

# KIC 009097423

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009097423-01	OBS	No	1.591042	132.887365	51.1	3.423	9.2	9.3	3.25	8048	2.71	34627.04
009097423-02	OBS	No	1.008126	131.917722	48.1	12.098	8.8	13.1	3.25	8048	2.34	63626.46

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009097423-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009097423-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—CENT_FEW_DIFFS

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

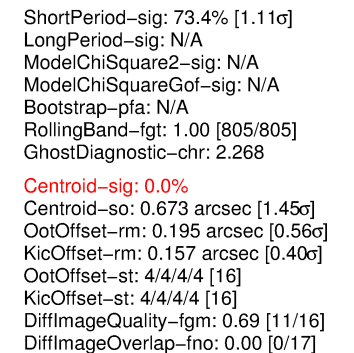
N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

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.

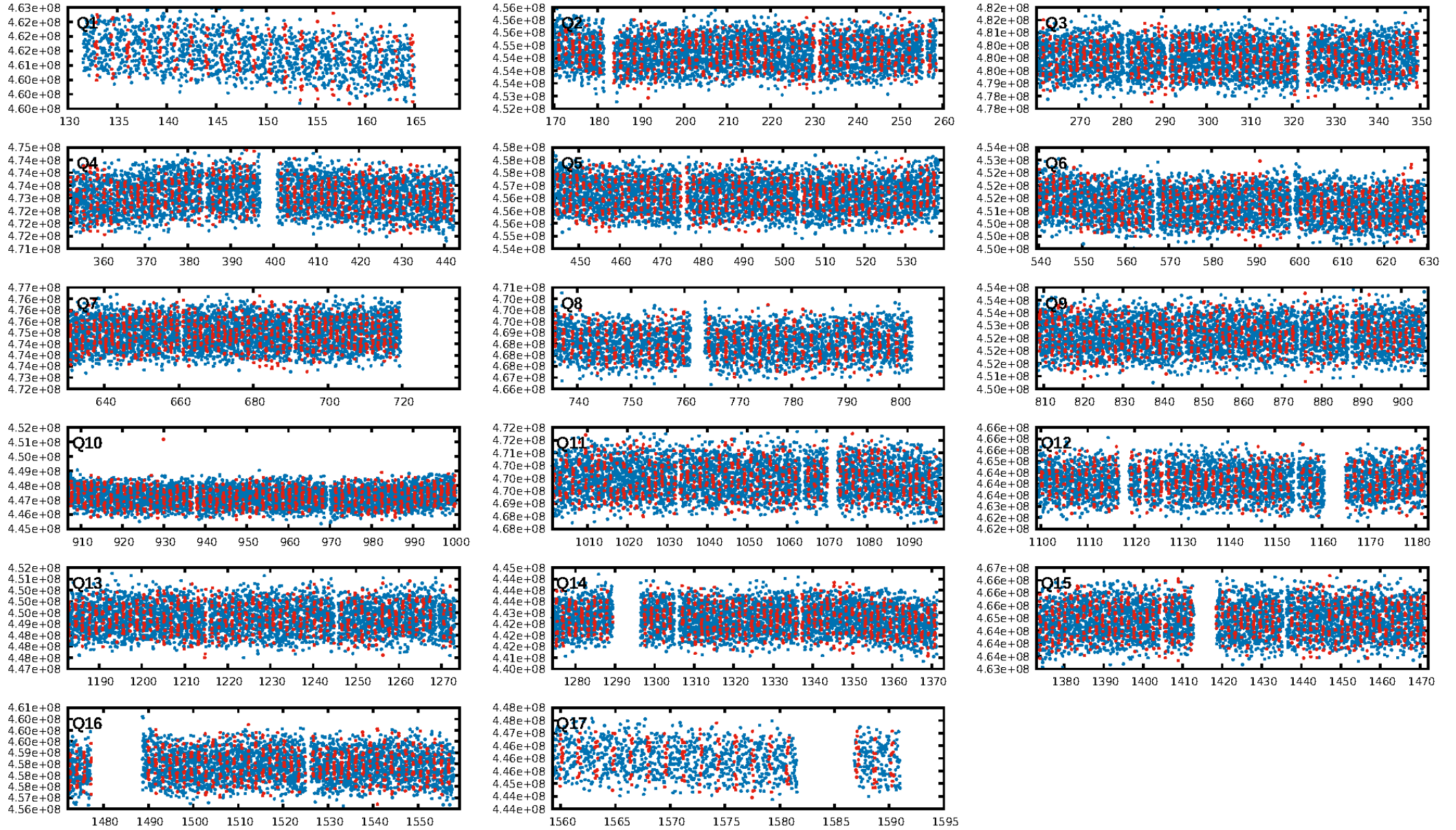
## Ephemeris Match Information For 009097423-01

No Significant Match Found

## KIC: 9097423    Candidate: 1 of 2    Period: 1.591 d

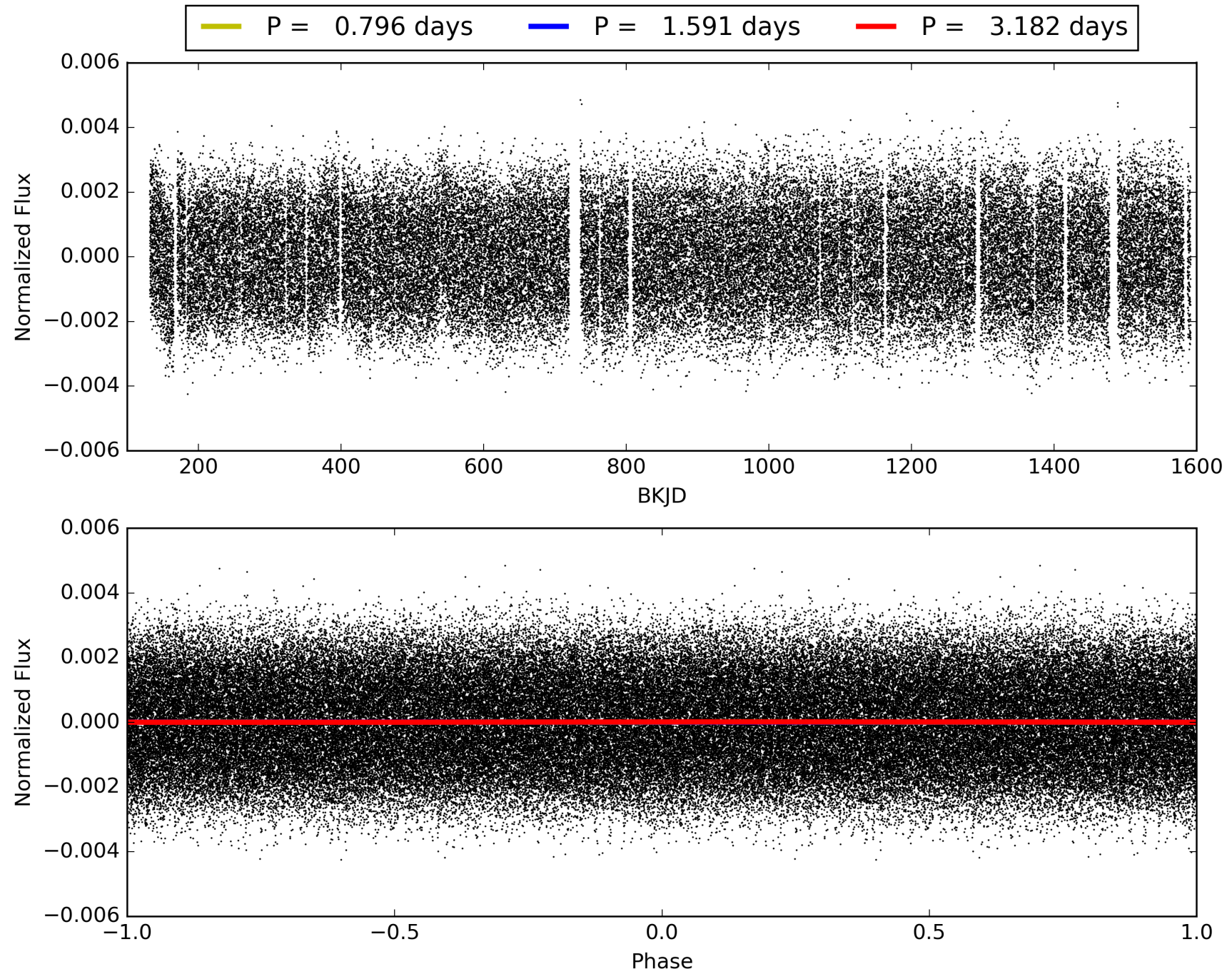


# TCE 009097423-01, PDC Light Curves



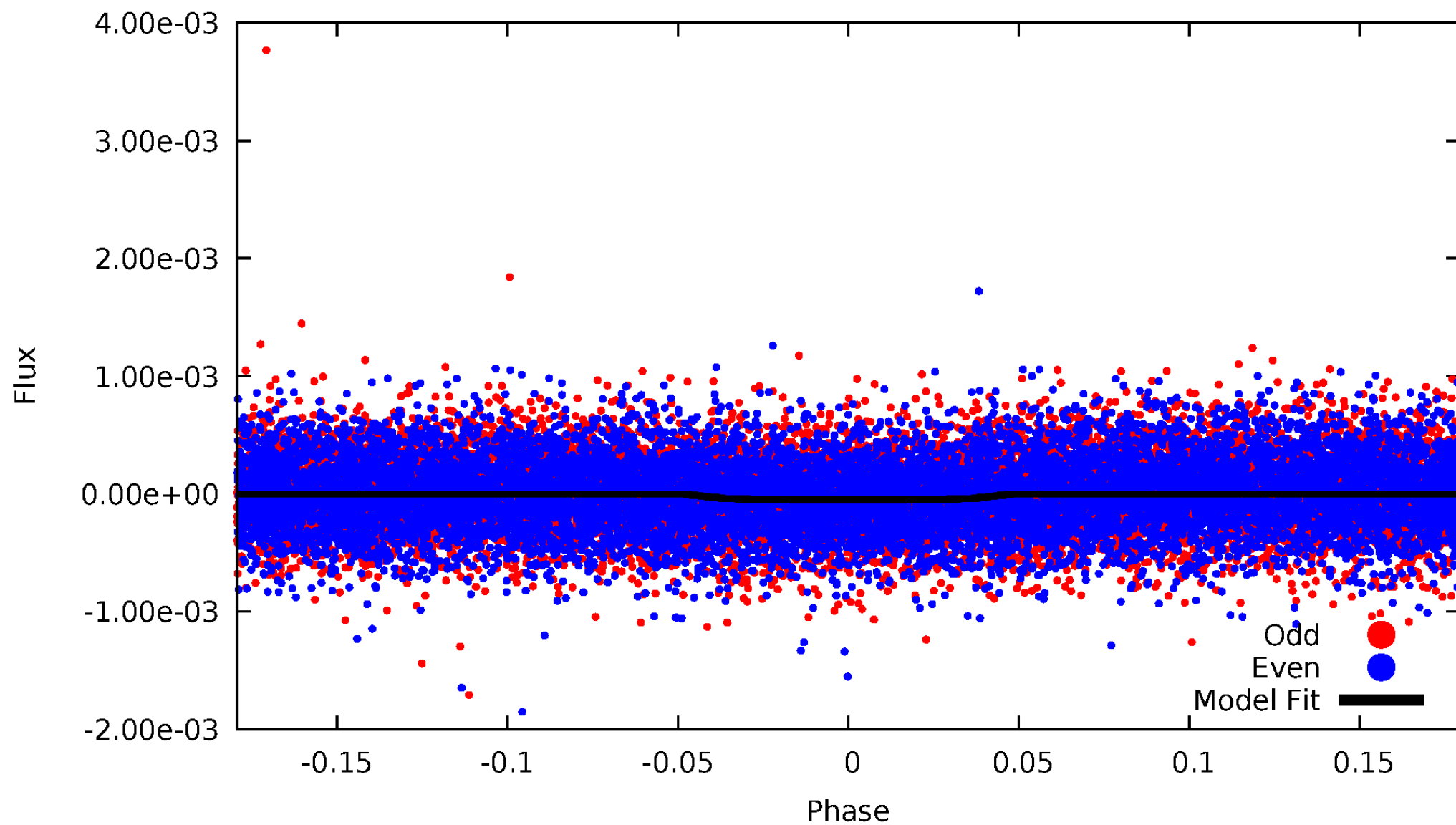


TCE 009097423-01



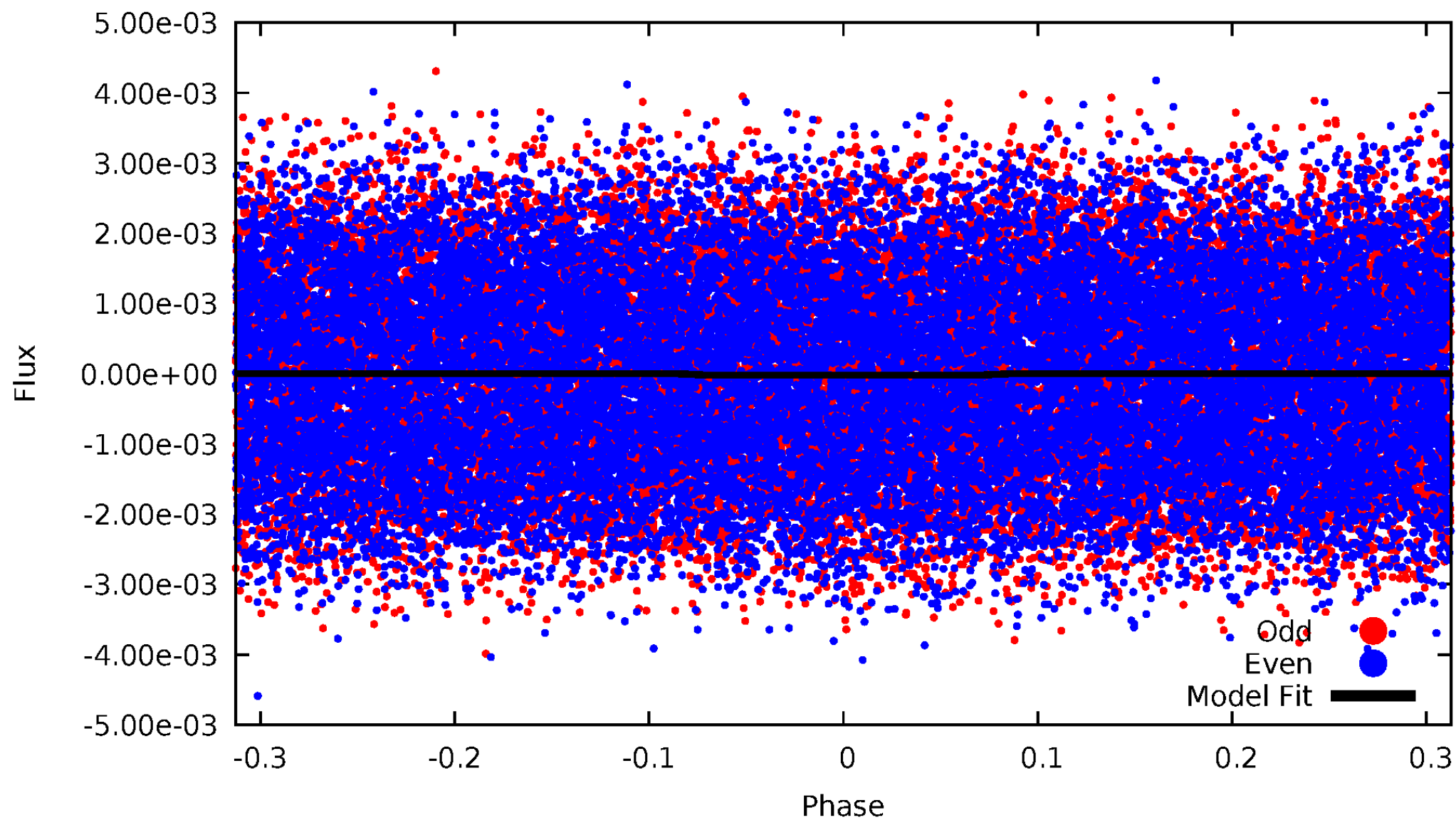
# DV Odd/Even

TCE 009097423-01



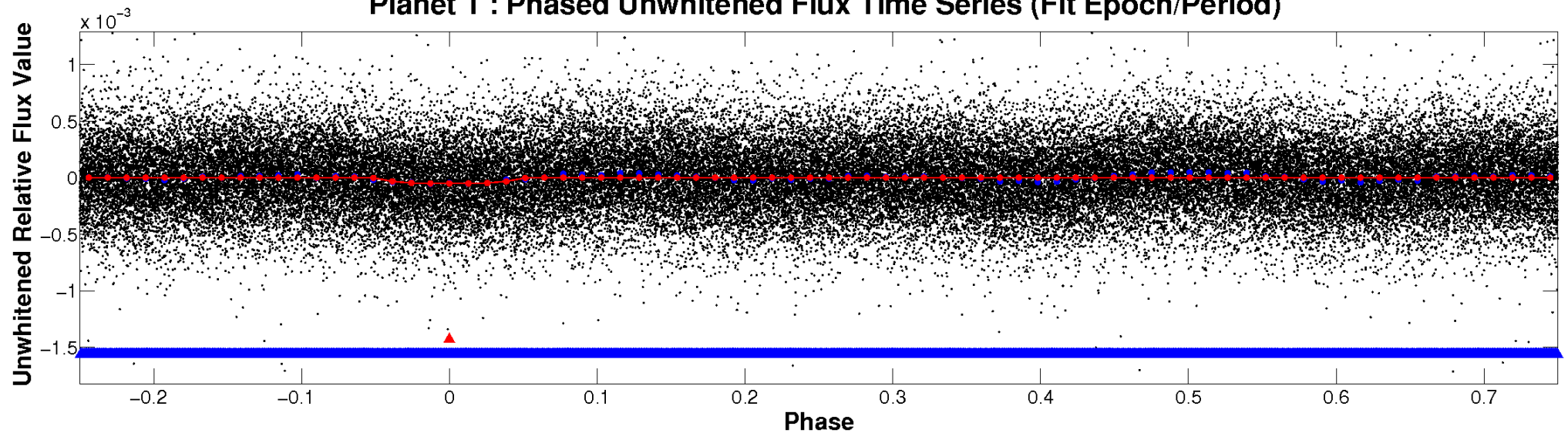
# ALT Odd/Even

TCE 009097423-01

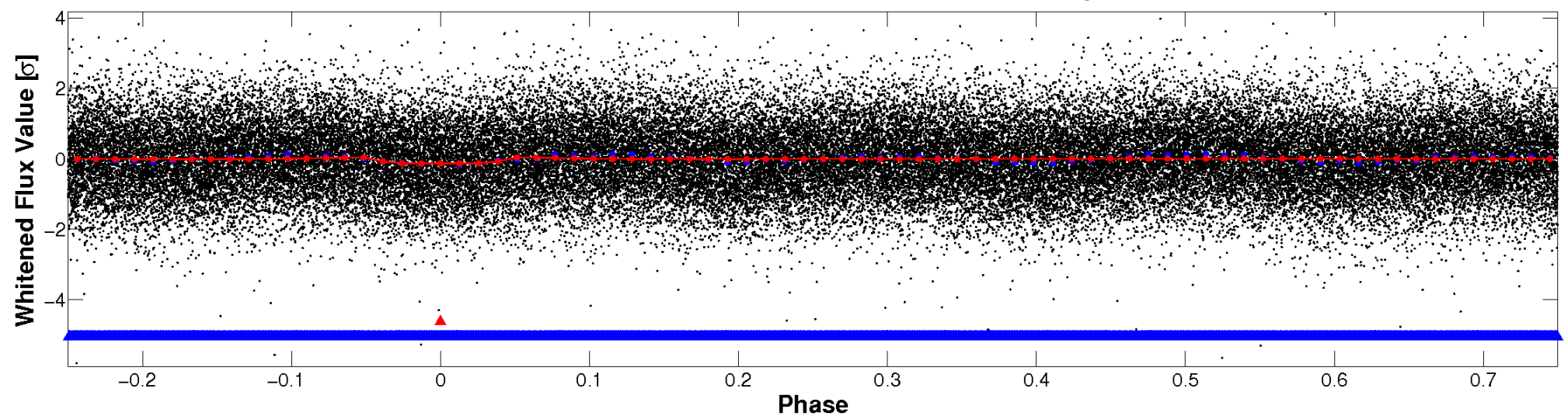


# Non-Whitened Vs. Whitened Light Curve

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



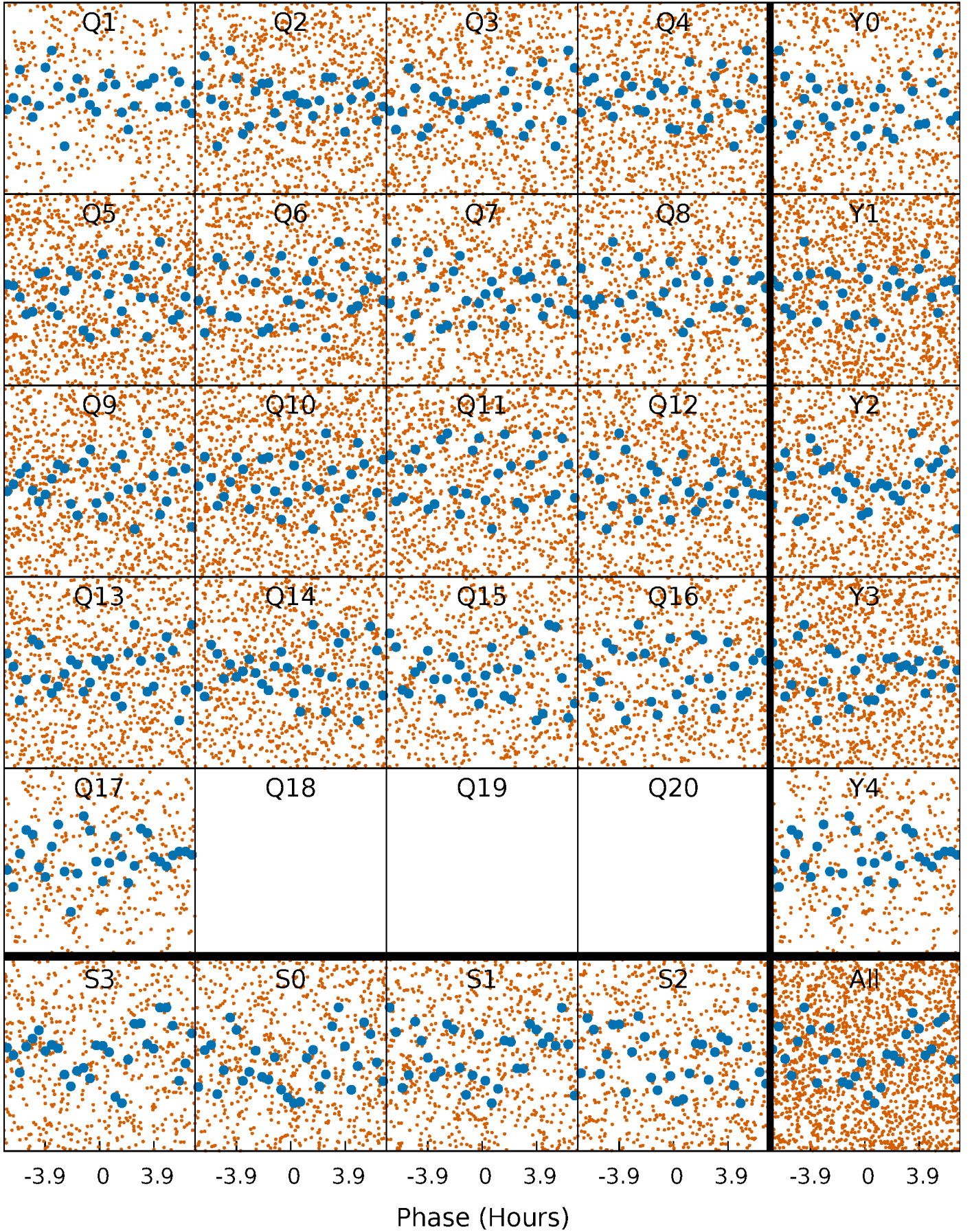
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

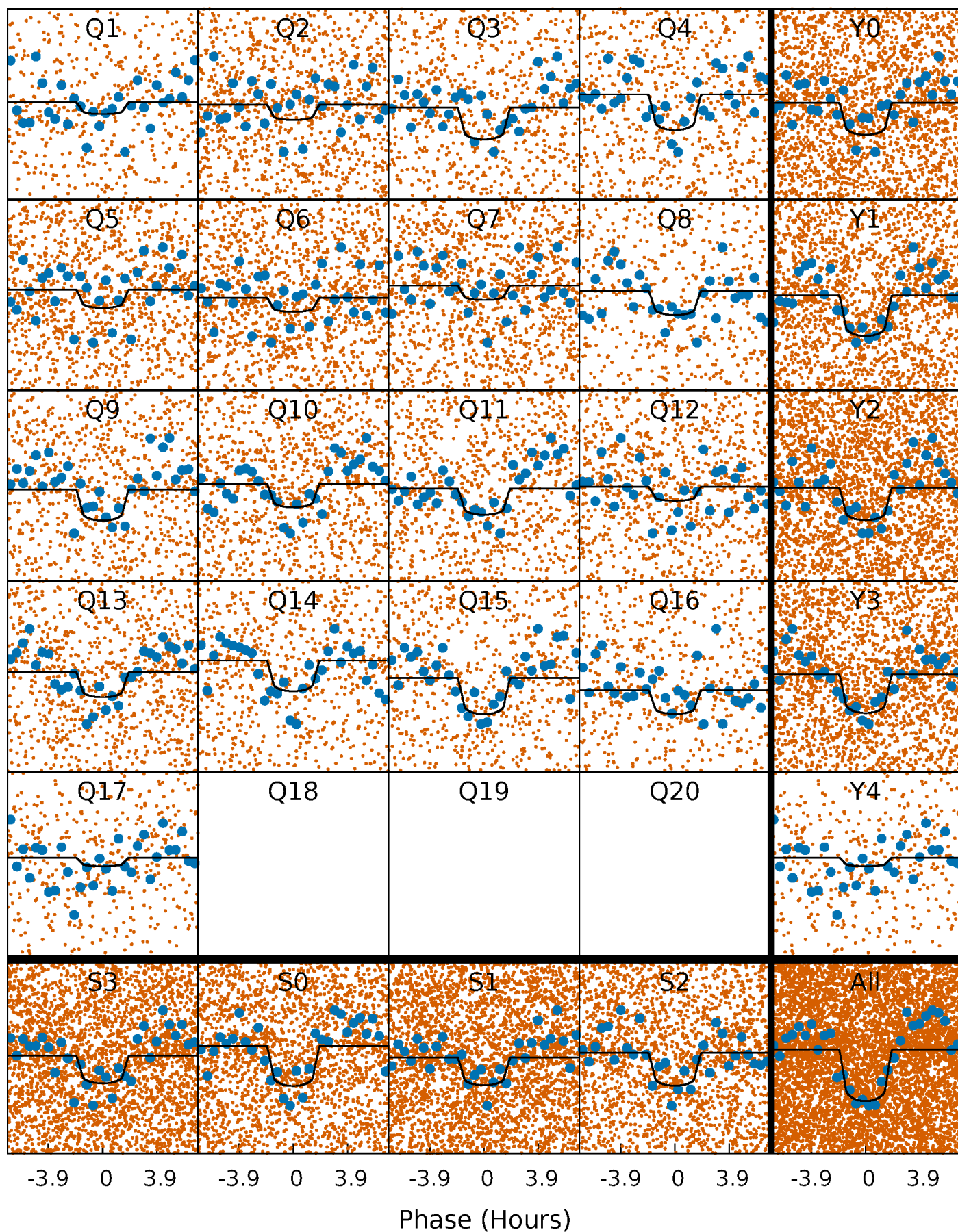
TCE 009097423-01   P= 1.591042 Days    $T_0=132.887365$  (BKJD)





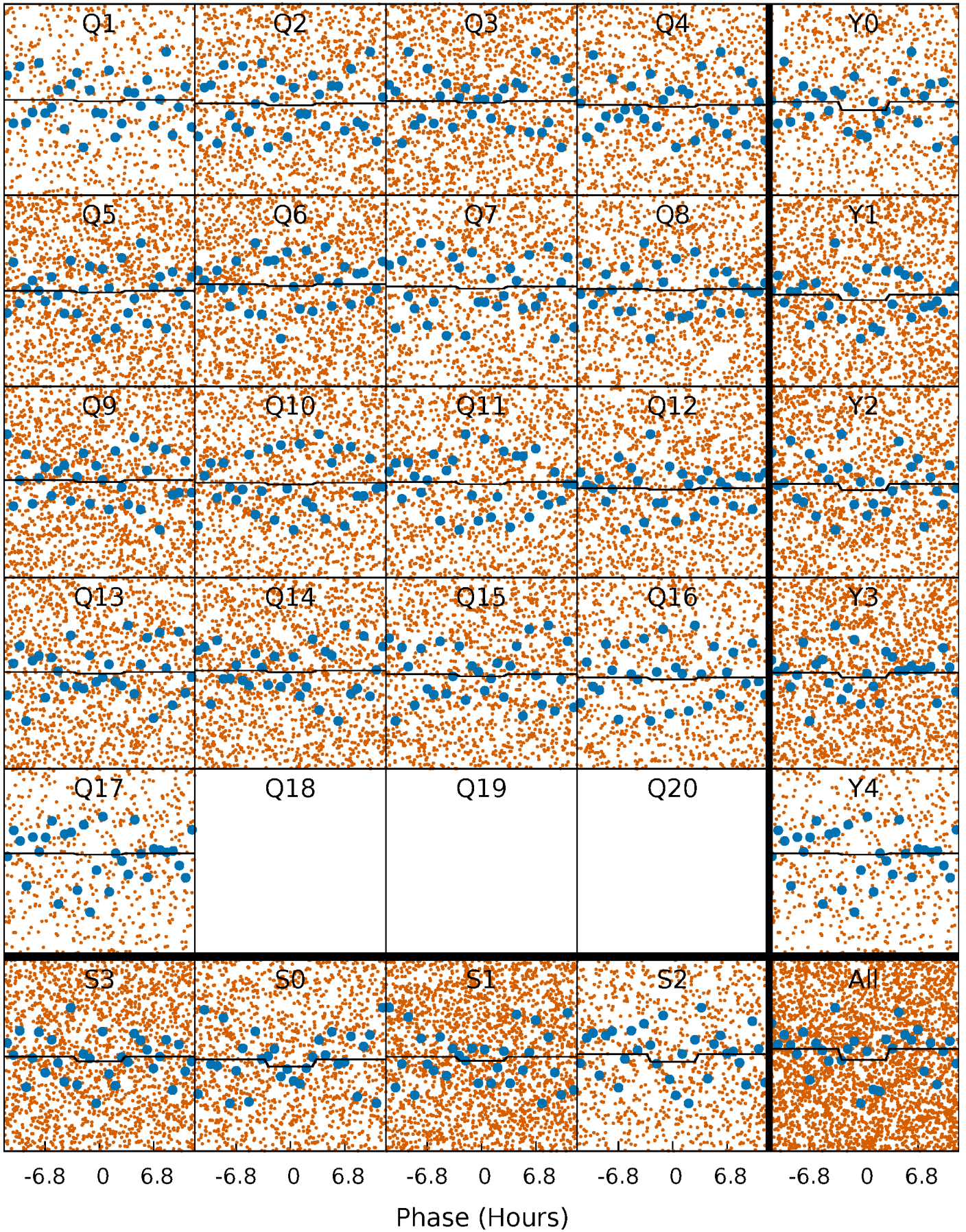
# DV Quarter-Phased Transit Curves

TCE 009097423-01 P= 1.591042 Days  $T_0=132.887365$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009097423-01 P= 1.591005 Days  $T_0=132.872573$  (BKJD)

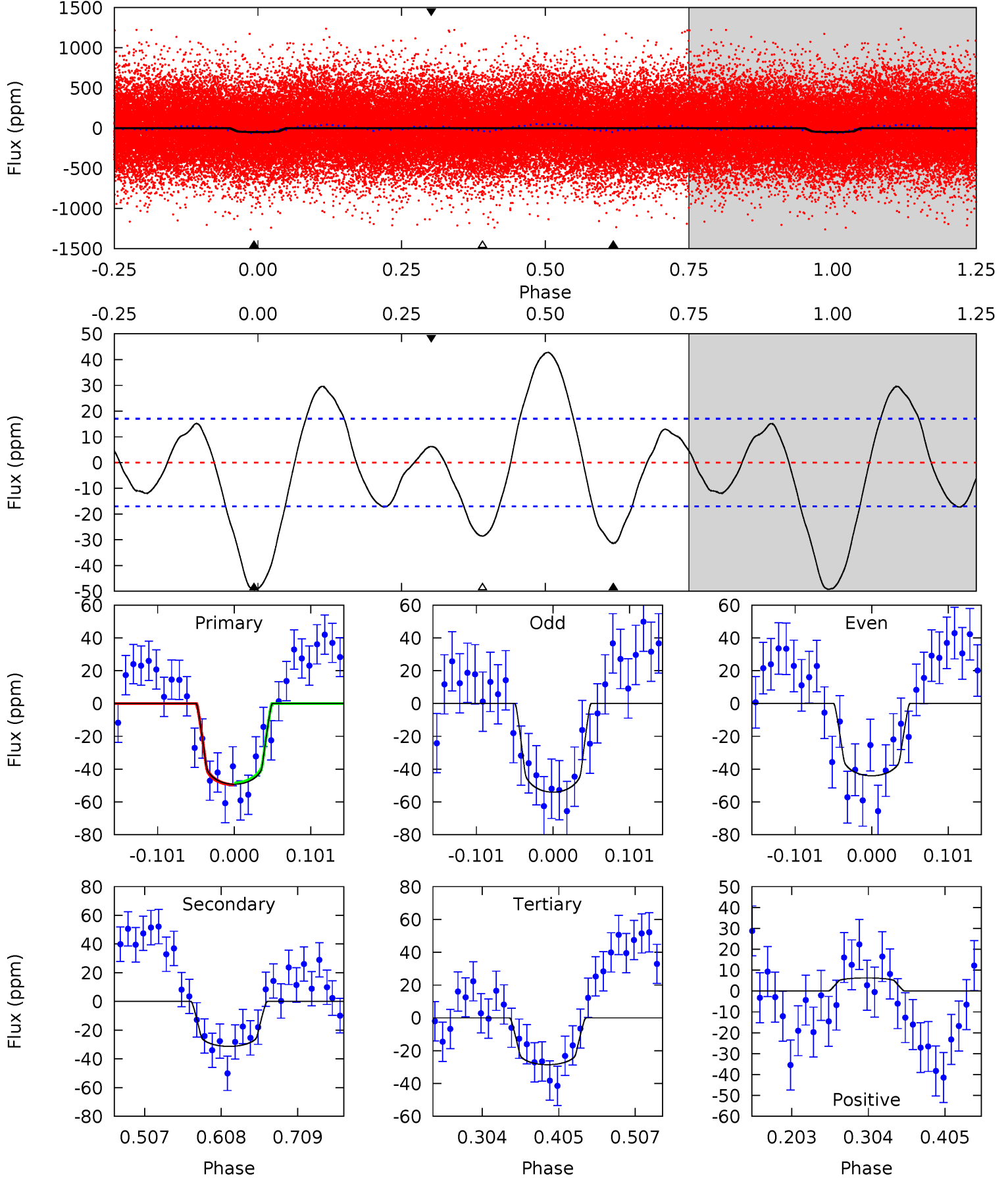




# DV Model-Shift Uniqueness Test

009097423-01, P = 1.591042 Days, E = 131.296323 Days

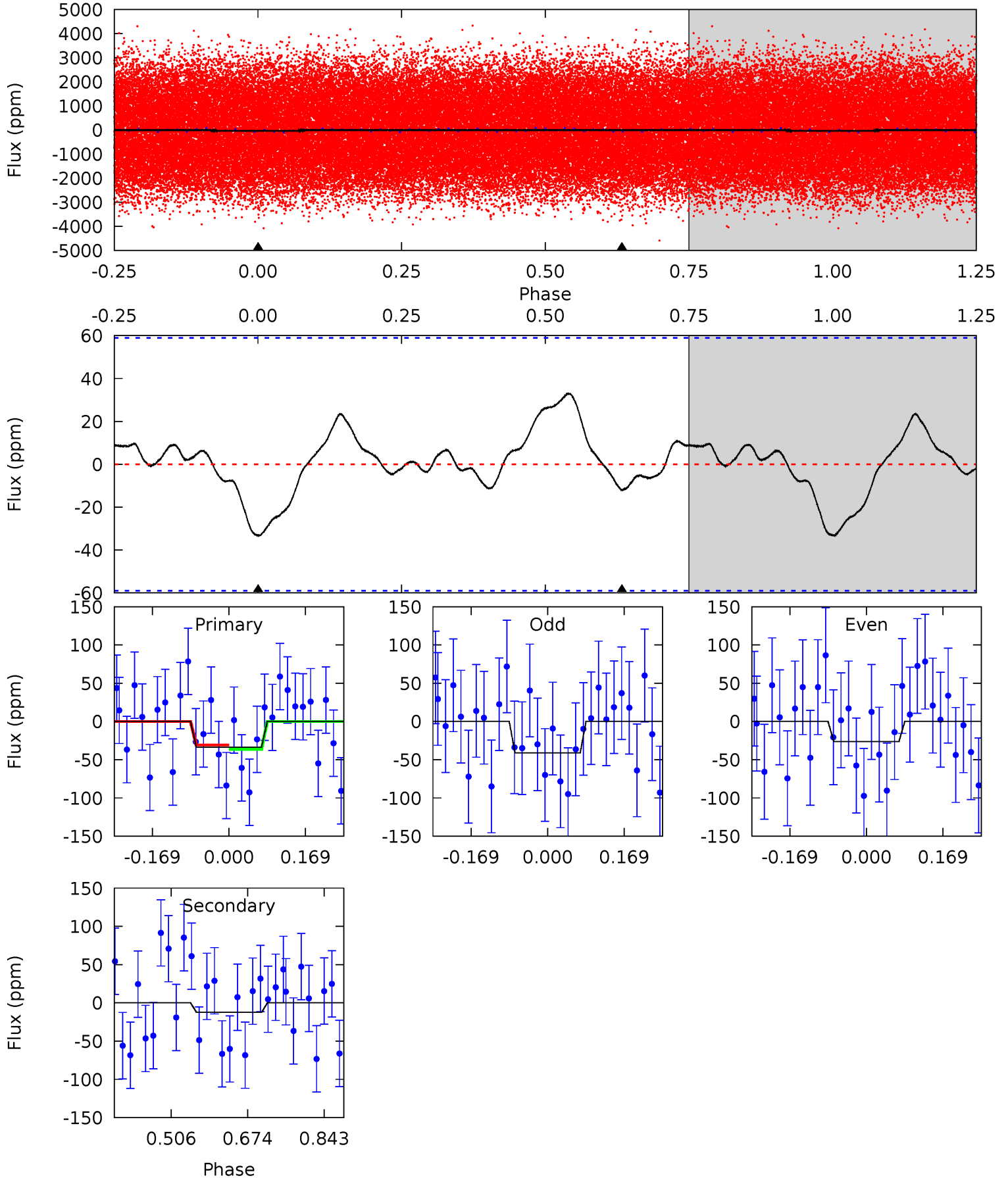
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.2	8.39	7.65	1.68	4.56	1.64	4.77	5.54	11.5	0.73	6.71	1.34	1.10	0.46	0.15



# Alt Model-Shift Uniqueness Test

009097423-01, P = 1.591005 Days, E = 131.281568 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
2.54	0.93	0	0	4.45	1.38	0.39	2.54	2.54	0.93	0.93	0.56	1.12	0.50	0.21





### Stellar Parameters For KIC 009097423

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$8048^{+224}_{-336}$	$3.725^{+0.442}_{-0.104}$	$-0.100^{+0.200}_{-0.350}$	$3.251^{+0.801}_{-1.603}$	$2.046^{+0.335}_{-0.503}$	$0.084^{+0.320}_{-0.029}$
	+3%/-4%	+12%/-3%	+200%/-350%	+25%/-49%	+16%/-25%	+382%/-35%
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 009097423-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-31 \pm 4$	$2.38^{+1.15}_{-0.95}$	$4644^{+390}_{-600}$	$6475^{+2162}_{-1049}$	$3.474^{+5.659}_{-1.830}$
Alt.	$-12 \pm 13$	$1.45^{+1.06}_{-0.78}$	$4719^{+345}_{-611}$	$6372^{+4734}_{-10625}$	$2.944^{+13.429}_{-3.015}$

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

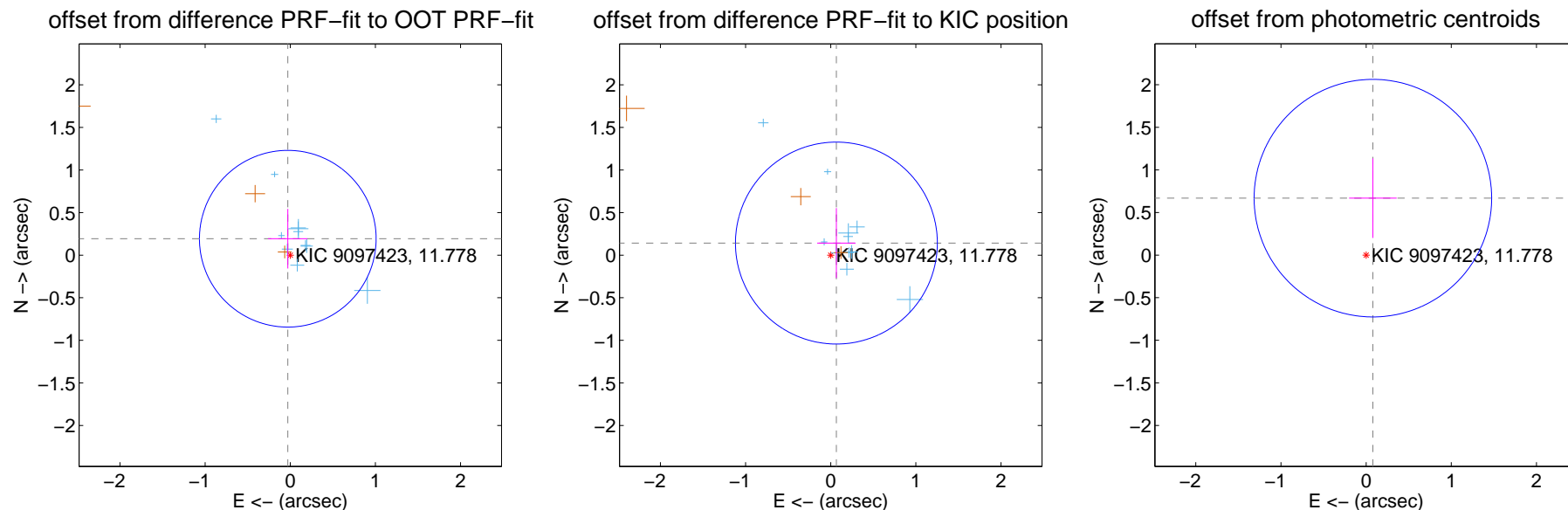
## DV Centroid Data

Supplemental centroid analysis for 009097423-01. **Kepler magnitude: 11.78.** Transit SNR 9.33

There are 11 quarters with good PRF difference image offsets

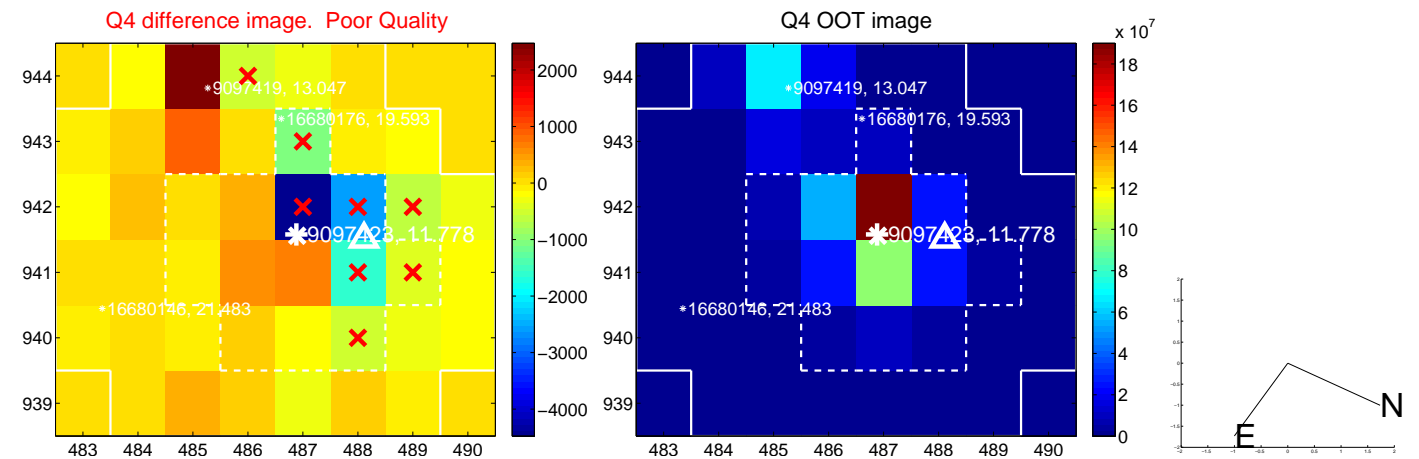
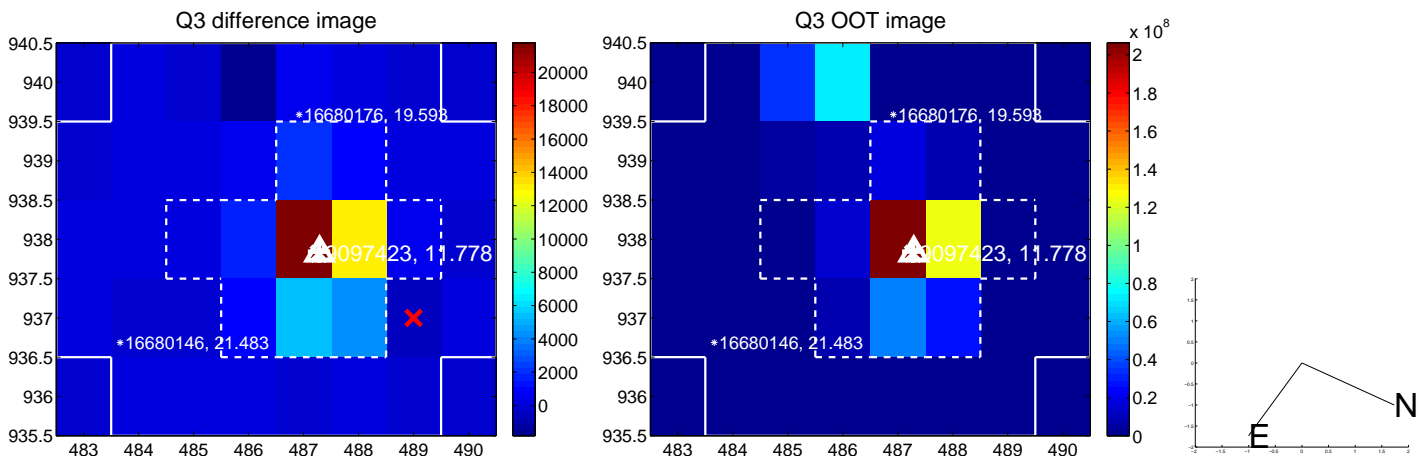
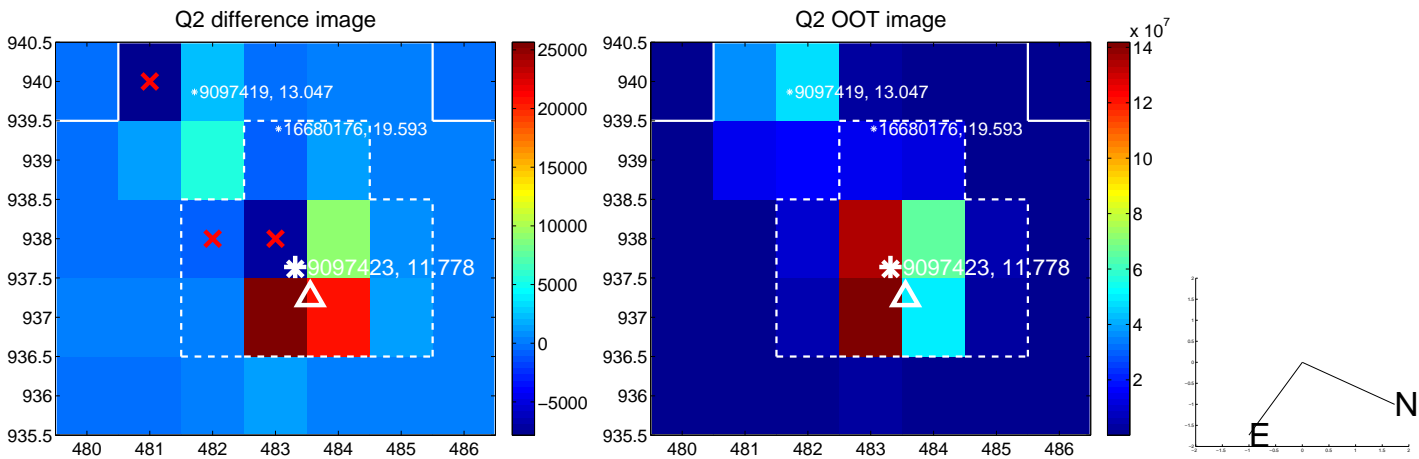
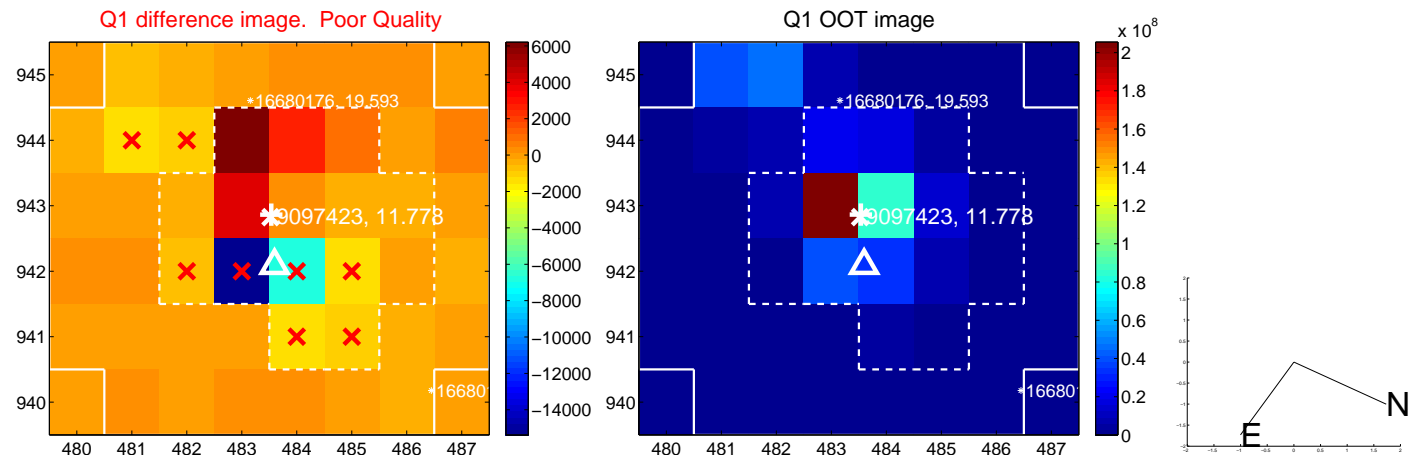
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.195 \pm 0.346$	0.56	$0.029 \pm 0.231$	$0.193 \pm 0.350$
PRF-fit source offset from KIC position	$0.157 \pm 0.395$	0.40	$-0.067 \pm 0.225$	$0.142 \pm 0.410$
photometric centroid source offset	$0.67 \pm 0.46$	1.45	$-0.08 \pm 0.28$	$0.67 \pm 0.47$

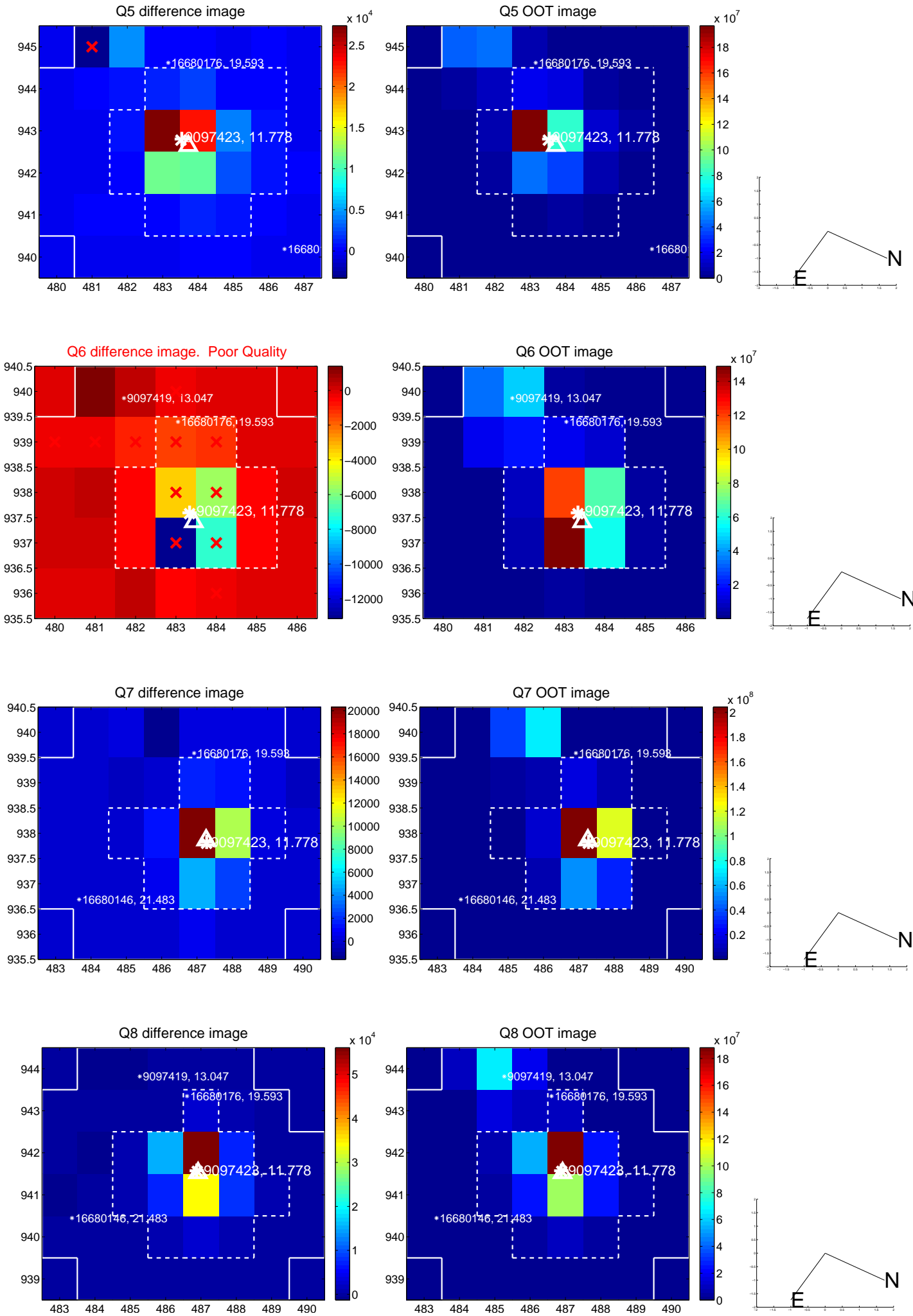


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

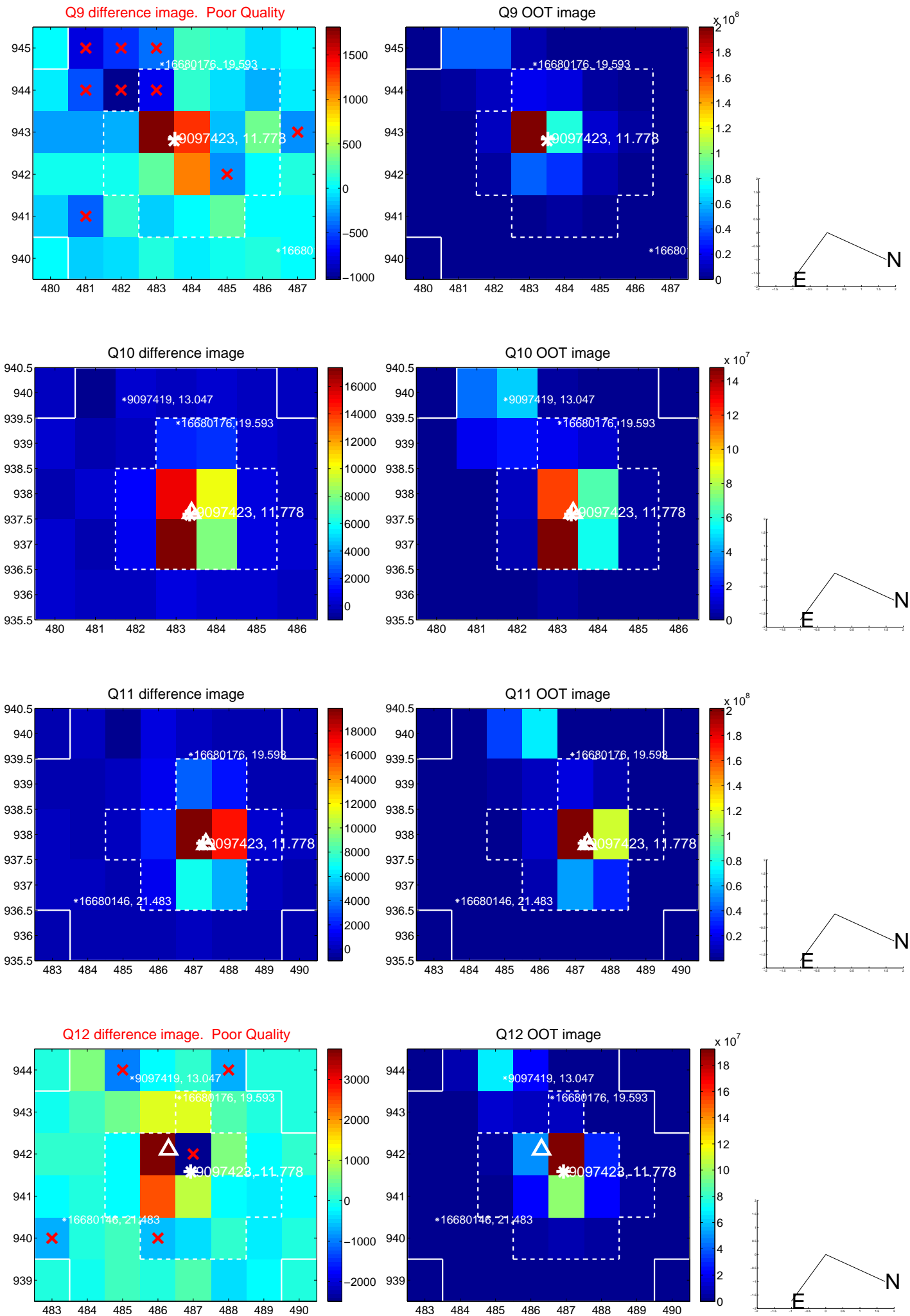


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

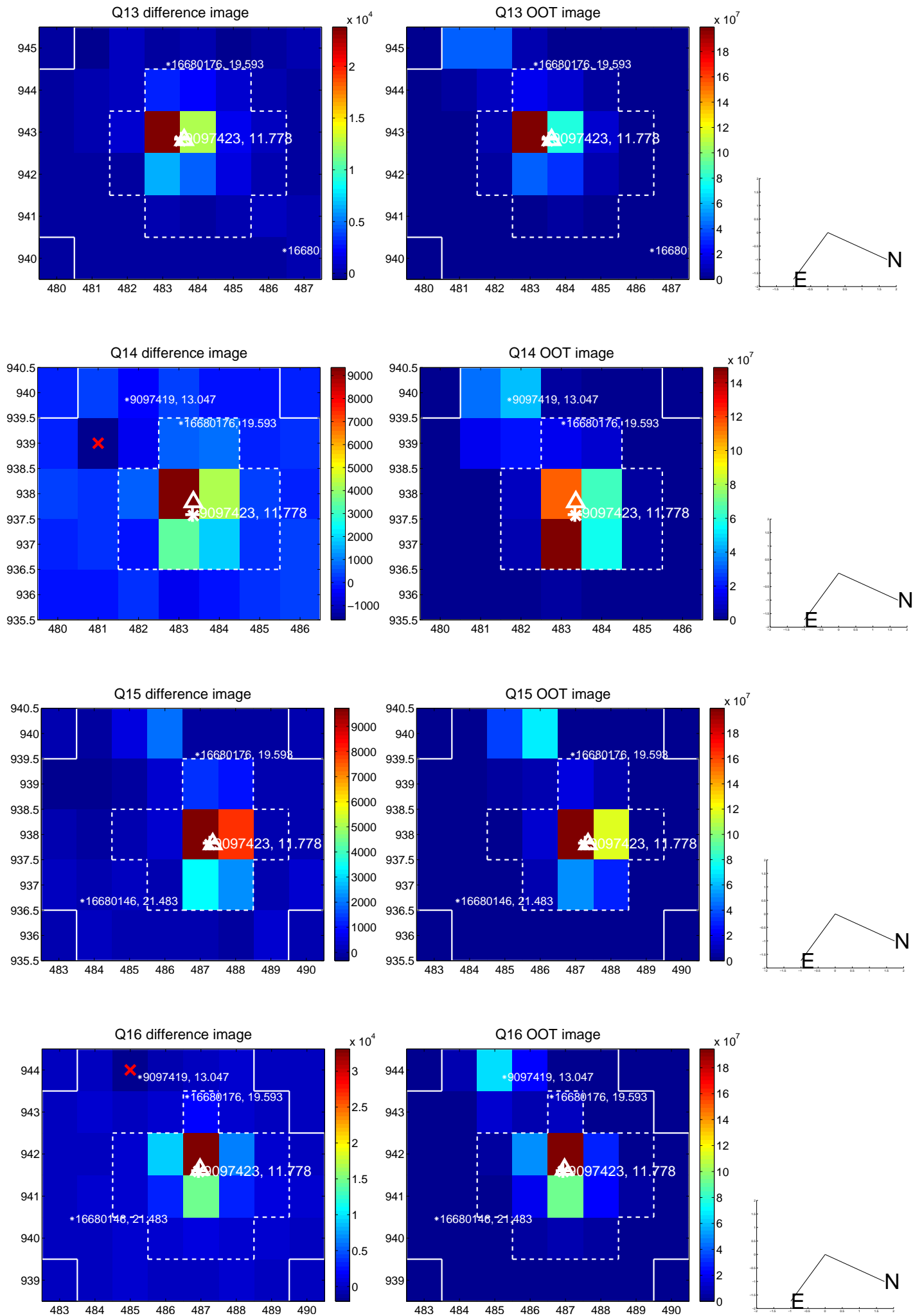




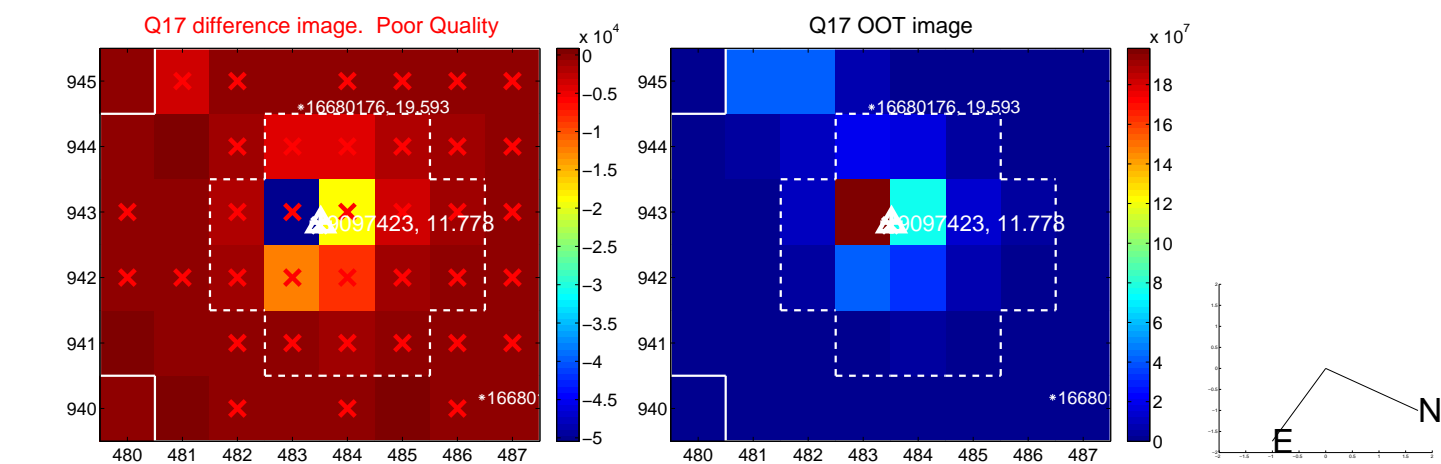
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



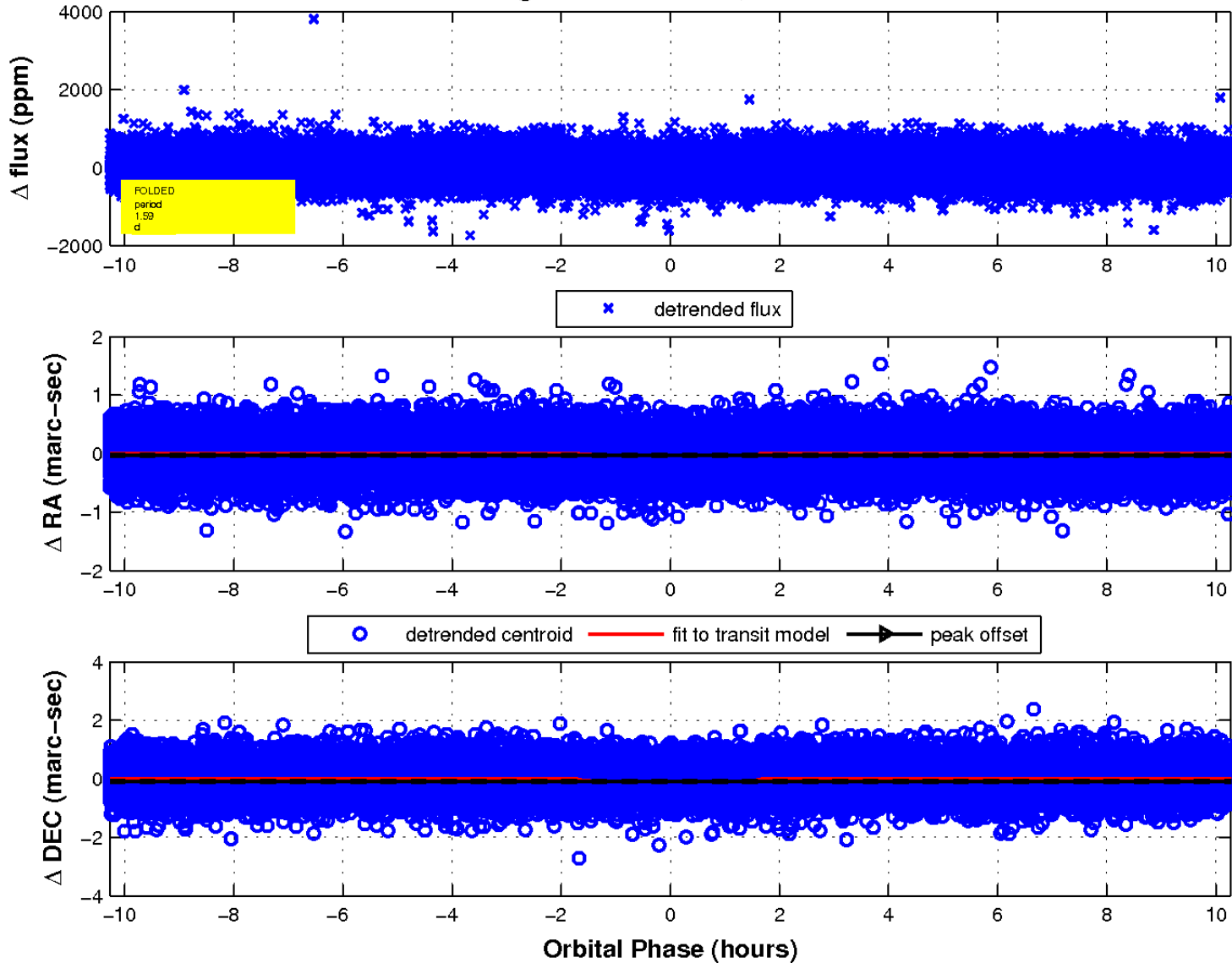
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white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

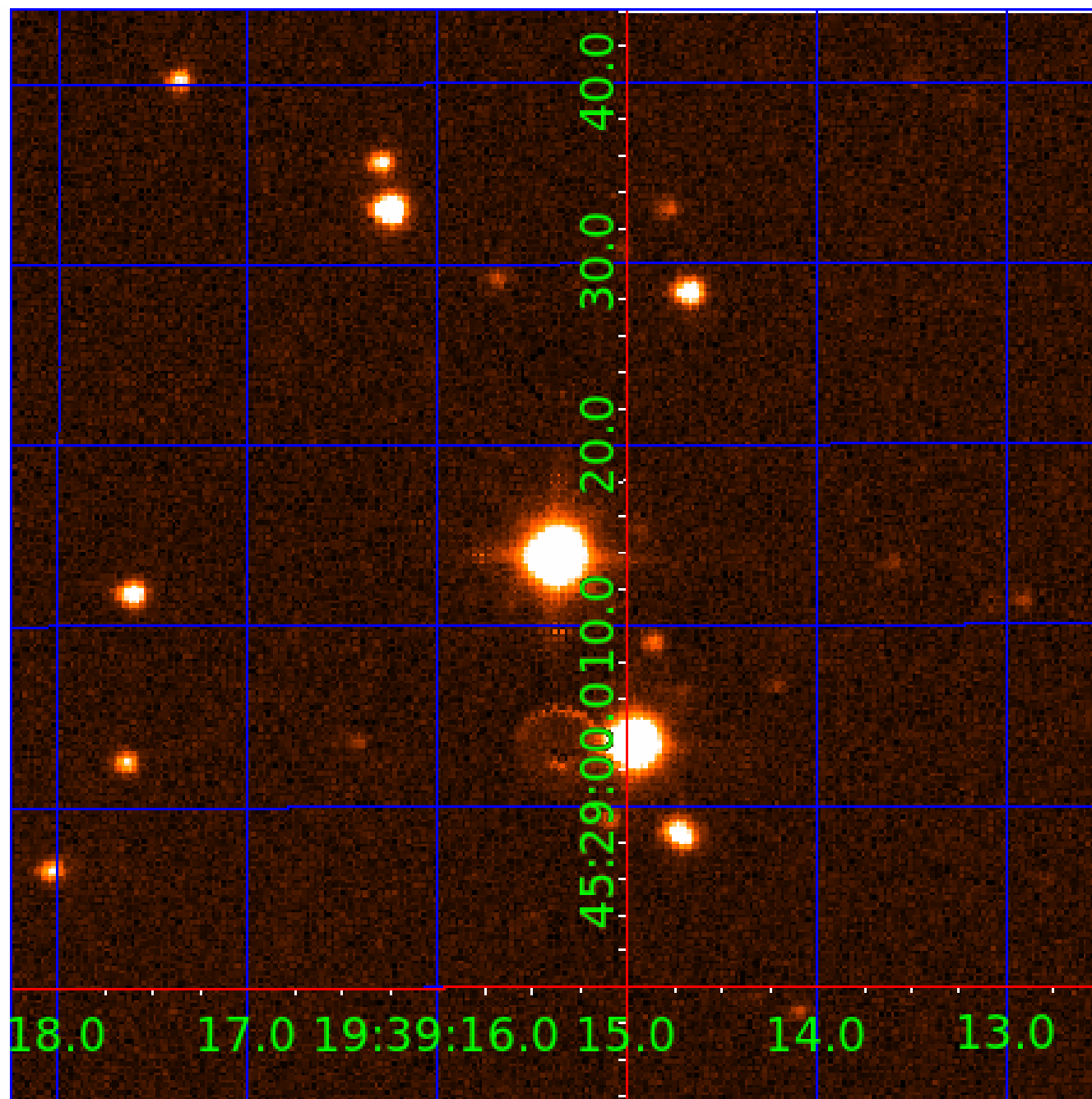


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 009097423

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009097423-01	OBS	No	1.591042	132.887365	51.1	3.423	9.2	9.3	3.25	8048	2.71	34627.04
009097423-02	OBS	No	1.008126	131.917722	48.1	12.098	8.8	13.1	3.25	8048	2.34	63626.46

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009097423-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009097423-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_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.

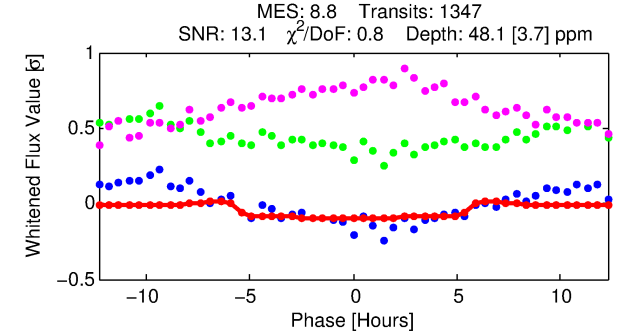
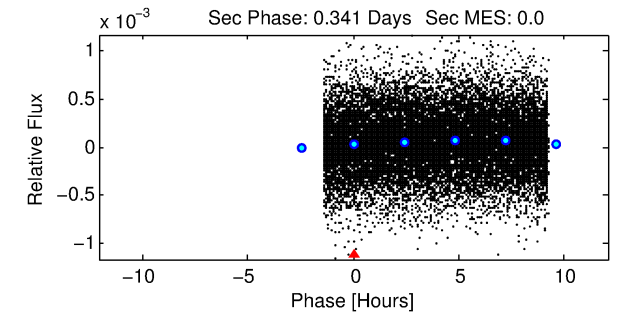
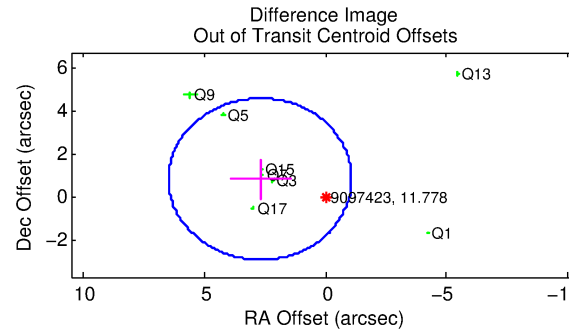
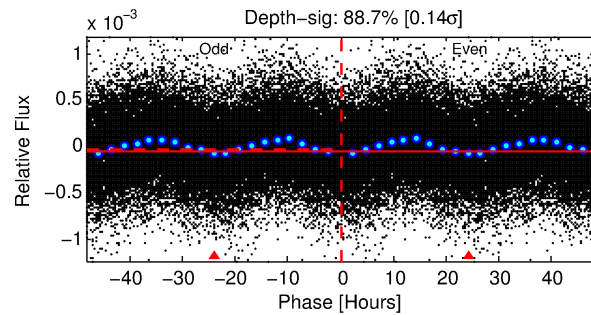
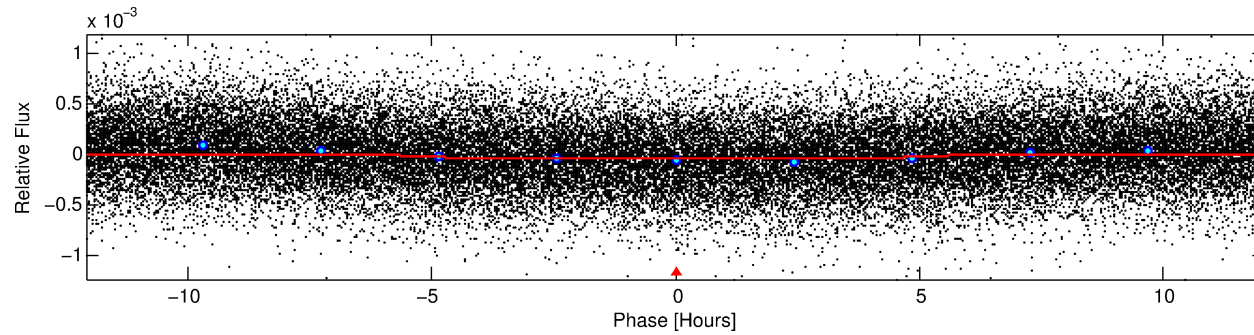
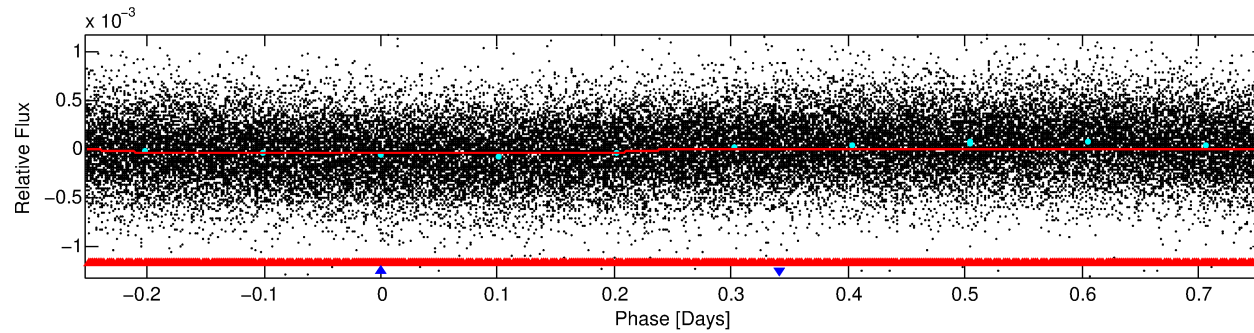
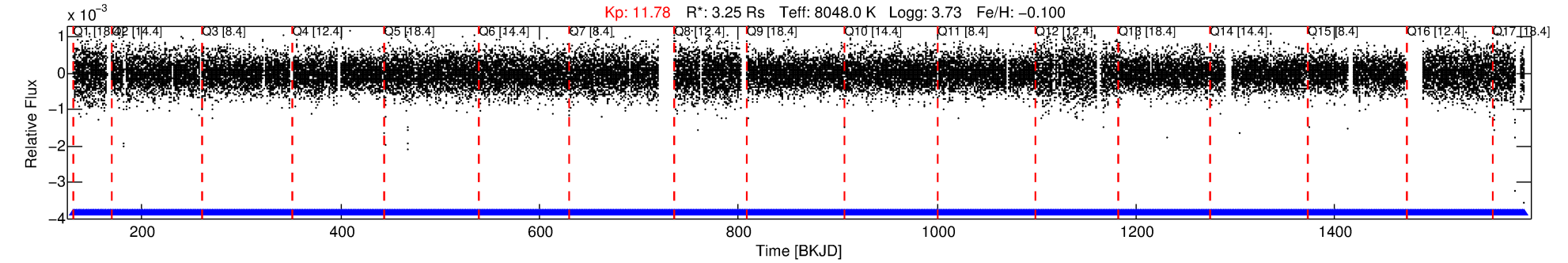
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009097423-02

No Significant Match Found

# DV One-Page Summary

KIC: 9097423 Candidate: 2 of 2 Period: 1.008 d



## DV Fit Results:

Period = 1.00813 [0.00002] d  
Epoch = 131.9177 [0.0069] BKJD  
Rp/R\* = 0.0066 [0.0010]  
a/R\* = 1.00 [0.00]  
b = 0.52 [1.21]  
Seff = 63626.46 [49132.66]  
Teff = 4050 [782] K  
Rp = 2.34 [1.21] Re  
a = 0.0250 [0.0118] AU  
Ag = N/A  
Teffp = N/A

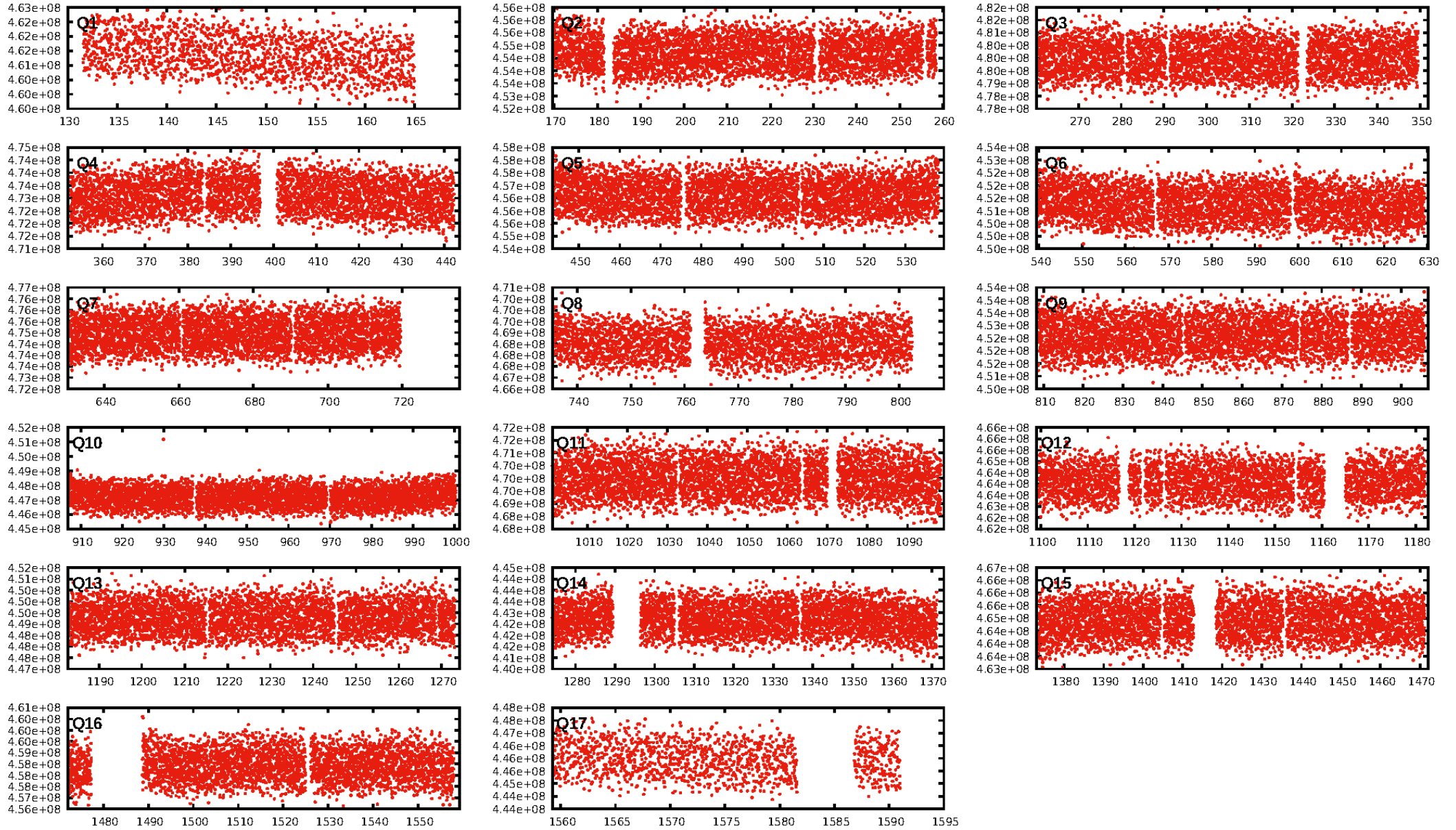
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 73.4% [1.11 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [1285/1285]  
GhostDiagnostic-chr: 5.763  
Centroid-sig: 0.0%  
Centroid-so: 1.430 arcsec [6.34 $\sigma$ ]  
OotOffset-rm: 2.820 arcsec [2.24 $\sigma$ ]  
KicOffset-rm: 2.693 arcsec [2.08 $\sigma$ ]  
OotOffset-st: 0/3/0/5 [8]  
KicOffset-st: 0/3/0/5 [8]  
DiffImageQuality-fgm: 0.25 [2/8]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 11:16:35 Z

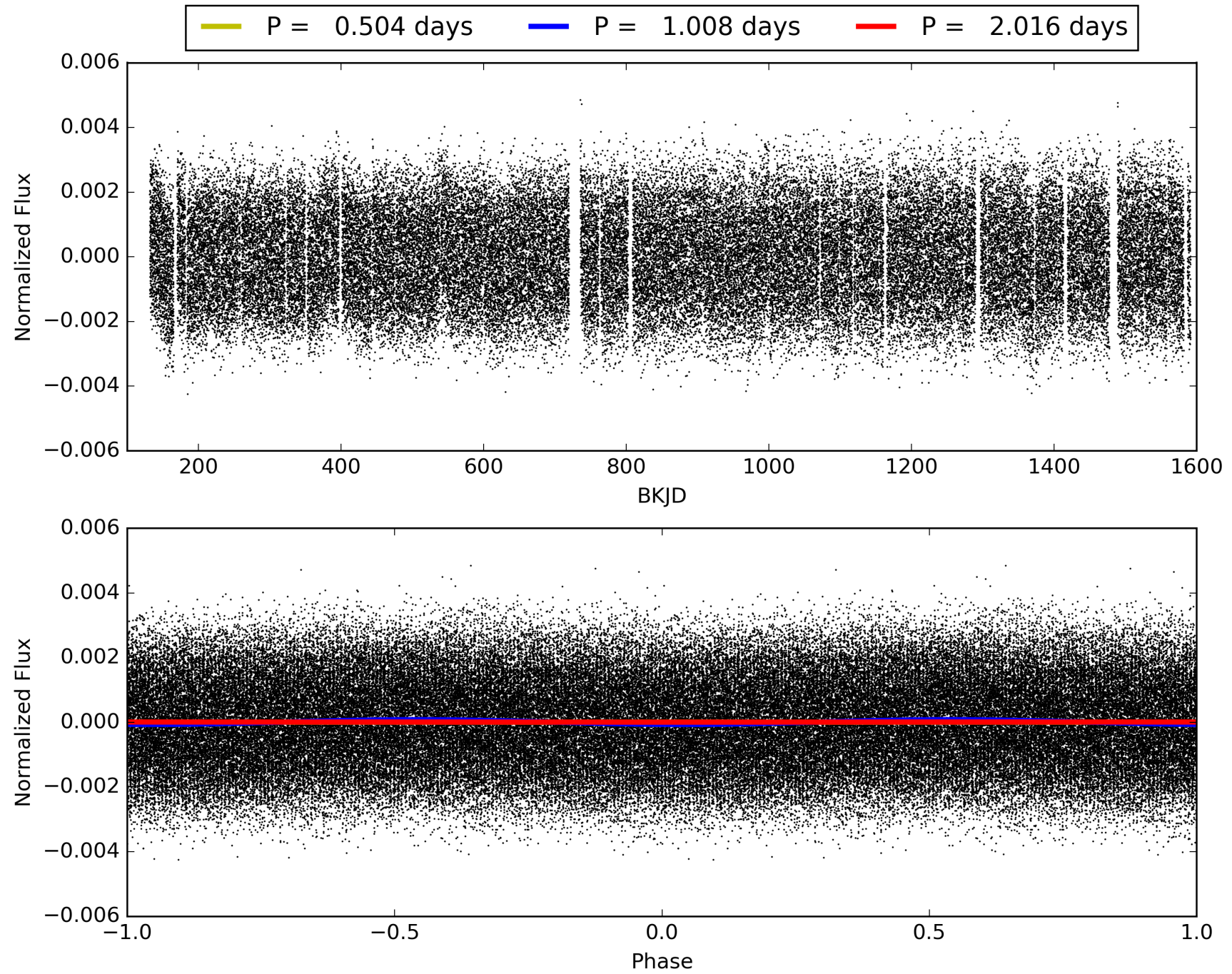
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009097423-02, PDC Light Curves





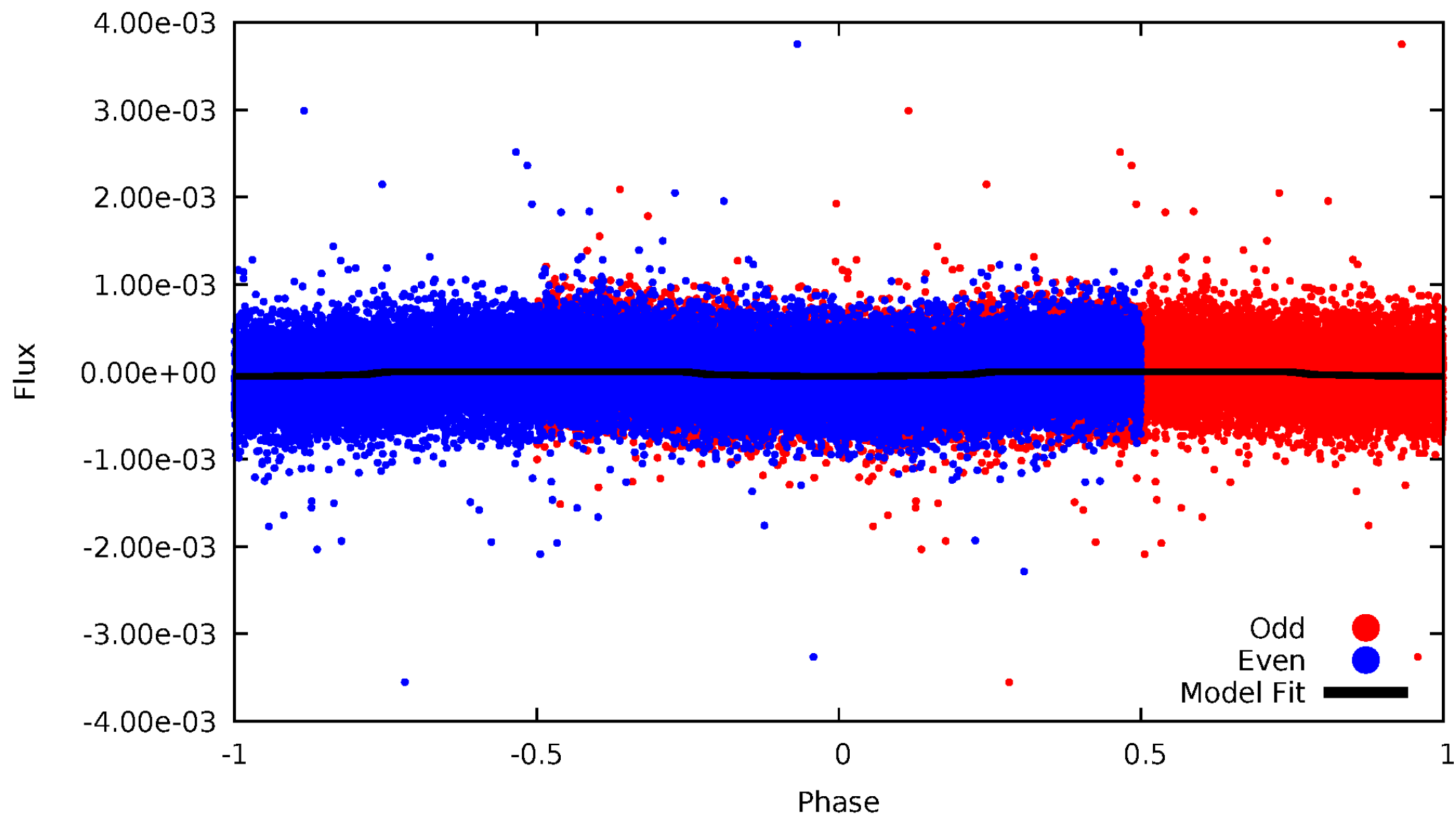
TCE 009097423-02





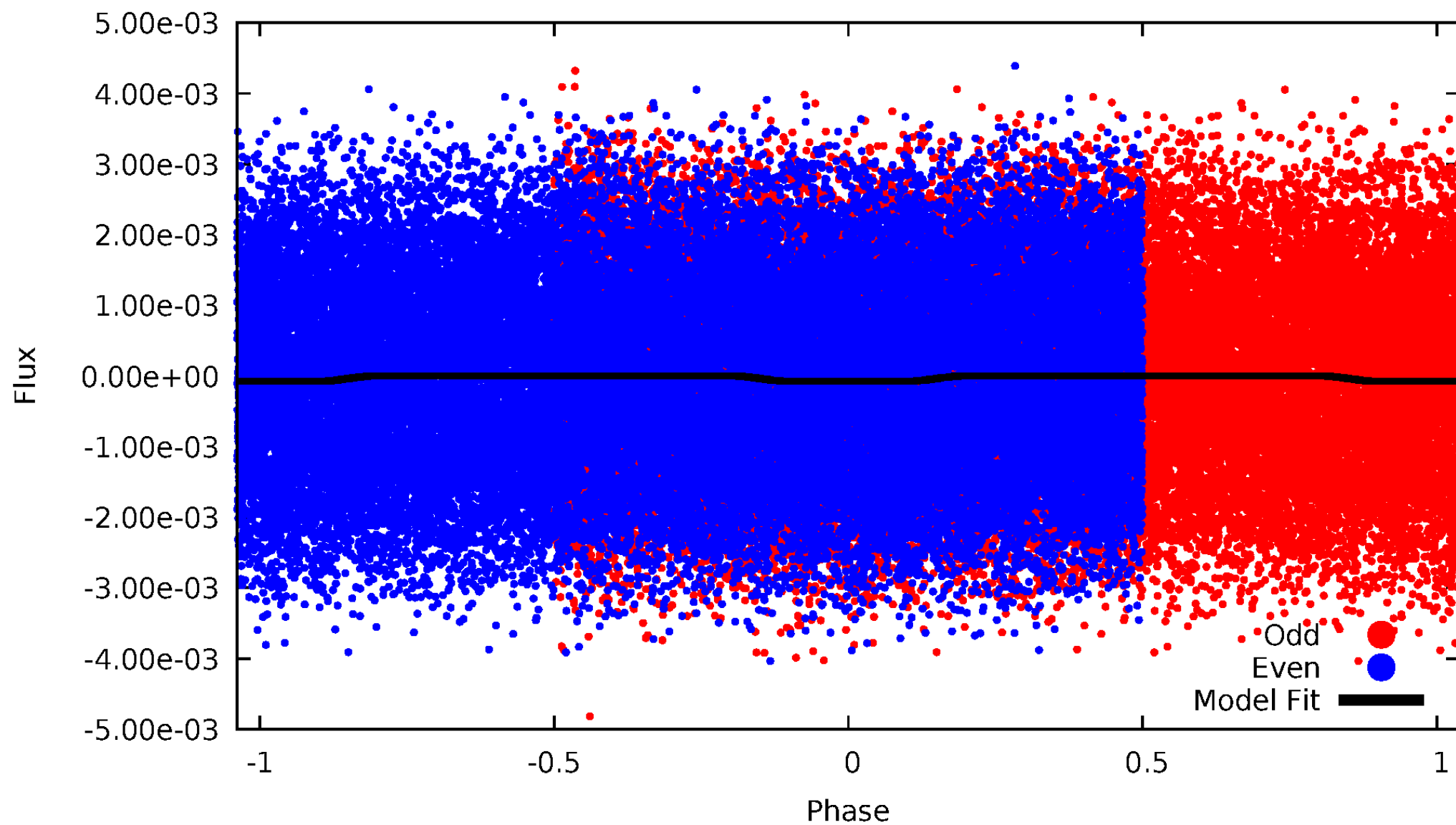
# DV Odd/Even

TCE 009097423-02



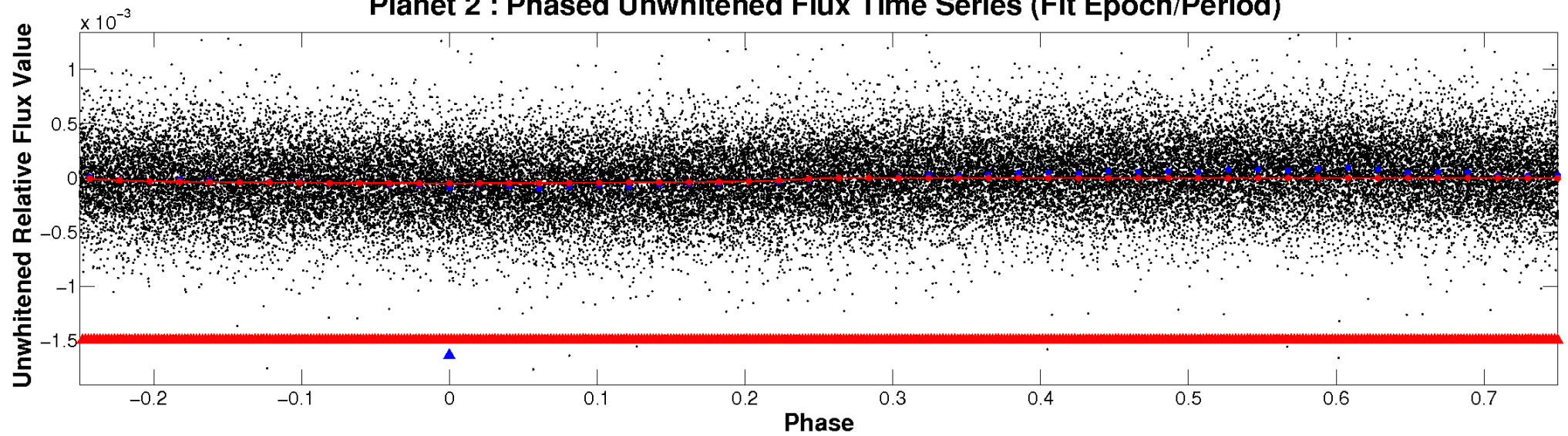
# ALT Odd/Even

TCE 009097423-02

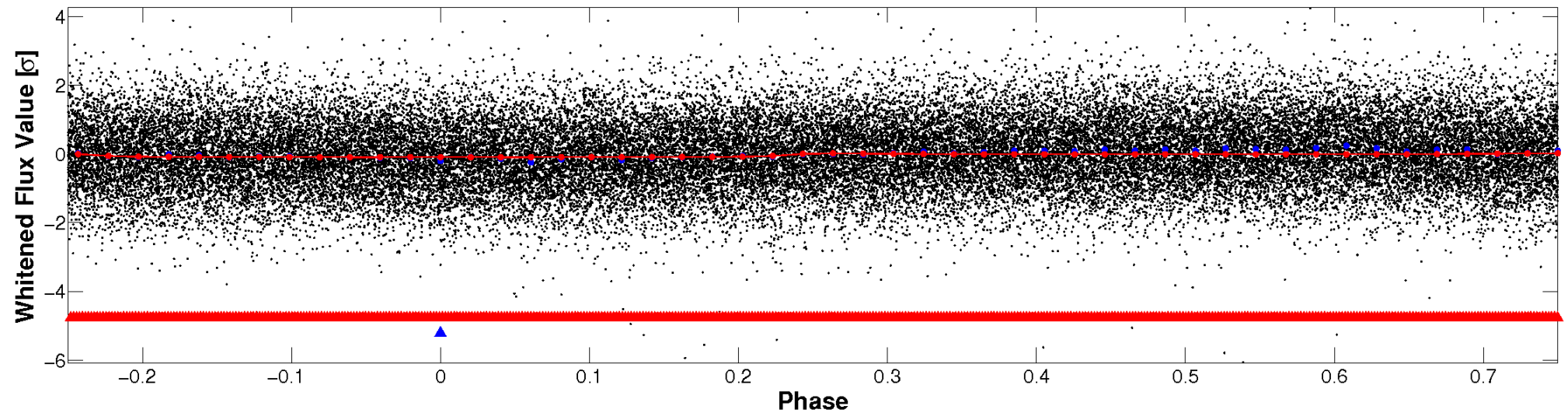


# Non-Whitened Vs. Whitened Light Curve

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

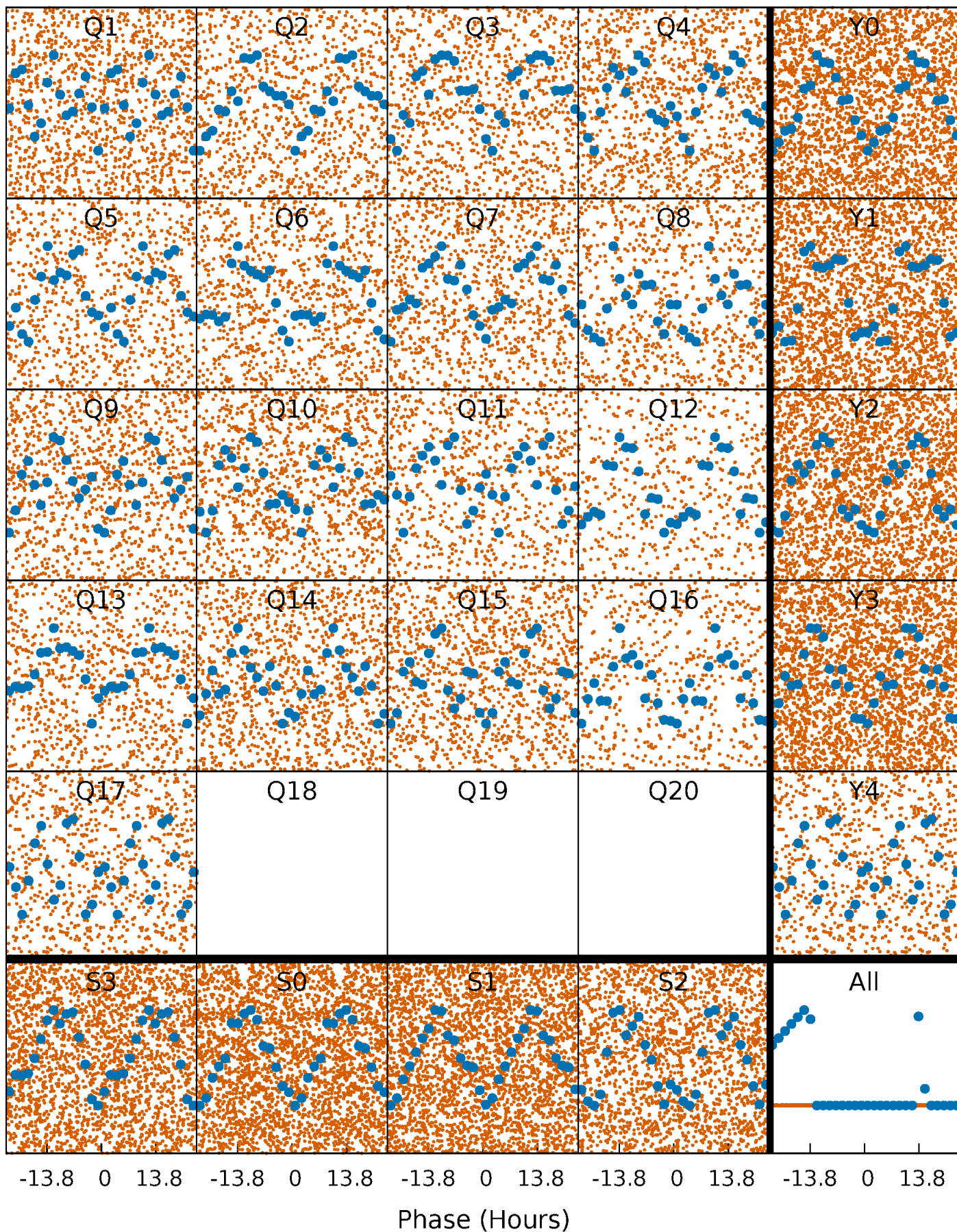


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

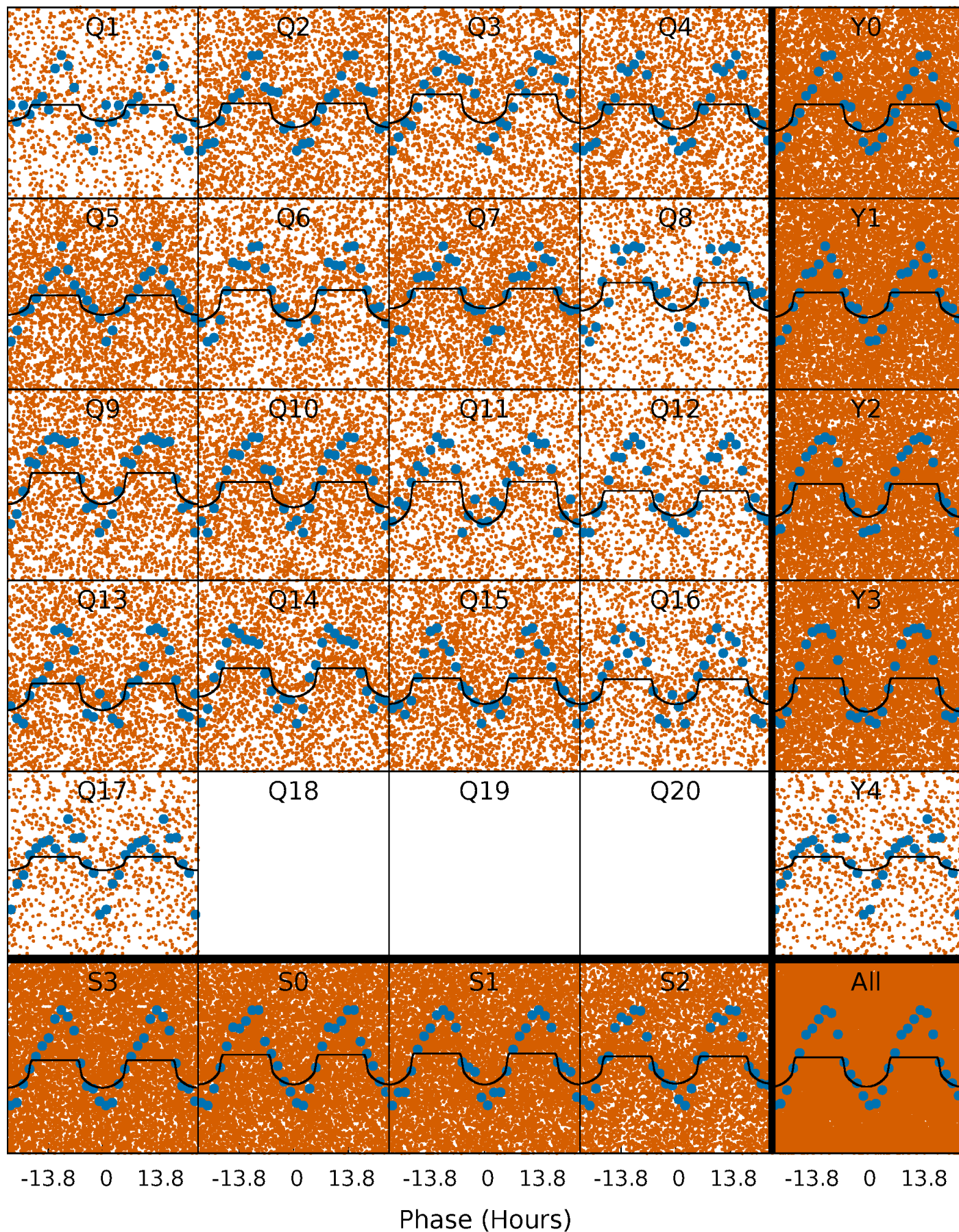
TCE 009097423-02 P= 1.008126 Days  $T_0=131.917721$  (BKJD)





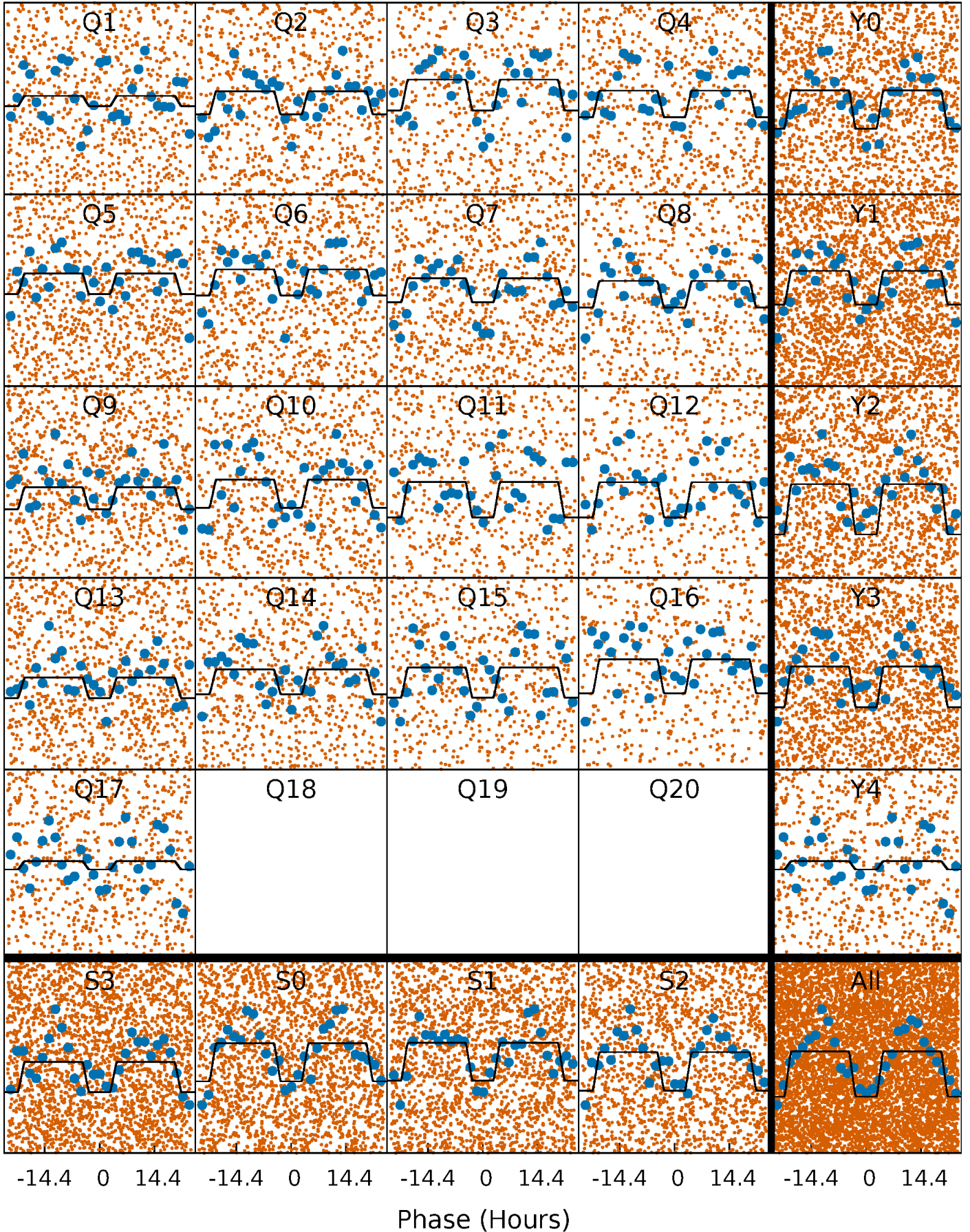
# DV Quarter-Phased Transit Curves

TCE 009097423-02 P= 1.008126 Days  $T_0=131.917721$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 009097423-02 P= 1.008189 Days  $T_0=131.921826$  (BKJD)

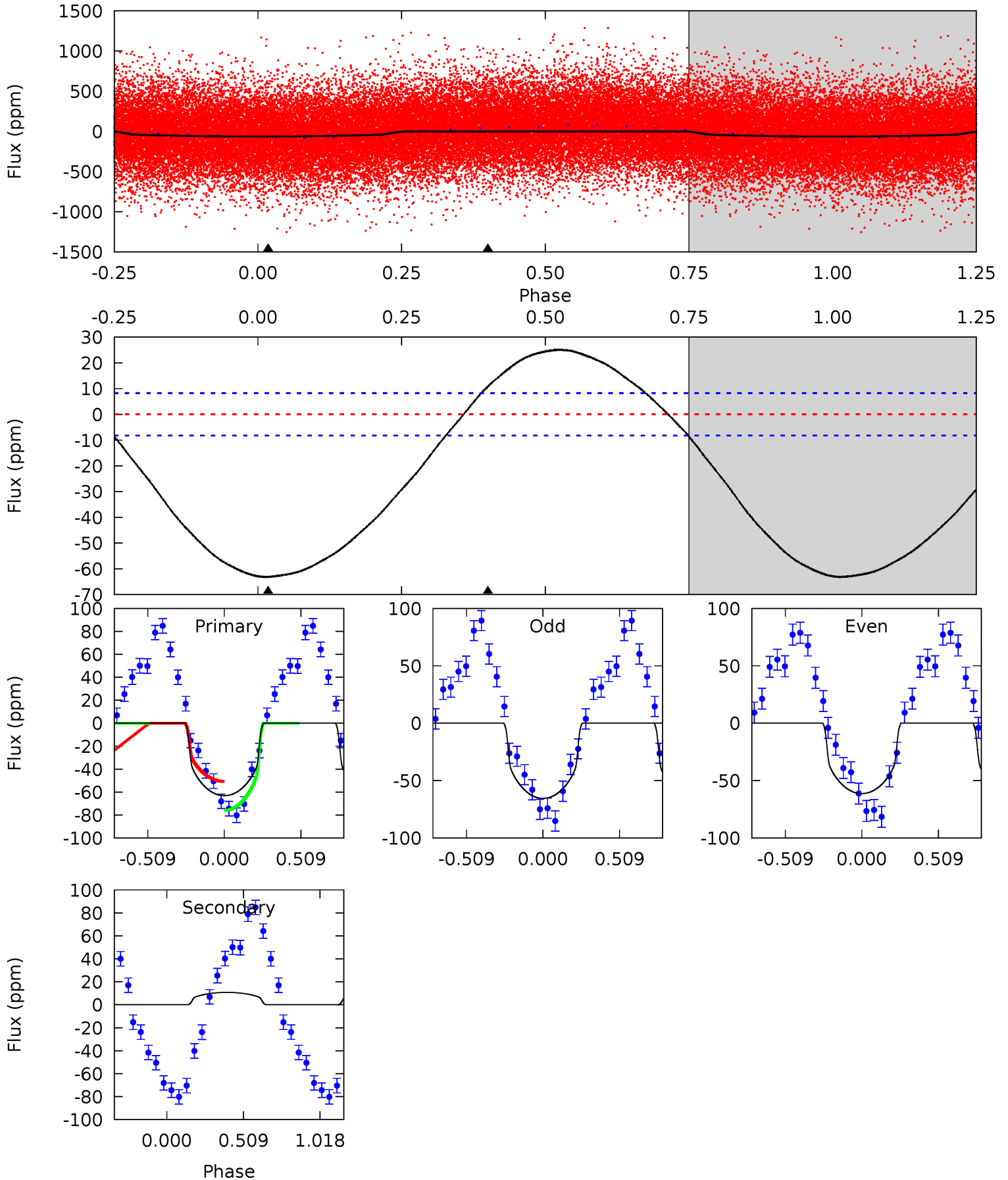




# DV Model-Shift Uniqueness Test

009097423-02, P = 1.008126 Days, E = 130.909595 Days

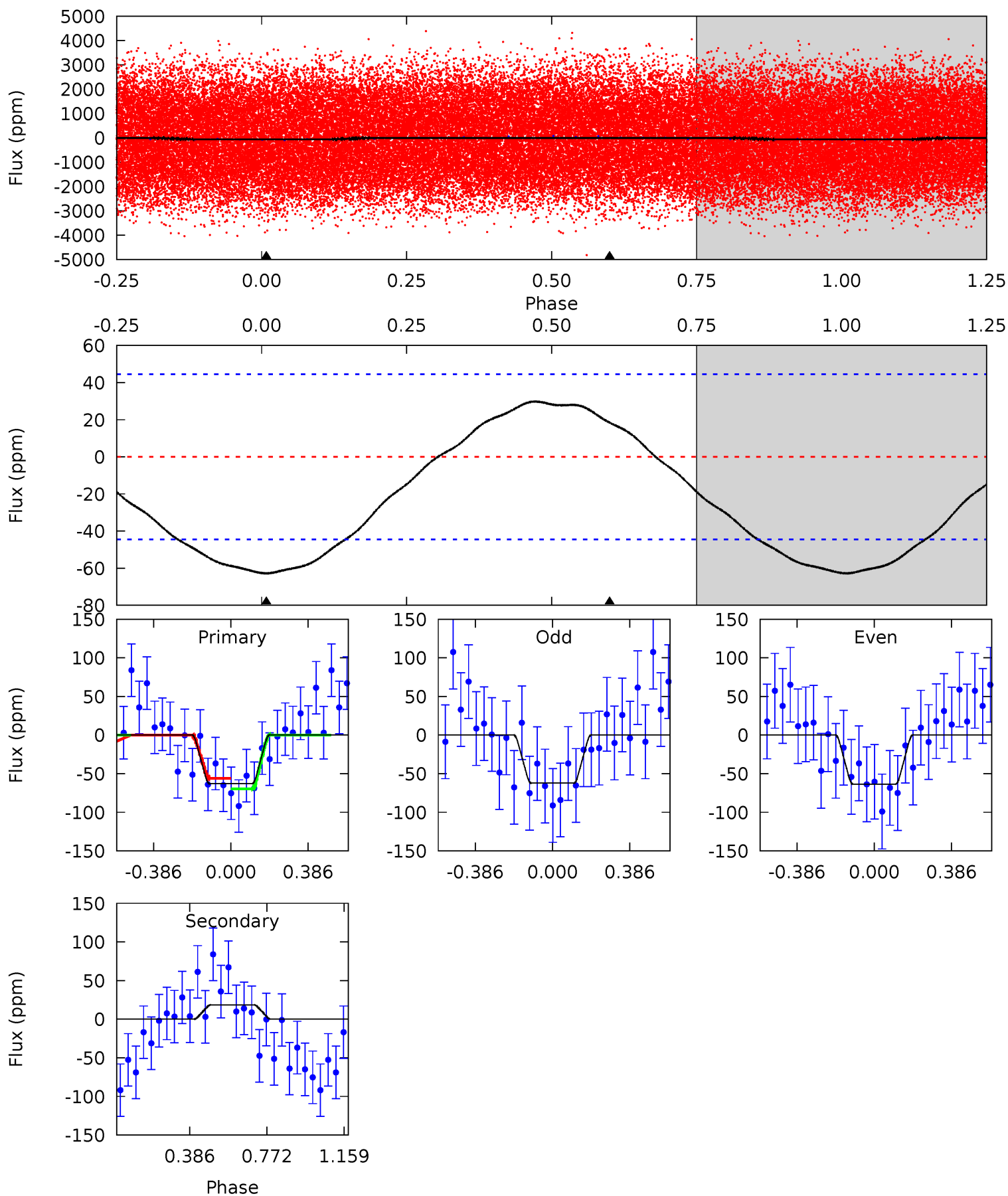
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
32.3	-5.52	0	0	4.21	0.66	3.44	32.3	32.3	-5.52	-5.52	1.07	0.74	0.29	6.51



# Alt Model-Shift Uniqueness Test

009097423-02, P = 1.008189 Days, E = 130.913637 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
6.03	-1.77	0	0	4.27	0.87	0.65	6.03	6.03	-1.77	-1.77	0.06	1.78	0.32	0.65



### Stellar Parameters For KIC 009097423

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$8048^{+224}_{-336}$	$3.725^{+0.442}_{-0.104}$	$-0.100^{+0.200}_{-0.350}$	$3.251^{+0.801}_{-1.603}$	$2.046^{+0.335}_{-0.503}$	$0.084^{+0.320}_{-0.029}$
	+3%/-4%	+12%/-3%	+200%/-350%	+25%/-49%	+16%/-25%	+382%/-35%
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 009097423-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$11 \pm 2$	$2.16^{+0.58}_{-0.58}$	$5483^{+432}_{-692}$	$-6005^{+433}_{-499}$	$-0.797^{+0.314}_{-0.702}$
Alt.	$18 \pm 10$	$2.80^{+0.62}_{-0.73}$	$5424^{+453}_{-649}$	$-5981^{+712}_{-676}$	$-0.832^{+0.476}_{-0.776}$

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

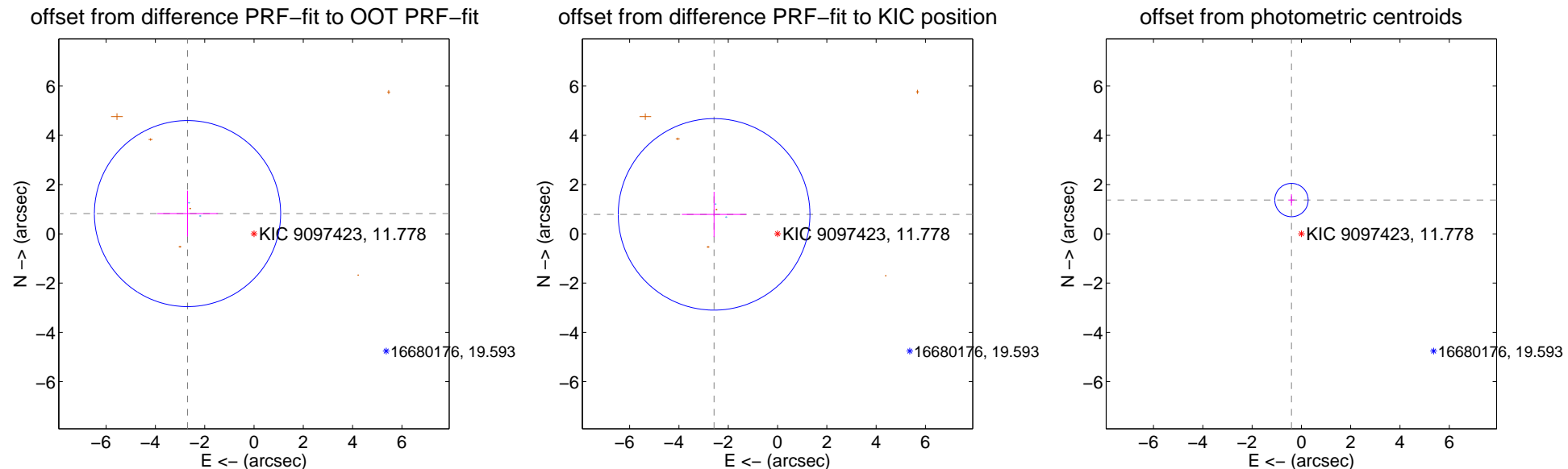
## DV Centroid Data

Supplemental centroid analysis for 009097423-02. **Kepler magnitude: 11.78.** Transit SNR 13.15

**There are 2 quarters with good PRF difference image offsets**

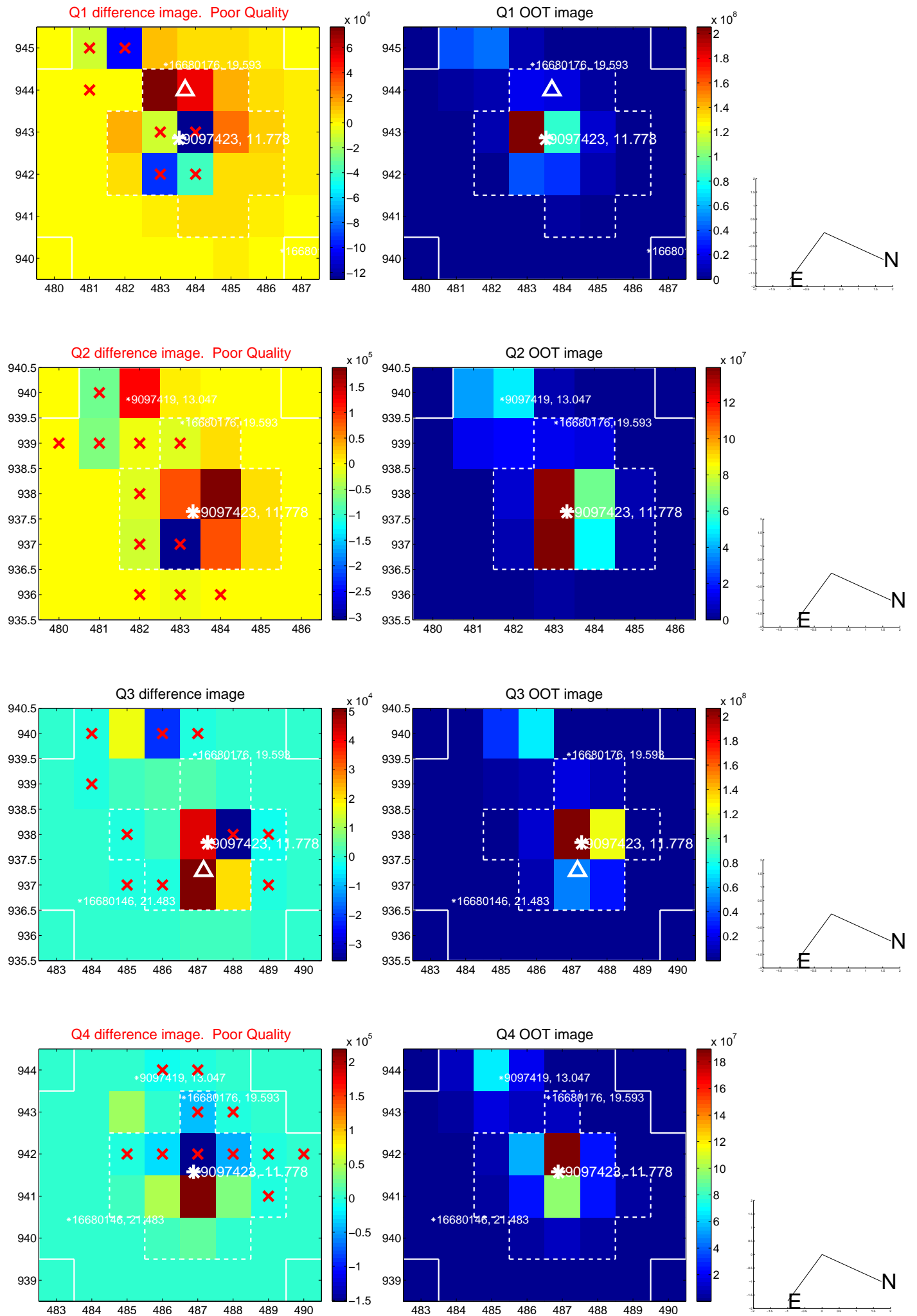
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.820 \pm 1.259$	2.24	$2.697 \pm 1.232$	$0.822 \pm 0.928$
PRF-fit source offset from KIC position	$2.693 \pm 1.296$	2.08	$2.575 \pm 1.303$	$0.790 \pm 0.918$
photometric centroid source offset	$1.43 \pm 0.23$	<b>6.34</b>	$0.40 \pm 0.13$	$1.37 \pm 0.23$

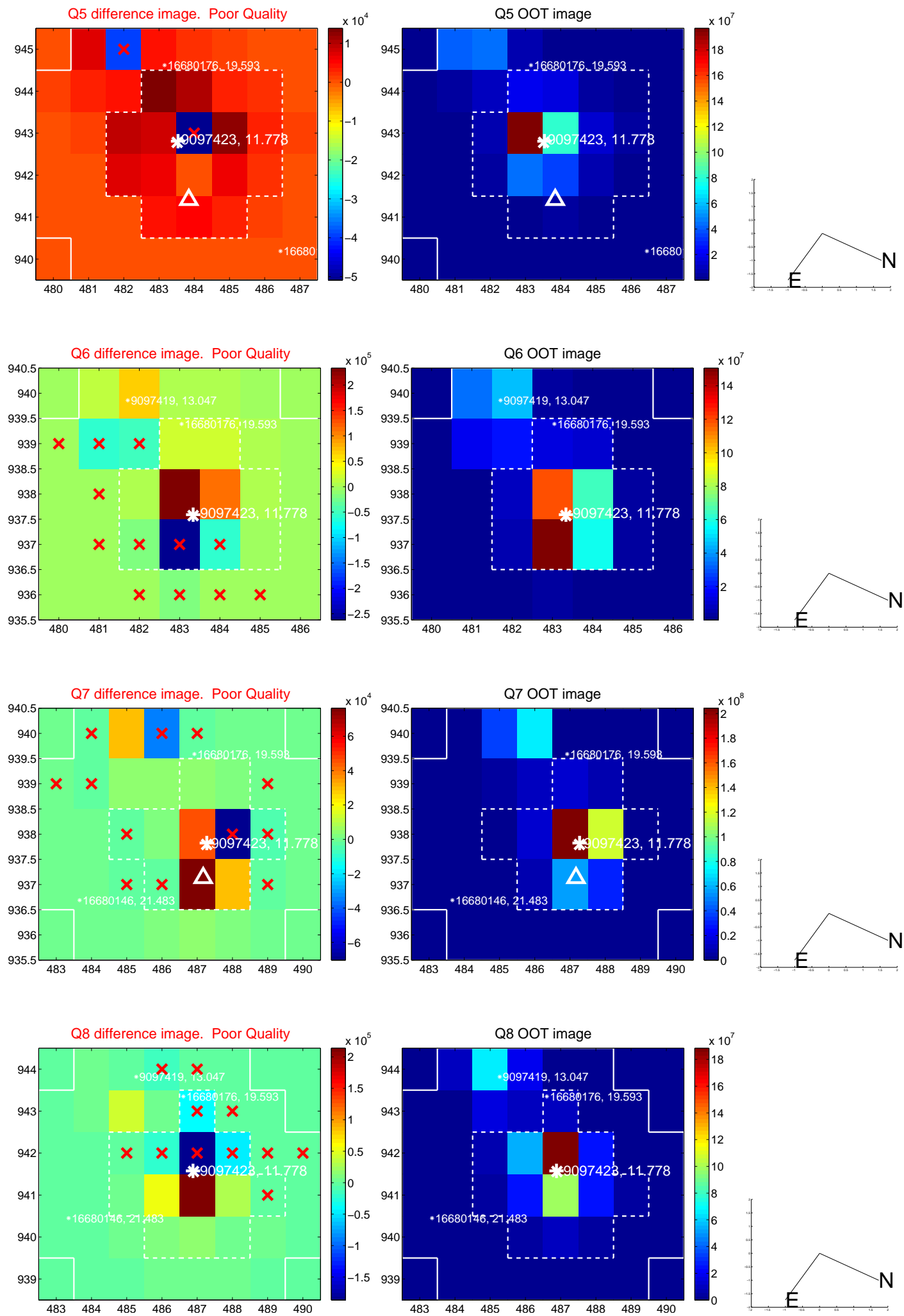


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

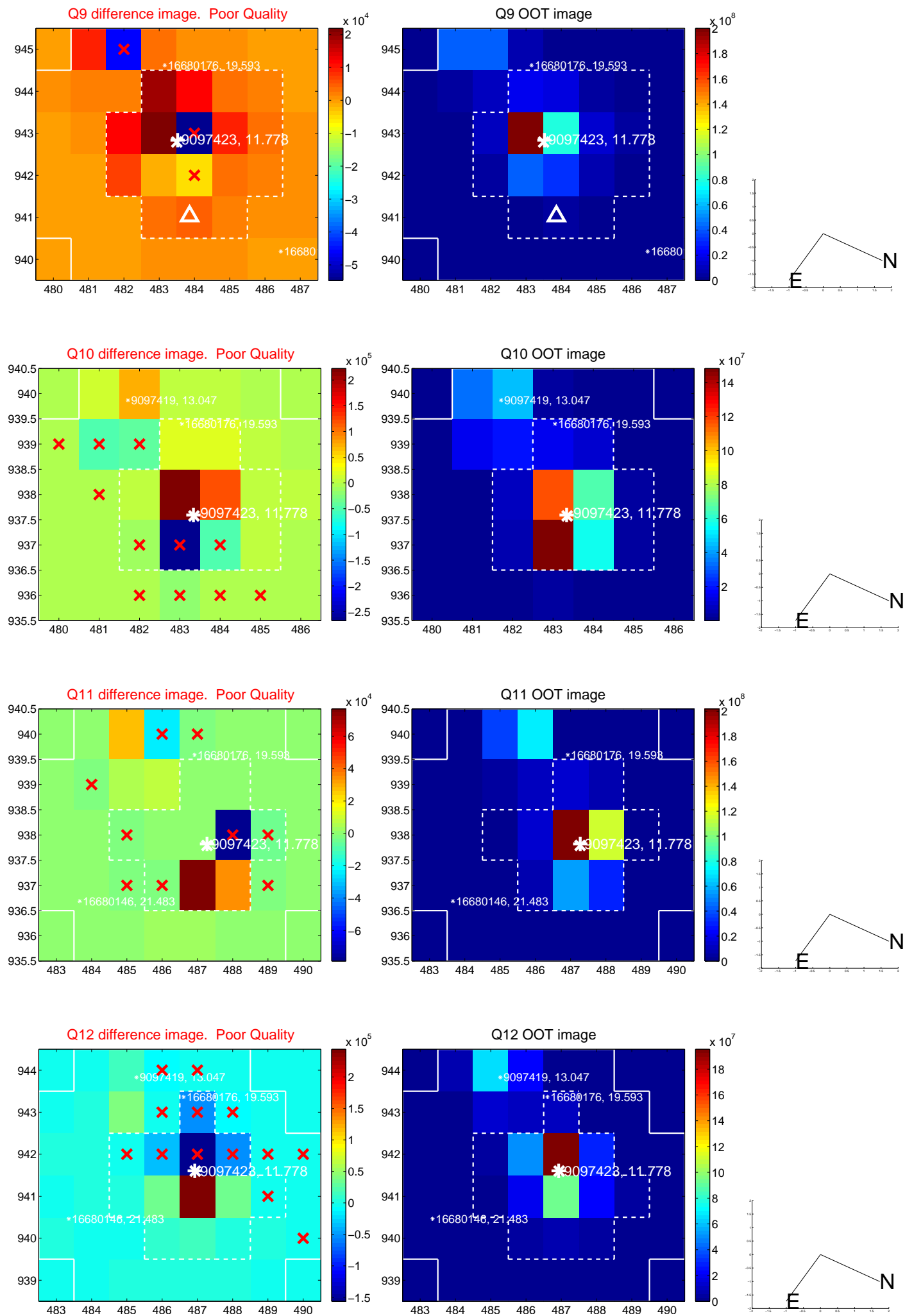


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

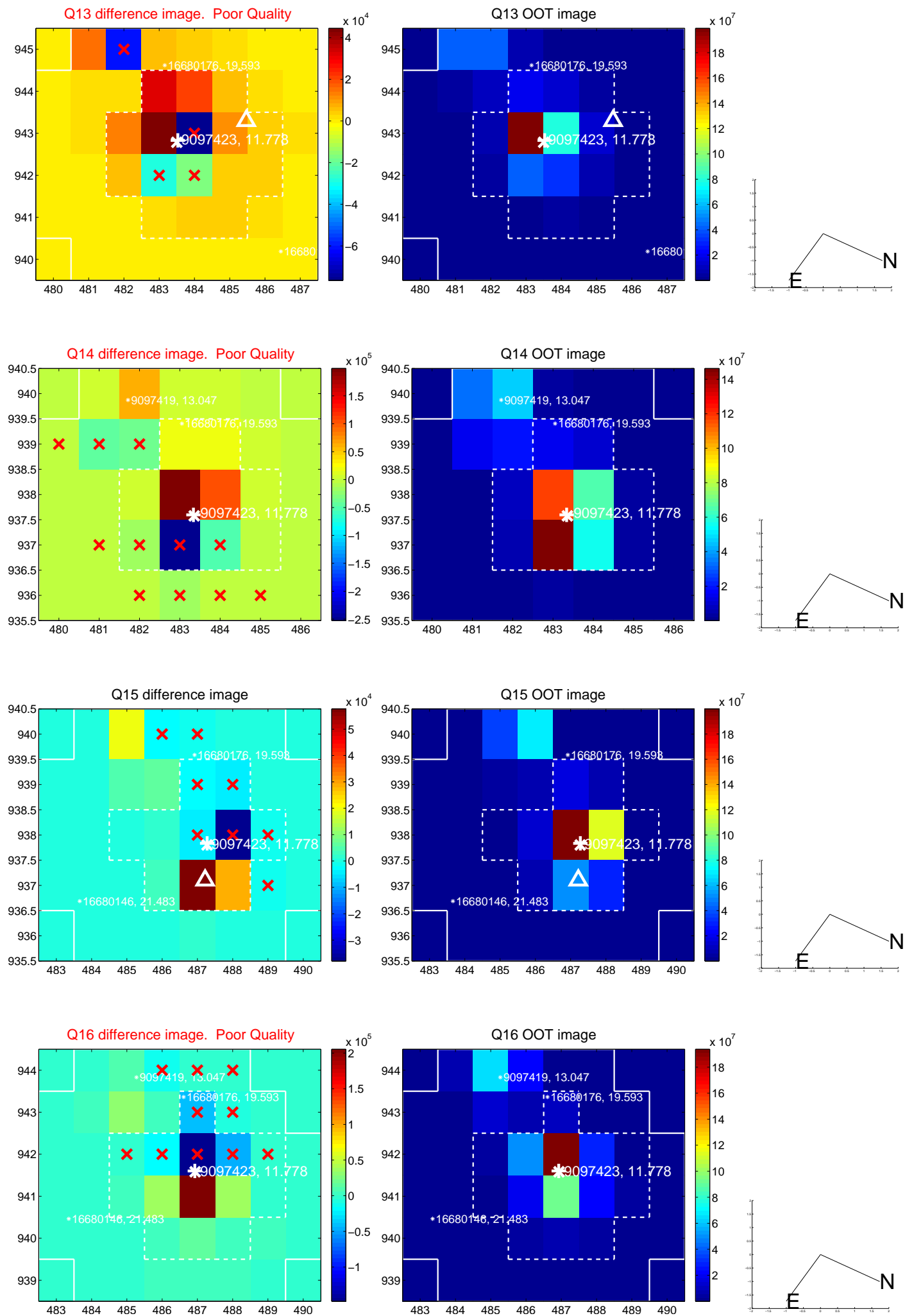




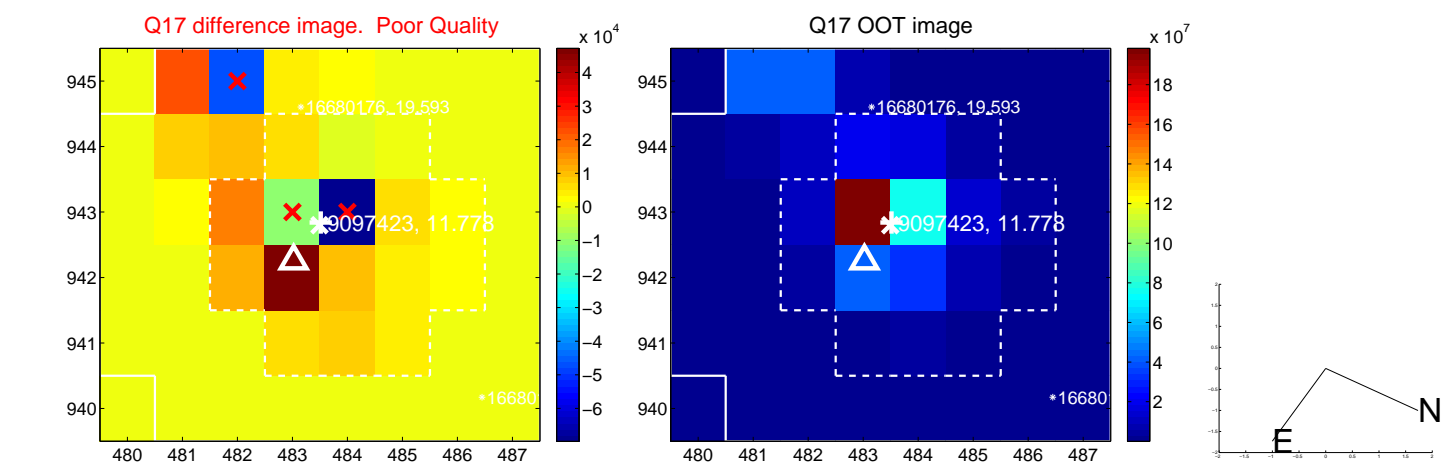
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



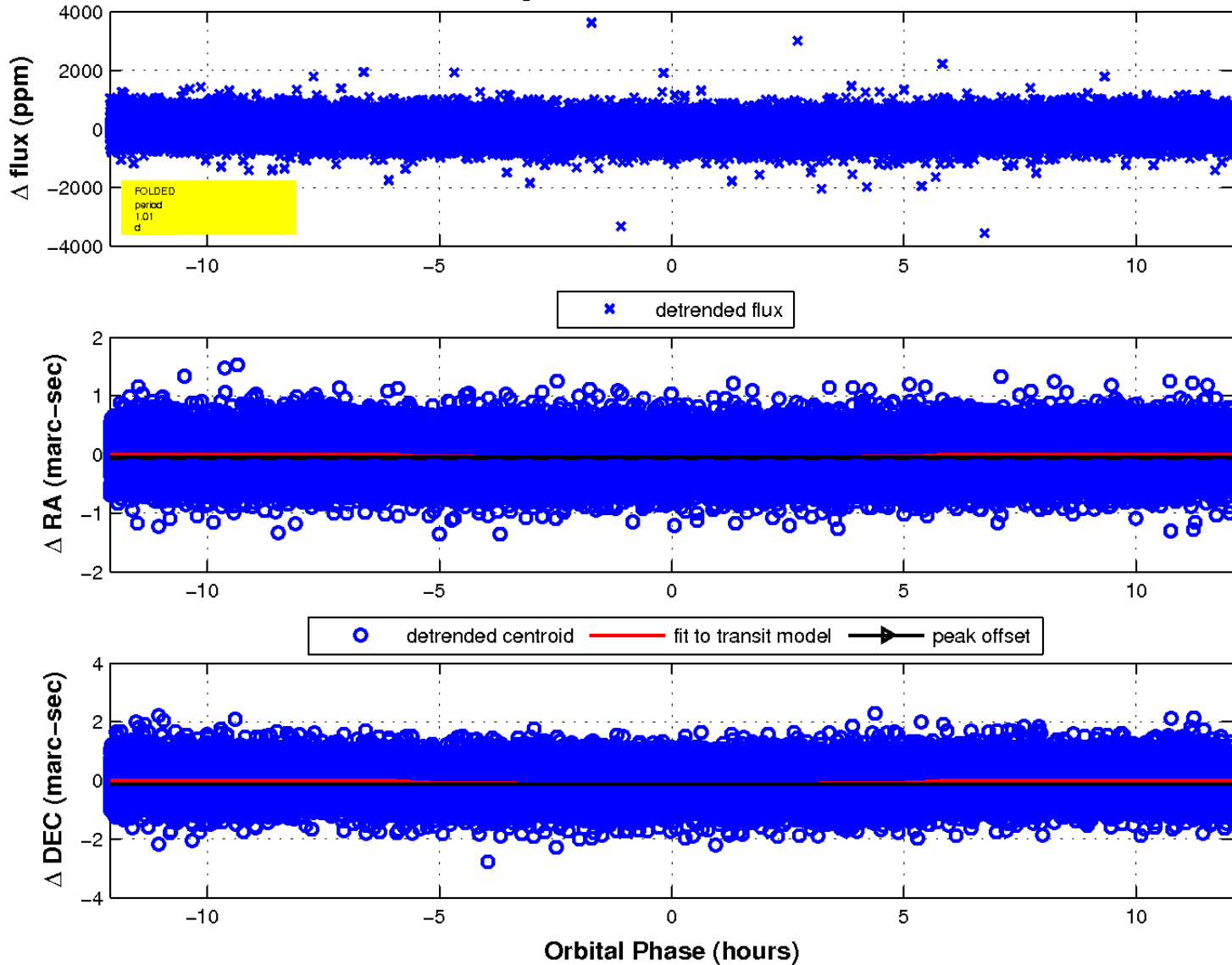
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

