

# KIC 002854181

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002854181-01	OBS	2232.01	101.132705	210.181811	1516.9	4.596	23.2	25.2	1.02	5492	4.30	4.92
002854181-02	OBS	2232.02	12.835025	134.366868	291.2	2.340	9.3	9.8	1.02	5492	1.95	77.13

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002854181-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
002854181-02	OBS	PC	1.00	0	0	0	0	CENT_FEW_MEAS

**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 002854181-01

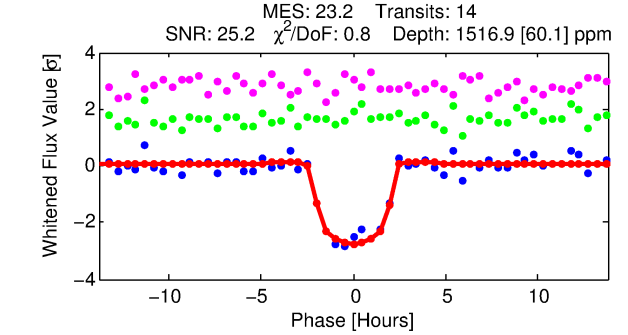
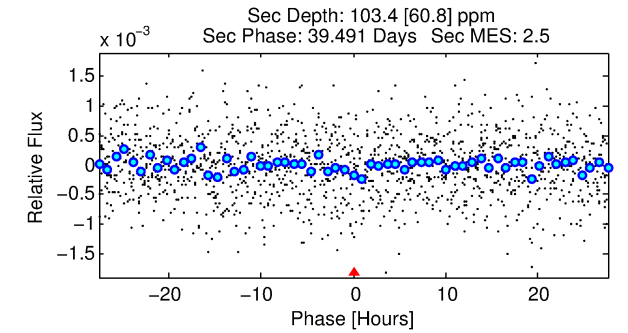
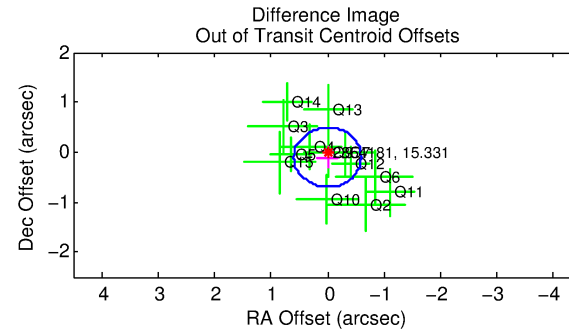
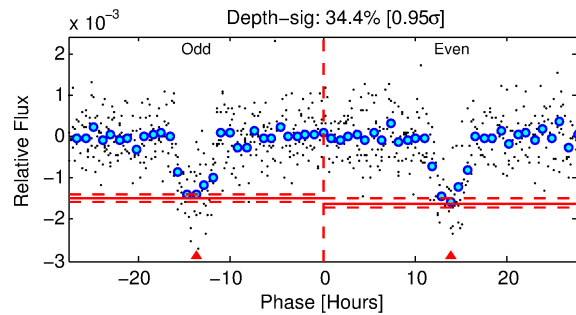
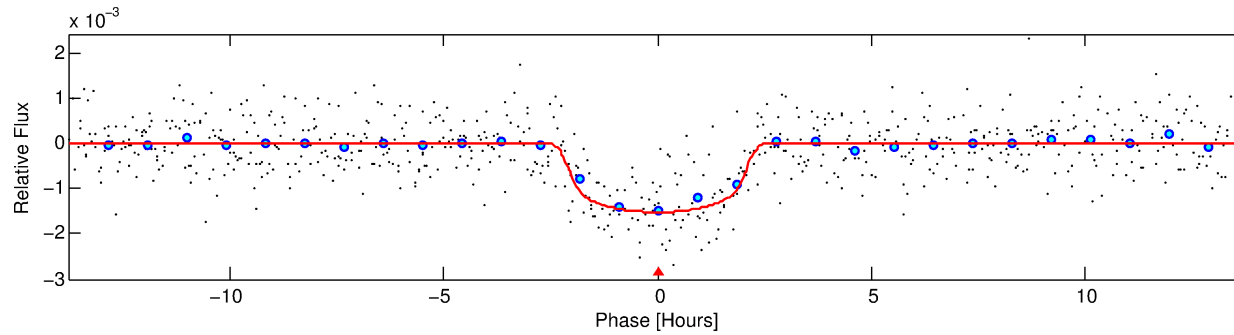
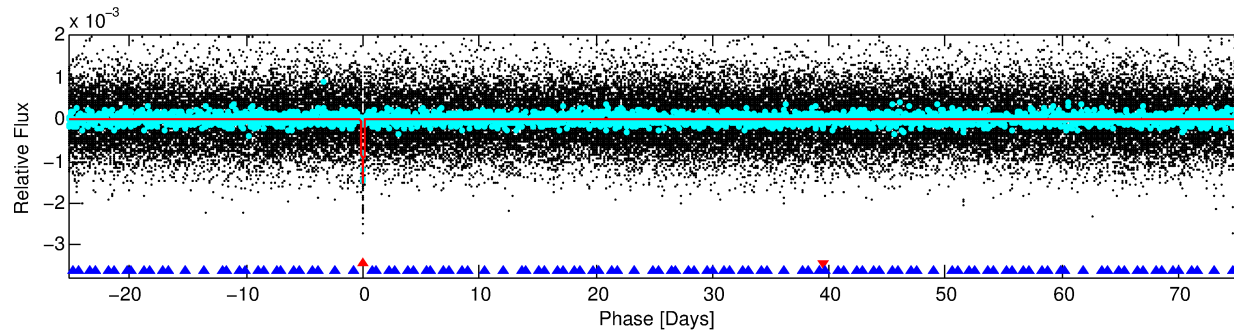
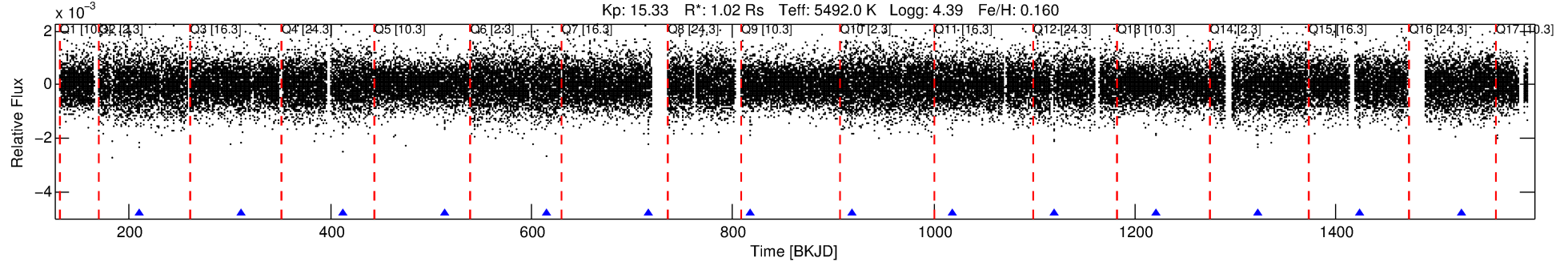
No Significant Match Found

# DV One-Page Summary

KIC: 2854181 Candidate: 1 of 2 Period: 101.133 d

KOI: K02232.01 Corr: 0.967

Kp: 15.33 R\*: 1.02 Rs Teff: 5492.0 K Logg: 4.39 Fe/H: 0.160



## DV Fit Results:

Period = 101.13270 [0.00053] d  
Epoch = 210.1818 [0.0040] BKJD  
Rp/R\* = 0.0388 [0.0086]  
a/R\* = 121.60 [105.99]  
b = 0.75 [0.53]  
Seff = 4.92 [0.95]  
Teq = 380 [18] K  
Rp = 4.30 [1.10] Re  
a = 0.4136 [0.0487] AU  
Ag = 526.72 [400.24] [1.31σ]  
Teffp = 2813 [520] K [4.67σ]

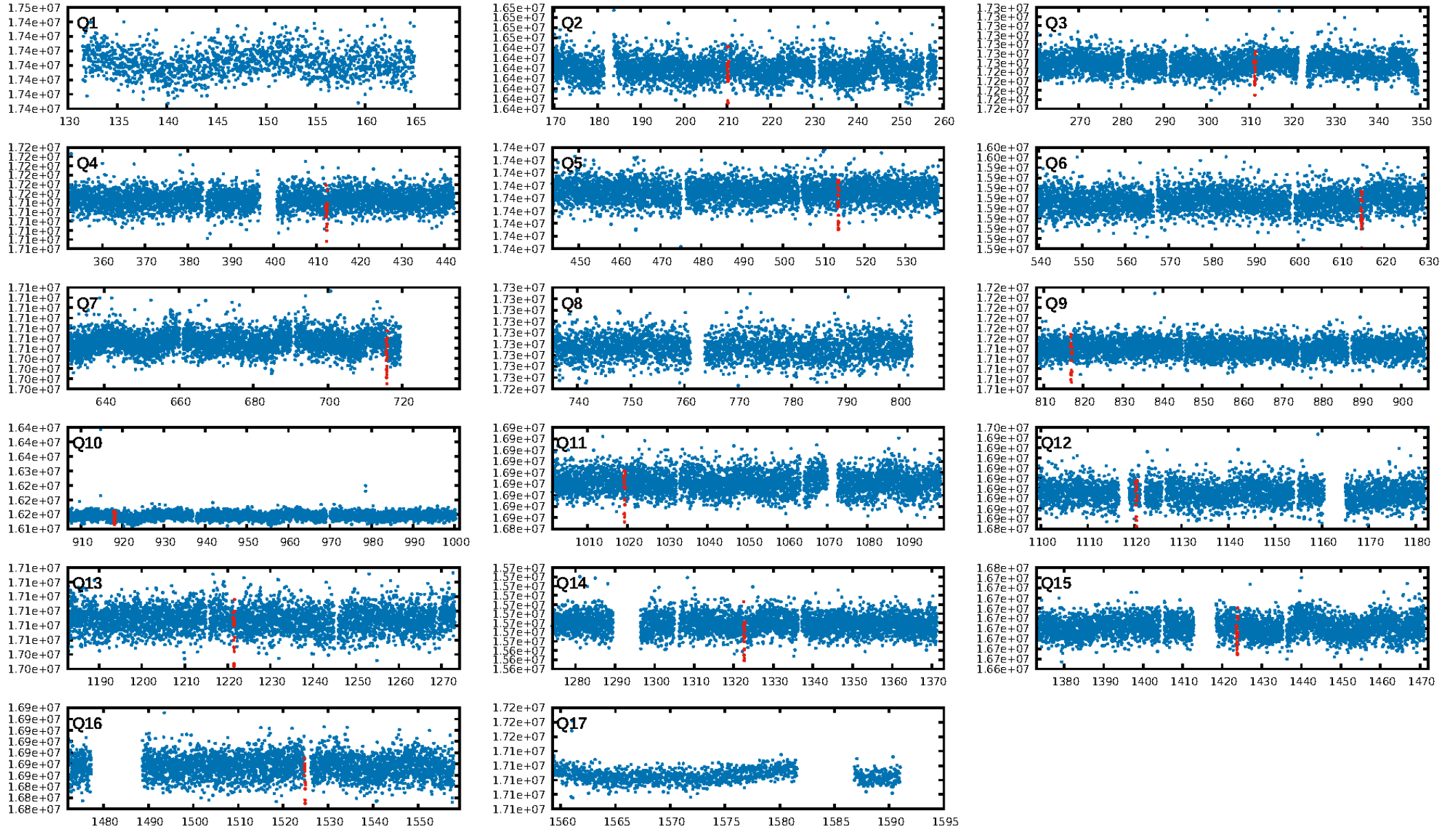
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [410.88σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 29.1%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.47e-116  
RollingBand-fgt: 1.00 [14/14]  
GhostDiagnostic-chr: 2.889  
Centroid-sig: 0.4%  
Centroid-so: 0.888 arcsec [1.65σ]  
OotOffset-rm: 0.103 arcsec [0.52σ]  
KicOffset-rm: 0.391 arcsec [1.79σ]  
OotOffset-st: 4/4/2/3 [13]  
KicOffset-st: 4/4/2/3 [13]  
DiffImageQuality-fgm: 1.00 [13/13]  
DiffImageOverlap-fno: 1.00 [13/13]

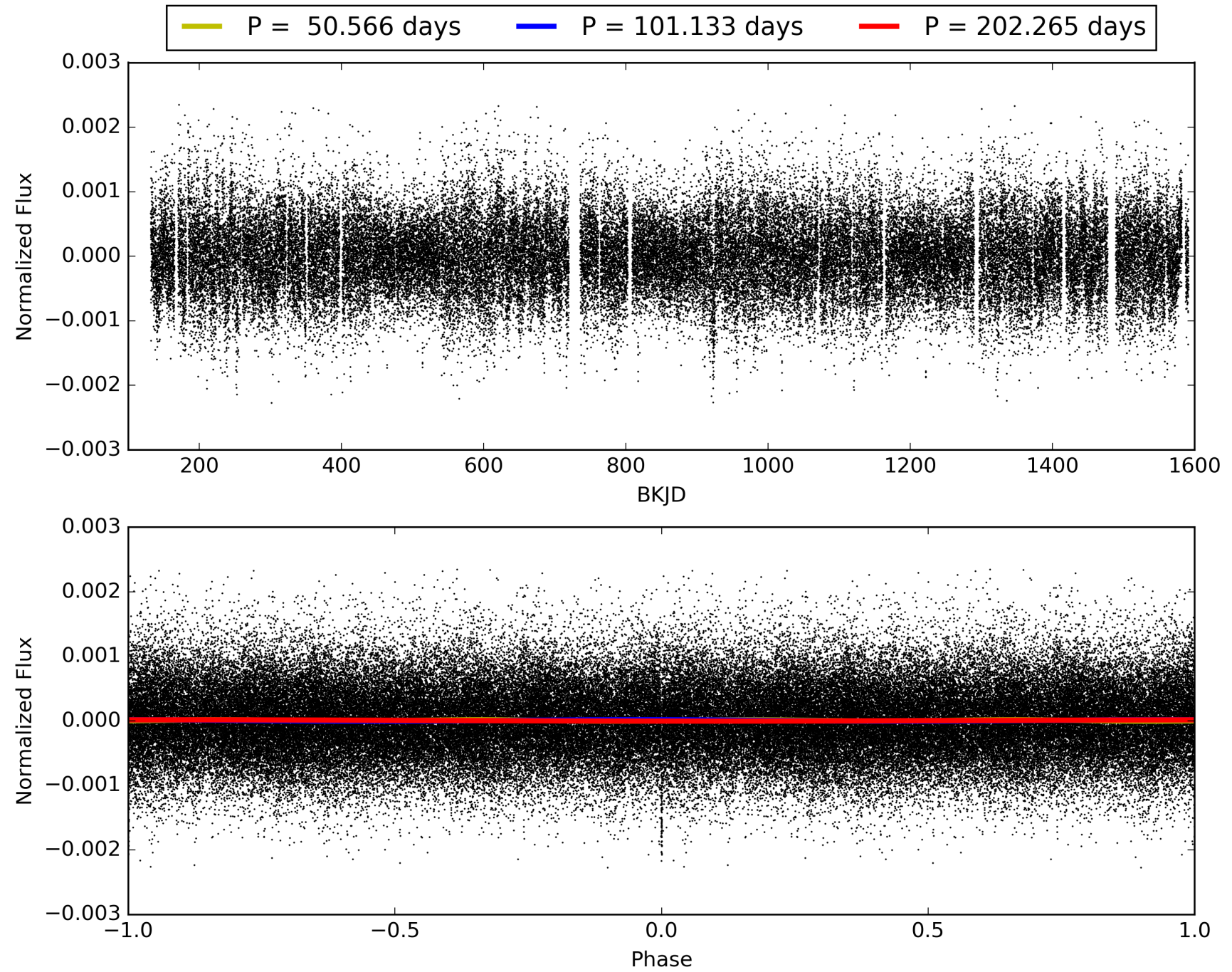
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 23:37:43 Z

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

# TCE 002854181-01, PDC Light Curves

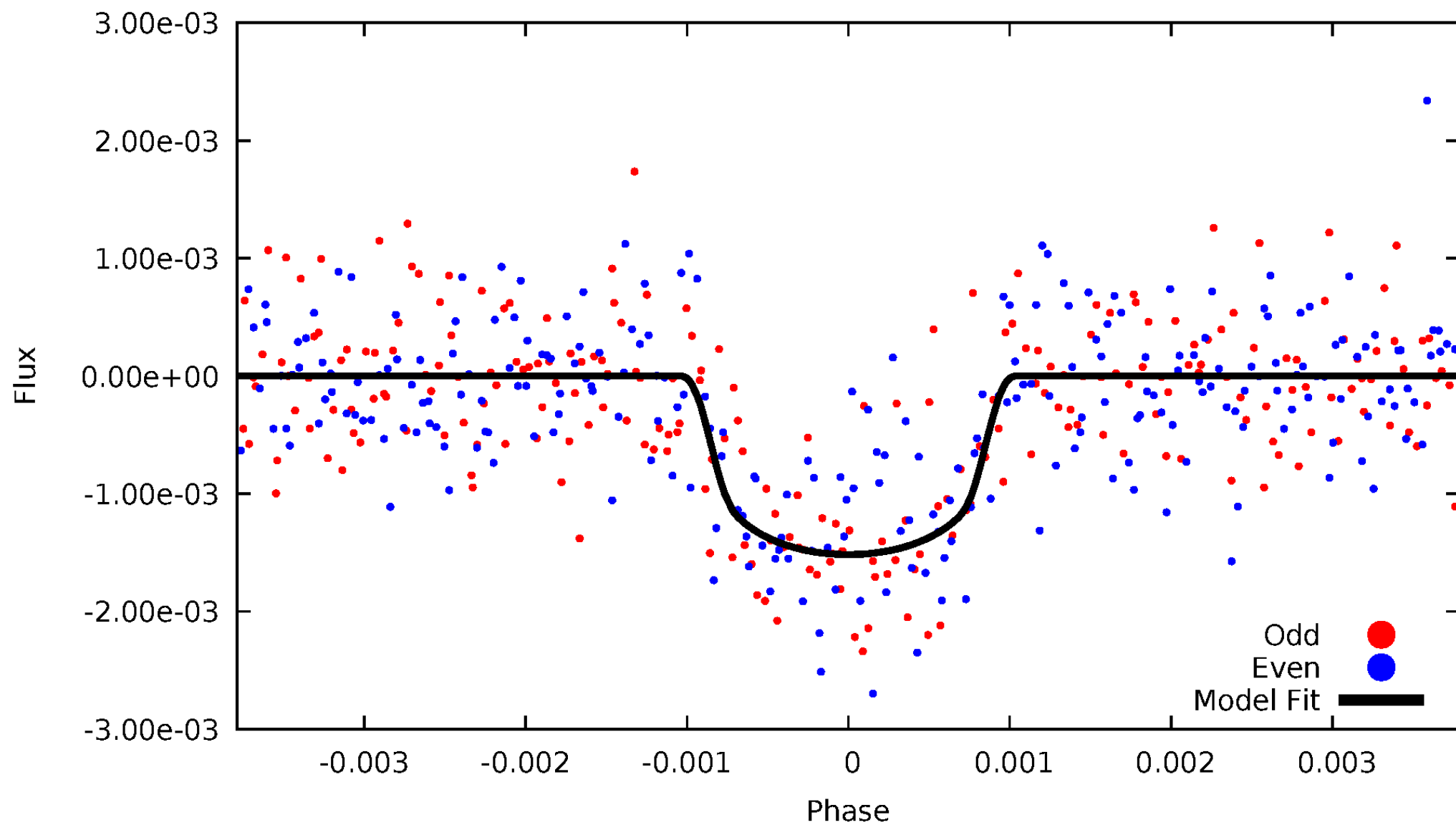


# TCE 002854181-01



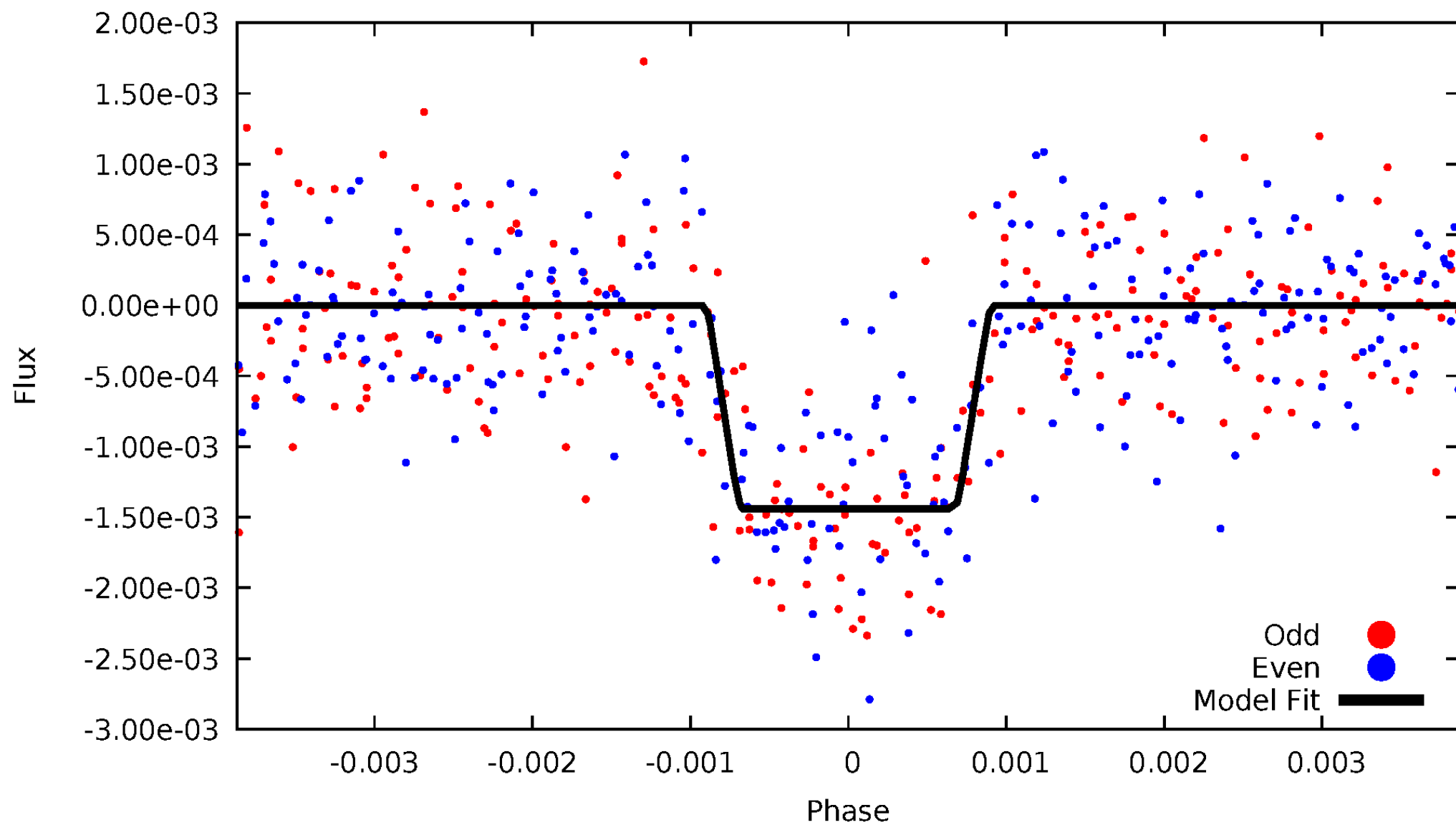
# DV Odd/Even

TCE 002854181-01



# ALT Odd/Even

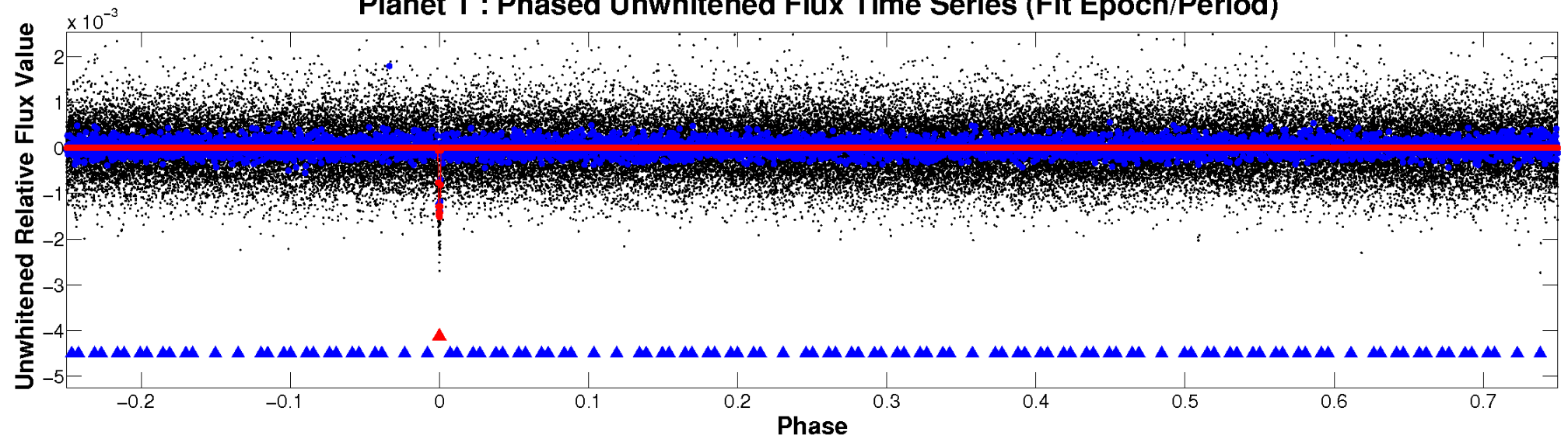
TCE 002854181-01



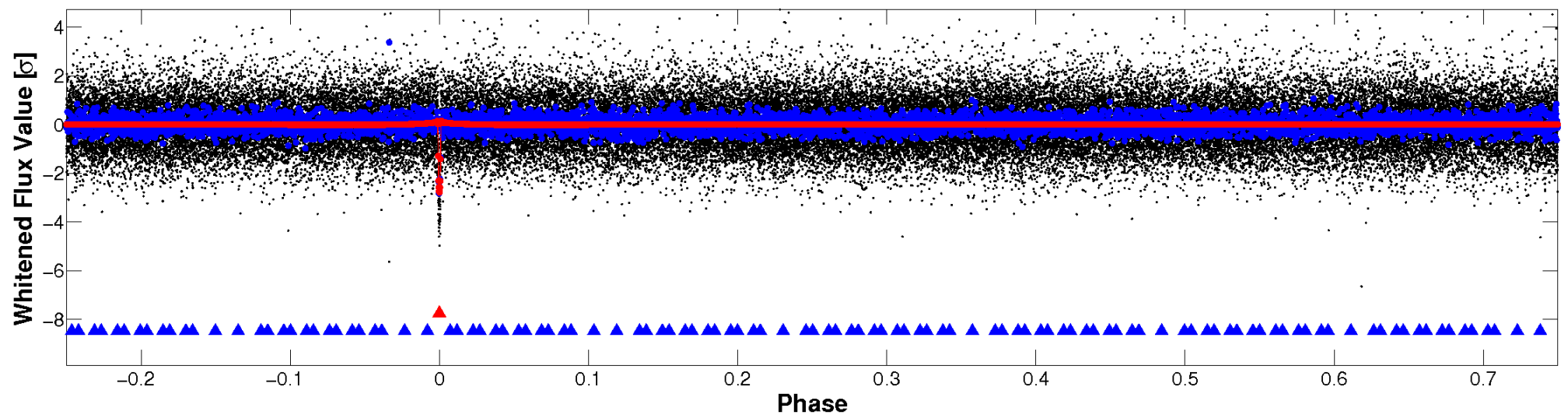


# Non-Whitened Vs. Whitened Light Curve

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

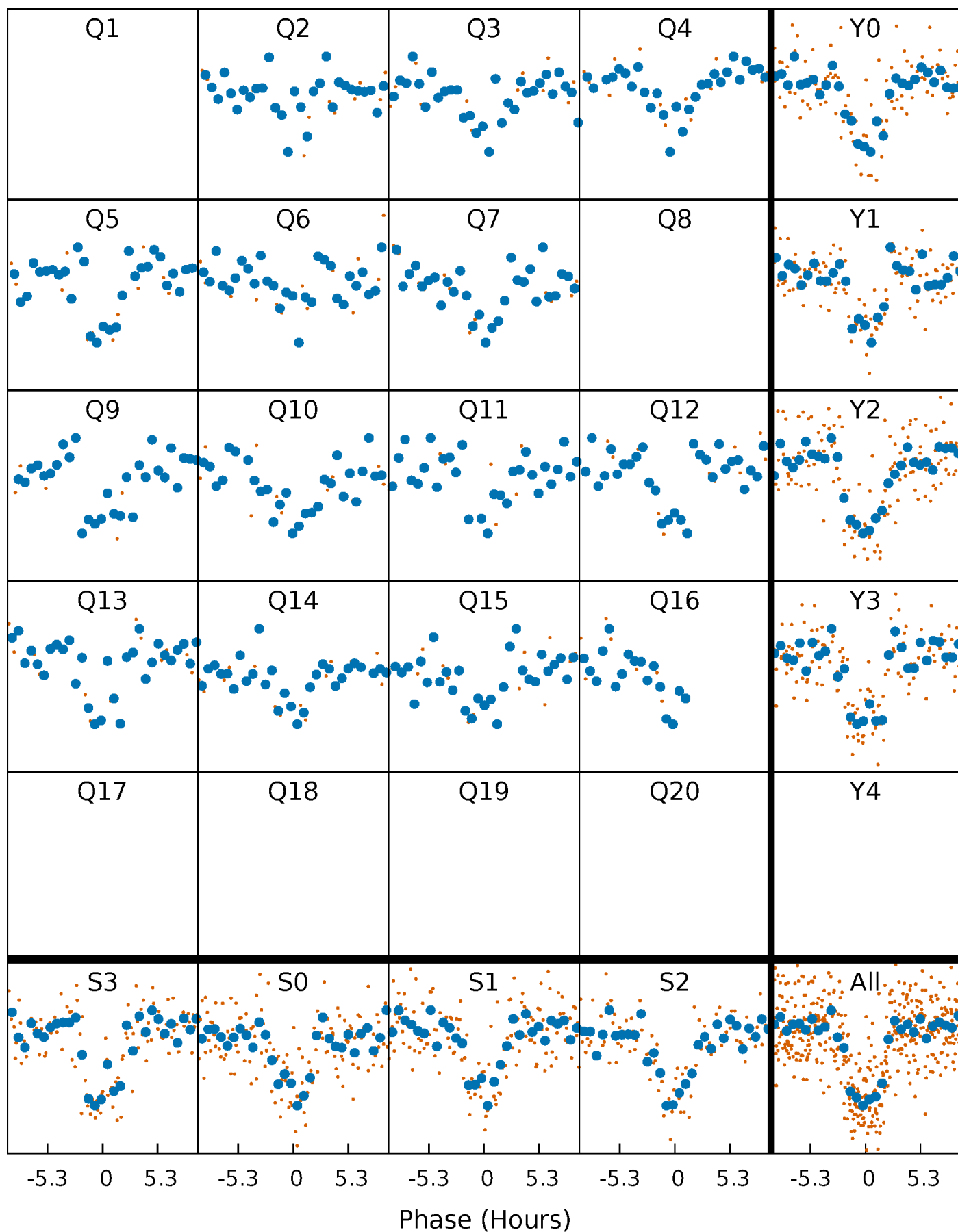


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

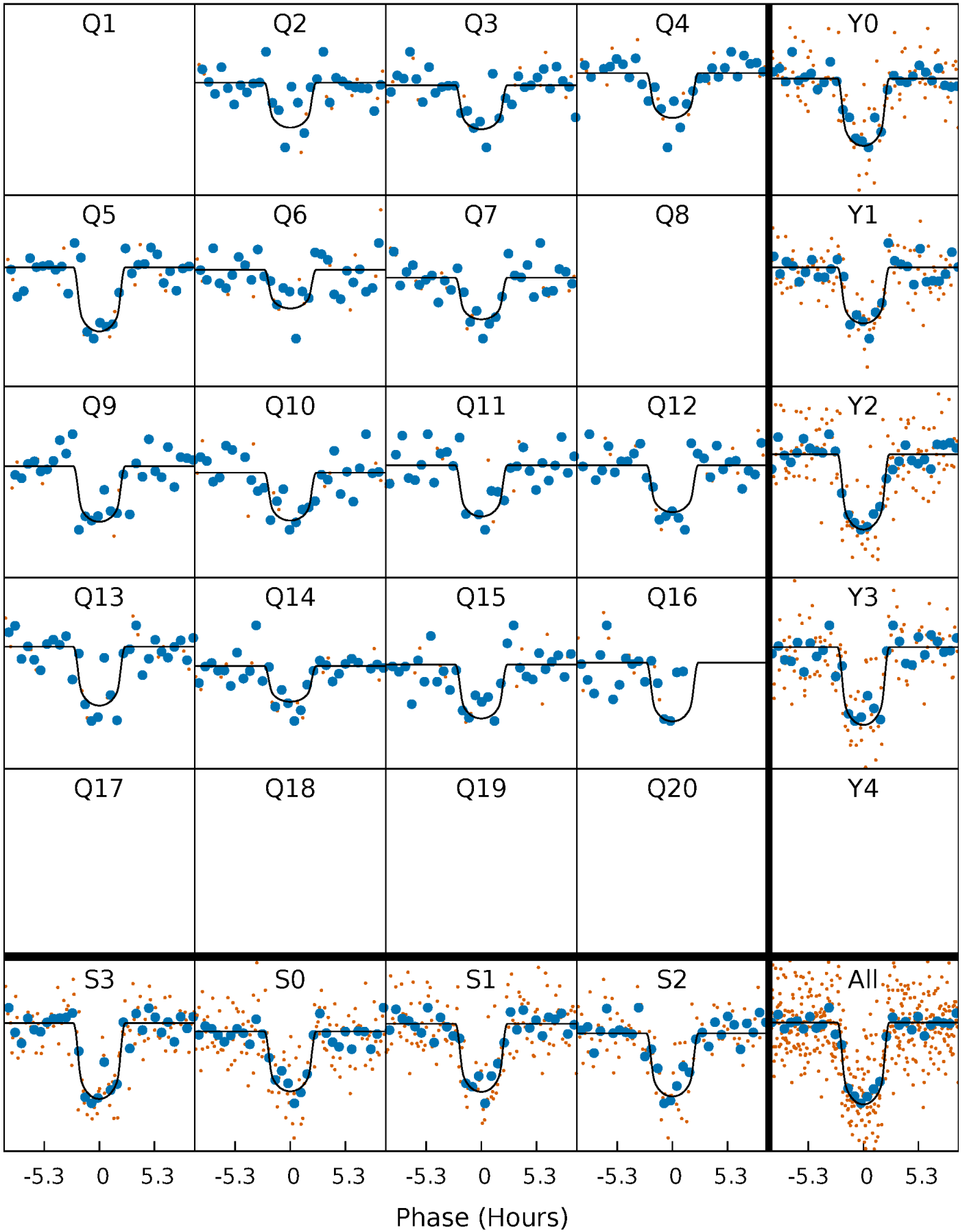
TCE 002854181-01 P=101.132705 Days  $T_0=210.181811$  (BKJD)





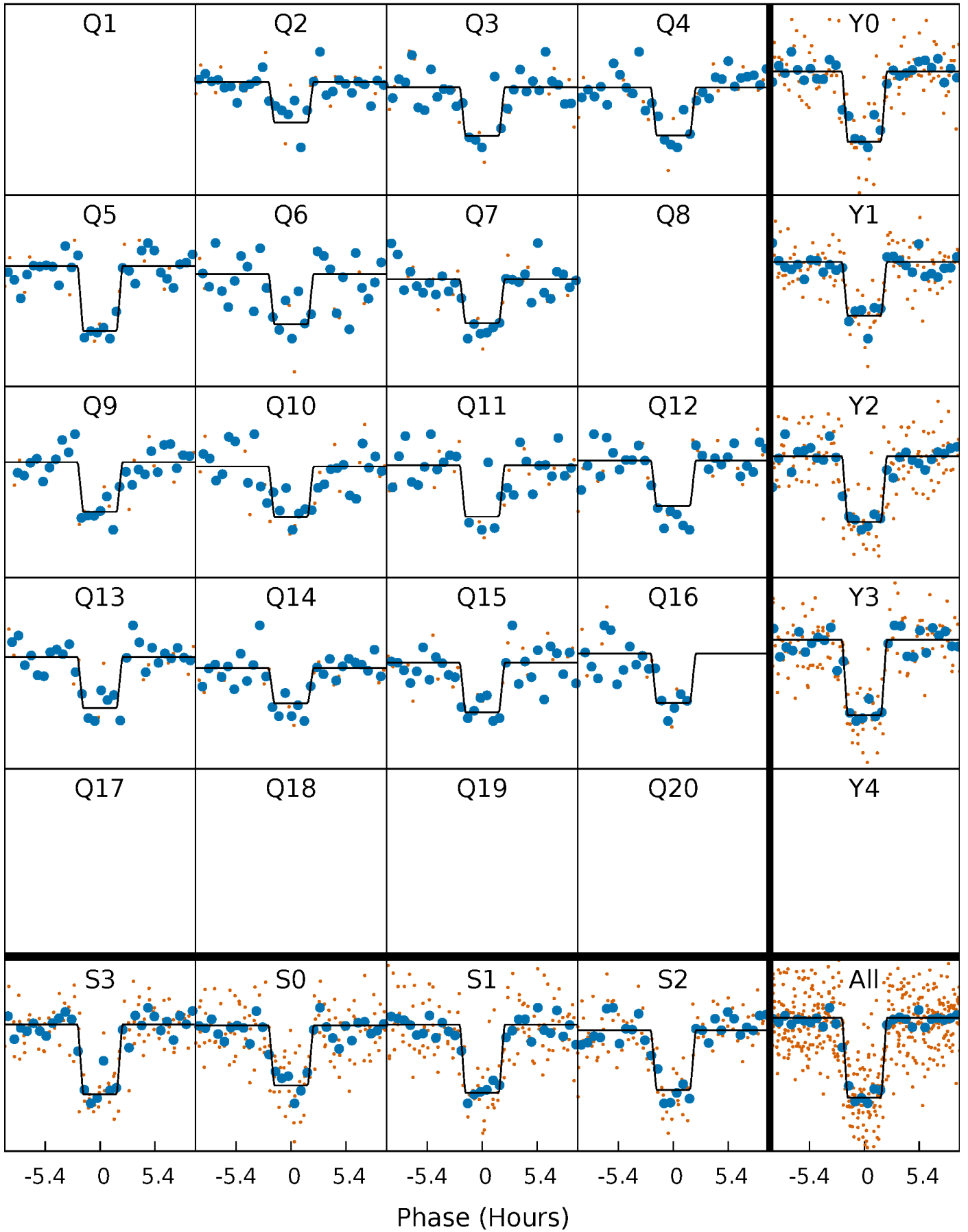
# DV Quarter-Phased Transit Curves

TCE 002854181-01 P=101.132705 Days  $T_0=210.181811$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

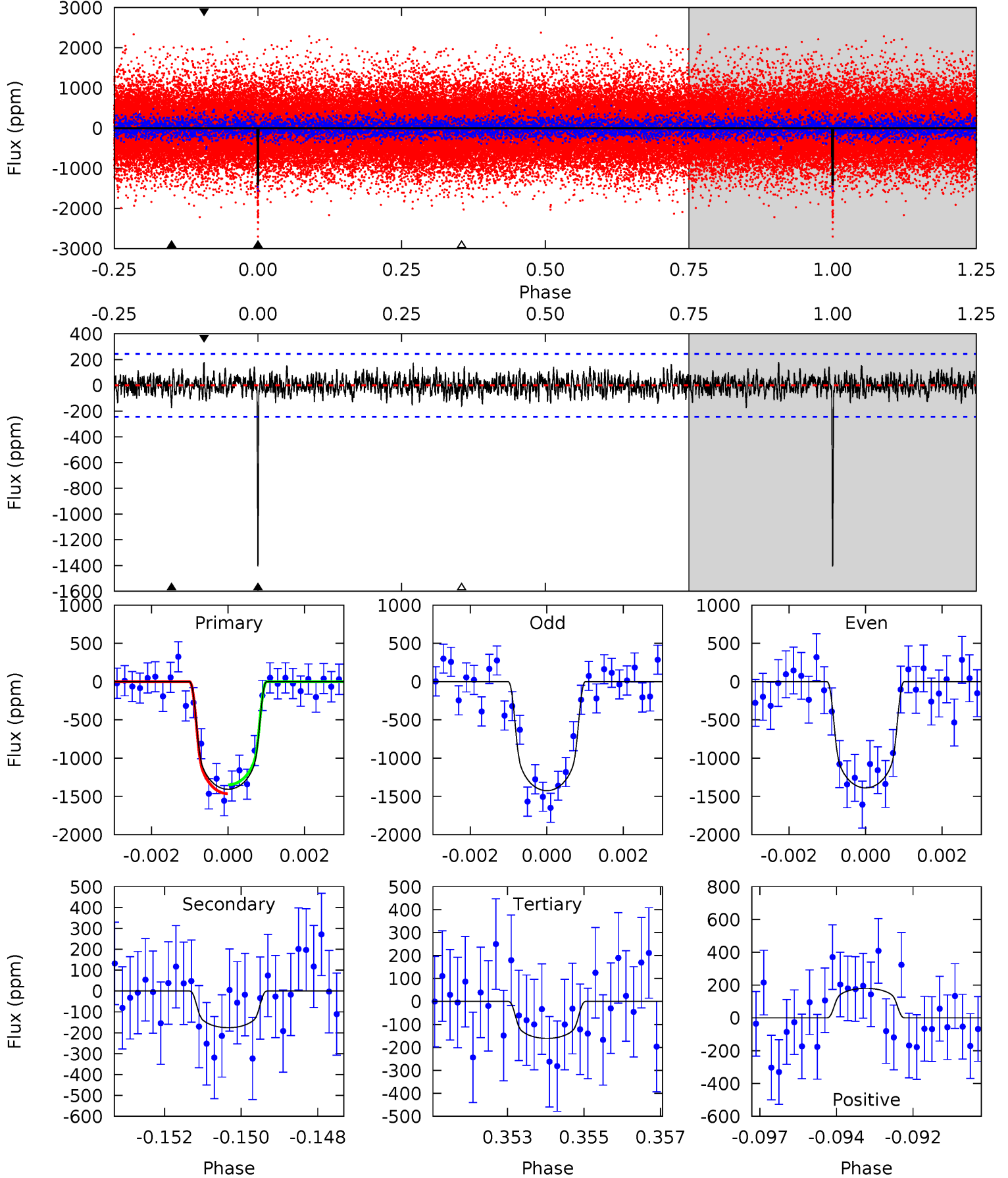
TCE 002854181-01 P=101.132008 Days  $T_0=210.186473$  (BKJD)



# DV Model-Shift Uniqueness Test

002854181-01, P = 101.132705 Days, E = 109.049106 Days

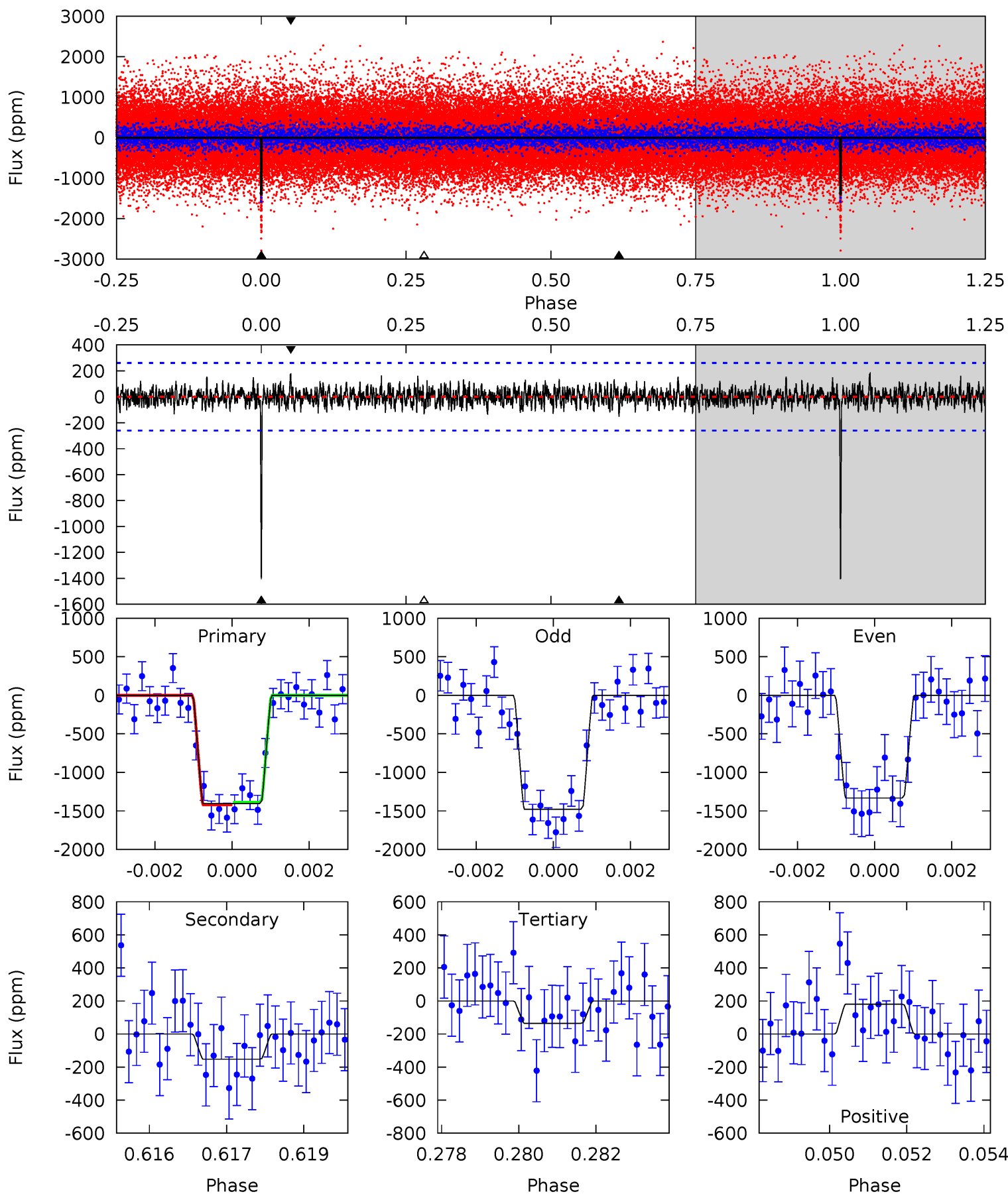
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
30.6	3.82	3.50	3.91	5.32	3.08	1.14	27.1	26.7	0.32	-0.09	0.39	0.99	0.11	1.27



# Alt Model-Shift Uniqueness Test

002854181-01, P = 101.132008 Days, E = 109.054465 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
28.8	3.12	2.77	3.70	5.35	3.12	1.00	26.0	25.1	0.35	-0.58	1.51	1.03	0.11	0.33



### Stellar Parameters For KIC 002854181

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5492^{+82}_{-74}$	$4.389^{+0.105}_{-0.095}$	$0.160^{+0.150}_{-0.150}$	$1.016^{+0.131}_{-0.108}$	$0.921^{+0.057}_{-0.042}$	$1.238^{+0.530}_{-0.371}$
	+1%/-1%	+2%/-2%	+94%/-94%	+13%/-11%	+6%/-5%	+43%/-30%
Source	SPE90	SPE90	SPE90	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 002854181-01 / KOI 2232.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-176 \pm 46$	$4.22^{+1.09}_{-1.00}$	$529^{+21}_{-16}$	$3648^{+368}_{-289}$	$902^{+761}_{-369}$
Alt.	$-152 \pm 49$	$4.18^{+1.00}_{-0.89}$	$530^{+20}_{-19}$	$3563^{+342}_{-313}$	$791^{+629}_{-353}$

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

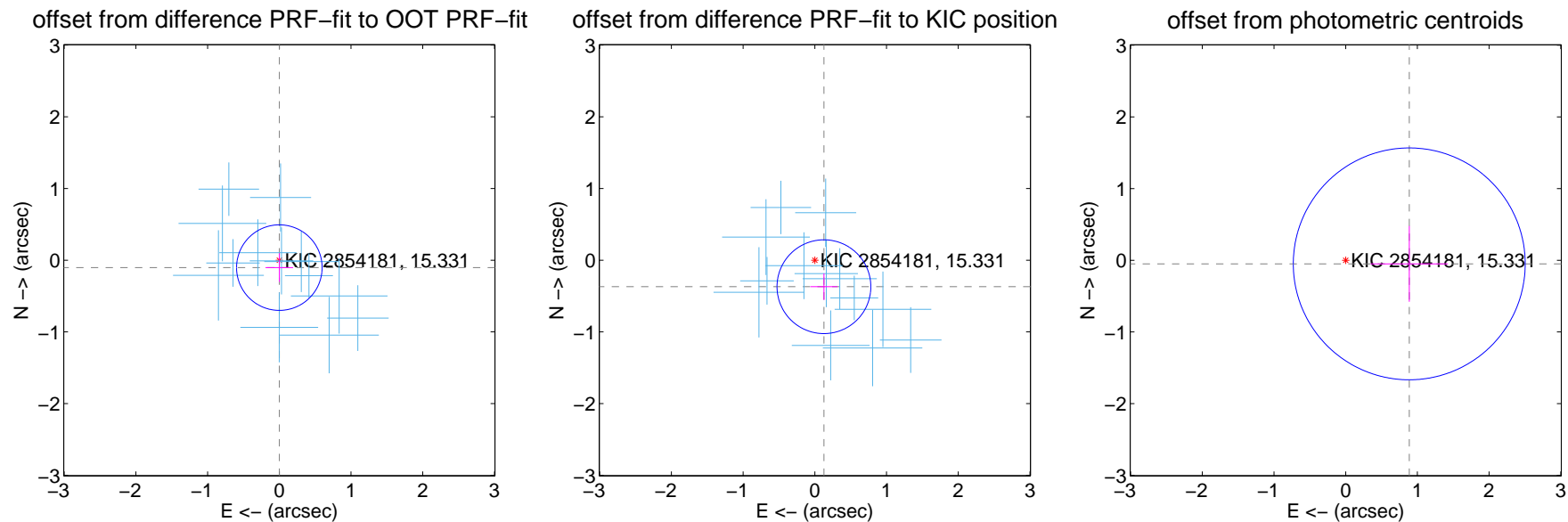
## DV Centroid Data

Supplemental centroid analysis for 002854181-01. Kepler magnitude: 15.33. Transit SNR 25.18

There are 13 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.25 arcsec

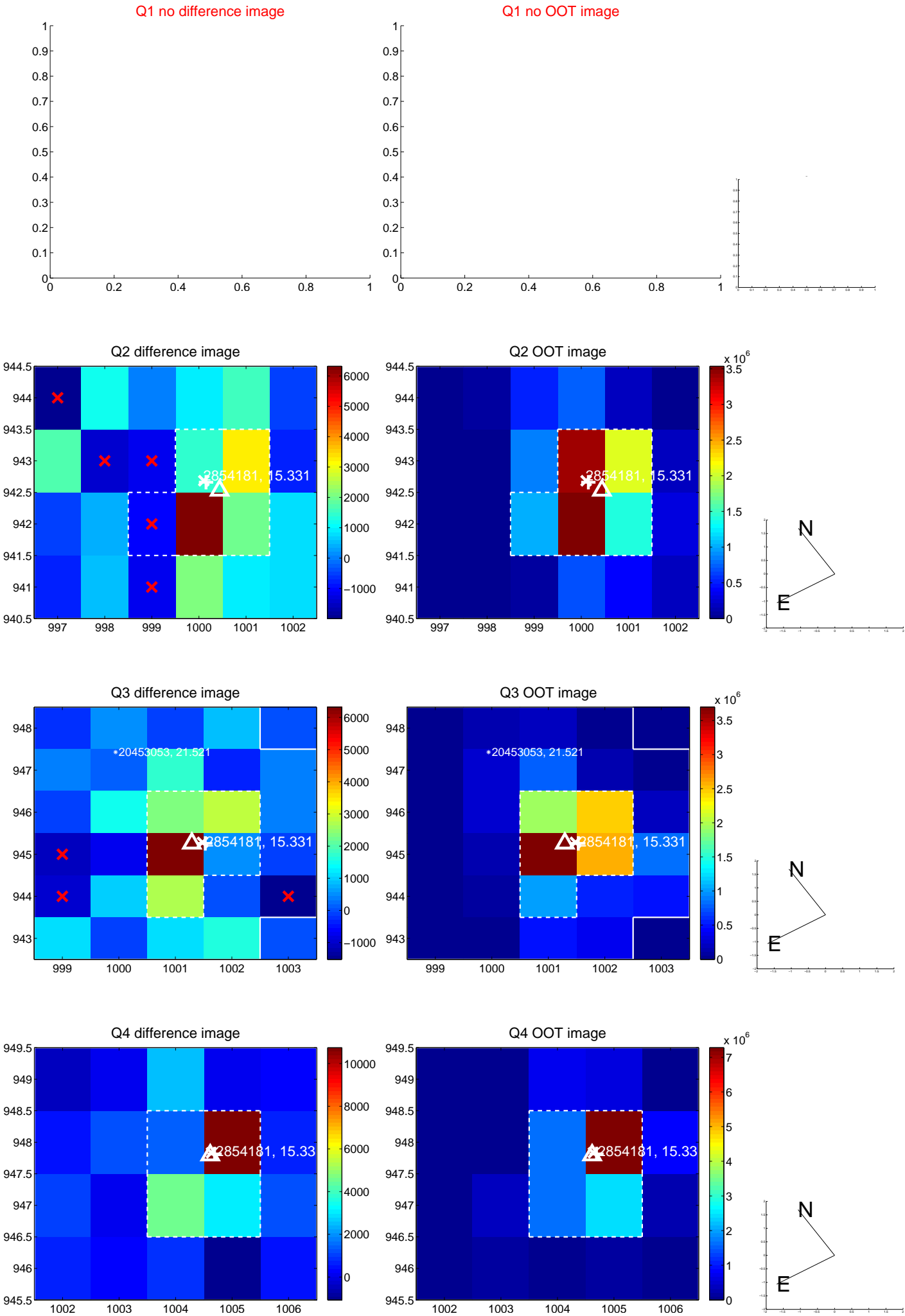
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.103 \pm 0.199$	0.52	$-0.000 \pm 0.193$	$-0.103 \pm 0.199$
PRF-fit source offset from KIC position	$0.391 \pm 0.218$	1.79	$-0.127 \pm 0.189$	$-0.370 \pm 0.185$
photometric centroid source offset	$0.89 \pm 0.54$	1.65	$-0.89 \pm 0.54$	$-0.05 \pm 0.53$



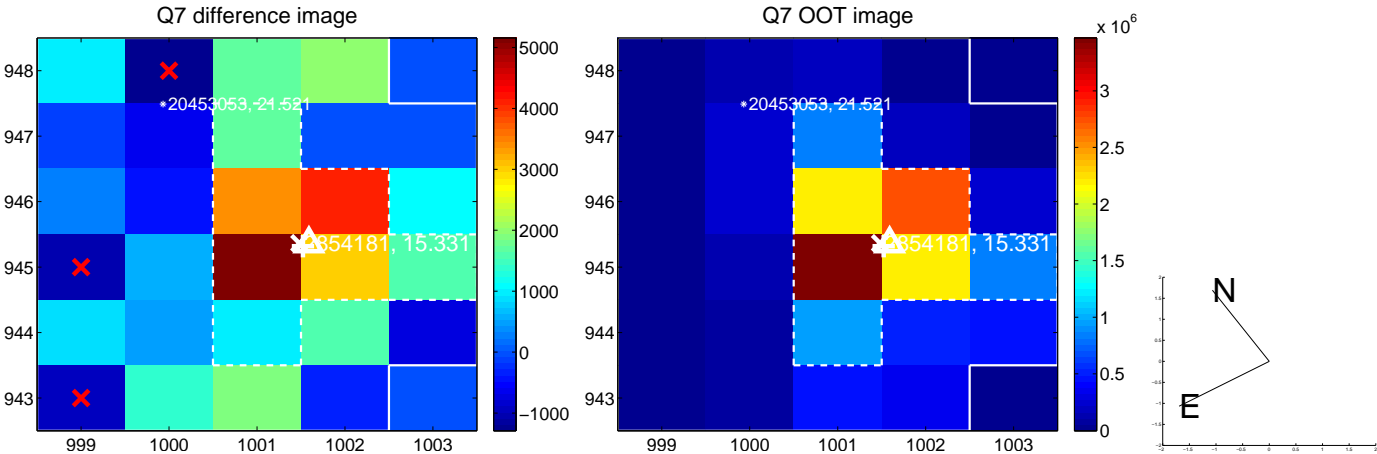
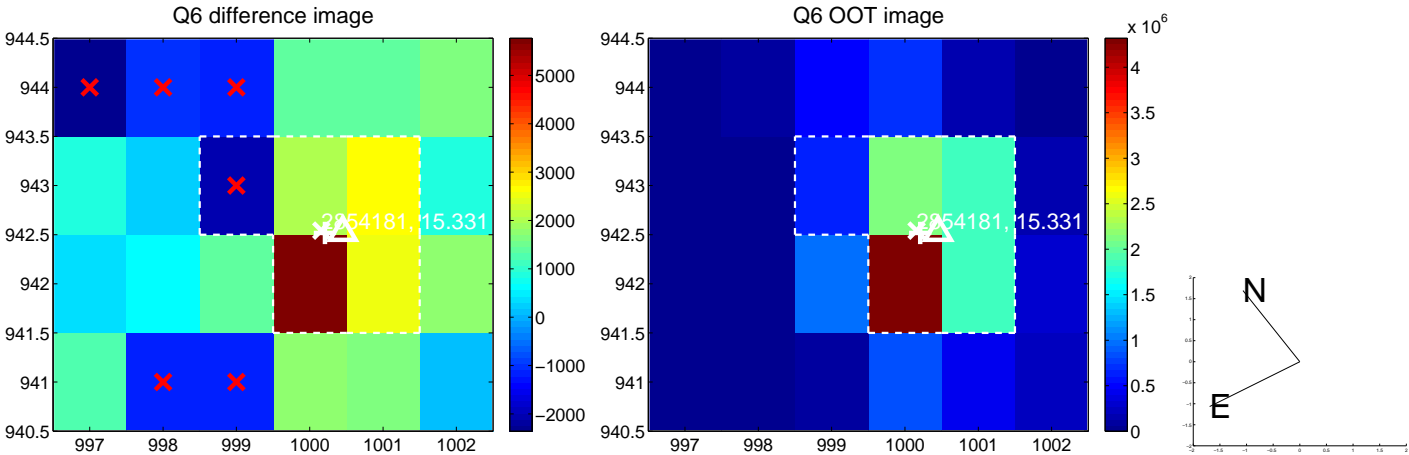
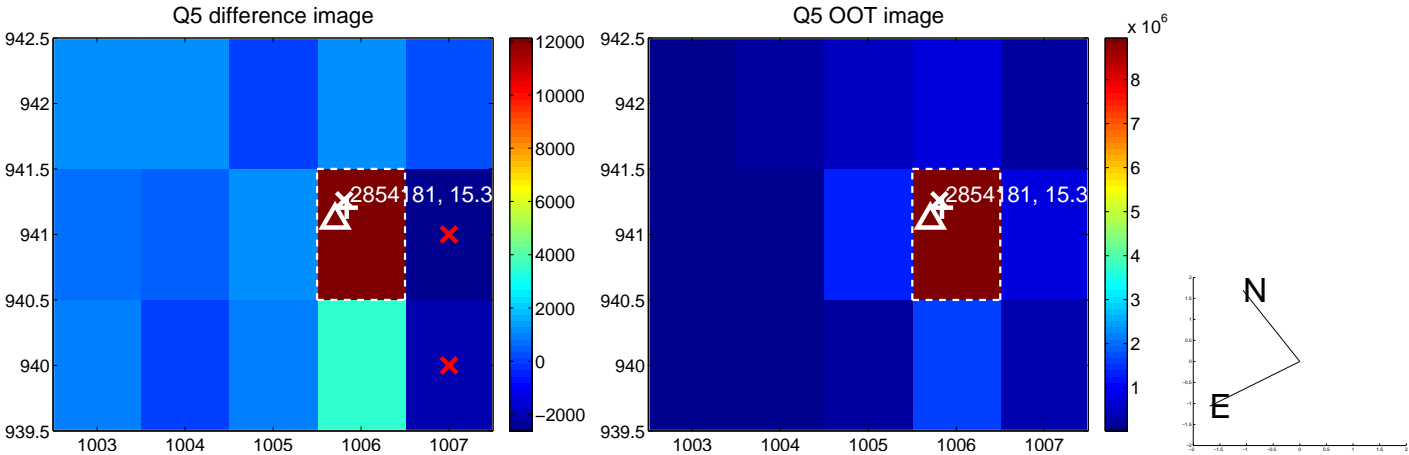
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



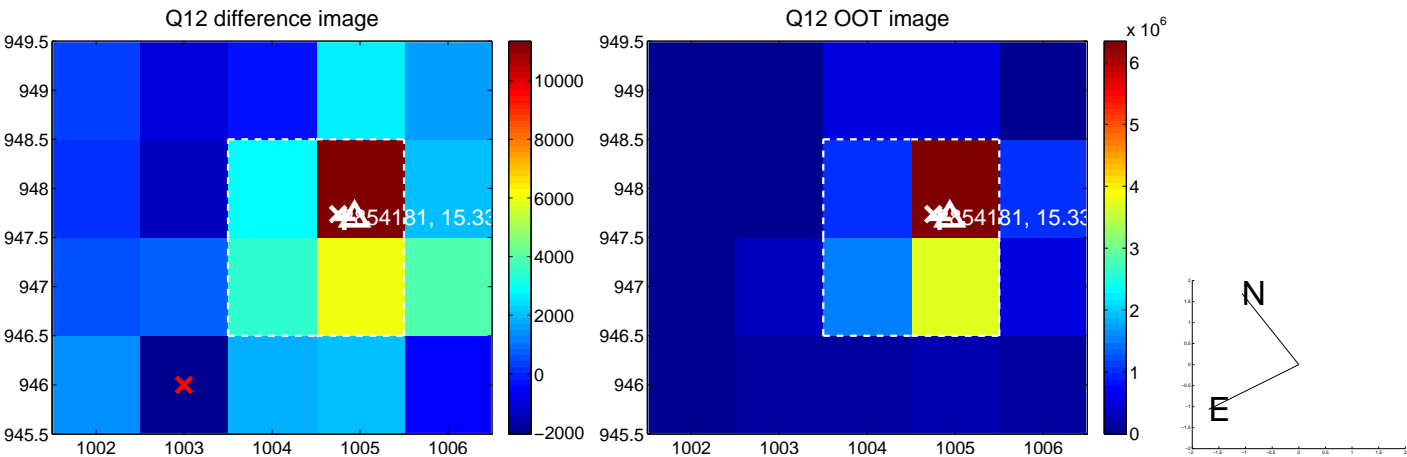
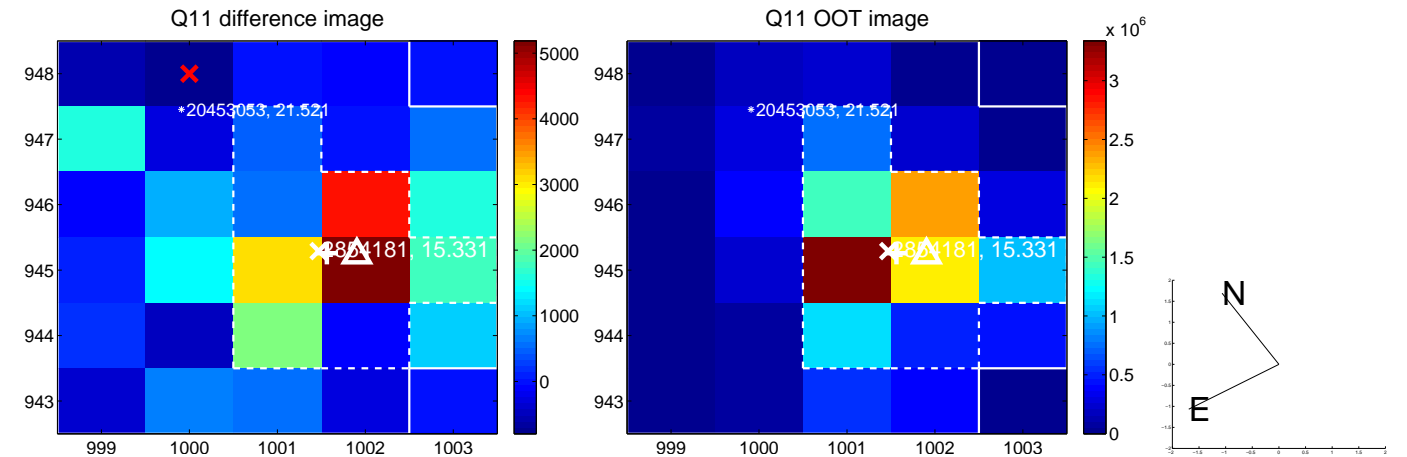
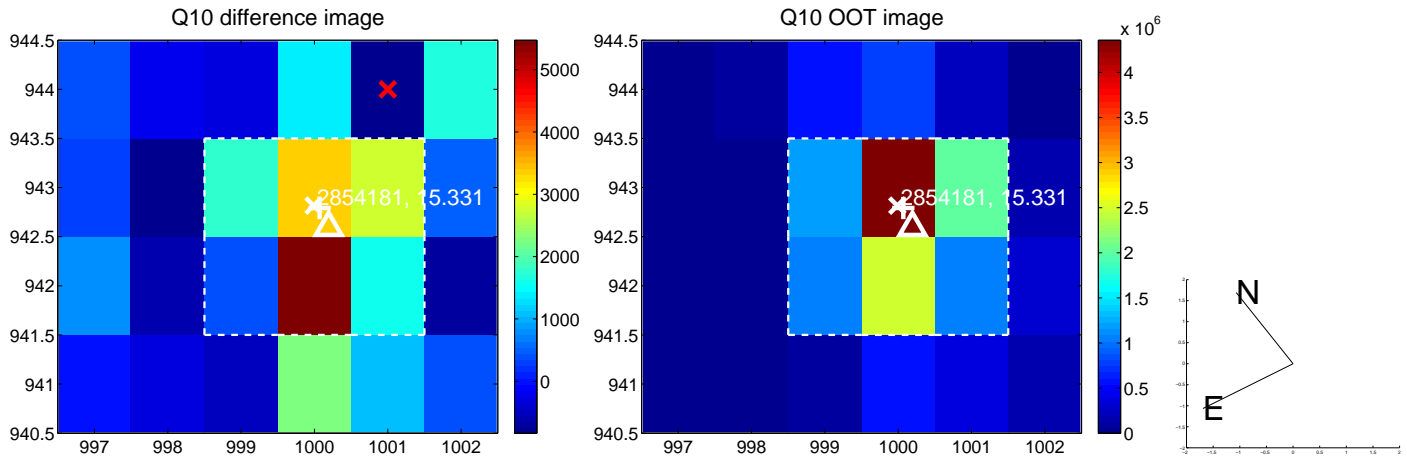
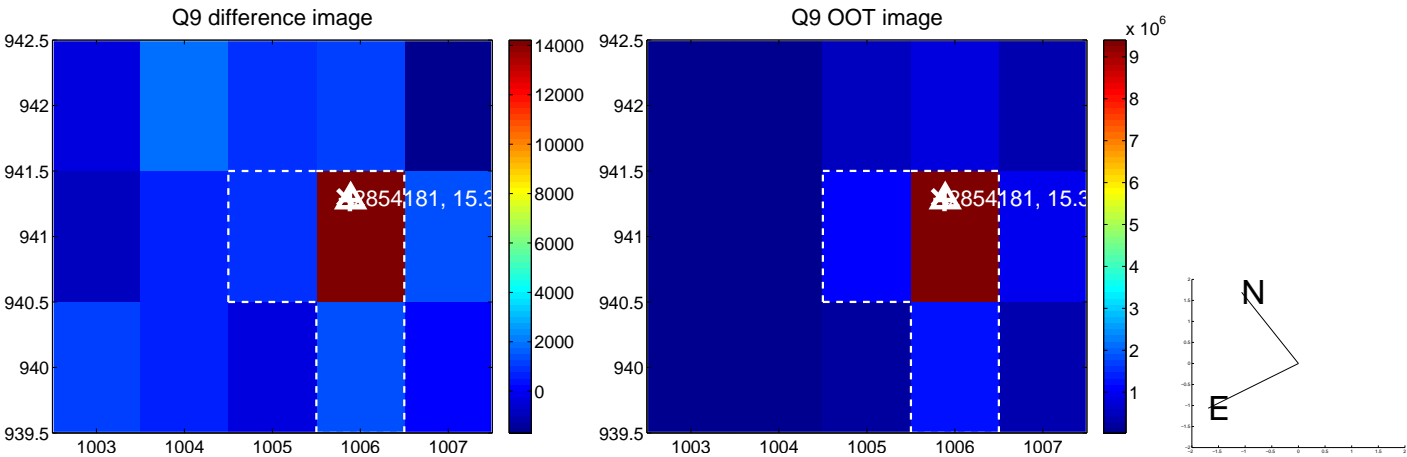
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



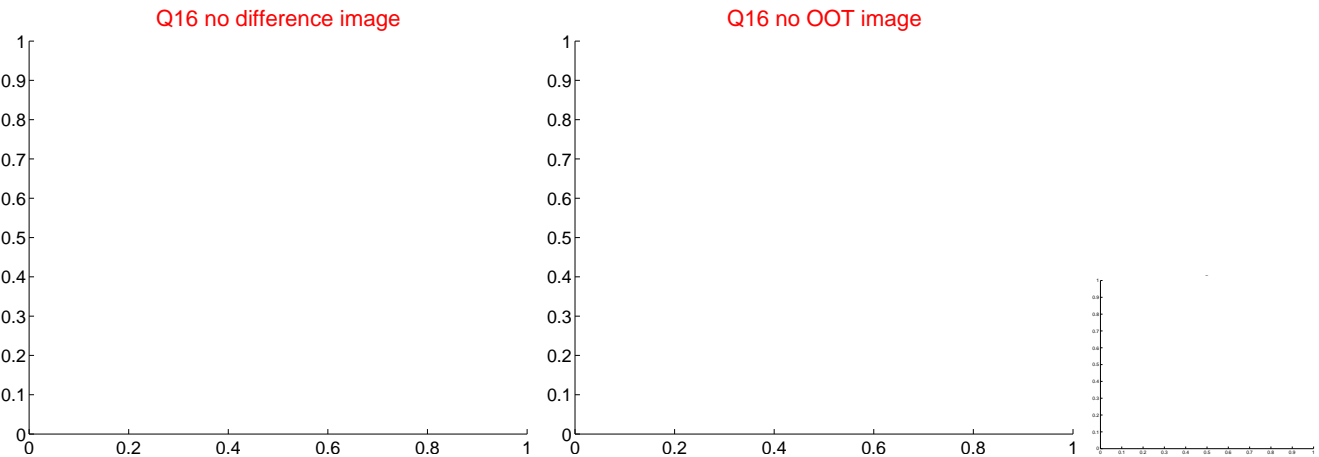
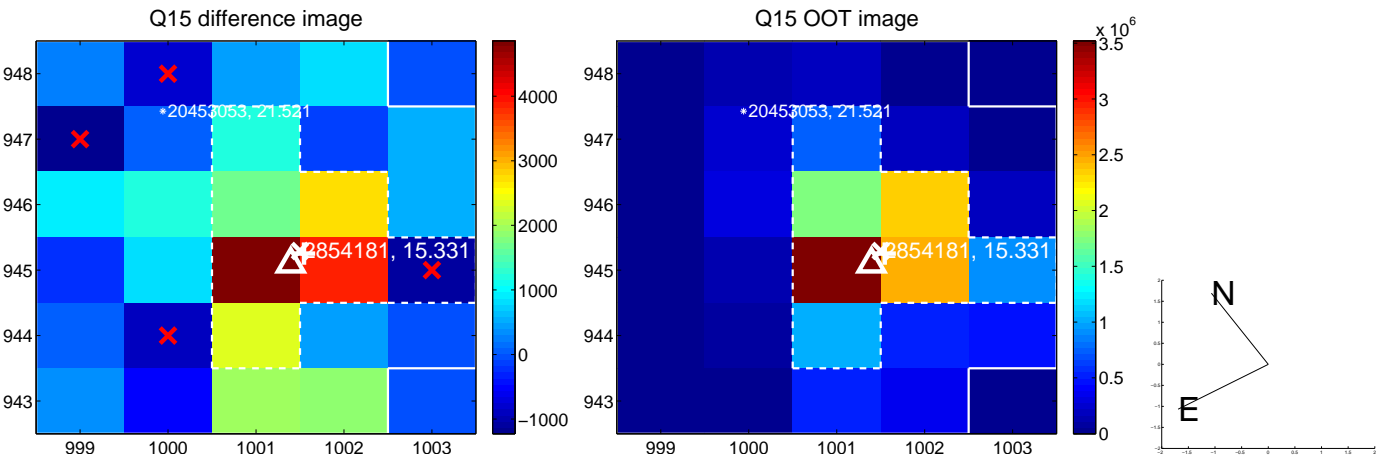
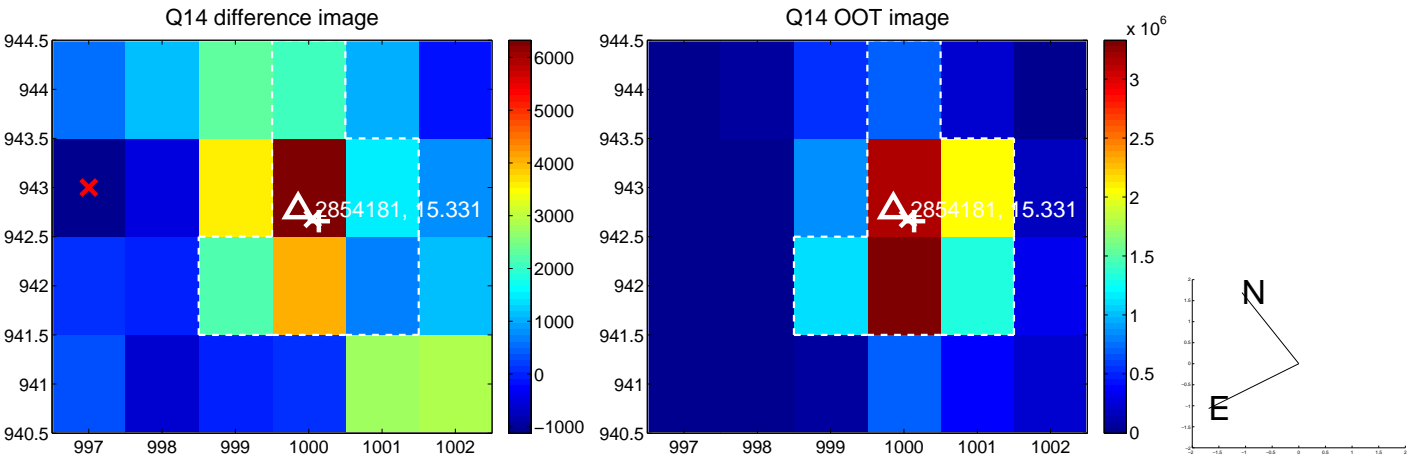
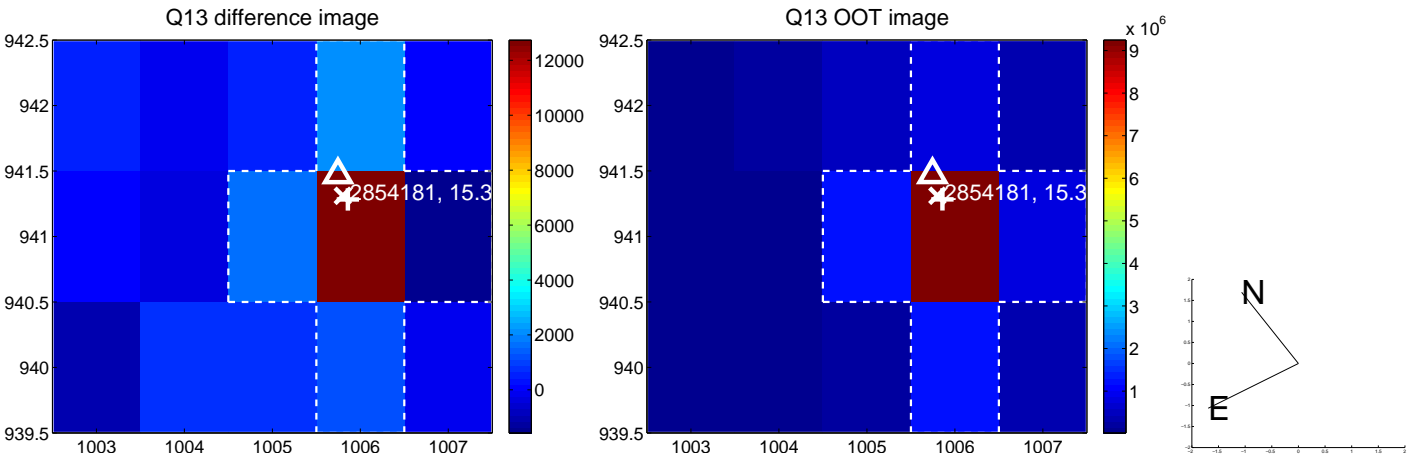
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



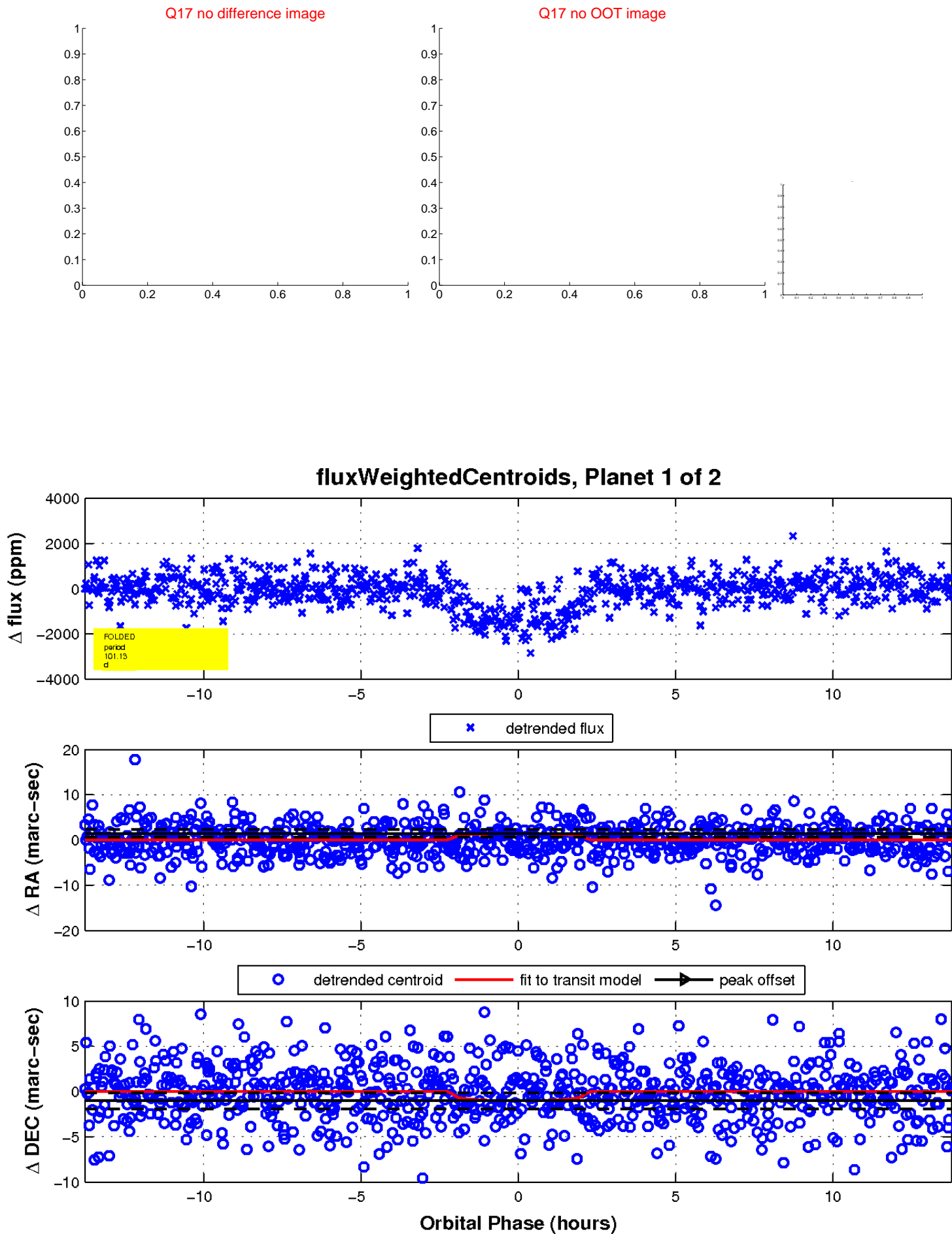
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

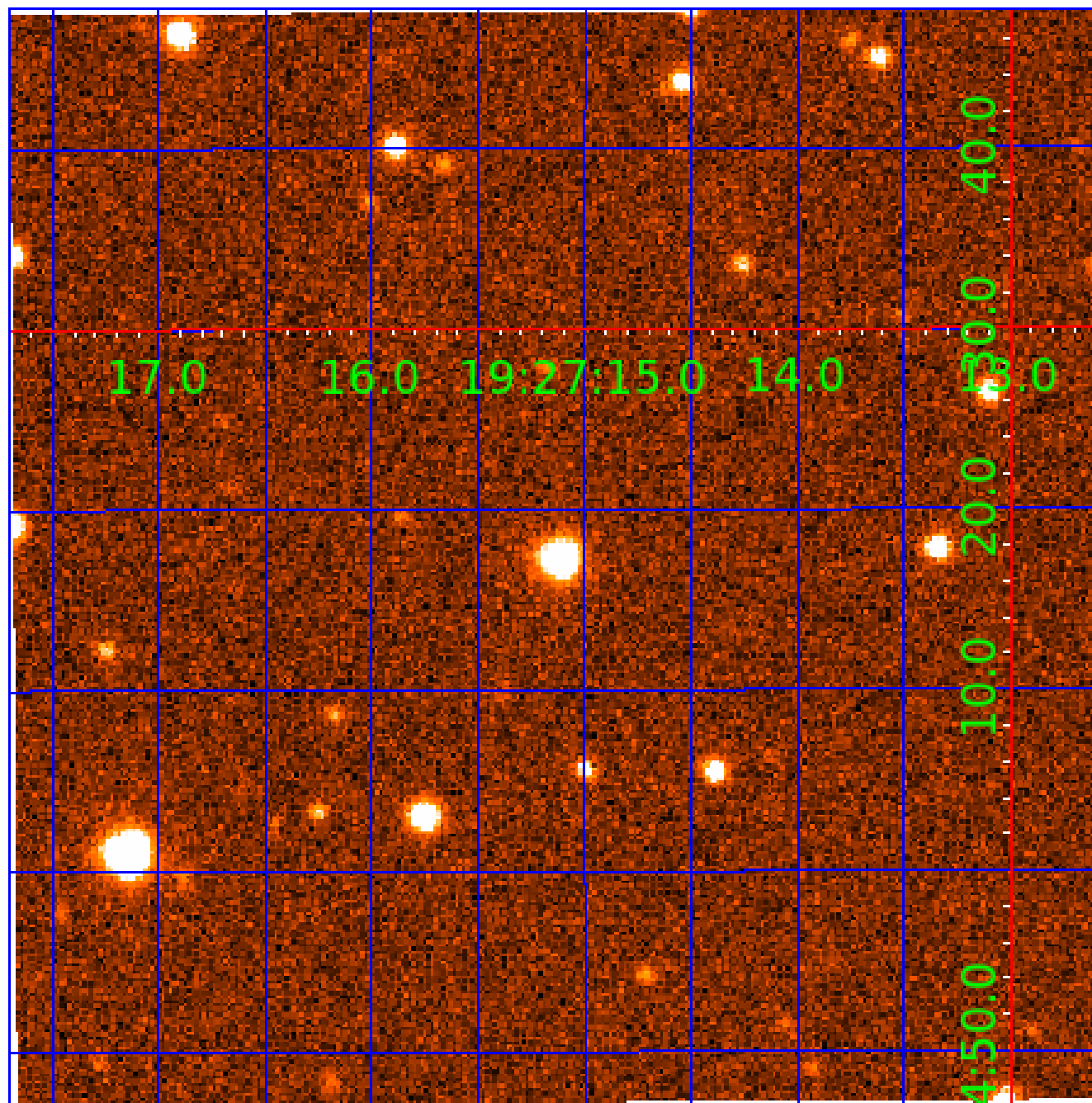


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 002854181

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002854181-01	OBS	2232.01	101.132705	210.181811	1516.9	4.596	23.2	25.2	1.02	5492	4.30	4.92
002854181-02	OBS	2232.02	12.835025	134.366868	291.2	2.340	9.3	9.8	1.02	5492	1.95	77.13

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002854181-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
002854181-02	OBS	PC	1.00	0	0	0	0	CENT_FEW_MEAS

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

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

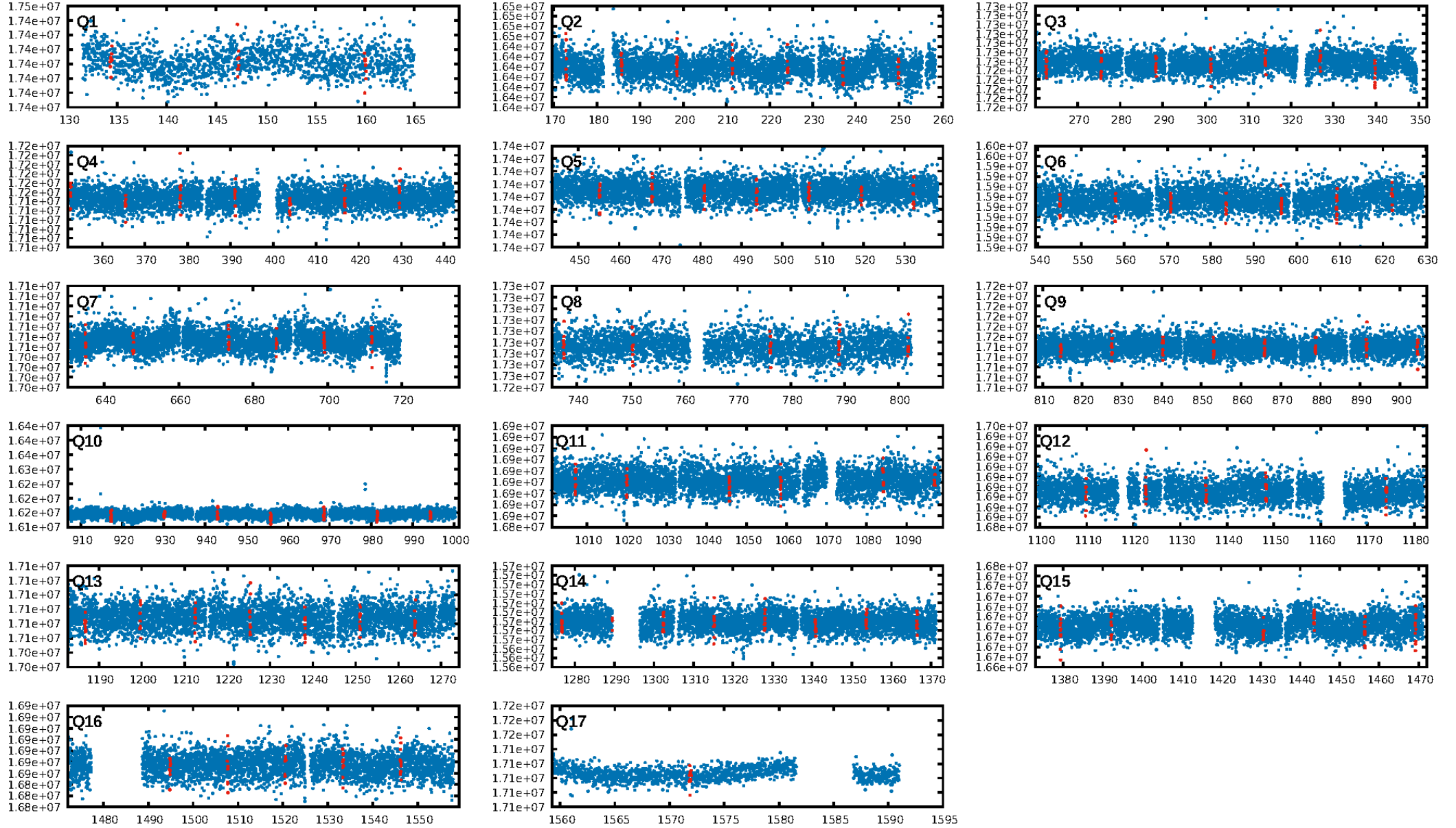
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 002854181-02

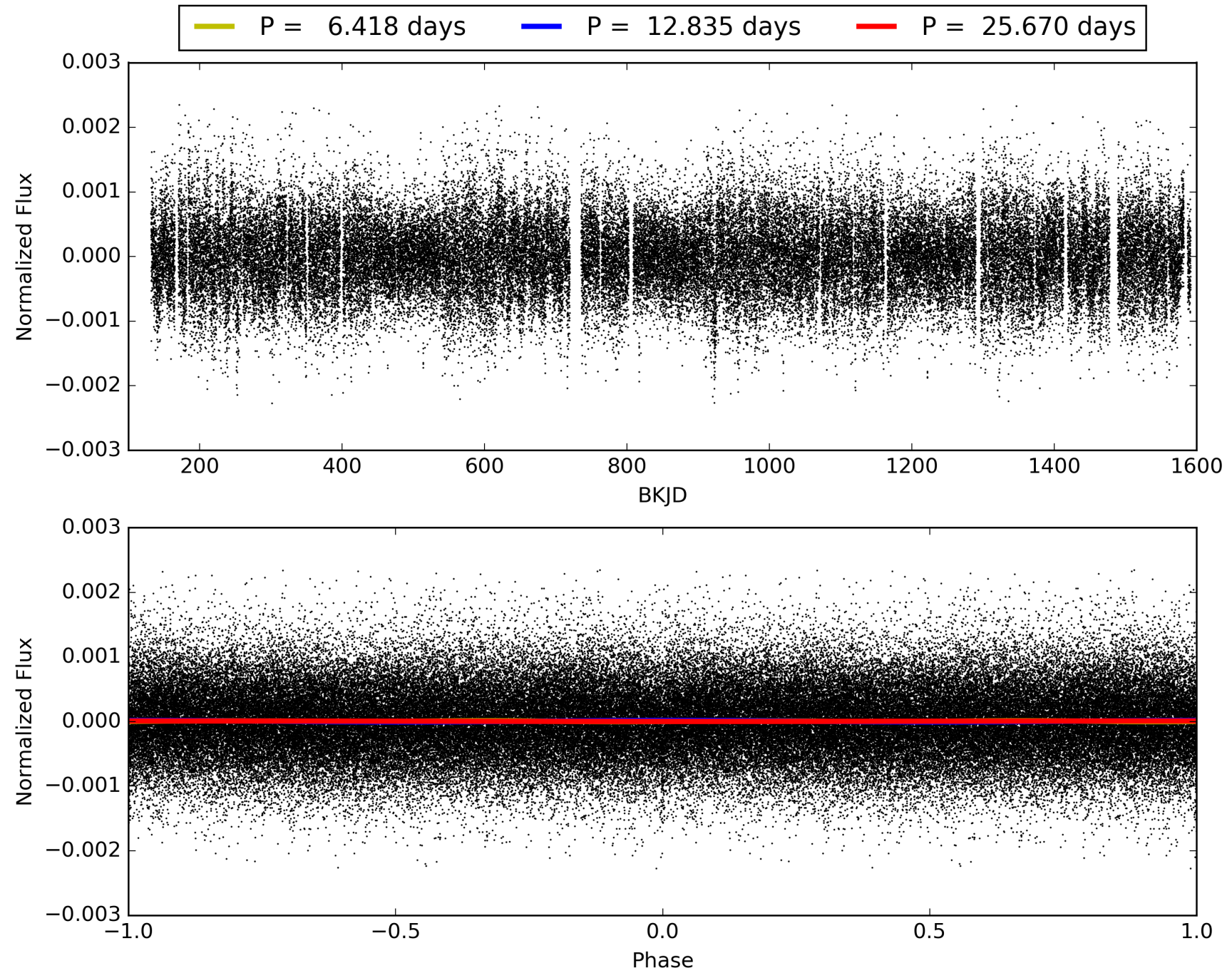
No Significant Match Found

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

# TCE 002854181-02, PDC Light Curves

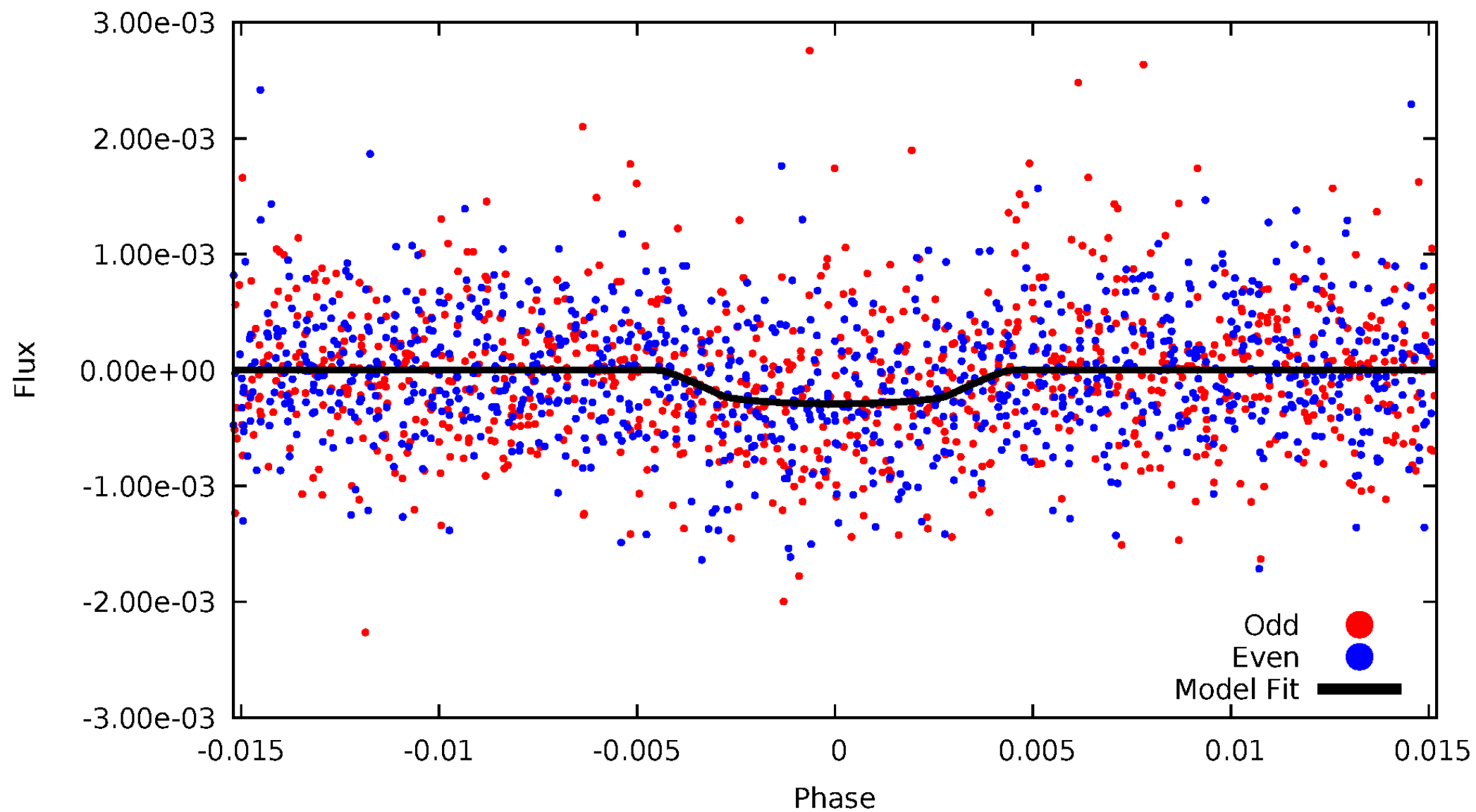


TCE 002854181-02



# DV Odd/Even

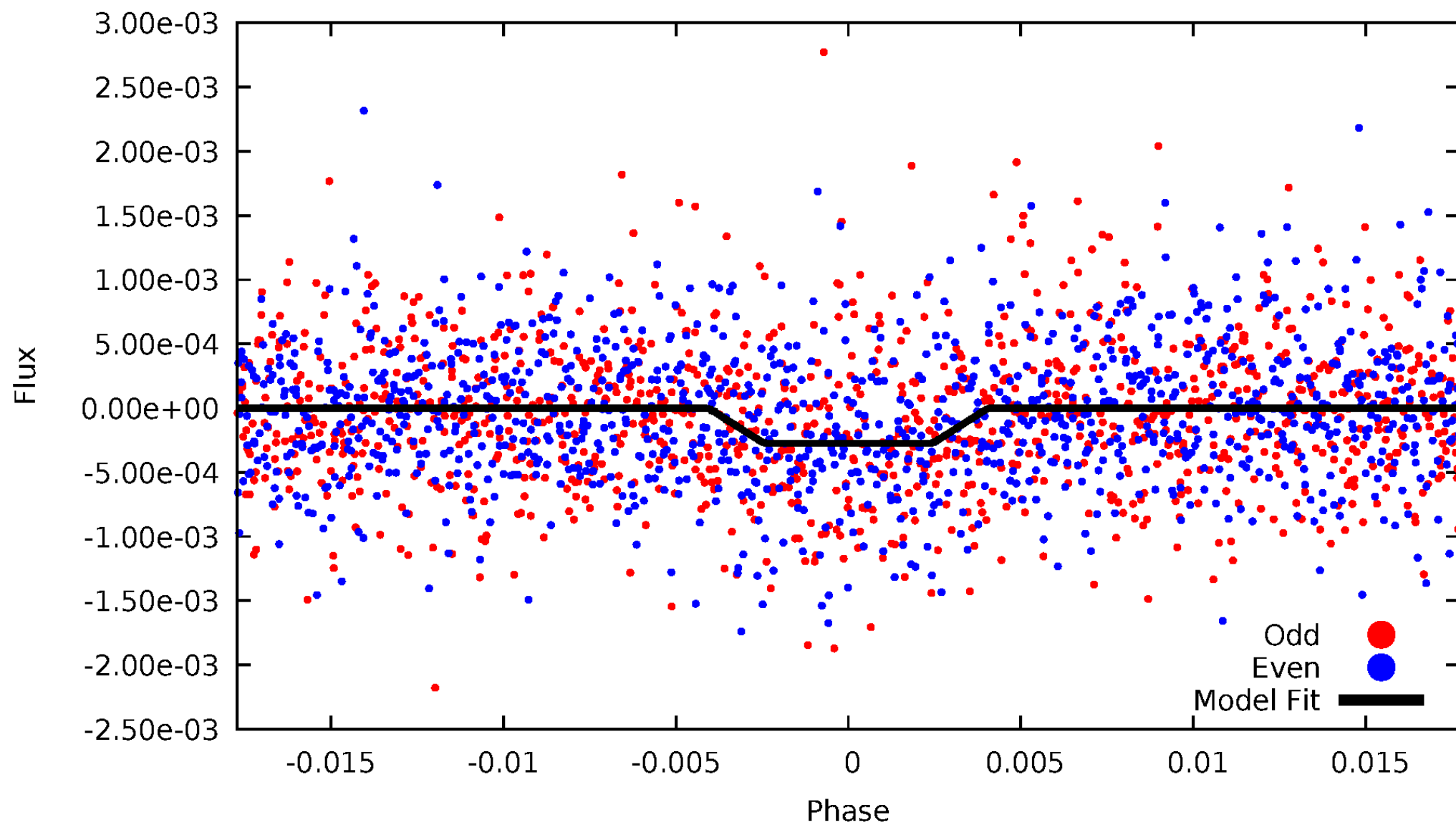
TCE 002854181-02





# ALT Odd/Even

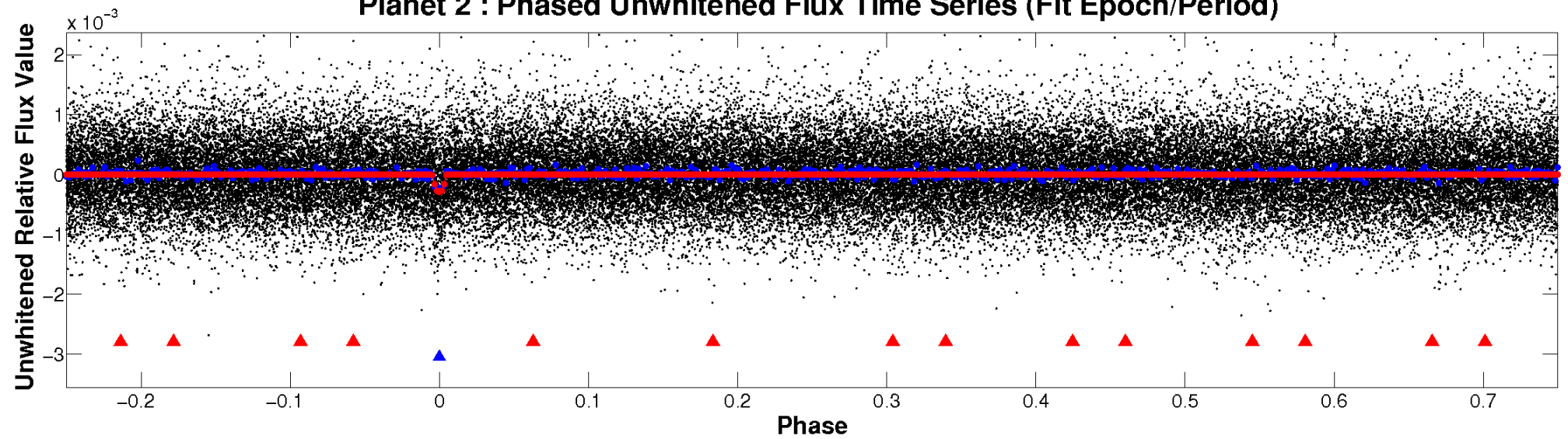
TCE 002854181-02



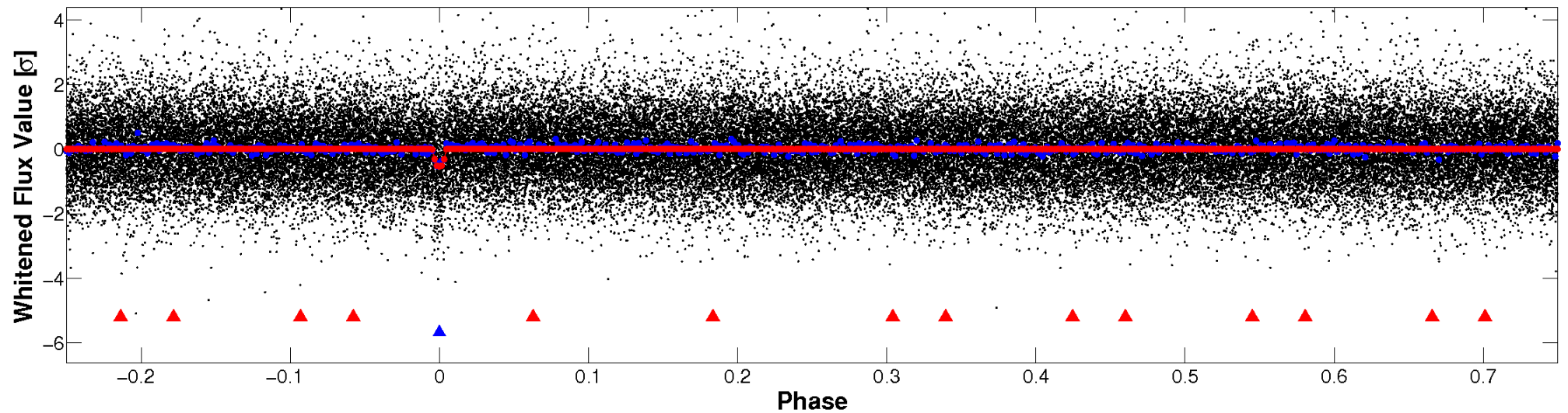


# Non-Whitened Vs. Whitened Light Curve

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

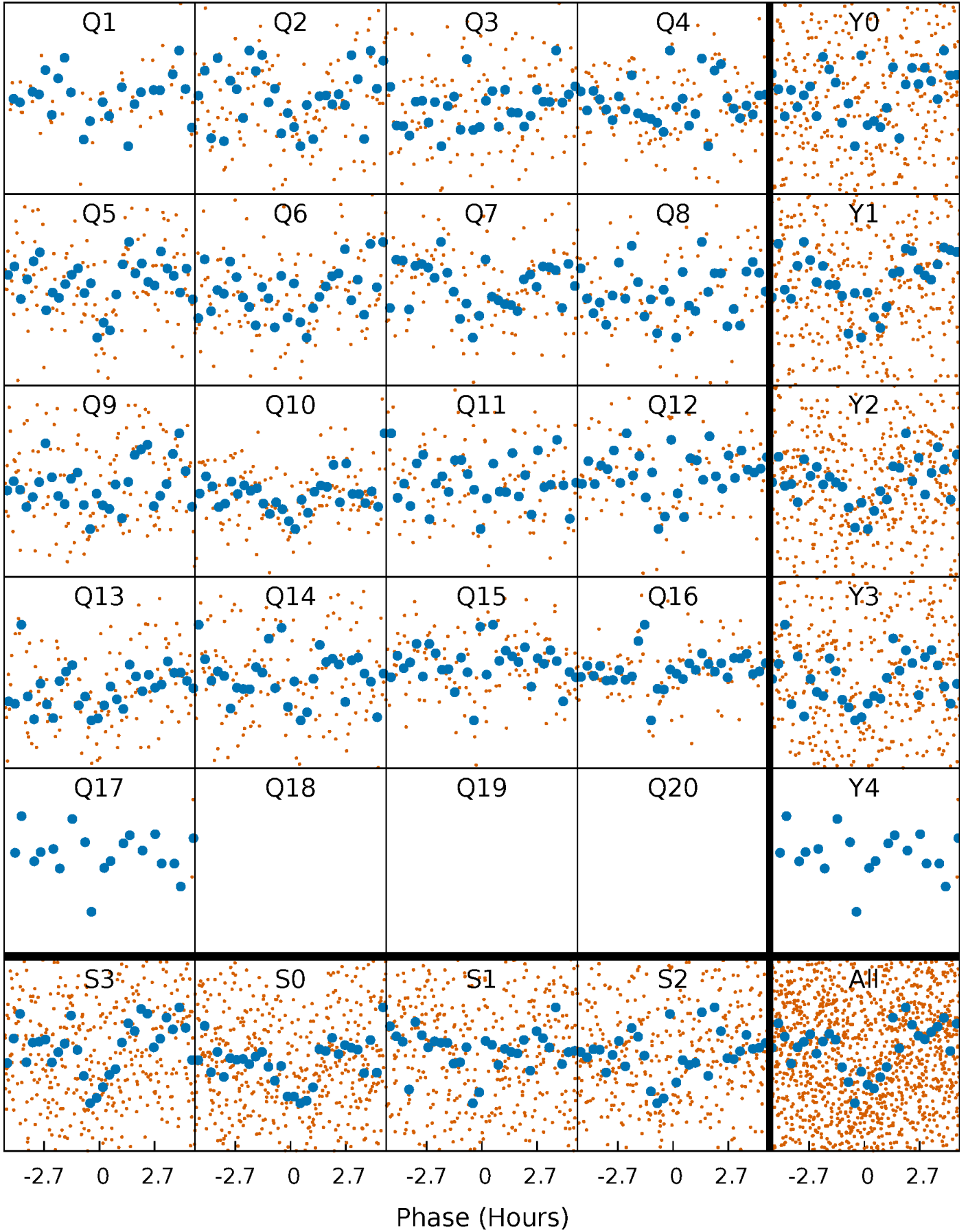


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



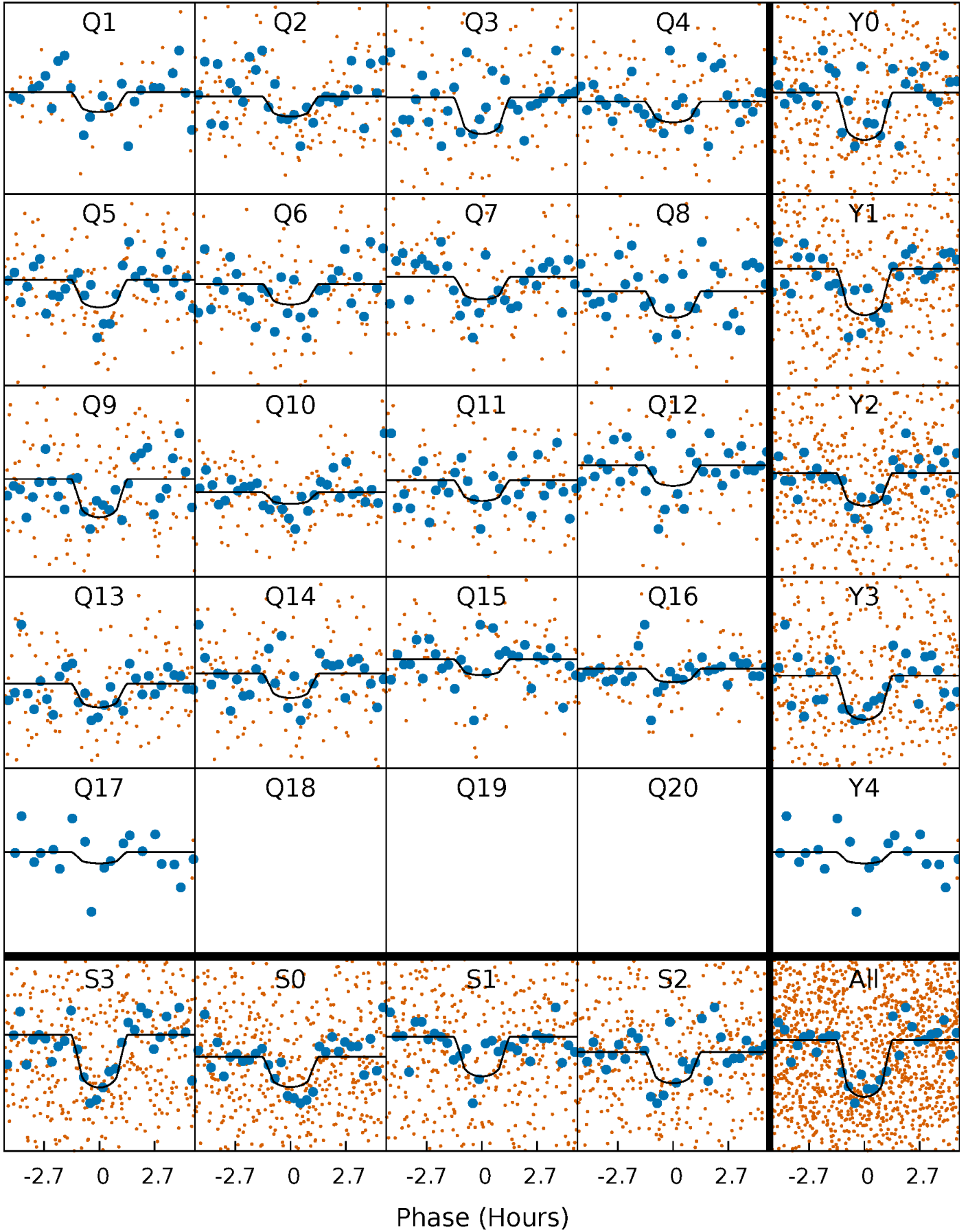
# PDC Quarter-Phased Transit Curves

TCE 002854181-02 P= 12.835025 Days  $T_0=134.366868$  (BKJD)



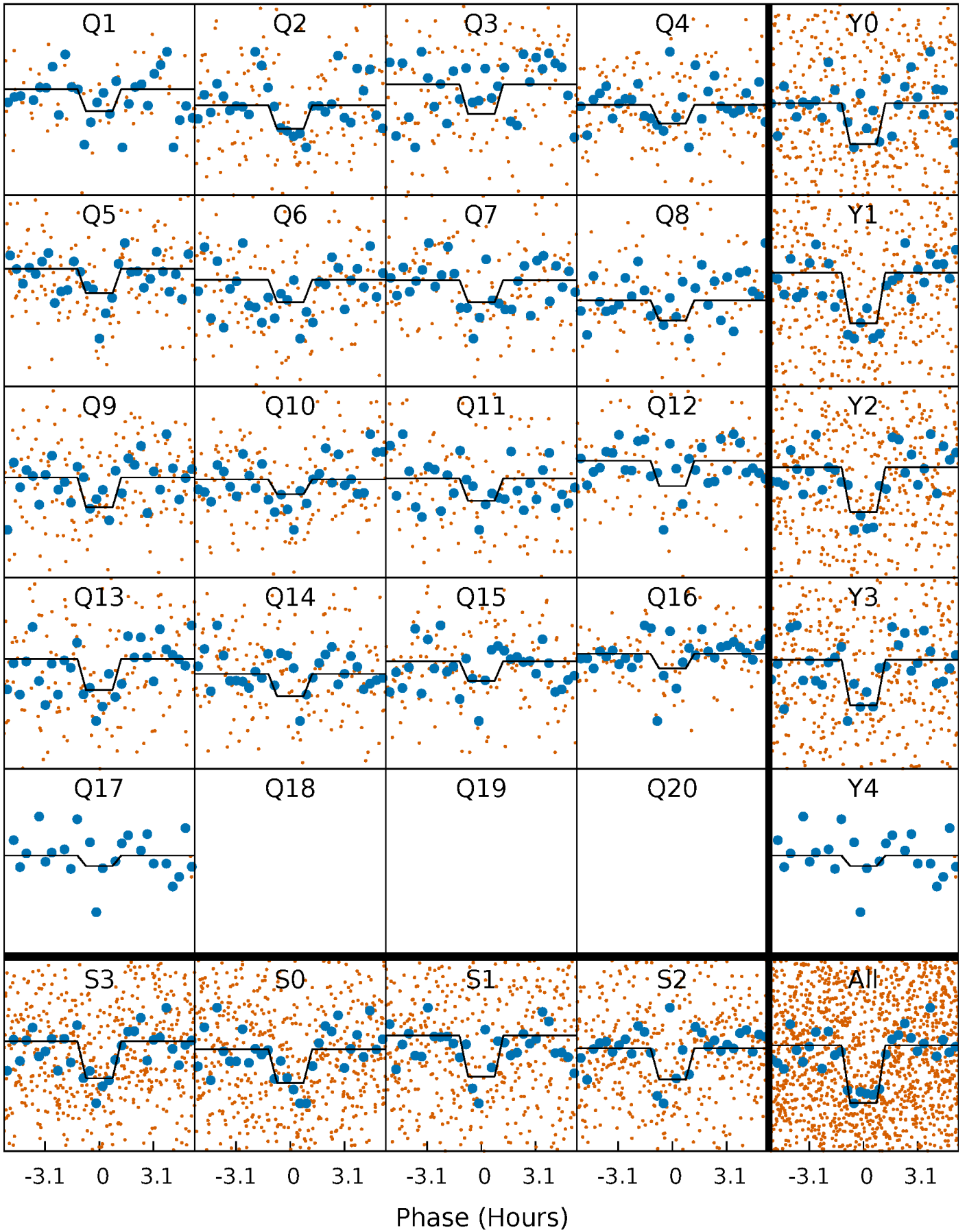
# DV Quarter-Phased Transit Curves

TCE 002854181-02 P= 12.835025 Days  $T_0=134.366868$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

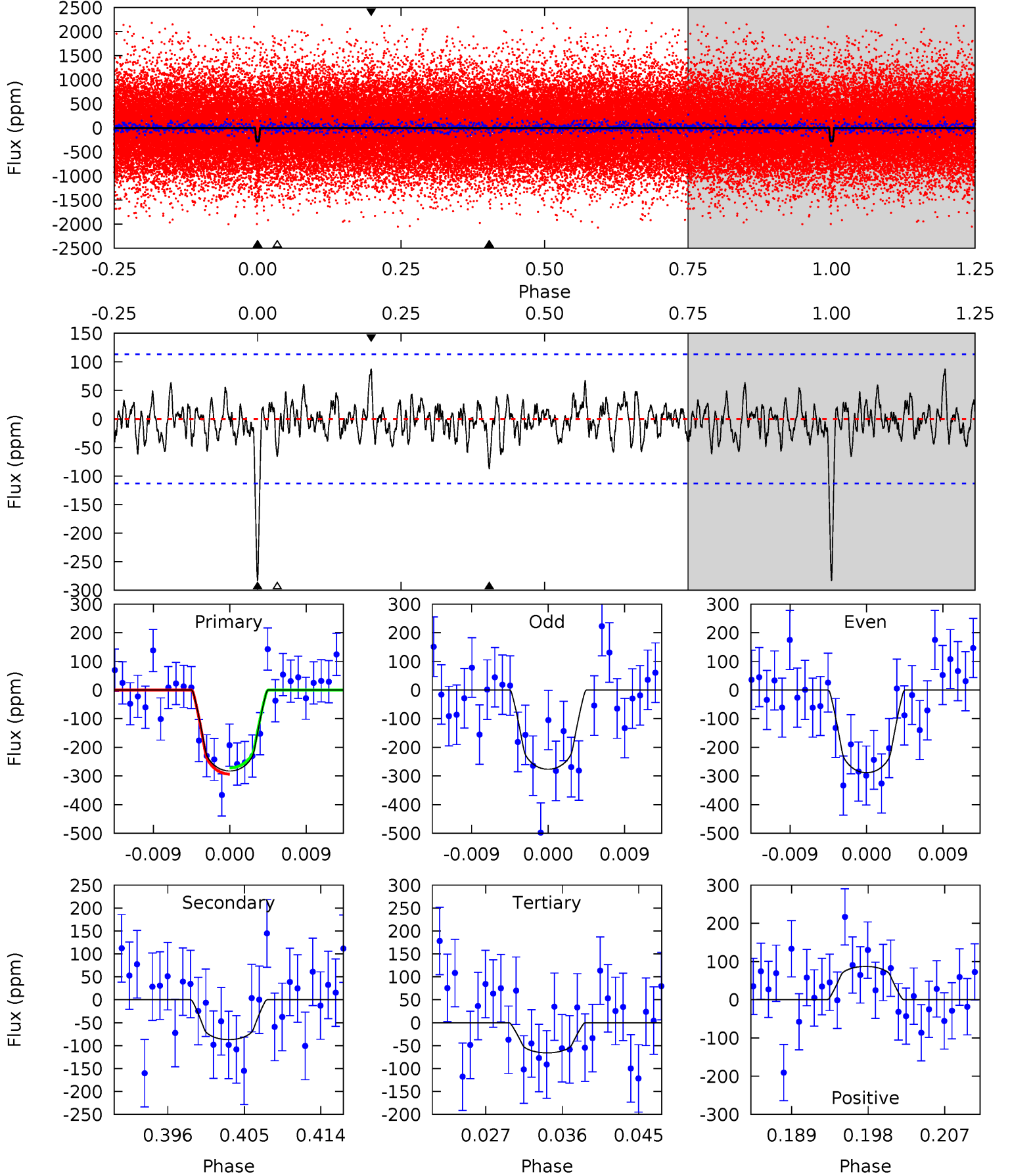
TCE 002854181-02 P= 12.834932 Days  $T_0=134.369558$  (BKJD)



# DV Model-Shift Uniqueness Test

002854181-02,  $P = 12.835025$  Days,  $E = 121.531843$  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
12.6	3.88	2.94	3.89	5.05	2.61	1.07	9.67	8.71	0.94	-0.01	0.27	0.93	0.24	0.48

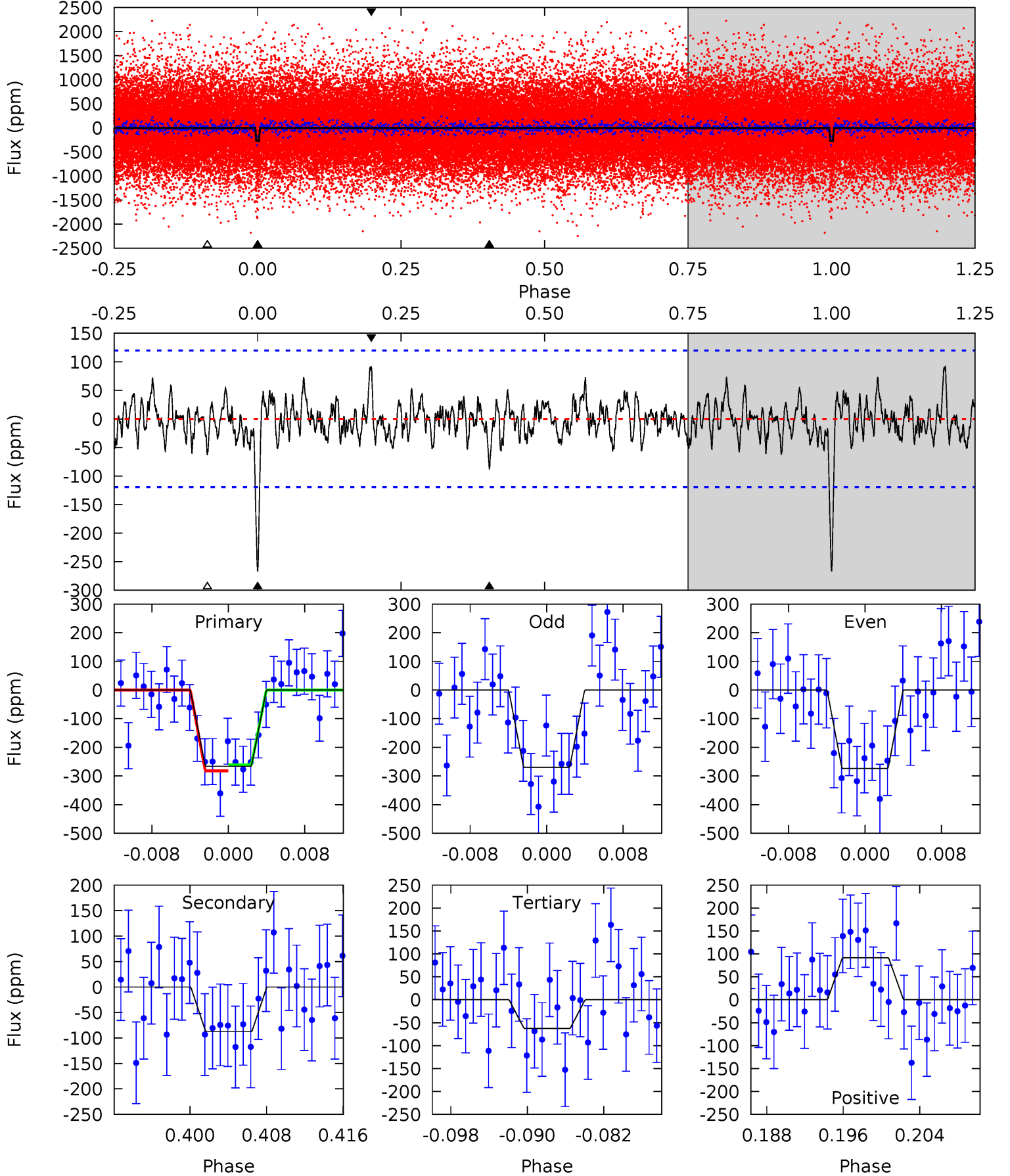




# Alt Model-Shift Uniqueness Test

002854181-02,  $P = 12.834932$  Days,  $E = 121.534626$  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
11.3	3.71	2.65	3.88	5.07	2.65	1.08	8.61	7.38	1.06	-0.18	0.09	1.00	0.26	0.44





### Stellar Parameters For KIC 002854181

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5492^{+82}_{-74}$	$4.389^{+0.105}_{-0.095}$	$0.160^{+0.150}_{-0.150}$	$1.016^{+0.131}_{-0.108}$	$0.921^{+0.057}_{-0.042}$	$1.238^{+0.530}_{-0.371}$
	+1%/-1%	+2%/-2%	+94%/-94%	+13%/-11%	+6%/-5%	+43%/-30%
Source	SPE90	SPE90	SPE90	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 002854181-02 / KOI 2232.02

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-87 \pm 22$	$2.46^{+2.11}_{-1.61}$	$1055^{+41}_{-38}$	$3860^{+2133}_{-682}$	$84^{+616}_{-60}$
Alt.	$-88 \pm 24$	$2.36^{+2.03}_{-1.54}$	$1053^{+38}_{-34}$	$3952^{+2279}_{-748}$	$91^{+735}_{-64}$

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

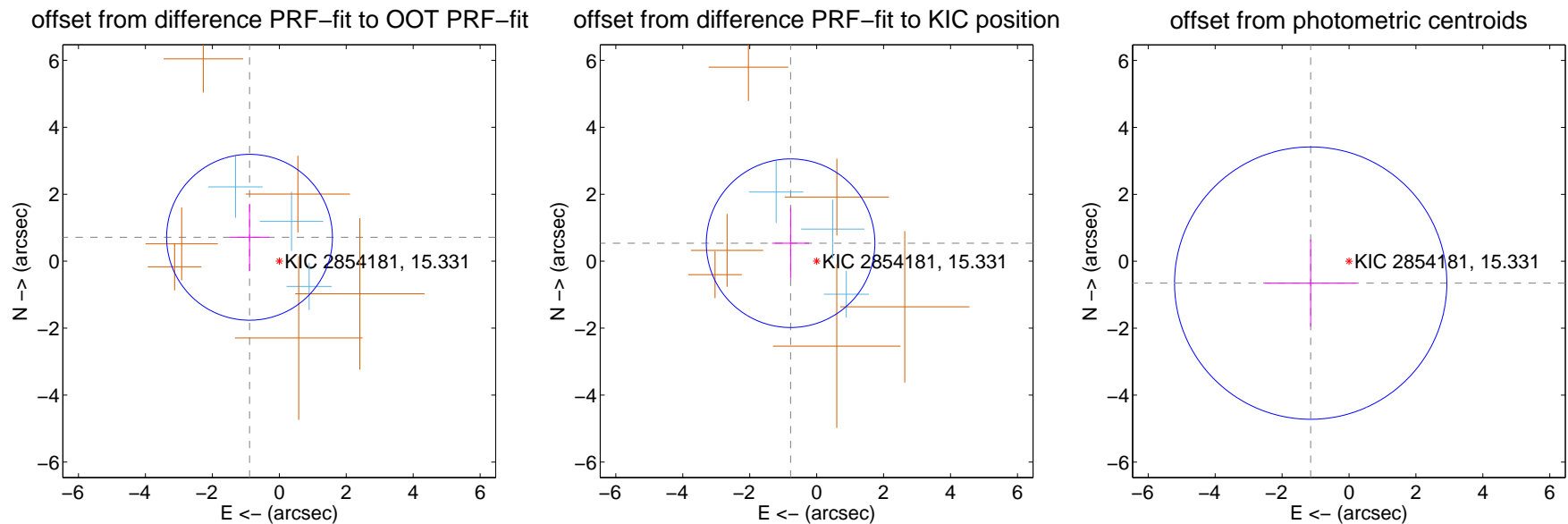
## DV Centroid Data

Supplemental centroid analysis for 002854181-02. Kepler magnitude: 15.33. Transit SNR 9.77

There are 3 quarters with good PRF difference image offsets

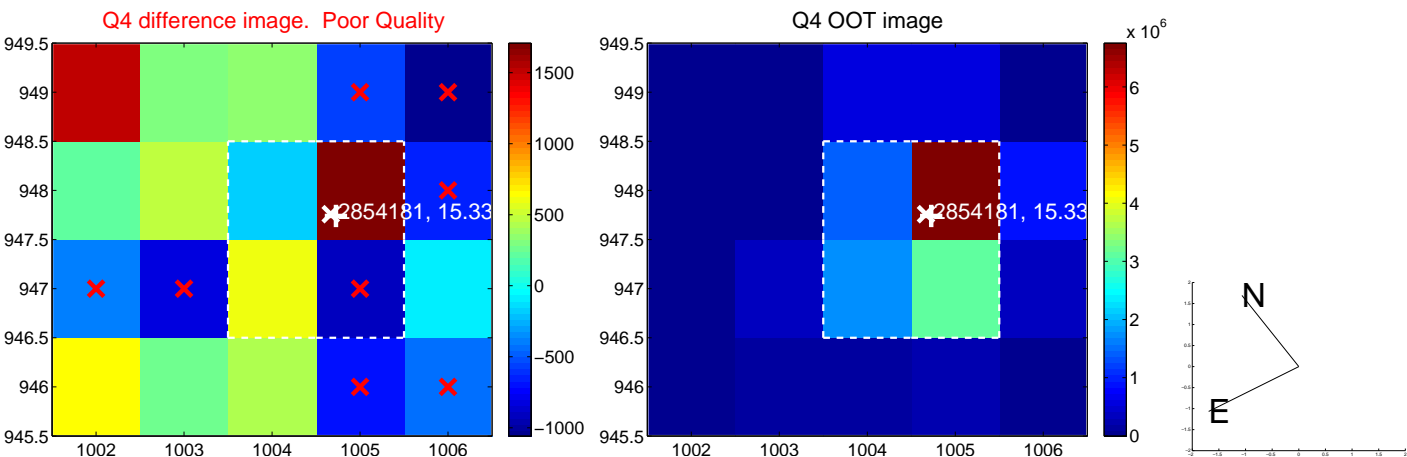
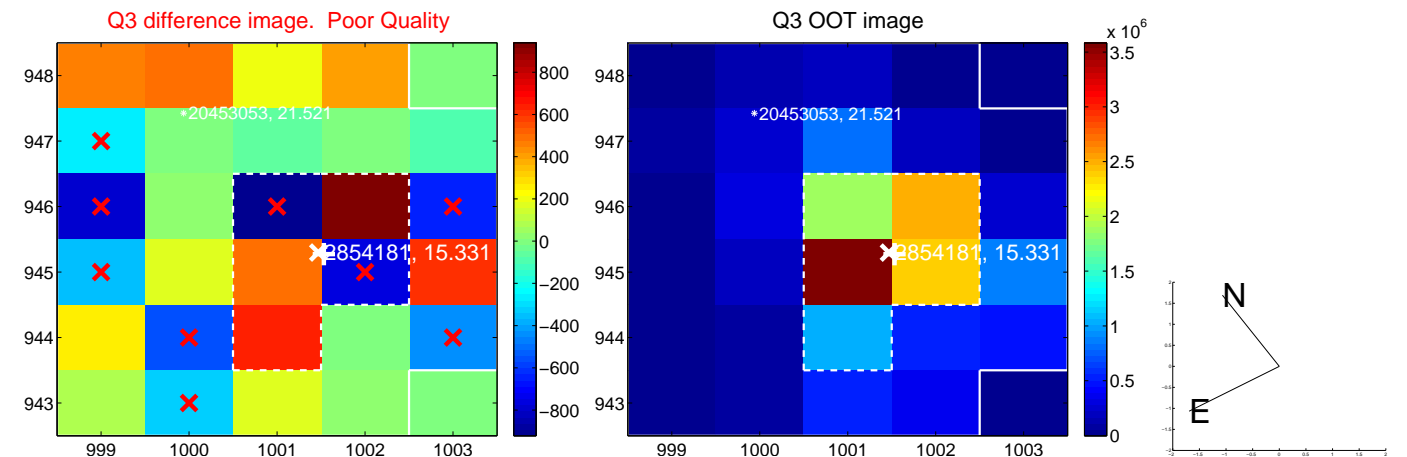
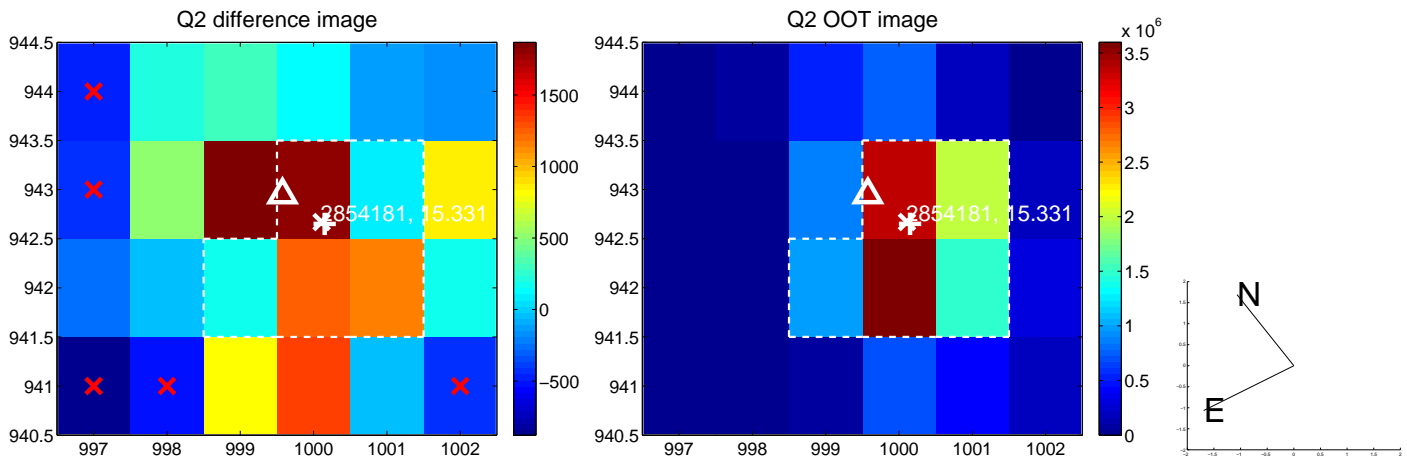
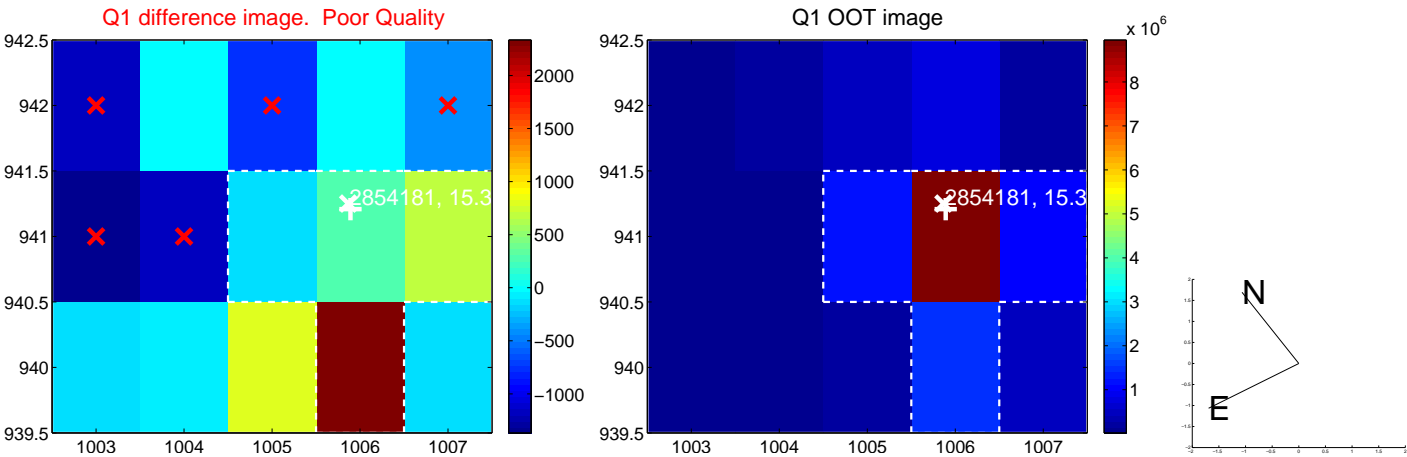
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.141 \pm 0.826$	1.38	$0.889 \pm 0.586$	$0.715 \pm 1.003$
PRF-fit source offset from KIC position	$0.946 \pm 0.839$	1.13	$0.779 \pm 0.554$	$0.537 \pm 1.054$
photometric centroid source offset	$1.32 \pm 1.36$	0.97	$1.15 \pm 1.37$	$-0.65 \pm 1.30$

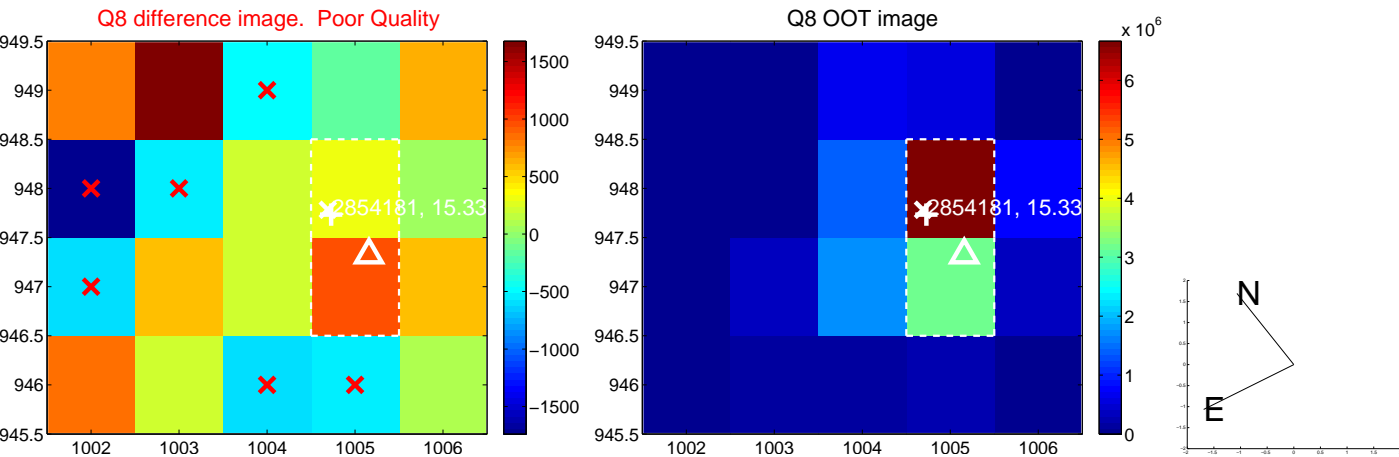
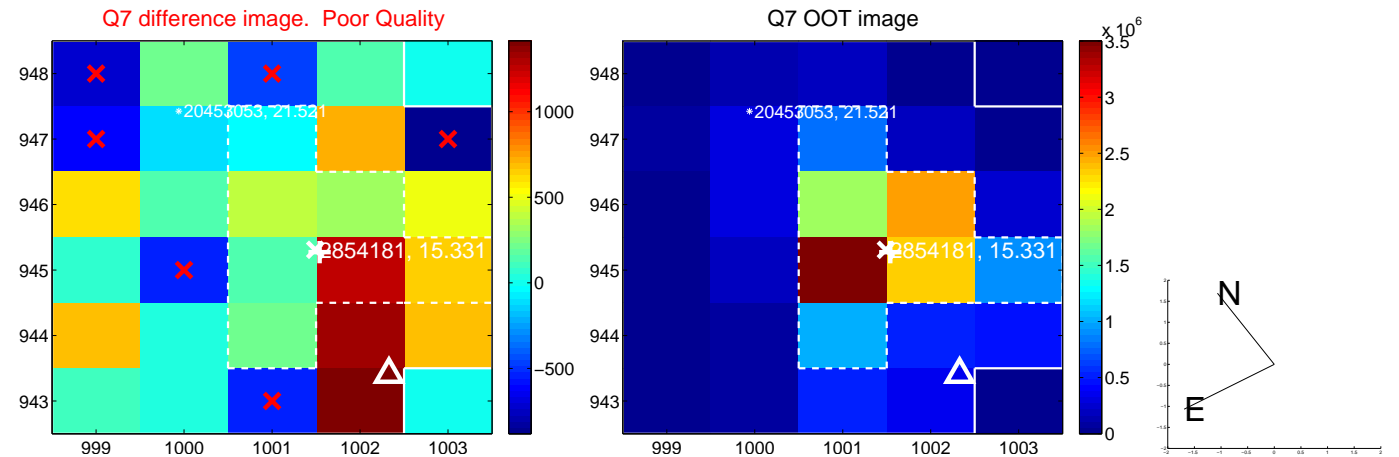
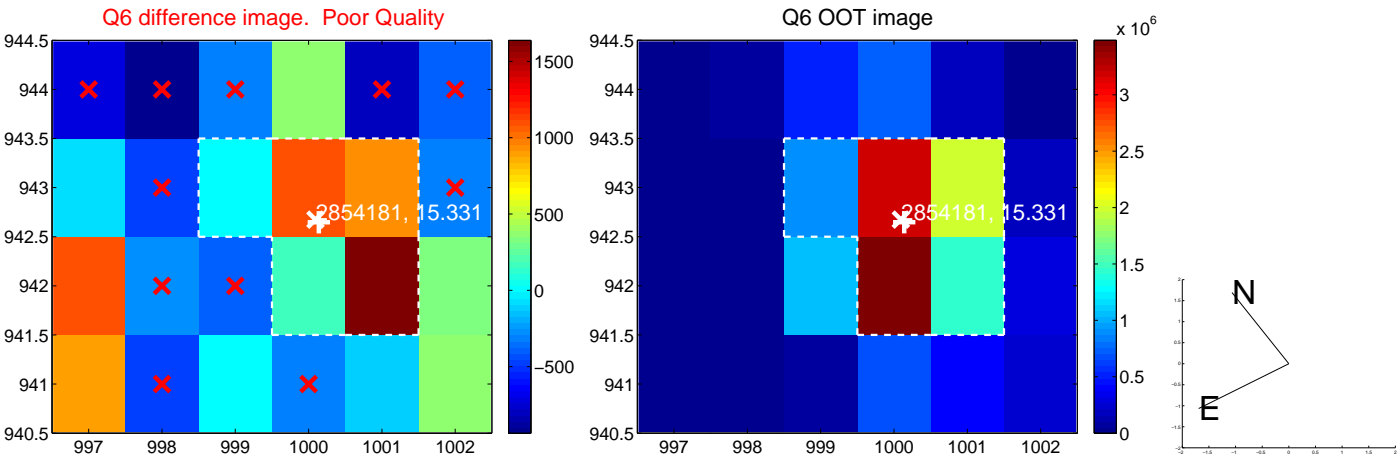
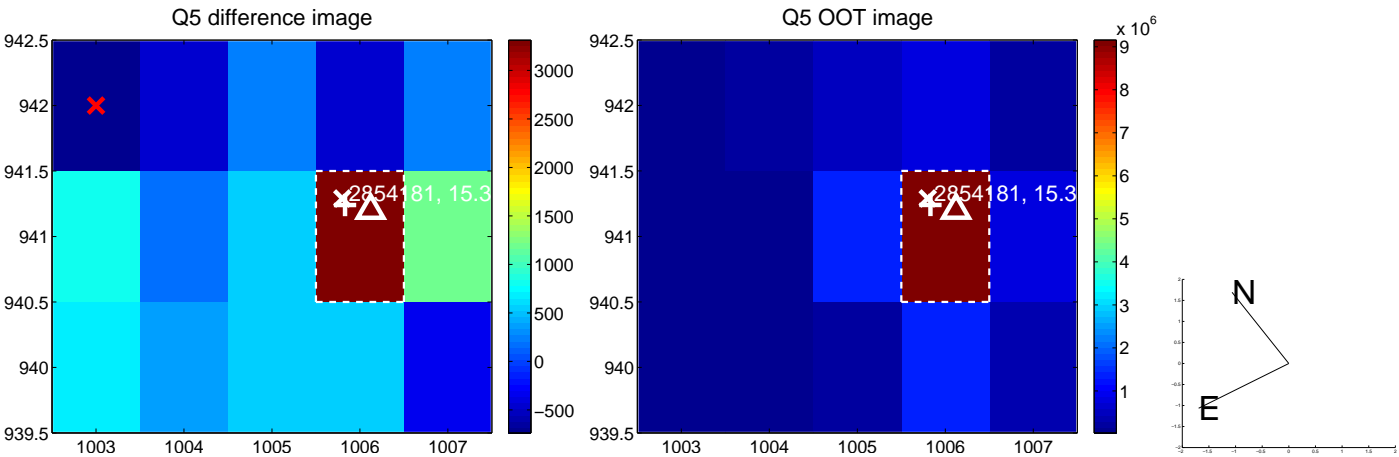


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

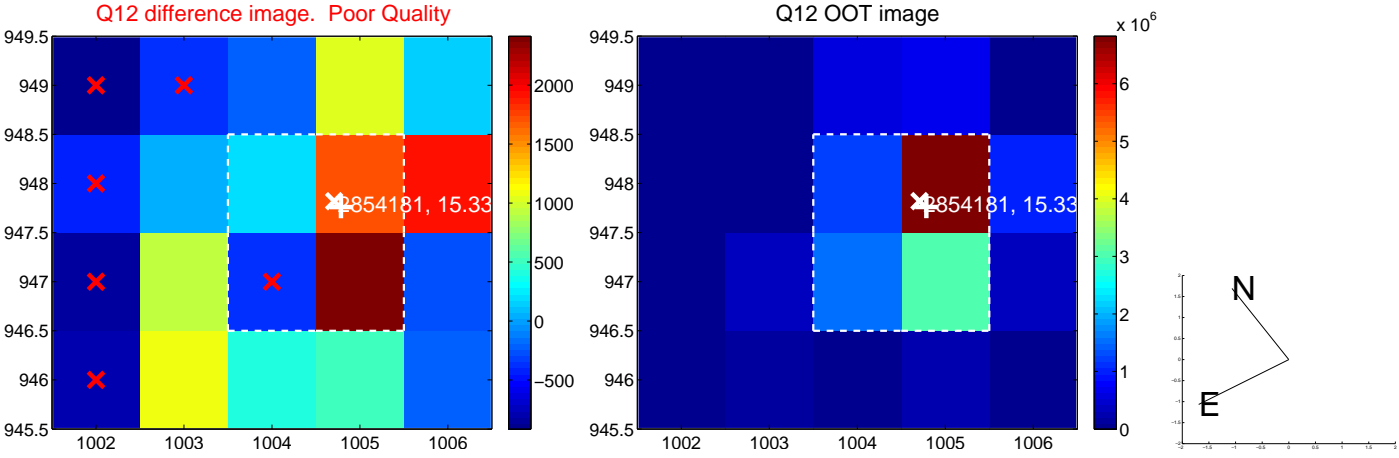
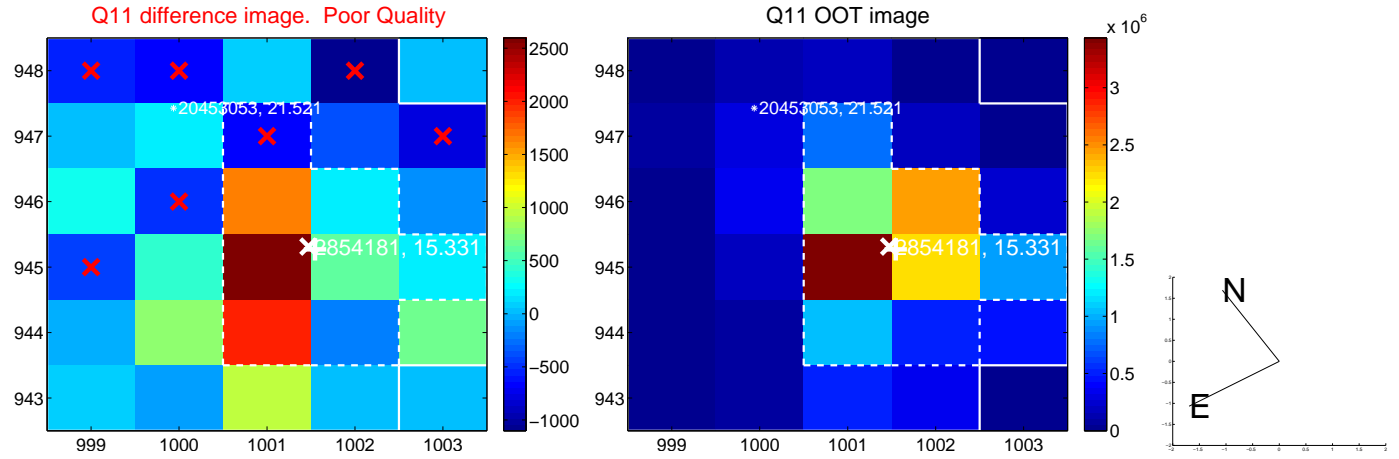
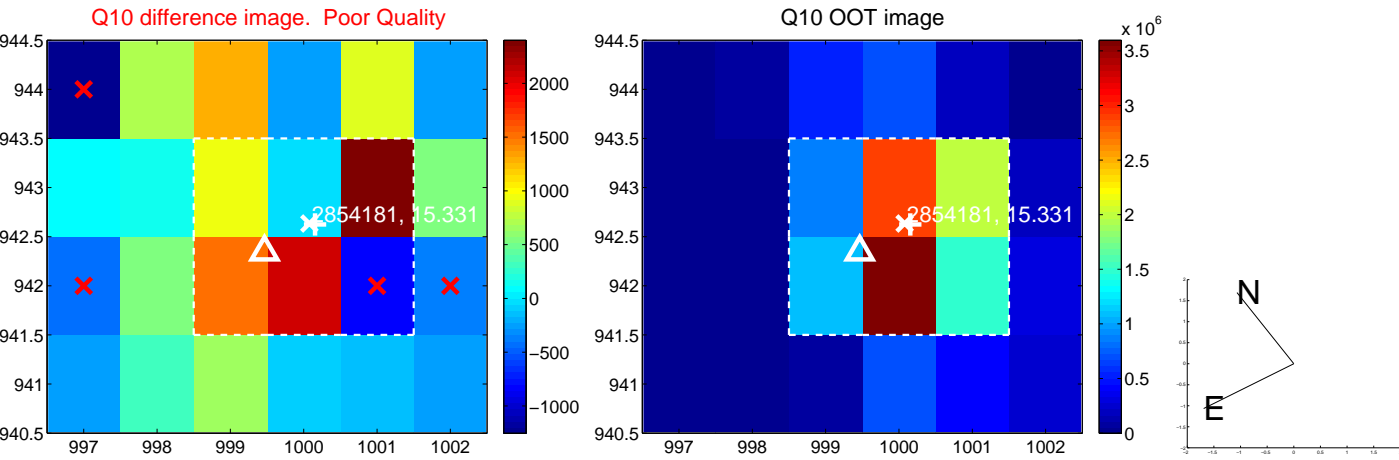
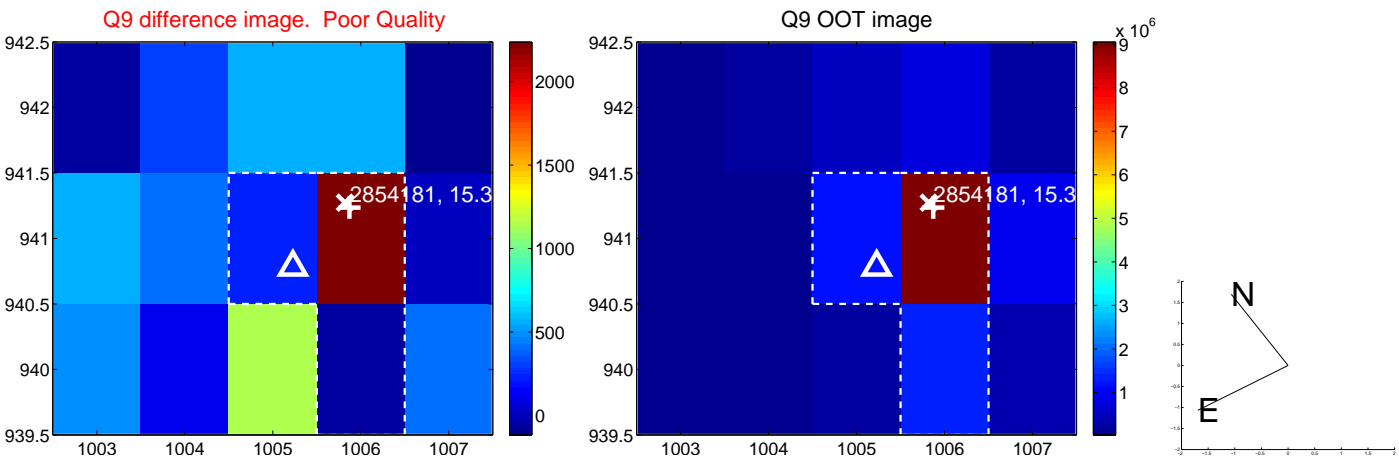
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



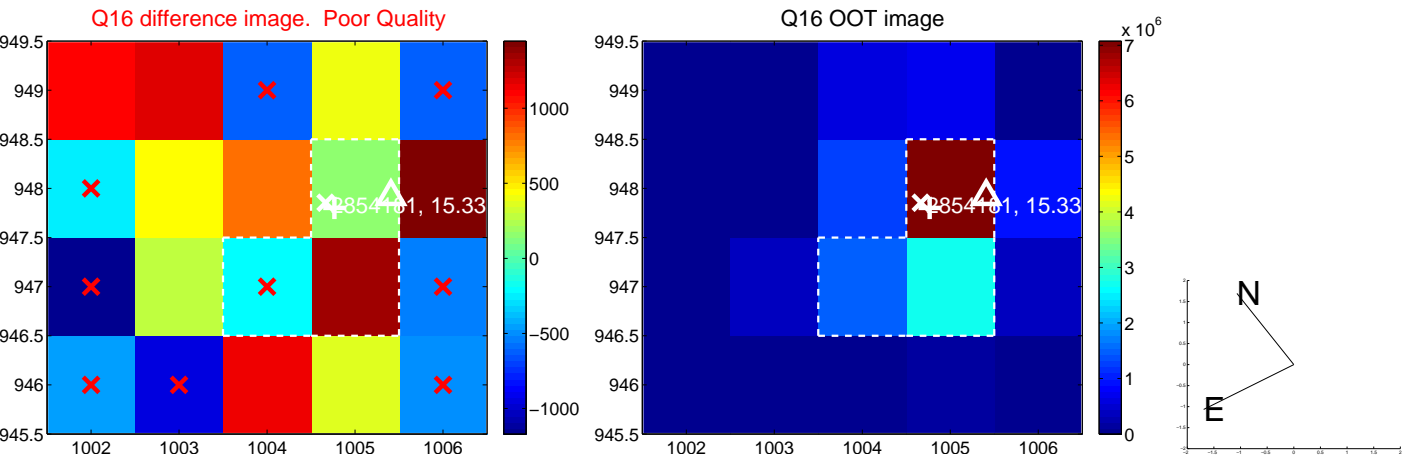
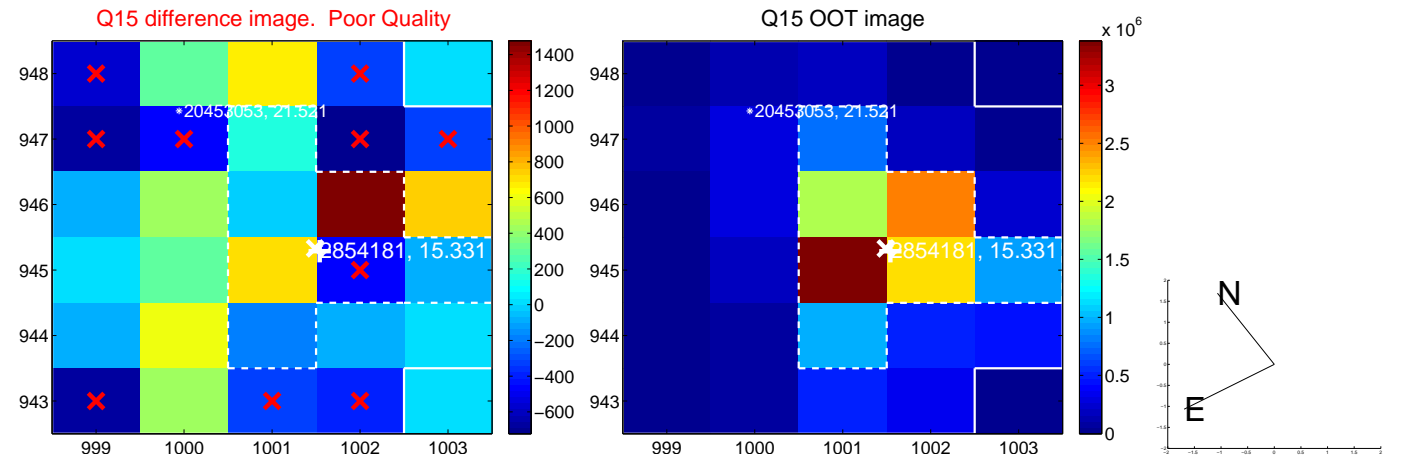
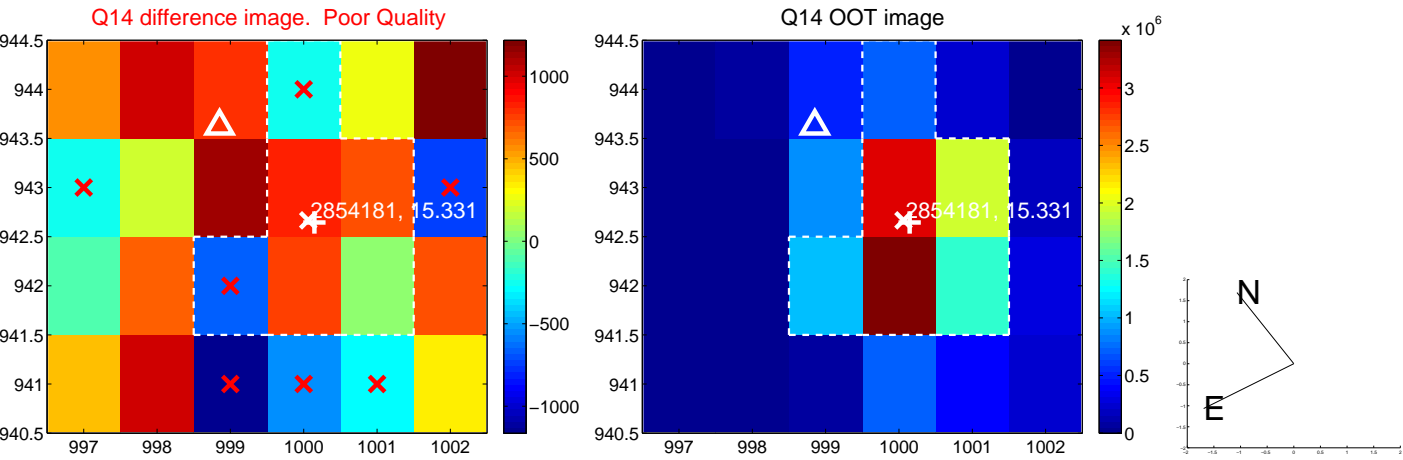
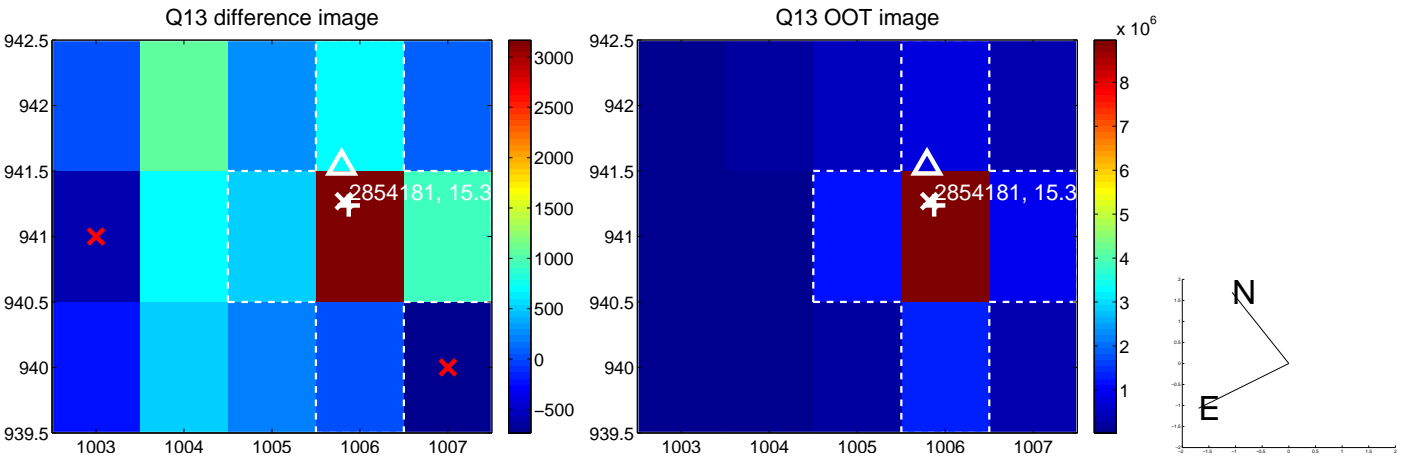
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



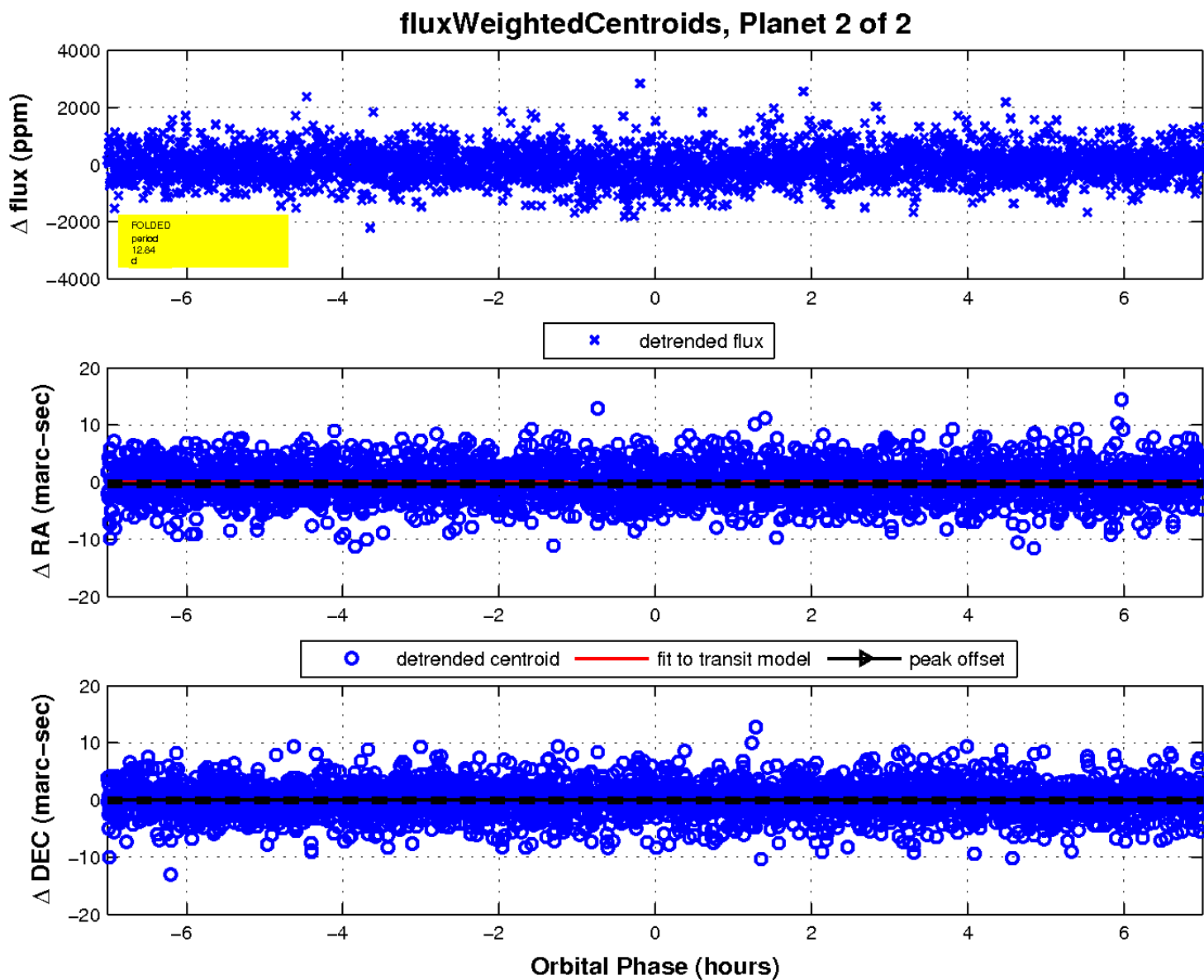
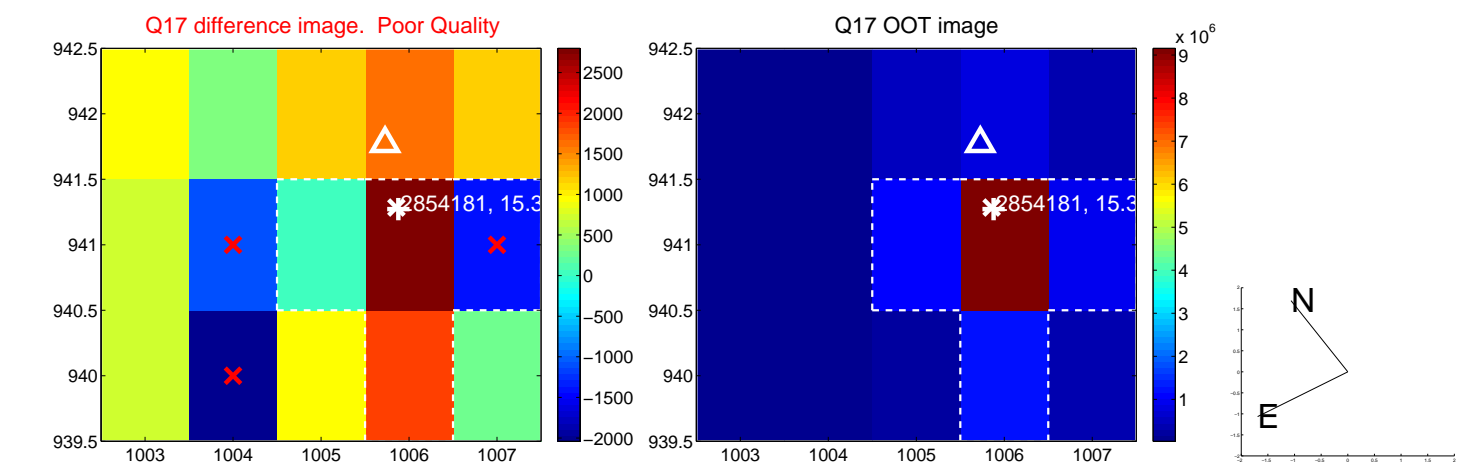
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

