

# KIC 011512246

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011512246-01	OBS	0168.01	10.742413	133.287813	395.1	6.758	64.2	72.3	1.52	5761	3.69	244.49
011512246-02	OBS	0168.02	15.274418	132.304221	200.9	6.260	31.1	32.1	1.52	5761	2.43	152.91
011512246-03	OBS	0168.03	7.107034	138.322686	105.8	5.630	21.7	23.4	1.52	5761	1.88	424.11

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011512246-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
011512246-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT
011512246-03	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

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

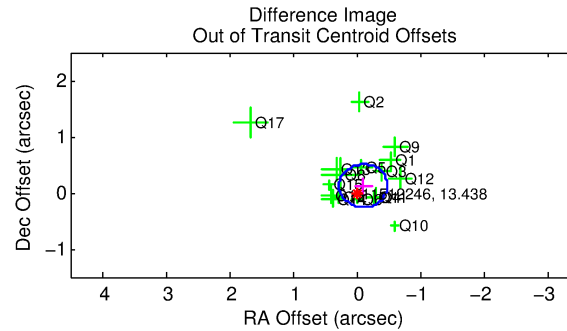
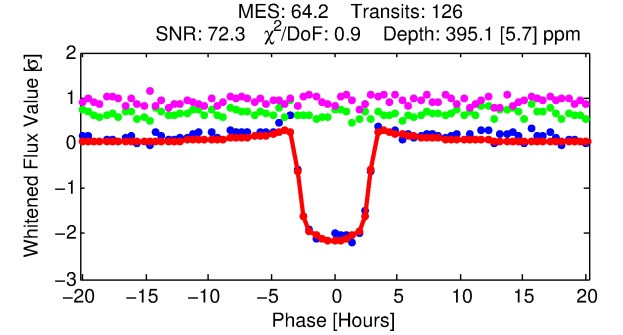
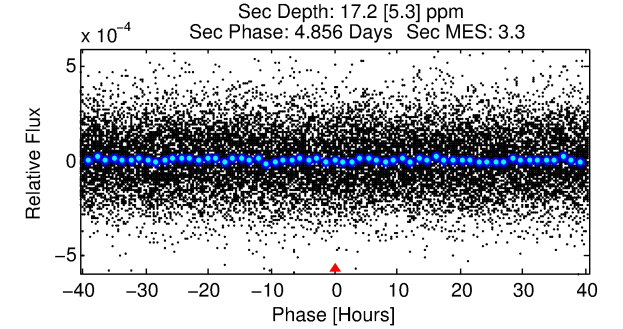
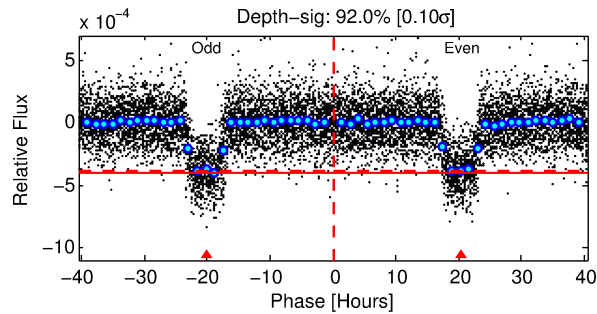
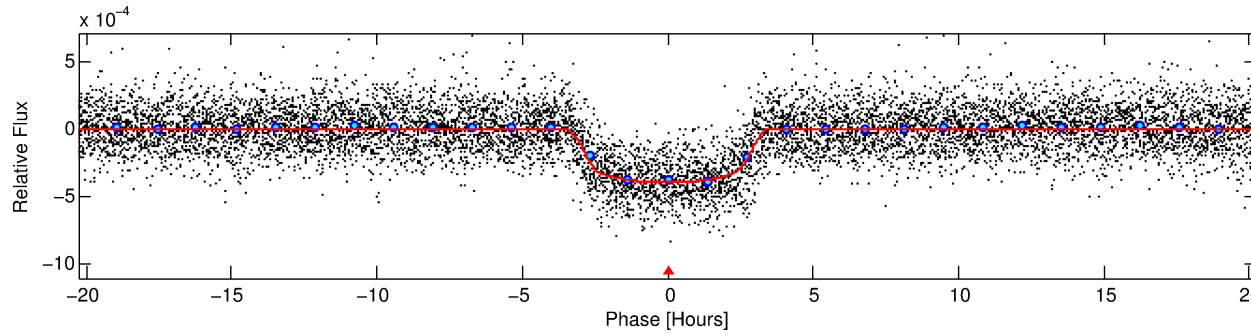
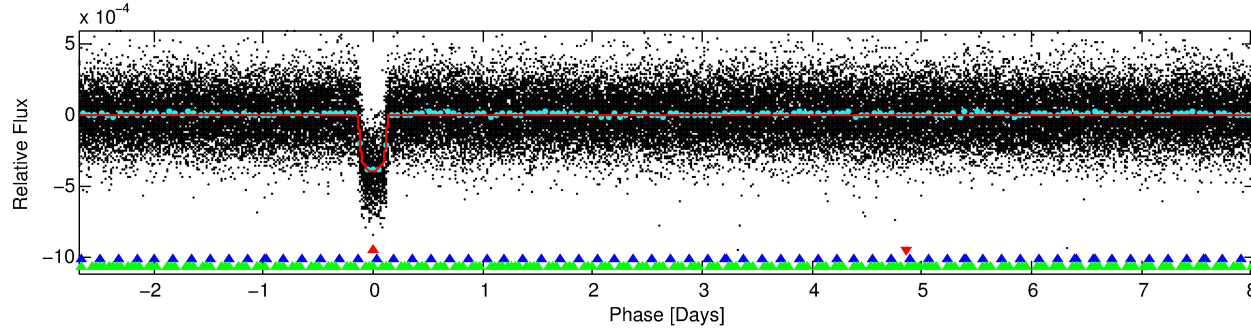
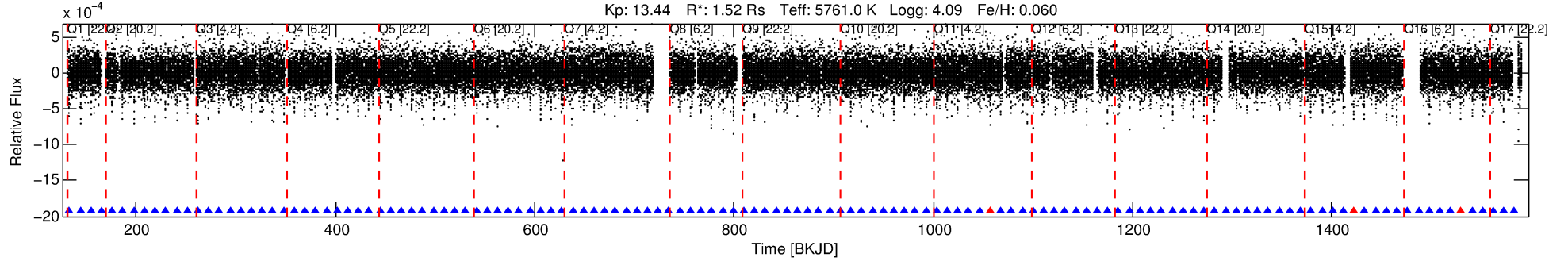
Ephemeris Match Information For 011512246-01

No Significant Match Found

# DV One-Page Summary

KIC: 11512246 Candidate: 1 of 3 Period: 10.742 d  
KOI: K00168.01 Name: Kepler-23c Corr: 0.947

Kp: 13.44 R\*: 1.52 Rs Teff: 5761.0 K Logg: 4.09 Fe/H: 0.060



## DV Fit Results:

Period = 10.74241 [0.00002] d  
Epoch = 133.2878 [0.0017] BKJD  
Rp/R\* = 0.0223 [0.0004]  
a/R\* = 5.37 [0.36]  
b = 0.92 [0.01]  
Seff = 244.49 [18.88]  
Teq = 1008 [19] K  
Rp = 3.69 [0.23] Re  
a = 0.0964 [0.0041] AU  
Ag = 6.47 [2.04] [2.67σ]  
Teffp = 2486 [198] K [7.44σ]

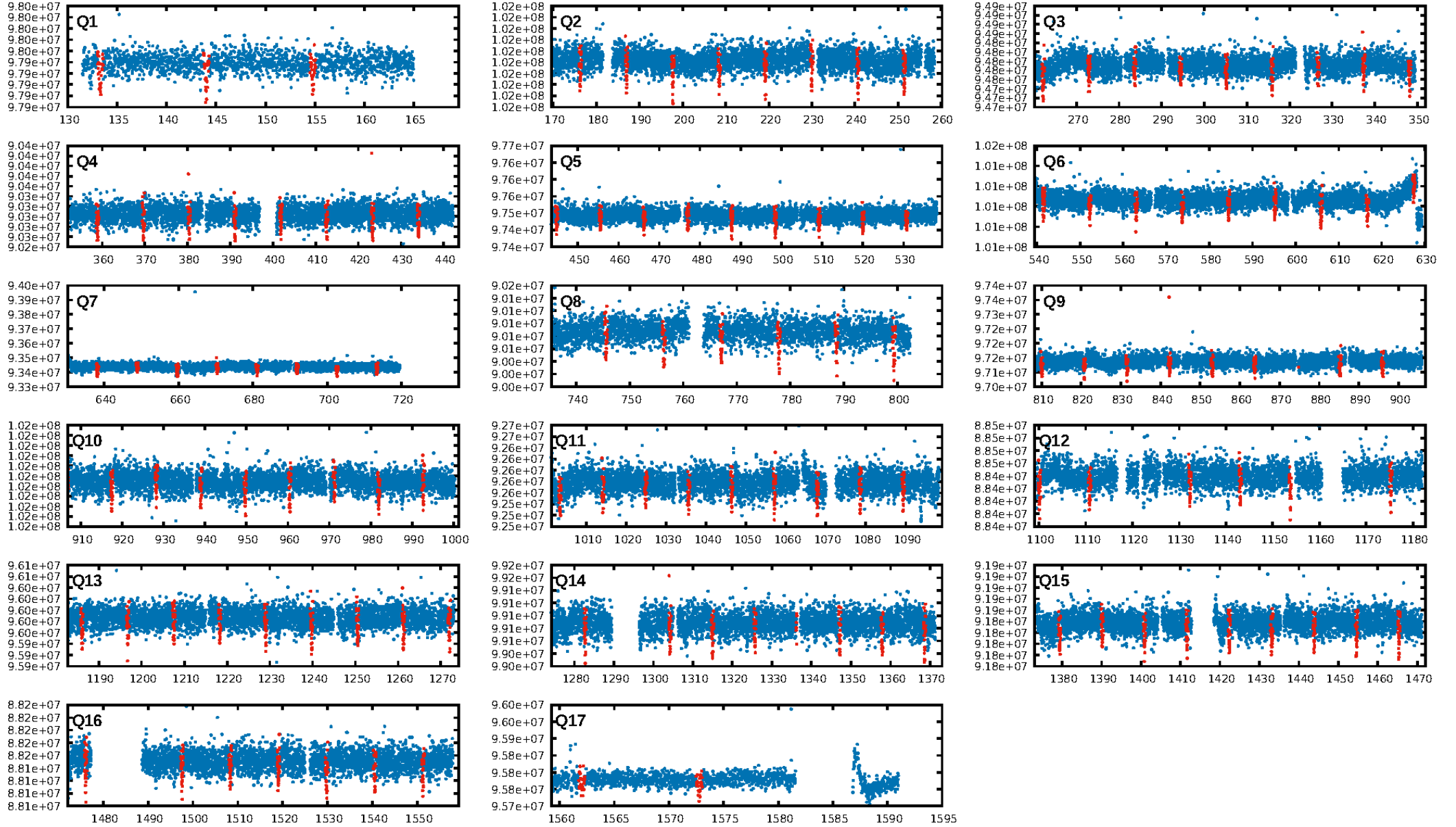
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [9.92σ]  
LongPeriod-sig: 100.0% [11.81σ]  
ModelChiSquare2-sig: 99.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.98 [118/121]  
GhostDiagnostic-chr: 7.519  
Centroid-sig: N/A  
Centroid-so: 0.183 arcsec [1.09σ]  
OotOffset-rm: 0.161 arcsec [1.27σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-rm: 0.245 arcsec [1.75σ]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

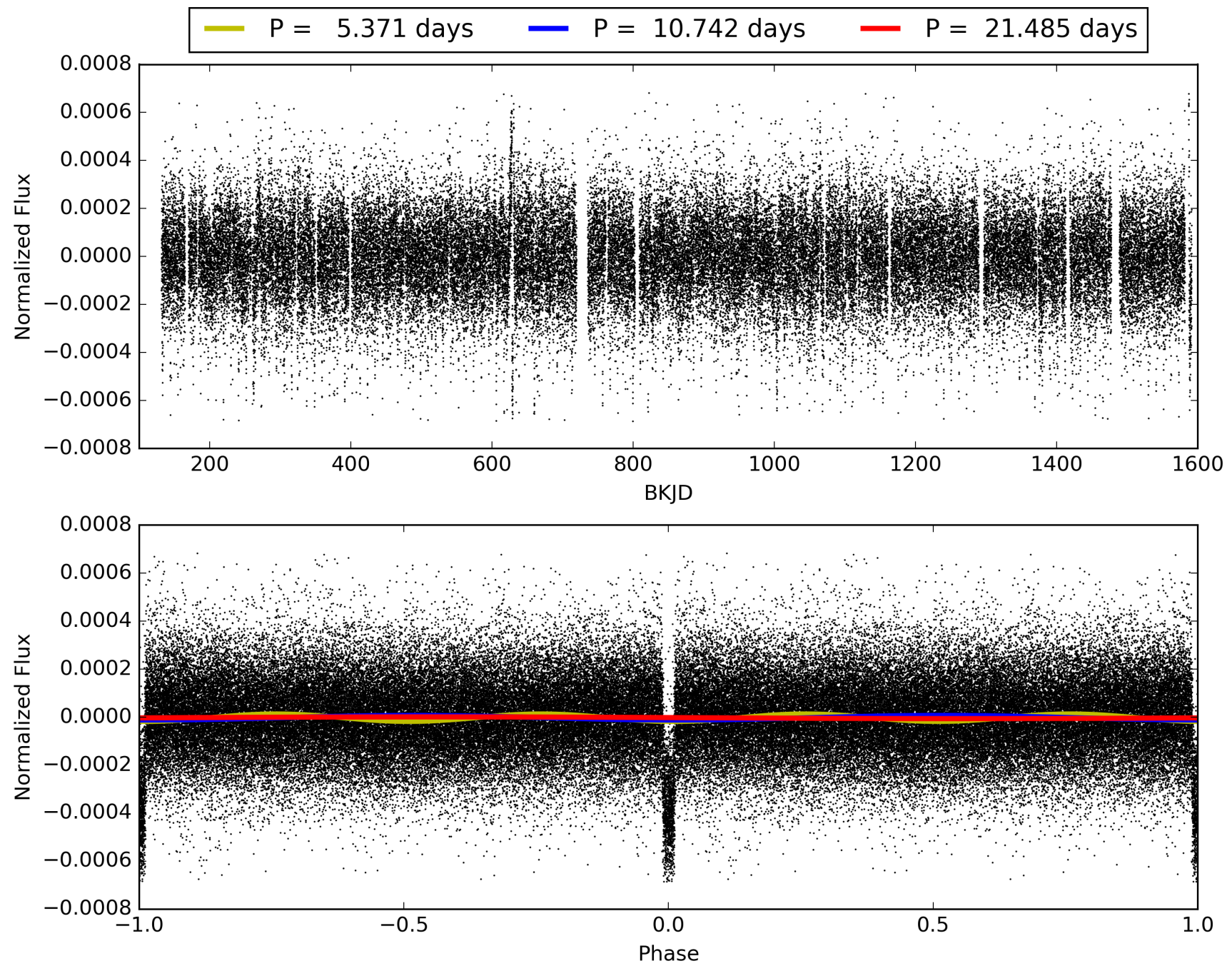
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 11:04:16 Z

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

# TCE 011512246-01, PDC Light Curves



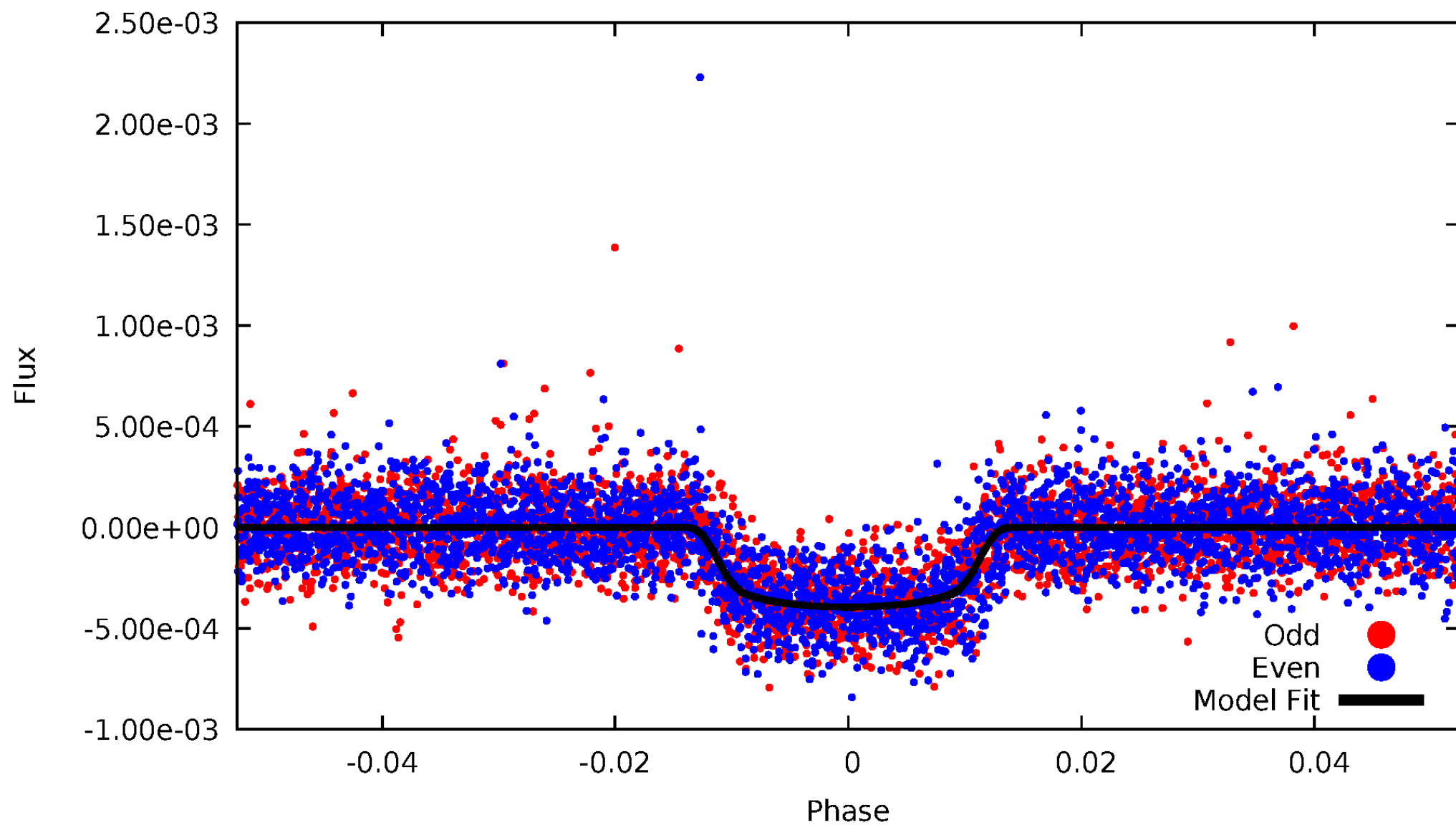
TCE 011512246-01





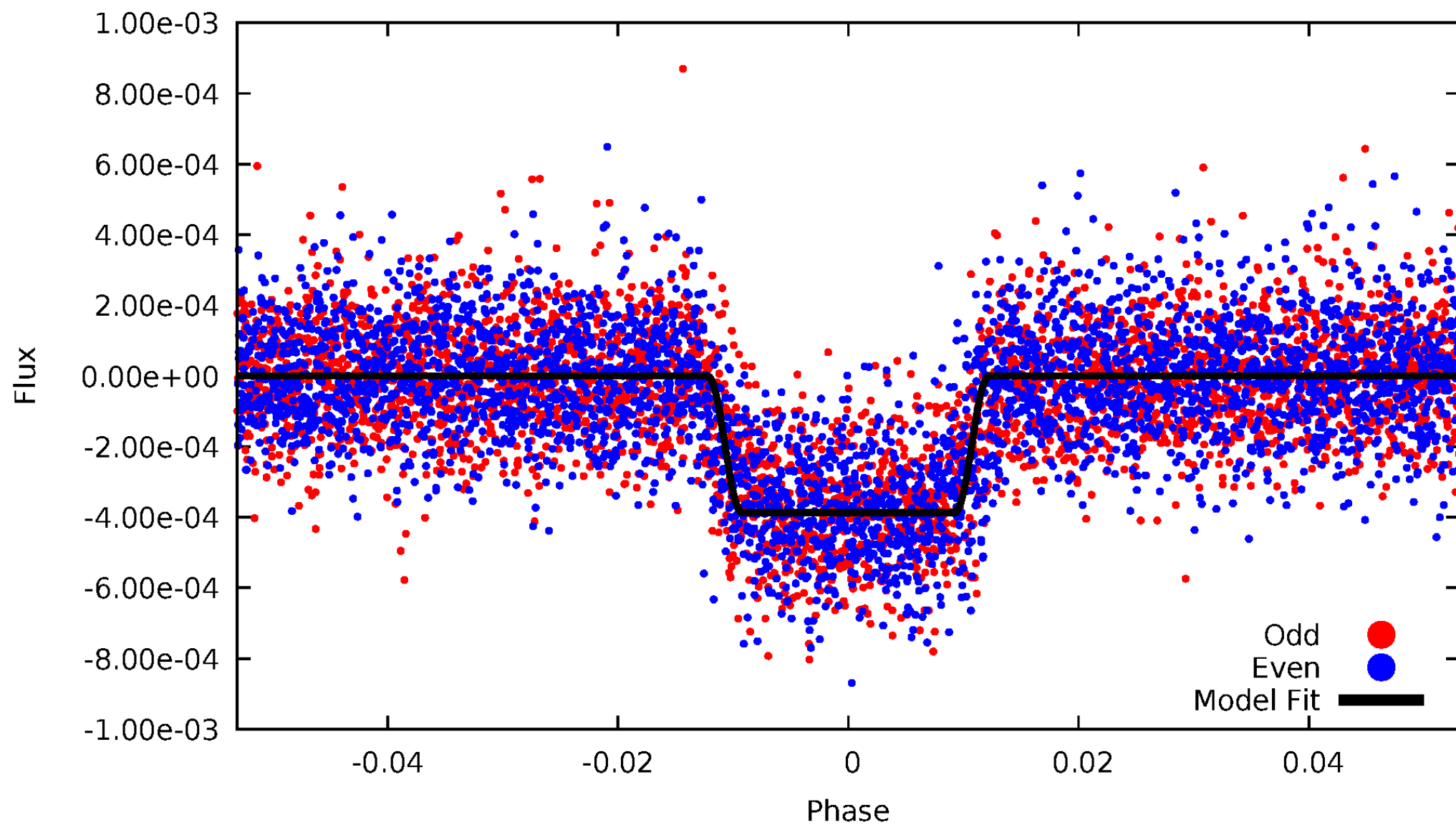
# DV Odd/Even

TCE 011512246-01



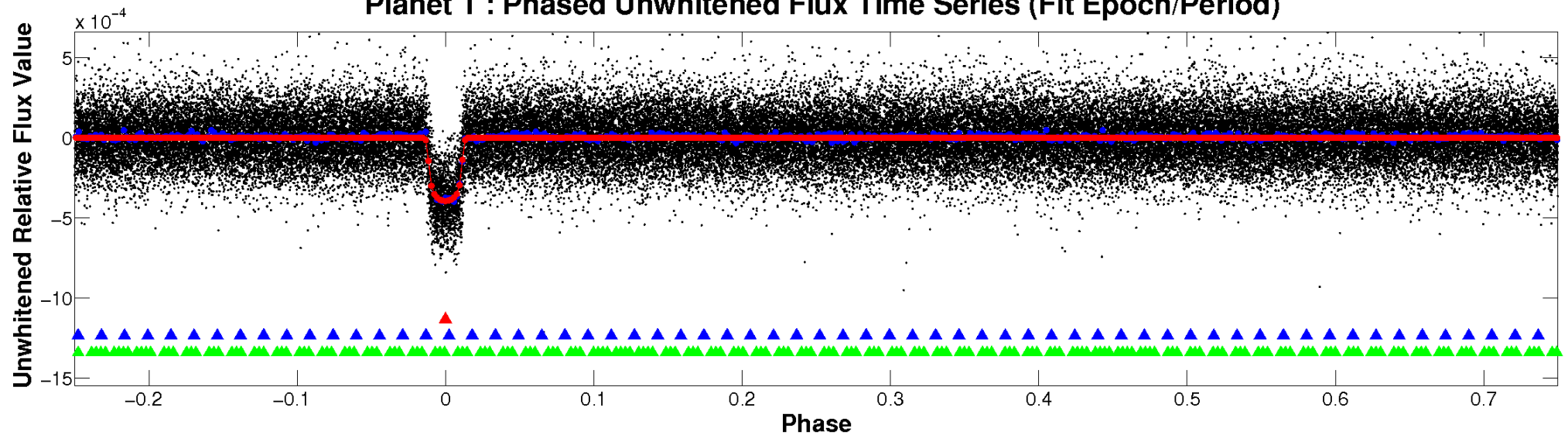
# ALT Odd/Even

TCE 011512246-01

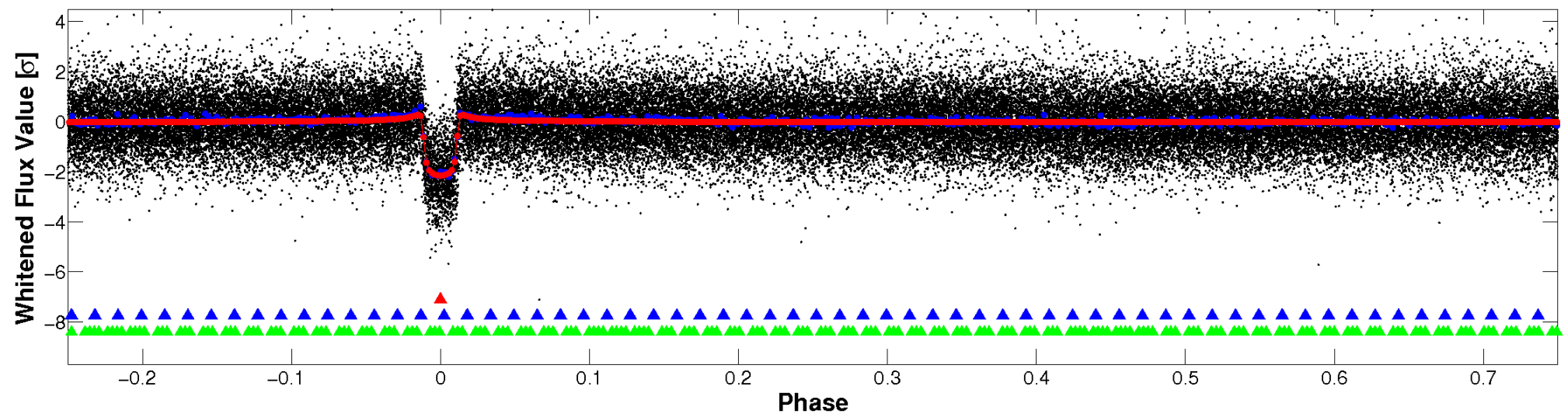


# Non-Whitened Vs. Whitened Light Curve

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

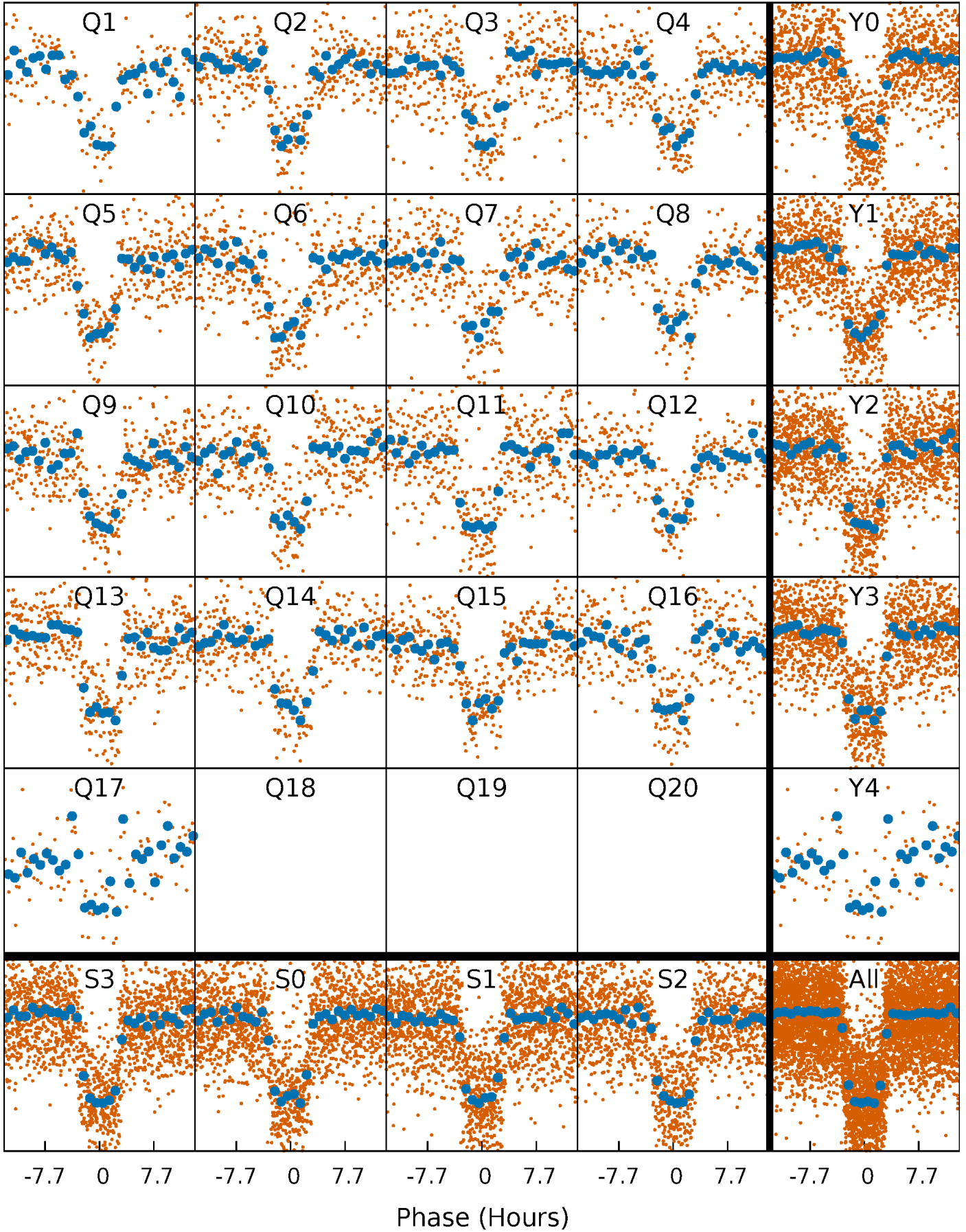


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

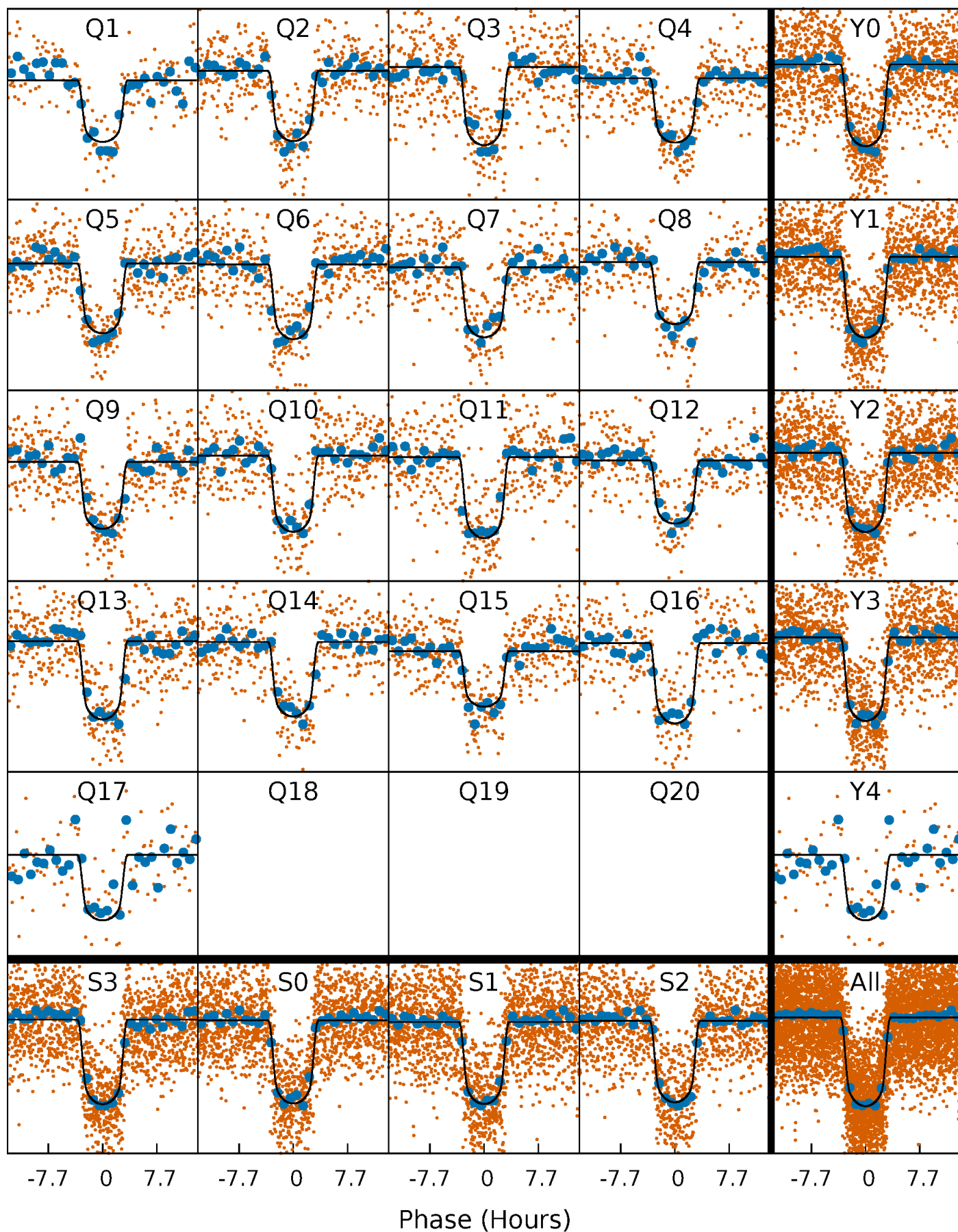
TCE 011512246-01 P= 10.742413 Days  $T_0=133.287813$  (BKJD)





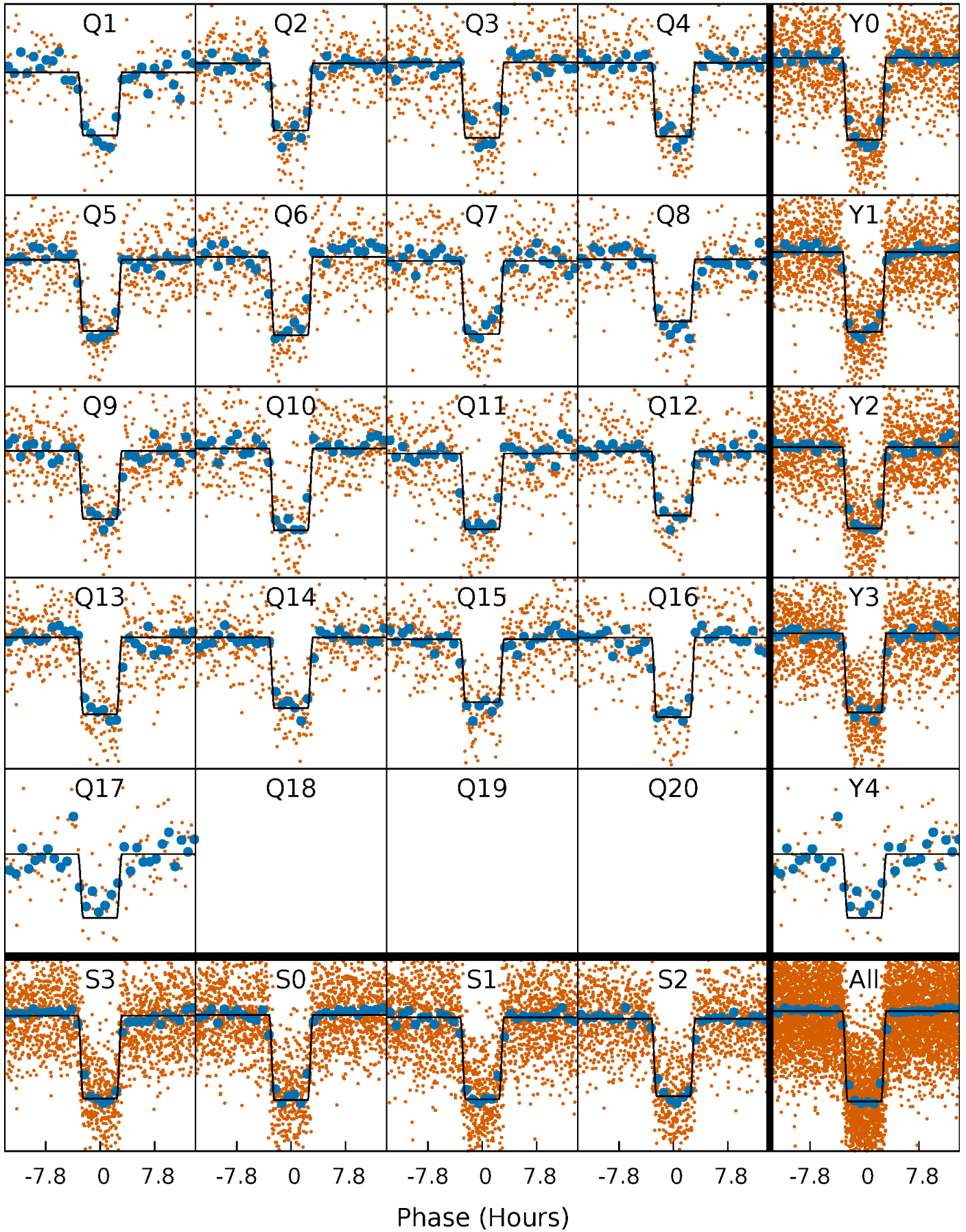
# DV Quarter-Phased Transit Curves

TCE 011512246-01 P= 10.742413 Days  $T_0=133.287813$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

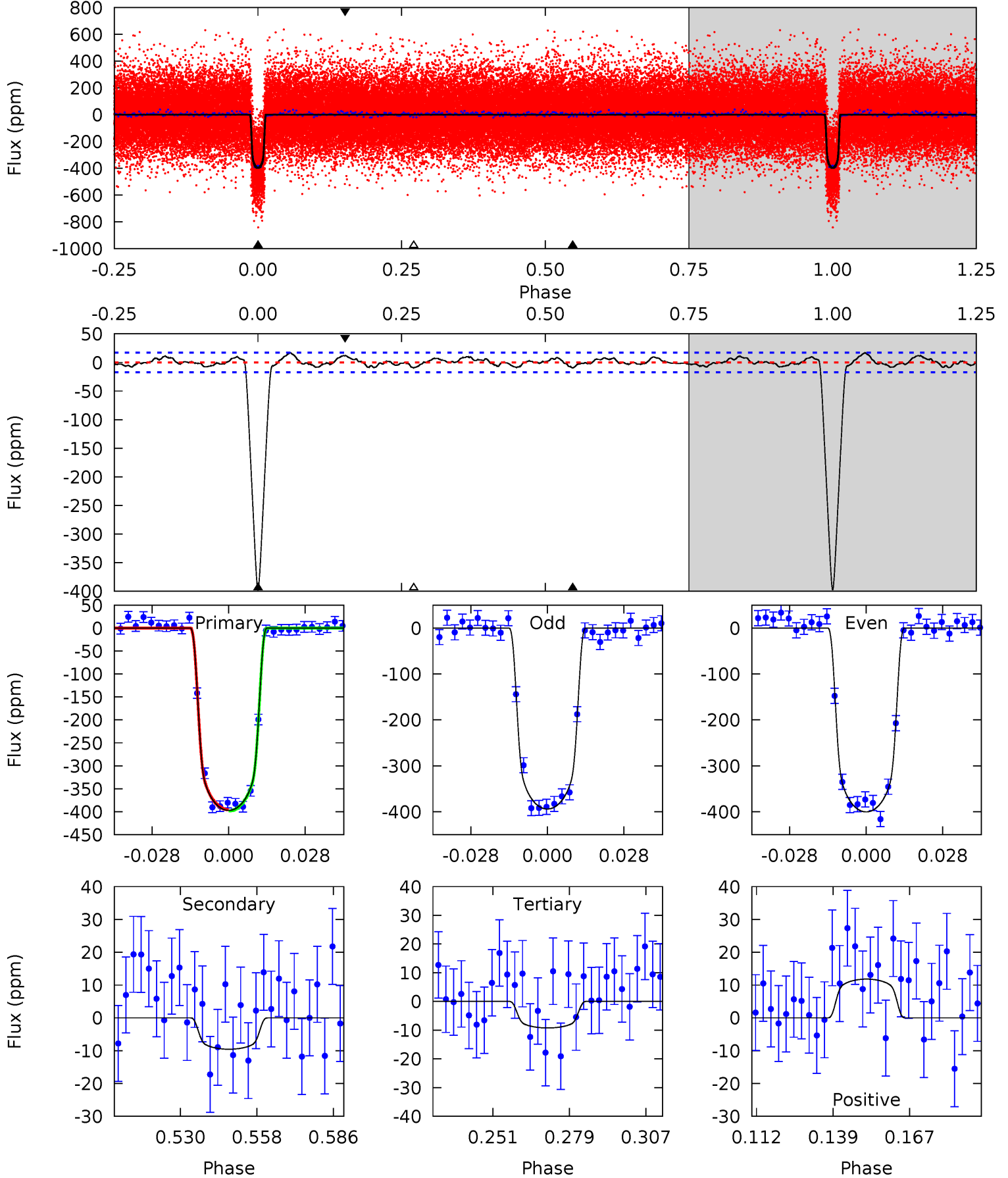
TCE 011512246-01 P= 10.742458 Days  $T_0=133.285120$  (BKJD)



# DV Model-Shift Uniqueness Test

011512246-01,  $P = 10.742413$  Days,  $E = 122.545400$  Days

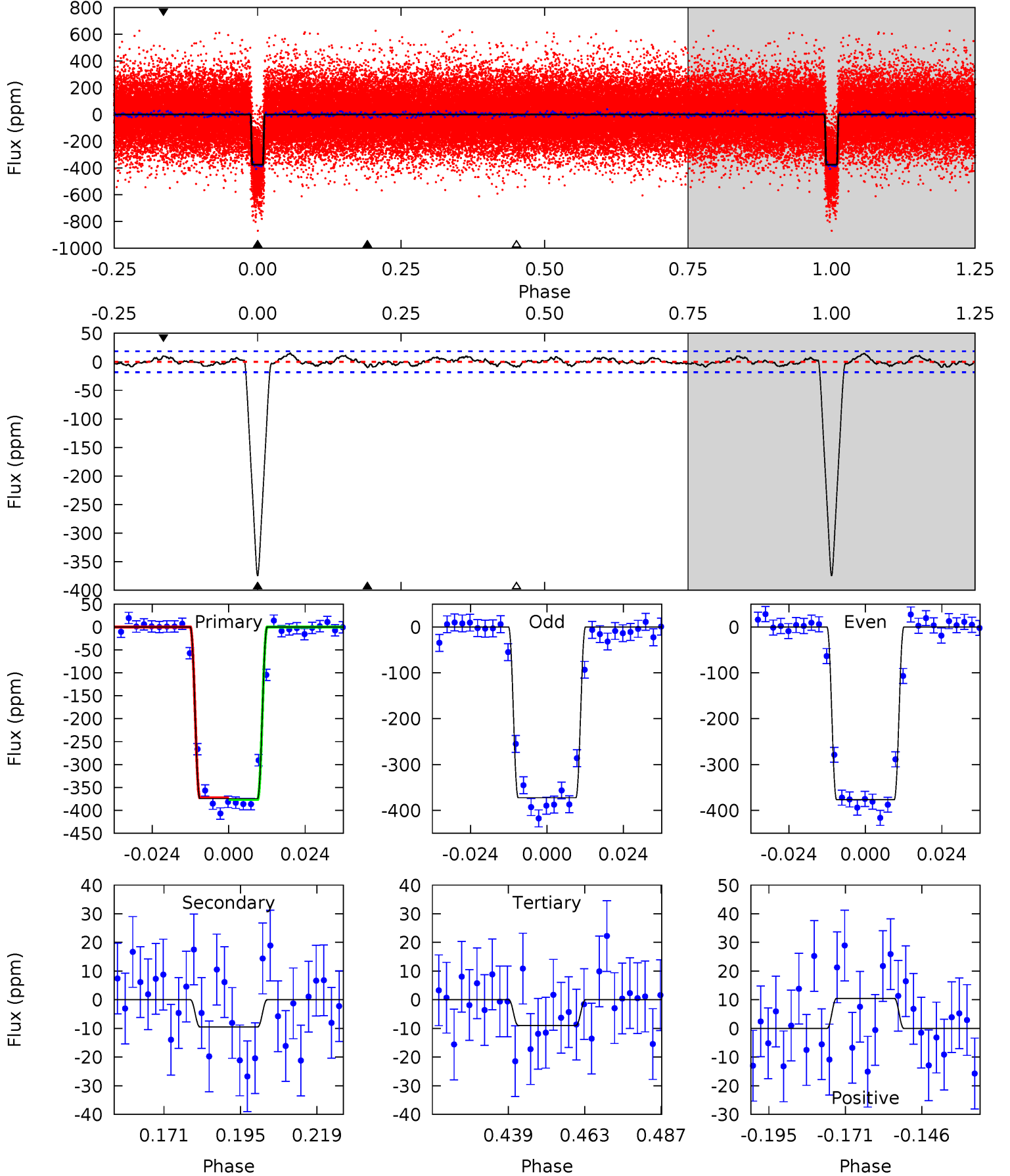
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
111.6	2.68	2.59	3.32	4.83	2.20	1.47	109.0	108.2	0.09	-0.63	0.88	0.99	0.04	0.38



# Alt Model-Shift Uniqueness Test

011512246-01,  $P = 10.742458$  Days,  $E = 122.542662$  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
99.0	2.51	2.37	2.77	4.85	2.25	1.22	96.7	96.3	0.14	-0.26	0.54	0.98	0.04	0.47





### Stellar Parameters For KIC 011512246

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$5761^{+86}_{-69}$	$4.091^{+0.018}_{-0.018}$	$0.060^{+0.200}_{-0.150}$	$1.518^{+0.092}_{-0.061}$	$1.036^{+0.101}_{-0.059}$	$0.417^{+0.031}_{-0.035}$
	+1%/-1%	+0%/-0%	+333%/-250%	+6%/-4%	+10%/-6%	+8%/-8%
Source	SPE72	AST8	SPE72	DSEP		

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

### Secondary Eclipse Parameters for KIC 011512246-01 / KOI 0168.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-10 \pm 4$	$3.69^{+0.13}_{-0.11}$	$1409^{+22}_{-22}$	$2836^{+147}_{-184}$	$3.641^{+1.369}_{-1.309}$
Alt.	$-9 \pm 4$	$3.26^{+0.13}_{-0.11}$	$1410^{+23}_{-21}$	$2932^{+155}_{-221}$	$4.565^{+1.821}_{-1.869}$

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

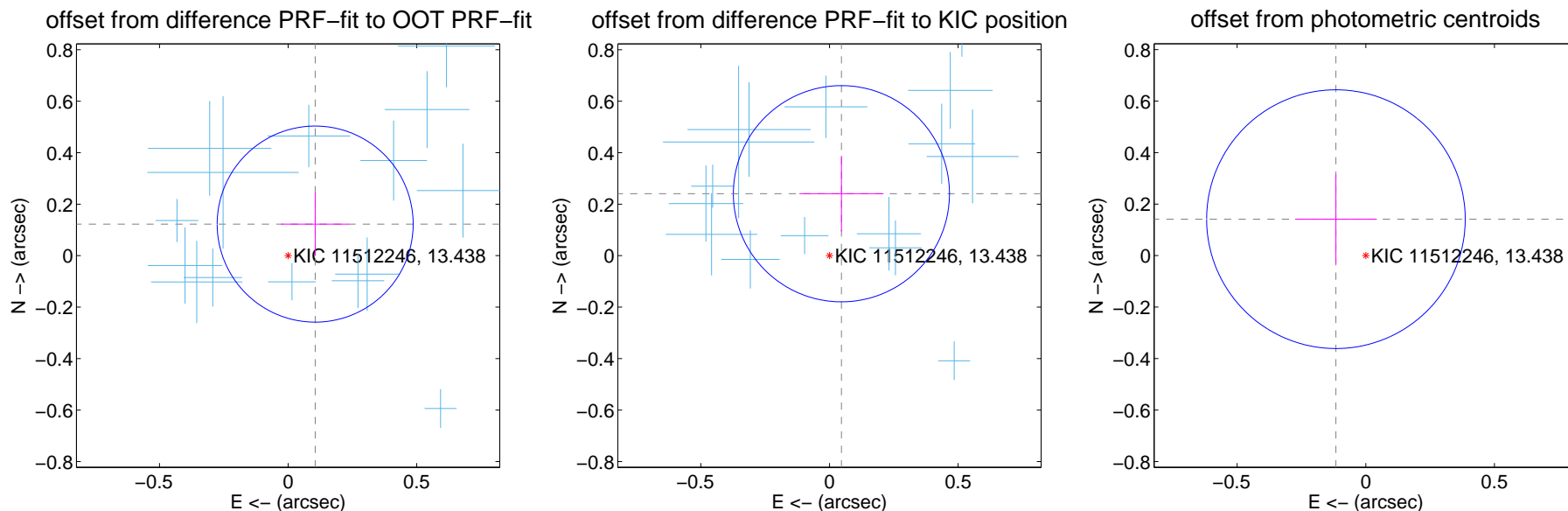
## DV Centroid Data

Supplemental centroid analysis for 011512246-01. Kepler magnitude: 13.44. Transit SNR 72.26

There are 17 quarters with good PRF difference image offsets

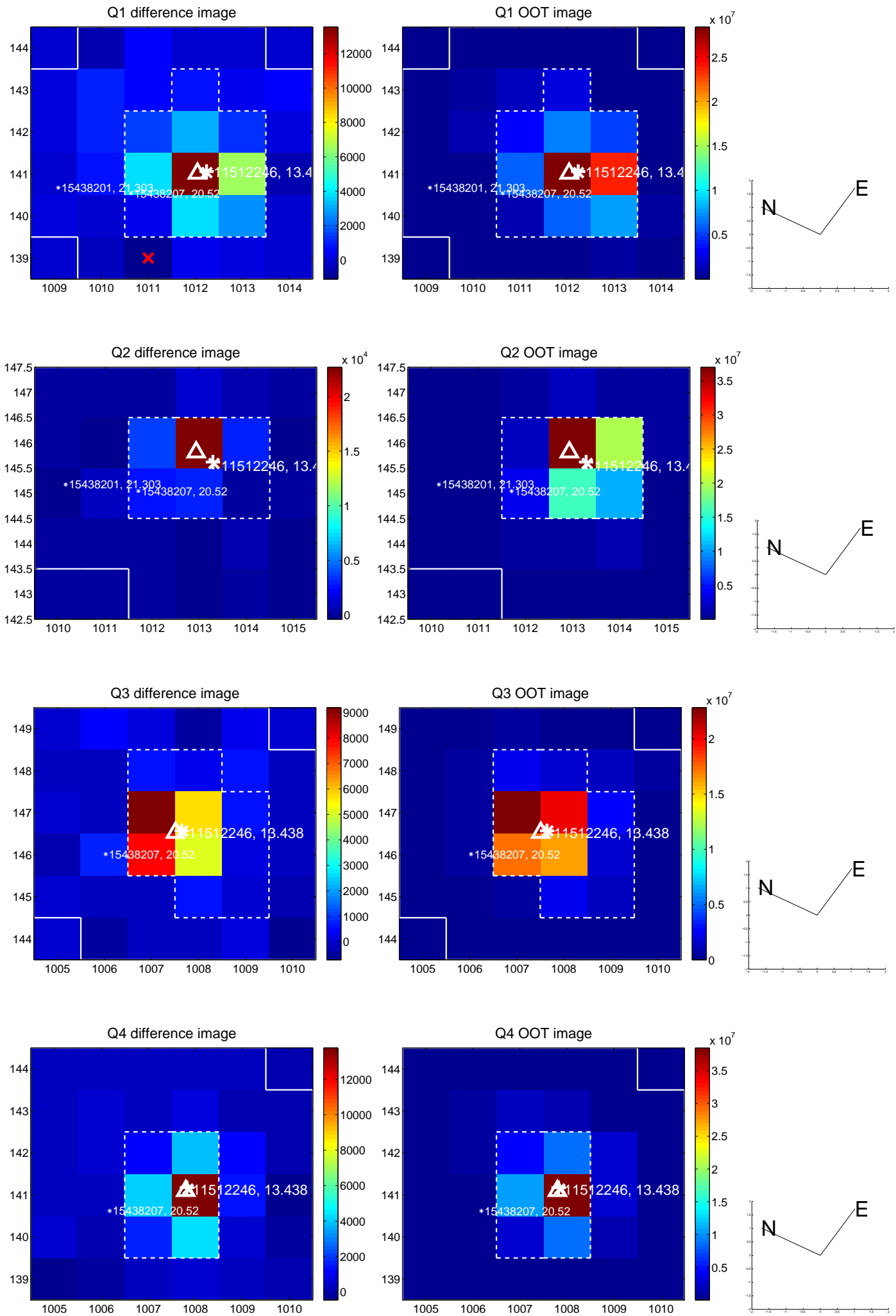
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.161 \pm 0.127$	1.27	$-0.105 \pm 0.131$	$0.123 \pm 0.124$
PRF-fit source offset from KIC position	$0.245 \pm 0.140$	1.75	$-0.046 \pm 0.164$	$0.241 \pm 0.147$
photometric centroid source offset	$0.18 \pm 0.17$	1.09	$0.12 \pm 0.16$	$0.14 \pm 0.17$

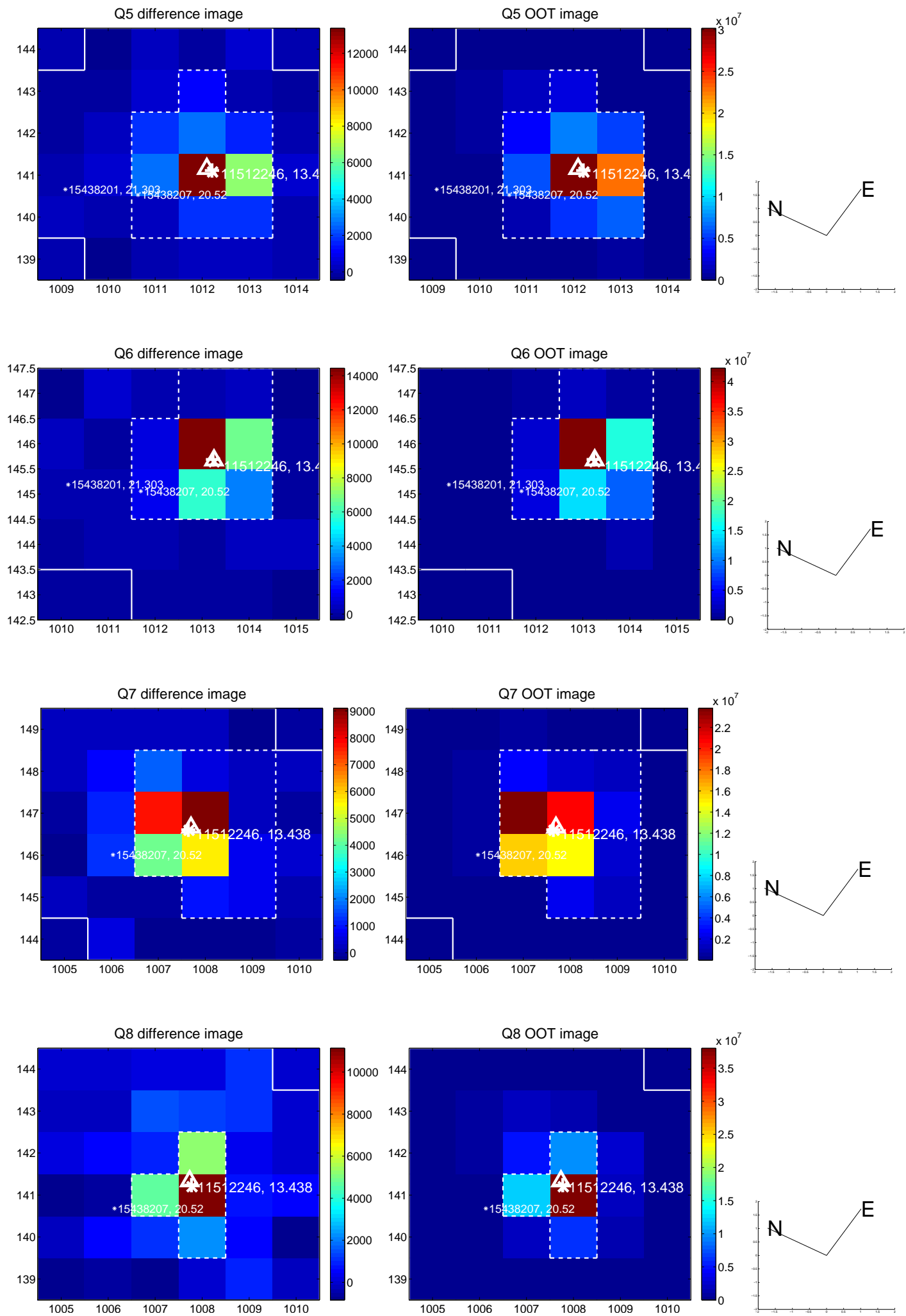


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

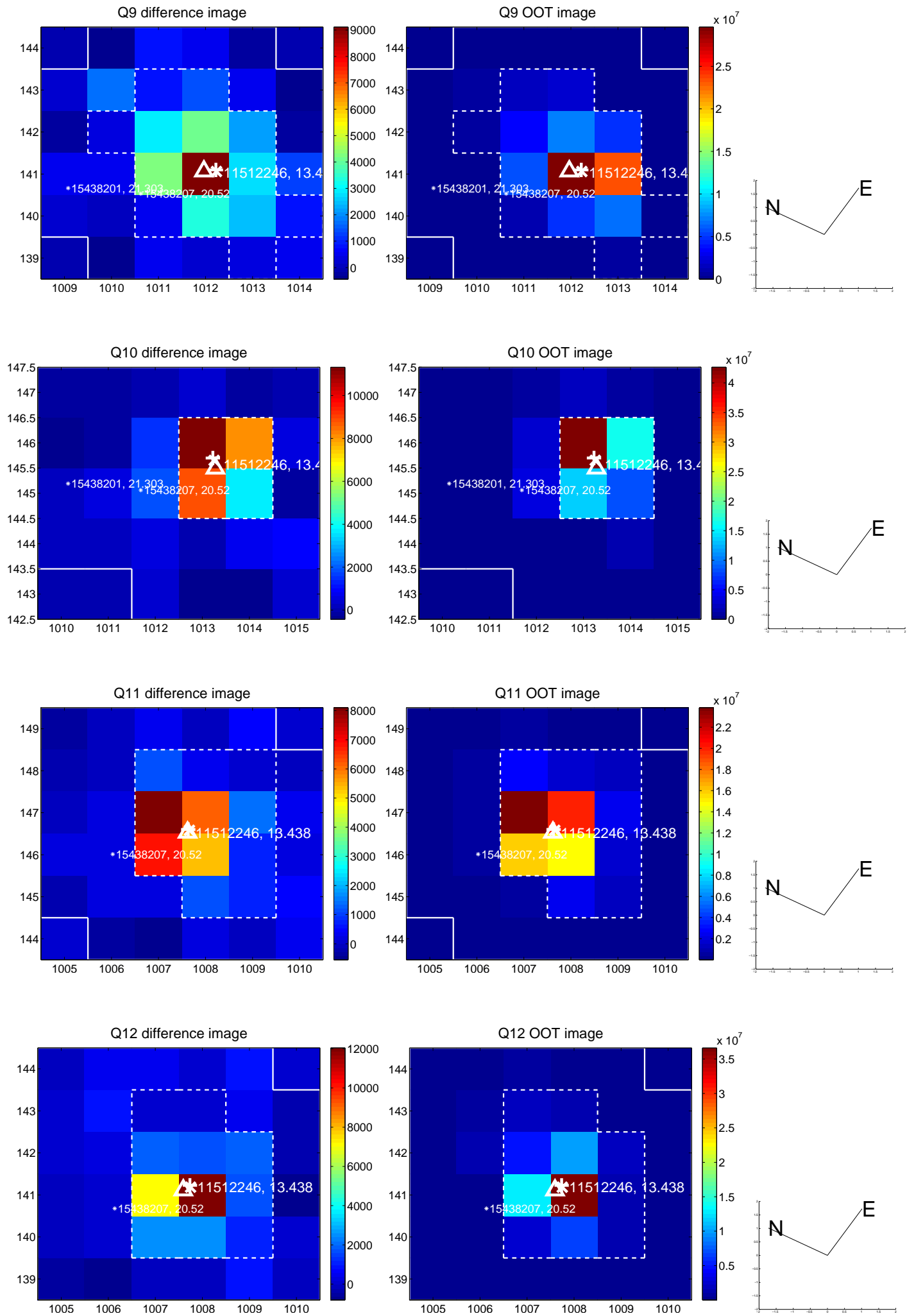


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

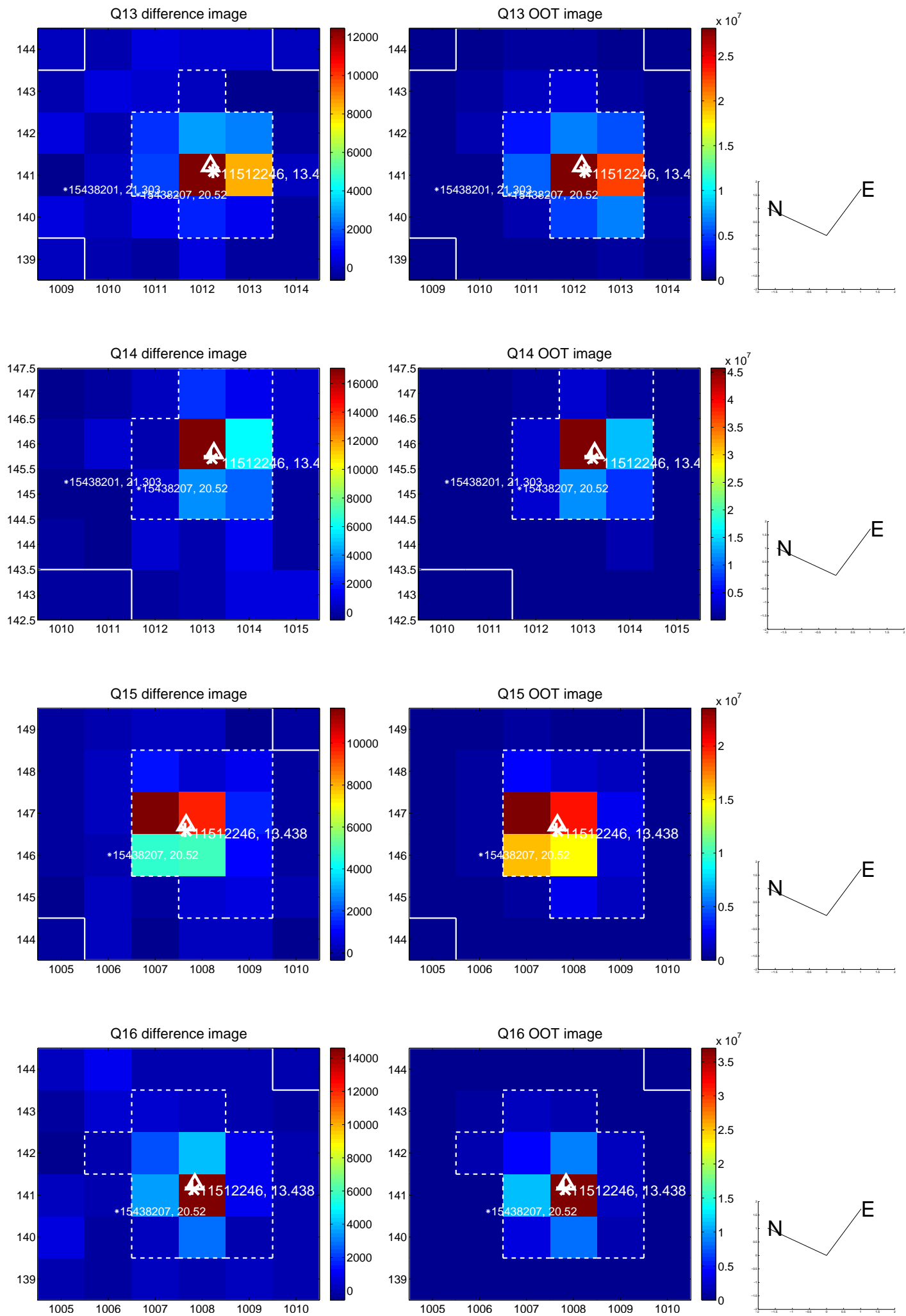




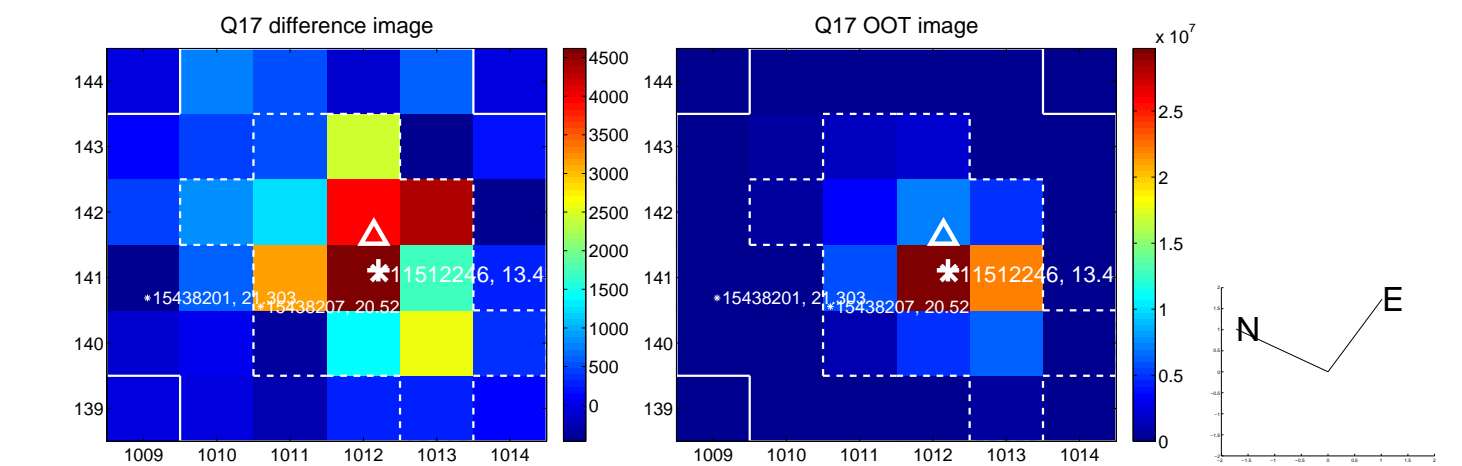
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



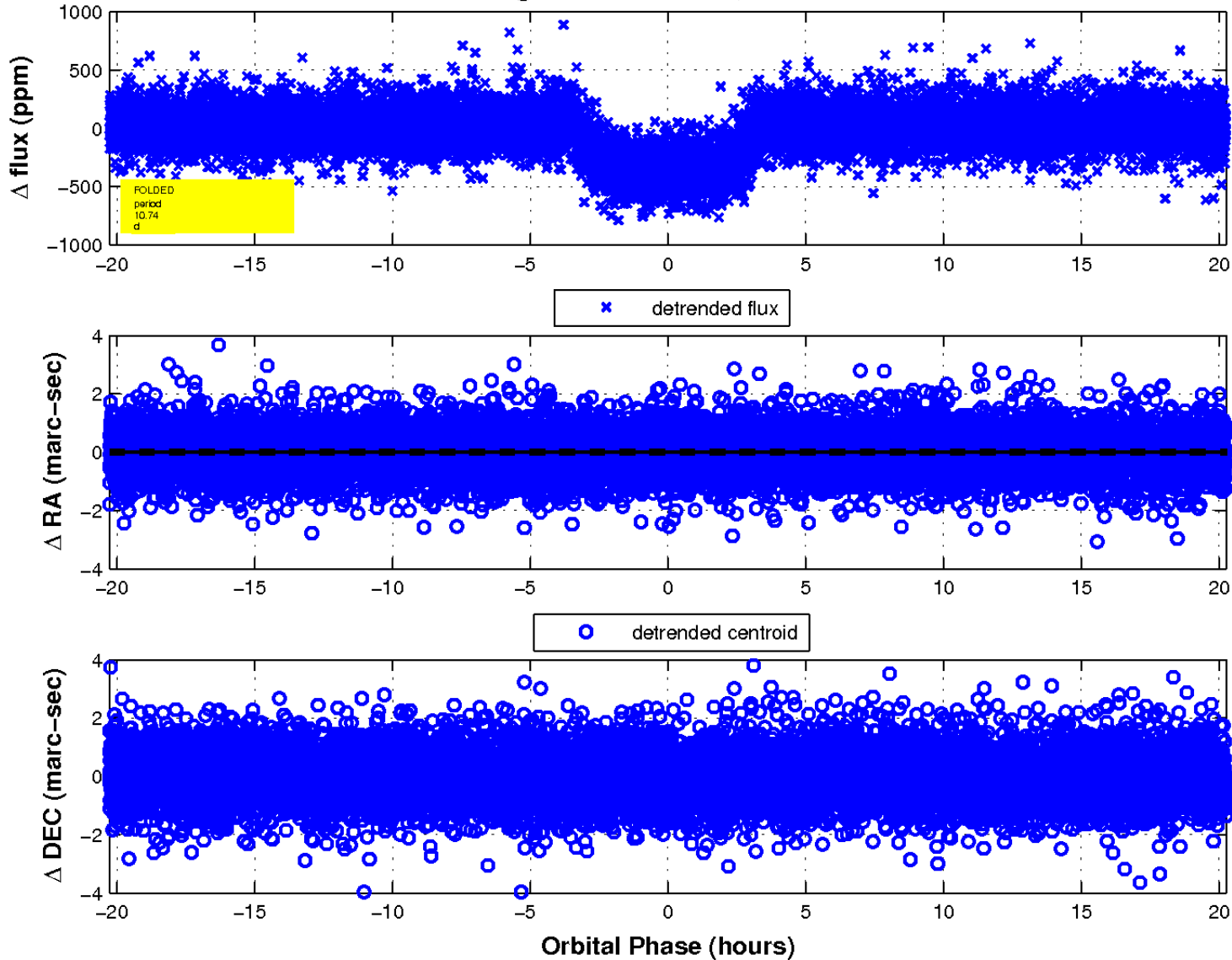
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



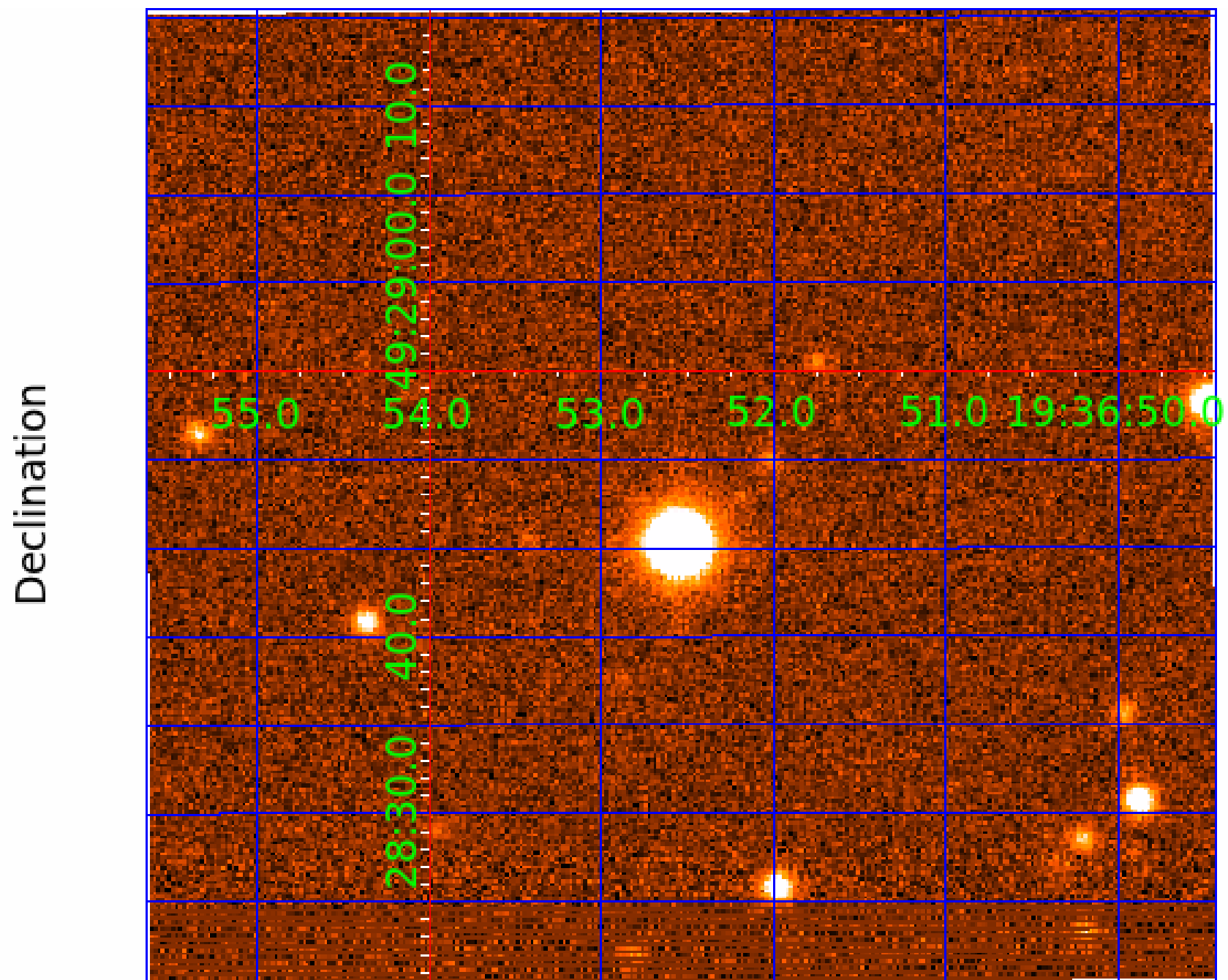
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 3



UKIRT Image





# KIC 011512246

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011512246-01	OBS	0168.01	10.742413	133.287813	395.1	6.758	64.2	72.3	1.52	5761	3.69	244.49
011512246-02	OBS	0168.02	15.274418	132.304221	200.9	6.260	31.1	32.1	1.52	5761	2.43	152.91
011512246-03	OBS	0168.03	7.107034	138.322686	105.8	5.630	21.7	23.4	1.52	5761	1.88	424.11

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011512246-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
011512246-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT
011512246-03	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

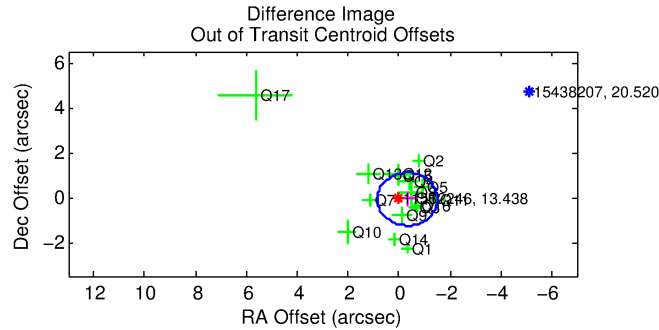
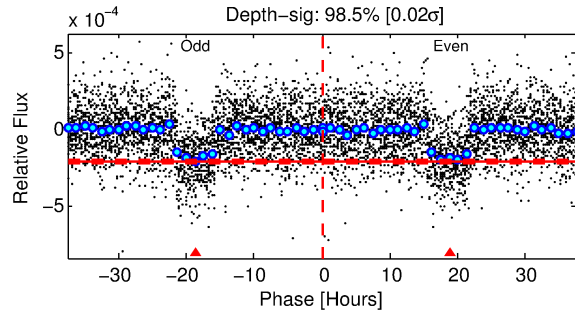
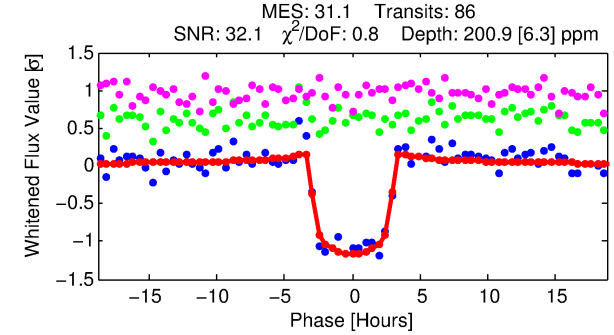
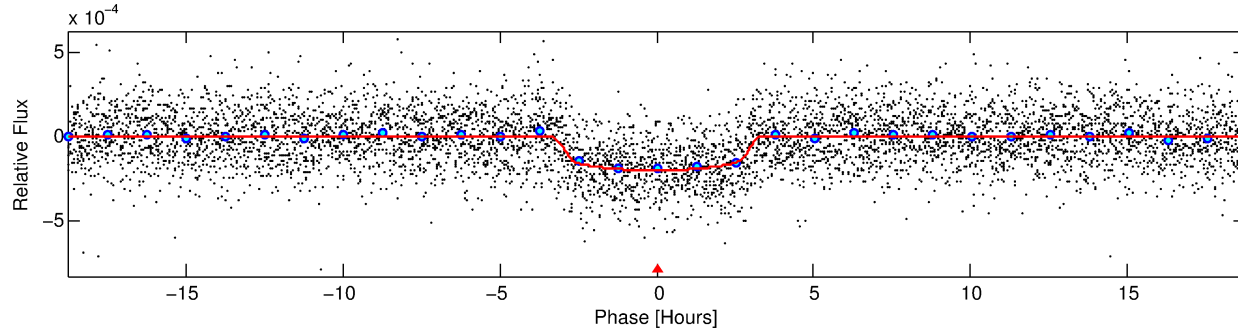
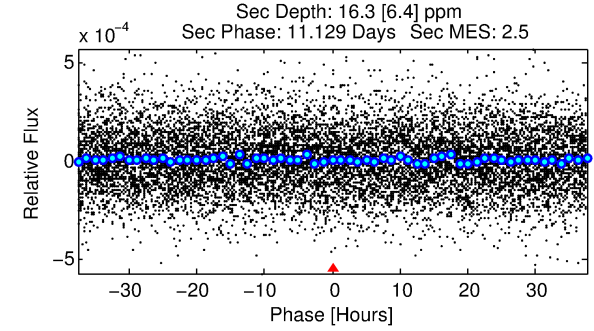
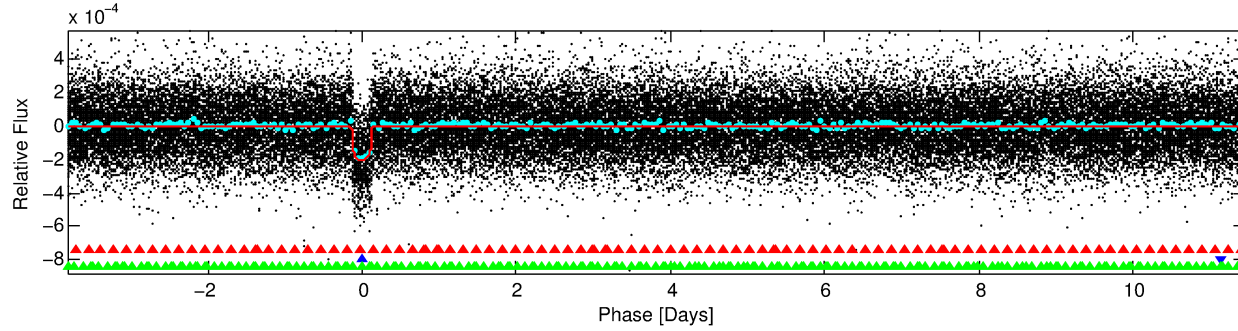
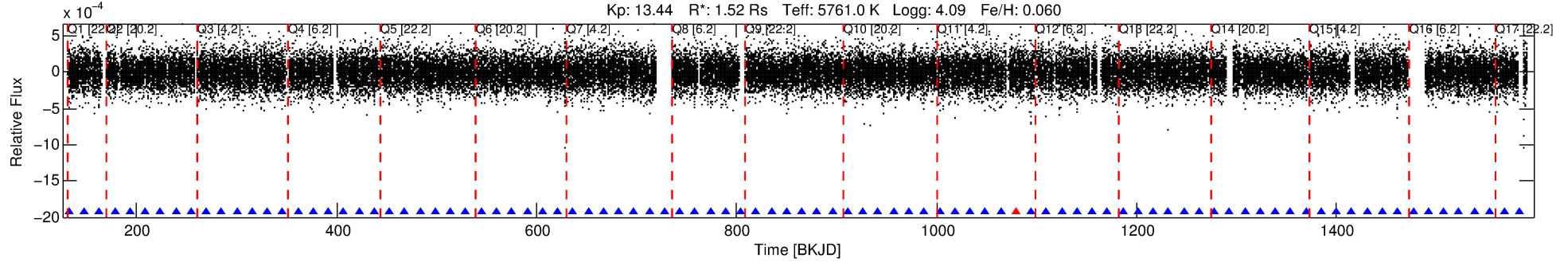
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 011512246-02

No Significant Match Found

# DV One-Page Summary

KIC: 11512246 Candidate: 2 of 3 Period: 15.274 d  
KOI: K00168.02 Name: Kepler-23d Corr: 0.992



## DV Fit Results:

Period = 15.27442 [0.00006] d  
Epoch = 132.3042 [0.0034] BKJD  
Rp/R\* = 0.0147 [0.0024]  
a/R\* = 10.92 [8.10]  
b = 0.83 [0.28]  
Seff = 152.91 [11.81]  
Teq = 897 [17] K  
Rp = 2.43 [0.43] Re  
a = 0.1220 [0.0052] AU  
Ag = 22.59 [11.67] [1.85σ]  
Teffp = 3022 [391] K [5.43σ]

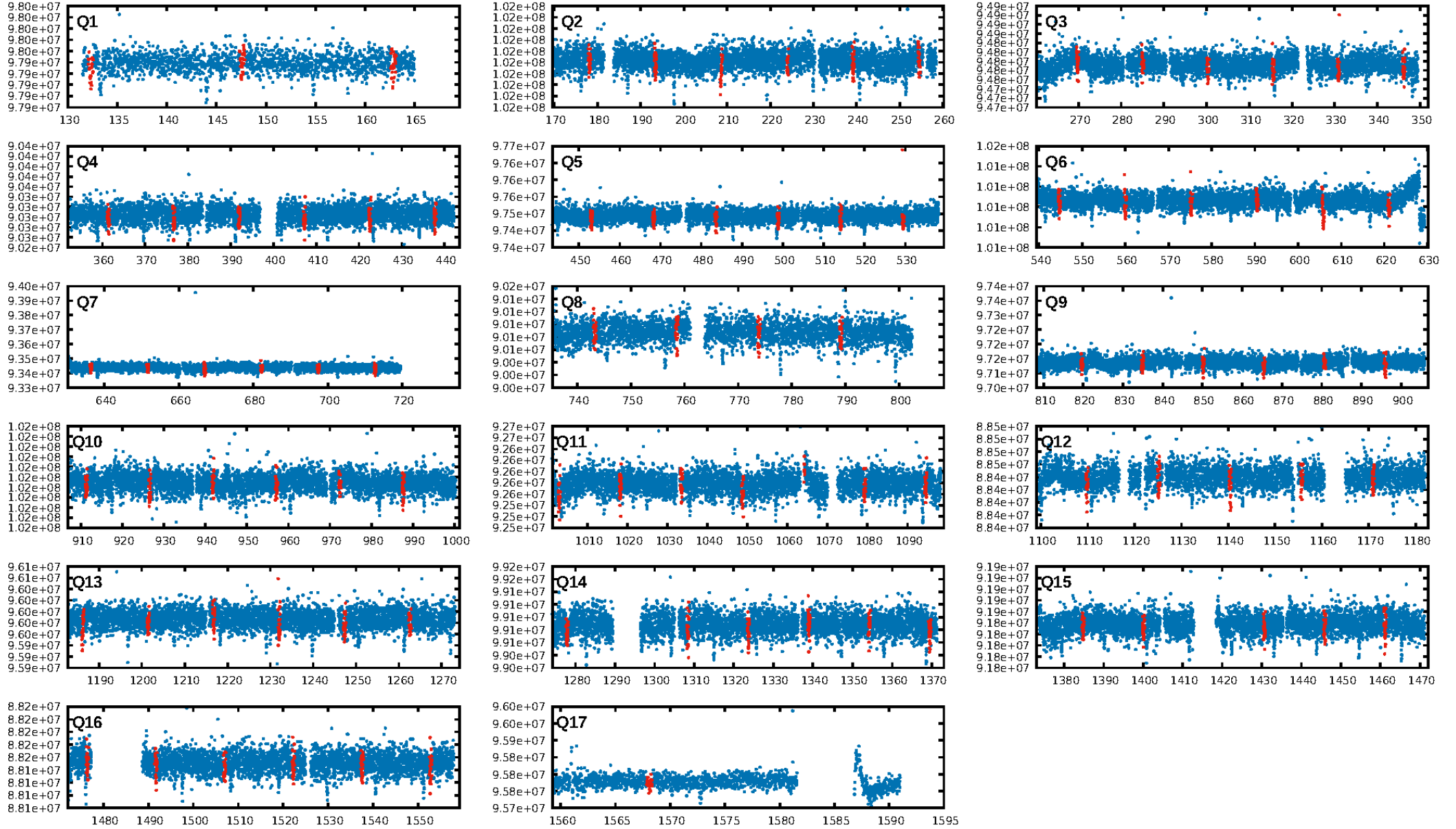
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [11.81σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 96.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.74e-202  
RollingBand-fgt: 0.99 [81/82]  
GhostDiagnostic-chr: 5.334  
Centroid-sig: N/A  
Centroid-so: 0.251 arcsec [0.63σ]  
OotOffset-rm: 0.336 arcsec [0.85σ]  
KicOffset-rm: 0.262 arcsec [0.78σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.94 [16/17]  
DiffImageOverlap-fno: 1.00 [17/17]

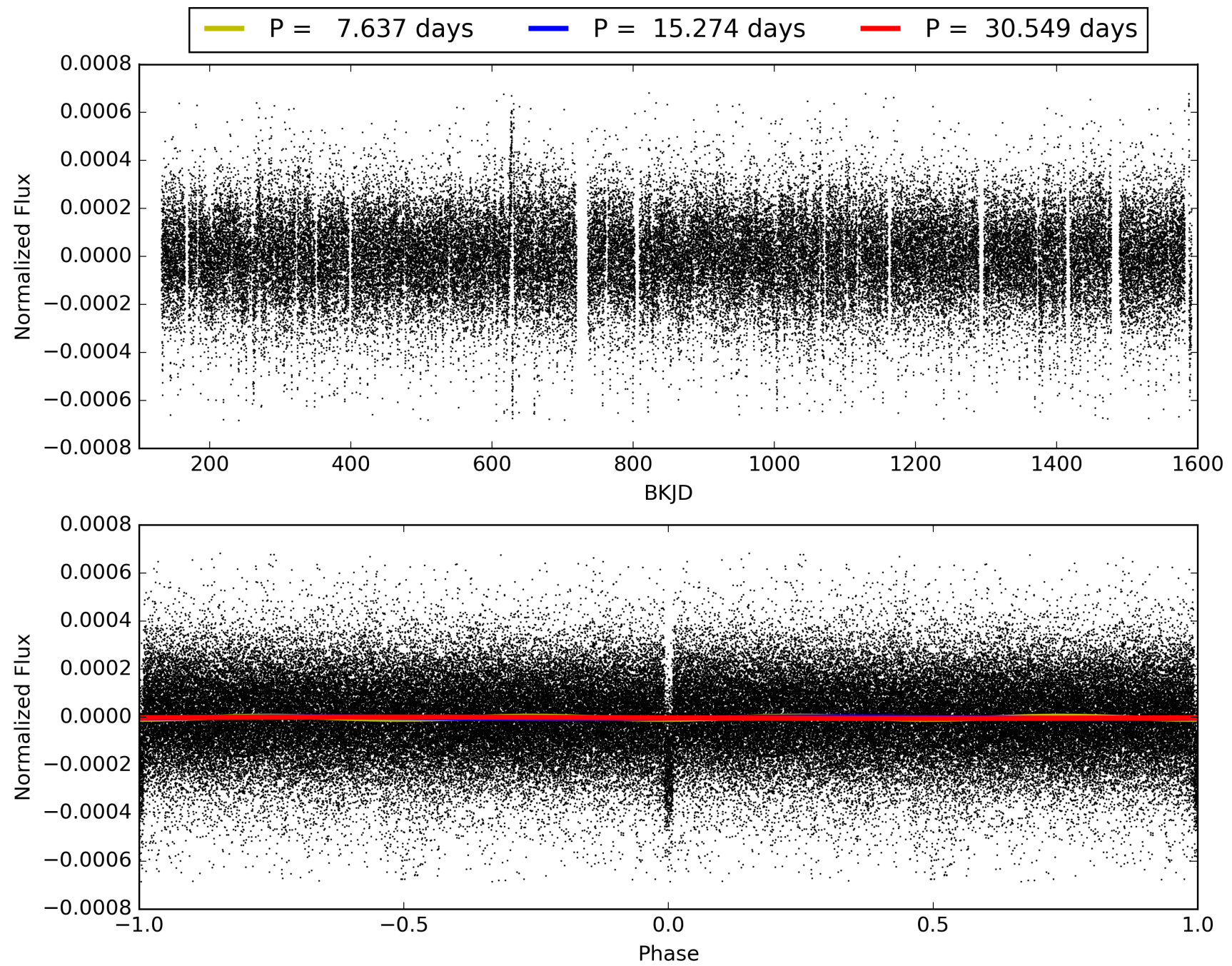
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 11:04:24 Z

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

# TCE 011512246-02, PDC Light Curves

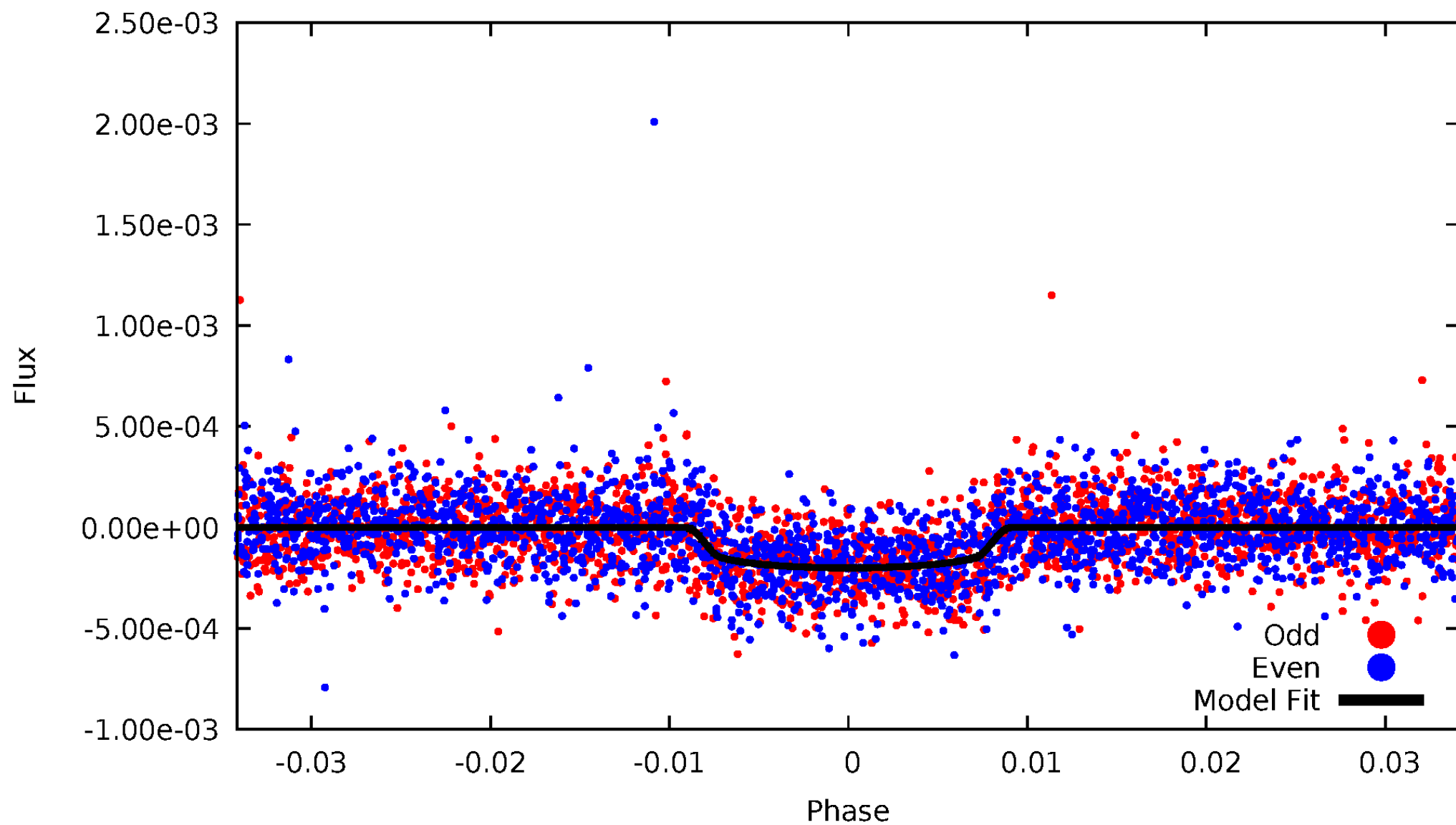


TCE 011512246-02



# DV Odd/Even

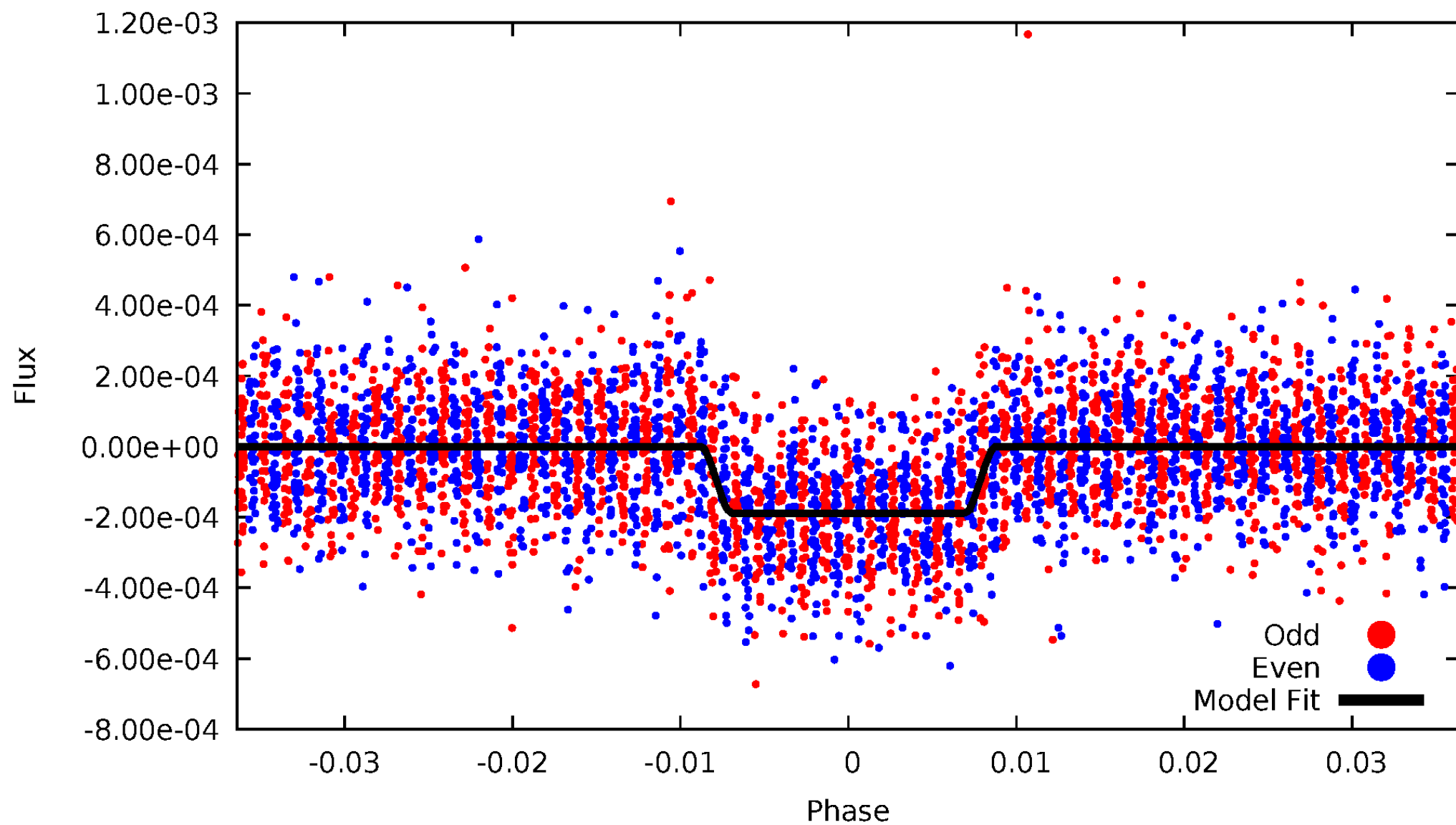
TCE 011512246-02





# ALT Odd/Even

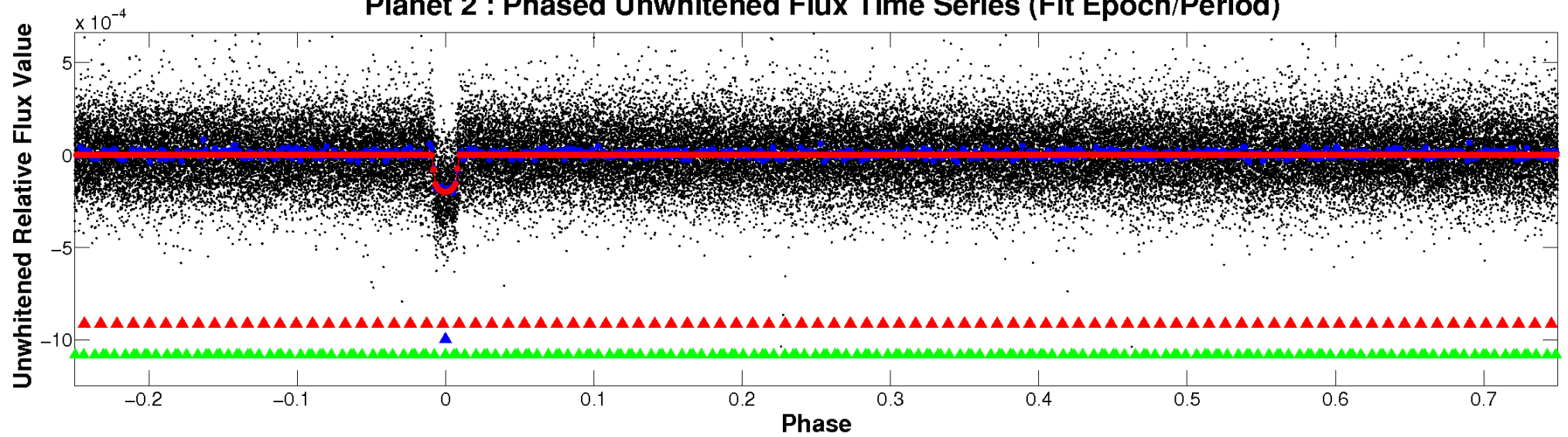
TCE 011512246-02



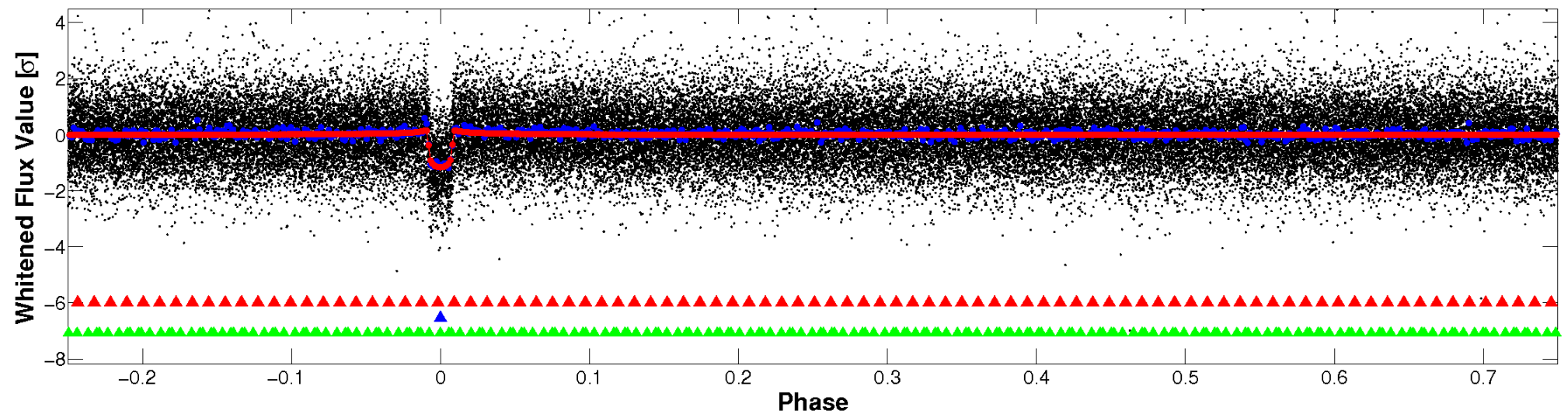


# Non-Whitened Vs. Whitened Light Curve

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

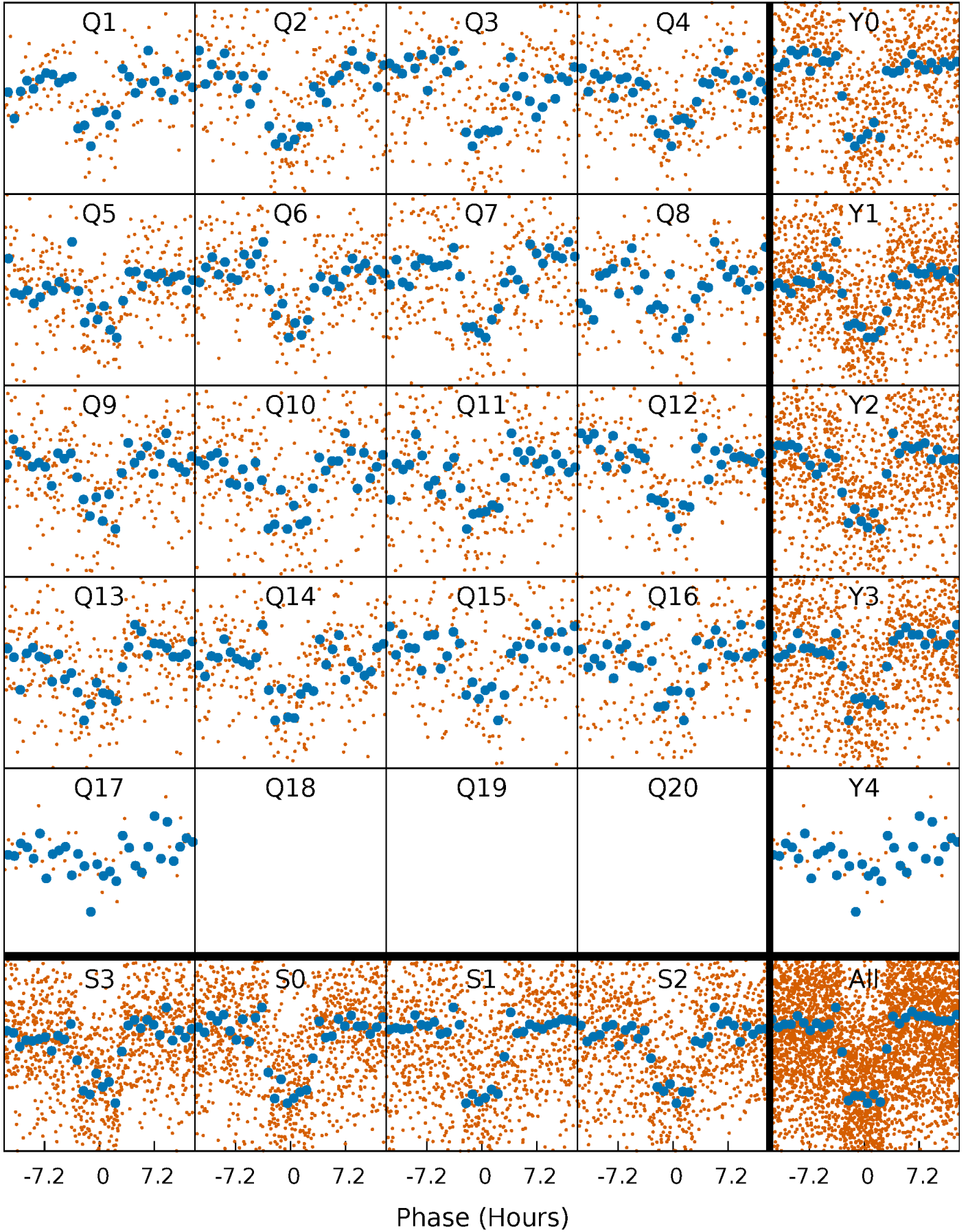


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



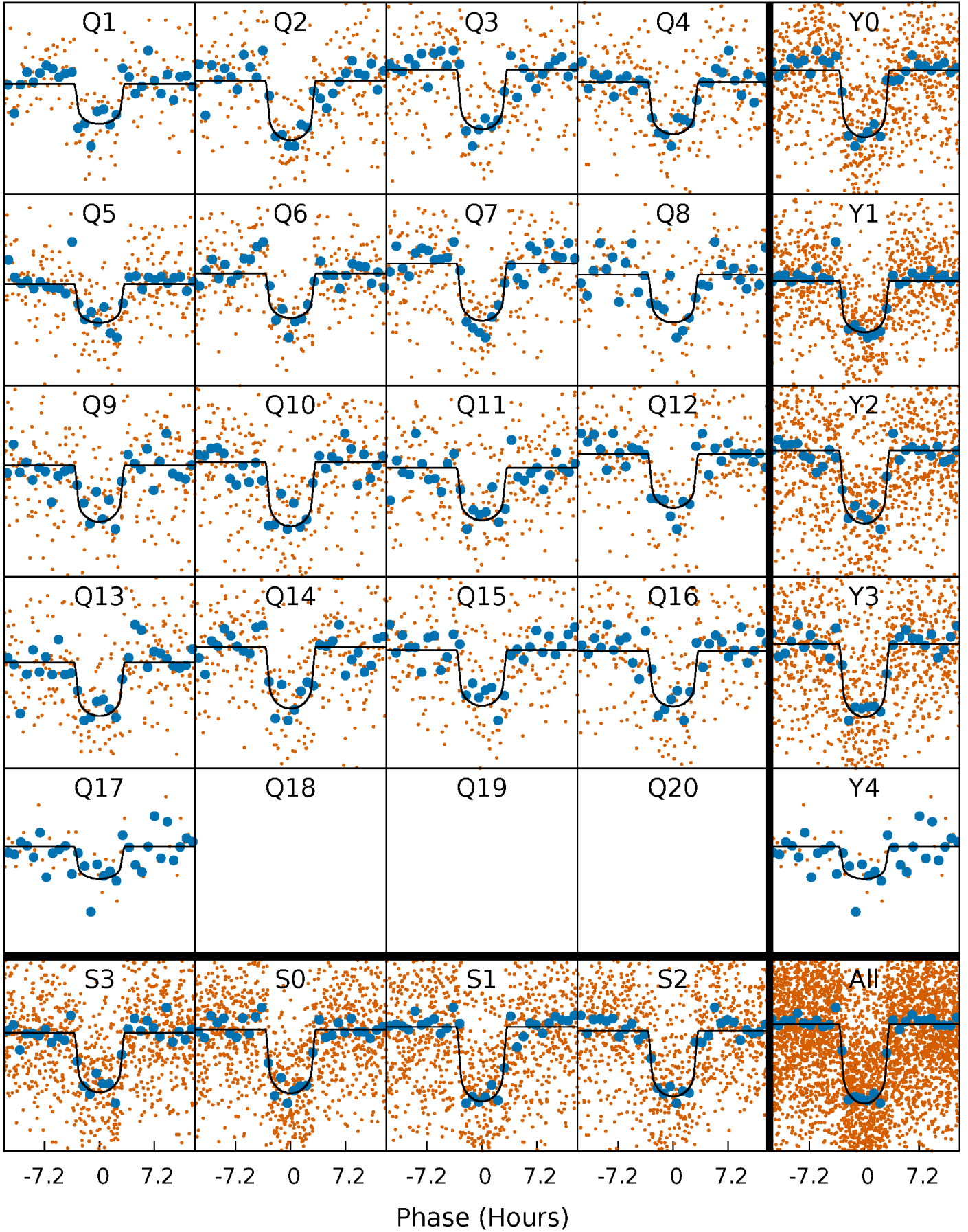
# PDC Quarter-Phased Transit Curves

TCE 011512246-02   P= 15.274418 Days    $T_0=132.304221$  (BKJD)



# DV Quarter-Phased Transit Curves

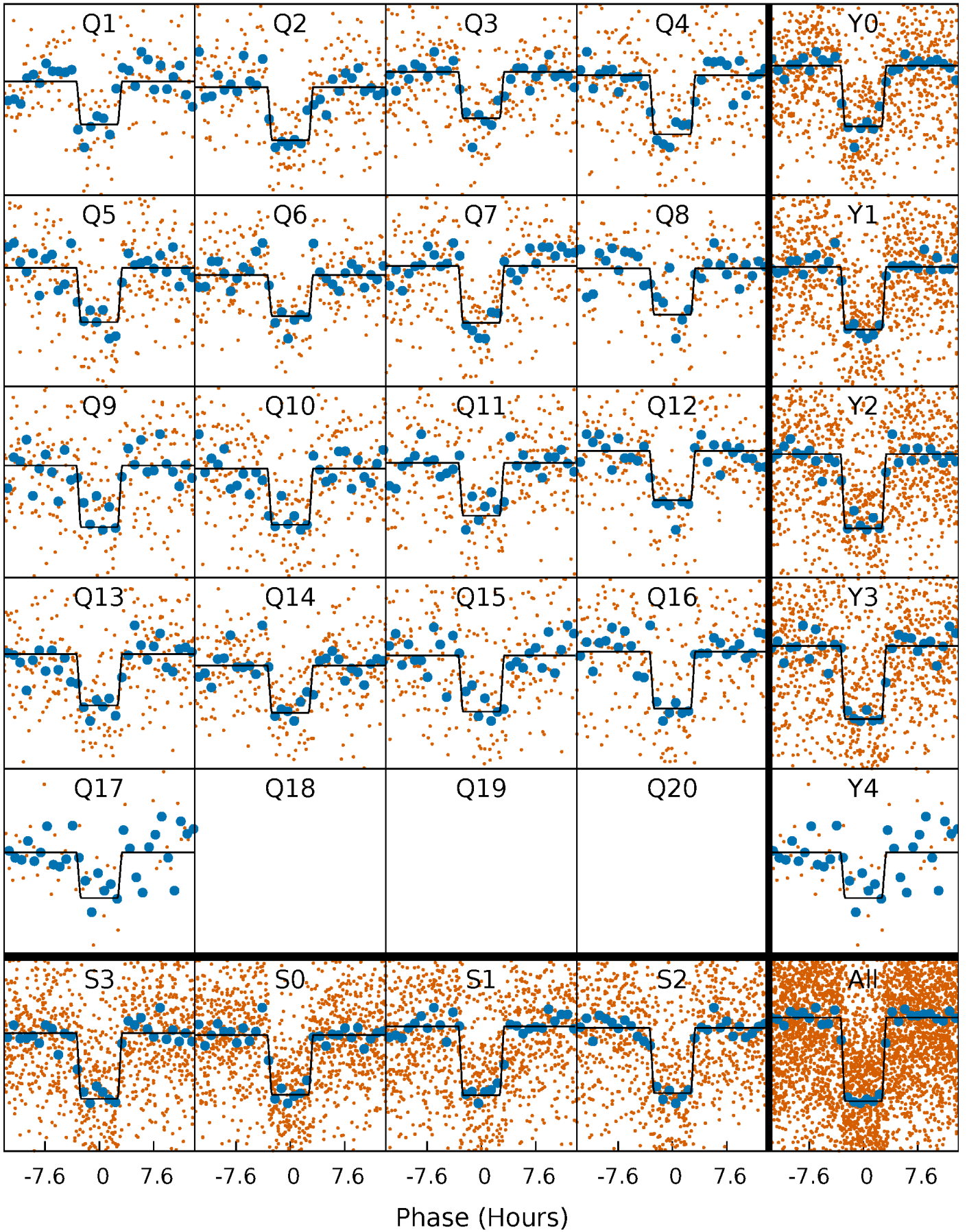
TCE 011512246-02 P= 15.274418 Days  $T_0=132.304221$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

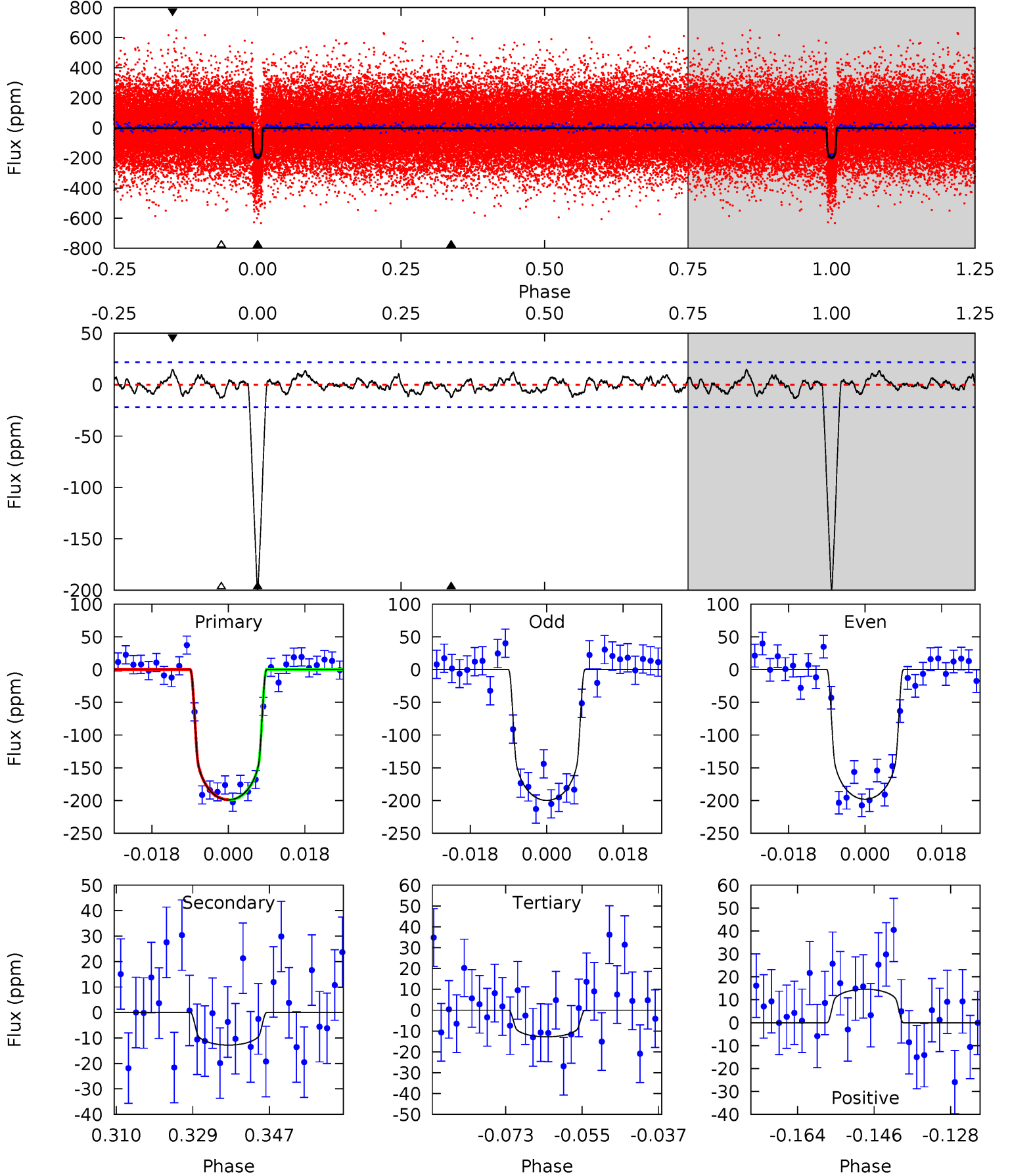
TCE 011512246-02 P= 15.274140 Days  $T_0=132.318126$  (BKJD)



# DV Model-Shift Uniqueness Test

011512246-02,  $P = 15.274418$  Days,  $E = 117.029803$  Days

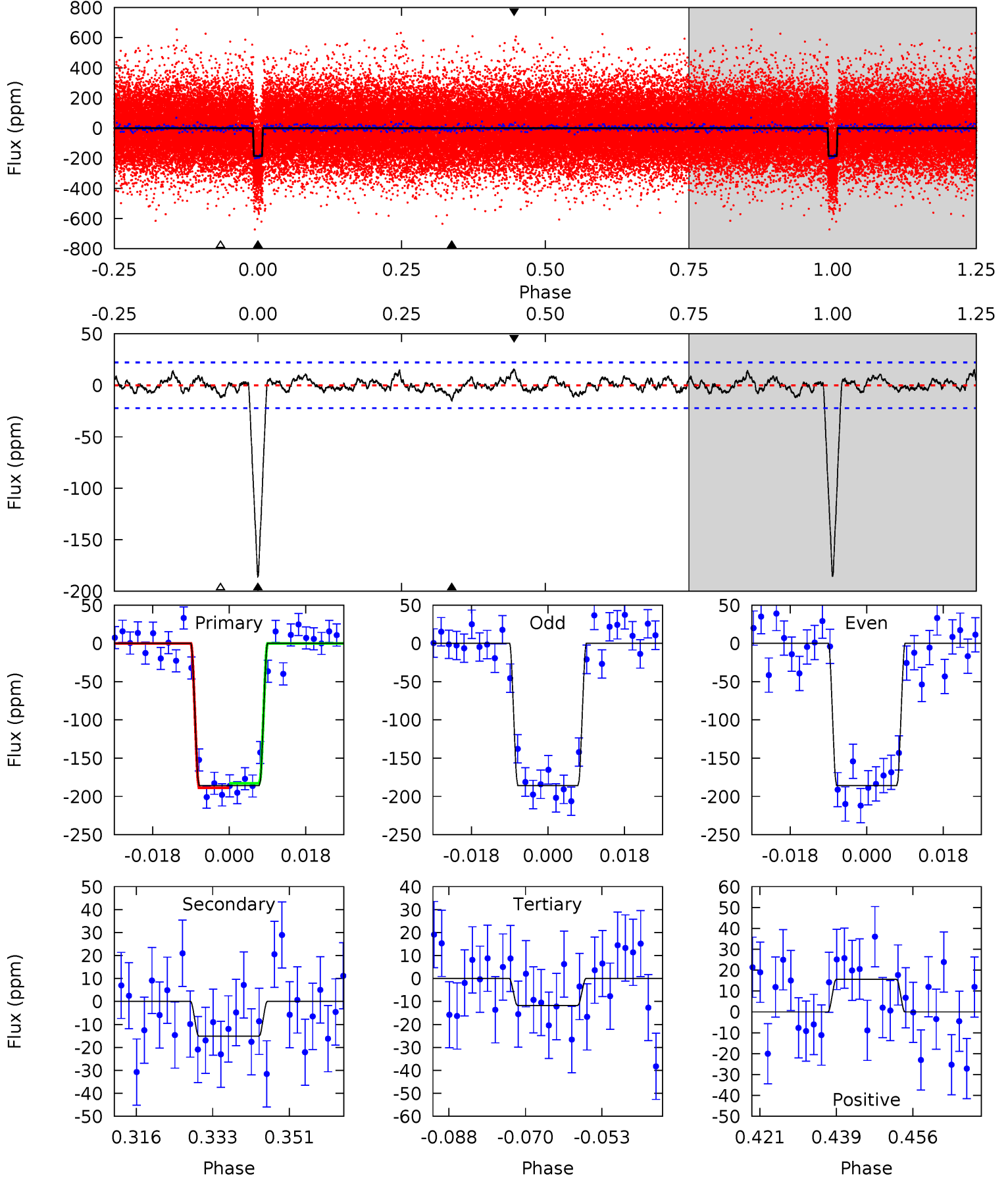
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
44.7	2.88	2.87	3.28	4.91	2.36	1.17	41.9	41.5	0.00	-0.40	0.20	1.01	0.07	0.07



# Alt Model-Shift Uniqueness Test

011512246-02,  $P = 15.274140$  Days,  $E = 117.043986$  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
41.2	3.36	2.60	3.47	4.92	2.37	1.06	38.6	37.8	0.76	-0.11	0.01	1.00	0.08	0.64



### Stellar Parameters For KIC 011512246

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5761^{+86}_{-69}$	$4.091^{+0.018}_{-0.018}$	$0.060^{+0.200}_{-0.150}$	$1.518^{+0.092}_{-0.061}$	$1.036^{+0.101}_{-0.059}$	$0.417^{+0.031}_{-0.035}$
	+1%/-1%	+0%/-0%	+333%/-250%	+6%/-4%	+10%/-6%	+8%/-8%
Source	SPE72	AST8	SPE72	DSEP		

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

### Secondary Eclipse Parameters for KIC 011512246-02 / KOI 0168.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-13 \pm 4$	$2.43^{+0.43}_{-0.41}$	$1256^{+20}_{-20}$	$3367^{+271}_{-269}$	$18^{+11}_{-8}$
Alt.	$-15 \pm 5$	$2.28^{+0.42}_{-0.41}$	$1253^{+20}_{-18}$	$3492^{+282}_{-245}$	$23^{+14}_{-9}$

$T_{\text{max}}$  = 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

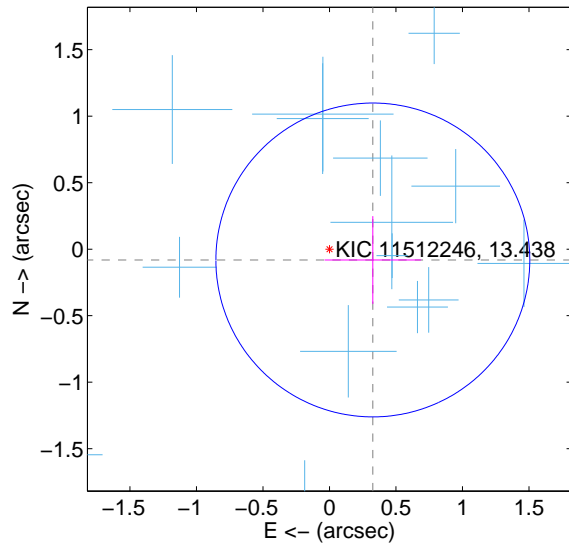
Supplemental centroid analysis for 011512246-02. Kepler magnitude: 13.44. Transit SNR 32.12

There are 16 quarters with good PRF difference image offsets

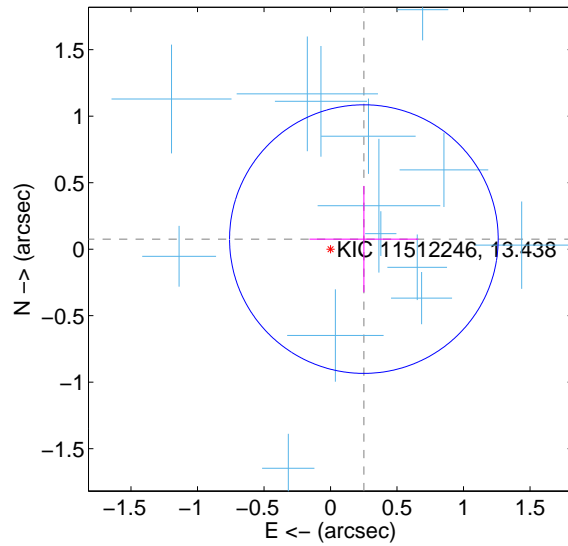
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.336 \pm 0.393$	0.85	$-0.326 \pm 0.363$	$-0.081 \pm 0.330$
PRF-fit source offset from KIC position	$0.262 \pm 0.337$	0.78	$-0.251 \pm 0.409$	$0.076 \pm 0.400$
photometric centroid source offset	$0.25 \pm 0.40$	0.63	$0.04 \pm 0.37$	$0.25 \pm 0.40$

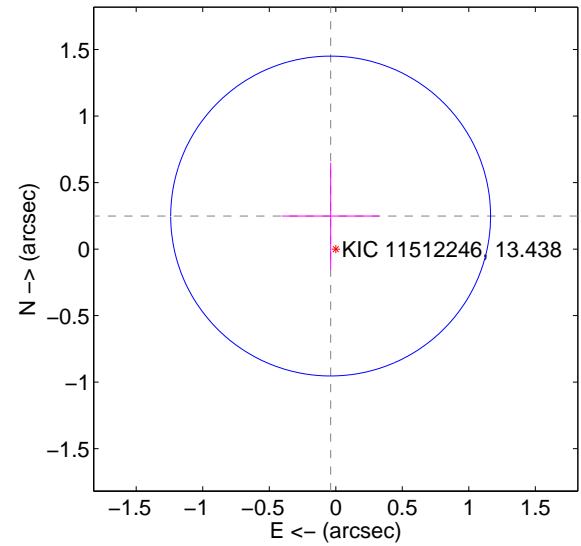
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

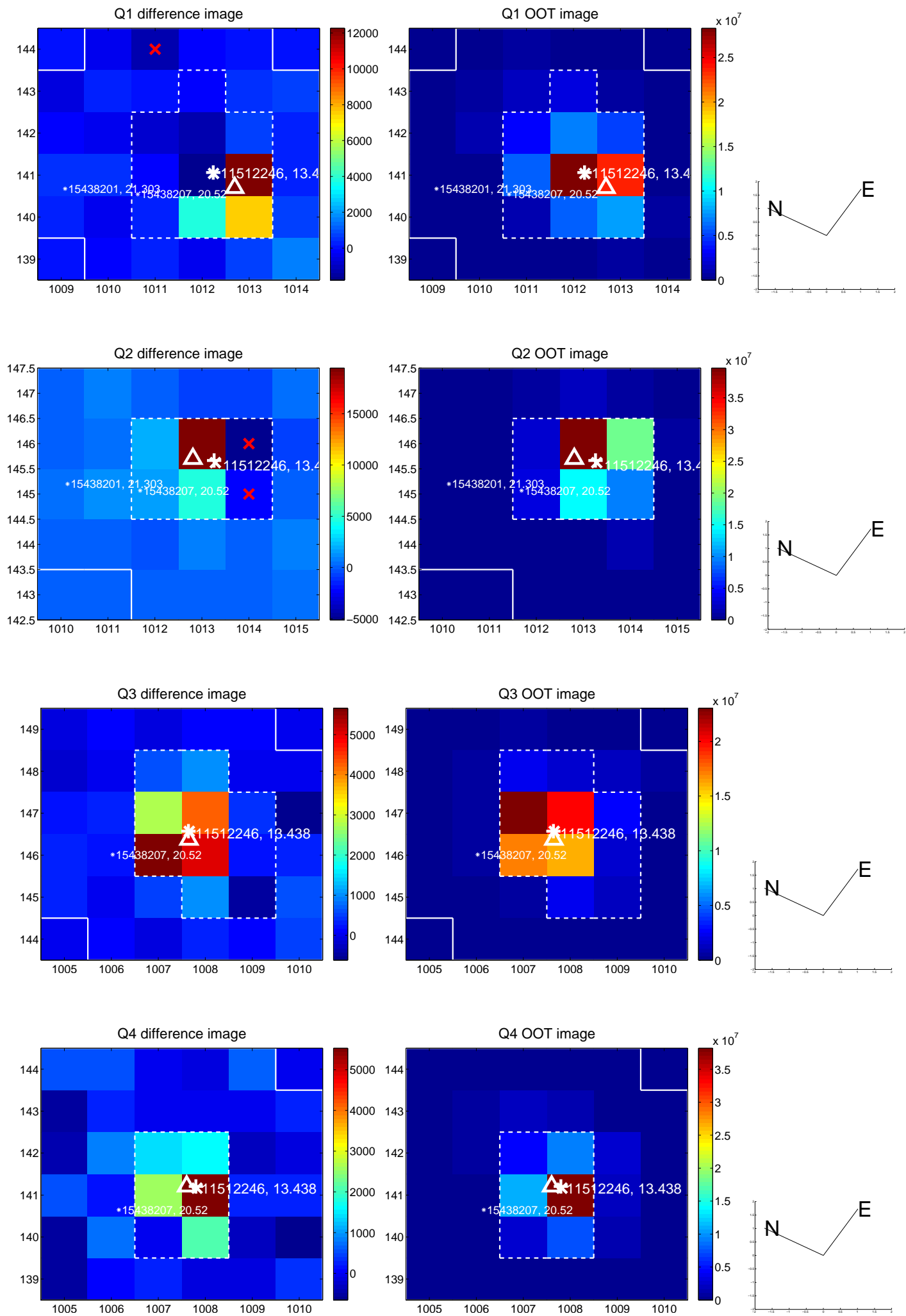


offset from photometric centroids

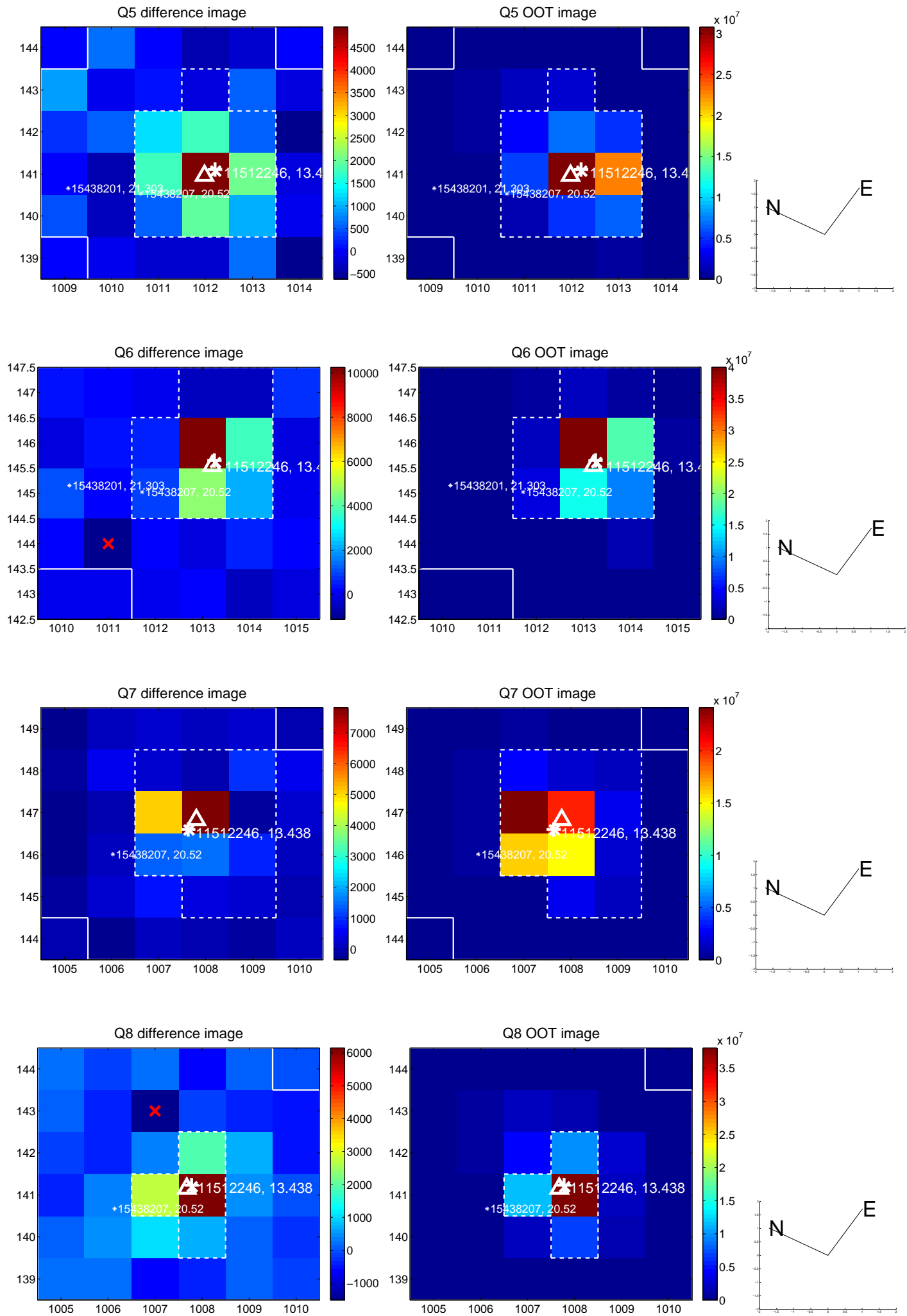


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

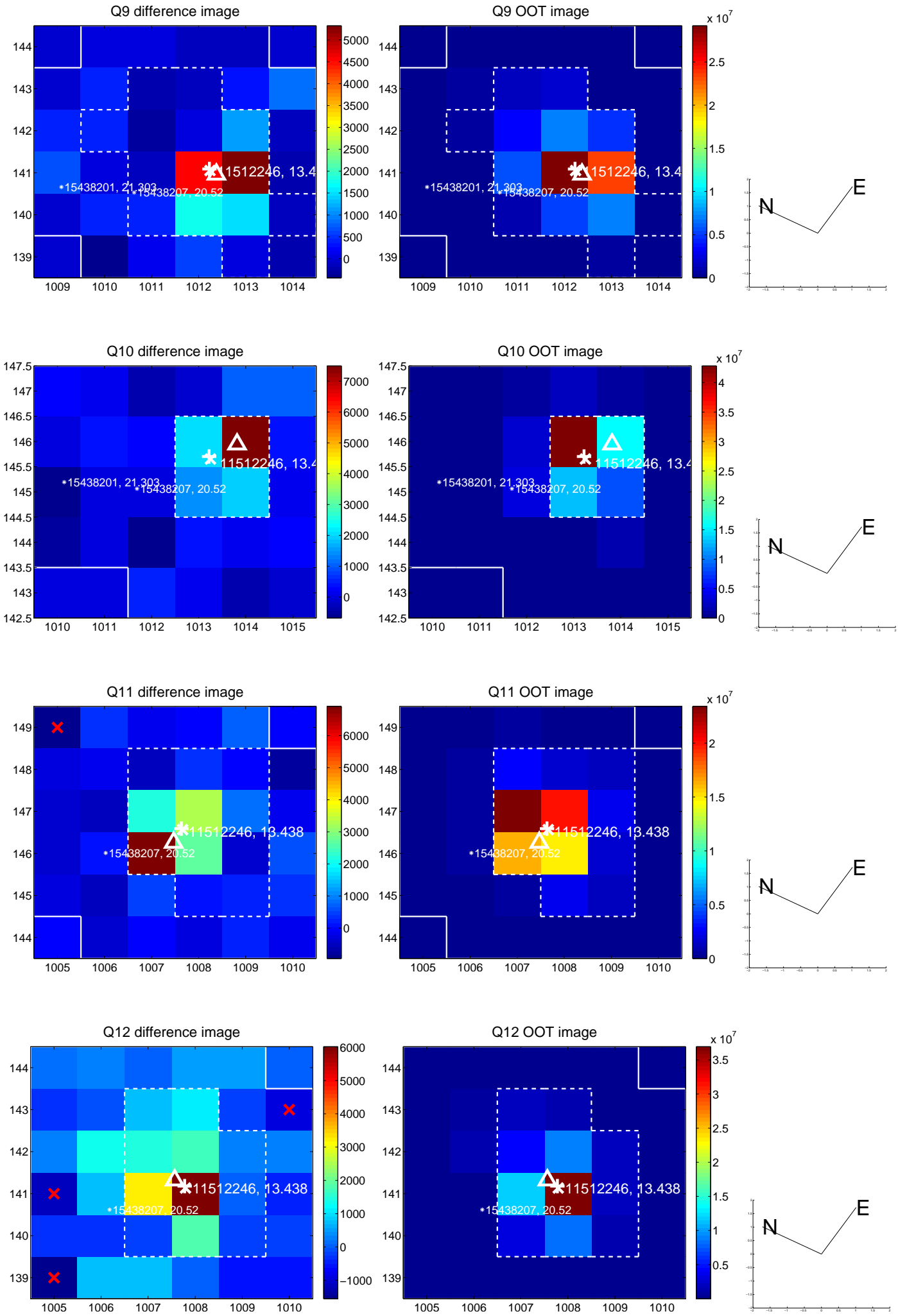
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



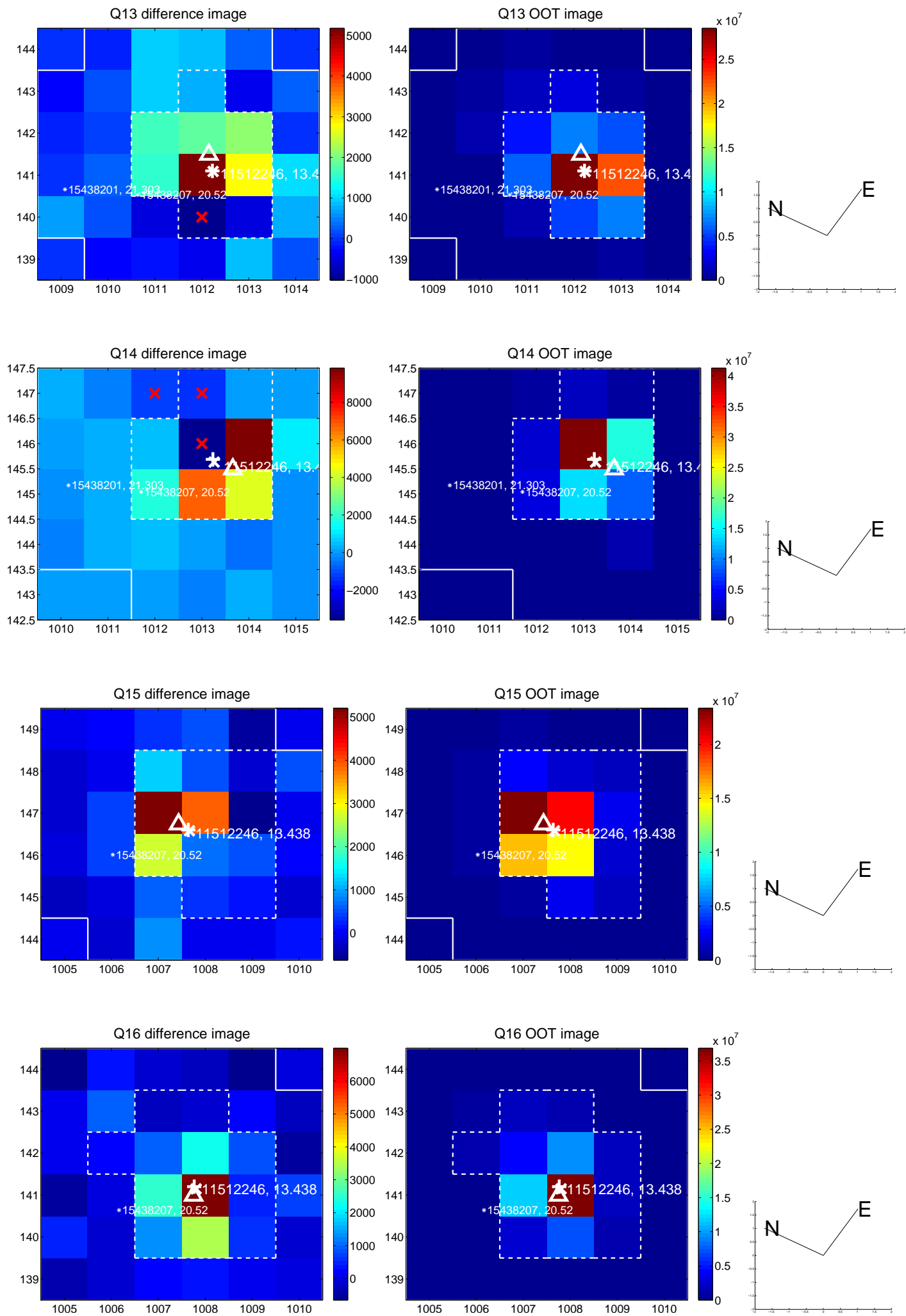
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



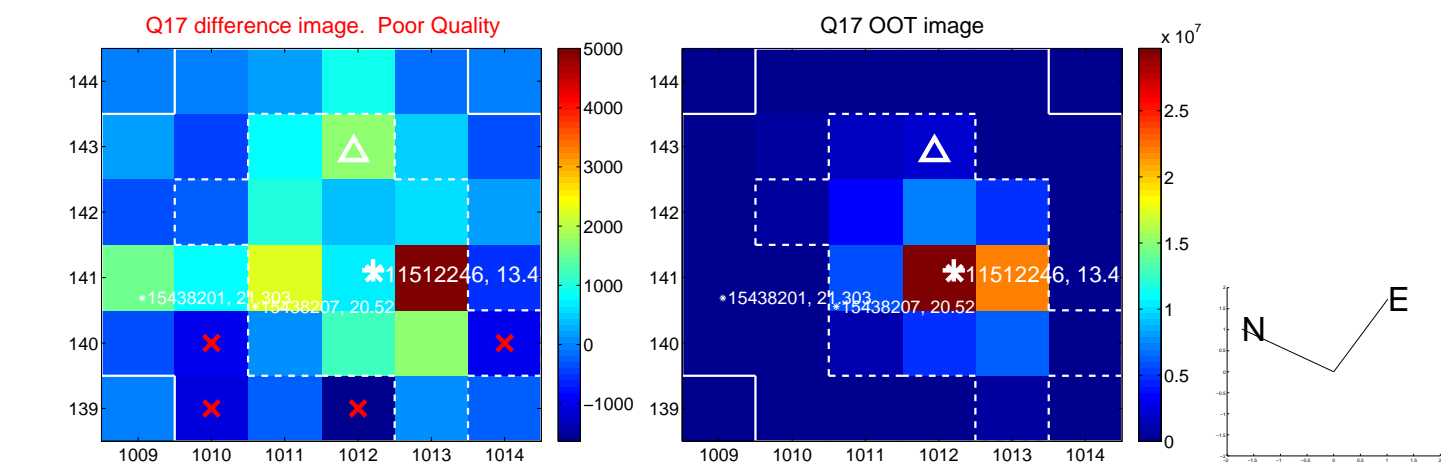
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



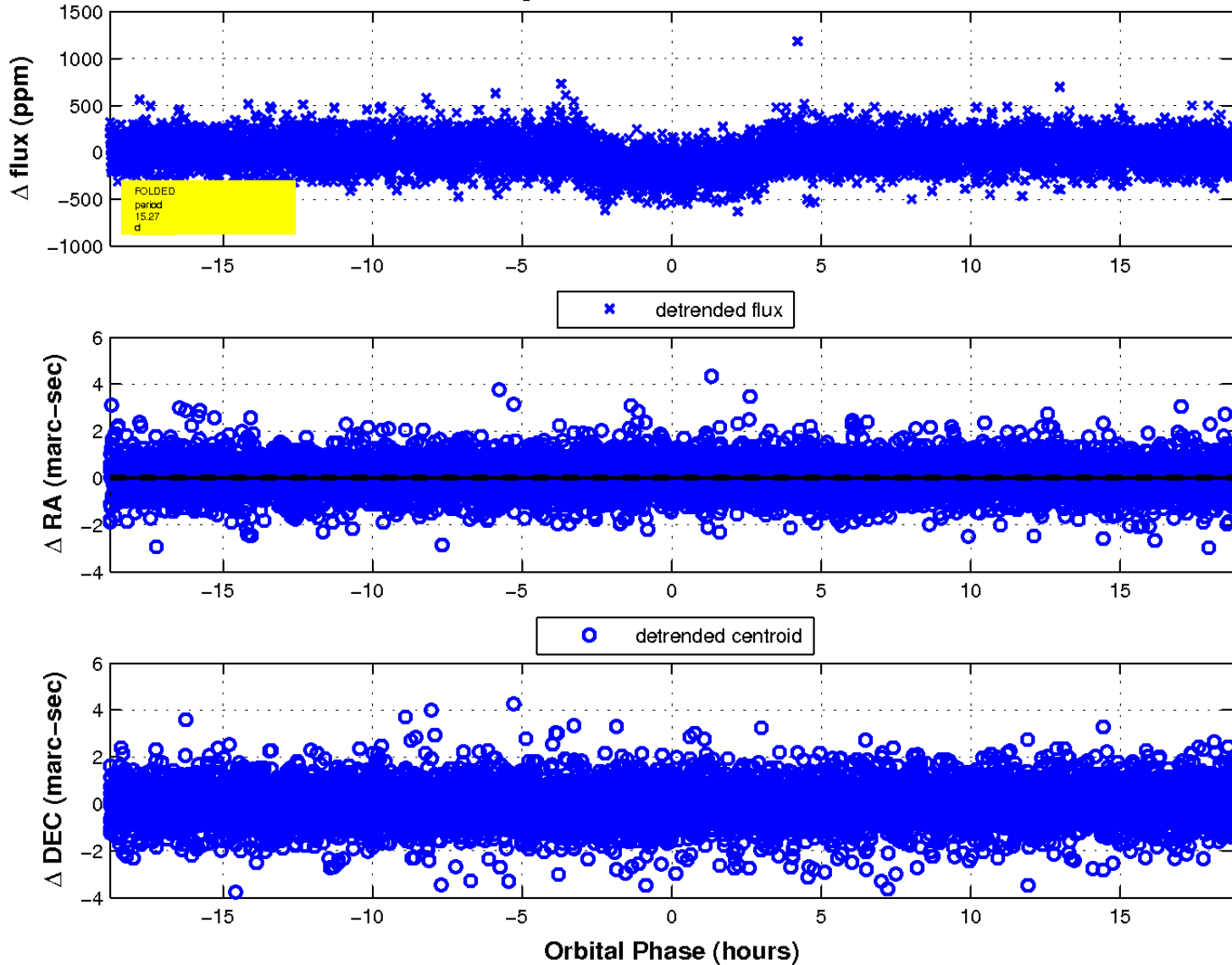
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

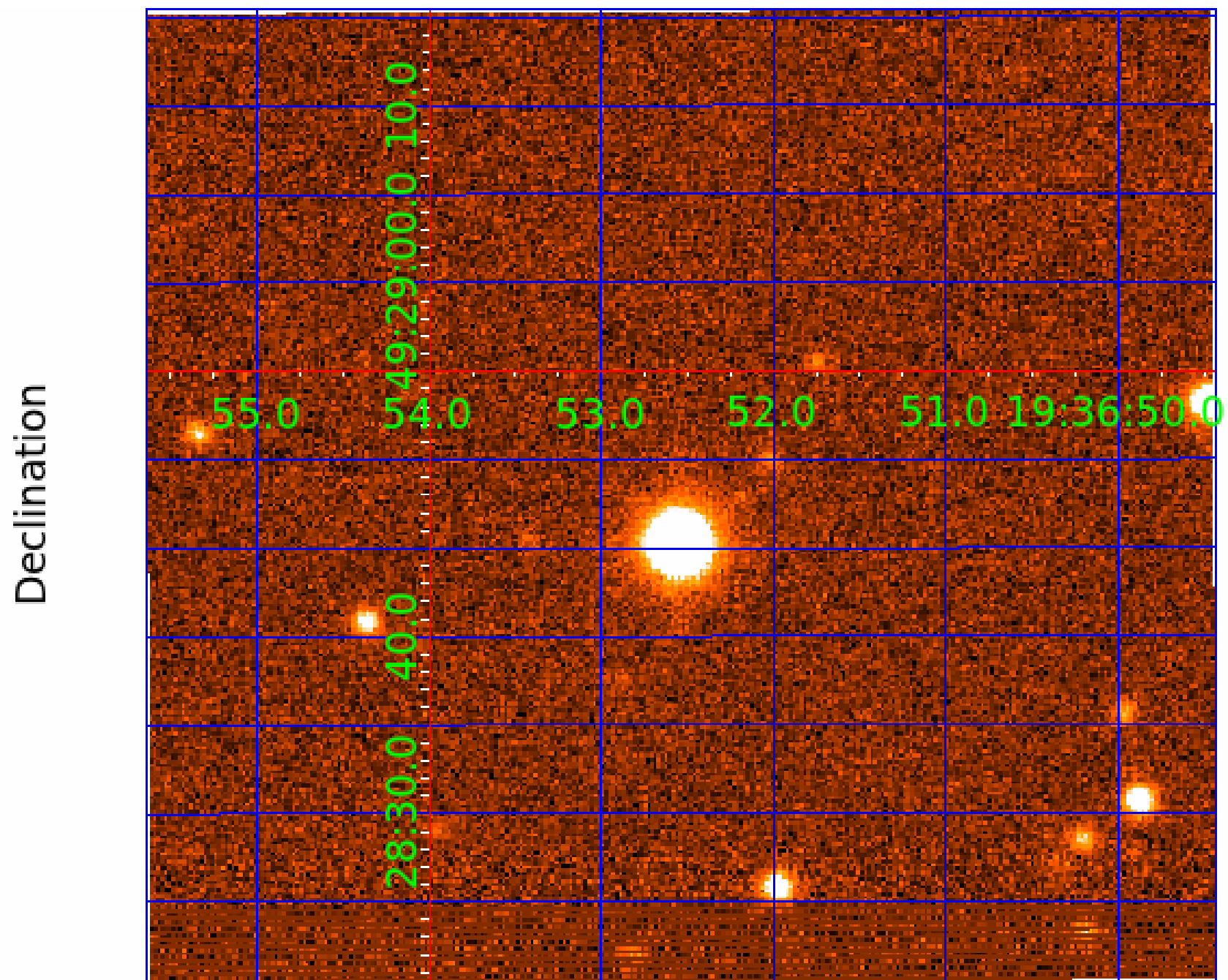


fluxWeightedCentroids, Planet 2 of 3





UKIRT Image



# KIC 011512246

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011512246-01	OBS	0168.01	10.742413	133.287813	395.1	6.758	64.2	72.3	1.52	5761	3.69	244.49
011512246-02	OBS	0168.02	15.274418	132.304221	200.9	6.260	31.1	32.1	1.52	5761	2.43	152.91
011512246-03	OBS	0168.03	7.107034	138.322686	105.8	5.630	21.7	23.4	1.52	5761	1.88	424.11

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011512246-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
011512246-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT
011512246-03	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

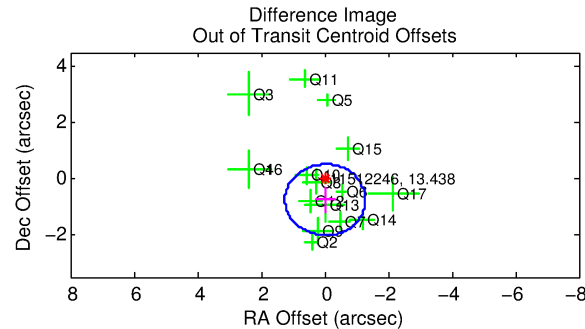
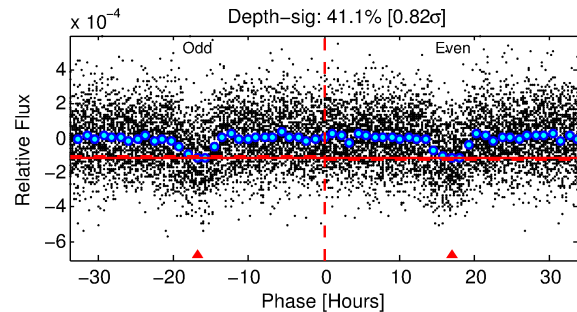
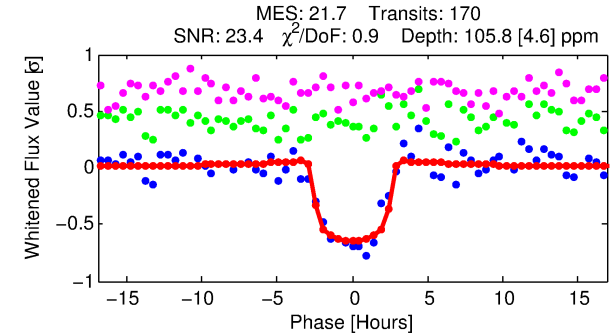
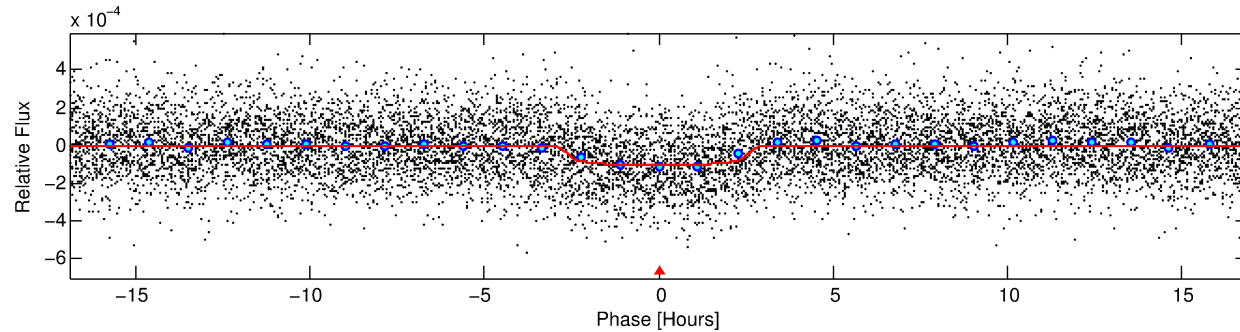
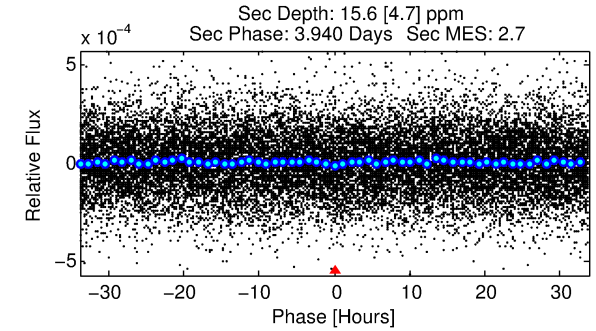
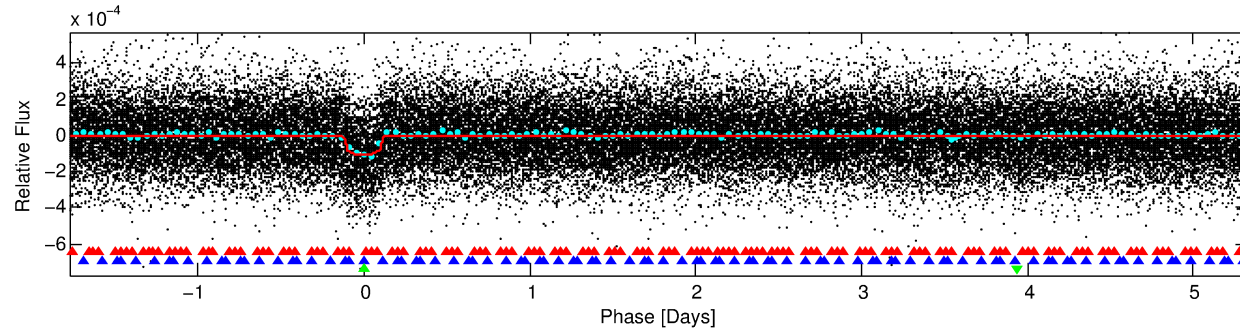
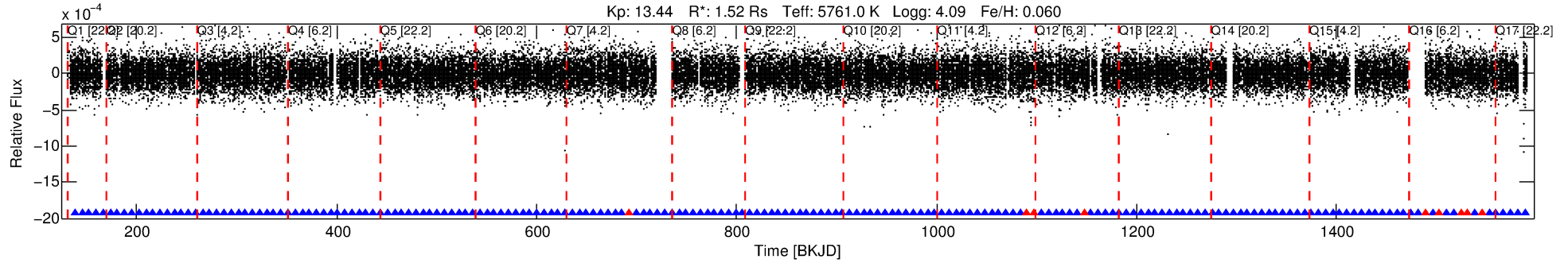
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 011512246-03

No Significant Match Found

# DV One-Page Summary

KIC: 11512246 Candidate: 3 of 3 Period: 7.107 d  
KOI: K00168.03 Name: Kepler-23b Corr: 0.958



## DV Fit Results:

Period = 7.10703 [0.00004] d  
Epoch = 138.3227 [0.0040] BKJD  
Rp/R\* = 0.0113 [0.0017]  
a/R\* = 4.37 [3.07]  
b = 0.91 [0.14]  
Seff = 424.11 [32.75]  
Teq = 1157 [22] K  
Rp = 1.87 [0.31] Re  
a = 0.0732 [0.0031] AU  
Ag = 13.11 [5.70] [2.12σ]  
Teffp = 3404 [371] K [6.04σ]

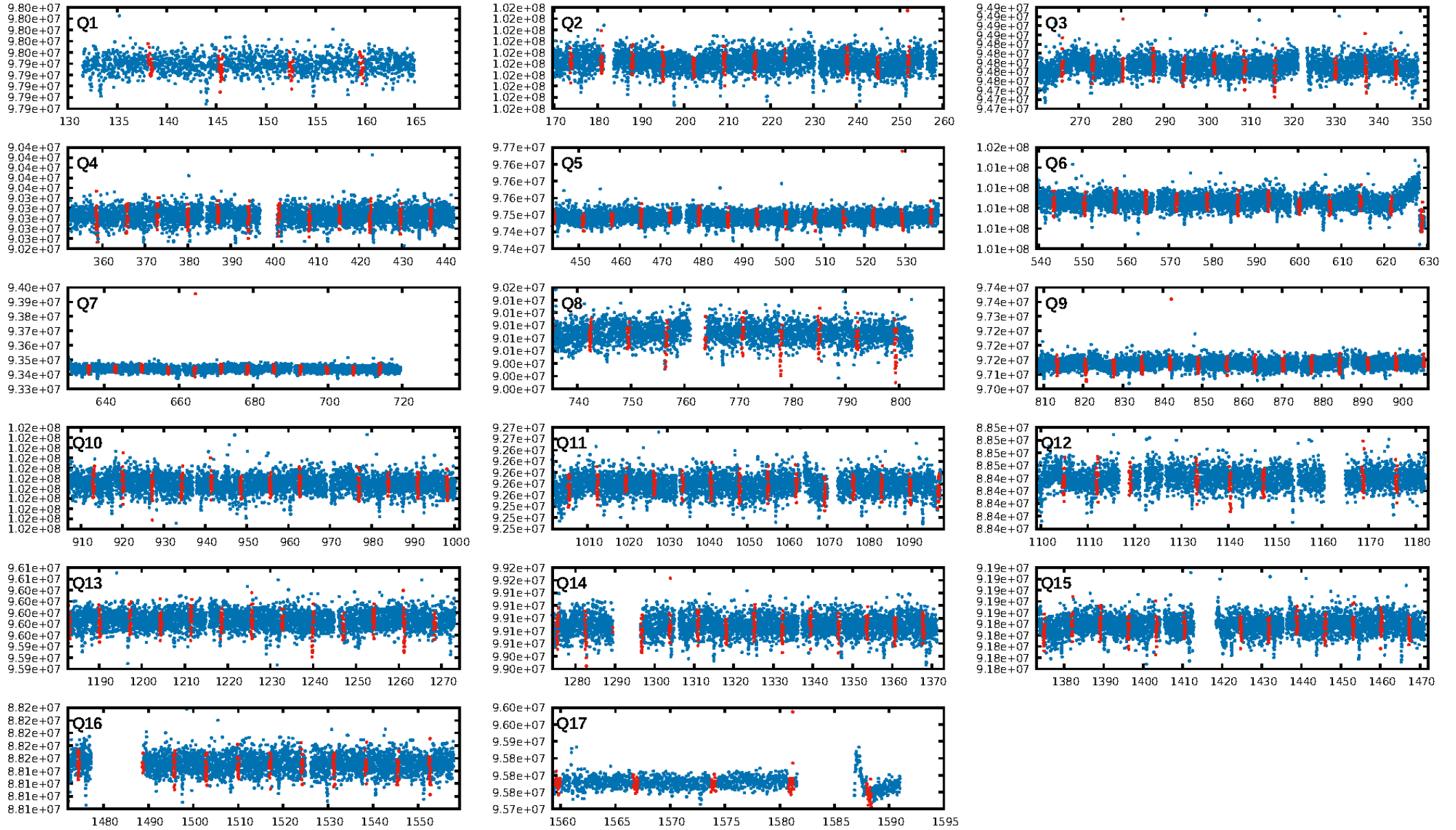
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [9.92σ]  
ModelChiSquare2-sig: 99.3%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 5.24e-98  
RollingBand-fgt: 0.94 [152/161]  
GhostDiagnostic-chr: 4.467  
Centroid-sig: N/A  
Centroid-so: 0.844 arcsec [1.54σ]  
OotOffset-rm: 0.754 arcsec [1.79σ]  
KicOffset-rm: 0.611 arcsec [1.55σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.75 [12/16]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 11:04:31 Z

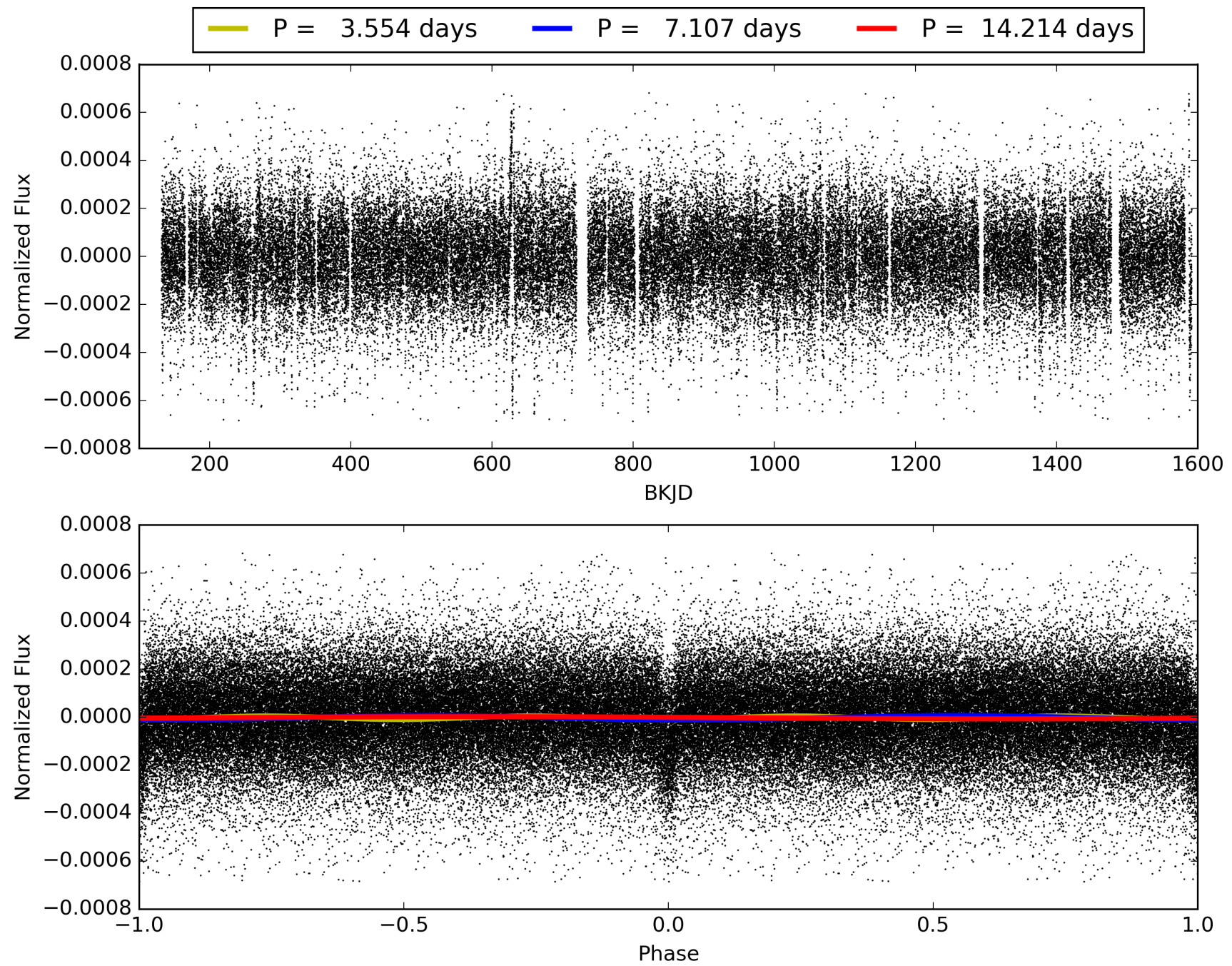
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 011512246-03, PDC Light Curves



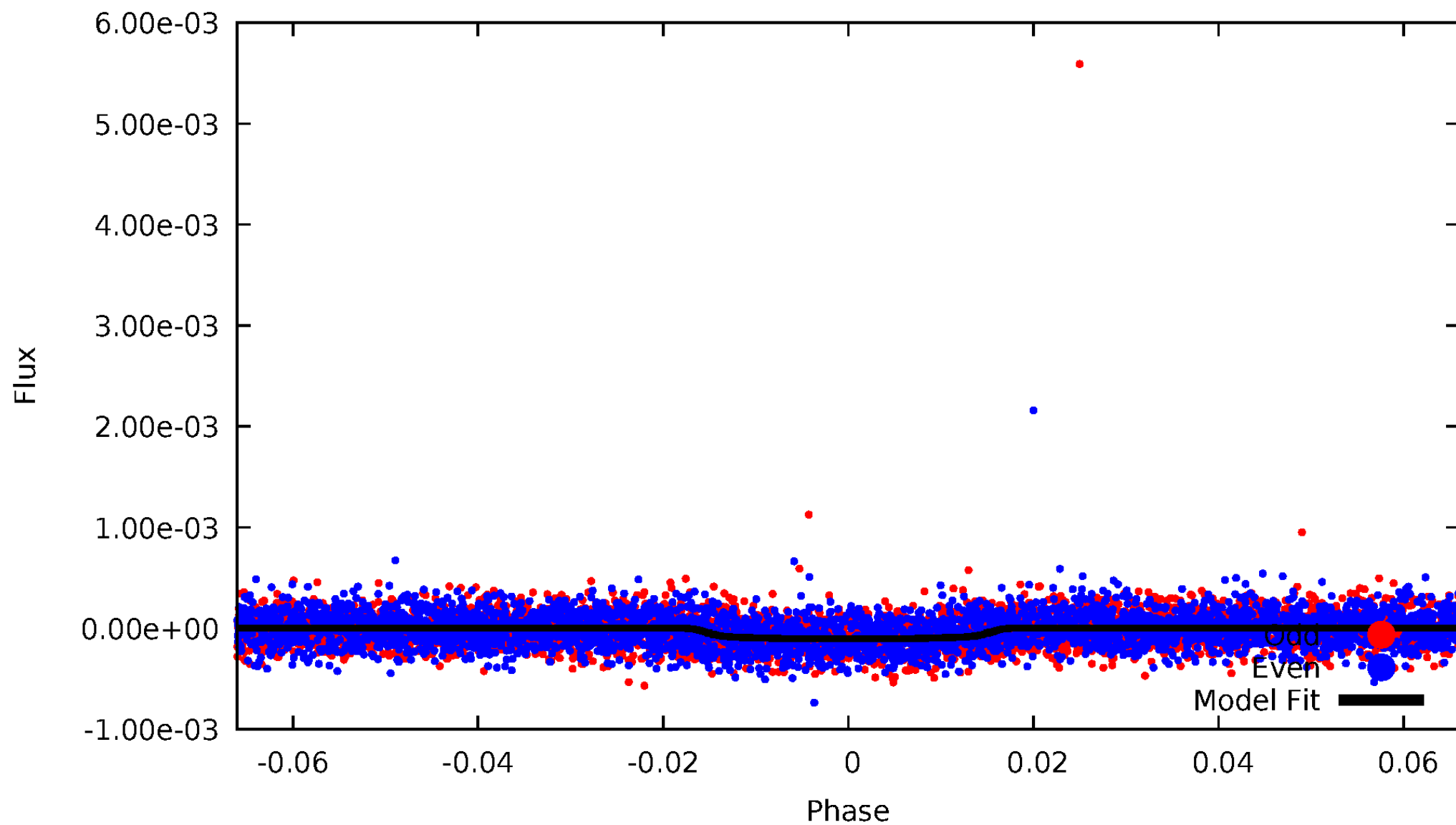


TCE 011512246-03



# DV Odd/Even

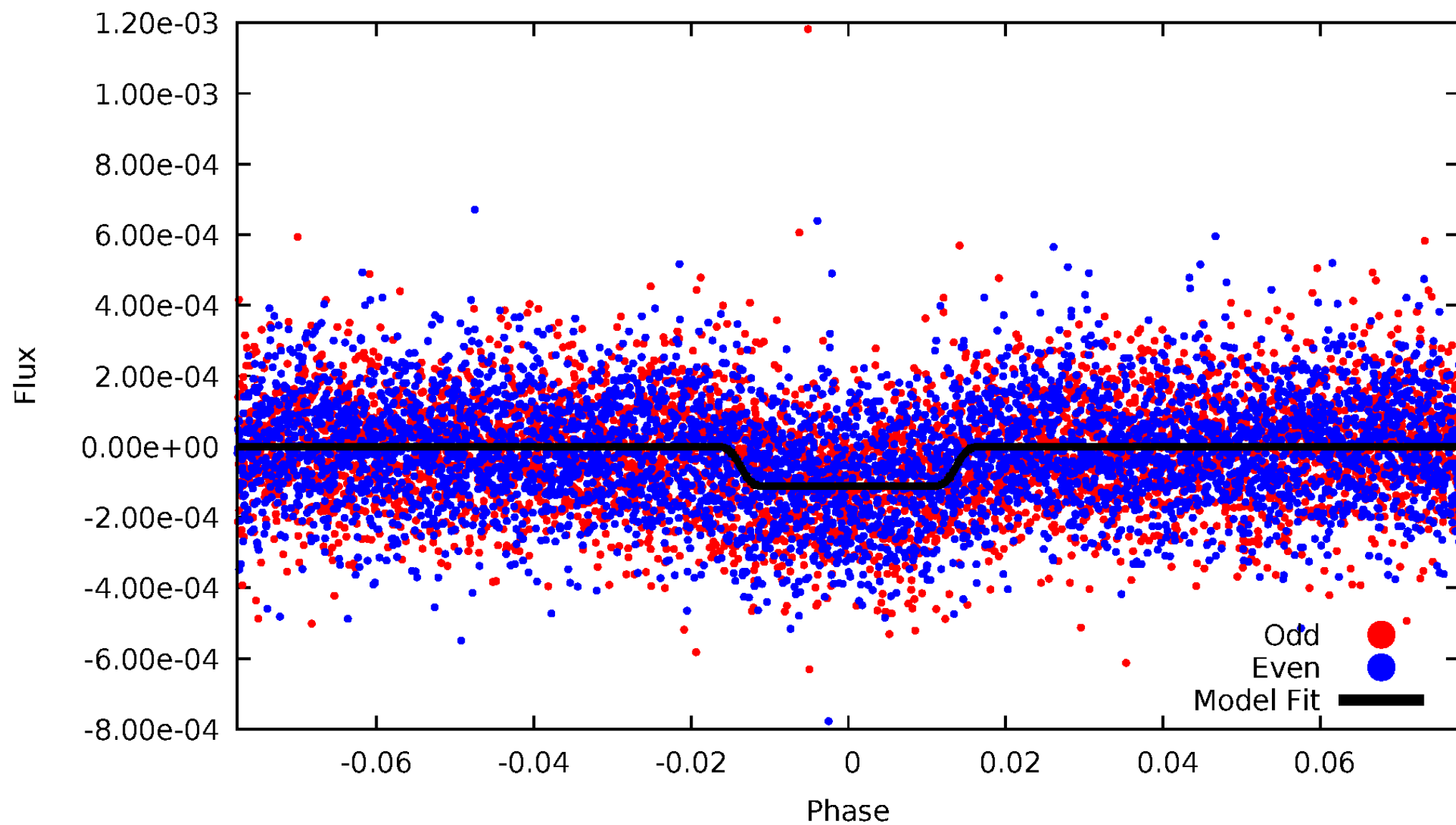
TCE 011512246-03





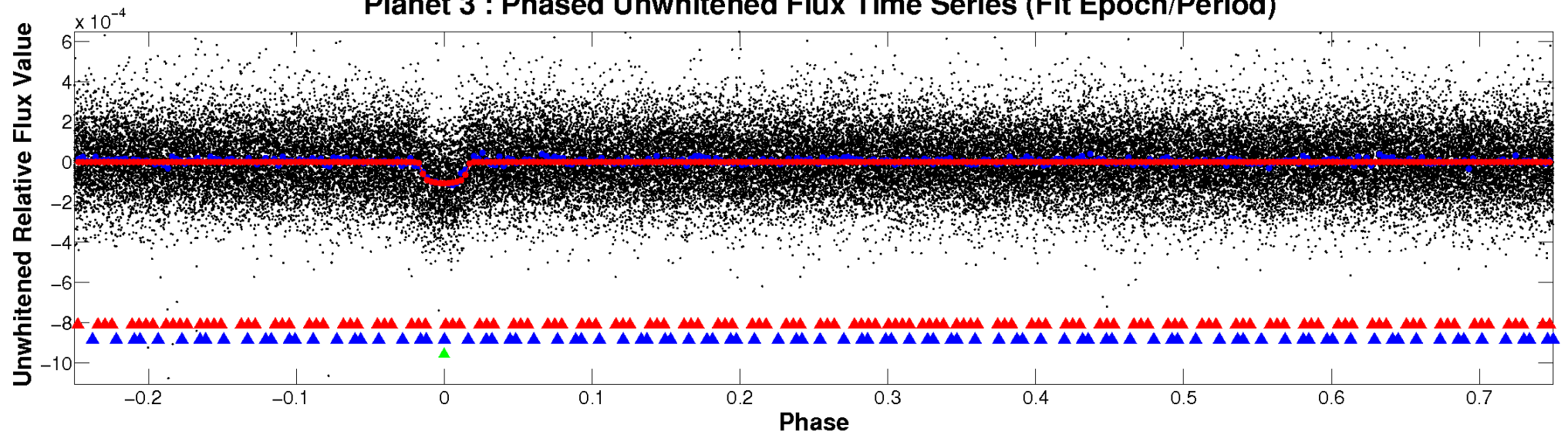
# ALT Odd/Even

TCE 011512246-03

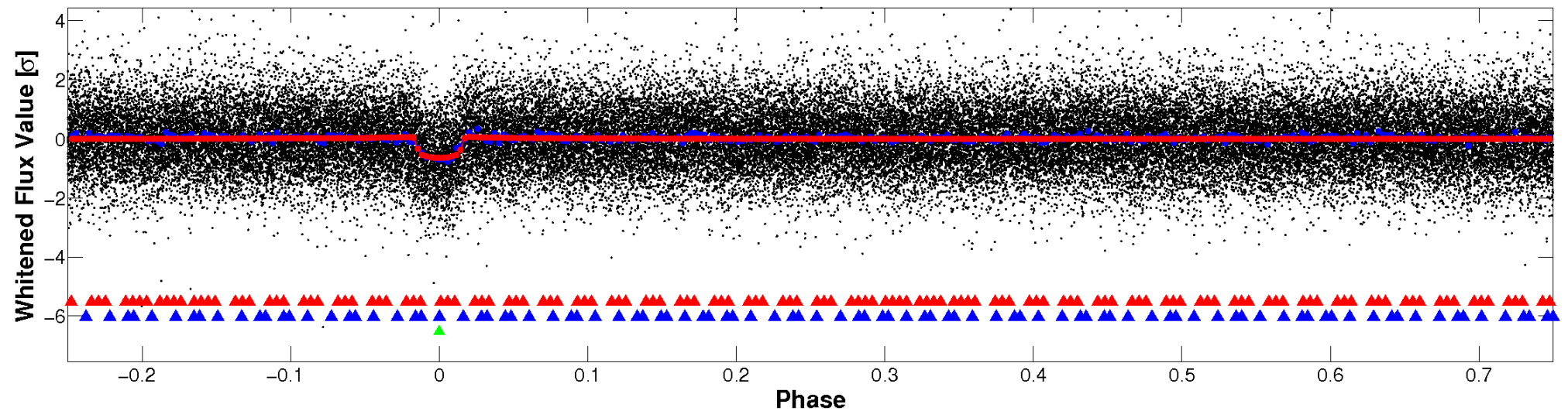


# Non-Whitened Vs. Whitened Light Curve

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

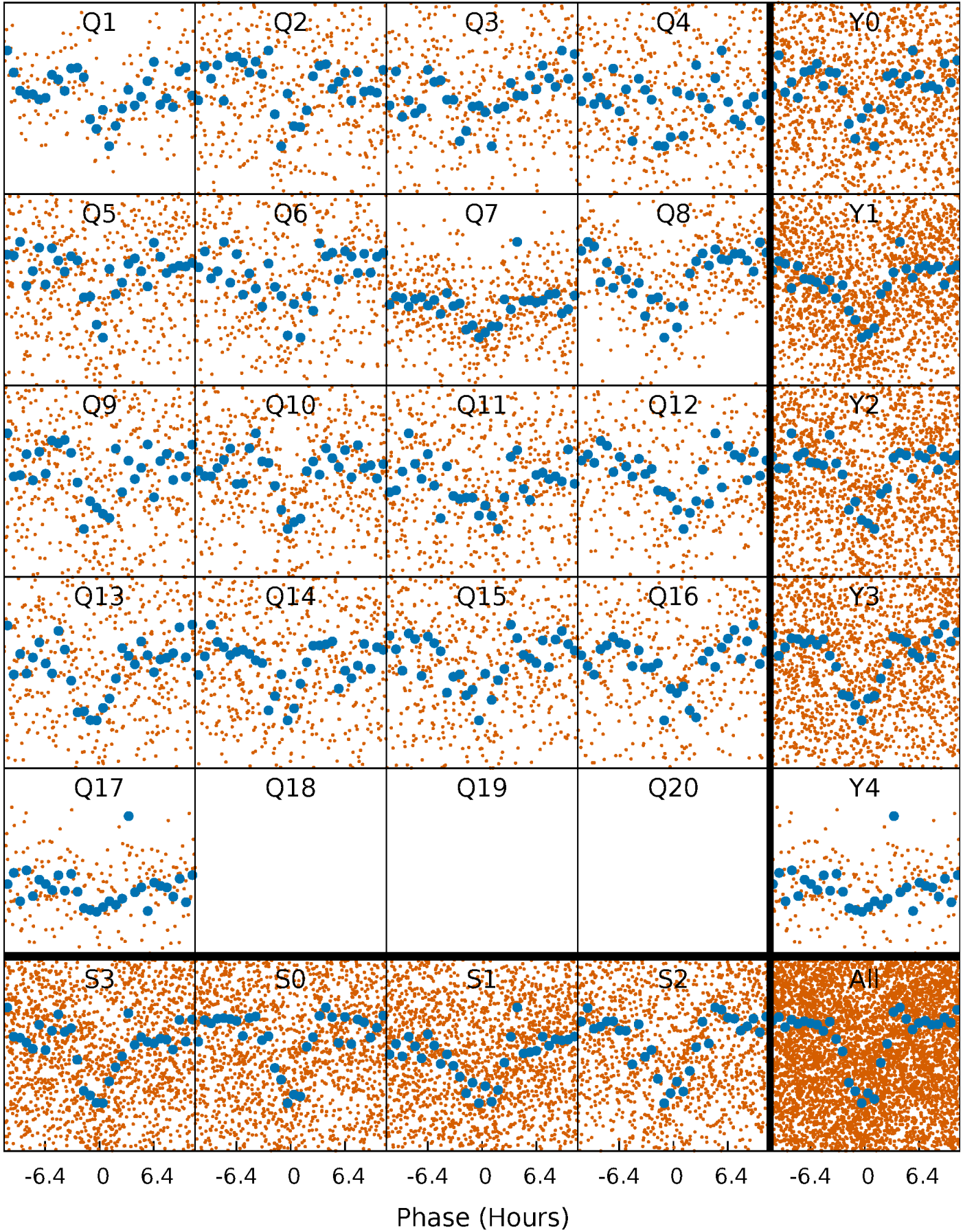


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

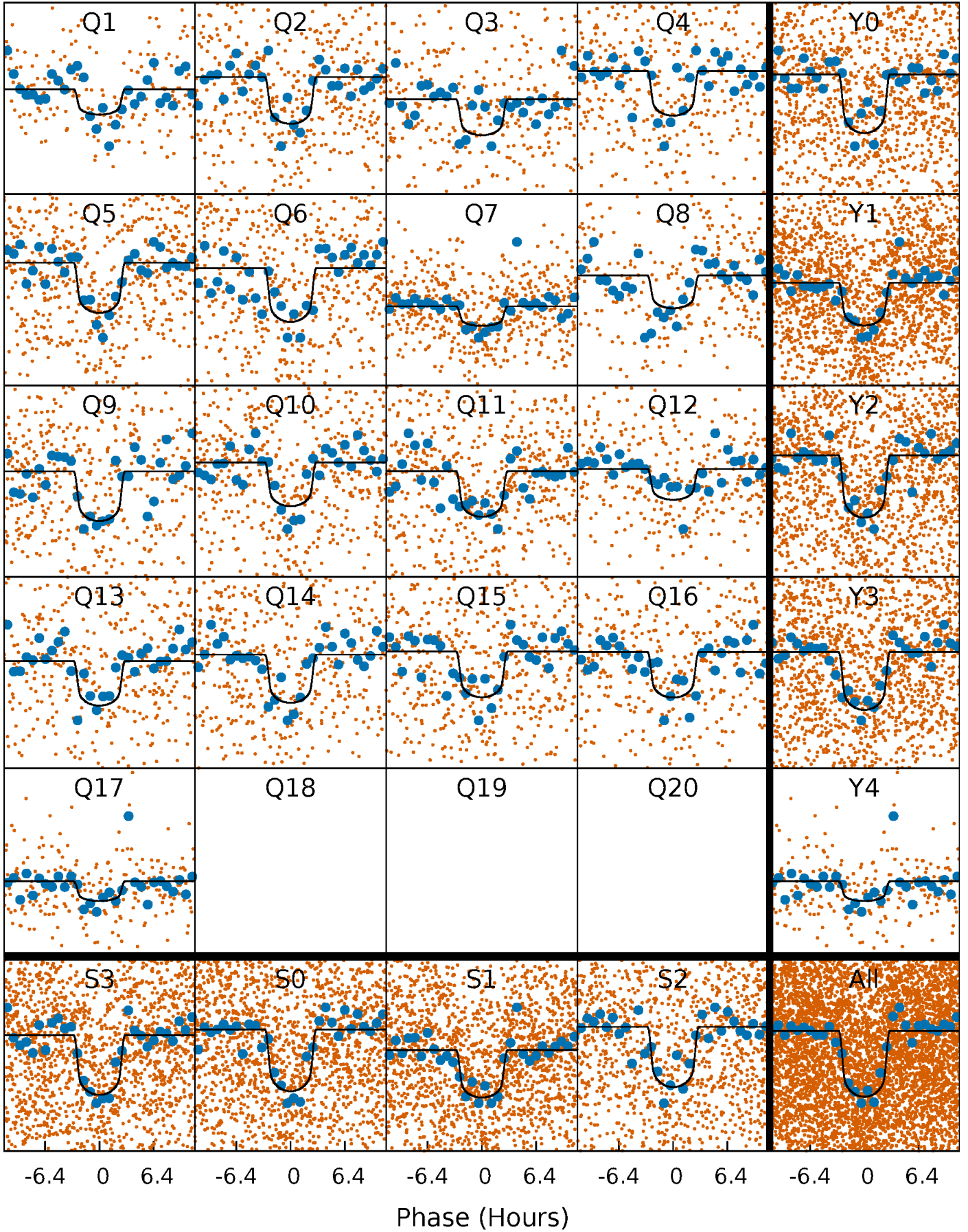
TCE 011512246-03   P= 7.107034 Days    $T_0=138.322686$  (BKJD)





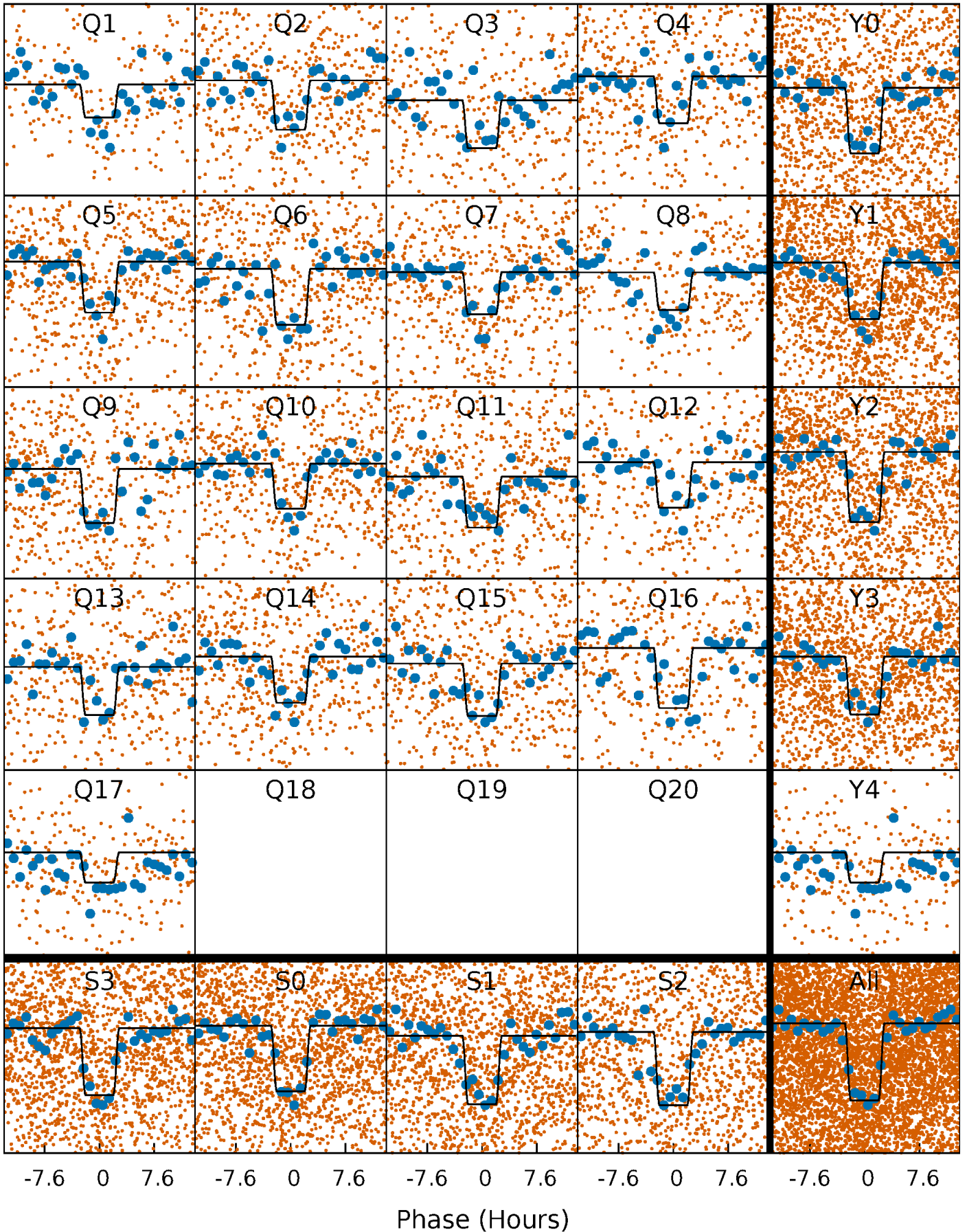
# DV Quarter-Phased Transit Curves

TCE 011512246-03   P= 7.107034 Days    $T_0=138.322686$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

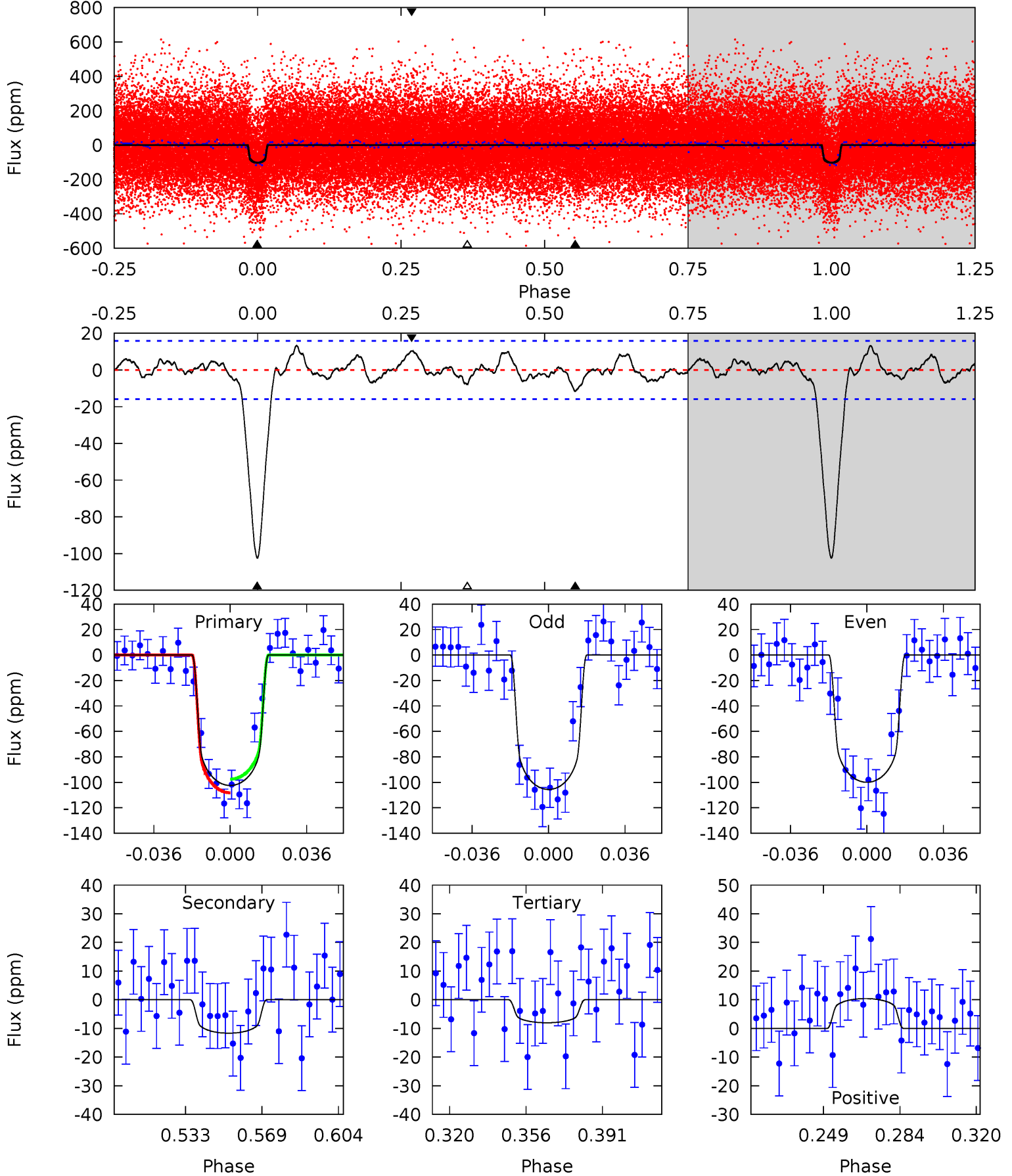
TCE 011512246-03   P= 7.106875 Days    $T_0=138.332086$  (BKJD)



# DV Model-Shift Uniqueness Test

011512246-03, P = 7.107034 Days, E = 131.215652 Days

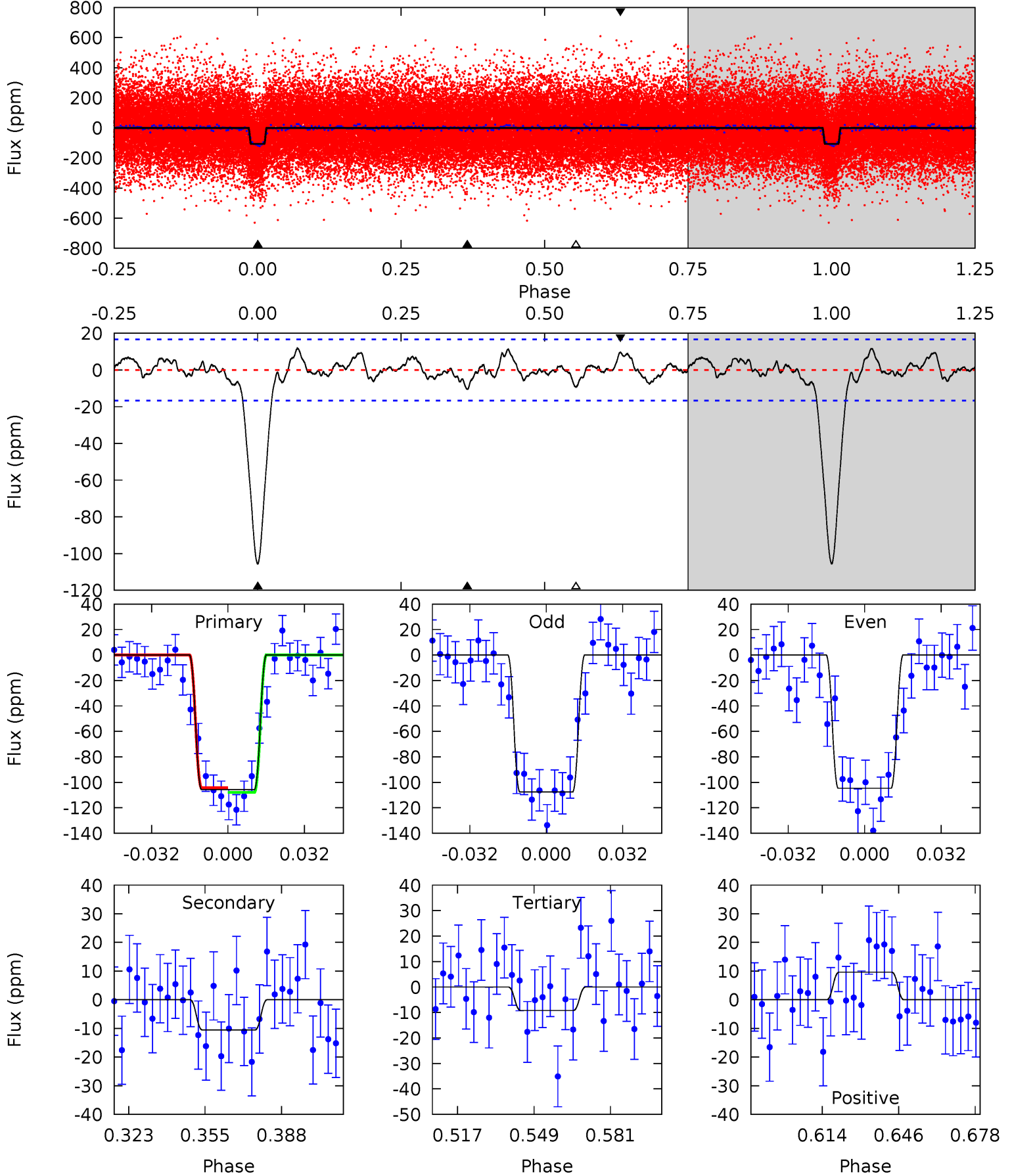
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
30.8	3.51	2.42	3.13	4.78	2.10	1.28	28.4	27.7	1.10	0.38	0.85	0.99	0.11	1.62



# Alt Model-Shift Uniqueness Test

011512246-03, P = 7.106875 Days, E = 131.225211 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
30.4	3.03	2.65	2.77	4.80	2.14	1.20	27.7	27.6	0.38	0.26	0.41	1.07	0.10	0.52





### Stellar Parameters For KIC 011512246

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$5761^{+86}_{-69}$	$4.091^{+0.018}_{-0.018}$	$0.060^{+0.200}_{-0.150}$	$1.518^{+0.092}_{-0.061}$	$1.036^{+0.101}_{-0.059}$	$0.417^{+0.031}_{-0.035}$
	+1%/-1%	+0%/-0%	+333%/-250%	+6%/-4%	+10%/-6%	+8%/-8%
Source	SPE72	AST8	SPE72	DSEP		

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

### Secondary Eclipse Parameters for KIC 011512246-03 / KOI 0168.03

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-12 \pm 3$	$1.87^{+0.30}_{-0.29}$	$1620^{+26}_{-27}$	$3581^{+263}_{-256}$	$9.612^{+4.986}_{-3.544}$
Alt.	$-11 \pm 3$	$1.77^{+0.29}_{-0.30}$	$1617^{+26}_{-24}$	$3602^{+305}_{-283}$	$9.845^{+6.113}_{-3.862}$

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

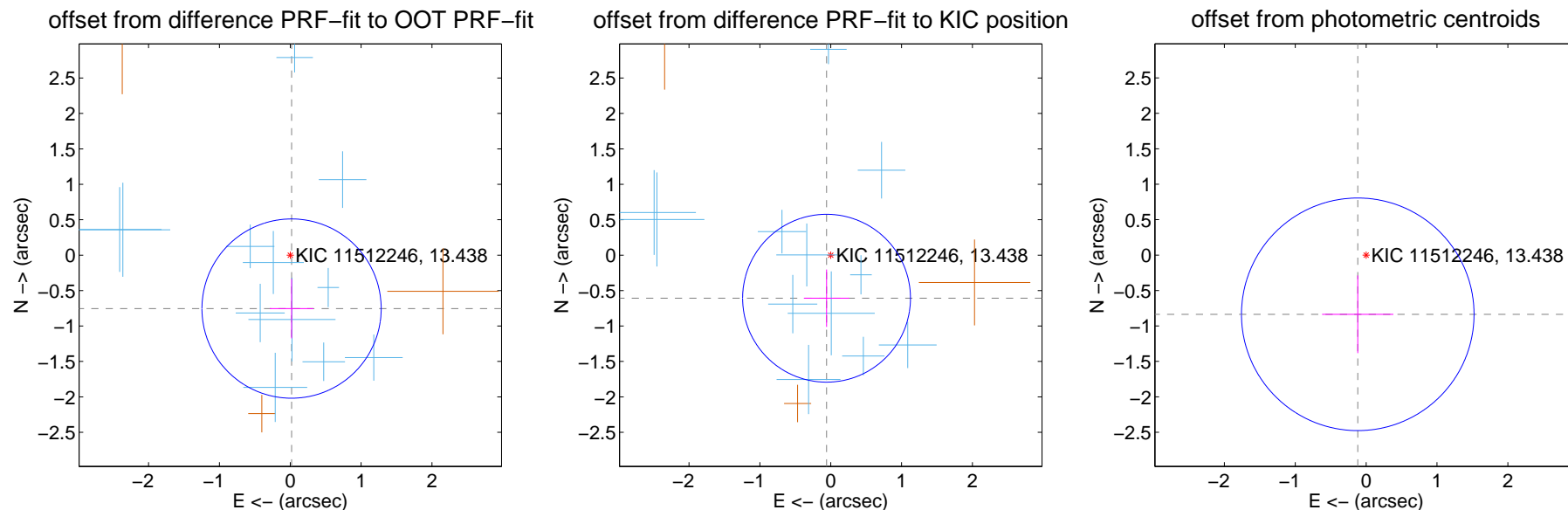
## DV Centroid Data

Supplemental centroid analysis for 011512246-03. Kepler magnitude: 13.44. Transit SNR 23.36

There are 12 quarters with good PRF difference image offsets

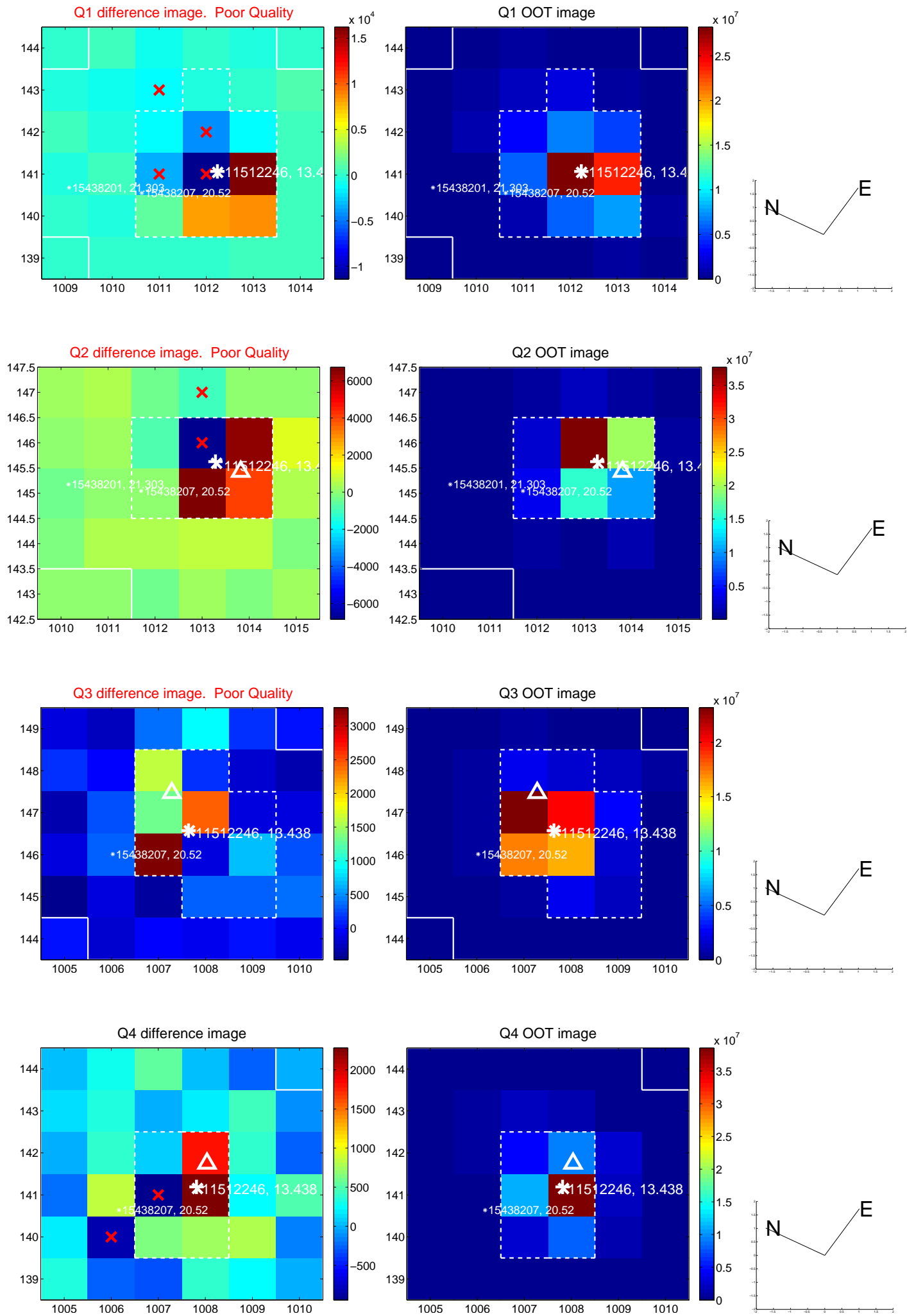
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.754 \pm 0.422$	1.79	$-0.018 \pm 0.307$	$-0.754 \pm 0.419$
PRF-fit source offset from KIC position	$0.611 \pm 0.395$	1.55	$0.059 \pm 0.320$	$-0.608 \pm 0.405$
photometric centroid source offset	$0.84 \pm 0.55$	1.54	$0.12 \pm 0.50$	$-0.84 \pm 0.55$

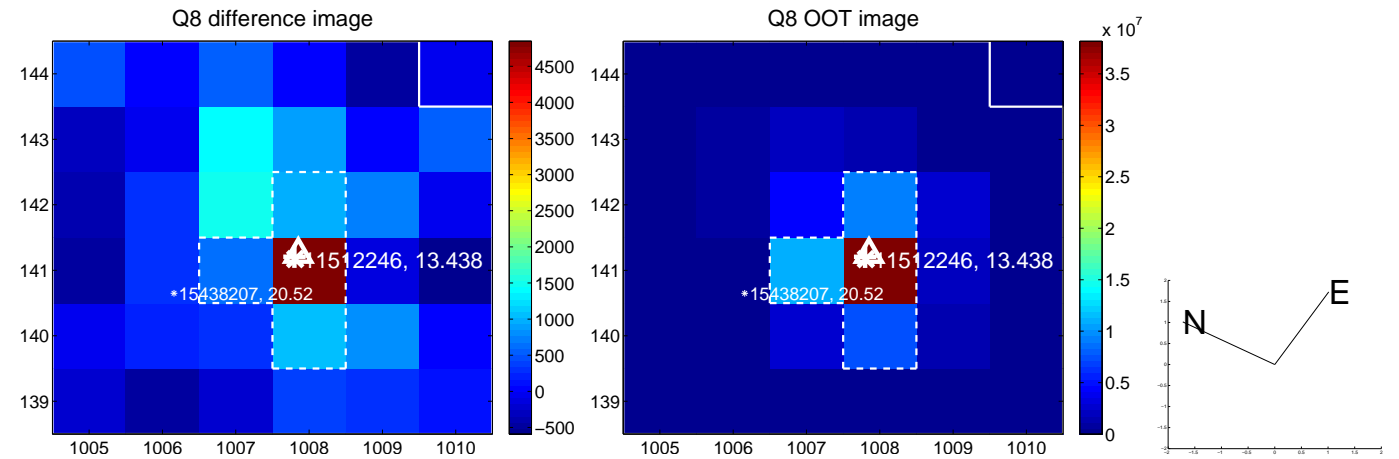
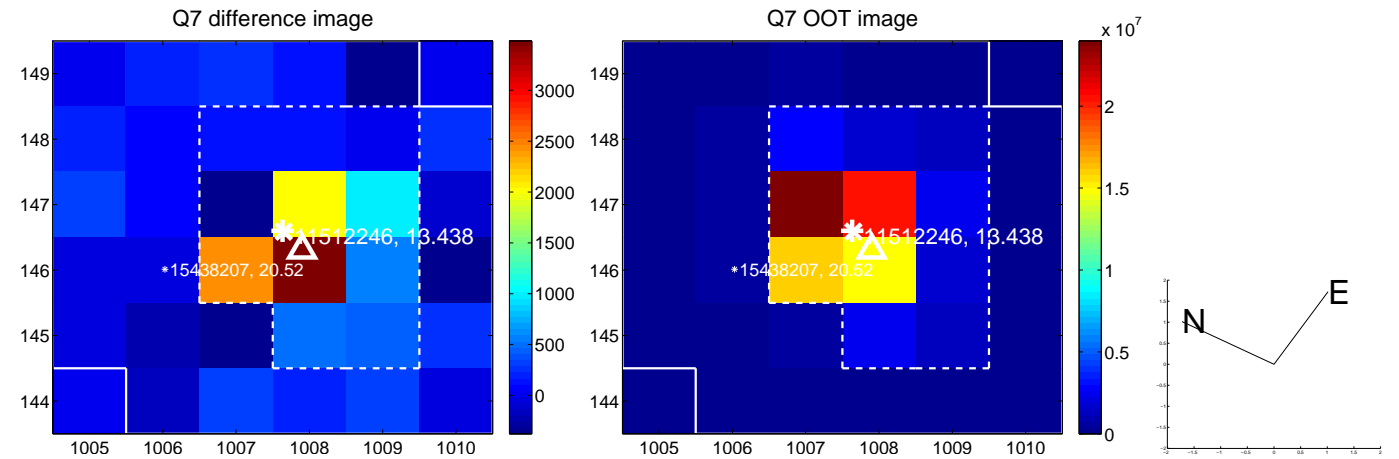
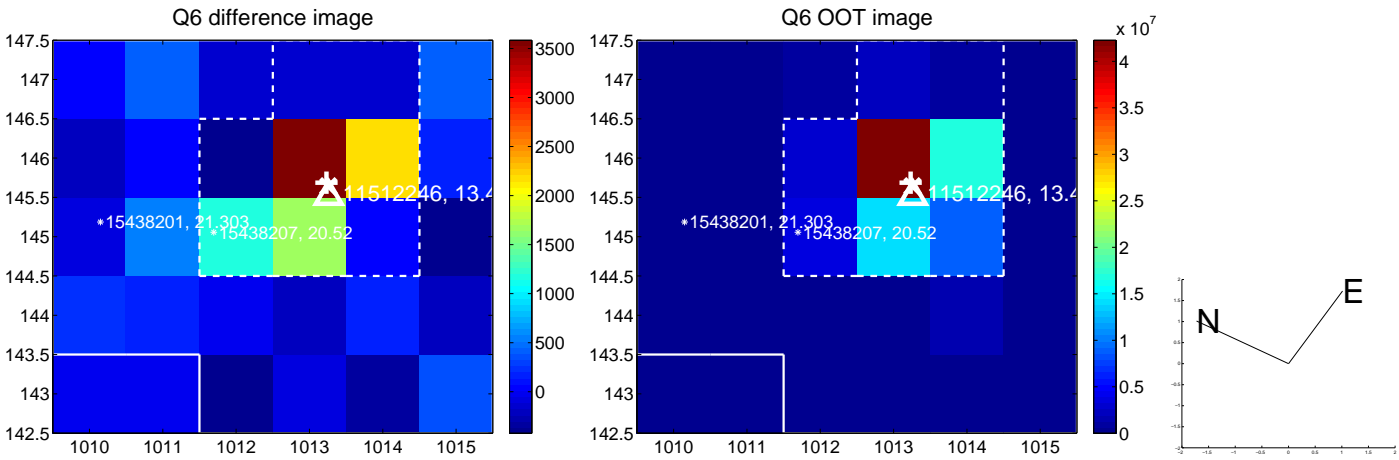
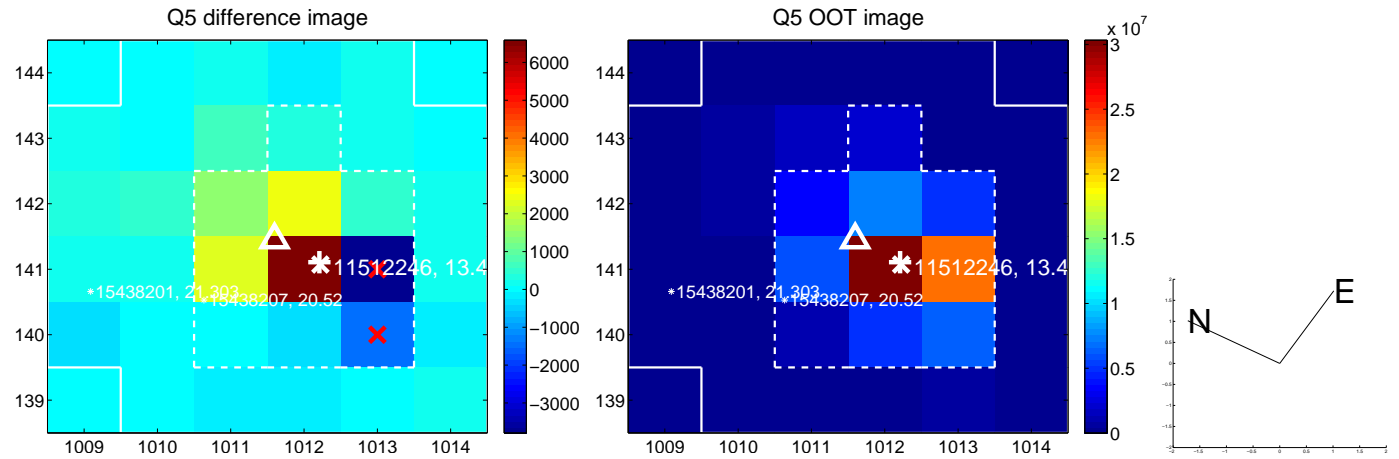


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

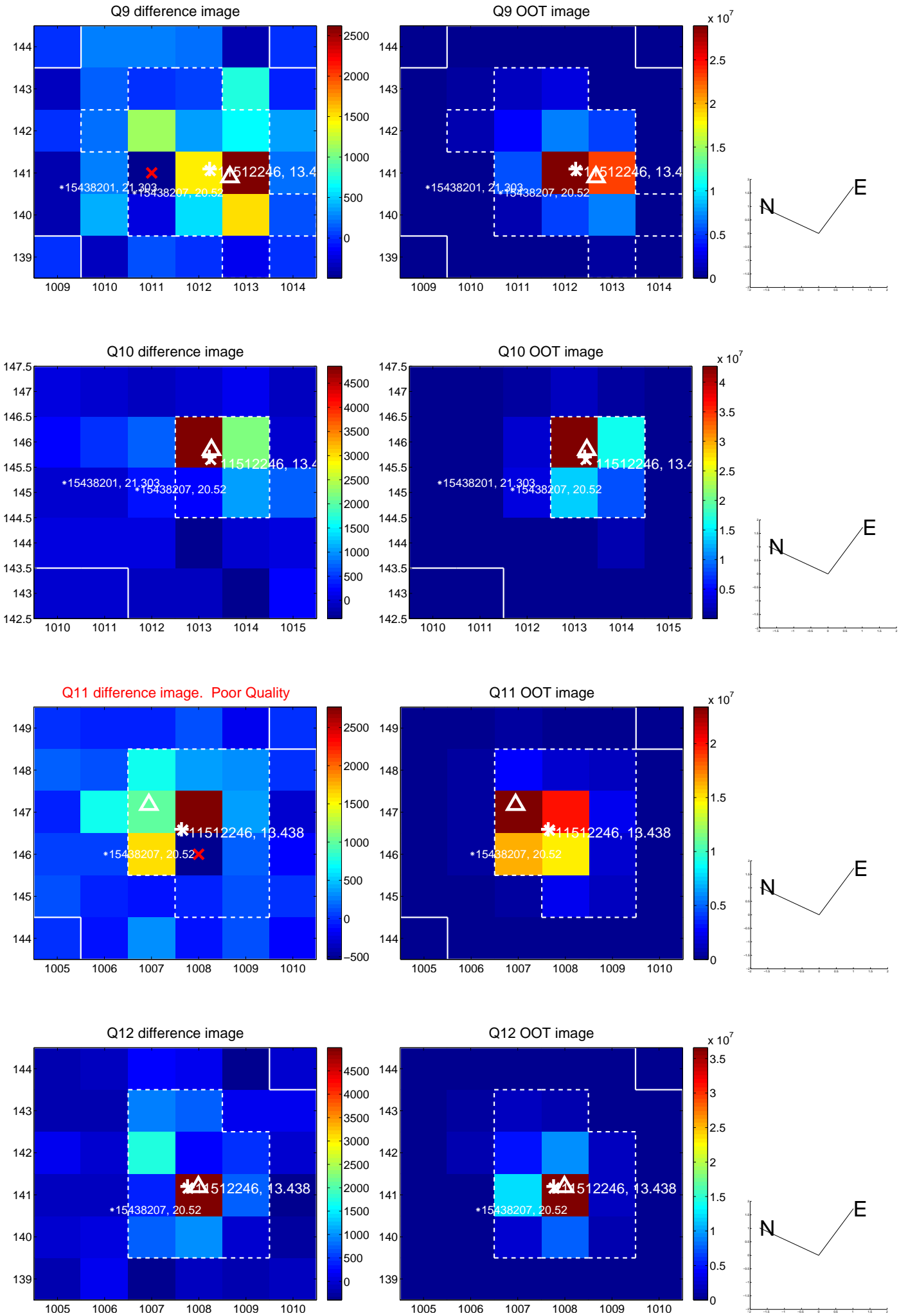
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



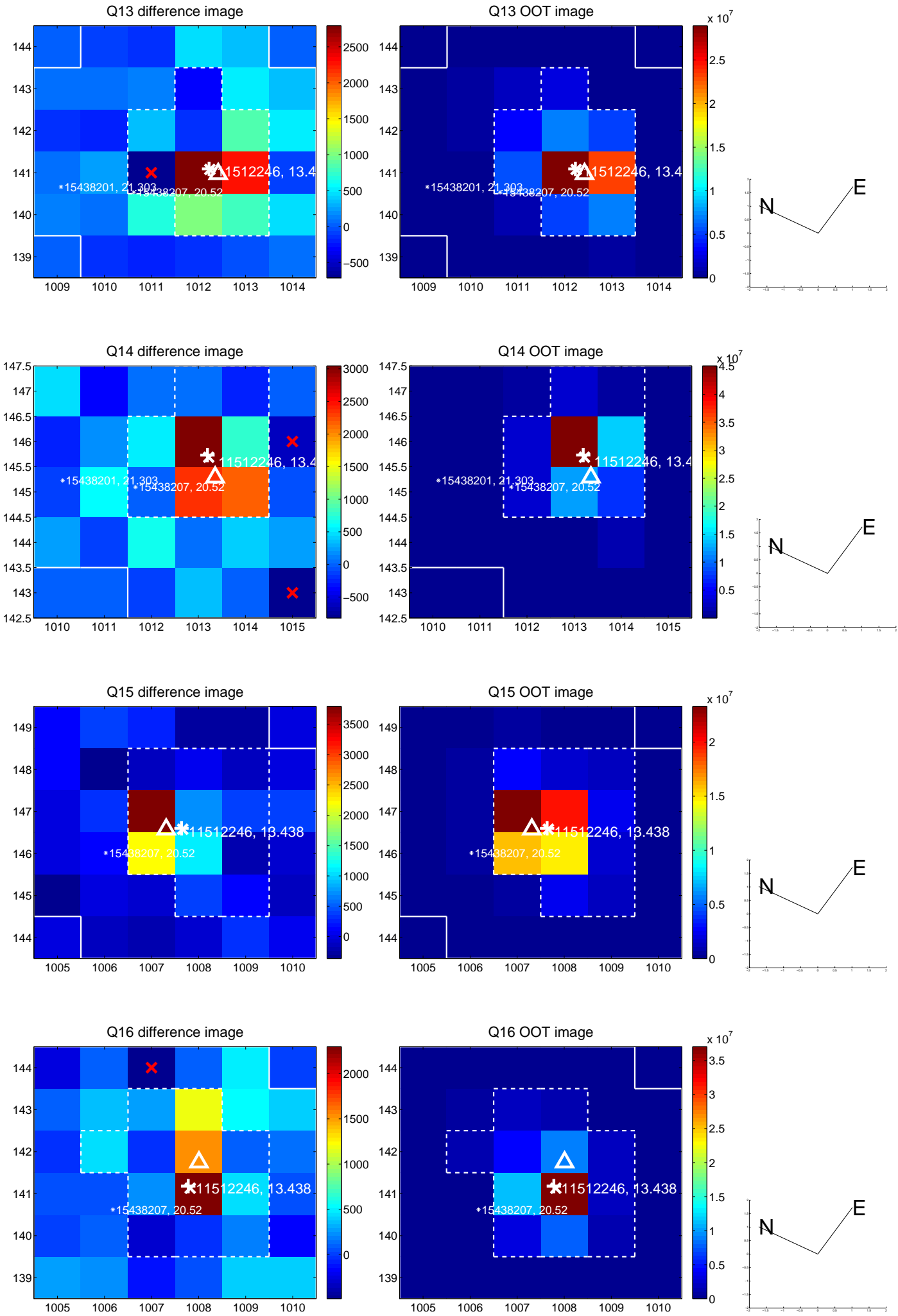
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

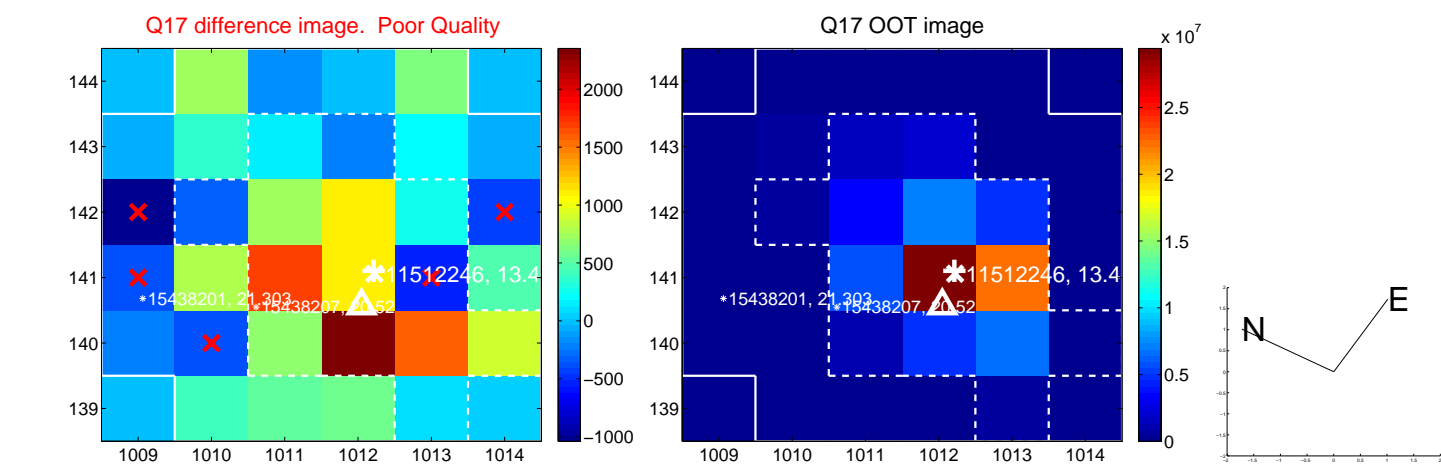


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

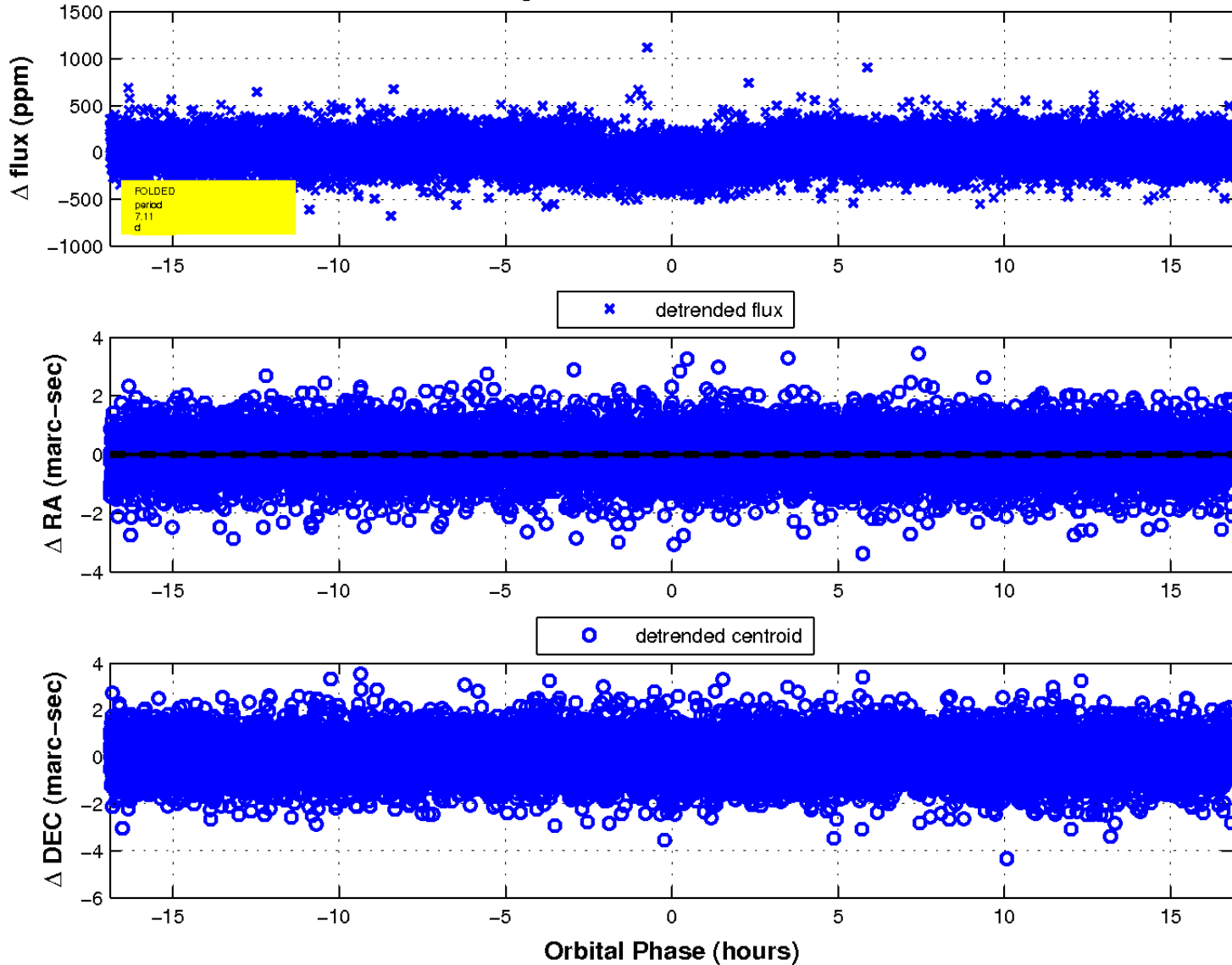




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 3 of 3



UKIRT Image

