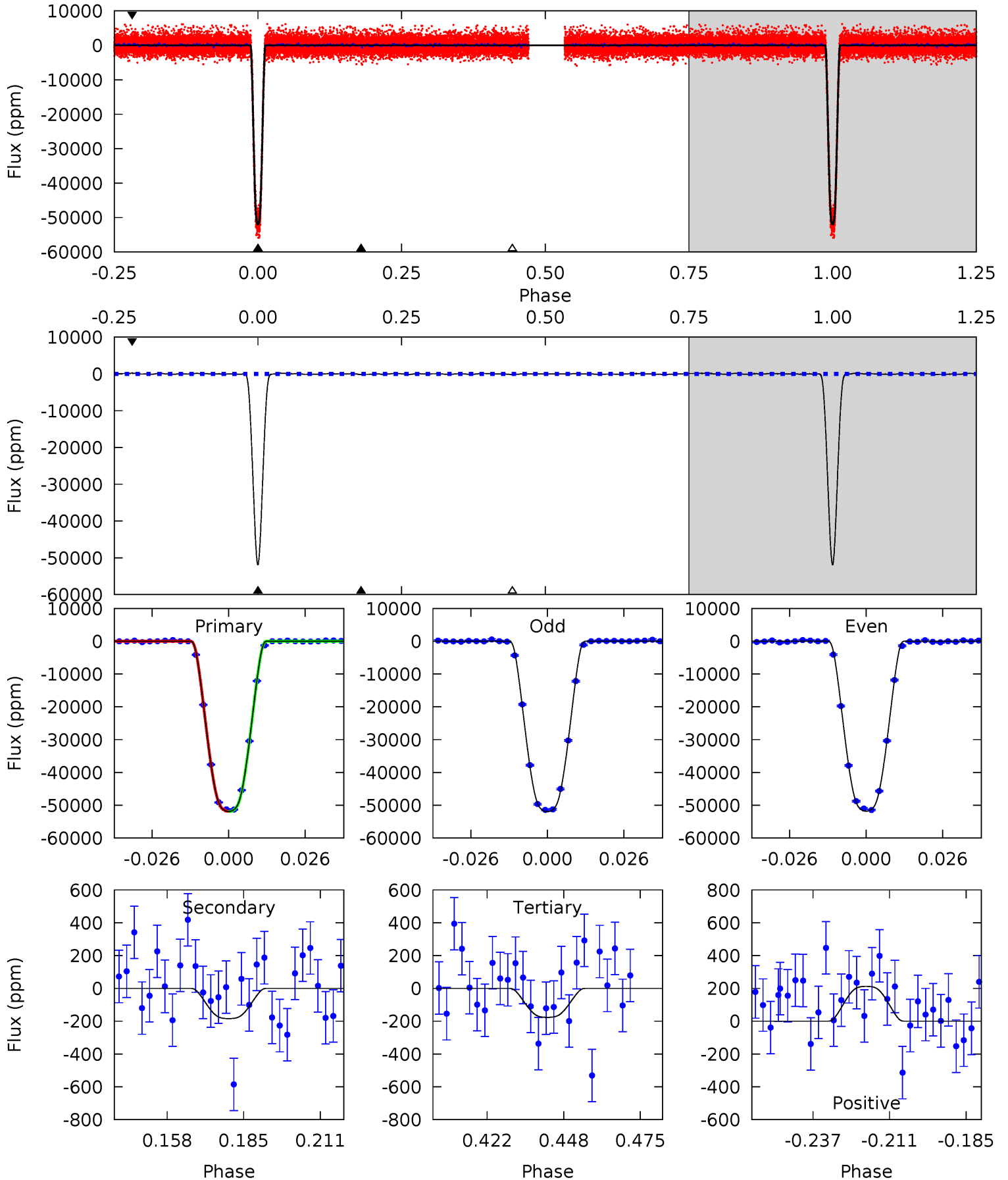
TCE 009636559-02 P= 10.636223 Days  $T_0=134.450081$  (BKJD)



# DV Model-Shift Uniqueness Test

009636559-02, P = 10.636308 Days, E = 134.440998 Days

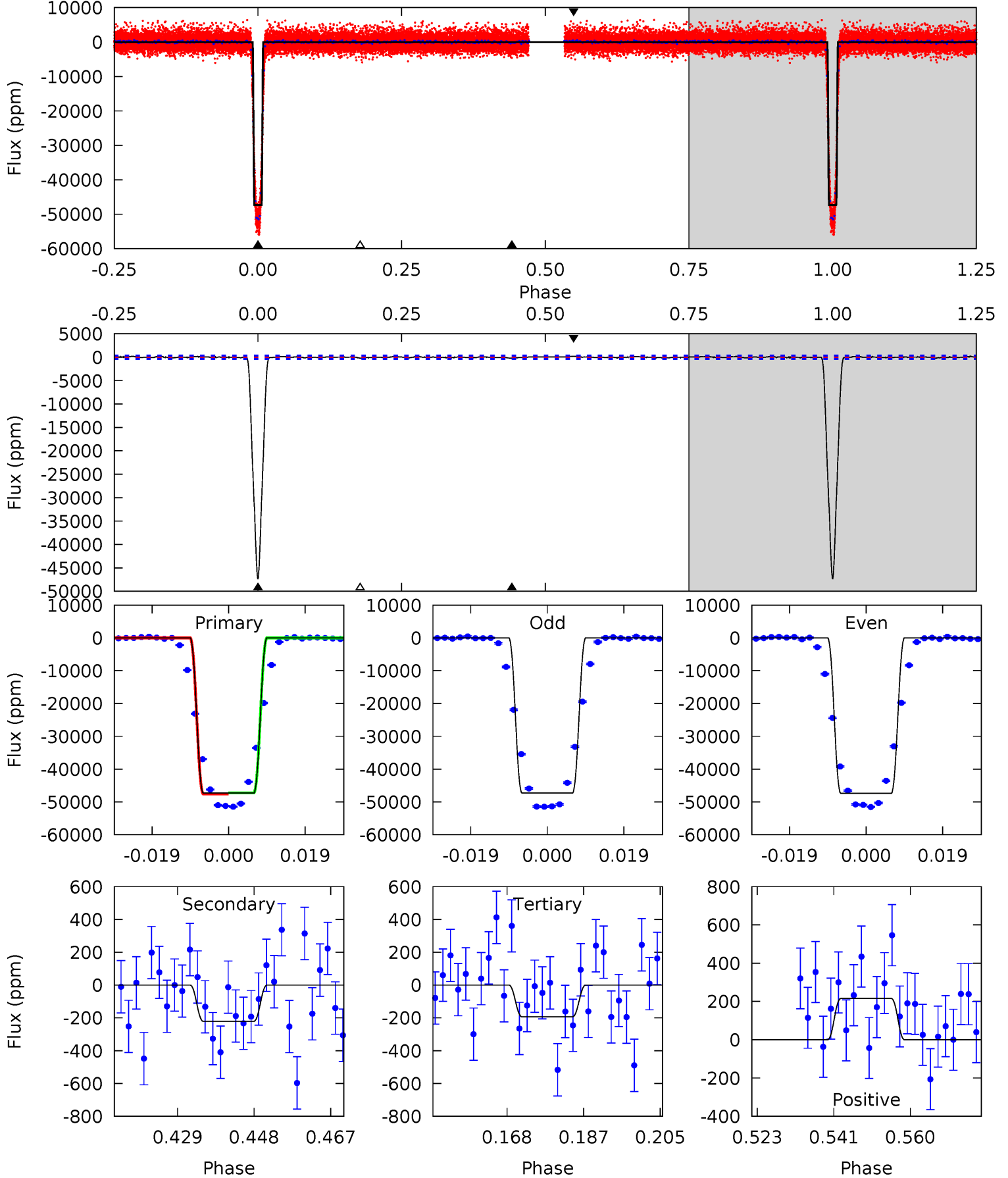
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
949.1	3.37	3.23	3.88	4.84	2.22	1.42	945.9	945.2	0.14	-0.51	1.39	0.99	0.00	0.72



# Alt Model-Shift Uniqueness Test

009636559-02, P = 10.636223 Days, E = 134.450081 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
705.7	3.30	2.89	3.22	4.91	2.35	1.15	702.8	702.4	0.41	0.08	0.95	1.00	0.00	2.65





### Stellar Parameters For KIC 009636559

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6781^{+212}_{-259}$	$4.221^{+0.175}_{-0.175}$	$-0.540^{+0.250}_{-0.300}$	$1.345^{+0.357}_{-0.292}$	$1.097^{+0.169}_{-0.138}$	$0.634^{+0.567}_{-0.301}$
	+3%/-4%	+4%/-4%	+46%/-56%	+27%/-22%	+15%/-13%	+89%/-47%
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 009636559-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-184 \pm 55$	$33.60^{+5.35}_{-4.08}$	$1547^{+118}_{-104}$	$2376^{+108}_{-184}$	$0.839^{+0.379}_{-0.274}$
Alt.	$-221 \pm 67$	$33.49^{+4.81}_{-4.00}$	$1561^{+107}_{-118}$	$2457^{+117}_{-168}$	$1.000^{+0.474}_{-0.332}$

$T_{\text{max}}$  = 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

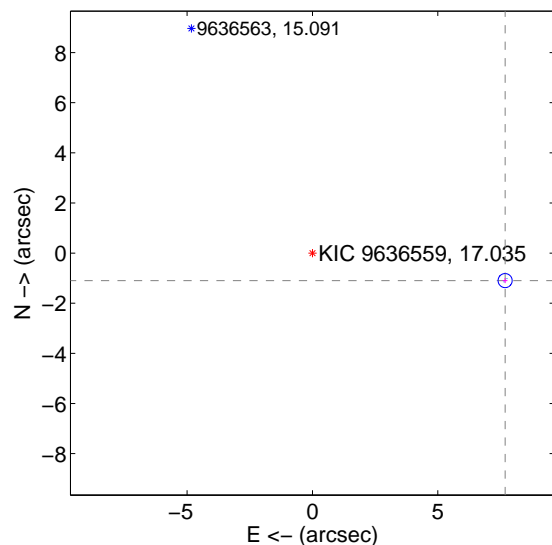
Supplemental centroid analysis for 009636559-02. Kepler magnitude: 17.04. Transit SNR 554.24

There are 8 quarters with good PRF difference image offsets

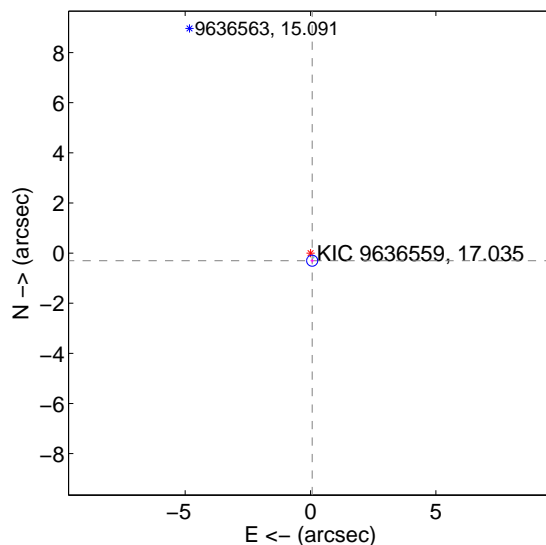
The OOT PRF centroid is offset from the target star catalog position by about 7.68 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$7.766 \pm 0.094$	82.98	$-7.688 \pm 0.093$	$-1.097 \pm 0.102$
PRF-fit source offset from KIC position	$0.310 \pm 0.074$	4.21	$-0.065 \pm 0.068$	$-0.303 \pm 0.074$
photometric centroid source offset	$4.68 \pm 0.01$	669.75	$4.57 \pm 0.01$	$0.99 \pm 0.00$

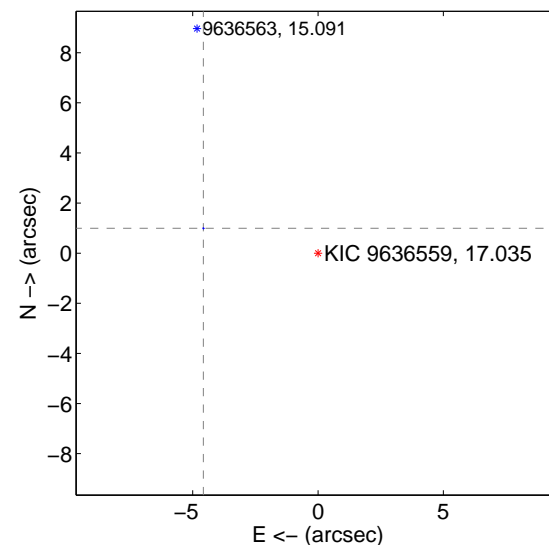
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids



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.

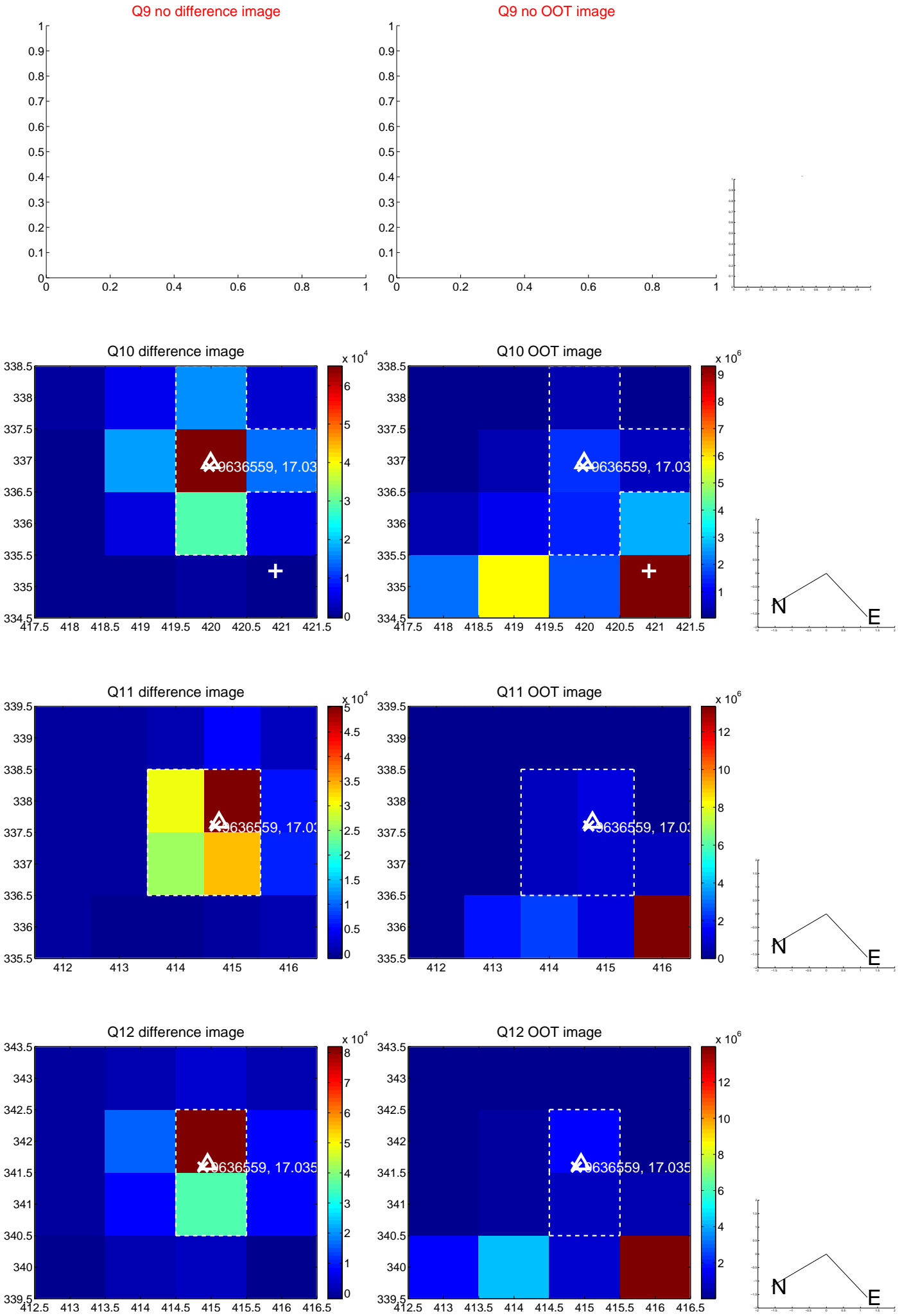
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



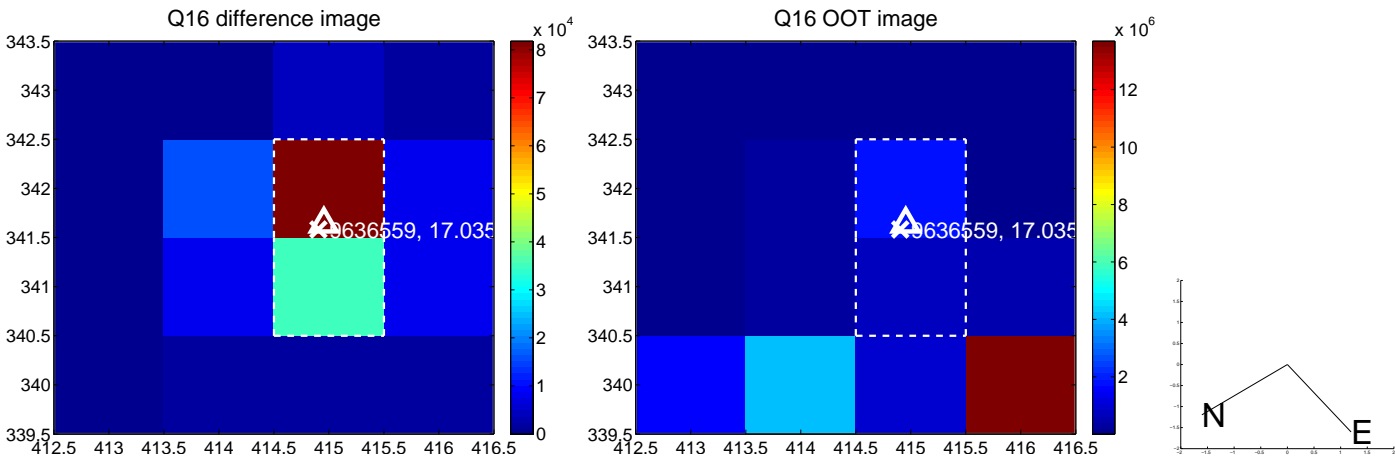
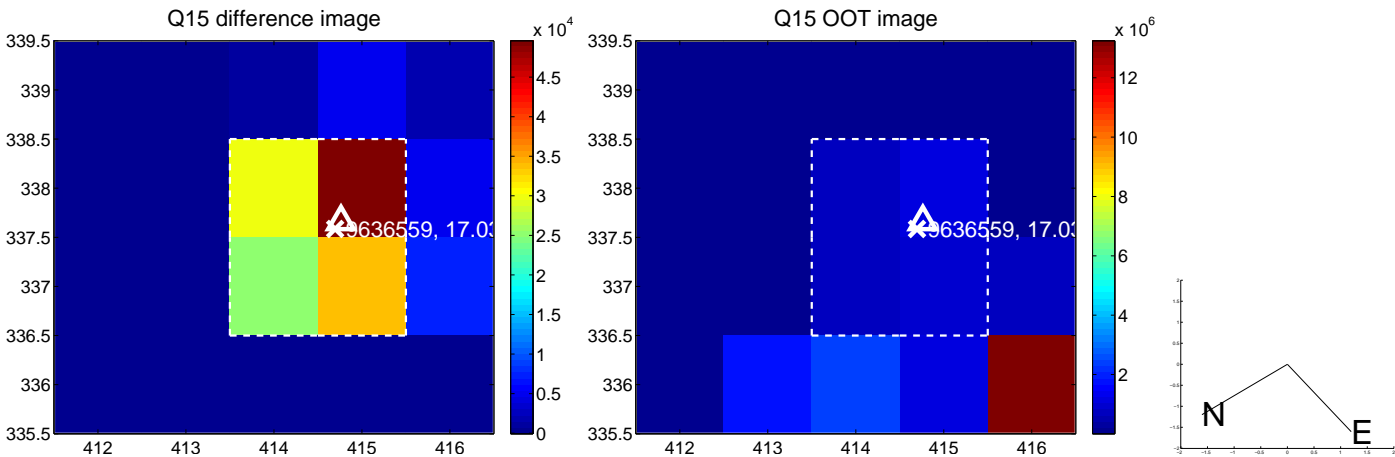
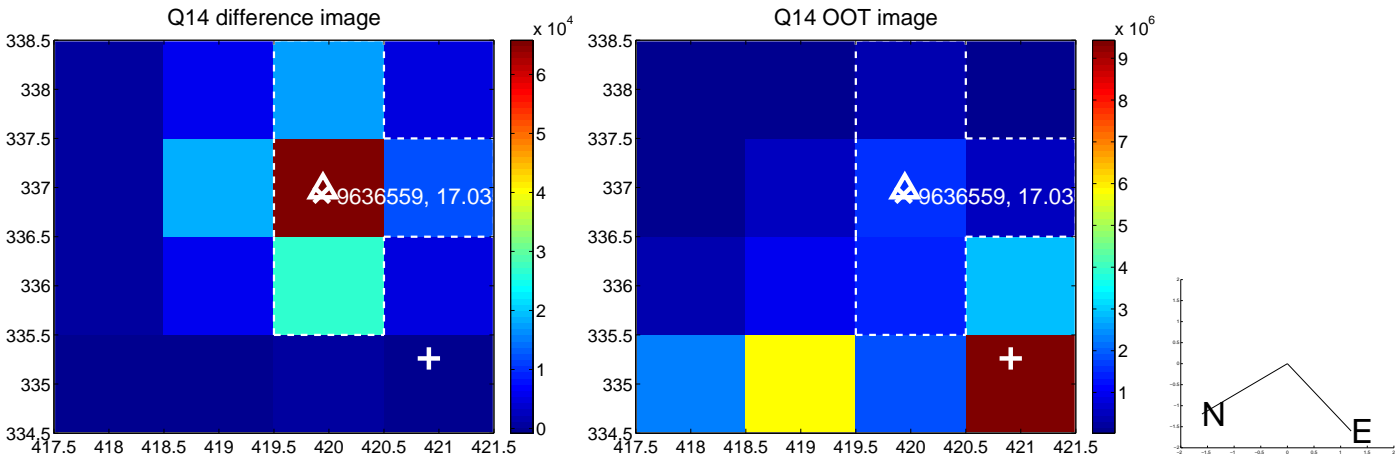
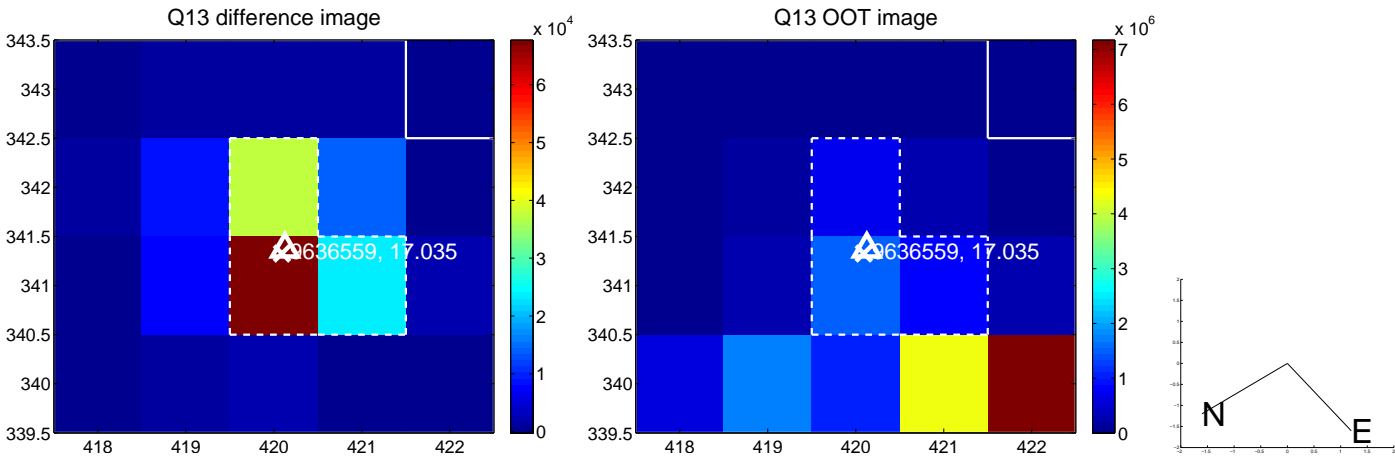
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



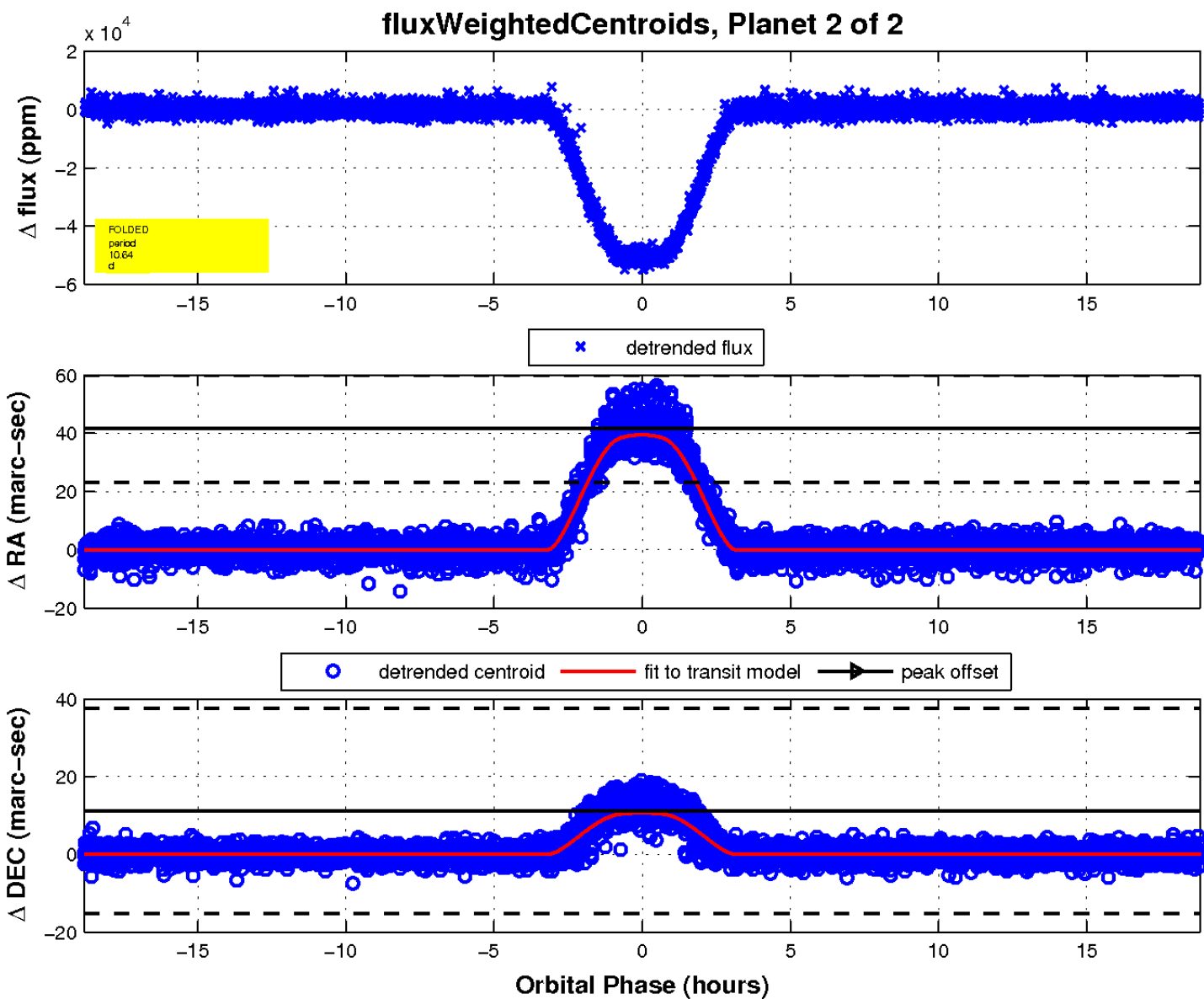
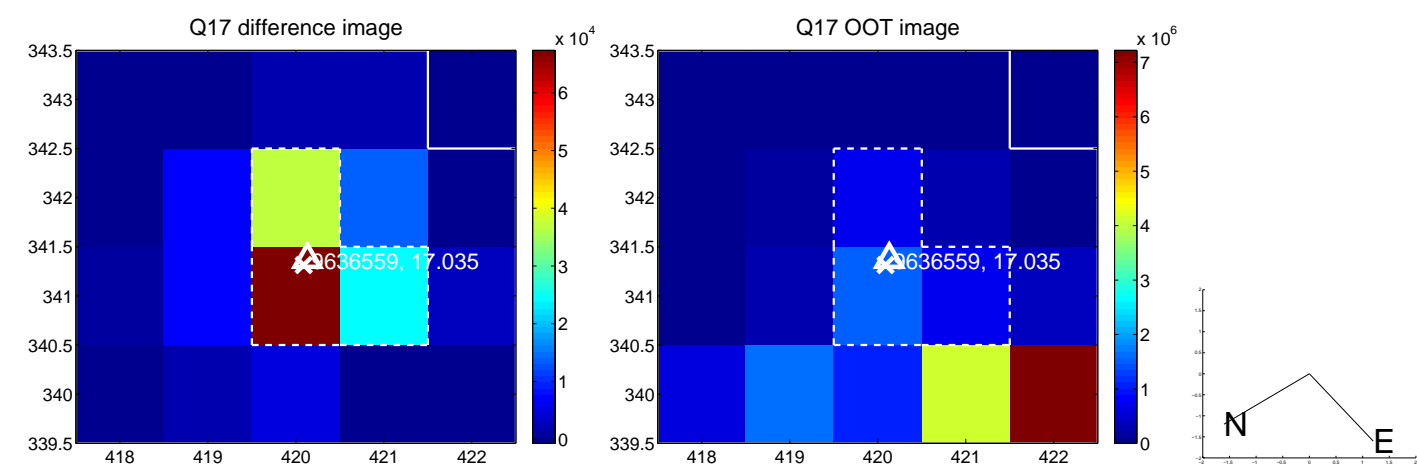
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

