

# KIC 010003658

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010003658-01	OBS	No	158.423163	165.534851	2276.4	20.762	9.3	20.3	154.30	3274	1043.12	0.00
010003658-02	OBS	No	97.476455	153.313746	117.4	2.104	15.5	2.5	154.30	3274	163.65	0.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010003658-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
010003658-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—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.

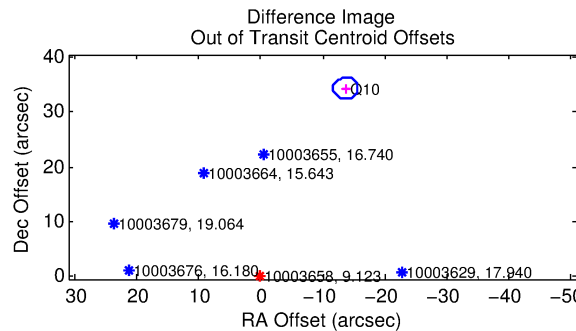
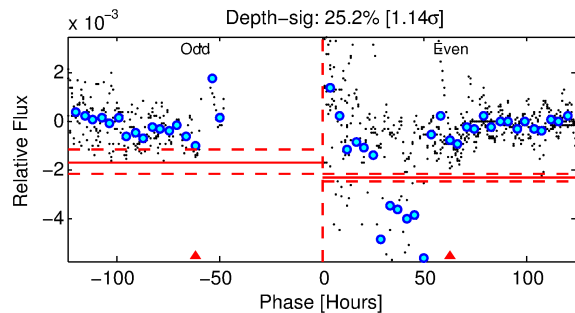
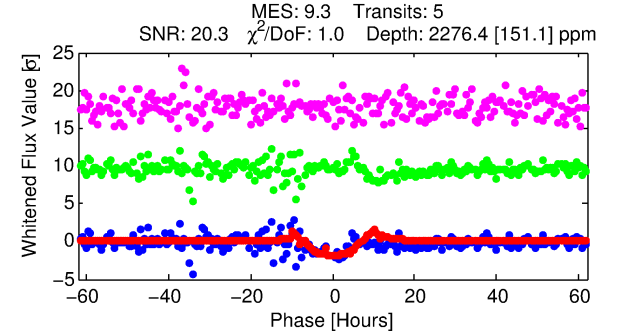
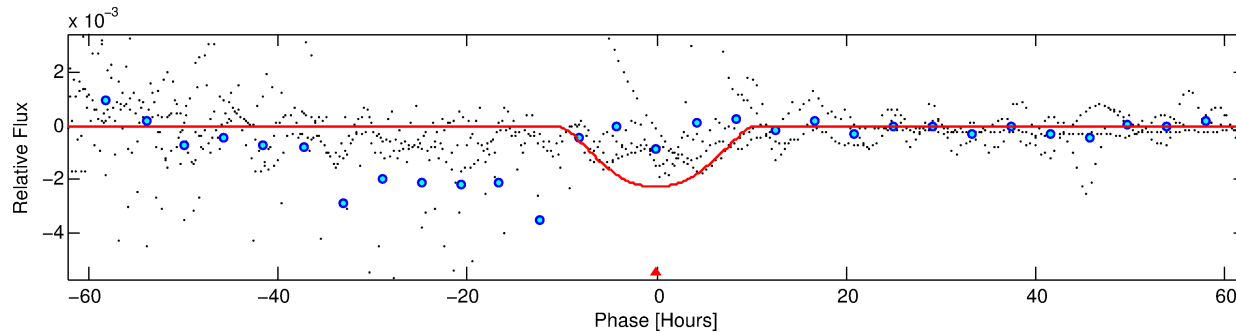
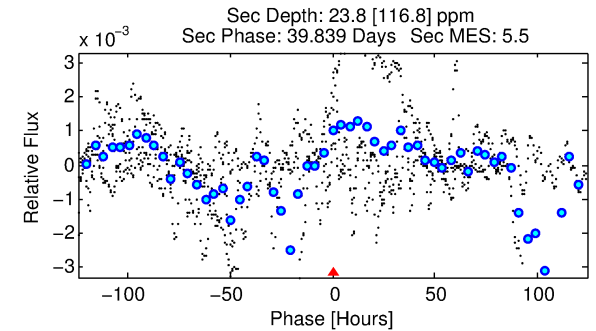
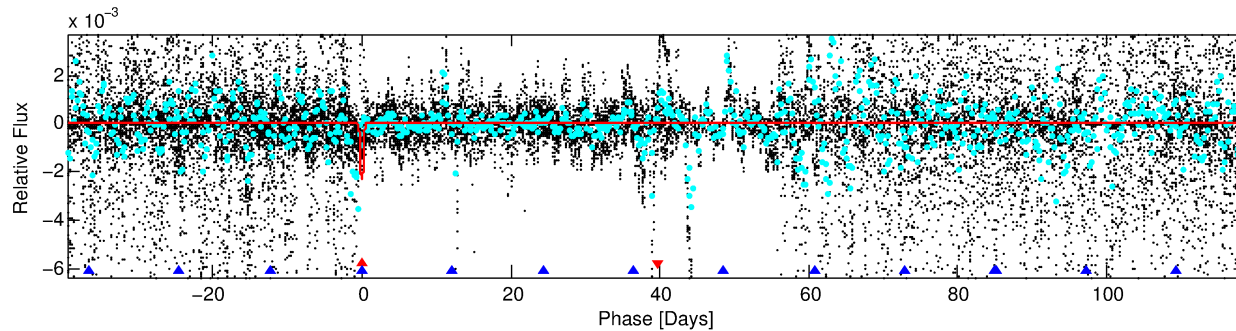
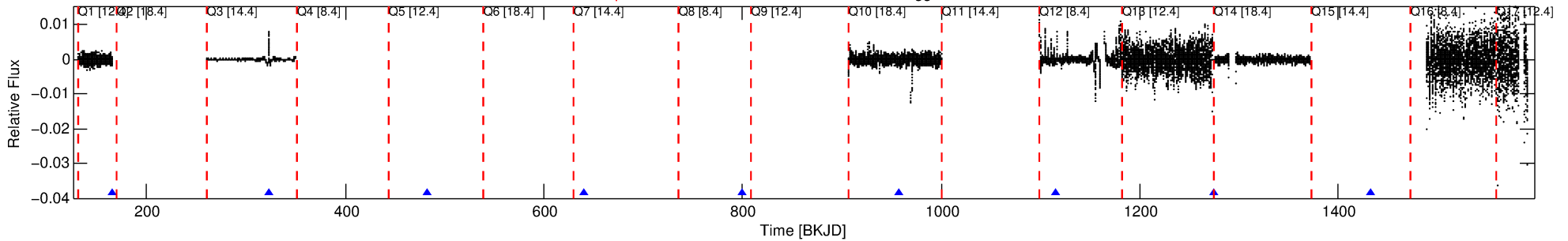
## Ephemeris Match Information For 010003658-01

No Significant Match Found

# DV One-Page Summary

KIC: 10003658 Candidate: 1 of 2 Period: 158.423 d

Kp: 9.12 R\*: 154.30 Rs Teff: 3274.0 K Logg: 0.11 Fe/H: -0.080



## DV Fit Results:

Period = 158.42316 [0.00279] d  
Epoch = 165.5349 [0.0084] BKJD  
Rp/R\* = 0.0620 [0.0037]  
a/R\* = 28.52 [0.97]  
b = 0.94 [0.01]  
Seff = N/A  
Teq = N/A  
Rp = 1043.12 [196.60] Re  
a = N/A  
Ag = N/A  
Teffp = N/A

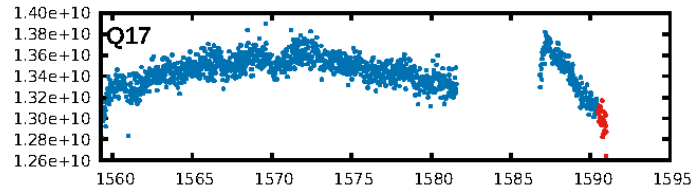
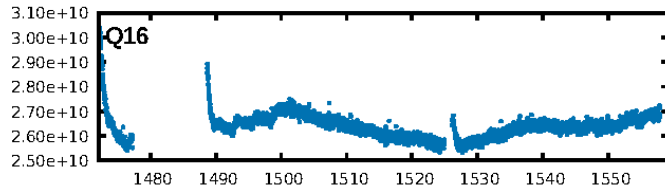
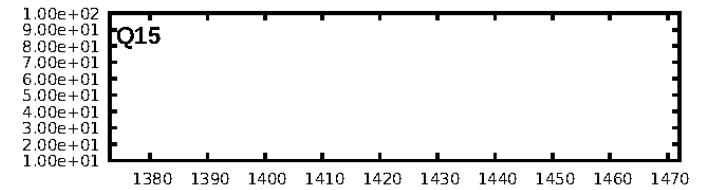
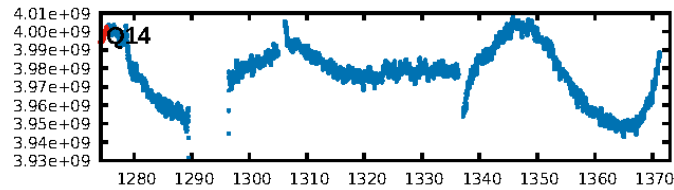
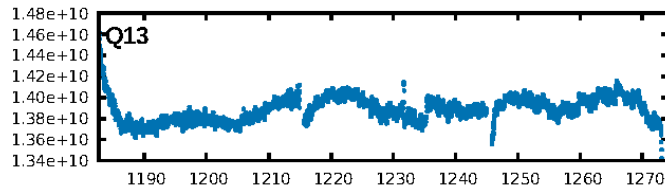
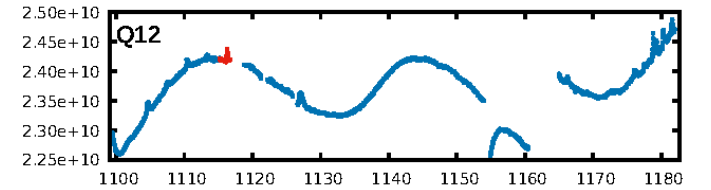
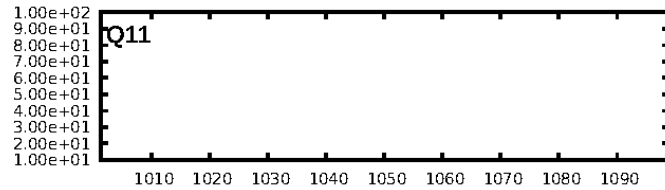
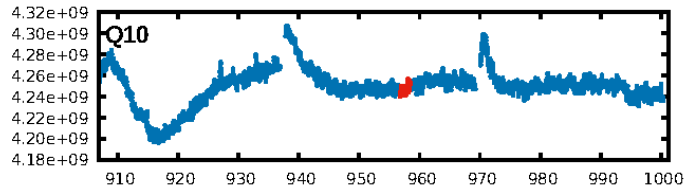
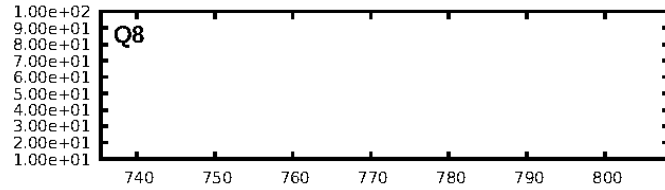
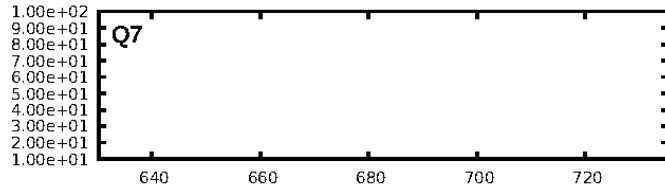
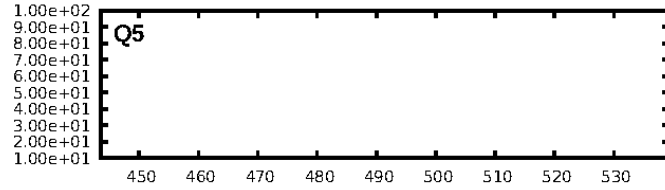
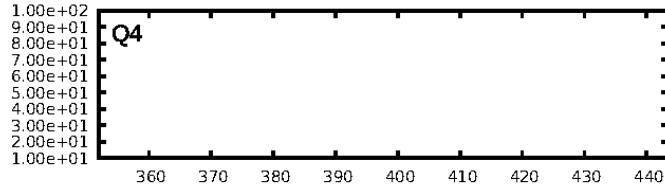
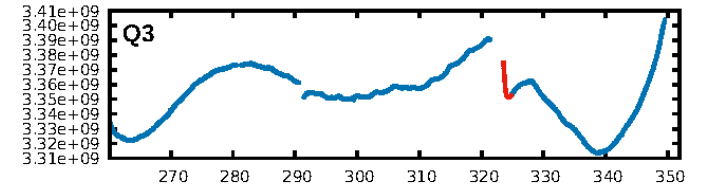
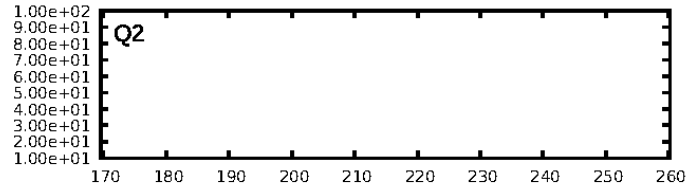
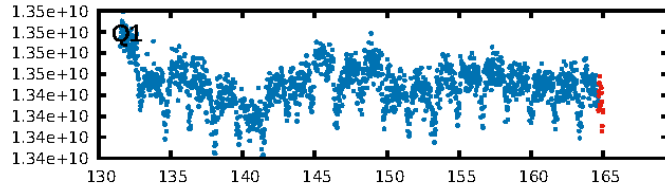
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [70.09σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 3.41e-07  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: N/A  
Centroid-sig: 42.7%  
Centroid-so: 0.383 arcsec [0.28σ]  
OotOffset-rm: 36.902 arcsec [55.86σ]  
KicOffset-rm: 40.254 arcsec [60.89σ]  
OotOffset-st: 1/0/0/0 [1]  
KicOffset-st: 1/0/0/0 [1]  
DiffImageQuality-fgm: 0.00 [0/1]  
DiffImageOverlap-fno: 1.00 [1/1]

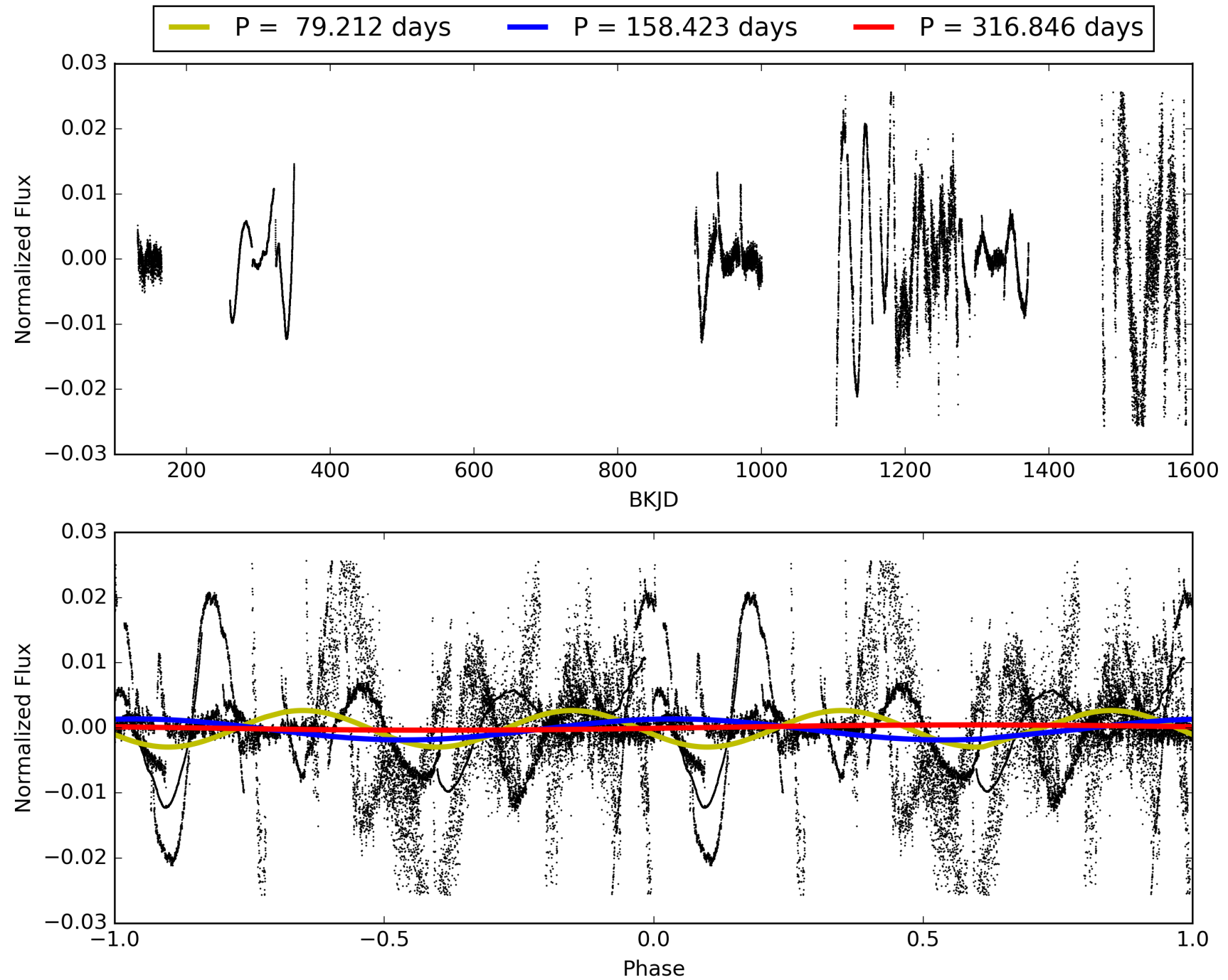
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010003658-01, PDC Light Curves

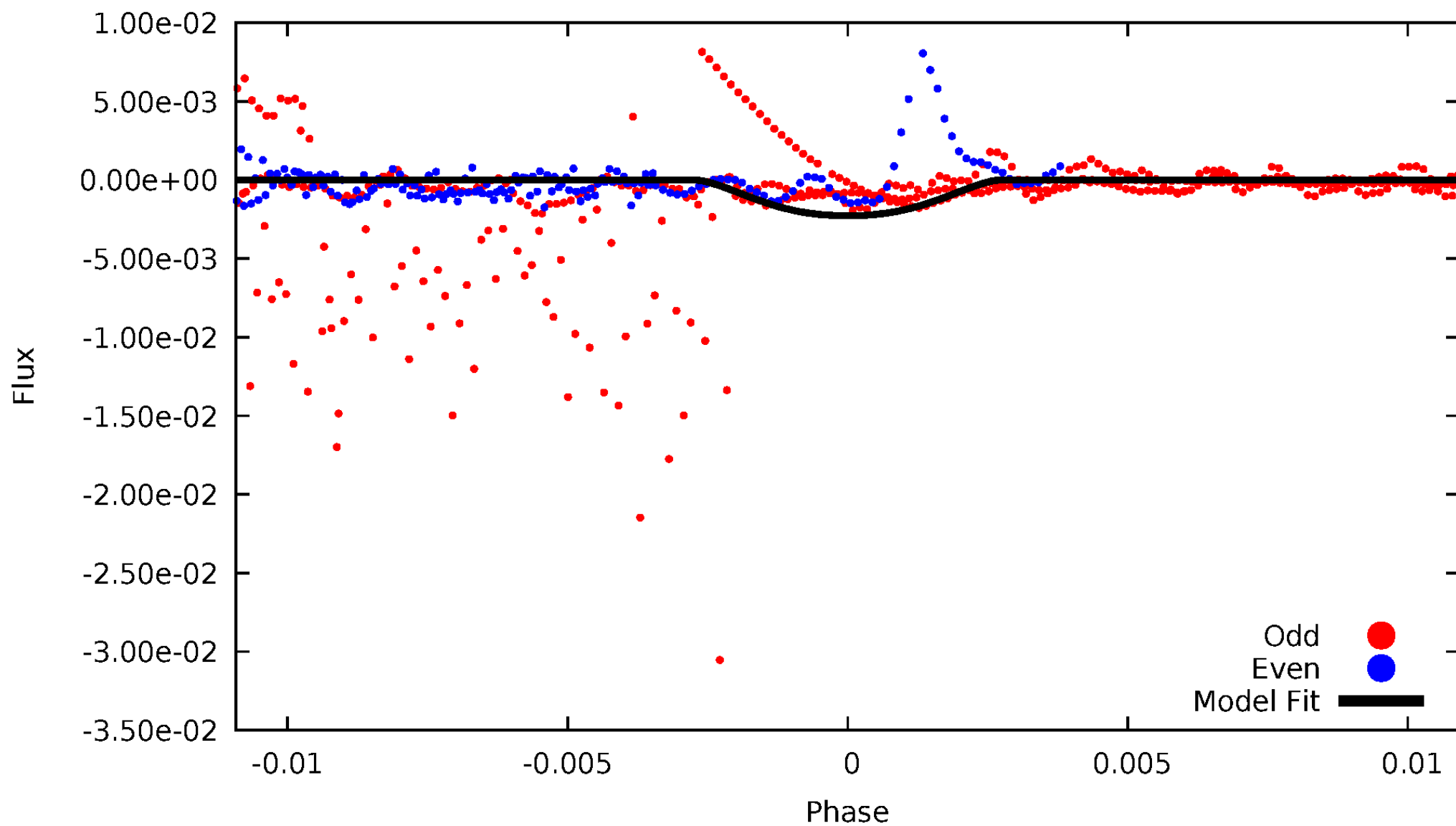


TCE 010003658-01



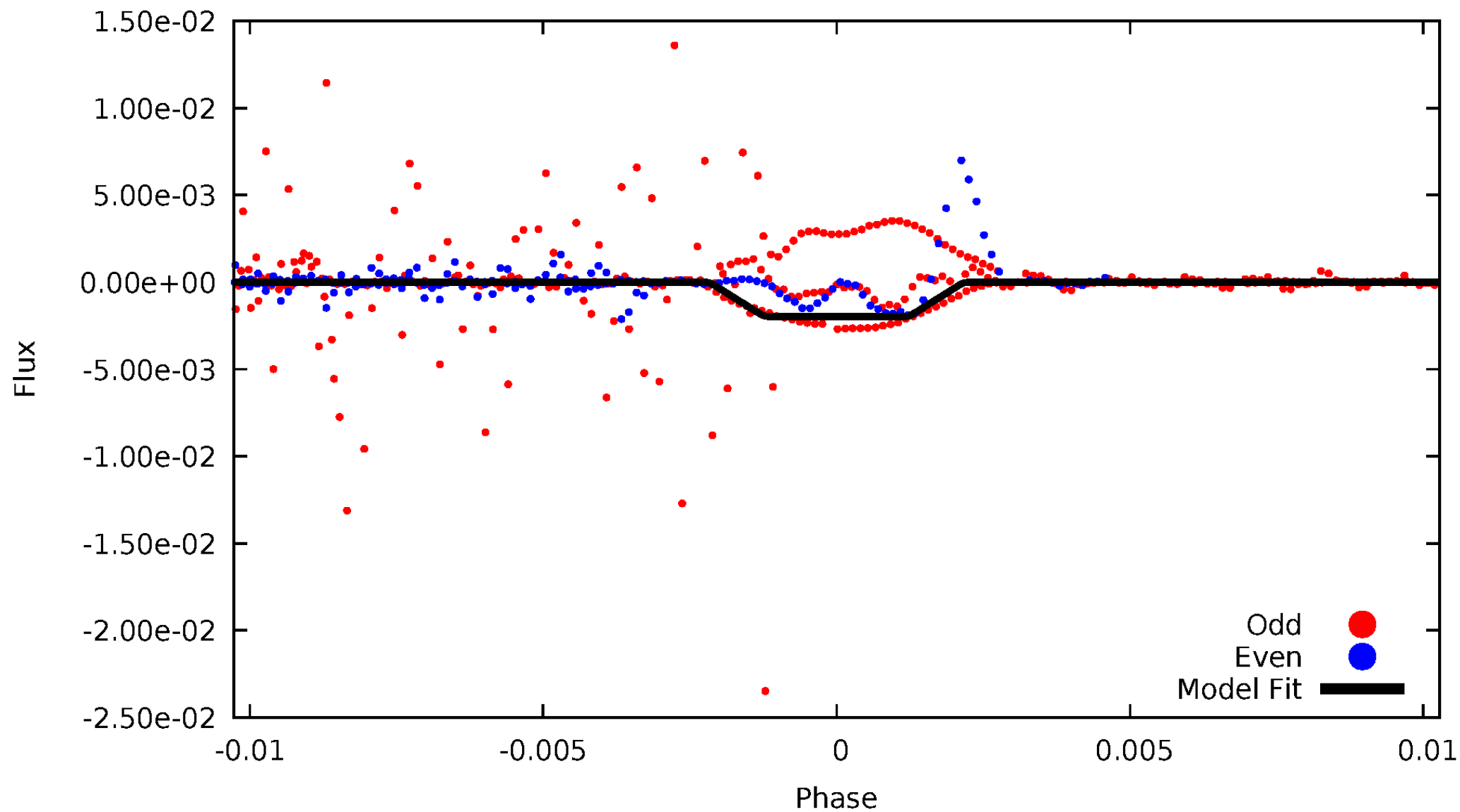
# DV Odd/Even

TCE 010003658-01



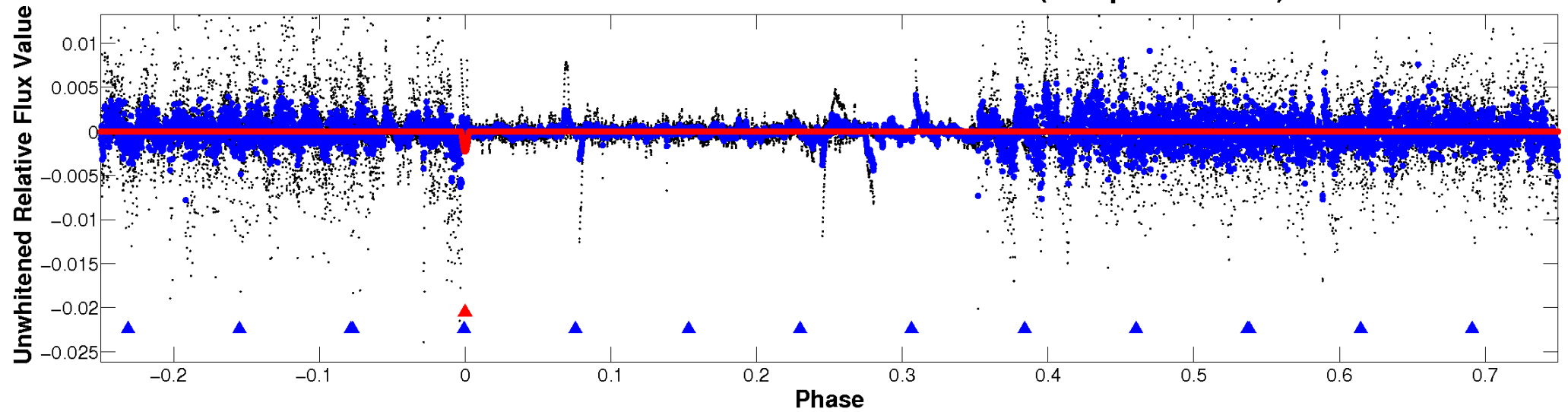
# ALT Odd/Even

TCE 010003658-01

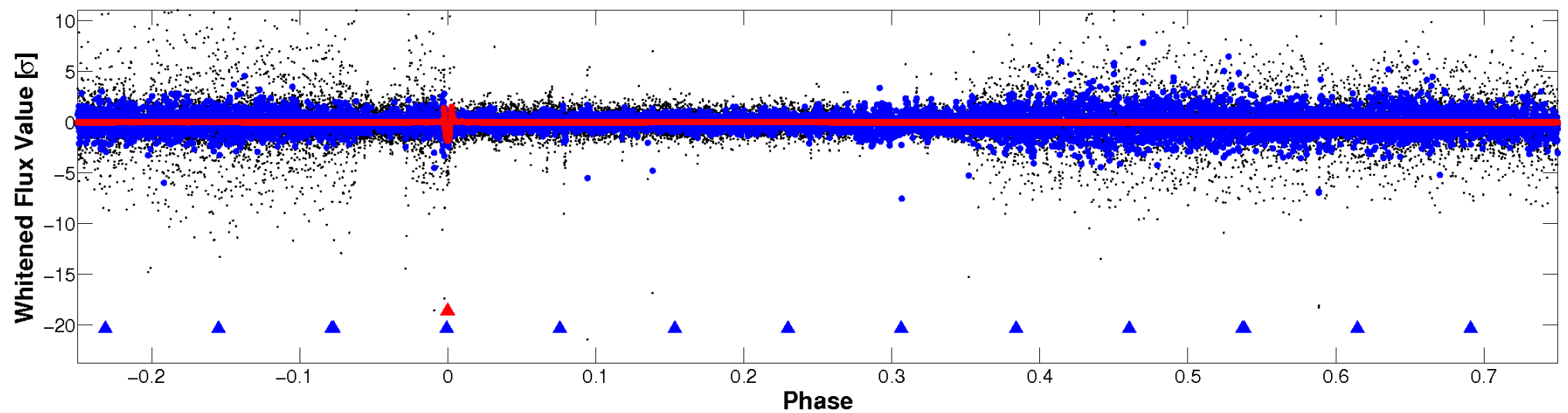


# Non-Whitened Vs. Whitened Light Curve

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

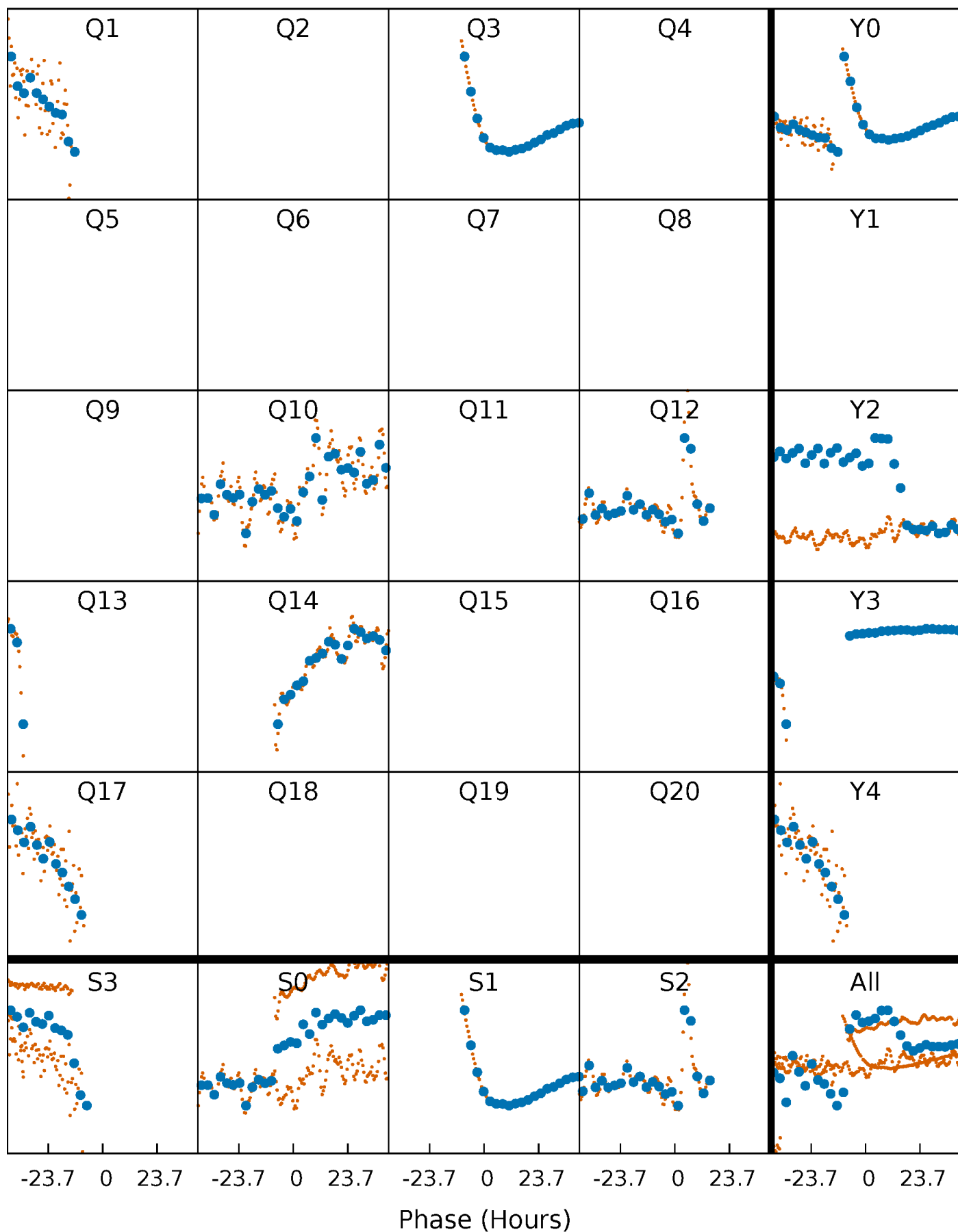


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

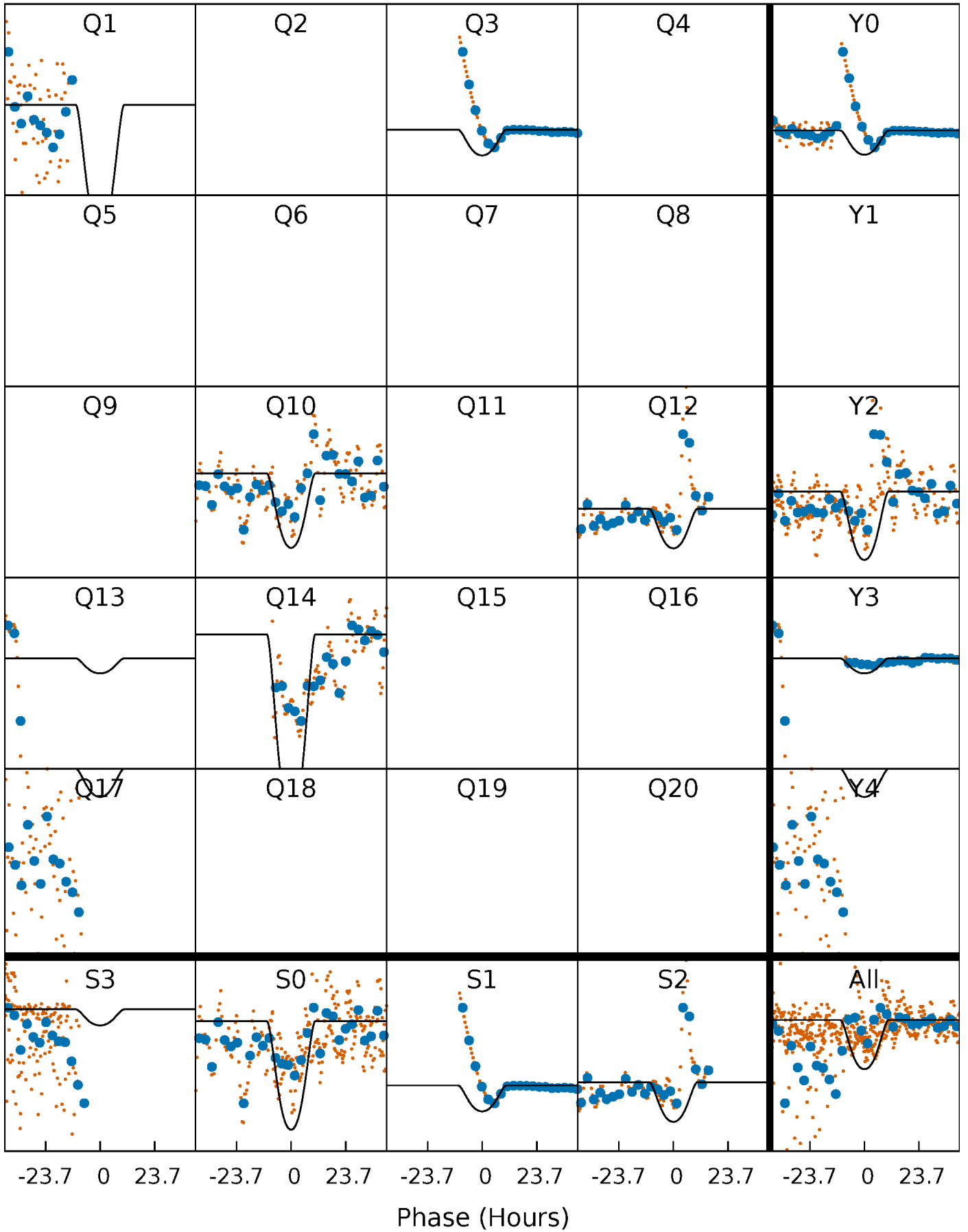
TCE 010003658-01 P=158.423163 Days  $T_0=165.534851$  (BKJD)





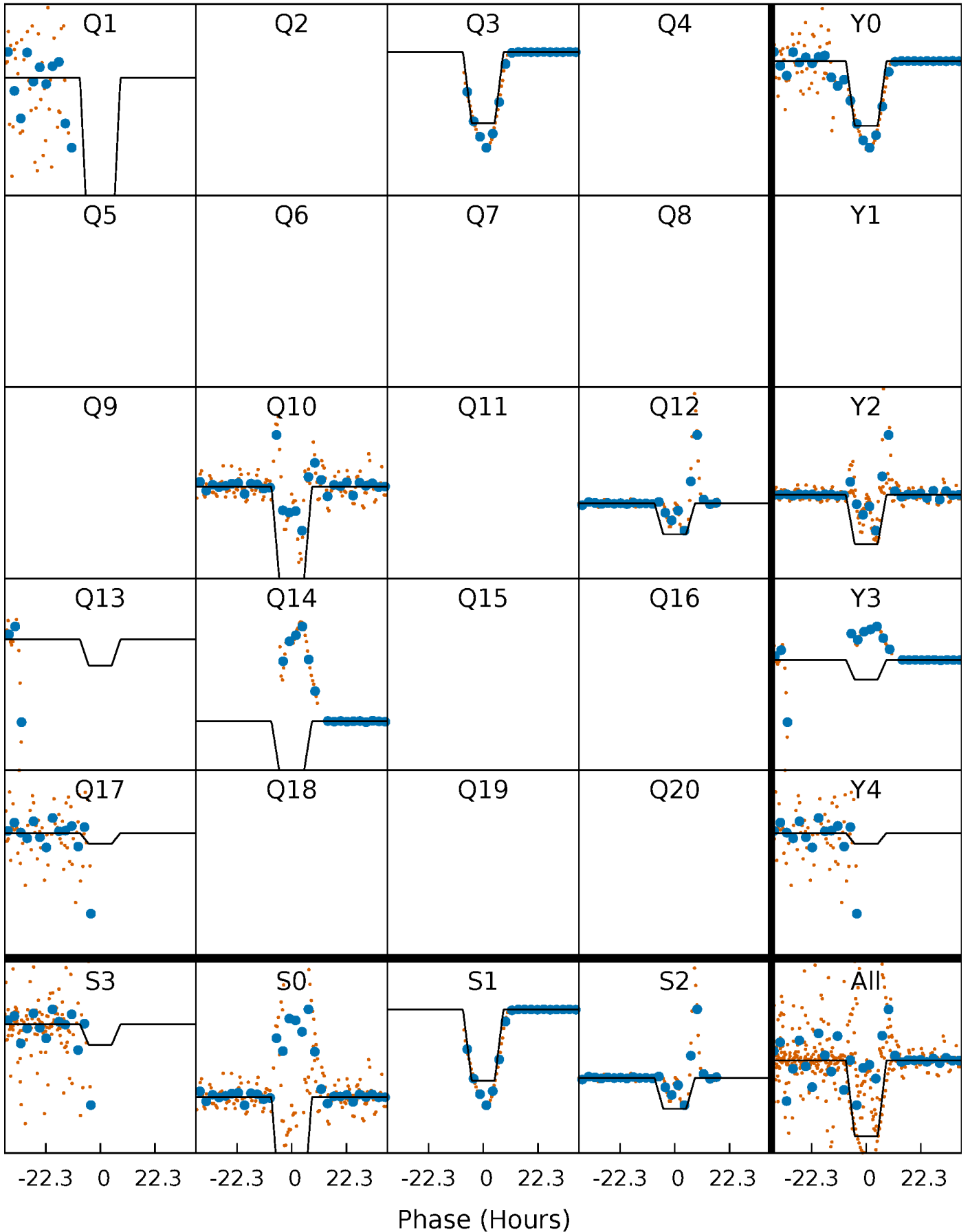
# DV Quarter-Phased Transit Curves

TCE 010003658-01 P=158.423163 Days  $T_0=165.534851$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

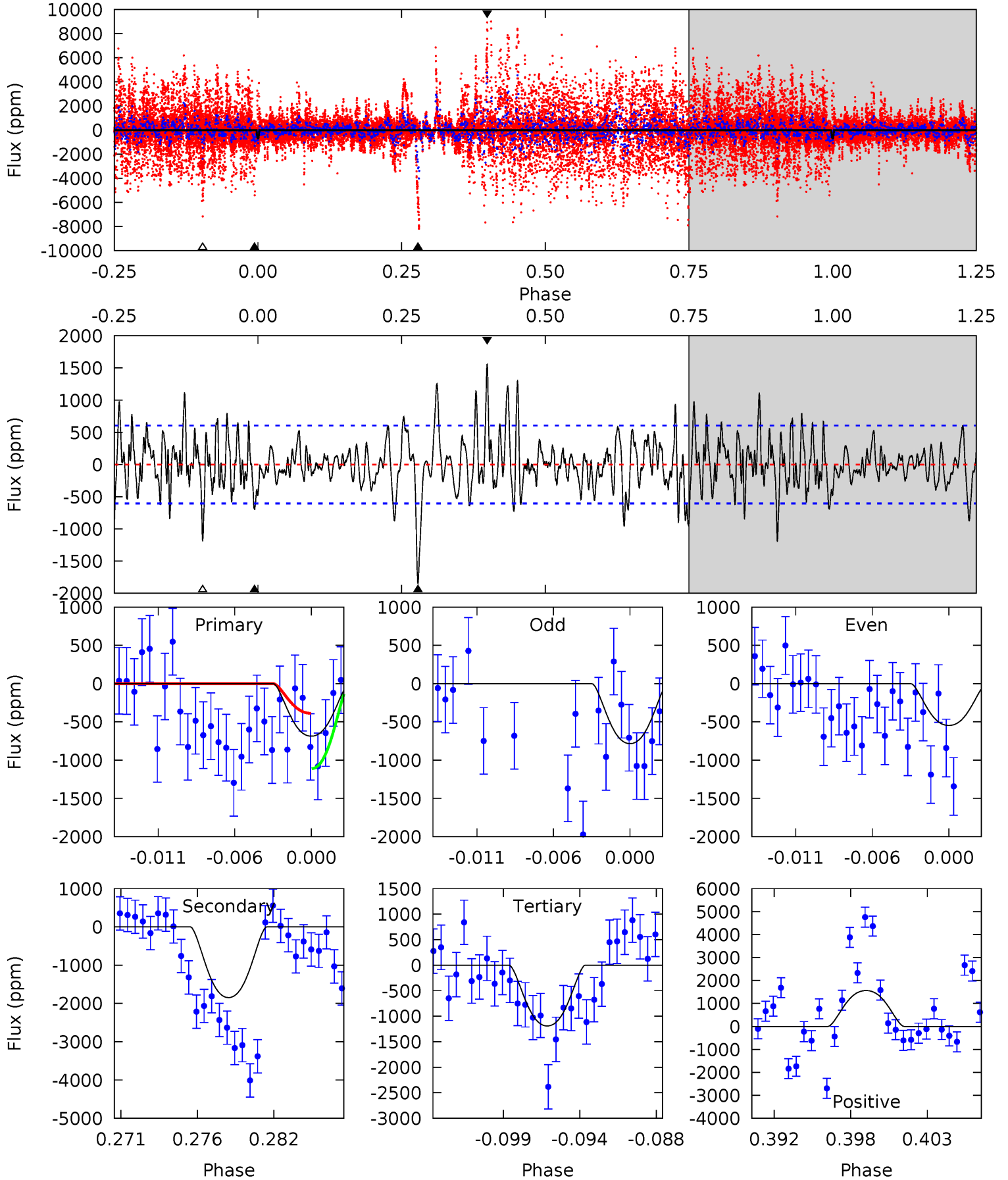
TCE 010003658-01 P=158.407768 Days  $T_0=165.503607$  (BKJD)



# DV Model-Shift Uniqueness Test

010003658-01, P = 158.423163 Days, E = 7.111688 Days

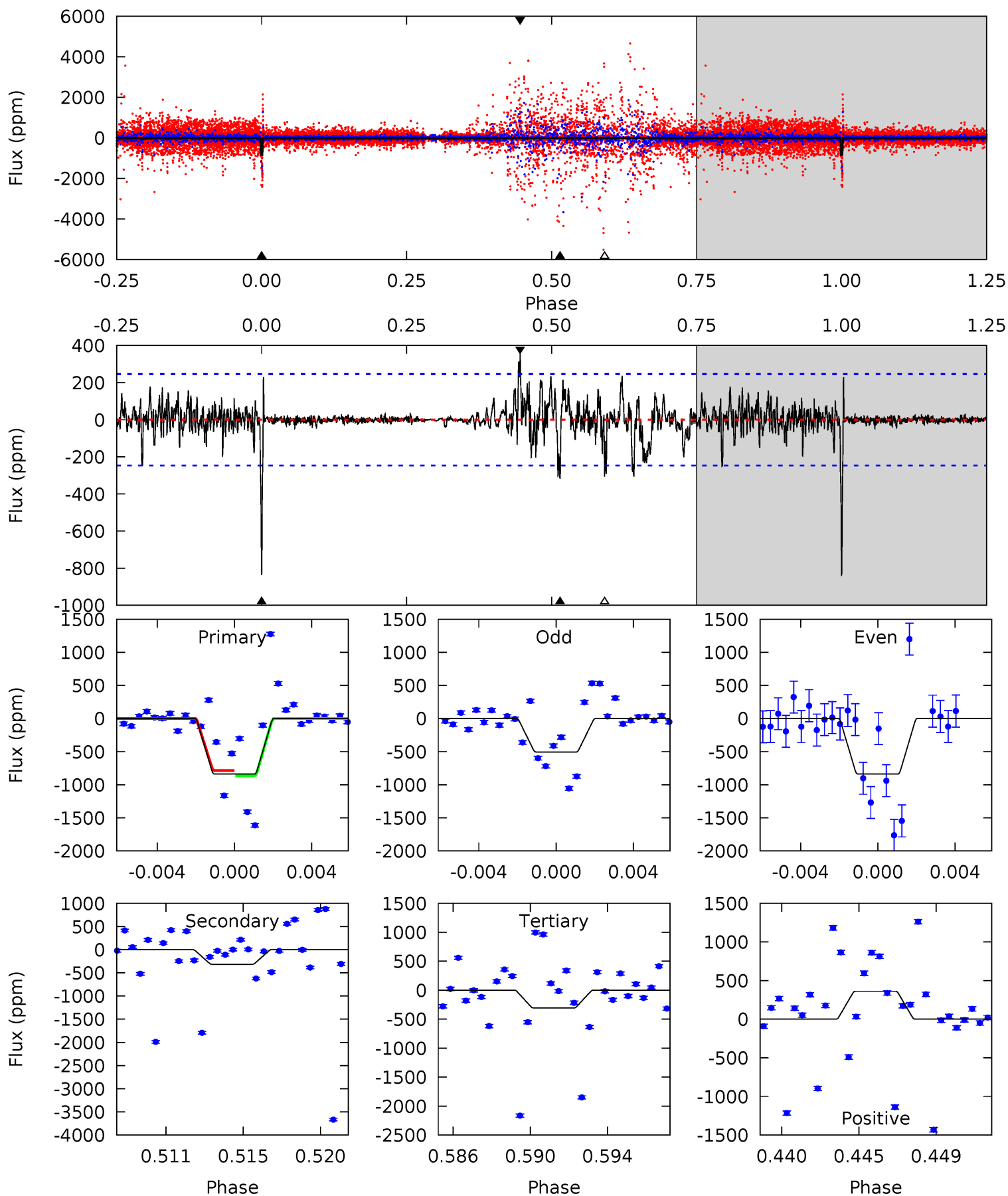
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.83	15.7	10.1	13.3	5.14	2.77	3.02	-4.28	-7.43	5.57	2.43	0.73	0.88	0.46	2.94



# Alt Model-Shift Uniqueness Test

010003658-01, P = 158.407768 Days, E = 7.095839 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
17.6	6.64	6.44	7.58	5.18	2.85	1.22	11.2	10.0	0.21	-0.94	2.09	0.21	0.30	0.63



### Stellar Parameters For KIC 010003658

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3274^{+117}_{-78}$	$0.108^{+0.208}_{-0.052}$	$-0.080^{+0.250}_{-0.150}$	$154.296^{+9.192}_{-27.576}$	$1.114^{+0.207}_{-0.128}$	$0.000^{+0.000}_{-0.000}$
	+4%/-2%	+193%/-48%	+312%/-188%	+6%/-18%	+19%/-11%	+93%/-14%
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 010003658-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-1847 \pm 118$	$1019.81^{+99.59}_{-116.18}$	$3201^{+142}_{-170}$	$2341^{+261}_{-4089}$	$0.358^{+0.091}_{-0.061}$
Alt.	$-316 \pm 48$	$728.74^{+88.67}_{-96.60}$	$3205^{+137}_{-162}$	$-2689^{+136}_{-117}$	$0.121^{+0.040}_{-0.030}$

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

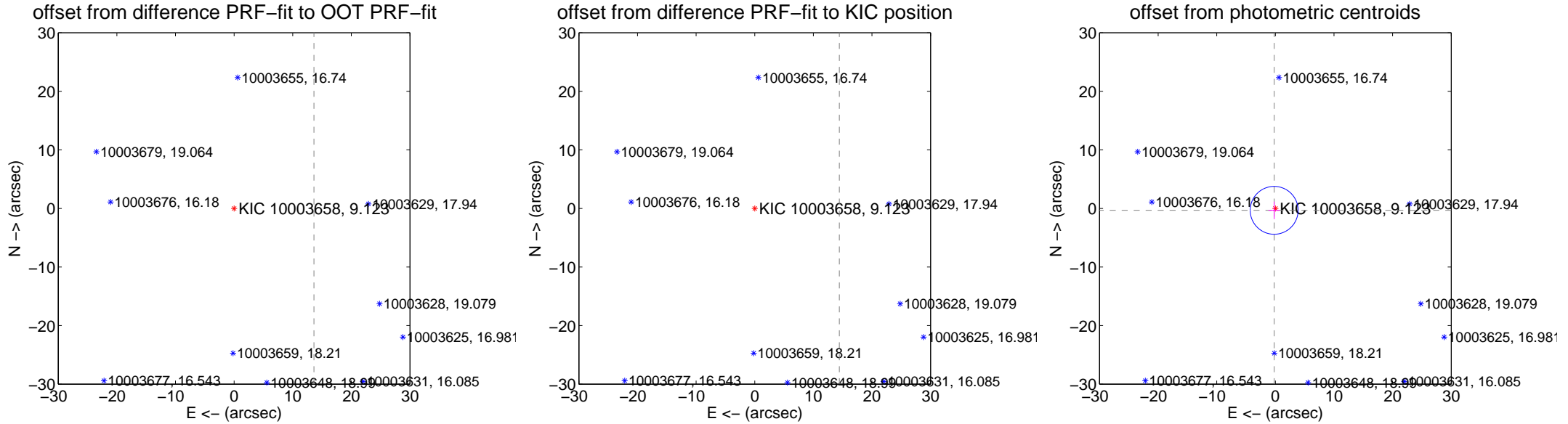
## DV Centroid Data

Supplemental centroid analysis for 010003658-01. **Kepler magnitude: 9.12.** Transit SNR 20.30

There are 0 quarters with good PRF difference image offsets

The OOT PRF centroid is offset from the target star catalog position by about 3.38 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>36.902 \pm 0.661</math></b>	<b>55.86</b>	$-13.625 \pm 0.606$	$34.294 \pm 0.669$
PRF-fit source offset from KIC position	<b><math>40.254 \pm 0.661</math></b>	<b>60.89</b>	$-14.430 \pm 0.606$	$37.579 \pm 0.669$
photometric centroid source offset	$0.38 \pm 1.36$	0.28	$0.21 \pm 0.97$	$-0.32 \pm 1.50$



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

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

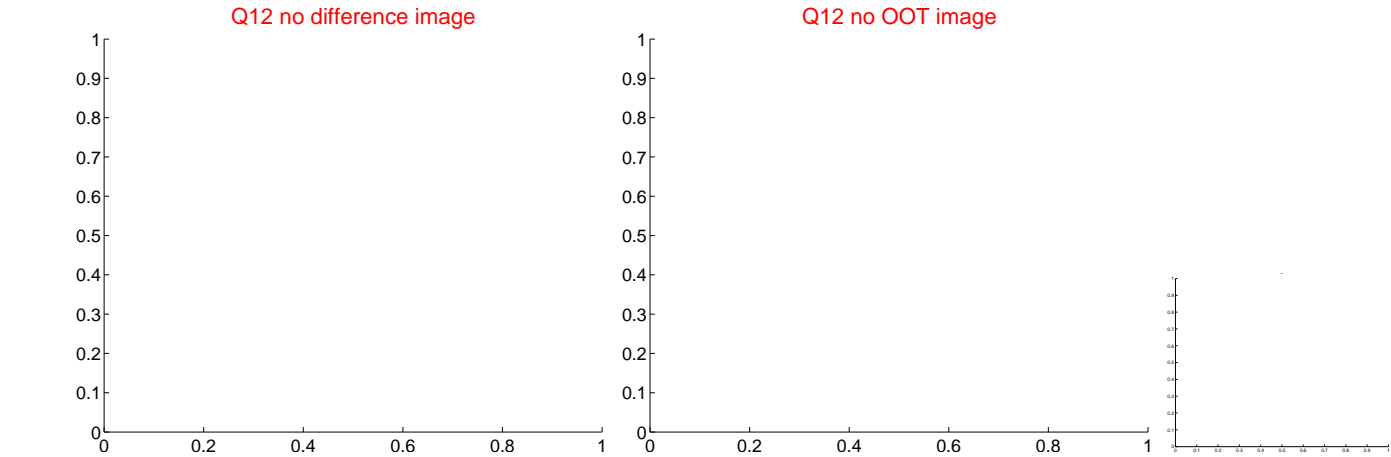
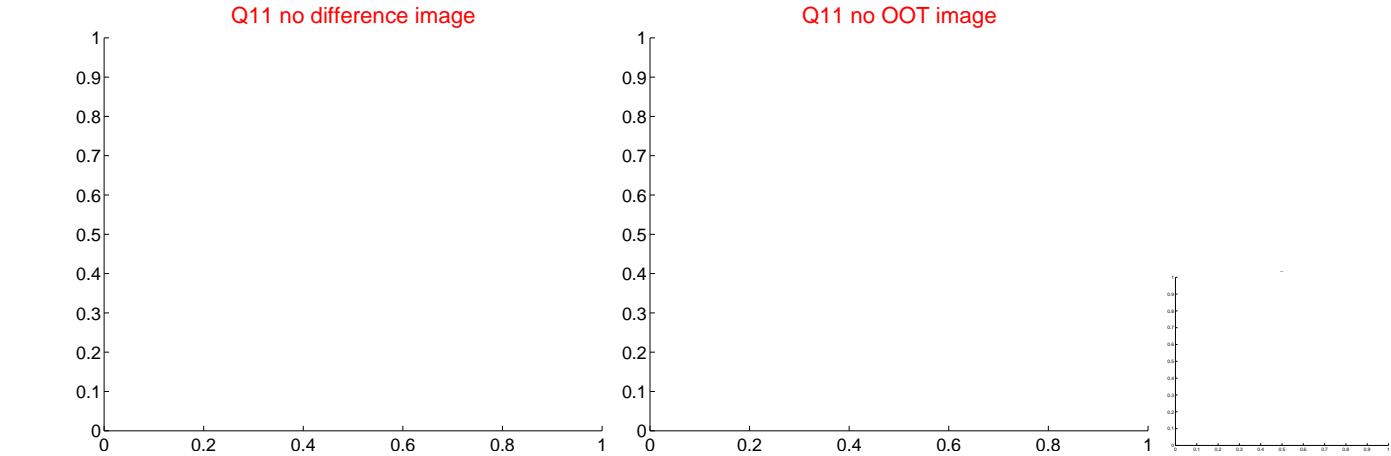
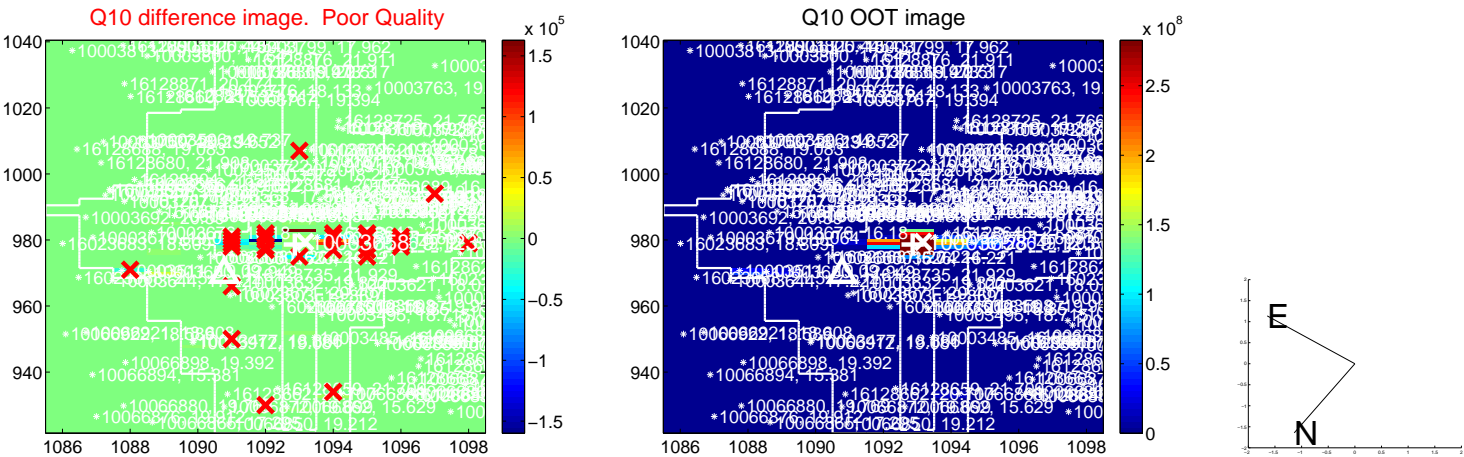
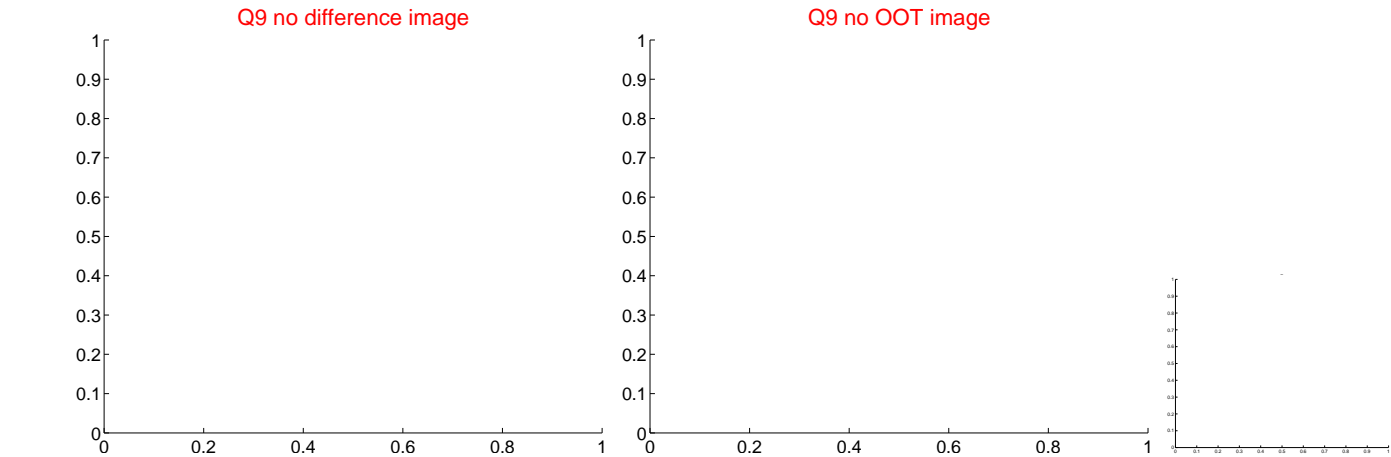


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





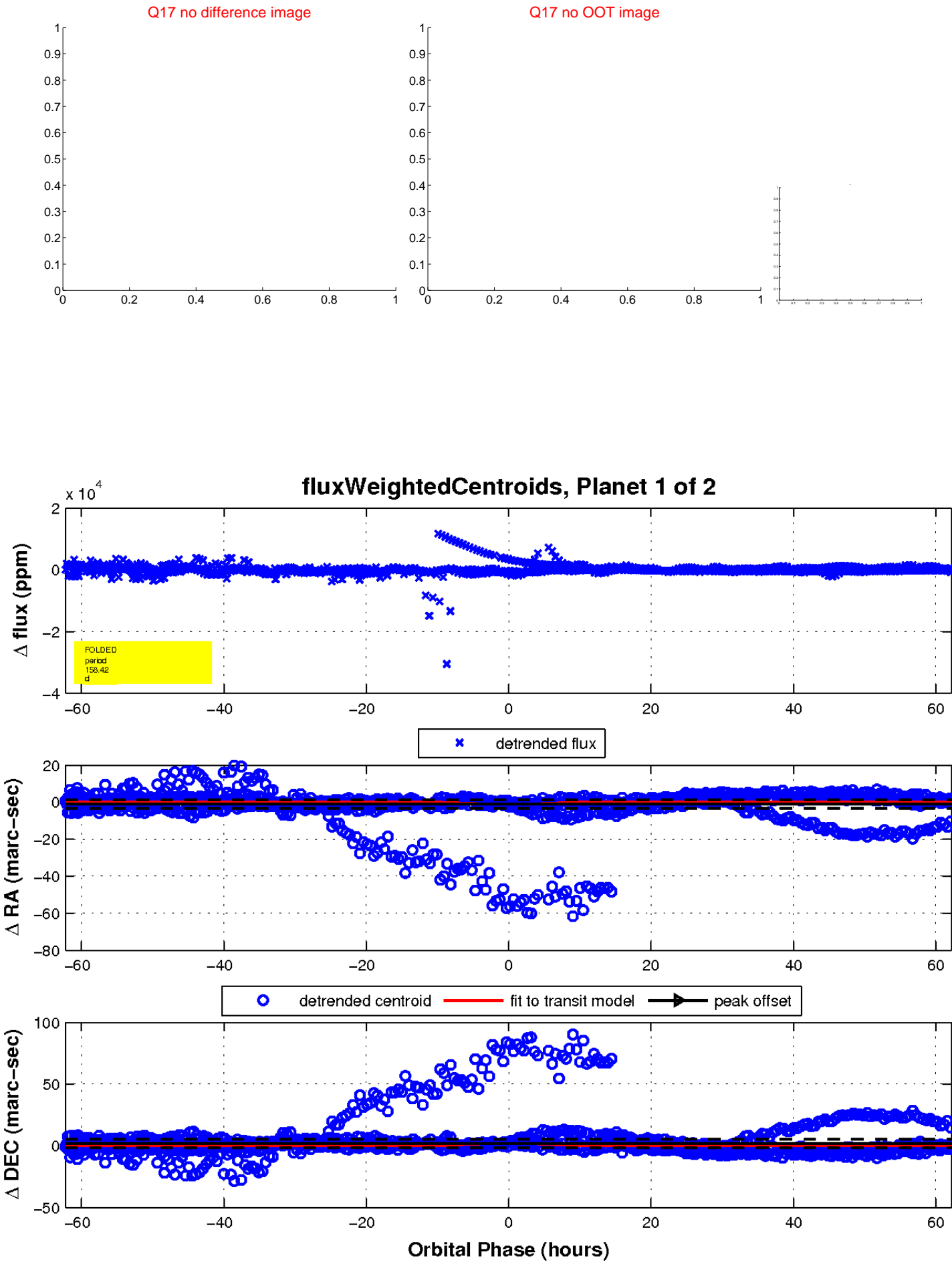
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



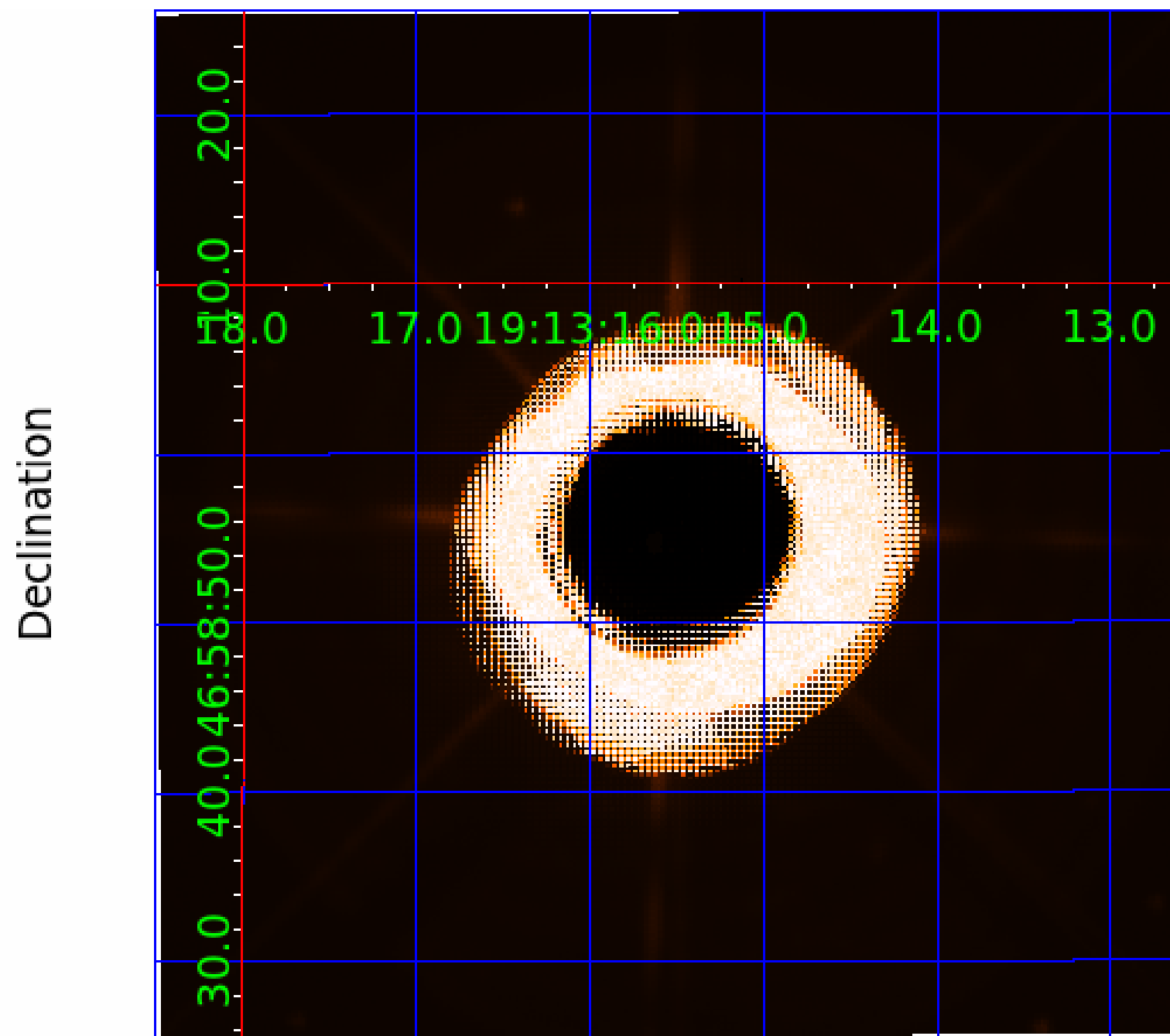
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 010003658

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010003658-01	OBS	No	158.423163	165.534851	2276.4	20.762	9.3	20.3	154.30	3274	1043.12	0.00
010003658-02	OBS	No	97.476455	153.313746	117.4	2.104	15.5	2.5	154.30	3274	163.65	0.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010003658-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED
010003658-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—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.

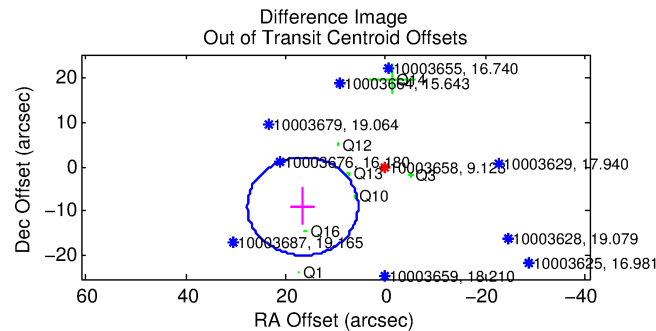
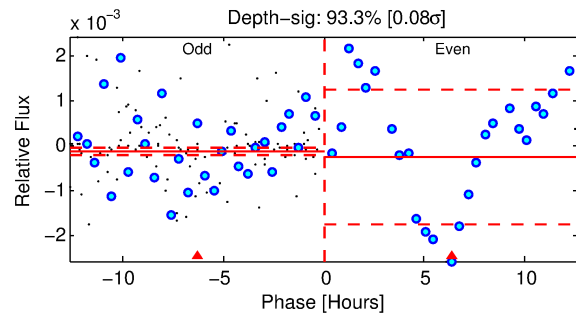
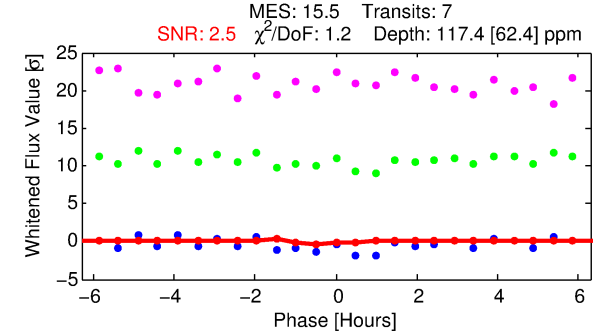
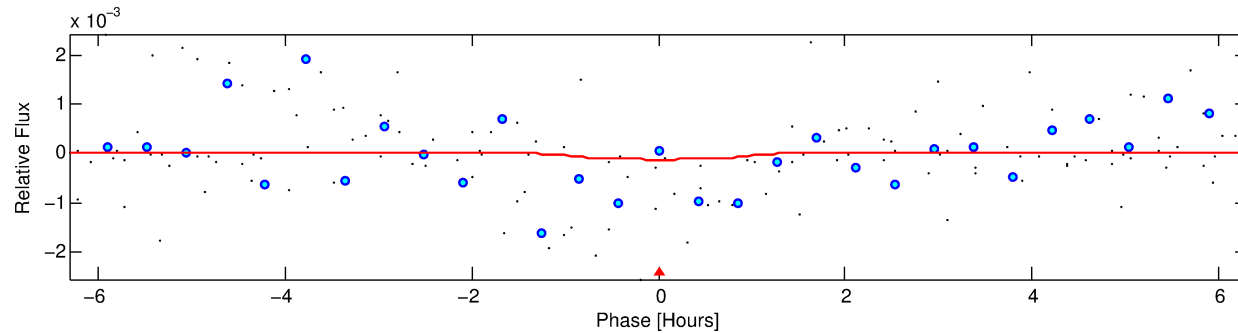
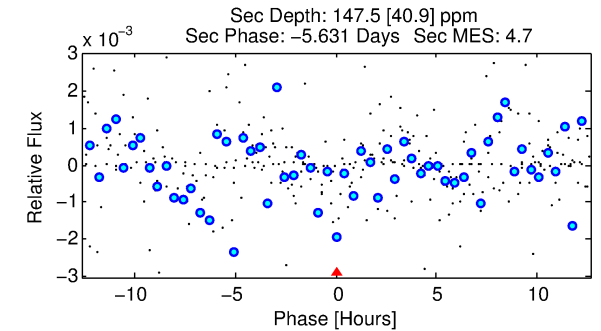
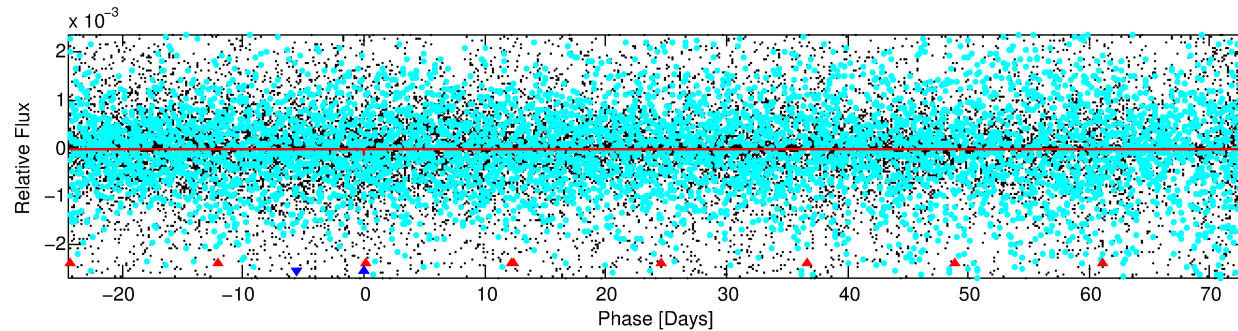
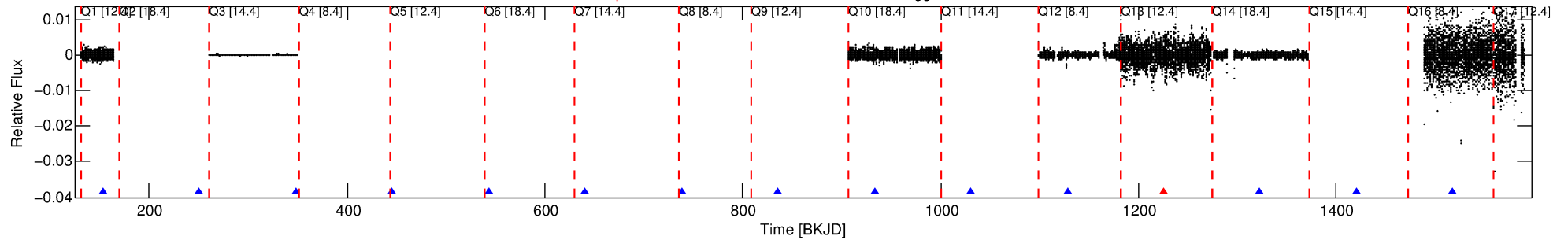
## Ephemeris Match Information For 010003658-02

No Significant Match Found

# DV One-Page Summary

KIC: 10003658 Candidate: 2 of 2 Period: 97.476 d

Kp: 9.12 R\*: 154.30 Rs Teff: 3274.0 K Logg: 0.11 Fe/H: -0.080



## DV Fit Results:

Period = 97.47646 [0.00133] d  
Epoch = 153.3137 [0.0094] BKJD  
Rp/R\* = 0.0097 [0.0216]  
a/R\* = 314.98 [1431.92]  
b = 0.48 [7.81]  
Seff = N/A  
Teq = N/A  
Rp = 163.65 [364.16] Re  
a = N/A  
Ag = N/A  
Teffp = N/A

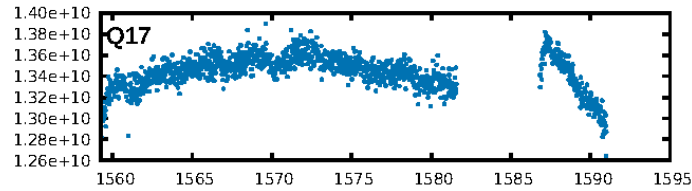
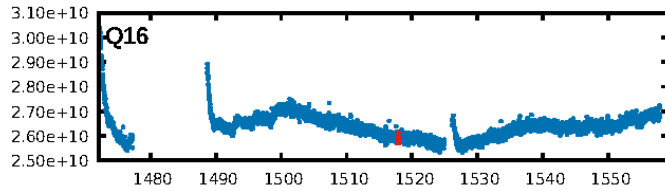
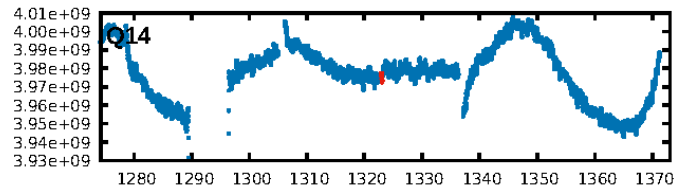
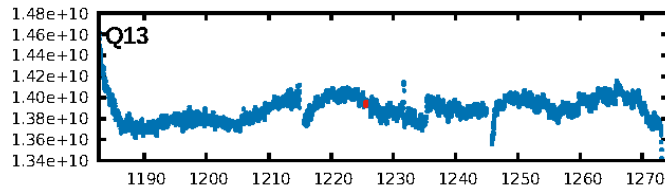
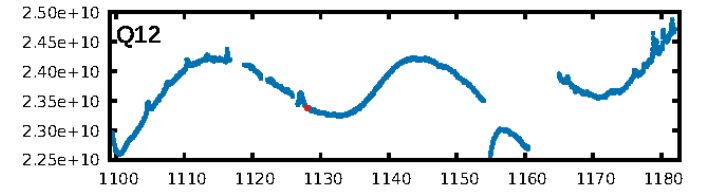
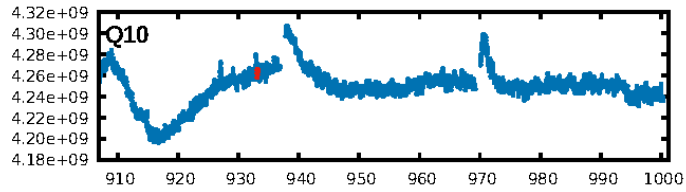
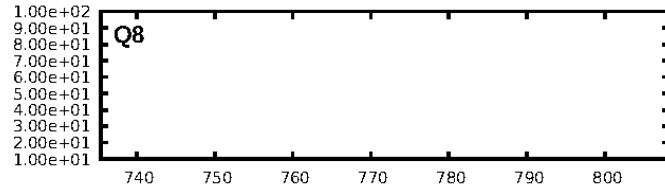
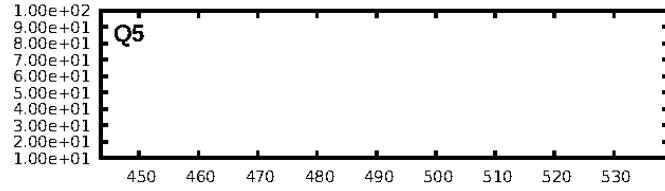
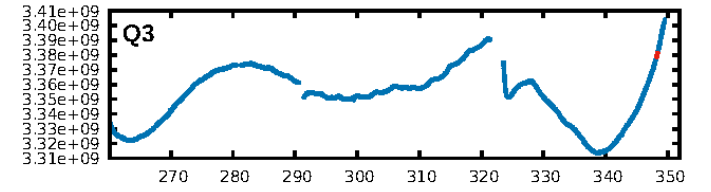
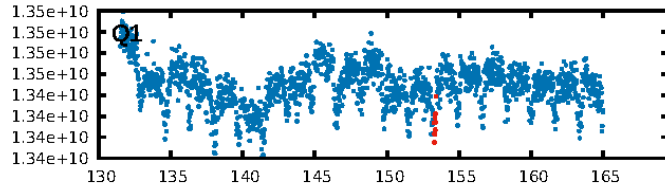
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [70.09σ]  
ModelChiSquare2-sig: 11.3%  
ModelChiSquareGof-sig: 85.0%  
Bootstrap-pfa: 4.49e-14  
RollingBand-fgt: 0.83 [5/6]  
GhostDiagnostic-chr: N/A  
Centroid-sig: 8.5%  
Centroid-so: 10.696 arcsec [1.05σ]  
OotOffset-rm: 18.838 arcsec [5.08σ]  
KicOffset-rm: 18.886 arcsec [3.94σ]  
OotOffset-st: 2/1/2/2 [7]  
KicOffset-st: 2/1/2/2 [7]  
DiffImageQuality-fgm: 0.14 [1/7]  
DiffImageOverlap-fno: 1.00 [7/7]

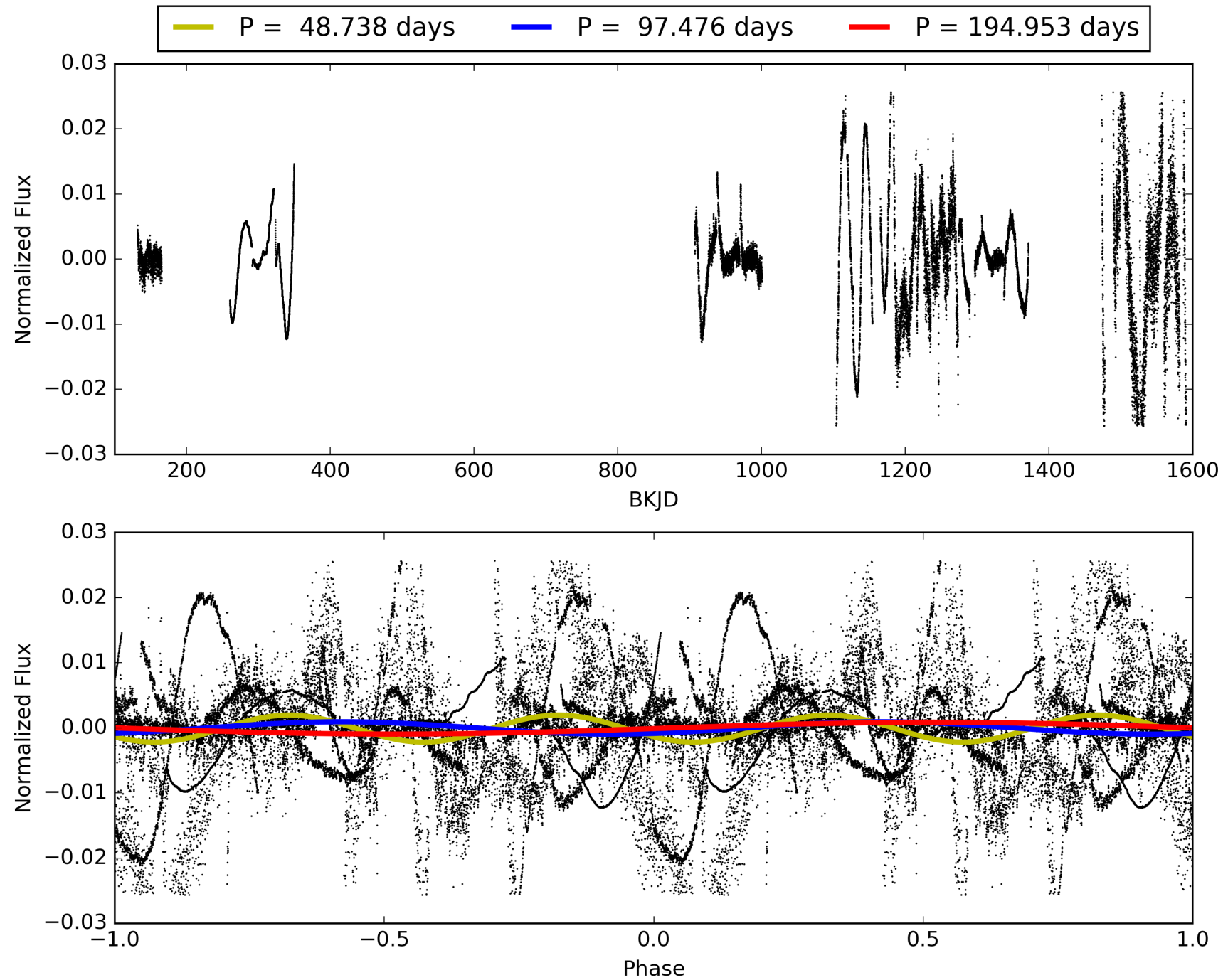
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 04:18:19 Z

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

# TCE 010003658-02, PDC Light Curves



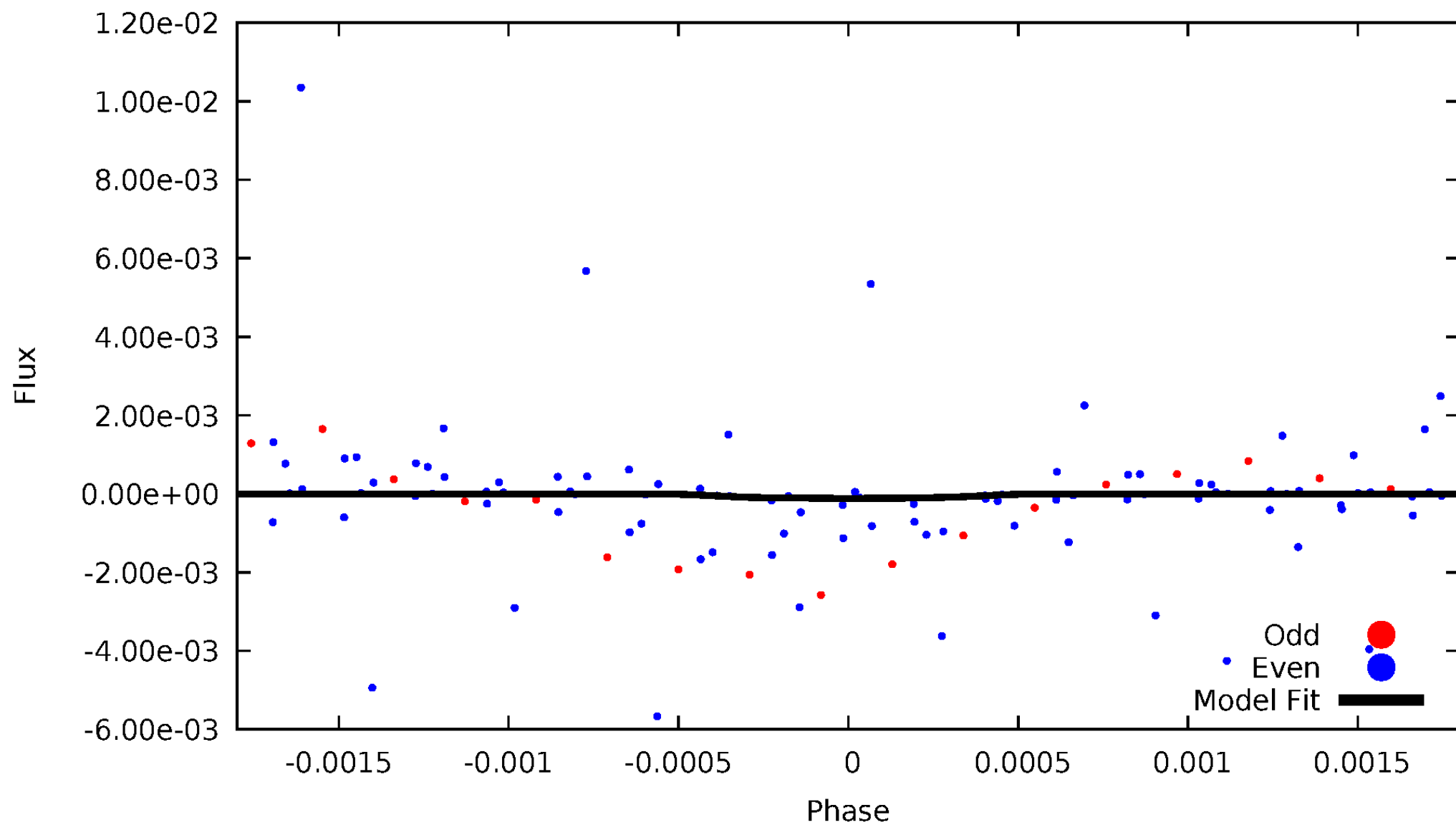
# TCE 010003658-02





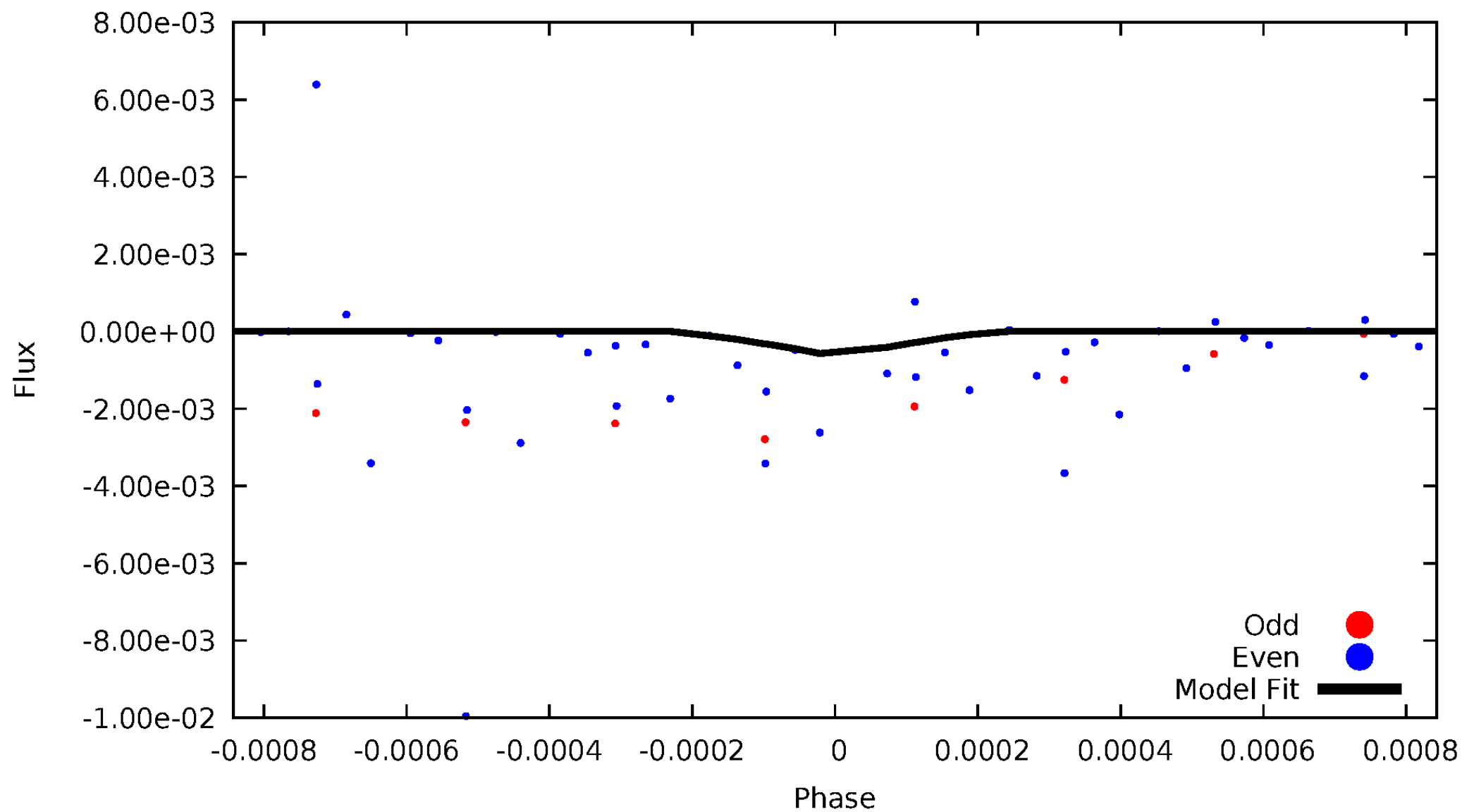
# DV Odd/Even

TCE 010003658-02



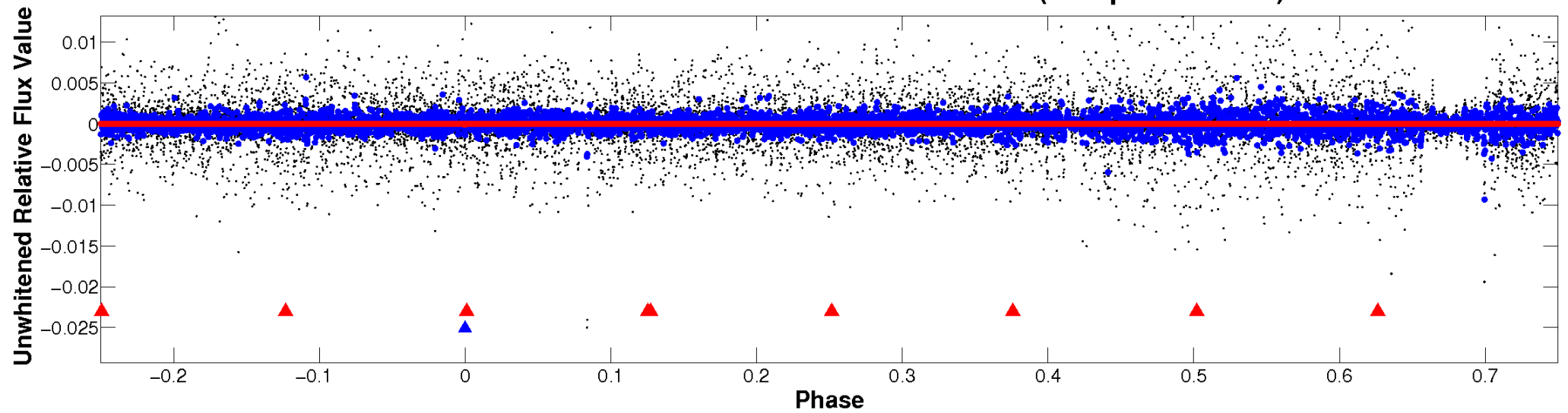
# ALT Odd/Even

TCE 010003658-02

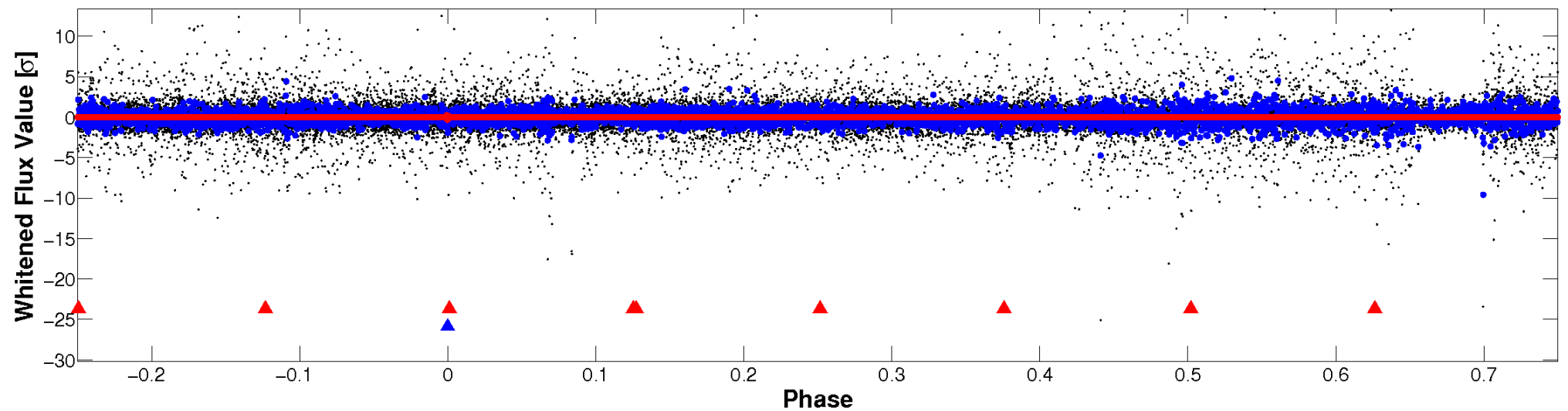


# Non-Whitened Vs. Whitened Light Curve

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

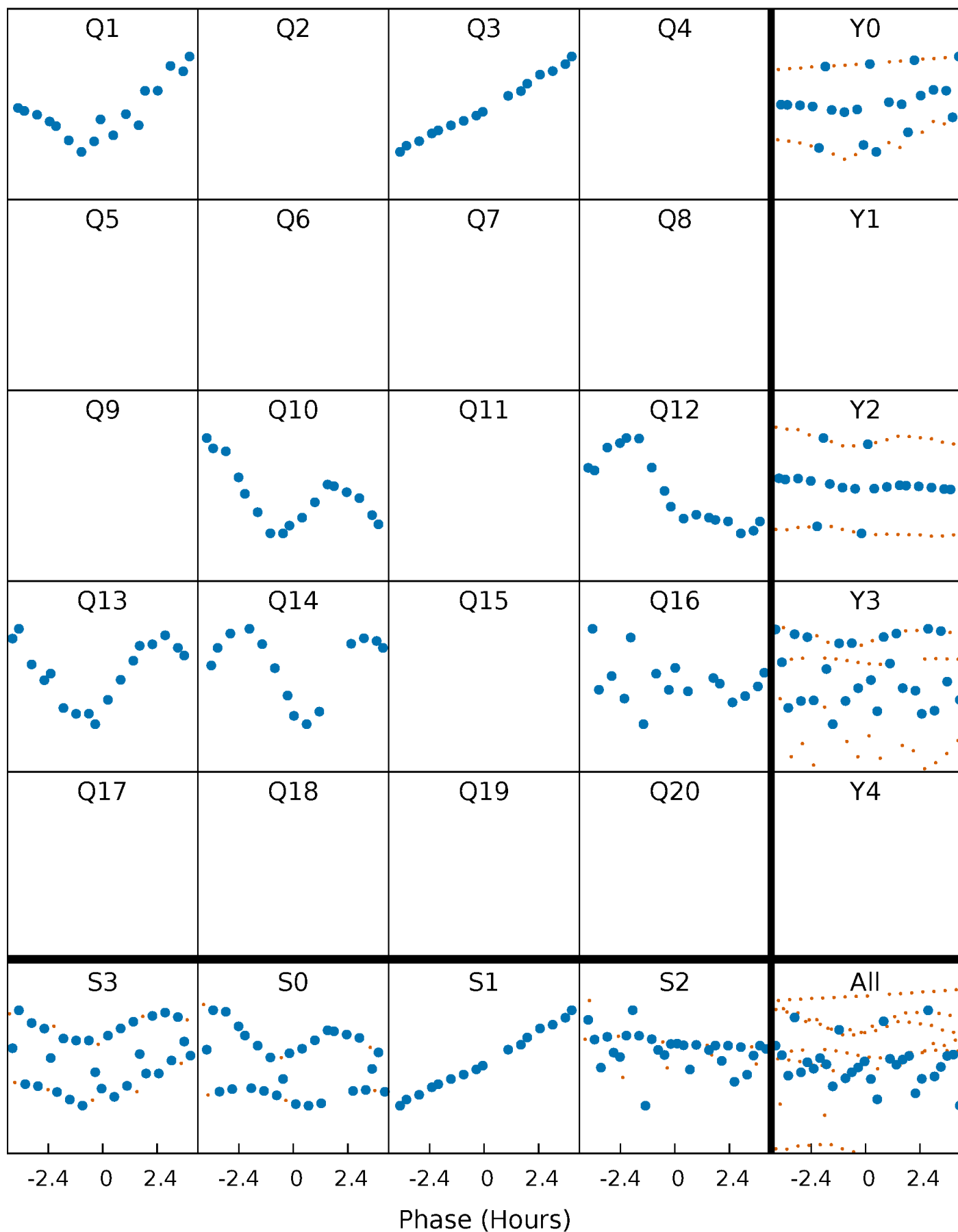


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



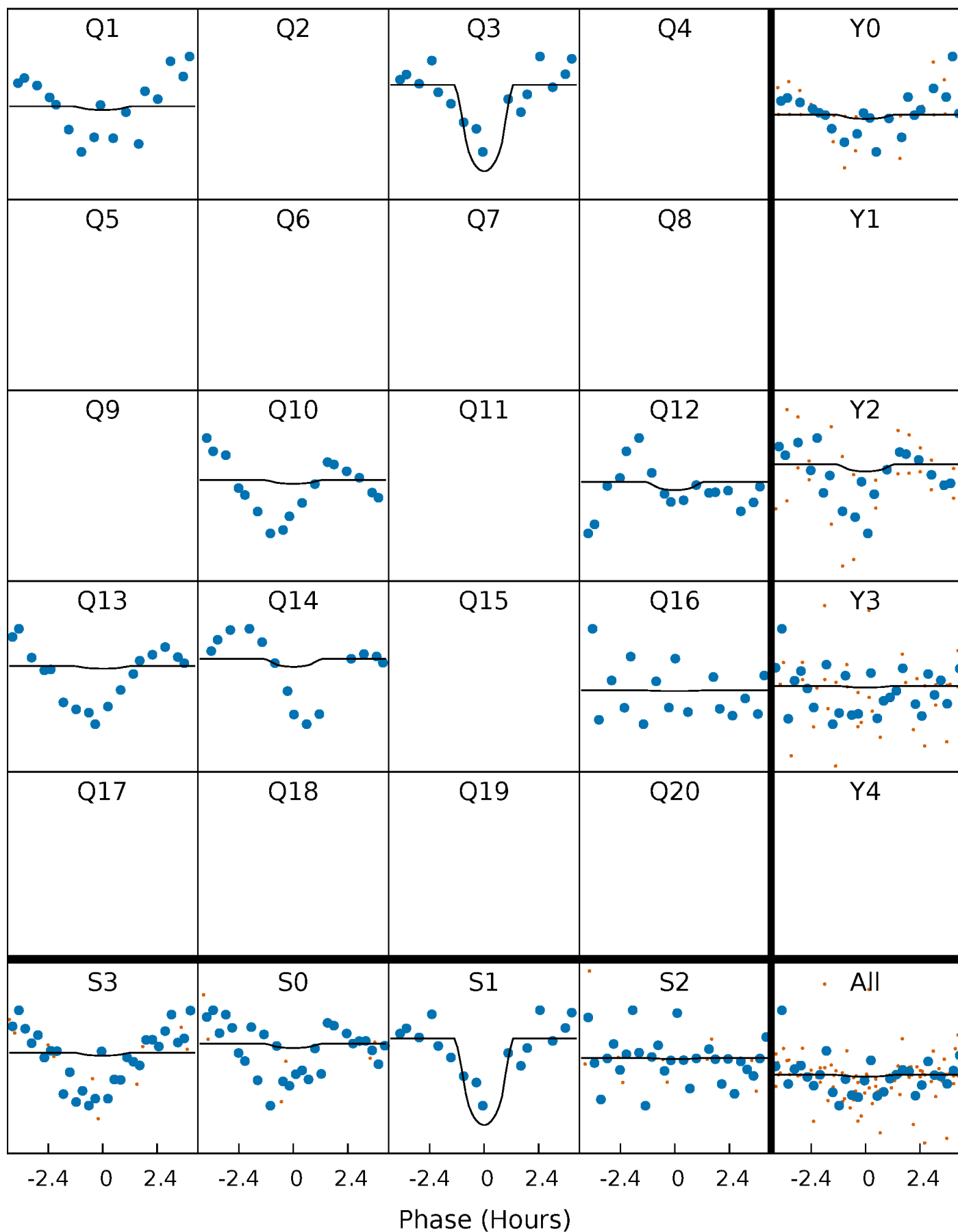
# PDC Quarter-Phased Transit Curves

TCE 010003658-02 P= 97.476455 Days  $T_0=153.313746$  (BKJD)



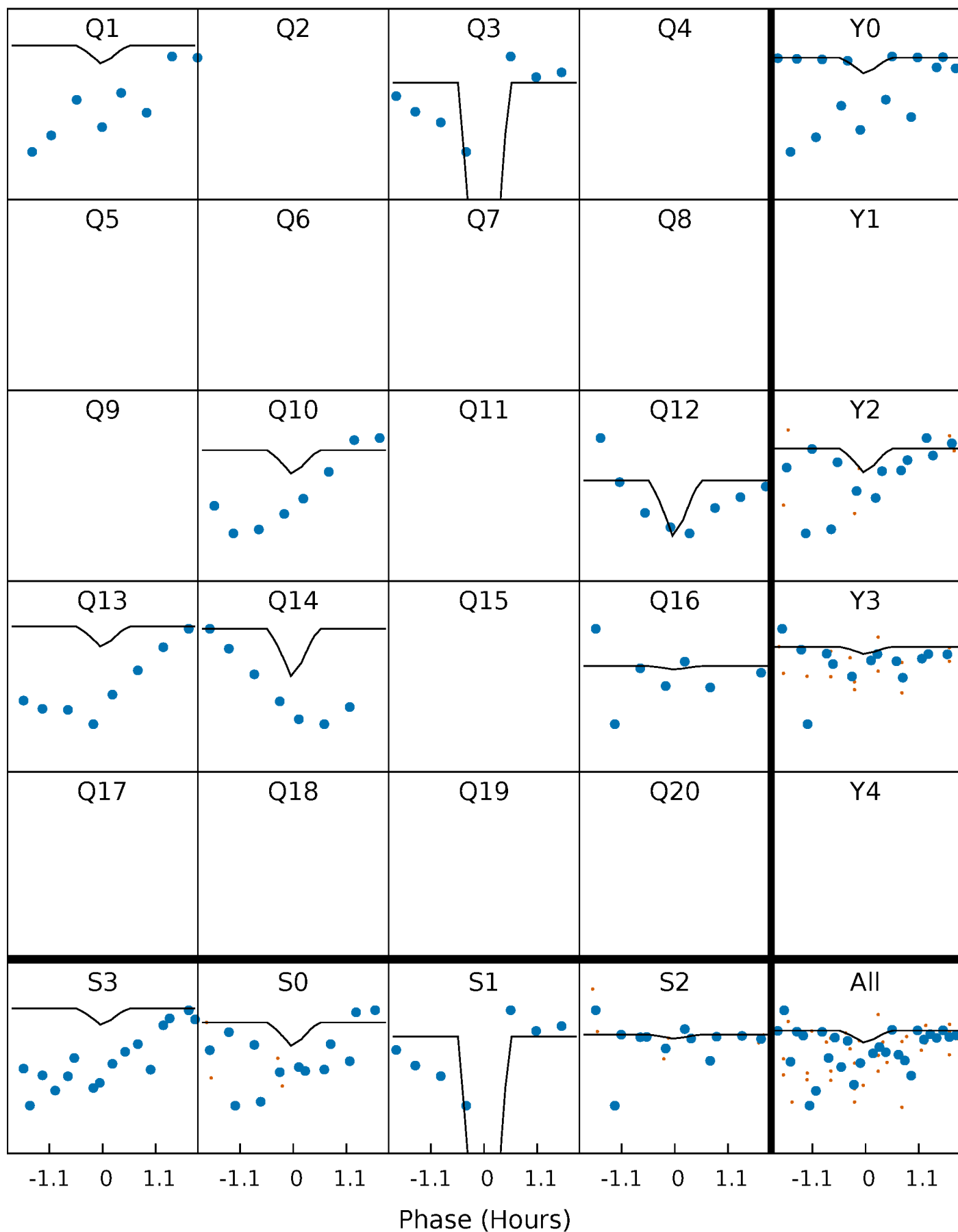
# DV Quarter-Phased Transit Curves

TCE 010003658-02   P= 97.476455 Days    $T_0=153.313746$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

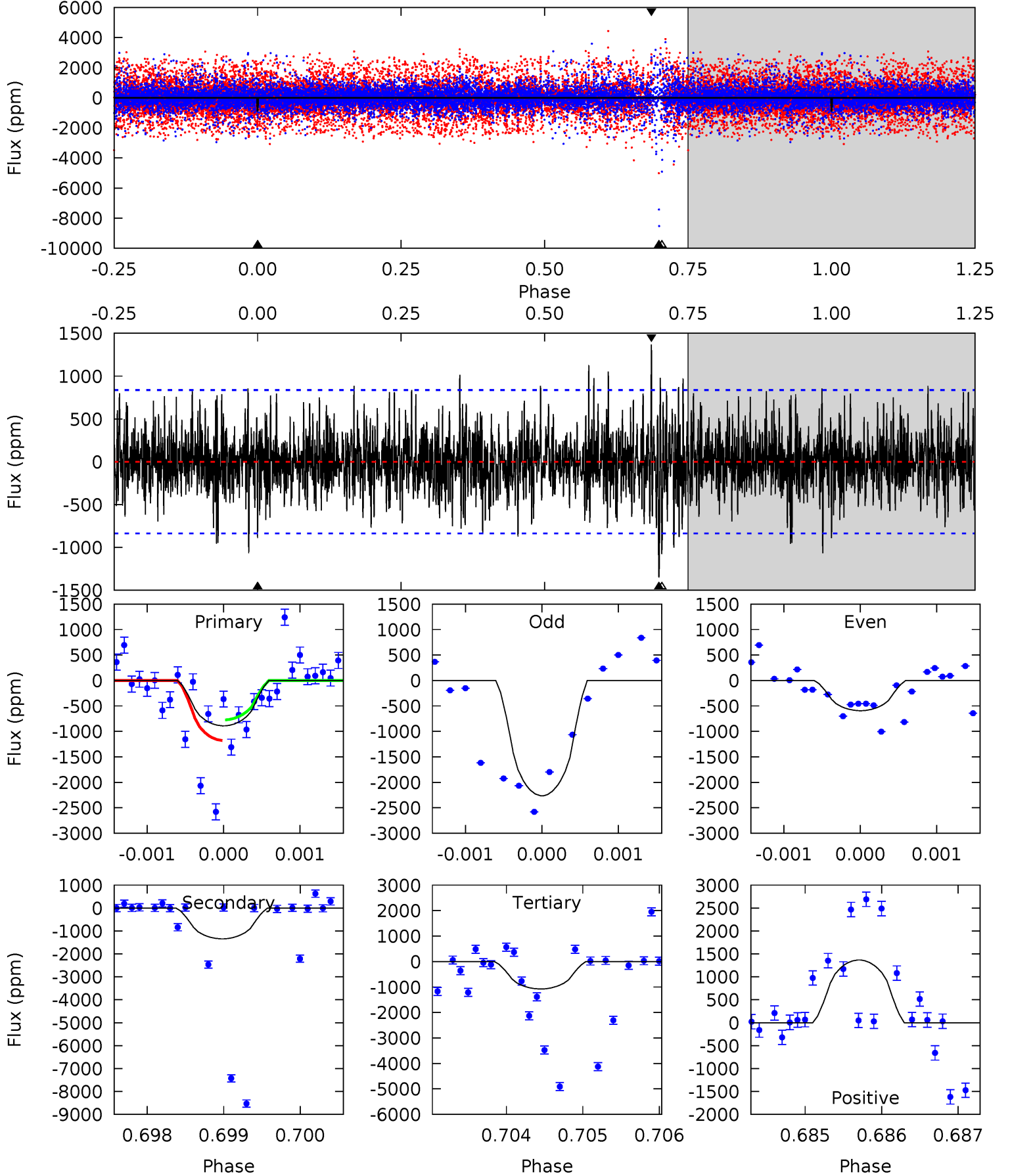
TCE 010003658-02 P= 97.474390 Days  $T_0=153.338178$  (BKJD)



# DV Model-Shift Uniqueness Test

010003658-02, P = 97.476455 Days, E = 55.837291 Days

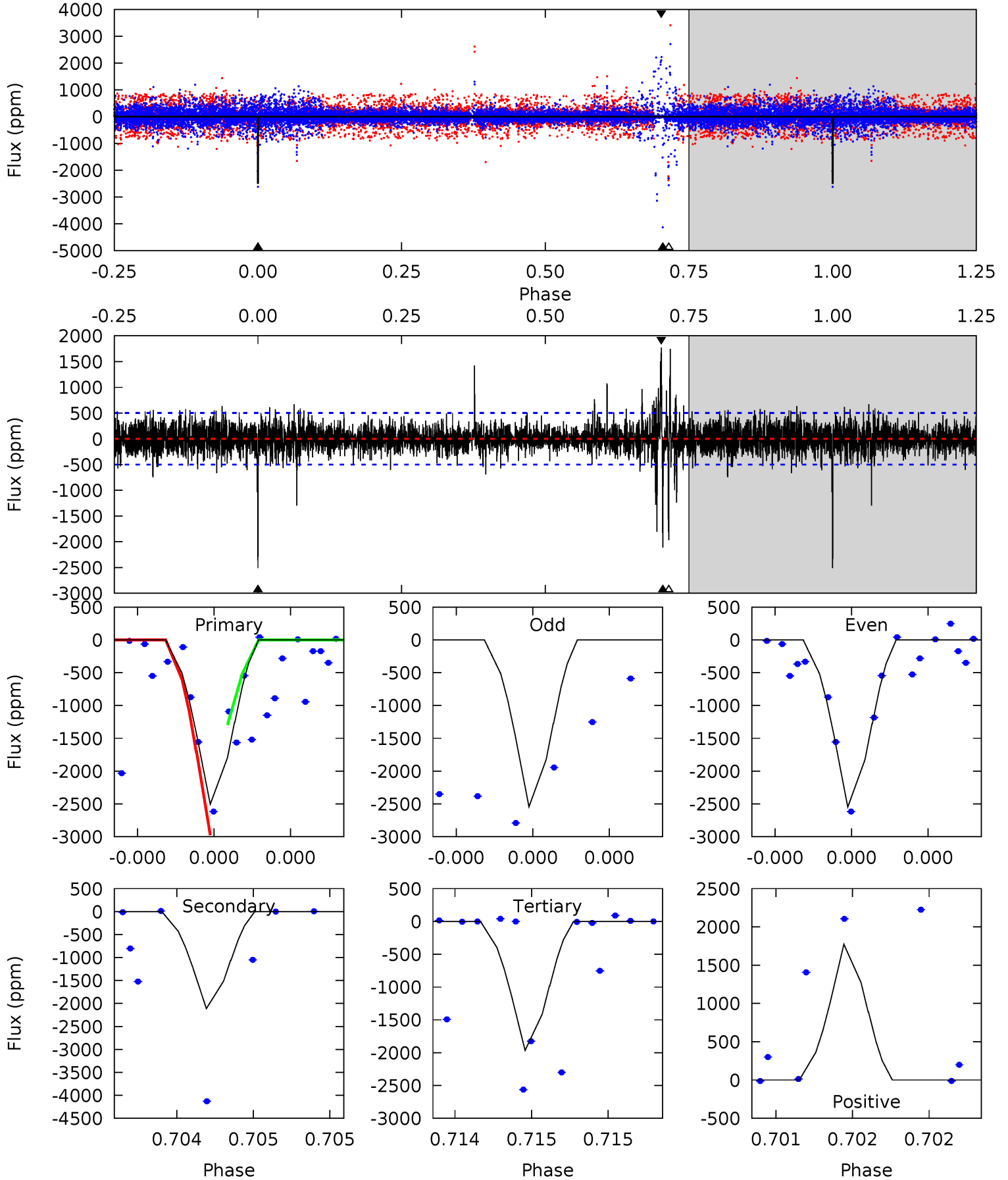
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.82	8.77	7.03	8.93	5.47	3.31	1.90	-1.21	-3.11	1.74	-0.16	1.73	1.02	0.50	1.39



# Alt Model-Shift Uniqueness Test

010003658-02, P = 97.474390 Days, E = 55.863788 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
28.0	23.6	22.0	19.8	5.60	3.53	2.07	6.04	8.21	1.63	3.79	0.00	0.95	0.41	8.98





### Stellar Parameters For KIC 010003658

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3274^{+117}_{-78}$	$0.108^{+0.208}_{-0.052}$	$-0.080^{+0.250}_{-0.150}$	$154.296^{+9.192}_{-27.576}$	$1.114^{+0.207}_{-0.128}$	$0.000^{+0.000}_{-0.000}$
	+4%/-2%	+193%/-48%	+312%/-188%	+6%/-18%	+19%/-11%	+93%/-14%
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 010003658-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-1343 \pm 153$	$310.74^{+277.86}_{-212.85}$	$3783^{+162}_{-203}$	$3888^{+2806}_{-1207}$	$1.431^{+13.097}_{-1.024}$
Alt.	$-2111 \pm 89$	$442.90^{+351.74}_{-271.28}$	$3750^{+181}_{-193}$	$3700^{+1772}_{-1152}$	$1.131^{+6.161}_{-0.767}$

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

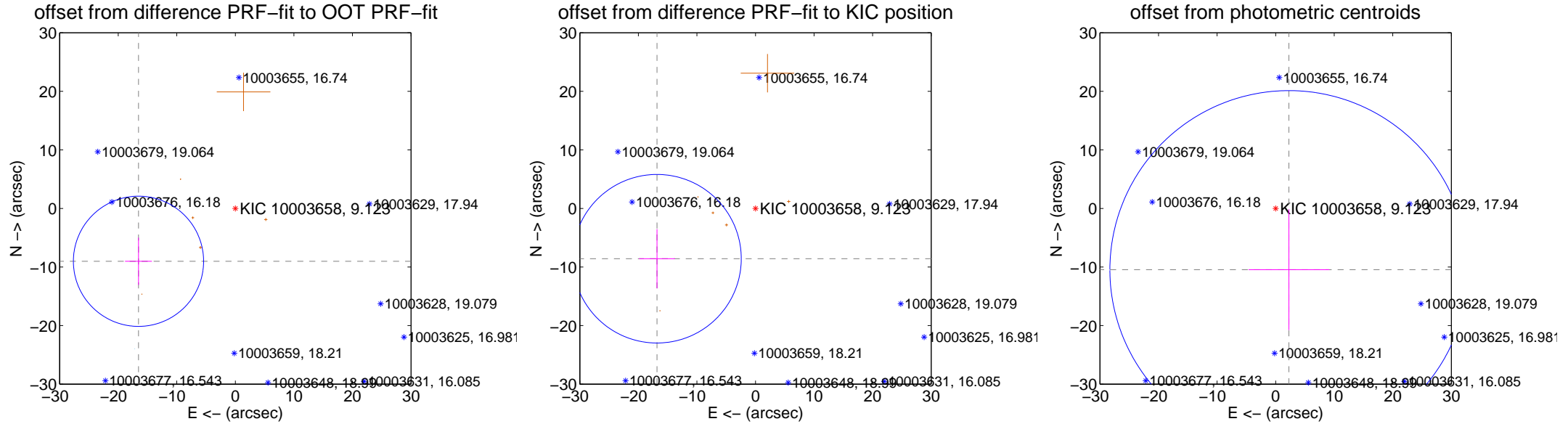
## DV Centroid Data

Supplemental centroid analysis for 010003658-02. **Kepler magnitude: 9.12.** Transit SNR 2.52

There are 1 quarters with good PRF difference image offsets

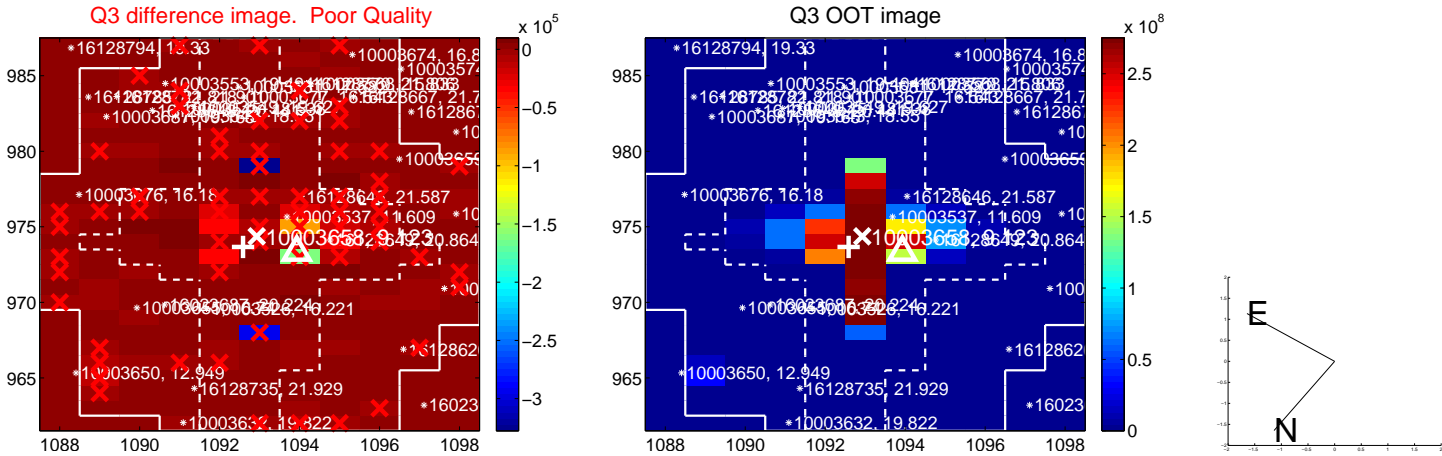
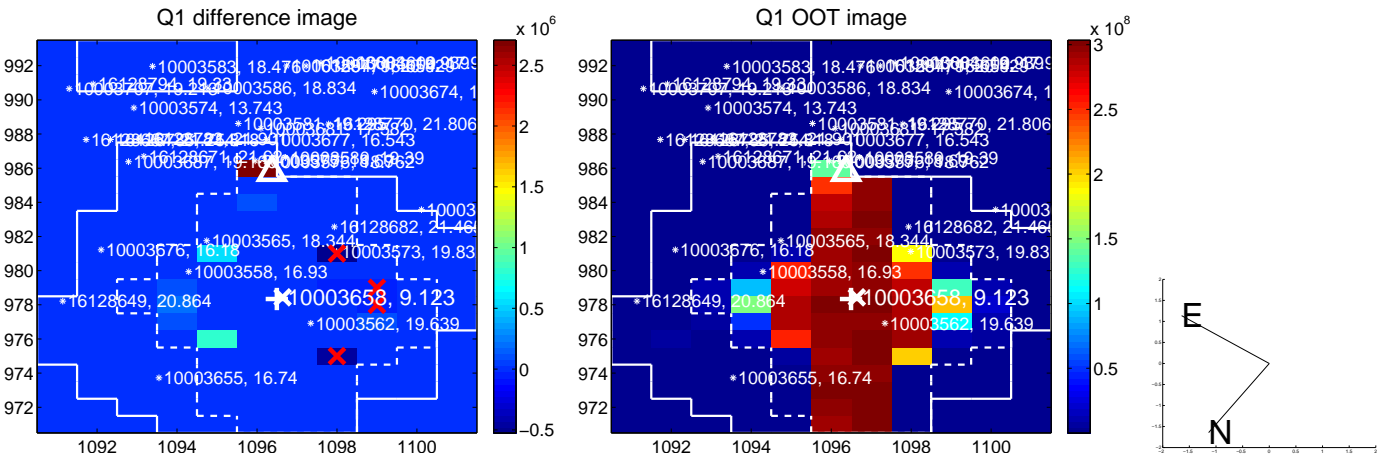
The OOT PRF centroid is offset from the target star catalog position by about 2.85 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>18.838 \pm 3.706</math></b>	<b>5.08</b>	$16.538 \pm 2.293$	$-9.022 \pm 4.033$
PRF-fit source offset from KIC position	<b><math>18.886 \pm 4.797</math></b>	<b>3.94</b>	$16.822 \pm 3.061$	$-8.585 \pm 5.057$
photometric centroid source offset	$10.70 \pm 10.19$	1.05	$-2.27 \pm 6.90$	$-10.45 \pm 10.32$



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.

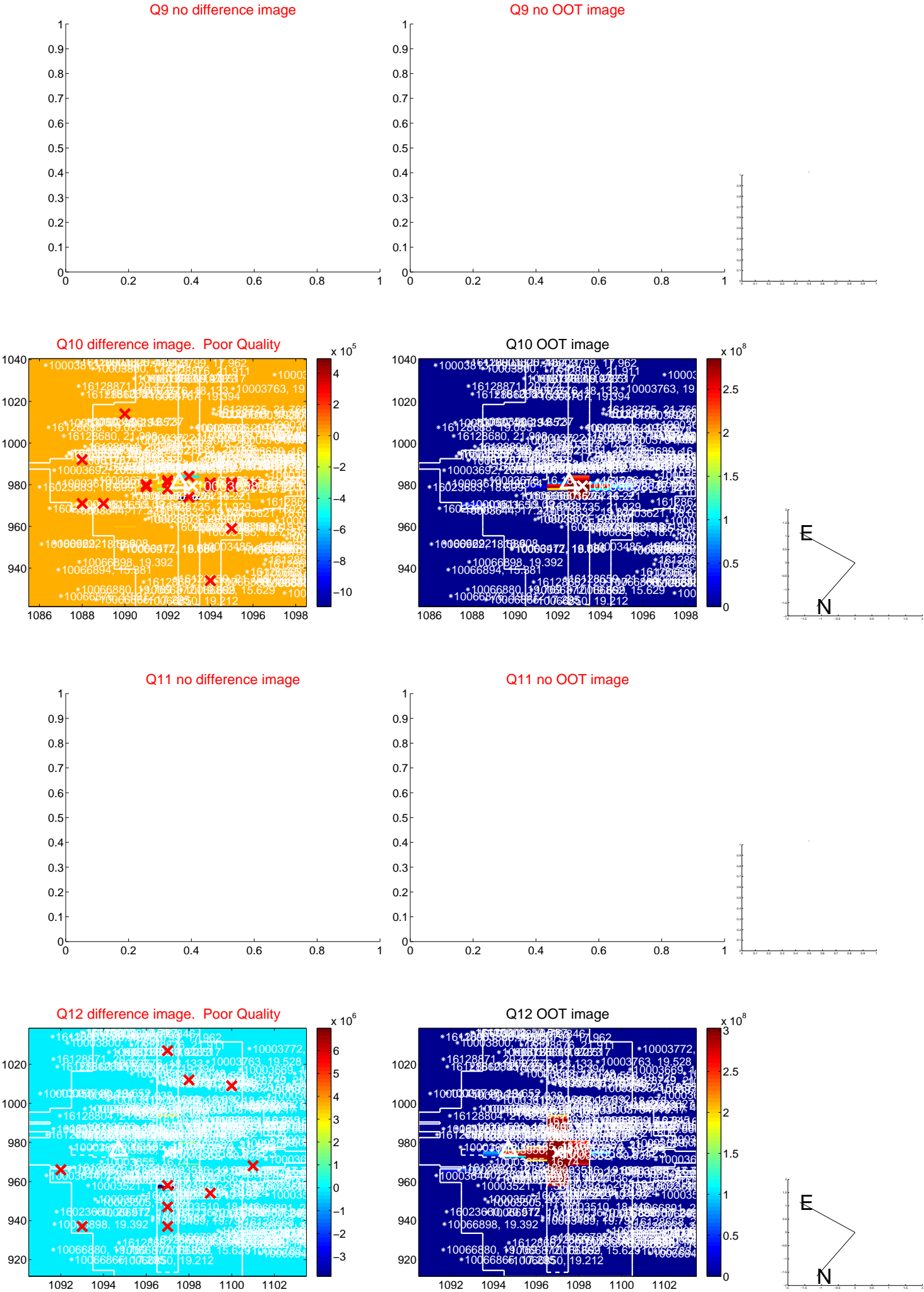
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



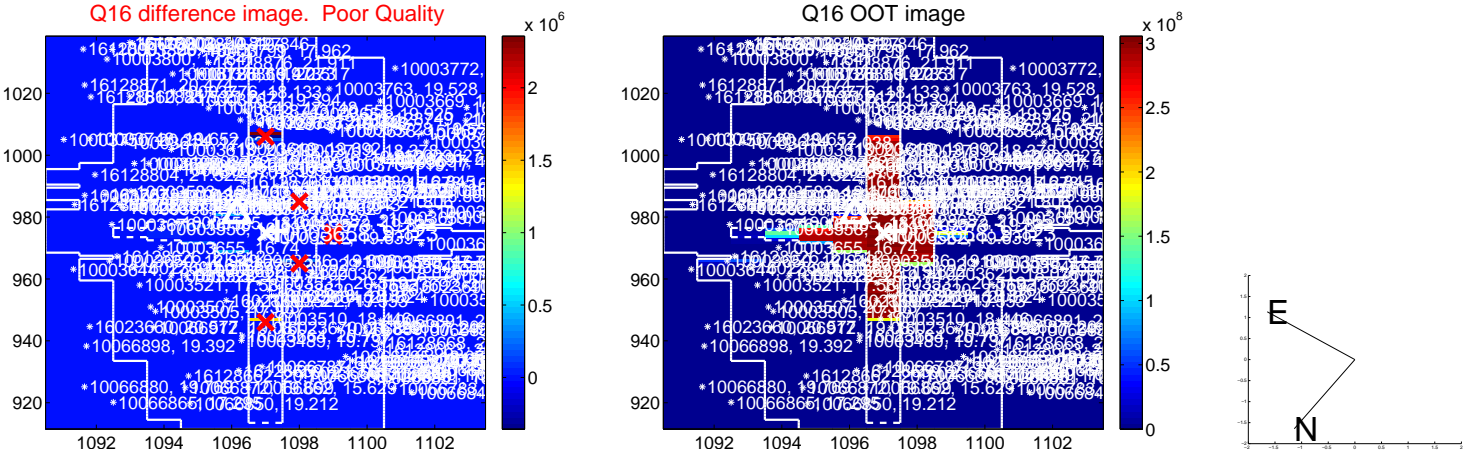
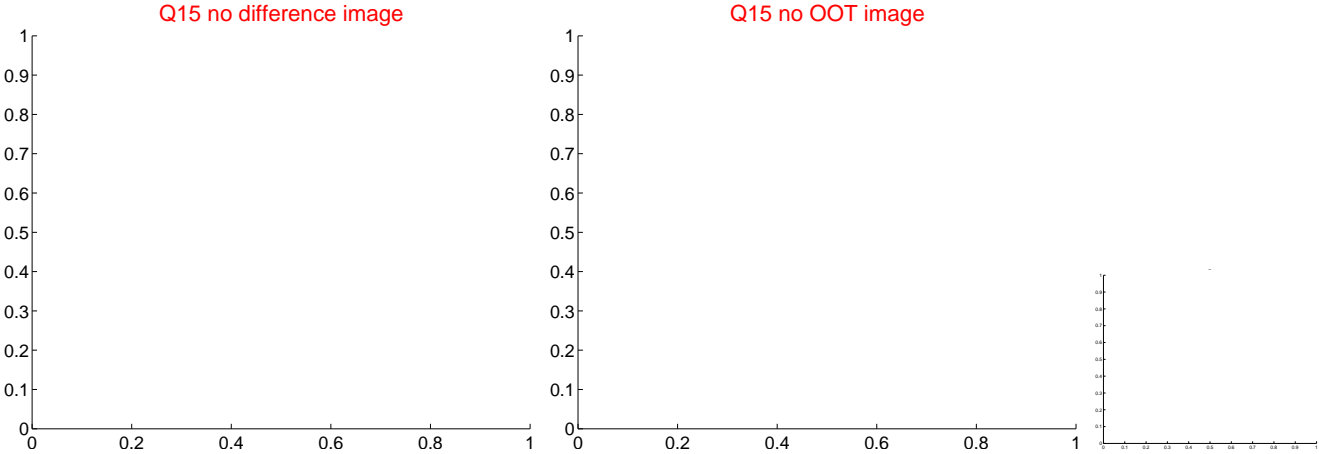
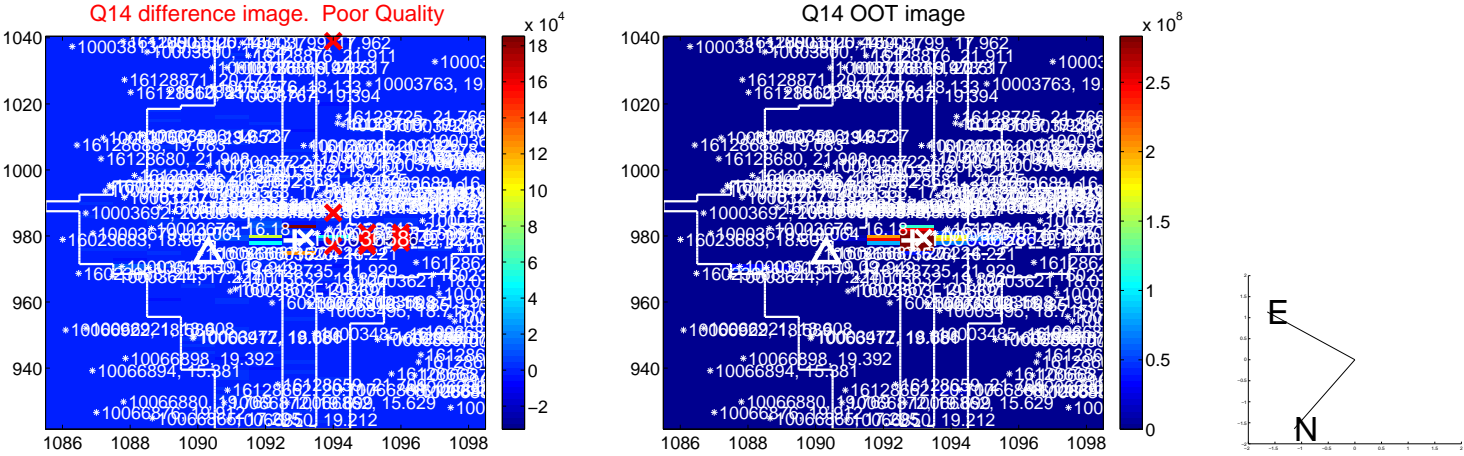
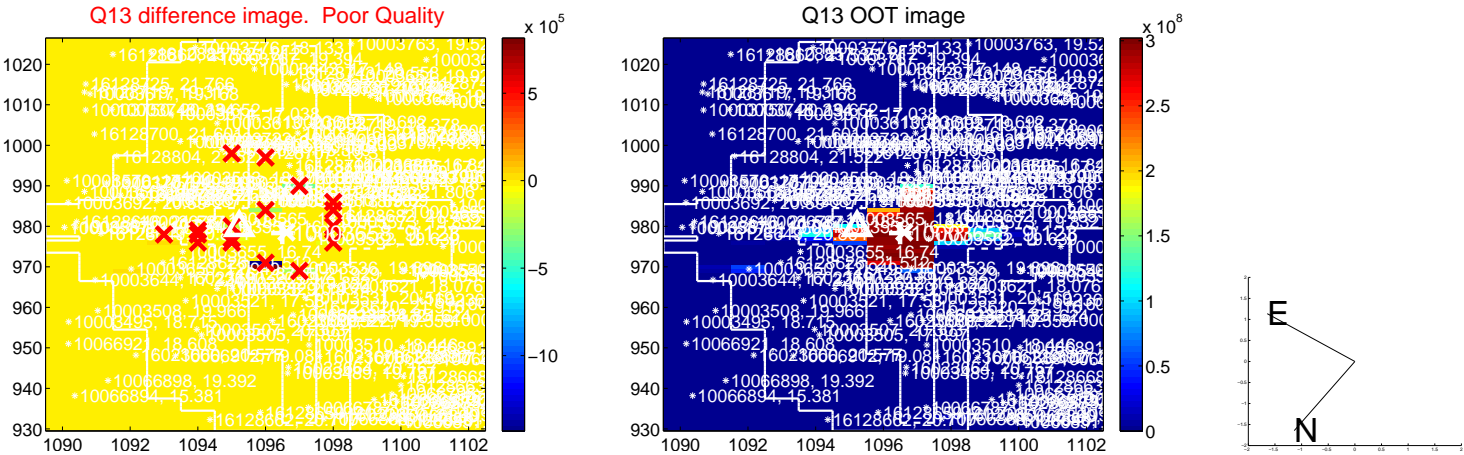
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

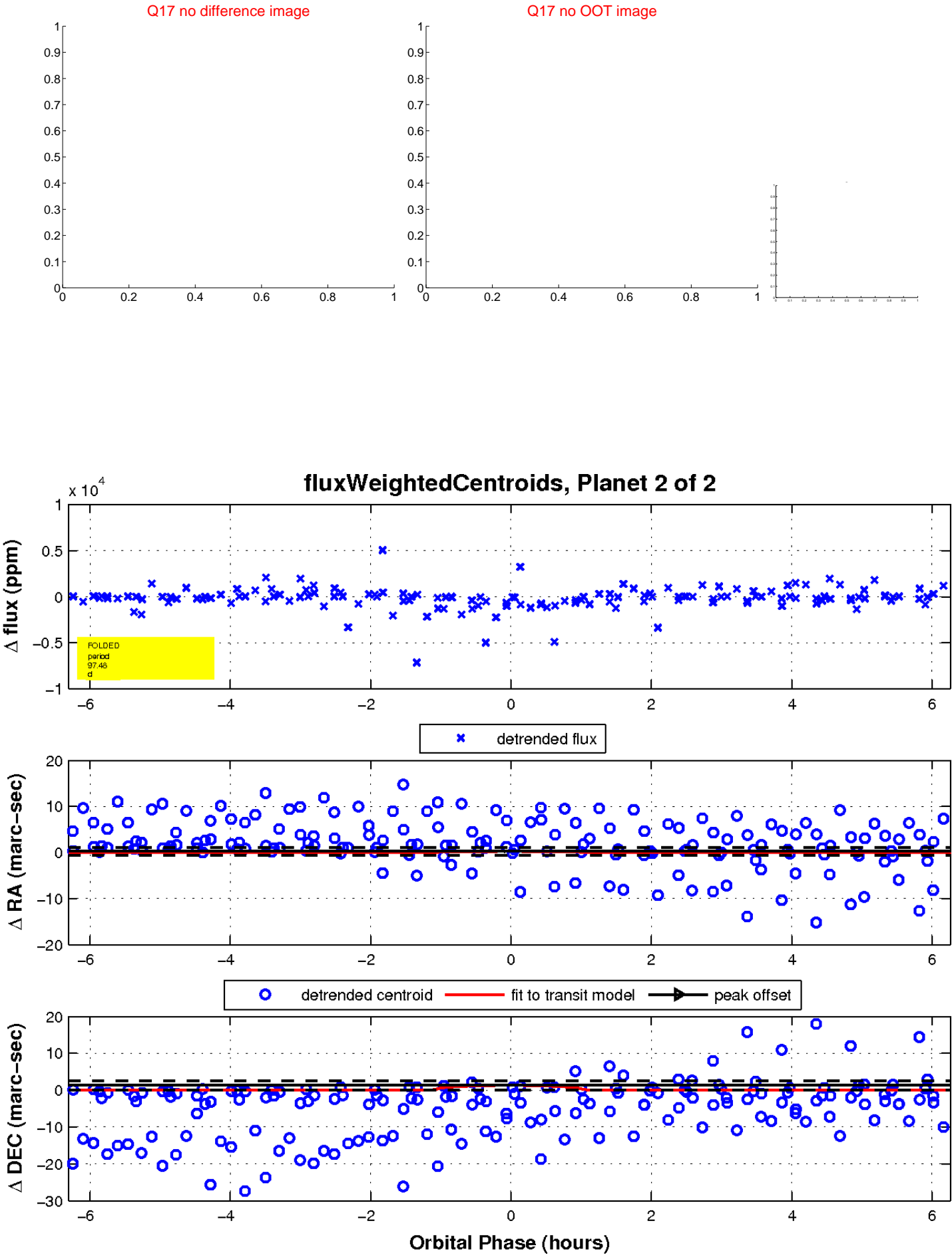


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



UKIRT Image

