

# KIC 008009500

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008009500-01	OBS	6951.01	38.476744	150.574239	173429.2	5.122	4760.2	3779.4	0.79	5294	33.83	10.87
008009500-02	OBS	No	38.476734	139.795383	8533.1	7.409	280.4	278.2	0.79	5294	10.13	10.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008009500-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_DV—HAS_SEC_TCE
008009500-02	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 008009500-01

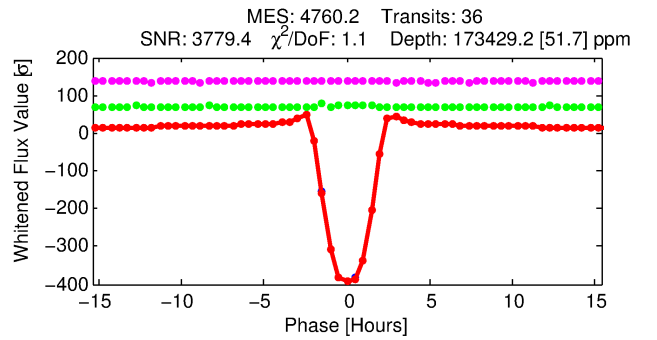
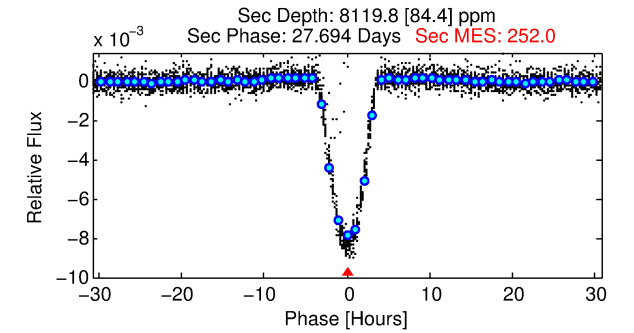
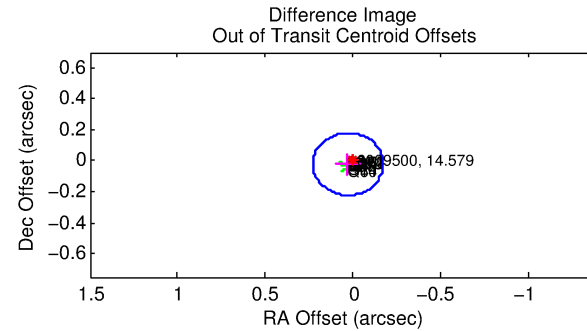
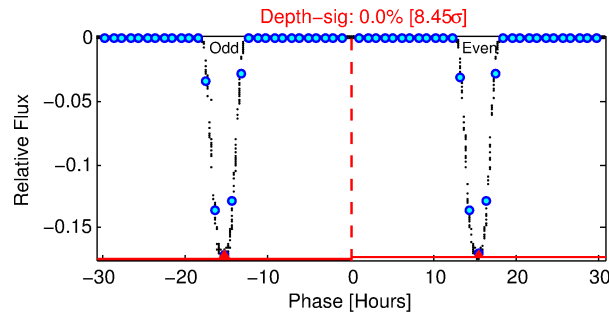
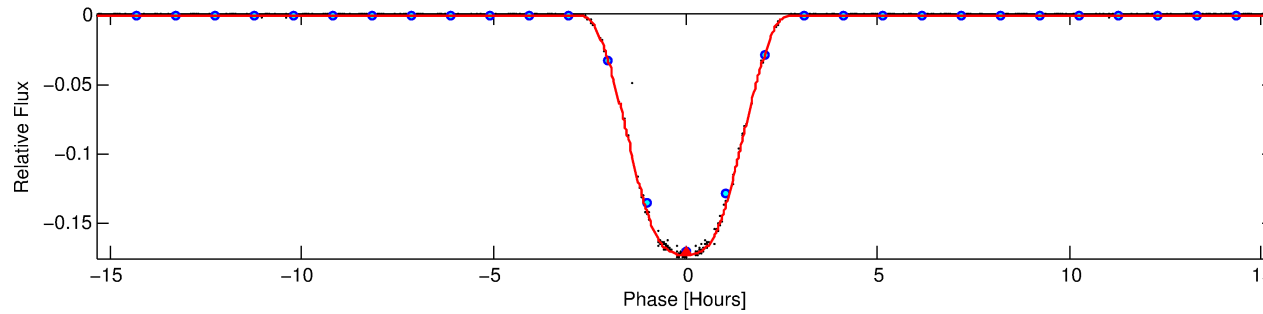
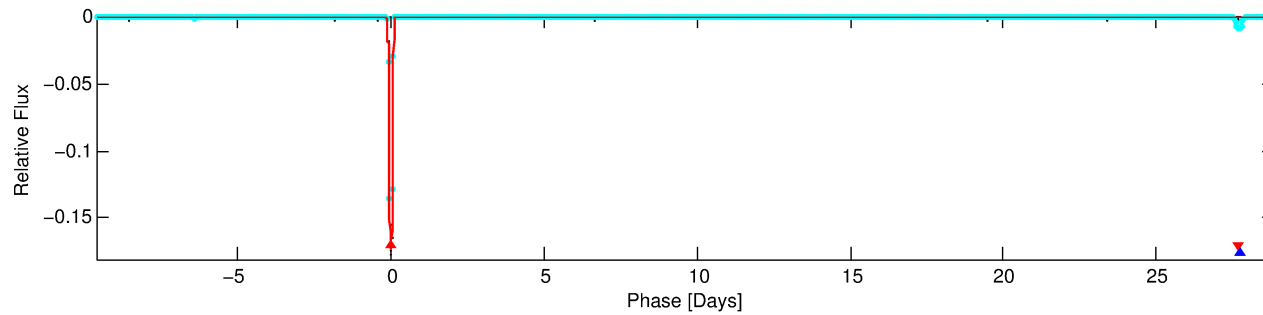
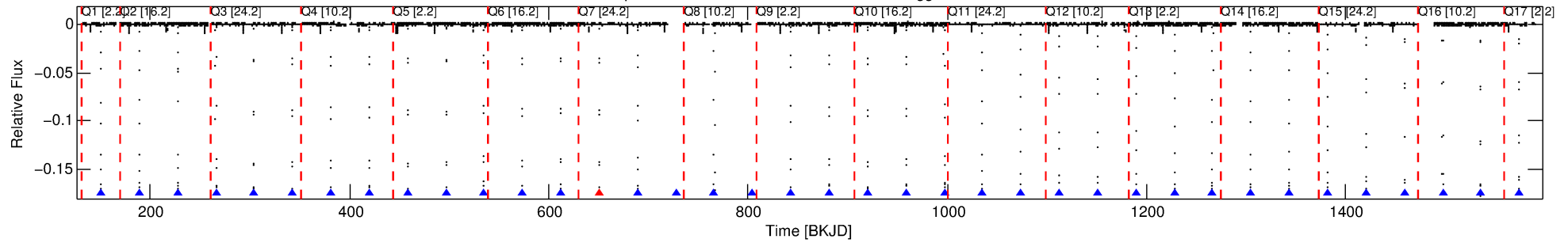
No Significant Match Found

# DV One-Page Summary

KIC: 8009500 Candidate: 1 of 2 Period: 38.477 d

KOI: K06951.01 Corr: 0.998

Kp: 14.58 R\*: 0.79 Rs Teff: 5294.0 K Logg: 4.51 Fe/H: -0.340



## DV Fit Results:

Period = 38.47674 [0.00000] d  
Epoch = 150.5742 [0.0000] BKJD  
Rp/R\* = 0.3924 [0.0001]  
a/R\* = 75.34 [0.03]  
b = 0.46 [0.00]  
Seff = 10.87 [2.26]  
Teq = 463 [24] K  
Rp = 33.83 [4.37] Re  
a = 0.2010 [0.0227] AU  
Ag = 157.73 [26.76] [5.86σ]  
Teffp = 2537 [76] K [25.87σ]

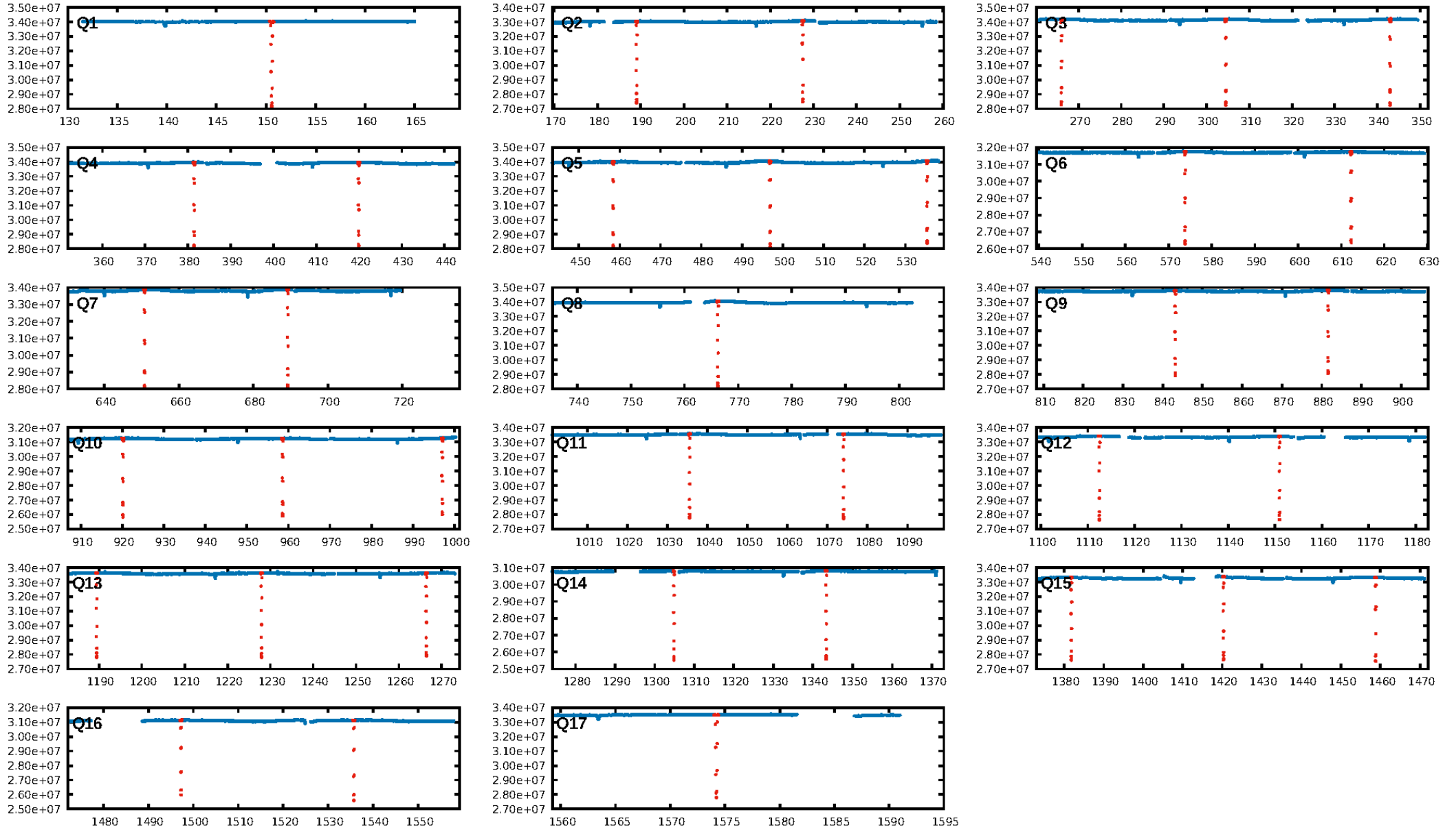
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 99.9%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.97 [33/34]  
GhostDiagnostic-chr: 9.952  
Centroid-sig: 0.0%  
Centroid-so: 0.377 arcsec [180.17σ]  
OotOffset-rm: 0.037 arcsec [0.55σ]  
KicOffset-rm: 0.137 arcsec [2.02σ]  
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]

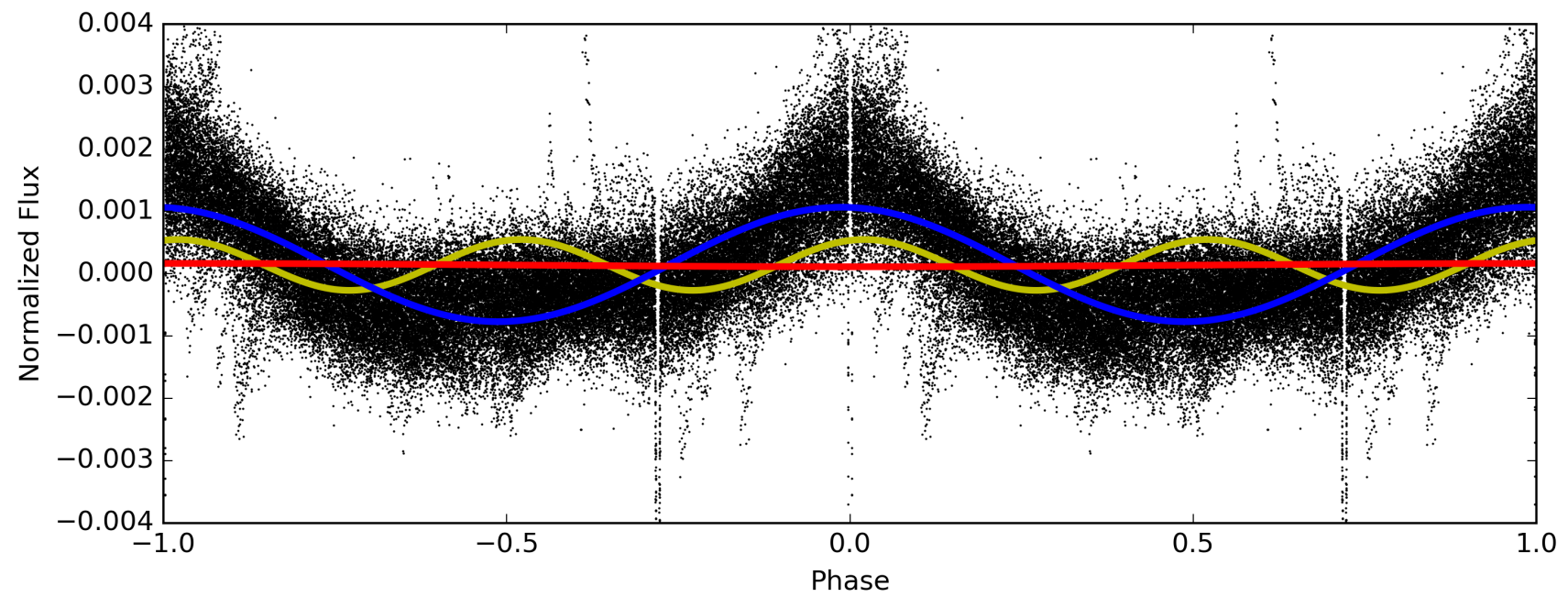
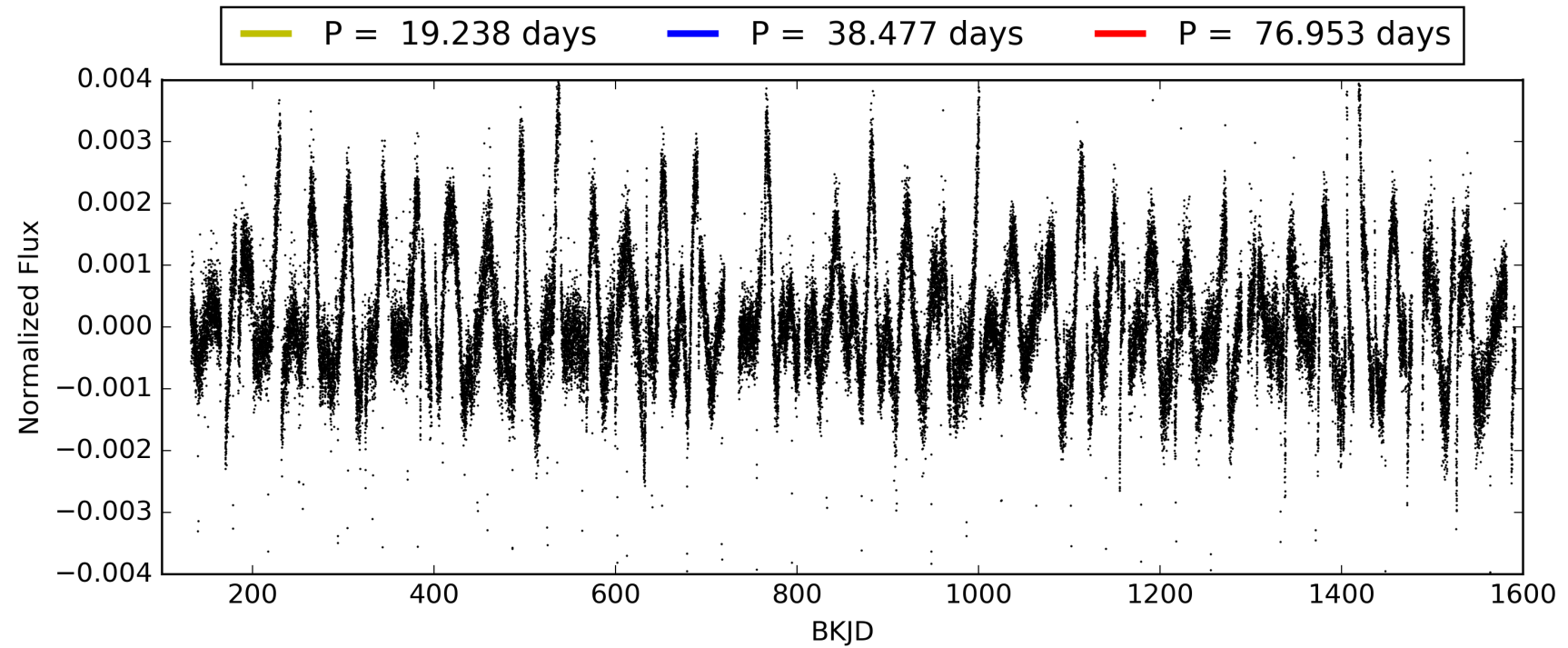
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 17:45:27 Z

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

# TCE 008009500-01, PDC Light Curves

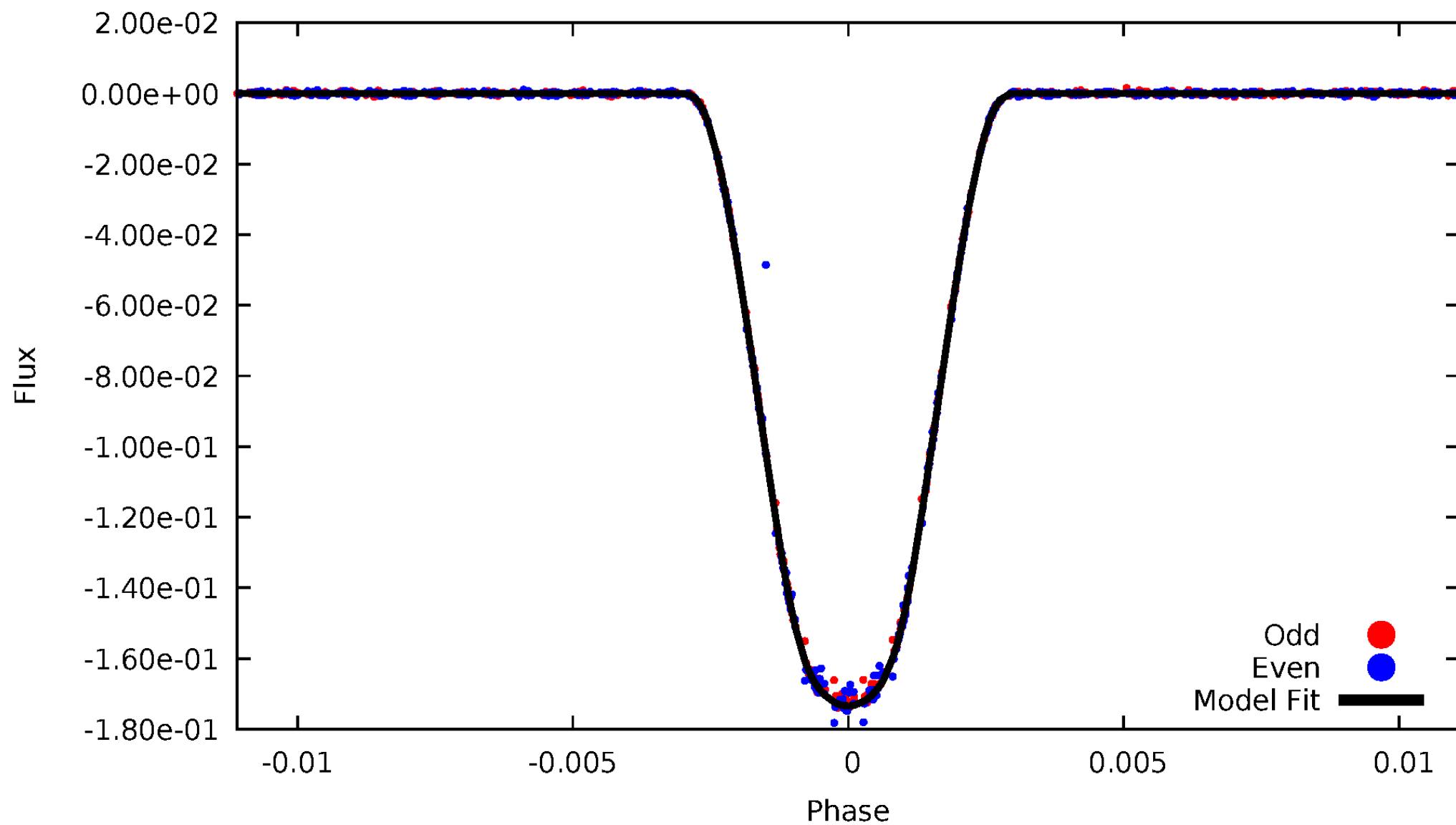


TCE 008009500-01



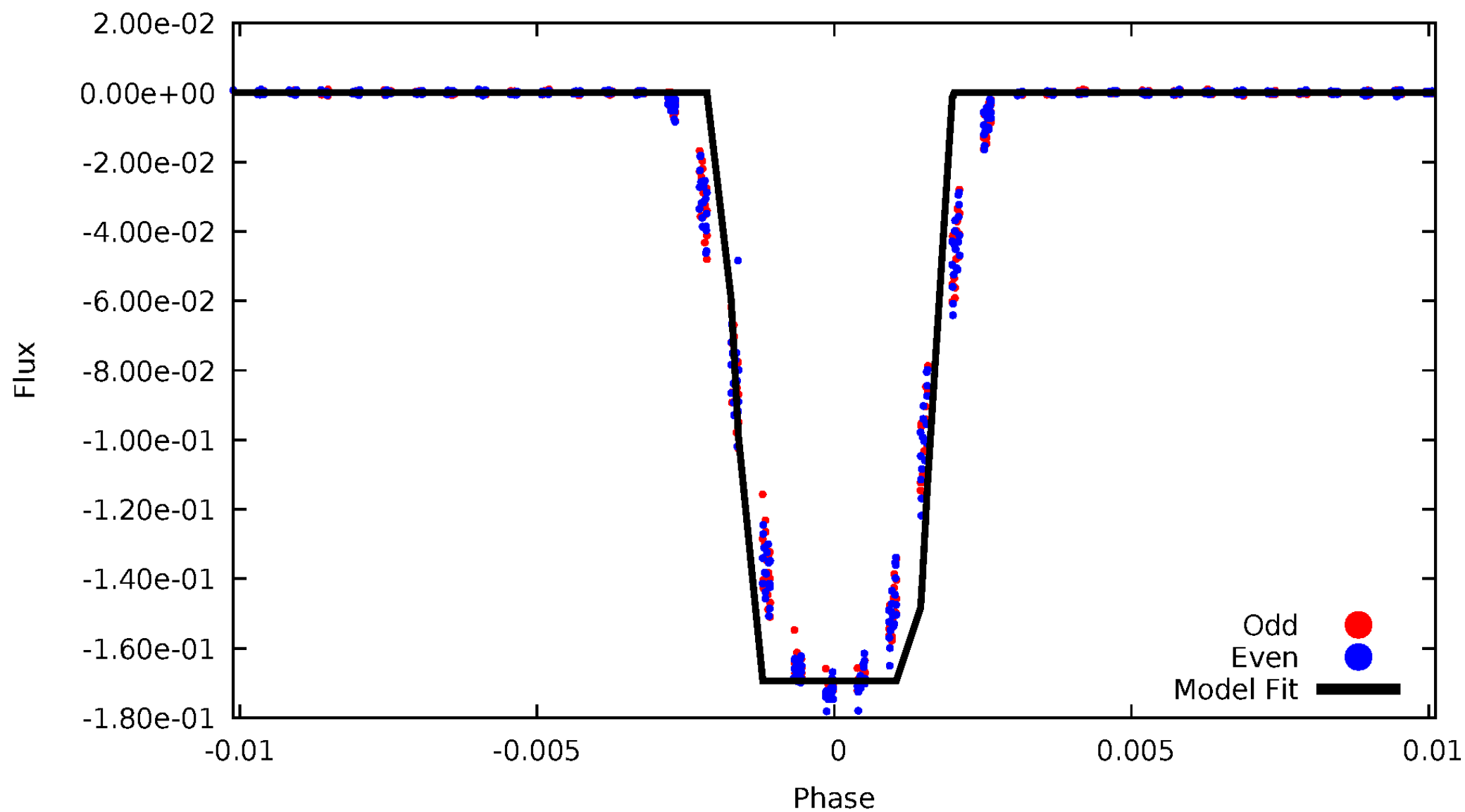
# DV Odd/Even

TCE 008009500-01



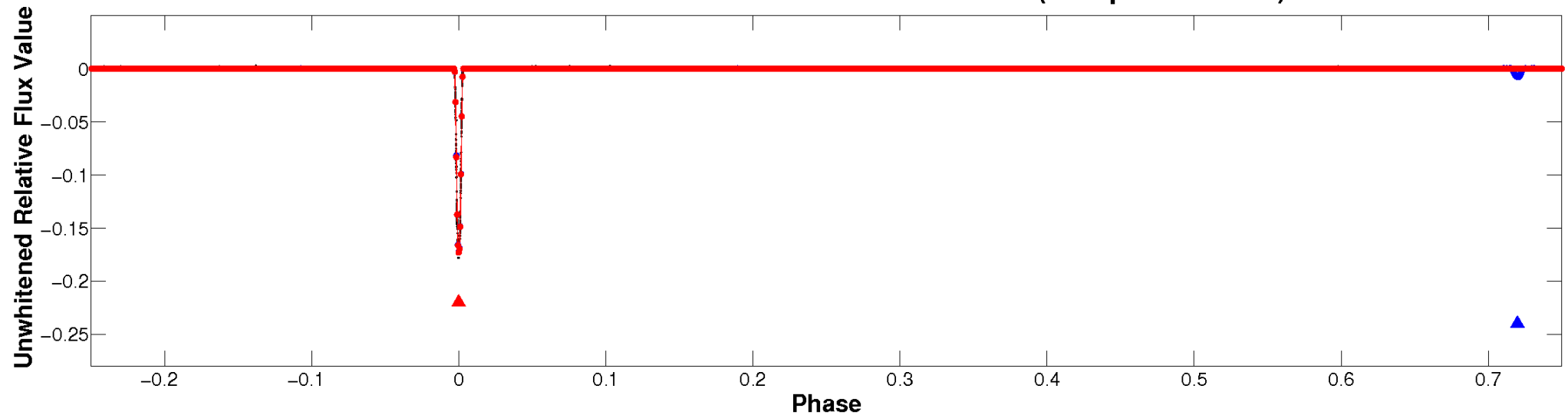
# ALT Odd/Even

TCE 008009500-01

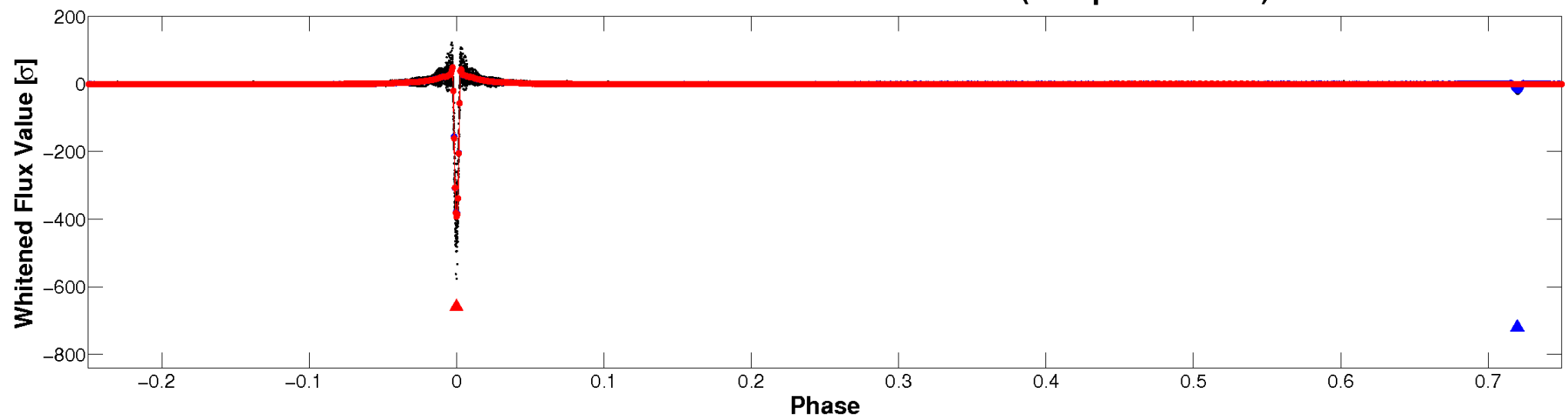


# Non-Whitened Vs. Whitened Light Curve

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

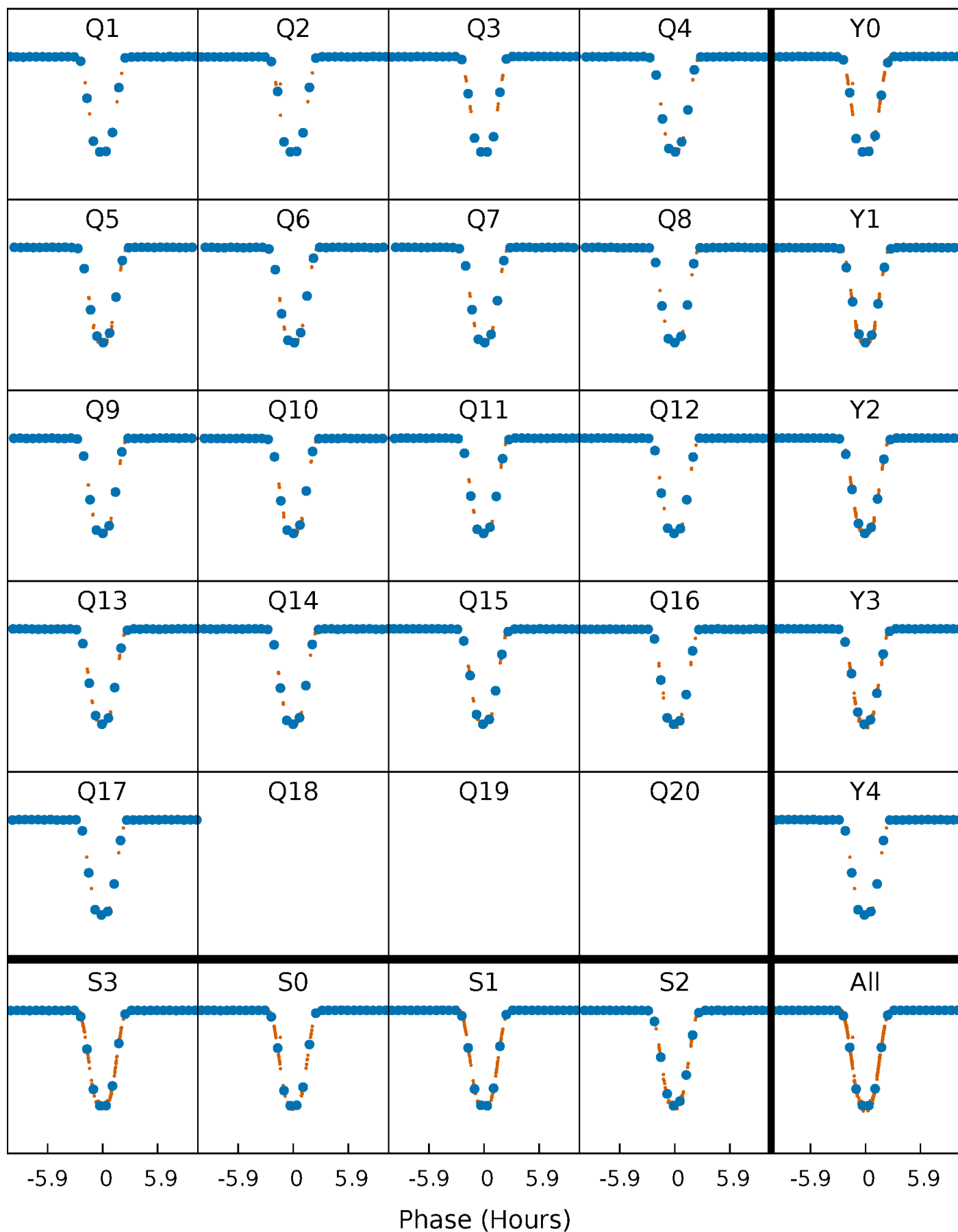


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

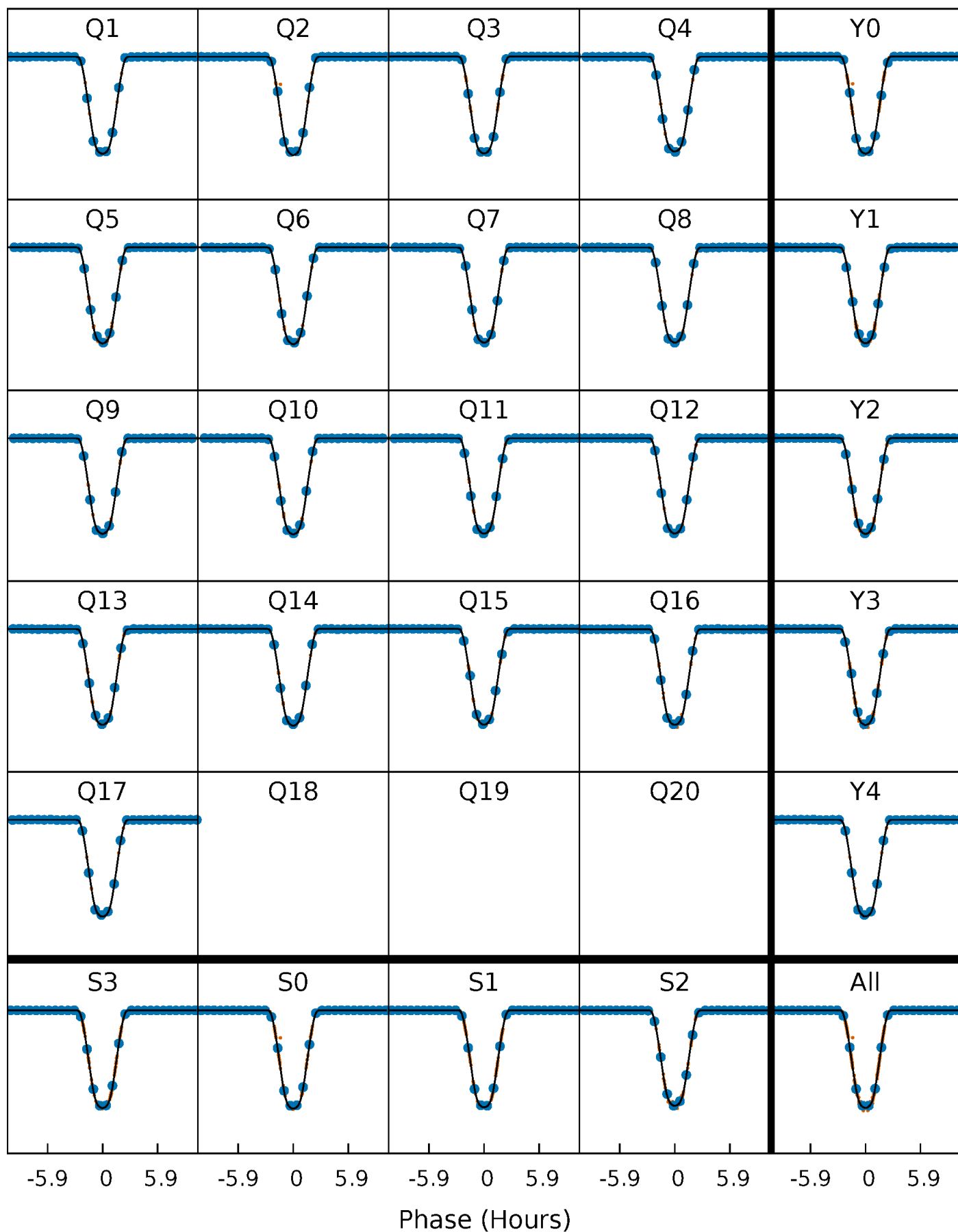
TCE 008009500-01 P= 38.476744 Days  $T_0=150.574240$  (BKJD)





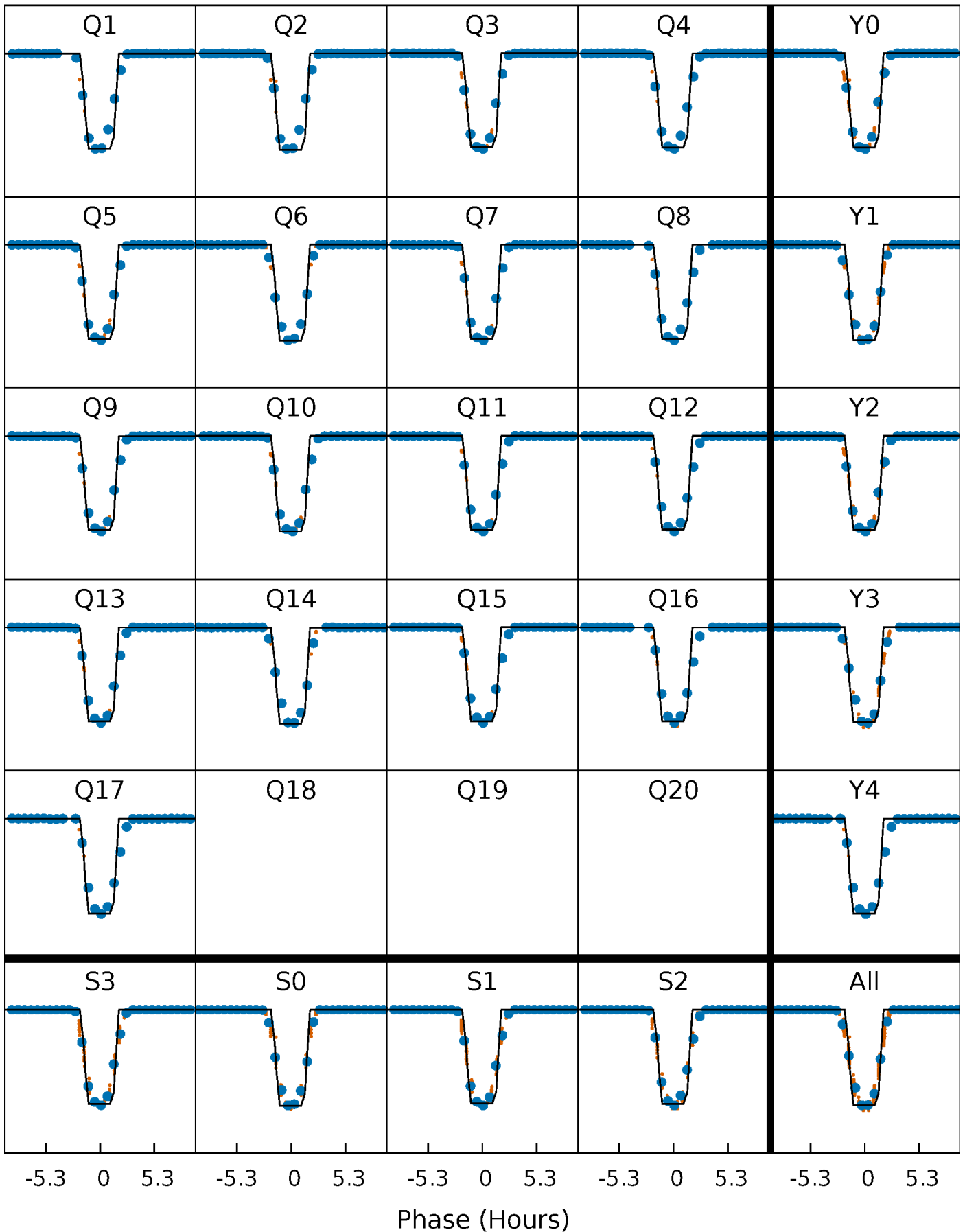
# DV Quarter-Phased Transit Curves

TCE 008009500-01 P= 38.476744 Days  $T_0=150.574240$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

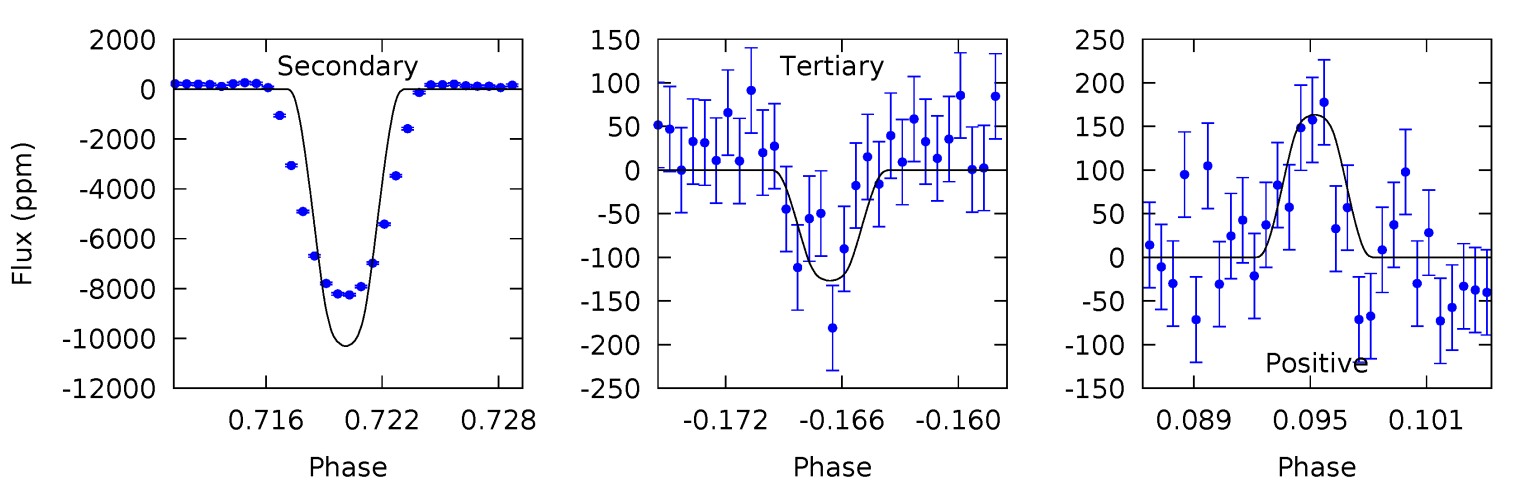
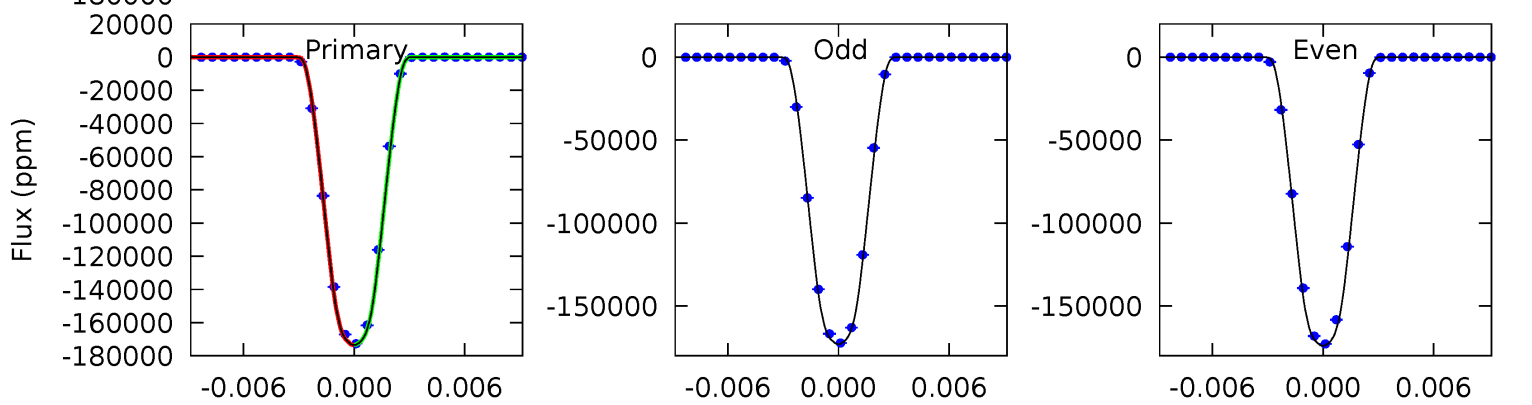
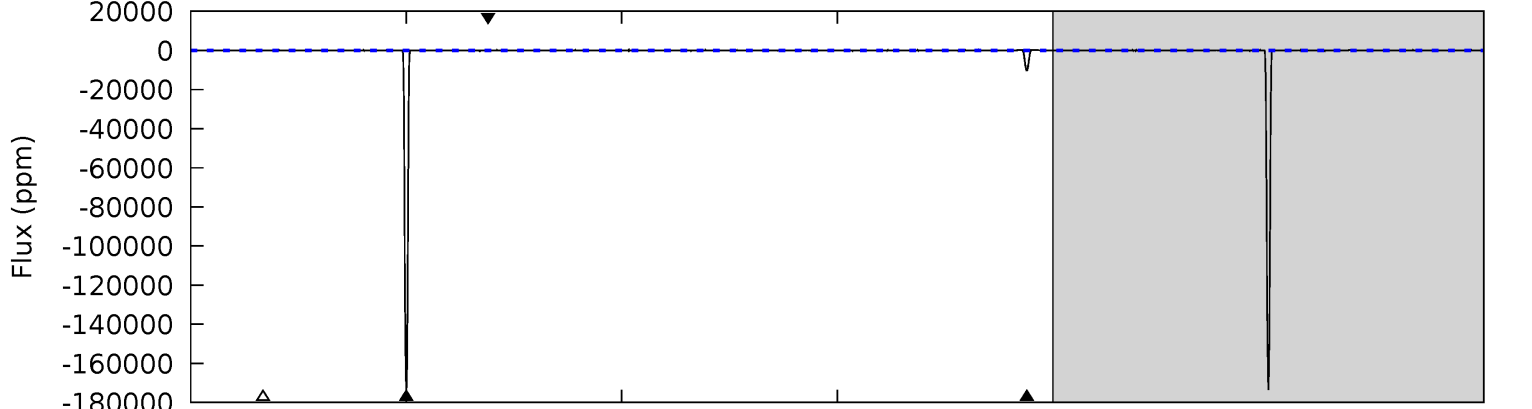
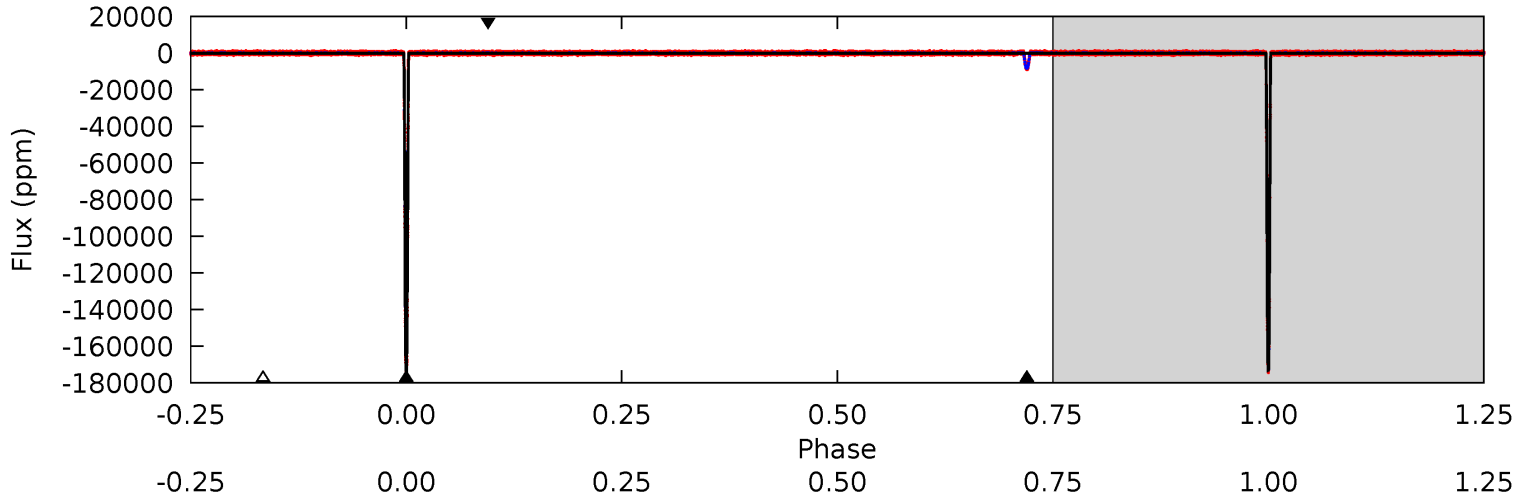
TCE 008009500-01 P= 38.476465 Days  $T_0=150.579421$  (BKJD)



# DV Model-Shift Uniqueness Test

008009500-01, P = 38.476744 Days, E = 112.097496 Days

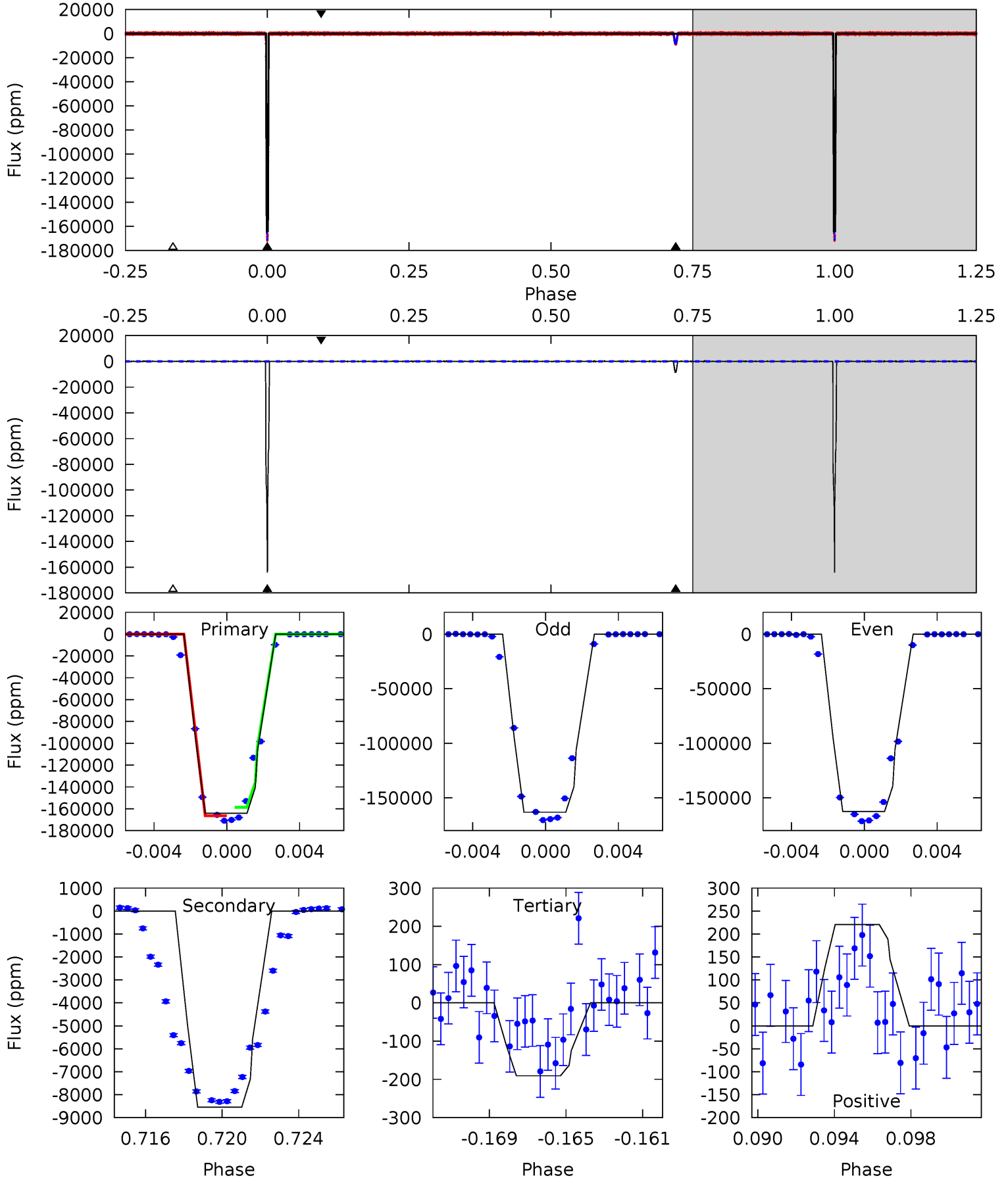
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9153	543.9	6.69	8.63	5.13	2.75	2.30	9146	9144	537.3	535.3	25.1	1.00	0.00	0



# Alt Model-Shift Uniqueness Test

008009500-01, P = 38.476465 Days, E = 112.102956 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
3526	183.5	4.09	4.74	5.21	2.90	1.20	3522	3522	179.4	178.8	7.09	1.00	0.00	37.9



### Stellar Parameters For KIC 008009500

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5294^{+159}_{-143}$	$4.507^{+0.095}_{-0.085}$	$-0.340^{+0.350}_{-0.300}$	$0.790^{+0.102}_{-0.092}$	$0.733^{+0.110}_{-0.047}$	$2.092^{+0.898}_{-0.582}$
	+3%/-3%	+2%/-2%	+103%/-88%	+13%/-12%	+15%/-6%	+43%/-28%
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 008009500-01 / KOI 6951.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-10309 \pm 19$	$33.88^{+2.76}_{-2.25}$	$645^{+26}_{-27}$	$3250^{+69}_{-59}$	$205^{+28}_{-26}$
Alt.	$-8541 \pm 47$	$35.62^{+2.87}_{-2.42}$	$647^{+28}_{-27}$	$3118^{+62}_{-56}$	$153^{+21}_{-18}$

$T_{\text{max}}$  = 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

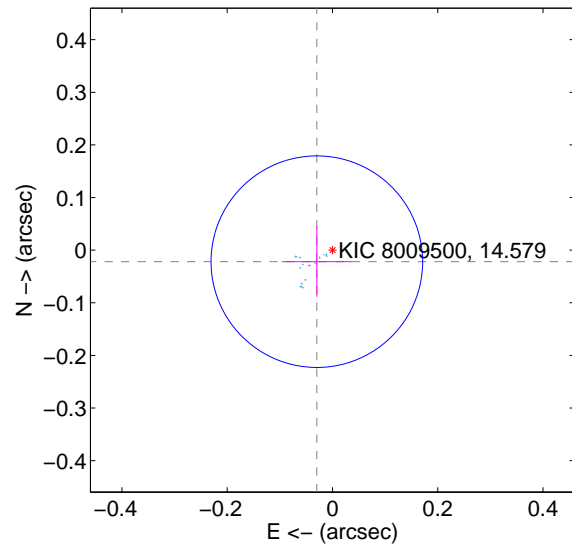
Supplemental centroid analysis for 008009500-01. Kepler magnitude: 14.58. Transit SNR 3779.39

There are 17 quarters with good PRF difference image offsets

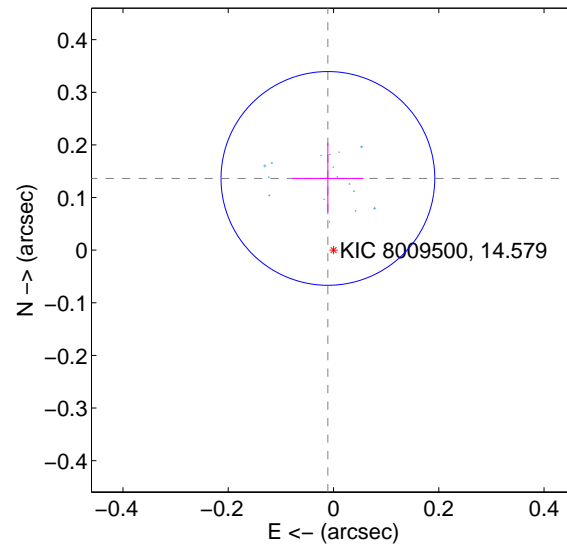
The direct PRF centroid is offset from the target star catalog position by about 0.24 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.037 \pm 0.067$	0.55	$0.030 \pm 0.067$	$-0.022 \pm 0.067$
PRF-fit source offset from KIC position	$0.137 \pm 0.068$	2.02	$0.011 \pm 0.068$	$0.136 \pm 0.068$
photometric centroid source offset	$0.38 \pm 0.00$	180.17	$-0.21 \pm 0.00$	$0.32 \pm 0.00$

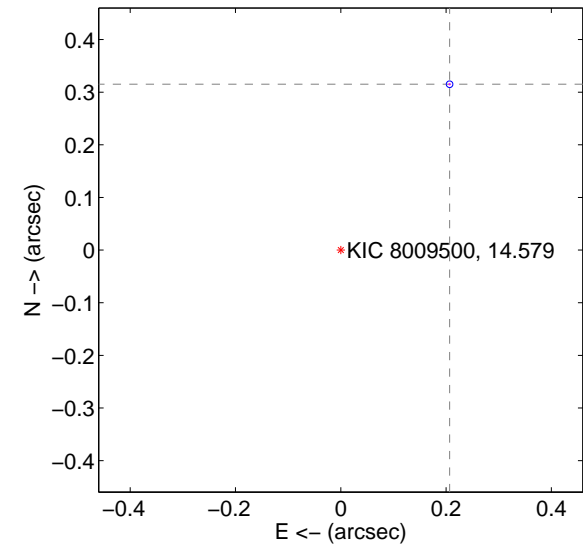
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

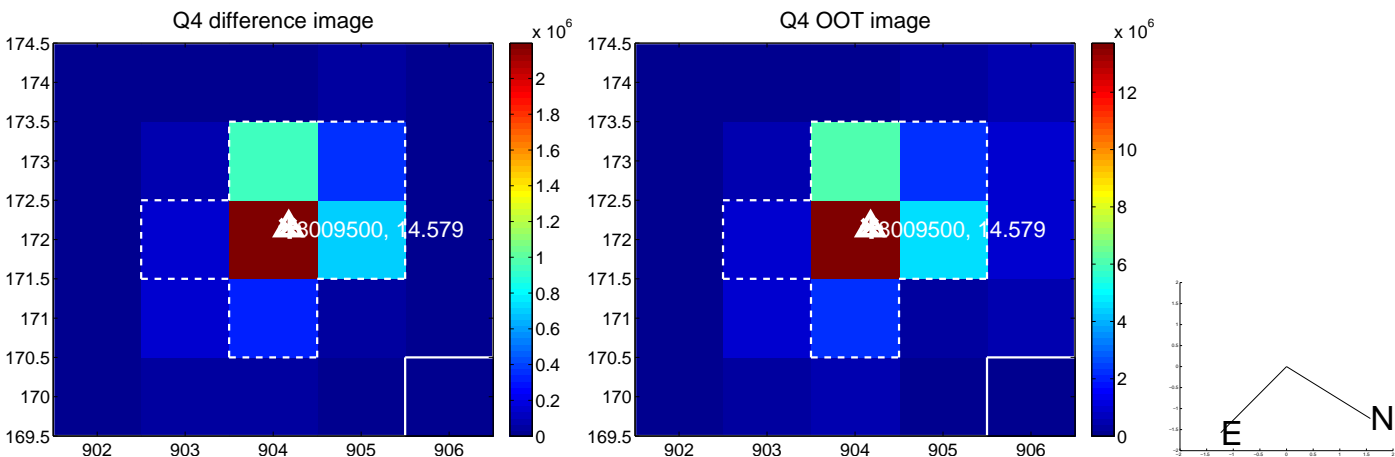
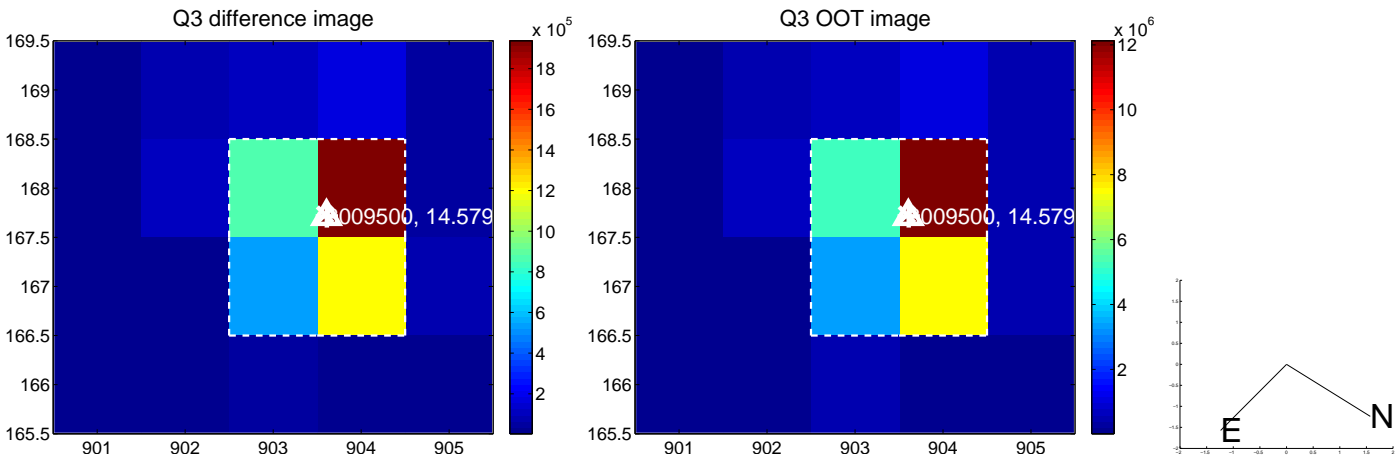
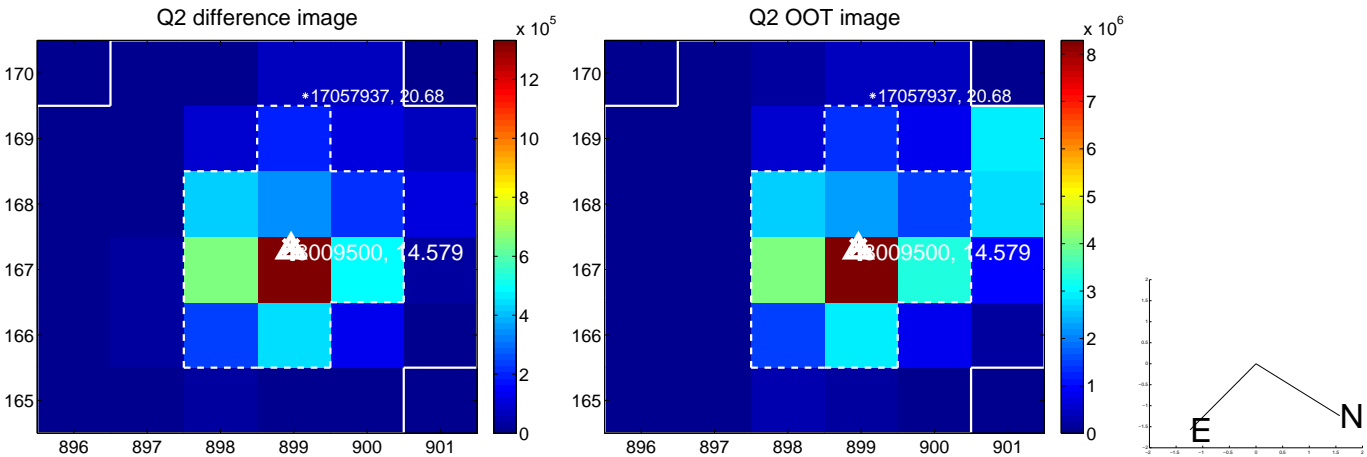
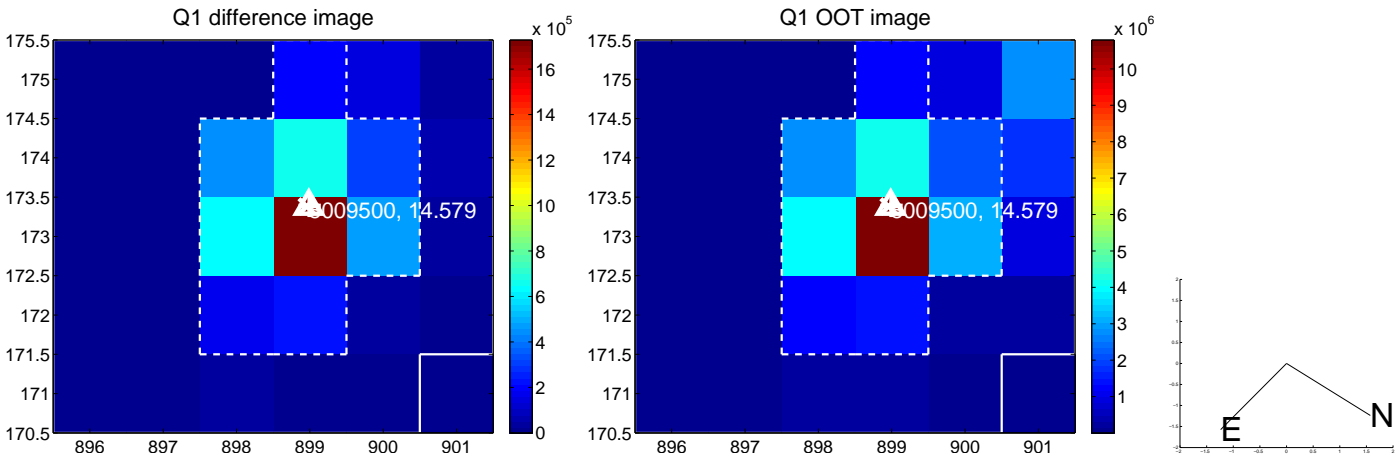


offset from photometric centroids

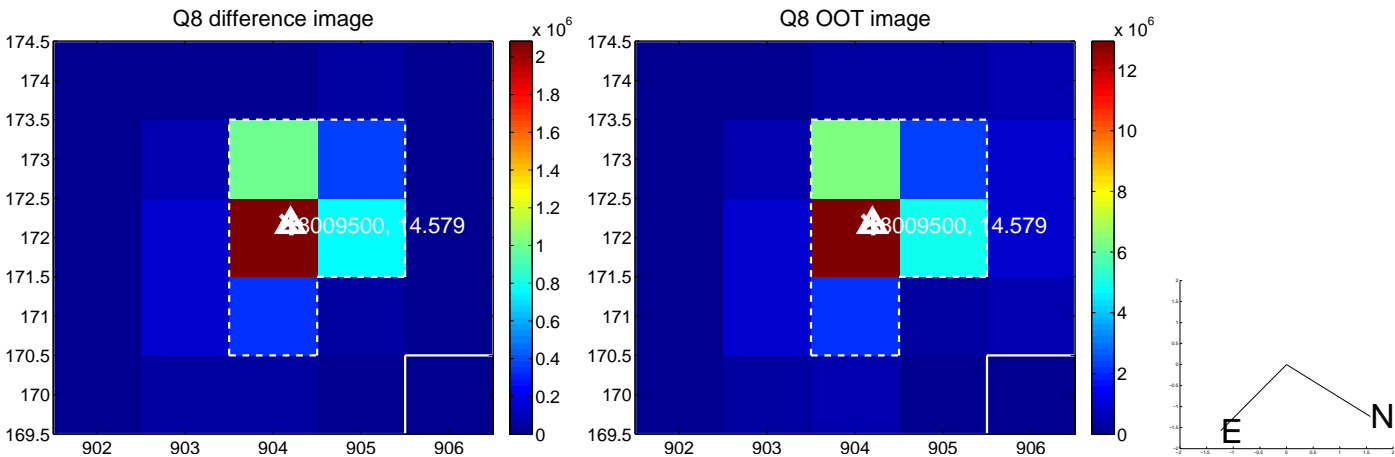
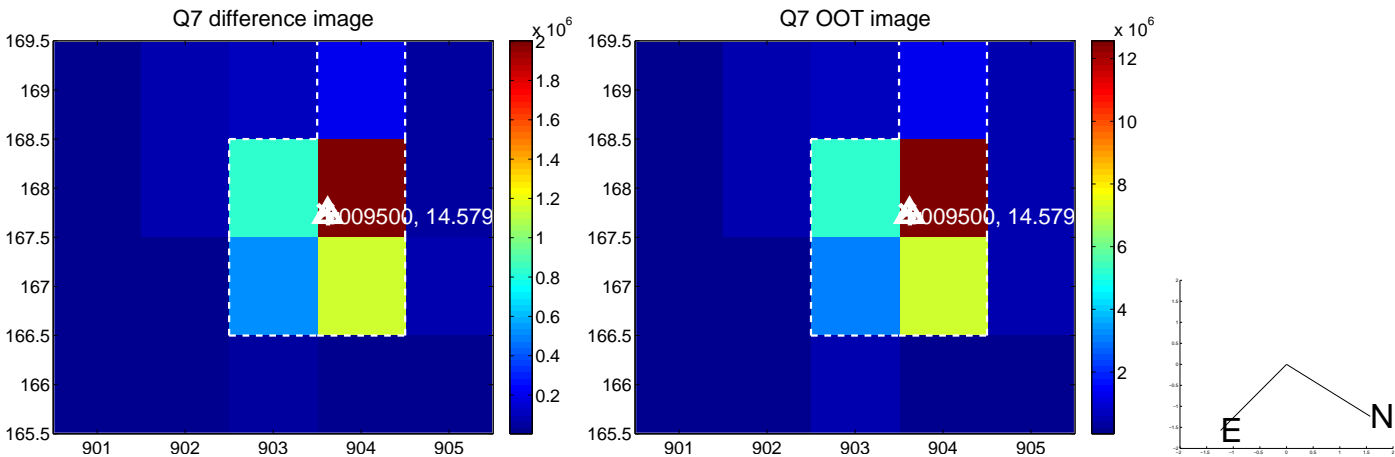
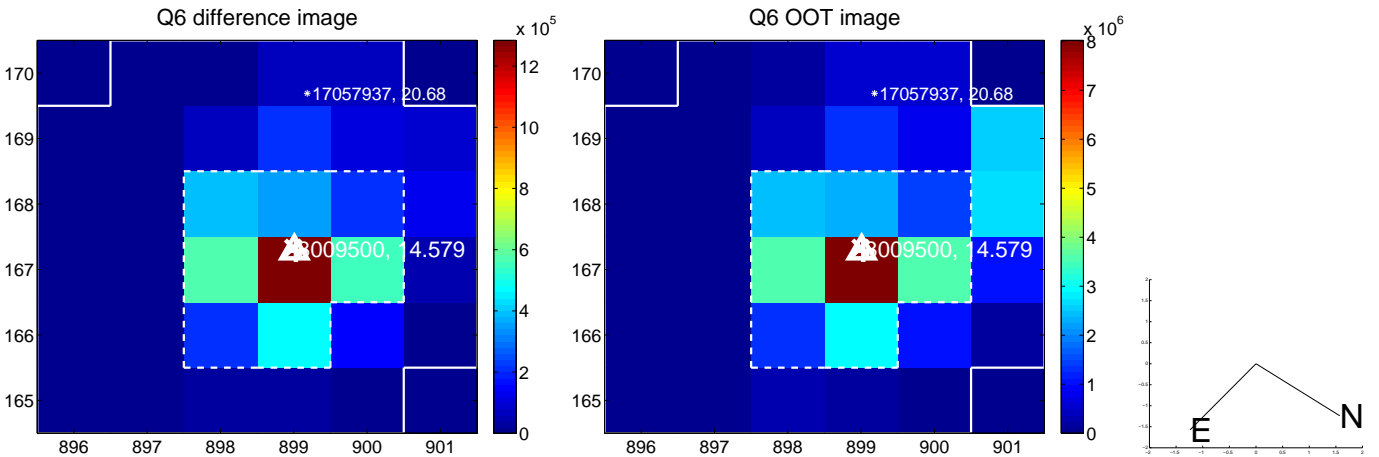
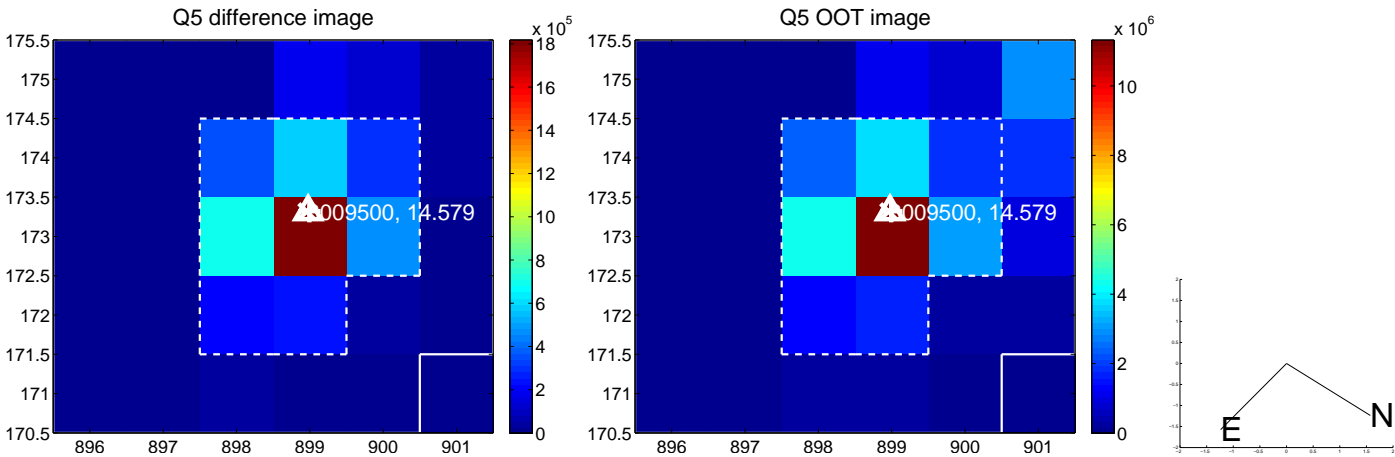


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

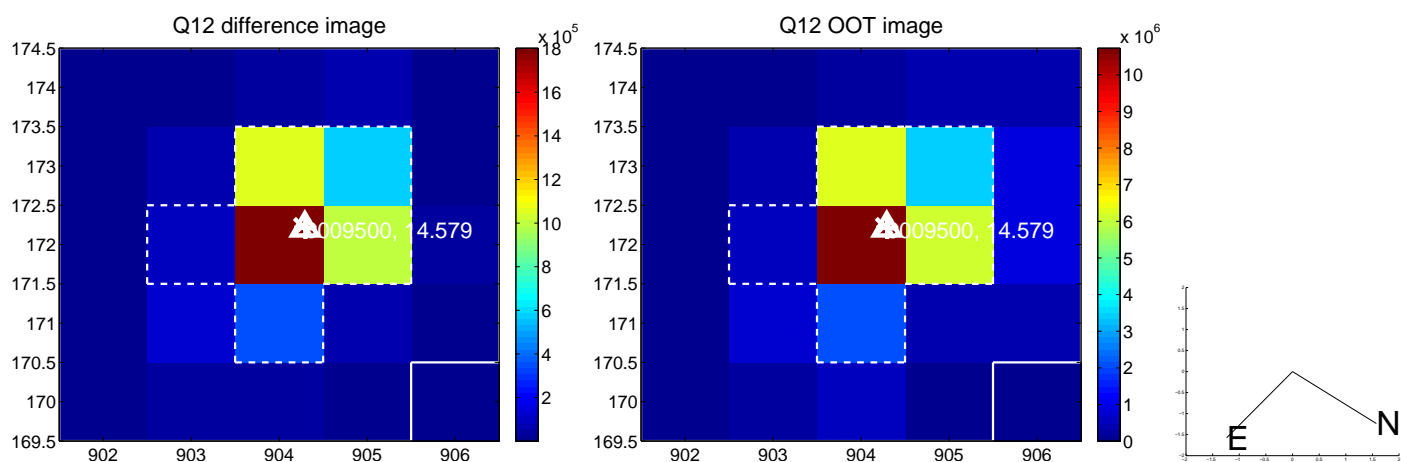
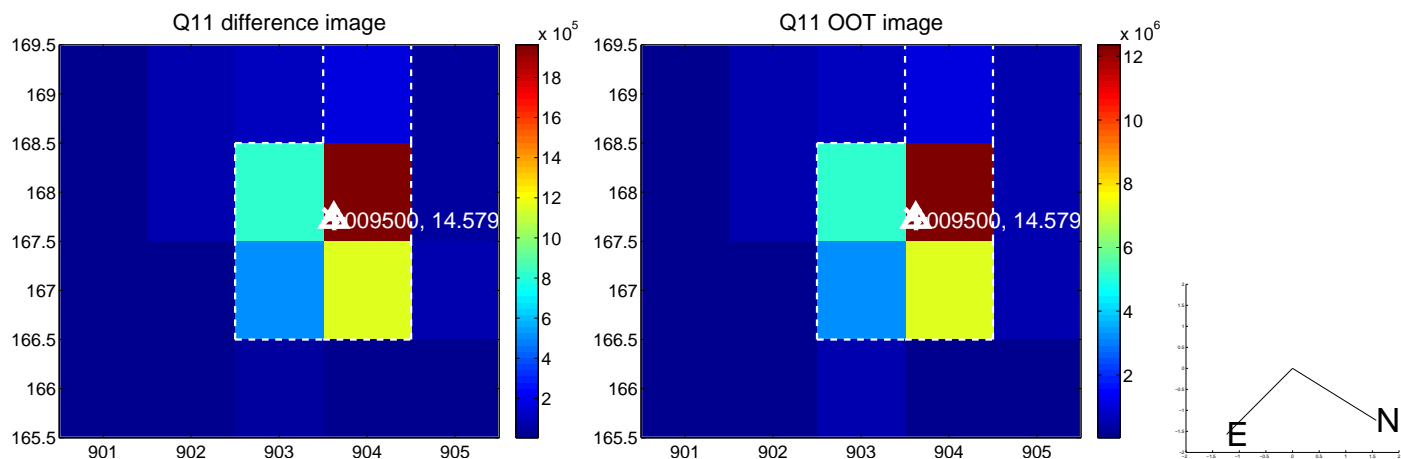
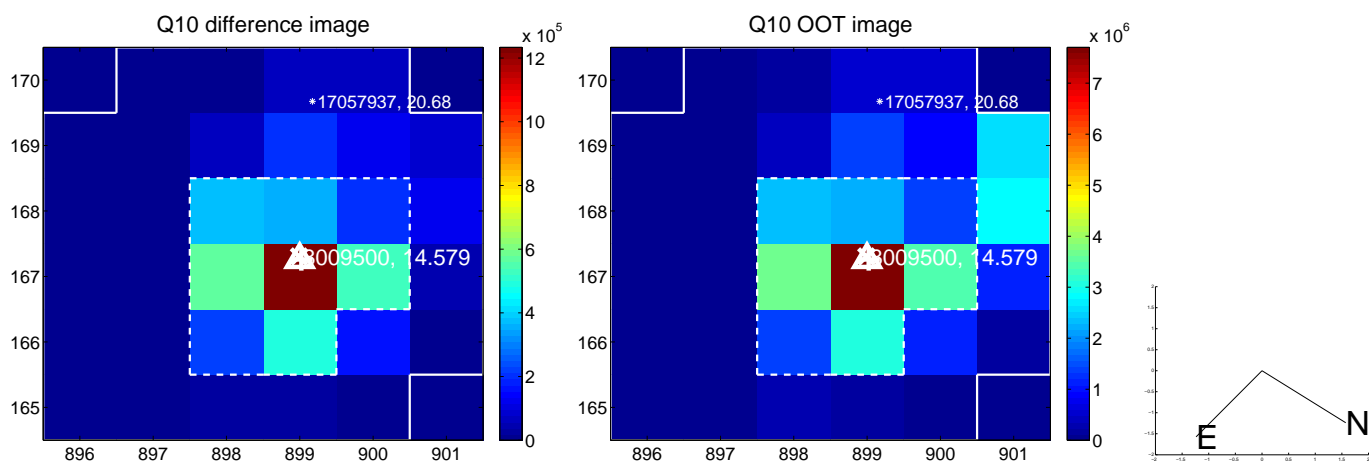
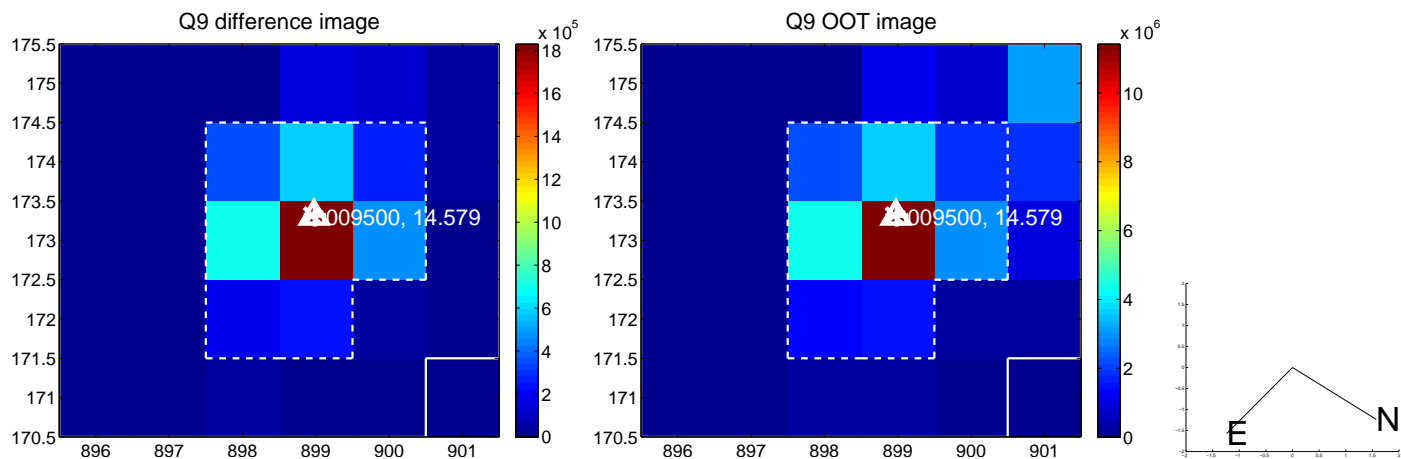


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

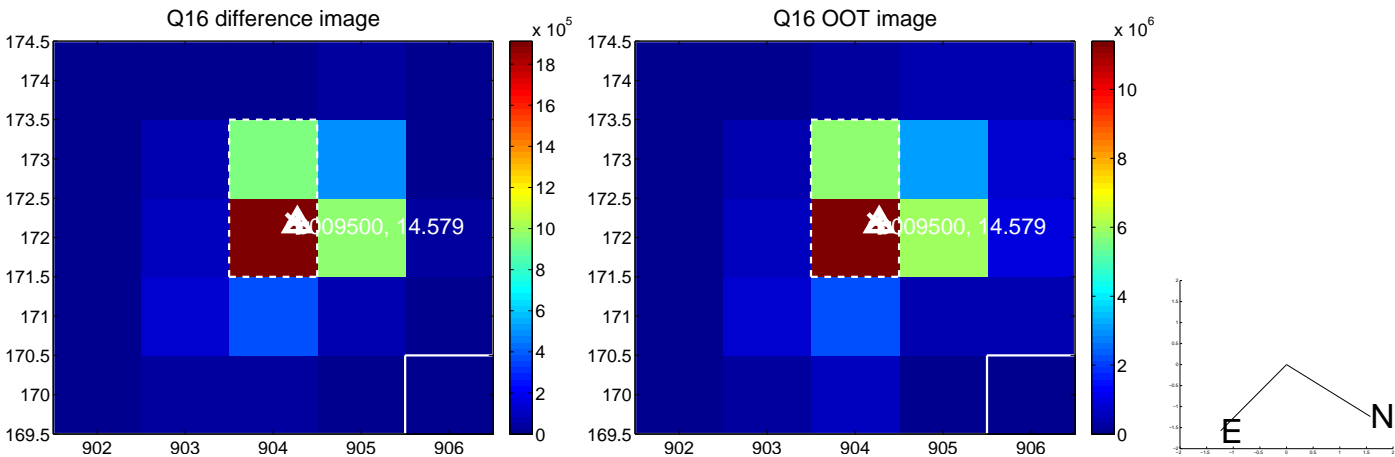
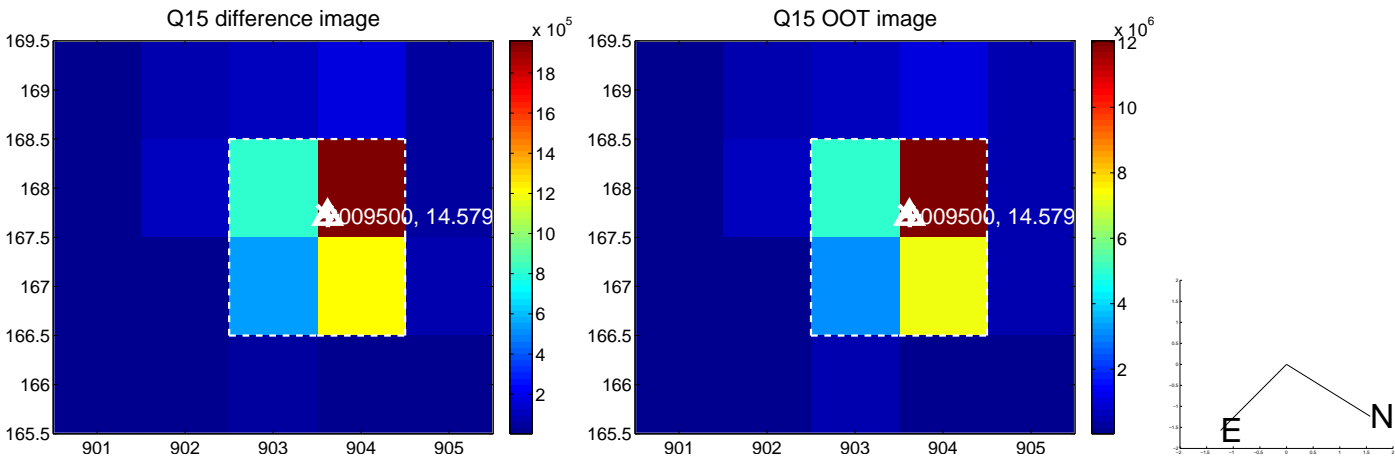
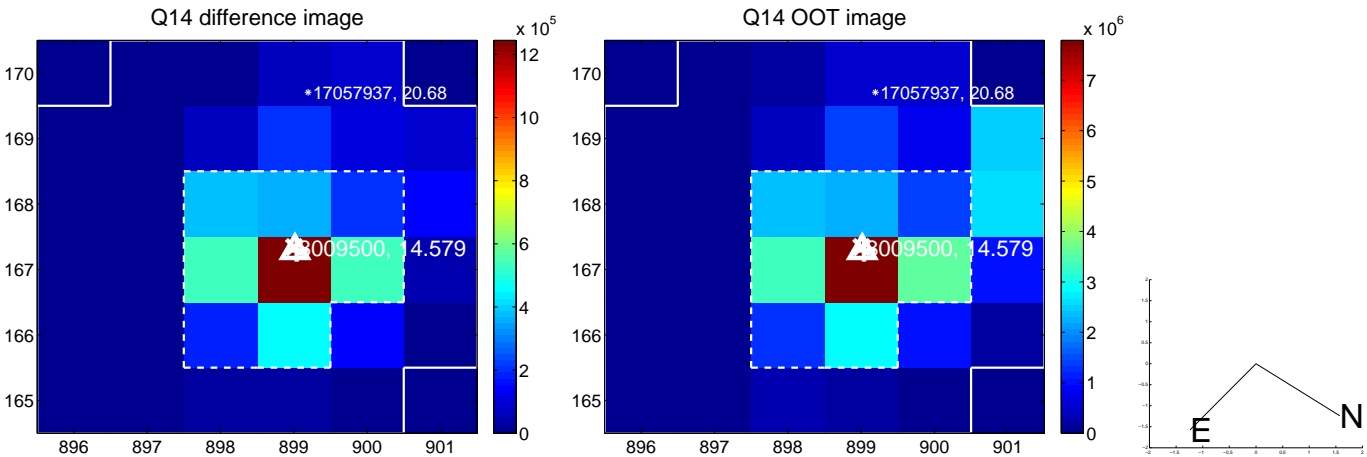
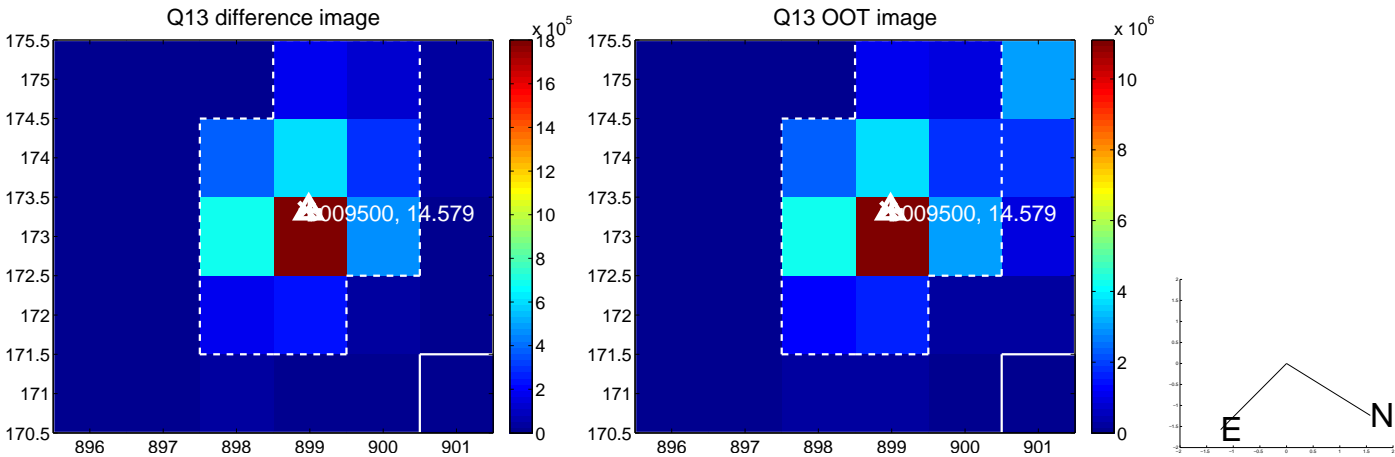




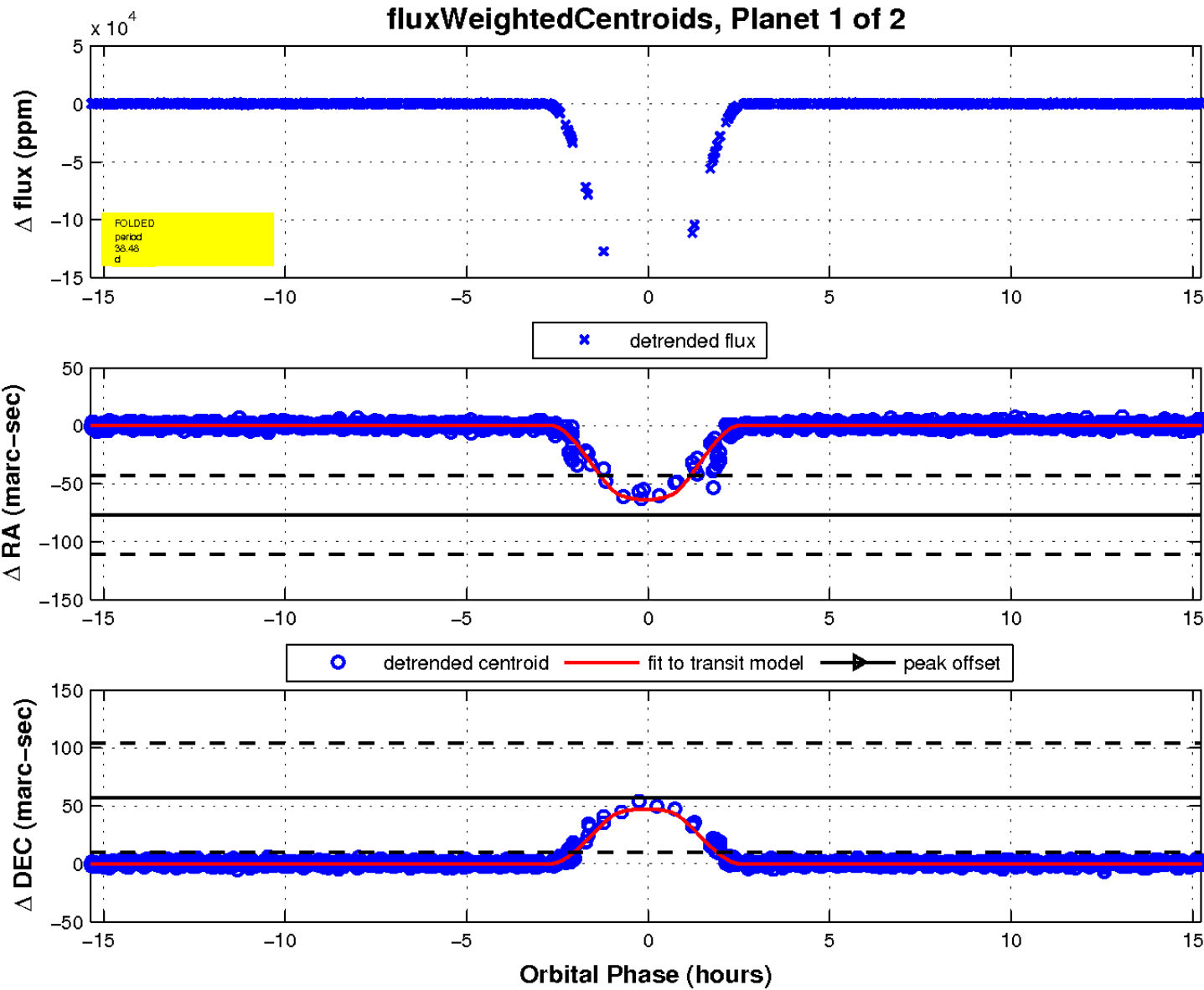
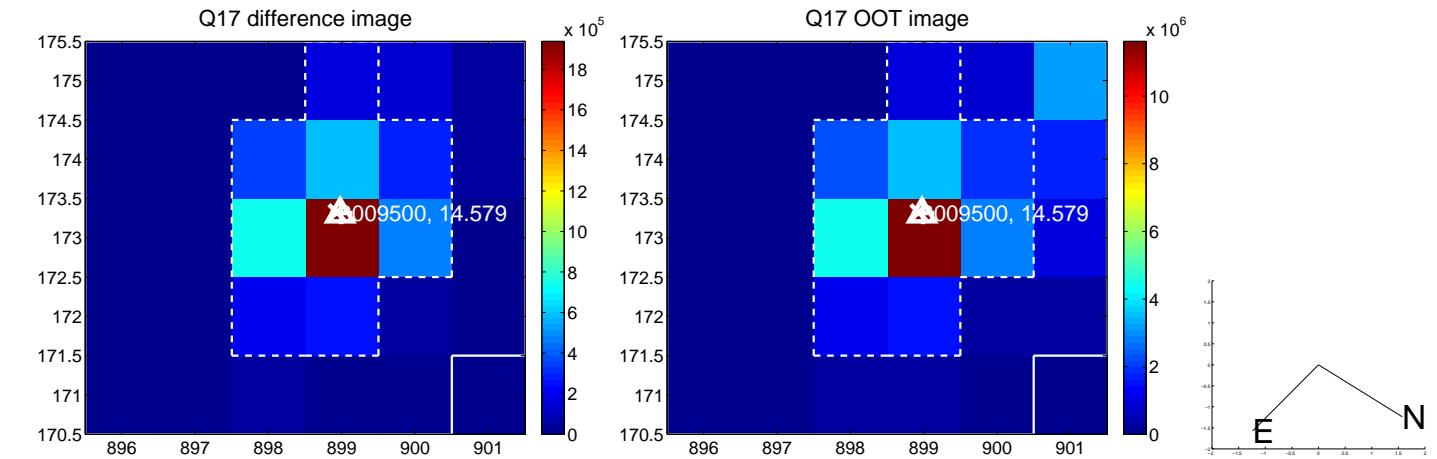
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

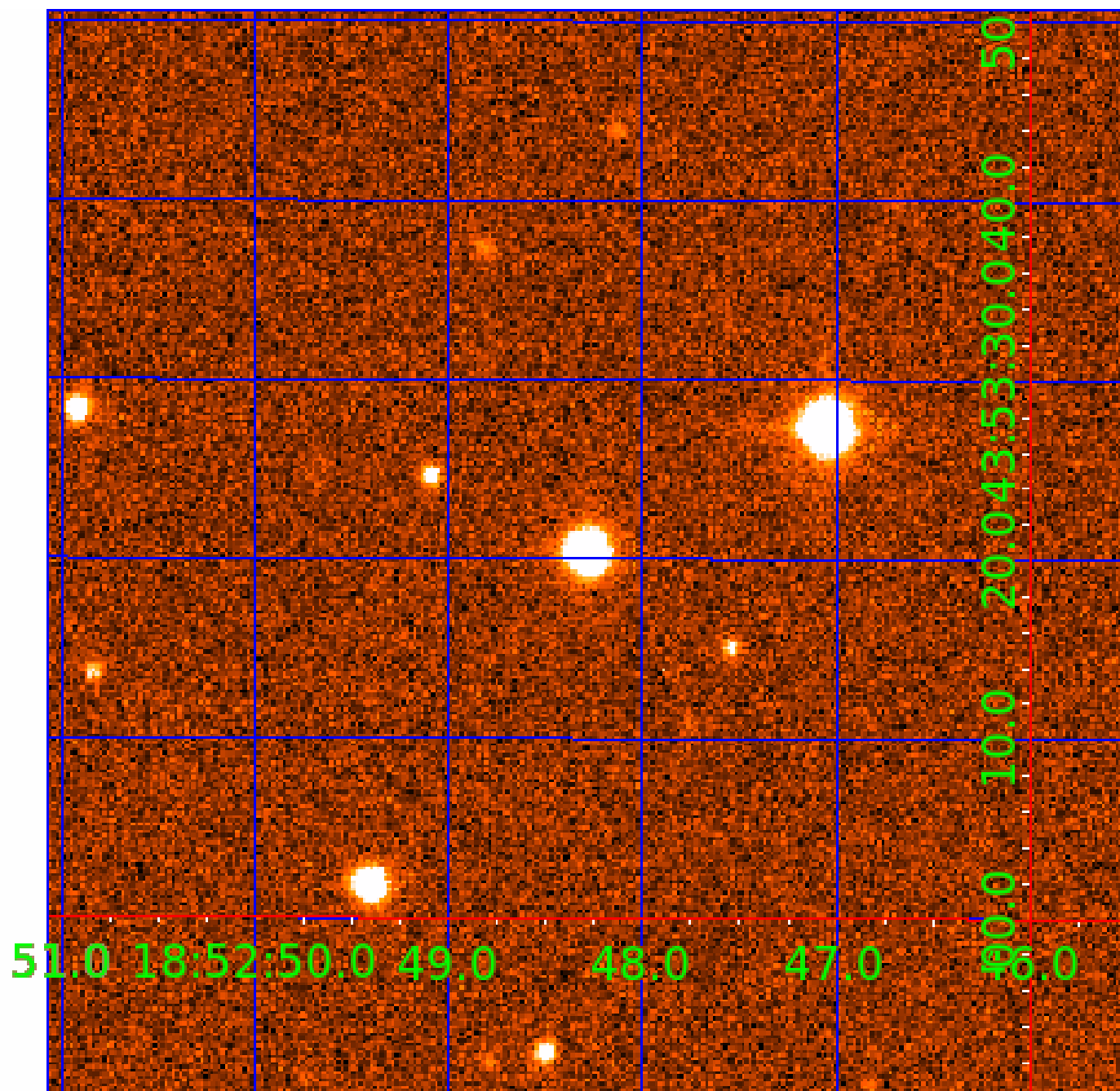


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008009500

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008009500-01	OBS	6951.01	38.476744	150.574239	173429.2	5.122	4760.2	3779.4	0.79	5294	33.83	10.87
008009500-02	OBS	No	38.476734	139.795383	8533.1	7.409	280.4	278.2	0.79	5294	10.13	10.87

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008009500-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—MOD_ODDEVEN_DV—HAS_SEC_TCE
008009500-02	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 008009500-02

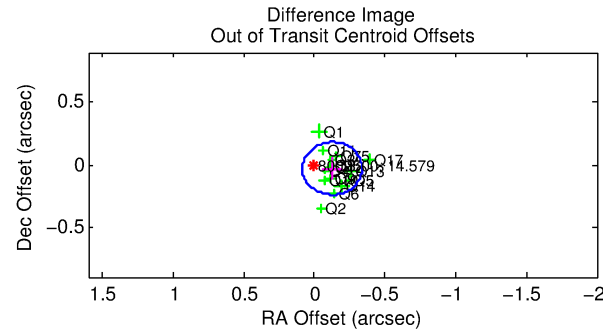
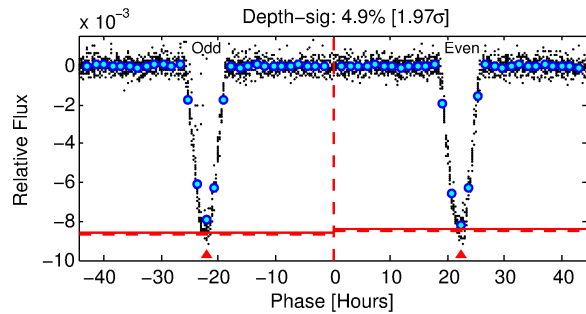
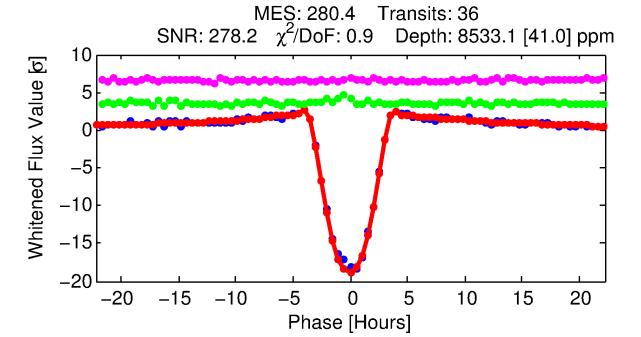
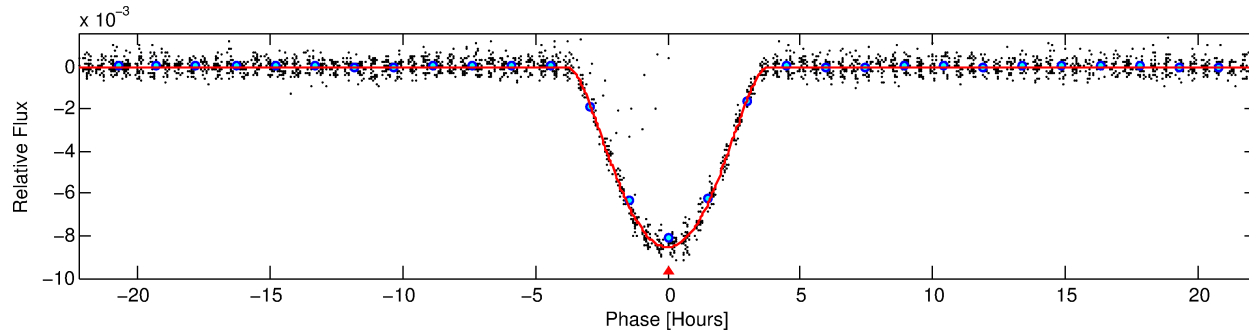
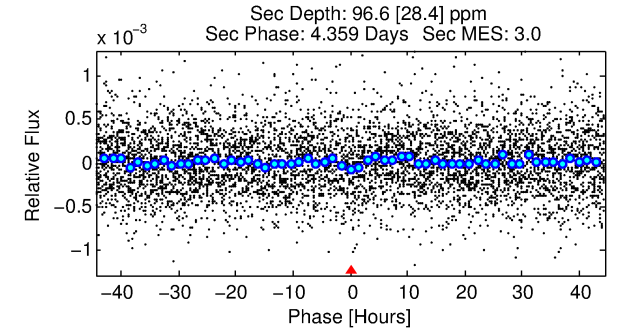
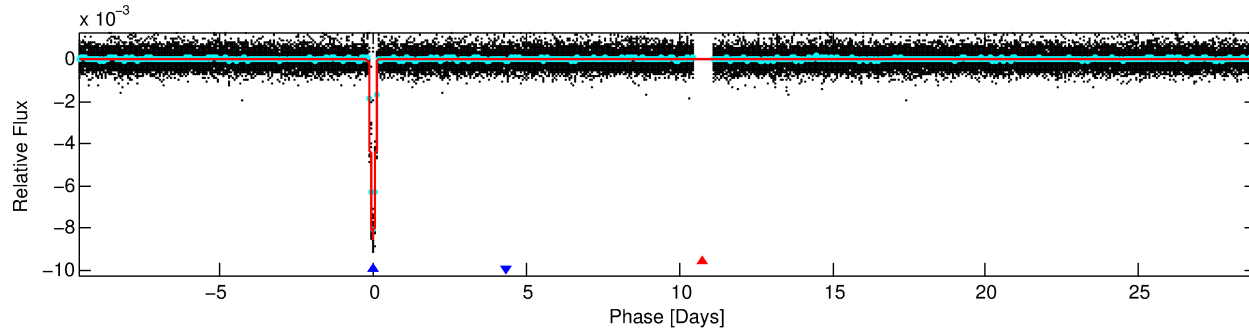
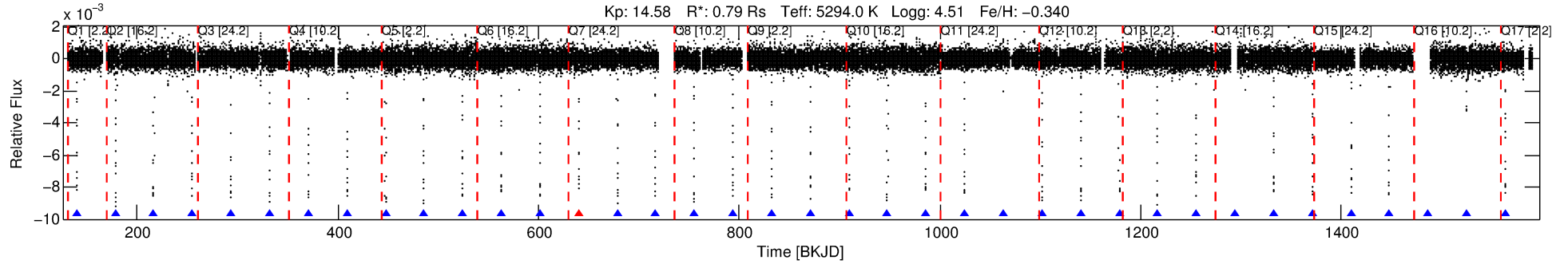
No Significant Match Found

# DV One-Page Summary

KIC: 8009500 Candidate: 2 of 2 Period: 38.477 d

KOI: K06951 Corr: No Ephemeris Match

Kp: 14.58 R\*: 0.79 Rs Teff: 5294.0 K Logg: 4.51 Fe/H: -0.340



## DV Fit Results:

Period = 38.47673 [0.00003] d  
Epoch = 139.7954 [0.0005] BKJD  
Rp/R\* = 0.1176 [0.0045]  
a/R\* = 24.13 [0.31]  
b = 0.94 [0.01]  
Seff = 10.87 [2.26]  
Teq = 463 [24] K  
Rp = 10.14 [1.37] Re  
a = 0.2010 [0.0227] AU  
Ag = 20.91 [7.27] [2.74σ]  
Teffp = 1531 [125] K [8.39σ]

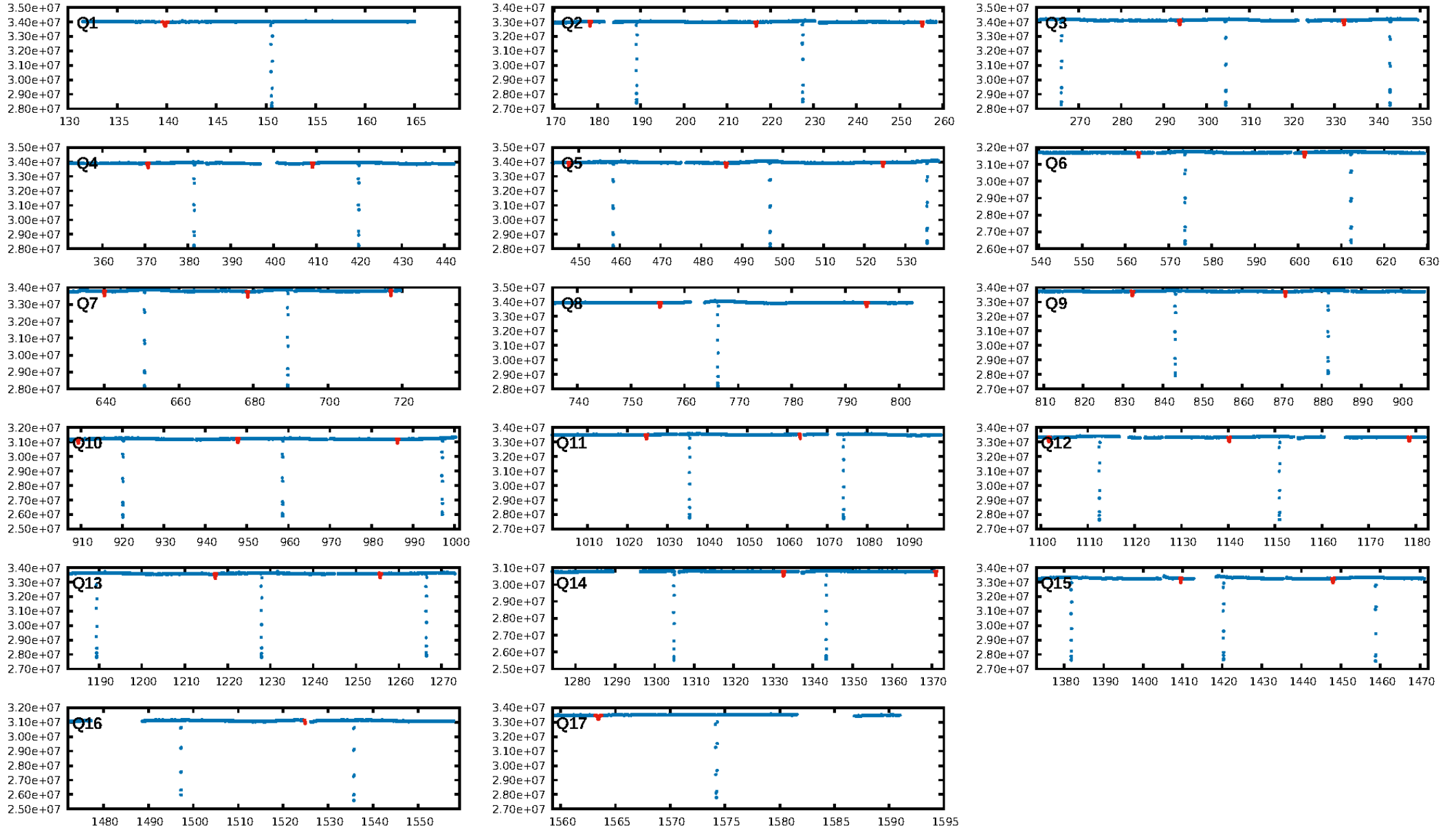
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 0.1%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.97 [33/34]  
GhostDiagnostic-chr: 7.769  
Centroid-sig: 0.0%  
Centroid-so: 0.519 arcsec [12.81σ]  
OotOffset-rm: 0.128 arcsec [1.82σ]  
KicOffset-rm: 0.186 arcsec [2.37σ]  
OotOffset-st: 4/4/3/5 [16]  
KicOffset-st: 4/4/3/5 [16]  
DiffImageQuality-fgm: 1.00 [16/16]  
DiffImageOverlap-fno: 1.00 [16/16]

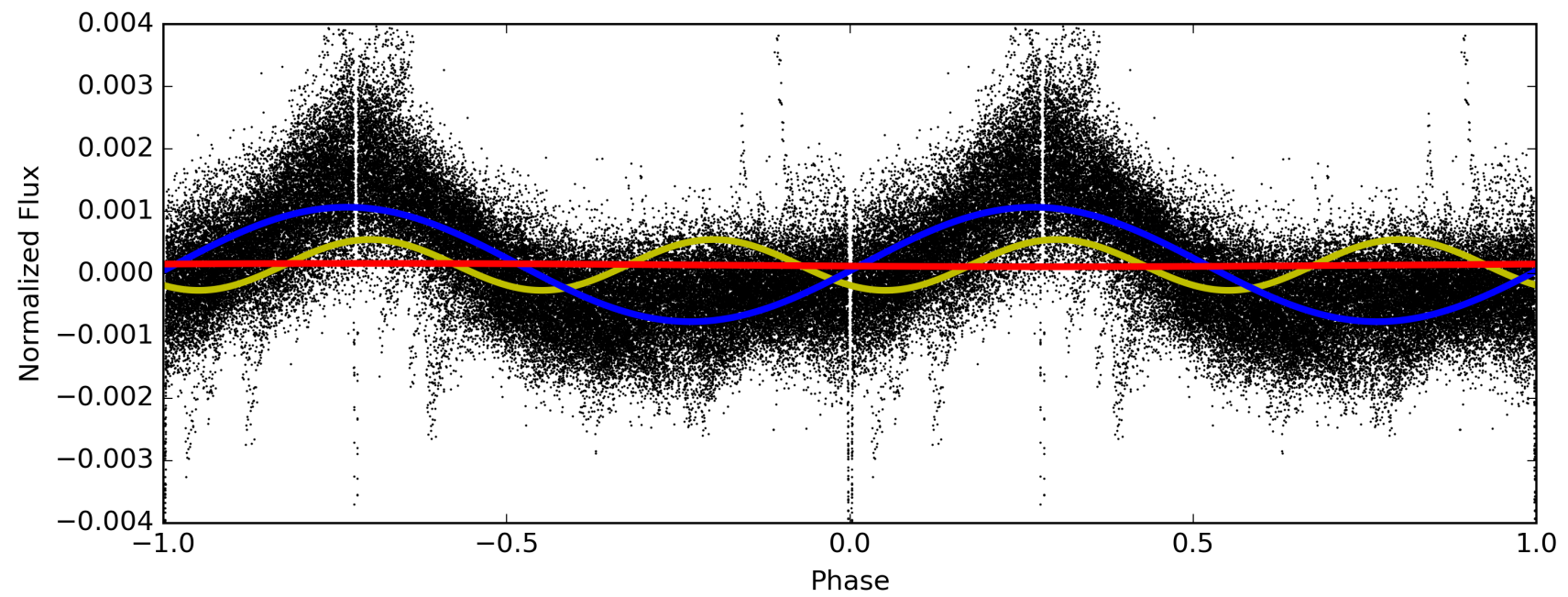
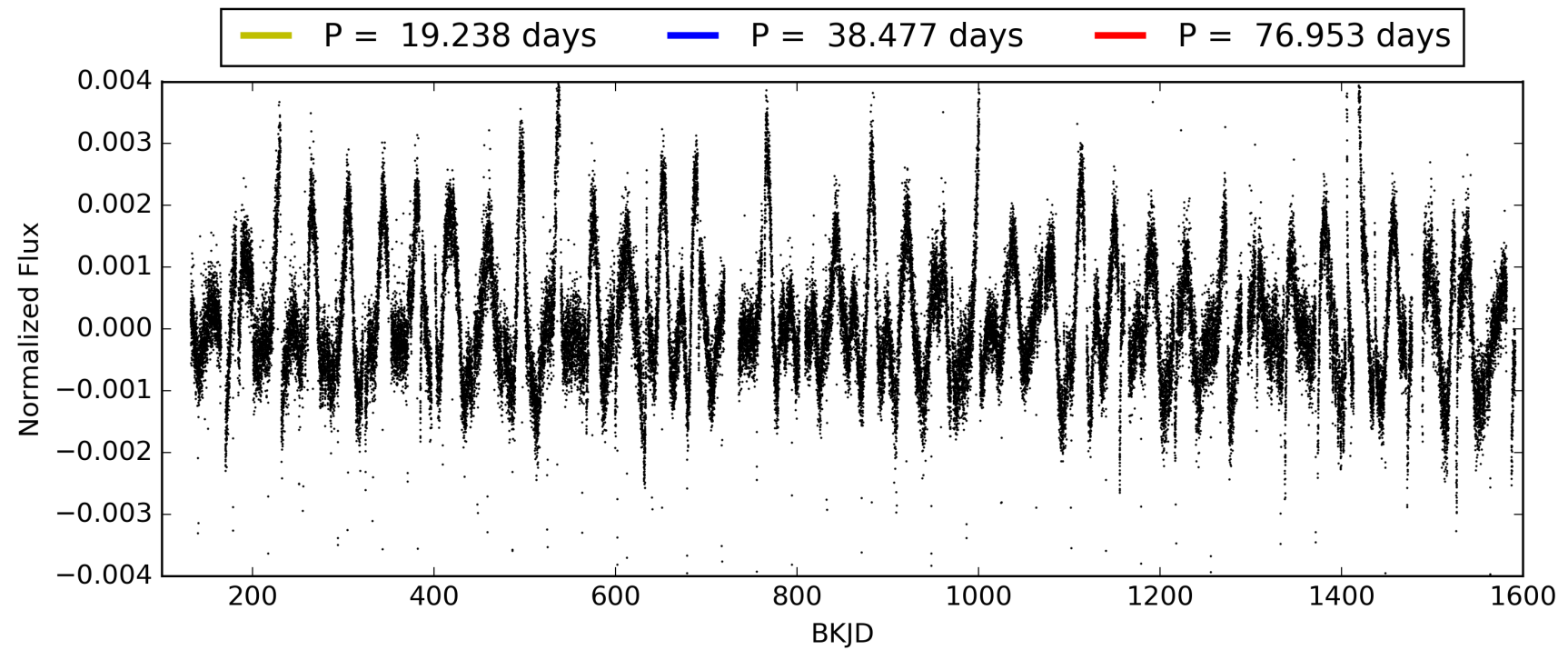
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 17:45:34 Z

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

# TCE 008009500-02, PDC Light Curves



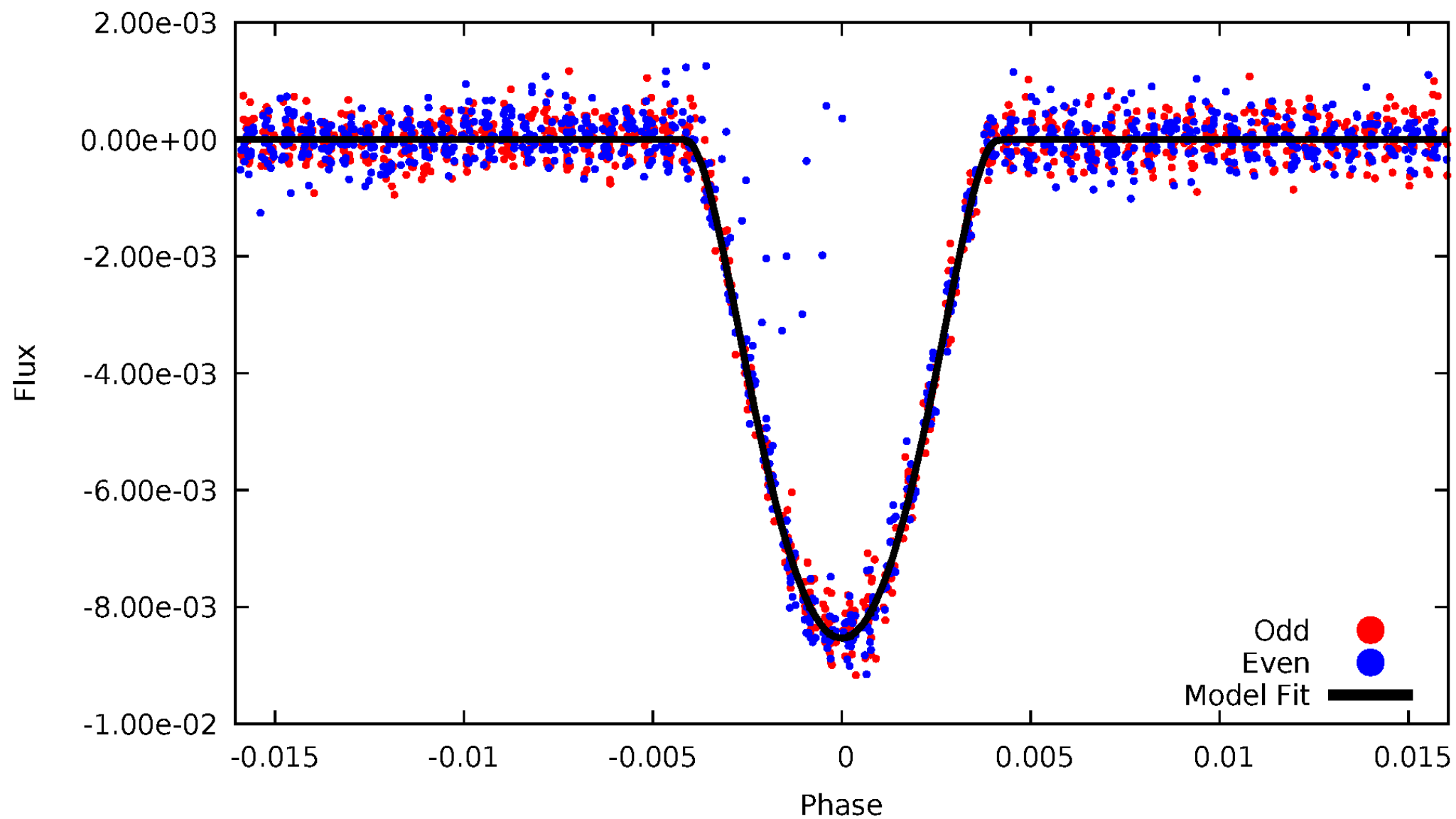
TCE 008009500-02





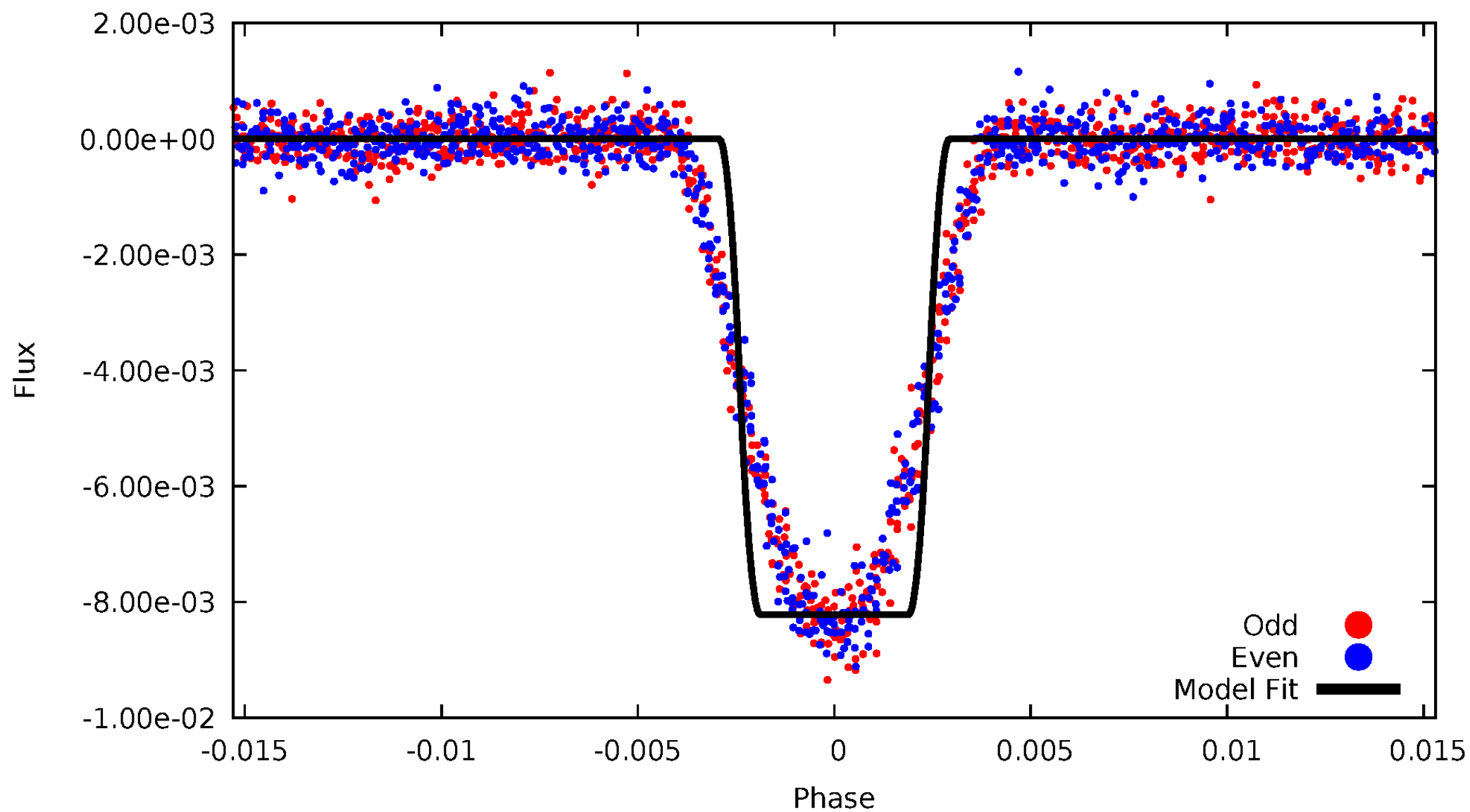
# DV Odd/Even

TCE 008009500-02



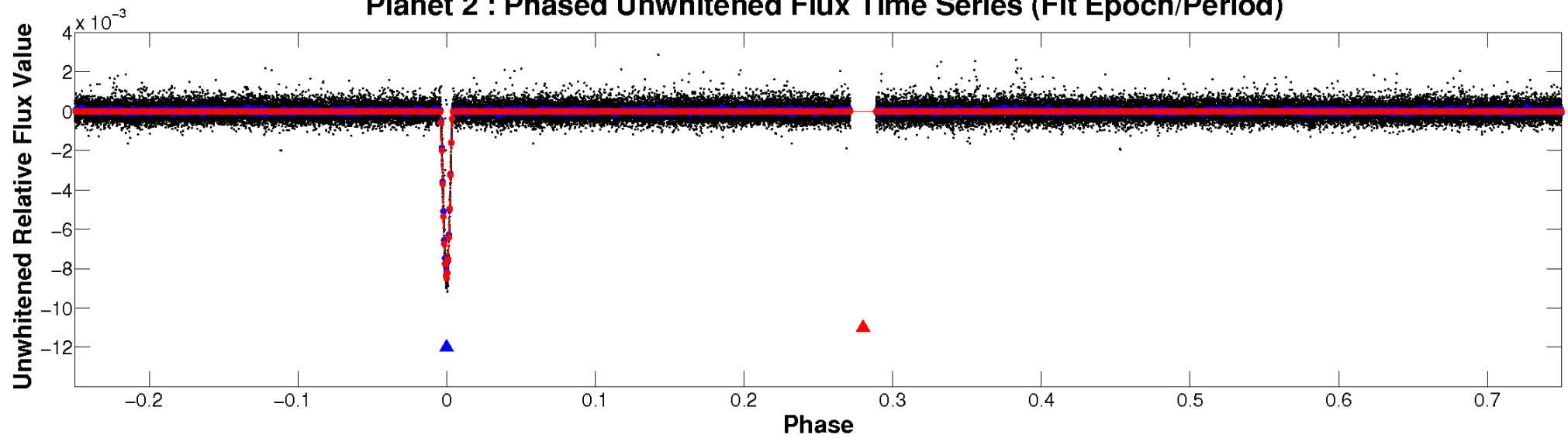
# ALT Odd/Even

TCE 008009500-02

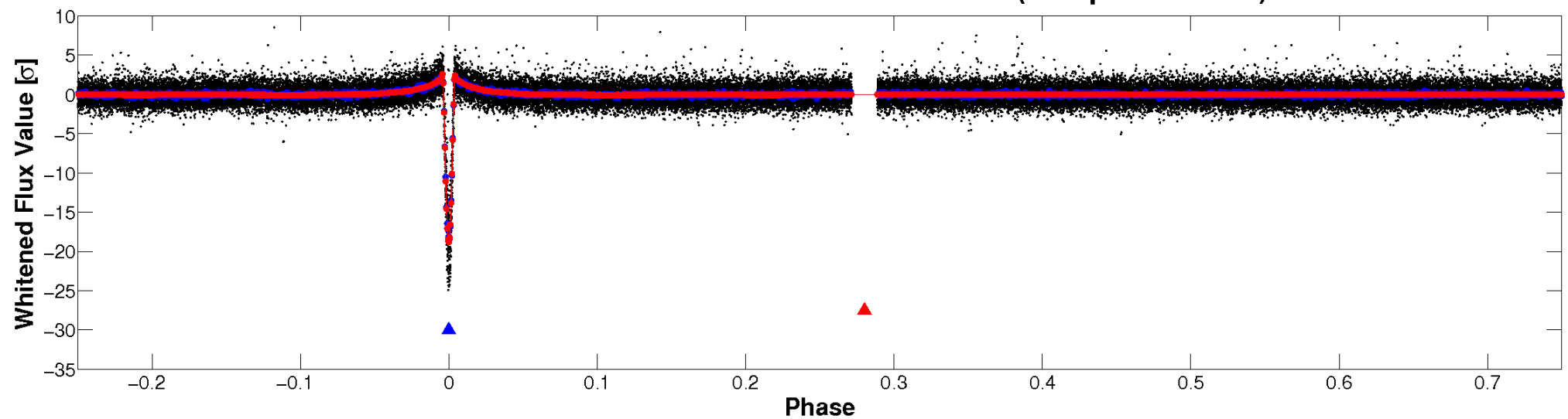


# Non-Whitened Vs. Whitened Light Curve

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

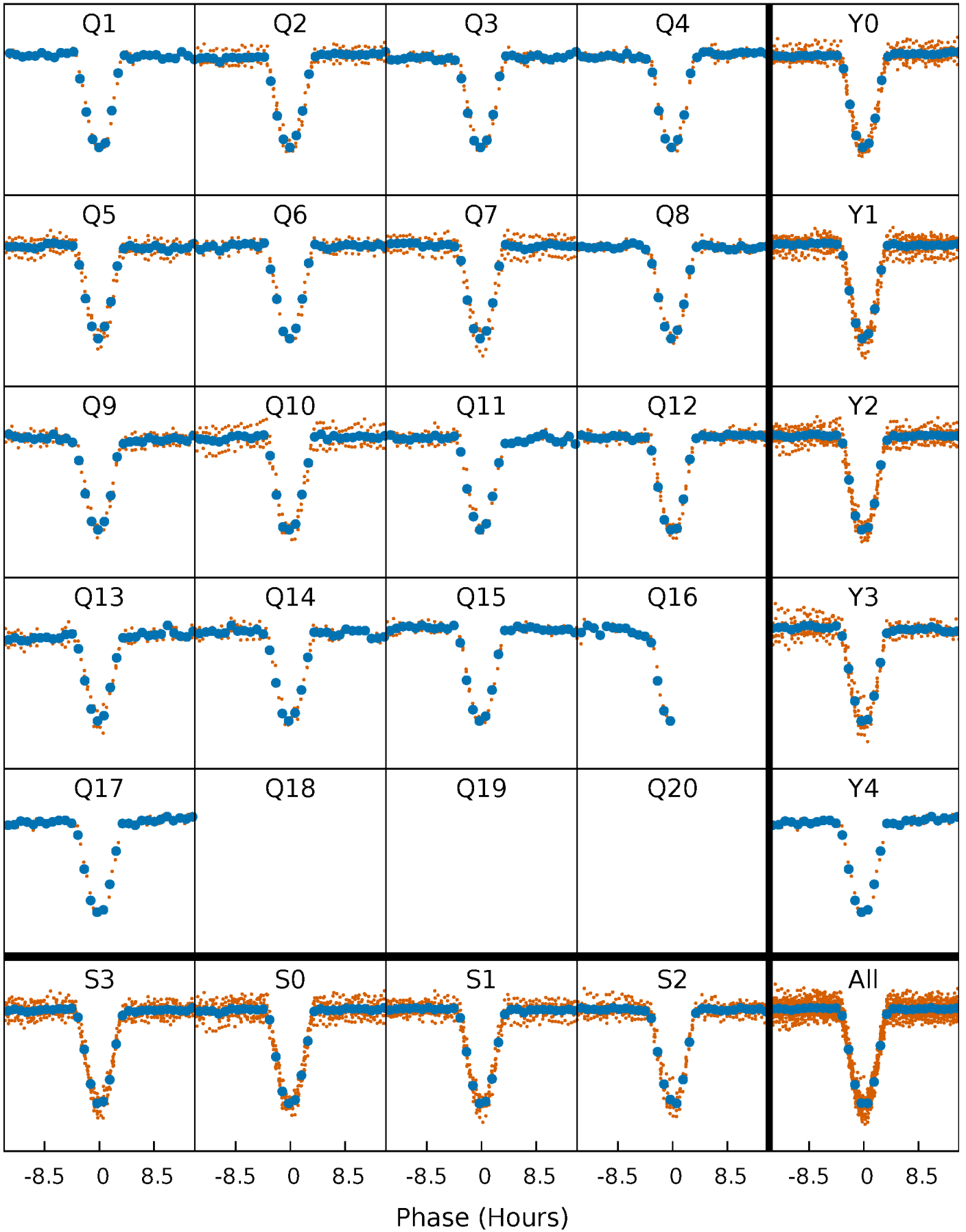


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



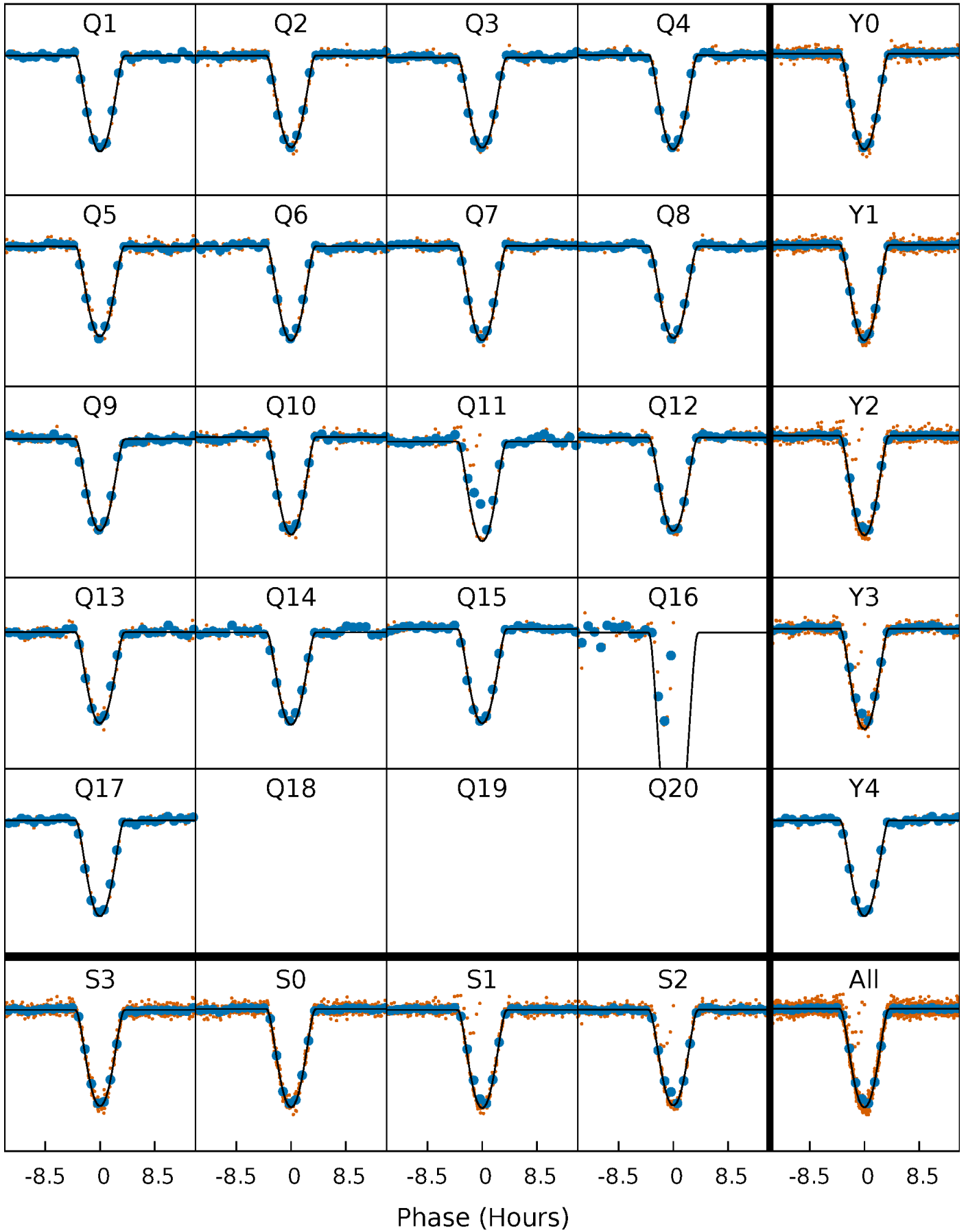
# PDC Quarter-Phased Transit Curves

TCE 008009500-02     $P = 38.476734$  Days     $T_0 = 139.795383$  (BKJD)



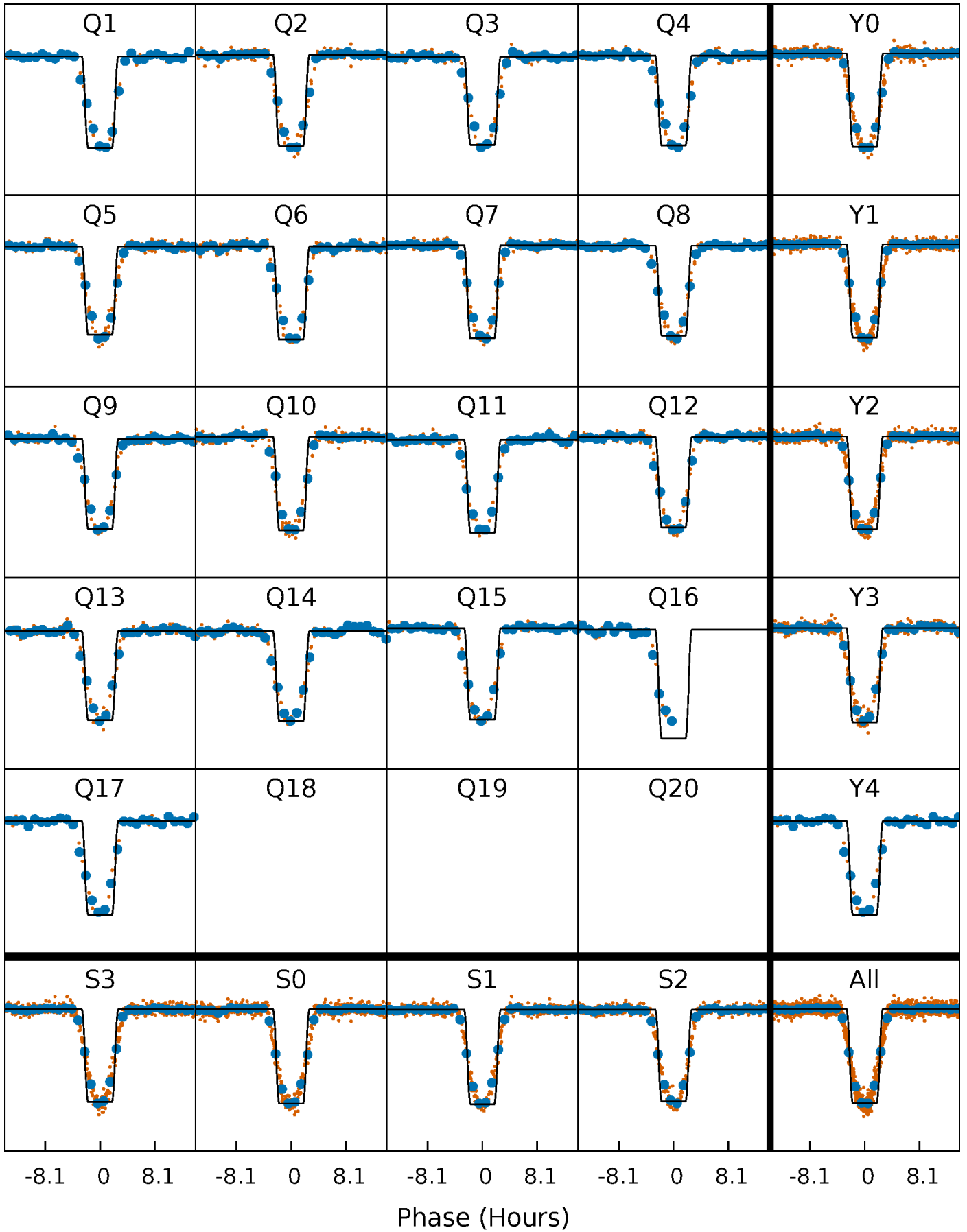
# DV Quarter-Phased Transit Curves

TCE 008009500-02   P= 38.476734 Days    $T_0=139.795383$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

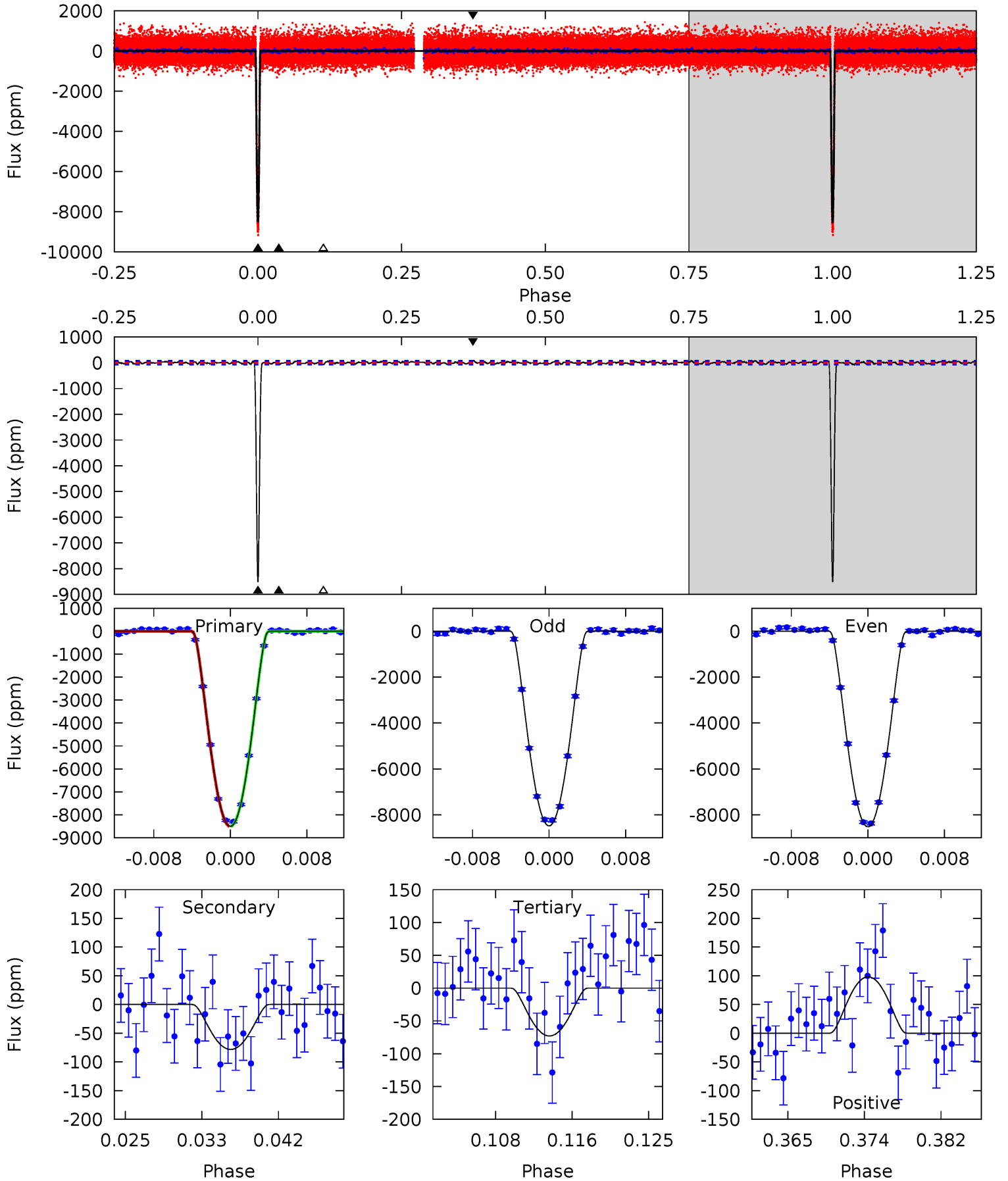
TCE 008009500-02     $P = 38.477135$  Days     $T_0 = 139.788458$  (BKJD)



# DV Model-Shift Uniqueness Test

008009500-02, P = 38.476734 Days, E = 101.318649 Days

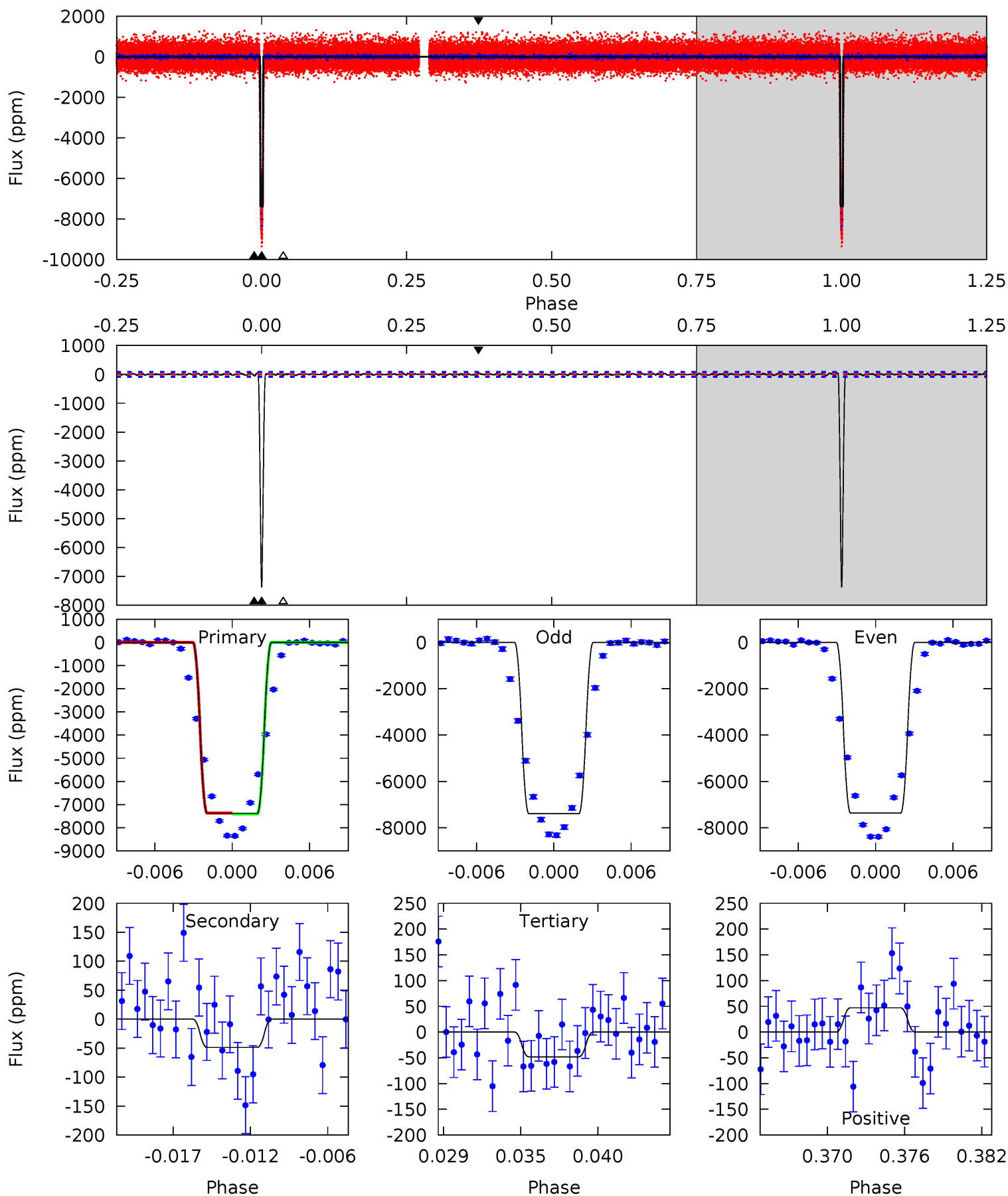
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
589.1	5.42	5.05	6.80	5.06	2.64	1.88	584.1	582.3	0.37	-1.38	1.47	0.96	0.01	0.11



# Alt Model-Shift Uniqueness Test

008009500-02,  $P = 38.477135$  Days,  $E = 101.311323$  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
458.0	3.03	2.99	2.92	5.13	2.76	0.89	455.0	455.1	0.05	0.11	0.81	1.00	0.01	1.35





### Stellar Parameters For KIC 008009500

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5294^{+159}_{-143}$	$4.507^{+0.095}_{-0.085}$	$-0.340^{+0.350}_{-0.300}$	$0.790^{+0.102}_{-0.092}$	$0.733^{+0.110}_{-0.047}$	$2.092^{+0.898}_{-0.582}$
	+3%/-3%	+2%/-2%	+103%/-88%	+13%/-12%	+15%/-6%	+43%/-28%
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 008009500-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-78 \pm 14$	$10.17^{+0.89}_{-0.79}$	$645^{+30}_{-26}$	$2342^{+66}_{-69}$	$17^{+5}_{-4}$
Alt.	$-49 \pm 16$	$7.91^{+0.73}_{-0.68}$	$648^{+29}_{-29}$	$2356^{+93}_{-116}$	$18^{+7}_{-6}$

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

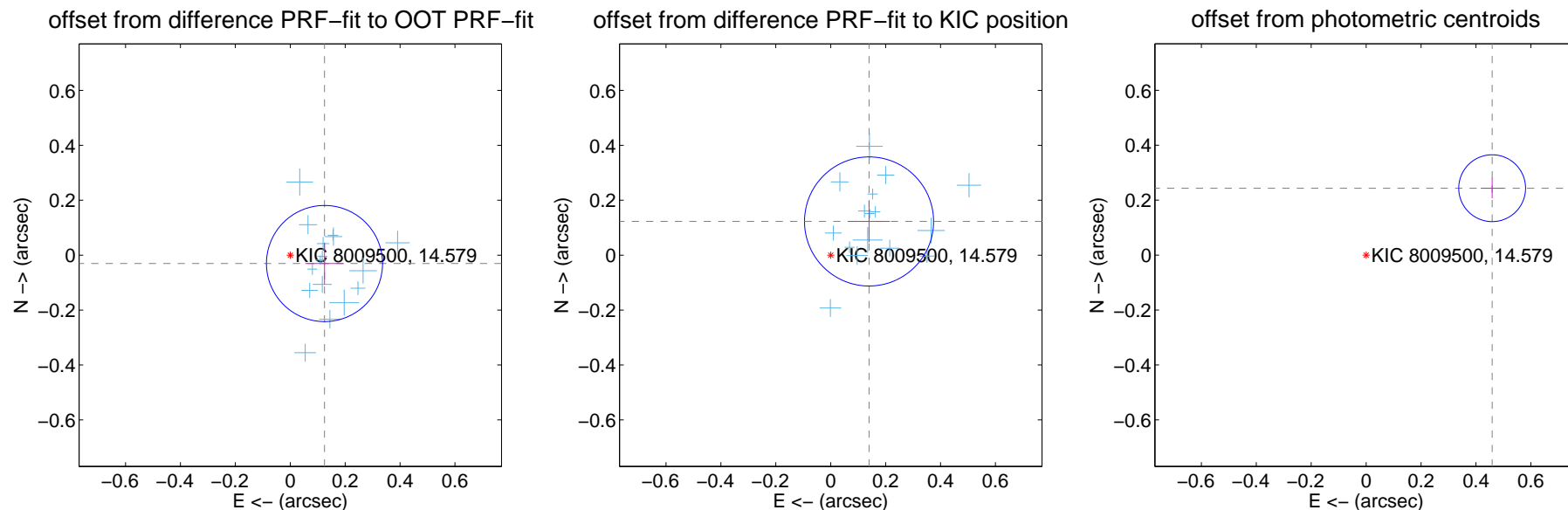
## DV Centroid Data

Supplemental centroid analysis for 008009500-02. Kepler magnitude: 14.58. Transit SNR 278.15

There are 16 quarters with good PRF difference image offsets

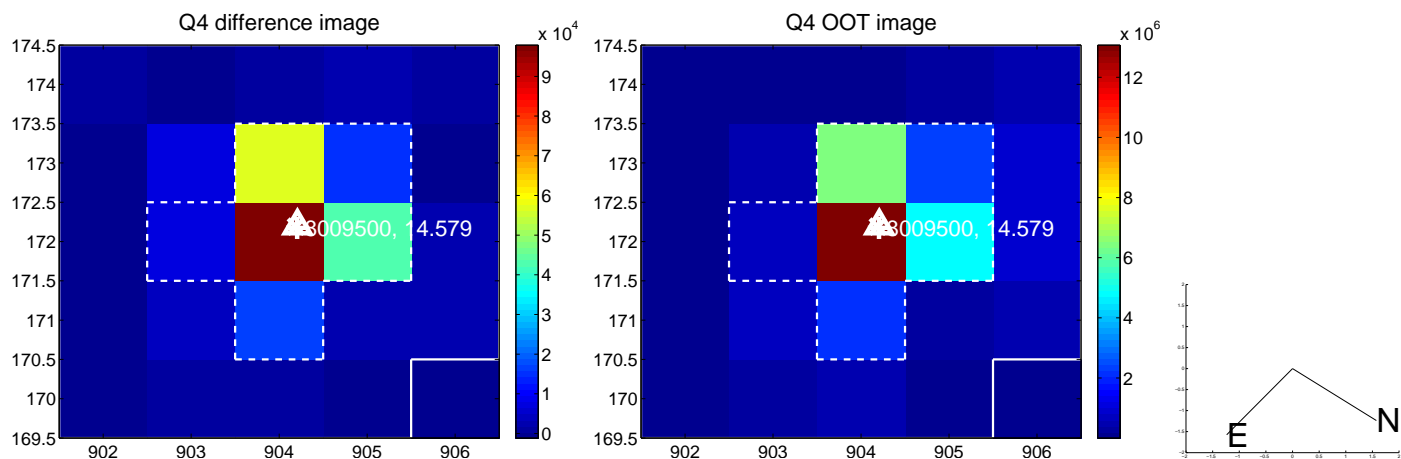
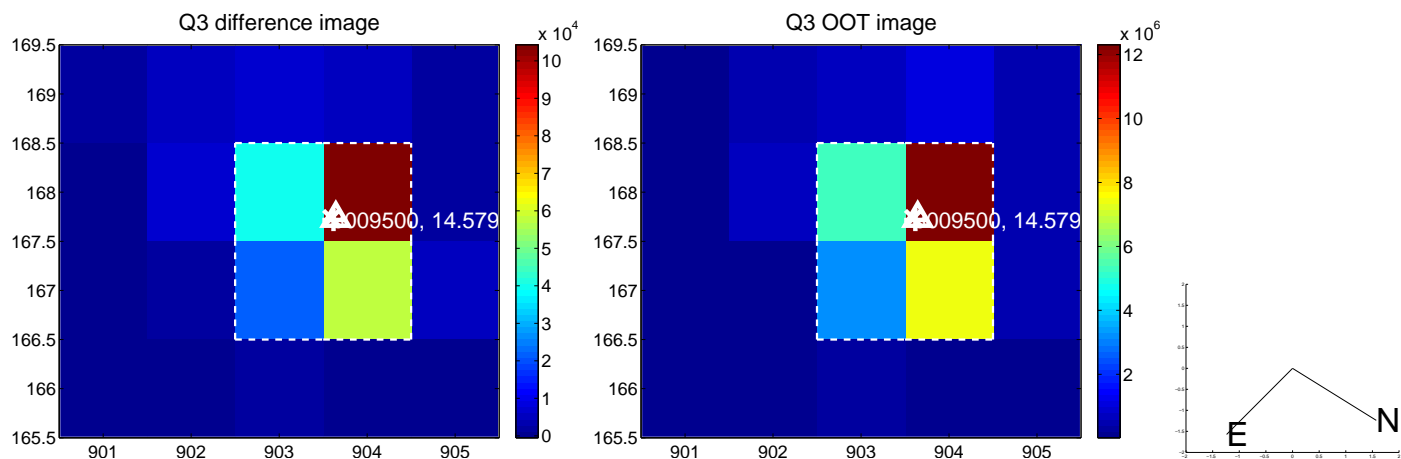
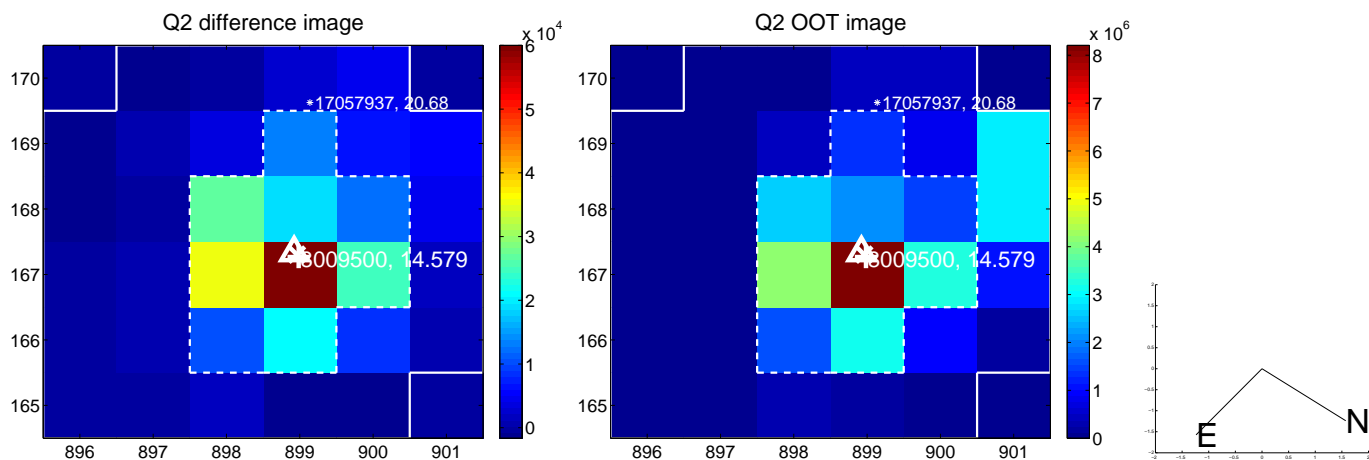
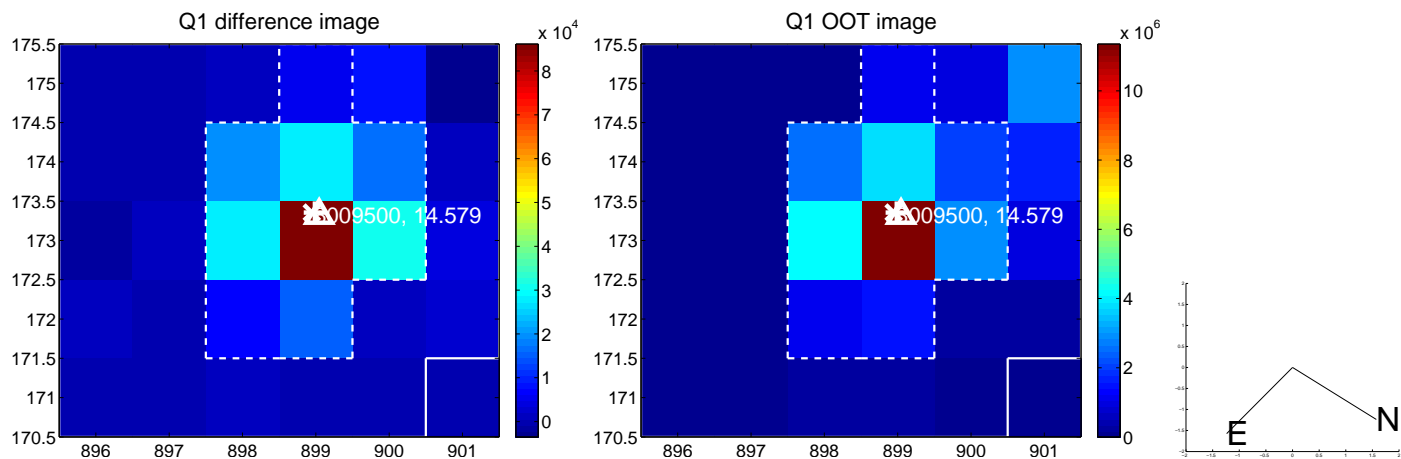
The direct PRF centroid is offset from the target star catalog position by about 0.24 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.128 \pm 0.070$	1.82	$-0.125 \pm 0.070$	$-0.030 \pm 0.076$
PRF-fit source offset from KIC position	$0.186 \pm 0.078$	2.37	$-0.140 \pm 0.076$	$0.123 \pm 0.076$
photometric centroid source offset	$0.52 \pm 0.04$	12.81	$-0.46 \pm 0.04$	$0.24 \pm 0.04$

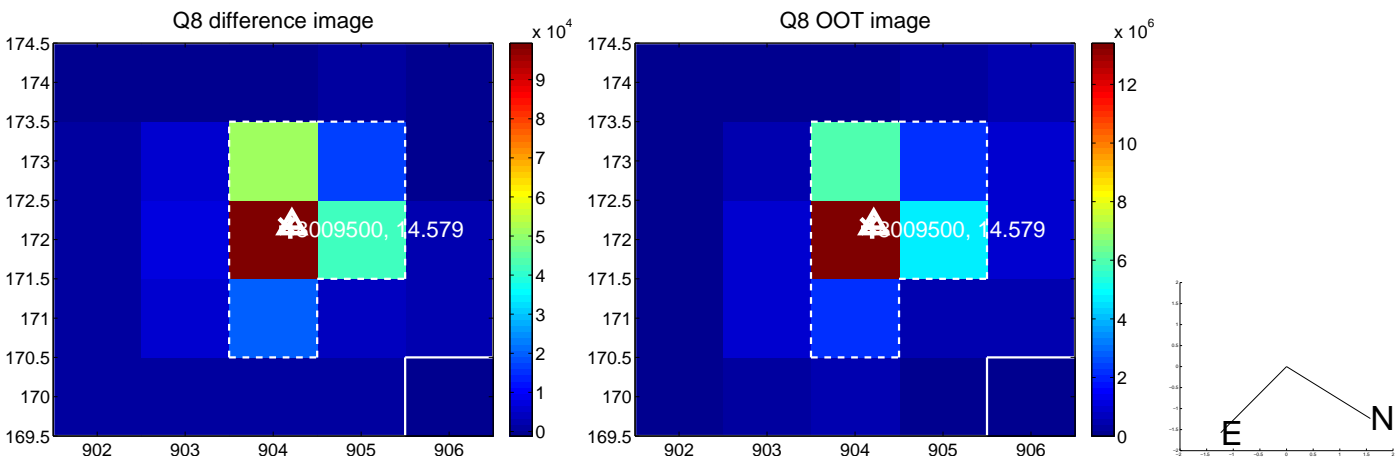
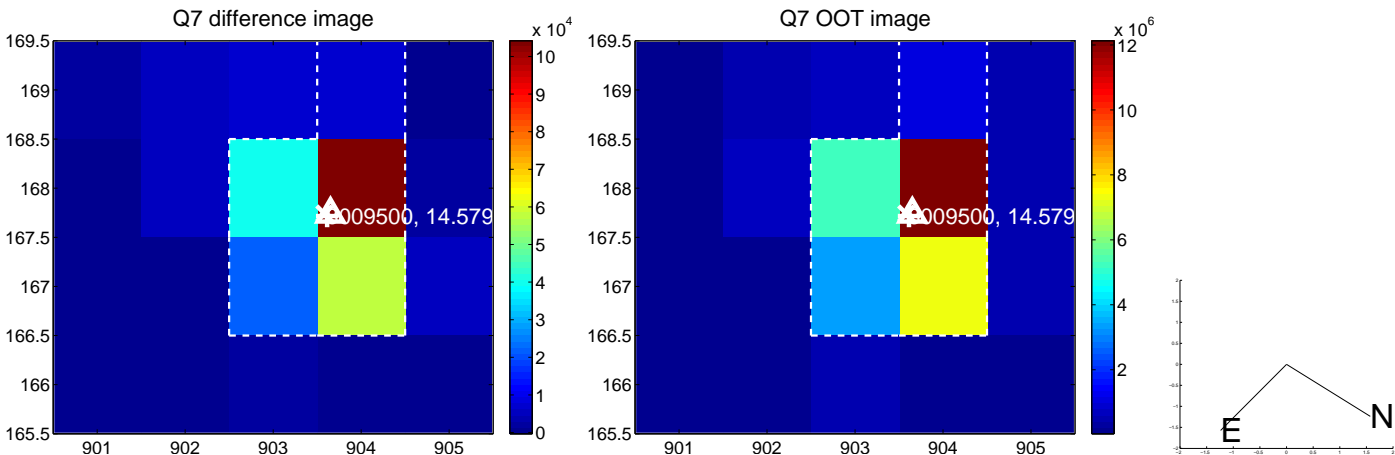
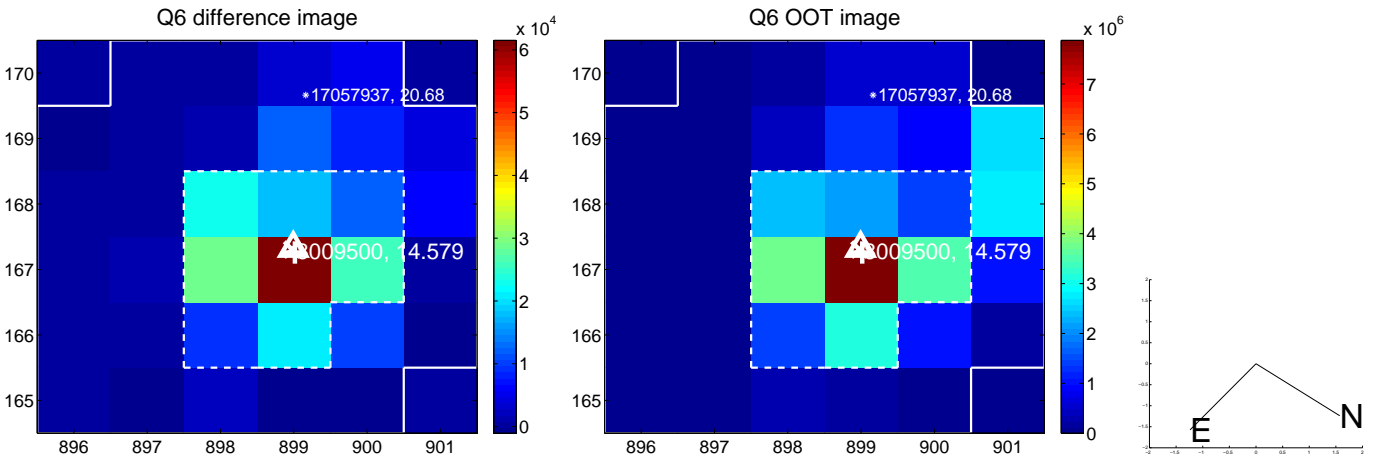
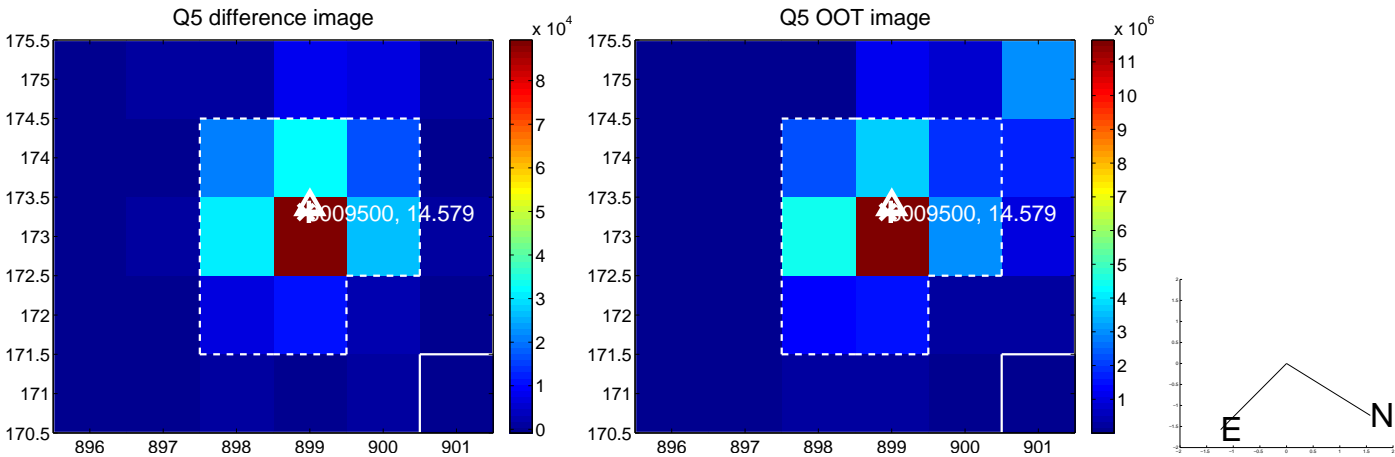


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

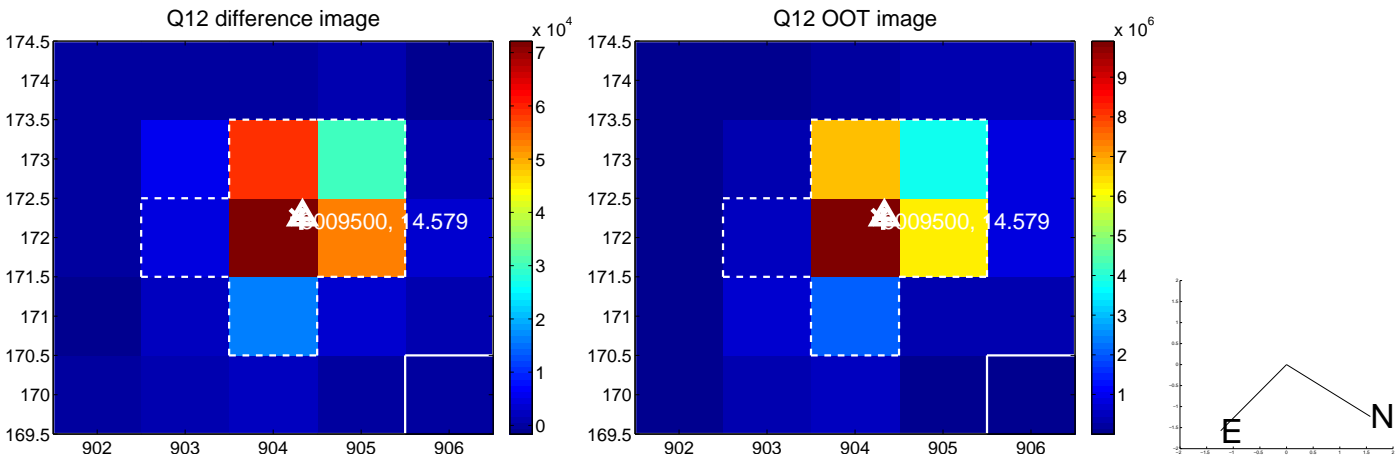
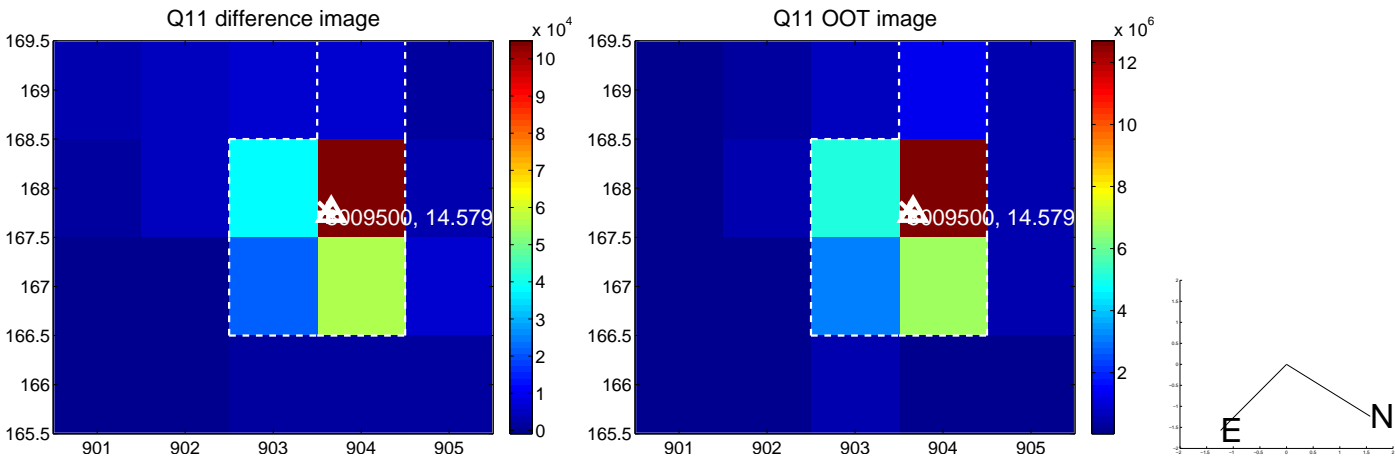
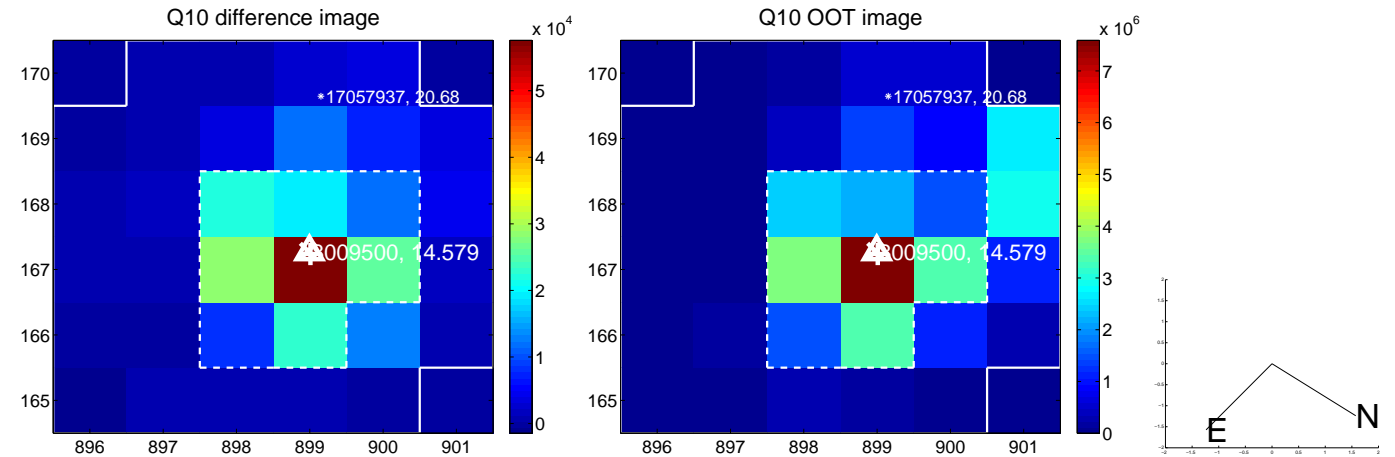
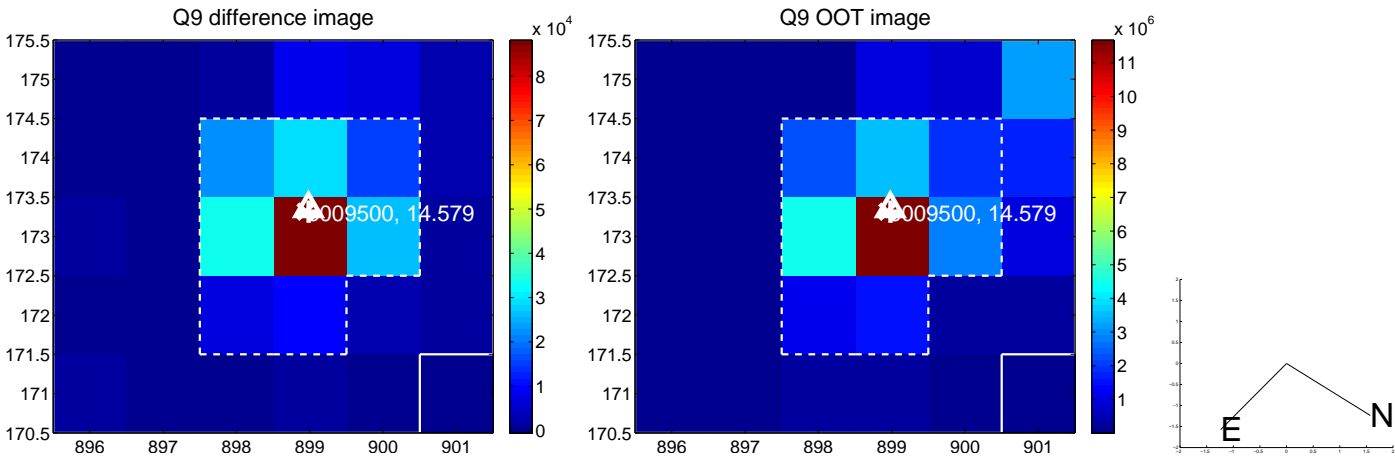
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



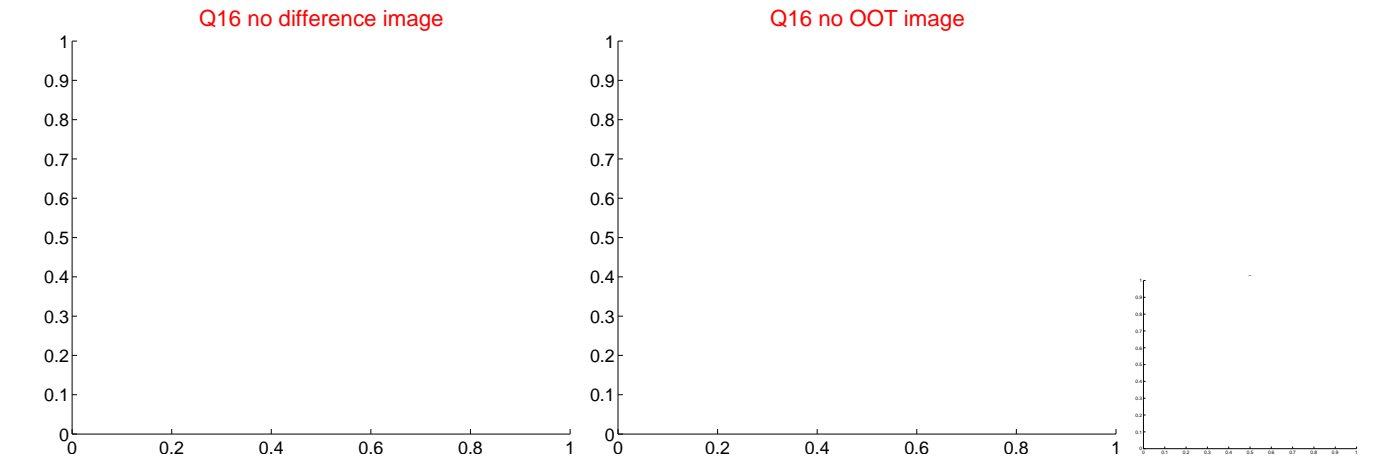
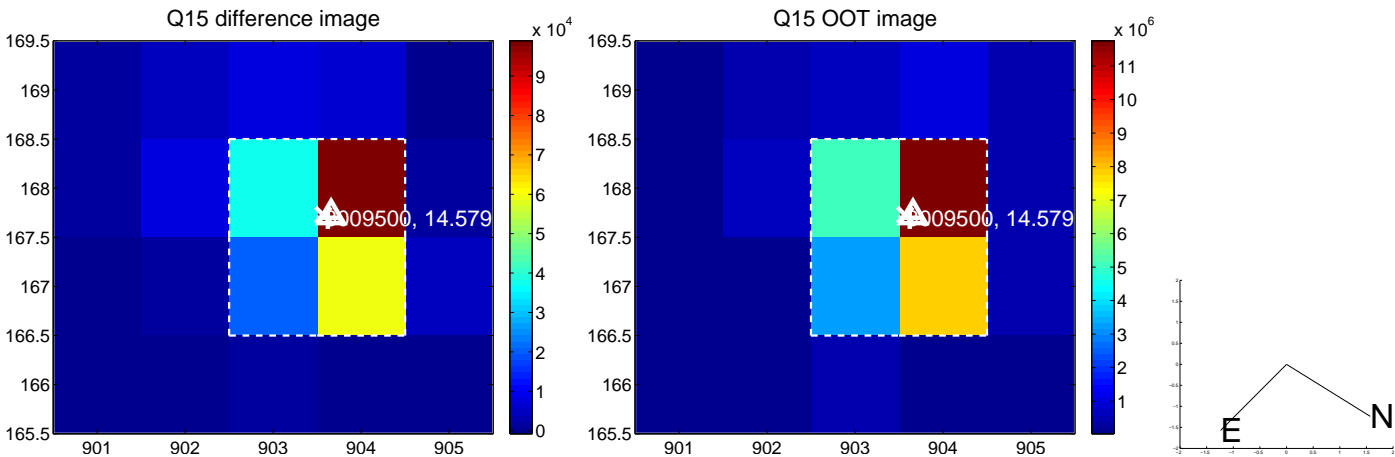
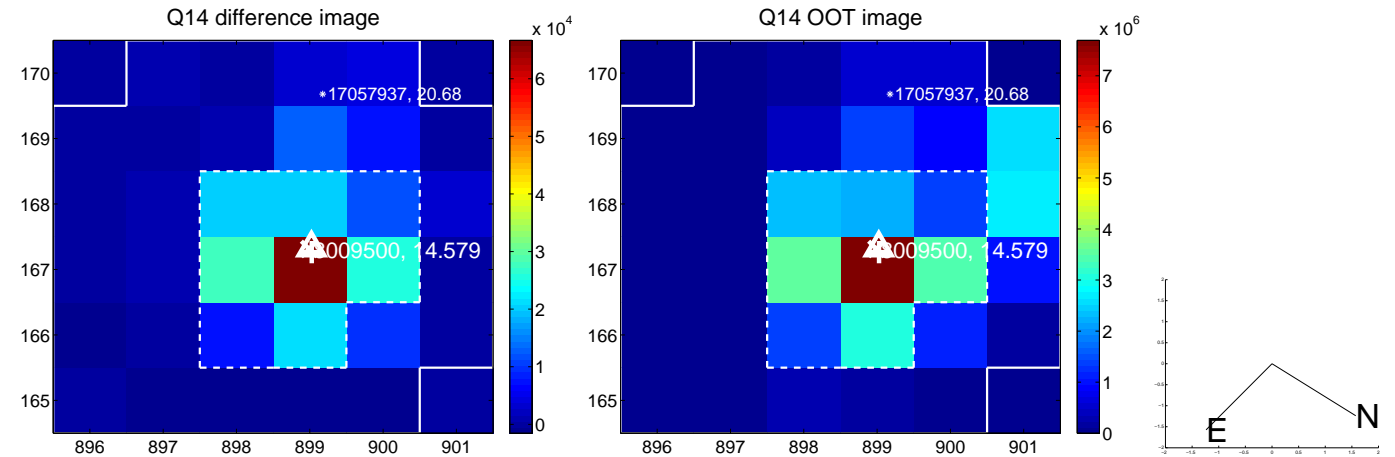
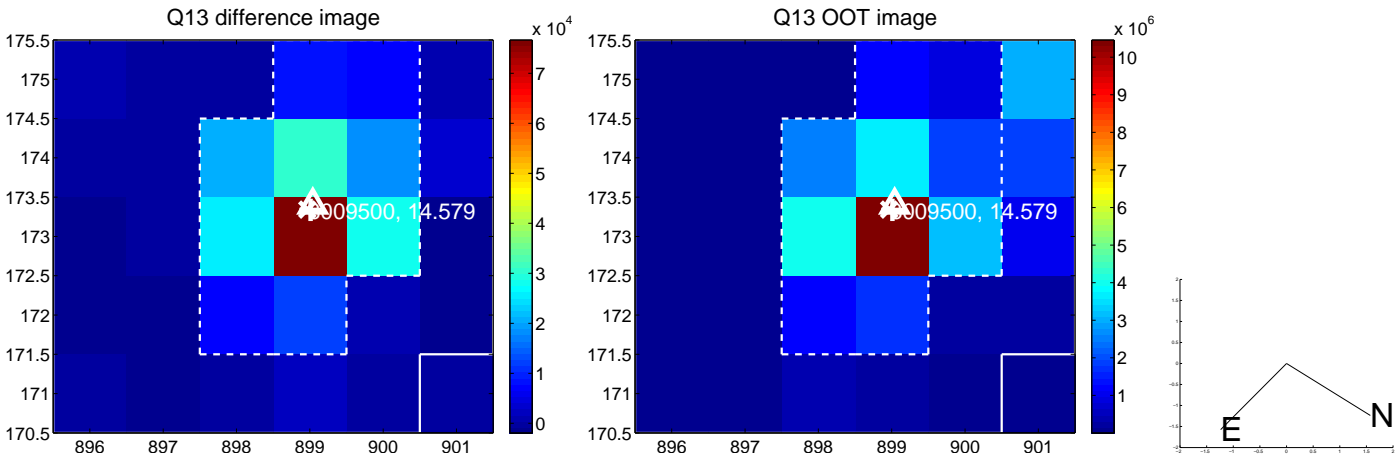
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



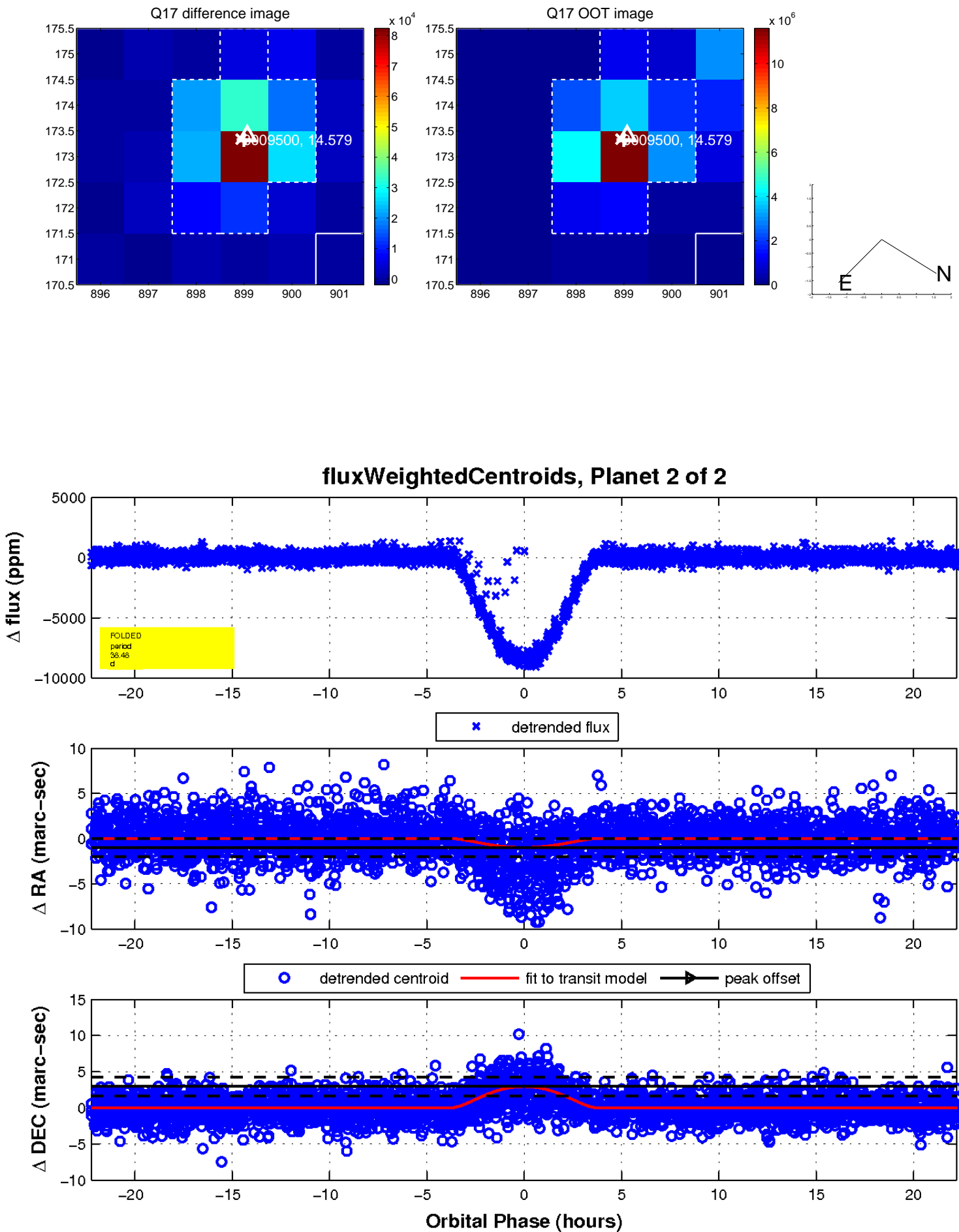
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

