

# KIC 010878263

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010878263-01	OBS	0341.01	7.170716	133.641767	841.5	3.029	104.7	103.4	0.94	5497	2.93	148.49
010878263-02	OBS	0341.02	4.699645	135.319419	293.9	2.836	41.0	45.4	0.94	5497	1.91	260.84

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010878263-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
010878263-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

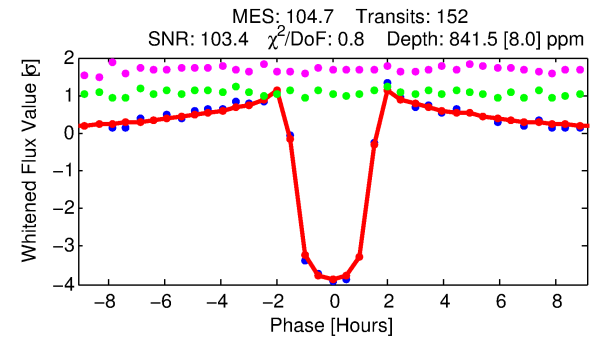
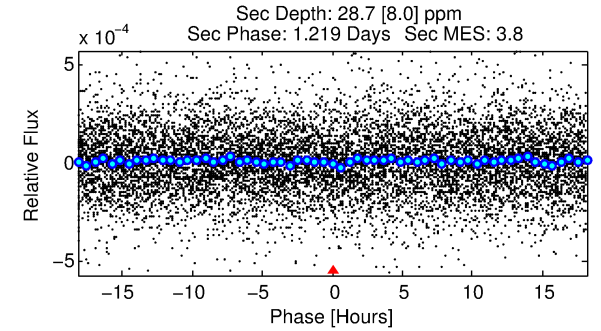
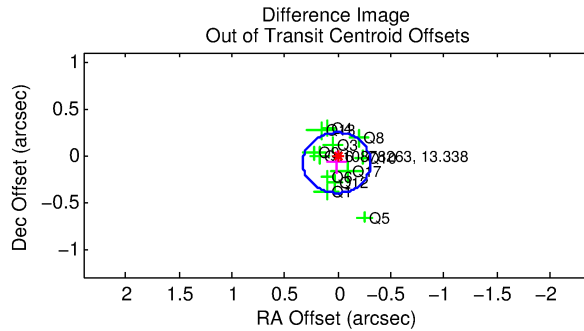
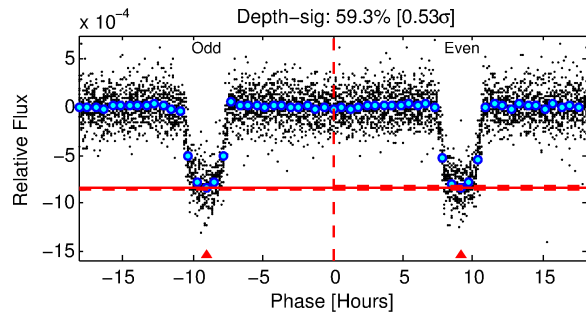
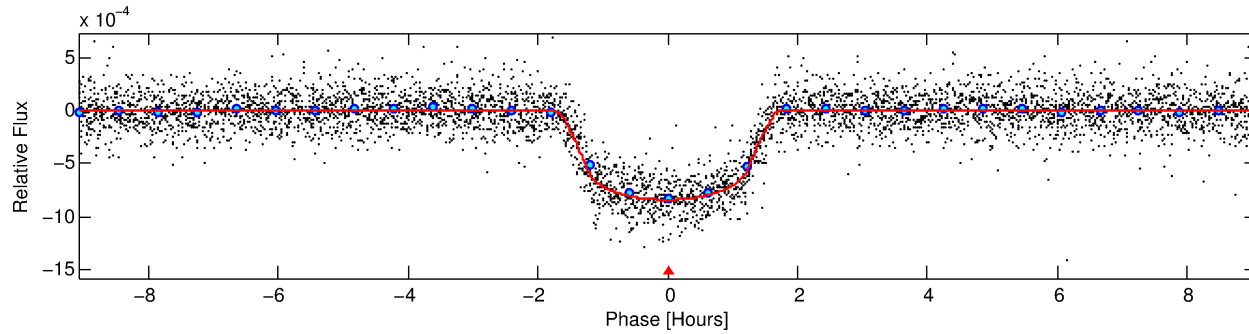
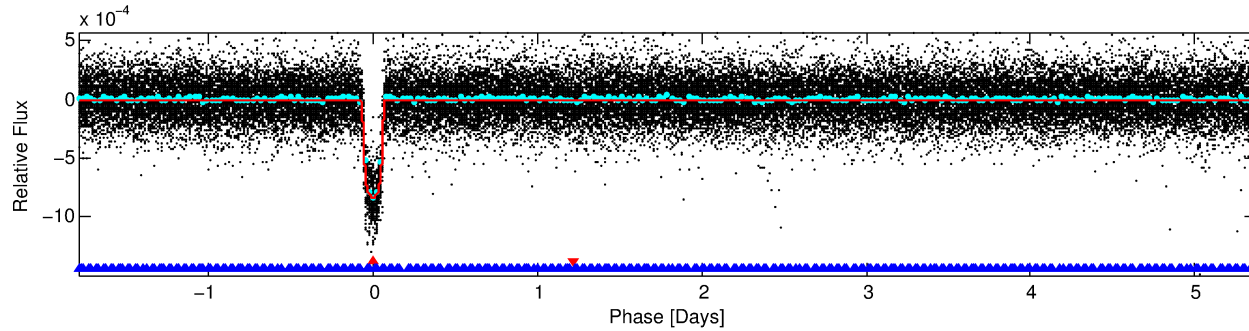
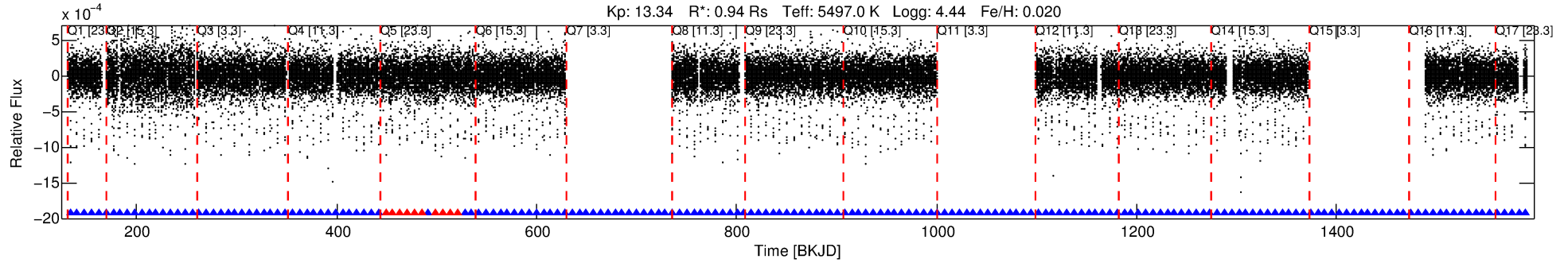
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010878263-01

No Significant Match Found

# DV One-Page Summary

KIC: 10878263 Candidate: 1 of 2 Period: 7.171 d  
KOI: K00341.01 Name: Kepler-414c Corr: 0.985



## DV Fit Results:

Period = 7.17072 [0.00000] d  
Epoch = 133.6418 [0.0005] BKJD  
Rp/R\* = 0.0285 [0.0026]  
a/R\* = 13.43 [4.93]  
b = 0.71 [0.26]  
Seff = 148.49 [26.33]  
Teq = 890 [39] K  
Rp = 2.93 [0.44] Re  
a = 0.0698 [0.0073] AU  
Ag = 8.98 [3.31] [2.41 $\sigma$ ]  
Teffp = 2382 [204] K [7.18 $\sigma$ ]

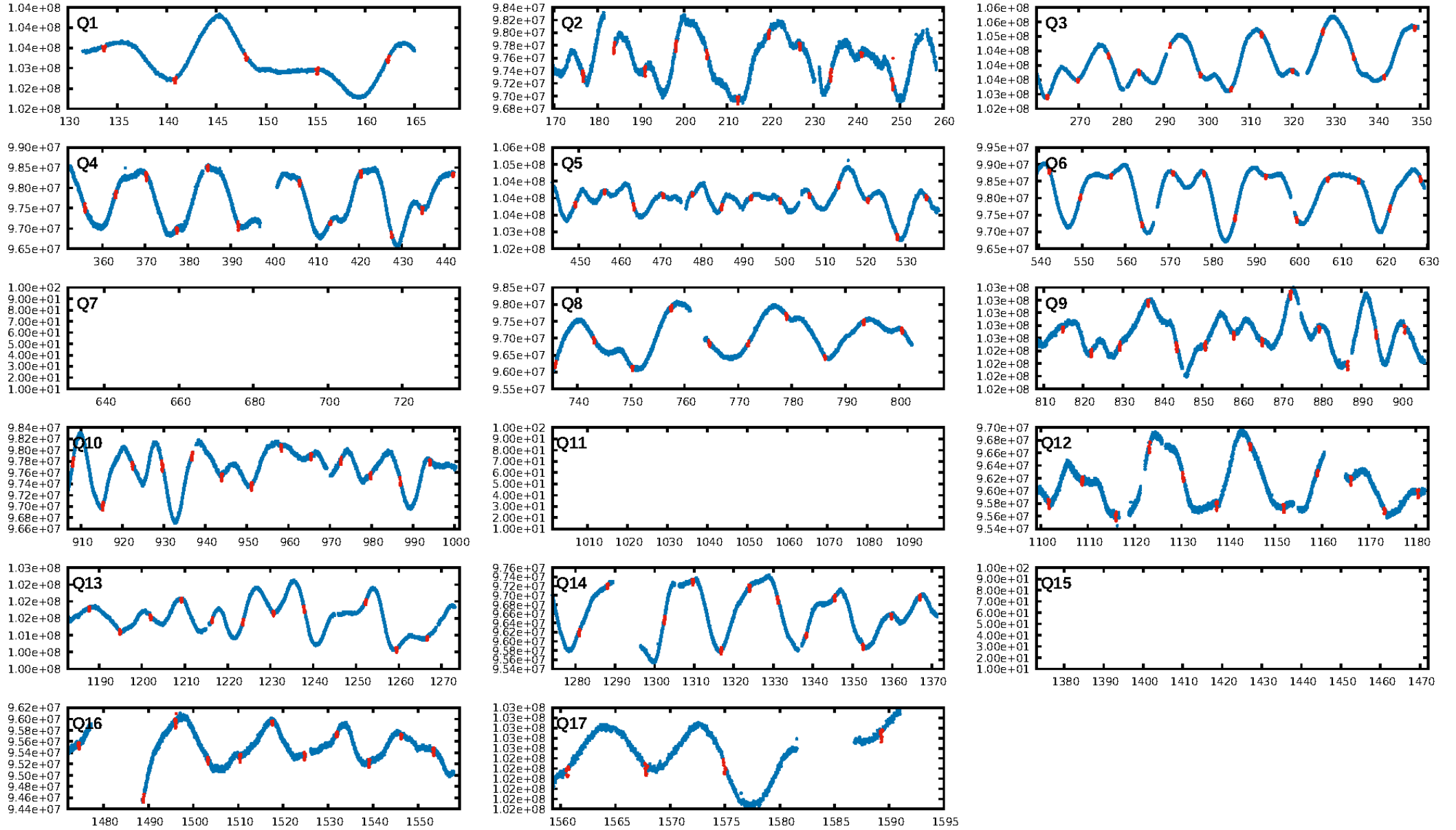
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [14.29 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 99.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.93 [133/143]  
GhostDiagnostic-chr: 3.427  
Centroid-sig: 64.9%  
Centroid-so: 0.257 arcsec [2.26 $\sigma$ ]  
OotOffset-rm: 0.080 arcsec [0.75 $\sigma$ ]  
KicOffset-rm: 0.123 arcsec [1.23 $\sigma$ ]  
OotOffset-st: 2/1/4/5 [12]  
KicOffset-st: 2/1/4/5 [12]  
DiffImageQuality-fgm: 1.00 [12/12]  
DiffImageOverlap-fno: 1.00 [14/14]

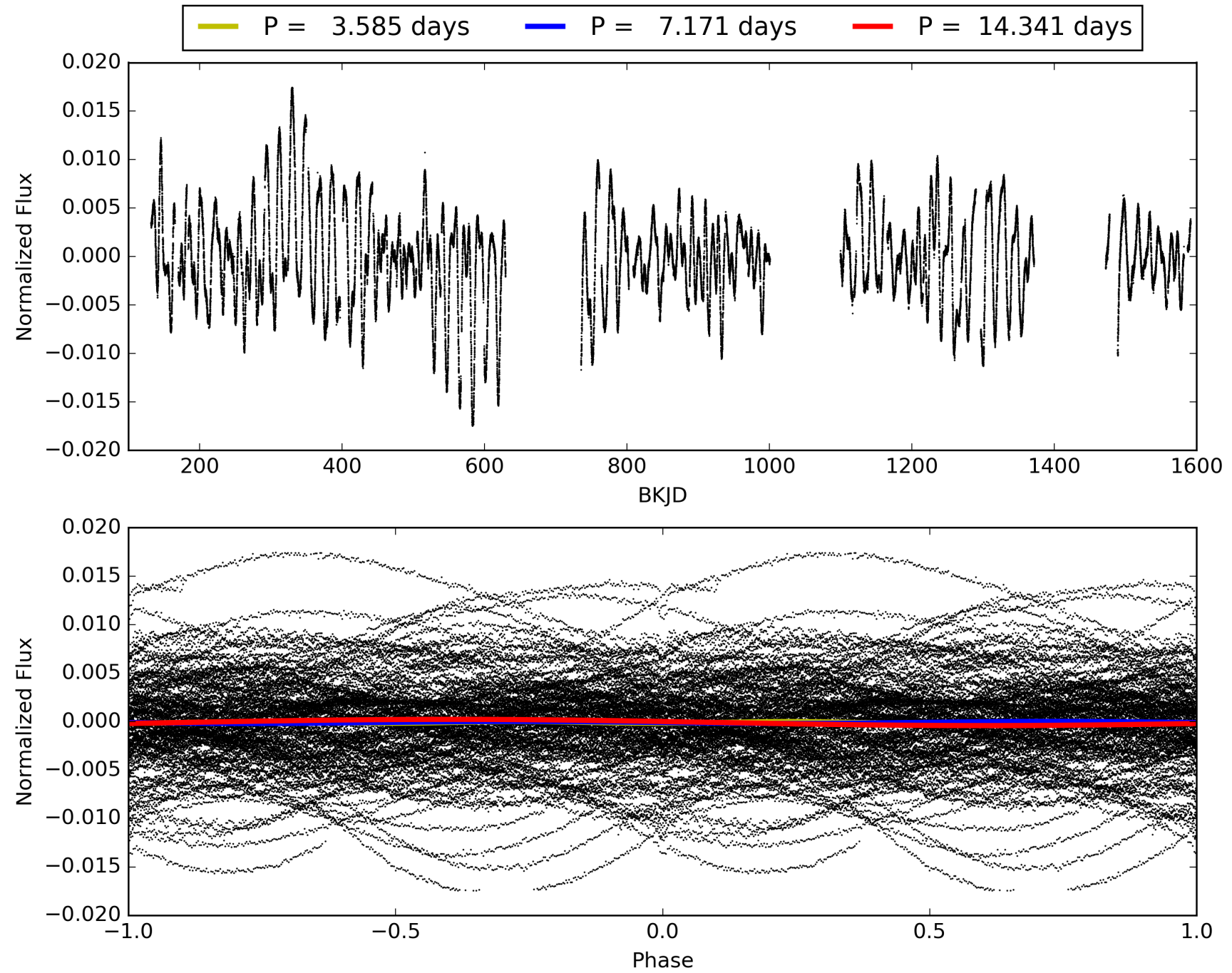
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 10:40:49 Z

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

# TCE 010878263-01, PDC Light Curves

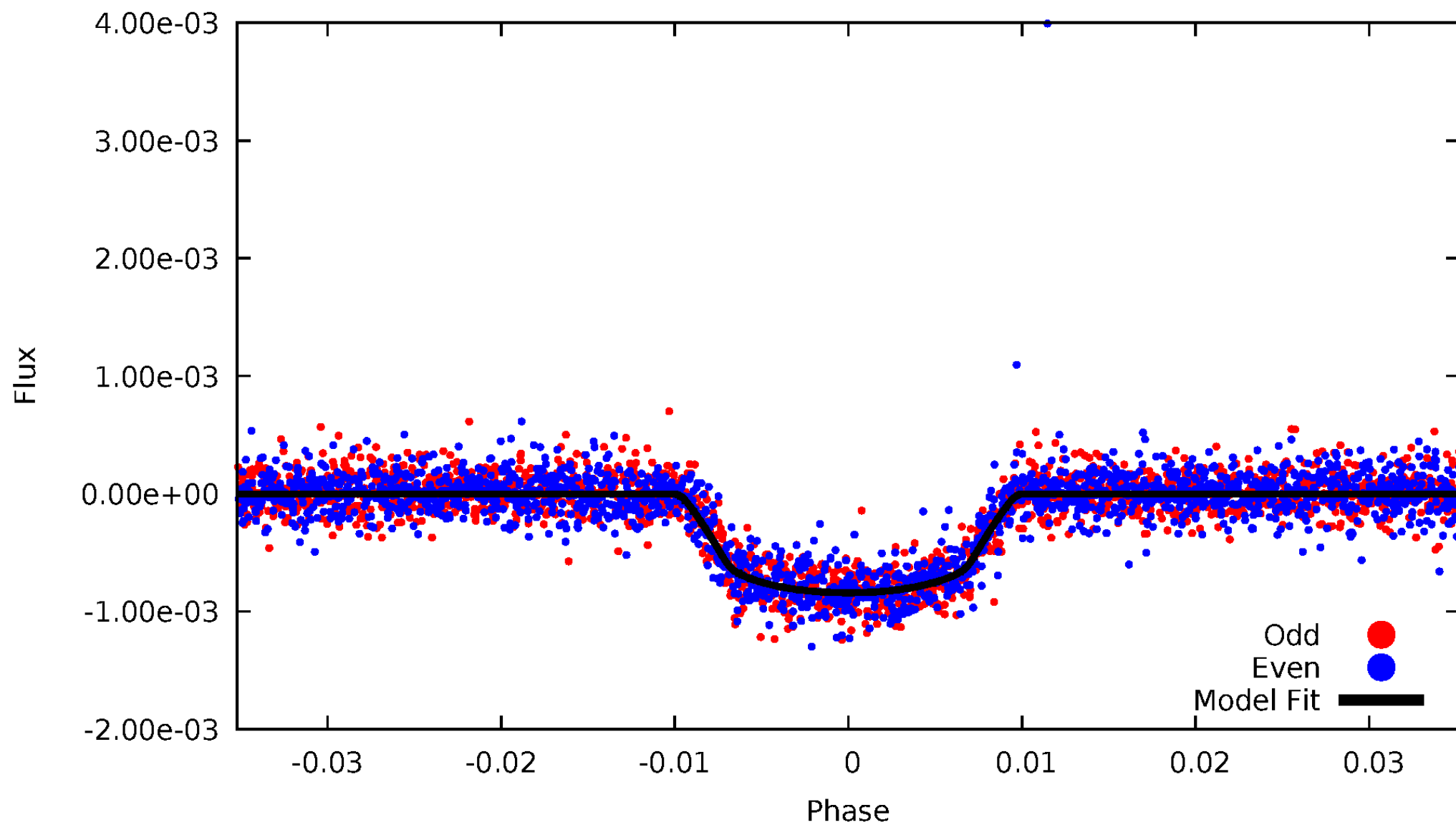


TCE 010878263-01



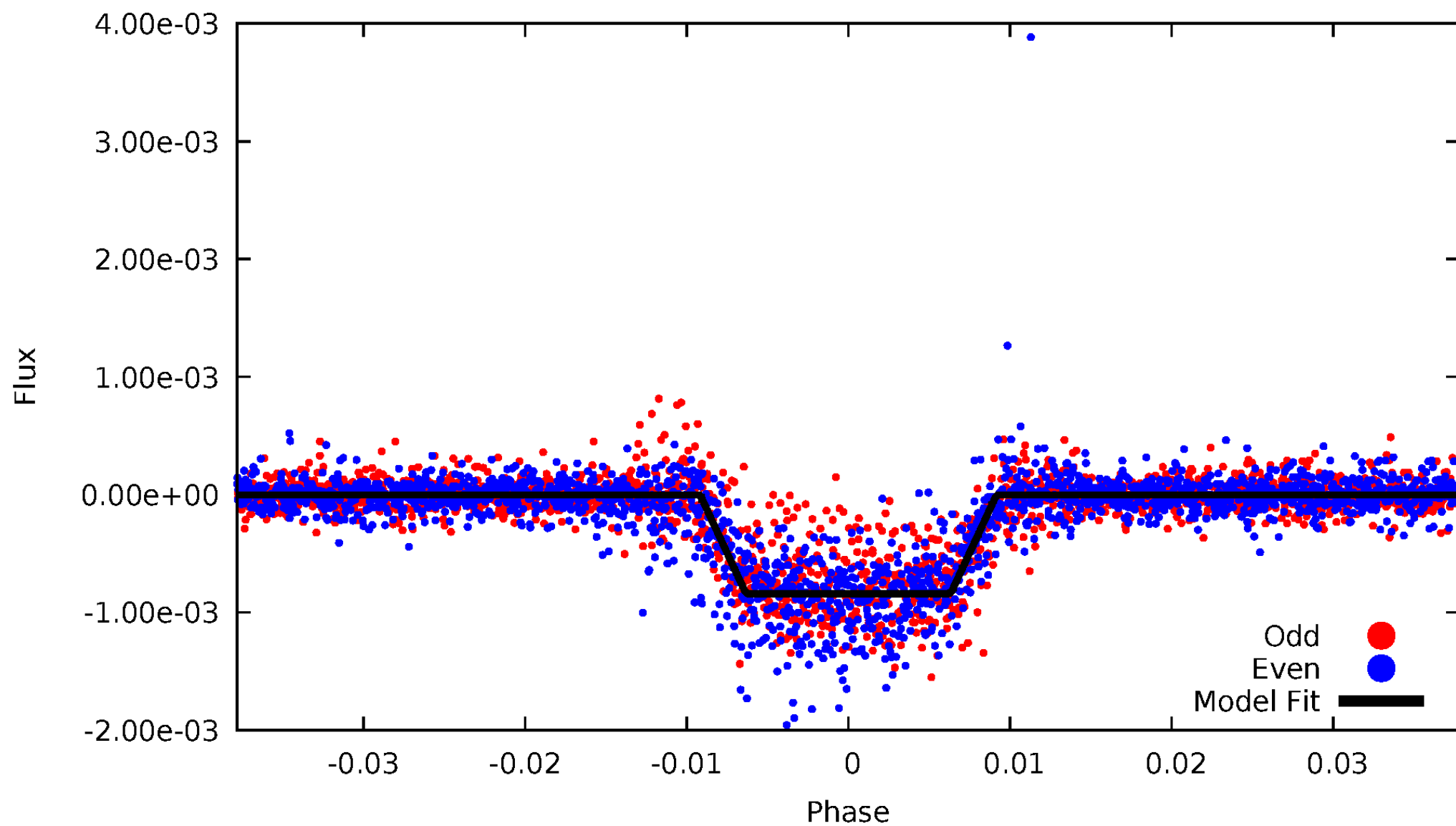
# DV Odd/Even

TCE 010878263-01



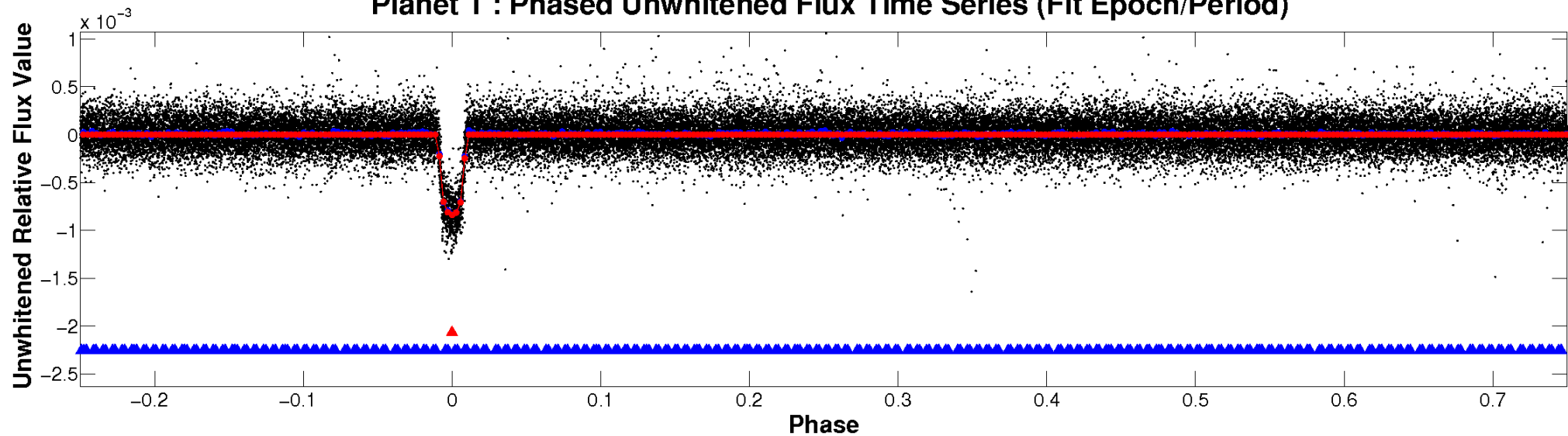
# ALT Odd/Even

TCE 010878263-01

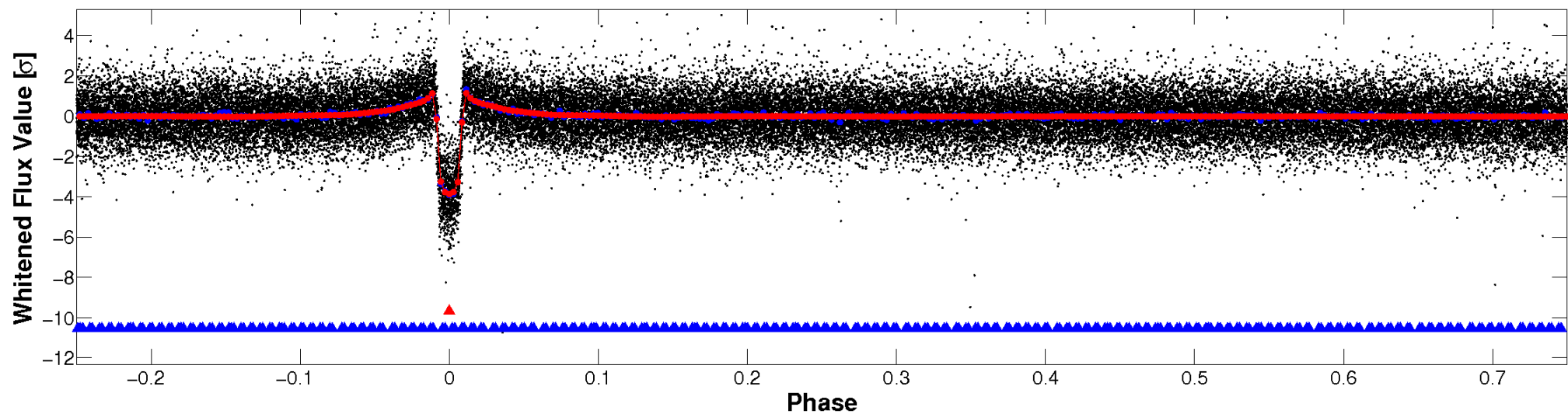


# Non-Whitened Vs. Whitened Light Curve

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



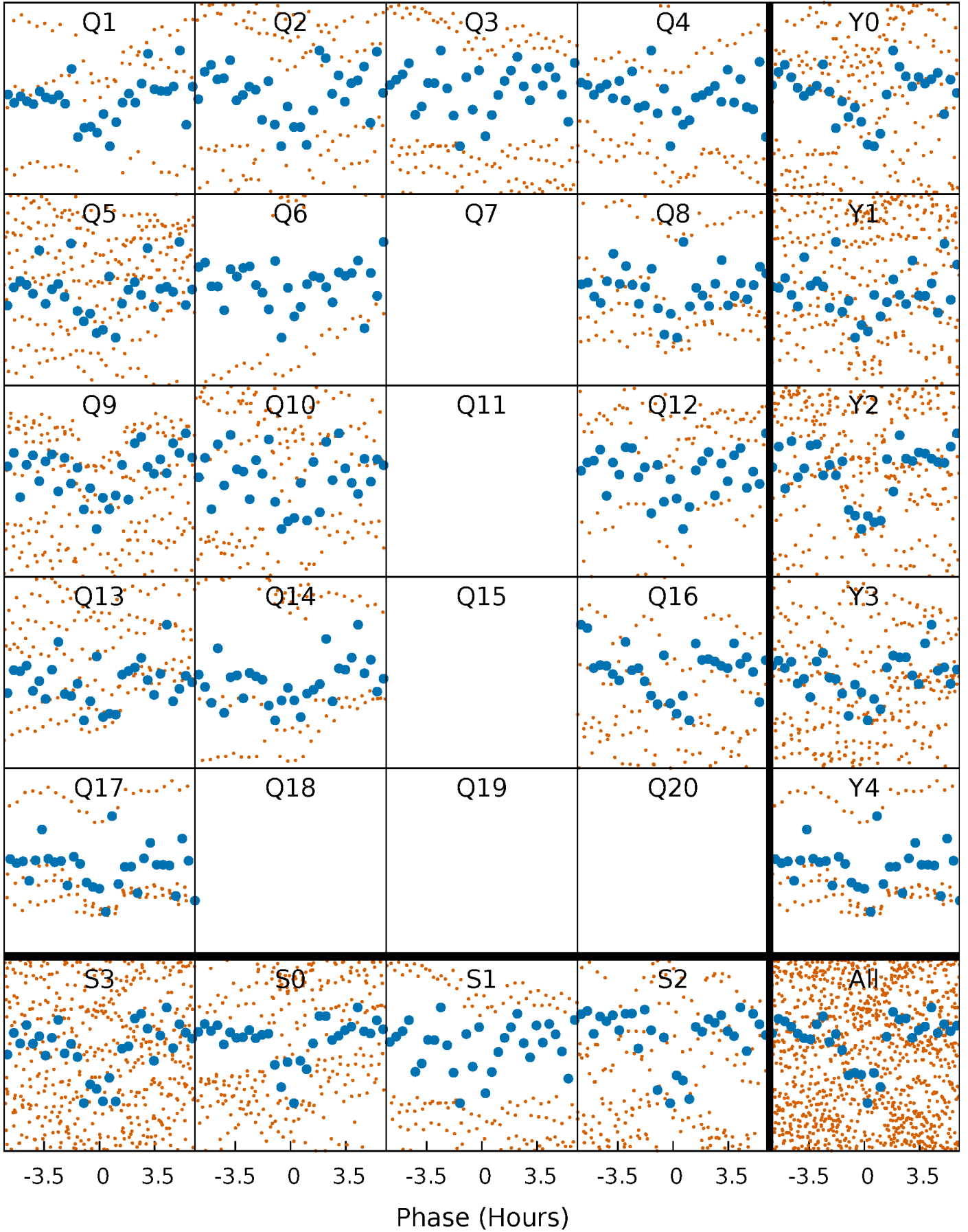
Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

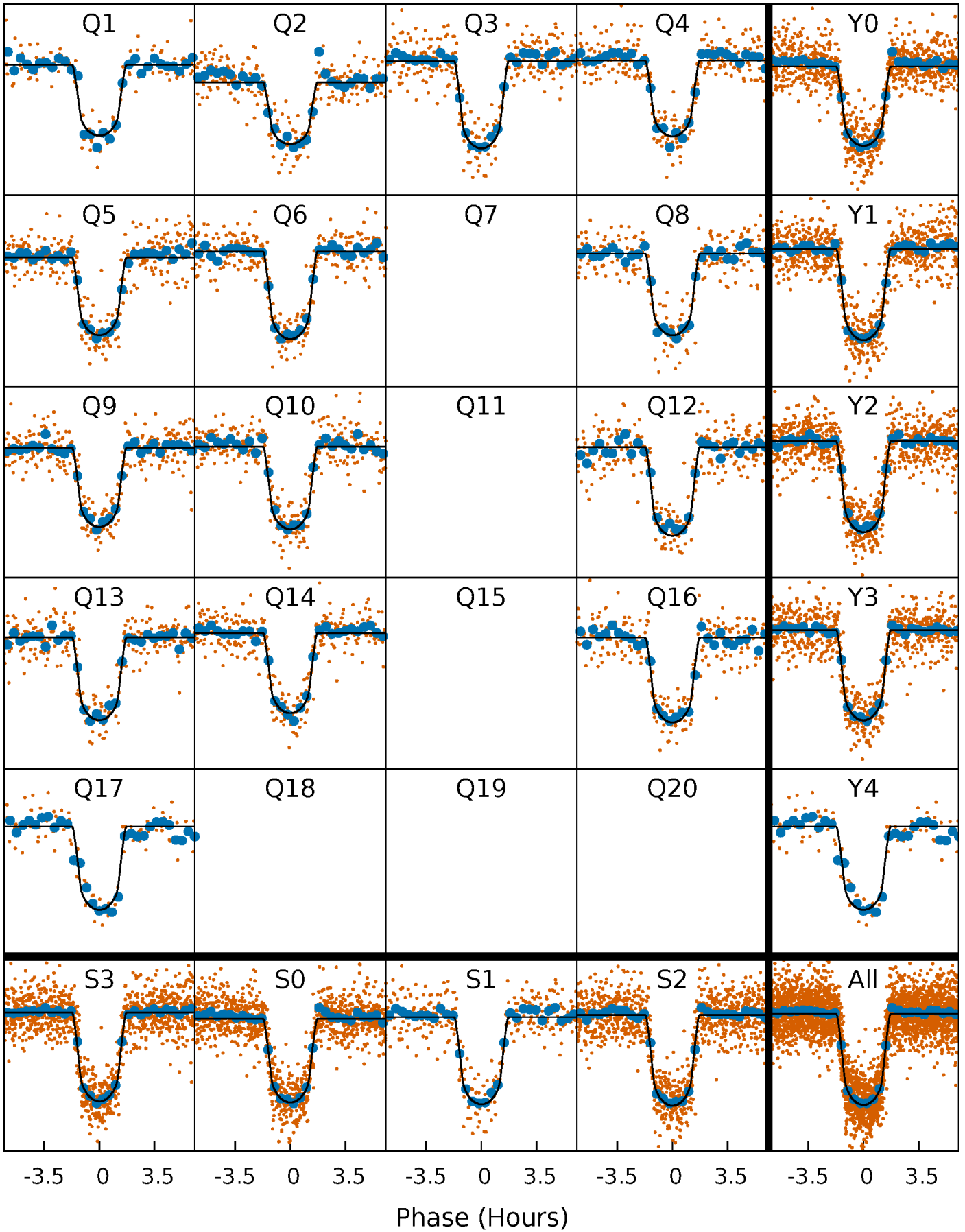
TCE 010878263-01 P= 7.170716 Days  $T_0=133.641767$  (BKJD)





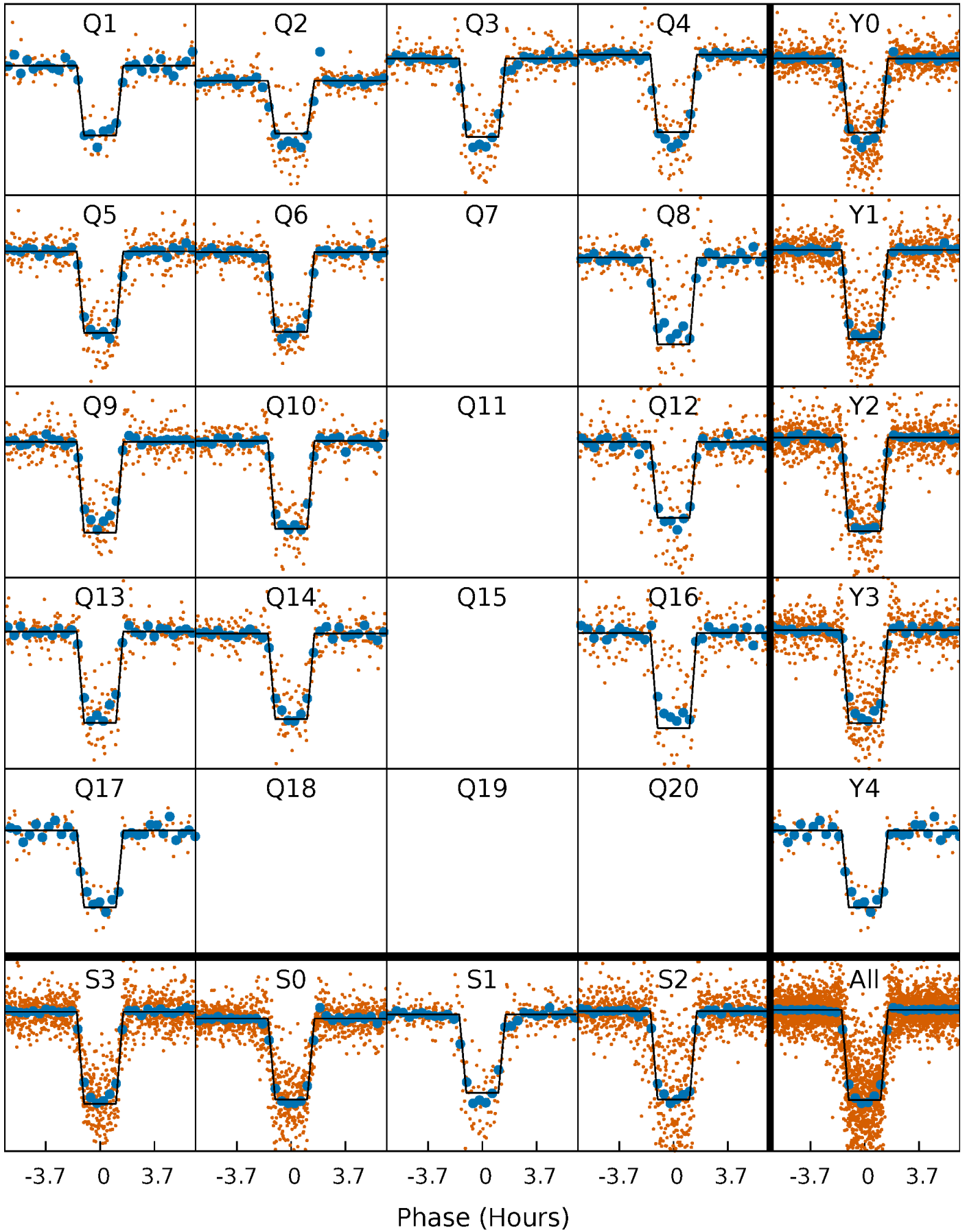
# DV Quarter-Phased Transit Curves

TCE 010878263-01 P= 7.170716 Days  $T_0=133.641767$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

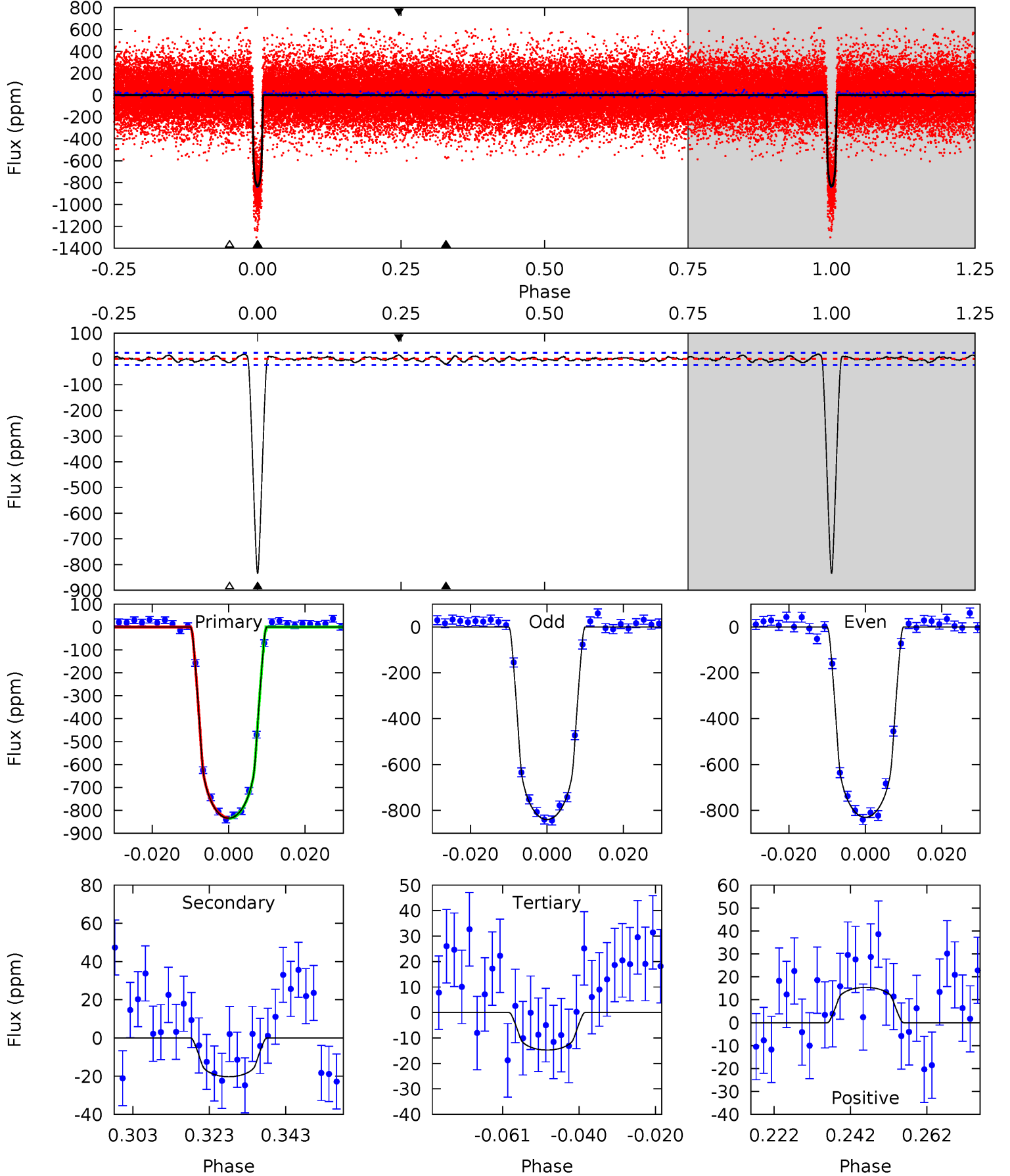
TCE 010878263-01 P= 7.170702 Days  $T_0=133.643218$  (BKJD)



# DV Model-Shift Uniqueness Test

010878263-01, P = 7.170716 Days, E = 126.471051 Days

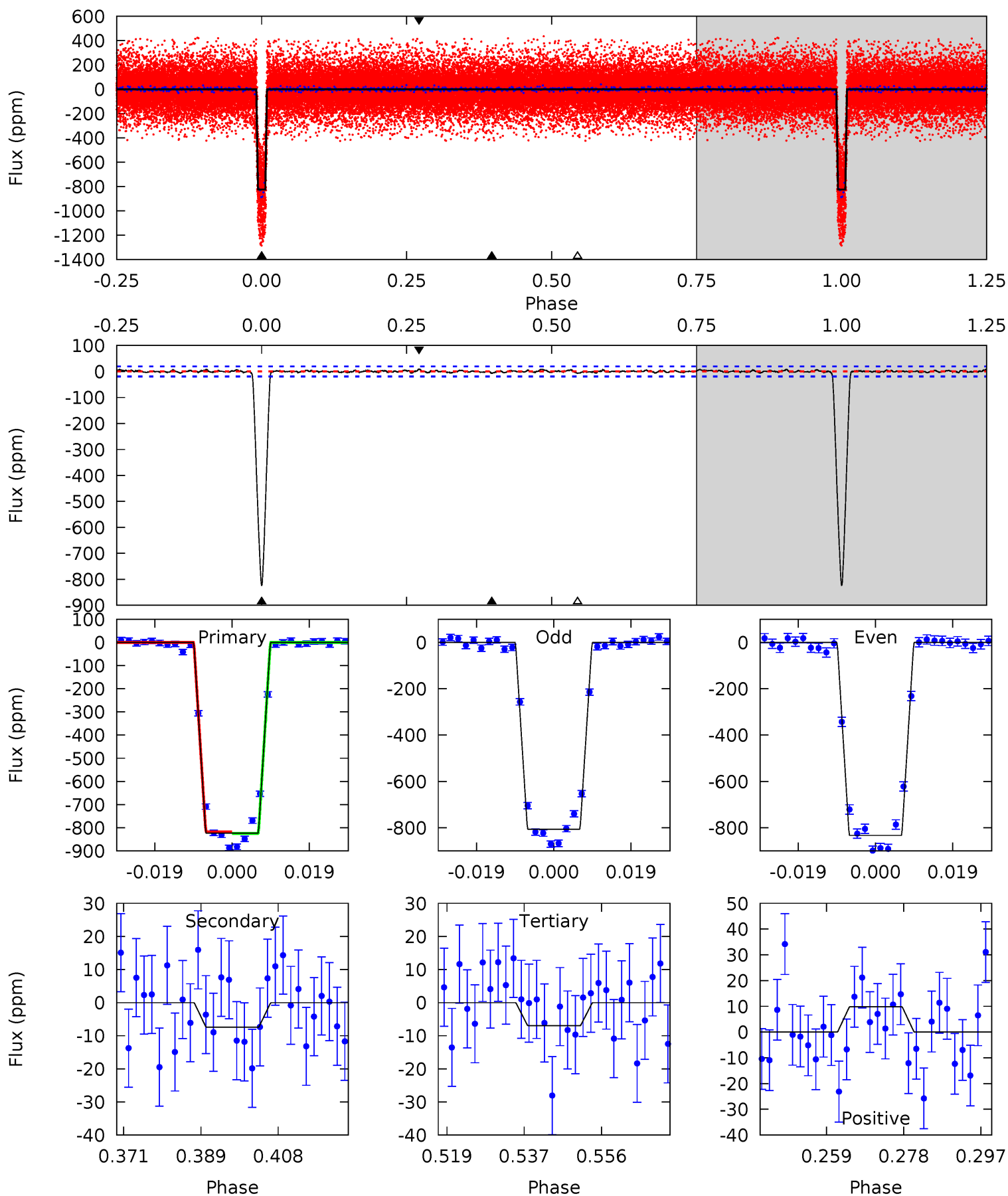
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
176.1	4.28	3.11	3.25	4.89	2.32	1.29	172.9	172.8	1.17	1.03	1.04	1.01	0.02	0.27



# Alt Model-Shift Uniqueness Test

010878263-01, P = 7.170702 Days, E = 126.472516 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
206.8	1.87	1.76	2.47	4.91	2.35	0.67	205.0	204.3	0.11	-0.60	3.37	1.03	0.01	0.96



### Stellar Parameters For KIC 010878263

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5497^{+109}_{-98}$	$4.437^{+0.090}_{-0.090}$	$0.020^{+0.150}_{-0.150}$	$0.941^{+0.110}_{-0.090}$	$0.884^{+0.066}_{-0.044}$	$1.493^{+0.484}_{-0.401}$
	+2%/-2%	+2%/-2%	+750%/-750%	+12%/-10%	+7%/-5%	+32%/-27%
Source	SPE59	SPE59	SPE59	DSEP		

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

### Secondary Eclipse Parameters for KIC 010878263-01 / KOI 0341.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-20 \pm 5$	$2.94^{+0.35}_{-0.33}$	$1248^{+42}_{-47}$	$2875^{+116}_{-131}$	$6.403^{+2.235}_{-1.960}$
Alt.	$-7 \pm 4$	$2.96^{+0.38}_{-0.30}$	$1244^{+45}_{-44}$	$2488^{+166}_{-254}$	$2.276^{+1.436}_{-1.225}$

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

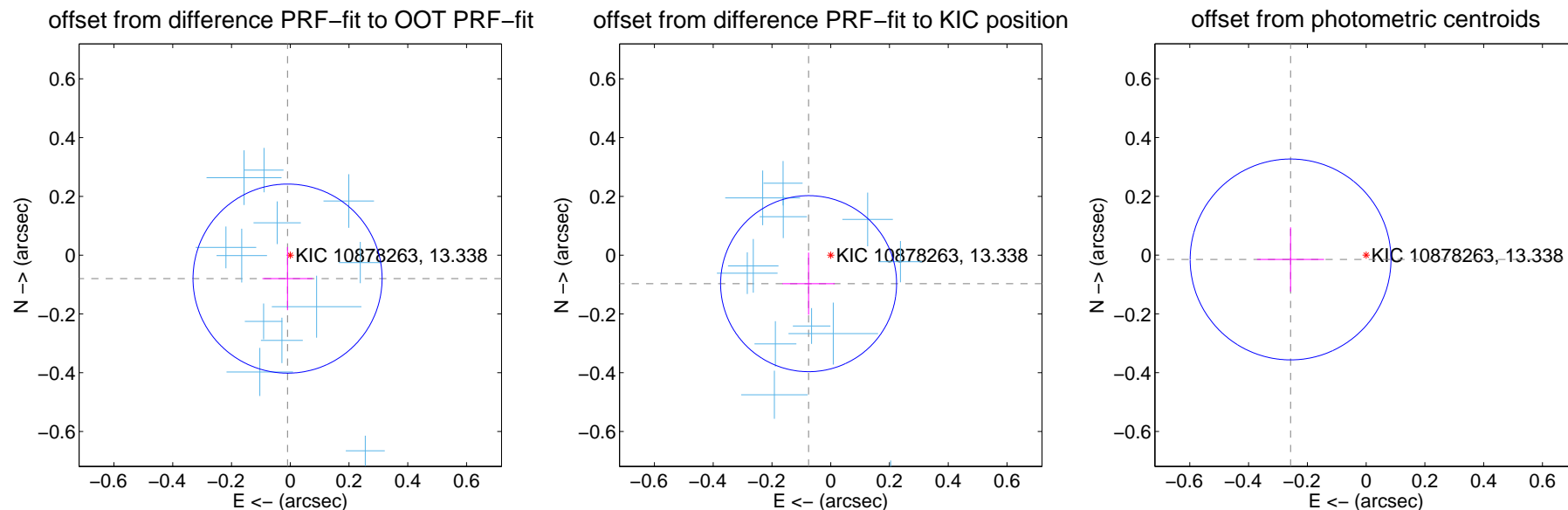
## DV Centroid Data

Supplemental centroid analysis for 010878263-01. Kepler magnitude: 13.34. Transit SNR 103.44

There are 12 quarters with good PRF difference image offsets

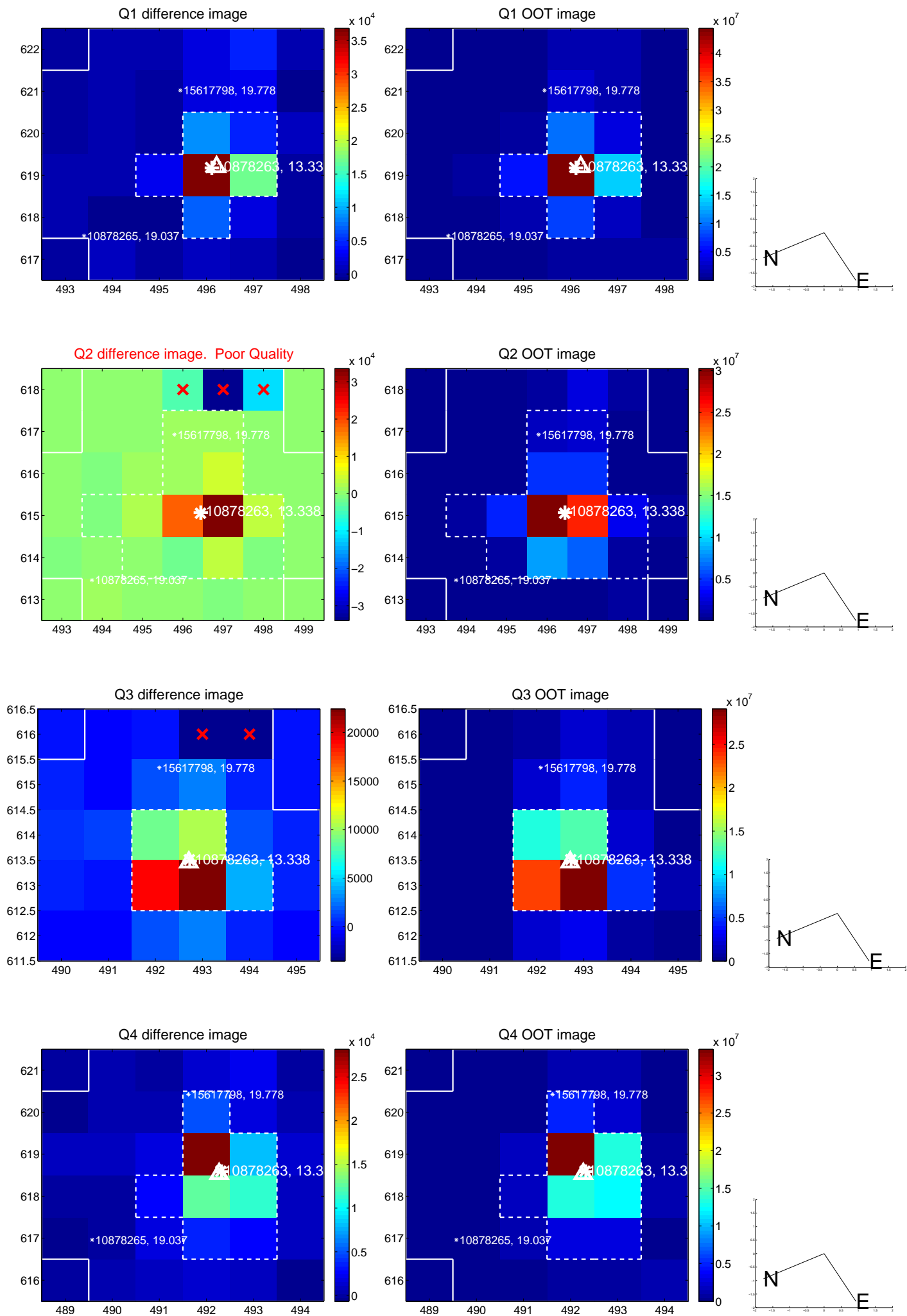
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.080 \pm 0.107$	0.75	$0.009 \pm 0.085$	$-0.080 \pm 0.107$
PRF-fit source offset from KIC position	$0.123 \pm 0.100$	1.23	$0.075 \pm 0.089$	$-0.097 \pm 0.106$
photometric centroid source offset	$0.26 \pm 0.11$	2.26	$0.26 \pm 0.11$	$-0.01 \pm 0.11$



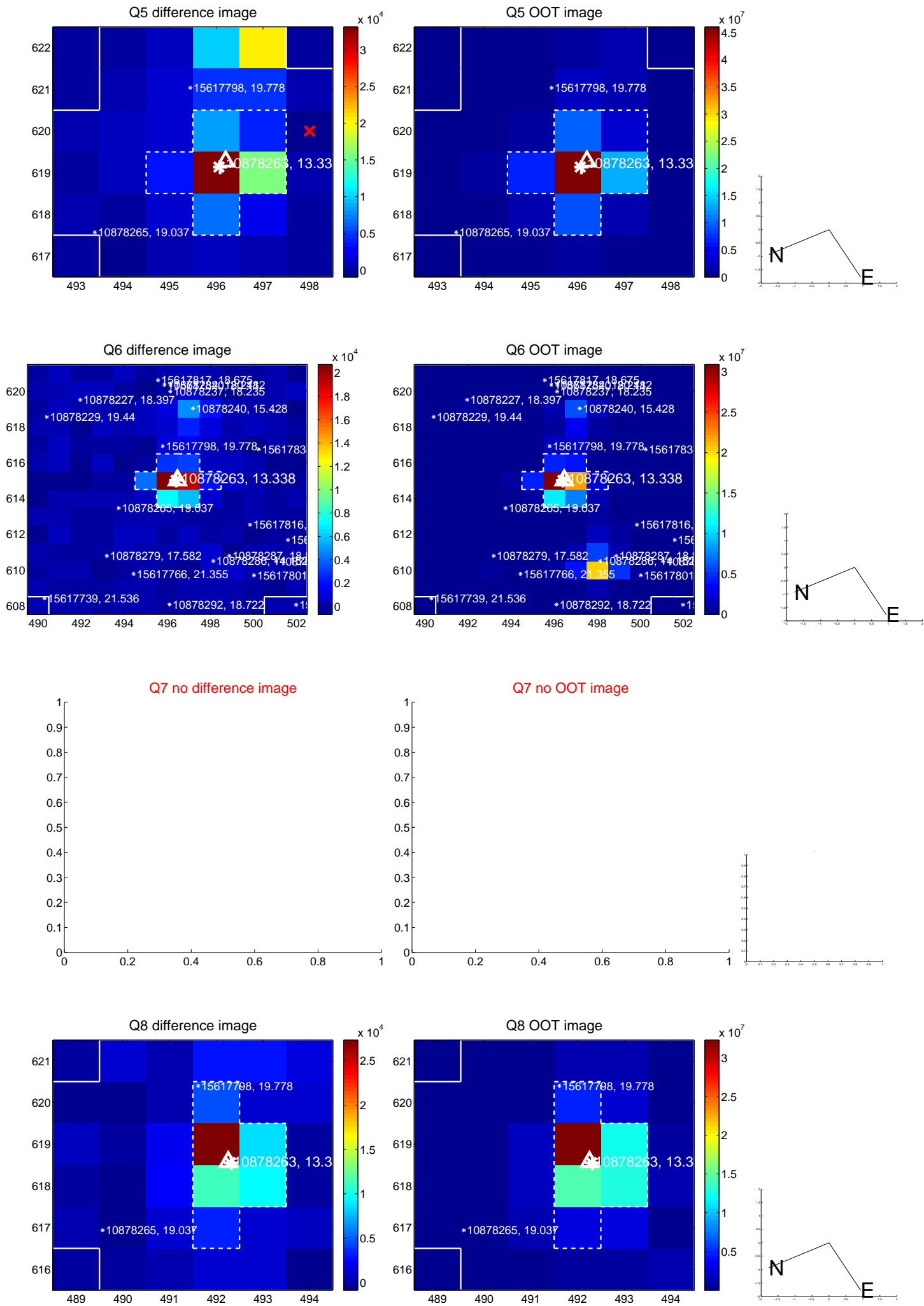
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

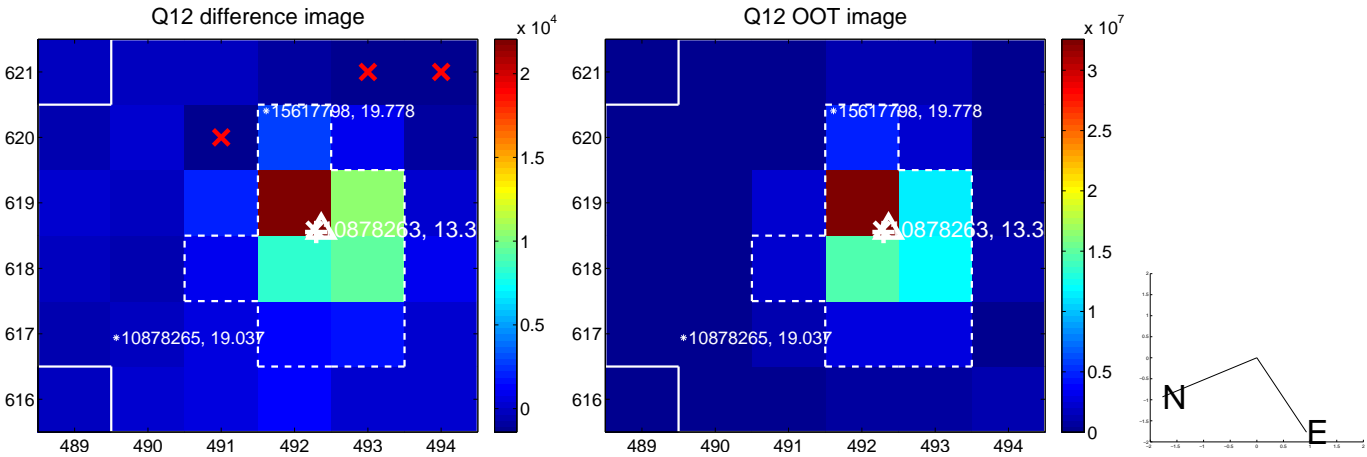
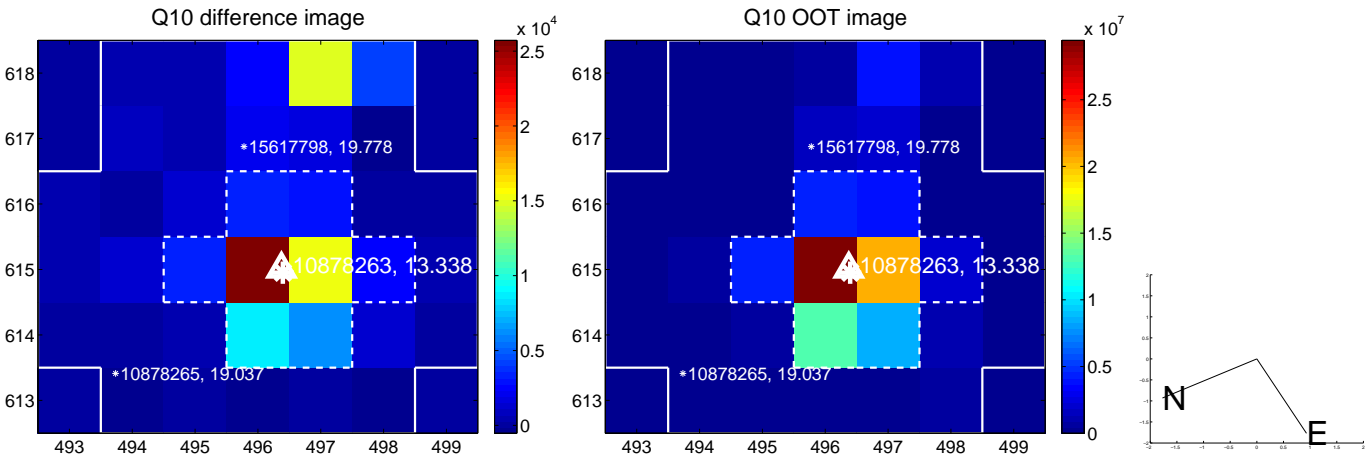
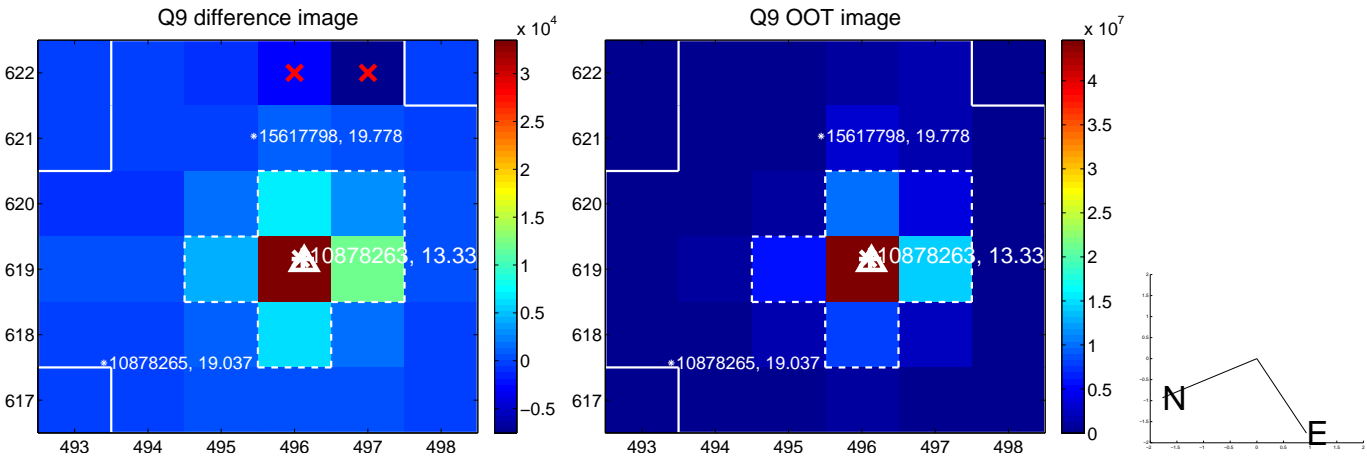




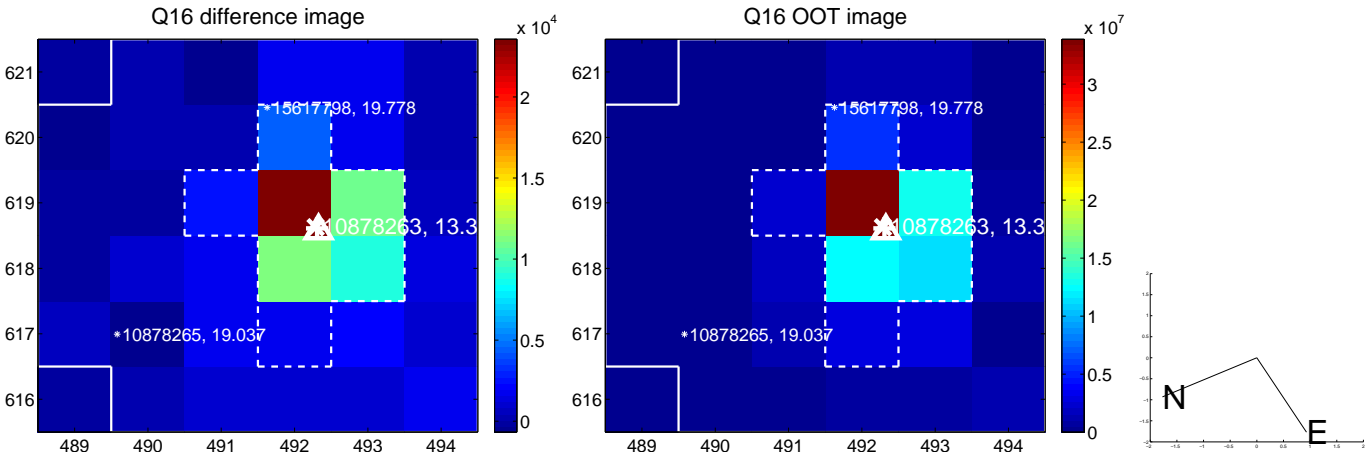
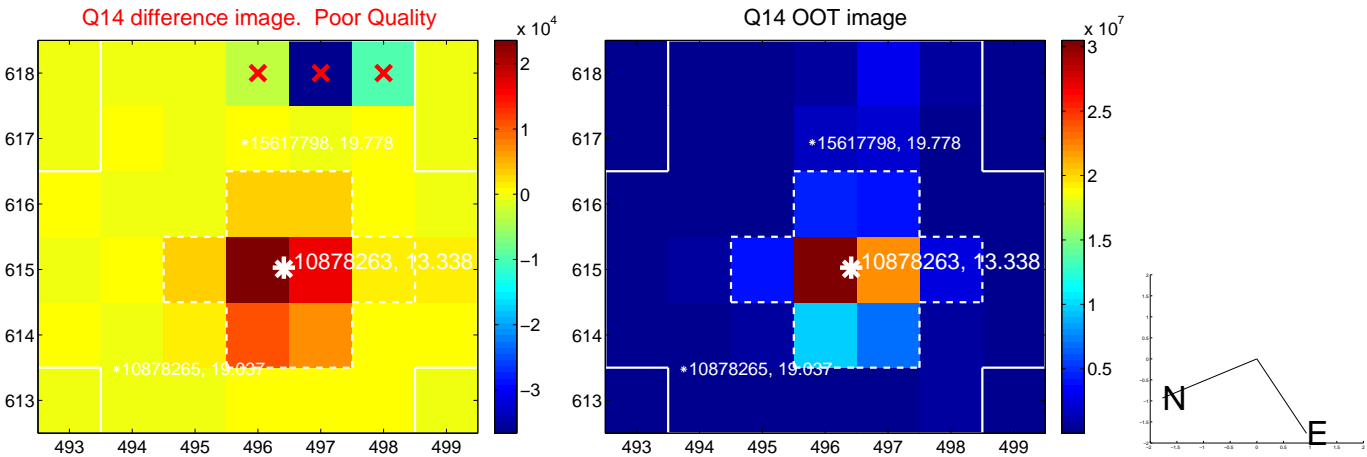
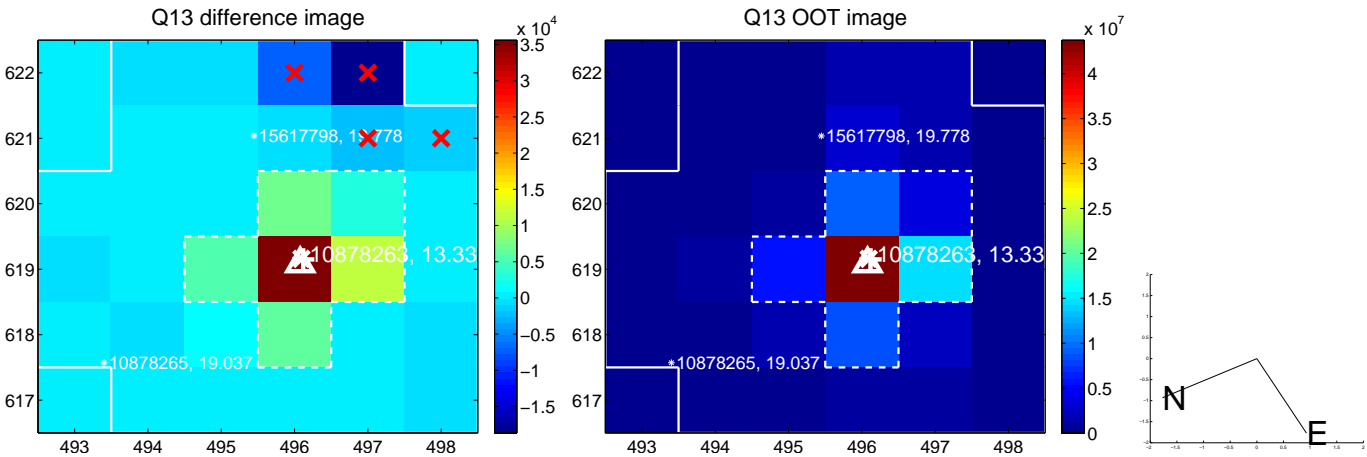
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



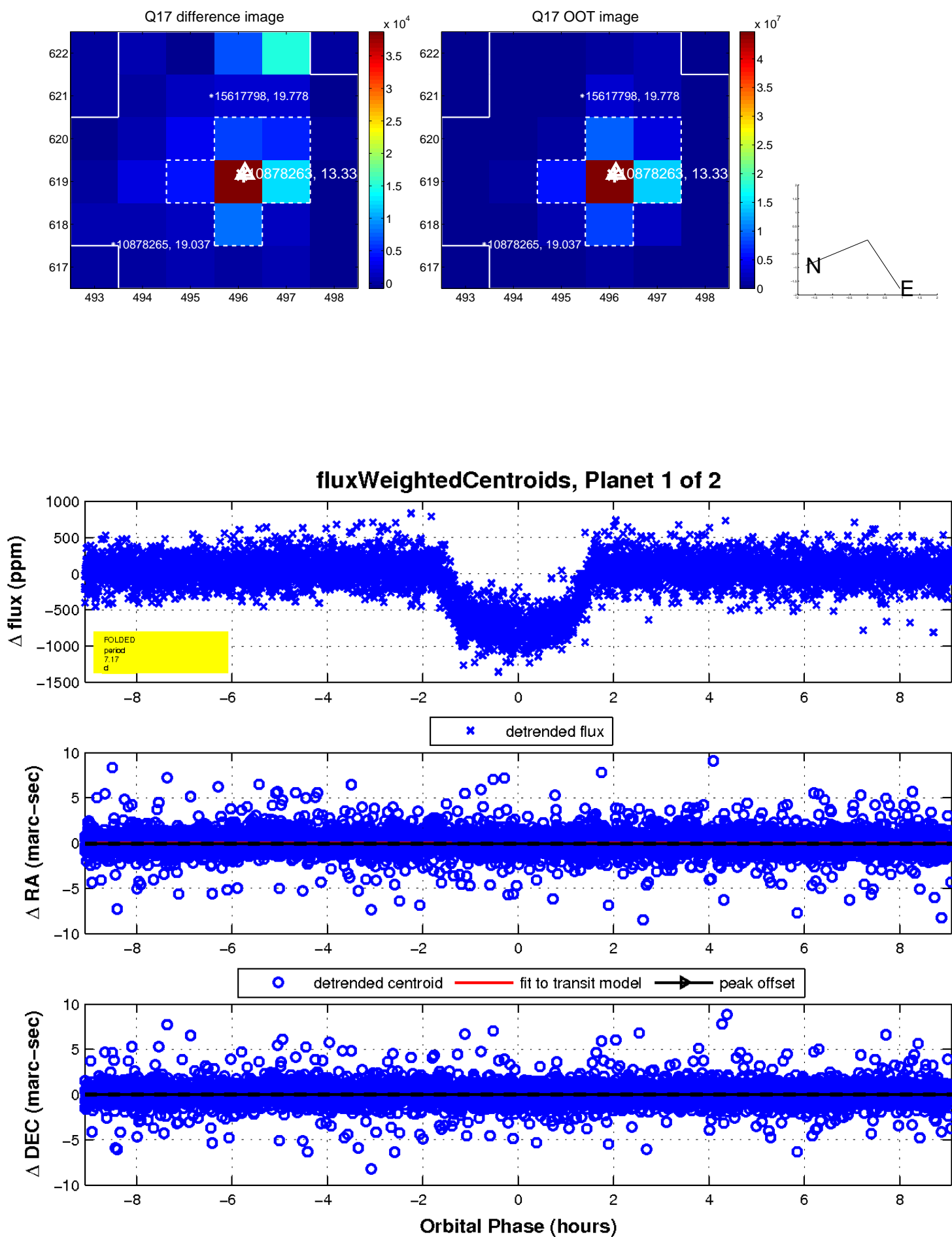
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

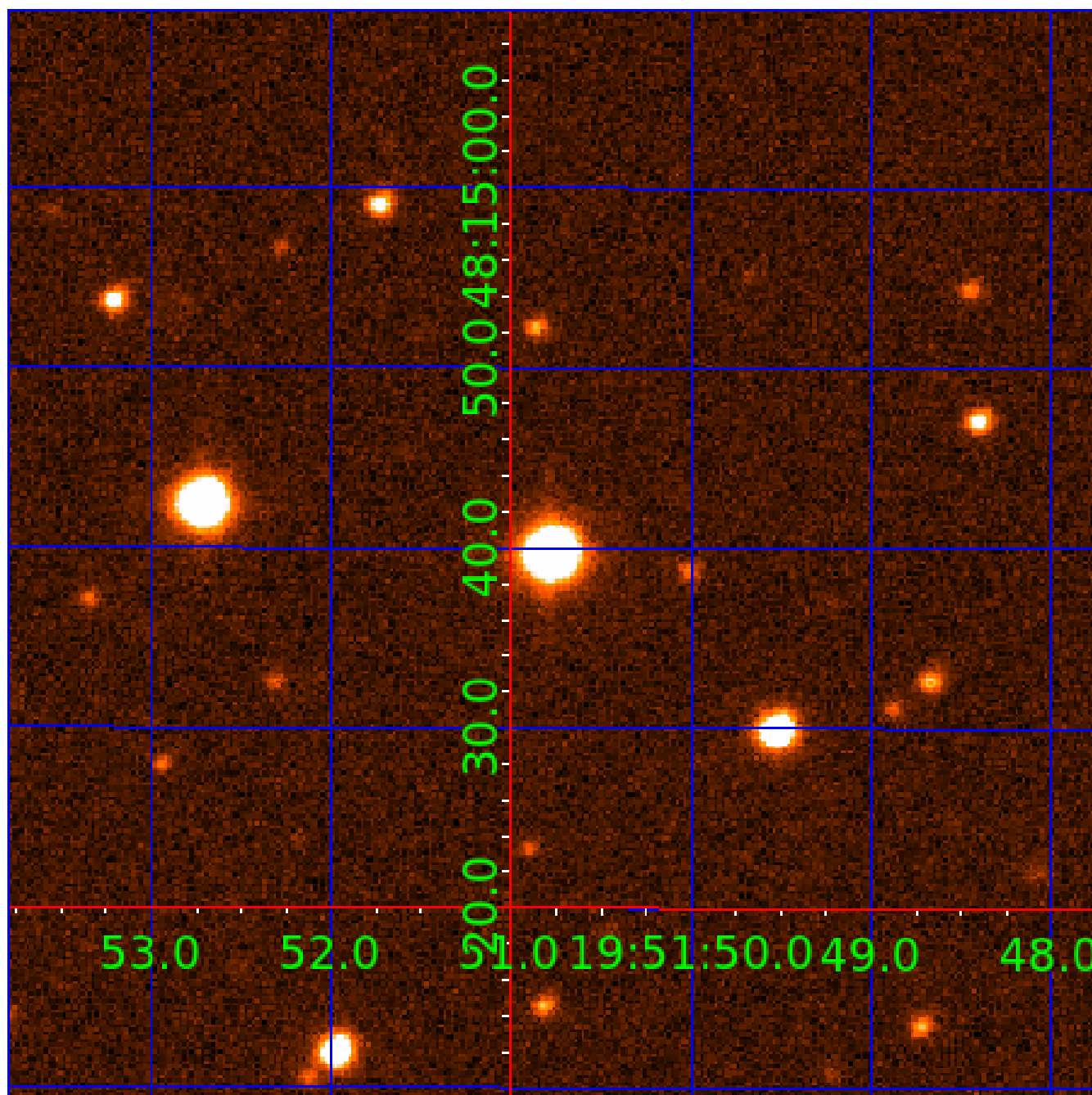


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010878263

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010878263-01	OBS	0341.01	7.170716	133.641767	841.5	3.029	104.7	103.4	0.94	5497	2.93	148.49
010878263-02	OBS	0341.02	4.699645	135.319419	293.9	2.836	41.0	45.4	0.94	5497	1.91	260.84

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010878263-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
010878263-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

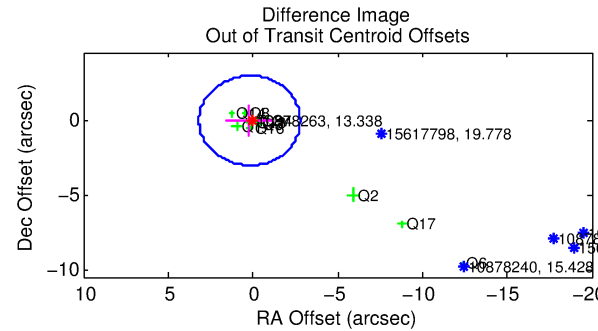
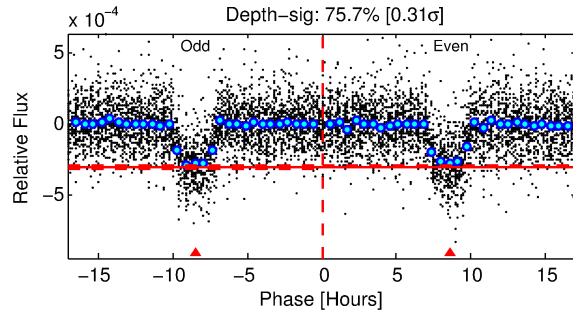
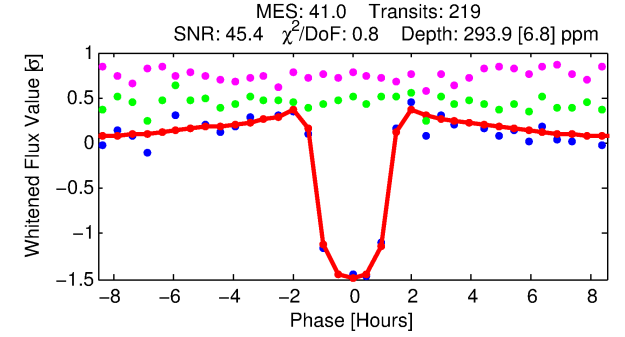
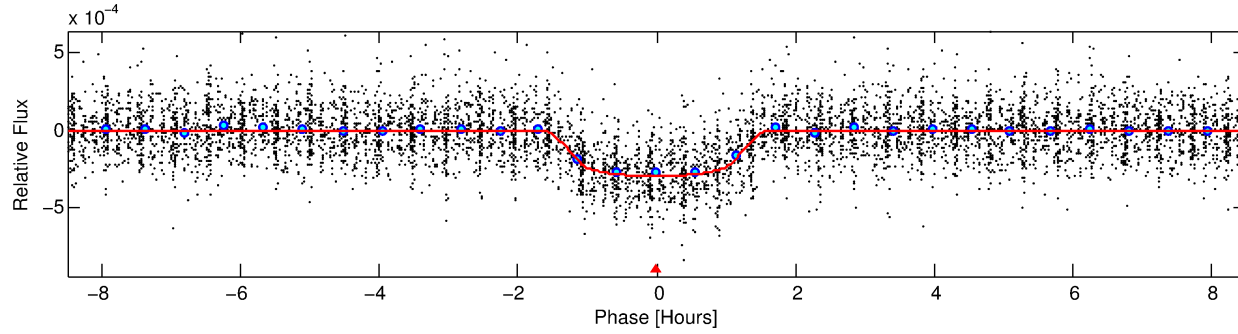
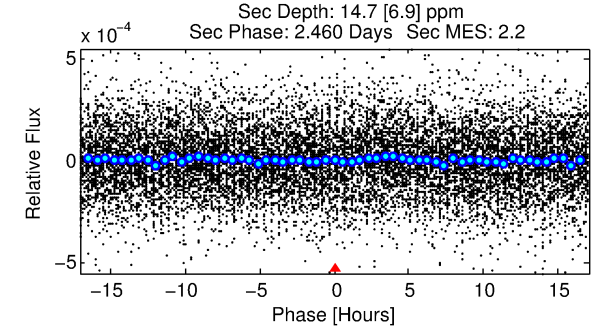
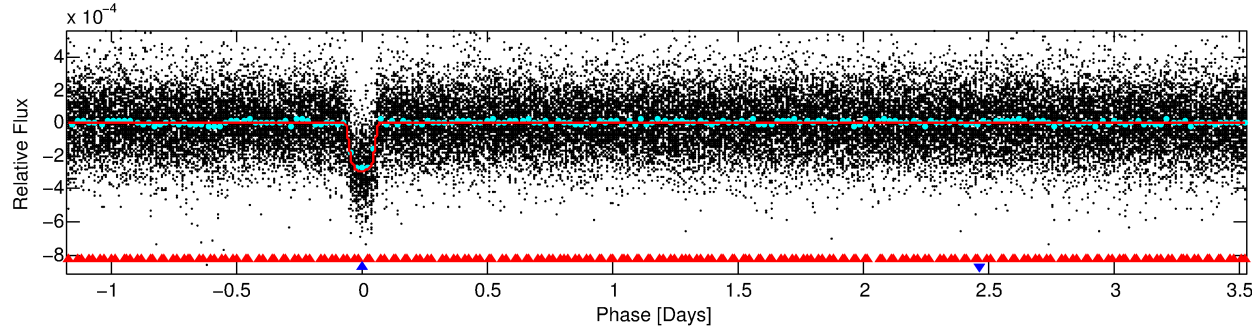
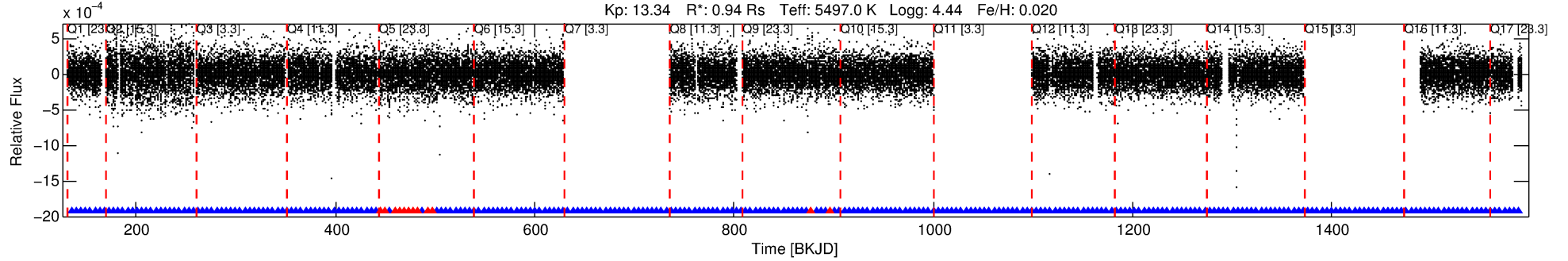
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010878263-02

No Significant Match Found

# DV One-Page Summary

KIC: 10878263 Candidate: 2 of 2 Period: 4.700 d  
KOI: K00341.02 Name: Kepler-414b Corr: 0.920



## DV Fit Results:

Period = 4.69965 [0.00001] d  
Epoch = 135.3194 [0.0009] BKJD  
Rp/R\* = 0.0186 [0.0019]  
a/R\* = 6.41 [2.82]  
b = 0.89 [0.11]  
Seff = 260.84 [46.26]  
Teff = 1025 [45] K  
p = 1.91 [0.30] Re  
a = 0.0527 [0.0055] AU  
Ag = 6.15 [3.29] [1.56σ]  
Teffp = 2495 [323] K [4.51σ]

## DV Diagnostic Results:

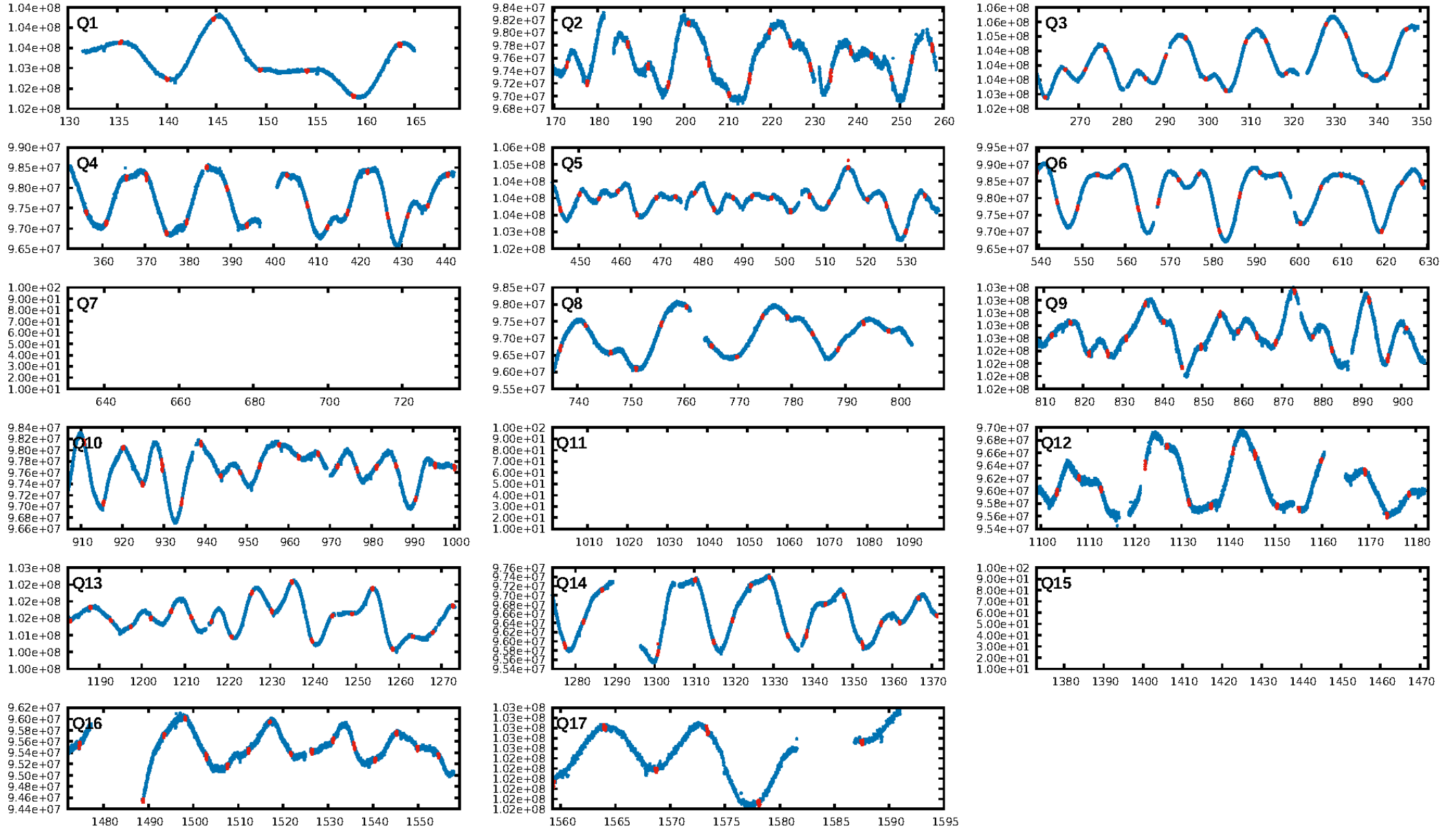
ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [14.29σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.94 [194/206]  
GhostDiagnostic-chr: 12.44  
Centroid-sig: 0.7%  
Centroid-so: 0.474 arcsec [1.81σ]  
OotOffset-rm: 0.195 arcsec [0.20σ]  
KicOffset-rm: 0.288 arcsec [0.34σ]  
OotOffset-st: 3/1/3/4 [11]  
KicOffset-st: 3/1/3/4 [11]  
DiffImageQuality-fgm: 0.73 [8/11]  
DiffImageOverlap-fno: 1.00 [14/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 10:40:55 Z

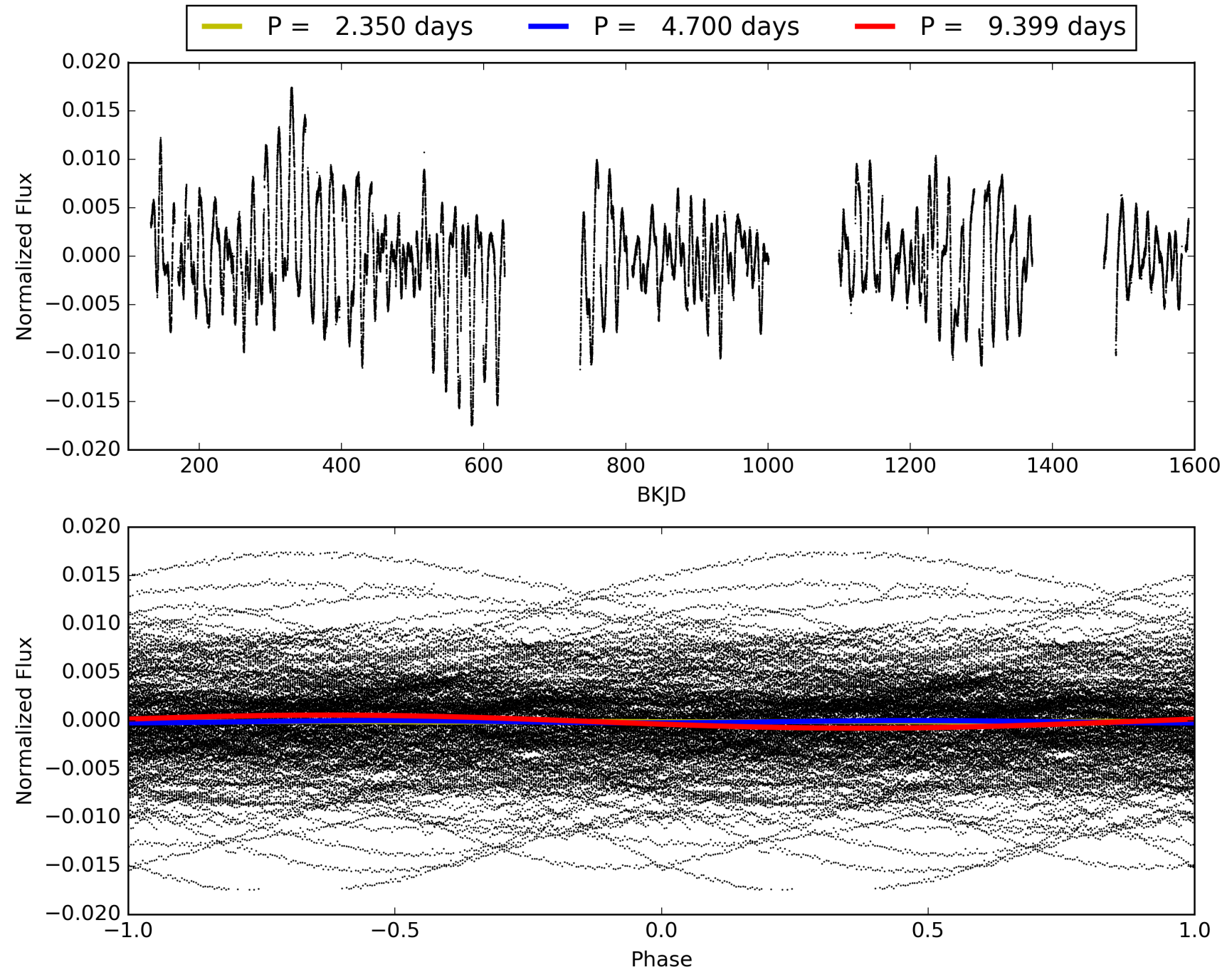
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 010878263-02, PDC Light Curves

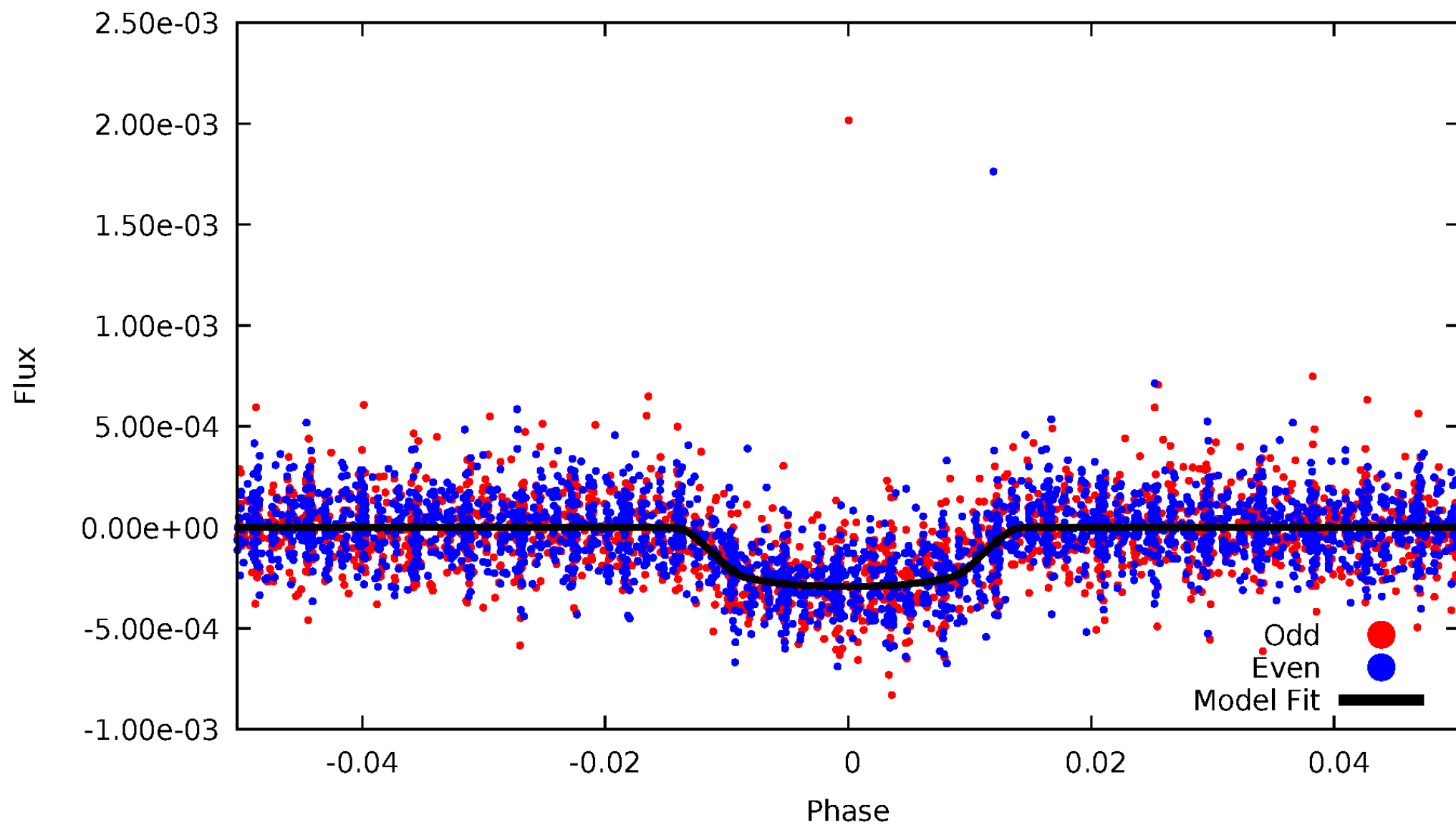


# TCE 010878263-02



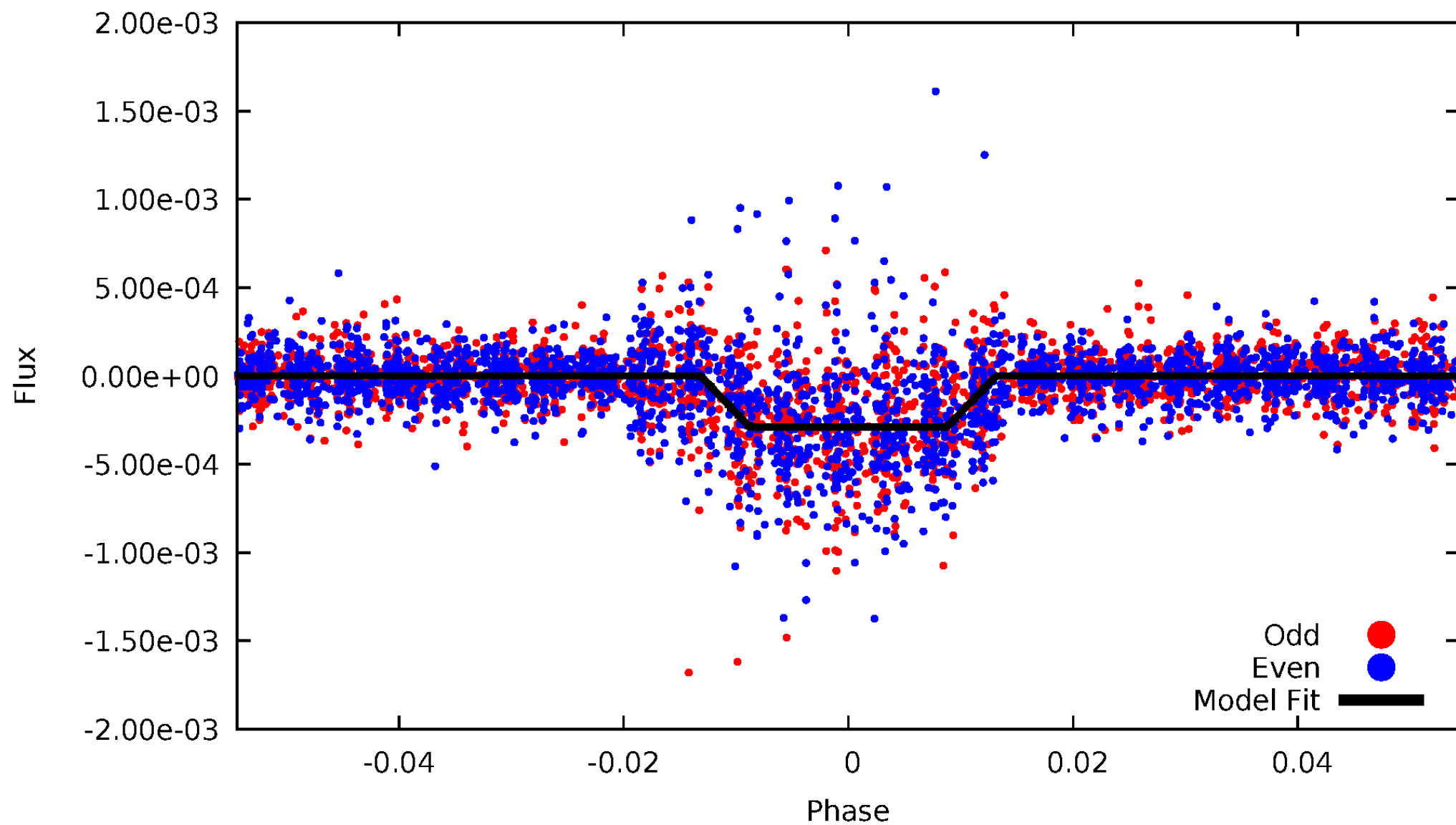
# DV Odd/Even

TCE 010878263-02



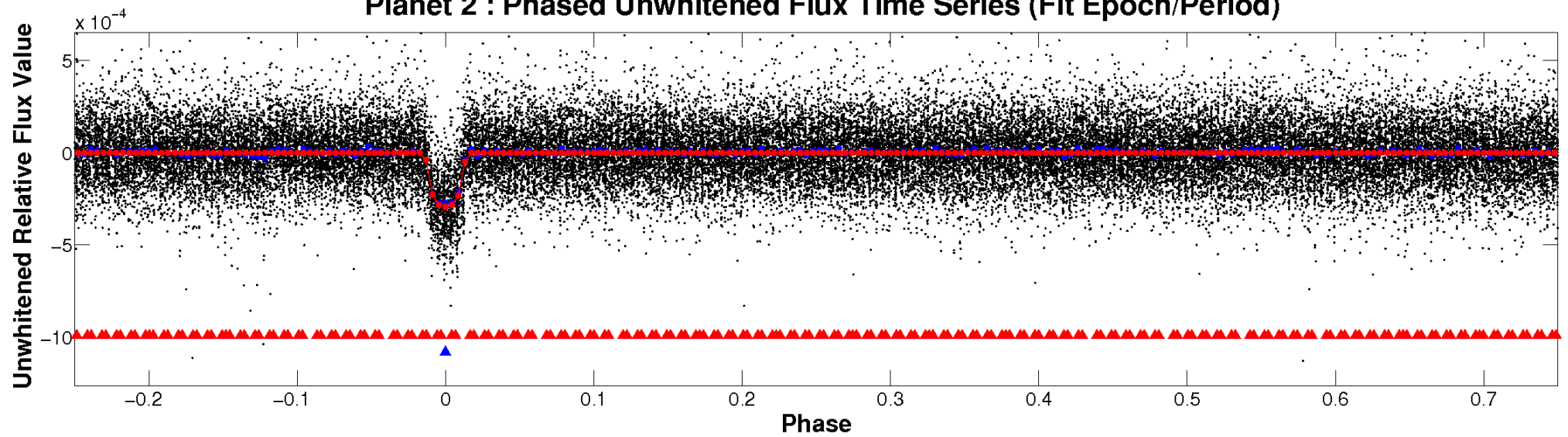
# ALT Odd/Even

TCE 010878263-02

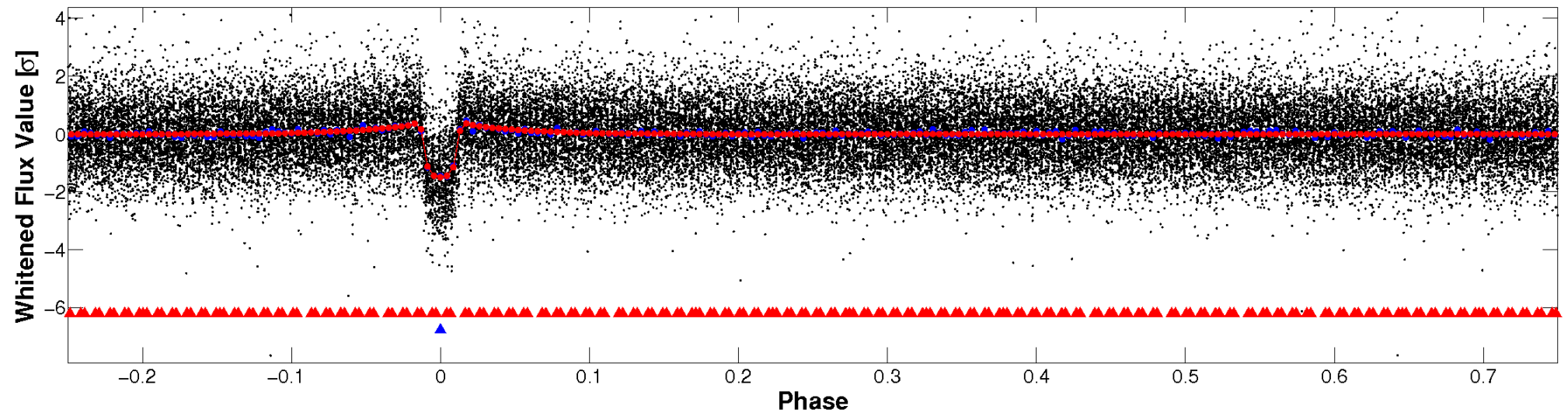


# Non-Whitened Vs. Whitened Light Curve

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

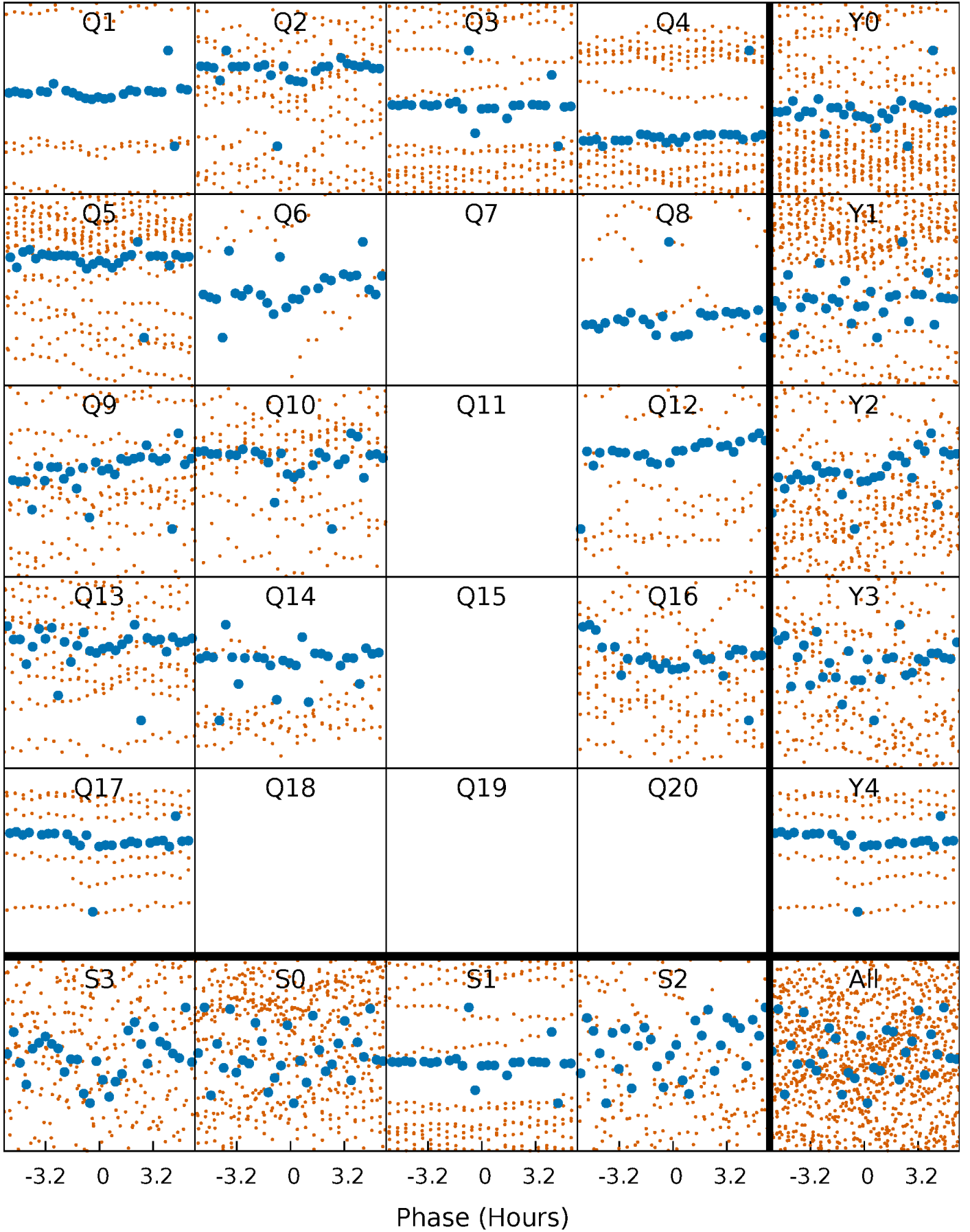


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

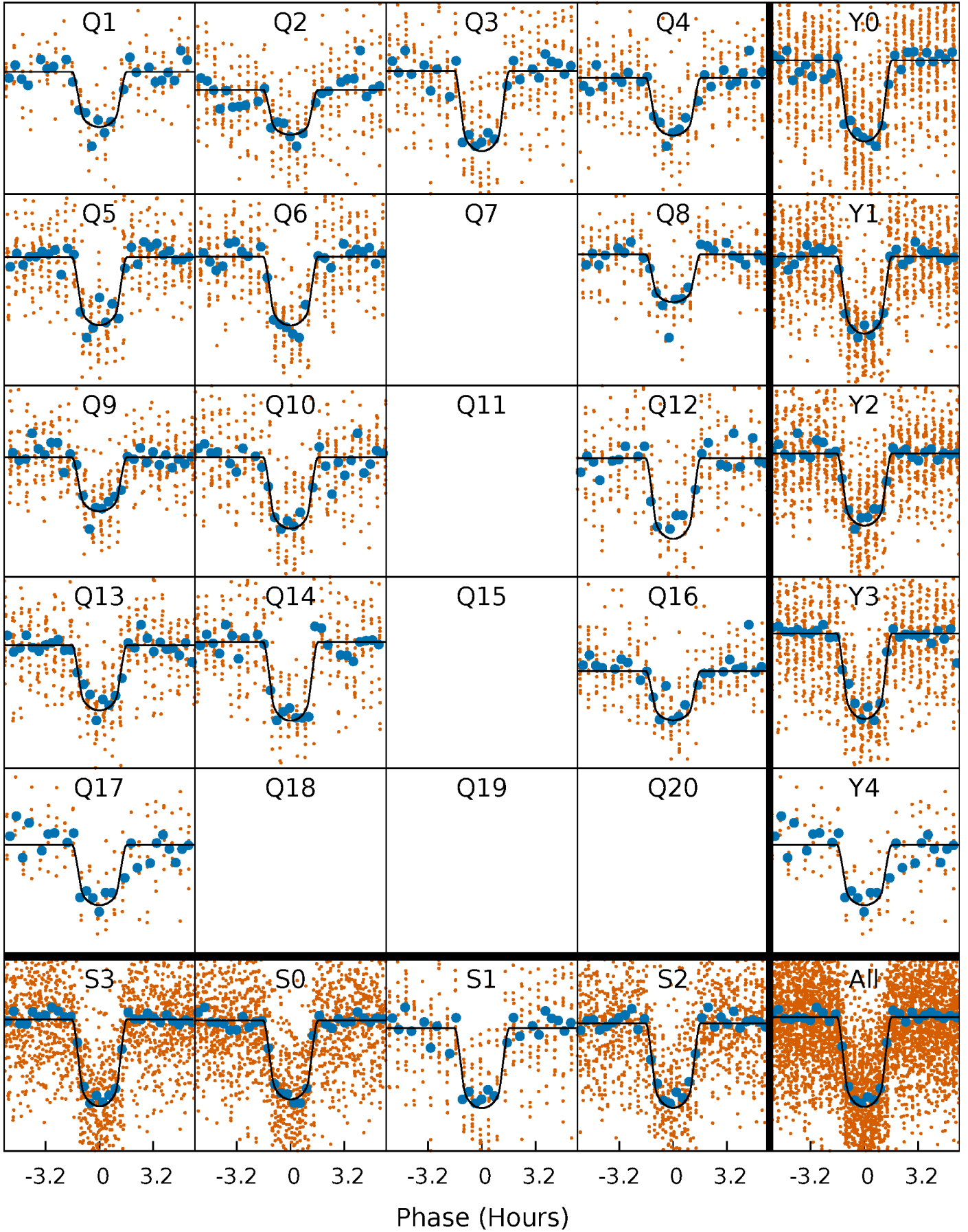
TCE 010878263-02   P= 4.699645 Days    $T_0=135.319419$  (BKJD)





# DV Quarter-Phased Transit Curves

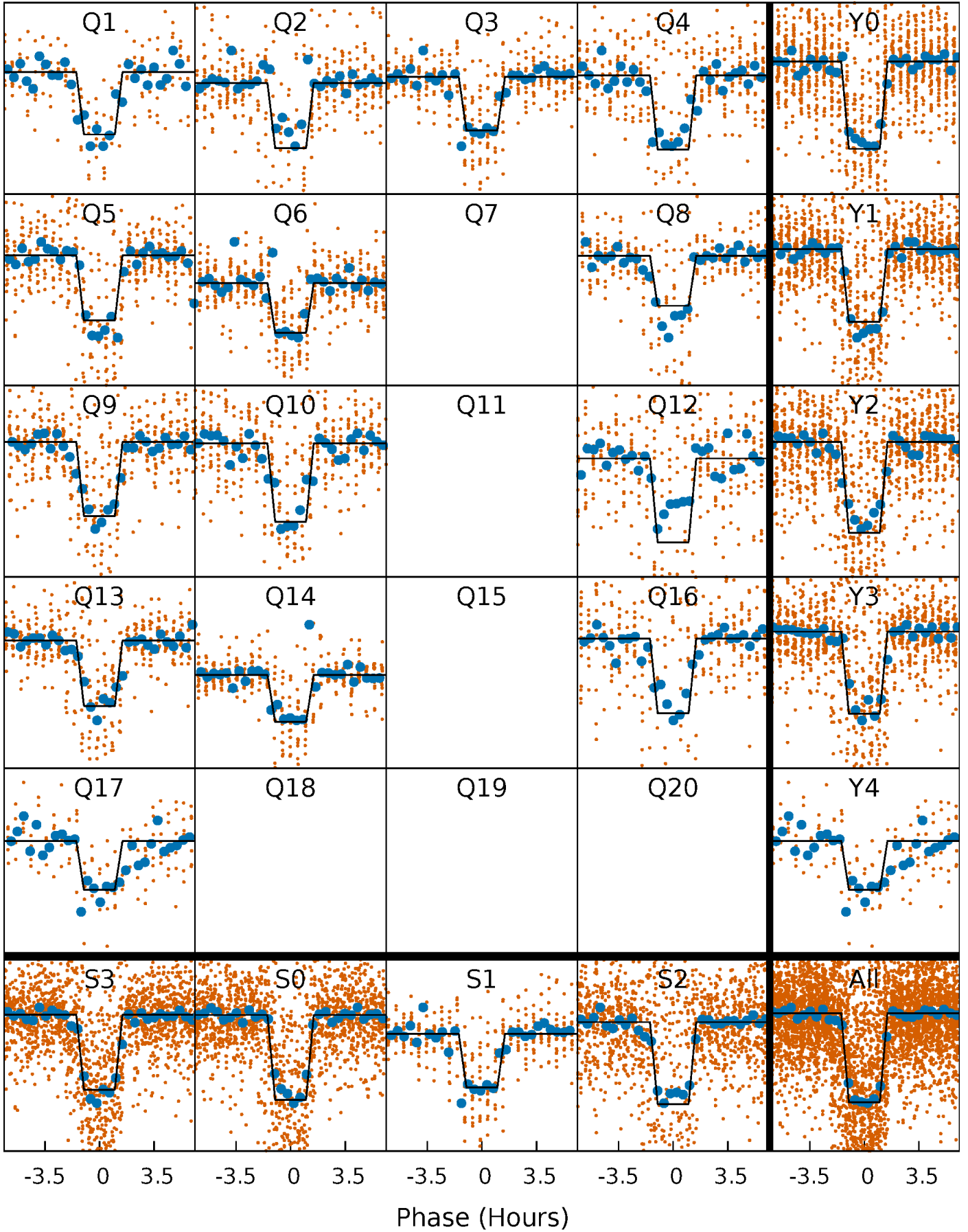
TCE 010878263-02   P= 4.699645 Days    $T_0=135.319419$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

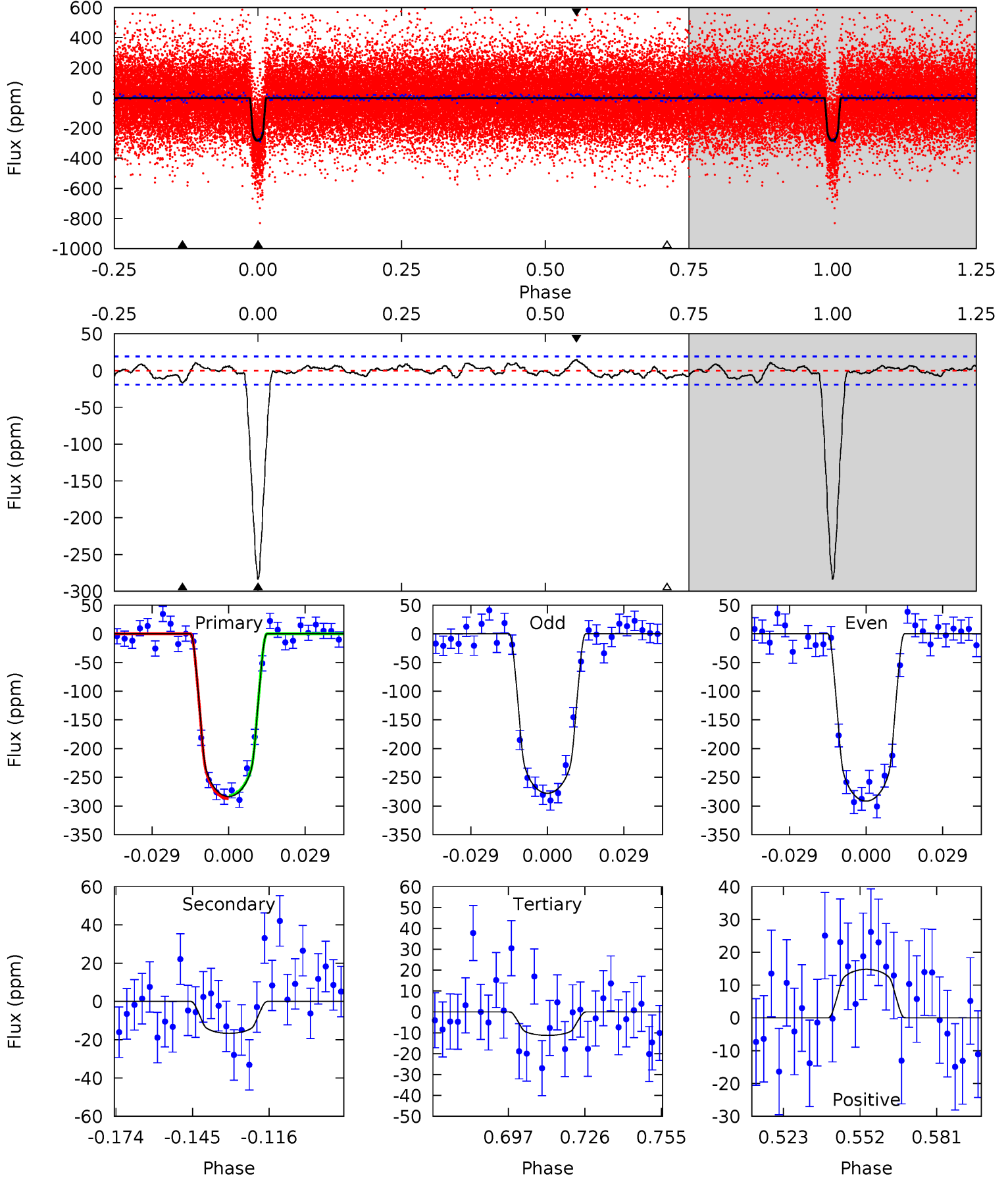
TCE 010878263-02   P= 4.699623 Days    $T_0=135.321444$  (BKJD)



# DV Model-Shift Uniqueness Test

010878263-02, P = 4.699645 Days, E = 130.619774 Days

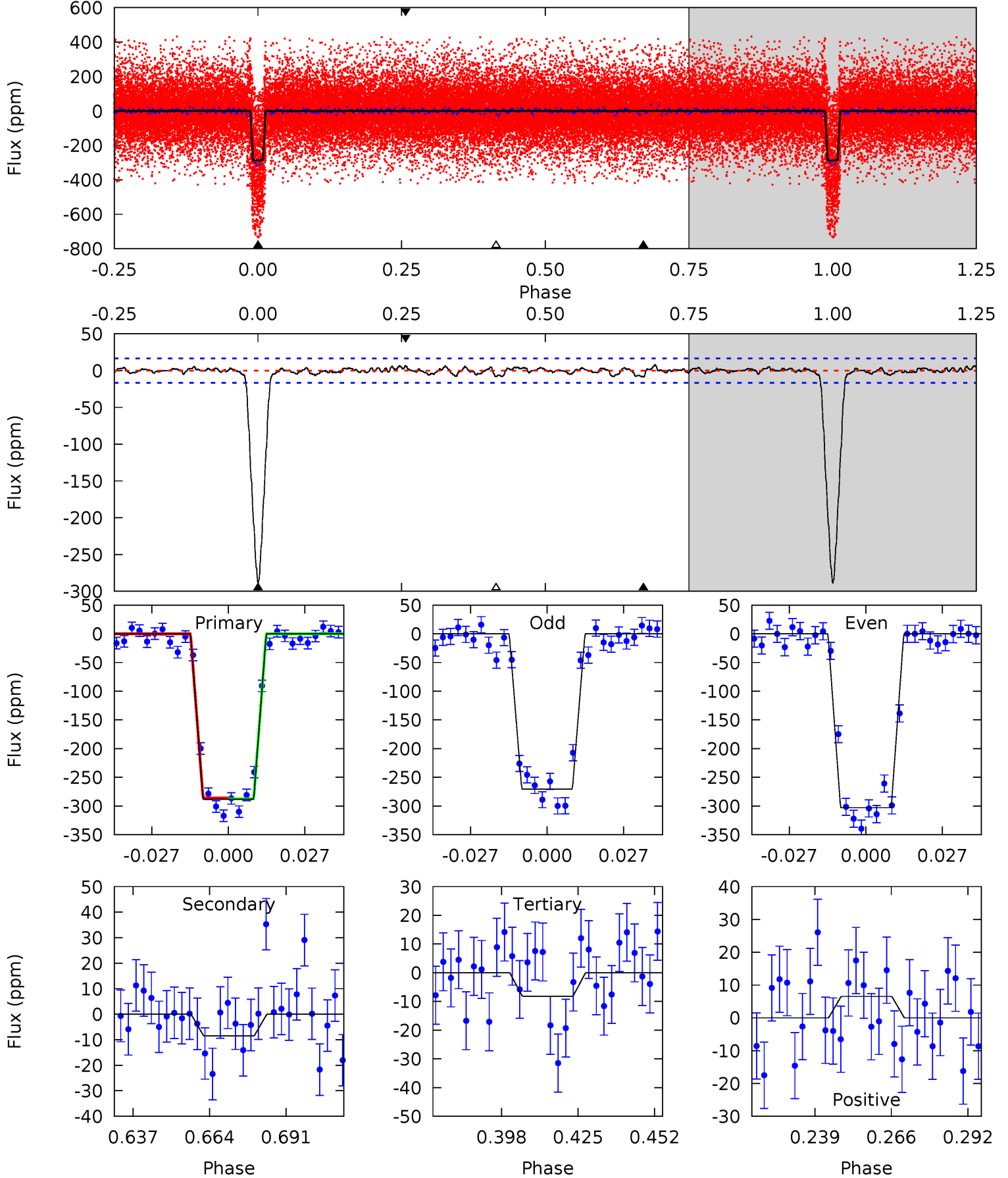
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
71.5	4.20	2.84	3.73	4.82	2.18	1.33	68.7	67.8	1.36	0.47	1.73	0.99	0.05	0.67



# Alt Model-Shift Uniqueness Test

010878263-02, P = 4.699623 Days, E = 130.621821 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
84.4	2.48	2.40	1.92	4.84	2.22	0.83	82.0	82.5	0.08	0.56	4.78	1.00	0.03	0.25



### Stellar Parameters For KIC 010878263

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5497^{+109}_{-98}$	$4.437^{+0.090}_{-0.090}$	$0.020^{+0.150}_{-0.150}$	$0.941^{+0.110}_{-0.090}$	$0.884^{+0.066}_{-0.044}$	$1.493^{+0.484}_{-0.401}$
	+2%/-2%	+2%/-2%	+750%/-750%	+12%/-10%	+7%/-5%	+32%/-27%
Source	SPE59	SPE59	SPE59	DSEP		

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

### Secondary Eclipse Parameters for KIC 010878263-02 / KOI 0341.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-17 \pm 4$	$1.91^{+0.24}_{-0.21}$	$1433^{+56}_{-48}$	$3156^{+160}_{-171}$	$6.949^{+2.712}_{-2.113}$
Alt.	$-8 \pm 3$	$1.73^{+0.23}_{-0.20}$	$1431^{+50}_{-49}$	$2926^{+194}_{-232}$	$4.249^{+2.347}_{-1.907}$

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

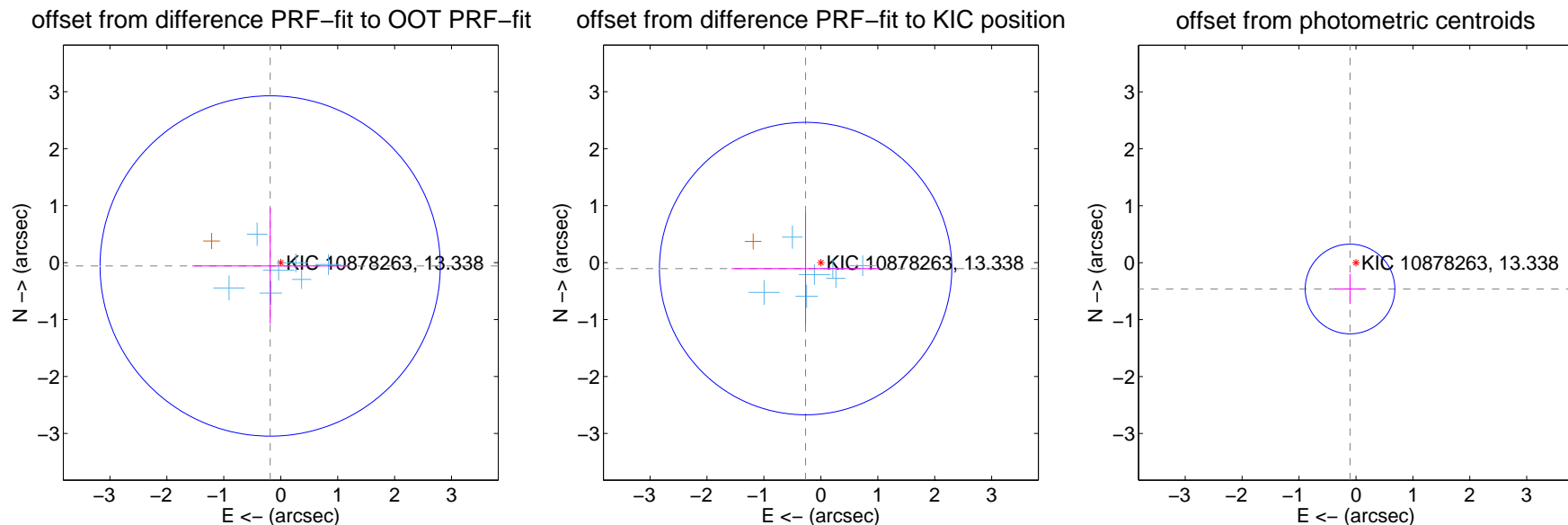
## DV Centroid Data

Supplemental centroid analysis for 010878263-02. Kepler magnitude: 13.34. Transit SNR 45.37

There are 8 quarters with good PRF difference image offsets

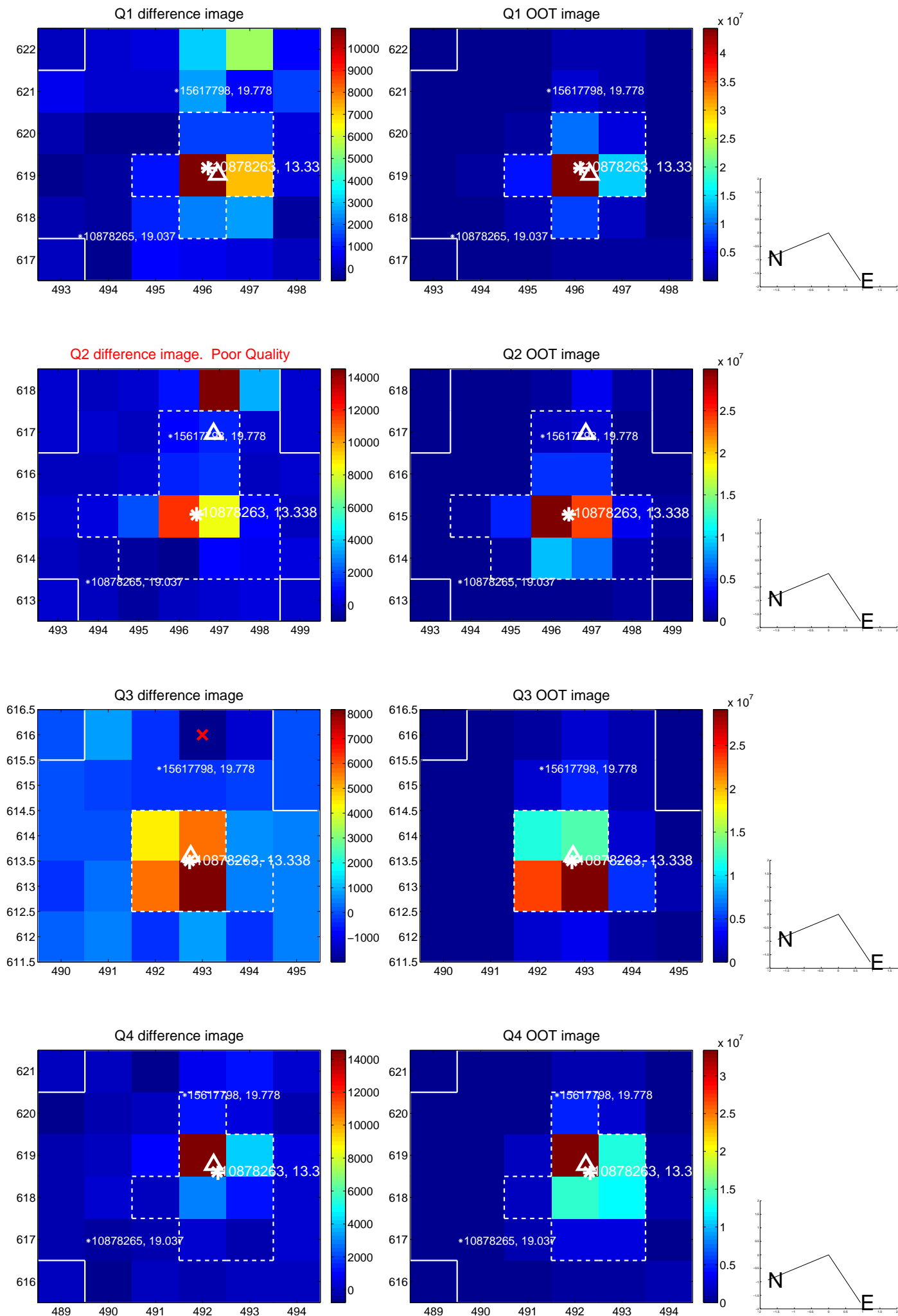
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.195 \pm 0.996$	0.20	$0.186 \pm 1.366$	$-0.059 \pm 1.017$
PRF-fit source offset from KIC position	$0.288 \pm 0.856$	0.34	$0.268 \pm 1.298$	$-0.105 \pm 0.986$
photometric centroid source offset	$0.47 \pm 0.26$	1.81	$0.10 \pm 0.27$	$-0.46 \pm 0.26$

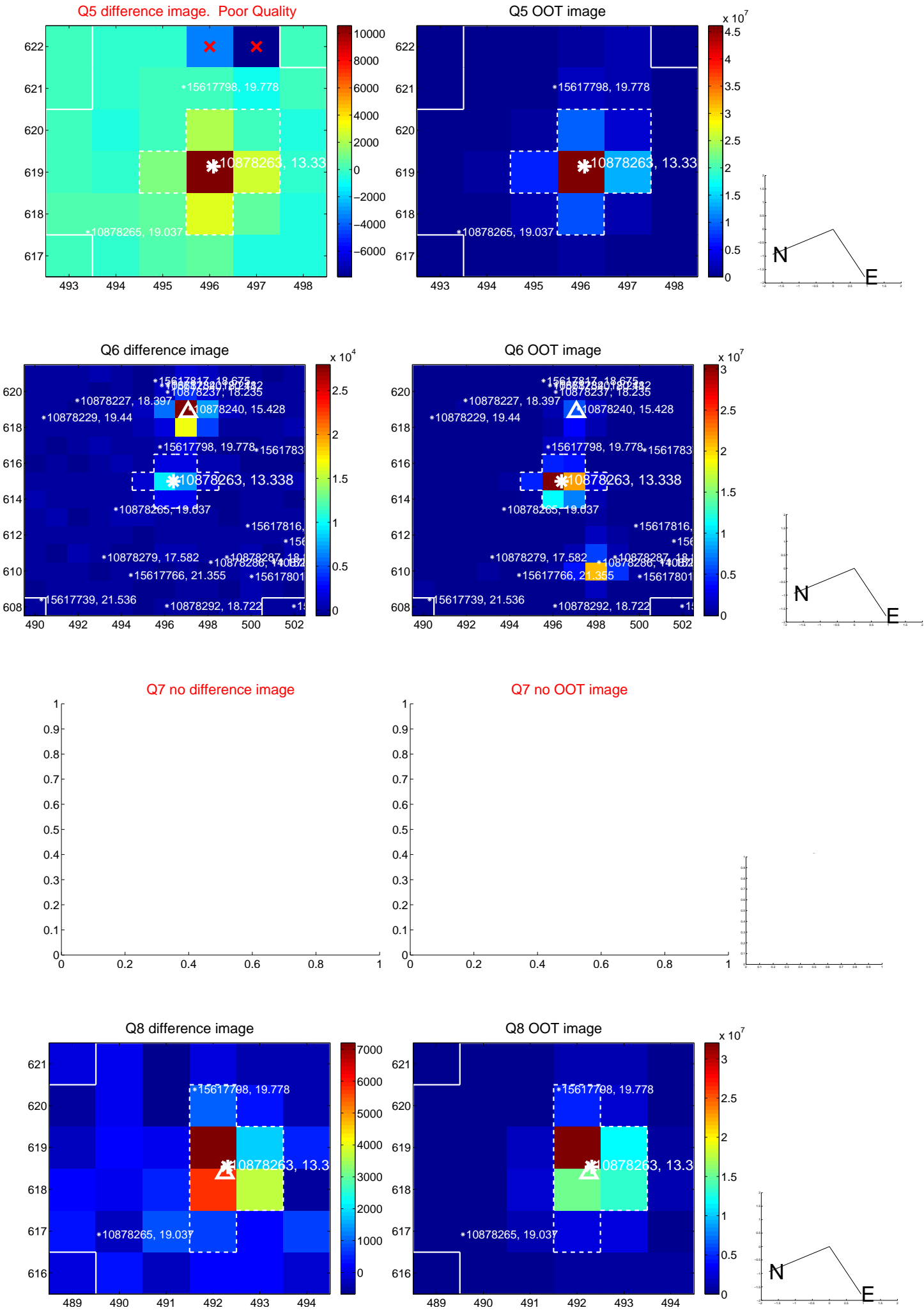


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

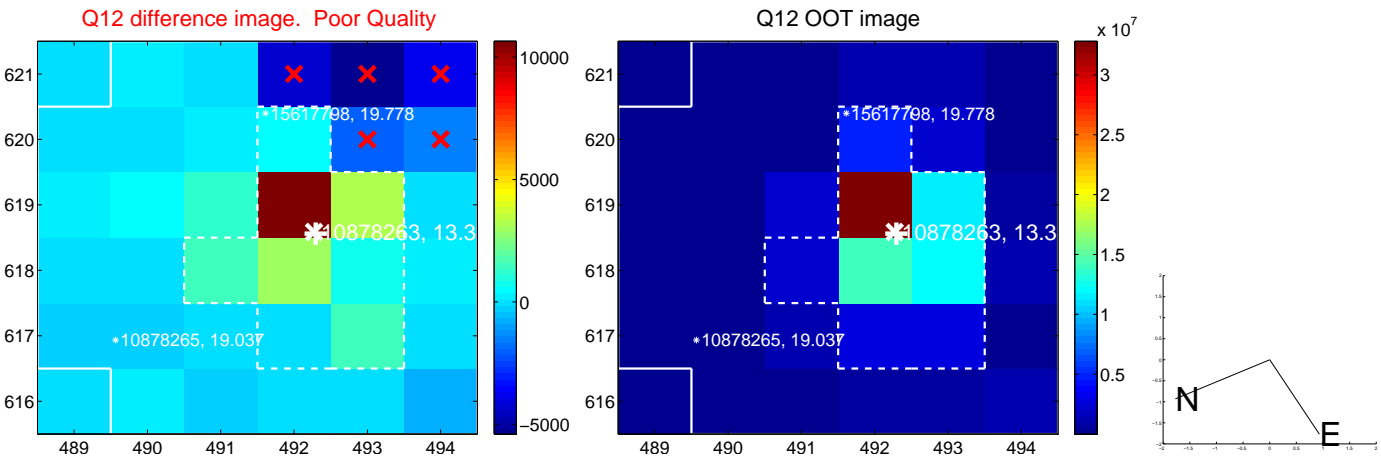
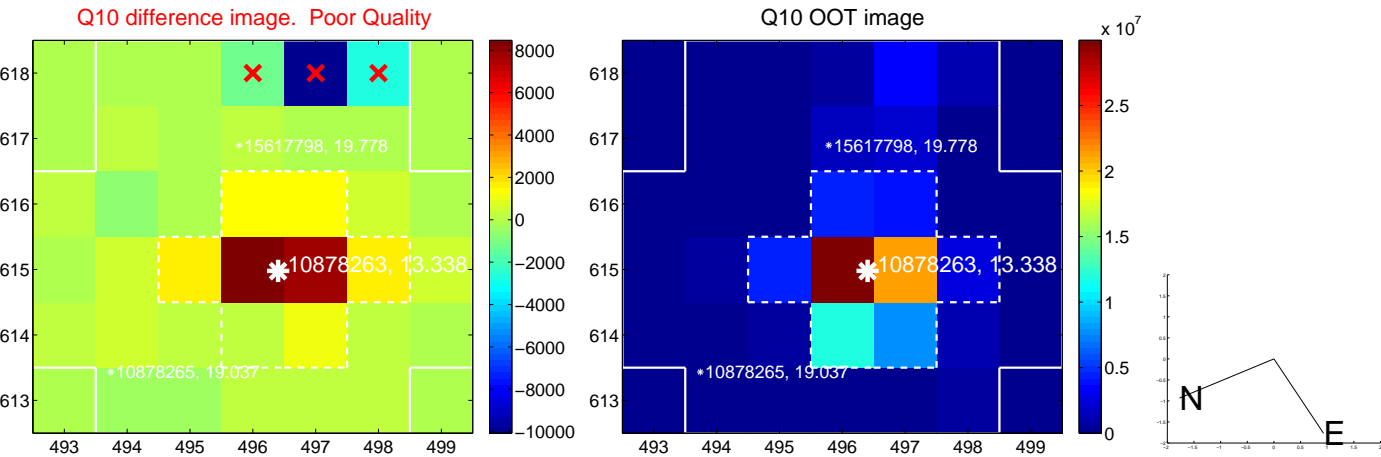
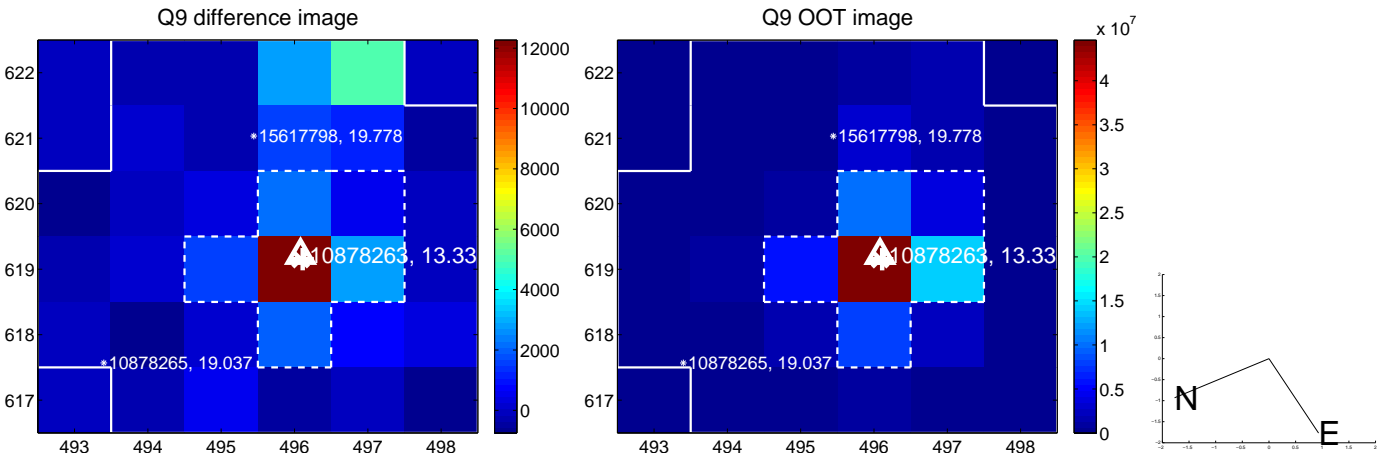


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

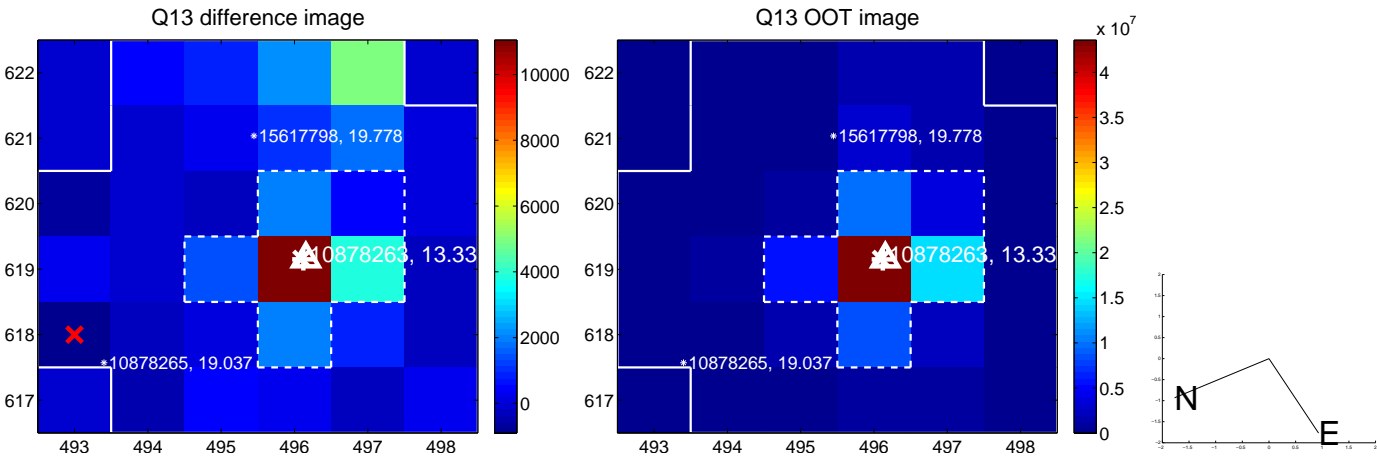




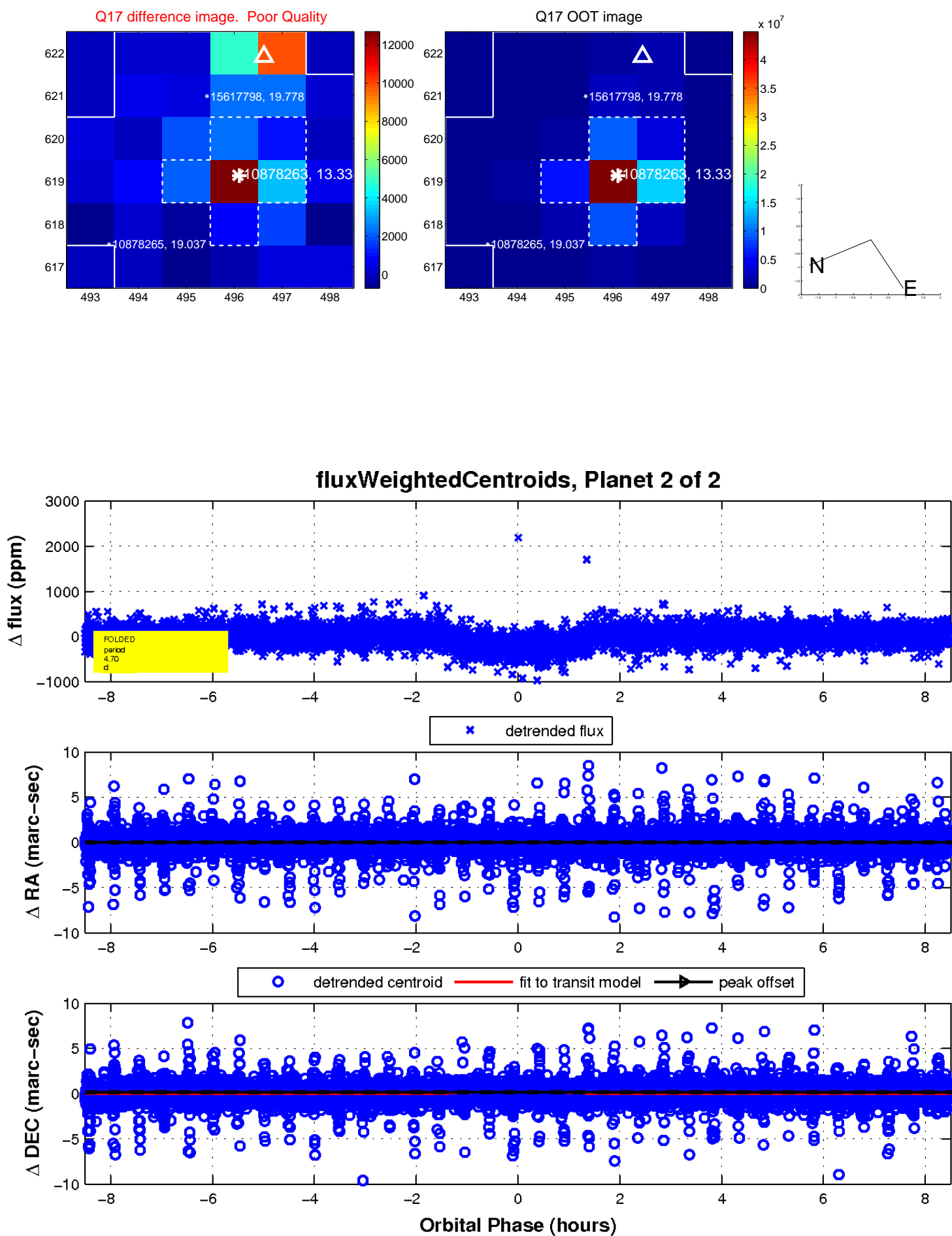
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

