

# KIC 010480921

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010480921-01	OBS	1173.01	2.037410	131.568598	133.2	4.649	23.1	24.9	1.01	6253	1.81	1448.06
010480921-02	OBS	No	368.347881	257.772616	440.1	10.227	7.1	8.7	1.01	6253	2.28	1.42

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010480921-01	OBS	FP	0.00	0	0	1	1	CENT_RESOLVED_OFFSET—EPHEM_MATCH
010480921-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—MOD_NONUNIQ_ALT—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 010480921-01

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	$\sigma_P$	$\sigma_T$
010480921-01	10480921	5797.01	10480952	1:1	33.7	-8	3	12.22	14.19	2479.40	Direct-PRF	0	1.52	0.93

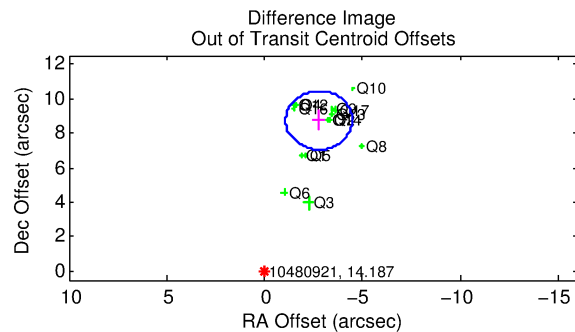
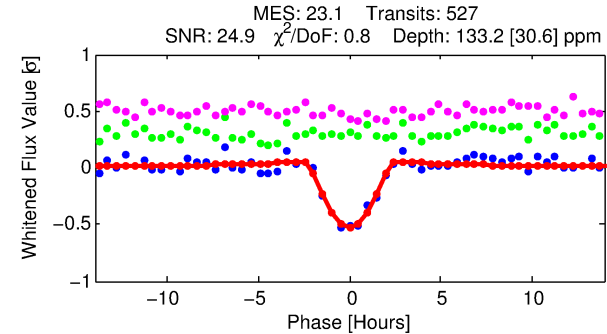
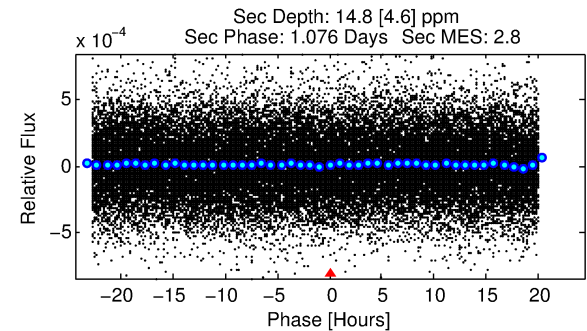
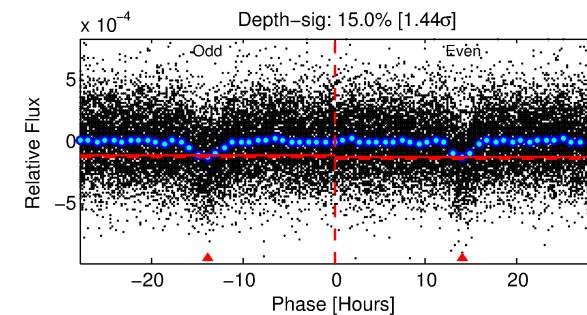
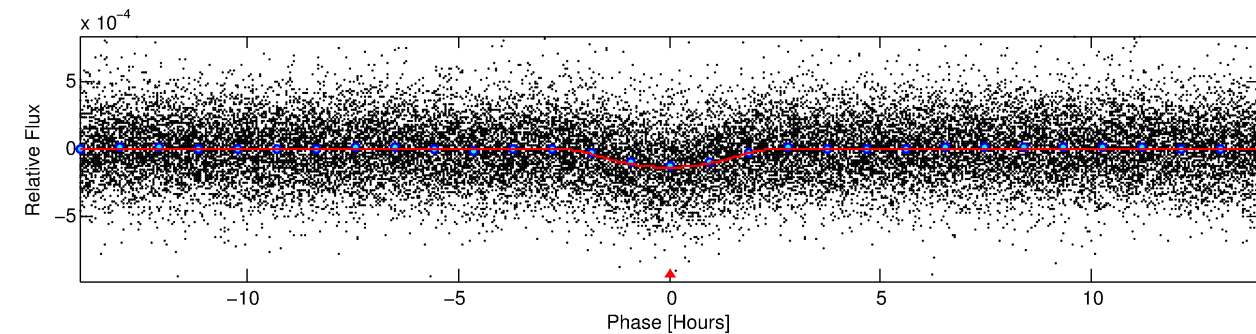
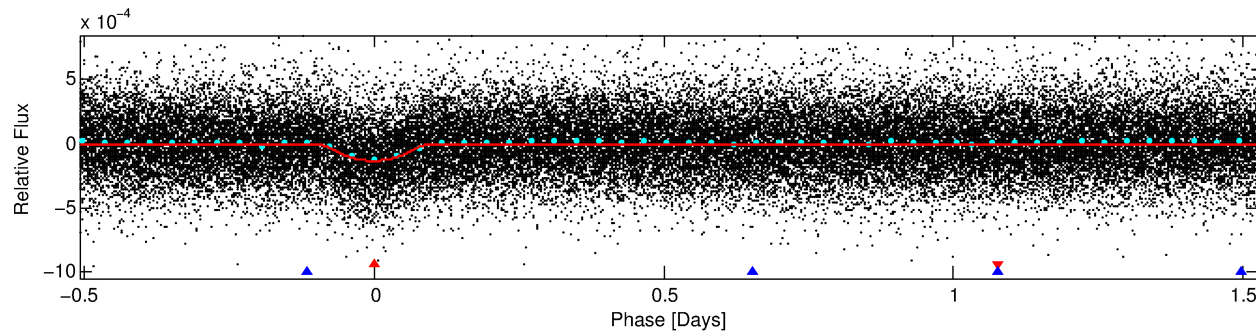
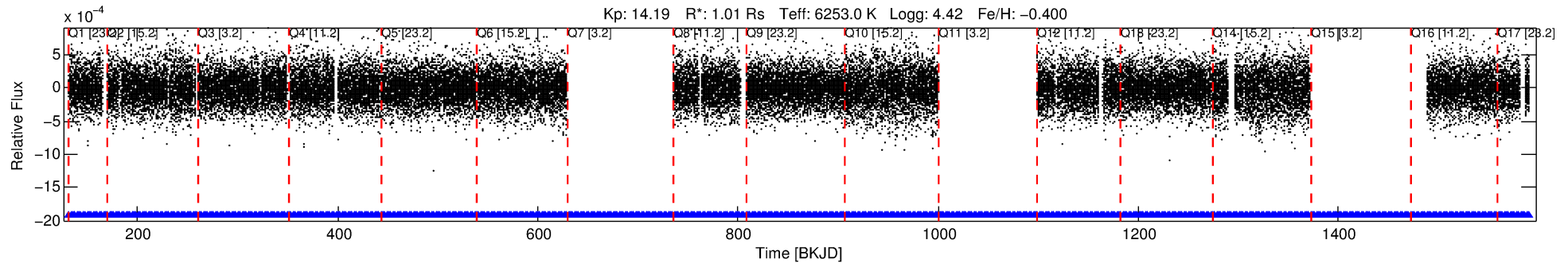
**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  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: 10480921 Candidate: 1 of 2 Period: 2.037 d

KOI: K01173.01 Corr: 0.868

Kp: 14.19 R\*: 1.01 Rs Teff: 6253.0 K Logg: 4.42 Fe/H: -0.400



## DV Fit Results:

Period = 2.03741 [0.00001] d  
Epoch = 131.5686 [0.0031] BKJD  
Rp/R\* = 0.0163 [0.0064]  
a/R\* = 1.25 [0.08]  
b = 0.99 [0.01]  
Seff = 1448.06 [573.10]  
Teq = 1573 [156] K  
Rp = 1.81 [0.90] Re  
a = 0.0312 [0.0080] AU  
Ag = 2.43 [2.24] [0.64σ]  
Teffp = 3036 [648] K [2.20σ]

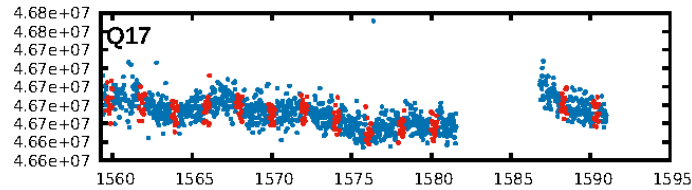
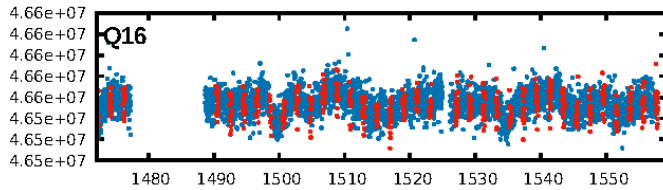
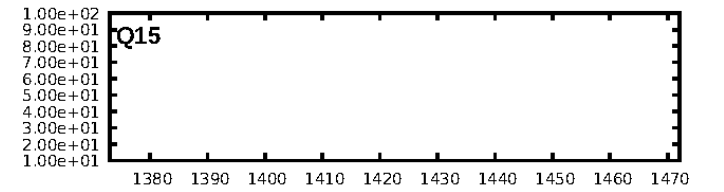
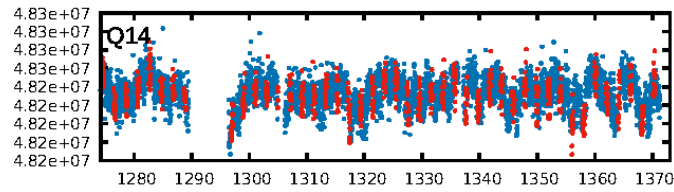
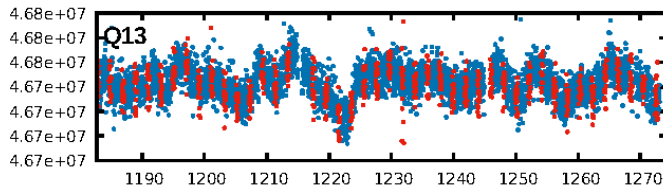
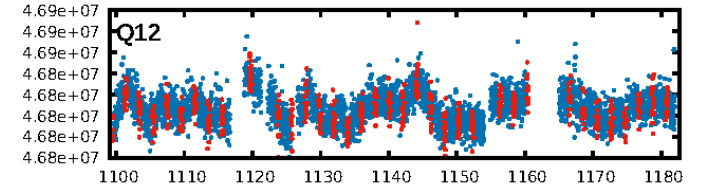
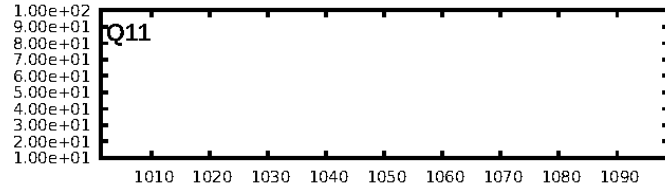
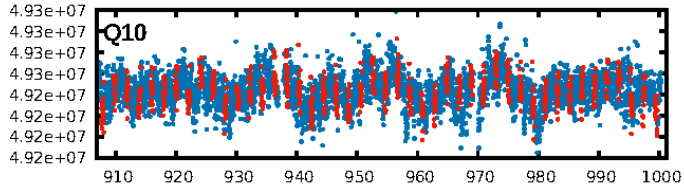
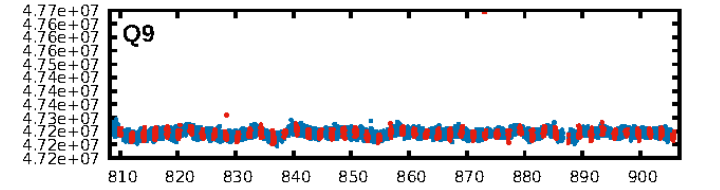
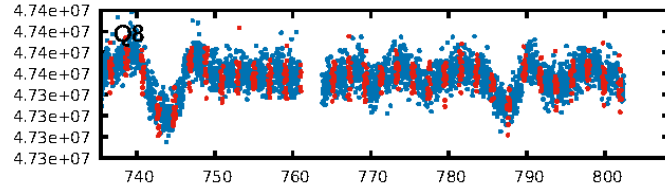
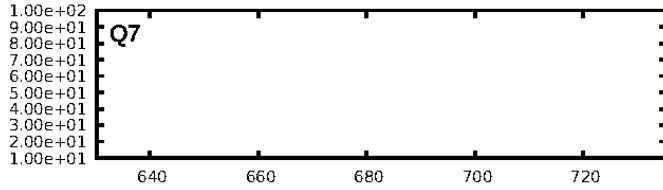
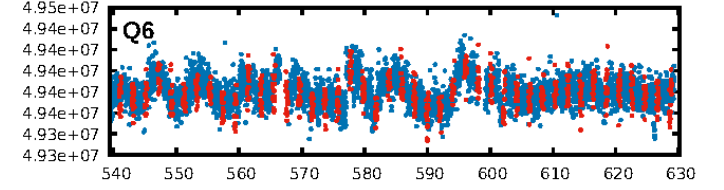
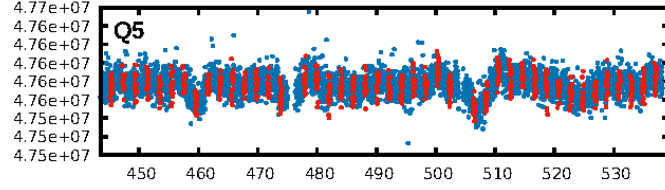
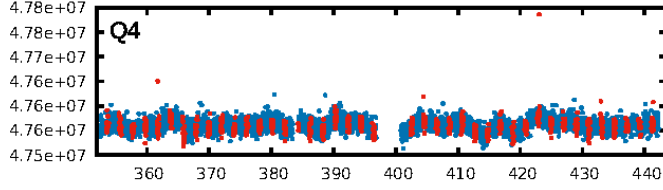
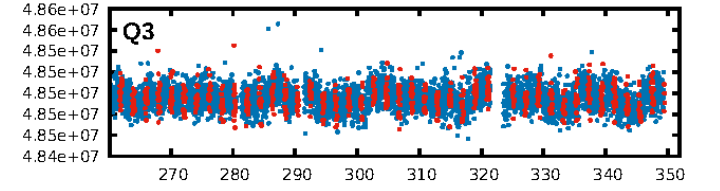
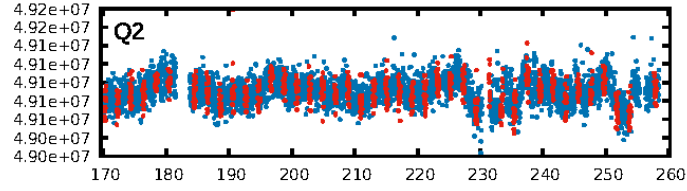
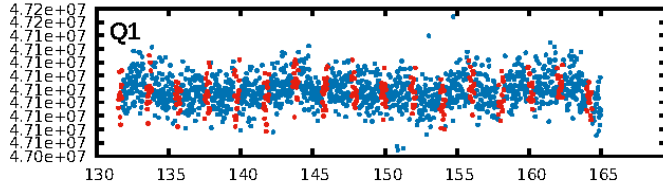
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [782.55σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.25e-107  
RollingBand-fgt: 1.00 [497/497]  
GhostDiagnostic-chr: -0.3546  
Centroid-sig: 0.0%  
Centroid-so: 6.656 arcsec [13.34σ]  
OotOffset-rm: 9.167 arcsec [16.18σ]  
KicOffset-rm: 9.176 arcsec [18.25σ]  
OotOffset-st: 4/1/4/5 [14]  
KicOffset-st: 4/1/4/5 [14]  
DiffImageQuality-fgm: 0.00 [0/14]  
DiffImageOverlap-fno: 1.00 [14/14]

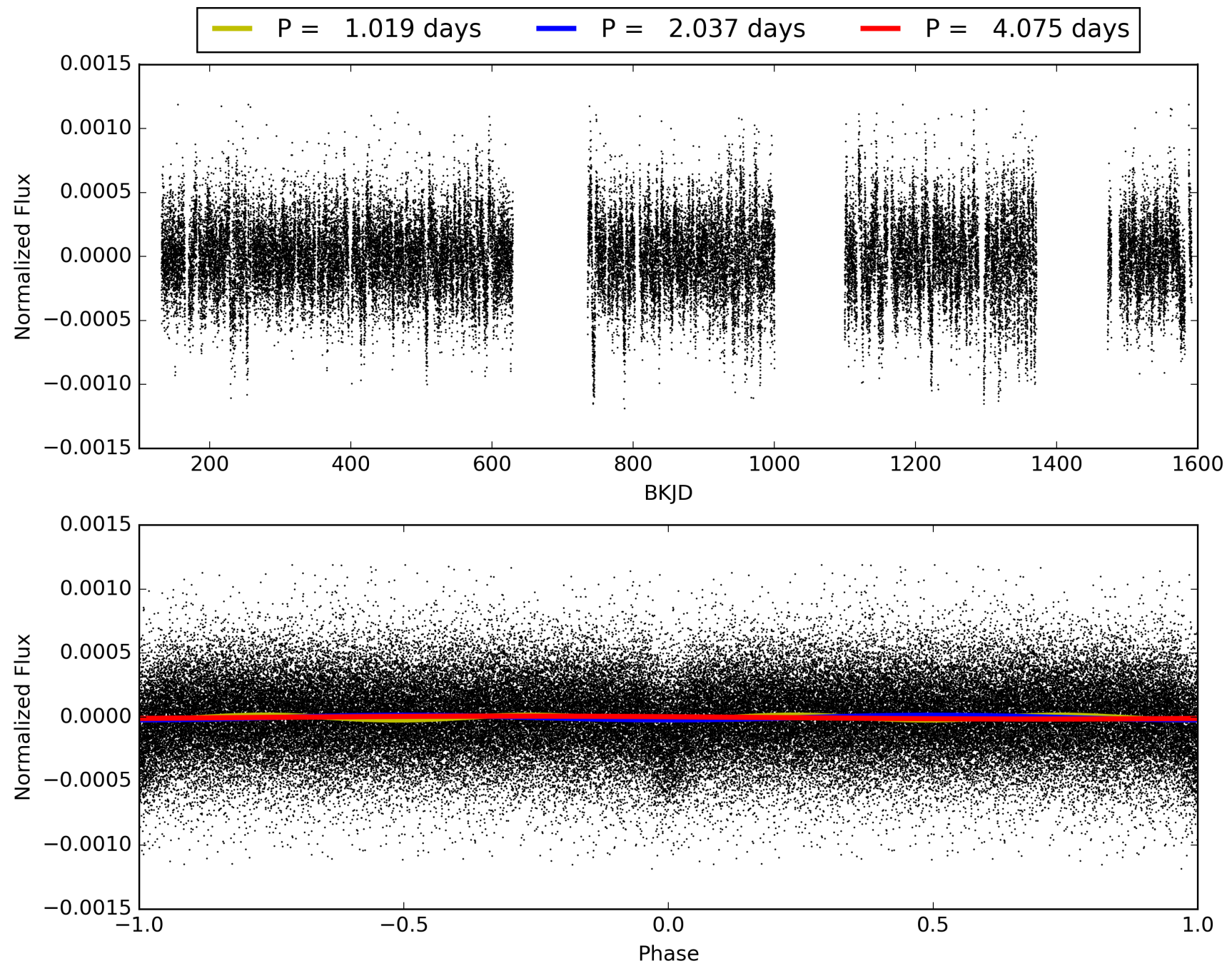
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 07:03:43 Z

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

# TCE 010480921-01, PDC Light Curves

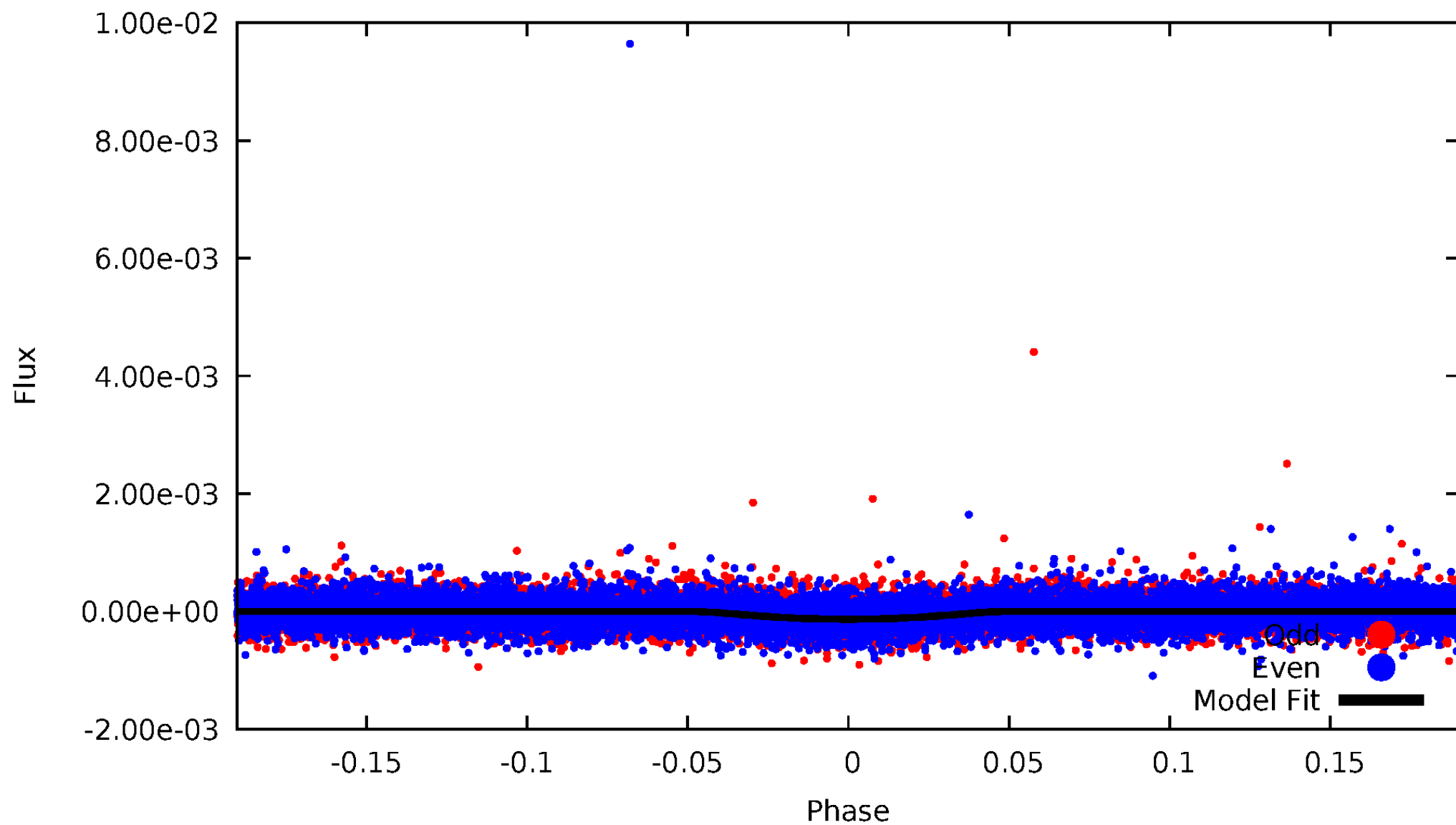


TCE 010480921-01



# DV Odd/Even

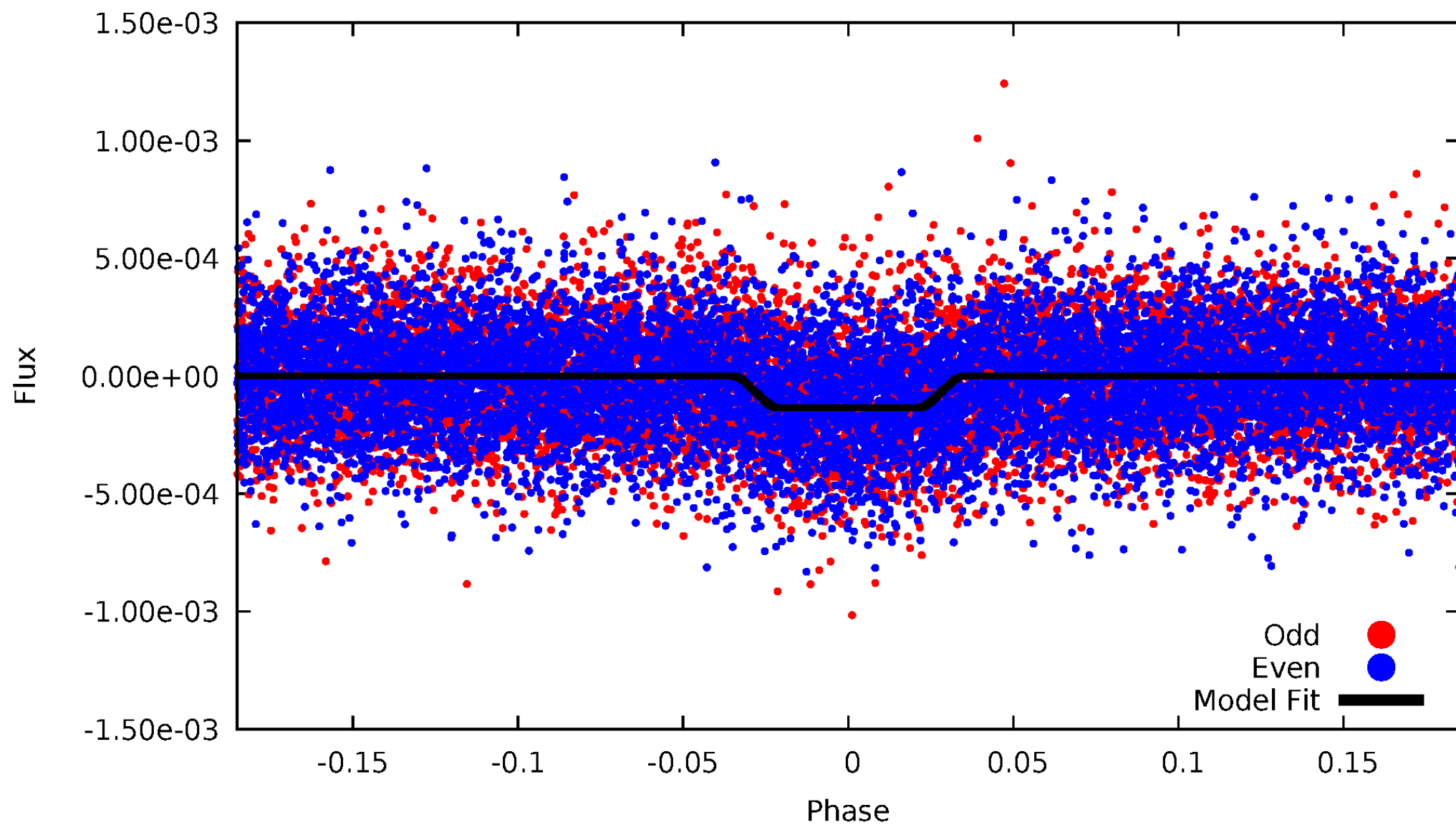
TCE 010480921-01



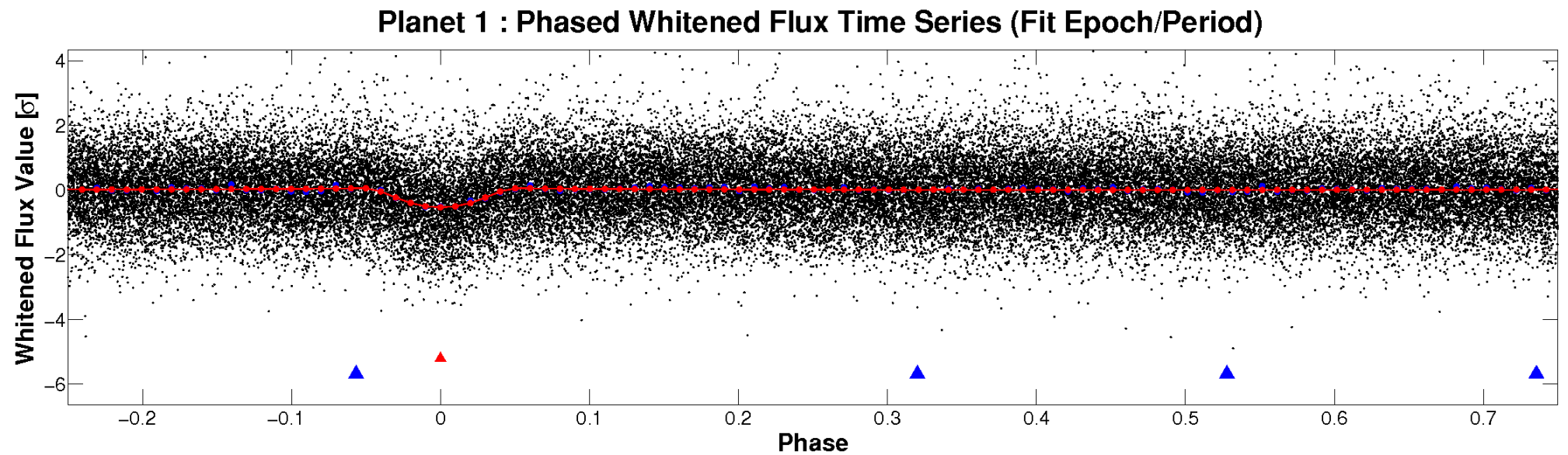
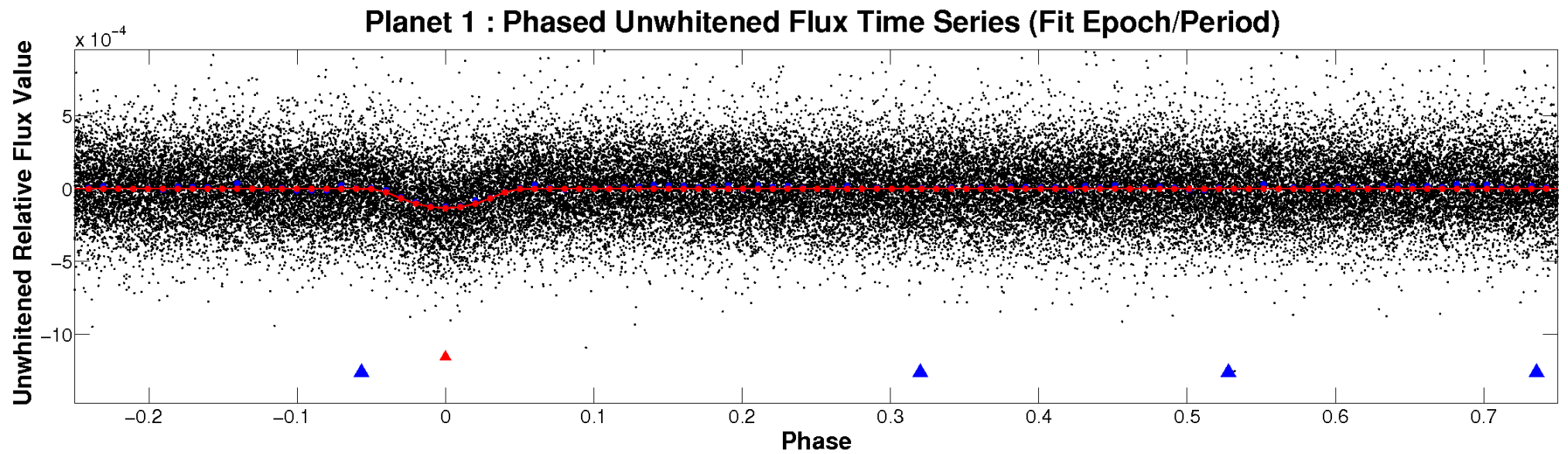


# ALT Odd/Even

TCE 010480921-01

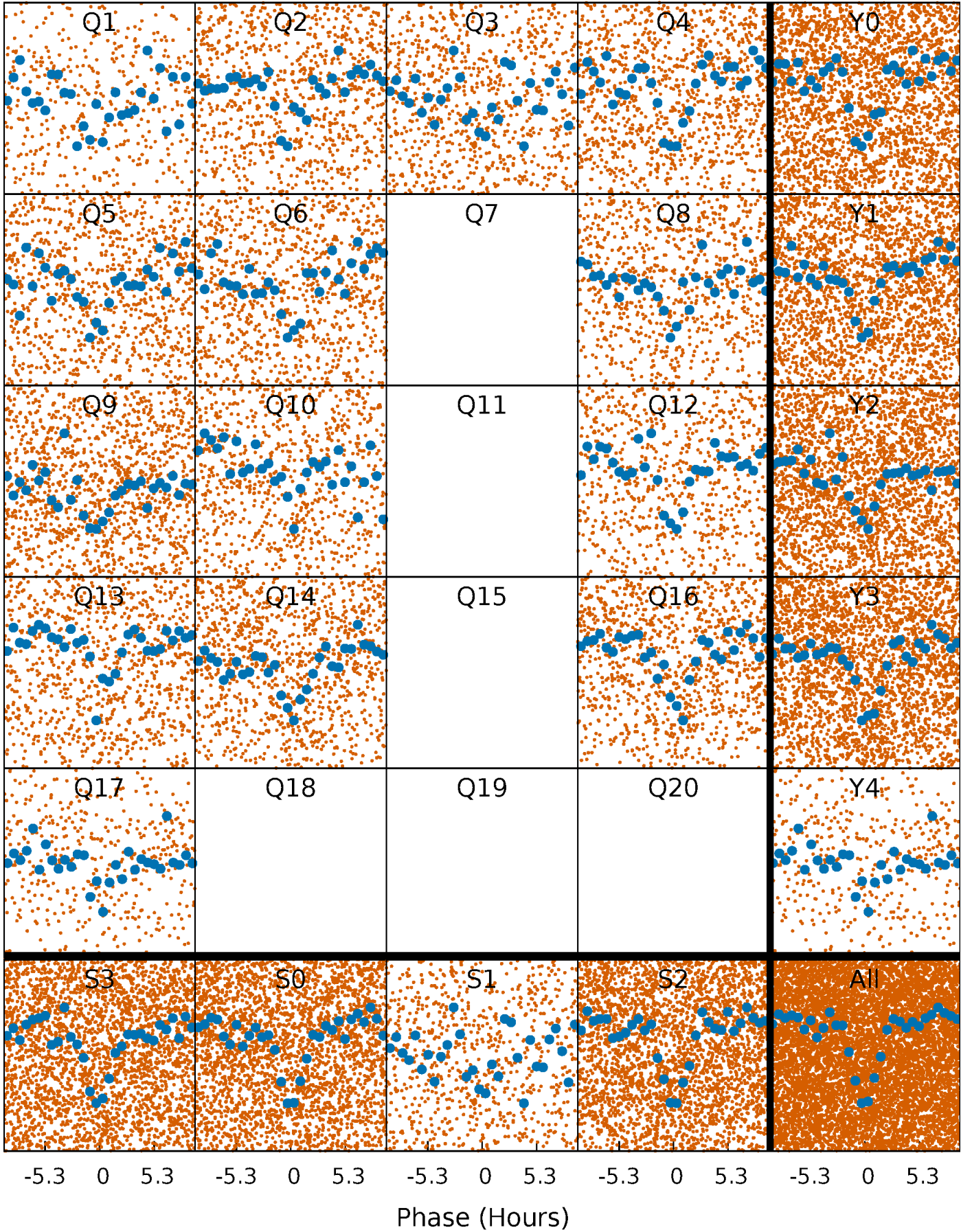


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

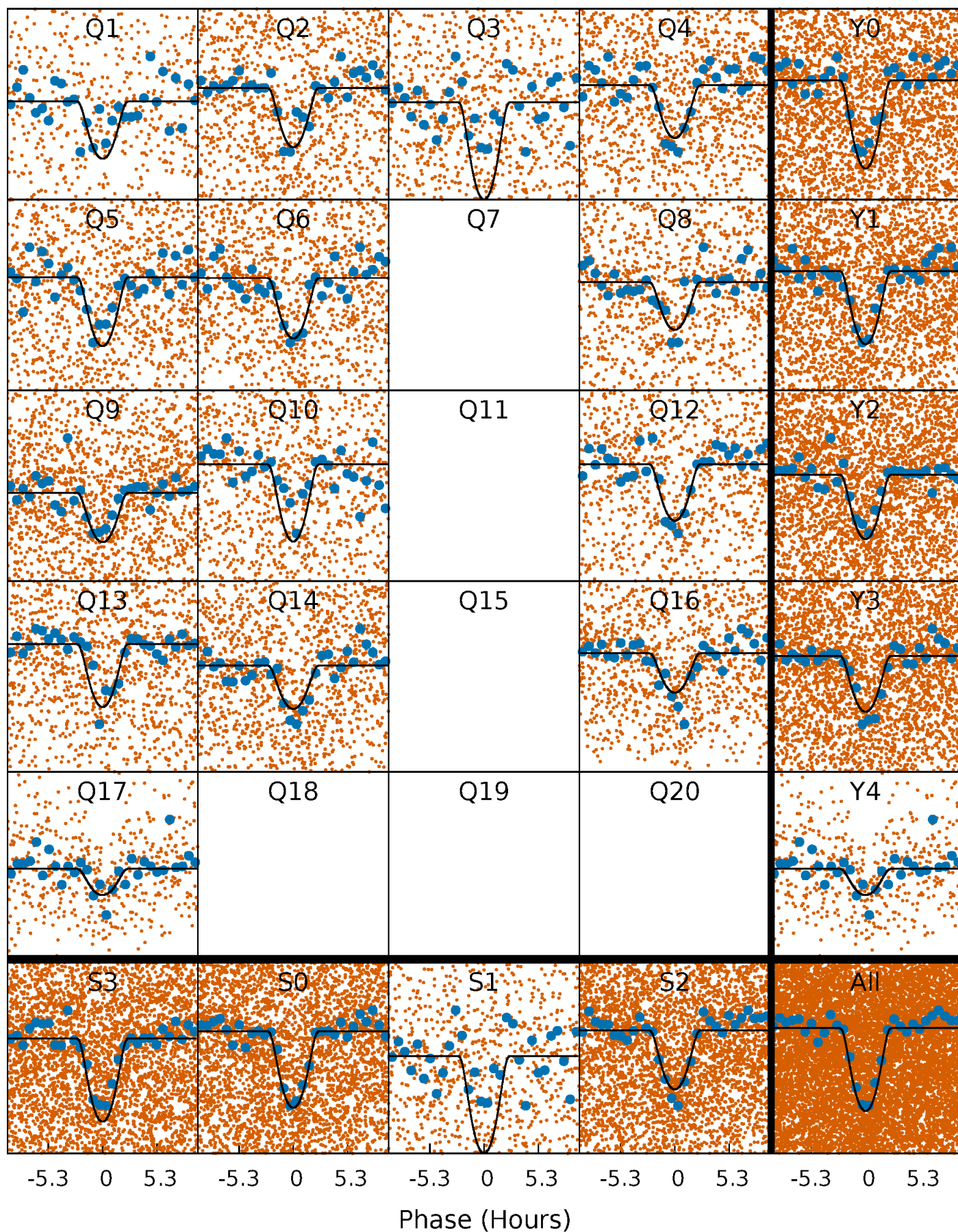
TCE 010480921-01   P= 2.037410 Days    $T_0=131.568598$  (BKJD)





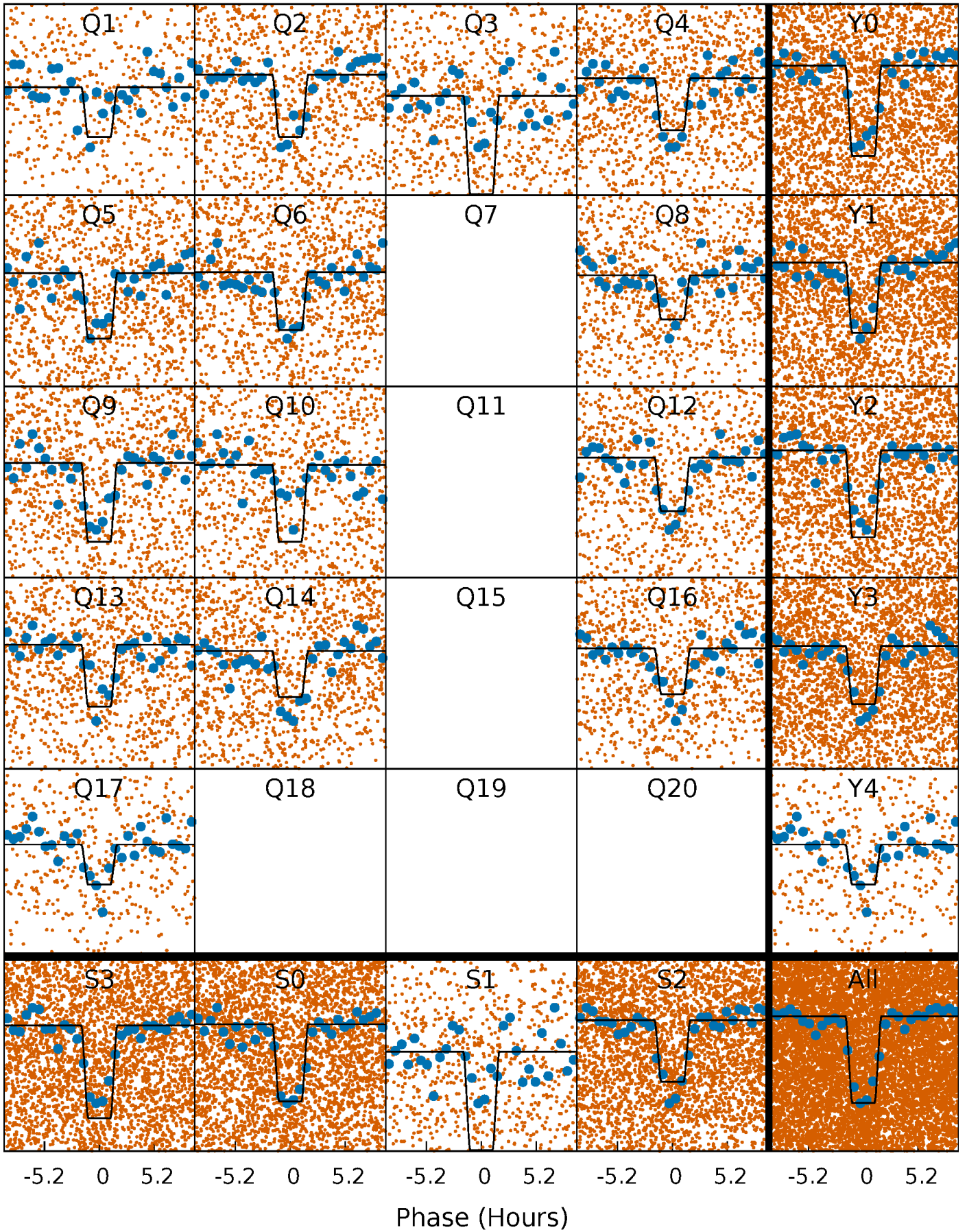
# DV Quarter-Phased Transit Curves

TCE 010480921-01 P= 2.037410 Days  $T_0=131.568598$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

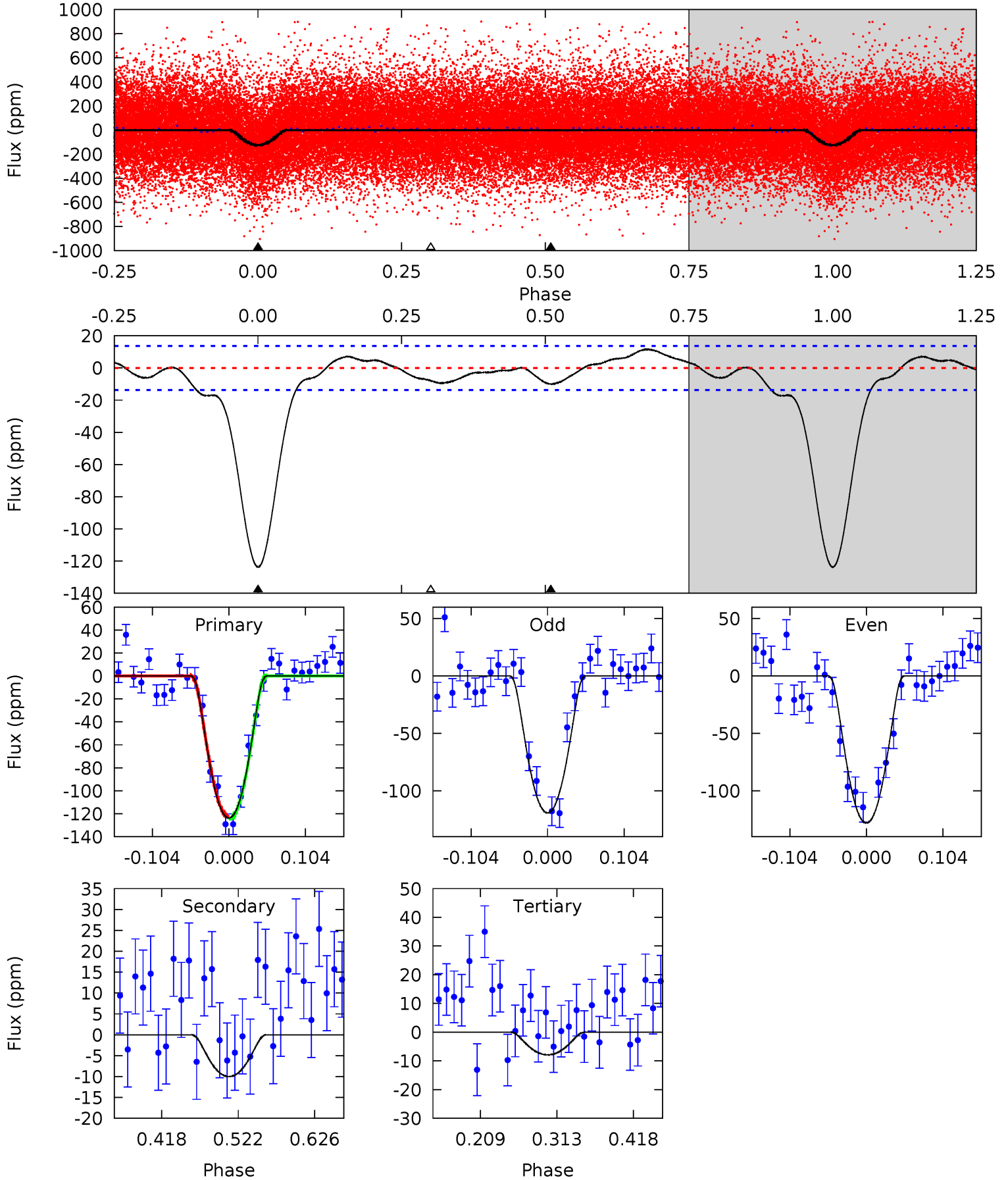
TCE 010480921-01 P= 2.037429 Days  $T_0=131.561526$  (BKJD)



# DV Model-Shift Uniqueness Test

010480921-01, P = 2.037410 Days, E = 129.531188 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
41.3	3.34	2.64	0	4.56	1.62	2.04	38.7	41.3	0.70	3.34	1.49	1.08	0.09	0.39

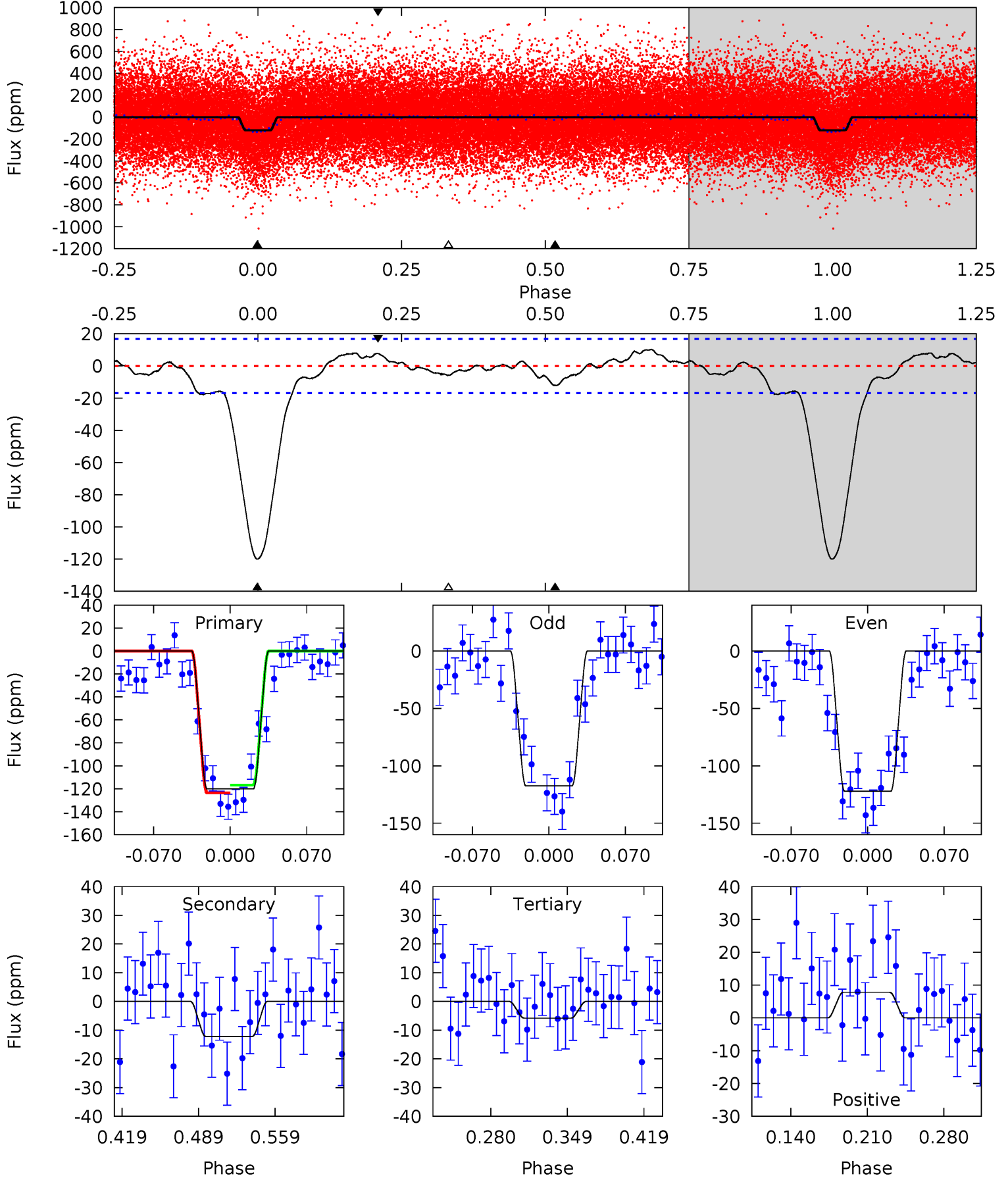




# Alt Model-Shift Uniqueness Test

010480921-01, P = 2.037429 Days, E = 129.524097 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
33.1	3.36	1.60	2.15	4.64	1.81	1.66	31.5	30.9	1.76	1.21	0.65	1.02	0.08	0.93





### Stellar Parameters For KIC 010480921

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6253^{+169}_{-207}$	$4.415^{+0.087}_{-0.203}$	$-0.400^{+0.300}_{-0.300}$	$1.015^{+0.312}_{-0.134}$	$0.975^{+0.135}_{-0.111}$	$1.314^{+0.493}_{-0.656}$
	+3%/-3%	+2%/-5%	+75%/-75%	+31%/-13%	+14%/-11%	+38%/-50%
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 010480921-01 / KOI 1173.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-10 \pm 3$	$1.89^{+0.81}_{-0.81}$	$2224^{+178}_{-121}$	$3182^{+662}_{-465}$	$1.454^{+2.824}_{-0.785}$
Alt.	$-12 \pm 4$	$1.38^{+0.78}_{-0.70}$	$2216^{+179}_{-113}$	$3679^{+1132}_{-584}$	$3.427^{+10.005}_{-2.176}$

$T_{\text{max}}$  = 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

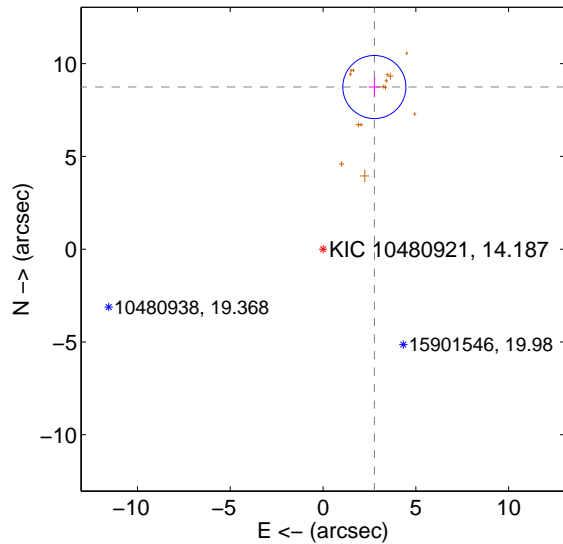
Supplemental centroid analysis for 010480921-01. Kepler magnitude: 14.19. Transit SNR 24.92

There are 0 quarters with good PRF difference image offsets

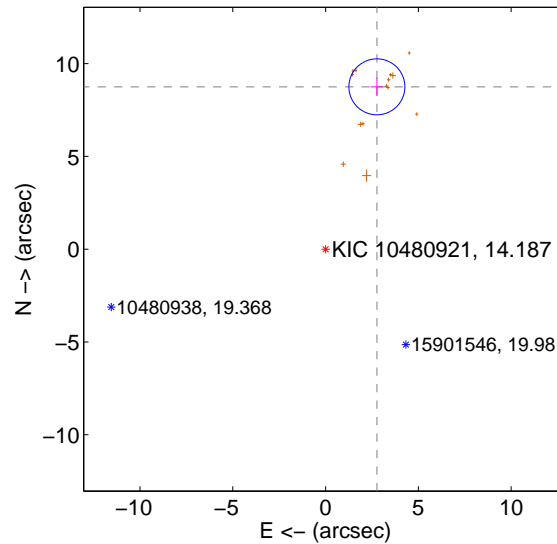
The direct PRF centroid is offset from the target star catalog position by about 0.03 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$9.167 \pm 0.567$	16.18	$-2.766 \pm 0.306$	$8.740 \pm 0.545$
PRF-fit source offset from KIC position	$9.176 \pm 0.503$	18.25	$-2.765 \pm 0.334$	$8.750 \pm 0.490$
photometric centroid source offset	$6.66 \pm 0.50$	13.34	$1.57 \pm 0.45$	$6.47 \pm 0.50$

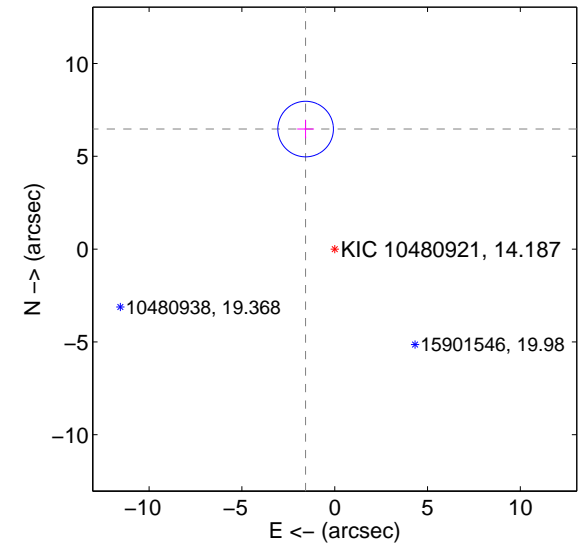
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

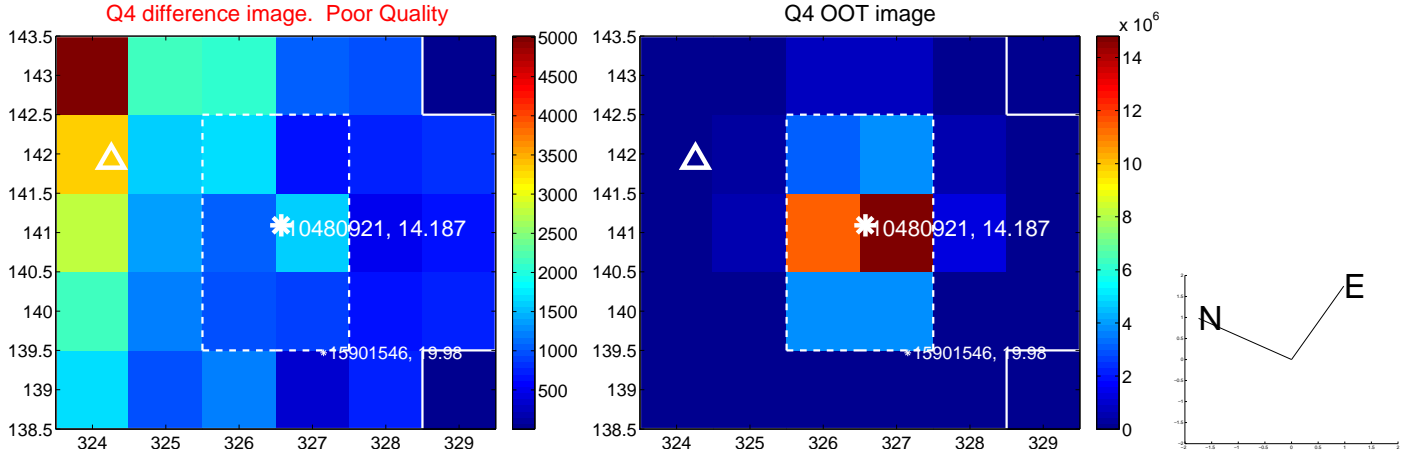
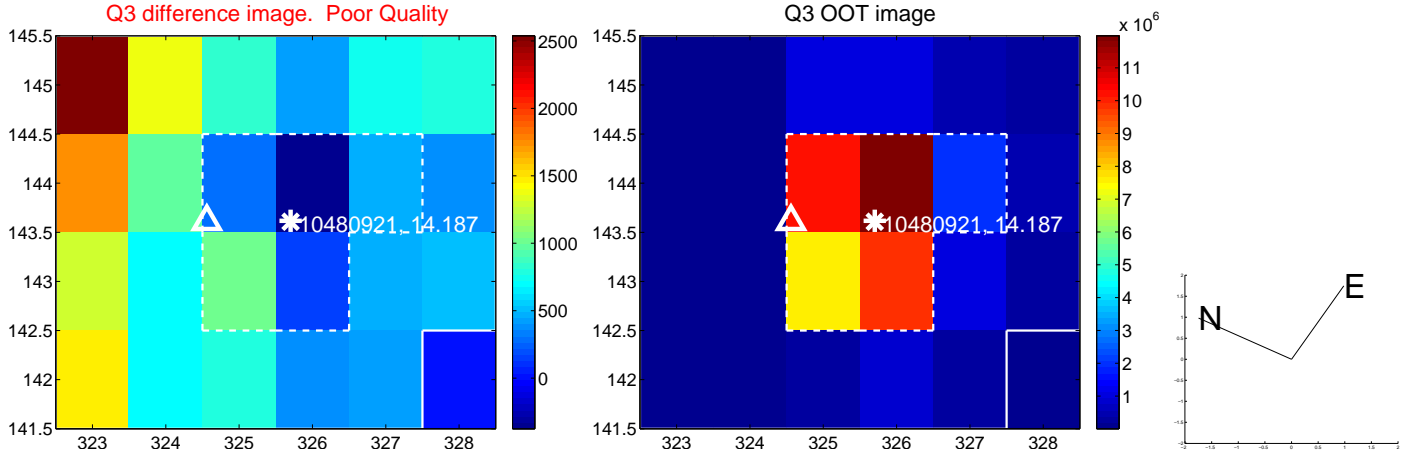
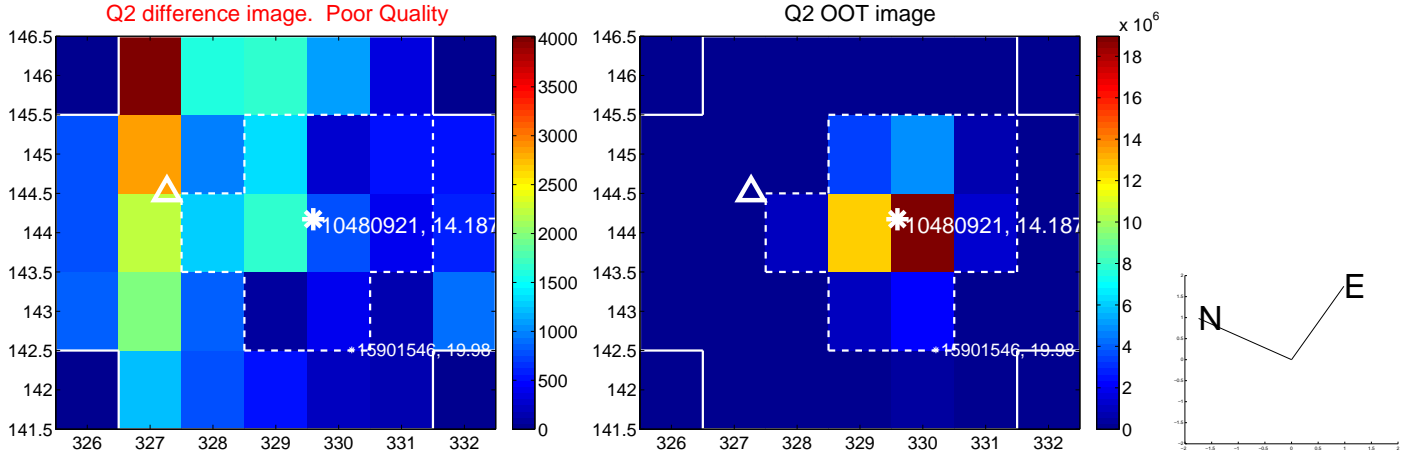
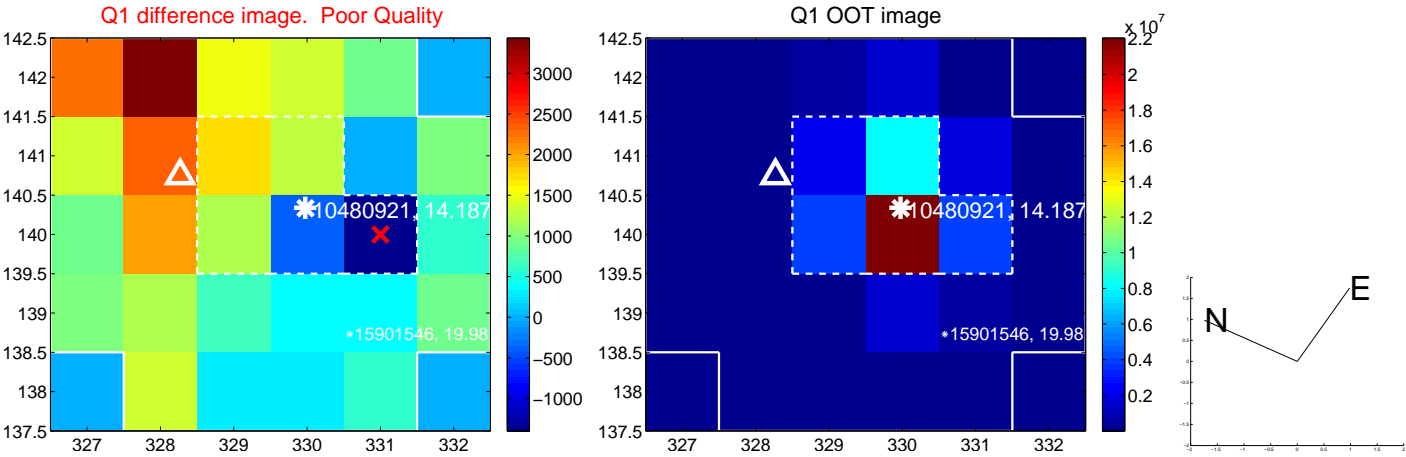


offset from photometric centroids

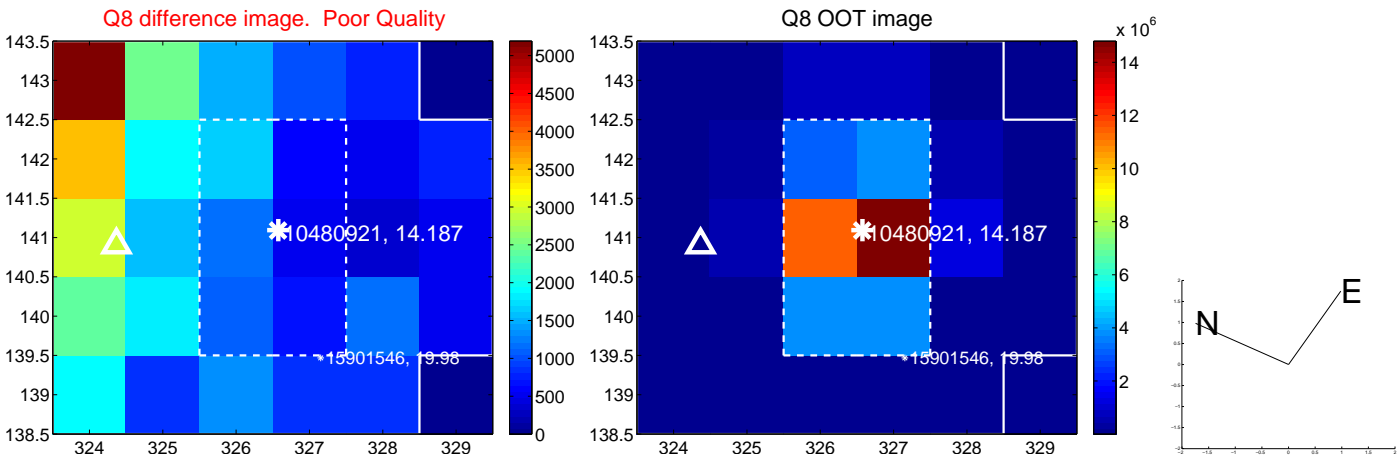
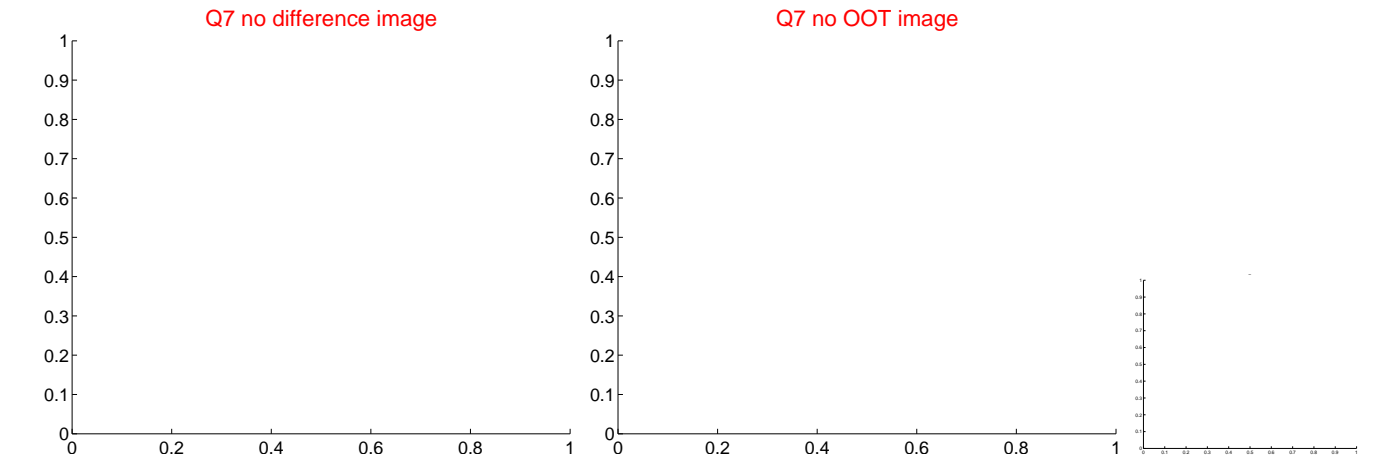
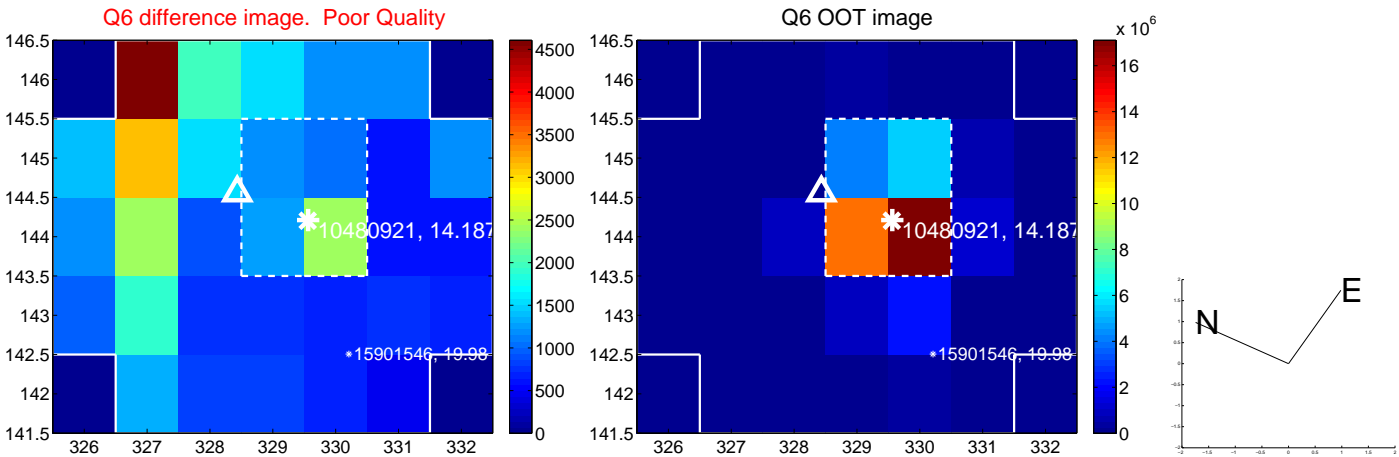
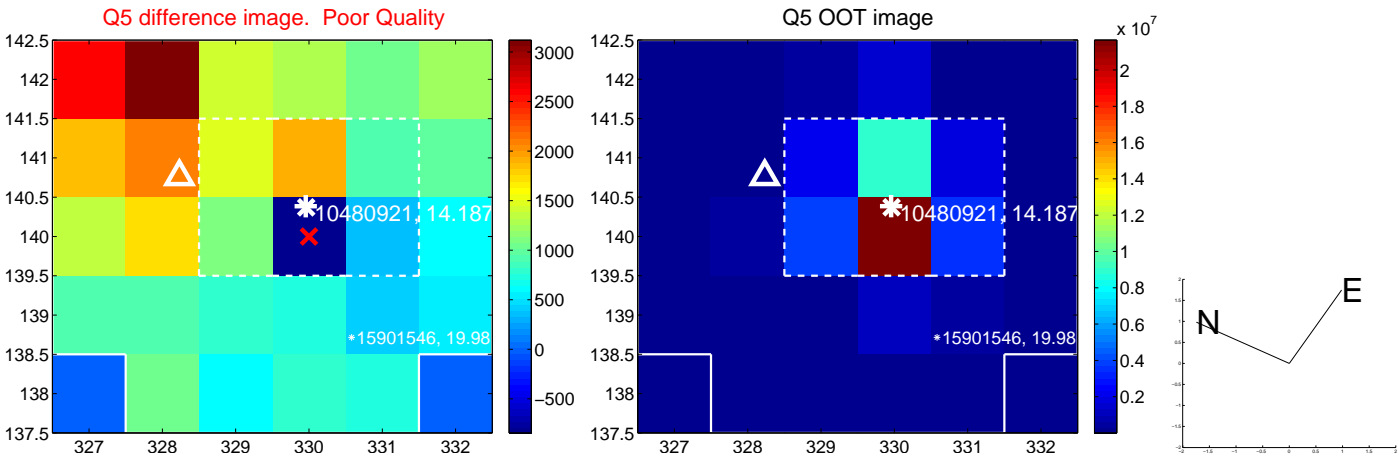


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

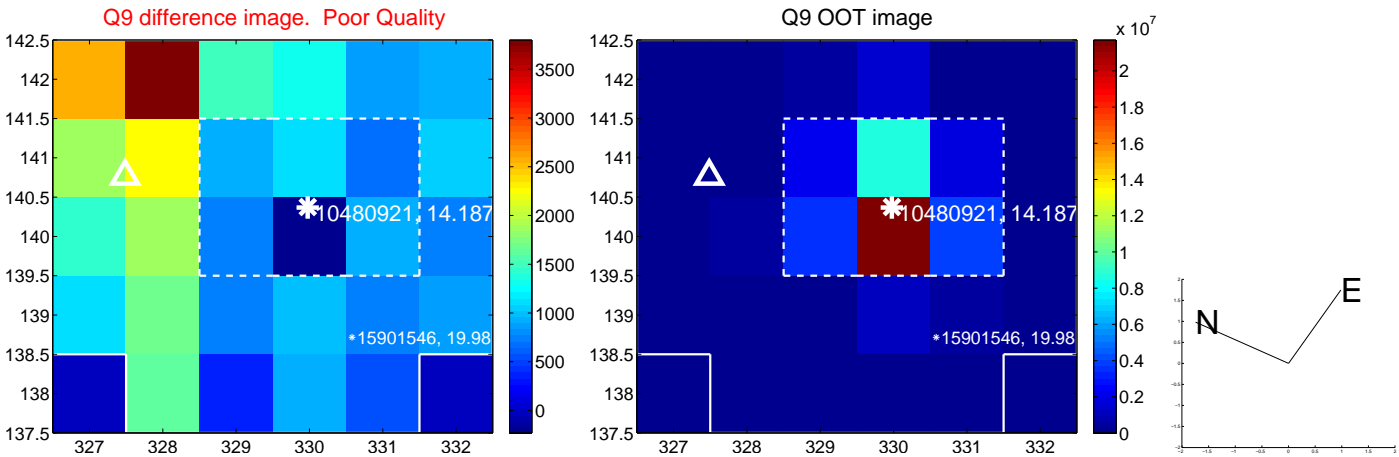


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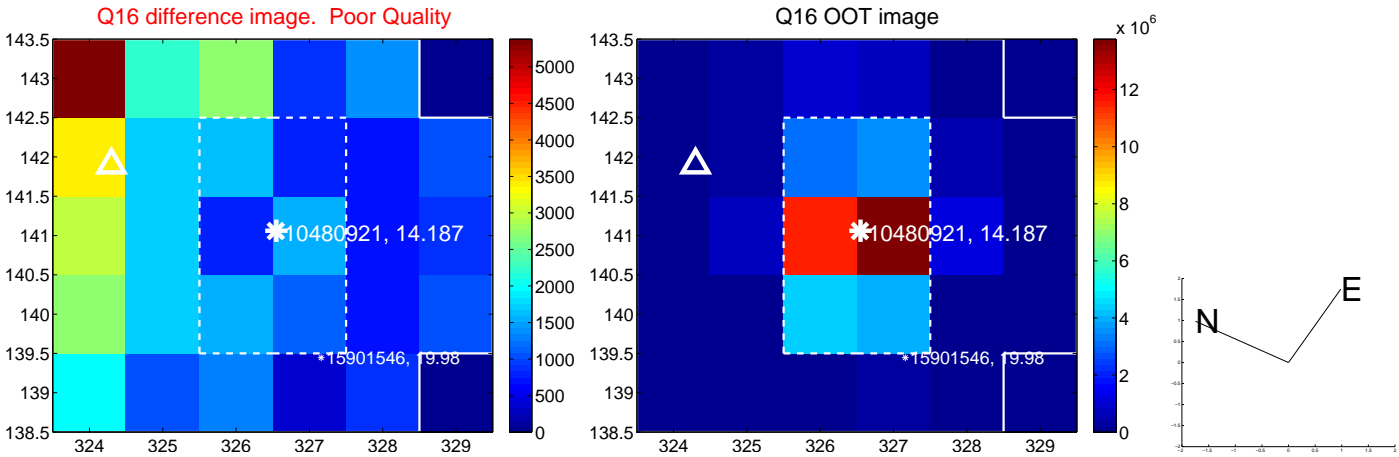
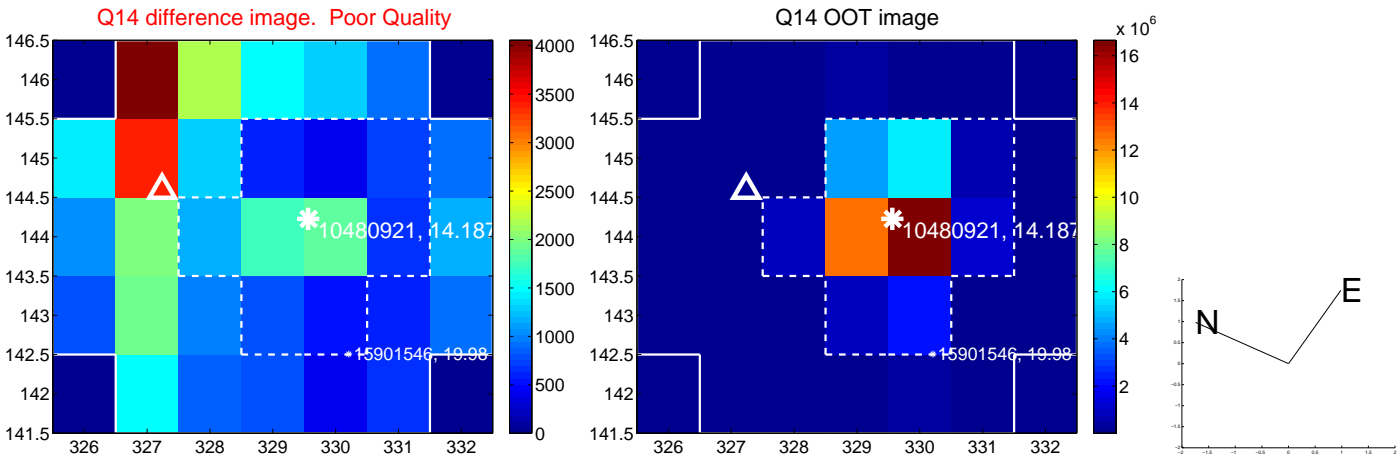
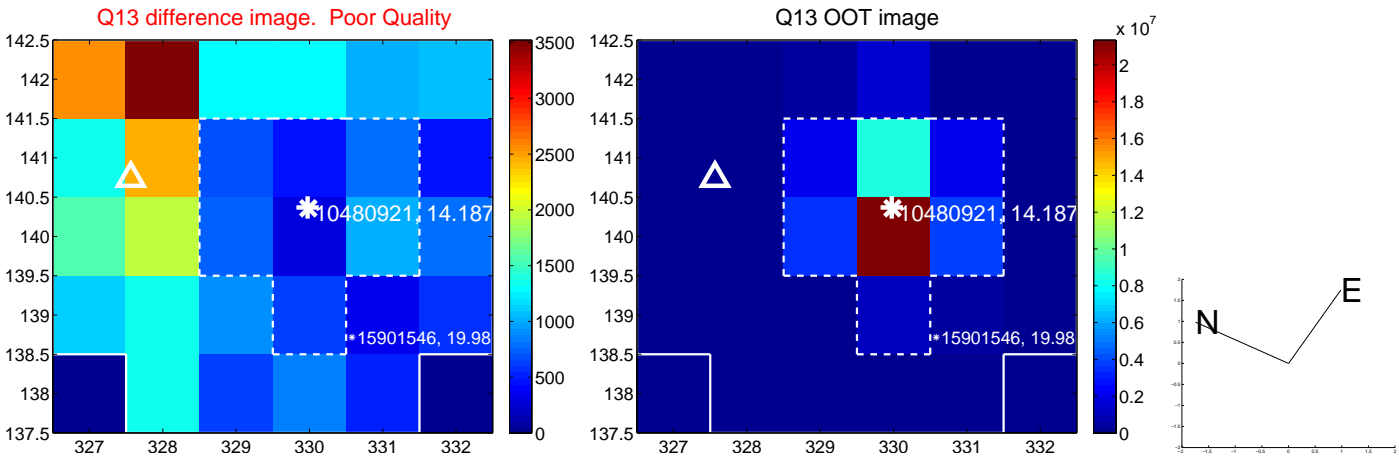




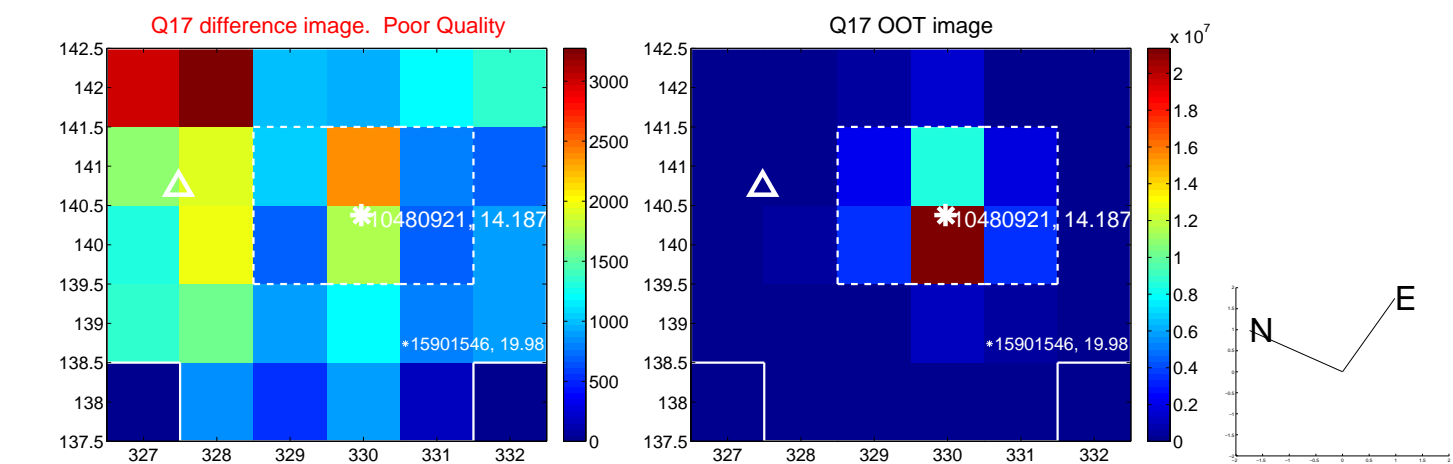
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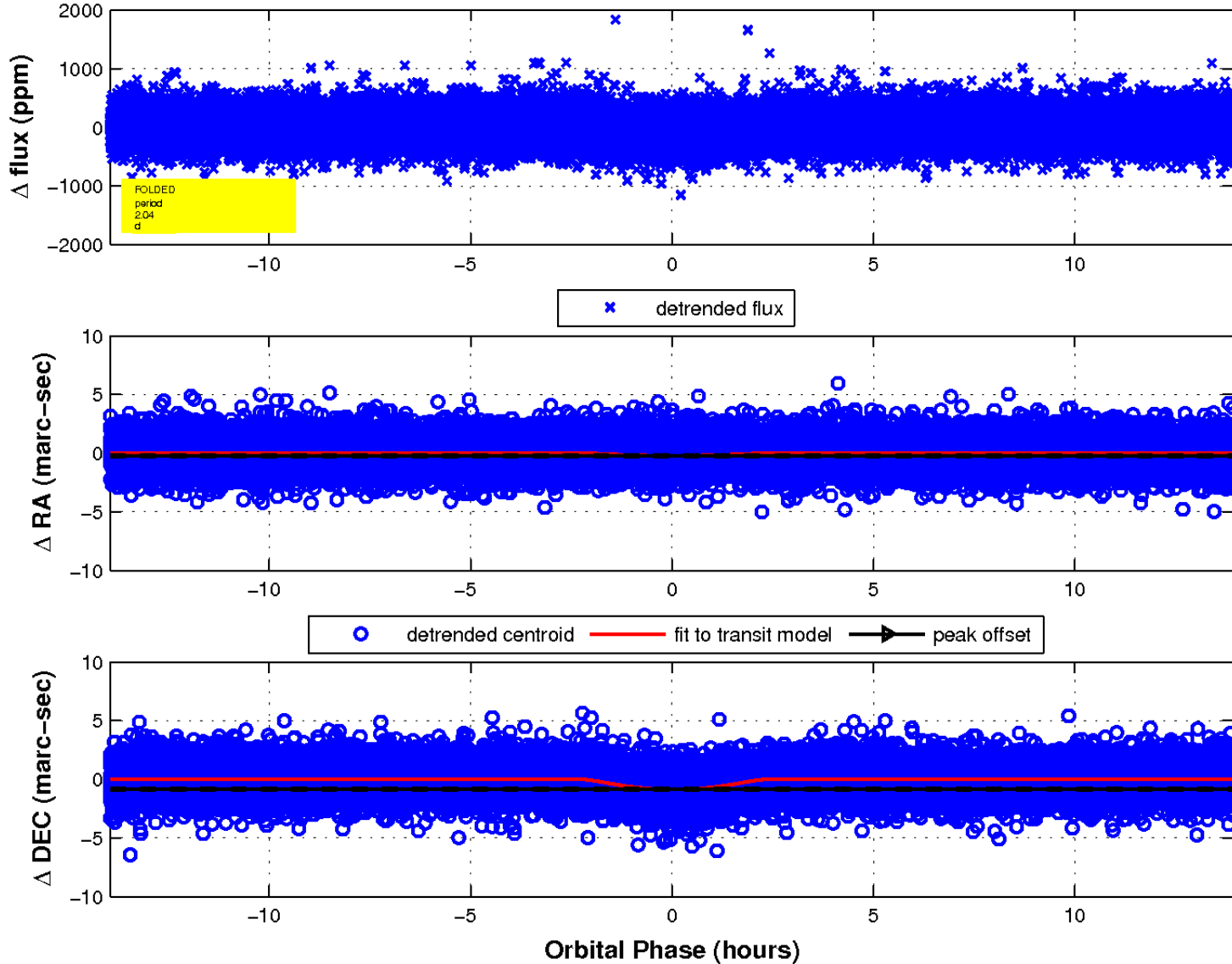
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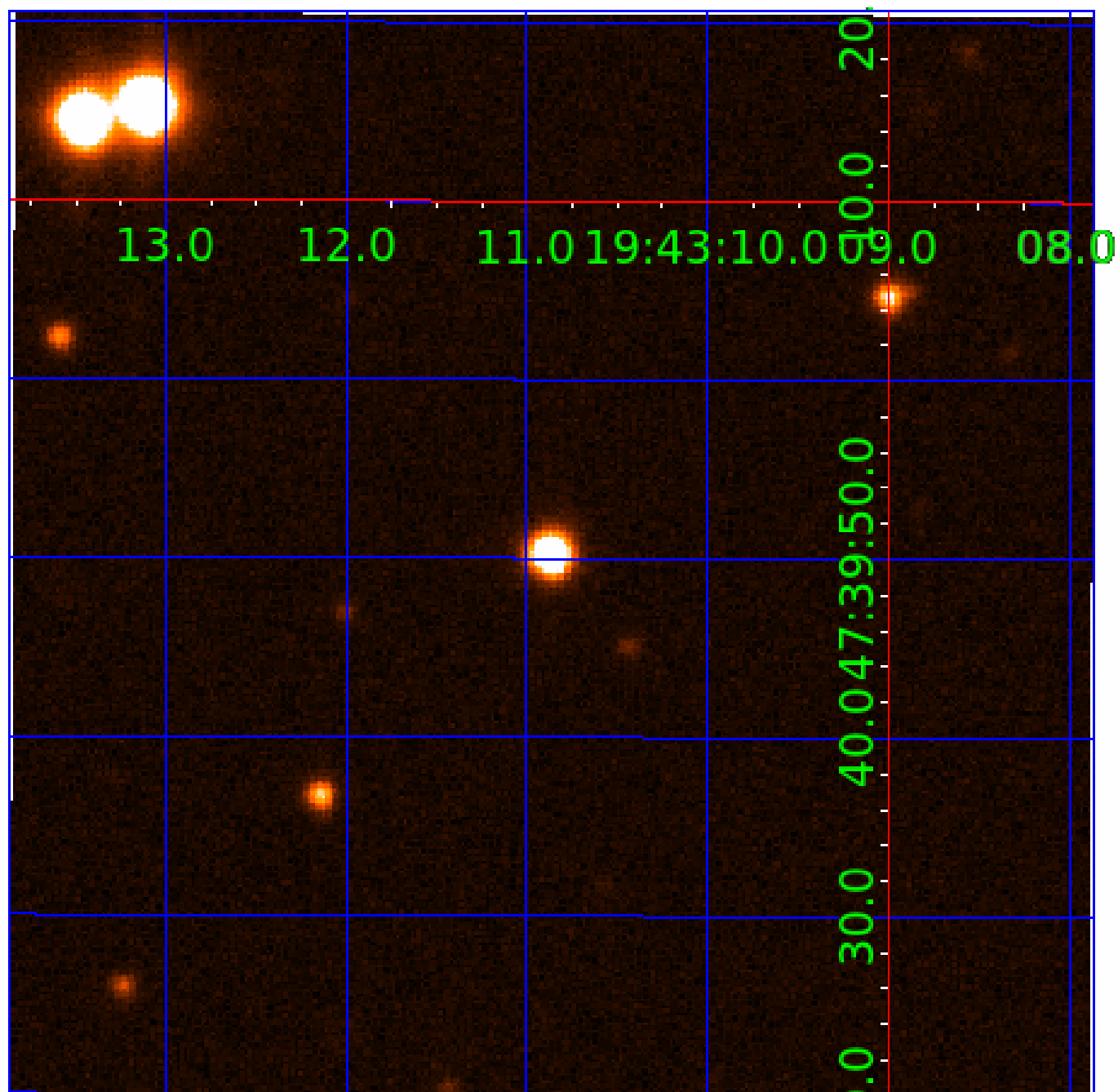


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 010480921

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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## Robovetter Results

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010480921-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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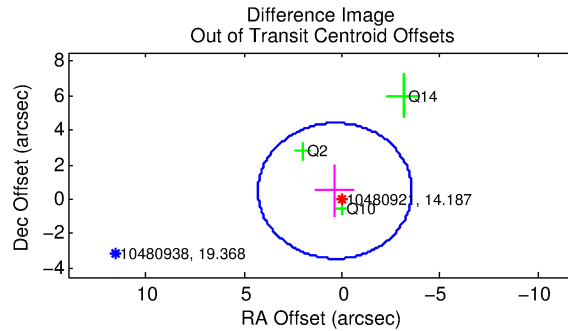
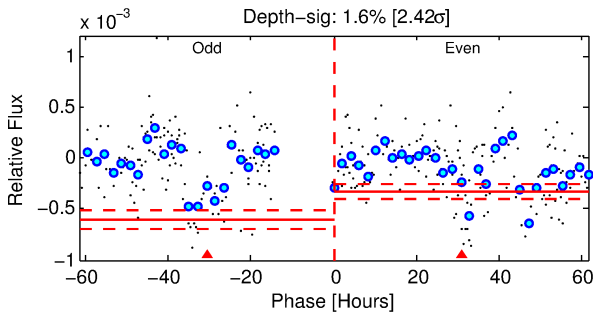
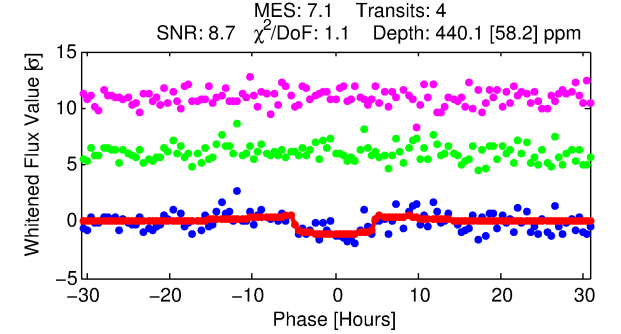
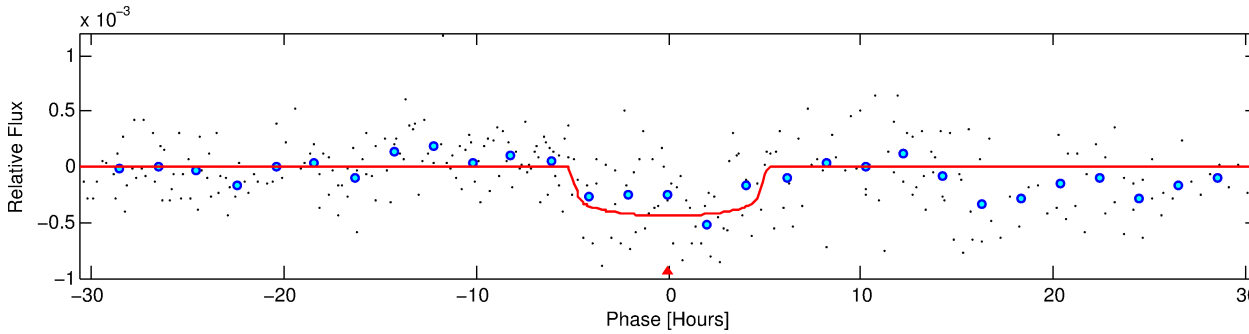
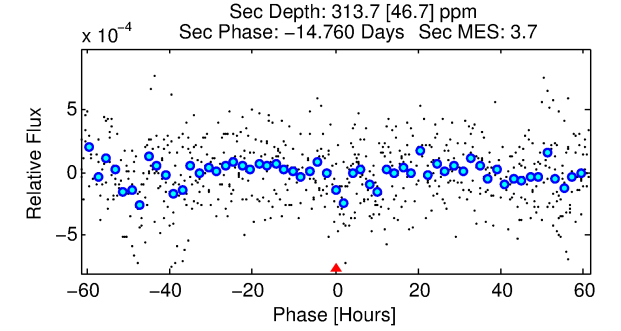
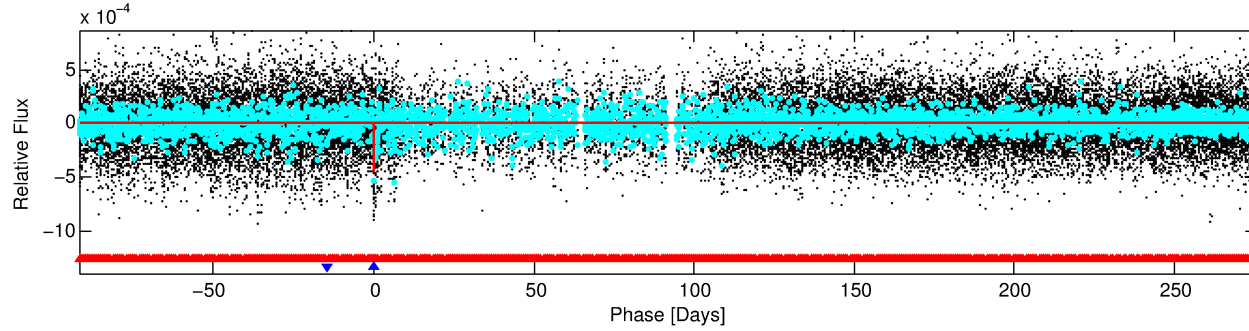
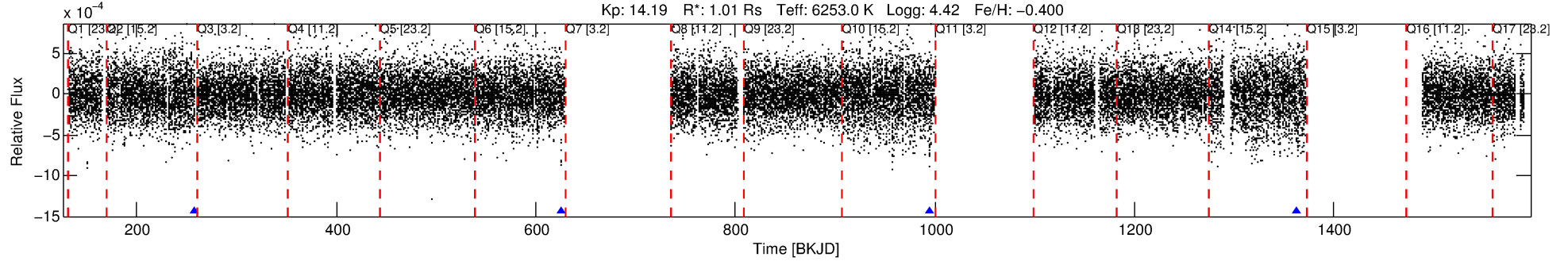
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010480921-02

No Significant Match Found

# DV One-Page Summary

KIC: 10480921 Candidate: 2 of 2 Period: 368.348 d  
KOI: K01173 Corr: No Ephemeris Match



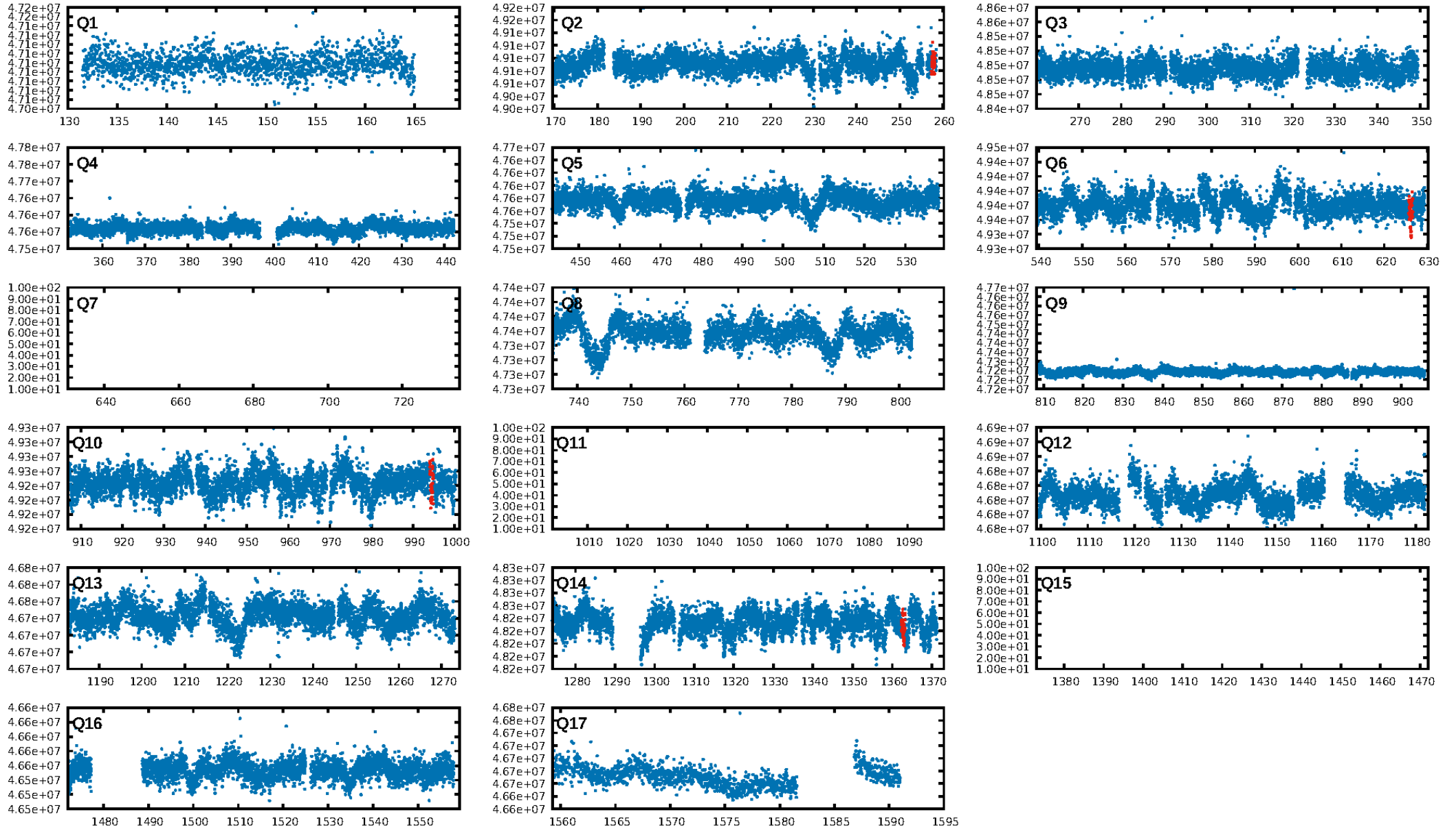
## DV Fit Results:

Period = 368.34788 [0.00810] d  
Epoch = 257.7726 [0.0154] BKJD  
Rp/R\* = 0.0206 [0.0083]  
a/R\* = 205.02 [429.04]  
b = 0.70 [1.55]  
Seff = 1.42 [0.56]  
Teq = 278 [28] K  
Rp = 2.28 [1.16] Re  
a = 0.9981 [0.2569] AU  
Ag = 33182.26 [29977.32] [1.11 $\sigma$ ]  
Teffp = 5805 [1209] K [4.57 $\sigma$ ]

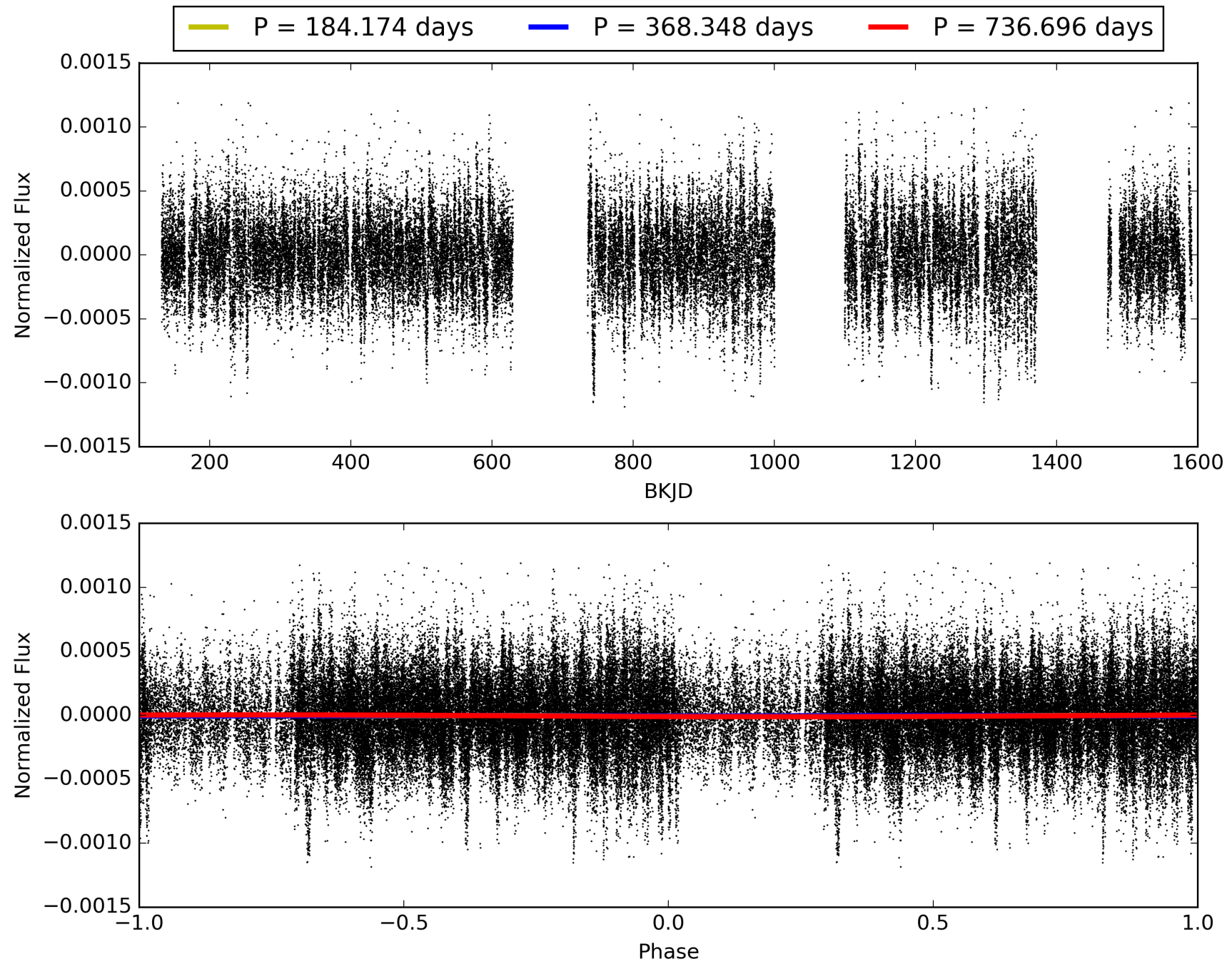
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [782.55 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 51.2%  
ModelChiSquareGof-sig: 99.6%  
**Bootstrap-pfa: 1.20e-11**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 2.009  
Centroid-sig: 79.0%  
Centroid-so: 0.455 arcsec [0.47 $\sigma$ ]  
OotOffset-rm: 0.604 arcsec [0.46 $\sigma$ ]  
KicOffset-rm: 0.616 arcsec [0.47 $\sigma$ ]  
OotOffset-st: 3/0/0/0 [3]  
KicOffset-st: 3/0/0/0 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 0.25 [1/4]

# TCE 010480921-02, PDC Light Curves



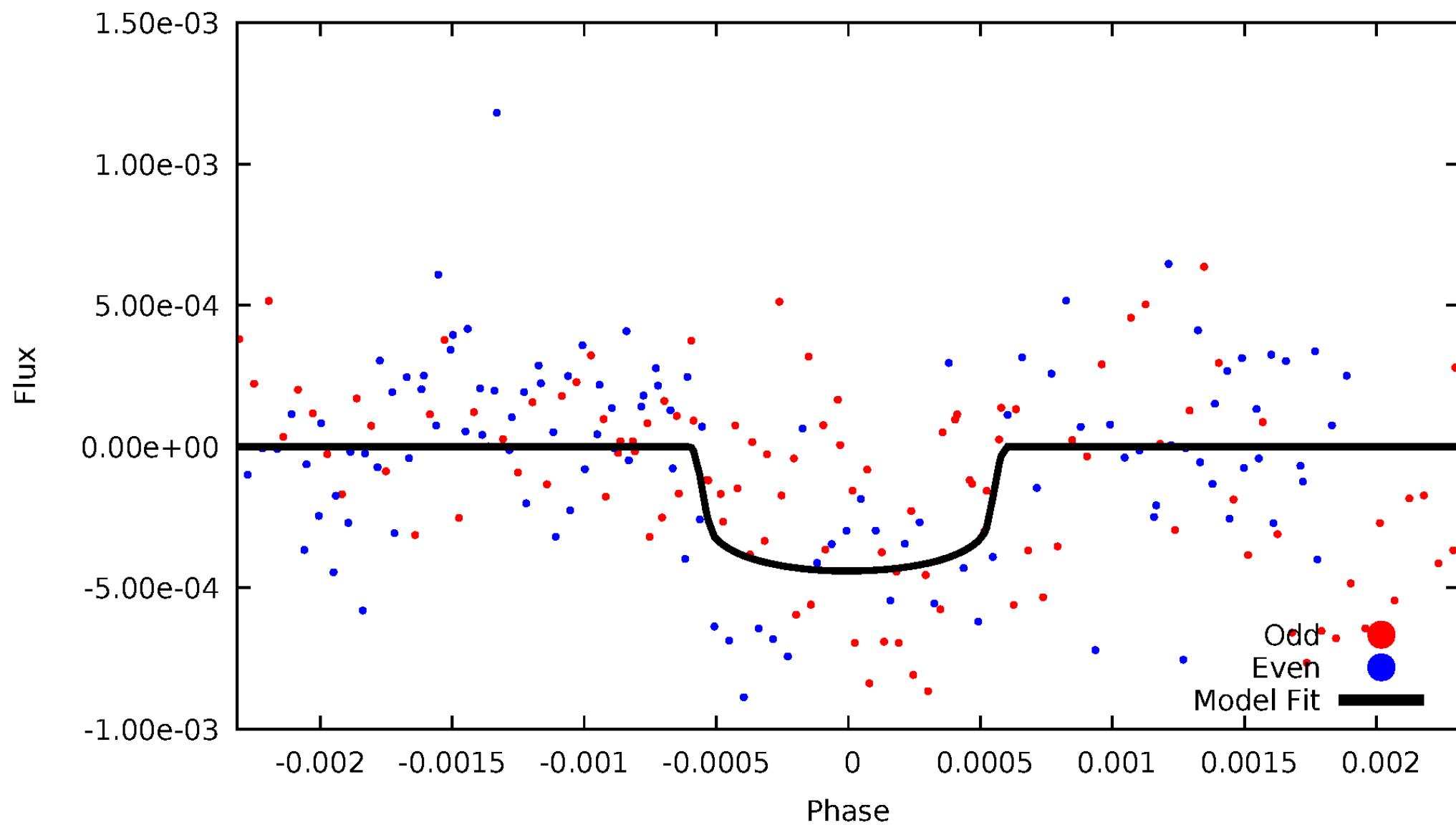
TCE 010480921-02





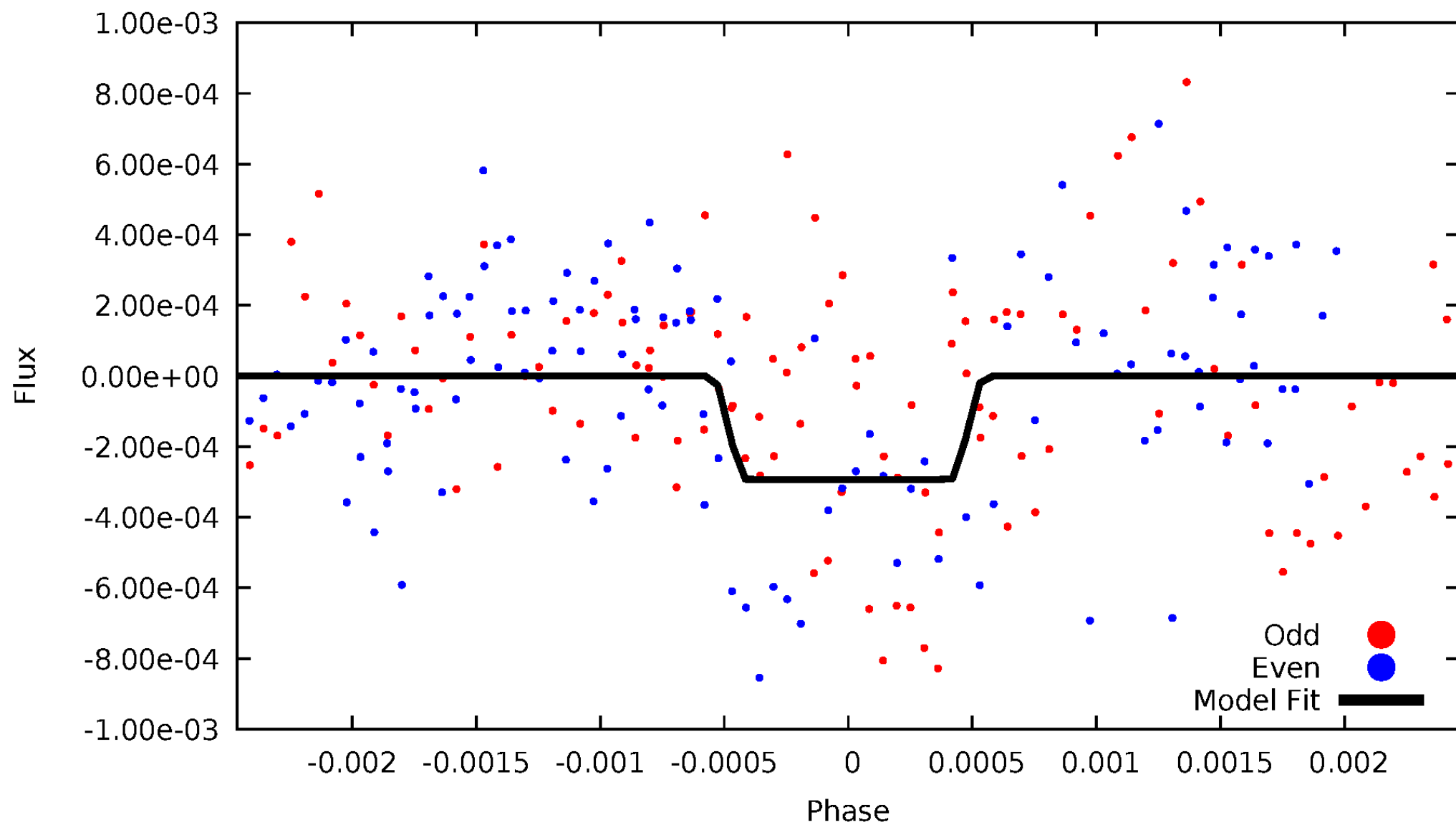
# DV Odd/Even

TCE 010480921-02



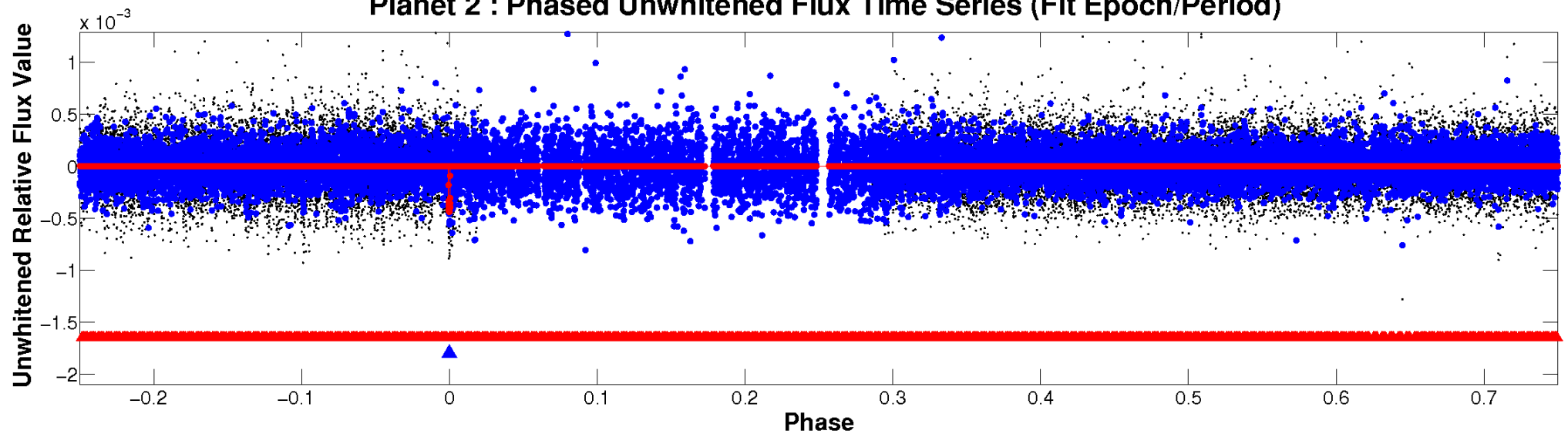
# ALT Odd/Even

TCE 010480921-02

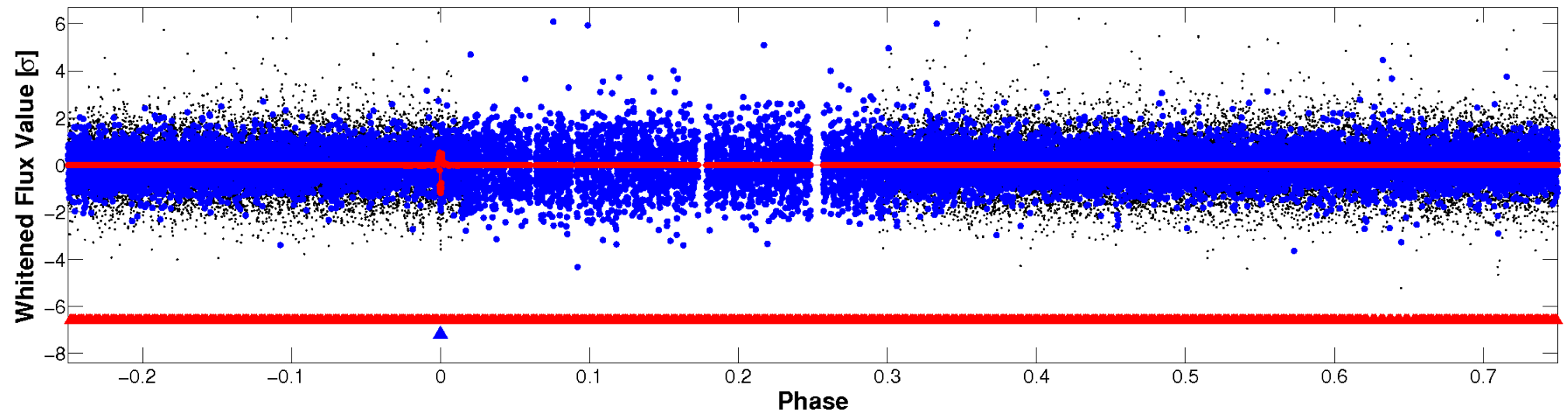


# Non-Whitened Vs. Whitened Light Curve

## Planet 2 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

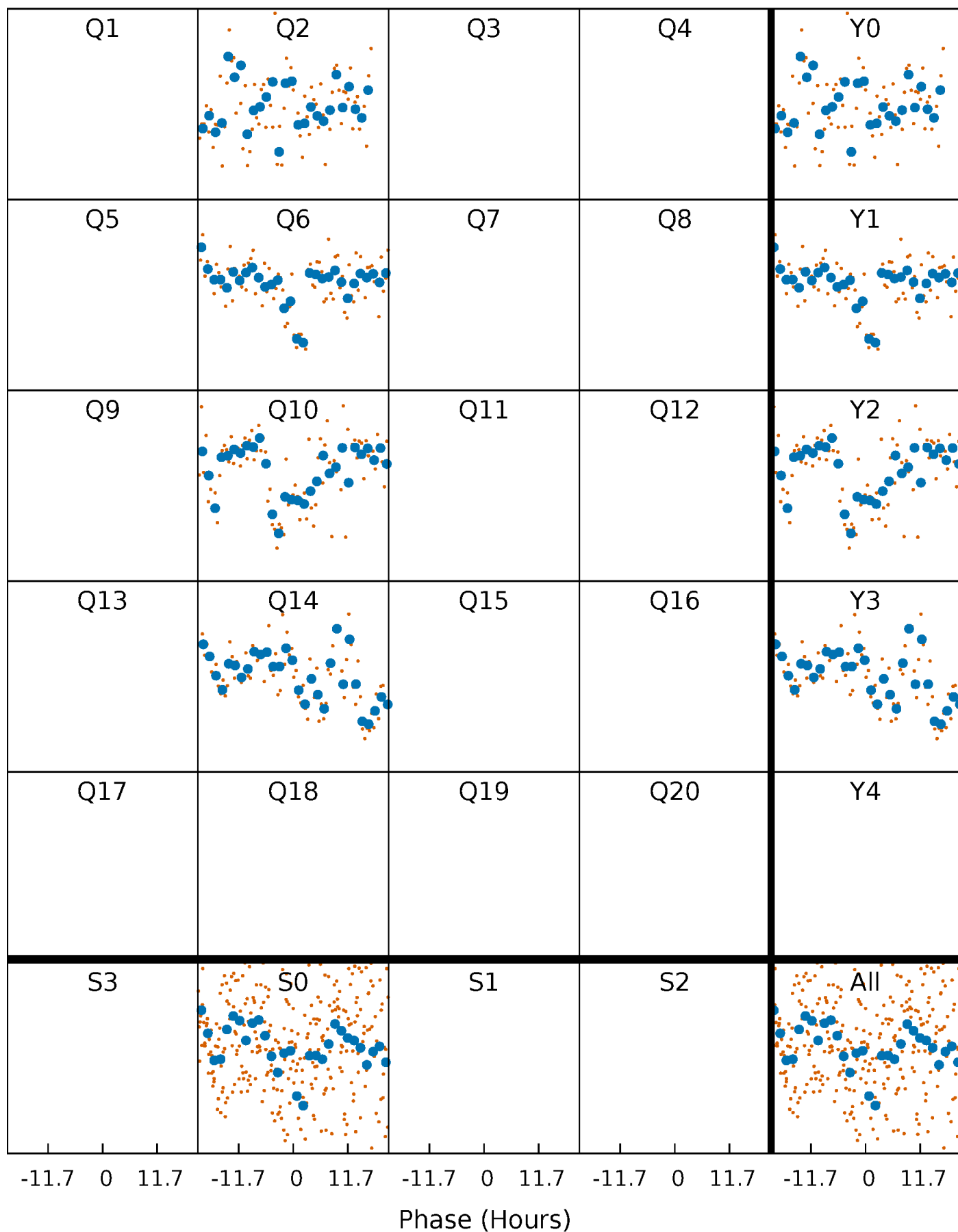


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



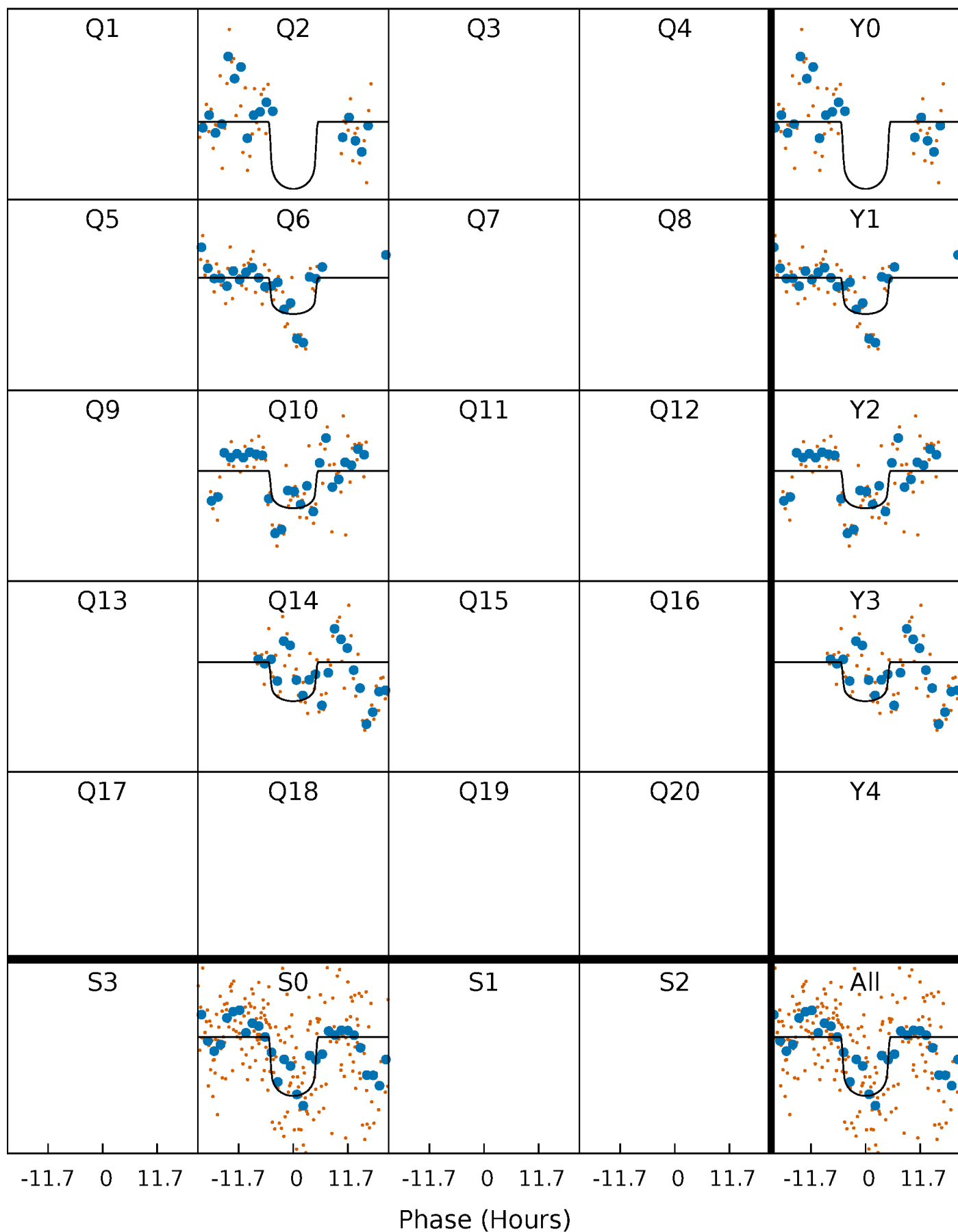
# PDC Quarter-Phased Transit Curves

TCE 010480921-02     $P=368.347881$  Days     $T_0=257.772616$  (BKJD)



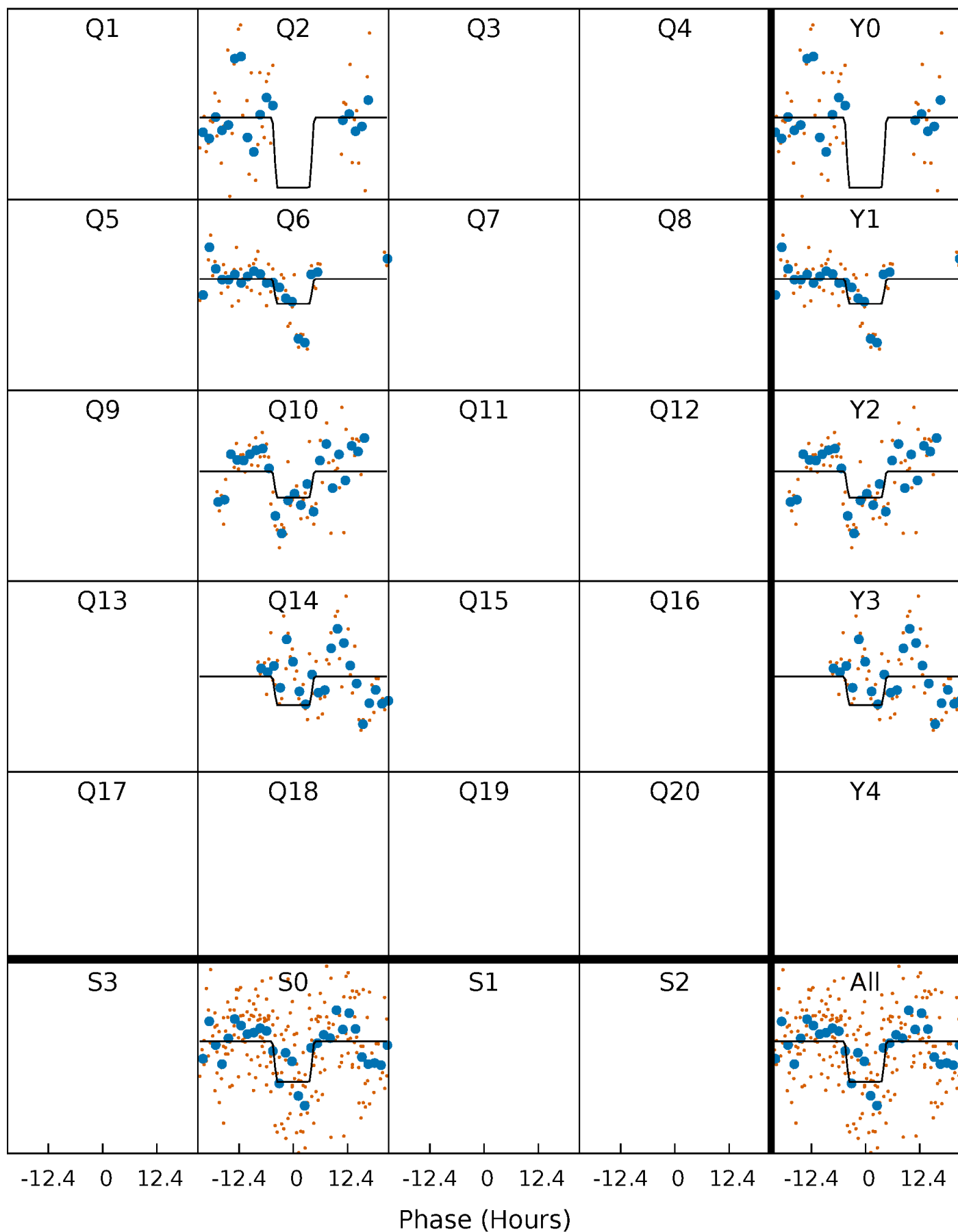
# DV Quarter-Phased Transit Curves

TCE 010480921-02     $P=368.347881$  Days     $T_0=257.772616$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

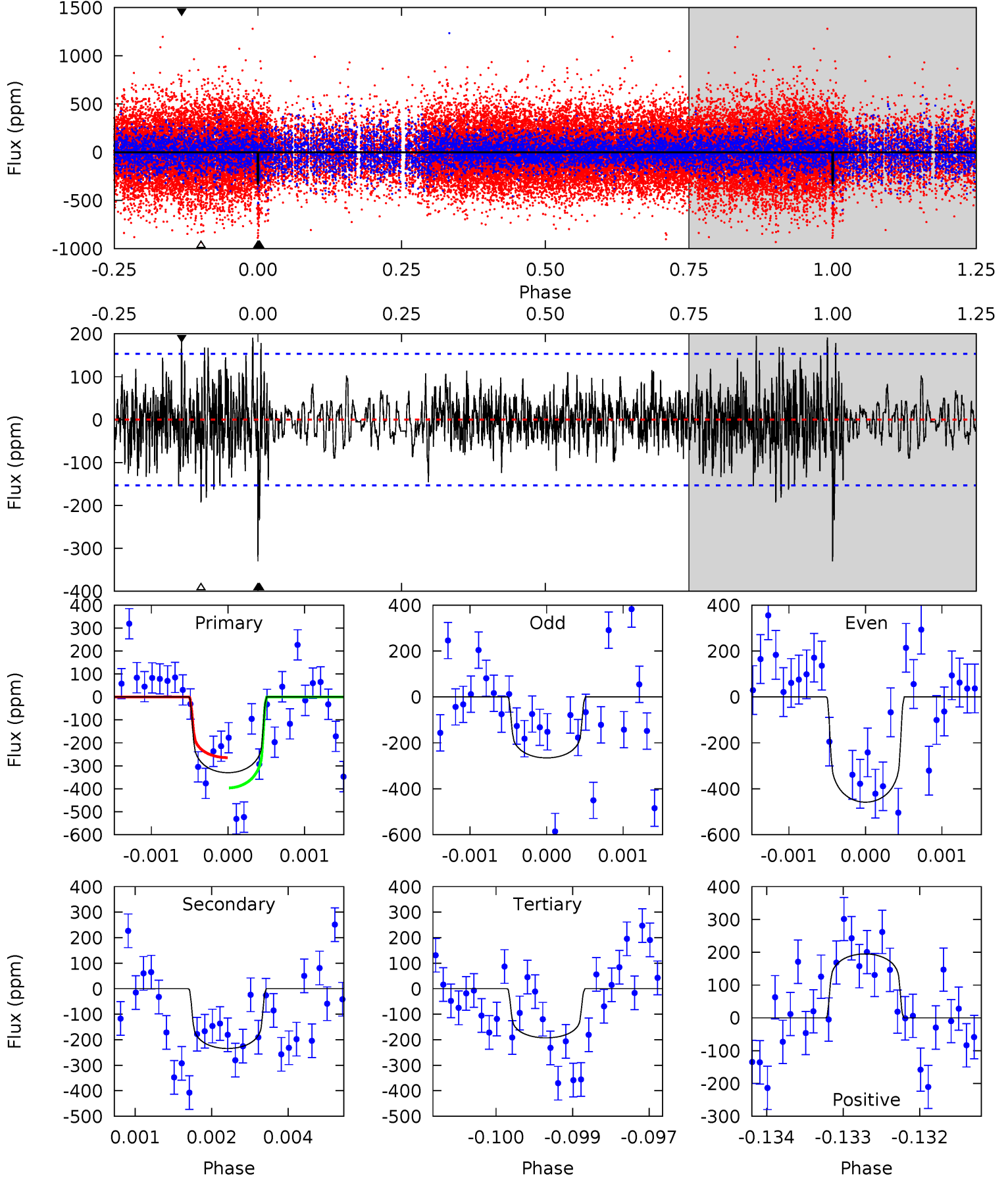
TCE 010480921-02 P=368.355786 Days  $T_0=257.742736$  (BKJD)



# DV Model-Shift Uniqueness Test

010480921-02, P = 368.347881 Days, E = 257.772616 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
11.7	8.29	6.81	6.89	5.42	3.24	1.65	4.85	4.77	1.48	1.40	3.25	0.83	0.37	2.34

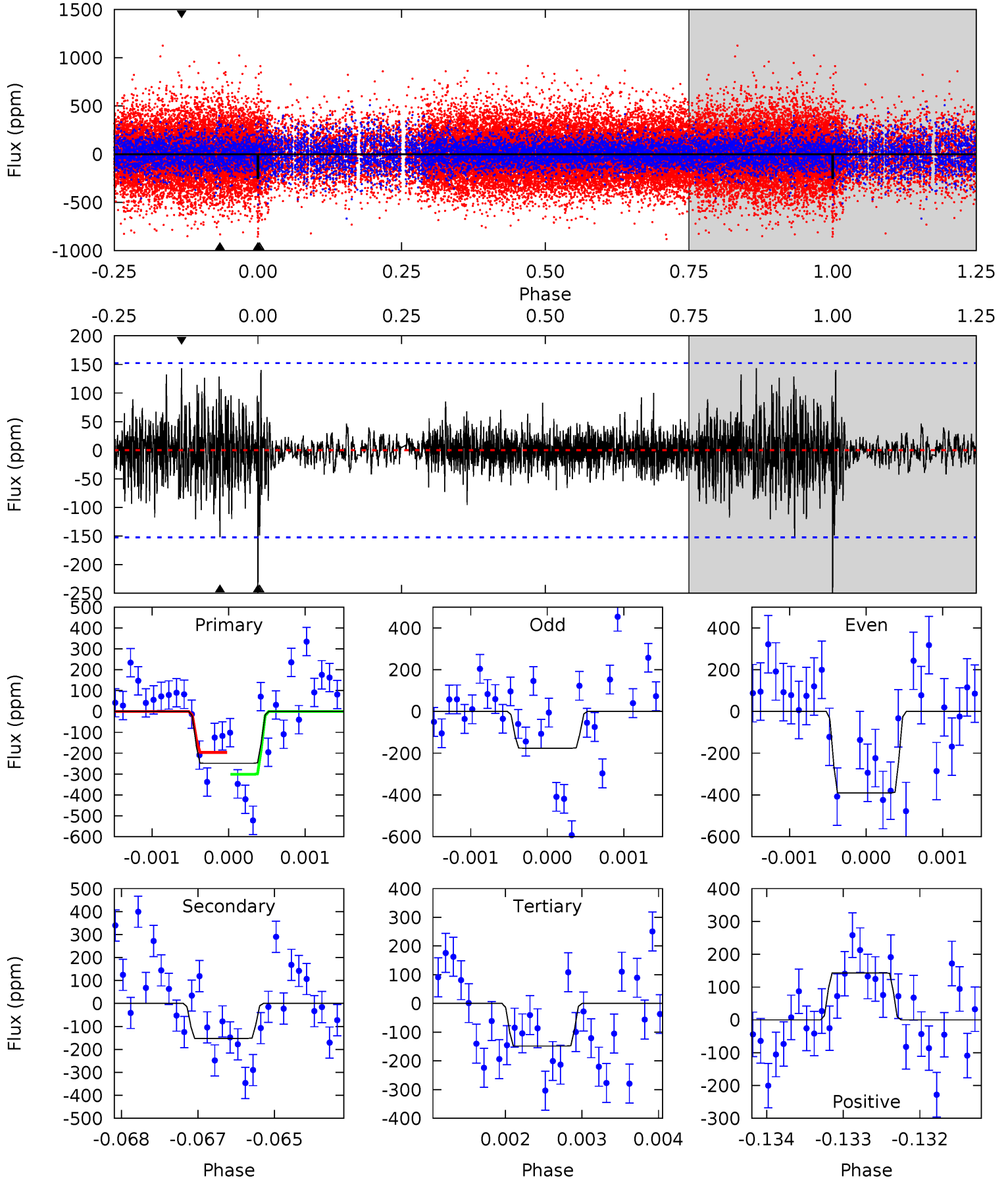




# Alt Model-Shift Uniqueness Test

010480921-02,  $P = 368.355786$  Days,  $E = 257.742736$  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
8.85	5.42	5.29	5.10	5.43	3.26	1.04	3.56	3.75	0.13	0.32	3.66	0.91	0.37	1.88



### Stellar Parameters For KIC 010480921

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6253^{+169}_{-207}$	$4.415^{+0.087}_{-0.203}$	$-0.400^{+0.300}_{-0.300}$	$1.015^{+0.312}_{-0.134}$	$0.975^{+0.135}_{-0.111}$	$1.314^{+0.493}_{-0.656}$
	+3%/-3%	+2%/-5%	+75%/-75%	+31%/-13%	+14%/-11%	+38%/-50%
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 010480921-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-234 \pm 28$	$2.34^{+1.05}_{-0.92}$	$392^{+27}_{-19}$	$5421^{+1498}_{-775}$	$22964^{+39865}_{-11898}$
Alt.	$-152 \pm 28$	$2.01^{+1.04}_{-0.95}$	$394^{+29}_{-21}$	$5286^{+1914}_{-822}$	$20541^{+51668}_{-11963}$

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

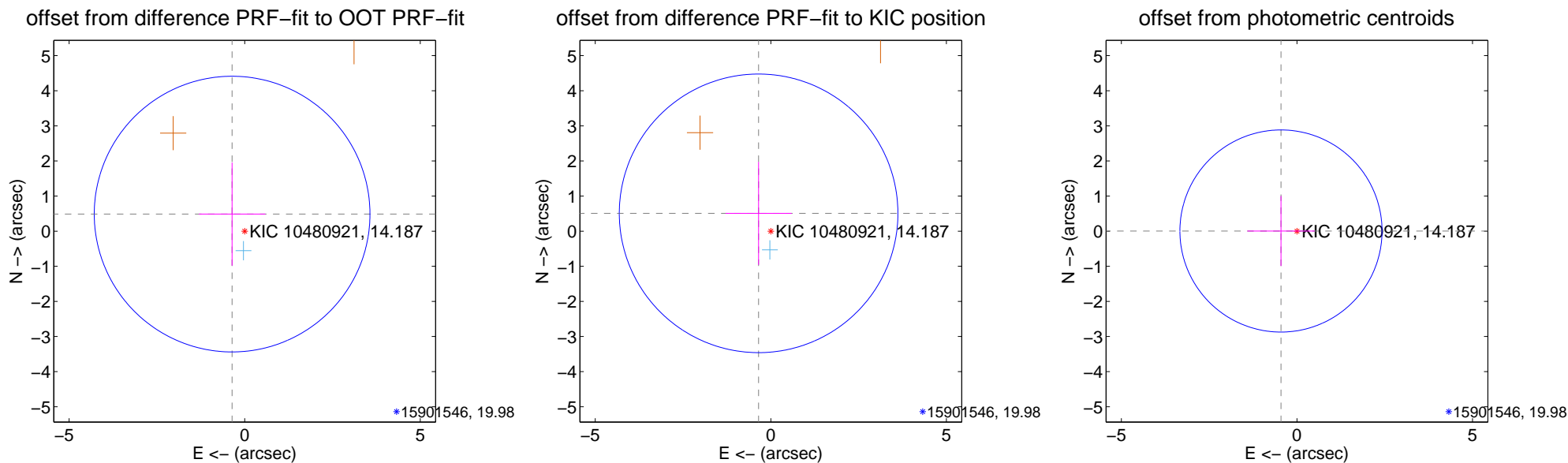
## DV Centroid Data

Supplemental centroid analysis for 010480921-02. Kepler magnitude: 14.19. Transit SNR 8.67

There are 1 quarters with good PRF difference image offsets

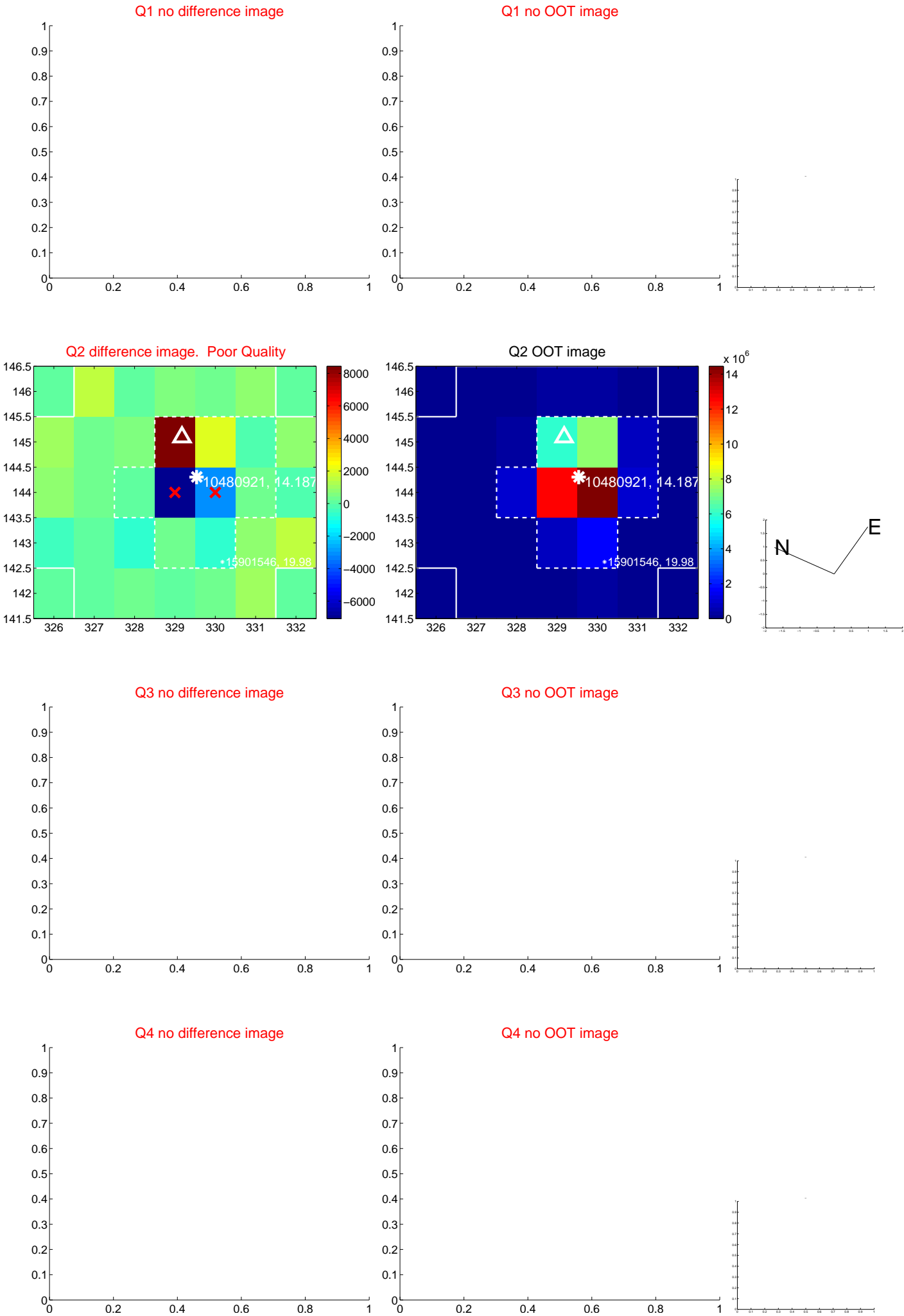
The direct PRF centroid is offset from the target star catalog position by about 0.03 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.604 \pm 1.309$	0.46	$0.358 \pm 0.945$	$0.487 \pm 1.469$
PRF-fit source offset from KIC position	$0.616 \pm 1.323$	0.47	$0.348 \pm 0.941$	$0.508 \pm 1.467$
photometric centroid source offset	$0.45 \pm 0.96$	0.47	$0.45 \pm 0.96$	$0.01 \pm 1.00$

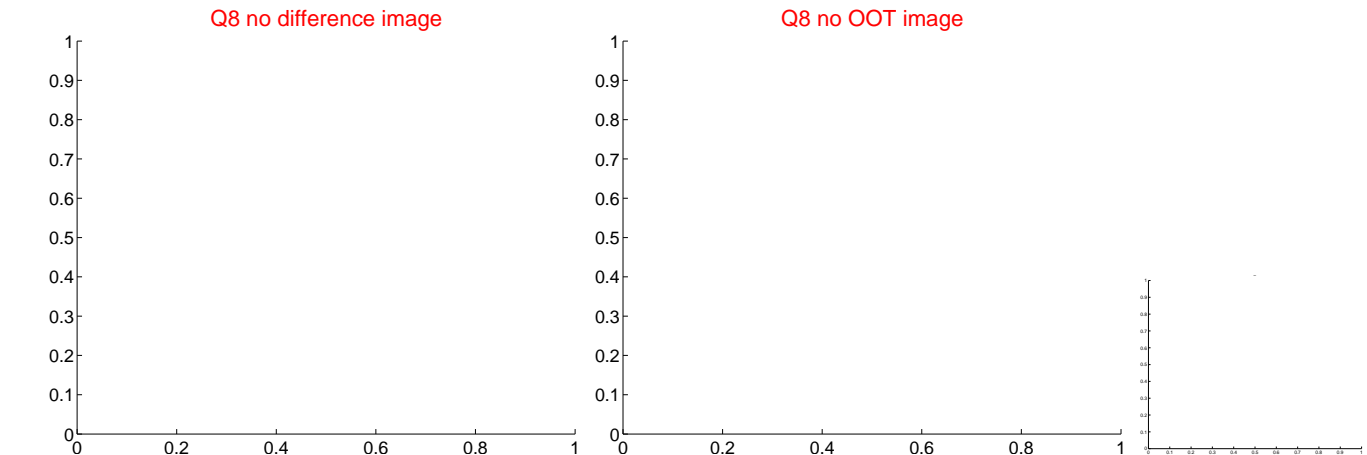
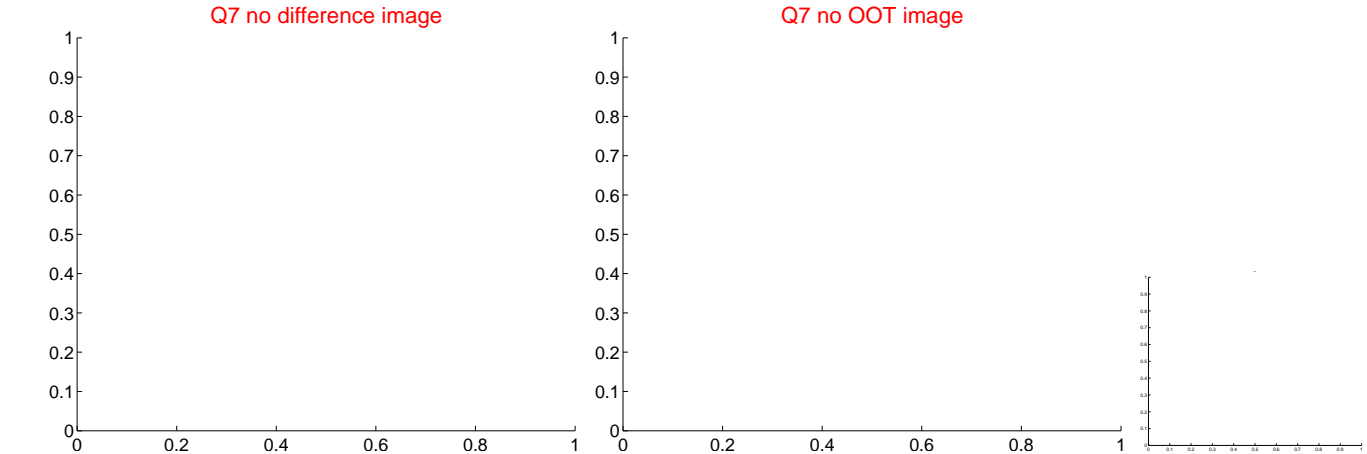
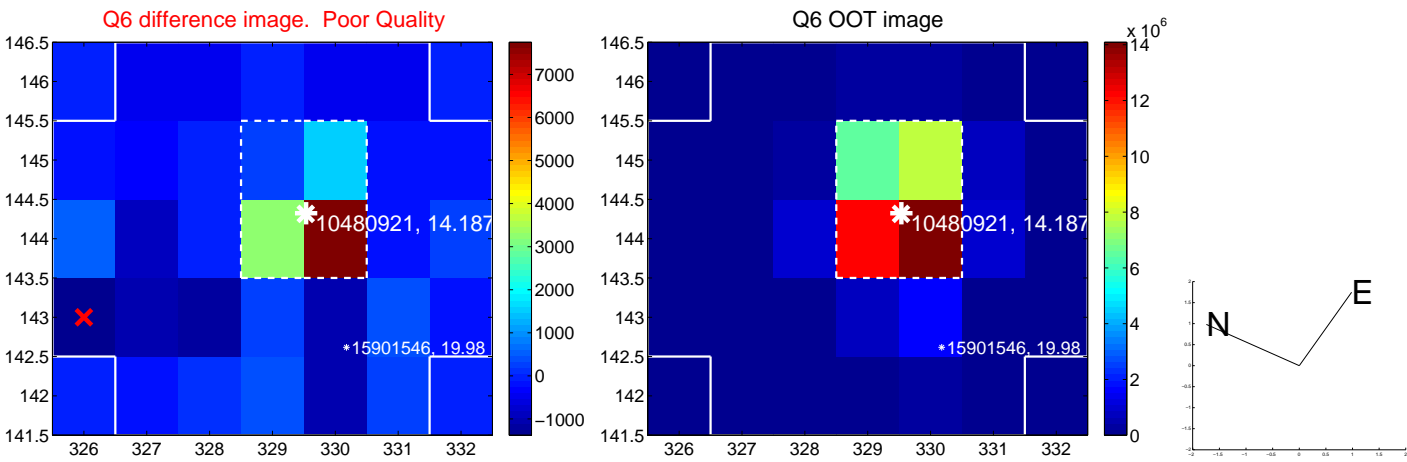
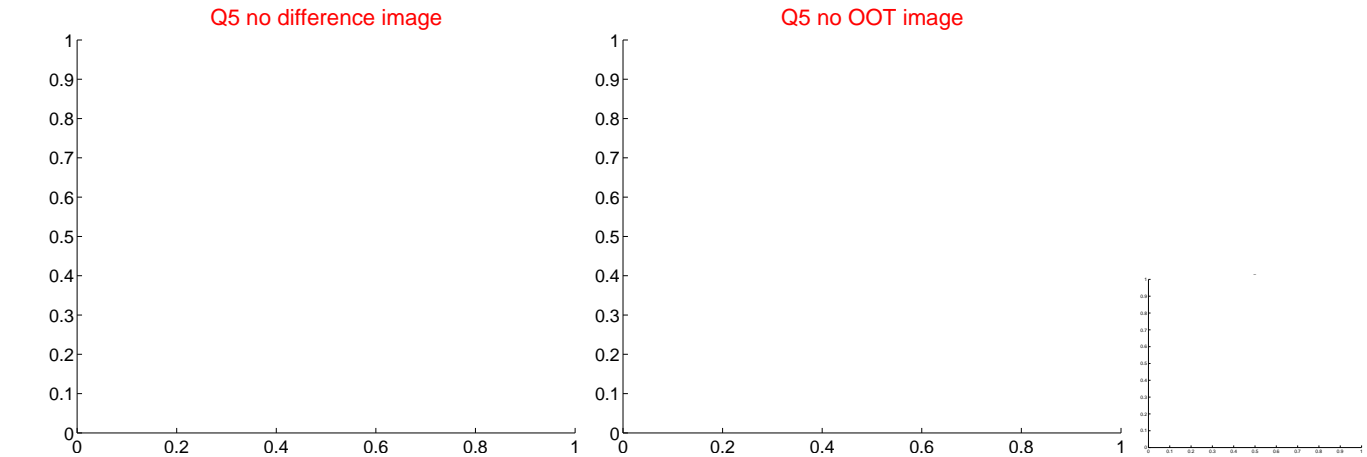


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

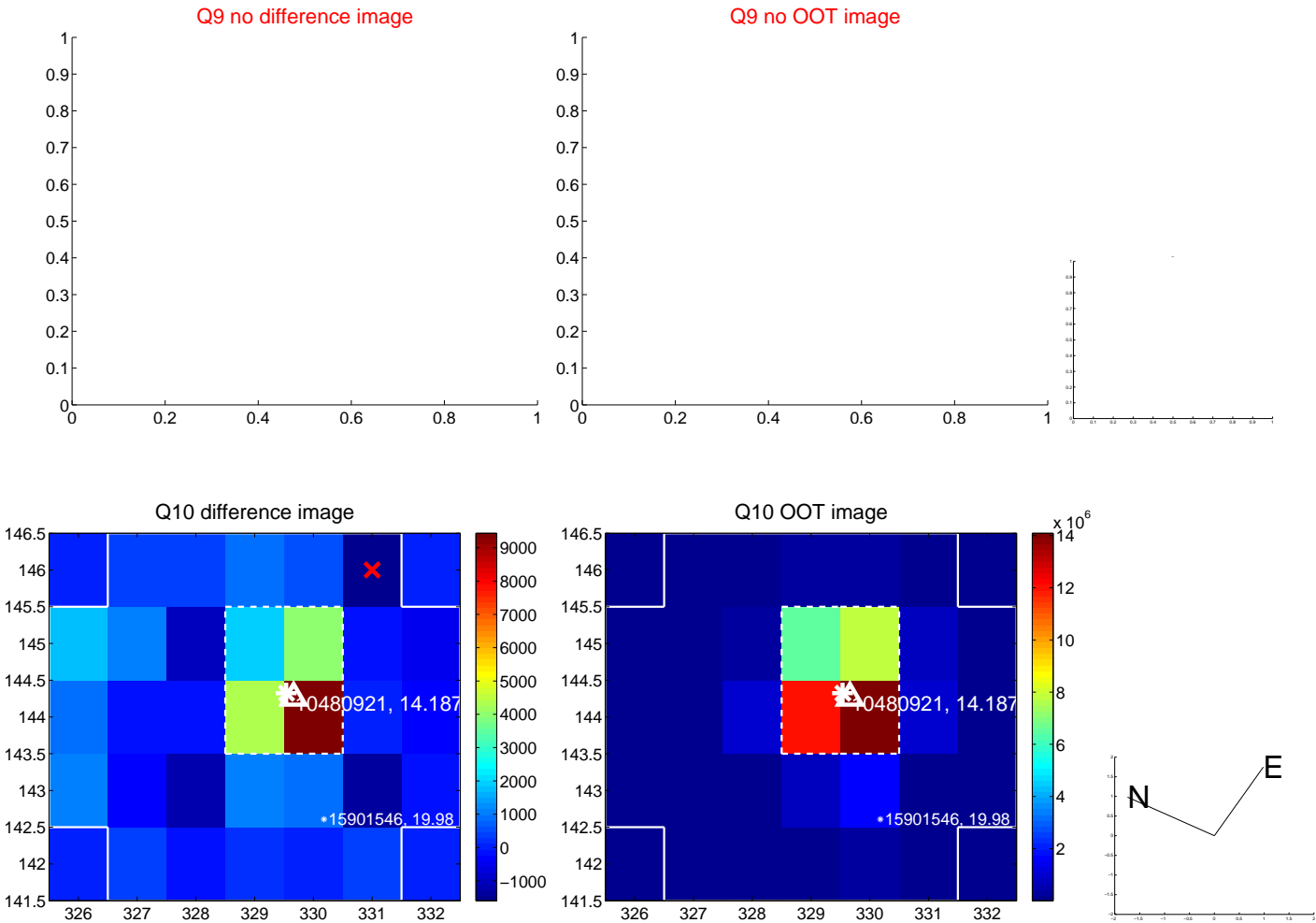
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



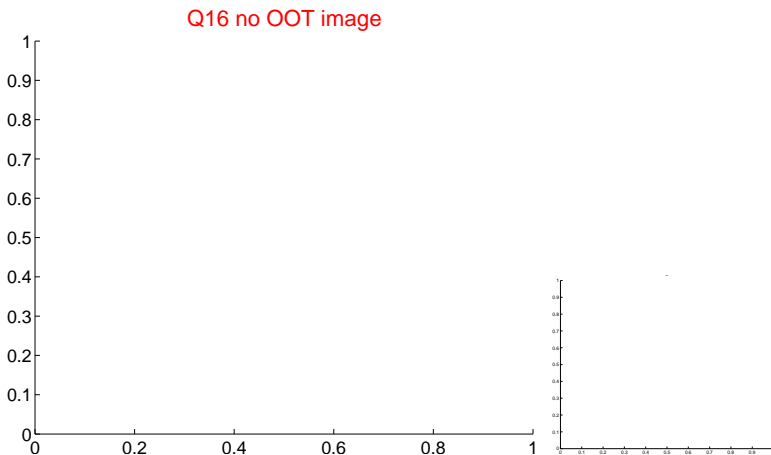
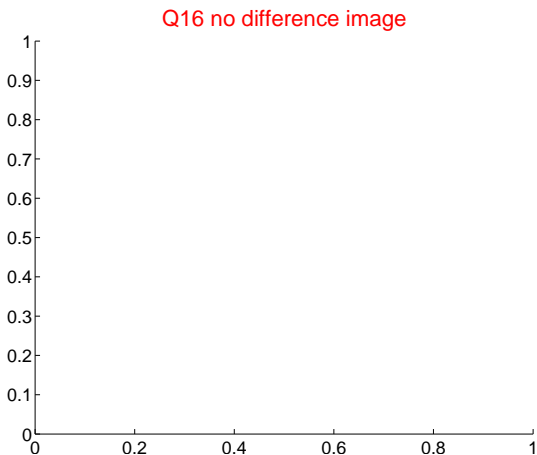
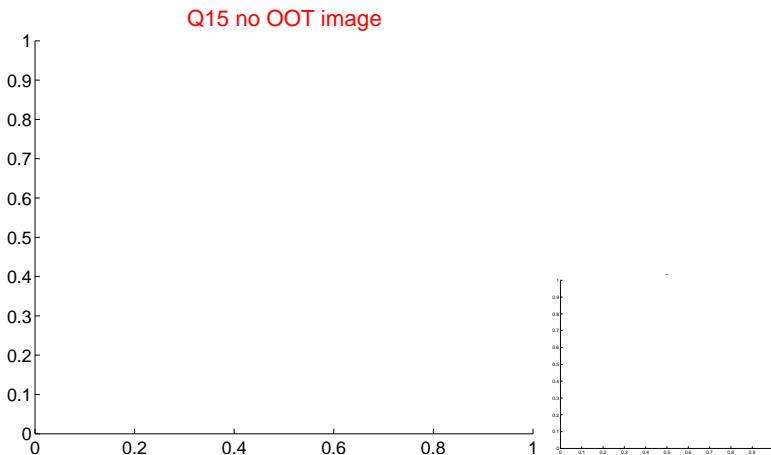
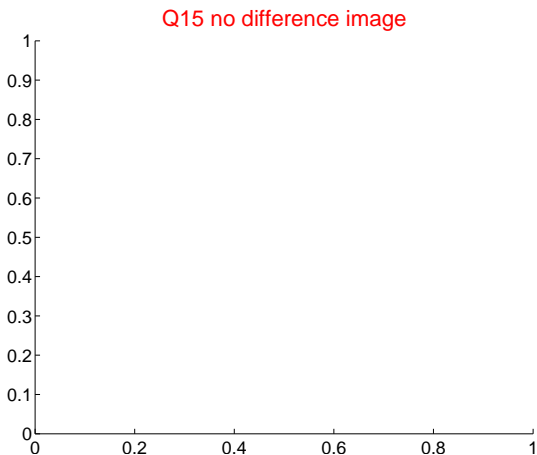
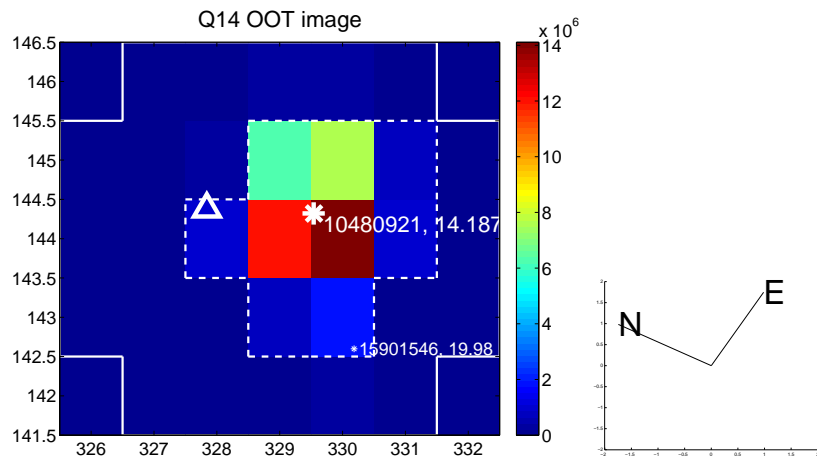
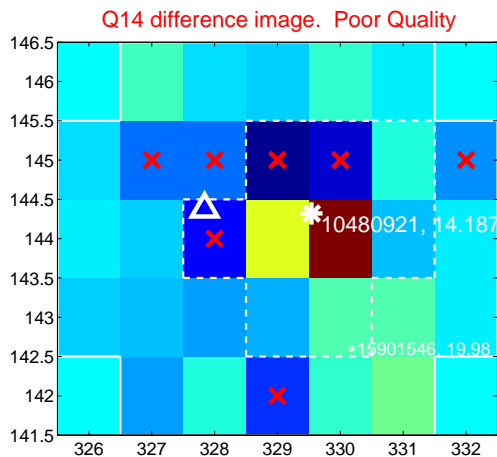
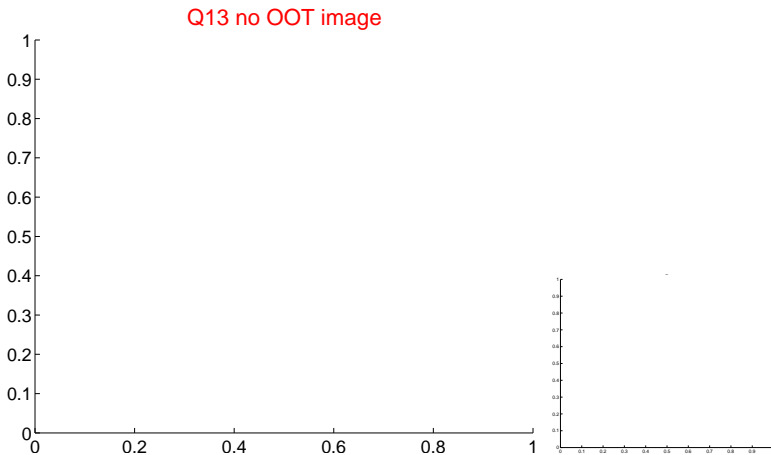
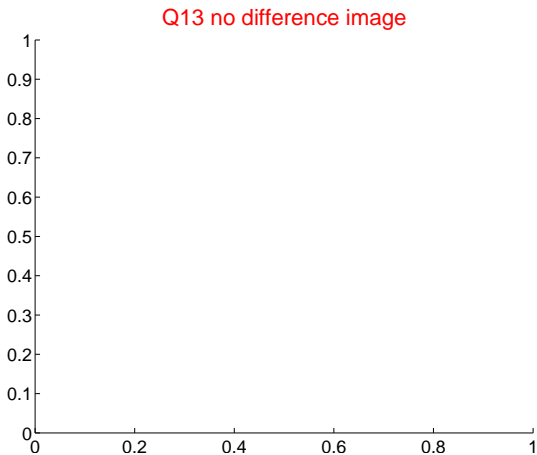
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

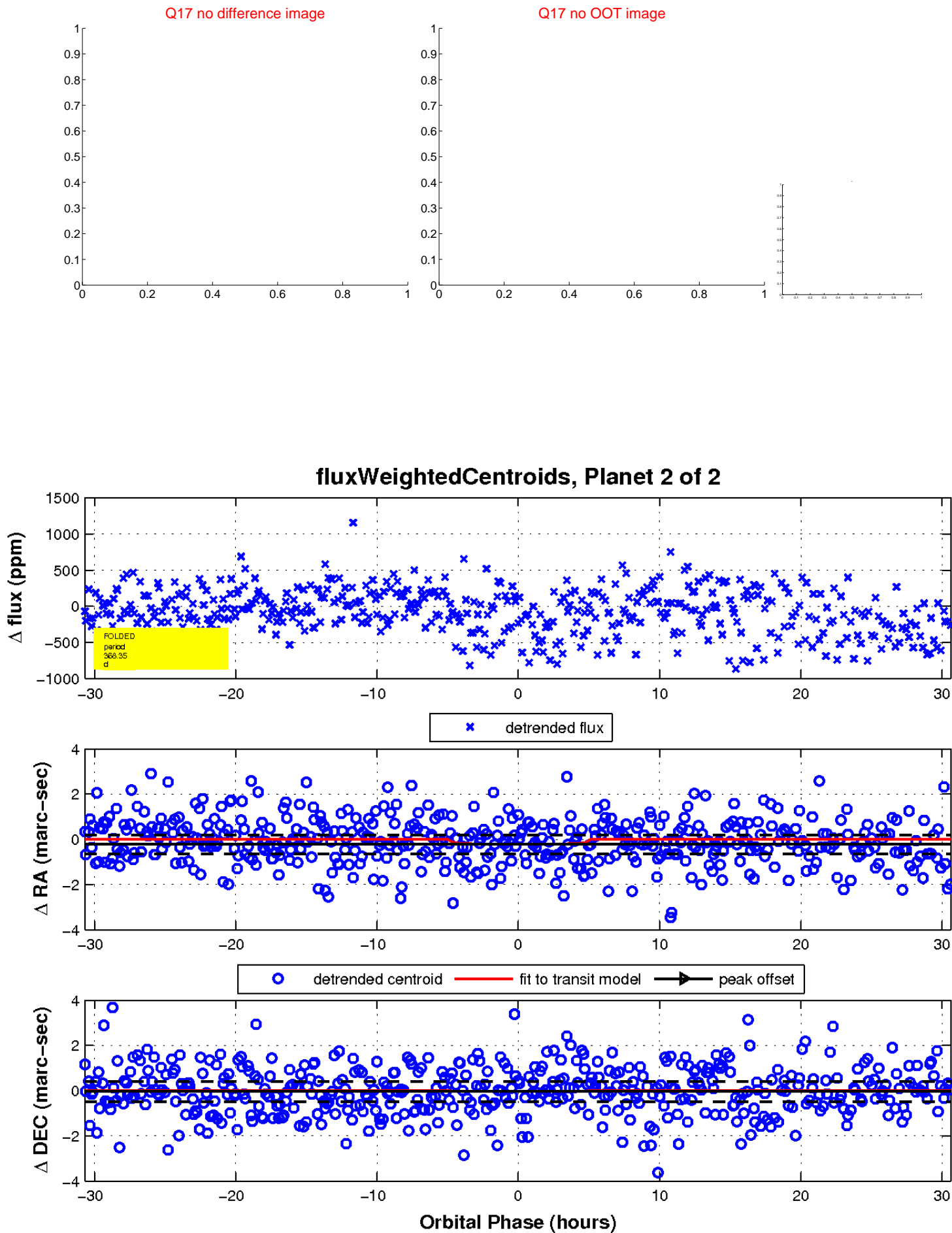


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value





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



UKIRT Image

