

# KIC 009640931

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009640931-01	OBS	4175.01	2.178127	132.030176	222.0	2.609	15.3	16.0	0.70	5357	1.25	397.99

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009640931-01	OBS	FP	0.00	0	0	1	1	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 009640931-01

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	$\sigma_P$	$\sigma_T$
009640931-01	9640931	FL-Lyr-pri	9641031	1:1	151.6	2	-38	9.18	15.92	1959.70	Direct-PRF	0	0.86	0.45

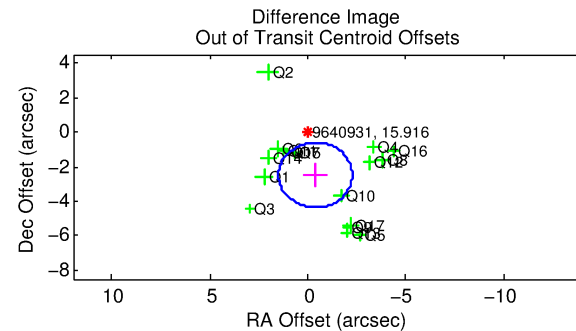
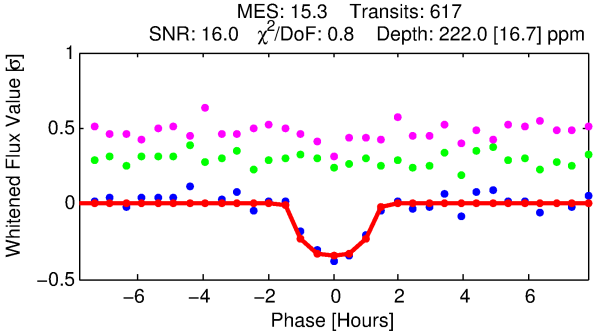
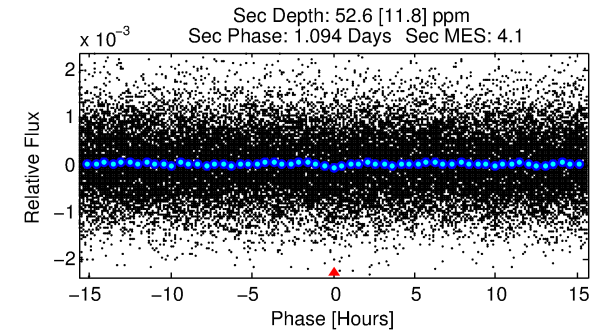
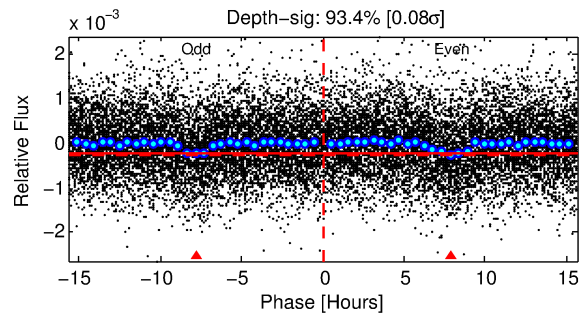
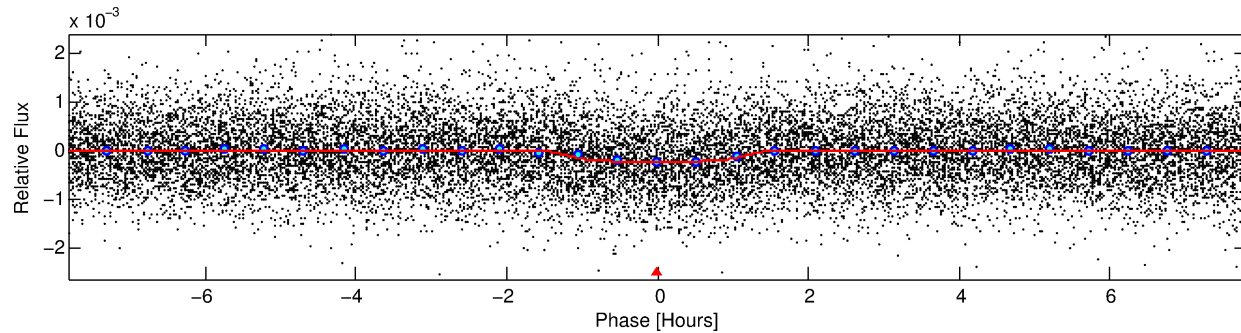
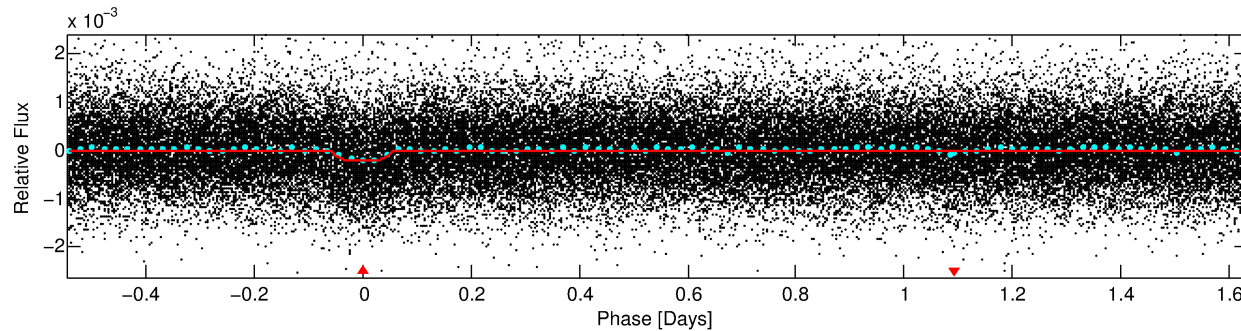
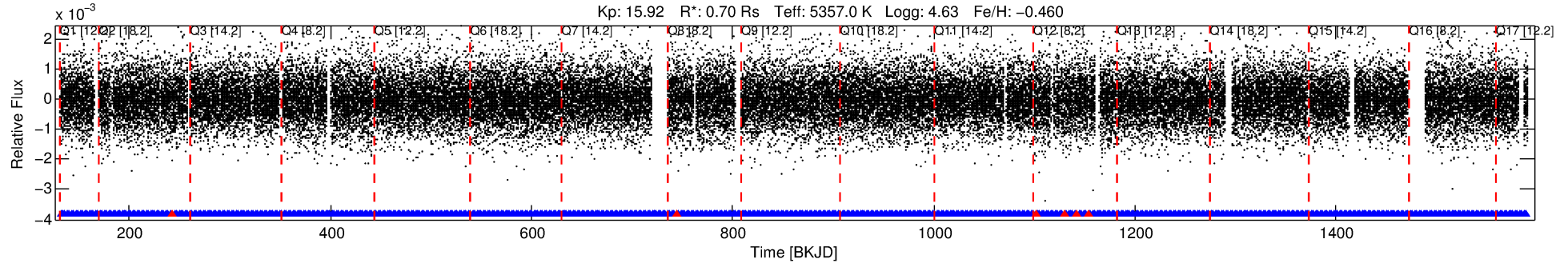
**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  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: 9640931 Candidate: 1 of 1 Period: 2.178 d

KOI: K04175.01 Corr: 0.943

Kp: 15.92 R\*: 0.70 Rs Teff: 5357.0 K Logg: 4.63 Fe/H: -0.460



## DV Fit Results:

Period = 2.17813 [0.00001] d  
Epoch = 132.0302 [0.0025] BKJD  
Rp/R\* = 0.0163 [0.0071]  
a/R\* = 3.17 [5.56]  
b = 0.90 [0.43]  
Seff = 397.99 [83.61]  
Teq = 1139 [60] K  
Rp = 1.25 [0.57] Re  
a = 0.0301 [0.0038] AU  
Ag = 16.93 [15.45] [1.03σ]  
Teffp = 3572 [807] K [3.00σ]

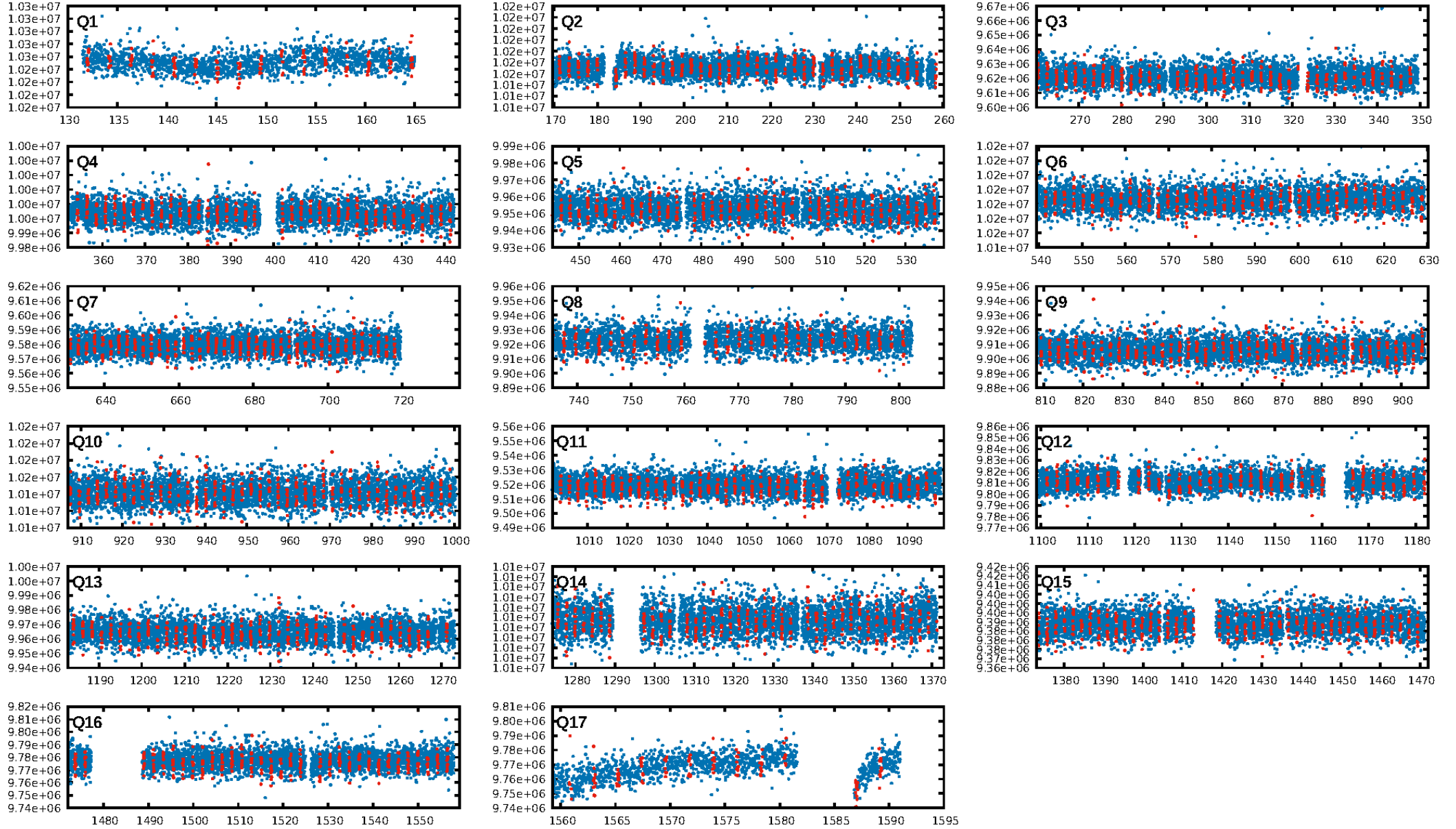
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.63e-51  
RollingBand-fgt: 0.99 [583/589]  
GhostDiagnostic-chr: -0.05296  
Centroid-sig: 0.0%  
Centroid-so: 5.736 arcsec [6.28σ]  
OotOffset-rm: 2.514 arcsec [4.01σ]  
KicOffset-rm: 2.421 arcsec [3.86σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.06 [1/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 00:47:38 Z

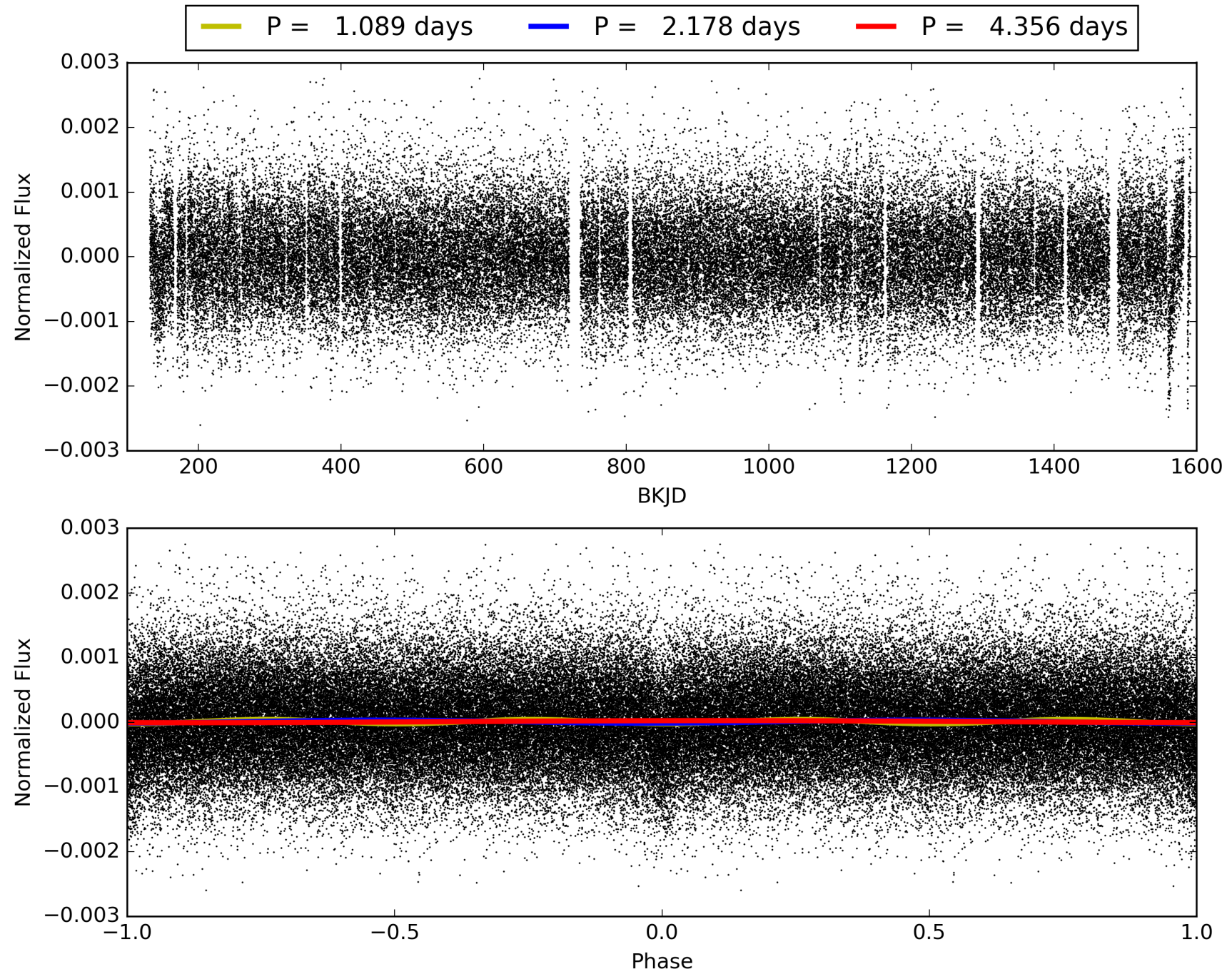
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009640931-01, PDC Light Curves



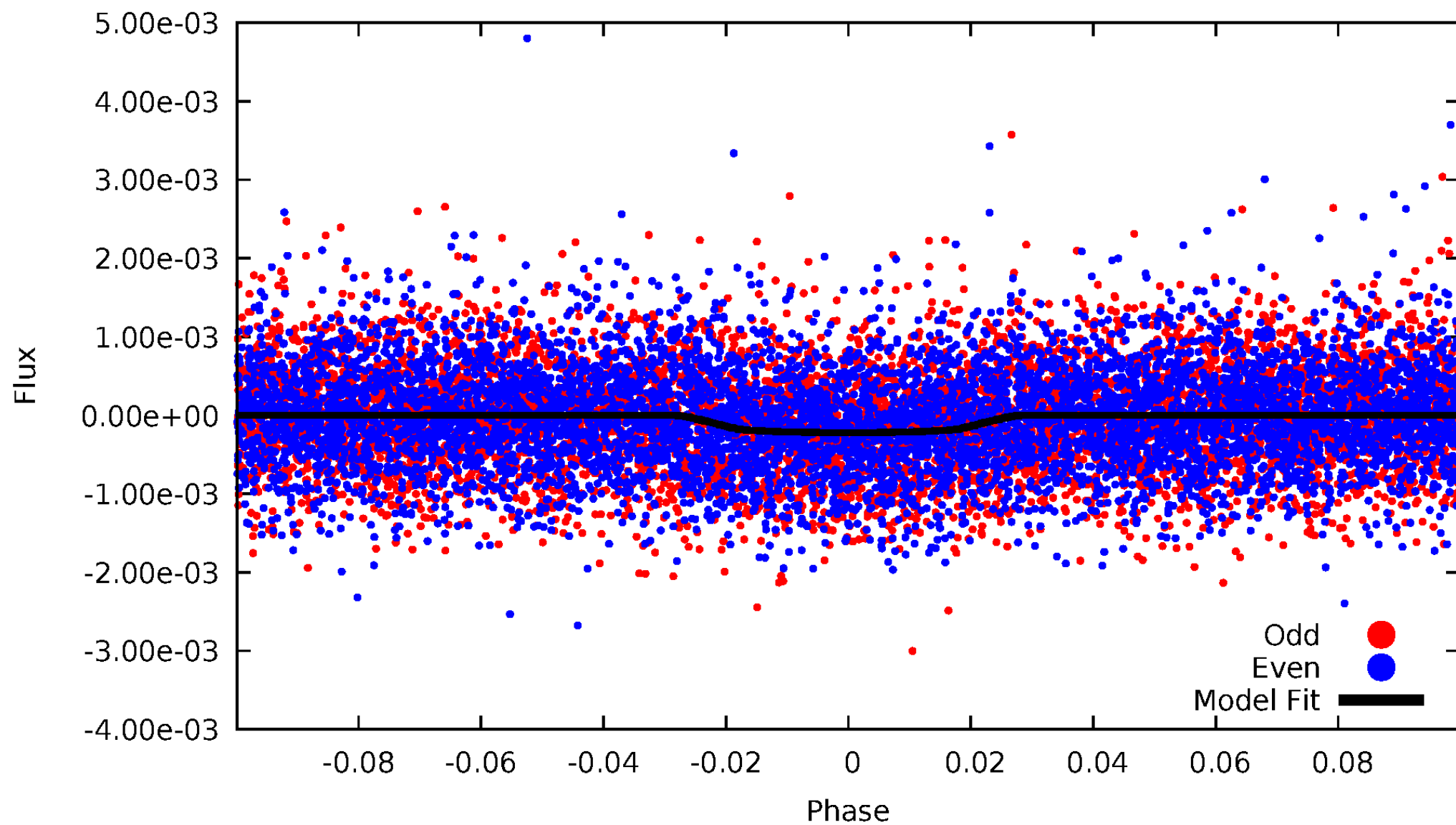


TCE 009640931-01



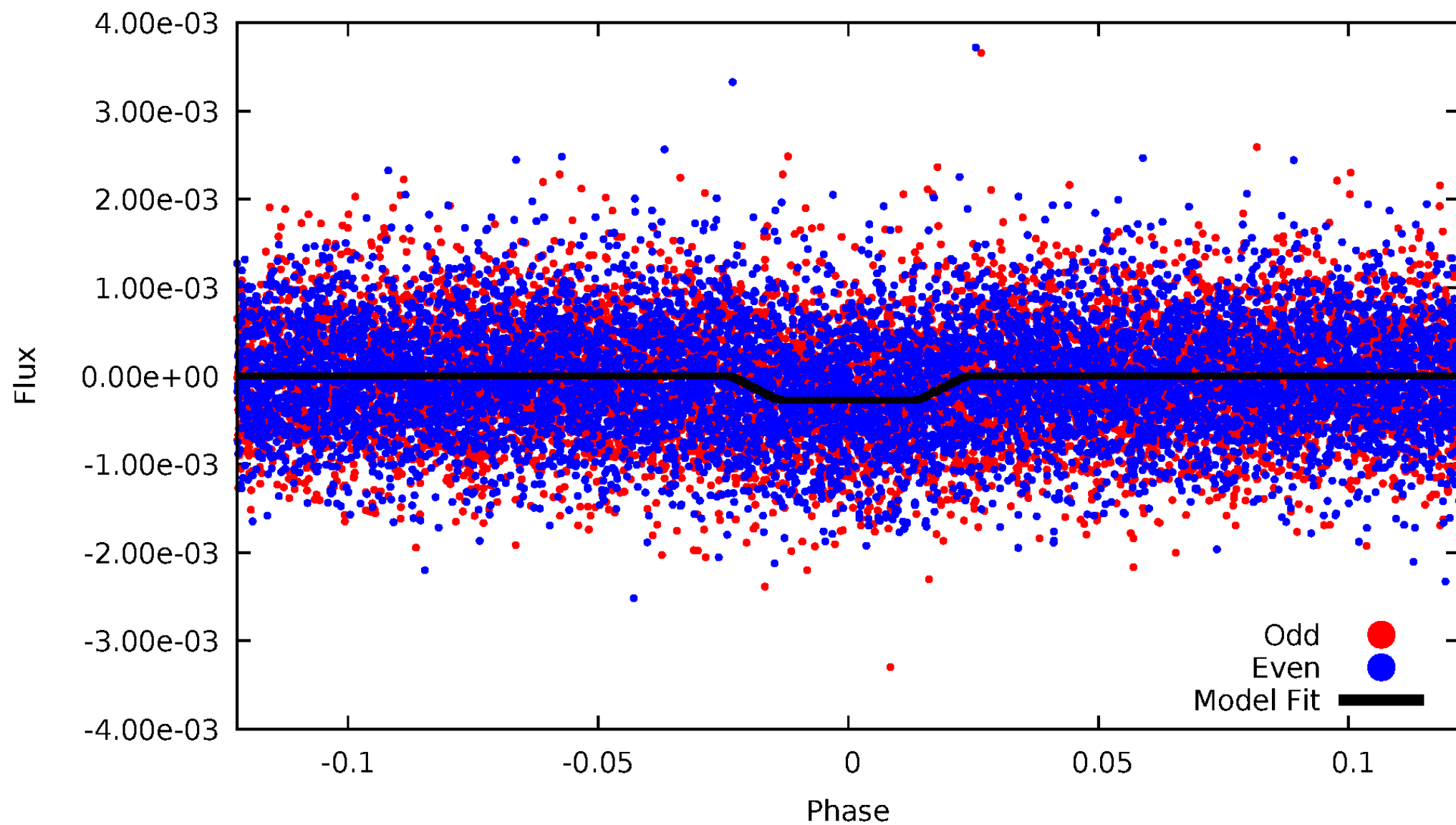
# DV Odd/Even

TCE 009640931-01

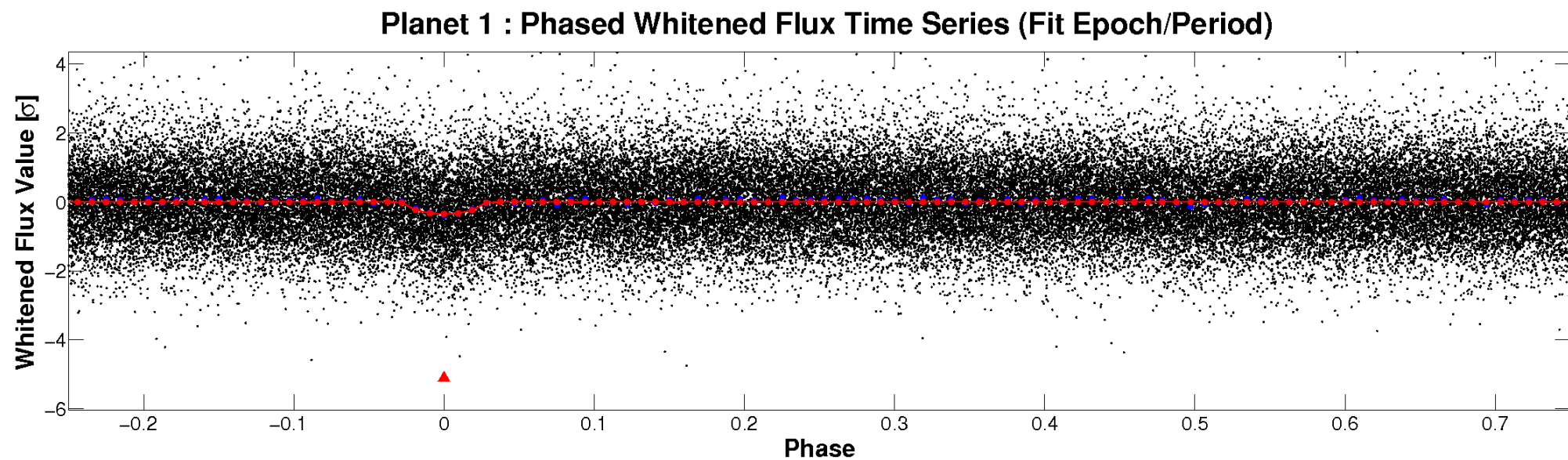
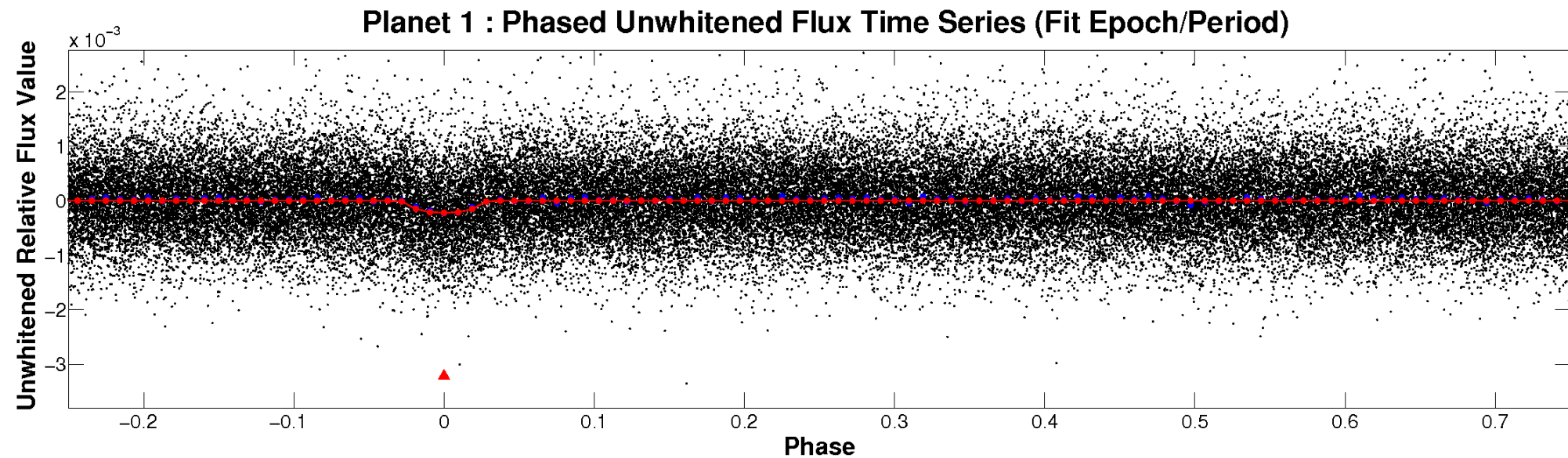


# ALT Odd/Even

TCE 009640931-01



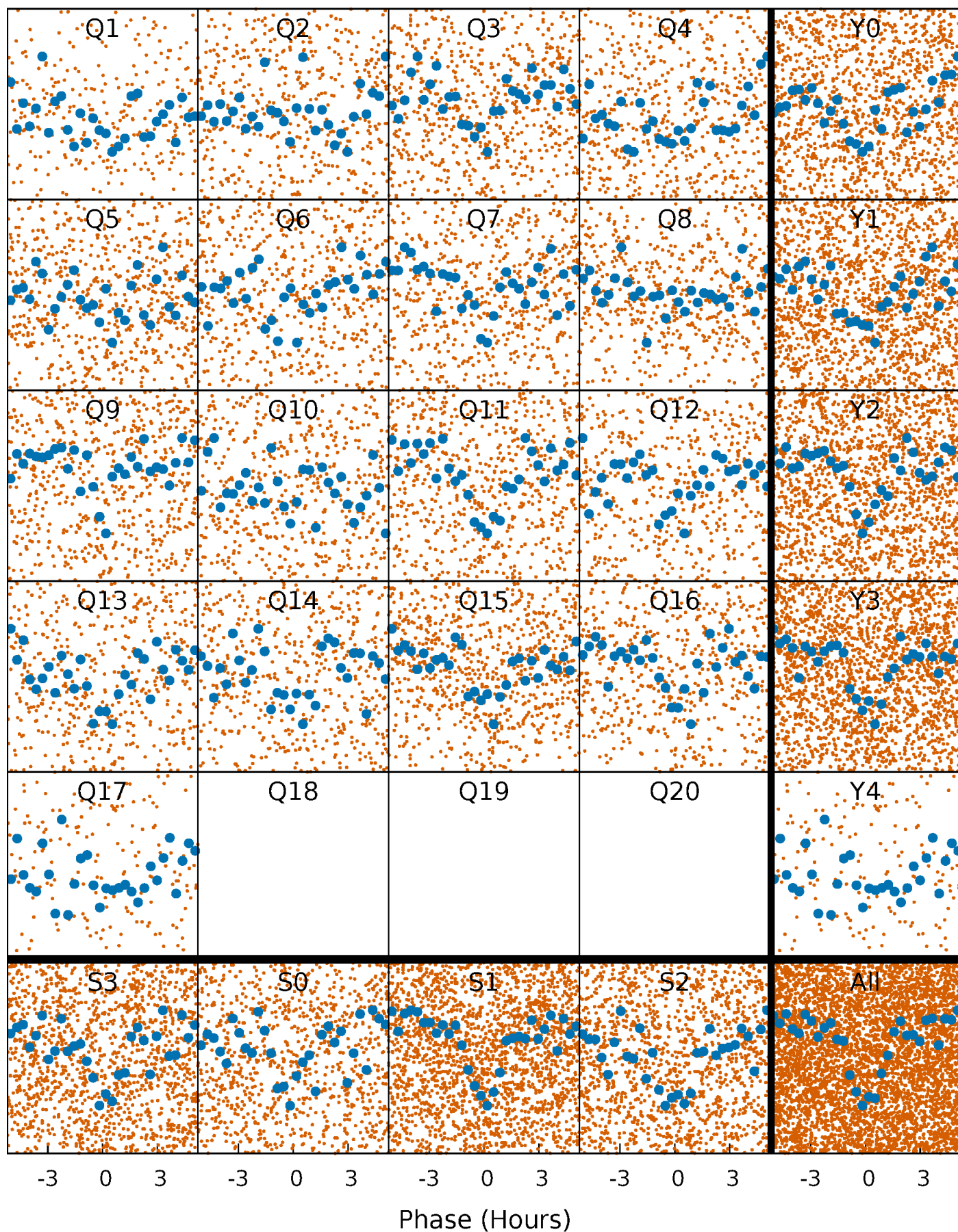
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

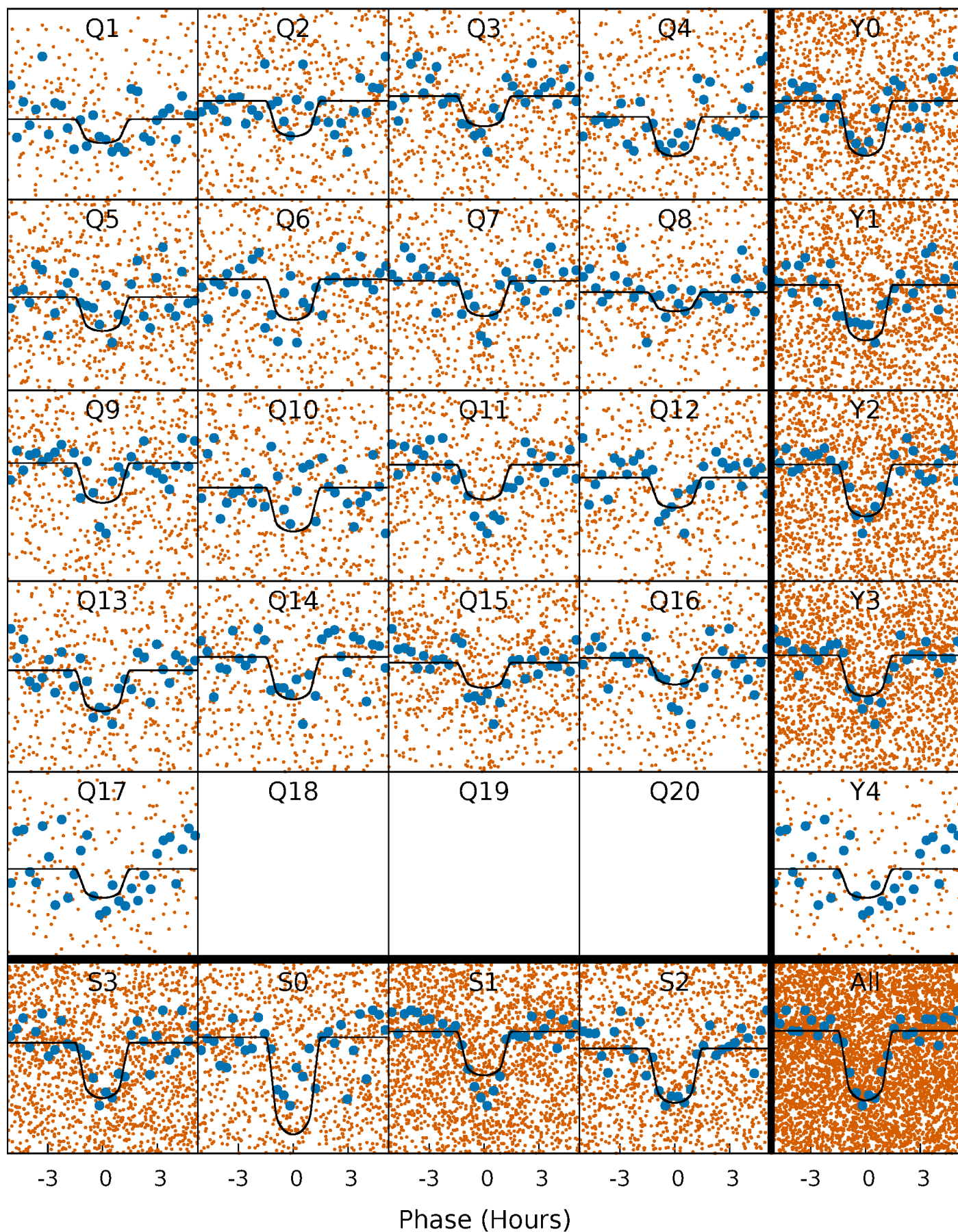
TCE 009640931-01 P= 2.178127 Days  $T_0=132.030176$  (BKJD)





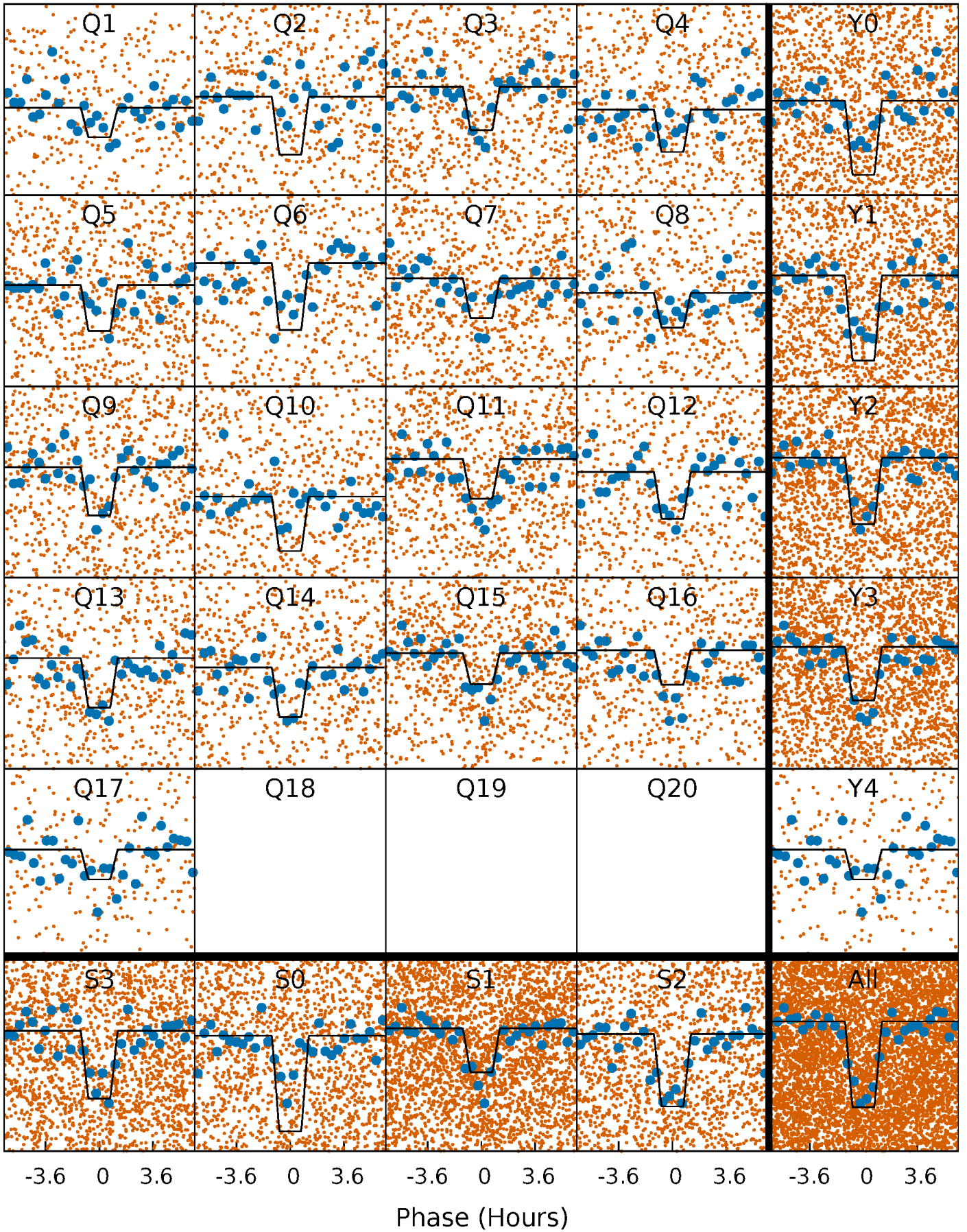
# DV Quarter-Phased Transit Curves

TCE 009640931-01 P= 2.178127 Days  $T_0=132.030176$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

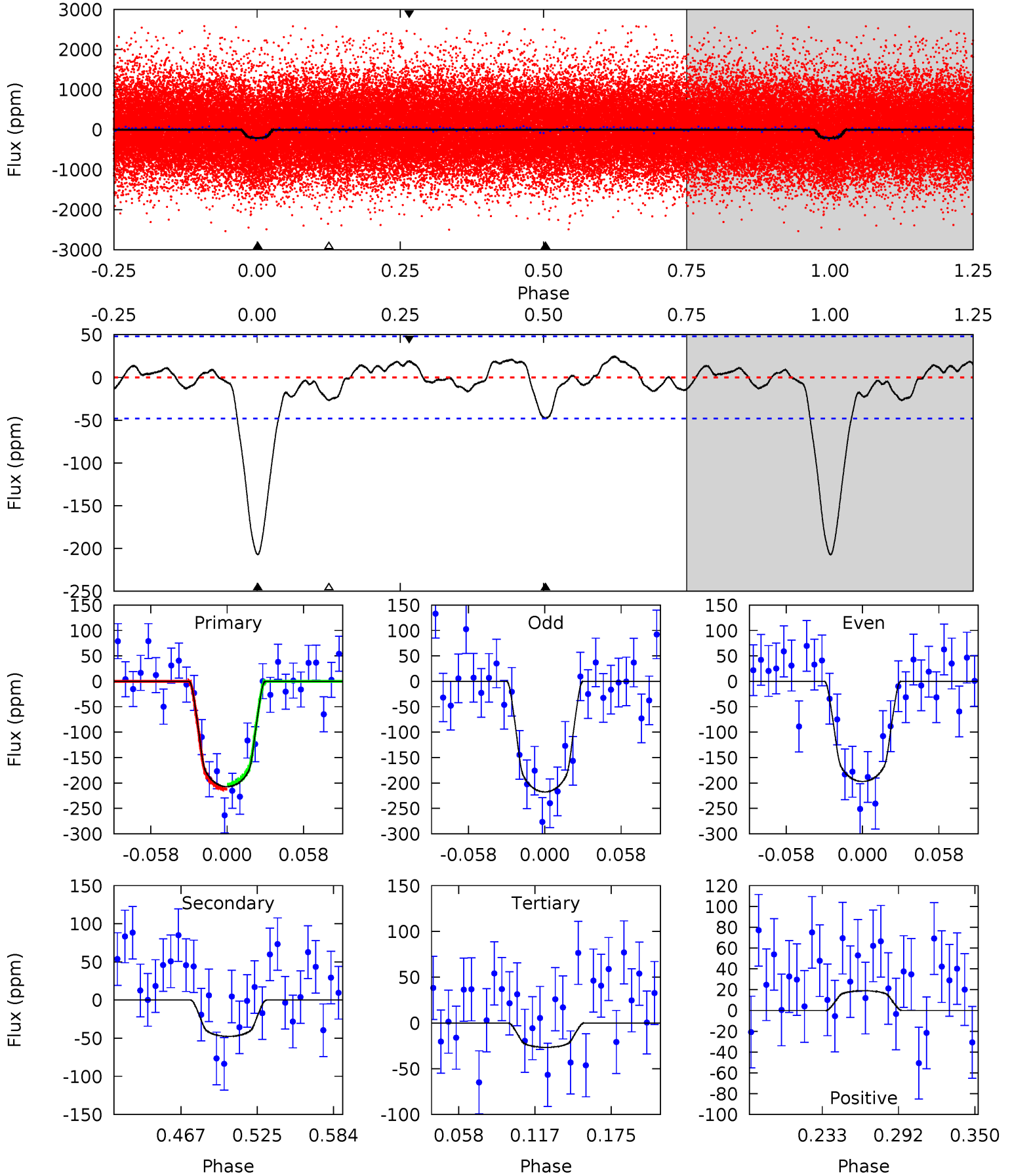
TCE 009640931-01 P= 2.178154 Days  $T_0=132.021698$  (BKJD)



# DV Model-Shift Uniqueness Test

009640931-01, P = 2.178127 Days, E = 129.852049 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
20.2	4.64	2.60	1.85	4.68	1.89	1.16	17.6	18.3	2.04	2.79	1.00	0.94	0.11	0.46

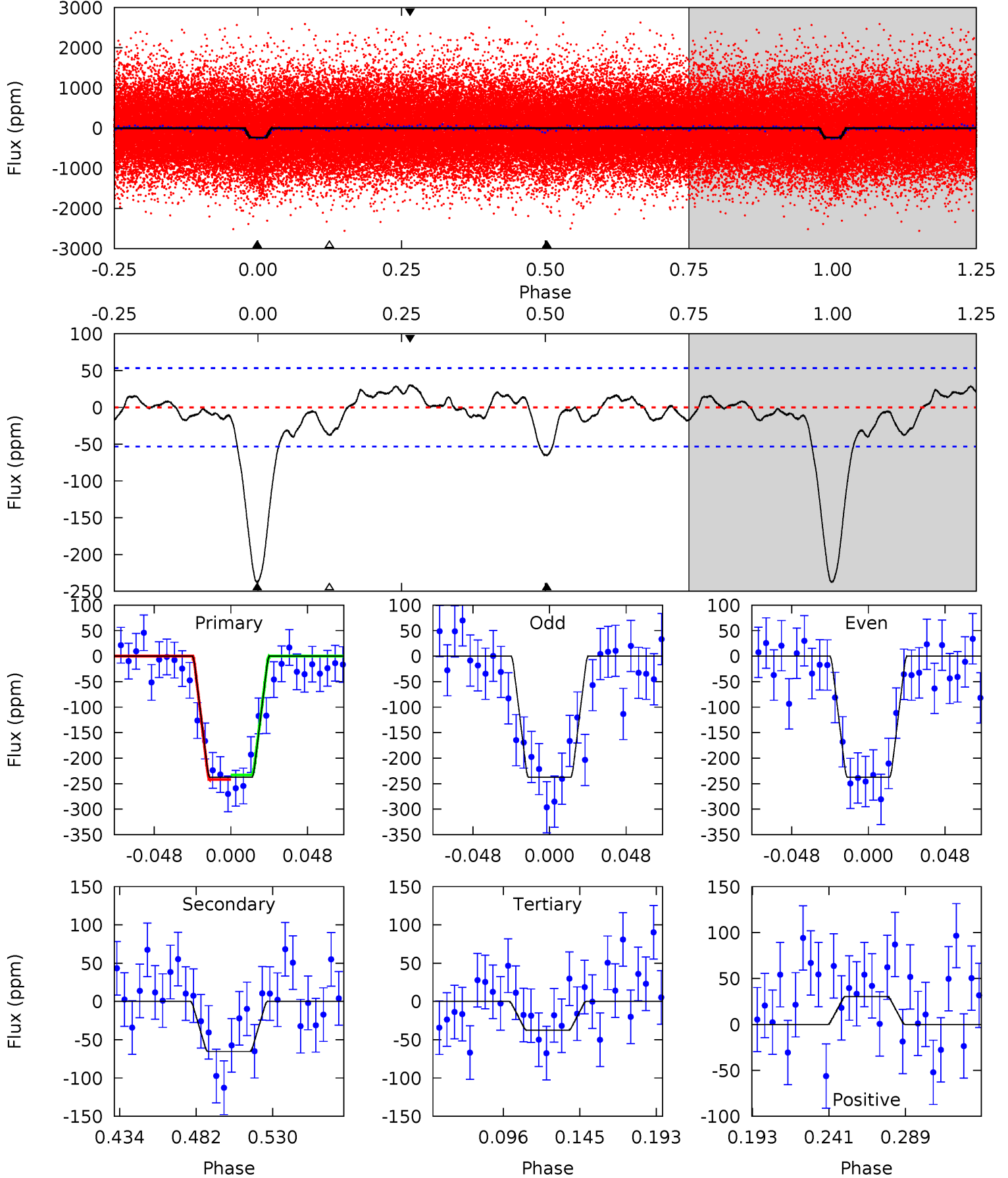




# Alt Model-Shift Uniqueness Test

009640931-01, P = 2.178154 Days, E = 129.843544 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
21.0	5.78	3.31	2.68	4.72	1.98	1.35	17.7	18.3	2.47	3.10	0.01	0.92	0.11	0.40





### Stellar Parameters For KIC 009640931

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5357^{+160}_{-160}$	$4.634^{+0.036}_{-0.090}$	$-0.460^{+0.300}_{-0.300}$	$0.700^{+0.109}_{-0.051}$	$0.775^{+0.076}_{-0.076}$	$3.187^{+0.520}_{-0.945}$
	+3%/-3%	+1%/-2%	+65%/-65%	+16%/-7%	+10%/-10%	+16%/-30%
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 009640931-01 / KOI 4175.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-48 \pm 10$	$1.26^{+0.58}_{-0.54}$	$1606^{+68}_{-58}$	$3803^{+911}_{-427}$	$15^{+29}_{-7}$
Alt.	$-65 \pm 11$	$1.25^{+0.55}_{-0.52}$	$1605^{+68}_{-60}$	$4027^{+915}_{-471}$	$20^{+38}_{-11}$

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

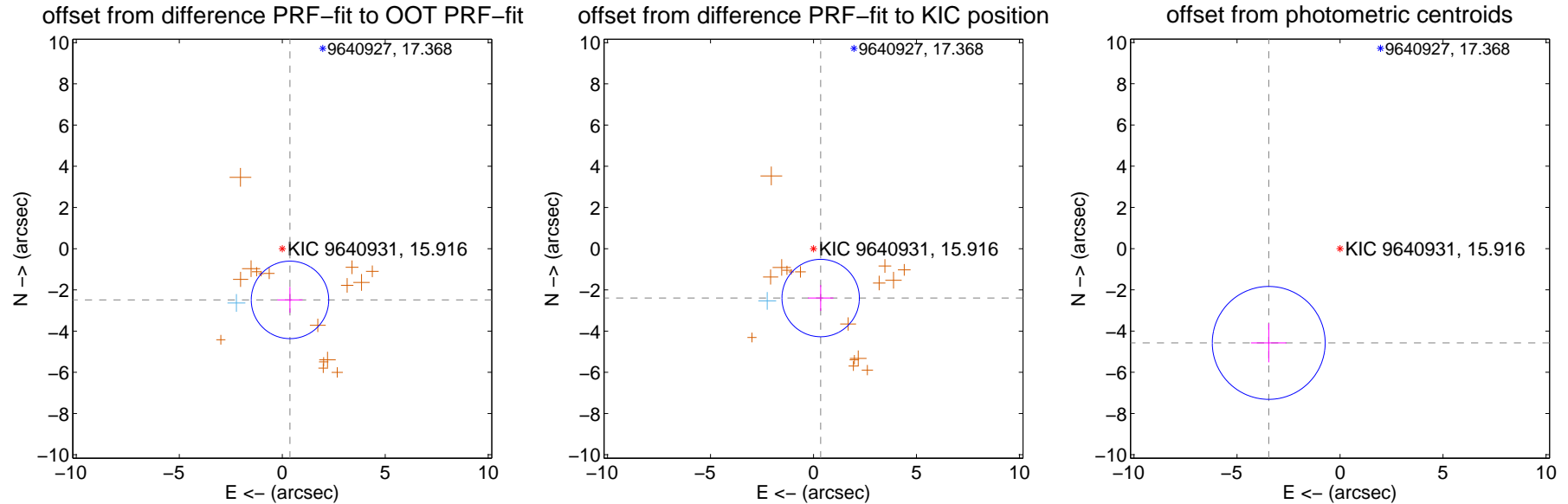
## DV Centroid Data

Supplemental centroid analysis for 009640931-01. Kepler magnitude: 15.92. Transit SNR 16.01

There are 1 quarters with good PRF difference image offsets

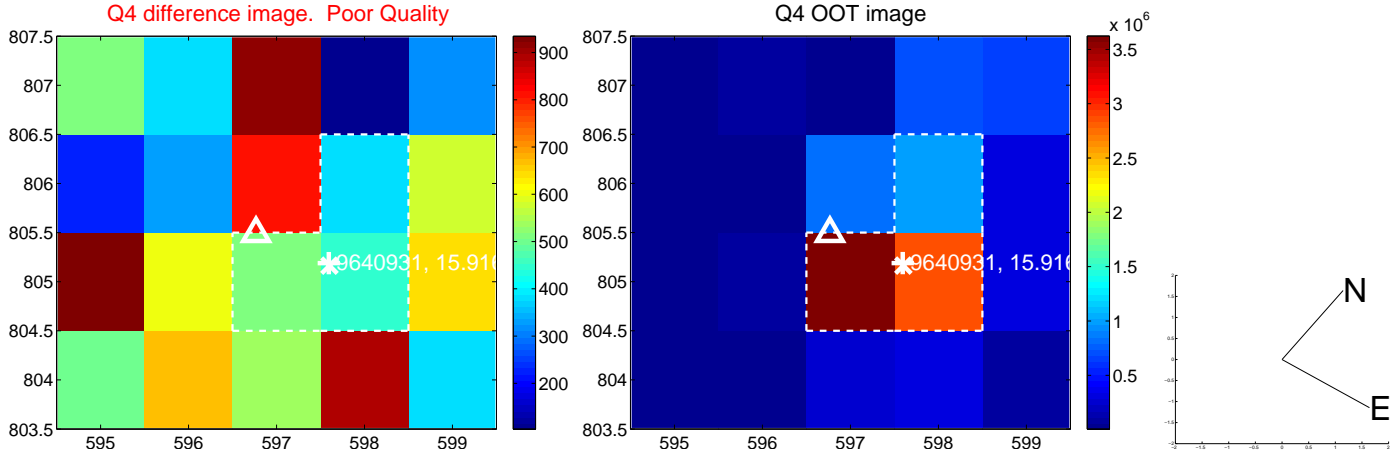
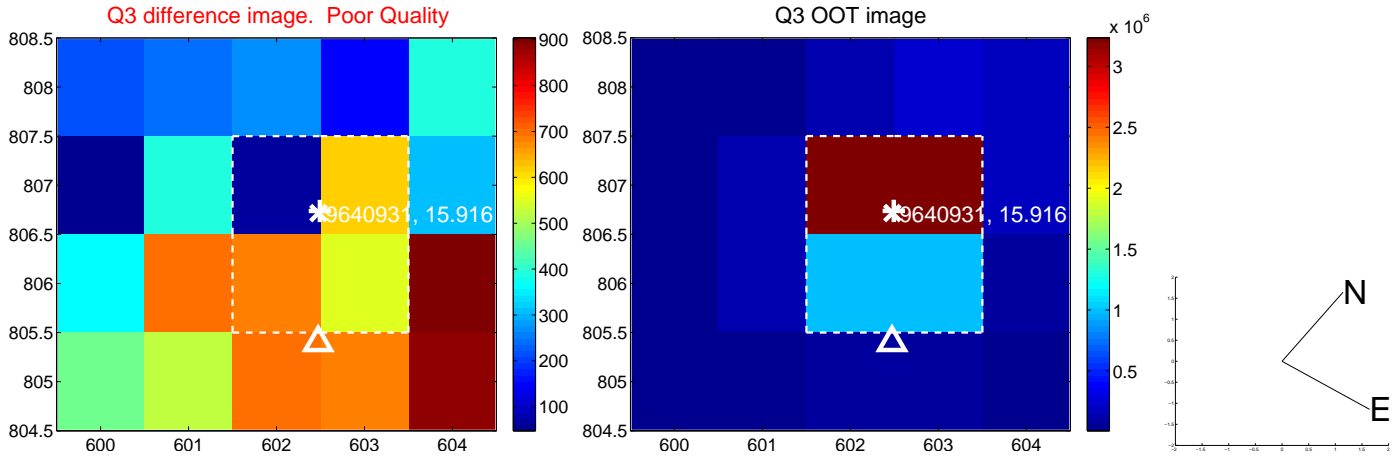
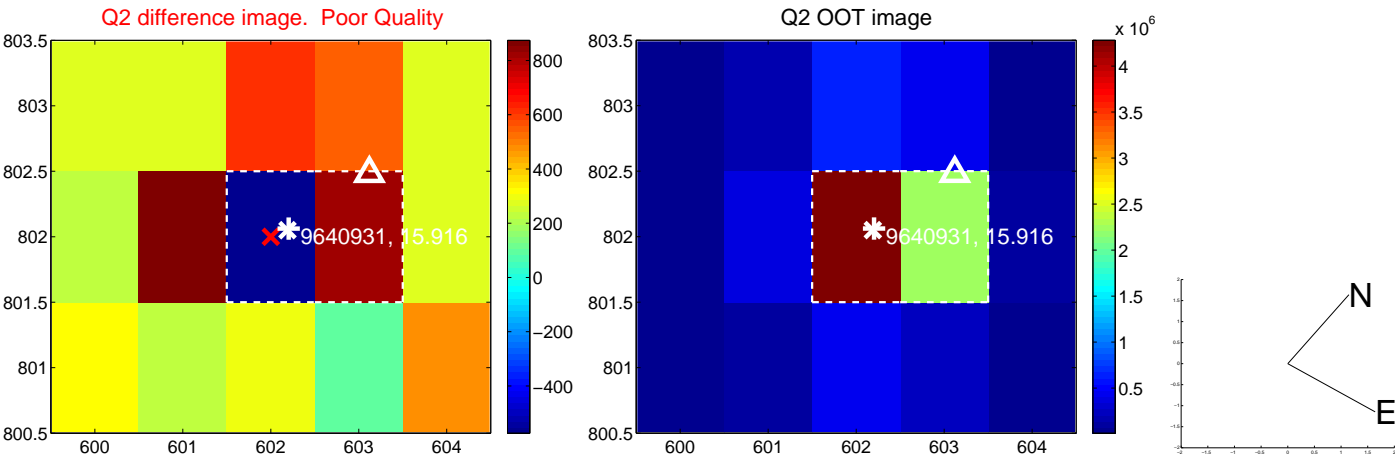
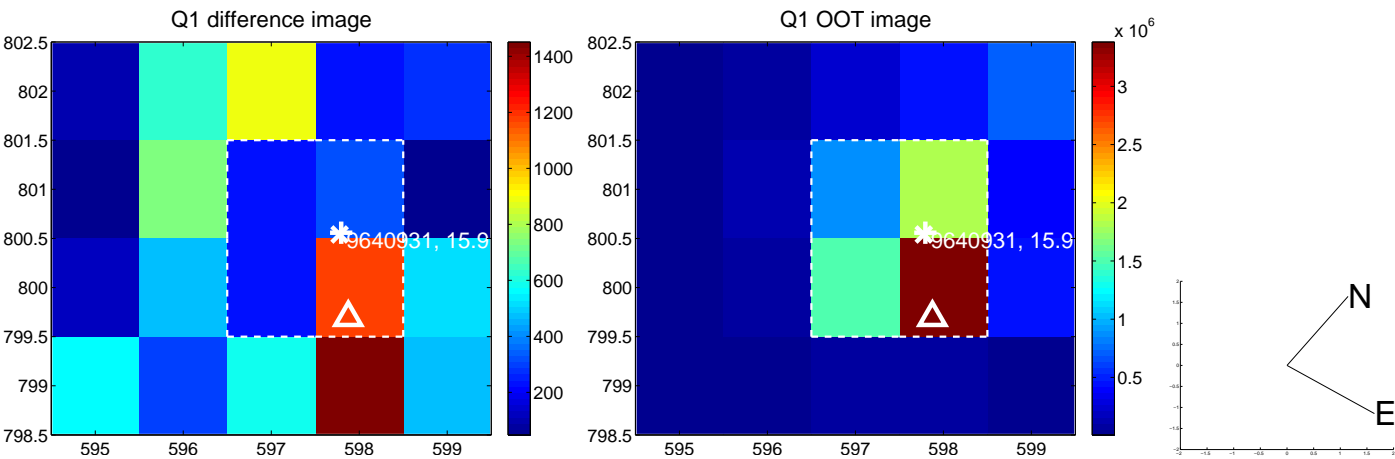
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.514 \pm 0.627$	4.01	$-0.375 \pm 0.611$	$-2.485 \pm 0.627$
PRF-fit source offset from KIC position	$2.421 \pm 0.626$	3.86	$-0.349 \pm 0.615$	$-2.395 \pm 0.627$
photometric centroid source offset	$5.74 \pm 0.91$	6.28	$3.46 \pm 0.86$	$-4.58 \pm 0.94$

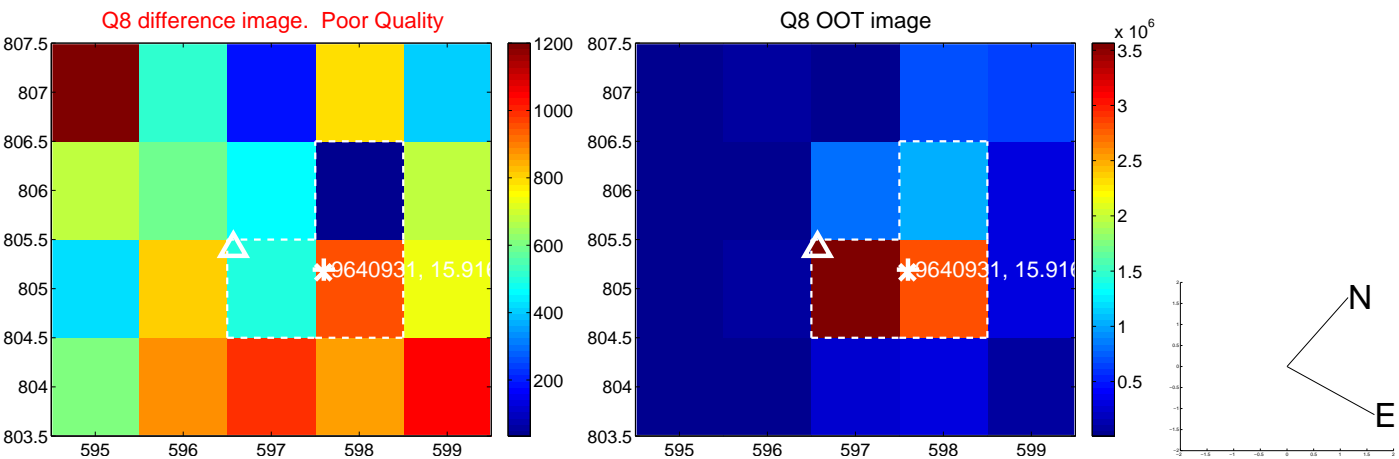
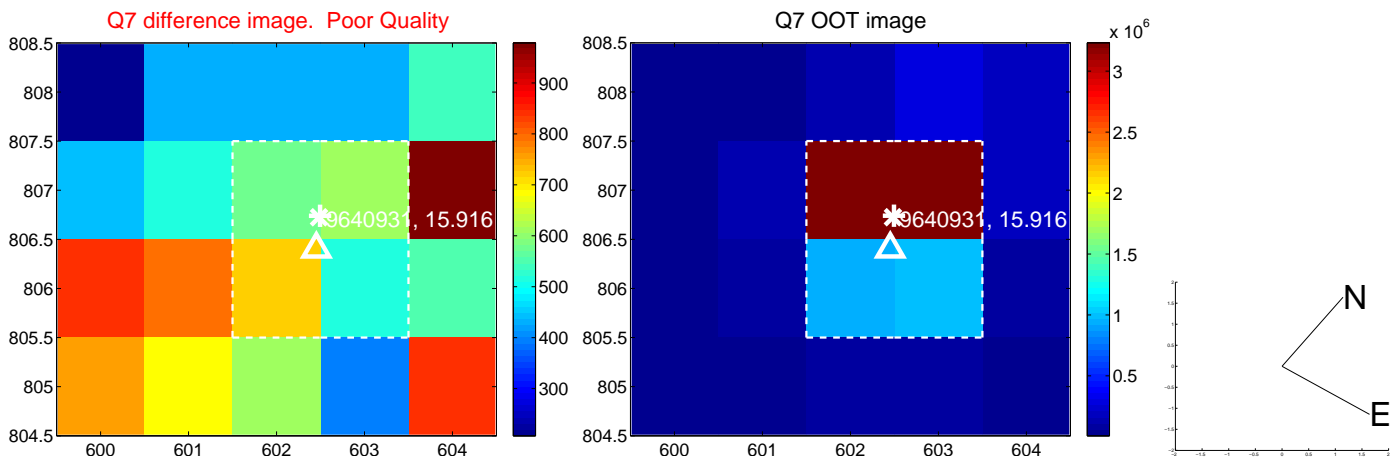
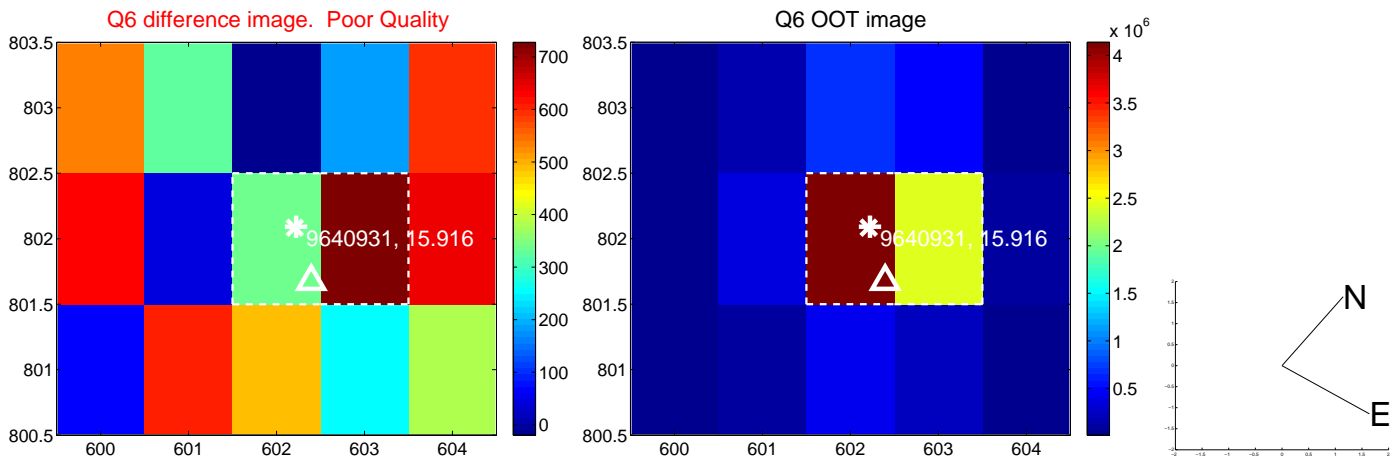
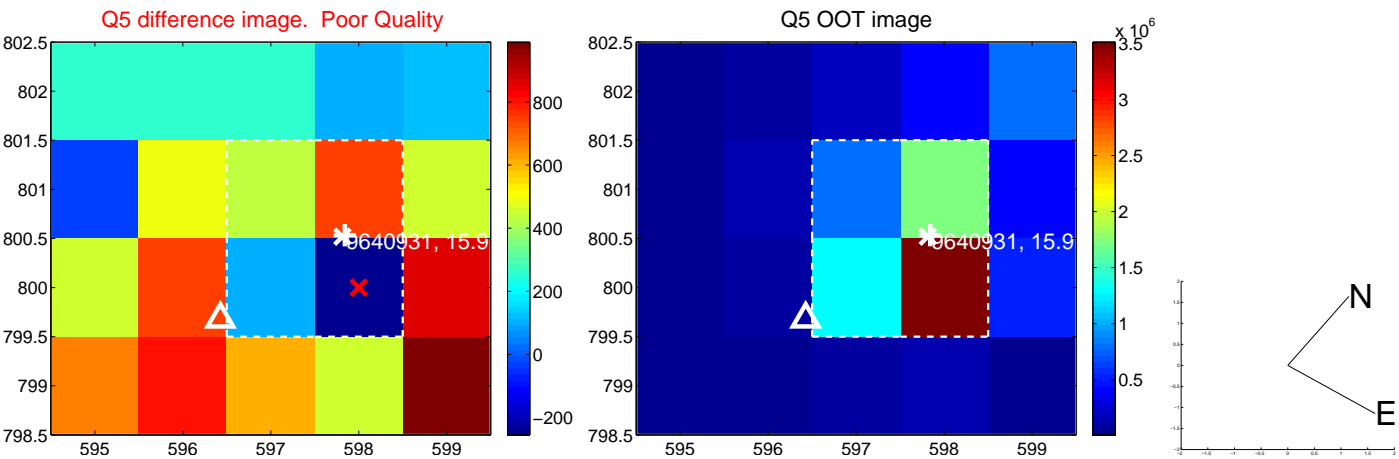


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

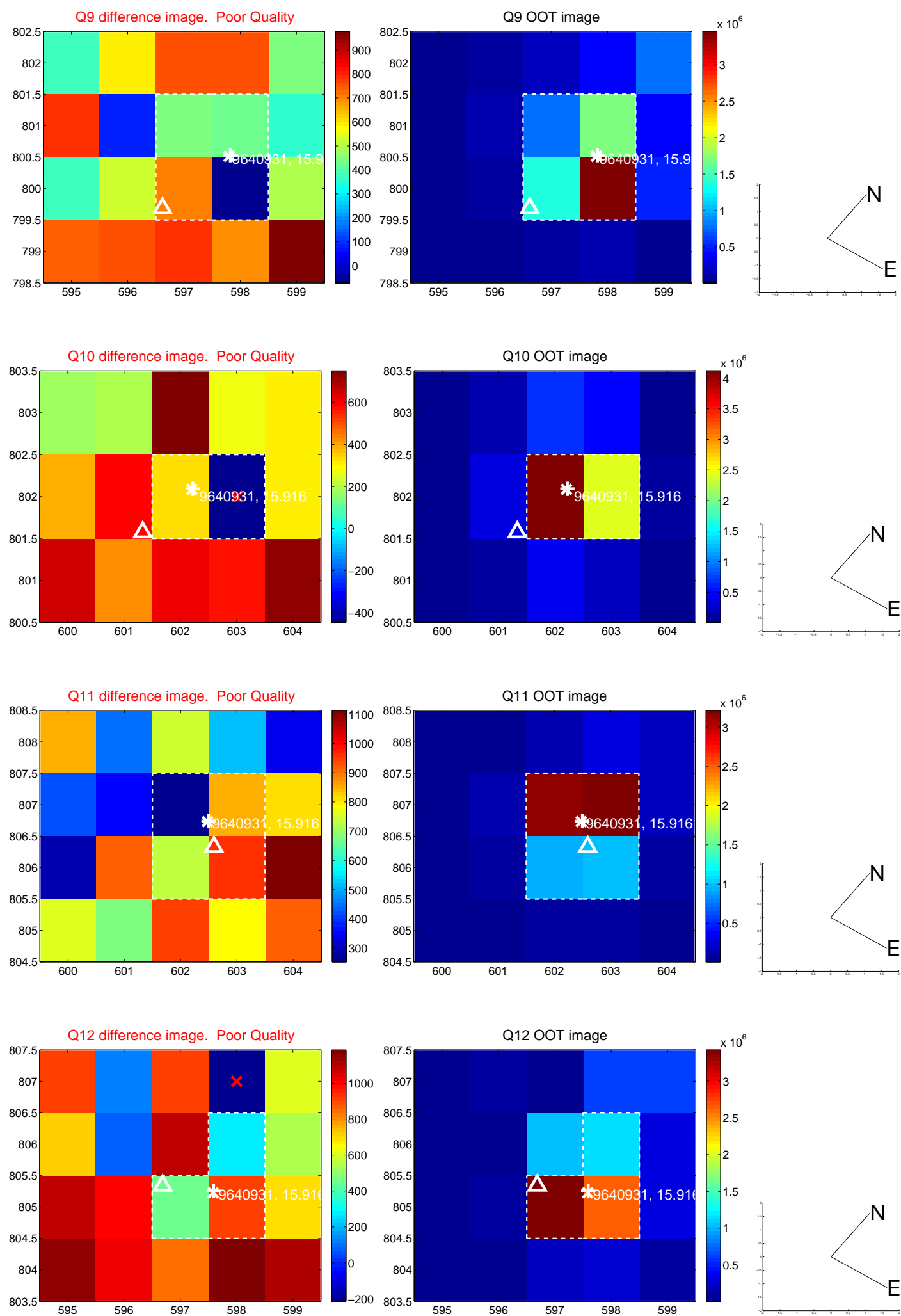


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

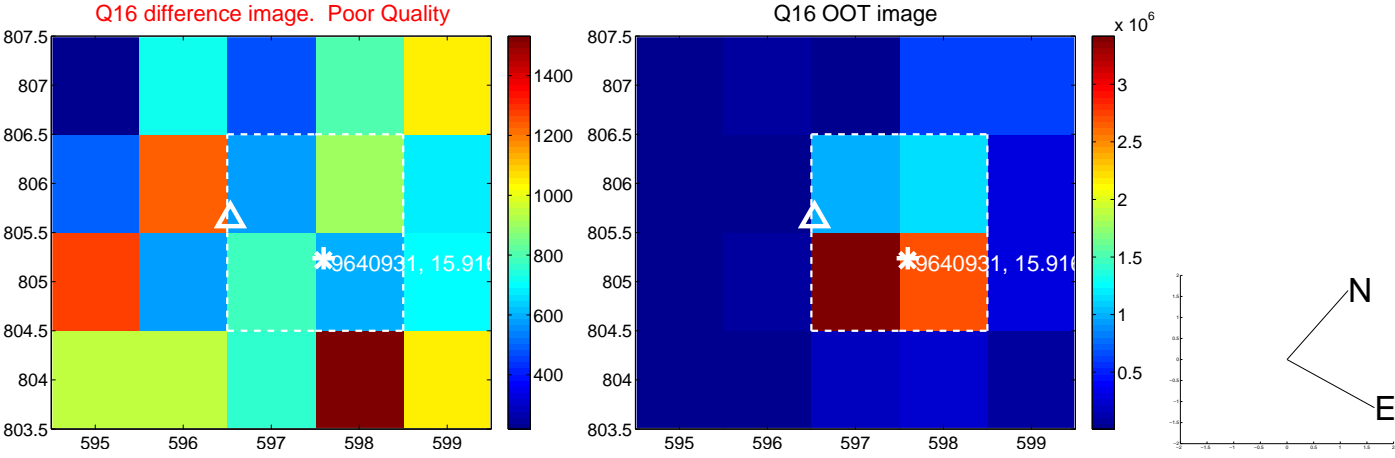
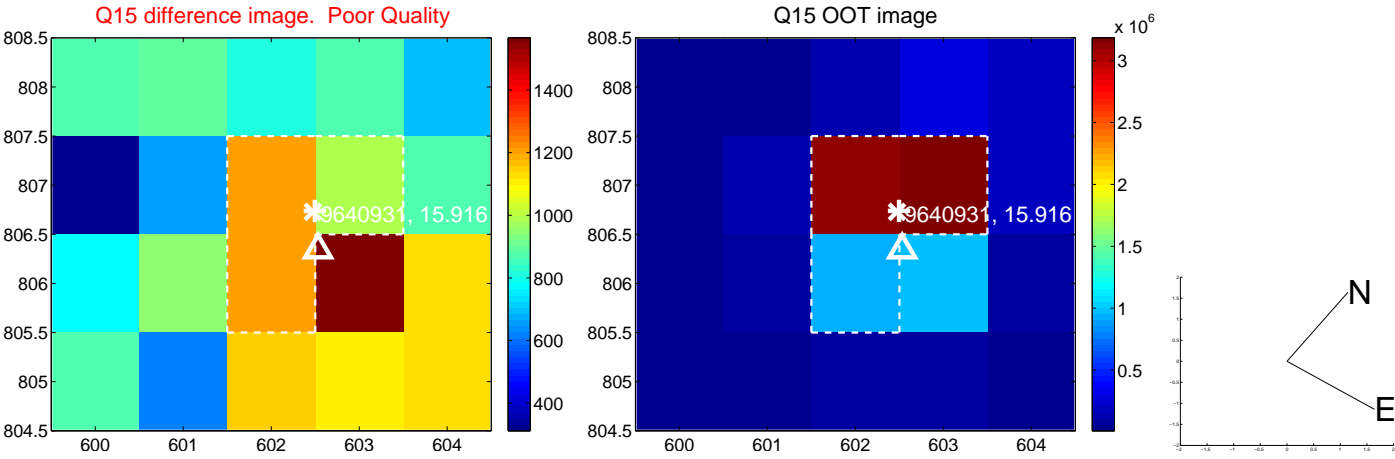
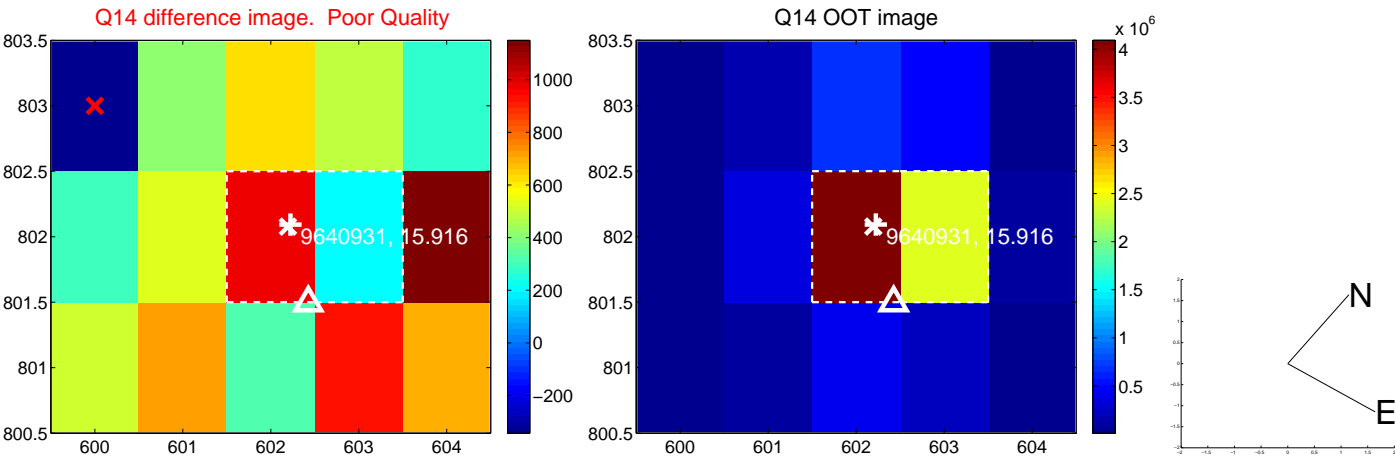
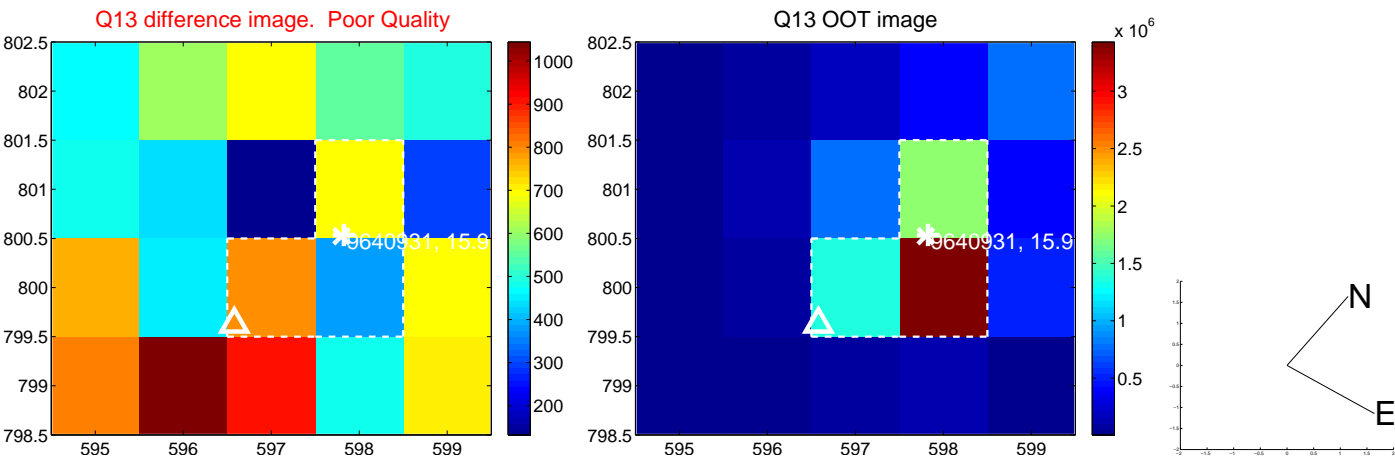




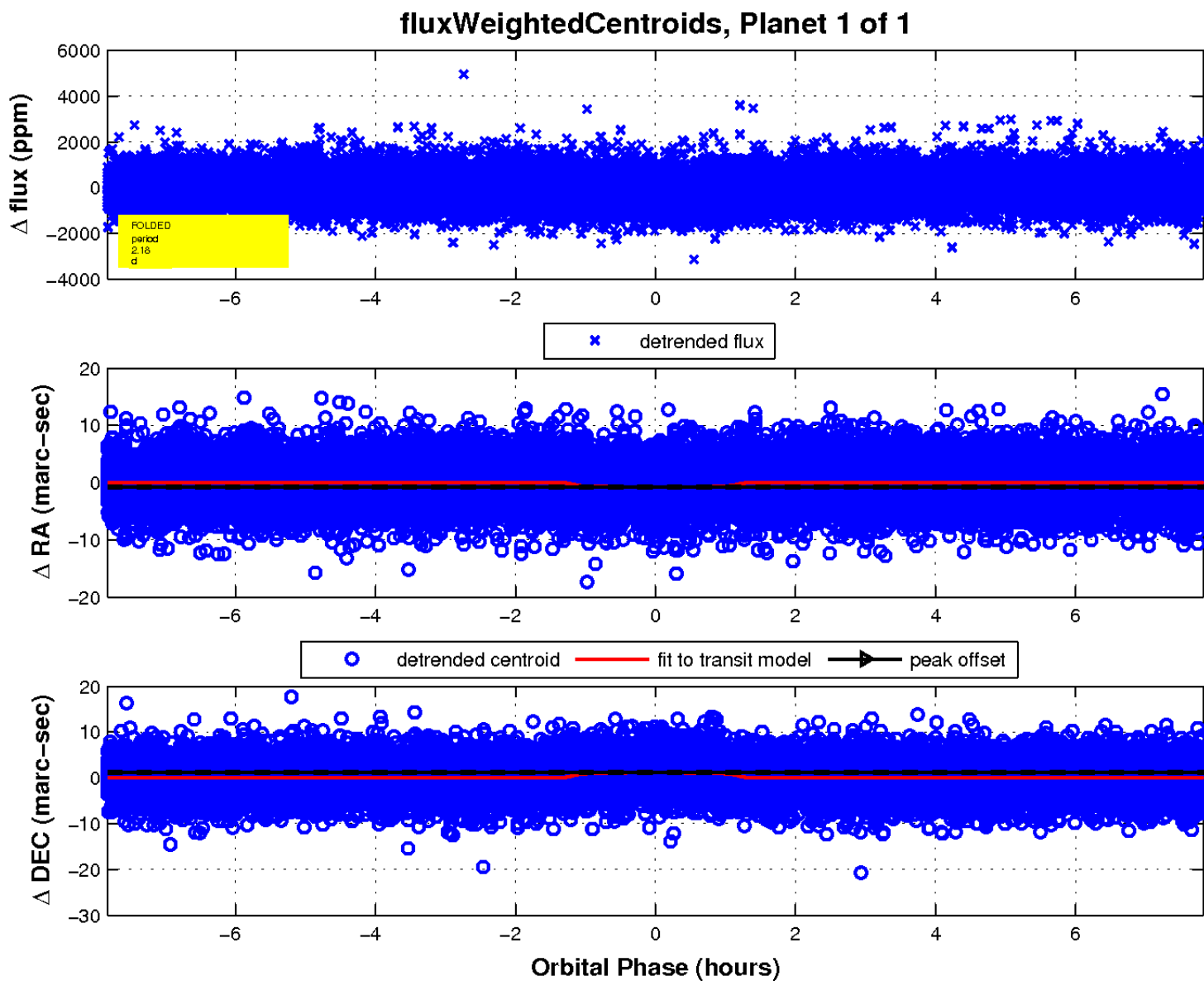
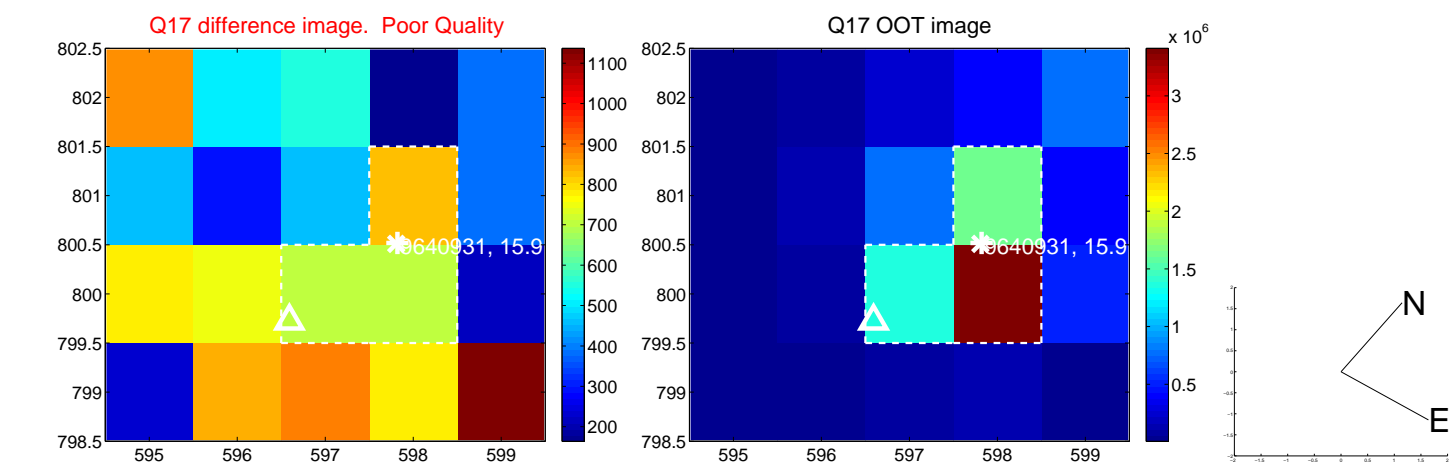
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



UKIRT Image

Declination

