

# KIC 009138031

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009138031-01	OBS	No	675.259545	222.579244	404.1	18.339	8.7	8.7	1.09	6190	2.41	0.65

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009138031-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

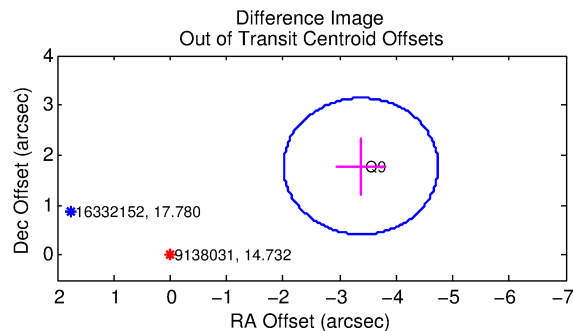
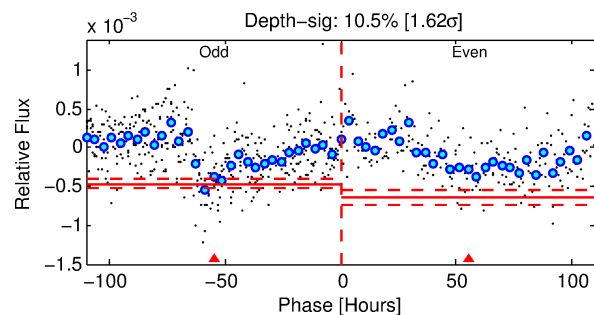
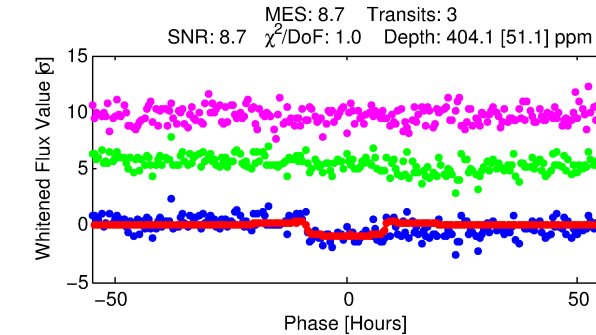
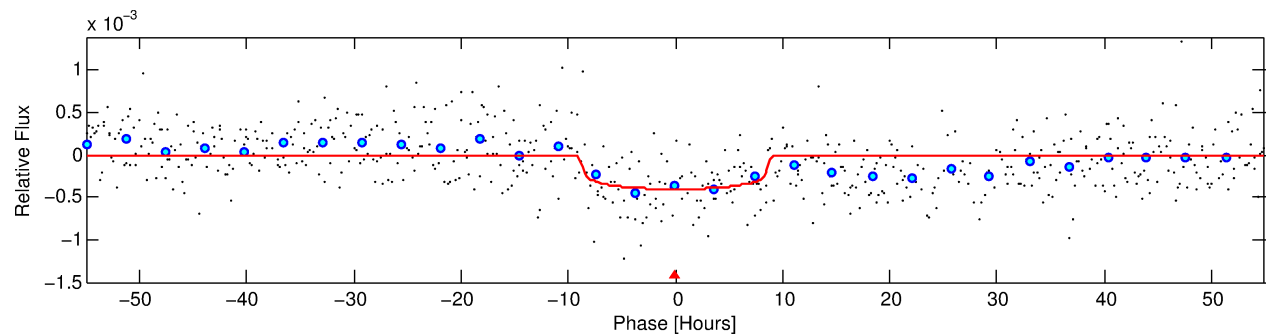
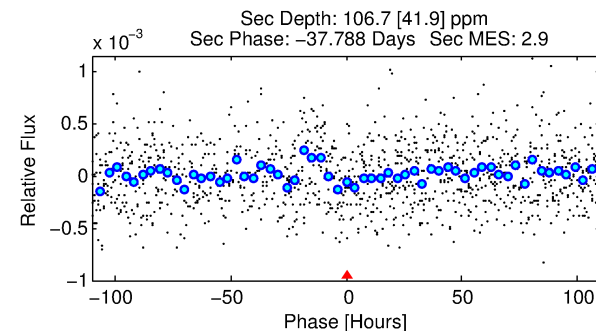
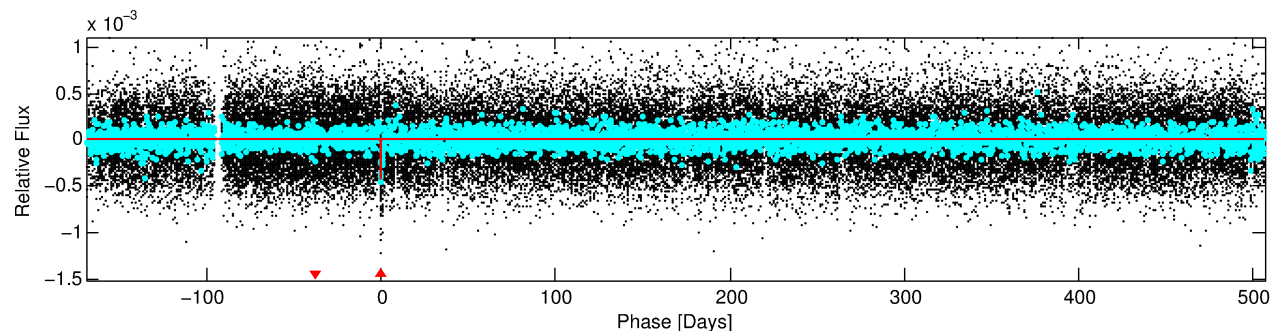
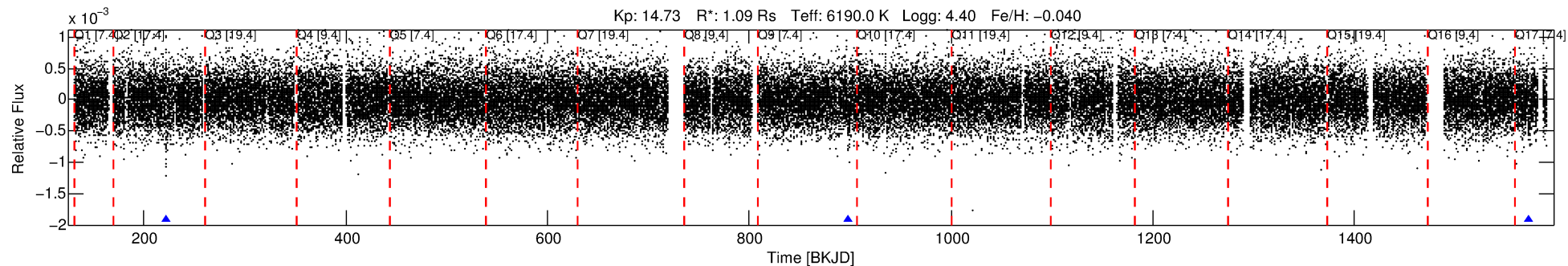
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009138031-01

No Significant Match Found

# DV One-Page Summary

KIC: 9138031 Candidate: 1 of 1 Period: 675.260 d



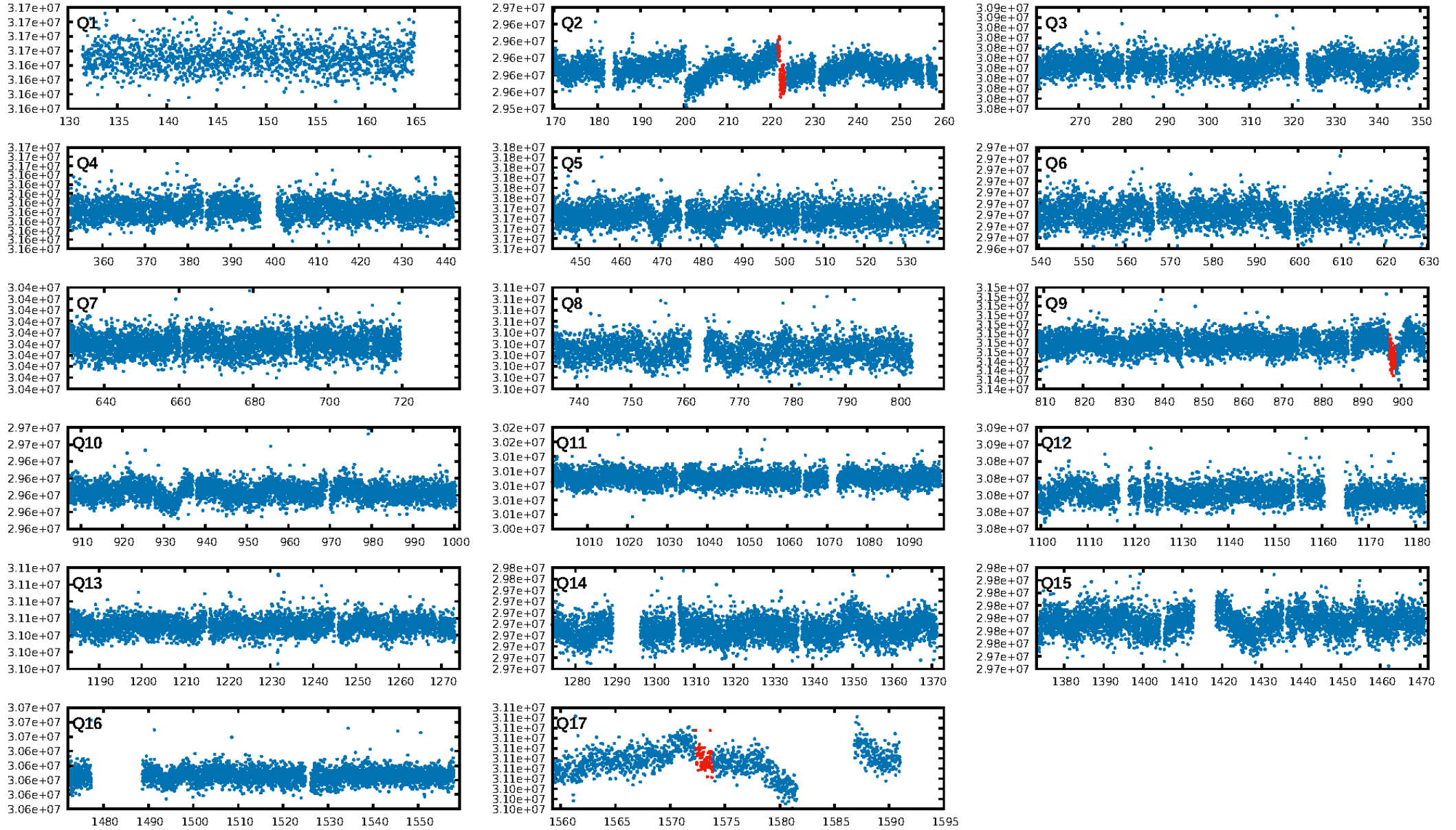
## DV Fit Results:

Period = 675.25954 [0.01657] d  
Epoch = 222.5792 [0.0224] BKJD  
Rp/R\* = 0.0203 [0.0036]  
a/R\* = 180.43 [149.11]  
b = 0.79 [0.39]  
Seff = 0.65 [0.27]  
Teff = 229 [24] K  
Rp = 2.41 [0.90] Re  
a = 1.5518 [0.4277] AU  
Ag = 24314.64 [16131.17] [1.51 $\sigma$ ]  
Teffp = 4413 [606] K [6.90 $\sigma$ ]

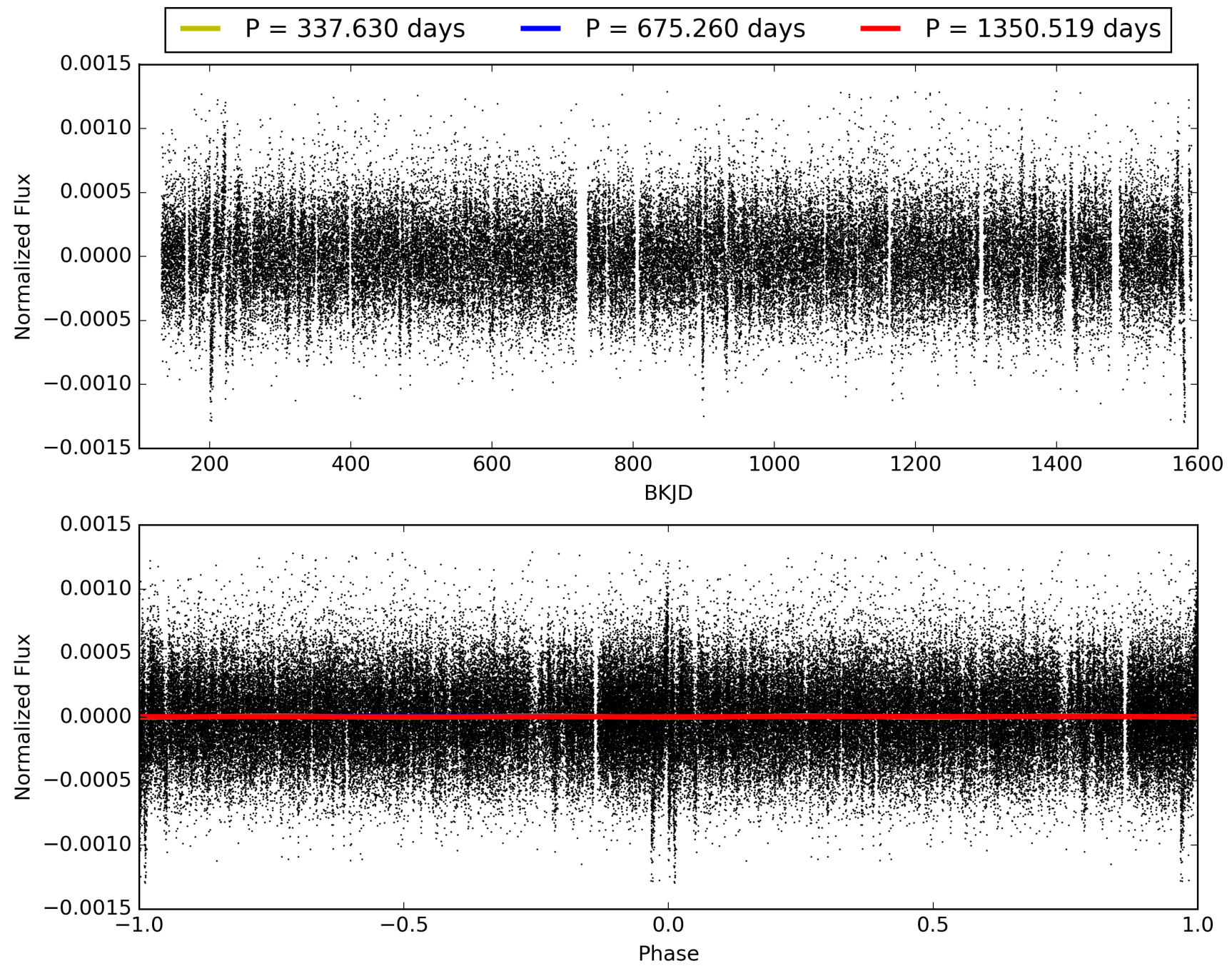
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 2.8%  
ModelChiSquareGof-sig: 99.9%  
Bootstrap-pfa: 4.67e-19  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: 2.59  
Centroid-sig: 92.3%  
Centroid-so: 0.801 arcsec [0.63 $\sigma$ ]  
OotOffset-rm: 3.813 arcsec [8.37 $\sigma$ ]  
KicOffset-rm: 3.817 arcsec [8.51 $\sigma$ ]  
OotOffset-st: 0/0/0/1 [1]  
KicOffset-st: 0/0/0/1 [1]  
DiffImageQuality-fgm: 0.00 [0/1]  
DiffImageOverlap-fno: 1.00 [2/2]

# TCE 009138031-01, PDC Light Curves

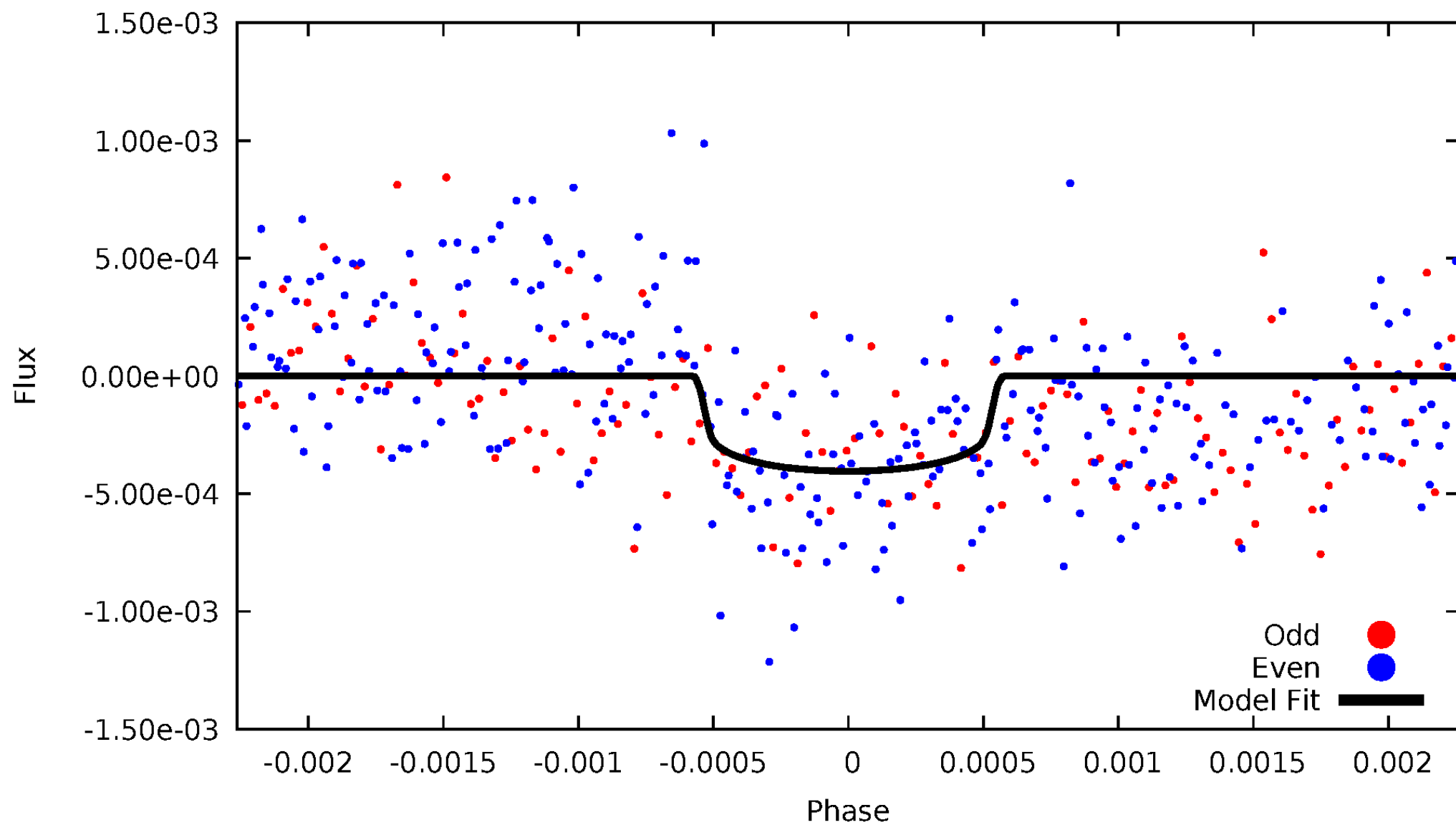


TCE 009138031-01



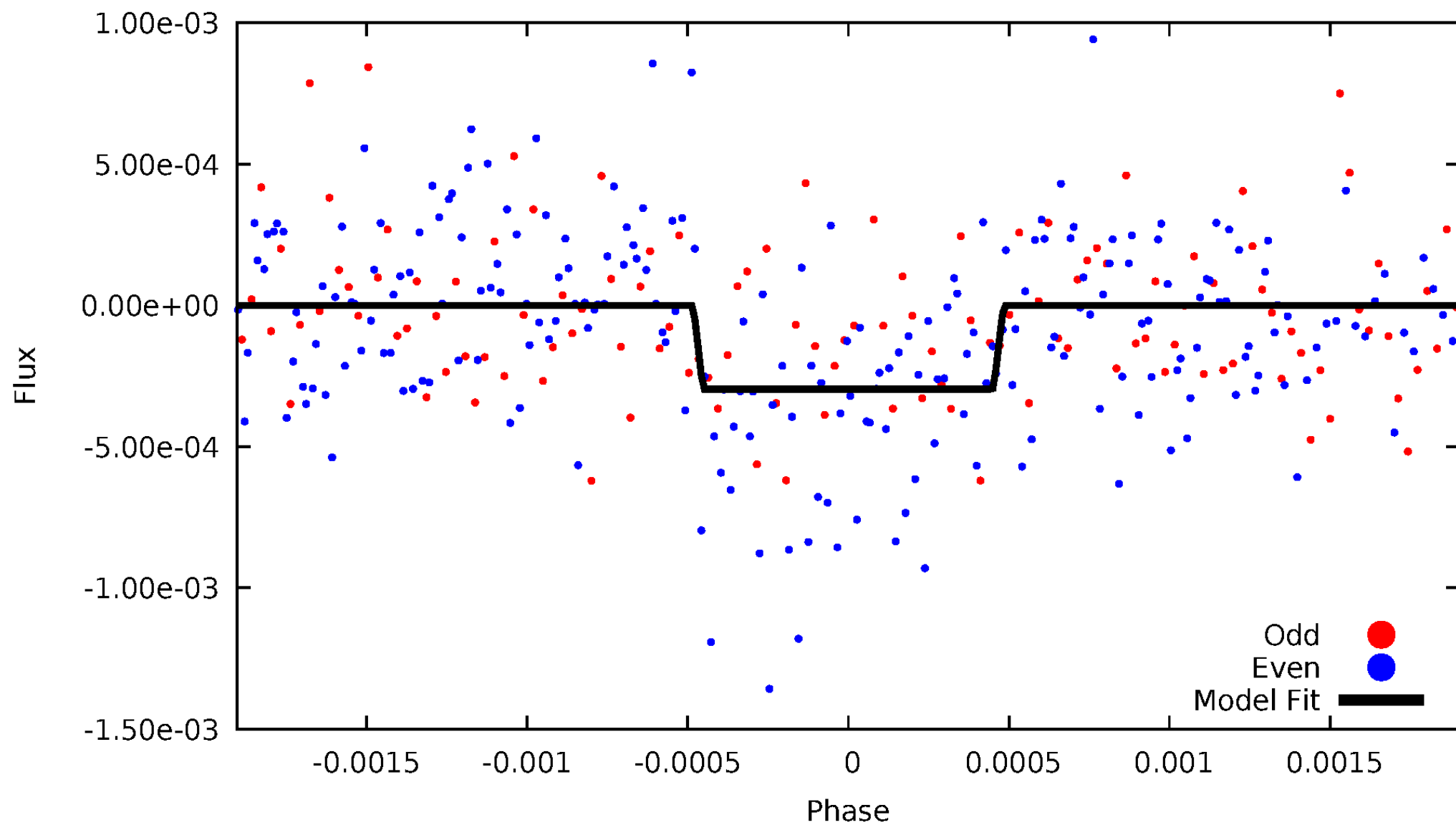
# DV Odd/Even

TCE 009138031-01



# ALT Odd/Even

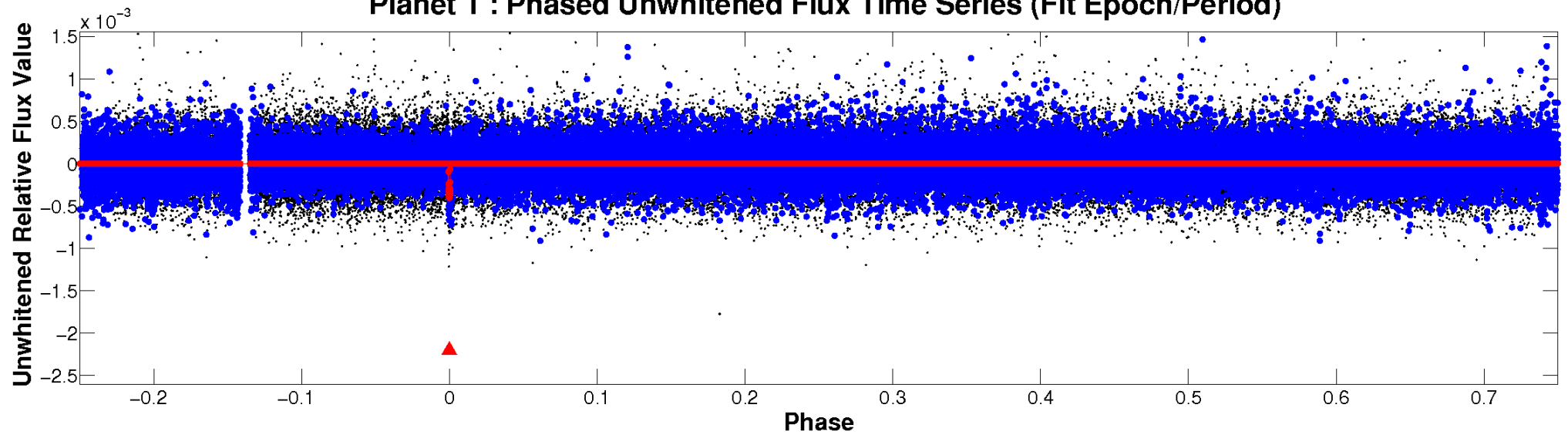
TCE 009138031-01



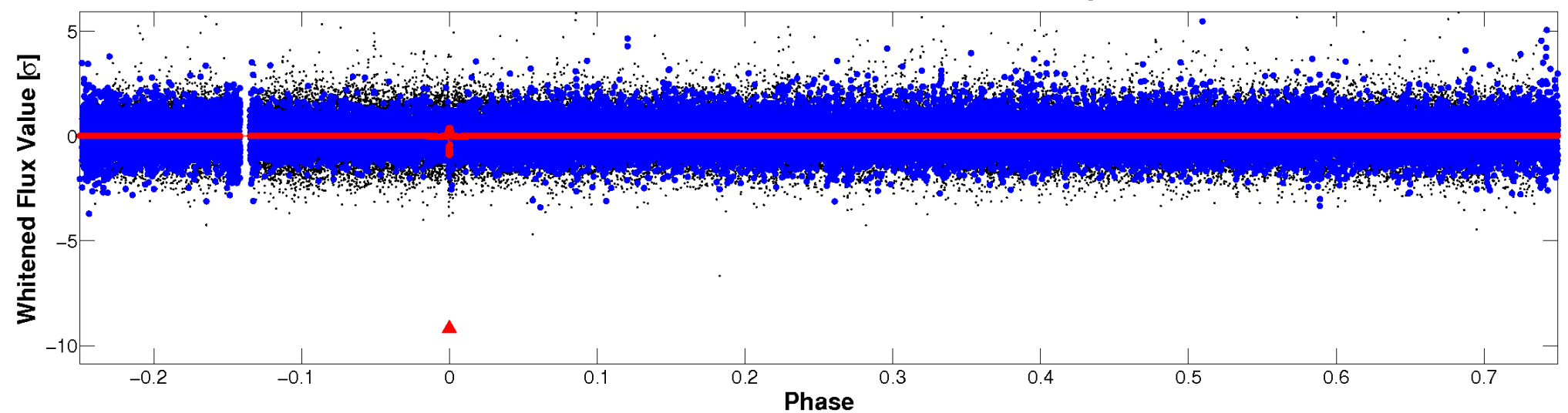


# Non-Whitened Vs. Whitened Light Curve

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

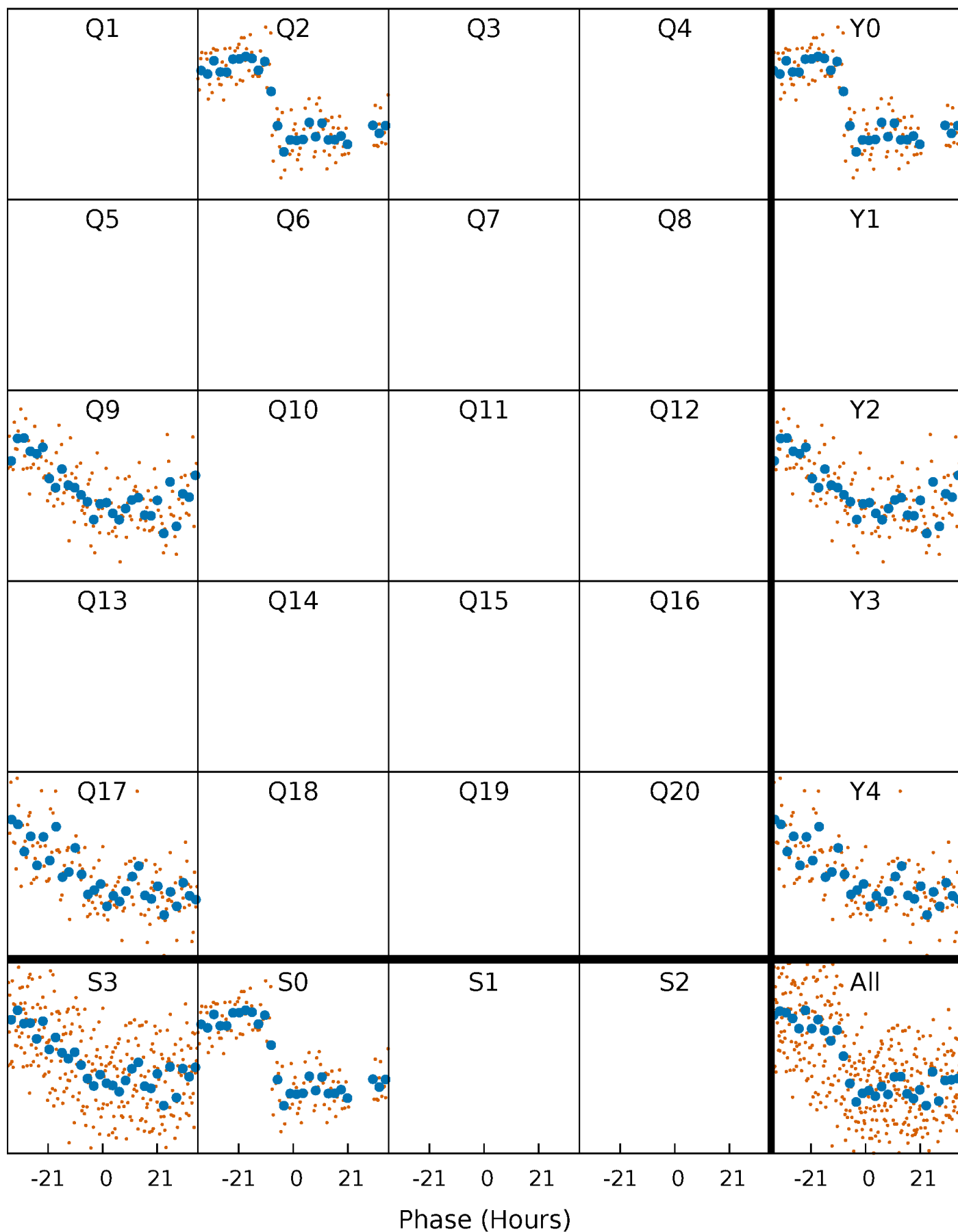


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

TCE 009138031-01 P=675.259545 Days  $T_0=222.579244$  (BKJD)





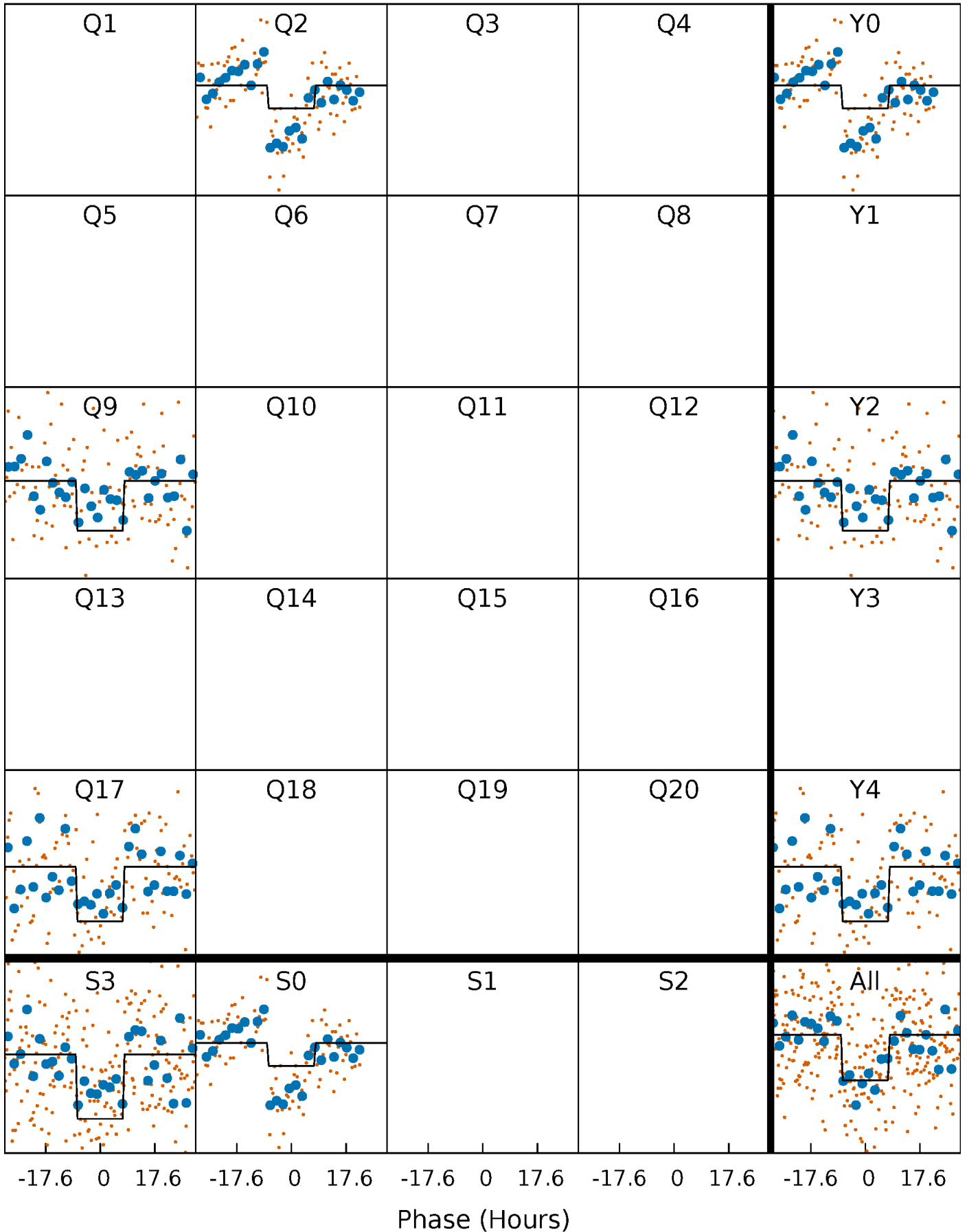
# DV Quarter-Phased Transit Curves

TCE 009138031-01 P=675.259545 Days  $T_0=222.579244$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

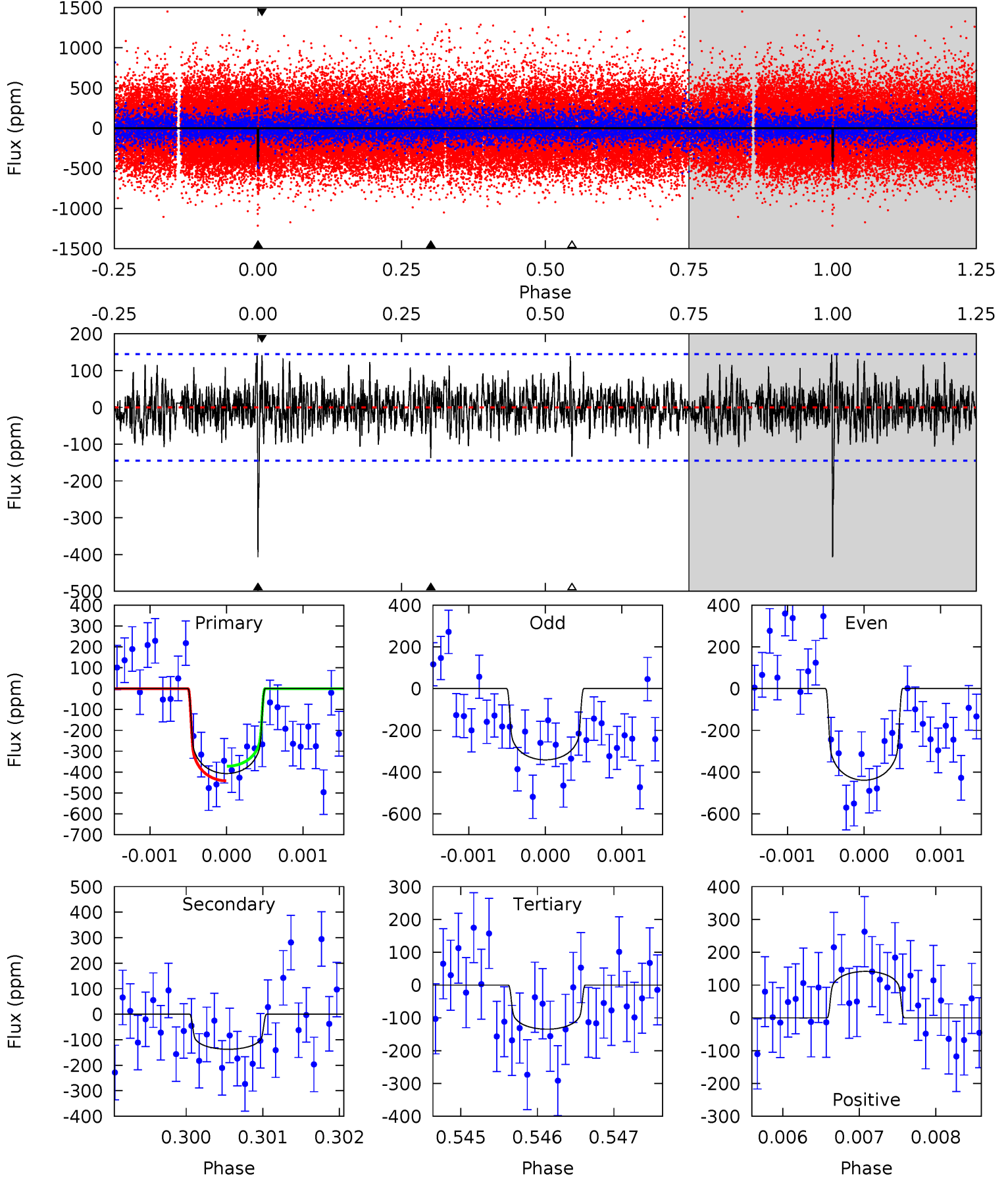
TCE 009138031-01 P=675.295102 Days  $T_0=222.548049$  (BKJD)



# DV Model-Shift Uniqueness Test

009138031-01, P = 675.259545 Days, E = 222.579244 Days

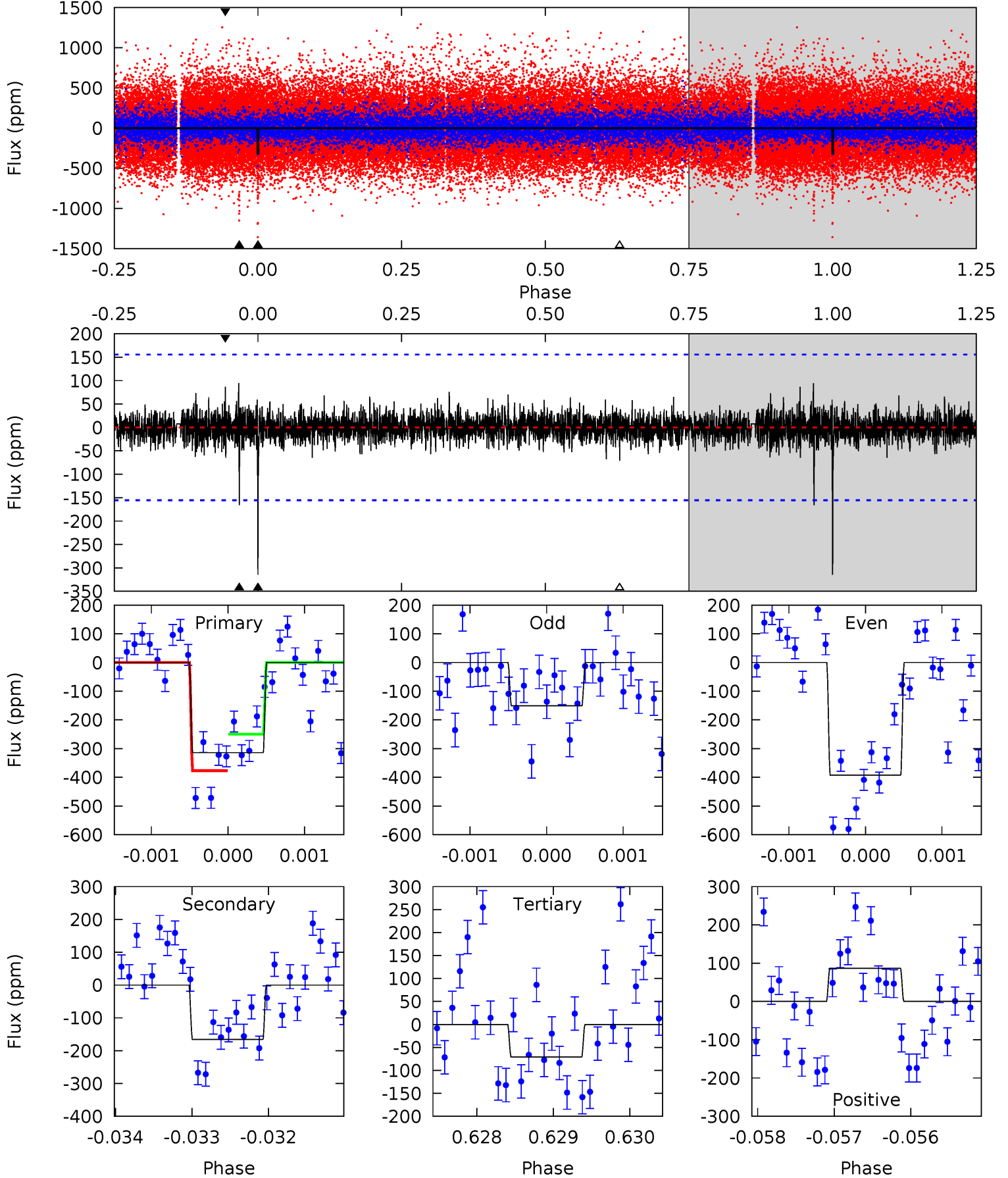
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.2	5.14	5.04	5.30	5.43	3.25	1.47	10.2	9.94	0.10	-0.16	1.72	1.19	0.26	1.30



# Alt Model-Shift Uniqueness Test

009138031-01, P = 675.295102 Days, E = 222.548049 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
11.0	5.81	2.49	3.04	5.46	3.30	0.67	8.52	7.97	3.32	2.77	4.00	1.49	0.23	2.22



### Stellar Parameters For KIC 009138031

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6190^{+185}_{-222}$	$4.404^{+0.072}_{-0.217}$	$-0.040^{+0.250}_{-0.300}$	$1.087^{+0.358}_{-0.128}$	$1.087^{+0.168}_{-0.137}$	$1.193^{+0.377}_{-0.674}$
	+3%/-4%	+2%/-5%	+625%/-750%	+33%/-12%	+15%/-13%	+32%/-57%
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 009138031-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-137 \pm 27$	$2.52^{+0.59}_{-0.54}$	$323^{+23}_{-17}$	$4789^{+516}_{-389}$	$28035^{+18309}_{-10328}$
Alt.	$-166 \pm 29$	$2.11^{+0.58}_{-0.45}$	$326^{+27}_{-18}$	$5387^{+683}_{-497}$	$47675^{+32353}_{-18448}$

$T_{max}$  = 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

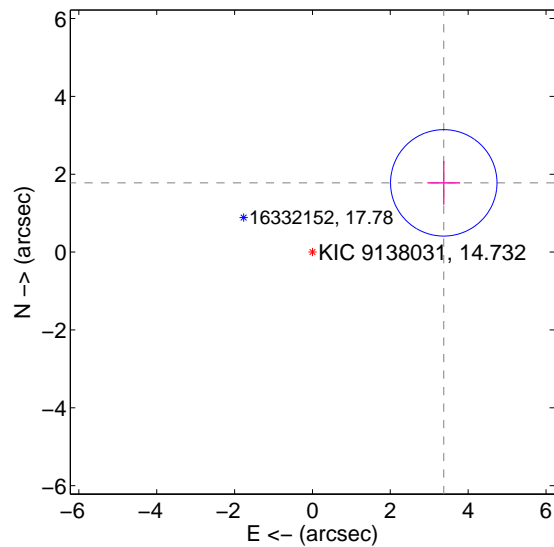
Supplemental centroid analysis for 009138031-01. Kepler magnitude: 14.73. Transit SNR 8.74

There are 0 quarters with good PRF difference image offsets

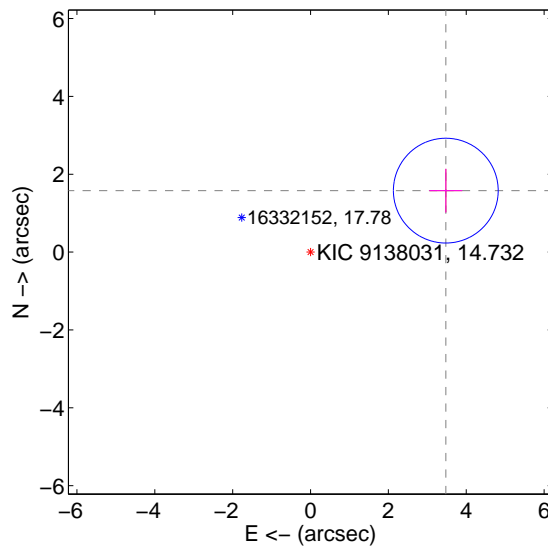
The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.813 \pm 0.456$	8.37	$-3.373 \pm 0.422$	$1.779 \pm 0.562$
PRF-fit source offset from KIC position	$3.817 \pm 0.449$	8.51	$-3.475 \pm 0.422$	$1.579 \pm 0.562$
photometric centroid source offset	$0.80 \pm 1.27$	0.63	$0.62 \pm 1.32$	$-0.51 \pm 1.19$

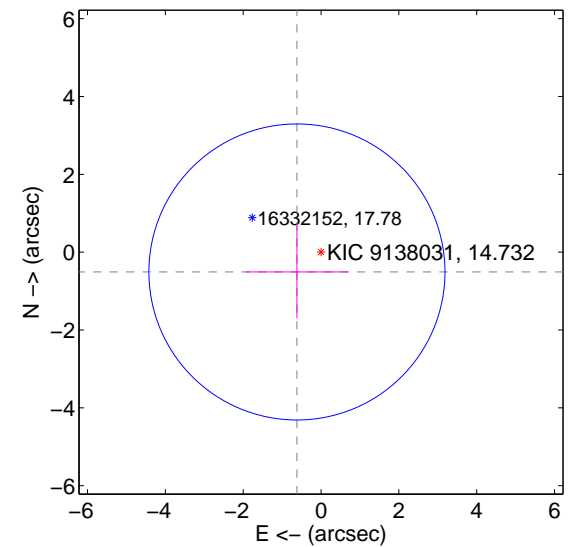
offset from difference PRF-fit to OOT PRF-fit



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.

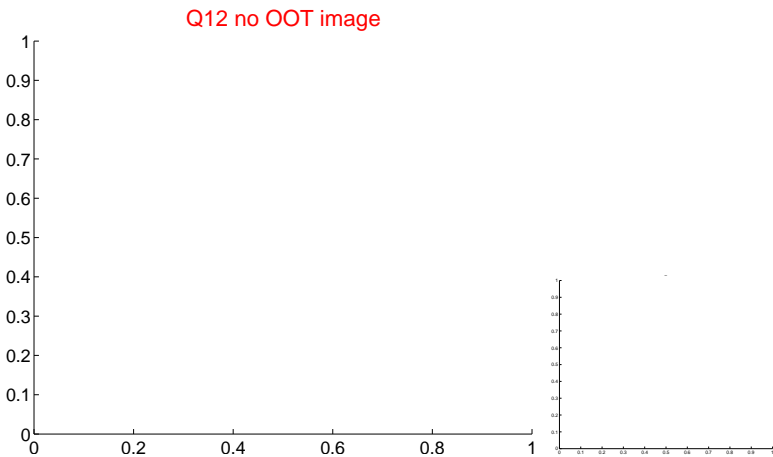
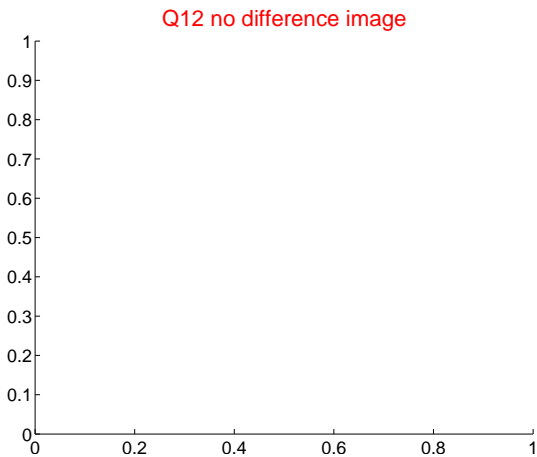
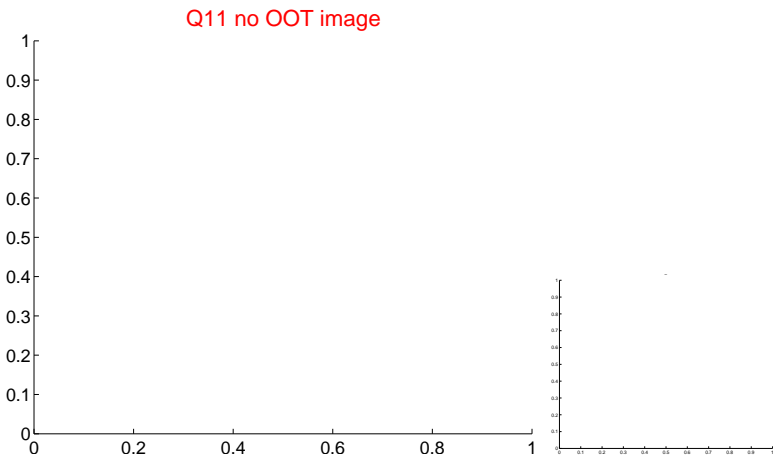
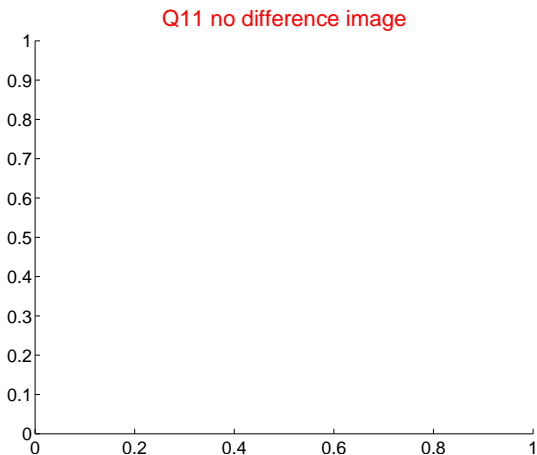
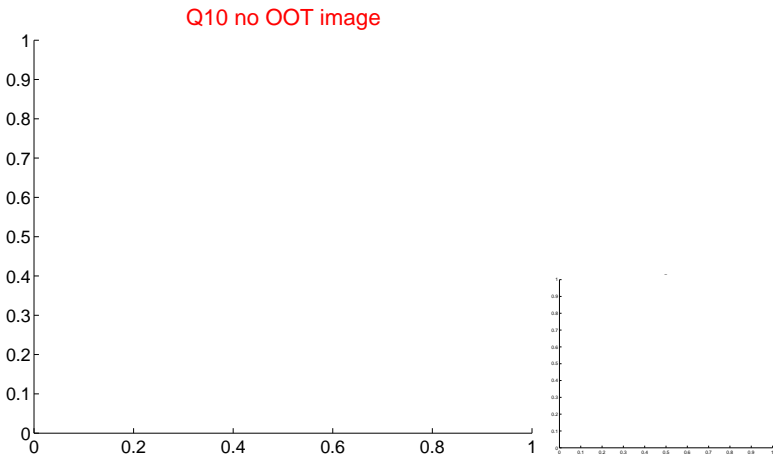
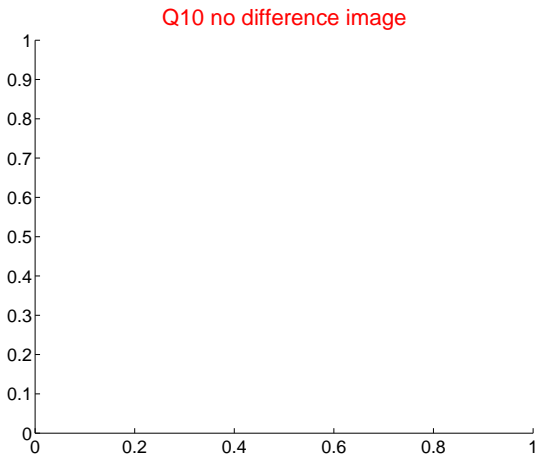
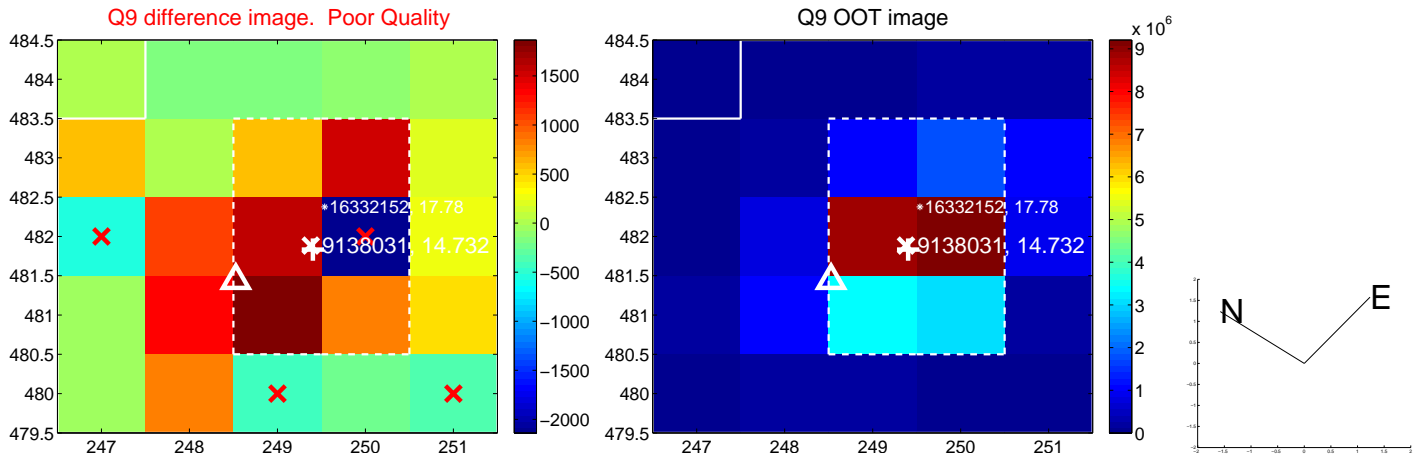




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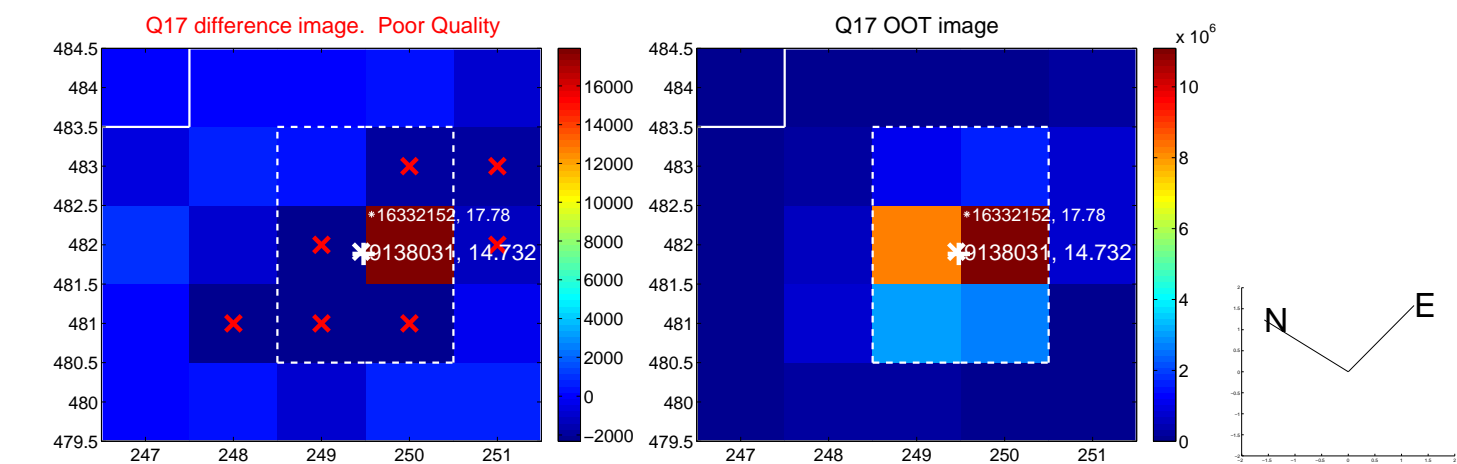
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



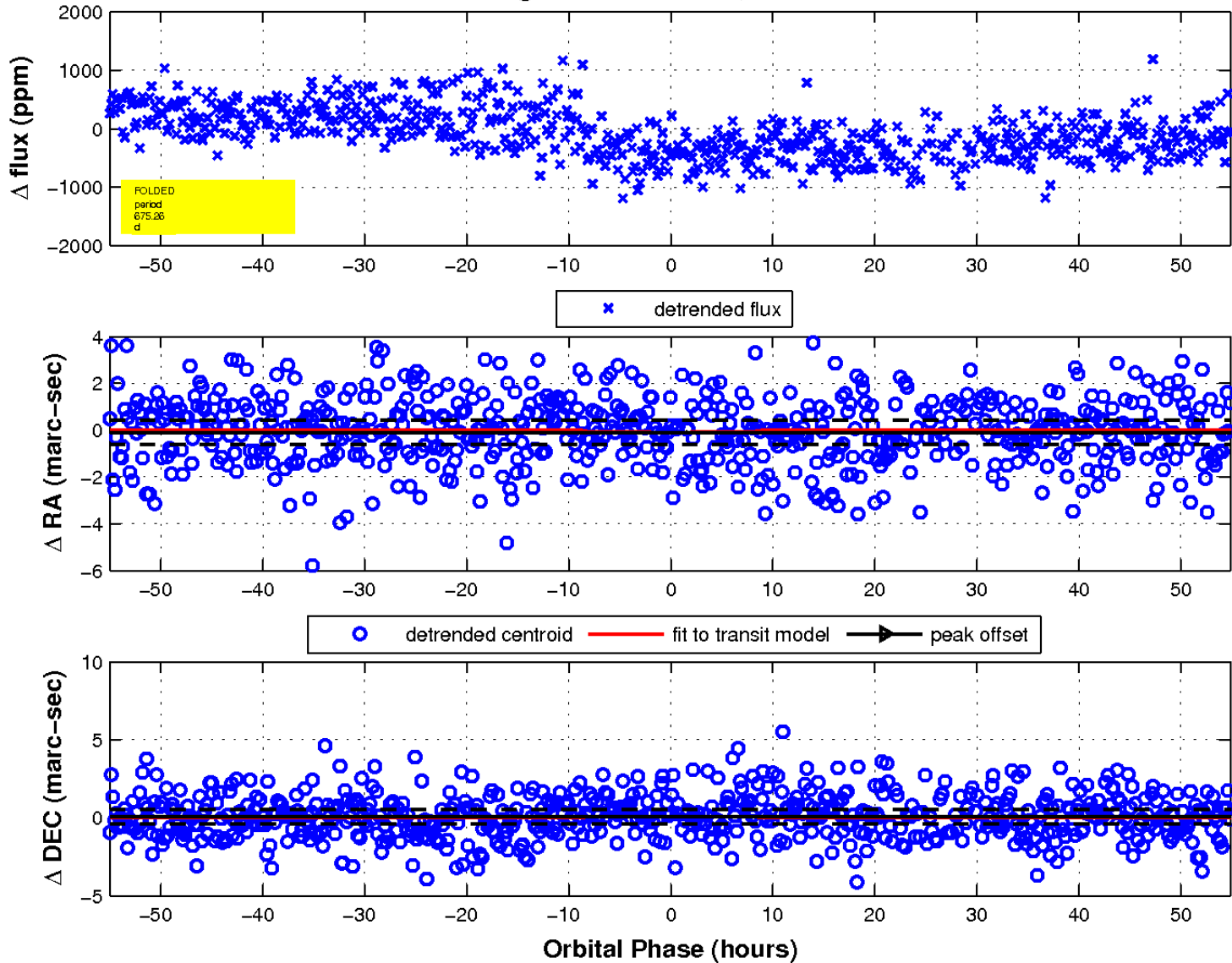
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 1 of 1



UKIRT Image

Declination

