

# KIC 011967788

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011967788-01	OBS	4021.01	7.235295	133.123406	108.6	3.381	18.6	19.3	1.42	6422	1.73	502.76
011967788-02	OBS	4021.02	4.932092	132.454181	73.1	3.684	14.0	15.4	1.42	6422	1.42	838.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011967788-01	OBS	PC	0.85	0	0	0	0	NO_COMMENT
011967788-02	OBS	PC	0.99	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.

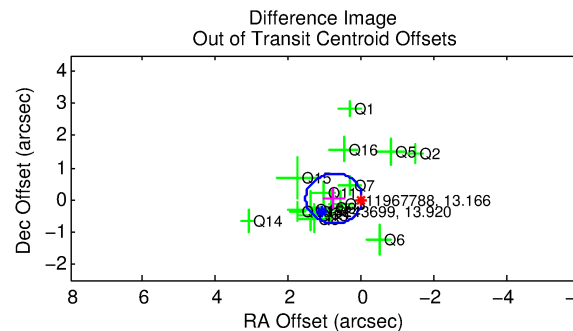
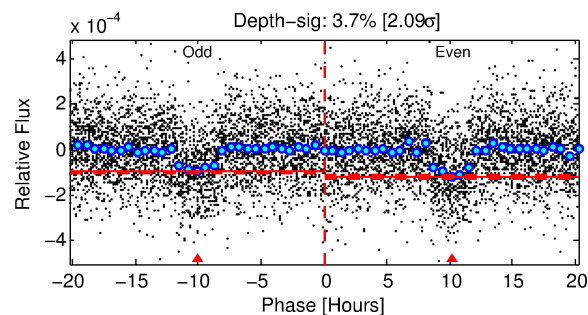
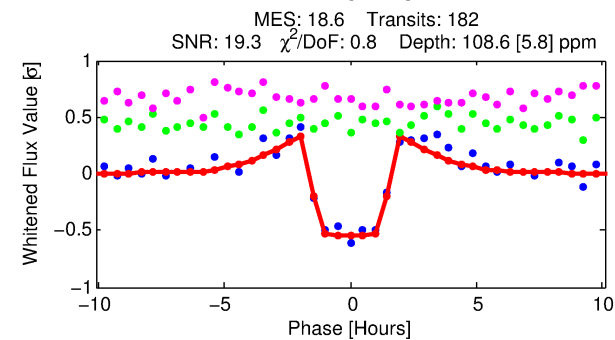
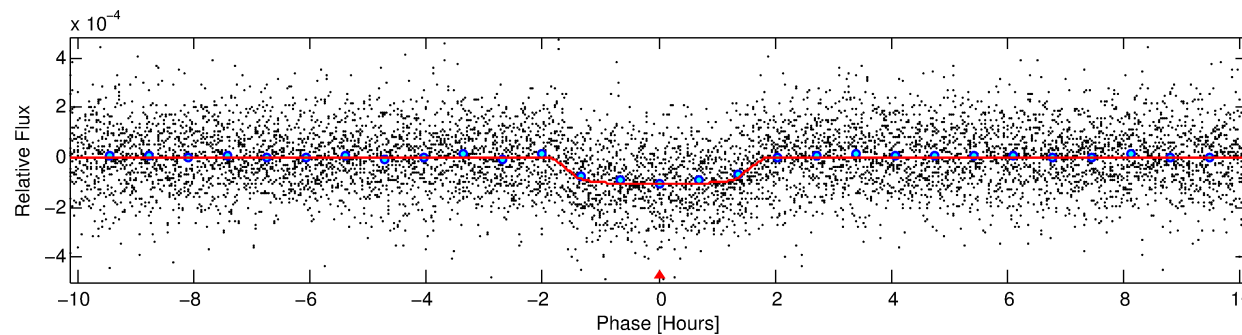
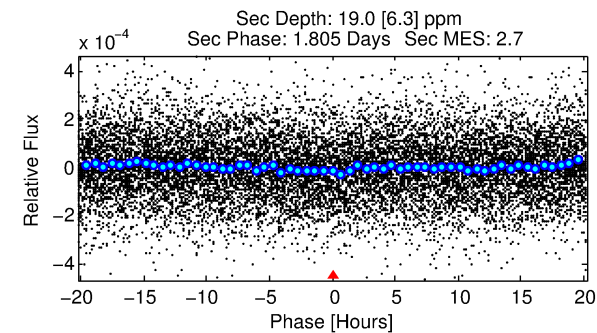
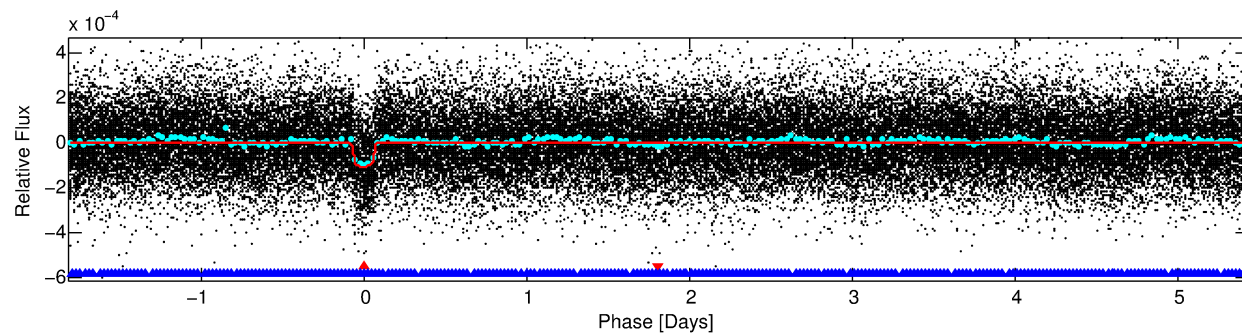
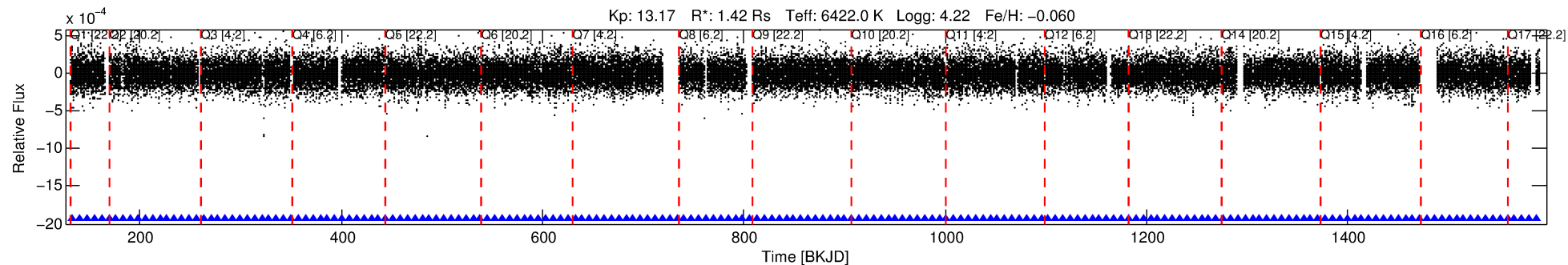
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 011967788-01

No Significant Match Found

# DV One-Page Summary

KIC: 11967788 Candidate: 1 of 2 Period: 7.235 d  
KOI: K04021.01 Corr: 0.974



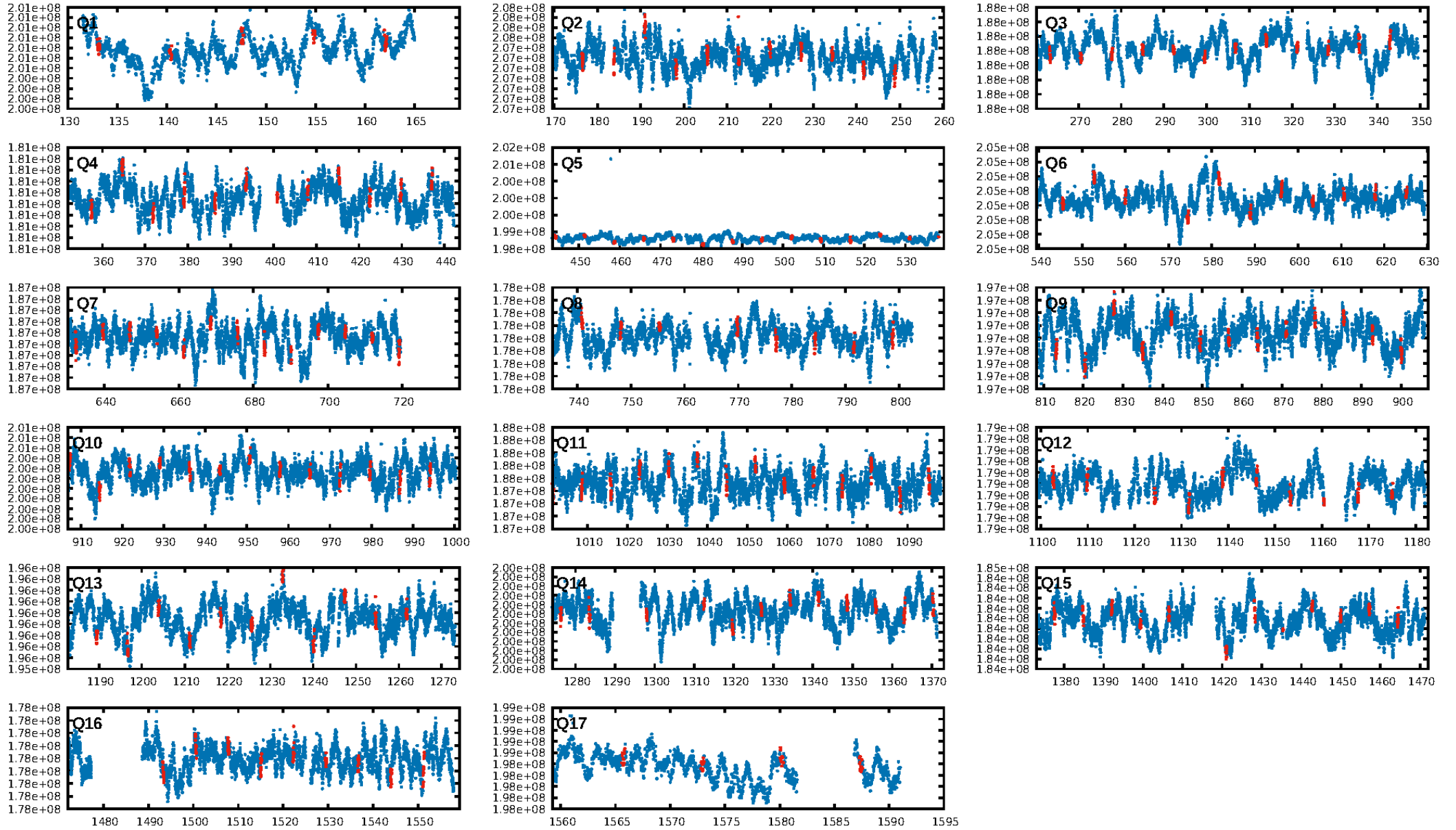
## DV Fit Results:

Period = 7.23530 [0.00002] d  
Epoch = 133.1234 [0.0022] BKJD  
Rp/R\* = 0.0112 [0.0020]  
a/R\* = 7.62 [7.57]  
b = 0.90 [0.22]  
Seff = 502.76 [113.22]  
Teq = 1207 [68] K  
Rp = 1.73 [0.45] Re  
a = 0.0782 [0.0119] AU  
Ag = 21.37 [11.55] [1.76σ]  
Teffp = 4014 [498] K [5.59σ]

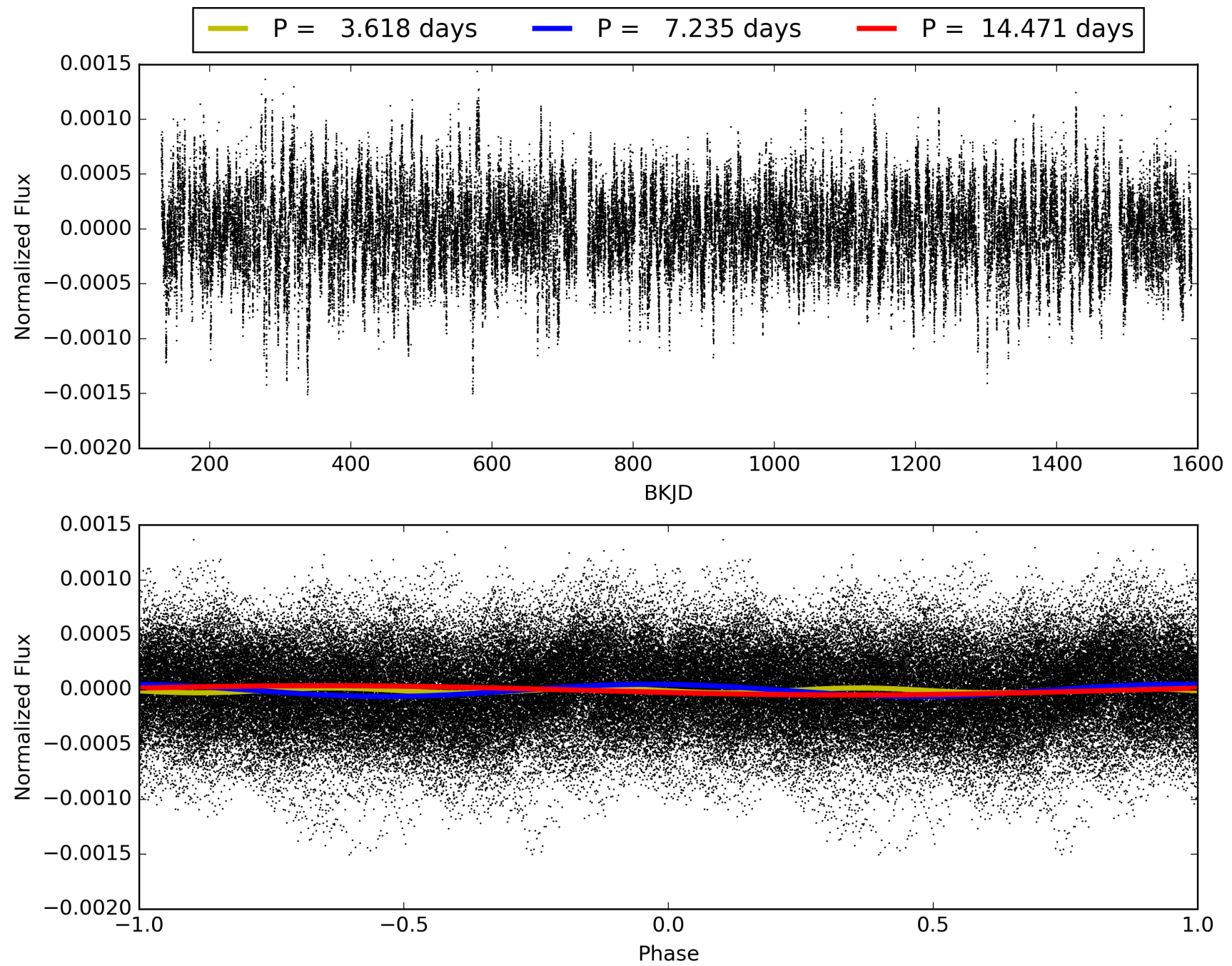
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [11.05σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 100.0%  
ModelChiSquareGoF-sig: 100.0%  
Bootstrap-pfa: 1.60e-75  
RollingBand-fgt: 1.00 [173/173]  
GhostDiagnostic-chr: 4.03  
Centroid-sig: 25.8%  
Centroid-so: 0.531 arcsec [1.14σ]  
OotOffset-rm: 0.745 arcsec [2.88σ]  
KicOffset-rm: 0.919 arcsec [3.68σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 1.00 [16/16]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 011967788-01, PDC Light Curves

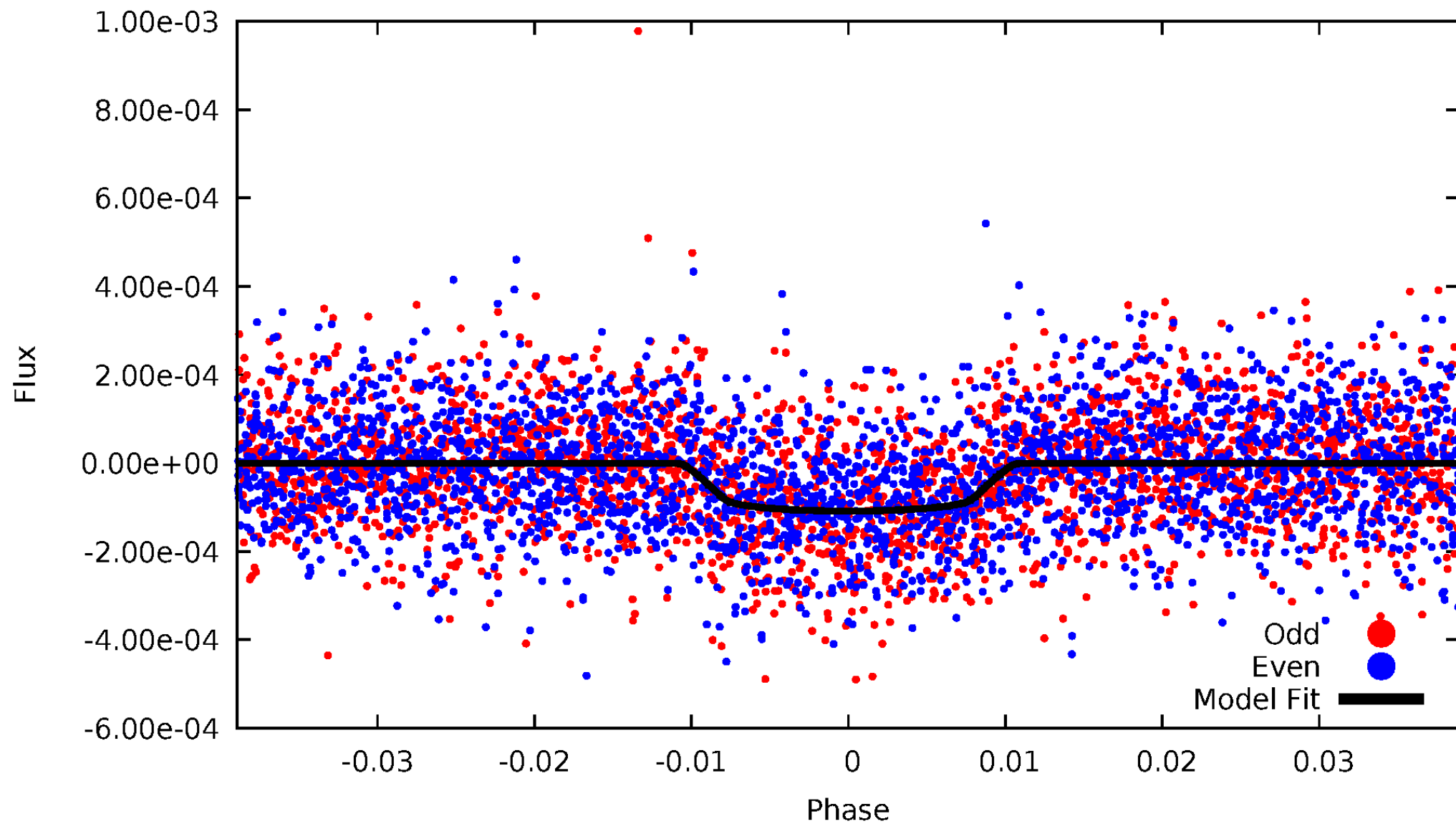


# TCE 011967788-01



# DV Odd/Even

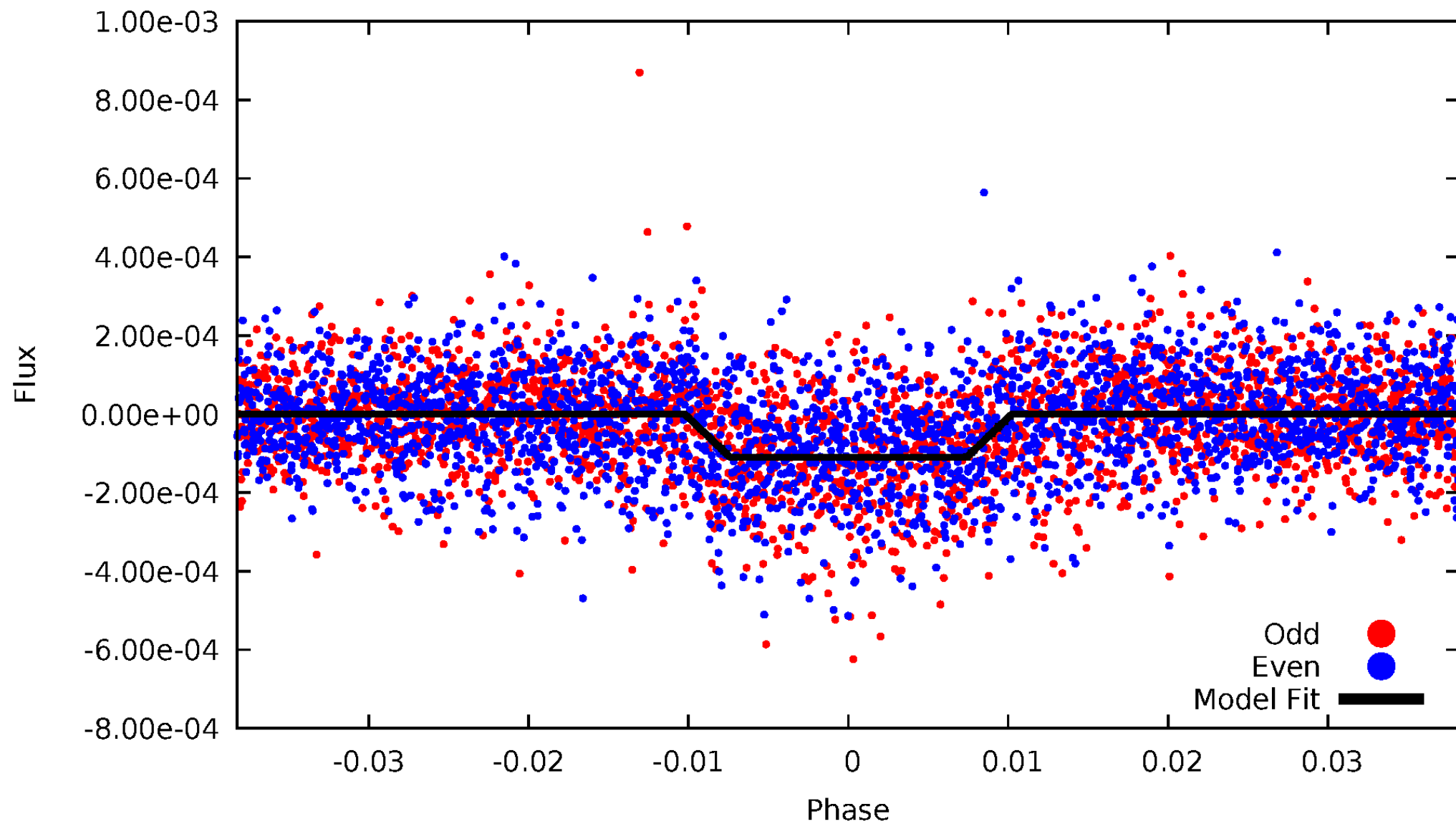
TCE 011967788-01





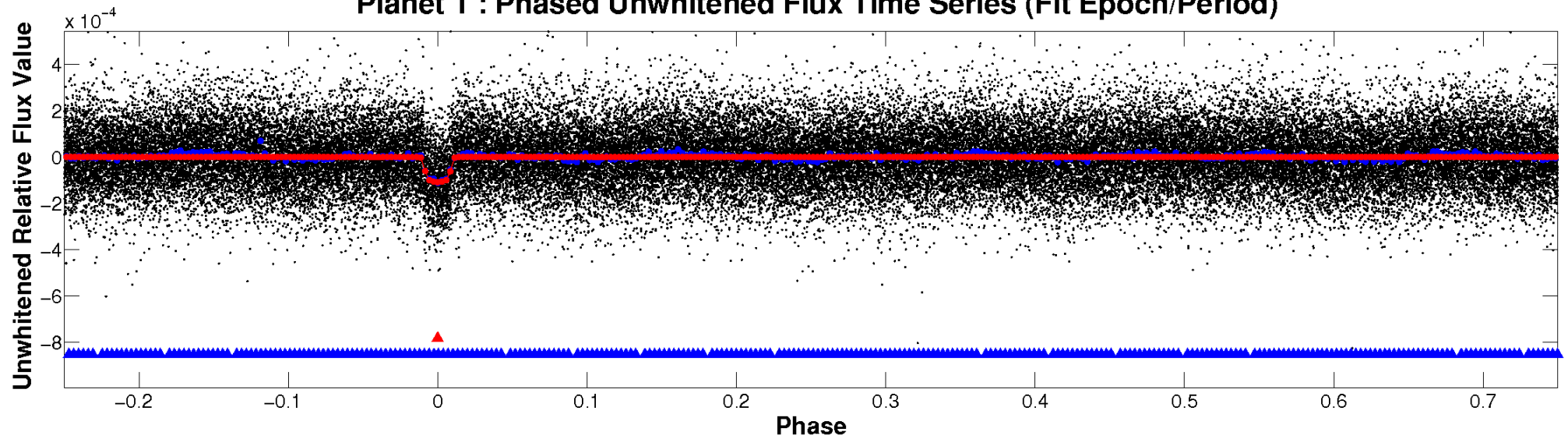
# ALT Odd/Even

TCE 011967788-01

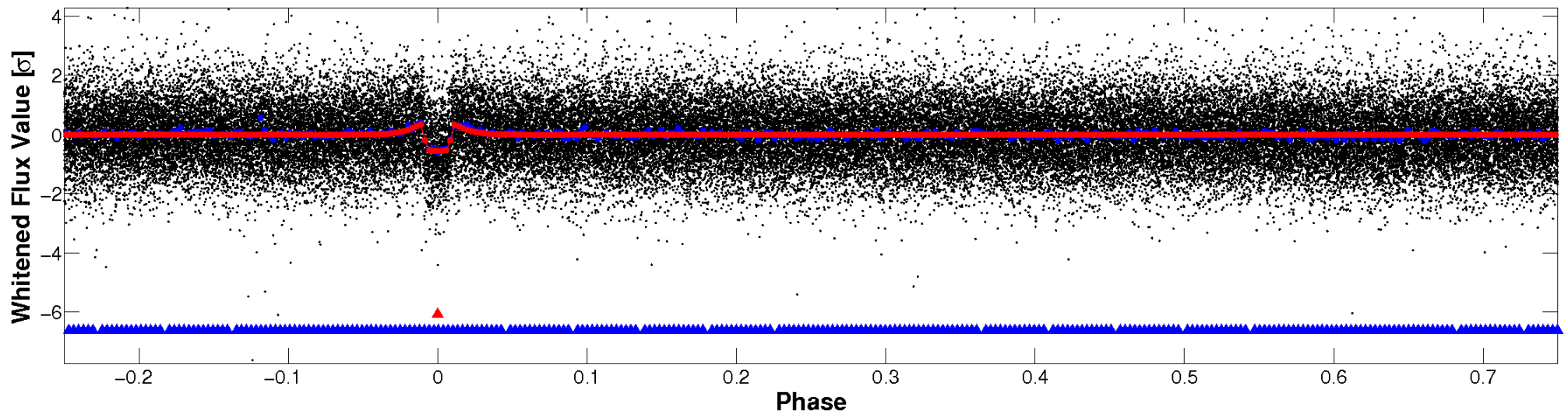


# Non-Whitened Vs. Whitened Light Curve

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

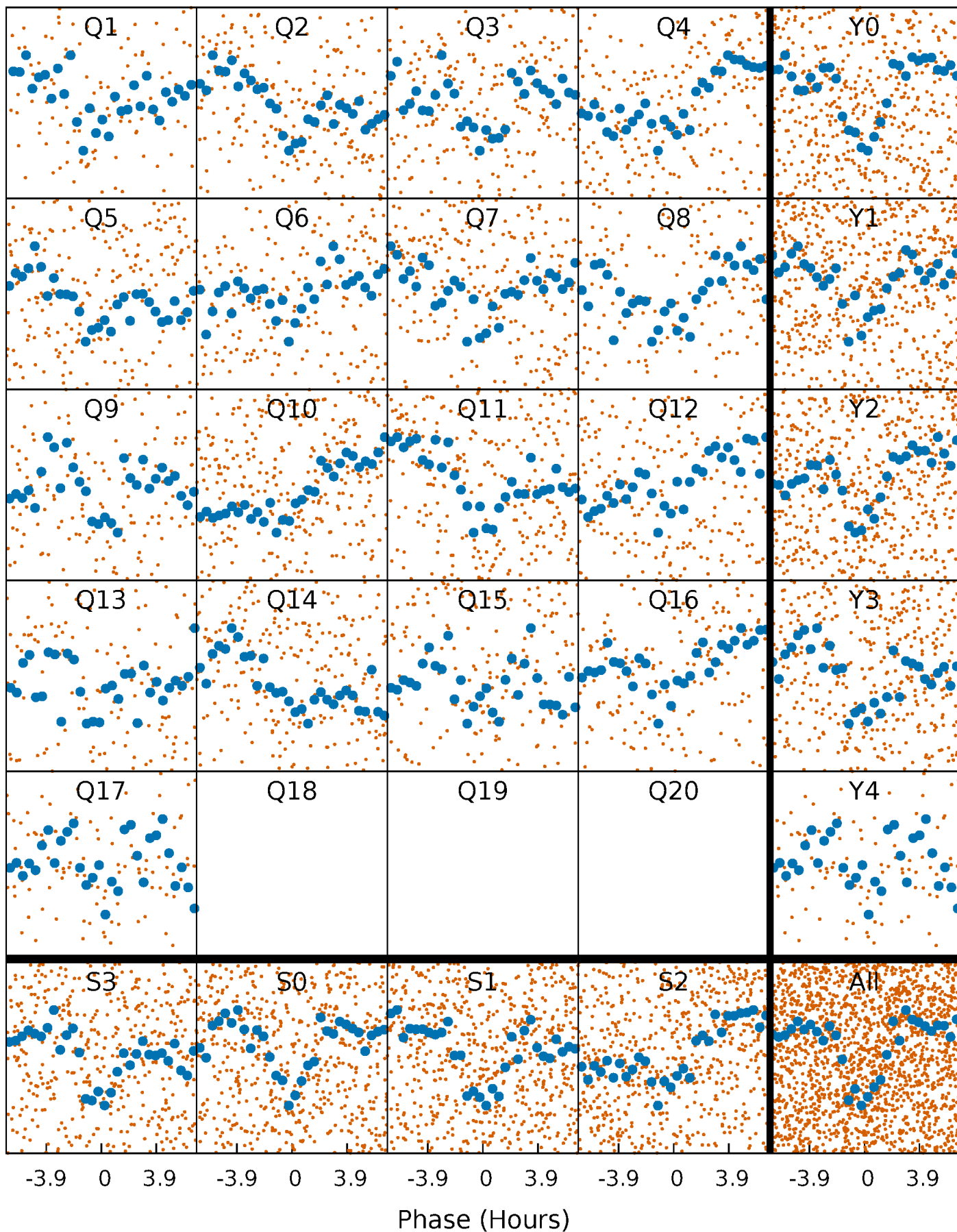


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

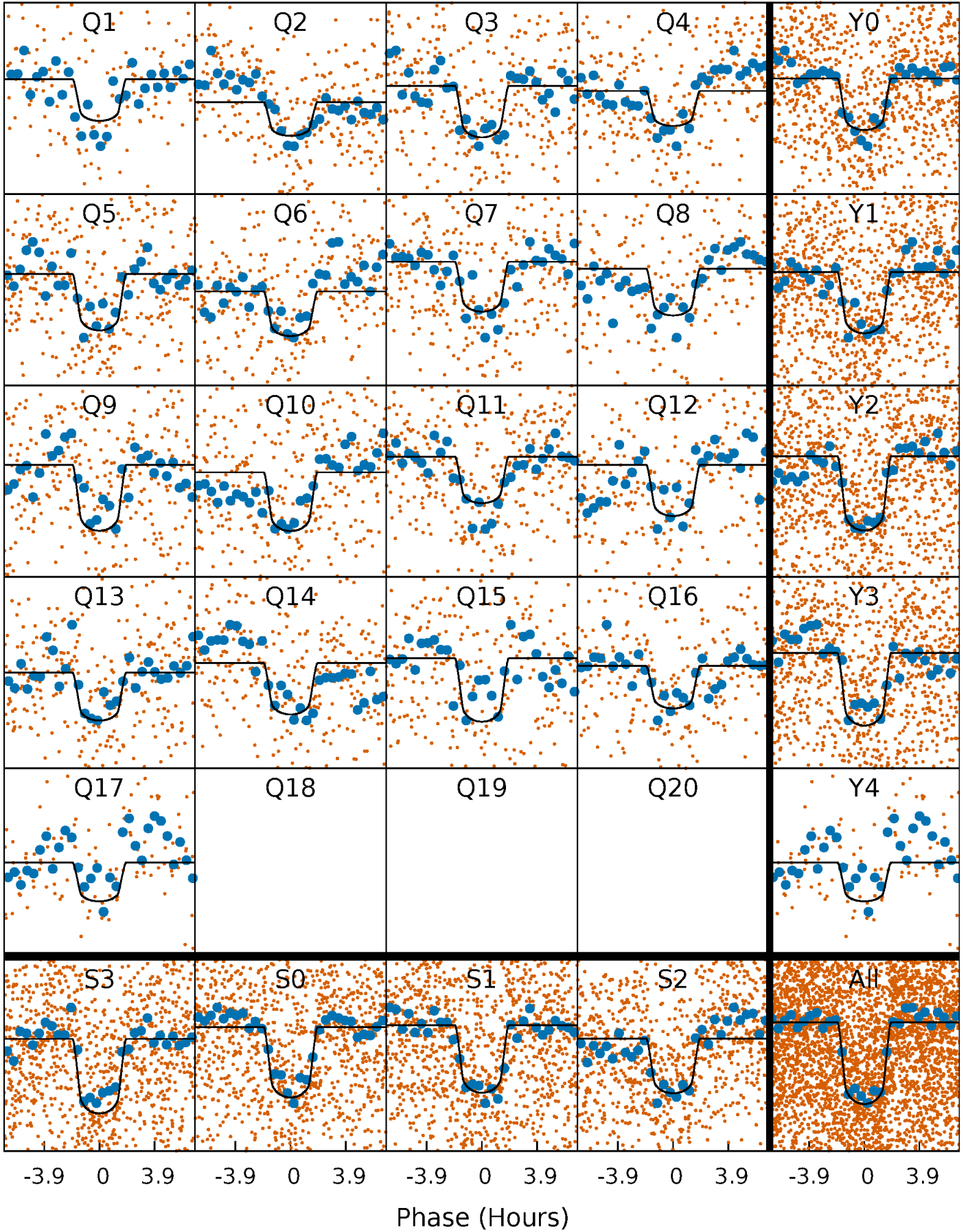
TCE 011967788-01 P= 7.235295 Days  $T_0=133.123405$  (BKJD)





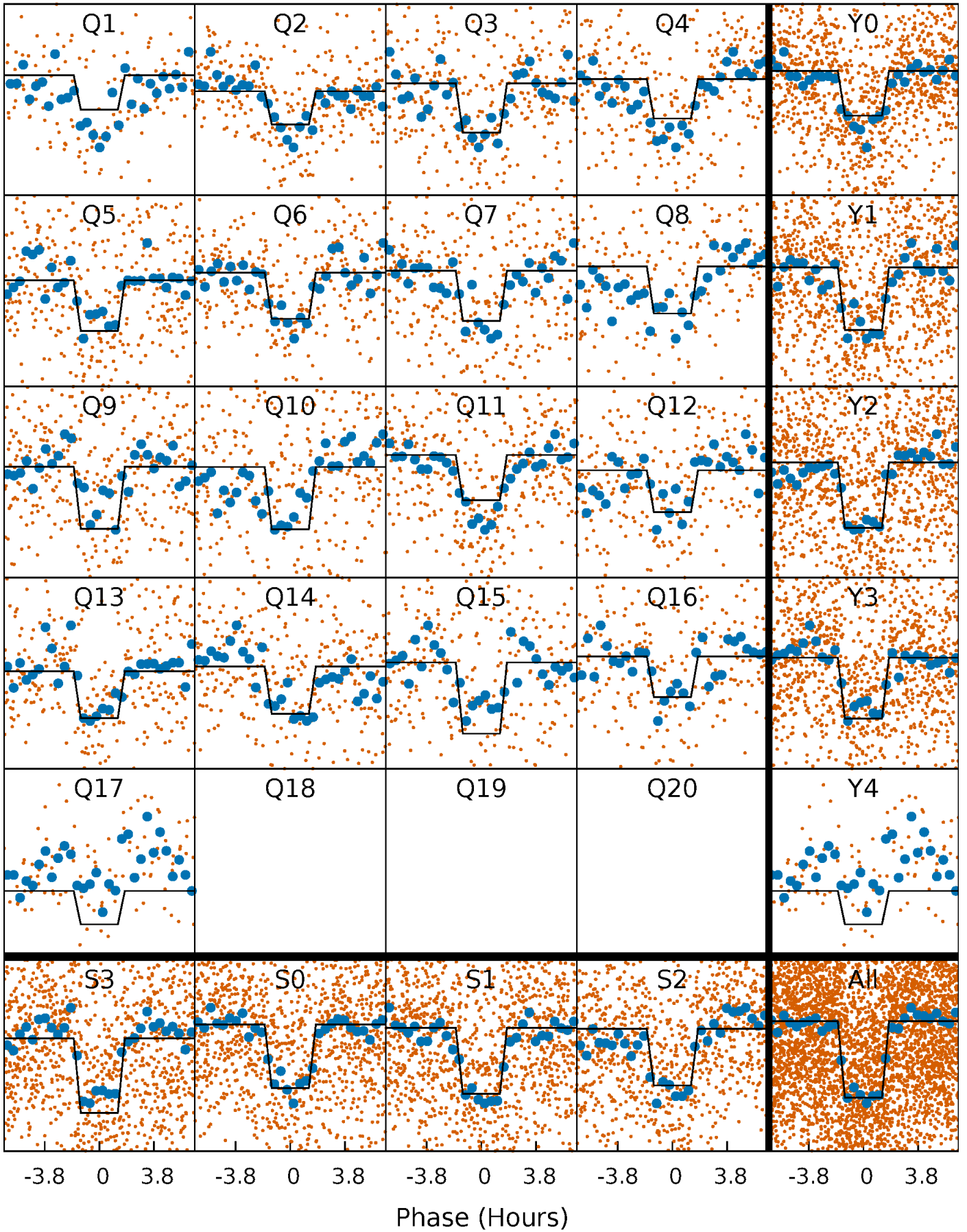
# DV Quarter-Phased Transit Curves

TCE 011967788-01   P= 7.235295 Days    $T_0=133.123405$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

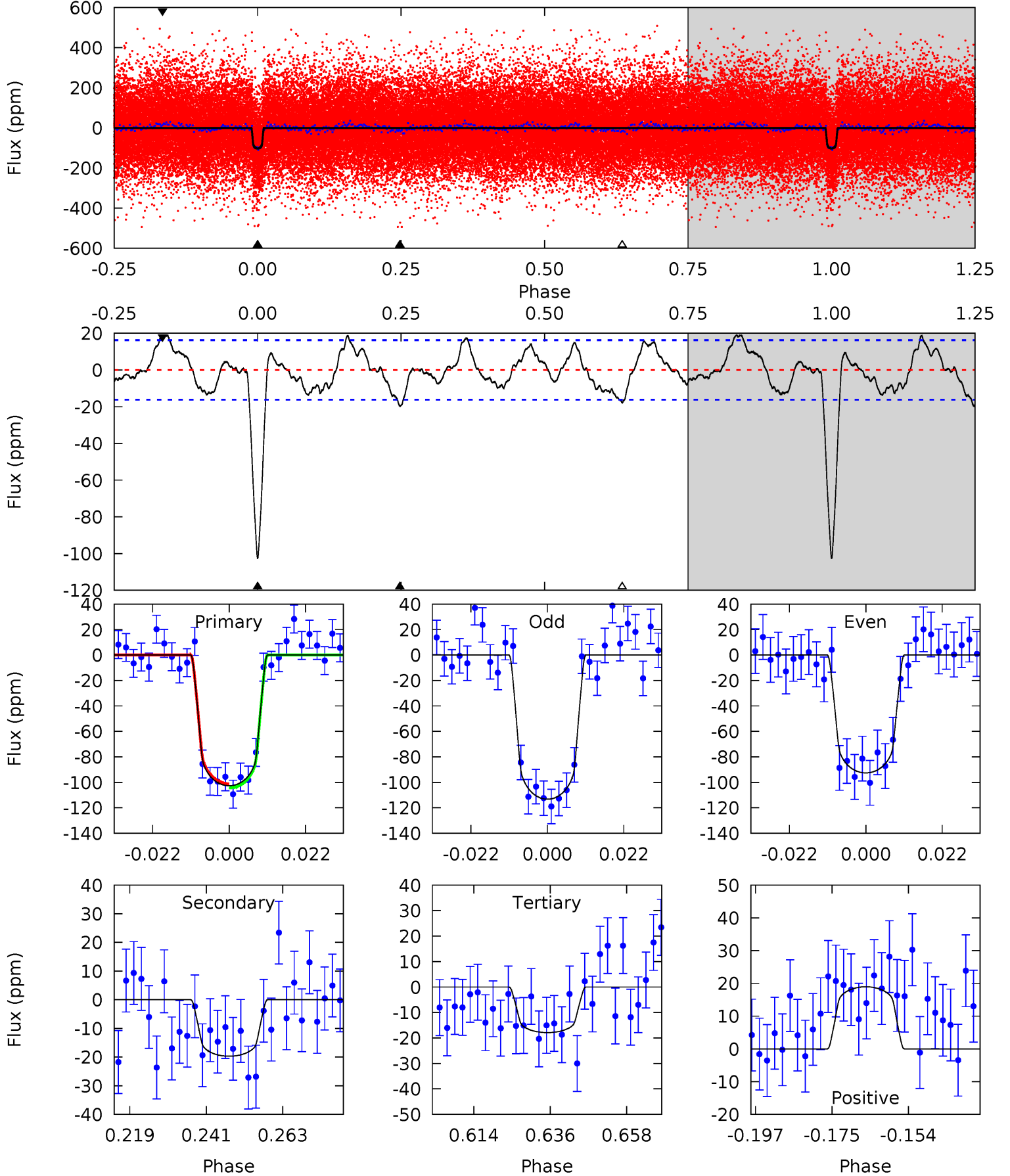
TCE 011967788-01 P= 7.235320 Days  $T_0=133.120678$  (BKJD)



# DV Model-Shift Uniqueness Test

011967788-01, P = 7.235295 Days, E = 125.888110 Days

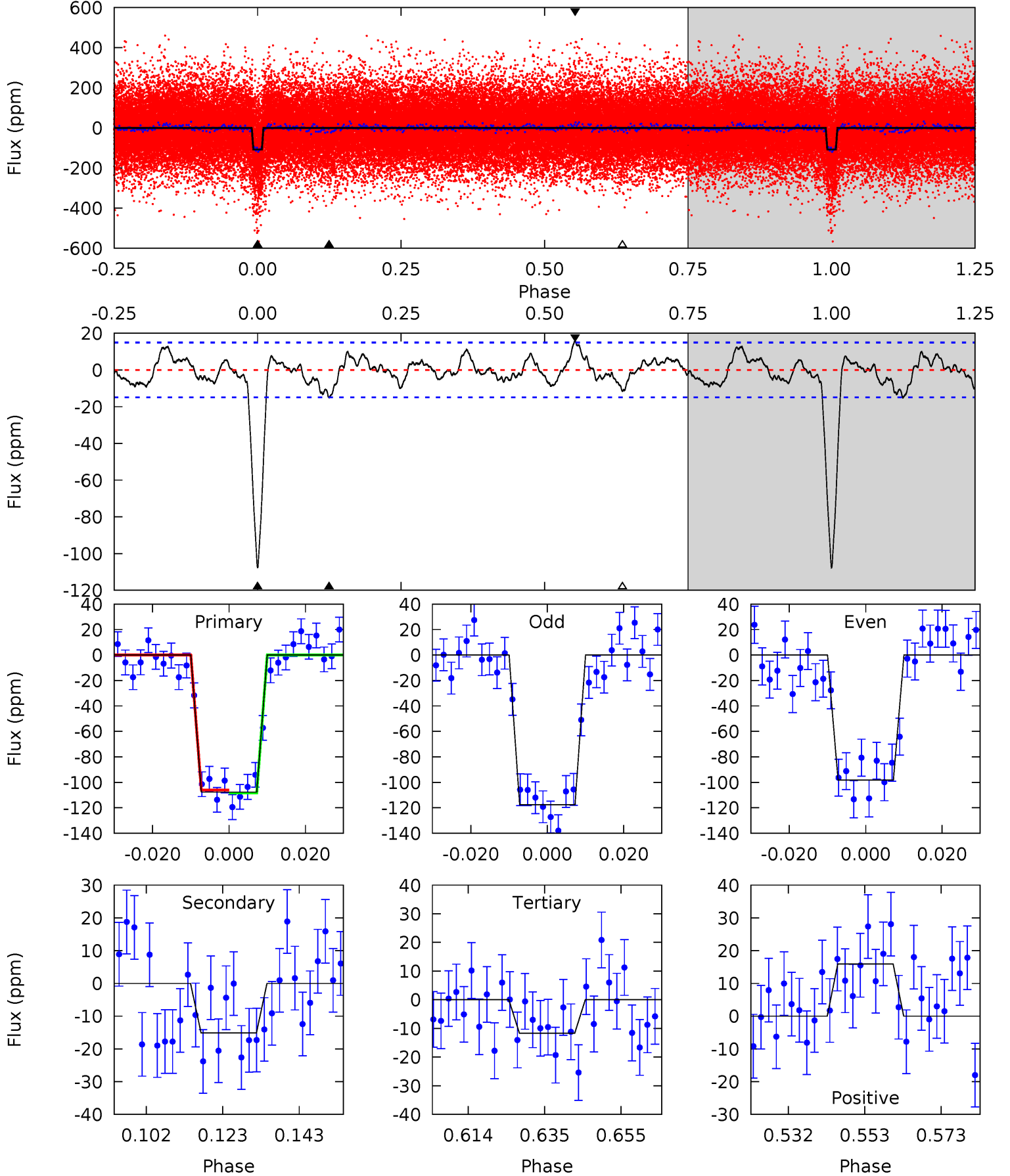
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
30.8	5.91	5.37	5.69	4.87	2.29	2.50	25.5	25.1	0.55	0.22	3.11	0.98	0.16	0.48



# Alt Model-Shift Uniqueness Test

011967788-01, P = 7.235320 Days, E = 125.885358 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
35.3	4.96	3.82	5.21	4.89	2.32	1.73	31.5	30.1	1.14	-0.25	3.20	1.05	0.13	0.37



### Stellar Parameters For KIC 011967788

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6422^{+76}_{-76}$	$4.219^{+0.120}_{-0.120}$	$-0.060^{+0.150}_{-0.150}$	$1.421^{+0.257}_{-0.210}$	$1.220^{+0.096}_{-0.106}$	$0.599^{+0.326}_{-0.210}$
	+1%/-1%	+3%/-3%	+250%/-250%	+18%/-15%	+8%/-9%	+54%/-35%
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 011967788-01 / KOI 4021.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-20 \pm 3$	$1.71^{+0.37}_{-0.35}$	$1680^{+81}_{-69}$	$4277^{+396}_{-305}$	$23^{+14}_{-8}$
Alt.	$-15 \pm 3$	$1.64^{+0.35}_{-0.34}$	$1686^{+73}_{-72}$	$4164^{+407}_{-311}$	$19^{+11}_{-7}$

$T_{max}$  = 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

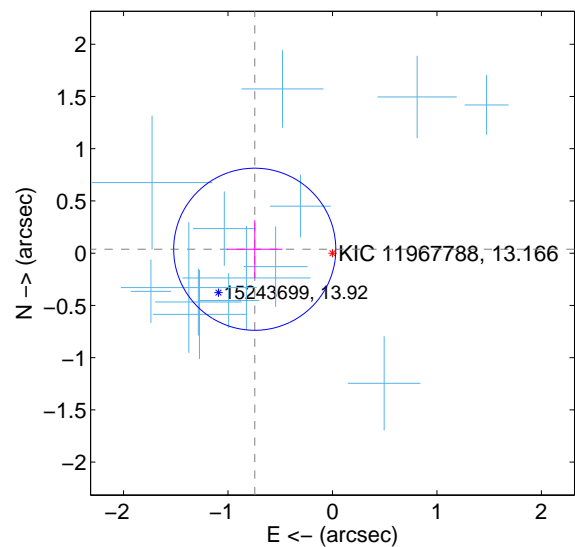
Supplemental centroid analysis for 011967788-01. Kepler magnitude: 13.17. Transit SNR 19.26

There are 16 quarters with good PRF difference image offsets

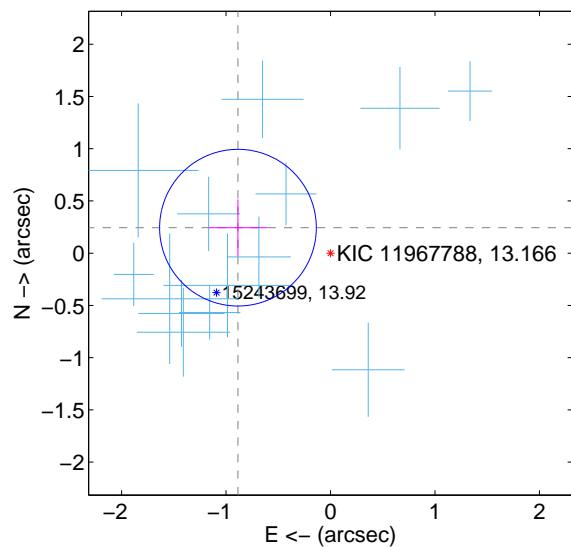
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.745 \pm 0.259$	2.88	$0.744 \pm 0.266$	$0.038 \pm 0.278$
PRF-fit source offset from KIC position	$0.919 \pm 0.250$	3.68	$0.886 \pm 0.280$	$0.244 \pm 0.270$
photometric centroid source offset	$0.53 \pm 0.47$	1.14	$0.29 \pm 0.45$	$-0.45 \pm 0.47$

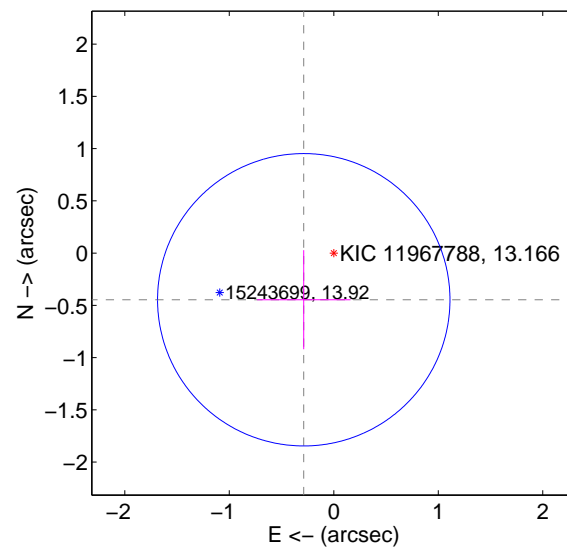
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

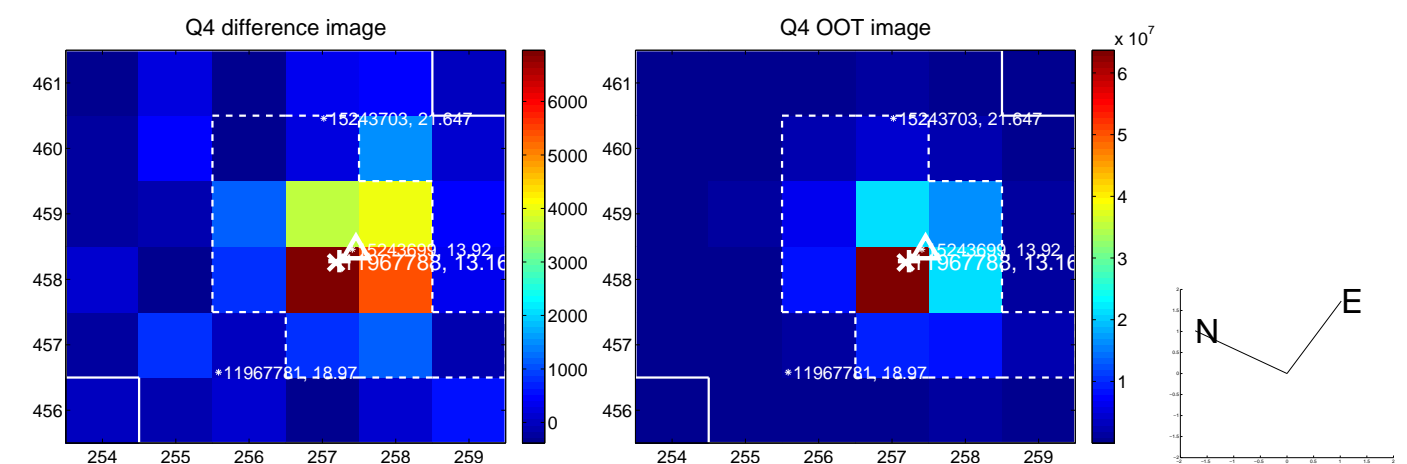
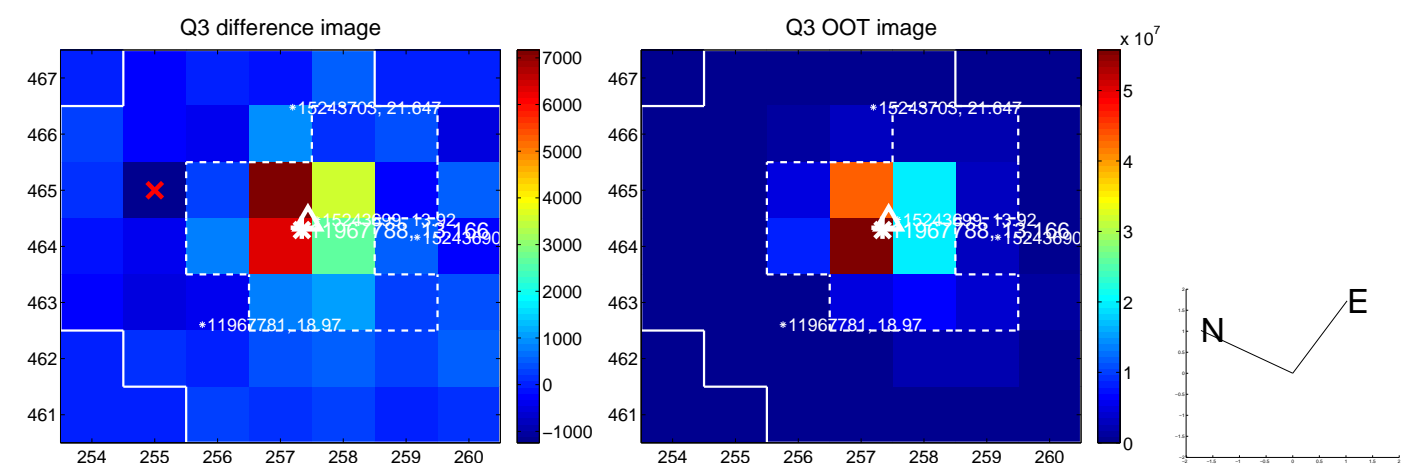
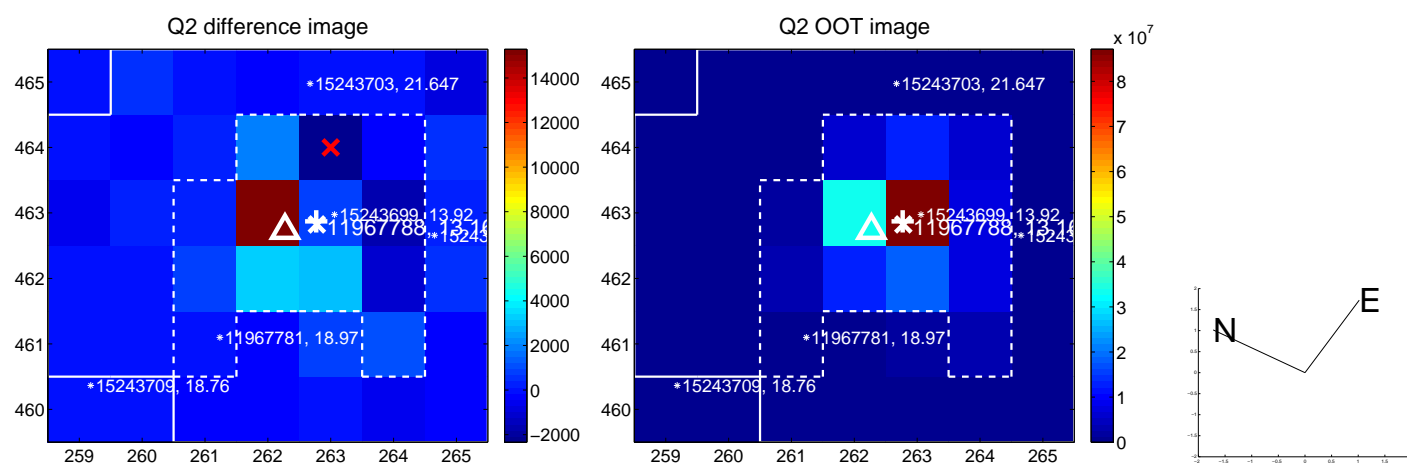
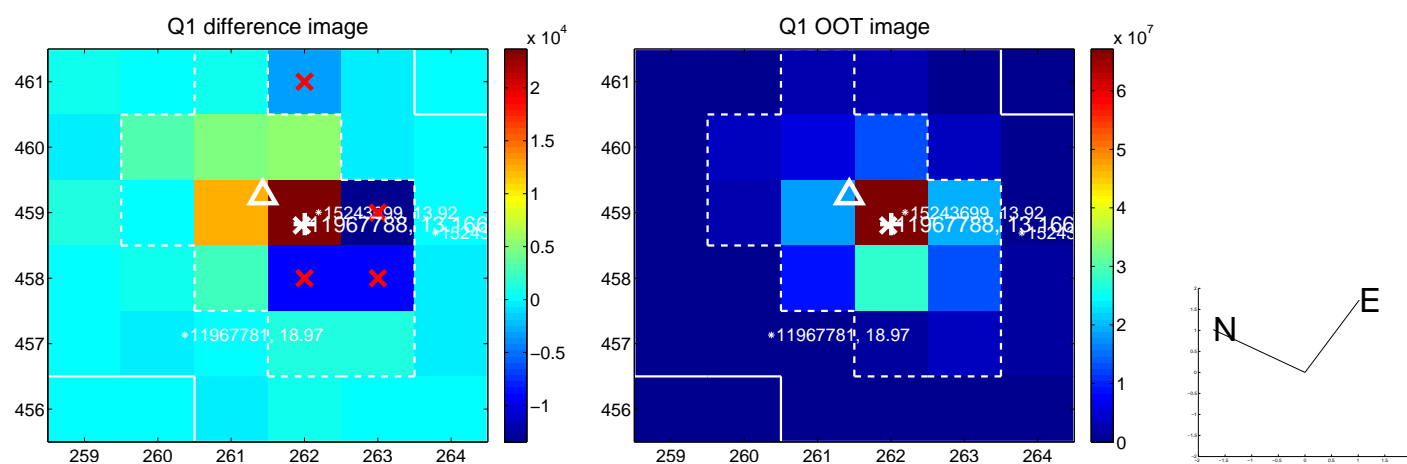


offset from photometric centroids

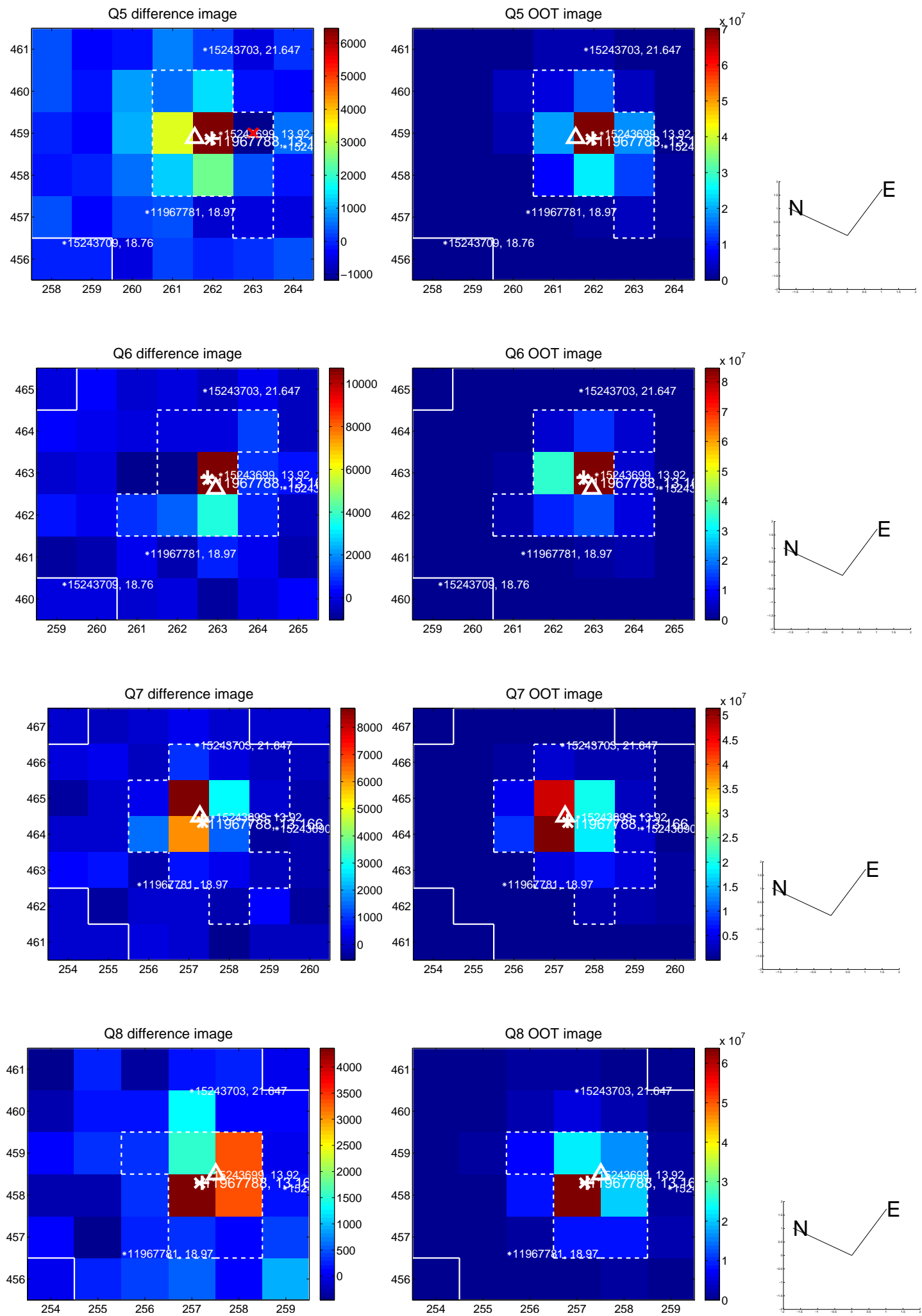


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

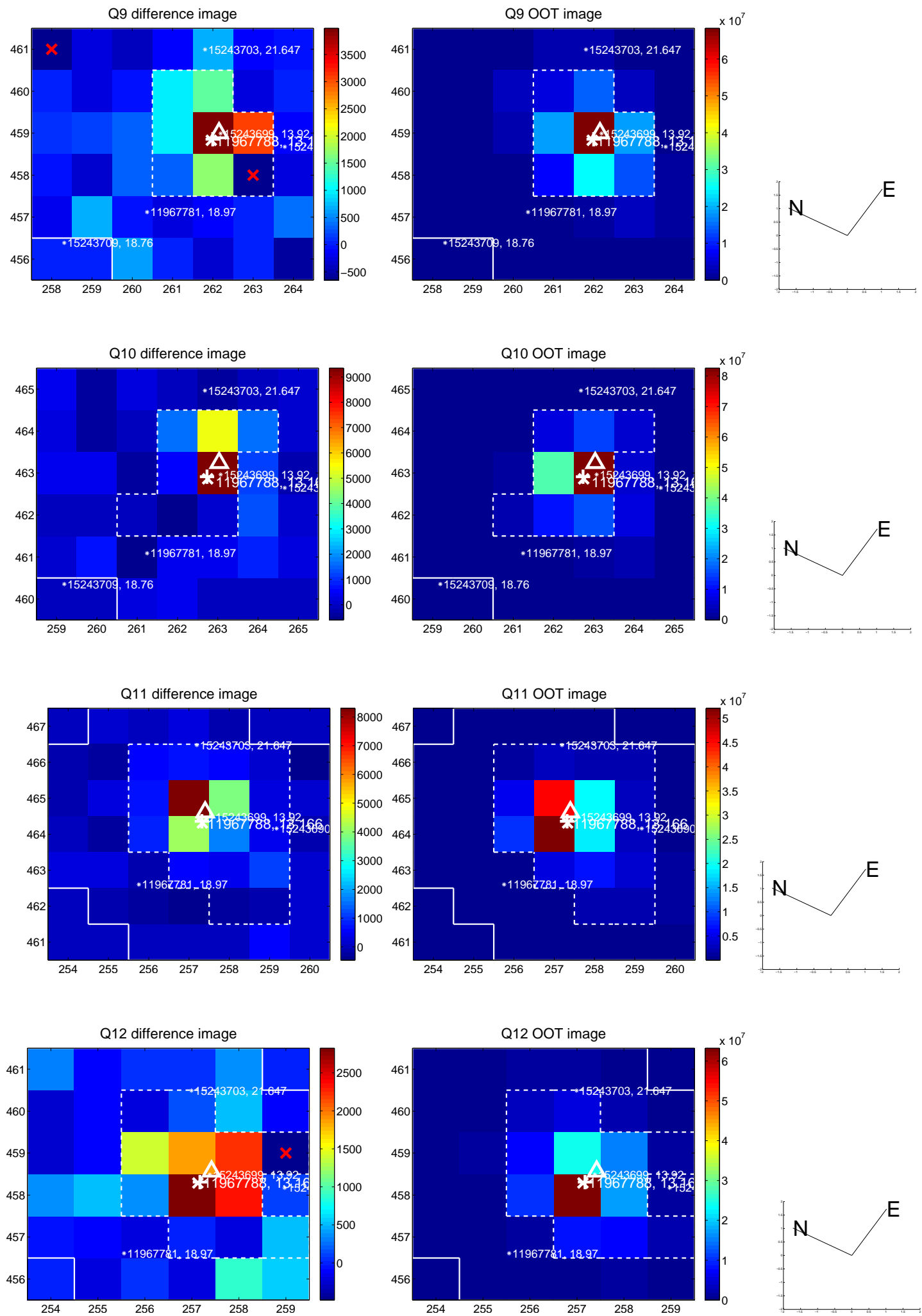
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



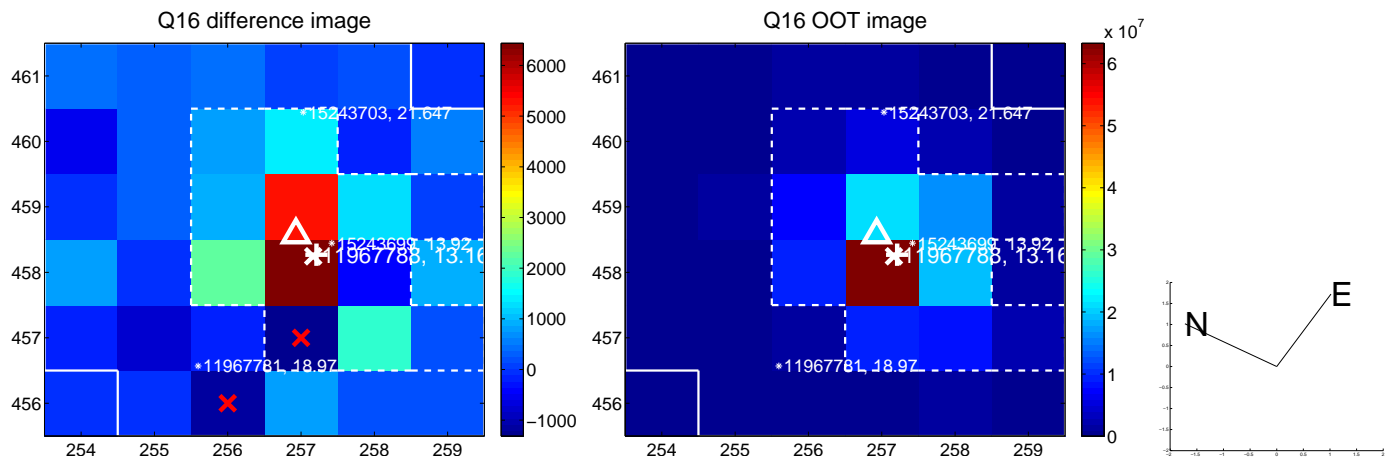
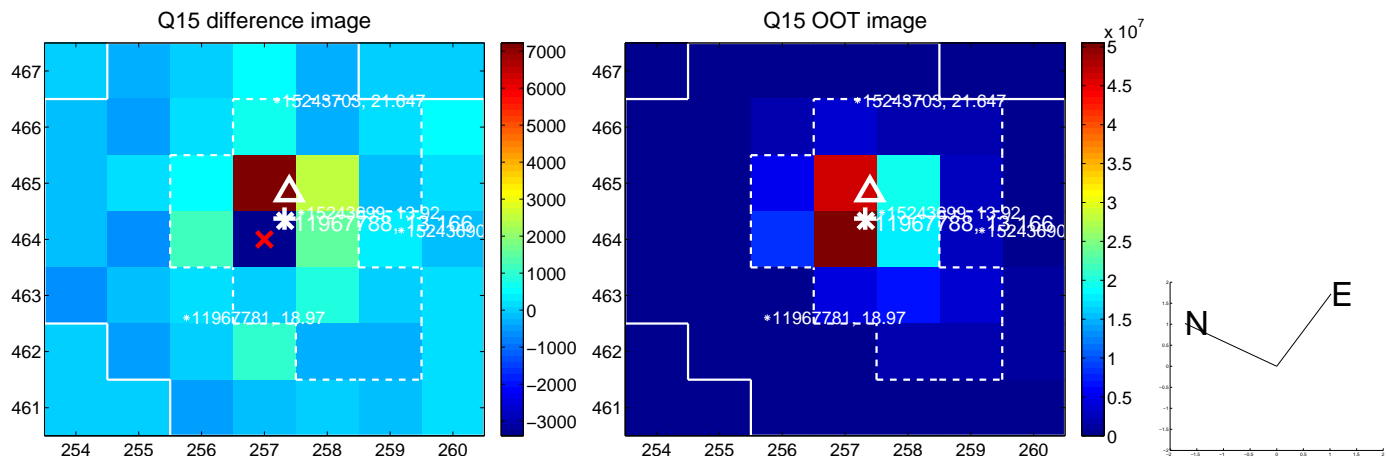
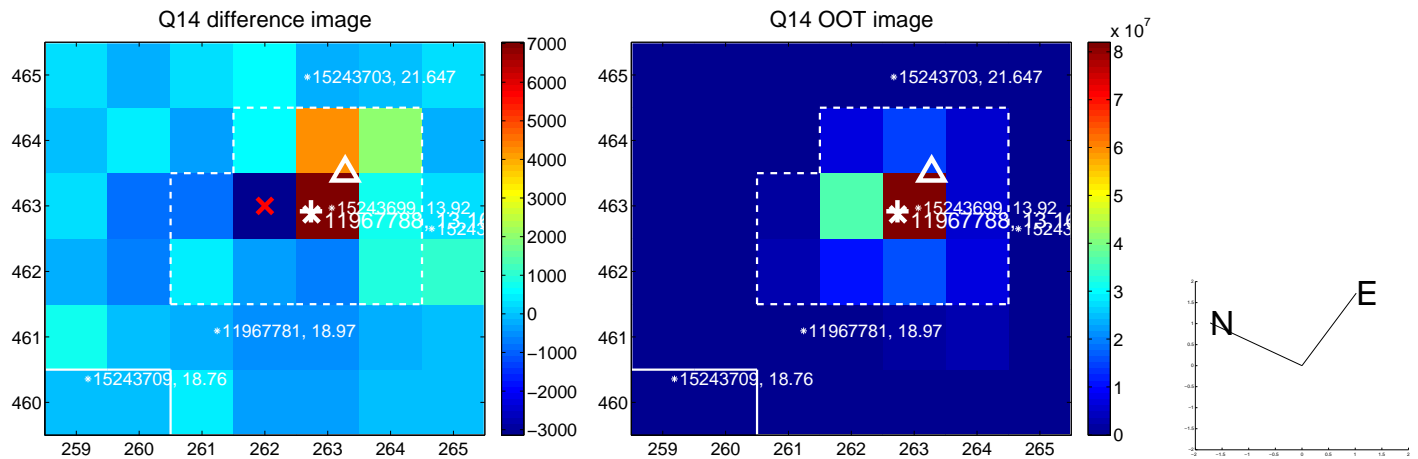
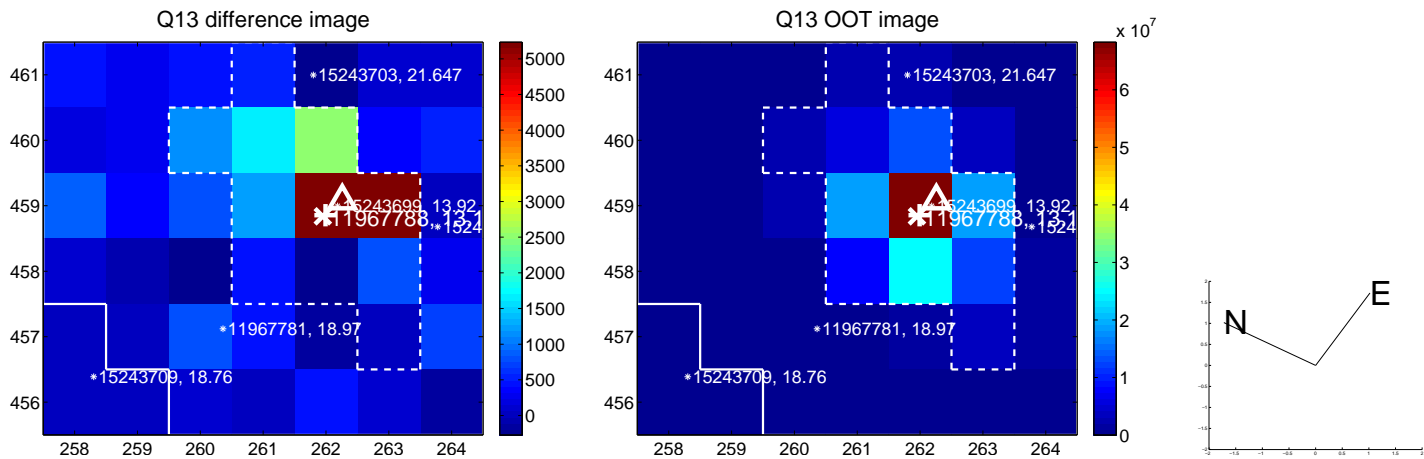
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

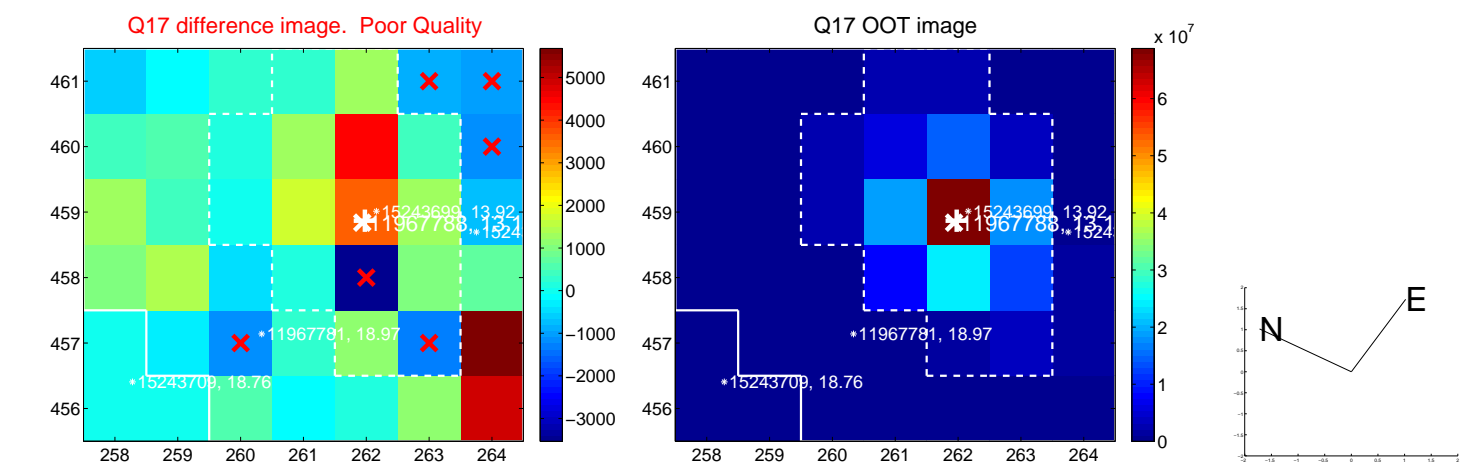


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

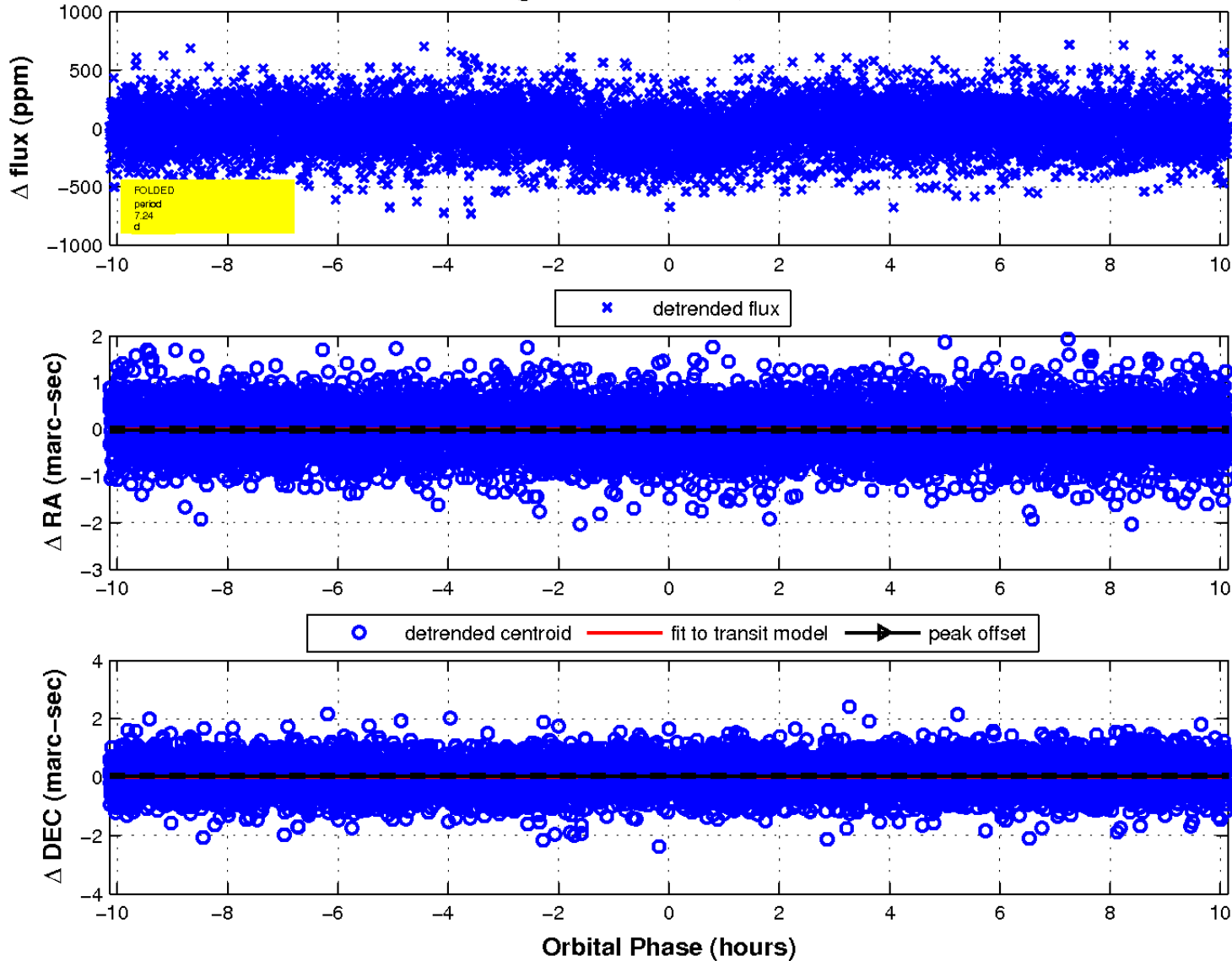




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

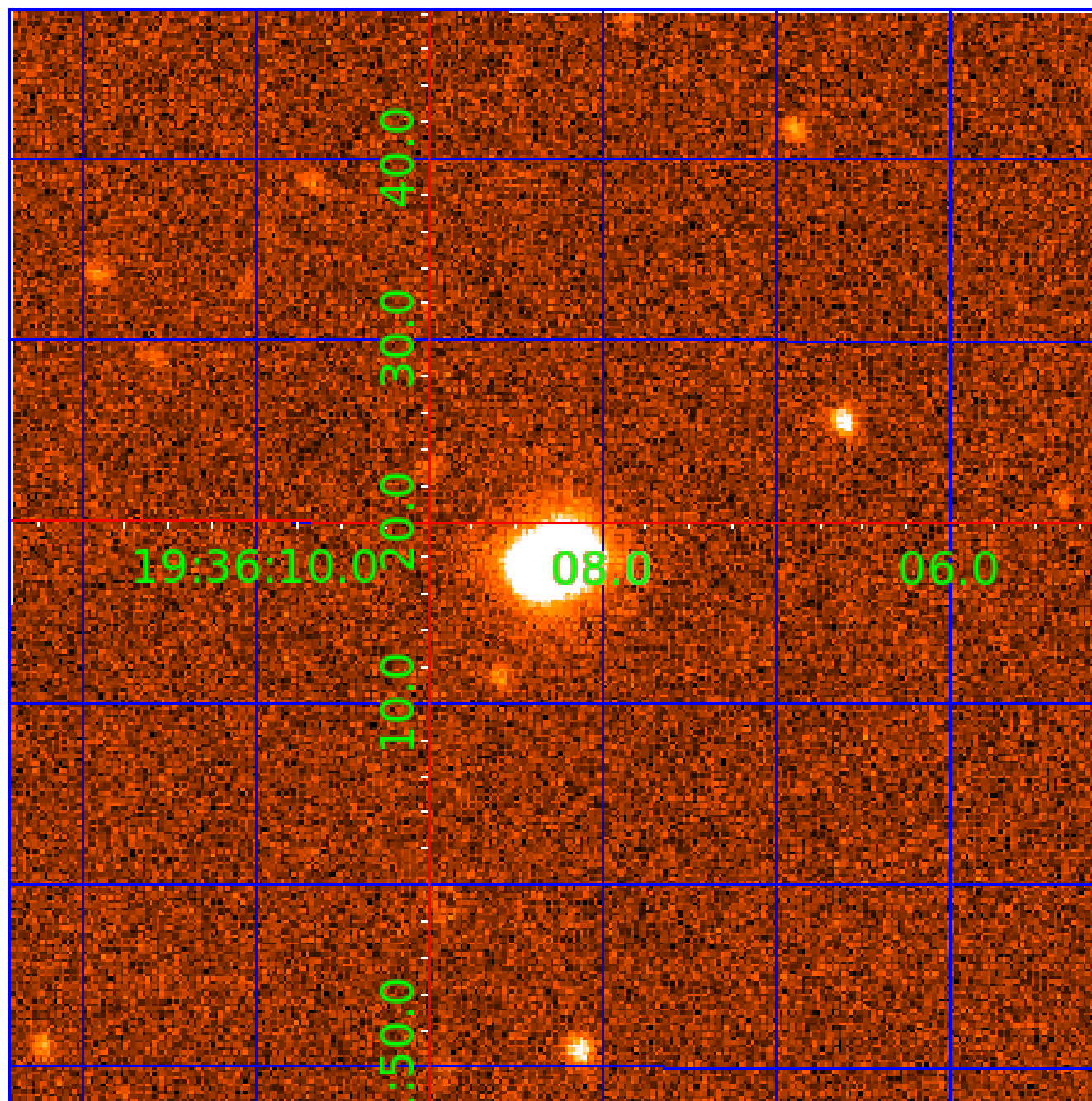


### fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



# KIC 011967788

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011967788-01	OBS	4021.01	7.235295	133.123406	108.6	3.381	18.6	19.3	1.42	6422	1.73	502.76
011967788-02	OBS	4021.02	4.932092	132.454181	73.1	3.684	14.0	15.4	1.42	6422	1.42	838.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011967788-01	OBS	PC	0.85	0	0	0	0	NO_COMMENT
011967788-02	OBS	PC	0.99	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.

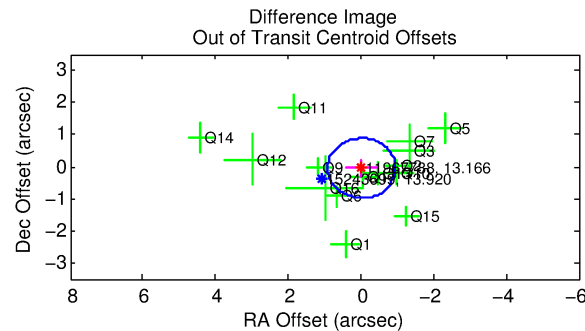
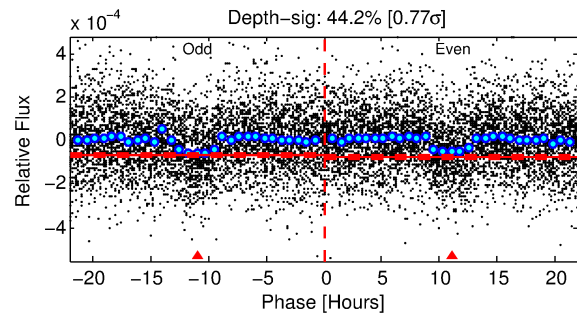
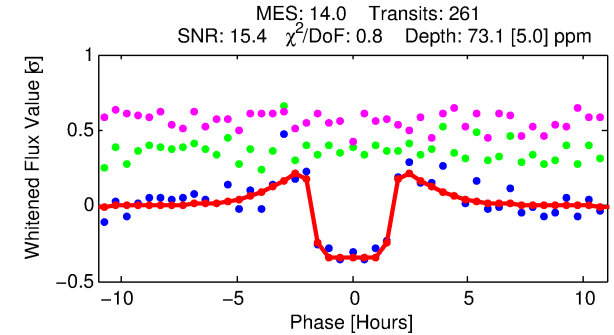
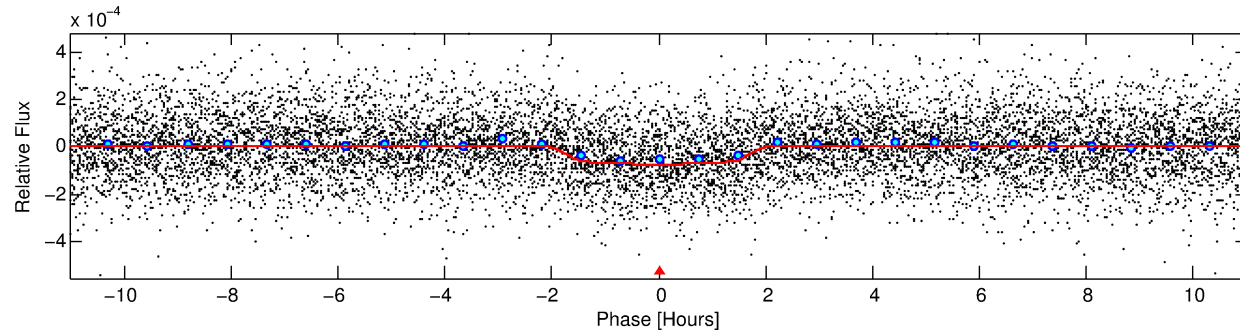
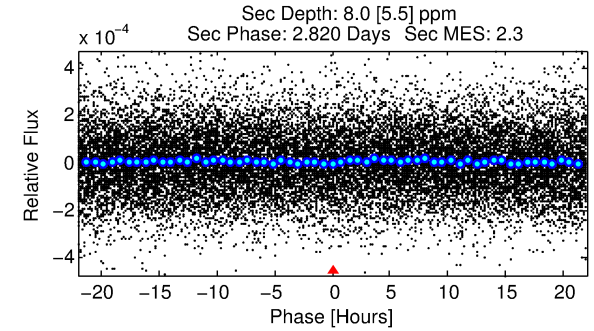
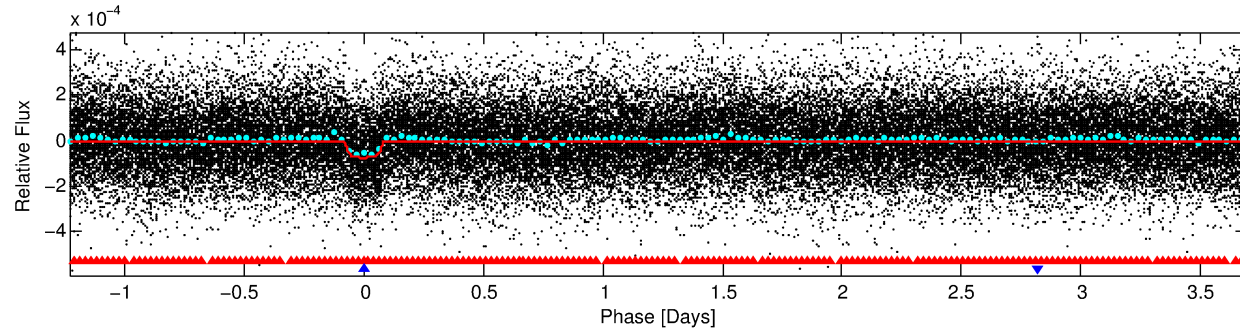
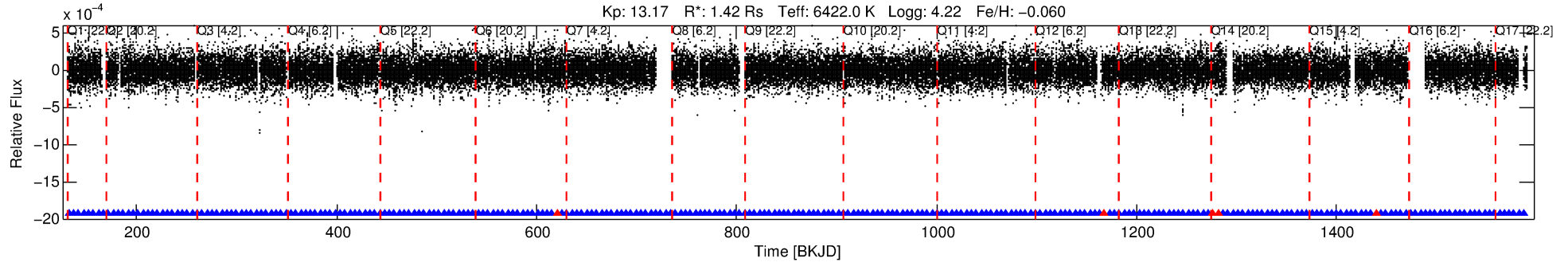
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 011967788-02

No Significant Match Found

# DV One-Page Summary

KIC: 11967788 Candidate: 2 of 2 Period: 4.932 d  
KOI: K04021.02 Corr: 0.961



## DV Fit Results:

Period = 4.93209 [0.00002] d  
Epoch = 132.4542 [0.0024] BKJD  
Rp/R\* = 0.0091 [0.0018]  
a/R\* = 4.82 [5.04]  
b = 0.90 [0.24]  
Seff = 838.04 [188.72]  
Teq = 1372 [77] K  
Rp = 1.42 [0.38] Re  
a = 0.0606 [0.0092] AU  
Ag = 8.00 [6.58] [1.06σ]  
Teffp = 3567 [708] K [3.08σ]

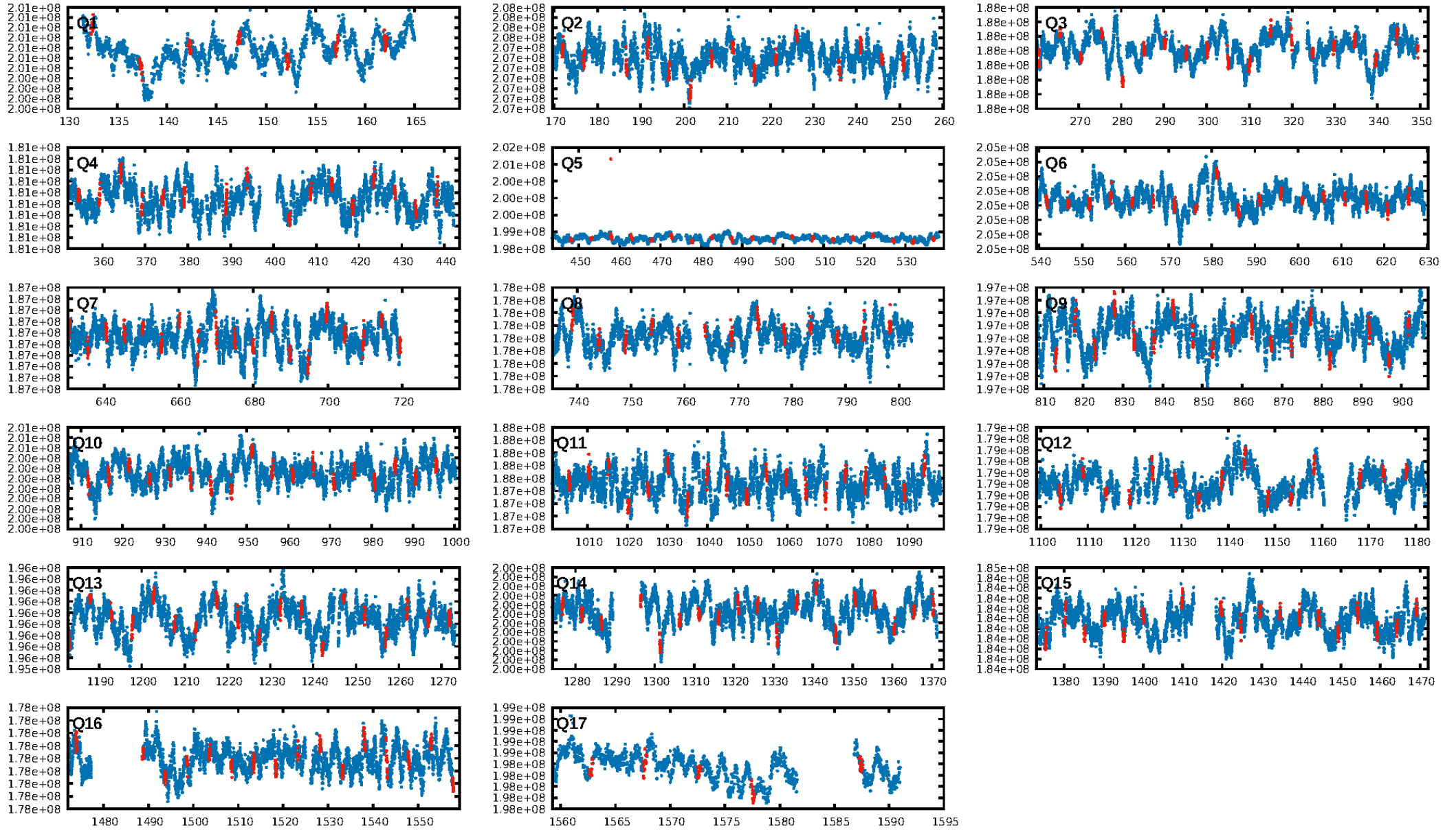
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [11.05σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 8.58e-44  
RollingBand-fgt: 0.98 [246/251]  
GhostDiagnostic-chr: 2.477  
Centroid-sig: 0.1%  
Centroid-so: 1.158 arcsec [2.10σ]  
OotOffset-rm: 0.051 arcsec [0.16σ]  
KicOffset-rm: 0.147 arcsec [0.35σ]  
OotOffset-st: 4/4/2/5 [15]  
KicOffset-st: 4/4/2/5 [15]  
DiffImageQuality-fgm: 0.73 [11/15]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 04:43:45 Z

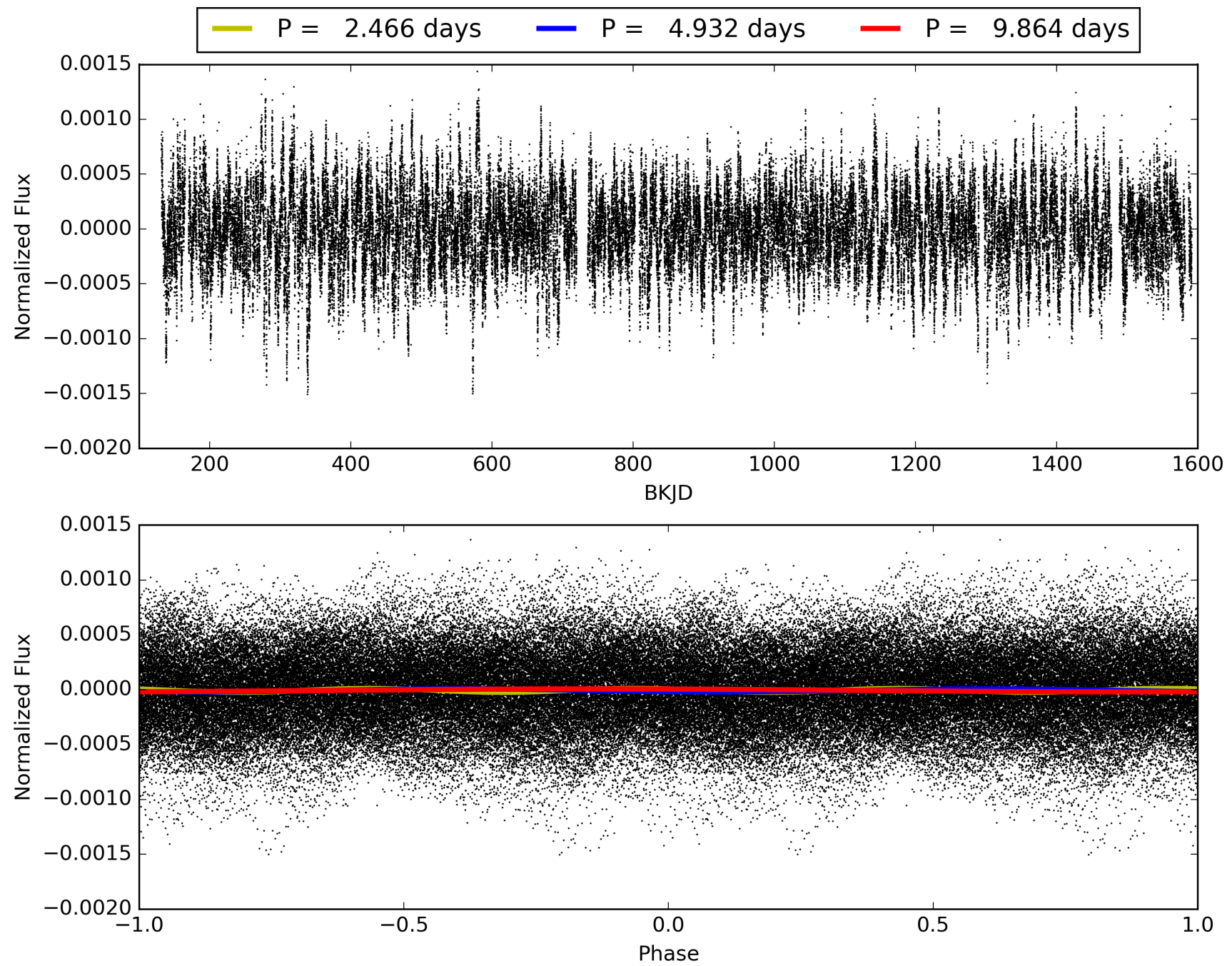
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 011967788-02, PDC Light Curves



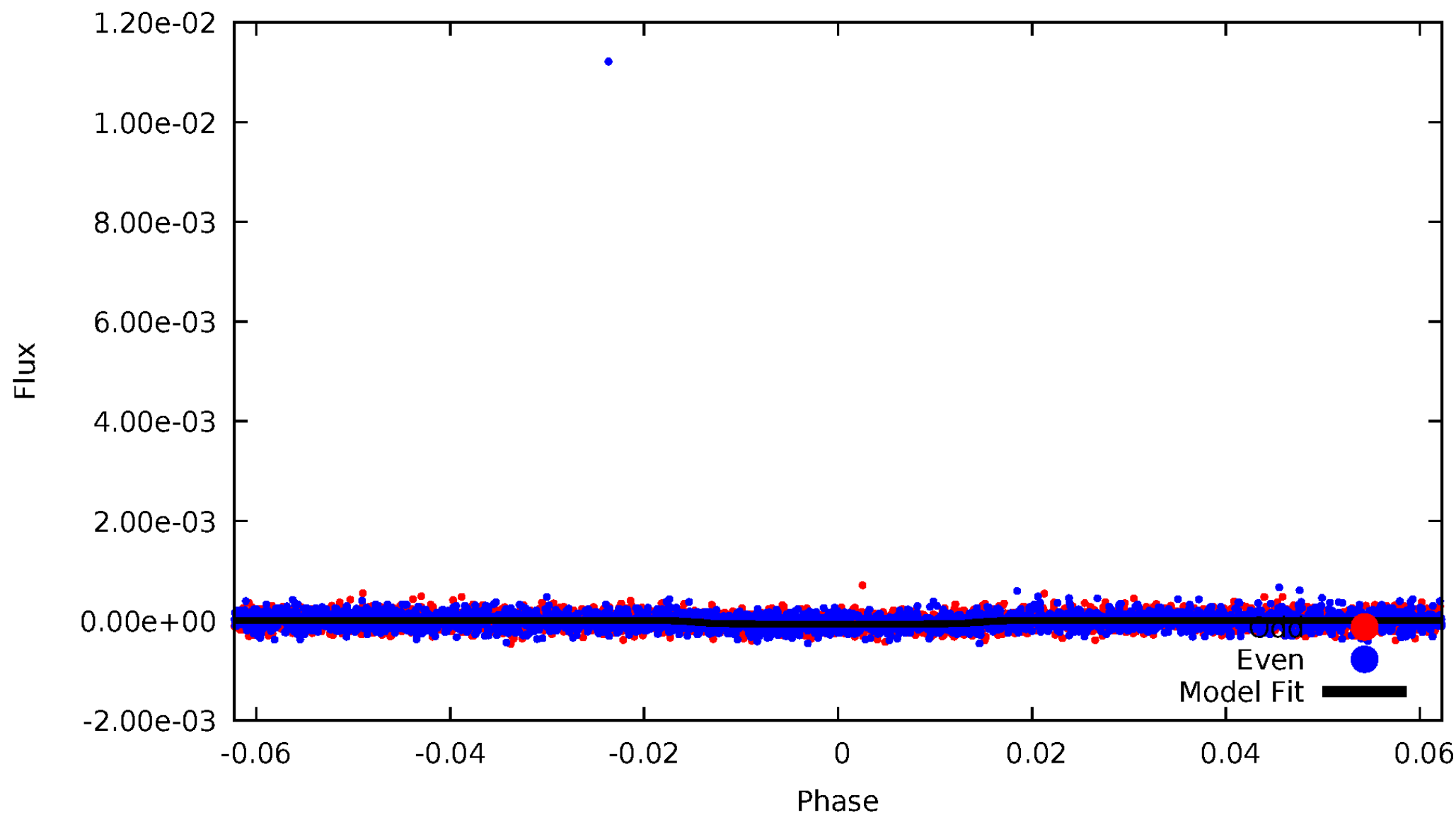


# TCE 011967788-02



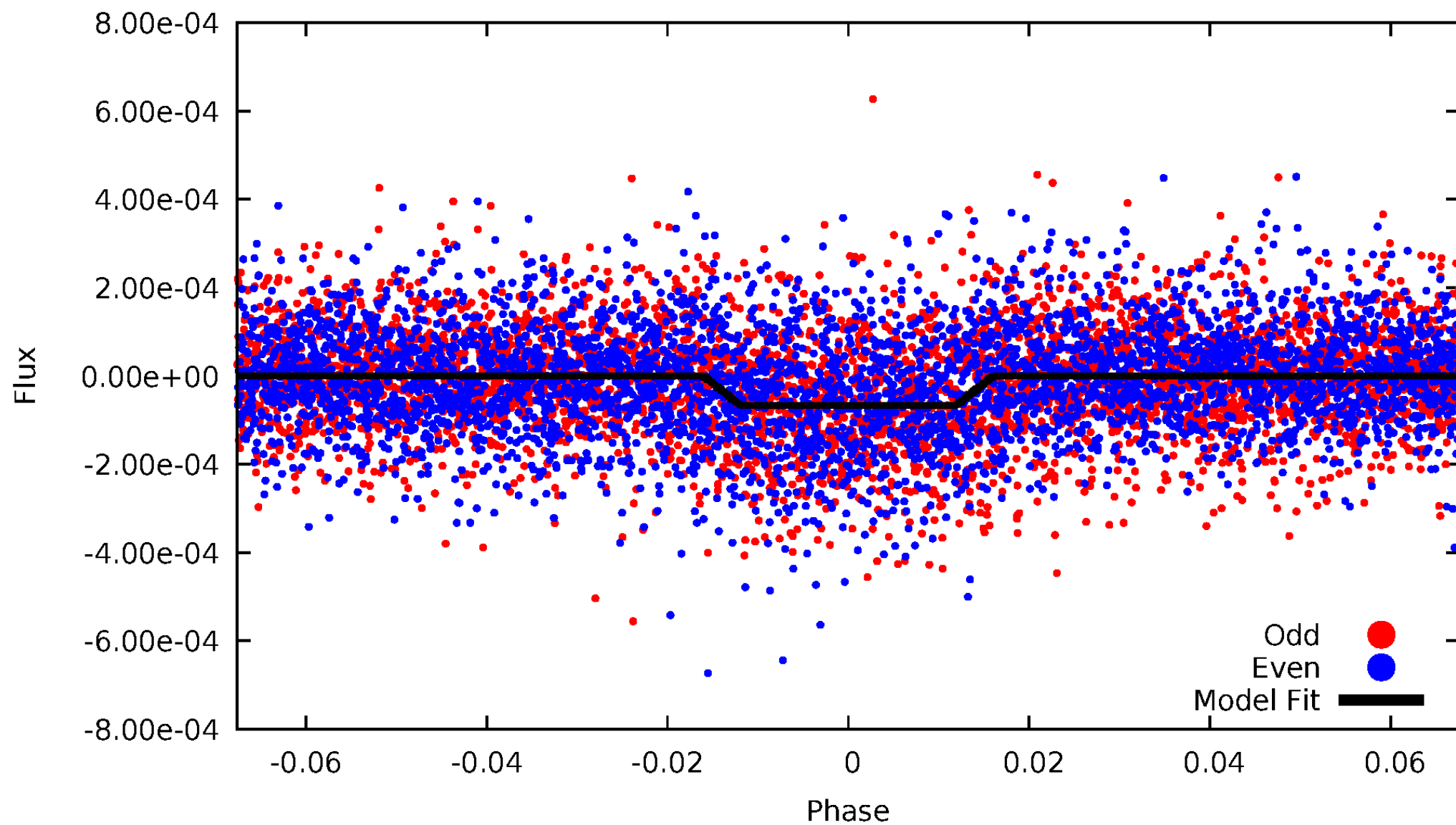
DV Odd/Even

TCE 011967788-02



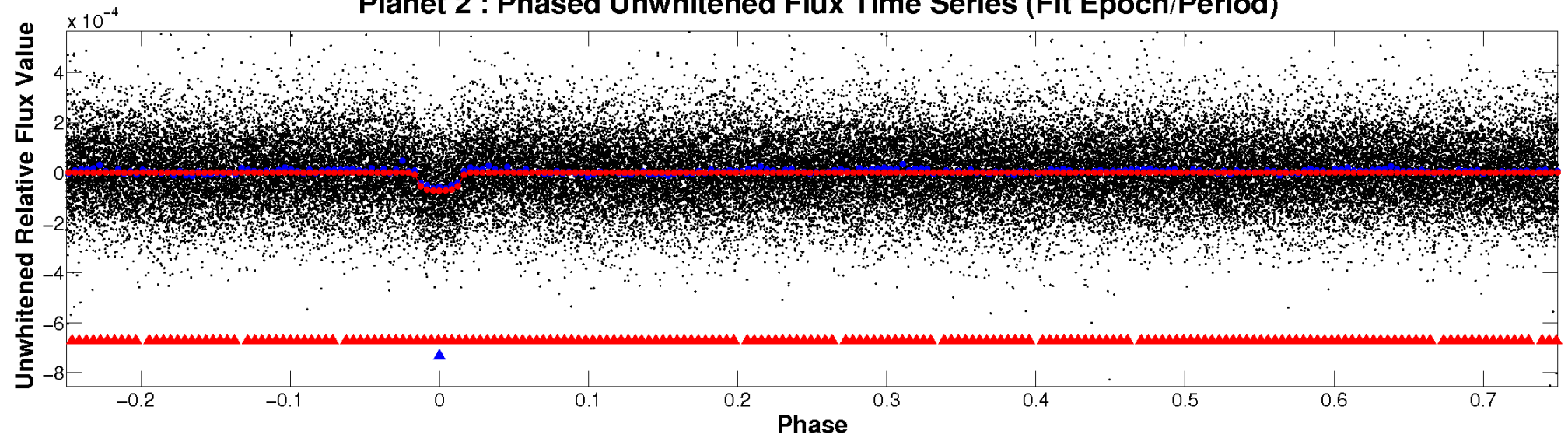
# ALT Odd/Even

TCE 011967788-02

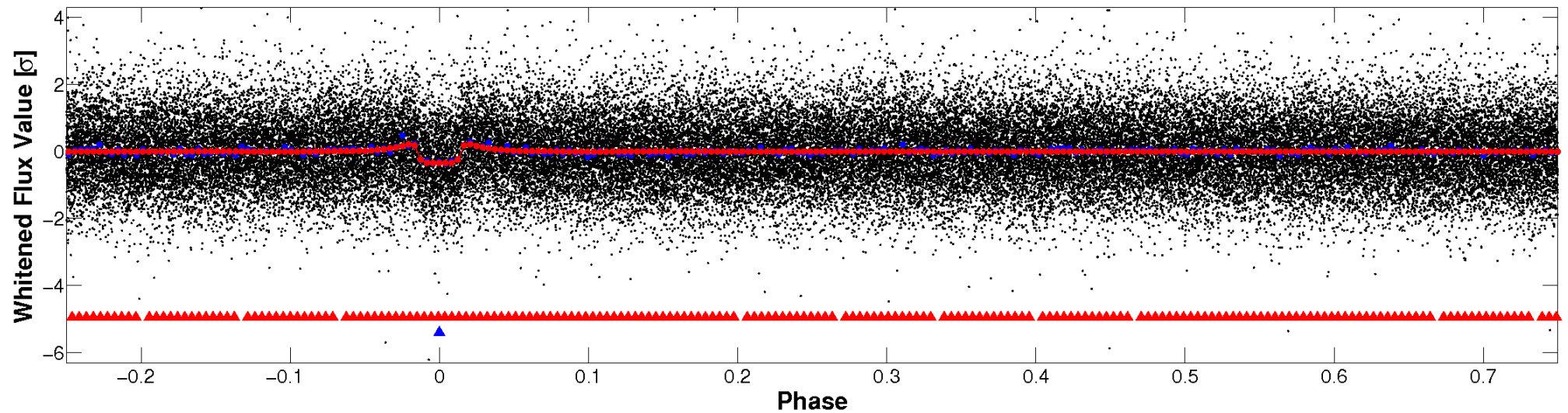


# Non-Whitened Vs. Whitened Light Curve

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

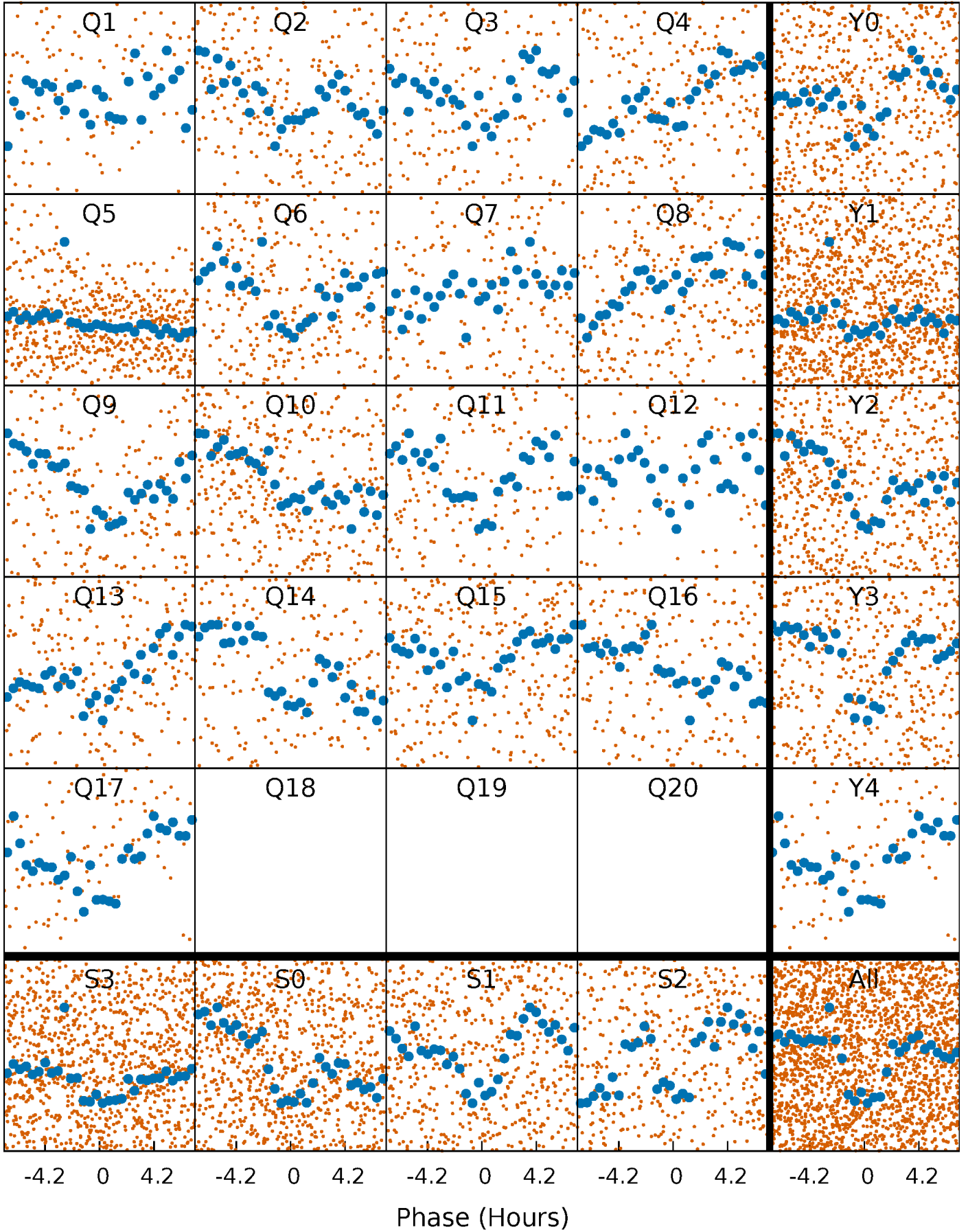


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

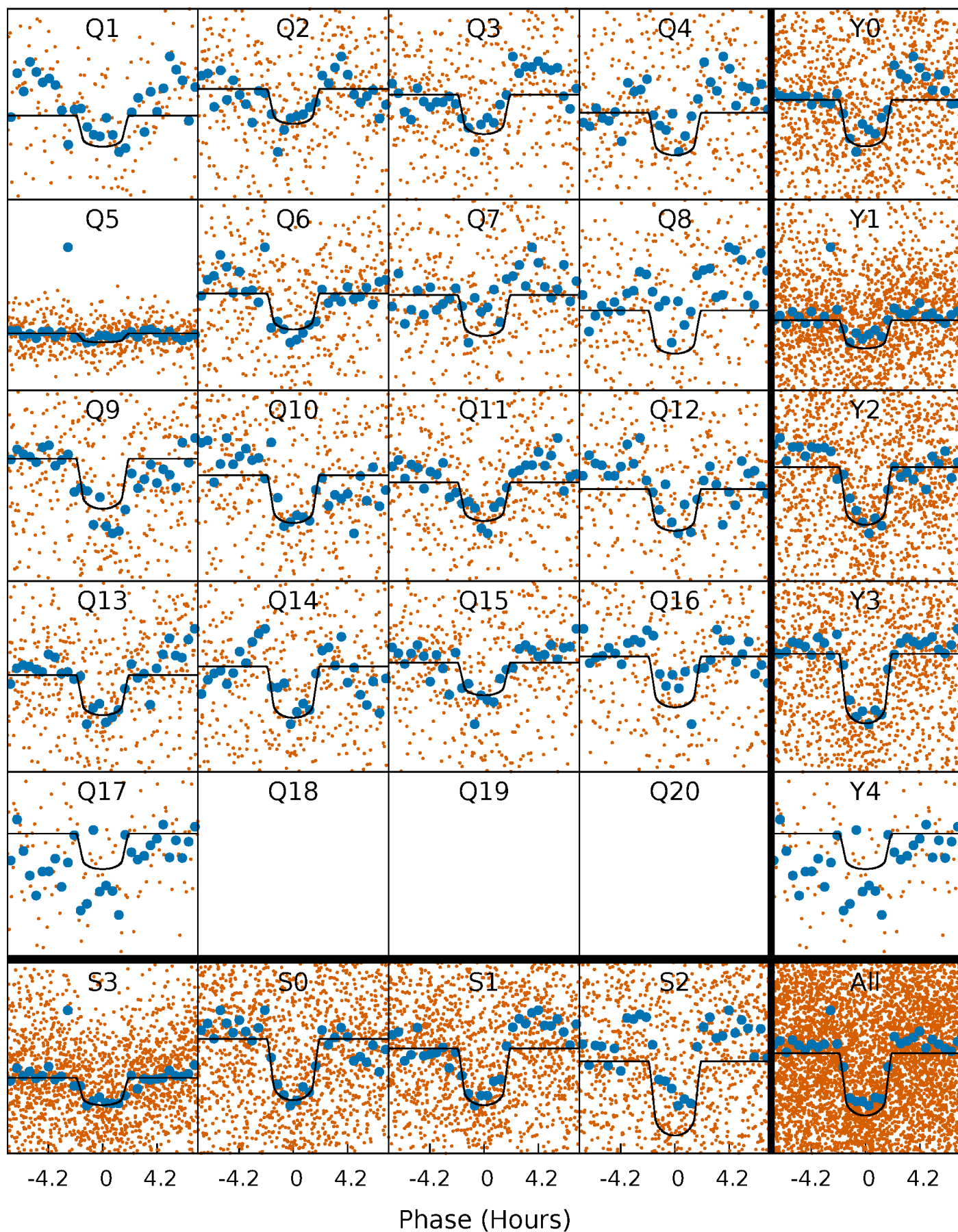
TCE 011967788-02 P= 4.932092 Days  $T_0=132.454181$  (BKJD)





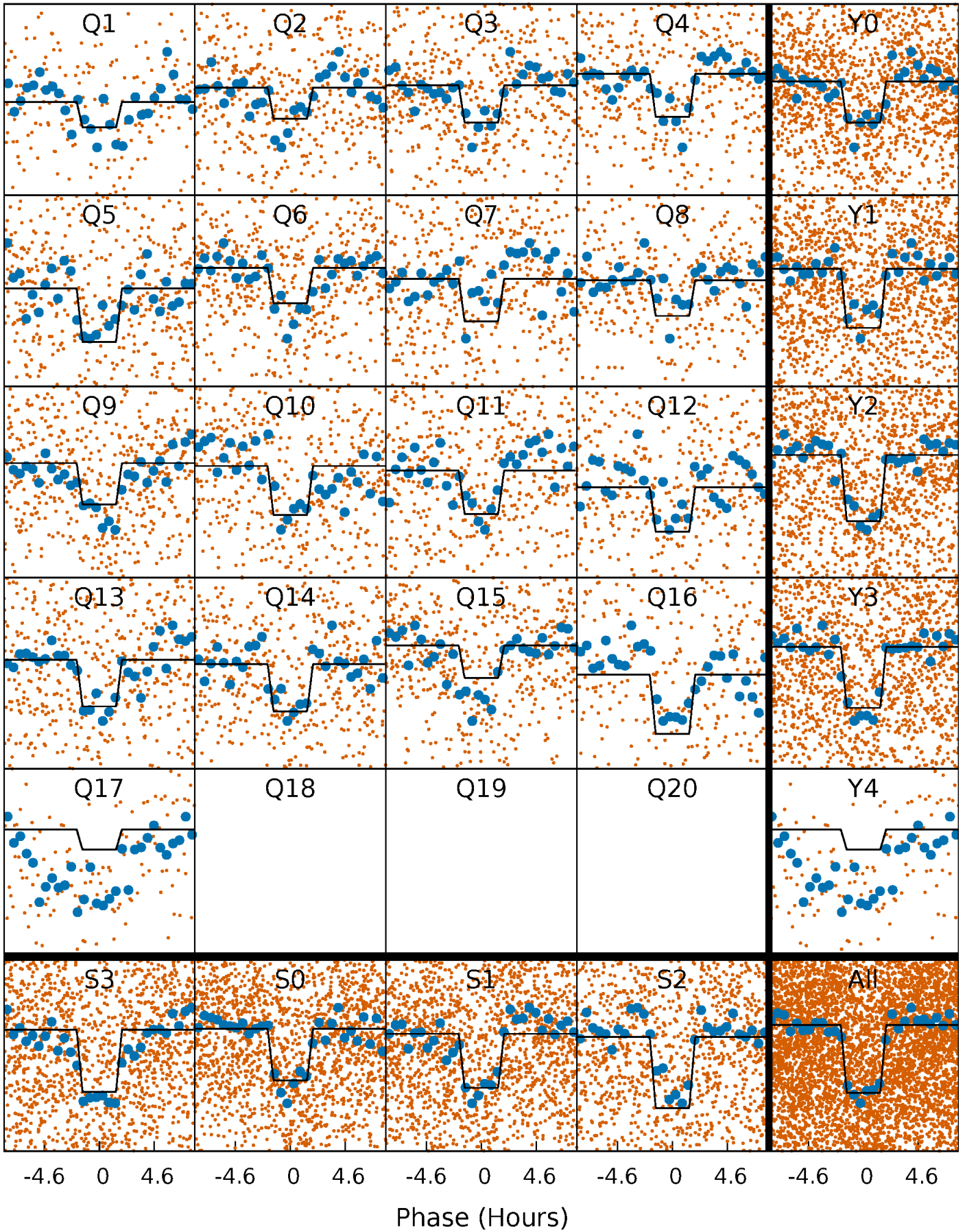
# DV Quarter-Phased Transit Curves

TCE 011967788-02 P= 4.932092 Days  $T_0=132.454181$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

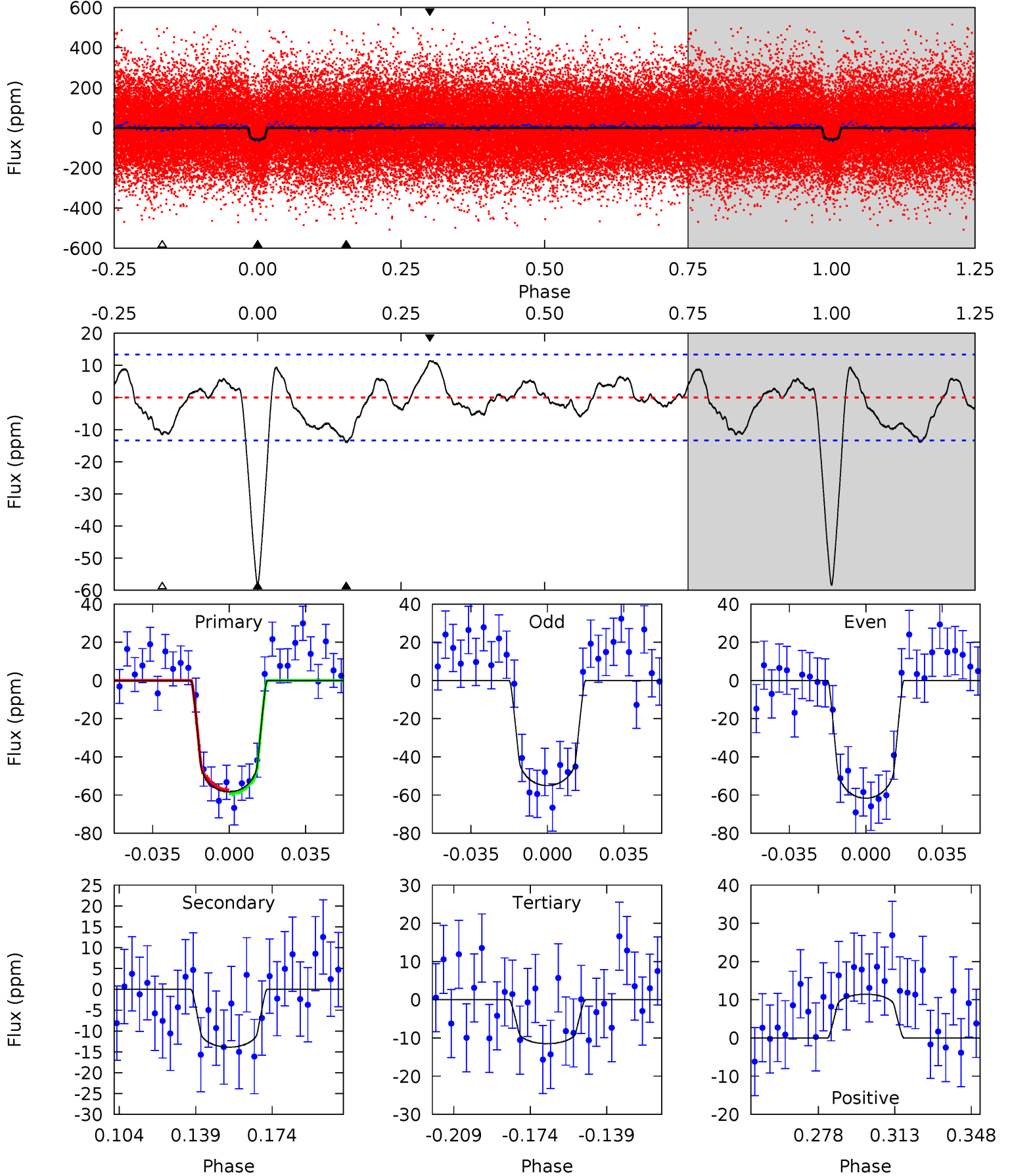
TCE 011967788-02   P= 4.932151 Days    $T_0=132.445279$  (BKJD)



# DV Model-Shift Uniqueness Test

011967788-02, P = 4.932092 Days, E = 127.522089 Days

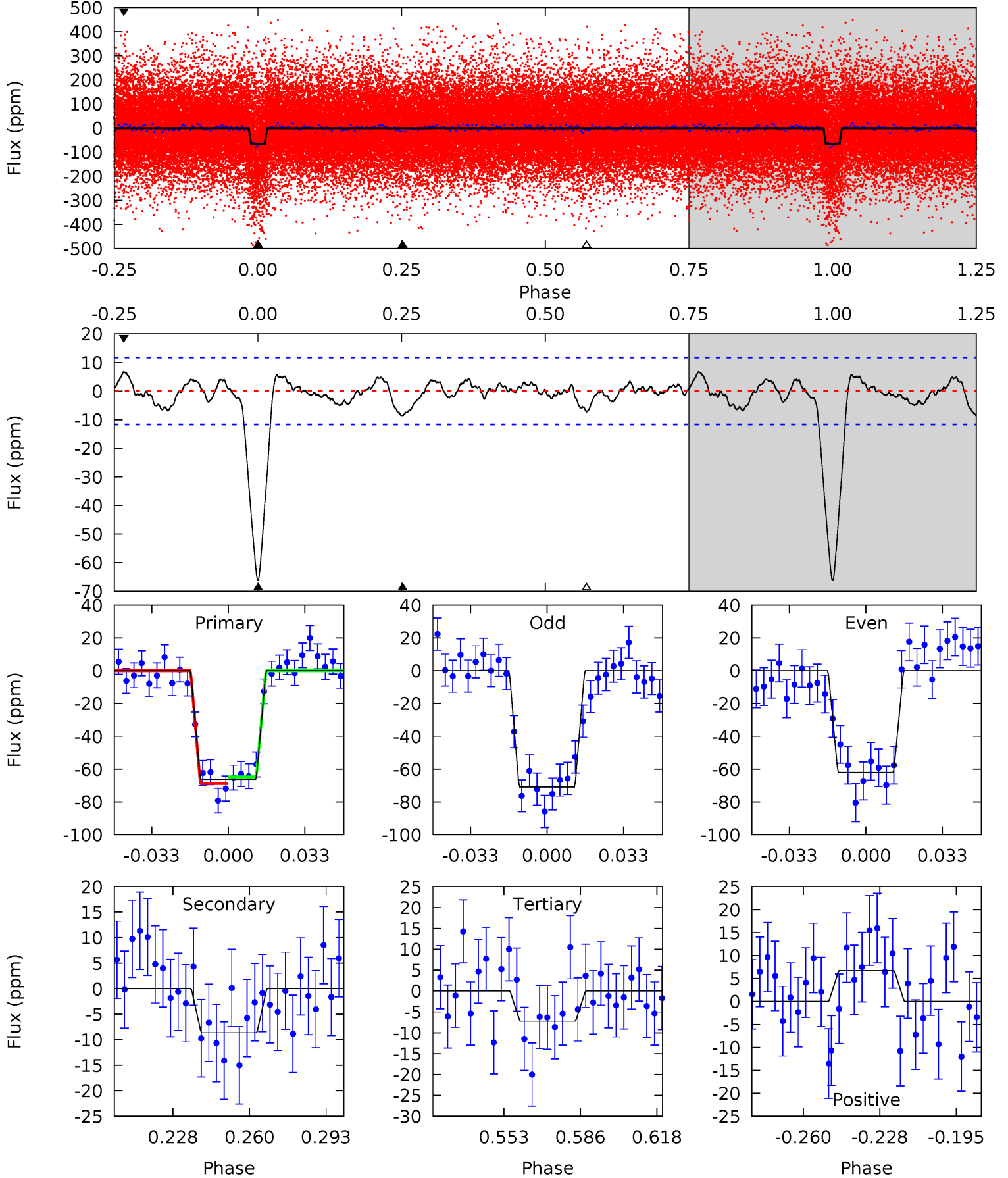
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
20.9	4.96	4.11	4.10	4.78	2.11	1.74	16.7	16.8	0.85	0.87	1.19	1.02	0.16	0.36



# Alt Model-Shift Uniqueness Test

011967788-02, P = 4.932151 Days, E = 127.513128 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
27.2	3.54	2.96	2.74	4.79	2.14	1.12	24.2	24.4	0.58	0.80	1.83	1.05	0.09	0.84



### Stellar Parameters For KIC 011967788

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6422^{+76}_{-76}$	$4.219^{+0.120}_{-0.120}$	$-0.060^{+0.150}_{-0.150}$	$1.421^{+0.257}_{-0.210}$	$1.220^{+0.096}_{-0.106}$	$0.599^{+0.326}_{-0.210}$
	+1%/-1%	+3%/-3%	+250%/-250%	+18%/-15%	+8%/-9%	+54%/-35%
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 011967788-02 / KOI 4021.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-14 \pm 3$	$1.42^{+0.30}_{-0.29}$	$1917^{+88}_{-79}$	$4284^{+457}_{-318}$	$14^{+9}_{-5}$
Alt.	$-9 \pm 2$	$1.27^{+0.34}_{-0.30}$	$1918^{+95}_{-80}$	$4083^{+451}_{-388}$	$10^{+9}_{-4}$

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



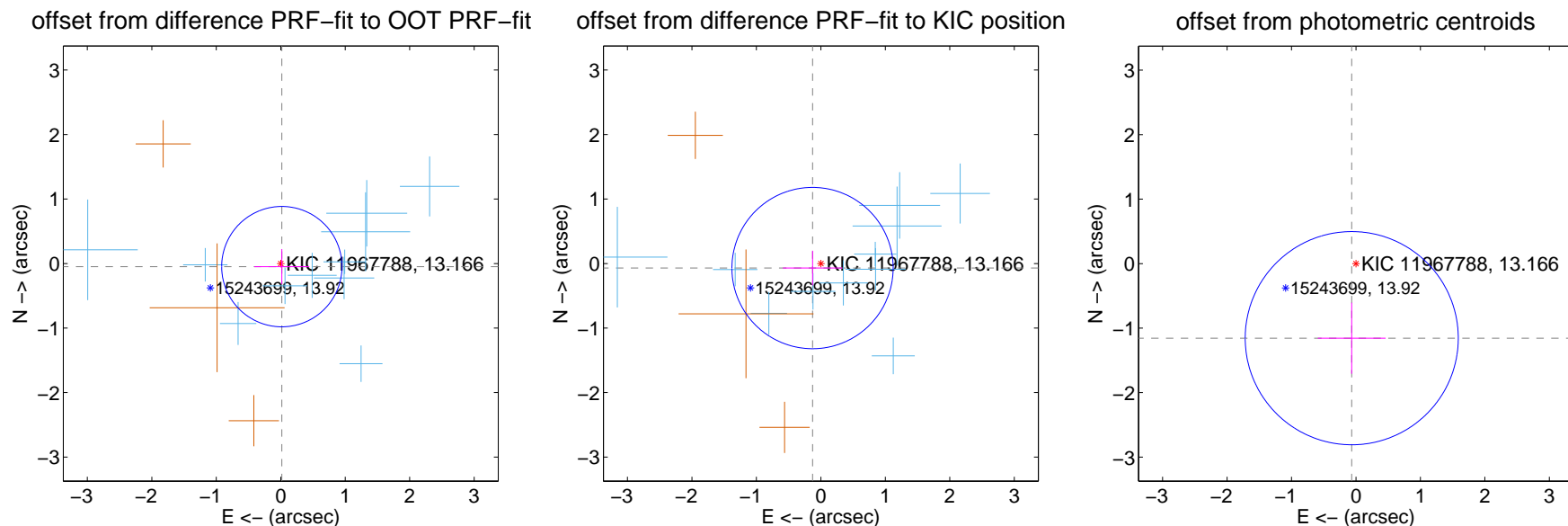
## DV Centroid Data

Supplemental centroid analysis for 011967788-02. Kepler magnitude: 13.17. Transit SNR 15.40

There are 11 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

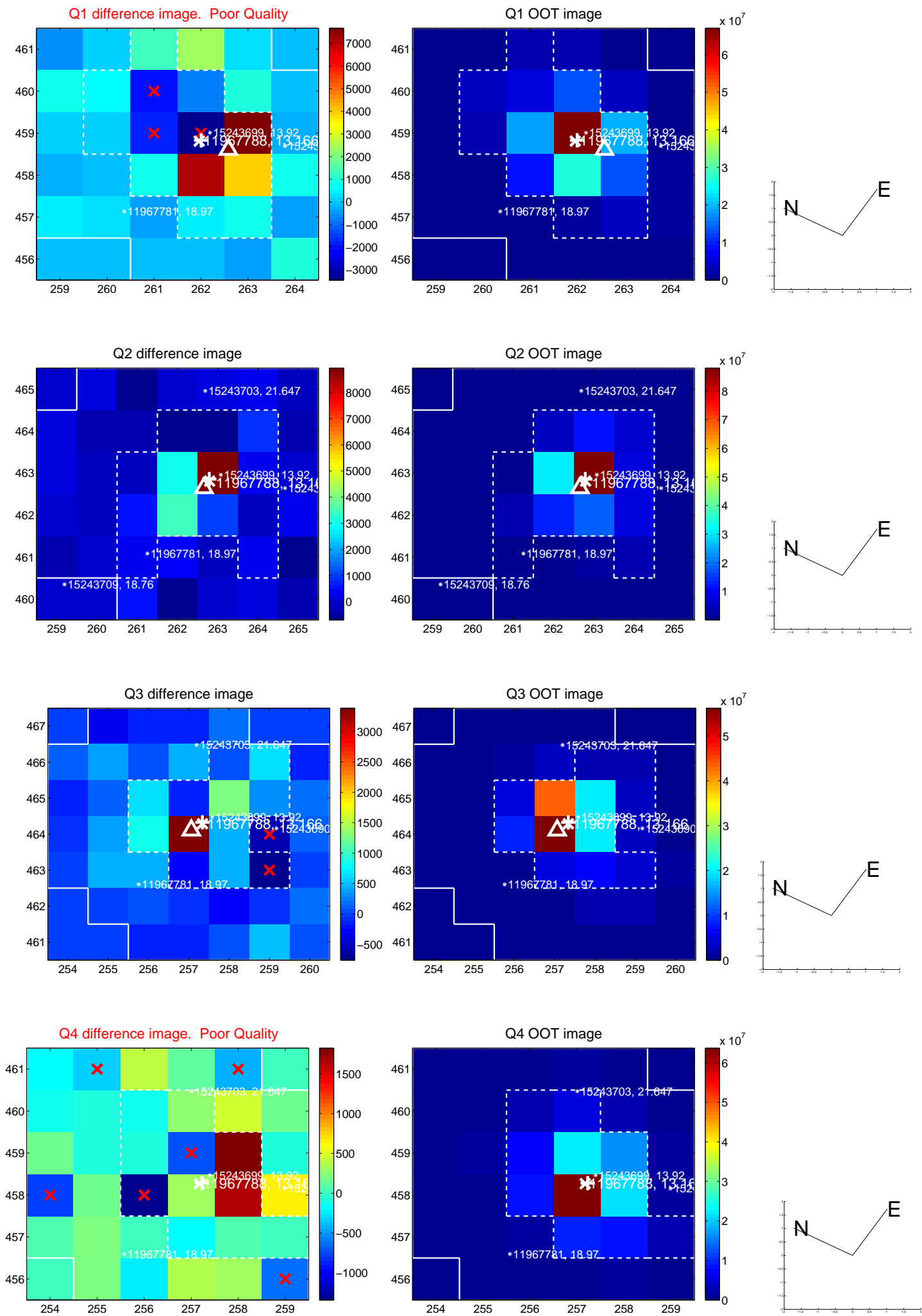
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.051 \pm 0.311$	0.16	$-0.017 \pm 0.426$	$-0.048 \pm 0.272$
PRF-fit source offset from KIC position	$0.147 \pm 0.417$	0.35	$0.129 \pm 0.460$	$-0.070 \pm 0.269$
photometric centroid source offset	$1.16 \pm 0.55$	2.10	$0.07 \pm 0.53$	$-1.16 \pm 0.55$



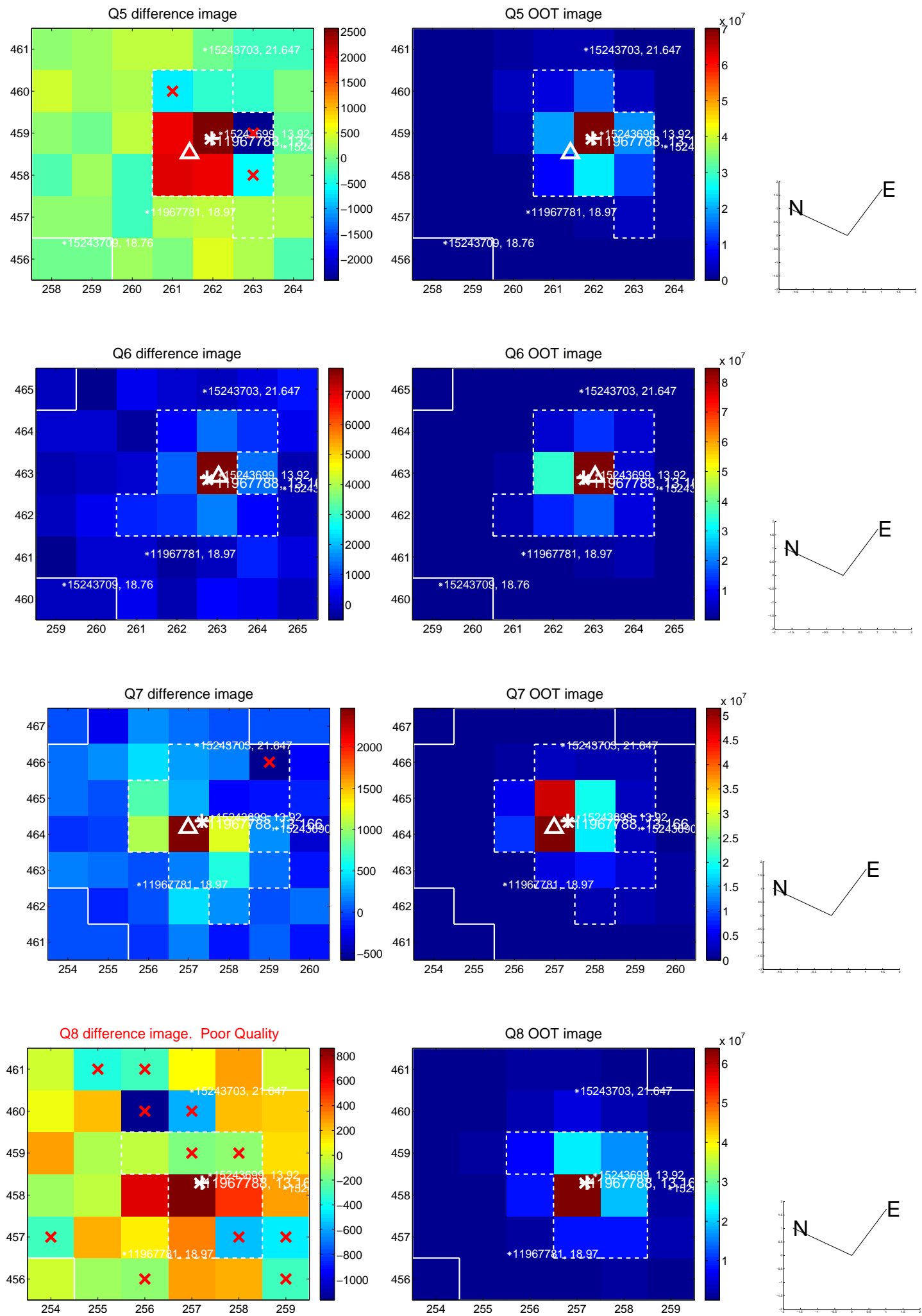
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



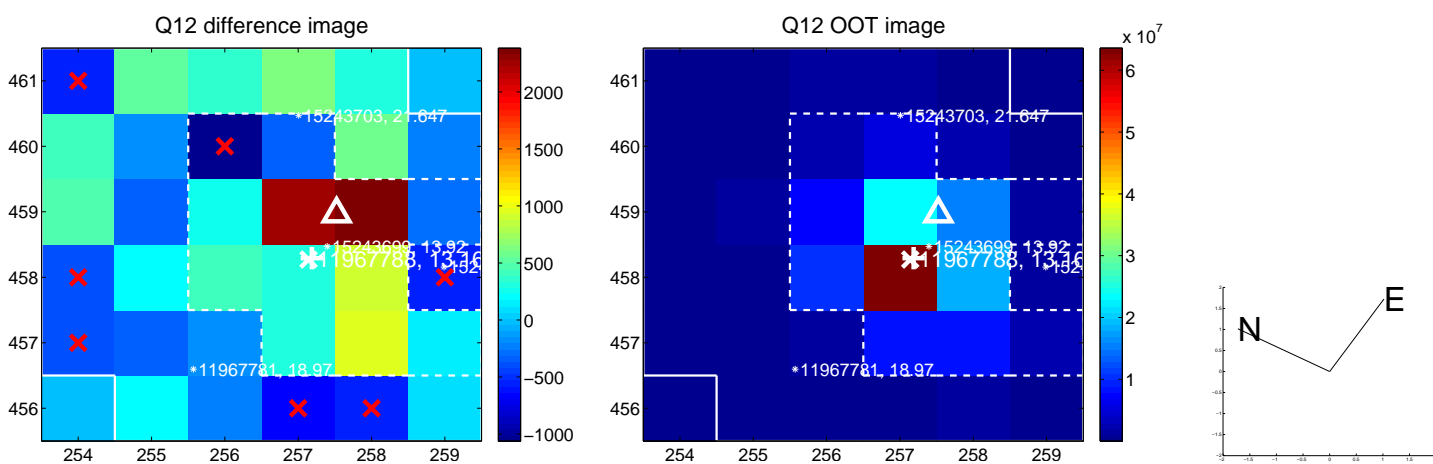
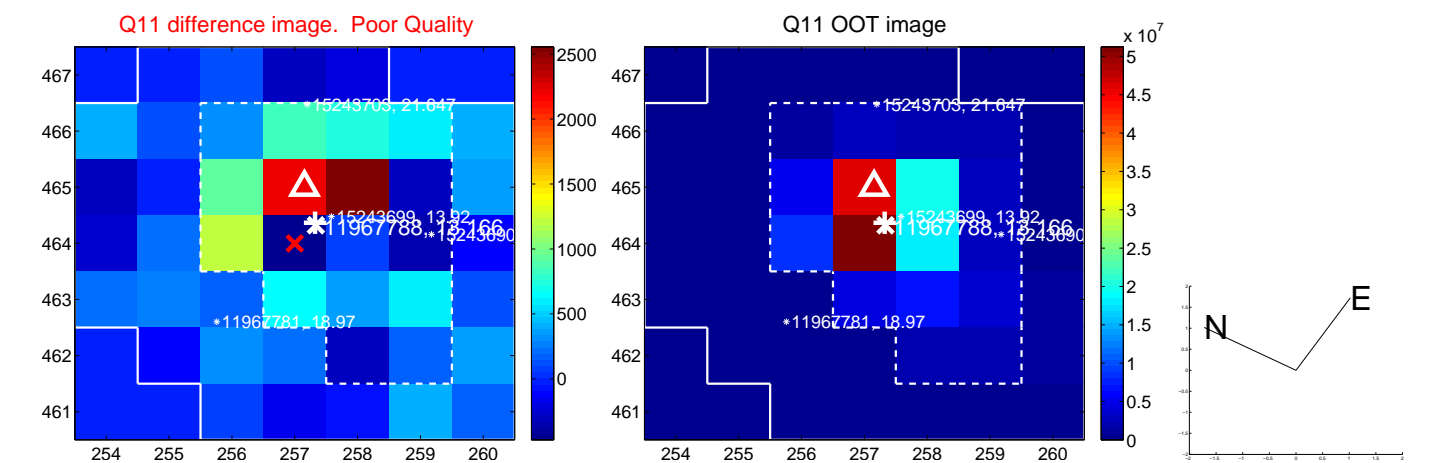
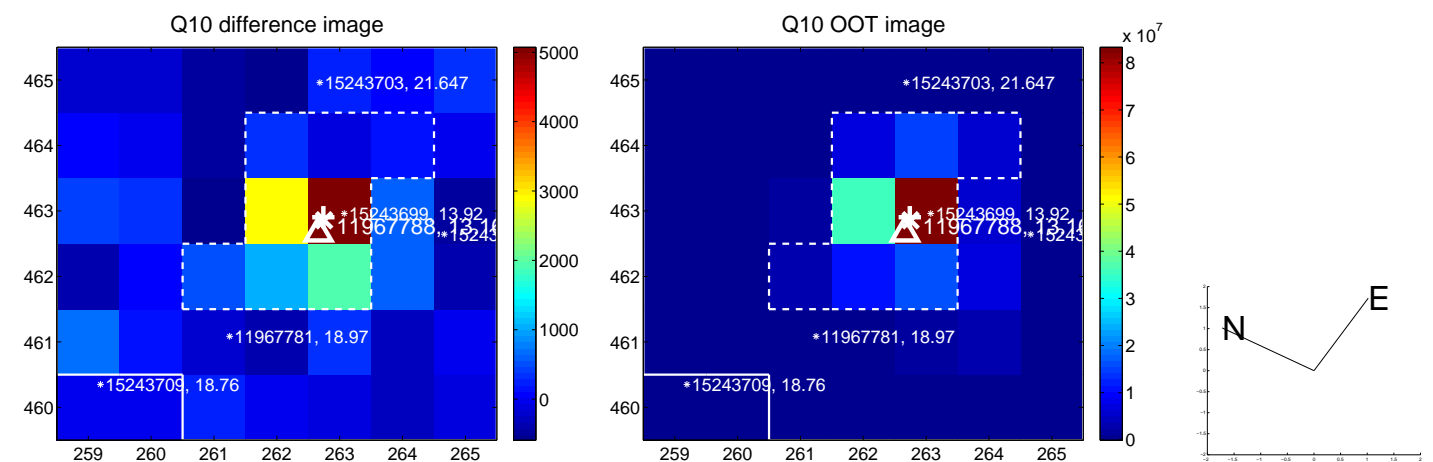
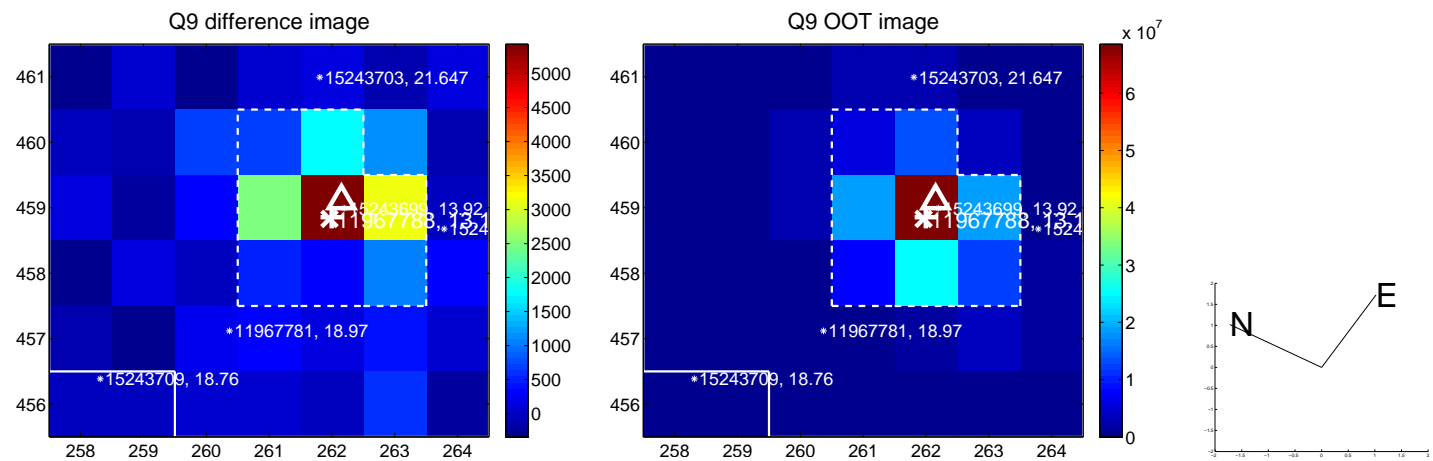
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



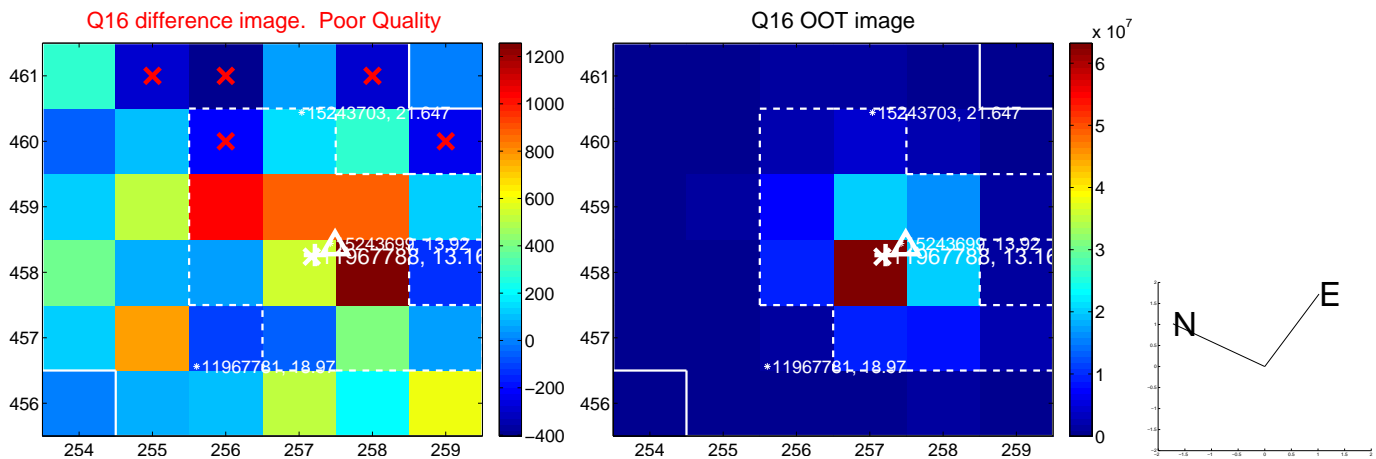
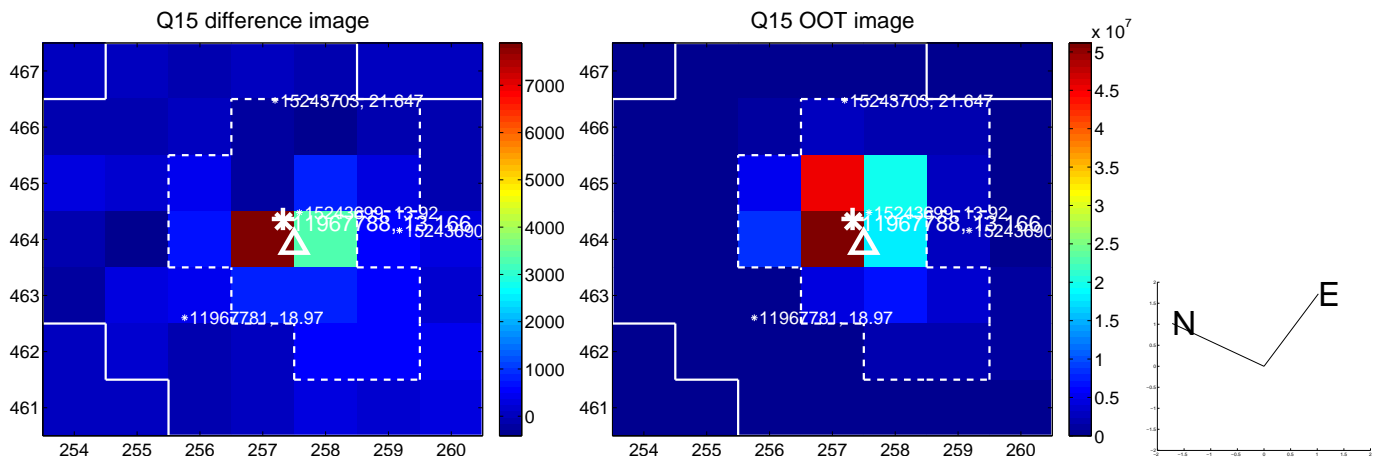
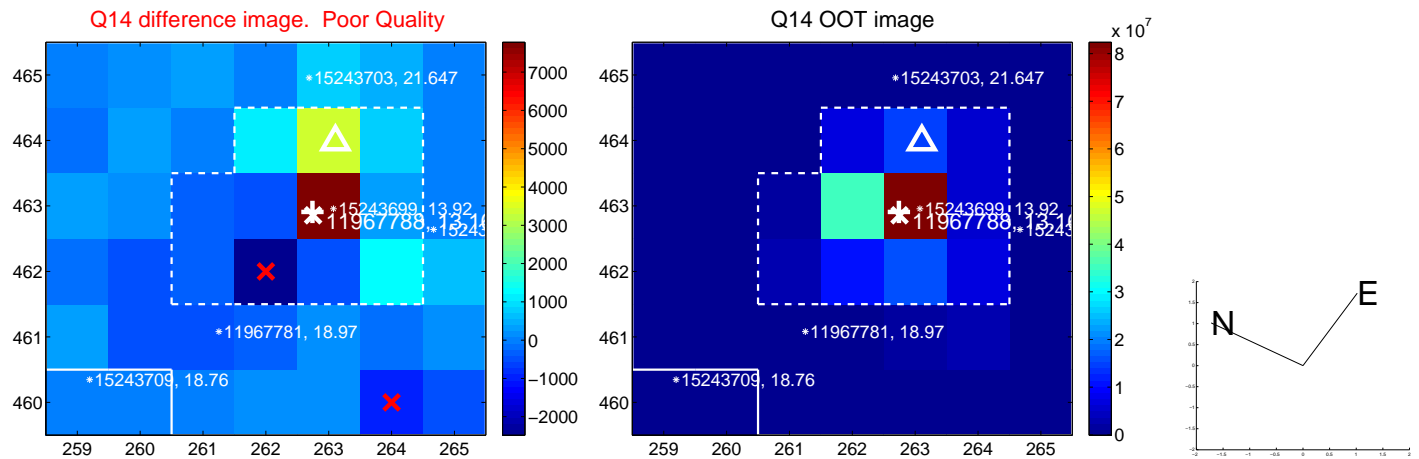
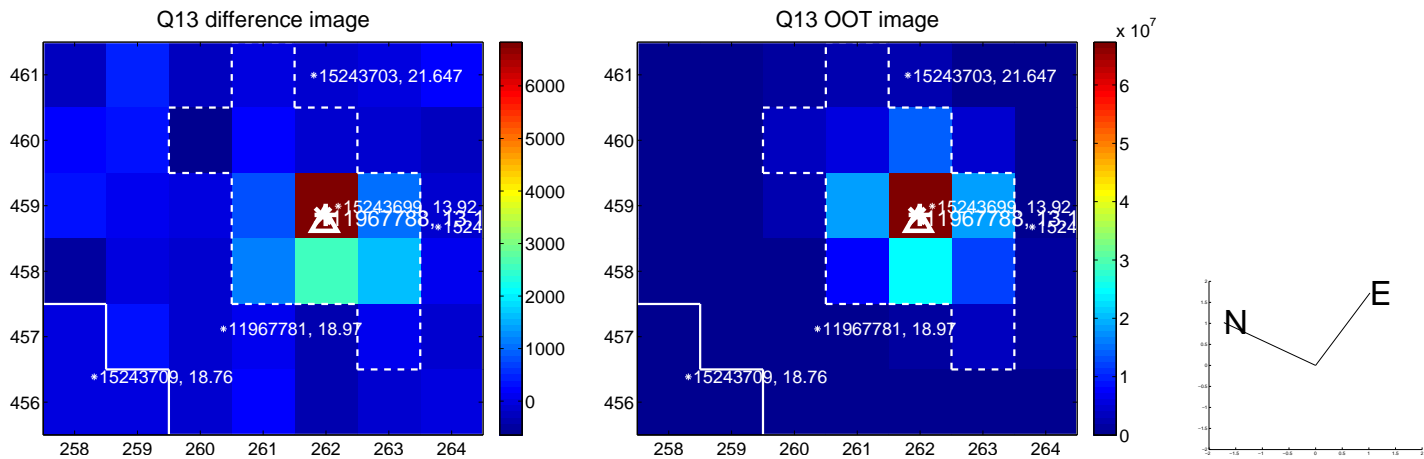
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



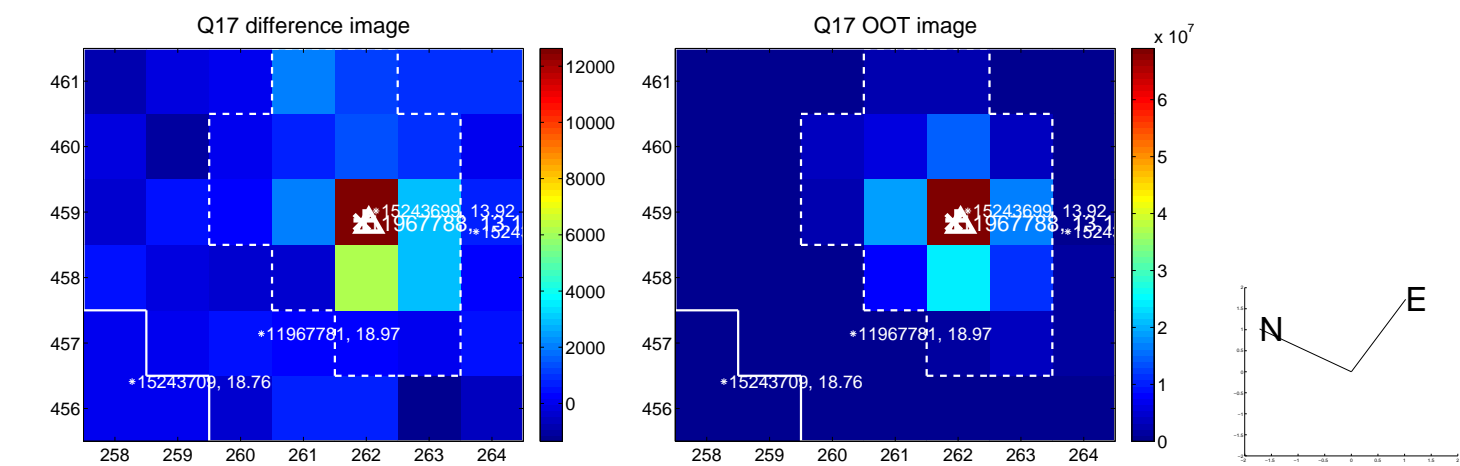
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



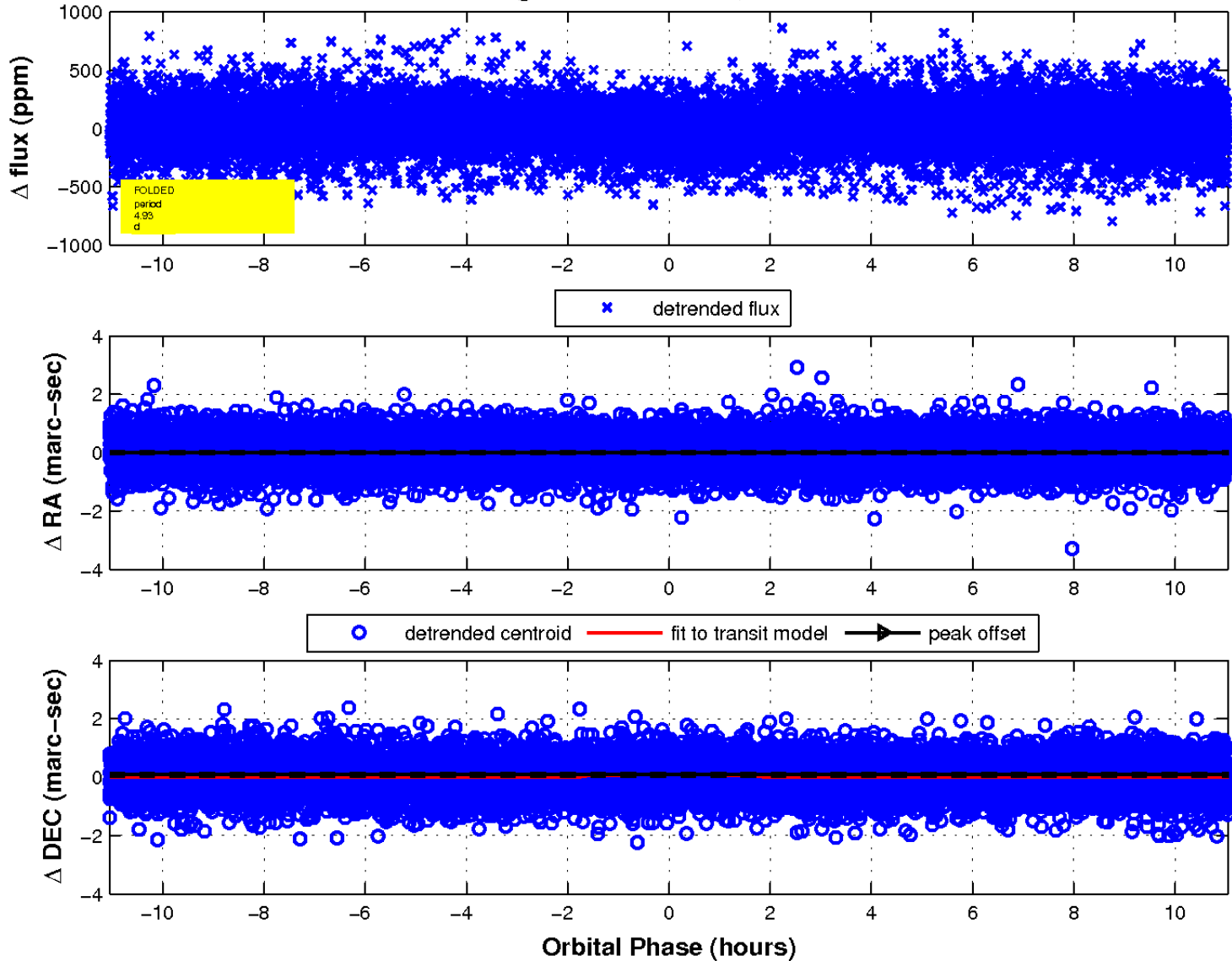
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

