

# KIC 011401822

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011401822-01	OBS	2454.01	2.161386	131.872052	188.6	3.385	14.5	15.4	0.81	5482	1.30	563.73
011401822-02	OBS	No	371.726856	154.623861	917.3	15.062	9.7	8.8	0.81	5482	2.56	0.59

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011401822-01	OBS	FP	0.00	0	1	0	1	MOD_SEC_DV—MOD_SEC_ALT—CENT_FEW_DIFFS—EPHEM_MATCH
011401822-02	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—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.

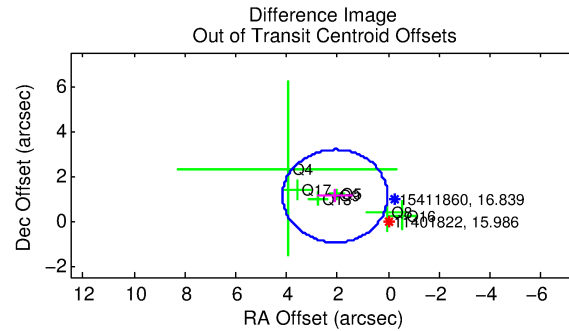
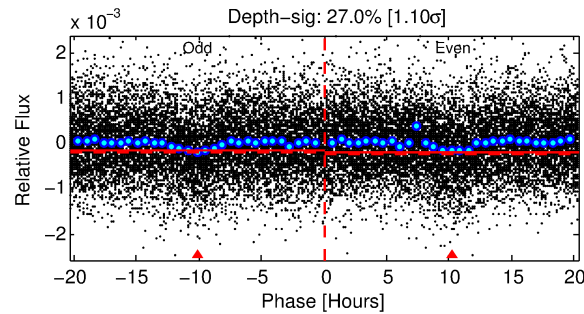
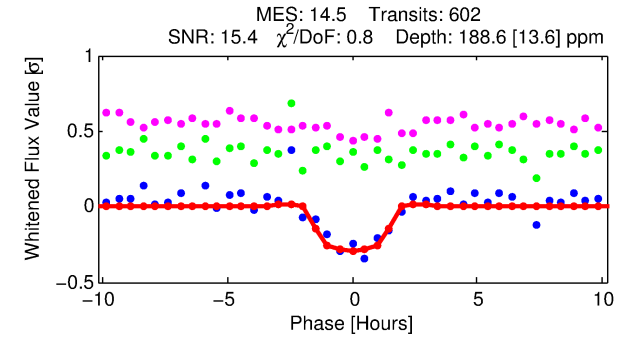
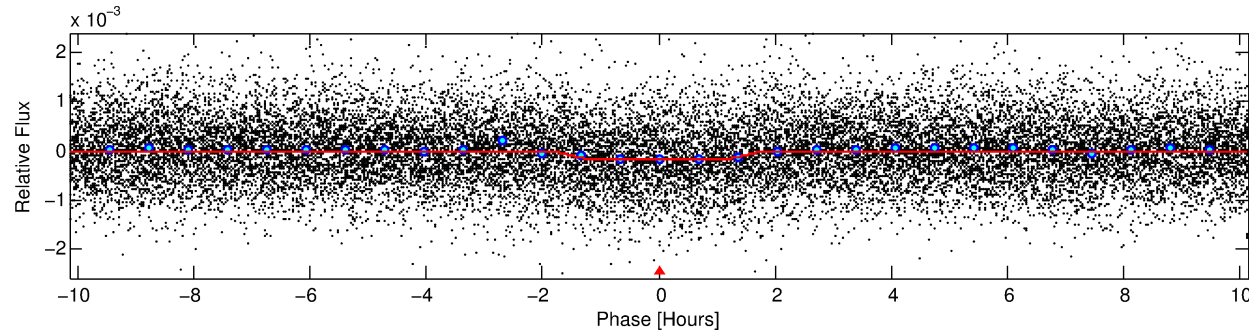
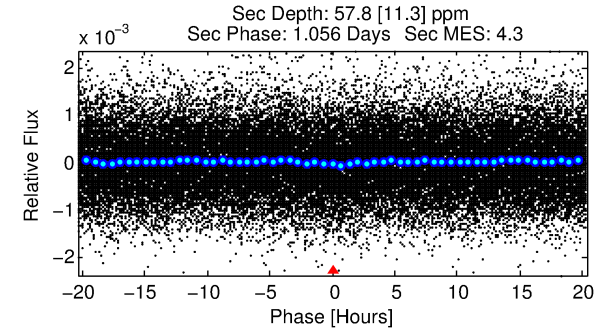
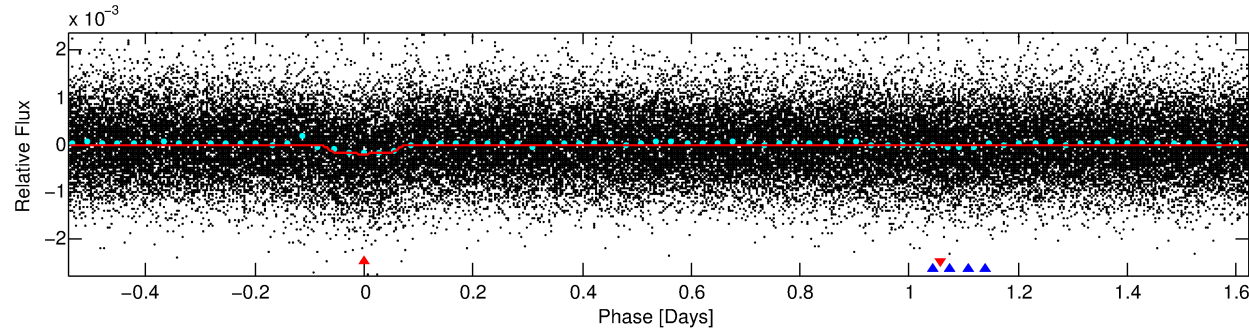
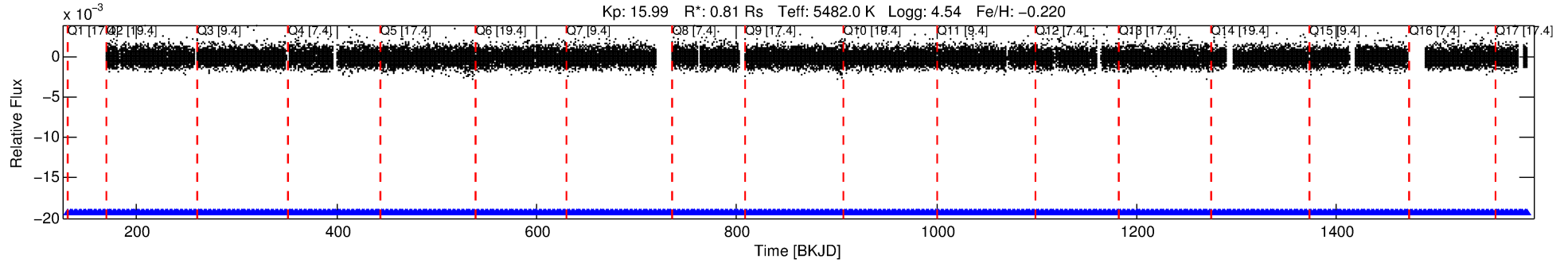
## Ephemeris Match Information For 011401822-01

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	$\sigma_P$	$\sigma_T$
011401822-01	11401822	011401845-pri	11401845	1:1	25.7	-3	6	14.36	15.99	2171.40	Direct-PRF	0	0.42	0.46

**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: 11401822 Candidate: 1 of 2 Period: 2.161 d  
KOI: K02454 Corr: No Ephemeris Match



## DV Fit Results:

Period = 2.16139 [0.00001] d  
Epoch = 131.8721 [0.0032] BKJD  
Rp/R\* = 0.0147 [0.0075]  
a/R\* = 2.70 [5.28]  
b = 0.87 [0.64]  
Seff = 563.73 [162.99]  
Teq = 1242 [90] K  
Rp = 1.30 [0.72] Re  
a = 0.0308 [0.0054] AU  
Ag = 17.84 [19.06] [0.88σ]  
Teffp = 3948 [1035] K [2.60σ]

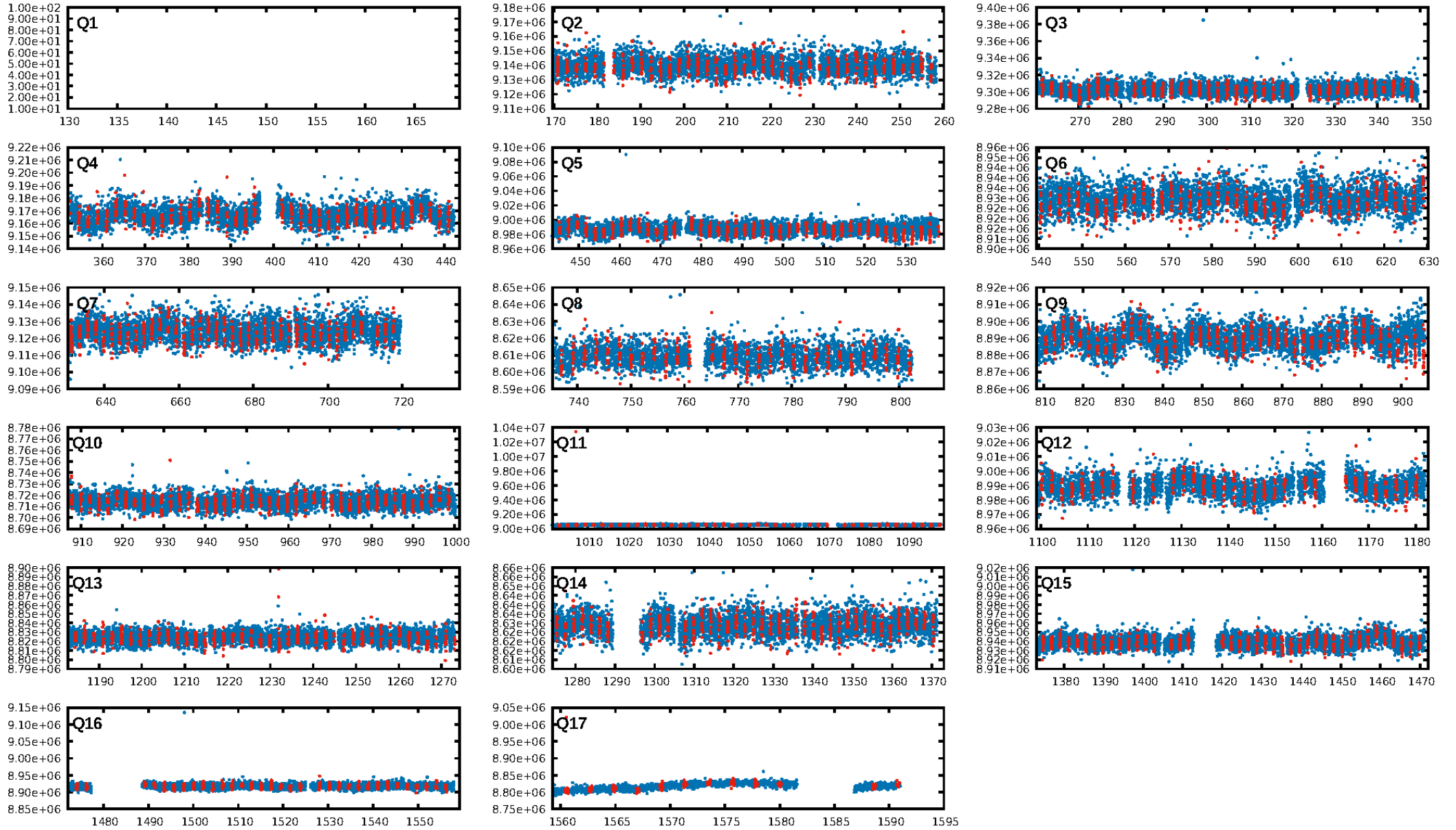
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [574.54σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 6.30e-46  
RollingBand-fgt: 1.00 [590/590]  
**GhostDiagnostic-chr: 0.9976**  
Centroid-sig: 3.5%  
Centroid-so: 1.407 arcsec [1.37σ]  
**OotOffset-rm: 2.366 arcsec [3.44σ]**  
**KicOffset-rm: 2.501 arcsec [3.93σ]**  
OotOffset-st: 0/0/3/4 [7]  
KicOffset-st: 0/0/3/4 [7]  
DiffImageQuality-fgm: 0.00 [0/7]  
DiffImageOverlap-fno: 1.00 [16/16]

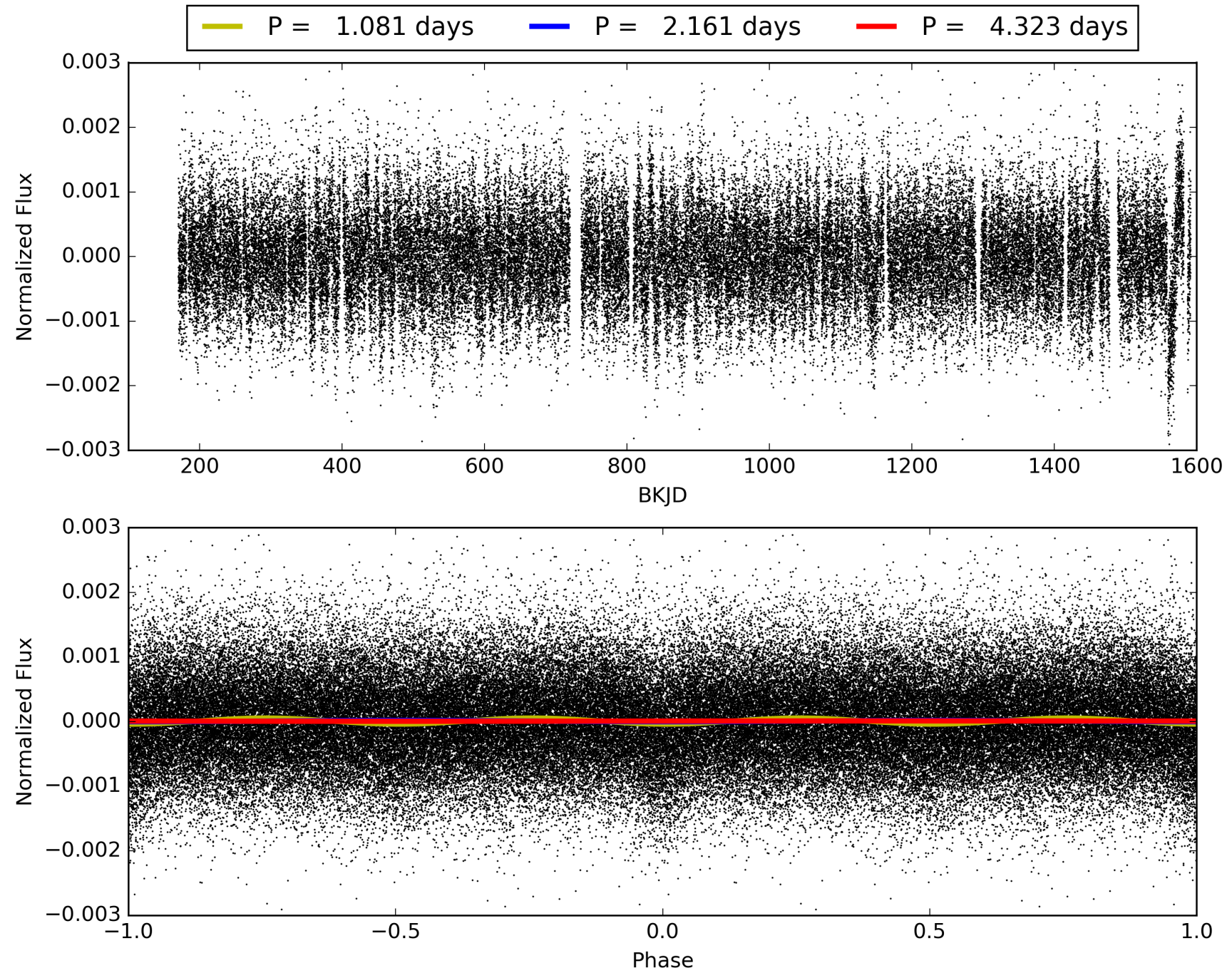
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 07:06:30 Z

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

# TCE 011401822-01, PDC Light Curves



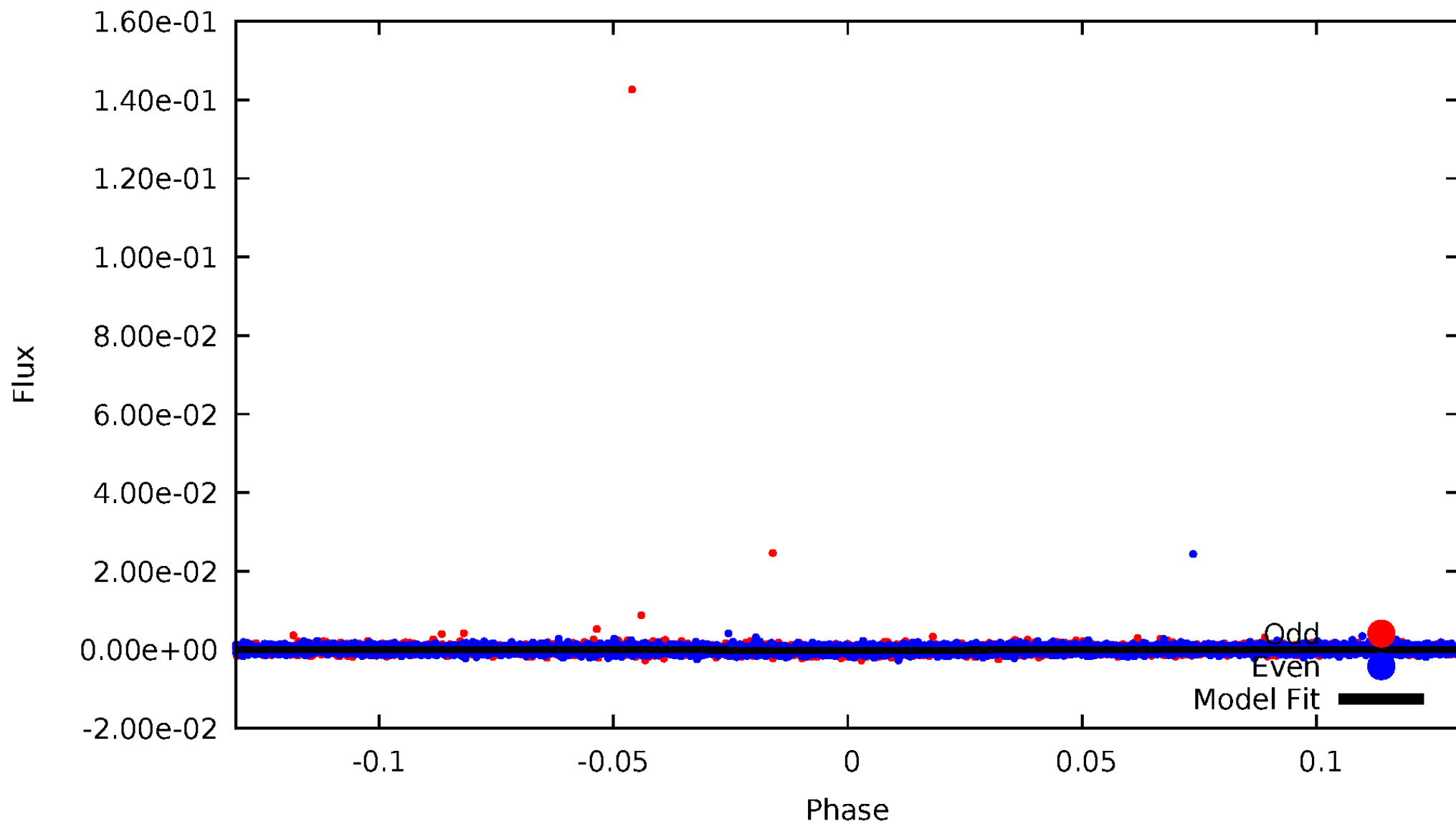
# TCE 011401822-01





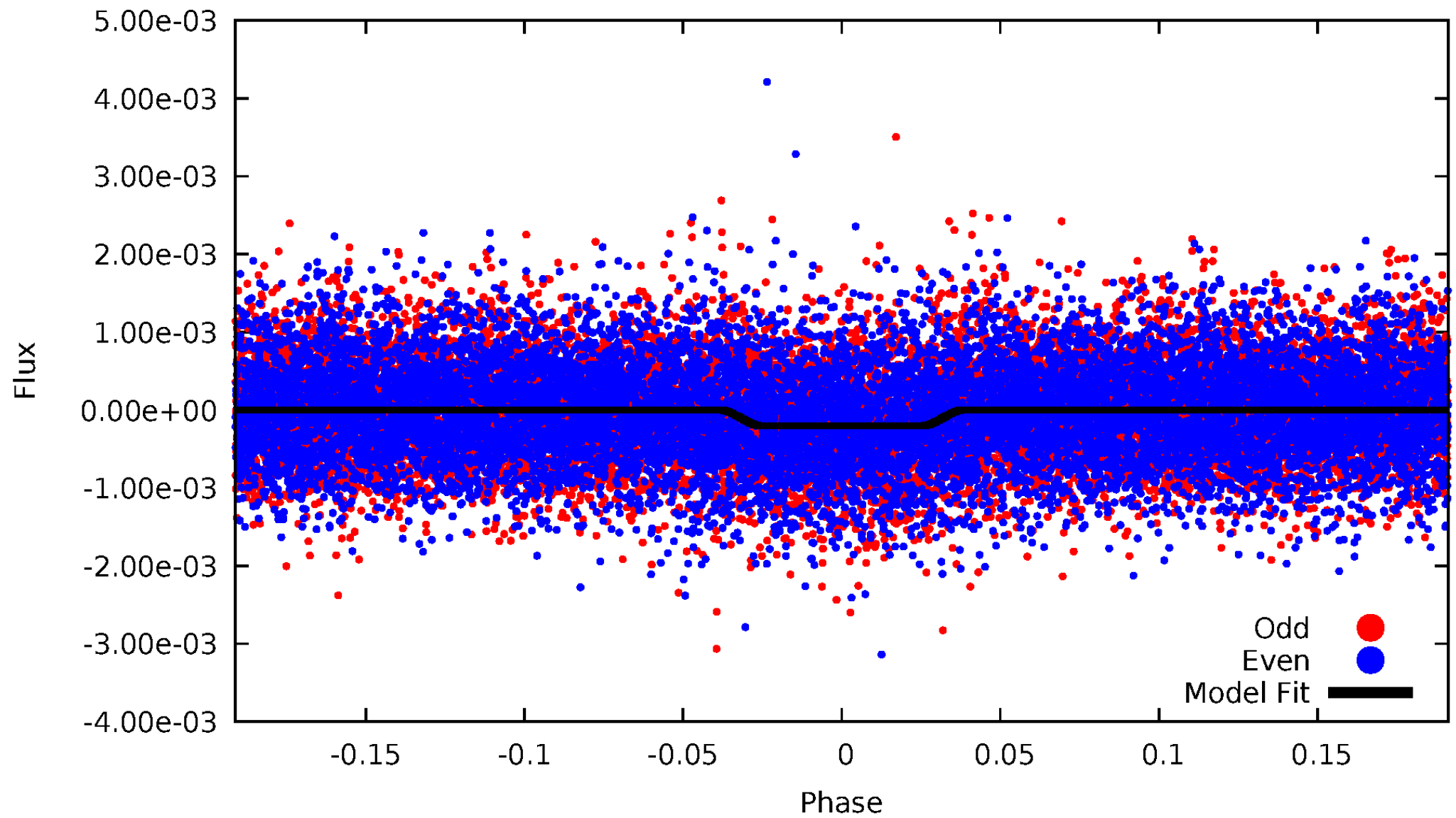
# DV Odd/Even

TCE 011401822-01

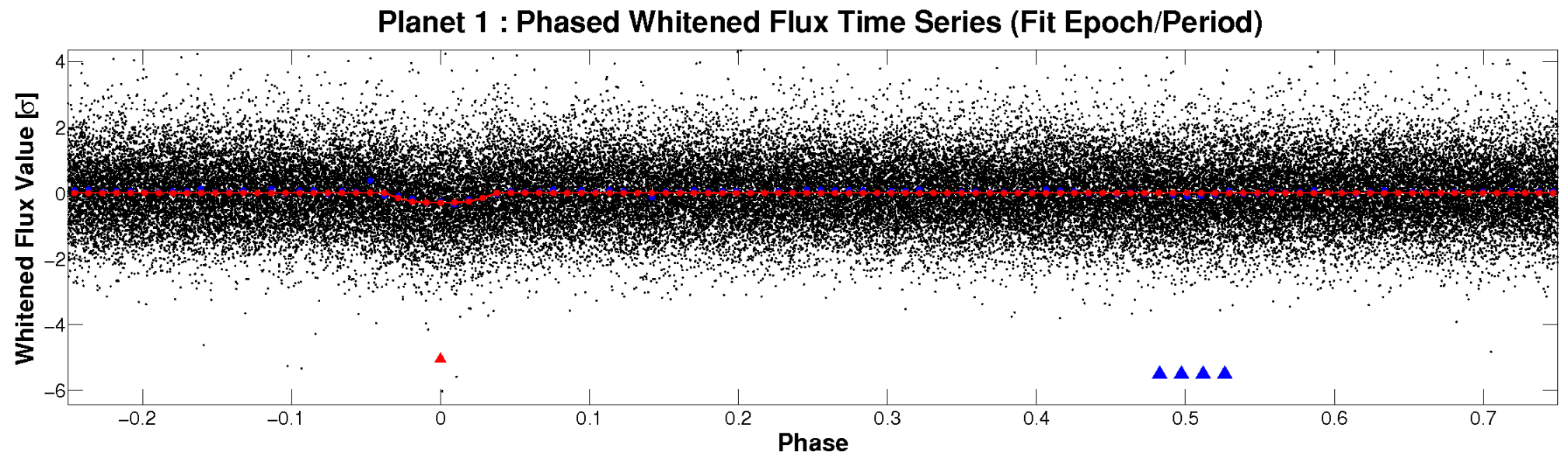
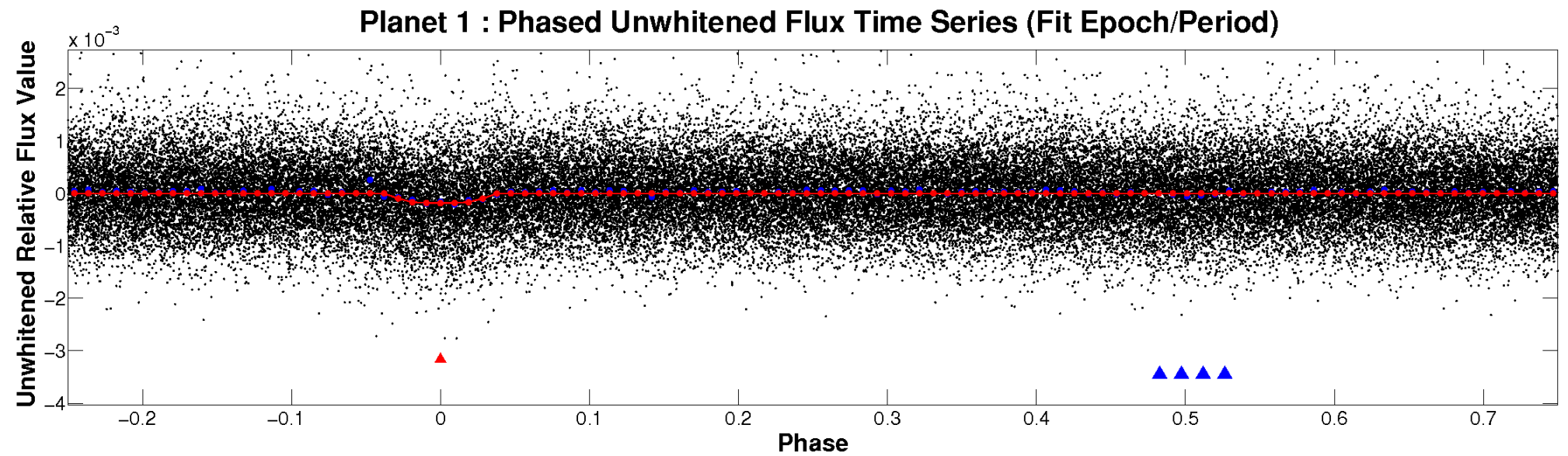


# ALT Odd/Even

TCE 011401822-01

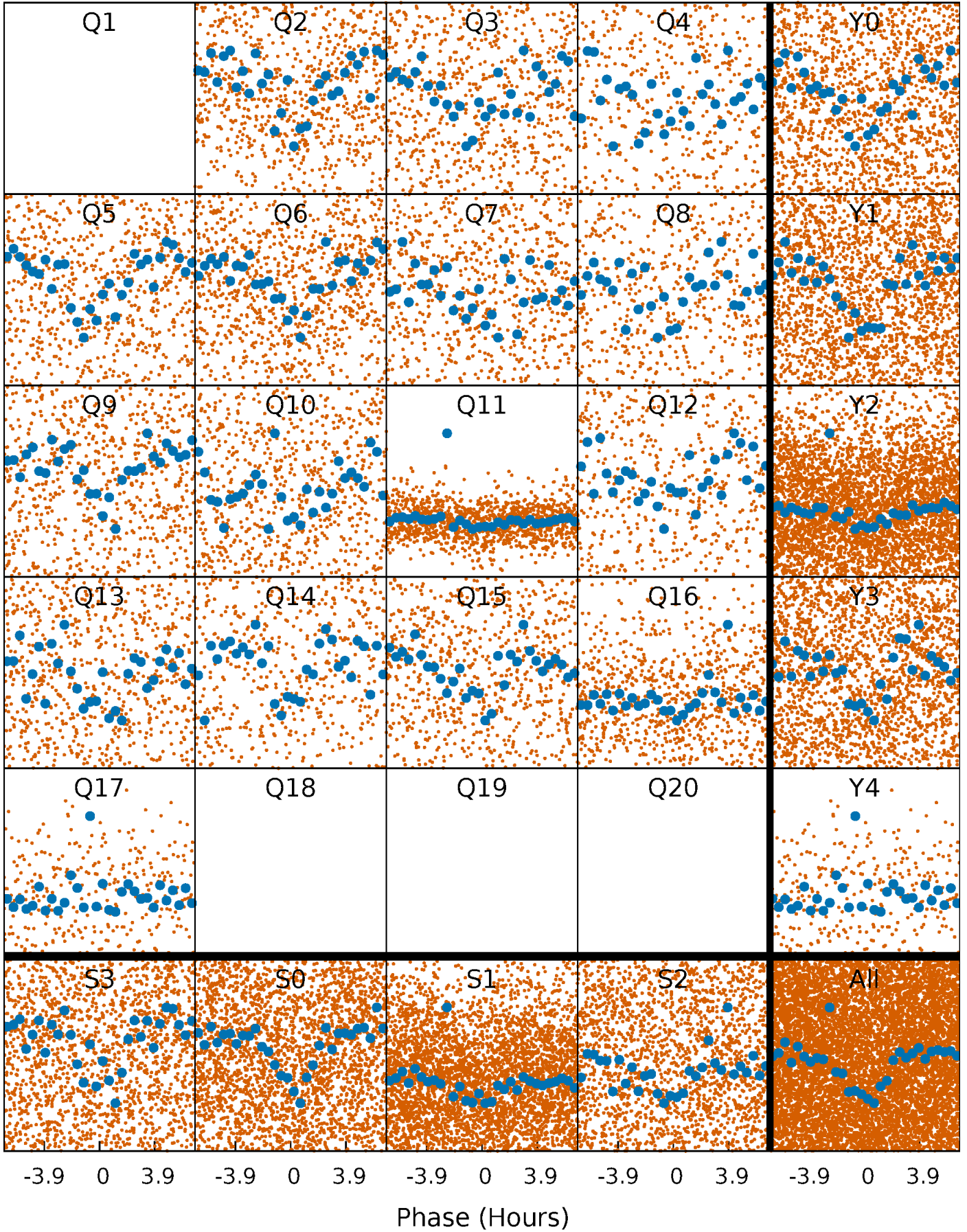


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

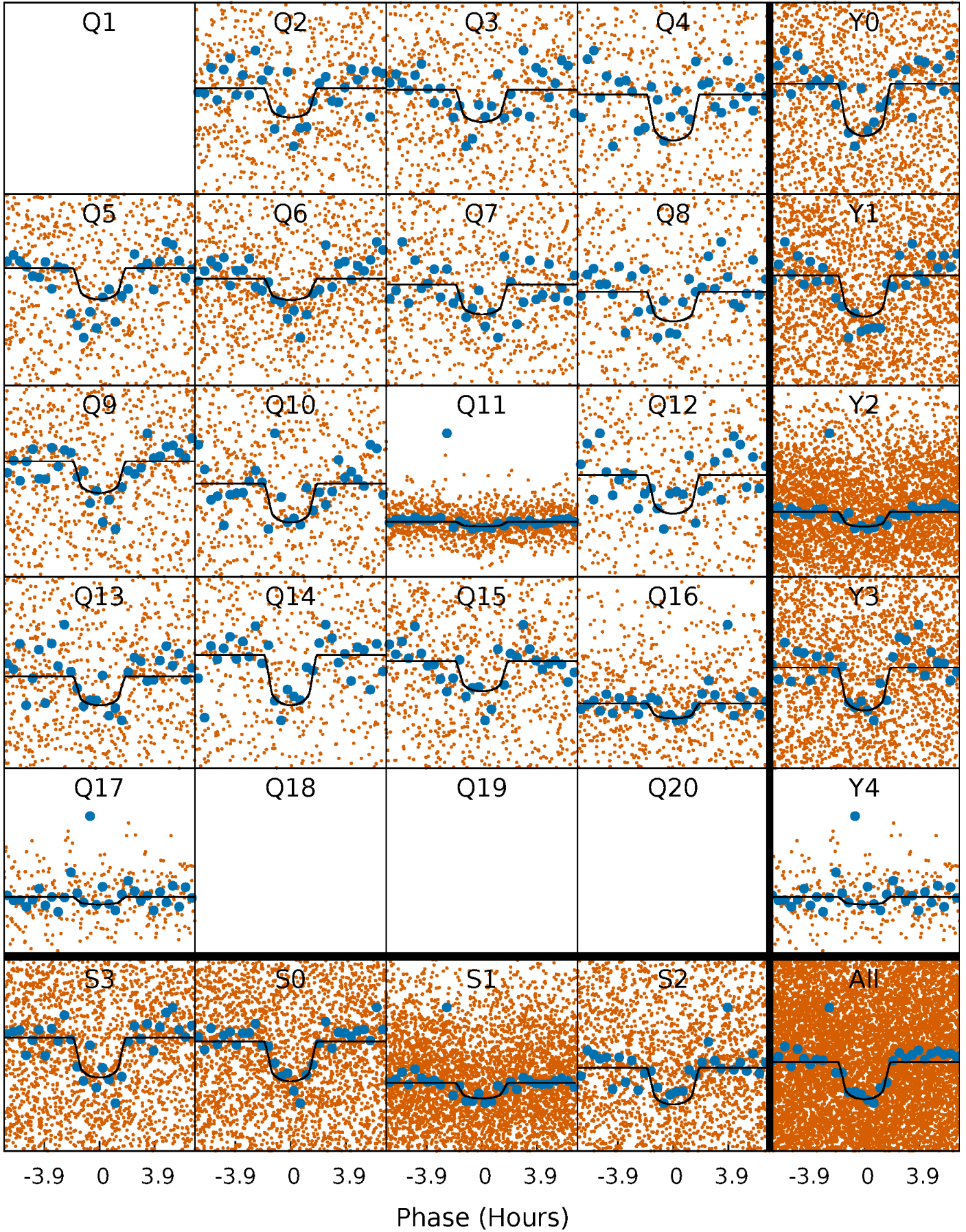
TCE 011401822-01 P= 2.161386 Days  $T_0=131.872052$  (BKJD)





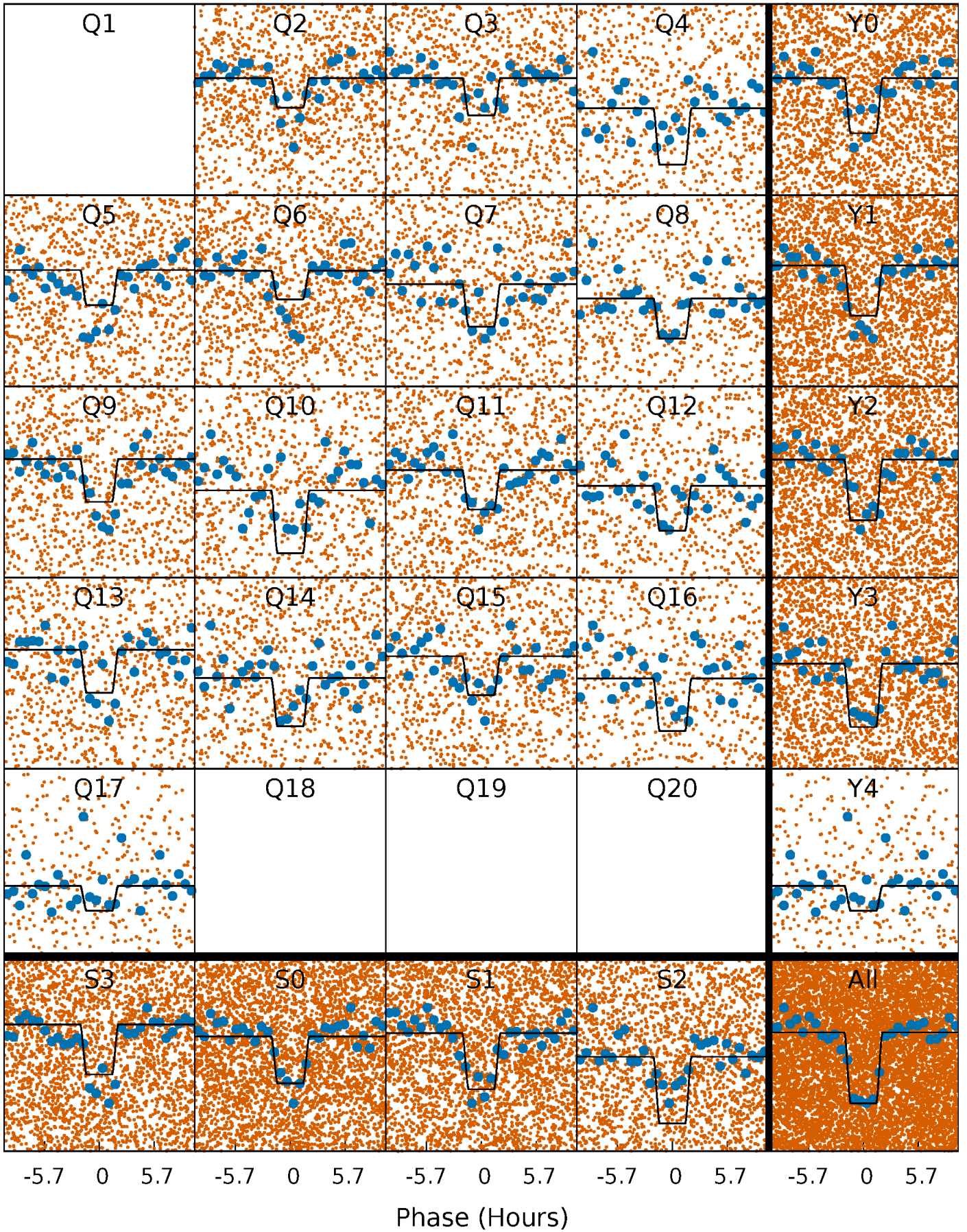
# DV Quarter-Phased Transit Curves

TCE 011401822-01 P= 2.161386 Days  $T_0=131.872052$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

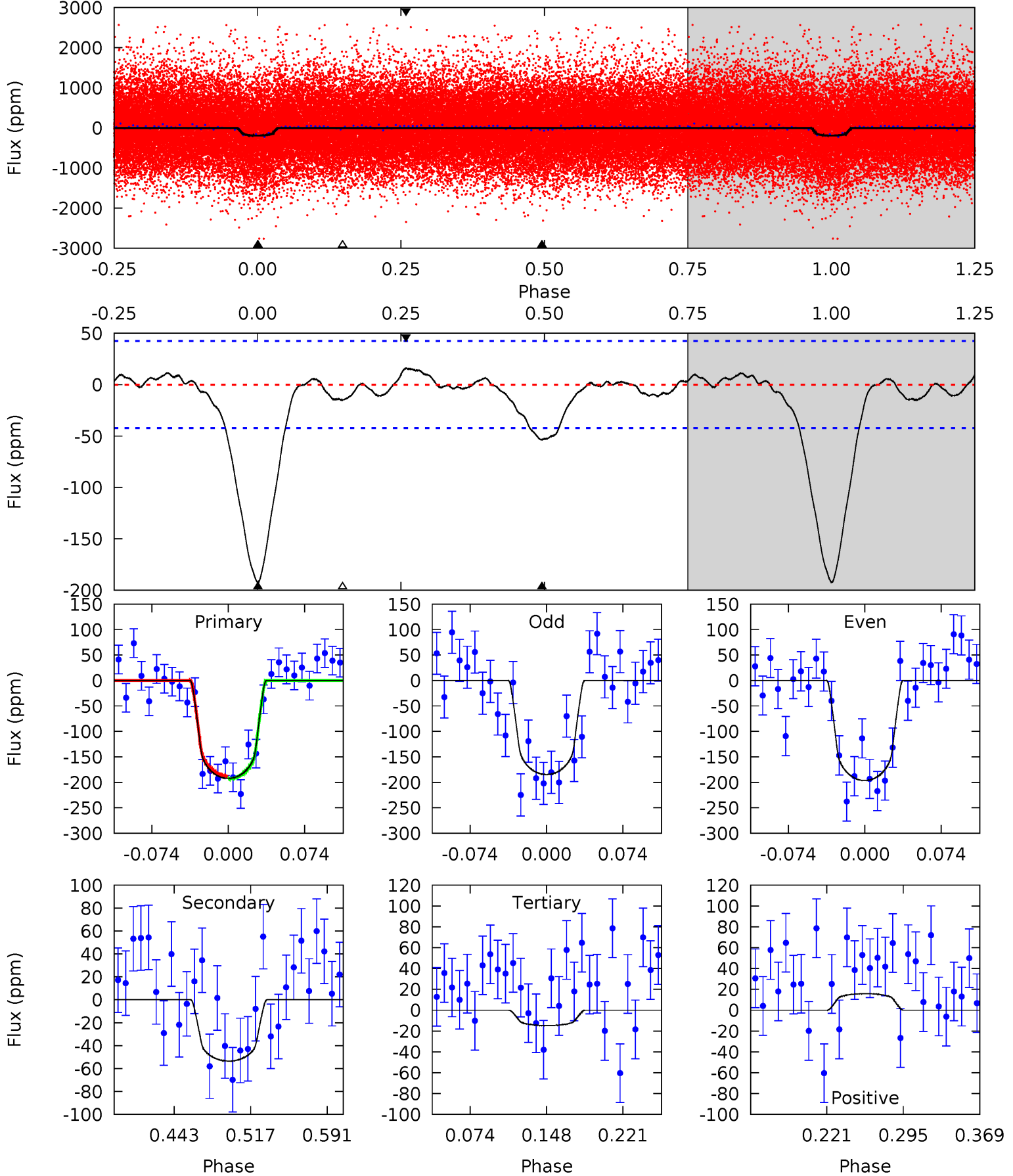
TCE 011401822-01 P= 2.161361 Days  $T_0=131.877182$  (BKJD)



# DV Model-Shift Uniqueness Test

011401822-01, P = 2.161386 Days, E = 131.872052 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	5.84	1.62	1.73	4.63	1.79	0.79	19.4	19.3	4.23	4.11	0.63	0.99	0.08	0.28

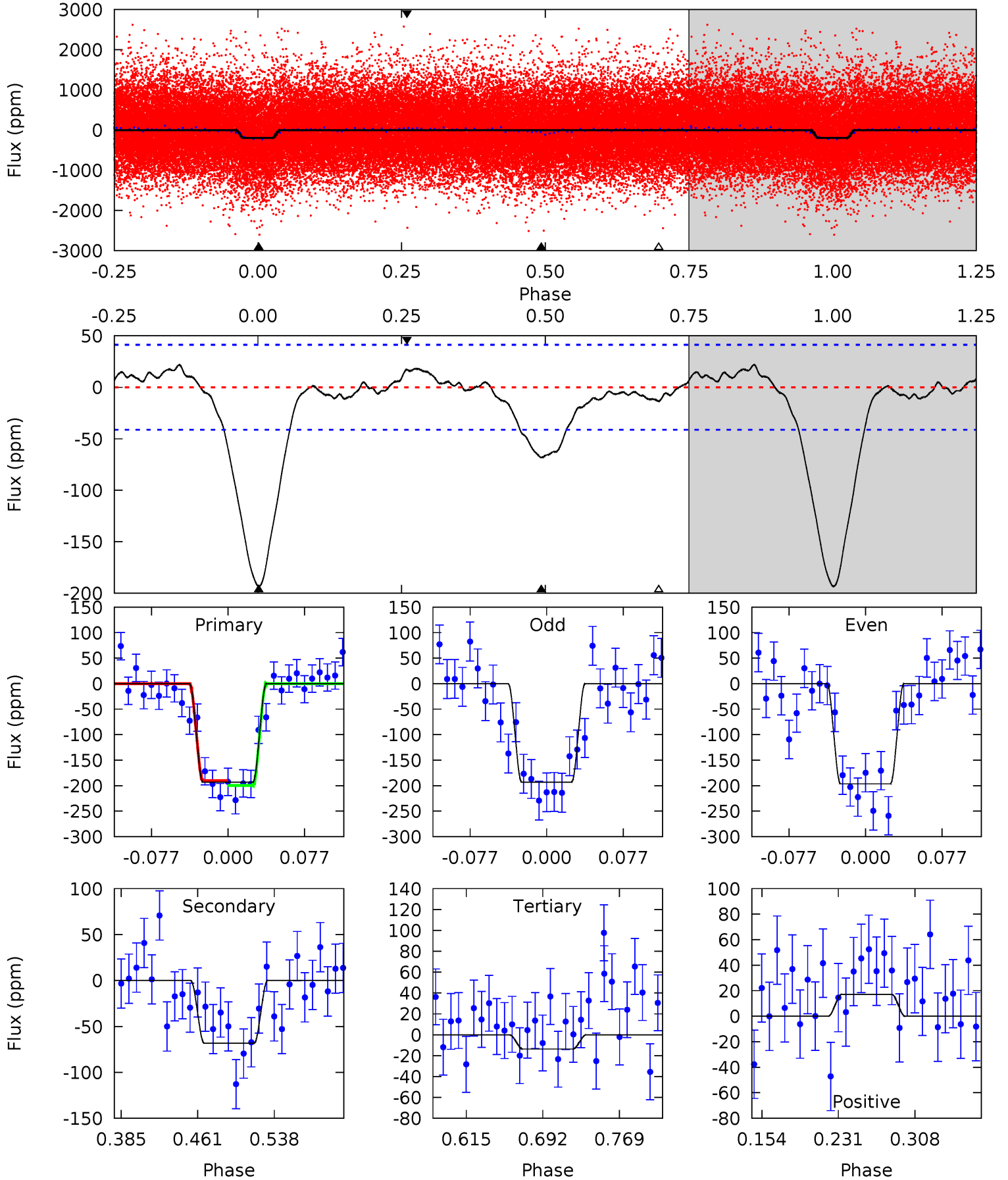




# Alt Model-Shift Uniqueness Test

011401822-01, P = 2.161361 Days, E = 131.877182 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
21.7	7.65	1.53	1.92	4.62	1.77	1.03	20.1	19.7	6.12	5.73	0.19	1.06	0.10	0.56





### Stellar Parameters For KIC 011401822

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5482^{+199}_{-199}$	$4.539^{+0.057}_{-0.133}$	$-0.220^{+0.300}_{-0.300}$	$0.813^{+0.176}_{-0.088}$	$0.833^{+0.102}_{-0.083}$	$2.187^{+0.641}_{-0.878}$
	+4%/-4%	+1%/-3%	+136%/-136%	+22%/-11%	+12%/-10%	+29%/-40%
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 011401822-01 / KOI 2454.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-53 \pm 9$	$1.35^{+0.69}_{-0.64}$	$1760^{+98}_{-87}$	$4108^{+1265}_{-597}$	$15^{+42}_{-9}$
Alt.	$-68 \pm 9$	$1.37^{+0.65}_{-0.71}$	$1753^{+103}_{-76}$	$4260^{+1627}_{-553}$	$19^{+65}_{-10}$

$T_{max}$  = 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

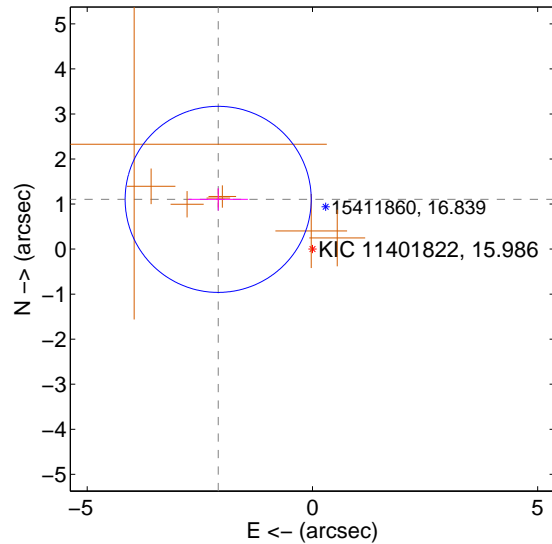
Supplemental centroid analysis for 011401822-01. Kepler magnitude: 15.99. Transit SNR 15.41

There are 0 quarters with good PRF difference image offsets

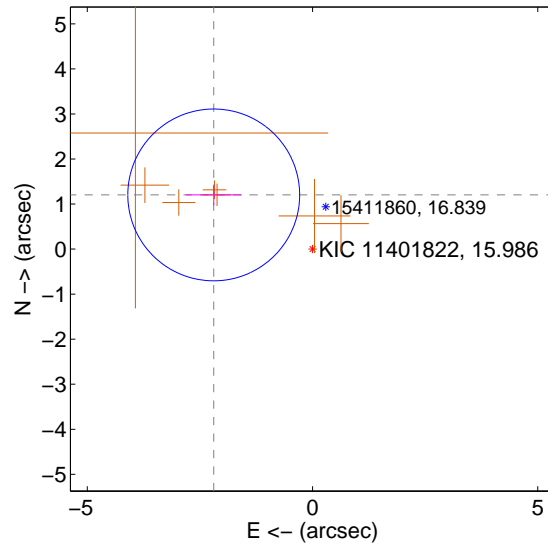
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.366 \pm 0.688$	3.44	$2.092 \pm 0.660$	$1.104 \pm 0.248$
PRF-fit source offset from KIC position	$2.501 \pm 0.636$	3.93	$2.193 \pm 0.620$	$1.203 \pm 0.230$
photometric centroid source offset	$1.41 \pm 1.02$	1.37	$-0.41 \pm 1.02$	$-1.35 \pm 1.02$

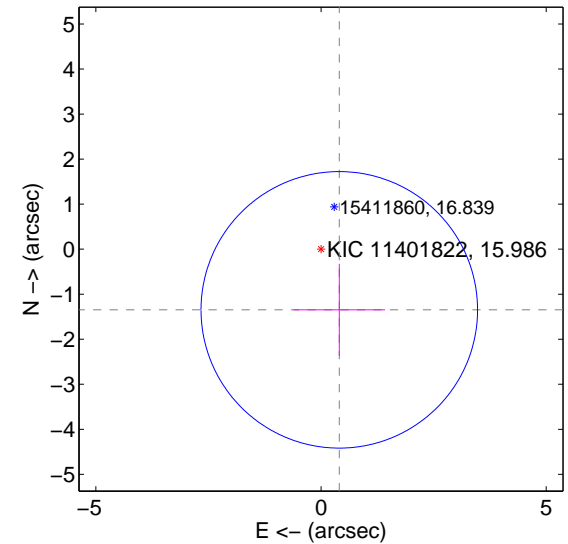
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

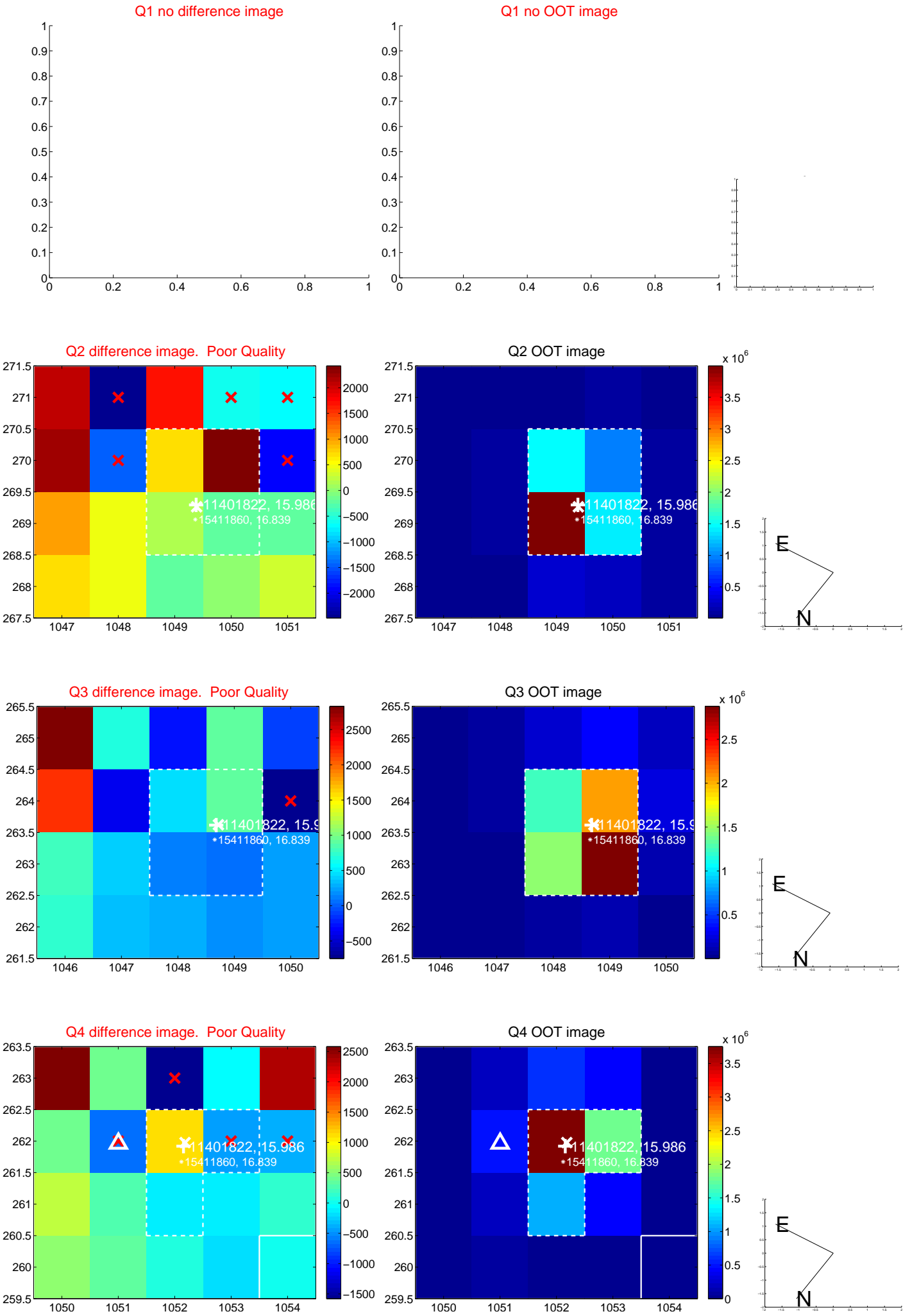


offset from photometric centroids

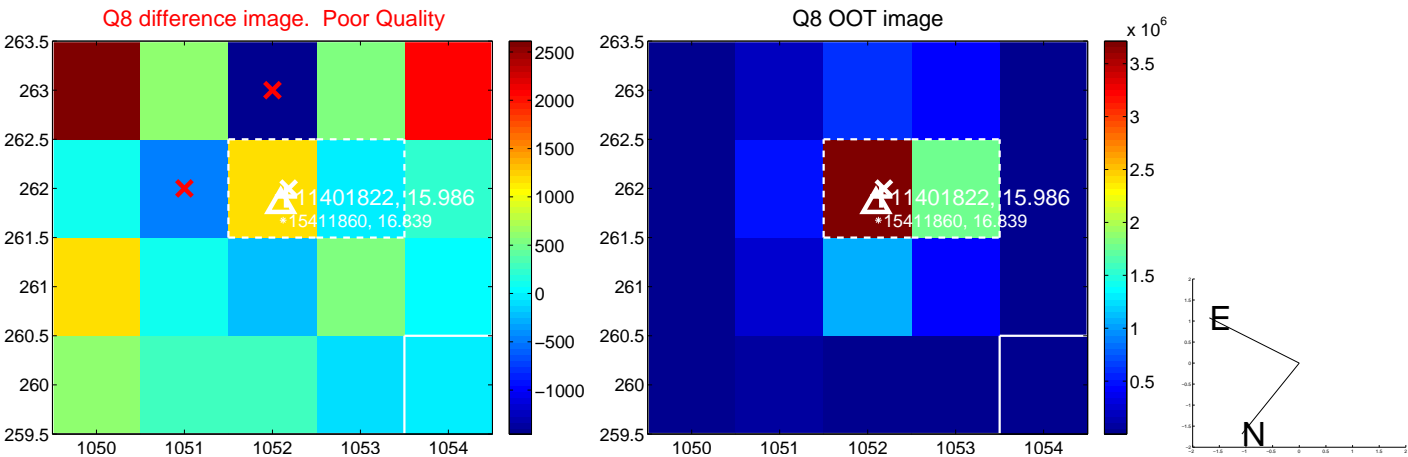
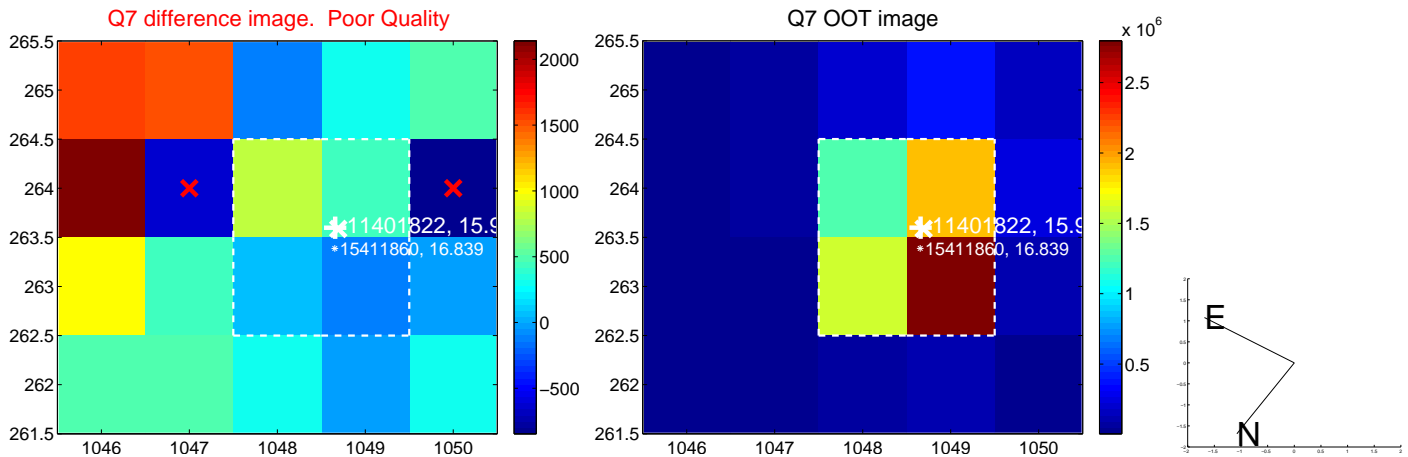
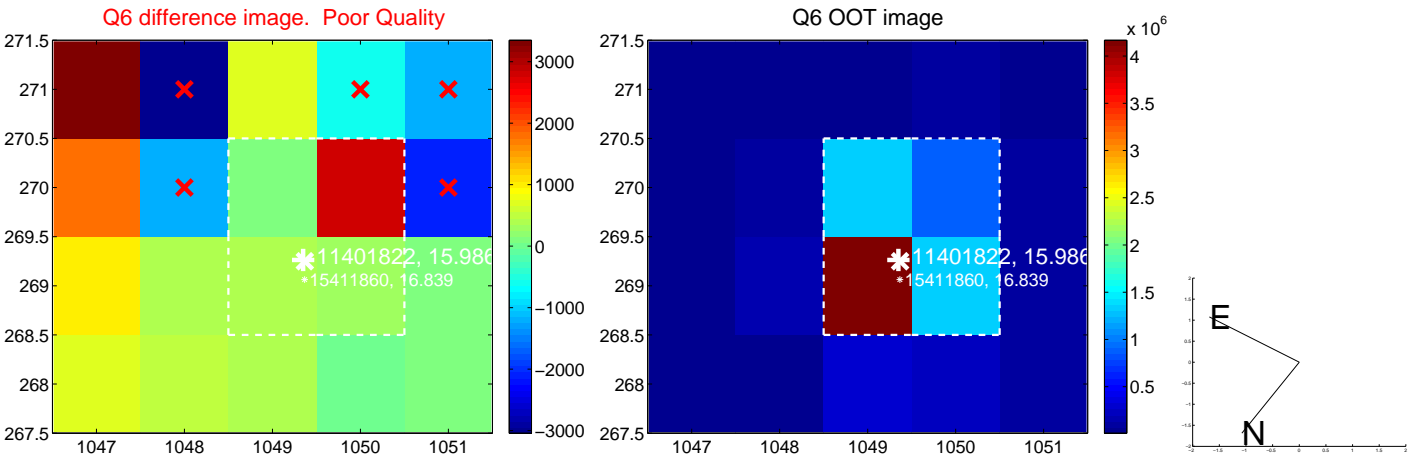
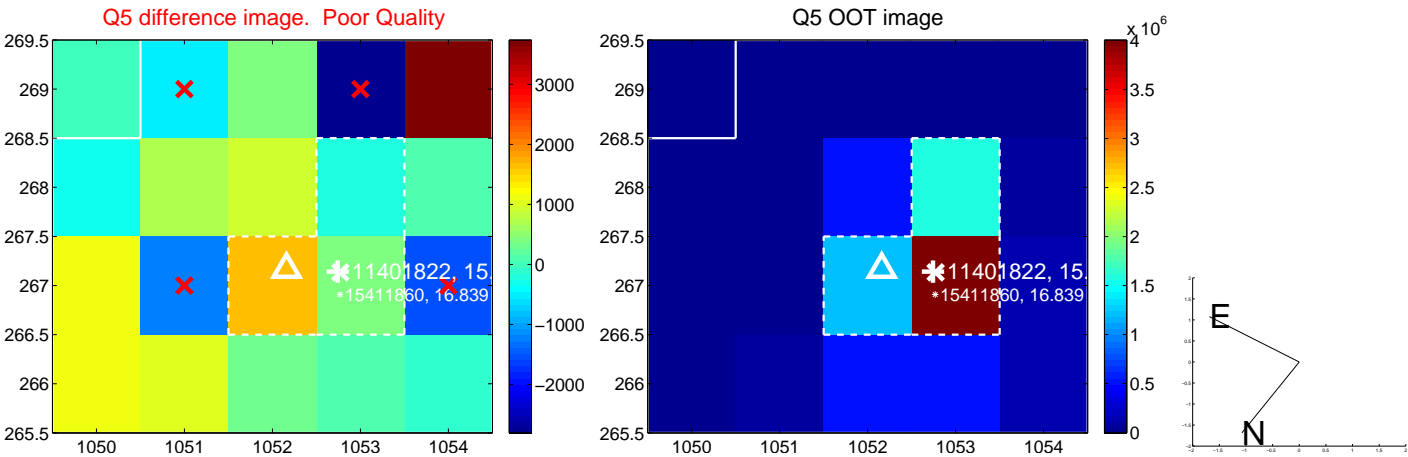


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

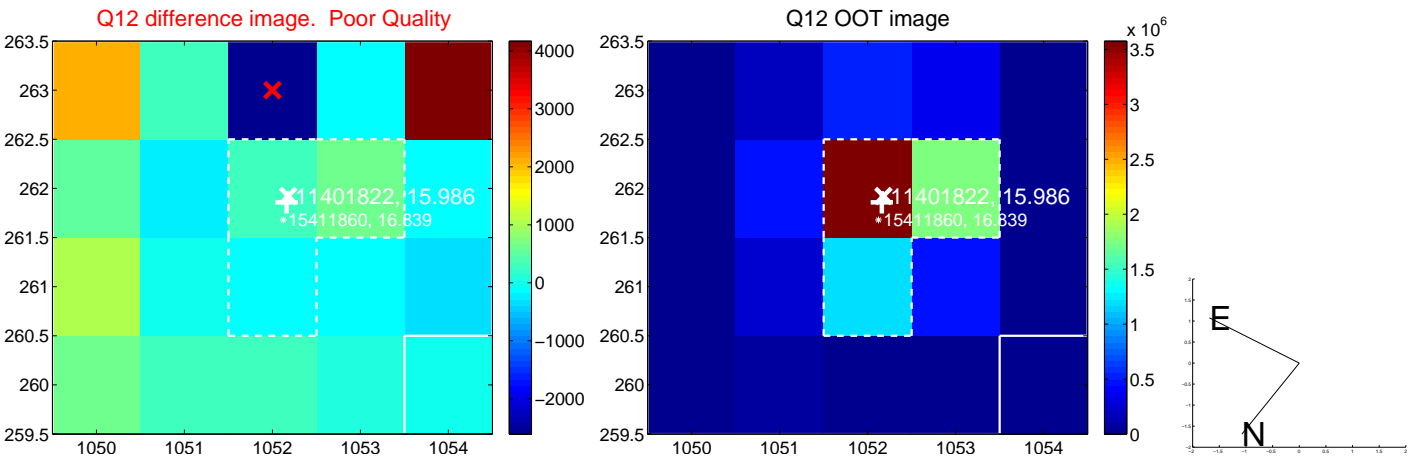
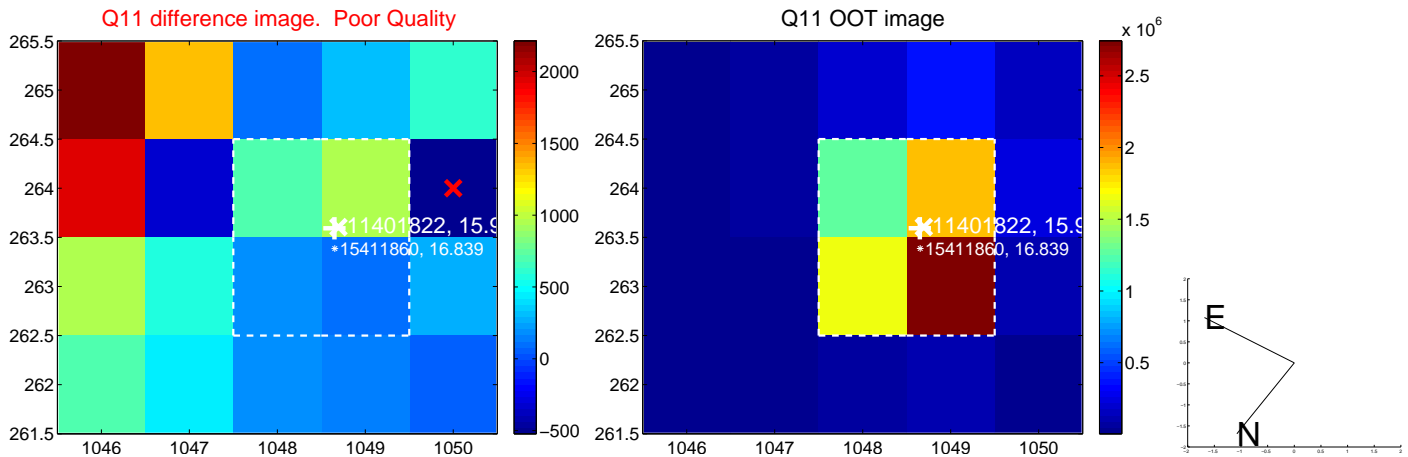
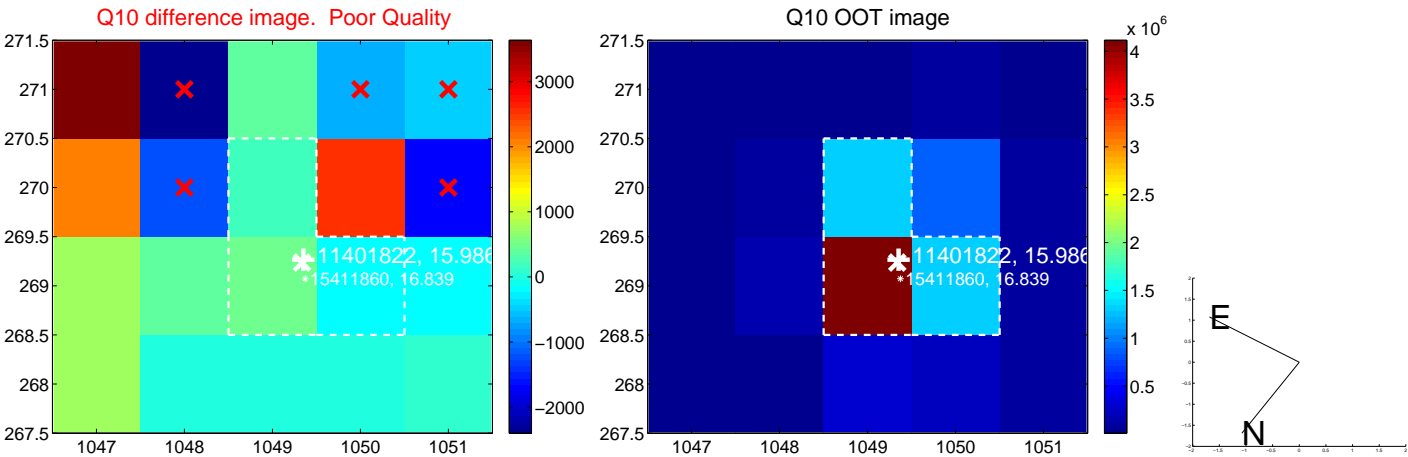
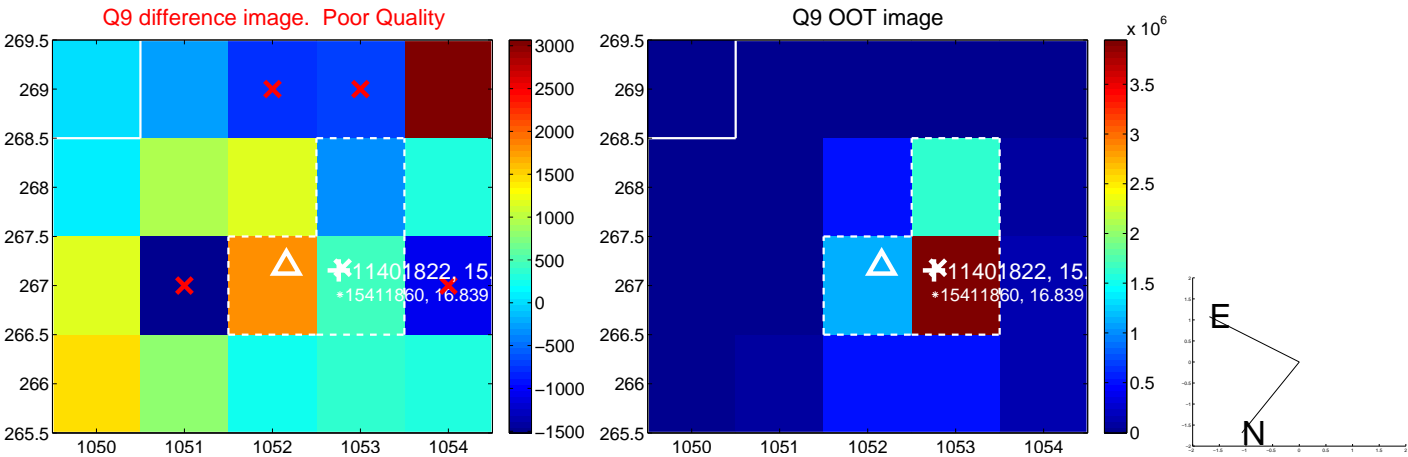


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

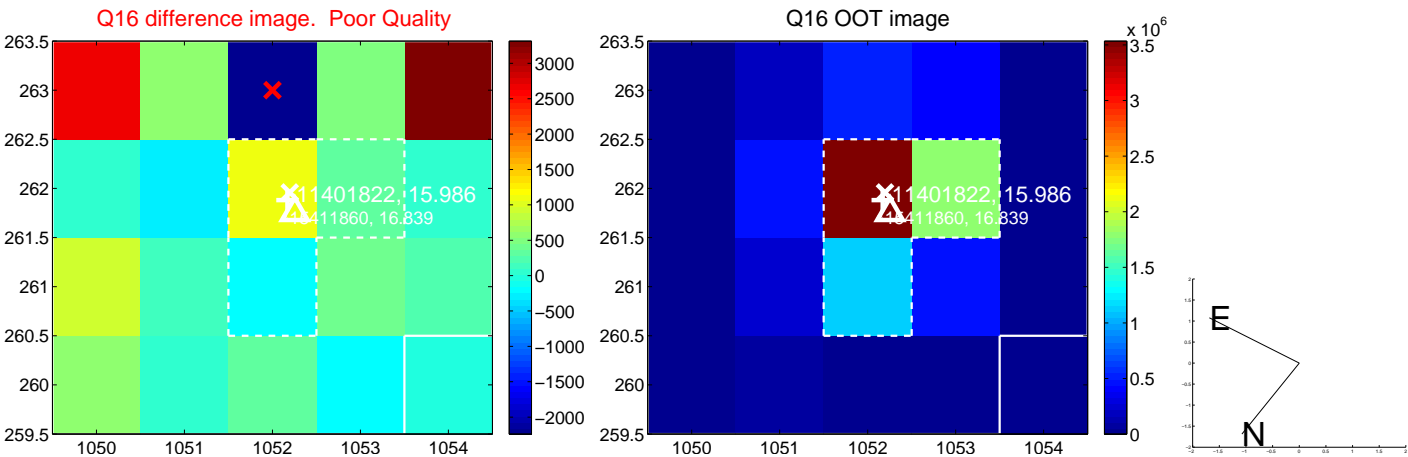
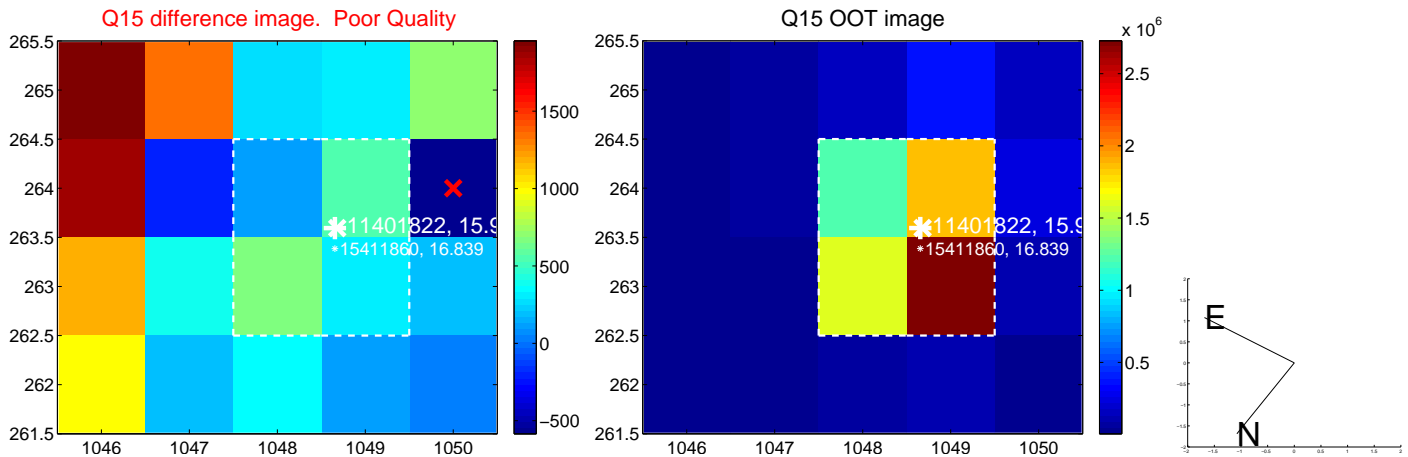
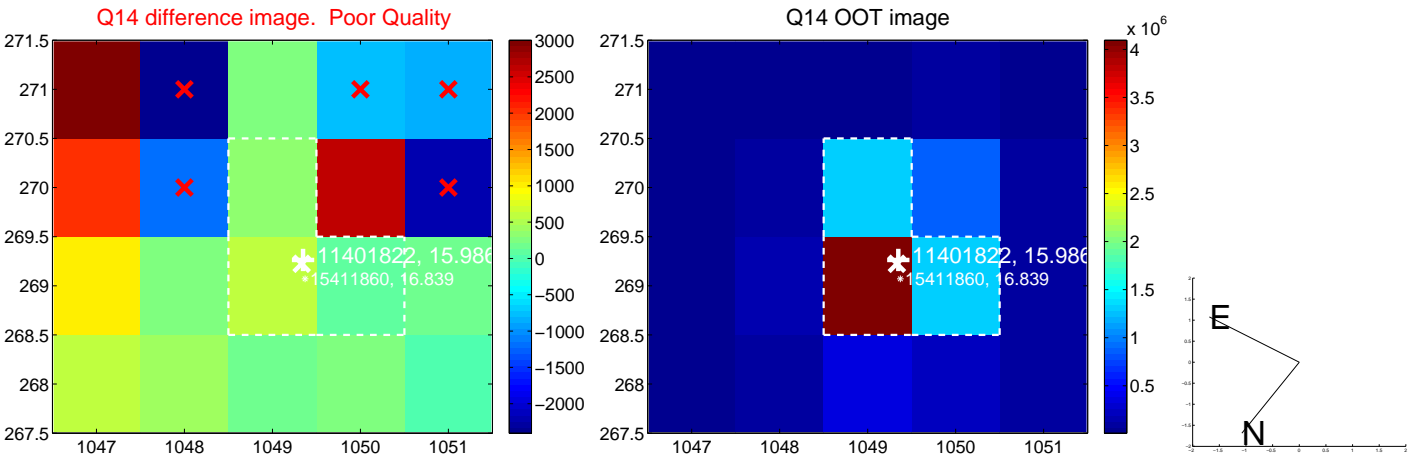
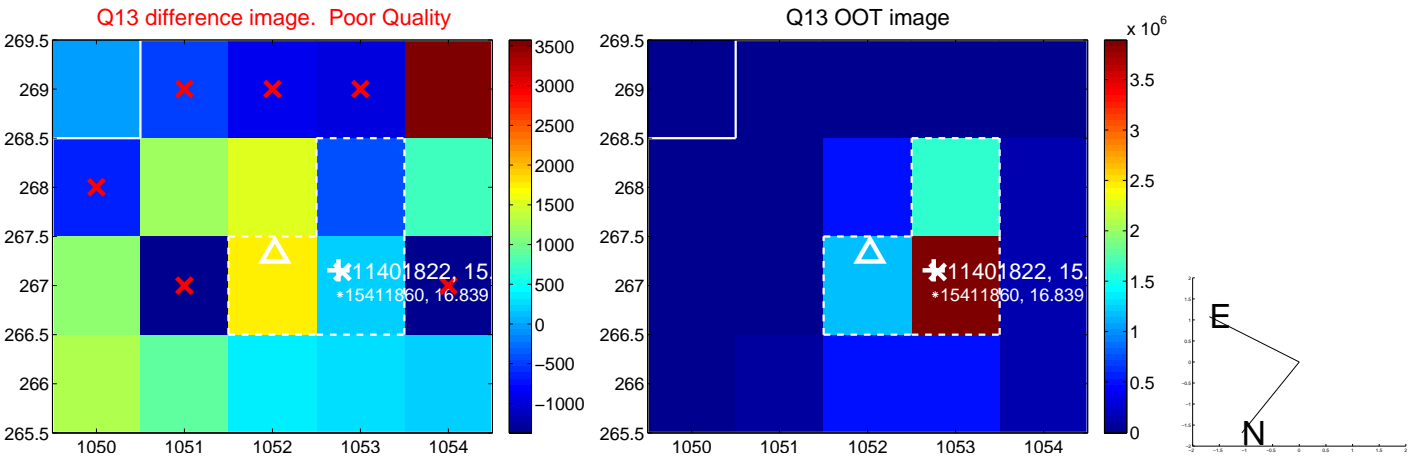




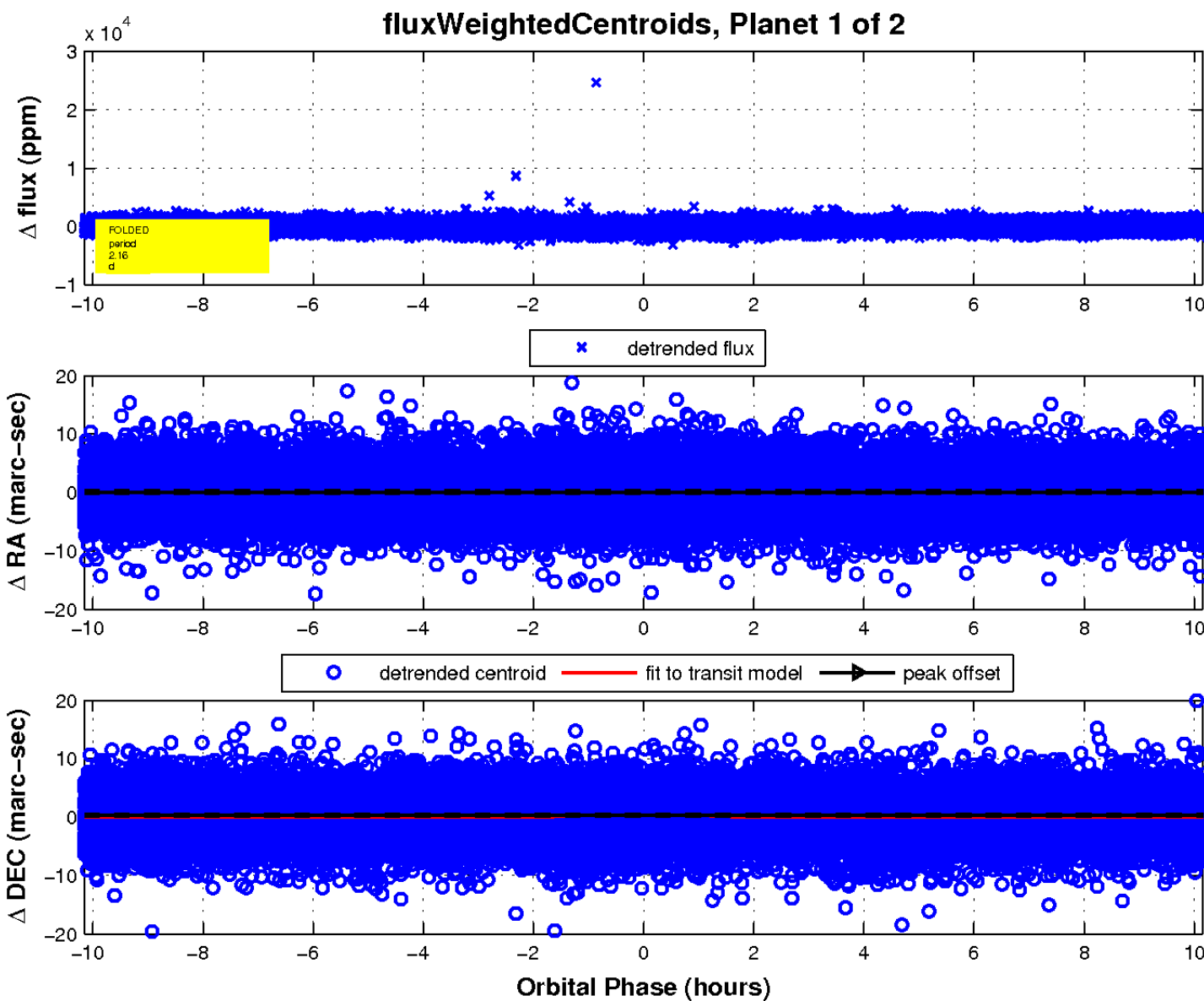
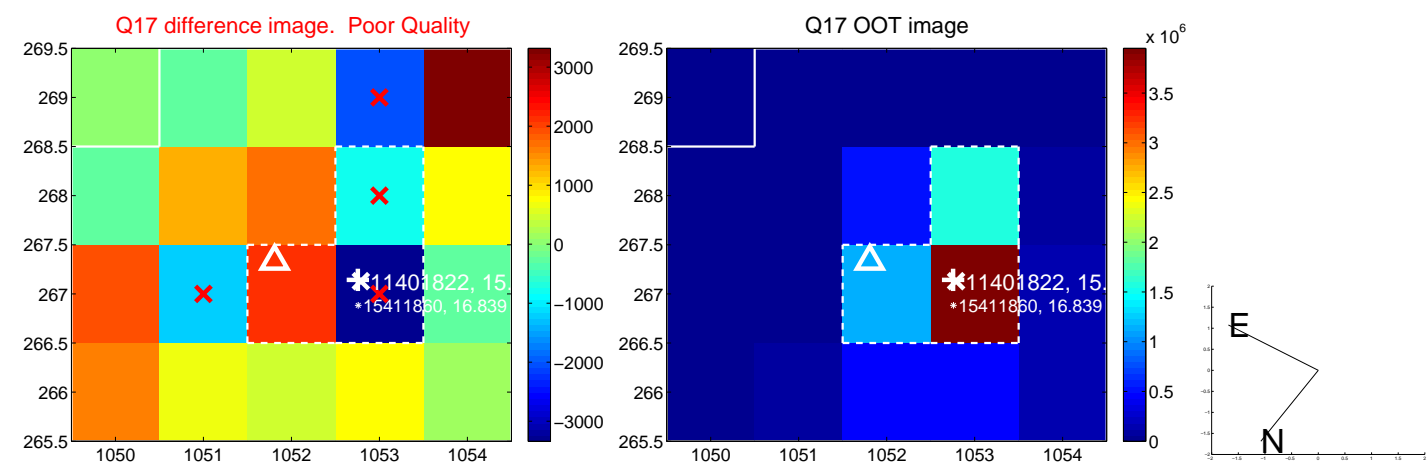
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

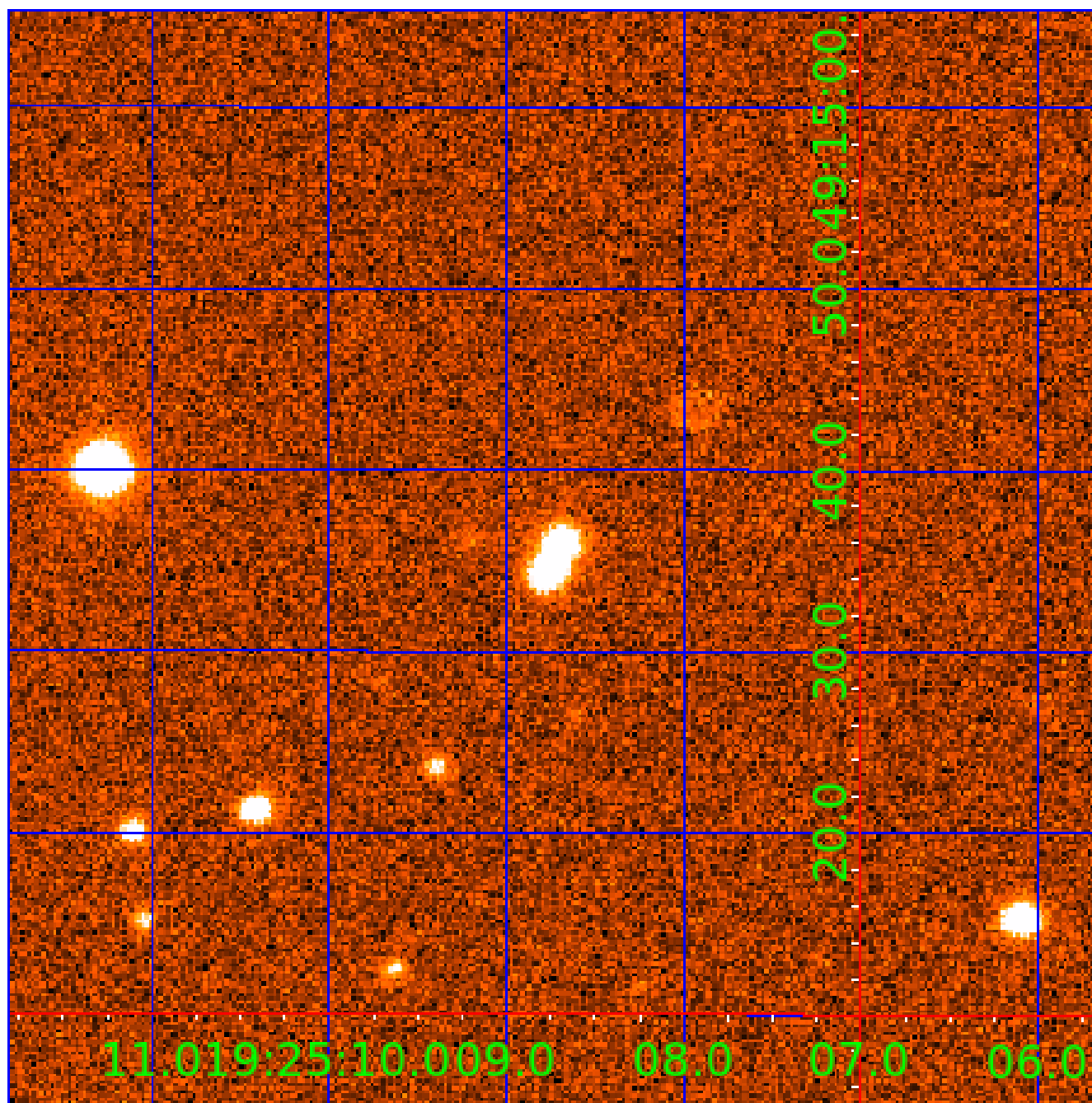


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination





# KIC 011401822

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011401822-01	OBS	2454.01	2.161386	131.872052	188.6	3.385	14.5	15.4	0.81	5482	1.30	563.73
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011401822-01	OBS	FP	0.00	0	1	0	1	MOD_SEC_DV—MOD_SEC_ALT—CENT_FEW_DIFFS—EPHEM_MATCH
011401822-02	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—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.

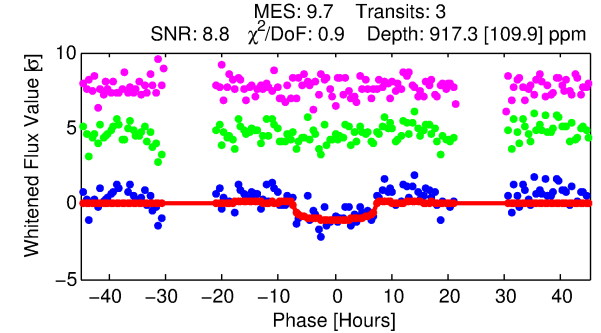
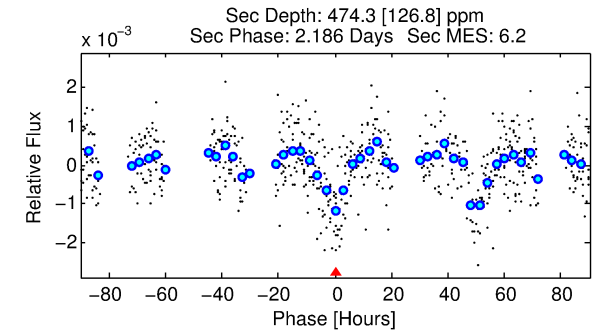
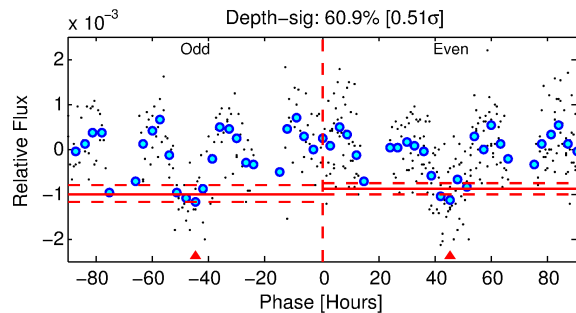
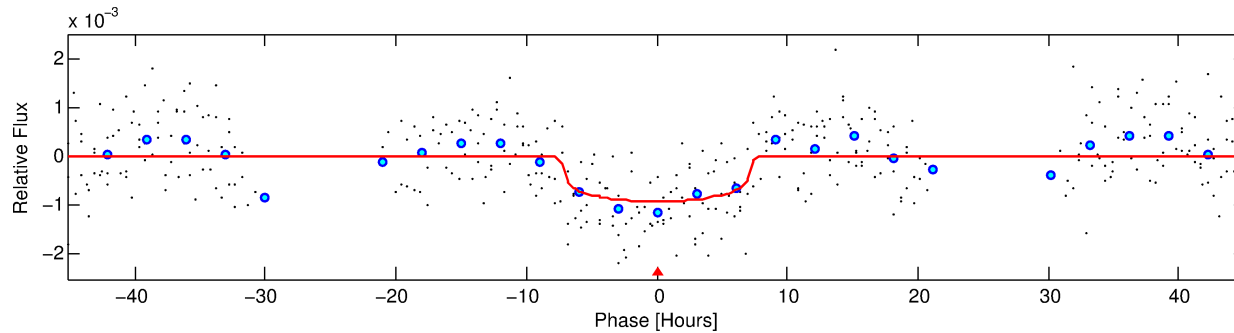
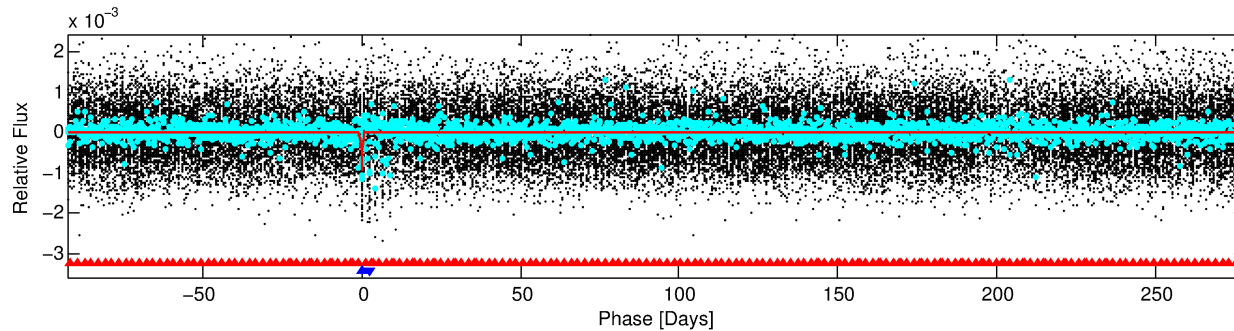
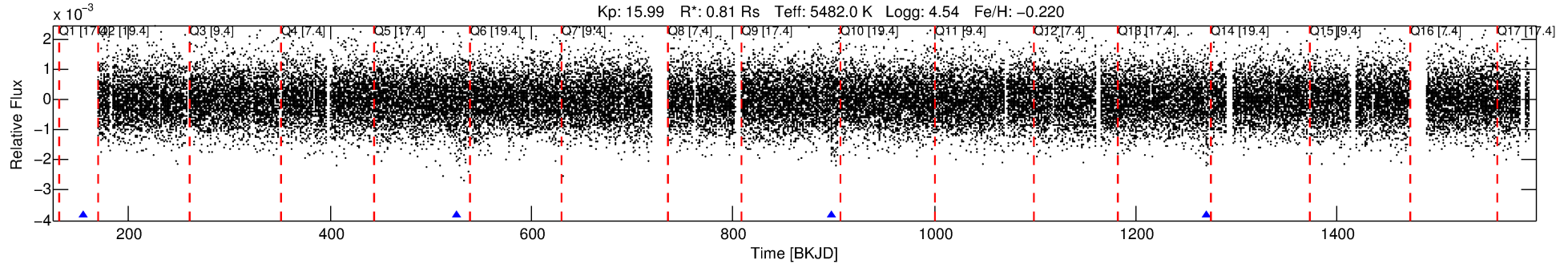
## Ephemeris Match Information For 011401822-02

No Significant Match Found

# DV One-Page Summary

KIC: 11401822 Candidate: 2 of 2 Period: 371.727 d  
KOI: K02454 Corr: No Ephemeris Match

Kp: 15.99 R\*: 0.81 Rs Teff: 5482.0 K Logg: 4.54 Fe/H: -0.220



## DV Fit Results:

Period = 371.72686 [0.01685] d  
Epoch = 154.6239 [0.0372] BKJD  
Rp/R\* = 0.0288 [0.0116]  
a/R\* = 157.57 [254.48]  
b = 0.60 [1.75]  
Seff = 0.59 [0.17]  
Teq = 223 [16] K  
Rp = 2.56 [1.17] Re  
a = 0.9526 [0.1684] AU  
Ag = 36248.36 [32041.91] [1.13σ]  
Teffp = 4766 [1025] K [4.43σ]

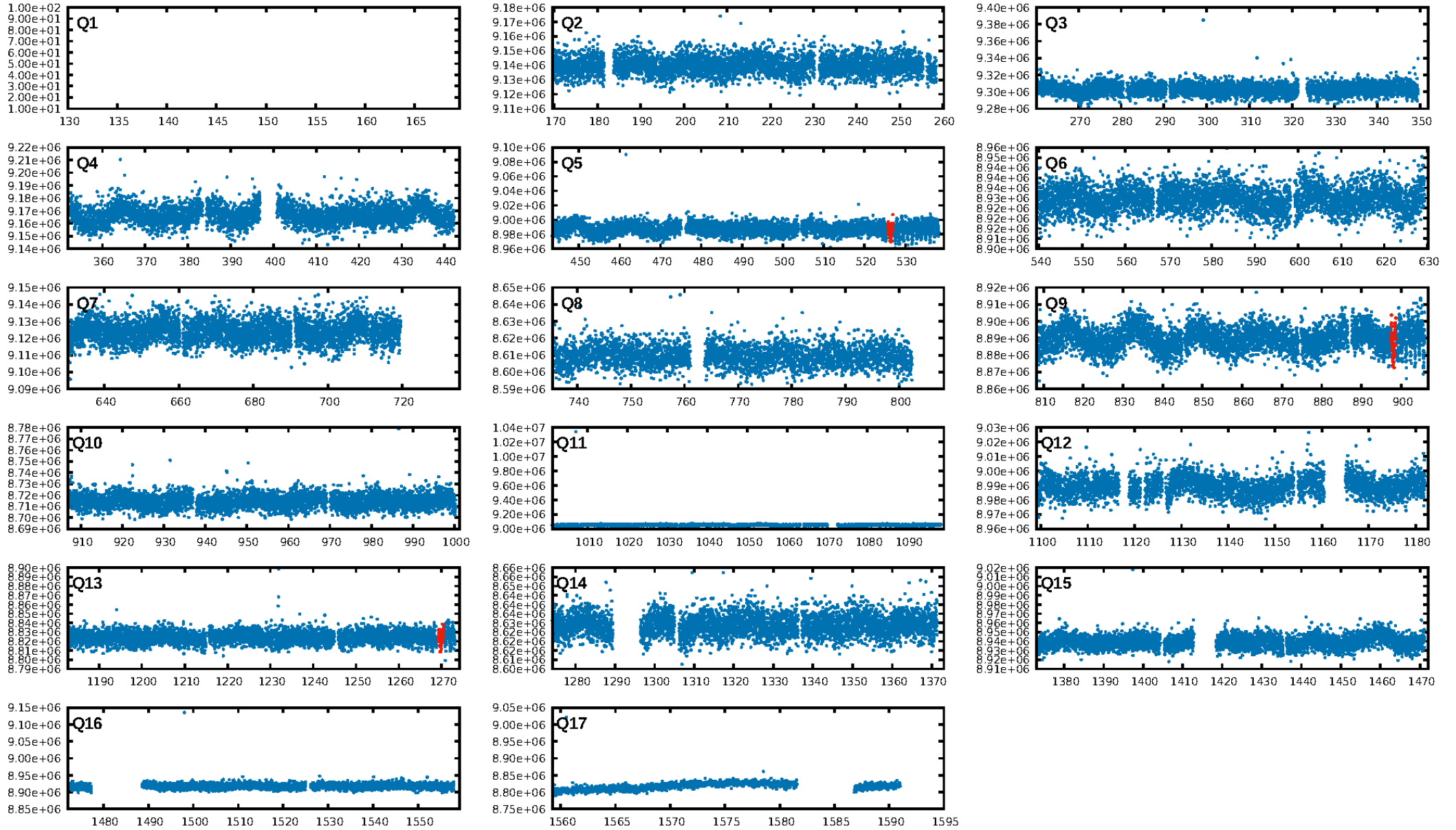
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [574.54σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 75.3%  
ModelChiSquareGof-sig: 99.9%  
Bootstrap-pfa: 3.31e-14  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -5.264  
Centroid-sig: 5.9%  
Centroid-so: 2.107 arcsec [1.54σ]  
OotOffset-rm: N/A  
KicOffset-rm: N/A  
OotOffset-st: 0/0/0/0 [0]  
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DiffImageOverlap-fno: 0.00 [0/2]

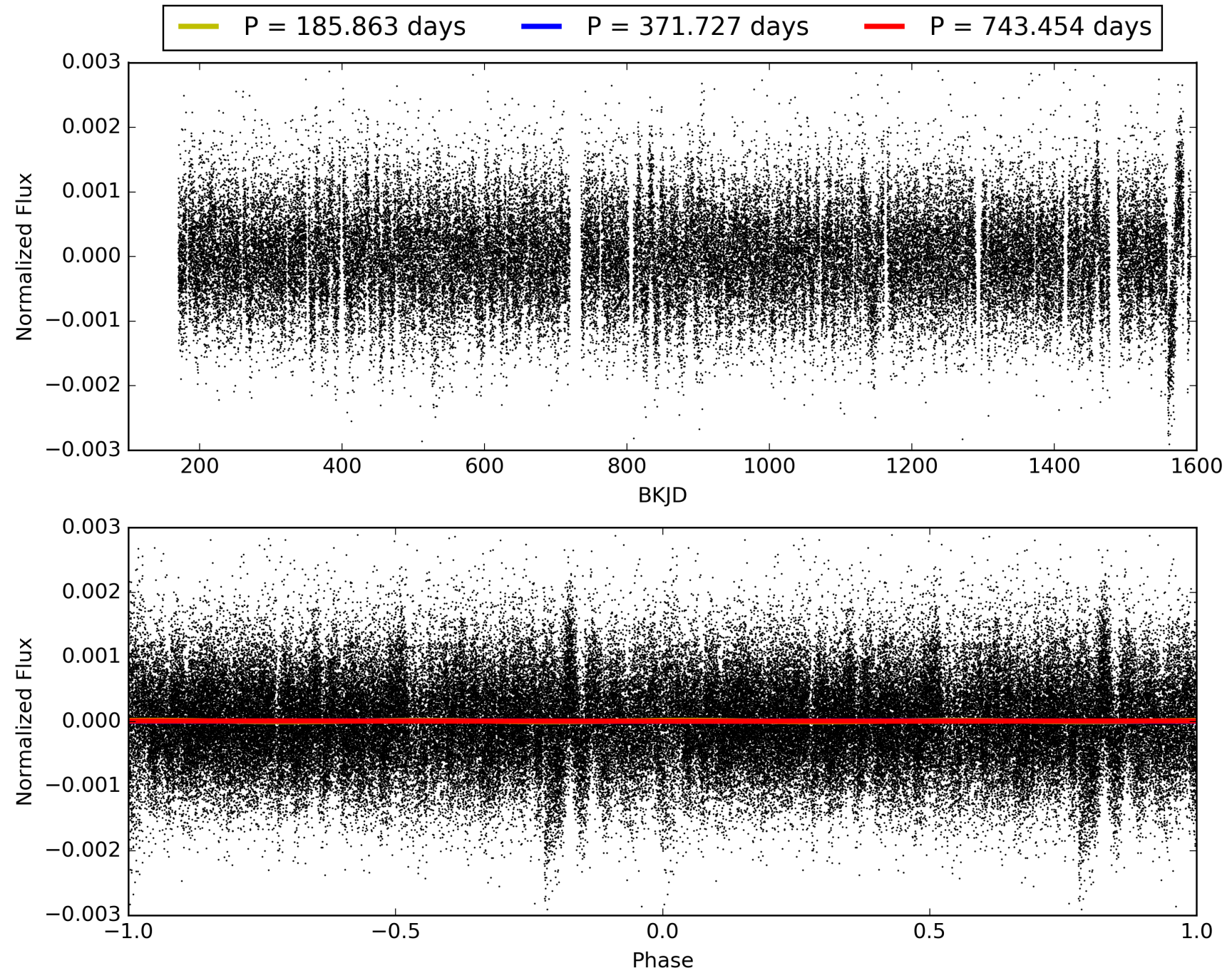
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 011401822-02, PDC Light Curves



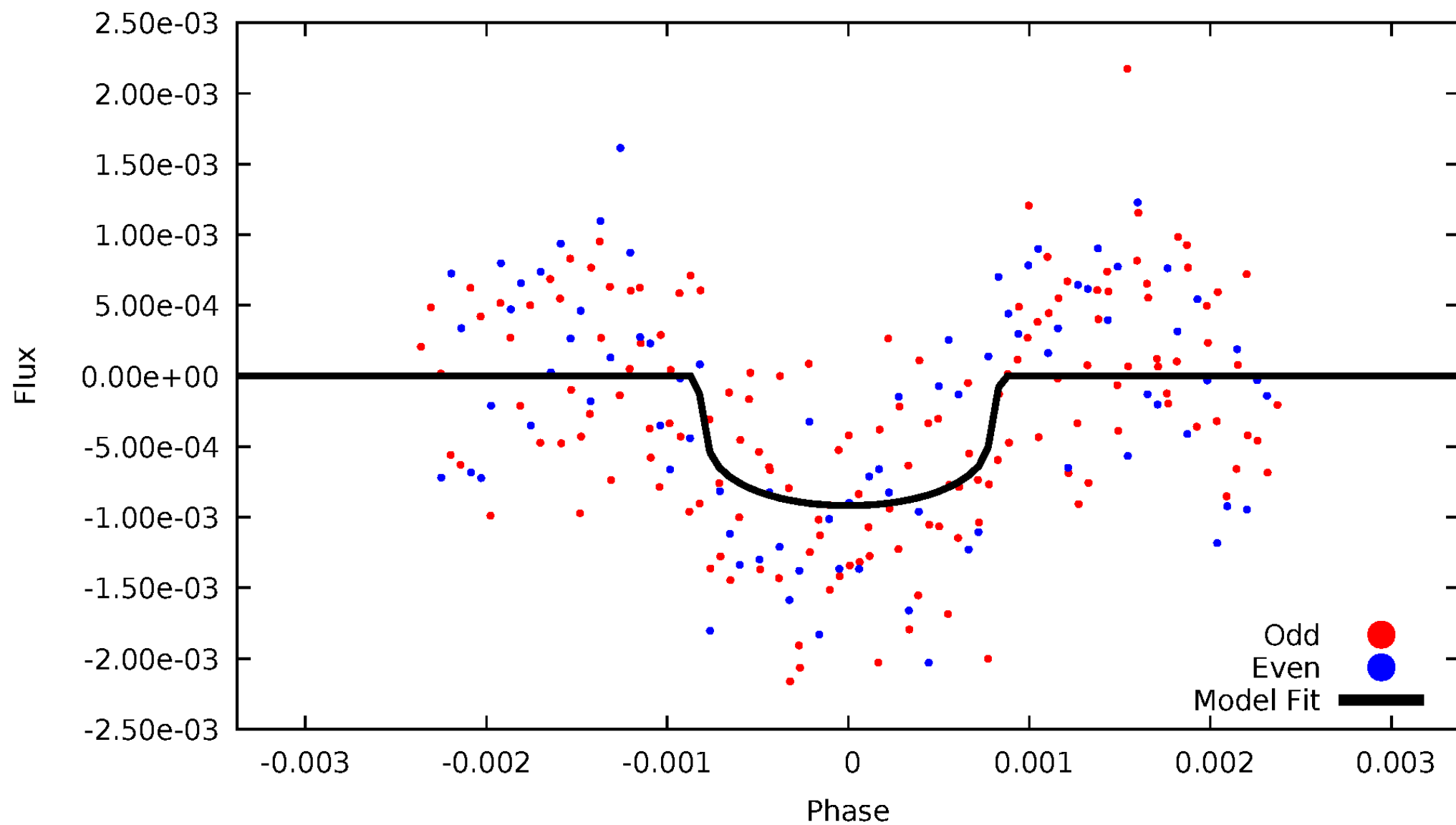
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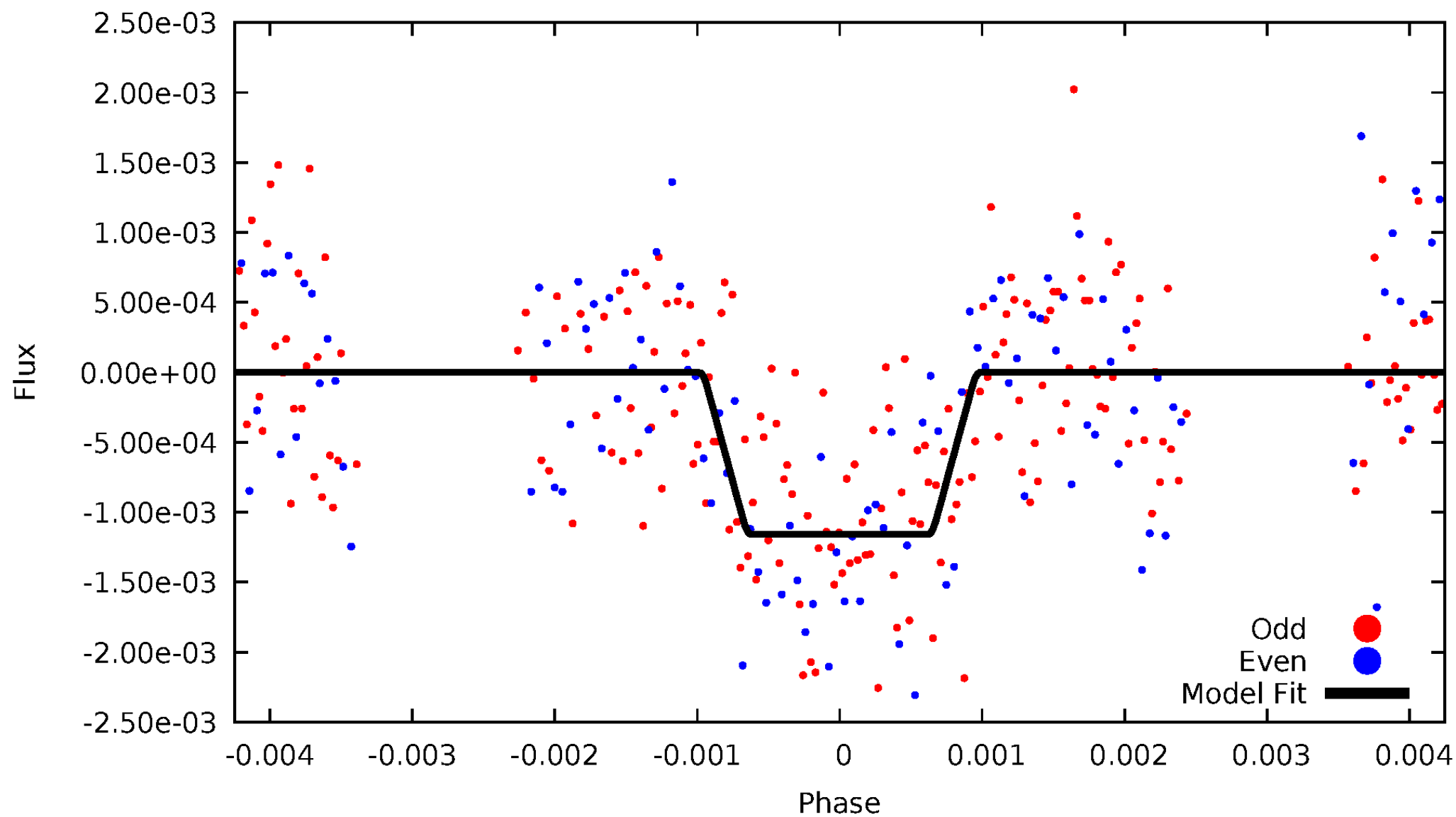
# DV Odd/Even

TCE 011401822-02



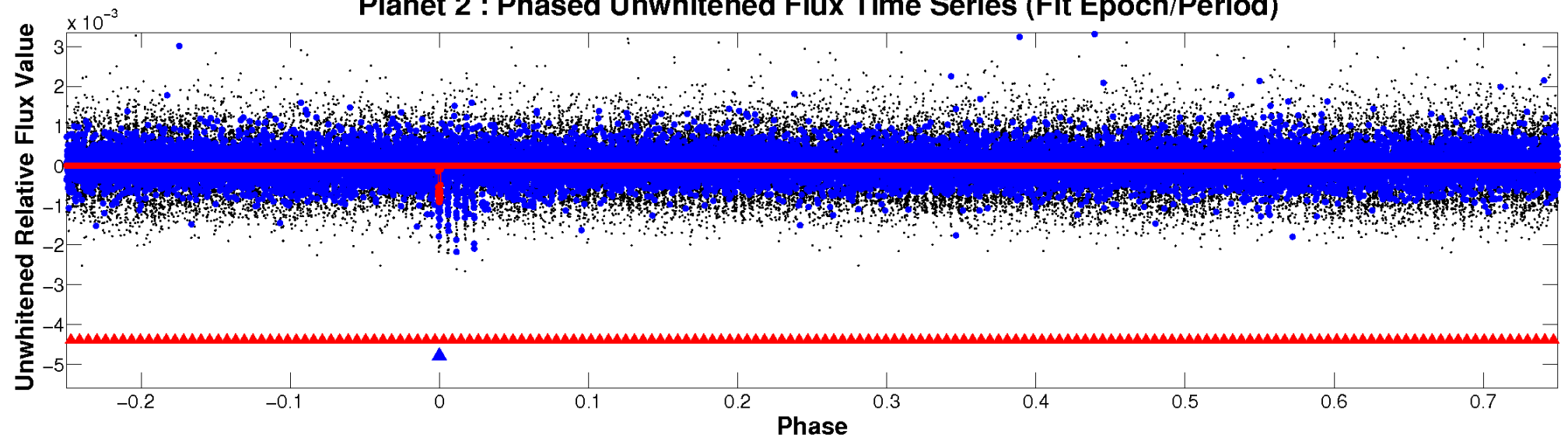
# ALT Odd/Even

TCE 011401822-02

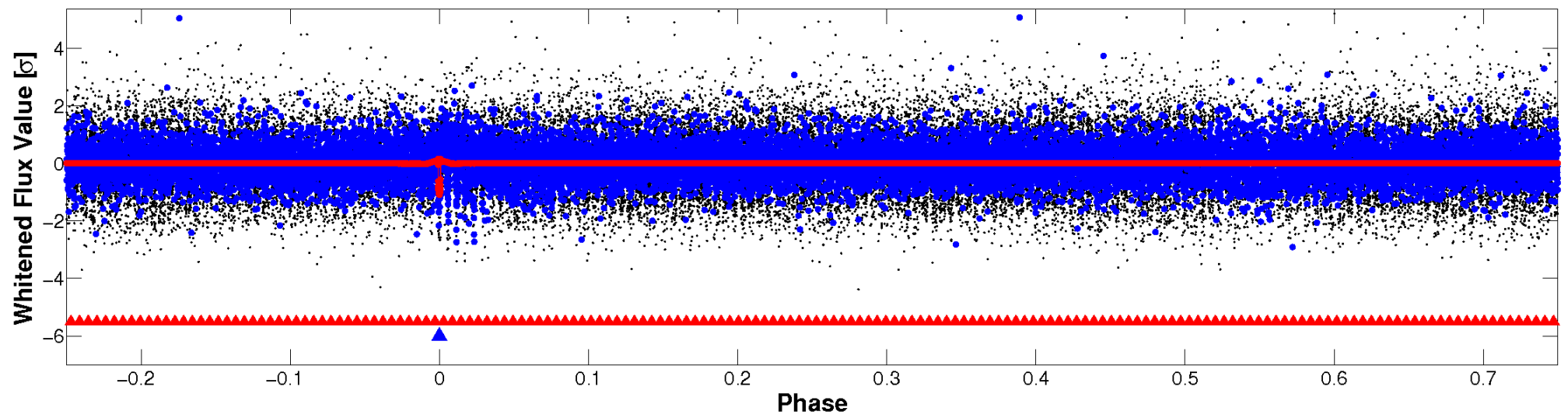


# Non-Whitened Vs. Whitened Light Curve

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

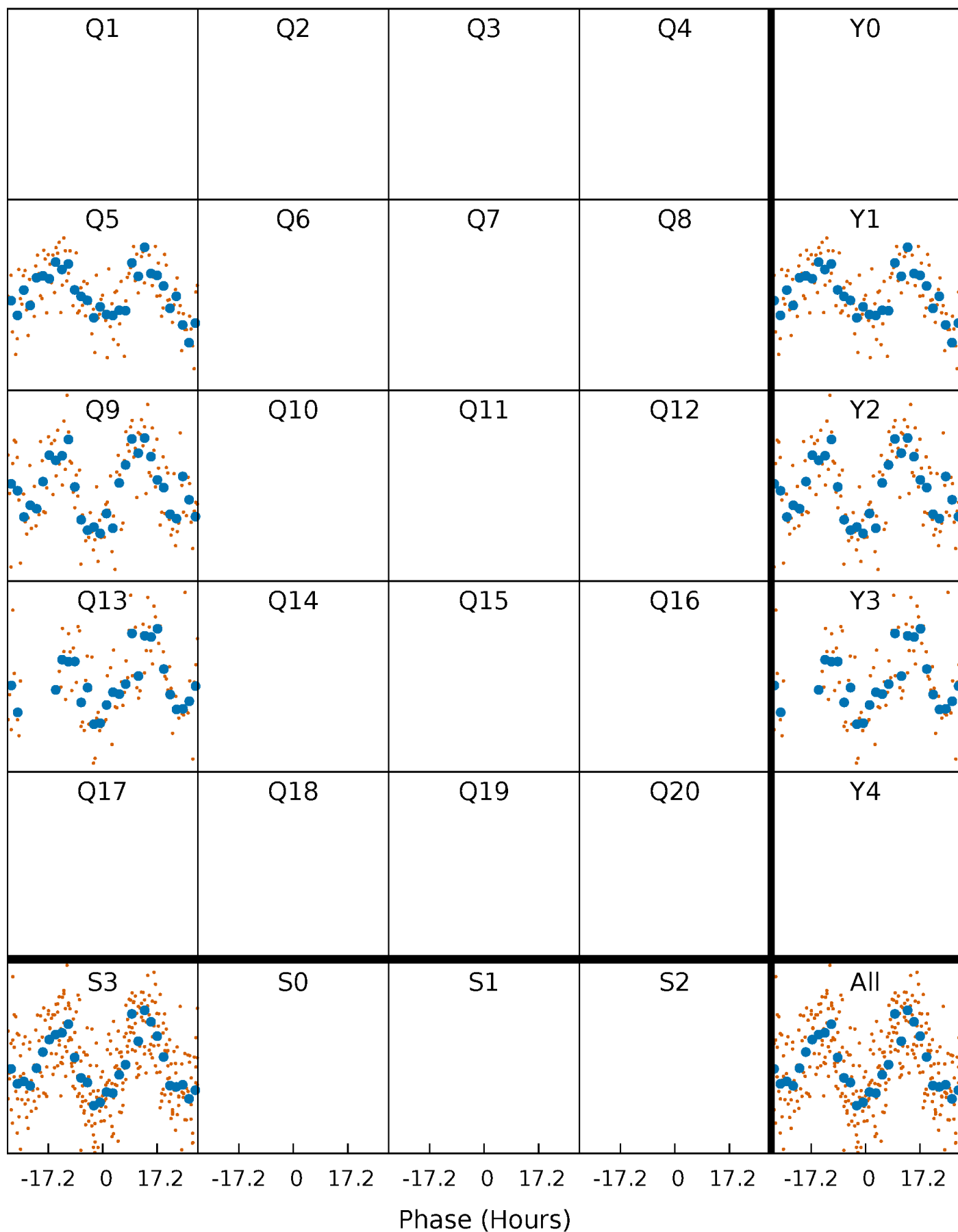


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



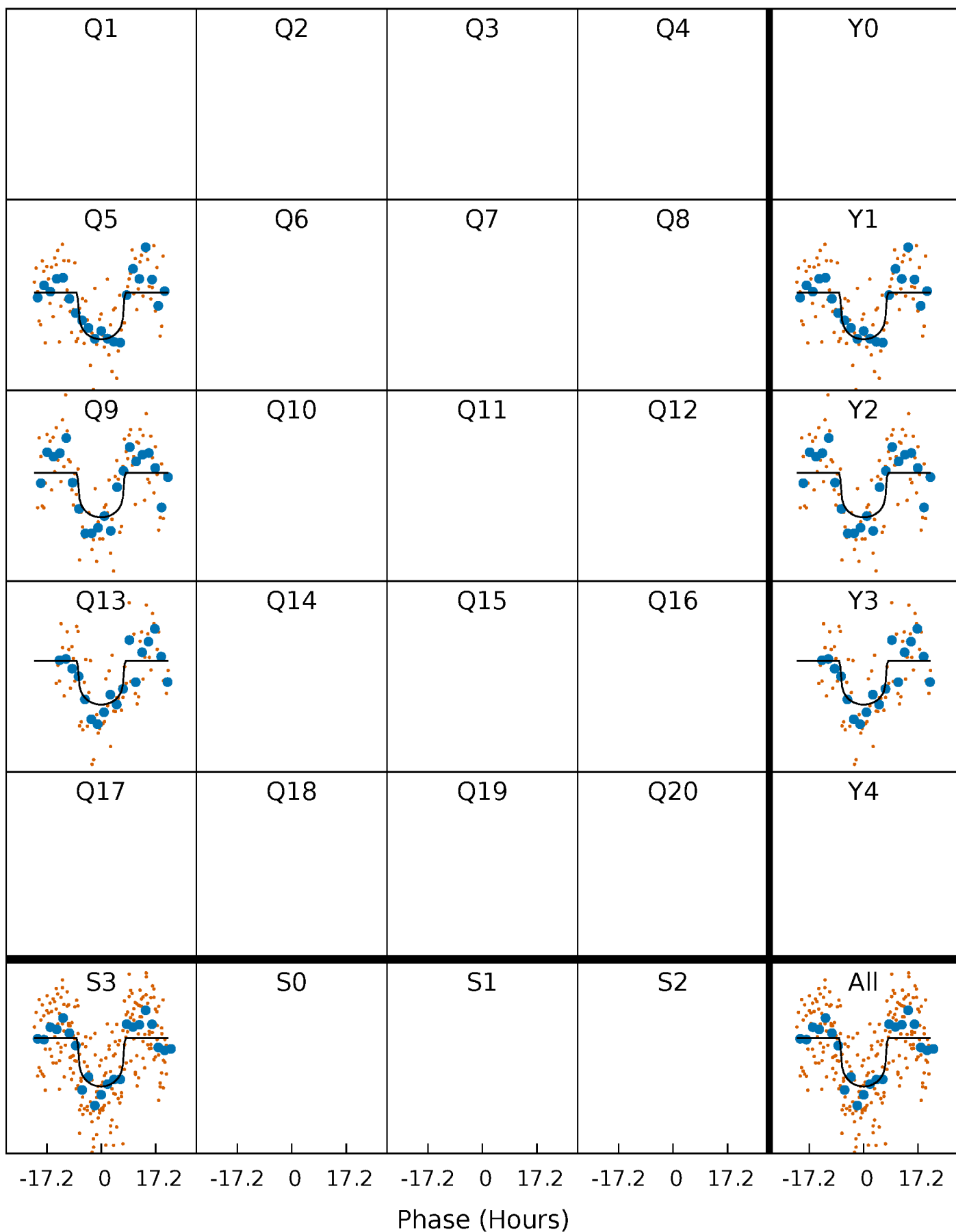
# PDC Quarter-Phased Transit Curves

TCE 011401822-02     $P=371.726856$  Days     $T_0=154.623861$  (BKJD)



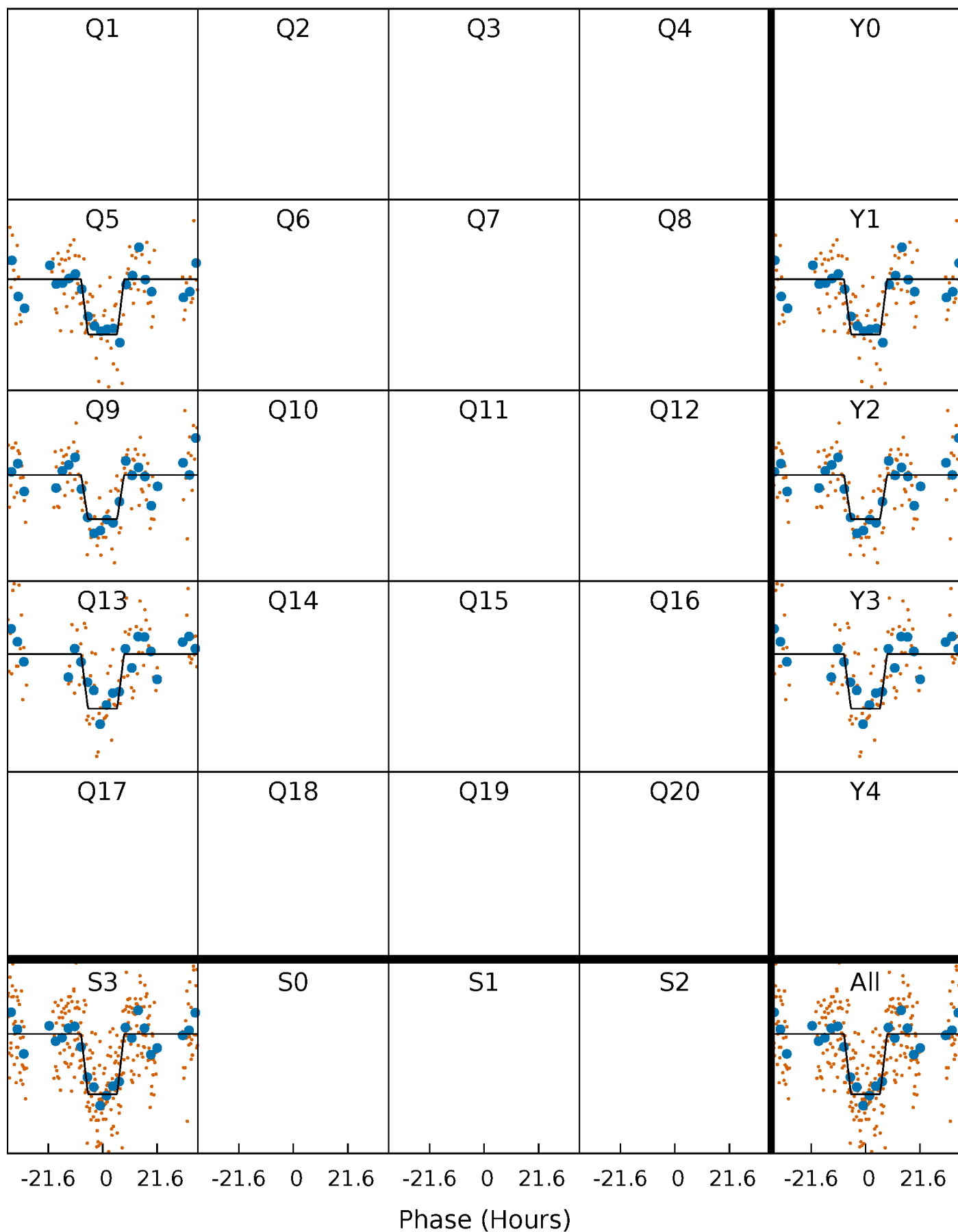
# DV Quarter-Phased Transit Curves

TCE 011401822-02     $P=371.726856$  Days     $T_0=154.623861$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 011401822-02 P=371.734135 Days  $T_0=154.578120$  (BKJD)

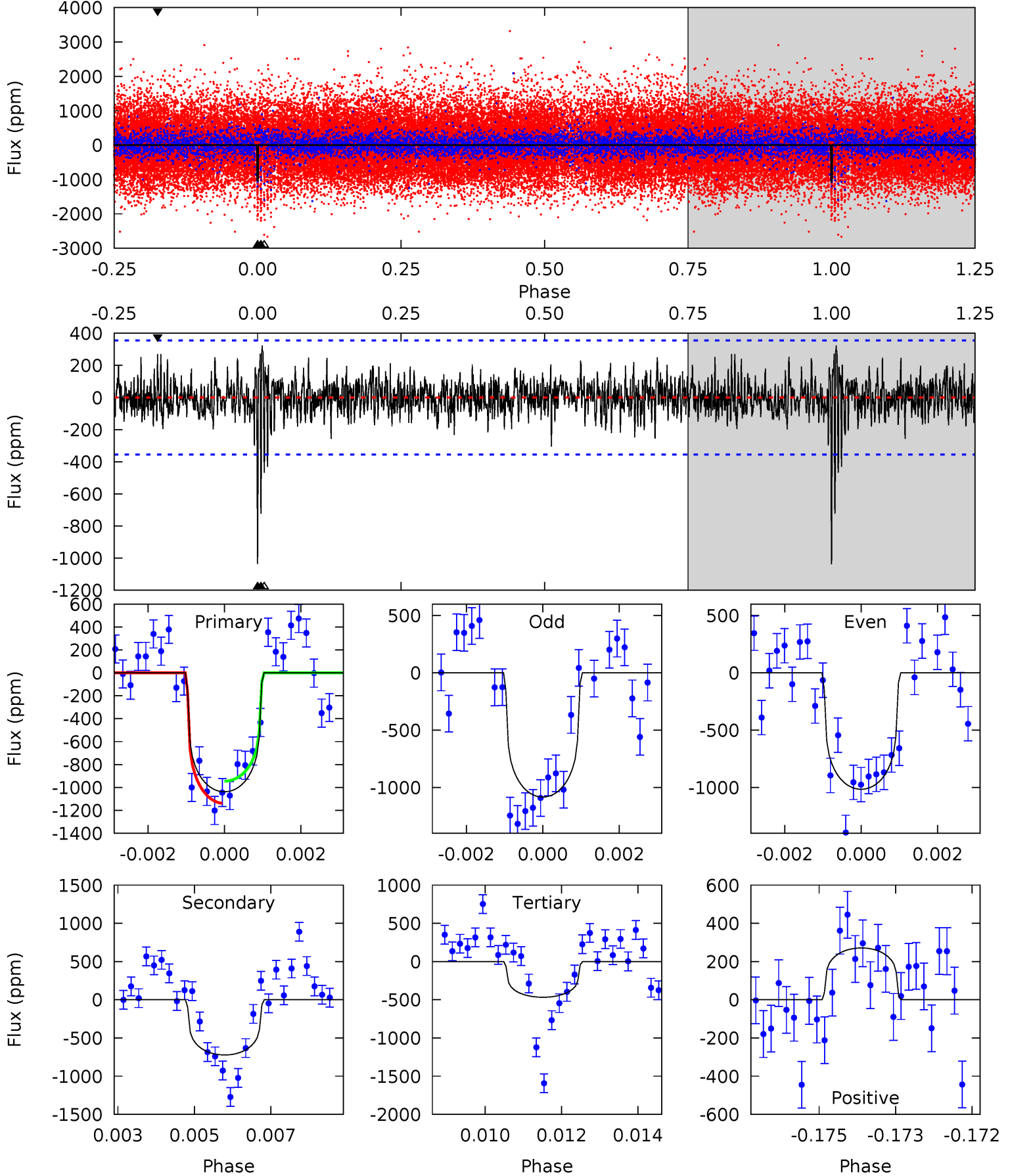




# DV Model-Shift Uniqueness Test

011401822-02, P = 371.726856 Days, E = 154.623861 Days

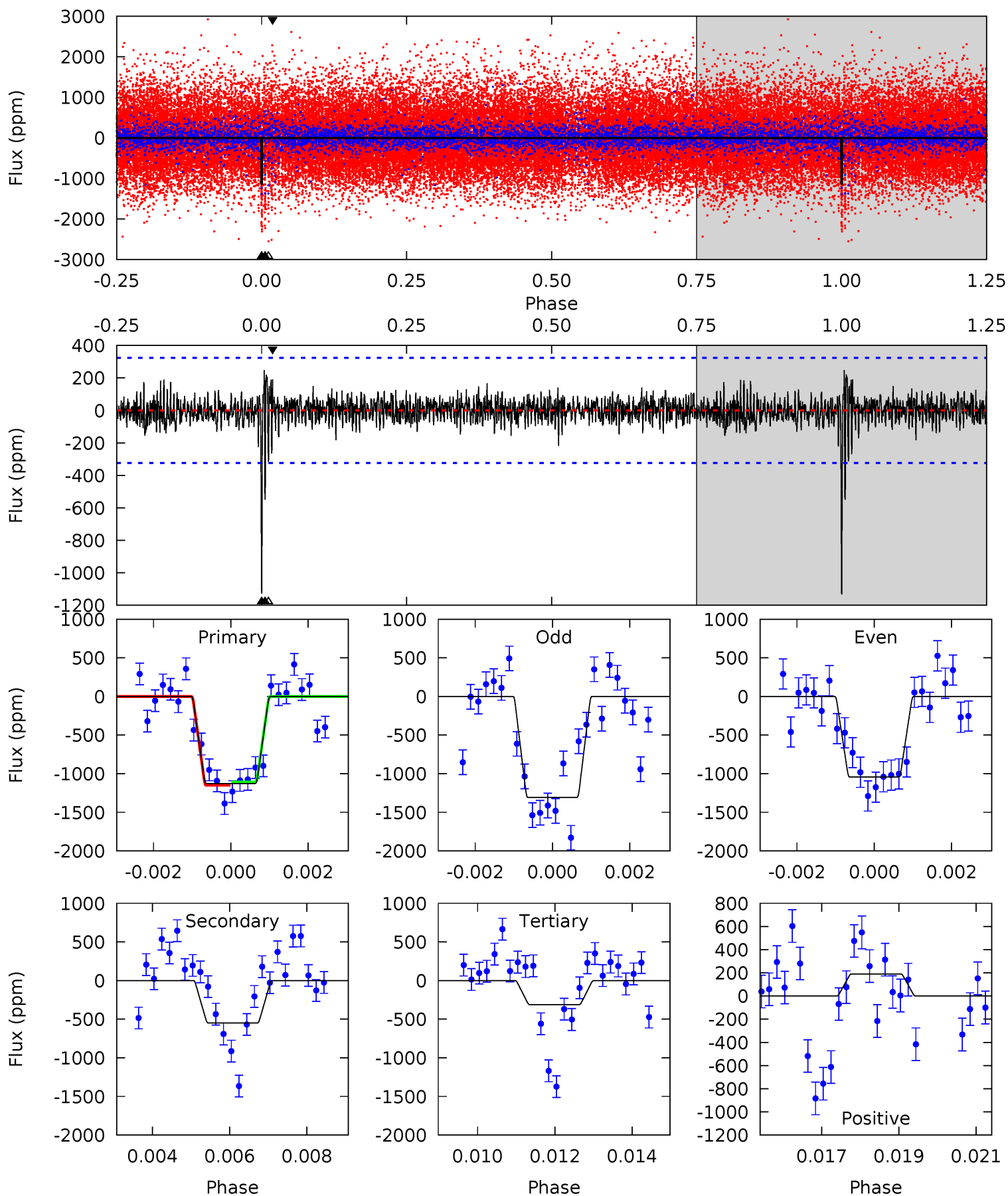
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.6	10.9	7.04	4.09	5.36	3.14	1.25	8.60	11.6	3.85	6.80	0.48	0.96	0.24	1.45



# Alt Model-Shift Uniqueness Test

011401822-02,  $P = 371.734135$  Days,  $E = 154.578120$  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
18.6	9.04	5.15	3.14	5.33	3.10	0.90	13.4	15.4	3.90	5.91	2.06	1.06	0.18	0.35



### Stellar Parameters For KIC 011401822

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$\rho_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5482^{+199}_{-199}$	$4.539^{+0.057}_{-0.133}$	$-0.220^{+0.300}_{-0.300}$	$0.813^{+0.176}_{-0.088}$	$0.833^{+0.102}_{-0.083}$	$2.187^{+0.641}_{-0.878}$
	+4%/-4%	+1%/-3%	+136%/-136%	+22%/-11%	+12%/-10%	+29%/-40%
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 011401822-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-723 \pm 66$	$2.59^{+1.08}_{-1.18}$	$318^{+18}_{-16}$	$5399^{+1766}_{-786}$	$54134^{+120099}_{-27832}$
Alt.	$-549 \pm 61$	$3.12^{+1.13}_{-1.11}$	$316^{+18}_{-14}$	$4653^{+1003}_{-530}$	$28036^{+39817}_{-13086}$

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

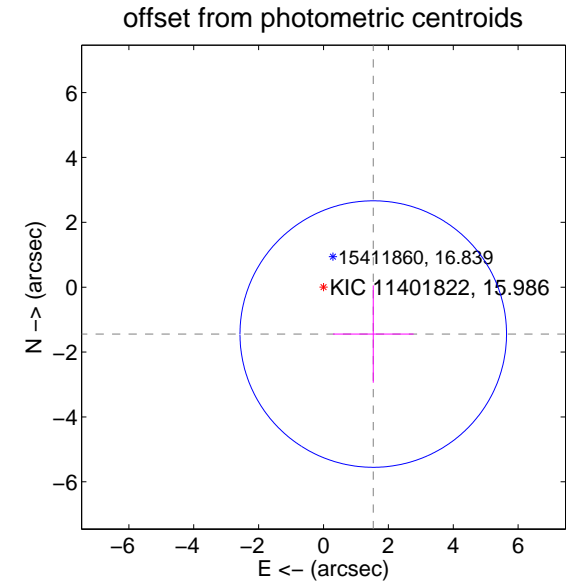
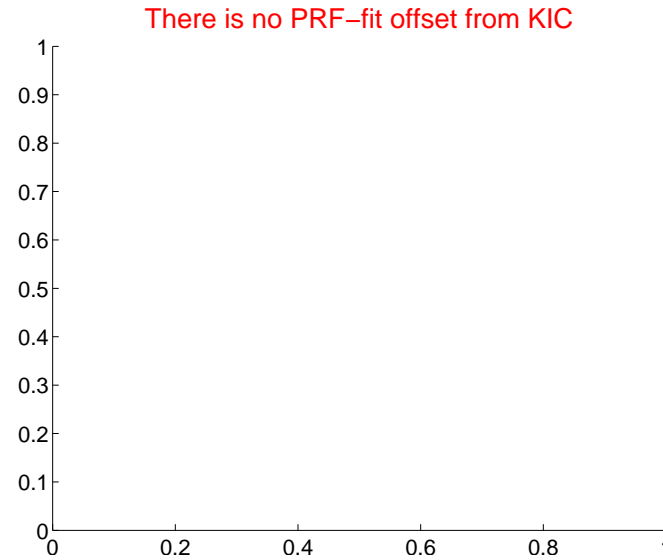
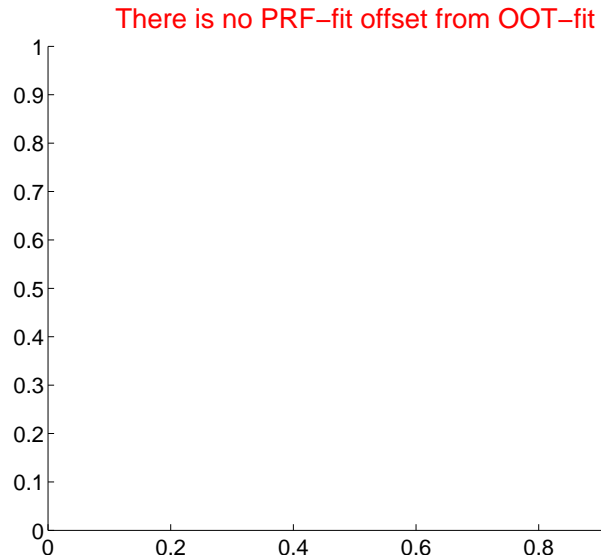
## DV Centroid Data

Supplemental centroid analysis for 011401822-02. Kepler magnitude: 15.99. Transit SNR 8.80

There are 0 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	—	—	—	—
photometric centroid source offset	$2.11 \pm 1.37$	1.54	$-1.53 \pm 1.24$	$-1.44 \pm 1.50$

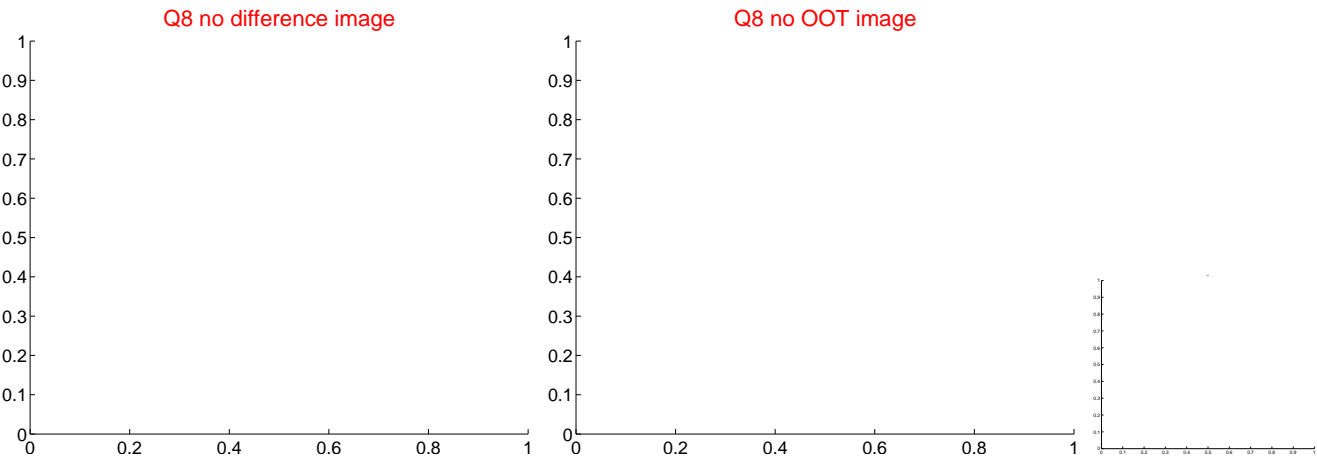
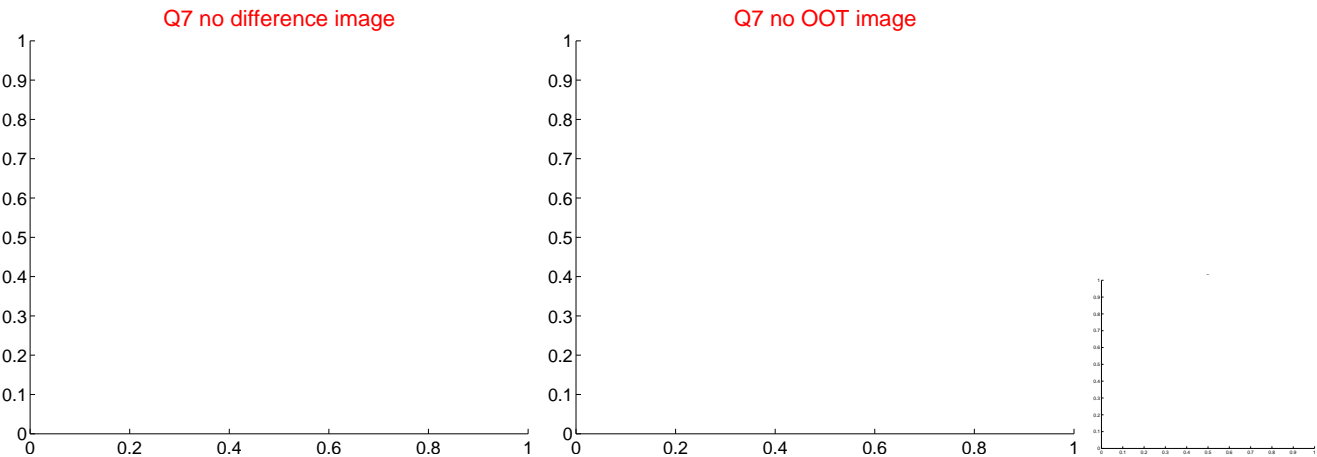
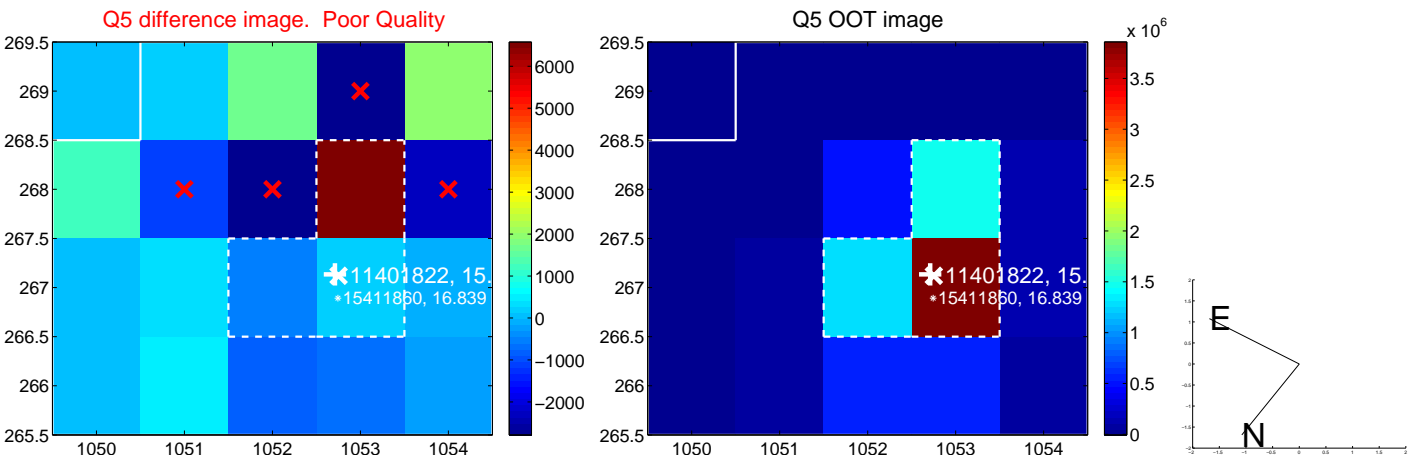


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

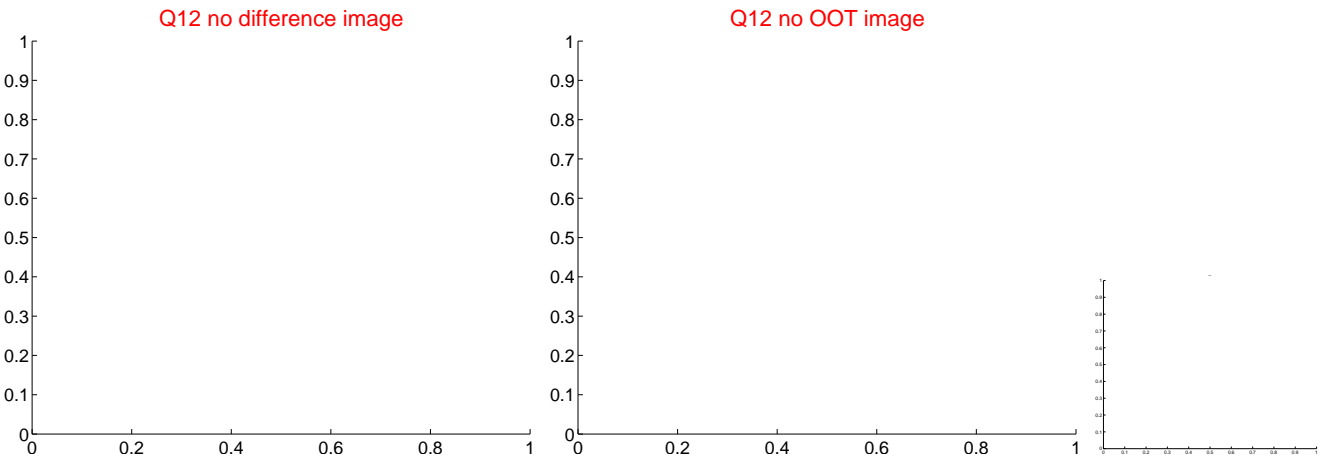
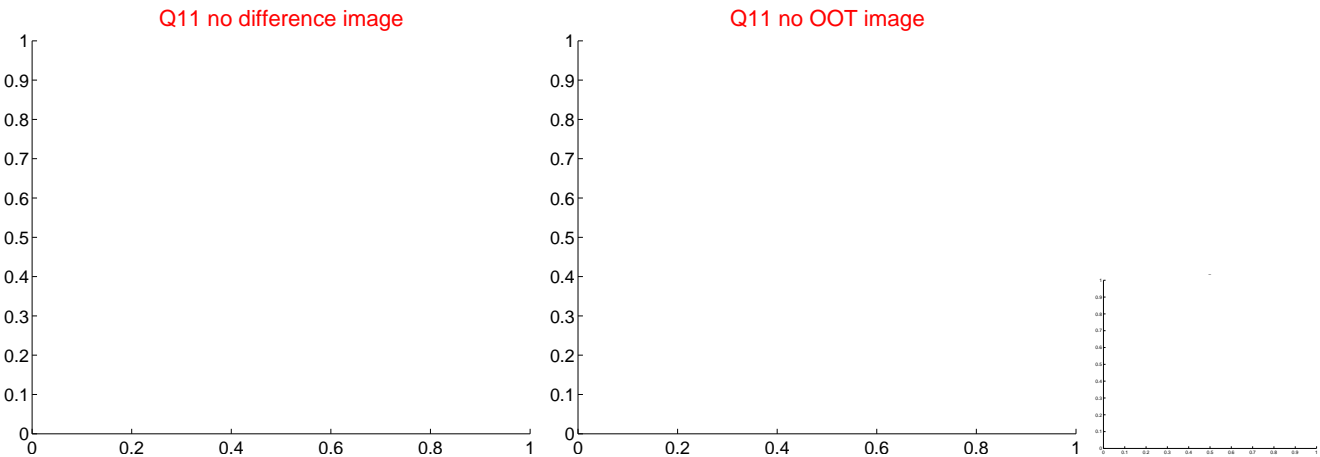
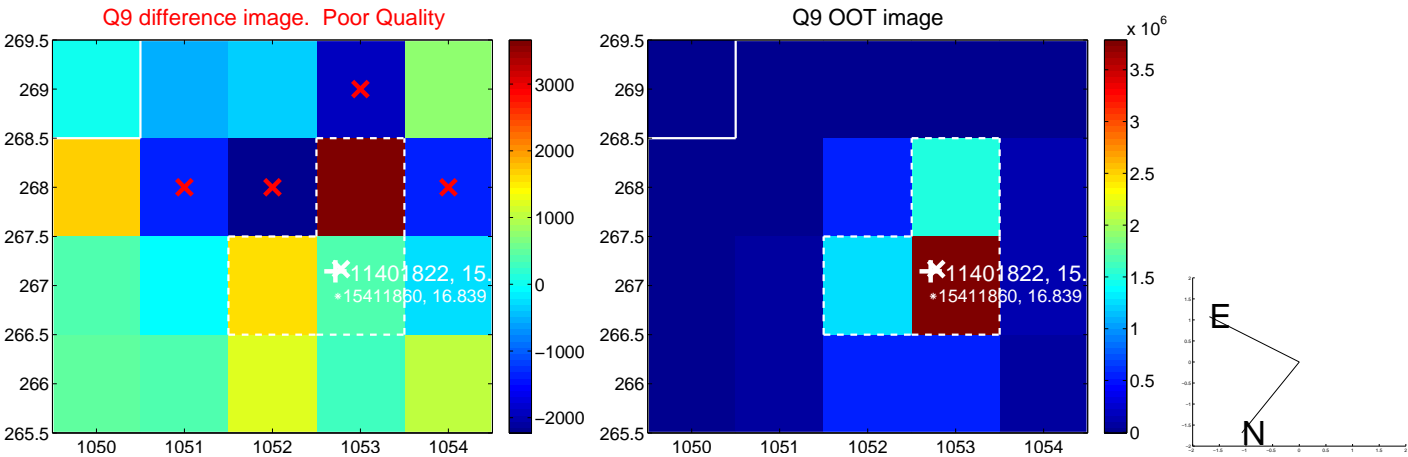


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.





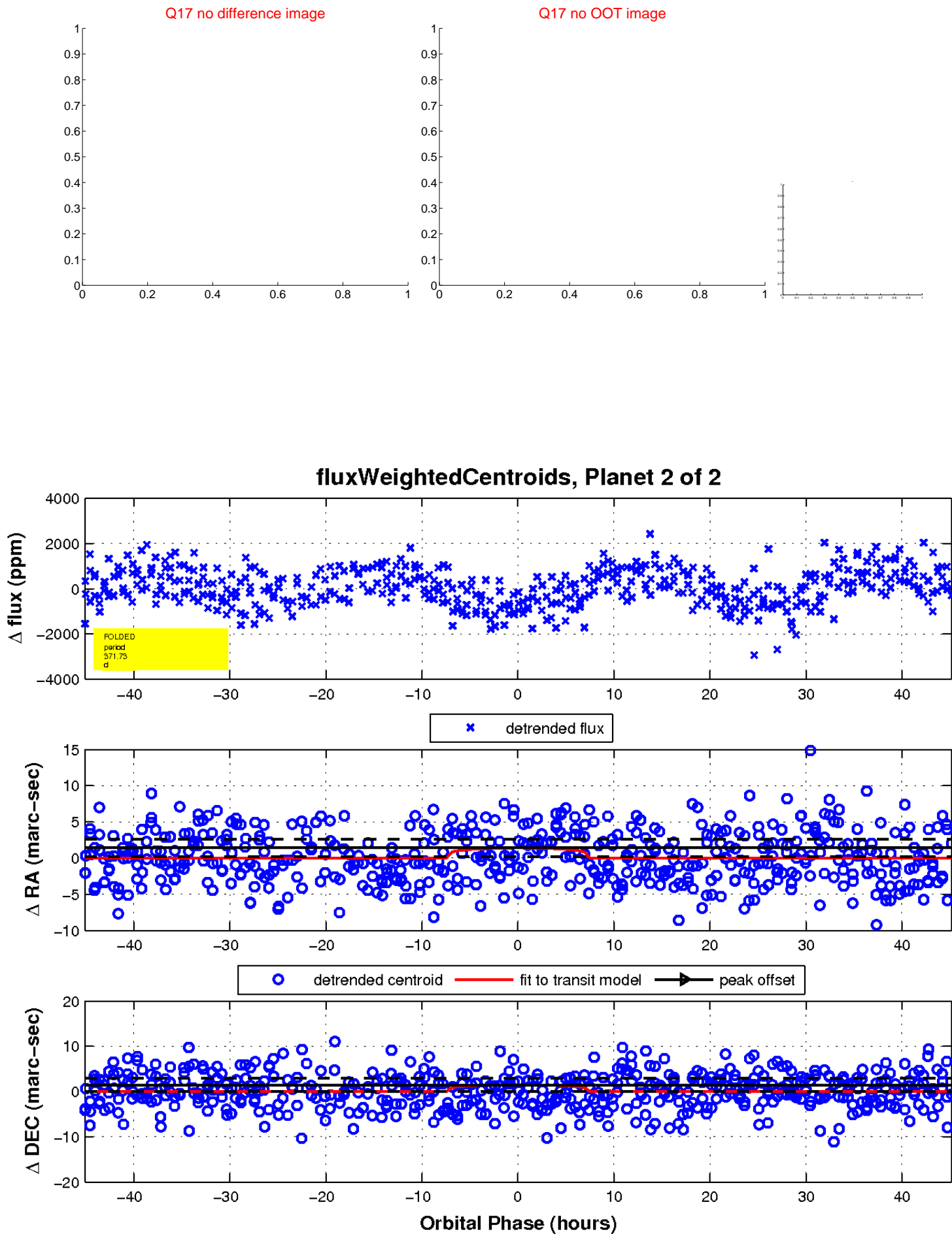
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



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

