

# KIC 007281615

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007281615-01	OBS	No	0.566757	131.843710	39.6	3.482	12.3	7.2	0.92	5825	0.70	4827.07
007281615-02	OBS	No	96.581197	162.768878	881.5	2.618	7.5	8.3	0.92	5825	2.95	5.11

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007281615-01	OBS	FP	0.00	1	0	1	1	LPP_DV—CENT_RESOLVED_OFFSET—EPHEM_MATCH
007281615-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—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.

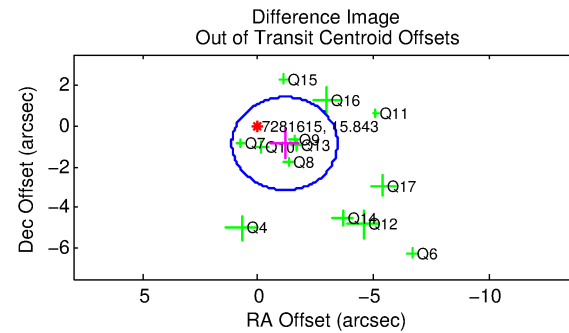
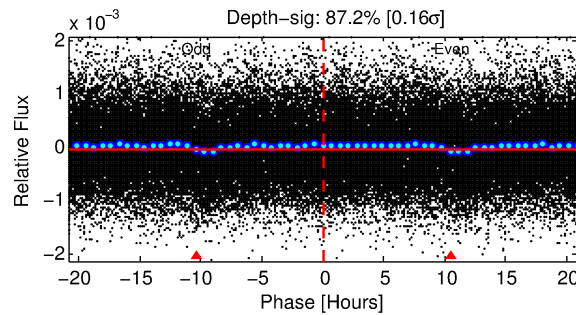
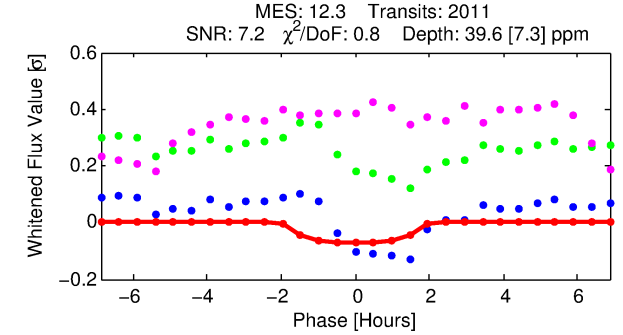
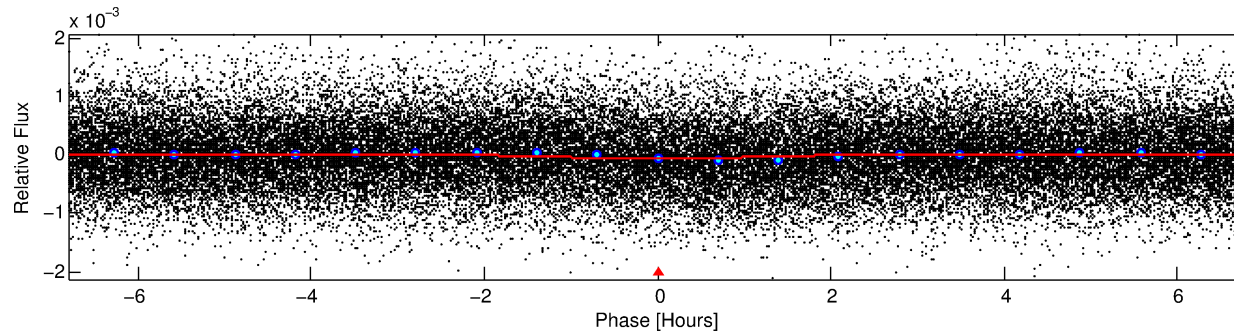
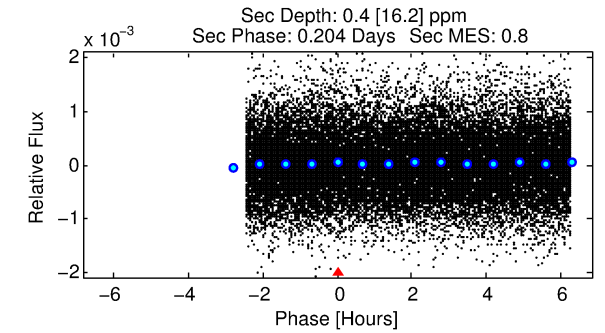
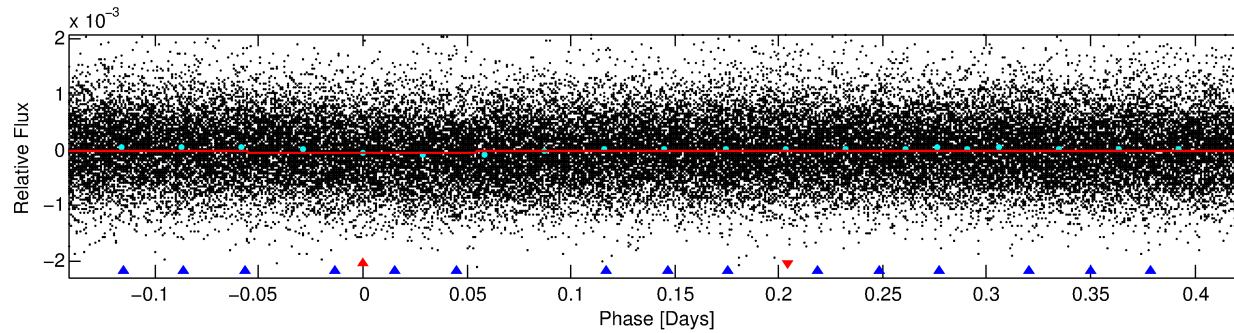
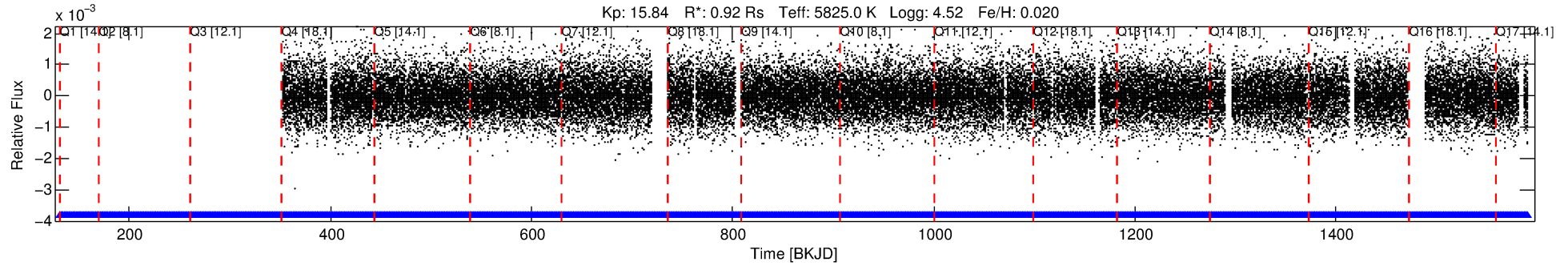
## Ephemeris Match Information For 007281615-01

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	$\sigma_P$	$\sigma_T$
007281615-01	7281615	RR-Lyr-pri	7198959	1:1	764.1	61	182	7.86	15.84	15582.00	Direct-PRF	0	1.77	23.83

**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: 7281615 Candidate: 1 of 2 Period: 0.567 d



## DV Fit Results:

Period = 0.56676 [0.00001] d  
Epoch = 131.8437 [0.0059] BKJD  
Rp/R\* = 0.0069 [0.0076]  
a/R\* = 1.09 [0.90]  
b = 0.91 [1.01]  
Seff = 4827.07 [2053.20]  
Teq = 2125 [226] K  
Rp = 0.70 [0.79] Re  
a = 0.0135 [0.0037] AU  
Ag = 0.08 [3.33] [-0.28σ]  
Teffp = 1755 [17963] K [-0.02σ]

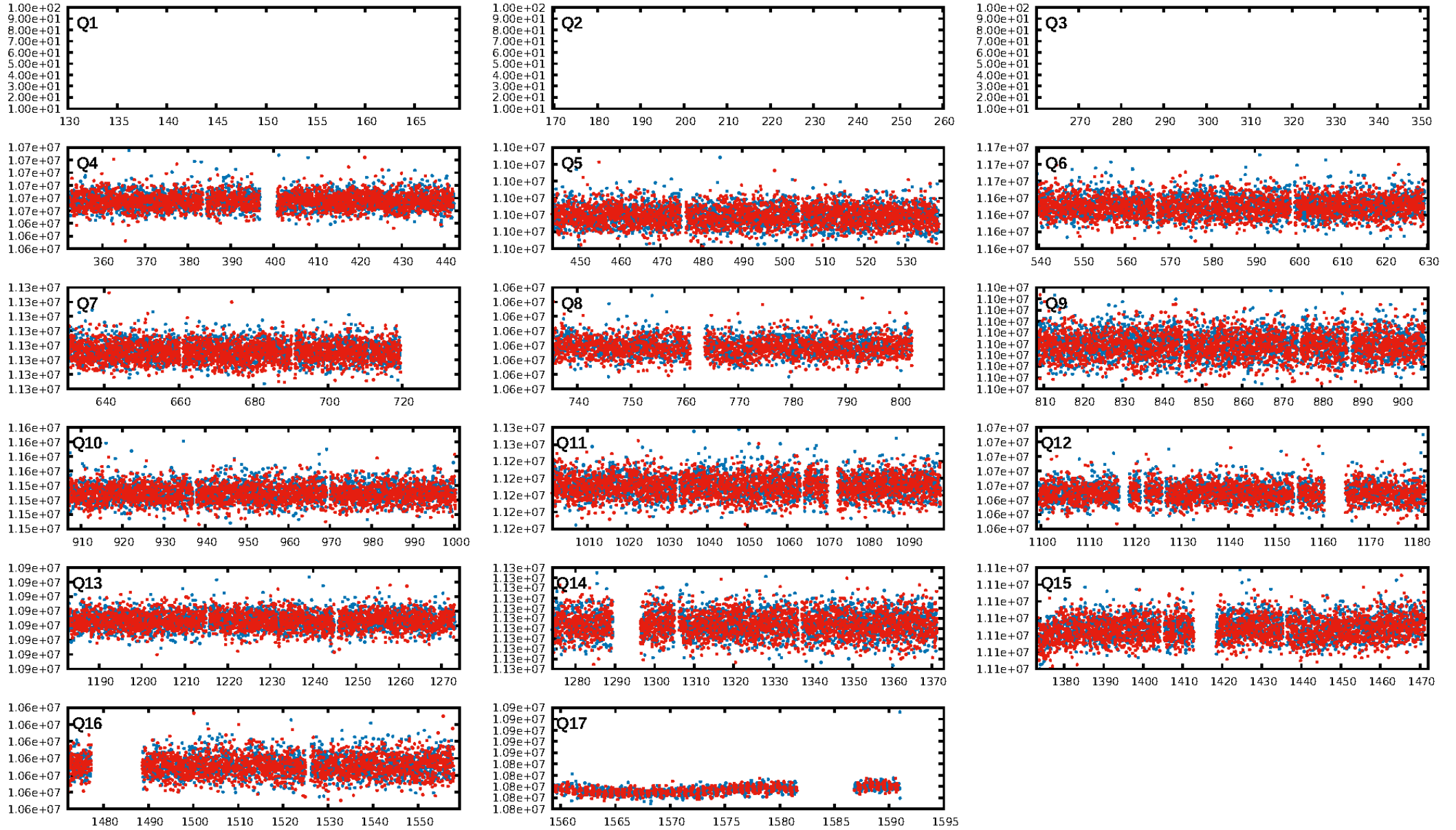
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [528.94σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 9.41e-25  
RollingBand-fgt: 1.00 [1964/1964]  
GhostDiagnostic-chr: 2.256  
Centroid-sig: 40.5%  
Centroid-so: 1.965 arcsec [0.97σ]  
OotOffset-rm: 1.441 arcsec [1.90σ]  
OotOffset-st: 3/3/4/3 [13]  
KicOffset-rm: 1.472 arcsec [1.73σ]  
KicOffset-st: 3/3/4/3 [13]  
DiffImageQuality-fgm: 0.00 [0/13]  
DiffImageOverlap-fno: 1.00 [14/14]

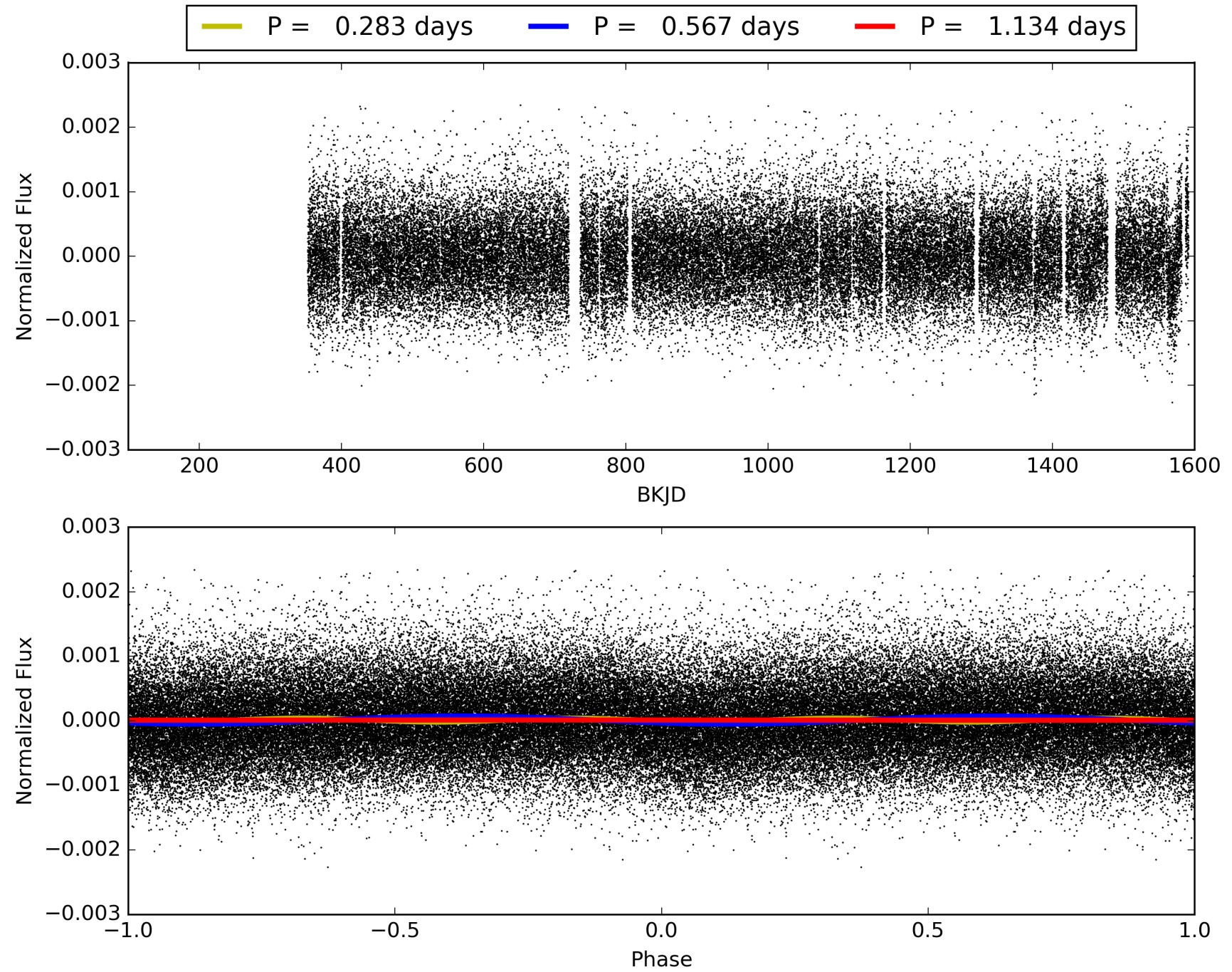
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 14:46:30 Z

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

# TCE 007281615-01, PDC Light Curves



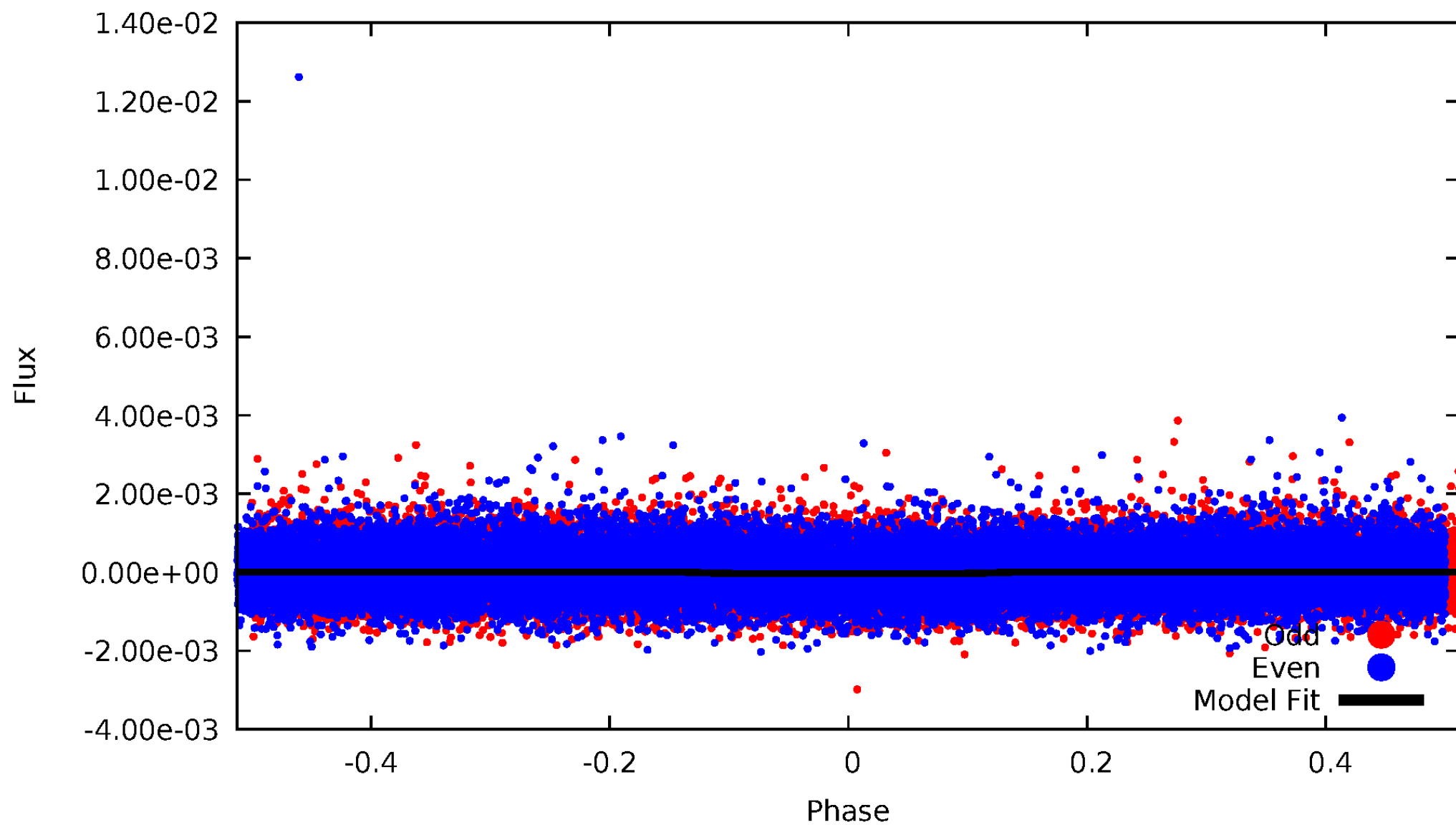
# TCE 007281615-01





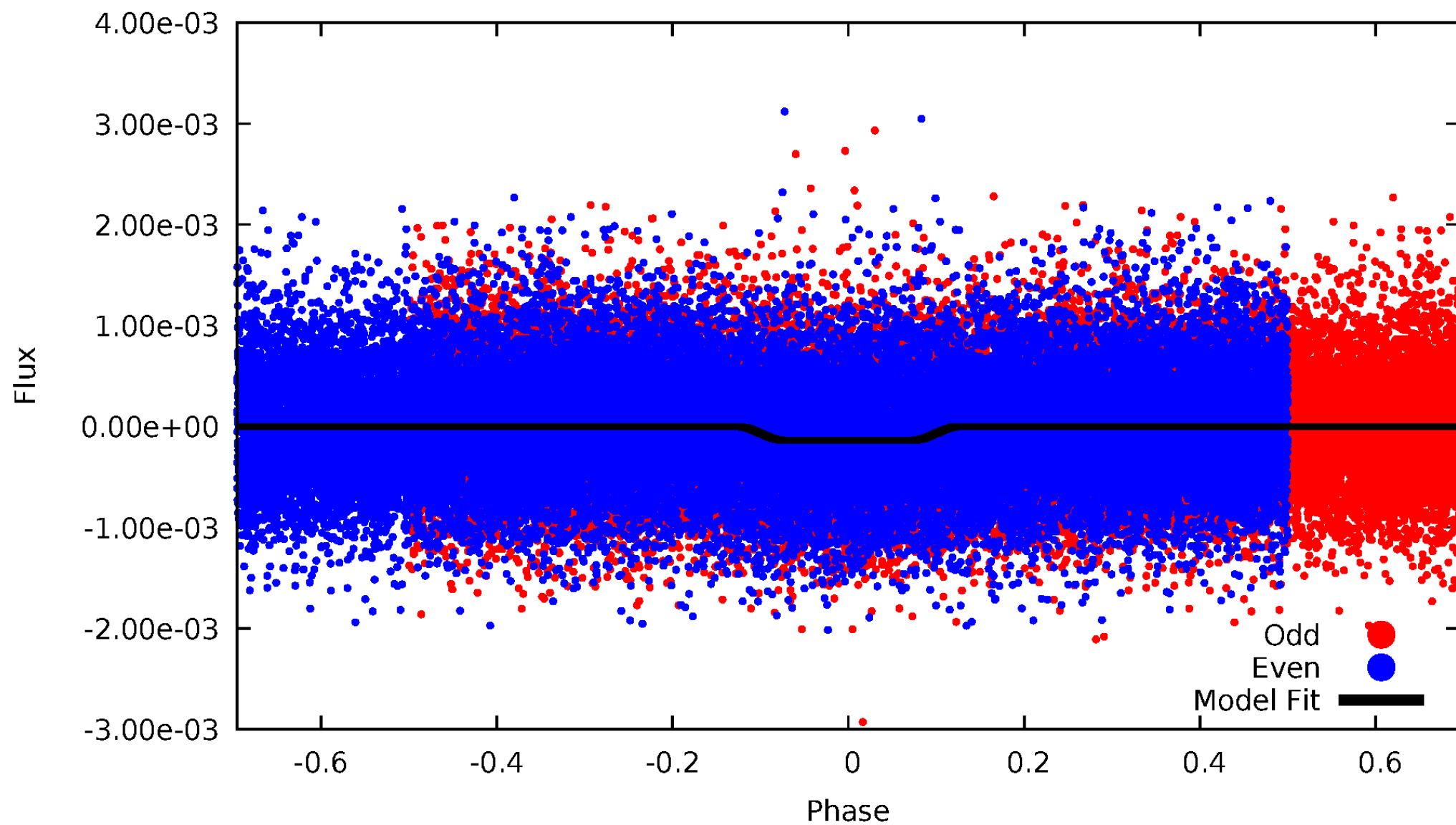
# DV Odd/Even

TCE 007281615-01



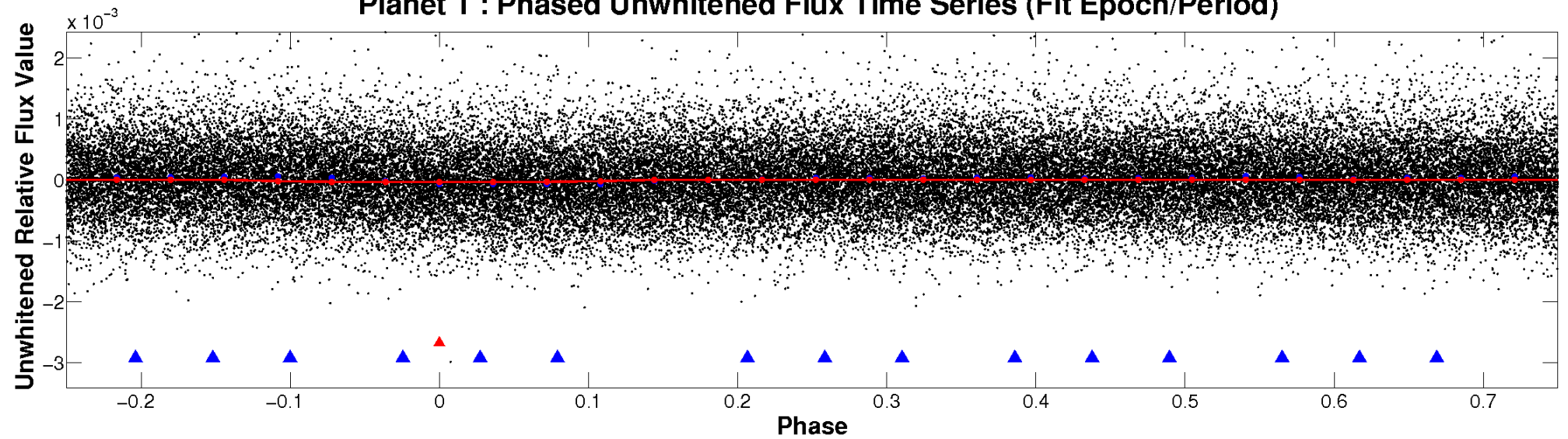
# ALT Odd/Even

TCE 007281615-01

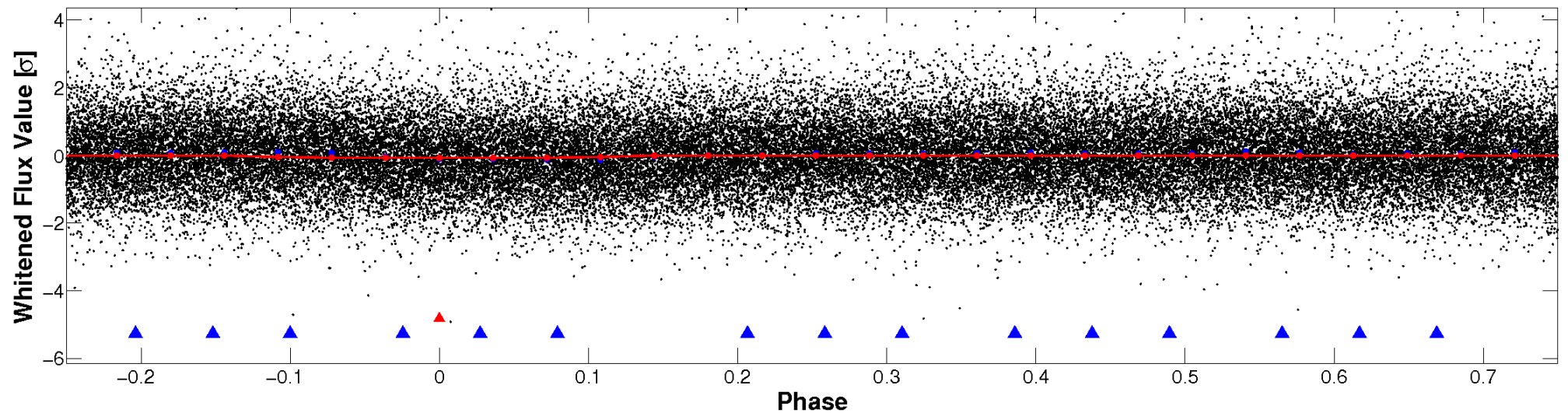


# Non-Whitened Vs. Whitened Light Curve

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

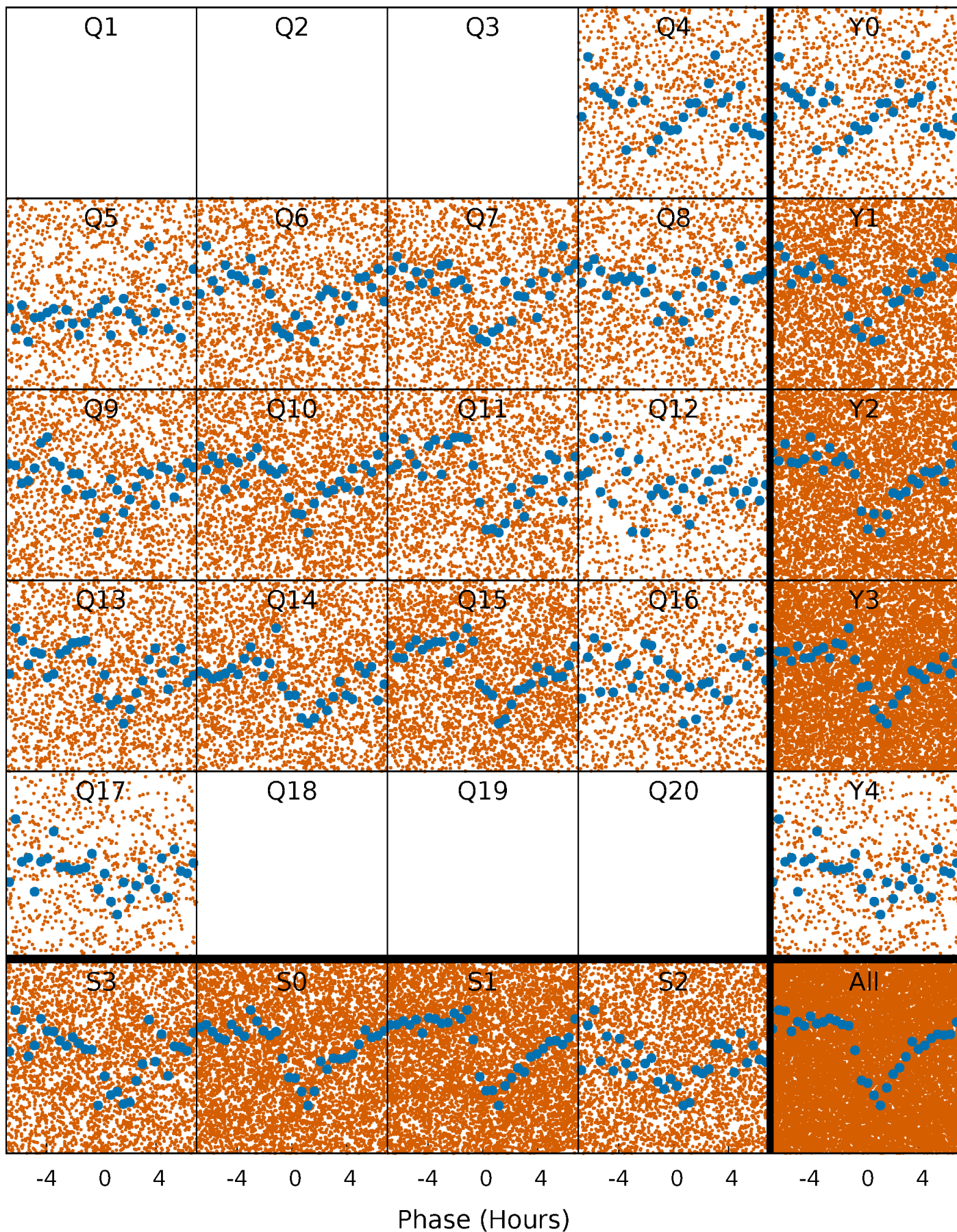


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

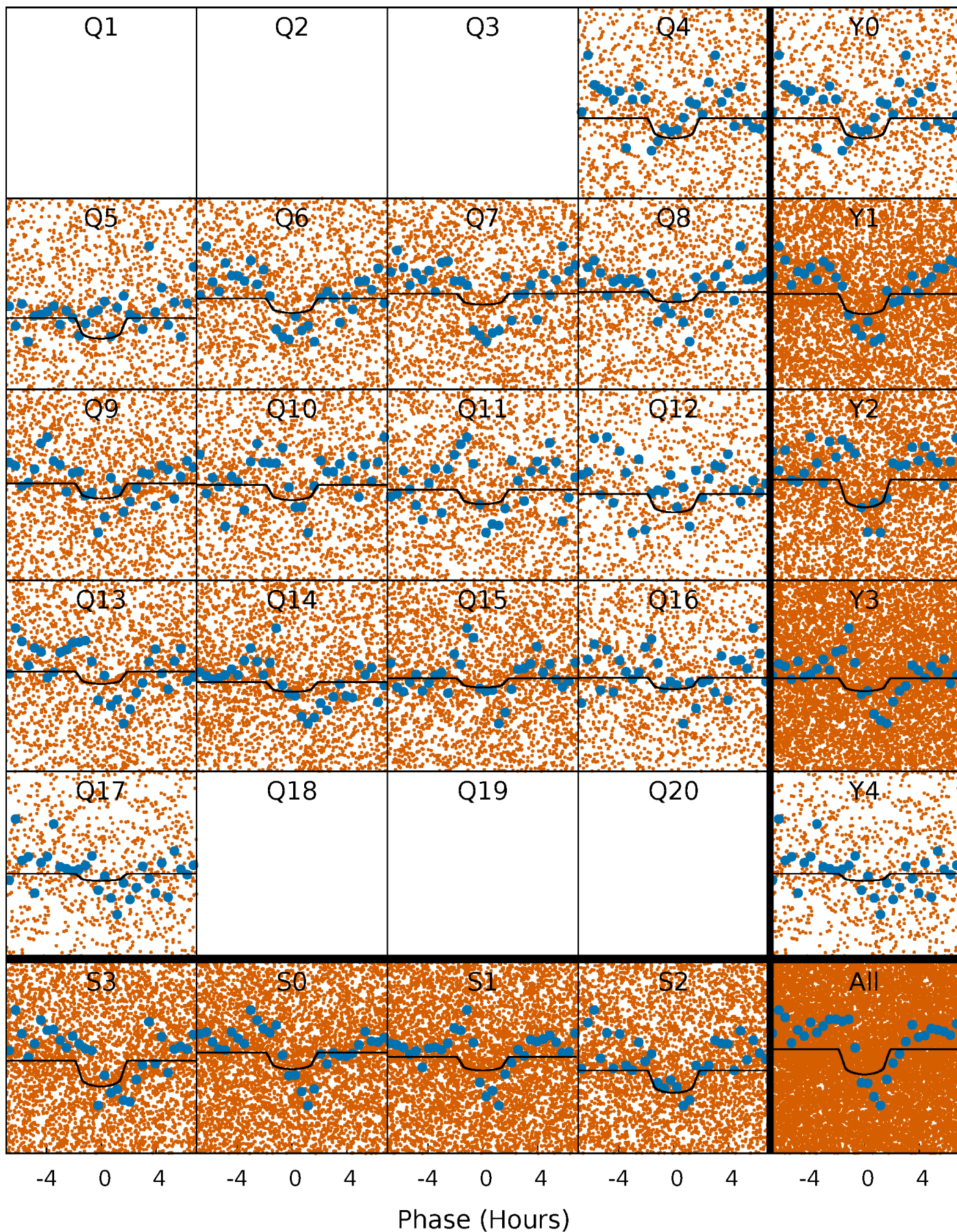
TCE 007281615-01 P= 0.566757 Days  $T_0=131.843710$  (BKJD)





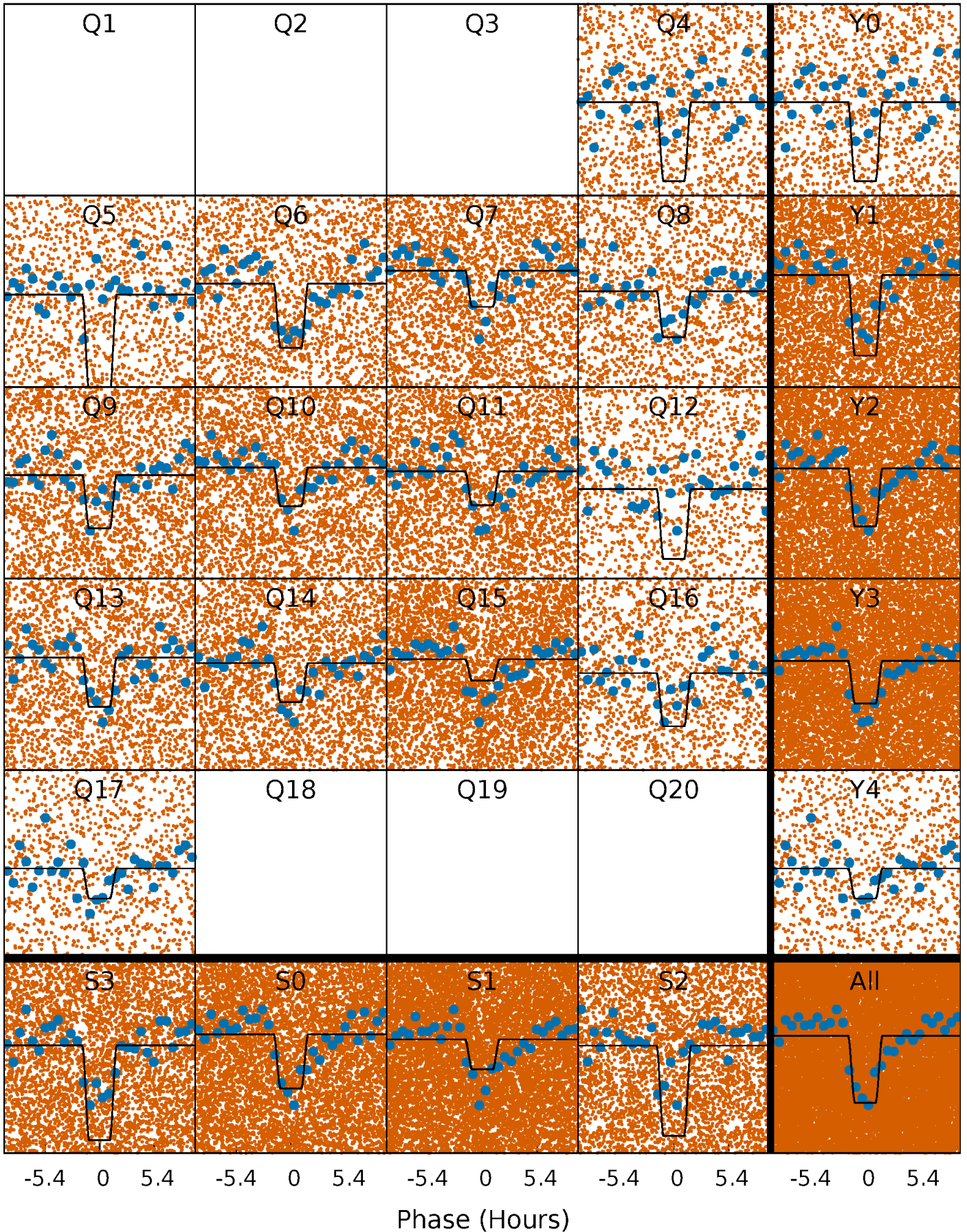
# DV Quarter-Phased Transit Curves

TCE 007281615-01 P= 0.566757 Days  $T_0=131.843710$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 007281615-01 P= 0.566795 Days  $T_0=131.822819$  (BKJD)

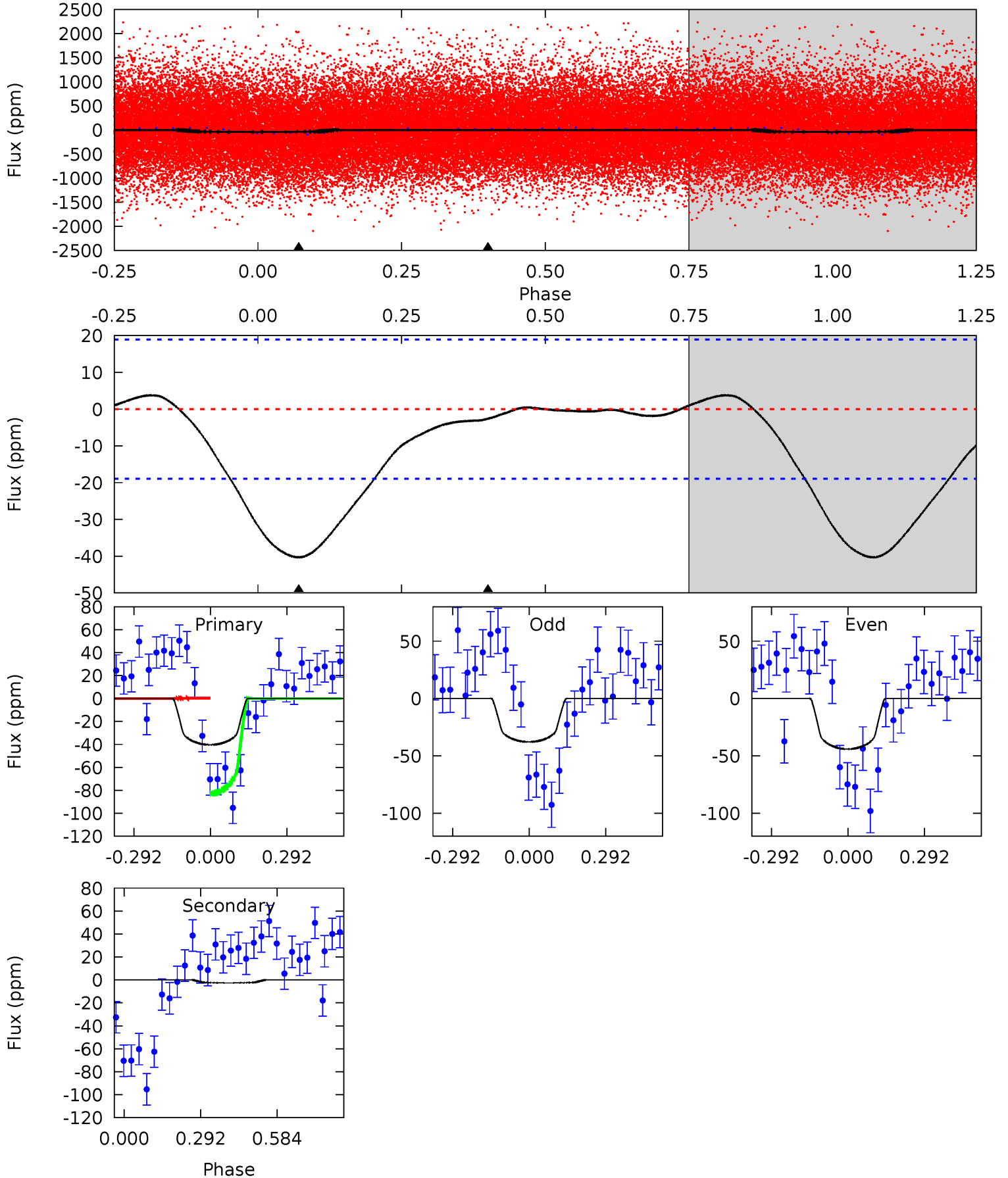




# DV Model-Shift Uniqueness Test

007281615-01, P = 0.566757 Days, E = 131.843710 Days

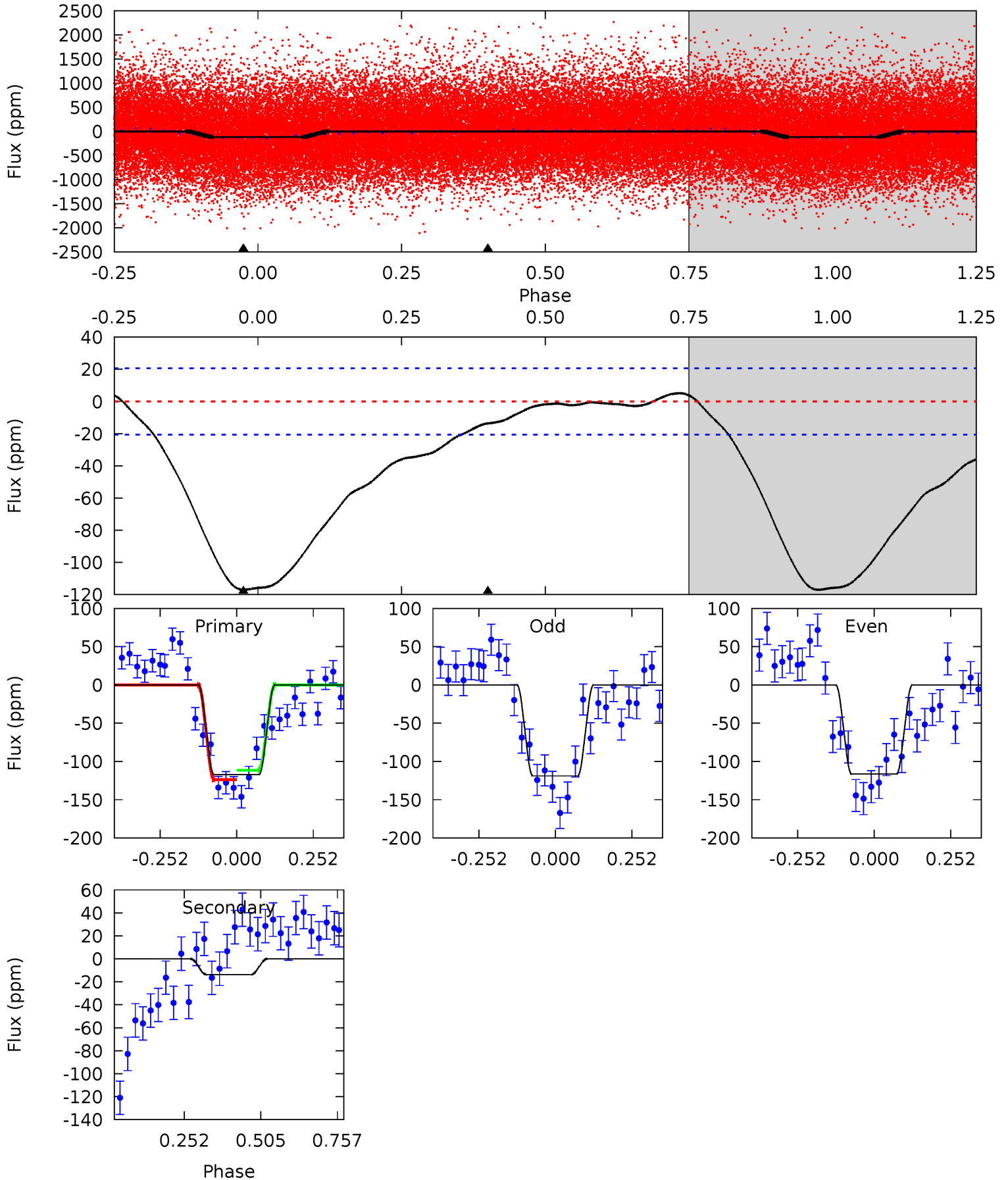
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.24	0.60	0	0	4.33	1.05	0.36	9.24	9.24	0.60	0.60	0.71	0.81	0.09	9.63



# Alt Model-Shift Uniqueness Test

007281615-01, P = 0.566795 Days, E = 131.822819 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
24.8	2.90	0	0	4.37	1.14	0.64	24.8	24.8	2.90	2.90	0.26	0.99	0.04	1.30





### Stellar Parameters For KIC 007281615

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5825^{+184}_{-205}$	$4.516^{+0.039}_{-0.221}$	$0.020^{+0.250}_{-0.300}$	$0.923^{+0.297}_{-0.099}$	$1.019^{+0.115}_{-0.127}$	$1.824^{+0.391}_{-0.987}$
	+3%/-4%	+1%/-5%	+1250%/-1500%	+32%/-11%	+11%/-12%	+21%/-54%
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 007281615-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-3\pm 4$	$0.95^{+0.78}_{-0.61}$	$3063^{+232}_{-164}$	$-2647^{+6887}_{-722}$	$0.214^{+1.984}_{-0.361}$
Alt.	$-14\pm 5$	$1.31^{+0.85}_{-0.71}$	$3052^{+239}_{-149}$	$3340^{+1421}_{-5799}$	$0.757^{+3.022}_{-0.499}$

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

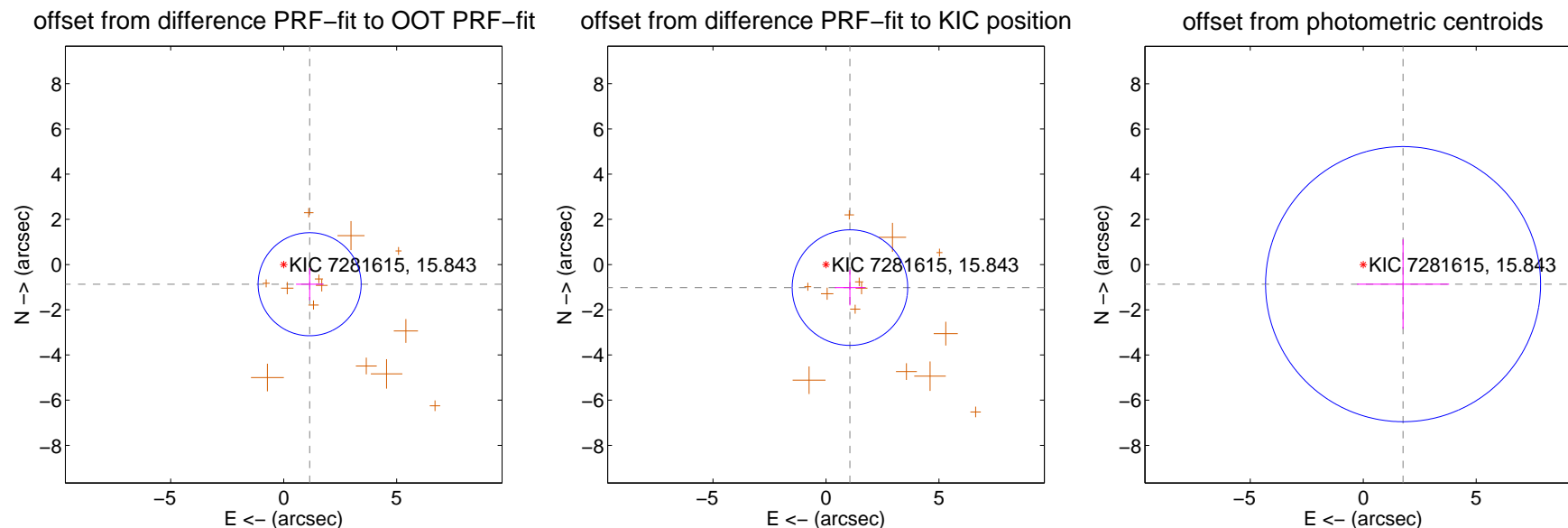
## DV Centroid Data

Supplemental centroid analysis for 007281615-01. Kepler magnitude: 15.84. Transit SNR 7.21

There are 0 quarters with good PRF difference image offsets

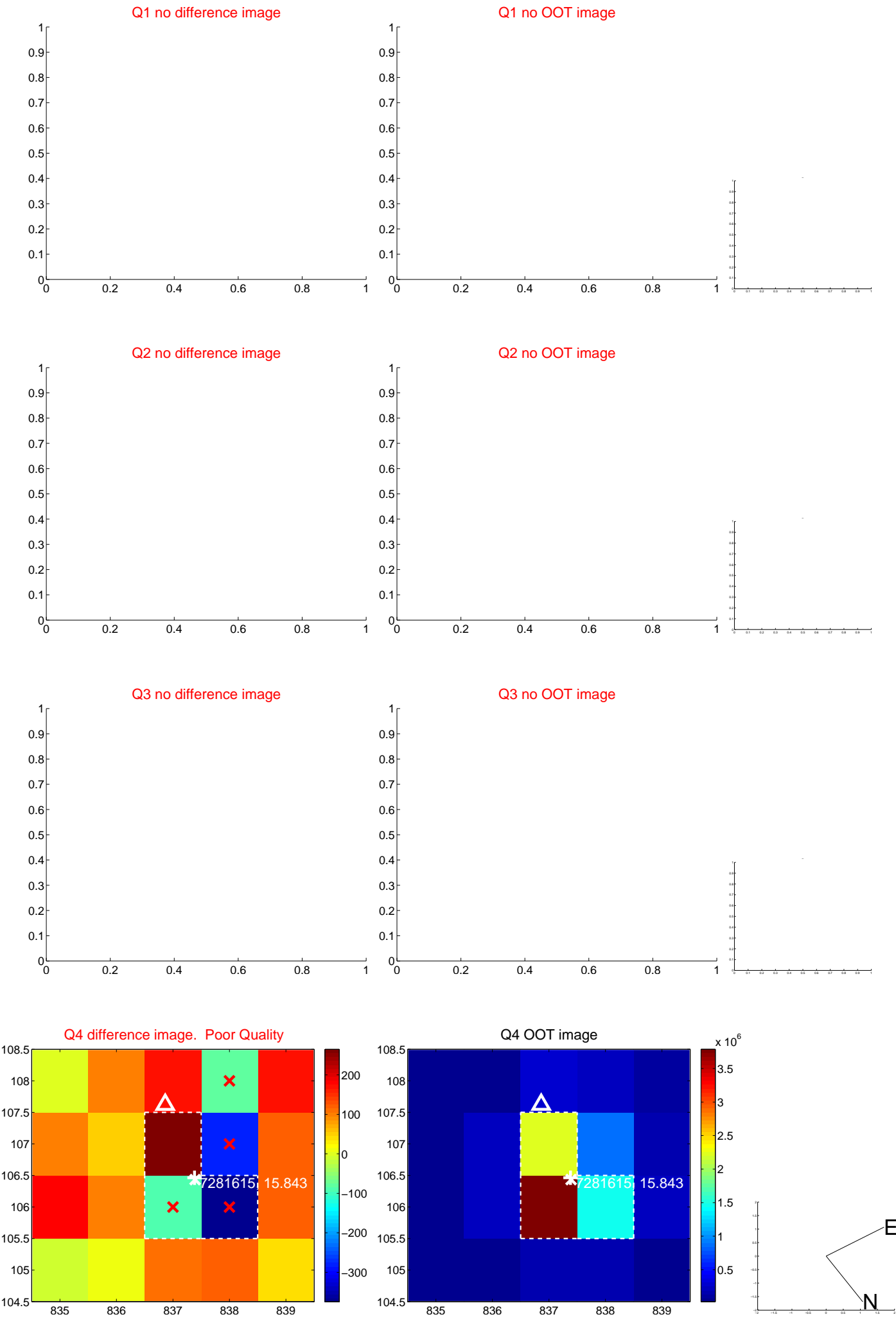
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.441 \pm 0.760$	1.90	$-1.148 \pm 0.604$	$-0.871 \pm 0.708$
PRF-fit source offset from KIC position	$1.472 \pm 0.852$	1.73	$-1.061 \pm 0.666$	$-1.020 \pm 0.789$
photometric centroid source offset	$1.97 \pm 2.03$	0.97	$-1.76 \pm 2.04$	$-0.86 \pm 1.98$

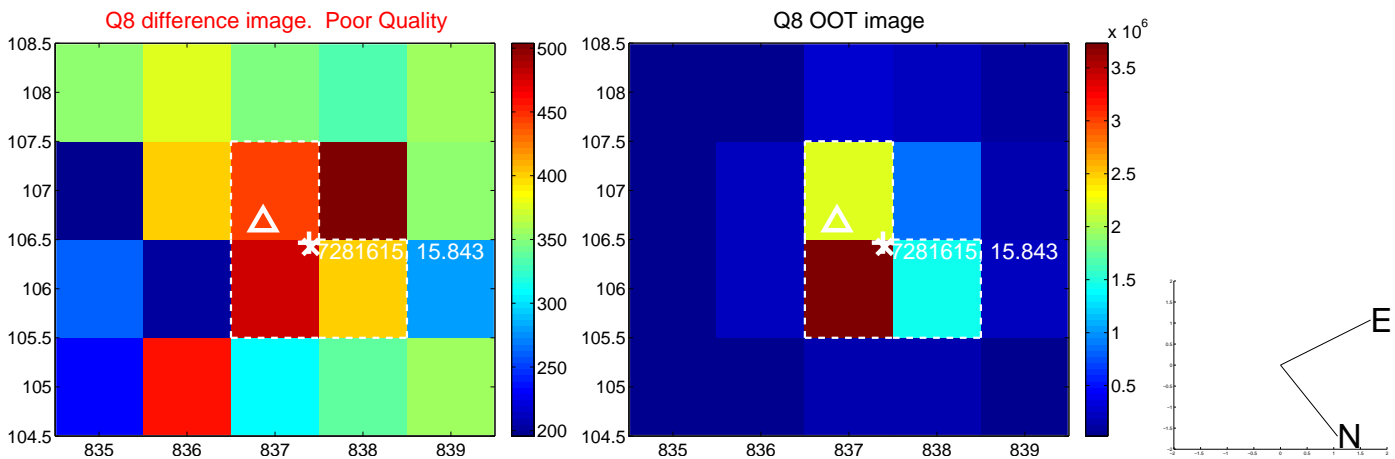
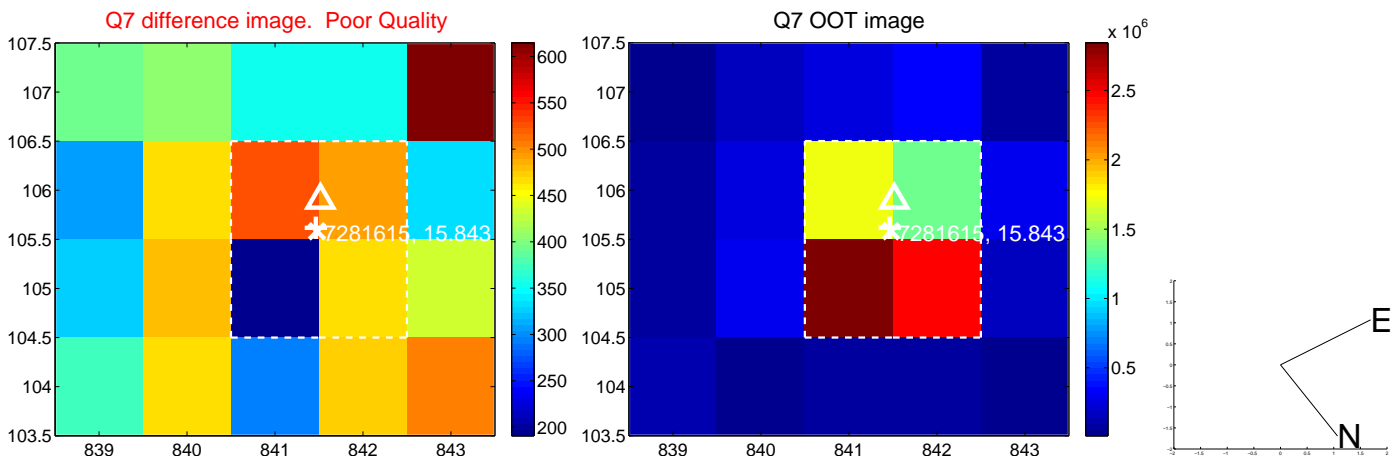
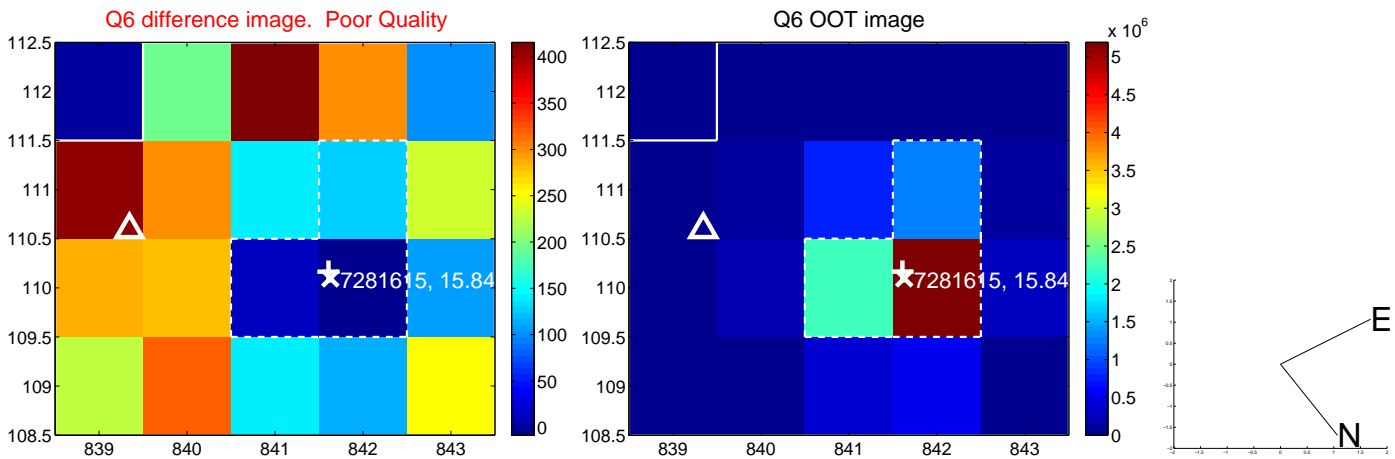
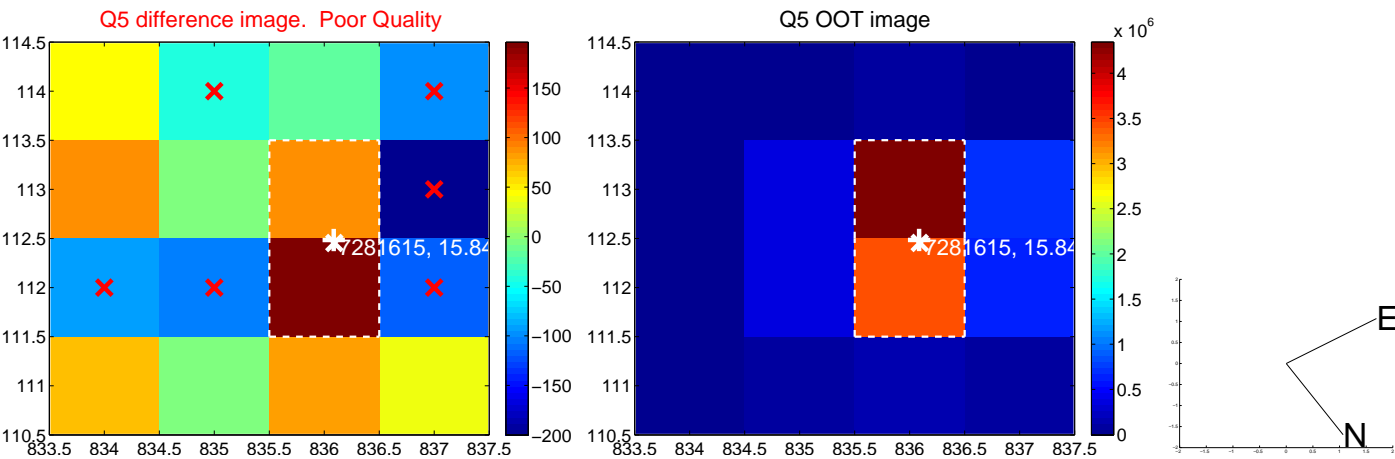


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

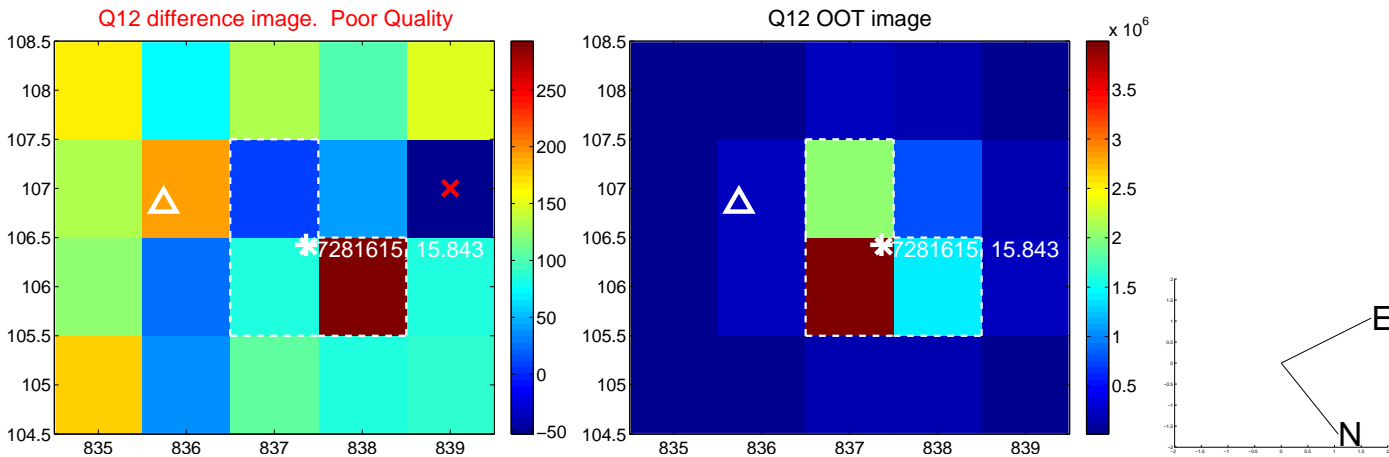
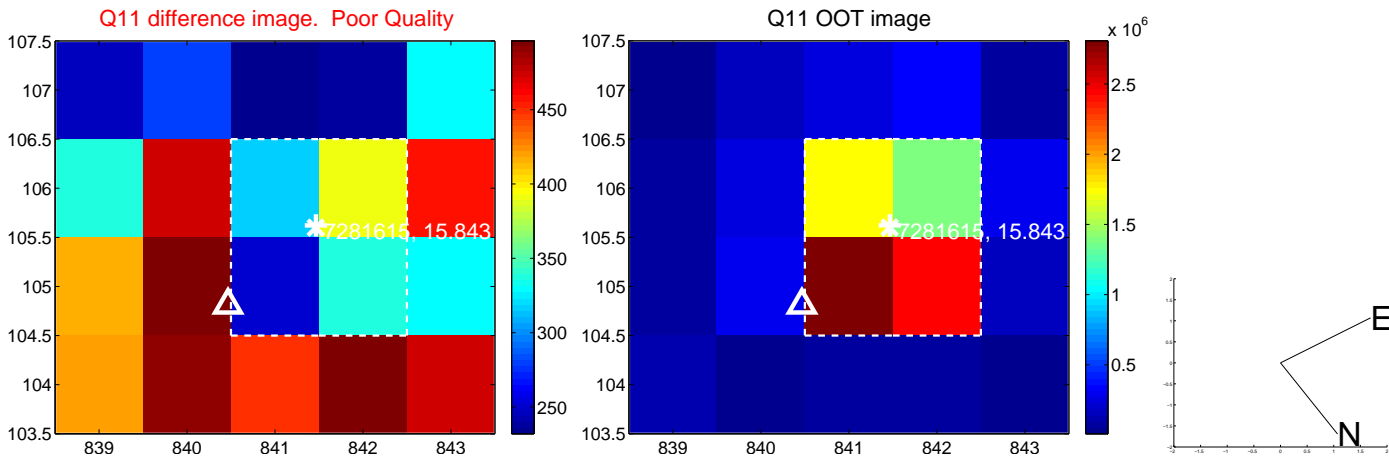
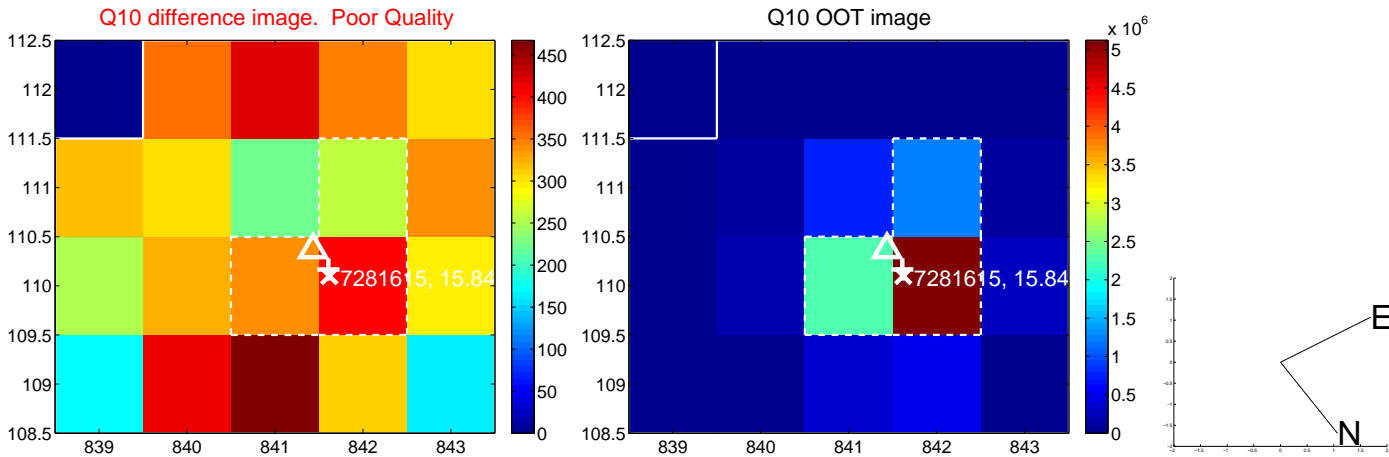
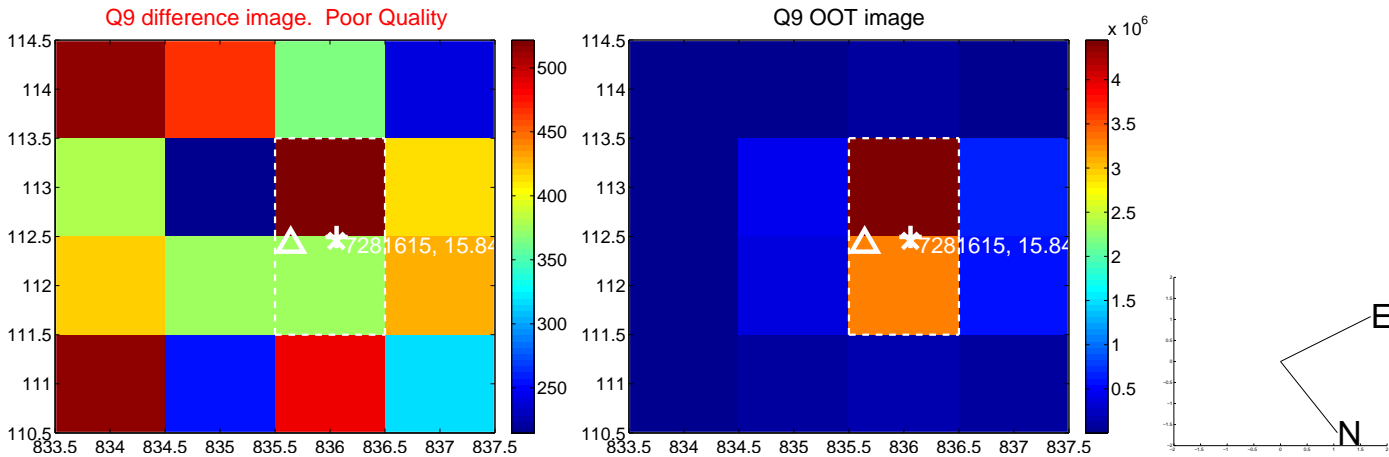


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

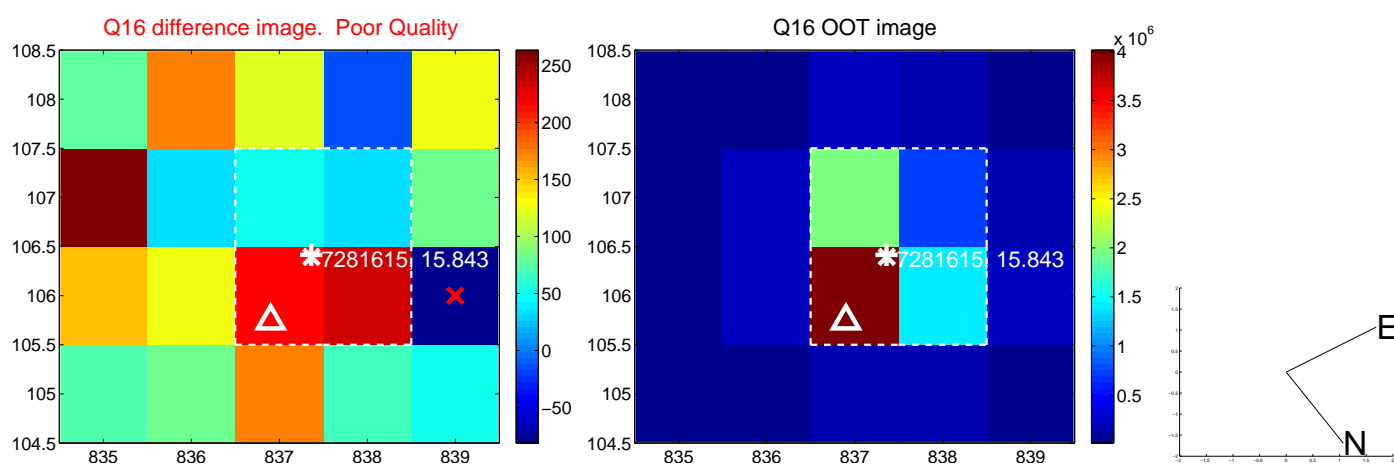
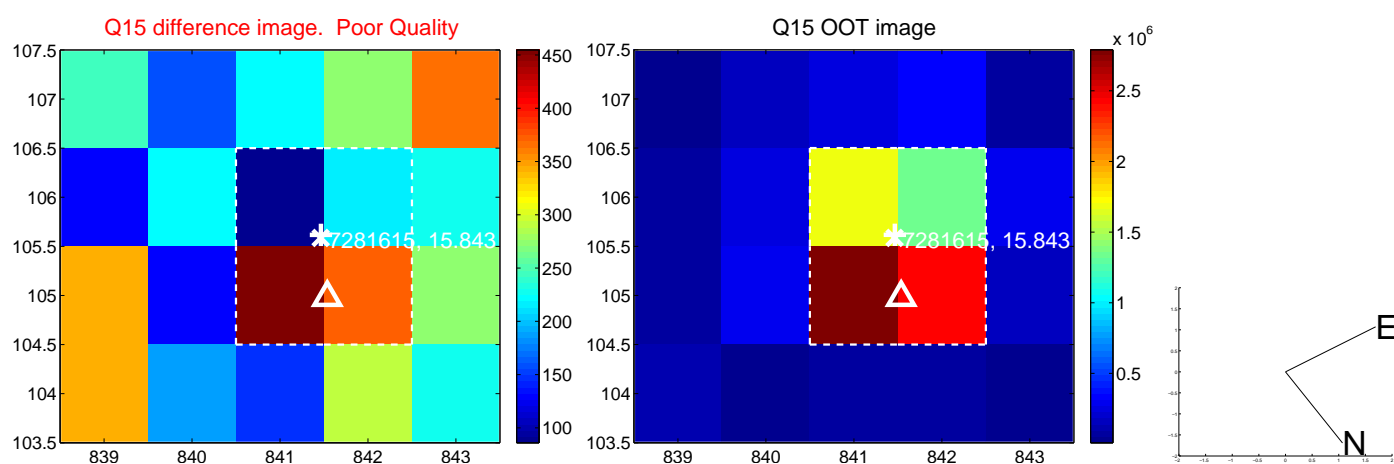
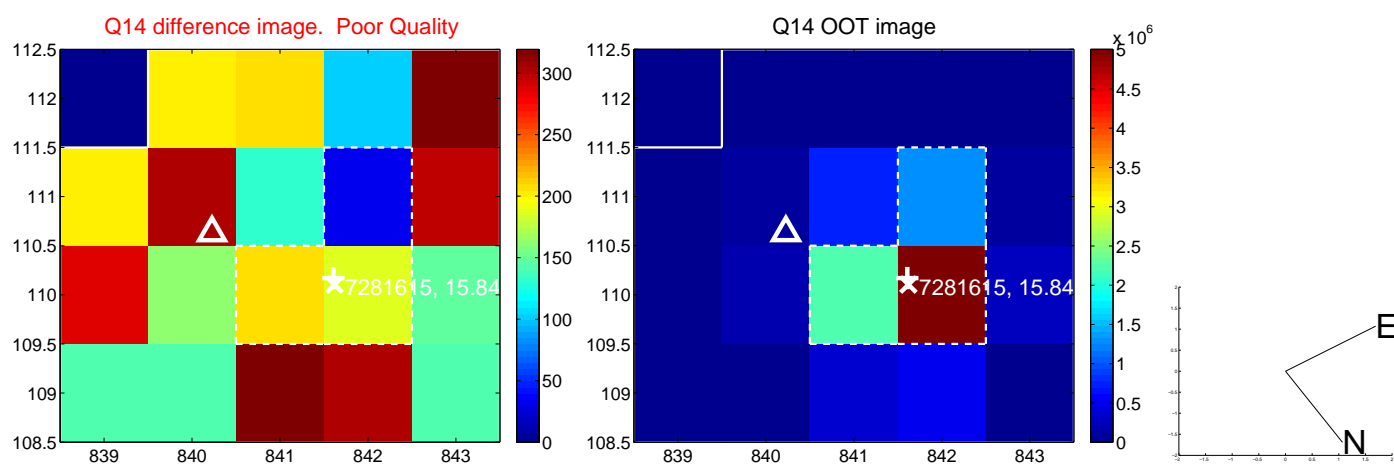
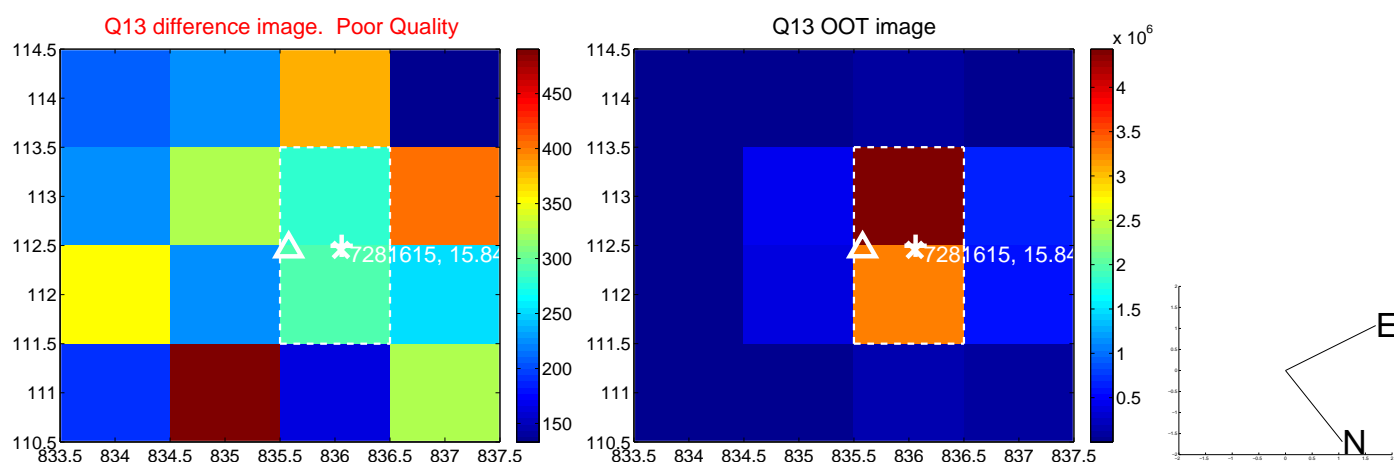




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

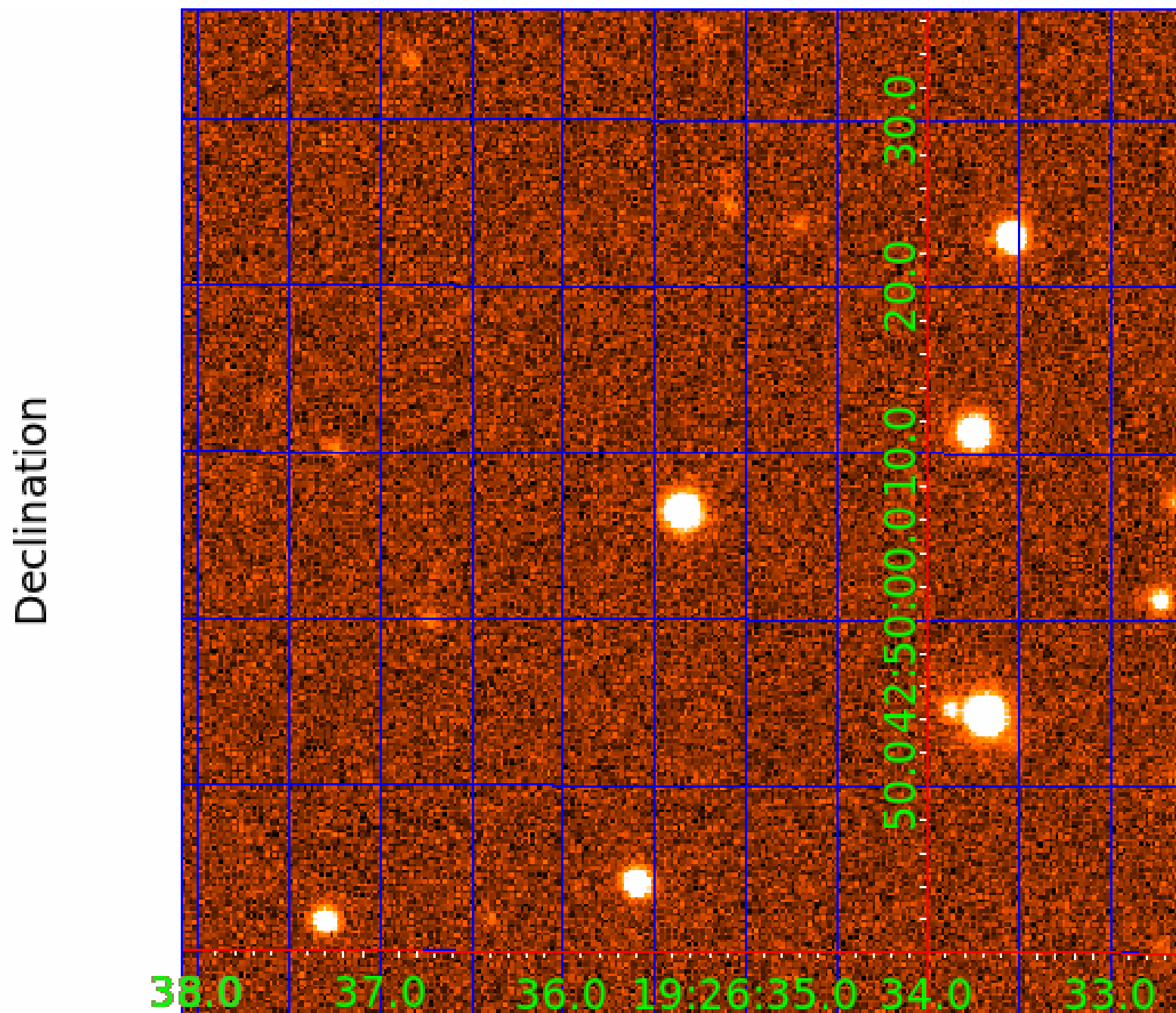


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image





# KIC 007281615

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007281615-01	OBS	No	0.566757	131.843710	39.6	3.482	12.3	7.2	0.92	5825	0.70	4827.07
007281615-02	OBS	No	96.581197	162.768878	881.5	2.618	7.5	8.3	0.92	5825	2.95	5.11

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007281615-01	OBS	FP	0.00	1	0	1	1	LPP_DV—CENT_RESOLVED_OFFSET—EPHEM_MATCH
007281615-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—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.

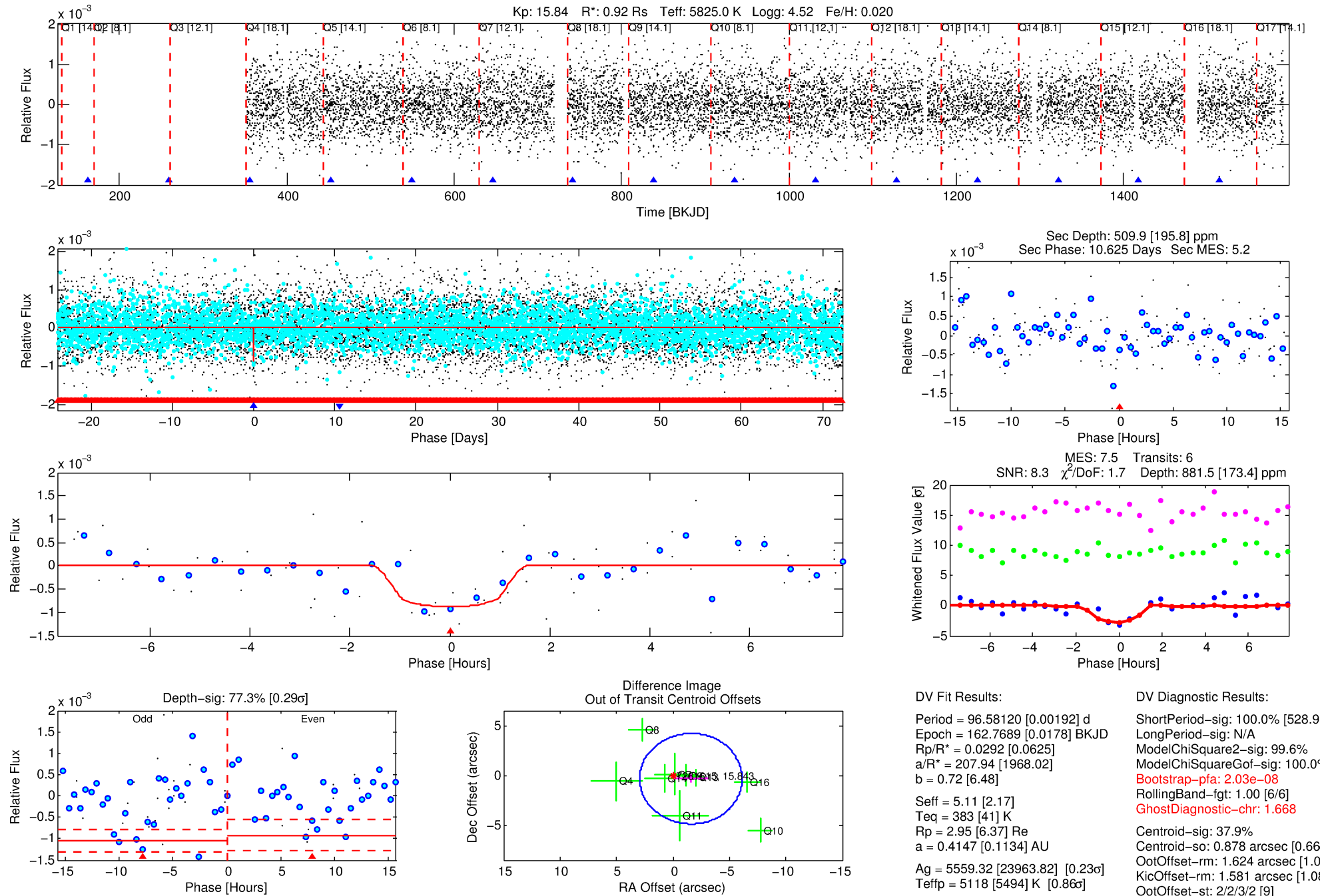
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007281615-02

No Significant Match Found

# DV One-Page Summary

KIC: 7281615 Candidate: 2 of 2 Period: 96.581 d



## DV Fit Results:

Period = 96.58120 [0.00192] d  
Epoch = 162.7689 [0.0178] BKJD  
Rp/R\* = 0.0292 [0.0625]  
a/R\* = 207.94 [1968.02]  
b = 0.72 [6.48]  
Seff = 5.11 [2.17]  
Teff = 383 [41] K  
Rp = 2.95 [6.37] Re  
a = 0.4147 [0.1134] AU  
Ag = 5559.32 [23963.82] [0.23σ]  
Teffp = 5118 [5494] K [0.86σ]

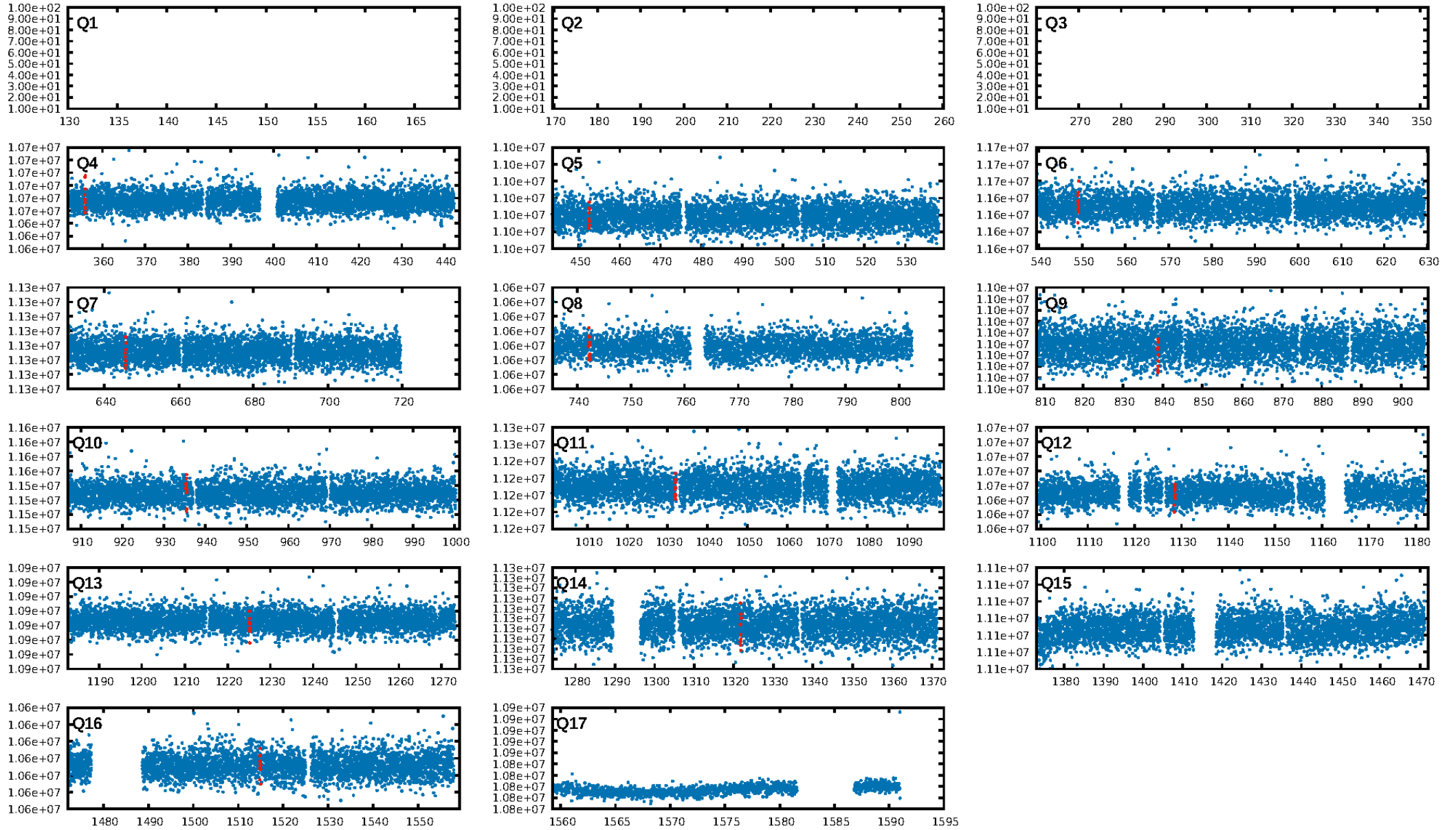
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [528.94σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 99.6%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 2.03e-08**  
RollingBand-fgt: 1.00 [6/6]  
**GhostDiagnostic-chr: 1.668**  
Centroid-sig: 37.9%  
Centroid-so: 0.878 arcsec [0.66σ]  
OotOffset-rm: 1.624 arcsec [1.07σ]  
KicOffset-rm: 1.581 arcsec [1.08σ]  
OotOffset-st: 2/2/3/2 [9]  
KicOffset-st: 2/2/3/2 [9]  
DiffImageQuality-fgm: 0.00 [0/9]  
DiffImageOverlap-fno: 0.00 [0/12]

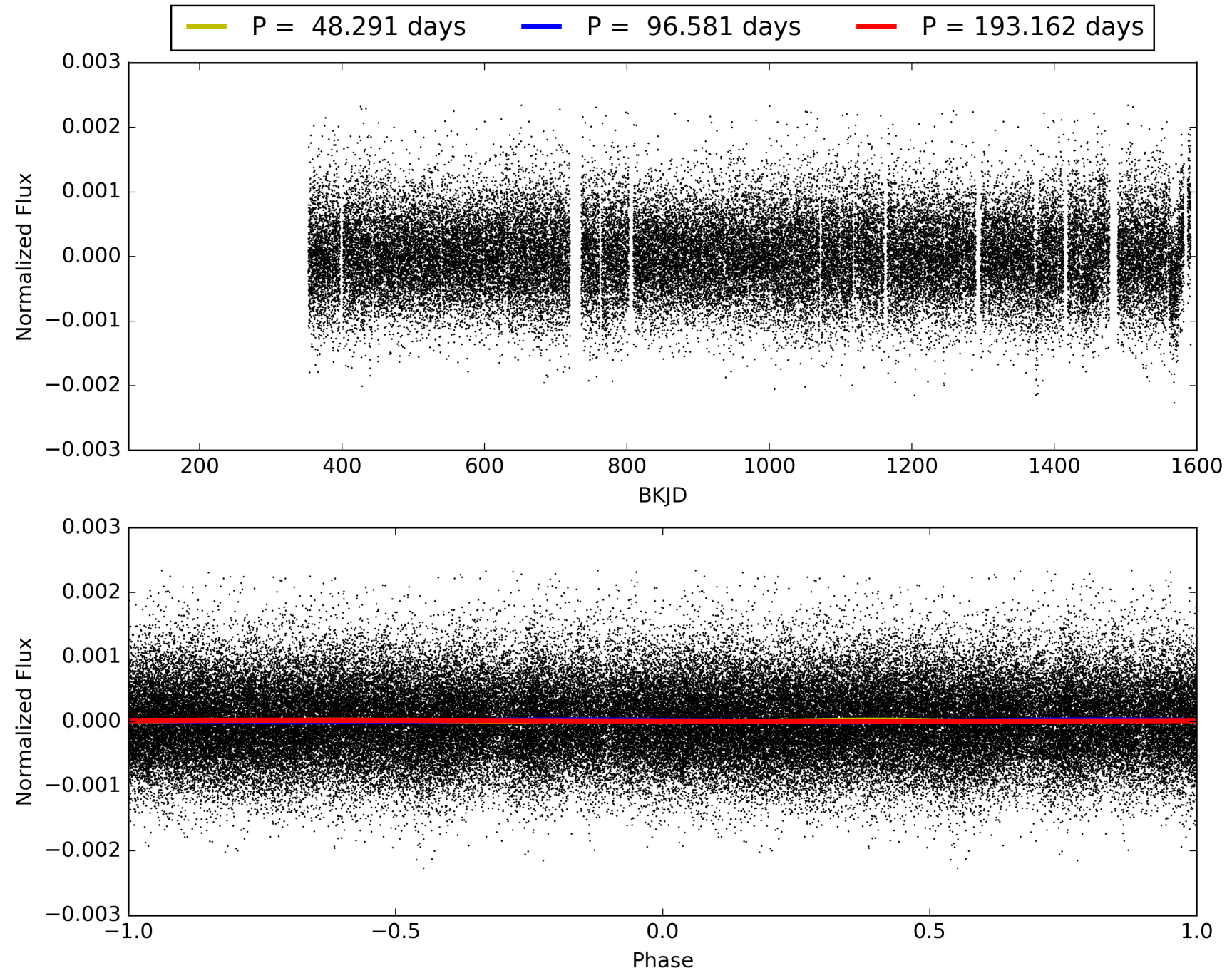
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 14:46:40 Z

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

# TCE 007281615-02, PDC Light Curves

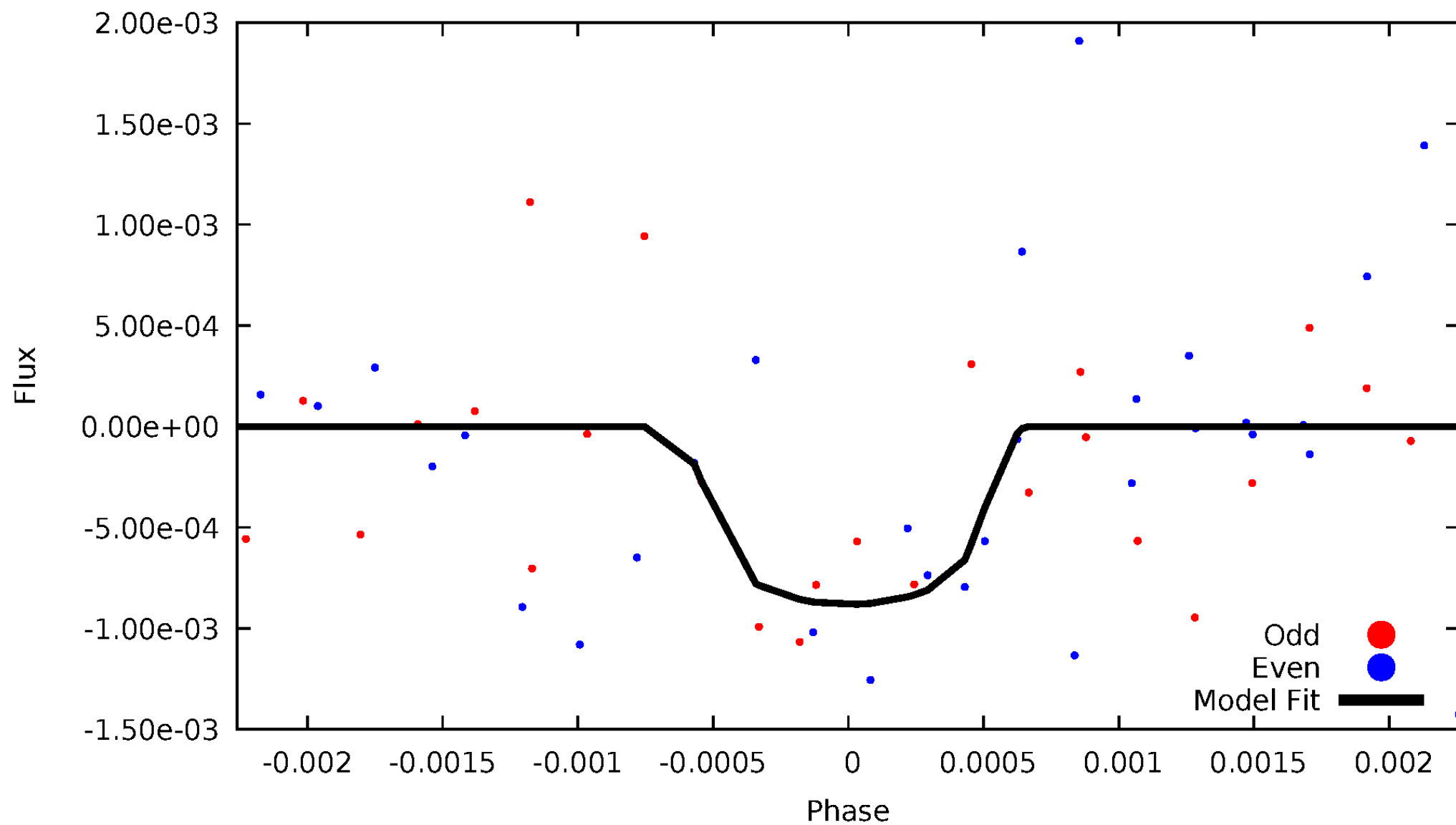


# TCE 007281615-02



# DV Odd/Even

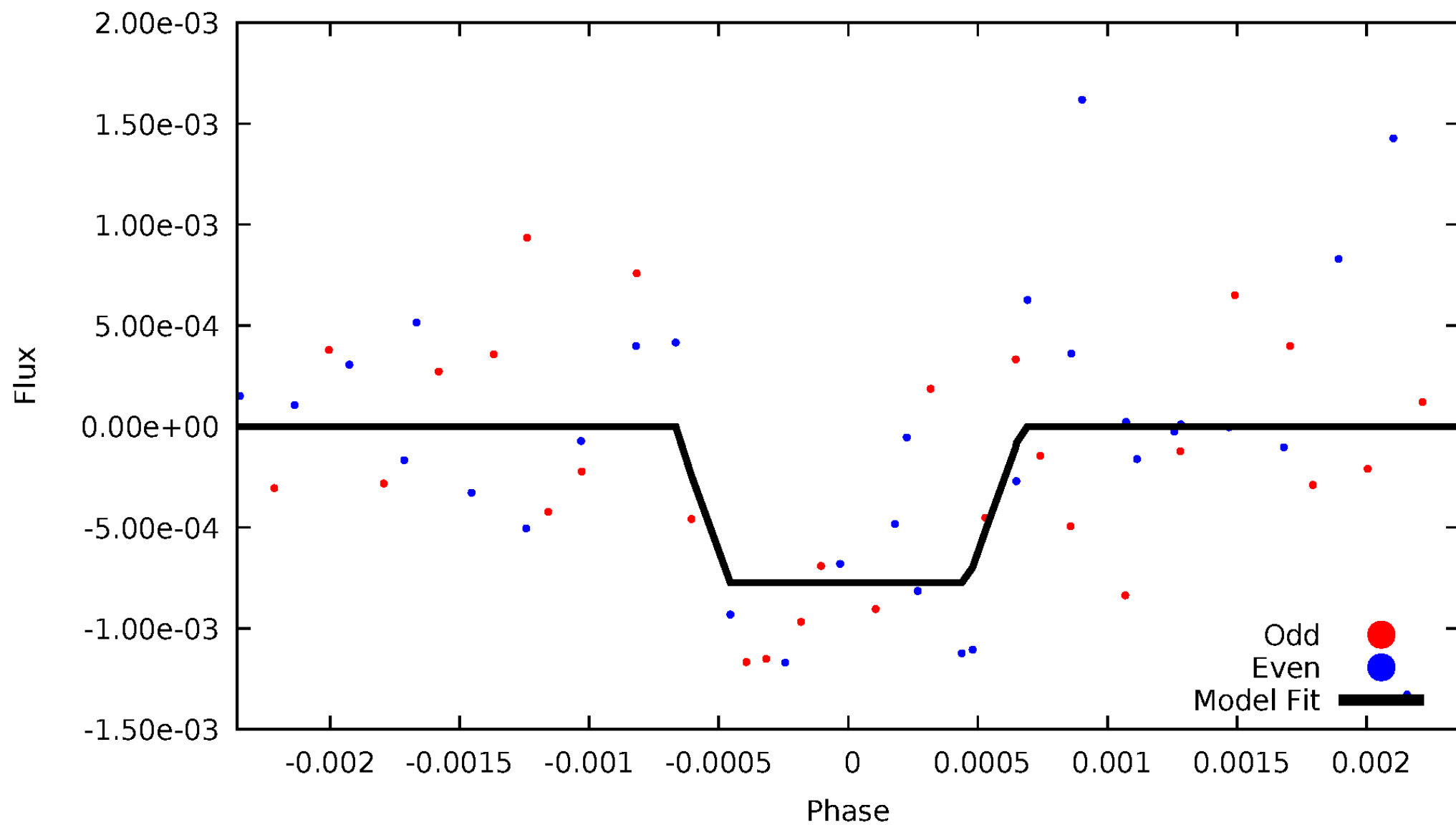
TCE 007281615-02





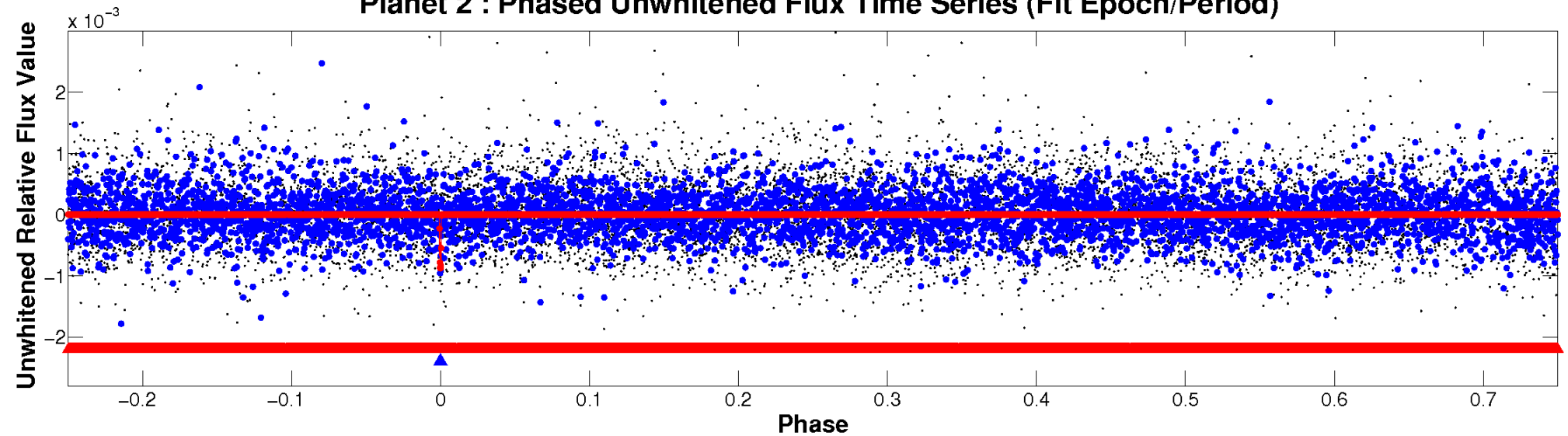
# ALT Odd/Even

TCE 007281615-02

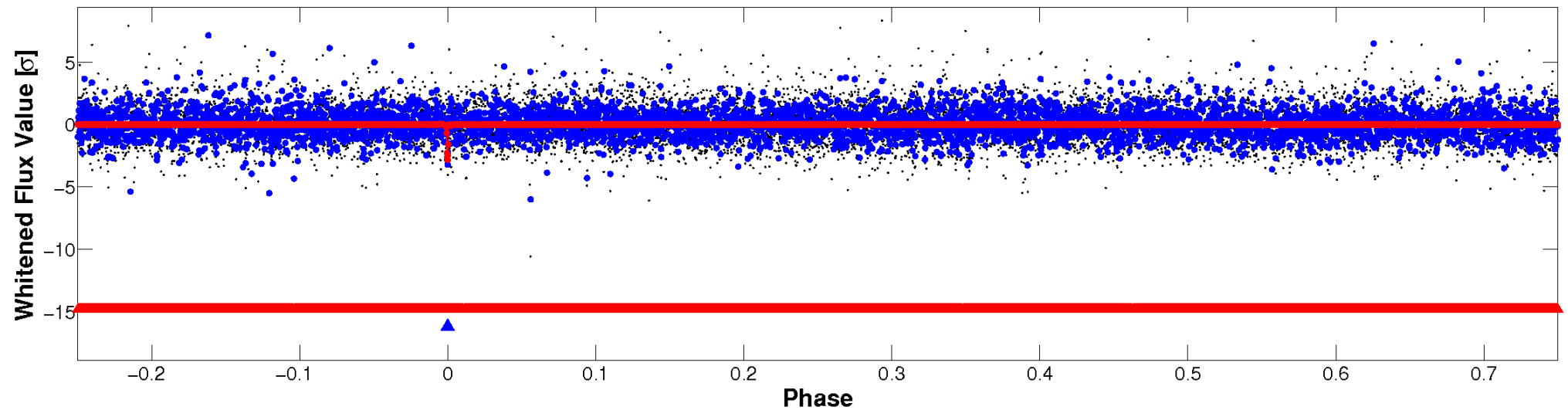


# Non-Whitened Vs. Whitened Light Curve

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

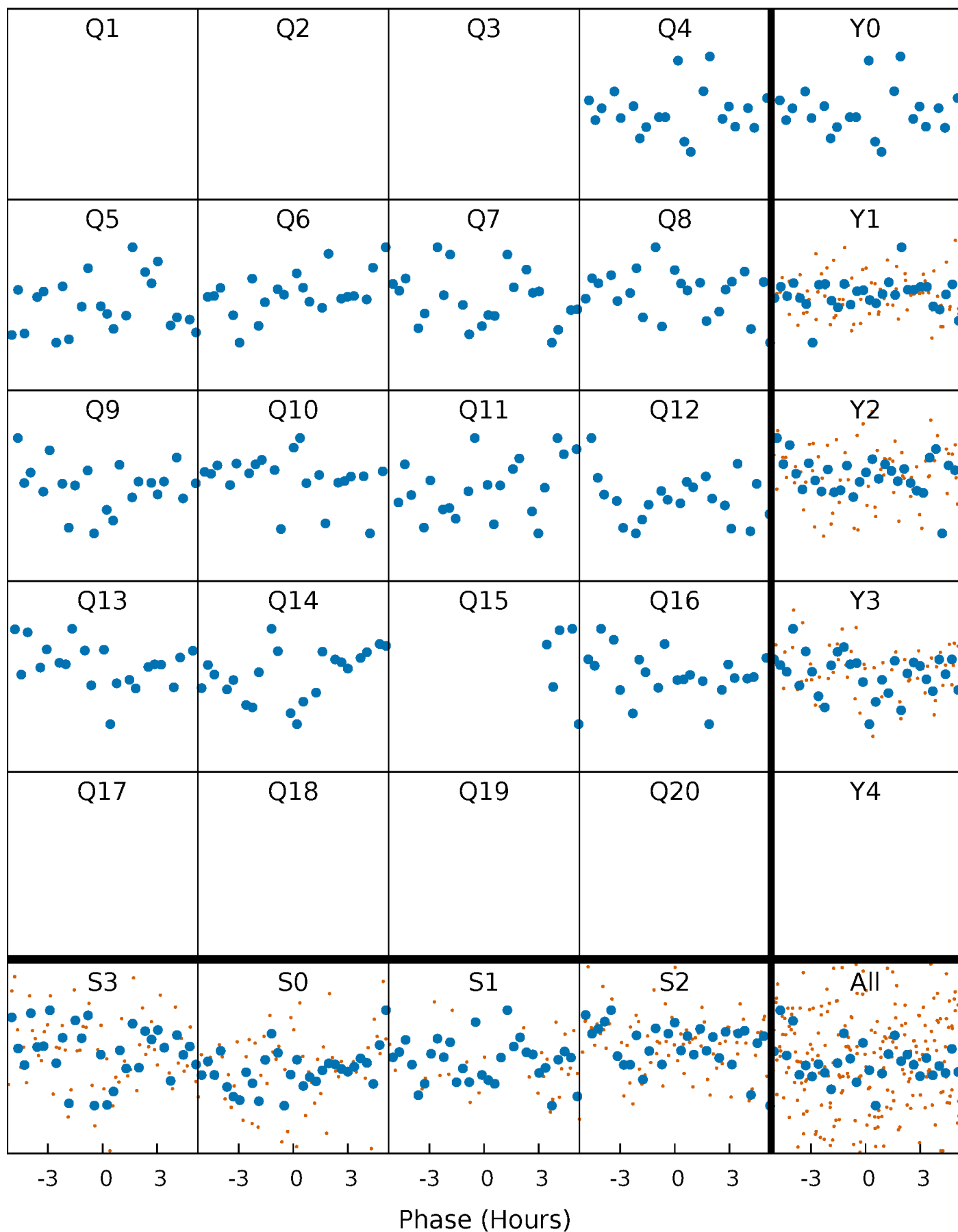


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



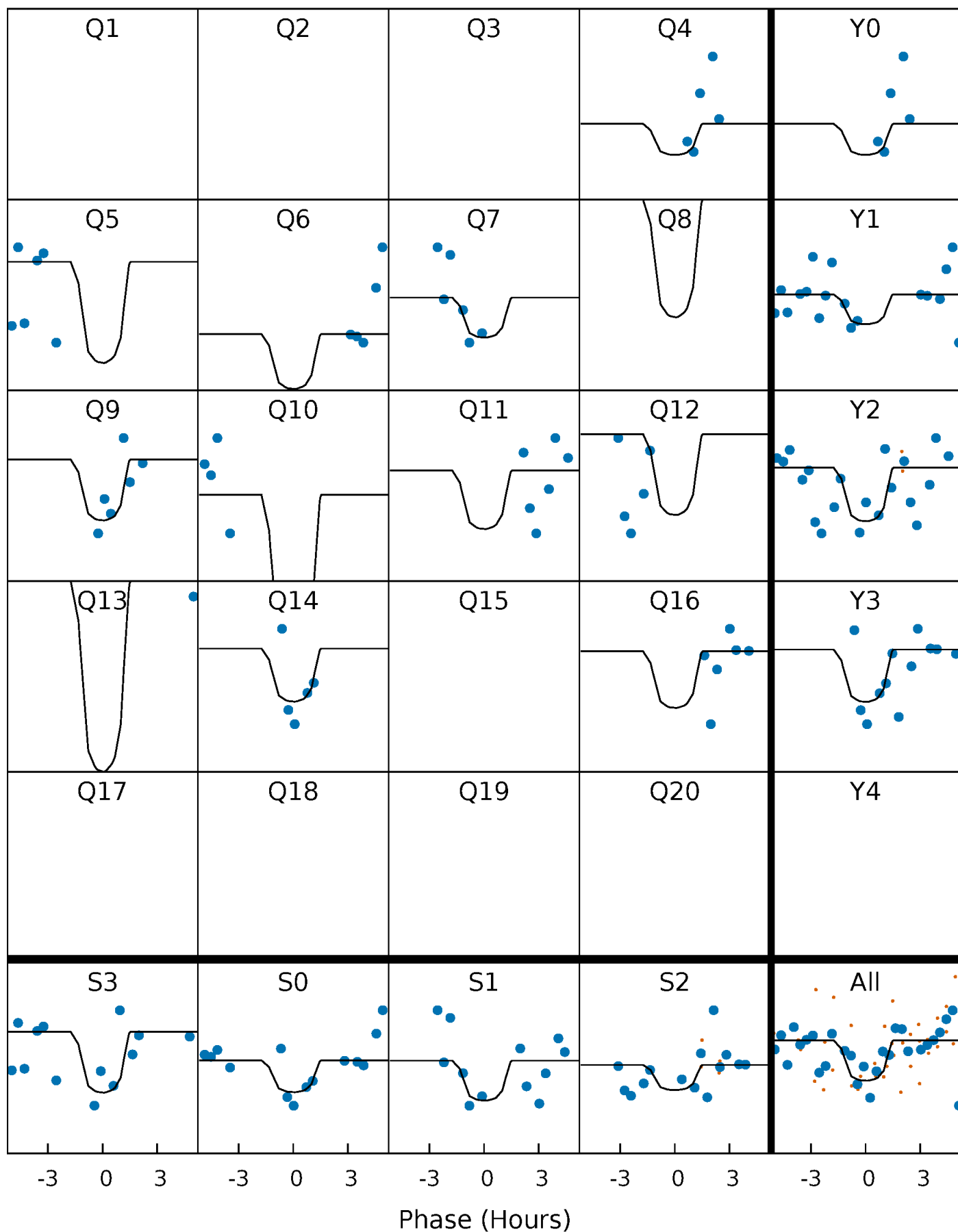
# PDC Quarter-Phased Transit Curves

TCE 007281615-02 P= 96.581197 Days  $T_0=162.768878$  (BKJD)



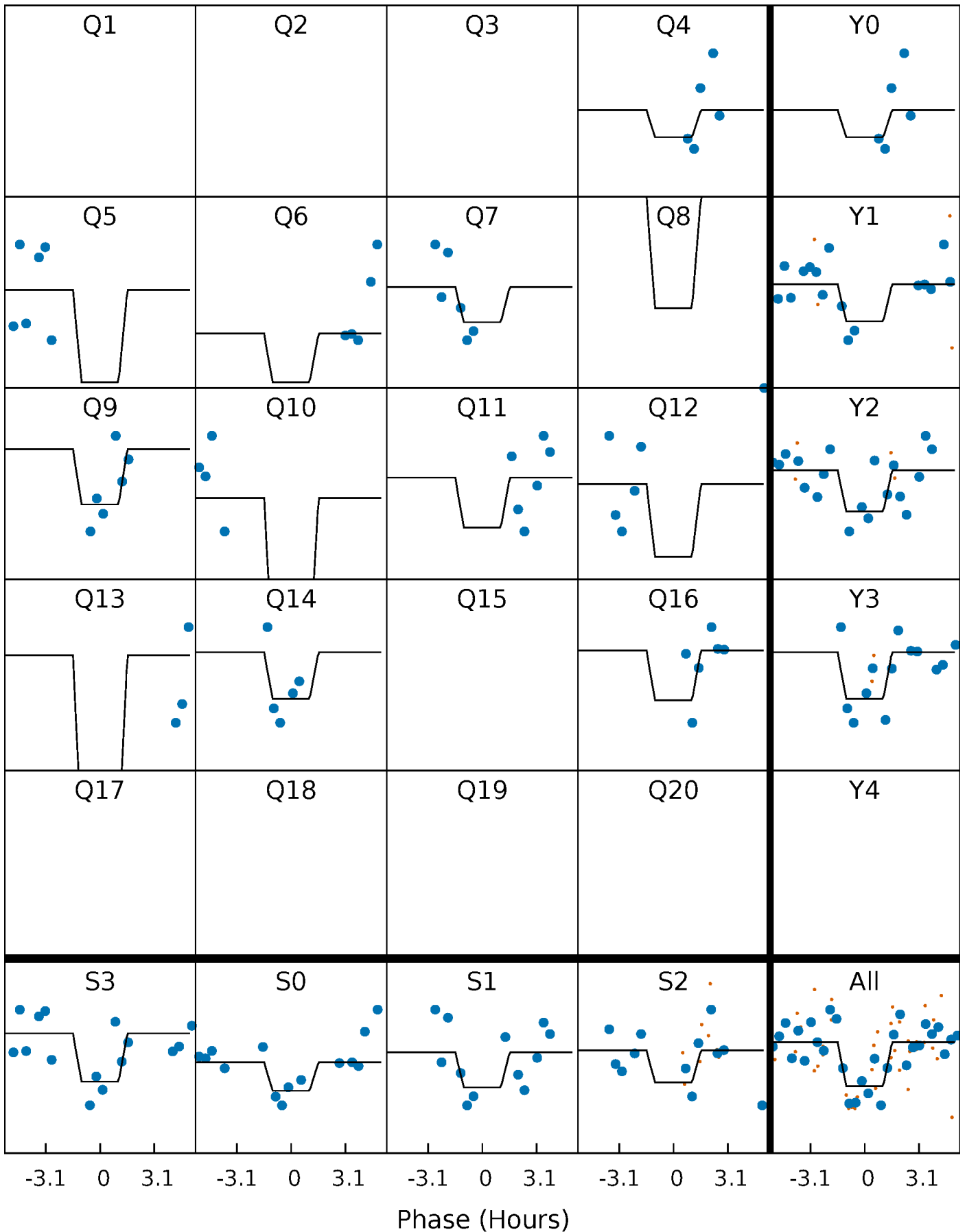
# DV Quarter-Phased Transit Curves

TCE 007281615-02 P= 96.581197 Days  $T_0=162.768878$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 007281615-02 P= 96.584803 Days  $T_0=162.756942$  (BKJD)

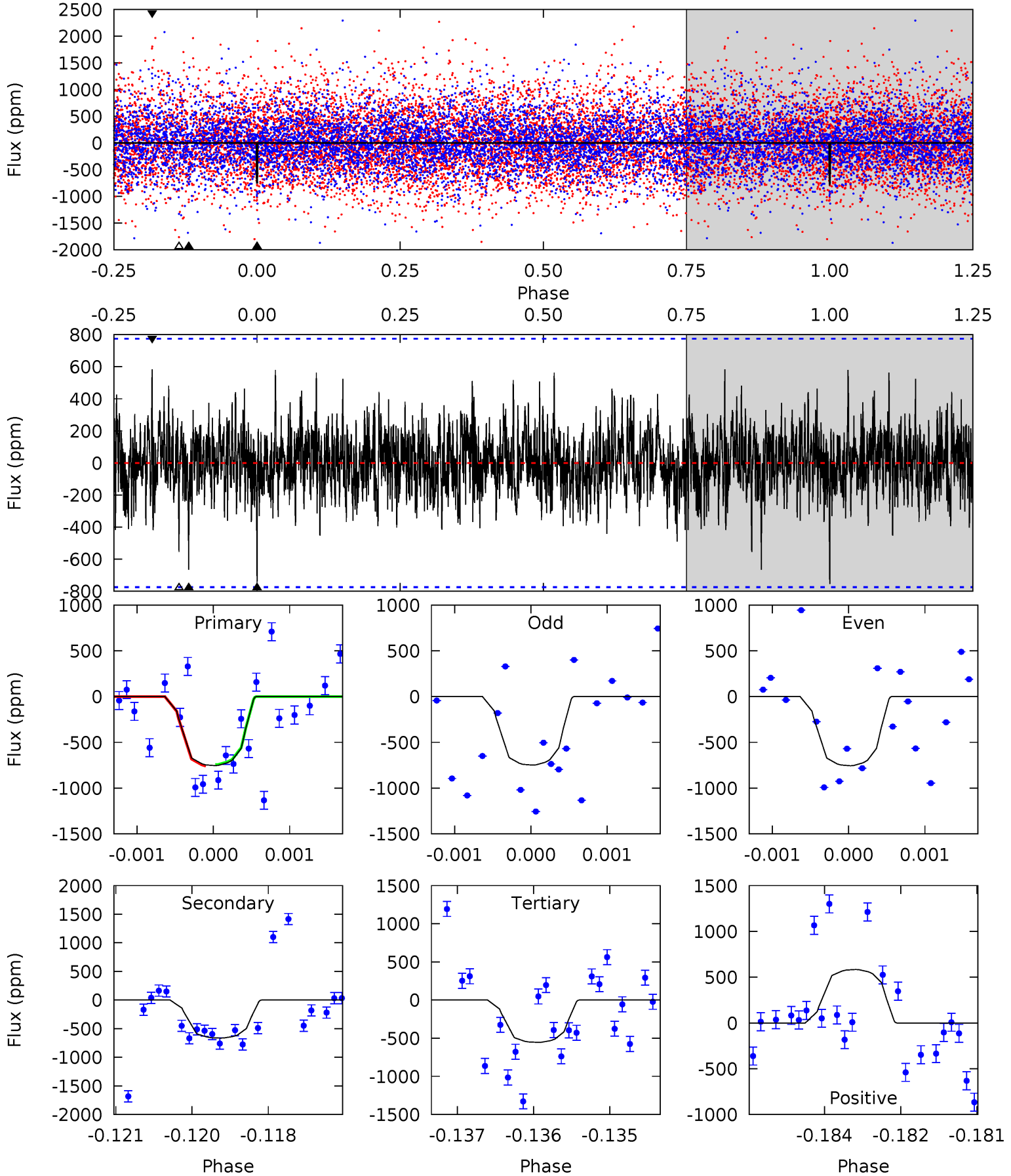




# DV Model-Shift Uniqueness Test

007281615-02, P = 96.581197 Days, E = 162.768878 Days

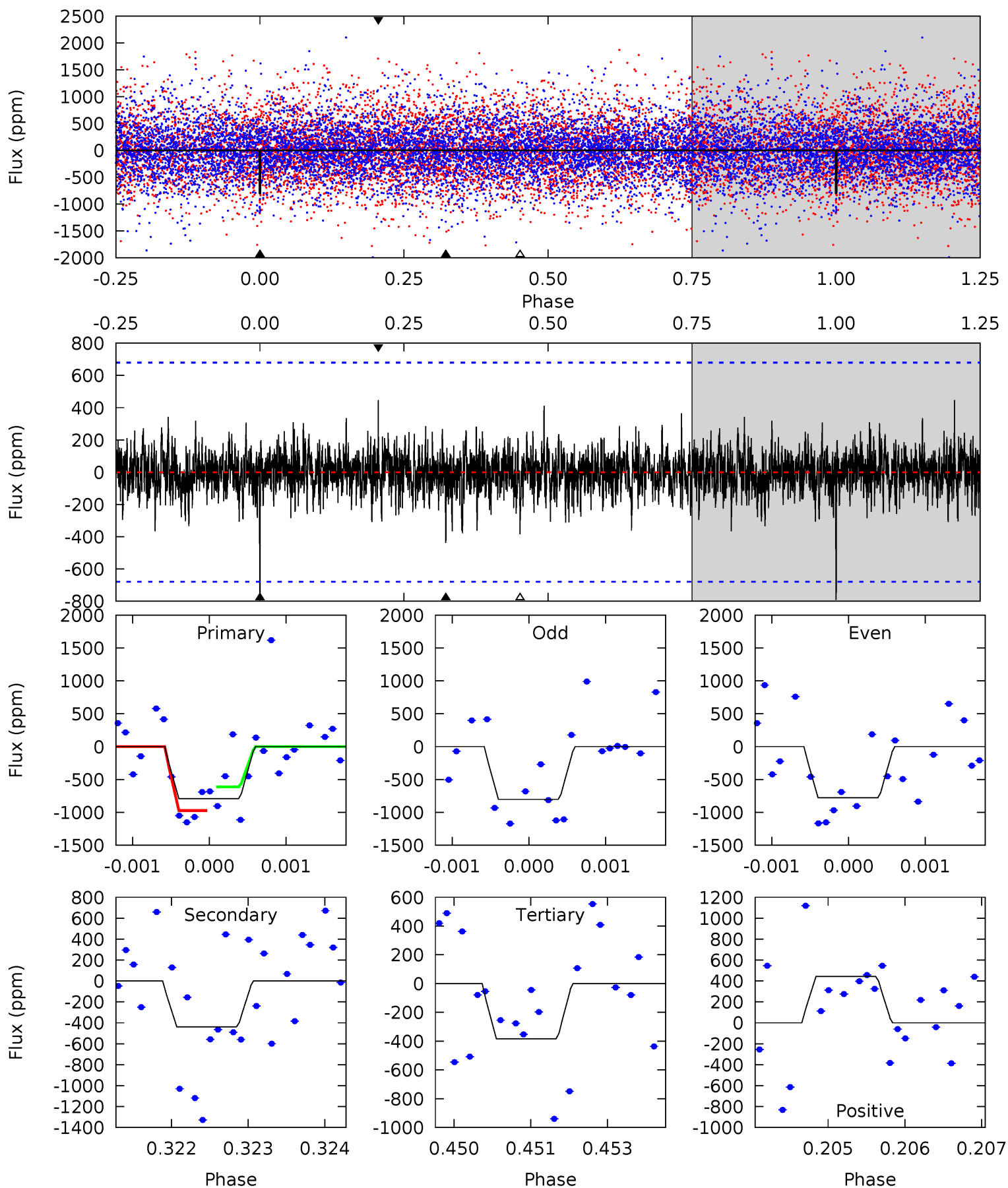
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.28	4.65	3.89	4.09	5.42	3.24	1.12	1.40	1.20	0.77	0.57	0.02	1.03	0.44	0.04



# Alt Model-Shift Uniqueness Test

007281615-02, P = 96.584803 Days, E = 162.756942 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
6.32	3.50	3.07	3.54	5.43	3.25	0.82	3.26	2.79	0.44	-0.04	0.10	1.02	0.36	1.39



### Stellar Parameters For KIC 007281615

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5825^{+184}_{-205}$	$4.516^{+0.039}_{-0.221}$	$0.020^{+0.250}_{-0.300}$	$0.923^{+0.297}_{-0.099}$	$1.019^{+0.115}_{-0.127}$	$1.824^{+0.391}_{-0.987}$
	+3%/-4%	+1%/-5%	+1250%/-1500%	+32%/-11%	+11%/-12%	+21%/-54%
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 007281615-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-665 \pm 143$	$5.70^{+6.01}_{-3.78}$	$552^{+39}_{-28}$	$4260^{+2785}_{-928}$	$1859^{+14464}_{-1435}$
Alt.	$-438 \pm 125$	$5.92^{+5.85}_{-4.15}$	$552^{+39}_{-27}$	$3904^{+2706}_{-778}$	$1085^{+10822}_{-813}$

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

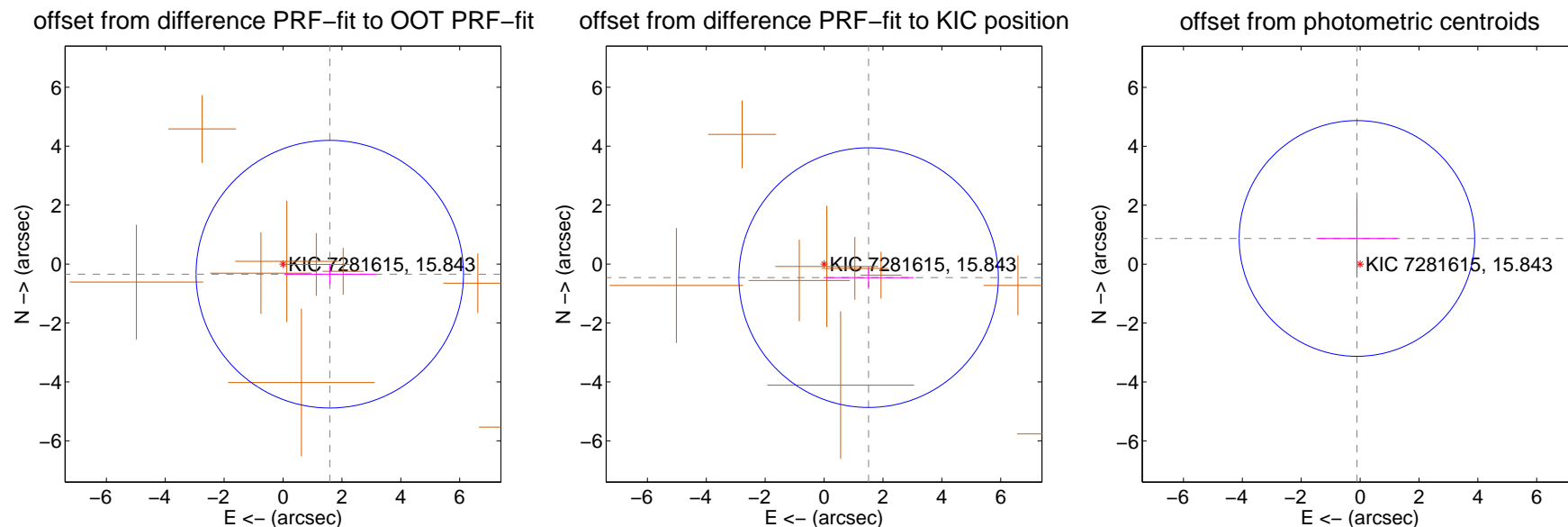
## DV Centroid Data

Supplemental centroid analysis for 007281615-02. Kepler magnitude: 15.84. Transit SNR 8.25

There are 0 quarters with good PRF difference image offsets

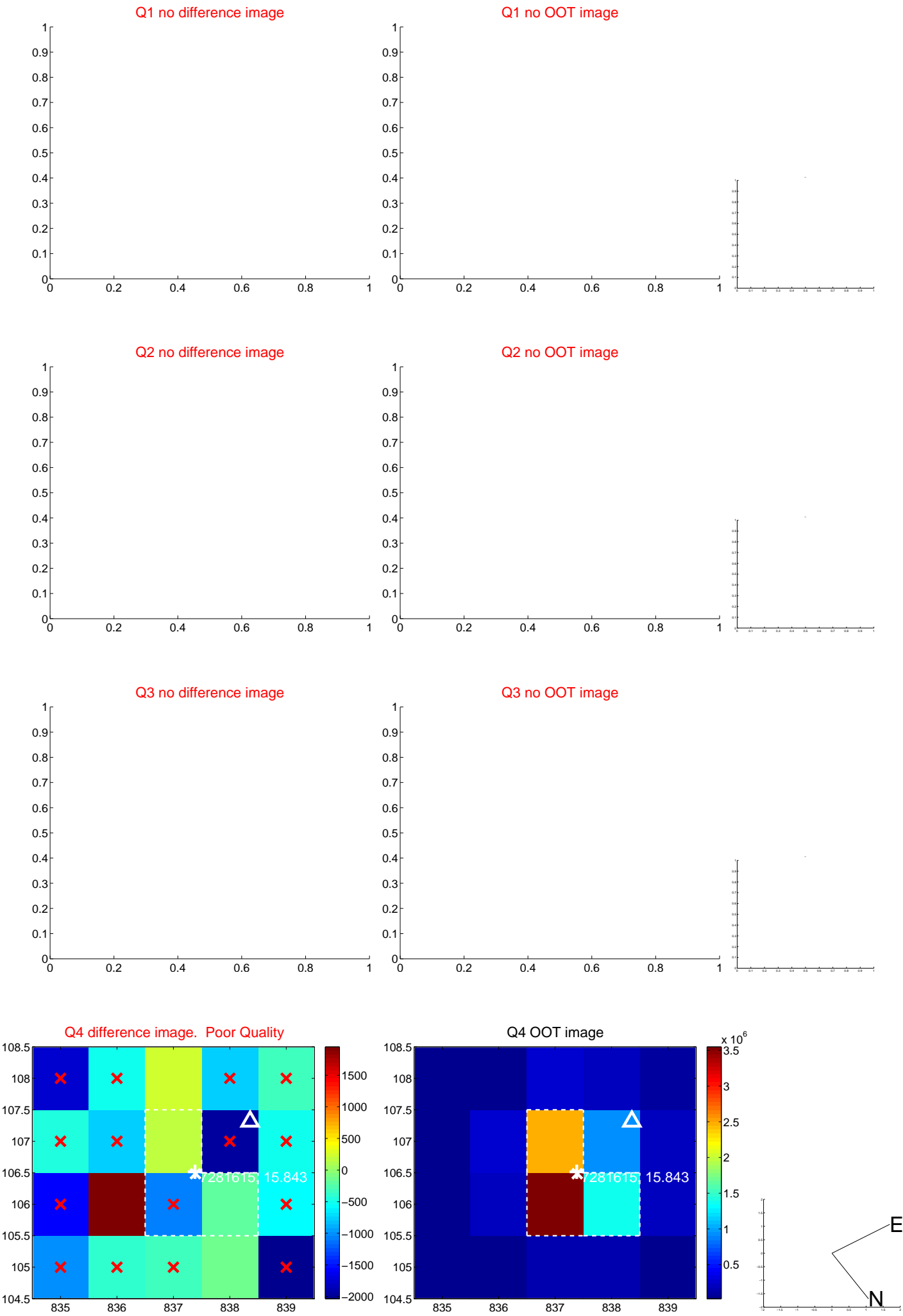
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.624 \pm 1.514$	1.07	$-1.587 \pm 1.547$	$-0.344 \pm 0.348$
PRF-fit source offset from KIC position	$1.581 \pm 1.468$	1.08	$-1.512 \pm 1.532$	$-0.461 \pm 0.331$
photometric centroid source offset	$0.88 \pm 1.33$	0.66	$0.11 \pm 1.37$	$0.87 \pm 1.33$



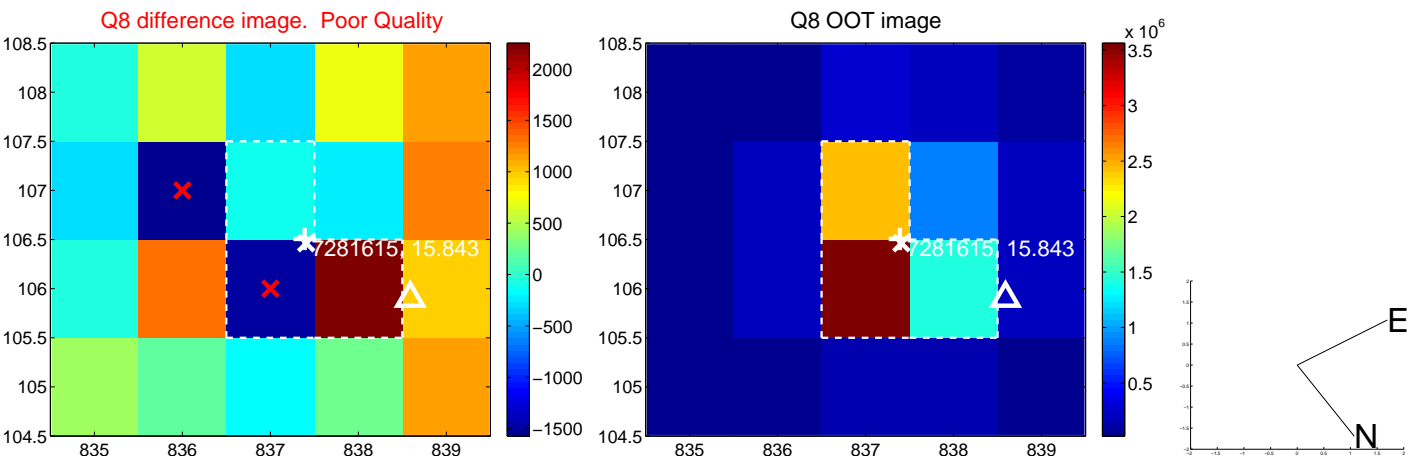
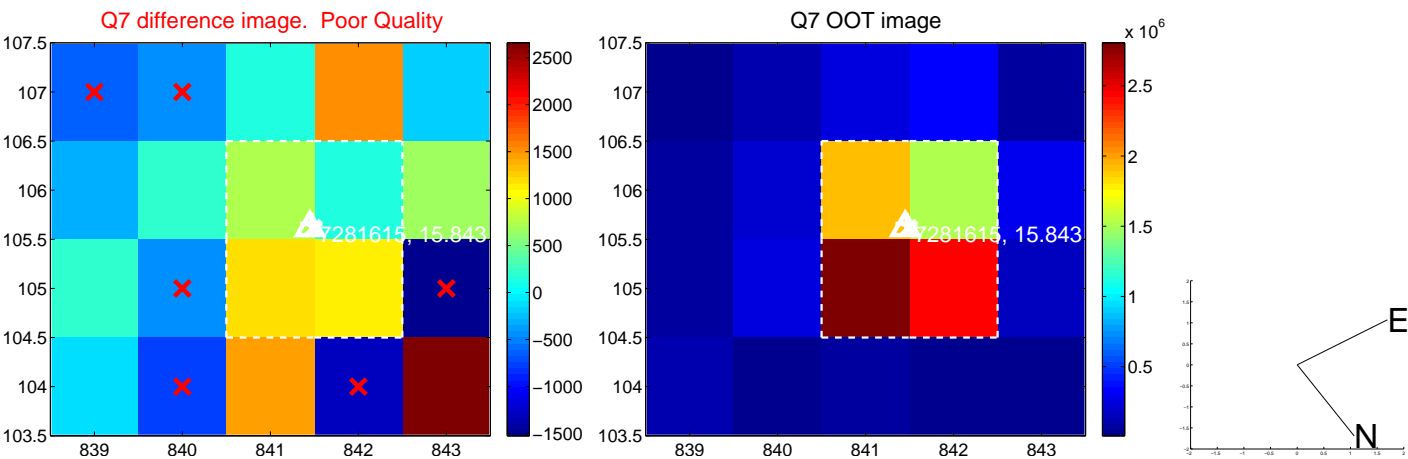
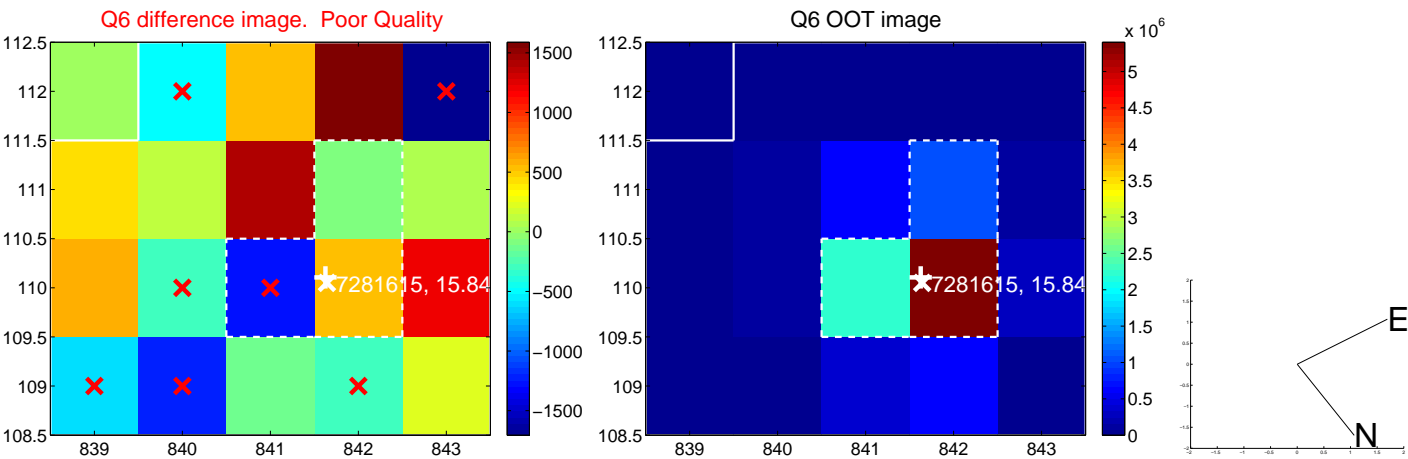
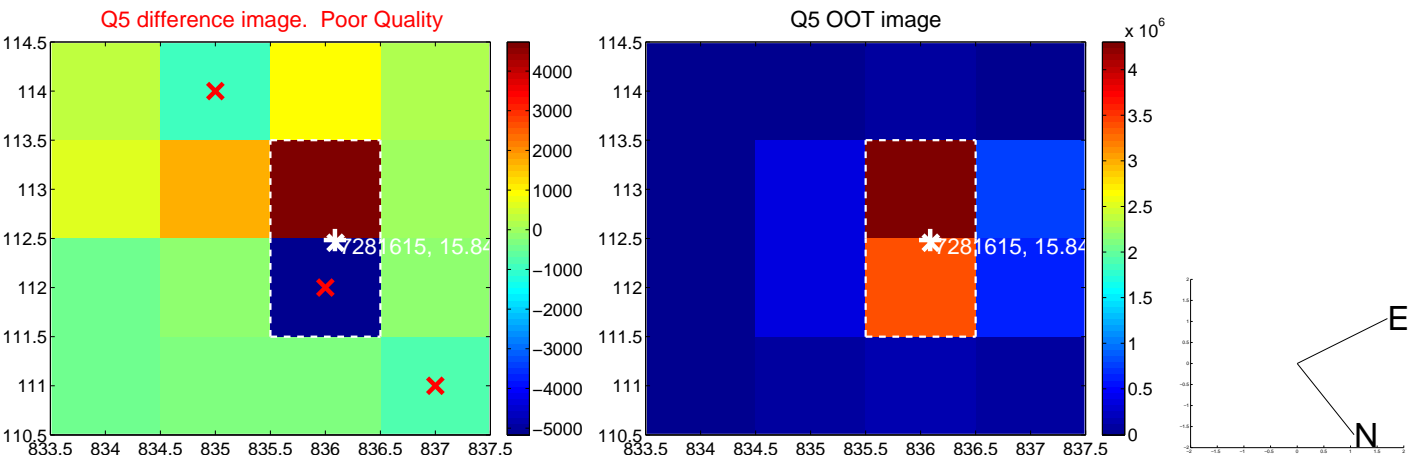
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

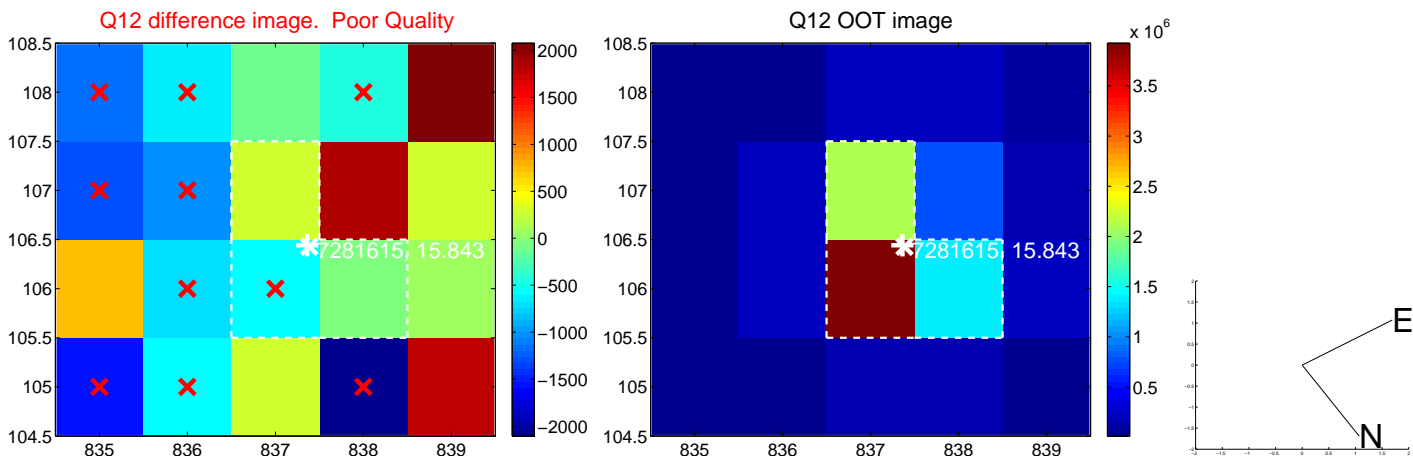
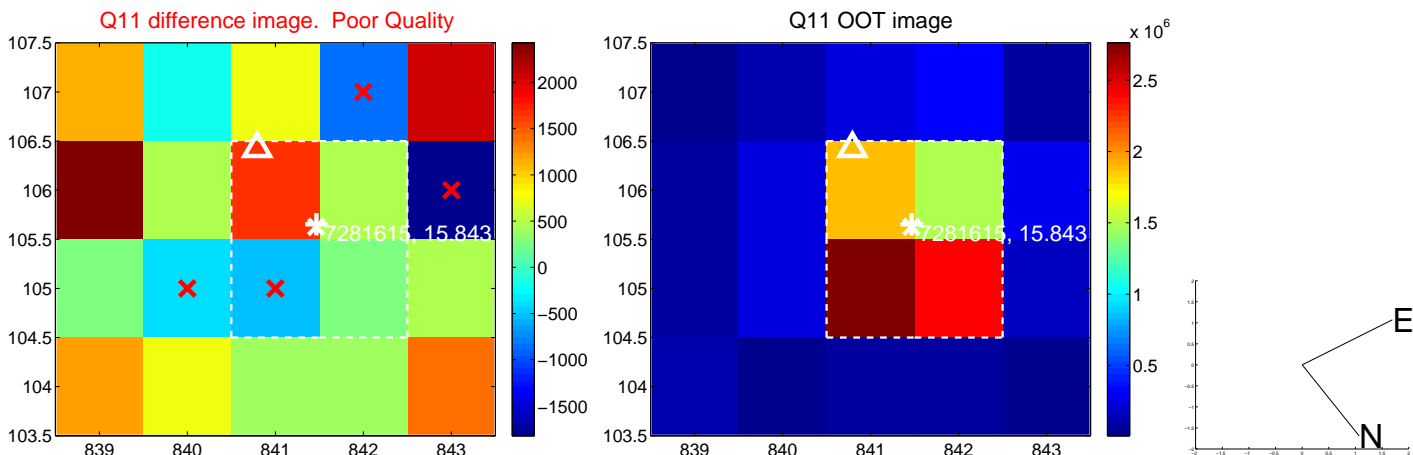
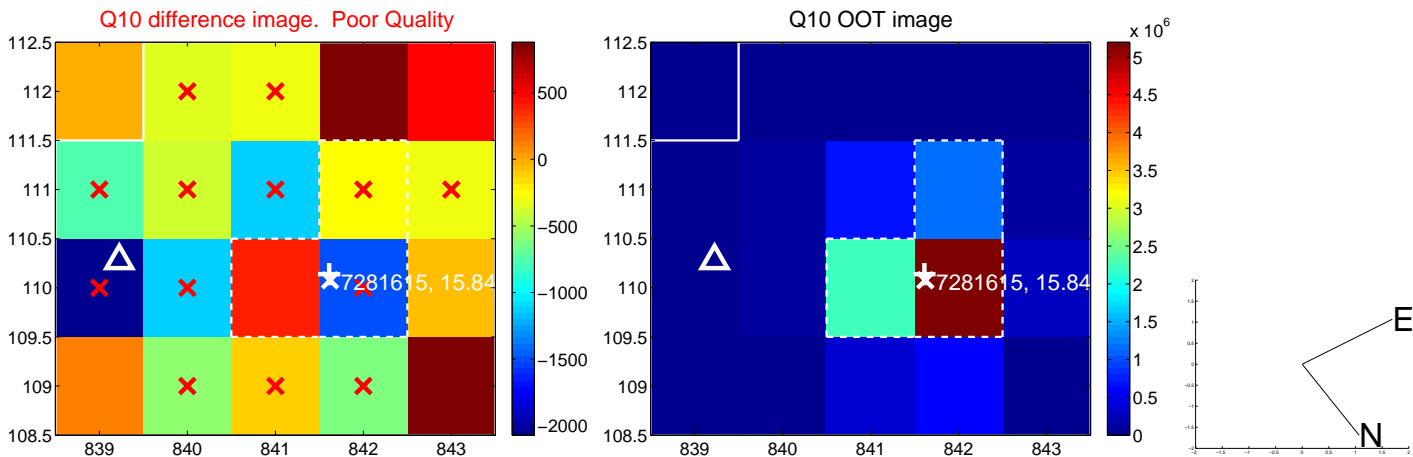
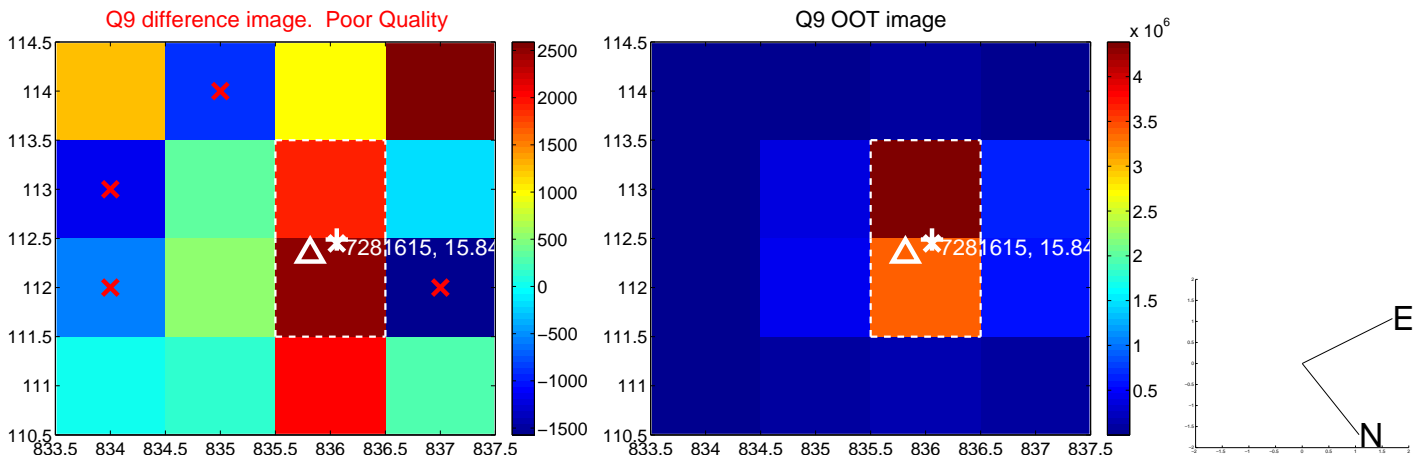




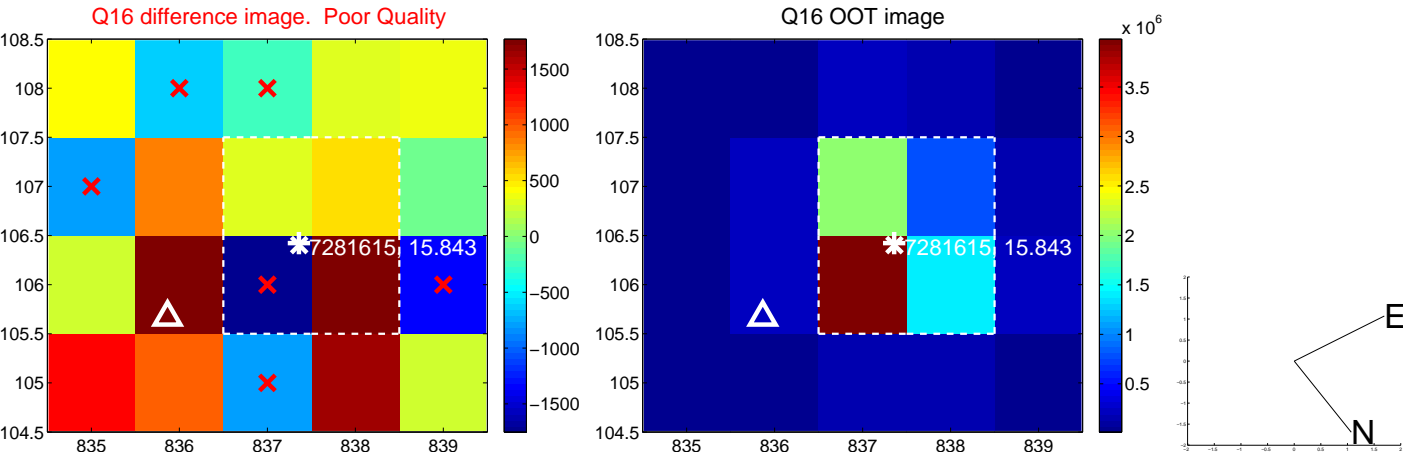
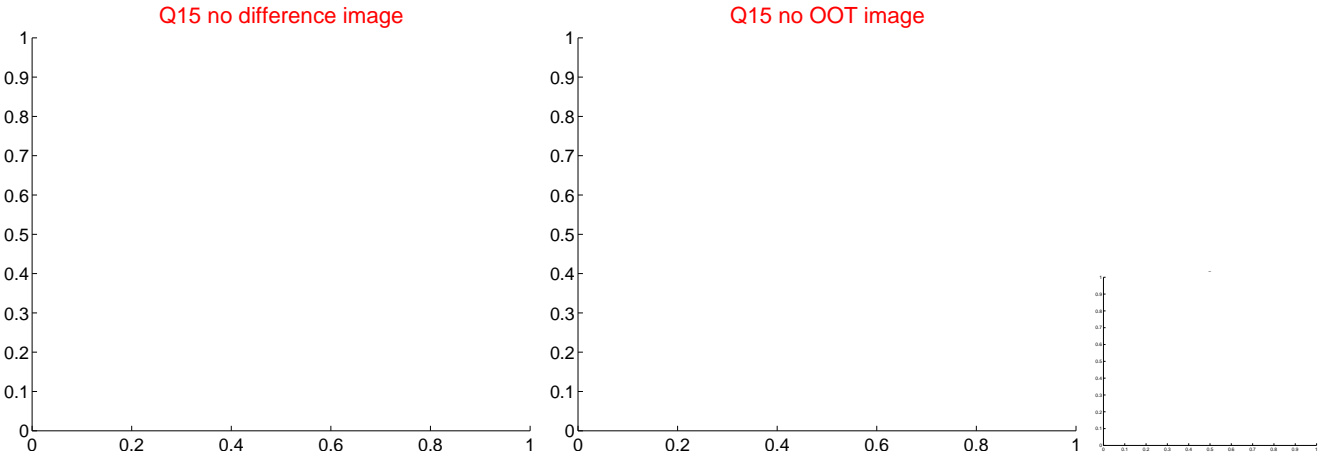
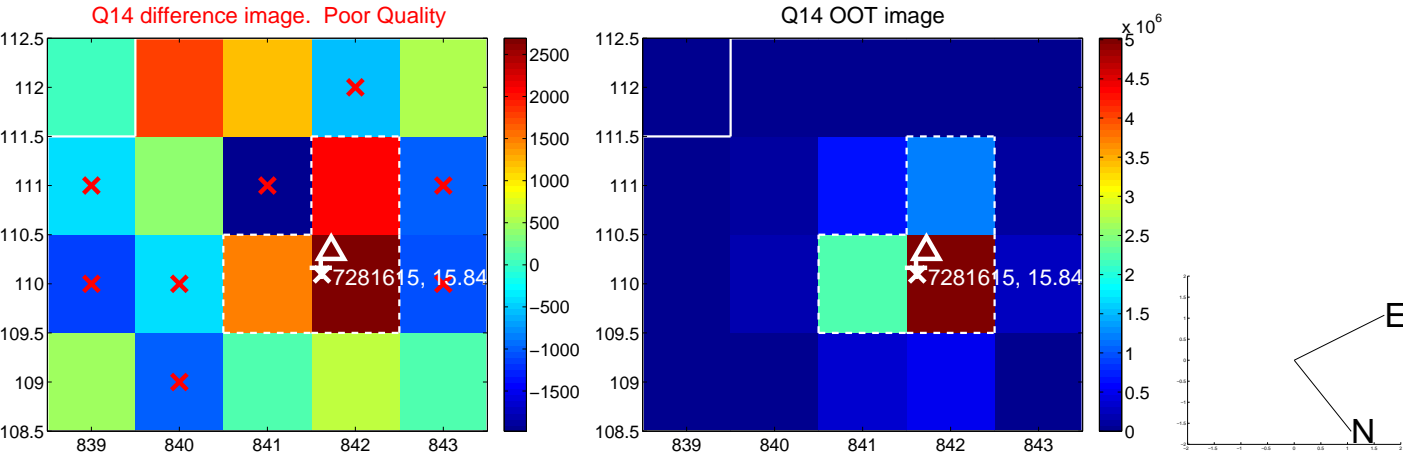
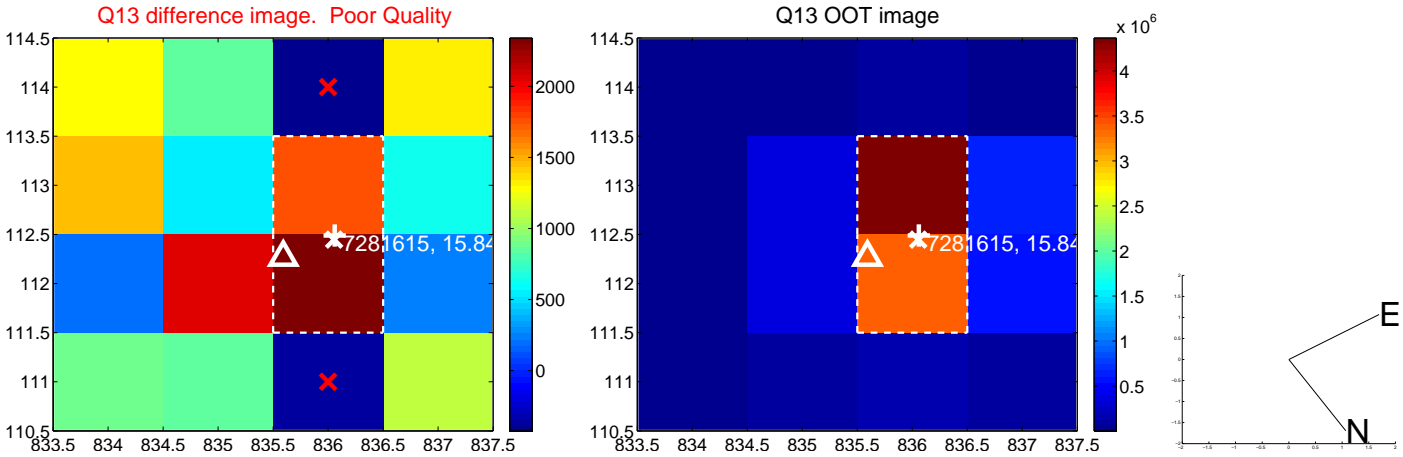
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



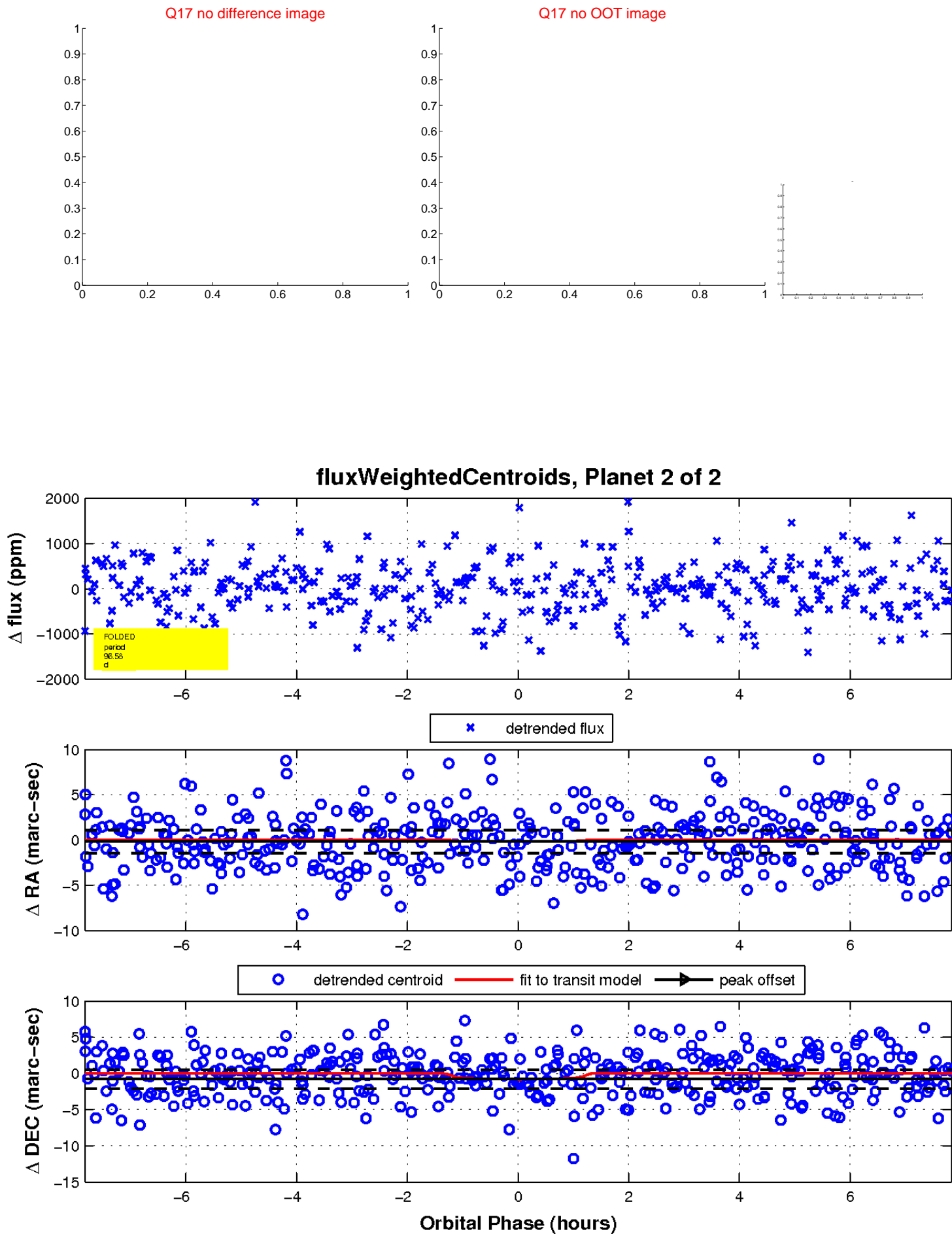
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

