

# KIC 008176601

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008176601-01	OBS	No	369.435447	233.814527	845.9	11.549	10.1	9.8	0.88	6026	2.62	0.94
008176601-02	OBS	No	367.293043	172.778733	1615.8	7.456	8.5	13.9	0.88	6026	4.20	0.95

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008176601-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_KIC_POS
008176601-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—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.

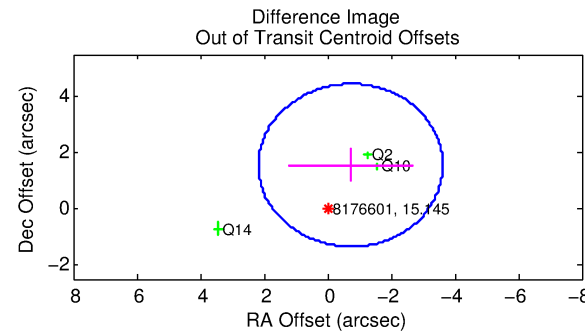
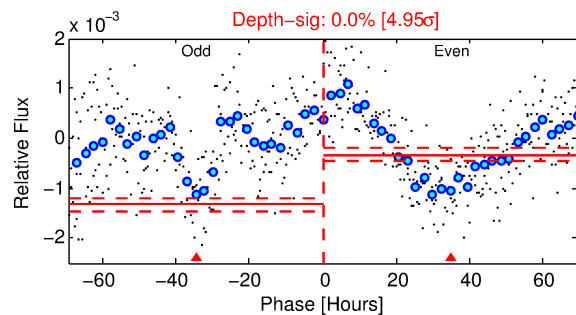
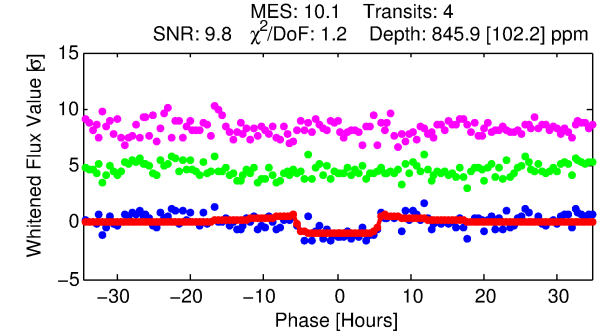
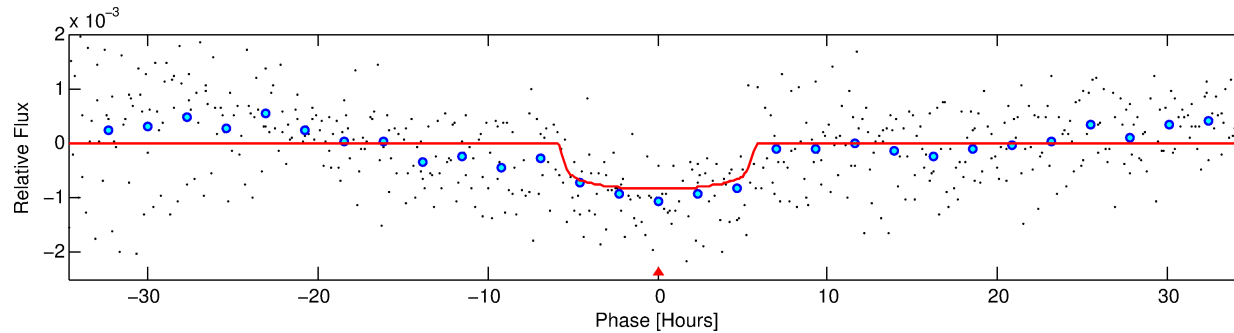
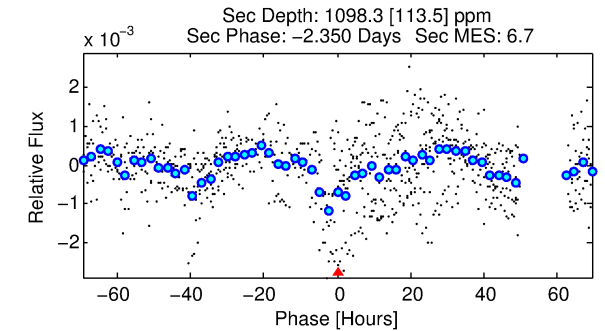
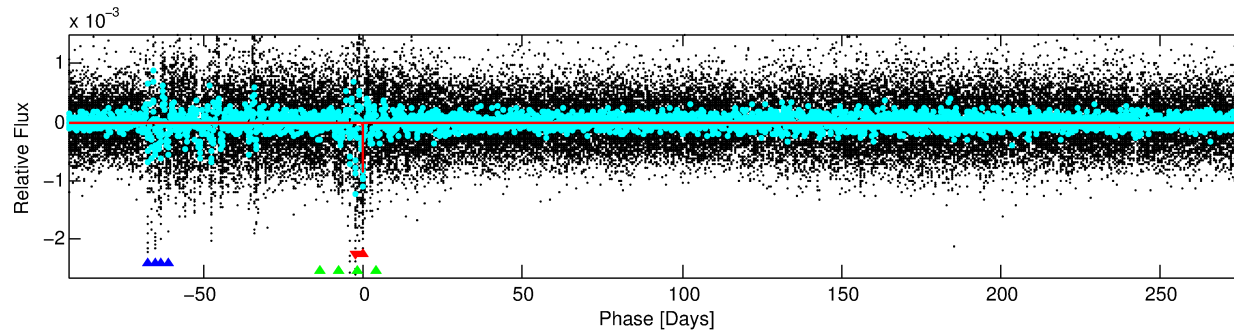
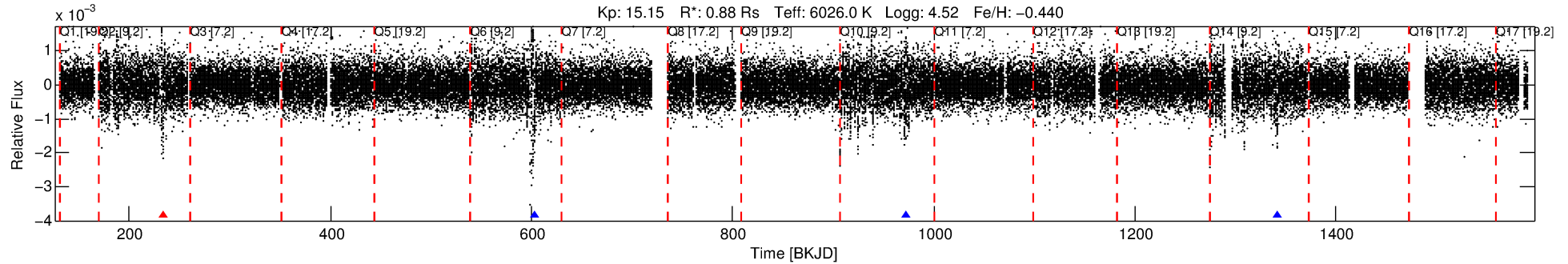
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008176601-01

No Significant Match Found

# DV One-Page Summary

KIC: 8176601 Candidate: 1 of 3 Period: 369.435 d



## DV Fit Results:

Period = 369.43545 [0.00681] d  
Epoch = 233.8145 [0.0127] BKJD  
Rp/R\* = 0.0275 [0.0124]  
a/R\* = 217.41 [480.83]  
b = 0.51 [3.18]  
Seff = 0.94 [0.35]  
Teq = 251 [24] K  
Rp = 2.62 [1.40] Re  
a = 0.9796 [0.2361] AU  
Ag = 84221.46 [81938.66] [1.03σ]  
Teffp = 6618 [1513] K [4.21σ]

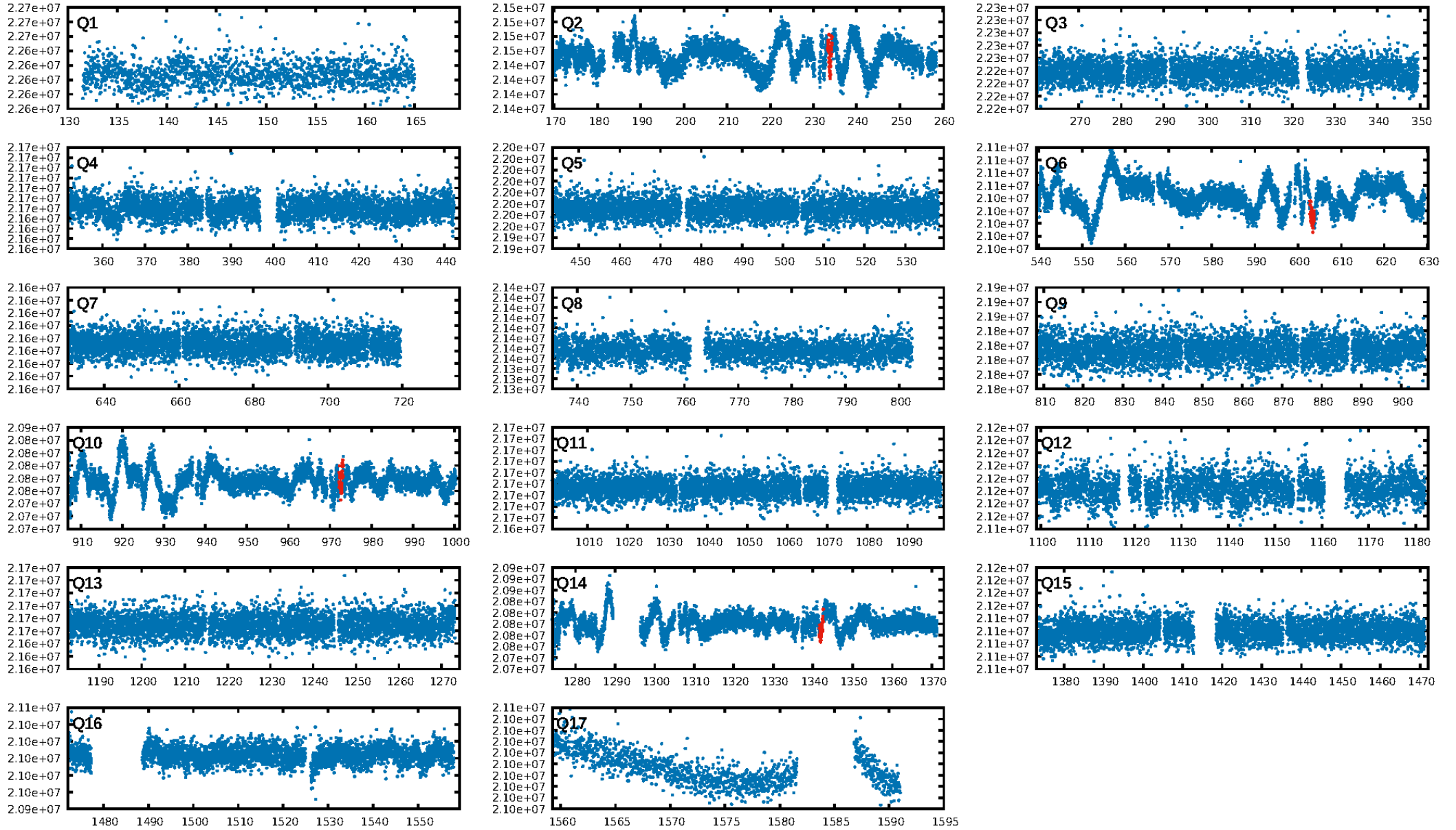
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [3.74σ]  
LongPeriod-sig: 100.0% [9.54σ]  
ModelChiSquare2-sig: 5.6%  
ModelChiSquareGof-sig: 97.4%  
Bootstrap-pfa: 1.51e-15  
RollingBand-fgt: 0.75 [3/4]  
GhostDiagnostic-chr: -6.55  
Centroid-sig: 46.8%  
Centroid-so: 1.286 arcsec [0.62σ]  
OotOffset-rm: 1.712 arcsec [1.77σ]  
OotOffset-st: 3/0/0/0 [3]  
KicOffset-rm: 1.707 arcsec [1.15σ]  
KicOffset-st: 3/0/0/0 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [4/4]

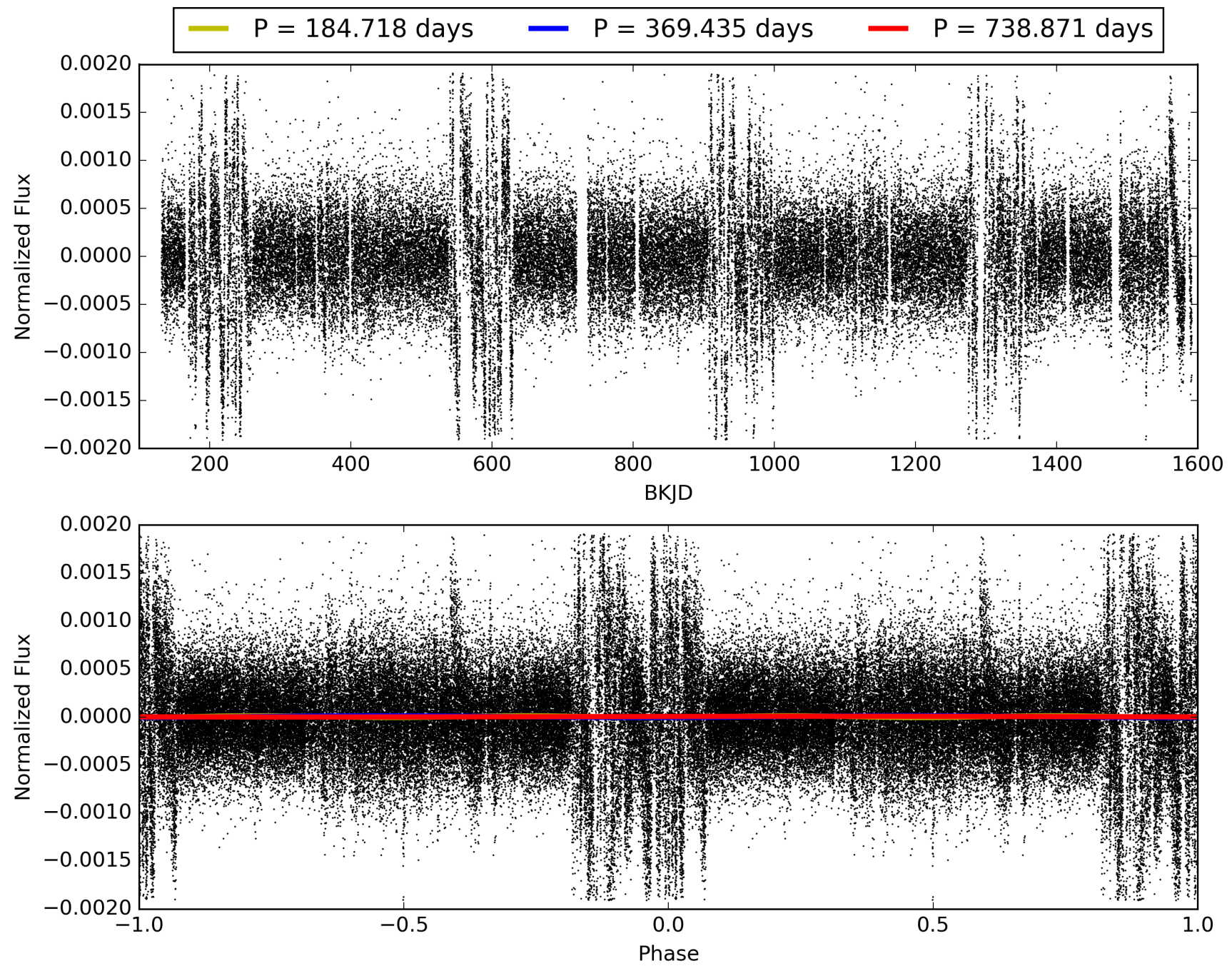
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 11:38:40 Z

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

# TCE 008176601-01, PDC Light Curves

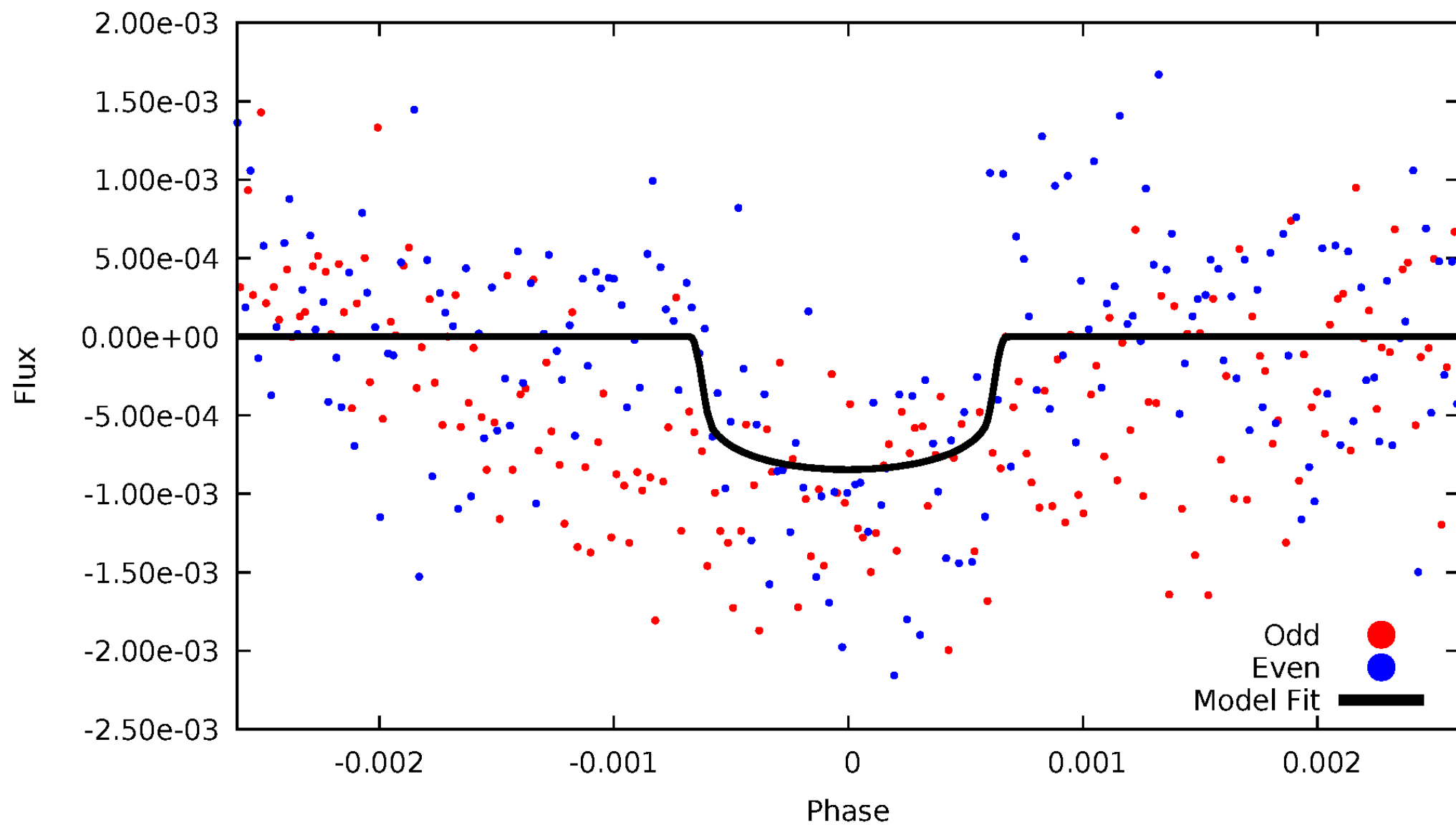


TCE 008176601-01



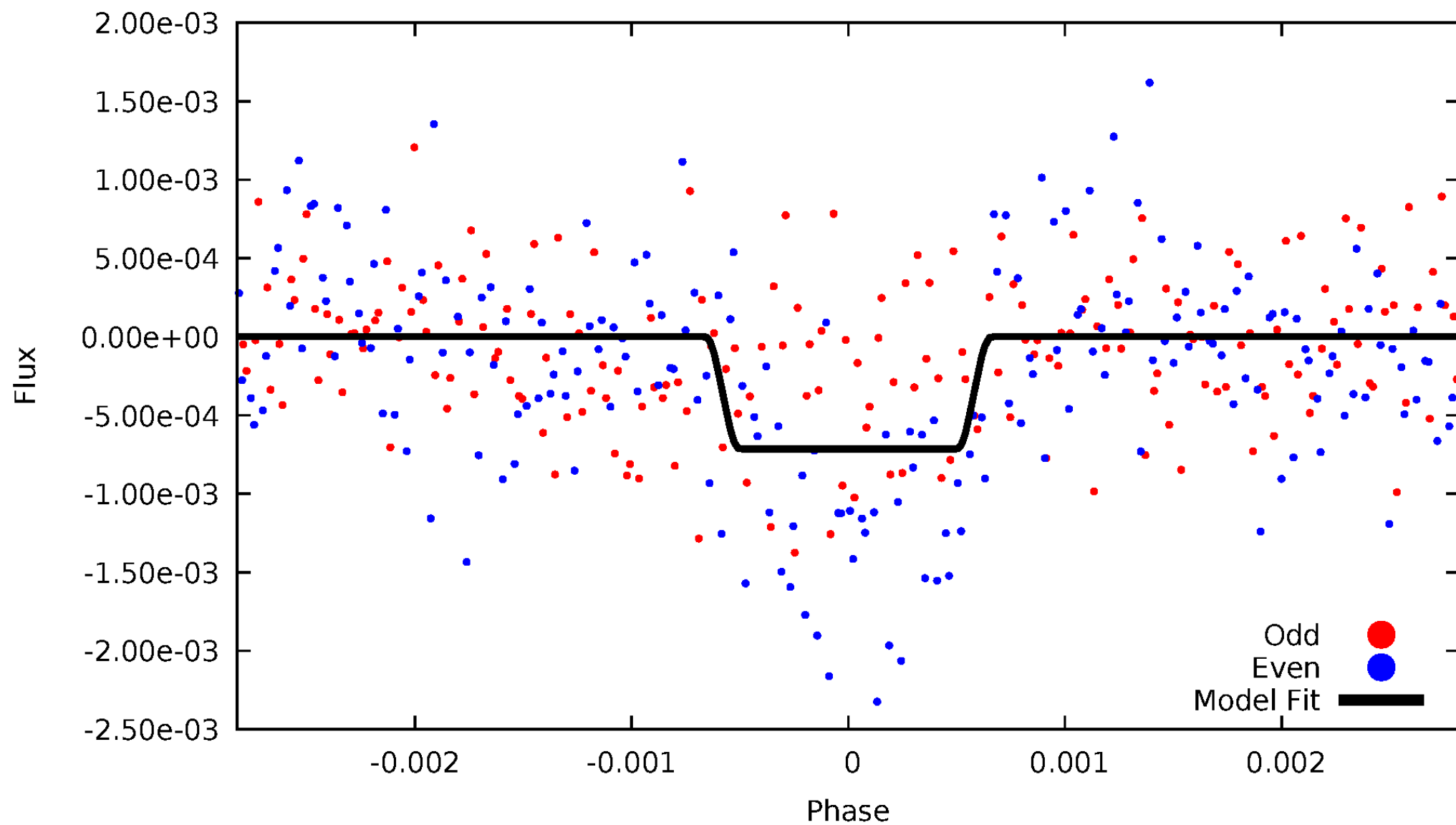
# DV Odd/Even

TCE 008176601-01



# ALT Odd/Even

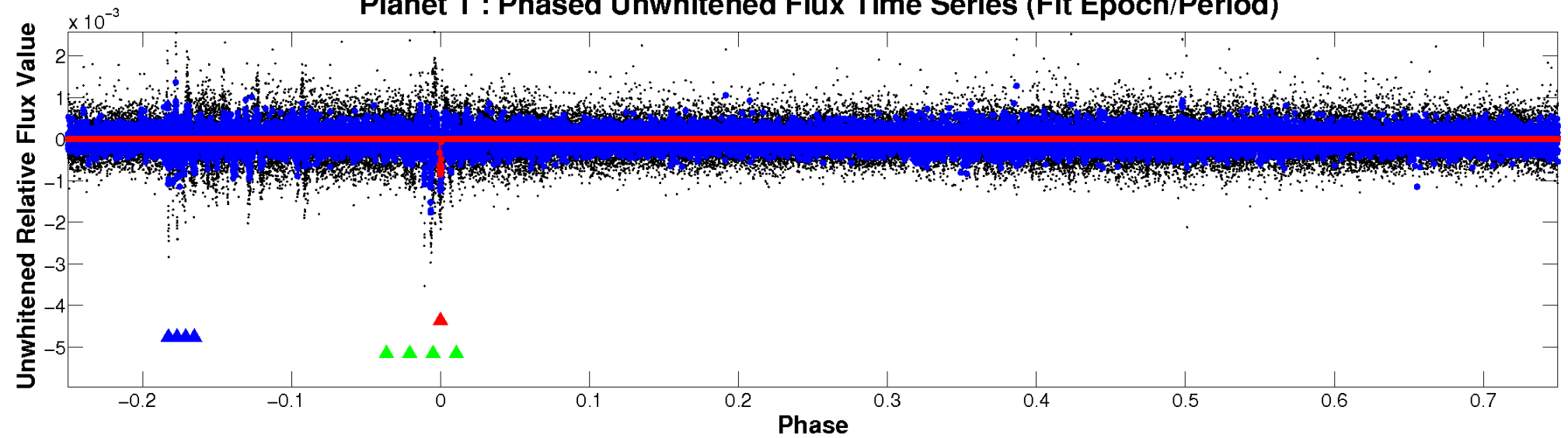
TCE 008176601-01



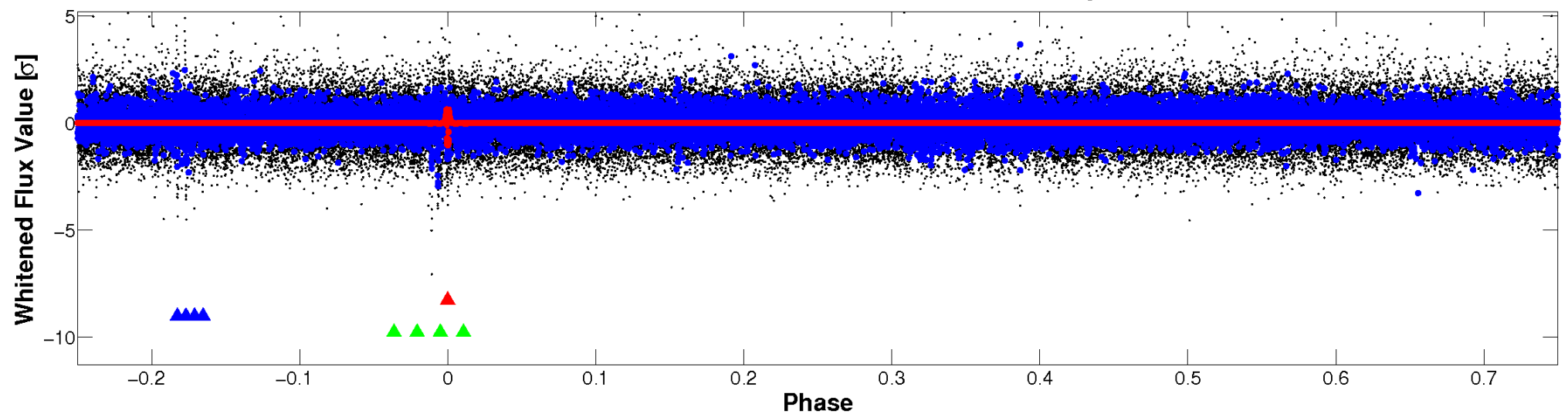


# Non-Whitened Vs. Whitened Light Curve

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

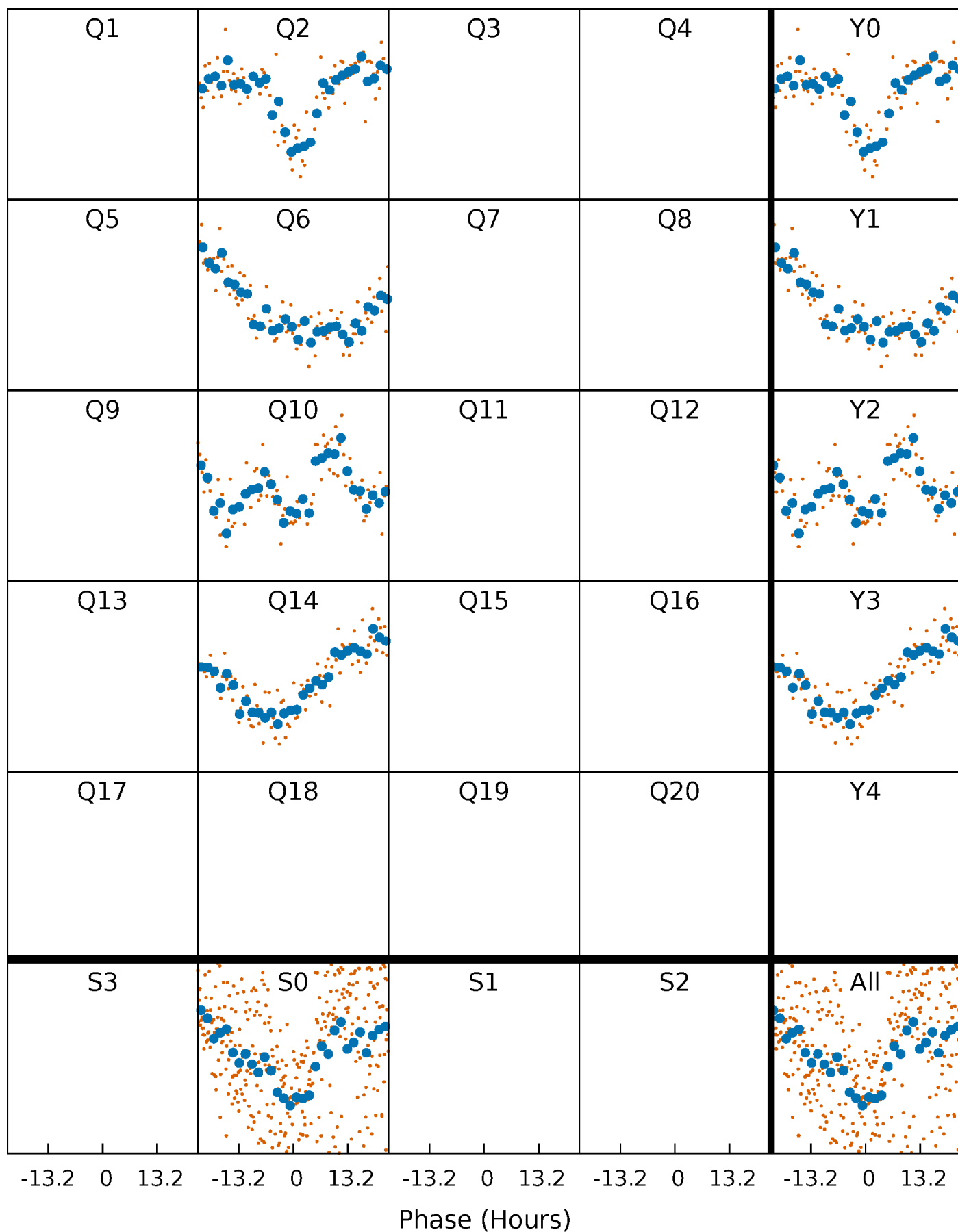


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

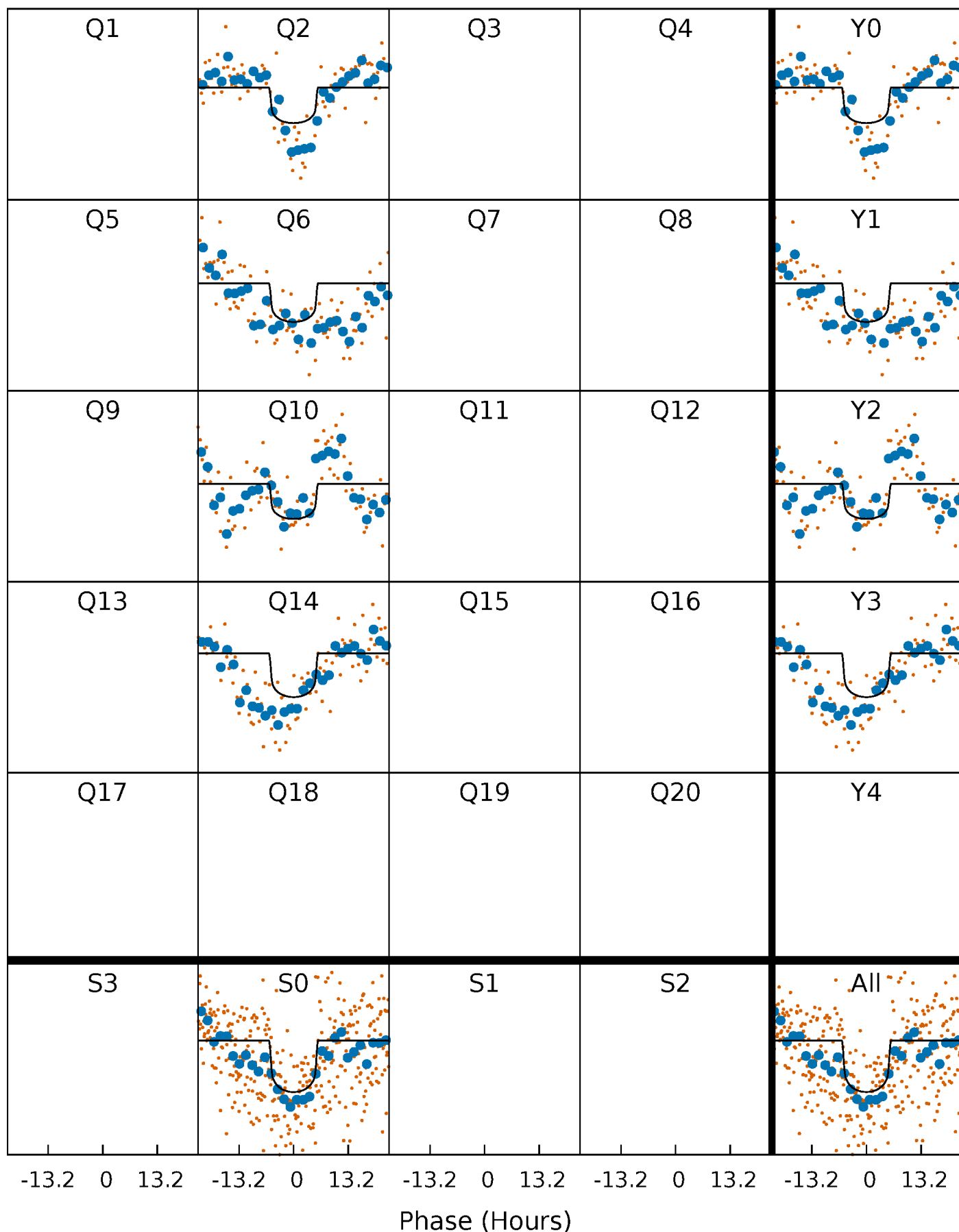
TCE 008176601-01 P=369.435447 Days  $T_0=233.814527$  (BKJD)





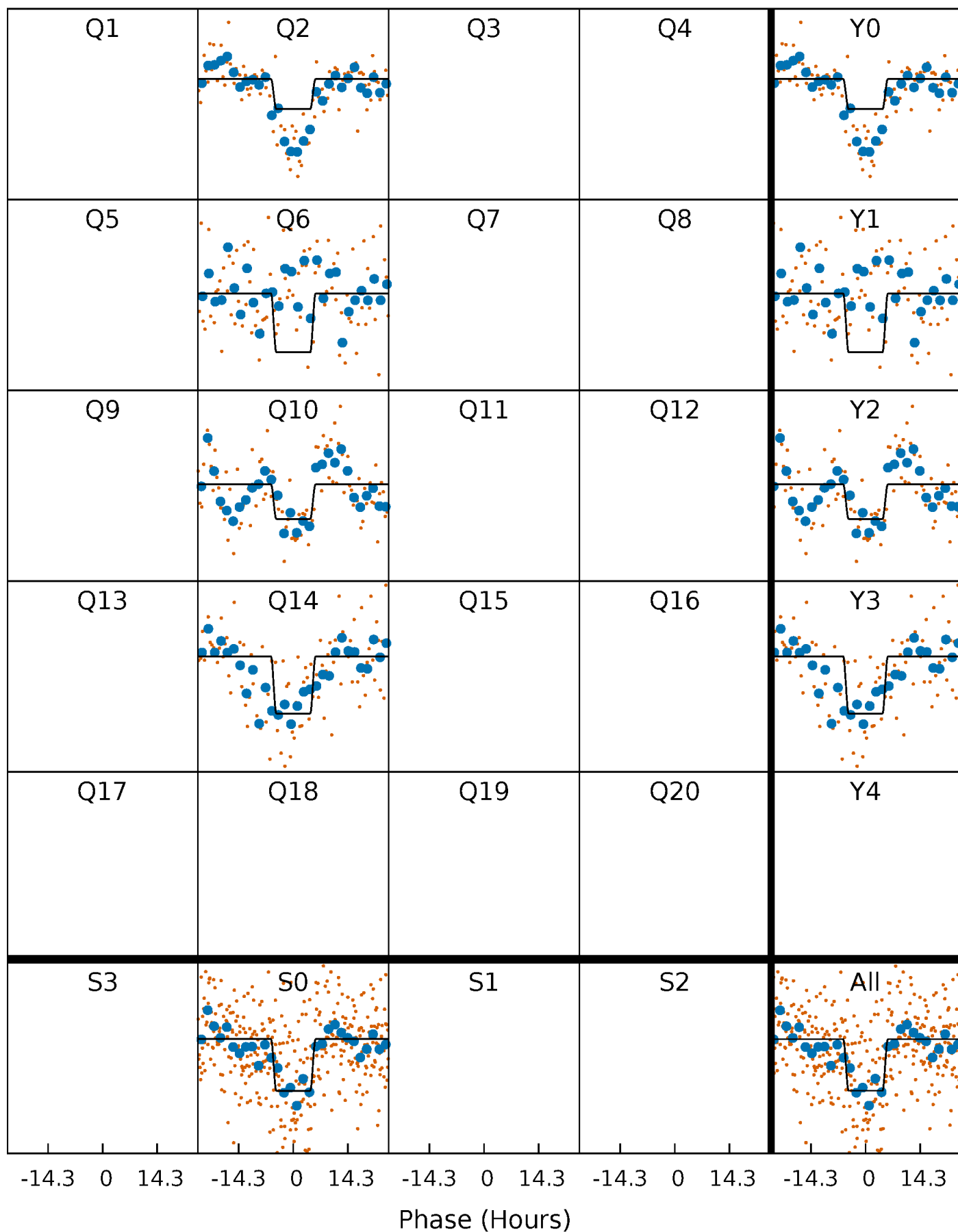
# DV Quarter-Phased Transit Curves

TCE 008176601-01 P=369.435447 Days  $T_0=233.814527$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

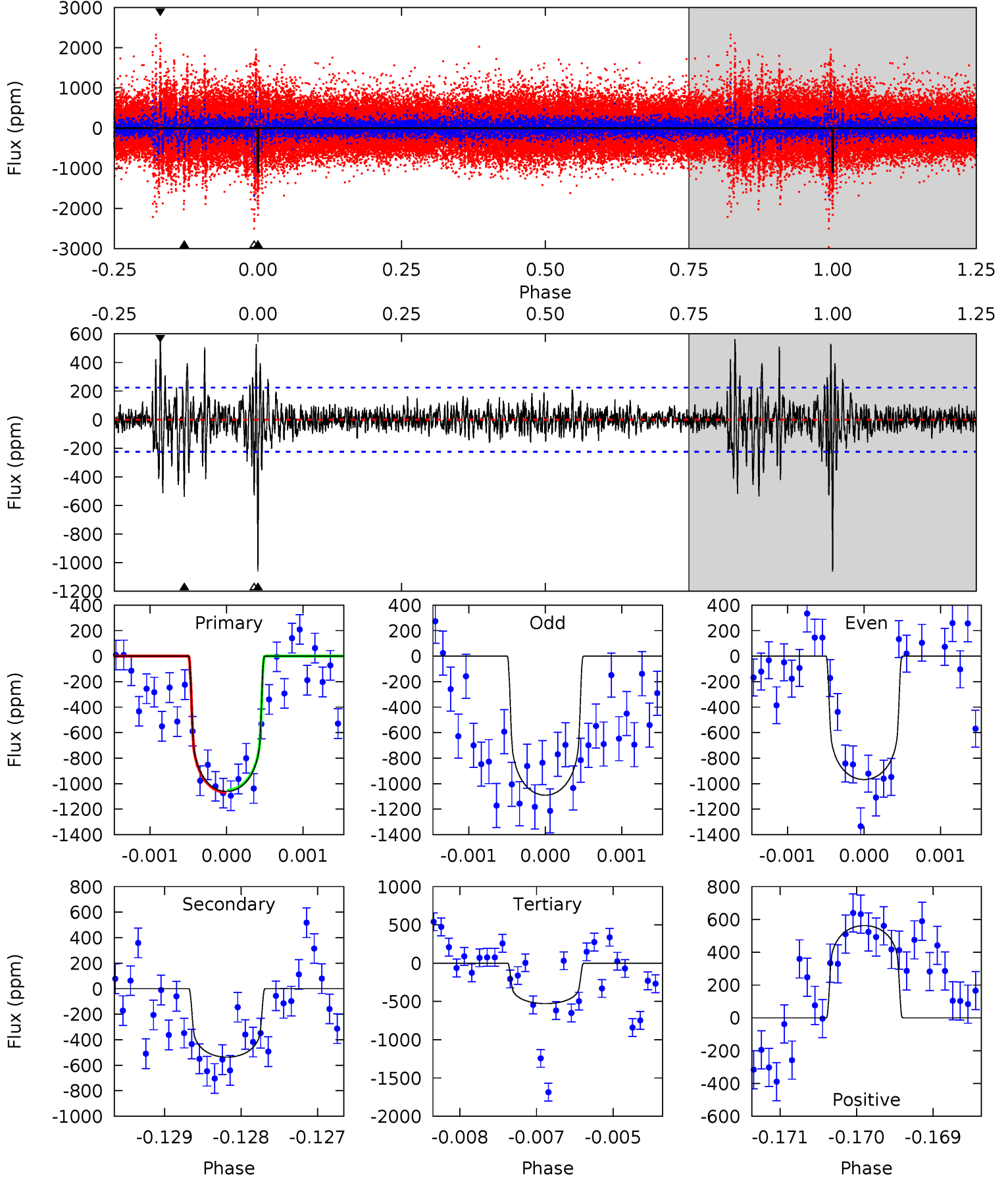
TCE 008176601-01 P=369.411520 Days  $T_0=233.837385$  (BKJD)



# DV Model-Shift Uniqueness Test

008176601-01, P = 369.435447 Days, E = 233.814527 Days

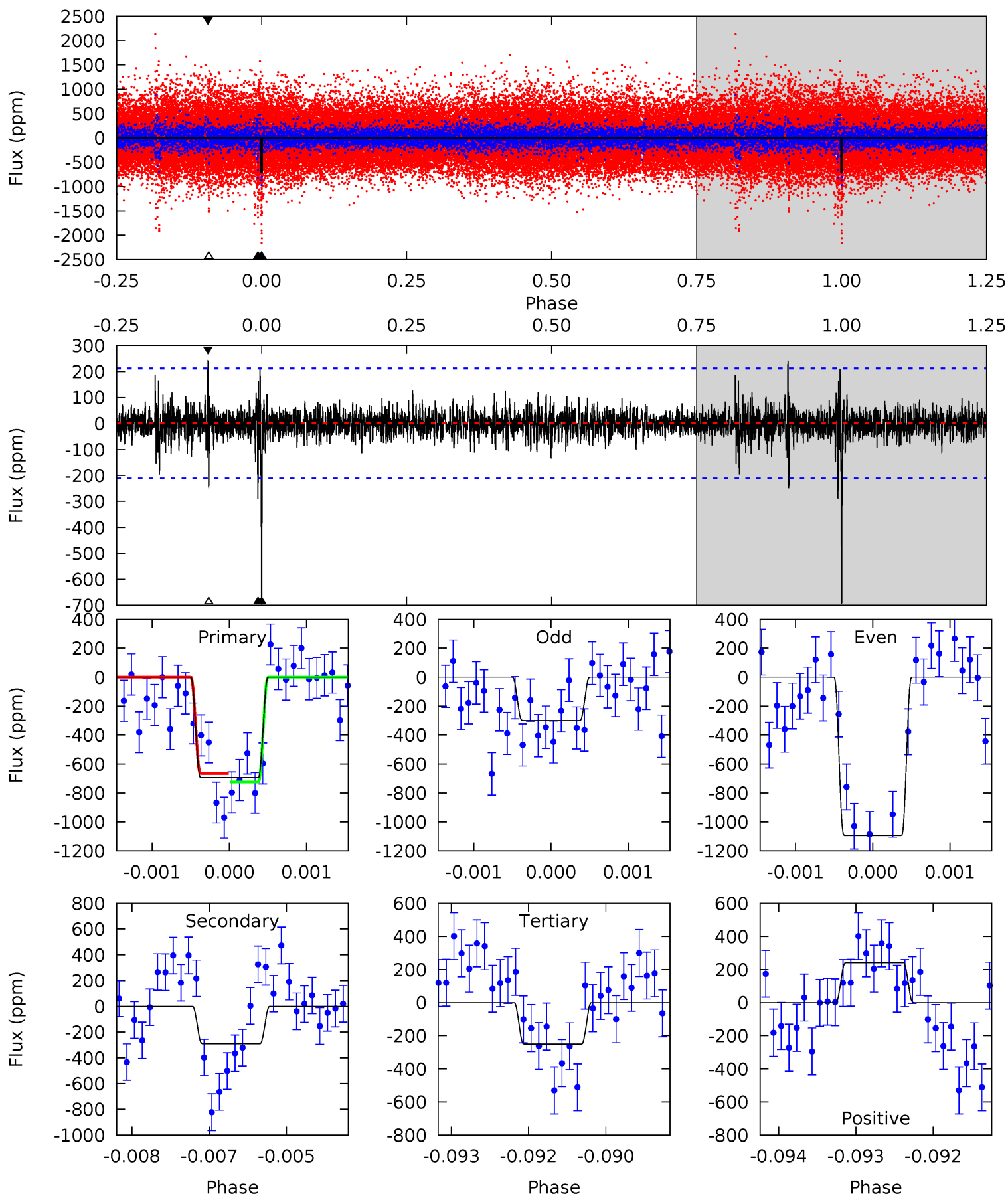
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
25.5	12.9	12.7	13.5	5.40	3.20	2.11	12.8	12.0	0.21	-0.63	1.49	0.94	0.35	0.20



# Alt Model-Shift Uniqueness Test

008176601-01, P = 369.411520 Days, E = 233.837385 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
17.7	7.41	6.38	6.17	5.40	3.21	0.97	11.3	11.5	1.04	1.24	10.3	1.00	0.26	0.75



### Stellar Parameters For KIC 008176601

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6026^{+167}_{-188}$	$4.517^{+0.052}_{-0.195}$	$-0.440^{+0.300}_{-0.300}$	$0.875^{+0.248}_{-0.083}$	$0.917^{+0.109}_{-0.109}$	$1.931^{+0.488}_{-0.941}$
	+3%/-3%	+1%/-4%	+68%/-68%	+28%/-9%	+12%/-12%	+25%/-49%
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 008176601-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-537 \pm 42$	$2.68^{+1.32}_{-1.28}$	$358^{+24}_{-16}$	$5609^{+2192}_{-912}$	$38618^{+97245}_{-21947}$
Alt.	$-290 \pm 39$	$2.73^{+1.19}_{-1.26}$	$358^{+26}_{-16}$	$4865^{+1537}_{-659}$	$20238^{+47393}_{-10531}$

$T_{max}$  = 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

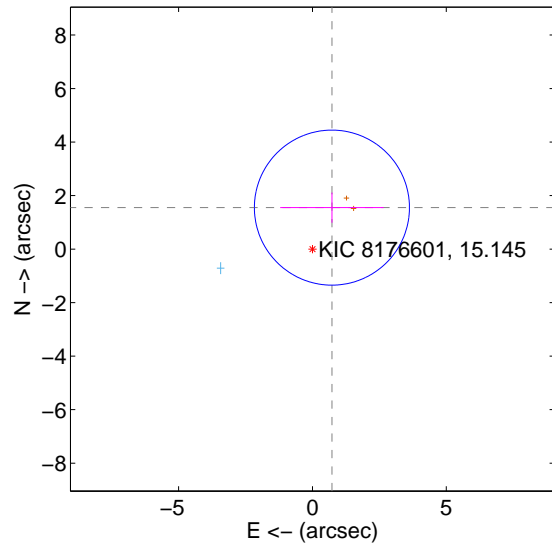
Supplemental centroid analysis for 008176601-01. Kepler magnitude: 15.14. Transit SNR 9.83

There are 1 quarters with good PRF difference image offsets

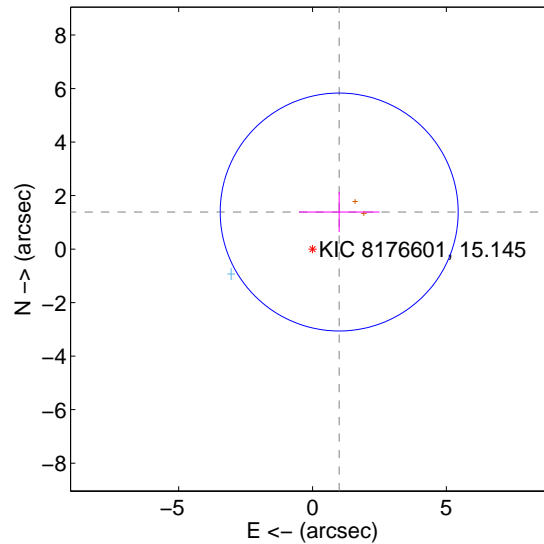
The direct PRF centroid is offset from the target star catalog position by about 0.45 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.712 \pm 0.966$	1.77	$-0.728 \pm 1.932$	$1.550 \pm 0.561$
PRF-fit source offset from KIC position	$1.707 \pm 1.482$	1.15	$-0.996 \pm 1.505$	$1.385 \pm 0.750$
photometric centroid source offset	$1.29 \pm 2.08$	0.62	$0.32 \pm 1.93$	$1.25 \pm 2.09$

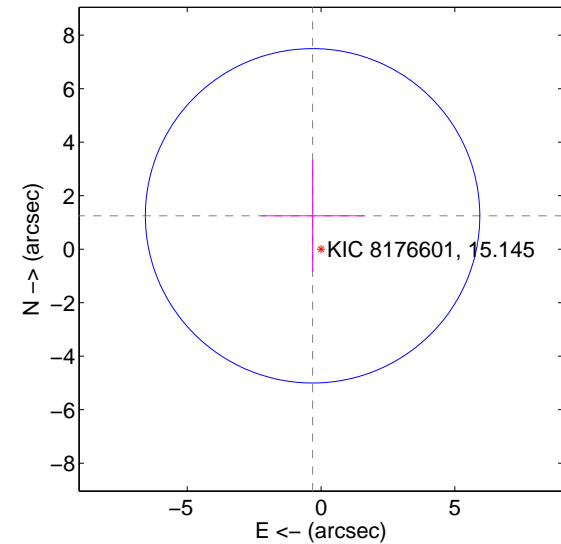
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



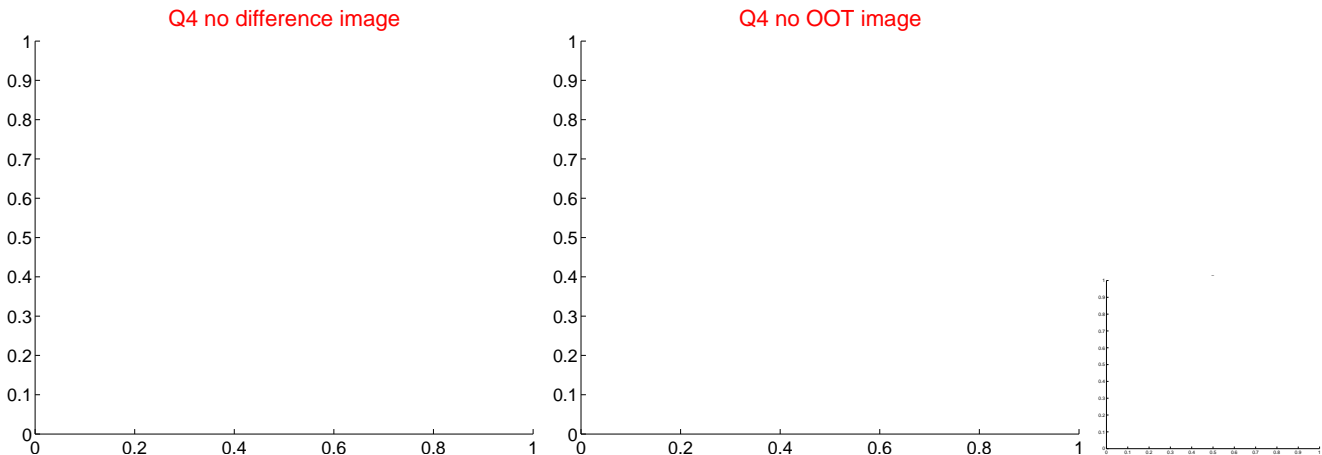
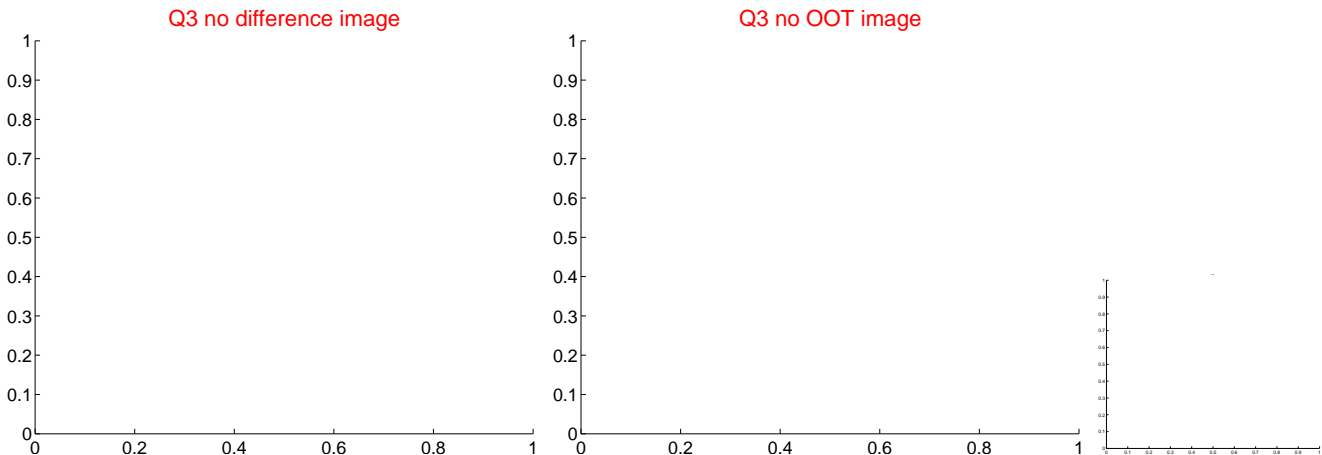
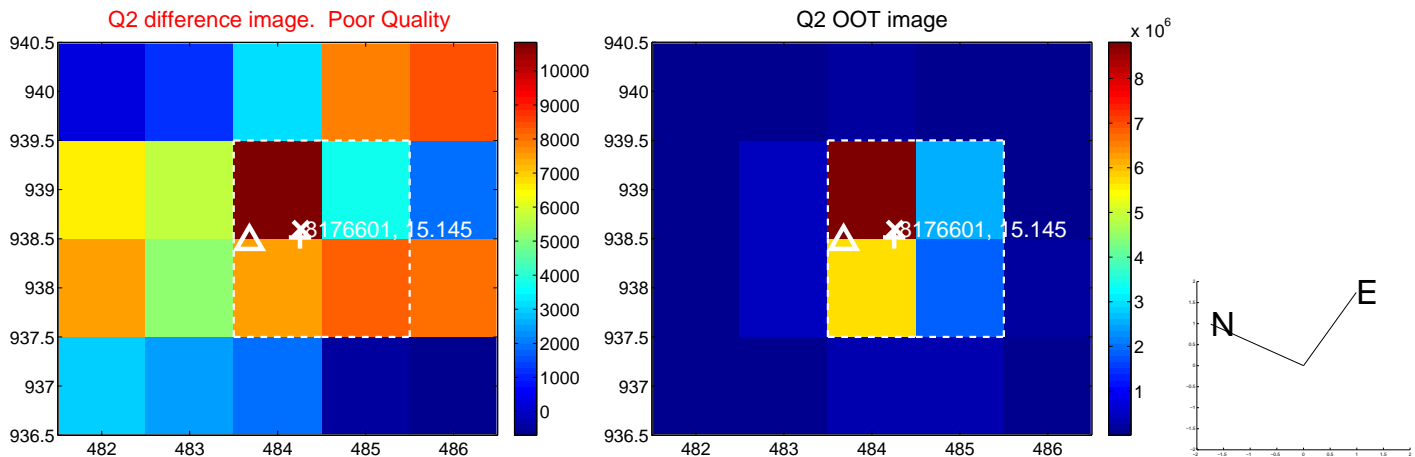
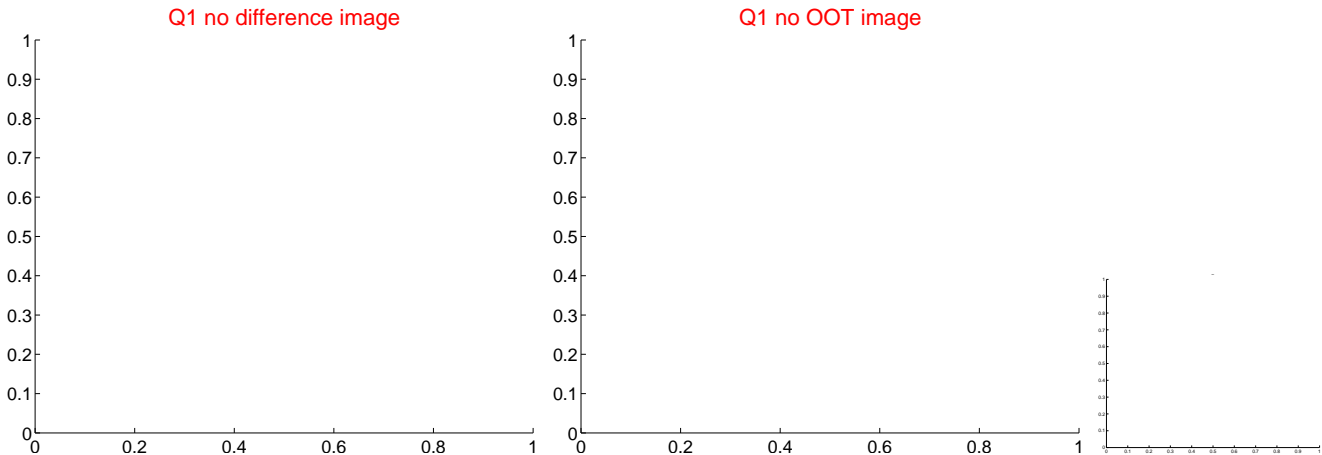
offset from photometric centroids



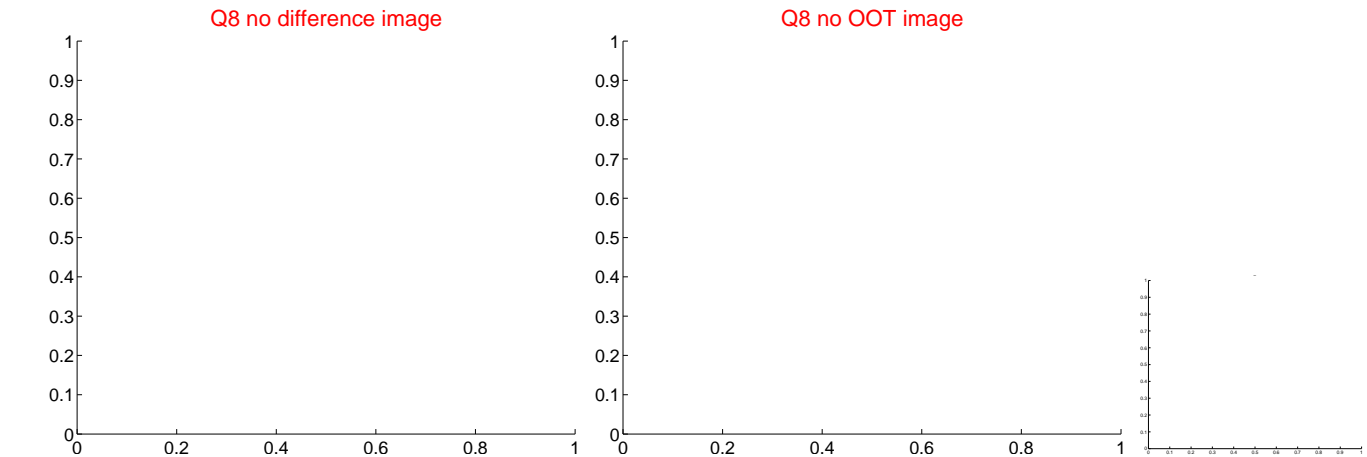
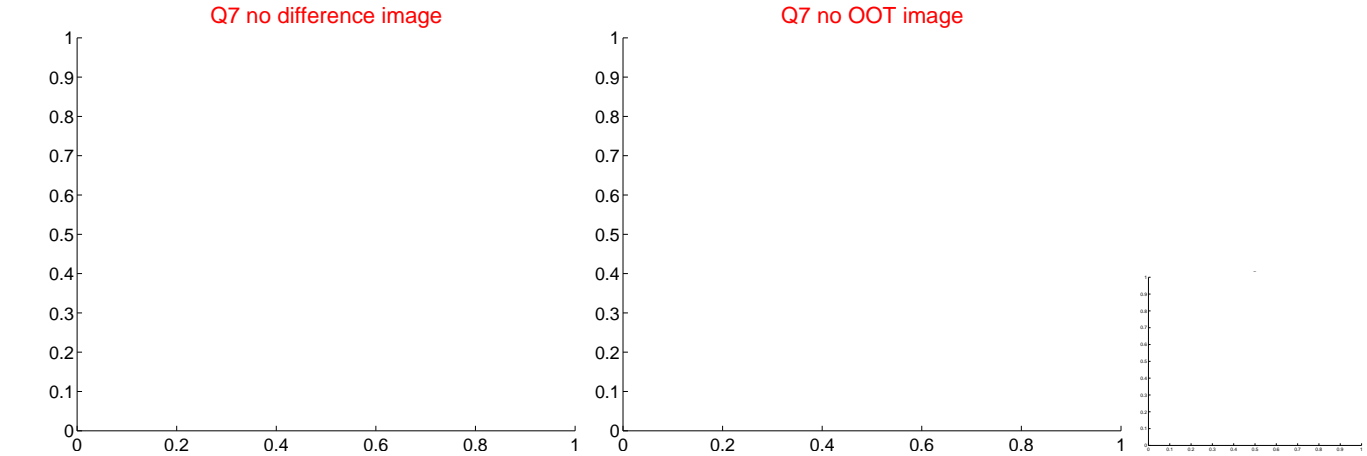
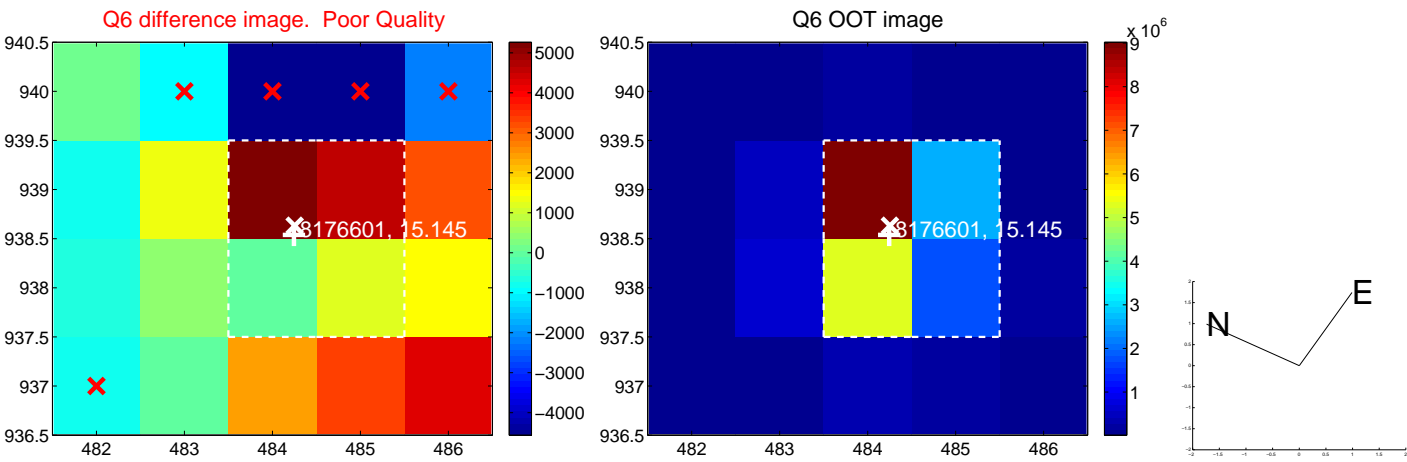
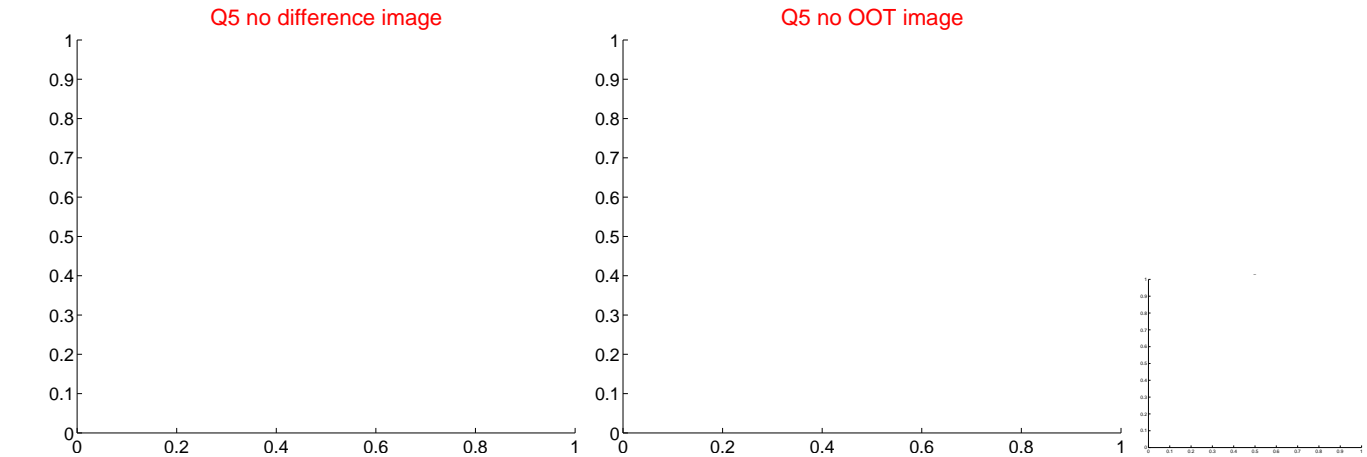
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



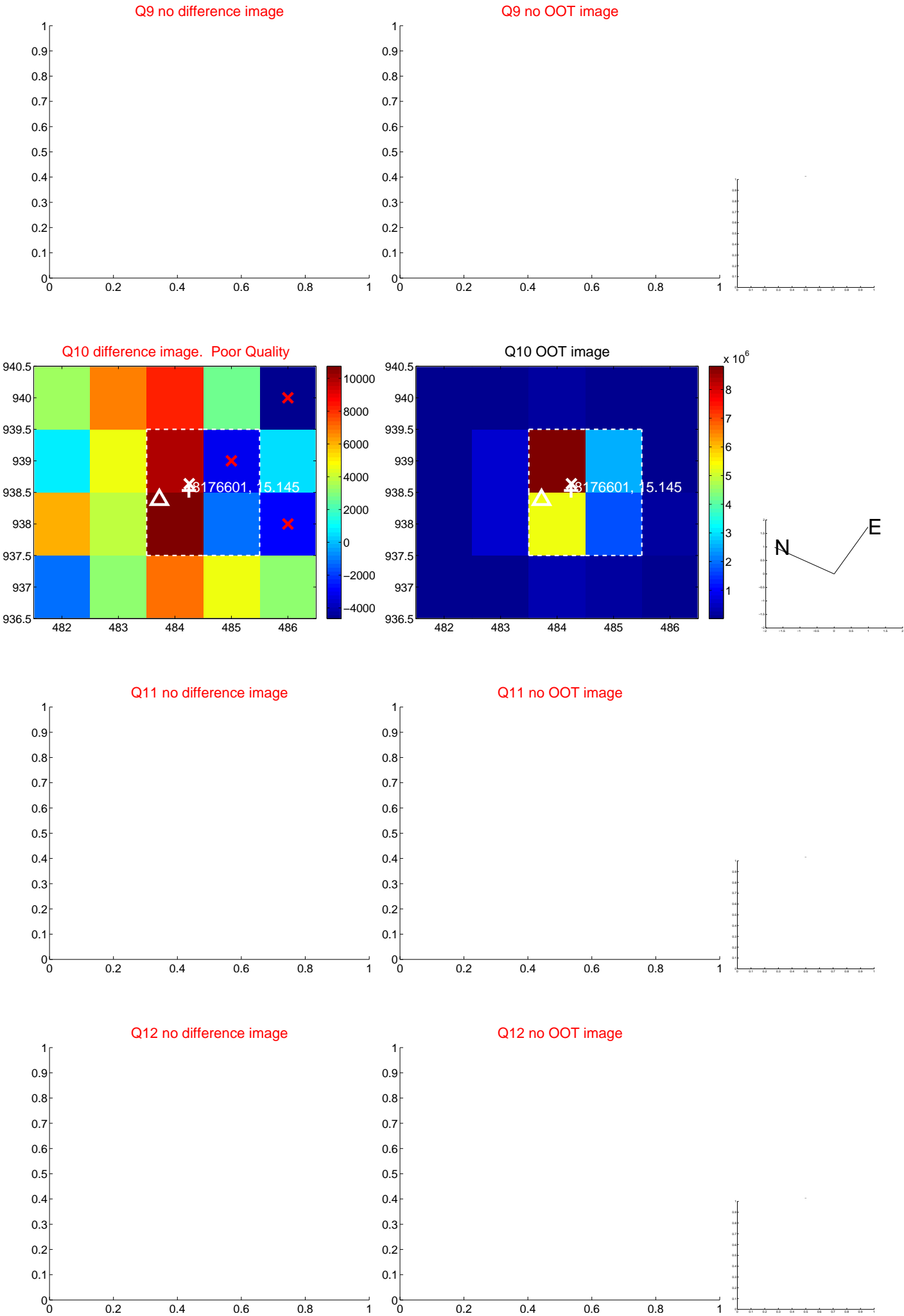
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



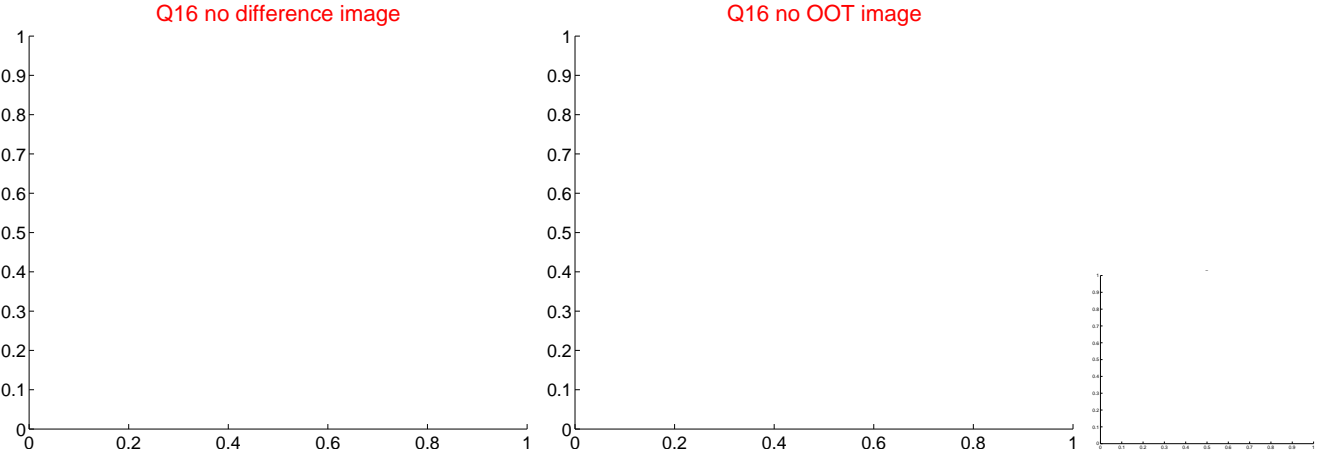
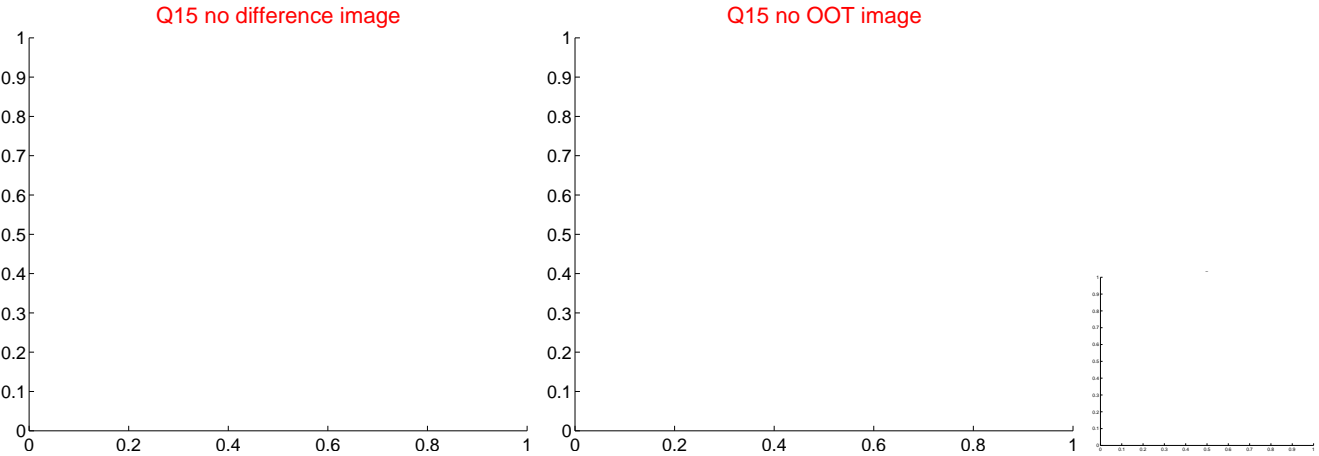
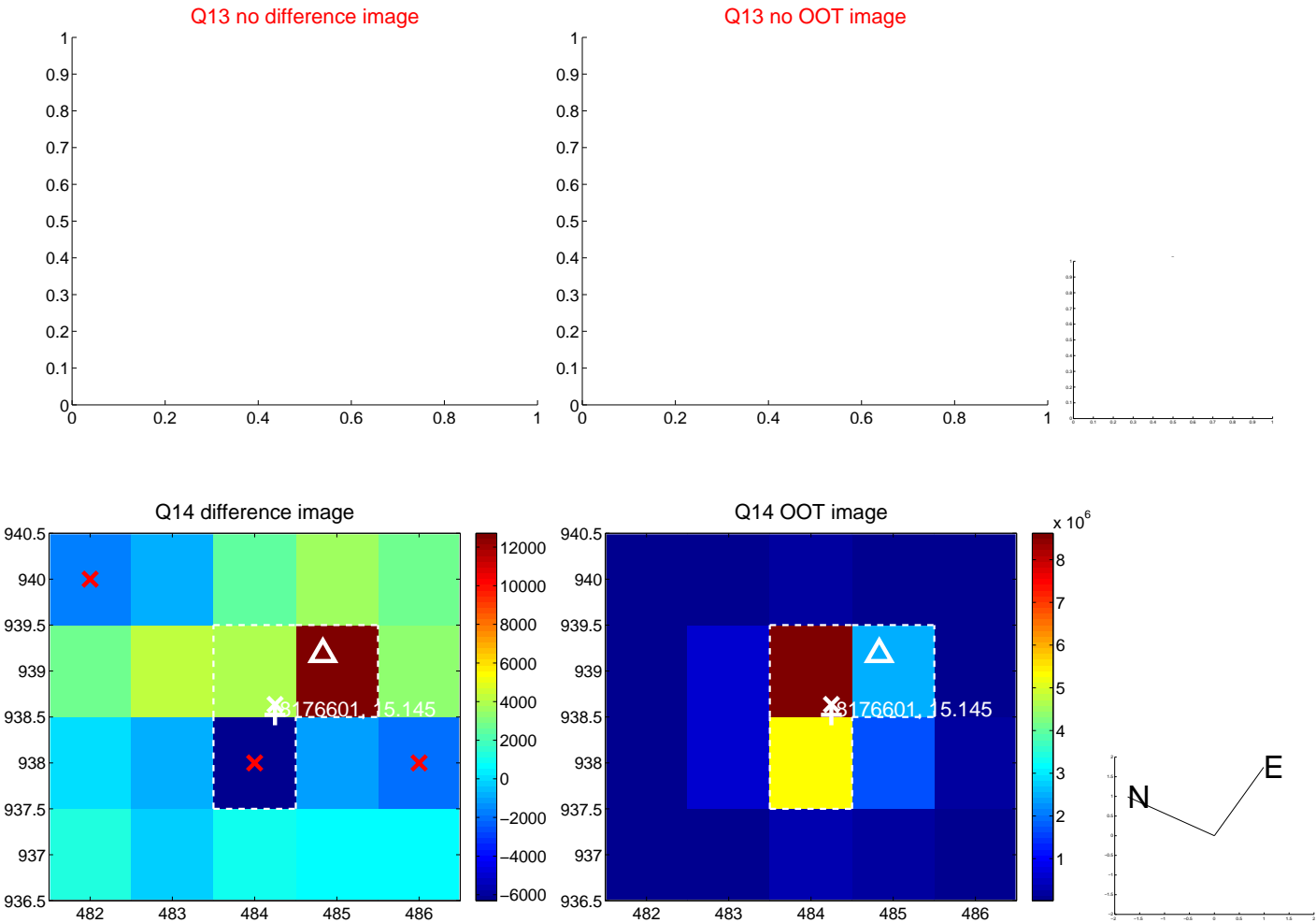
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



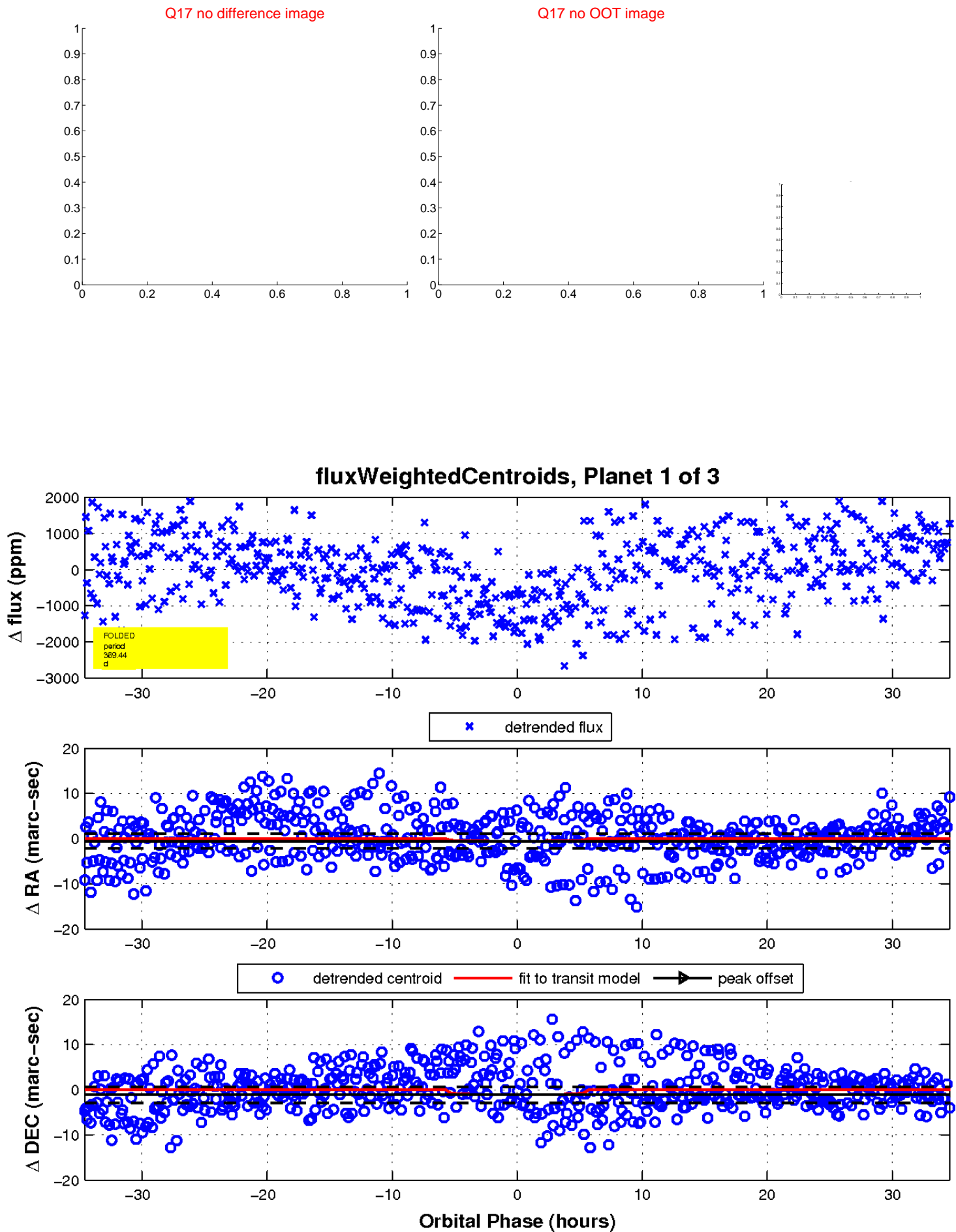
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

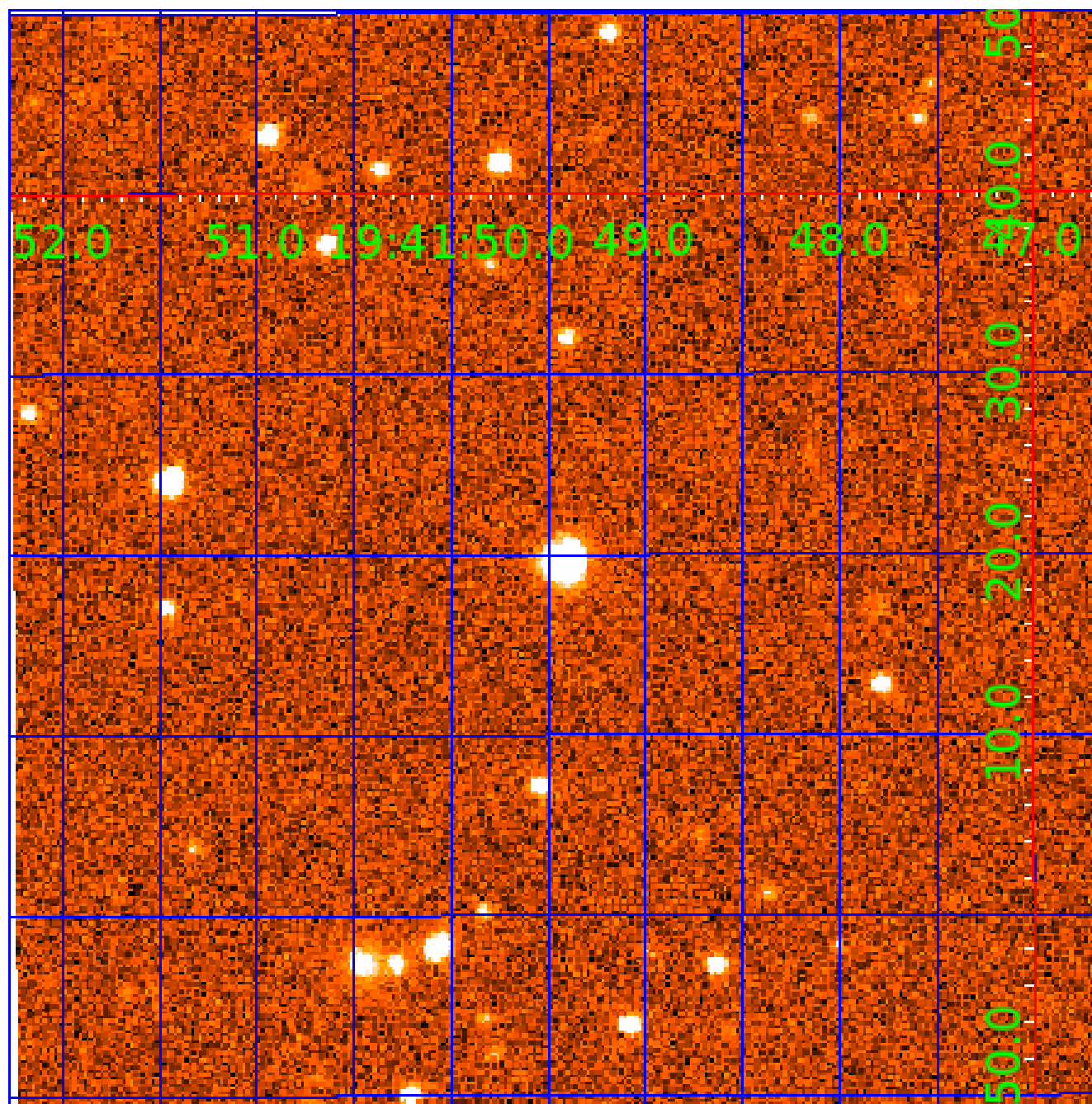


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 008176601

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008176601-01	OBS	No	369.435447	233.814527	845.9	11.549	10.1	9.8	0.88	6026	2.62	0.94
008176601-02	OBS	No	367.293043	172.778733	1615.8	7.456	8.5	13.9	0.88	6026	4.20	0.95

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008176601-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_KIC_POS
008176601-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—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.

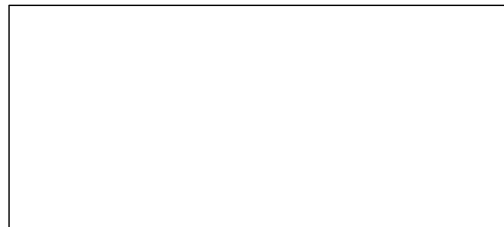
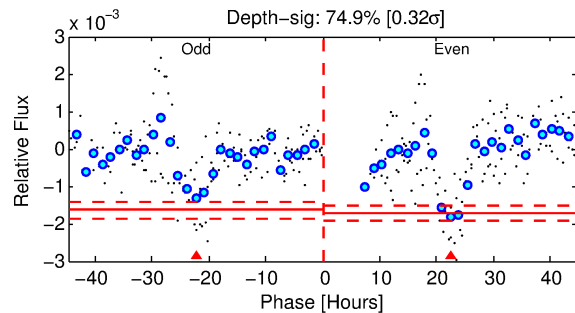
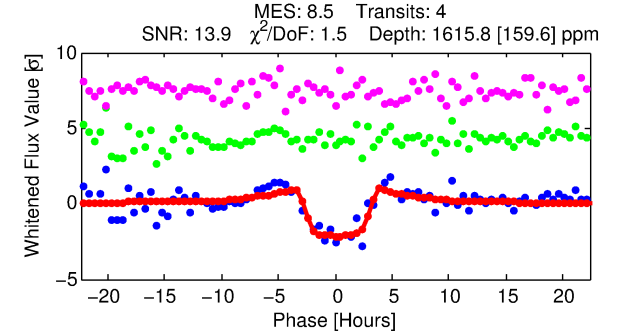
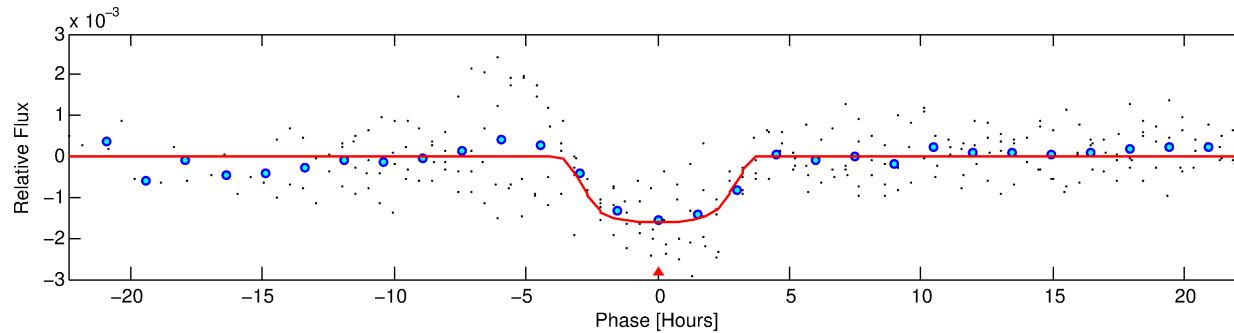
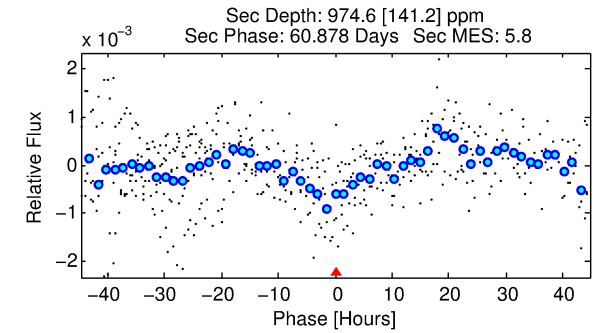
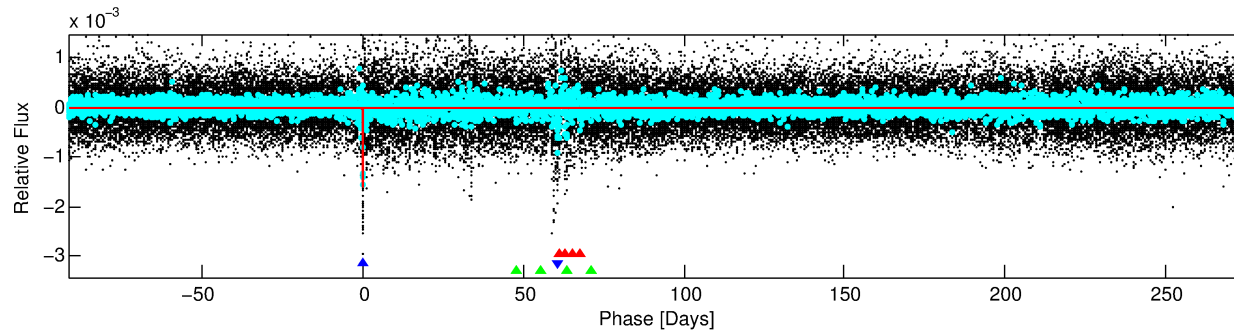
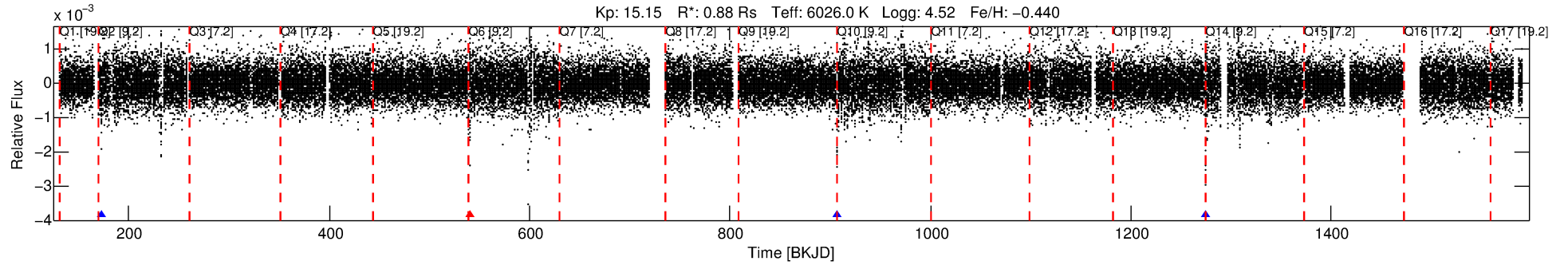
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008176601-02

No Significant Match Found

# DV One-Page Summary

KIC: 8176601 Candidate: 2 of 3 Period: 367.293 d



## DV Fit Results:

Period = 367.29304 [0.00547] d  
Epoch = 172.7787 [0.0102] BKJD  
Rp/R\* = 0.0440 [0.0031]  
a/R\* = 188.54 [38.59]  
b = 0.92 [0.04]  
Seff = 0.95 [0.36]  
Teq = 252 [24] K  
Rp = 4.20 [1.23] Re  
a = 0.9758 [0.2352] AU  
Ag = 28885.57 [11791.32] [2.45σ]  
Teffp = 5074 [303] K [15.89σ]

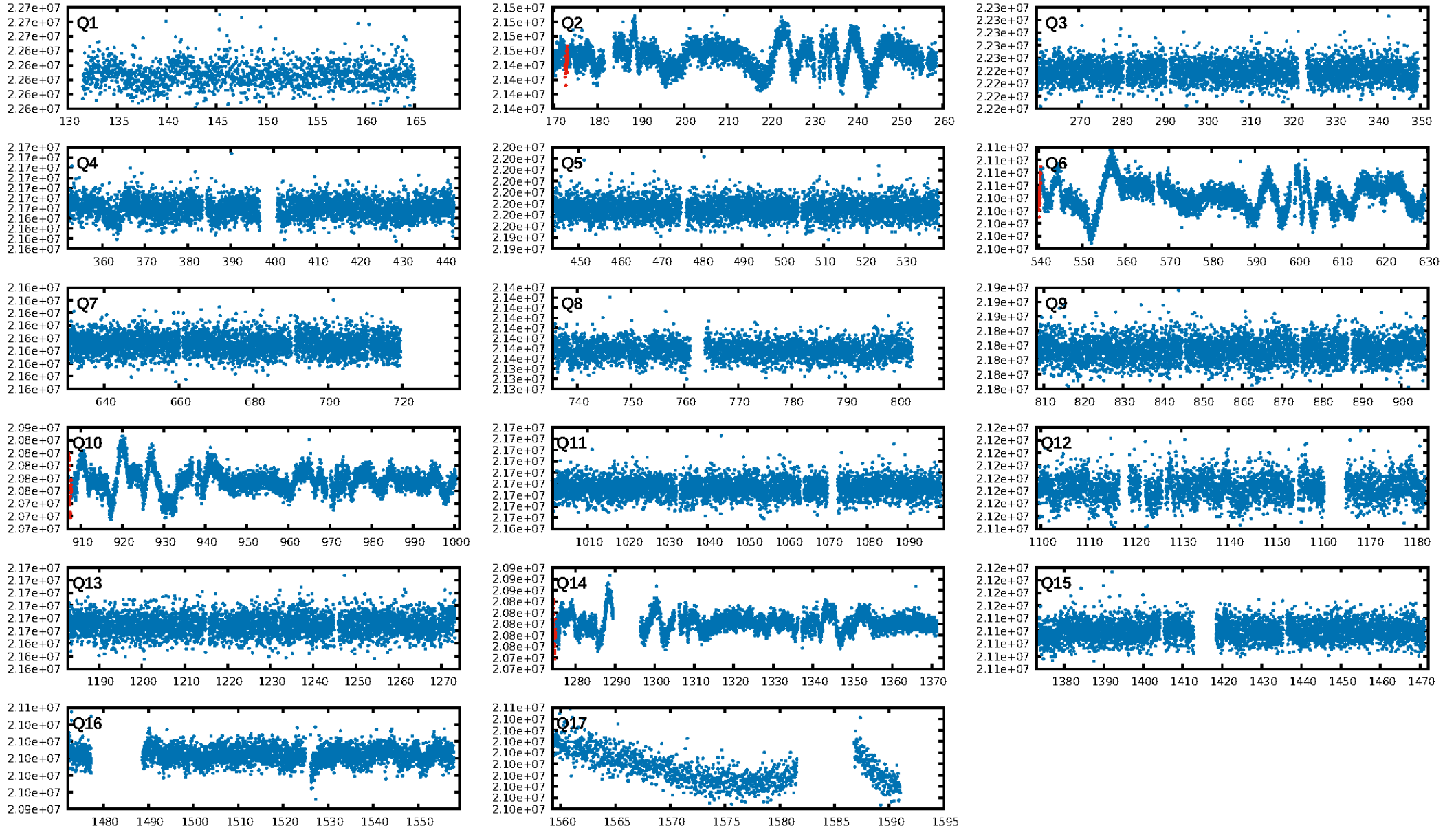
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [3.74σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 47.4%  
Bootstrap-pfa: 2.38e-12  
RollingBand-fgt: 0.75 [3/4]  
GhostDiagnostic-chr: 0.3289  
Centroid-sig: 0.0%  
Centroid-so: 8.887 arcsec [6.54σ]  
OotOffset-rm: N/A  
KicOffset-rm: N/A  
OotOffset-st: 0/0/0/0 [0]  
KicOffset-st: 0/0/0/0 [0]  
DiffImageQuality-fgm: N/A  
DiffImageOverlap-fno: 1.00 [1/1]

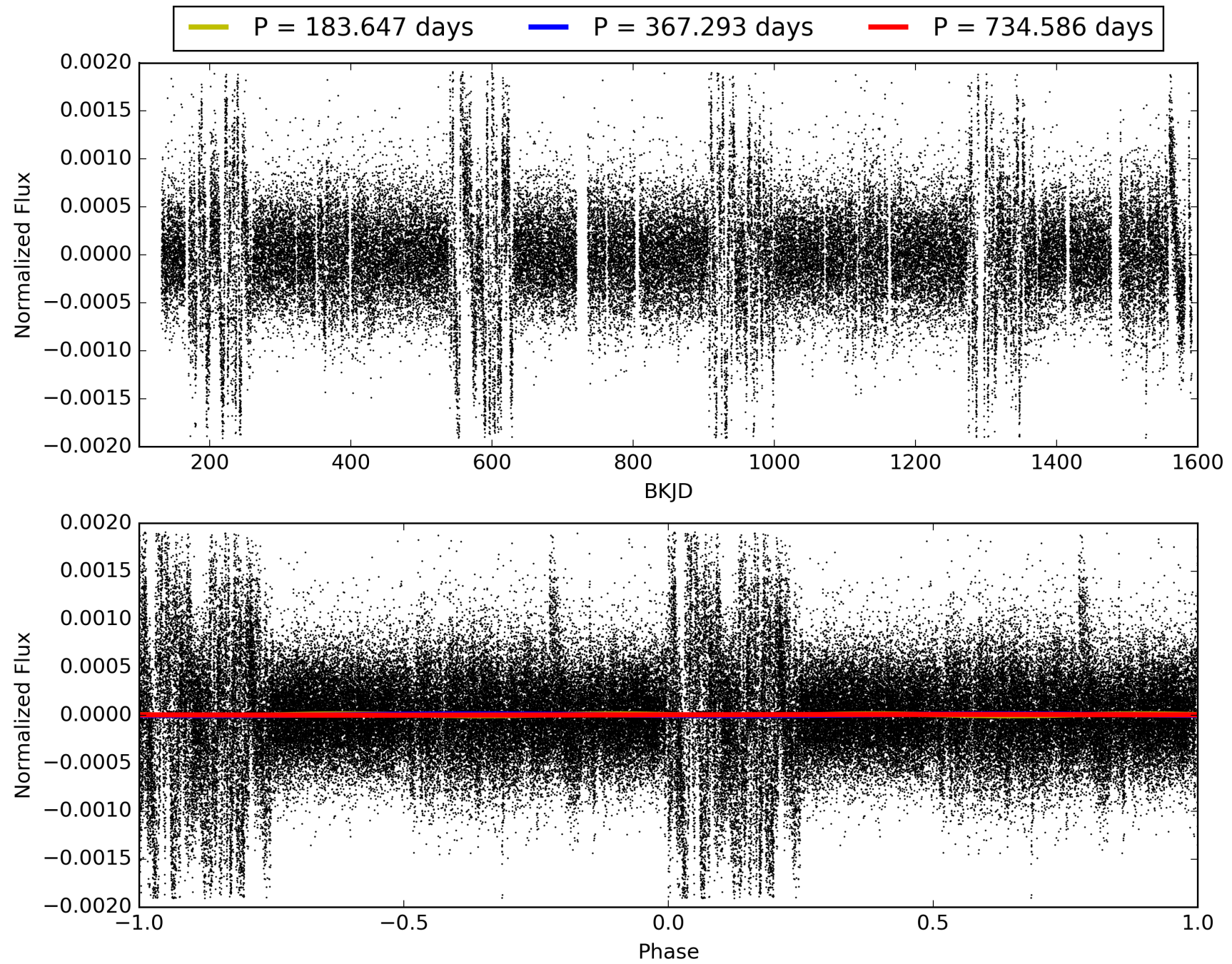
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 11:38:51 Z

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

# TCE 008176601-02, PDC Light Curves

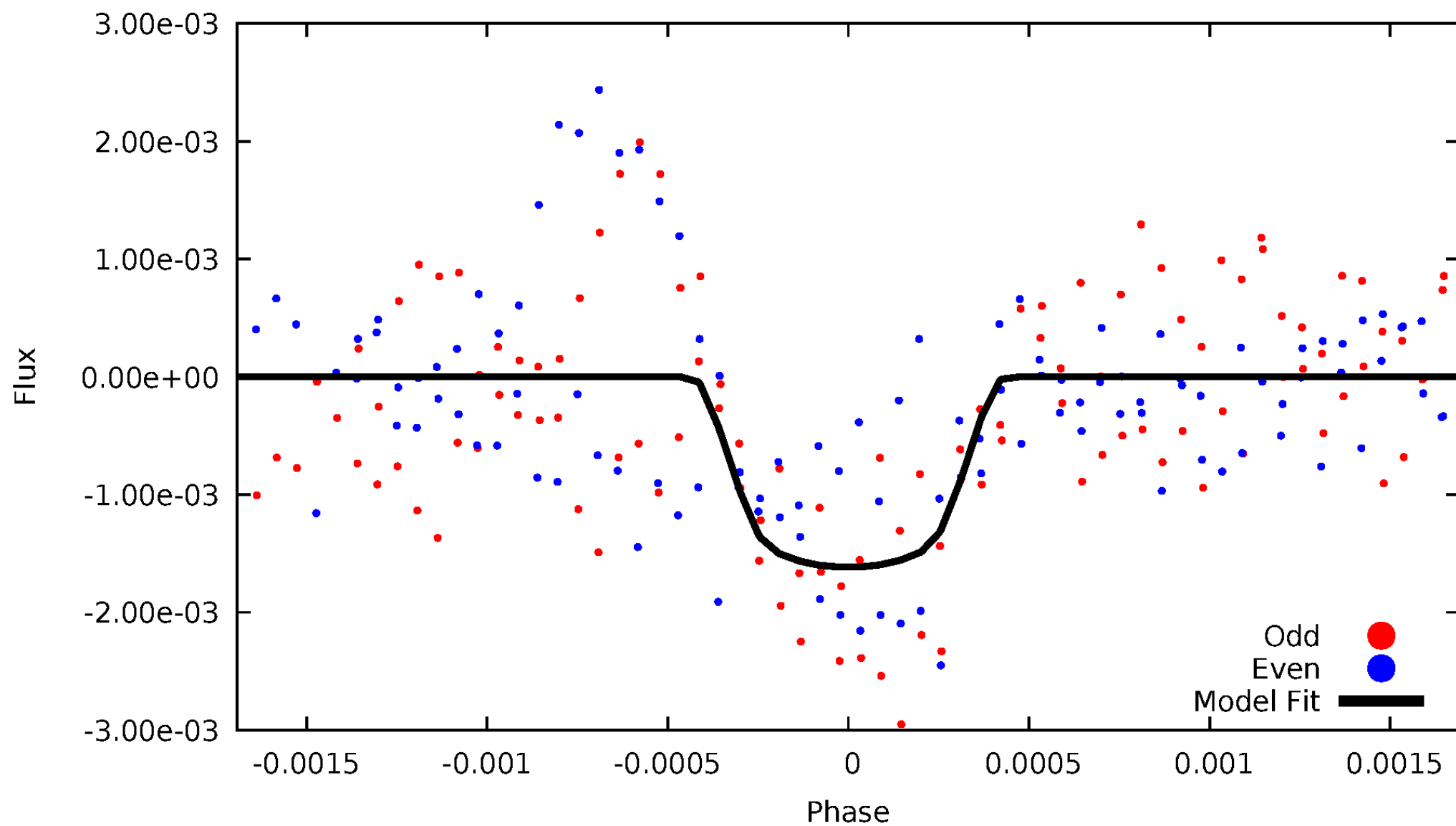


TCE 008176601-02



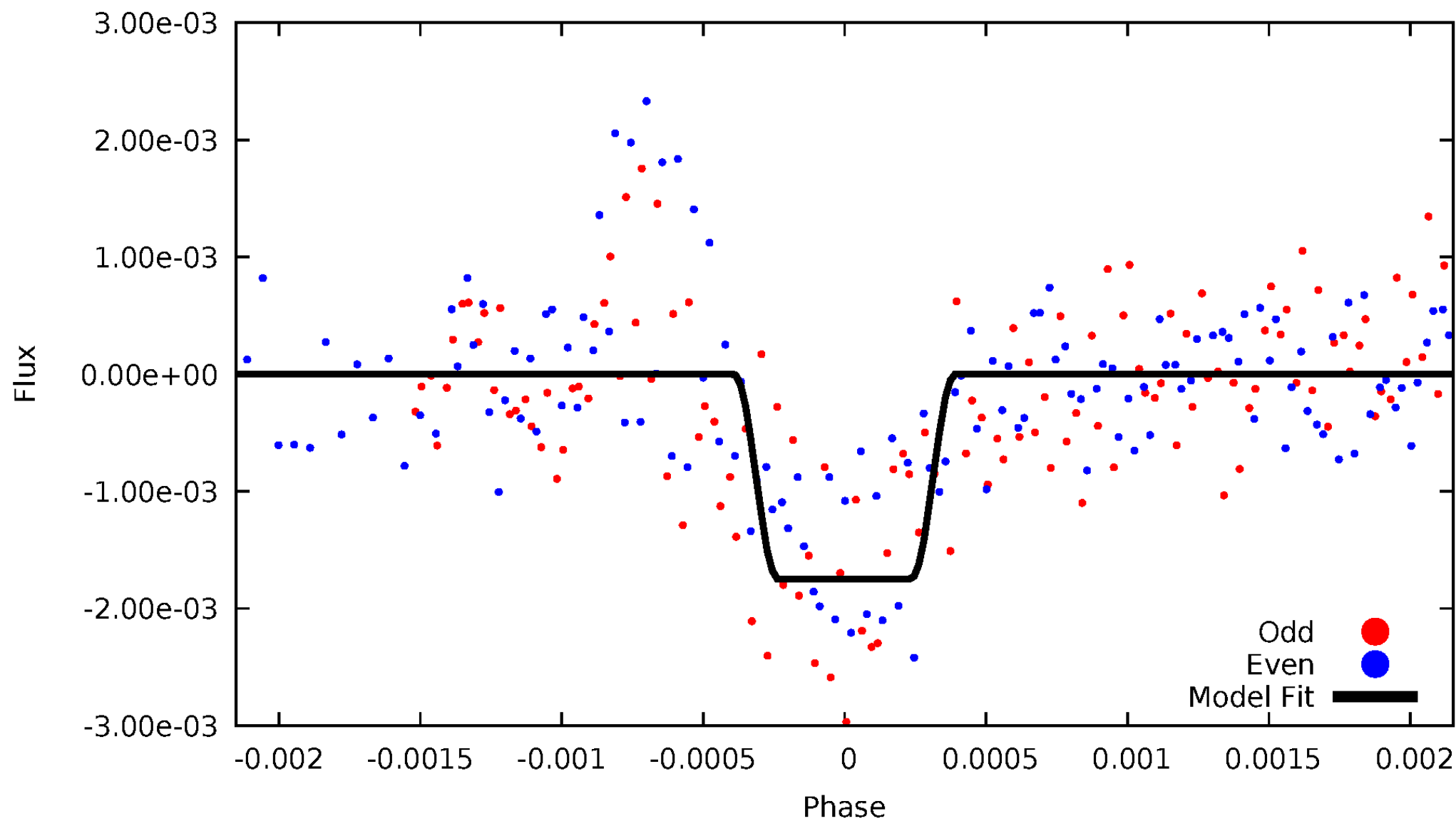
# DV Odd/Even

TCE 008176601-02



# ALT Odd/Even

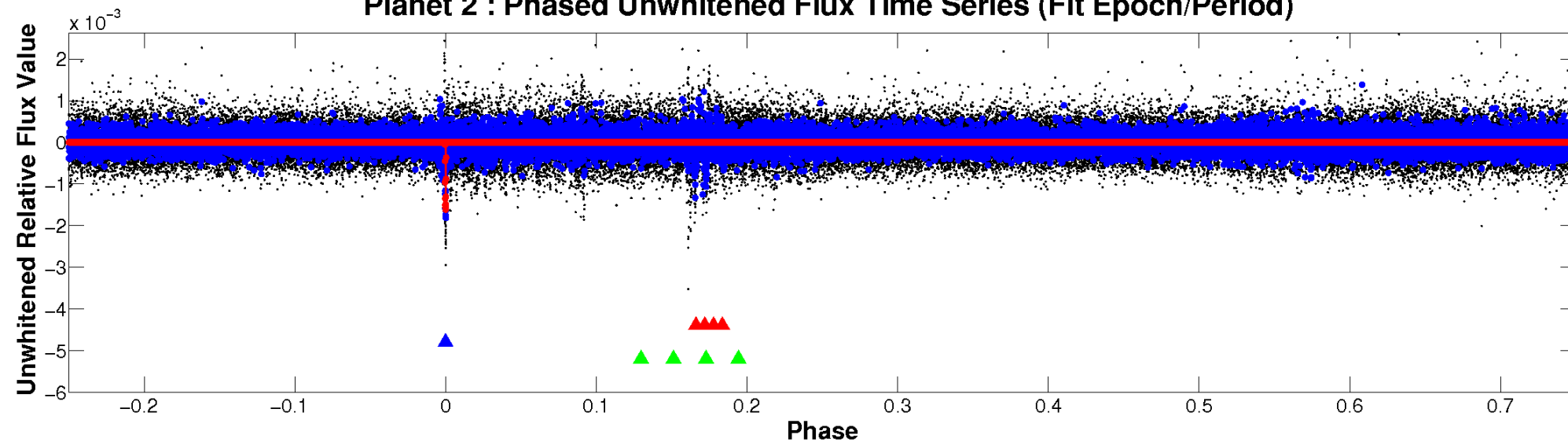
TCE 008176601-02



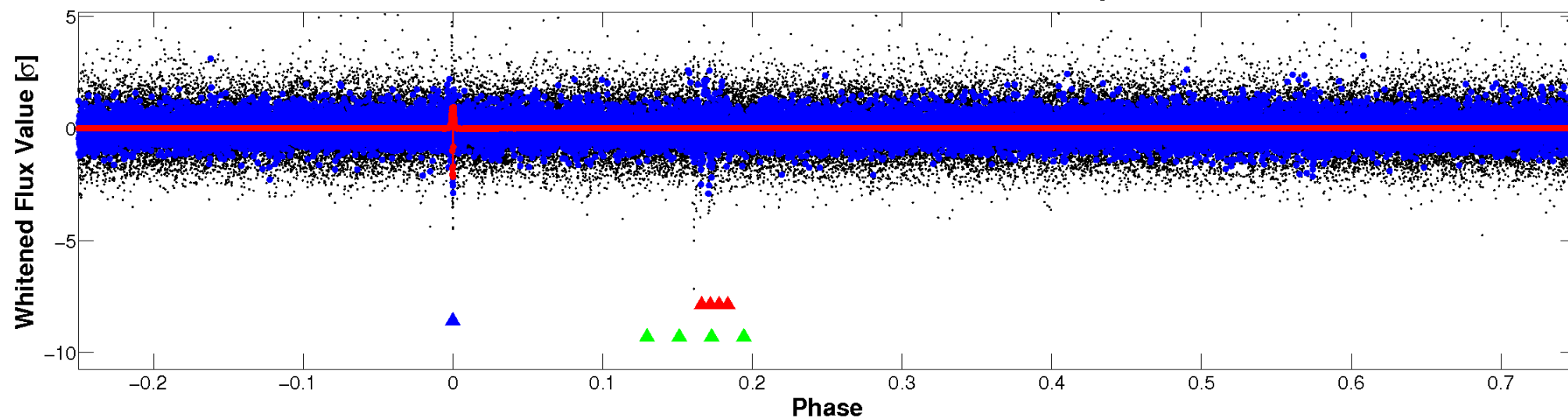


# Non-Whitened Vs. Whitened Light Curve

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

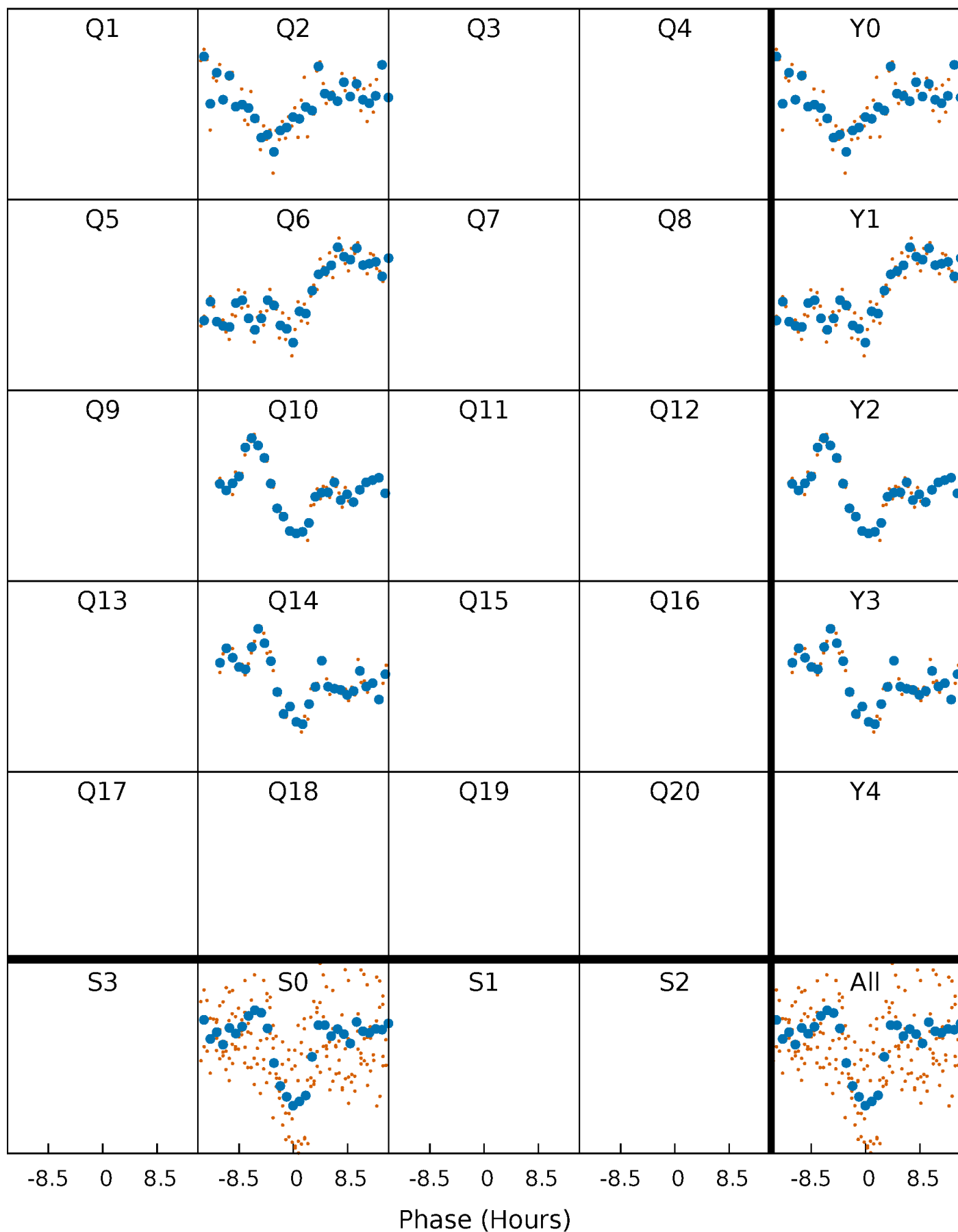


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



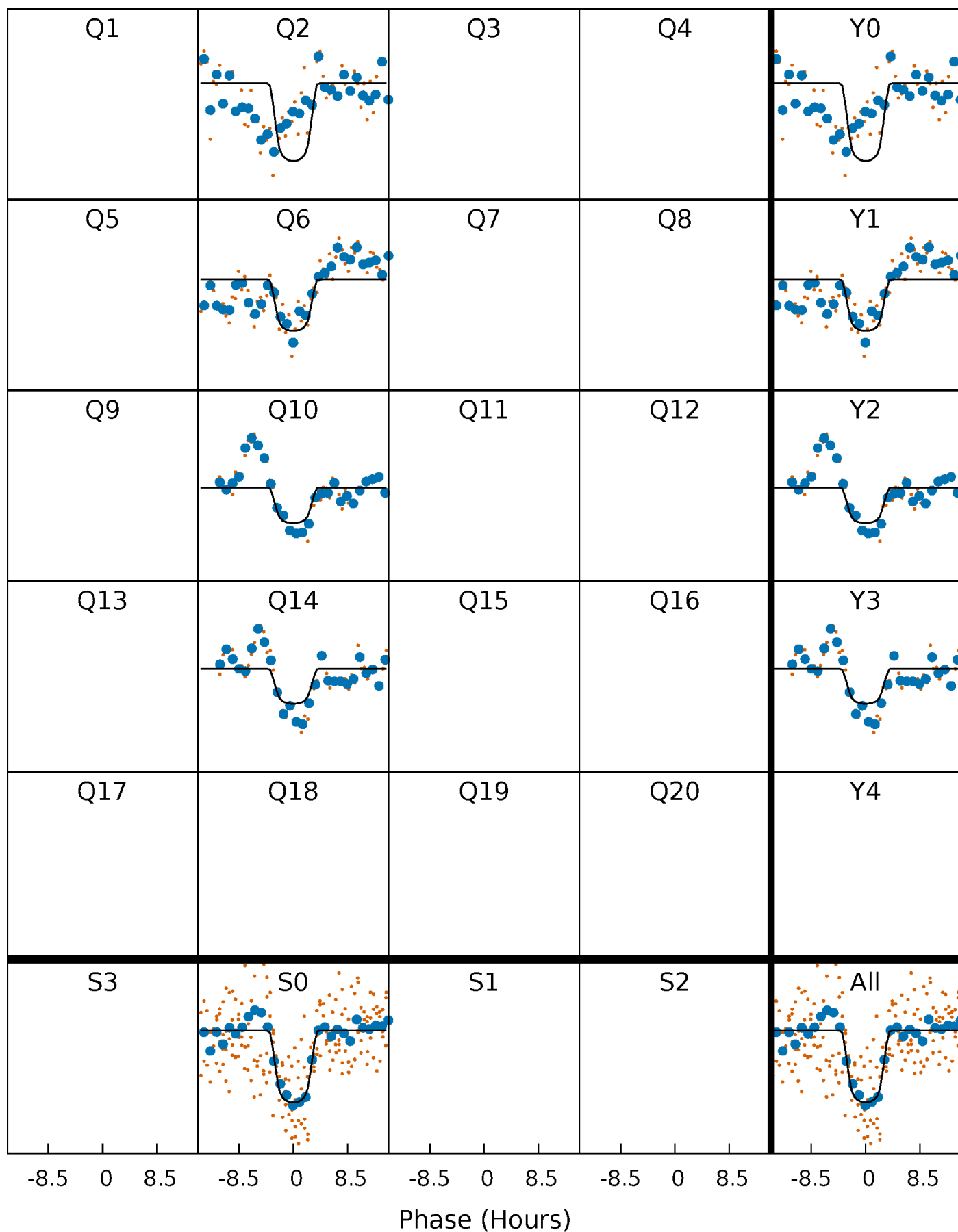
# PDC Quarter-Phased Transit Curves

TCE 008176601-02     $P=367.293043$  Days     $T_0=172.778733$  (BKJD)



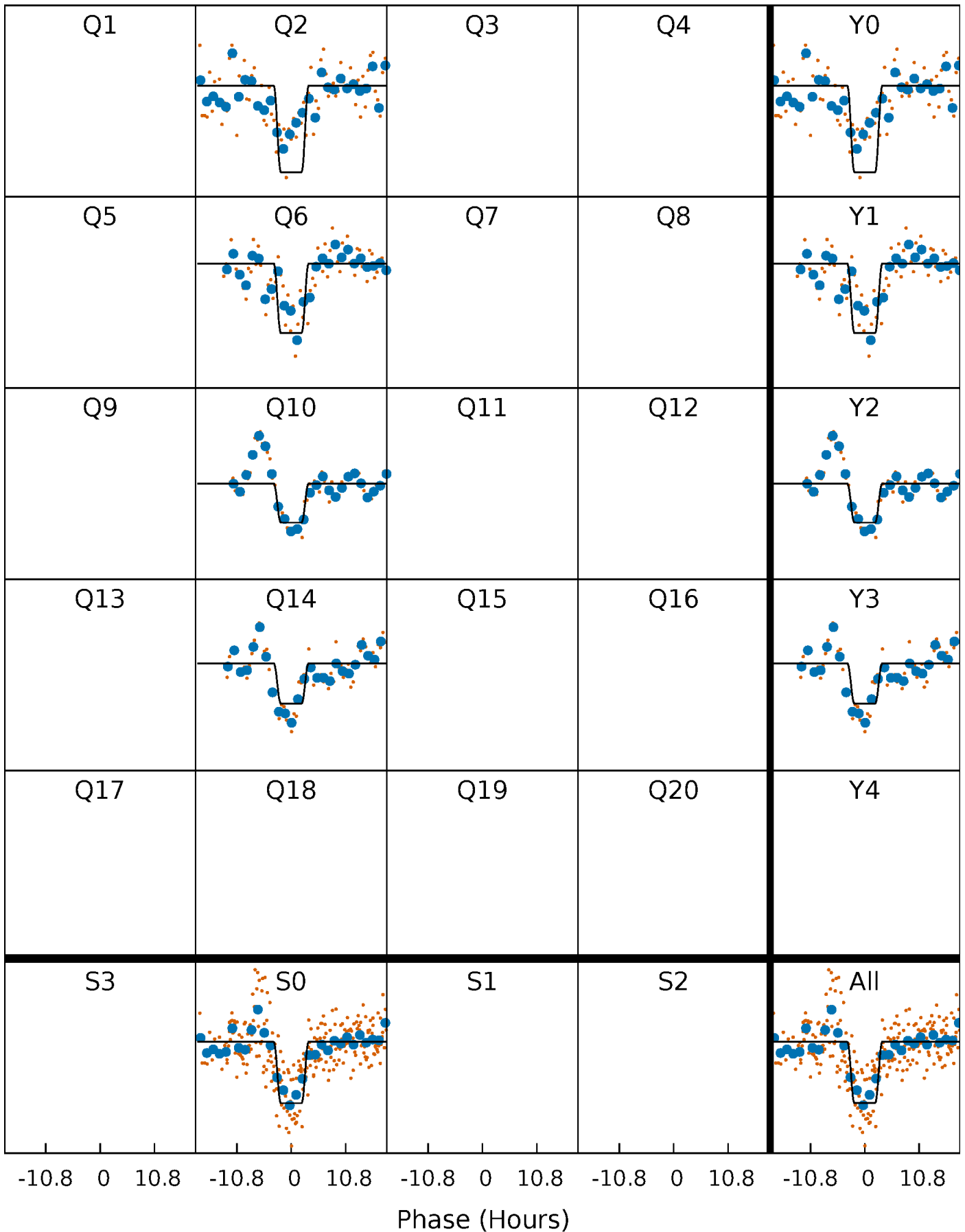
# DV Quarter-Phased Transit Curves

TCE 008176601-02 P=367.293043 Days  $T_0=172.778733$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

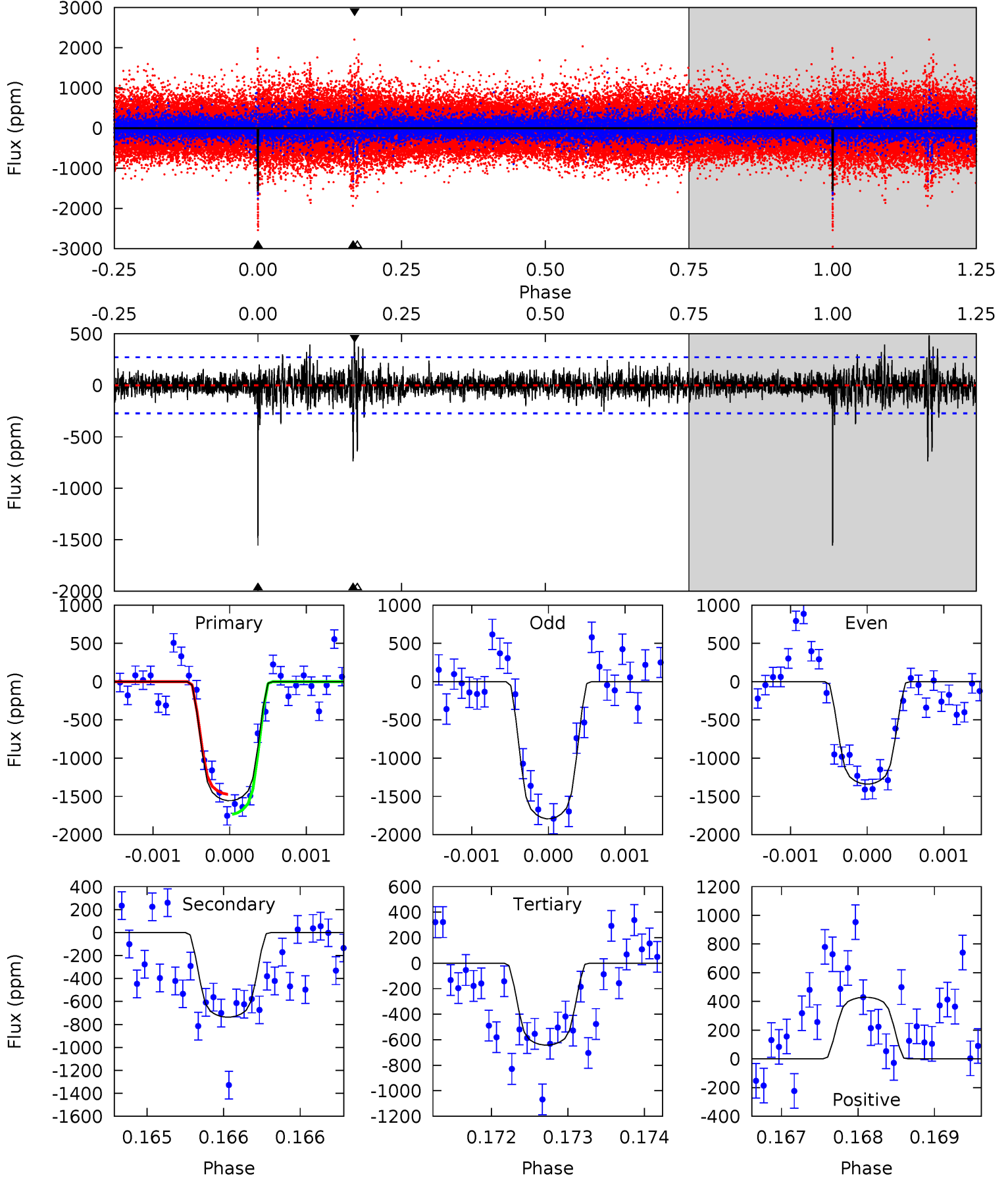
TCE 008176601-02 P=367.340919 Days  $T_0=172.686818$  (BKJD)



# DV Model-Shift Uniqueness Test

008176601-02, P = 367.293043 Days, E = 172.778733 Days

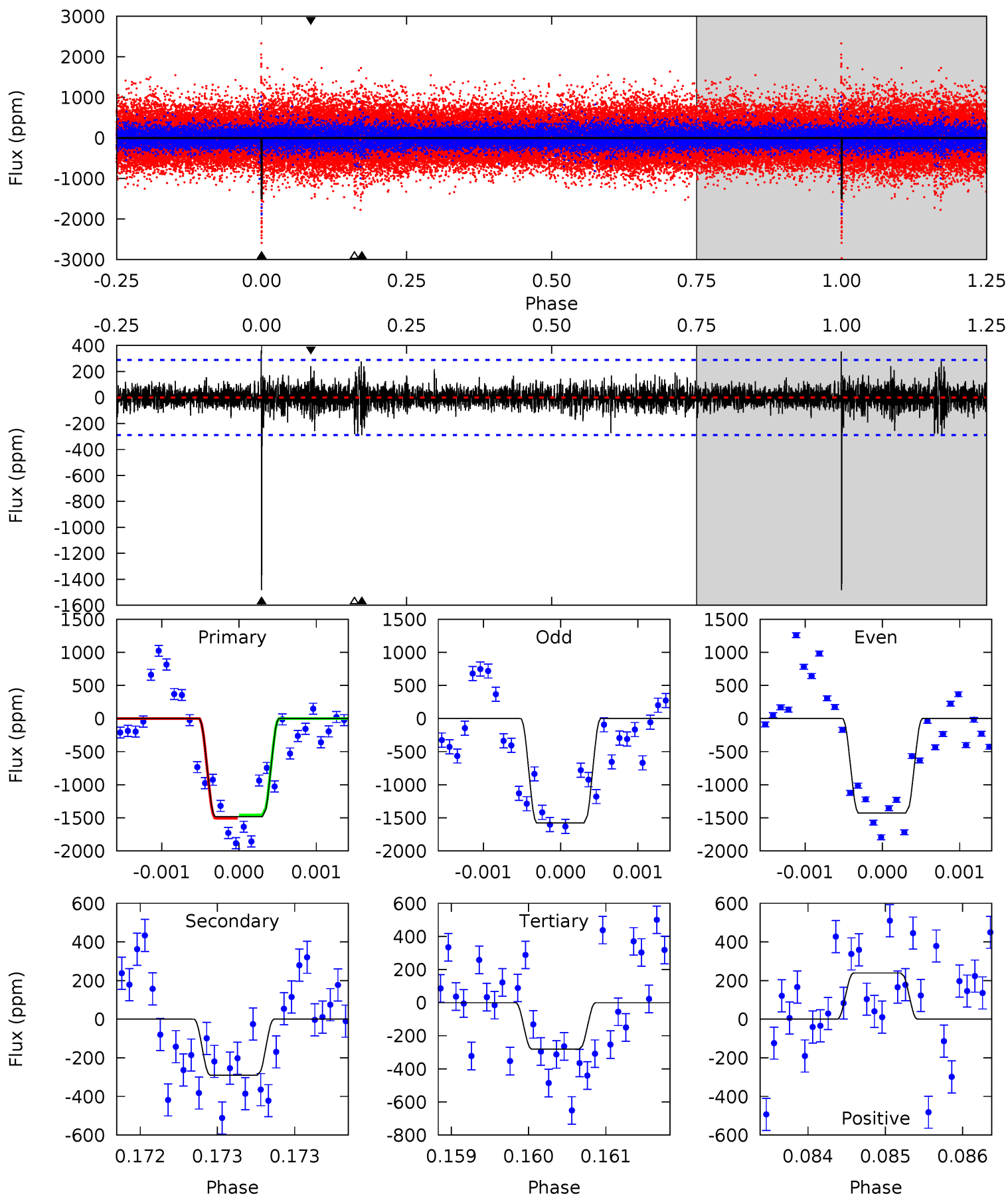
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
31.3	14.8	12.9	8.65	5.48	3.34	1.52	18.4	22.7	1.91	6.19	4.60	0.96	0.24	2.61



# Alt Model-Shift Uniqueness Test

008176601-02, P = 367.340919 Days, E = 172.686818 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
28.2	5.52	5.35	4.55	5.50	3.37	1.06	22.8	23.6	0.17	0.97	1.43	1.00	0.19	0.45





### Stellar Parameters For KIC 008176601

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6026^{+167}_{-188}$	$4.517^{+0.052}_{-0.195}$	$-0.440^{+0.300}_{-0.300}$	$0.875^{+0.248}_{-0.083}$	$0.917^{+0.109}_{-0.109}$	$1.931^{+0.488}_{-0.941}$
	+3%/-3%	+1%/-4%	+68%/-68%	+28%/-9%	+12%/-12%	+25%/-49%
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 008176601-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-737 \pm 50$	$4.35^{+0.63}_{-0.47}$	$359^{+23}_{-17}$	$4840^{+219}_{-192}$	$20101^{+4852}_{-4893}$
Alt.	$-290 \pm 53$	$4.11^{+0.73}_{-0.43}$	$358^{+24}_{-16}$	$4123^{+198}_{-218}$	$8603^{+2938}_{-2573}$

$T_{\text{max}}$  = 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

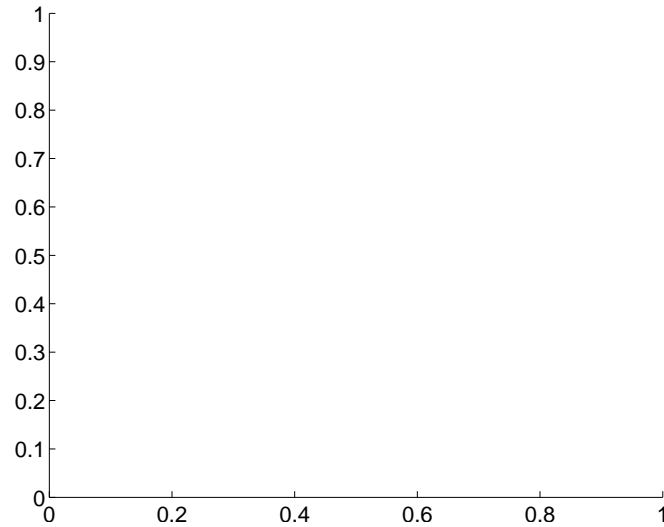
Supplemental centroid analysis for 008176601-02. Kepler magnitude: 15.14. Transit SNR 13.87

There are 0 quarters with good PRF difference image offsets

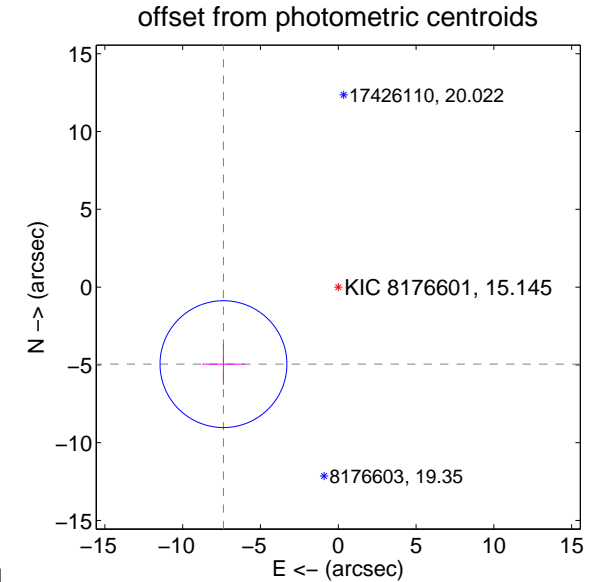
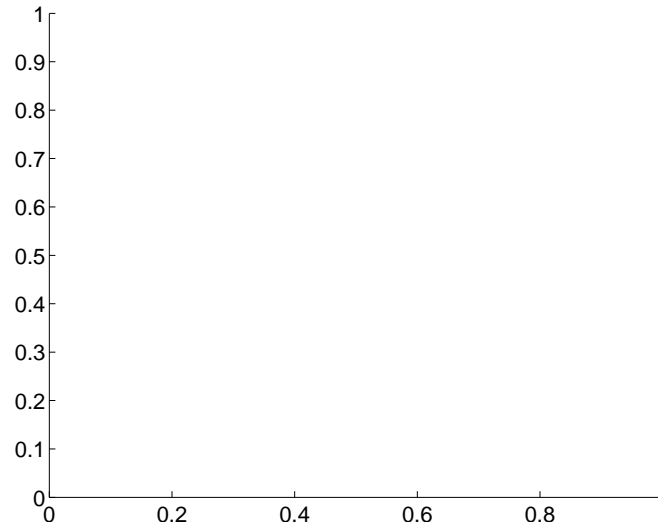
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	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	$8.89 \pm 1.36$	$6.54$	$7.38 \pm 1.38$	$-4.95 \pm 1.32$

There is no PRF-fit offset from OOT-fit

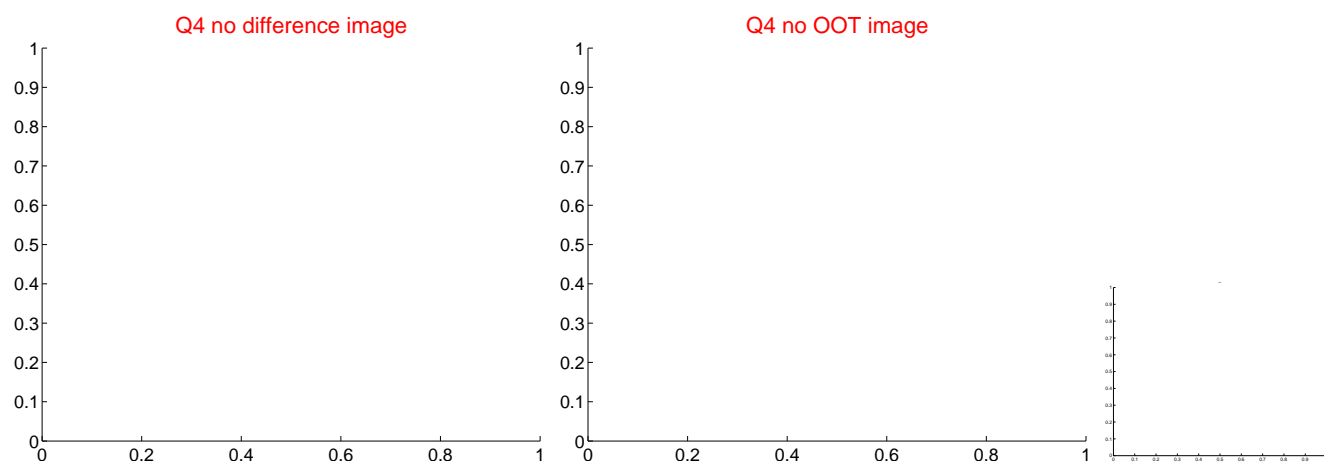
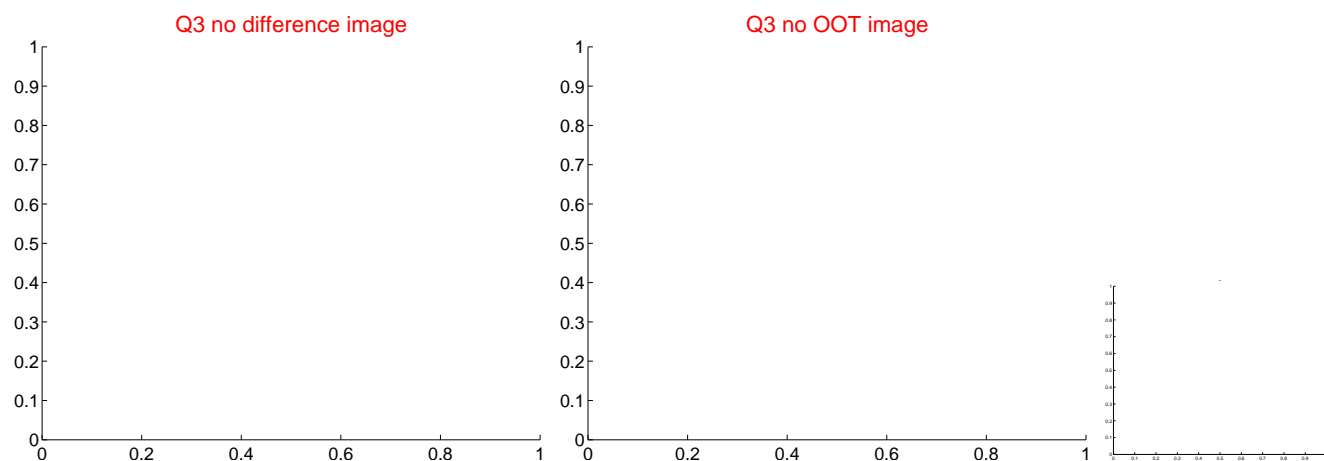
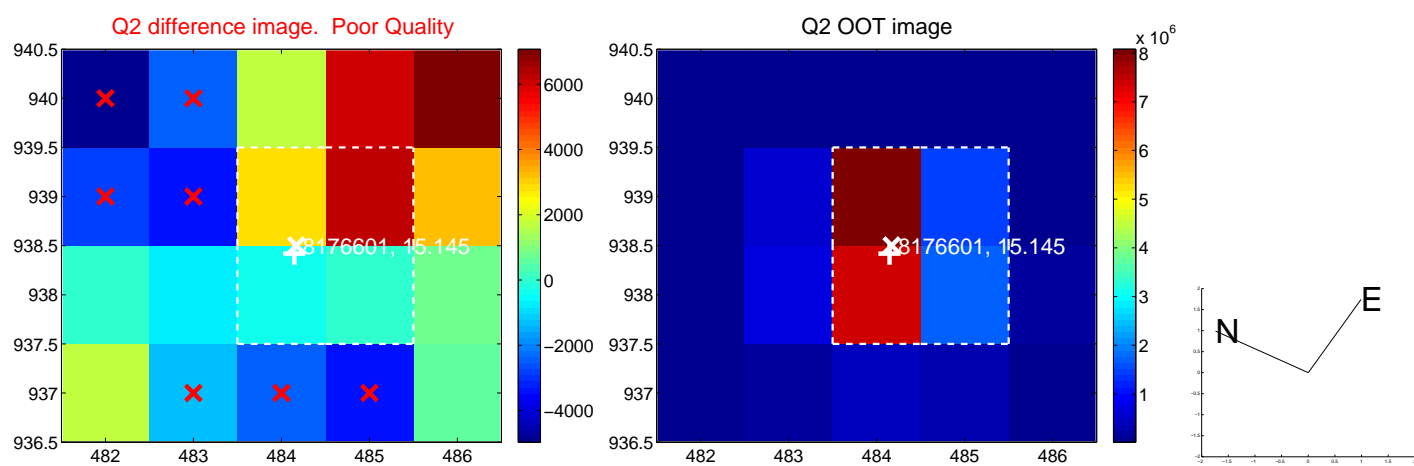
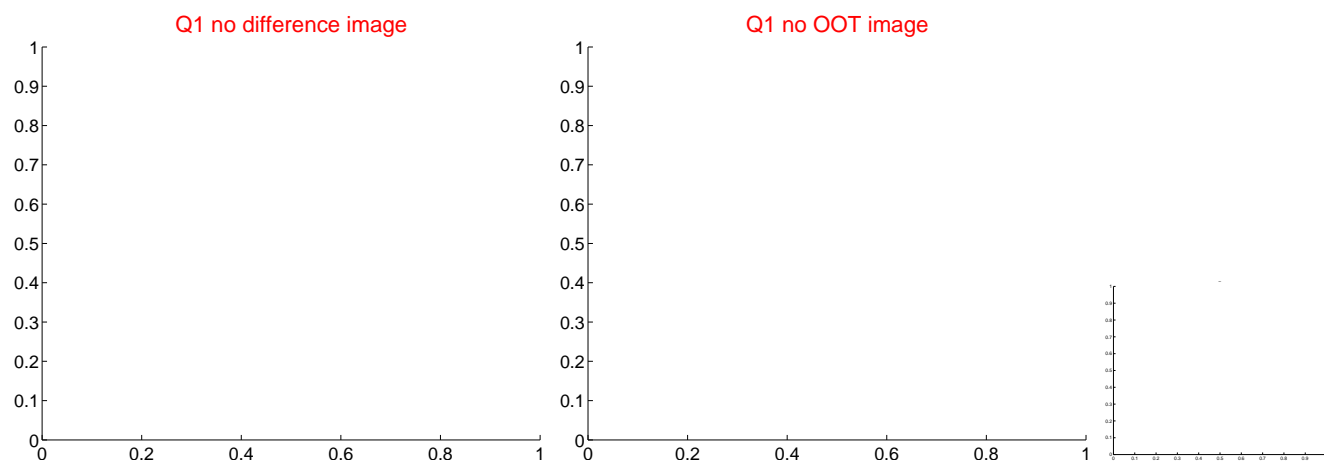


There is no PRF-fit offset from KIC



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.



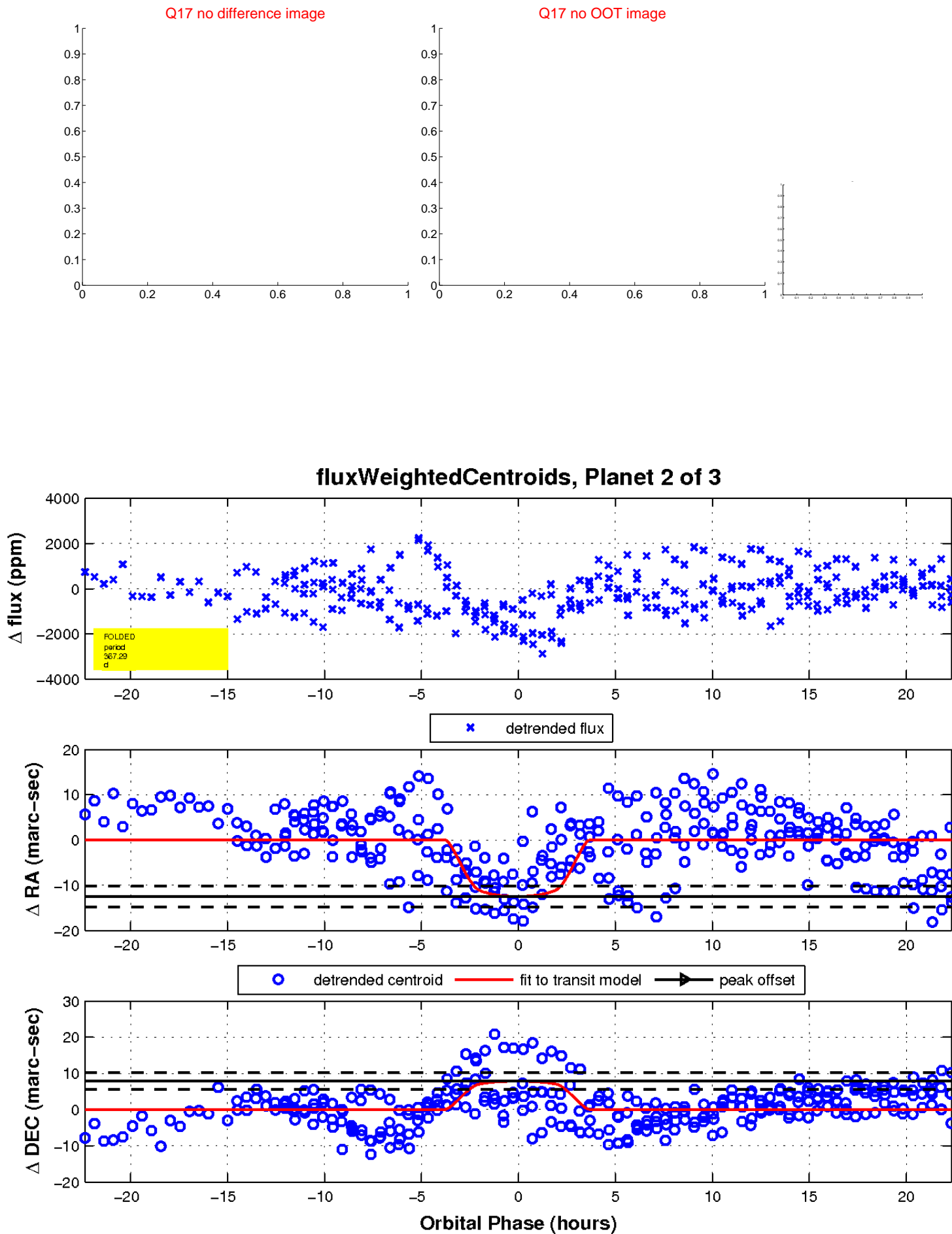
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

