

# KIC 009214715

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009214715-01	OBS	6065.01	265.300330	316.918287	31691.9	8.285	361.8	196.9	1.00	6108	18.93	1.81
009214715-02	OBS	6065.02	265.308404	326.241598	1388.7	3.472	12.8	11.5	1.00	6108	3.92	1.81

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009214715-01	OBS	FP	0.00	0	1	0	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_KIC_POS—EPHEM_MATCH
009214715-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH

**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 009214715-01

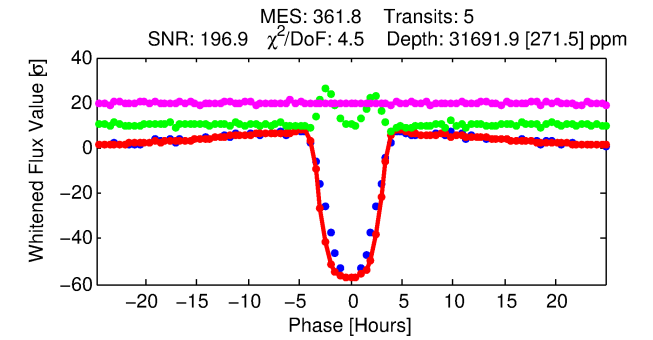
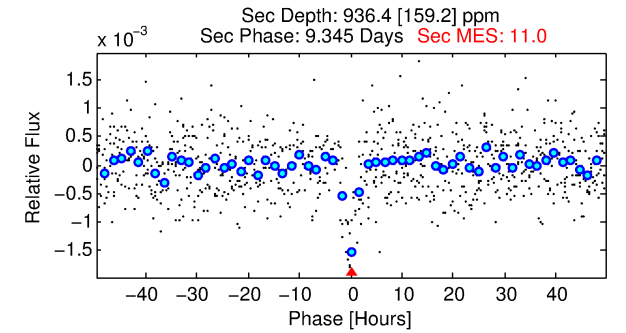
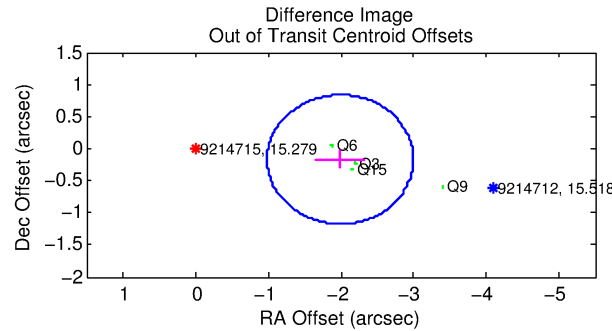
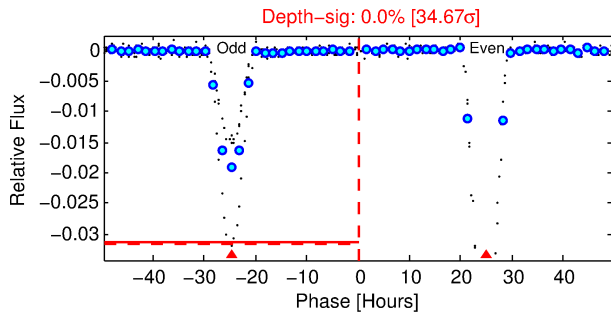
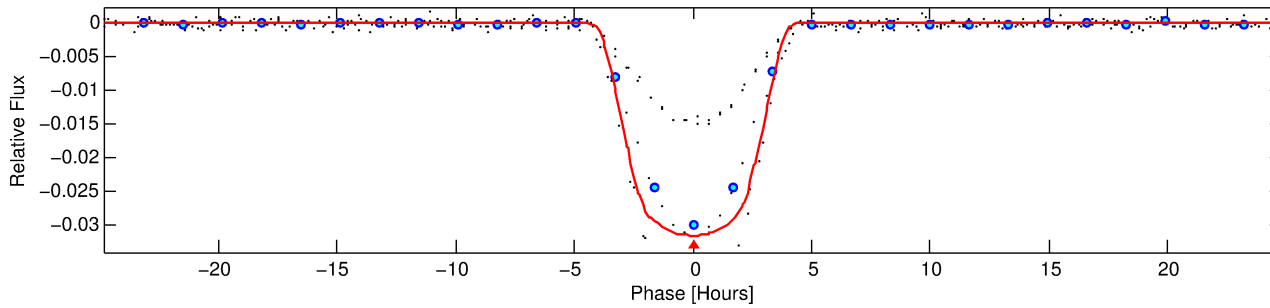
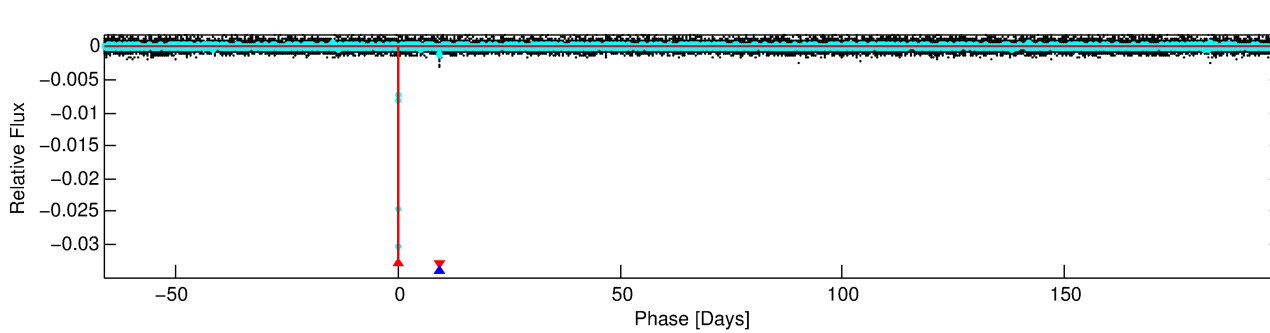
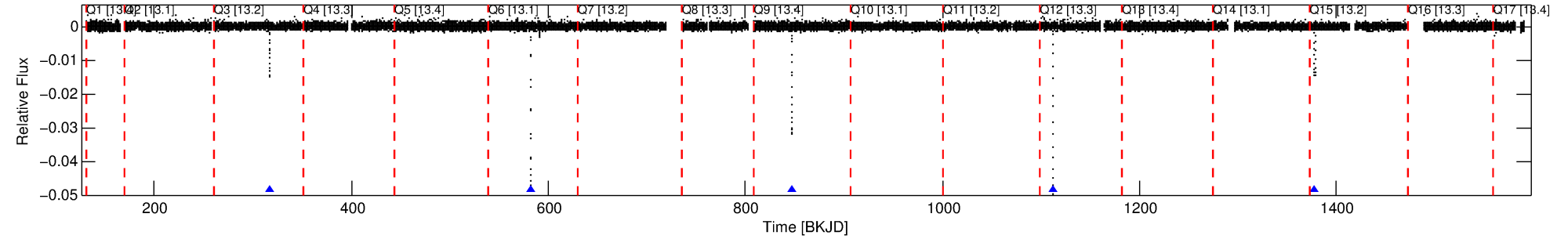
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
009214715-01	9214715	6064.01	9214712	1:1	4.1	-1	0	15.52	15.28	3.25	Direct-PRF	0	0.03	0.01

**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: 9214715 Candidate: 1 of 2 Period: 265.300 d  
KOI: K06065.01 Corr: 0.972

Kp: 15.28 R\*: 1.00 Rs Teff: 6108.0 K Logg: 4.47 Fe/H: -0.080



## DV Fit Results:

Period = 265.30033 [0.00049] d  
Epoch = 316.9183 [0.0012] BKJD  
Rp/R\* = 0.1740 [0.0013]  
a/R\* = 235.08 [5.18]  
b = 0.67 [0.02]  
Seff = 1.81 [0.74]  
Teq = 296 [30] K  
Rp = 18.93 [5.93] Re  
a = 0.8273 [0.2173] AU  
Ag = 983.67 [411.03] [2.39σ]  
Teffp = 2561 [143] K [15.50σ]

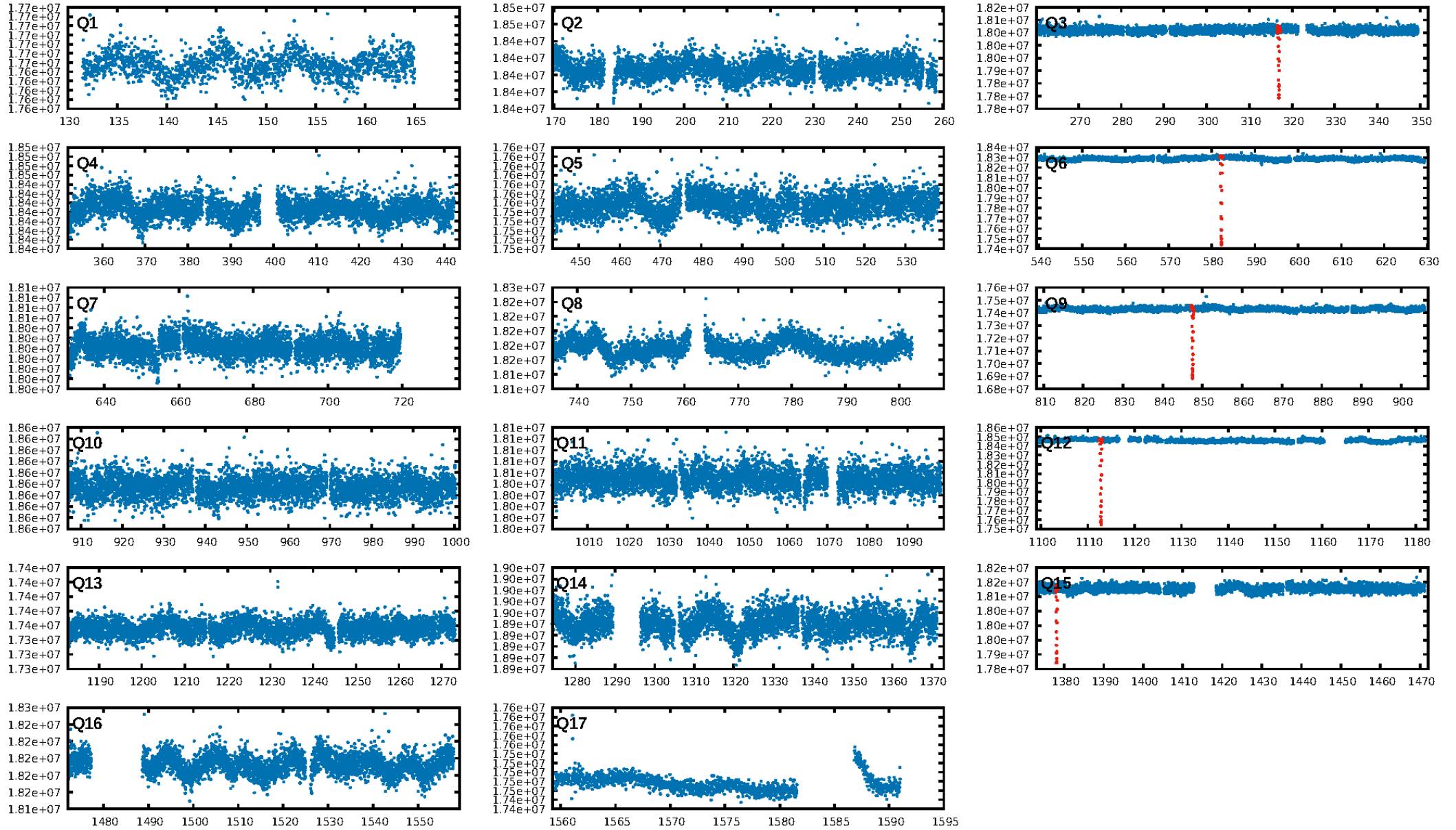
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 1.7% [0.02σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 0.3009  
Centroid-sig: 0.0%  
Centroid-so: 3.919 arcsec [158.90σ]  
OotOffset-rm: 1.996 arcsec [5.96σ]  
OotOffset-st: 1/2/0/1 [4]  
KicOffset-rm: 4.301 arcsec [62.76σ]  
KicOffset-st: 1/2/0/1 [4]  
DiffImageQuality-fgm: 1.00 [4/4]  
DiffImageOverlap-fno: 1.00 [4/4]

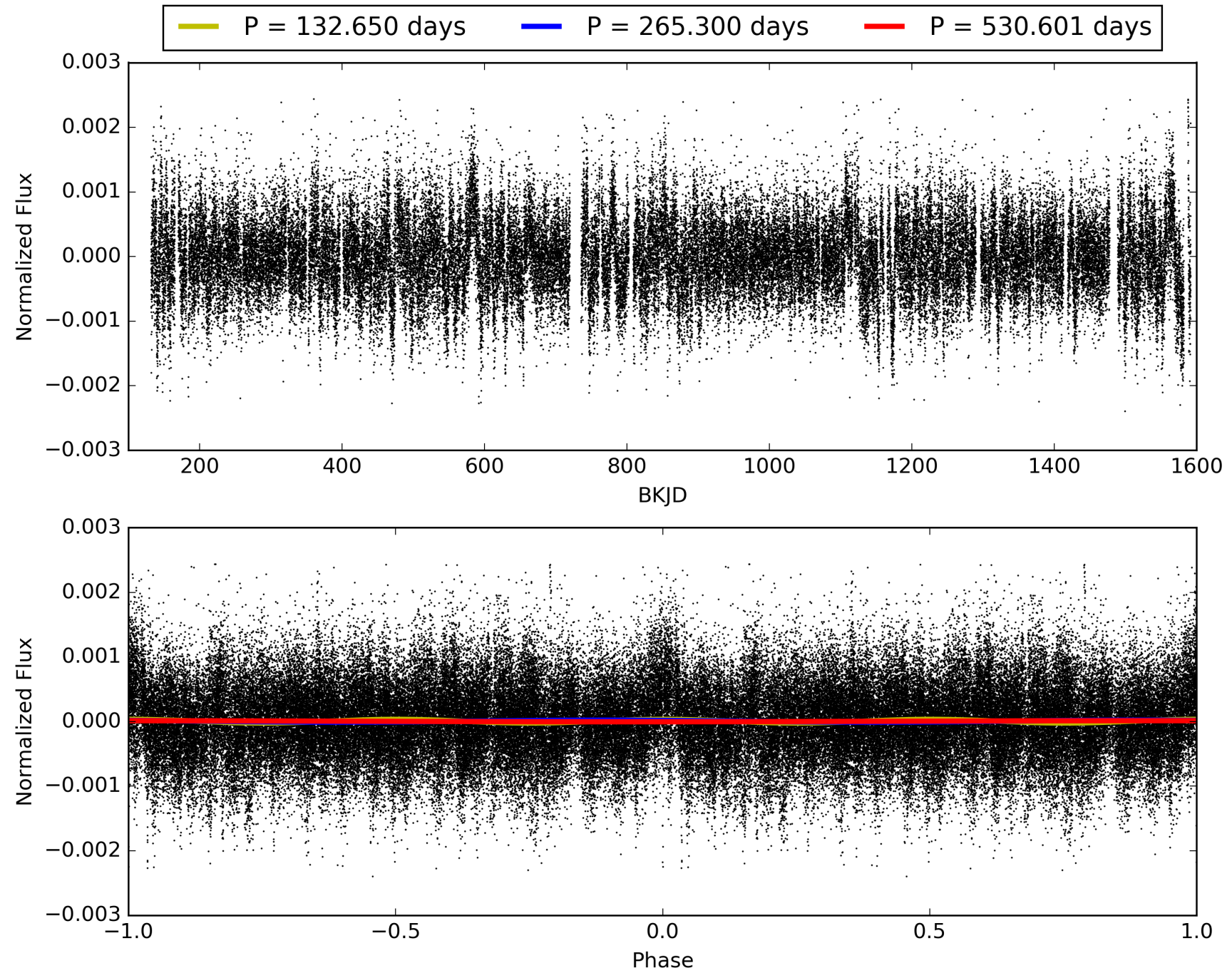
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 18:28:59 Z

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

# TCE 009214715-01, PDC Light Curves

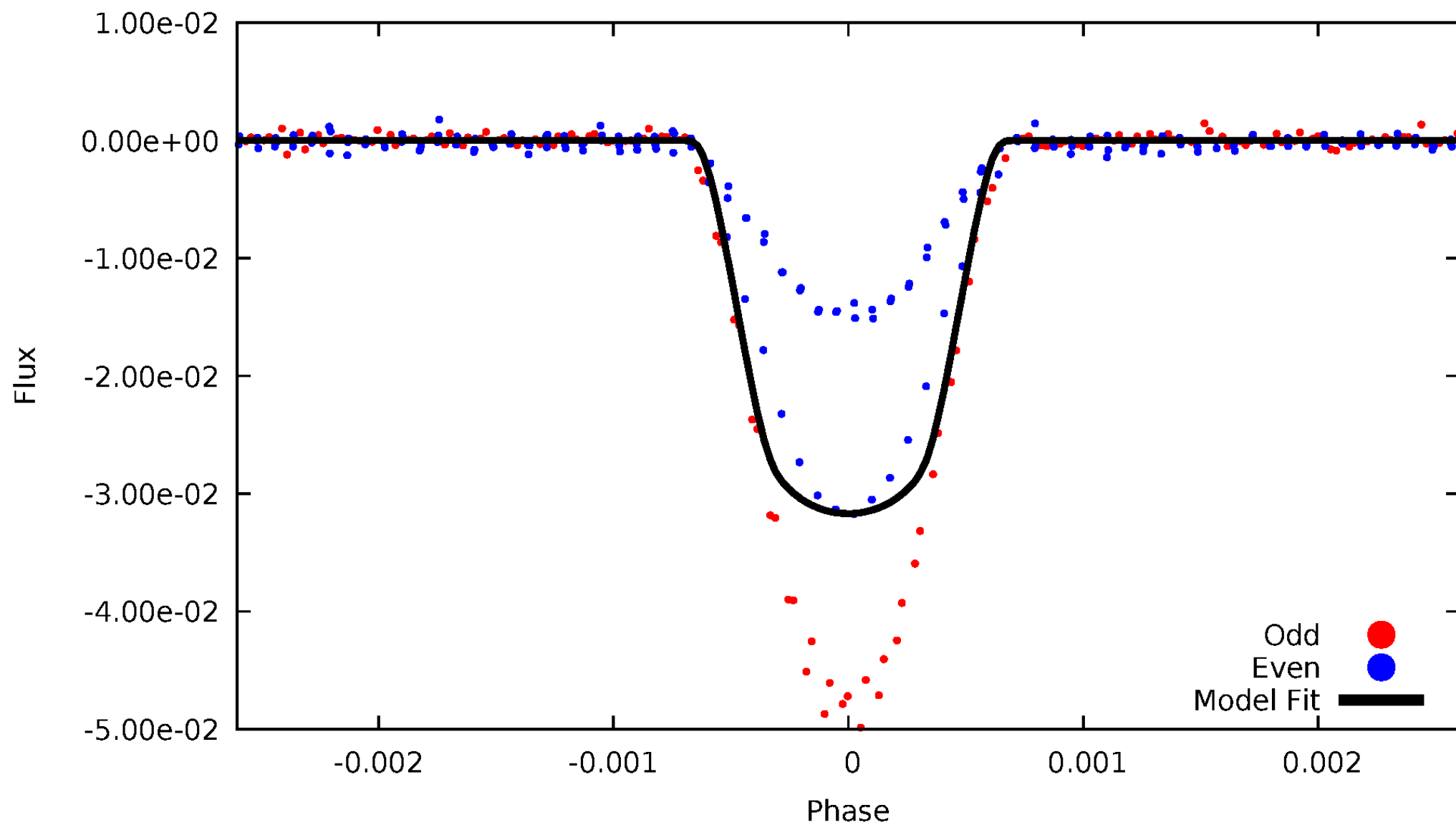


TCE 009214715-01



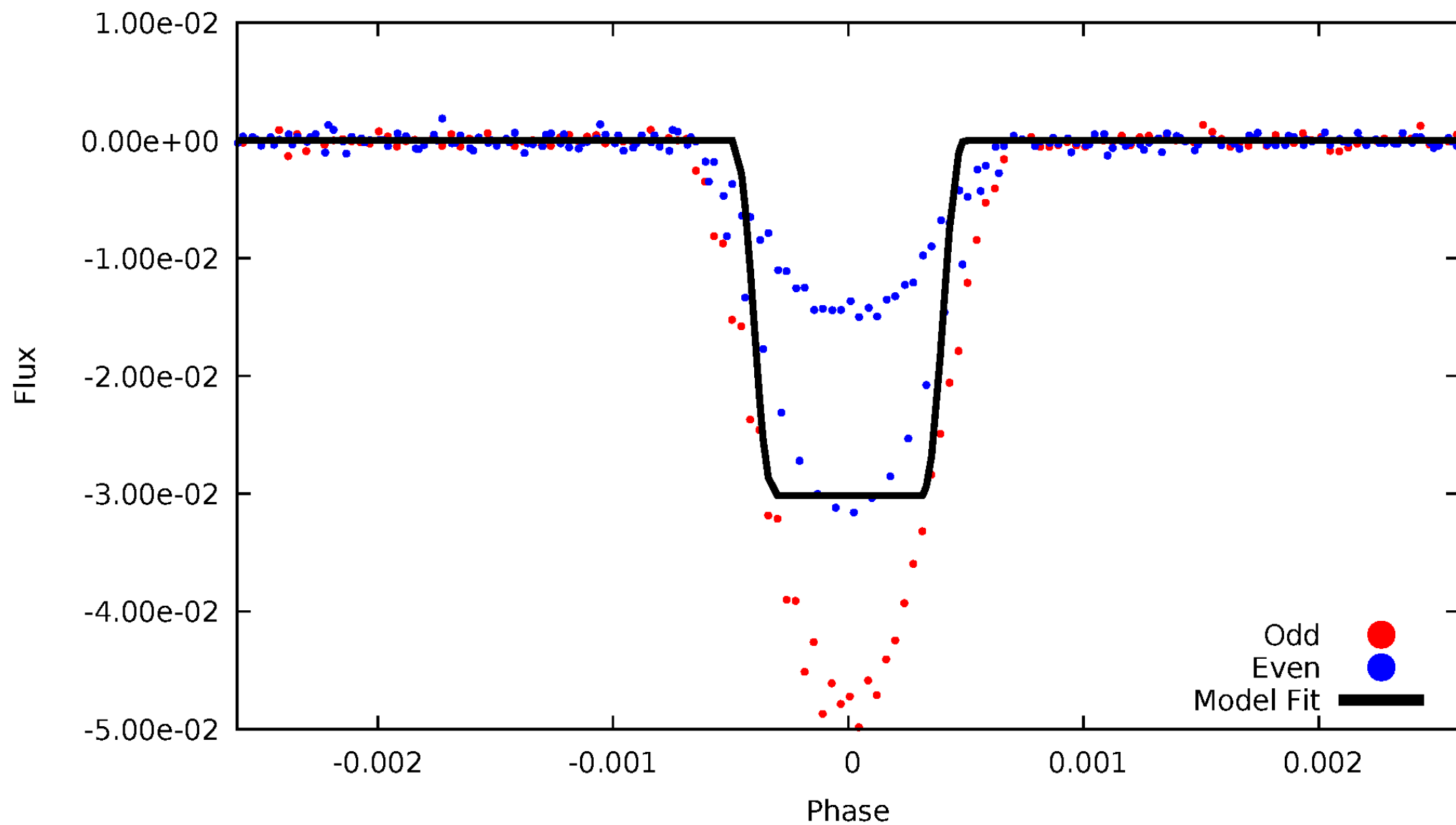
# DV Odd/Even

TCE 009214715-01



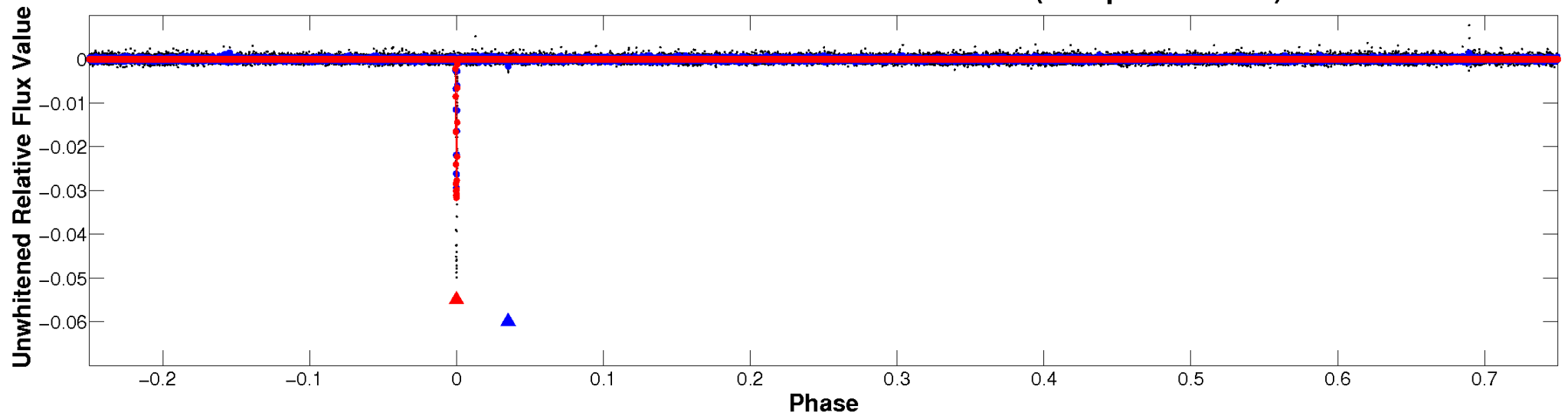
# ALT Odd/Even

TCE 009214715-01

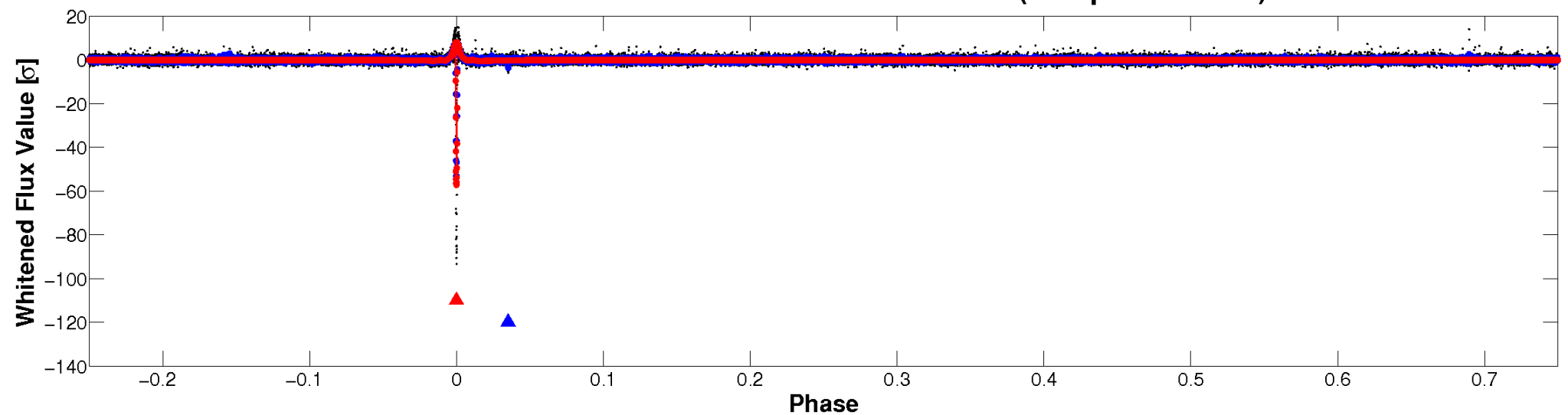


# Non-Whitened Vs. Whitened Light Curve

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

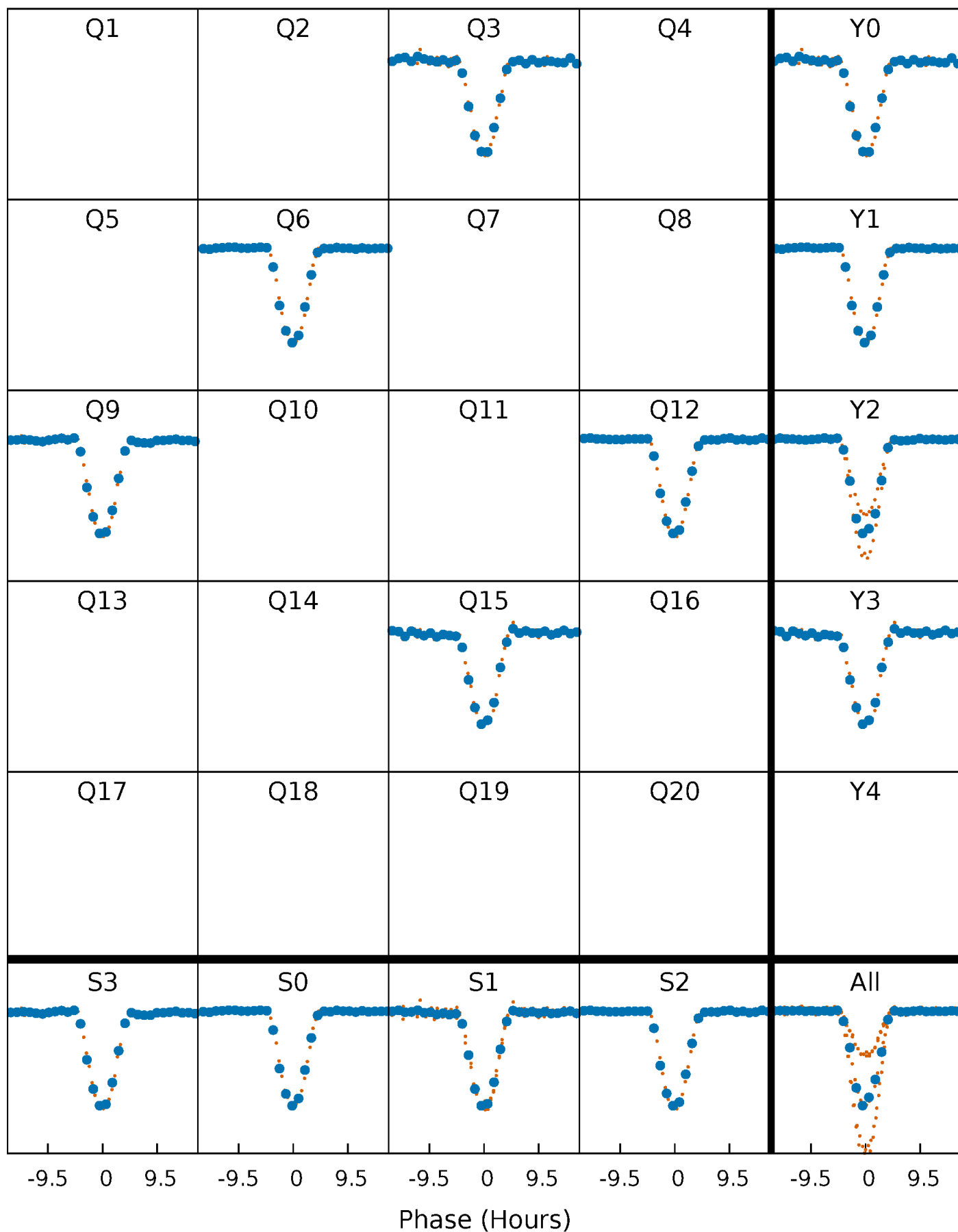


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

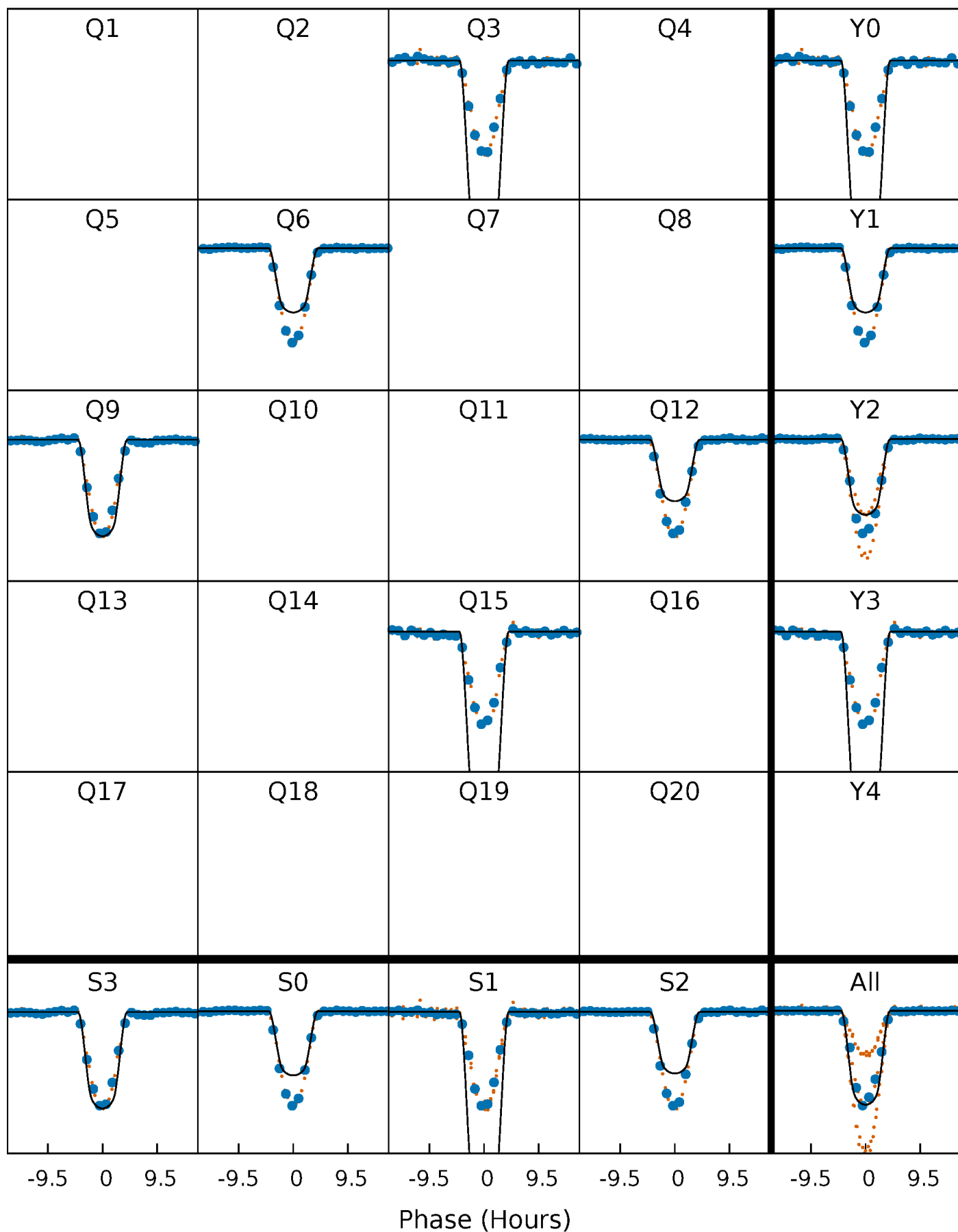
TCE 009214715-01 P=265.300330 Days  $T_0=316.918287$  (BKJD)





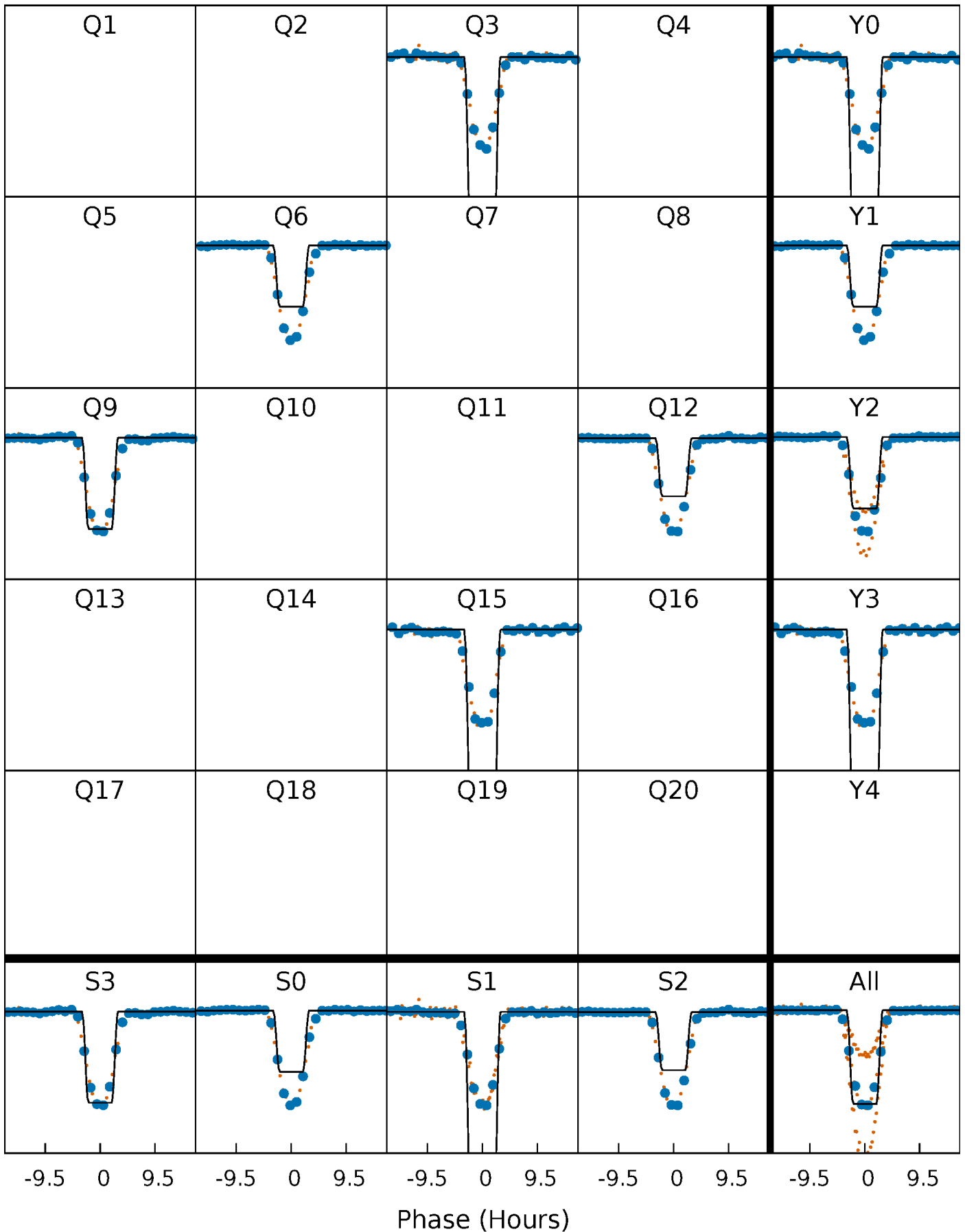
# DV Quarter-Phased Transit Curves

TCE 009214715-01 P=265.300330 Days  $T_0=316.918287$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

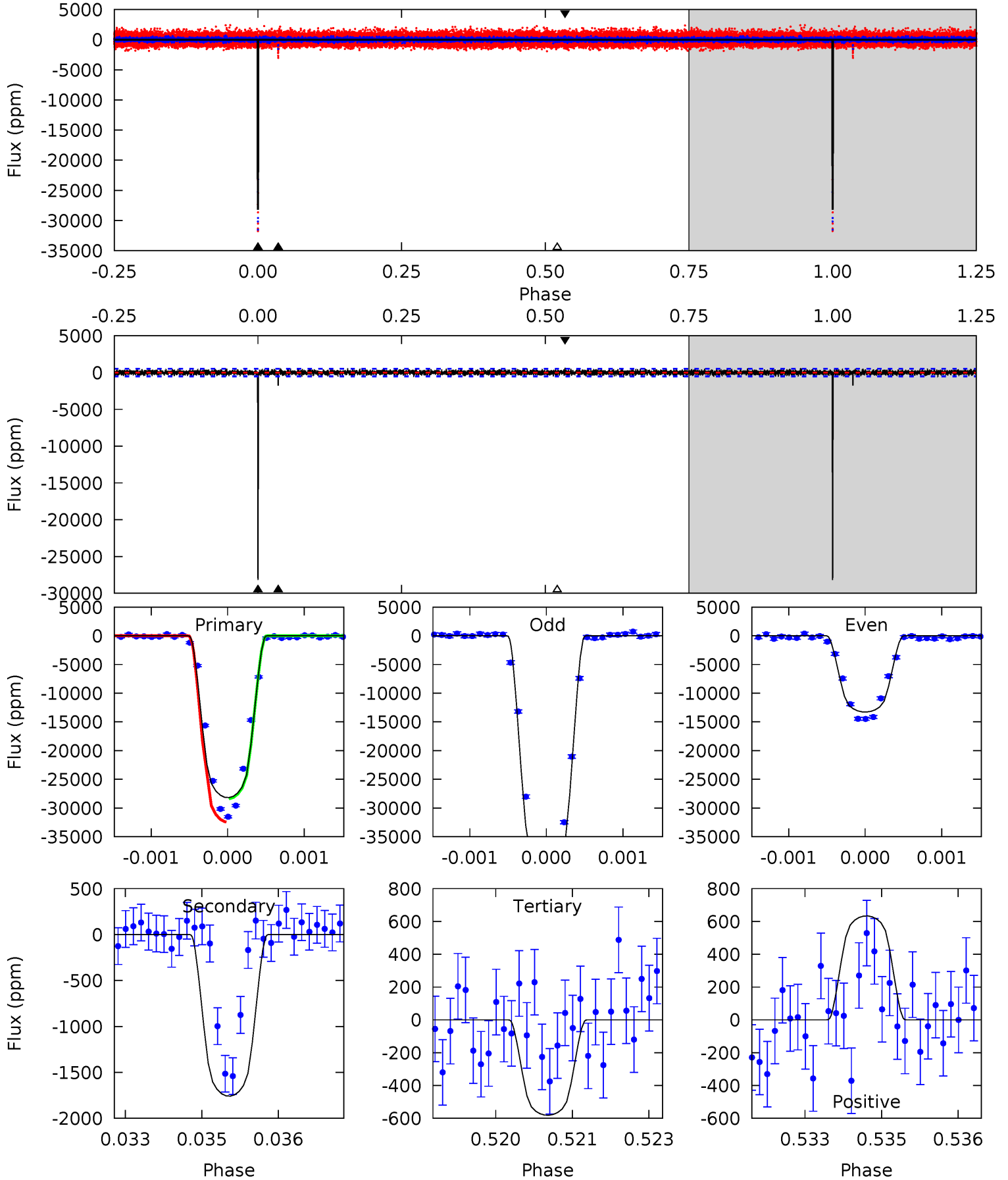
TCE 009214715-01 P=265.302532 Days  $T_0=316.913742$  (BKJD)



# DV Model-Shift Uniqueness Test

009214715-01, P = 265.300330 Days, E = 51.617957 Days

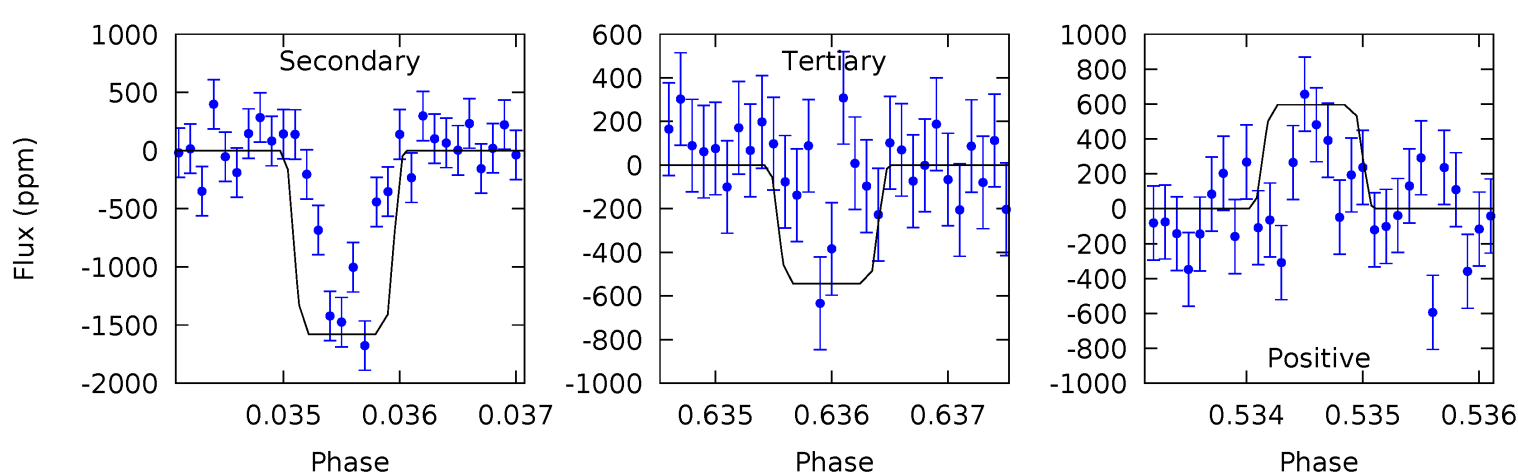
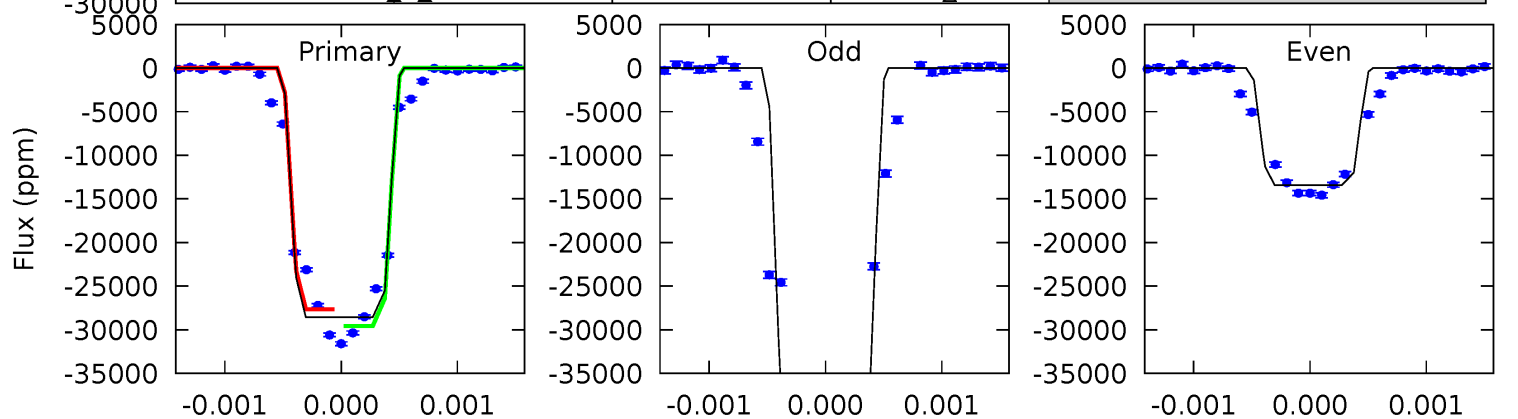
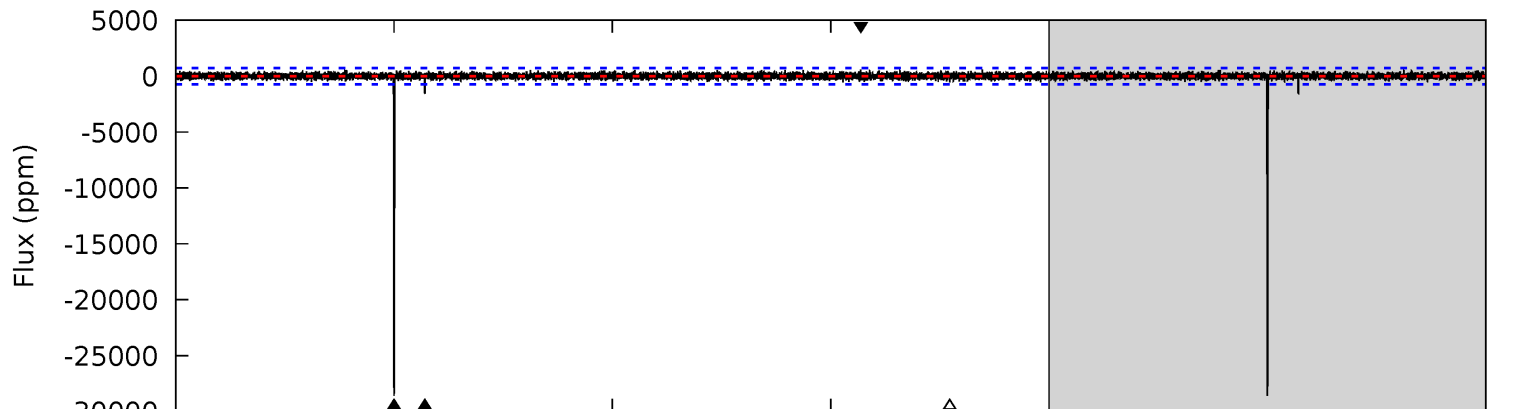
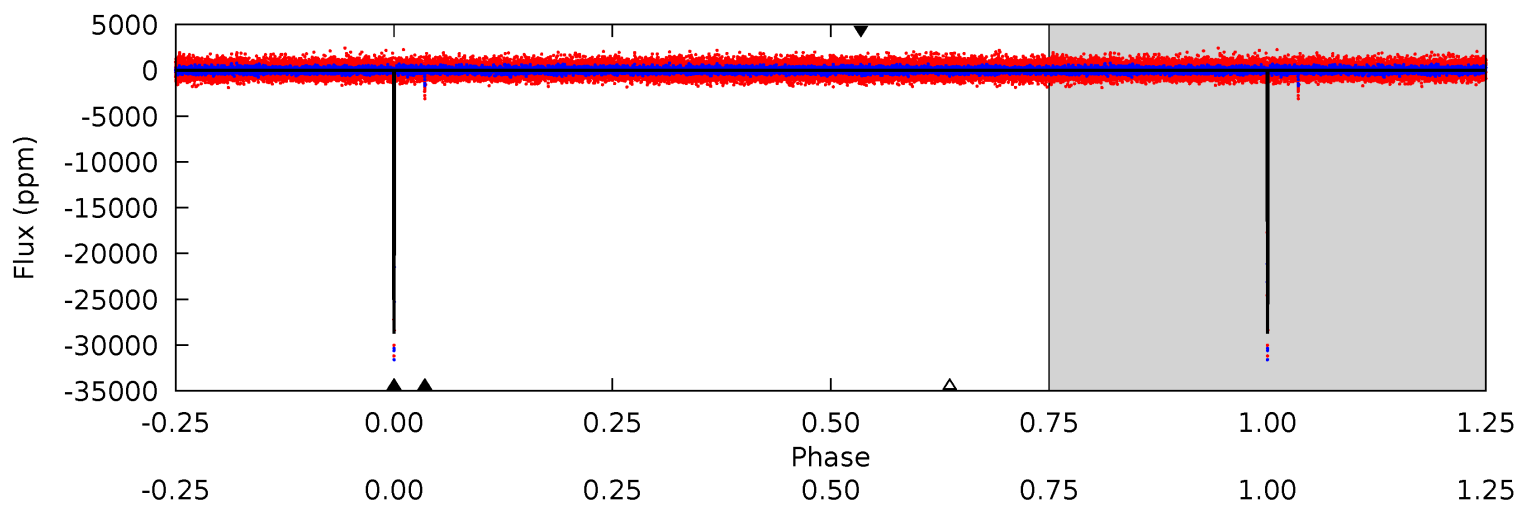
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
294.1	18.4	6.06	6.61	5.40	3.21	1.64	288.0	287.5	12.3	11.7	234.1	1.00	0.02	0



# Alt Model-Shift Uniqueness Test

009214715-01, P = 265.302532 Days, E = 51.611210 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
213.6	11.8	4.06	4.45	5.46	3.31	1.13	209.5	209.1	7.73	7.34	175.4	1.00	0.02	0



### Stellar Parameters For KIC 009214715

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6108^{+165}_{-220}$	$4.471^{+0.052}_{-0.208}$	$-0.080^{+0.250}_{-0.350}$	$0.997^{+0.312}_{-0.104}$	$1.072^{+0.133}_{-0.148}$	$1.525^{+0.411}_{-0.775}$
	+3%/-4%	+1%/-5%	+312%/-438%	+31%/-10%	+12%/-14%	+27%/-51%
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 009214715-01 / KOI 6065.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1759 \pm 96$	$19.49^{+3.40}_{-1.56}$	$422^{+31}_{-23}$	$3484^{+73}_{-83}$	$1696^{+317}_{-405}$
Alt.	$-1578 \pm 134$	$19.21^{+3.32}_{-1.35}$	$422^{+29}_{-22}$	$3429^{+84}_{-86}$	$1550^{+277}_{-385}$

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

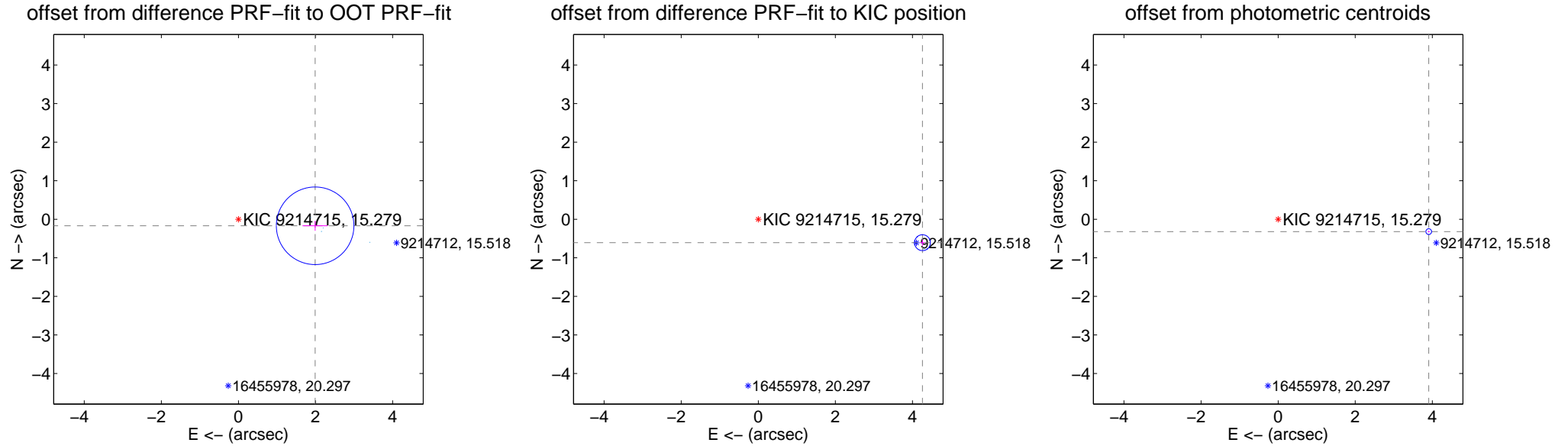
## DV Centroid Data

Supplemental centroid analysis for 009214715-01. Kepler magnitude: 15.28. Transit SNR 196.88

There are 4 quarters with good PRF difference image offsets

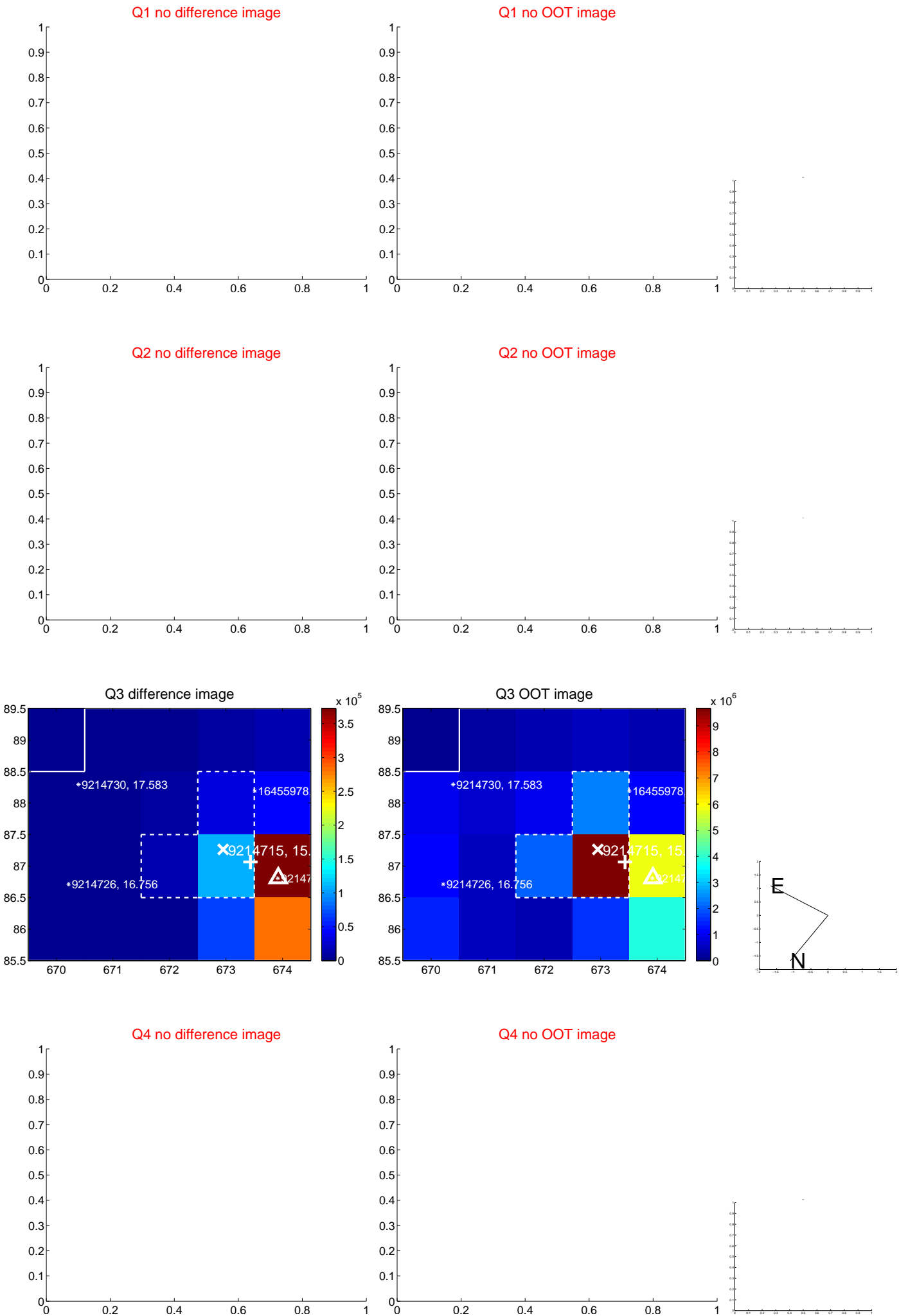
The OOT PRF centroid is offset from the target star catalog position by about 2.18 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.996 \pm 0.335$	5.96	$-1.989 \pm 0.328$	$-0.169 \pm 0.129$
PRF-fit source offset from KIC position	$4.301 \pm 0.069$	62.76	$-4.258 \pm 0.068$	$-0.607 \pm 0.078$
photometric centroid source offset	$3.92 \pm 0.02$	158.90	$-3.91 \pm 0.02$	$-0.32 \pm 0.02$



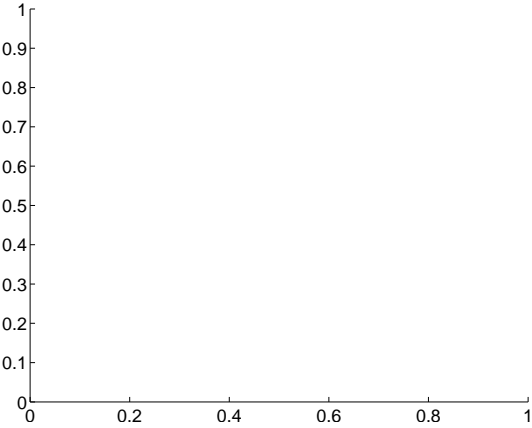
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . 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 ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

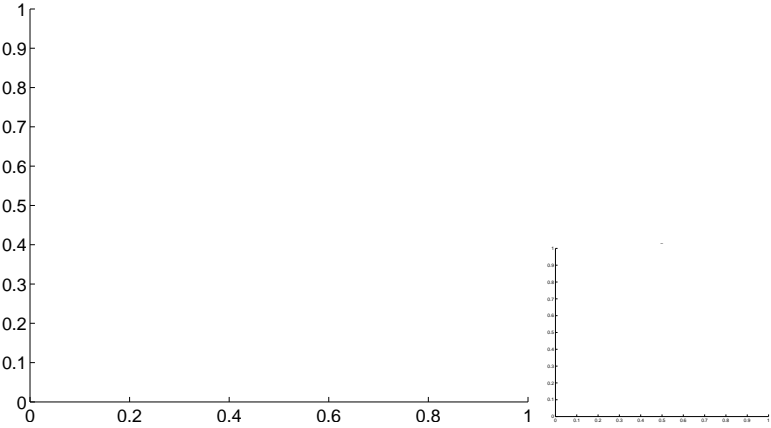


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

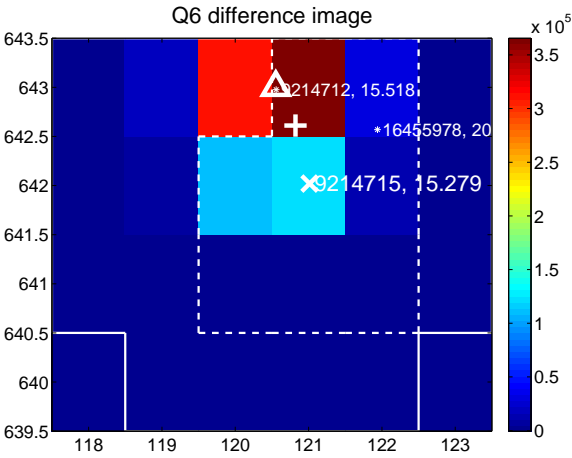
Q5 no difference image



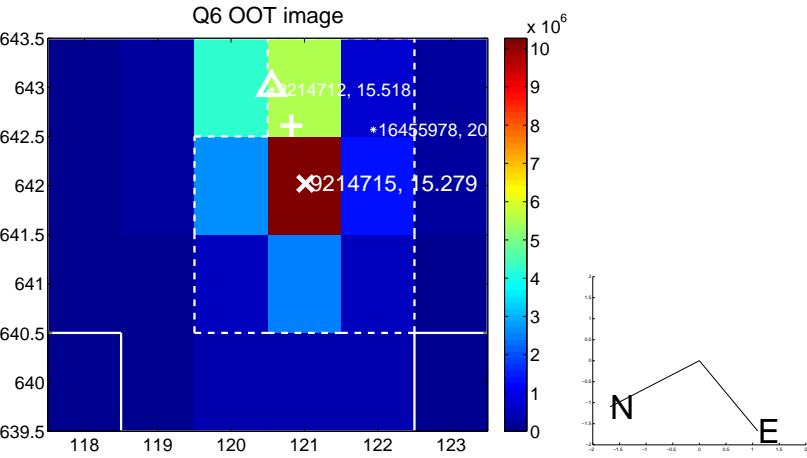
Q5 no OOT image



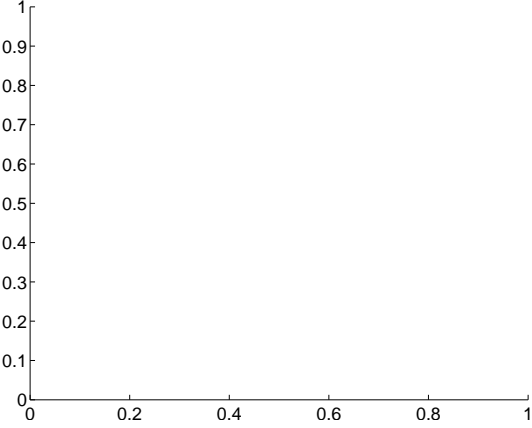
Q6 difference image



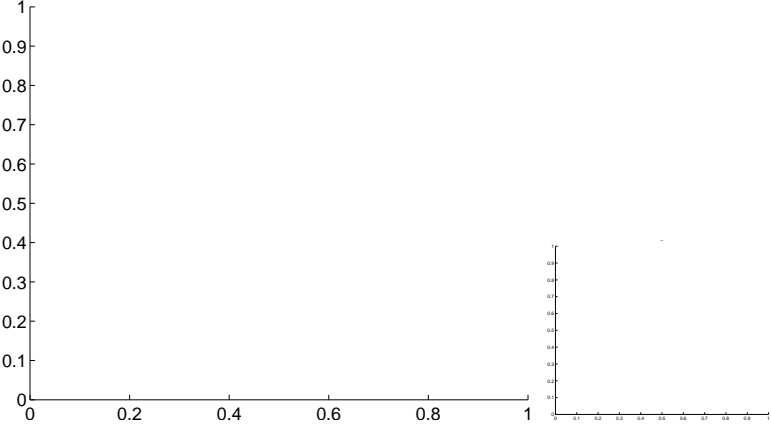
Q6 OOT image



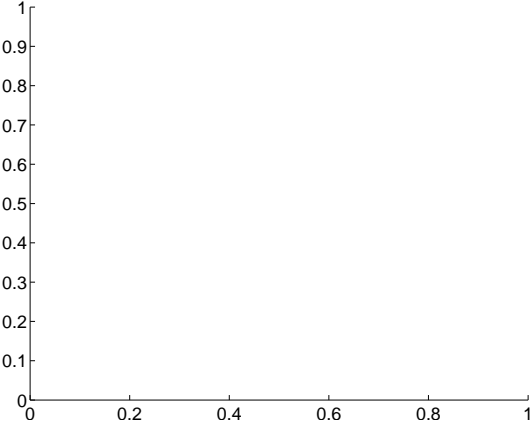
Q7 no difference image



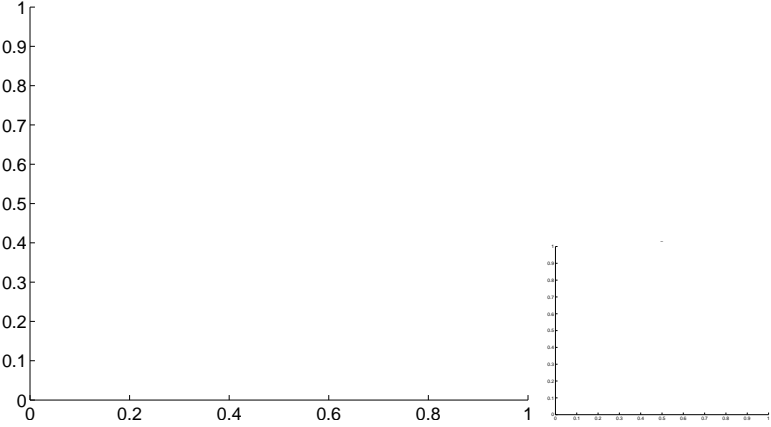
Q7 no OOT image



Q8 no difference image

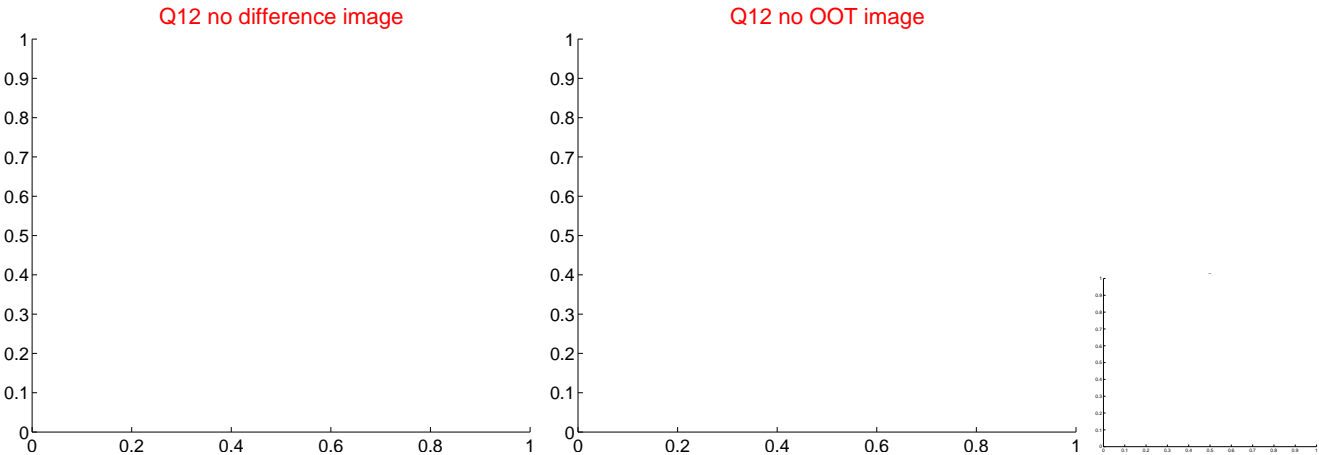
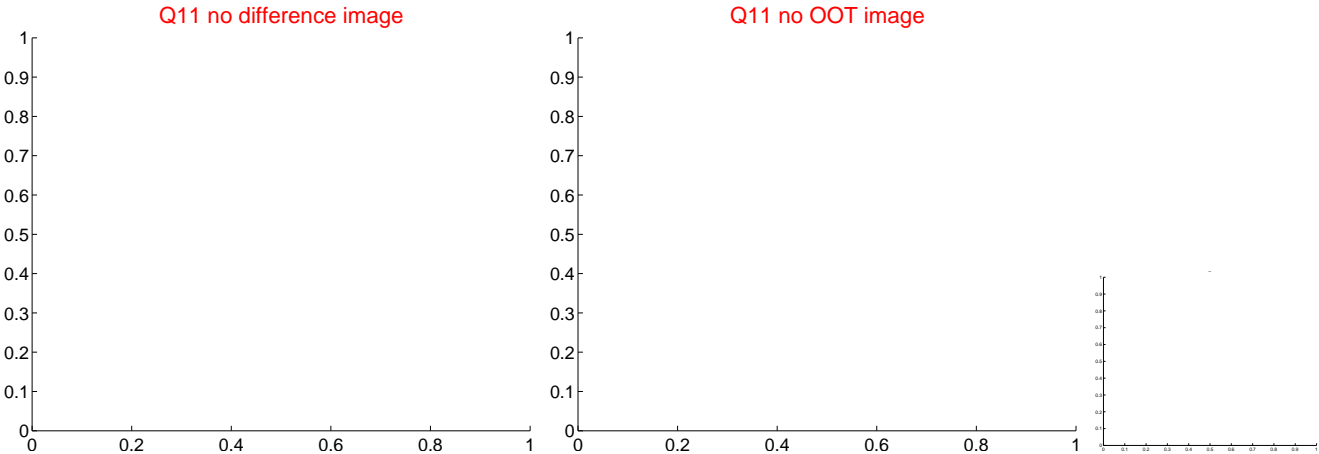
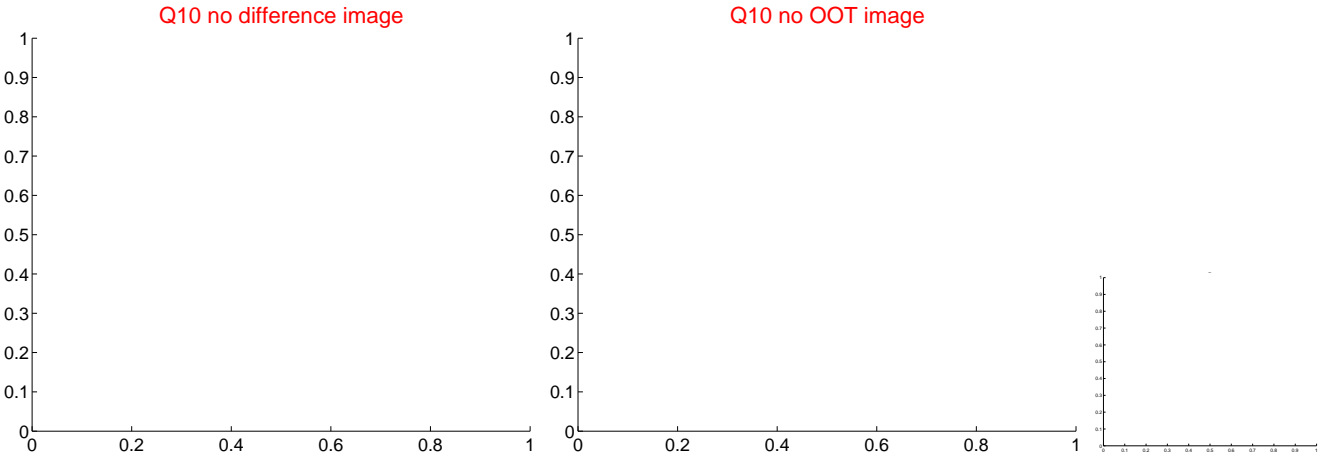
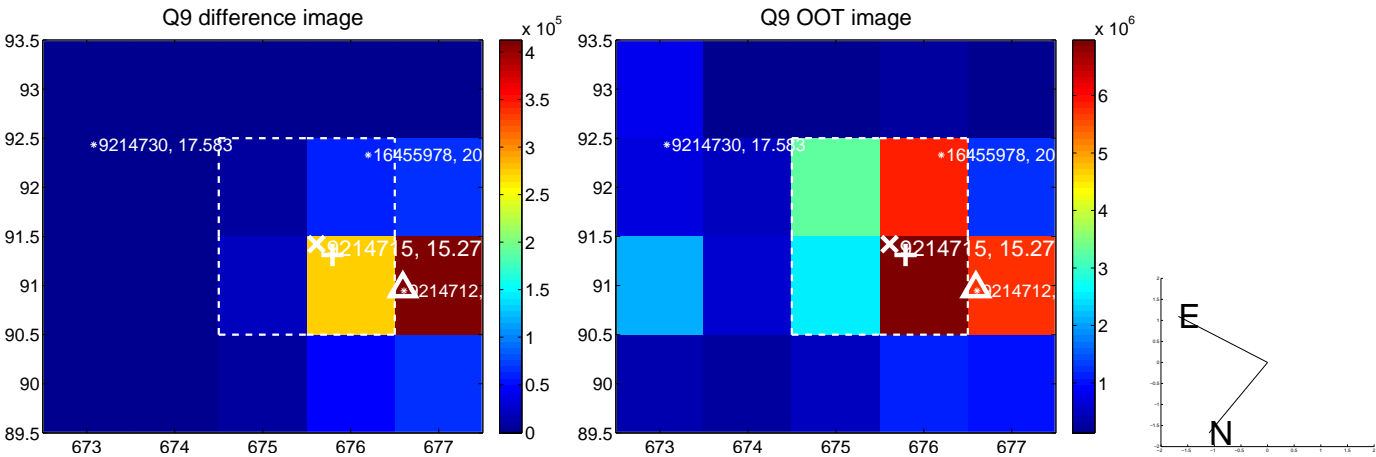


Q8 no OOT image

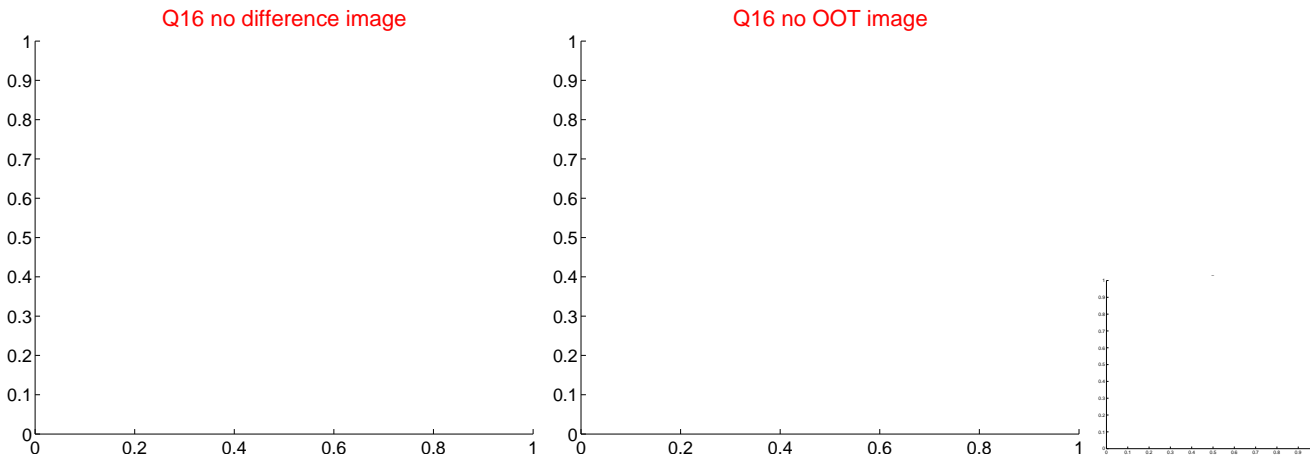
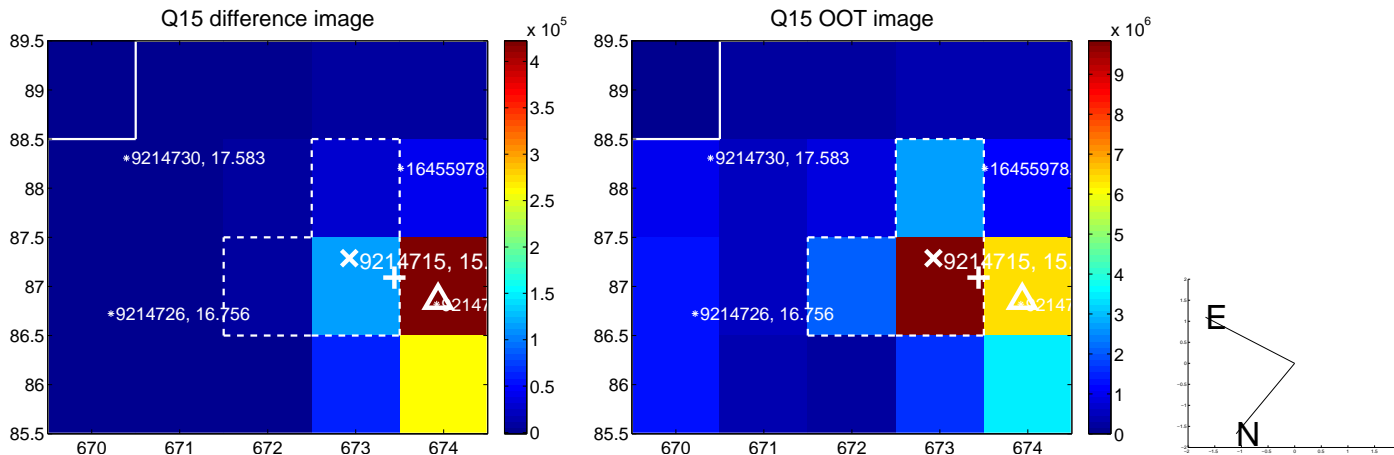
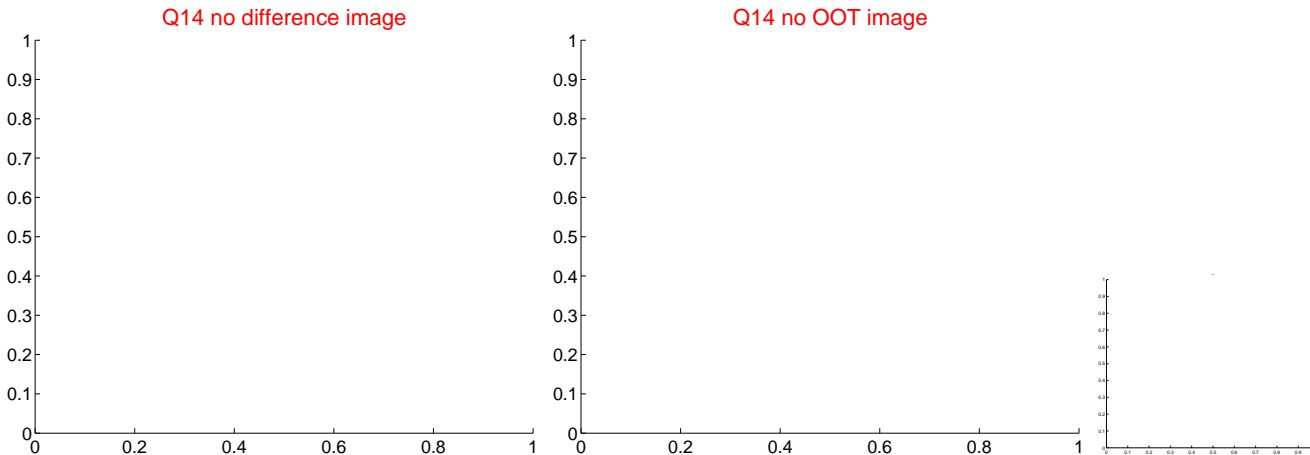
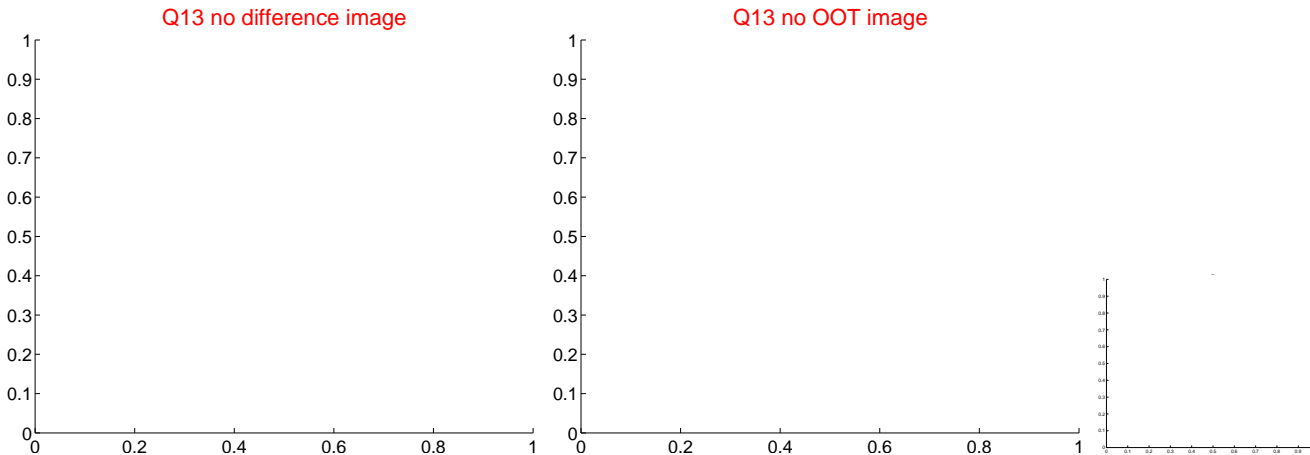




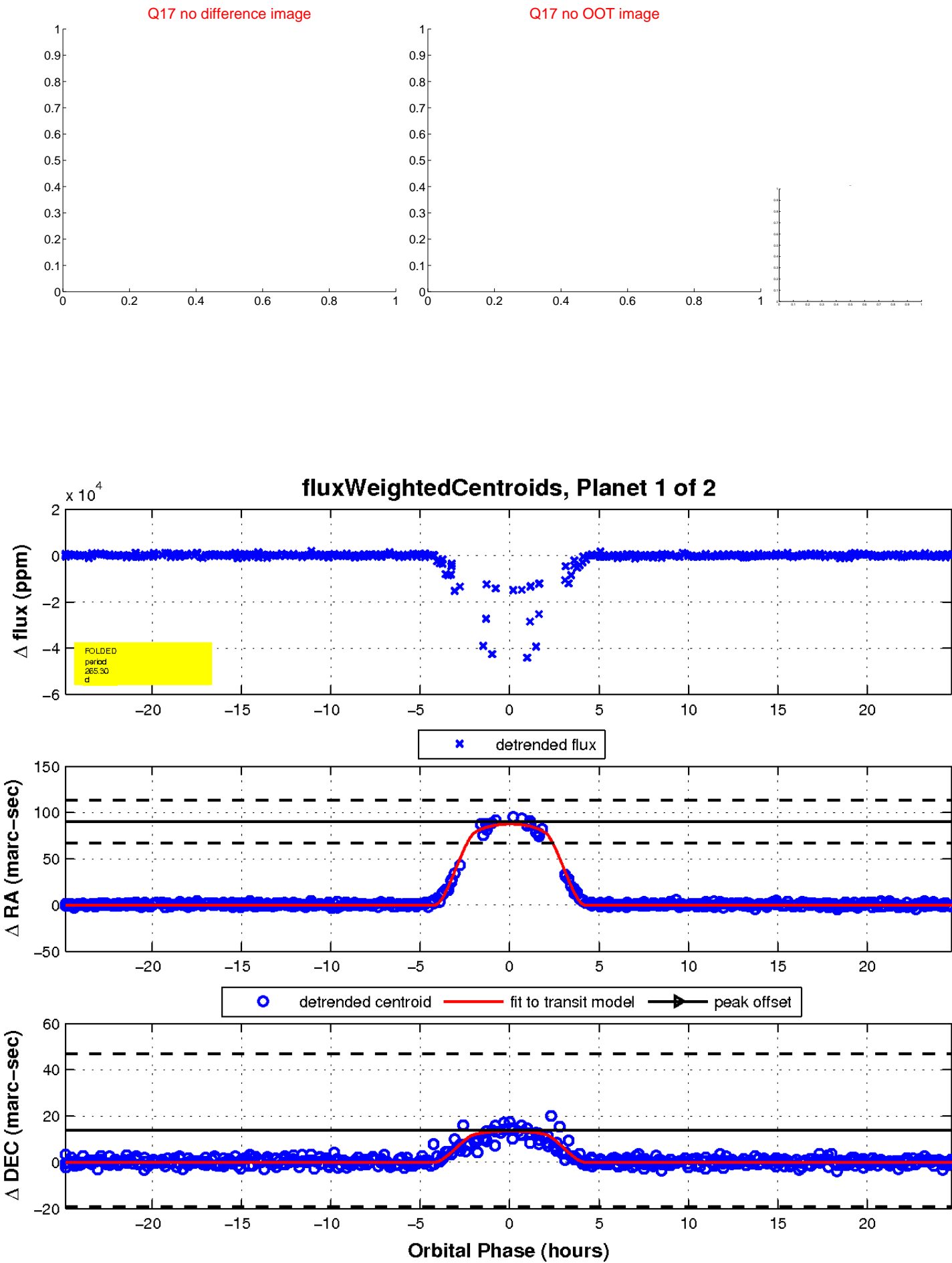
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

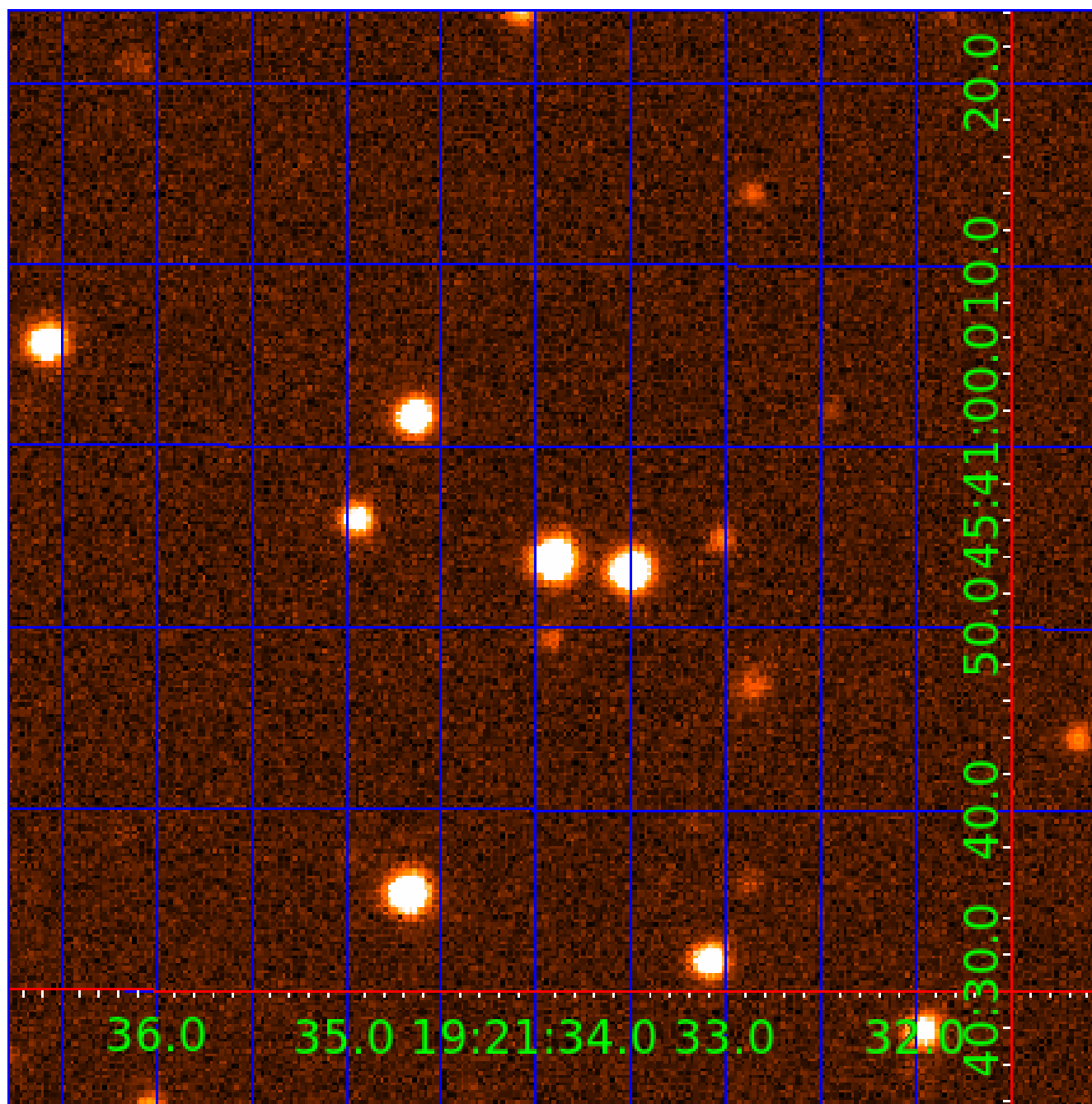


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009214715

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009214715-01	OBS	6065.01	265.300330	316.918287	31691.9	8.285	361.8	196.9	1.00	6108	18.93	1.81
009214715-02	OBS	6065.02	265.308404	326.241598	1388.7	3.472	12.8	11.5	1.00	6108	3.92	1.81

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009214715-01	OBS	FP	0.00	0	1	0	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_KIC_POS—EPHEM_MATCH
009214715-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_FEW_DIFFS—HALO_GHOST—EPHEM_MATCH

**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.

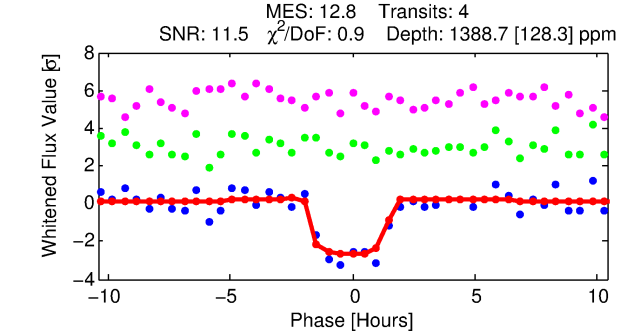
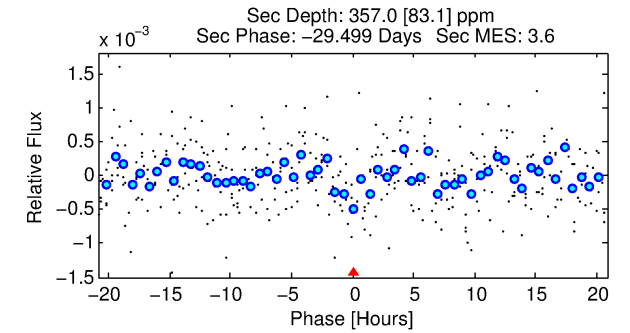
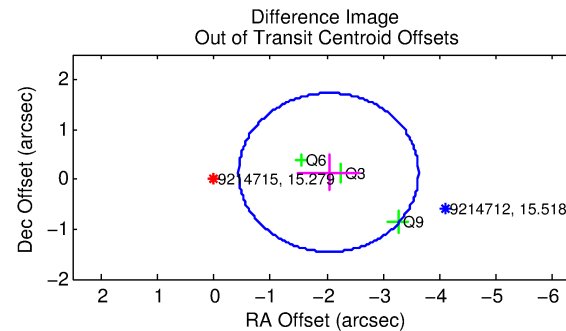
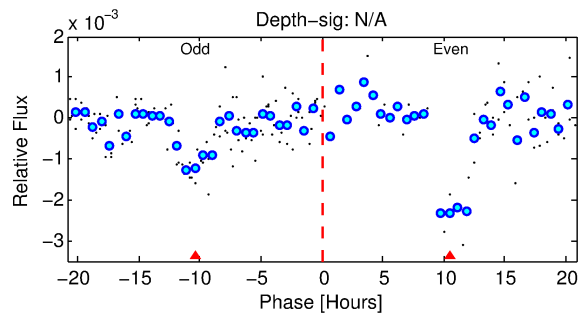
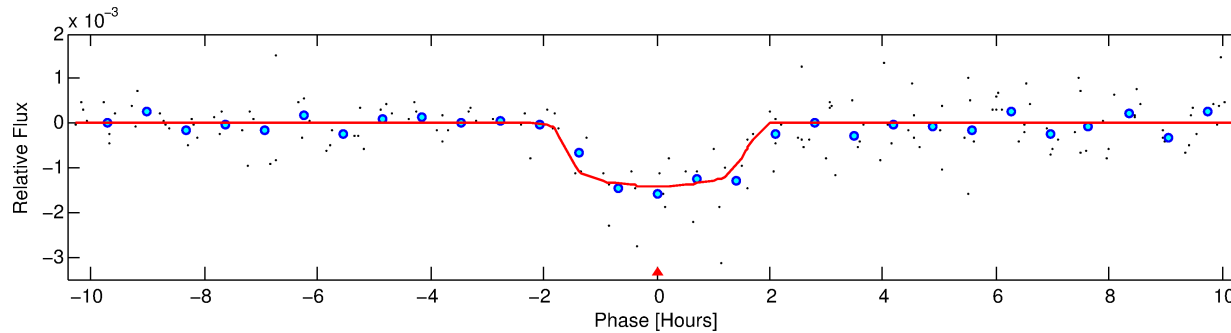
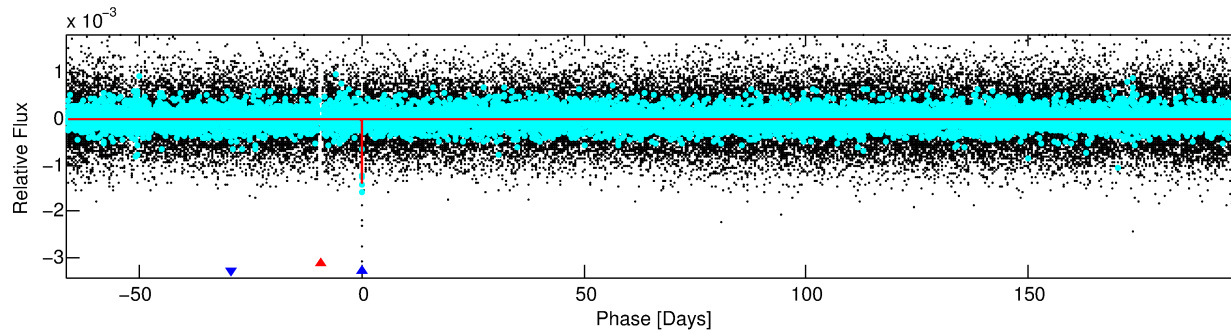
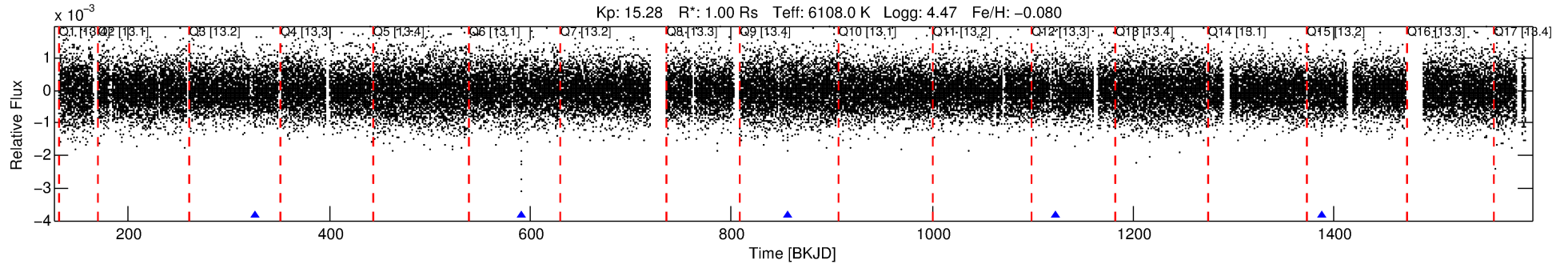
## Ephemeris Match Information For 009214715-02

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	$\sigma_P$	$\sigma_T$
009214715-02	9214715	6064.02	9214712	1:1	4.1	-1	0	15.52	15.28	3.63	Direct-PRF	0	0.37	0.20

**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: 9214715 Candidate: 2 of 2 Period: 265.308 d  
KOI: K06065.02 Corr: 0.935



## DV Fit Results:

Period = 265.30840 [0.00219] d  
Epoch = 326.2416 [0.0054] BKJD  
Rp/R\* = 0.0360 [0.0324]  
a/R\* = 475.50 [2068.90]  
b = 0.64 [4.06]  
Seff = 1.81 [0.74]  
Teq = 296 [30] K  
Rp = 3.92 [3.73] Re  
a = 0.8273 [0.2173] AU  
Ag = 8769.60 [16270.74] [0.54σ]  
Teffp = 4426 [2015] K [2.05σ]

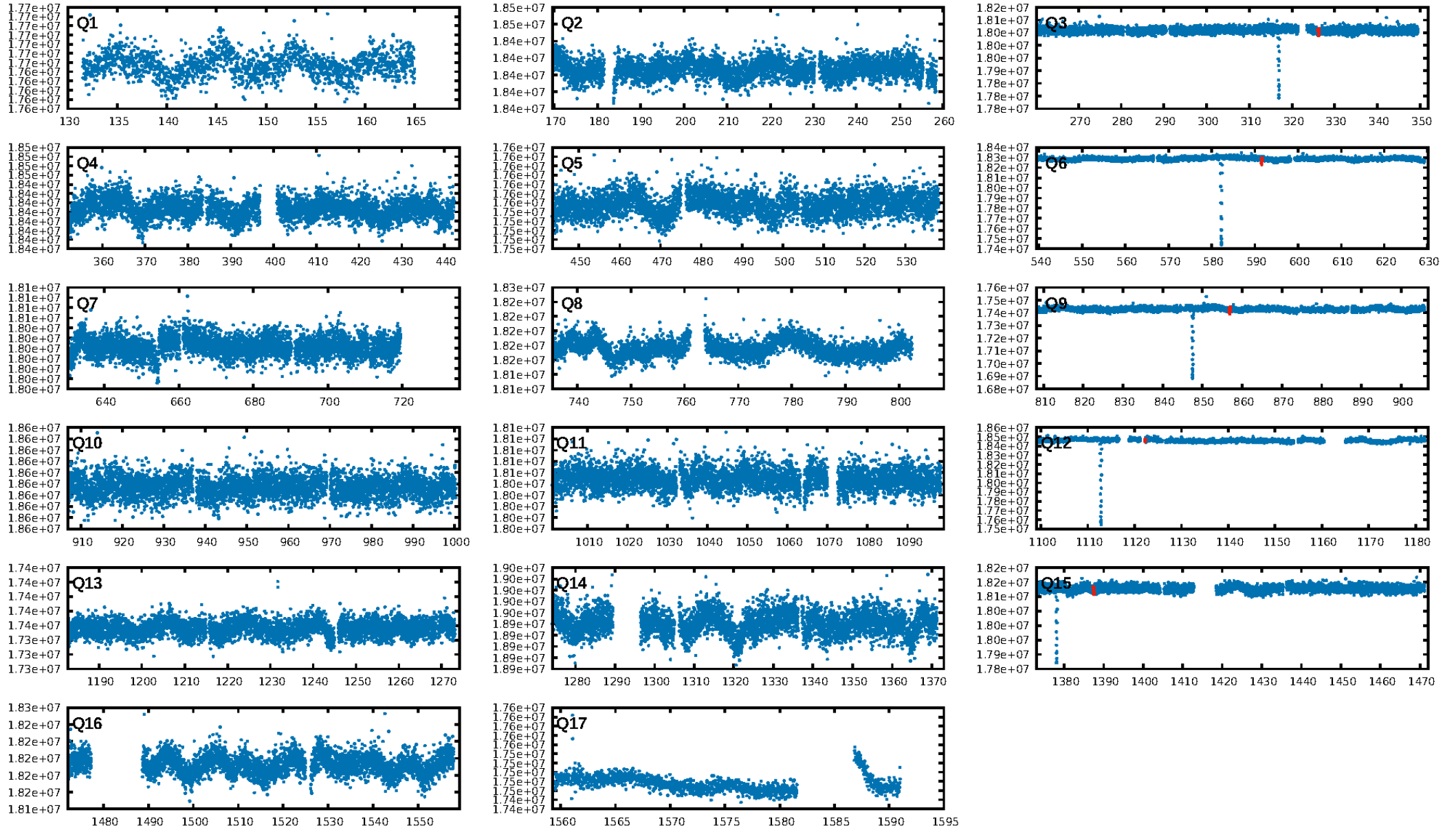
## DV Diagnostic Results:

ShortPeriod-sig: 1.7% [0.02σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 91.4%  
Bootstrap-pfa: 6.31e-42  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 0.2094  
Centroid-sig: 1.3%  
Centroid-so: 2.881 arcsec [3.69σ]  
OotOffset-rm: 2.038 arcsec [3.84σ]  
KicOffset-rm: 4.047 arcsec [34.34σ]  
OotOffset-st: 1/1/0/1 [3]  
KicOffset-st: 1/1/0/1 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 18:29:11 Z

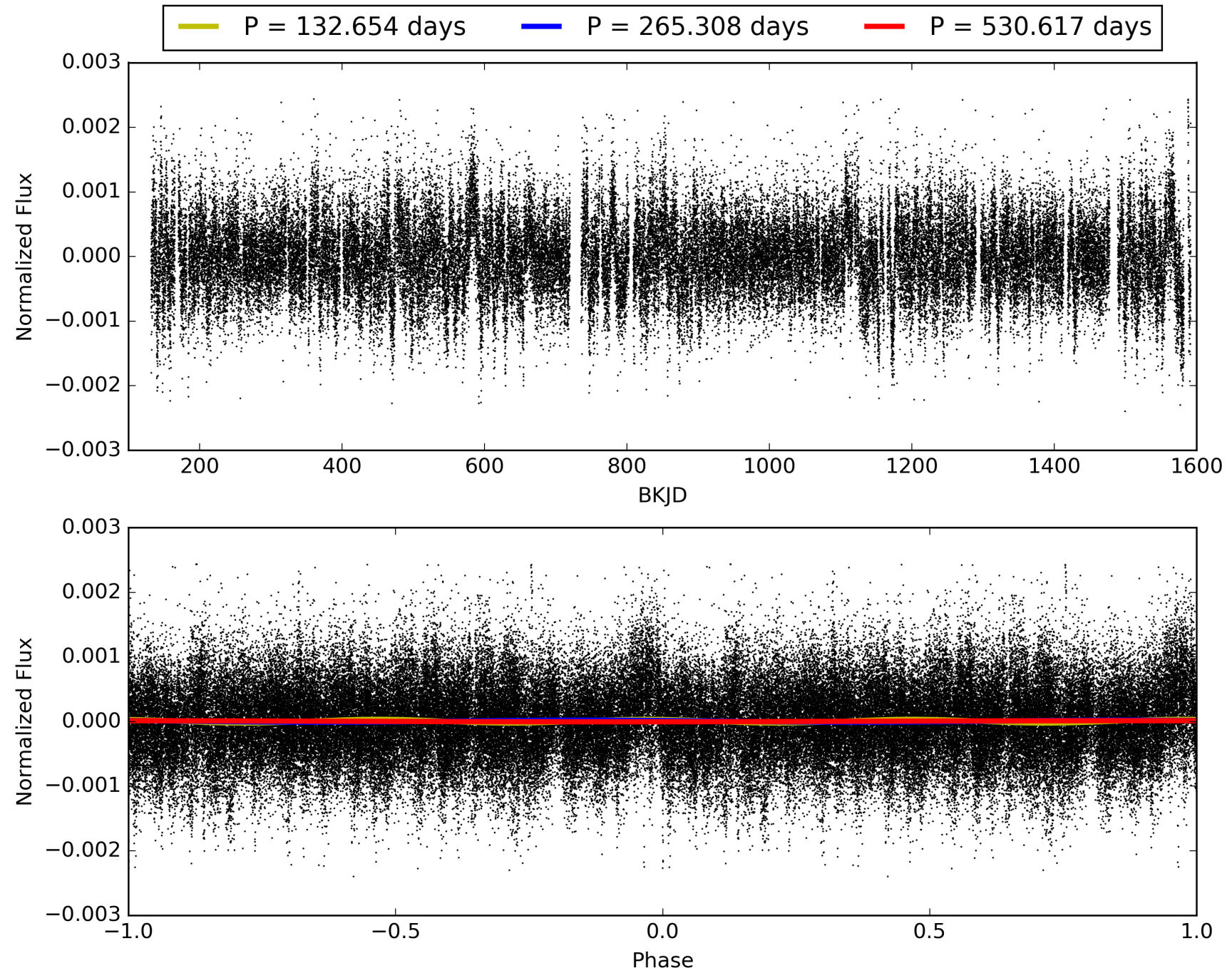
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009214715-02, PDC Light Curves





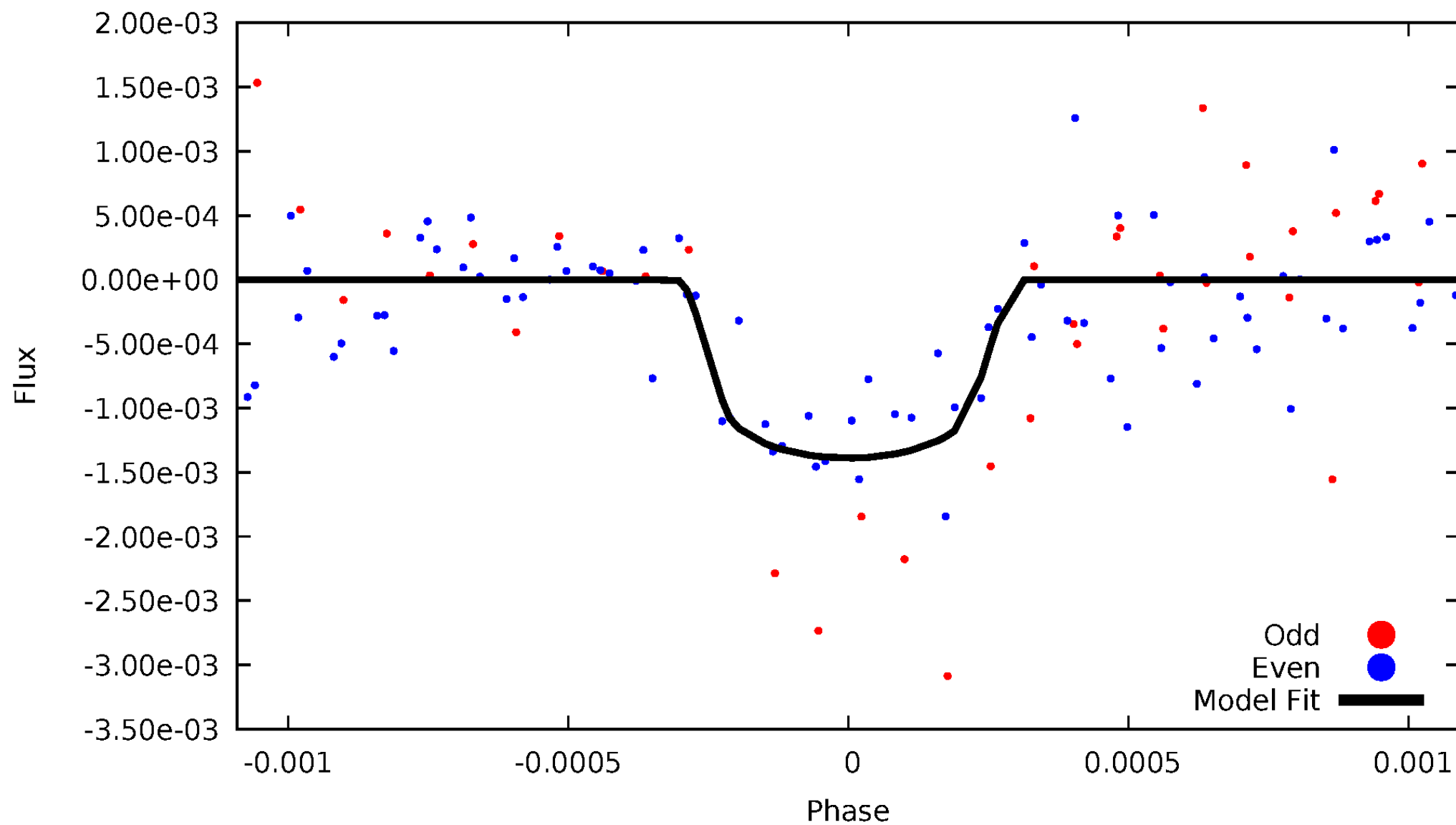
TCE 009214715-02





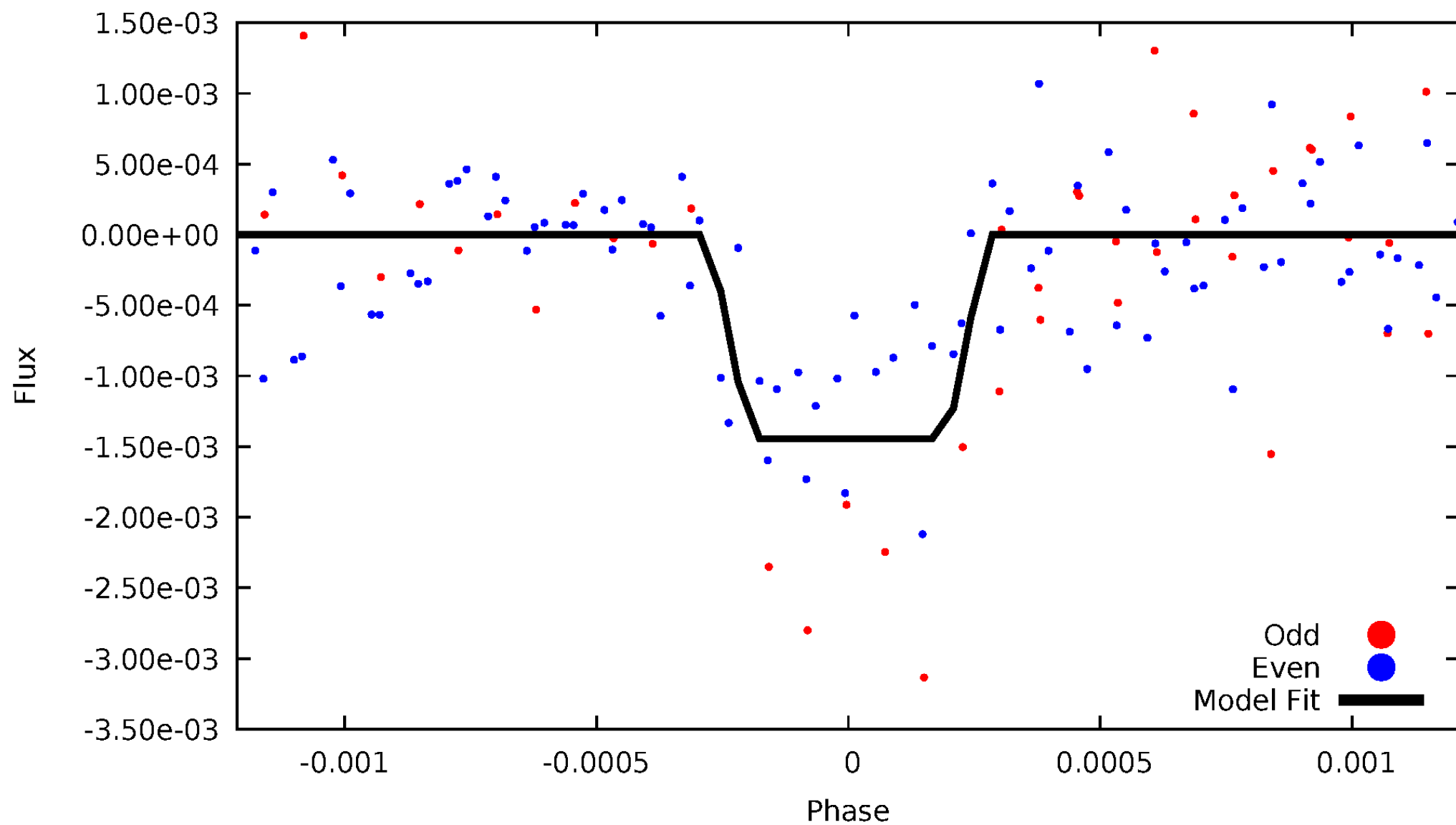
# DV Odd/Even

TCE 009214715-02



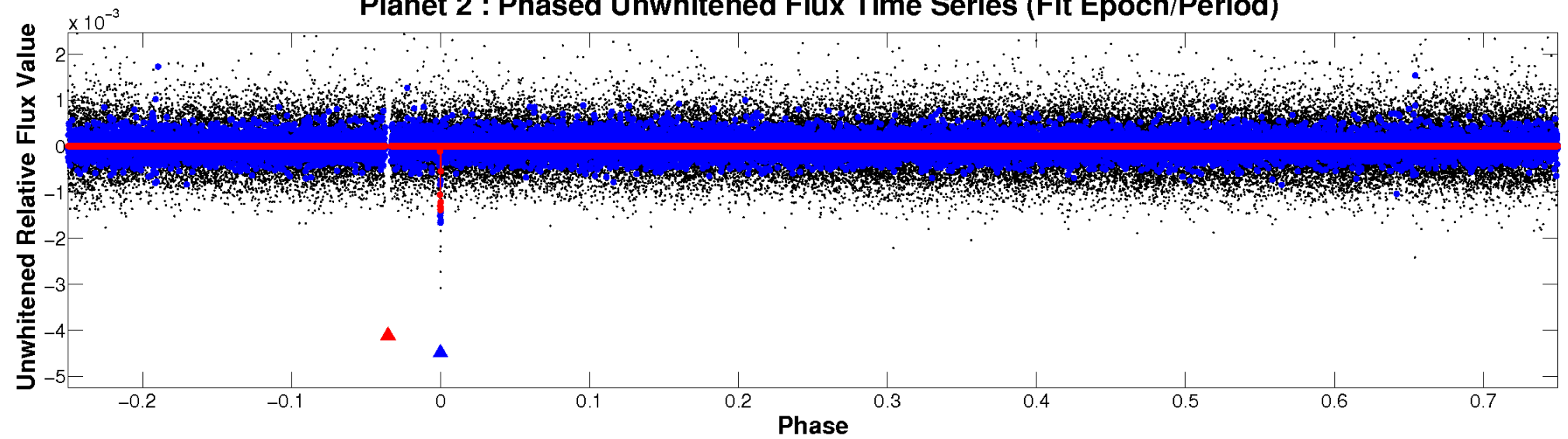
# ALT Odd/Even

TCE 009214715-02

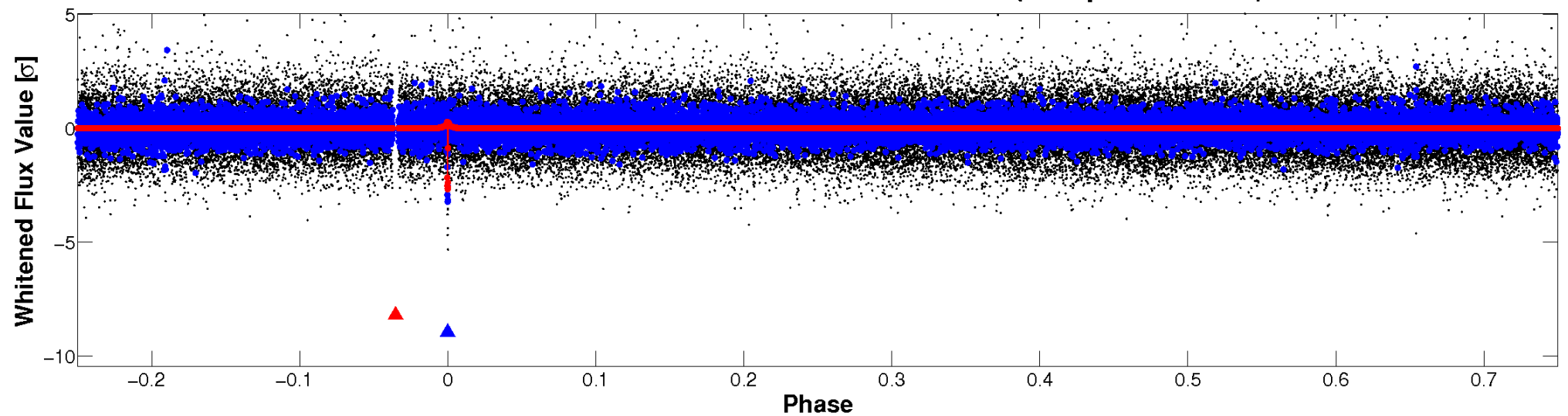


# Non-Whitened Vs. Whitened Light Curve

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

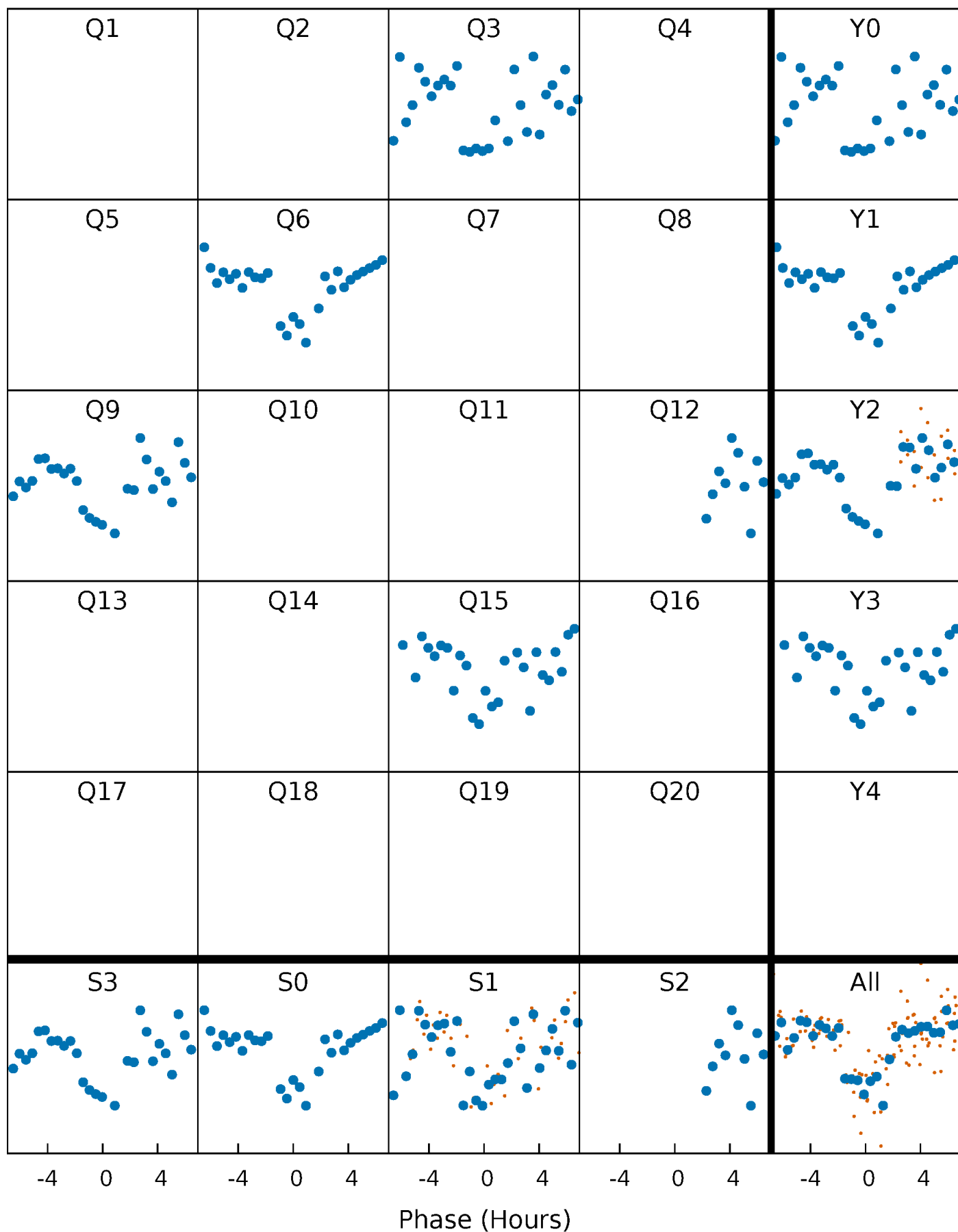


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



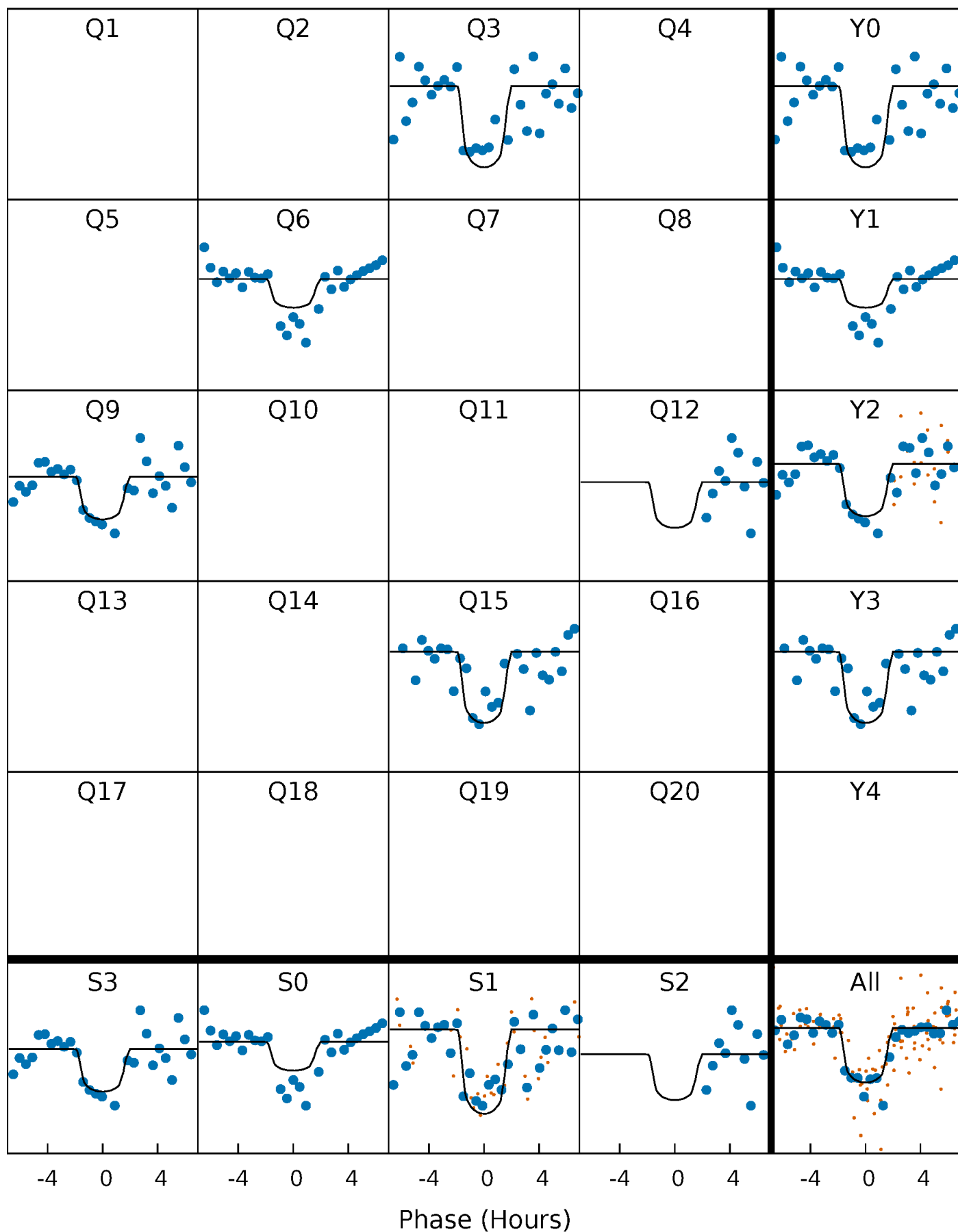
# PDC Quarter-Phased Transit Curves

TCE 009214715-02 P=265.308404 Days  $T_0=326.241598$  (BKJD)



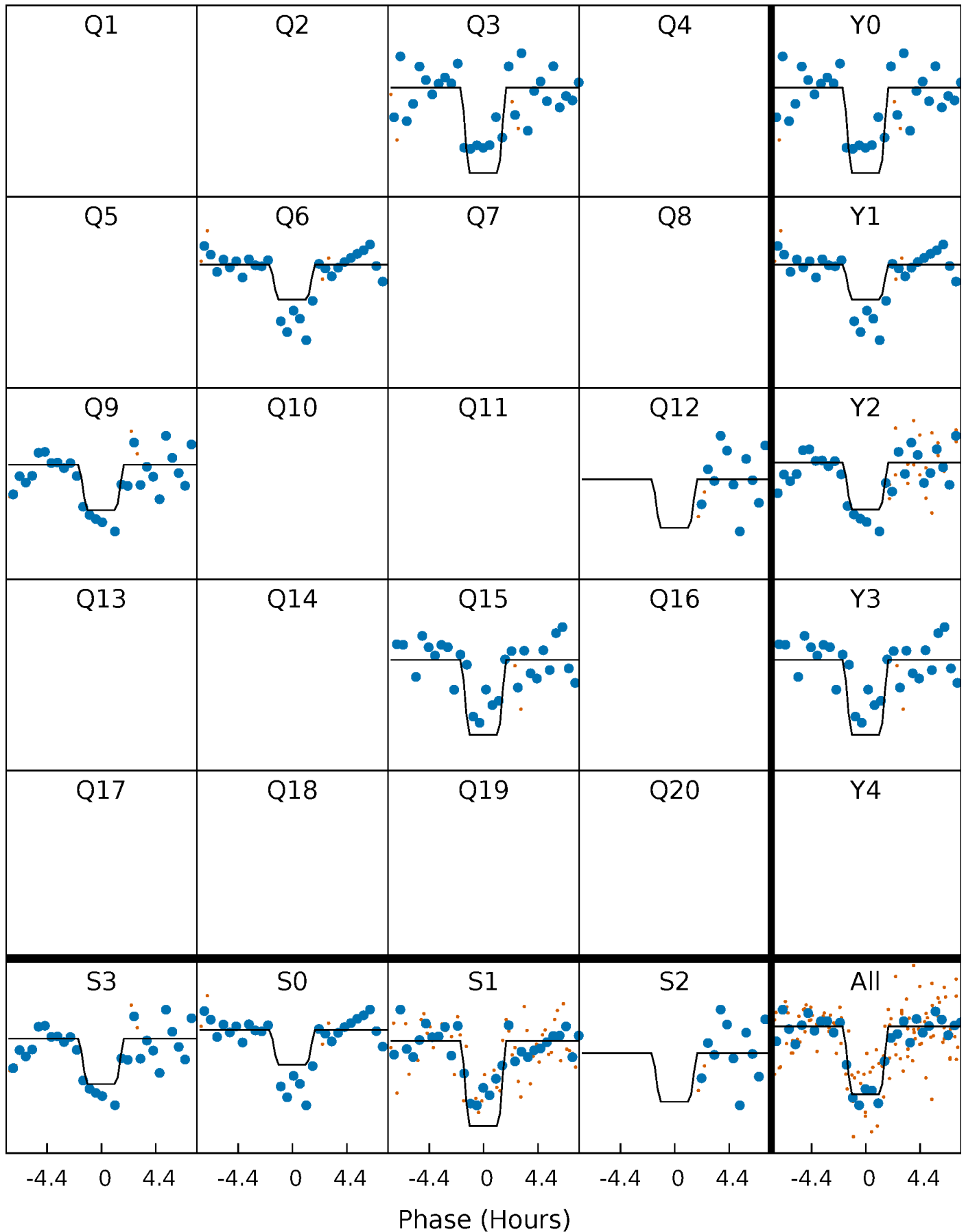
# DV Quarter-Phased Transit Curves

TCE 009214715-02 P=265.308404 Days  $T_0=326.241598$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

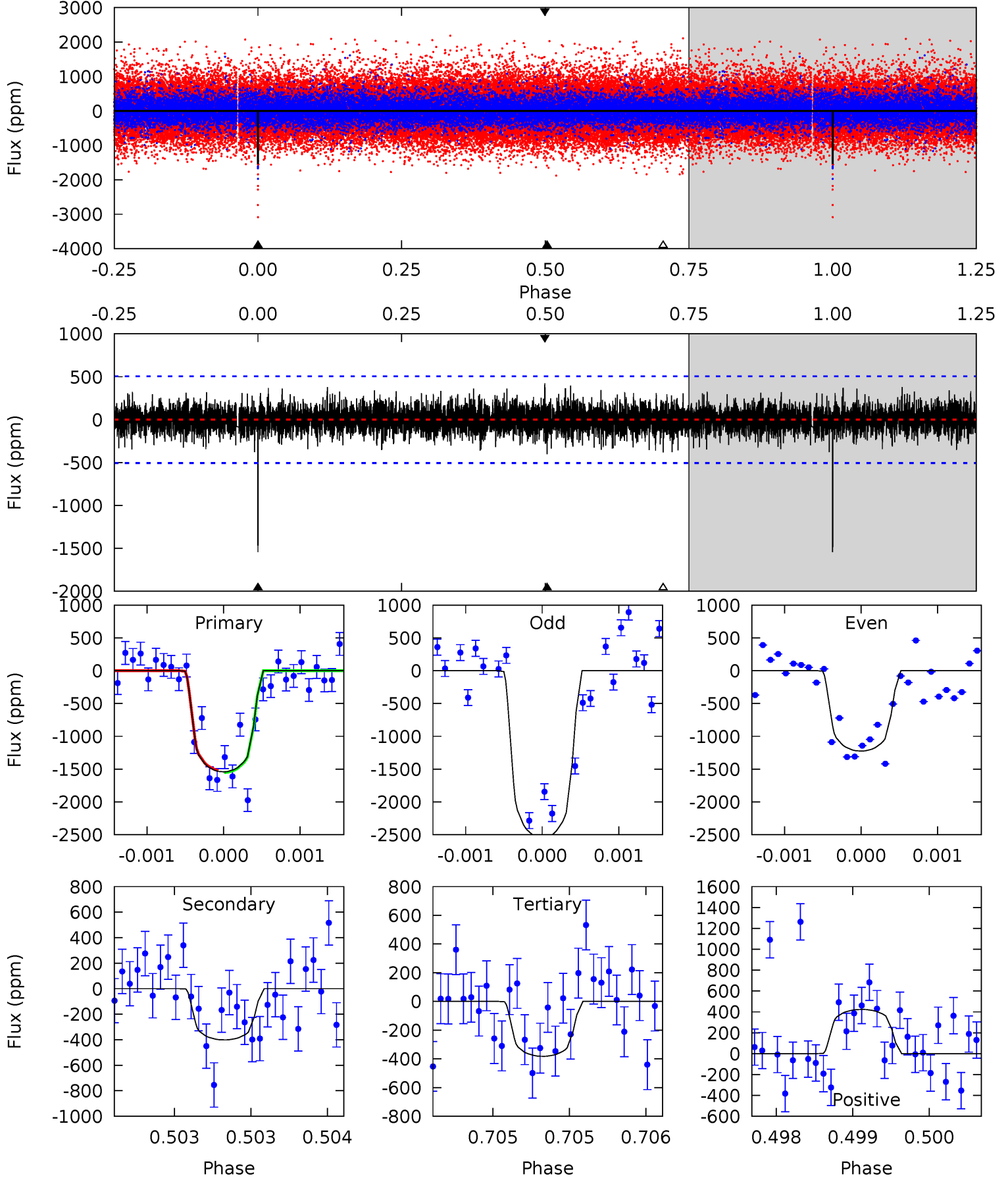
TCE 009214715-02 P=265.308084 Days  $T_0=326.249078$  (BKJD)



# DV Model-Shift Uniqueness Test

009214715-02, P = 265.308404 Days, E = 60.933194 Days

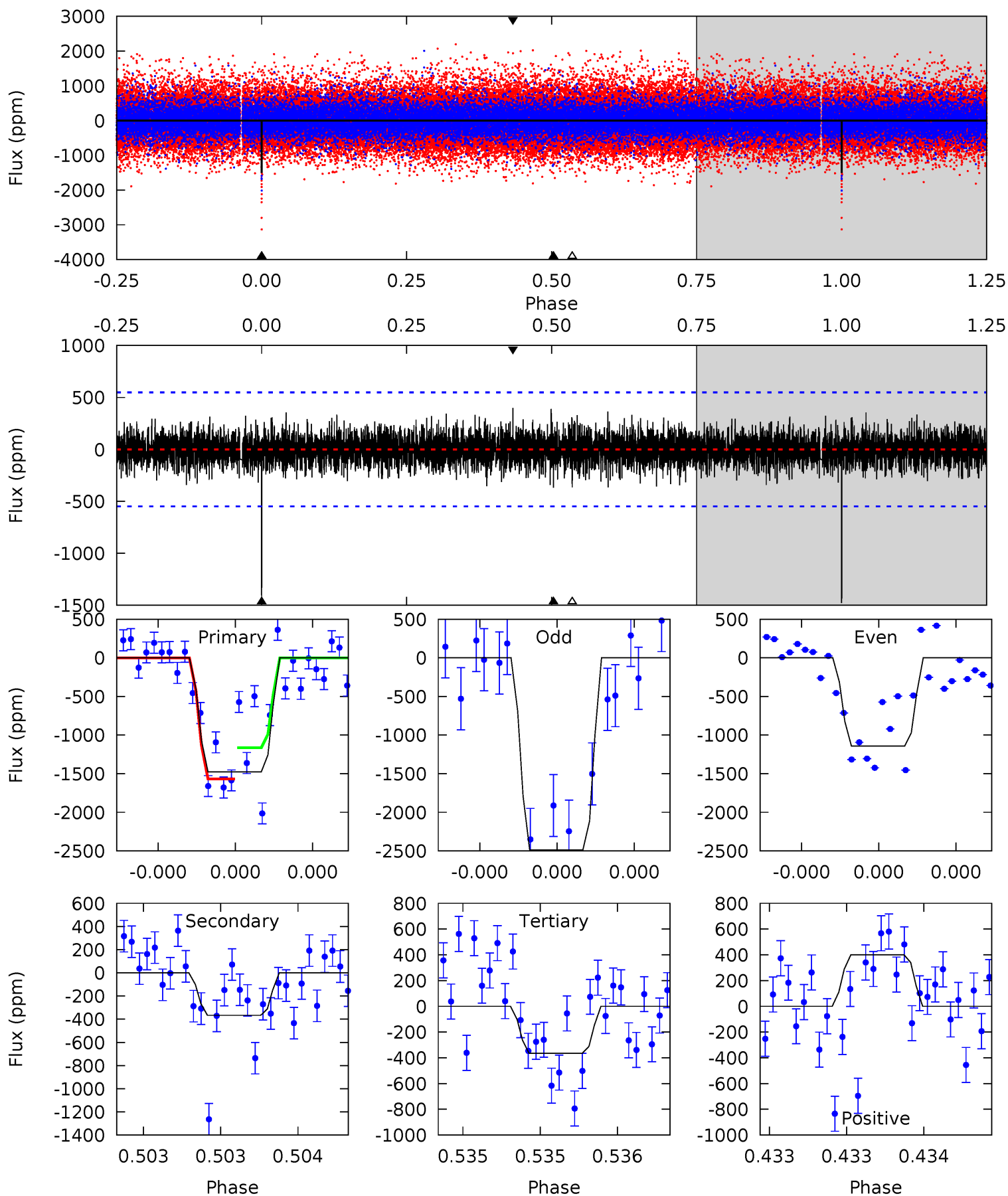
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.9	4.40	4.19	4.64	5.54	3.43	1.15	12.7	12.2	0.21	-0.25	6.27	1.18	0.22	0.17



# Alt Model-Shift Uniqueness Test

009214715-02, P = 265.308084 Days, E = 60.940994 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
15.0	3.73	3.71	4.06	5.57	3.48	1.02	11.3	11.0	0.02	-0.33	5.89	1.10	0.21	1.99





### Stellar Parameters For KIC 009214715

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6108^{+165}_{-220}$	$4.471^{+0.052}_{-0.208}$	$-0.080^{+0.250}_{-0.350}$	$0.997^{+0.312}_{-0.104}$	$1.072^{+0.133}_{-0.148}$	$1.525^{+0.411}_{-0.775}$
	+3%/-4%	+1%/-5%	+312%/-438%	+31%/-10%	+12%/-14%	+27%/-51%
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 009214715-02 / KOI 6065.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-402 \pm 91$	$4.86^{+3.41}_{-3.08}$	$421^{+31}_{-20}$	$4374^{+2648}_{-766}$	$6154^{+39985}_{-4134}$
Alt.	$-367 \pm 98$	$4.82^{+3.64}_{-2.81}$	$422^{+31}_{-21}$	$4308^{+2091}_{-764}$	$5770^{+28394}_{-3956}$

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

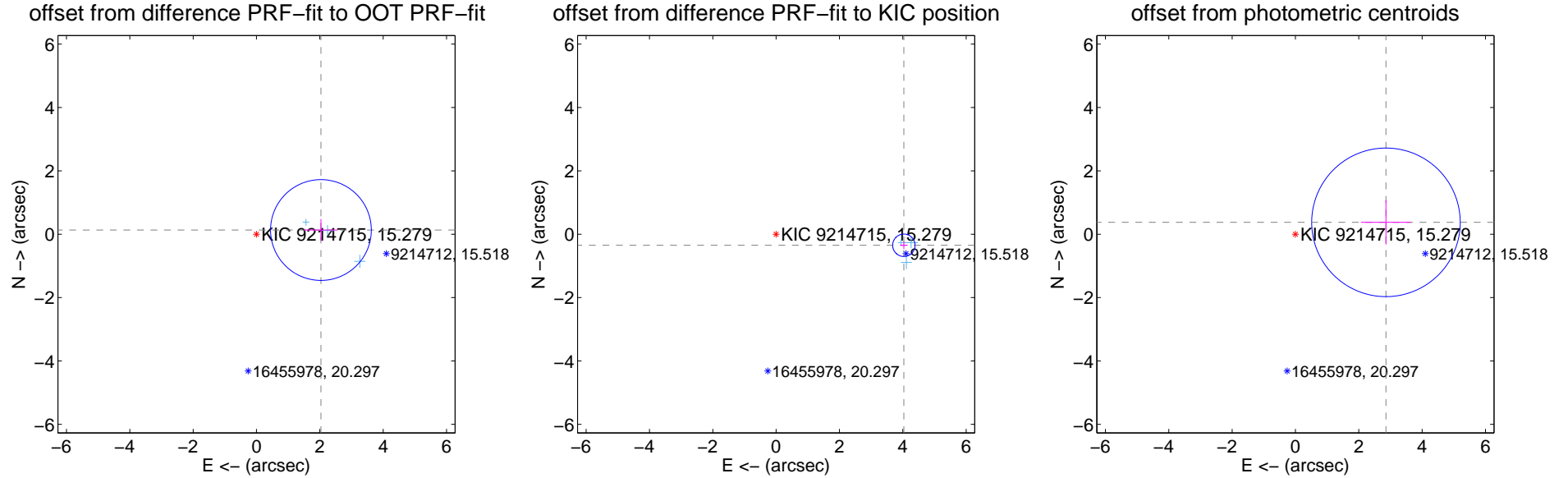
## DV Centroid Data

Supplemental centroid analysis for 009214715-02. Kepler magnitude: 15.28. Transit SNR 11.46

There are 3 quarters with good PRF difference image offsets

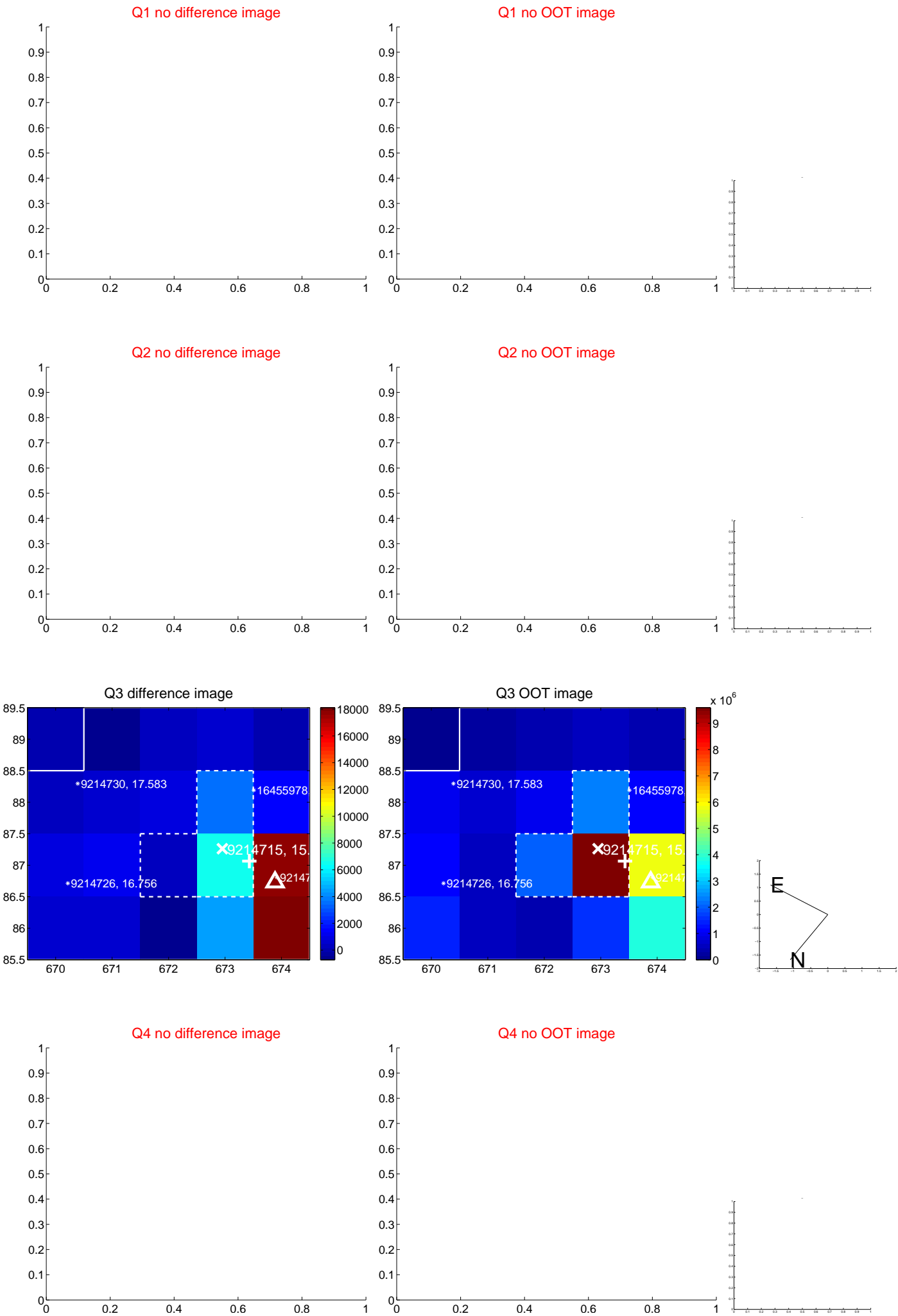
The direct PRF centroid is offset from the target star catalog position by about 0.85 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.038 \pm 0.530$	3.84	$-2.034 \pm 0.531$	$0.133 \pm 0.346$
PRF-fit source offset from KIC position	$4.047 \pm 0.118$	34.34	$-4.032 \pm 0.118$	$-0.349 \pm 0.118$
photometric centroid source offset	$2.88 \pm 0.78$	3.69	$-2.86 \pm 0.78$	$0.37 \pm 0.70$



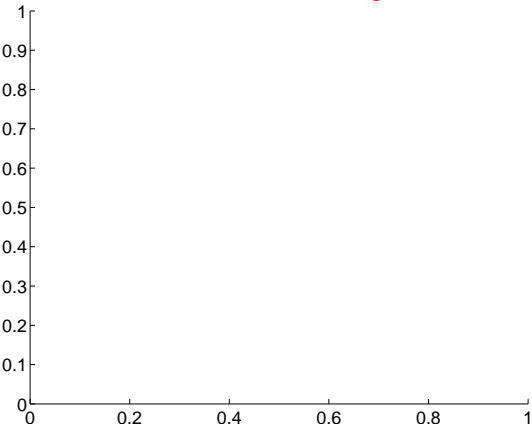
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . 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 ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

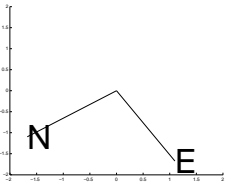
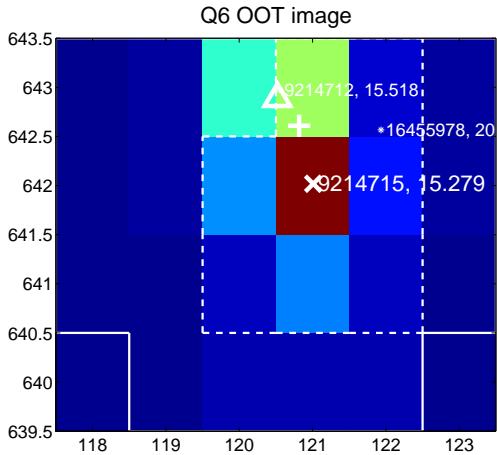
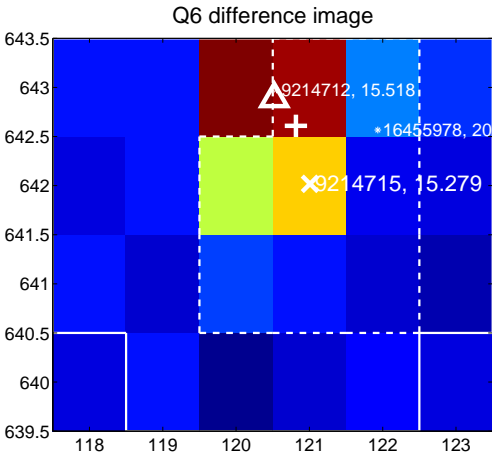
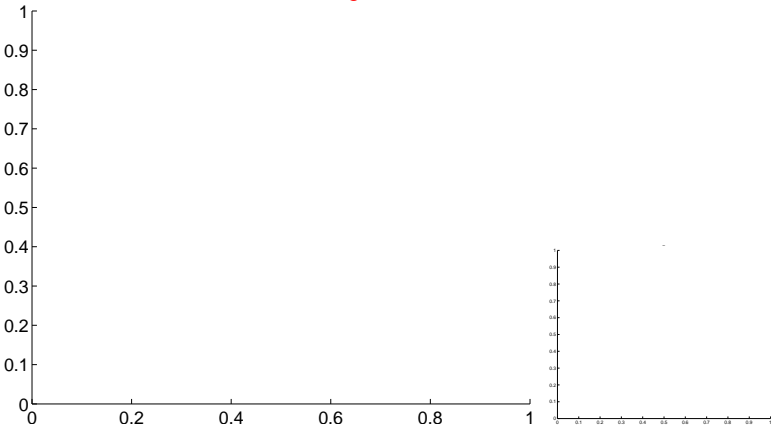


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

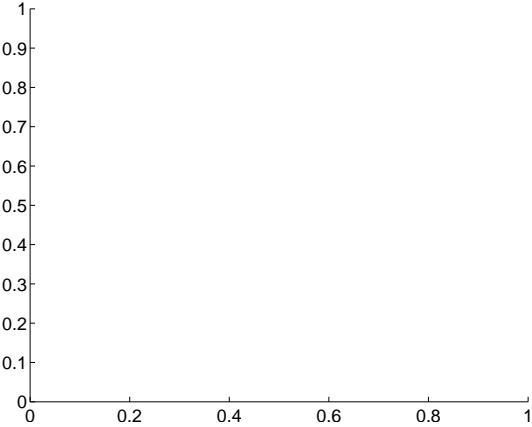
Q5 no difference image



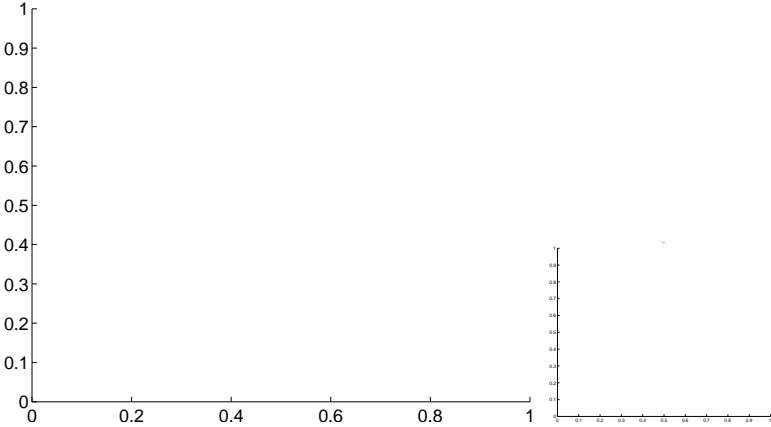
Q5 no OOT image



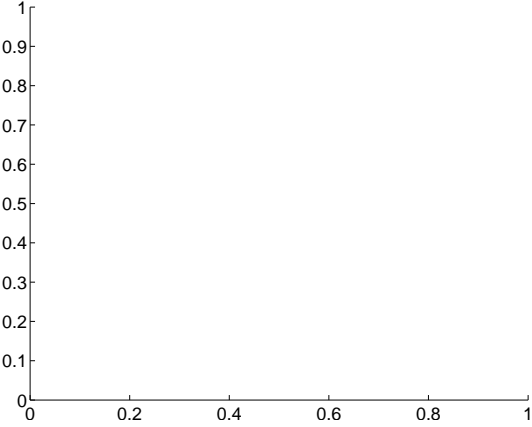
Q7 no difference image



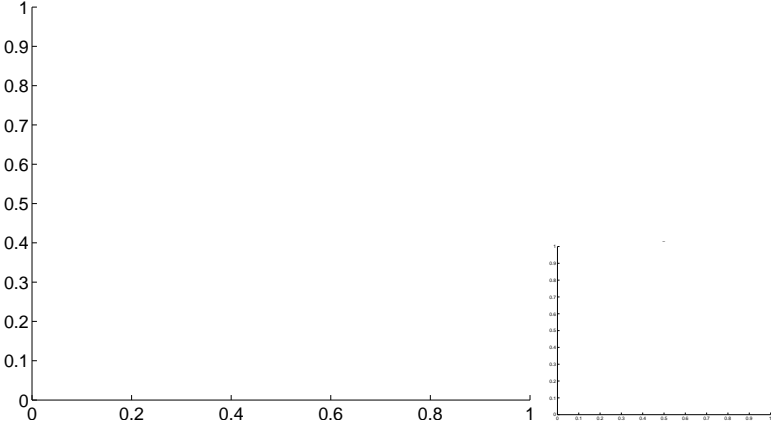
Q7 no OOT image



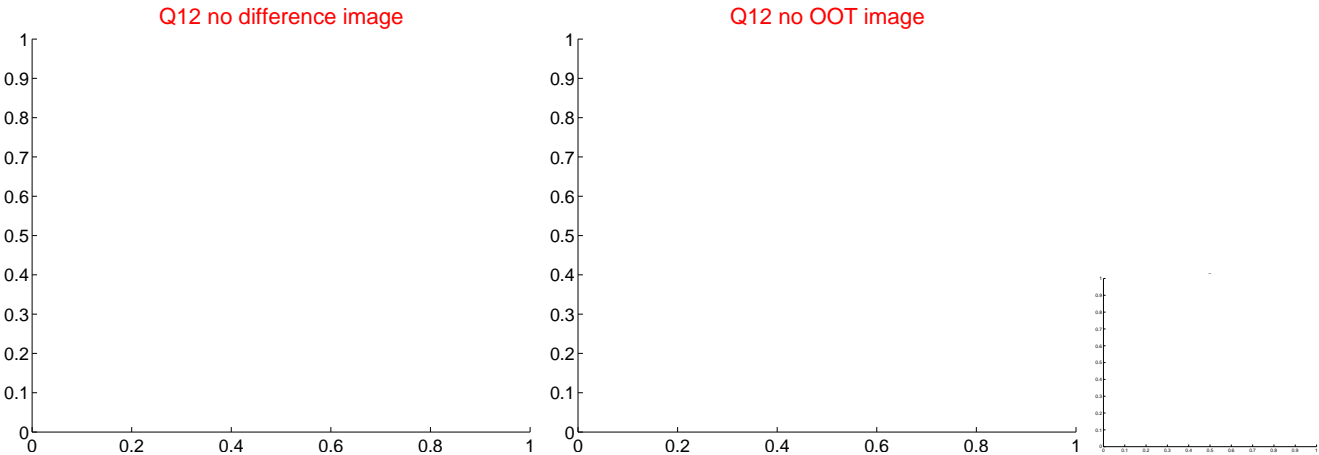
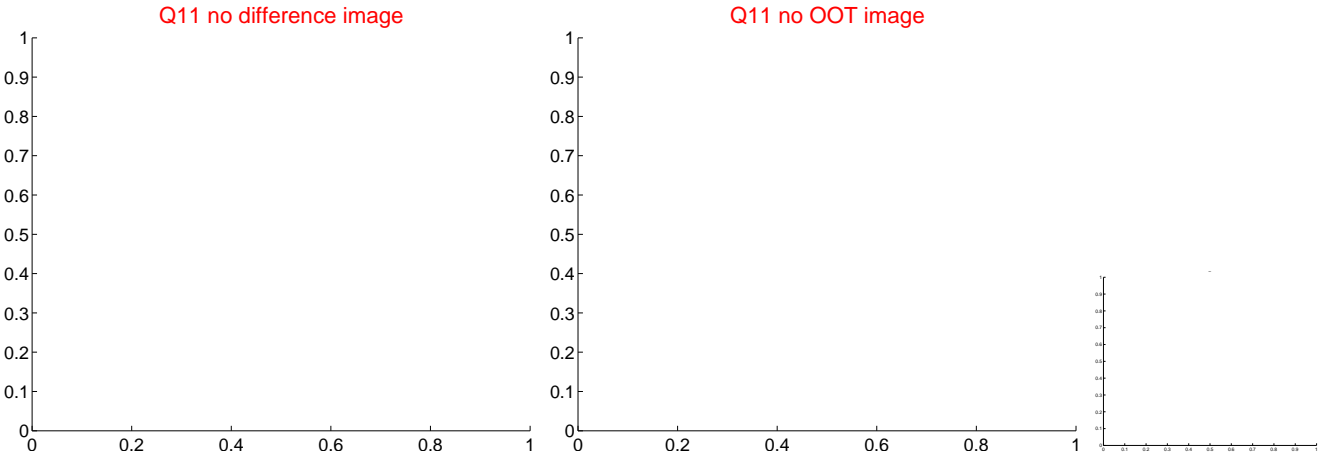
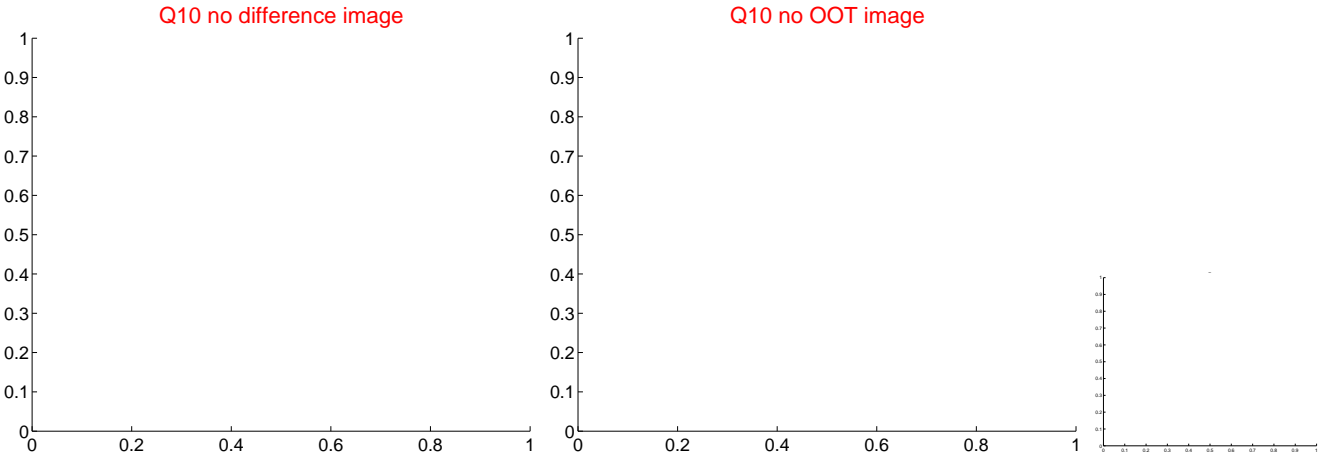
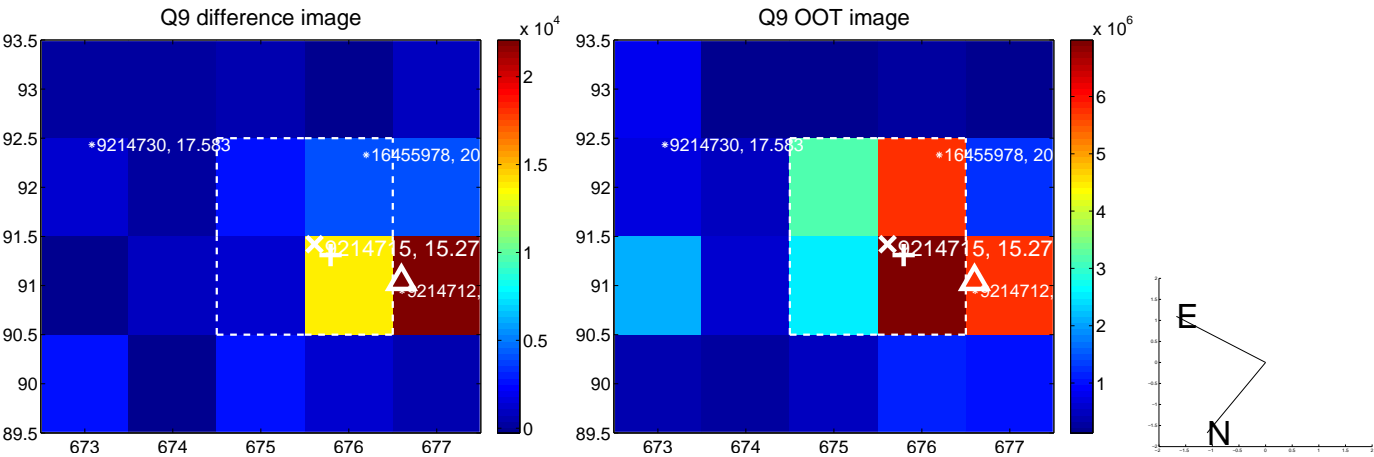
Q8 no difference image



Q8 no OOT image



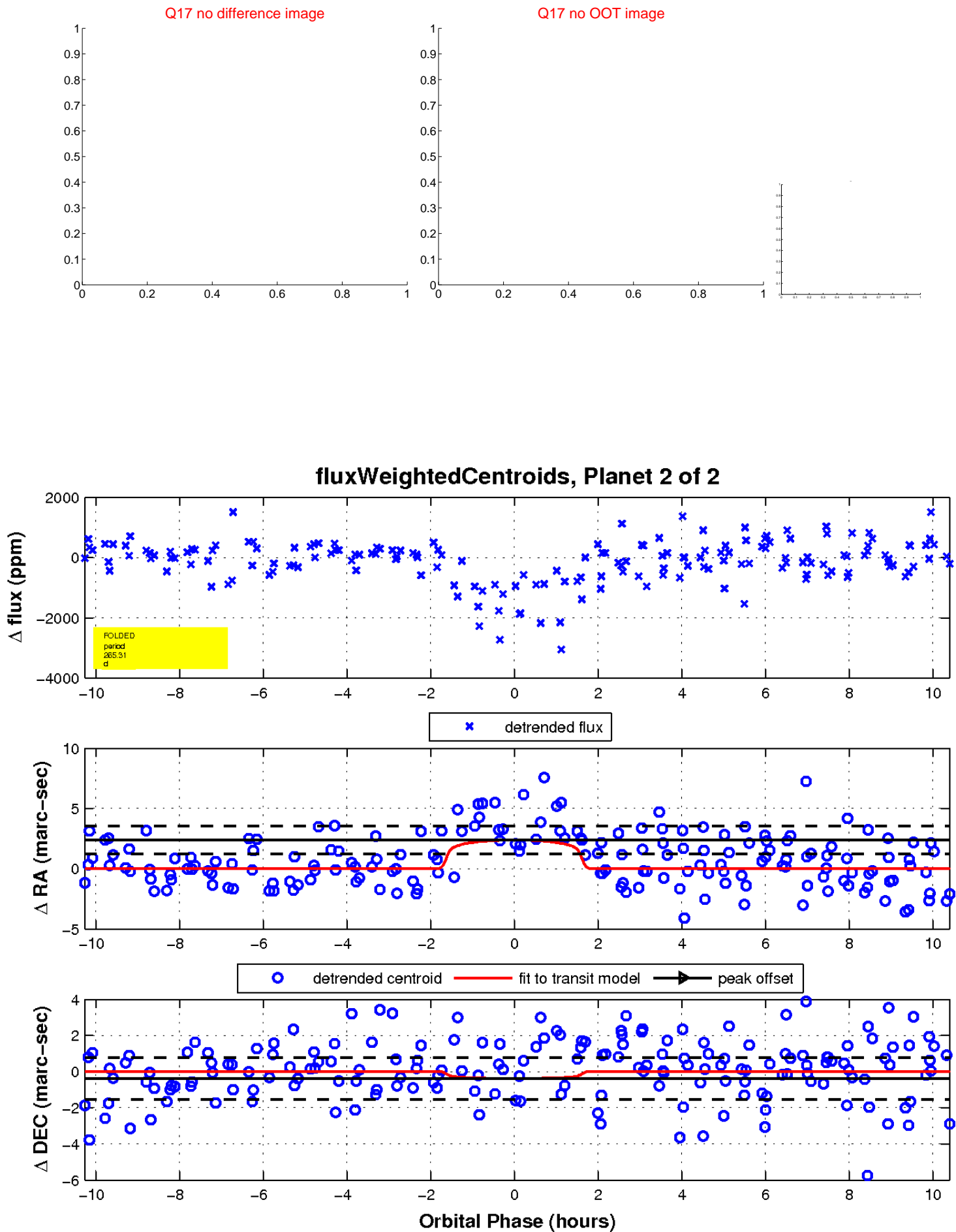
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

