

# KIC 002708278

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002708278-01	OBS	4102.01	1.891235	132.711285	106.1	4.720	16.4	18.4	0.93	5285	1.16	701.67
002708278-02	OBS	No	516.395590	307.022000	536.8	7.559	9.4	6.4	0.93	5285	2.29	0.40
002708278-03	OBS	No	289.788098	210.439676	561.0	8.078	7.6	6.9	0.93	5285	2.51	0.86

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002708278-01	OBS	FP	0.00	0	0	1	1	CENT_UNRESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
002708278-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_FEW_DIFFS
002708278-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—ALL_TRANS_CHASES—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 002708278-01

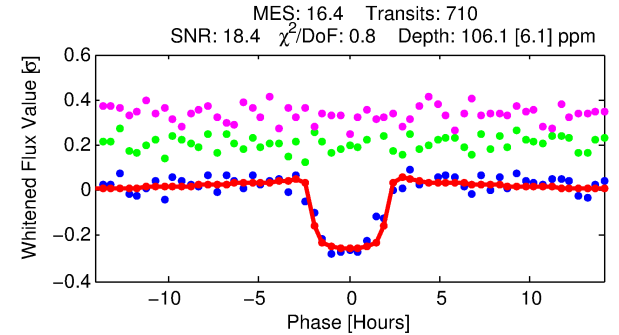
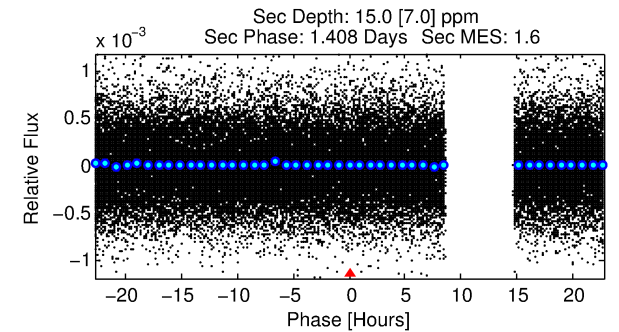
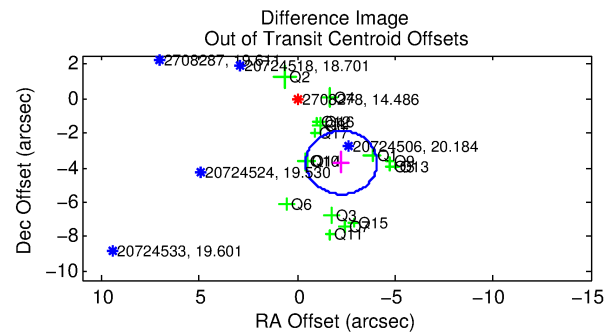
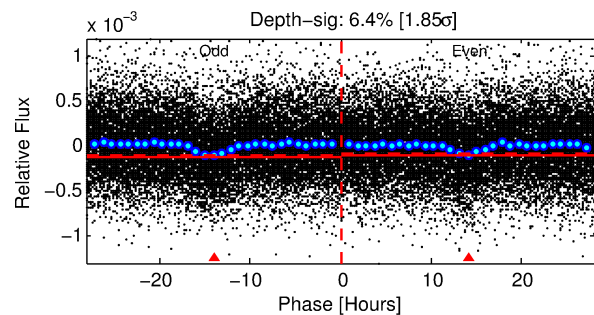
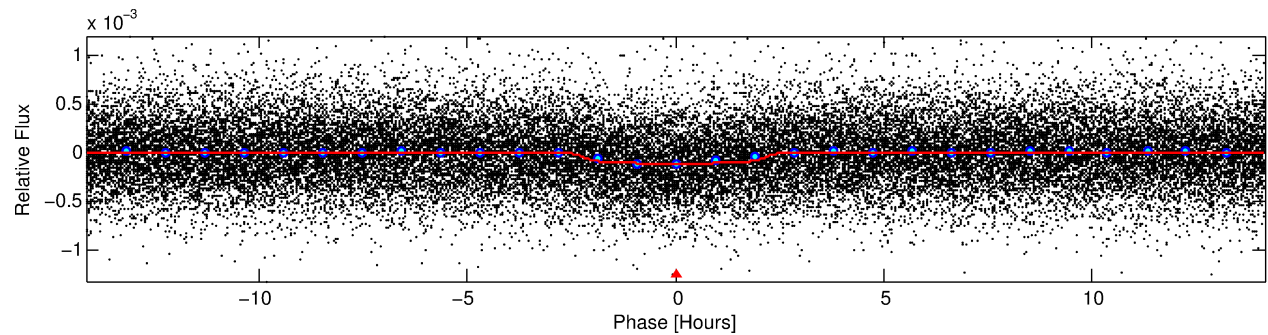
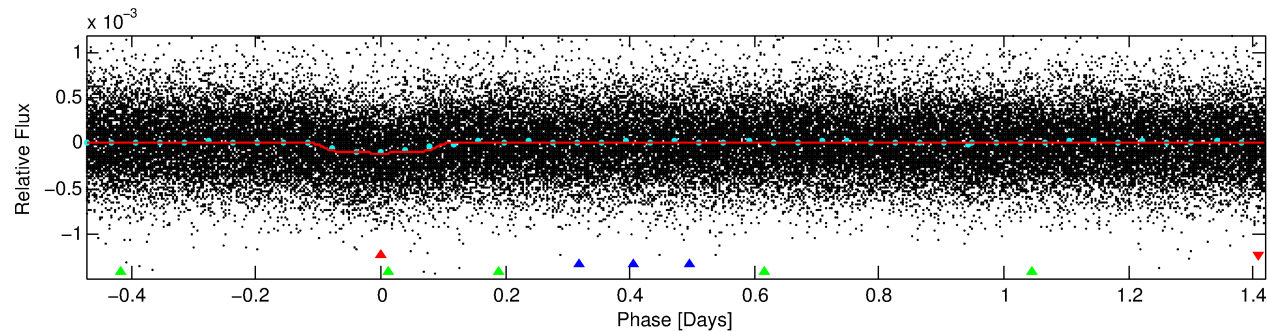
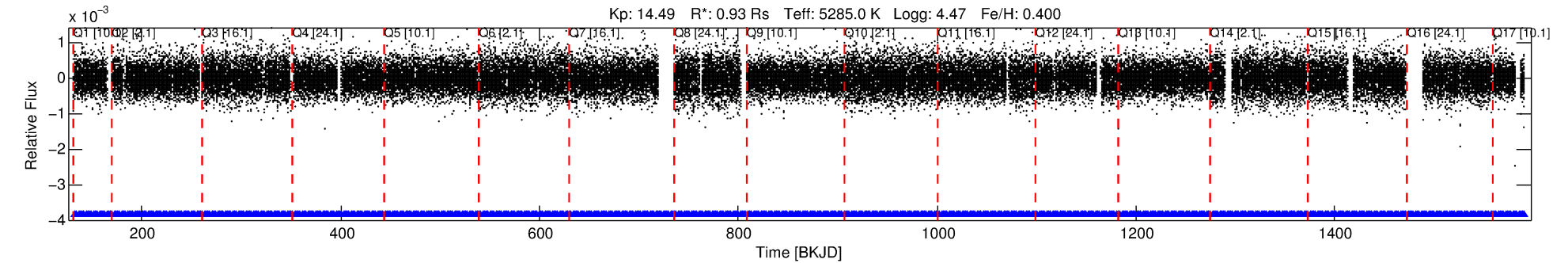
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
002708278-01	2708278	6286.01	2708156	1:1	169.6	-20	38	10.67	14.48	6046.30	Direct-PRF	0	1.27	1.62

**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  and  $\sigma_T$  are the significance of the match in period and epoch. For a match to be considered significant  $\sigma_P < 5.0$  and  $\sigma_T < 5.0$ . Matches which have  $\sigma_P$  and  $\sigma_T$  very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

# DV One-Page Summary

KIC: 2708278 Candidate: 1 of 3 Period: 1.891 d

KOI: K04102.01 Corr: 0.931



## DV Fit Results:

Period = 1.89124 [0.00001] d  
Epoch = 132.7113 [0.0027] BKJD  
Rp/R\* = 0.0114 [0.0029]  
a/R\* = 1.71 [1.18]  
b = 0.90 [0.23]  
Seff = 701.67 [110.17]  
Teff = 1312 [52] K  
Rp = 1.15 [0.32] Re  
a = 0.0293 [0.0027] AU  
Ag = 5.29 [3.72] [1.15 $\sigma$ ]  
Teffp = 3077 [533] K [3.30 $\sigma$ ]

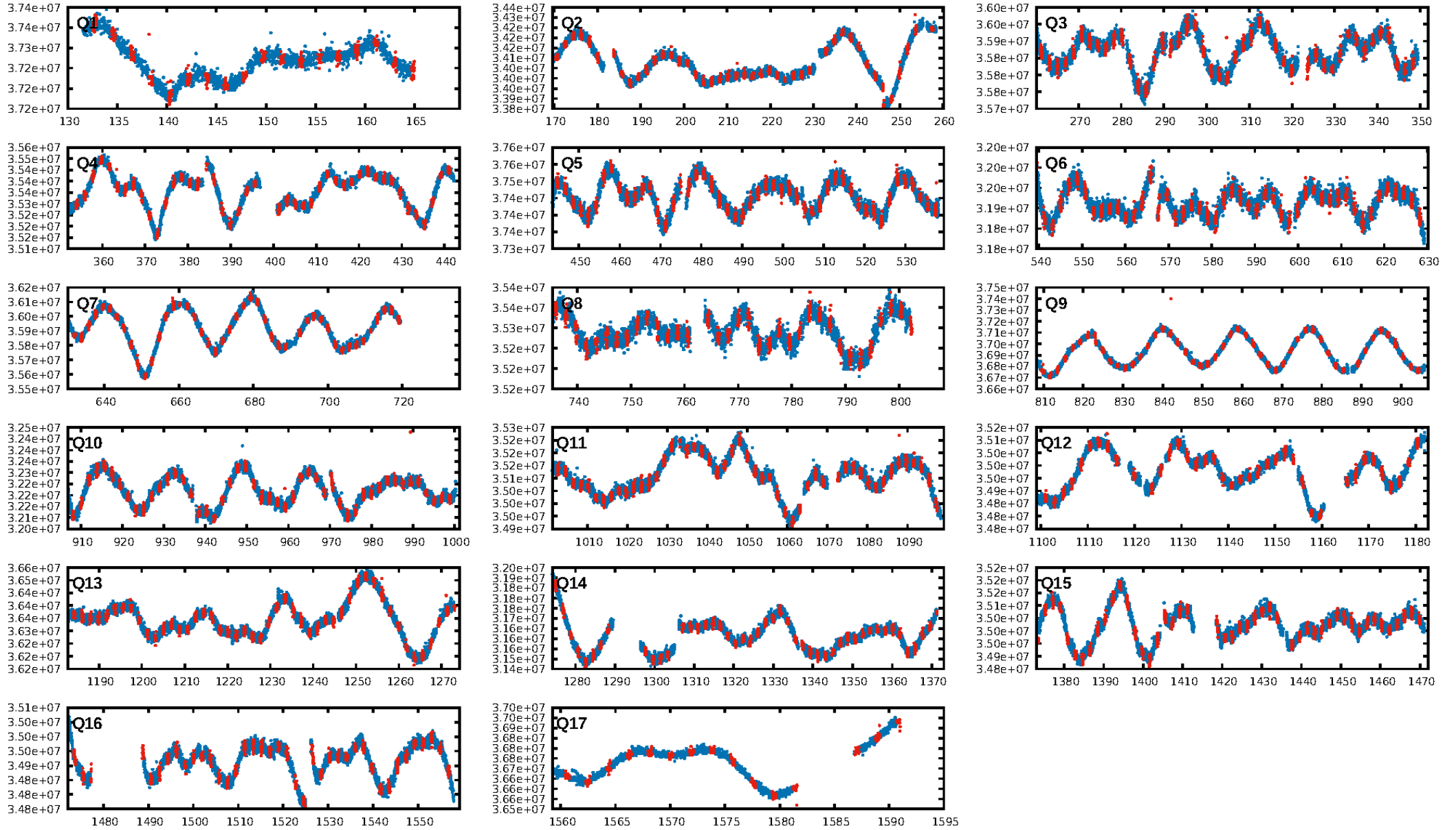
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [738.57 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 4.57e-52  
RollingBand-fgt: 1.00 [677/677]  
GhostDiagnostic-chr: -0.01855  
Centroid-sig: 0.0%  
Centroid-so: 3.122 arcsec [5.28 $\sigma$ ]  
OotOffset-rm: 4.340 arcsec [7.14 $\sigma$ ]  
KicOffset-rm: 4.390 arcsec [6.50 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.00 [0/17]  
DiffImageOverlap-fno: 1.00 [17/17]

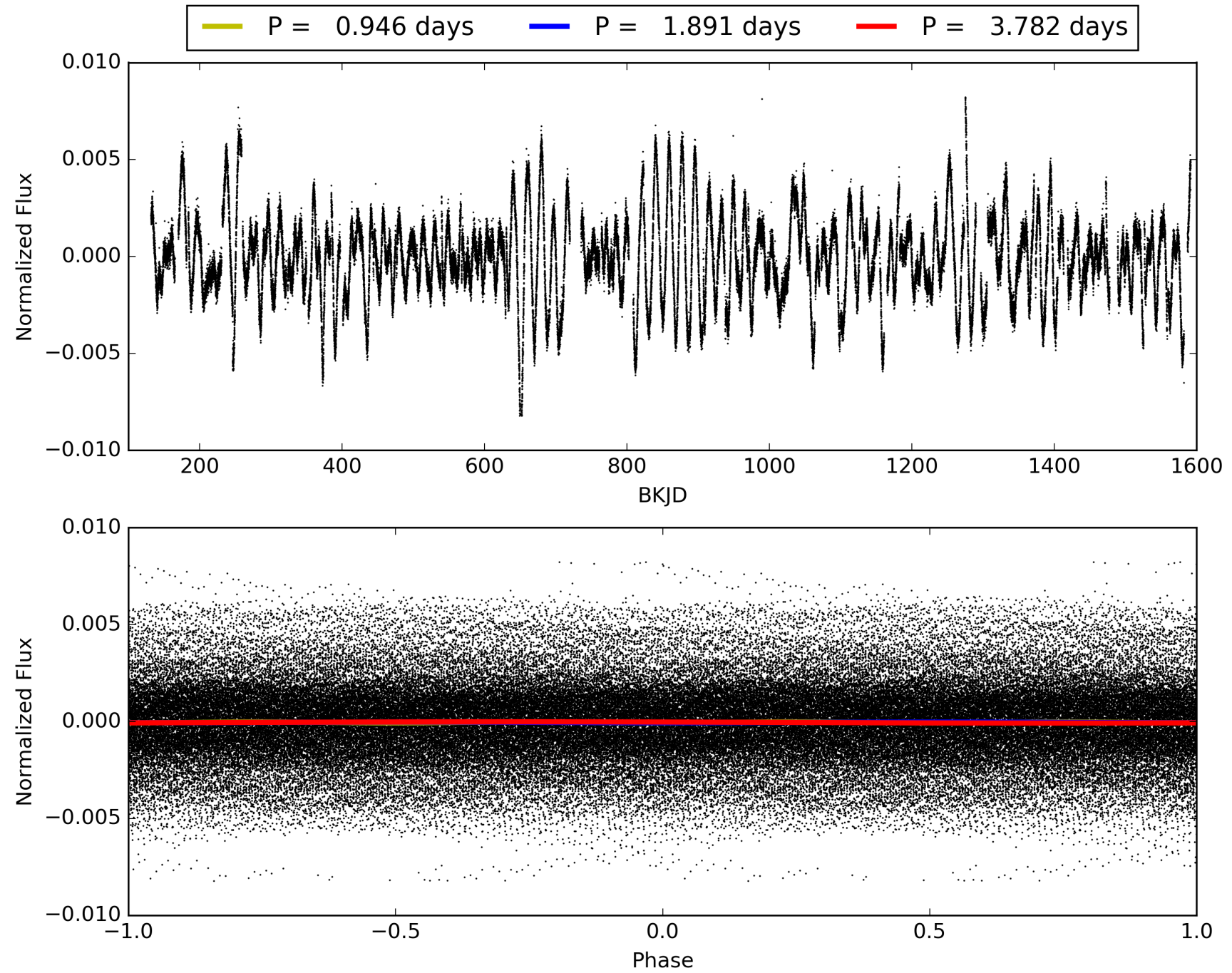
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 04:21:07 Z

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

# TCE 002708278-01, PDC Light Curves

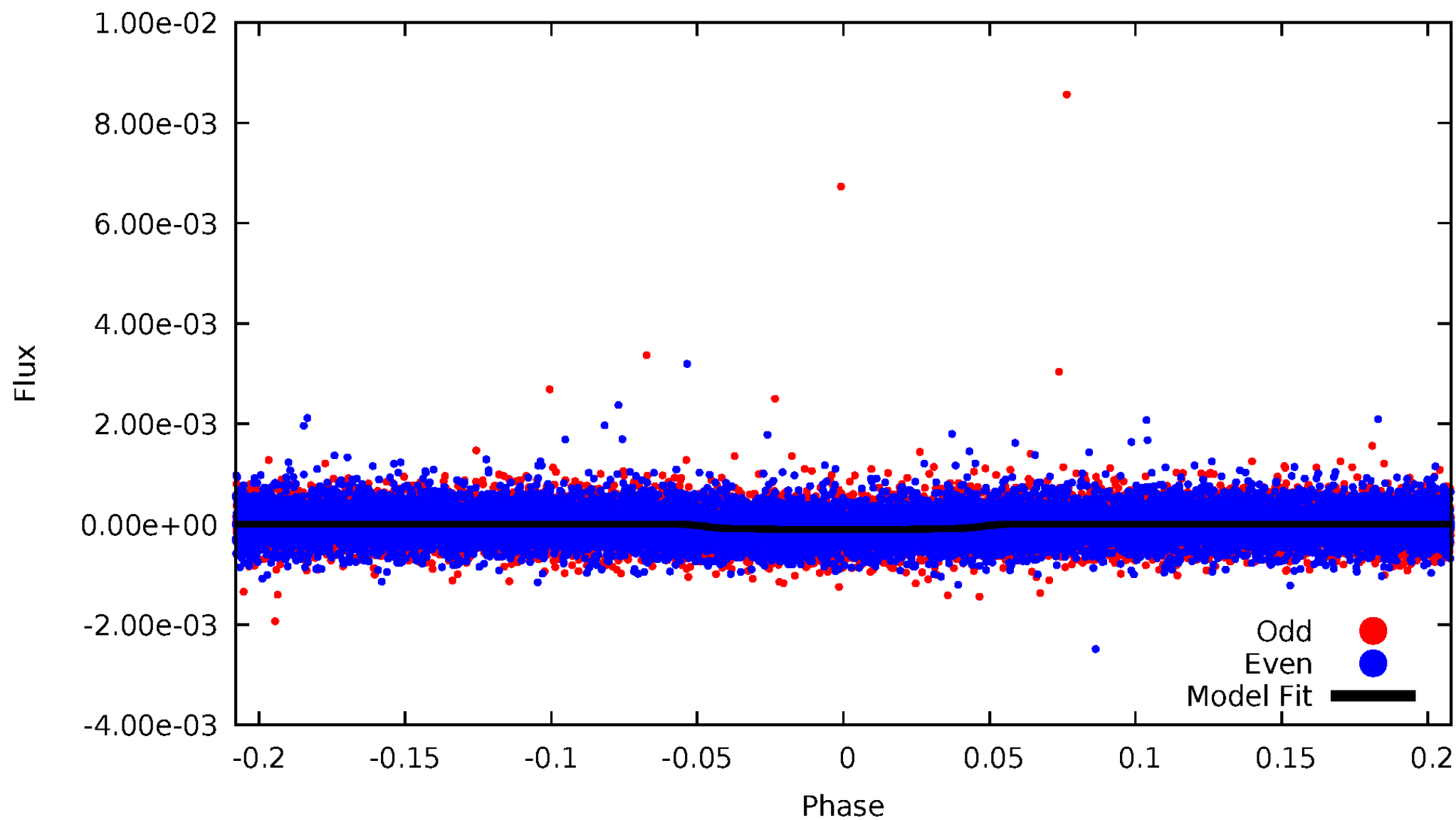


TCE 002708278-01



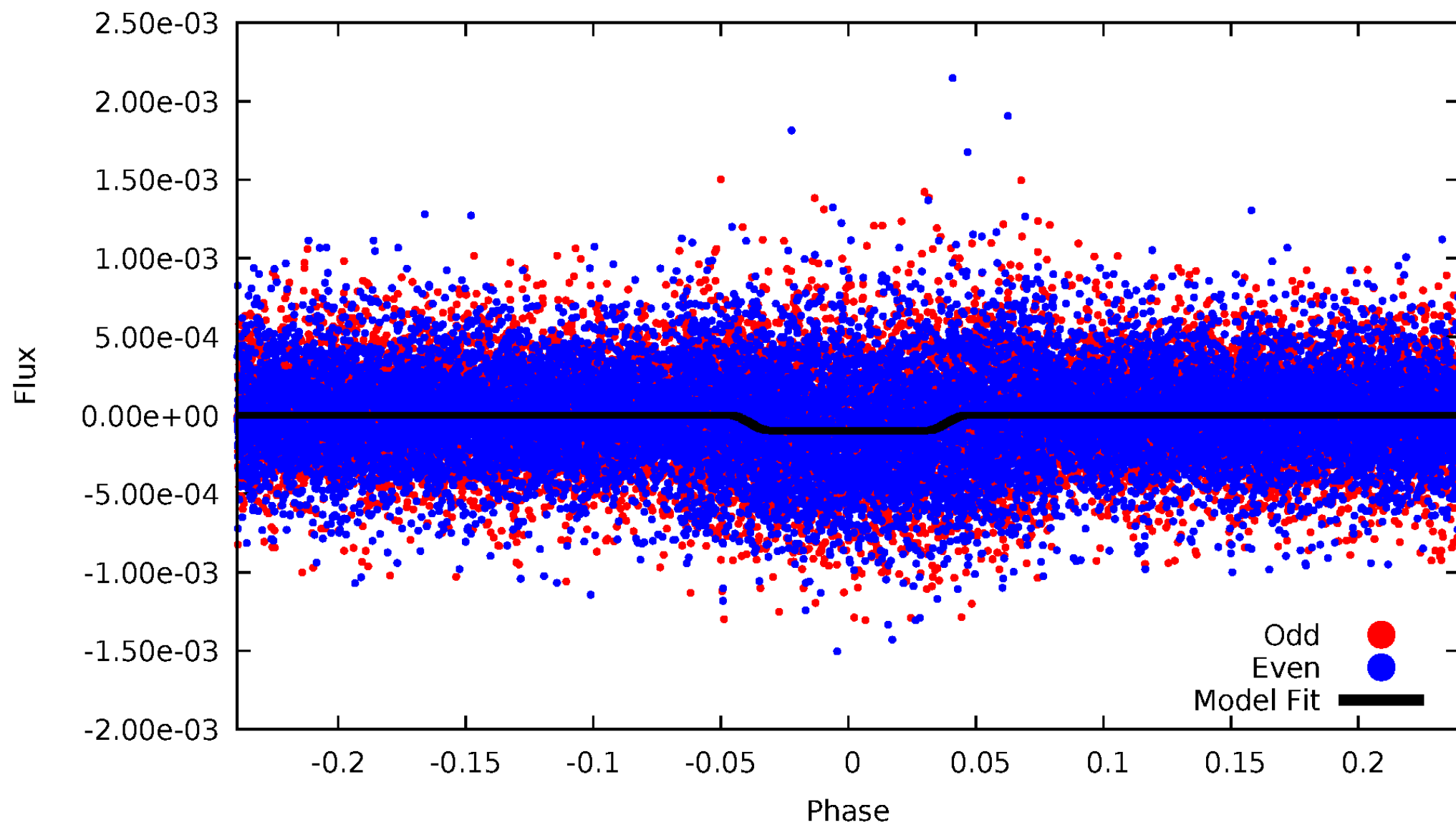
# DV Odd/Even

TCE 002708278-01



# ALT Odd/Even

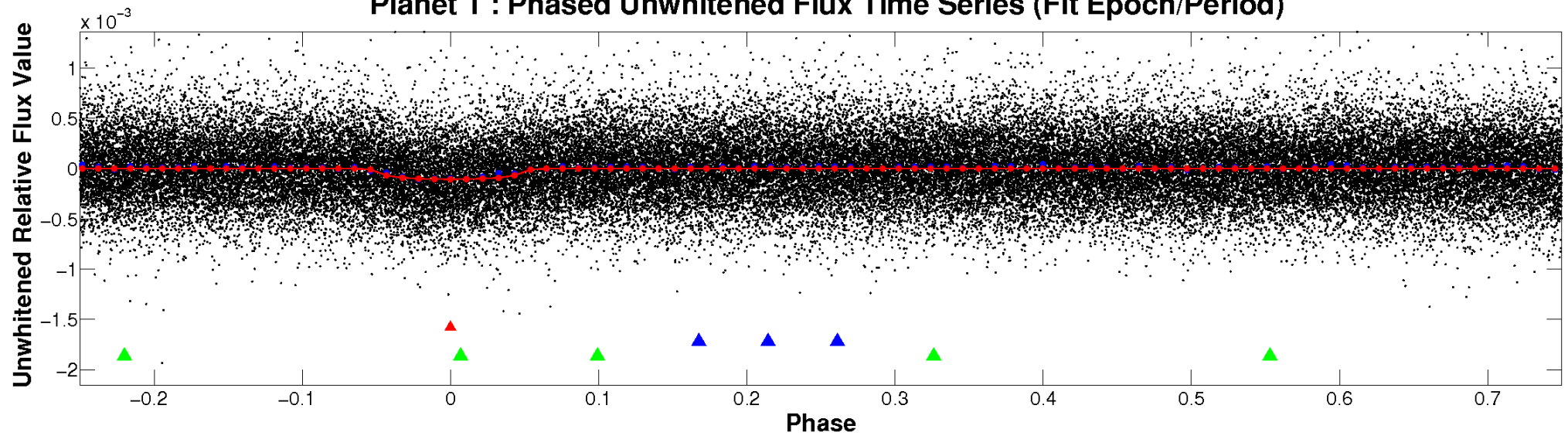
TCE 002708278-01



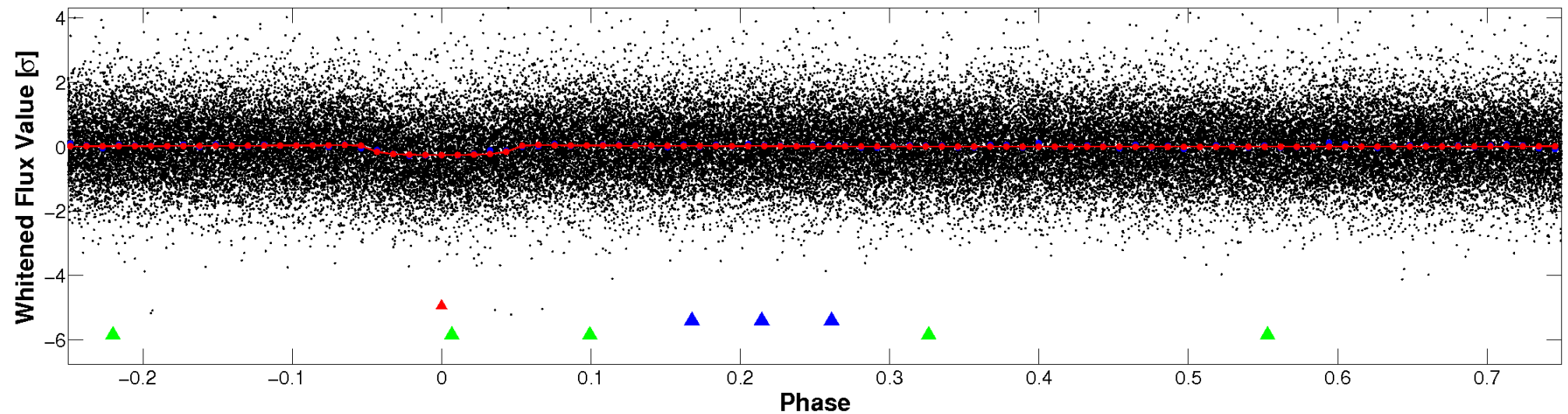


# Non-Whitened Vs. Whitened Light Curve

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

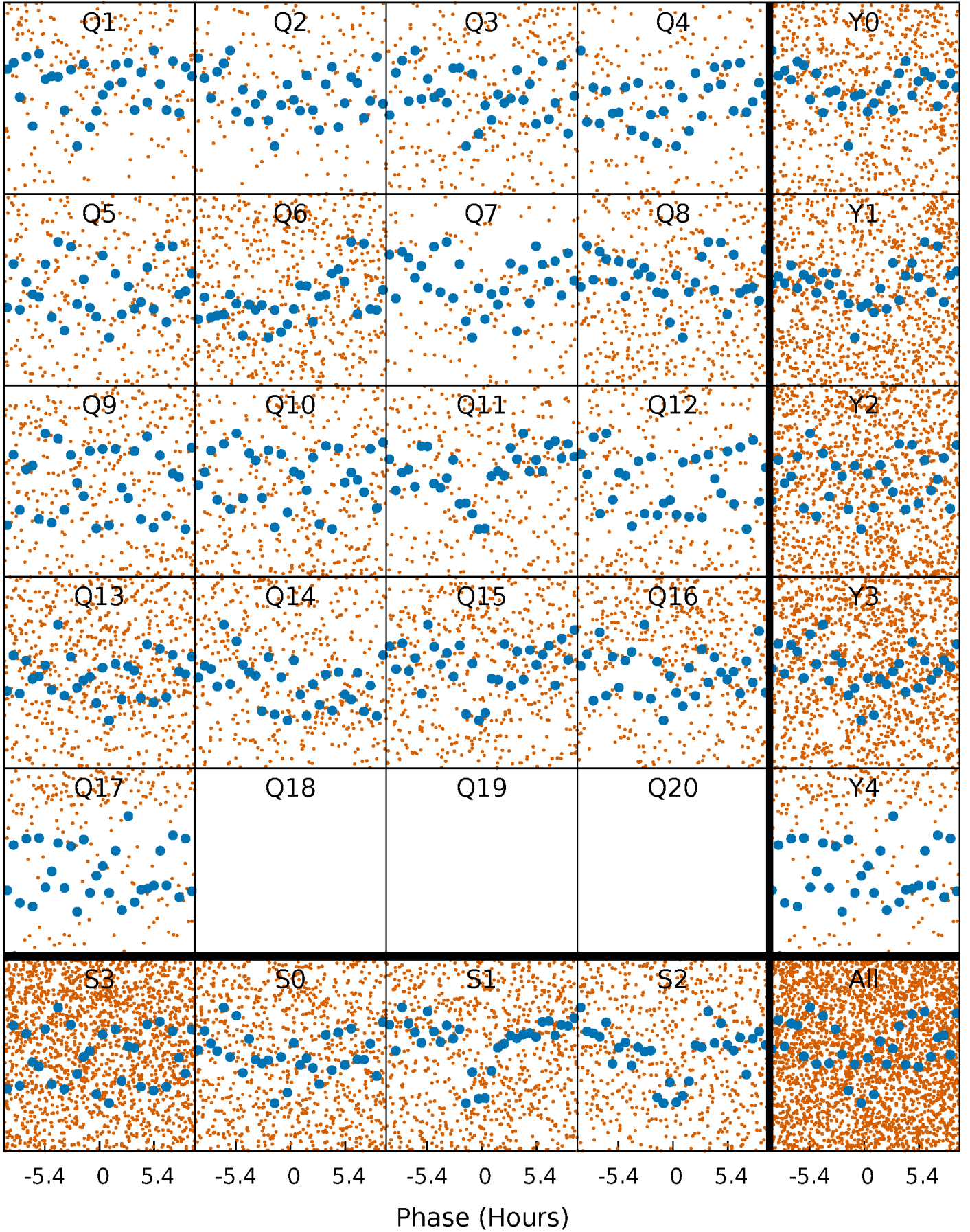


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

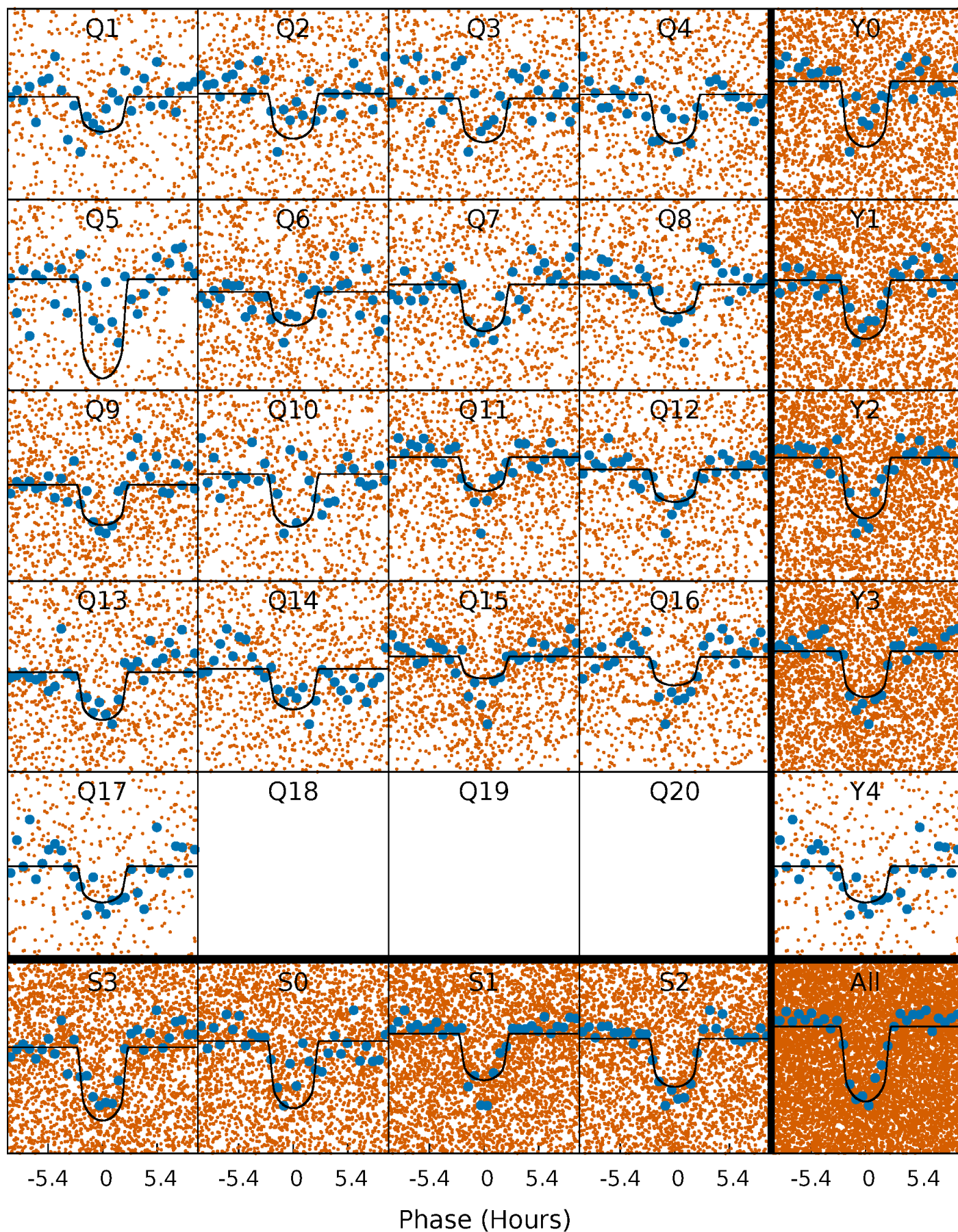
TCE 002708278-01 P= 1.891235 Days  $T_0=132.711285$  (BKJD)





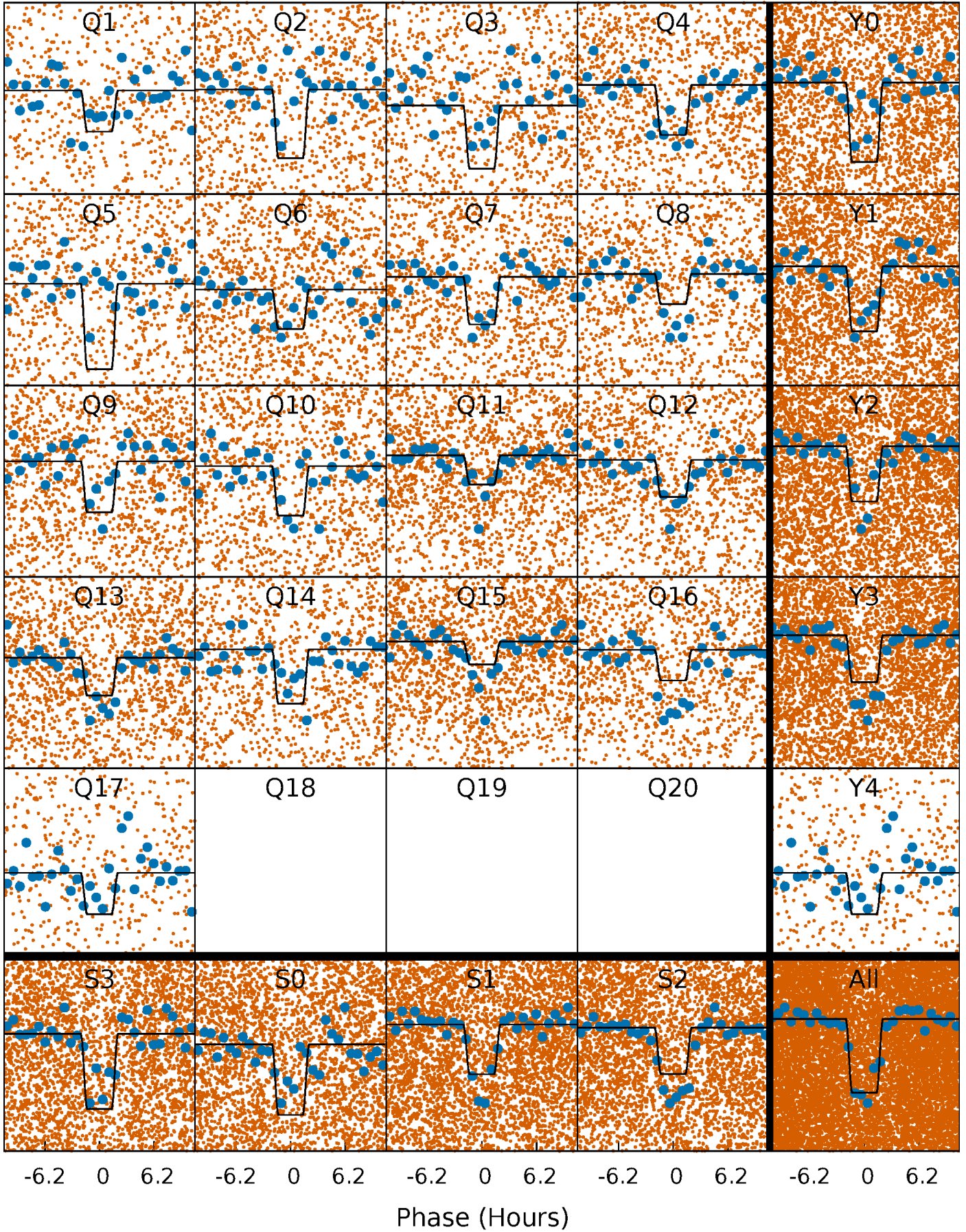
# DV Quarter-Phased Transit Curves

TCE 002708278-01 P= 1.891235 Days  $T_0=132.711285$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 002708278-01 P= 1.891235 Days  $T_0=132.704491$  (BKJD)

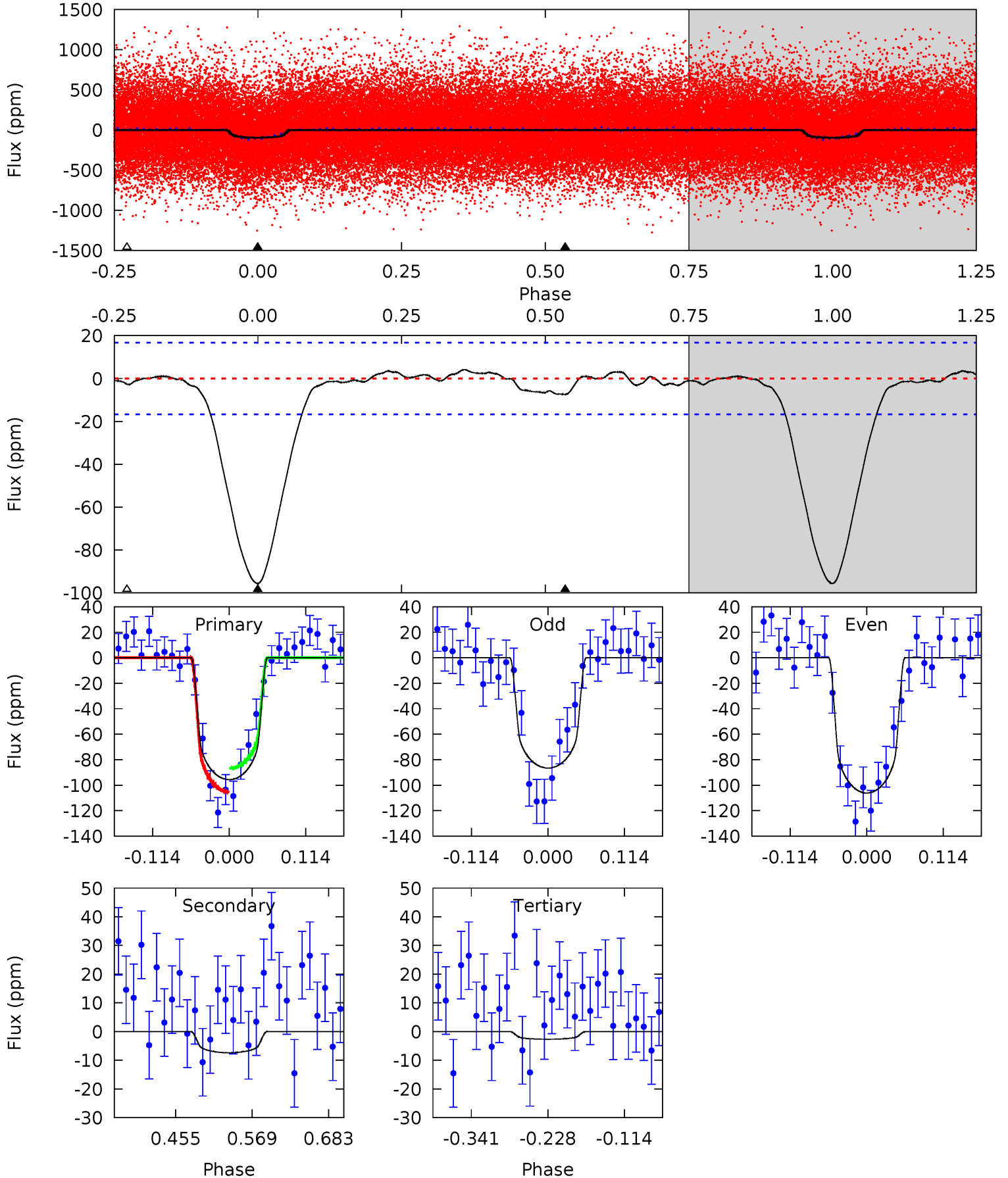




# DV Model-Shift Uniqueness Test

002708278-01, P = 1.891235 Days, E = 130.820050 Days

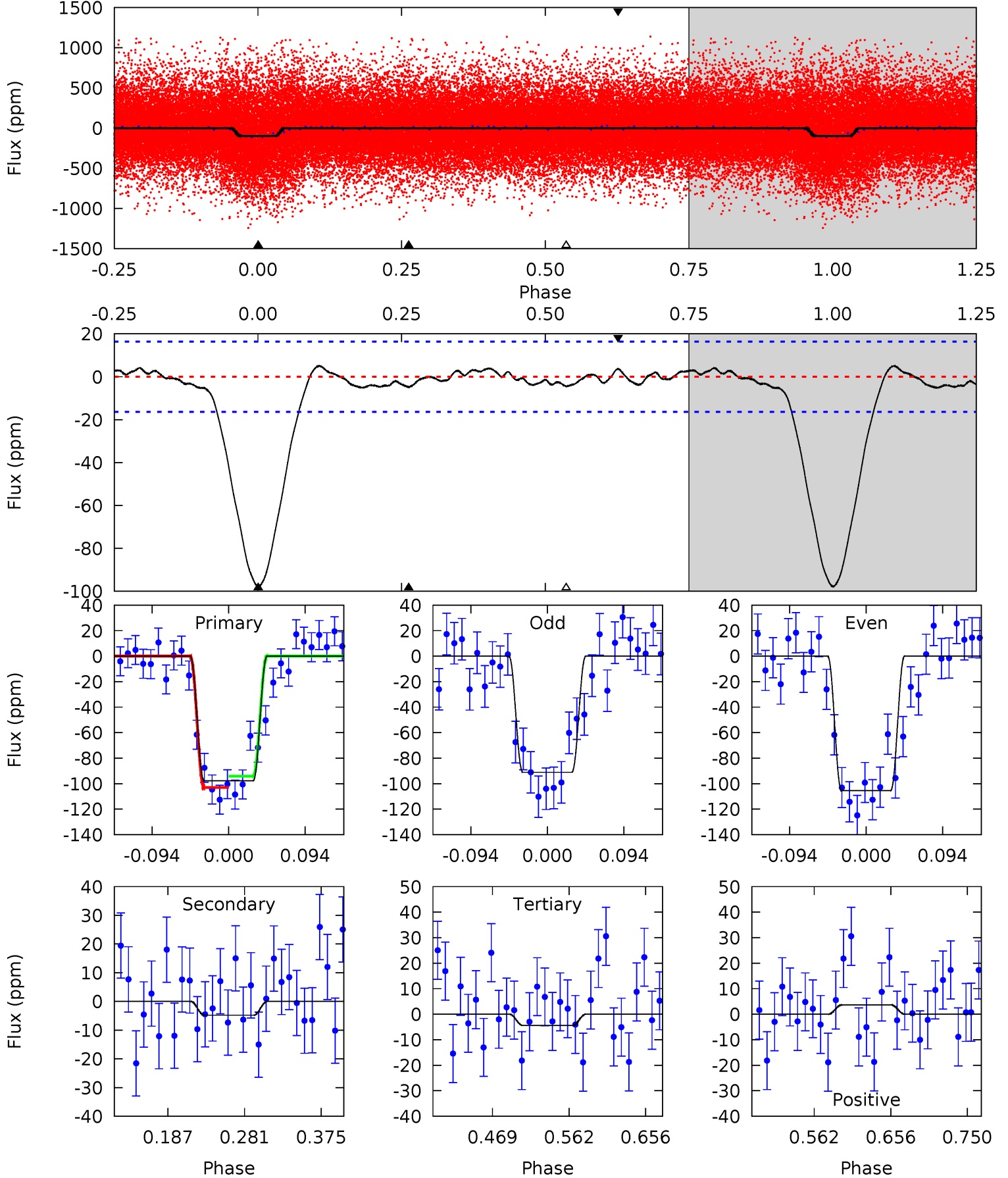
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
25.9	2.00	0.73	0	4.54	1.58	0.52	25.2	25.9	1.27	2.00	2.66	1.07	0.04	2.52



# Alt Model-Shift Uniqueness Test

002708278-01, P = 1.891235 Days, E = 130.813256 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
27.4	1.34	1.24	1.02	4.58	1.68	0.71	26.1	26.4	0.10	0.32	2.01	1.04	0.05	1.23



### Stellar Parameters For KIC 002708278

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5285^{+84}_{-73}$	$4.474^{+0.060}_{-0.082}$	$0.400^{+0.050}_{-0.150}$	$0.927^{+0.096}_{-0.056}$	$0.933^{+0.031}_{-0.039}$	$1.649^{+0.355}_{-0.419}$
	+2%/-1%	+1%/-2%	+12%/-37%	+10%/-6%	+3%/-4%	+22%/-25%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 002708278-01 / KOI 4102.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-7 \pm 4$	$1.17^{+0.30}_{-0.32}$	$1836^{+53}_{-45}$	$3095^{+404}_{-413}$	$2.542^{+2.717}_{-1.458}$
Alt.	$-5 \pm 4$	$1.00^{+0.30}_{-0.30}$	$1835^{+56}_{-47}$	$3013^{+519}_{-879}$	$2.174^{+3.349}_{-1.757}$

$T_{\text{max}}$  = 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

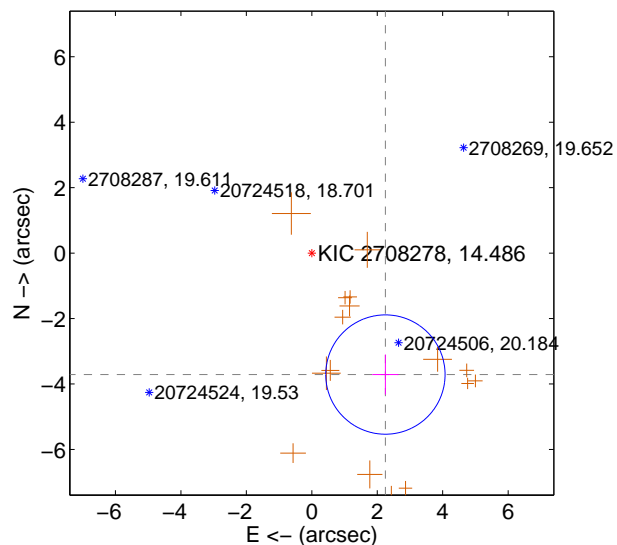
Supplemental centroid analysis for 002708278-01. Kepler magnitude: 14.49. Transit SNR 18.37

There are 0 quarters with good PRF difference image offsets

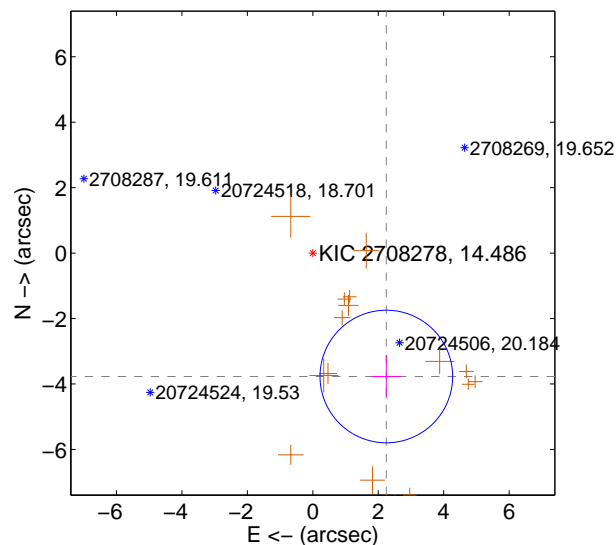
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.340 \pm 0.608$	7.14	$-2.249 \pm 0.398$	$-3.712 \pm 0.612$
PRF-fit source offset from KIC position	$4.390 \pm 0.675$	6.50	$-2.247 \pm 0.444$	$-3.771 \pm 0.659$
photometric centroid source offset	$3.12 \pm 0.59$	5.28	$0.68 \pm 0.55$	$-3.05 \pm 0.59$

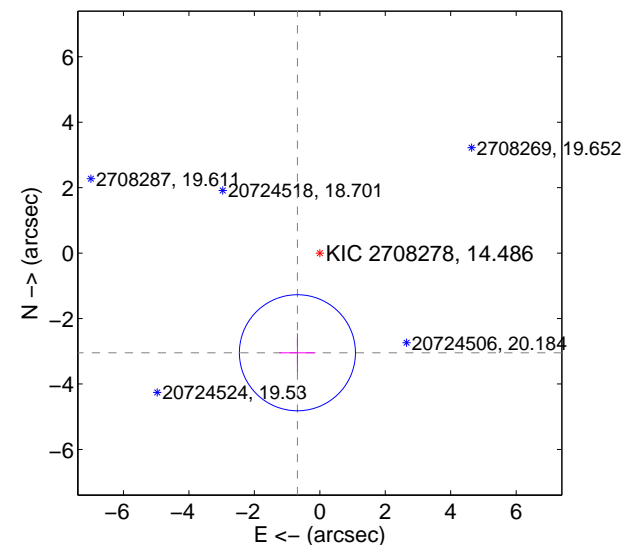
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

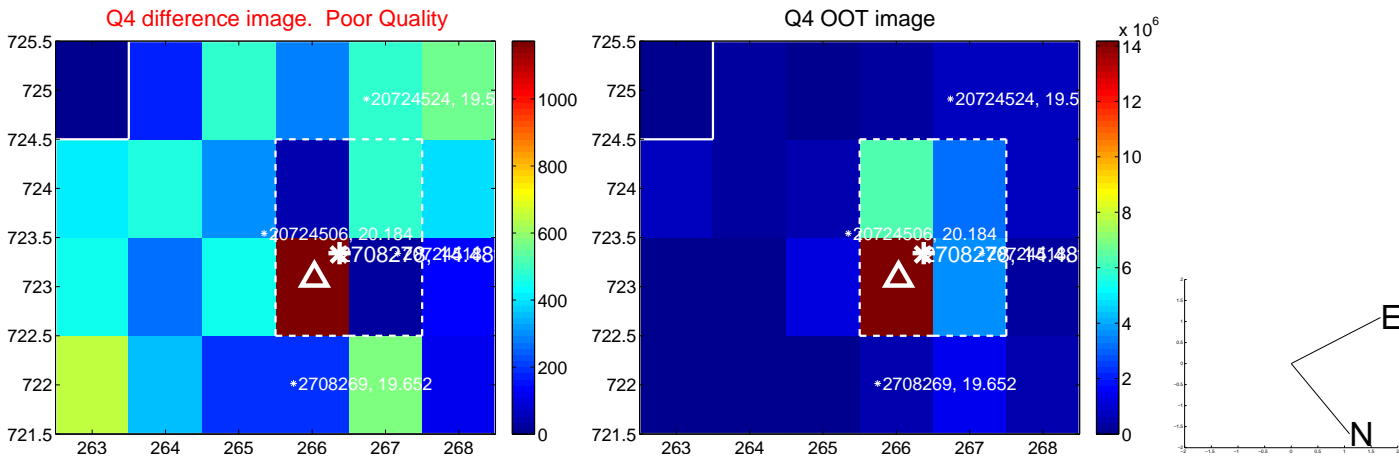
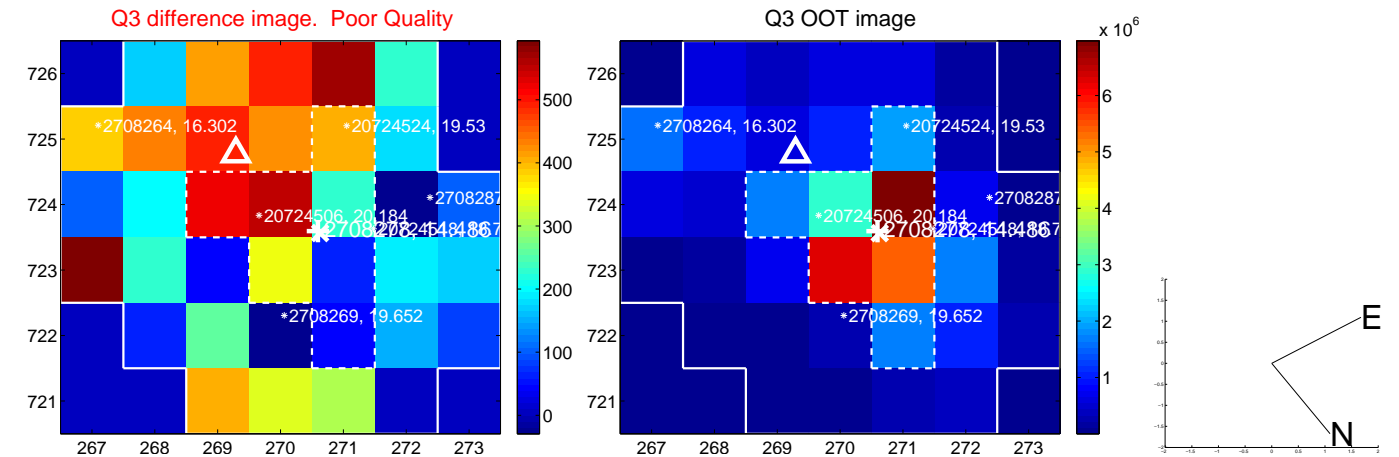
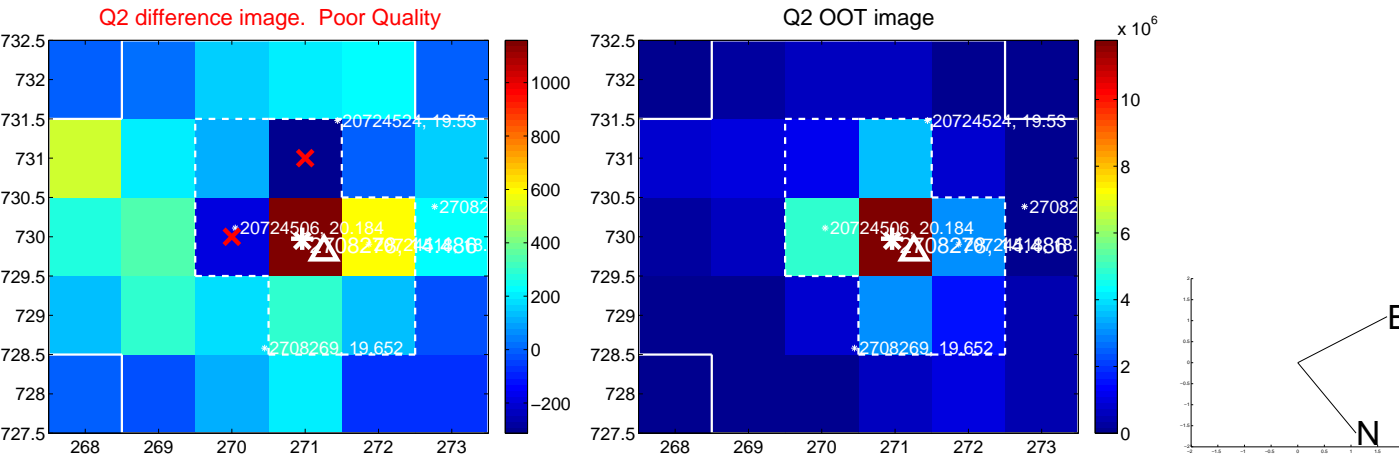
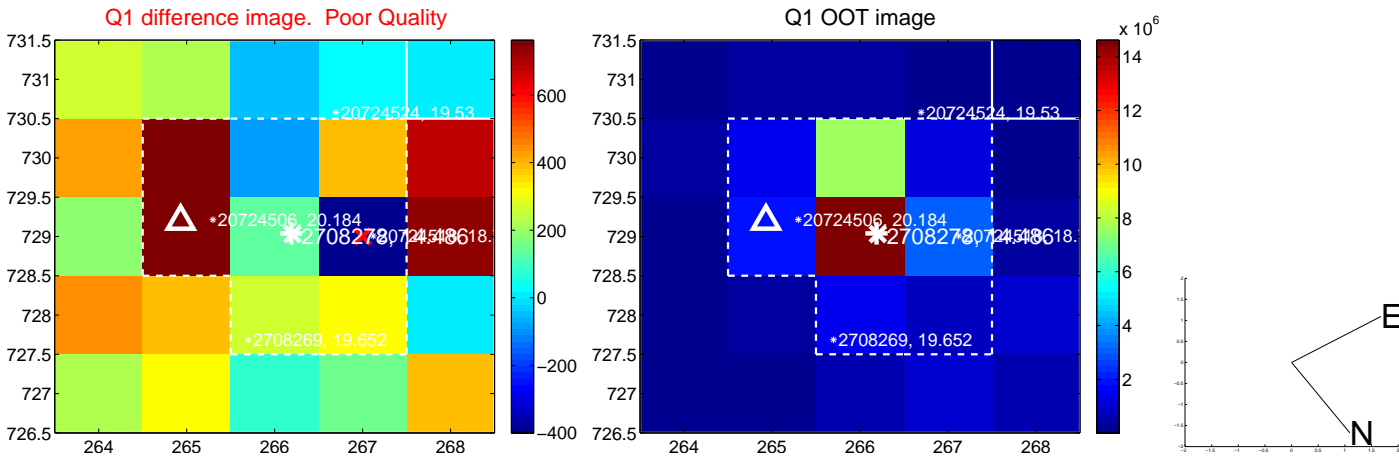


offset from photometric centroids



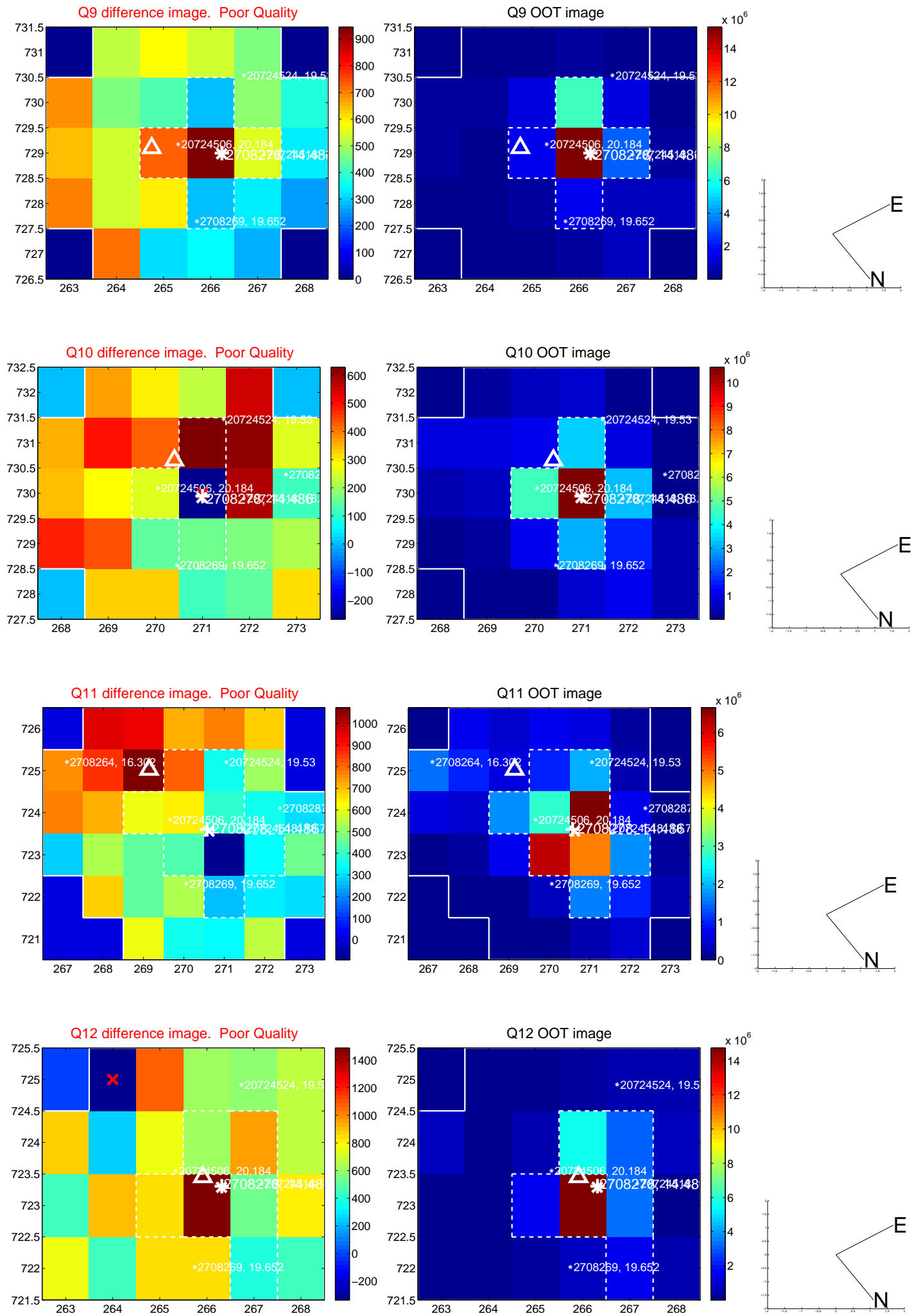
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

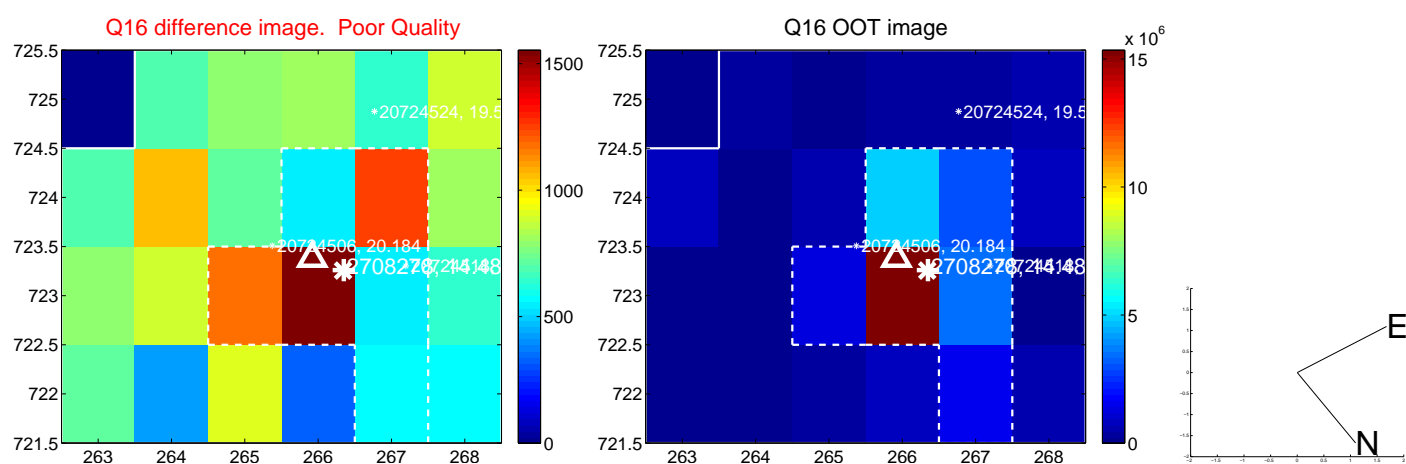
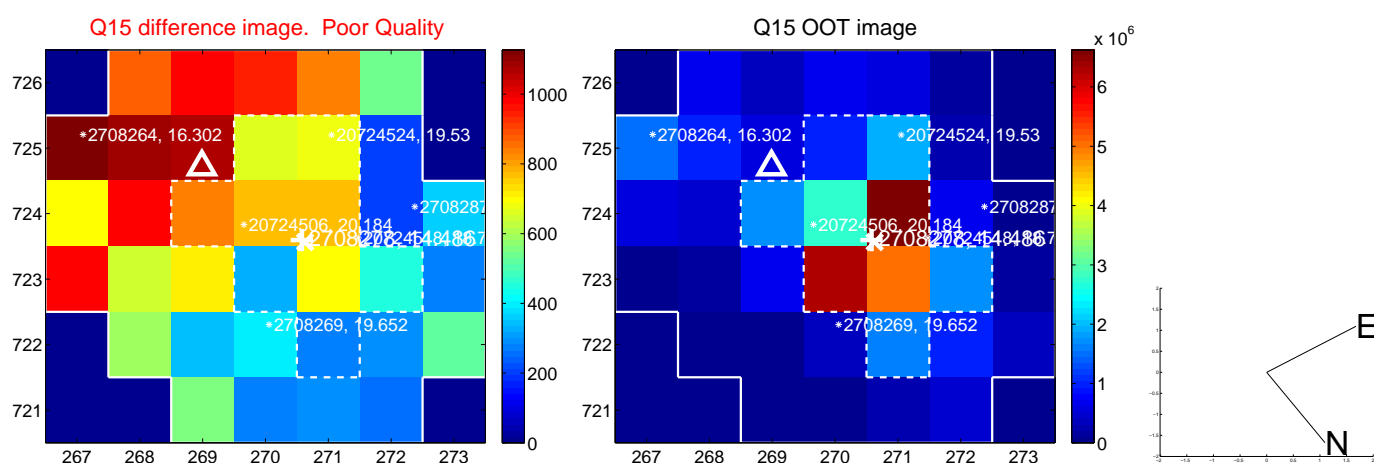
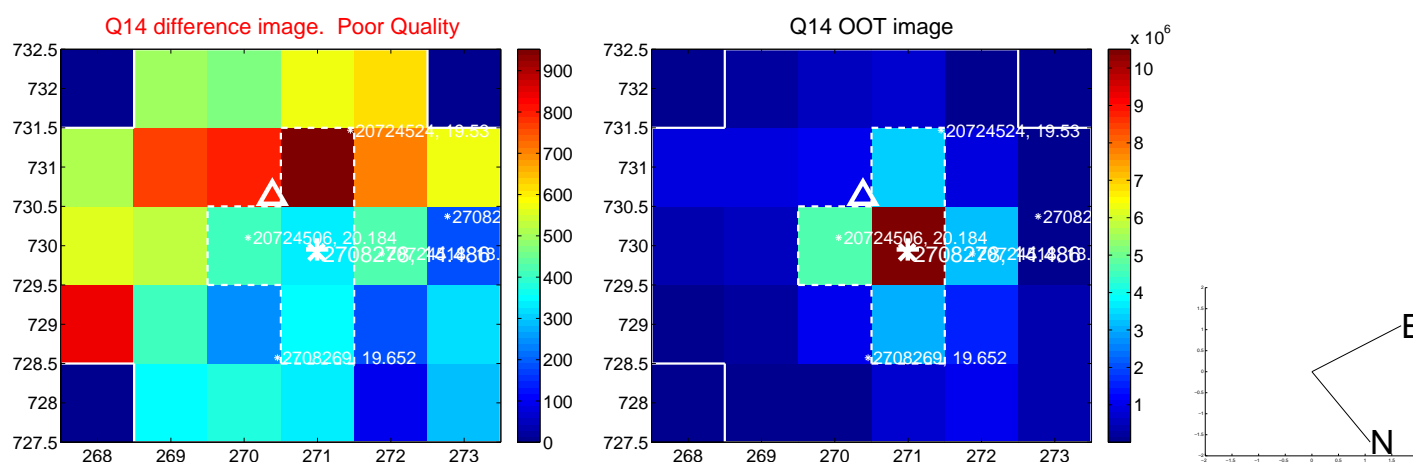
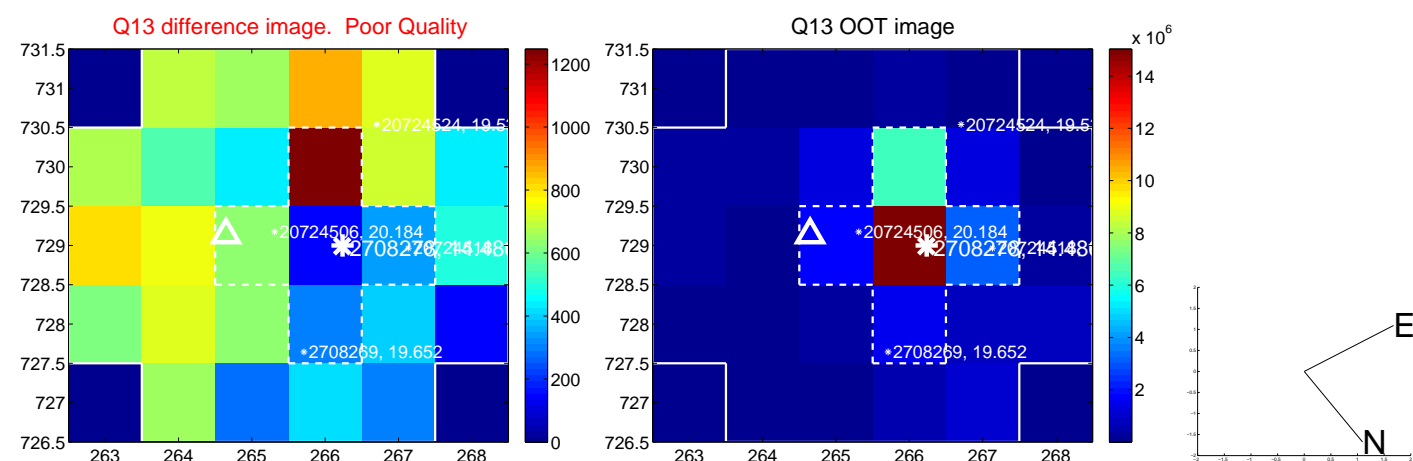




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

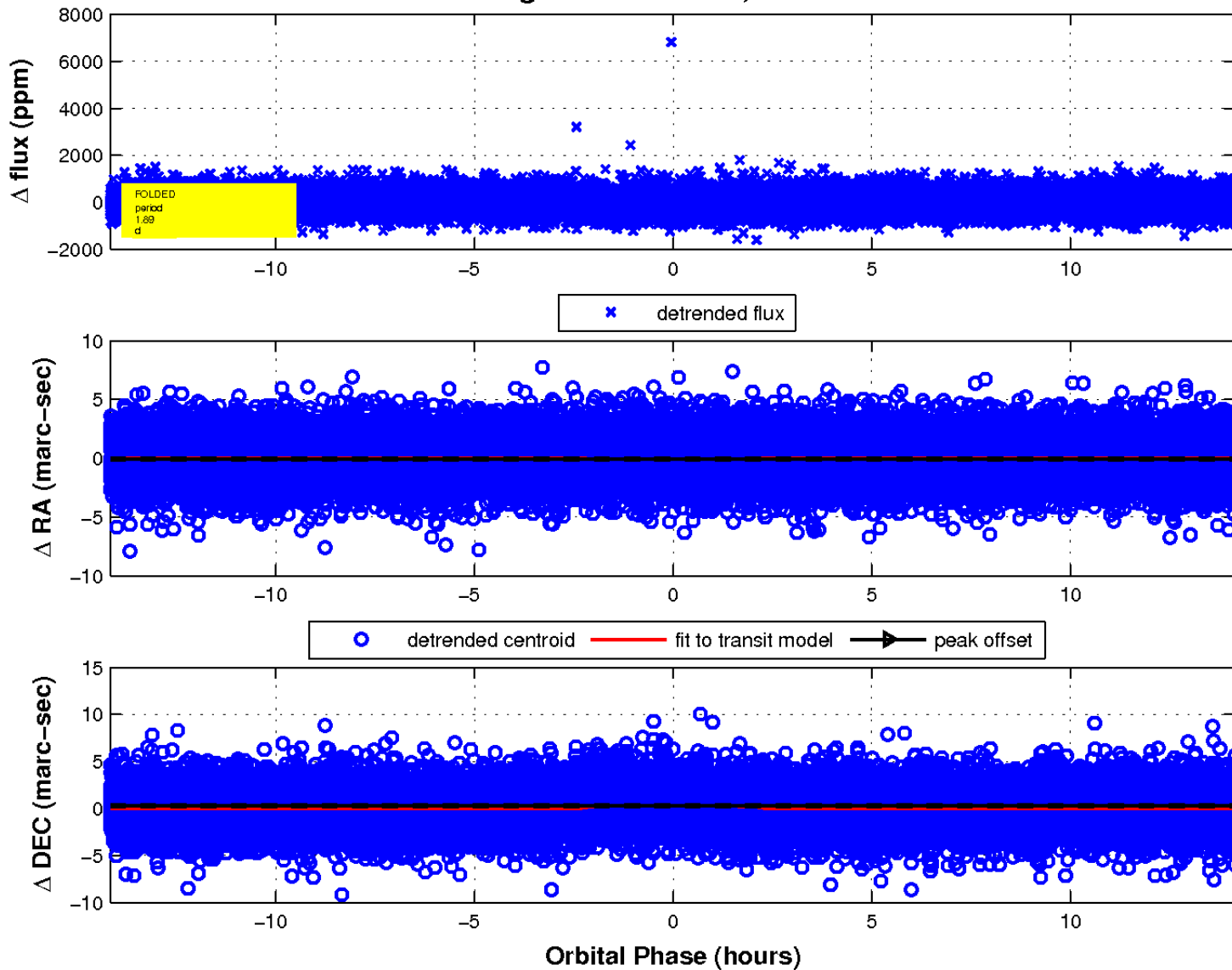
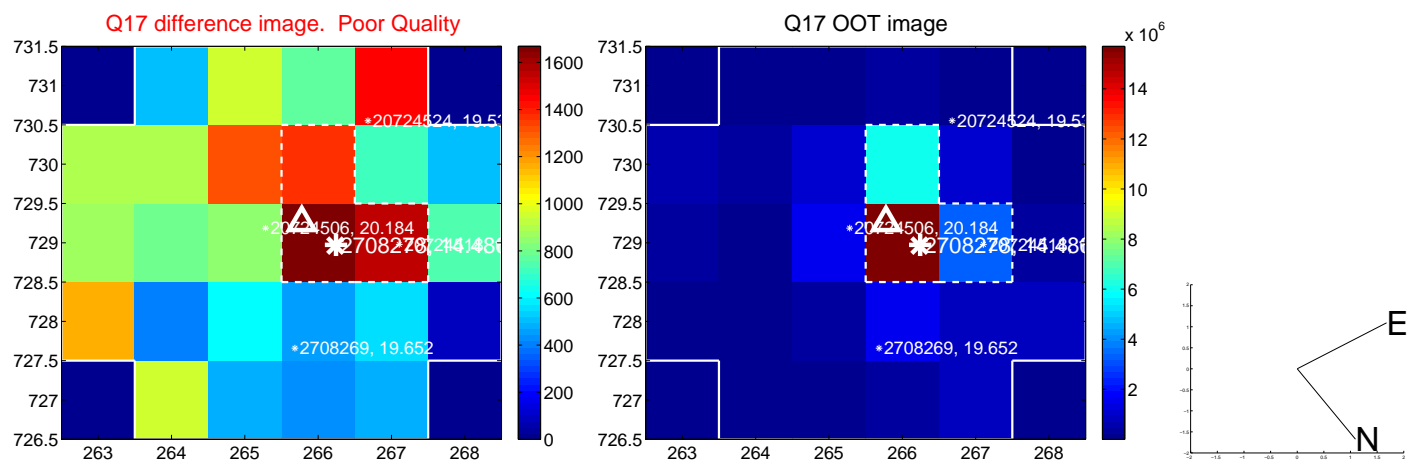


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



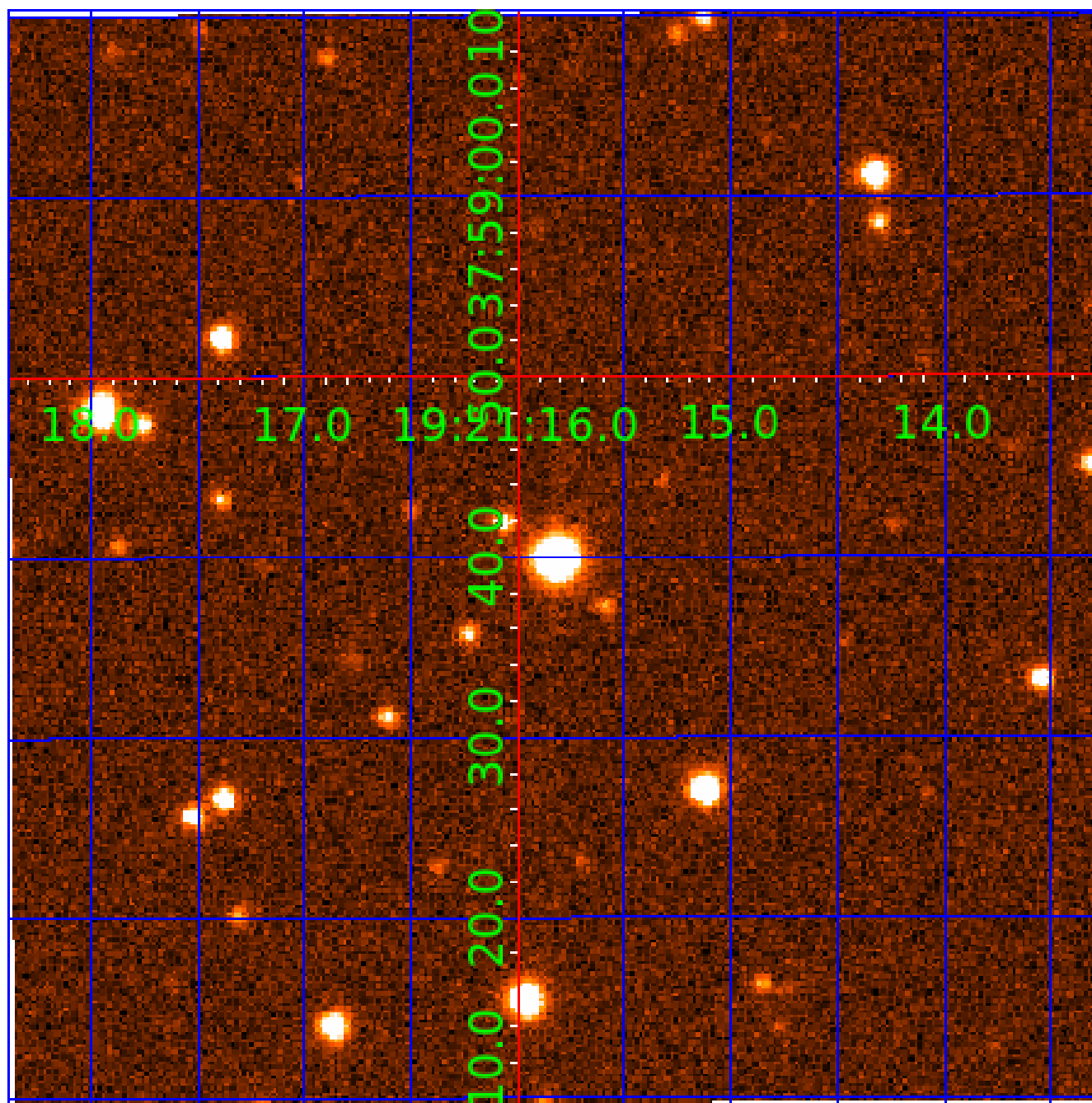


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 002708278

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002708278-01	OBS	4102.01	1.891235	132.711285	106.1	4.720	16.4	18.4	0.93	5285	1.16	701.67
002708278-02	OBS	No	516.395590	307.022000	536.8	7.559	9.4	6.4	0.93	5285	2.29	0.40
002708278-03	OBS	No	289.788098	210.439676	561.0	8.078	7.6	6.9	0.93	5285	2.51	0.86

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002708278-01	OBS	FP	0.00	0	0	1	1	CENT_UNRESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
002708278-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_FEW_DIFFS
002708278-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—ALL_TRANS_CHASES—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.

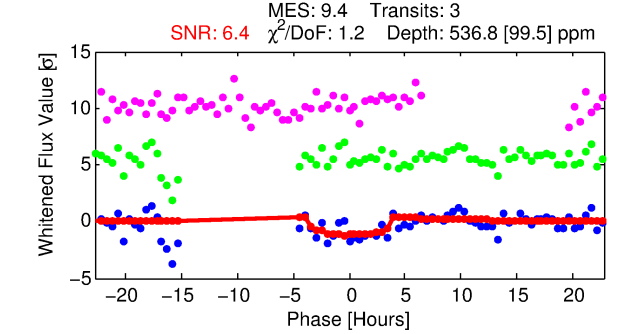
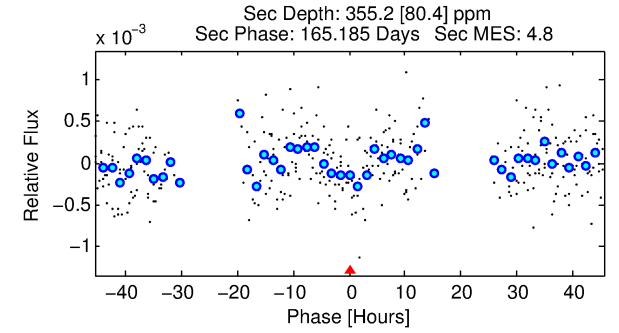
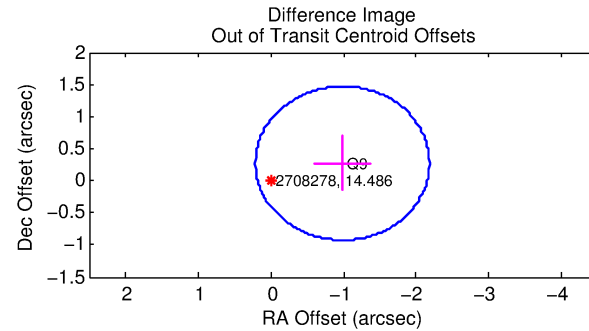
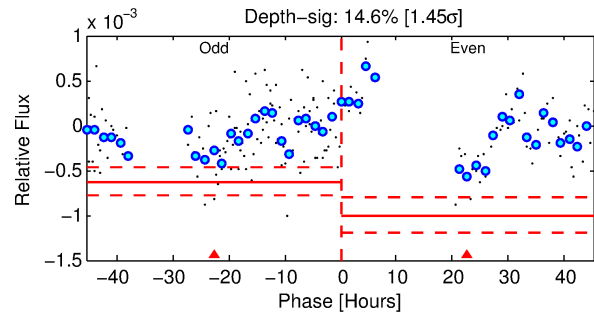
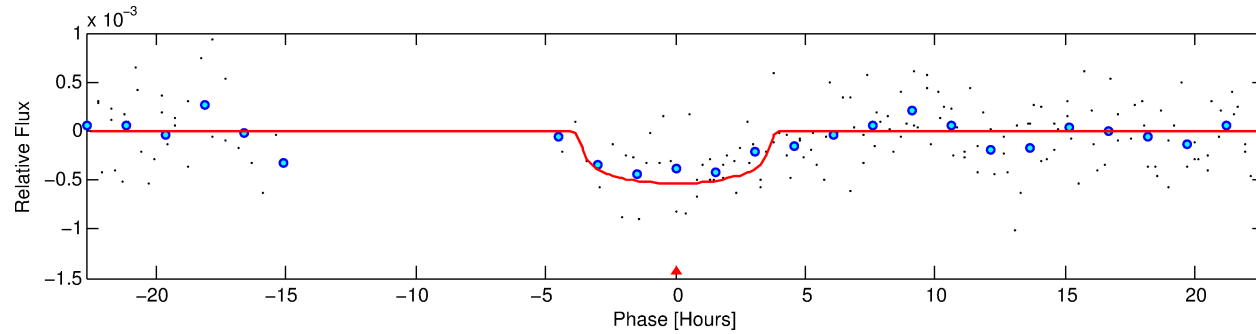
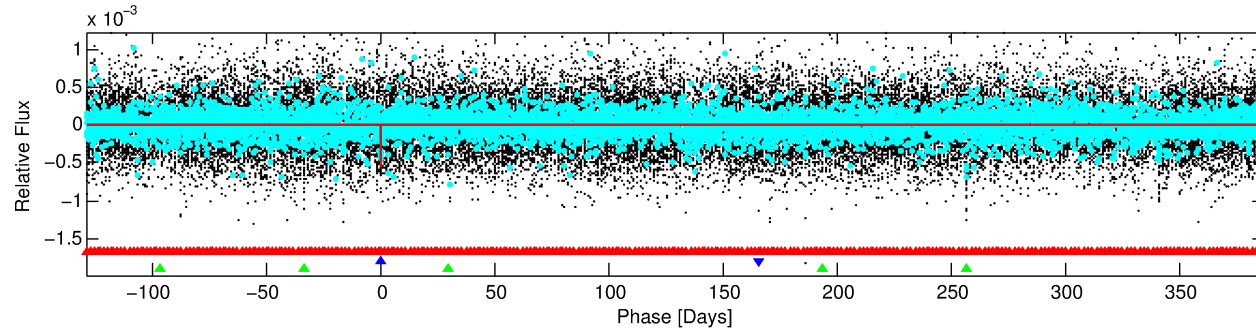
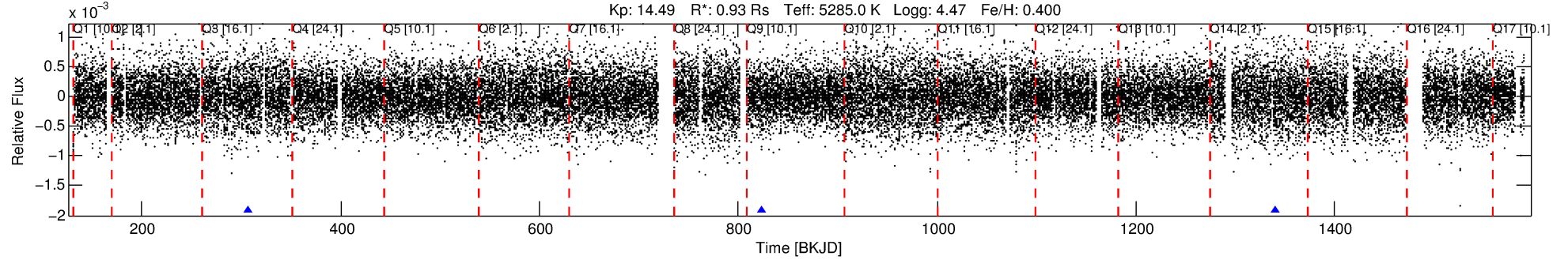
## Ephemeris Match Information For 002708278-02

No Significant Match Found

# DV One-Page Summary

KIC: 2708278 Candidate: 2 of 3 Period: 516.396 d  
KOI: K04102 Corr: No Ephemeris Match

Kp: 14.49 R\*: 0.93 Rs Teff: 5285.0 K Logg: 4.47 Fe/H: 0.400



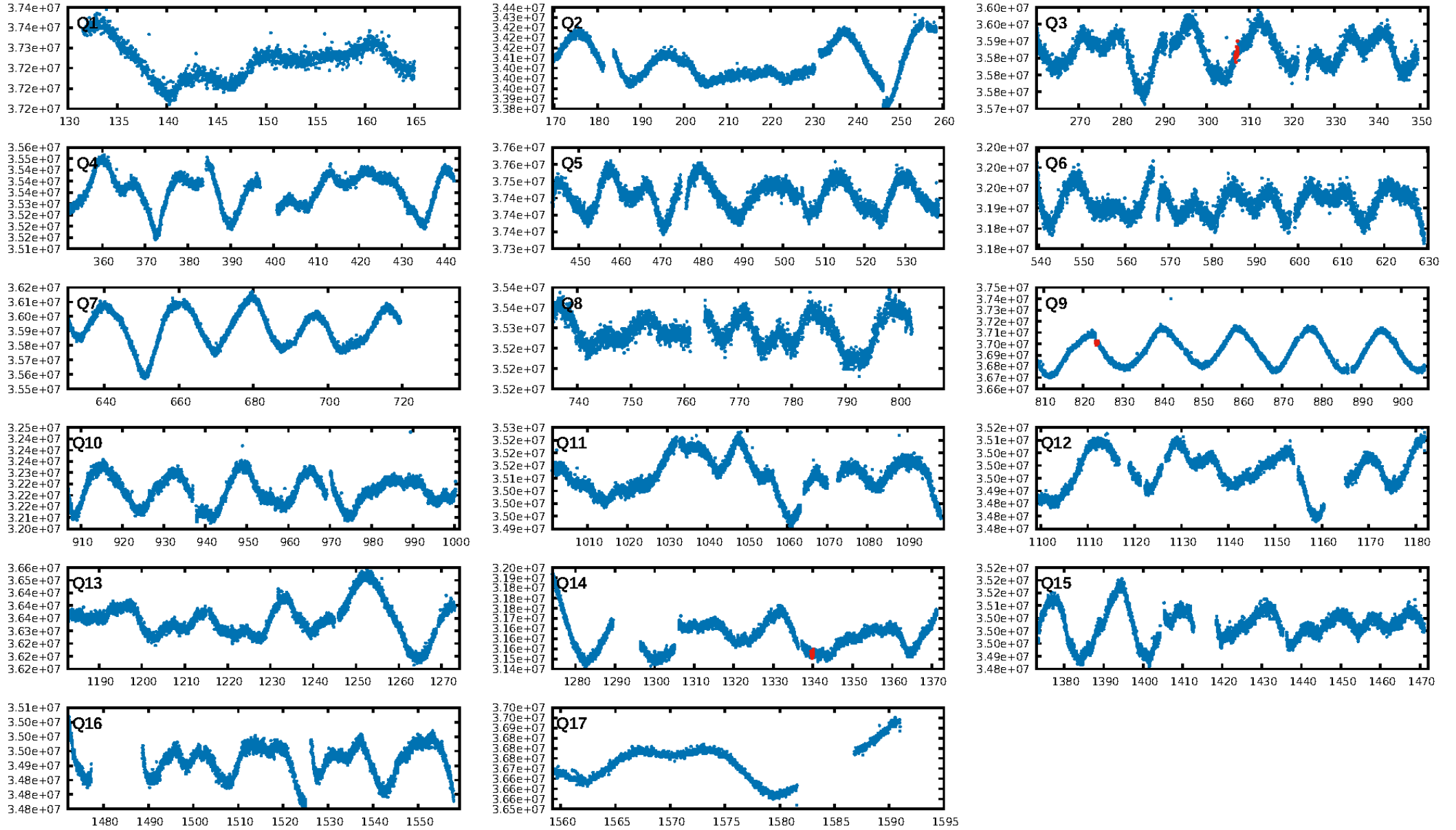
## DV Fit Results:

Period = 516.39559 [0.01830] d  
Epoch = 307.0220 [0.0321] BKJD  
Rp/R\* = 0.0226 [0.0343]  
a/R\* = 391.92 [2146.91]  
b = 0.69 [4.12]  
Seff = 0.40 [0.06]  
Teq = 202 [8] K  
Rp = 2.29 [3.48] Re  
a = 1.2314 [0.1150] AU  
Ag = 56744.66 [172933.43] [0.33σ]  
Teffp = 4827 [3675] K [1.26σ]

## DV Diagnostic Results:

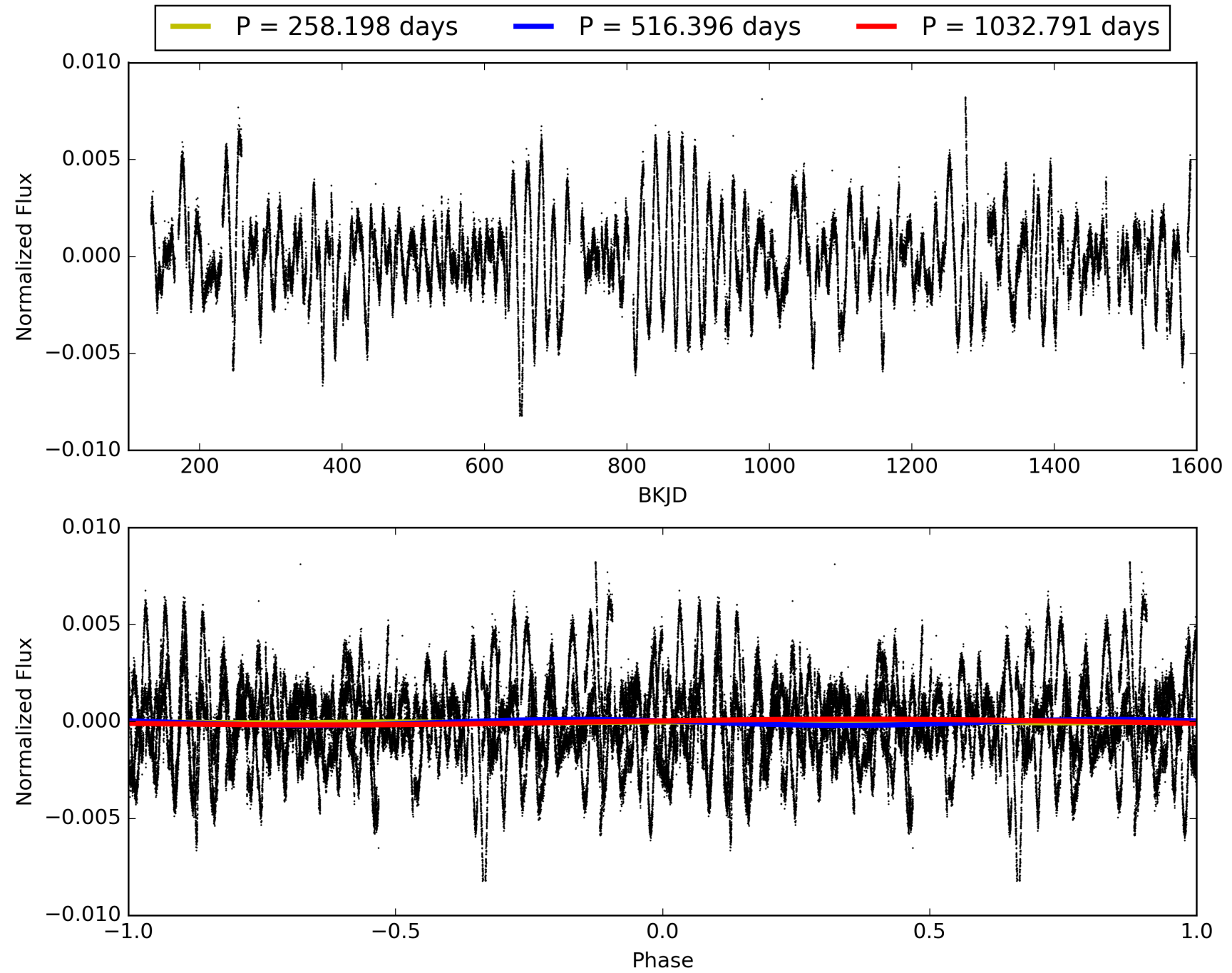
ShortPeriod-sig: 100.0% [491.62σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 3.9%  
ModelChiSquareGof-sig: 99.1%  
Bootstrap-pfa: 2.07e-14  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -0.4721  
Centroid-sig: 41.4%  
Centroid-so: 1.716 arcsec [1.06σ]  
OotOffset-rm: 1.023 arcsec [2.56σ]  
KicOffset-rm: 0.969 arcsec [2.43σ]  
OotOffset-st: 0/0/0/1 [1]  
KicOffset-st: 0/0/0/1 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 0.00 [0/3]

# TCE 002708278-02, PDC Light Curves



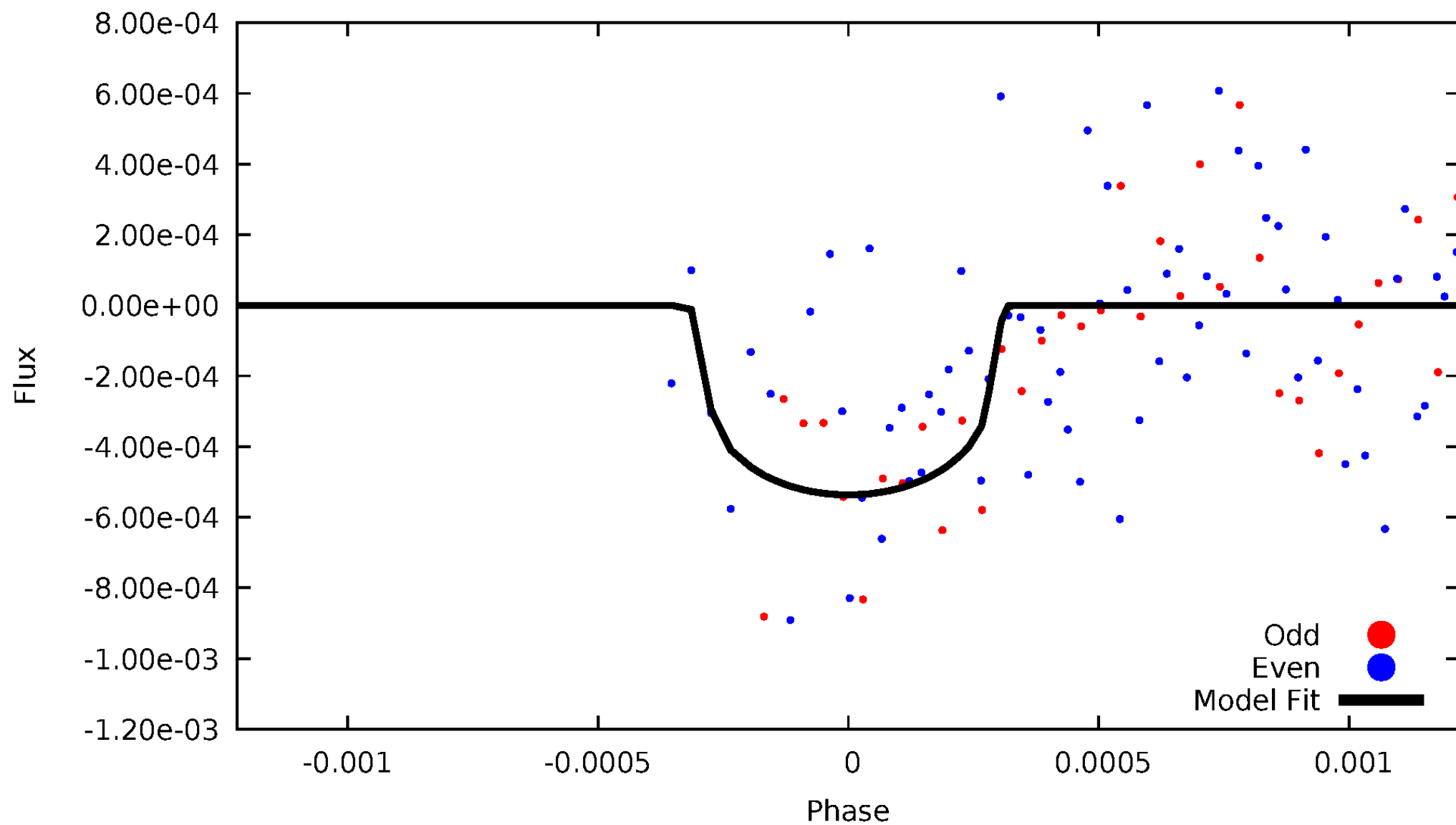


TCE 002708278-02



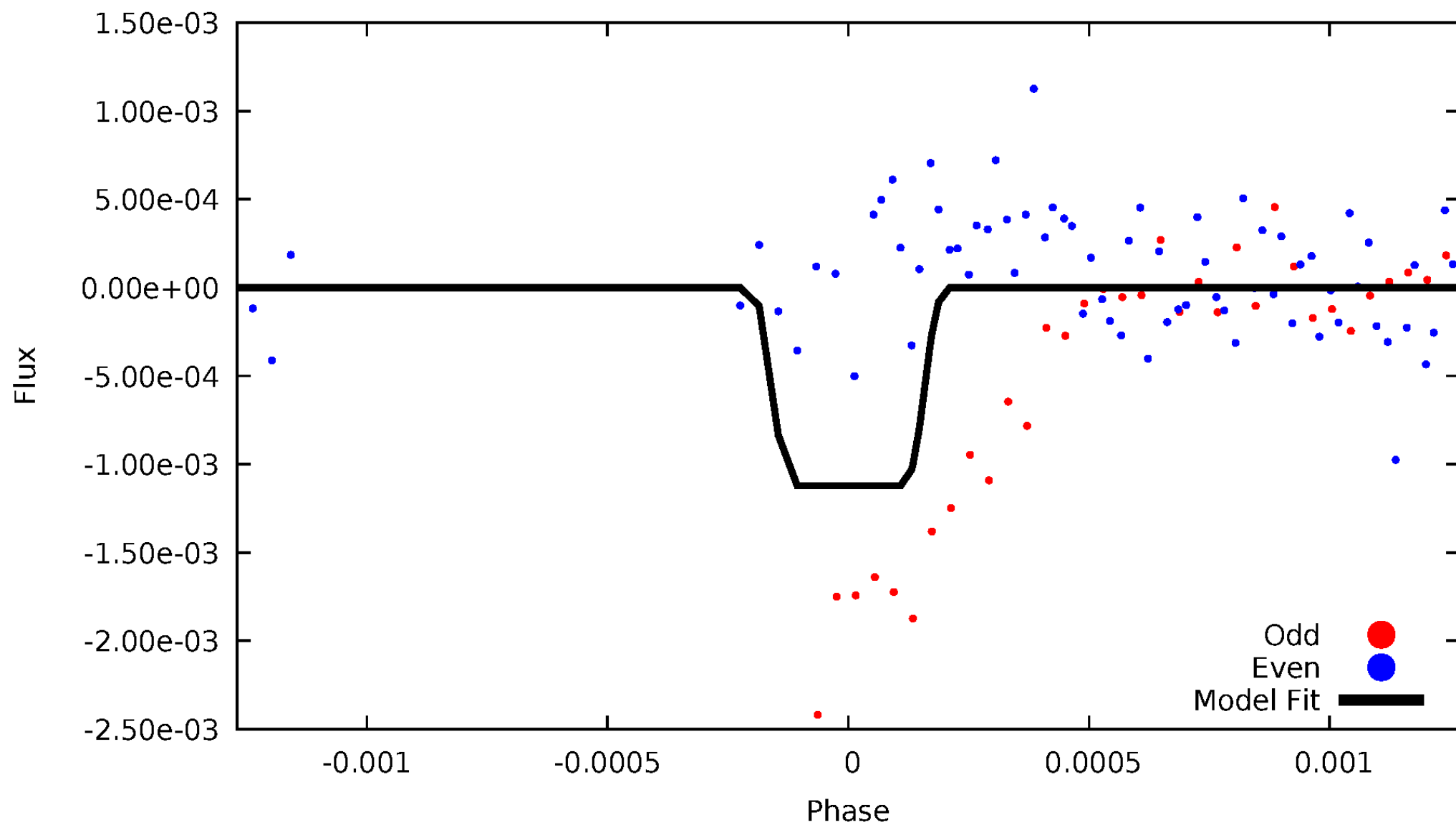
# DV Odd/Even

TCE 002708278-02



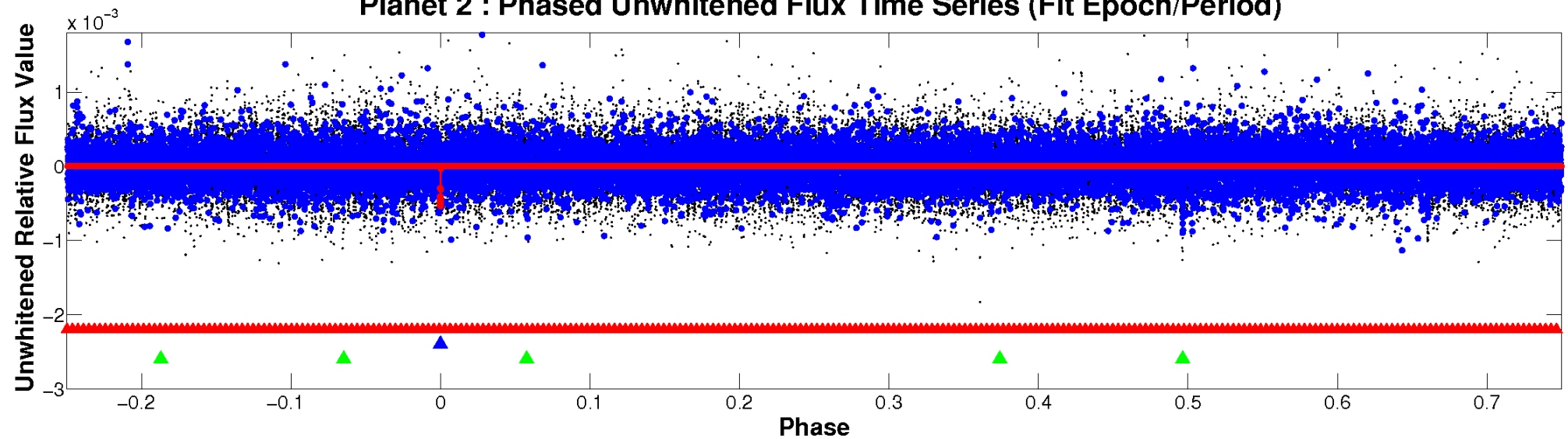
# ALT Odd/Even

TCE 002708278-02

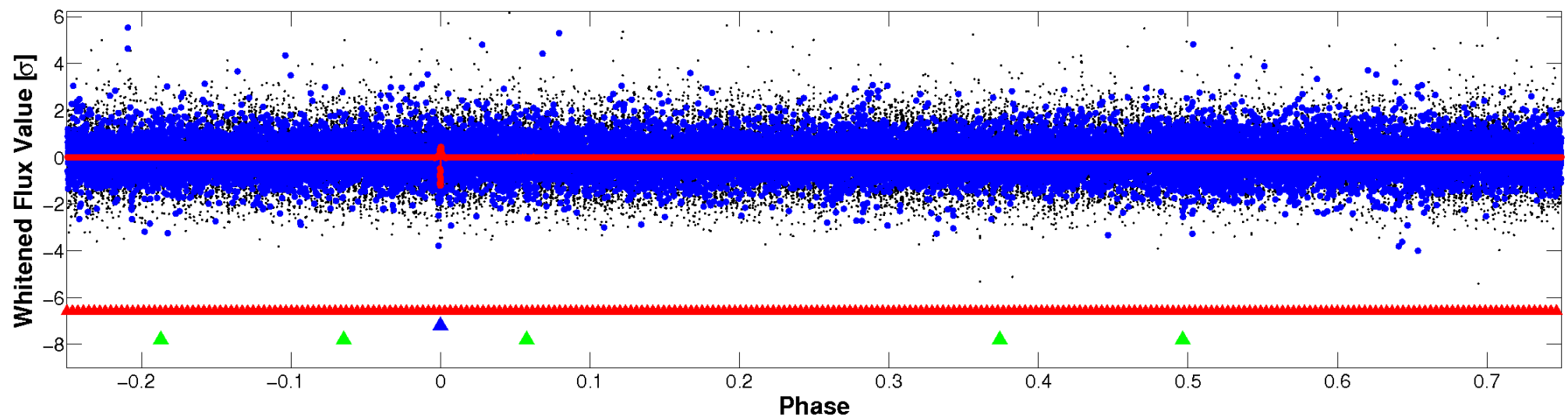


# Non-Whitened Vs. Whitened Light Curve

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

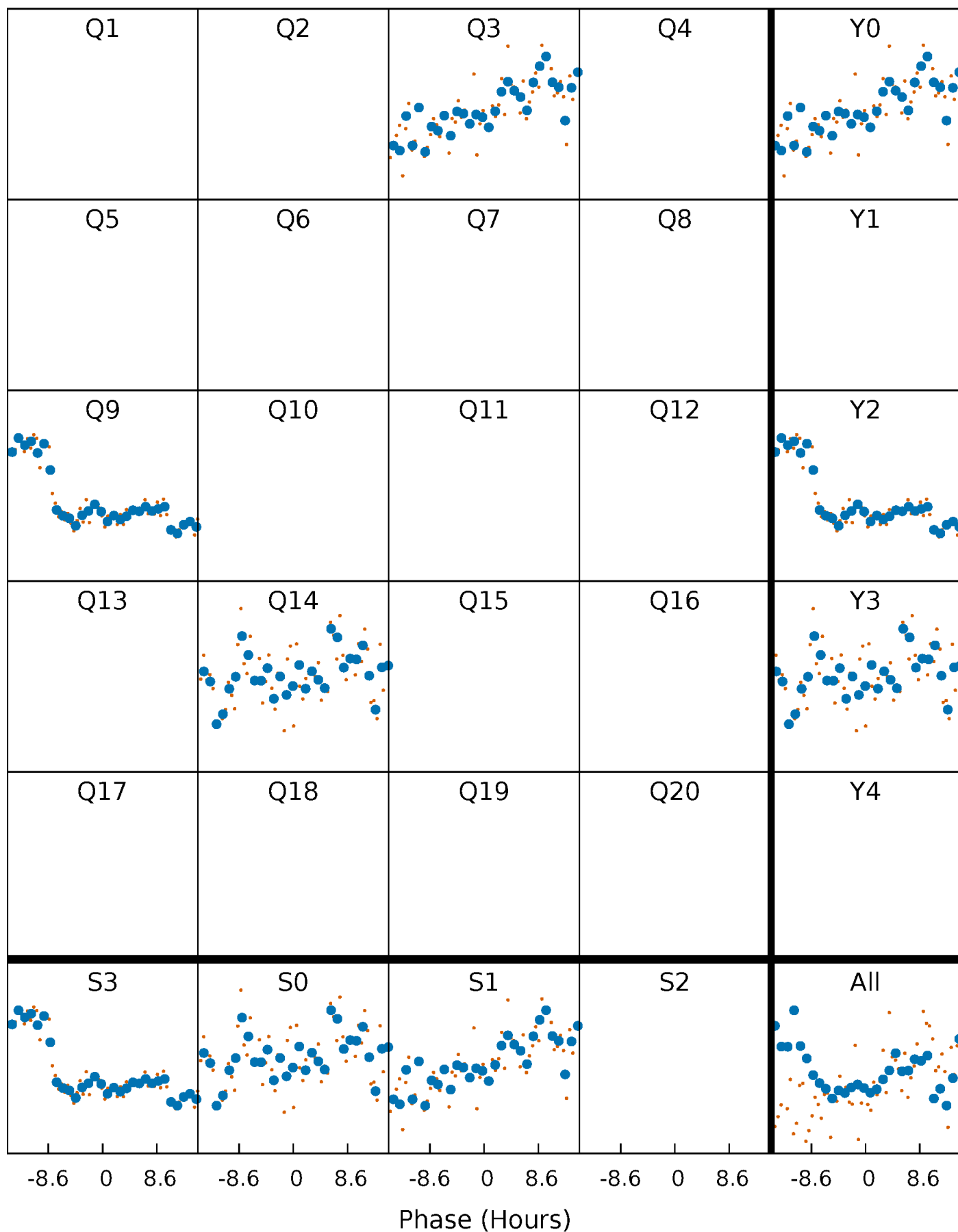


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

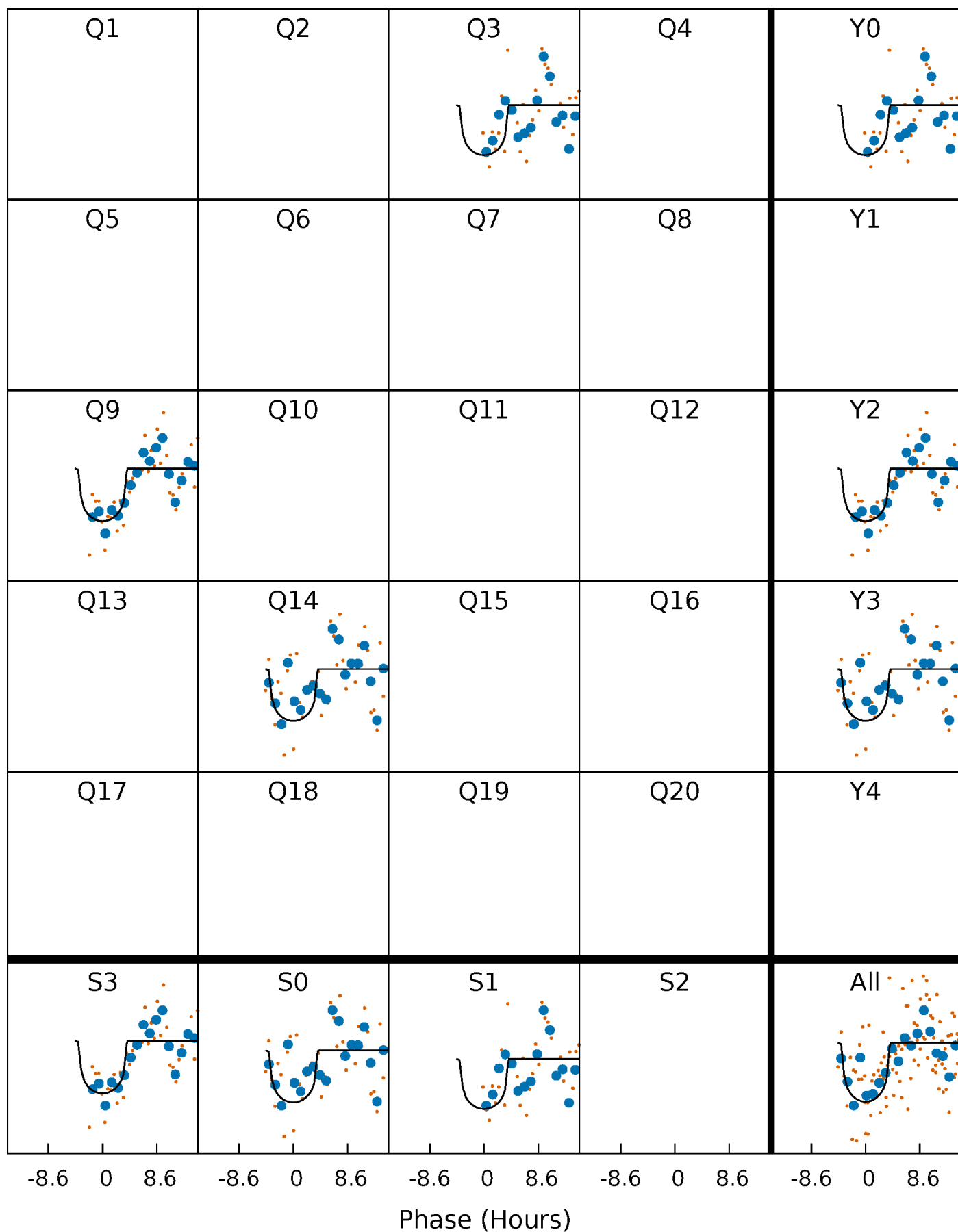
TCE 002708278-02     $P=516.395590$  Days     $T_0=307.022000$  (BKJD)





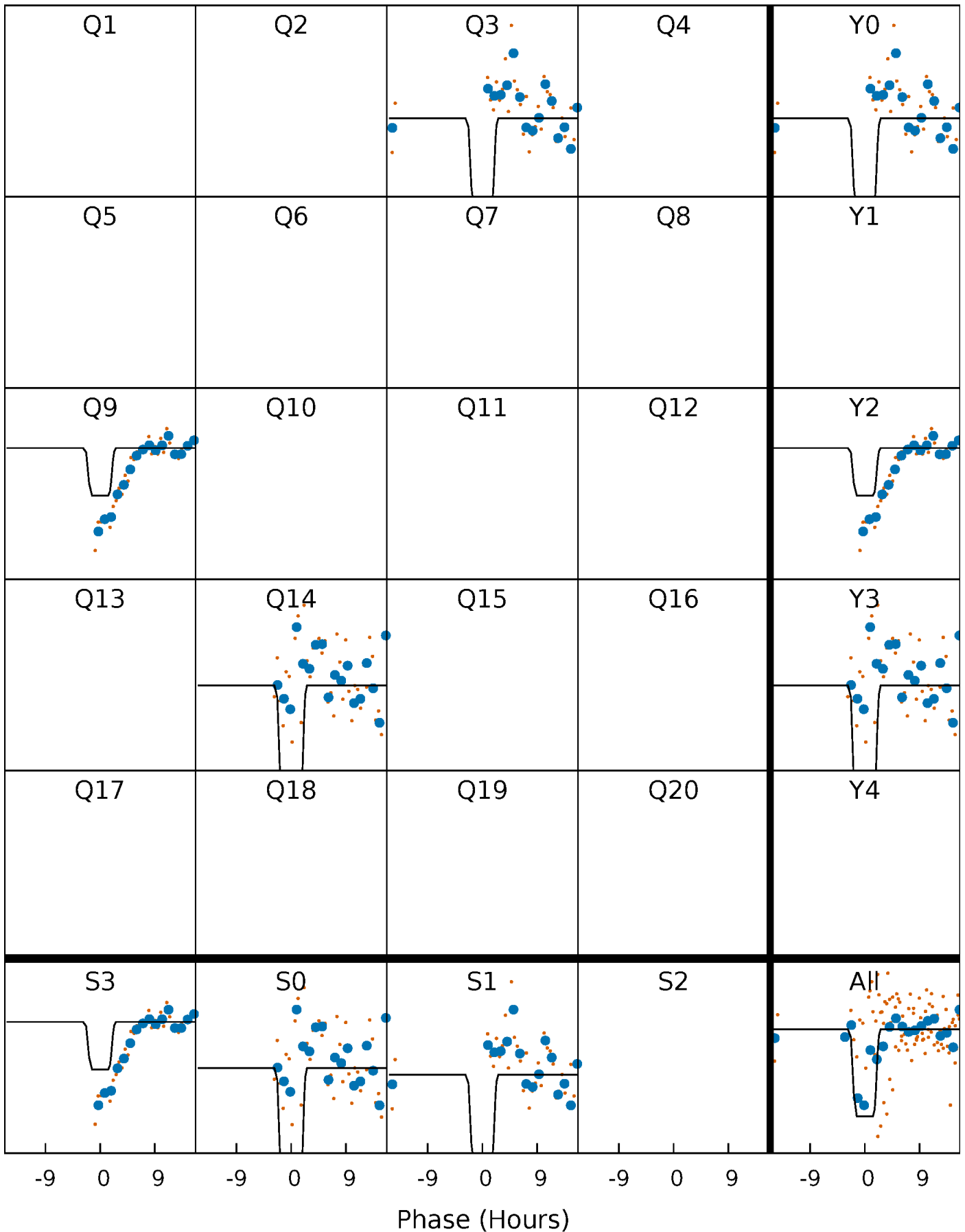
# DV Quarter-Phased Transit Curves

TCE 002708278-02     $P=516.395590$  Days     $T_0=307.022000$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

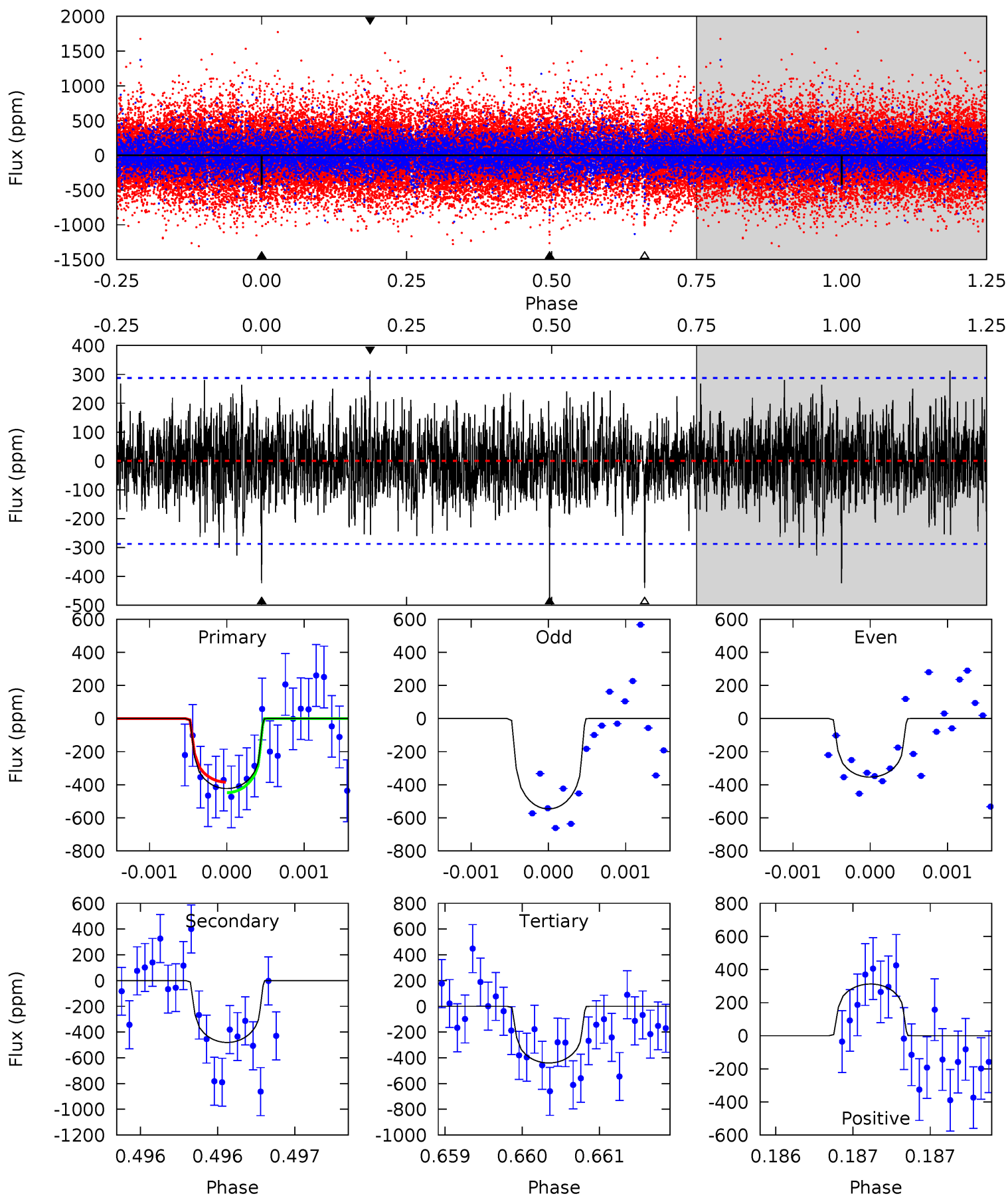
TCE 002708278-02     $P=516.383306$  Days     $T_0=306.980241$  (BKJD)



# DV Model-Shift Uniqueness Test

002708278-02, P = 516.395590 Days, E = 307.022000 Days

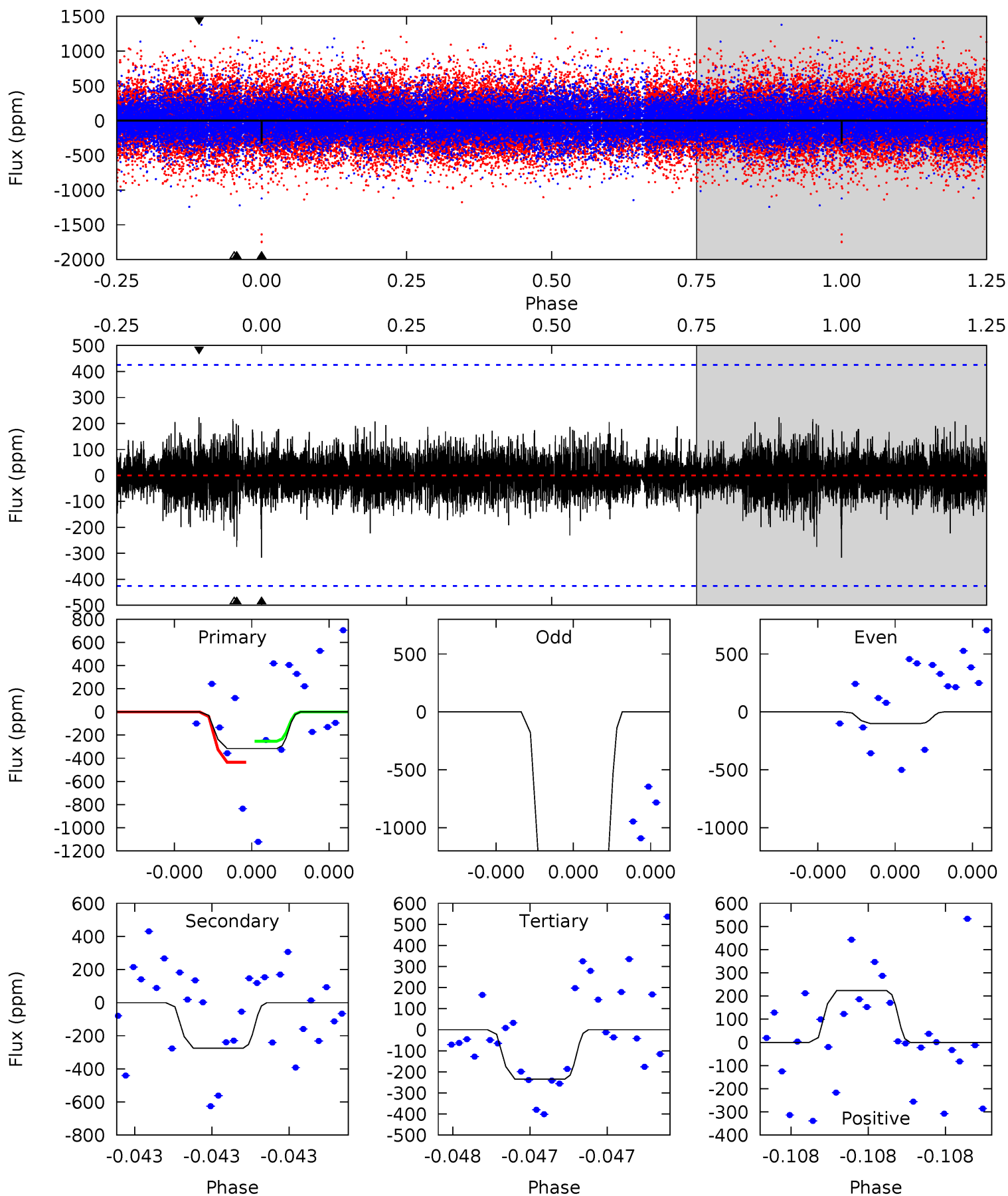
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.14	9.24	8.47	6.01	5.53	3.41	1.55	-0.32	2.13	0.78	3.23	1.73	1.05	0.39	0.58



# Alt Model-Shift Uniqueness Test

002708278-02, P = 516.383306 Days, E = 306.980241 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
4.21	3.65	3.12	2.97	5.64	3.59	0.69	1.09	1.24	0.53	0.68	13.4	-21.4	0.41	1.09



### Stellar Parameters For KIC 002708278

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5285^{+84}_{-73}$	$4.474^{+0.060}_{-0.082}$	$0.400^{+0.050}_{-0.150}$	$0.927^{+0.096}_{-0.056}$	$0.933^{+0.031}_{-0.039}$	$1.649^{+0.355}_{-0.419}$
	+2%/-1%	+1%/-2%	+12%/-37%	+10%/-6%	+3%/-4%	+22%/-25%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 002708278-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-481 \pm 52$	$3.37^{+3.19}_{-2.25}$	$283^{+9}_{-7}$	$4474^{+3180}_{-950}$	$35280^{+298554}_{-26025}$
Alt.	$-275 \pm 75$	$3.99^{+3.24}_{-2.44}$	$283^{+9}_{-7}$	$3767^{+1642}_{-636}$	$13625^{+76680}_{-9519}$

$T_{max}$  = 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

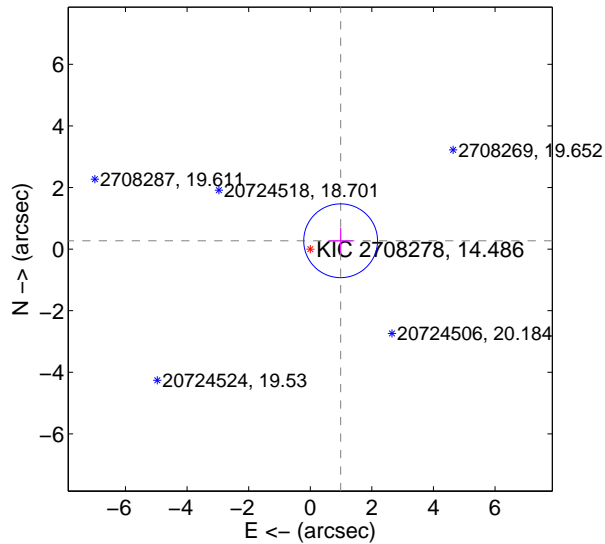
Supplemental centroid analysis for 002708278-02. Kepler magnitude: 14.49. Transit SNR 6.37

There are 1 quarters with good PRF difference image offsets

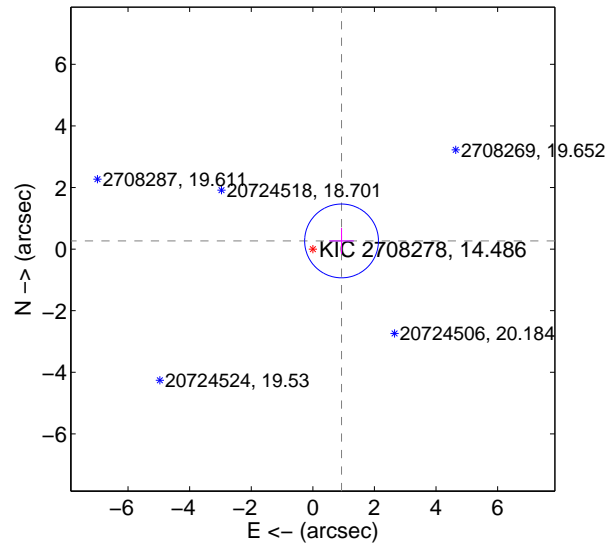
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.023 \pm 0.399$	2.56	$-0.986 \pm 0.398$	$0.271 \pm 0.421$
PRF-fit source offset from KIC position	$0.969 \pm 0.399$	2.43	$-0.932 \pm 0.398$	$0.265 \pm 0.421$
photometric centroid source offset	$1.72 \pm 1.61$	1.06	$-0.68 \pm 1.45$	$-1.57 \pm 1.64$

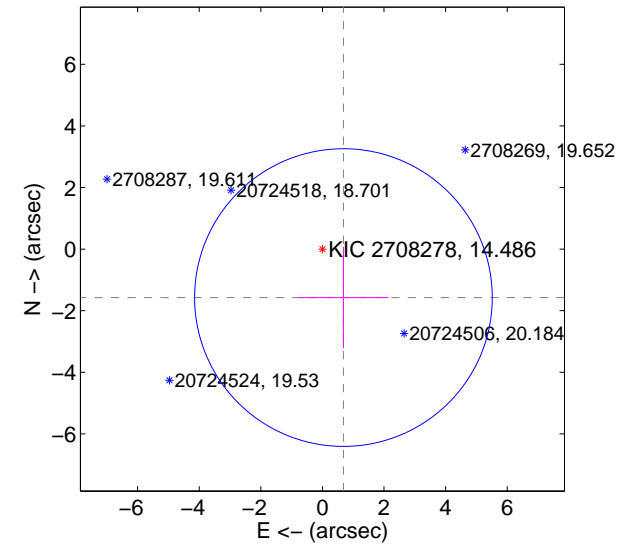
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

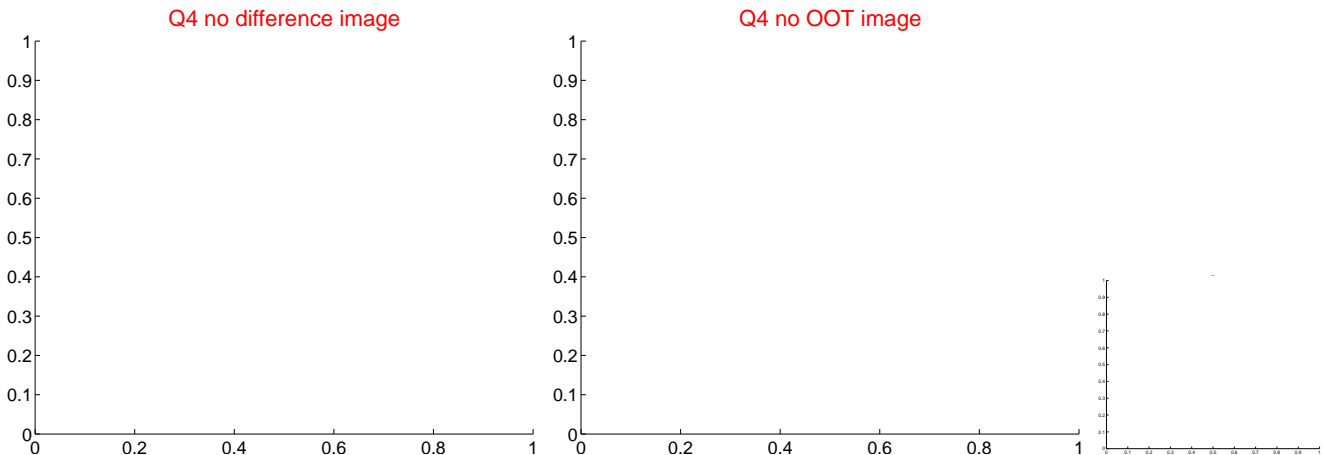
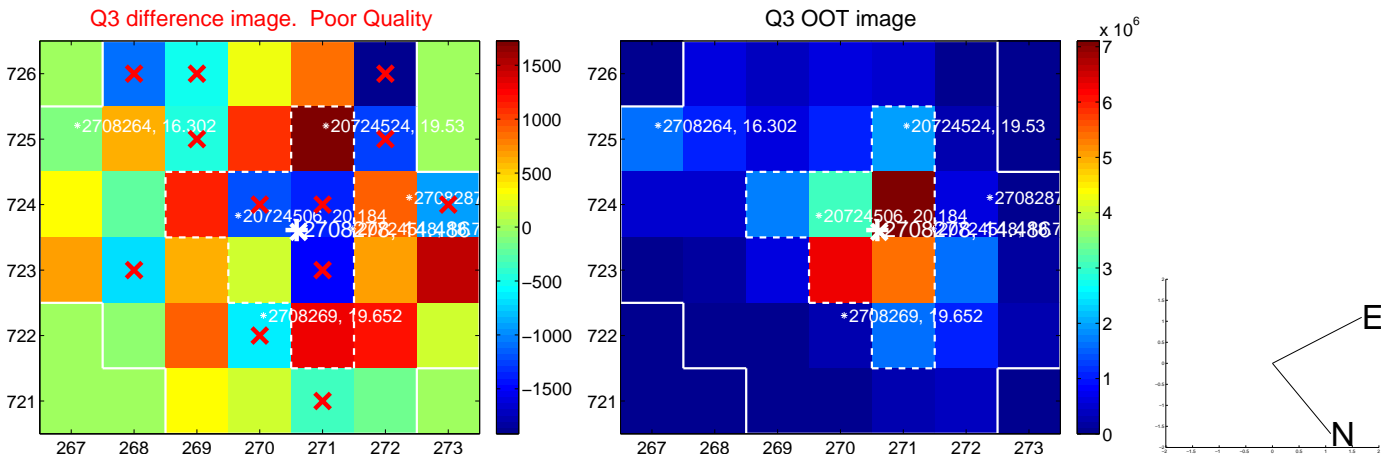
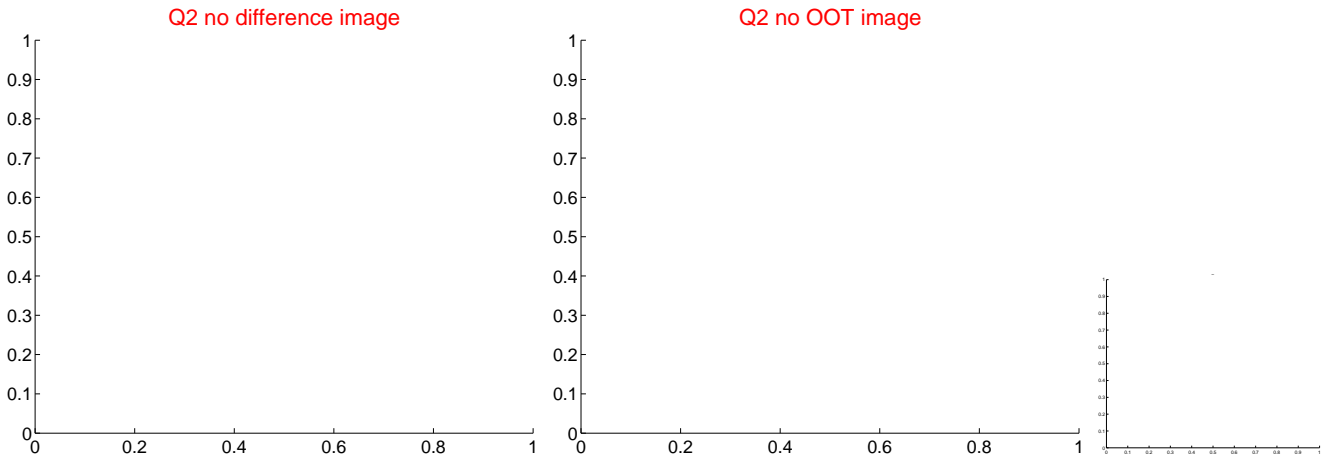
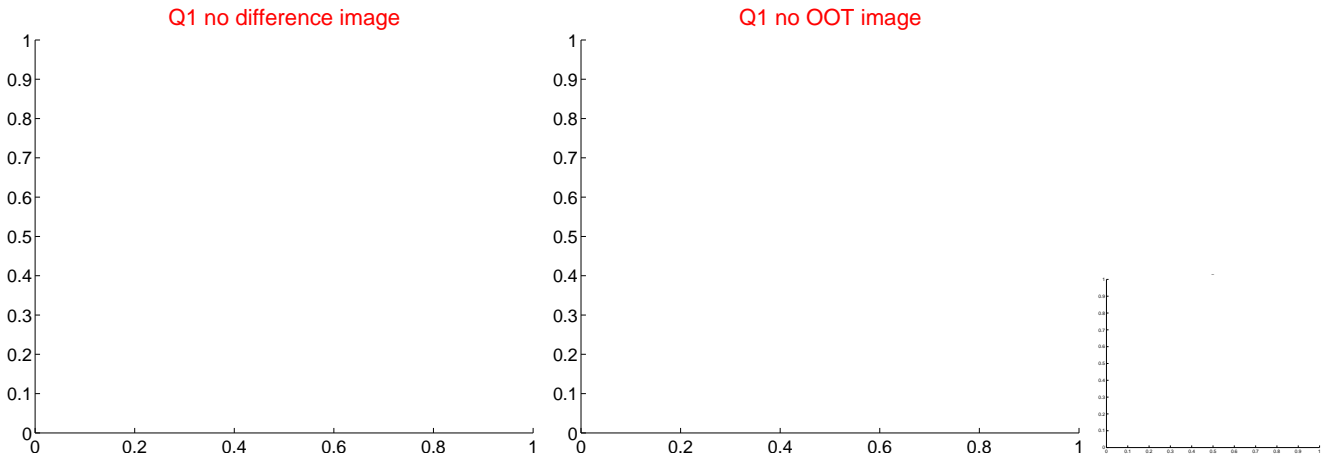


offset from photometric centroids



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

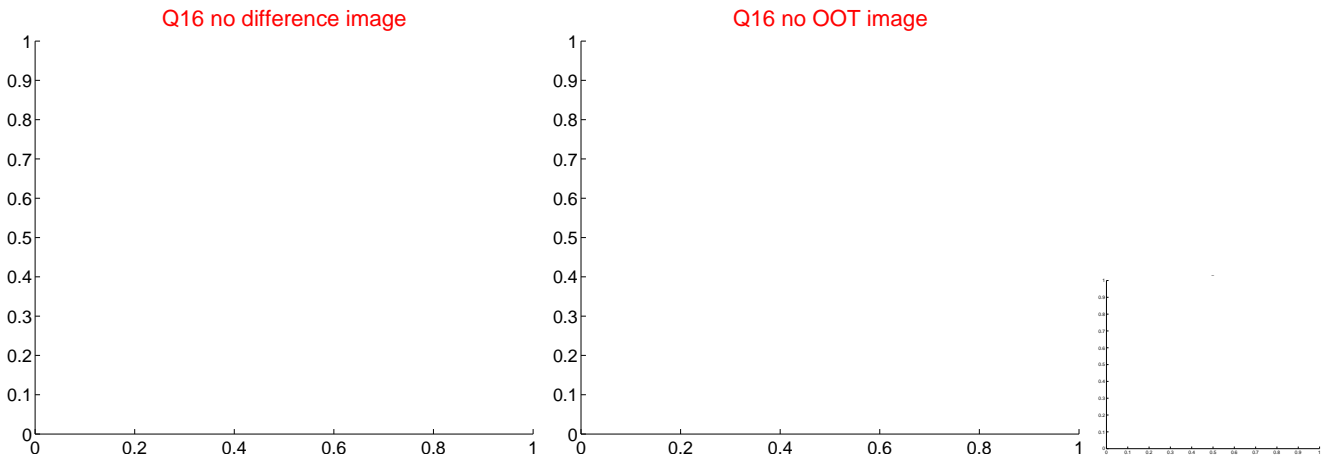
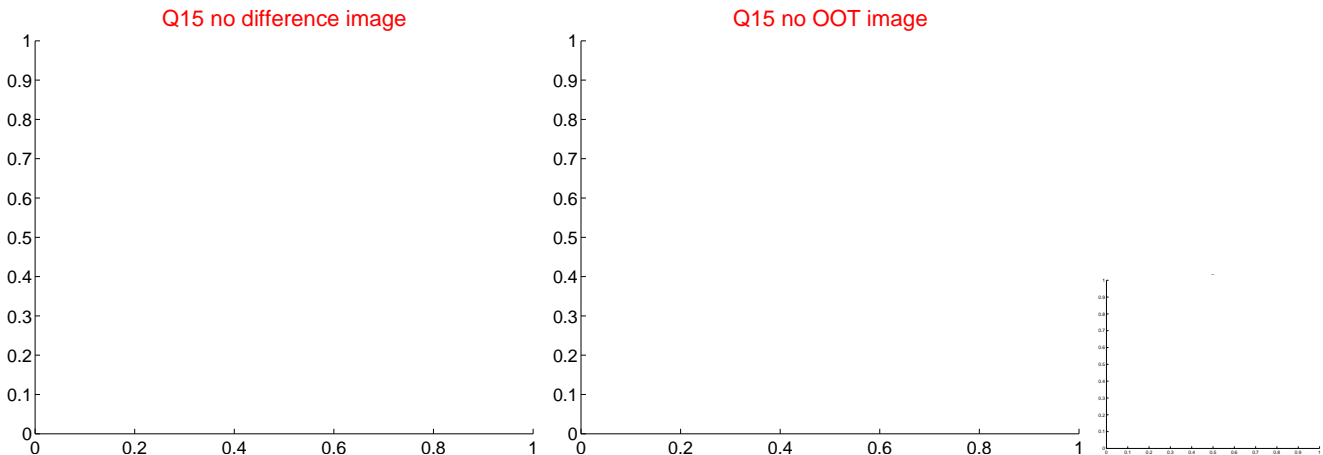
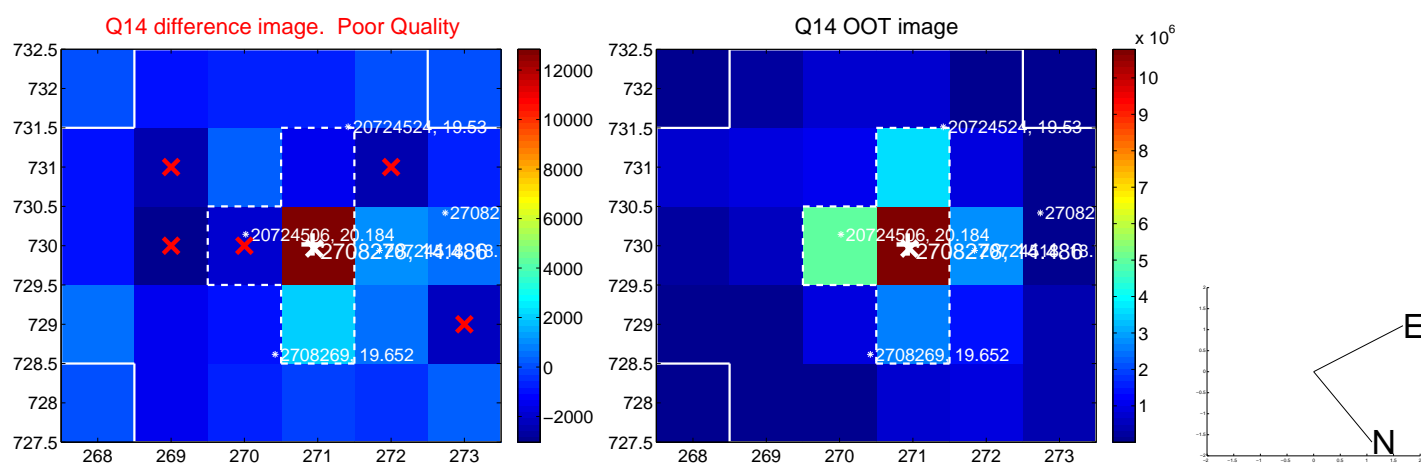
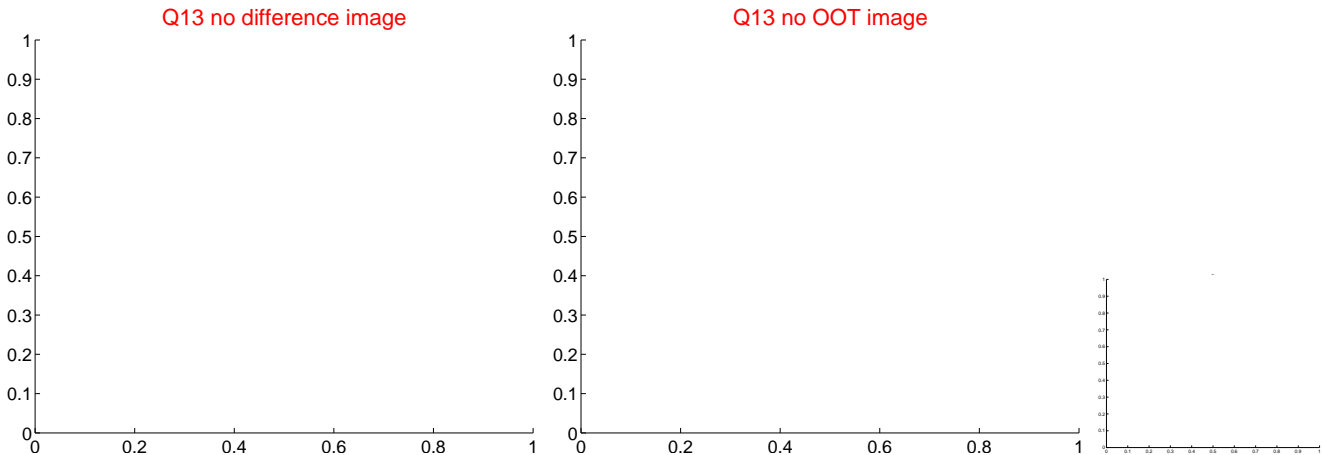


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



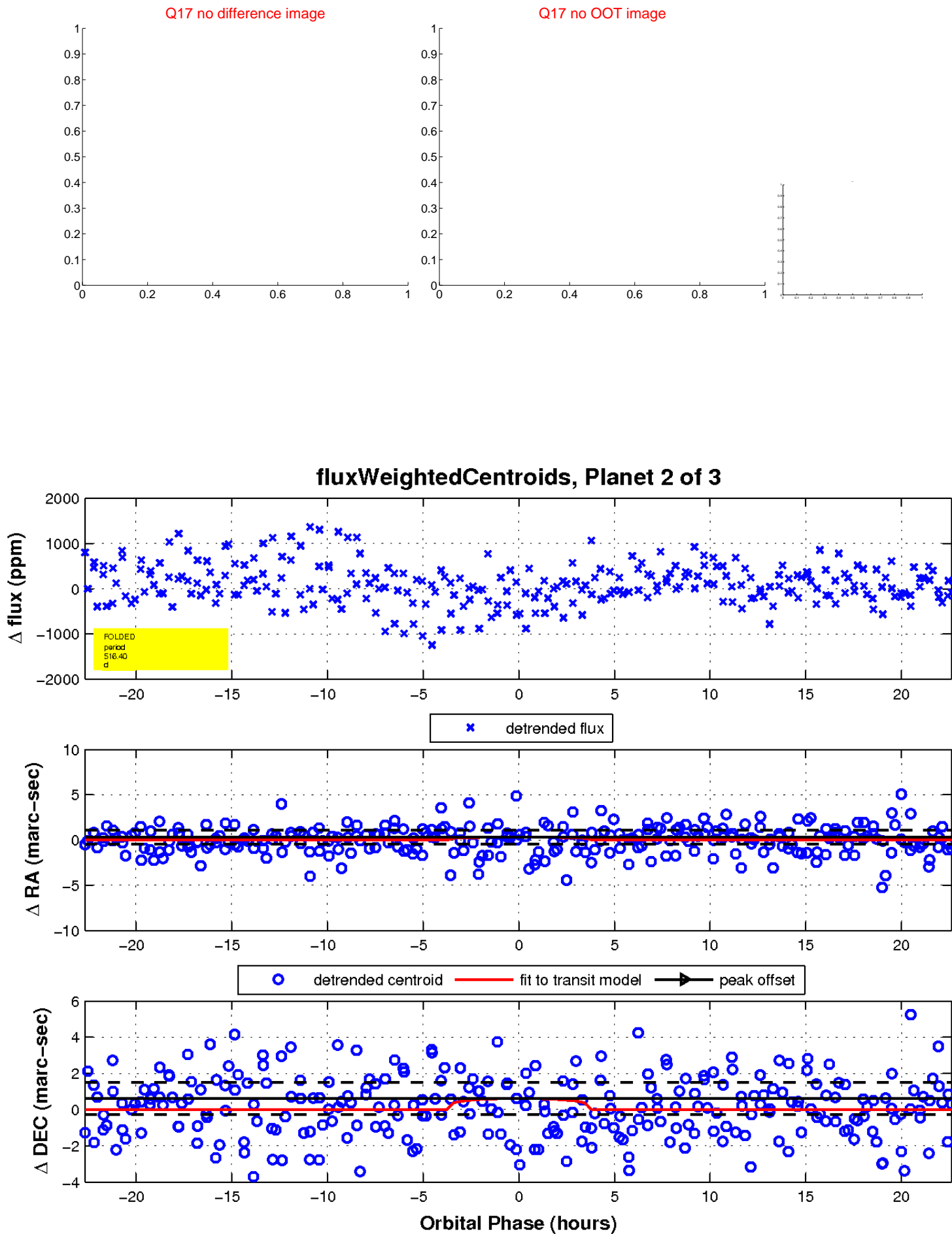


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



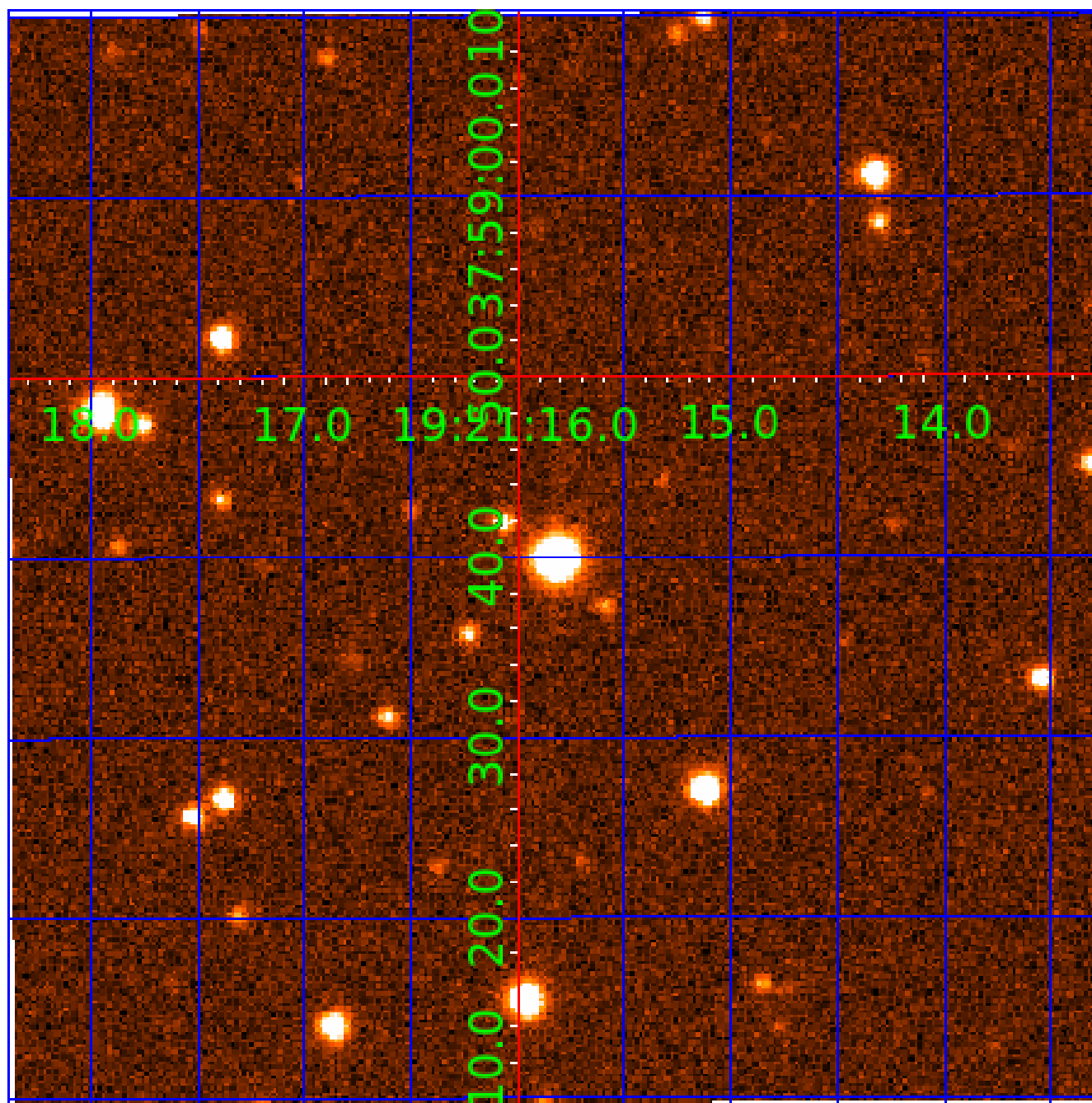


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 002708278

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002708278-01	OBS	4102.01	1.891235	132.711285	106.1	4.720	16.4	18.4	0.93	5285	1.16	701.67
002708278-02	OBS	No	516.395590	307.022000	536.8	7.559	9.4	6.4	0.93	5285	2.29	0.40
002708278-03	OBS	No	289.788098	210.439676	561.0	8.078	7.6	6.9	0.93	5285	2.51	0.86

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002708278-01	OBS	FP	0.00	0	0	1	1	CENT_UNRESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
002708278-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
002708278-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL_SKYE—ALL_TRANS_CHASES—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 002708278-03

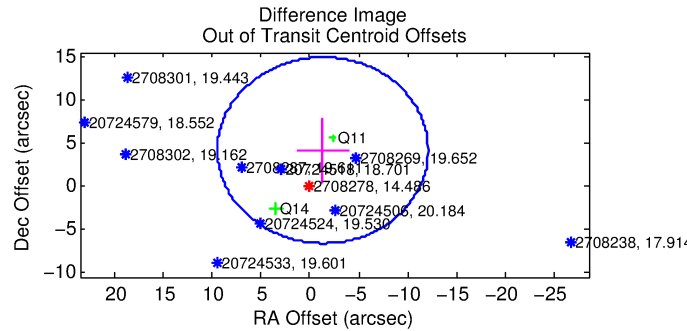
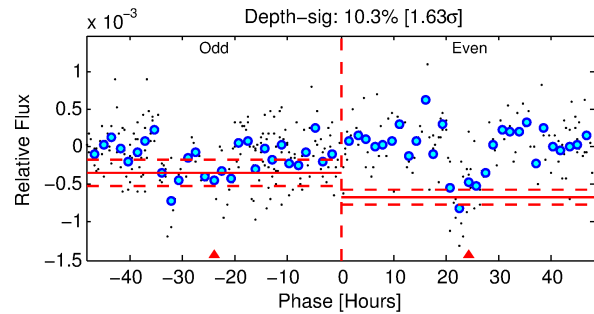
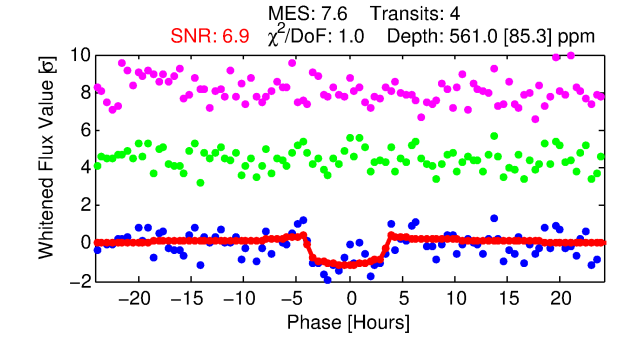
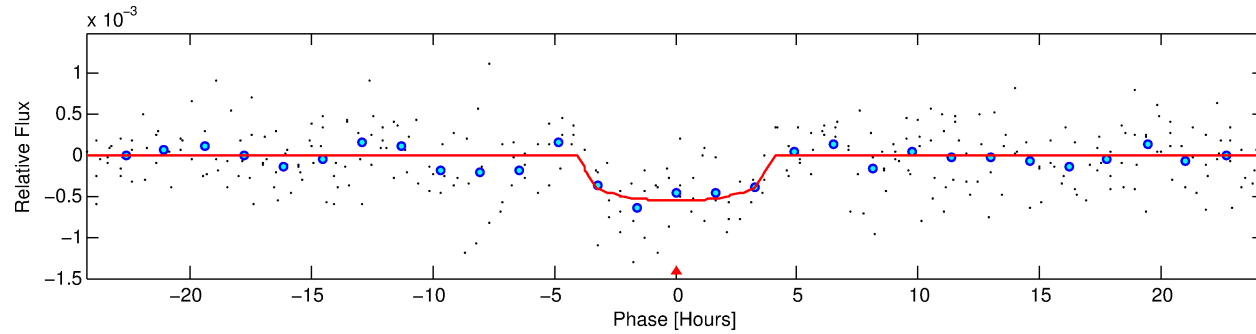
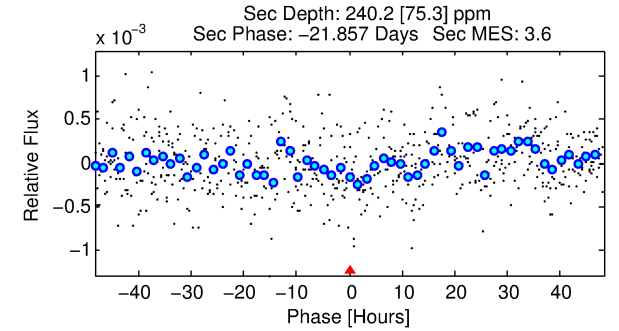
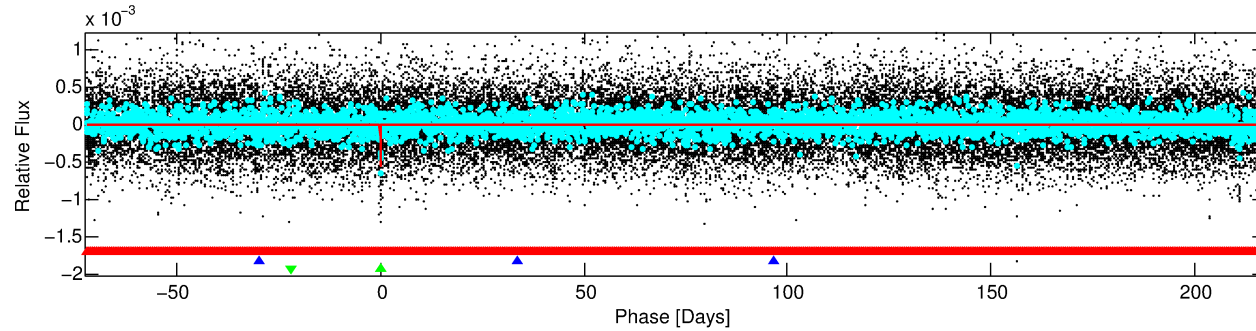
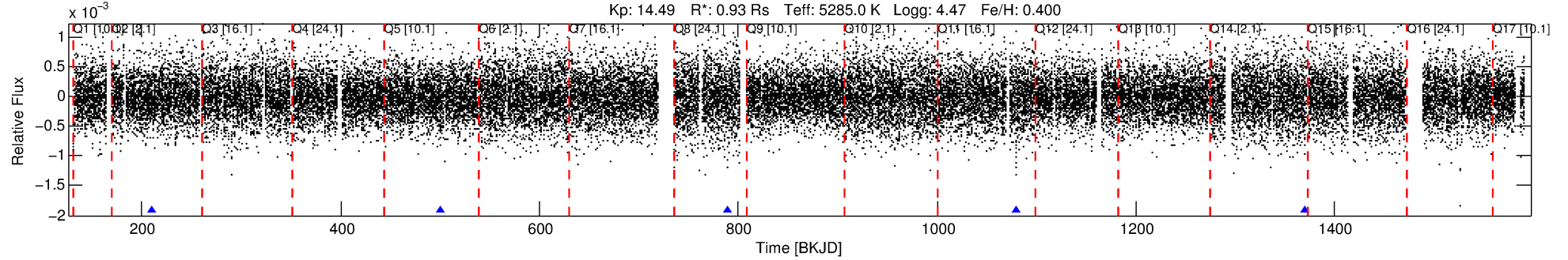
No Significant Match Found

# DV One-Page Summary

KIC: 2708278 Candidate: 3 of 3 Period: 289.788 d

KOI: K04102 Corr: No Ephemeris Match

Kp: 14.49 R\*: 0.93 Rs Teff: 5285.0 K Logg: 4.47 Fe/H: 0.400



## DV Fit Results:

Period = 289.78810 [0.01356] d  
Epoch = 210.4397 [0.0187] BKJD  
Rp/R\* = 0.0248 [0.0148]  
a/R\* = 163.69 [375.33]  
b = 0.83 [0.85]  
Seff = 0.86 [0.13]  
Teq = 245 [10] K  
Rp = 2.51 [1.52] Re  
a = 0.8378 [0.0783] AU  
Ag = 14752.49 [18391.39] [0.80σ]  
Teff = 4179 [1296] K [3.04σ]

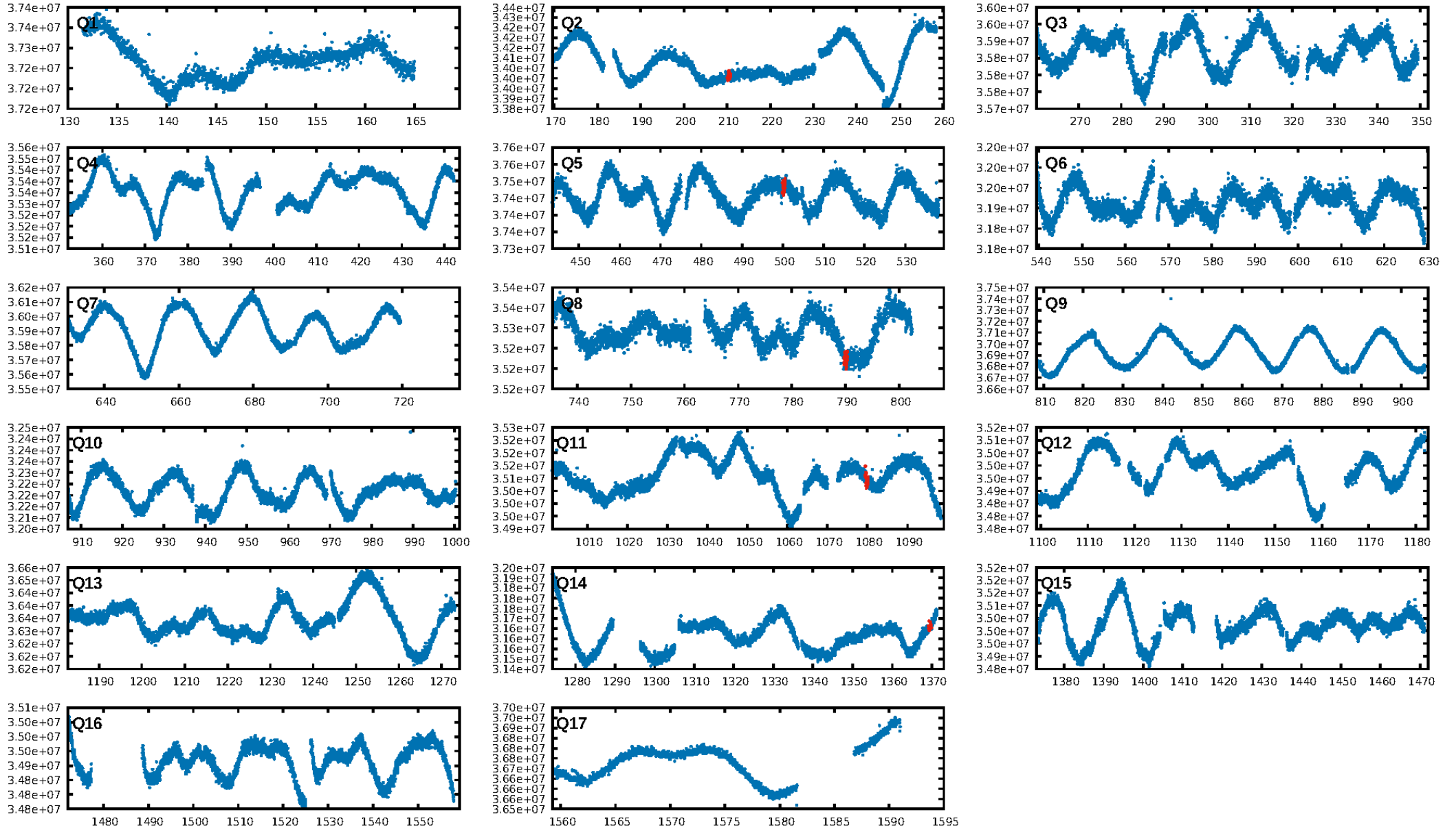
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [738.57σ]  
LongPeriod-sig: 100.0% [491.62σ]  
ModelChiSquare2-sig: 28.9%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 9.92e-10**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -0.4359  
Centroid-sig: 60.9%  
Centroid-so: 0.450 arcsec [0.47σ]  
OotOffset-rm: 4.364 arcsec [1.22σ]  
KicOffset-rm: 4.167 arcsec [1.13σ]  
OotOffset-st: 1/1/0/0 [2]  
KicOffset-st: 1/1/0/0 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 0.20 [1/5]

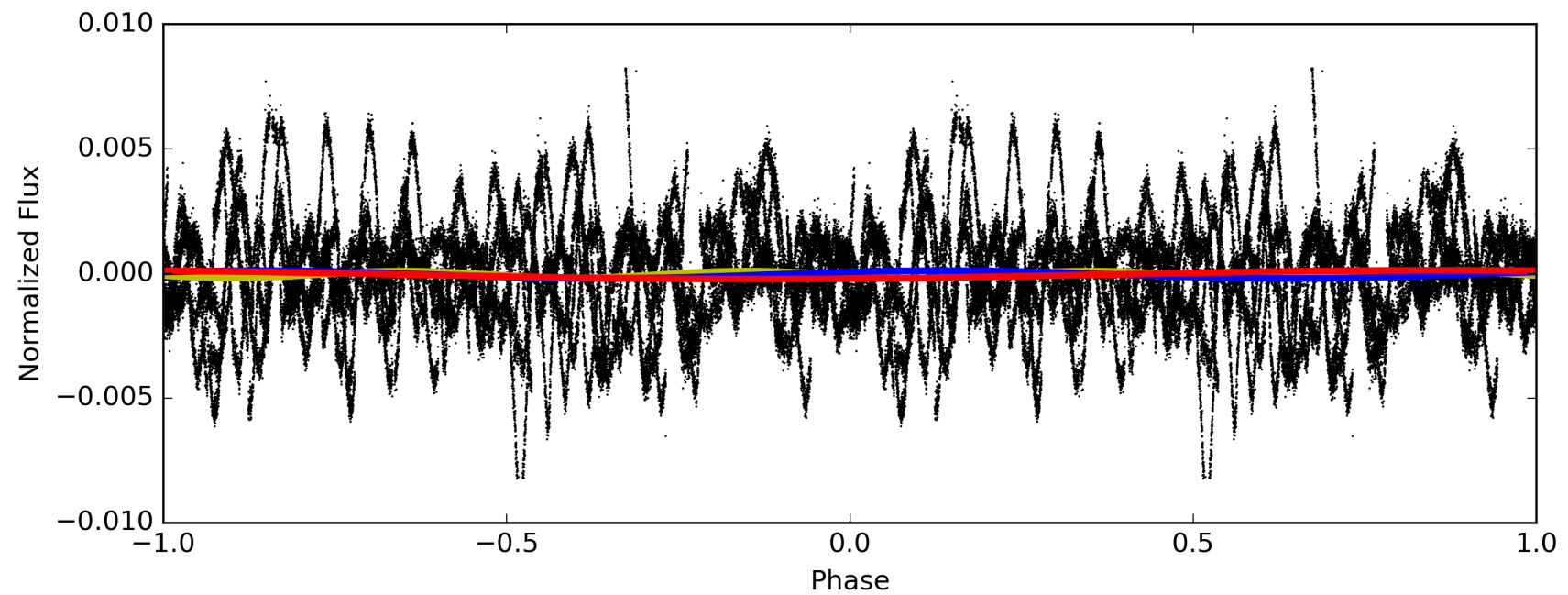
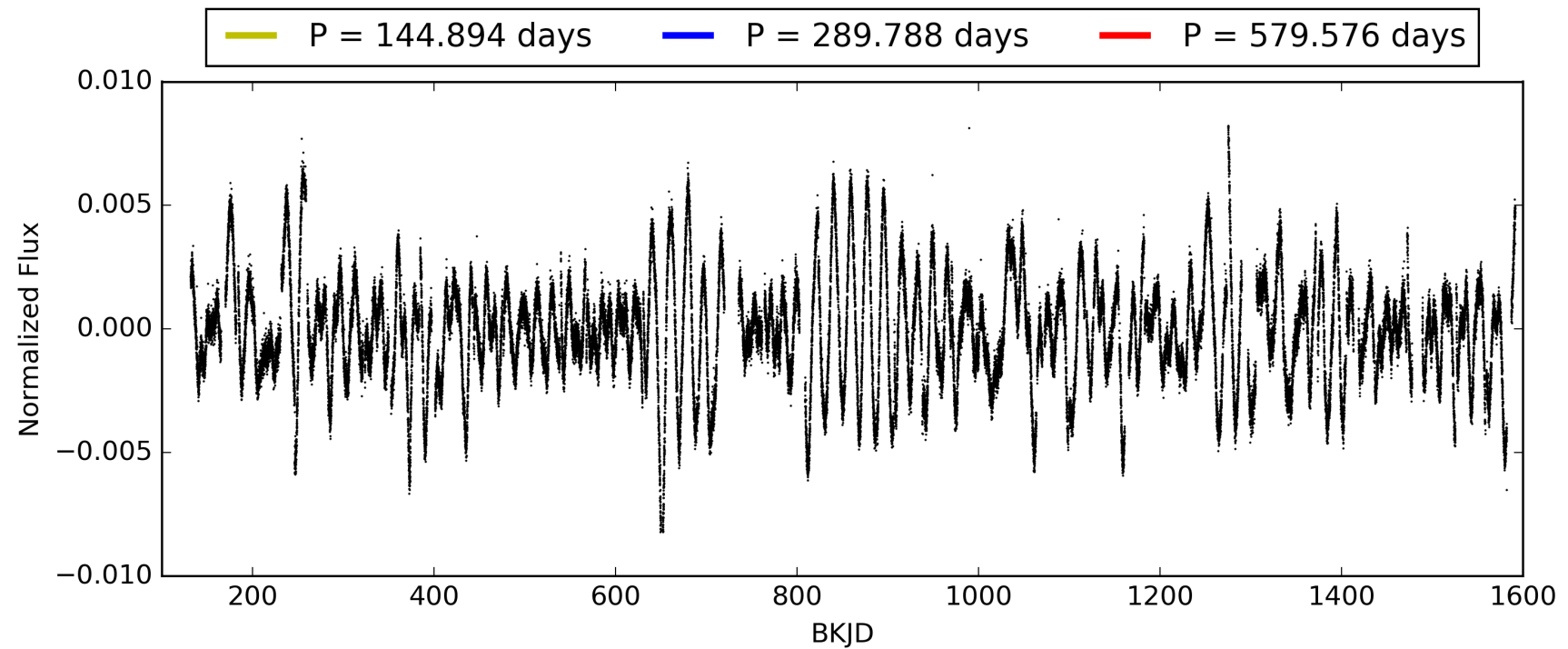
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 04:21:29 Z

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

# TCE 002708278-03, PDC Light Curves



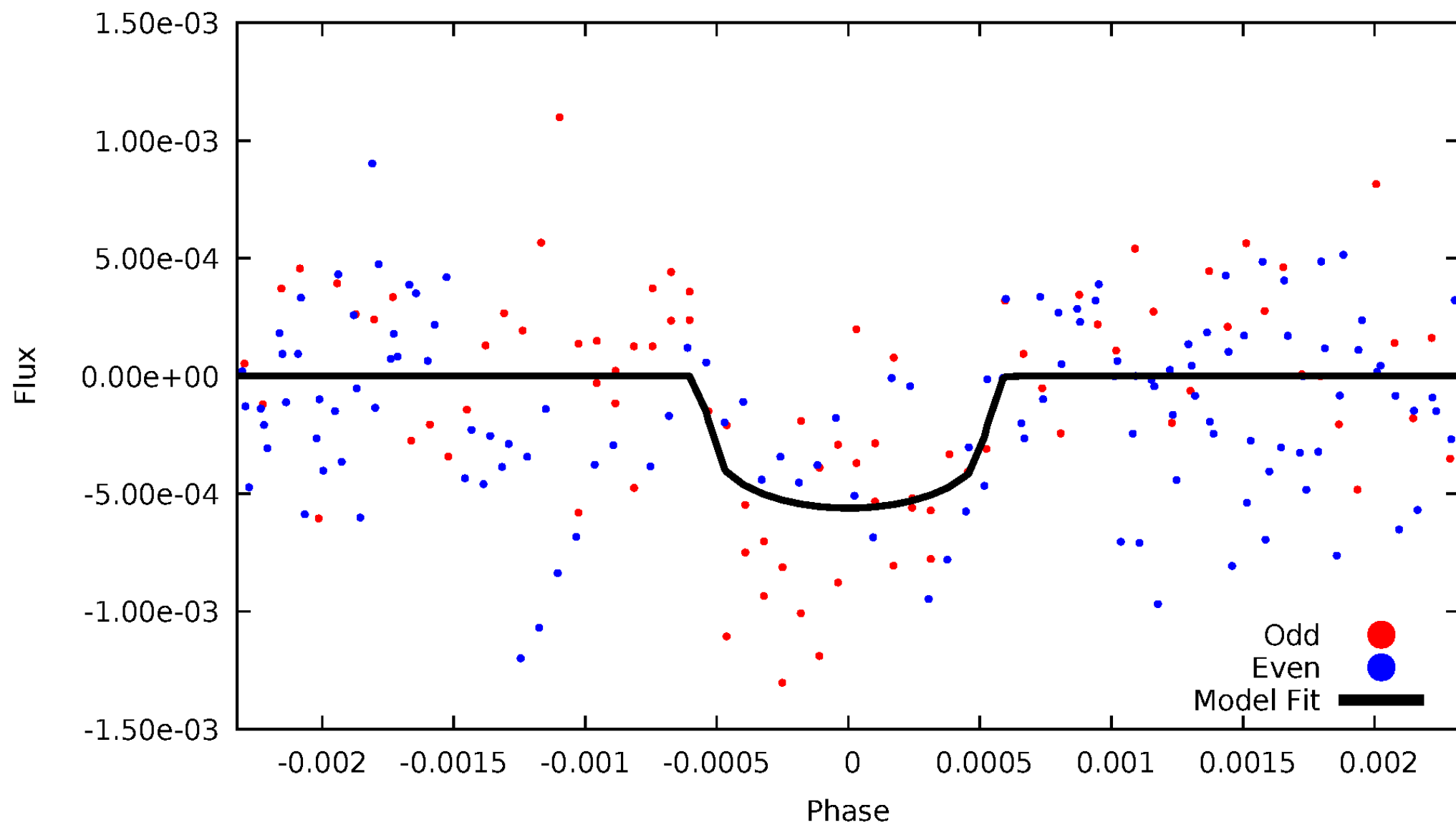
TCE 002708278-03





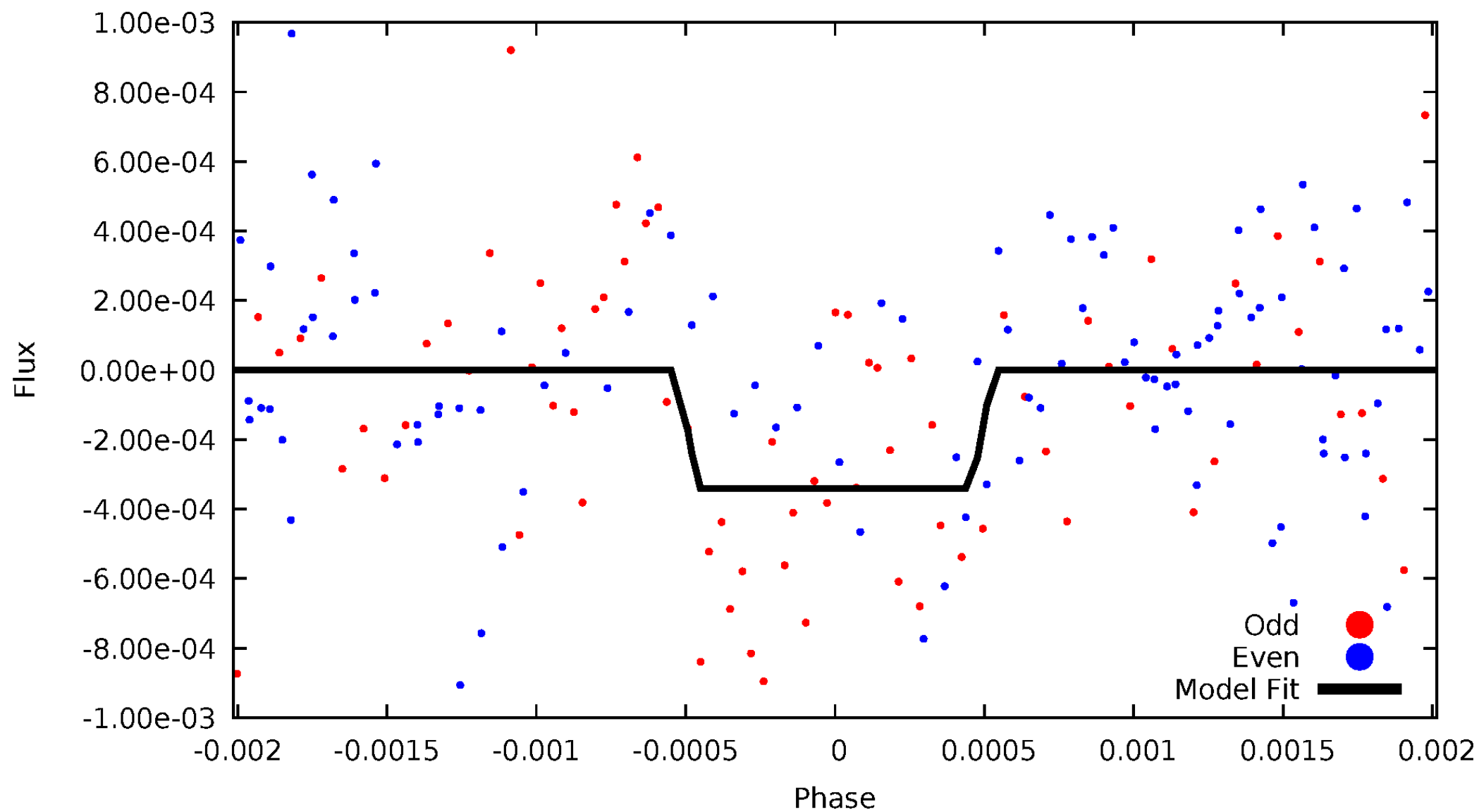
# DV Odd/Even

TCE 002708278-03

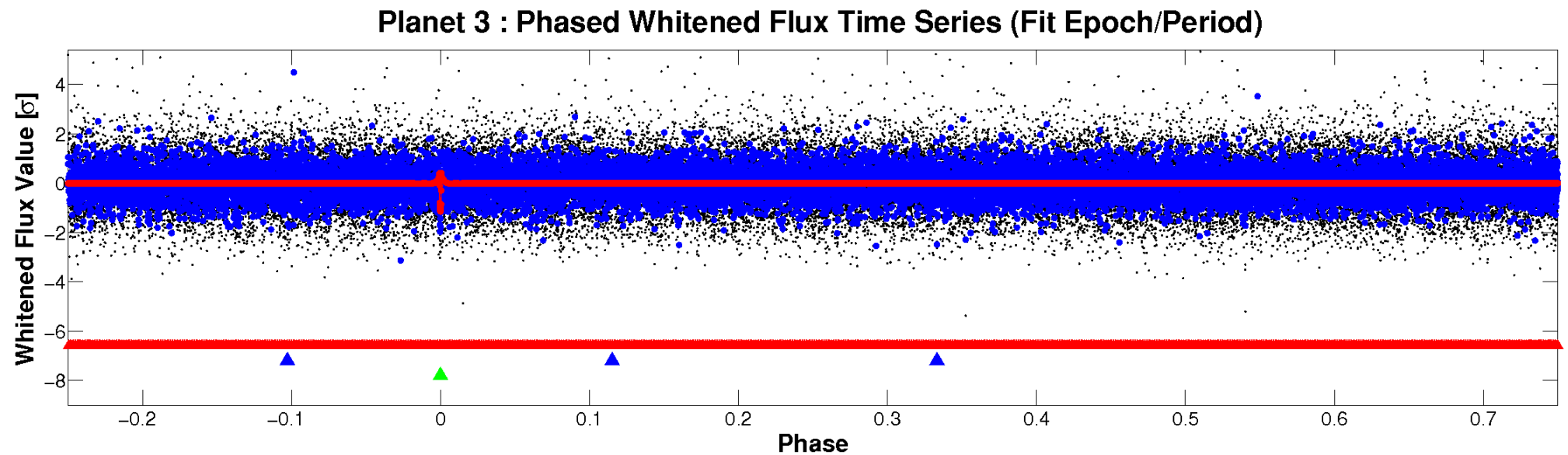
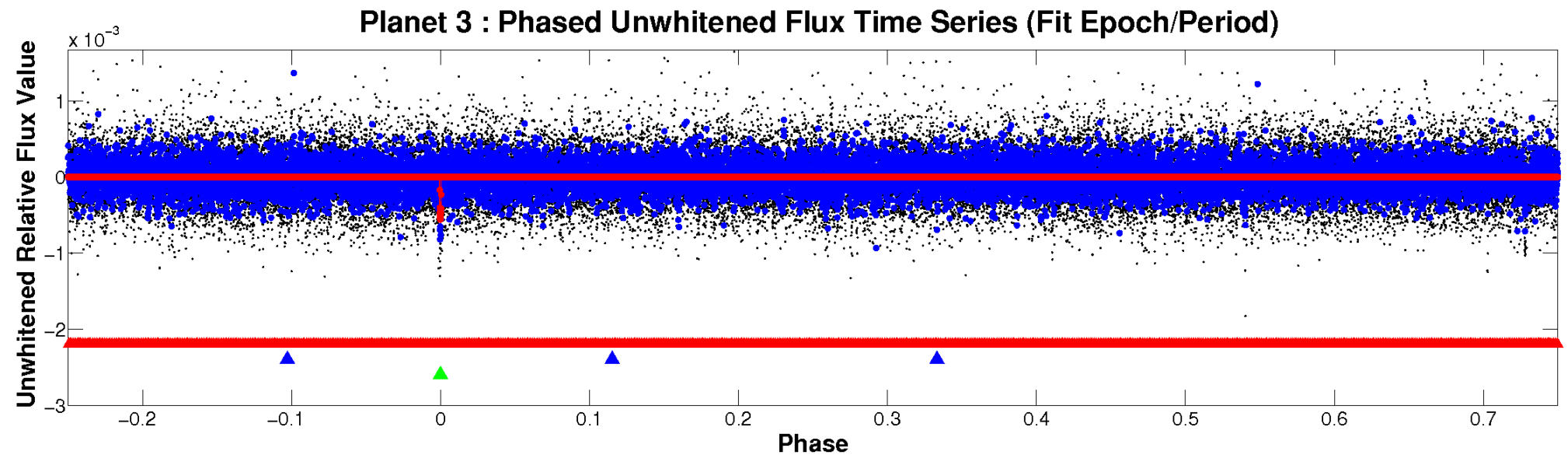


# ALT Odd/Even

TCE 002708278-03

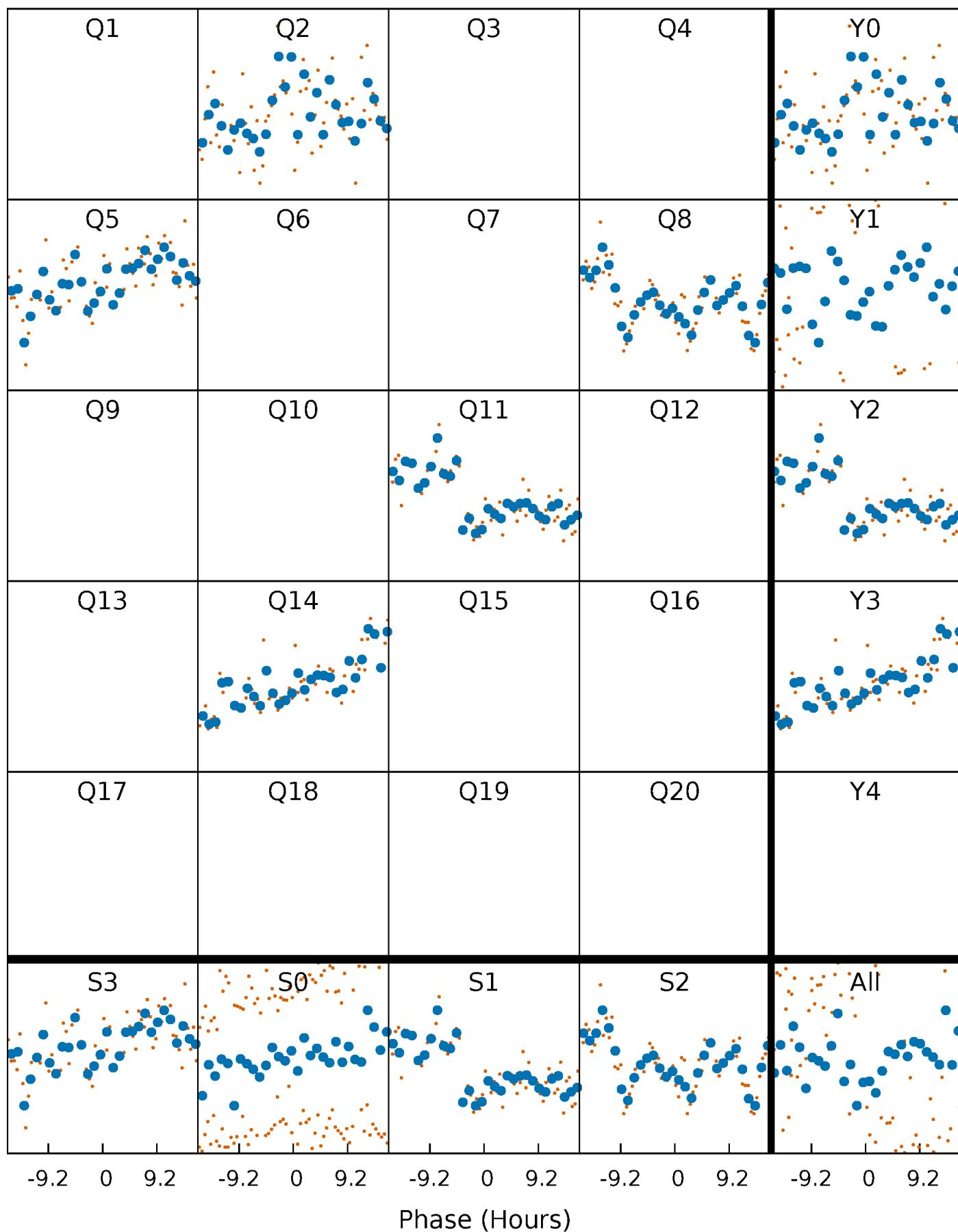


# Non-Whitened Vs. Whitened Light Curve



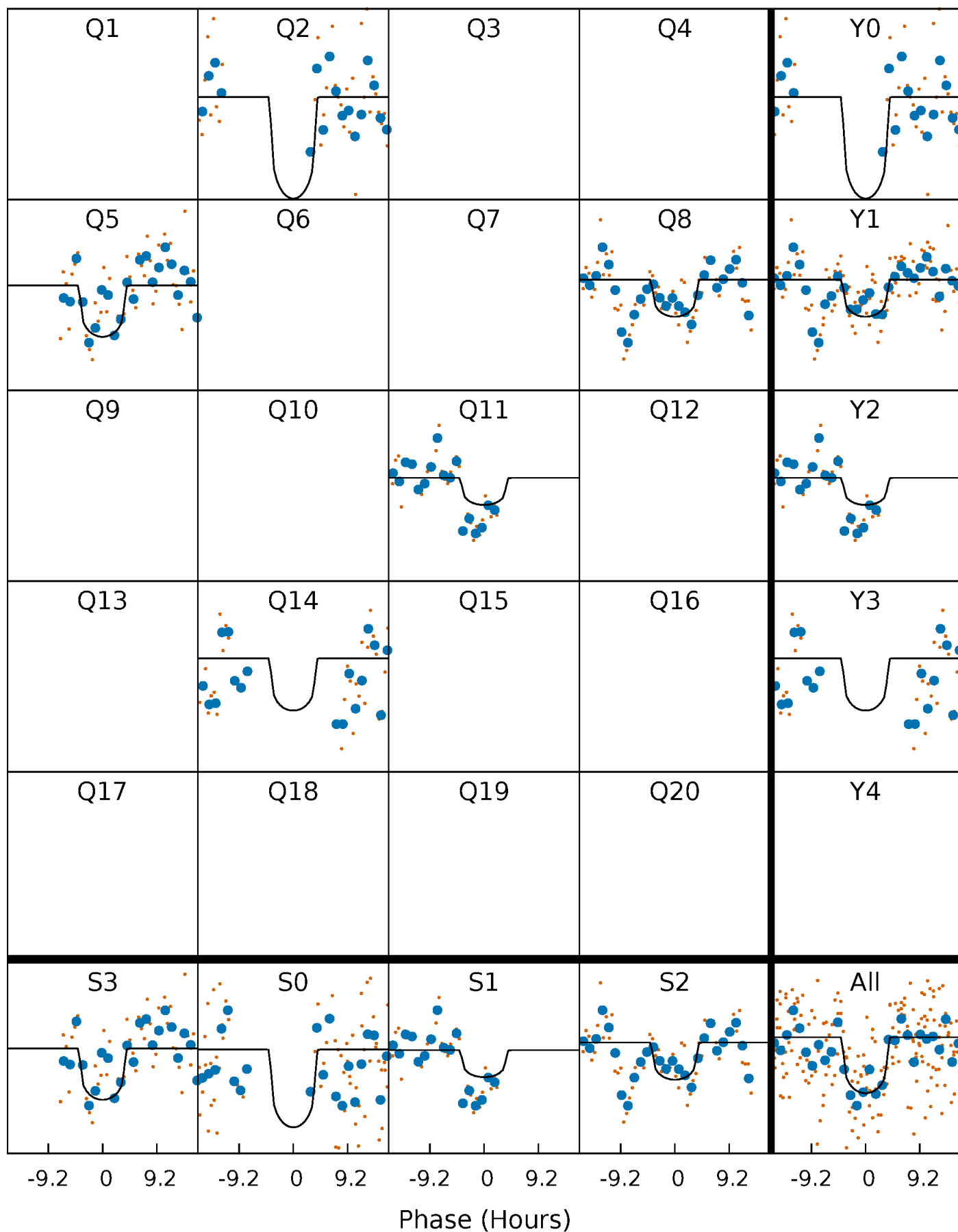
# PDC Quarter-Phased Transit Curves

TCE 002708278-03     $P=289.788098$  Days     $T_0=210.439676$  (BKJD)



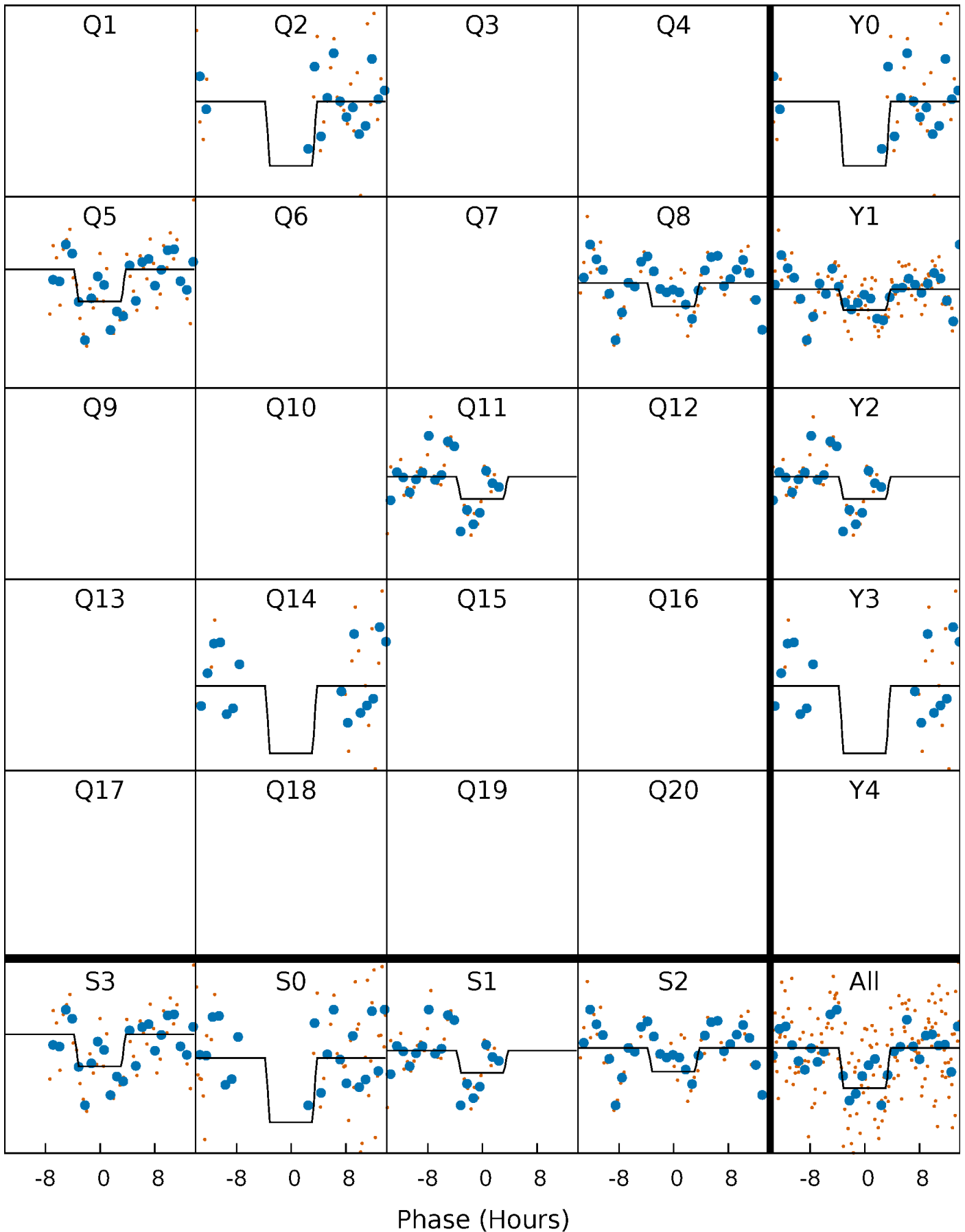
# DV Quarter-Phased Transit Curves

TCE 002708278-03 P=289.788098 Days  $T_0=210.439676$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 002708278-03 P=289.781937 Days  $T_0=210.454660$  (BKJD)

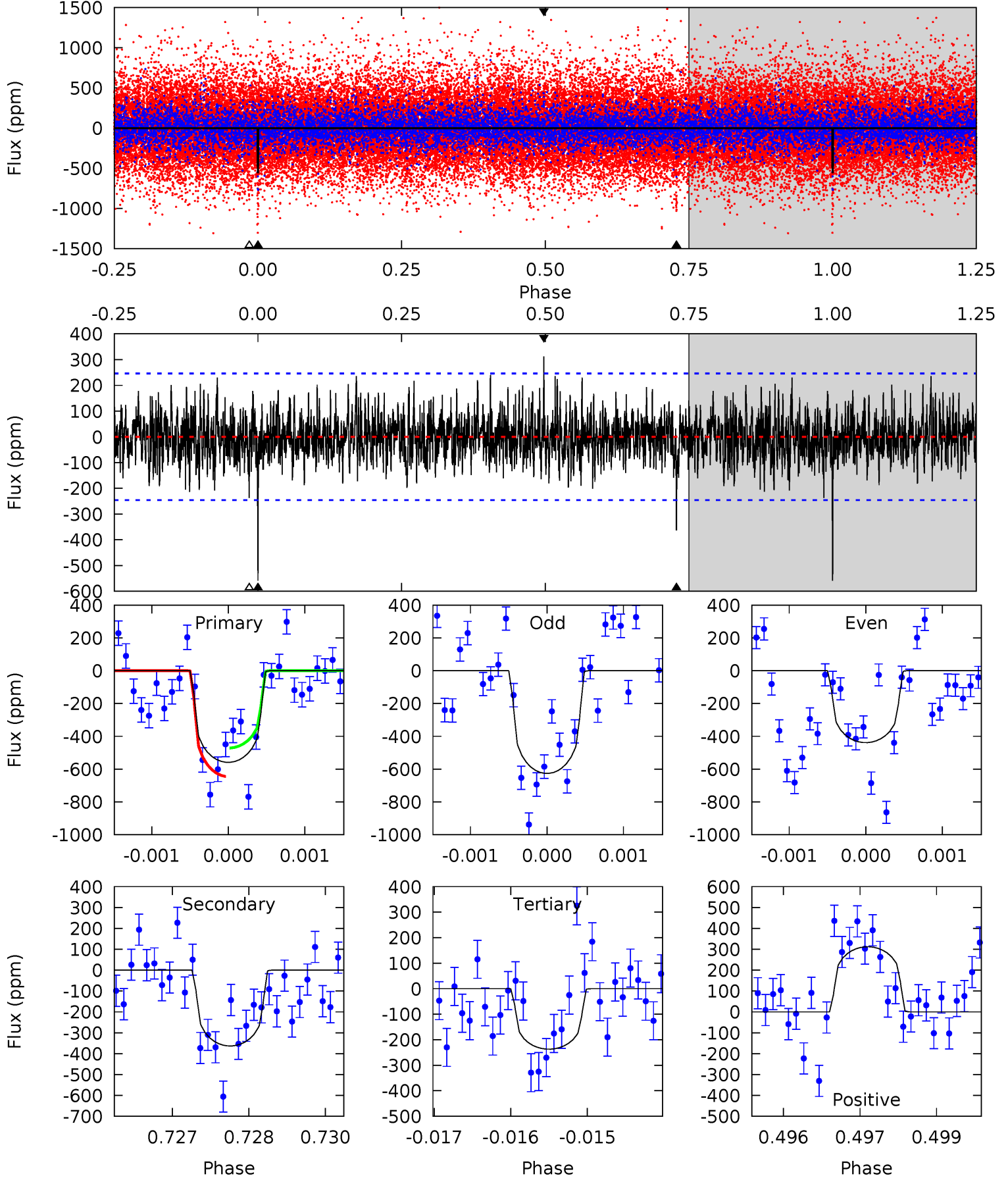




# DV Model-Shift Uniqueness Test

002708278-03, P = 289.788098 Days, E = 210.439676 Days

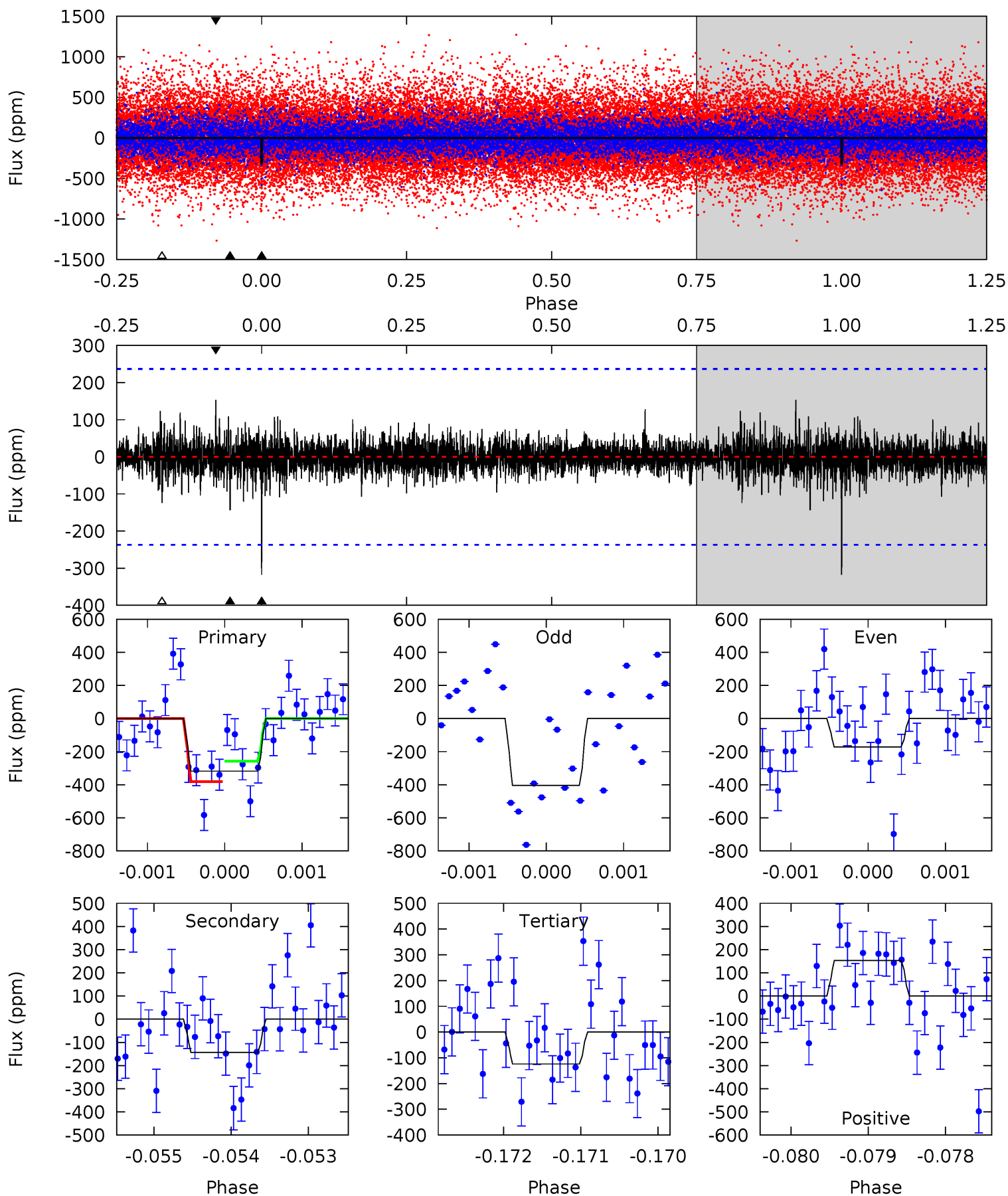
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.3	8.00	5.22	6.87	5.42	3.24	1.56	7.09	5.44	2.78	1.13	2.04	1.24	0.36	1.91



# Alt Model-Shift Uniqueness Test

002708278-03, P = 289.781937 Days, E = 210.454660 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
7.31	3.30	2.85	3.53	5.45	3.28	0.64	4.46	3.78	0.45	-0.23	2.59	1.01	0.33	1.42



### Stellar Parameters For KIC 002708278

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5285^{+84}_{-73}$	$4.474^{+0.060}_{-0.082}$	$0.400^{+0.050}_{-0.150}$	$0.927^{+0.096}_{-0.056}$	$0.933^{+0.031}_{-0.039}$	$1.649^{+0.355}_{-0.419}$
	+2%/-1%	+1%/-2%	+12%/-37%	+10%/-6%	+3%/-4%	+22%/-25%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 002708278-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-363 \pm 45$	$2.57^{+1.52}_{-1.32}$	$344^{+10}_{-10}$	$4691^{+1847}_{-730}$	$20853^{+66251}_{-12347}$
Alt.	$-144 \pm 44$	$2.10^{+1.36}_{-1.20}$	$344^{+11}_{-8}$	$4244^{+1737}_{-706}$	$12624^{+50311}_{-8399}$

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

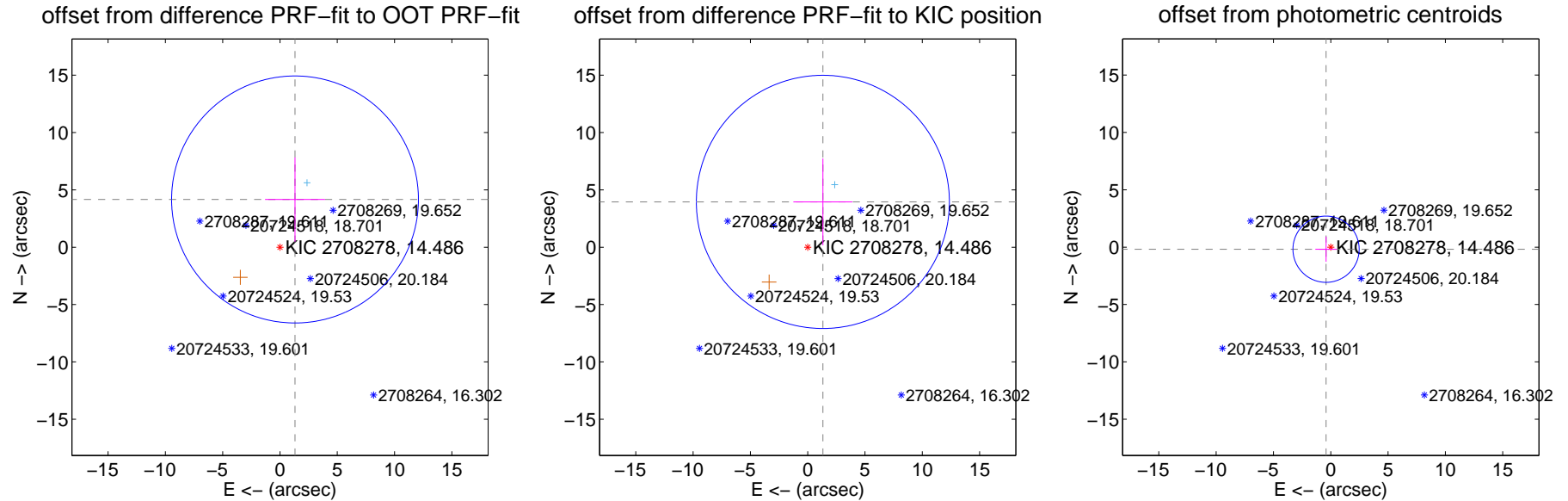
## DV Centroid Data

Supplemental centroid analysis for 002708278-03. Kepler magnitude: 14.49. Transit SNR 6.88

There are 1 quarters with good PRF difference image offsets

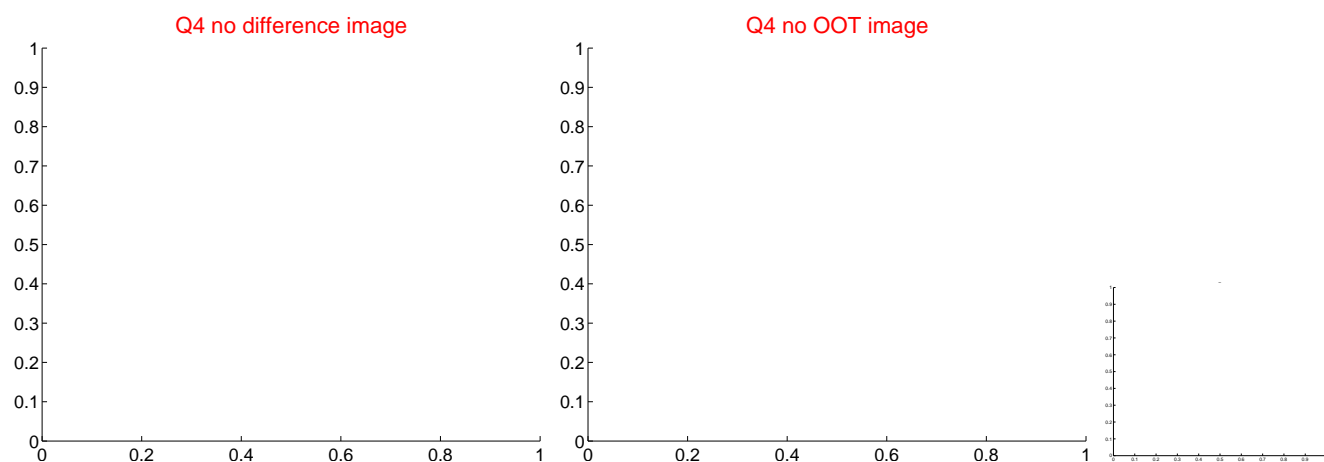
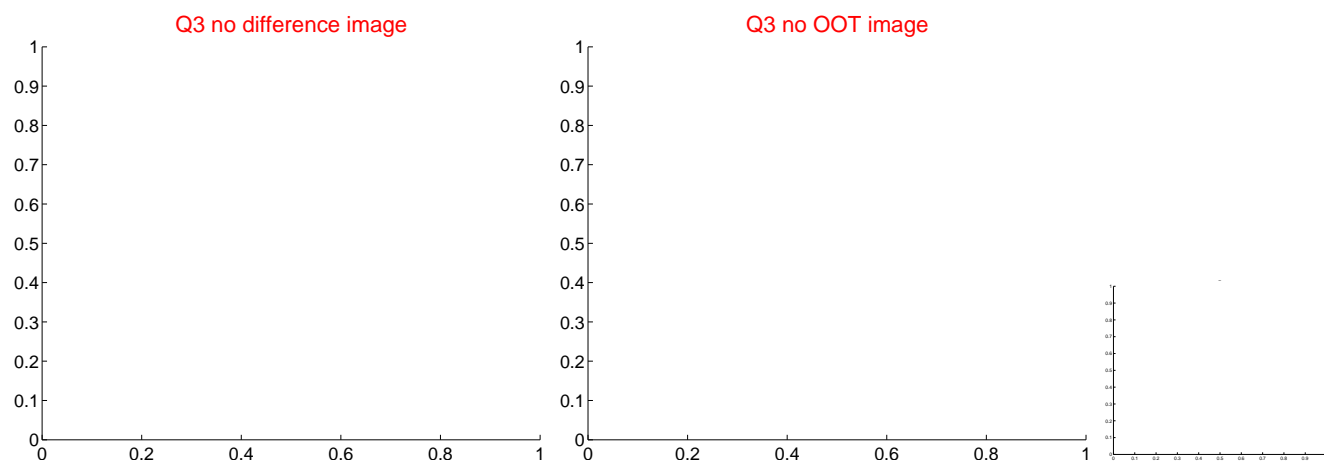
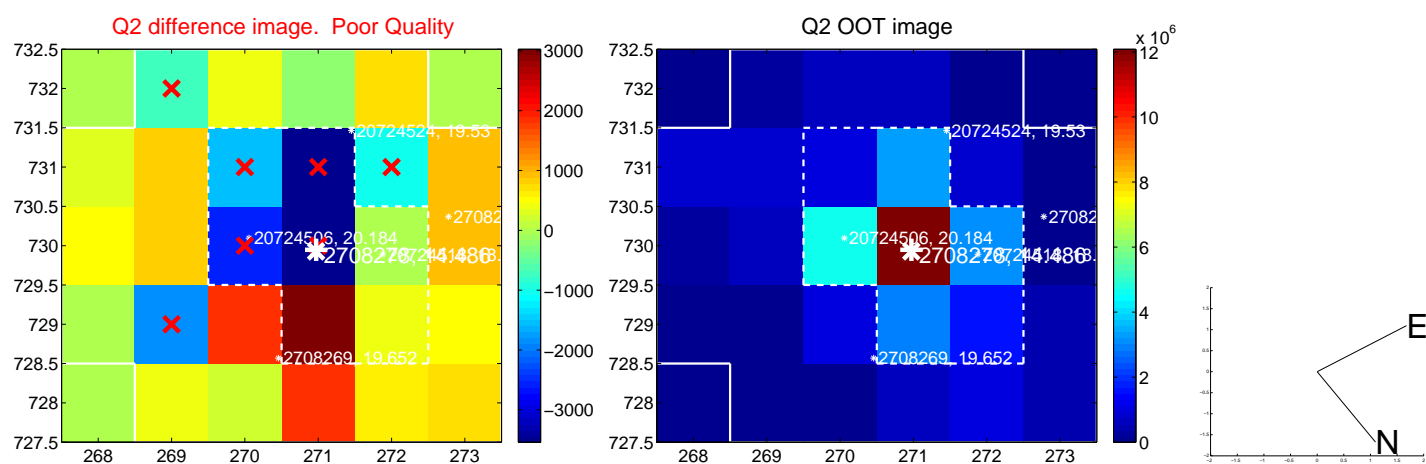
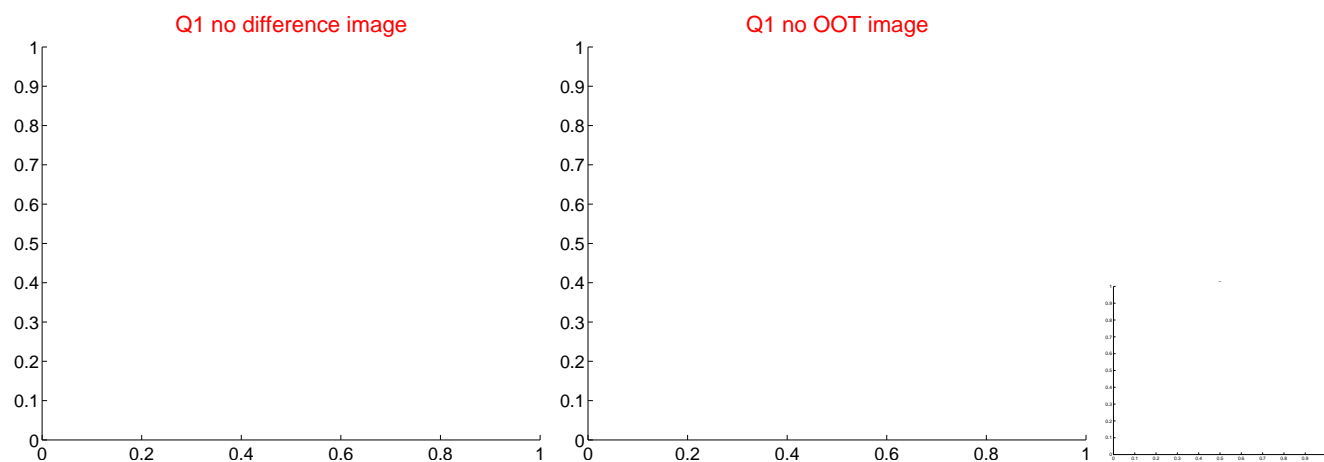
The direct PRF centroid is offset from the target star catalog position by about 0.43 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.364 \pm 3.590$	1.22	$-1.312 \pm 2.616$	$4.162 \pm 3.672$
PRF-fit source offset from KIC position	$4.167 \pm 3.680$	1.13	$-1.324 \pm 2.572$	$3.951 \pm 3.784$
photometric centroid source offset	$0.45 \pm 0.96$	0.47	$0.41 \pm 0.93$	$-0.18 \pm 1.09$

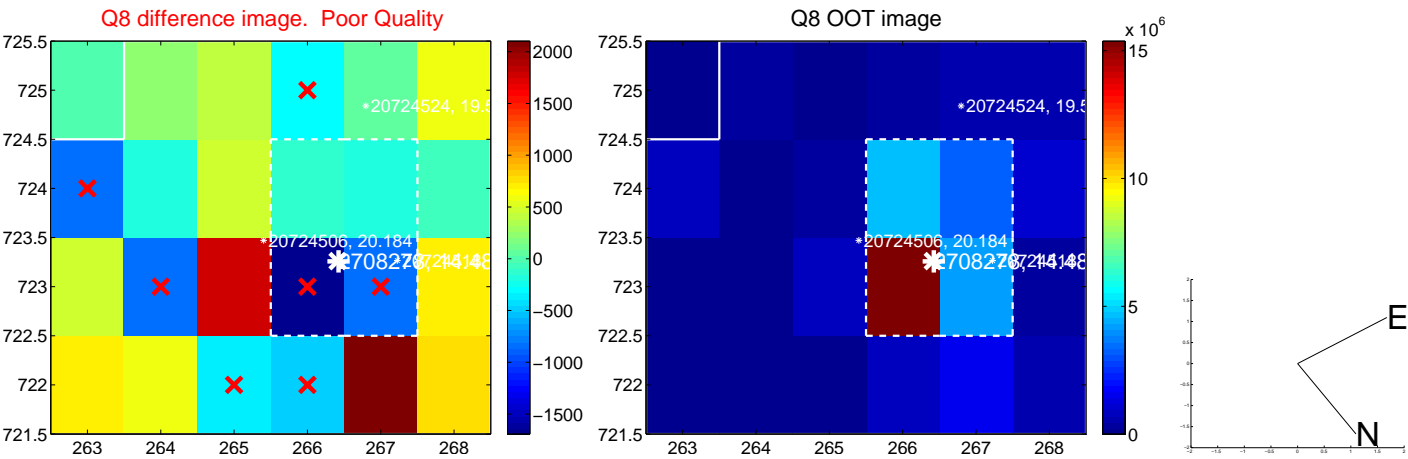
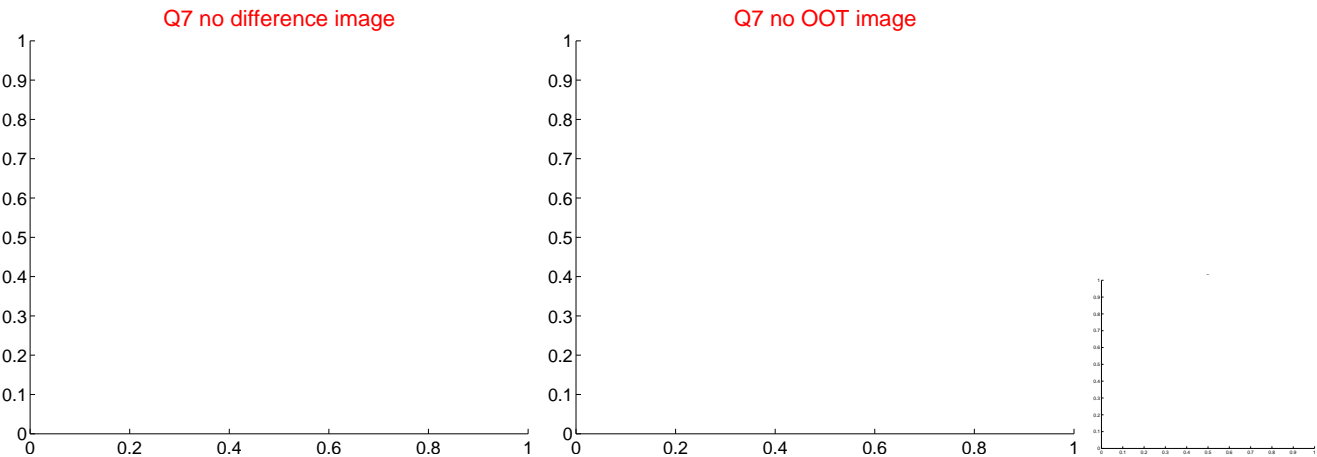
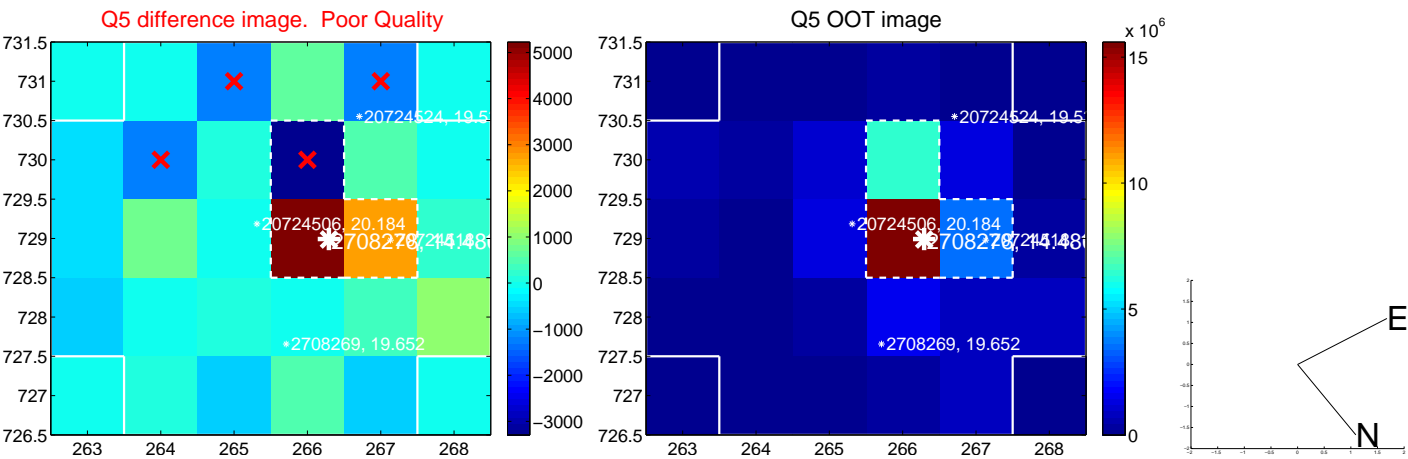


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

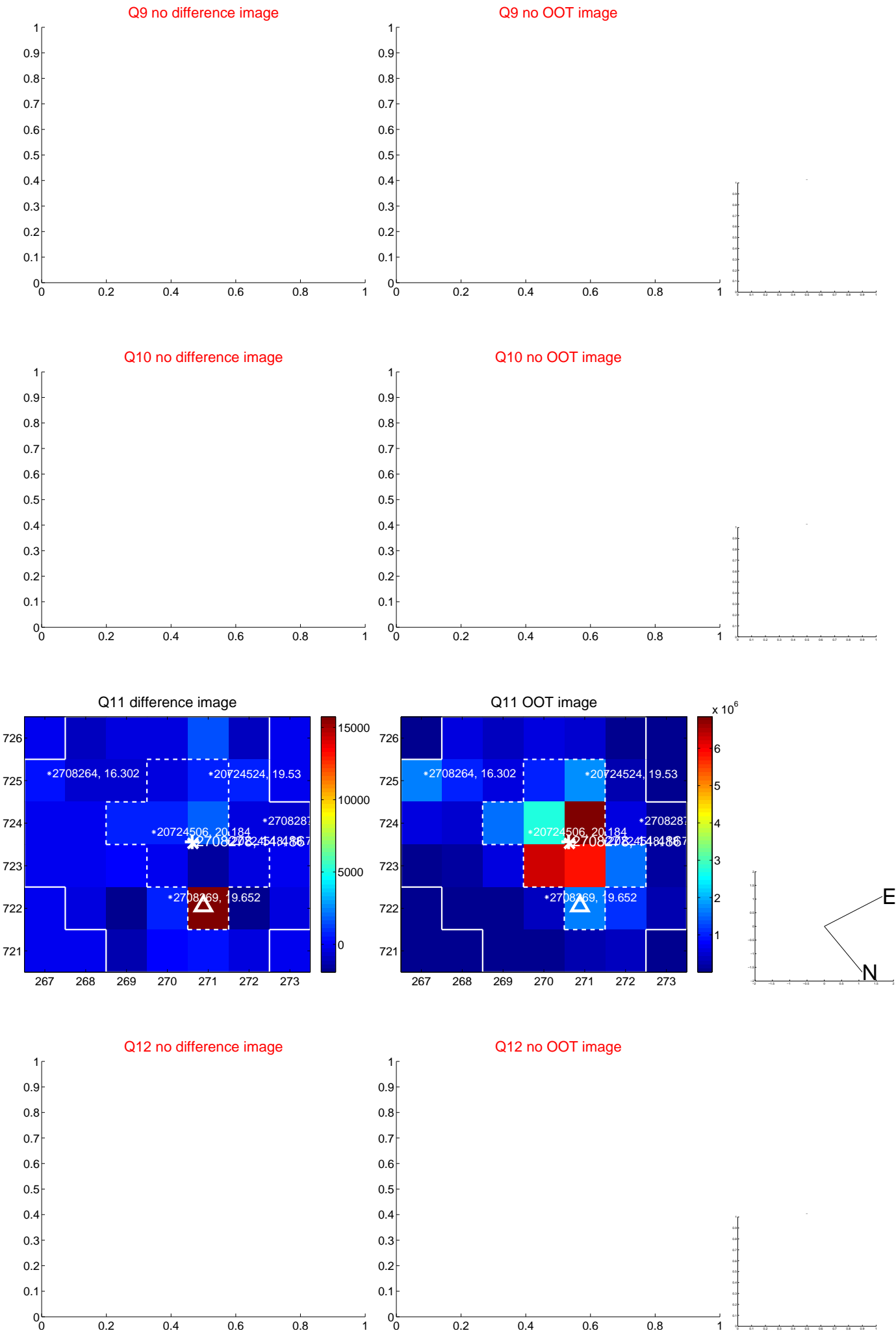
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

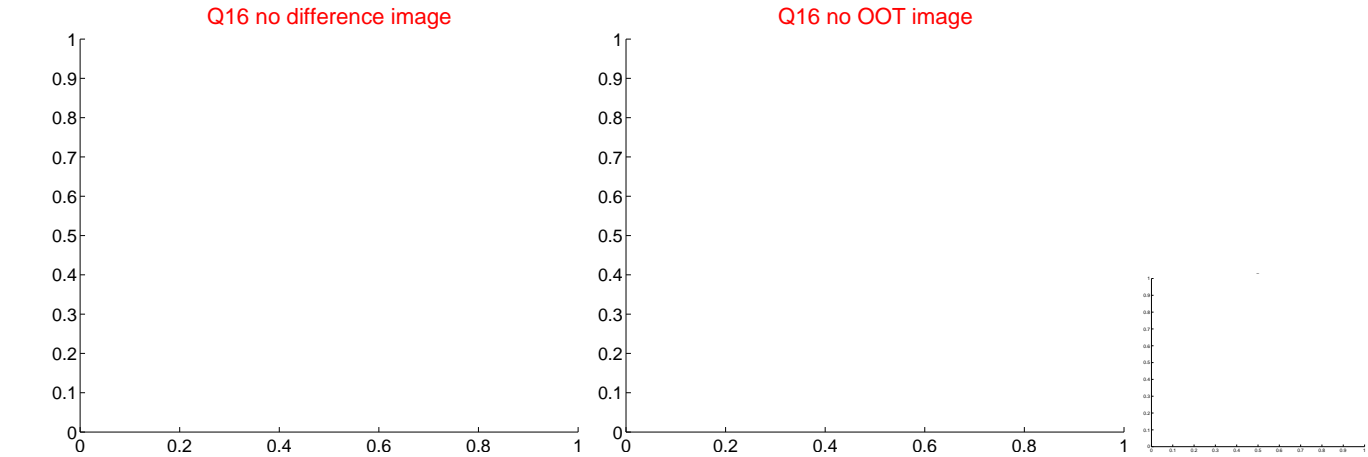
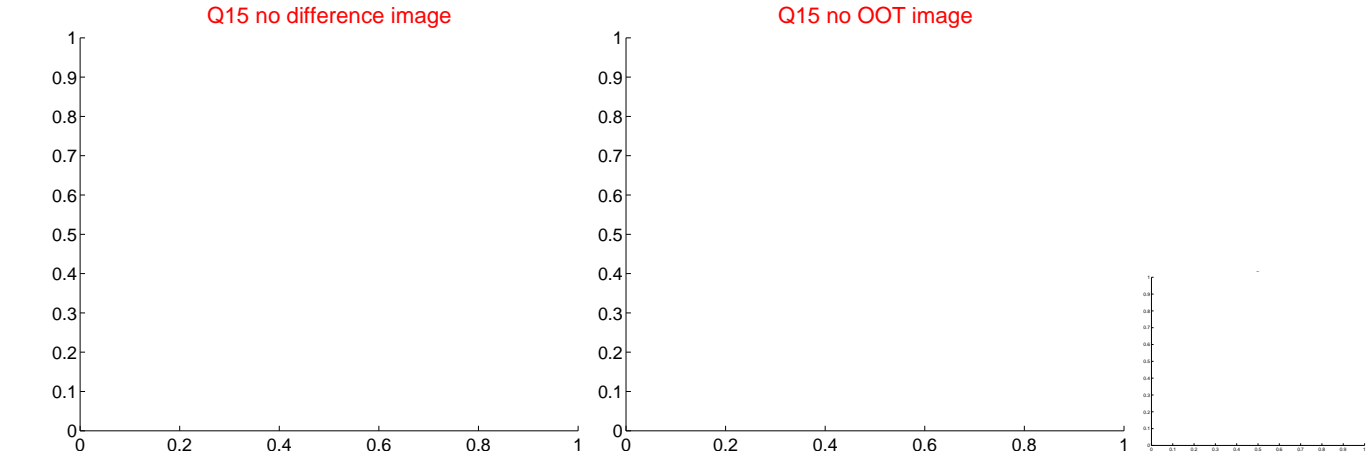
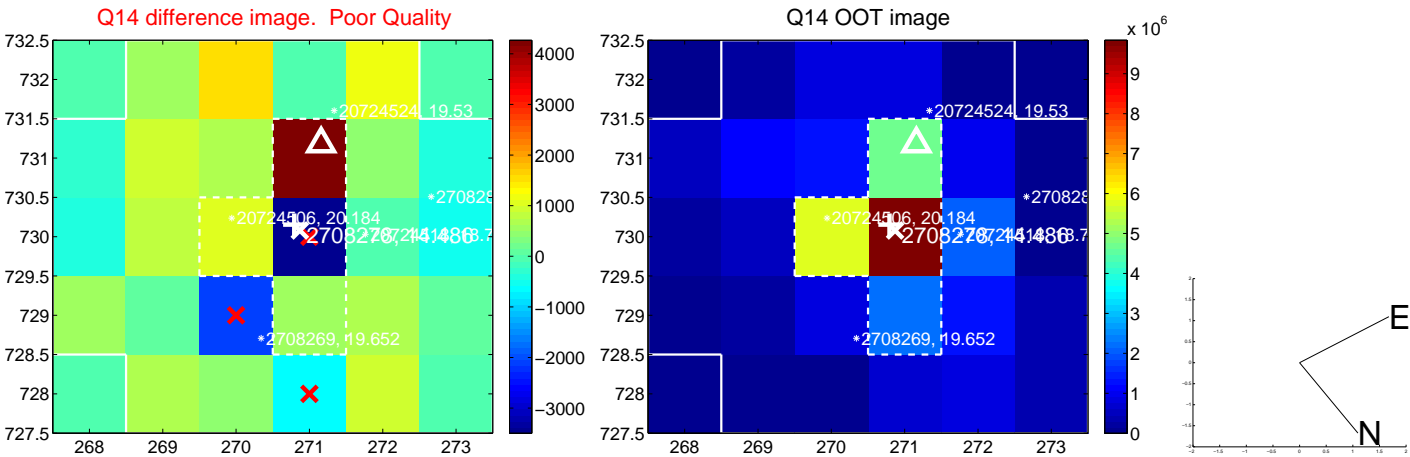
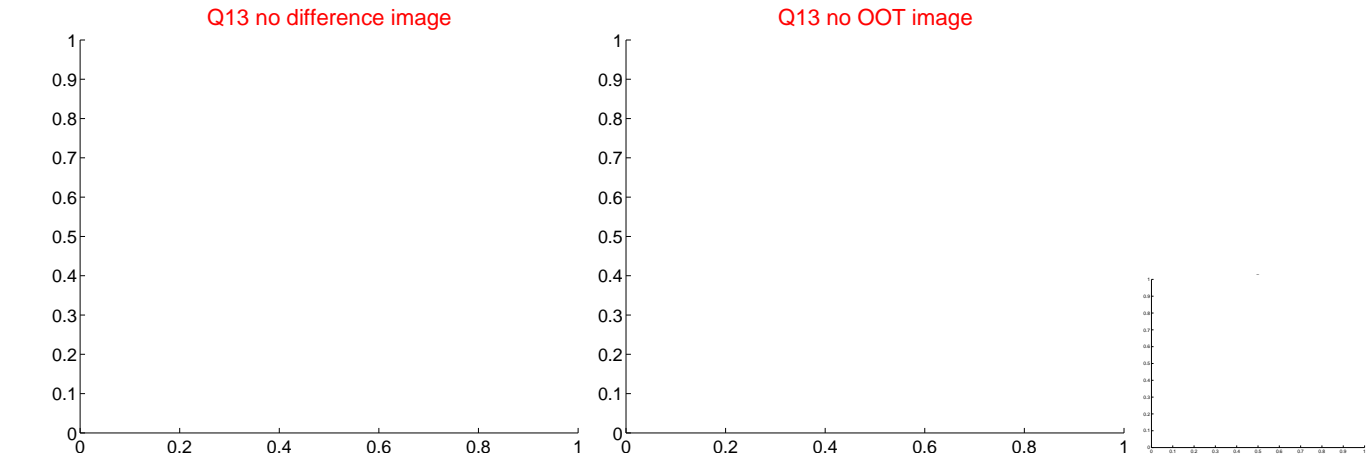


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

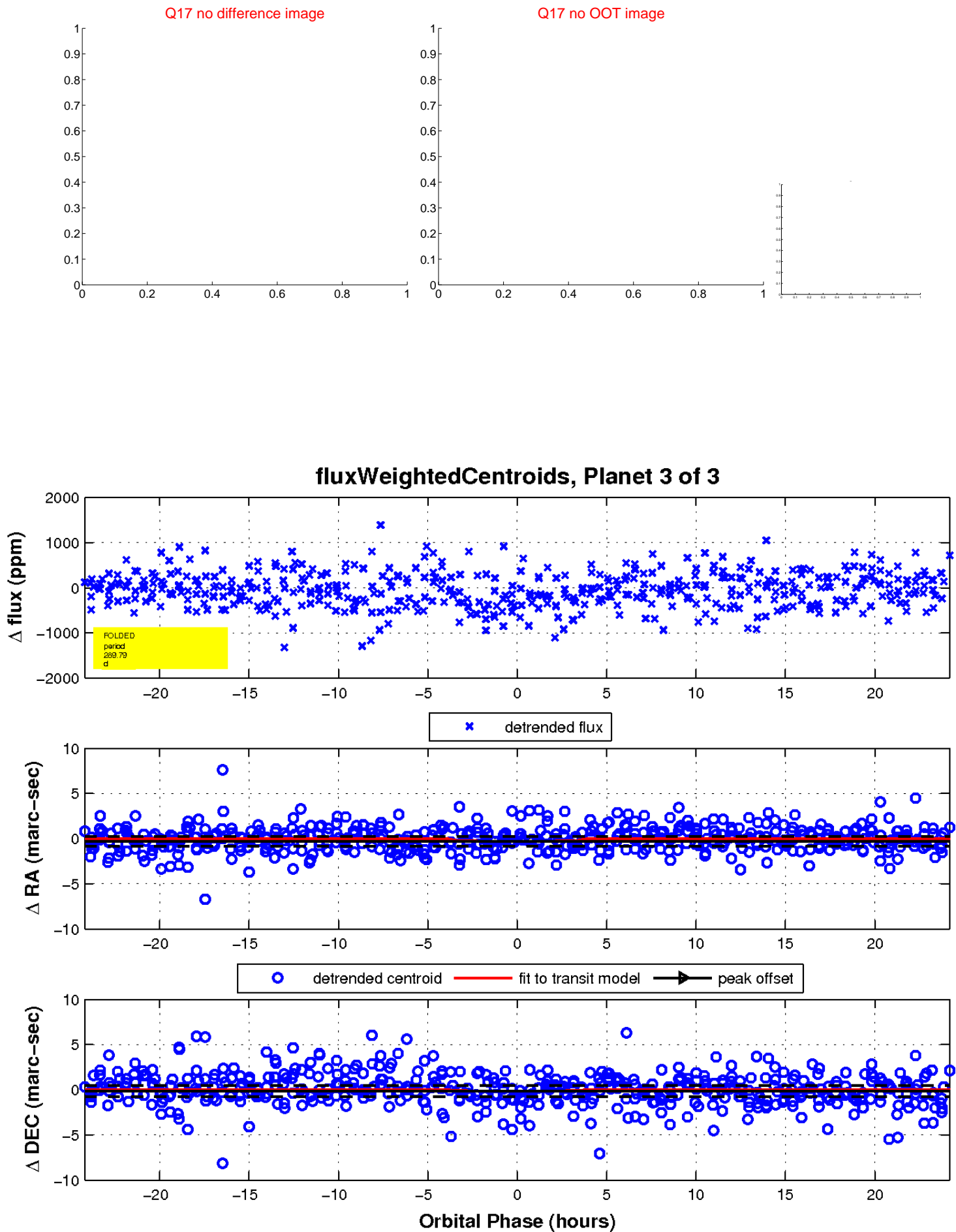




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image

Declination

