

# KIC 010467815

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010467815-01	OBS	No	402.558470	446.139475	127.0	6.761	14.3	6.9	3.22	9030	4.11	29.35
010467815-02	OBS	3191.02	371.230486	458.599290	138.6	17.368	9.7	8.3	3.22	9030	3.92	32.70
010467815-03	OBS	No	368.909232	457.615781	145.9	7.572	7.9	7.1	3.22	9030	4.33	32.97
010467815-04	OBS	No	350.086426	171.236624	125.3	10.665	7.6	8.5	3.22	9030	4.48	35.36

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010467815-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
010467815-02	OBS	PC	0.60	0	0	0	0	CENT_SATURATED
010467815-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
010467815-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—CENT_SATURATED

**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.

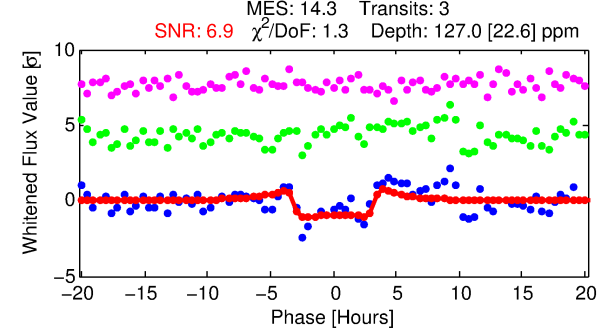
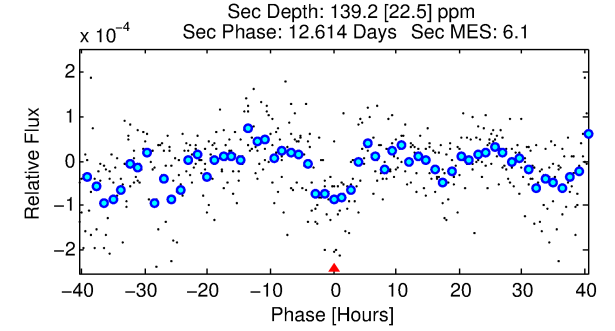
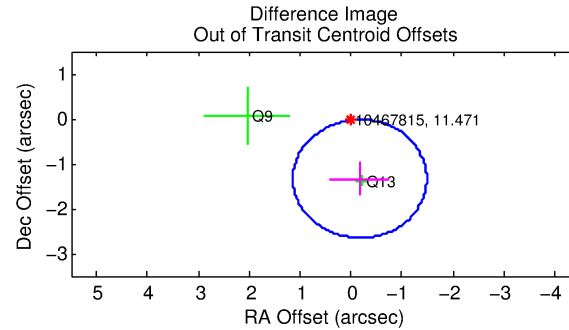
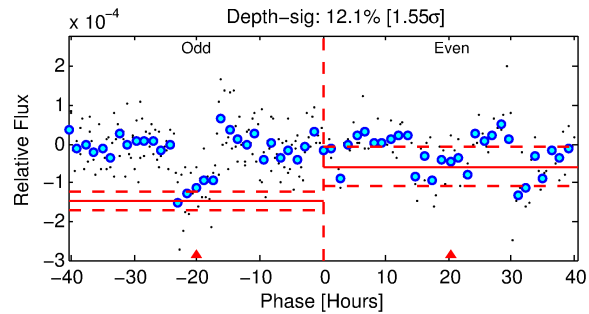
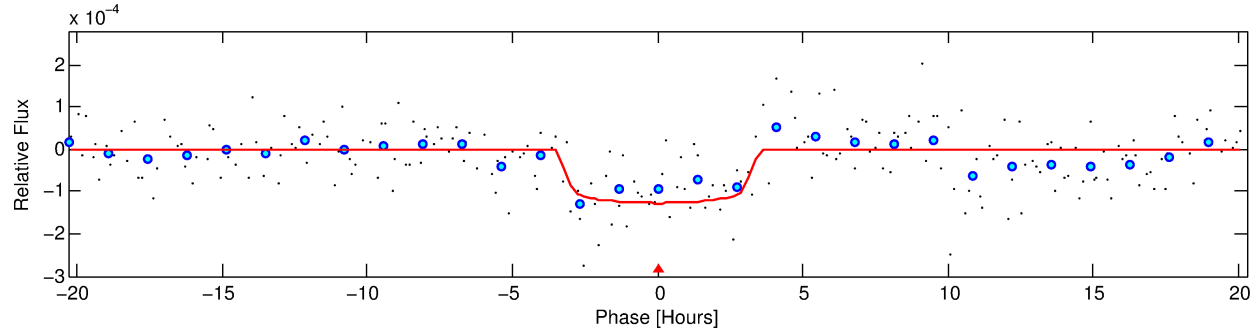
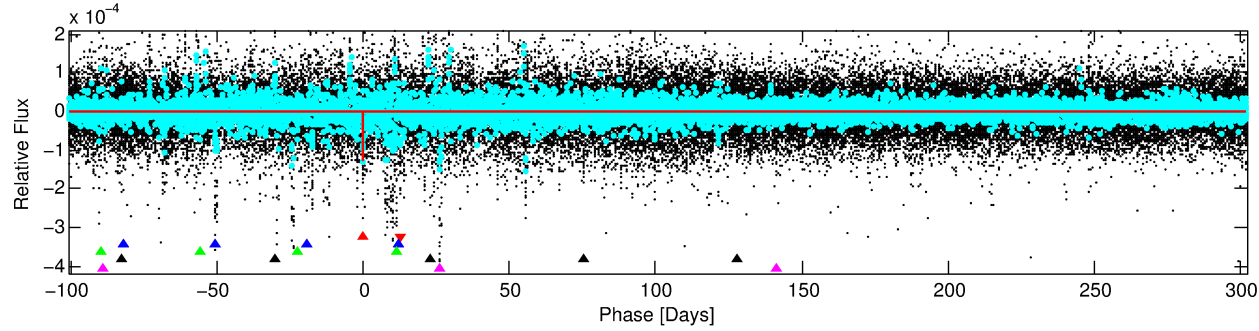
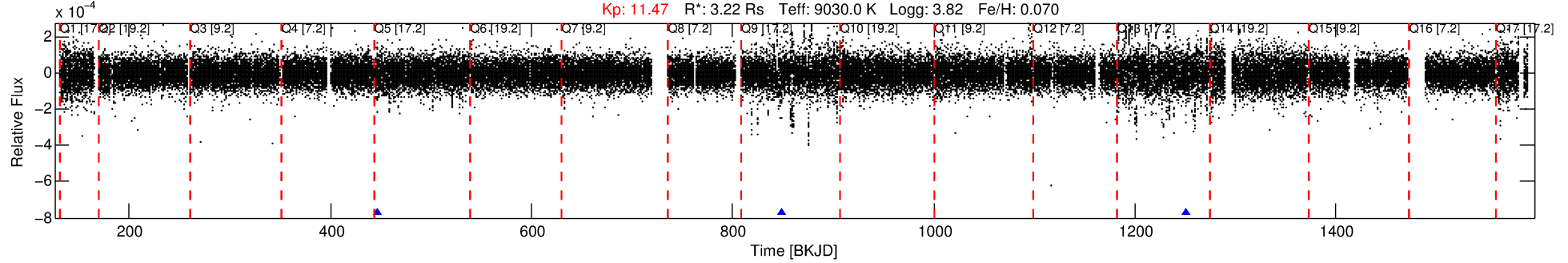
Ephemeris Match Information For 010467815-01

No Significant Match Found

# DV One-Page Summary

KIC: 10467815 Candidate: 1 of 5 Period: 402.558 d  
KOI: K03191 Corr: No Ephemeris Match

Kp: 11.47 R\*: 3.22 Rs Teff: 9030.0 K Logg: 3.82 Fe/H: 0.070



## DV Fit Results:

Period = 402.55847 [0.00806] d  
Epoch = 446.1395 [0.0099] BKJD  
Rp/R\* = 0.0117 [0.0034]  
a/R\* = 235.38 [456.02]  
b = 0.87 [0.55]  
Seff = 29.35 [19.14]  
Teq = 594 [97] K  
Rp = 4.11 [2.23] Re  
a = 1.4498 [0.5886] AU  
Ag = 9535.86 [8282.76] [1.15σ]  
Teffp = 9068 [1460] K [5.79σ]

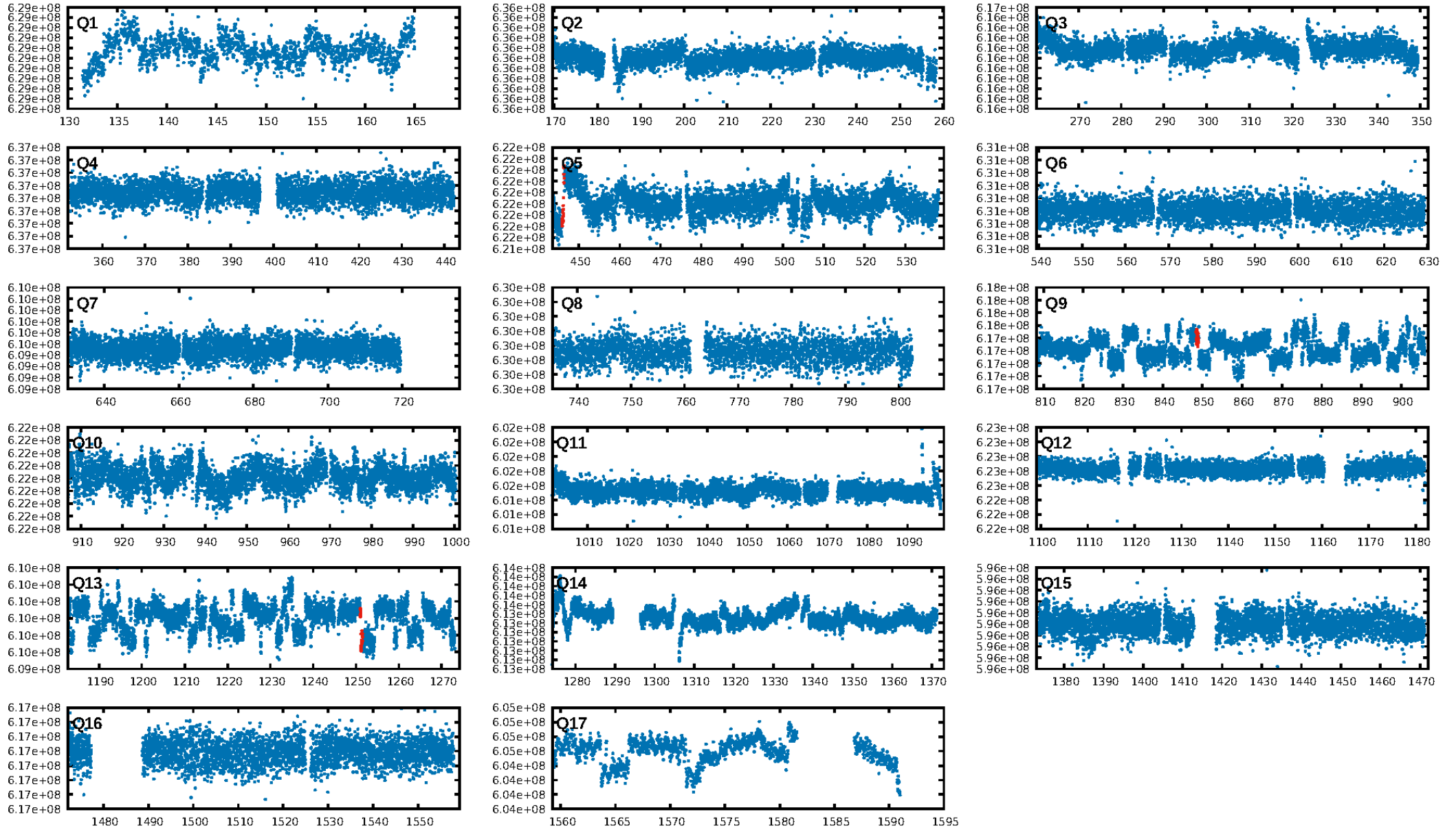
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [40.34σ]  
LongPeriod-sig: 100.0% [359.58σ]  
ModelChiSquare2-sig: 1.1%  
ModelChiSquareGof-sig: 72.0%  
Bootstrap-pfa: 1.01e-19  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 2.358  
Centroid-sig: 50.9%  
Centroid-so: 0.687 arcsec [0.50σ]  
OotOffset-rm: 1.347 arcsec [3.07σ]  
KicOffset-rm: 1.197 arcsec [3.04σ]  
OotOffset-st: 0/0/0/2 [2]  
KicOffset-st: 0/0/0/2 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [3/3]

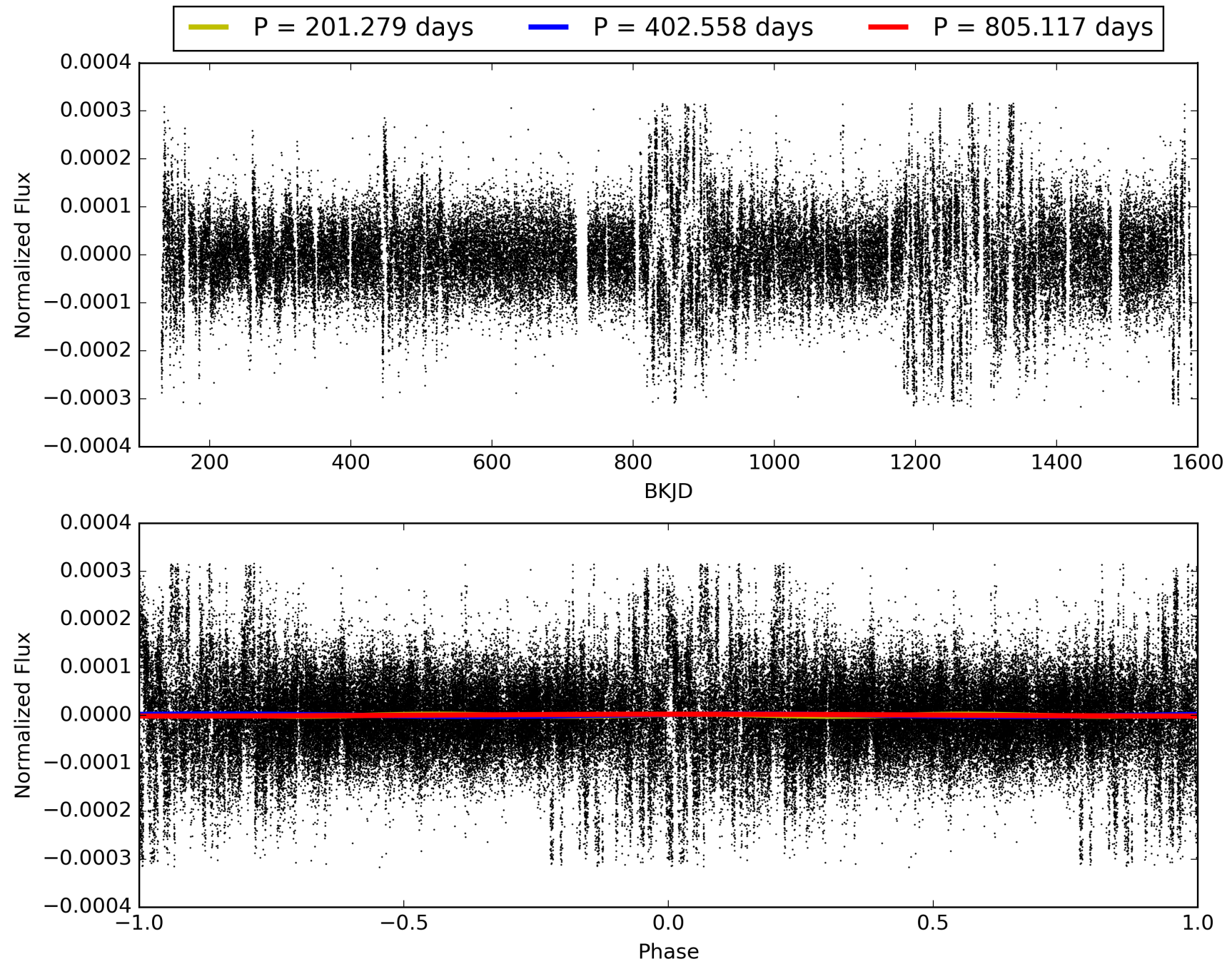
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 22:05:26 Z

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

# TCE 010467815-01, PDC Light Curves



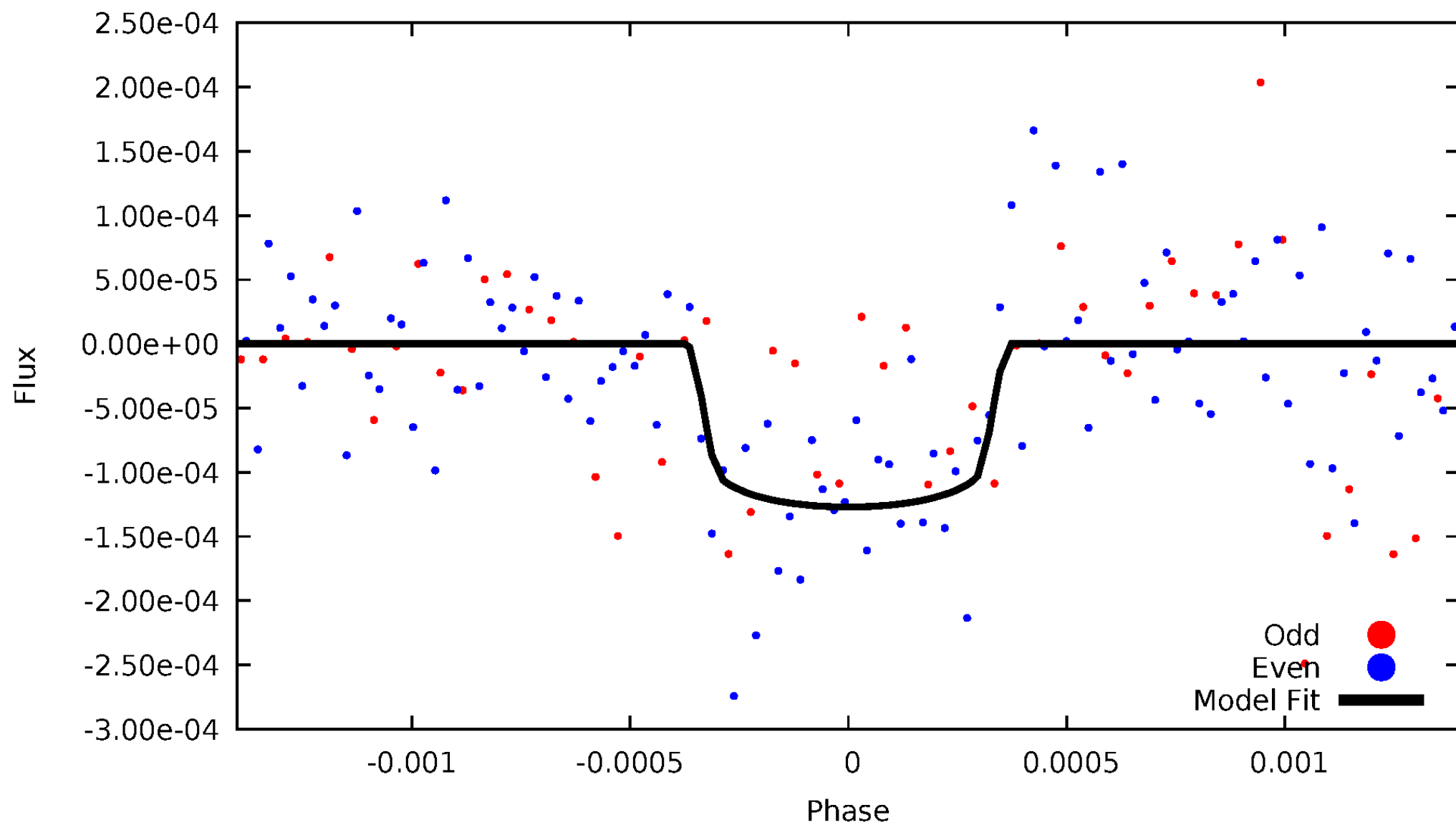
# TCE 010467815-01





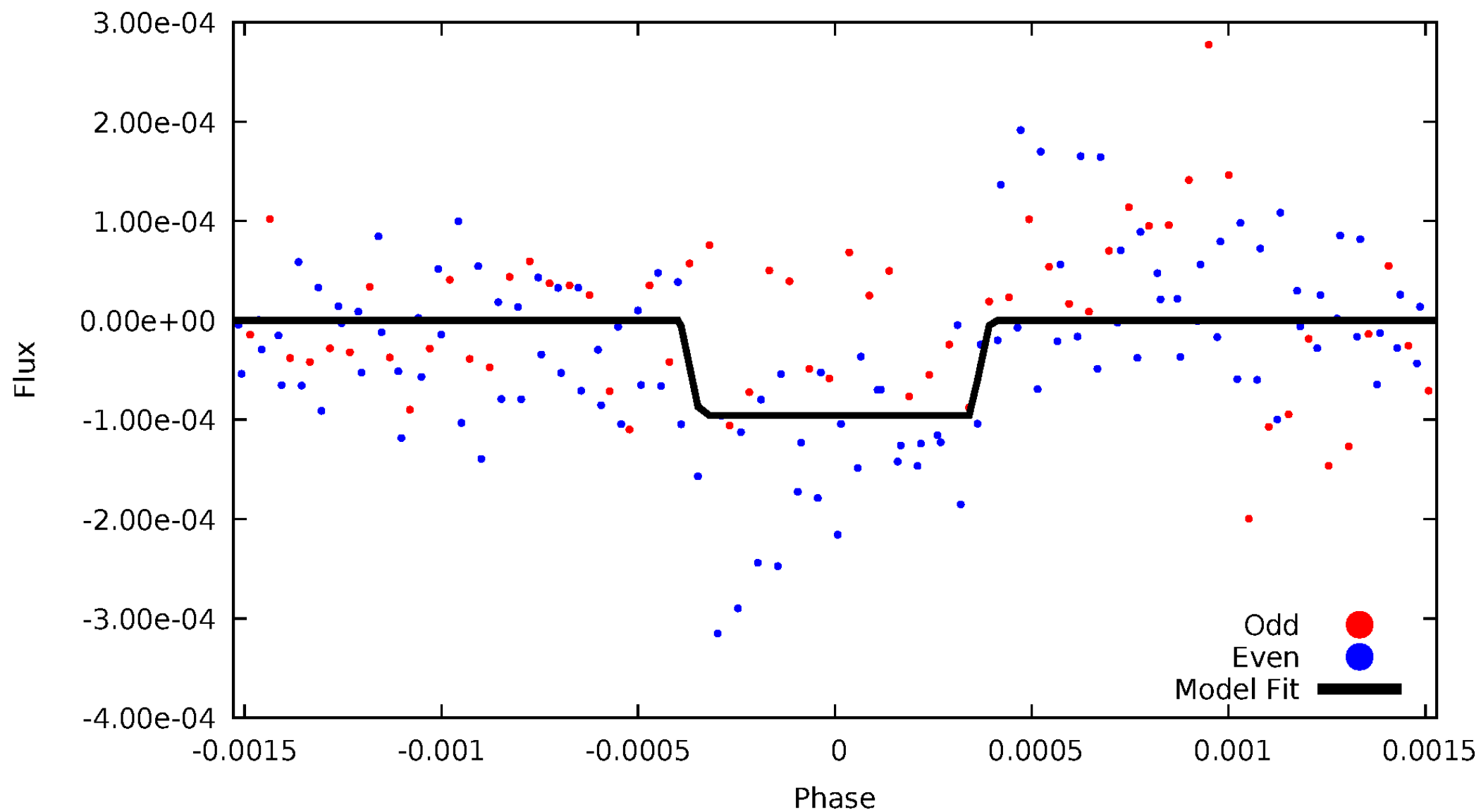
# DV Odd/Even

TCE 010467815-01



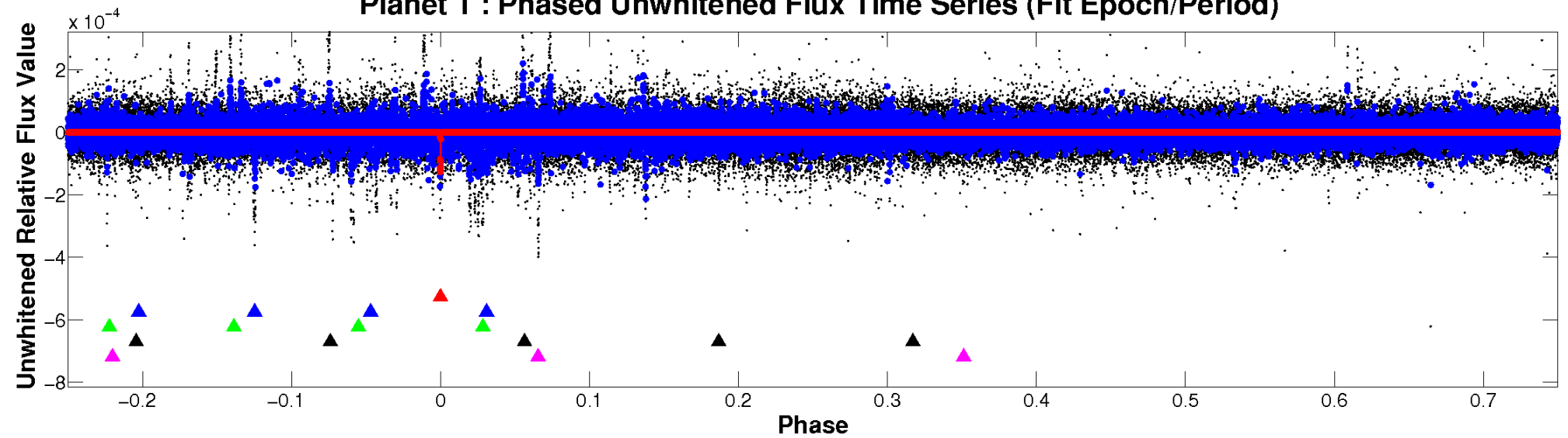
# ALT Odd/Even

TCE 010467815-01

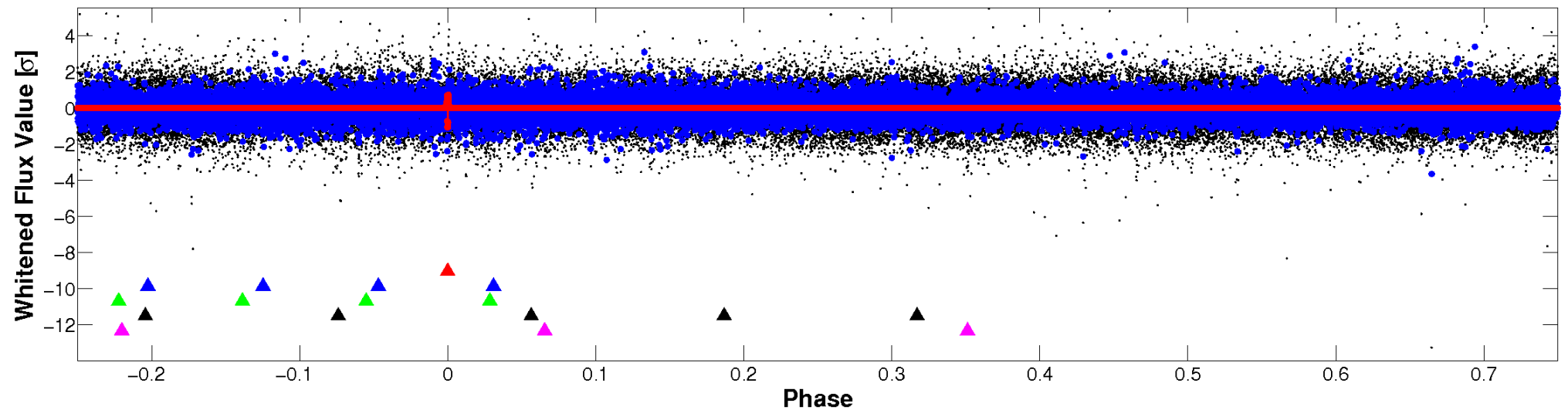


# Non-Whitened Vs. Whitened Light Curve

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

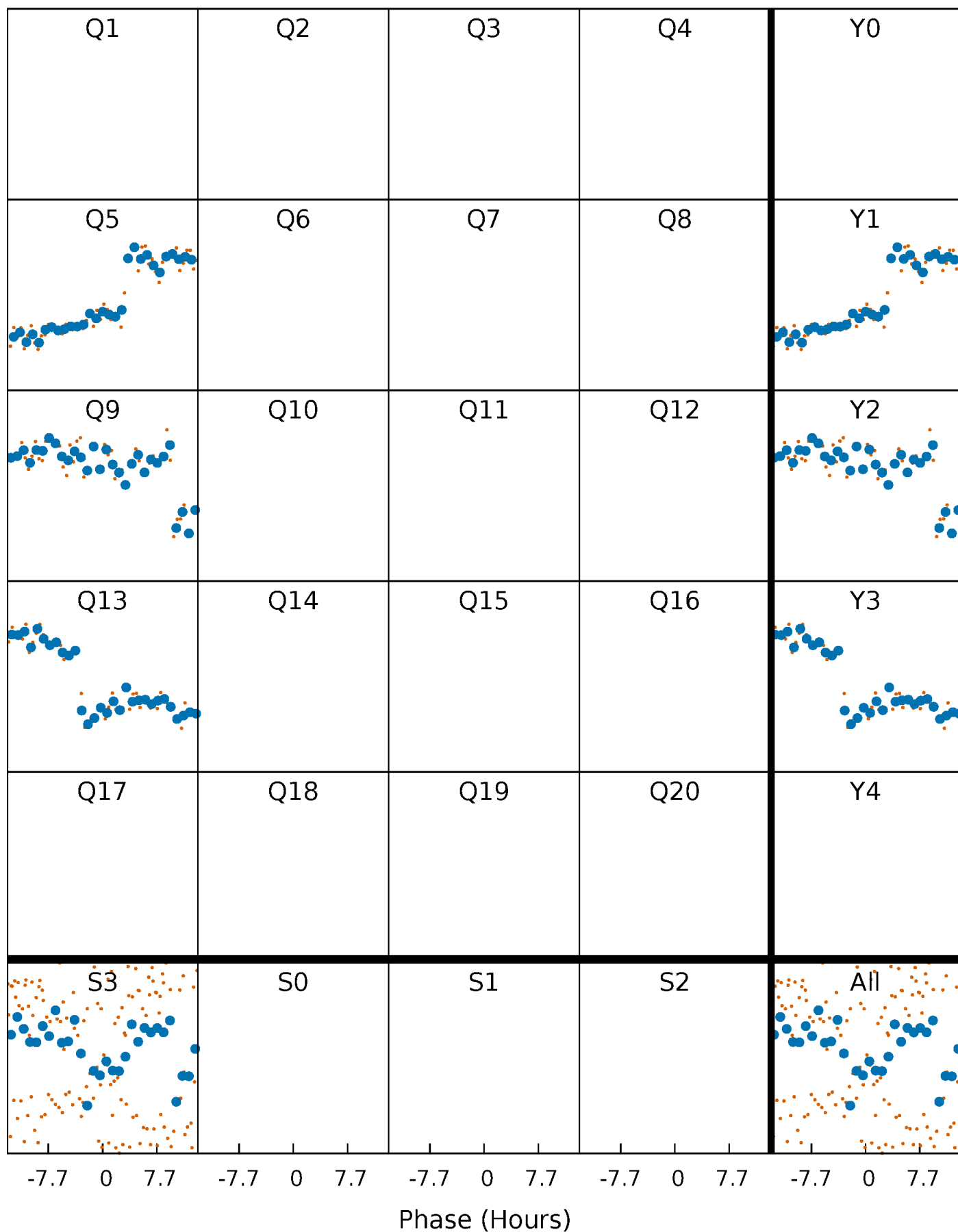


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



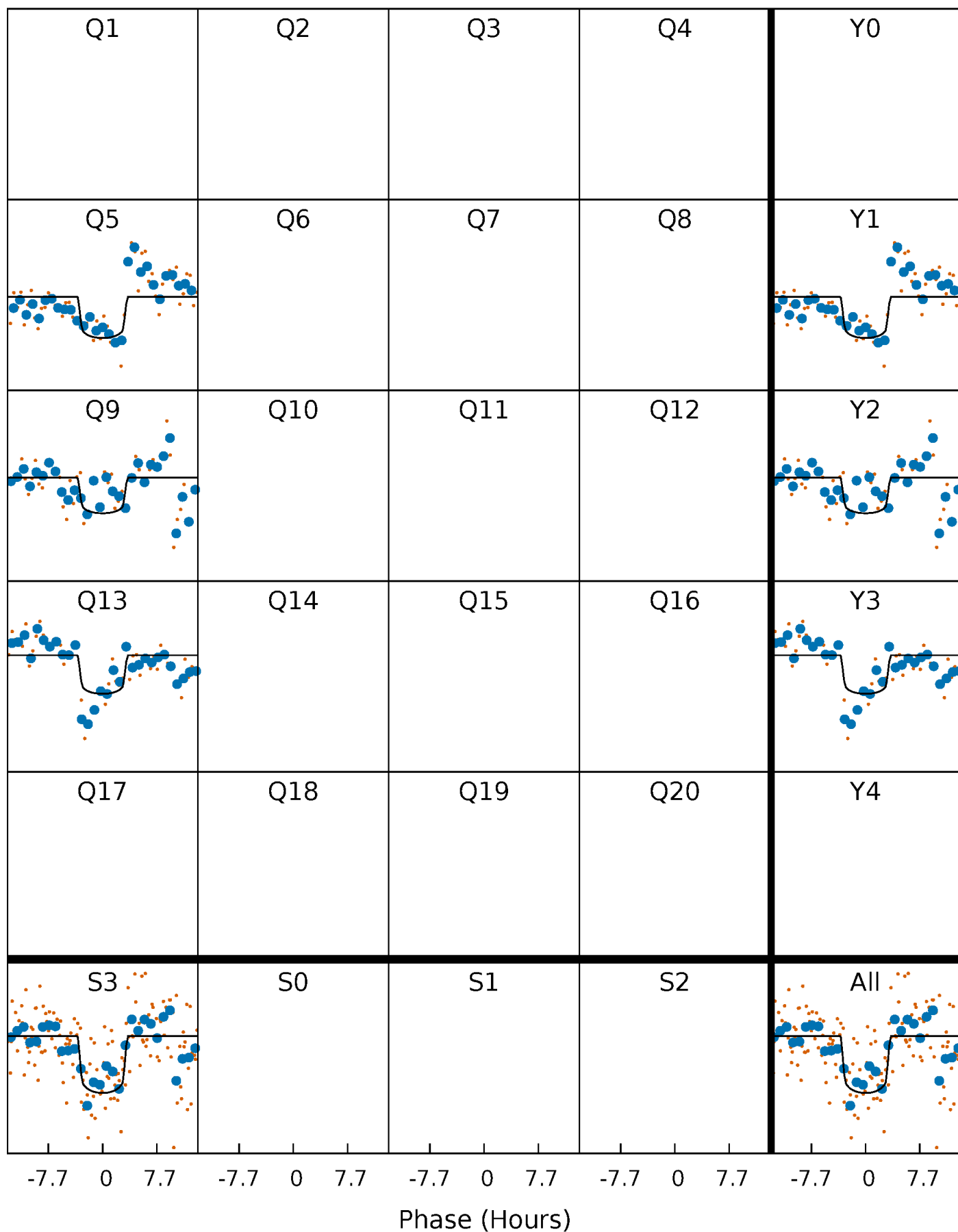
# PDC Quarter-Phased Transit Curves

TCE 010467815-01     $P=402.558470$  Days     $T_0=446.139476$  (BKJD)



# DV Quarter-Phased Transit Curves

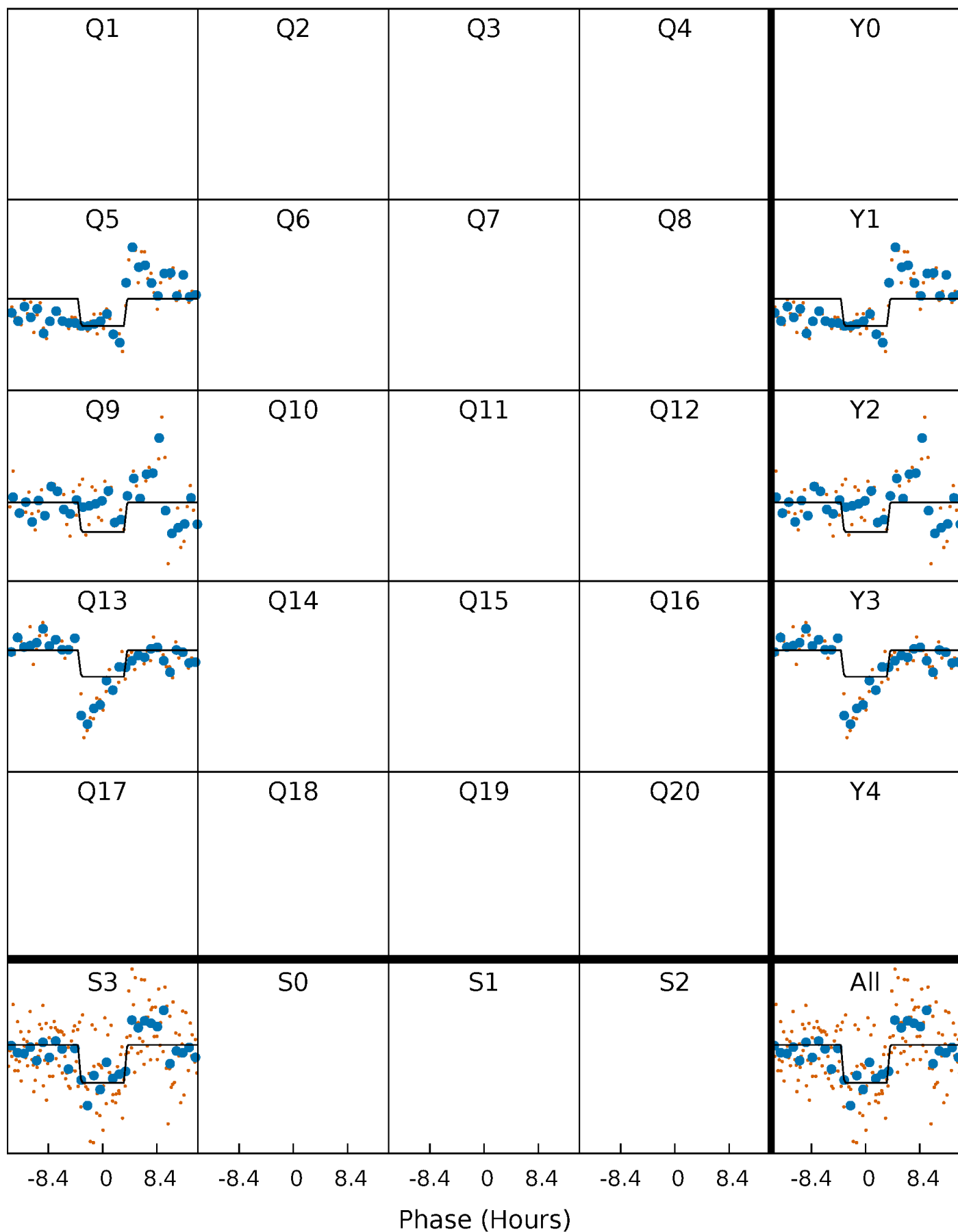
TCE 010467815-01 P=402.558470 Days  $T_0=446.139476$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

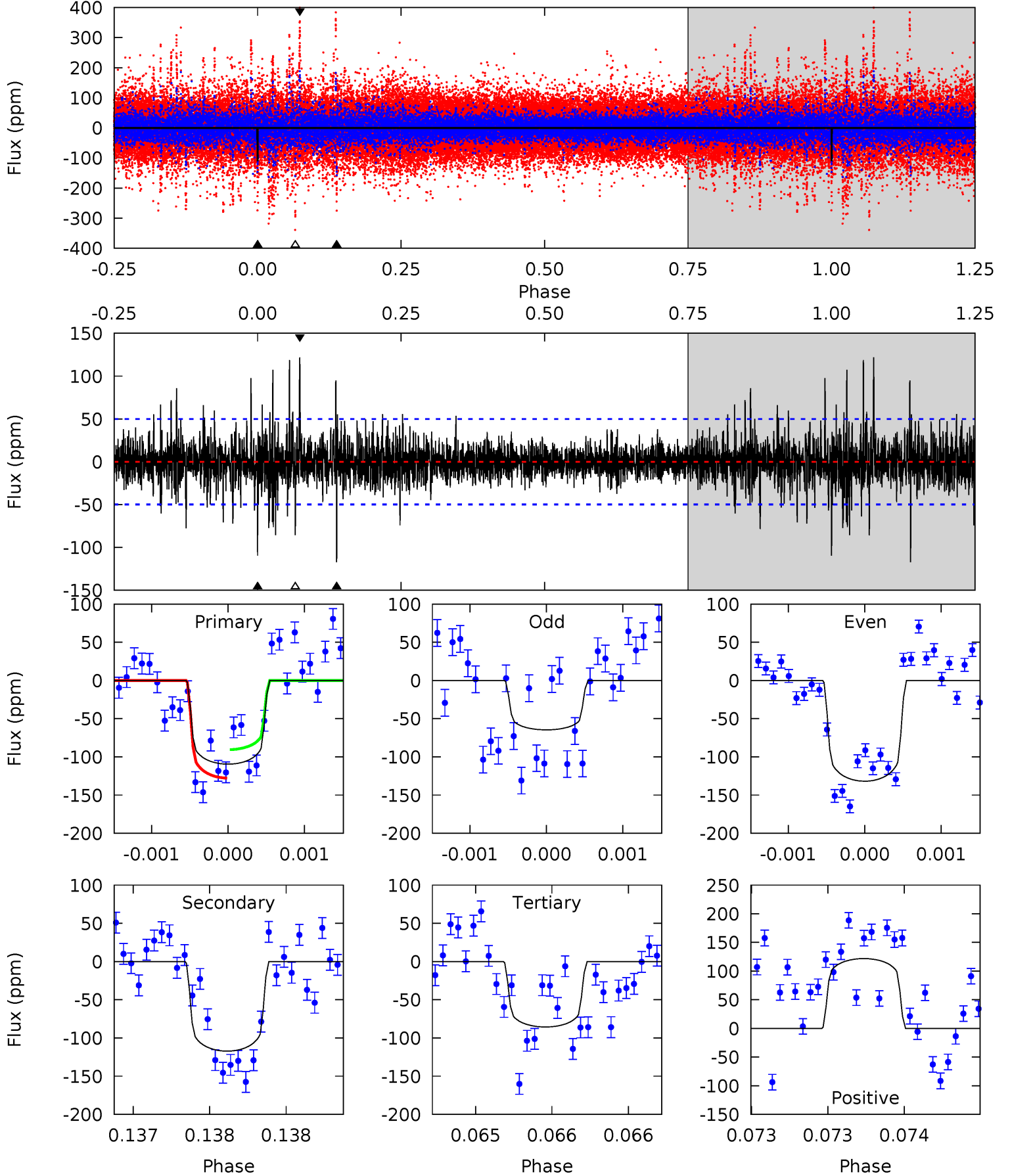
TCE 010467815-01 P=402.575188 Days  $T_0=446.120330$  (BKJD)



# DV Model-Shift Uniqueness Test

010467815-01, P = 402.558470 Days, E = 43.581006 Days

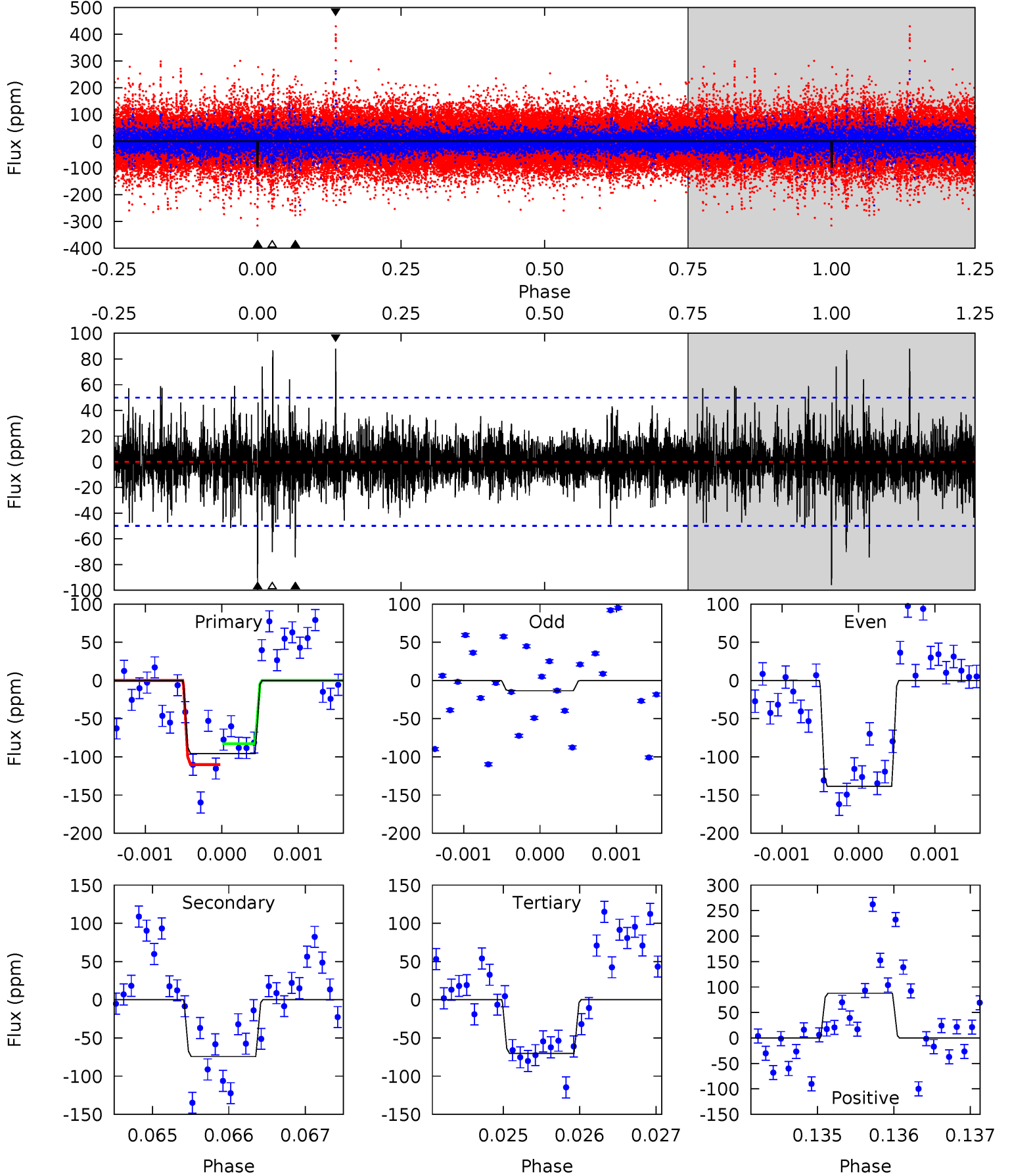
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.1	13.0	9.48	13.5	5.52	3.40	1.86	2.65	-1.36	3.50	-0.51	3.49	0.92	0.51	2.07



# Alt Model-Shift Uniqueness Test

010467815-01,  $P = 402.575188$  Days,  $E = 43.545142$  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
10.6	8.18	7.73	9.67	5.49	3.36	1.49	2.83	0.88	0.45	-1.49	6.47	0.97	0.48	1.51



### Stellar Parameters For KIC 010467815

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$9030^{+251}_{-466}$	$3.822^{+0.351}_{-0.162}$	$0.070^{+0.150}_{-0.650}$	$3.218^{+0.977}_{-1.466}$	$2.505^{+0.299}_{-0.838}$	$0.106^{+0.330}_{-0.047}$
	+3%/-5%	+9%/-4%	+214%/-929%	+30%/-46%	+12%/-33%	+311%/-44%
Source	KIC0	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 010467815-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-117 \pm 9$	$3.81^{+1.43}_{-1.35}$	$808^{+77}_{-86}$	$8562^{+2243}_{-1321}$	$8891^{+12043}_{-4024}$
Alt.	$-74 \pm 9$	$3.18^{+1.37}_{-1.29}$	$808^{+75}_{-88}$	$8195^{+2973}_{-1330}$	$8219^{+13414}_{-4248}$

$T_{\text{max}}$  = 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

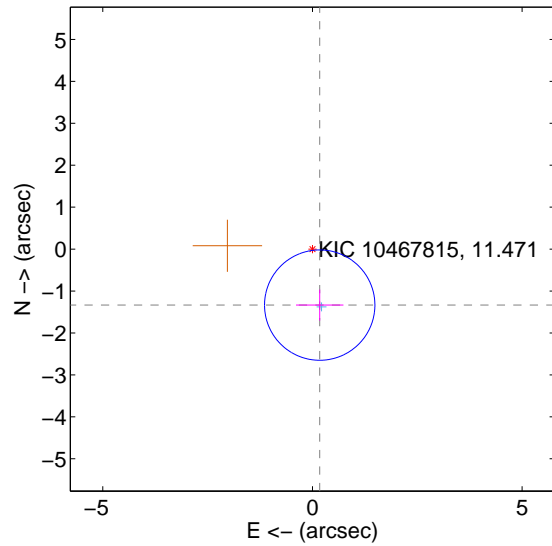
Supplemental centroid analysis for 010467815-01. **Kepler magnitude: 11.47.** Transit SNR 6.92

**There are 1 quarters with good PRF difference image offsets**

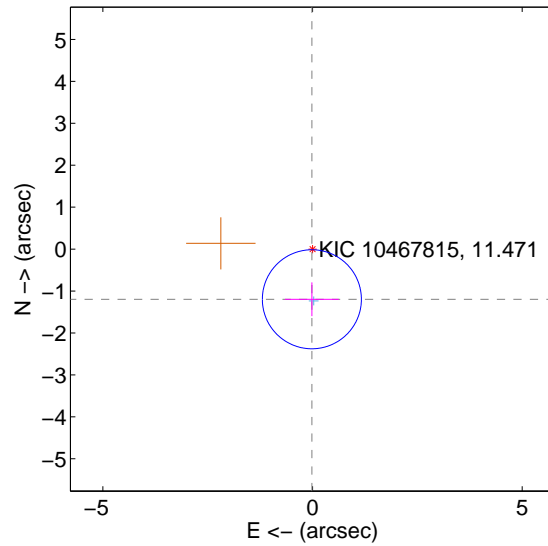
The direct PRF centroid is offset from the target star catalog position by about 0.24 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>1.347 \pm 0.439</math></b>	<b>3.07</b>	$-0.174 \pm 0.565$	$-1.336 \pm 0.370$
PRF-fit source offset from KIC position	<b><math>1.197 \pm 0.394</math></b>	<b>3.04</b>	$0.016 \pm 0.643$	$-1.197 \pm 0.402$
photometric centroid source offset	$0.69 \pm 1.37$	0.50	$-0.27 \pm 1.22$	$-0.63 \pm 1.40$

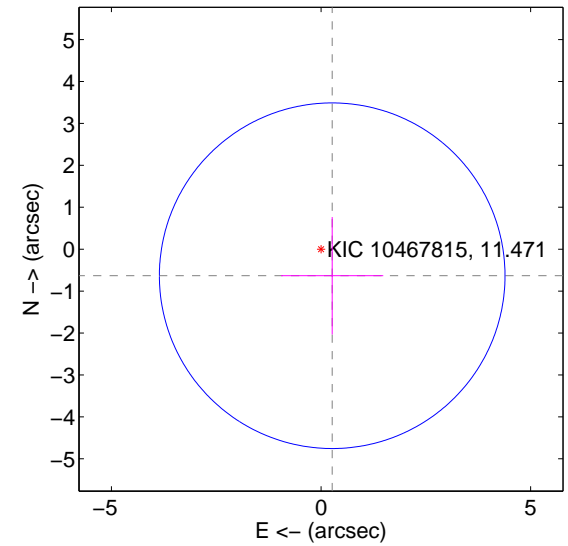
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids



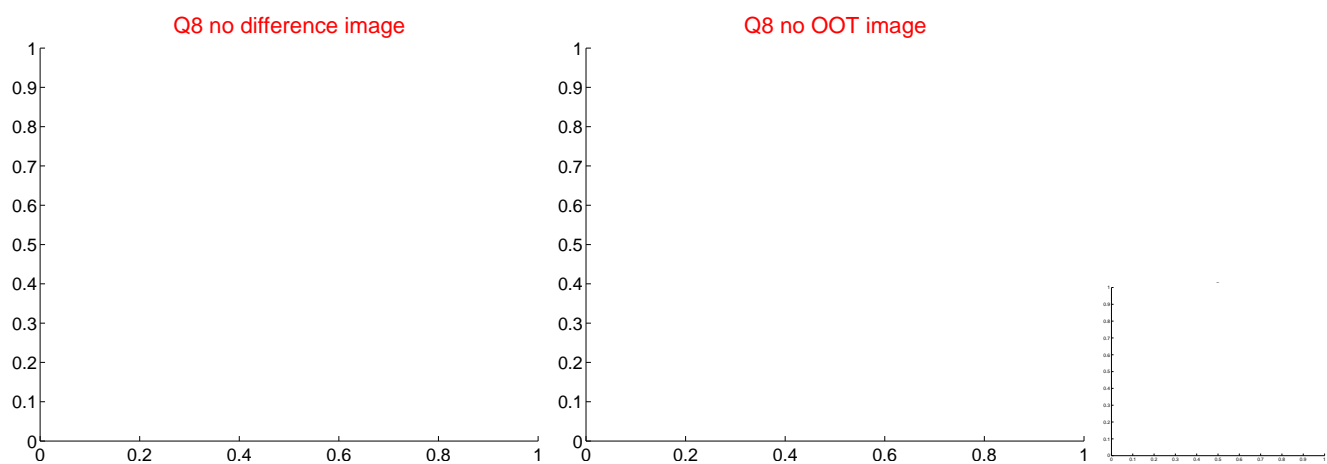
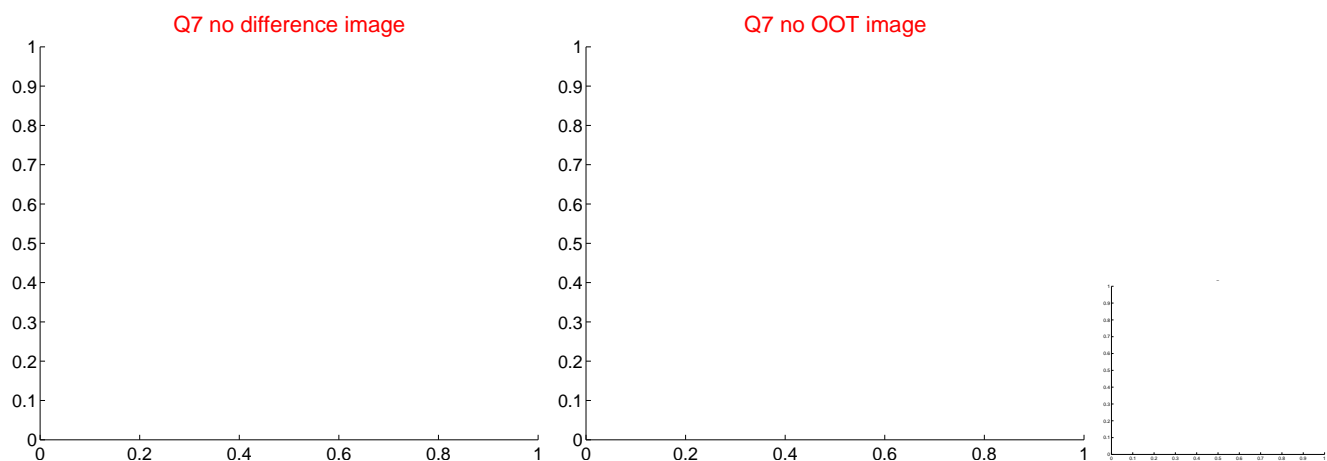
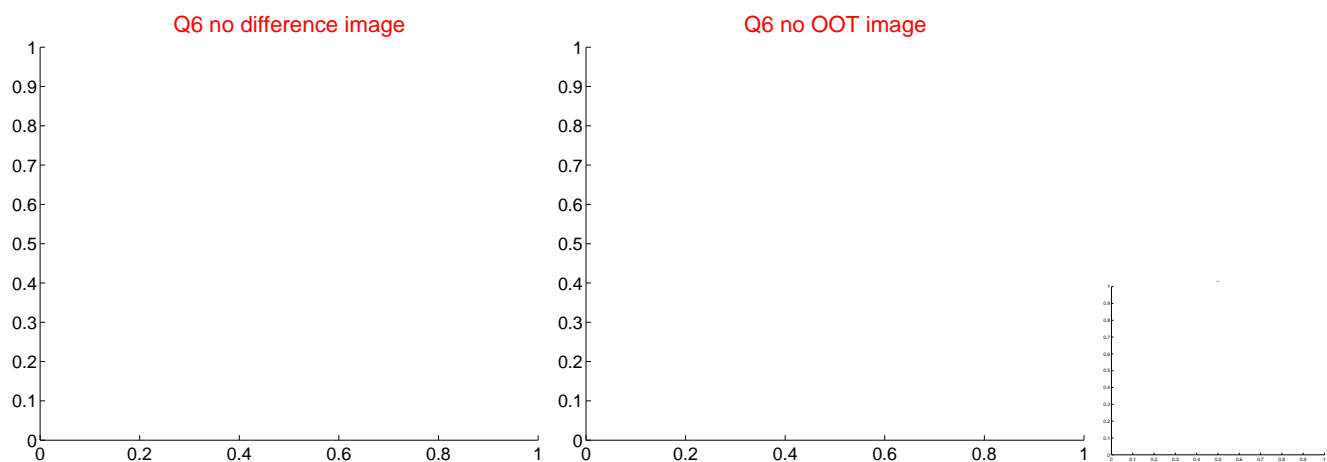
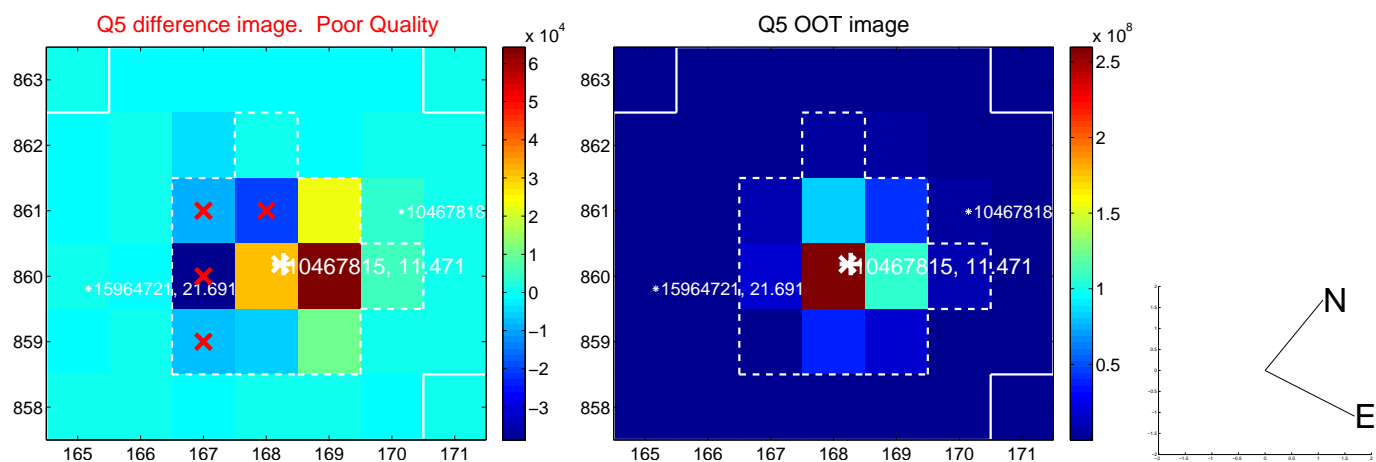
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



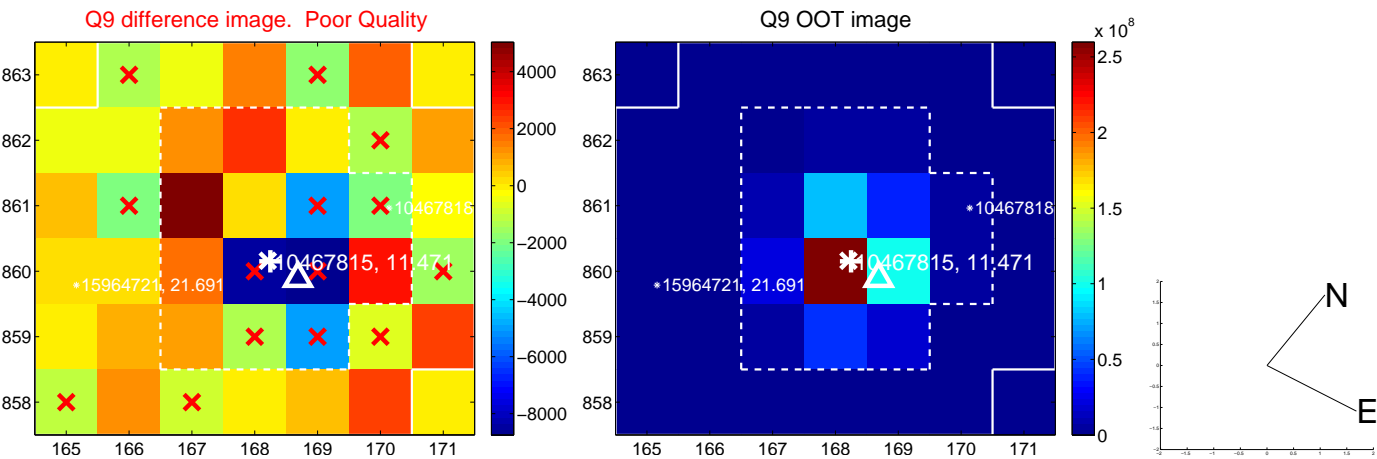
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



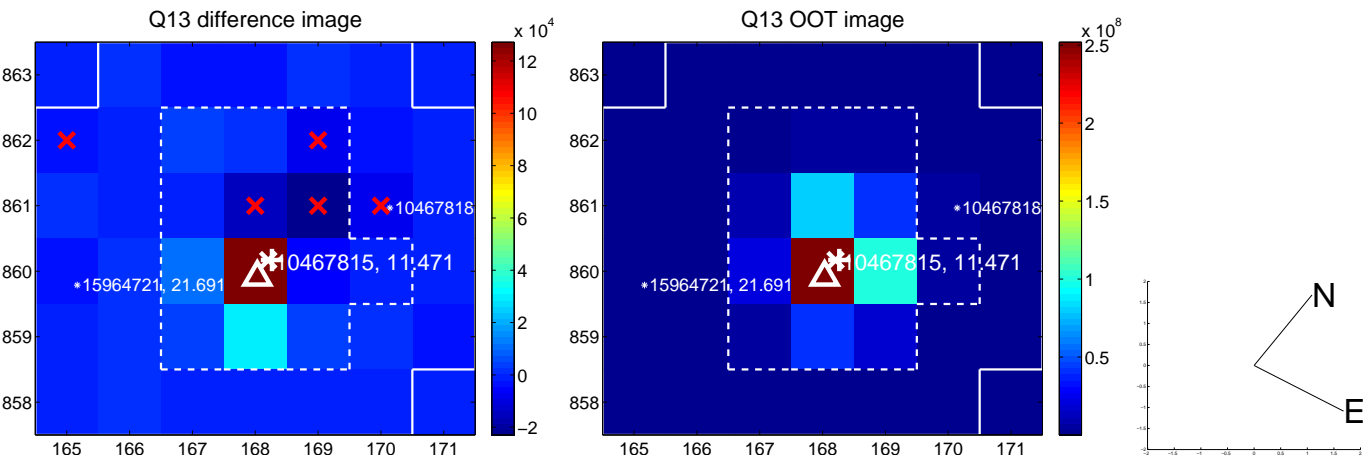
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



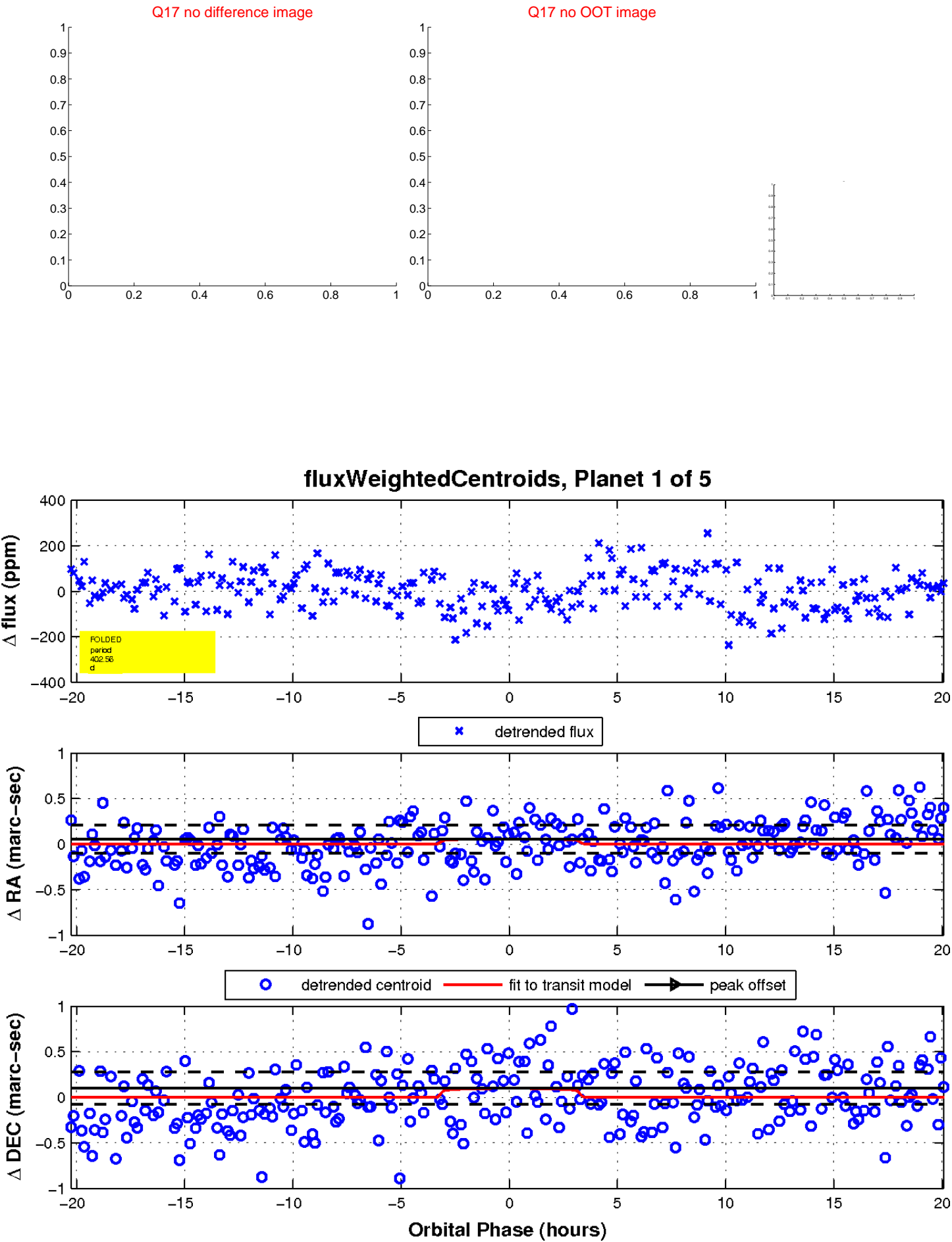
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



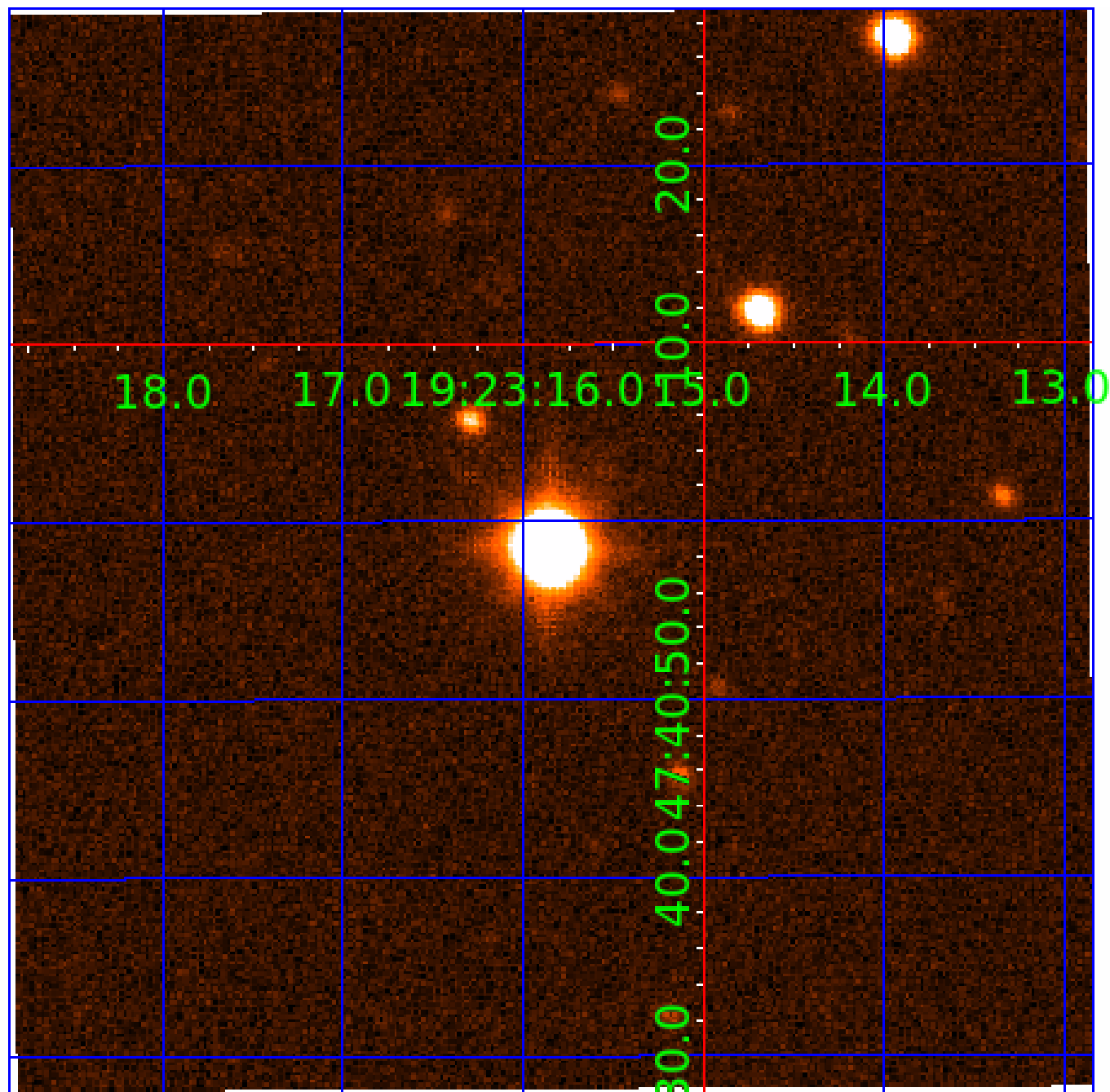
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 010467815

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010467815-01	OBS	No	402.558470	446.139475	127.0	6.761	14.3	6.9	3.22	9030	4.11	29.35
010467815-02	OBS	3191.02	371.230486	458.599290	138.6	17.368	9.7	8.3	3.22	9030	3.92	32.70
010467815-03	OBS	No	368.909232	457.615781	145.9	7.572	7.9	7.1	3.22	9030	4.33	32.97
010467815-04	OBS	No	350.086426	171.236624	125.3	10.665	7.6	8.5	3.22	9030	4.48	35.36

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010467815-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
010467815-02	OBS	PC	0.60	0	0	0	0	CENT_SATURATED
010467815-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
010467815-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—CENT_SATURATED

**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.

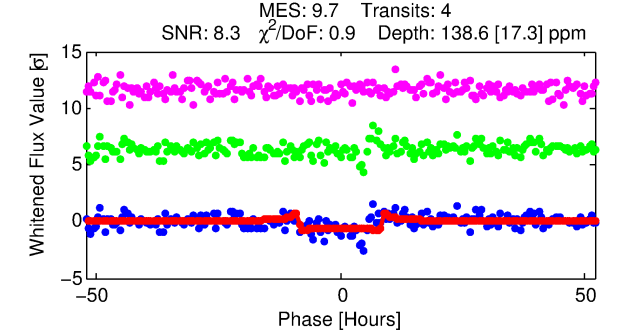
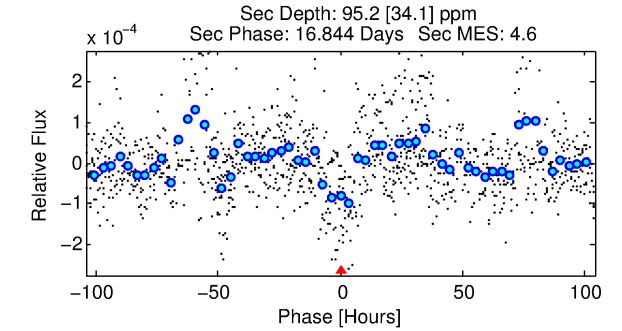
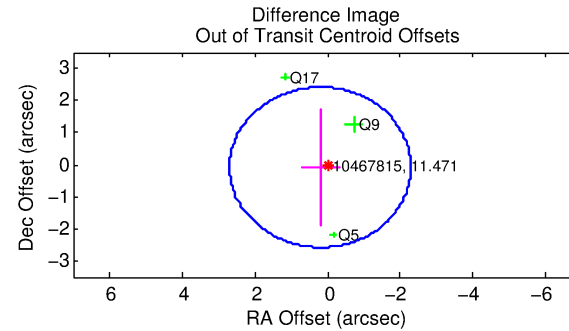
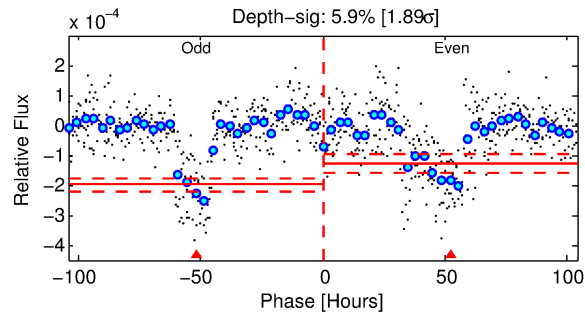
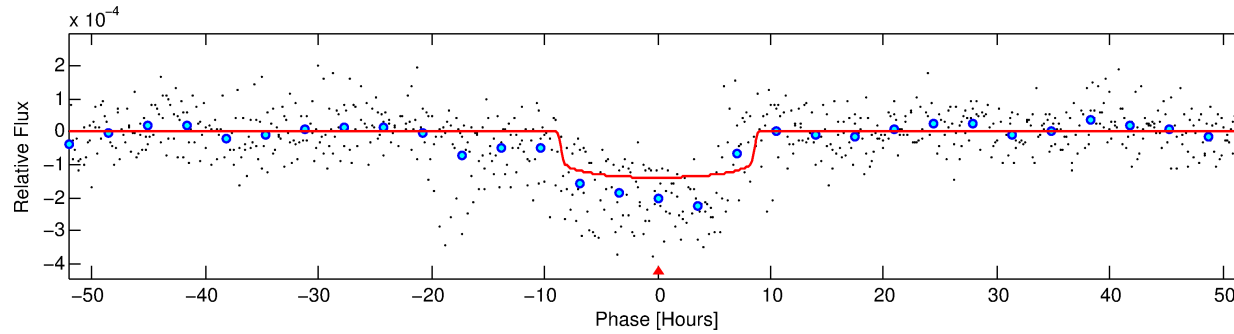
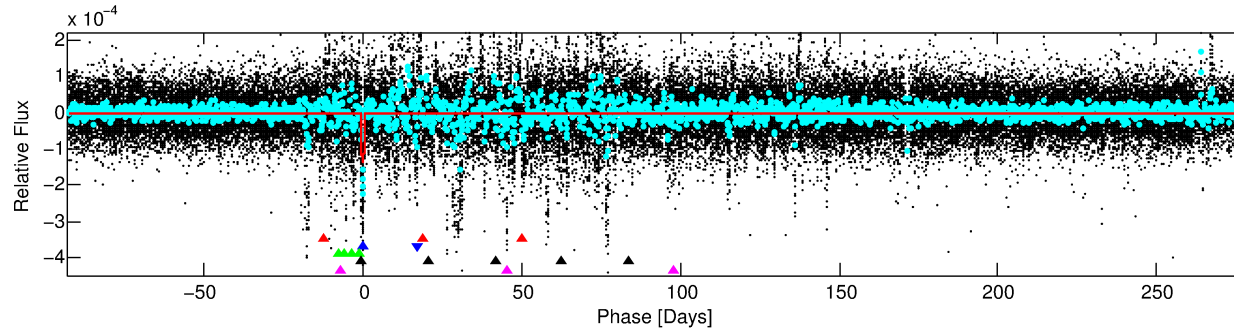
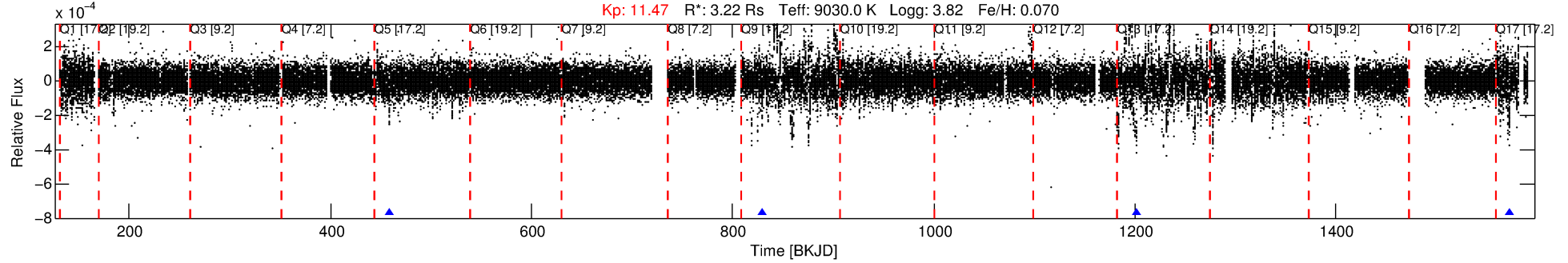
## Ephemeris Match Information For 010467815-02

No Significant Match Found

# DV One-Page Summary

KIC: 10467815 Candidate: 2 of 5 Period: 371.230 d  
KOI: K03191 Corr: No Ephemeris Match

Kp: 11.47 R\*: 3.22 Rs Teff: 9030.0 K Logg: 3.82 Fe/H: 0.070



DV Fit Results:

Period = 371.23049 [0.00477] d  
Epoch = 458.5993 [0.0076] BKJD  
Rp/R\* = 0.0112 [0.0036]  
a/R\* = 150.92 [313.23]  
b = 0.41 [4.22]  
Seff = 32.70 [21.32]  
Teq = 610 [99] K  
Rp = 3.92 [2.18] Re  
a = 1.3736 [0.5576] AU  
Ag = 6443.83 [6191.69] [1.04σ]  
Teffp = 8447 [1613] K [4.85σ]

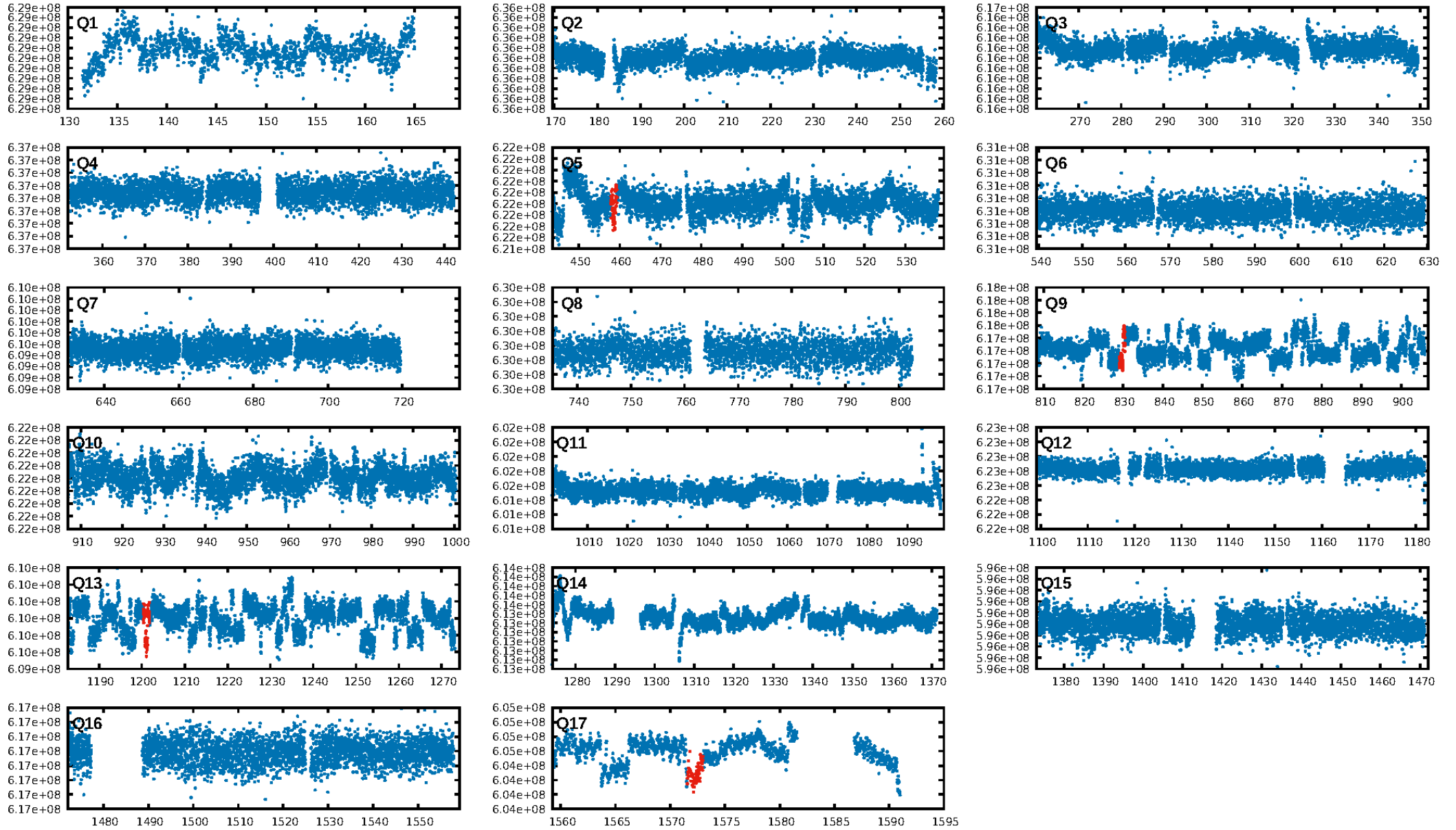
DV Diagnostic Results:

ShortPeriod-sig: 99.7% [2.94σ]  
LongPeriod-sig: 100.0% [40.34σ]  
ModelChiSquare2-sig: 7.3%  
ModelChiSquareGof-sig: 96.8%  
Bootstrap-pfa: 1.16e-12  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.8119  
Centroid-sig: 3.4%  
Centroid-so: 1.489 arcsec [1.72σ]  
OotOffset-rm: 0.216 arcsec [0.26σ]  
KicOffset-rm: 0.381 arcsec [0.67σ]  
OotOffset-st: 0/0/0/3 [3]  
KicOffset-st: 0/0/0/3 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 0.33 [1/3]

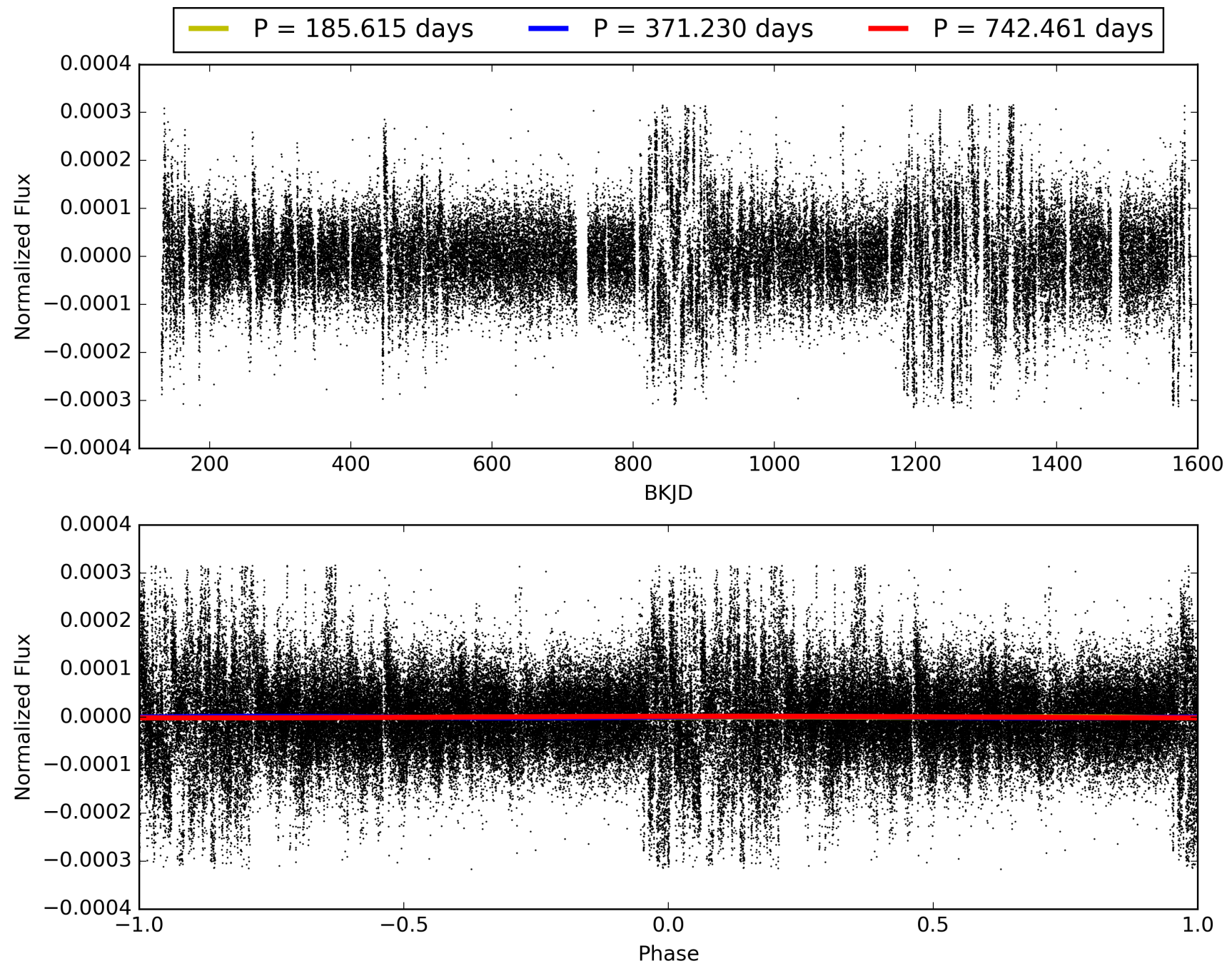
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 22:05:35 Z

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

# TCE 010467815-02, PDC Light Curves

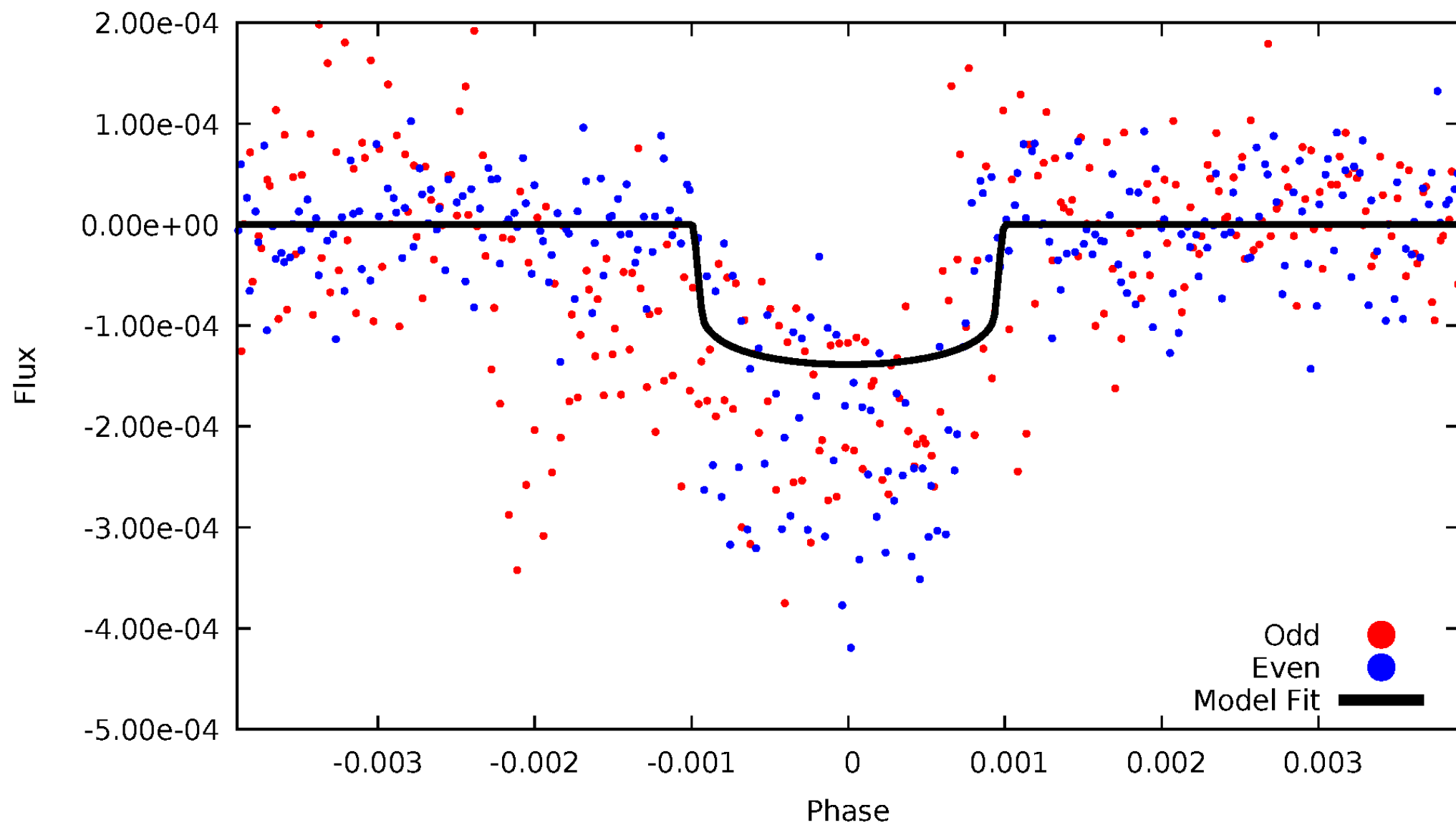


# TCE 010467815-02



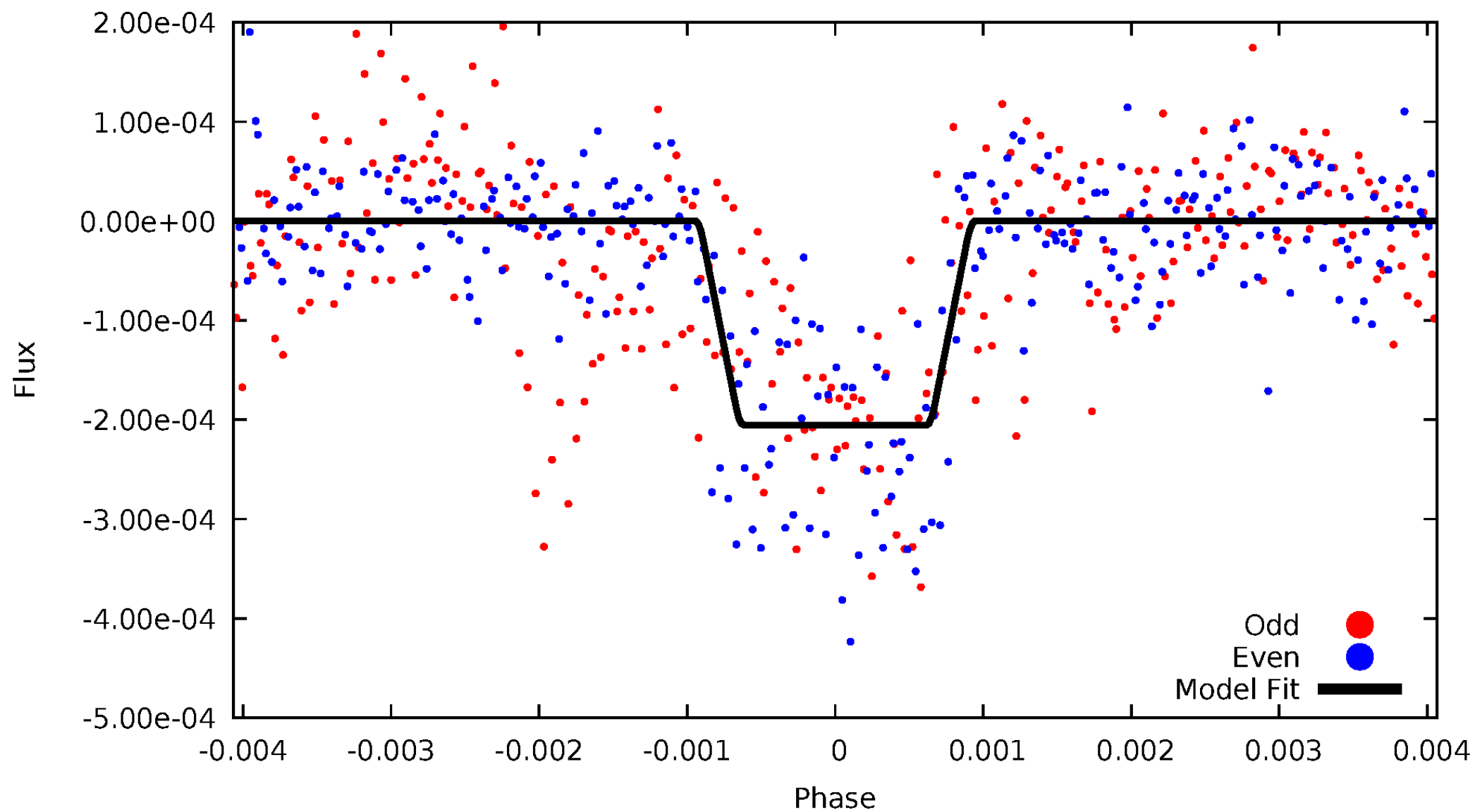
# DV Odd/Even

TCE 010467815-02



# ALT Odd/Even

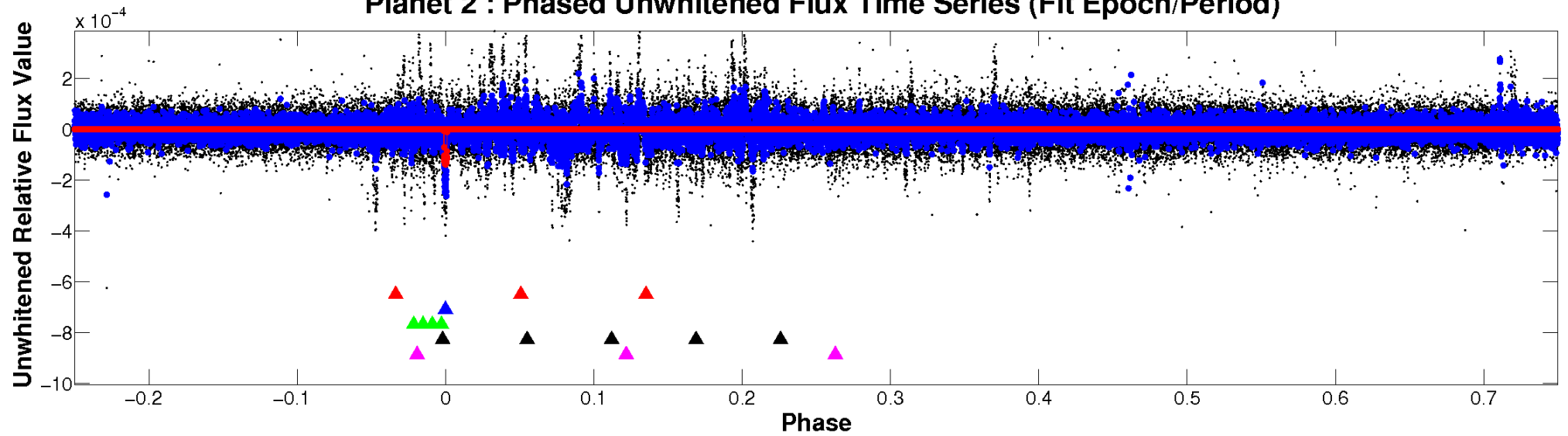
TCE 010467815-02



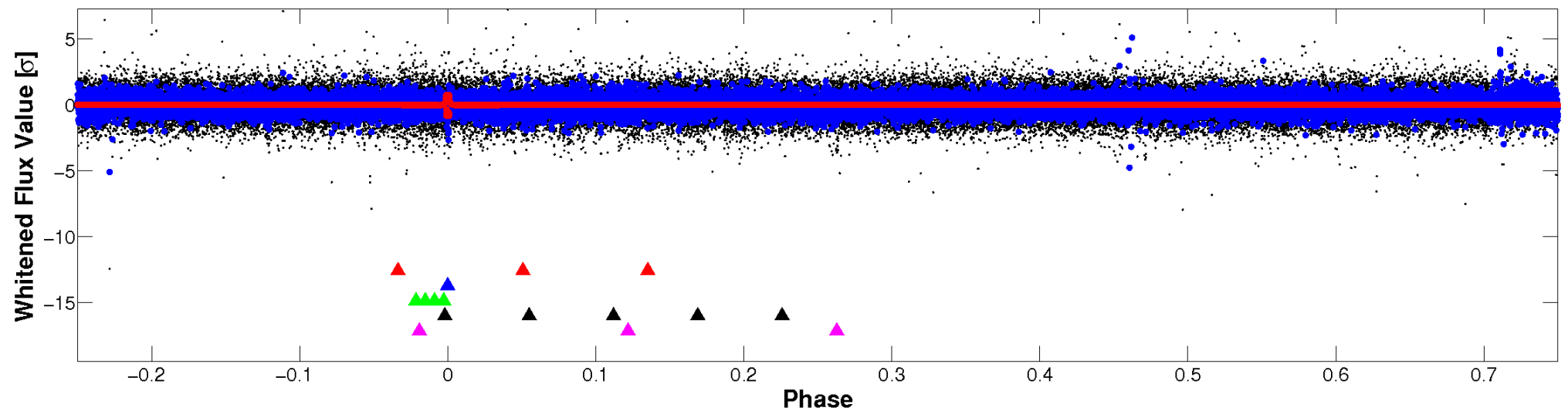


# Non-Whitened Vs. Whitened Light Curve

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



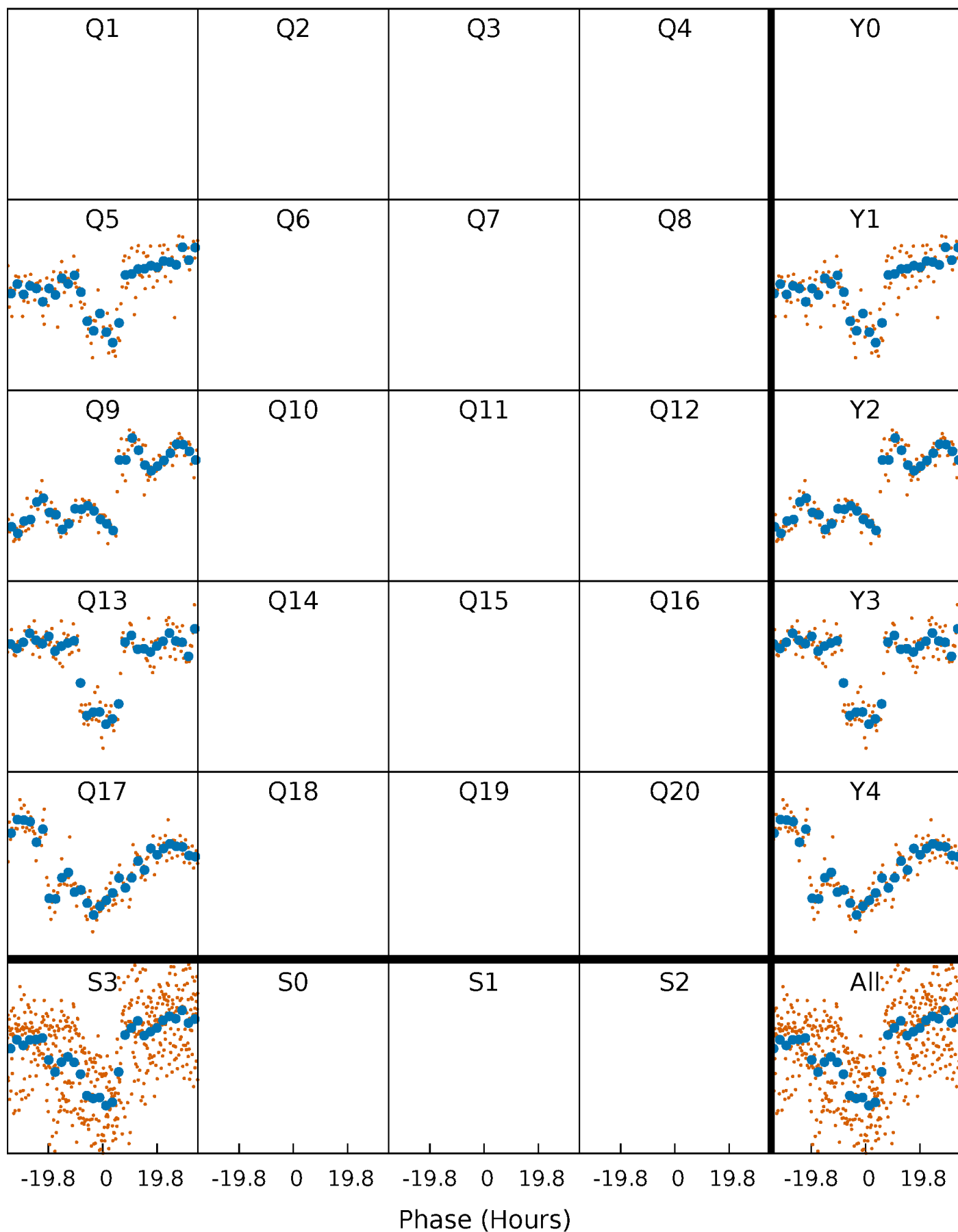
Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





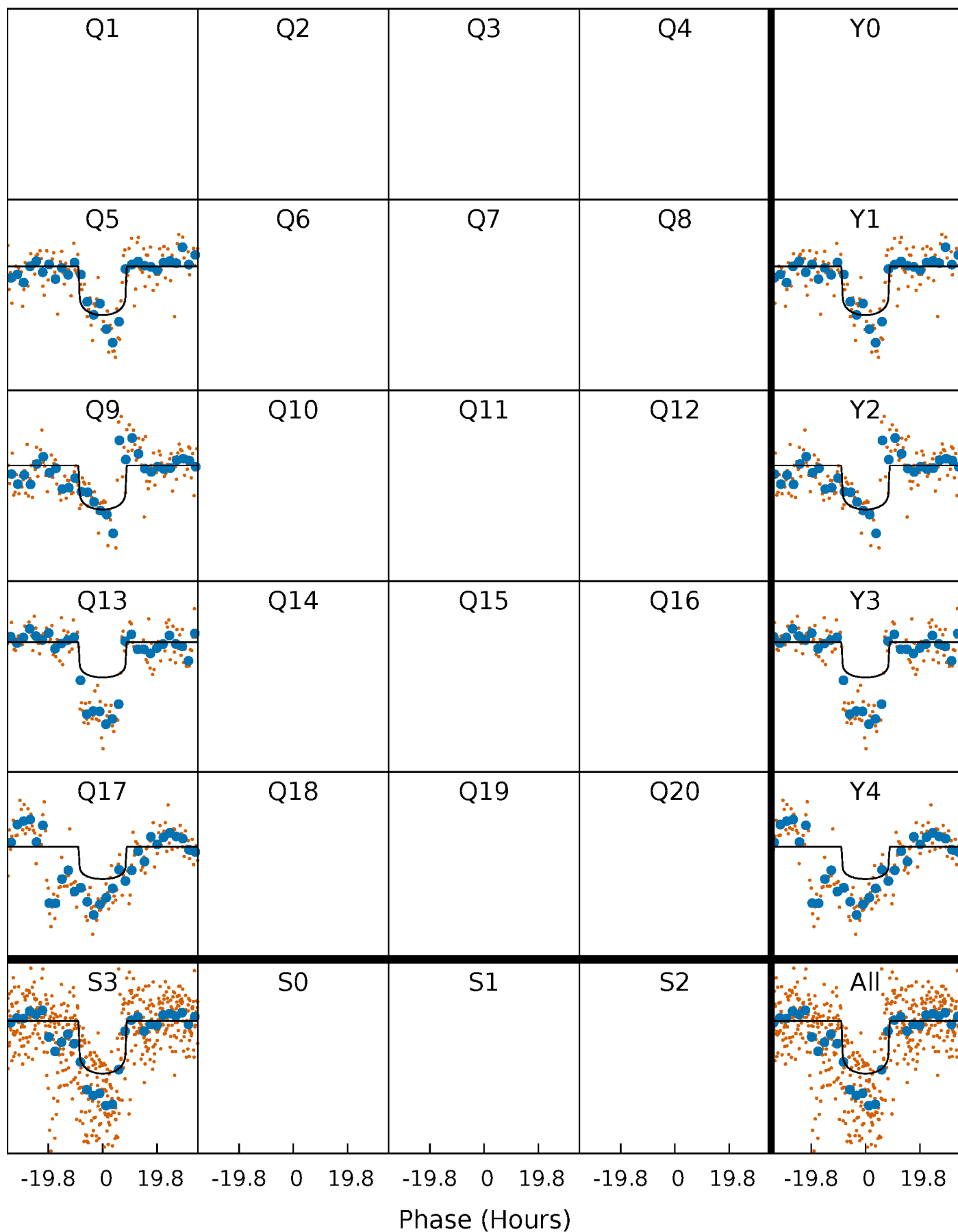
# PDC Quarter-Phased Transit Curves

TCE 010467815-02     $P=371.230486$  Days     $T_0=458.599290$  (BKJD)



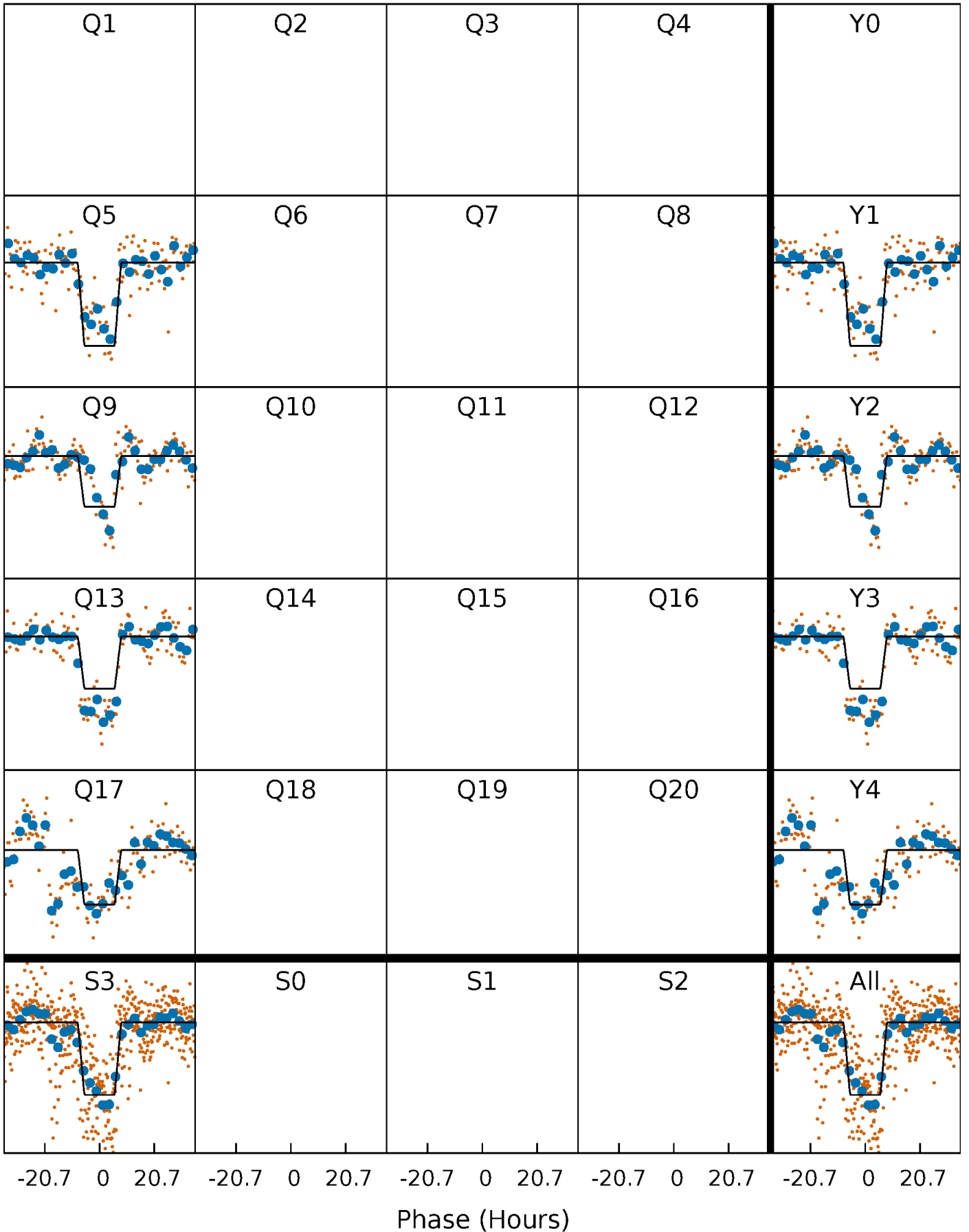
# DV Quarter-Phased Transit Curves

TCE 010467815-02     $P=371.230486$  Days     $T_0=458.599290$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

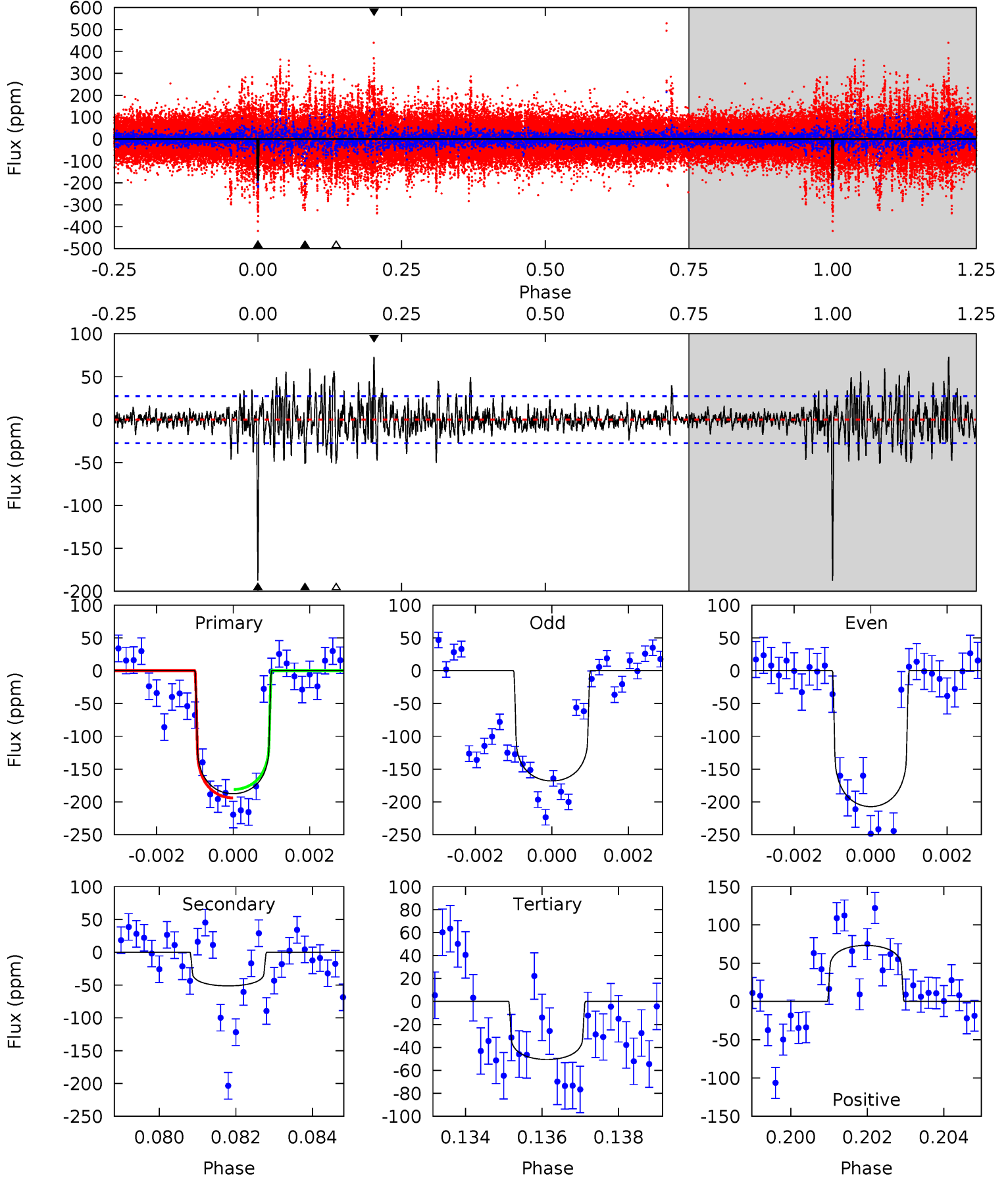
TCE 010467815-02     $P=371.209673$  Days     $T_0=458.608769$  (BKJD)



# DV Model-Shift Uniqueness Test

010467815-02, P = 371.230486 Days, E = 87.368804 Days

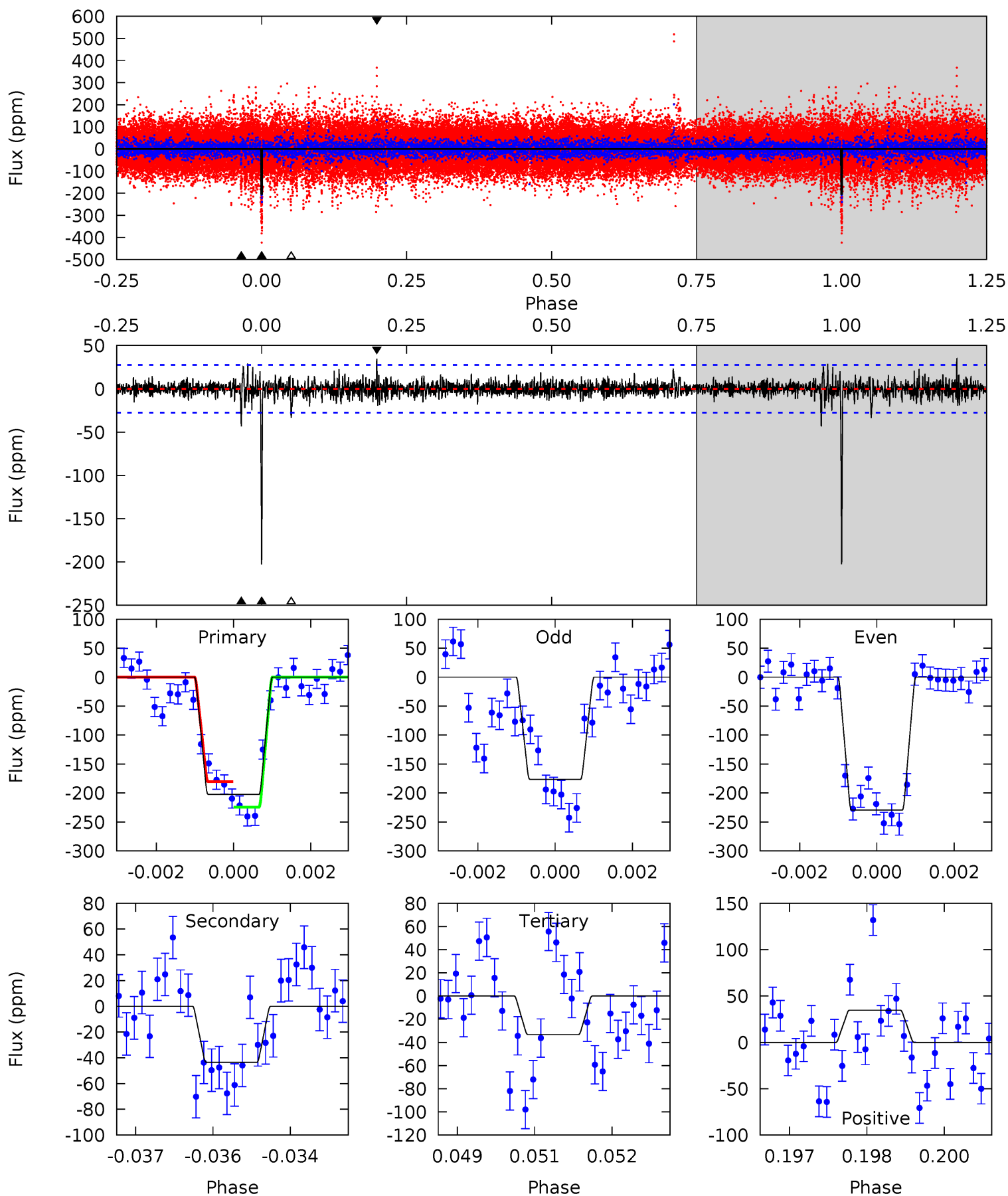
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
36.2	9.91	9.77	14.2	5.33	3.09	2.61	26.5	22.1	0.15	-4.24	3.67	1.03	0.28	1.24



# Alt Model-Shift Uniqueness Test

010467815-02, P = 371.209673 Days, E = 87.399096 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
39.1	8.37	6.41	6.70	5.34	3.11	1.13	32.7	32.4	1.96	1.67	5.08	1.15	0.15	4.25



### Stellar Parameters For KIC 010467815

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$9030^{+251}_{-466}$	$3.822^{+0.351}_{-0.162}$	$0.070^{+0.150}_{-0.650}$	$3.218^{+0.977}_{-1.466}$	$2.505^{+0.299}_{-0.838}$	$0.106^{+0.330}_{-0.047}$
	+3%/-5%	+9%/-4%	+214%/-929%	+30%/-46%	+12%/-33%	+311%/-44%
Source	KIC0	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 010467815-02 / KOI 3191.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-51 \pm 5$	$3.54^{+1.73}_{-1.26}$	$832^{+77}_{-96}$	$6786^{+1891}_{-915}$	$4112^{+5460}_{-2193}$
Alt.	$-43 \pm 5$	$4.74^{+1.65}_{-1.54}$	$833^{+74}_{-102}$	$5704^{+926}_{-538}$	$1936^{+2236}_{-894}$

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

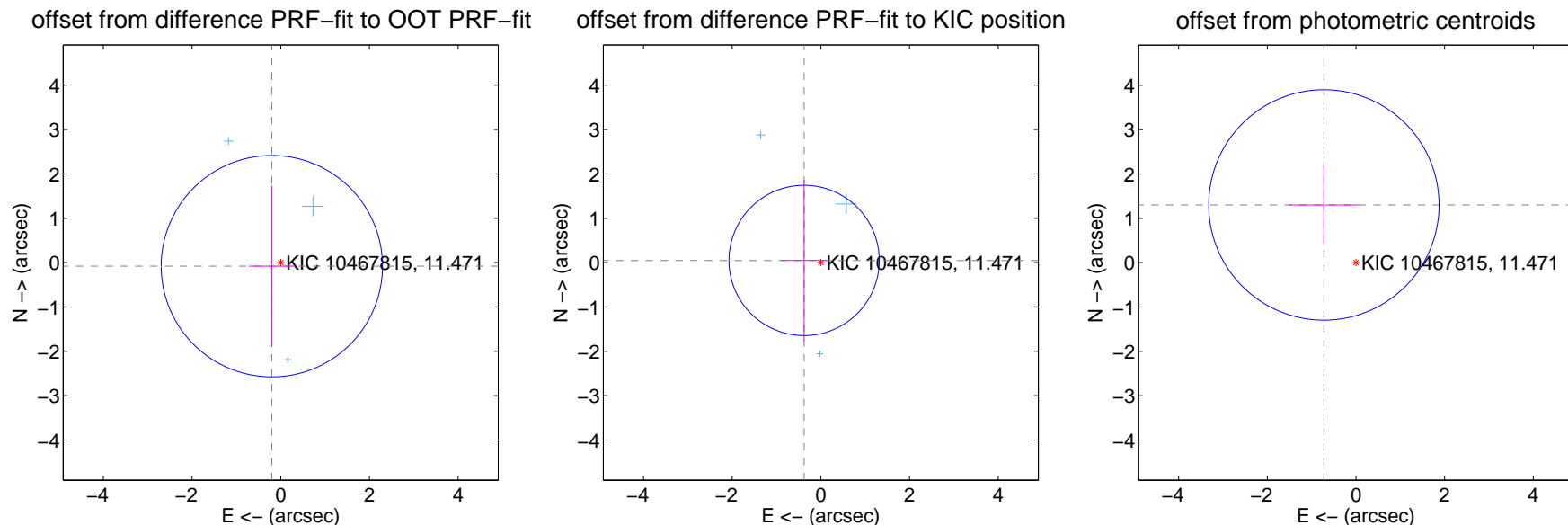
## DV Centroid Data

Supplemental centroid analysis for 010467815-02. **Kepler magnitude: 11.47.** Transit SNR 8.33

**There are 3 quarters with good PRF difference image offsets**

The direct PRF centroid is offset from the target star catalog position by about 0.23 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.216 \pm 0.832$	0.26	$0.200 \pm 0.517$	$-0.081 \pm 1.819$
PRF-fit source offset from KIC position	$0.381 \pm 0.565$	0.67	$0.378 \pm 0.519$	$0.049 \pm 1.818$
photometric centroid source offset	$1.49 \pm 0.87$	1.72	$0.72 \pm 0.79$	$1.30 \pm 0.89$



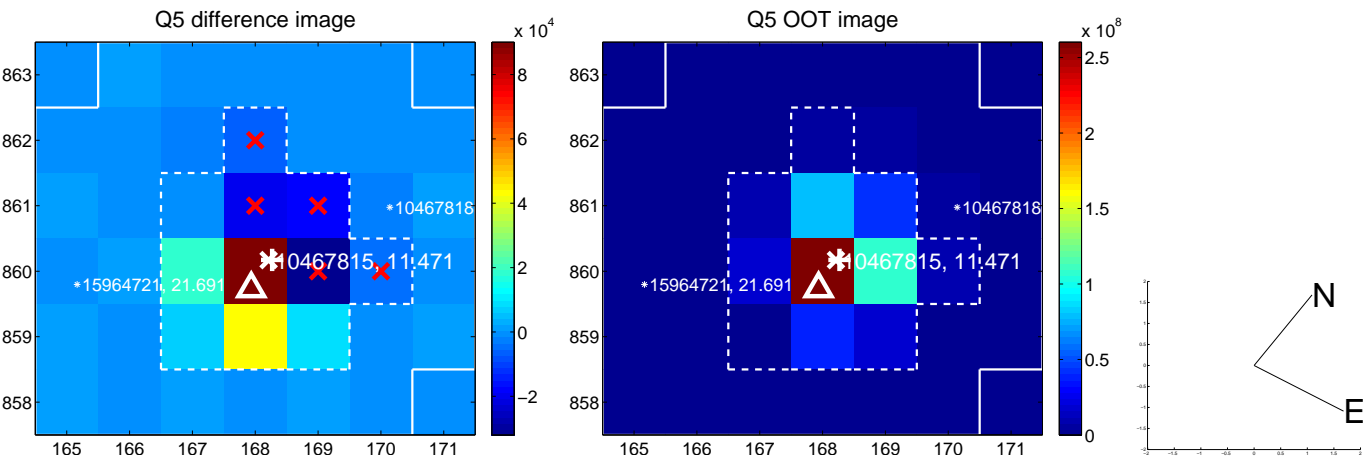
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

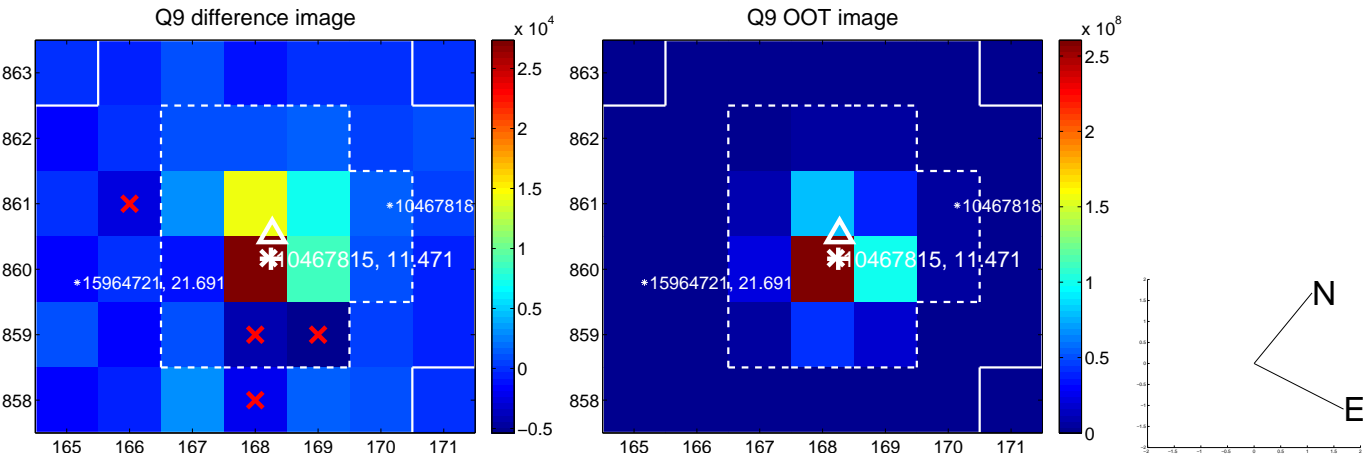




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



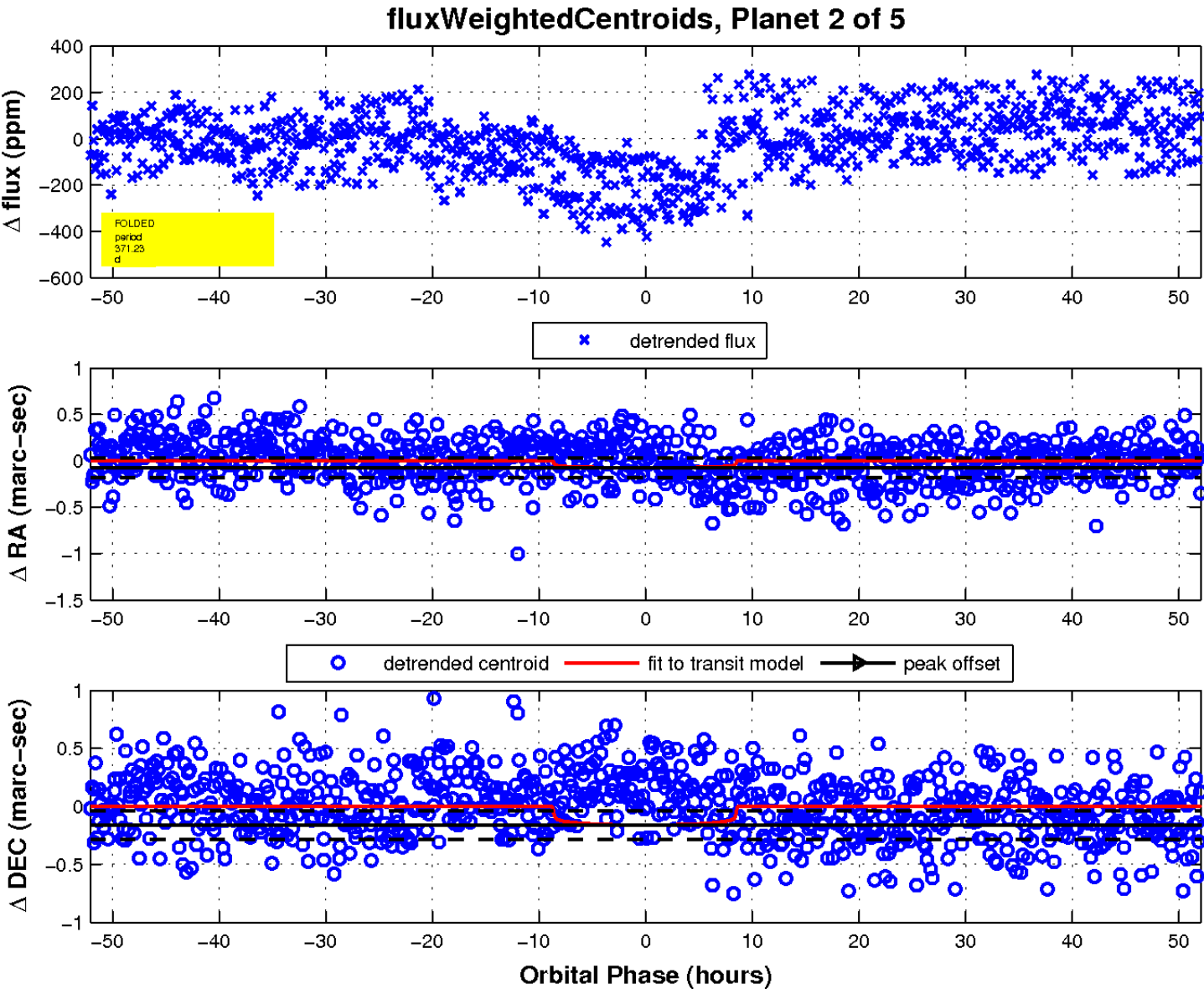
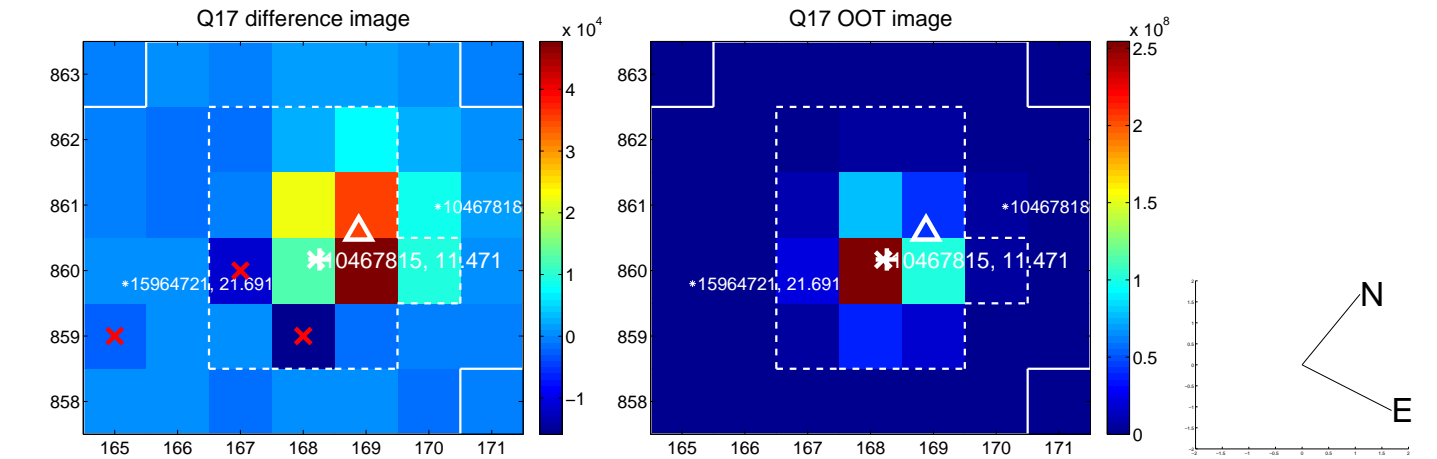
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

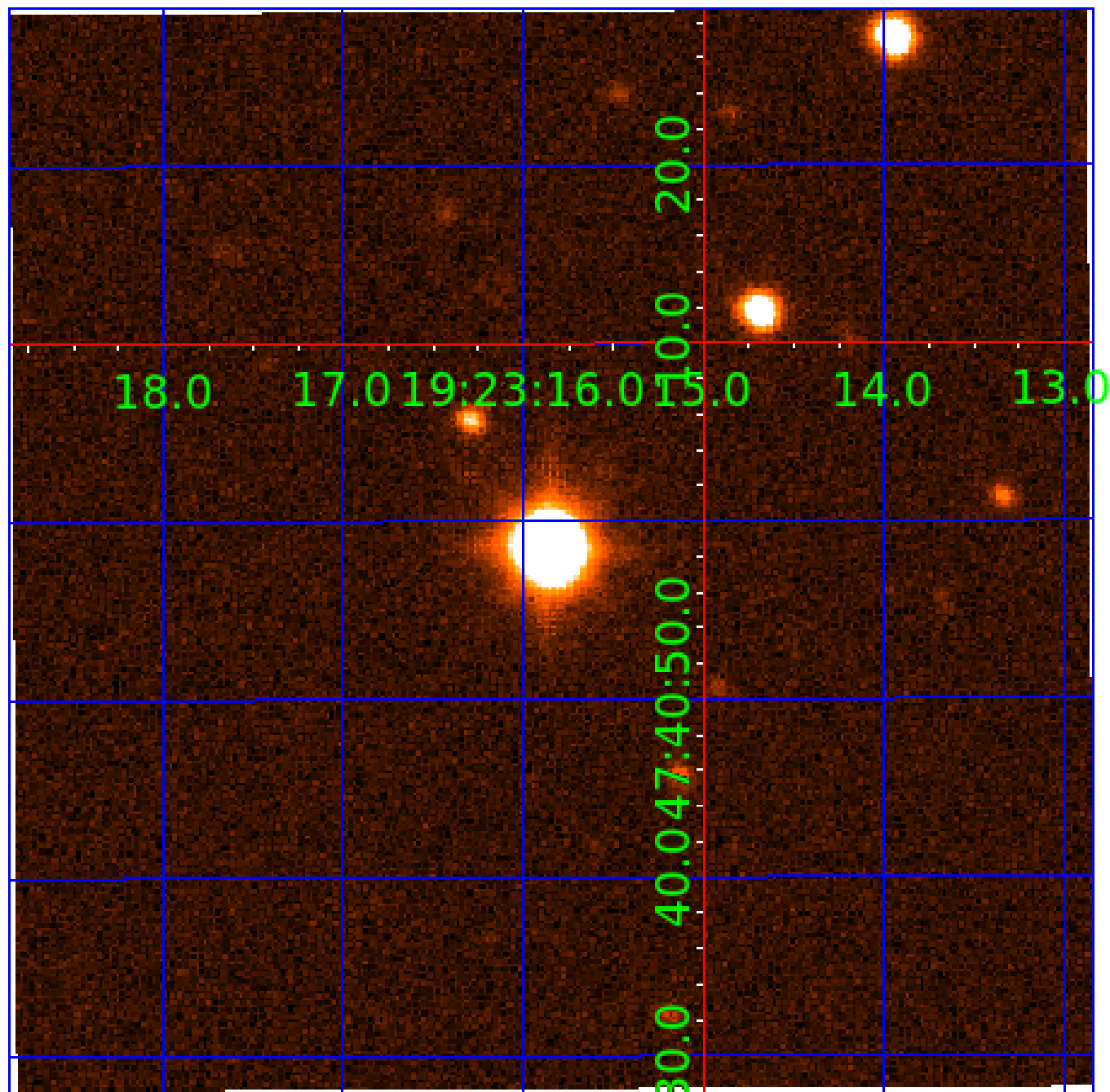


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010467815

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010467815-01	OBS	No	402.558470	446.139475	127.0	6.761	14.3	6.9	3.22	9030	4.11	29.35
010467815-02	OBS	3191.02	371.230486	458.599290	138.6	17.368	9.7	8.3	3.22	9030	3.92	32.70
010467815-03	OBS	No	368.909232	457.615781	145.9	7.572	7.9	7.1	3.22	9030	4.33	32.97
010467815-04	OBS	No	350.086426	171.236624	125.3	10.665	7.6	8.5	3.22	9030	4.48	35.36

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010467815-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
010467815-02	OBS	PC	0.60	0	0	0	0	CENT_SATURATED
010467815-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
010467815-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—CENT_SATURATED

**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.

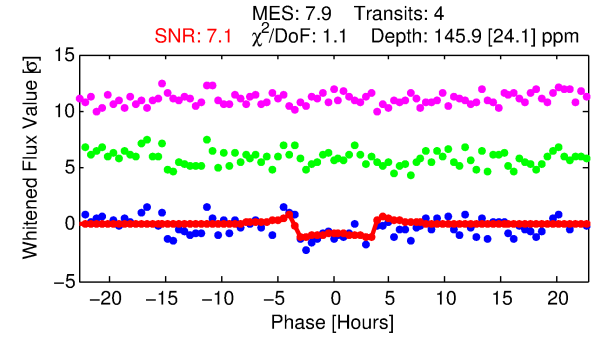
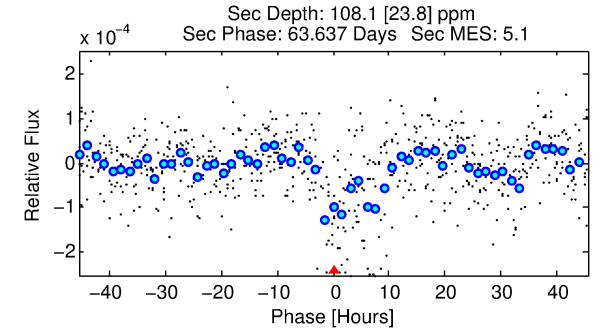
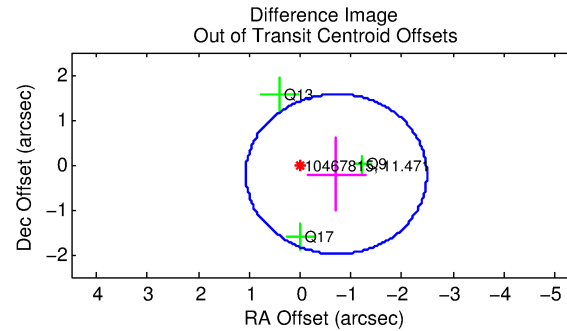
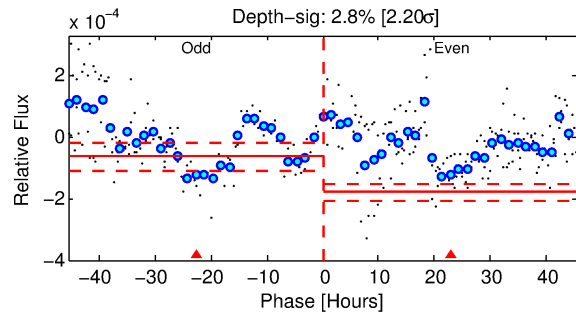
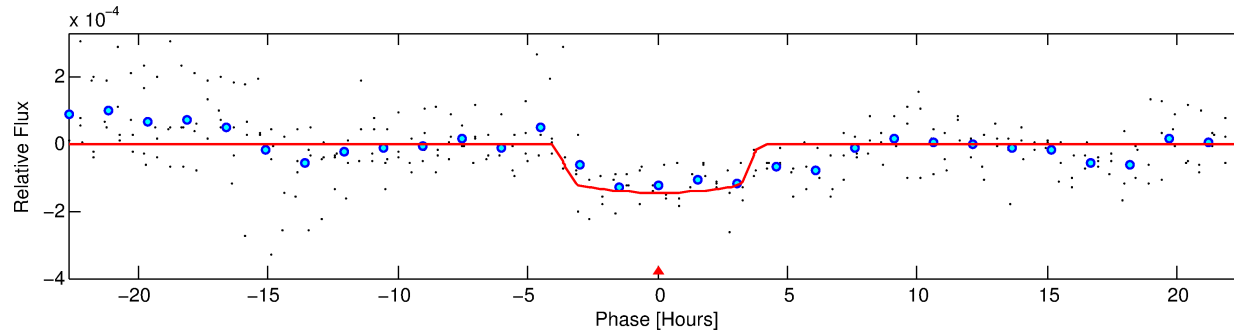
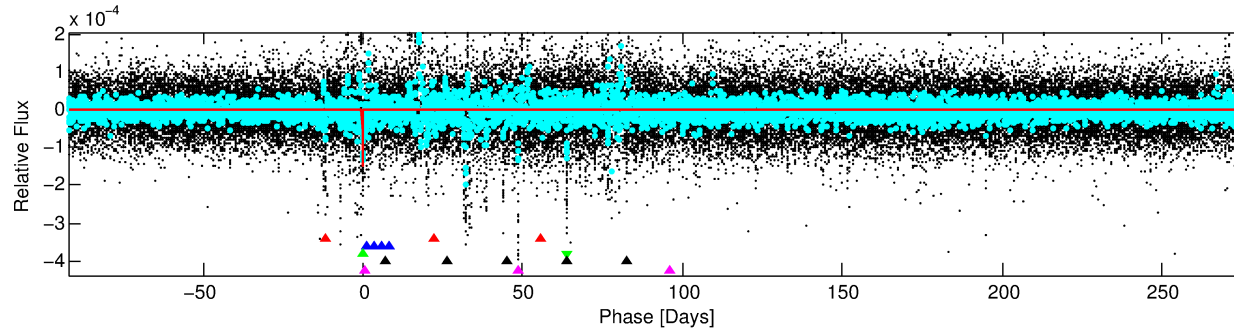
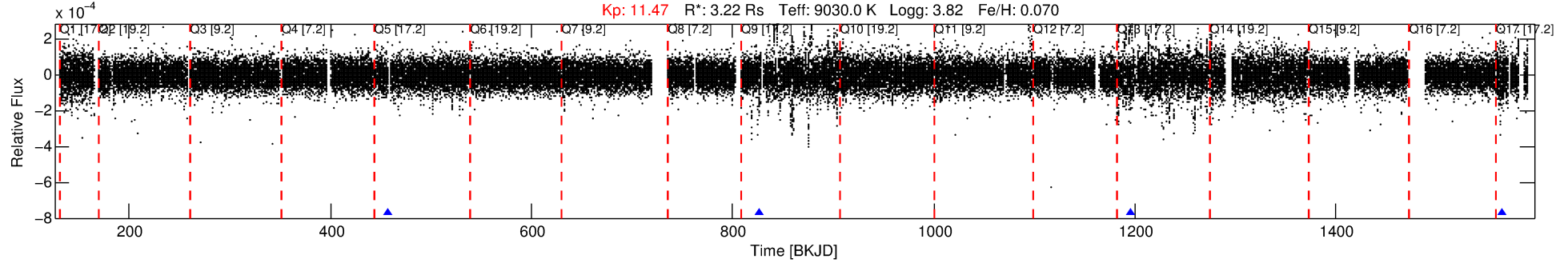
## Ephemeris Match Information For 010467815-03

No Significant Match Found

# DV One-Page Summary

KIC: 10467815 Candidate: 3 of 5 Period: 368.909 d  
KOI: K03191 Corr: No Ephemeris Match

Kp: 11.47 R\*: 3.22 Rs Teff: 9030.0 K Logg: 3.82 Fe/H: 0.070



## DV Fit Results:

Period = 368.90923 [0.00439] d  
Epoch = 457.6158 [0.0087] BKJD  
Rp/R\* = 0.0123 [0.0065]  
a/R\* = 214.90 [786.52]  
b = 0.83 [1.38]  
Seff = 32.97 [21.50]  
Teff = 611 [100] K  
Rp = 4.33 [3.01] Re  
a = 1.3678 [0.5553] AU  
Ag = 5932.71 [7349.07] [0.81σ]  
Teffp = 8291 [2265] K [3.39σ]

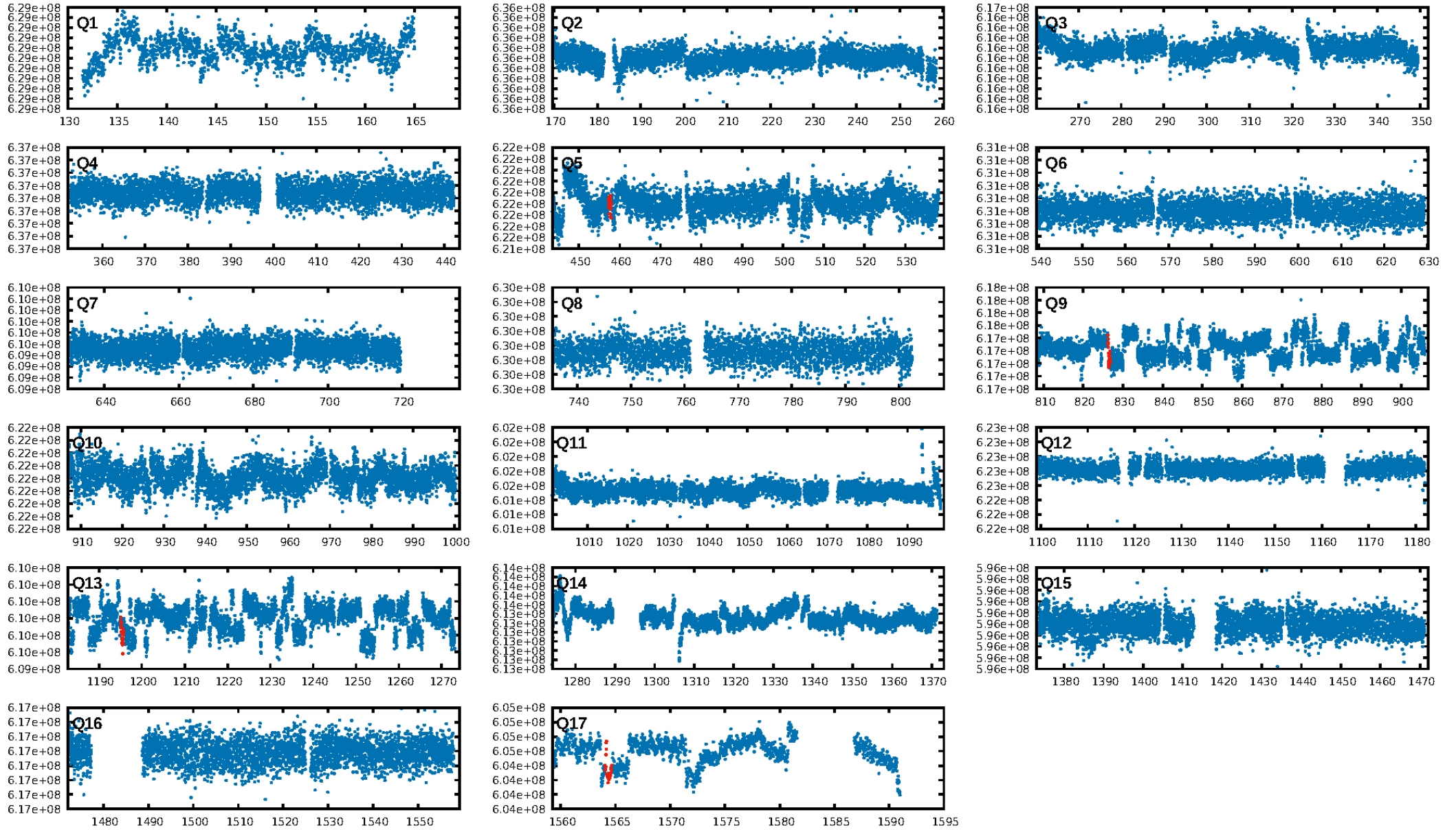
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [34.54σ]  
LongPeriod-sig: 99.7% [2.94σ]  
ModelChiSquare2-sig: 15.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 9.88e-10  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 0.5091  
Centroid-sig: 5.8%  
Centroid-so: 1.311 arcsec [1.45σ]  
OotOffset-rm: 0.744 arcsec [1.25σ]  
KicOffset-rm: 0.566 arcsec [0.95σ]  
OotOffset-st: 0/0/0/3 [3]  
KicOffset-st: 0/0/0/3 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 0.75 [3/4]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 22:05:46 Z

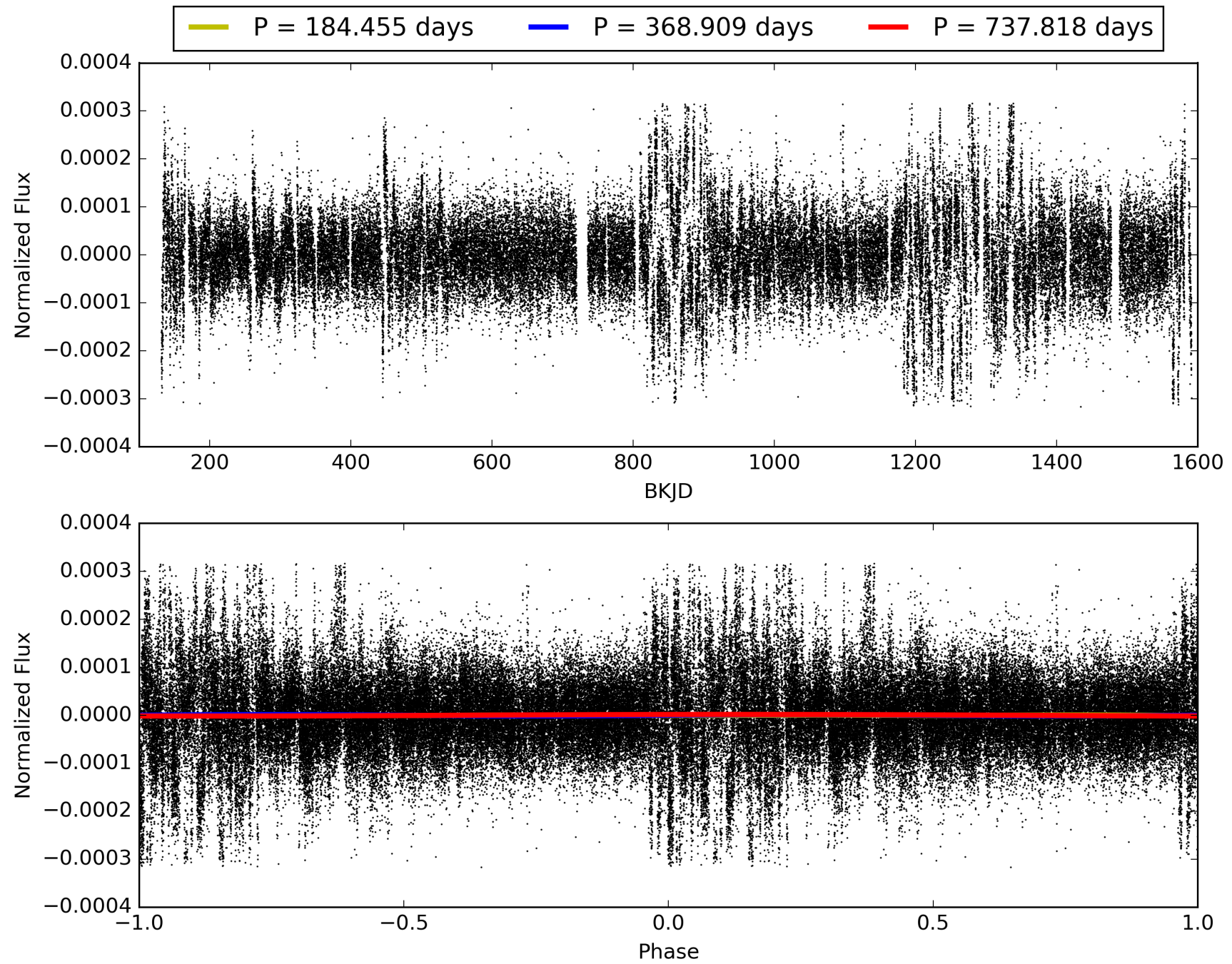
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010467815-03, PDC Light Curves



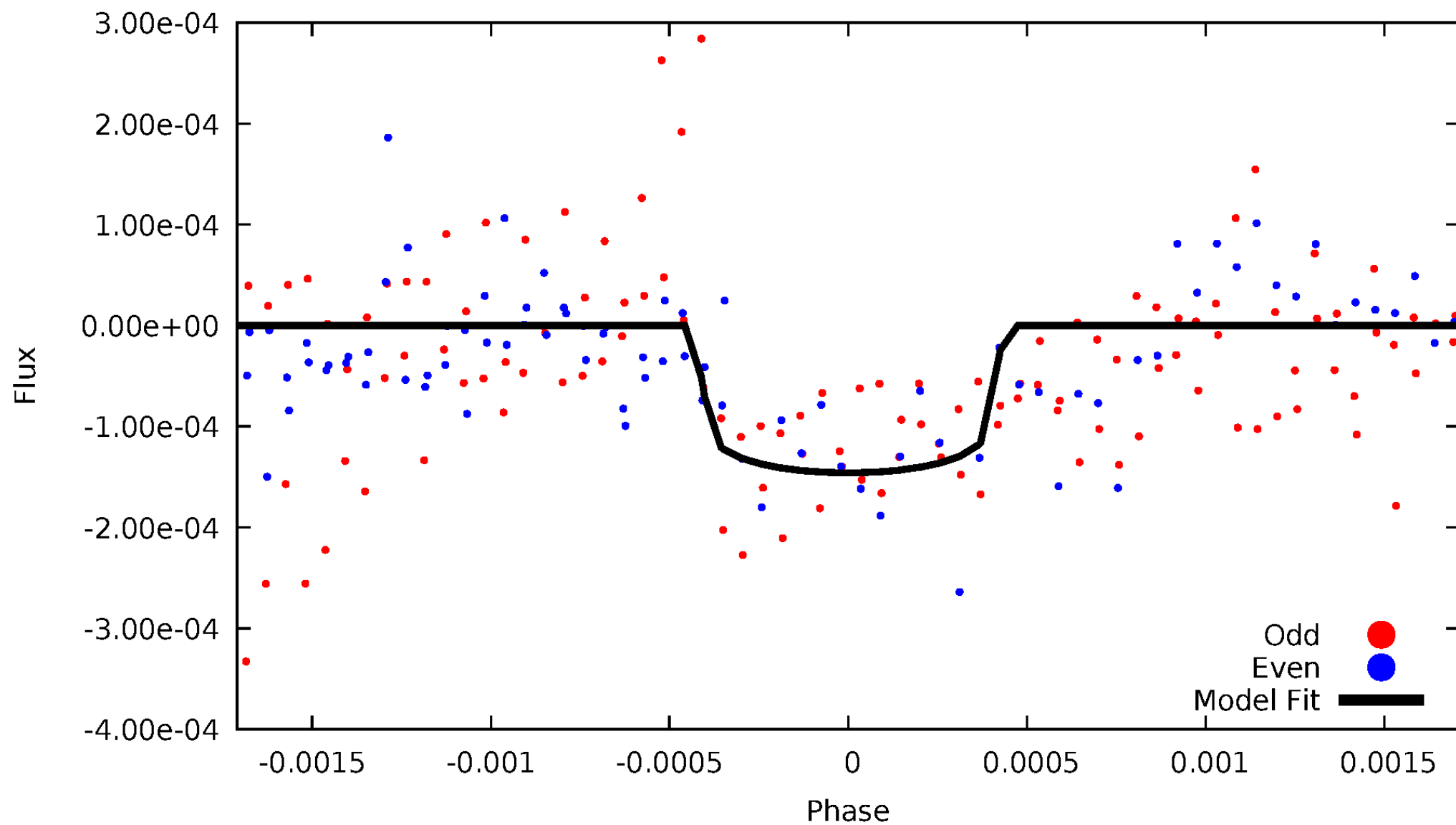


TCE 010467815-03



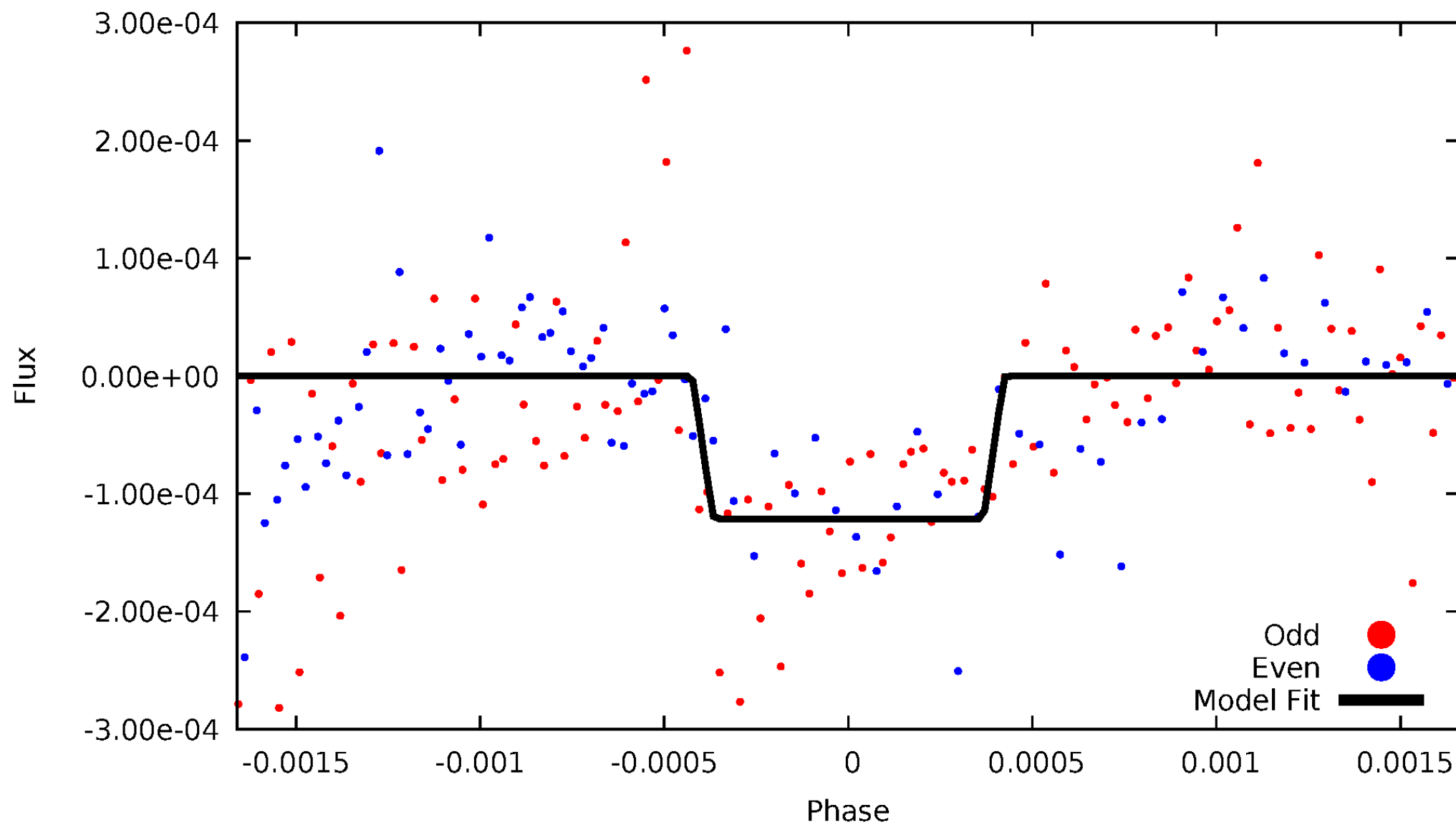
# DV Odd/Even

TCE 010467815-03



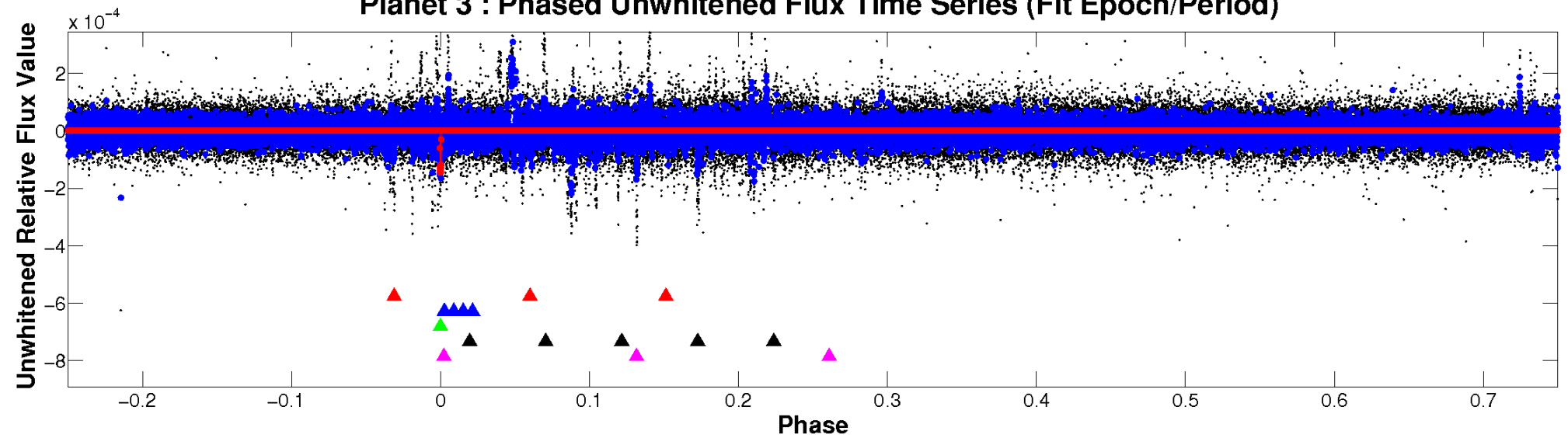
# ALT Odd/Even

TCE 010467815-03

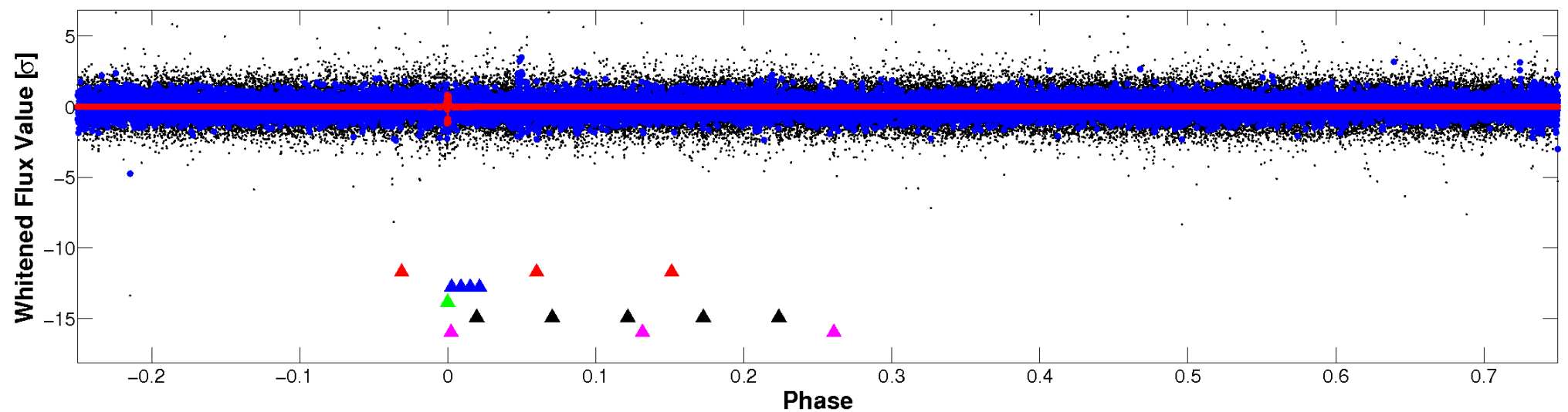


# Non-Whitened Vs. Whitened Light Curve

**Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)**

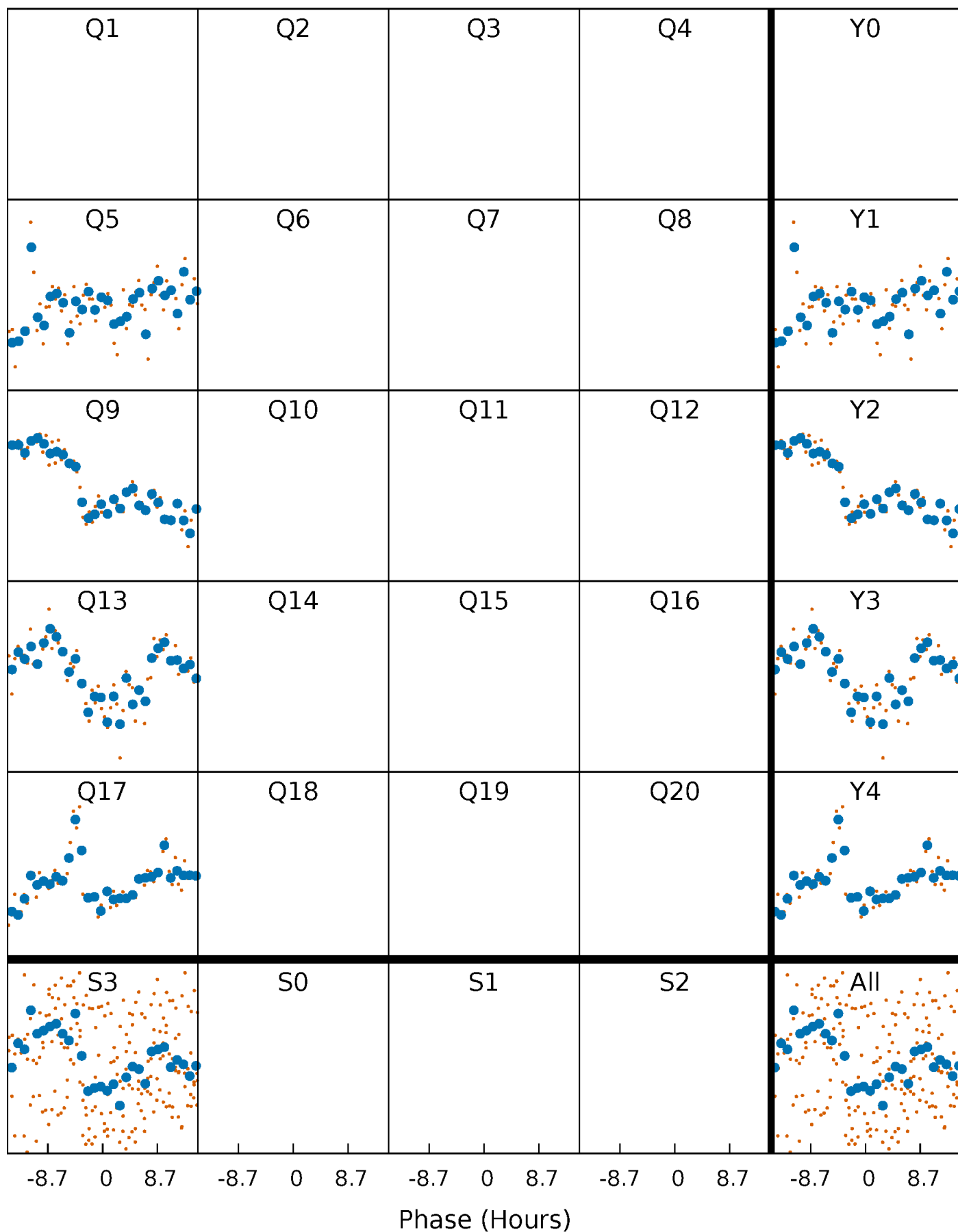


**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



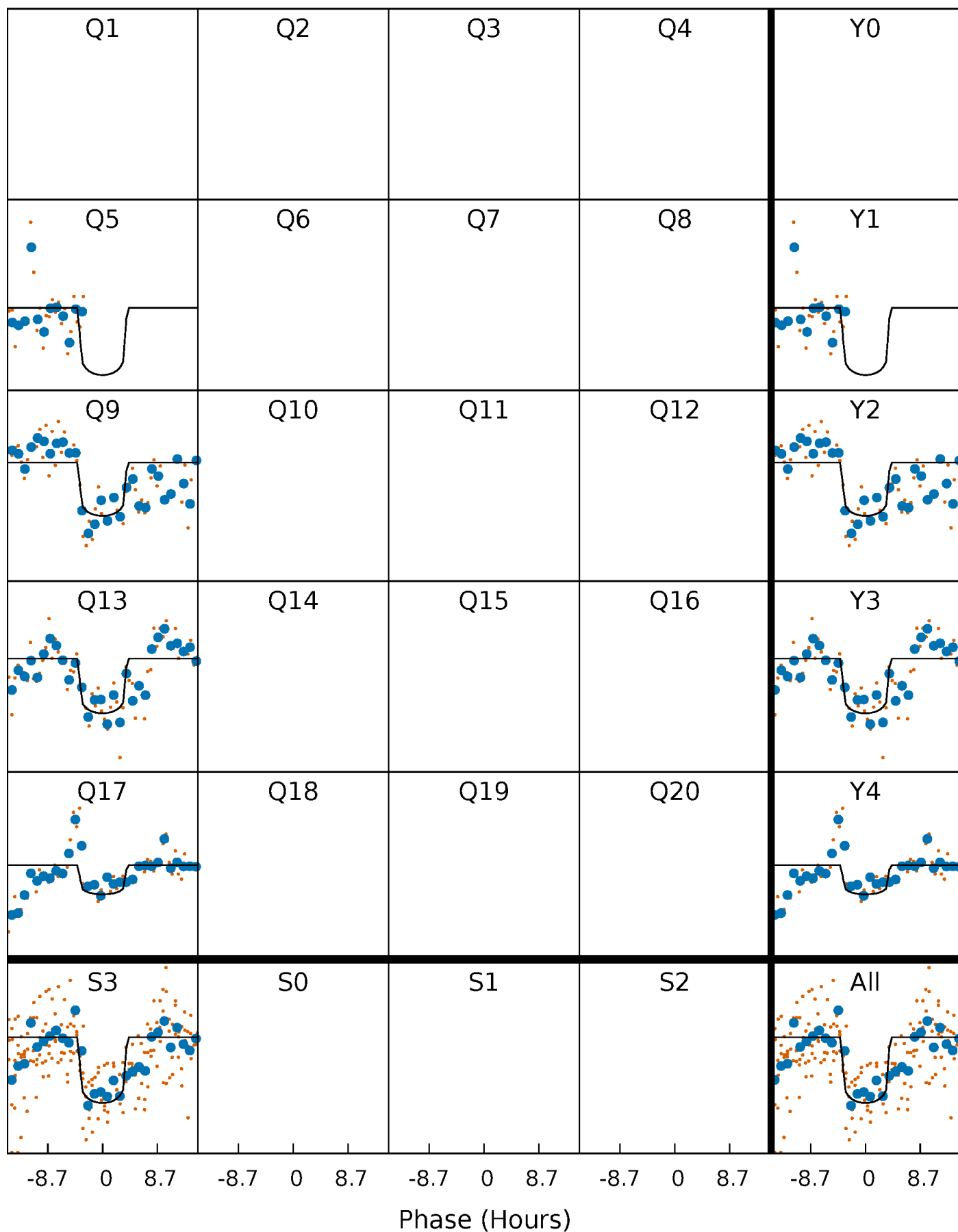
# PDC Quarter-Phased Transit Curves

TCE 010467815-03 P=368.909232 Days  $T_0=457.615781$  (BKJD)



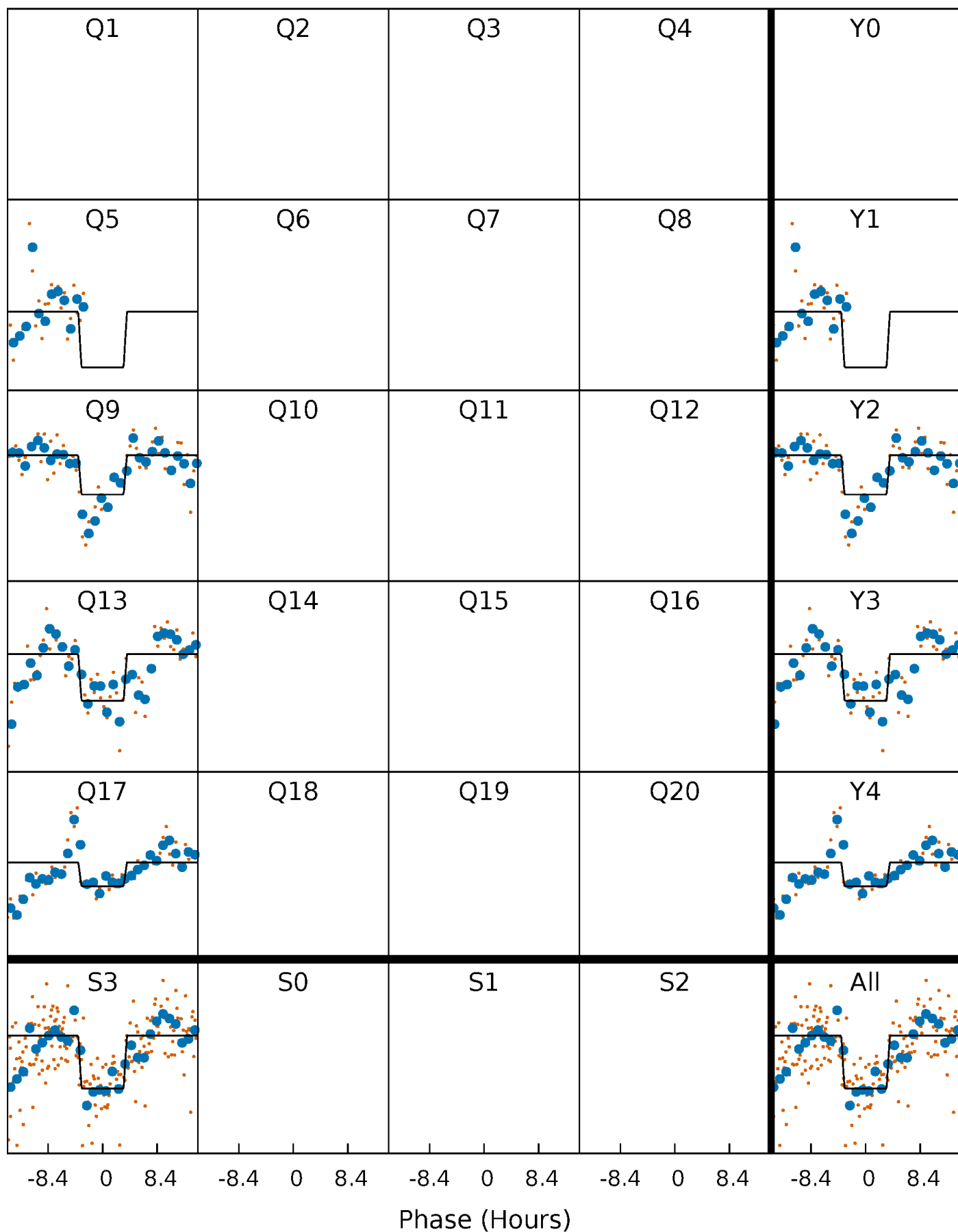
# DV Quarter-Phased Transit Curves

TCE 010467815-03   P=368.909232 Days    $T_0=457.615781$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

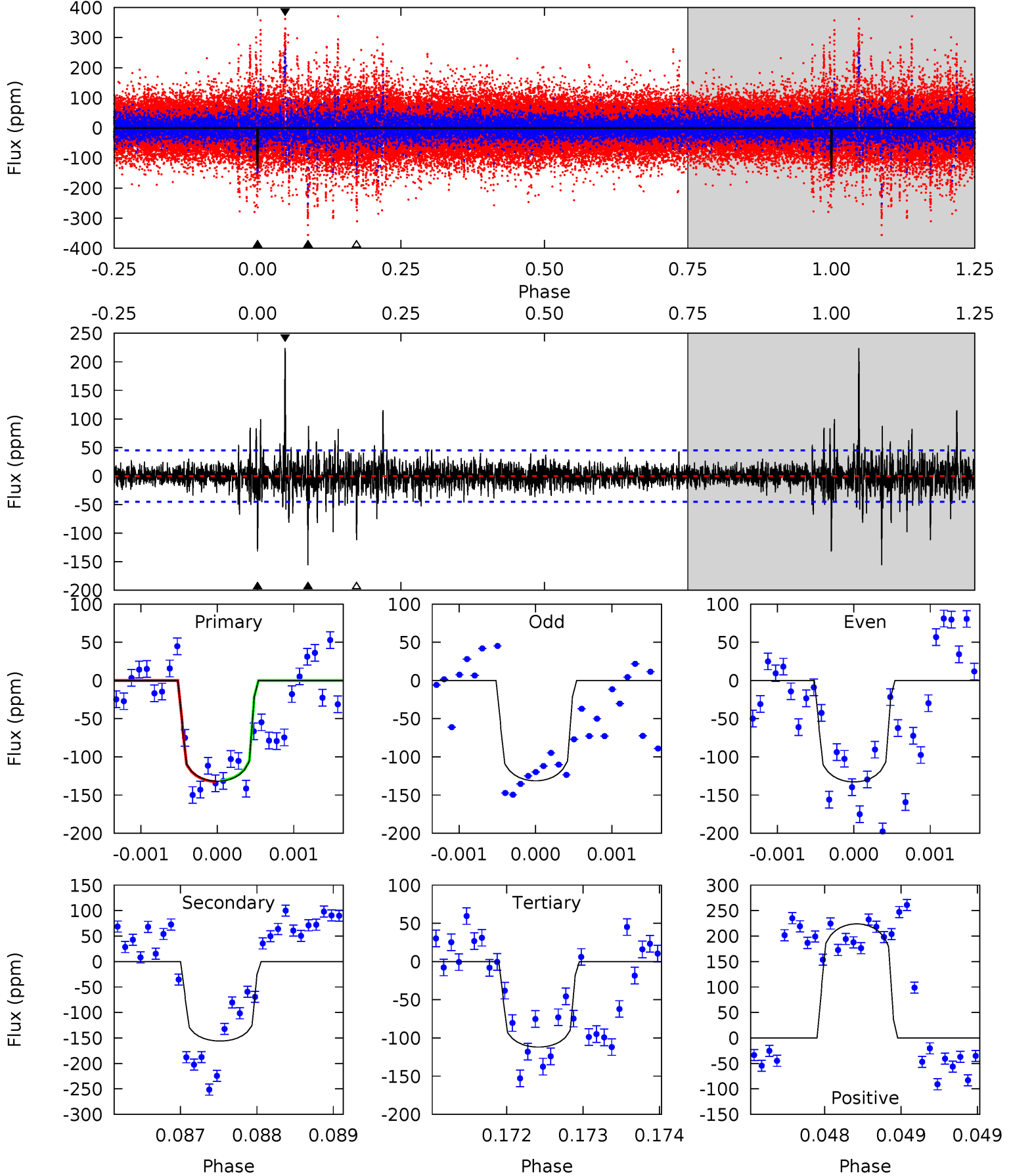
TCE 010467815-03   P=368.914303 Days    $T_0=457.610593$  (BKJD)



# DV Model-Shift Uniqueness Test

010467815-03, P = 368.909232 Days, E = 88.706549 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
16.1	19.0	13.6	27.3	5.47	3.33	2.09	2.43	-11.2	5.37	-8.28	0.08	0.83	0.59	0.08

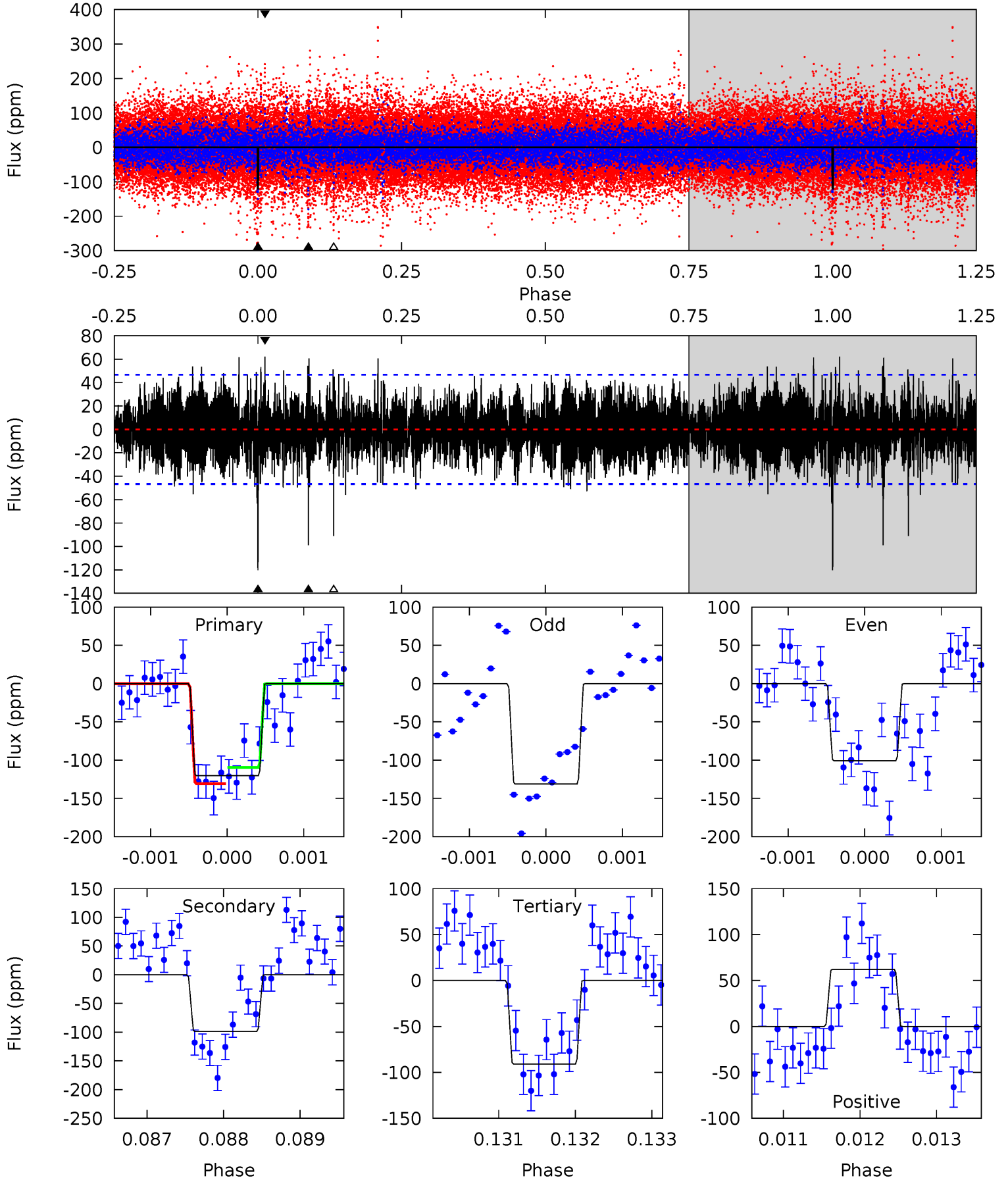




# Alt Model-Shift Uniqueness Test

010467815-03,  $P = 368.914303$  Days,  $E = 88.696290$  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
14.1	11.6	10.6	7.27	5.48	3.33	2.20	3.44	6.82	0.93	4.31	1.71	0.81	0.34	1.25



### Stellar Parameters For KIC 010467815

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$9030^{+251}_{-466}$	$3.822^{+0.351}_{-0.162}$	$0.070^{+0.150}_{-0.650}$	$3.218^{+0.977}_{-1.466}$	$2.505^{+0.299}_{-0.838}$	$0.106^{+0.330}_{-0.047}$
	+3%/-5%	+9%/-4%	+214%/-929%	+30%/-46%	+12%/-33%	+311%/-44%
Source	KIC0	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 010467815-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-156 \pm 8$	$3.93^{+2.54}_{-1.80}$	$830^{+78}_{-93}$	$8949^{+5475}_{-1986}$	$10027^{+24178}_{-6139}$
Alt.	$-99 \pm 9$	$3.78^{+2.32}_{-1.96}$	$830^{+85}_{-91}$	$8071^{+5625}_{-1810}$	$6675^{+23949}_{-4043}$

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

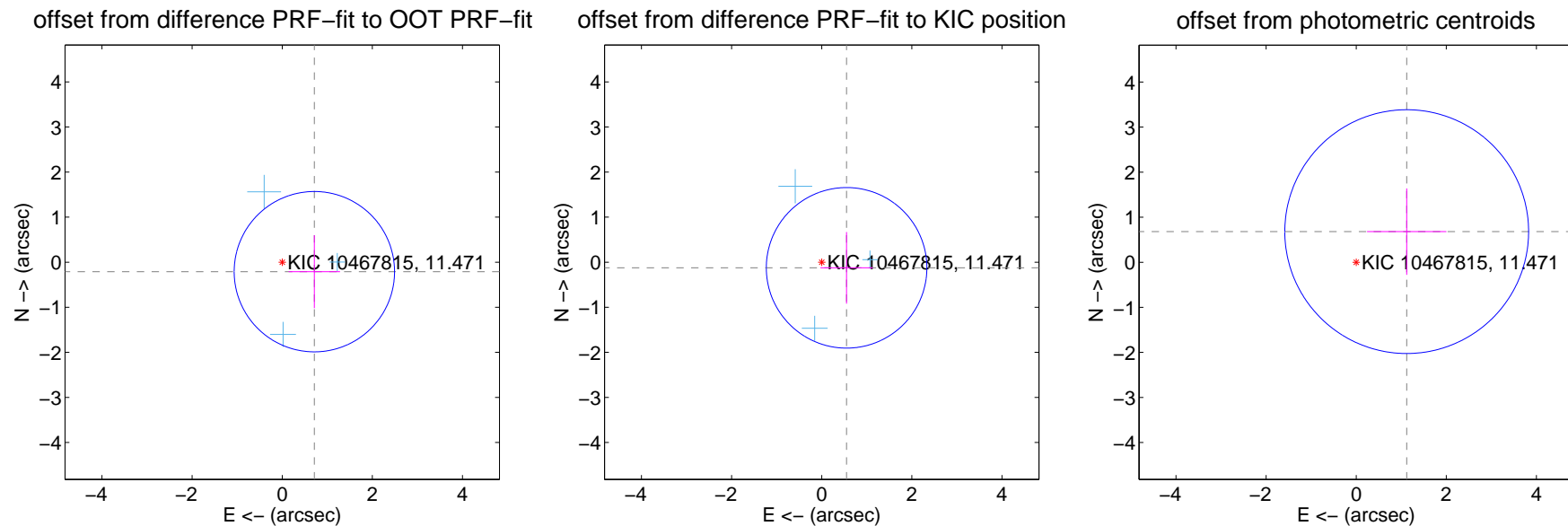
## DV Centroid Data

Supplemental centroid analysis for 010467815-03. **Kepler magnitude: 11.47.** Transit SNR 7.09

**There are 3 quarters with good PRF difference image offsets**

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

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.744 \pm 0.593$	1.25	$-0.713 \pm 0.570$	$-0.210 \pm 0.810$
PRF-fit source offset from KIC position	$0.566 \pm 0.594$	0.95	$-0.552 \pm 0.582$	$-0.125 \pm 0.795$
photometric centroid source offset	$1.31 \pm 0.90$	1.45	$-1.12 \pm 0.88$	$0.68 \pm 0.96$

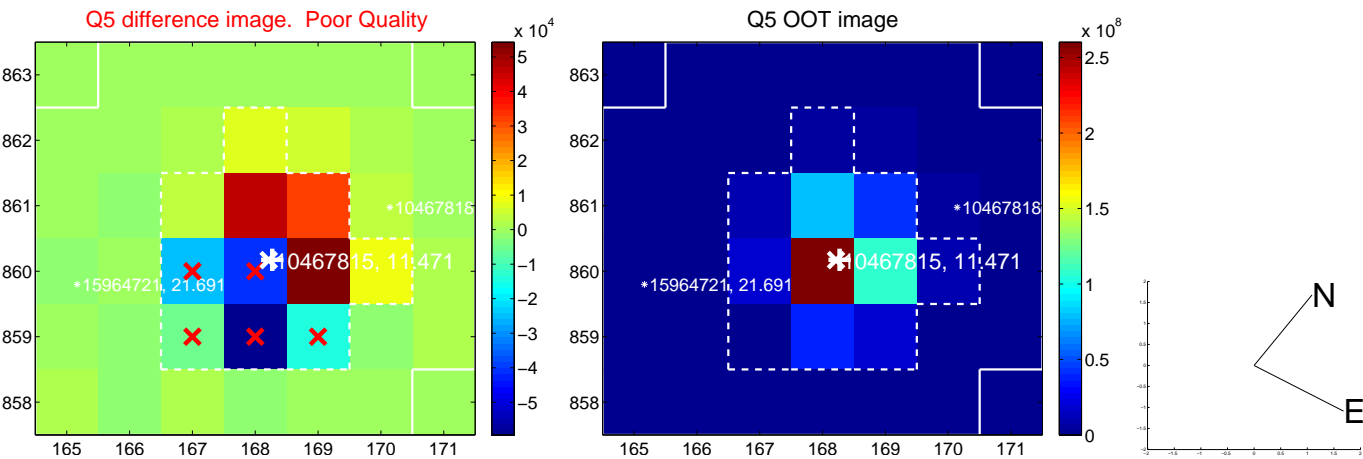


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

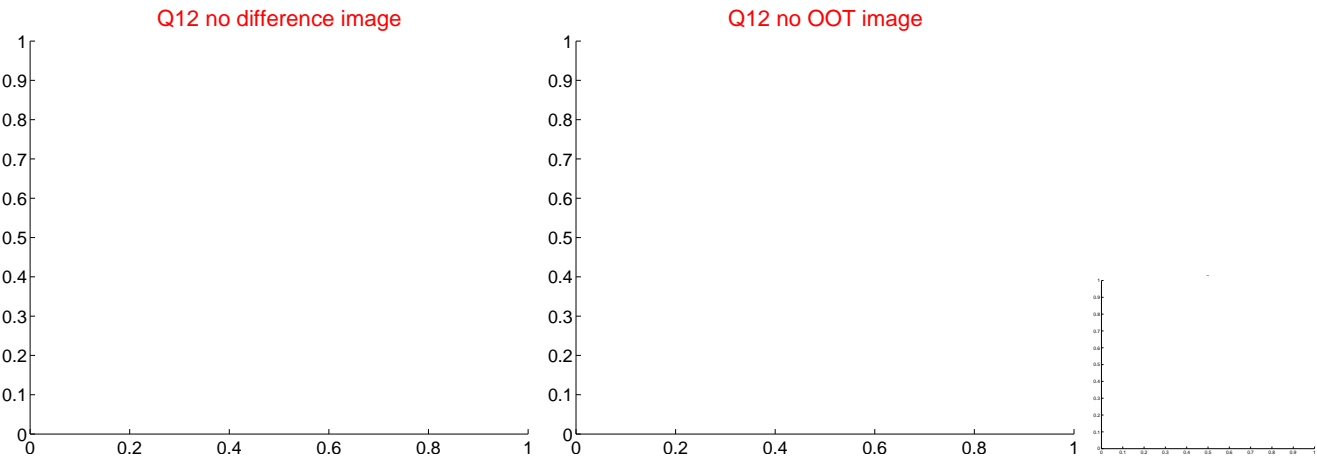
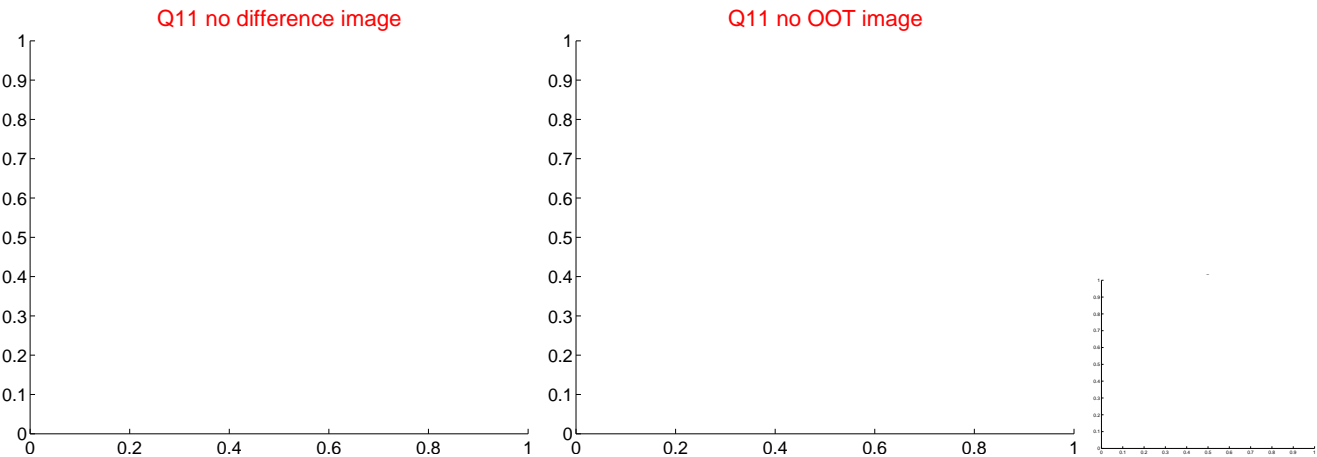
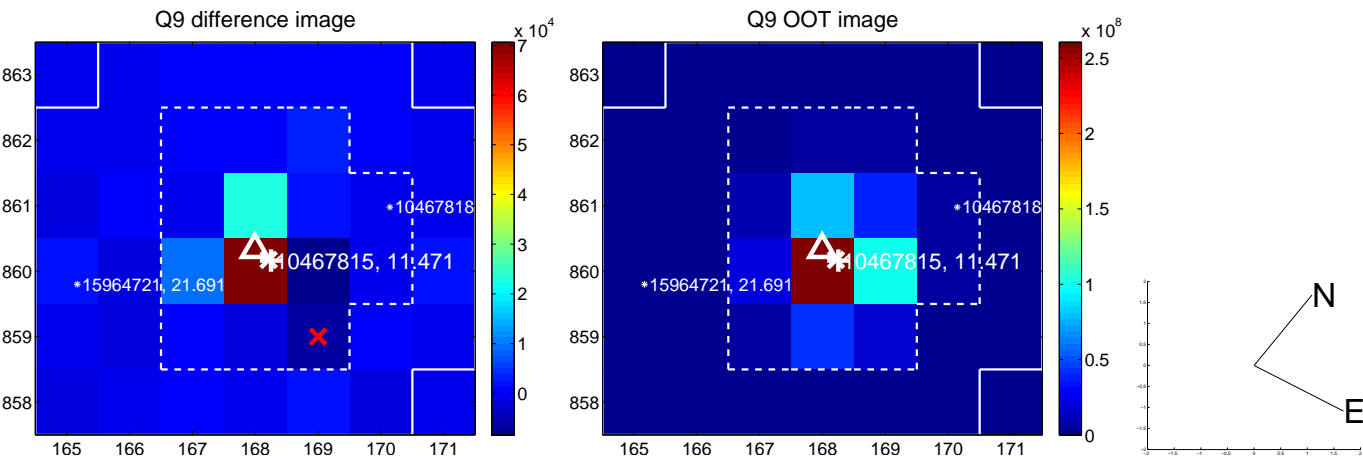
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



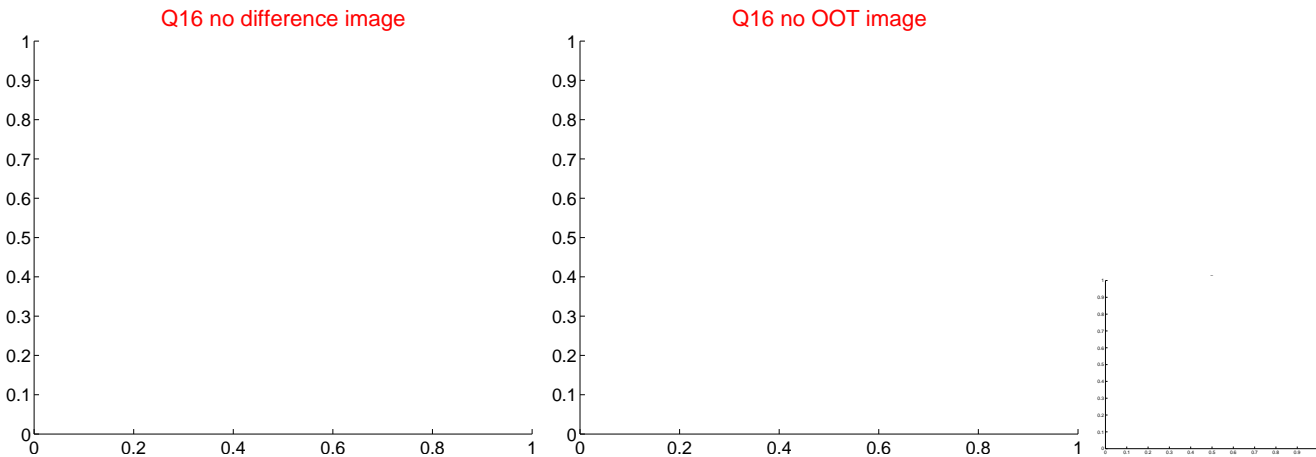
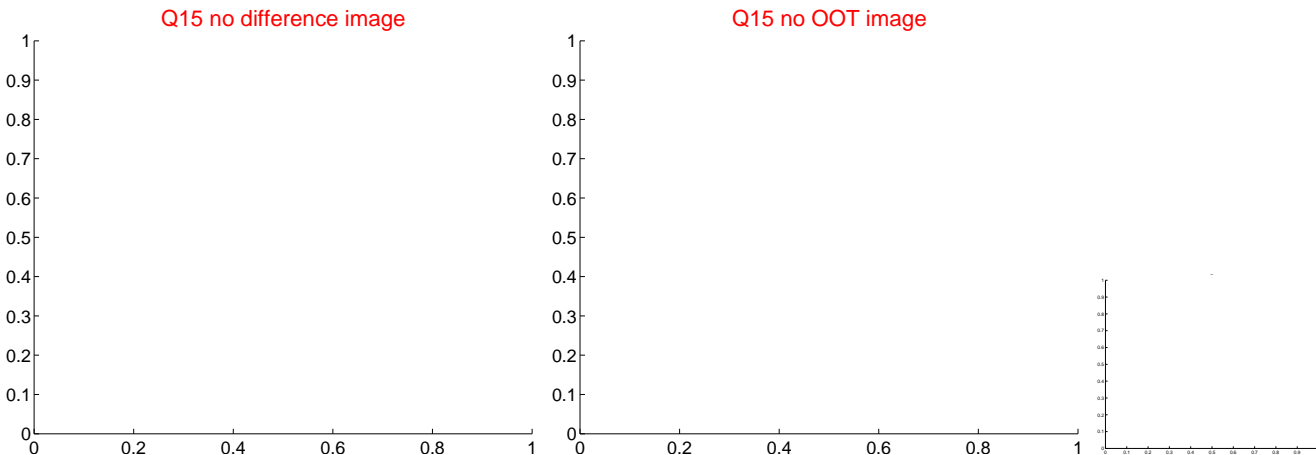
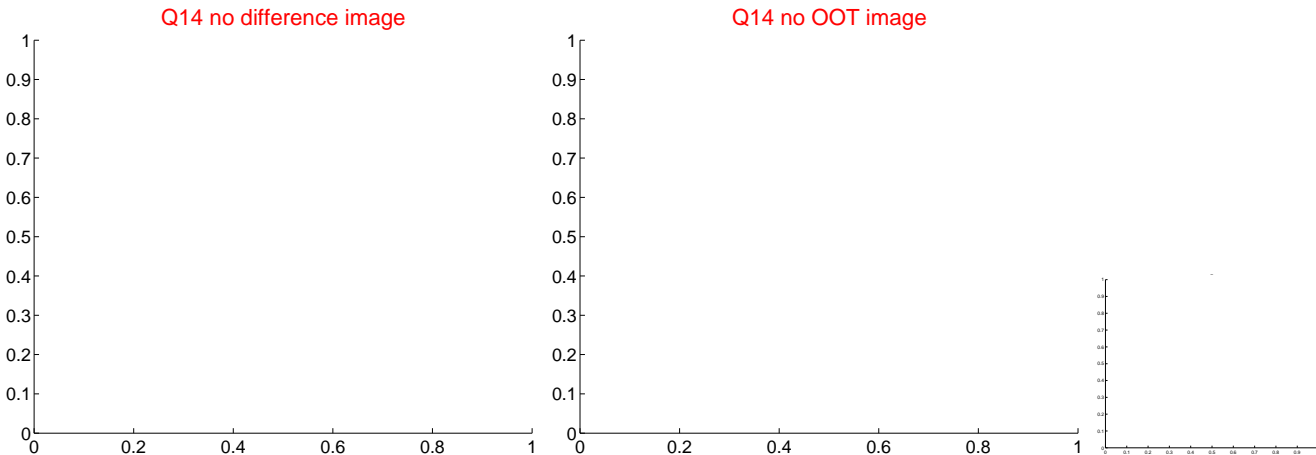
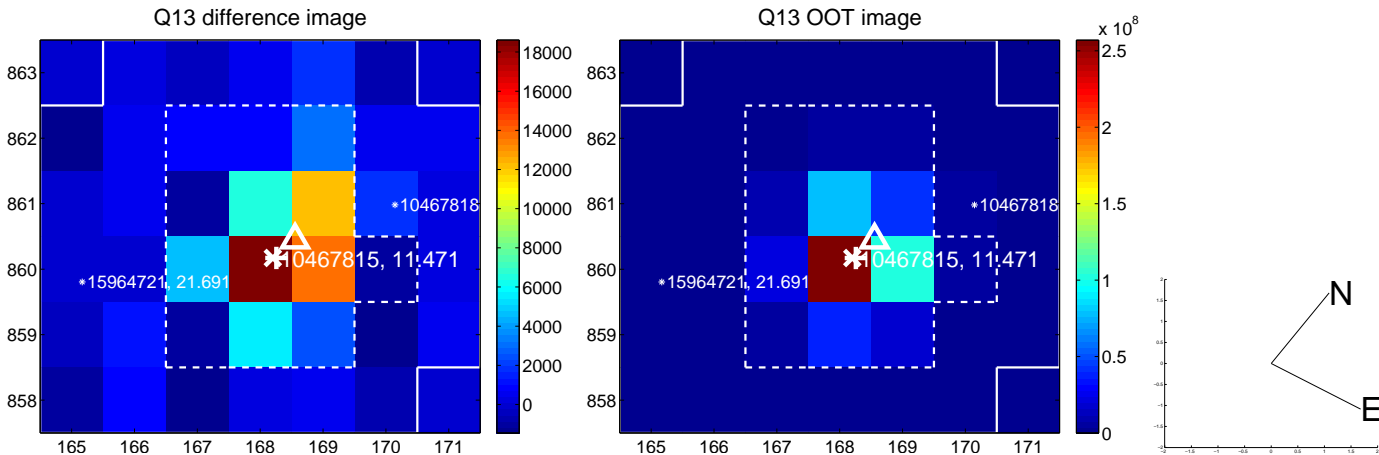
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



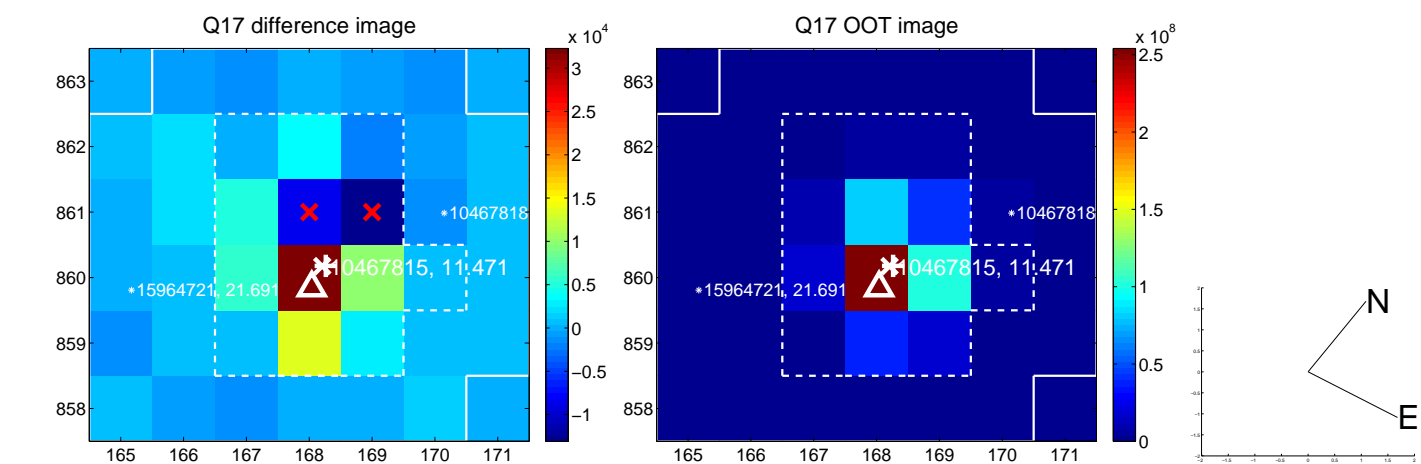
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



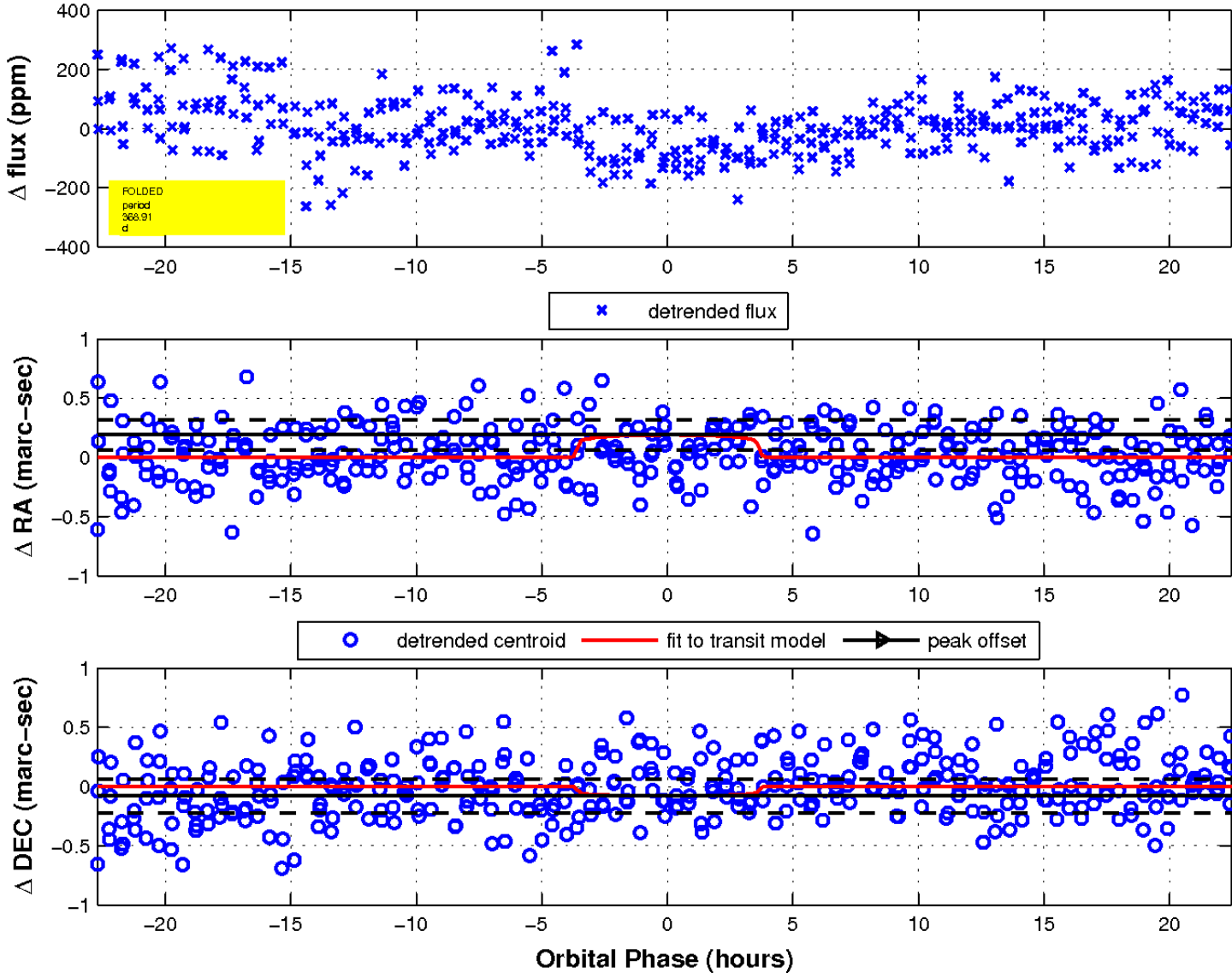
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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



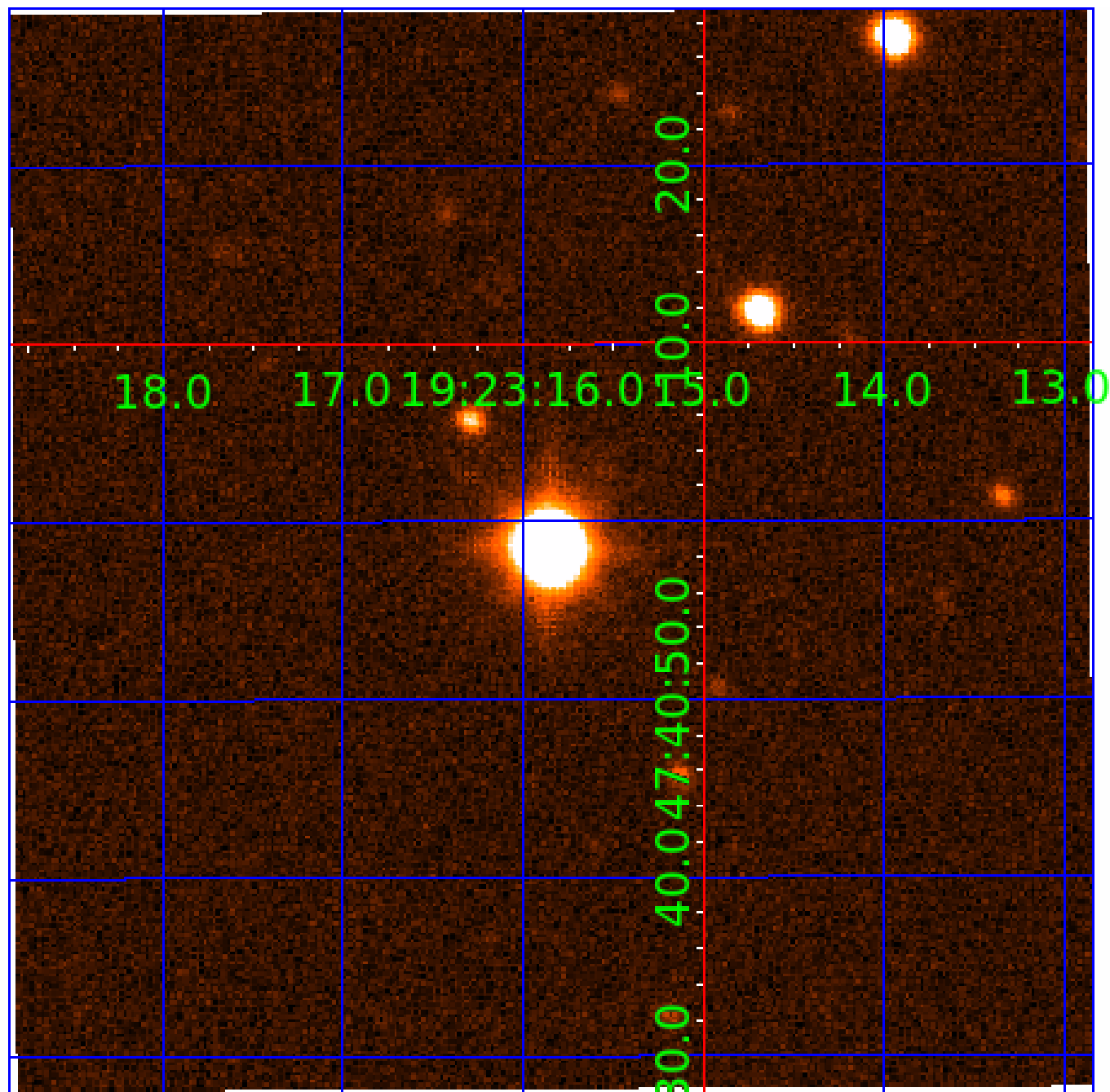
fluxWeightedCentroids, Planet 3 of 5





UKIRT Image

Declination



# KIC 010467815

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010467815-01	OBS	No	402.558470	446.139475	127.0	6.761	14.3	6.9	3.22	9030	4.11	29.35
010467815-02	OBS	3191.02	371.230486	458.599290	138.6	17.368	9.7	8.3	3.22	9030	3.92	32.70
010467815-03	OBS	No	368.909232	457.615781	145.9	7.572	7.9	7.1	3.22	9030	4.33	32.97
010467815-04	OBS	No	350.086426	171.236624	125.3	10.665	7.6	8.5	3.22	9030	4.48	35.36

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010467815-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_SATURATED
010467815-02	OBS	PC	0.60	0	0	0	0	CENT_SATURATED
010467815-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
010467815-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—CENT_SATURATED

**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 010467815-04

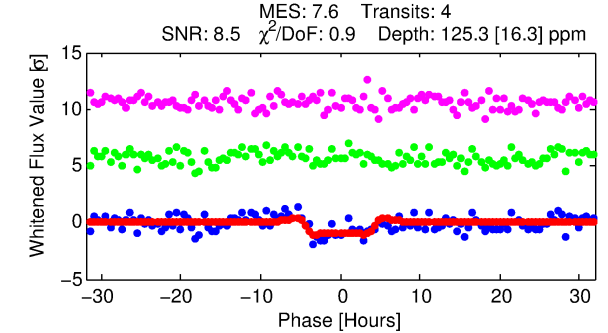
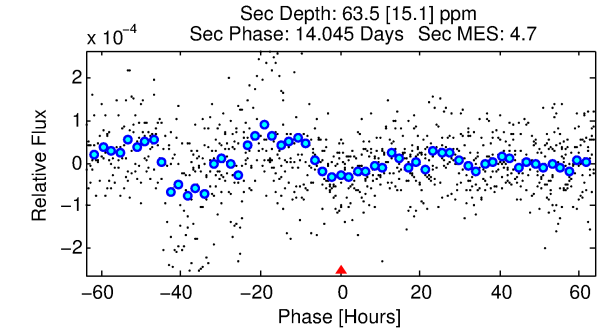
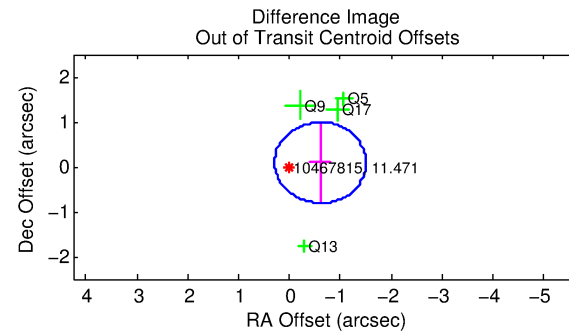
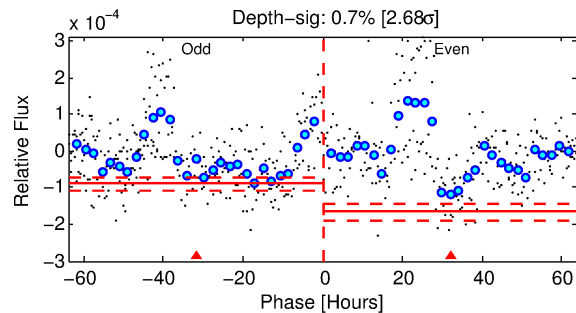
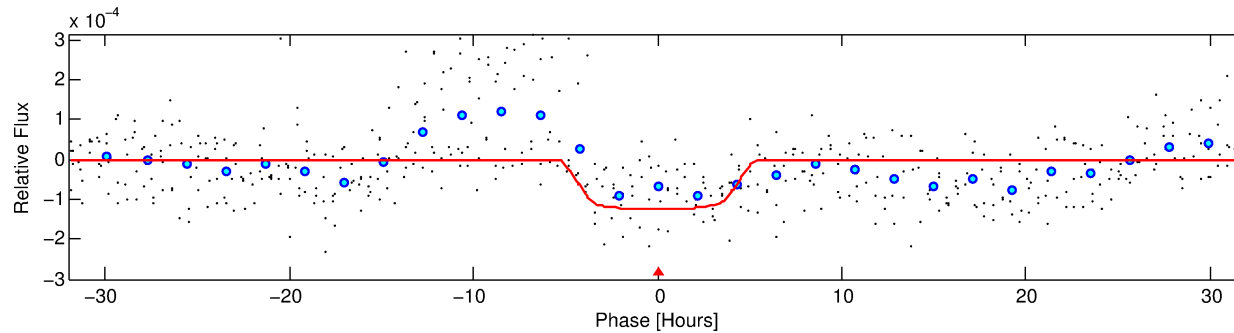
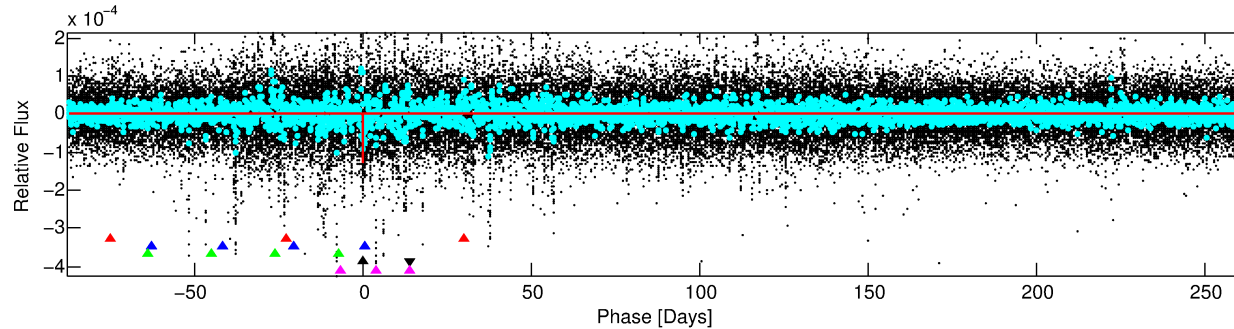
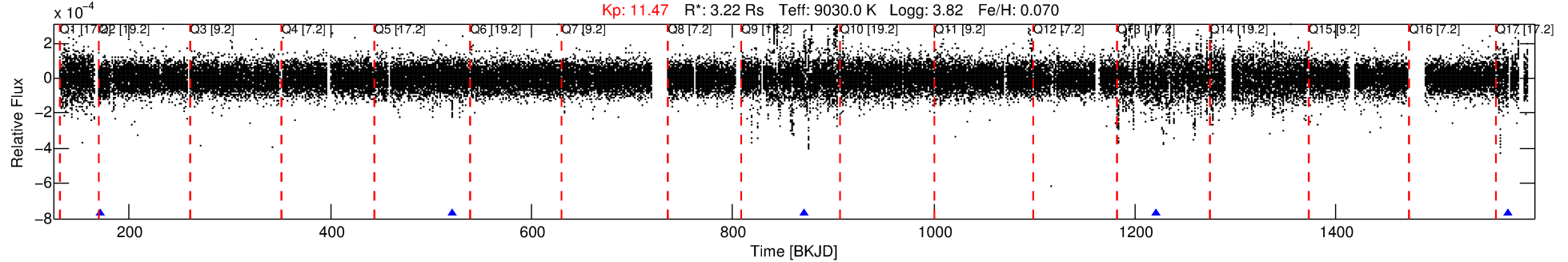
No Significant Match Found

# DV One-Page Summary

KIC: 10467815 Candidate: 4 of 5 Period: 350.086 d

KOI: K03191 Corr: No Ephemeris Match

Kp: 11.47 R\*: 3.22 Rs Teff: 9030.0 K Logg: 3.82 Fe/H: 0.070



## DV Fit Results:

Period = 350.08643 [0.00847] d  
Epoch = 171.2366 [0.0141] BKJD  
Rp/R\* = 0.0128 [0.0010]  
a/R\* = 72.41 [15.16]  
b = 0.97 [0.01]  
Seff = 35.36 [23.05]  
Teff = 622 [101] K  
Rp = 4.48 [2.07] Re  
a = 1.3209 [0.5363] AU  
Ag = 3033.78 [2060.55] [1.47σ]  
Teffp = 7135 [621] K [10.34σ]

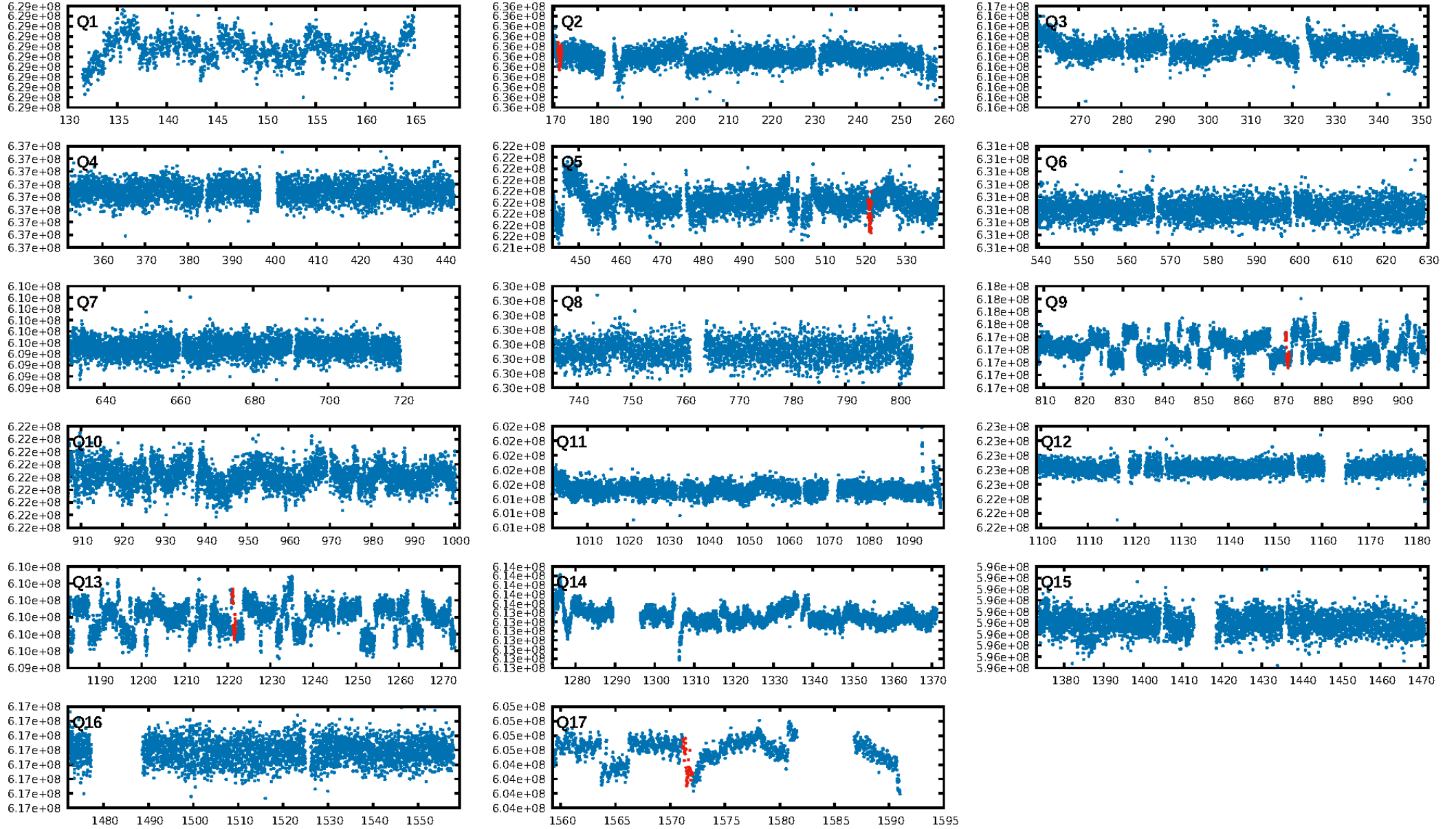
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [34.54σ]  
ModelChiSquare2-sig: 8.2%  
ModelChiSquareGof-sig: 99.2%  
**Bootstrap-pfa: 5.20e-09**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 2.912  
**Centroid-sig: 0.2%**  
Centroid-so: 2.244 arcsec [2.24σ]  
OotOffset-rm: 0.614 arcsec [2.05σ]  
KicOffset-rm: 0.481 arcsec [0.90σ]  
OotOffset-st: 0/0/0/4 [4]  
KicOffset-st: 0/0/0/4 [4]  
DiffImageQuality-fgm: 1.00 [4/4]  
DiffImageOverlap-fno: 0.75 [3/4]

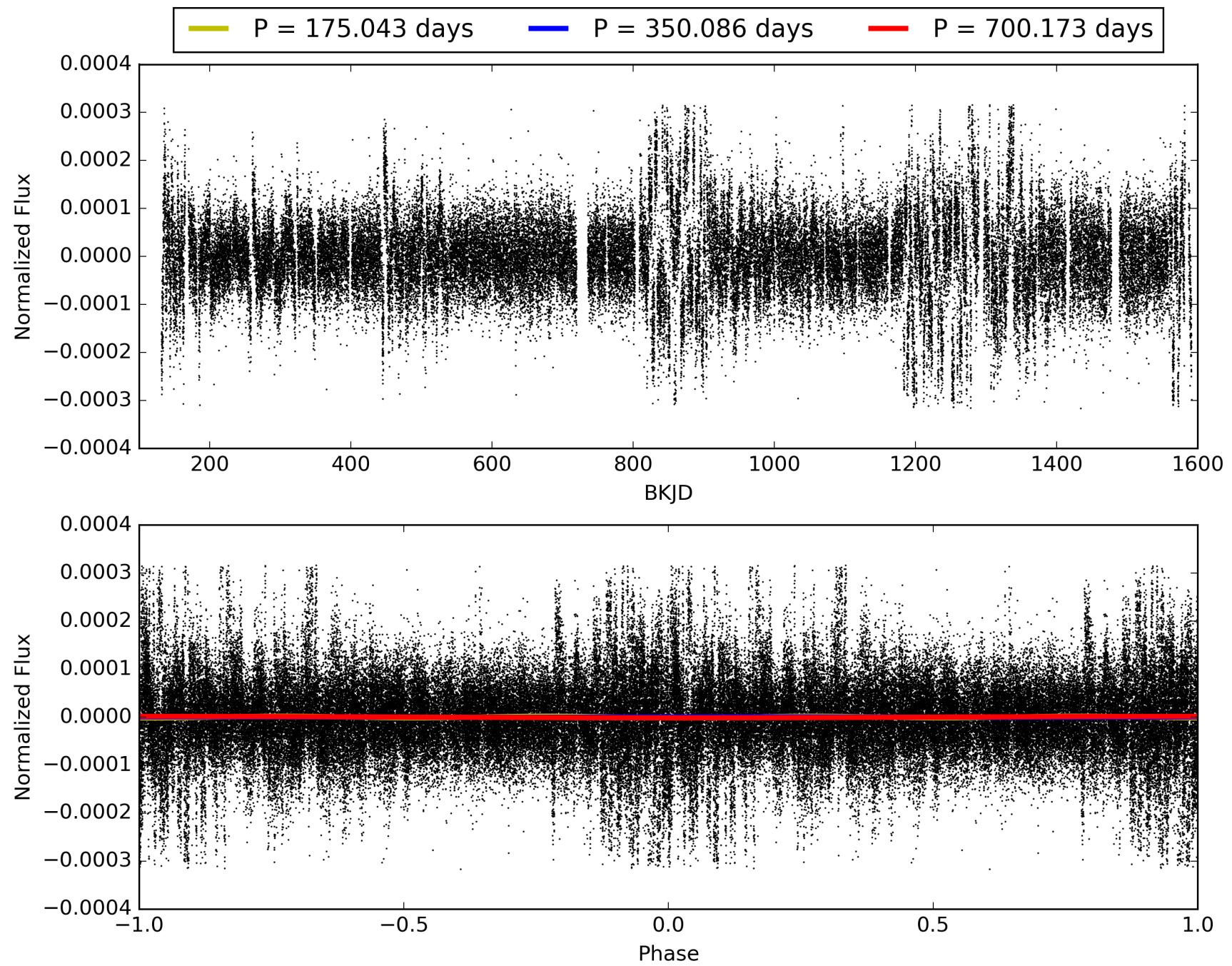
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 22:05:55 Z

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

# TCE 010467815-04, PDC Light Curves

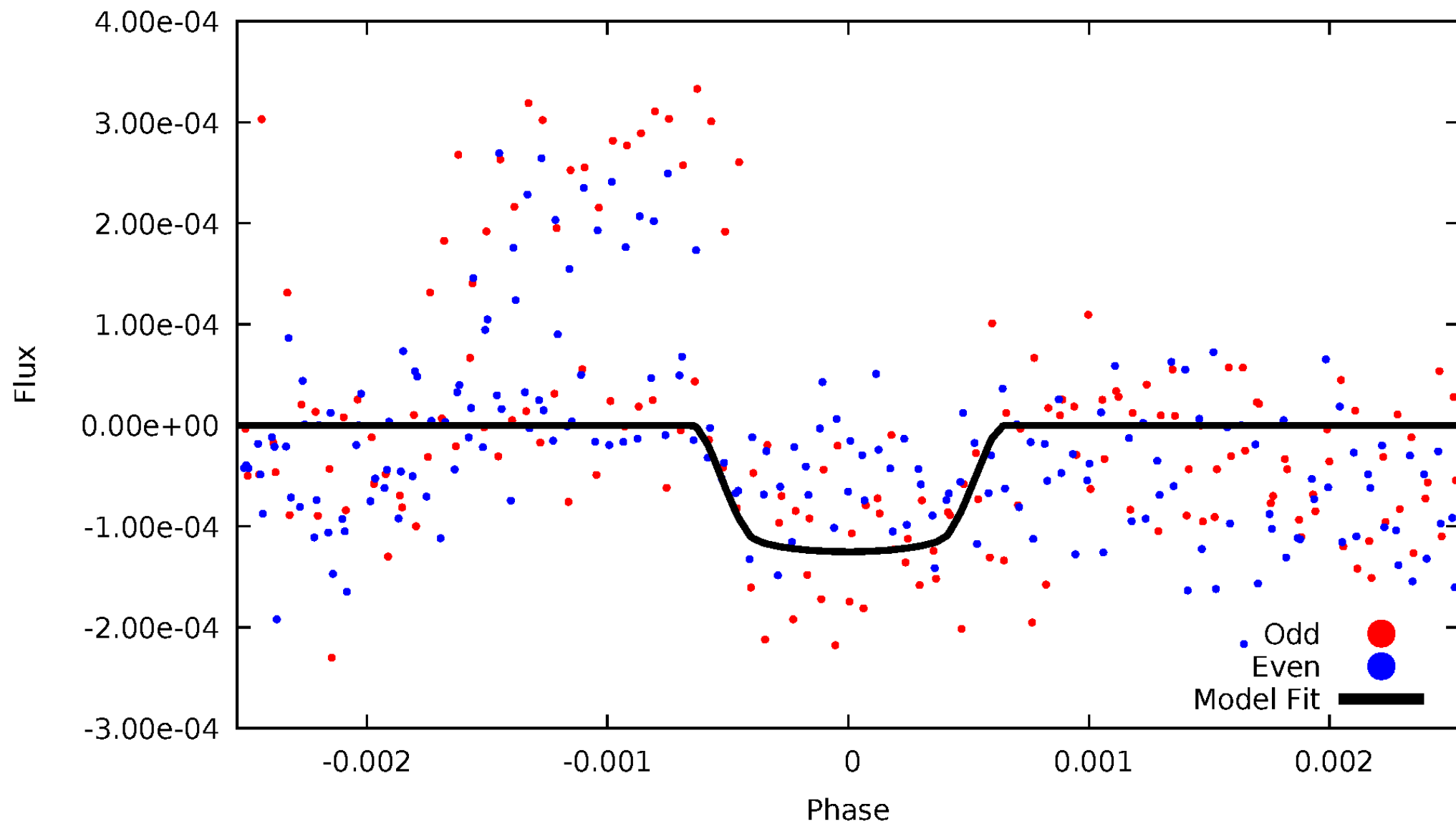


TCE 010467815-04



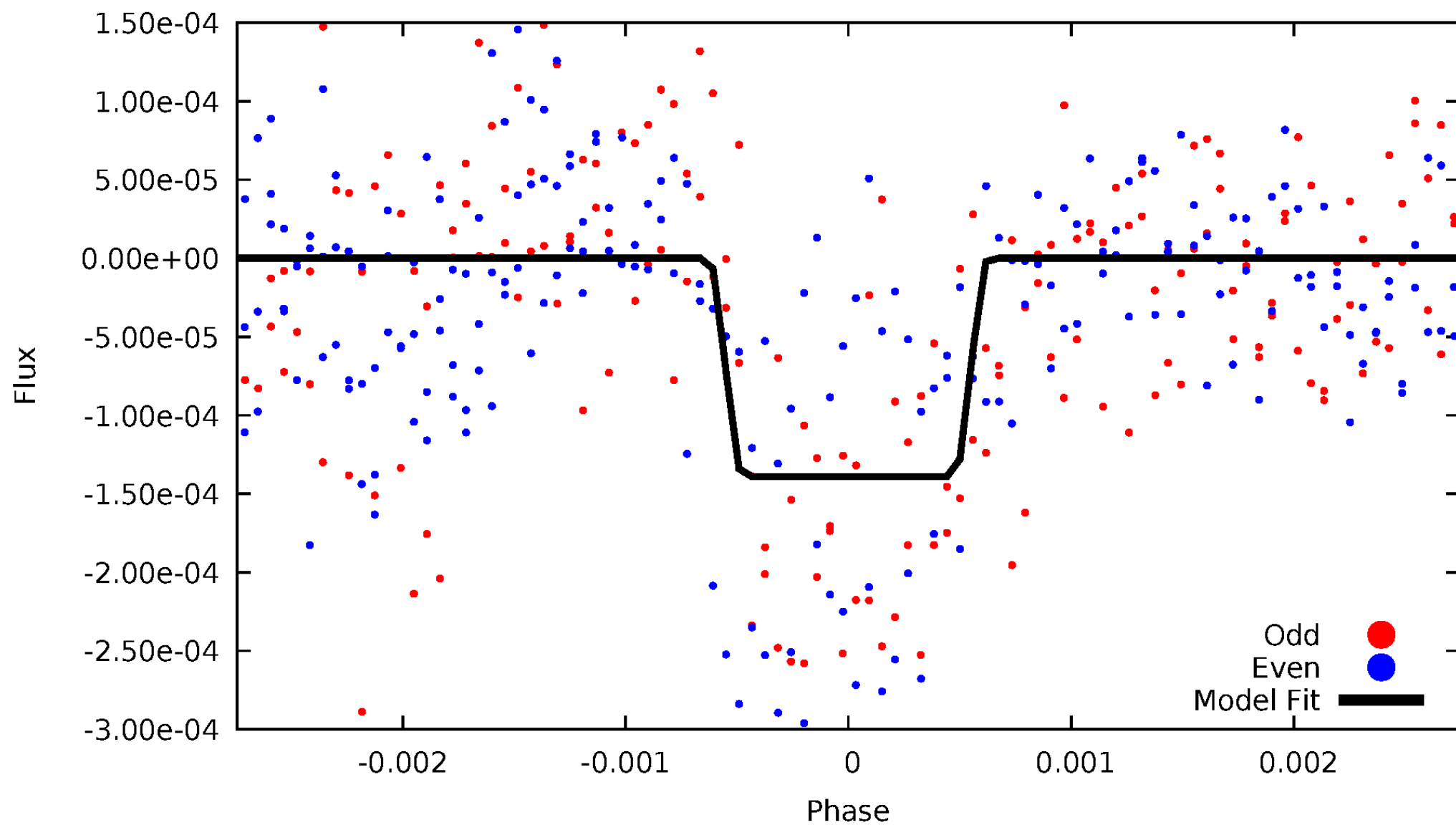
# DV Odd/Even

TCE 010467815-04



# ALT Odd/Even

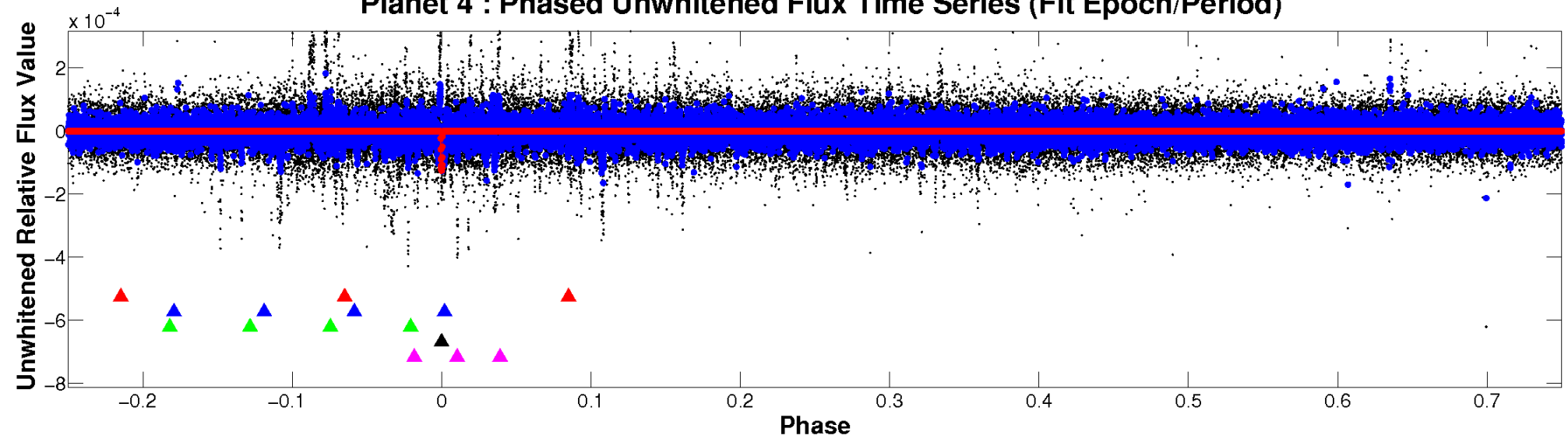
TCE 010467815-04



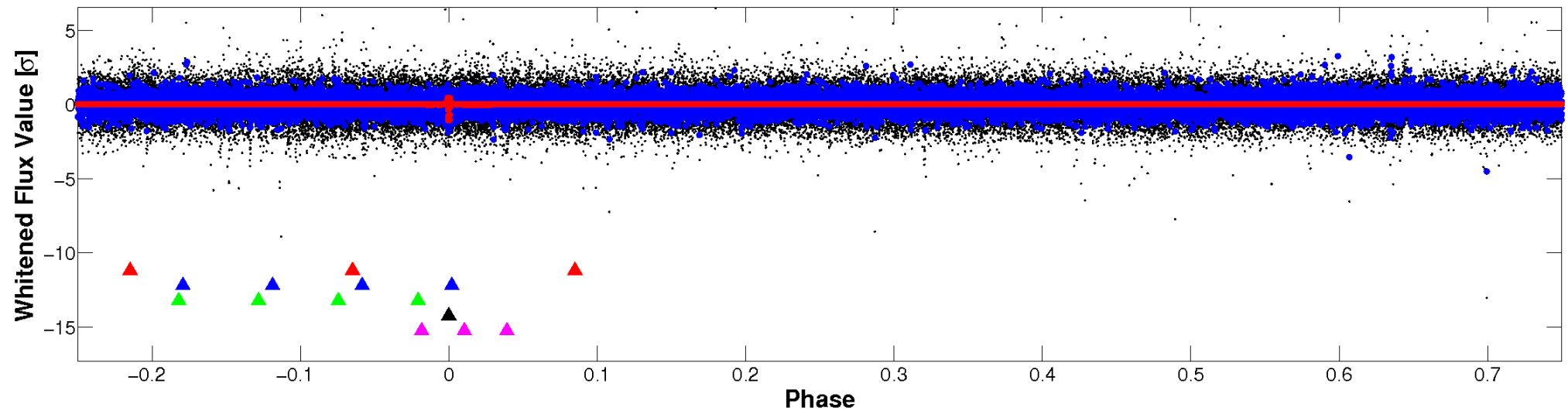


# Non-Whitened Vs. Whitened Light Curve

## Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)





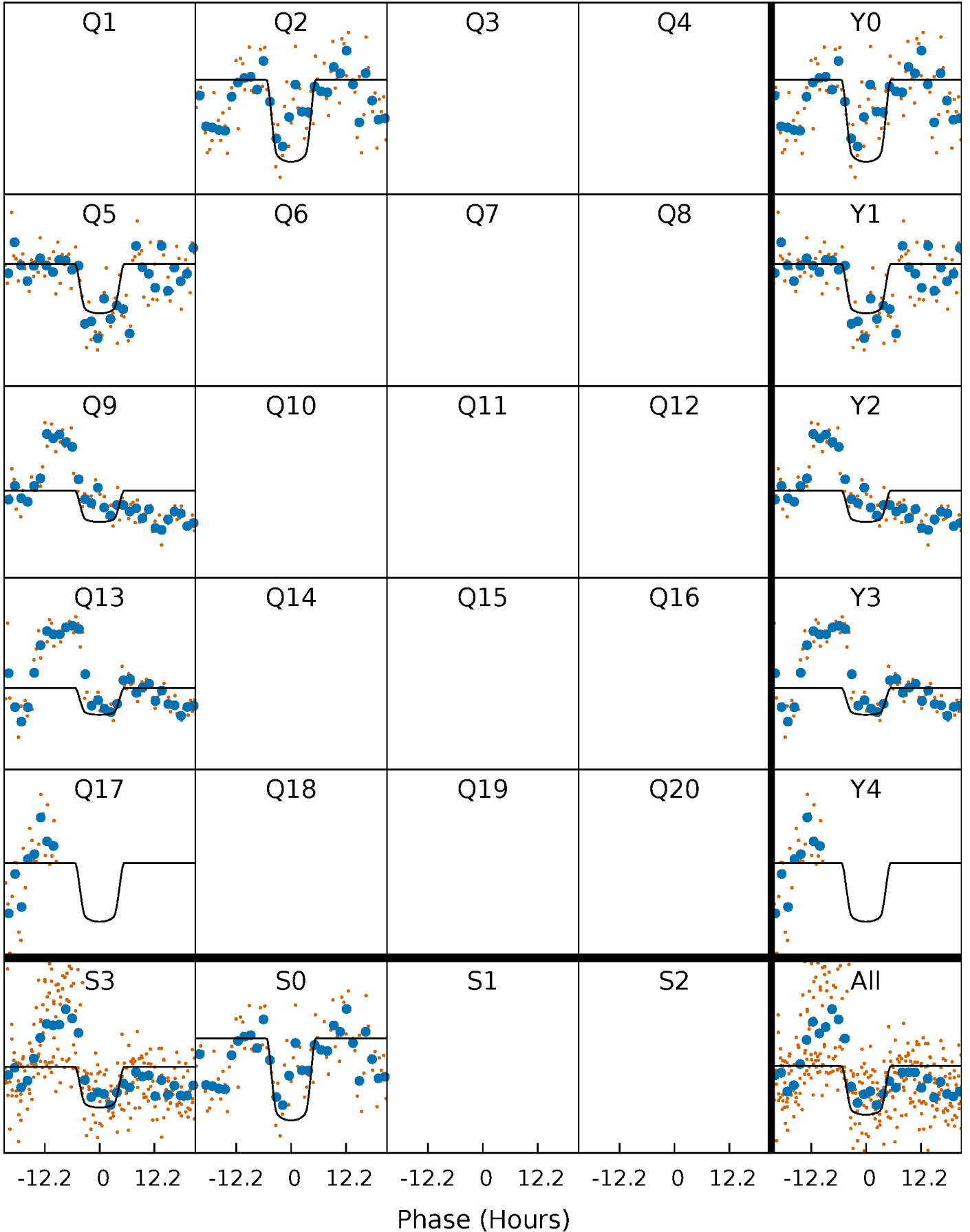
# PDC Quarter-Phased Transit Curves

TCE 010467815-04     $P=350.086426$  Days     $T_0=171.236624$  (BKJD)



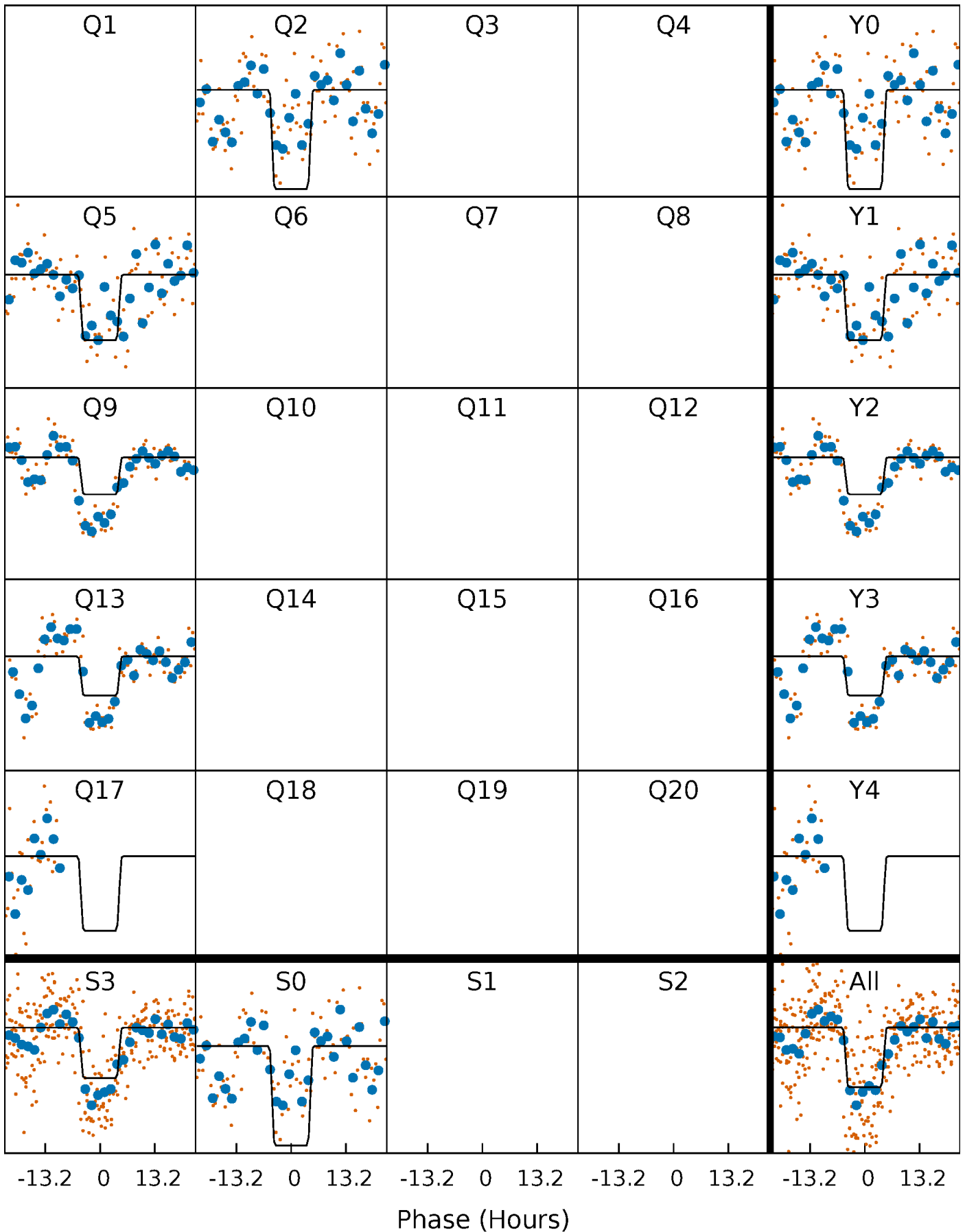
# DV Quarter-Phased Transit Curves

TCE 010467815-04     $P=350.086426$  Days     $T_0=171.236624$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

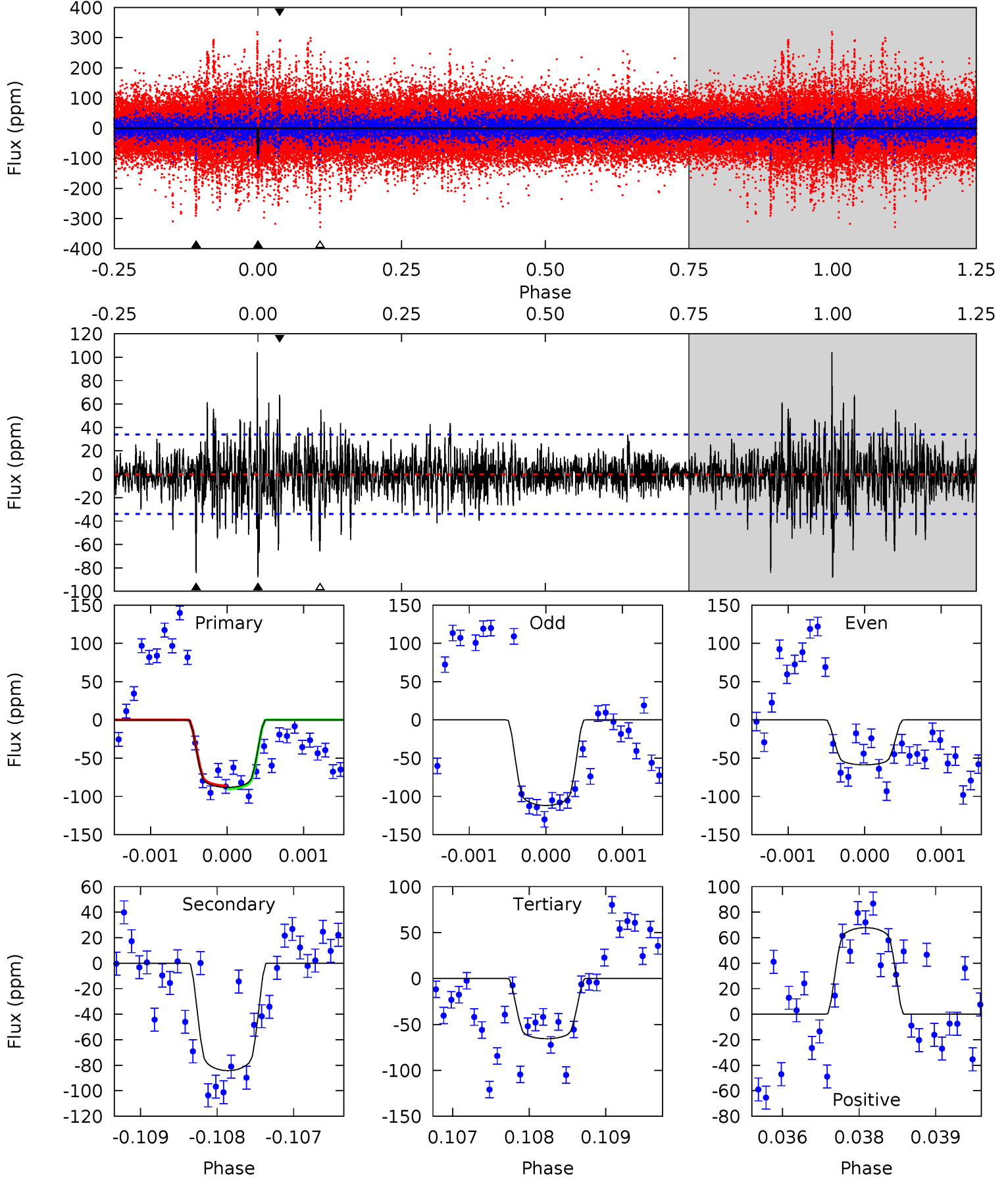
TCE 010467815-04     $P=350.088184$  Days     $T_0=171.244691$  (BKJD)



# DV Model-Shift Uniqueness Test

010467815-04, P = 350.086426 Days, E = 171.236624 Days

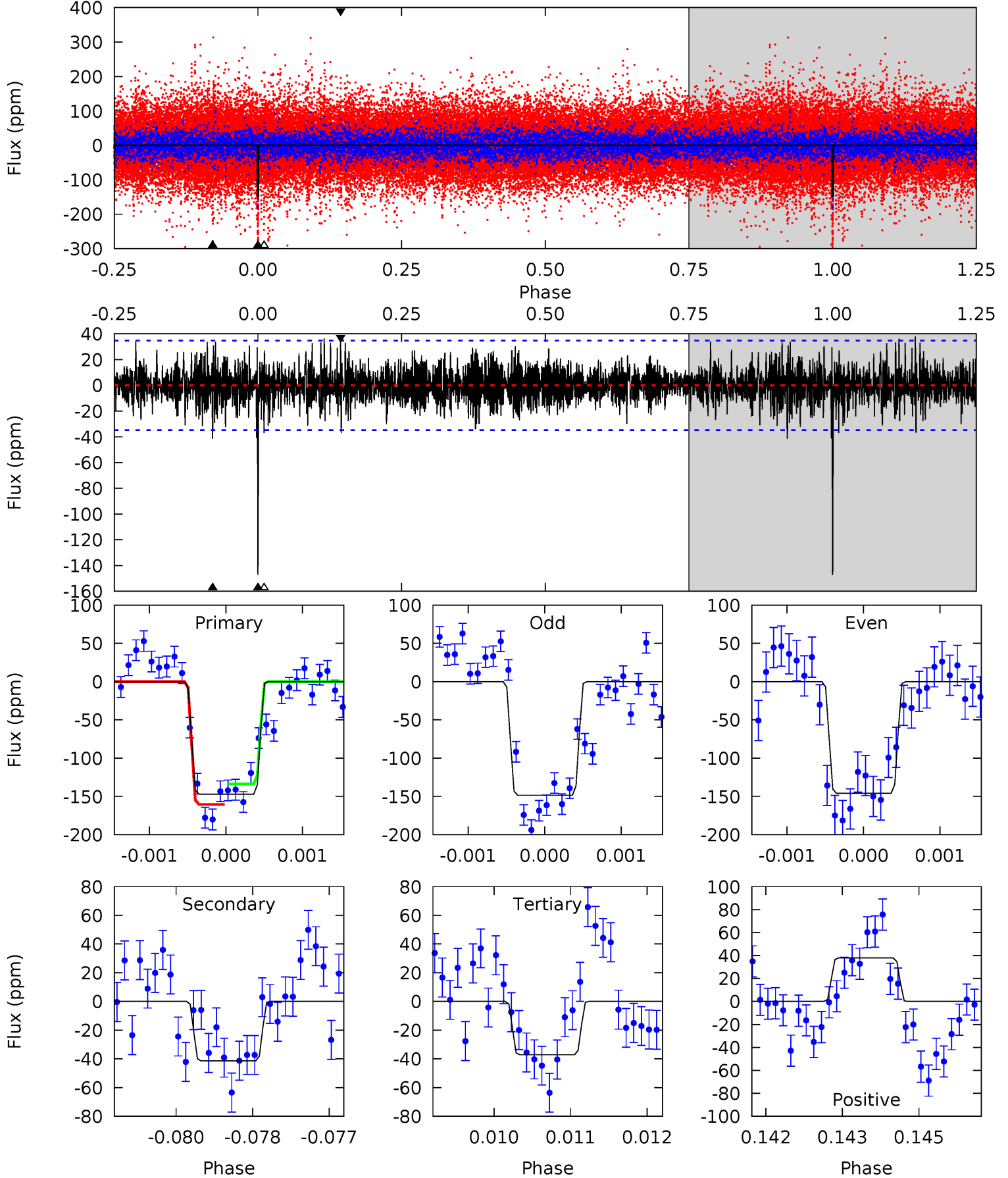
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.0	13.4	10.4	10.8	5.40	3.22	2.35	3.60	3.24	2.97	2.60	4.20	1.34	0.54	0.30



# Alt Model-Shift Uniqueness Test

010467815-04, P = 350.088184 Days, E = 171.244691 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
22.9	6.44	5.78	5.89	5.41	3.23	1.63	17.1	17.0	0.66	0.55	0.20	0.99	0.20	2.09



### Stellar Parameters For KIC 010467815

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$9030^{+251}_{-466}$	$3.822^{+0.351}_{-0.162}$	$0.070^{+0.150}_{-0.650}$	$3.218^{+0.977}_{-1.466}$	$2.505^{+0.299}_{-0.838}$	$0.106^{+0.330}_{-0.047}$
	+3%/-5%	+9%/-4%	+214%/-929%	+30%/-46%	+12%/-33%	+311%/-44%
Source	KIC0	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 010467815-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-84 \pm 6$	$4.29^{+0.81}_{-1.01}$	$846^{+80}_{-99}$	$7305^{+418}_{-452}$	$4341^{+2629}_{-1326}$
Alt.	$-41 \pm 6$	$3.95^{+0.84}_{-0.95}$	$844^{+83}_{-94}$	$6259^{+432}_{-391}$	$2483^{+1672}_{-818}$

$T_{\text{max}}$  = 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

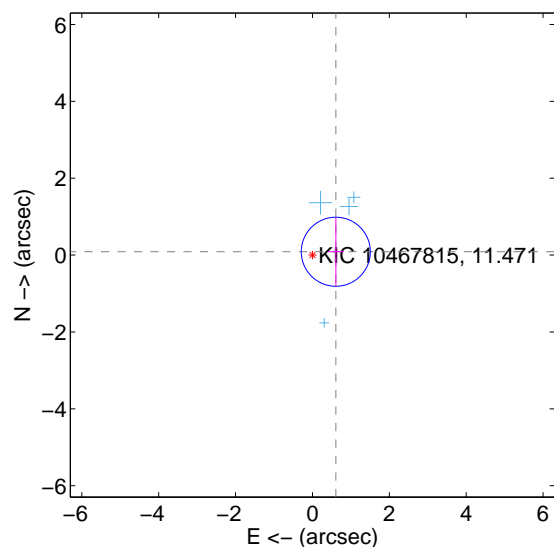
Supplemental centroid analysis for 010467815-04. **Kepler magnitude: 11.47.** Transit SNR 8.53

There are 4 quarters with good PRF difference image offsets

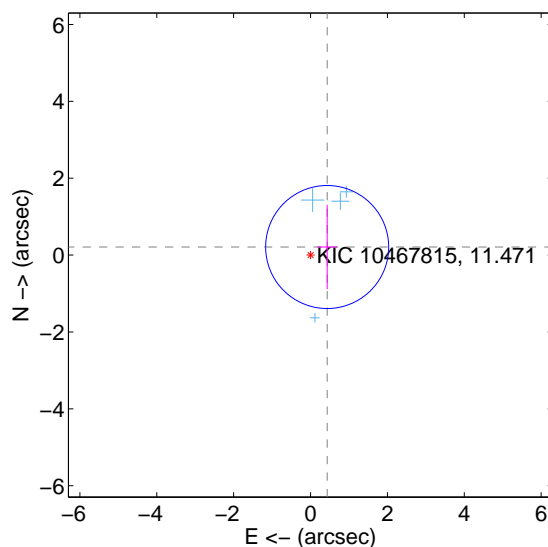
The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.614 \pm 0.299$	2.05	$-0.608 \pm 0.206$	$0.087 \pm 0.891$
PRF-fit source offset from KIC position	$0.481 \pm 0.533$	0.90	$-0.433 \pm 0.259$	$0.210 \pm 1.099$
photometric centroid source offset	$2.24 \pm 1.00$	2.24	$-1.18 \pm 0.99$	$1.91 \pm 1.01$

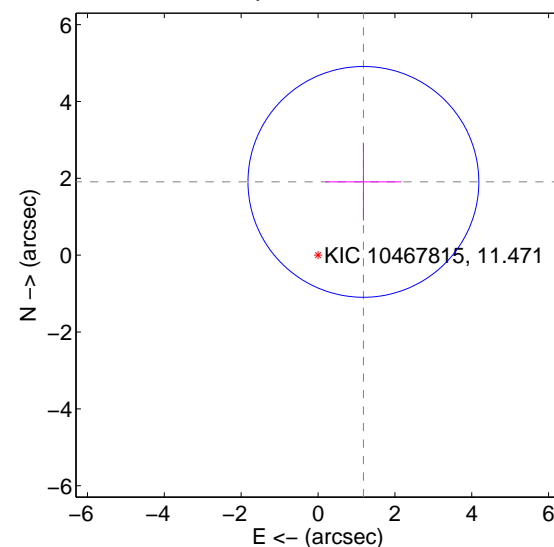
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids



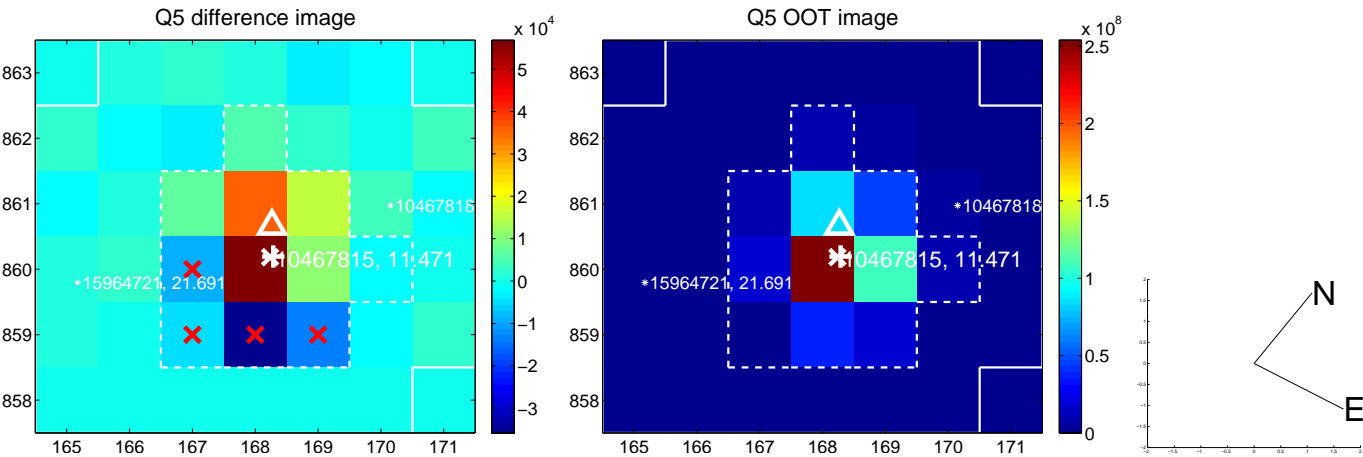
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

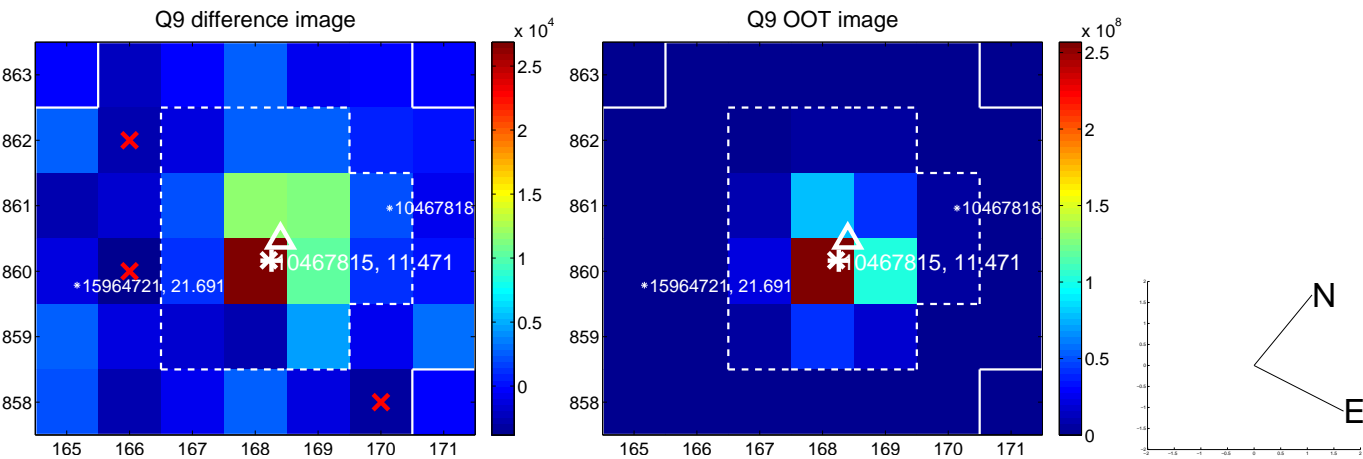




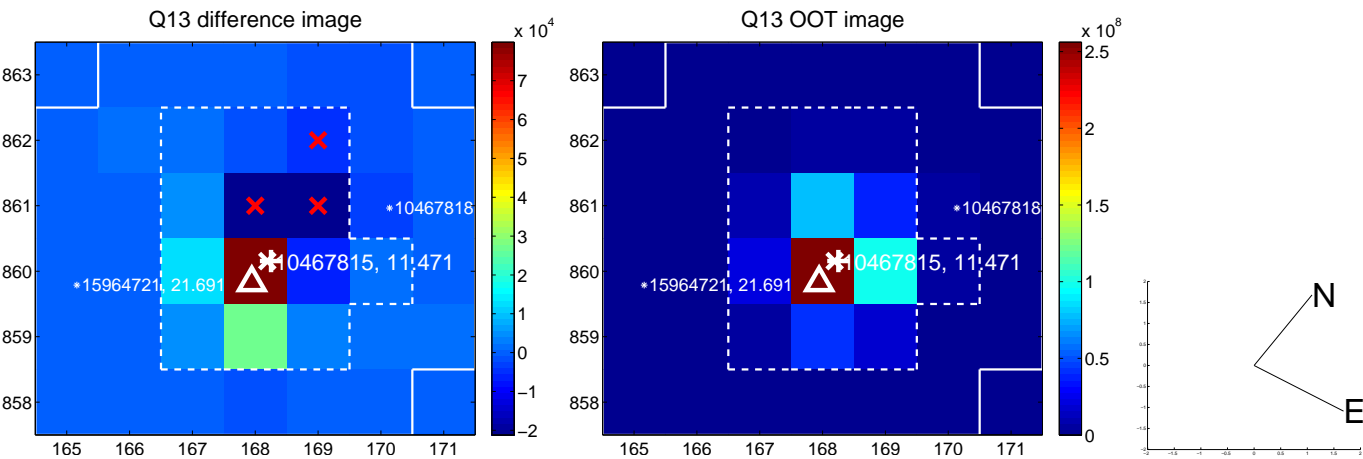
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



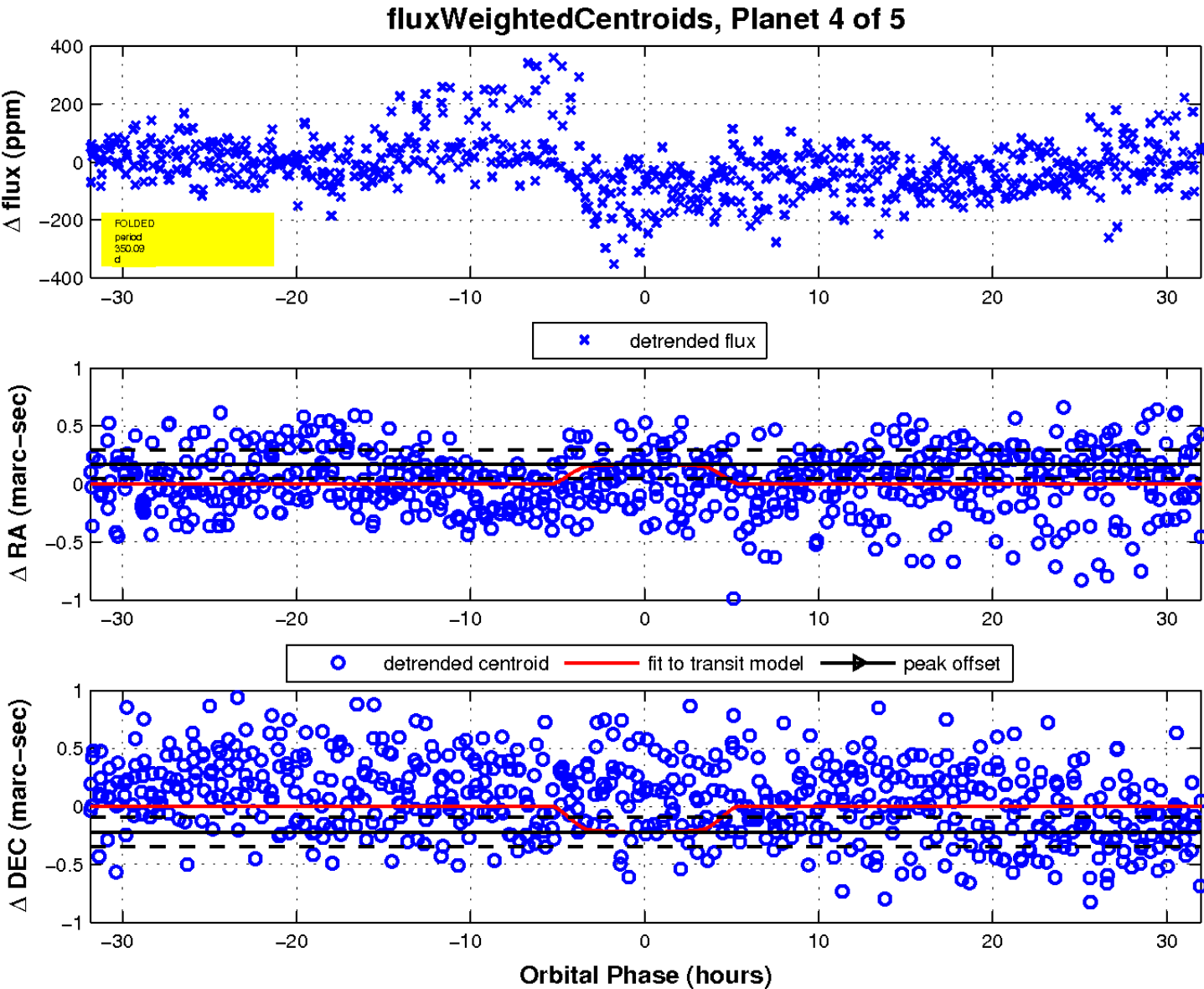
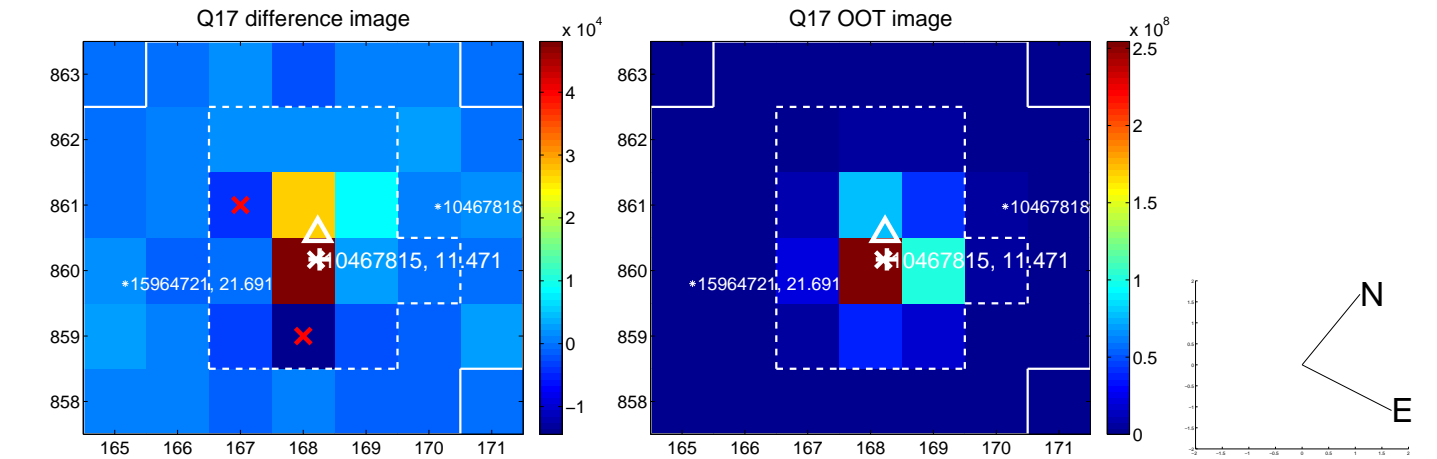
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

