

# KIC 003836509

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003836509-01	OBS	5011.01	1.540411	131.992117	369.8	1.937	39.9	43.6	15.15	4964	35.73	0.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003836509-01	OBS	FP	0.00	0	0	1	1	PLANET_IN_STAR—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH

**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 003836509-01

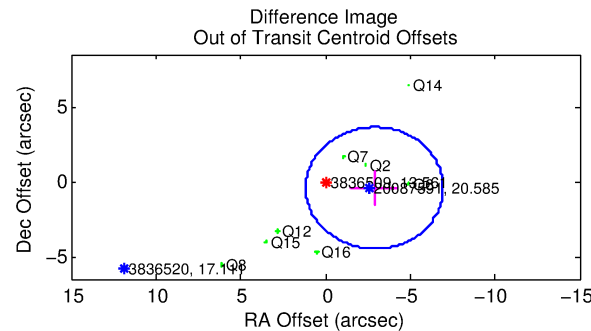
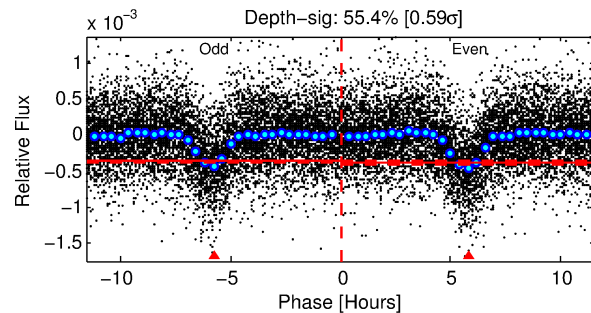
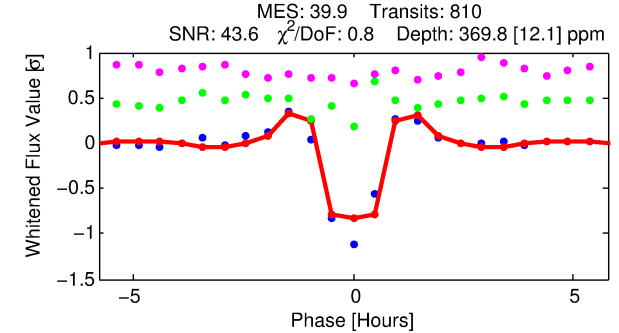
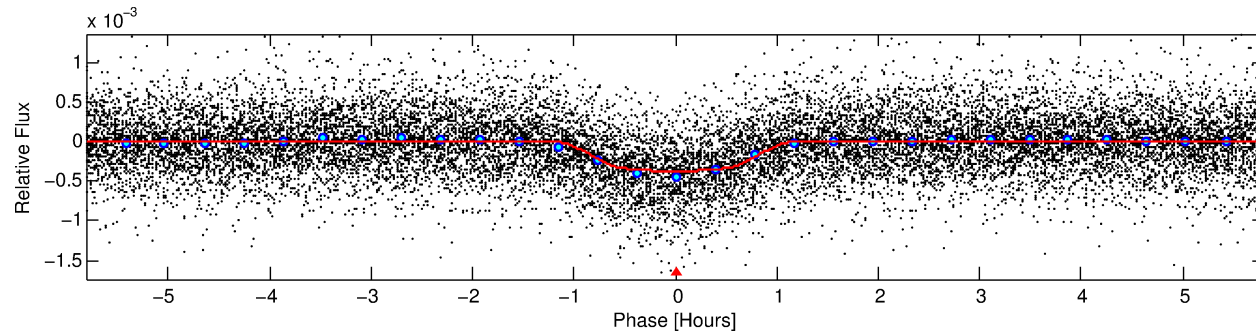
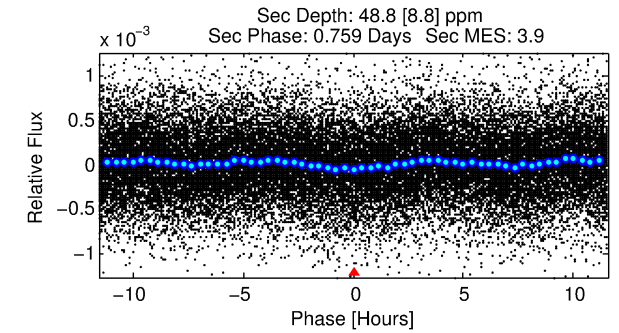
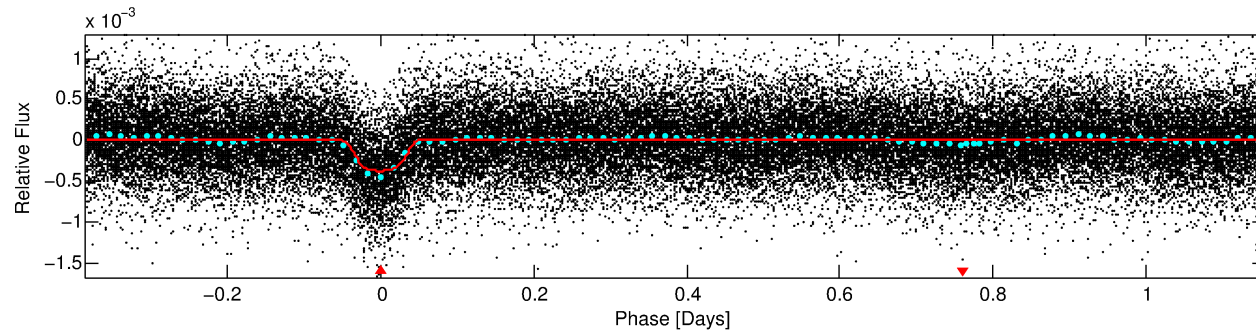
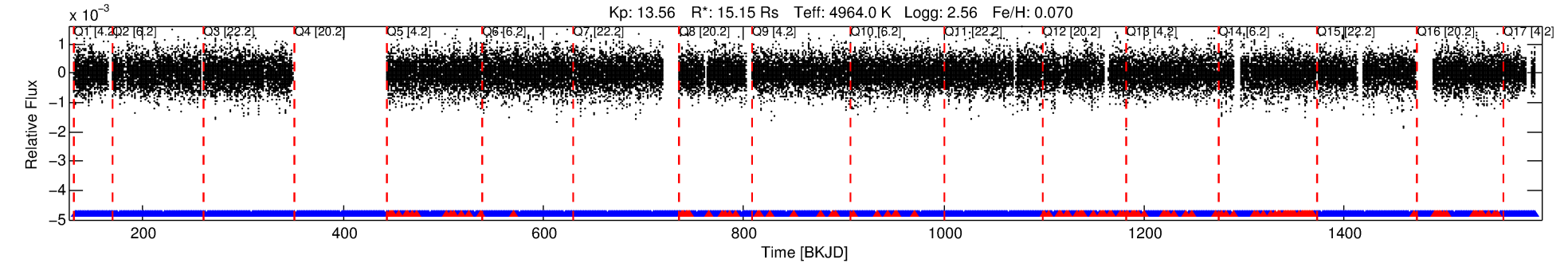
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
003836509-01	3836509	6363.01	3836413	1:1	98.7	-25	-3	13.76	13.56	200.43	Direct-PRF	0	0.77	0.26

**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  and  $\sigma_T$  are the significance of the match in period and epoch. For a match to be considered significant  $\sigma_P < 5.0$  and  $\sigma_T < 5.0$ . Matches which have  $\sigma_P$  and  $\sigma_T$  very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

# DV One-Page Summary

KIC: 3836509 Candidate: 1 of 1 Period: 1.540 d

KOI: K05011.01 Corr: 0.930



## DV Fit Results:

Period = 1.54041 [0.00000] d  
Epoch = 131.9921 [0.0004] BKJD  
Rp/R\* = 0.0216 [0.0018]  
a/R\* = 3.04 [0.85]  
b = 0.90 [0.07]  
Seff = N/A  
Teq = N/A  
Rp = 35.73 [14.09] Re  
a = N/A  
Ag = N/A  
Teffp = N/A

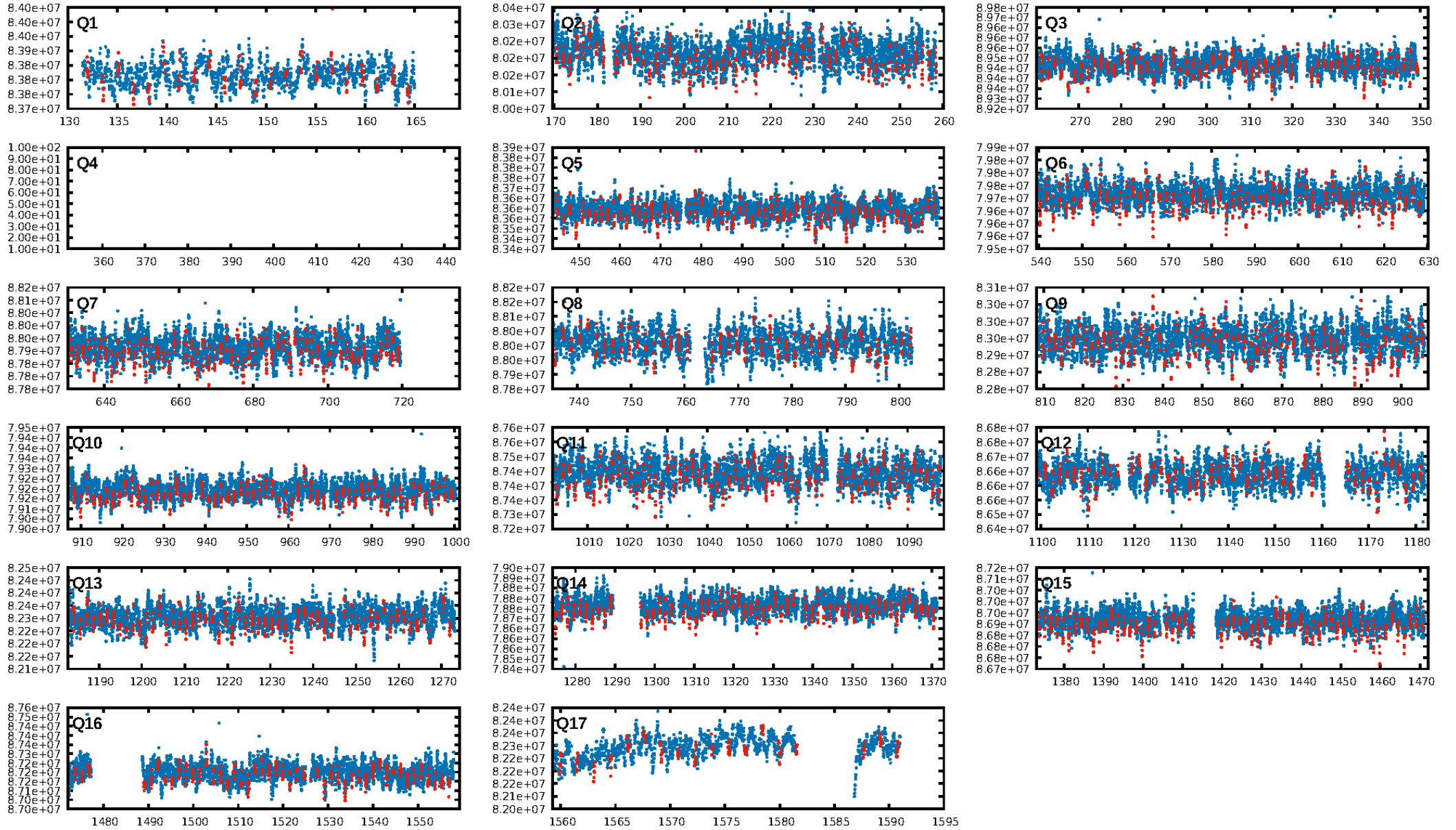
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.85 [657/770]  
GhostDiagnostic-chr: -0.0802  
Centroid-sig: 0.0%  
Centroid-so: 7.309 arcsec [48.42σ]  
OotOffset-rm: 2.919 arcsec [2.16σ]  
KicOffset-rm: 2.963 arcsec [2.20σ]  
OotOffset-st: 3/2/3/0 [8]  
KicOffset-st: 3/2/3/0 [8]  
DiffImageQuality-fgm: 0.12 [1/8]  
DiffImageOverlap-fno: 1.00 [16/16]

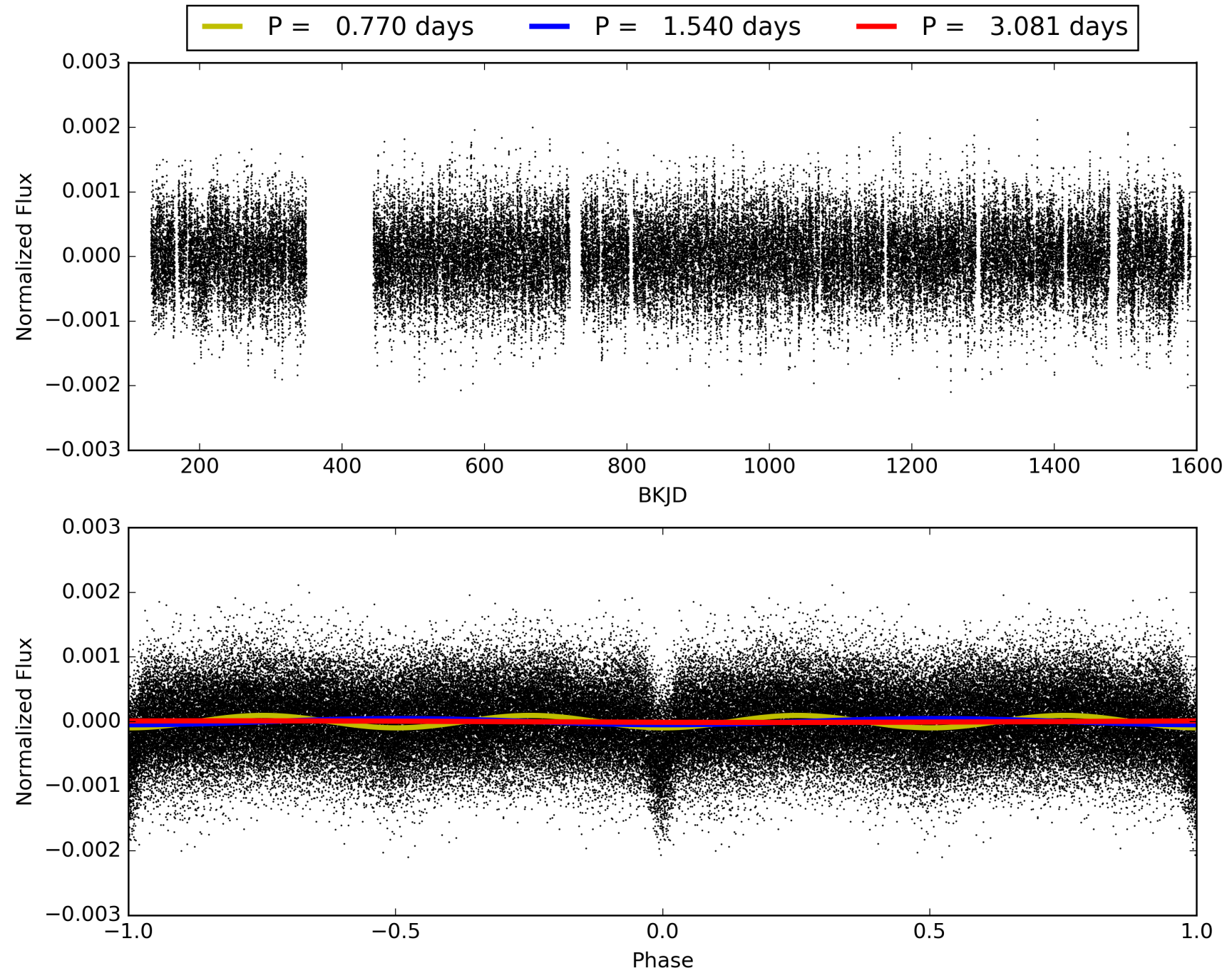
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 23:48:23 Z

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

# TCE 003836509-01, PDC Light Curves



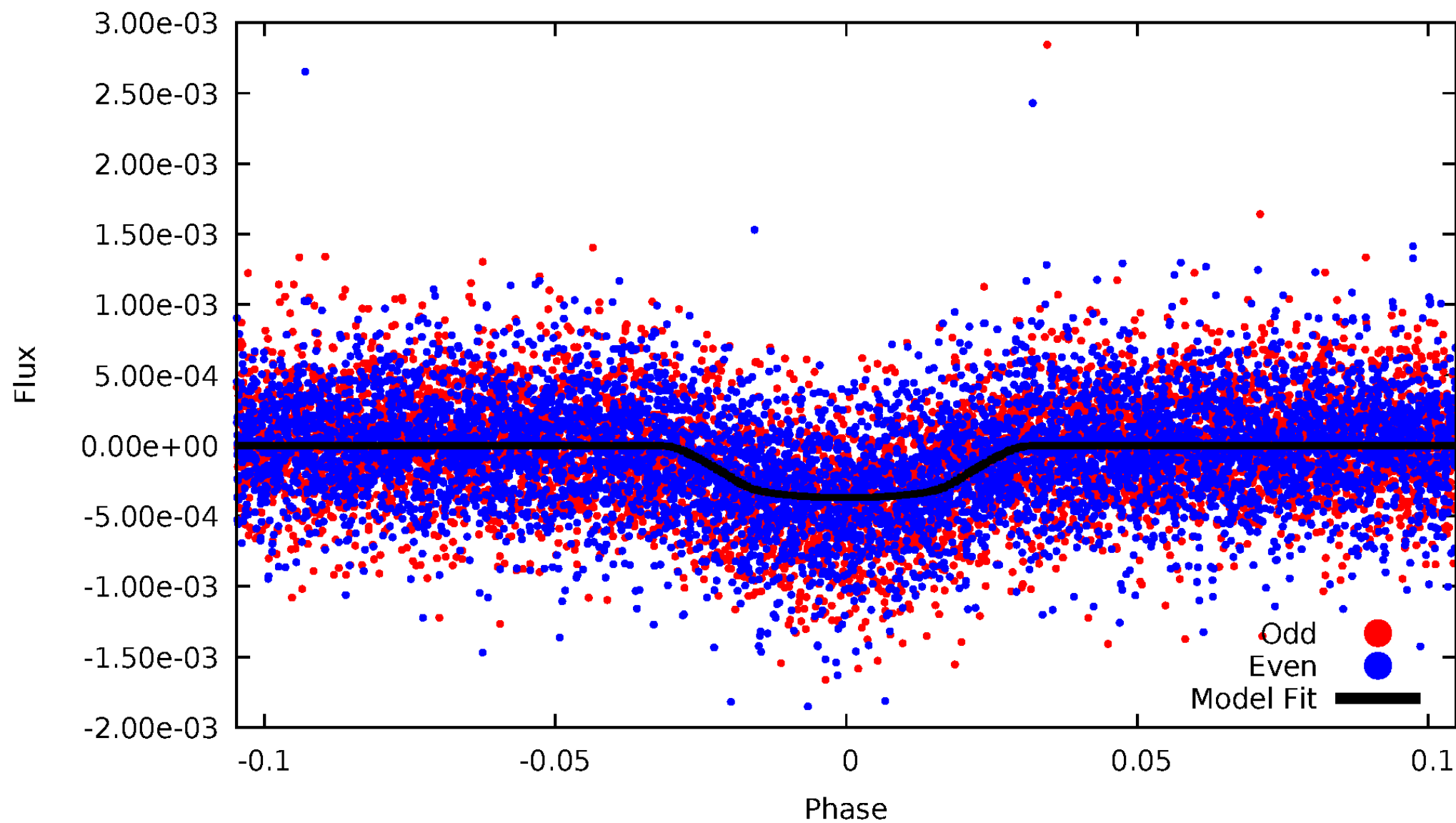
TCE 003836509-01





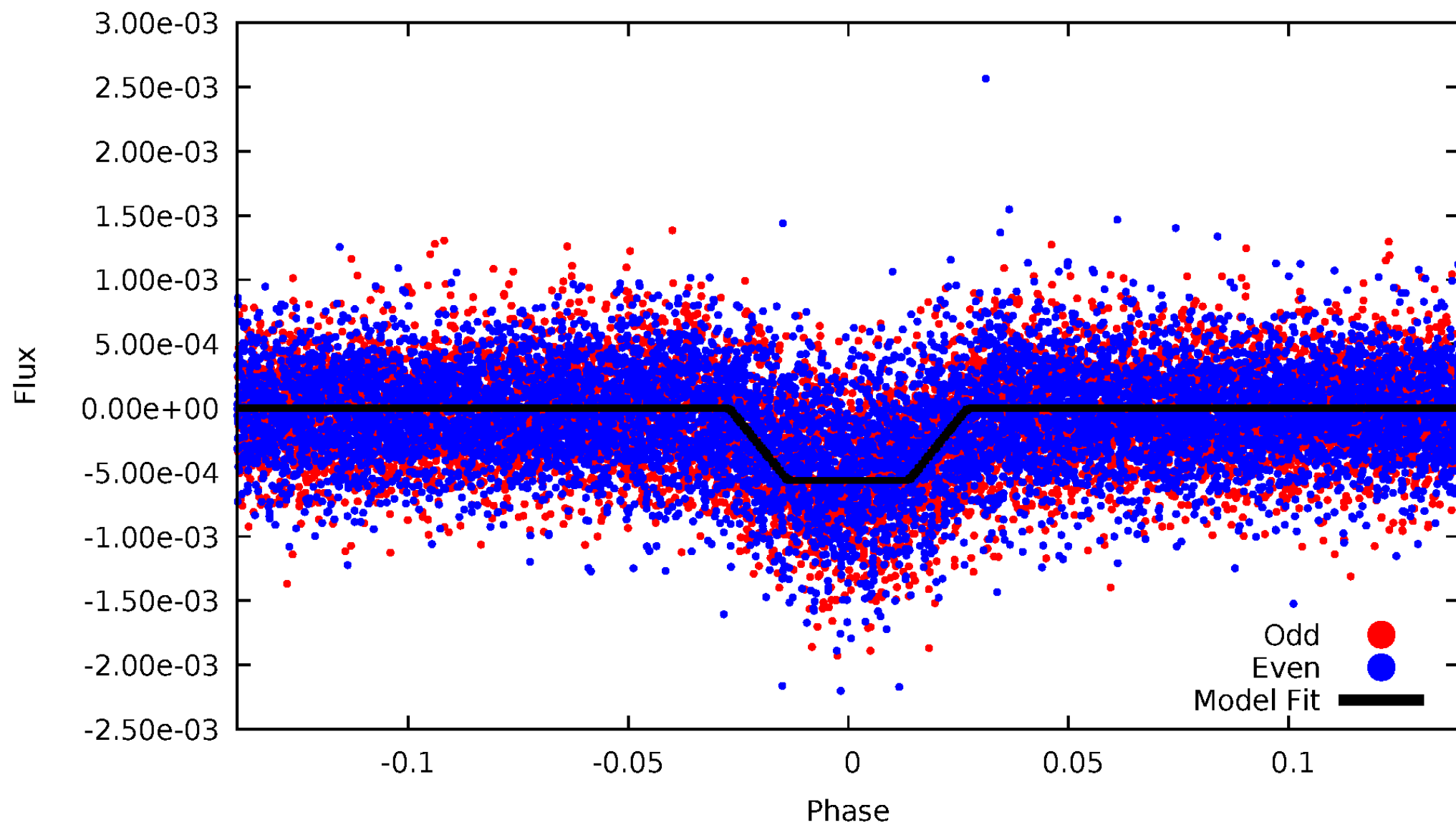
# DV Odd/Even

TCE 003836509-01



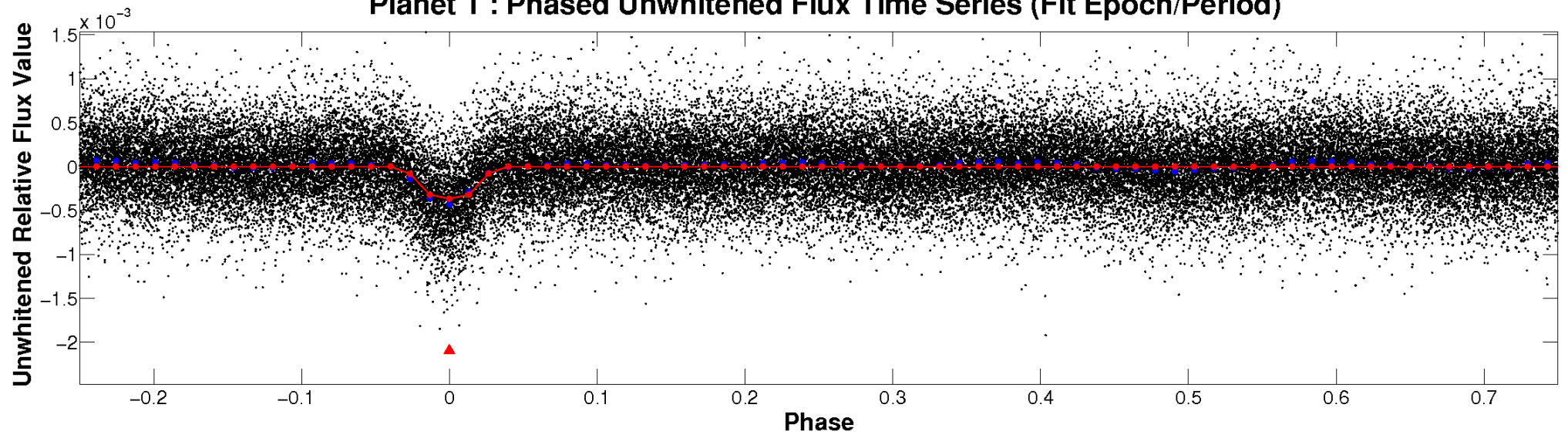
# ALT Odd/Even

TCE 003836509-01

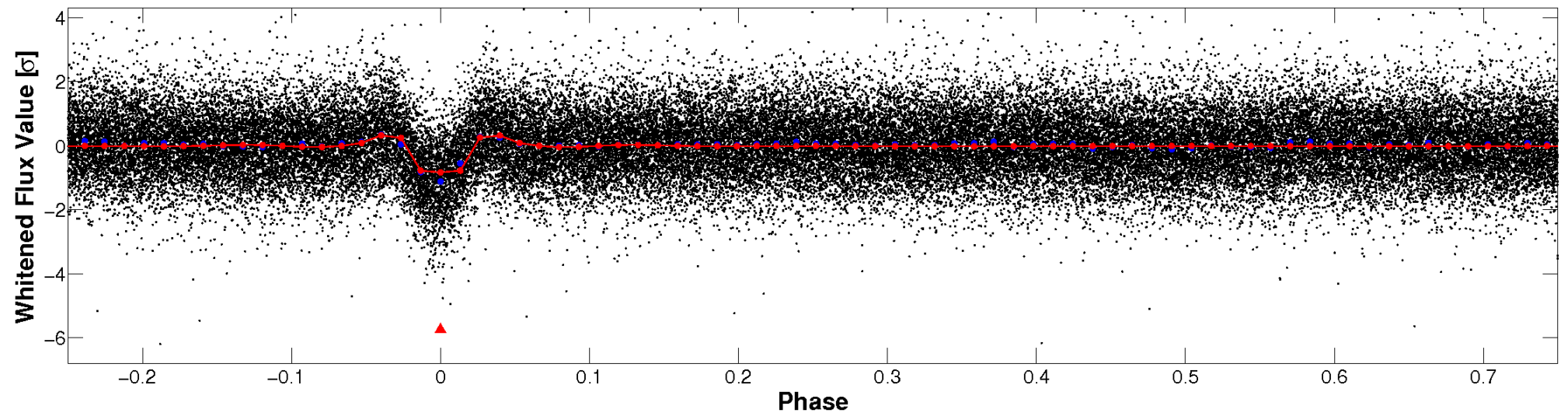


# Non-Whitened Vs. Whitened Light Curve

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

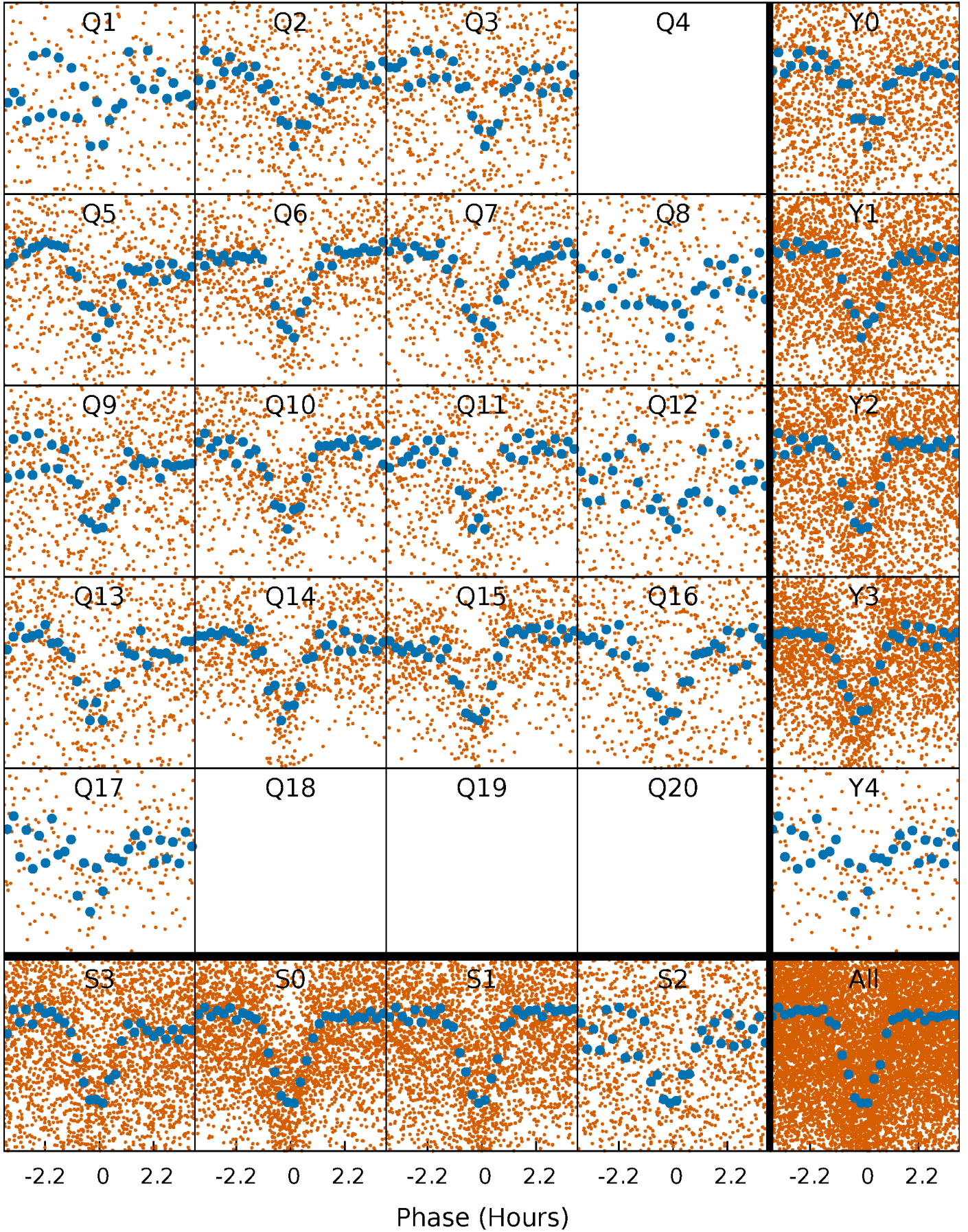


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

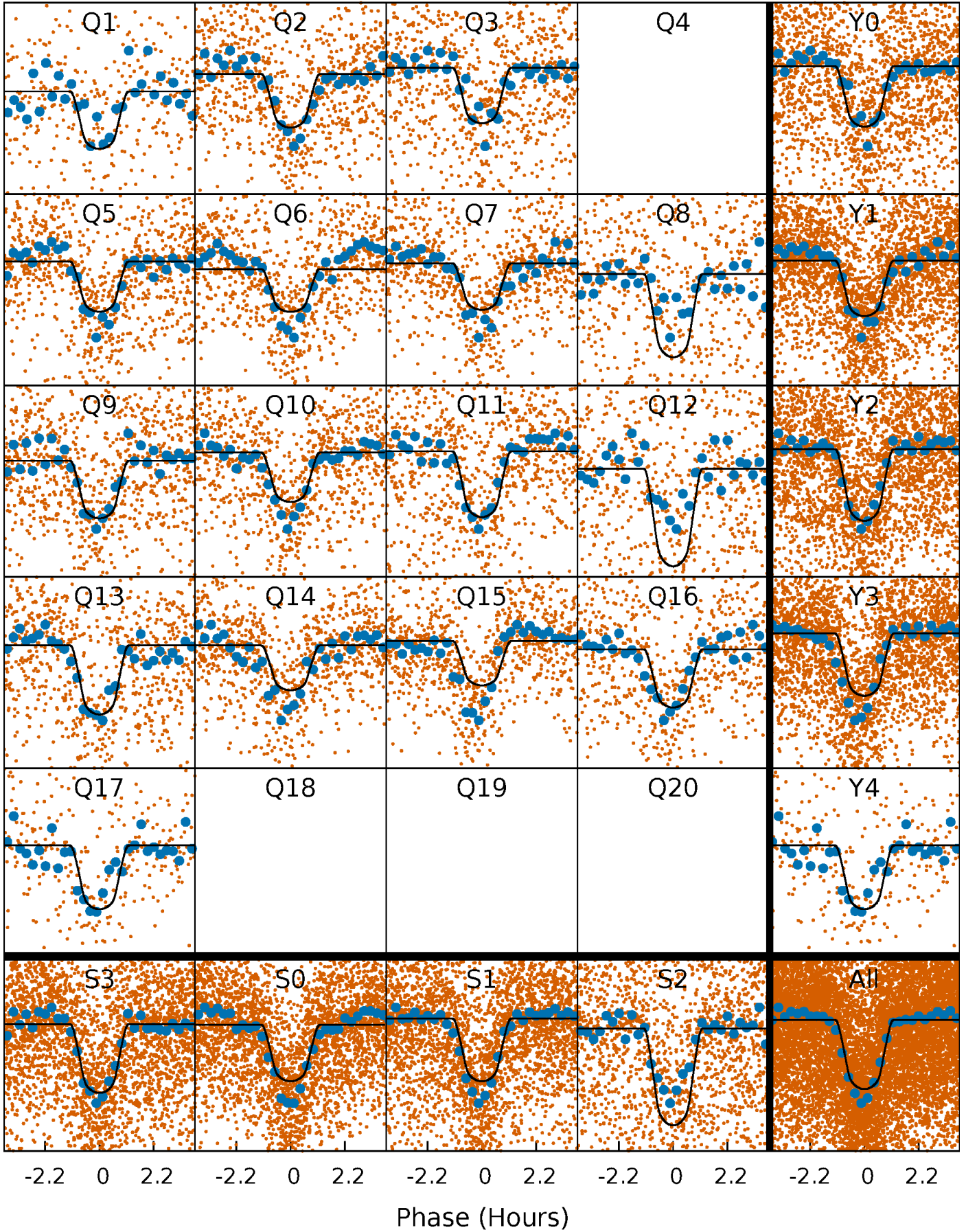
TCE 003836509-01 P= 1.540411 Days  $T_0=131.992117$  (BKJD)





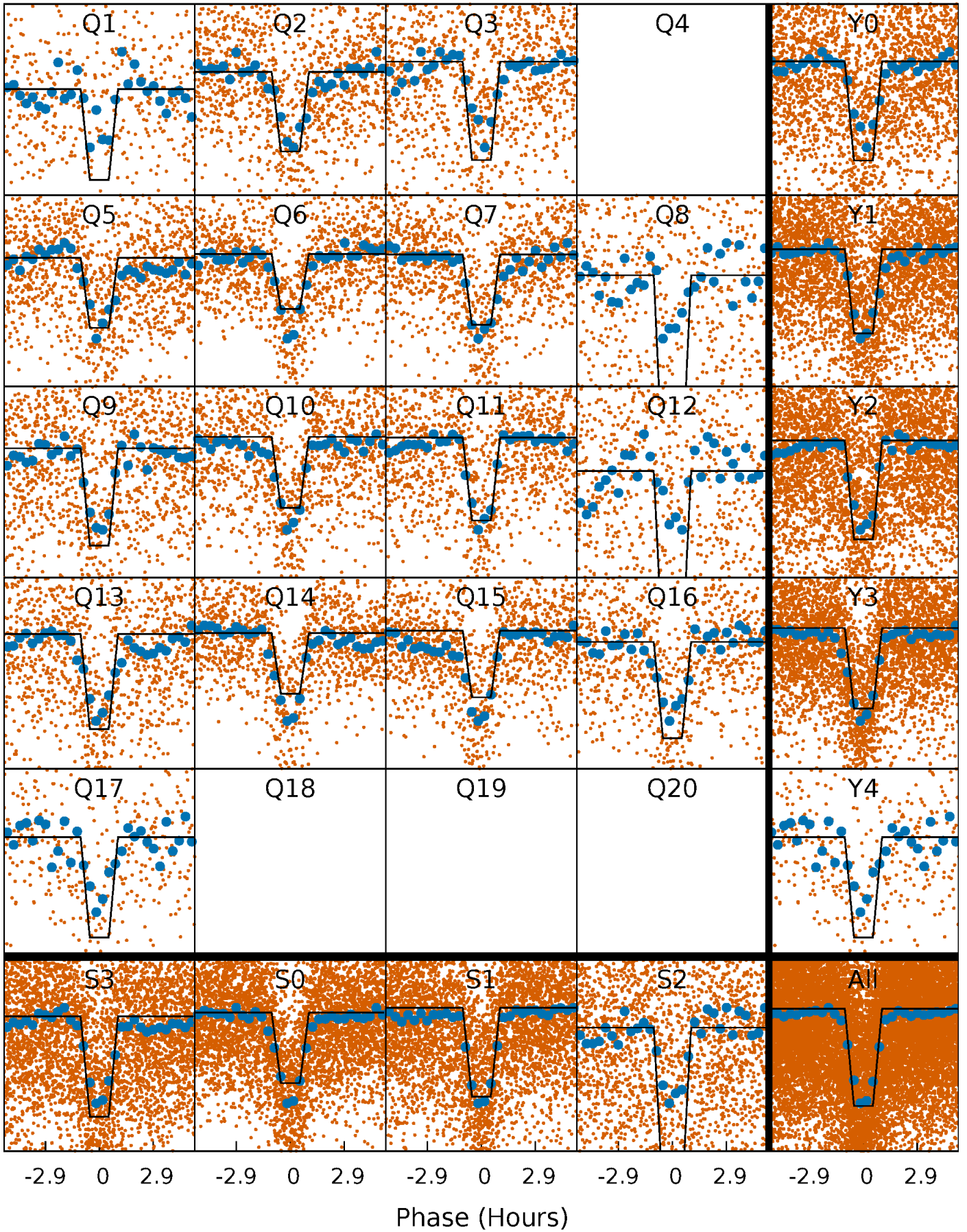
# DV Quarter-Phased Transit Curves

TCE 003836509-01   P= 1.540411 Days    $T_0=131.992117$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

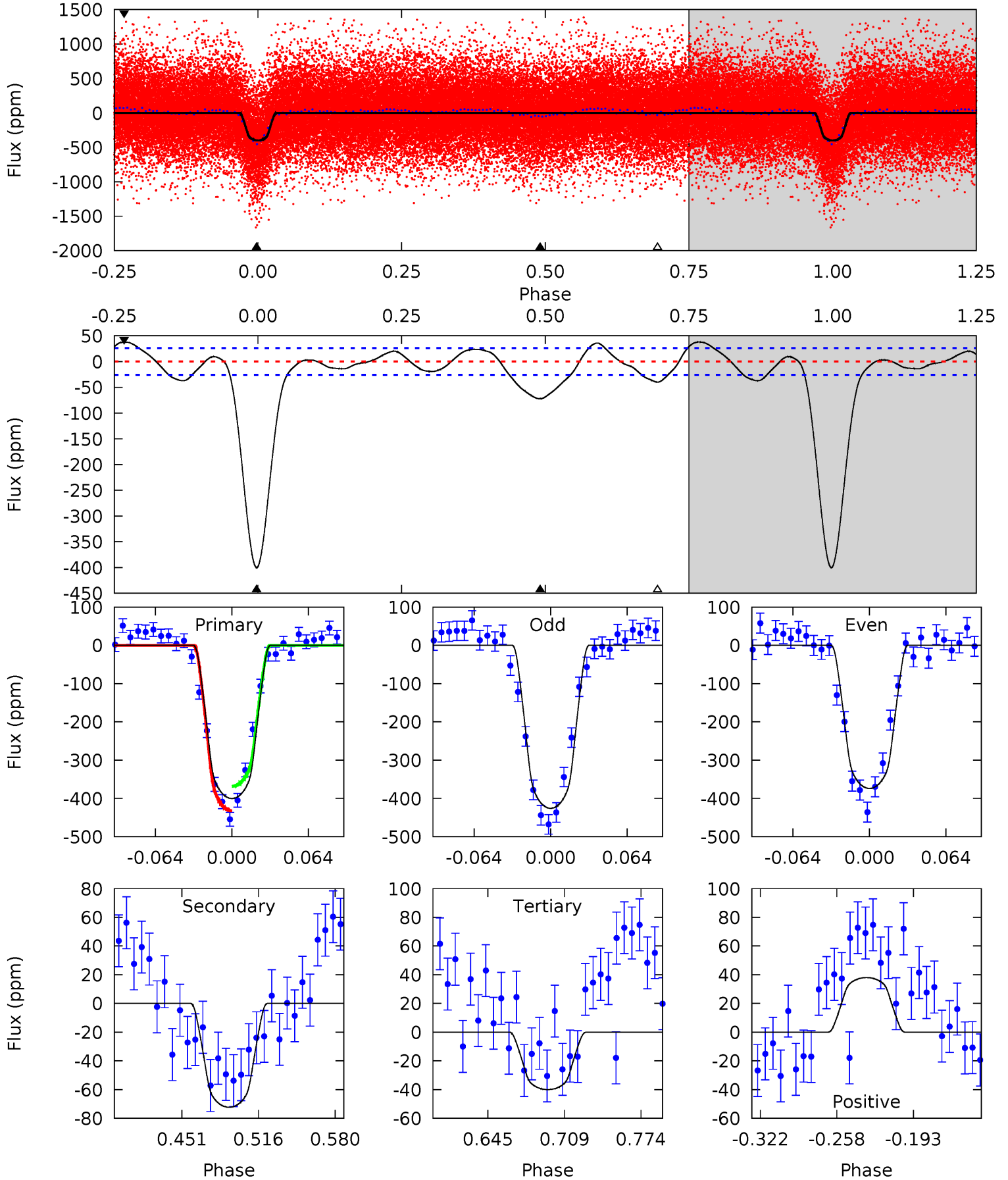
TCE 003836509-01 P= 1.540401 Days  $T_0=131.993586$  (BKJD)



# DV Model-Shift Uniqueness Test

003836509-01, P = 1.540411 Days, E = 130.451706 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
71.6	12.9	7.17	6.81	4.66	1.85	3.54	64.5	64.8	5.78	6.14	4.67	1.02	0.09	5.75

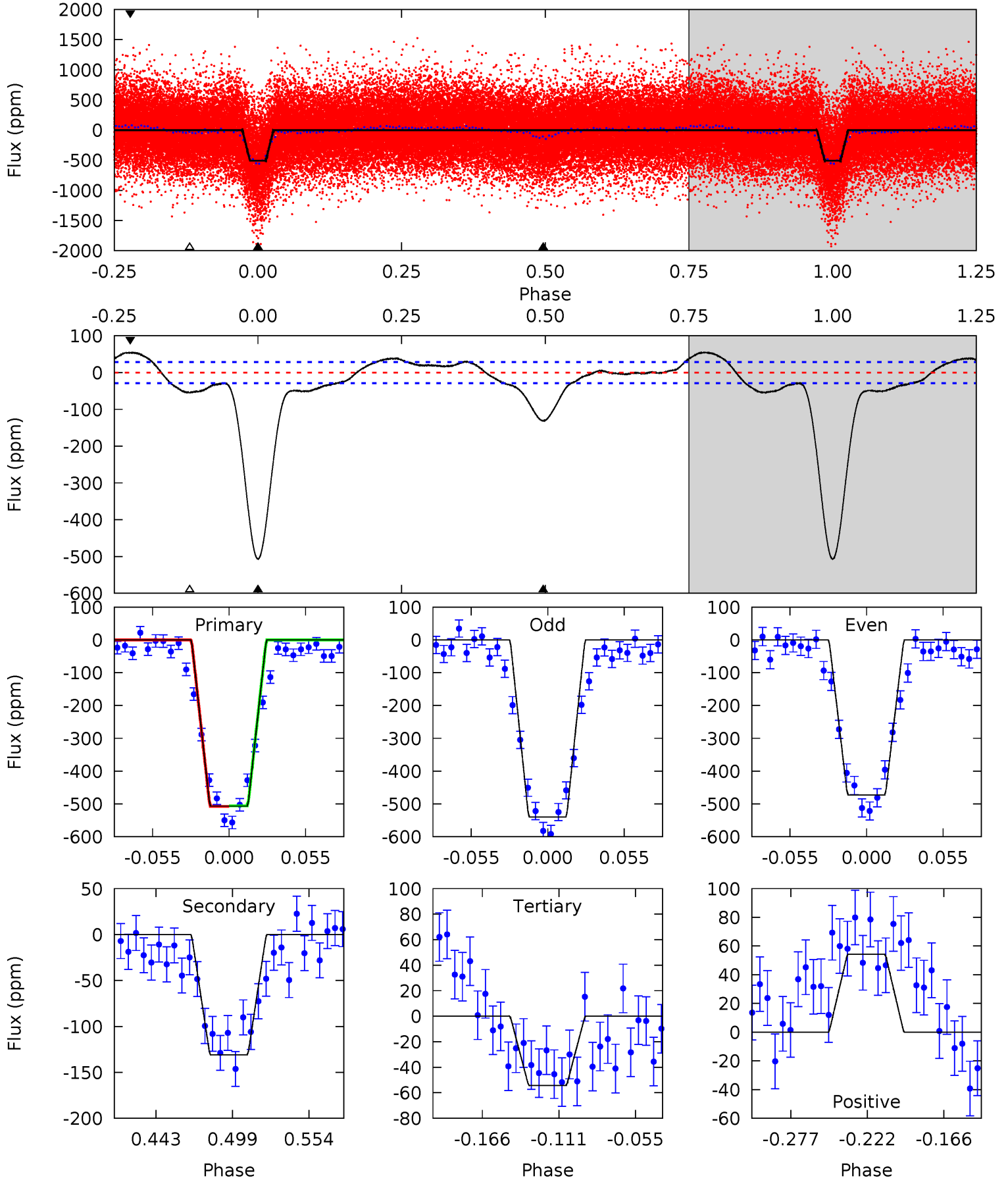




# Alt Model-Shift Uniqueness Test

003836509-01, P = 1.540401 Days, E = 130.453185 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
83.2	21.5	8.92	8.91	4.69	1.92	4.91	74.3	74.3	12.6	12.6	5.51	1.02	0.10	0.17





### Stellar Parameters For KIC 003836509

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4964^{+72}_{-260}$	$2.562^{+0.033}_{-0.030}$	$0.070^{+0.150}_{-0.500}$	$15.155^{+0.649}_{-5.838}$	$3.055^{+0.205}_{-1.841}$	$0.001^{+0.001}_{-0.000}$
	+1%/-5%	+1%/-1%	+214%/-714%	+4%/-39%	+7%/-60%	+66%/-9%
Source	PHO1	AST9	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 003836509-01 / KOI 5011.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-72 \pm 6$	$36.19^{+3.55}_{-3.69}$	$6106^{+132}_{-313}$	$-4809^{+231}_{-129}$	$0.044^{+0.010}_{-0.008}$
Alt.	$-131 \pm 6$	$39.86^{+3.42}_{-3.49}$	$6110^{+135}_{-307}$	$-4724^{+227}_{-126}$	$0.067^{+0.013}_{-0.011}$

$T_{\text{max}}$  = 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

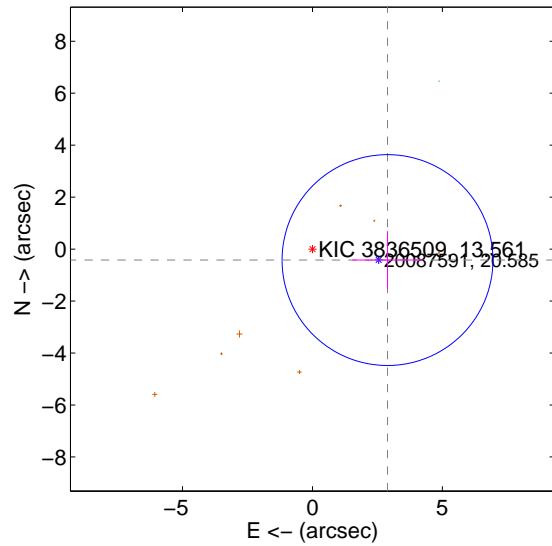
Supplemental centroid analysis for 003836509-01. Kepler magnitude: 13.56. Transit SNR 43.56

There are 1 quarters with good PRF difference image offsets

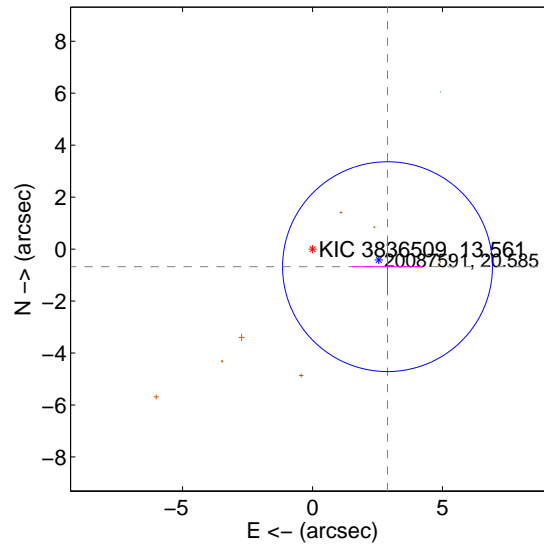
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.919 \pm 1.352$	2.16	$-2.889 \pm 1.357$	$-0.422 \pm 1.112$
PRF-fit source offset from KIC position	$2.963 \pm 1.346$	2.20	$-2.885 \pm 1.358$	$-0.676 \pm 1.101$
photometric centroid source offset	$7.31 \pm 0.15$	48.42	$-3.72 \pm 0.14$	$6.29 \pm 0.16$

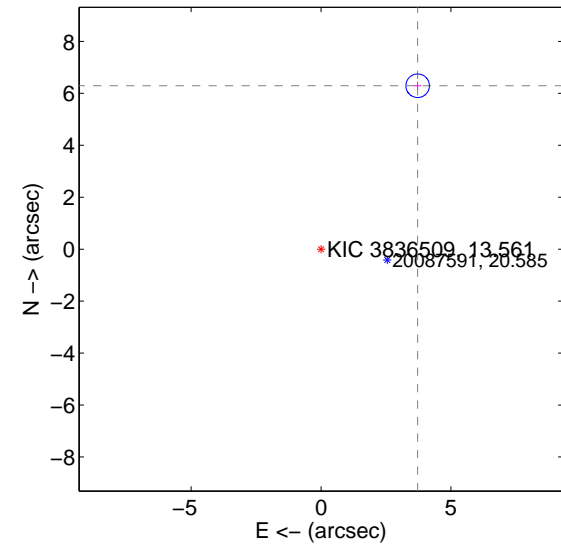
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

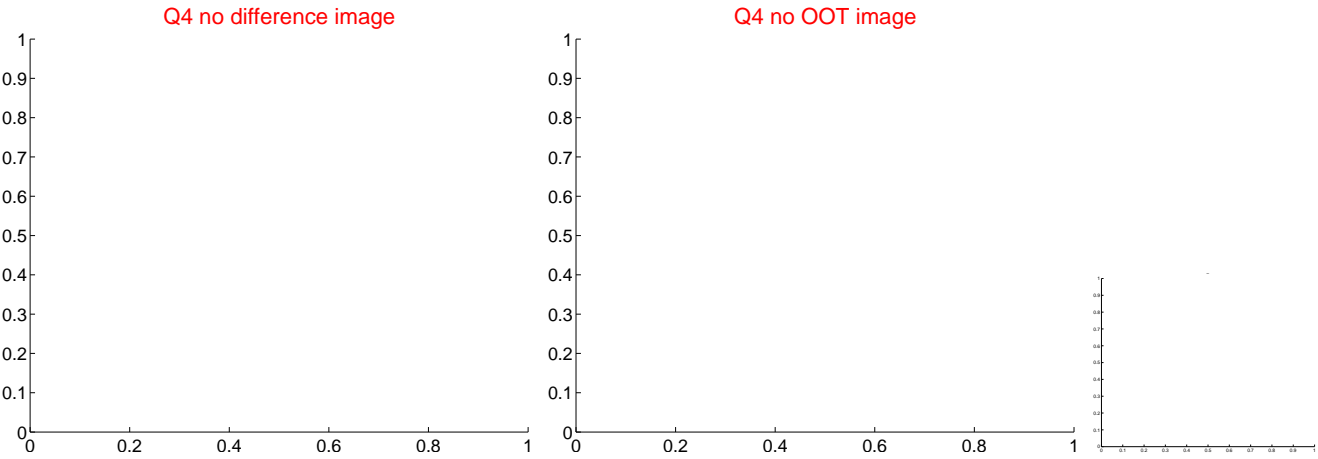
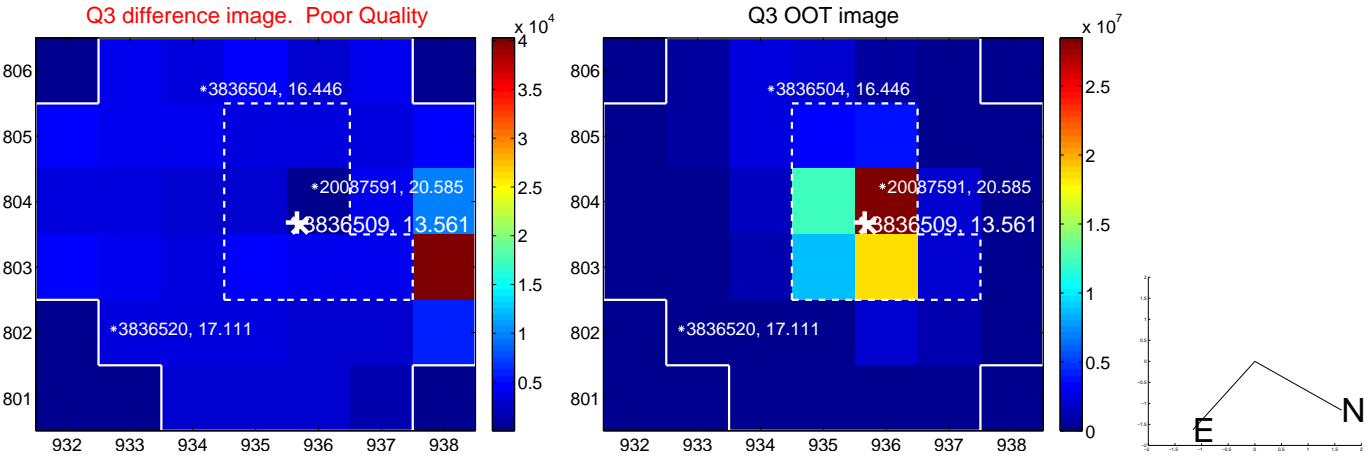
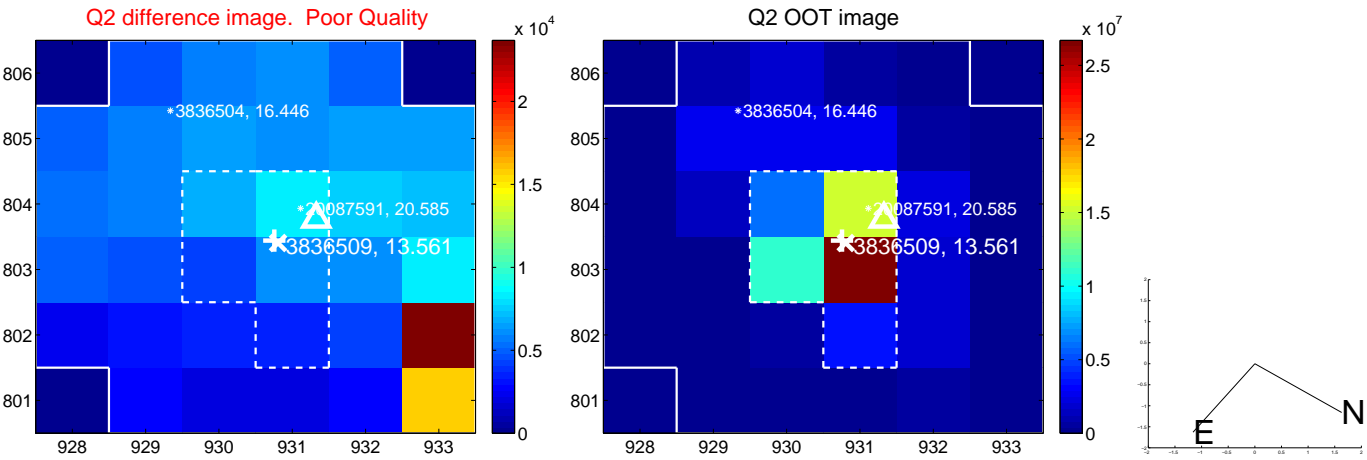
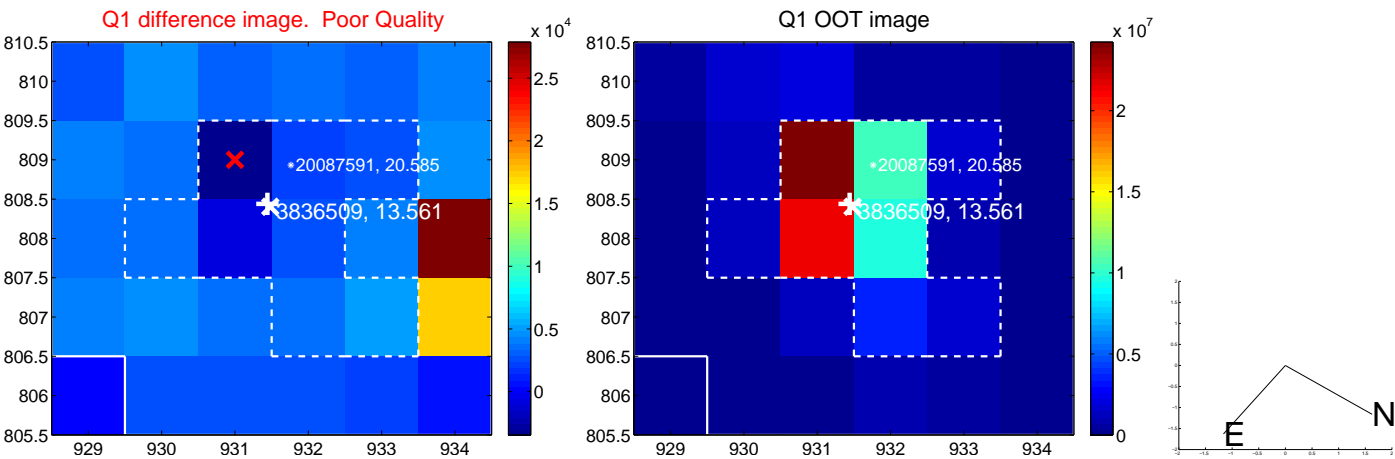


offset from photometric centroids

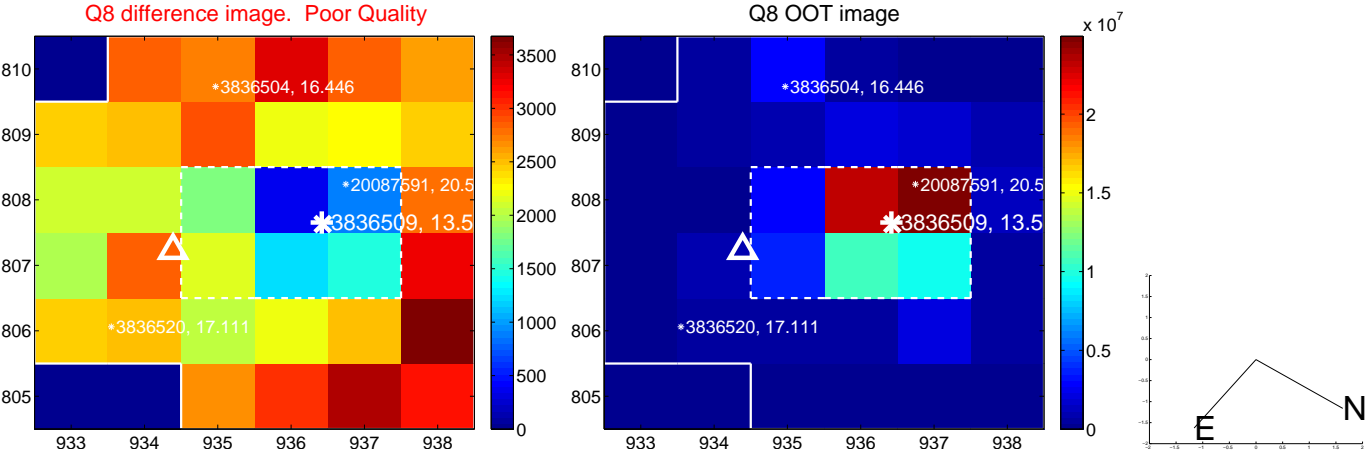
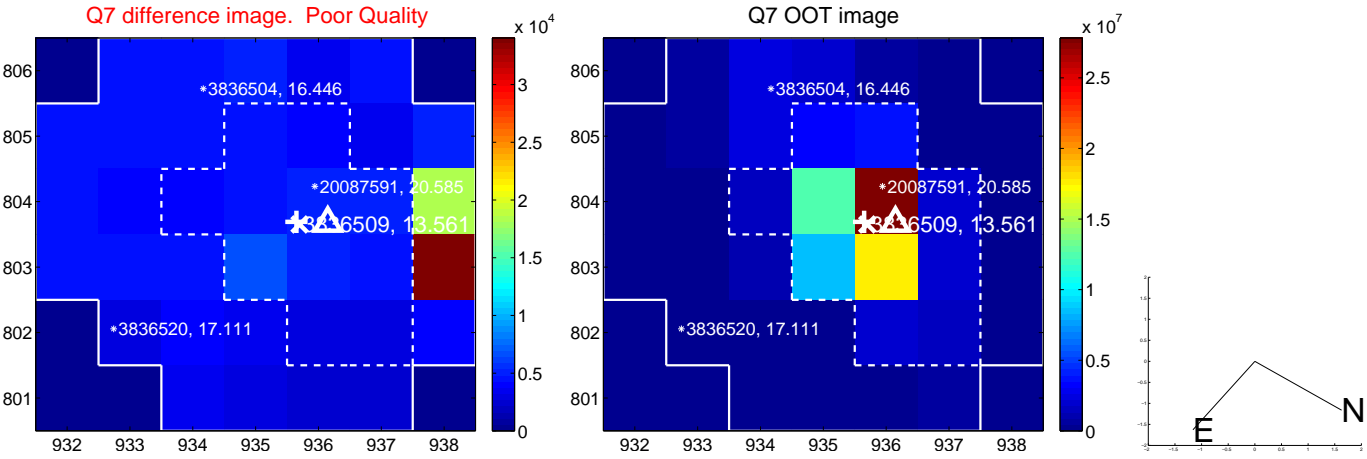
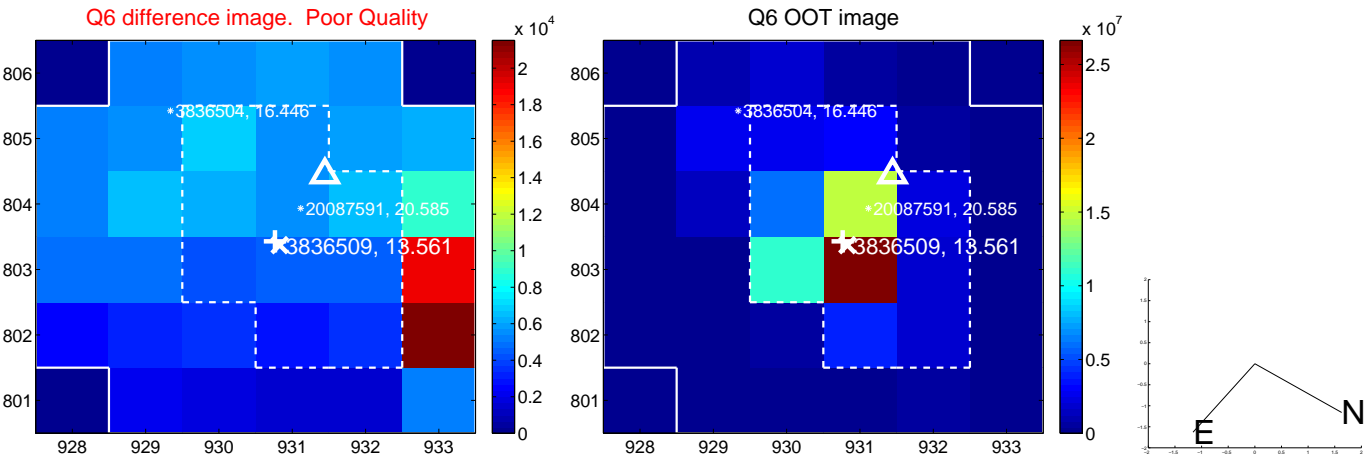
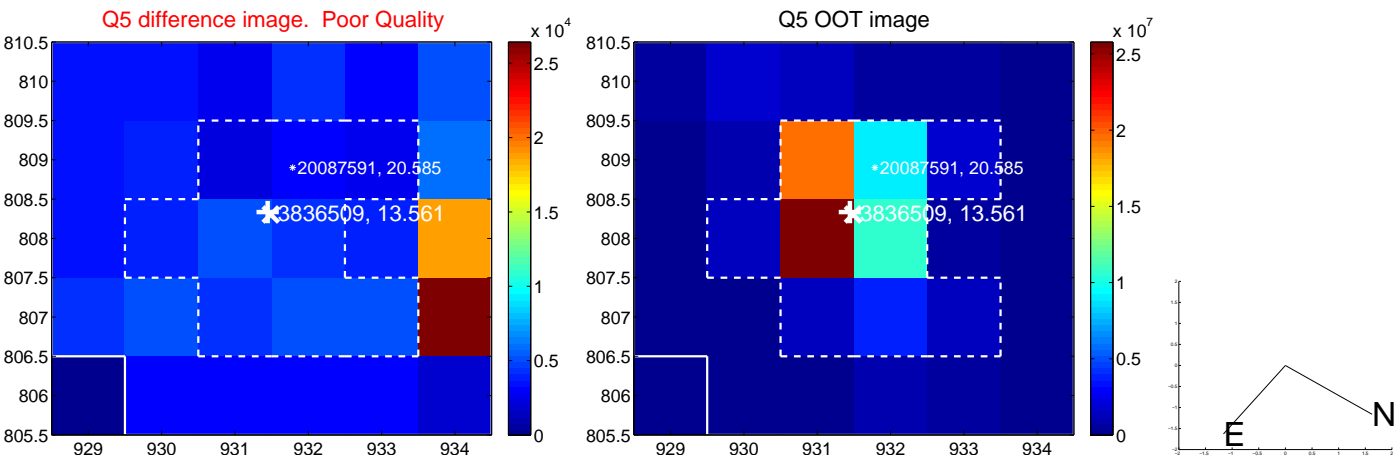


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

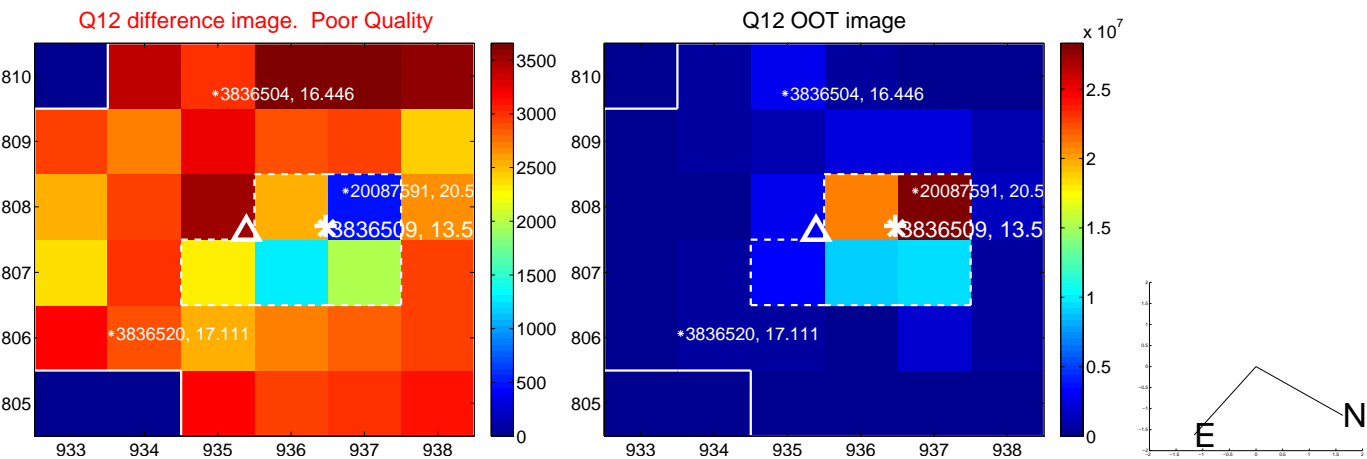
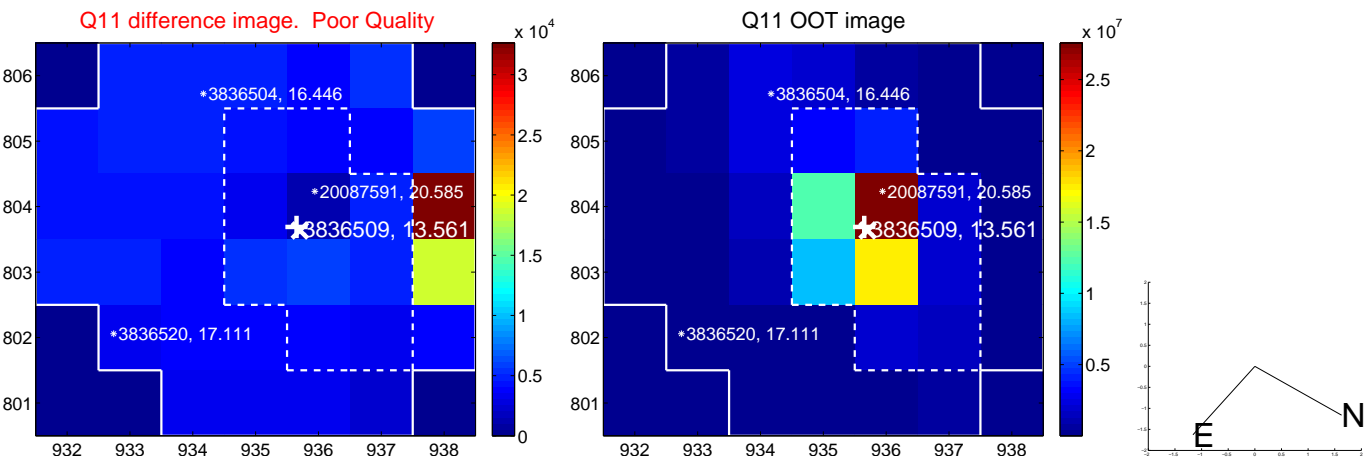
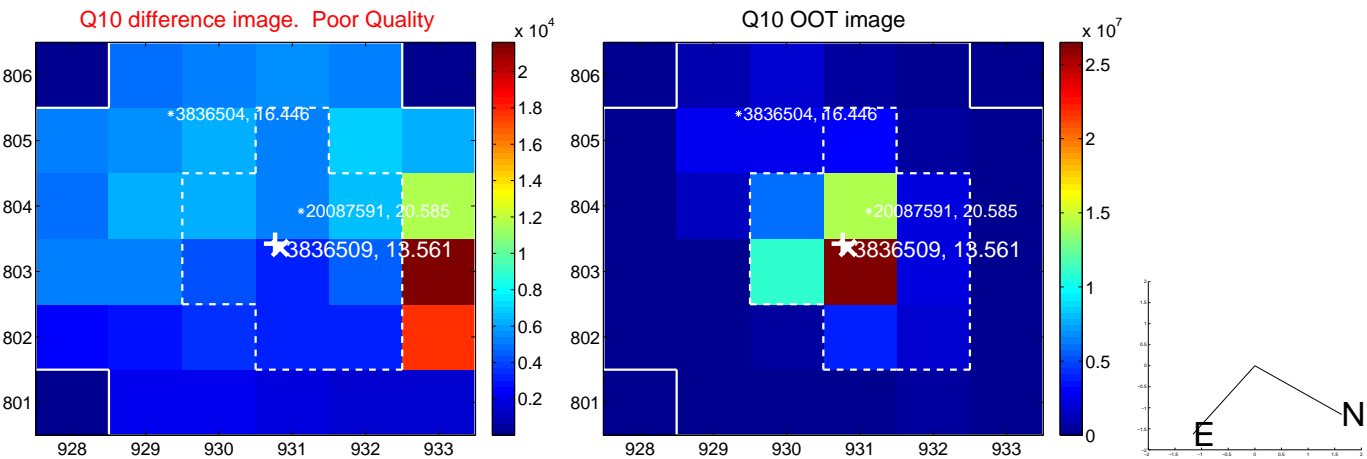
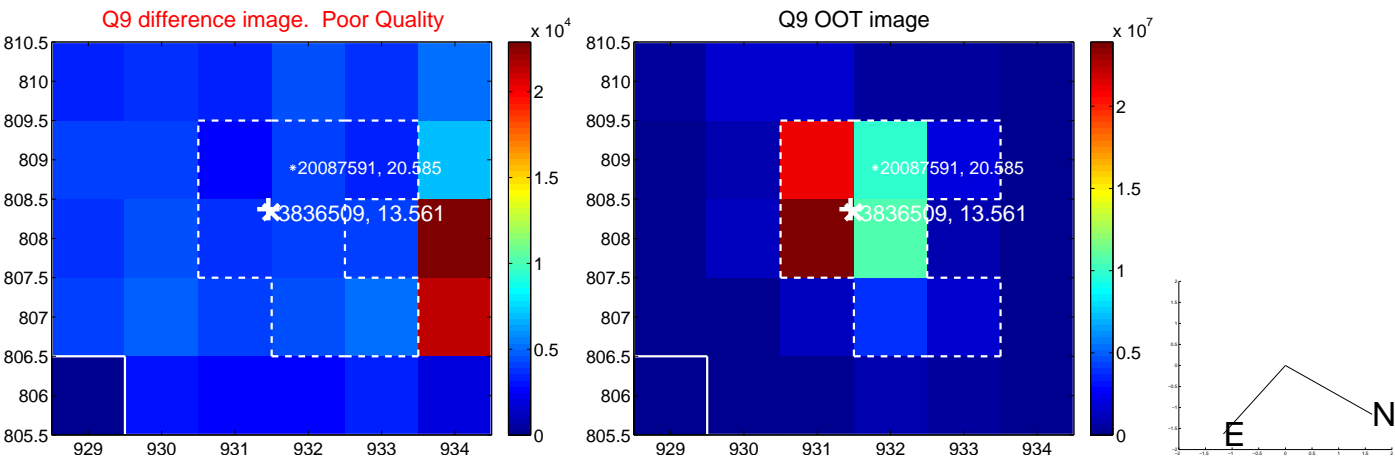


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

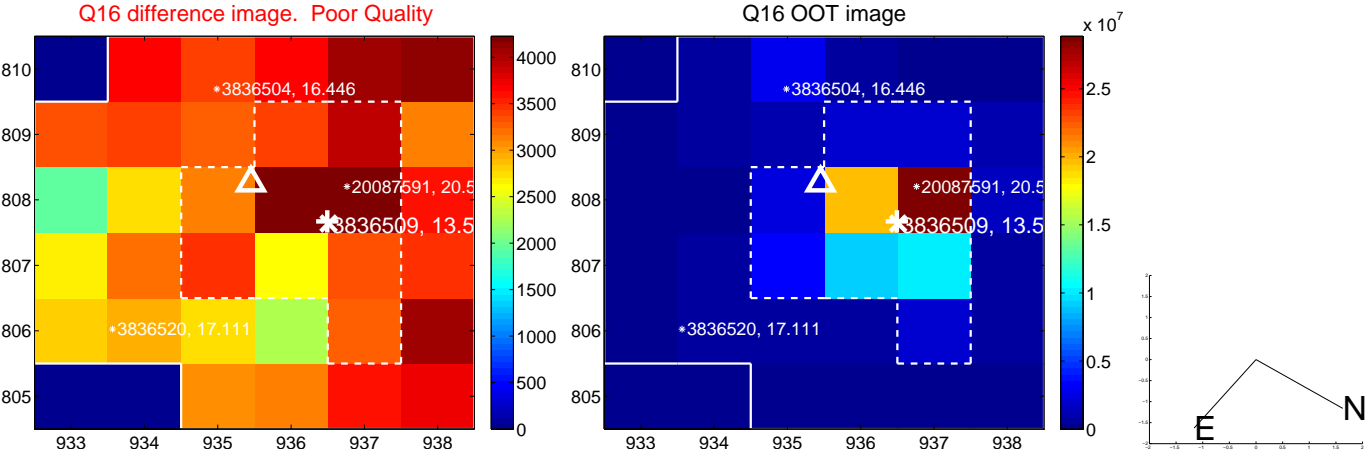
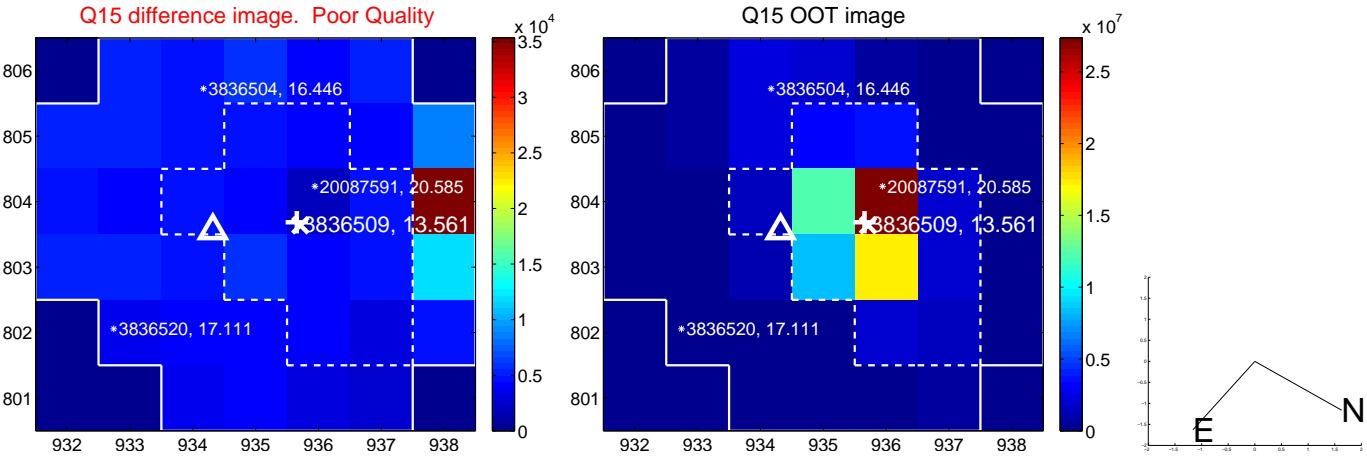
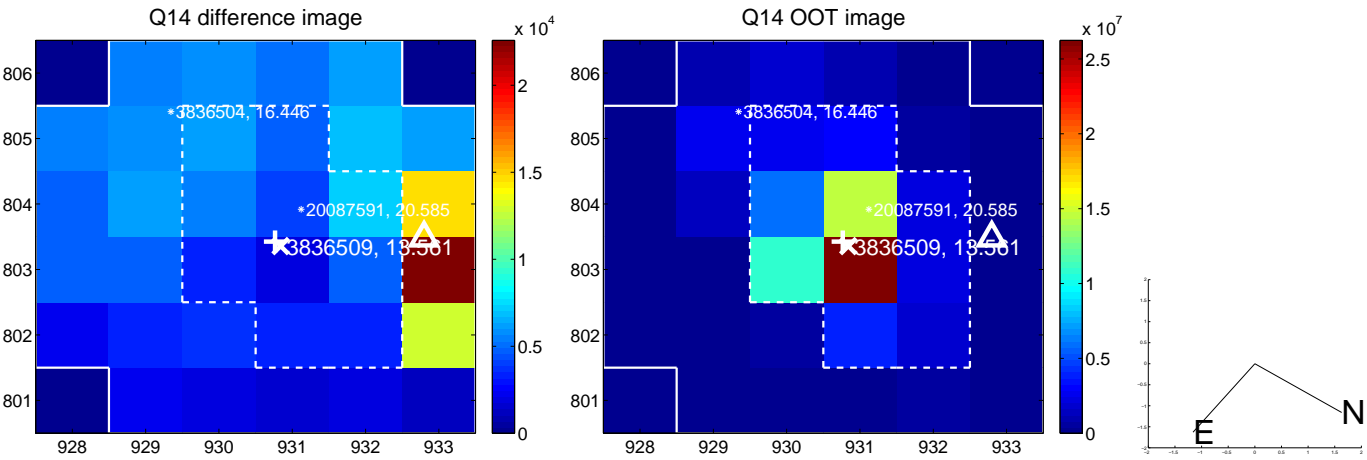
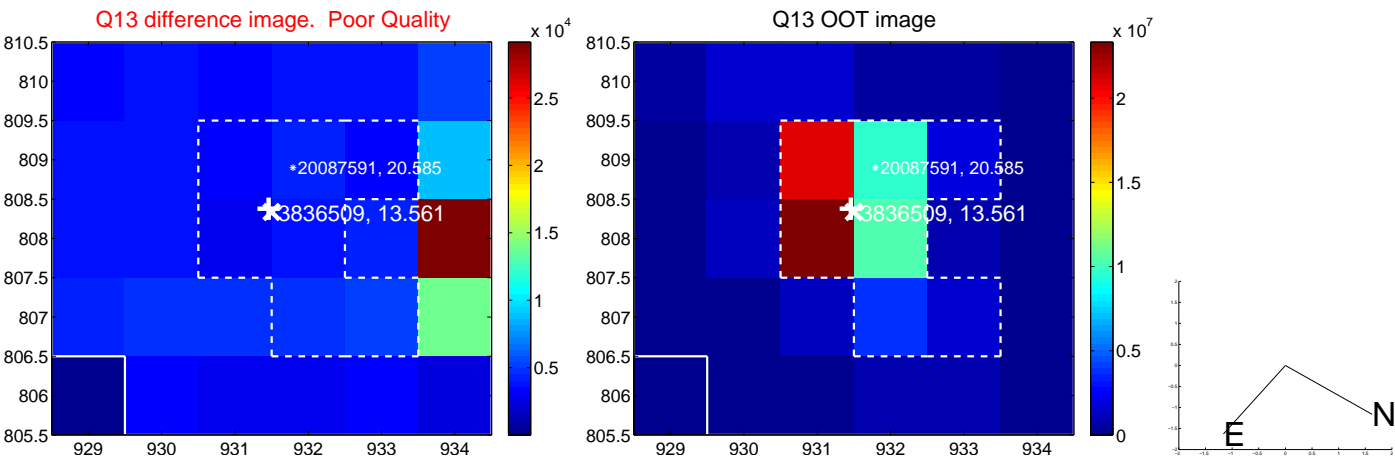




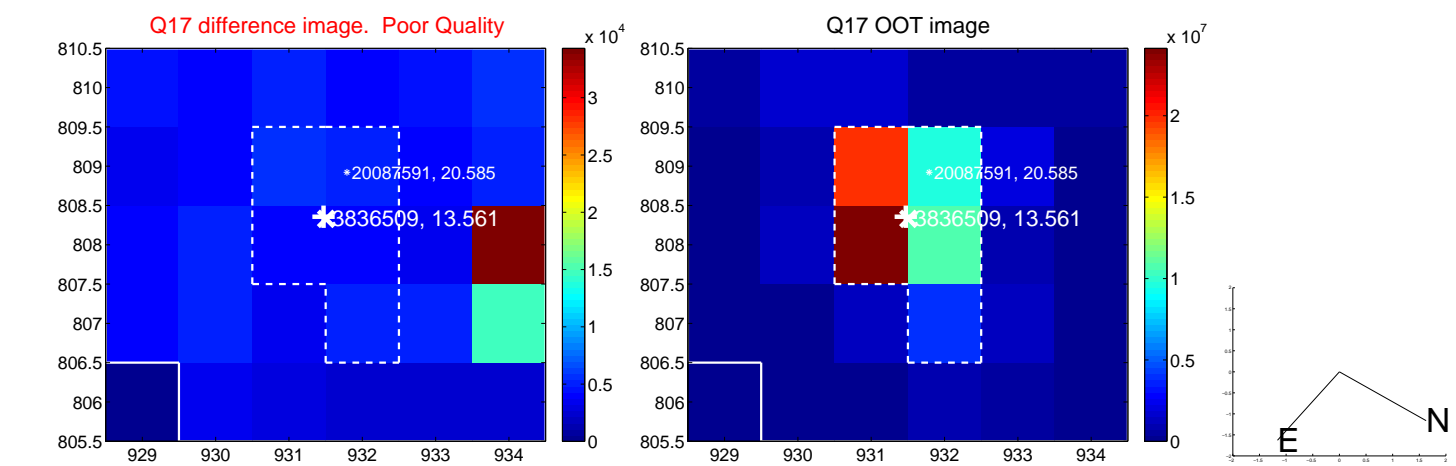
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



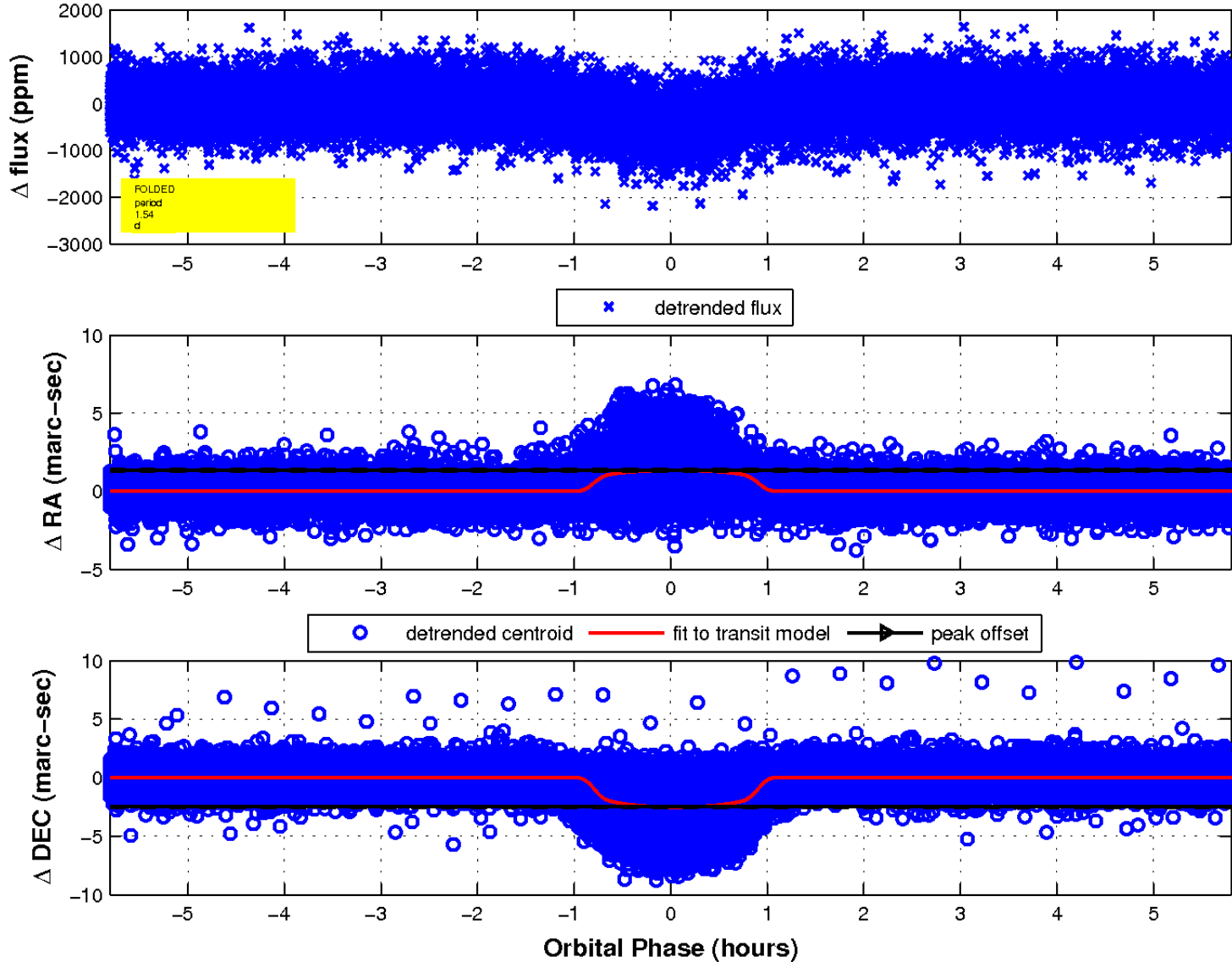
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 1 of 1



UKIRT Image

Declination

