

# KIC 008494142

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008494142-01	OBS	0370.01	42.882520	160.765145	405.4	9.928	68.8	72.6	1.76	6143	3.85	59.73
008494142-02	OBS	0370.02	22.950614	151.532238	131.9	5.112	25.0	25.8	1.76	6143	2.64	137.47

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008494142-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
008494142-02	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.

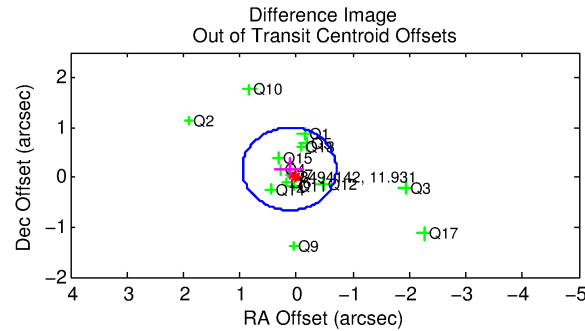
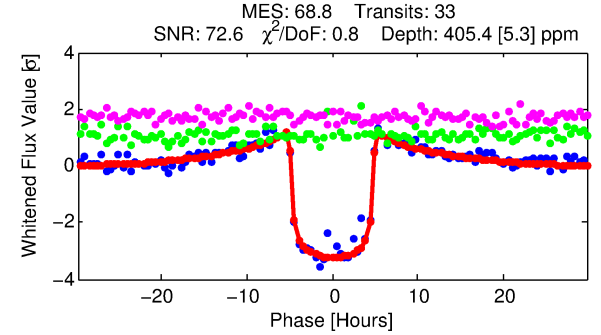
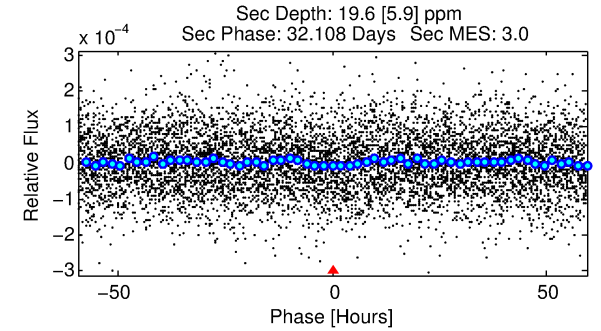
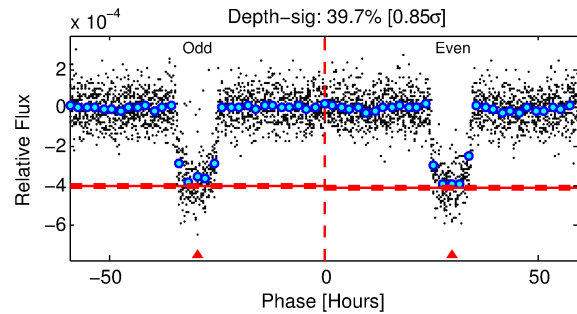
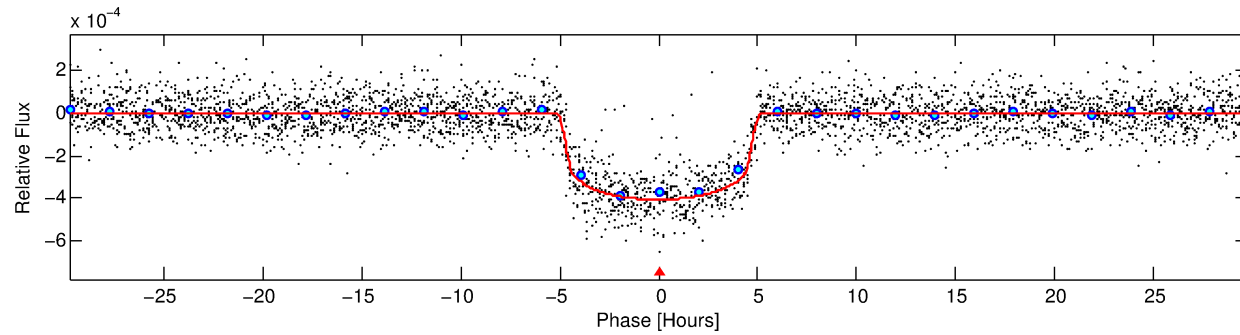
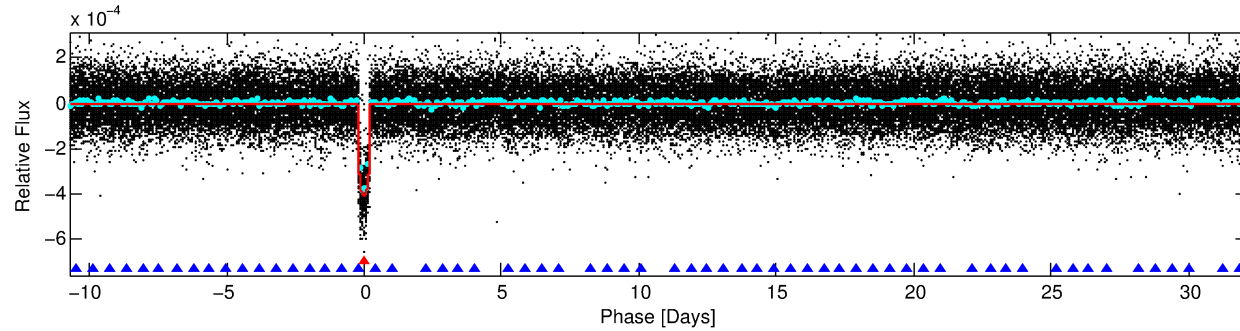
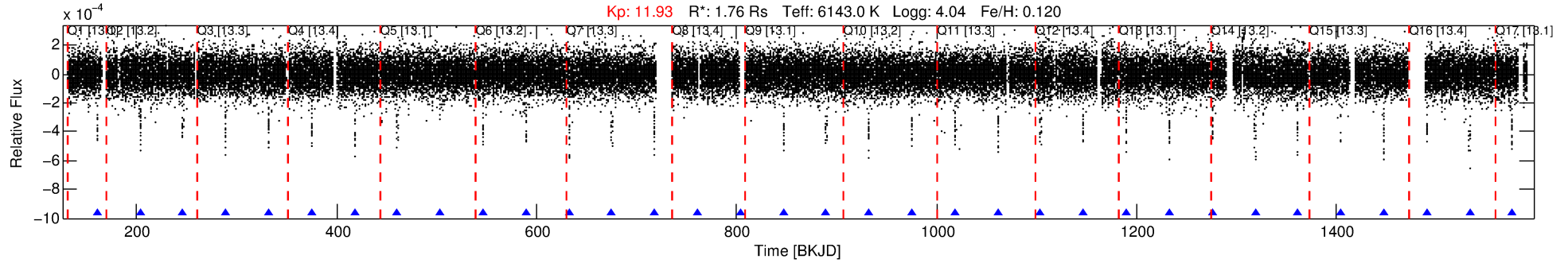
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008494142-01

No Significant Match Found

# DV One-Page Summary

KIC: 8494142 Candidate: 1 of 2 Period: 42.883 d  
KOI: K00370.01 Name: Kepler-145c Corr: 0.992



## DV Fit Results:

Period = 42.88252 [0.00008] d  
Epoch = 160.7651 [0.0016] BKJD  
 $R_p/R^* = 0.0200$  [0.0008]  
 $a/R^* = 22.76$  [4.12]  
 $b = 0.75$  [0.11]  
 $S_{\text{eff}} = 59.73$  [5.75]  
 $T_{\text{eq}} = 709$  [17] K  
 $R_p = 3.86$  [0.30]  $R_{\text{e}}$   
 $a = 0.2577$  [0.0130] AU  
 $A_g = 48.23$  [15.35] [3.08 $\sigma$ ]  
 $T_{\text{eff}} = 2888$  [231] K [9.41 $\sigma$ ]

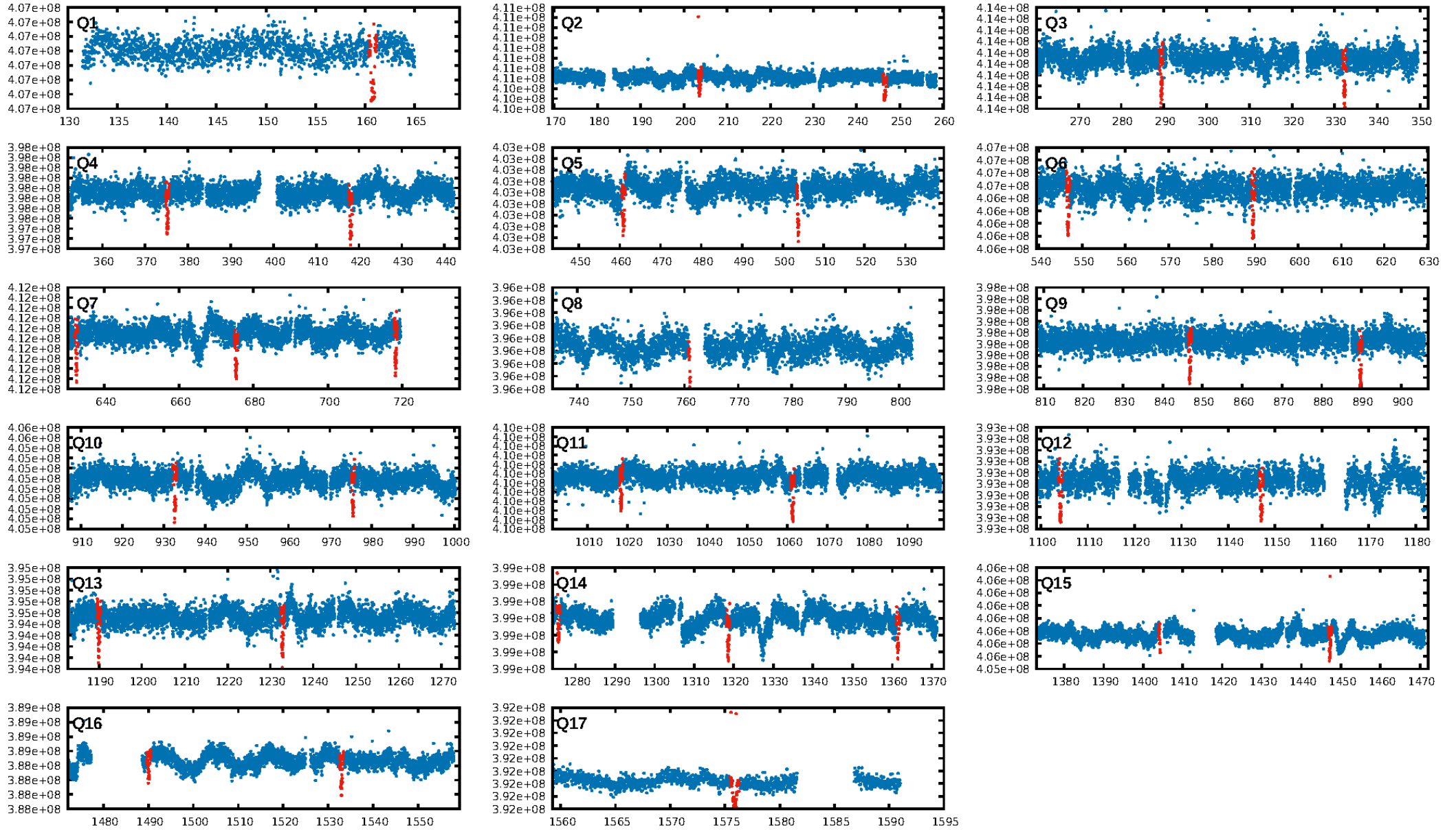
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [42.84 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 37.4%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [31/31]  
GhostDiagnostic-chr: 14.56  
Centroid-sig: 61.8%  
Centroid-so: 0.098 arcsec [0.74 $\sigma$ ]  
OotOffset-rm: 0.206 arcsec [0.75 $\sigma$ ]  
KicOffset-rm: 0.161 arcsec [0.72 $\sigma$ ]  
OotOffset-st: 4/4/2/5 [15]  
KicOffset-st: 4/4/2/5 [15]  
DiffImageQuality-fgm: 1.00 [15/15]  
DiffImageOverlap-fno: 1.00 [15/15]

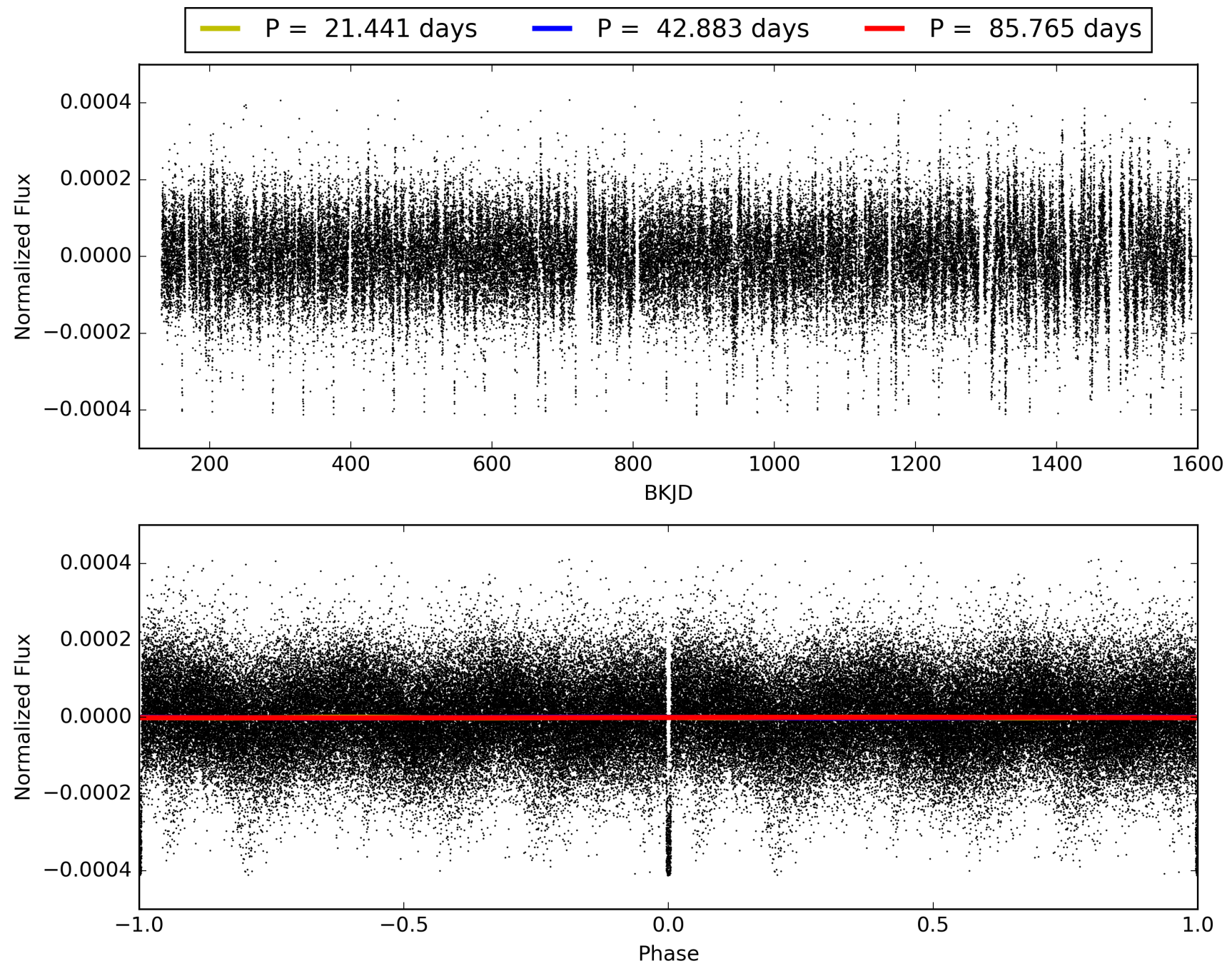
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 13:41:59 Z

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

# TCE 008494142-01, PDC Light Curves

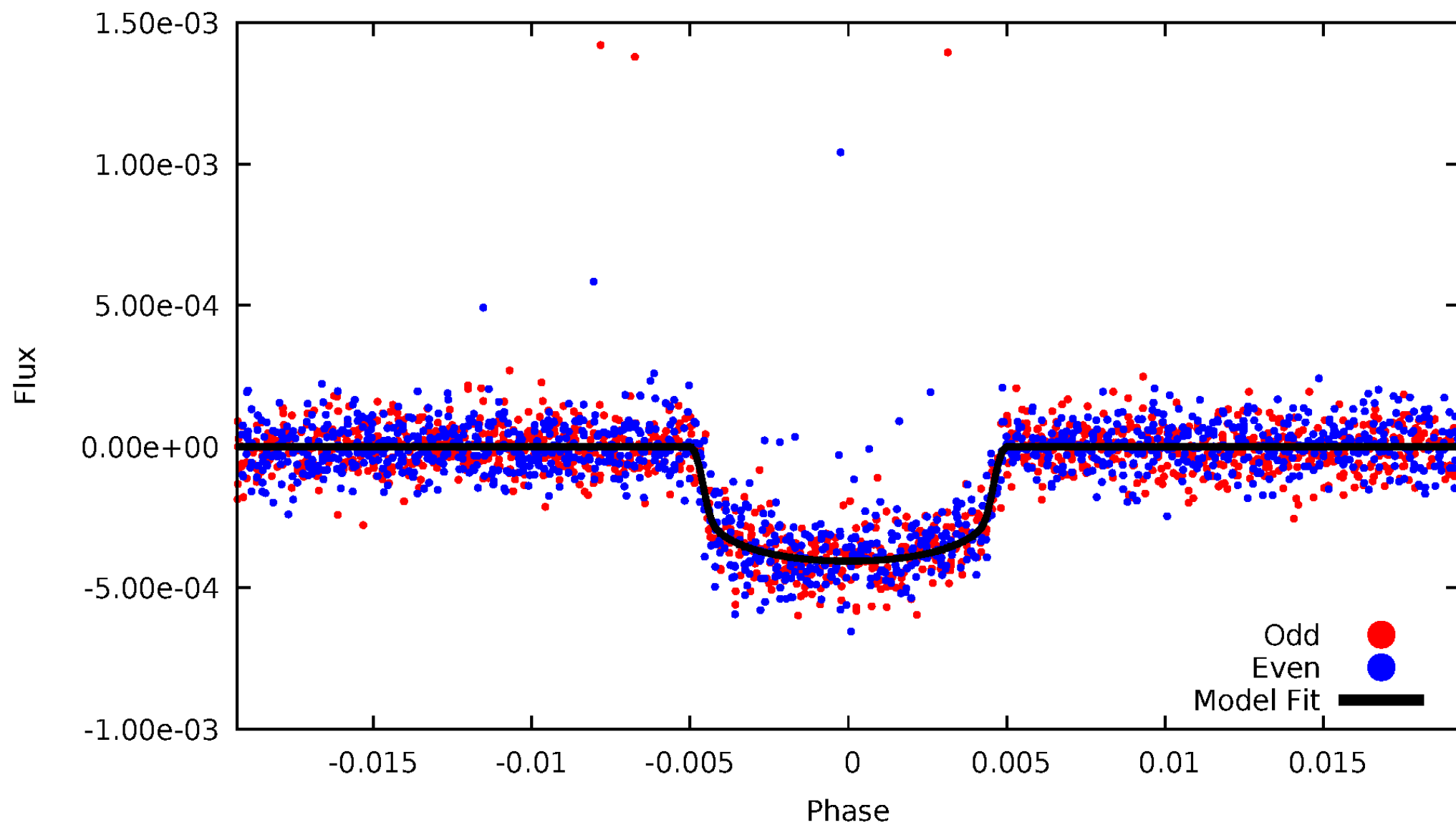


TCE 008494142-01



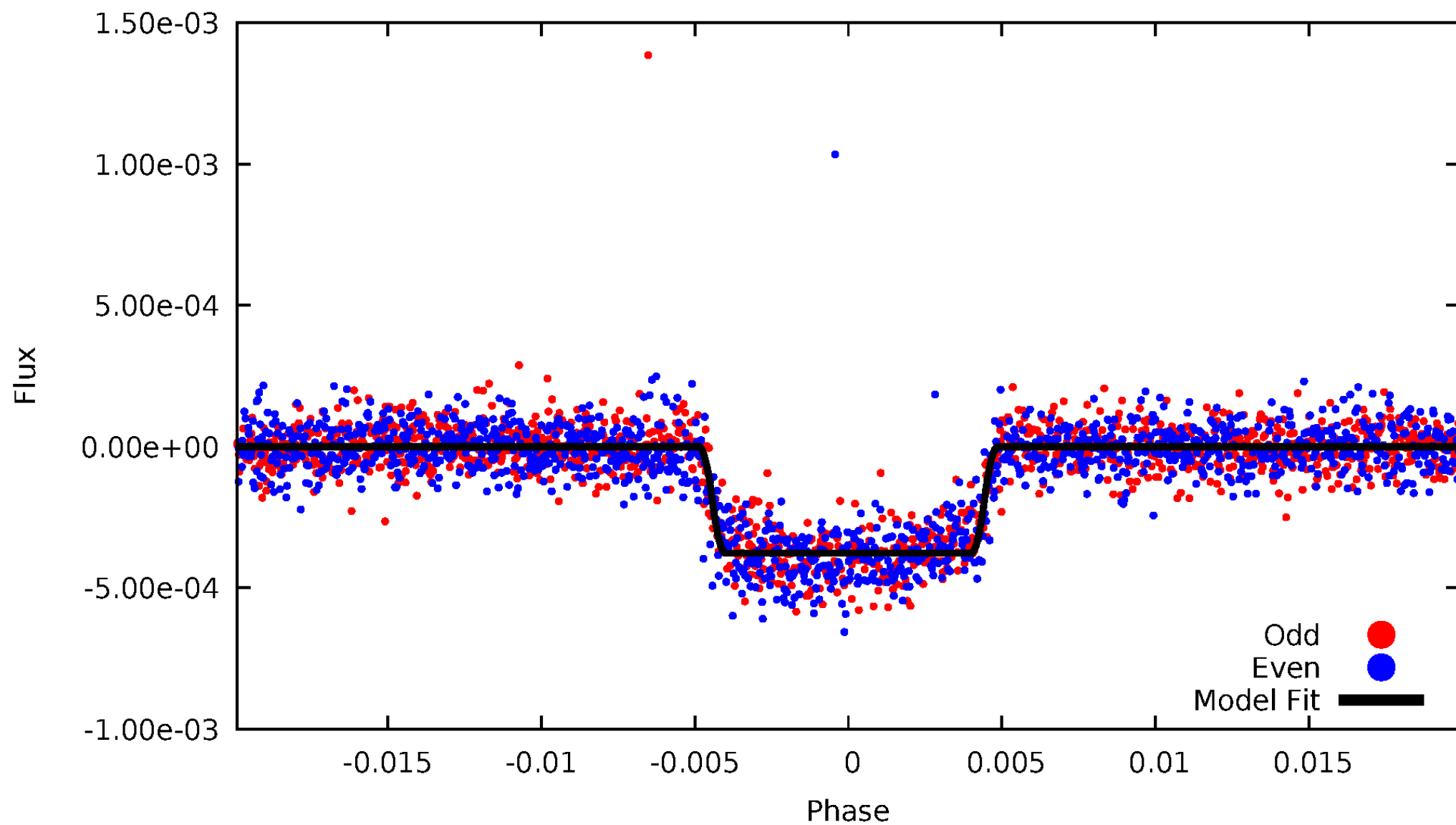
# DV Odd/Even

TCE 008494142-01



# ALT Odd/Even

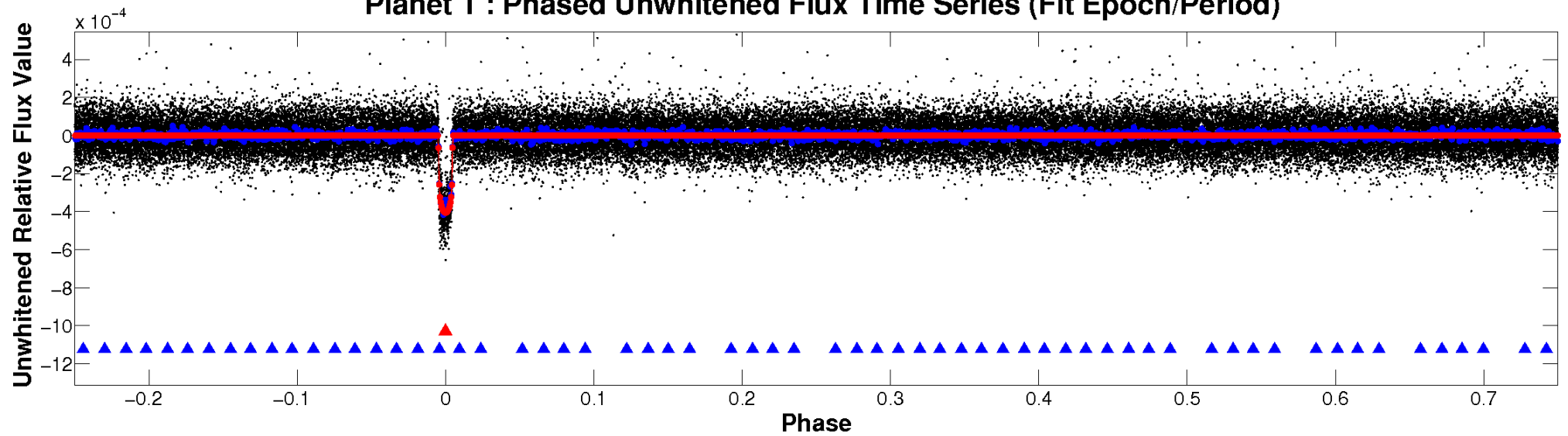
TCE 008494142-01



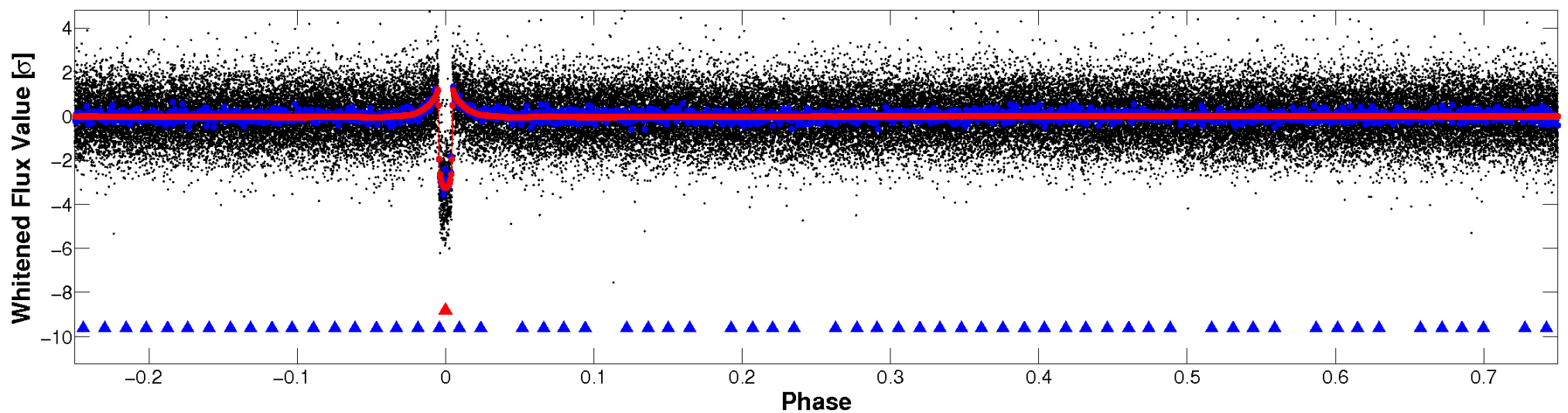


# Non-Whitened Vs. Whitened Light Curve

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

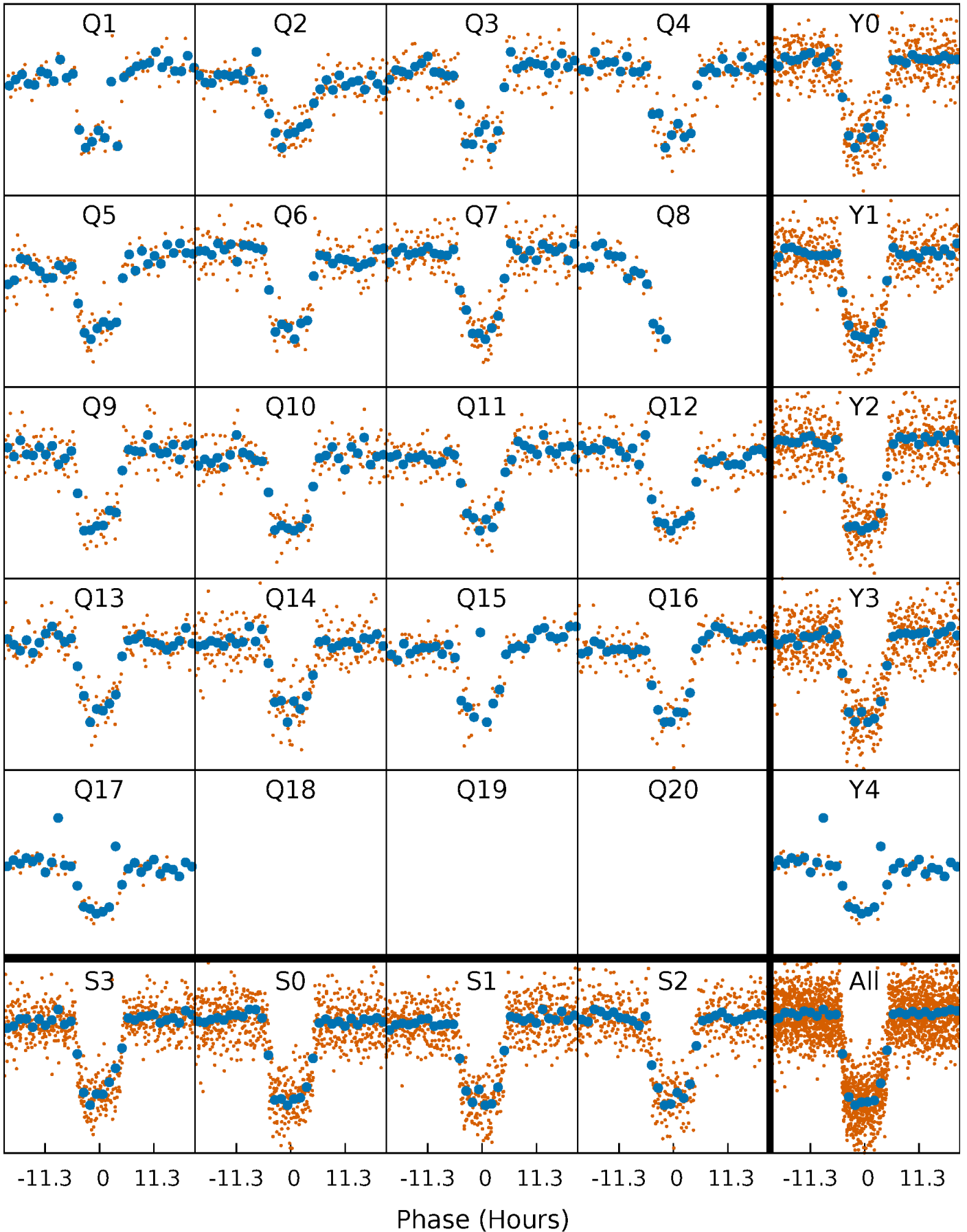


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

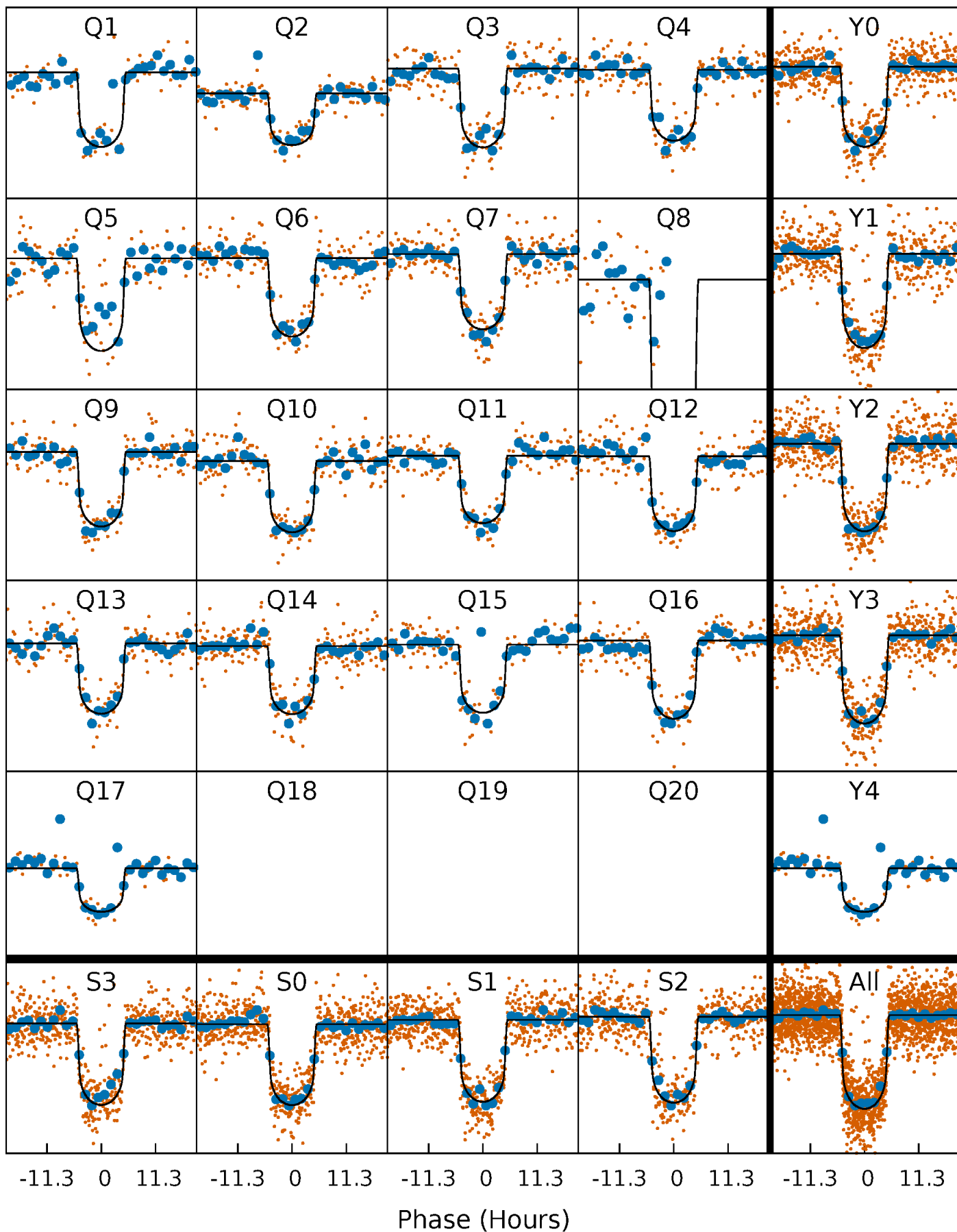
TCE 008494142-01 P= 42.882520 Days  $T_0=160.765145$  (BKJD)





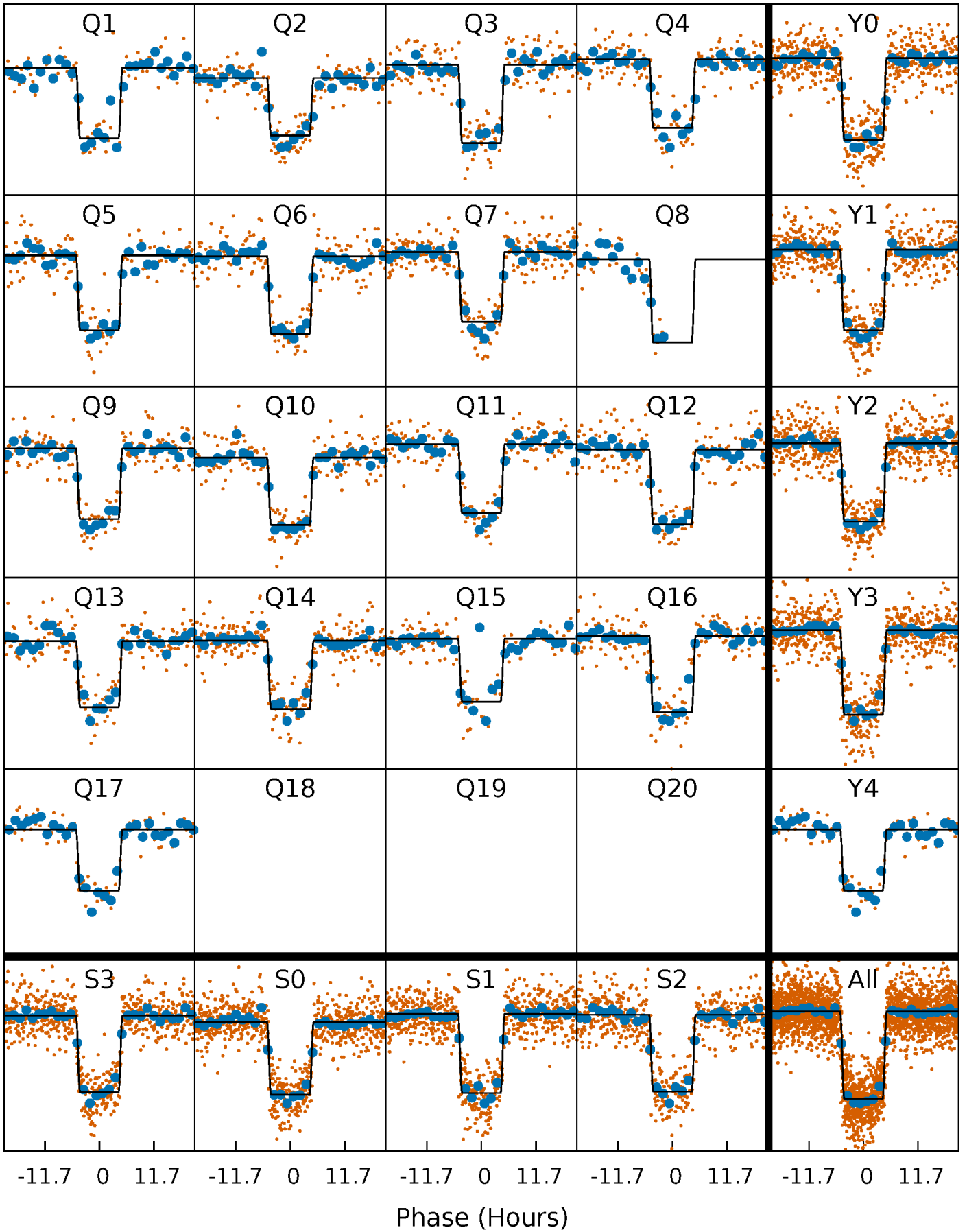
# DV Quarter-Phased Transit Curves

TCE 008494142-01 P= 42.882520 Days  $T_0=160.765145$  (BKJD)



## Alt. Detrend Quarter-Phased Transit Curves

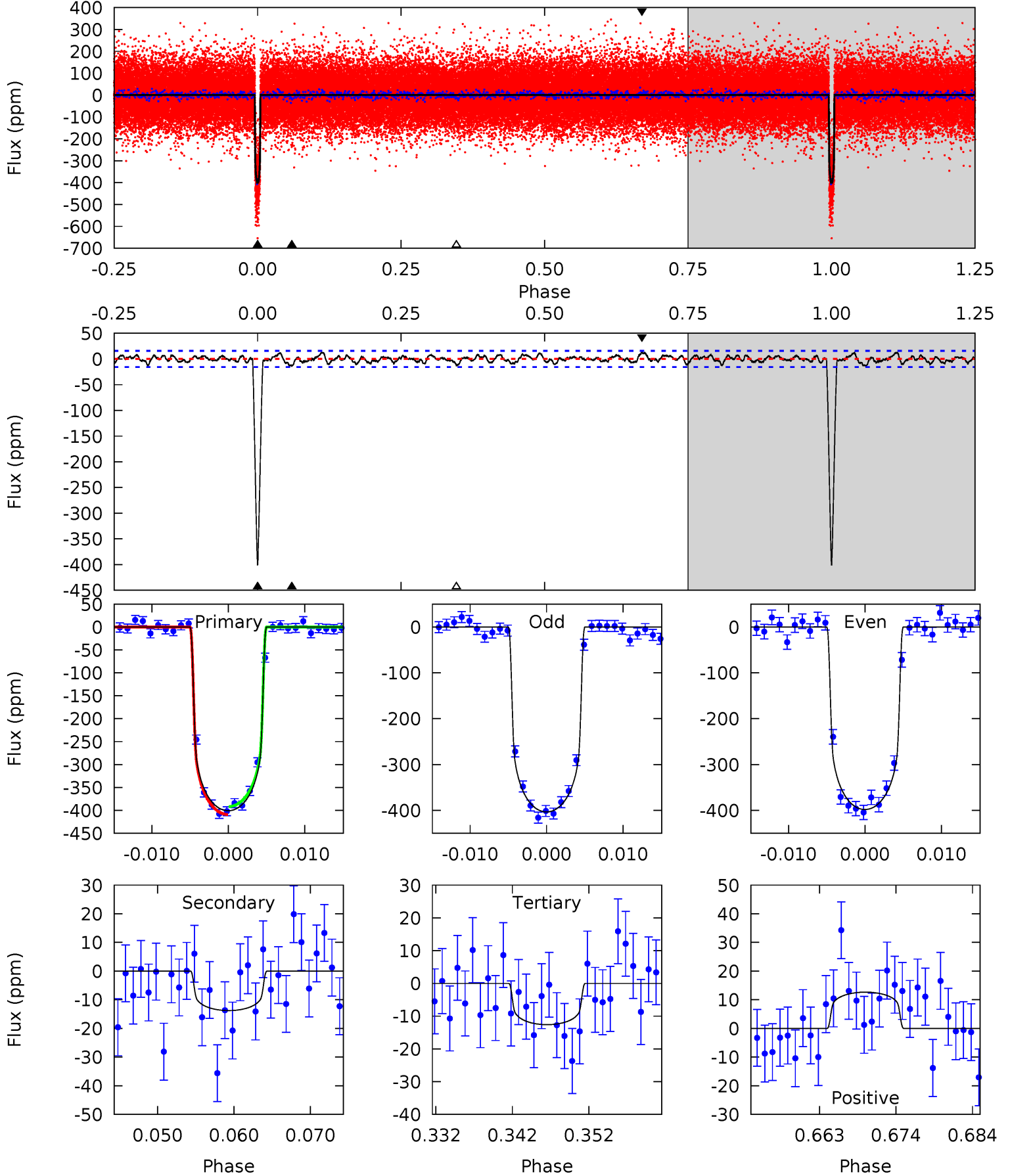
TCE 008494142-01 P= 42.883119 Days  $T_0=160.755017$  (BKJD)



# DV Model-Shift Uniqueness Test

008494142-01,  $P = 42.882520$  Days,  $E = 117.882625$  Days

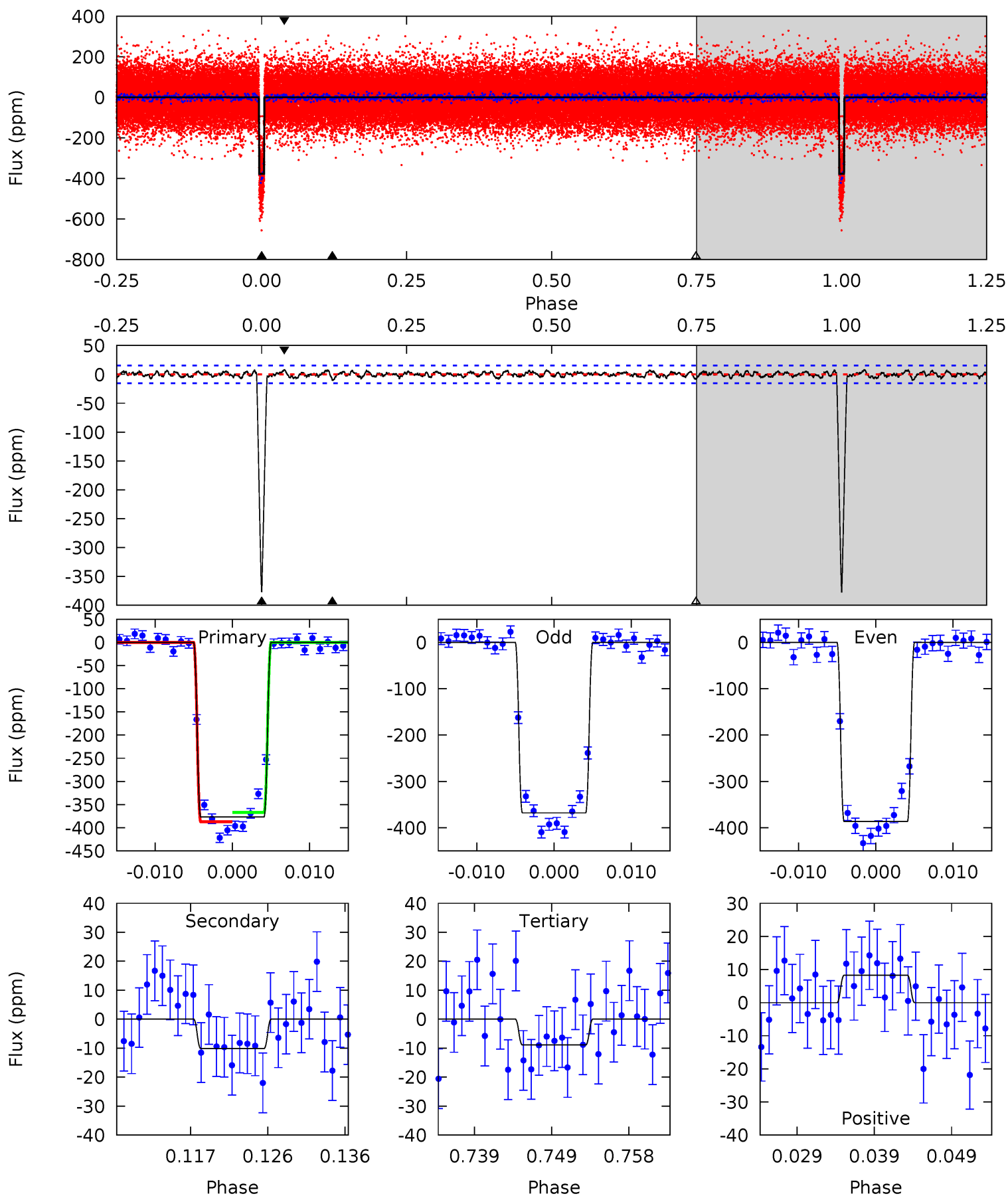
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
129.0	4.43	4.05	4.07	5.03	2.57	1.55	124.9	124.9	0.38	0.36	0.85	0.97	0.03	2.78



# Alt Model-Shift Uniqueness Test

008494142-01,  $P = 42.883119$  Days,  $E = 117.871898$  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
123.4	3.32	2.92	2.71	5.03	2.59	1.03	120.5	120.7	0.40	0.61	3.05	1.01	0.02	3.29



### Stellar Parameters For KIC 008494142

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6143^{+97}_{-110}$	$4.039^{+0.030}_{-0.030}$	$0.120^{+0.100}_{-0.100}$	$1.763^{+0.119}_{-0.082}$	$1.240^{+0.128}_{-0.064}$	$0.319^{+0.038}_{-0.038}$
	+2%/-2%	+1%/-1%	+83%/-83%	+7%/-5%	+10%/-5%	+12%/-12%
Source	SPE8	AST69	SPE69	DSEP		

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

### Secondary Eclipse Parameters for KIC 008494142-01 / KOI 0370.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-14 \pm 3$	$3.87^{+0.20}_{-0.20}$	$990^{+20}_{-19}$	$3221^{+109}_{-131}$	$34^{+8}_{-8}$
Alt.	$-10 \pm 3$	$3.74^{+0.22}_{-0.18}$	$989^{+21}_{-20}$	$3109^{+136}_{-166}$	$27^{+9}_{-8}$

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

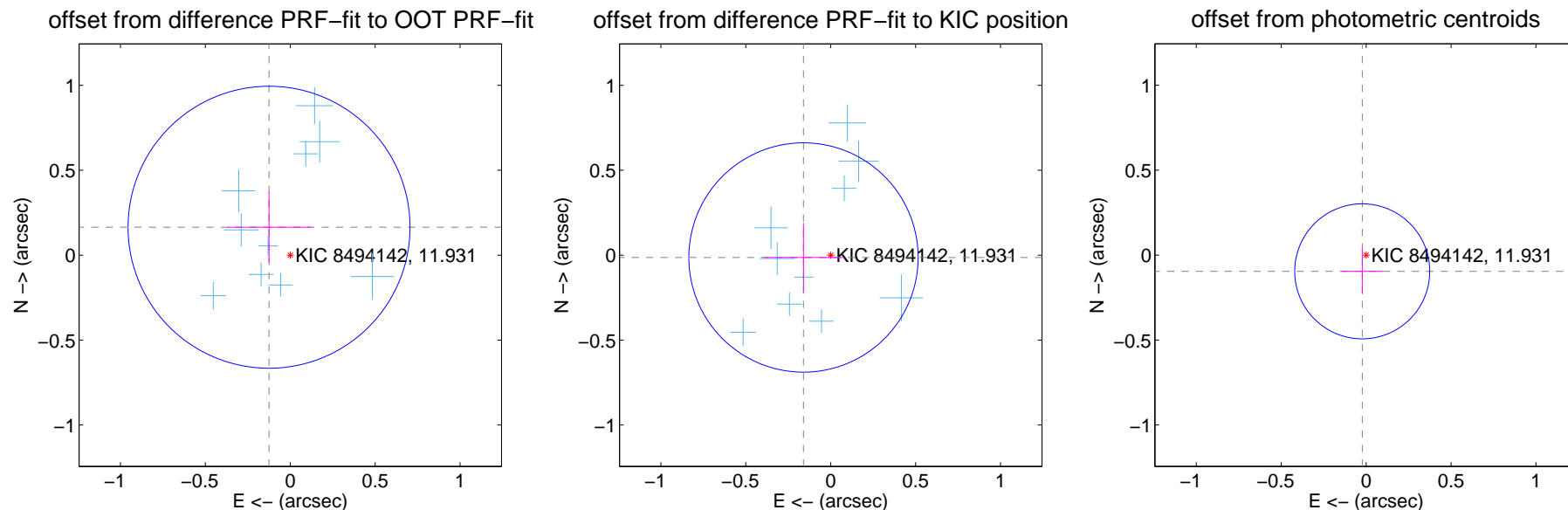
## DV Centroid Data

Supplemental centroid analysis for 008494142-01. **Kepler magnitude: 11.93.** Transit SNR 72.55

There are 15 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

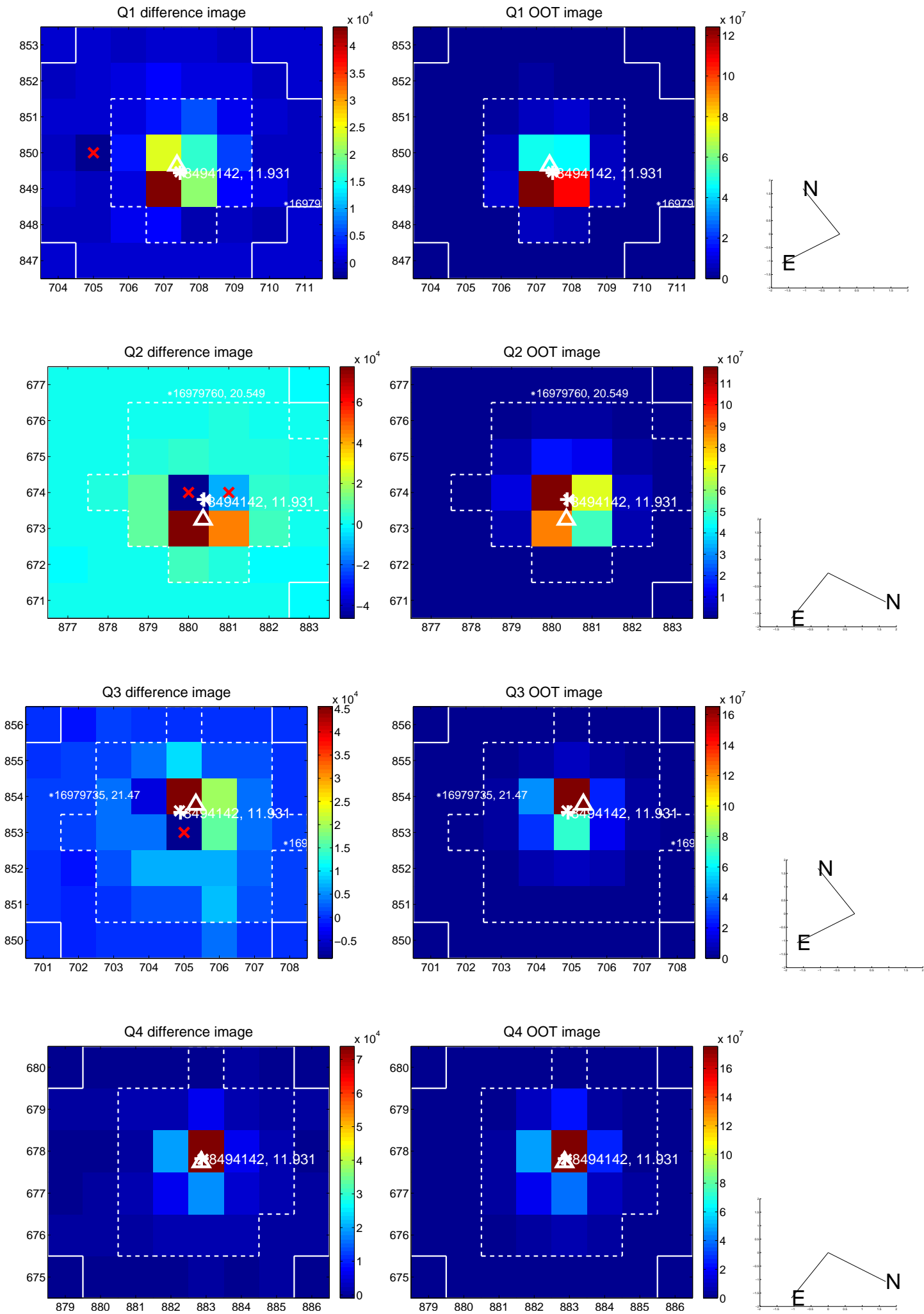
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.206 \pm 0.277$	0.75	$0.125 \pm 0.248$	$0.164 \pm 0.207$
PRF-fit source offset from KIC position	$0.161 \pm 0.225$	0.72	$0.160 \pm 0.233$	$-0.014 \pm 0.204$
photometric centroid source offset	$0.10 \pm 0.13$	0.74	$0.02 \pm 0.12$	$-0.10 \pm 0.13$



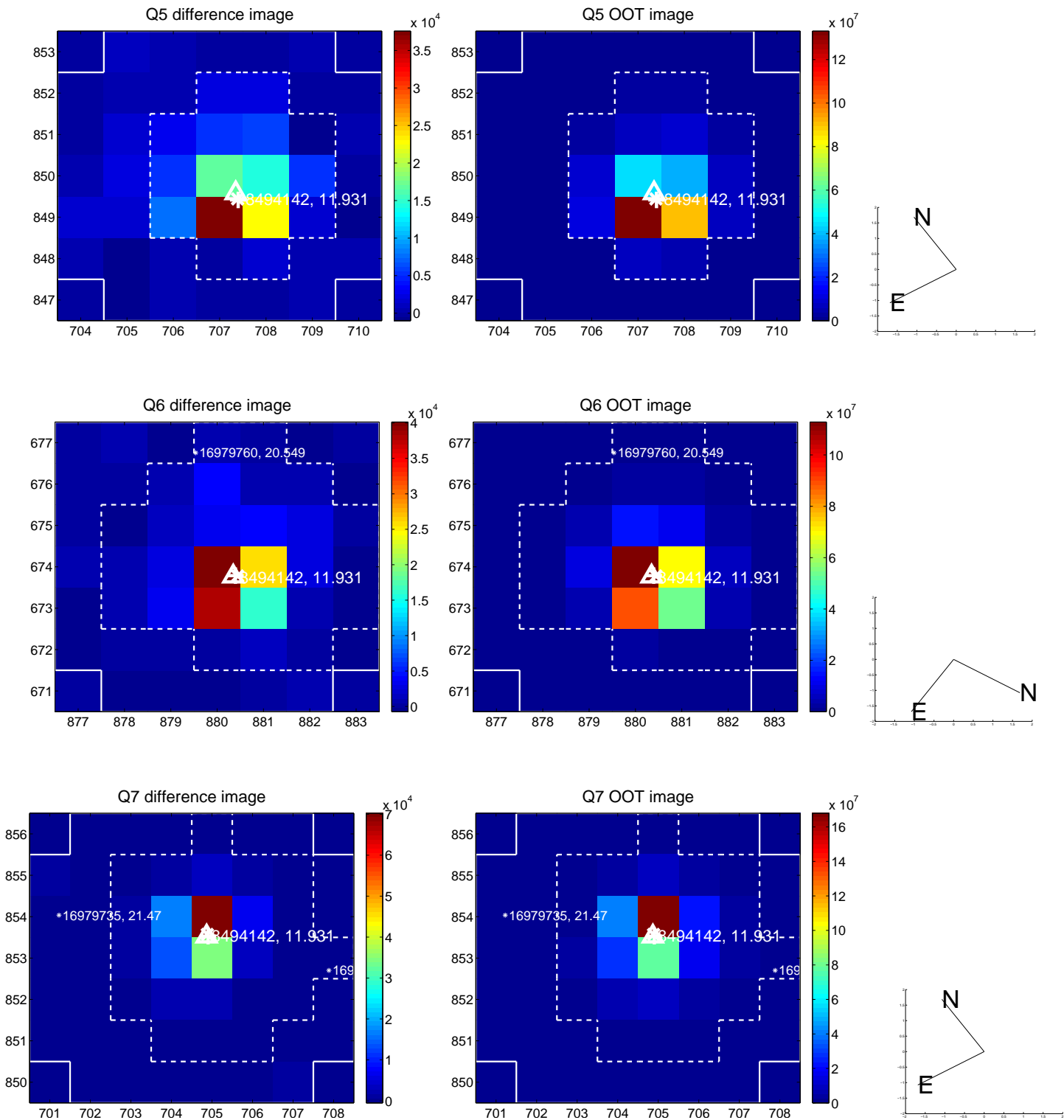
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

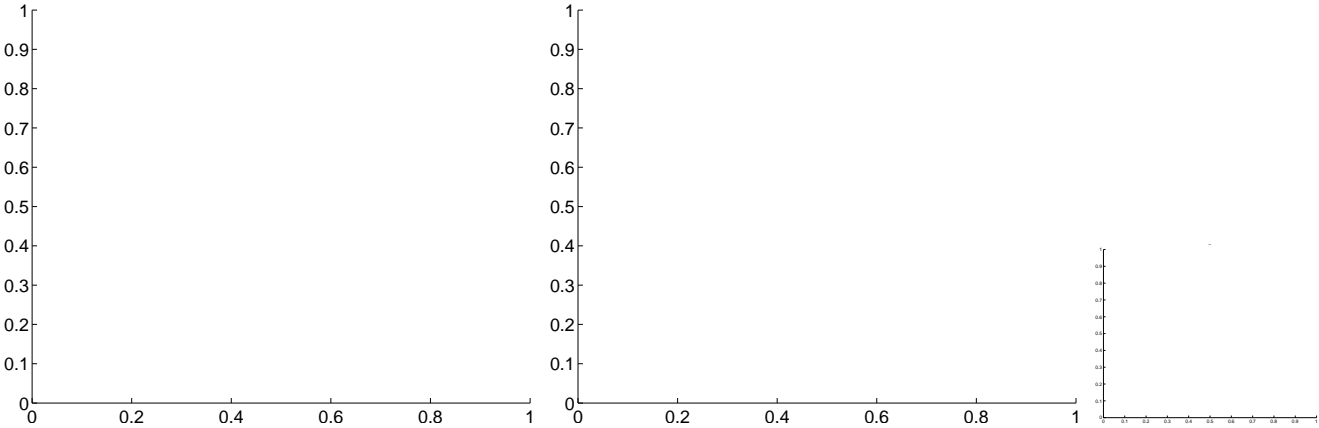


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

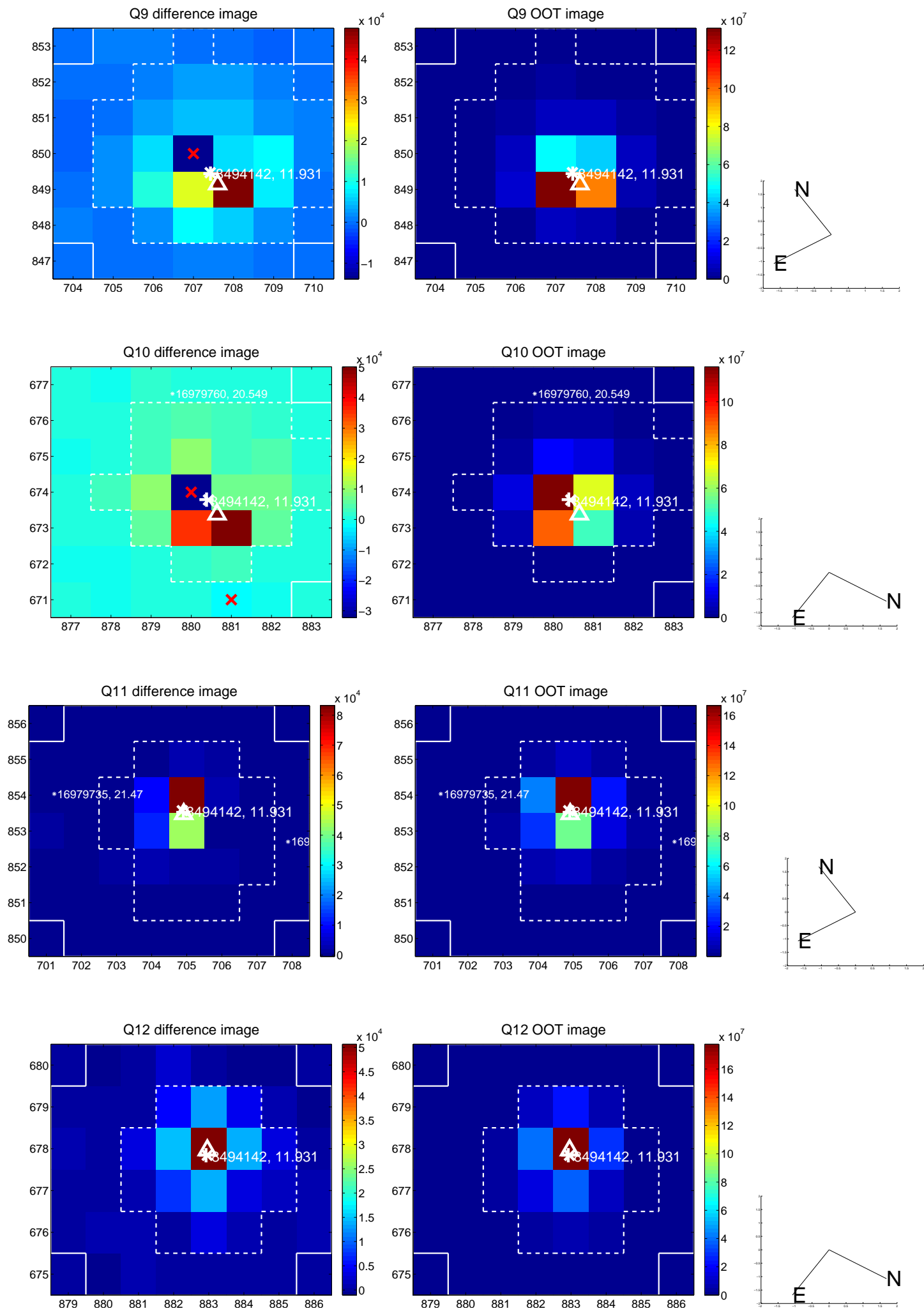


Q8 no difference image

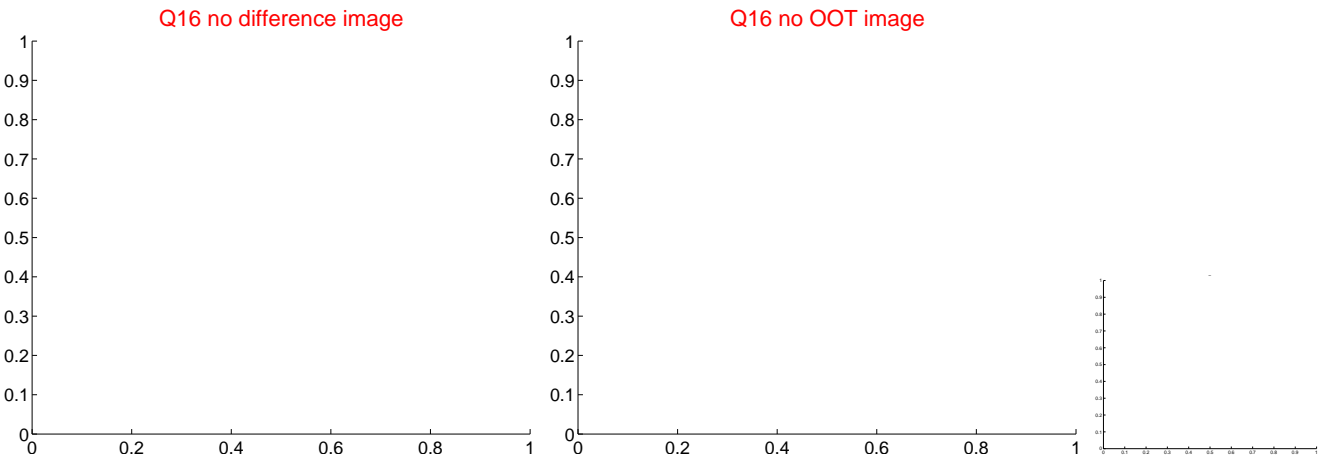
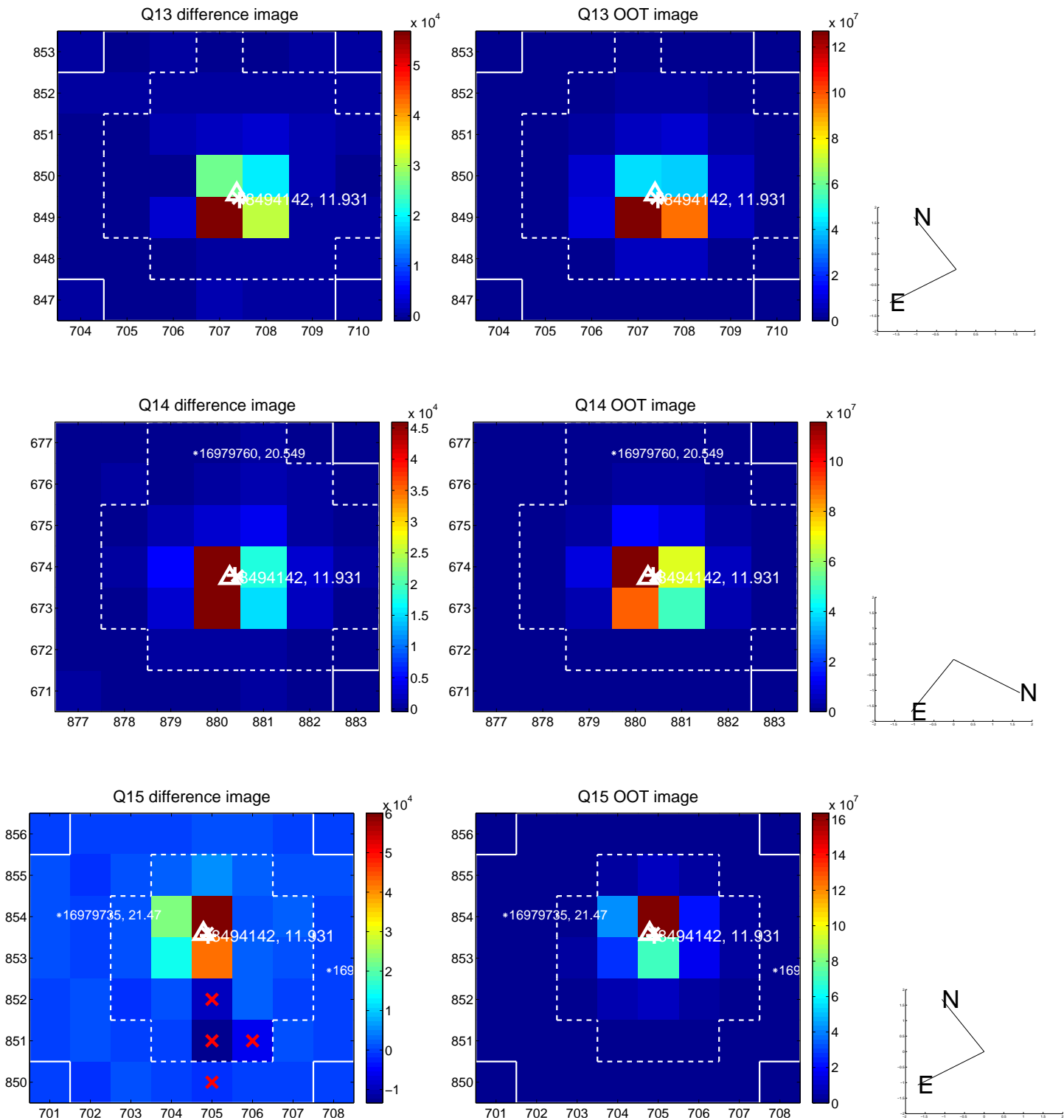
Q8 no OOT image



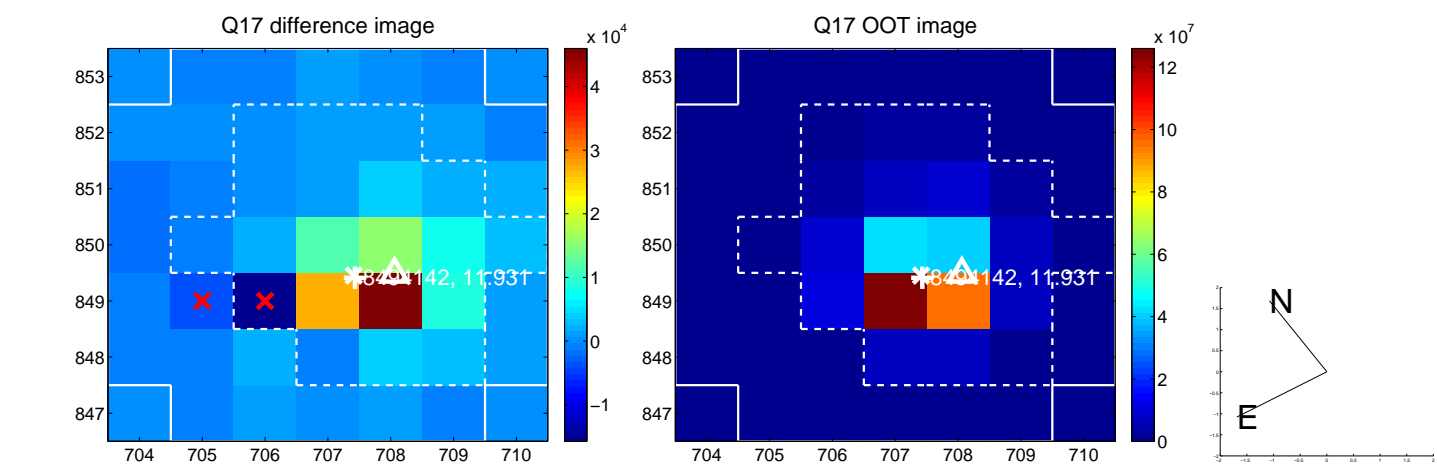
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



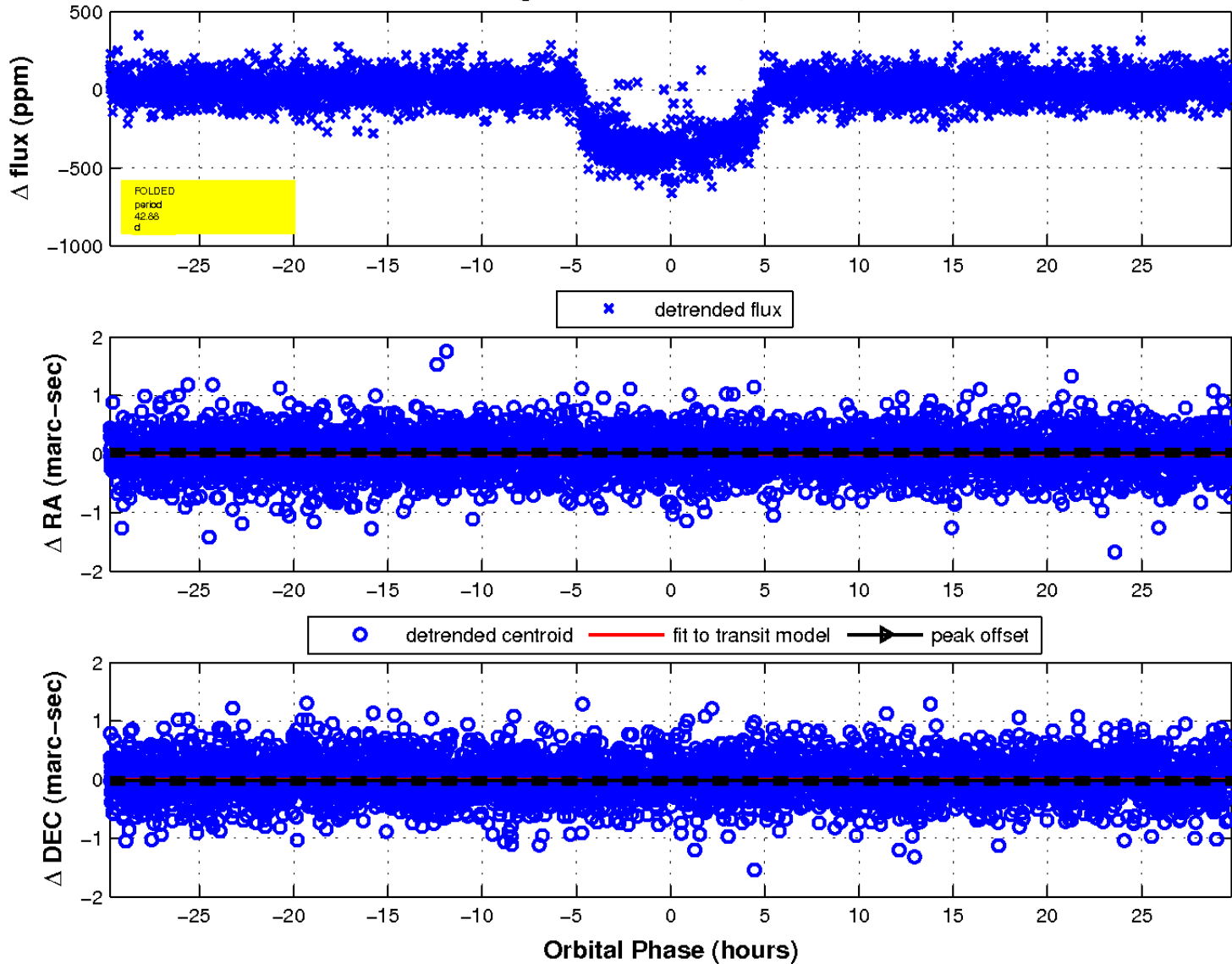
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

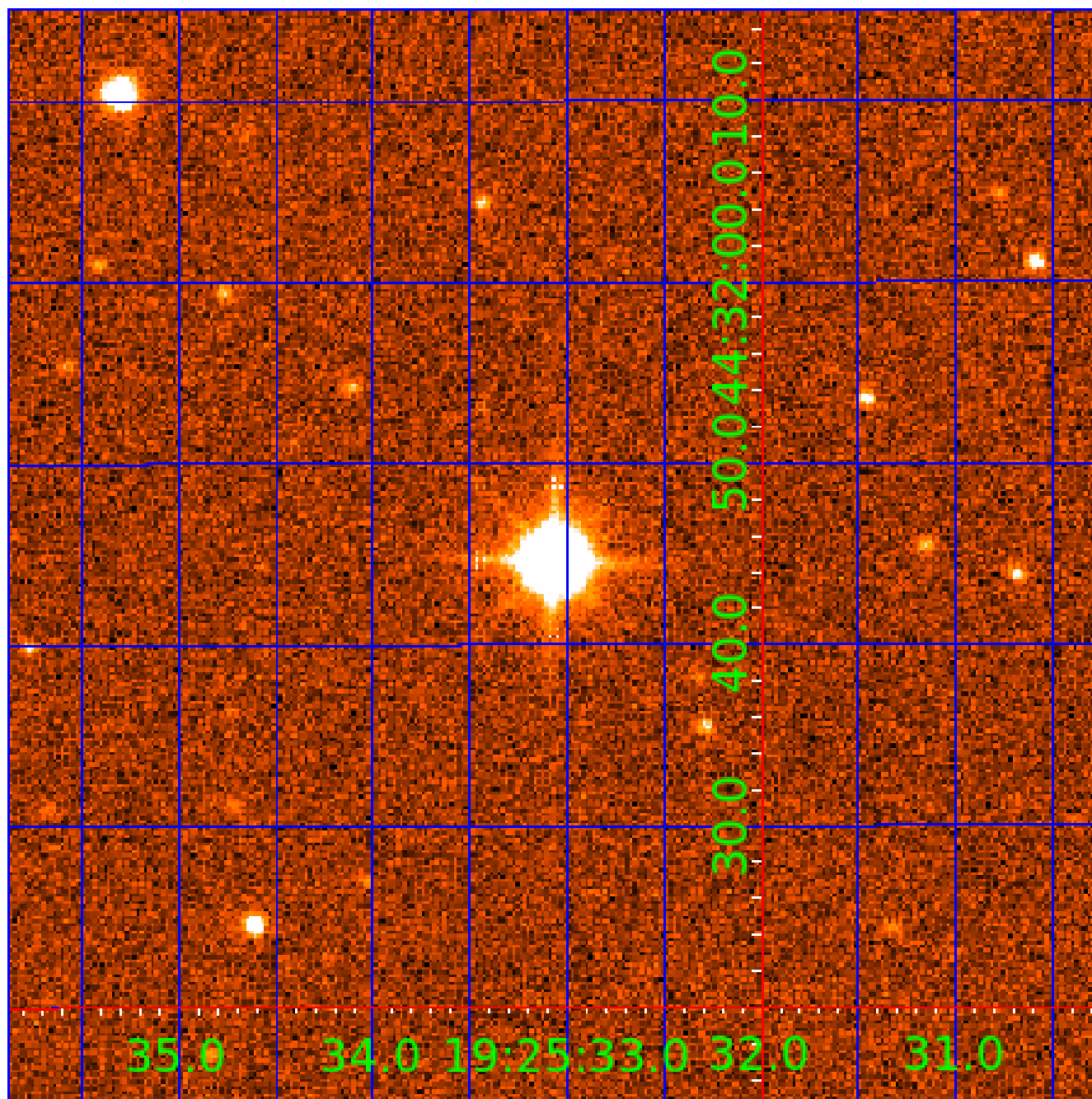


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 008494142

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008494142-01	OBS	0370.01	42.882520	160.765145	405.4	9.928	68.8	72.6	1.76	6143	3.85	59.73
008494142-02	OBS	0370.02	22.950614	151.532238	131.9	5.112	25.0	25.8	1.76	6143	2.64	137.47

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008494142-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
008494142-02	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.

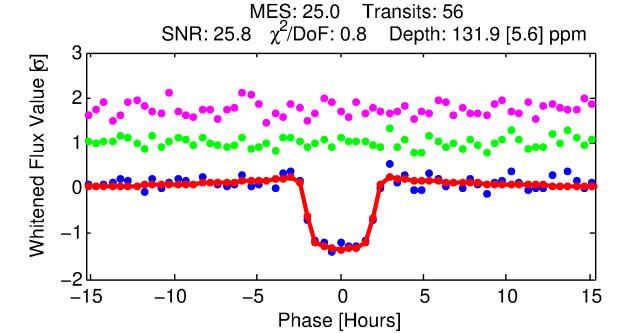
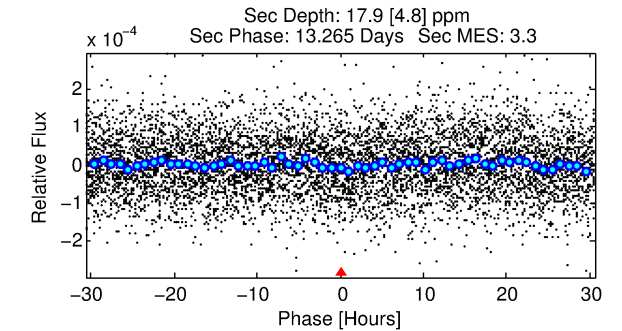
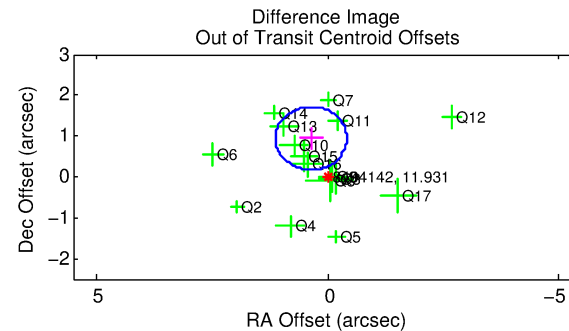
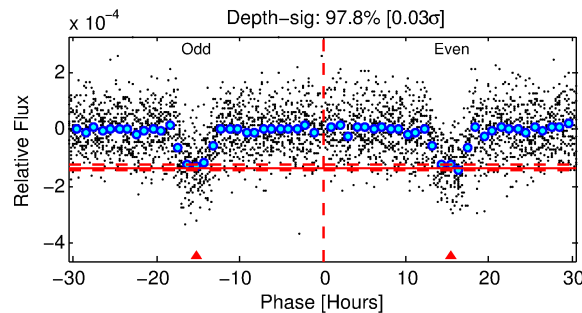
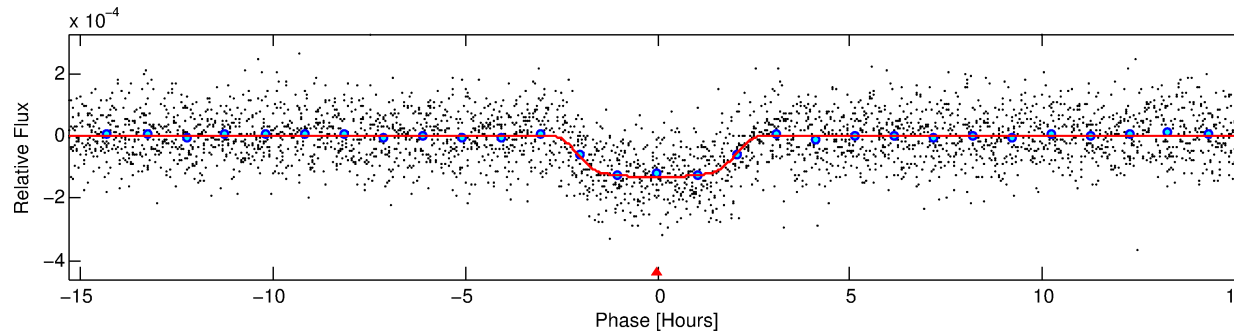
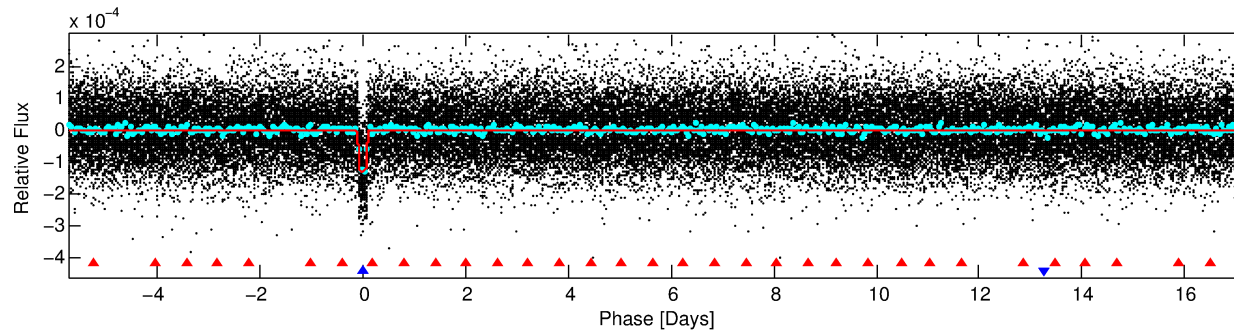
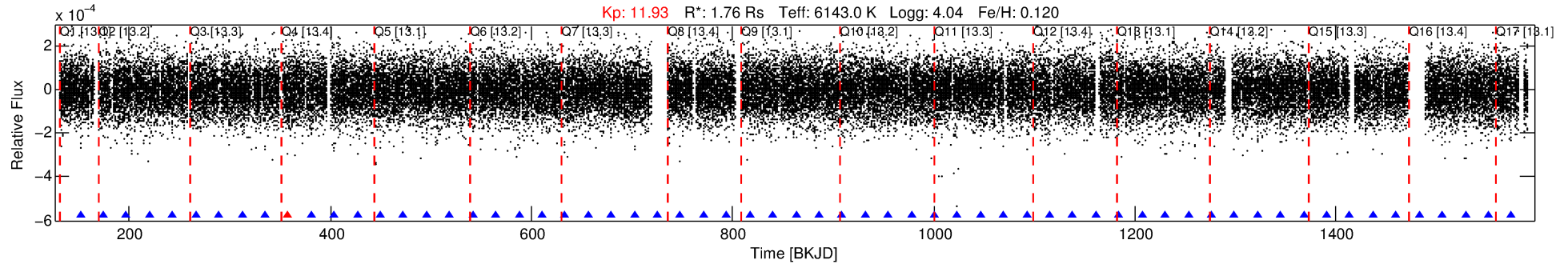
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008494142-02

No Significant Match Found

# DV One-Page Summary

KIC: 8494142 Candidate: 2 of 2 Period: 22.951 d  
KOI: K00370.02 Name: Kepler-145b Corr: 0.932



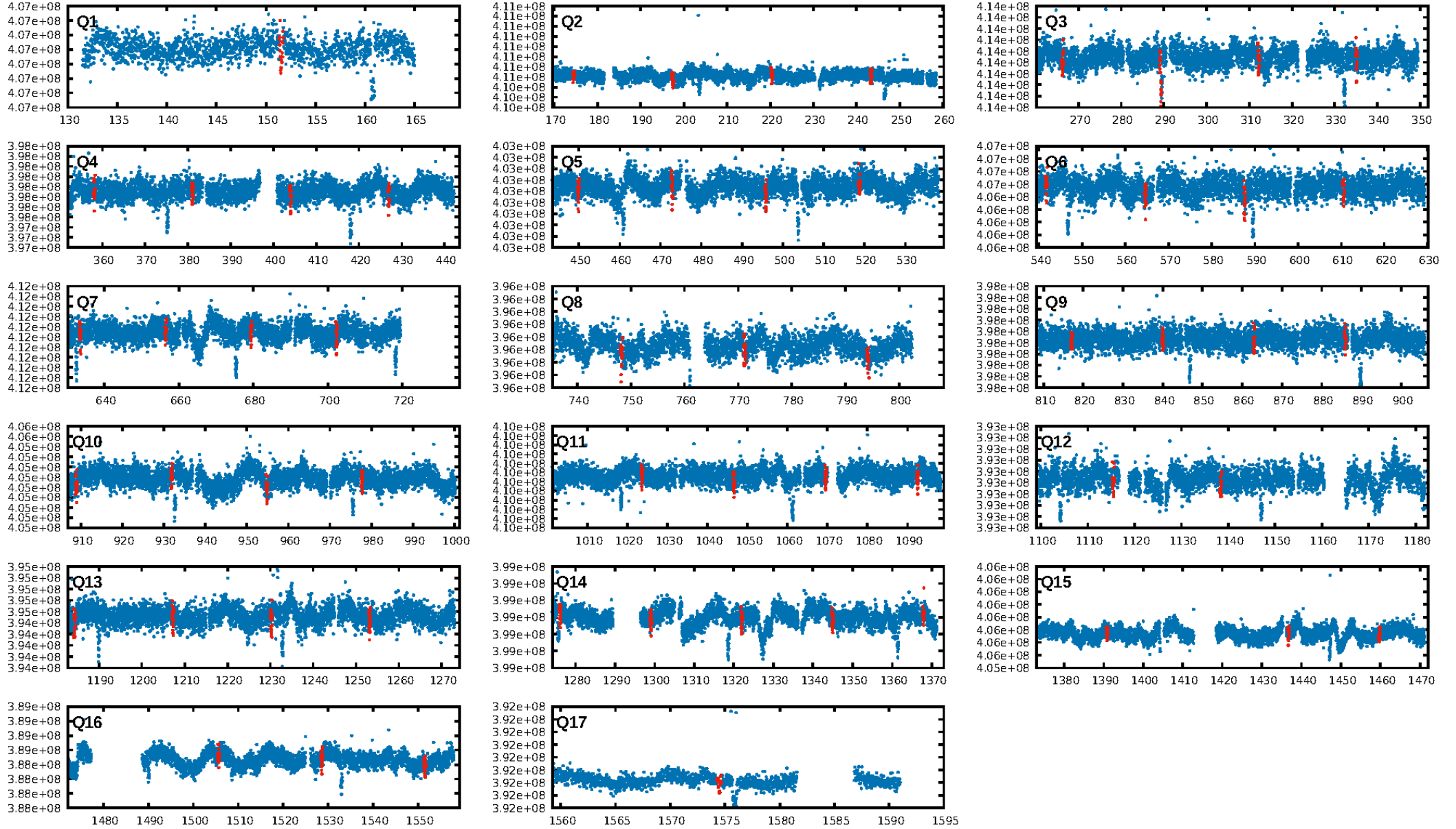
## DV Fit Results:

Period = 22.95061 [0.00011] d  
Epoch = 151.5322 [0.0038] BKJD  
Rp/R\* = 0.0137 [0.0005]  
a/R\* = 10.19 [1.31]  
b = 0.97 [0.01]  
Seff = 137.47 [13.24]  
Teq = 873 [21] K  
Rp = 2.64 [0.20] Re  
a = 0.1698 [0.0086] AU  
Ag = 40.53 [11.60] [3.41 $\sigma$ ]  
Teffp = 3406 [245] K [10.29 $\sigma$ ]

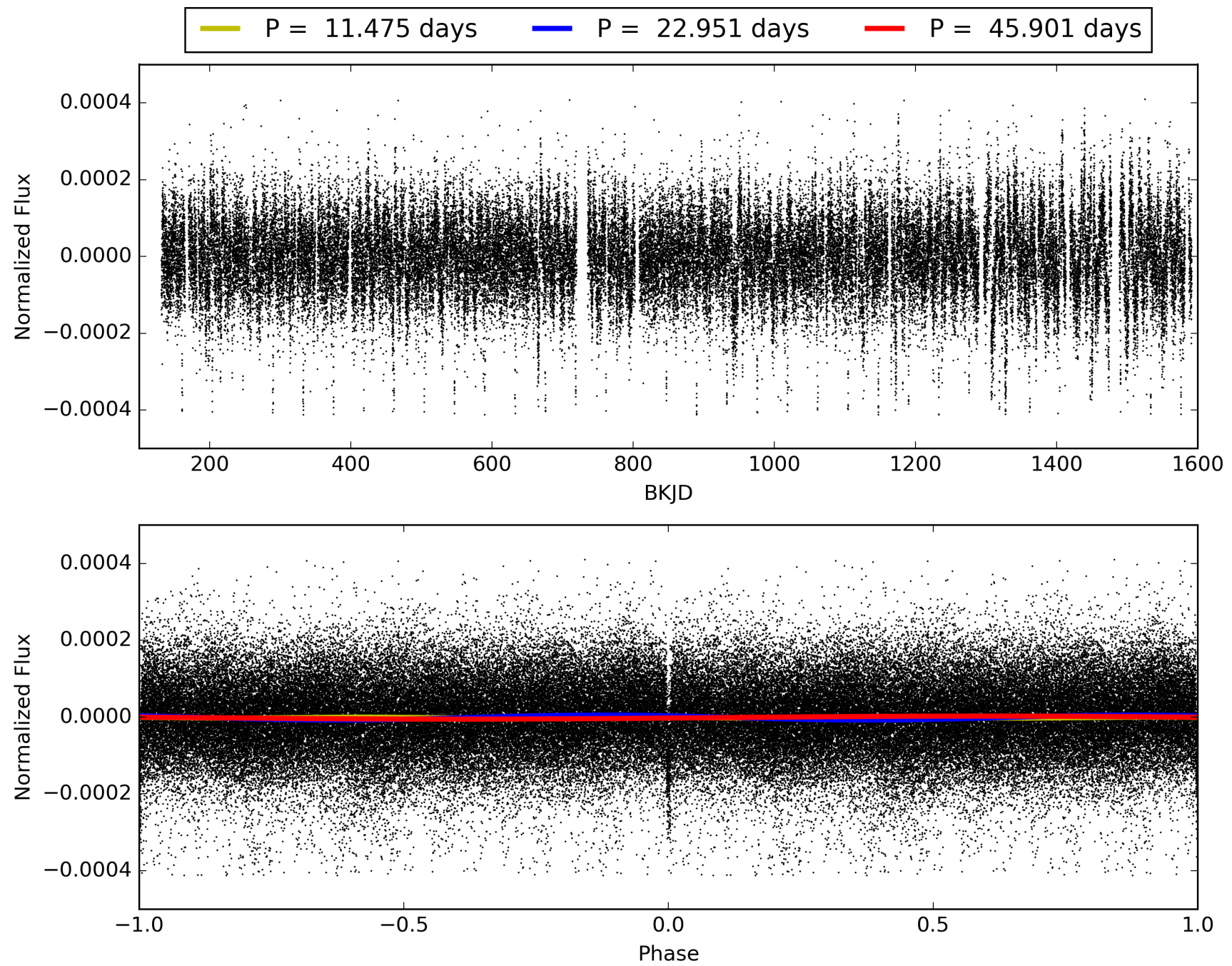
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [42.84 $\sigma$ ]  
ModelChiSquare2-sig: 99.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.45e-129  
RollingBand-fgt: 0.98 [53/54]  
GhostDiagnostic-chr: 14.67  
Centroid-sig: 5.9%  
Centroid-so: 0.651 arcsec [1.62 $\sigma$ ]  
OotOffset-rm: 1.007 arcsec [3.91 $\sigma$ ]  
KicOffset-rm: 0.792 arcsec [3.06 $\sigma$ ]  
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 008494142-02, PDC Light Curves

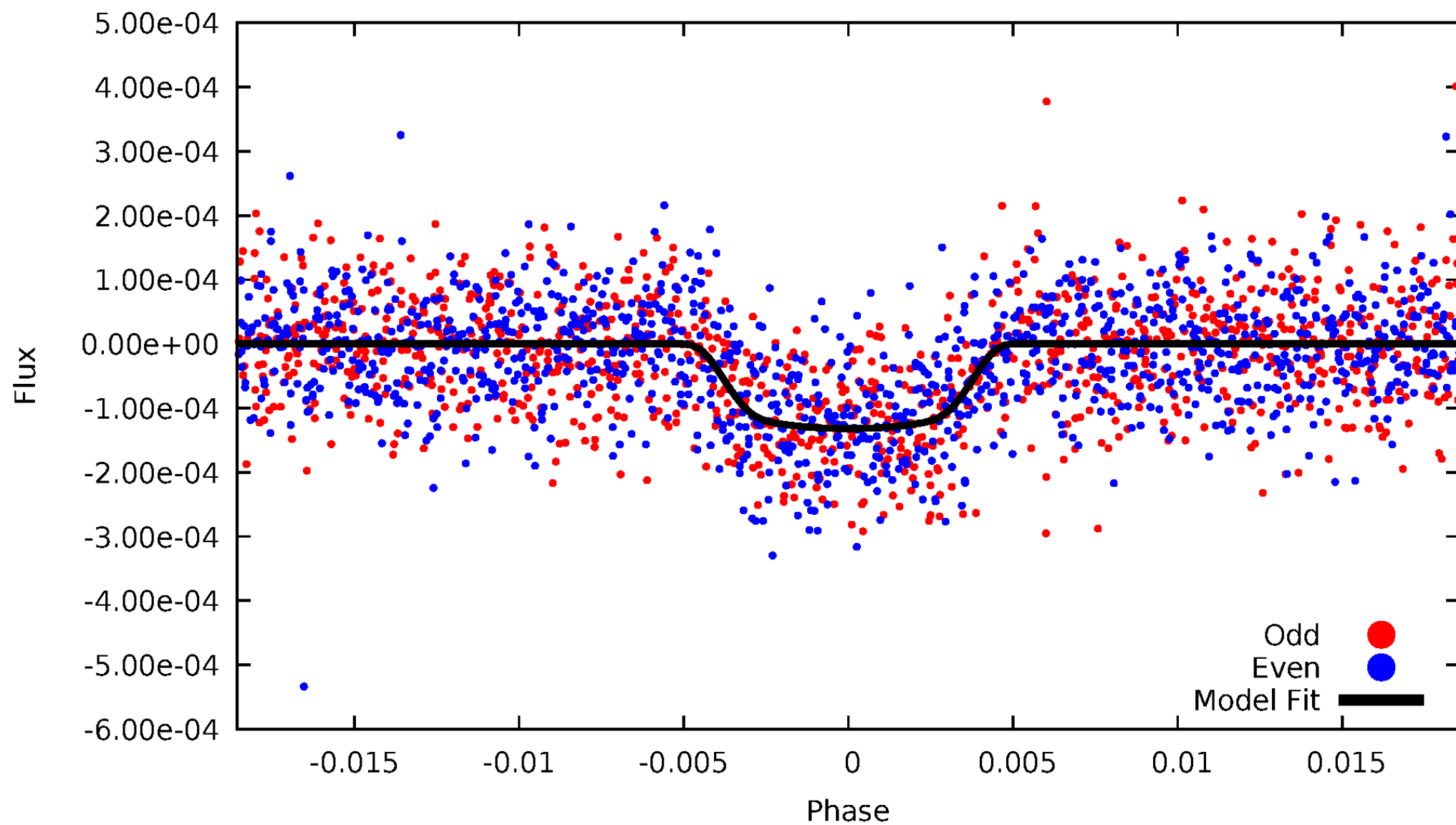


TCE 008494142-02



# DV Odd/Even

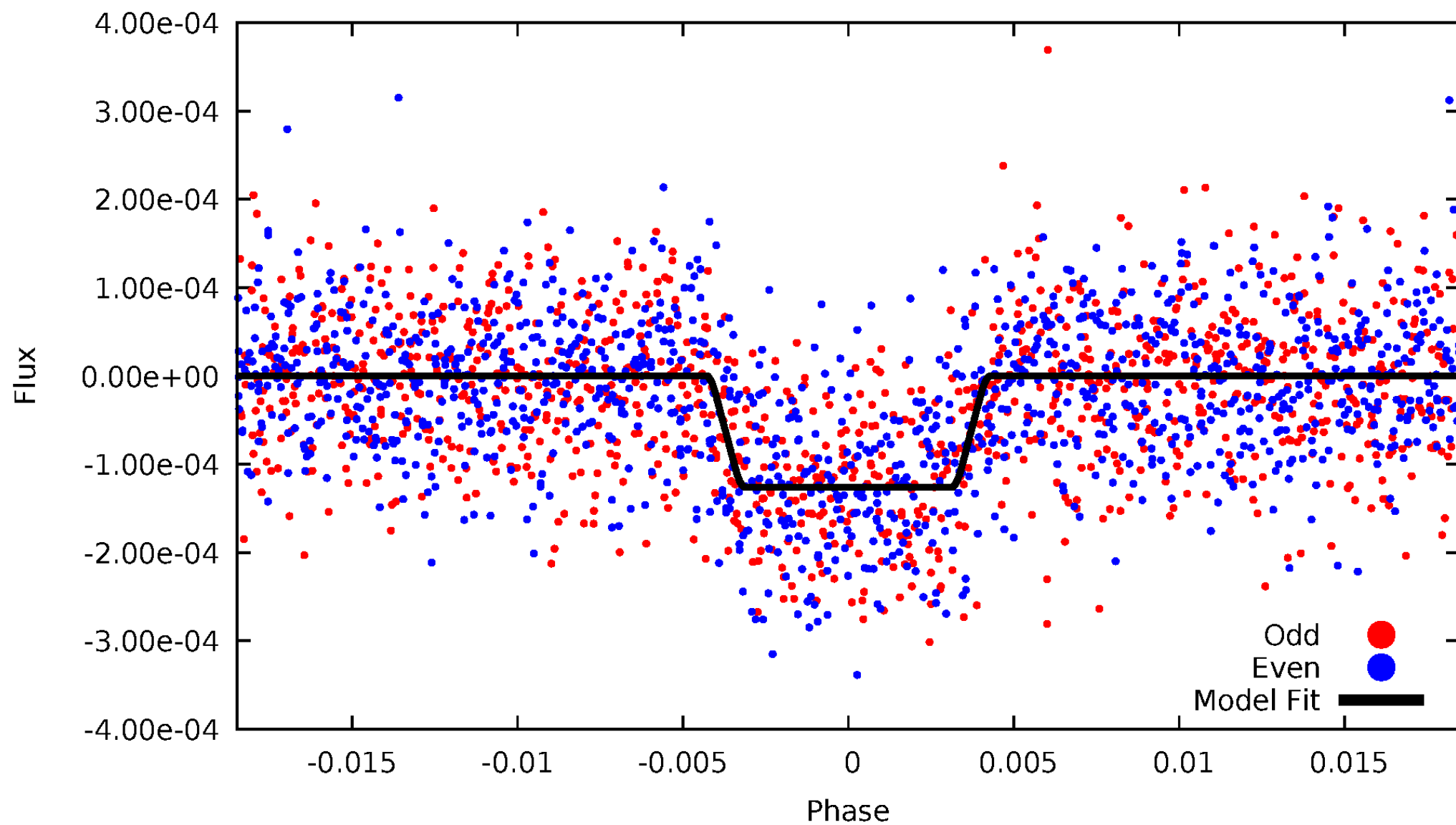
TCE 008494142-02





# ALT Odd/Even

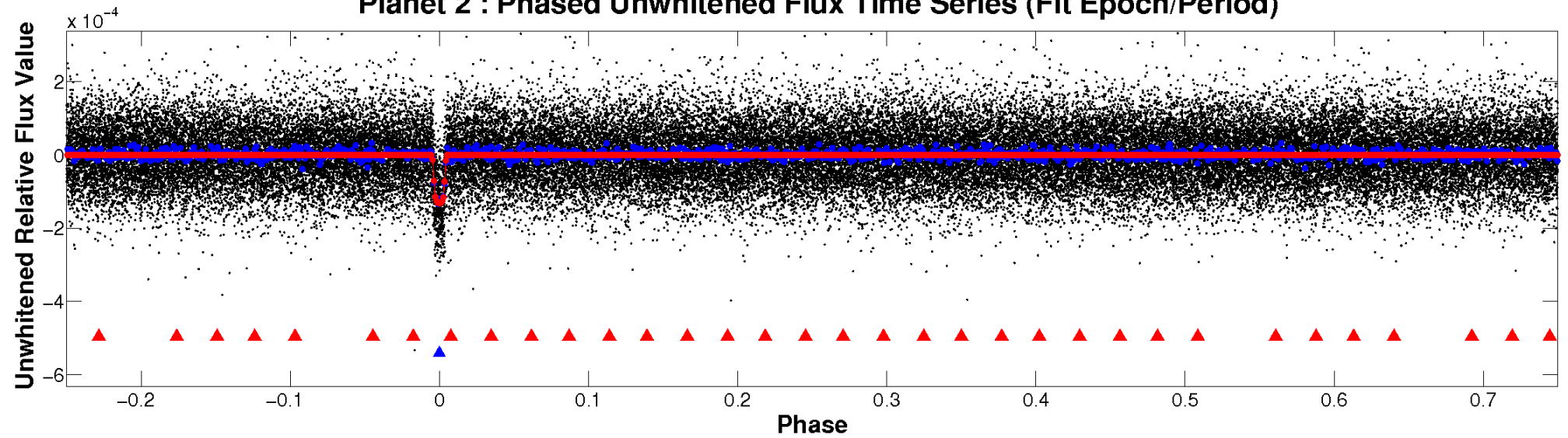
TCE 008494142-02



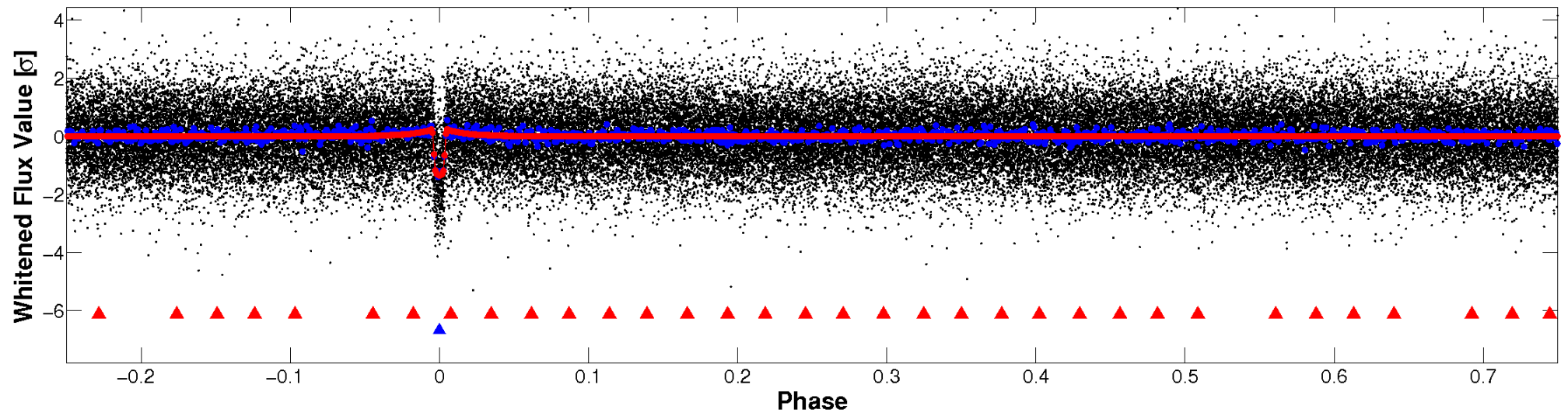


# Non-Whitened Vs. Whitened Light Curve

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

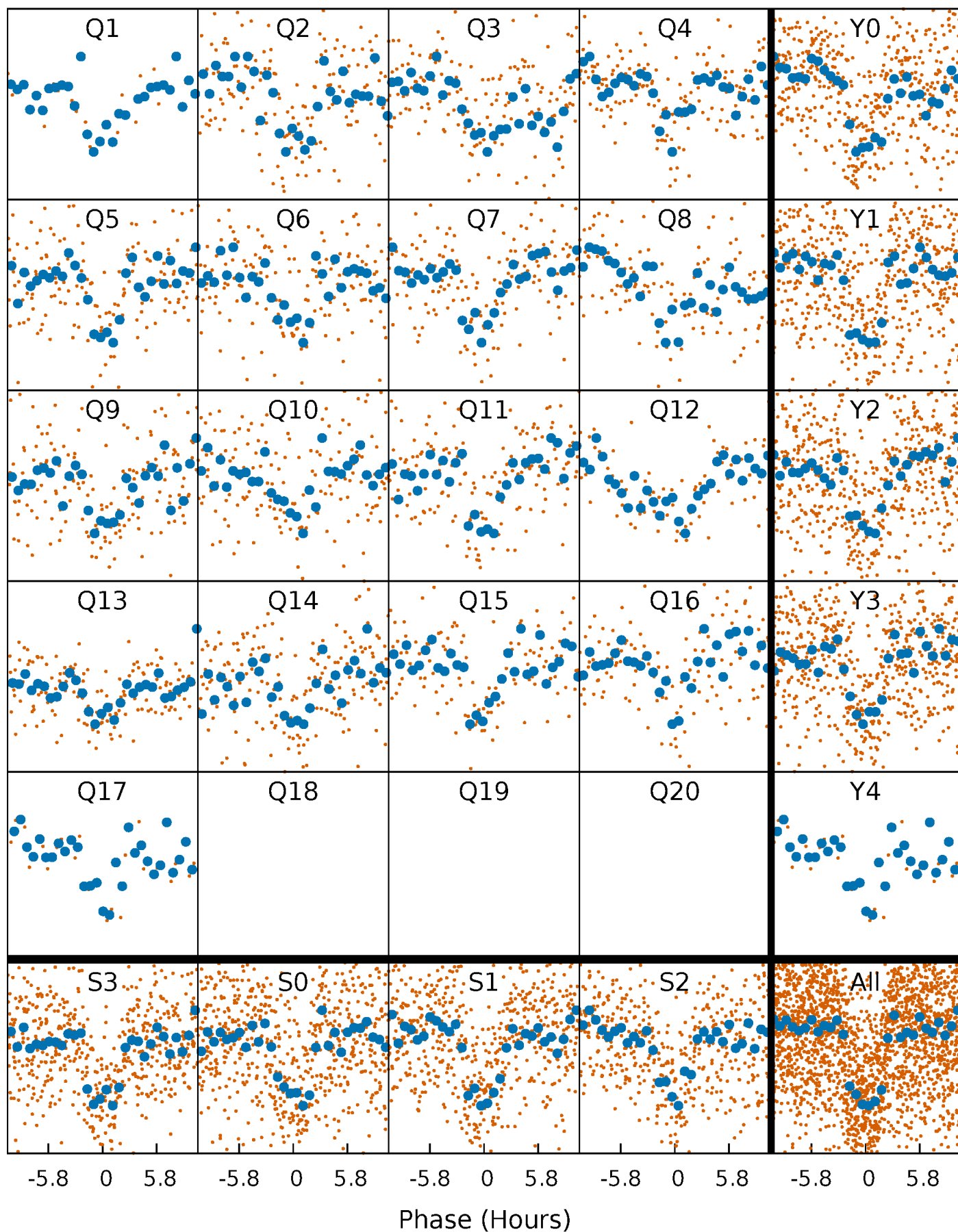


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



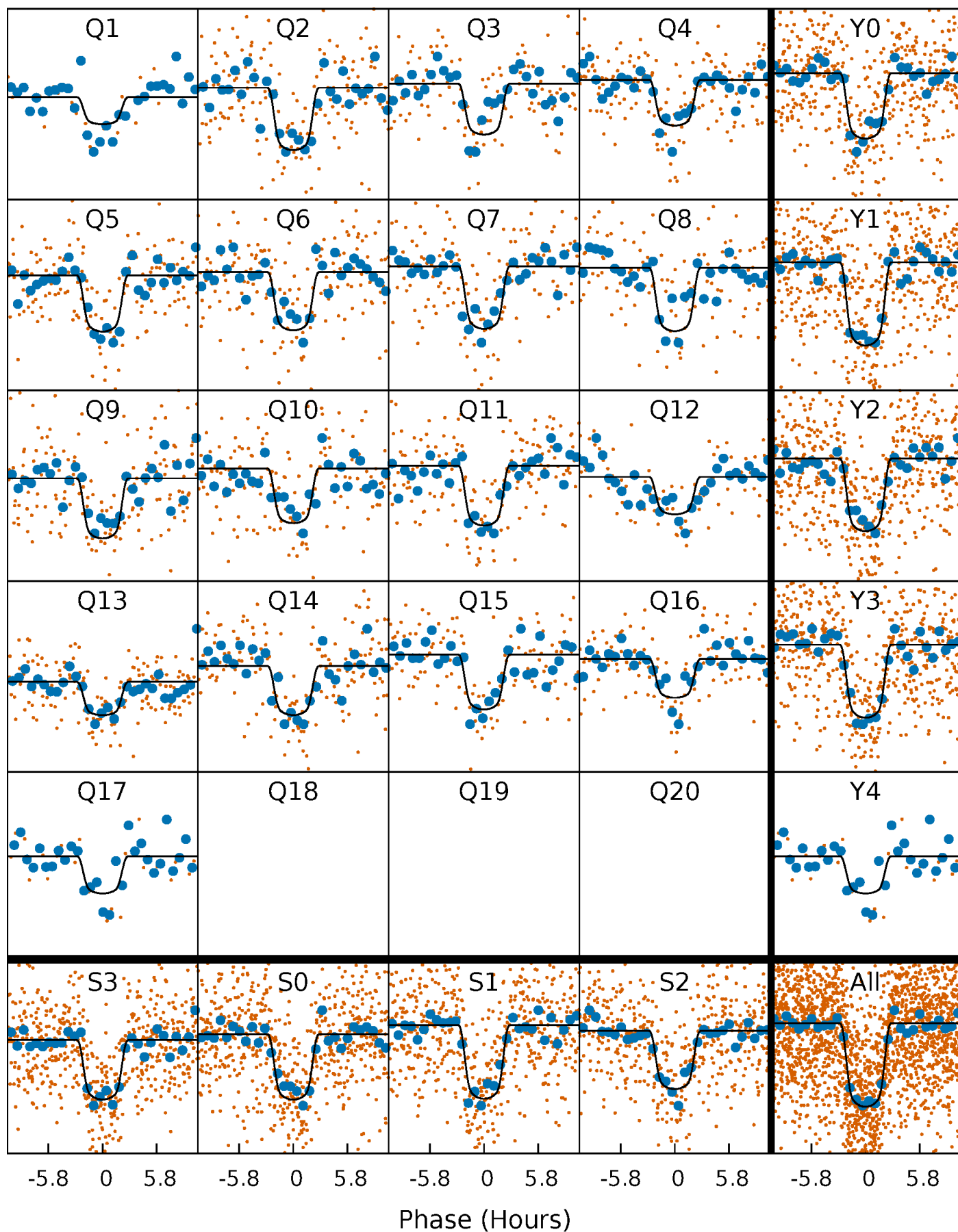
# PDC Quarter-Phased Transit Curves

TCE 008494142-02 P= 22.950614 Days  $T_0=151.532238$  (BKJD)



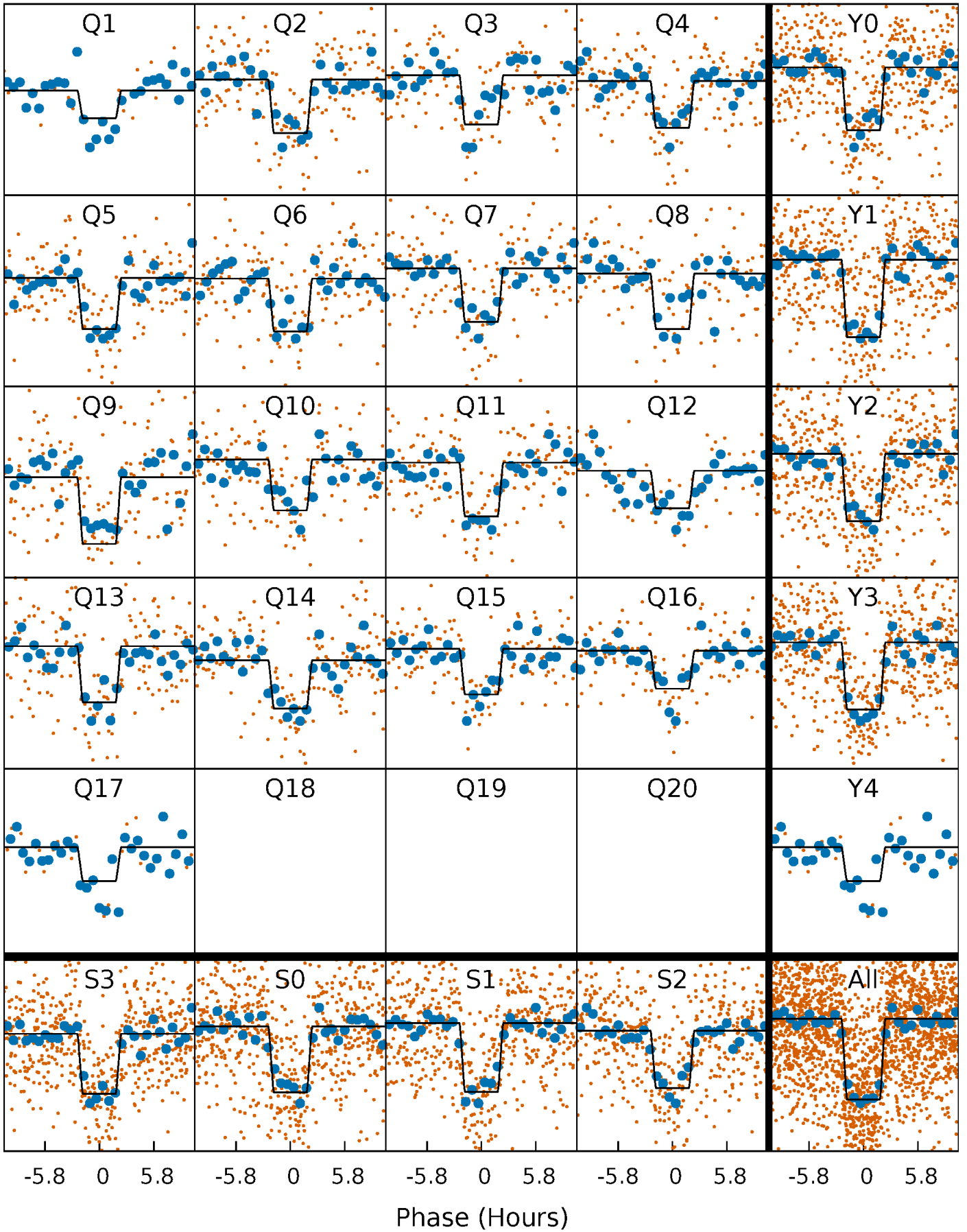
# DV Quarter-Phased Transit Curves

TCE 008494142-02 P= 22.950614 Days  $T_0=151.532238$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

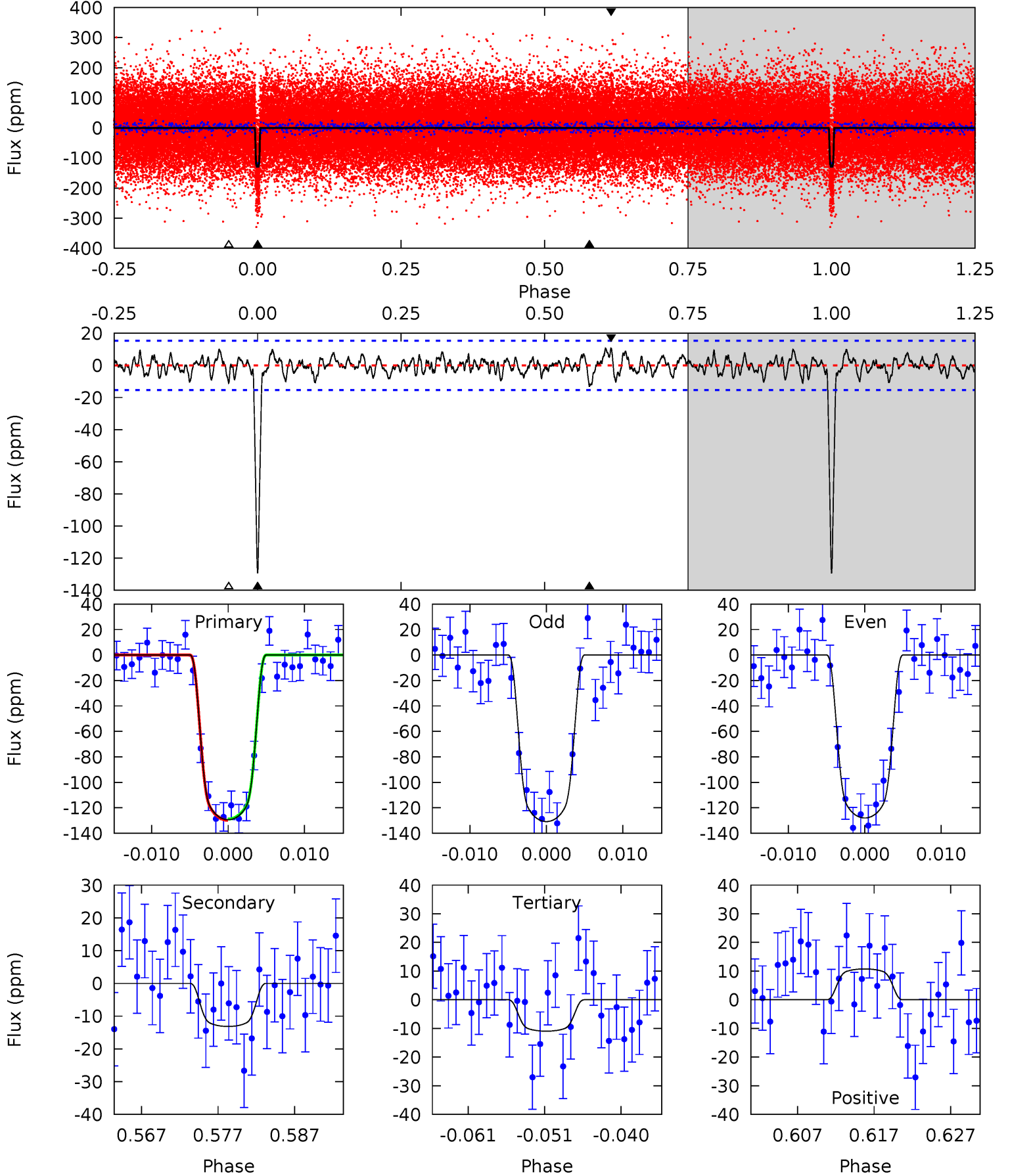
TCE 008494142-02 P= 22.950613 Days  $T_0=151.532120$  (BKJD)



# DV Model-Shift Uniqueness Test

008494142-02,  $P = 22.950614$  Days,  $E = 128.581624$  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
42.3	4.30	3.58	3.52	5.02	2.57	1.29	38.7	38.8	0.72	0.79	0.47	0.97	0.08	0.17

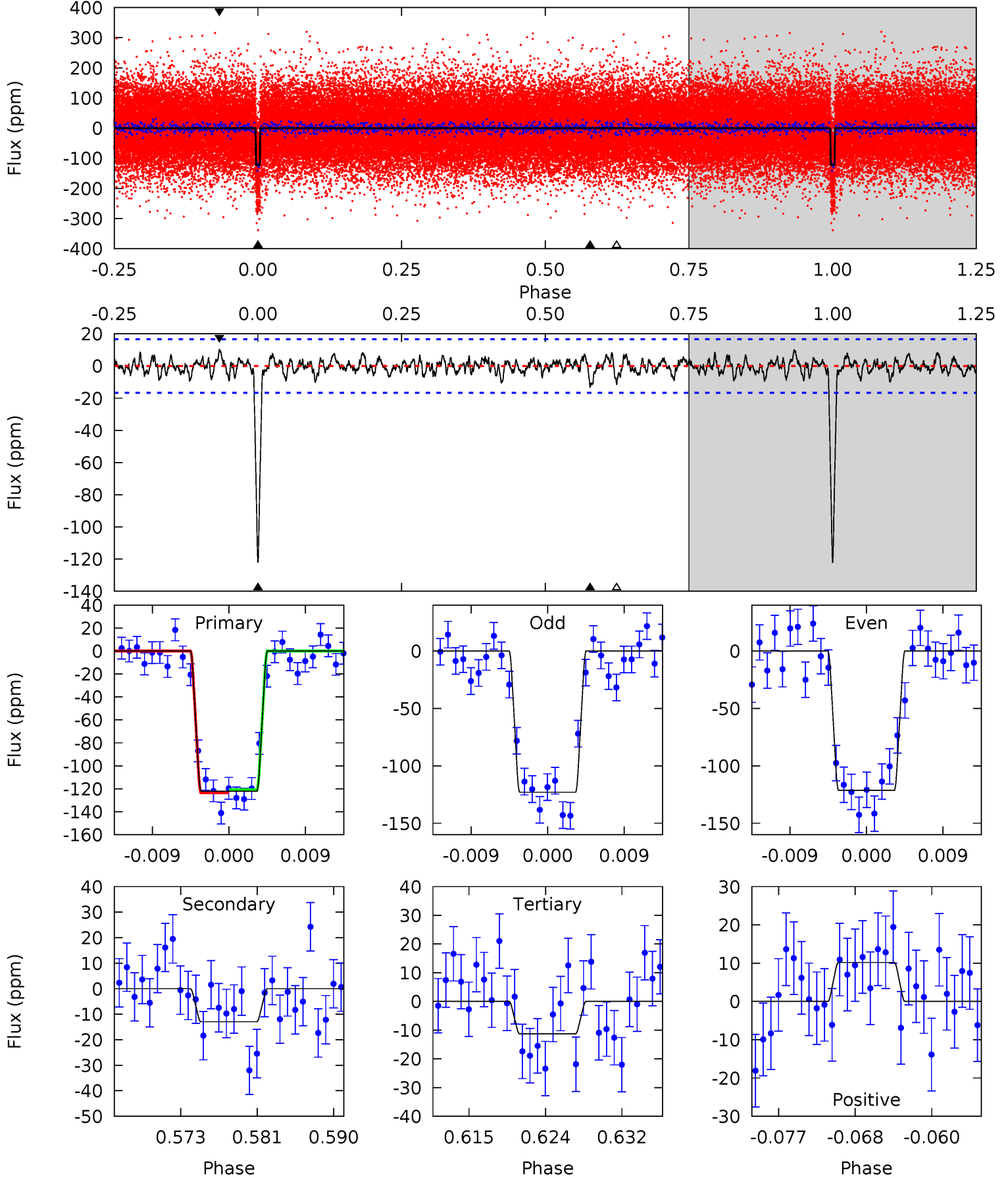




# Alt Model-Shift Uniqueness Test

008494142-02, P = 22.950613 Days, E = 128.581507 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
37.0	3.93	3.41	3.08	5.06	2.63	1.07	33.6	34.0	0.51	0.84	0.25	0.99	0.08	0.41



### Stellar Parameters For KIC 008494142

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6143^{+97}_{-110}$	$4.039^{+0.030}_{-0.030}$	$0.120^{+0.100}_{-0.100}$	$1.763^{+0.119}_{-0.082}$	$1.240^{+0.128}_{-0.064}$	$0.319^{+0.038}_{-0.038}$
	+2%/-2%	+1%/-1%	+83%/-83%	+7%/-5%	+10%/-5%	+12%/-12%
Source	SPE8	AST69	SPE69	DSEP		

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

### Secondary Eclipse Parameters for KIC 008494142-02 / KOI 0370.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-13 \pm 3$	$2.65^{+0.14}_{-0.13}$	$1218^{+28}_{-26}$	$3593^{+142}_{-149}$	$30^{+8}_{-7}$
Alt.	$-13 \pm 3$	$2.16^{+0.12}_{-0.12}$	$1219^{+26}_{-26}$	$3841^{+170}_{-198}$	$44^{+13}_{-11}$

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



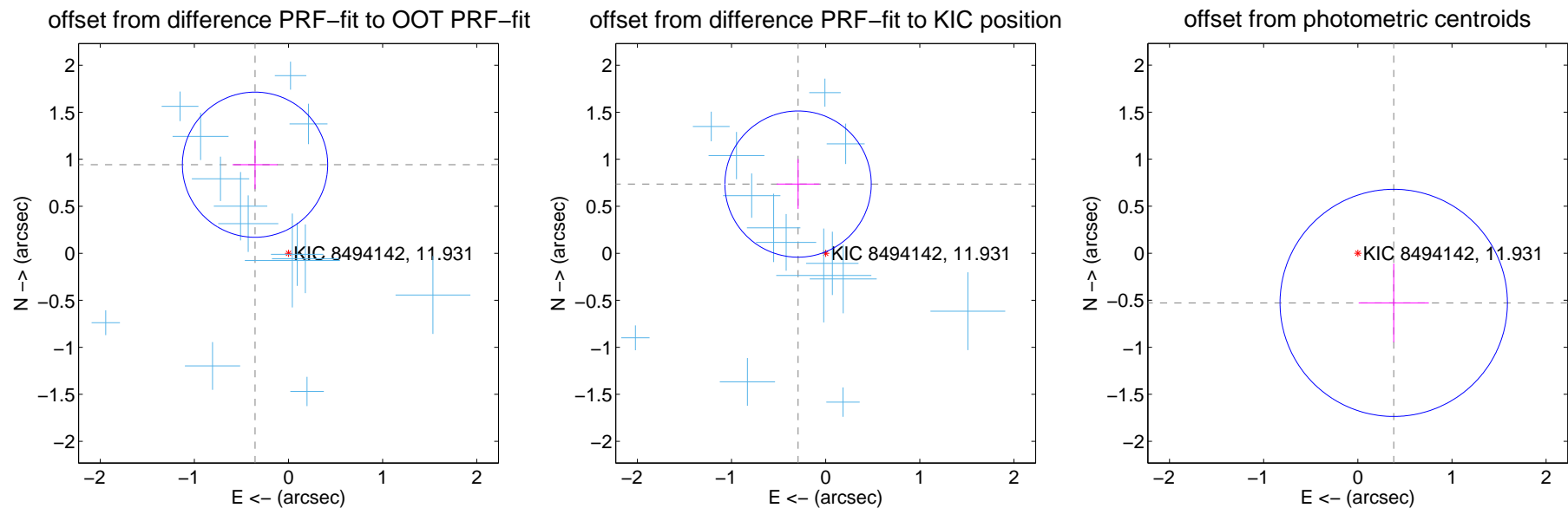
## DV Centroid Data

Supplemental centroid analysis for 008494142-02. **Kepler magnitude: 11.93.** Transit SNR 25.85

There are 16 quarters with good PRF difference image offsets

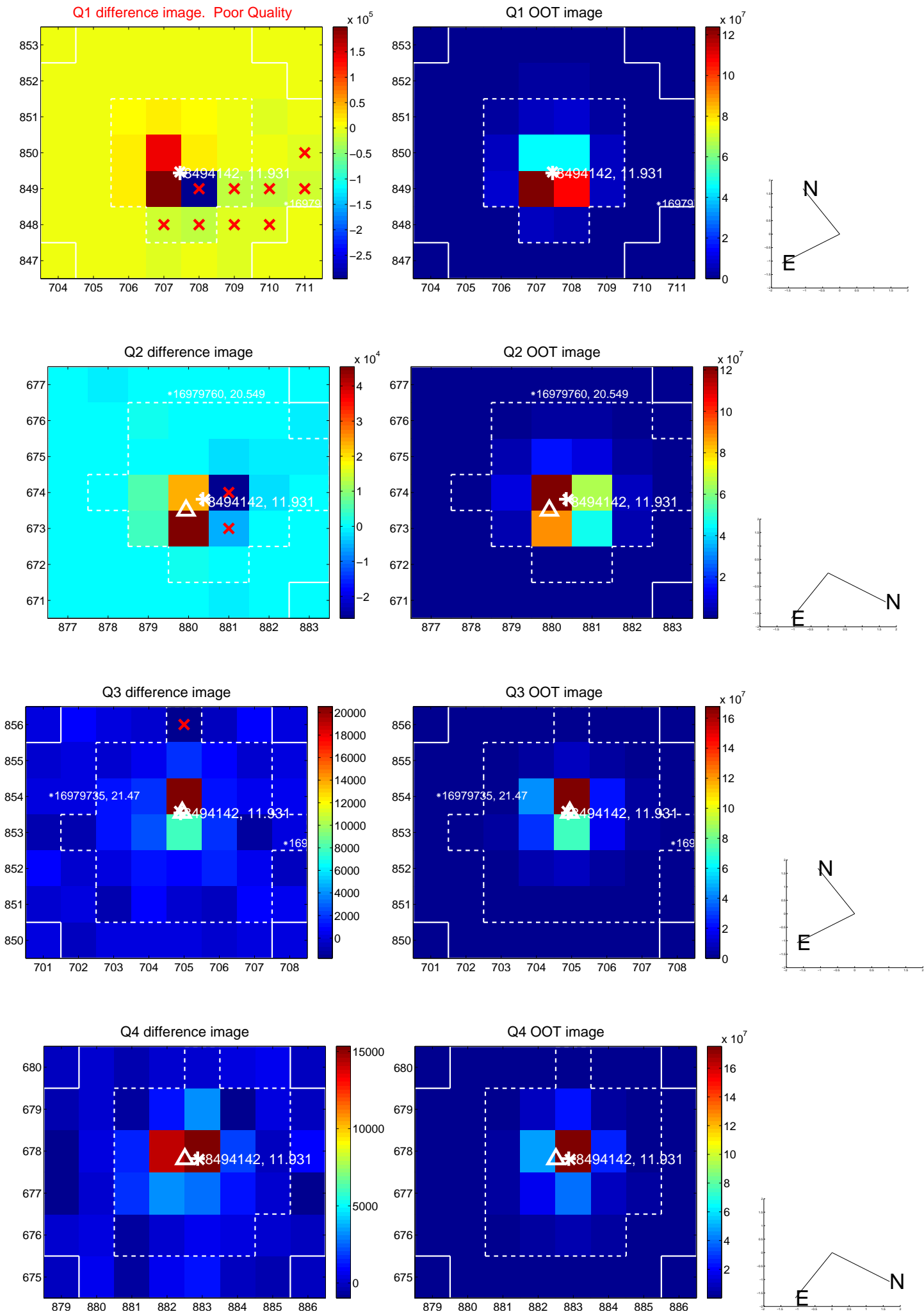
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>1.007 \pm 0.257</math></b>	<b>3.91</b>	$0.356 \pm 0.240$	$0.942 \pm 0.260$
PRF-fit source offset from KIC position	<b><math>0.792 \pm 0.259</math></b>	<b>3.06</b>	$0.293 \pm 0.227$	$0.736 \pm 0.264$
photometric centroid source offset	$0.65 \pm 0.40$	1.62	$-0.38 \pm 0.37$	$-0.53 \pm 0.42$

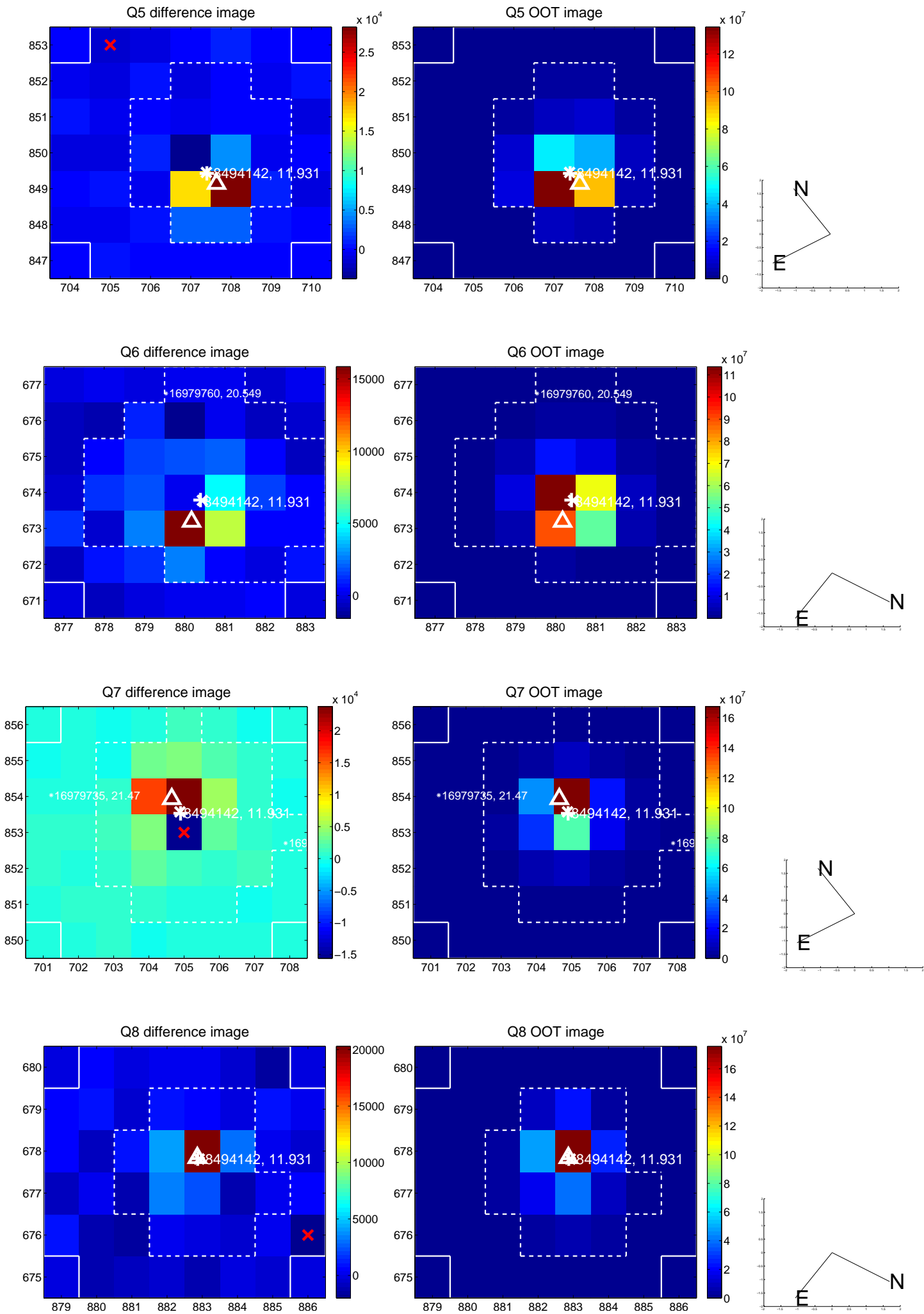


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

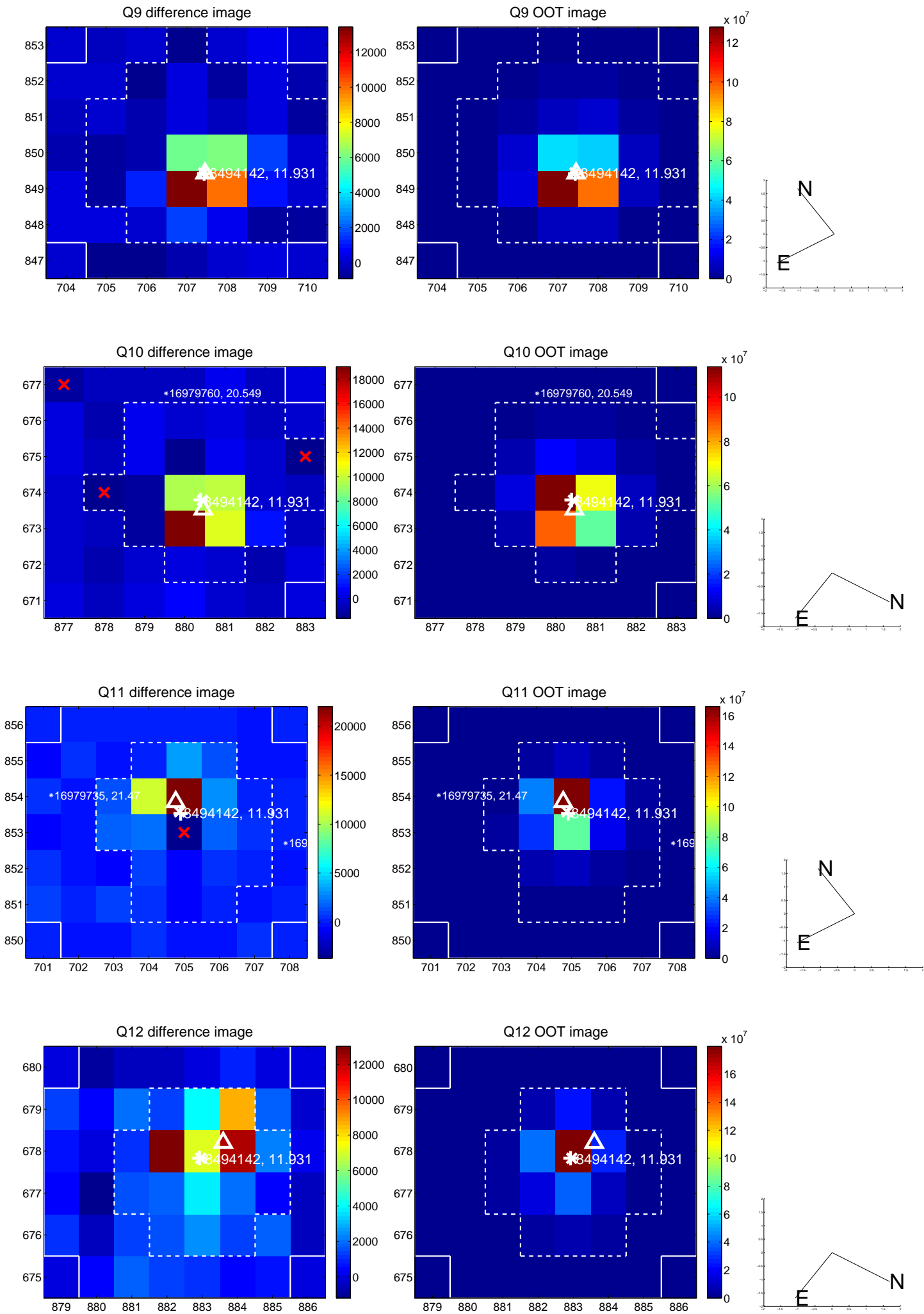
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



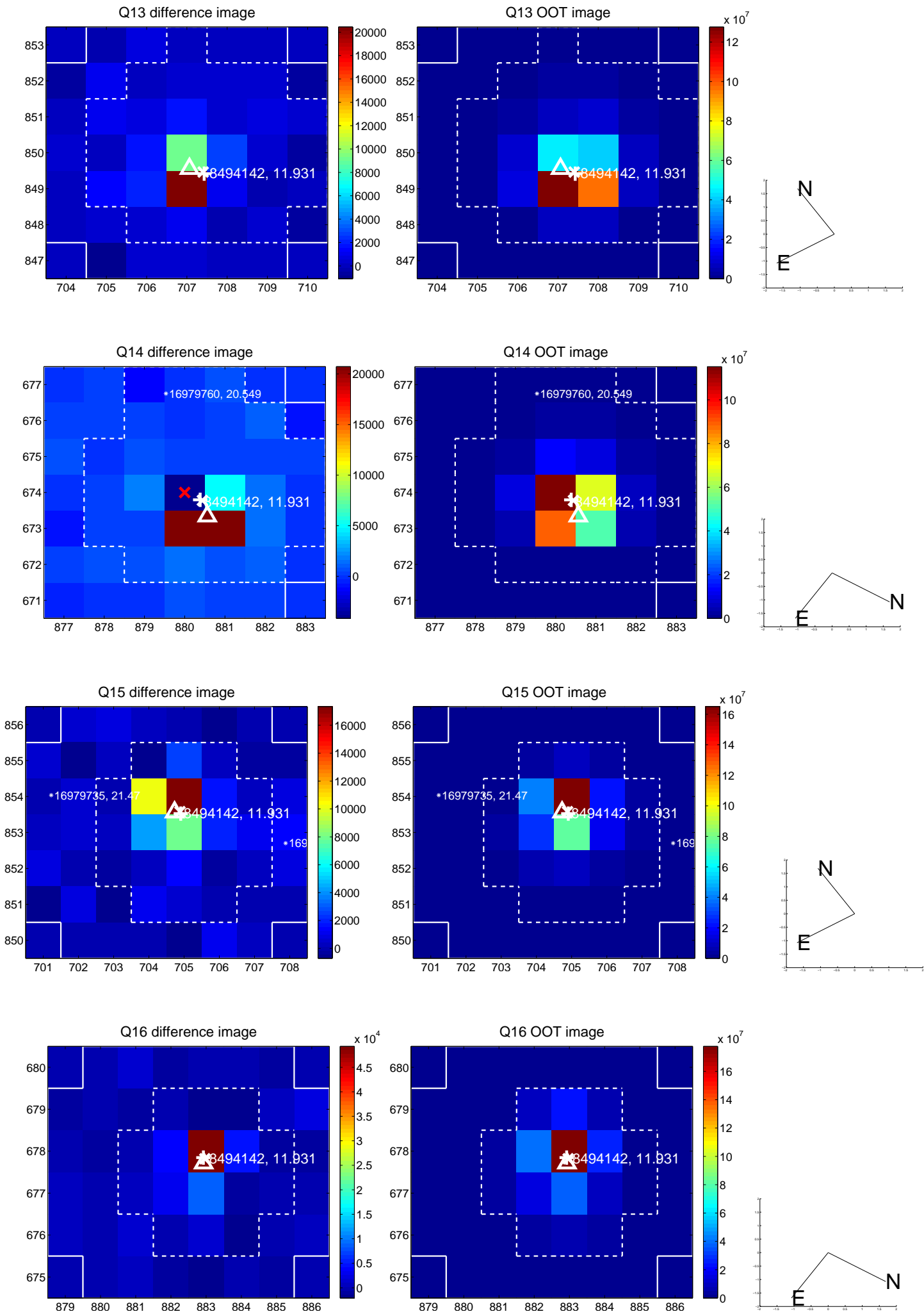
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



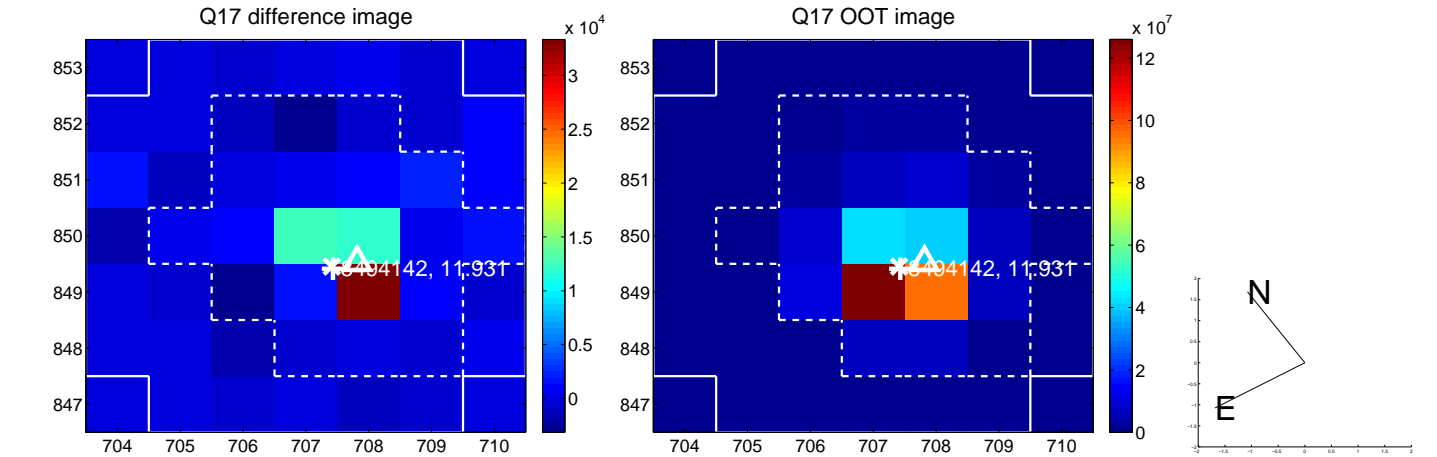
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



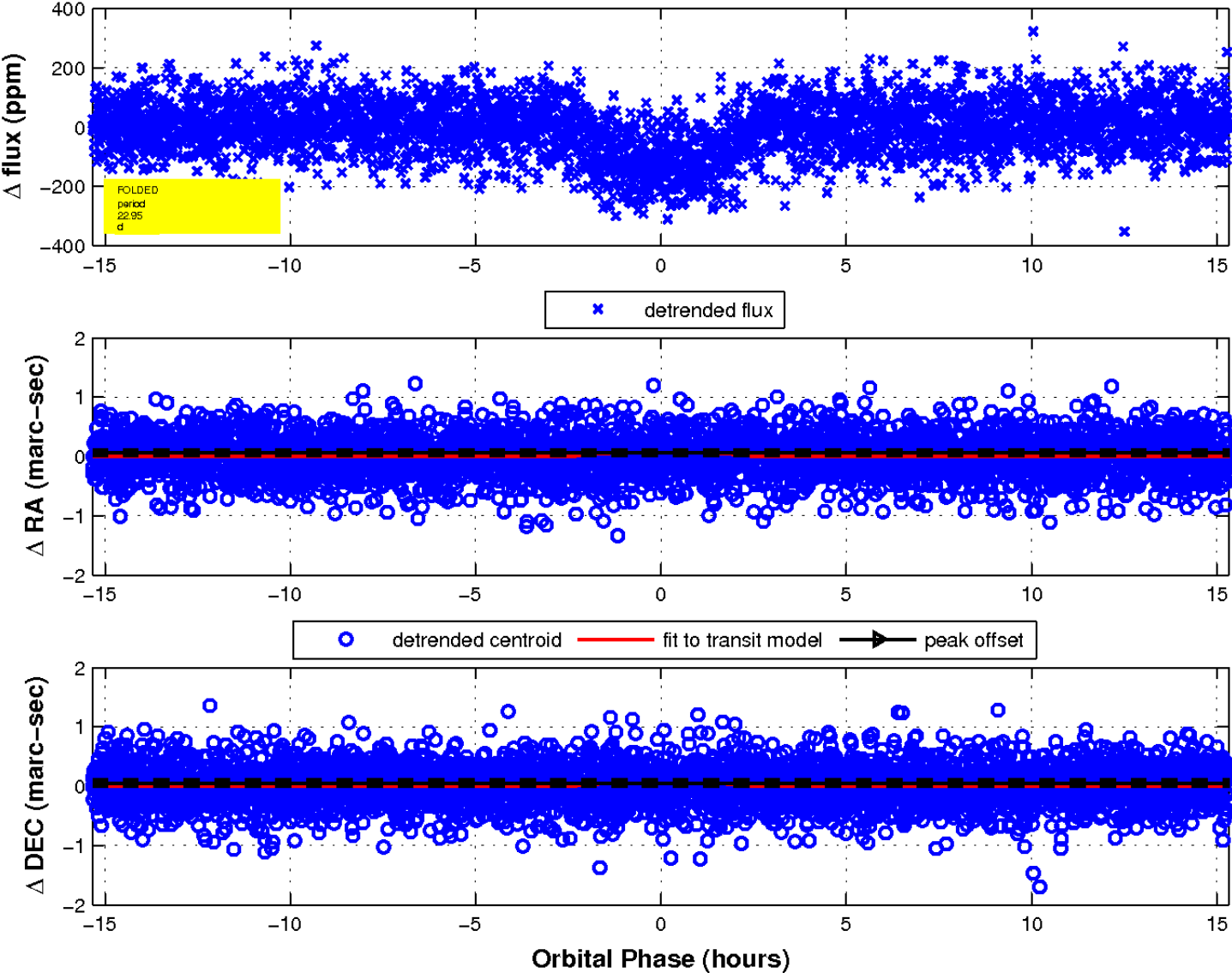
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

