

# KIC 009851360

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009851360-01	OBS	4381.01	8.480830	135.800423	166.9	7.427	11.1	11.1	0.74	5555	1.12	87.91

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009851360-01	OBS	FP	0.00	0	0	1	1	CENT_RESOLVED_OFFSET—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.

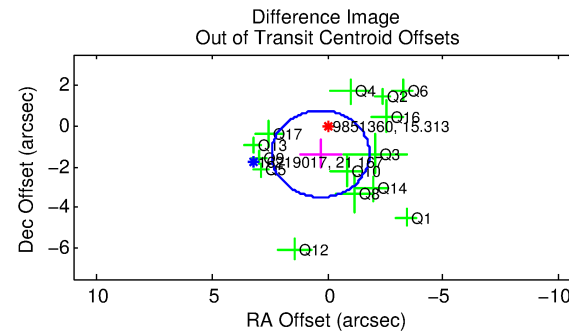
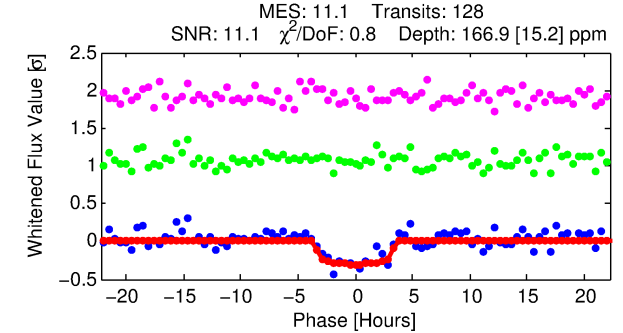
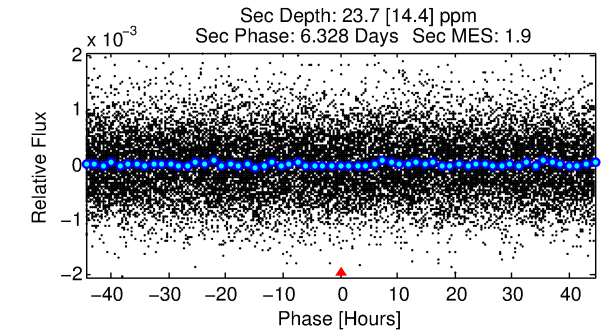
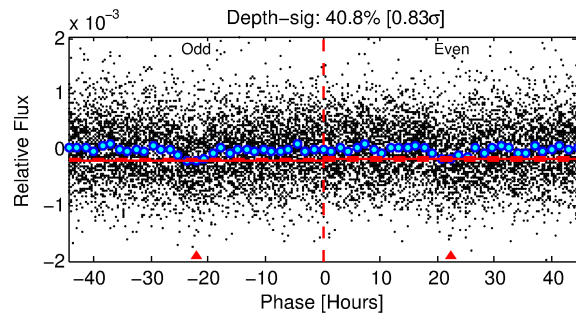
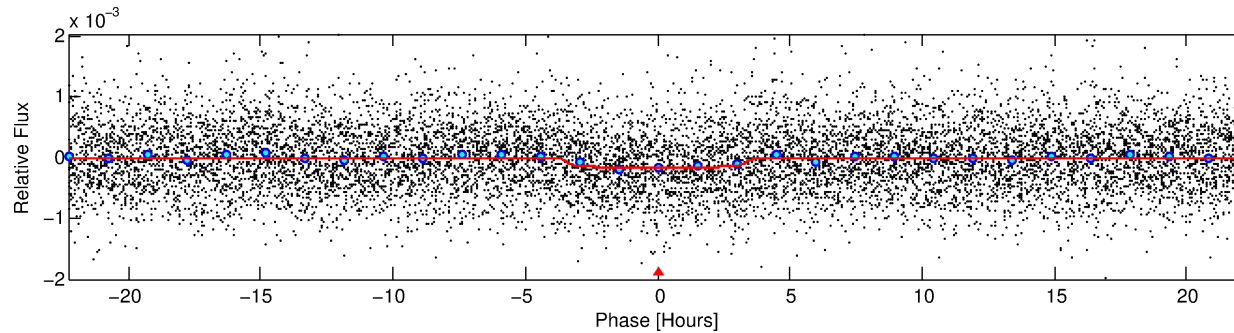
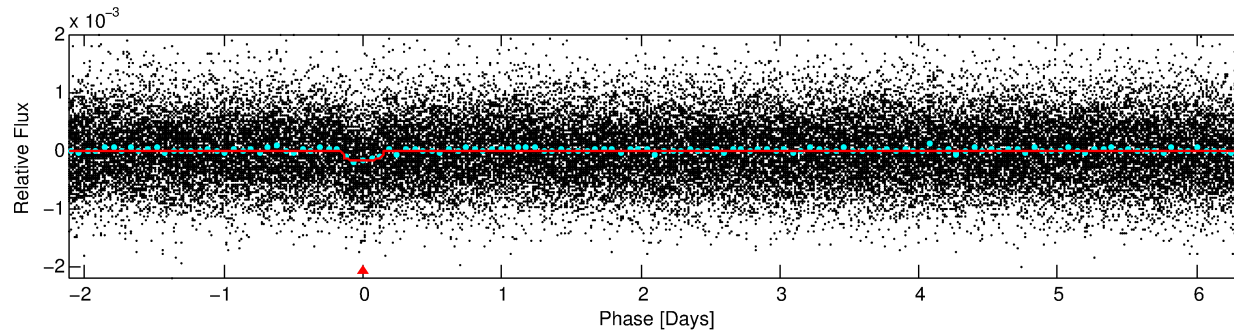
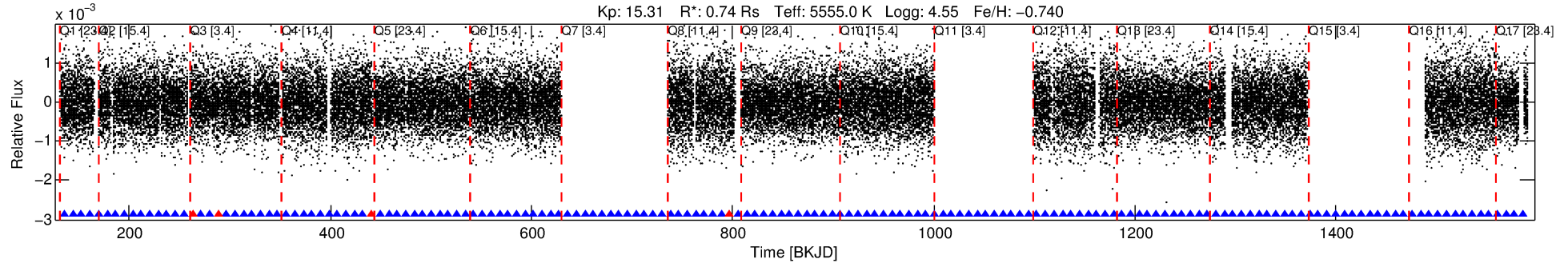
## Ephemeris Match Information For 009851360-01

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	$\sigma_P$	$\sigma_T$
009851360-01	9851360	009851142-pri	9851142	1:1	184.5	-45	9	7.63	15.31	545.51	Direct-PRF	0	2.57	1.84

**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: 9851360 Candidate: 1 of 1 Period: 8.481 d  
KOI: K04381.01 Corr: 0.914



## DV Fit Results:

Period = 8.48083 [0.00012] d  
Epoch = 135.8004 [0.0106] BKJD  
Rp/R\* = 0.0140 [0.0034]  
a/R\* = 4.23 [4.73]  
b = 0.90 [0.26]  
Seff = 87.91 [18.27]  
Teff = 781 [41] K  
Rp = 1.12 [0.32] Re  
a = 0.0726 [0.0084] AU  
Ag = 54.45 [43.26] [1.24 $\sigma$ ]  
Teffp = 3279 [646] K [3.86 $\sigma$ ]

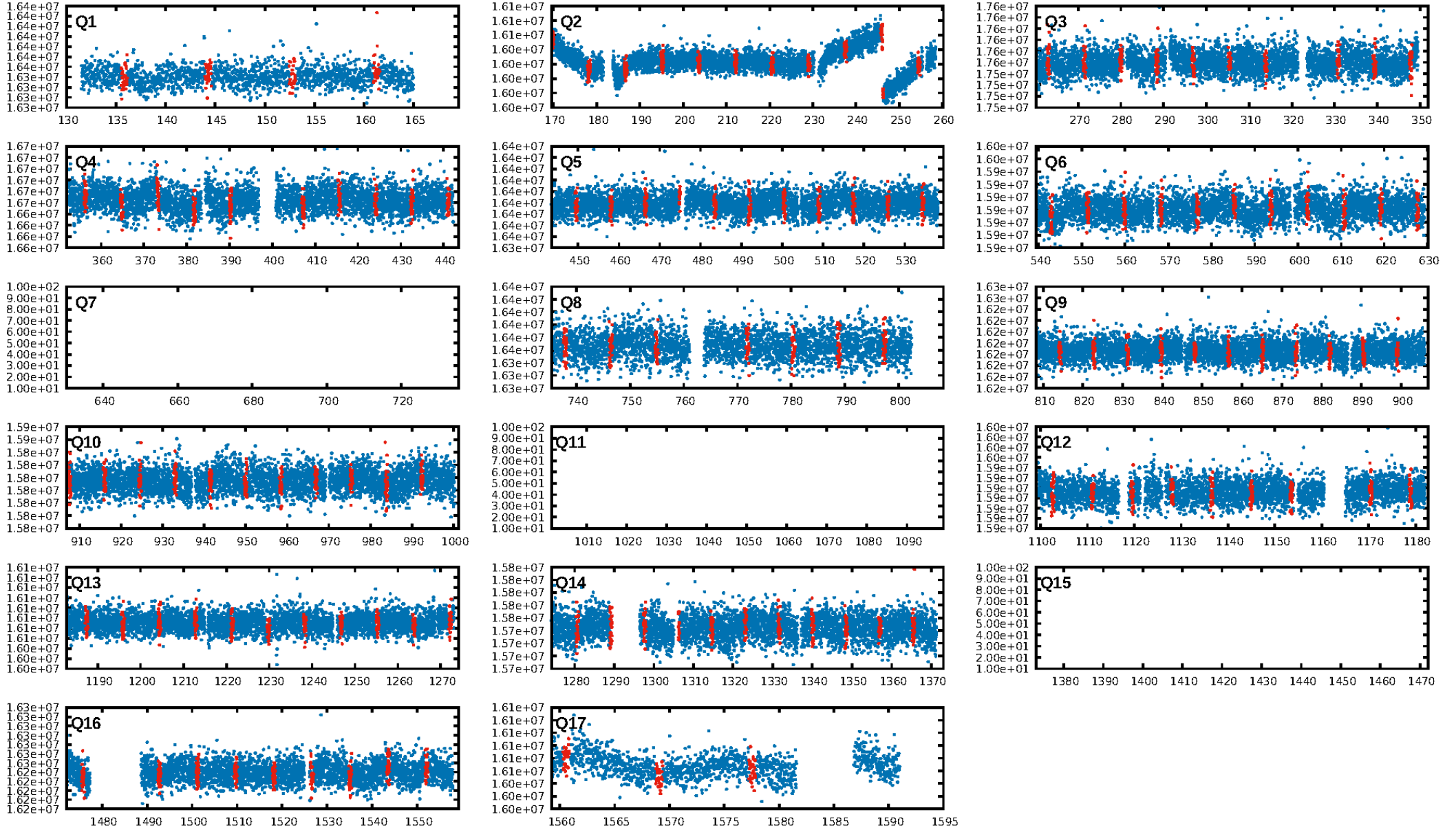
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 91.1%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.50e-29  
RollingBand-fgt: 0.97 [117/121]  
**GhostDiagnostic-chr: -0.2613**  
Centroid-sig: 3.3%  
Centroid-so: 2.193 arcsec [1.66 $\sigma$ ]  
OotOffset-rm: 1.411 arcsec [2.00 $\sigma$ ]  
KicOffset-rm: 1.450 arcsec [2.04 $\sigma$ ]  
OotOffset-st: 4/1/4/5 [14]  
KicOffset-st: 4/1/4/5 [14]  
DiffImageQuality-fgm: 0.07 [1/14]  
DiffImageOverlap-fno: 1.00 [14/14]

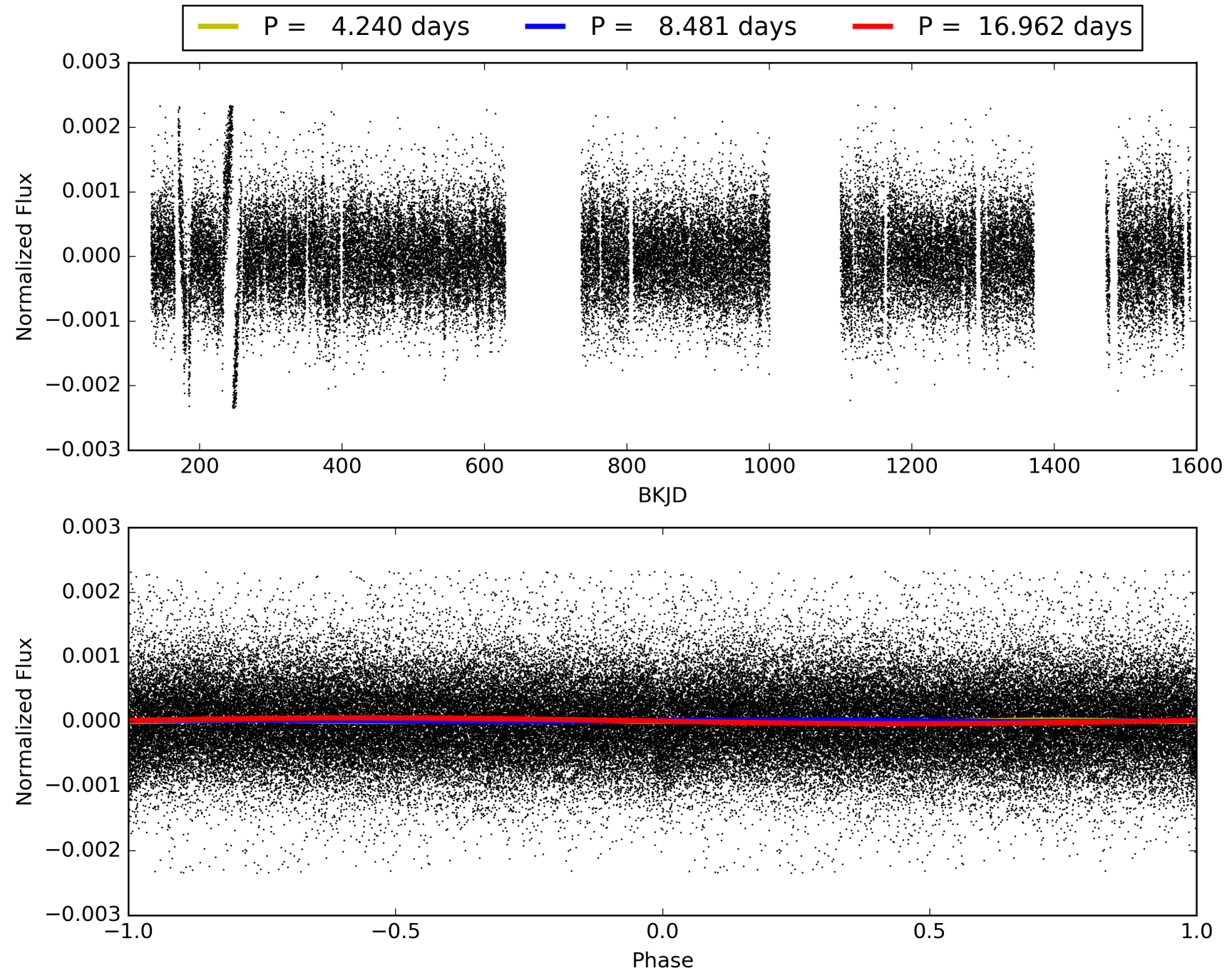
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 08:34:45 Z

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

# TCE 009851360-01, PDC Light Curves



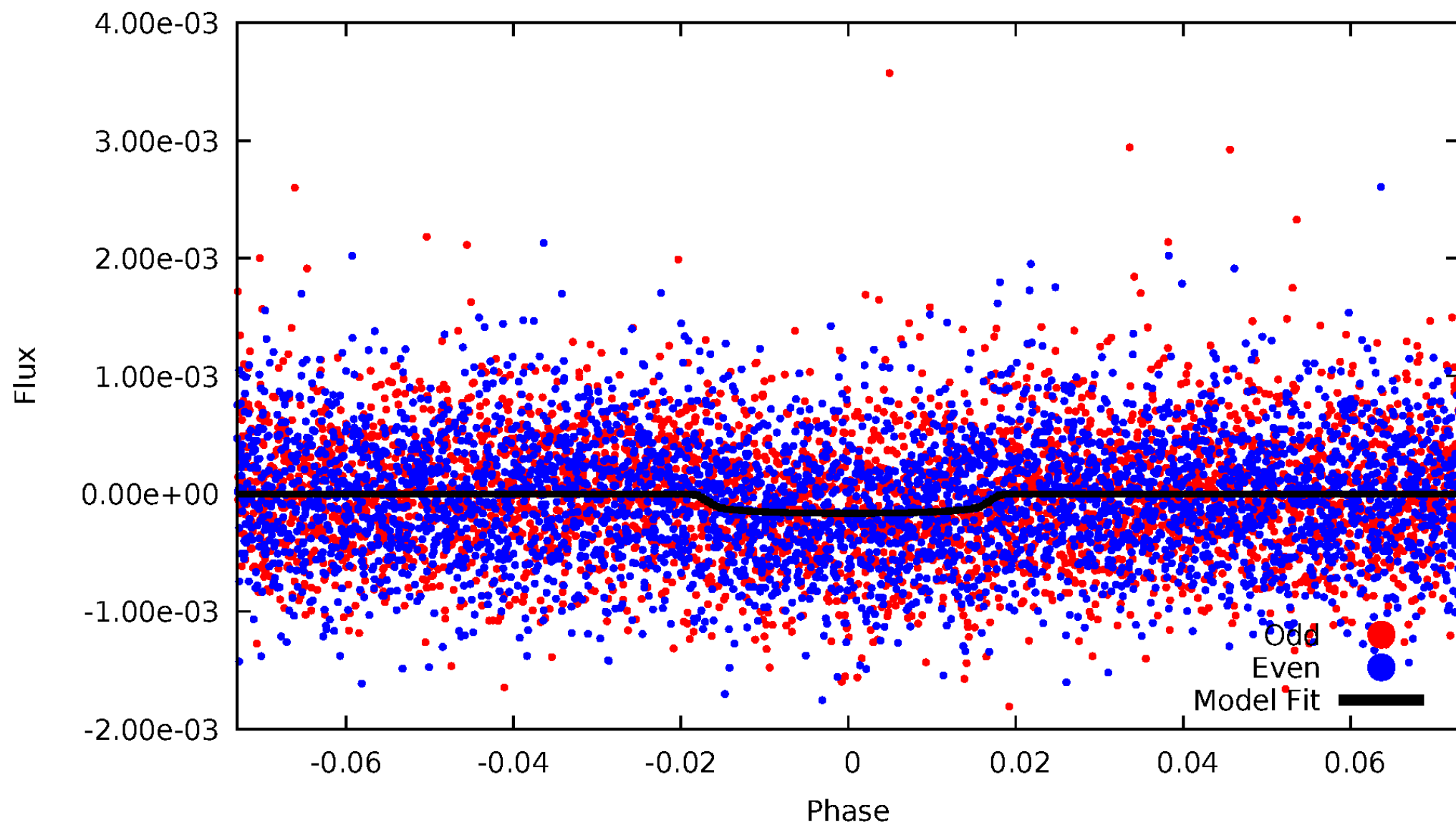
TCE 009851360-01





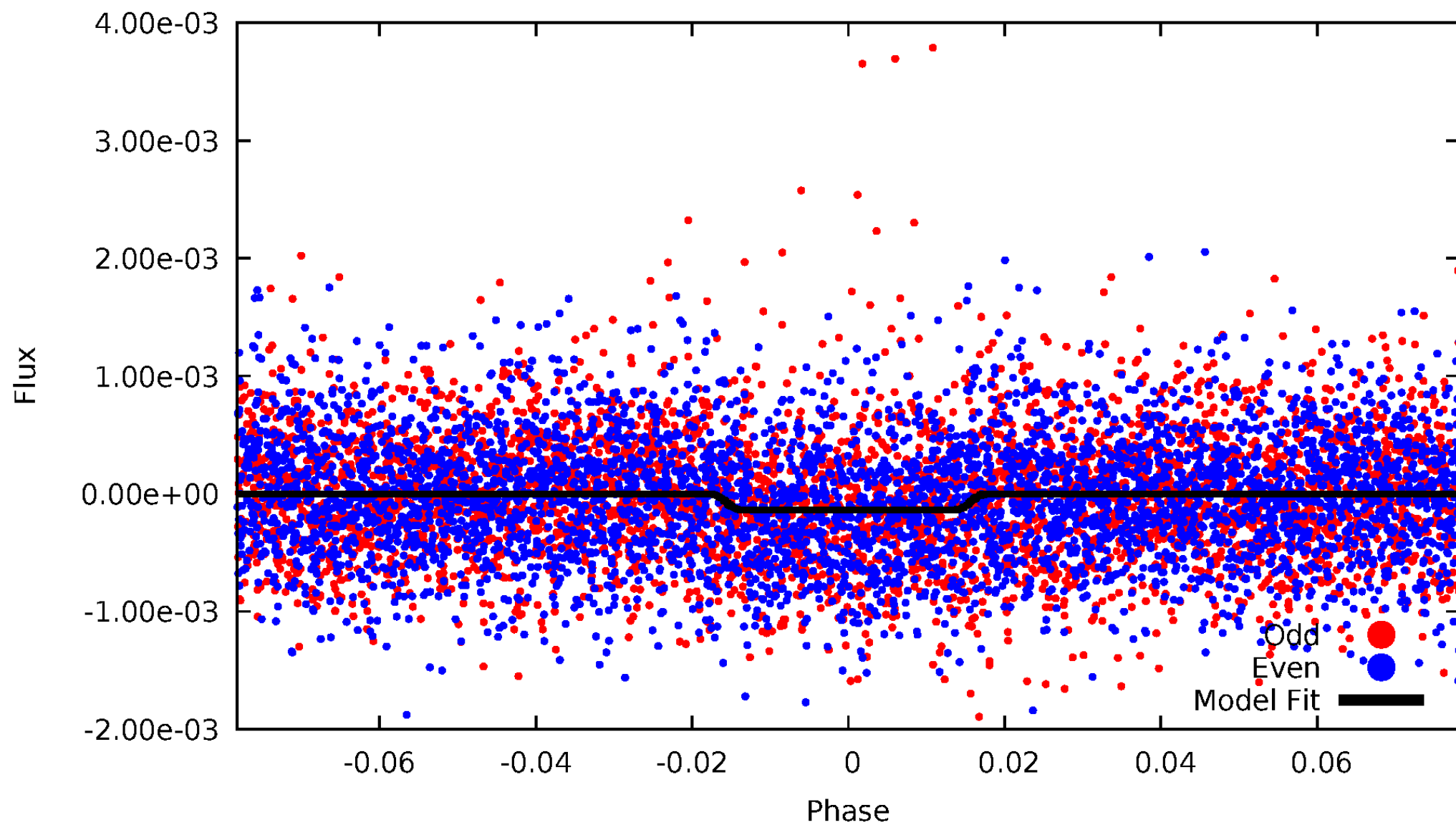
# DV Odd/Even

TCE 009851360-01



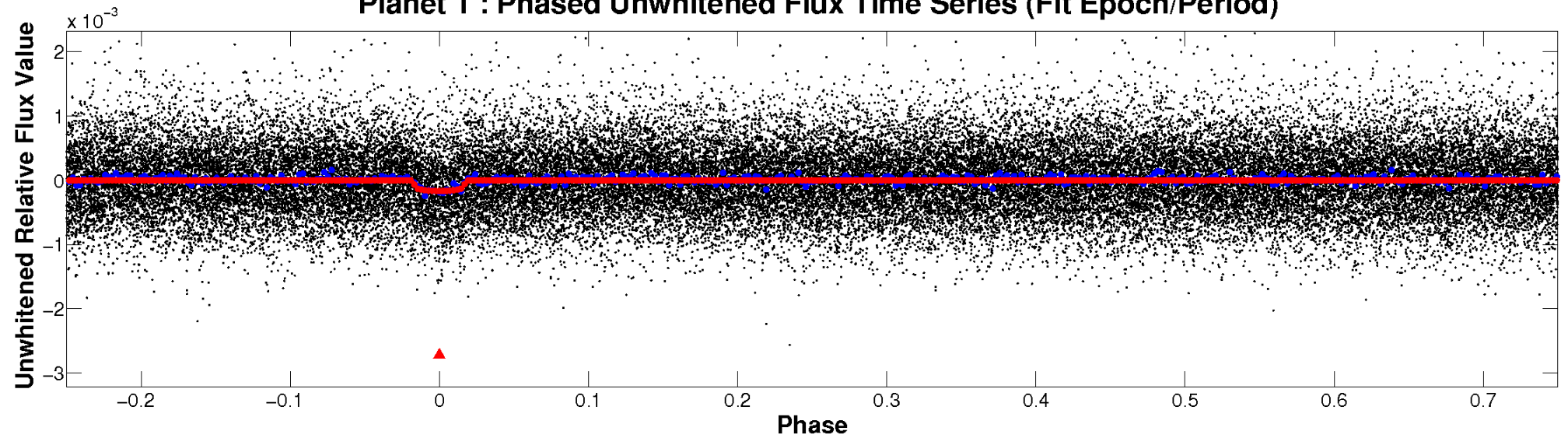
# ALT Odd/Even

TCE 009851360-01

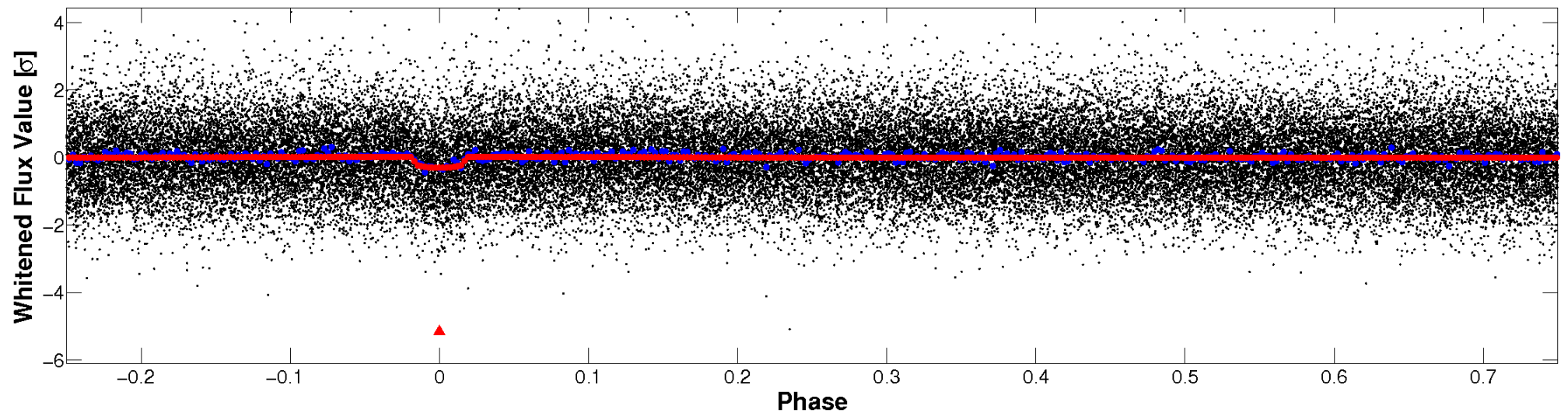


# Non-Whitened Vs. Whitened Light Curve

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

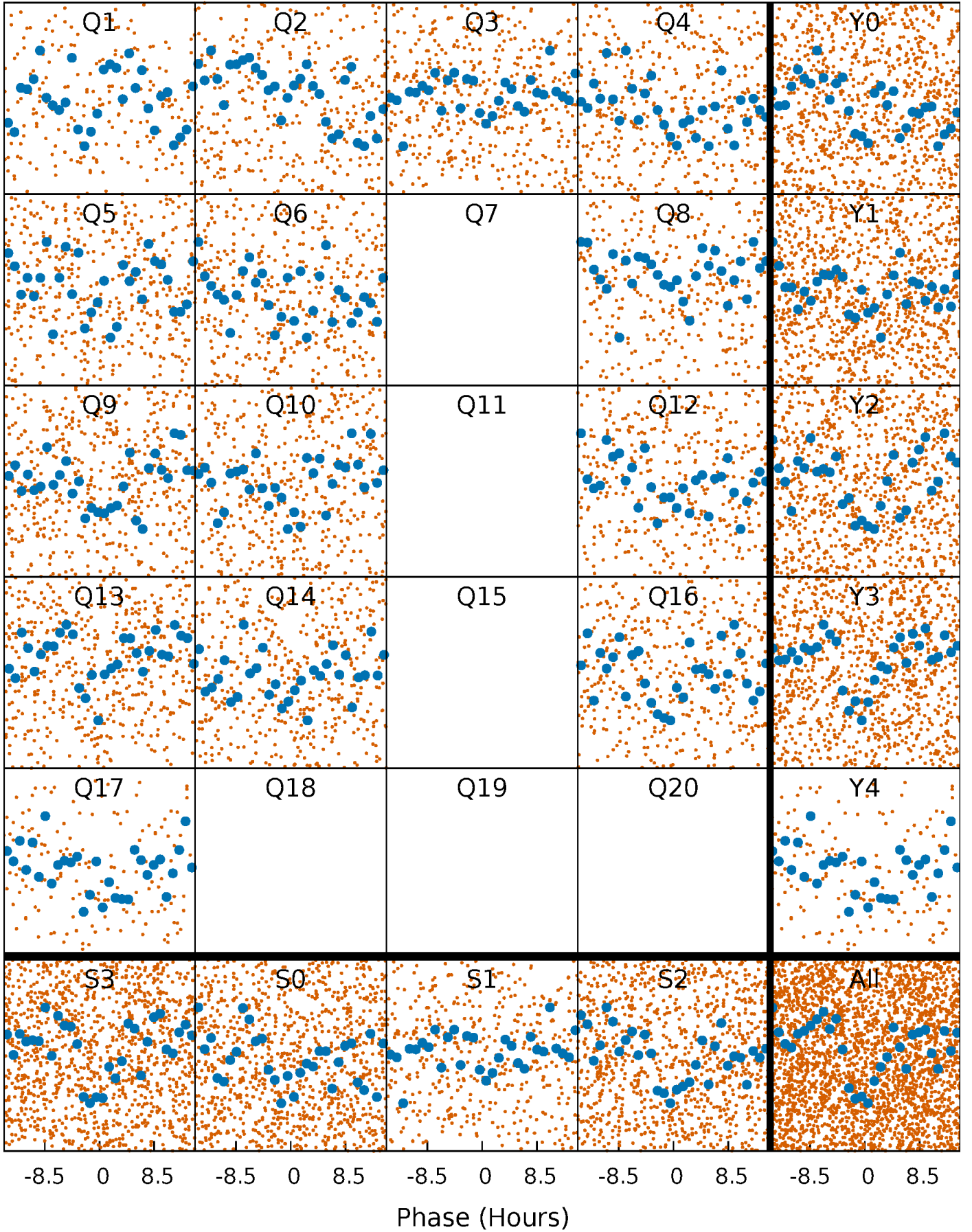


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

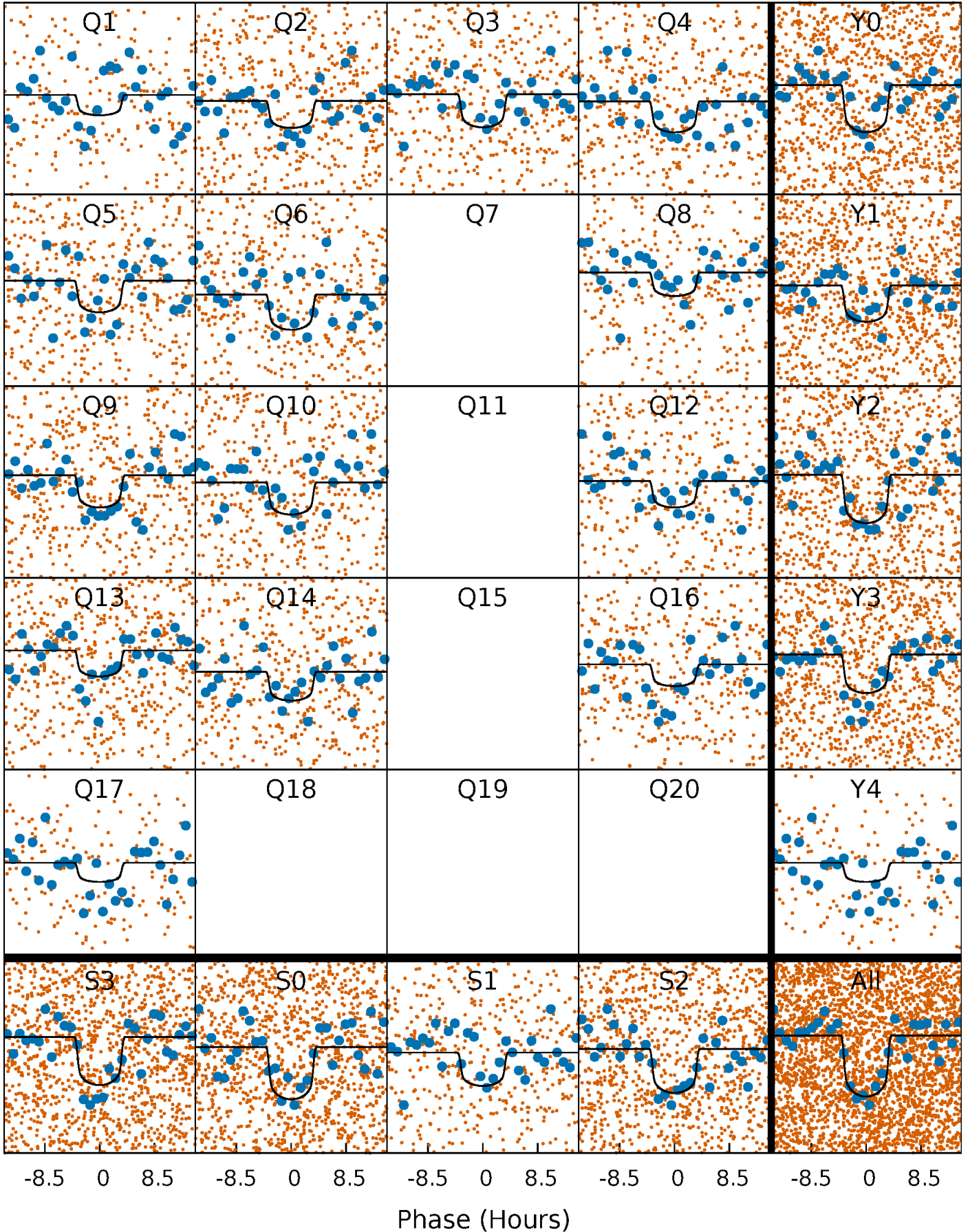
TCE 009851360-01   P= 8.480830 Days    $T_0=135.800423$  (BKJD)





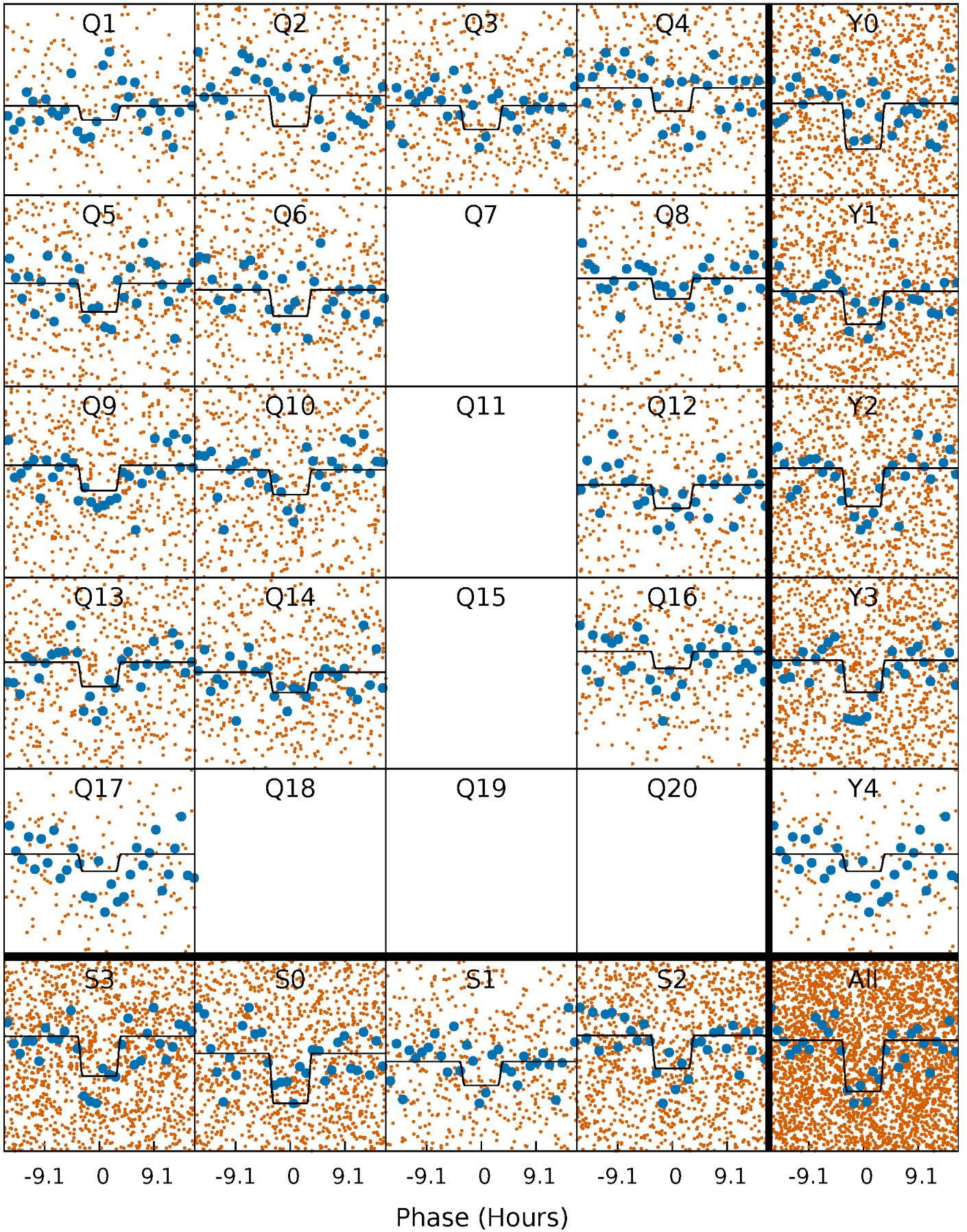
# DV Quarter-Phased Transit Curves

TCE 009851360-01 P= 8.480830 Days  $T_0=135.800423$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

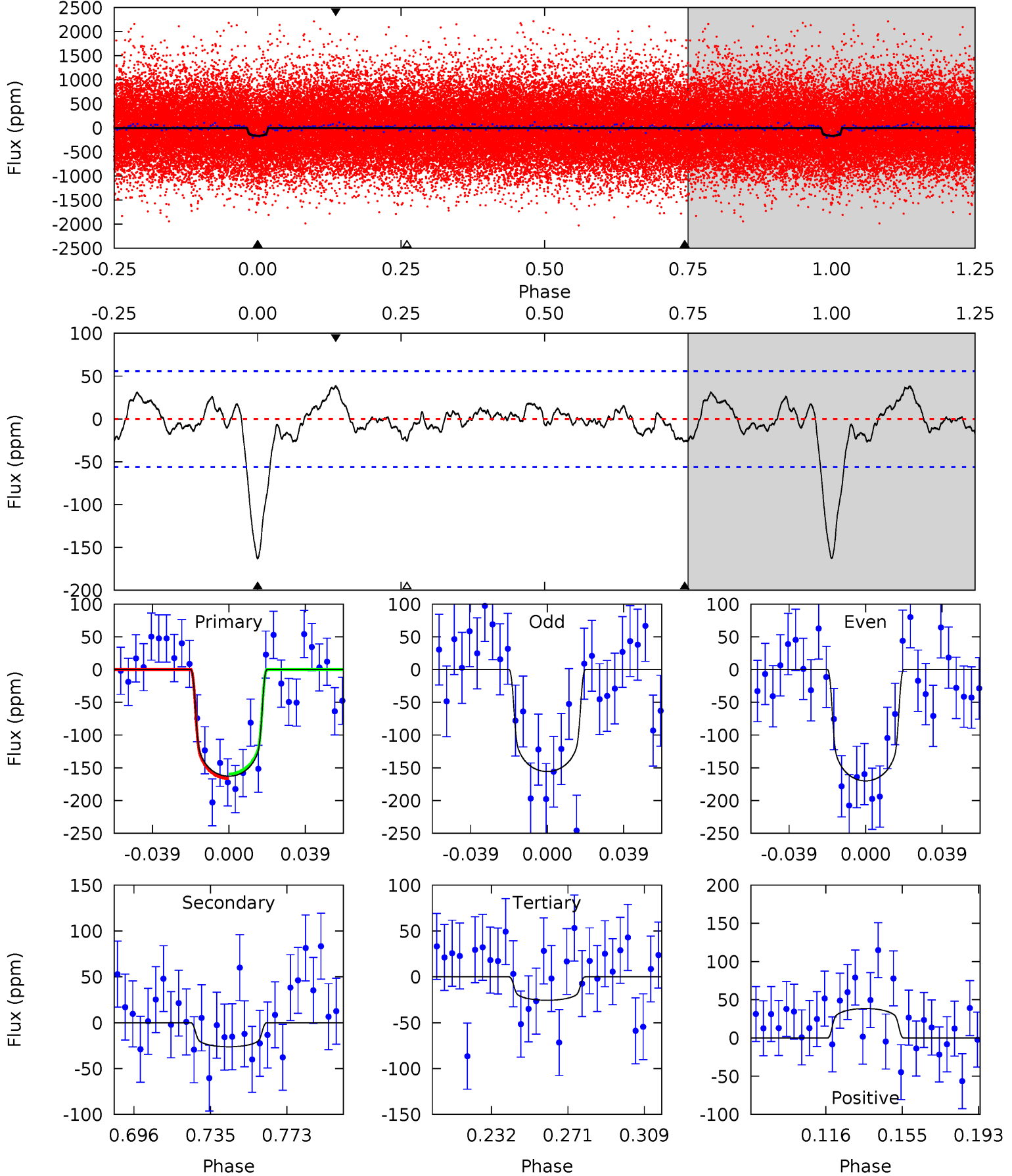
TCE 009851360-01   P= 8.480583 Days    $T_0=135.827657$  (BKJD)



# DV Model-Shift Uniqueness Test

009851360-01, P = 8.480830 Days, E = 127.319593 Days

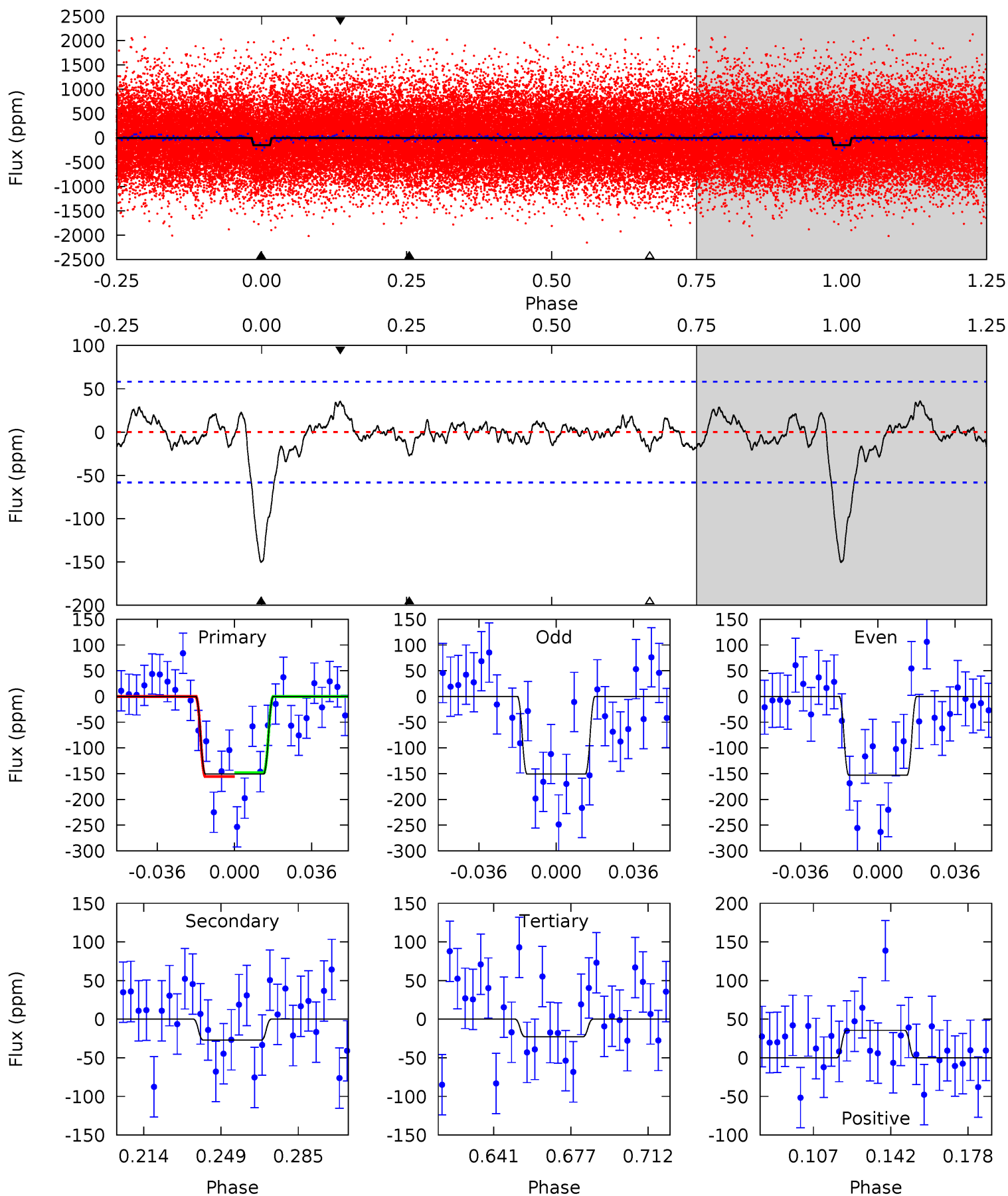
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.9	2.24	2.18	3.28	4.76	2.07	1.07	11.7	10.6	0.06	-1.04	0.61	0.98	0.19	0.29



# Alt Model-Shift Uniqueness Test

009851360-01, P = 8.480583 Days, E = 127.347074 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
12.4	2.23	1.87	2.92	4.78	2.10	0.97	10.5	9.44	0.36	-0.69	0.09	0.86	0.19	0.30





### Stellar Parameters For KIC 009851360

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5555^{+181}_{-165}$	$4.554^{+0.085}_{-0.085}$	$-0.740^{+0.300}_{-0.300}$	$0.737^{+0.106}_{-0.077}$	$0.709^{+0.085}_{-0.039}$	$2.498^{+0.911}_{-0.723}$
	+3%/-3%	+2%/-2%	+41%/-41%	+14%/-10%	+12%/-6%	+36%/-29%
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 009851360-01 / KOI 4381.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-26 \pm 12$	$1.13^{+0.29}_{-0.29}$	$1093^{+52}_{-49}$	$3733^{+539}_{-413}$	$58^{+68}_{-30}$
Alt.	$-27 \pm 12$	$0.93^{+0.28}_{-0.26}$	$1090^{+49}_{-45}$	$4007^{+643}_{-479}$	$90^{+104}_{-48}$

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

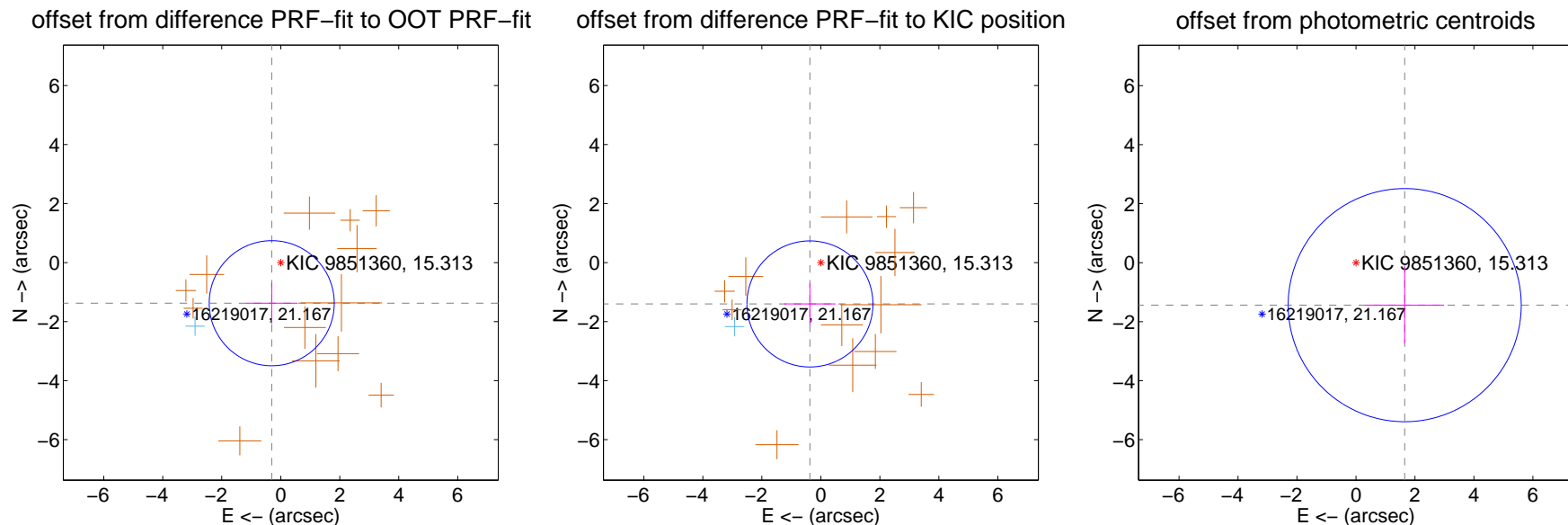
## DV Centroid Data

Supplemental centroid analysis for 009851360-01. Kepler magnitude: 15.31. Transit SNR 11.10

There are 1 quarters with good PRF difference image offsets

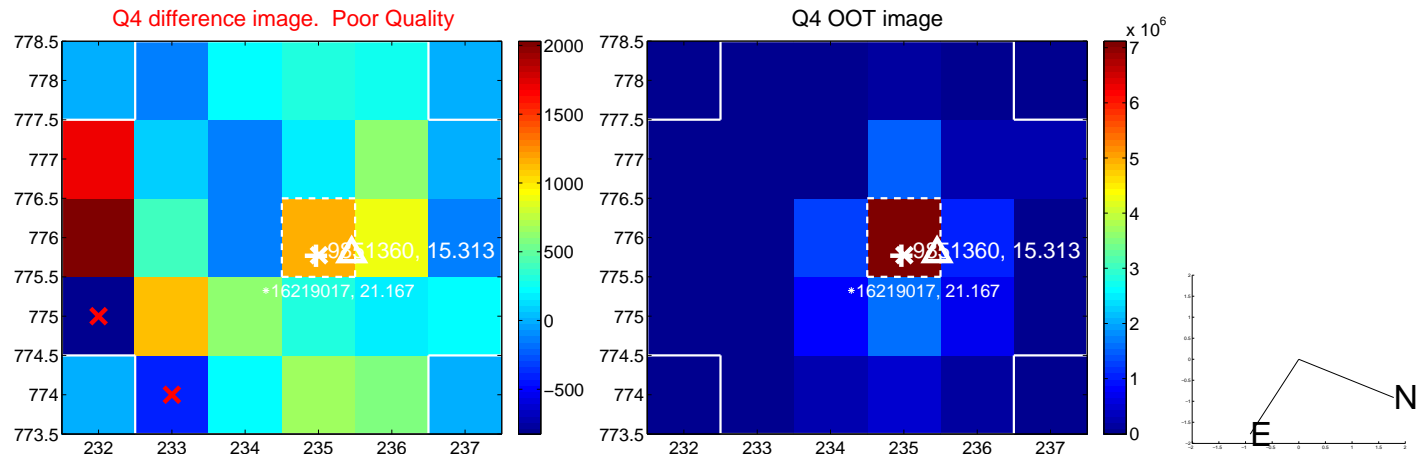
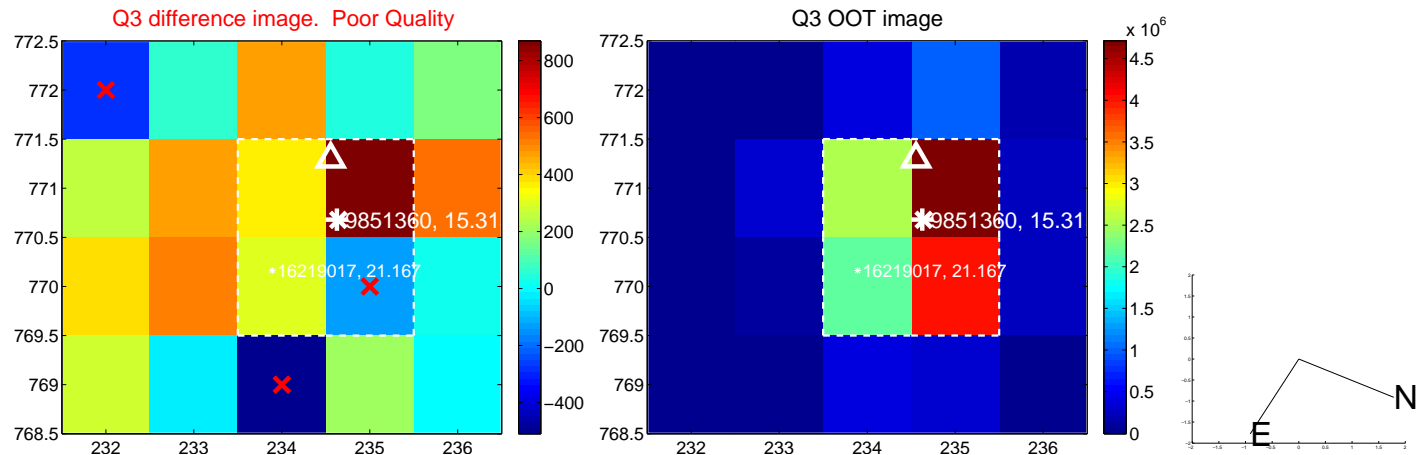
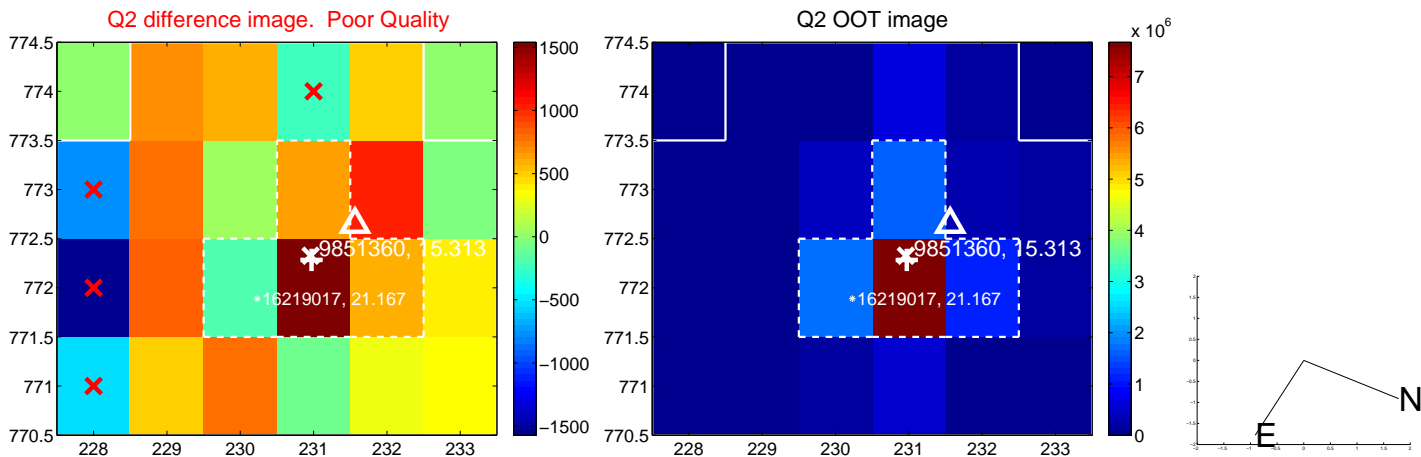
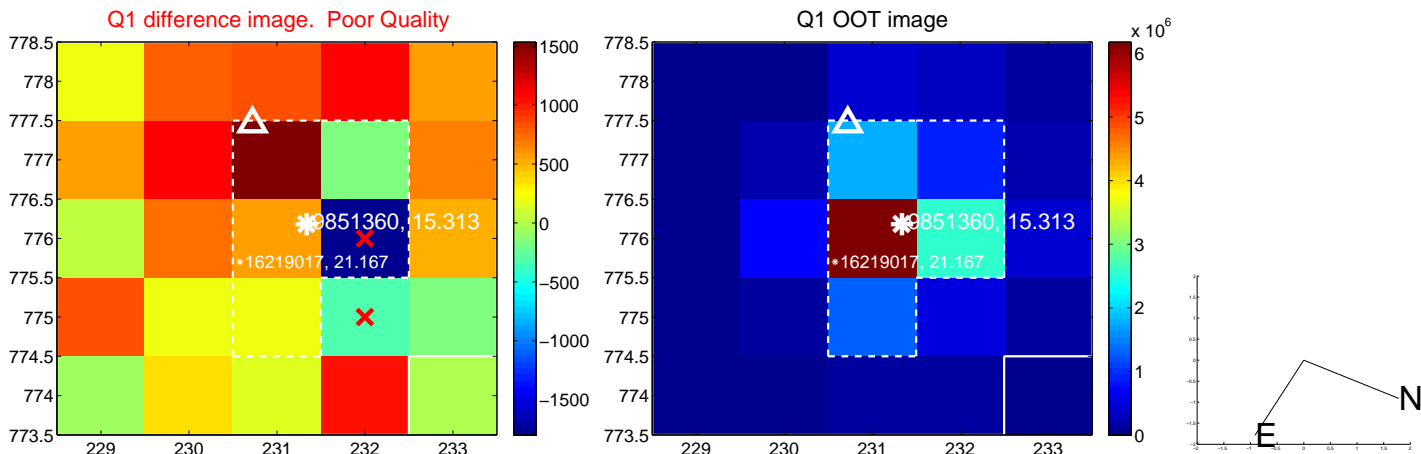
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.411 \pm 0.707$	2.00	$0.306 \pm 0.876$	$-1.377 \pm 0.697$
PRF-fit source offset from KIC position	$1.450 \pm 0.712$	2.04	$0.371 \pm 0.869$	$-1.402 \pm 0.700$
photometric centroid source offset	$2.19 \pm 1.32$	1.66	$-1.65 \pm 1.33$	$-1.44 \pm 1.30$

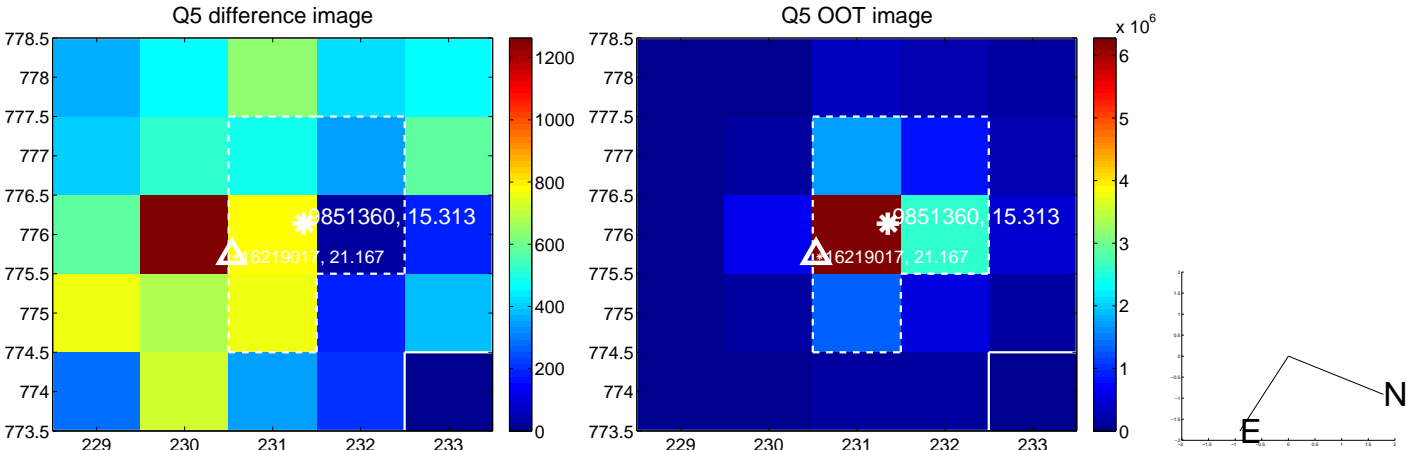


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

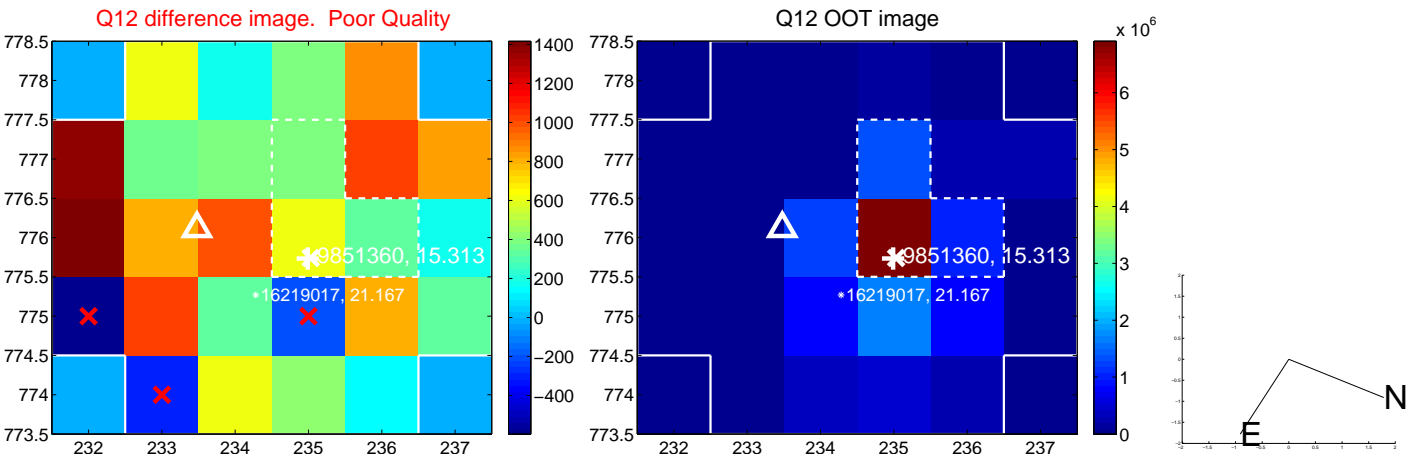
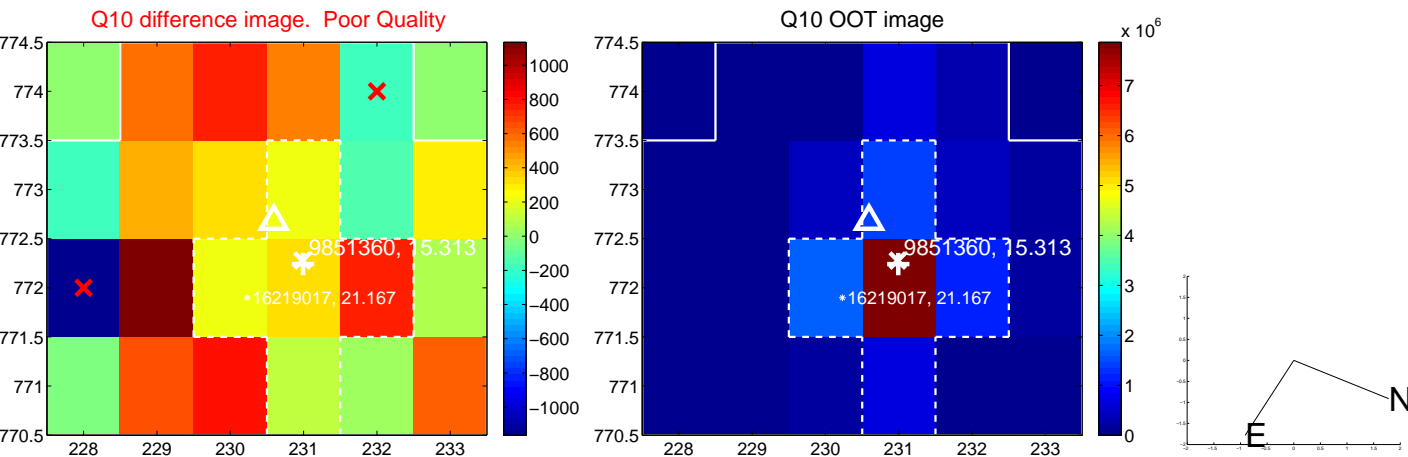
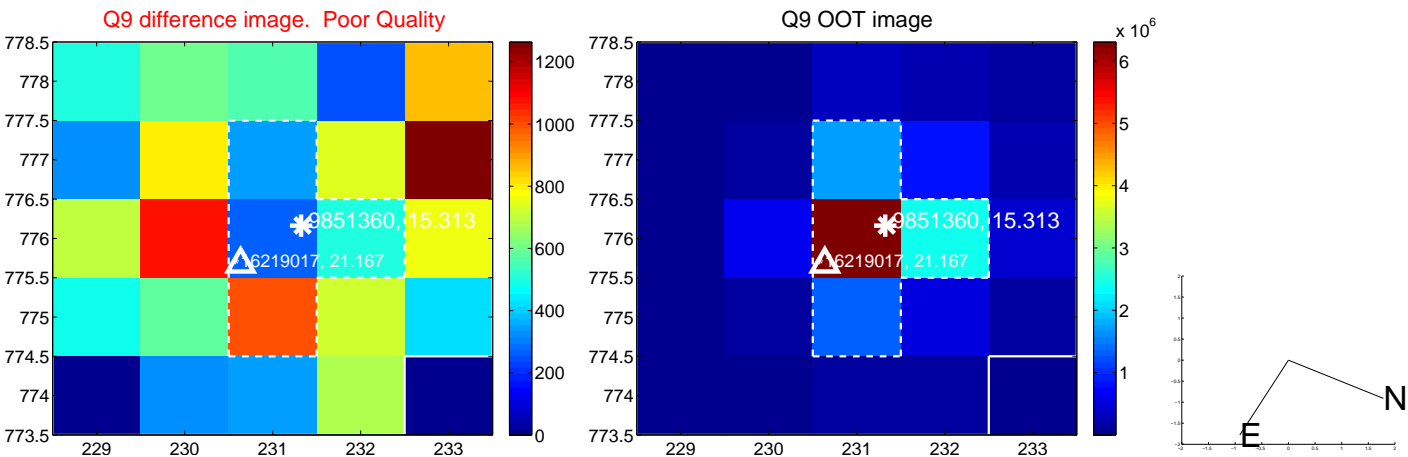


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

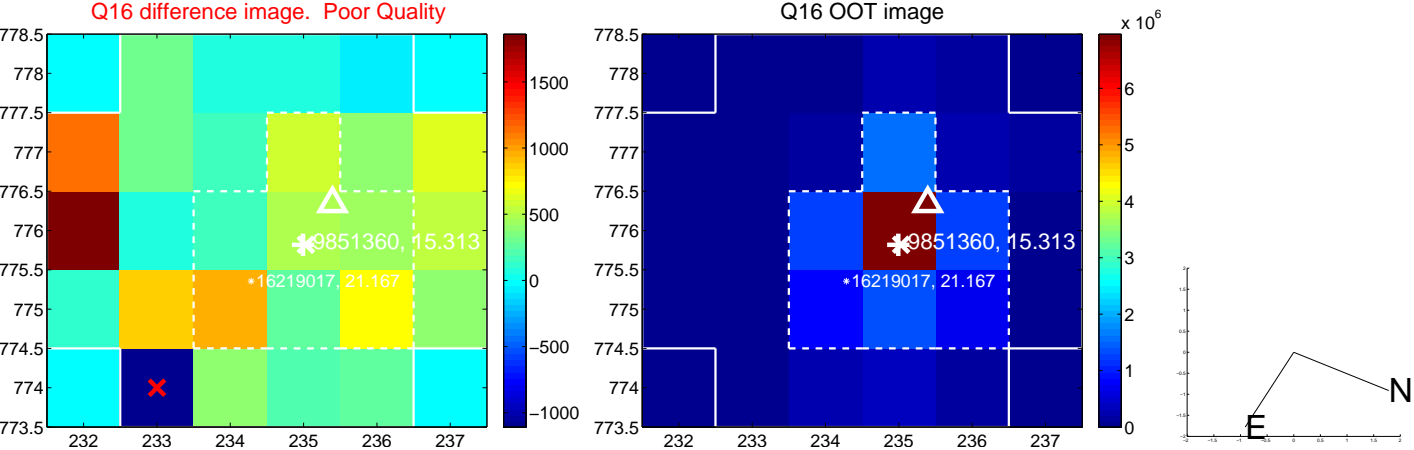
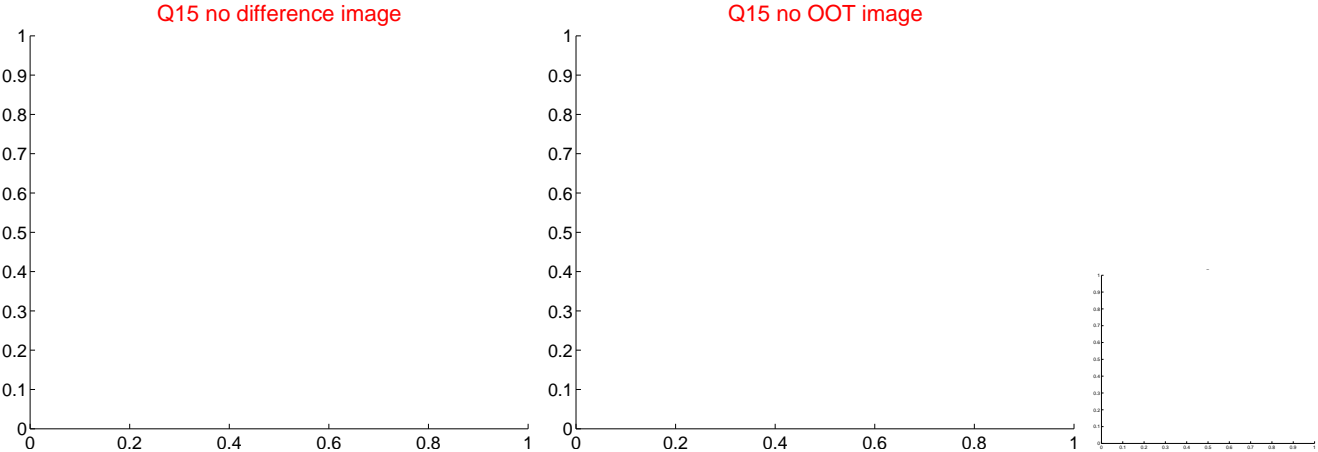
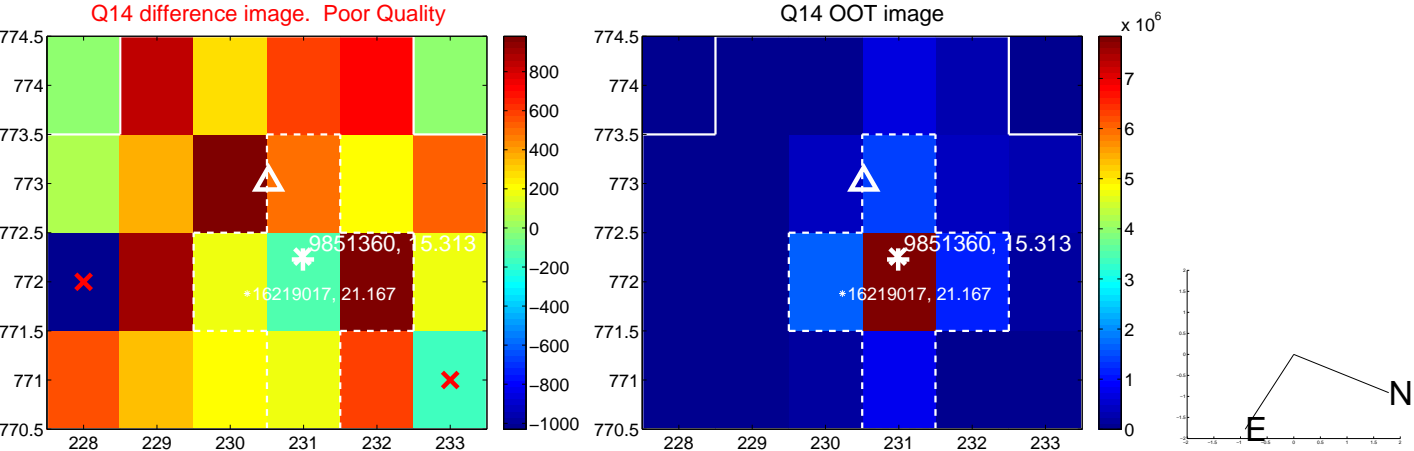
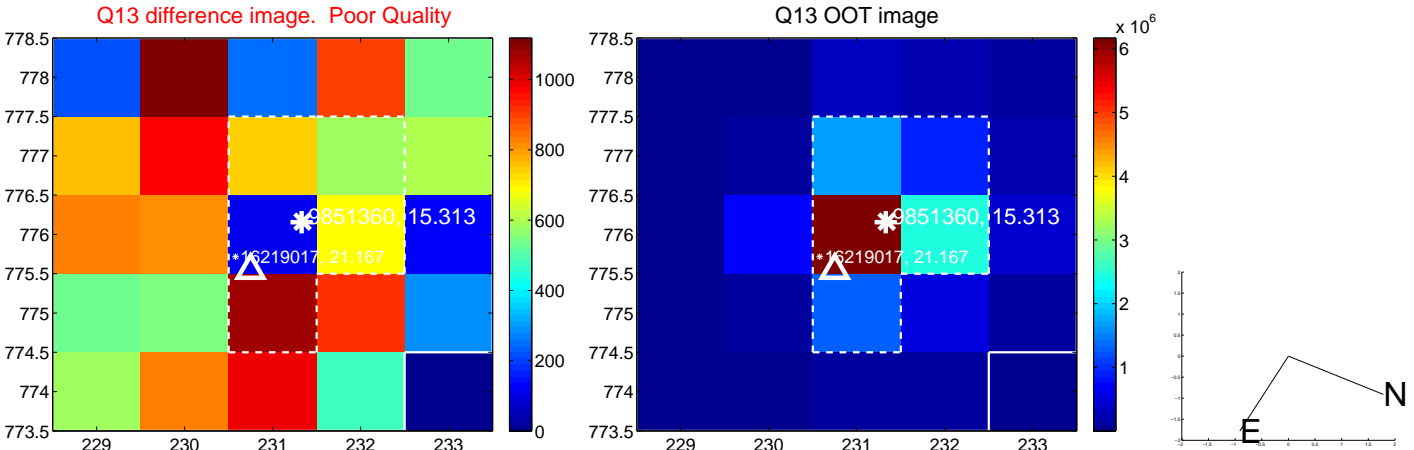




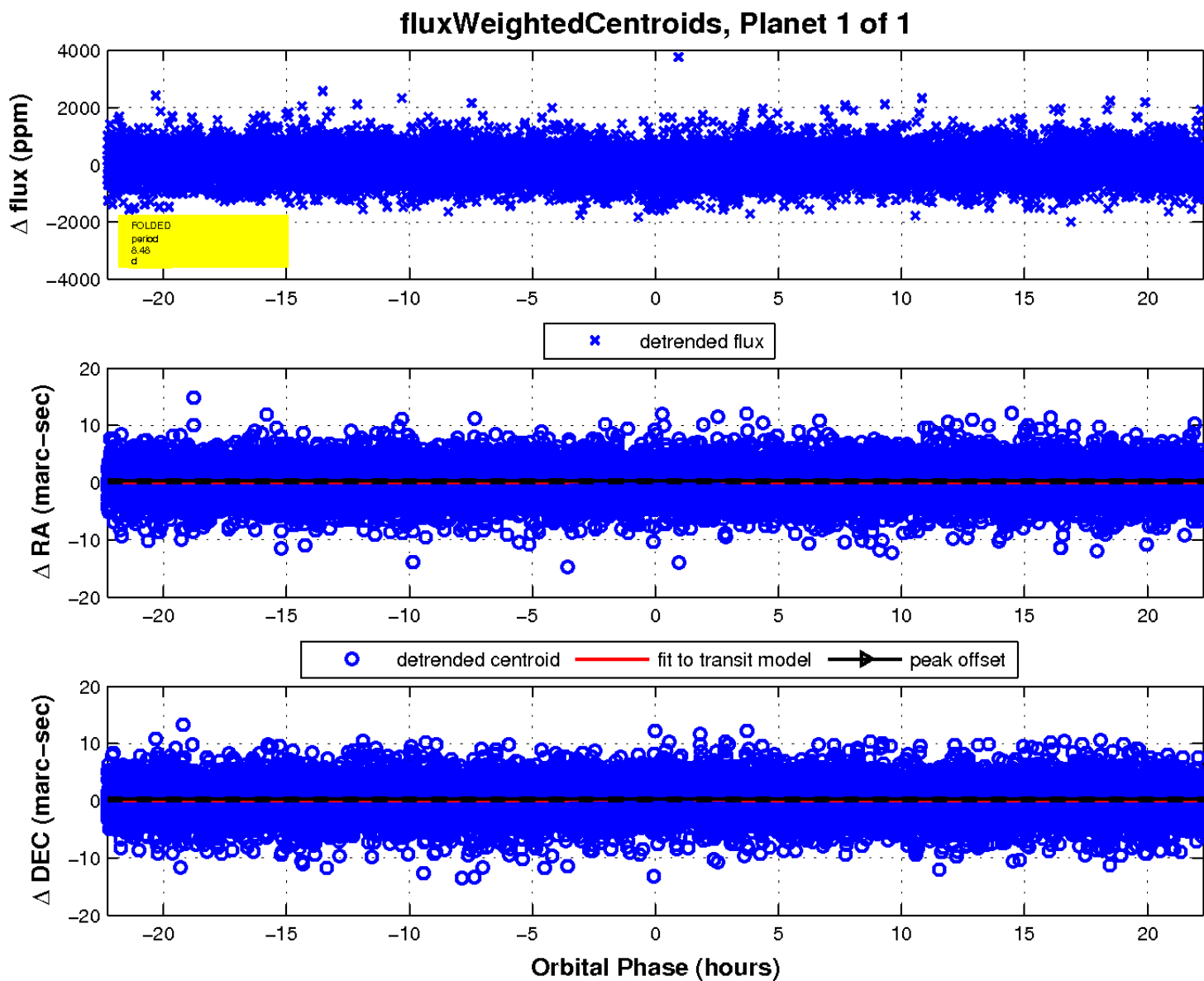
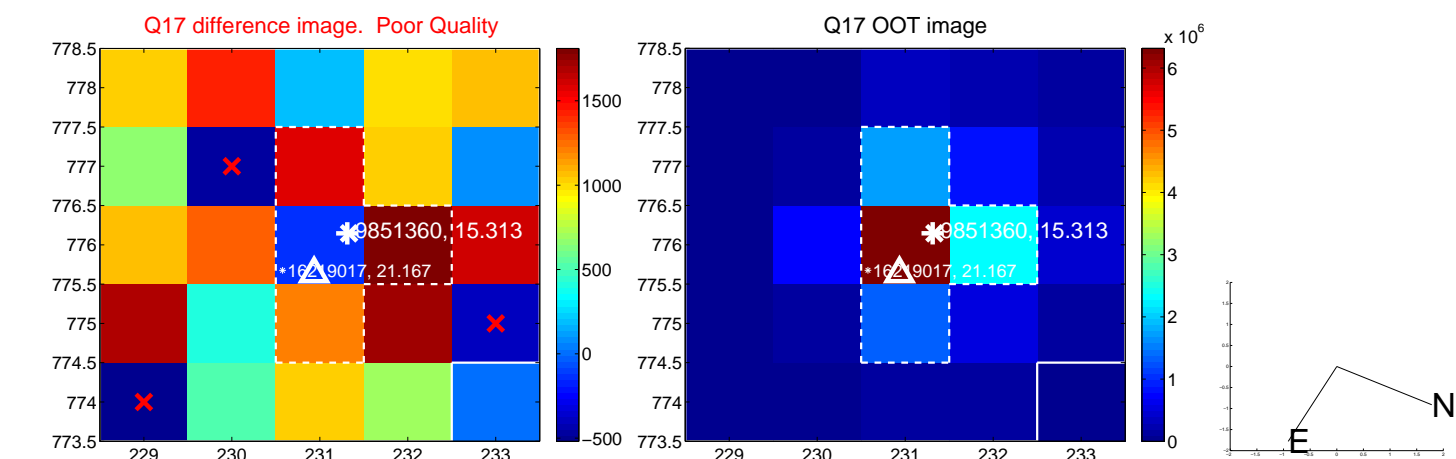
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image

Declination

