

# KIC 007668658

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007668658-01	OBS	No	443.303359	472.589056	1388.0	7.487	12.9	6.0	0.79	4904	3.06	0.30
007668658-02	OBS	No	448.759826	545.337243	1785.5	6.509	13.9	7.0	0.79	4904	3.60	0.29

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007668658-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
007668658-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

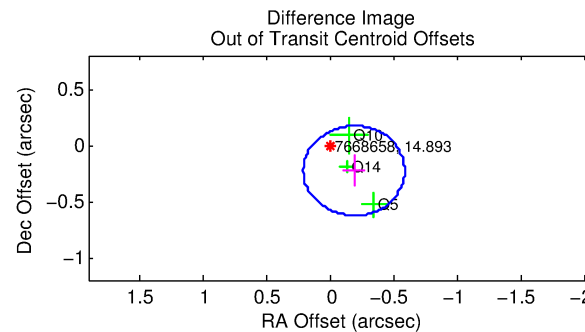
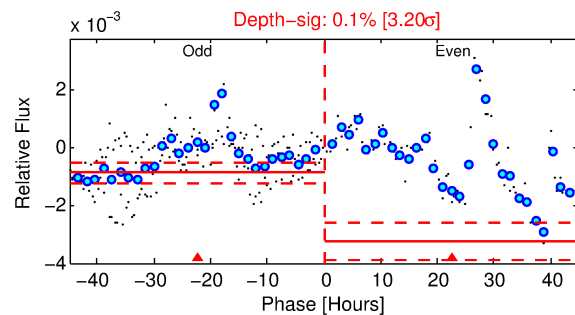
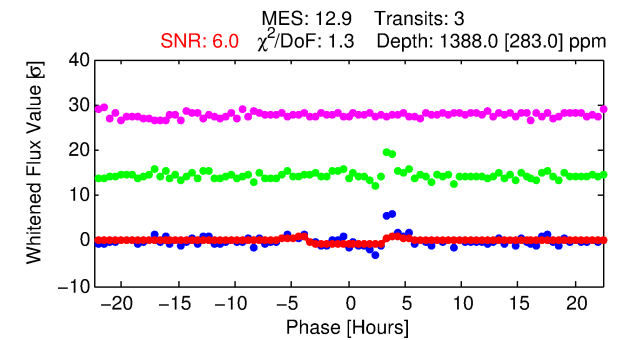
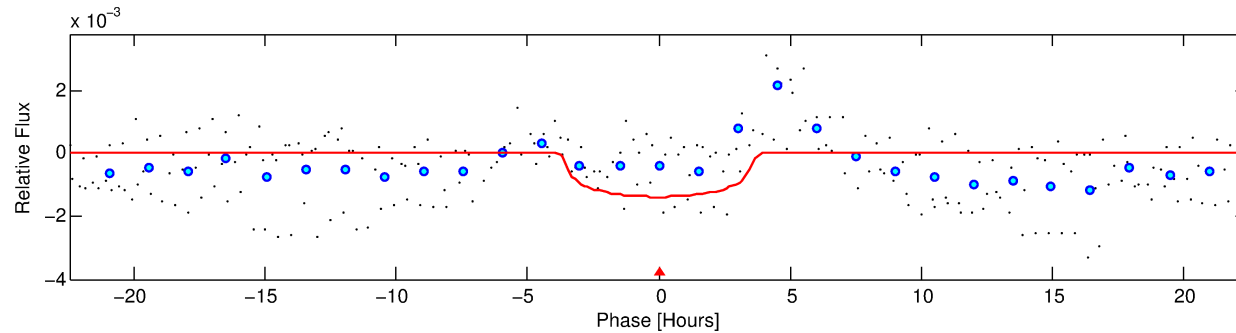
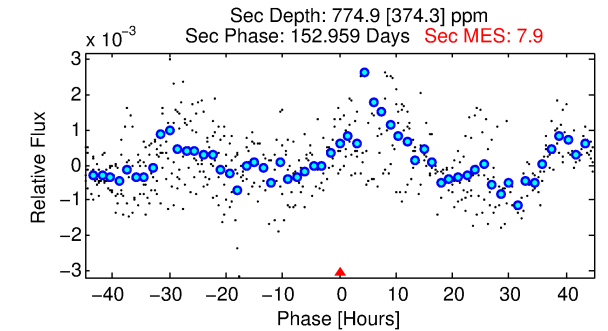
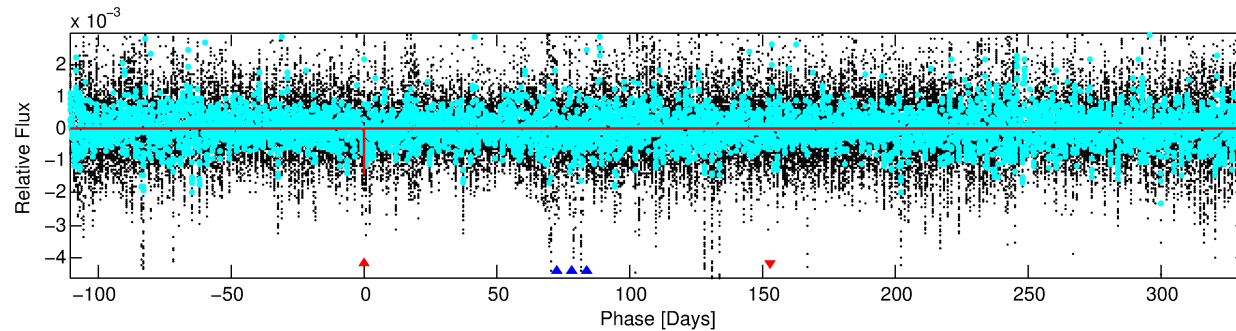
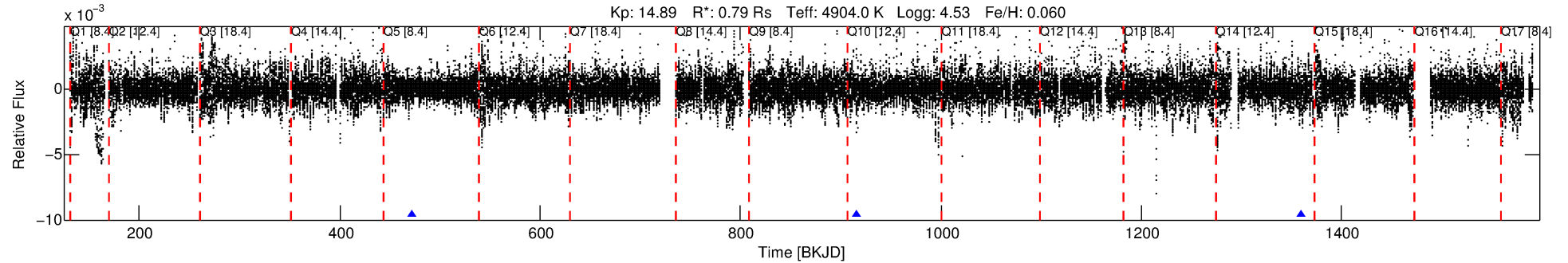
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 007668658-01

No Significant Match Found

# DV One-Page Summary

KIC: 7668658 Candidate: 1 of 2 Period: 443.303 d



## DV Fit Results:

Period = 443.30336 [0.00777] d  
Epoch = 472.5891 [0.0085] BKJD  
Rp/R\* = 0.0357 [0.0175]  
a/R\* = 365.72 [569.42]  
b = 0.65 [1.42]  
Seff = 0.30 [0.05]  
Teq = 188 [9] K  
Rp = 3.06 [1.54] Re  
a = 1.0378 [0.0961] AU  
Ag = 48941.44 [54017.26] [0.91 $\sigma$ ]  
**Teffp = 4330 [1192] K [3.47 $\sigma$ ]**

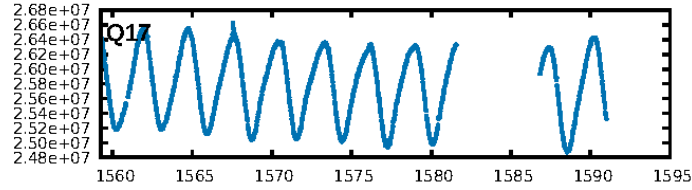
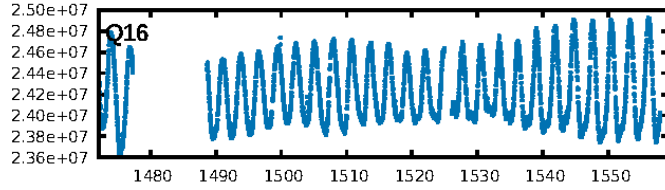
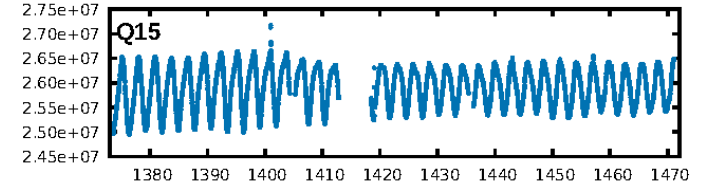
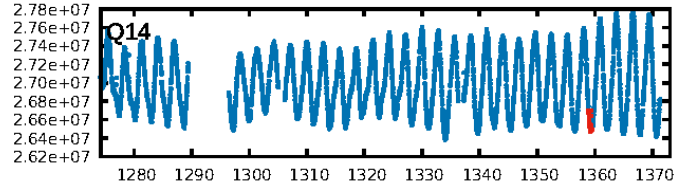
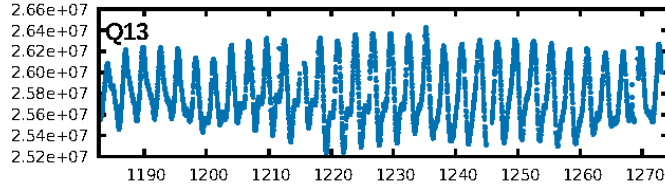
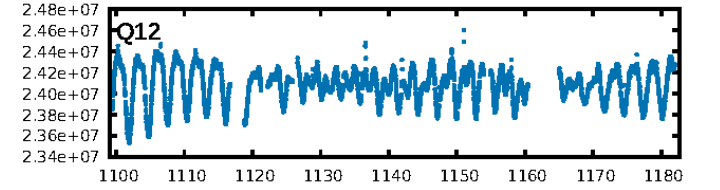
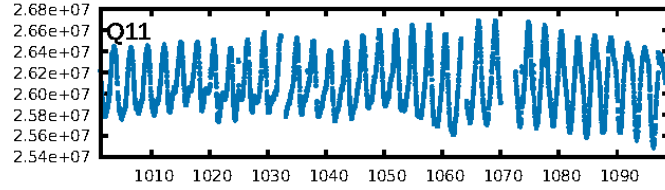
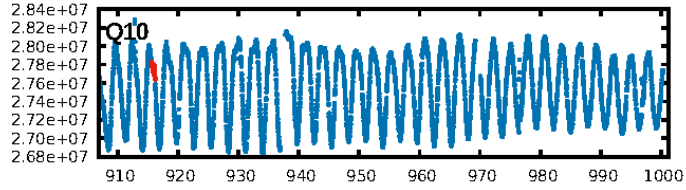
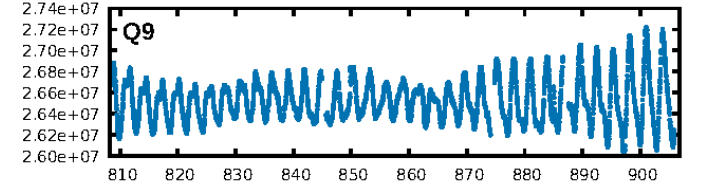
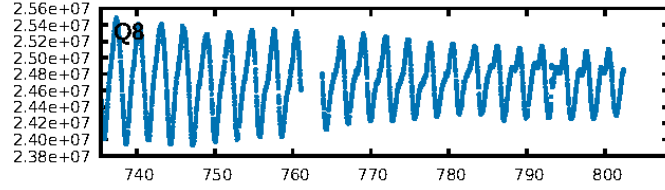
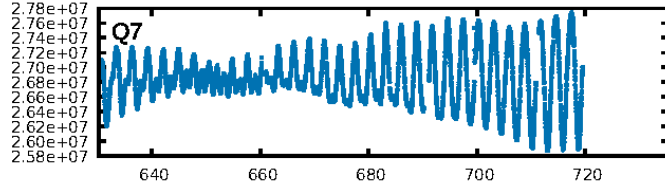
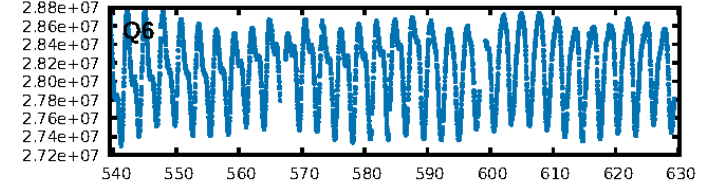
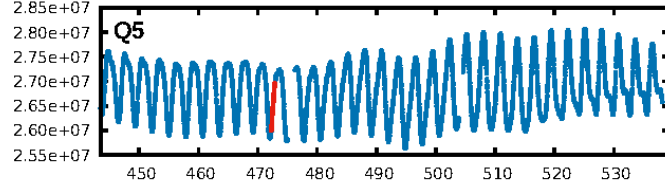
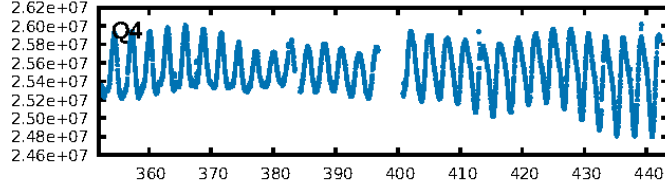
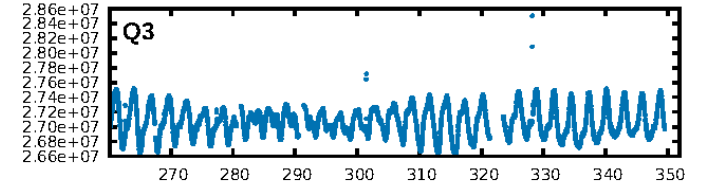
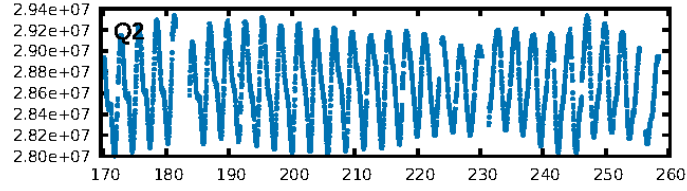
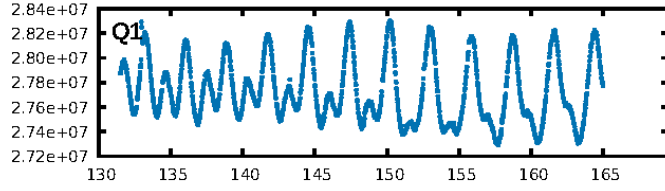
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [13.20 $\sigma$ ]  
ModelChiSquare2-sig: 4.0%  
ModelChiSquareGof-sig: 62.8%  
**Bootstrap-pfa: 6.27e-11**  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: 0.1036**  
Centroid-sig: 48.9%  
Centroid-so: 0.329 arcsec [0.49 $\sigma$ ]  
OotOffset-rm: 0.296 arcsec [2.22 $\sigma$ ]  
OotOffset-st: 2/0/0/1 [3]  
KicOffset-rm: **0.622 arcsec [4.56 $\sigma$ ]**  
KicOffset-st: 2/0/0/1 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

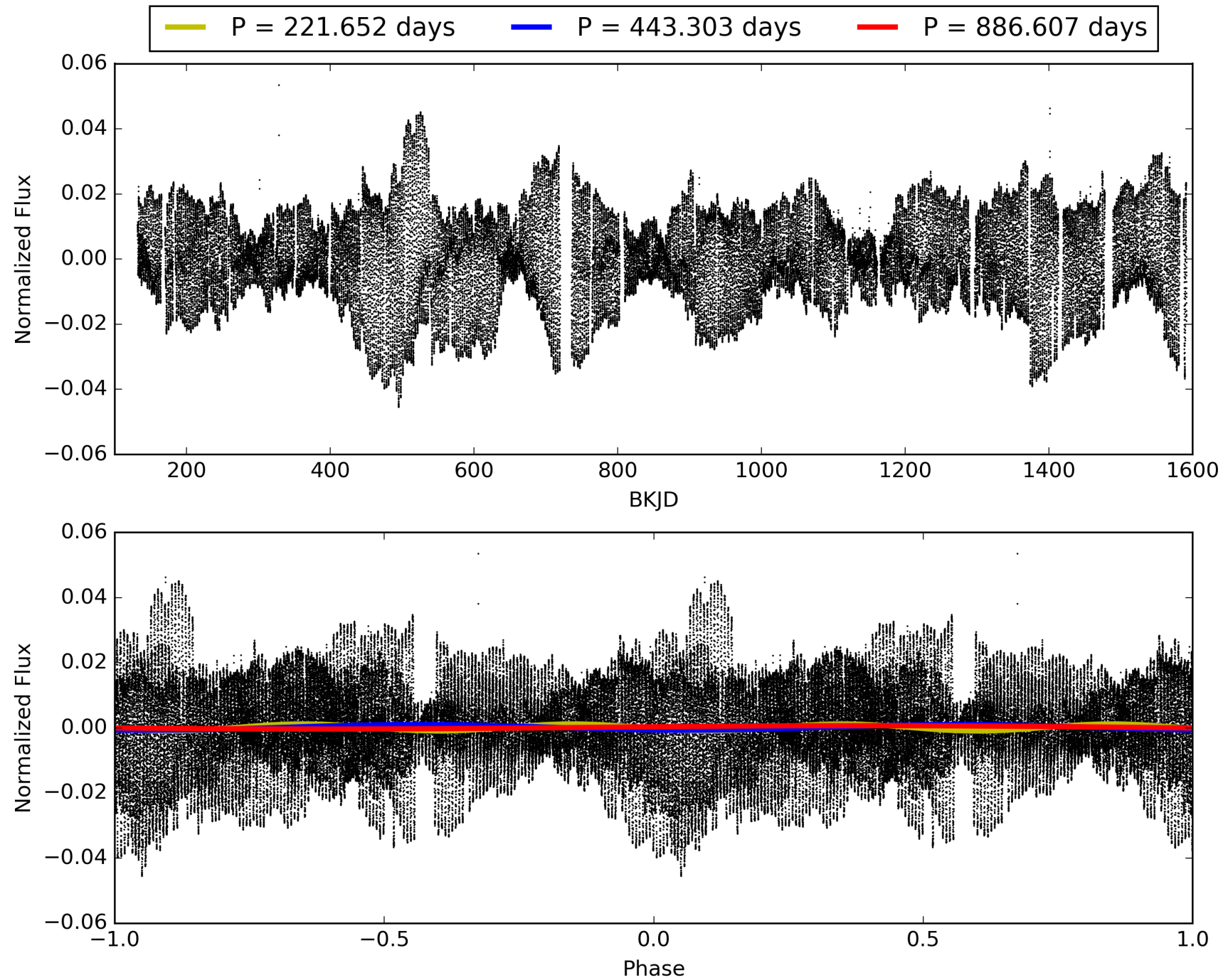
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 11:00:17 Z

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

# TCE 007668658-01, PDC Light Curves

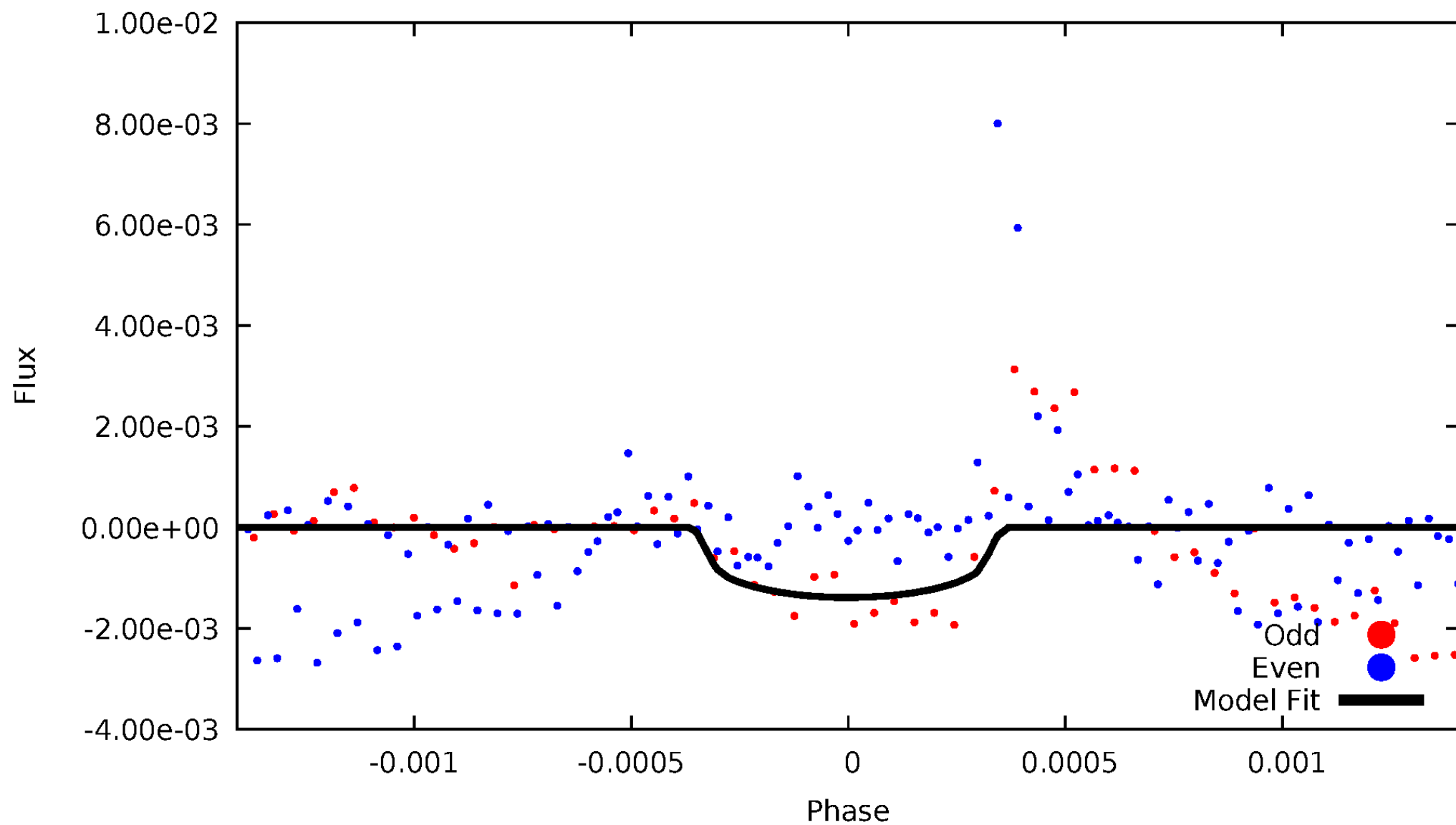


TCE 007668658-01



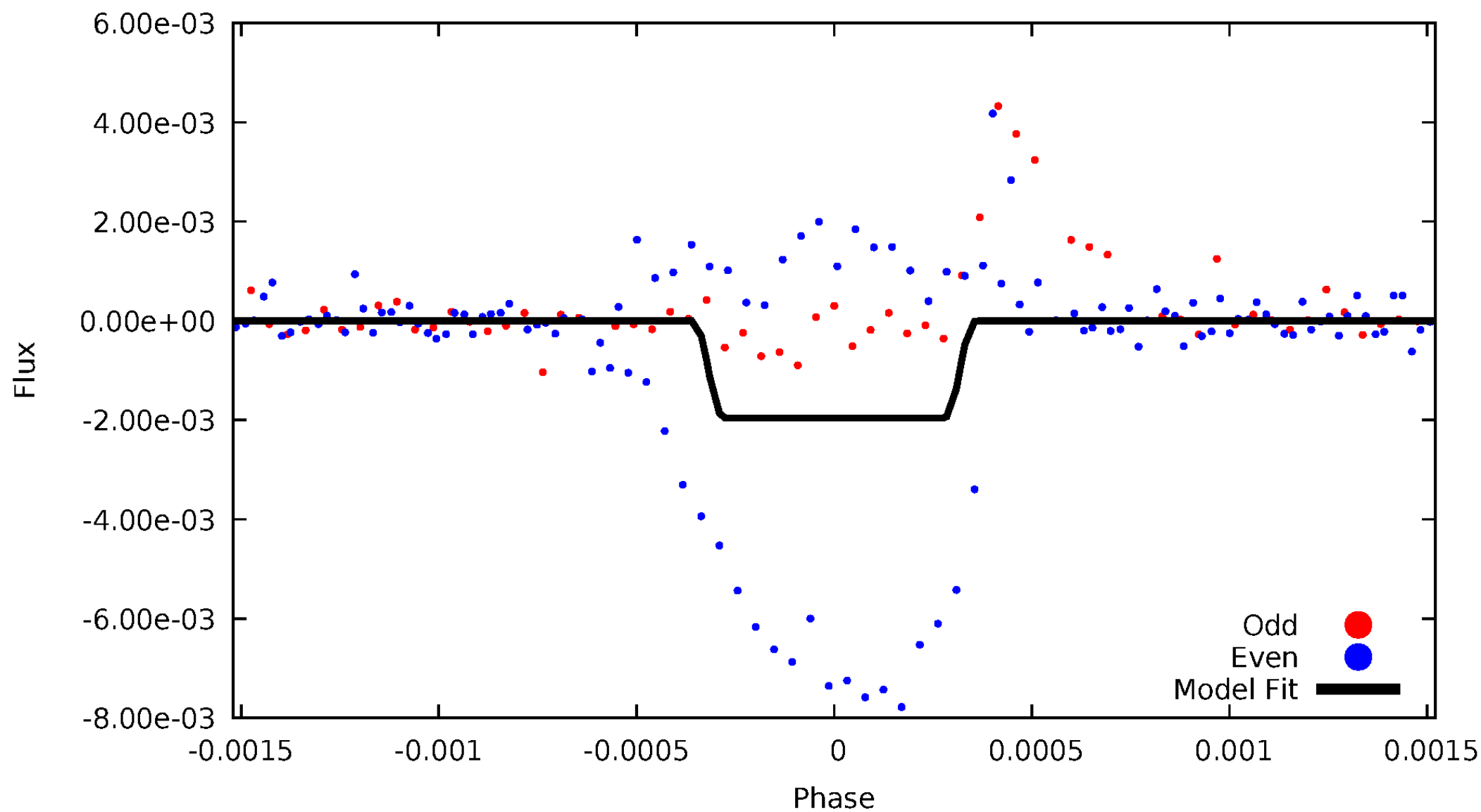
# DV Odd/Even

TCE 007668658-01



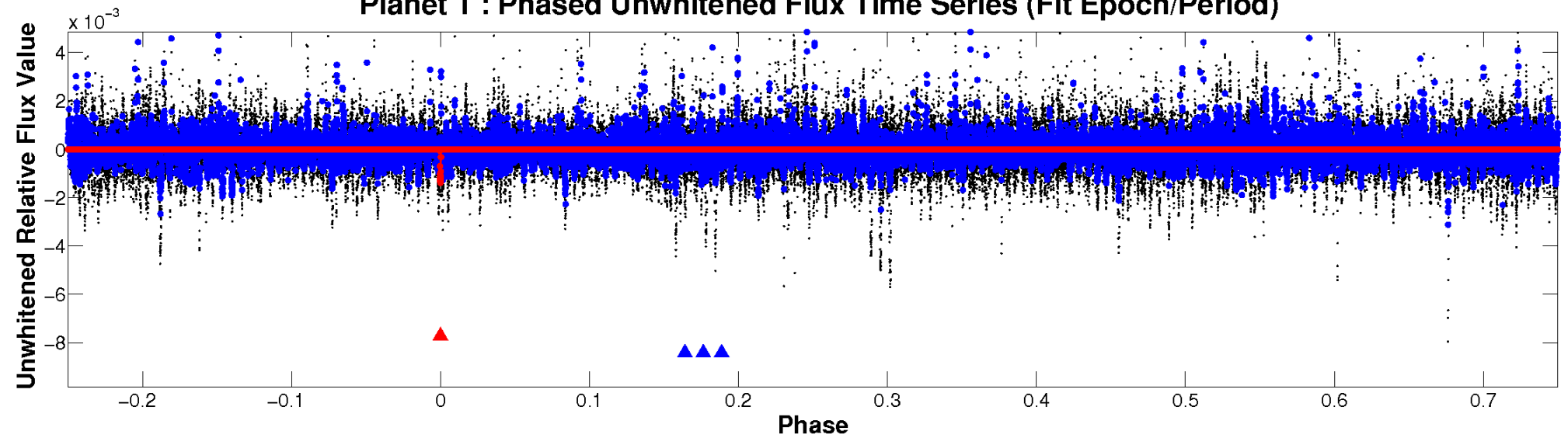
# ALT Odd/Even

TCE 007668658-01

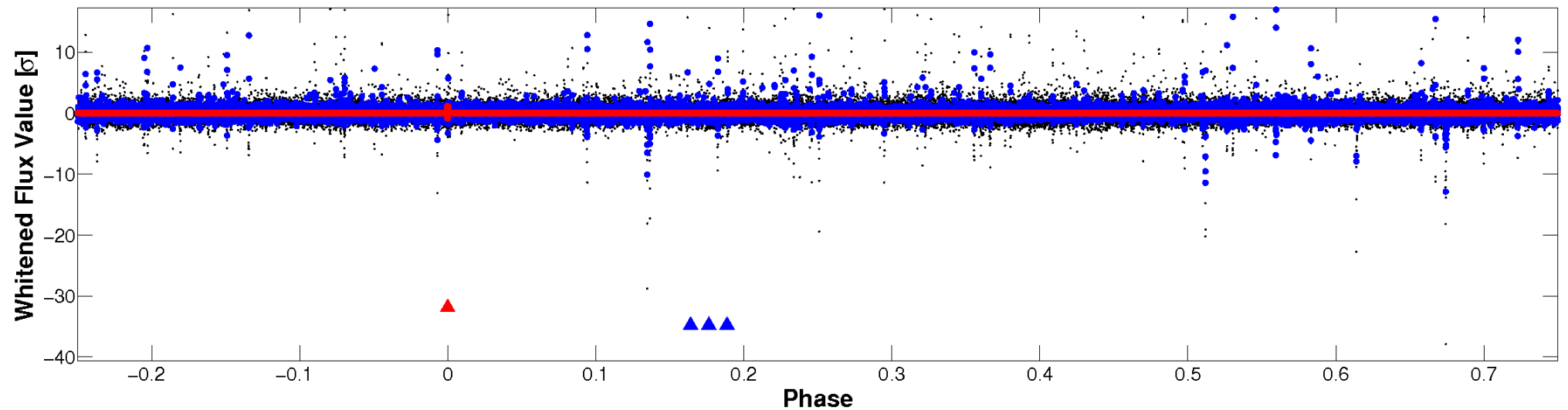


# Non-Whitened Vs. Whitened Light Curve

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

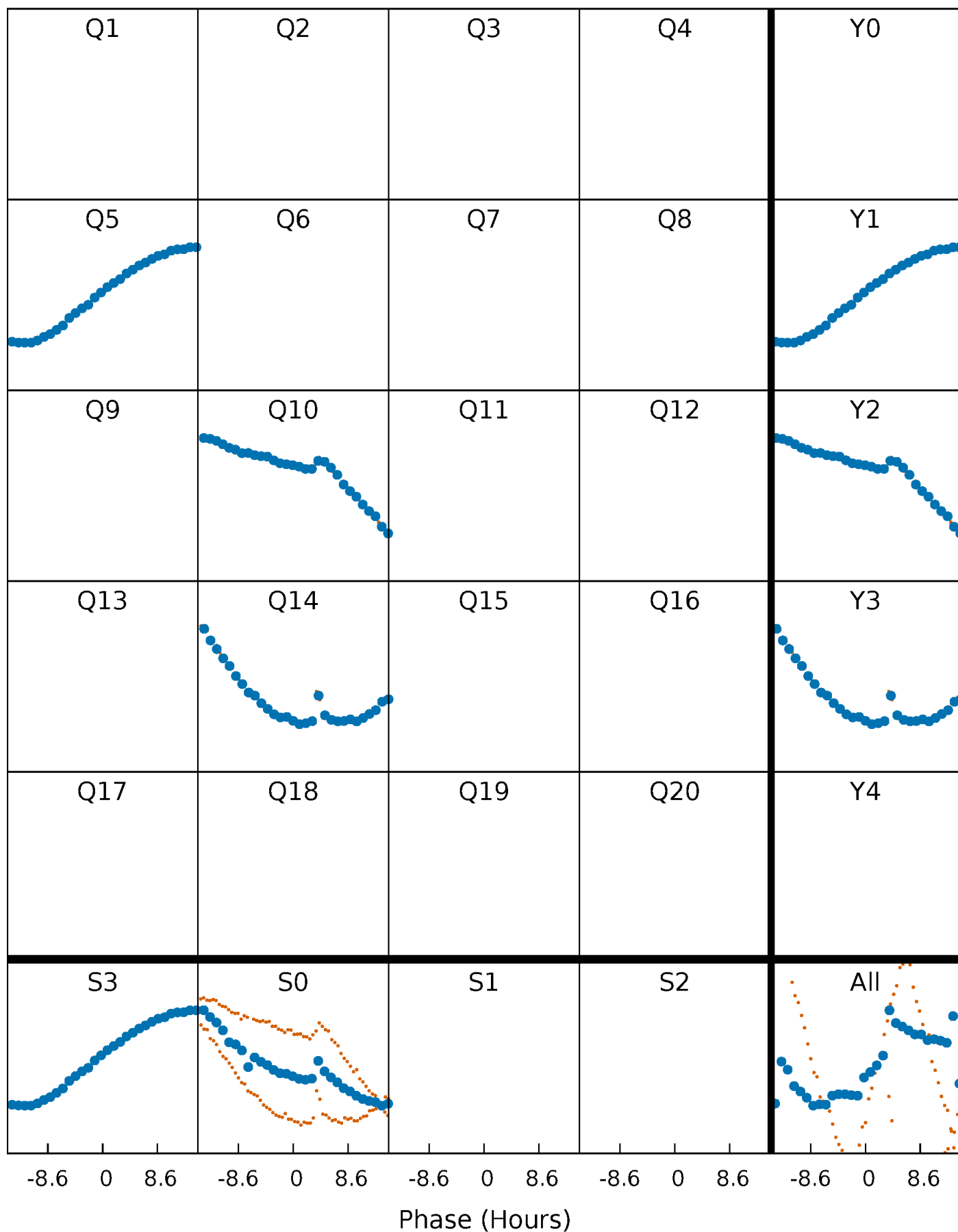


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

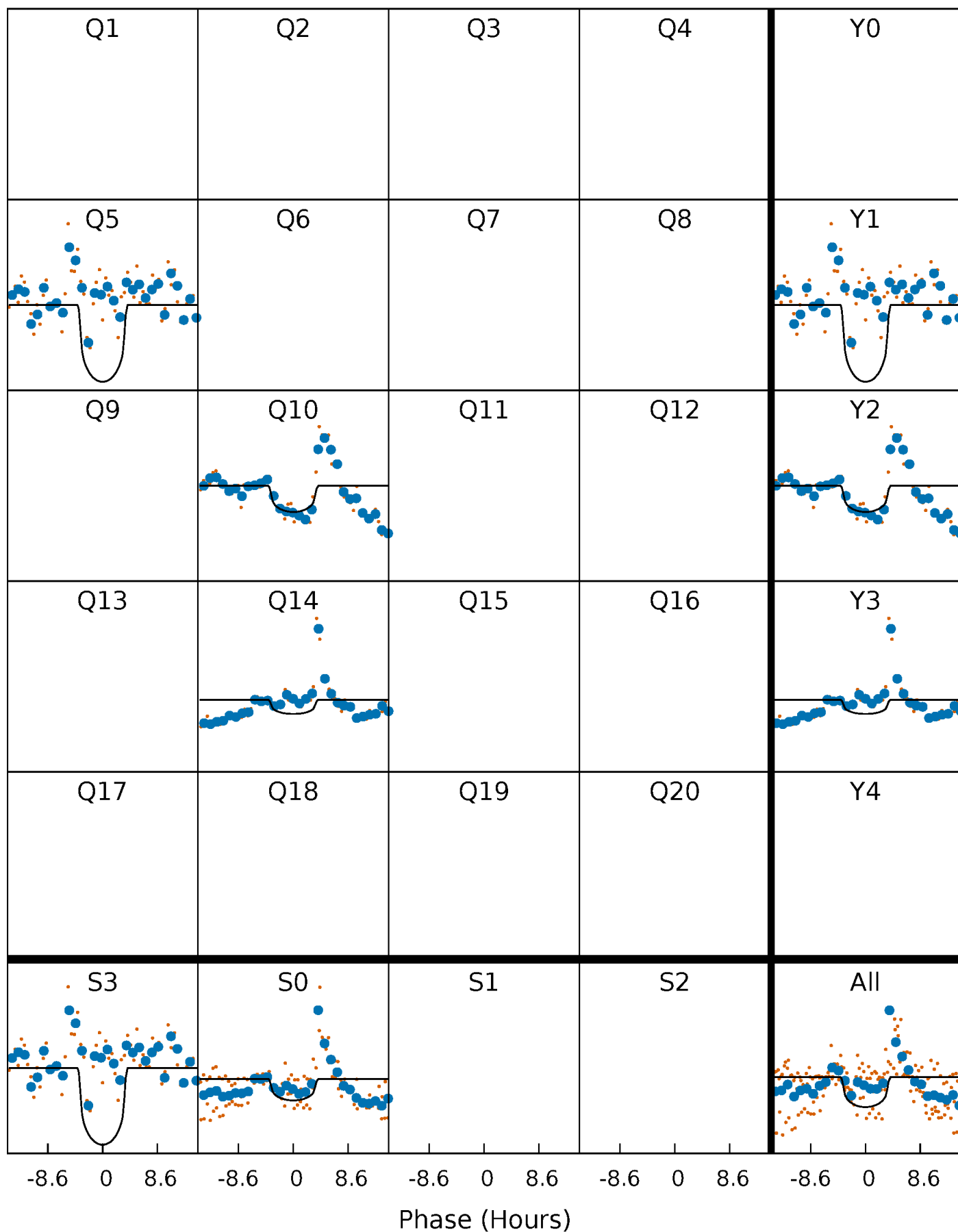
TCE 007668658-01 P=443.303359 Days  $T_0=472.589056$  (BKJD)





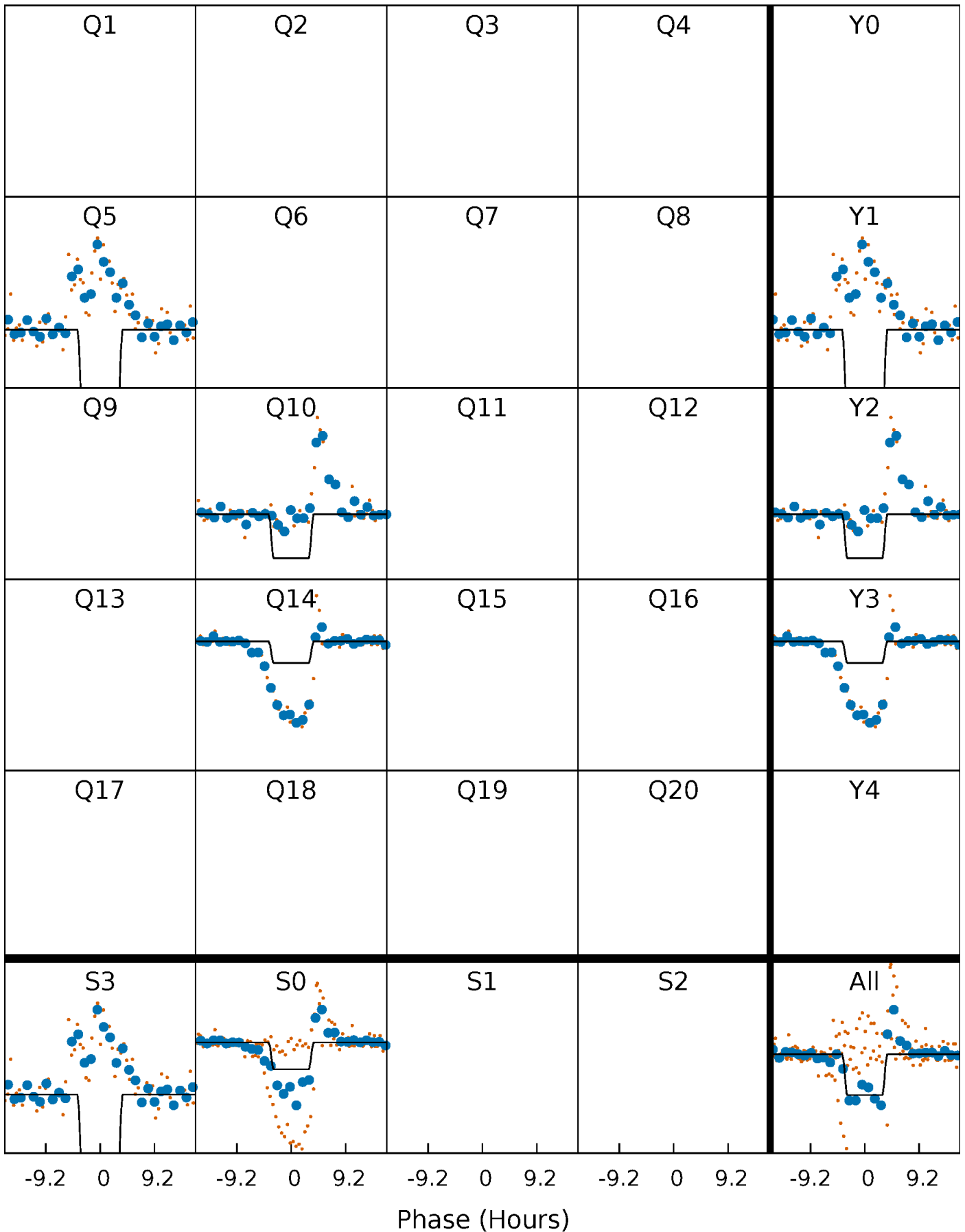
# DV Quarter-Phased Transit Curves

TCE 007668658-01 P=443.303359 Days  $T_0=472.589056$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

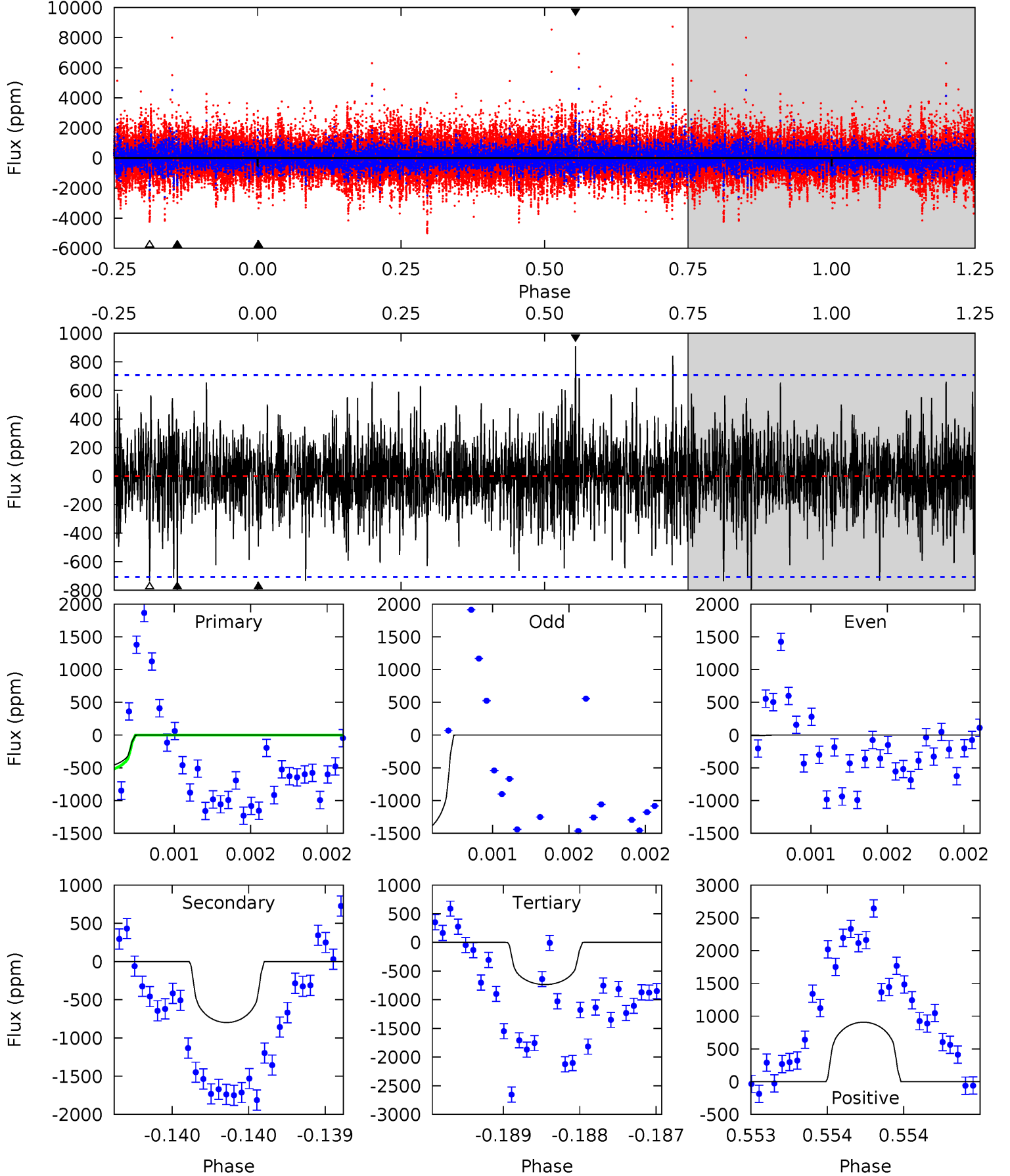
TCE 007668658-01 P=443.292462 Days  $T_0=472.585578$  (BKJD)



# DV Model-Shift Uniqueness Test

007668658-01, P = 443.303359 Days, E = 29.285697 Days

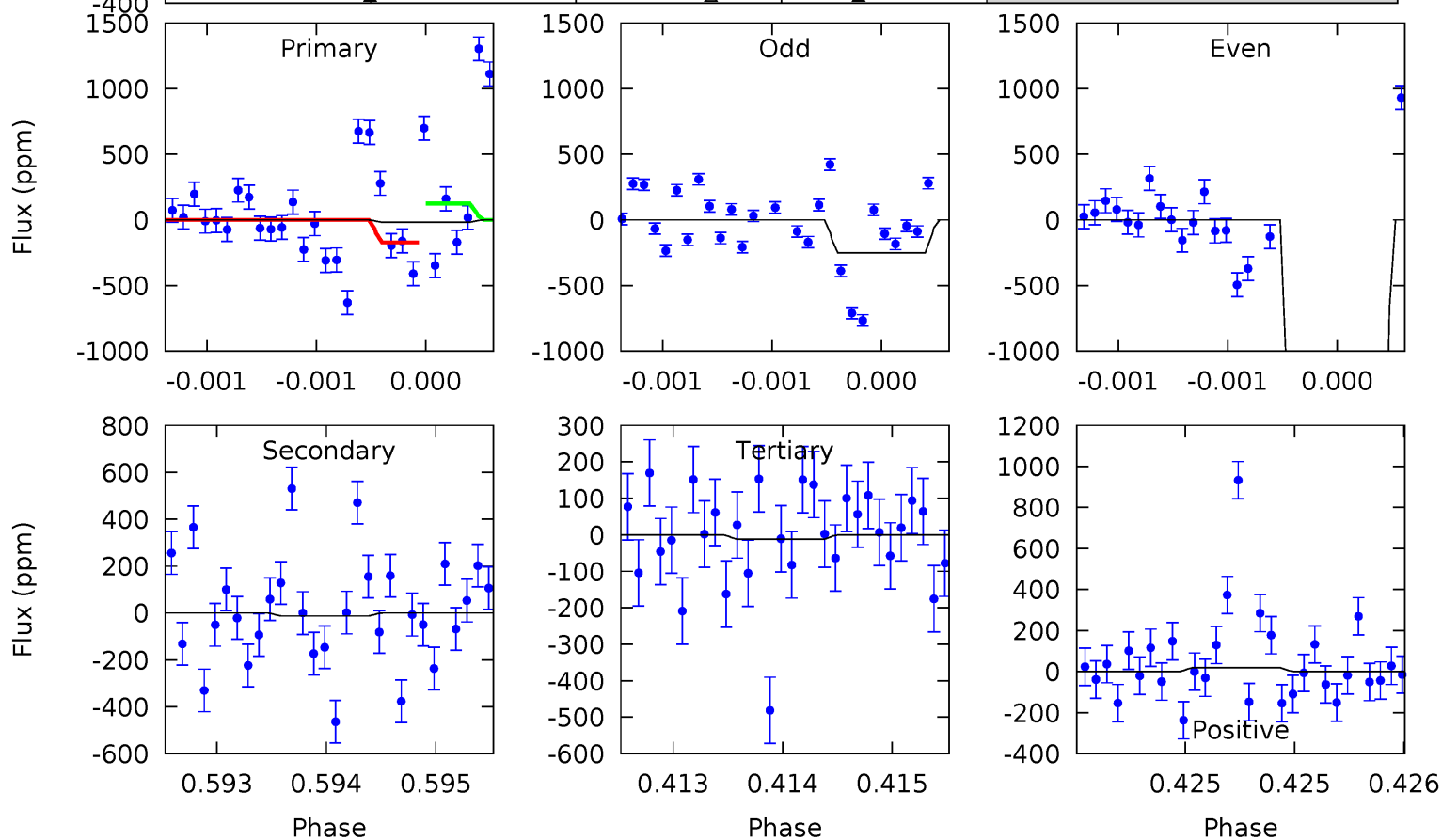
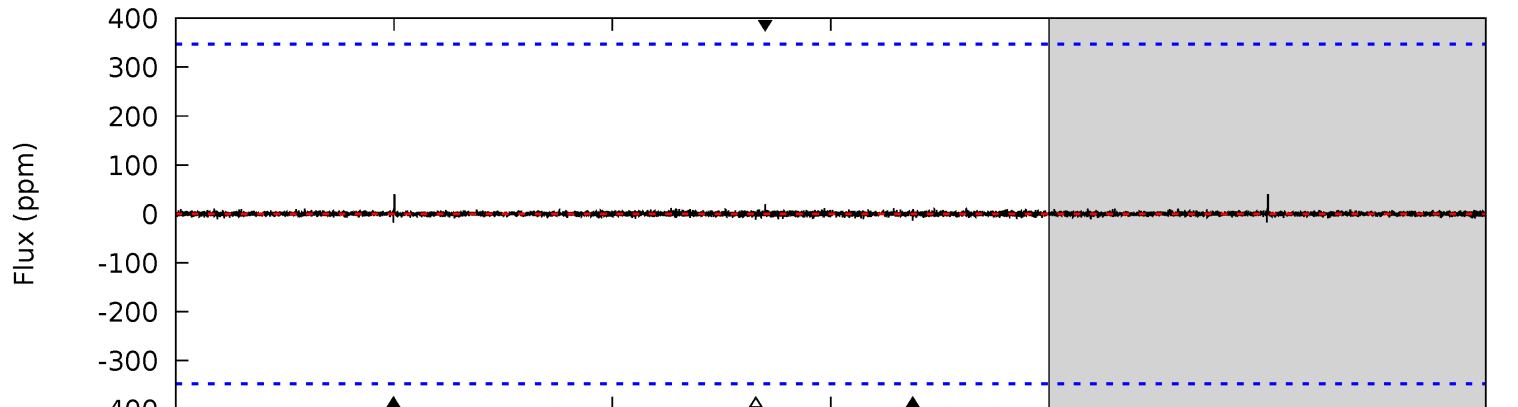
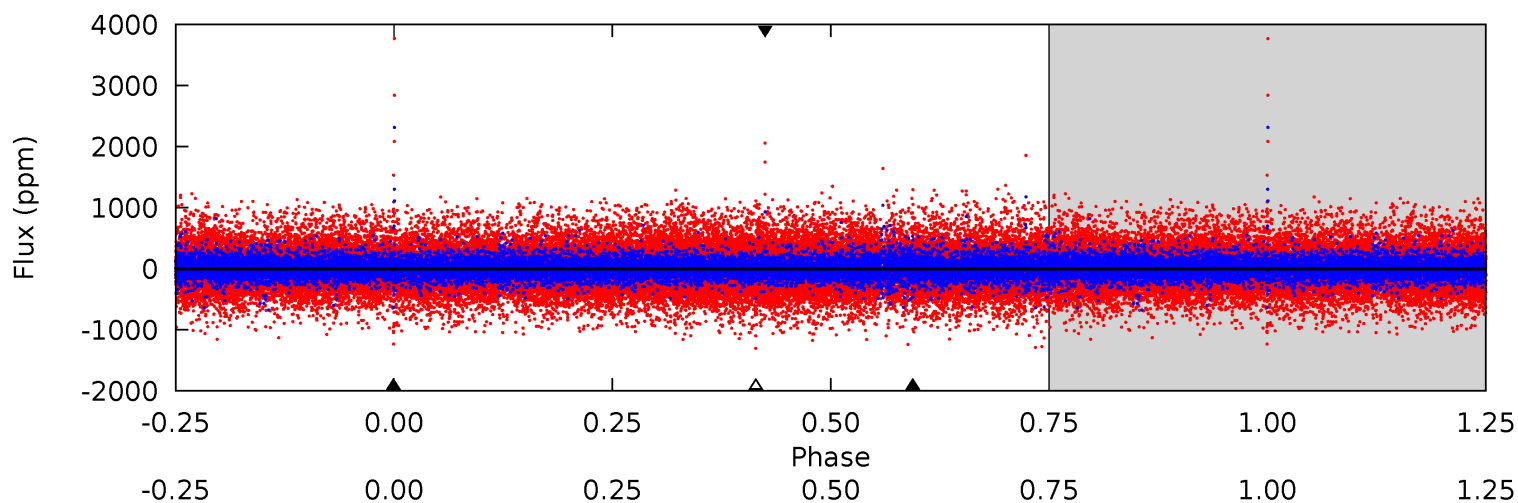
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.83	6.20	5.71	7.05	5.50	3.37	1.55	-1.88	-3.22	0.49	-0.85	4.88	-11.3	0.53	0.54



# Alt Model-Shift Uniqueness Test

007668658-01, P = 443.292462 Days, E = 29.293116 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
0.28	0.21	0.19	0.31	5.52	3.39	0.04	0.09	-0.03	0.02	-0.10	25.6	7.68	0.70	0



### Stellar Parameters For KIC 007668658

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4904^{+130}_{-145}$	$4.527^{+0.077}_{-0.056}$	$0.060^{+0.250}_{-0.250}$	$0.786^{+0.056}_{-0.084}$	$0.758^{+0.076}_{-0.055}$	$2.199^{+0.699}_{-0.369}$
	+3%/-3%	+2%/-1%	+417%/-417%	+7%/-11%	+10%/-7%	+32%/-17%
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 007668658-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-798 \pm 129$	$3.12^{+1.55}_{-1.44}$	$262^{+10}_{-10}$	$4435^{+1258}_{-608}$	$49146^{+116617}_{-27235}$
Alt.	$-13 \pm 63$	$3.91^{+1.55}_{-1.45}$	$262^{+9}_{-9}$	$2246^{+738}_{-4882}$	$436^{+4005}_{-2079}$

$T_{\text{max}}$  = 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

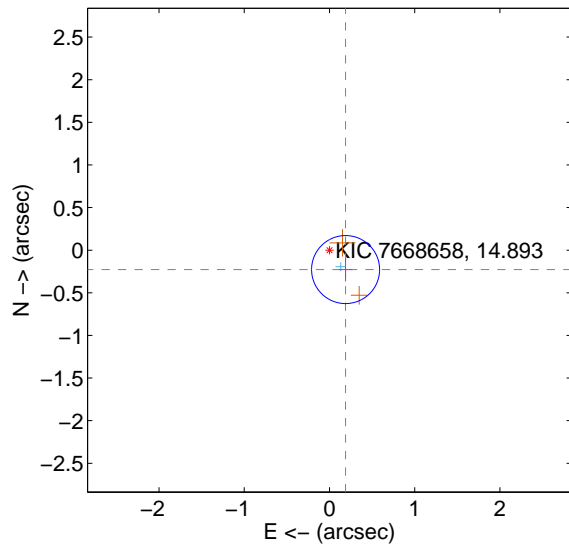
Supplemental centroid analysis for 007668658-01. Kepler magnitude: 14.89. Transit SNR 6.01

There are 1 quarters with good PRF difference image offsets

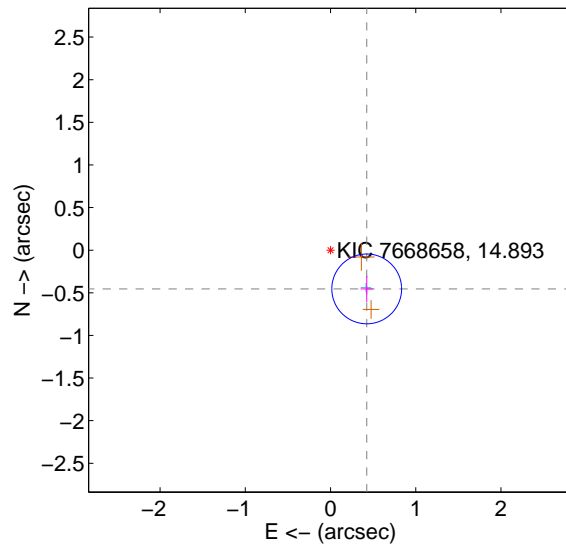
The direct PRF centroid is offset from the target star catalog position by about 0.37 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.296 \pm 0.133$	2.22	$-0.189 \pm 0.078$	$-0.228 \pm 0.139$
PRF-fit source offset from KIC position	$0.622 \pm 0.136$	4.56	$-0.425 \pm 0.072$	$-0.454 \pm 0.154$
photometric centroid source offset	$0.33 \pm 0.68$	0.49	$0.33 \pm 0.68$	$-0.03 \pm 0.73$

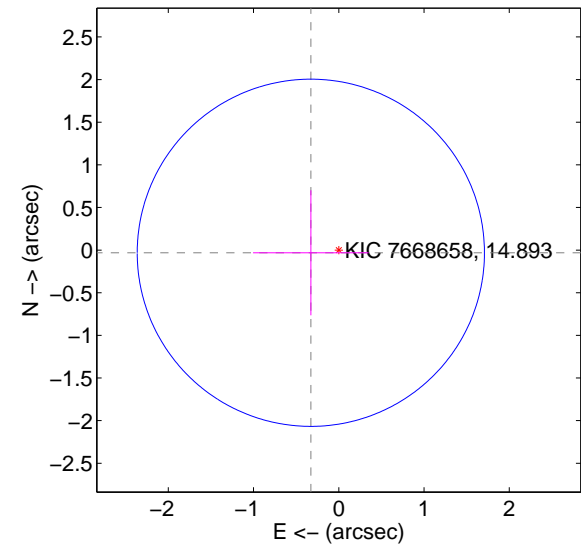
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids

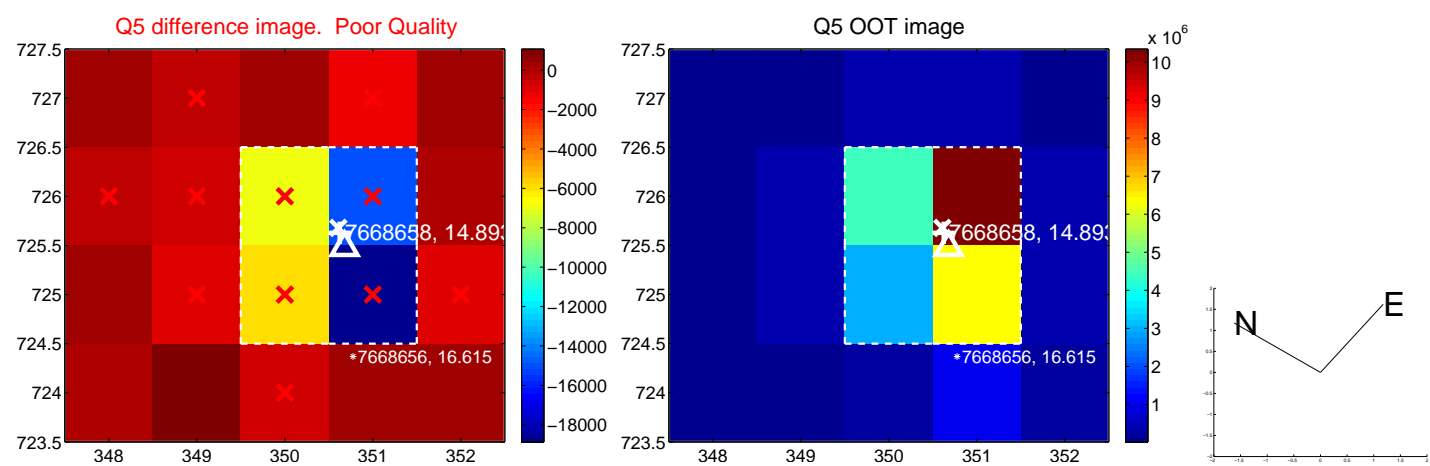


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

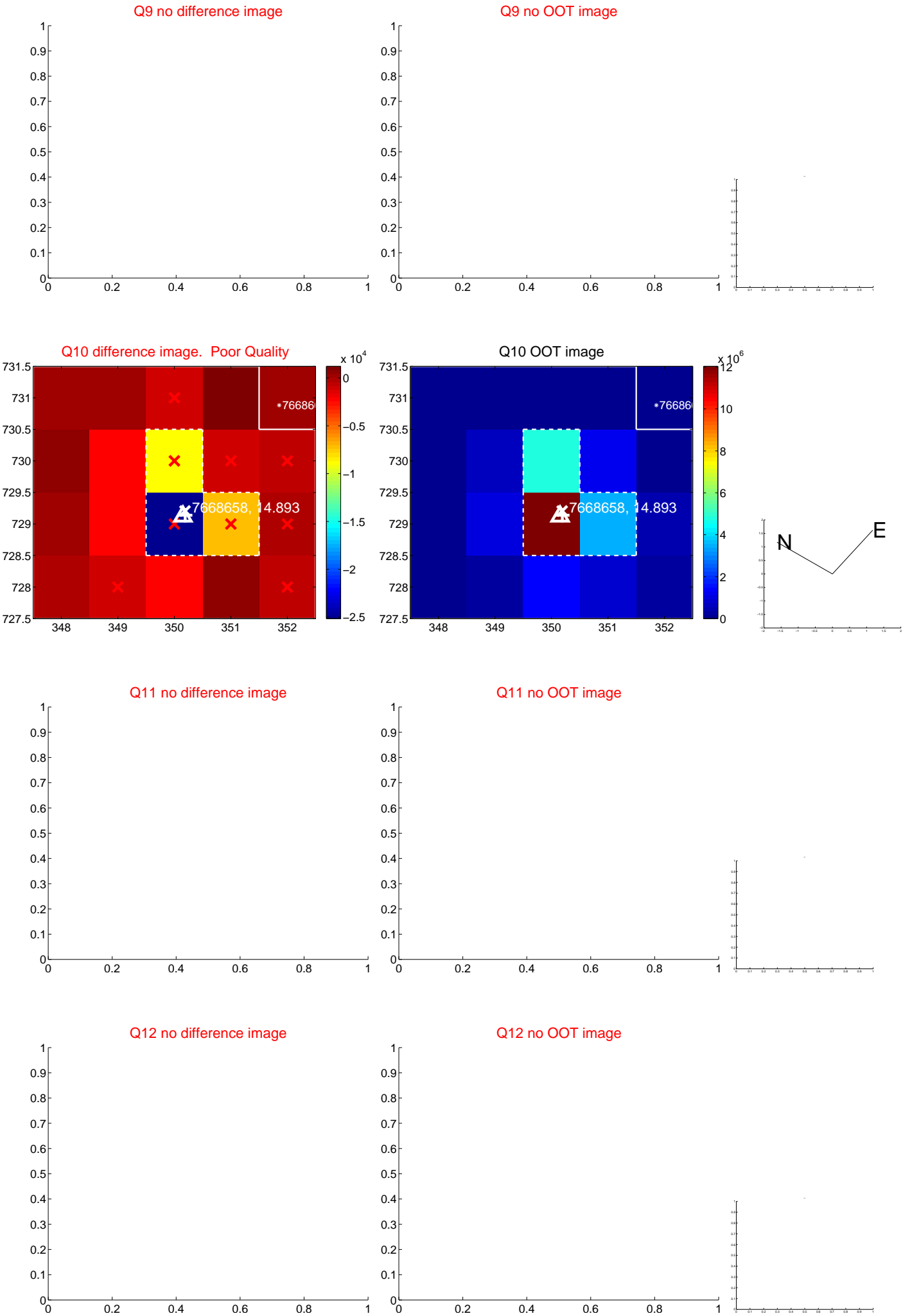


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.





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



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

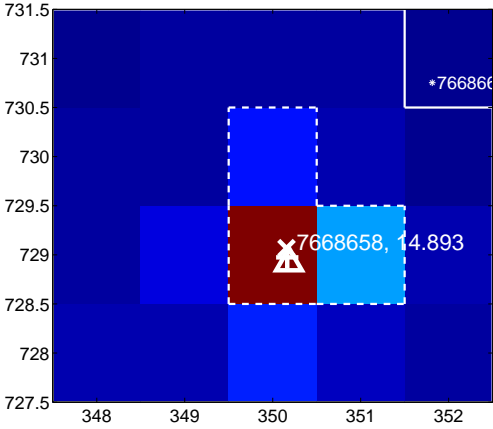
Q13 no difference image



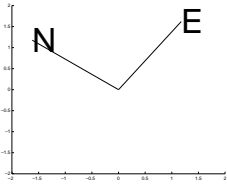
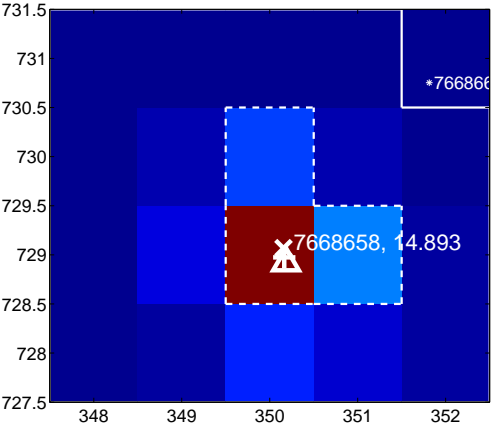
Q13 no OOT image



Q14 difference image



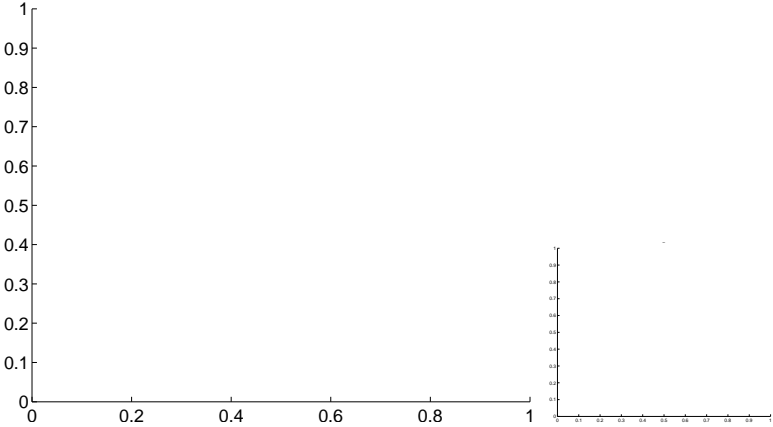
Q14 OOT image



Q15 no difference image



Q15 no OOT image



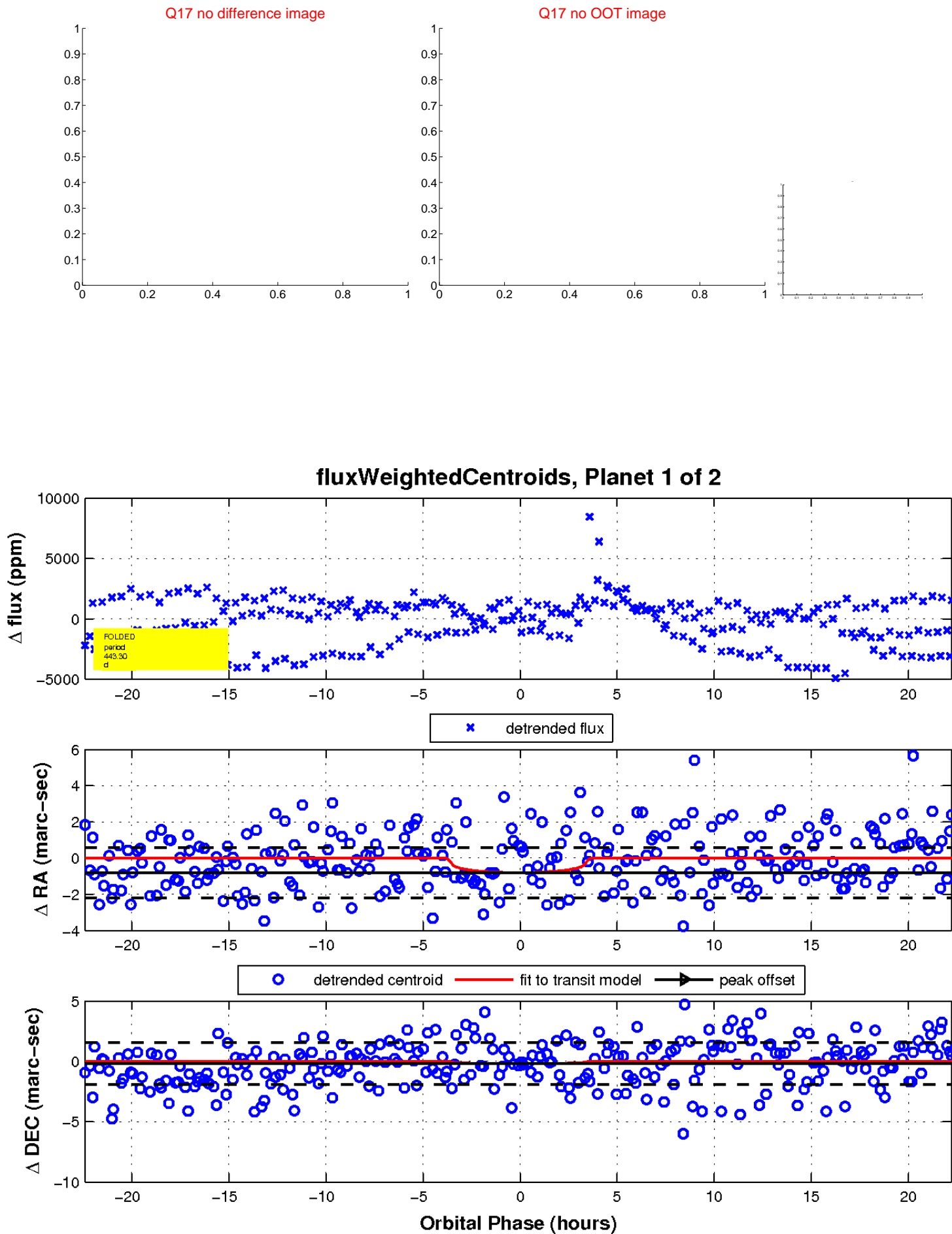
Q16 no difference image



Q16 no OOT image

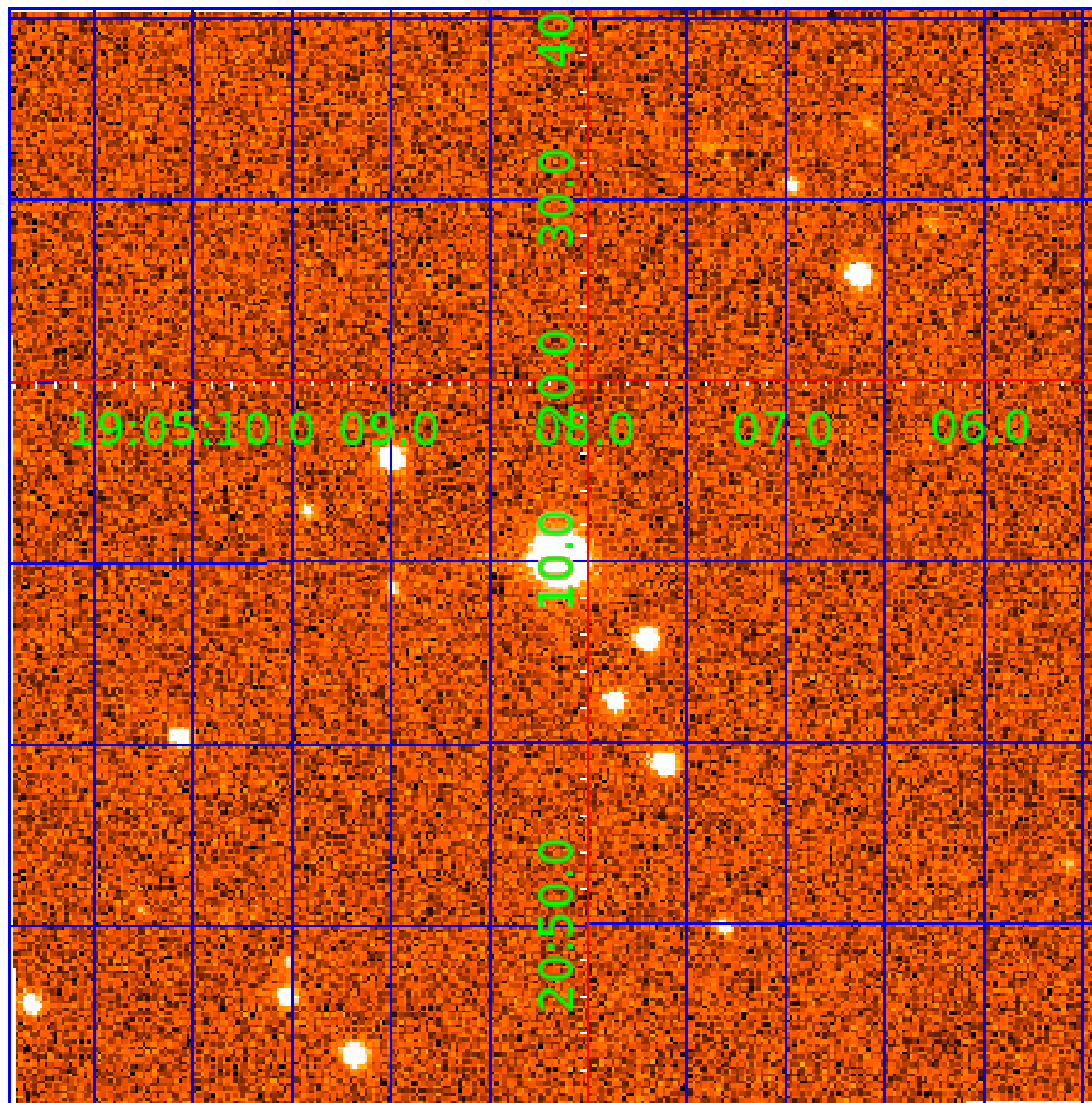


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination



# KIC 007668658

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007668658-01	OBS	No	443.303359	472.589056	1388.0	7.487	12.9	6.0	0.79	4904	3.06	0.30
007668658-02	OBS	No	448.759826	545.337243	1785.5	6.509	13.9	7.0	0.79	4904	3.60	0.29

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007668658-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS—HALO_GHOST
007668658-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

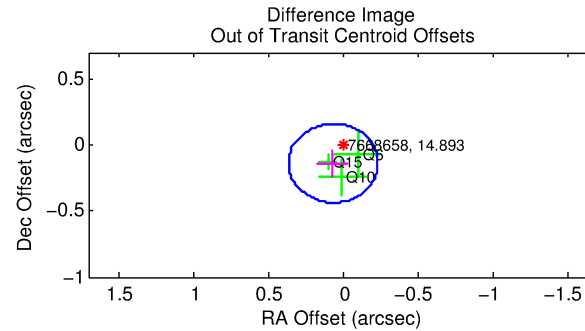
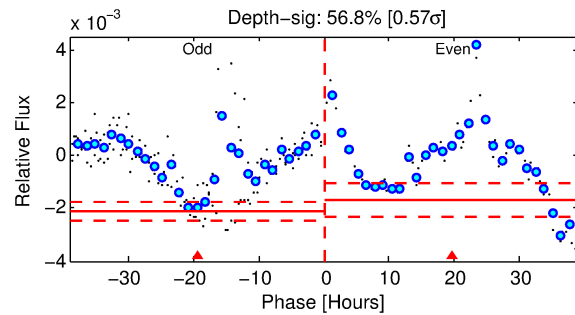
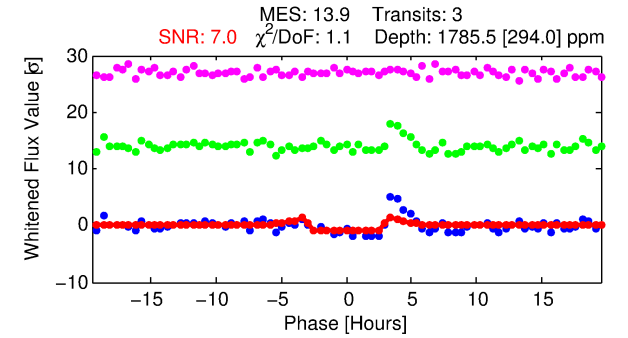
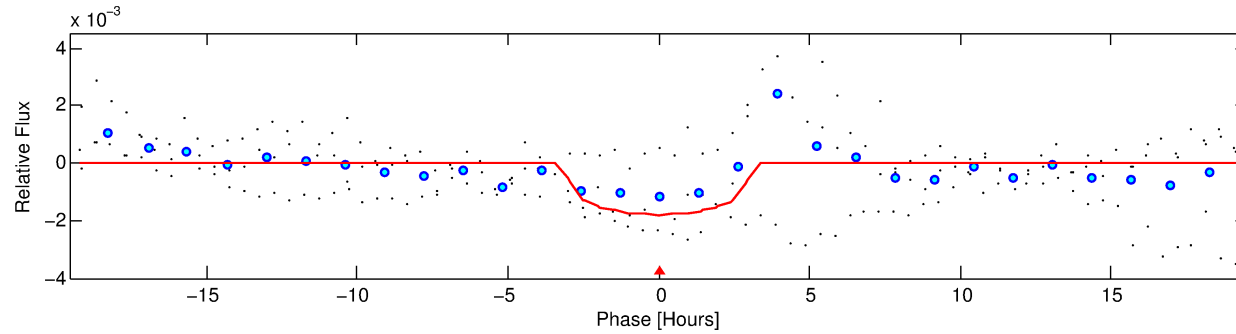
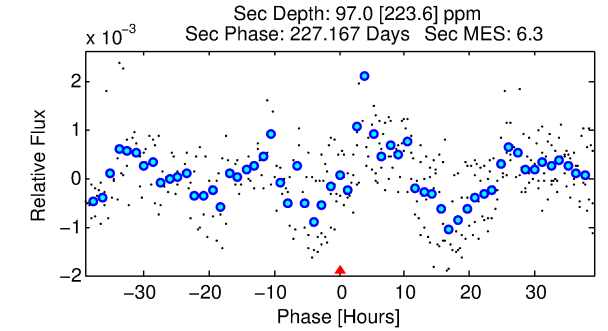
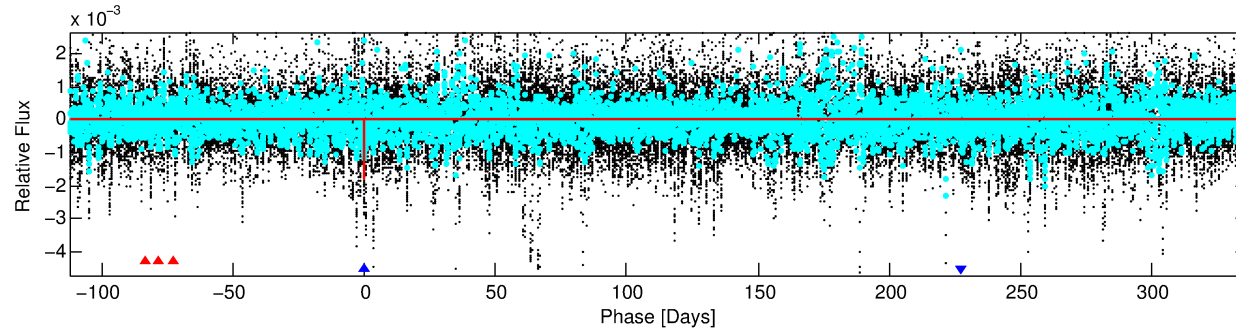
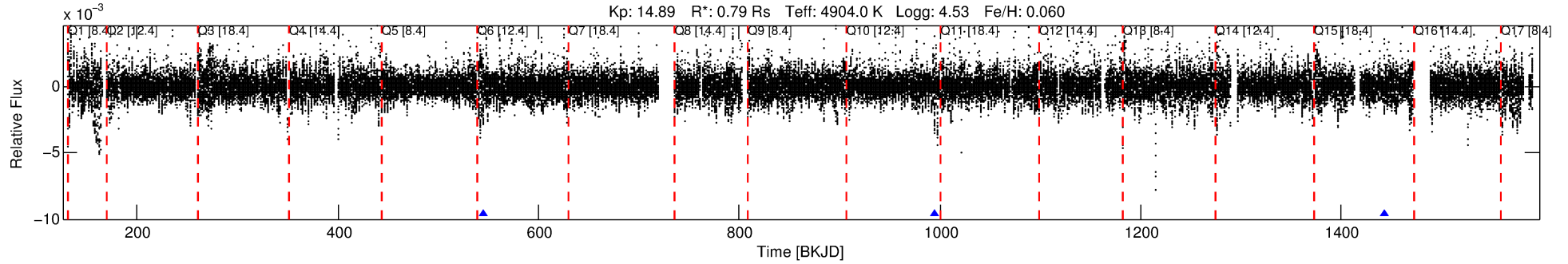
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 007668658-02

No Significant Match Found

# DV One-Page Summary

KIC: 7668658 Candidate: 2 of 2 Period: 448.760 d



## DV Fit Results:

Period = 448.75983 [0.00567] d  
Epoch = 545.3372 [0.0081] BKJD  
Rp/R\* = 0.0419 [0.0252]  
a/R\* = 389.45 [777.24]  
b = 0.73 [1.27]  
Seff = 0.29 [0.05]  
Teq = 188 [9] K  
Rp = 3.60 [2.19] Re  
a = 1.0463 [0.0969] AU  
Ag = 4519.18 [11760.16] [0.38 $\sigma$ ]  
Teffp = 2377 [1546] K [1.42 $\sigma$ ]

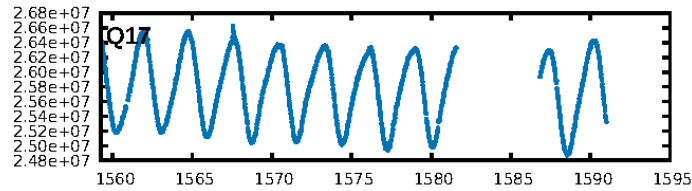
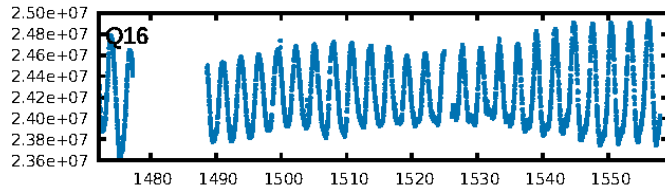
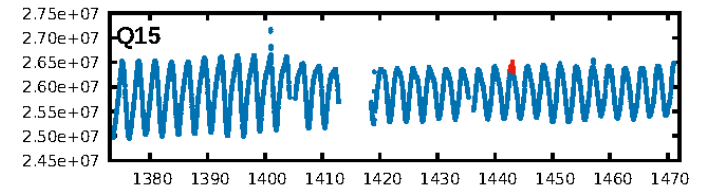
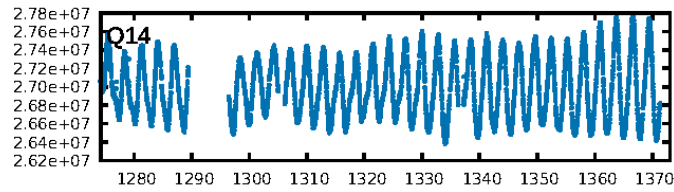
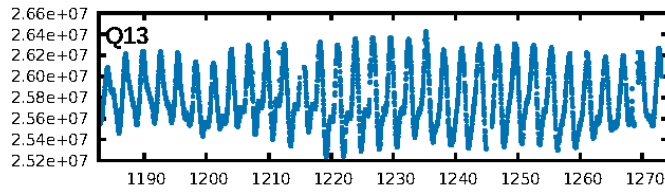
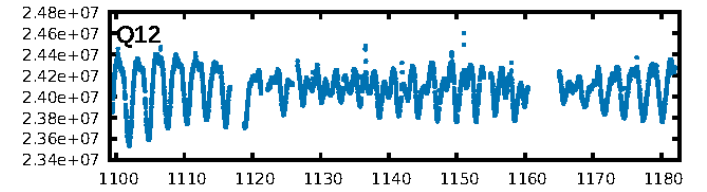
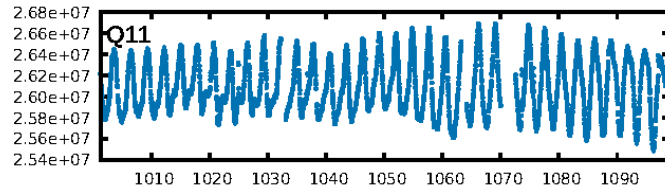
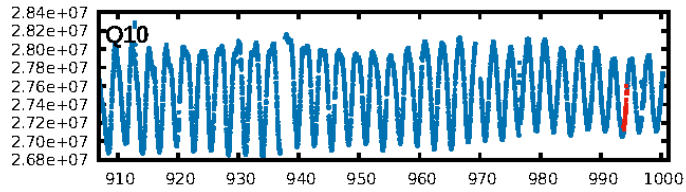
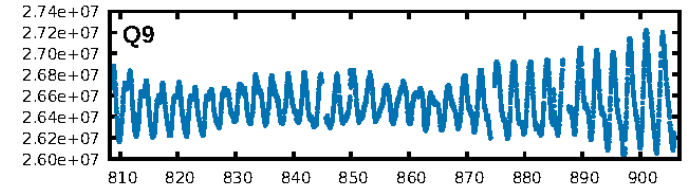
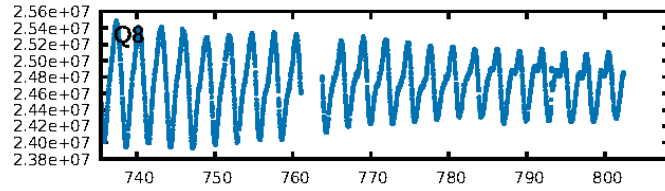
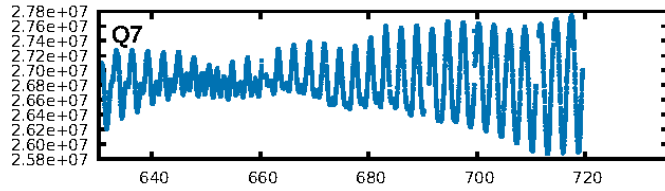
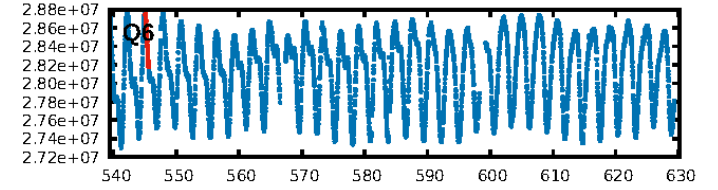
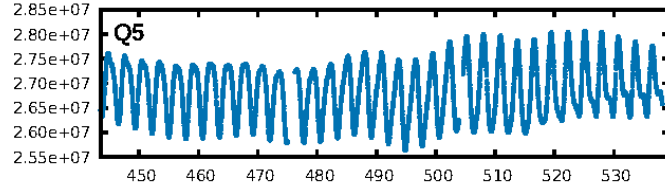
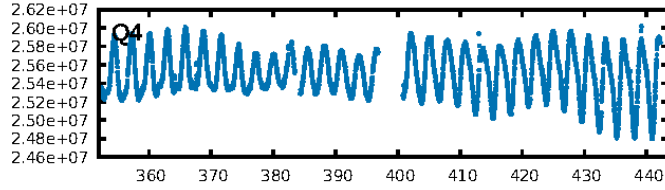
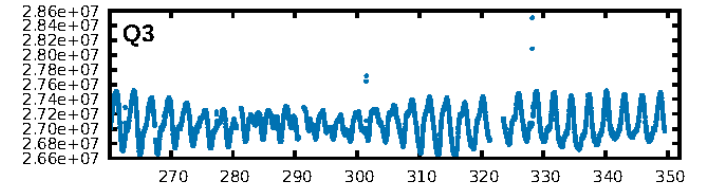
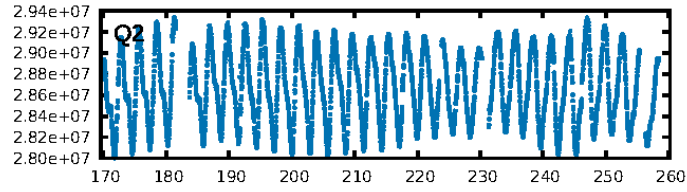
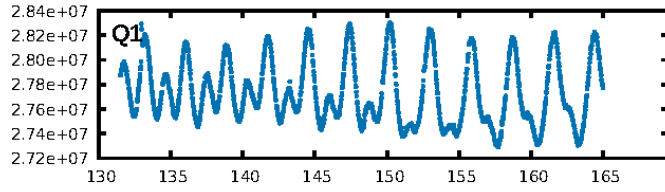
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [13.20 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 1.9%  
ModelChiSquareGof-sig: 87.5%  
**Bootstrap-pfa: 7.72e-12**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.661  
Centroid-sig: 59.3%  
Centroid-so: 0.623 arcsec [1.04 $\sigma$ ]  
OotOffset-rm: 0.153 arcsec [1.53 $\sigma$ ]  
OotOffset-st: 2/1/0/0 [3]  
**KicOffset-rm: 0.368 arcsec [3.69 $\sigma$ ]**  
KicOffset-st: 2/1/0/0 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 11:00:30 Z

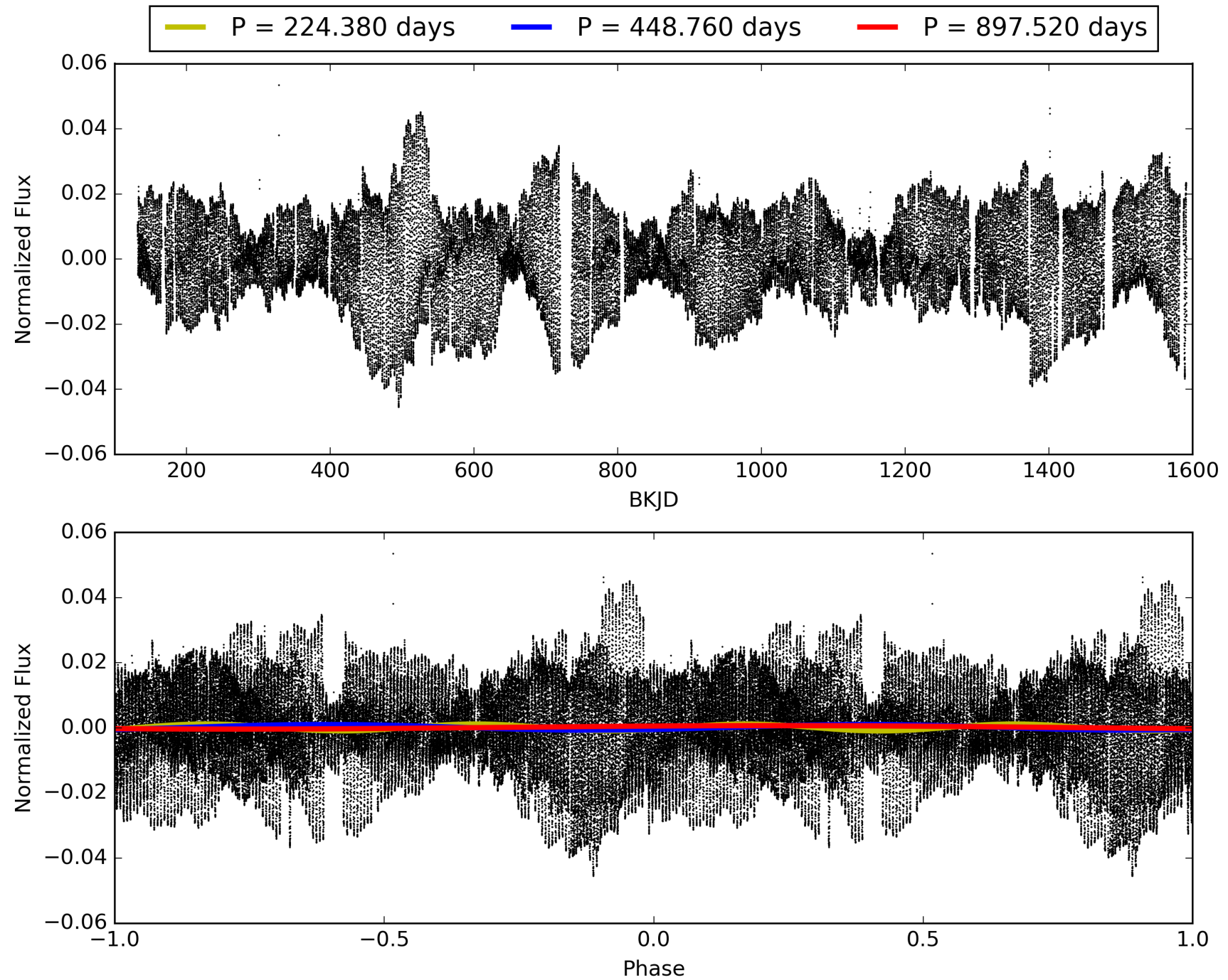
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 007668658-02, PDC Light Curves





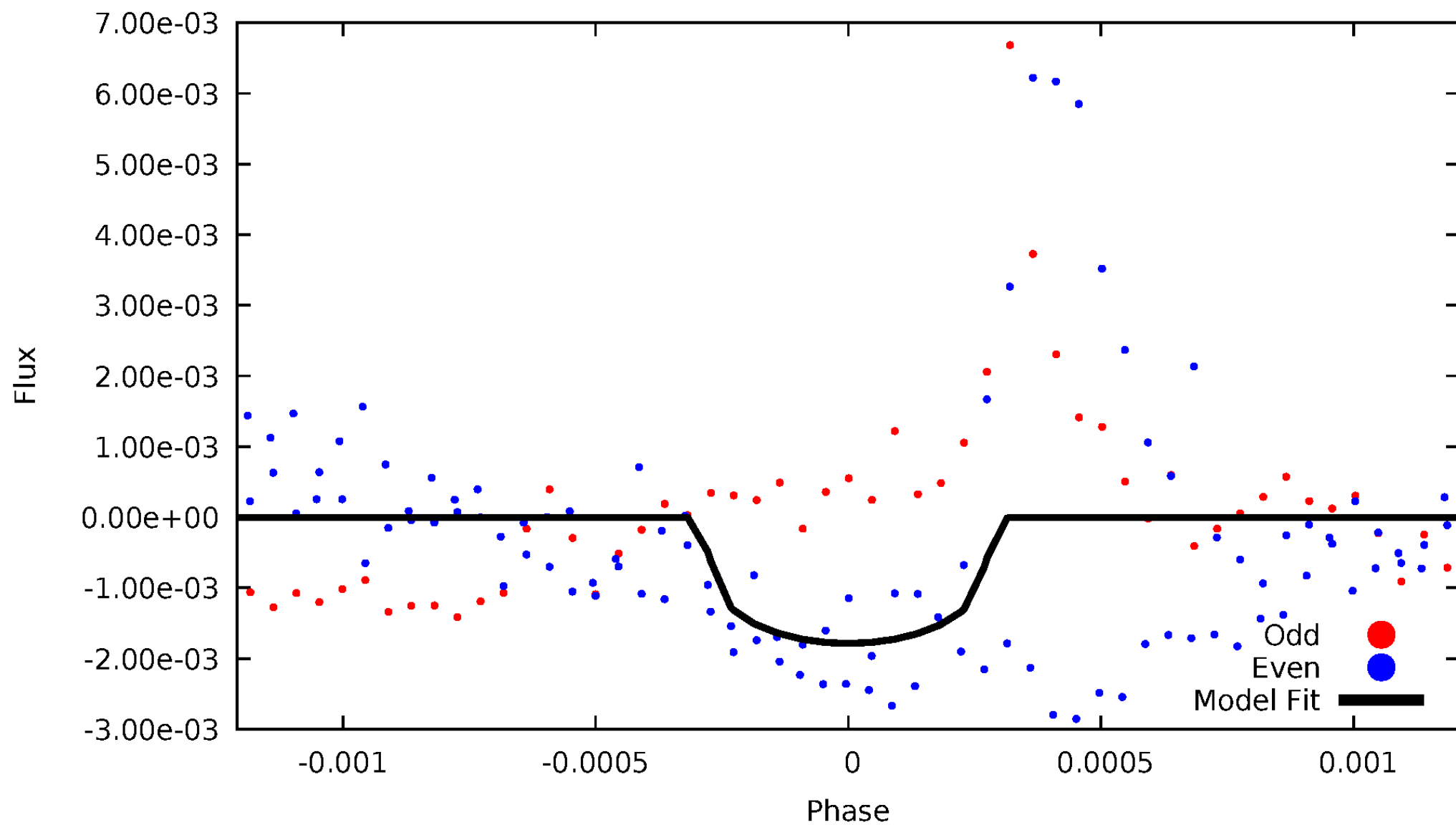
TCE 007668658-02





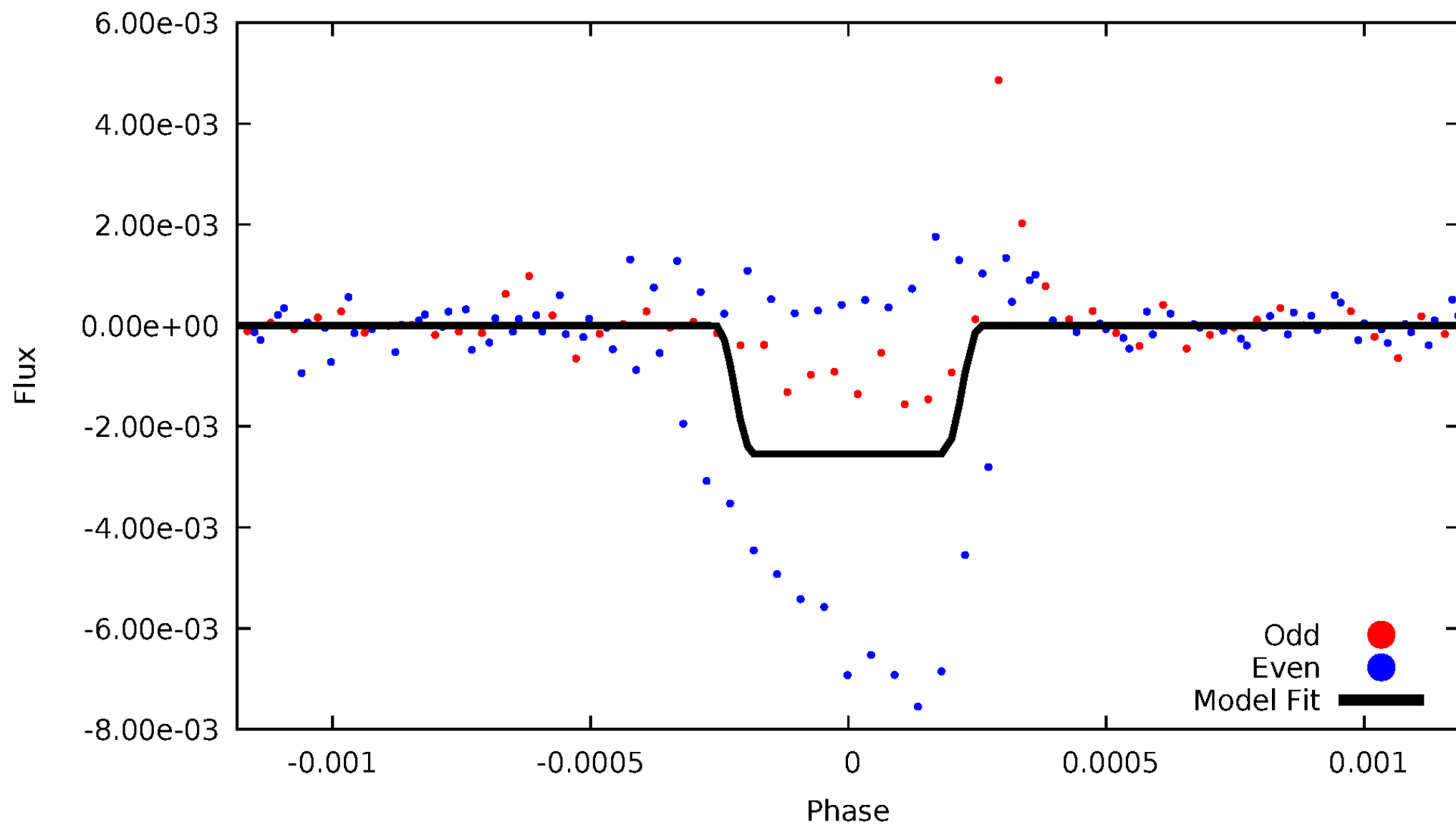
# DV Odd/Even

TCE 007668658-02



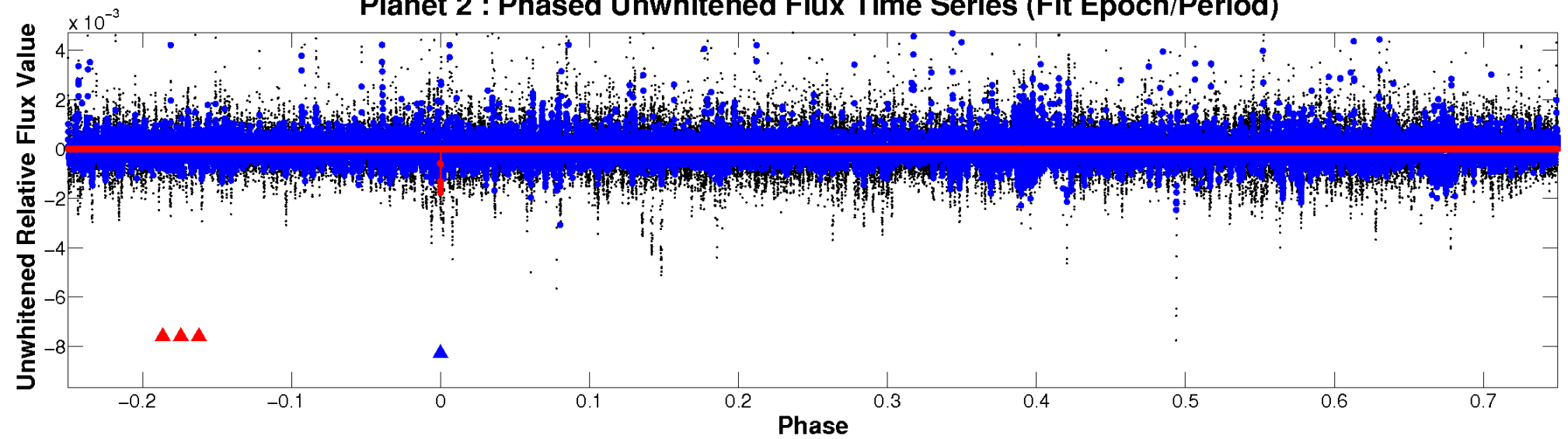
# ALT Odd/Even

TCE 007668658-02

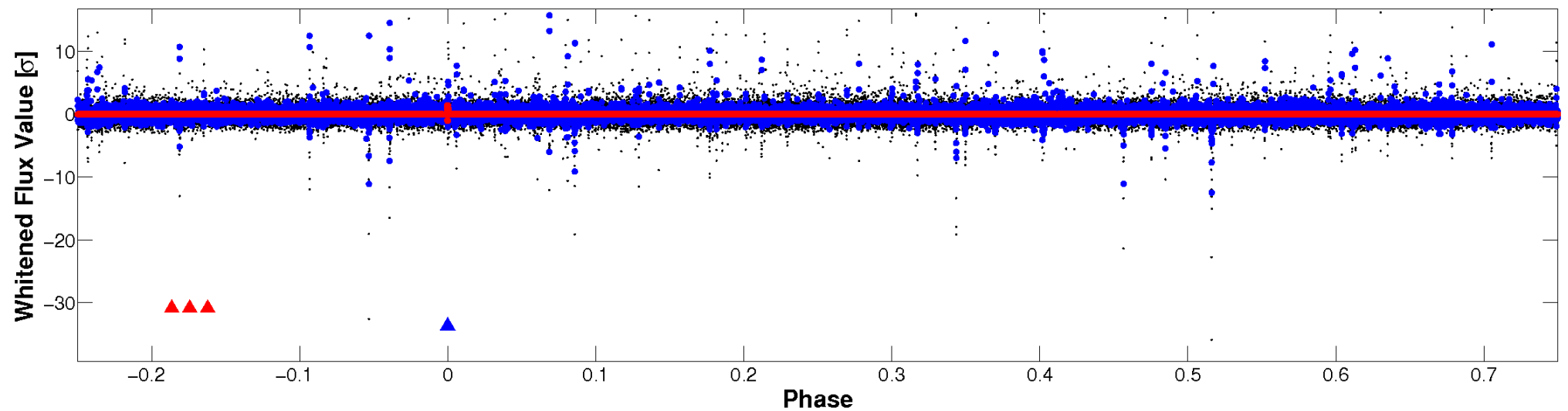


# Non-Whitened Vs. Whitened Light Curve

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

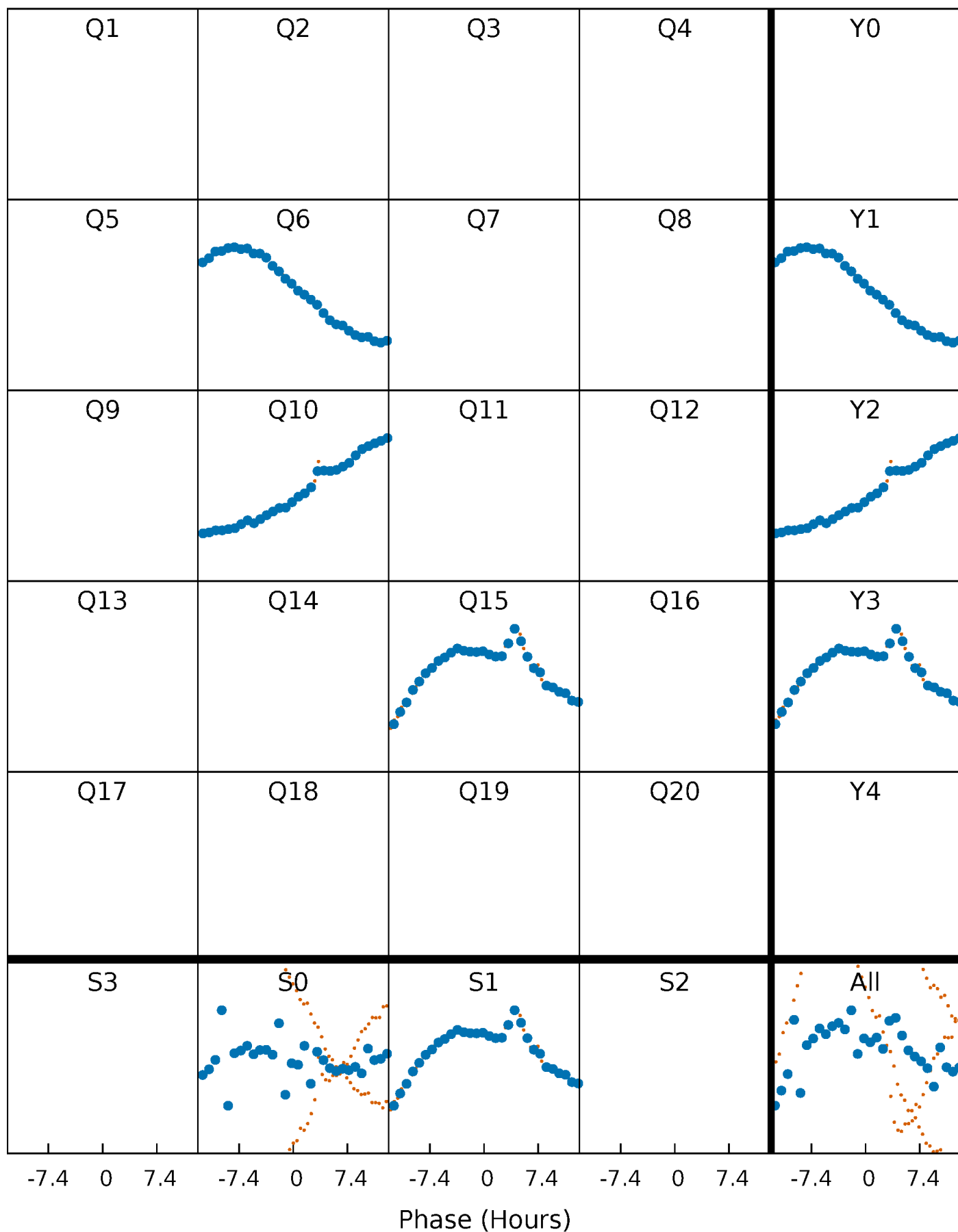


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



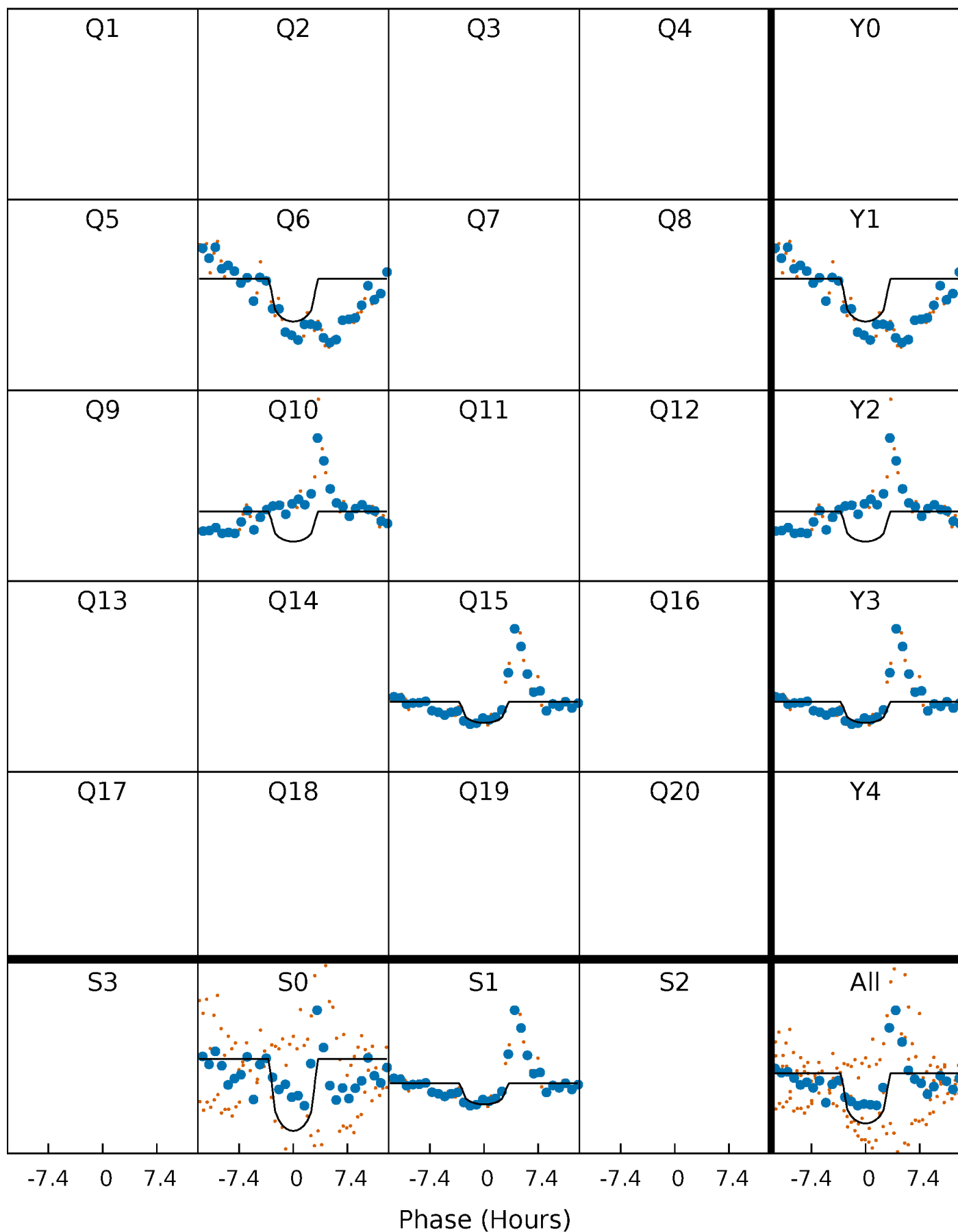
# PDC Quarter-Phased Transit Curves

TCE 007668658-02 P=448.759826 Days  $T_0=545.337243$  (BKJD)



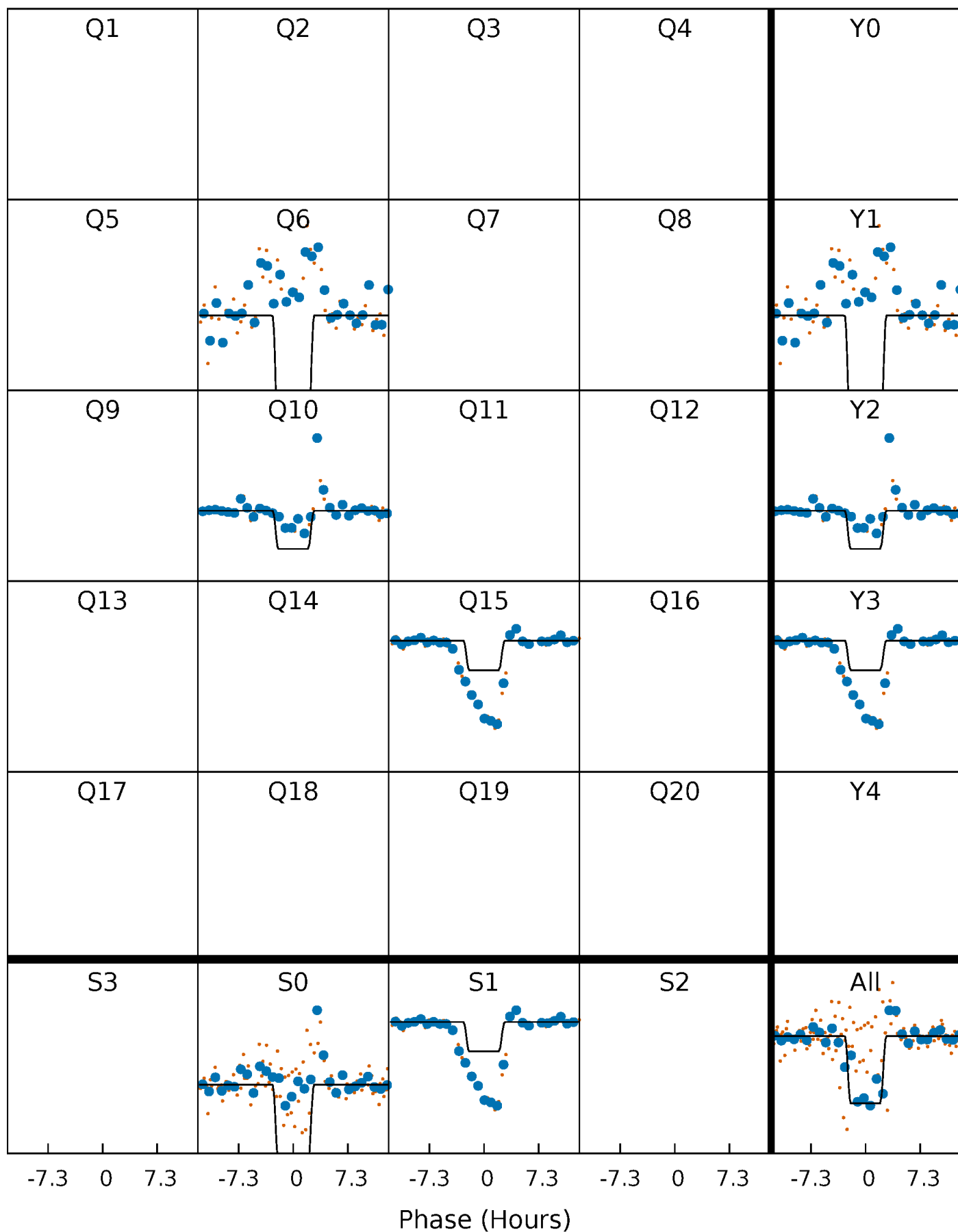
# DV Quarter-Phased Transit Curves

TCE 007668658-02 P=448.759826 Days  $T_0=545.337243$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

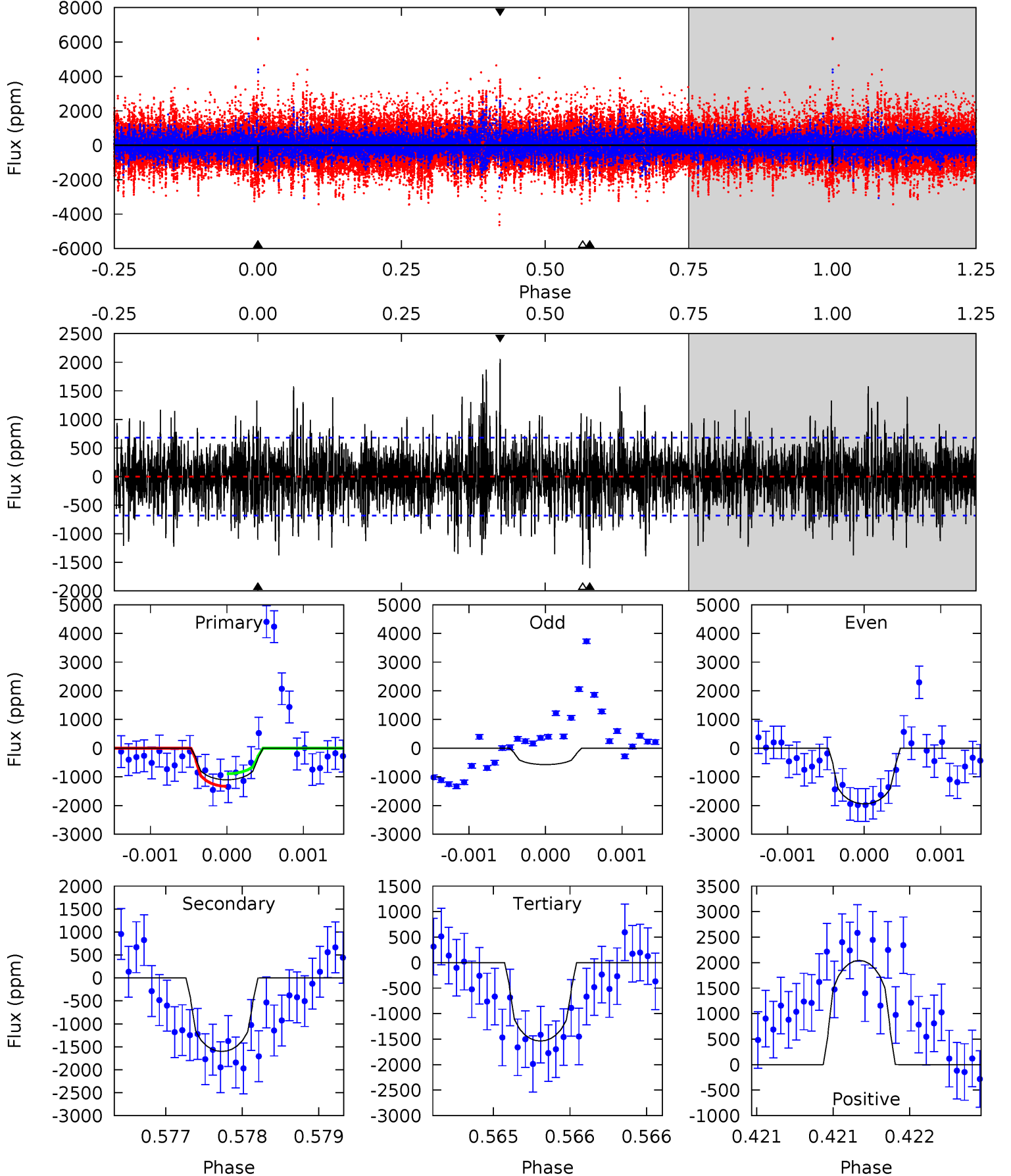
TCE 007668658-02 P=448.768656 Days  $T_0=545.341021$  (BKJD)



# DV Model-Shift Uniqueness Test

007668658-02, P = 448.759826 Days, E = 96.577417 Days

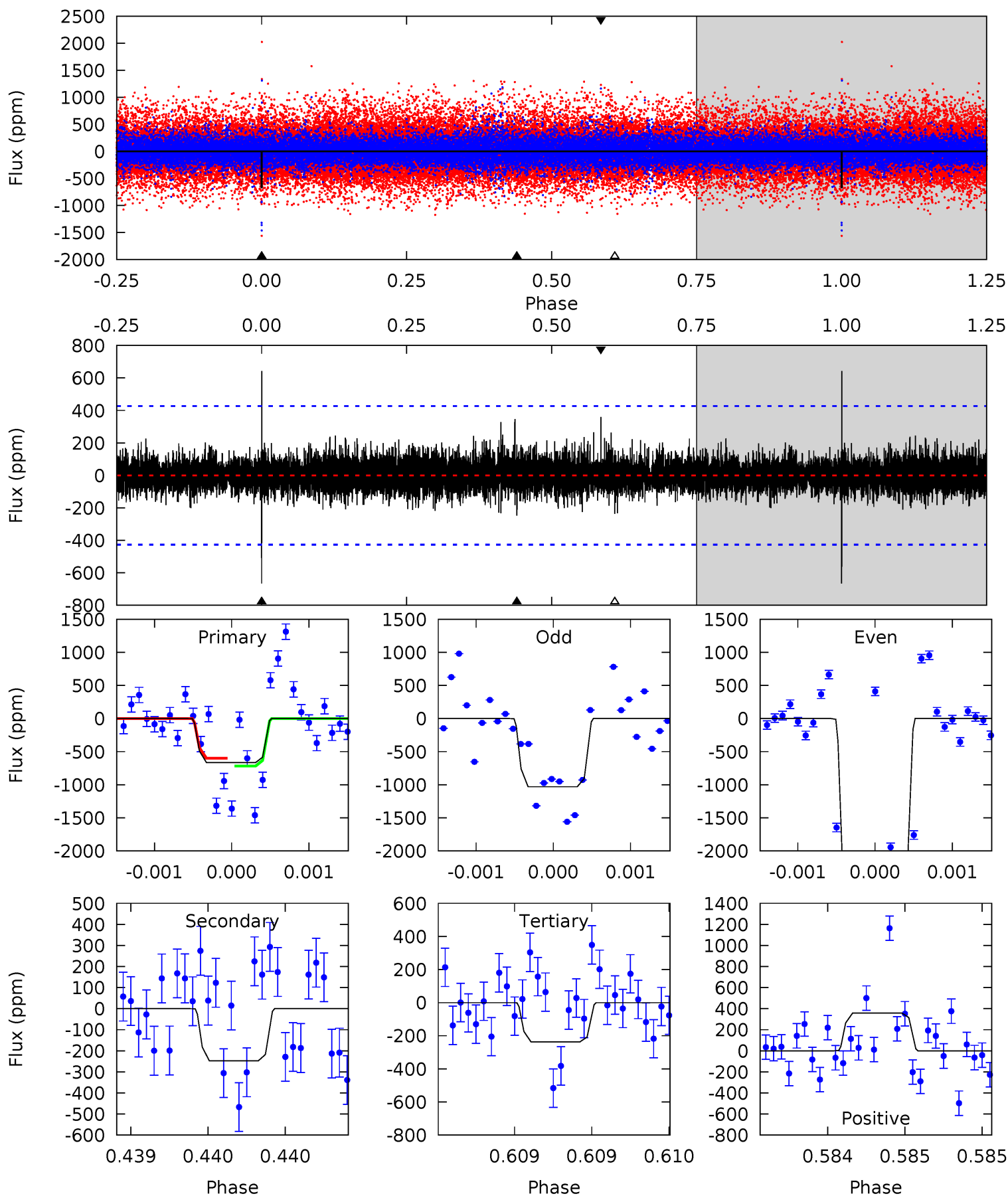
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.93	13.0	12.4	16.5	5.52	3.40	3.27	-3.50	-7.59	0.52	-3.57	4.63	0.69	0.56	1.78



# Alt Model-Shift Uniqueness Test

007668658-02, P = 448.768656 Days, E = 96.572365 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.68	3.23	3.09	4.68	5.57	3.48	0.76	5.59	4.00	0.14	-1.45	17.9	2.13	0.49	0





### Stellar Parameters For KIC 007668658

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4904^{+130}_{-145}$	$4.527^{+0.077}_{-0.056}$	$0.060^{+0.250}_{-0.250}$	$0.786^{+0.056}_{-0.084}$	$0.758^{+0.076}_{-0.055}$	$2.199^{+0.699}_{-0.369}$
	+3%/-3%	+2%/-1%	+417%/-417%	+7%/-11%	+10%/-7%	+32%/-17%
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 007668658-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1602 \pm 124$	$3.70^{+2.14}_{-1.93}$	$261^{+10}_{-10}$	$4724^{+1938}_{-729}$	$71618^{+237376}_{-43293}$
Alt.	$-247 \pm 77$	$4.33^{+2.02}_{-2.23}$	$261^{+10}_{-9}$	$3244^{+811}_{-386}$	$7882^{+23840}_{-4518}$

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

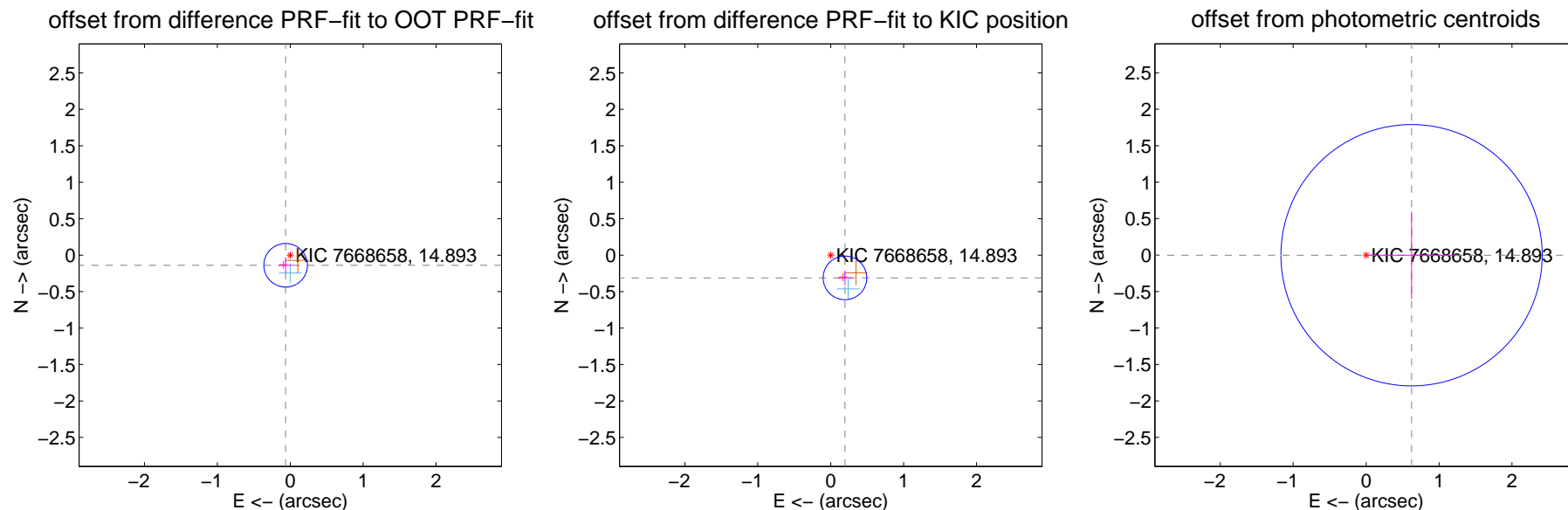
## DV Centroid Data

Supplemental centroid analysis for 007668658-02. Kepler magnitude: 14.89. Transit SNR 6.97

There are 1 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.31 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.153 \pm 0.100$	1.53	$0.063 \pm 0.100$	$-0.139 \pm 0.099$
PRF-fit source offset from KIC position	<b><math>0.368 \pm 0.100</math></b>	<b>3.69</b>	$-0.195 \pm 0.100$	$-0.312 \pm 0.099$
photometric centroid source offset	$0.62 \pm 0.60$	1.04	$-0.62 \pm 0.60$	$-0.00 \pm 0.60$

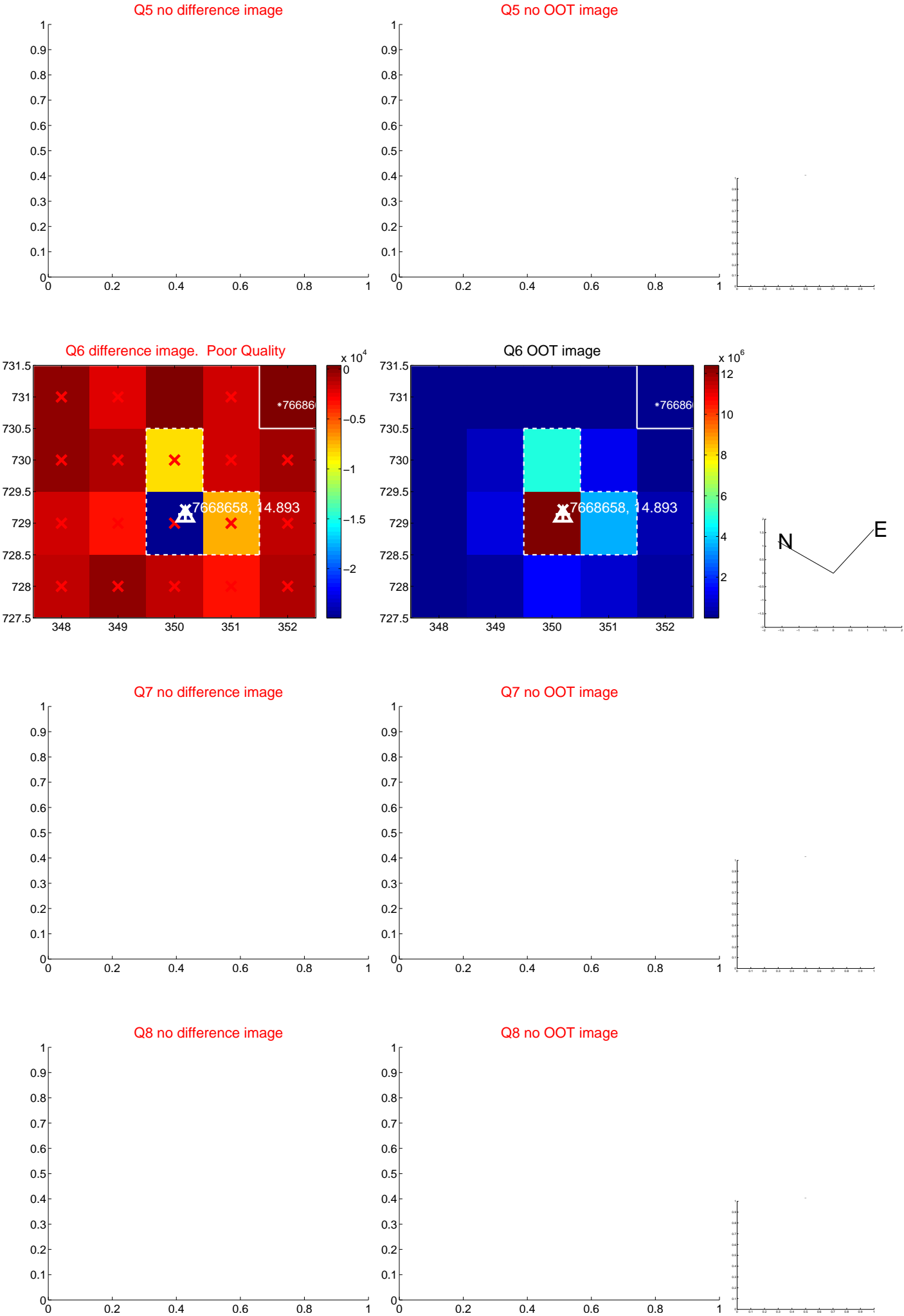


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

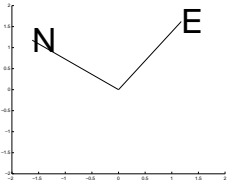
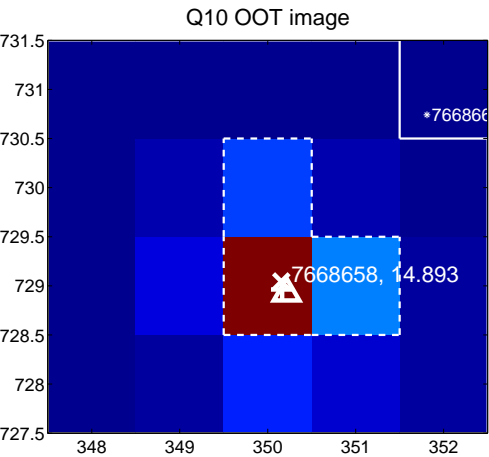
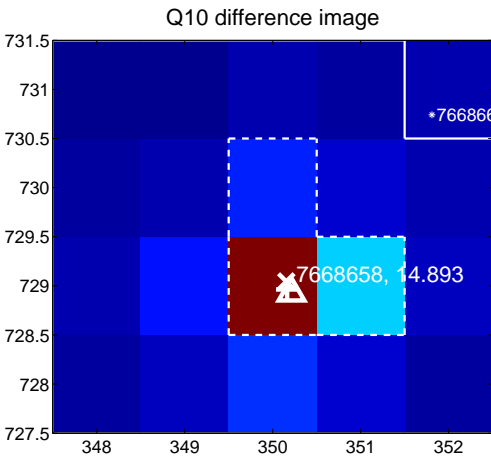


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

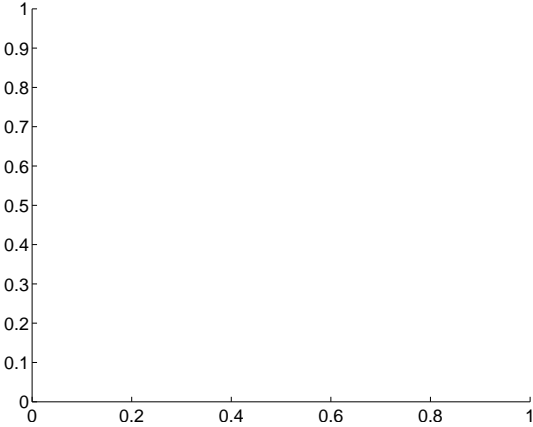
Q9 no difference image



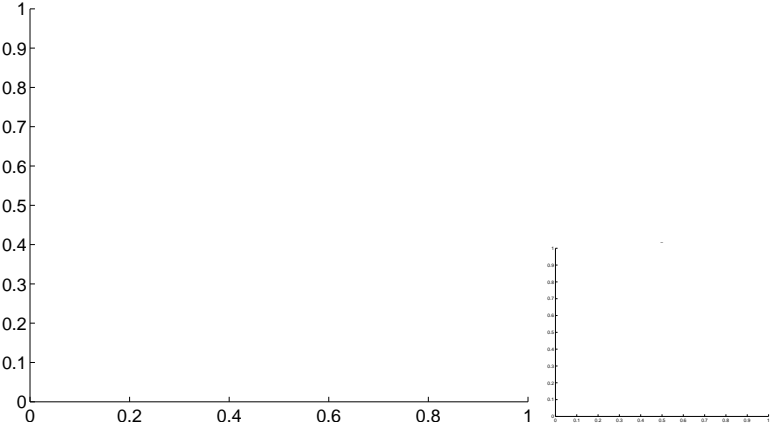
Q9 no OOT image



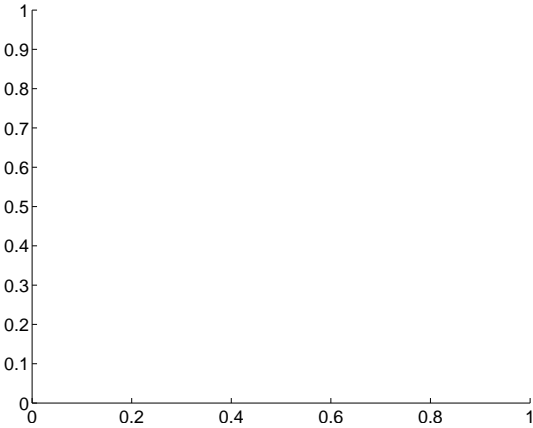
Q11 no difference image



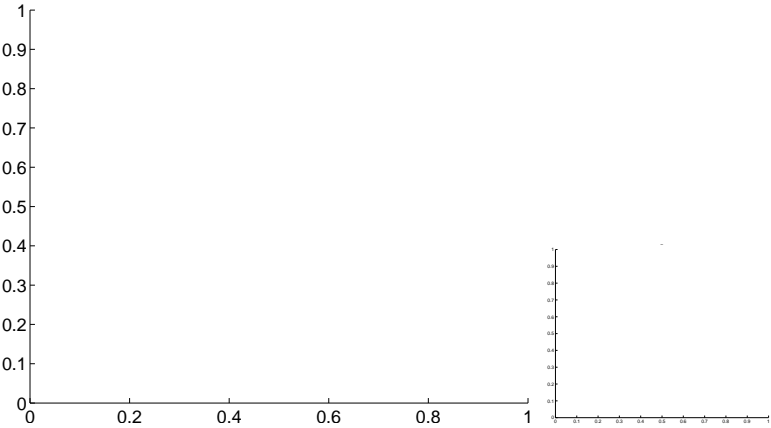
Q11 no OOT image



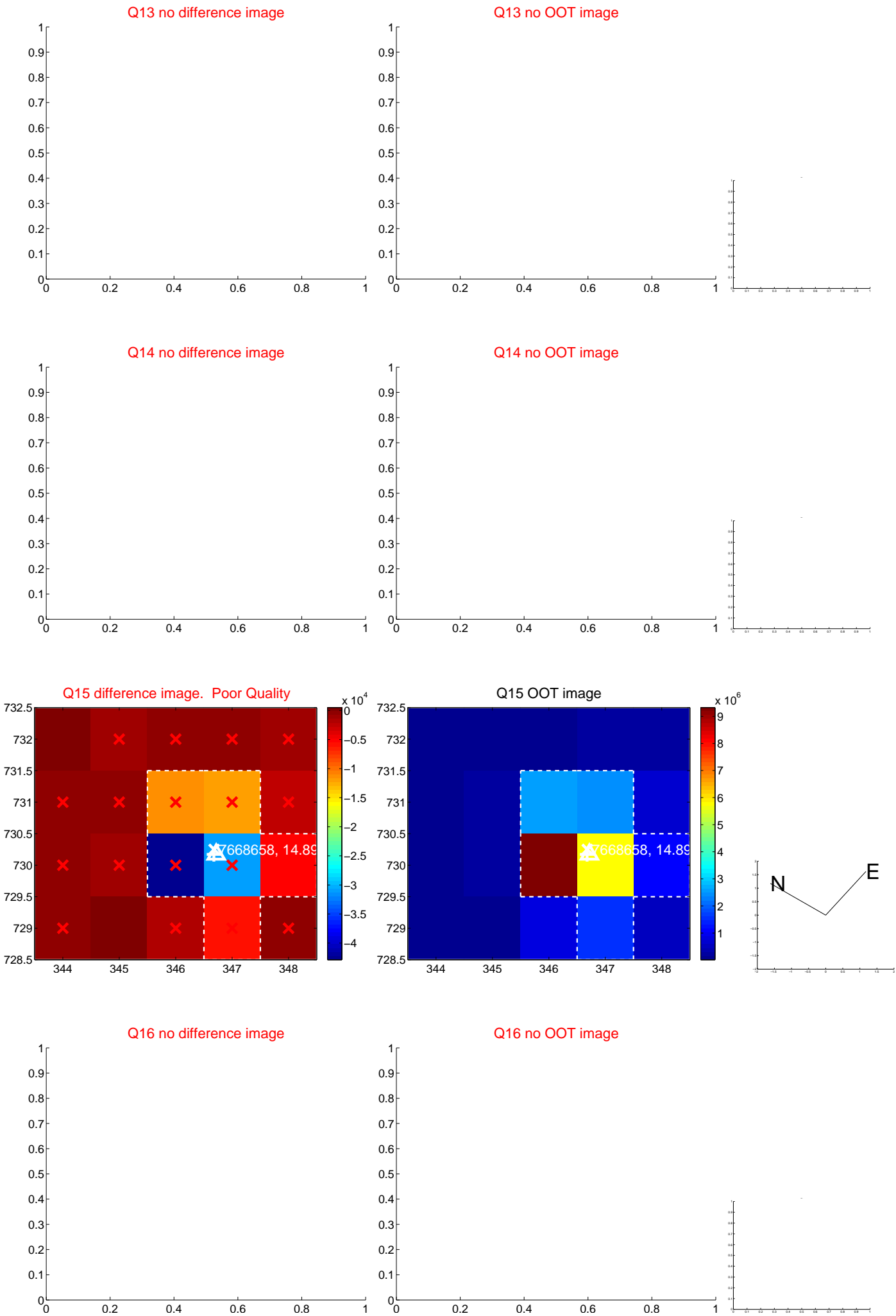
Q12 no difference image



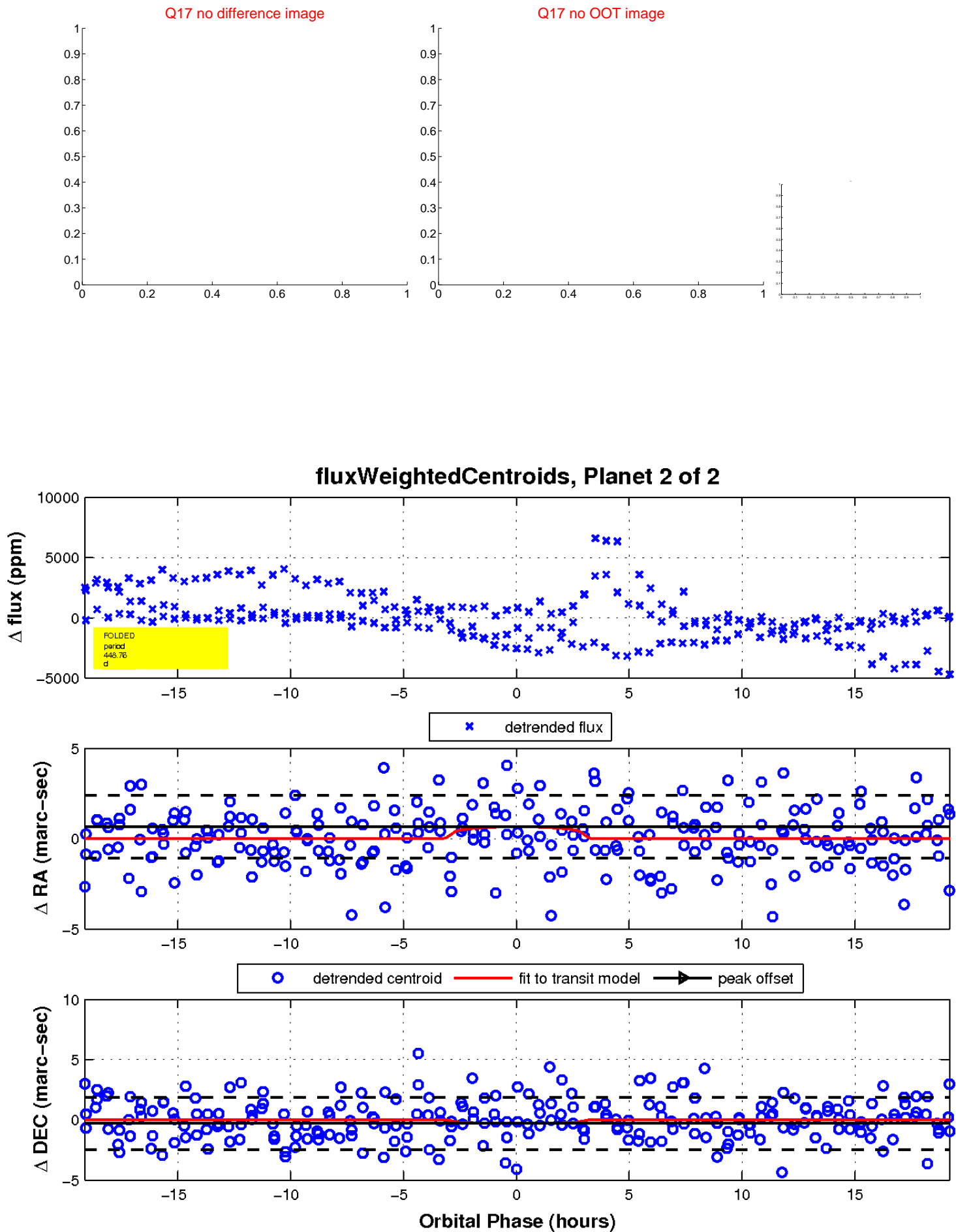
Q12 no OOT image



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

