

# KIC 009304923

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009304923-01	OBS	No	0.564465	131.699139	141.4	2.251	10.5	12.9	3.30	7981	4.57	136492.25
009304923-02	OBS	No	0.564464	132.066105	133.9	1.534	9.7	12.5	3.30	7981	4.10	136492.53
009304923-03	OBS	No	15.324070	145.175875	879.8	2.422	8.4	8.9	3.30	7981	11.33	1672.86

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009304923-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009304923-02	OBS	FP	0.00	1	0	0	0	LPP_DV—SAME_NTL_PERIOD
009304923-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT

**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.

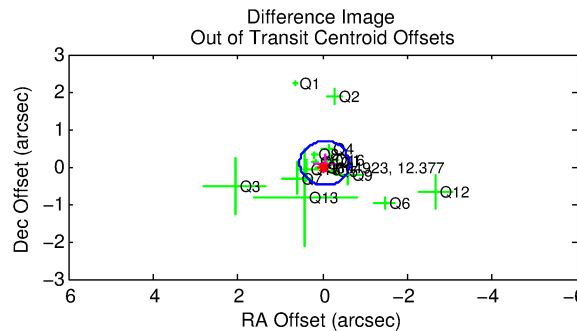
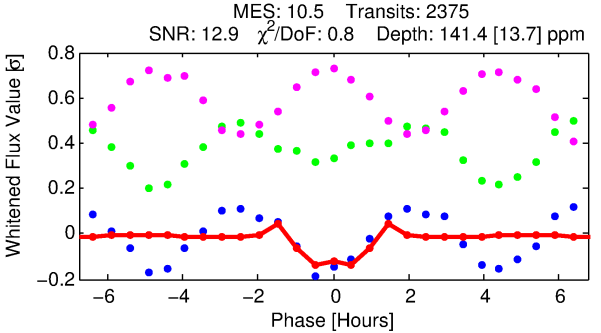
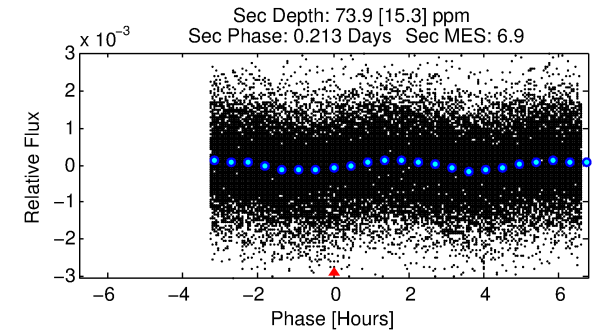
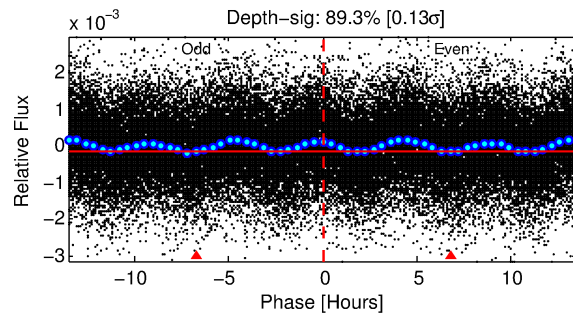
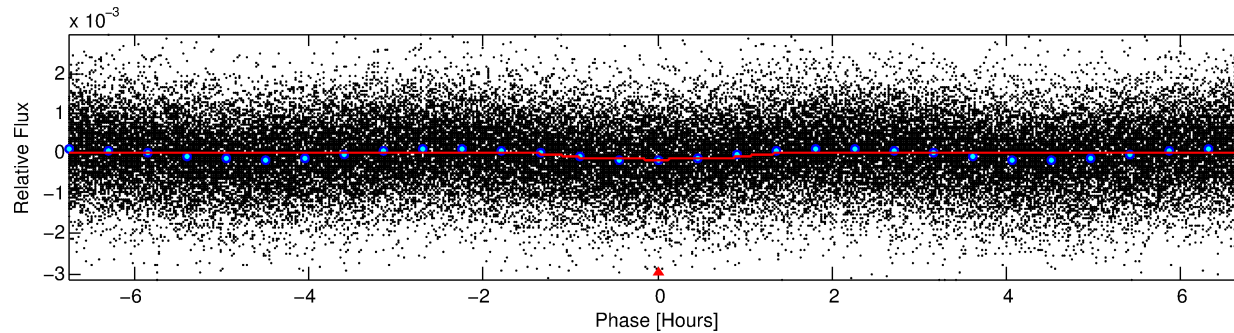
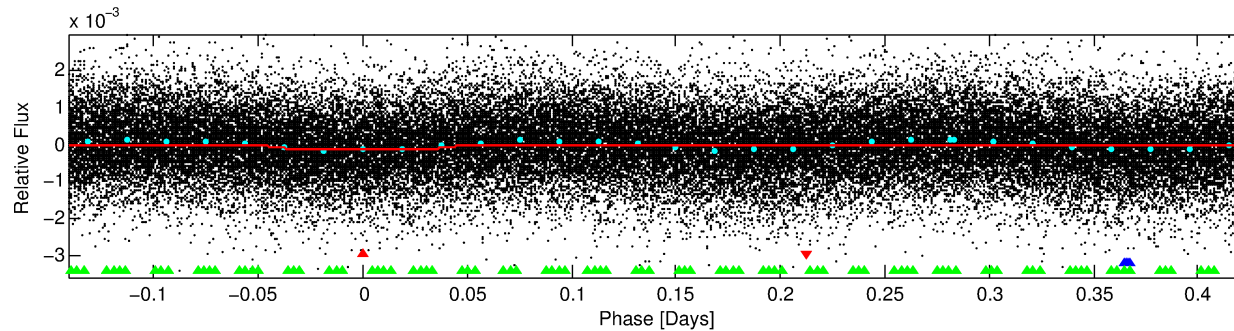
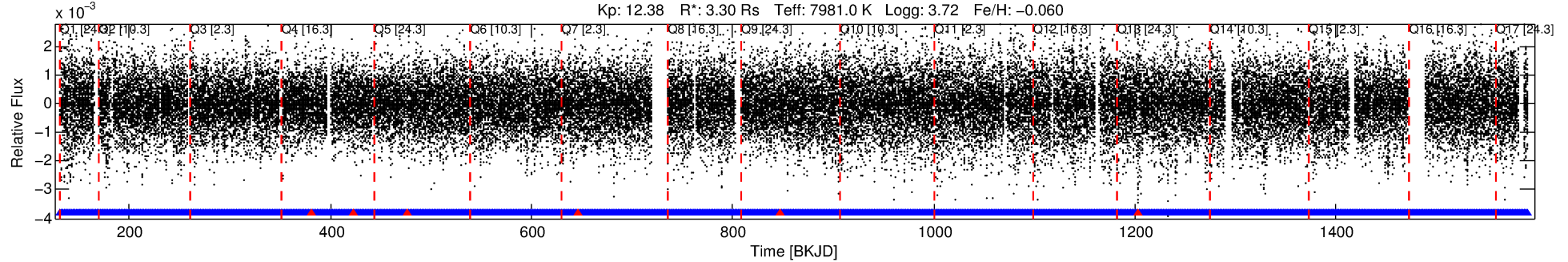
Ephemeris Match Information For 009304923-01

No Significant Match Found

# DV One-Page Summary

KIC: 9304923 Candidate: 1 of 3 Period: 0.564 d  
KOI: K06200 Corr: No Ephemeris Match

Kp: 12.38 R\*: 3.30 Rs Teff: 7981.0 K Logg: 3.72 Fe/H: -0.060



## DV Fit Results:

Period = 0.56446 [0.00001] d  
Epoch = 131.6991 [0.0013] BKJD  
Rp/R\* = 0.0127 [0.0029]  
a/R\* = 1.29 [0.71]  
b = 0.90 [0.29]  
Seff = 136492.25 [106617.38]  
Teq = 4901 [957] K  
Rp = 4.57 [2.46] Re  
a = 0.0170 [0.0081] AU  
Ag = 0.56 [0.51] [-0.85σ]  
Teffp = 6565 [870] K [1.29σ]

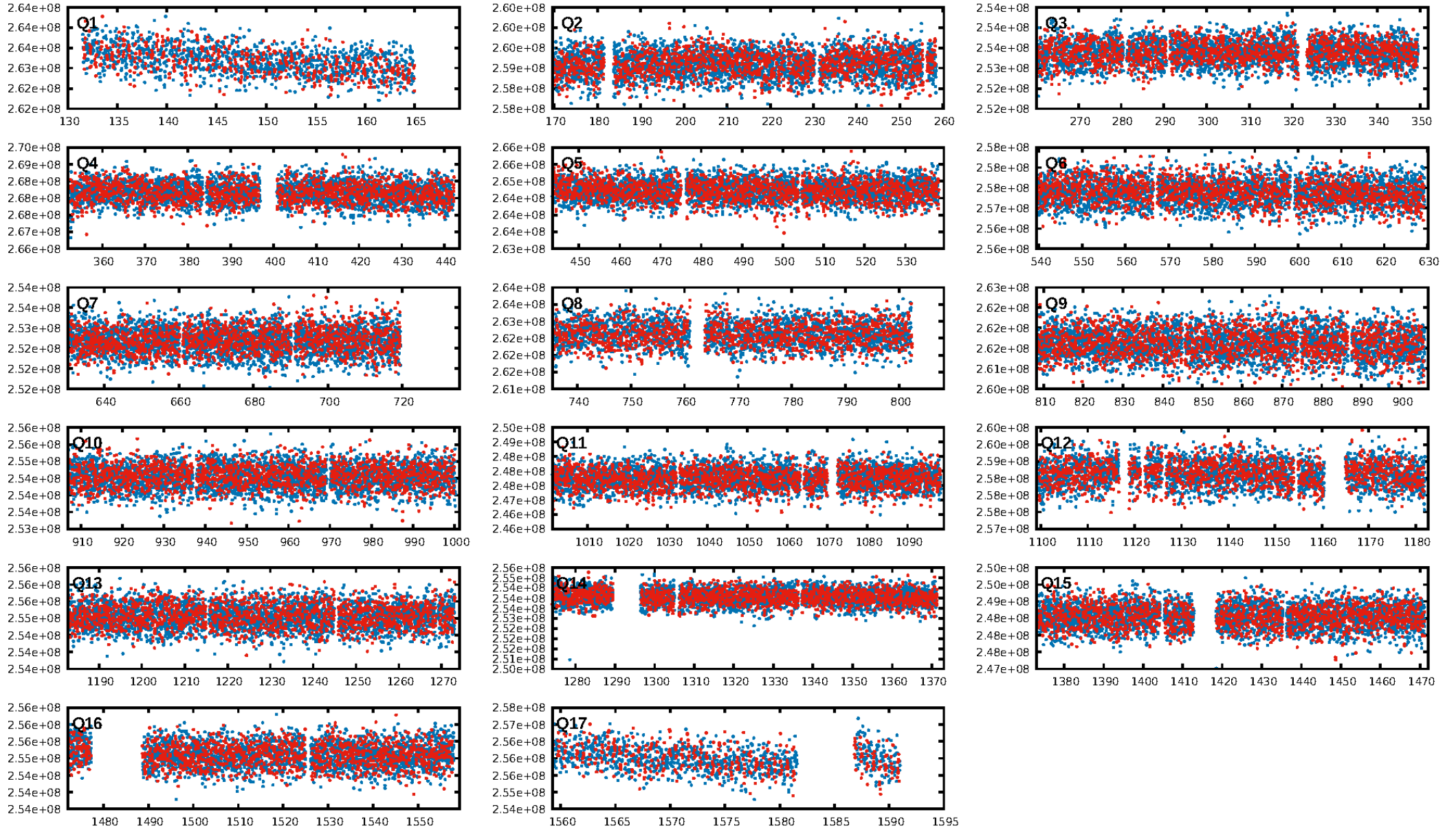
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: 100.0% [107.13σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.14e-08  
RollingBand-fgt: 1.00 [2261/2267]  
GhostDiagnostic-chr: 0.8696  
Centroid-sig: 0.0%  
Centroid-so: 0.567 arcsec [3.72σ]  
OotOffset-rm: 0.102 arcsec [0.52σ]  
KicOffset-rm: 0.182 arcsec [0.75σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.53 [9/17]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 12:23:53 Z

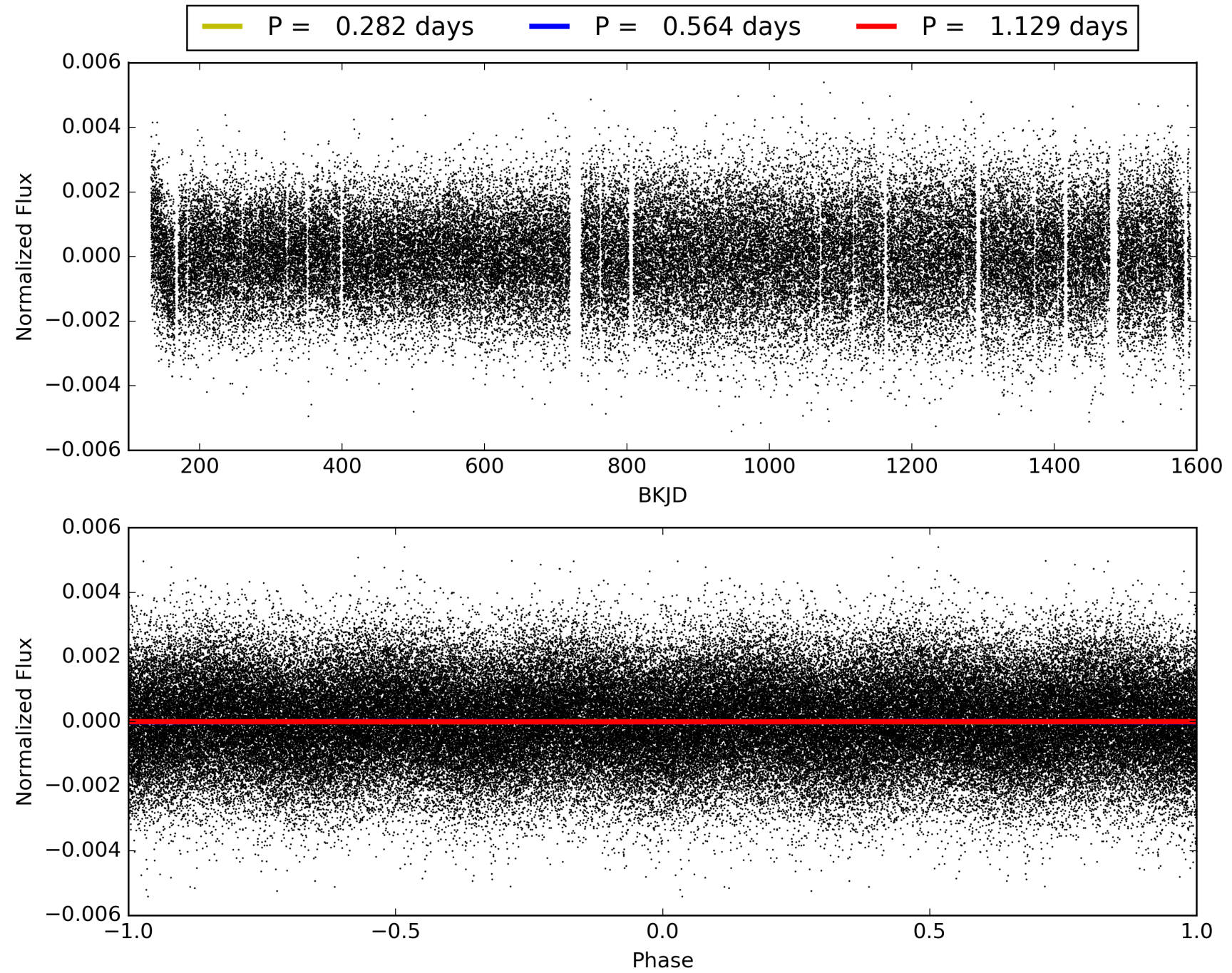
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009304923-01, PDC Light Curves





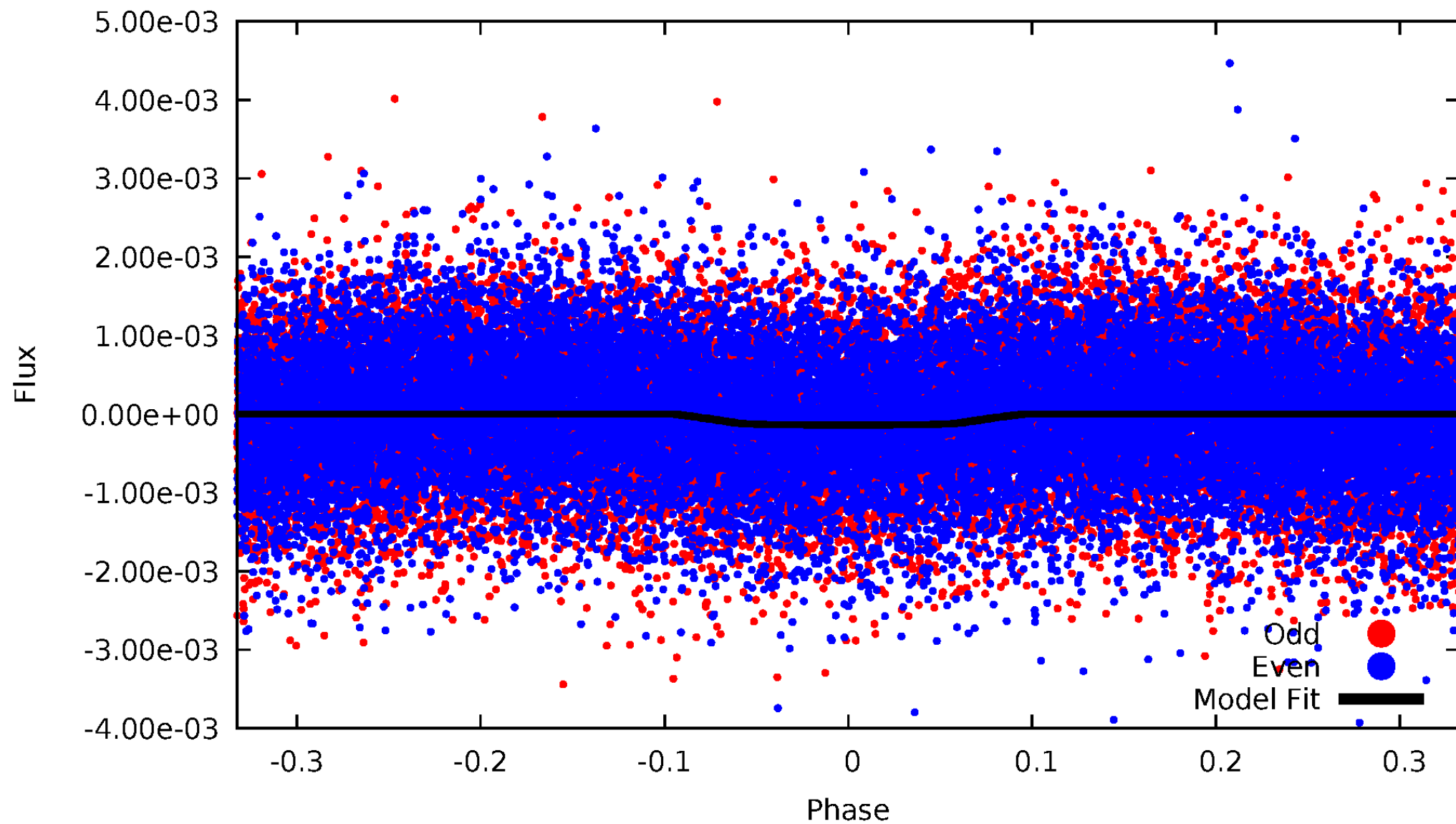
TCE 009304923-01





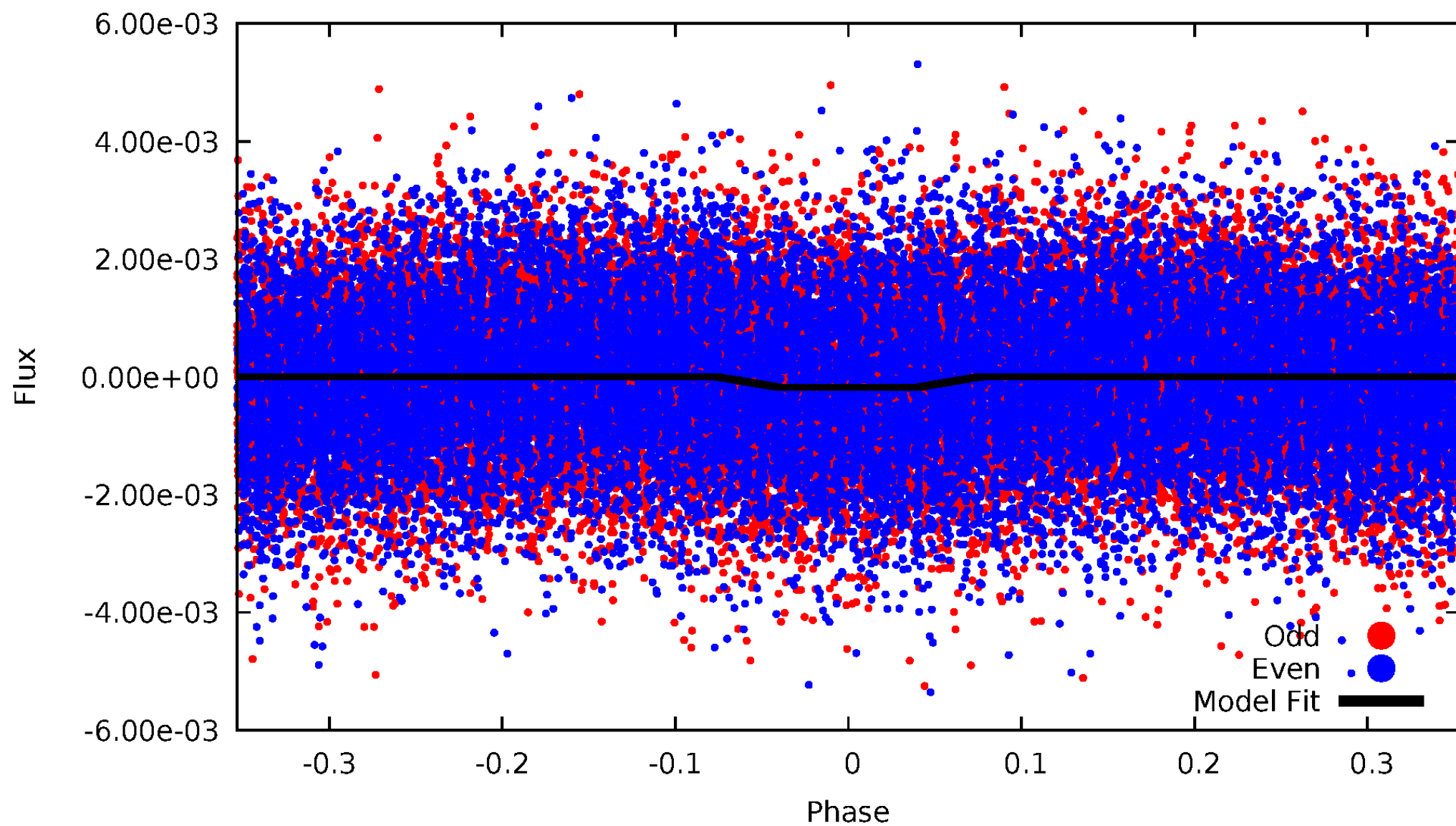
# DV Odd/Even

TCE 009304923-01

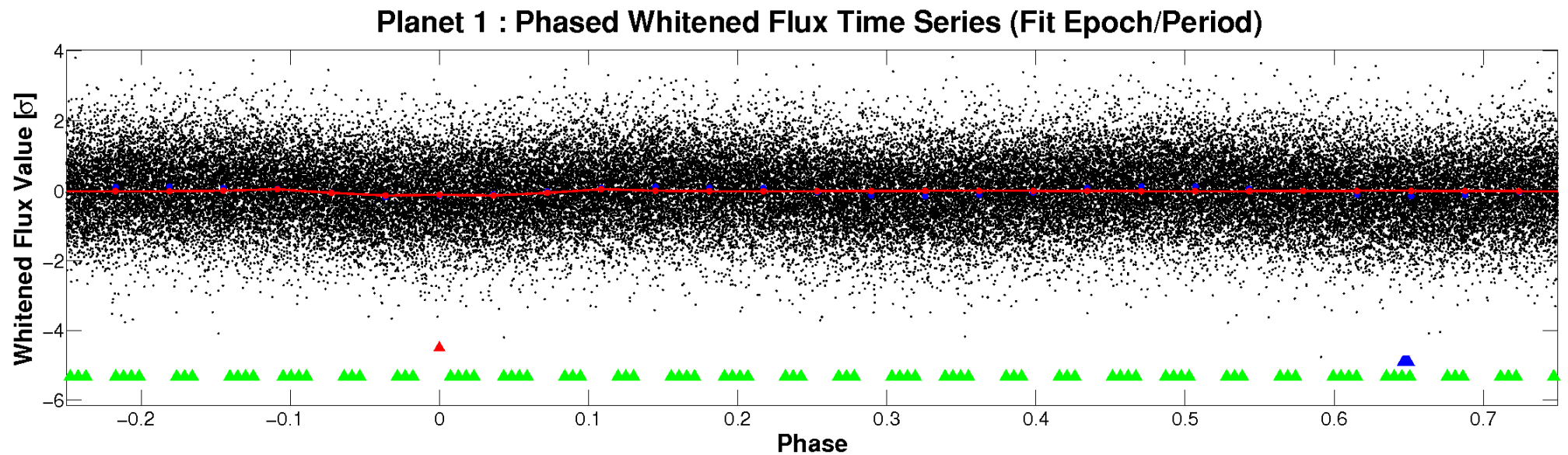
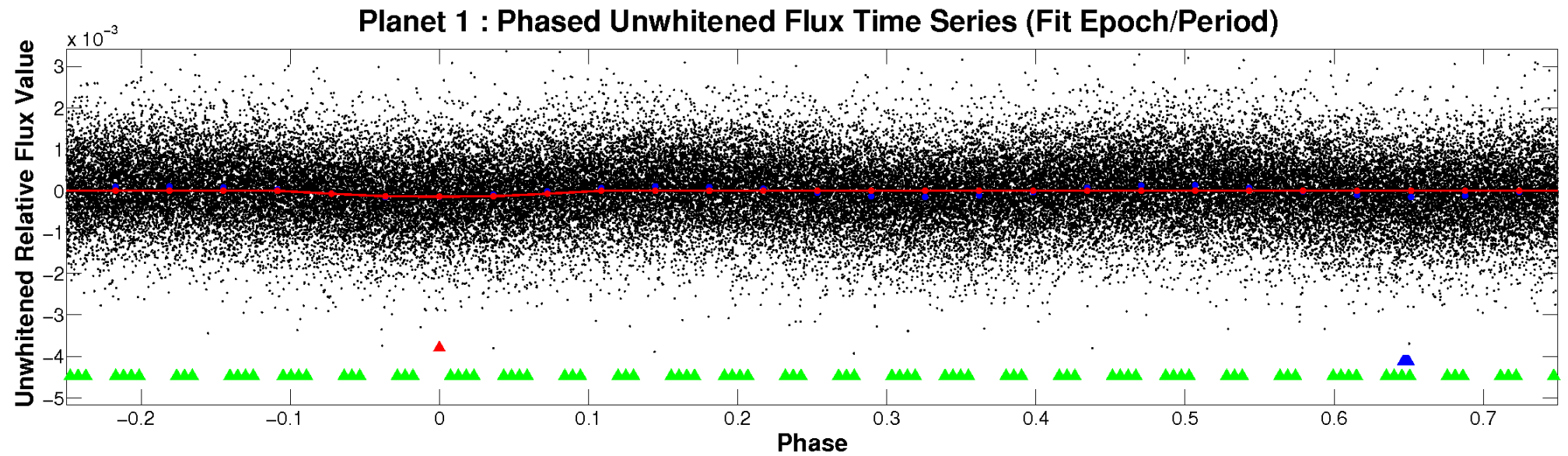


# ALT Odd/Even

TCE 009304923-01



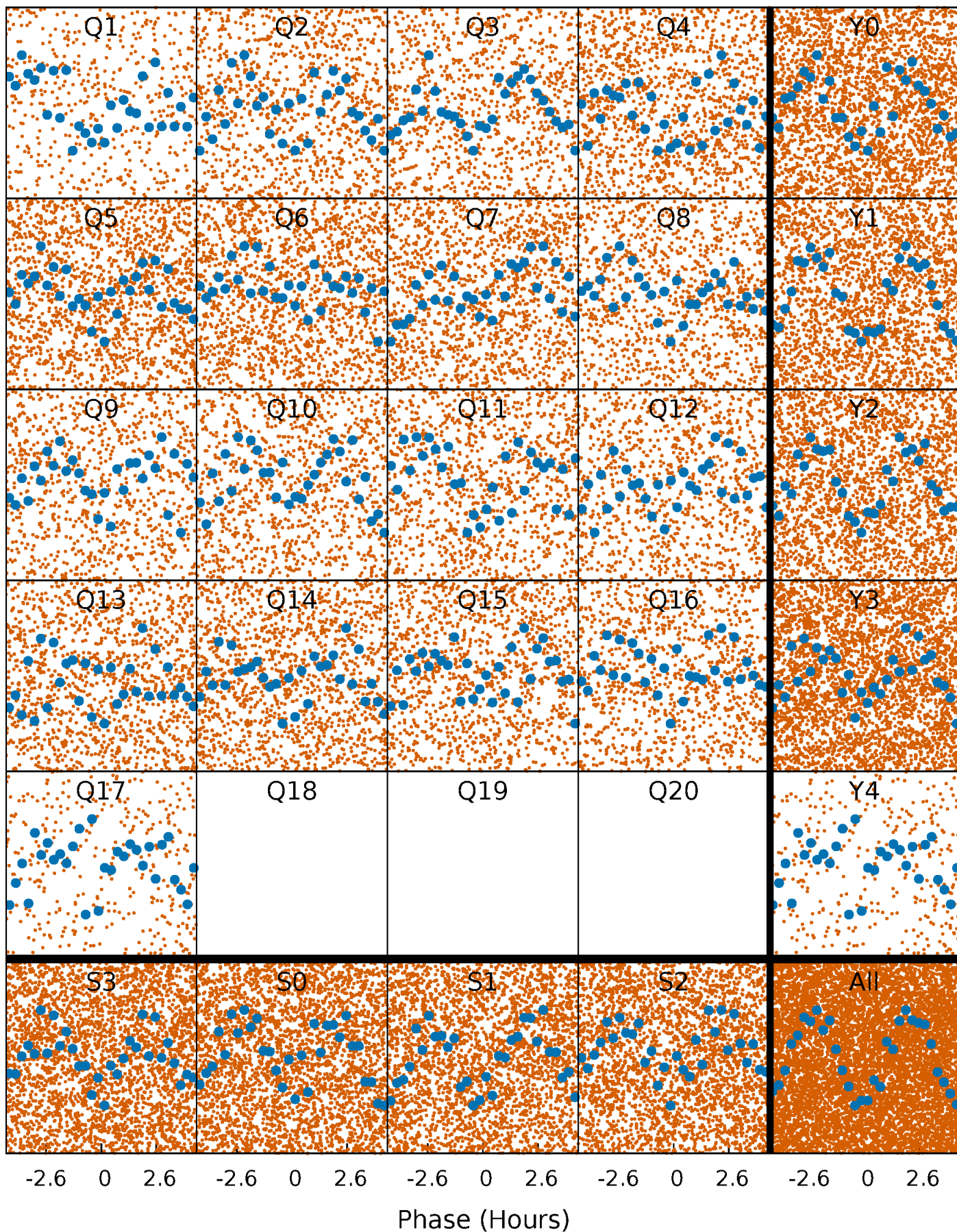
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

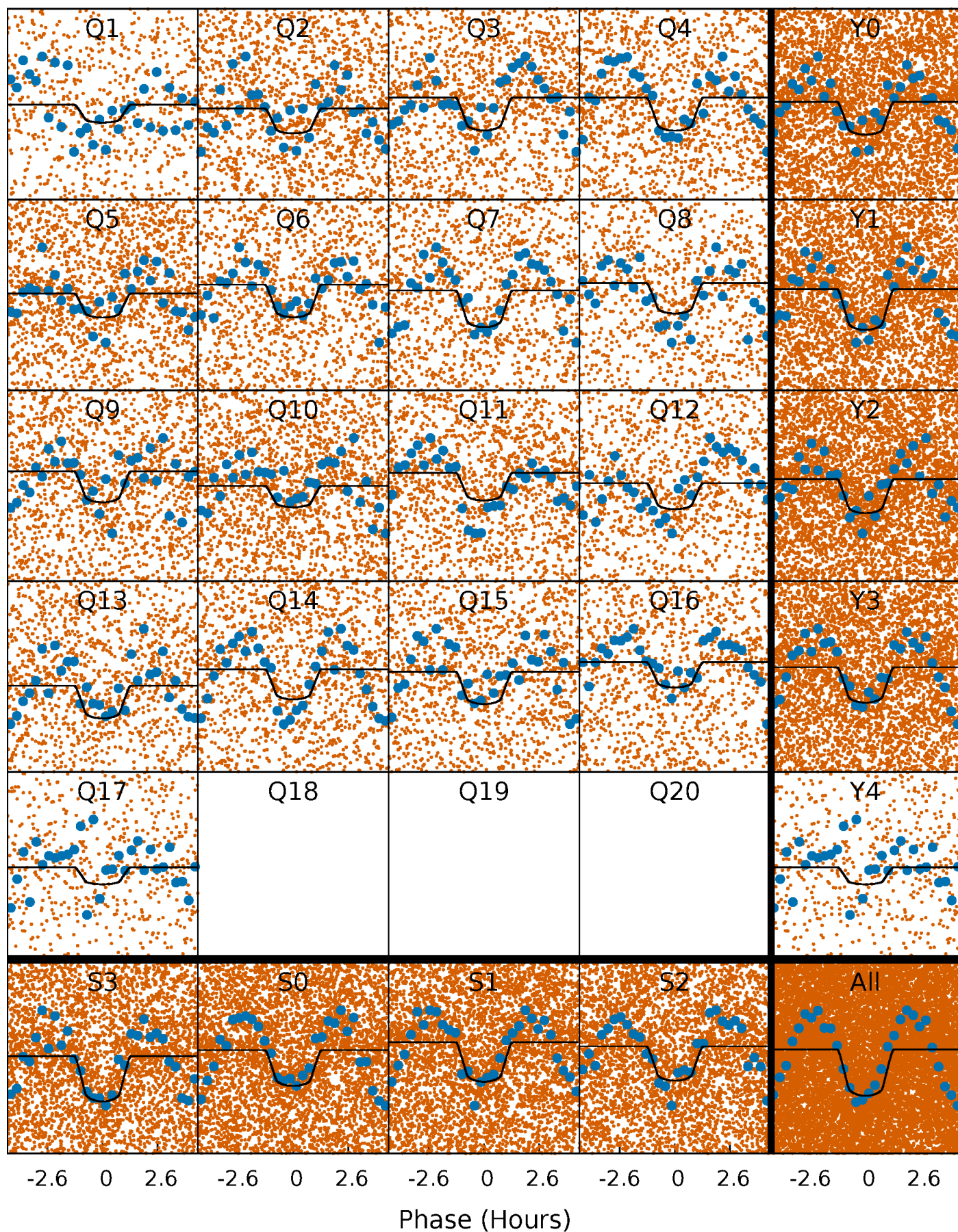
TCE 009304923-01 P= 0.564465 Days  $T_0=131.699140$  (BKJD)





# DV Quarter-Phased Transit Curves

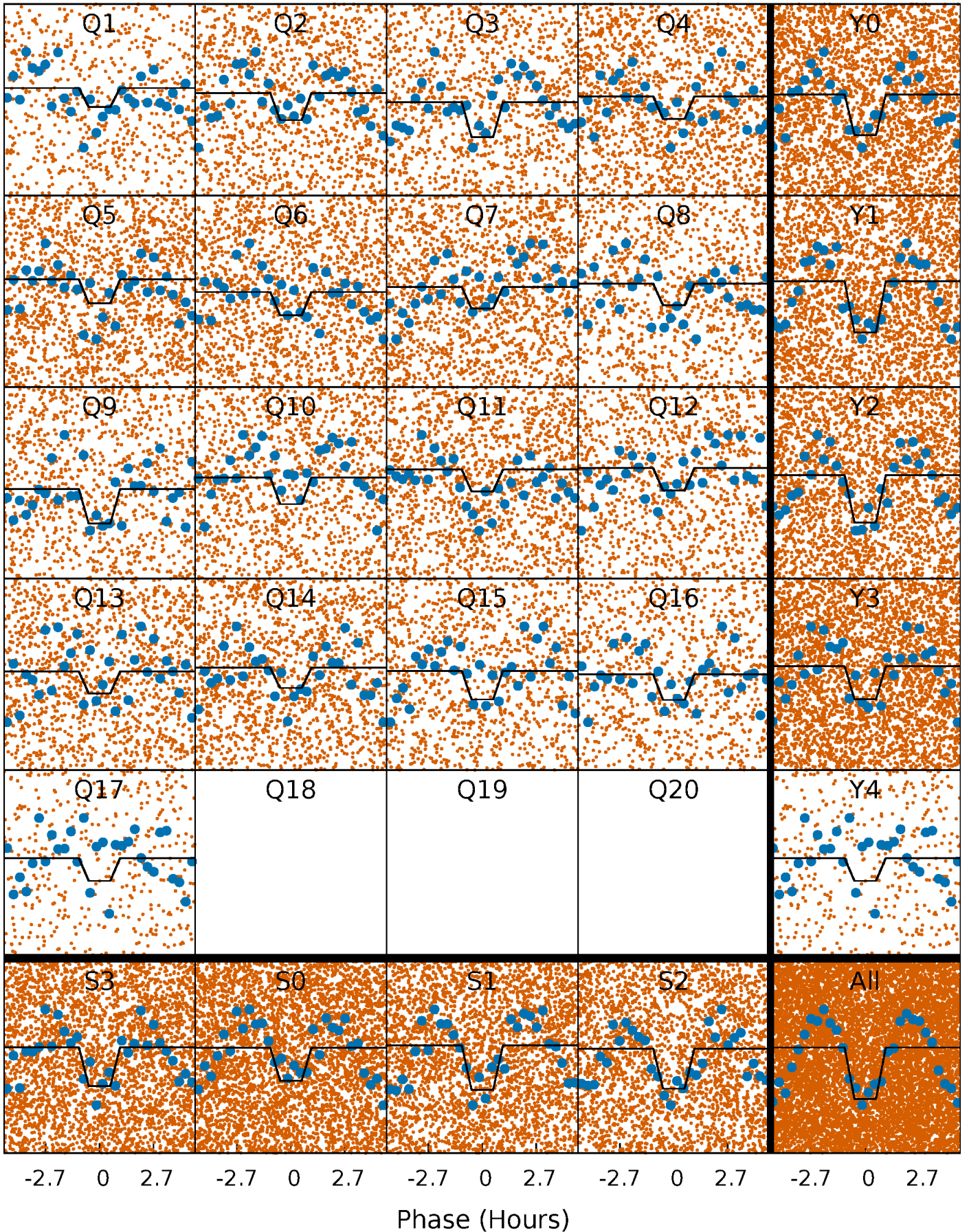
TCE 009304923-01 P= 0.564465 Days  $T_0=131.699140$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 009304923-01 P= 0.564463 Days  $T_0=131.694988$  (BKJD)

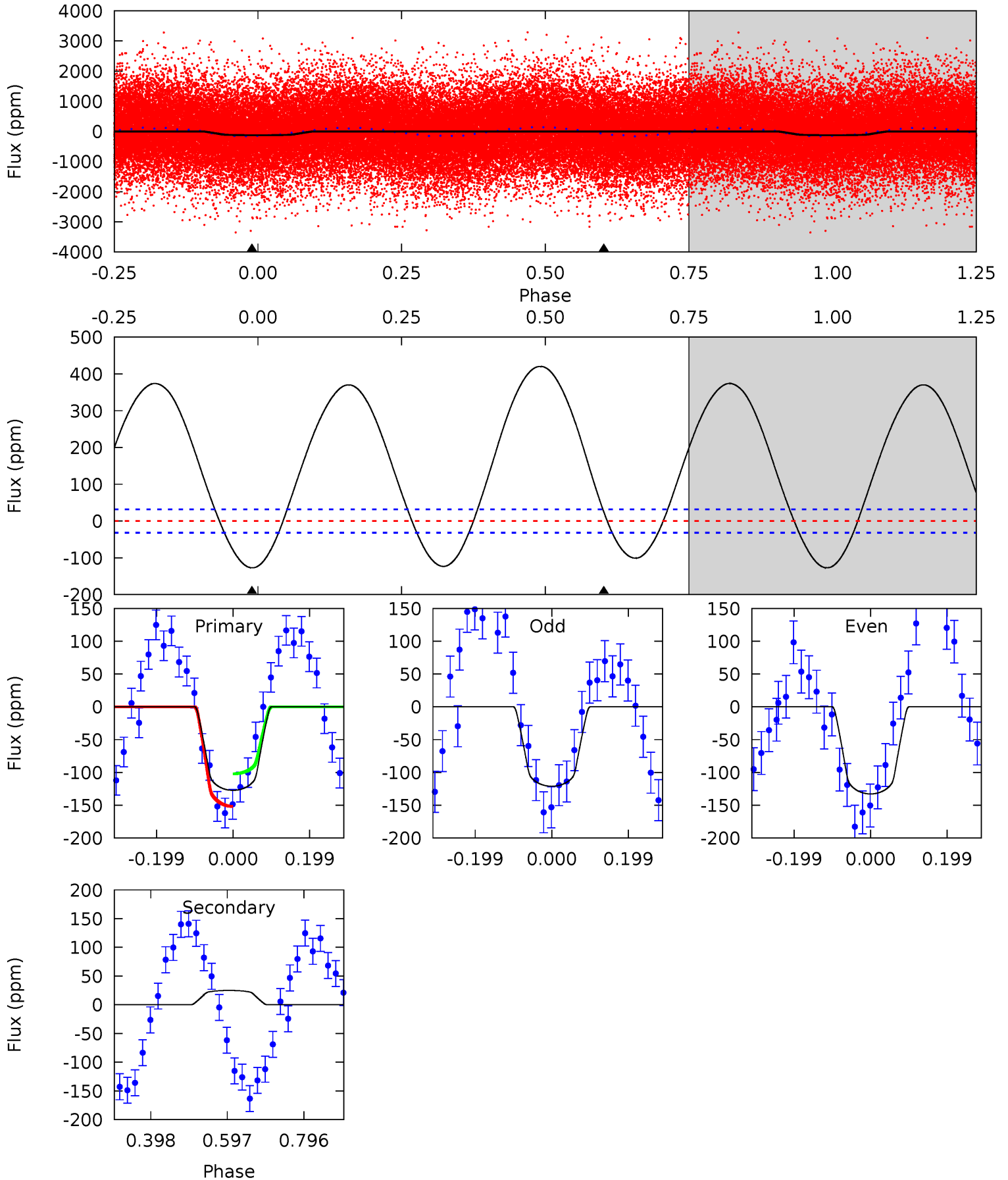




# DV Model-Shift Uniqueness Test

009304923-01, P = 0.564465 Days, E = 131.134675 Days

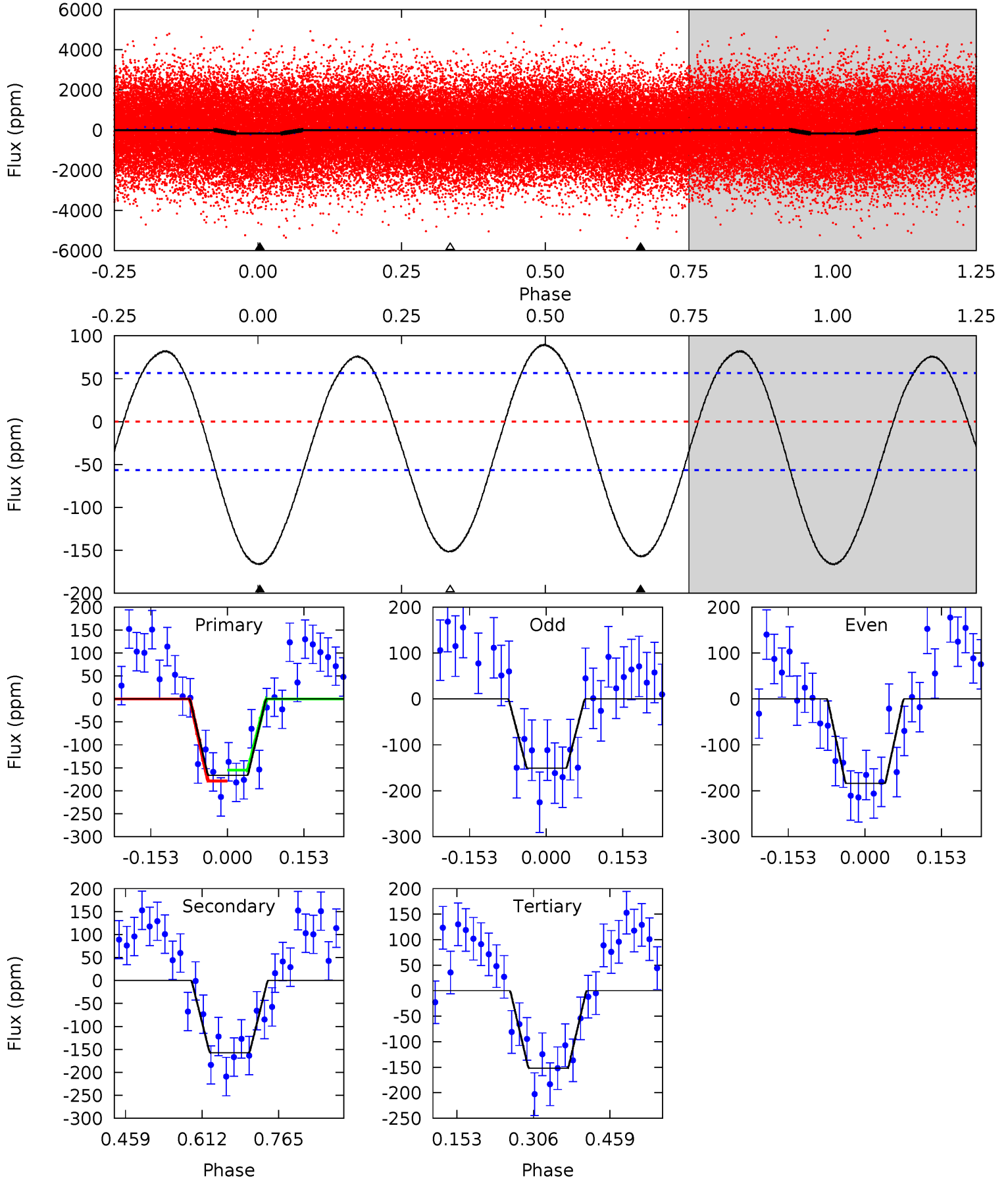
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.7	-3.48	0	0	4.42	1.28	18.7	17.7	17.7	-3.48	-3.48	0.82	1.04	0.77	3.55



# Alt Model-Shift Uniqueness Test

009304923-01, P = 0.564463 Days, E = 131.130525 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	12.4	12.0	0	4.47	1.43	6.85	1.17	13.2	0.44	12.4	1.28	1.15	0.35	0.90



### Stellar Parameters For KIC 009304923

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7981^{+222}_{-333}$	$3.716^{+0.450}_{-0.106}$	$-0.060^{+0.200}_{-0.350}$	$3.298^{+0.688}_{-1.604}$	$2.061^{+0.293}_{-0.545}$	$0.081^{+0.350}_{-0.028}$
	+3%/-4%	+12%/-3%	+333%/-583%	+21%/-49%	+14%/-26%	+433%/-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 009304923-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$25 \pm 7$	$4.16^{+1.37}_{-1.32}$	$6645^{+491}_{-826}$	$-6091^{+484}_{-514}$	$-0.225^{+0.110}_{-0.270}$
Alt.	$-157 \pm 13$	$4.39^{+1.40}_{-1.37}$	$6594^{+560}_{-825}$	$7044^{+1387}_{-1019}$	$1.281^{+1.343}_{-0.525}$

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



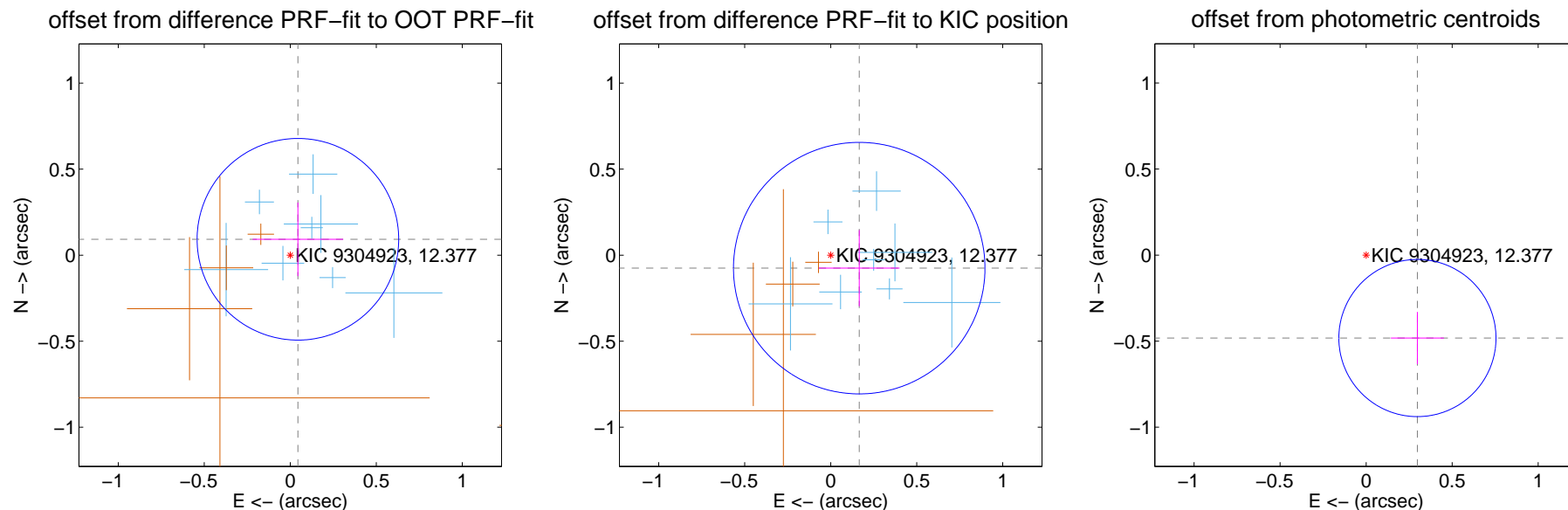
## DV Centroid Data

Supplemental centroid analysis for 009304923-01. Kepler magnitude: 12.38. Transit SNR 12.87

There are 9 quarters with good PRF difference image offsets

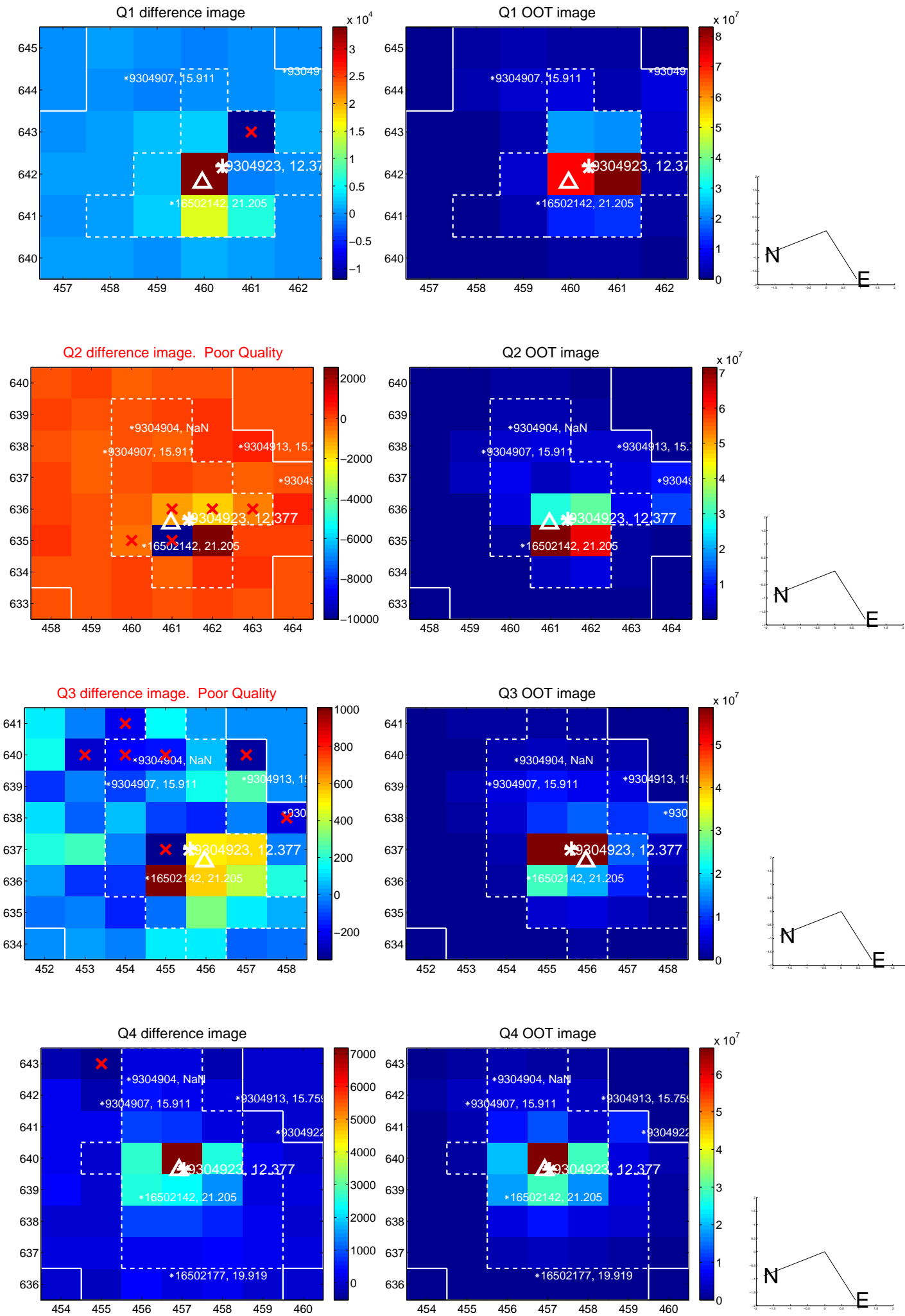
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.102 \pm 0.195$	0.52	$-0.044 \pm 0.263$	$0.092 \pm 0.214$
PRF-fit source offset from KIC position	$0.182 \pm 0.244$	0.75	$-0.166 \pm 0.235$	$-0.075 \pm 0.221$
photometric centroid source offset	$0.57 \pm 0.15$	3.72	$-0.30 \pm 0.15$	$-0.48 \pm 0.15$

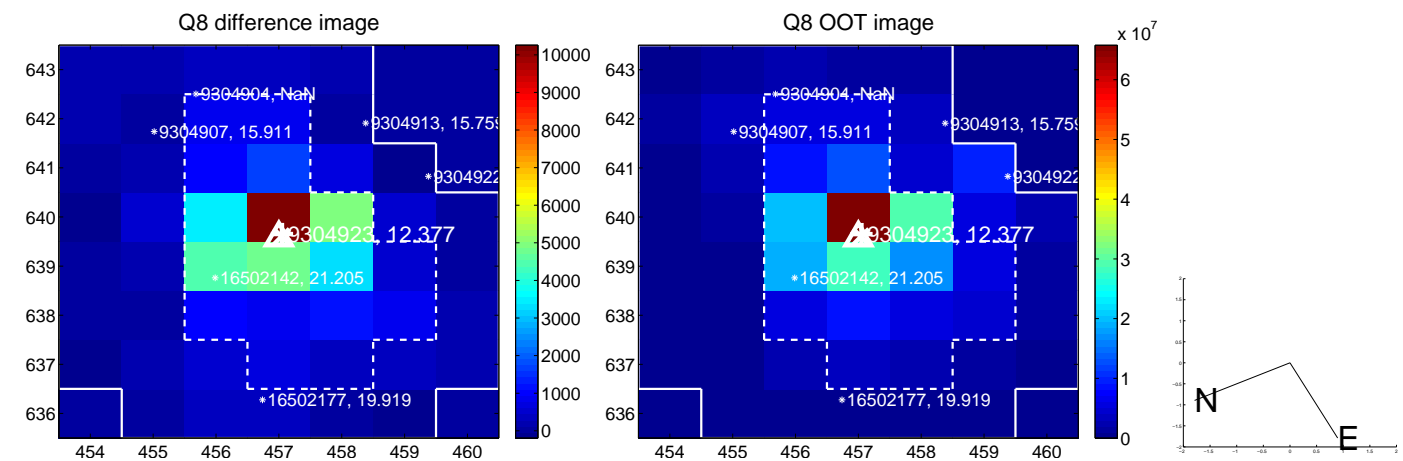
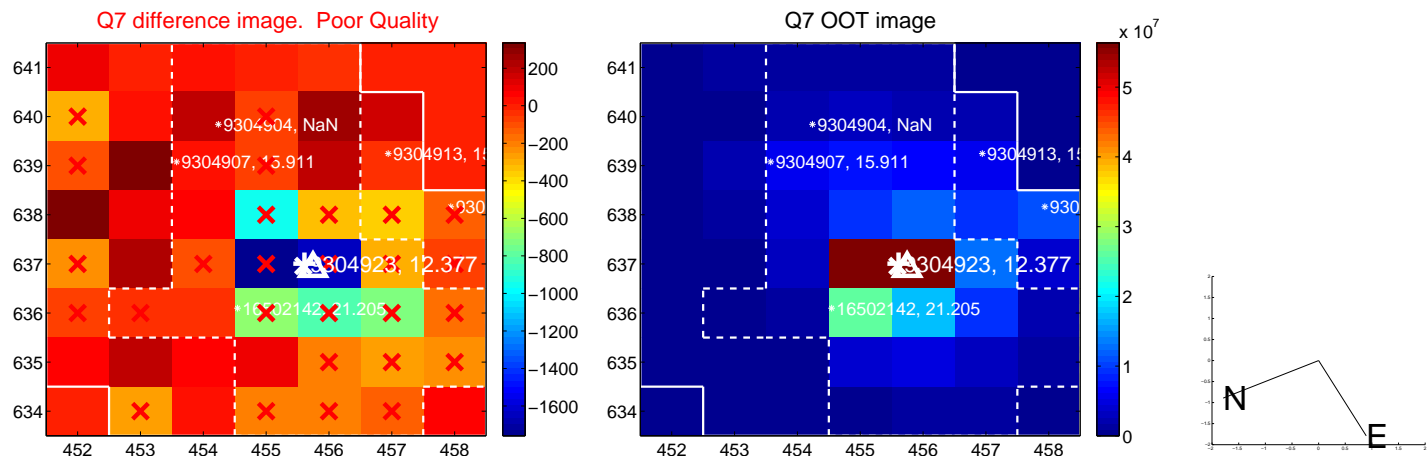
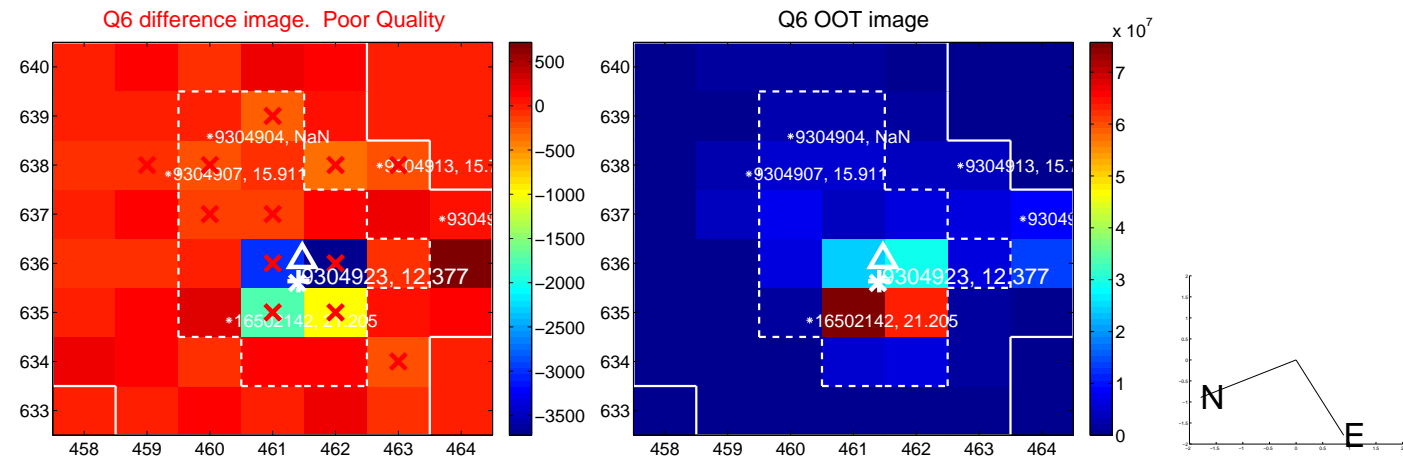
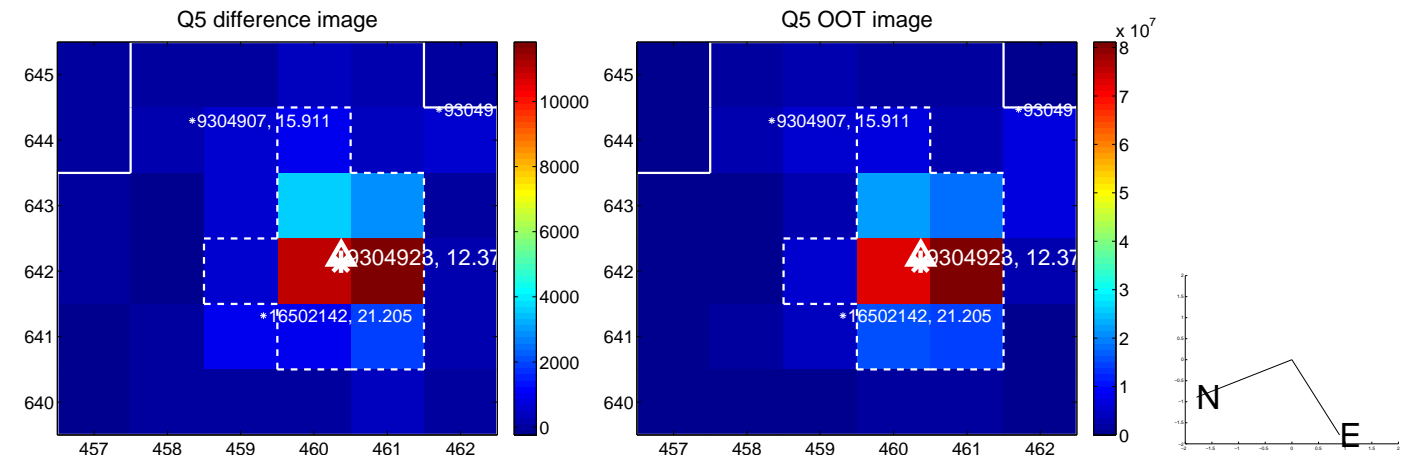


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

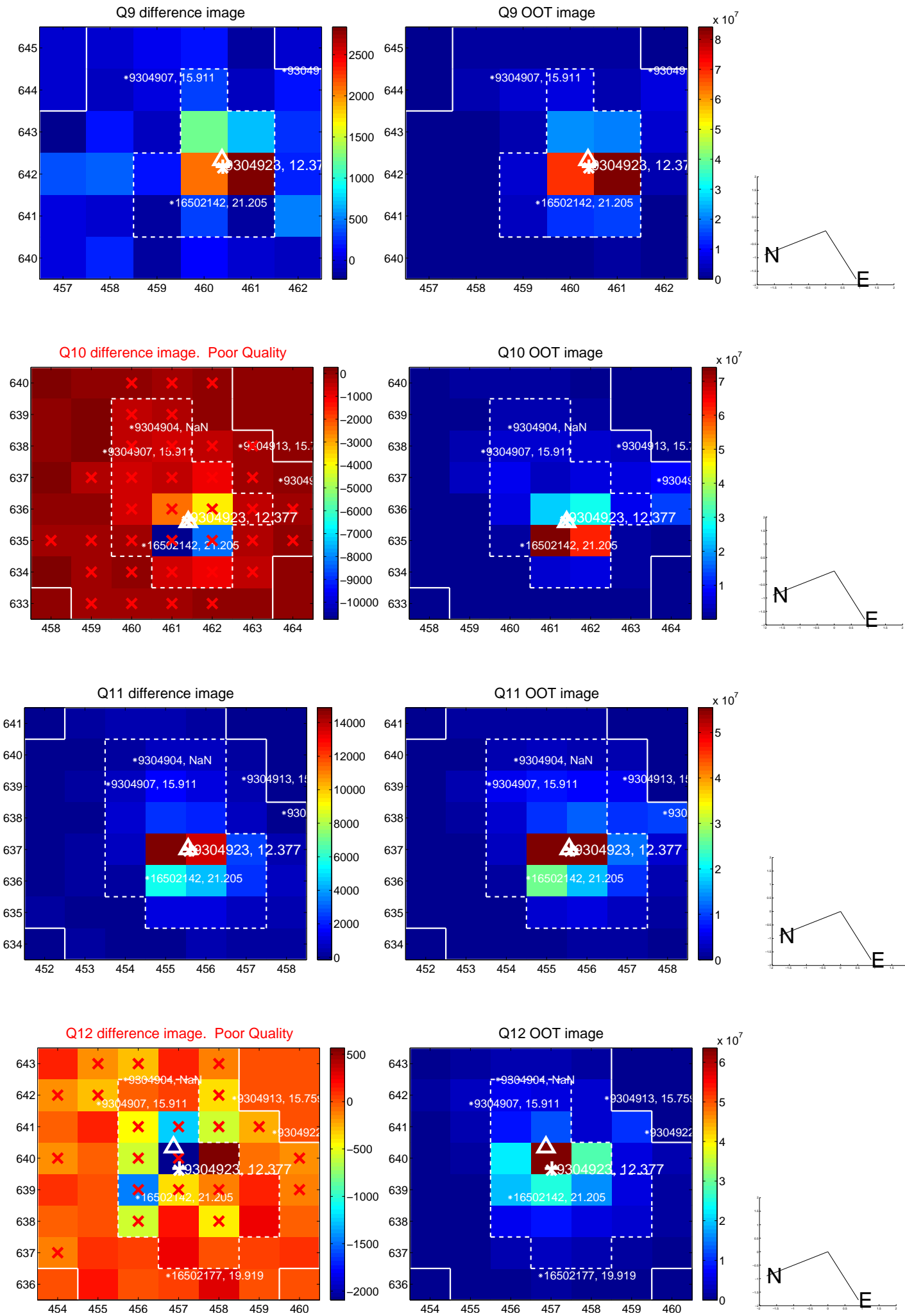


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

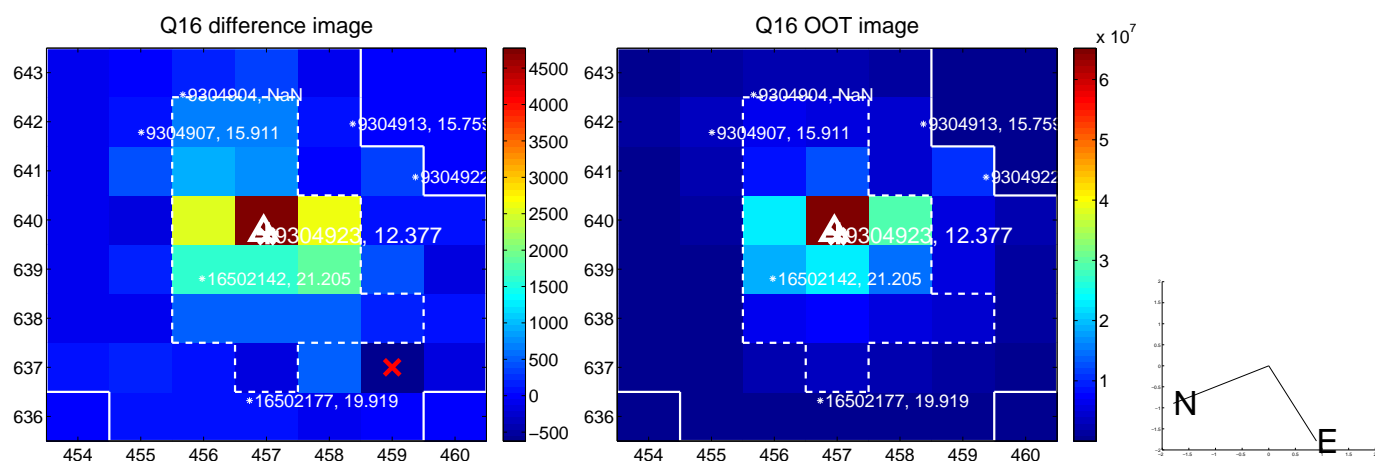
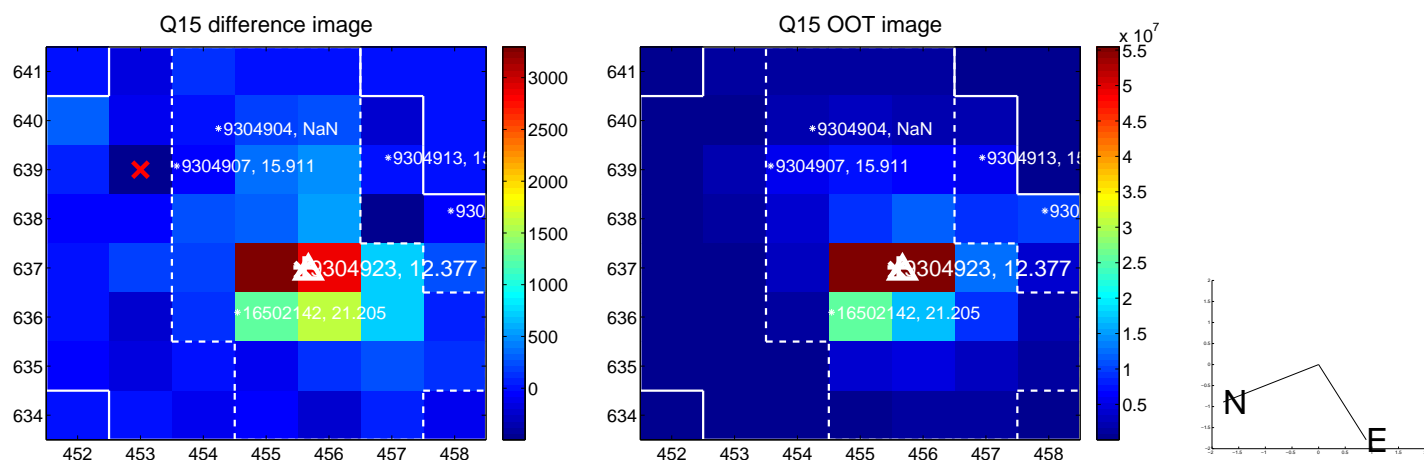
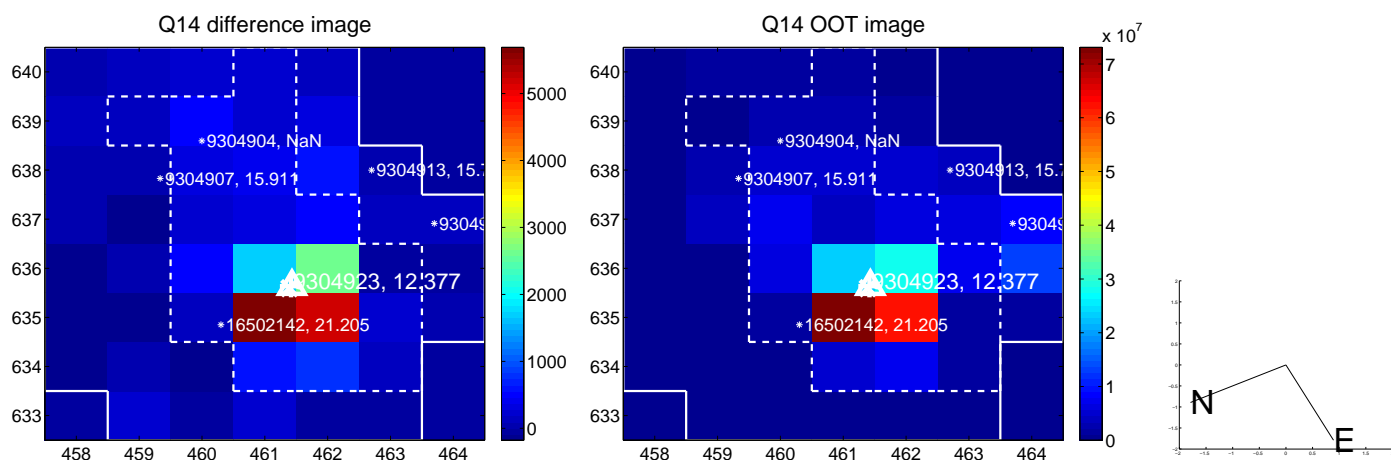
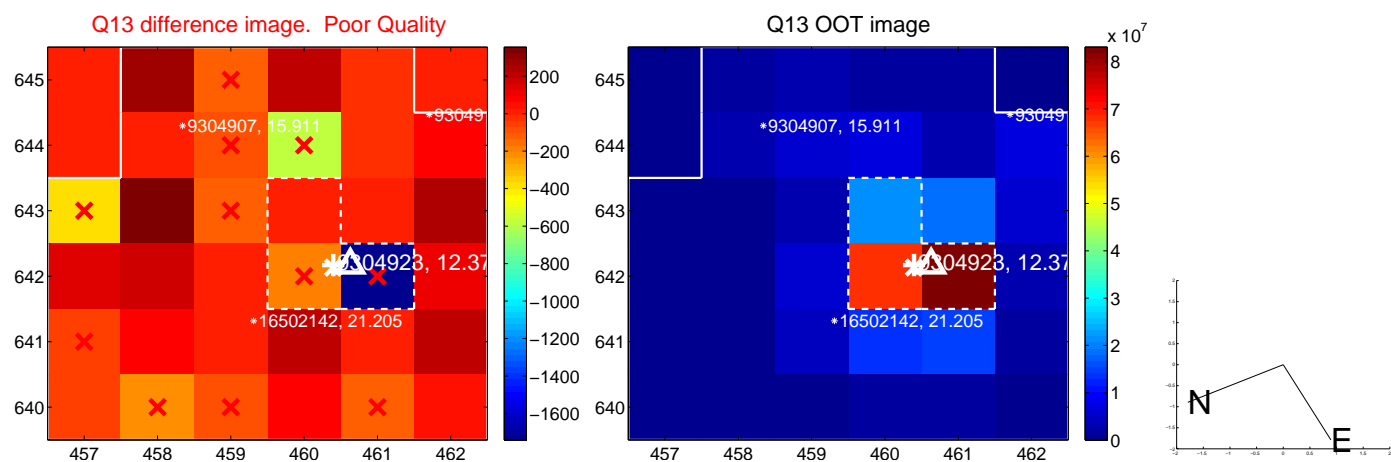




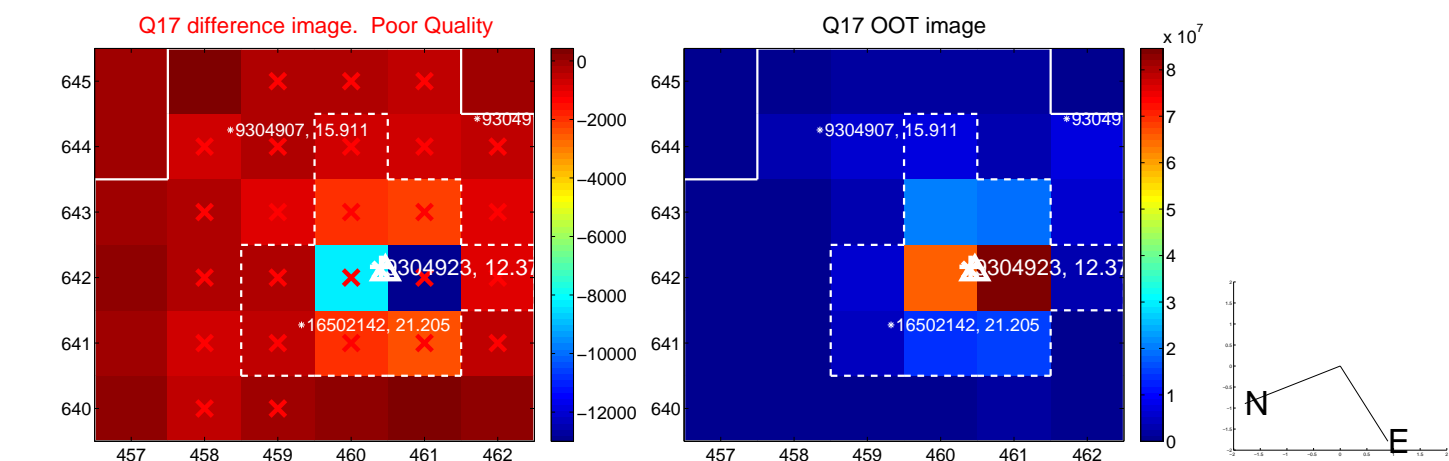
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



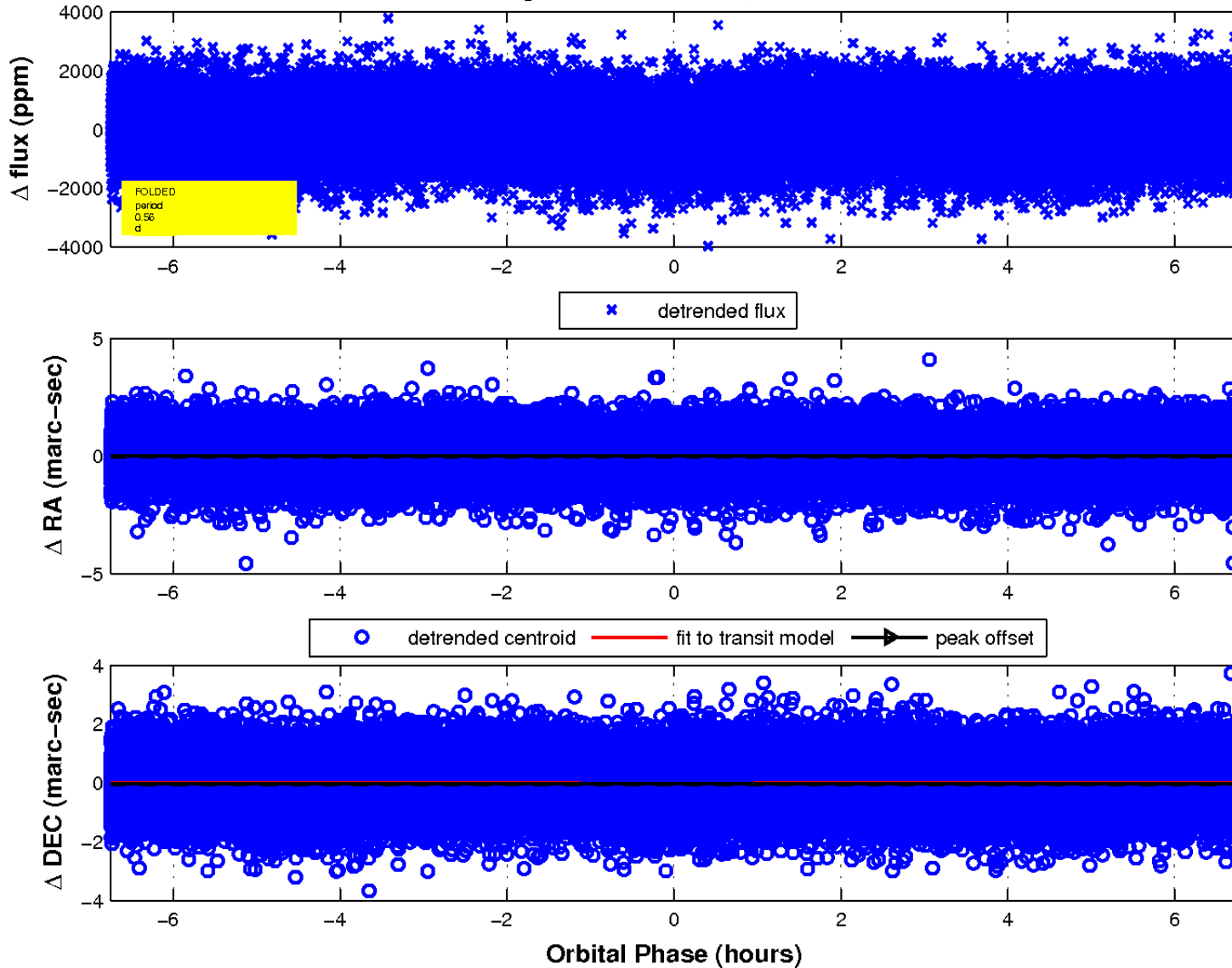
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



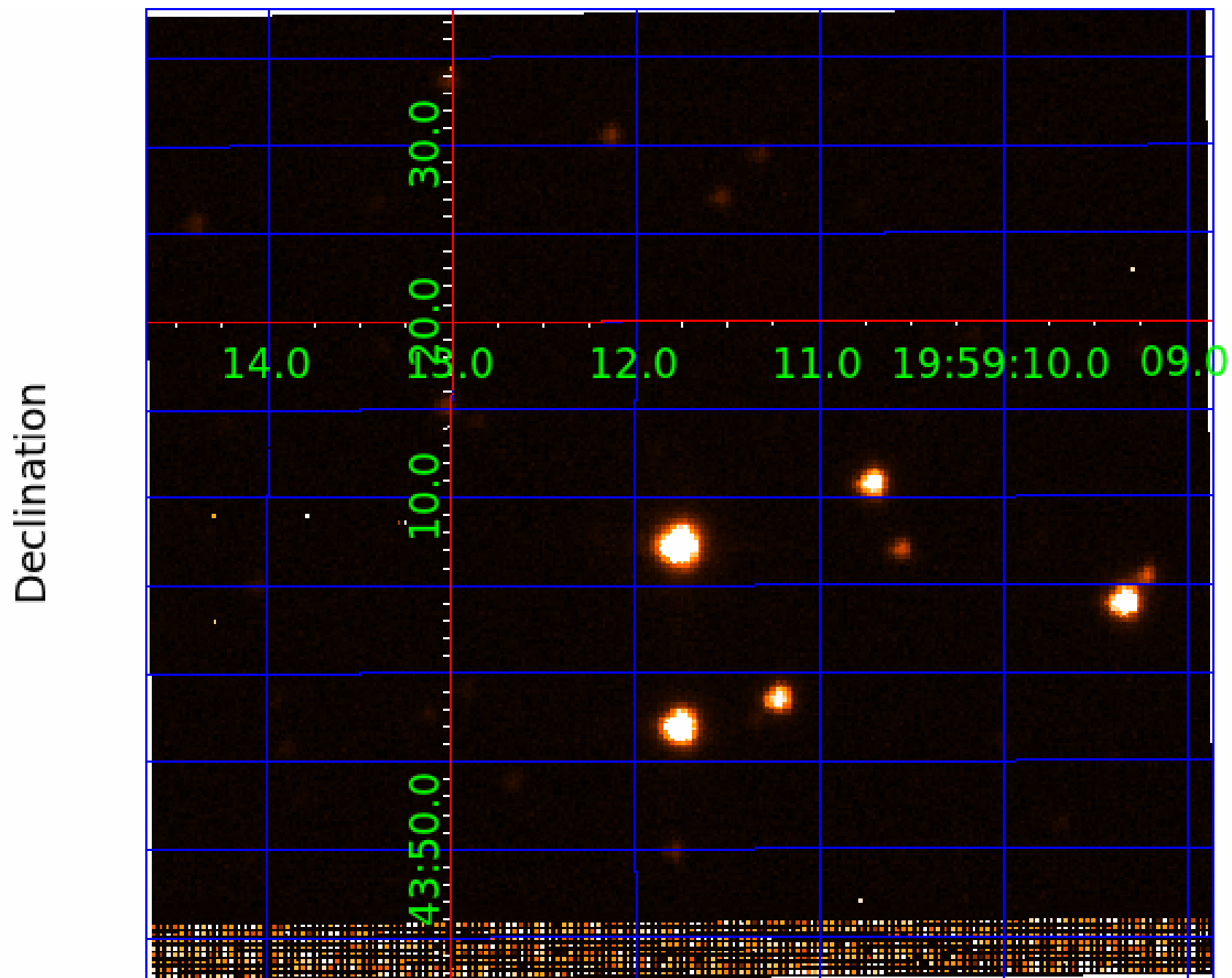
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 3



UKIRT Image





# KIC 009304923

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009304923-01	OBS	No	0.564465	131.699139	141.4	2.251	10.5	12.9	3.30	7981	4.57	136492.25
009304923-02	OBS	No	0.564464	132.066105	133.9	1.534	9.7	12.5	3.30	7981	4.10	136492.53
009304923-03	OBS	No	15.324070	145.175875	879.8	2.422	8.4	8.9	3.30	7981	11.33	1672.86

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009304923-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009304923-02	OBS	FP	0.00	1	0	0	0	LPP_DV—SAME_NTL_PERIOD
009304923-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT

**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.

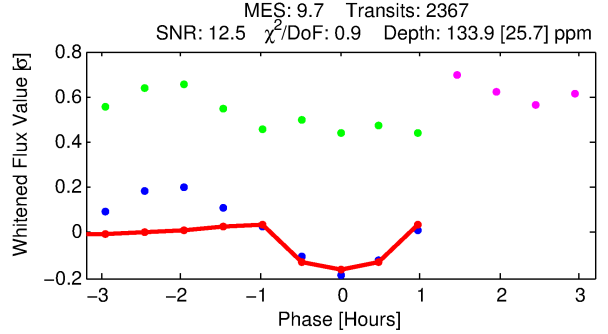
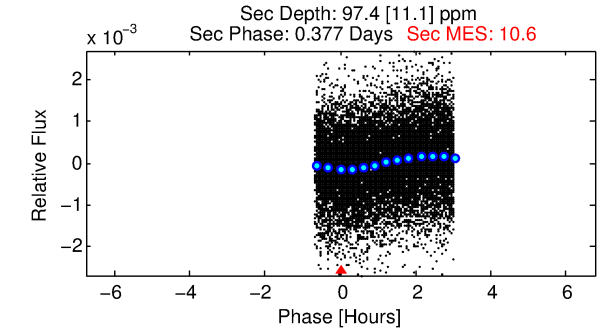
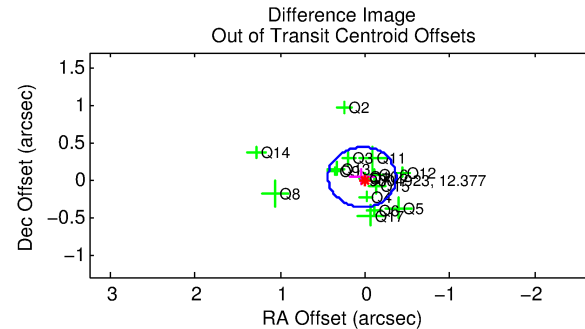
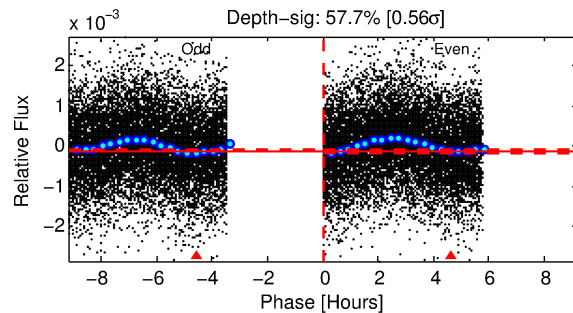
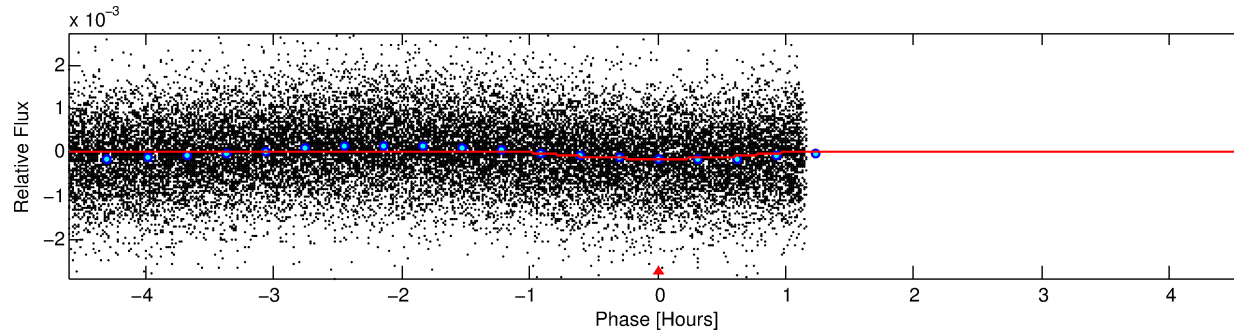
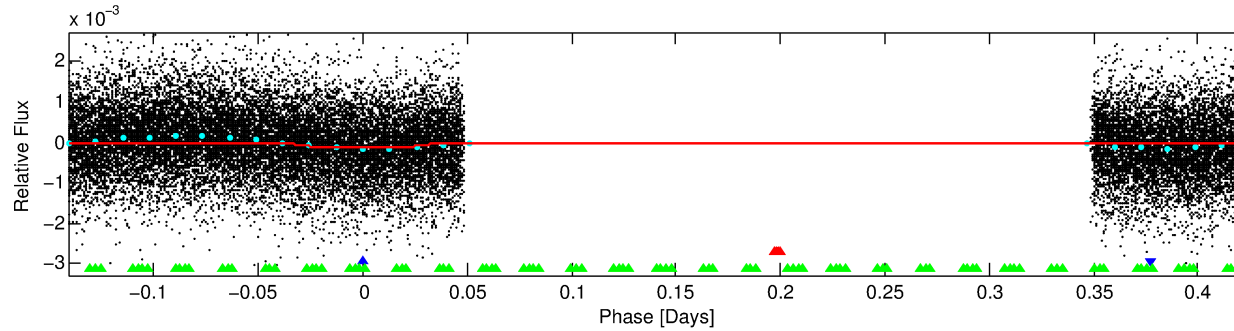
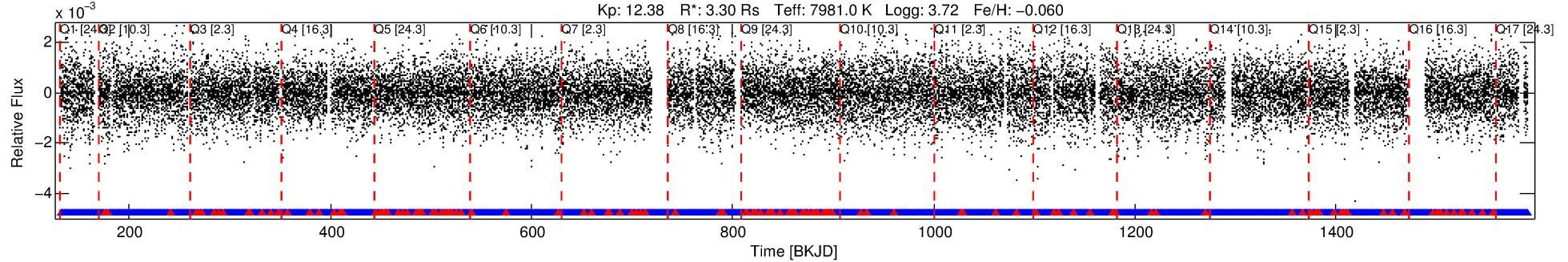
## Ephemeris Match Information For 009304923-02

No Significant Match Found

# DV One-Page Summary

KIC: 9304923 Candidate: 2 of 3 Period: 0.564 d  
KOI: K06200 Corr: No Ephemeris Match

Kp: 12.38 R\*: 3.30 Rs Teff: 7981.0 K Logg: 3.72 Fe/H: -0.060



## DV Fit Results:

Period = 0.56446 [0.00002] d  
Epoch = 132.0661 [0.0014] BKJD  
Rp/R\* = 0.0114 [0.0029]  
a/R\* = 2.21 [2.35]  
b = 0.70 [0.99]  
Seff = 136492.53 [106617.60]  
Teq = 4901 [957] K  
Rp = 4.10 [2.24] Re  
a = 0.0170 [0.0081] AU  
Ag = 0.92 [0.85] [-0.09σ]  
Teffp = 7429 [1006] K [1.82σ]

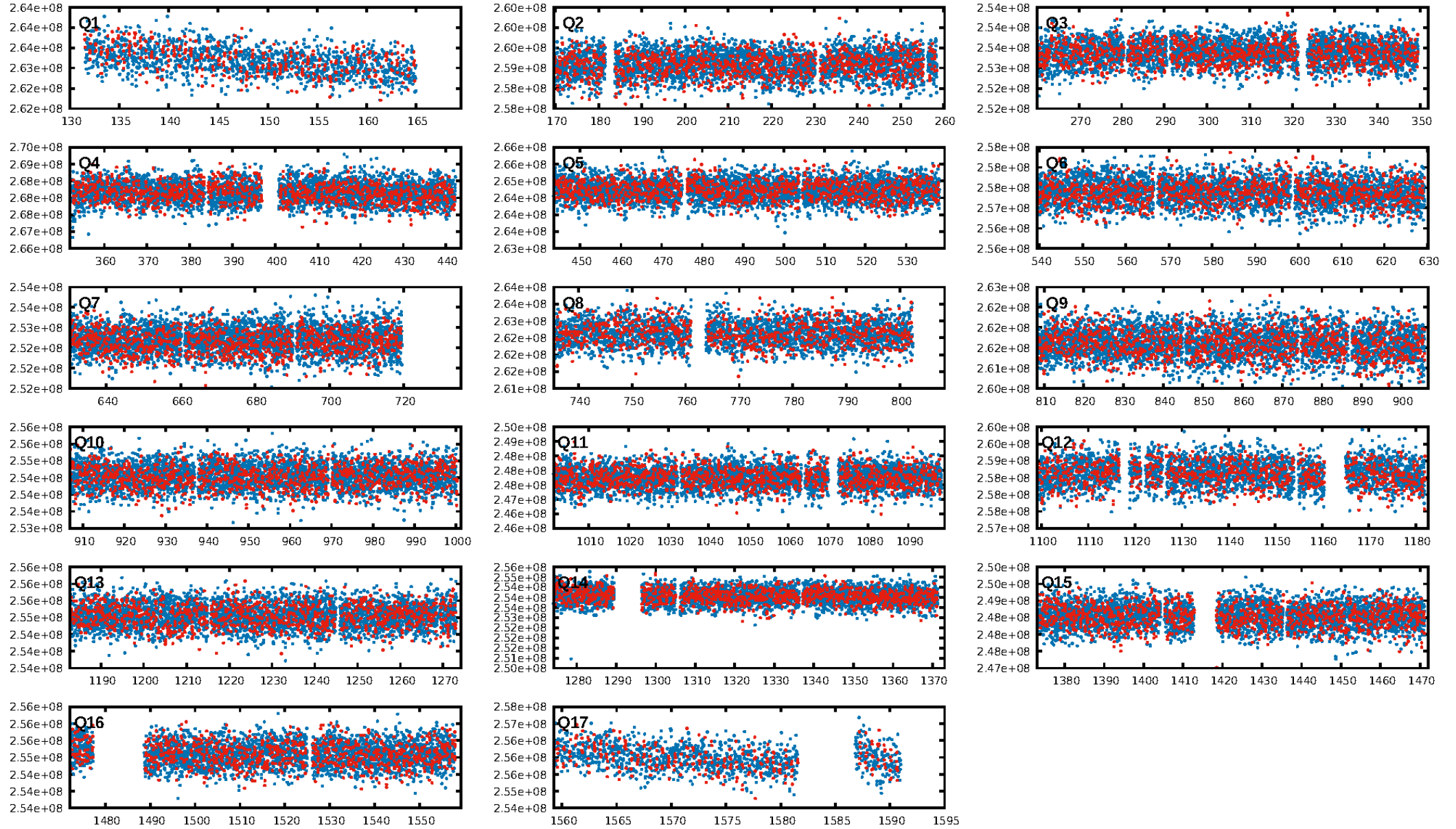
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.48e-09  
RollingBand-fgt: 0.94 [2130/2260]  
GhostDiagnostic-chr: 0.7008  
Centroid-sig: 60.4%  
Centroid-so: 0.841 arcsec [4.52σ]  
OotOffset-rm: 0.046 arcsec [0.34σ]  
KicOffset-rm: 0.145 arcsec [1.17σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 1.00 [16/16]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 12:24:05 Z

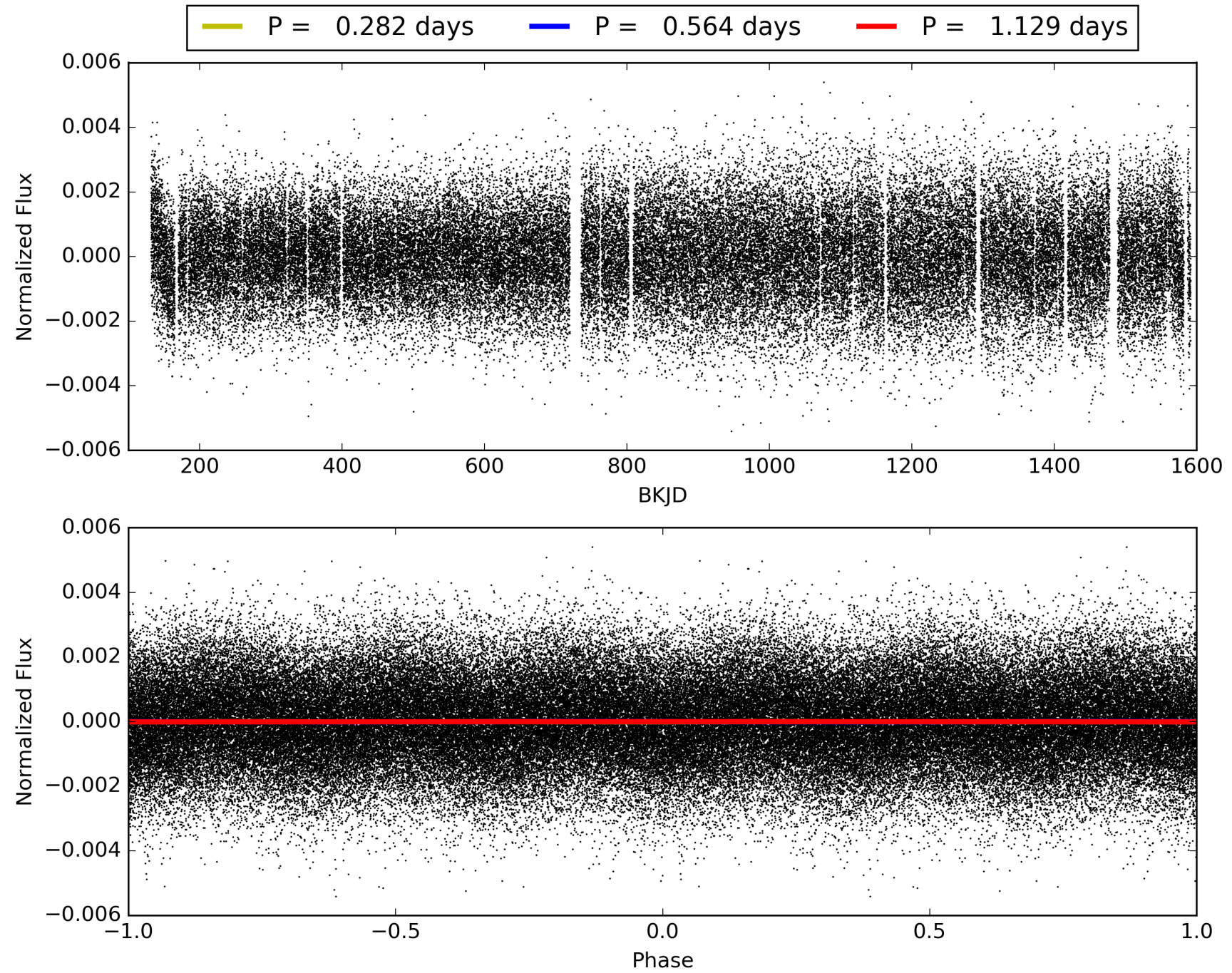
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009304923-02, PDC Light Curves





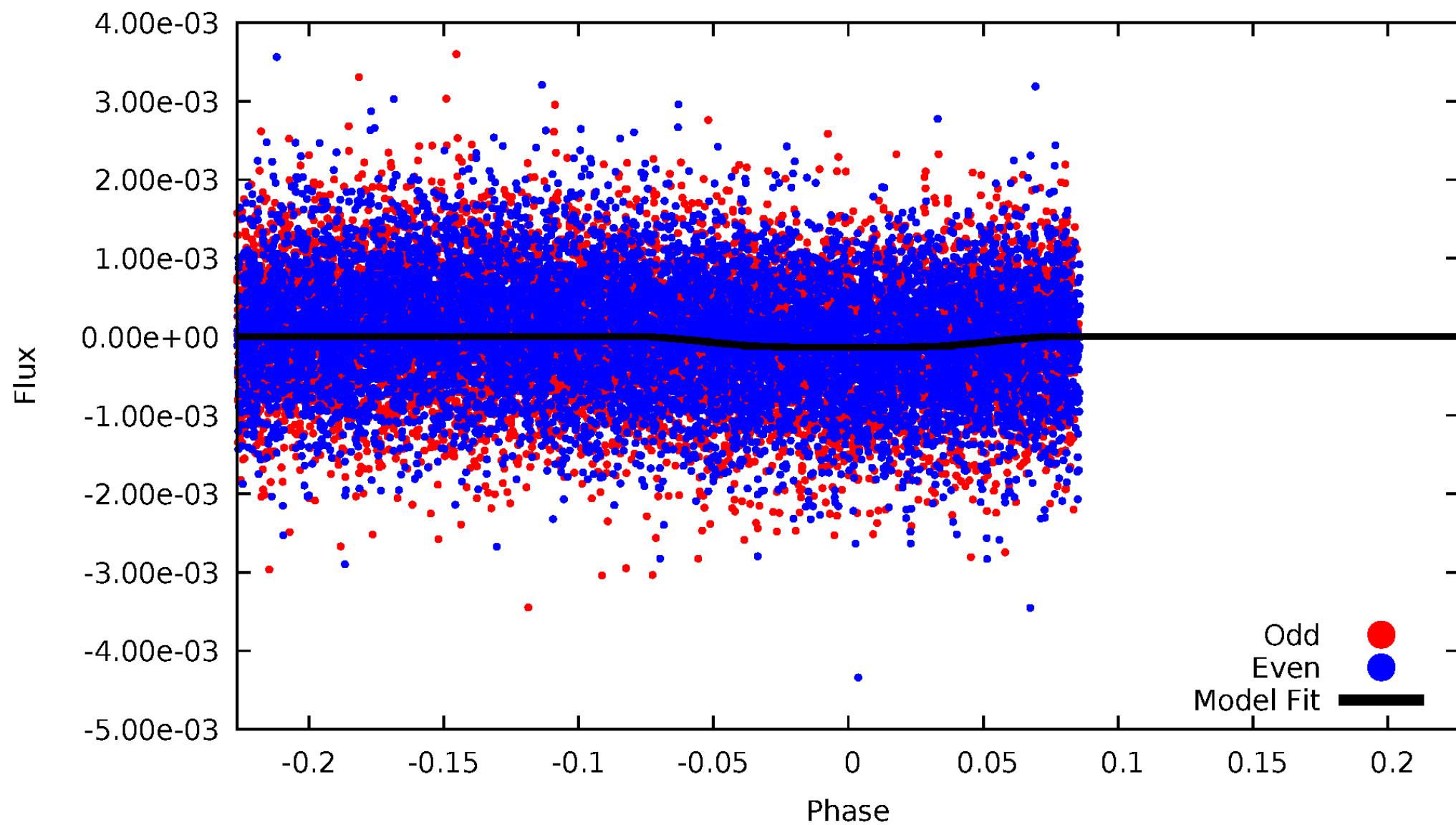
TCE 009304923-02





# DV Odd/Even

TCE 009304923-02



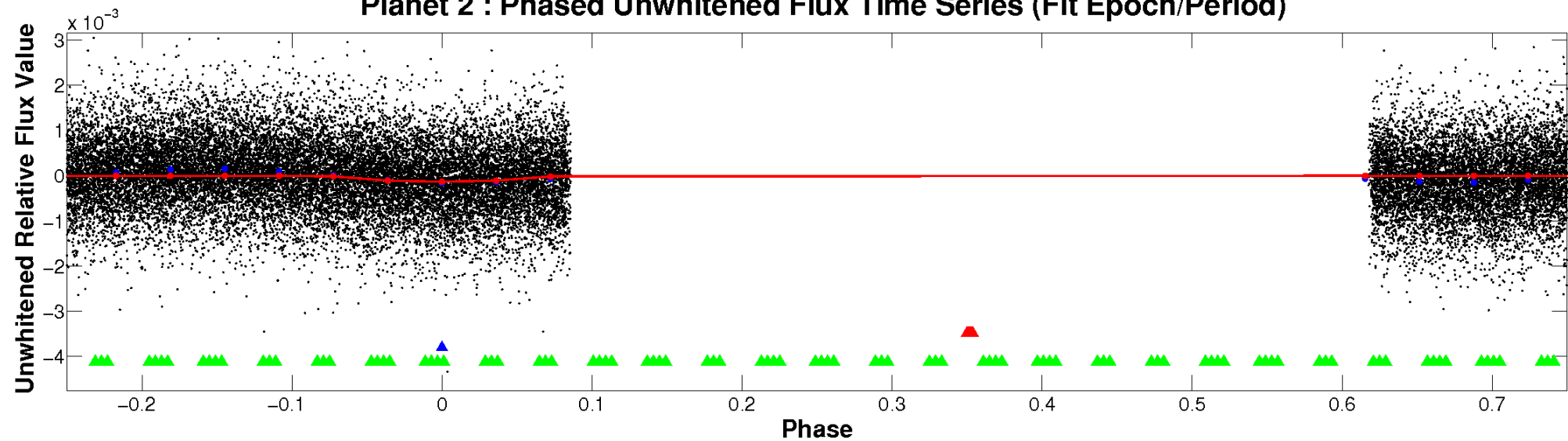


ALT Odd/Even

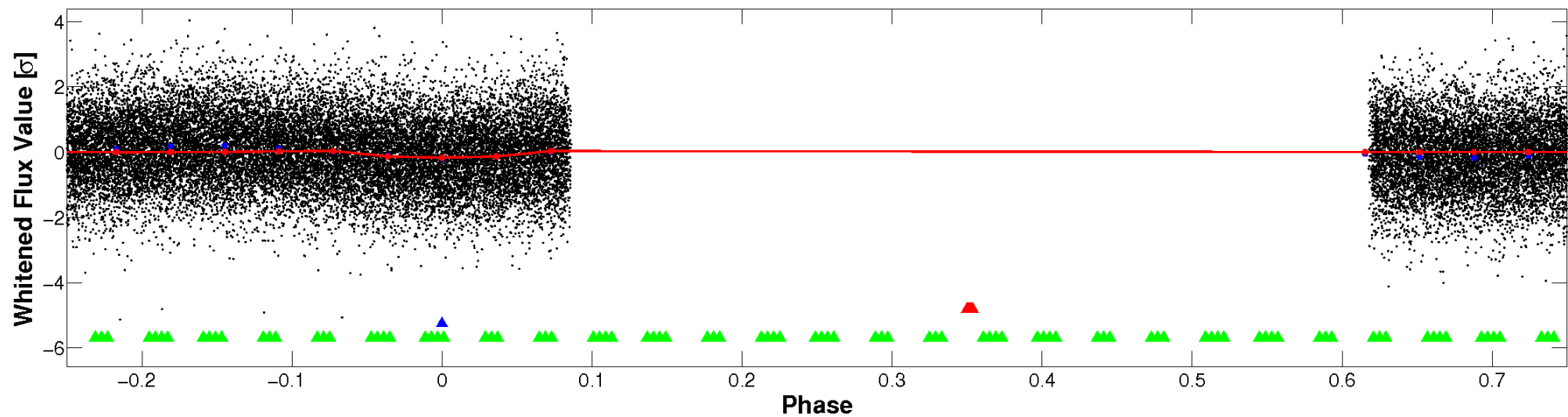
This plot does not exist for this TCE.

# Non-Whitened Vs. Whitened Light Curve

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



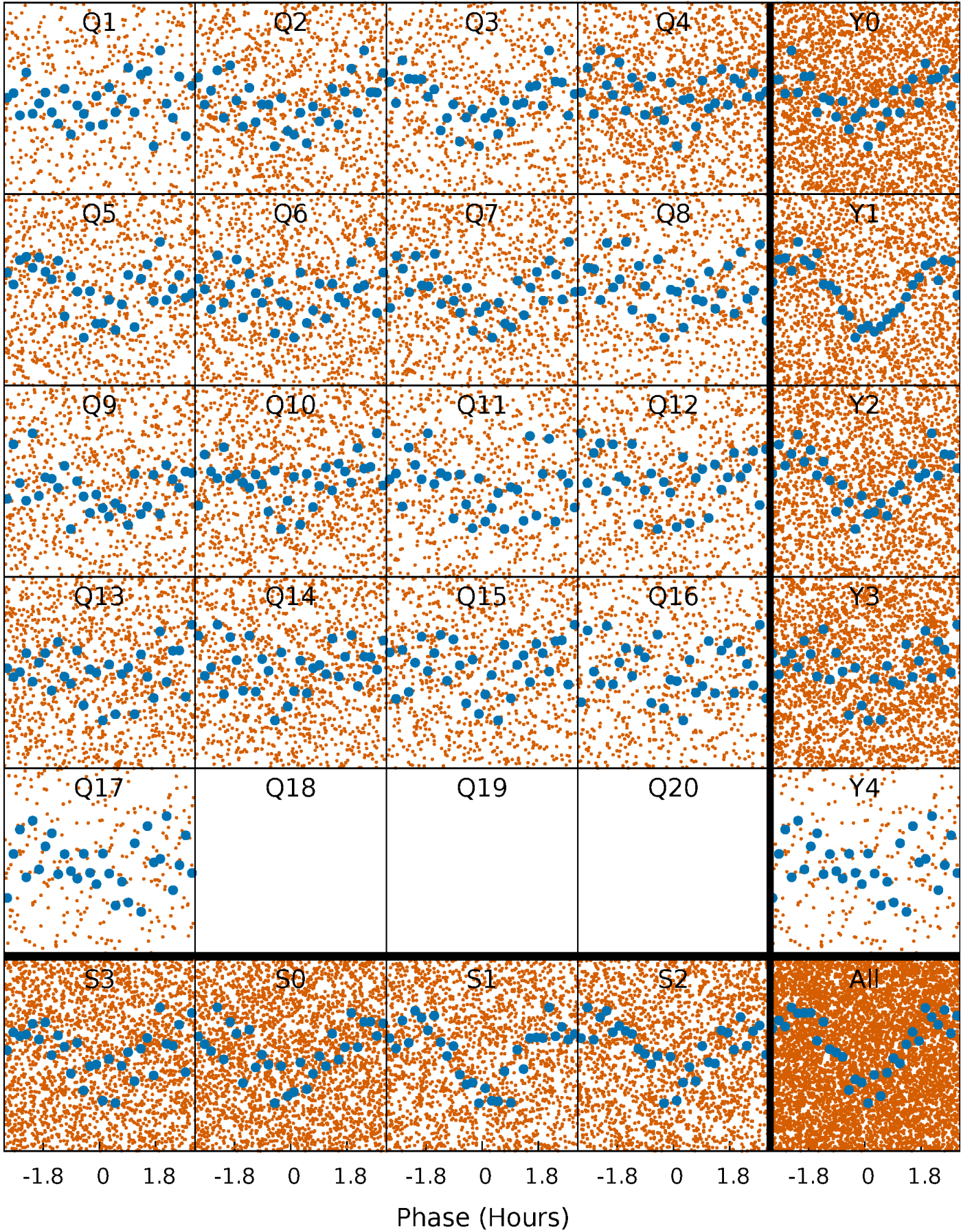
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





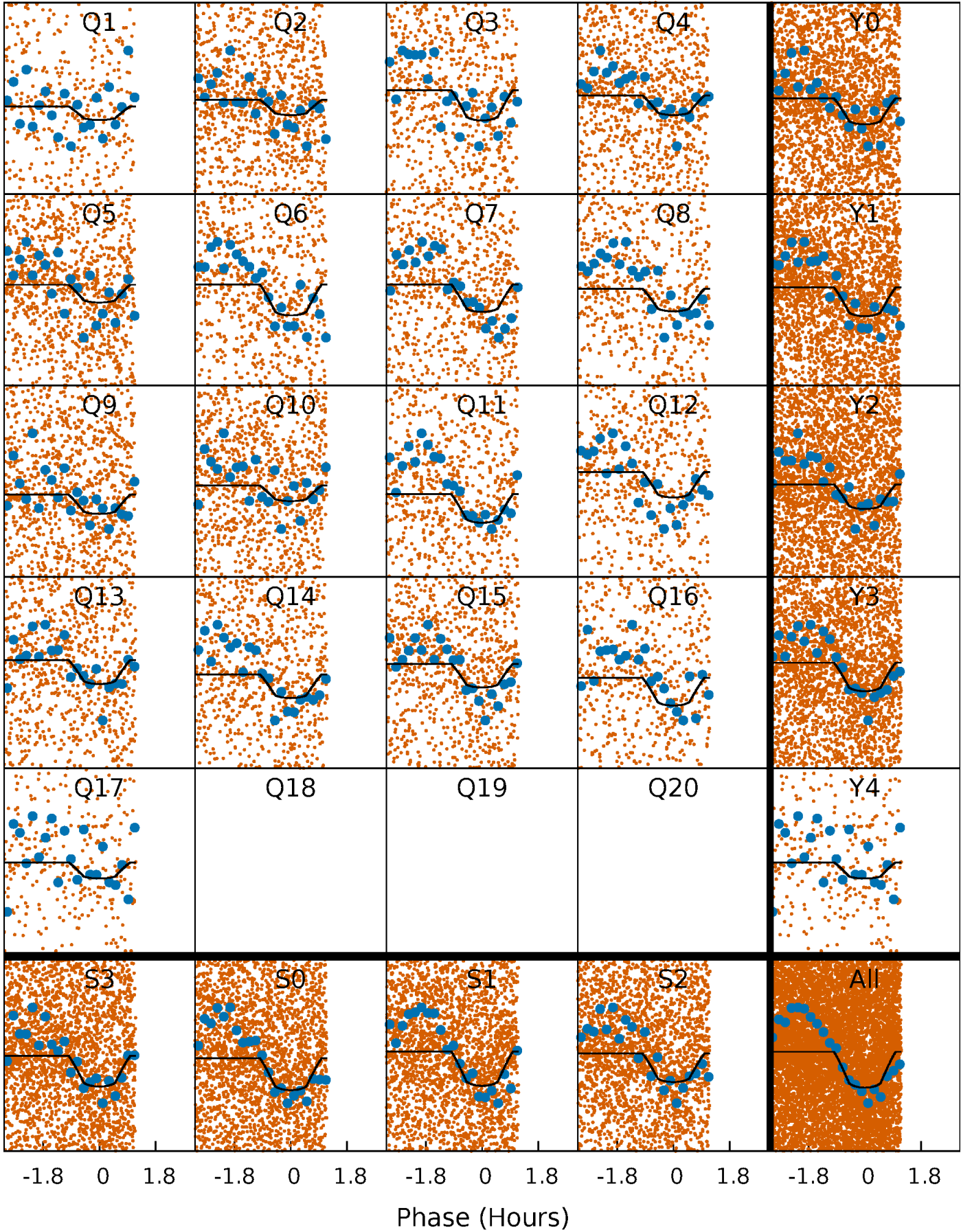
# PDC Quarter-Phased Transit Curves

TCE 009304923-02   P= 0.564464 Days    $T_0=132.066105$  (BKJD)



# DV Quarter-Phased Transit Curves

TCE 009304923-02   P= 0.564464 Days    $T_0=132.066105$  (BKJD)

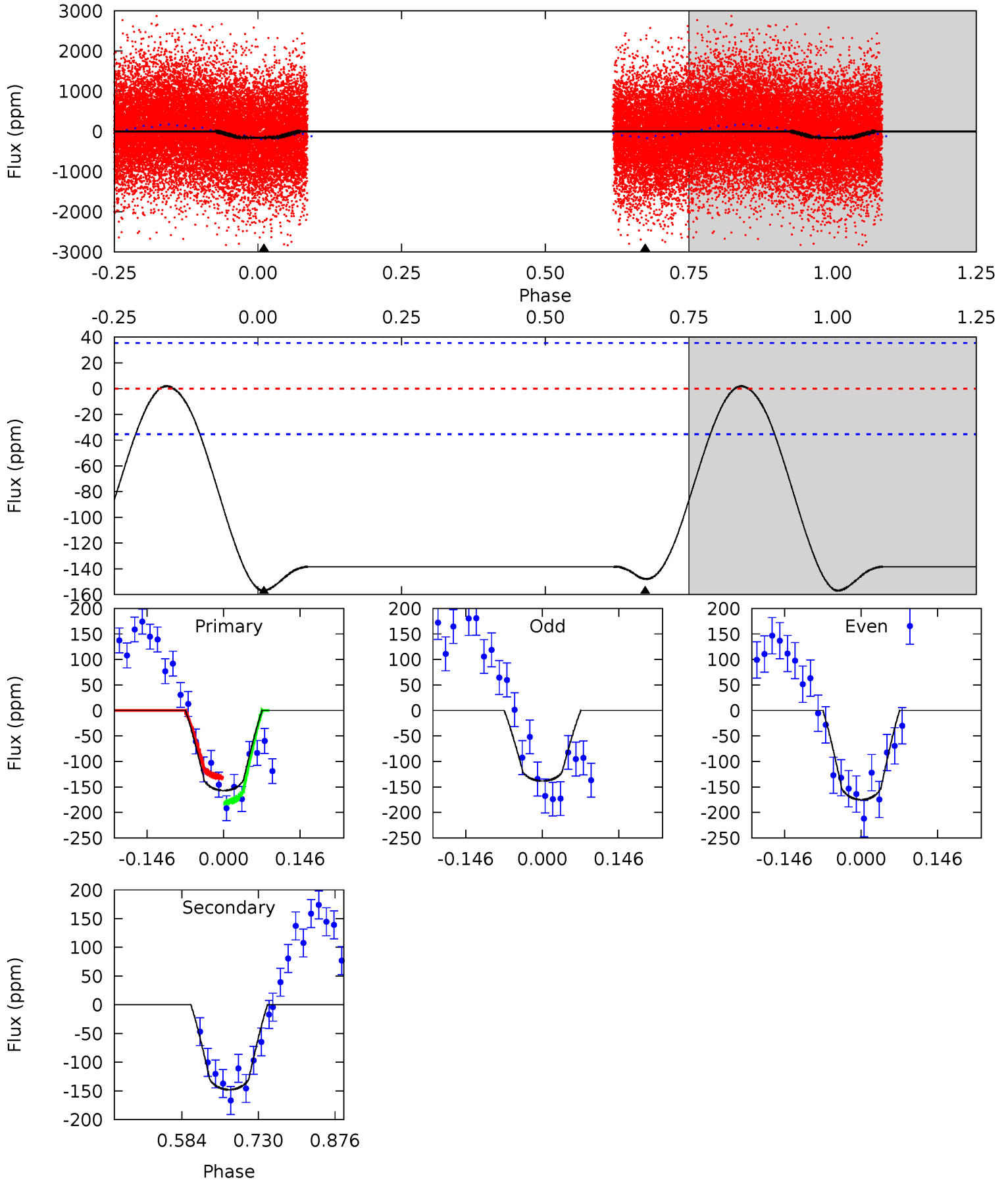


This plot does not exist for this TCE.

# DV Model-Shift Uniqueness Test

009304923-02, P = 0.564464 Days, E = 131.501641 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
19.9	18.7	0	0	4.48	1.45	0.27	19.9	19.9	18.7	18.7	2.34	1.04	0.01	3.32





## Alt Model-Shift Uniqueness Test

This plot does not exist for this TCE.

### Stellar Parameters For KIC 009304923

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7981^{+222}_{-333}$	$3.716^{+0.450}_{-0.106}$	$-0.060^{+0.200}_{-0.350}$	$3.298^{+0.688}_{-1.604}$	$2.061^{+0.293}_{-0.545}$	$0.081^{+0.350}_{-0.028}$
	+3%/-4%	+12%/-3%	+333%/-583%	+21%/-49%	+14%/-26%	+433%/-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 009304923-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-148 \pm 8$	$3.74^{+1.31}_{-1.19}$	$6622^{+528}_{-757}$	$7733^{+2093}_{-1200}$	$1.674^{+1.968}_{-0.731}$
Alt.	N/A	N/A	N/A	N/A	N/A

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

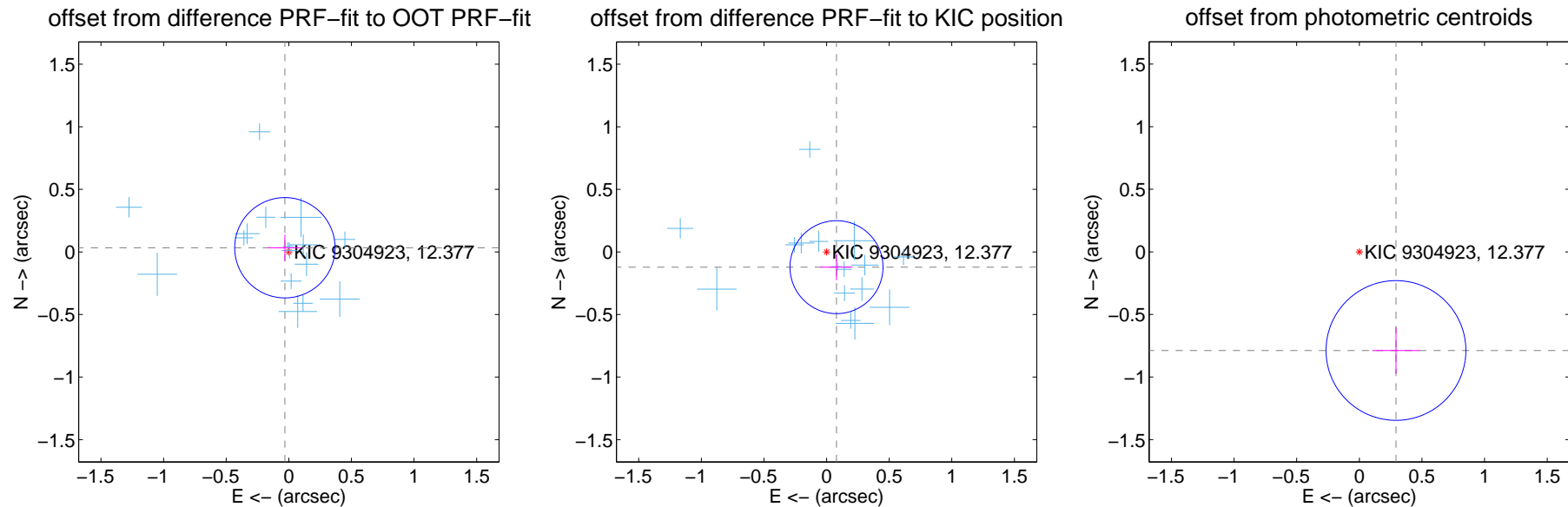
## DV Centroid Data

Supplemental centroid analysis for 009304923-02. Kepler magnitude: 12.38. Transit SNR 12.54

There are 16 quarters with good PRF difference image offsets

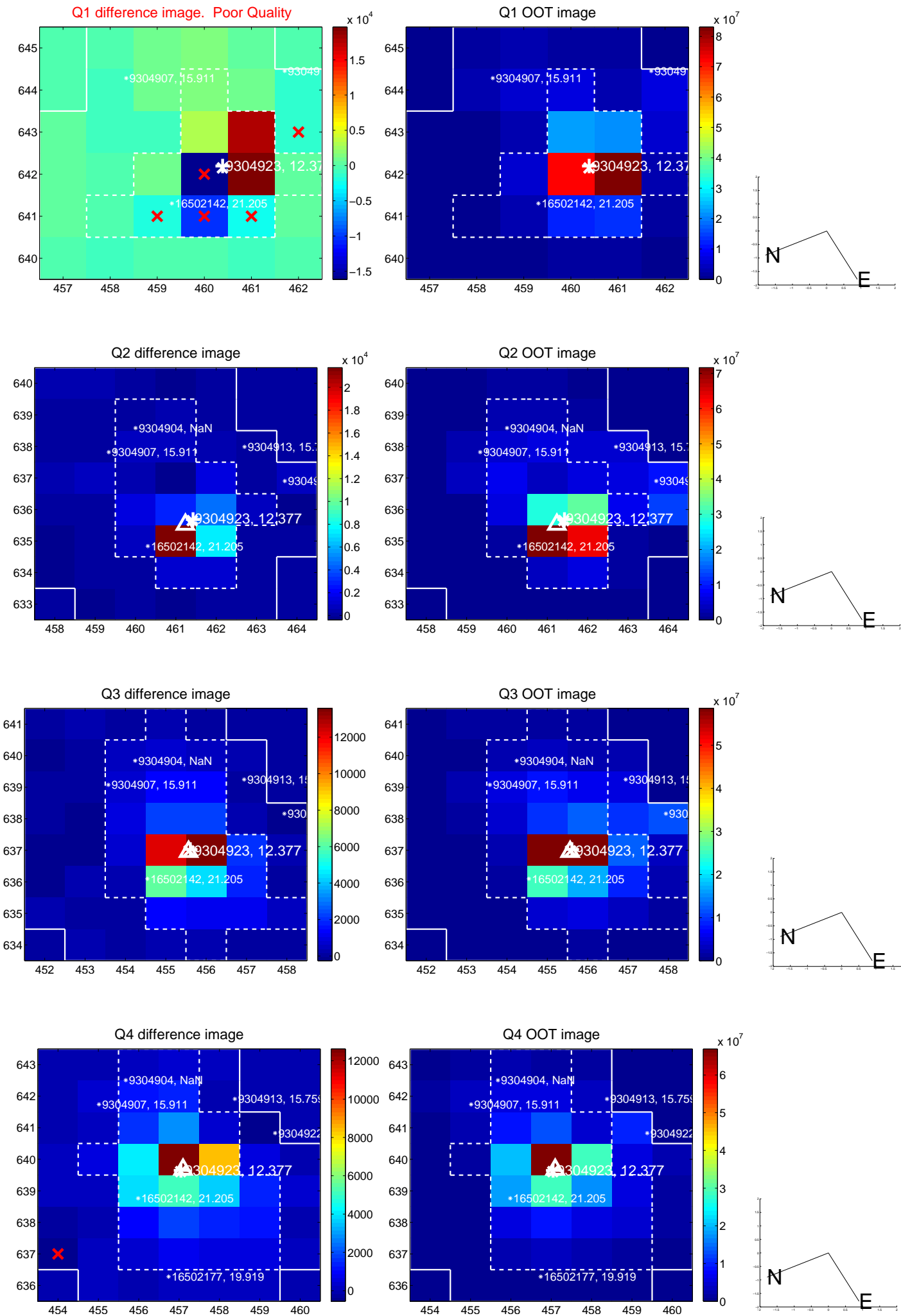
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.046 \pm 0.134$	0.34	$0.031 \pm 0.137$	$0.033 \pm 0.105$
PRF-fit source offset from KIC position	$0.145 \pm 0.124$	1.17	$-0.079 \pm 0.129$	$-0.122 \pm 0.105$
photometric centroid source offset	$0.84 \pm 0.19$	4.52	$-0.29 \pm 0.19$	$-0.79 \pm 0.19$

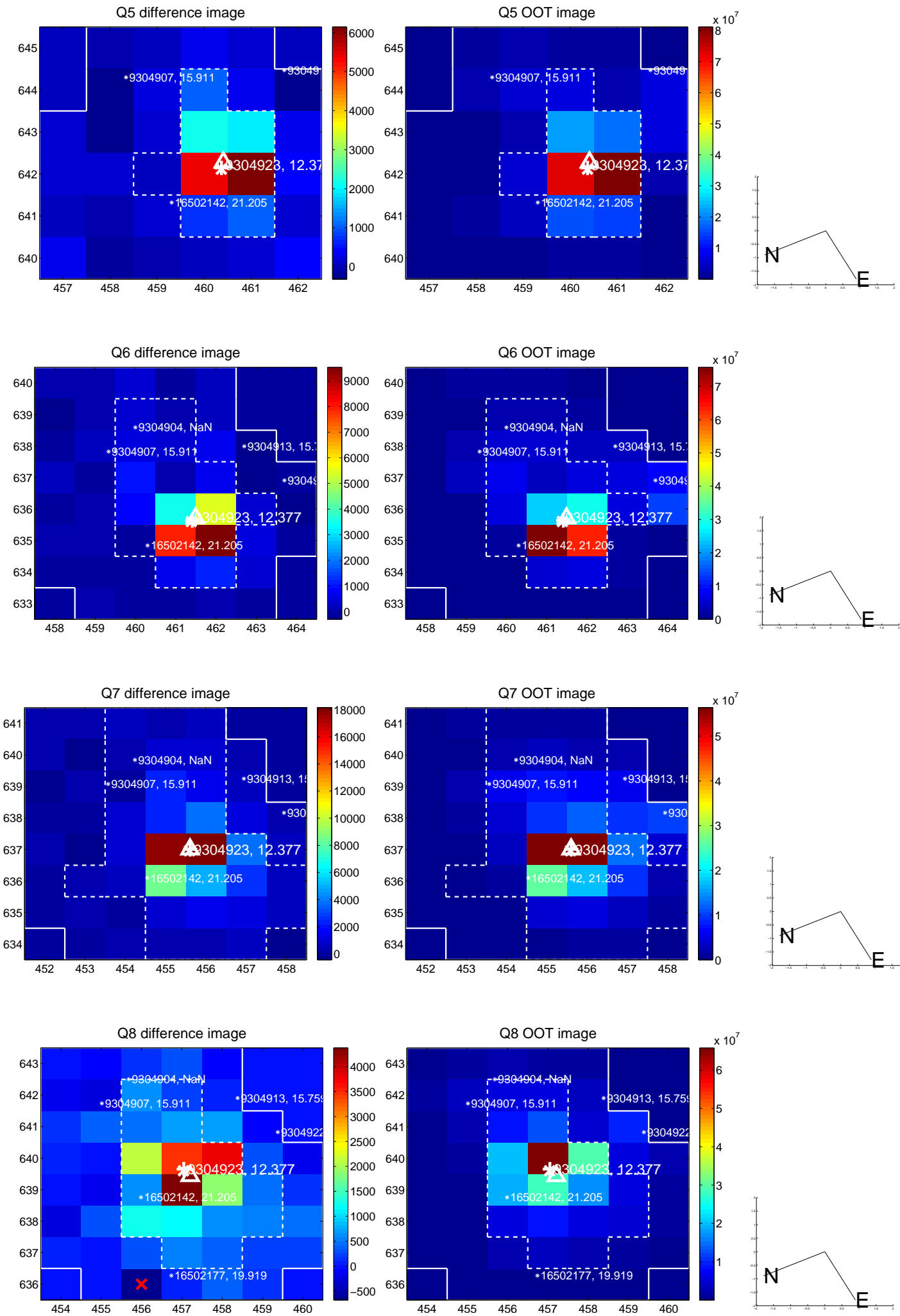


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

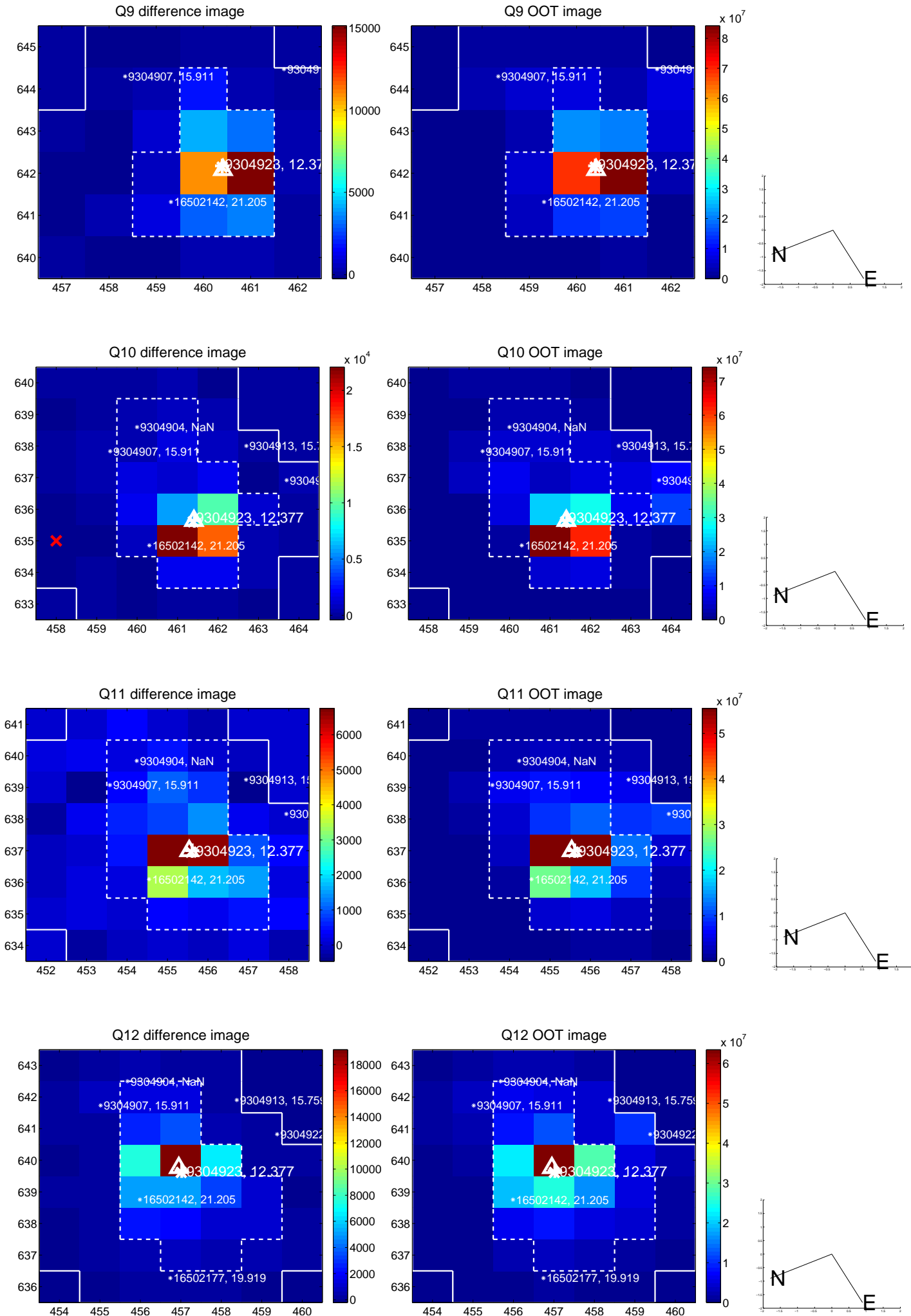


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

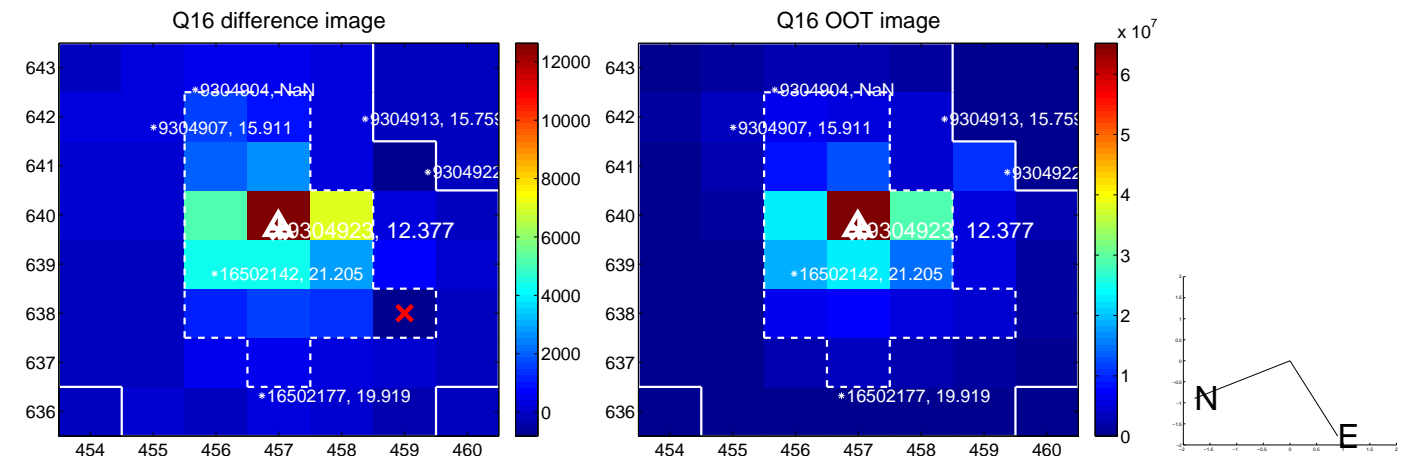
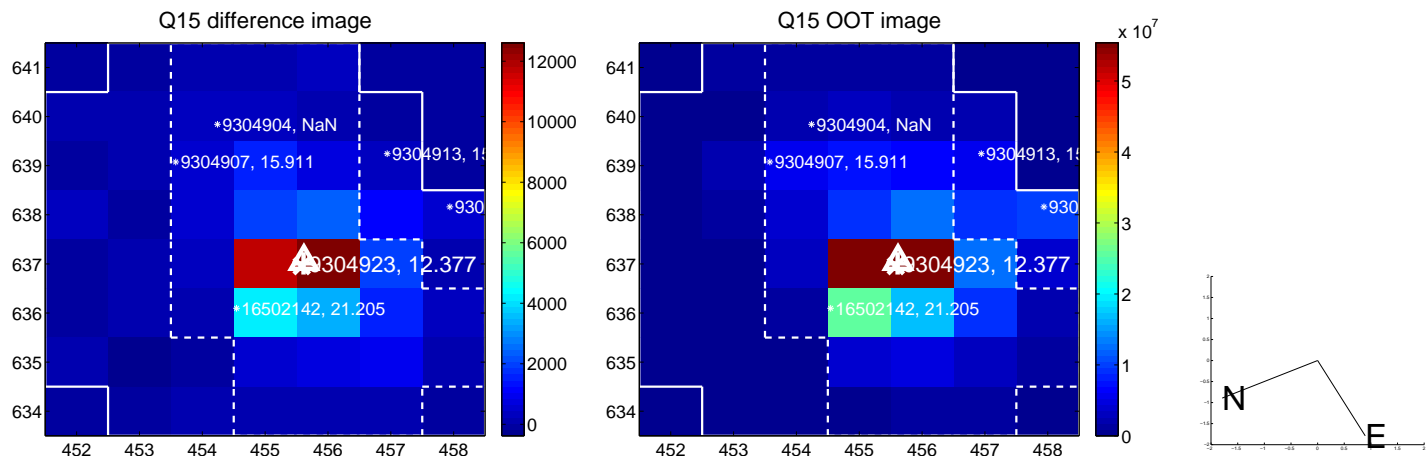
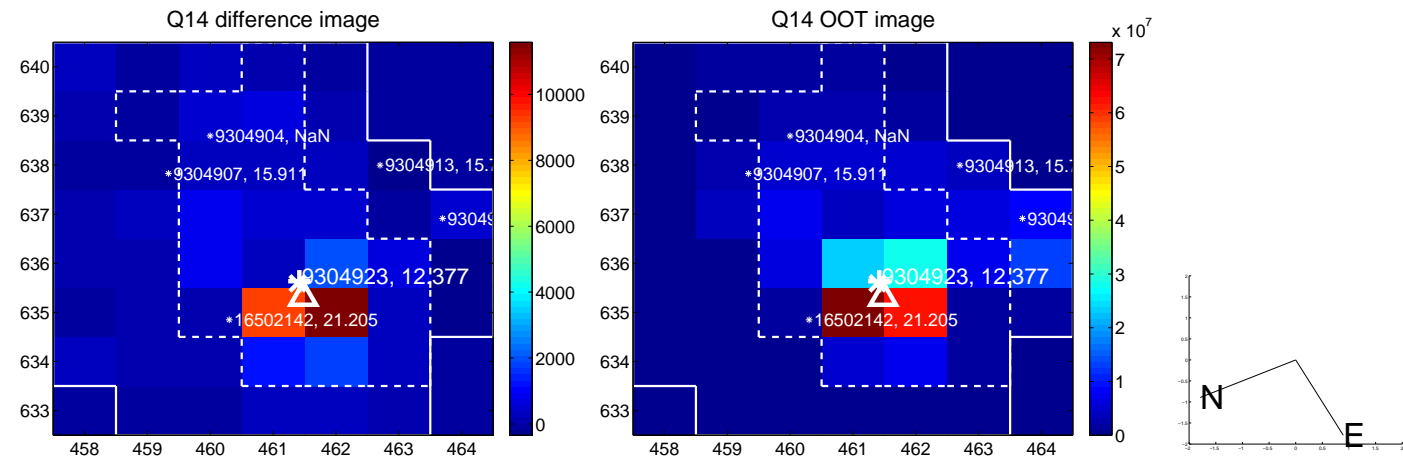
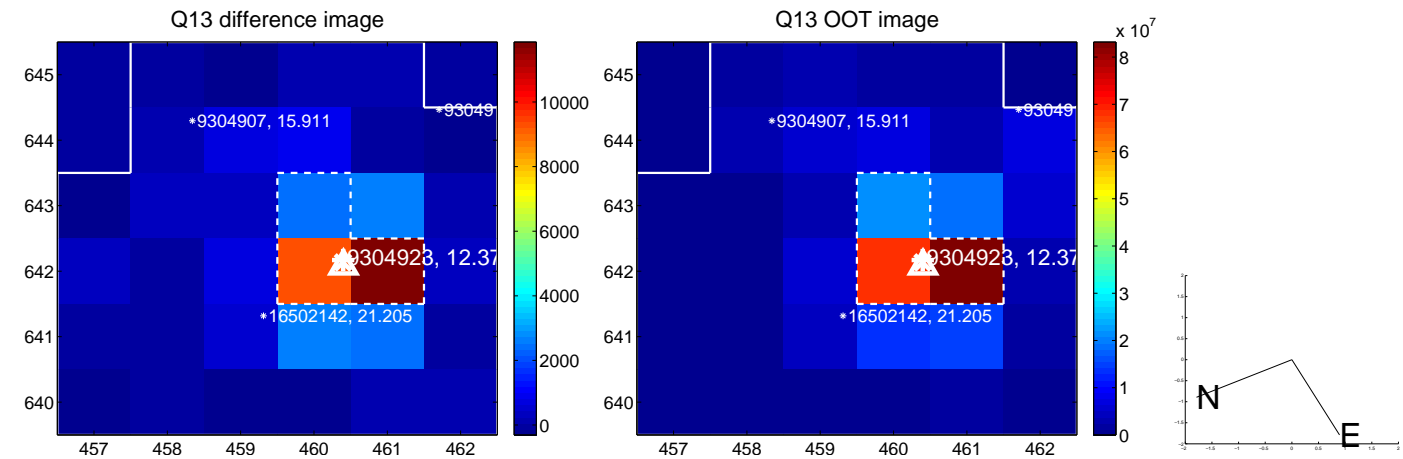




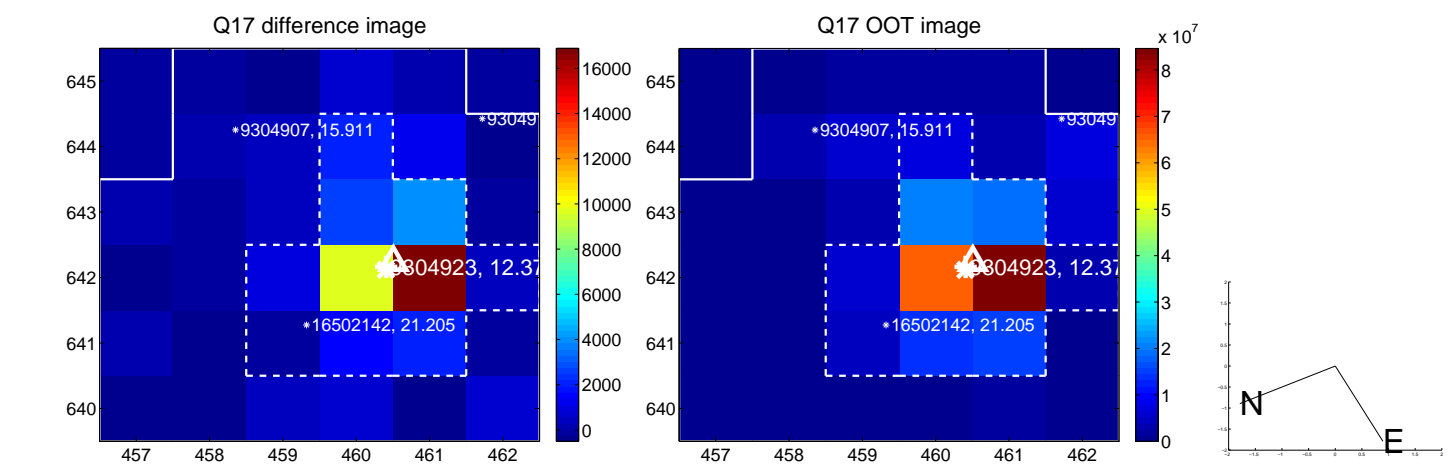
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



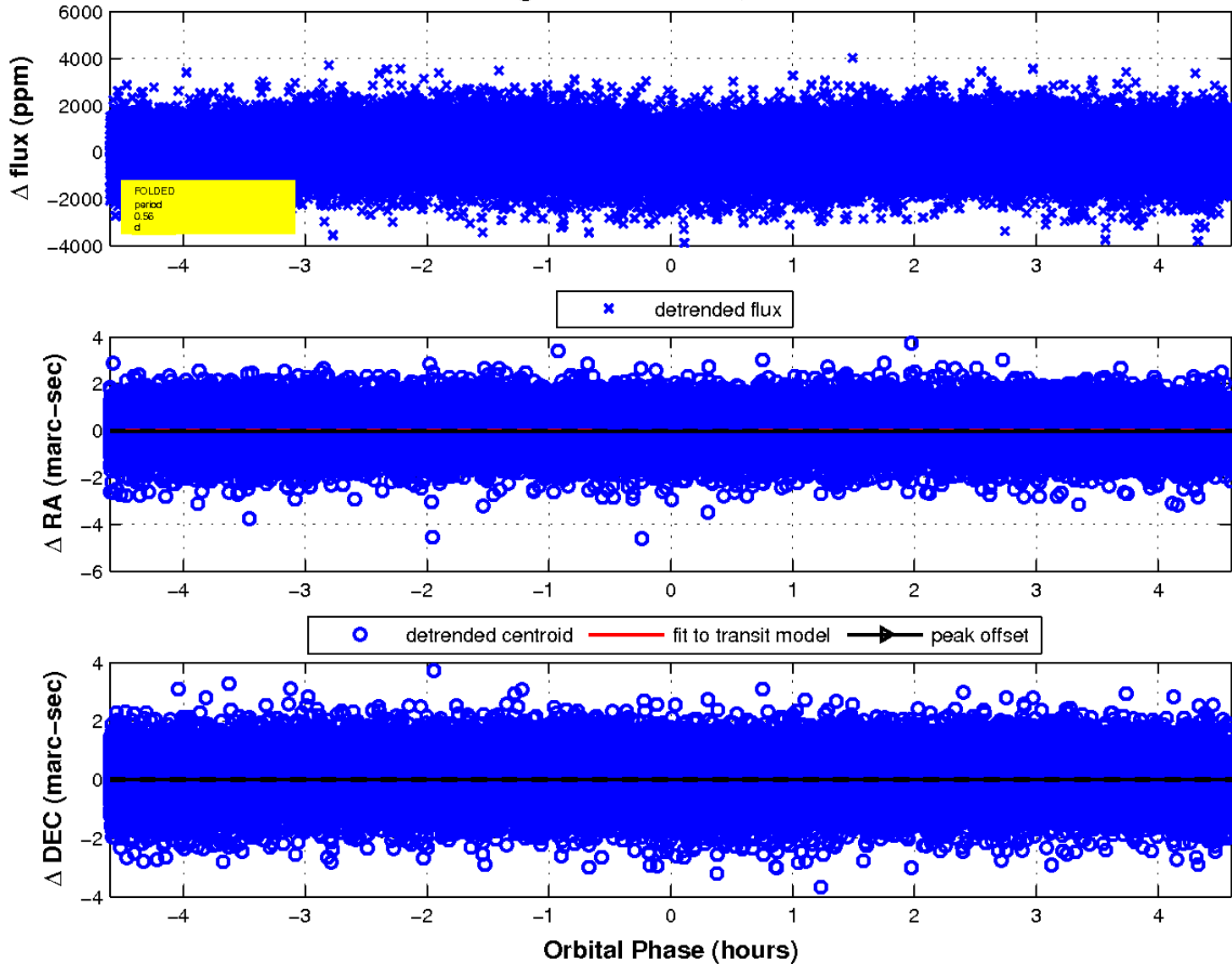
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



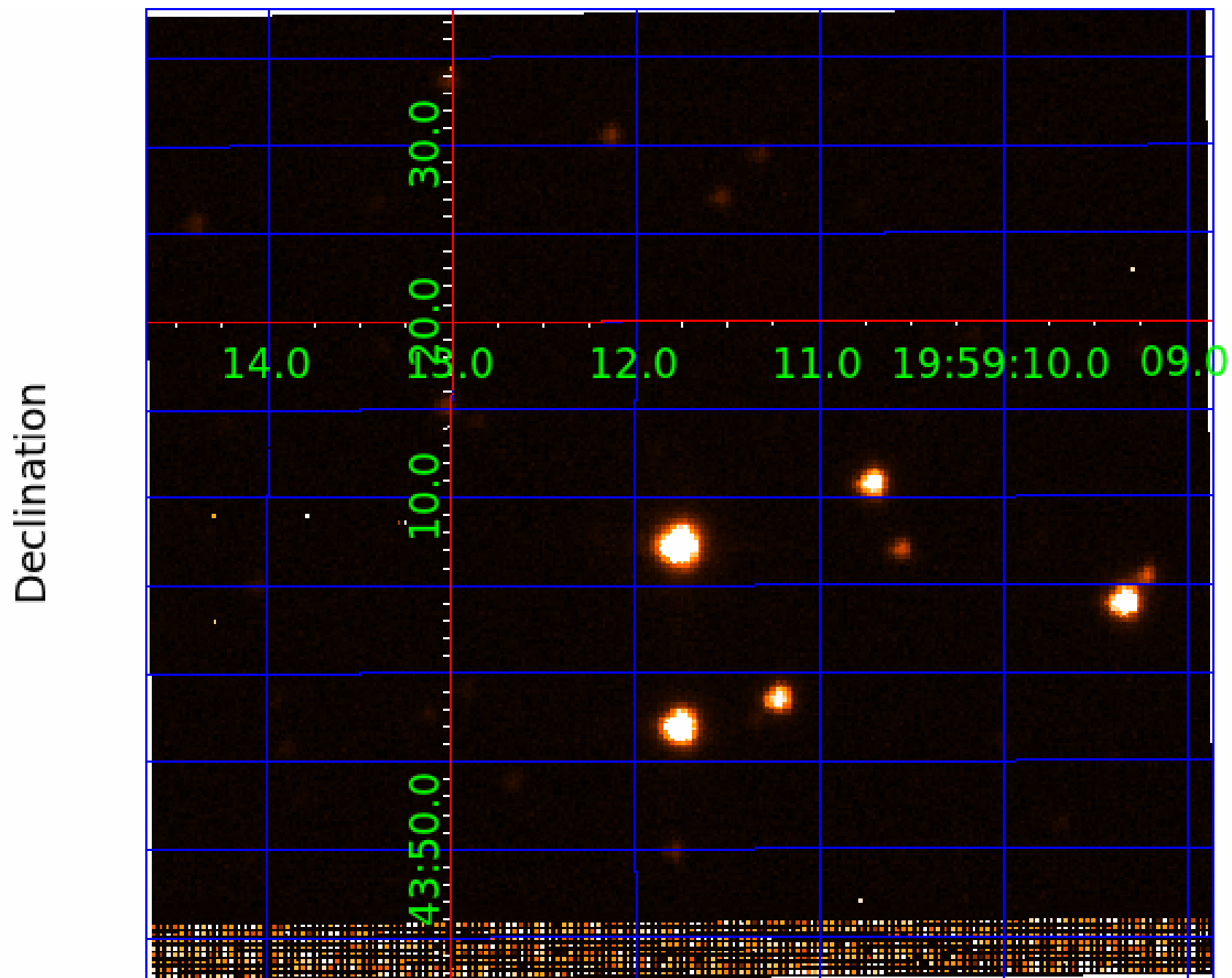
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 2 of 3



UKIRT Image



# KIC 009304923

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009304923-01	OBS	No	0.564465	131.699139	141.4	2.251	10.5	12.9	3.30	7981	4.57	136492.25
009304923-02	OBS	No	0.564464	132.066105	133.9	1.534	9.7	12.5	3.30	7981	4.10	136492.53
009304923-03	OBS	No	15.324070	145.175875	879.8	2.422	8.4	8.9	3.30	7981	11.33	1672.86

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009304923-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
009304923-02	OBS	FP	0.00	1	0	0	0	LPP_DV—SAME_NTL_PERIOD
009304923-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT

**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 009304923-03

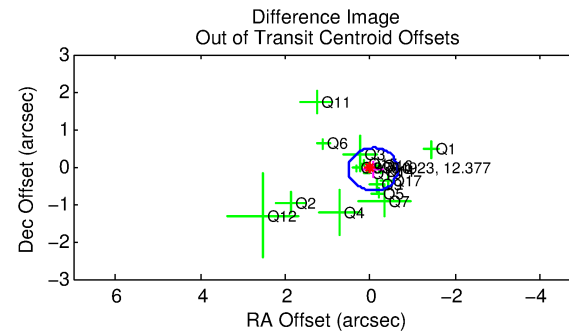
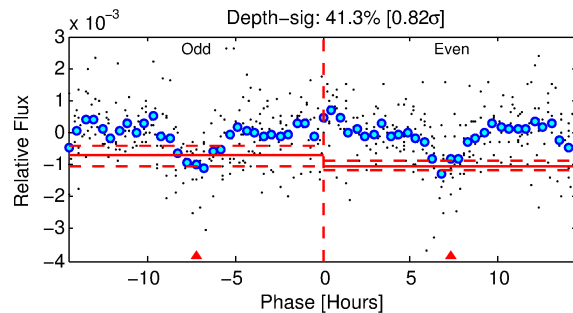
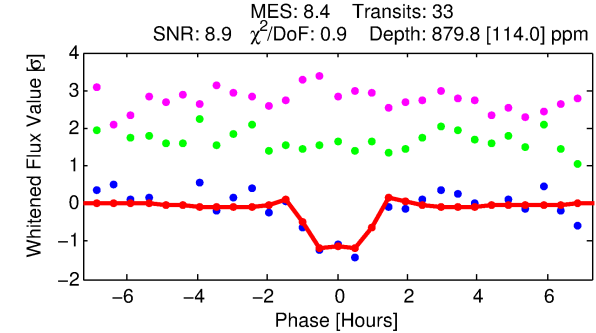
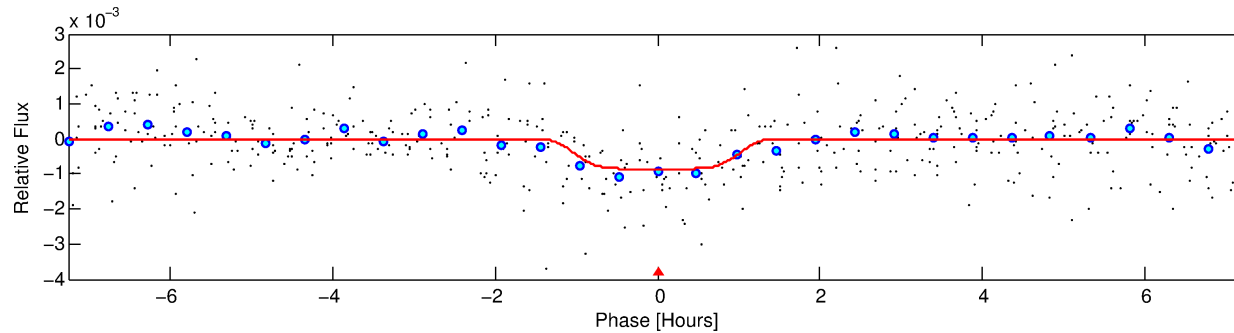
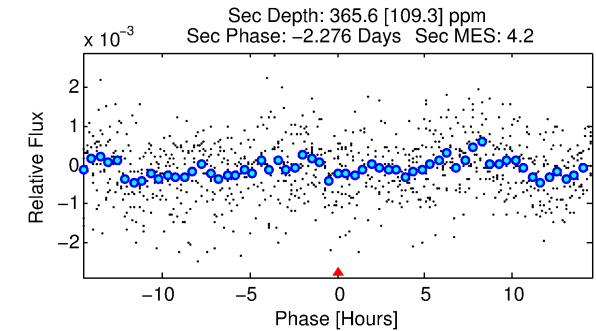
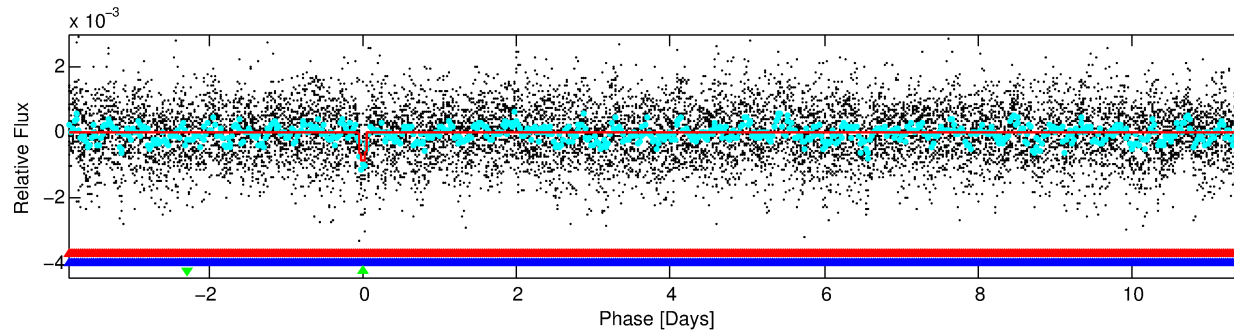
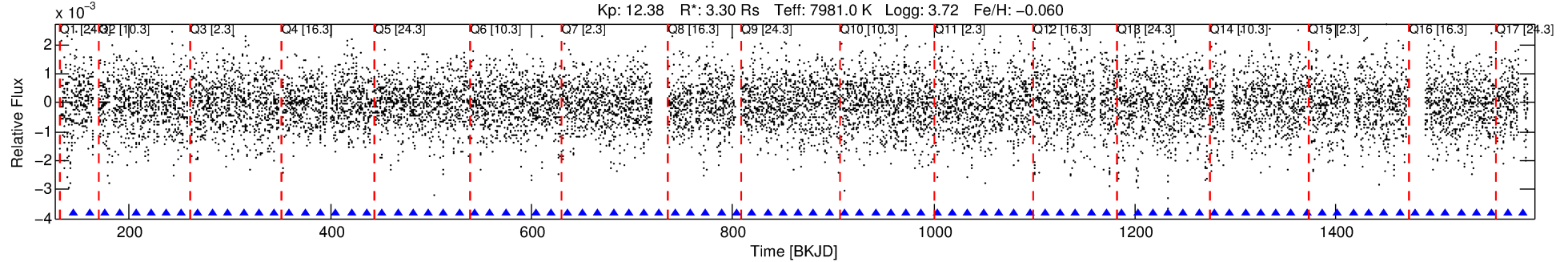
No Significant Match Found



# DV One-Page Summary

KIC: 9304923 Candidate: 3 of 3 Period: 15.324 d  
KOI: K06200 Corr: No Ephemeris Match

Kp: 12.38 R\*: 3.30 Rs Teff: 7981.0 K Logg: 3.72 Fe/H: -0.060



## DV Fit Results:

Period = 15.32407 [0.00011] d  
Epoch = 145.1759 [0.0058] BKJD  
Rp/R\* = 0.0315 [0.0075]  
a/R\* = 25.21 [32.28]  
b = 0.89 [0.30]  
Seff = 1672.86 [1306.71]  
Teq = 1631 [318] K  
Rp = 11.33 [6.13] Re  
a = 0.1537 [0.0728] AU  
Ag = 37.03 [35.08] [1.03σ]  
Teffp = 6220 [911] K [4.76σ]

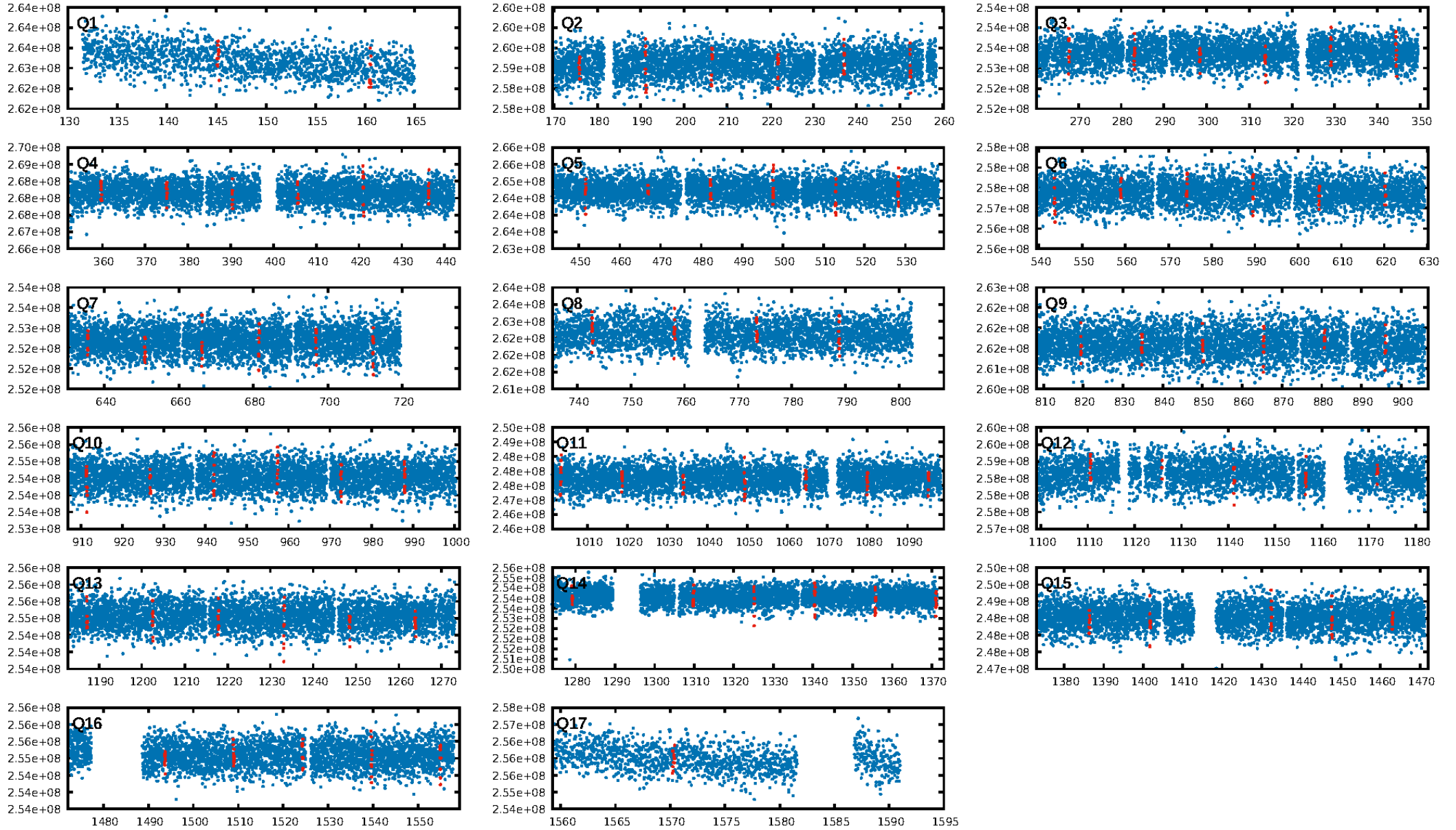
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [107.13σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 47.2%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.04e-09**  
RollingBand-fgt: 1.00 [33/33]  
GhostDiagnostic-chr: -7.634  
Centroid-sig: 15.6%  
**Centroid-so: 0.853 arcsec [6.41σ]**  
OotOffset-rm: 0.104 arcsec [0.54σ]  
KicOffset-rm: 0.285 arcsec [1.57σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.76 [13/17]  
DiffImageOverlap-fno: 0.00 [0/17]

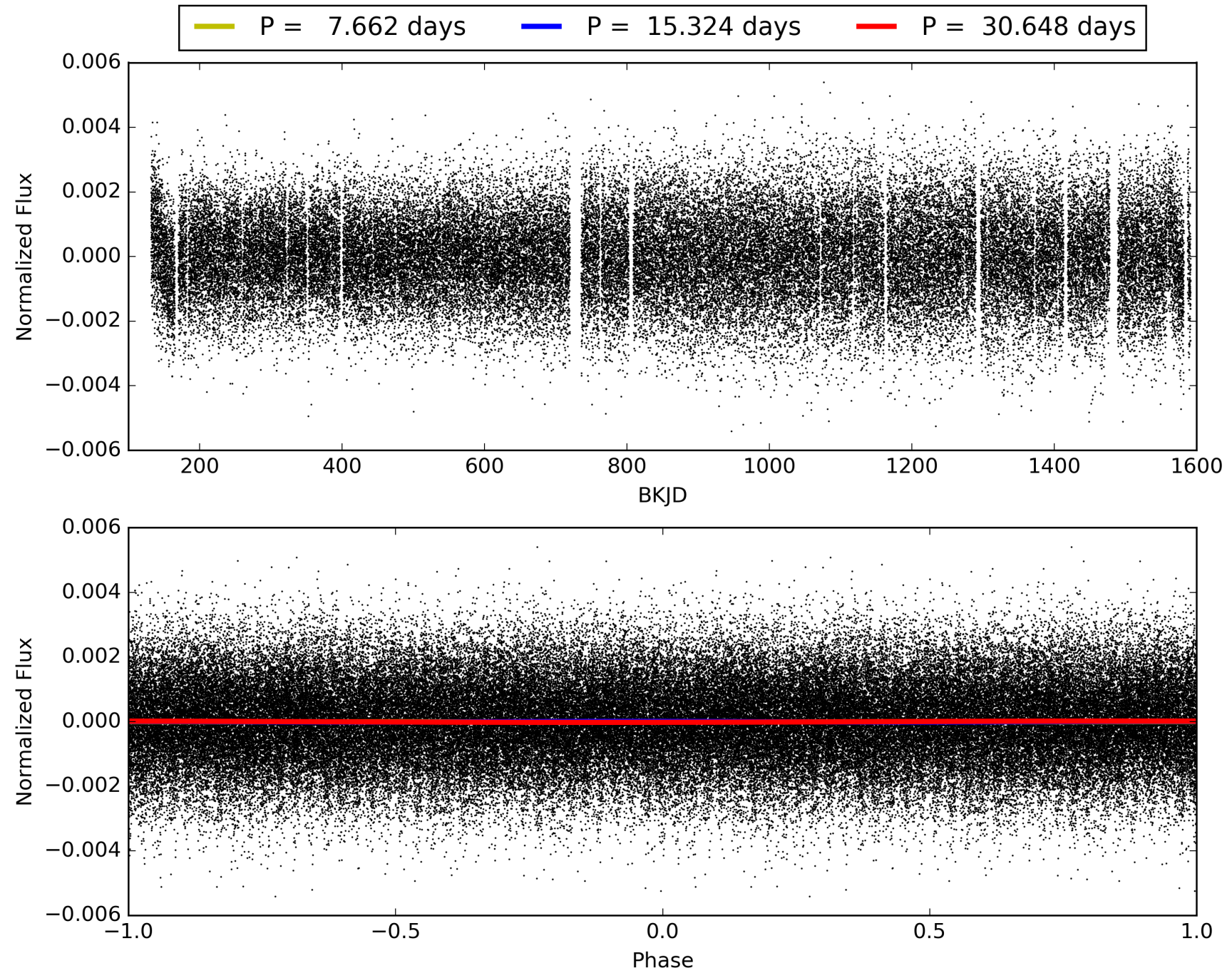
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 12:24:12 Z

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

# TCE 009304923-03, PDC Light Curves

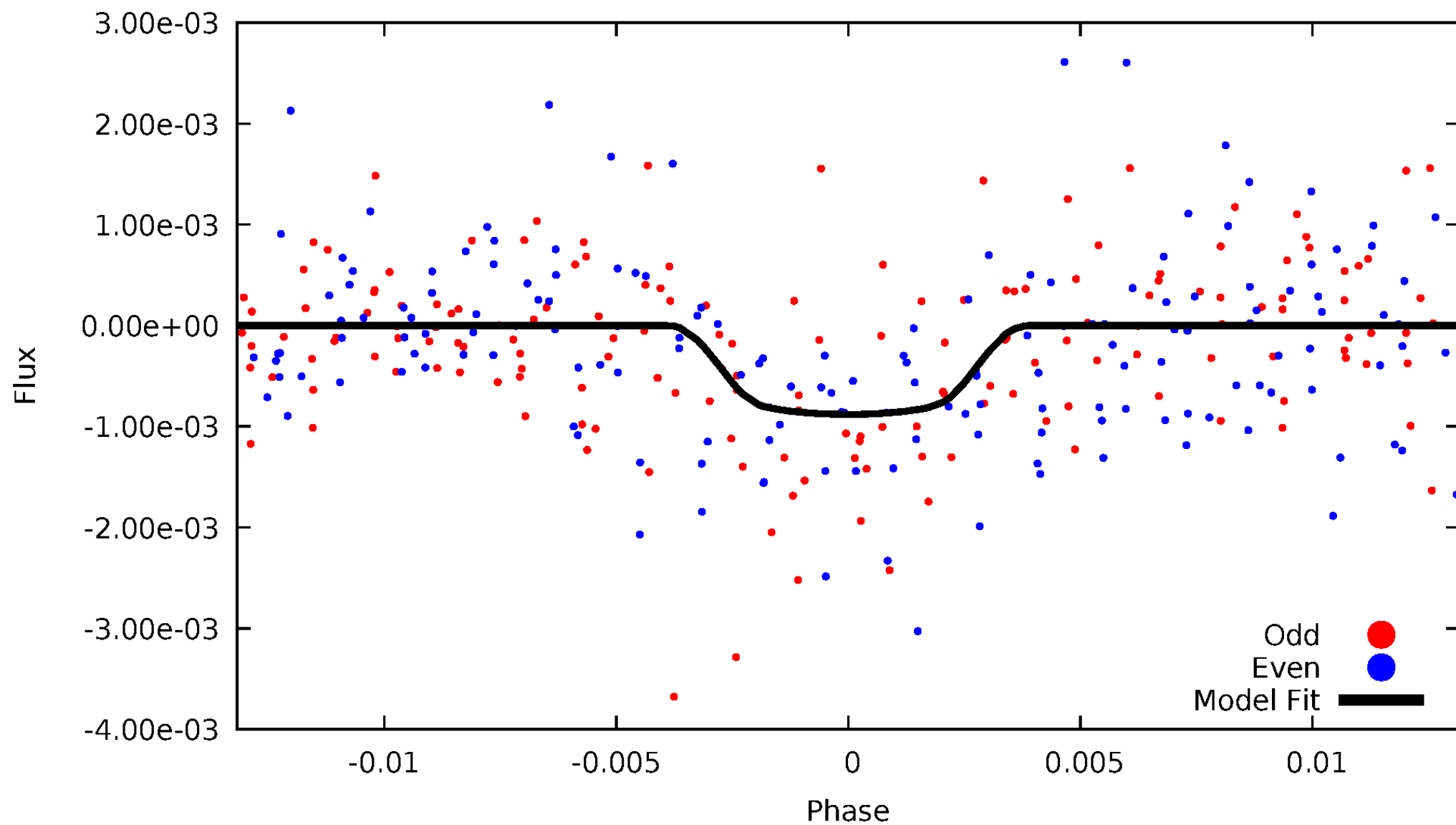


TCE 009304923-03



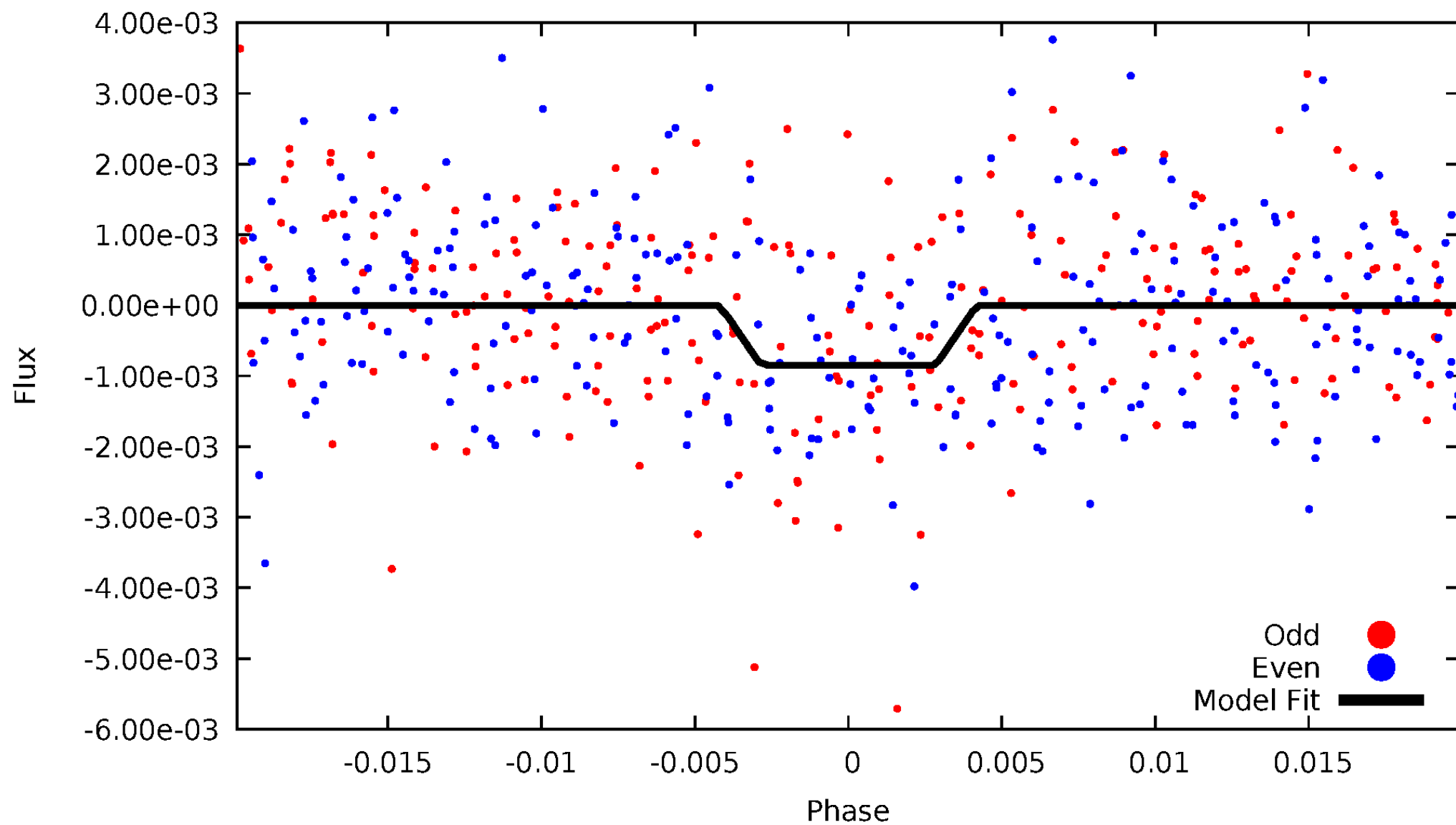
# DV Odd/Even

TCE 009304923-03



# ALT Odd/Even

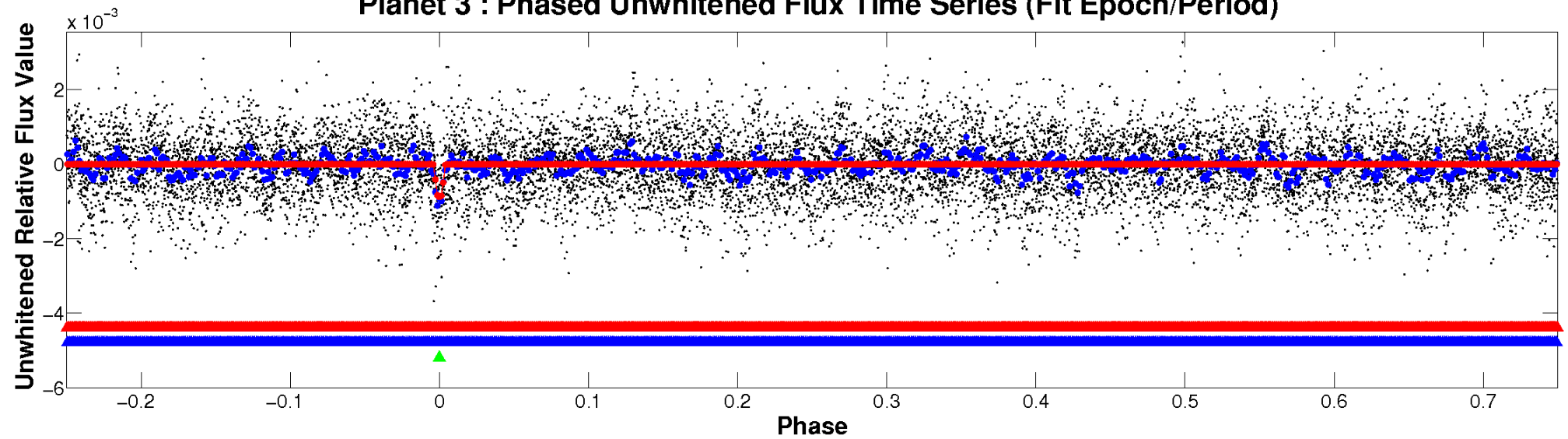
TCE 009304923-03



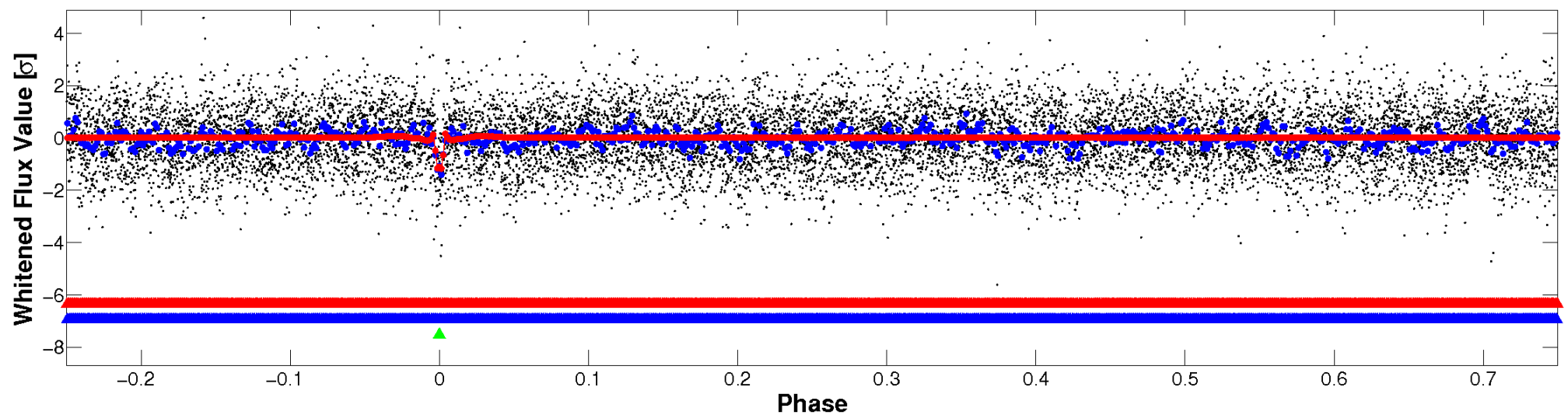


# Non-Whitened Vs. Whitened Light Curve

**Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)**

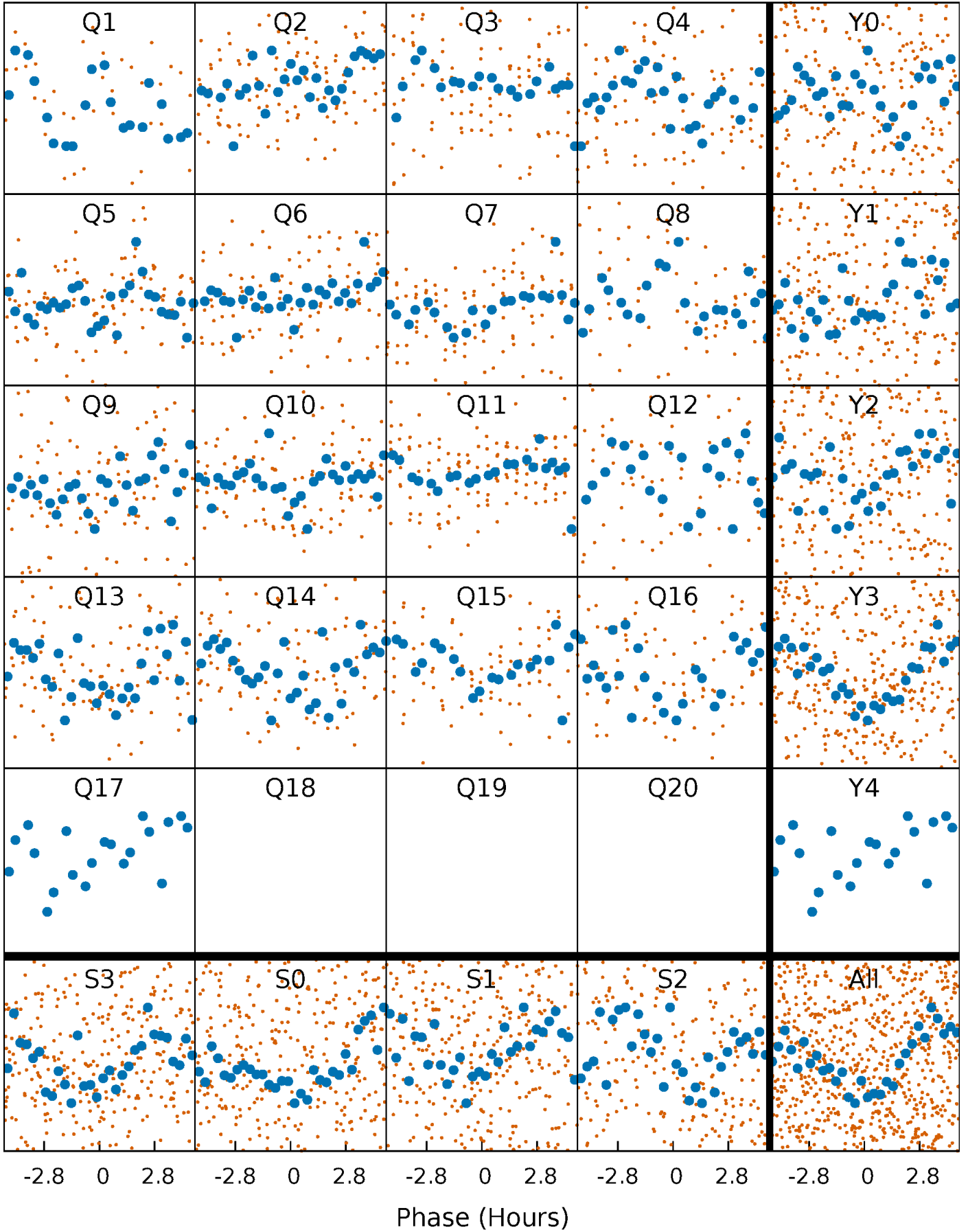


**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



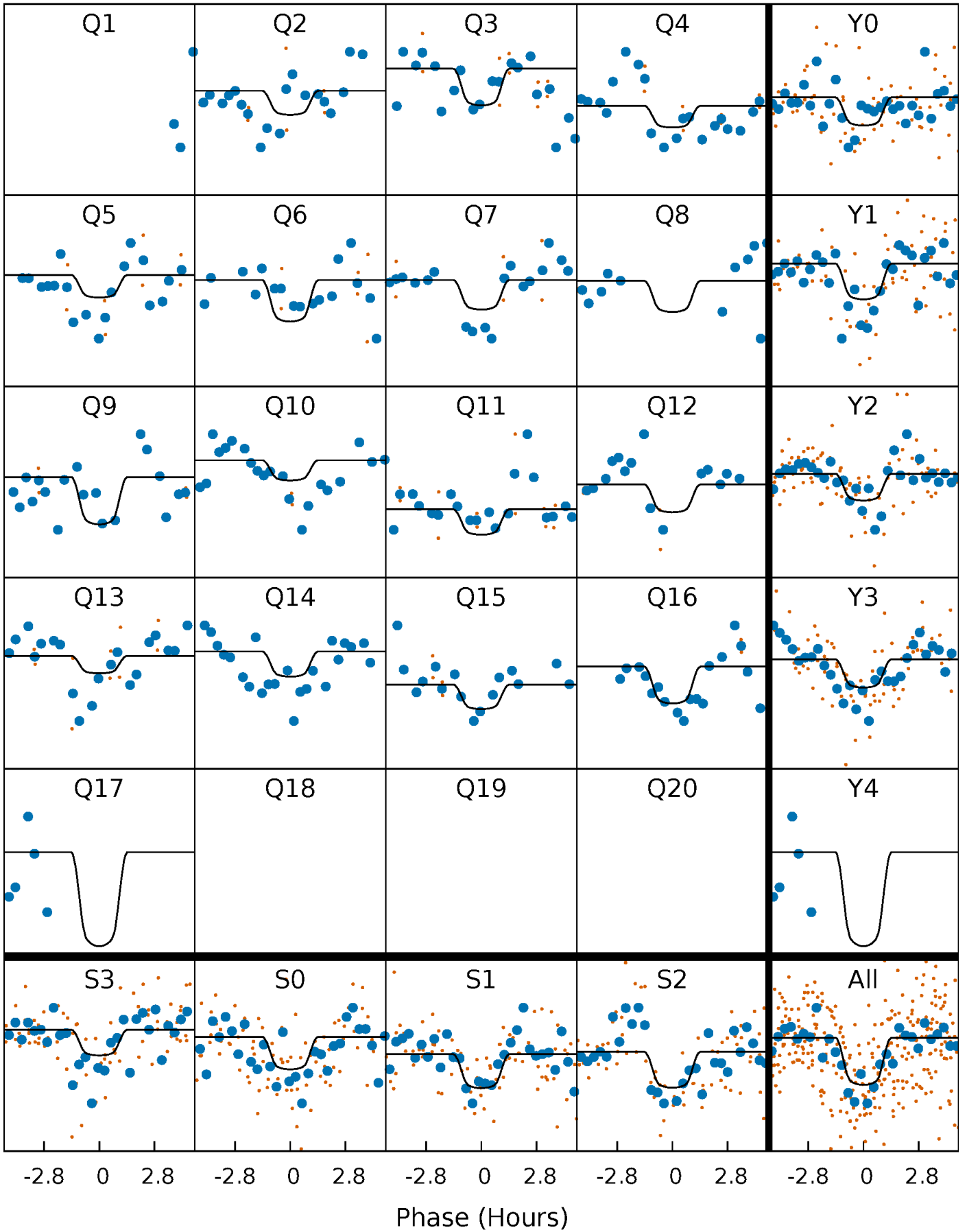
# PDC Quarter-Phased Transit Curves

TCE 009304923-03 P= 15.324070 Days  $T_0=145.175875$  (BKJD)



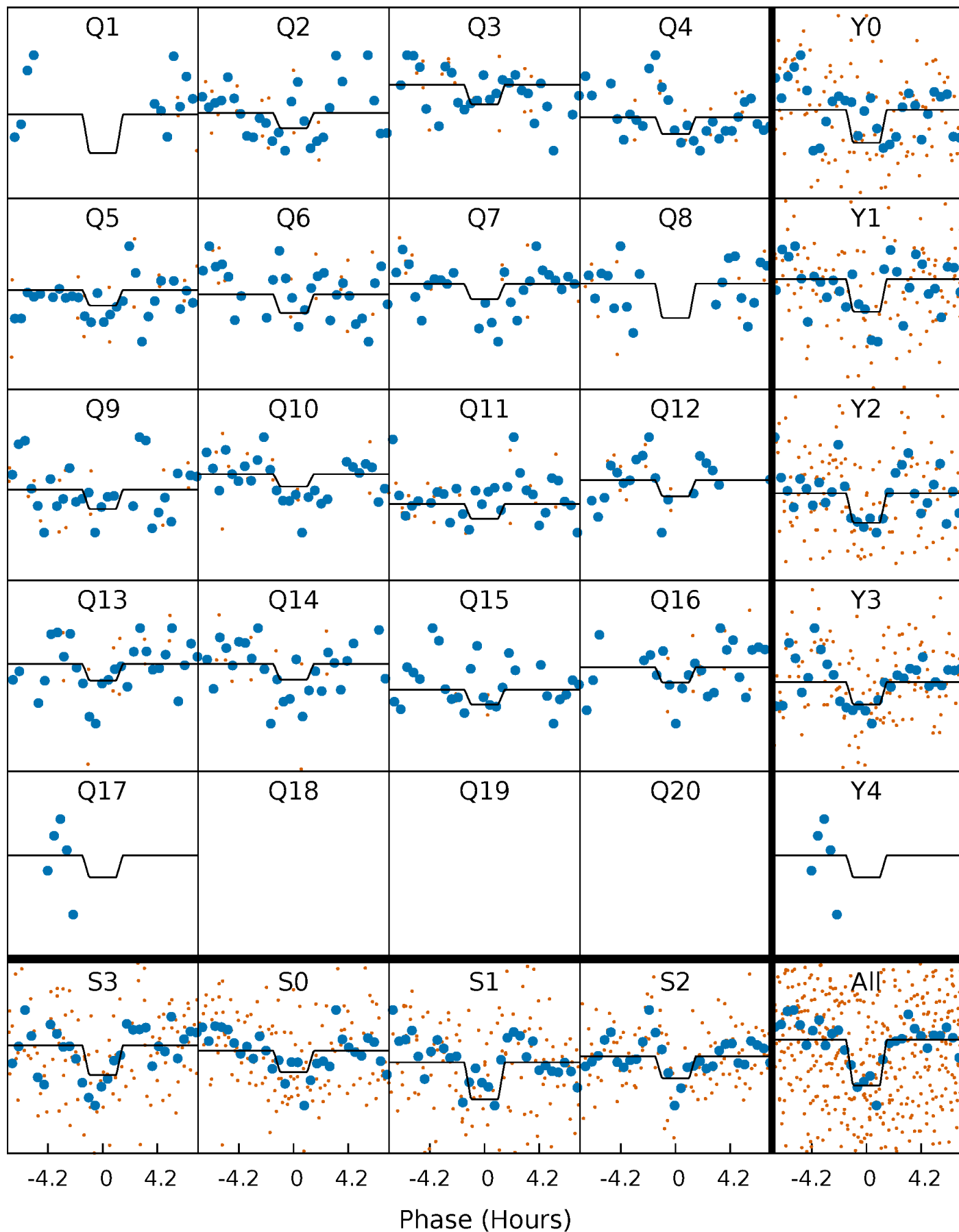
# DV Quarter-Phased Transit Curves

TCE 009304923-03   P= 15.324070 Days    $T_0=145.175875$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

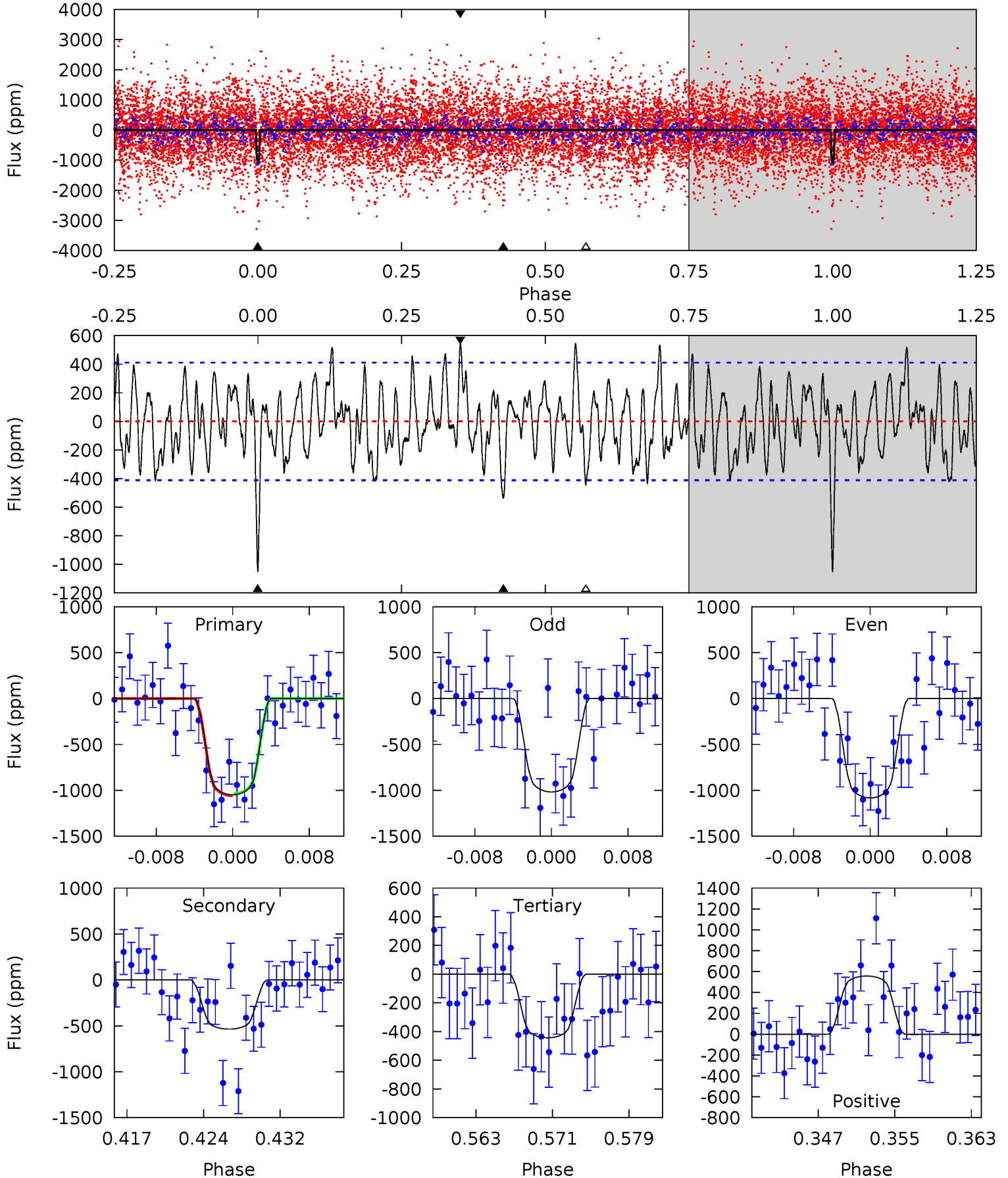
TCE 009304923-03 P= 15.324039 Days  $T_0=145.167376$  (BKJD)



# DV Model-Shift Uniqueness Test

009304923-03, P = 15.324070 Days, E = 129.851805 Days

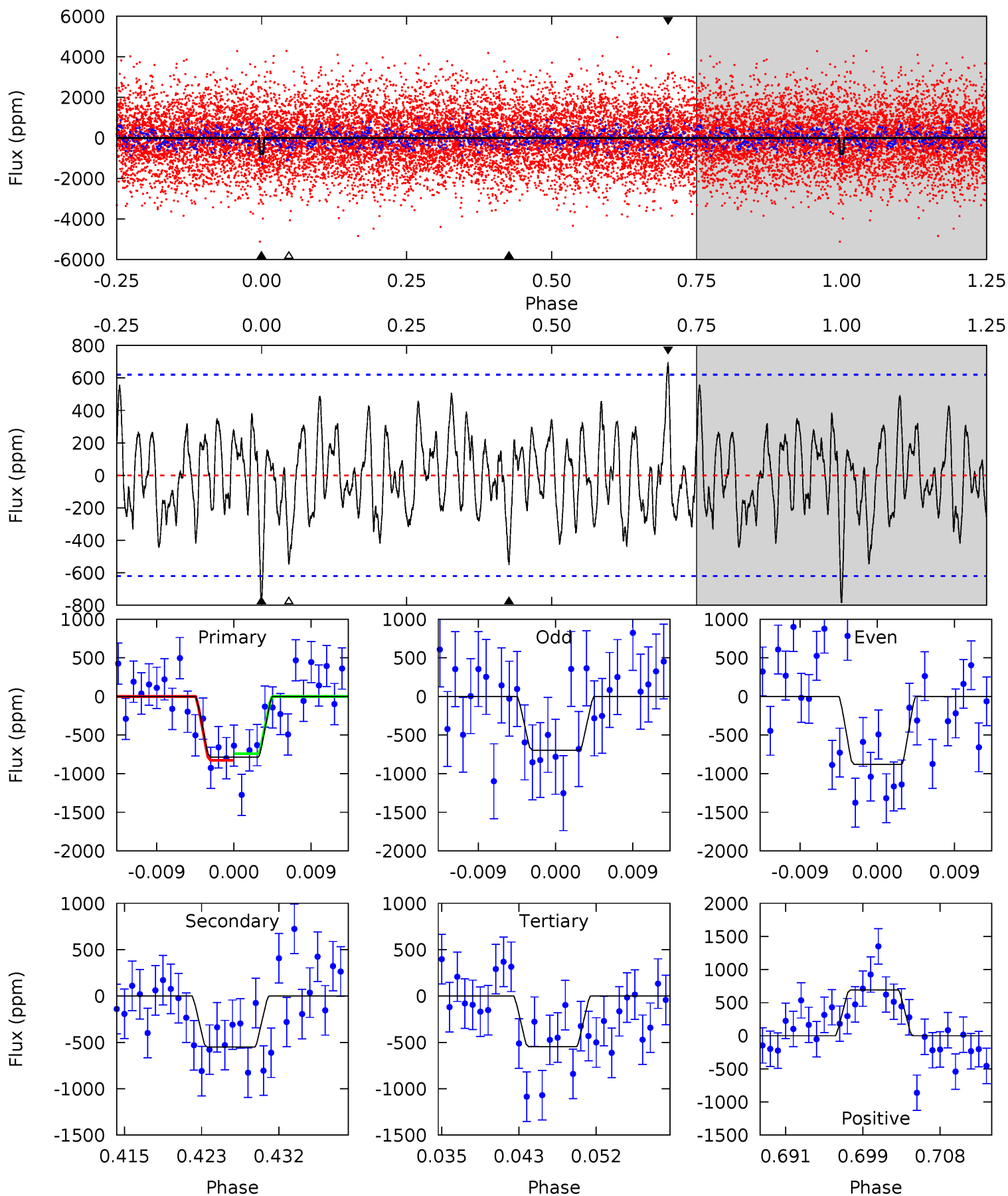
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.9	6.60	5.46	6.87	5.08	2.66	2.48	7.47	6.06	1.14	-0.27	0.40	0.91	0.35	0.12



# Alt Model-Shift Uniqueness Test

009304923-03,  $P = 15.324039$  Days,  $E = 129.843337$  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
6.40	4.49	4.46	5.65	5.05	2.63	1.72	1.93	0.75	0.02	-1.16	0.75	0.97	0.47	0.35





### Stellar Parameters For KIC 009304923

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7981^{+222}_{-333}$	$3.716^{+0.450}_{-0.106}$	$-0.060^{+0.200}_{-0.350}$	$3.298^{+0.688}_{-1.604}$	$2.061^{+0.293}_{-0.545}$	$0.081^{+0.350}_{-0.028}$
	+3%/-4%	+12%/-3%	+333%/-583%	+21%/-49%	+14%/-26%	+433%/-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 009304923-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-536 \pm 81$	$10.14^{+3.47}_{-2.91}$	$2190^{+183}_{-271}$	$6641^{+1069}_{-792}$	$67^{+63}_{-30}$
Alt.	$-550 \pm 123$	$9.36^{+3.51}_{-3.10}$	$2195^{+171}_{-285}$	$6990^{+1542}_{-936}$	$80^{+101}_{-38}$

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

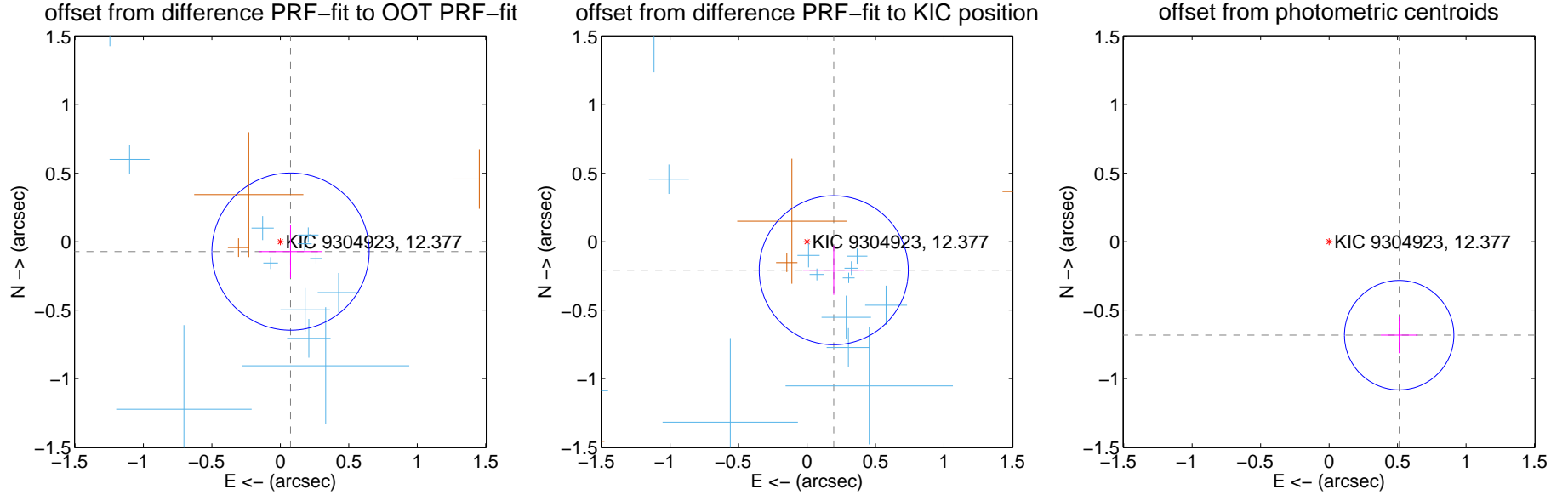
## DV Centroid Data

Supplemental centroid analysis for 009304923-03. Kepler magnitude: 12.38. Transit SNR 8.88

There are 13 quarters with good PRF difference image offsets

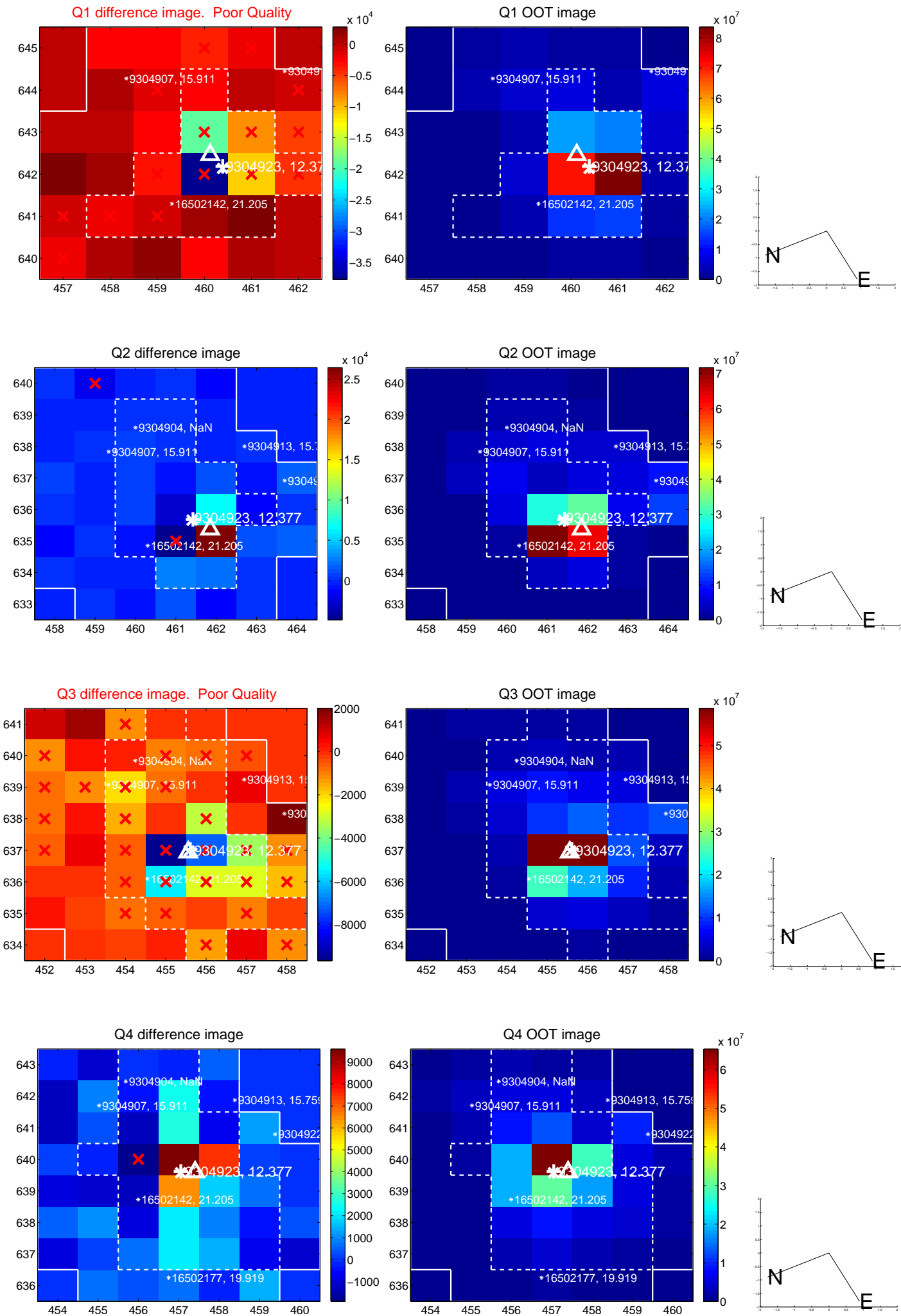
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.104 \pm 0.191$	0.54	$-0.074 \pm 0.233$	$-0.072 \pm 0.194$
PRF-fit source offset from KIC position	$0.285 \pm 0.181$	1.57	$-0.195 \pm 0.224$	$-0.208 \pm 0.180$
photometric centroid source offset	$0.85 \pm 0.13$	6.41	$-0.51 \pm 0.13$	$-0.68 \pm 0.13$

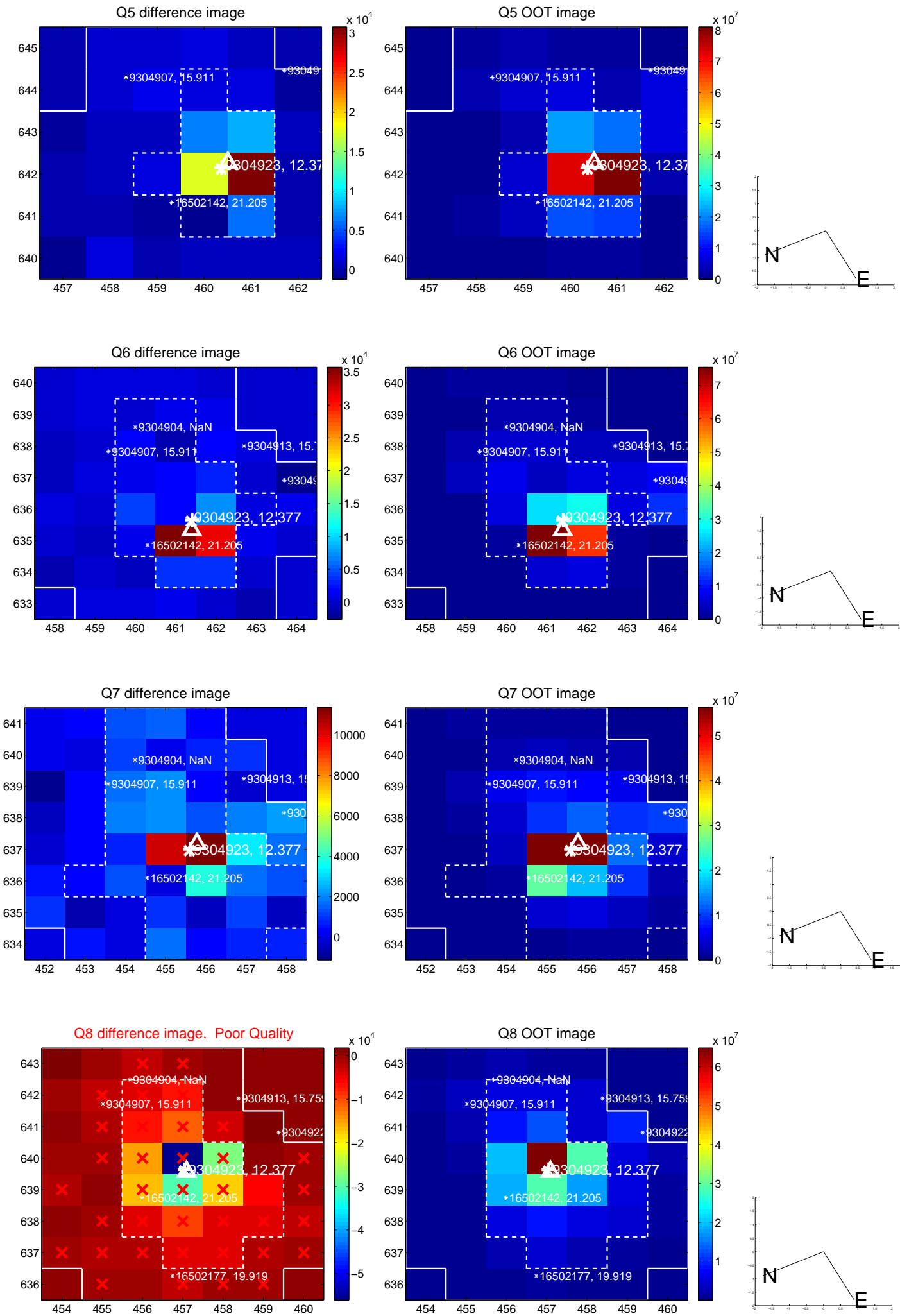


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

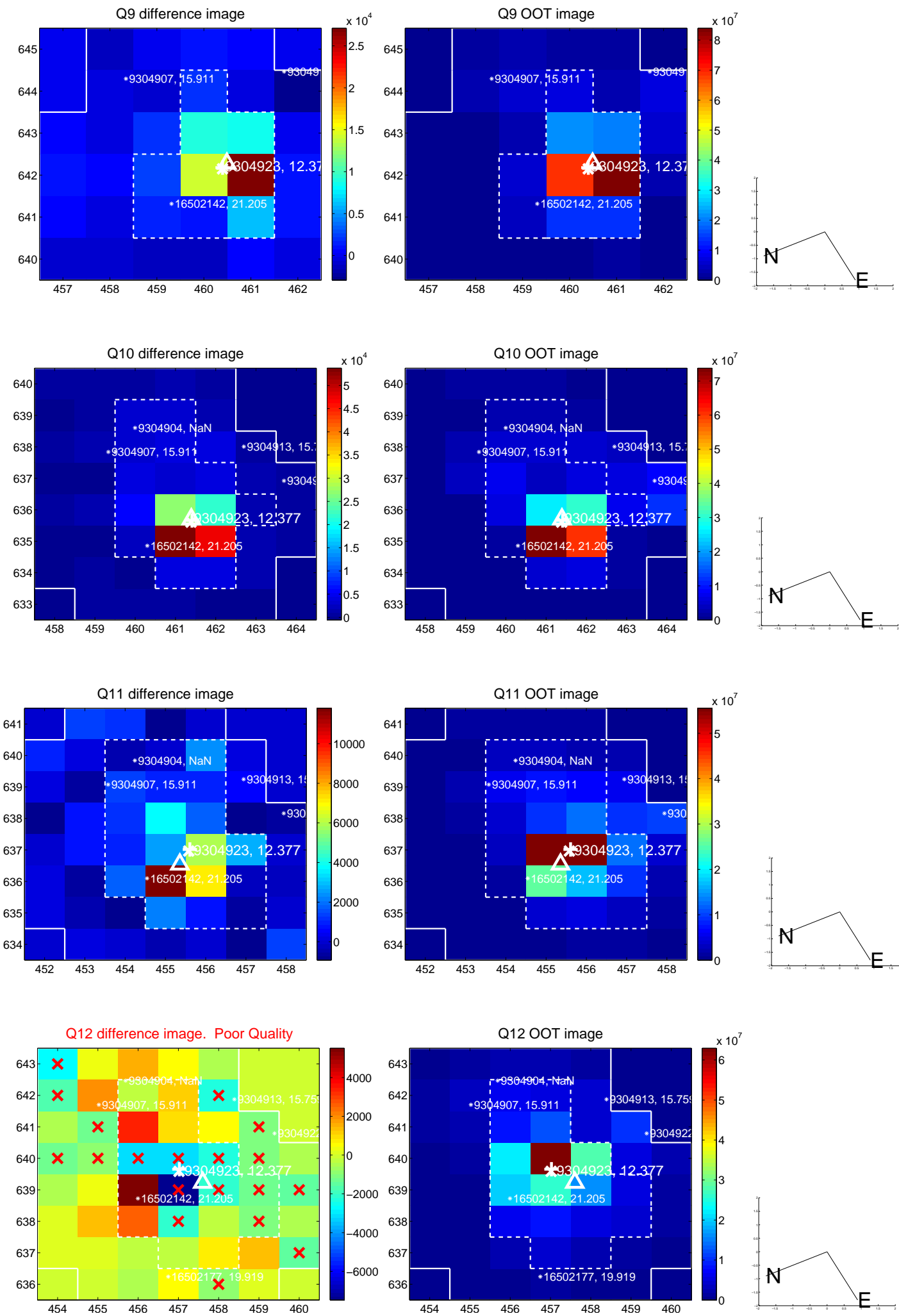
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



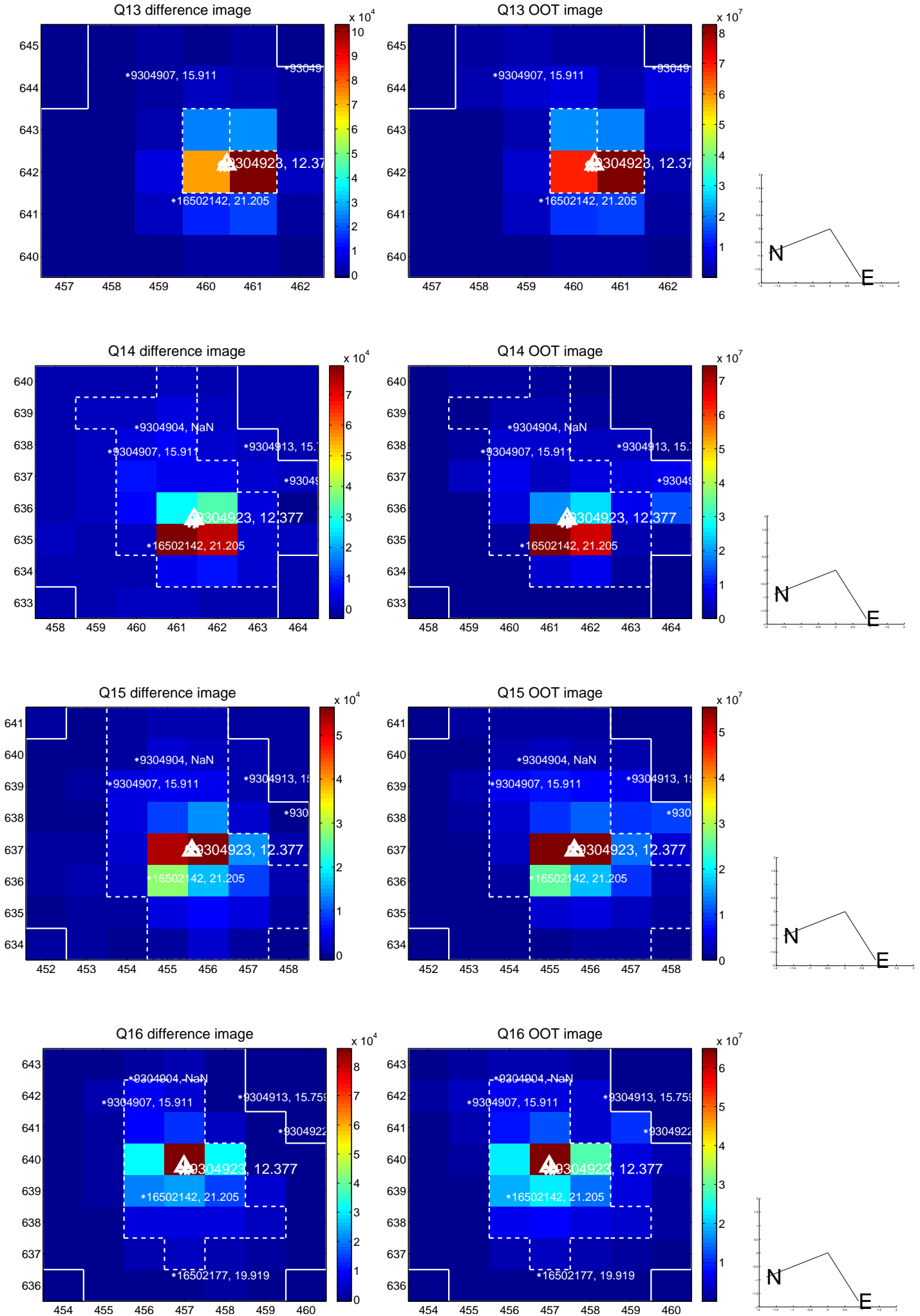
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

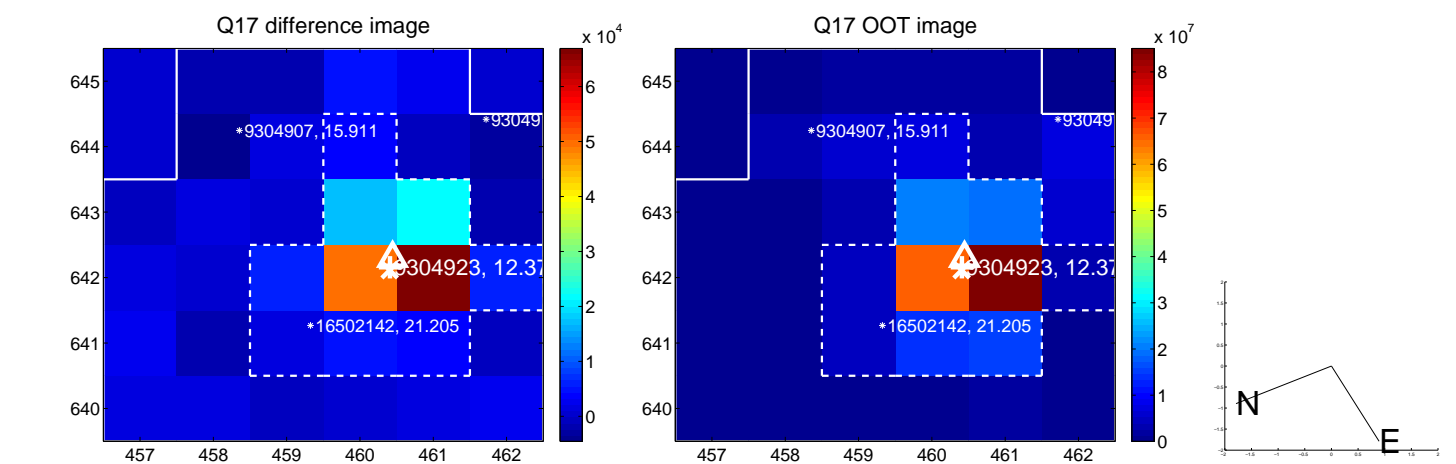


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

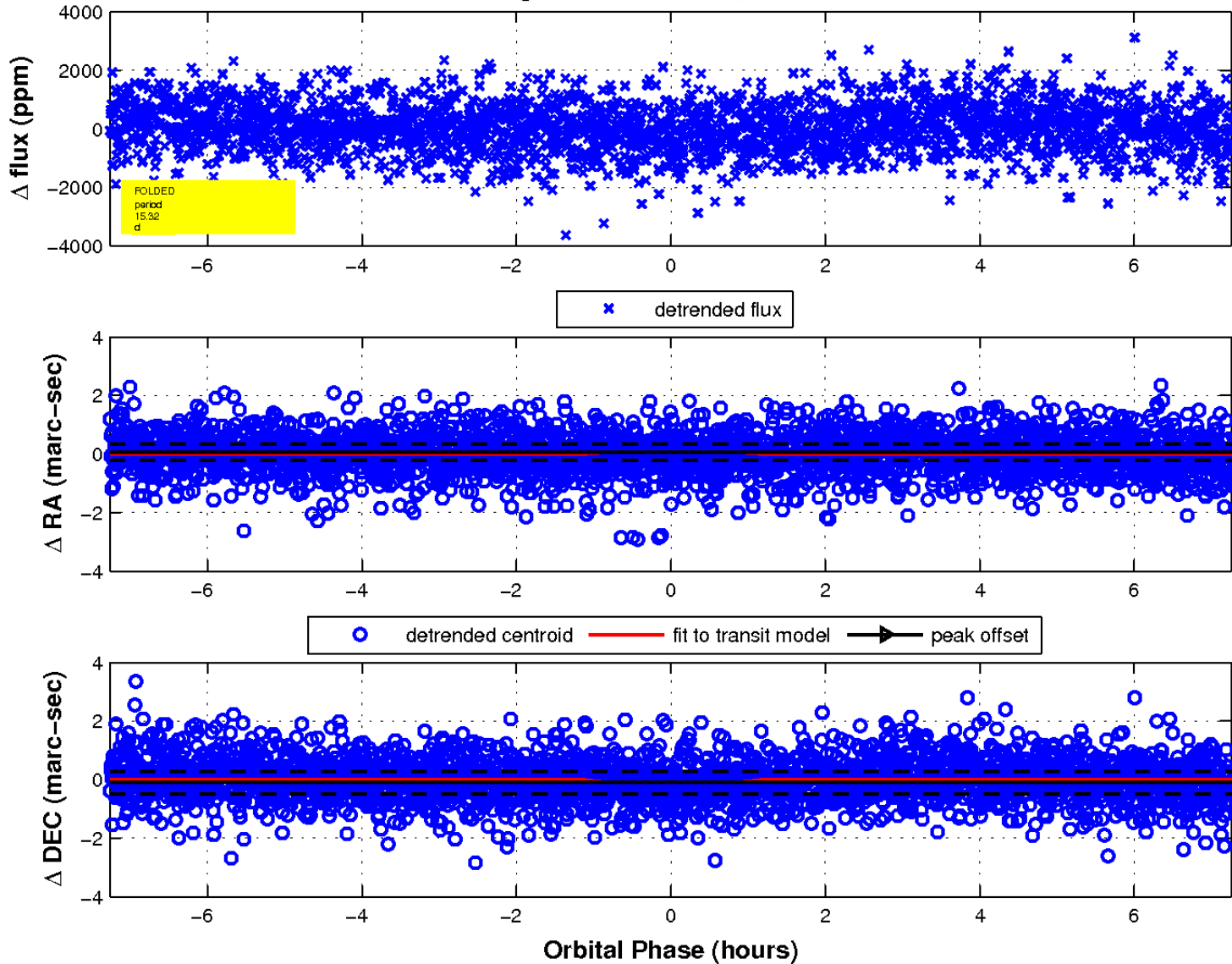




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



### fluxWeightedCentroids, Planet 3 of 3



UKIRT Image

