

# KIC 009278216

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009278216-01	OBS	4710.01	9.452830	135.773953	175.7	3.948	9.8	9.8	0.86	5973	1.24	113.65

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009278216-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

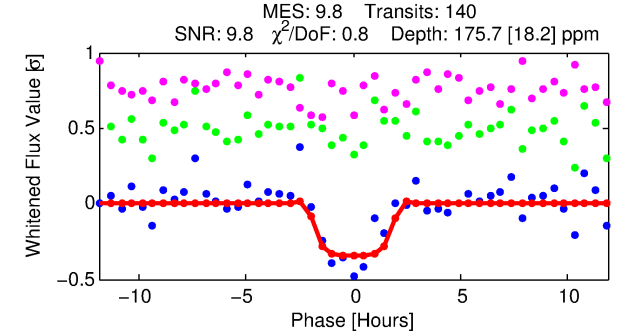
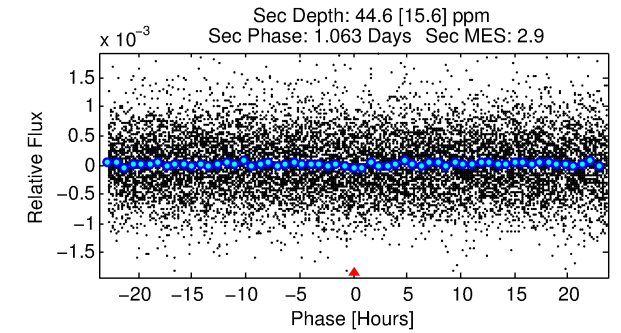
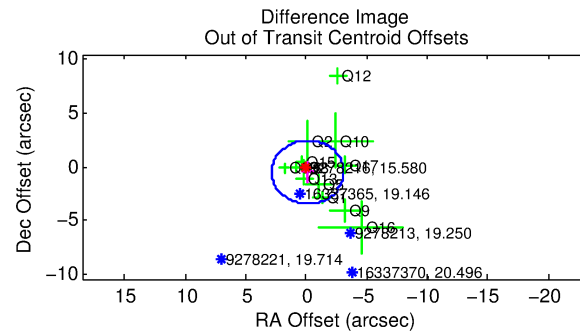
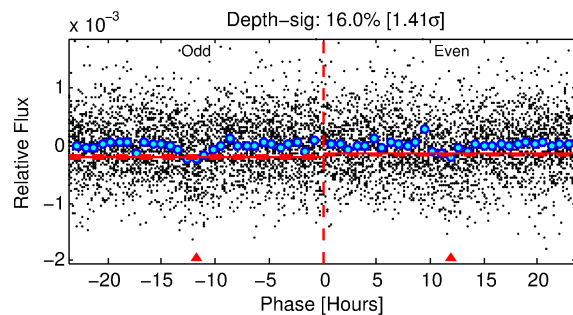
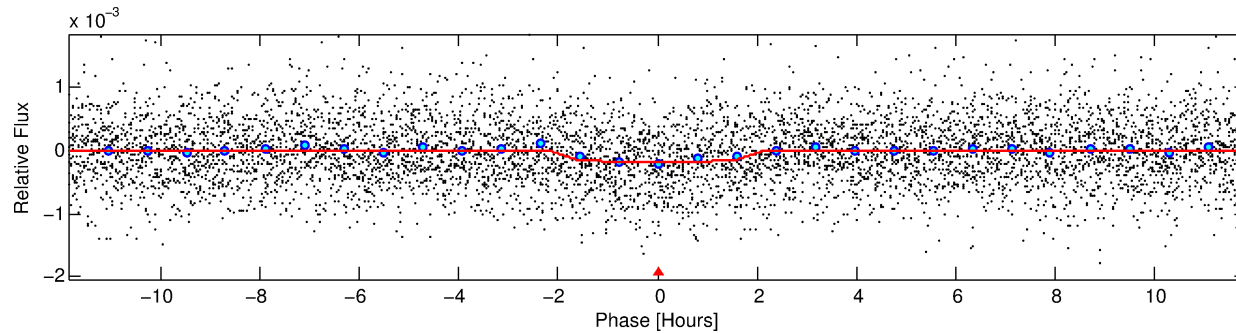
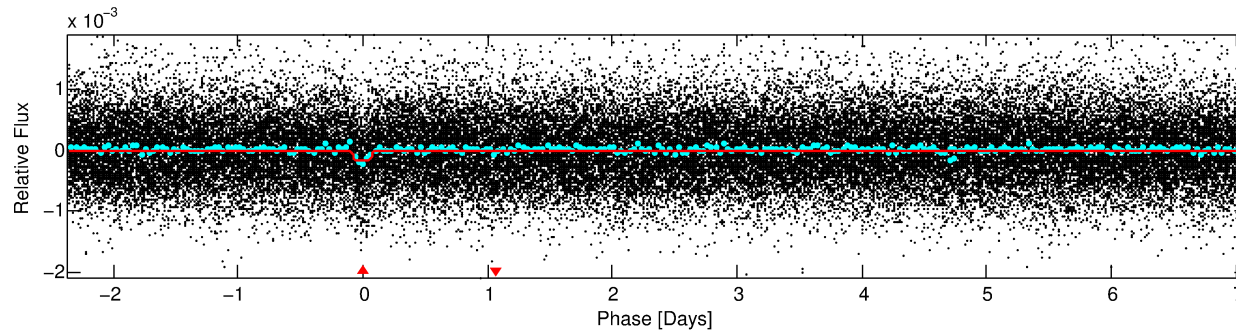
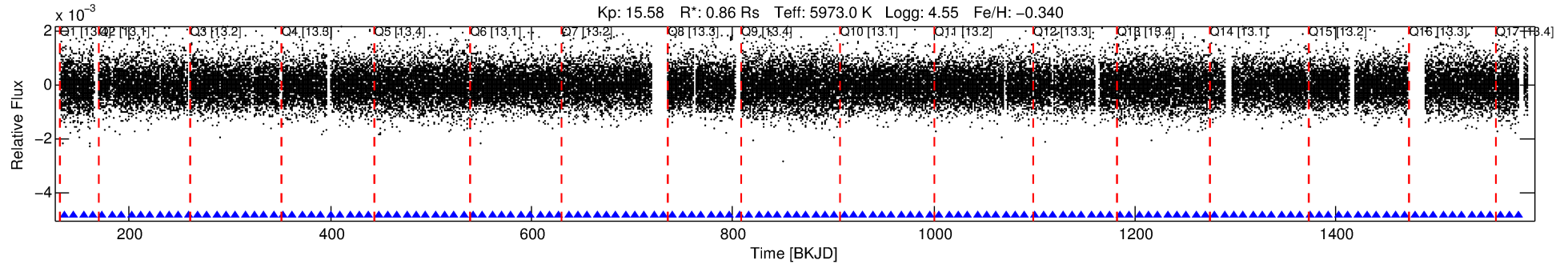
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009278216-01

No Significant Match Found

# DV One-Page Summary

KIC: 9278216 Candidate: 1 of 1 Period: 9.453 d  
KOI: K04710.01 Corr: 0.960



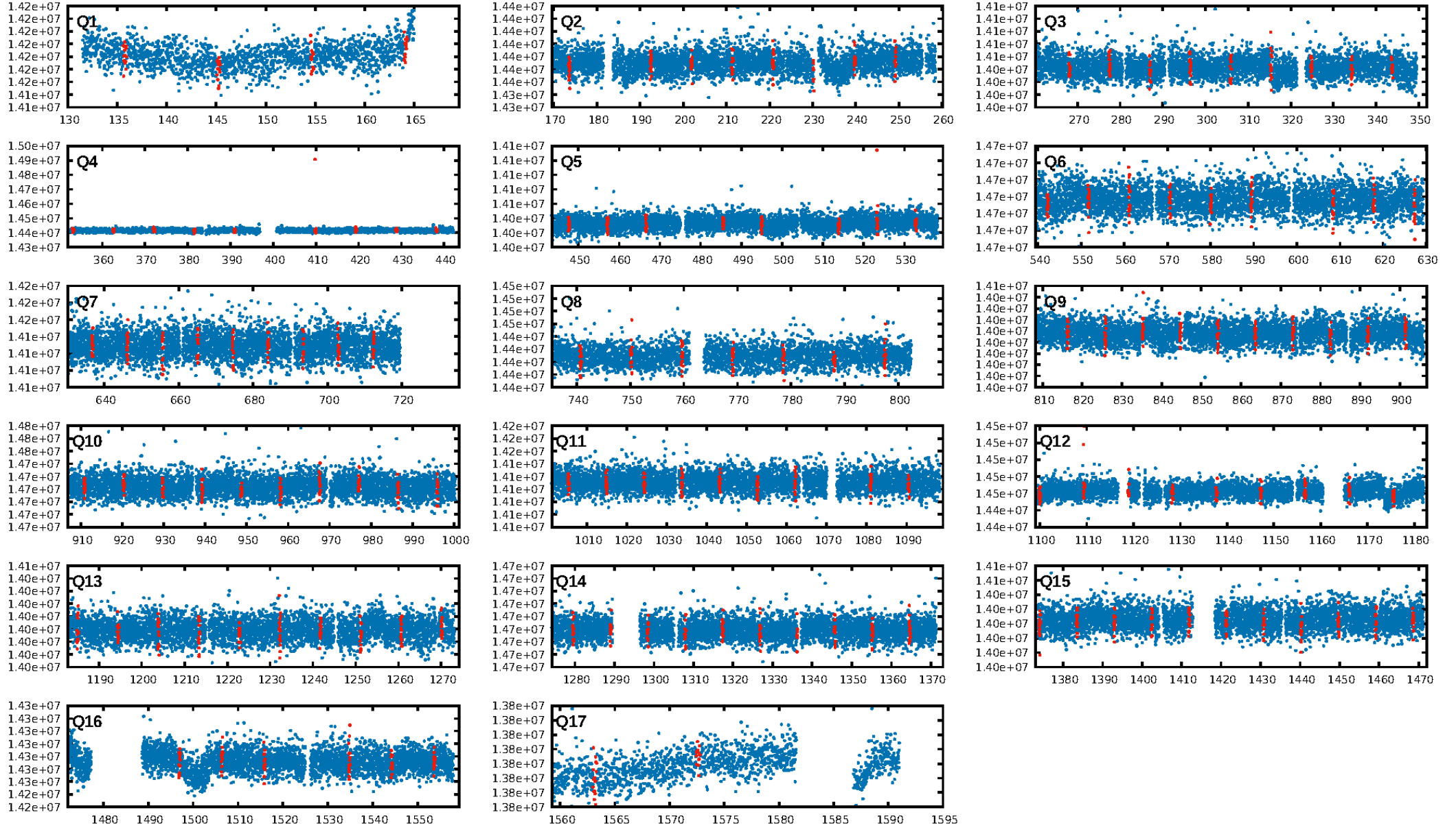
## DV Fit Results:

Period = 9.45283 [0.00010] d  
Epoch = 135.7740 [0.0083] BKJD  
Rp/R\* = 0.0132 [0.0112]  
a/R\* = 12.28 [51.93]  
b = 0.76 [2.39]  
Seff = 113.65 [41.07]  
Teq = 833 [75] K  
Rp = 1.24 [1.11] Re  
a = 0.0858 [0.0201] AU  
Ag = 118.06 [208.85] [0.56 $\sigma$ ]  
Teffp = 4243 [1846] K [1.85 $\sigma$ ]

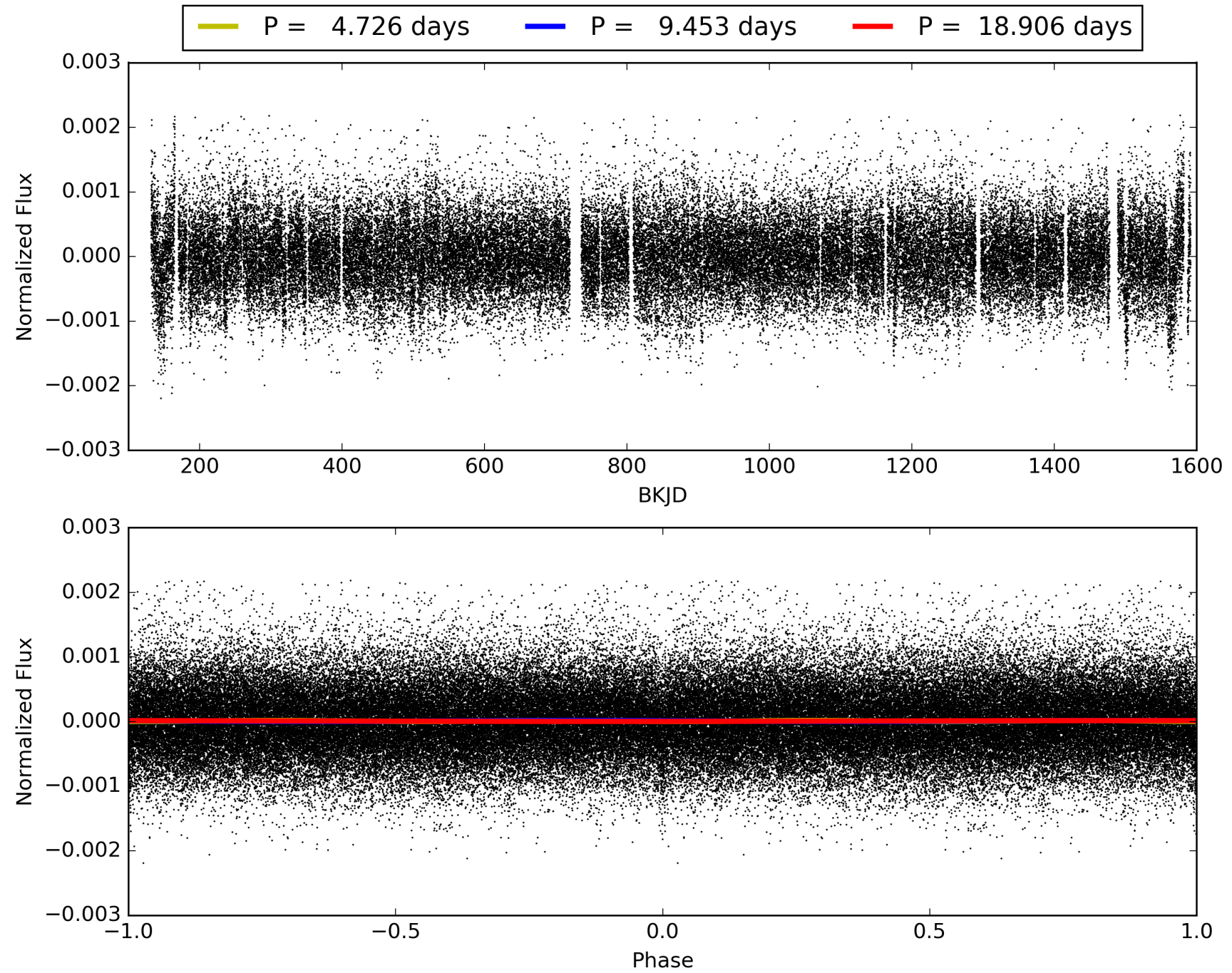
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 99.7%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 4.44e-22  
RollingBand-fgt: 1.00 [134/134]  
**GhostDiagnostic-chr: 0.6461**  
Centroid-sig: 48.2%  
Centroid-so: 1.323 arcsec [0.82 $\sigma$ ]  
OotOffset-rm: 0.532 arcsec [0.54 $\sigma$ ]  
OotOffset-st: 3/2/3/5 [13]  
KicOffset-rm: 0.679 arcsec [0.78 $\sigma$ ]  
KicOffset-st: 3/2/3/5 [13]  
DiffImageQuality-fgm: 0.46 [6/13]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 009278216-01, PDC Light Curves

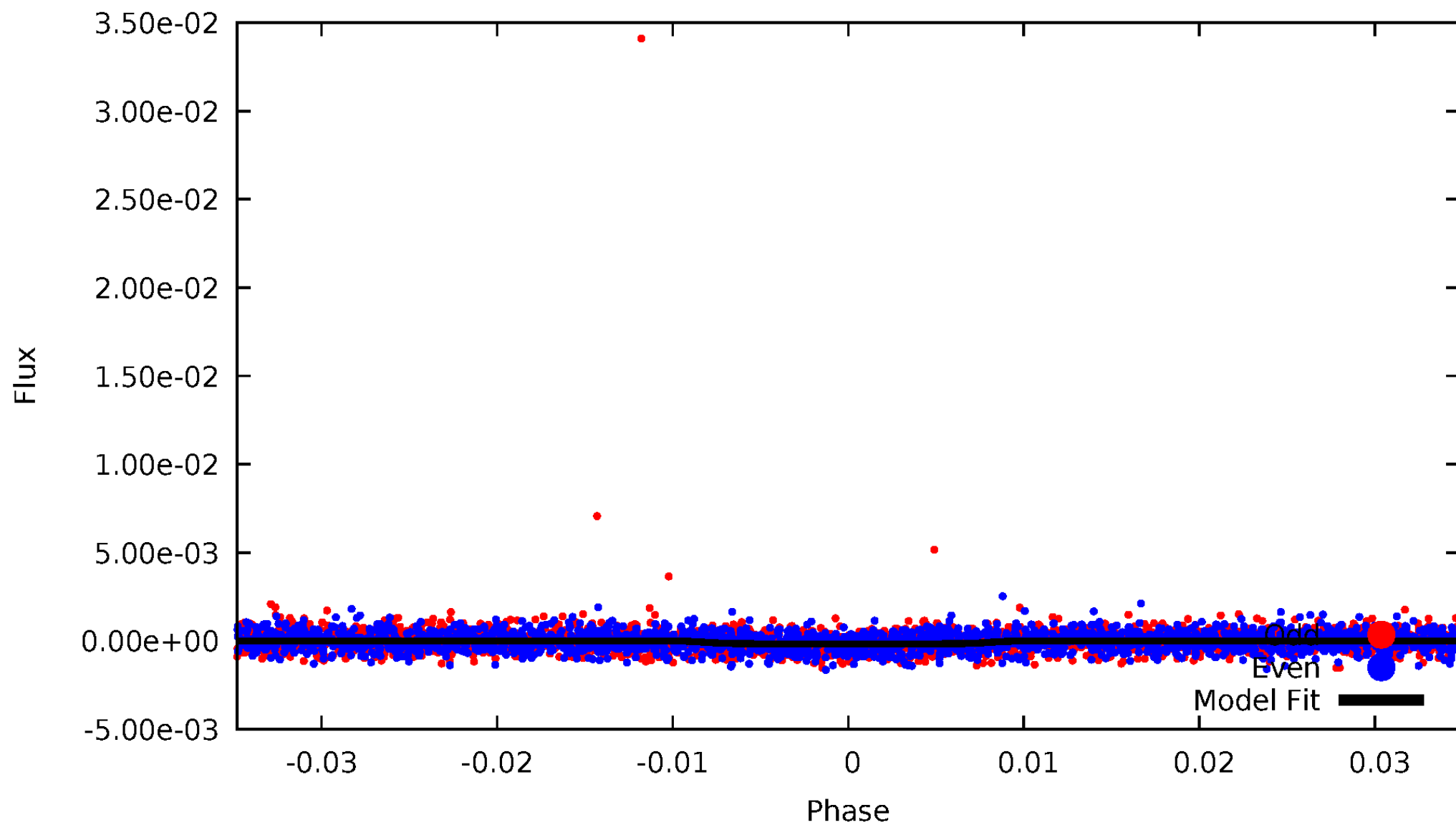


TCE 009278216-01



# DV Odd/Even

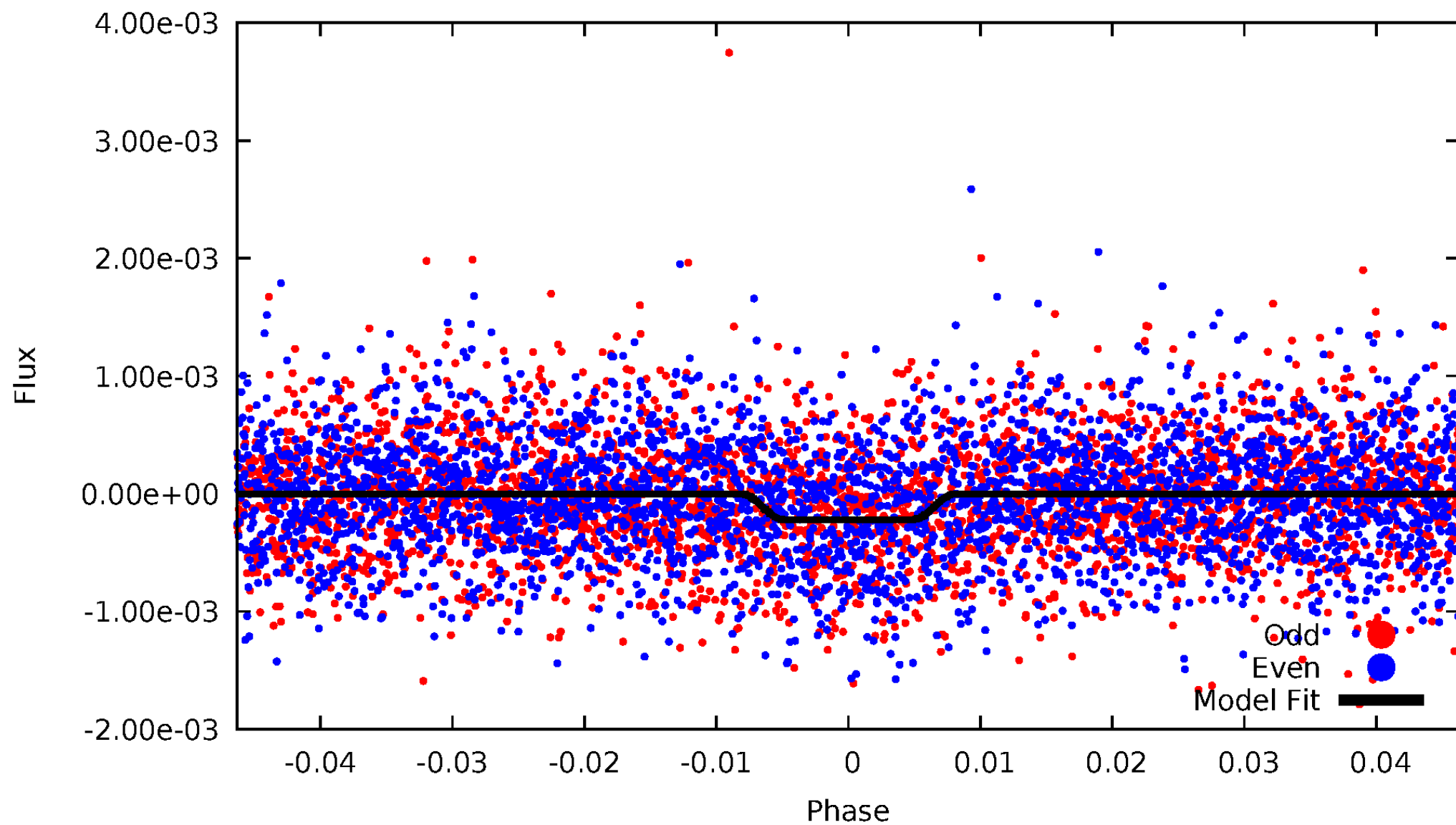
TCE 009278216-01





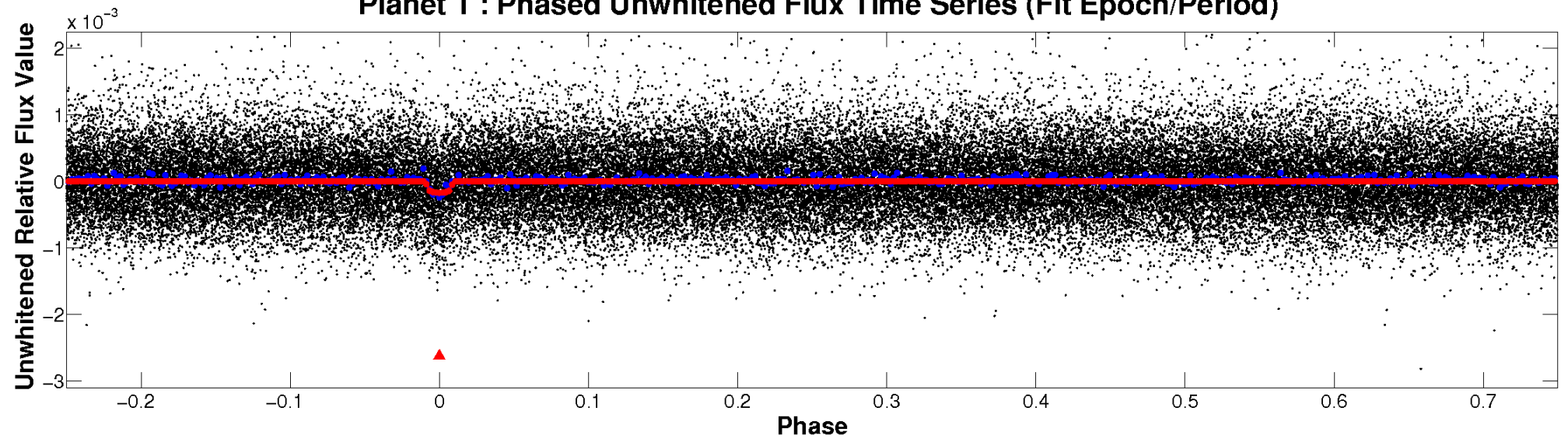
# ALT Odd/Even

TCE 009278216-01

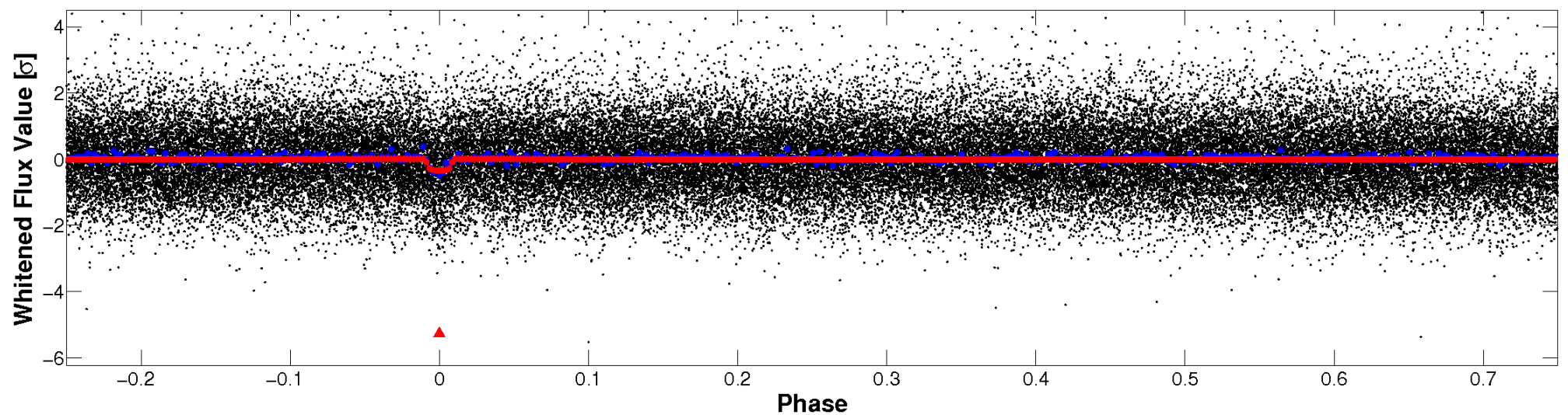


# Non-Whitened Vs. Whitened Light Curve

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

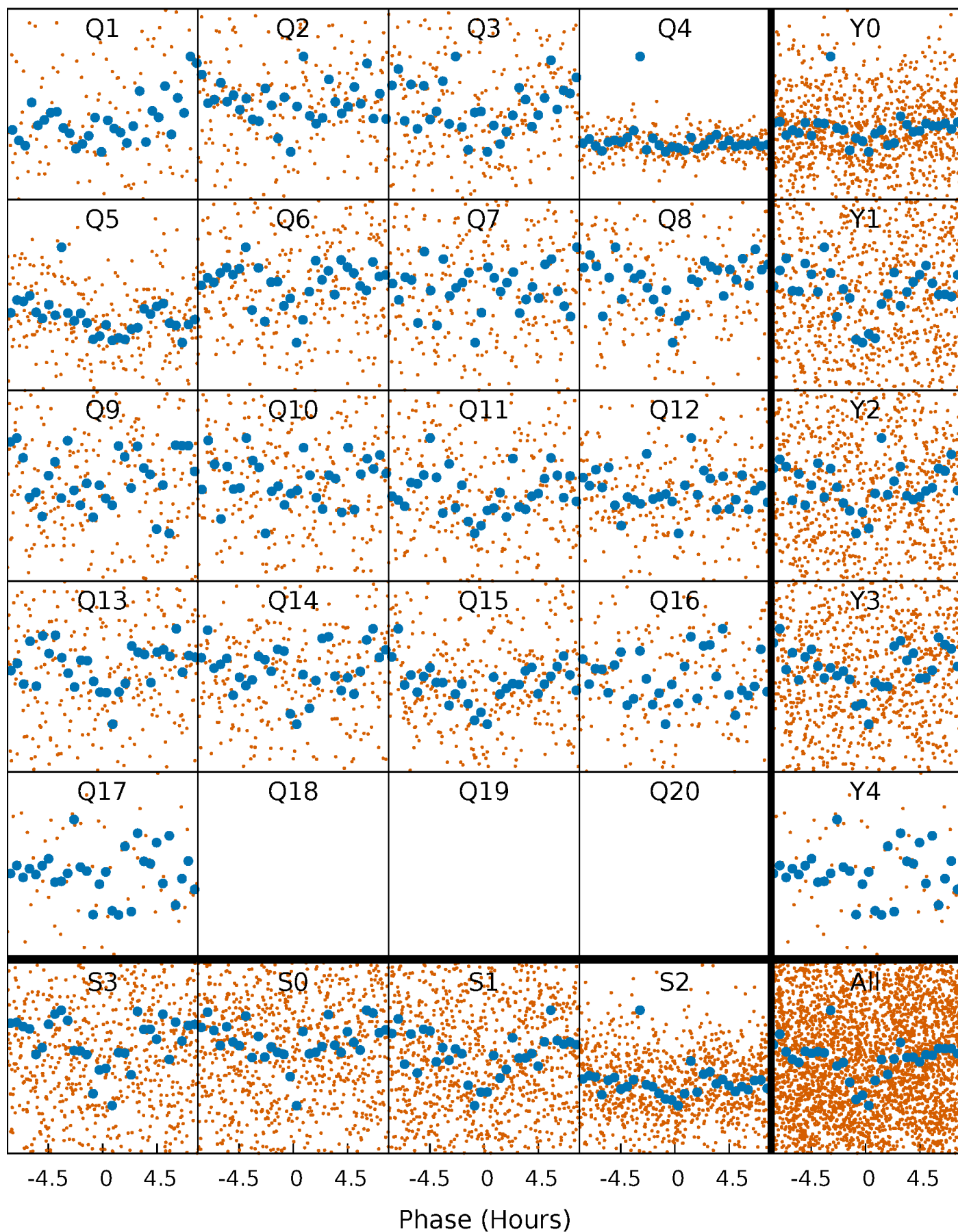


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

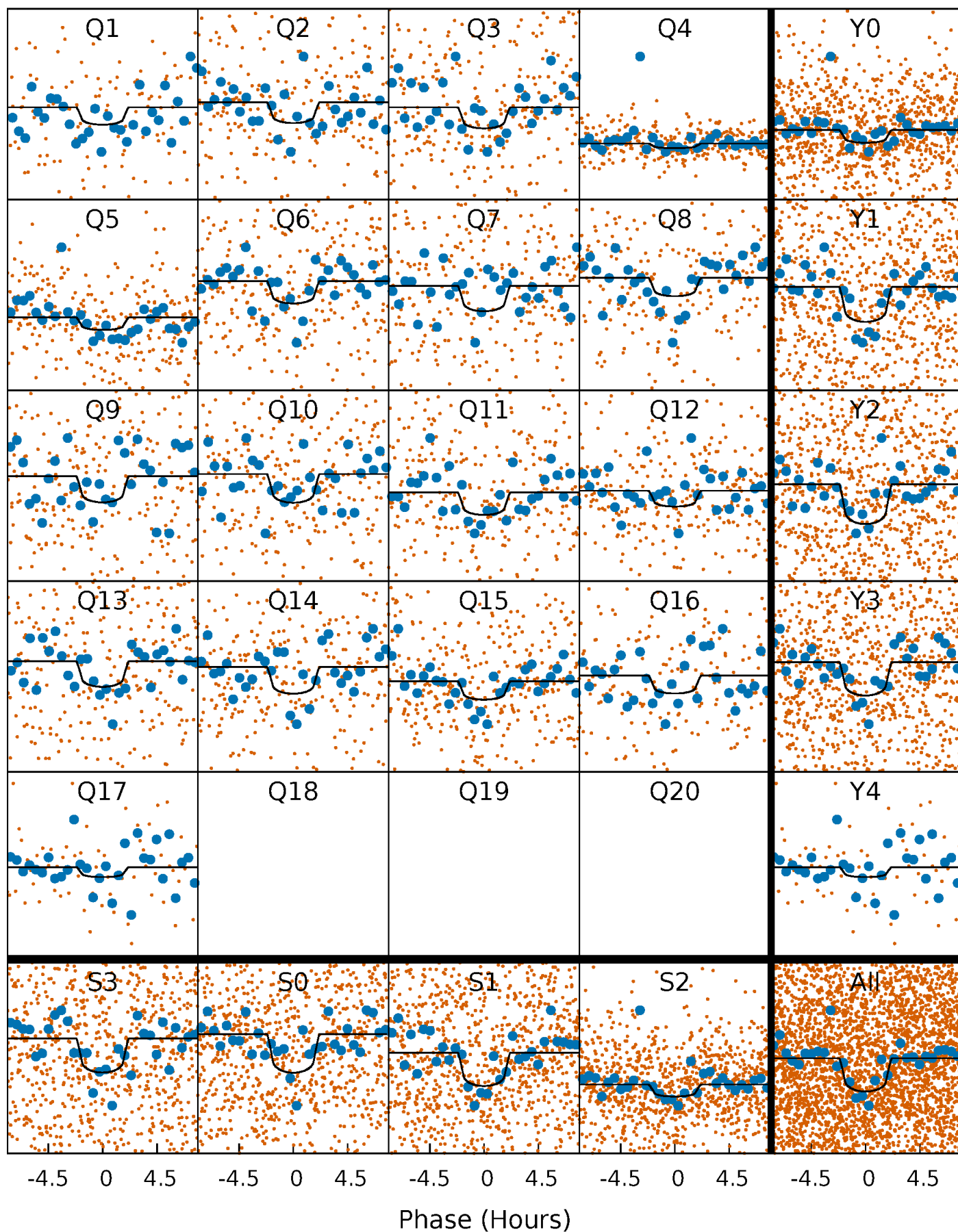
TCE 009278216-01 P= 9.452830 Days  $T_0=135.773953$  (BKJD)





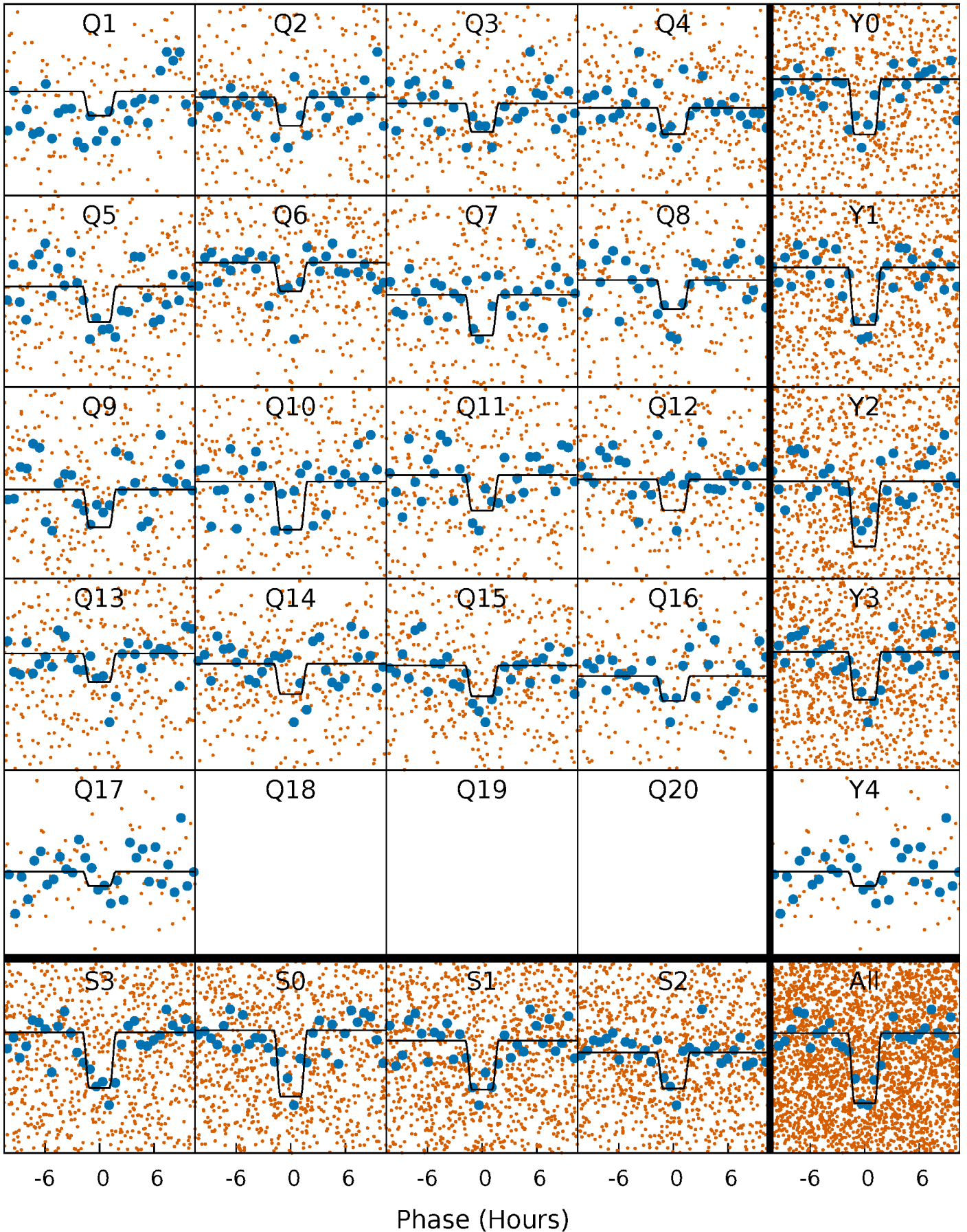
# DV Quarter-Phased Transit Curves

TCE 009278216-01 P= 9.452830 Days  $T_0=135.773953$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

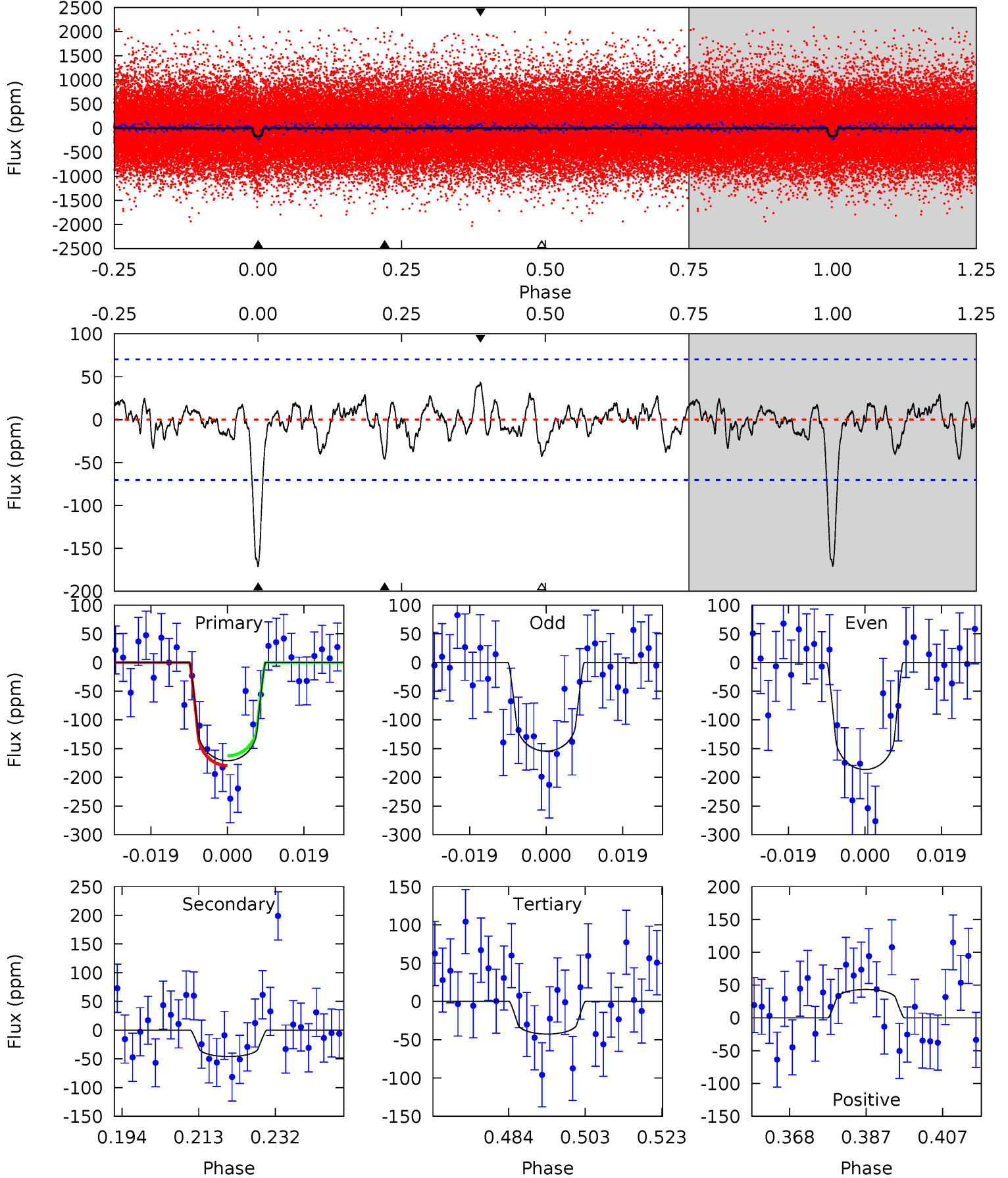
TCE 009278216-01 P= 9.452605 Days  $T_0=135.785912$  (BKJD)



# DV Model-Shift Uniqueness Test

009278216-01, P = 9.452830 Days, E = 126.321123 Days

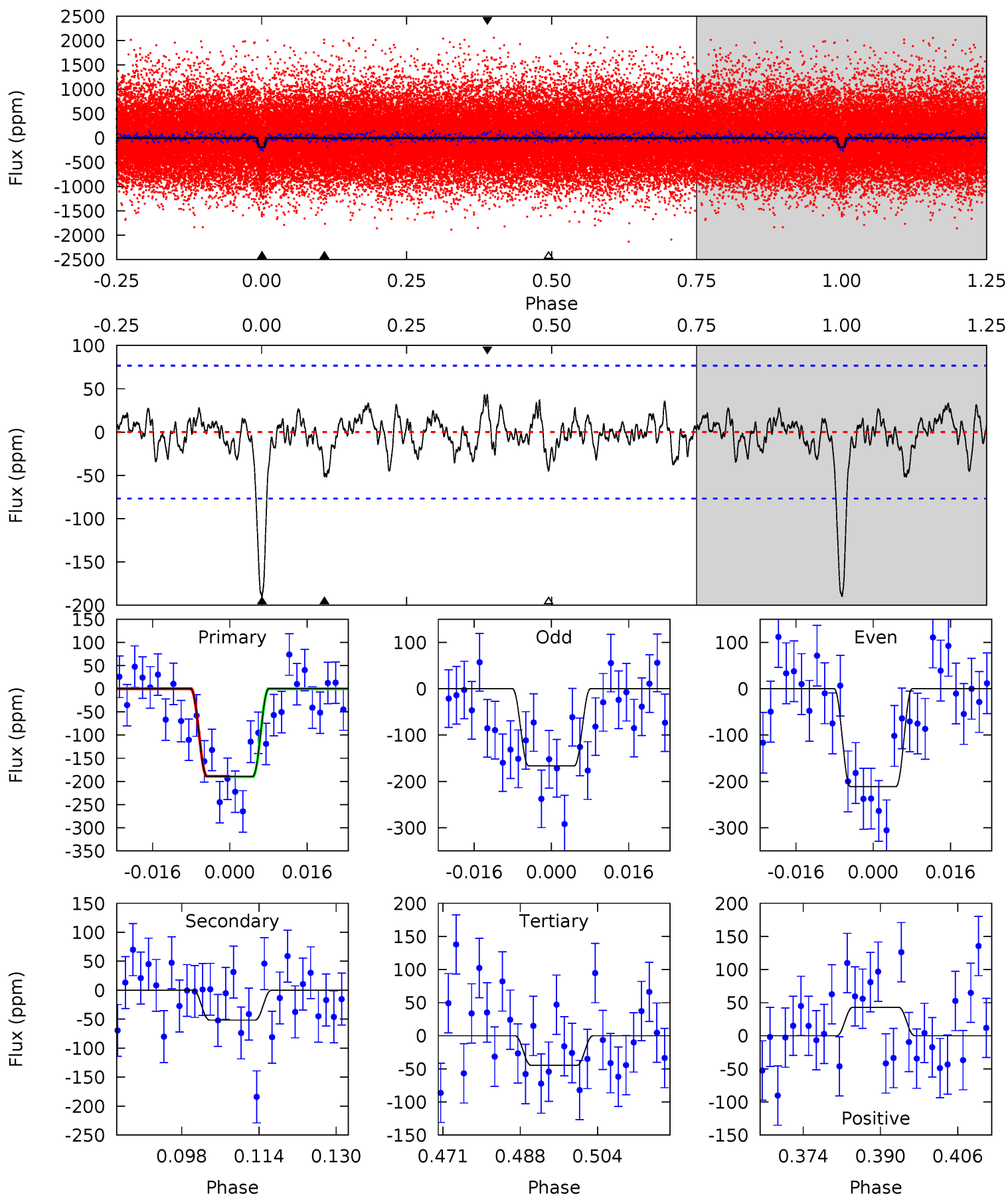
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.9	3.20	2.97	3.01	4.90	2.34	1.03	8.95	8.91	0.23	0.19	1.12	1.03	0.20	0.60



# Alt Model-Shift Uniqueness Test

009278216-01, P = 9.452605 Days, E = 126.333307 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
12.2	3.31	2.88	2.76	4.93	2.40	0.99	9.30	9.42	0.44	0.55	1.44	1.19	0.18	0.05



### Stellar Parameters For KIC 009278216

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5973^{+160}_{-178}$	$4.547^{+0.044}_{-0.187}$	$-0.340^{+0.300}_{-0.300}$	$0.857^{+0.237}_{-0.079}$	$0.945^{+0.098}_{-0.120}$	$2.114^{+0.389}_{-1.044}$
	+3%/-3%	+1%/-4%	+88%/-88%	+28%/-9%	+10%/-13%	+18%/-49%
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 009278216-01 / KOI 4710.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-46 \pm 14$	$1.49^{+1.05}_{-0.90}$	$1185^{+73}_{-54}$	$4175^{+2078}_{-694}$	$79^{+428}_{-52}$
Alt.	$-52 \pm 16$	$1.53^{+1.03}_{-0.87}$	$1187^{+82}_{-52}$	$4252^{+1904}_{-753}$	$82^{+393}_{-56}$

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



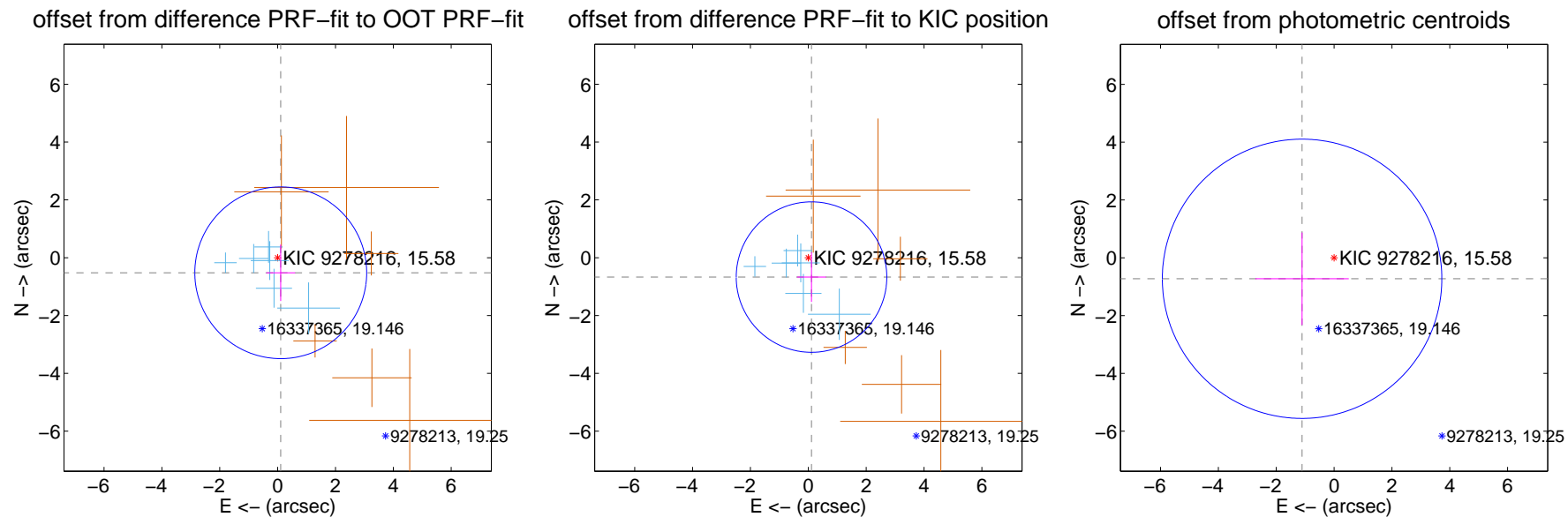
## DV Centroid Data

Supplemental centroid analysis for 009278216-01. Kepler magnitude: 15.58. Transit SNR 9.82

There are 6 quarters with good PRF difference image offsets

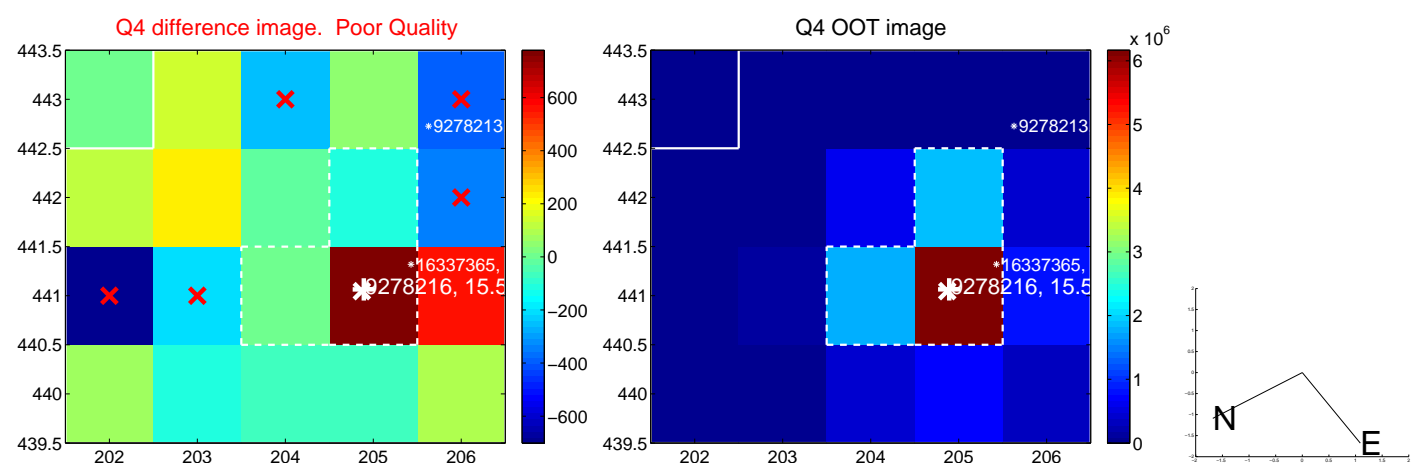
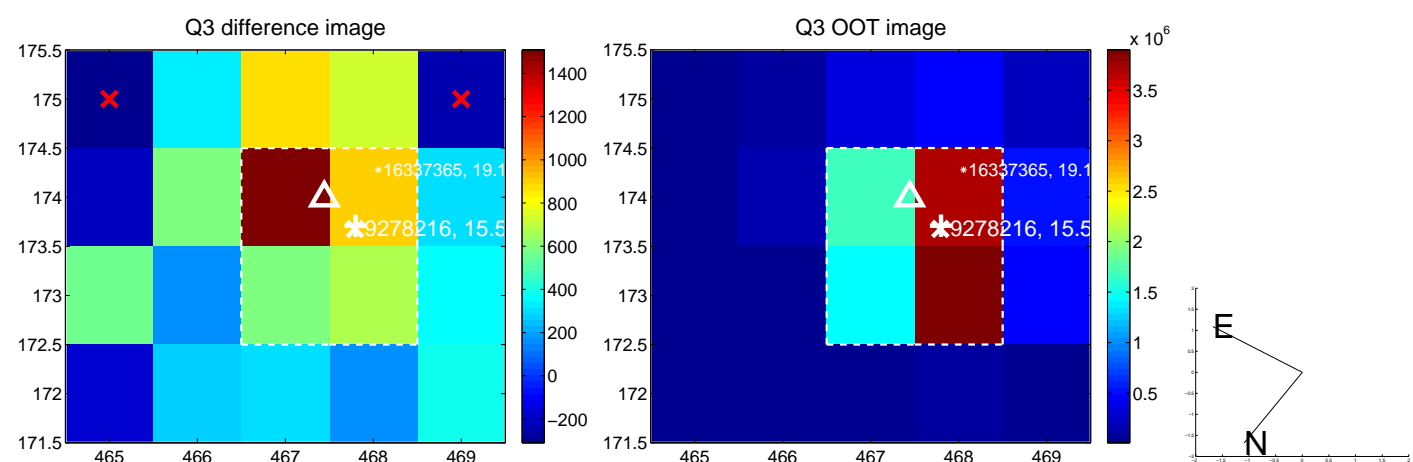
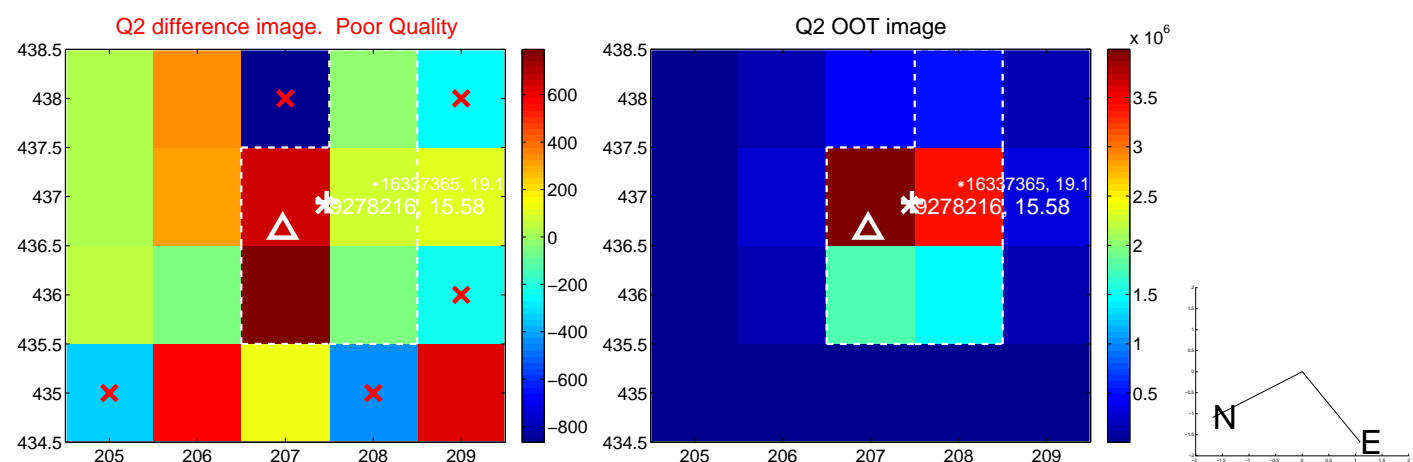
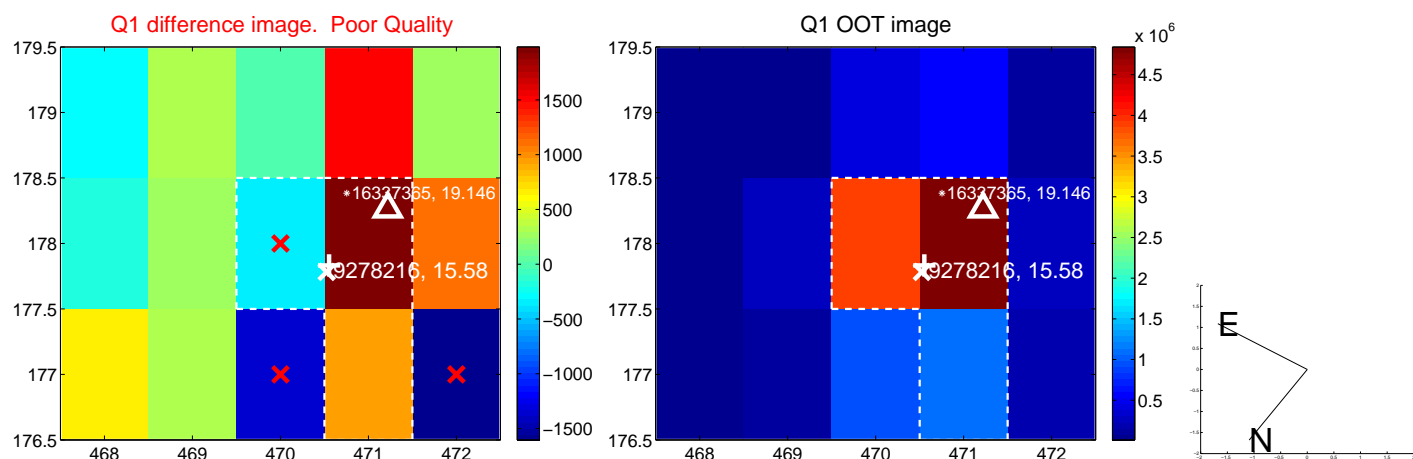
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.532 \pm 0.990$	0.54	$-0.108 \pm 0.498$	$-0.521 \pm 0.978$
PRF-fit source offset from KIC position	$0.679 \pm 0.867$	0.78	$-0.111 \pm 0.501$	$-0.670 \pm 0.859$
photometric centroid source offset	$1.32 \pm 1.61$	0.82	$1.11 \pm 1.62$	$-0.73 \pm 1.60$

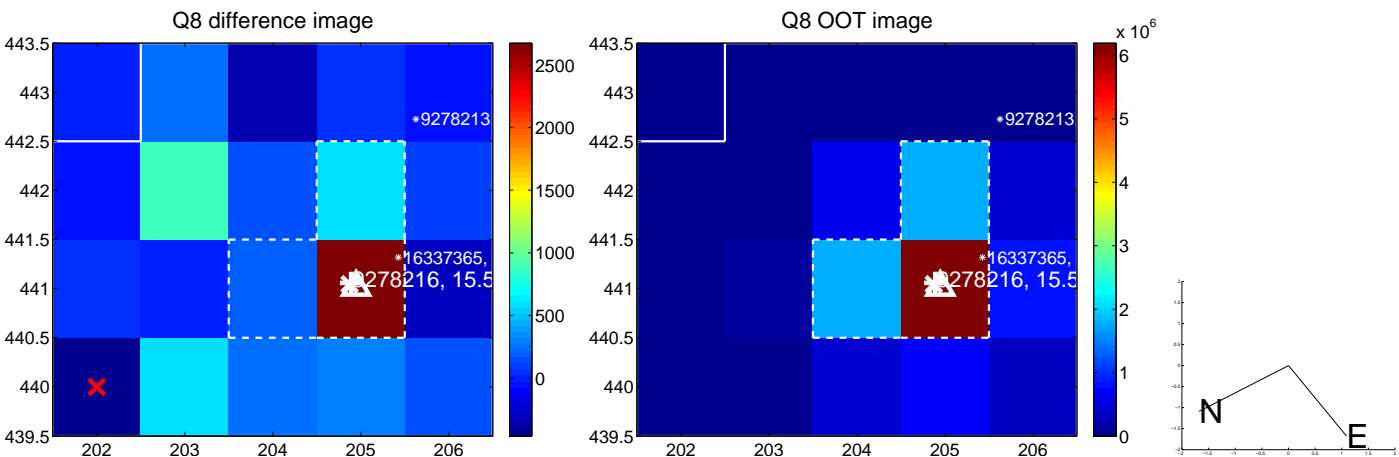
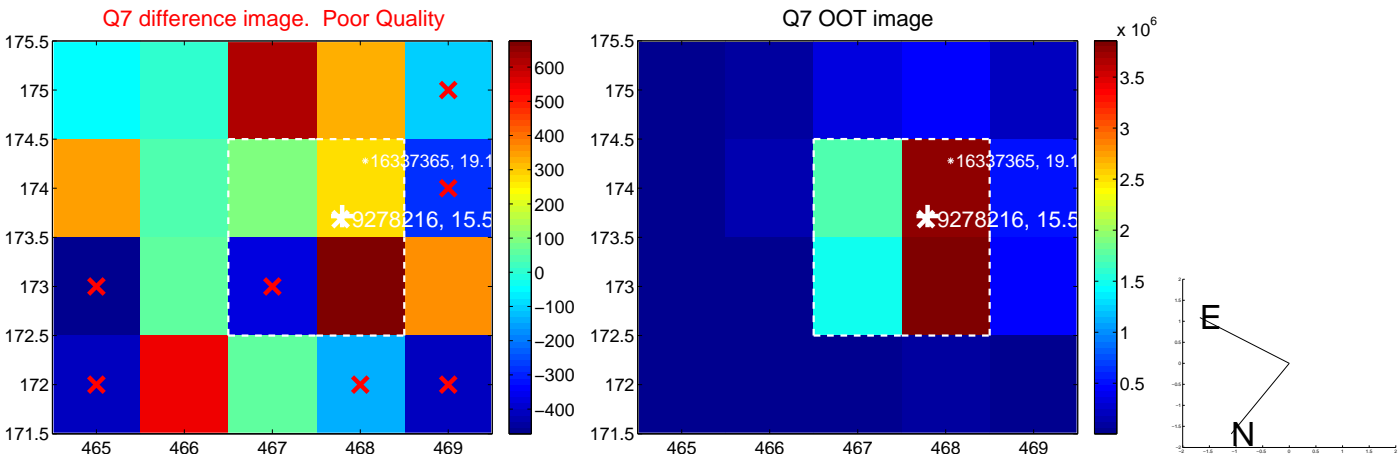
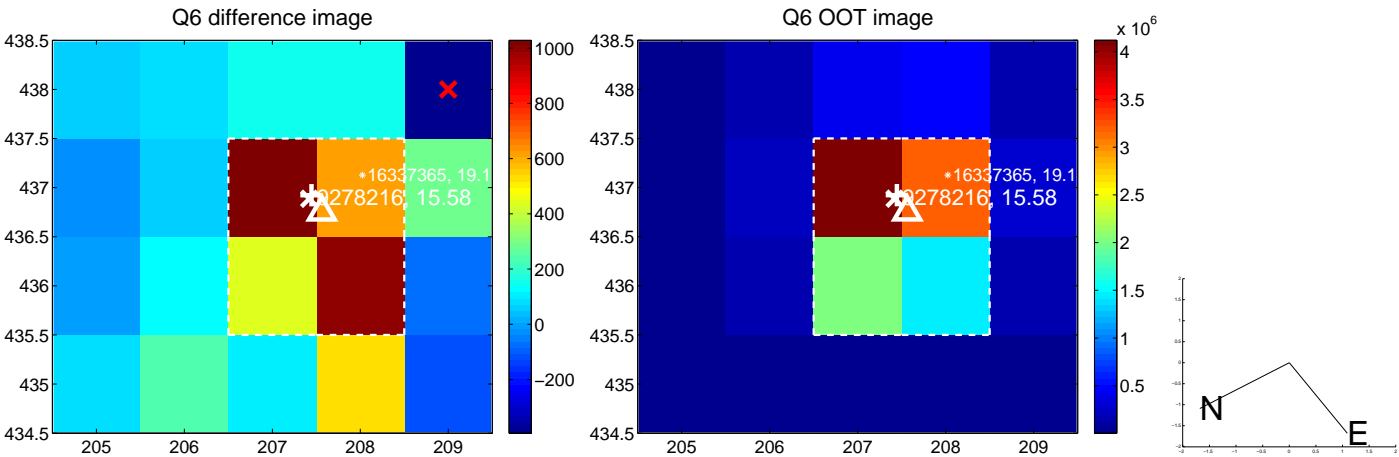
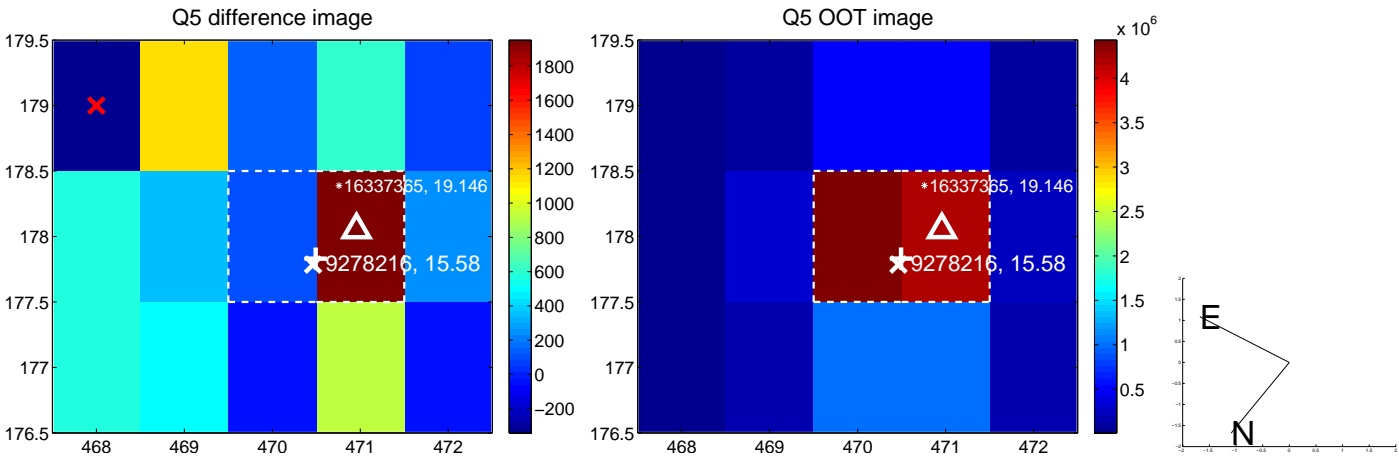


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

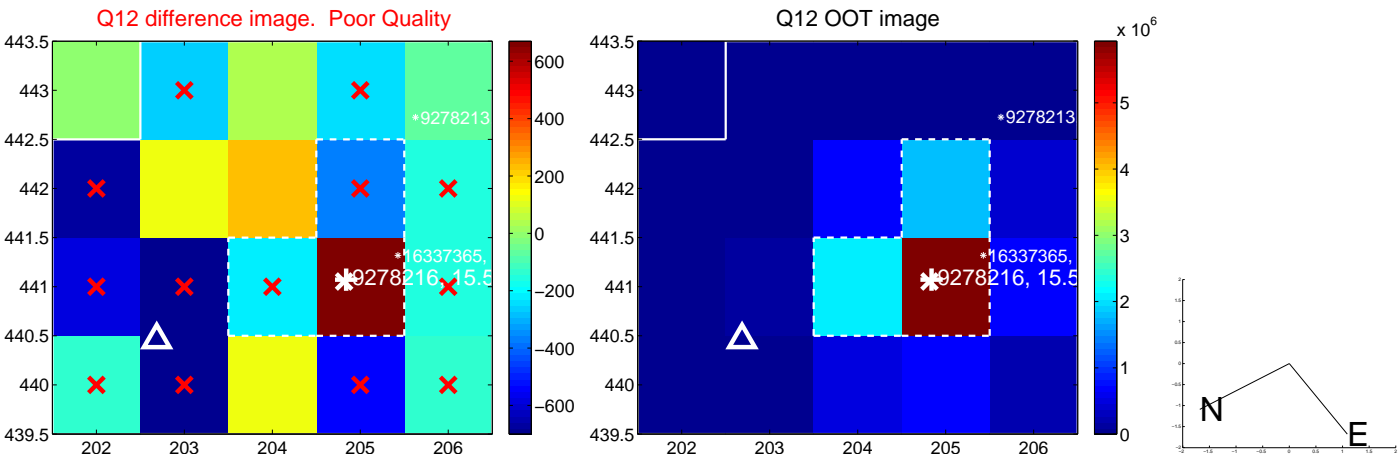
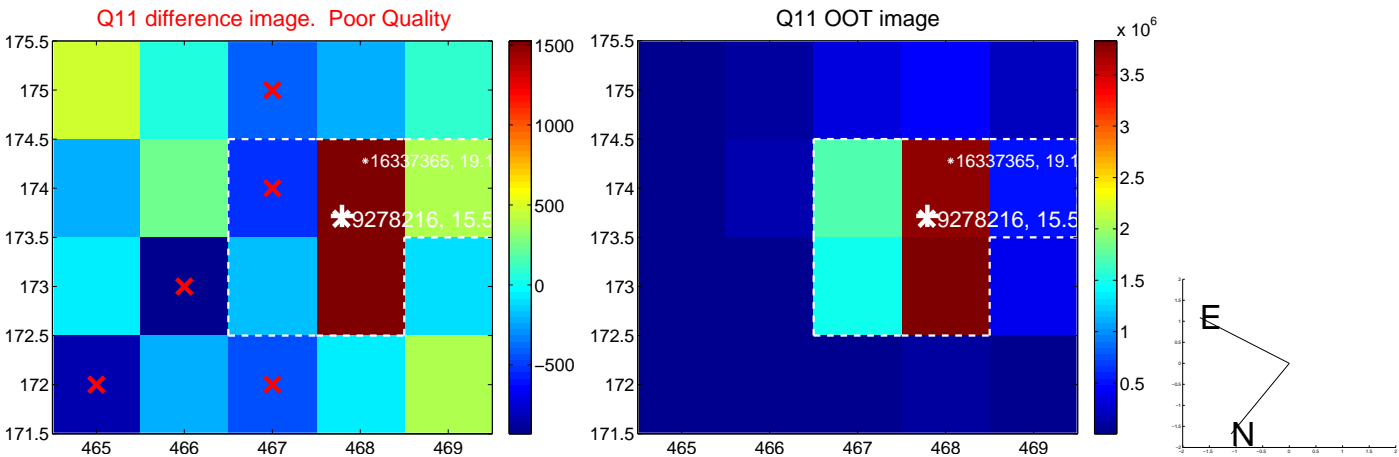
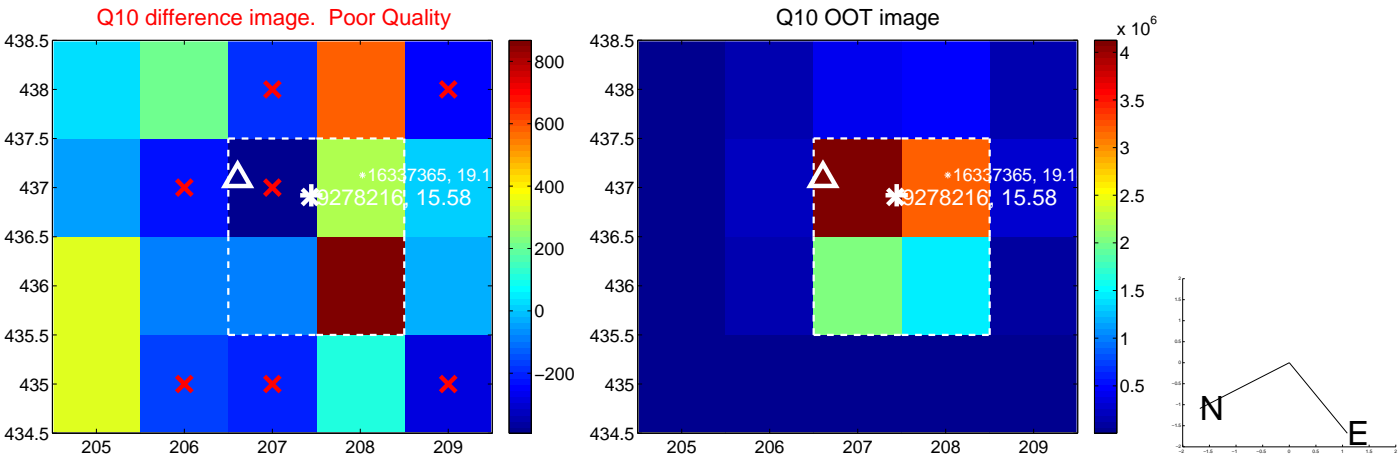
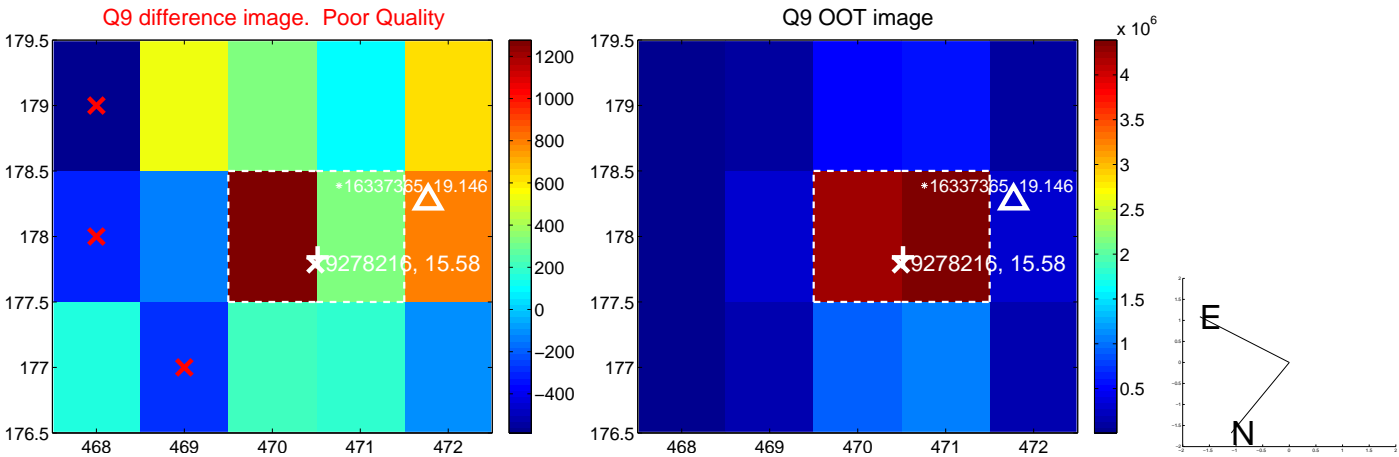
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



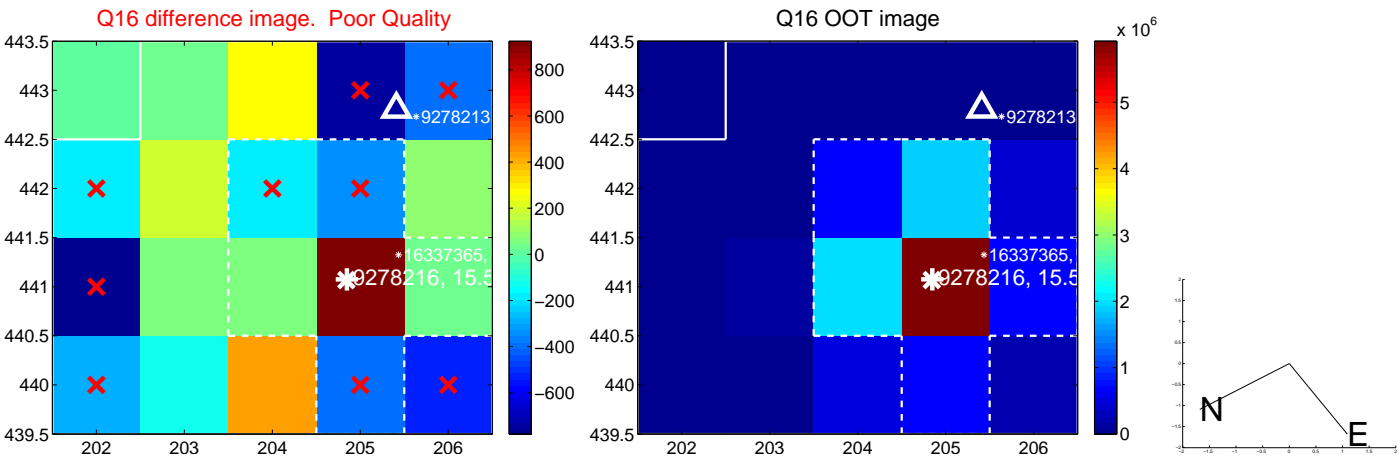
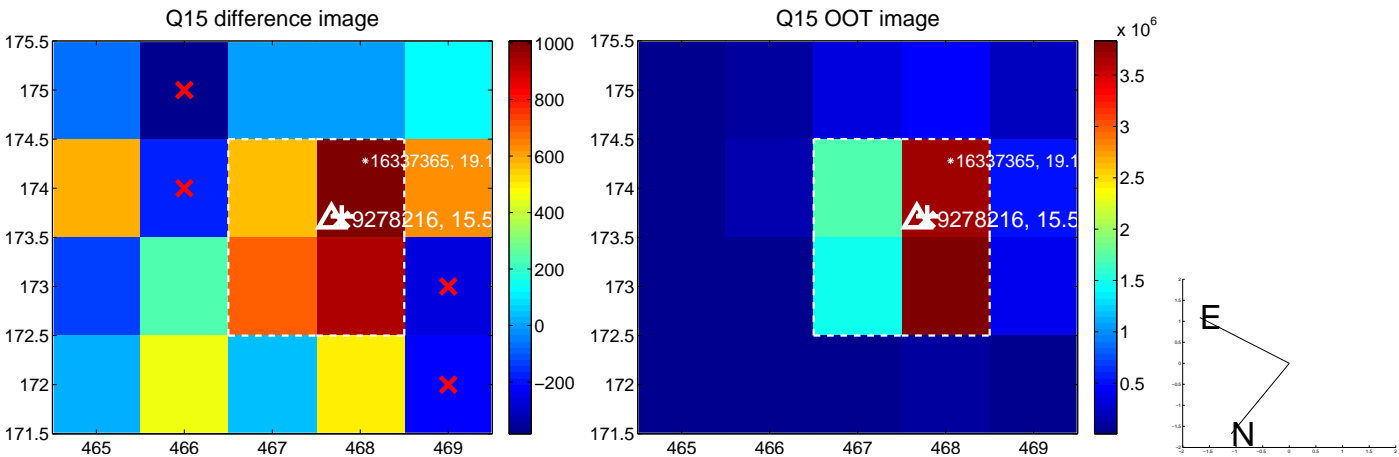
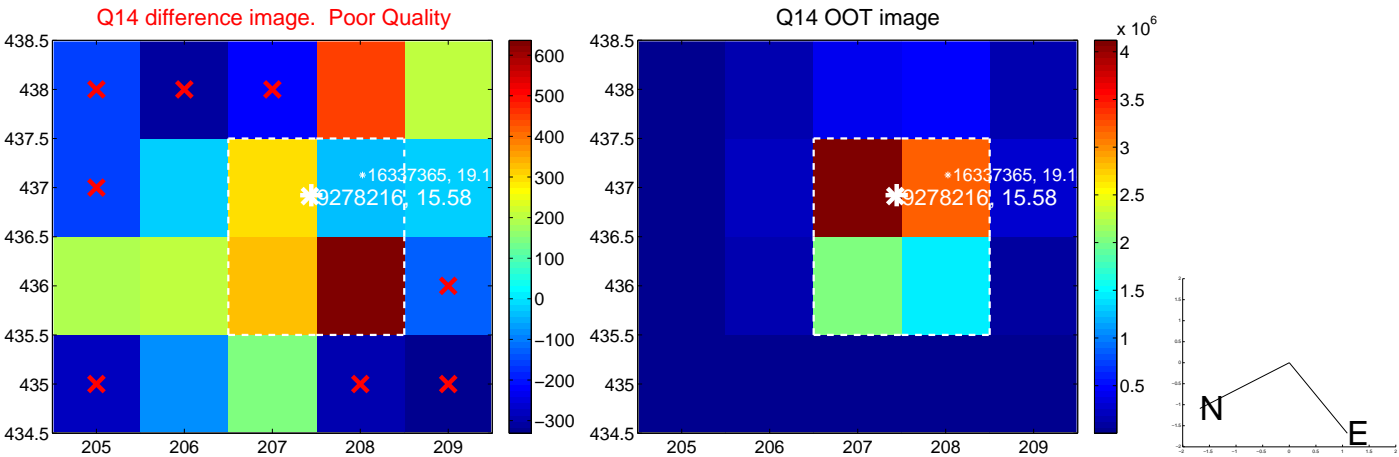
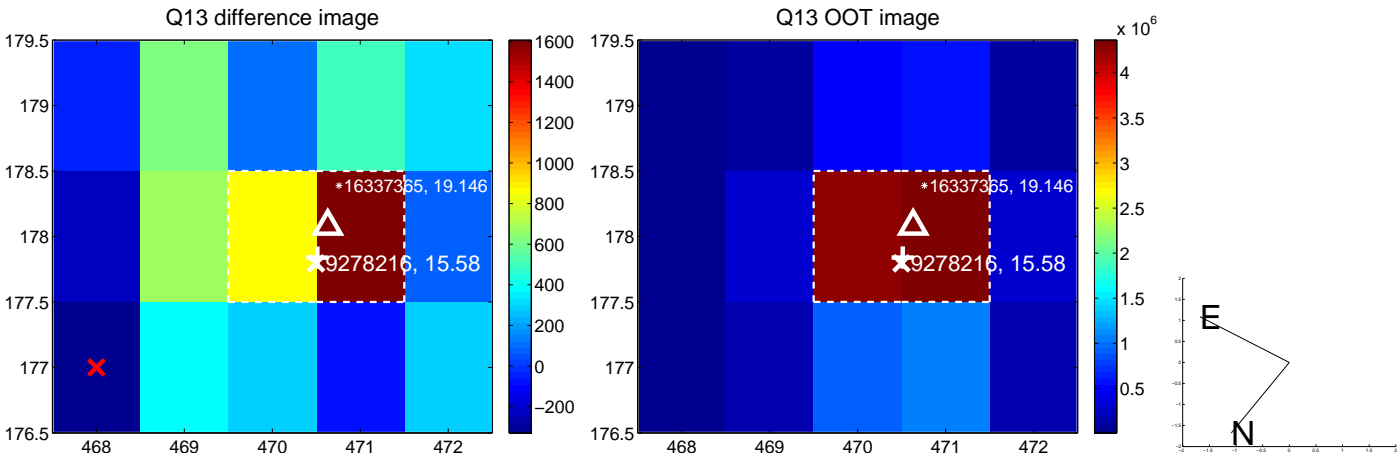
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

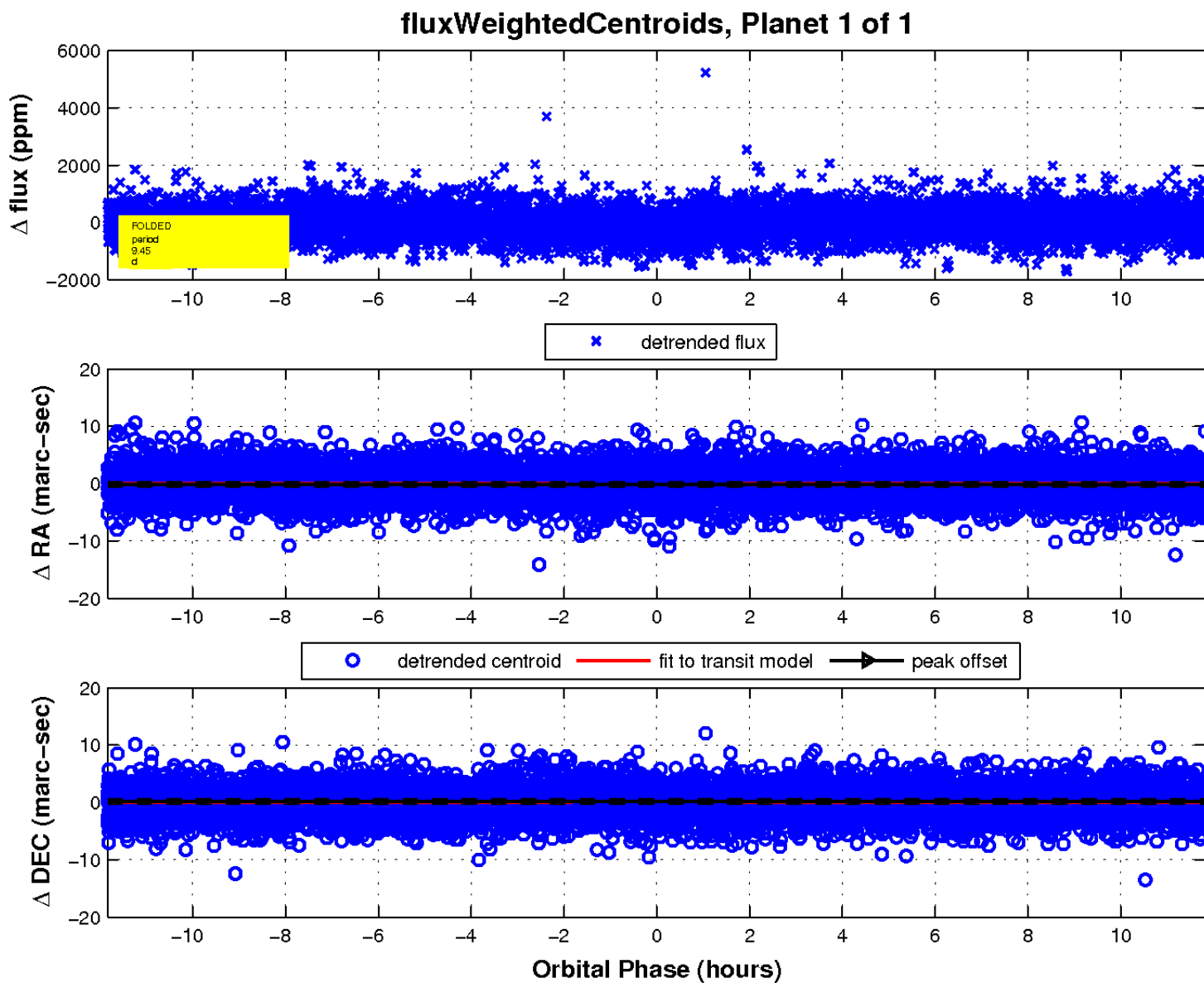
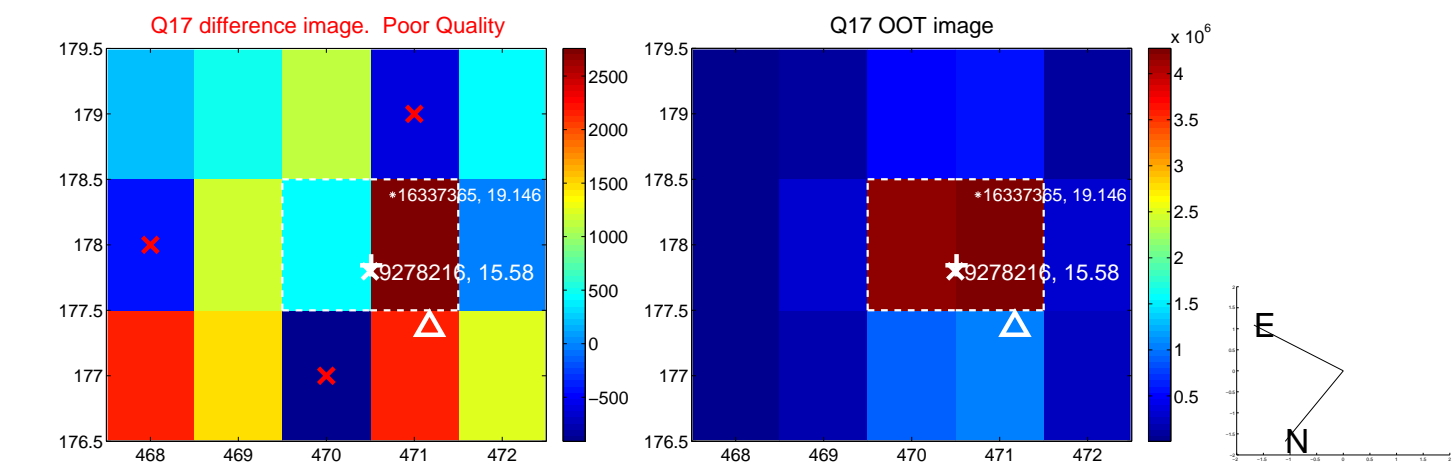


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



# UKIRT Image

Declination

