

# KIC 011909375

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011909375-01	OBS	No	2.023012	132.326486	32.3	4.620	9.9	10.2	1.93	7338	1.42	7487.06
011909375-02	OBS	No	0.674418	131.833639	17.7	0.762	8.8	4.8	1.93	7338	0.83	32389.46

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011909375-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
011909375-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD

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

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

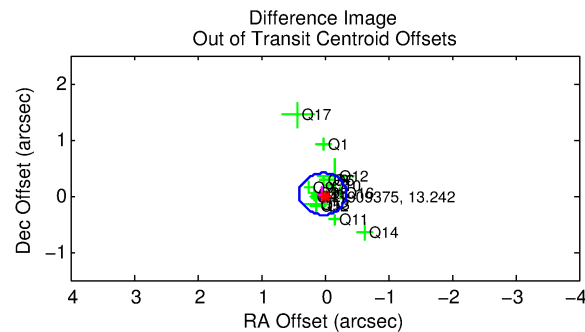
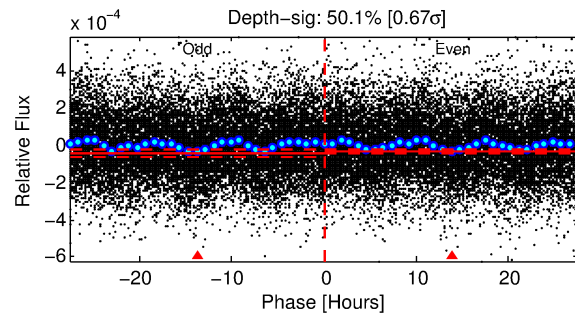
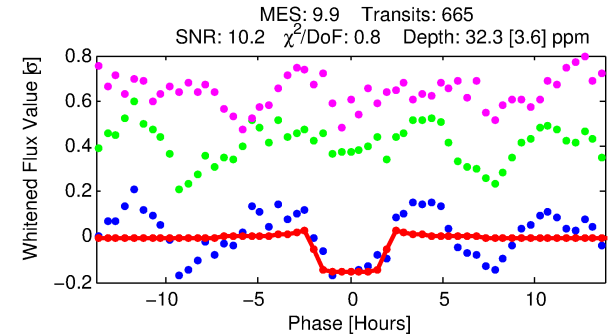
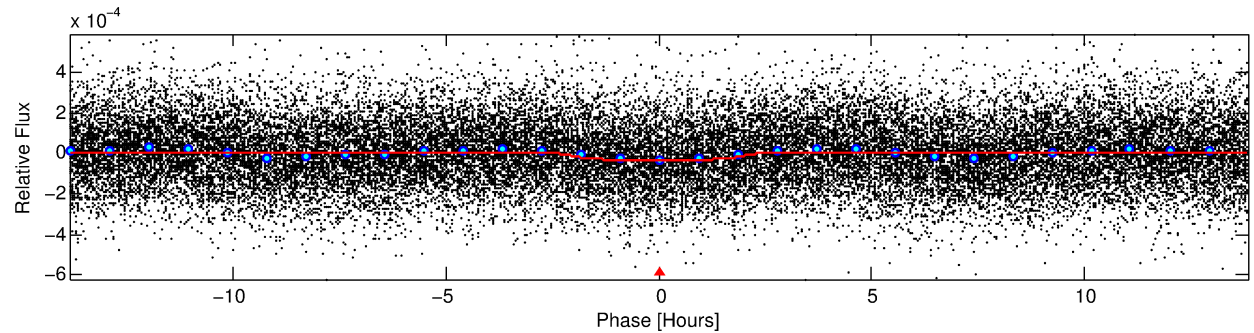
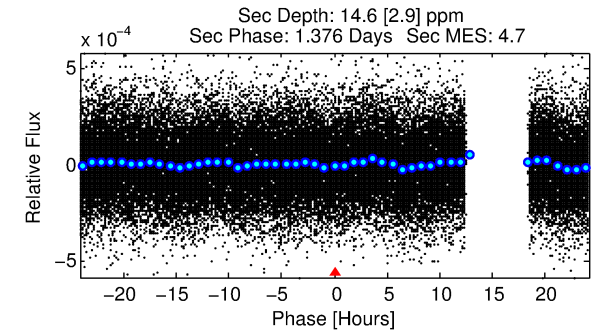
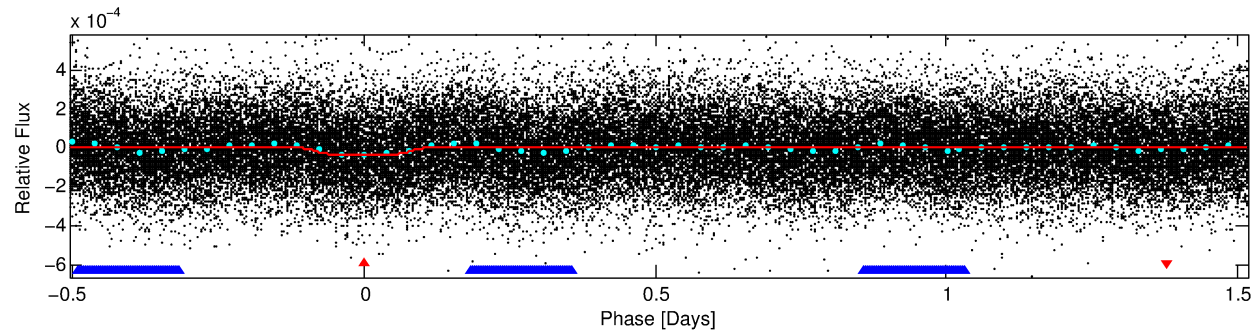
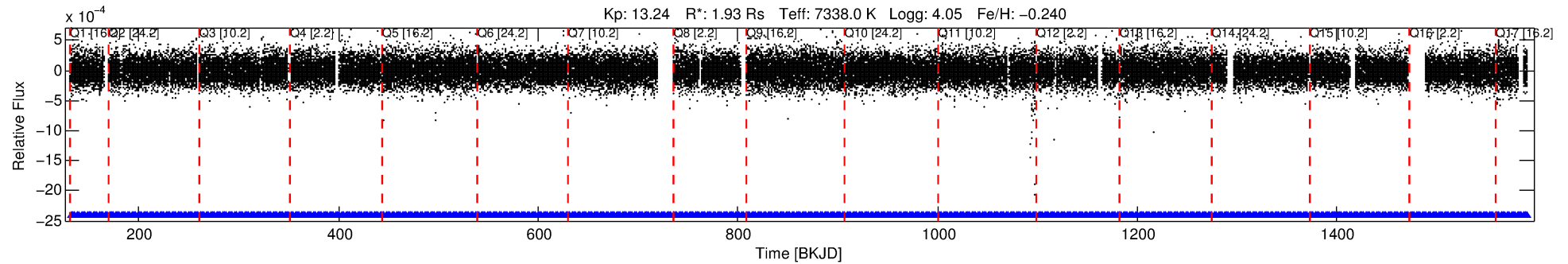
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 011909375-01

No Significant Match Found

# DV One-Page Summary

KIC: 11909375 Candidate: 1 of 2 Period: 2.023 d



## DV Fit Results:

Period = 2.02301 [0.00002] d  
Epoch = 132.3265 [0.0047] BKJD  
Rp/R\* = 0.0068 [0.0006]  
a/R\* = 1.26 [0.20]  
b = 0.98 [0.02]  
Seff = 7487.06 [3226.37]  
Teq = 2372 [256] K  
Rp = 1.42 [0.42] Re  
a = 0.0359 [0.0092] AU  
Ag = 5.11 [2.42] [1.69σ]  
Teffp = 5513 [426] K [6.32σ]

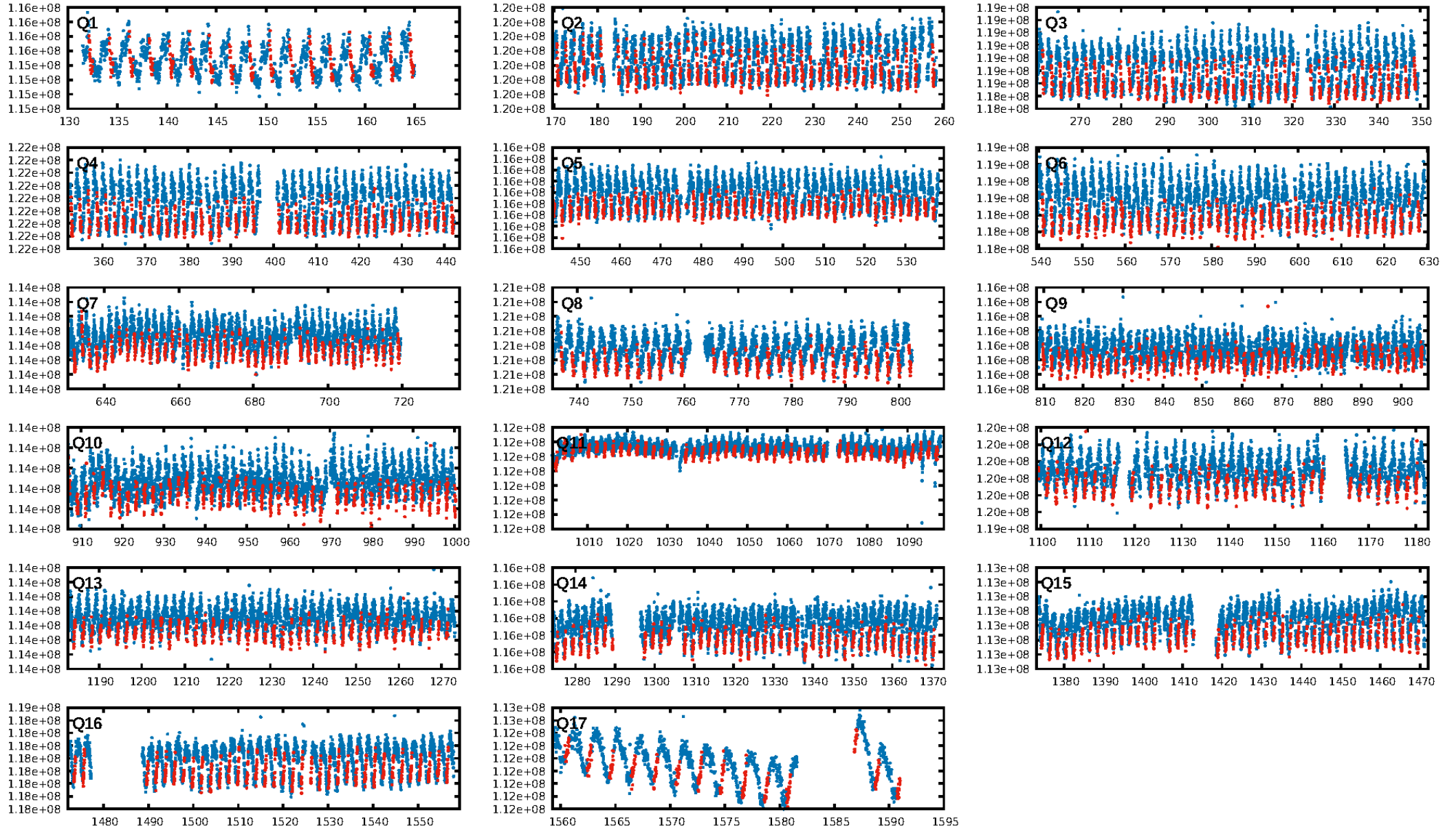
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [6.91σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 6.91e-19  
RollingBand-fgt: 1.00 [634/634]  
GhostDiagnostic-chr: 1.445  
Centroid-sig: 4.6%  
Centroid-so: 1.150 arcsec [1.40σ]  
OotOffset-rm: 0.045 arcsec [0.36σ]  
KicOffset-rm: 0.090 arcsec [1.05σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.00 [0/17]

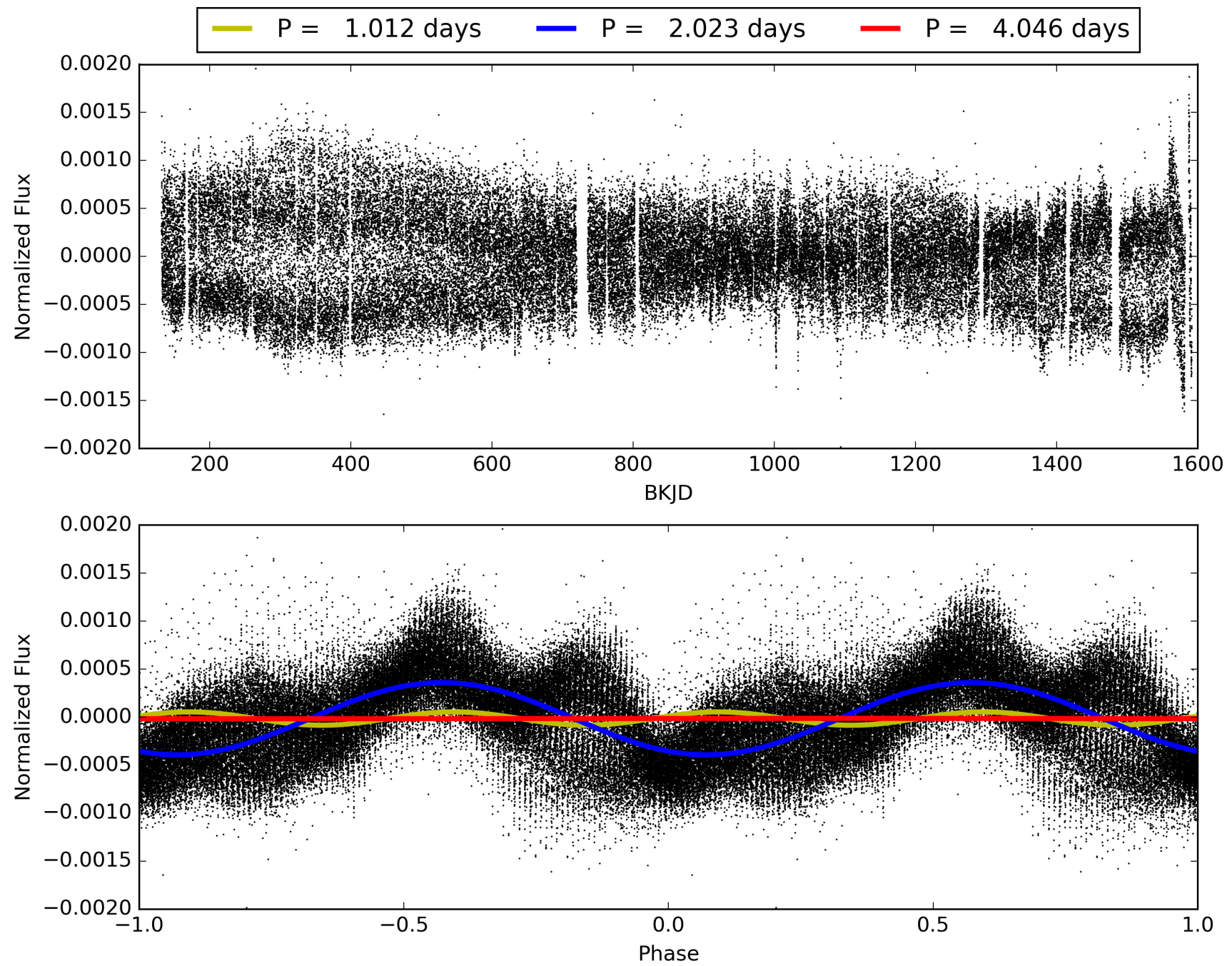
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 13:00:31 Z

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

# TCE 011909375-01, PDC Light Curves



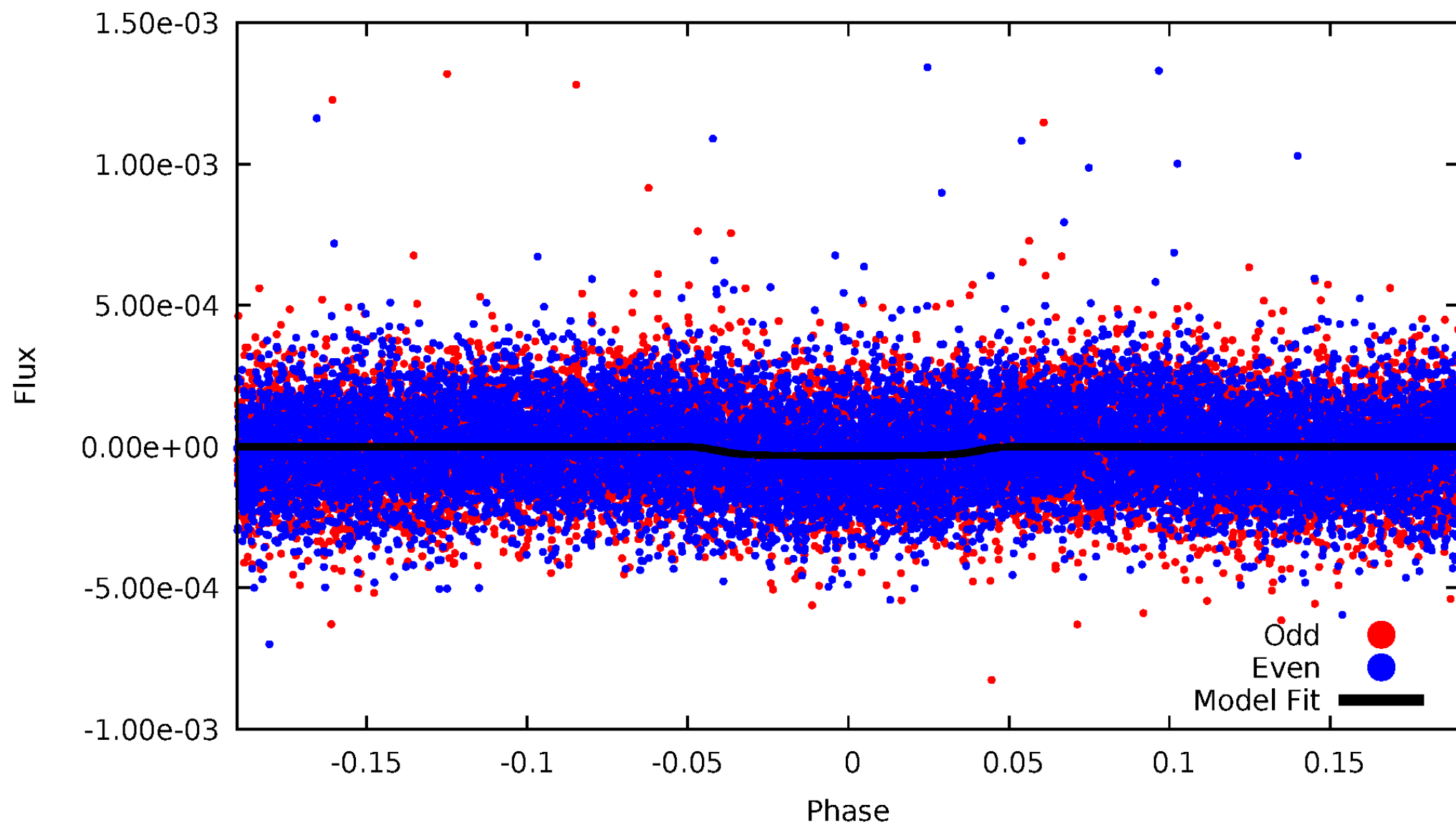
# TCE 011909375-01





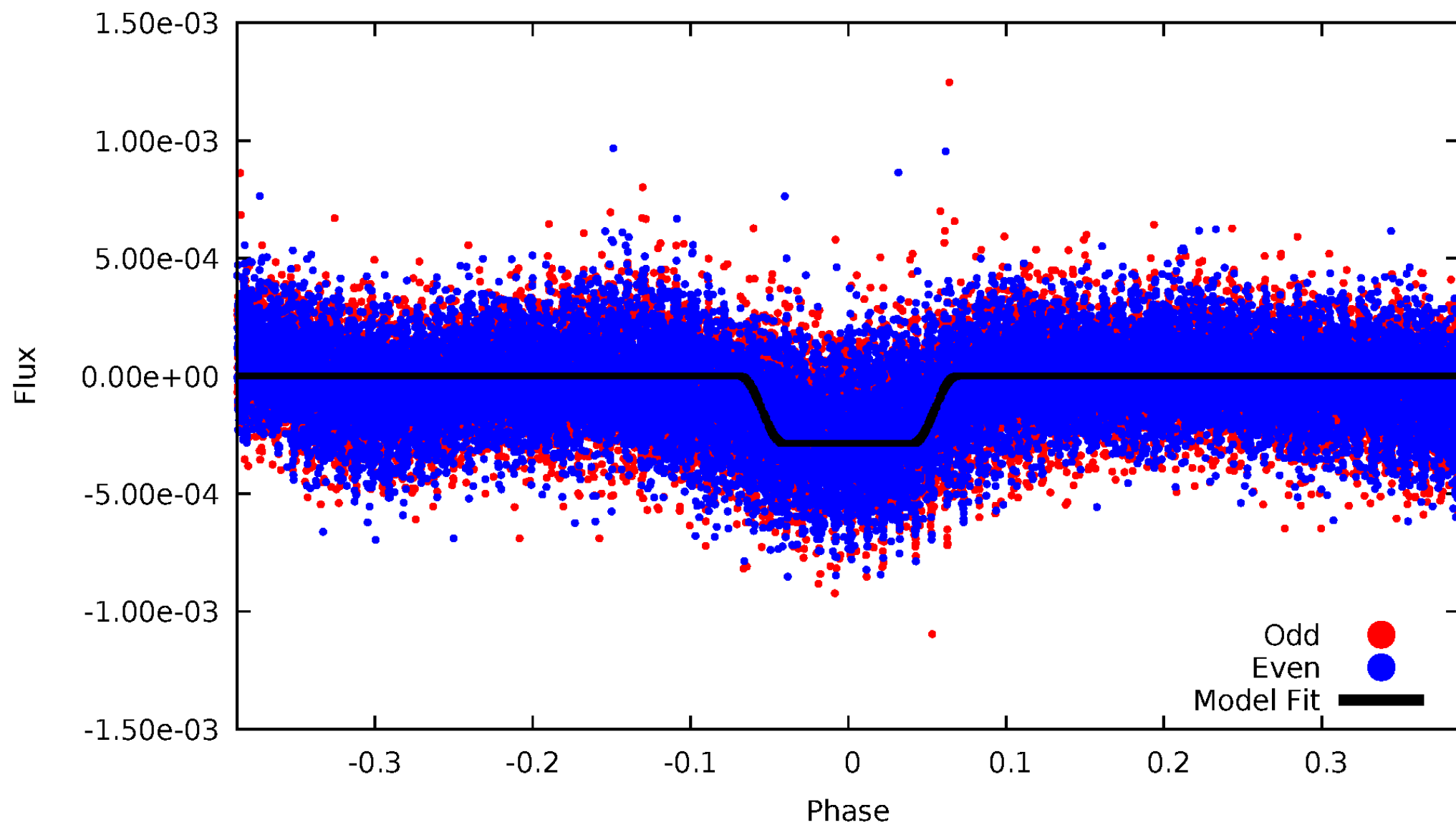
# DV Odd/Even

TCE 011909375-01



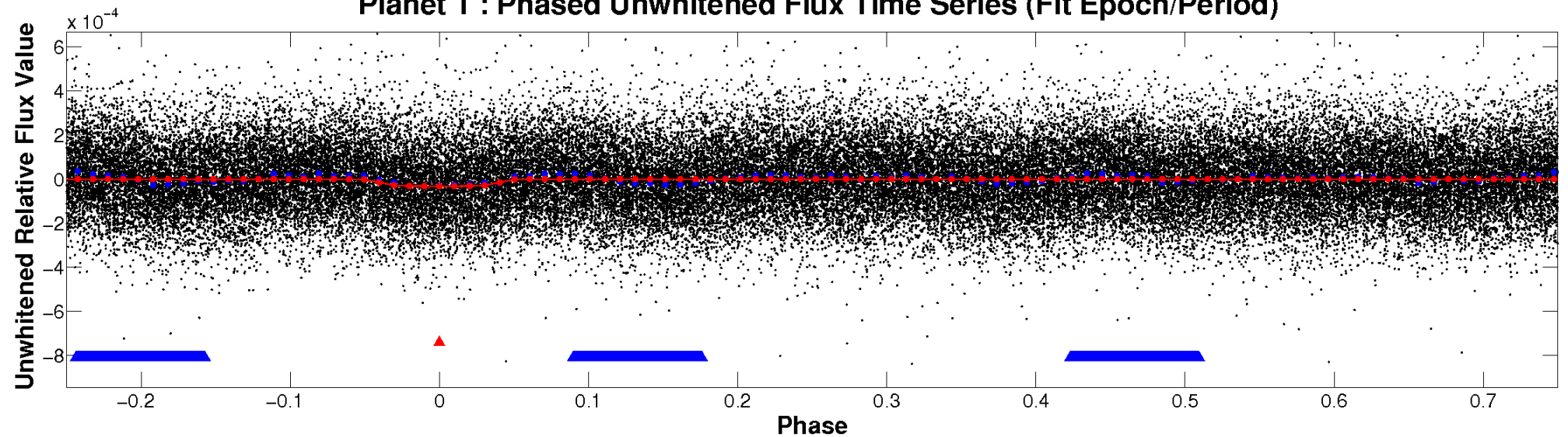
# ALT Odd/Even

TCE 011909375-01

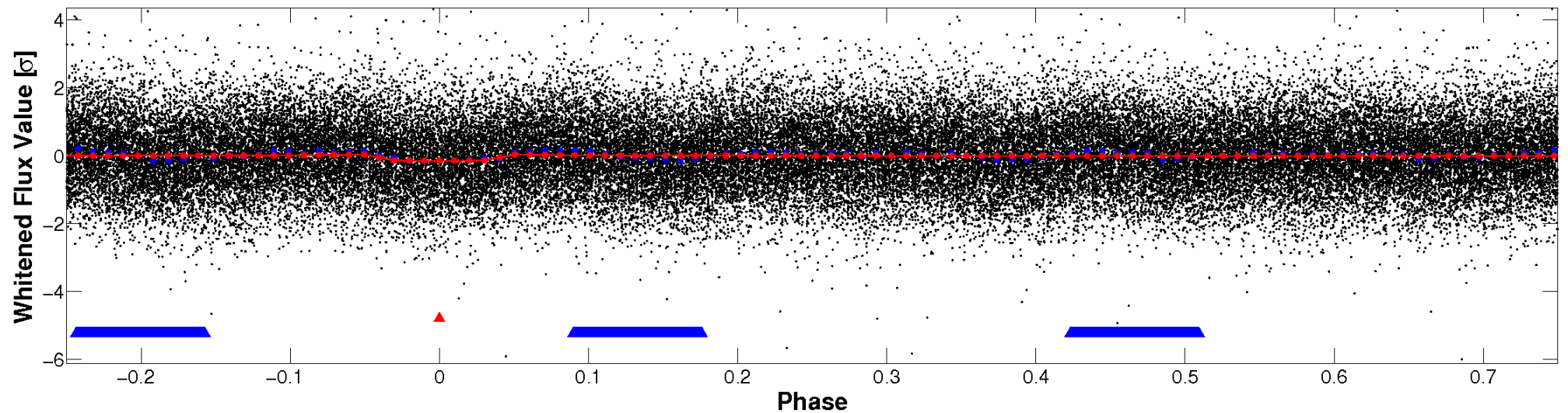


# Non-Whitened Vs. Whitened Light Curve

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

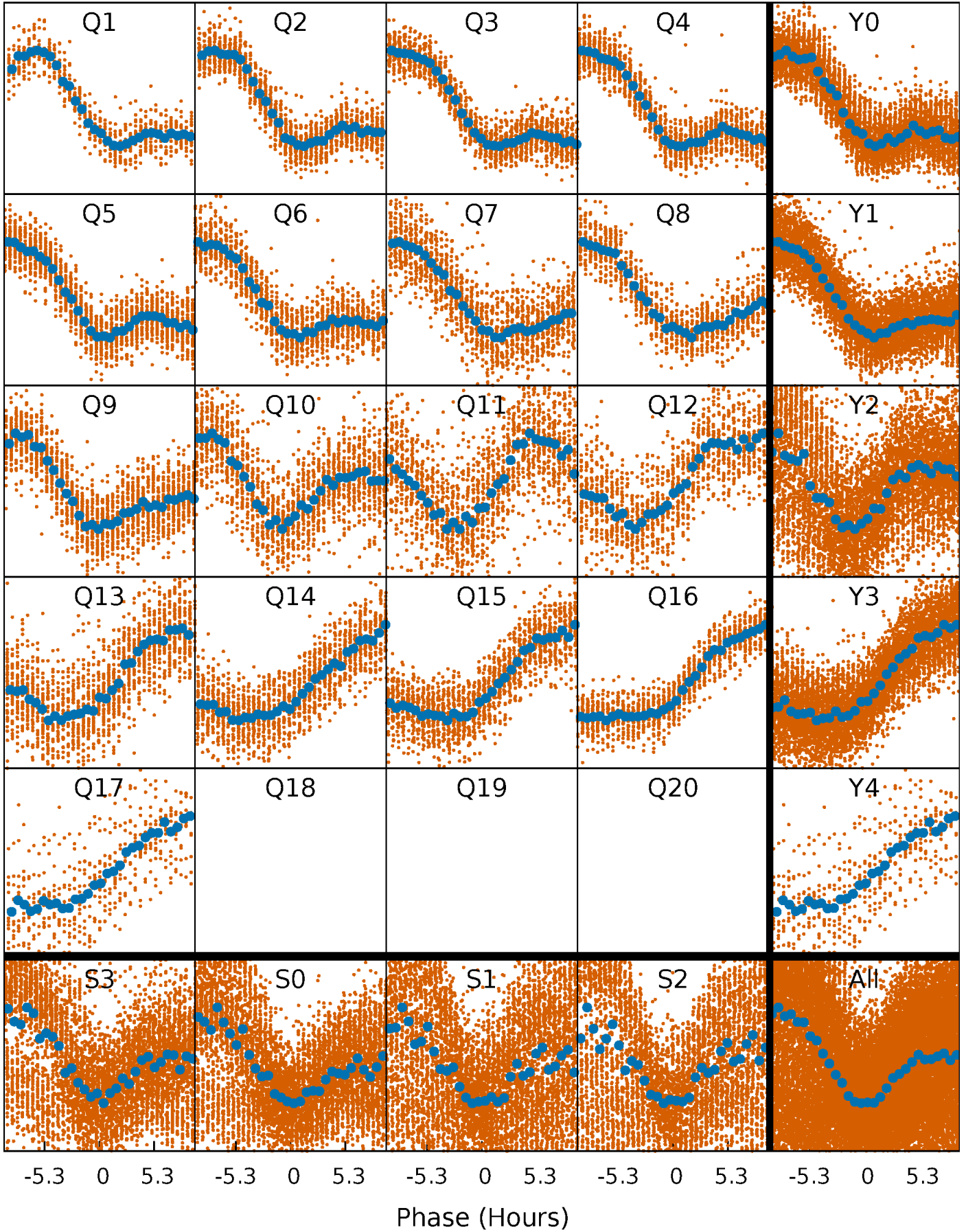


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

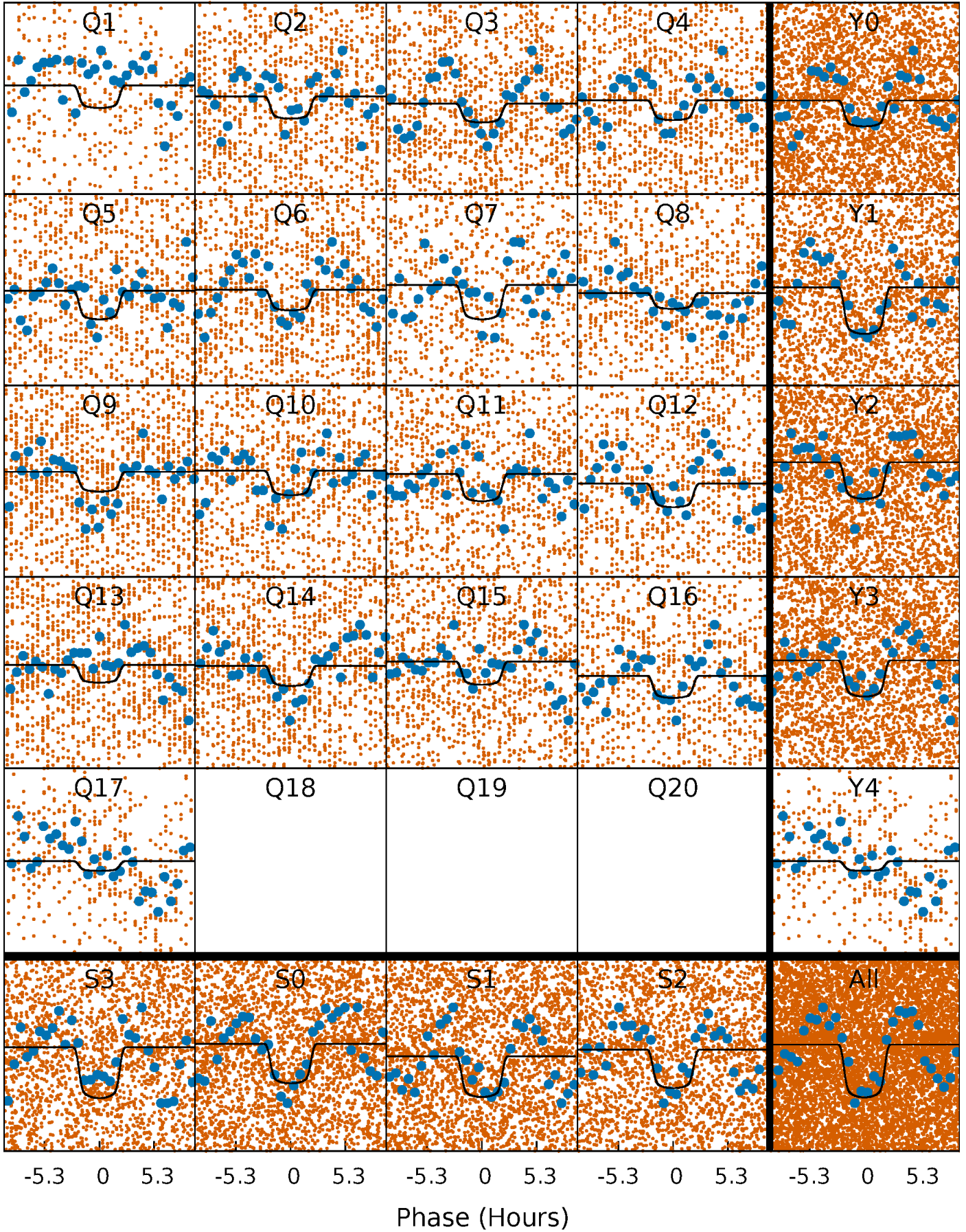
TCE 011909375-01 P= 2.023012 Days  $T_0=132.326486$  (BKJD)





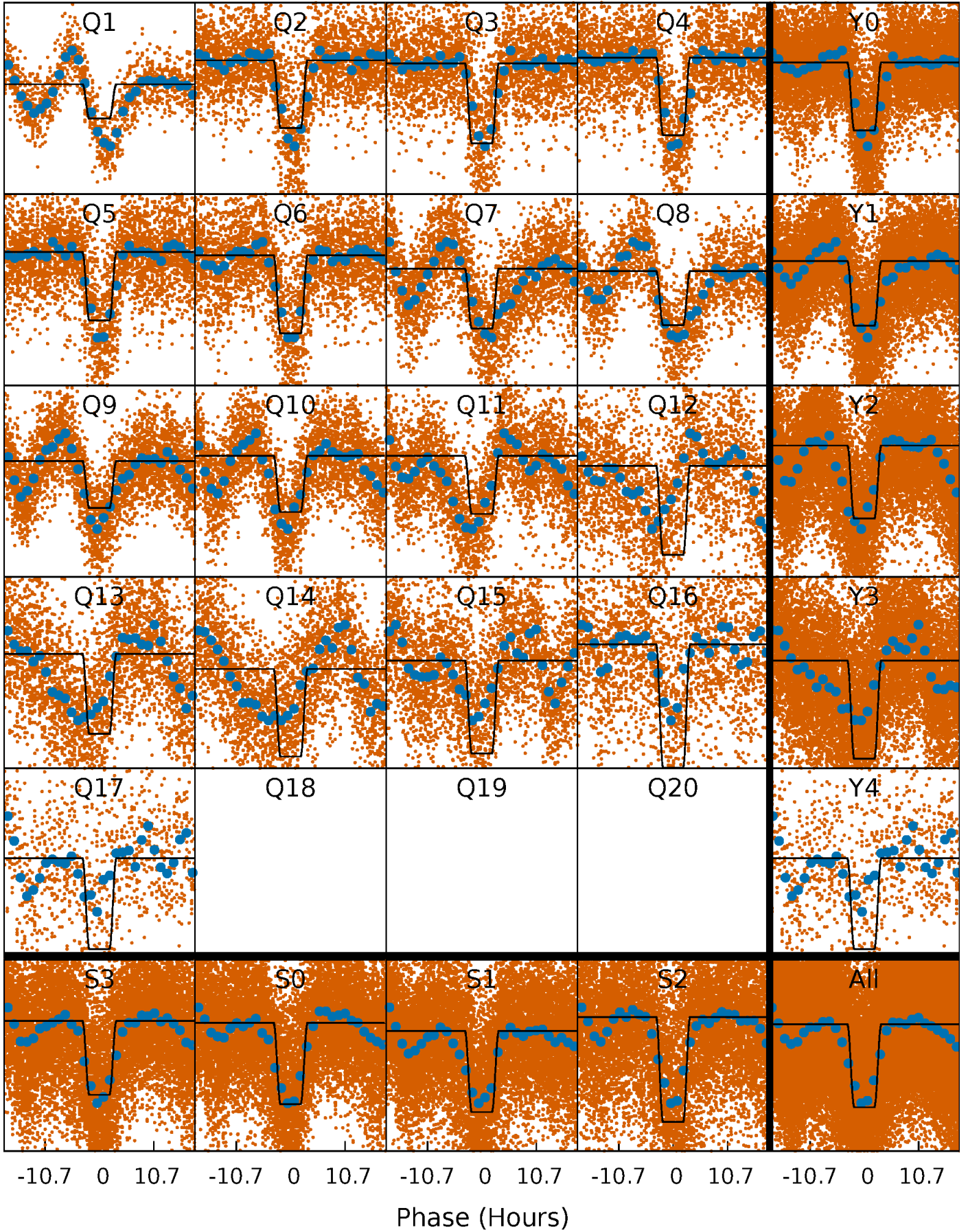
# DV Quarter-Phased Transit Curves

TCE 011909375-01 P= 2.023012 Days  $T_0=132.326486$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

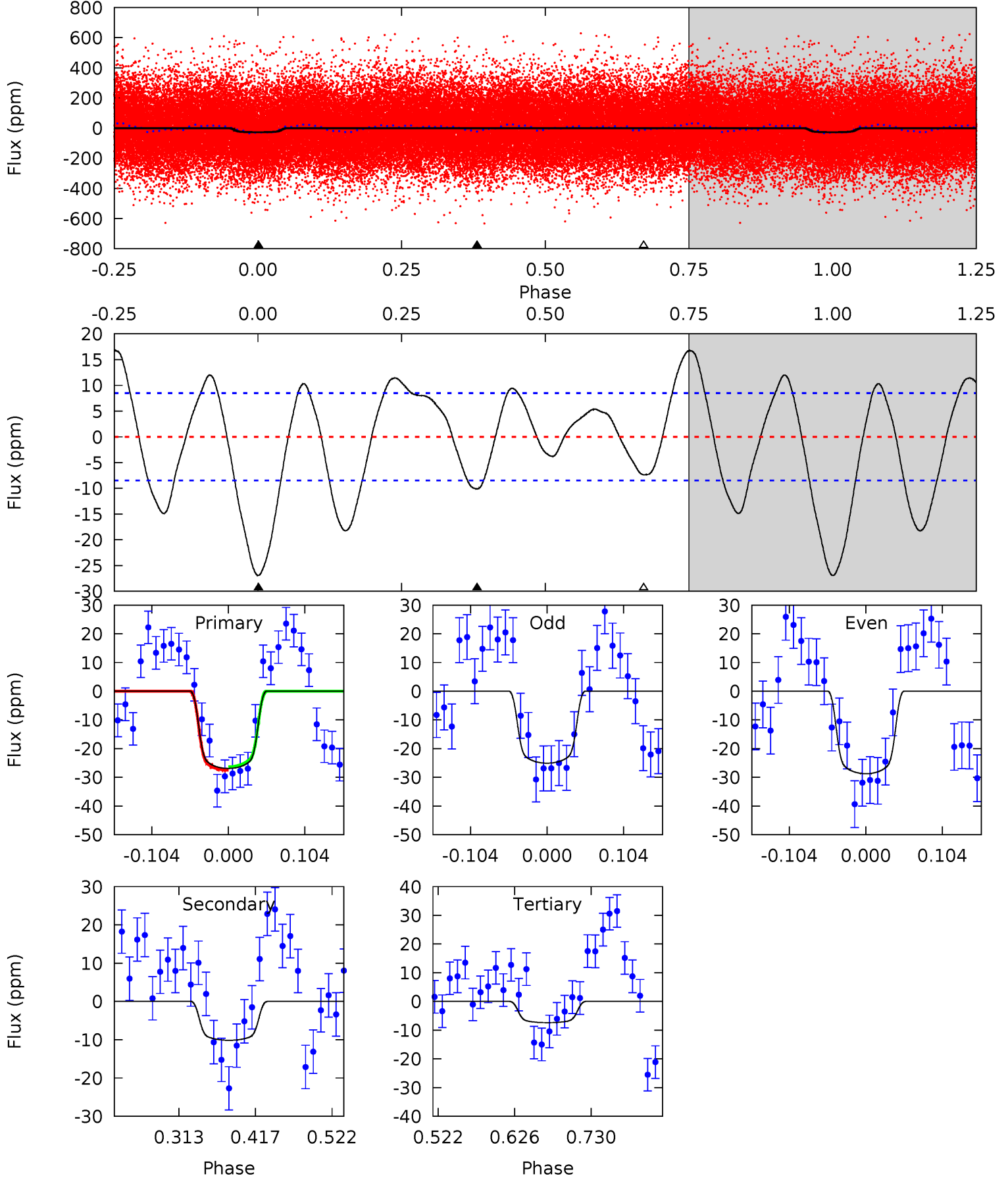
TCE 011909375-01 P= 2.023045 Days  $T_0=132.304033$  (BKJD)



# DV Model-Shift Uniqueness Test

011909375-01, P = 2.023012 Days, E = 130.303474 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
14.4	5.44	3.97	0	4.56	1.62	4.68	10.5	14.4	1.47	5.44	0.98	1.00	0.38	0.31

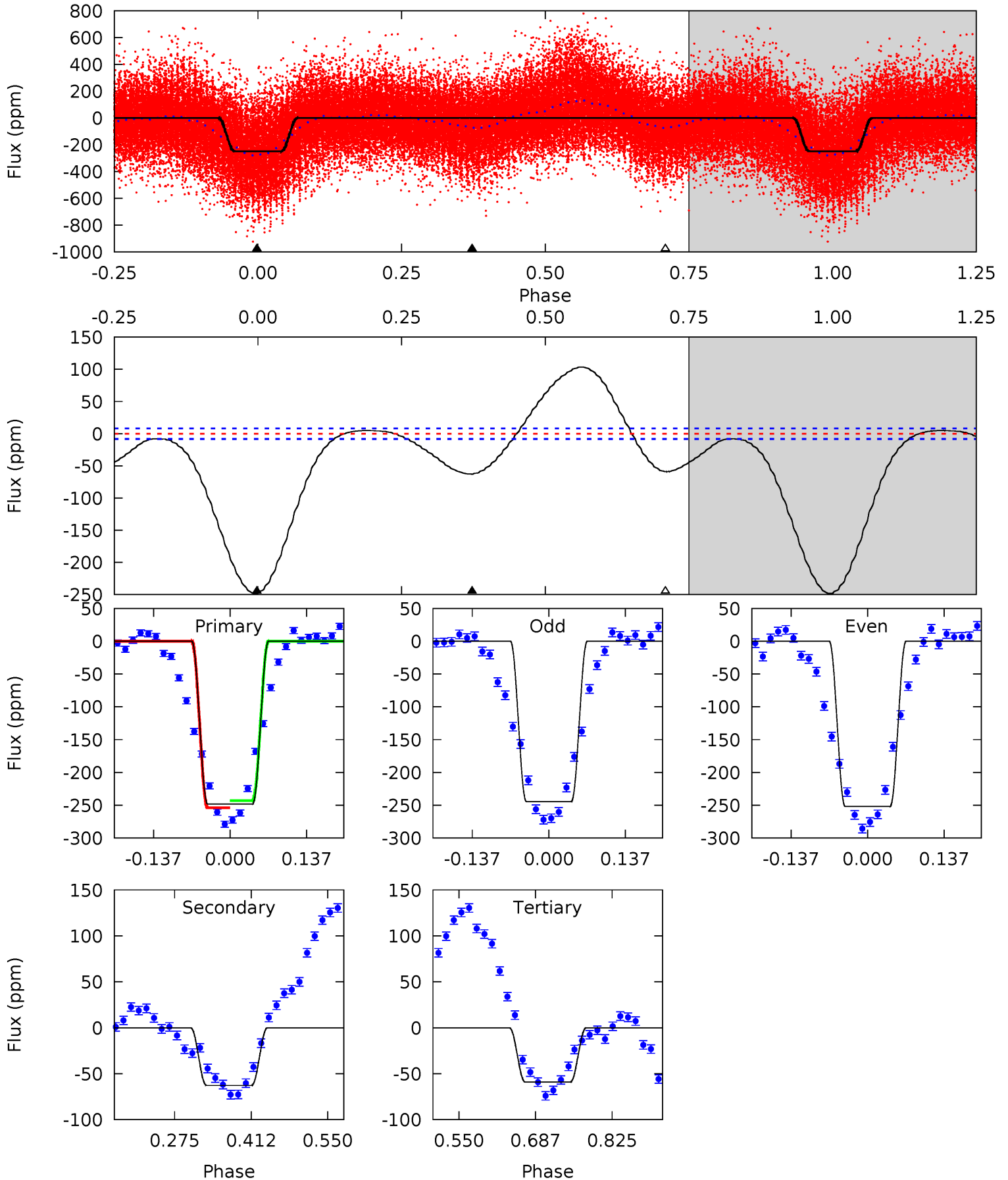




# Alt Model-Shift Uniqueness Test

011909375-01, P = 2.023045 Days, E = 130.280988 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
137.1	34.7	32.7	0	4.50	1.49	27.9	104.4	137.1	2.02	34.7	2.04	0.97	0.29	3.35





### Stellar Parameters For KIC 011909375

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7338^{+230}_{-307}$	$4.046^{+0.228}_{-0.171}$	$-0.240^{+0.250}_{-0.350}$	$1.926^{+0.542}_{-0.542}$	$1.503^{+0.209}_{-0.279}$	$0.296^{+0.392}_{-0.137}$
	+3%/-4%	+6%/-4%	+104%/-146%	+28%/-28%	+14%/-19%	+132%/-46%
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 011909375-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-10 \pm 2$	$1.40^{+0.27}_{-0.23}$	$3275^{+269}_{-273}$	$4919^{+345}_{-310}$	$3.576^{+1.637}_{-1.205}$
Alt.	$-63 \pm 2$	$3.53^{+0.58}_{-0.54}$	$3292^{+258}_{-275}$	$4928^{+147}_{-151}$	$3.525^{+1.260}_{-0.834}$

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

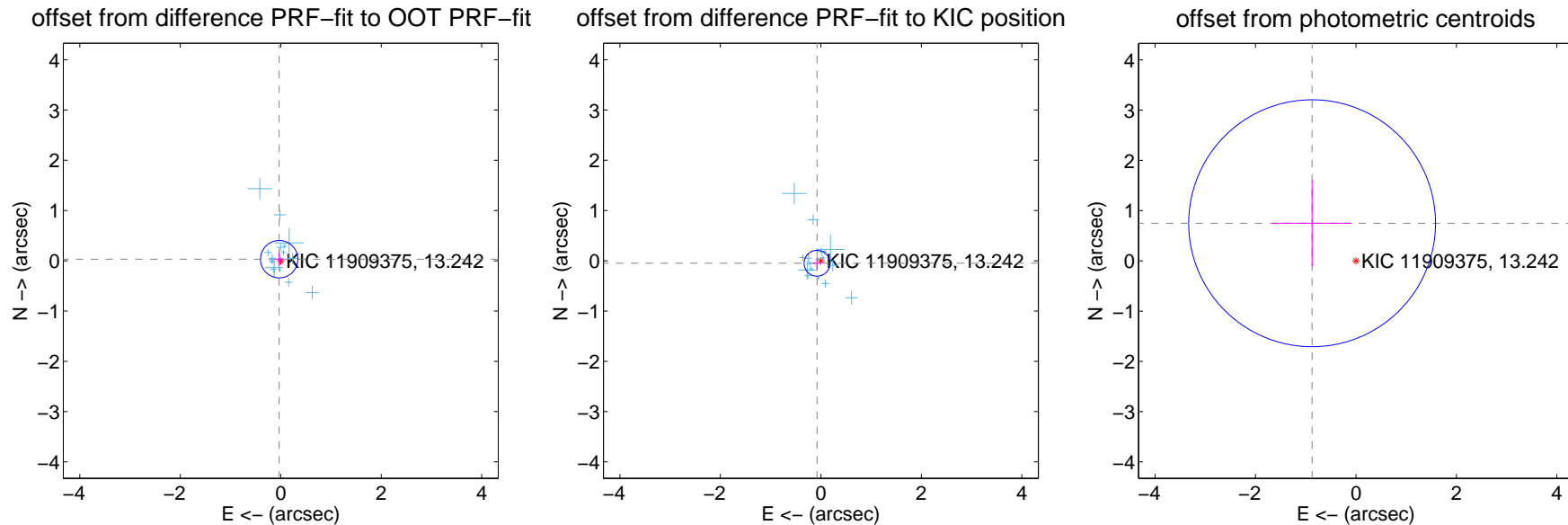
## DV Centroid Data

Supplemental centroid analysis for 011909375-01. Kepler magnitude: 13.24. Transit SNR 10.23

There are 17 quarters with good PRF difference image offsets

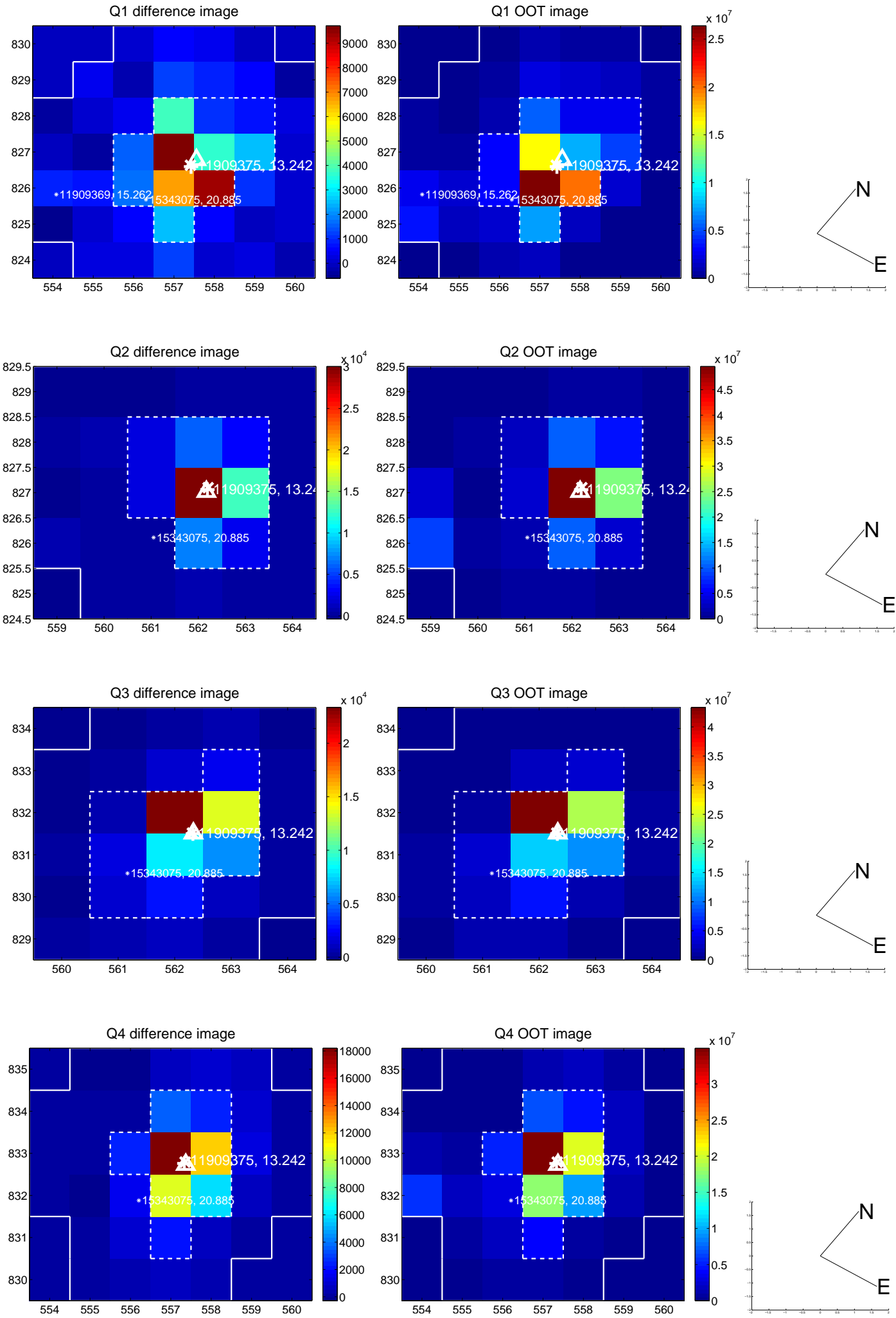
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.045 \pm 0.124$	0.36	$0.031 \pm 0.086$	$0.032 \pm 0.131$
PRF-fit source offset from KIC position	$0.090 \pm 0.086$	1.05	$0.076 \pm 0.091$	$-0.049 \pm 0.131$
photometric centroid source offset	$1.15 \pm 0.82$	1.40	$0.87 \pm 0.79$	$0.75 \pm 0.86$

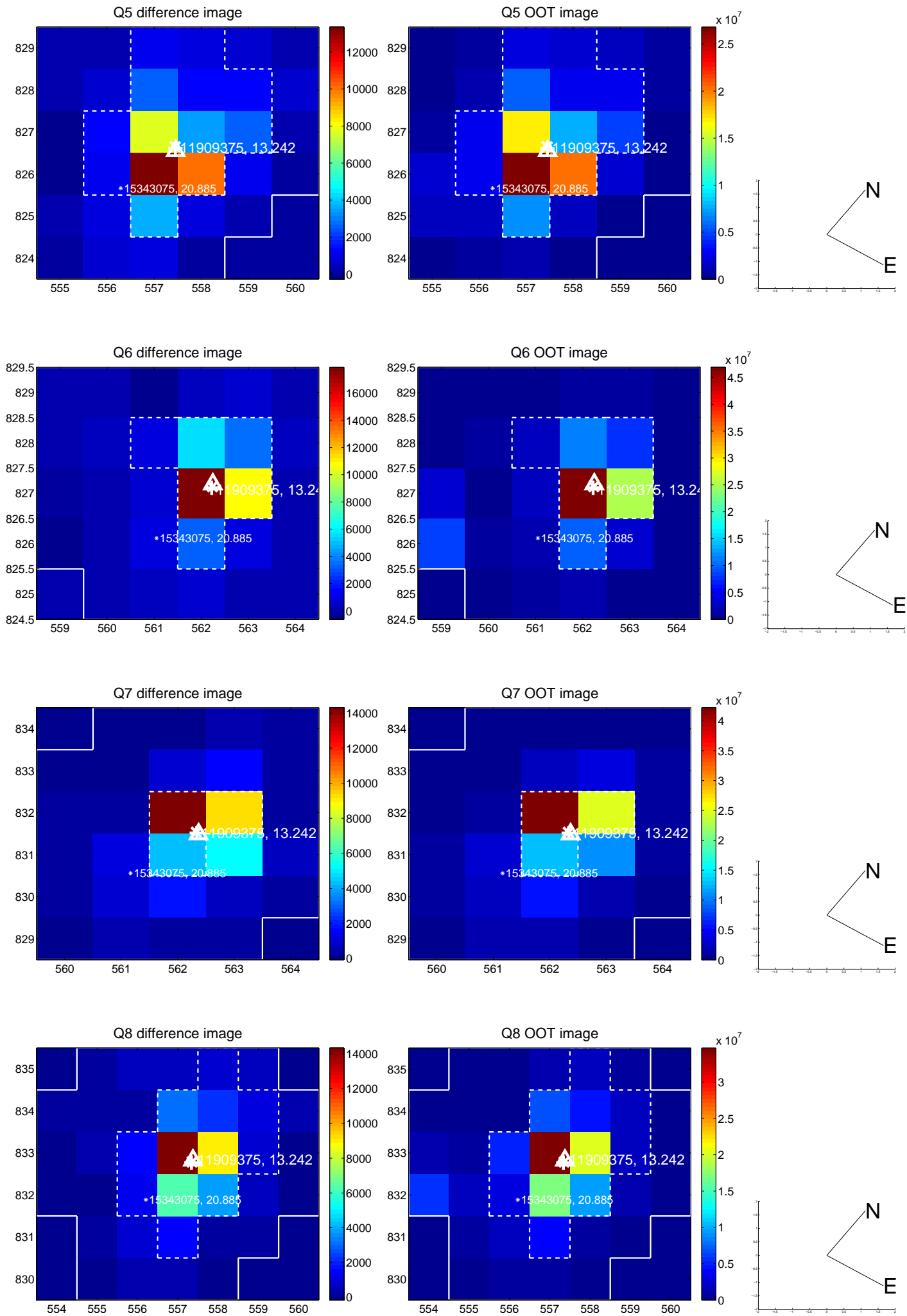


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

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

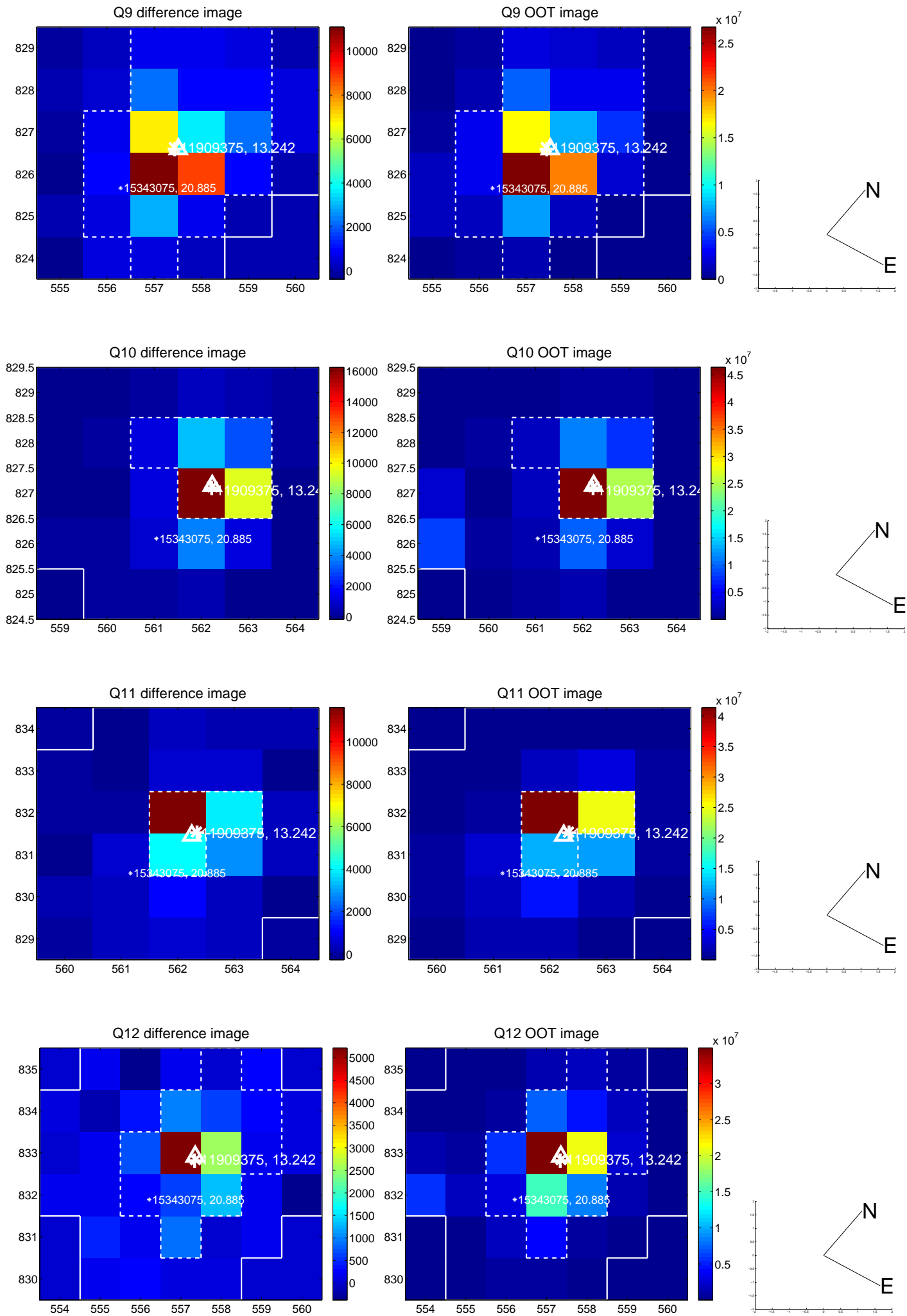


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

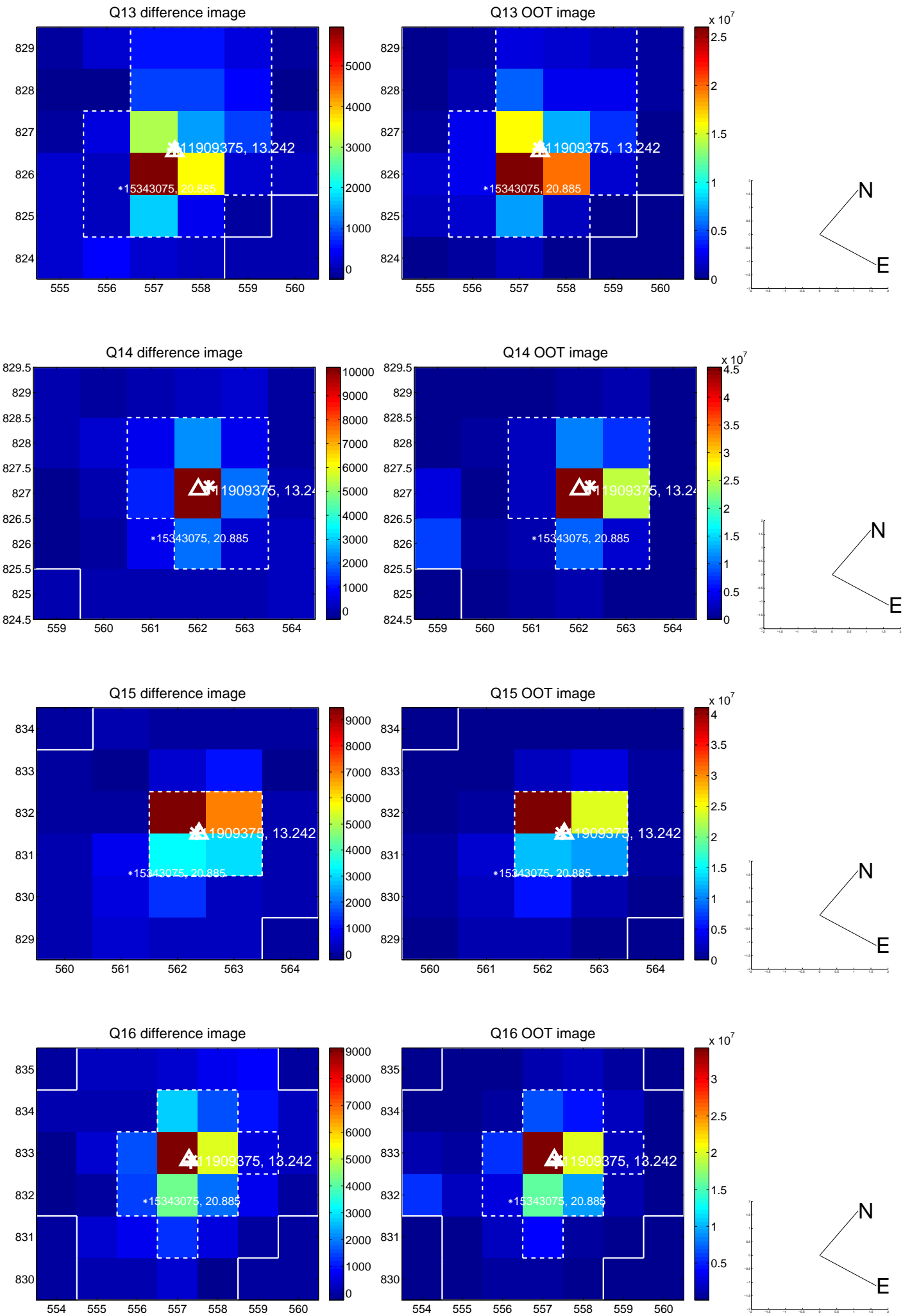




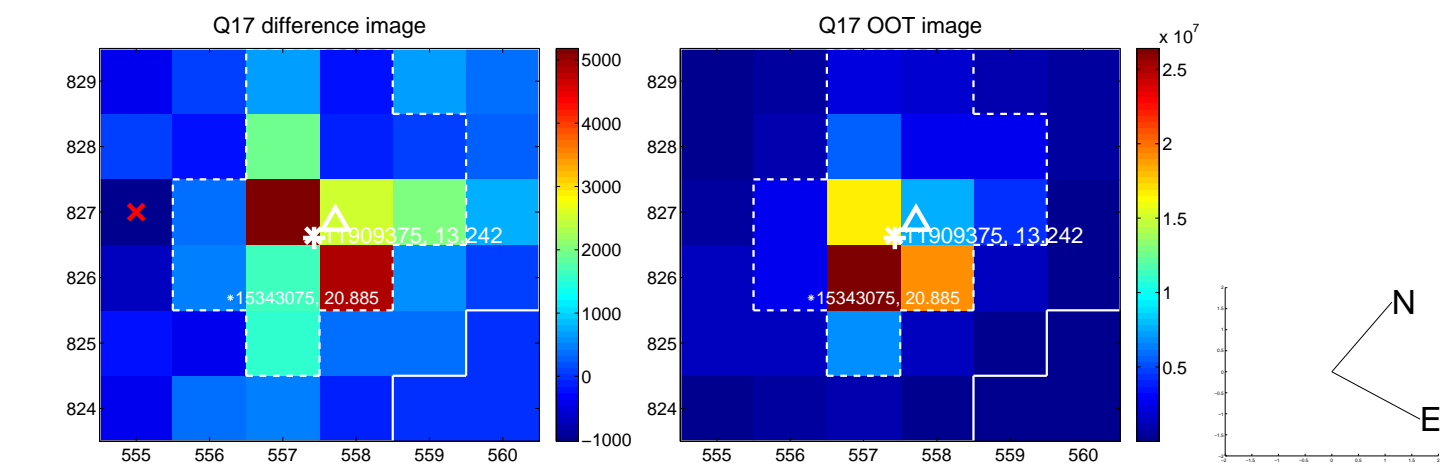
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



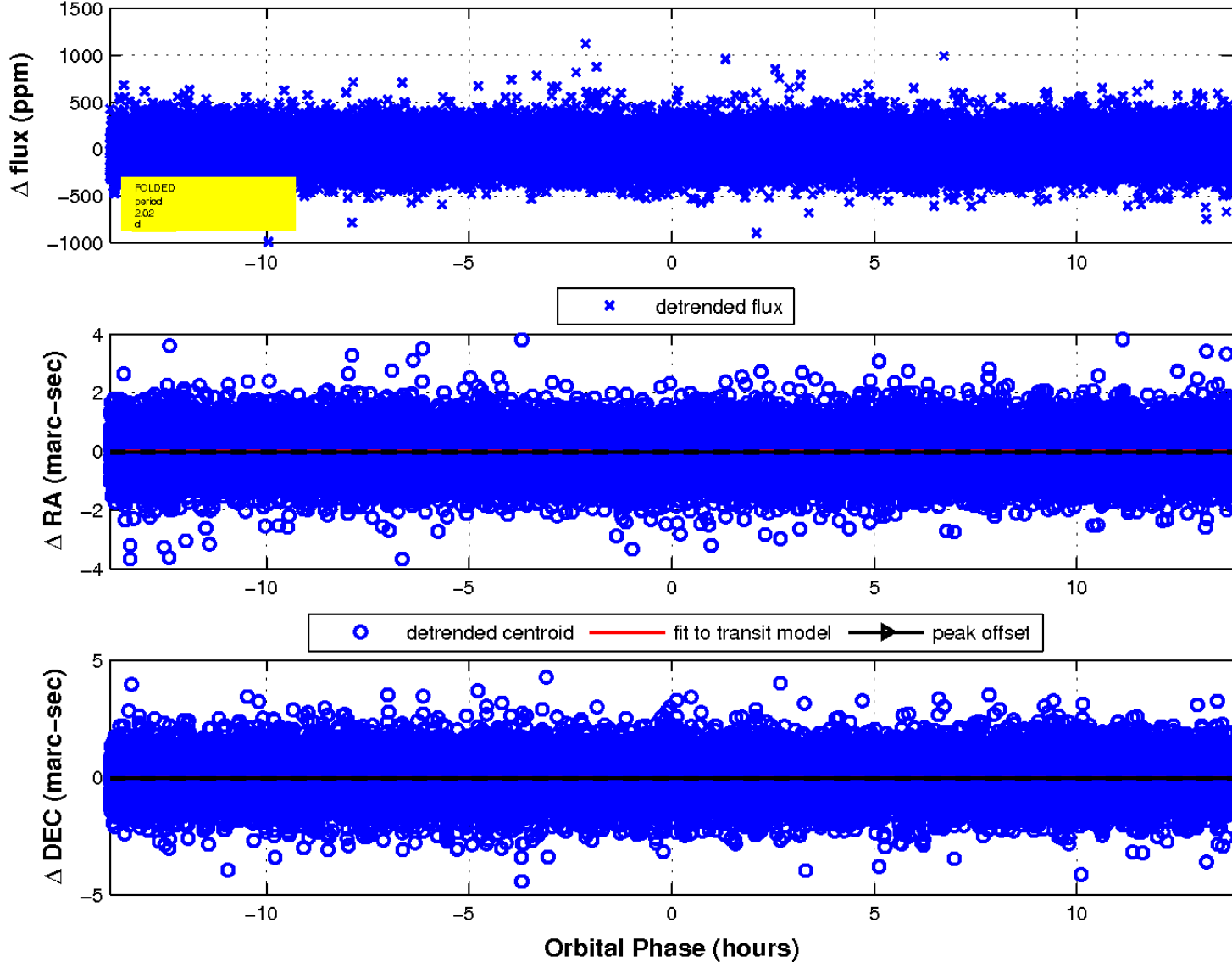
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

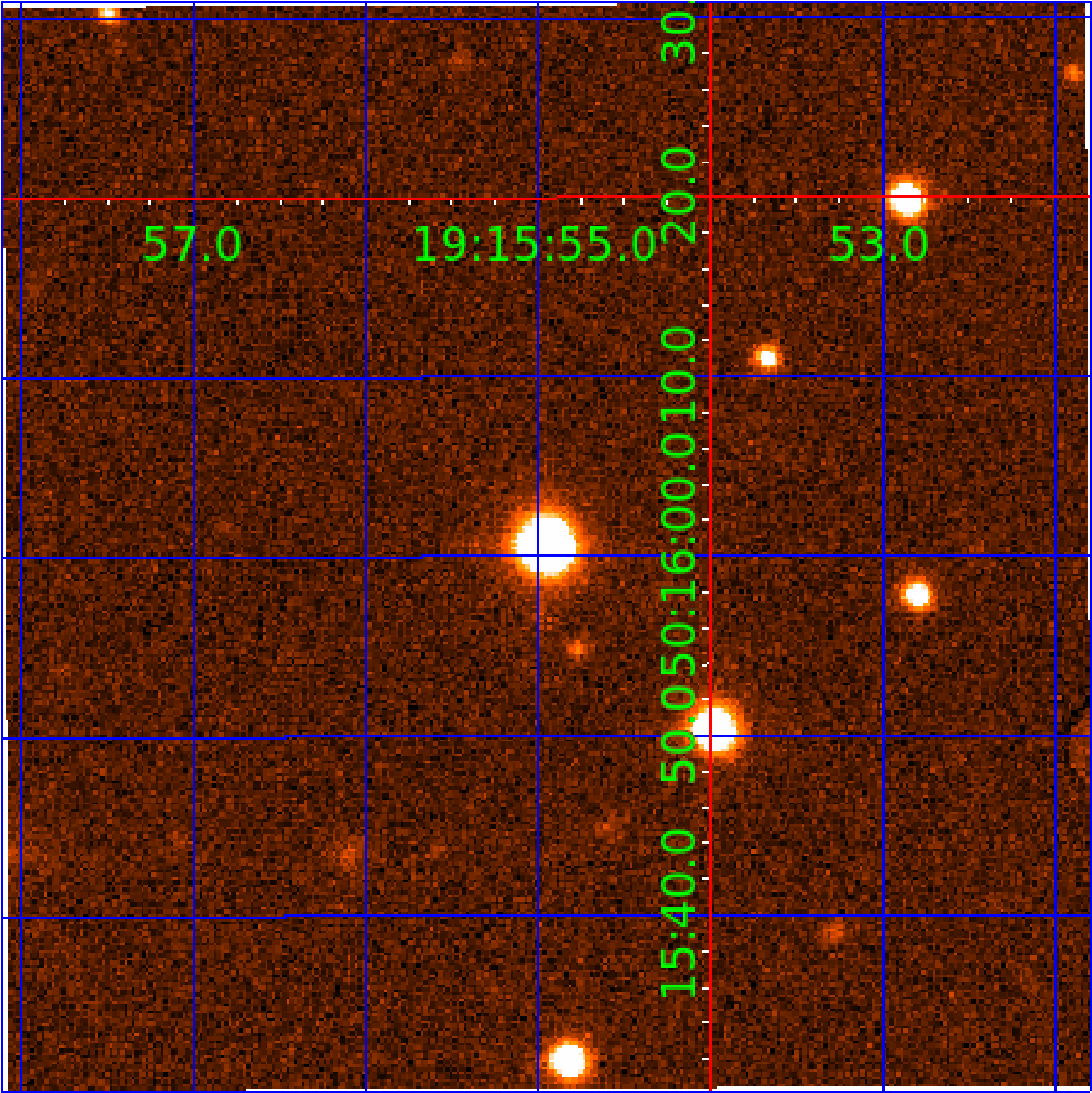


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 011909375

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011909375-01	OBS	No	2.023012	132.326486	32.3	4.620	9.9	10.2	1.93	7338	1.42	7487.06
011909375-02	OBS	No	0.674418	131.833639	17.7	0.762	8.8	4.8	1.93	7338	0.83	32389.46

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011909375-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
011909375-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD

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

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

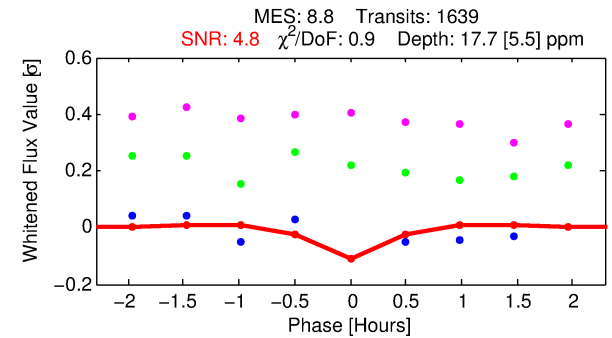
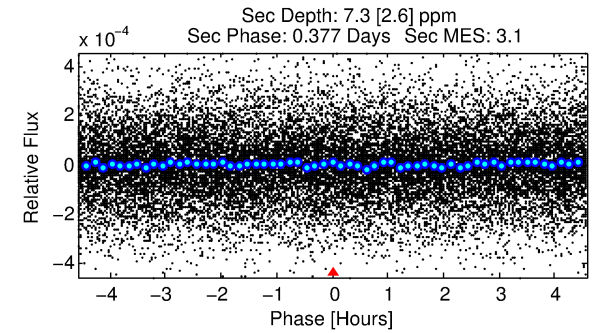
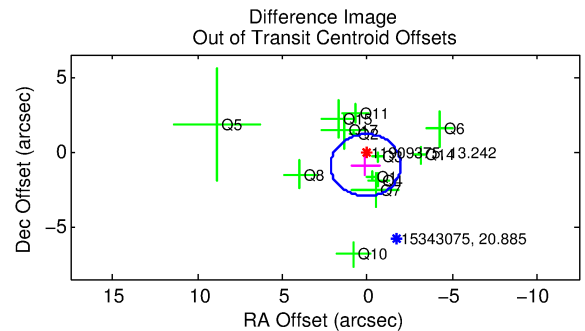
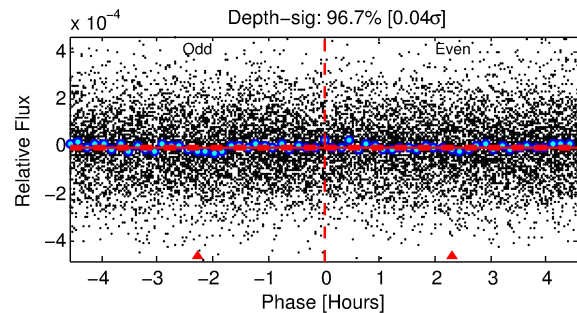
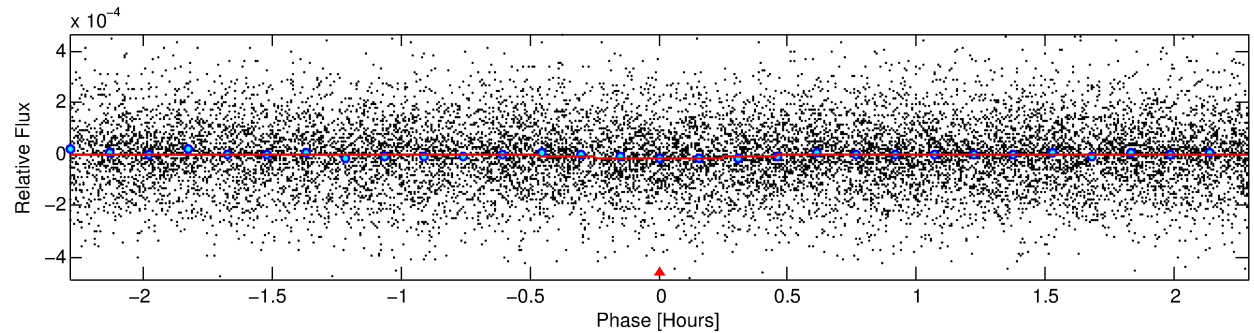
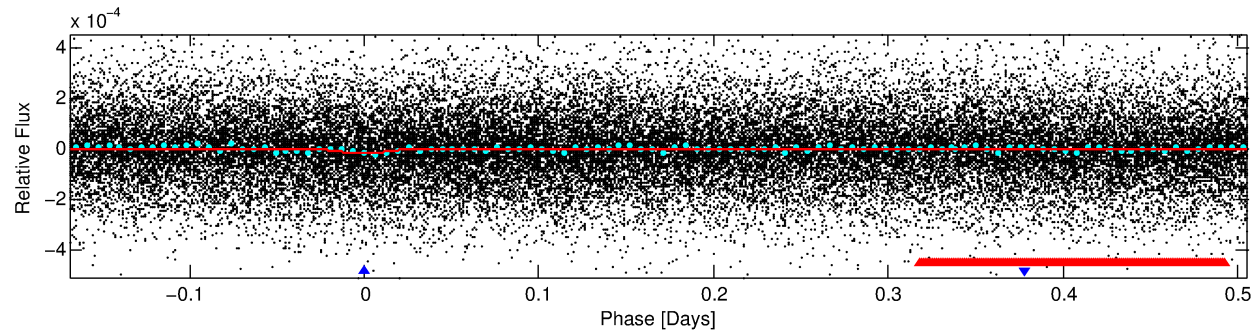
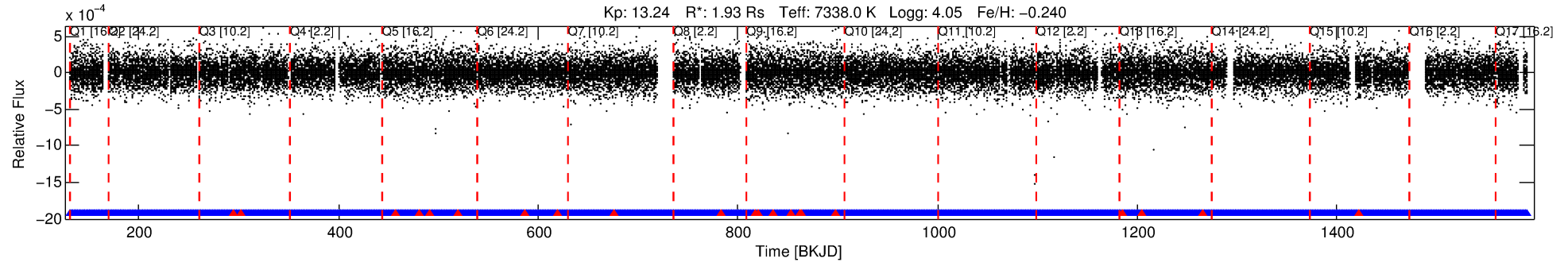
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 011909375-02

No Significant Match Found

# DV One-Page Summary

KIC: 11909375 Candidate: 2 of 2 Period: 0.674 d



## DV Fit Results:

Period = 0.67442 [0.00002] d  
Epoch = 131.8336 [0.0030] BKJD  
Rp/R\* = 0.0040 [0.0037]  
a/R\* = 6.54 [33.34]  
b = 0.28 [16.92]  
Seff = 32389.46 [13957.46]  
Teq = 3421 [369] K  
Rp = 0.84 [0.81] Re  
a = 0.0172 [0.0044] AU  
Ag = 1.72 [3.30] [0.22 $\sigma$ ]  
Teffp = 6053 [2858] K [0.91 $\sigma$ ]

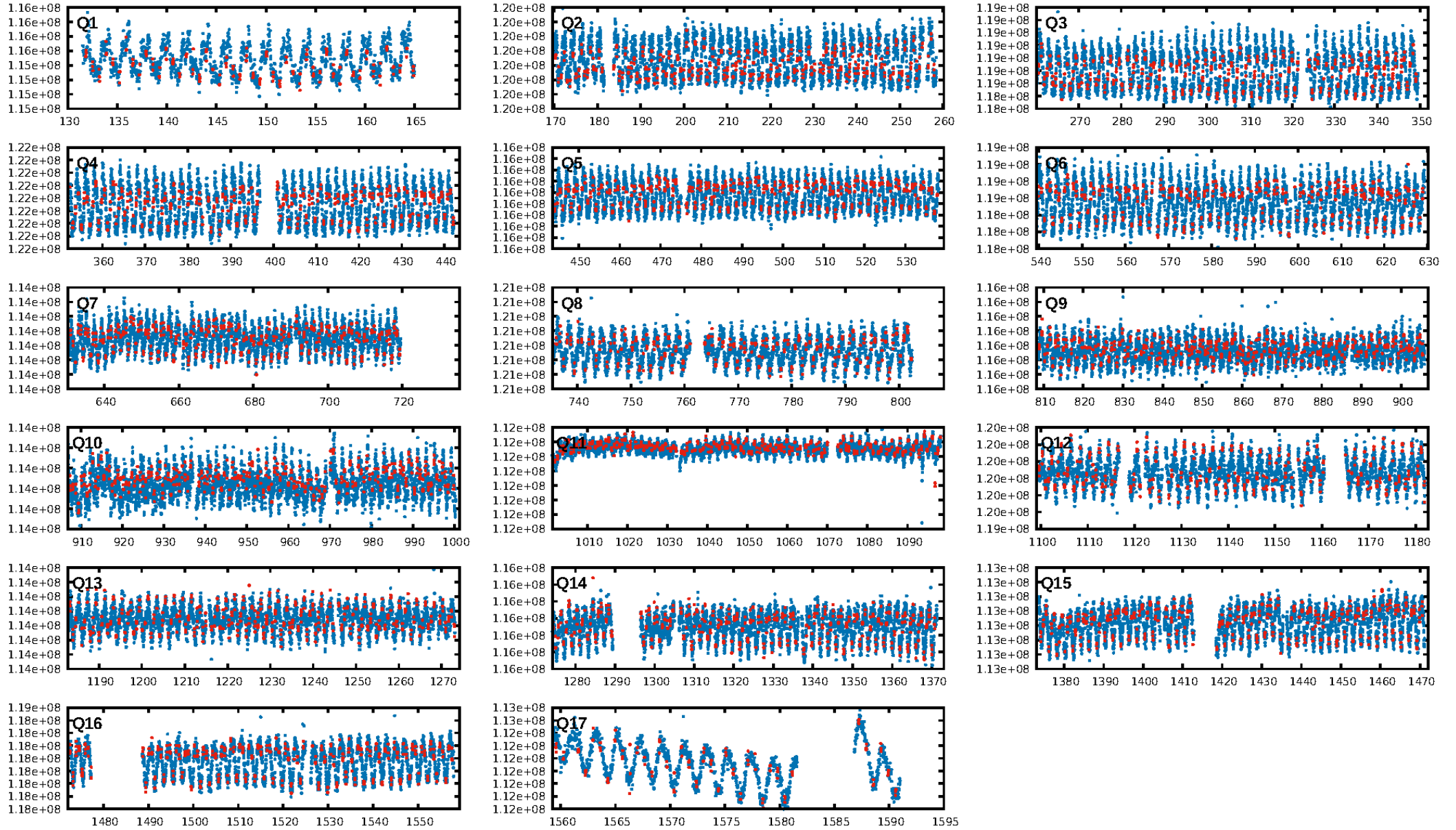
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [6.91 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.42e-16  
RollingBand-fgt: 0.99 [1546/1567]  
GhostDiagnostic-chr: 0.6938  
Centroid-sig: 25.7%  
Centroid-so: 1.736 arcsec [0.82 $\sigma$ ]  
OotOffset-rm: 0.911 arcsec [1.32 $\sigma$ ]  
OotOffset-st: 4/4/2/3 [13]  
KicOffset-rm: 1.007 arcsec [1.44 $\sigma$ ]  
KicOffset-st: 4/4/2/3 [13]  
DiffImageQuality-fgm: 0.38 [5/13]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 13:00:42 Z

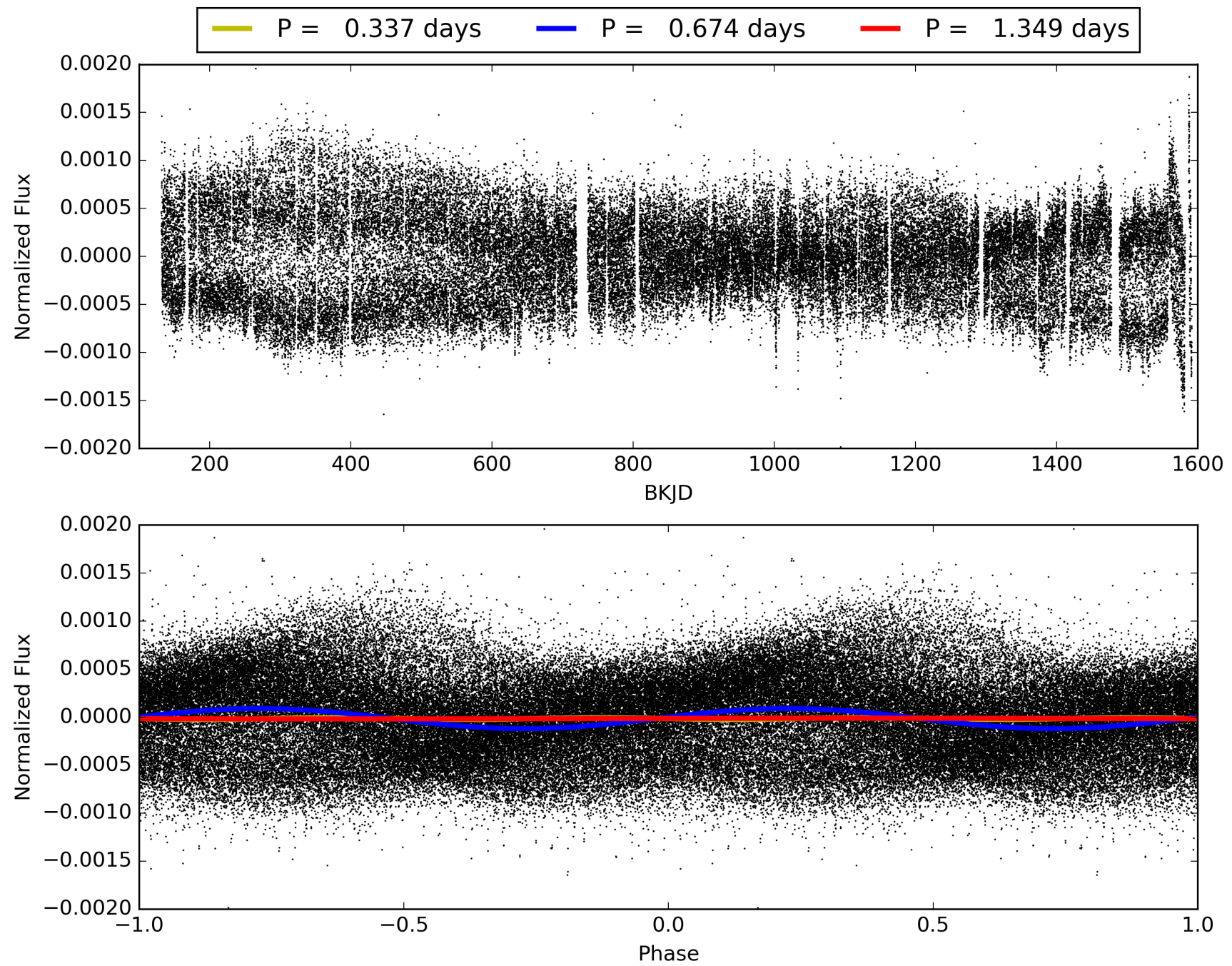
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 011909375-02, PDC Light Curves



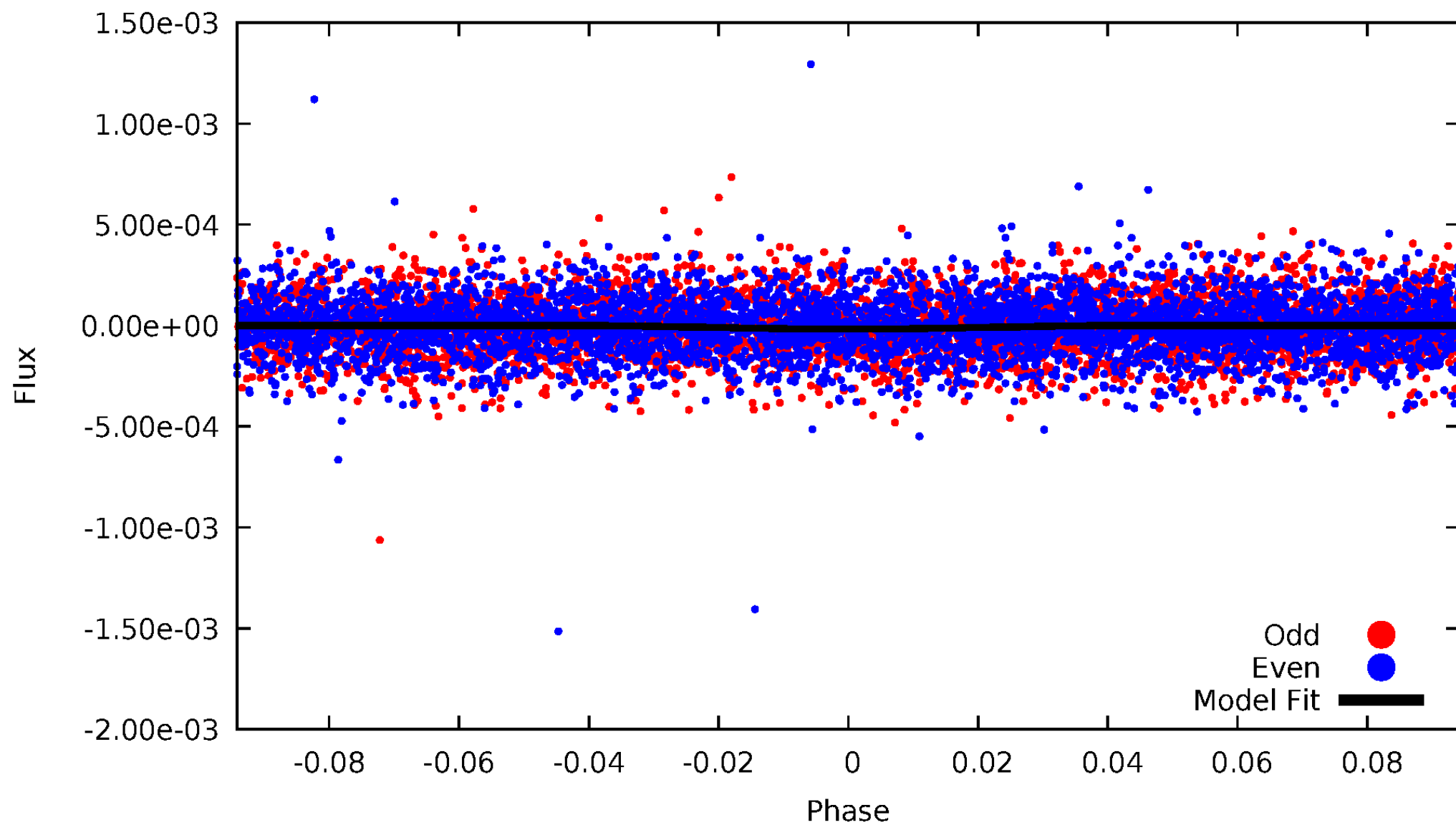


TCE 011909375-02



# DV Odd/Even

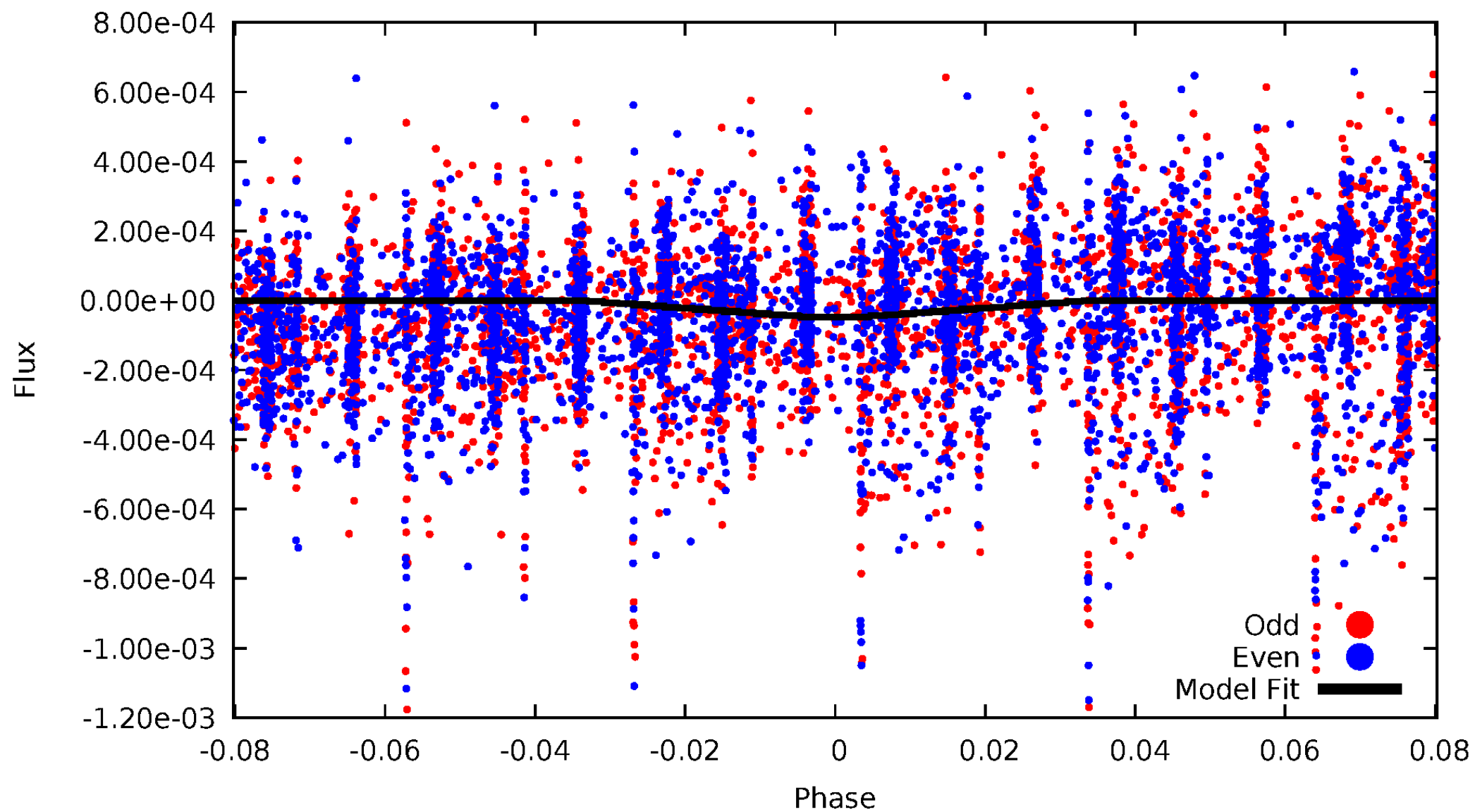
TCE 011909375-02





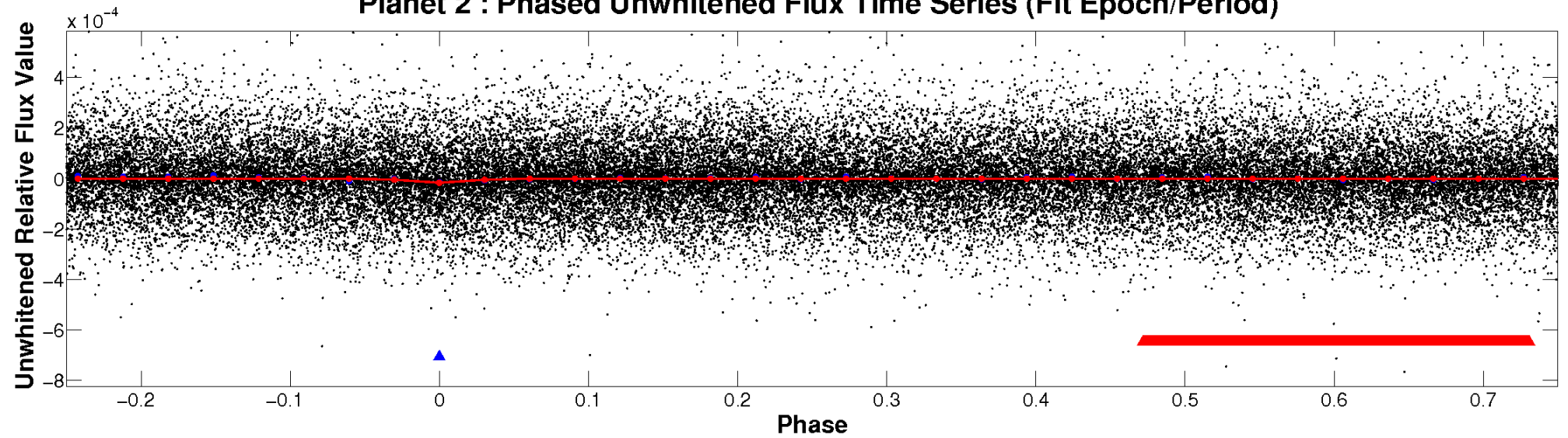
# ALT Odd/Even

TCE 011909375-02

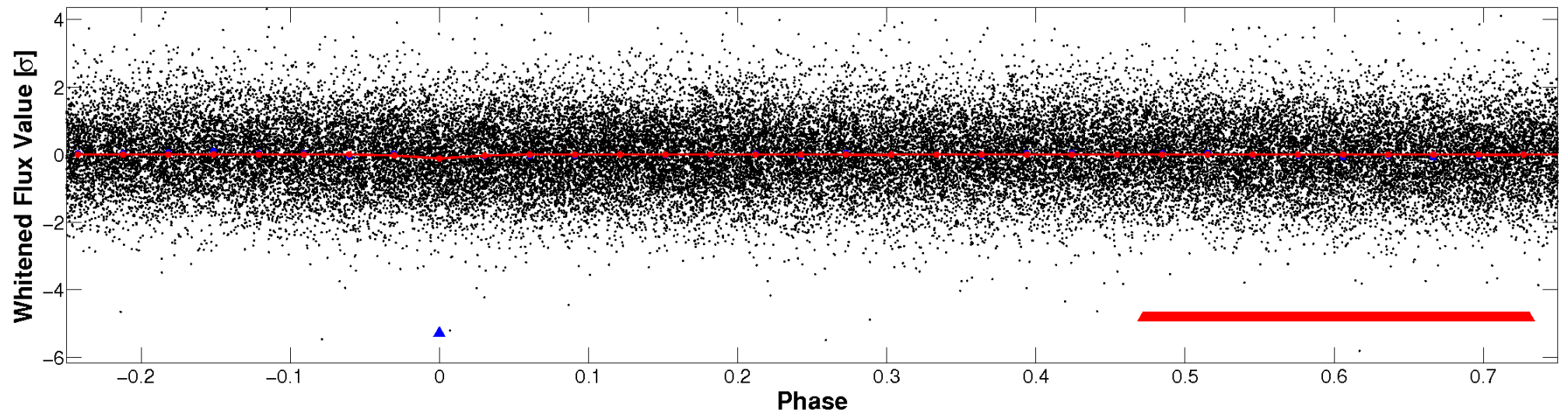


# Non-Whitened Vs. Whitened Light Curve

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

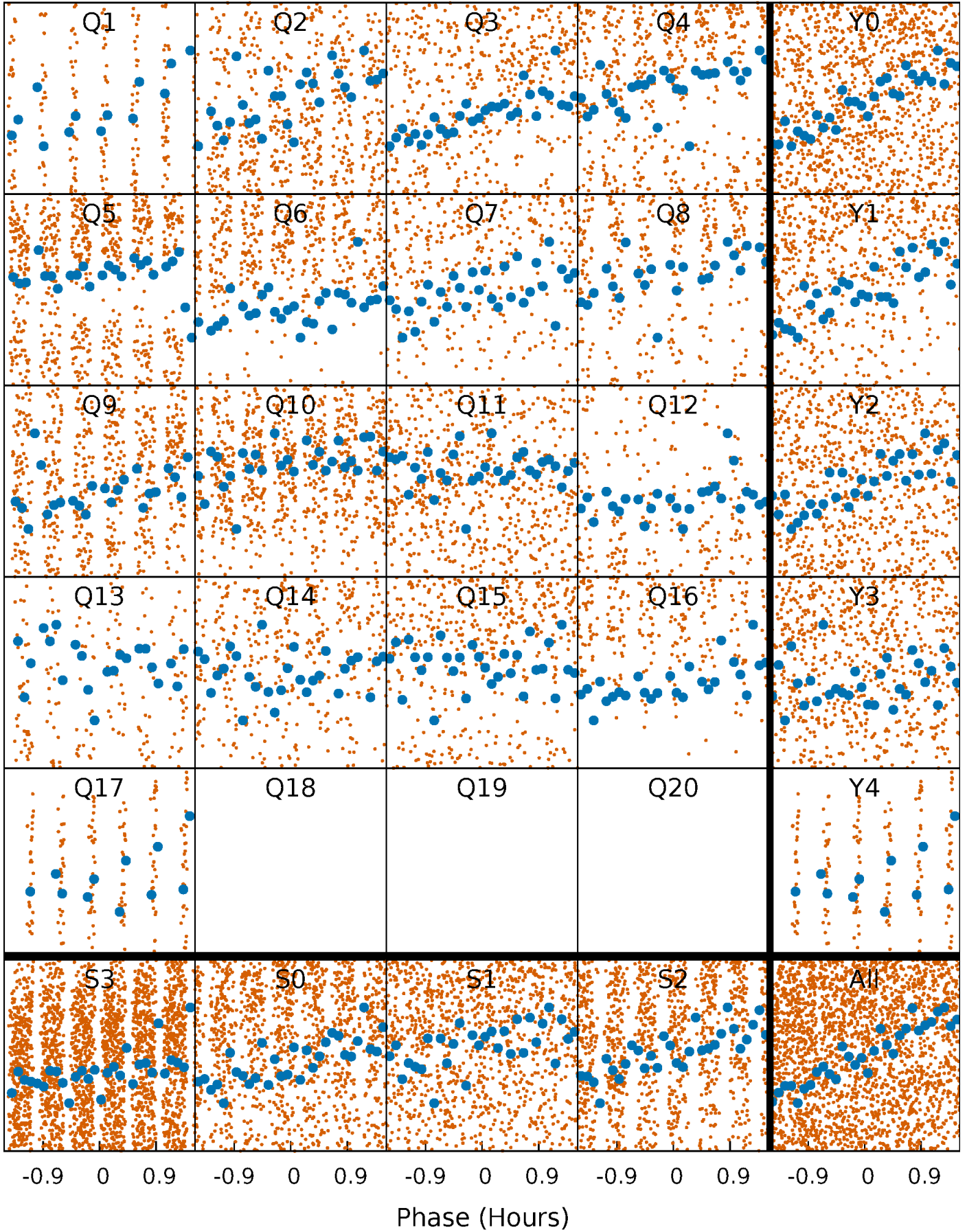


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



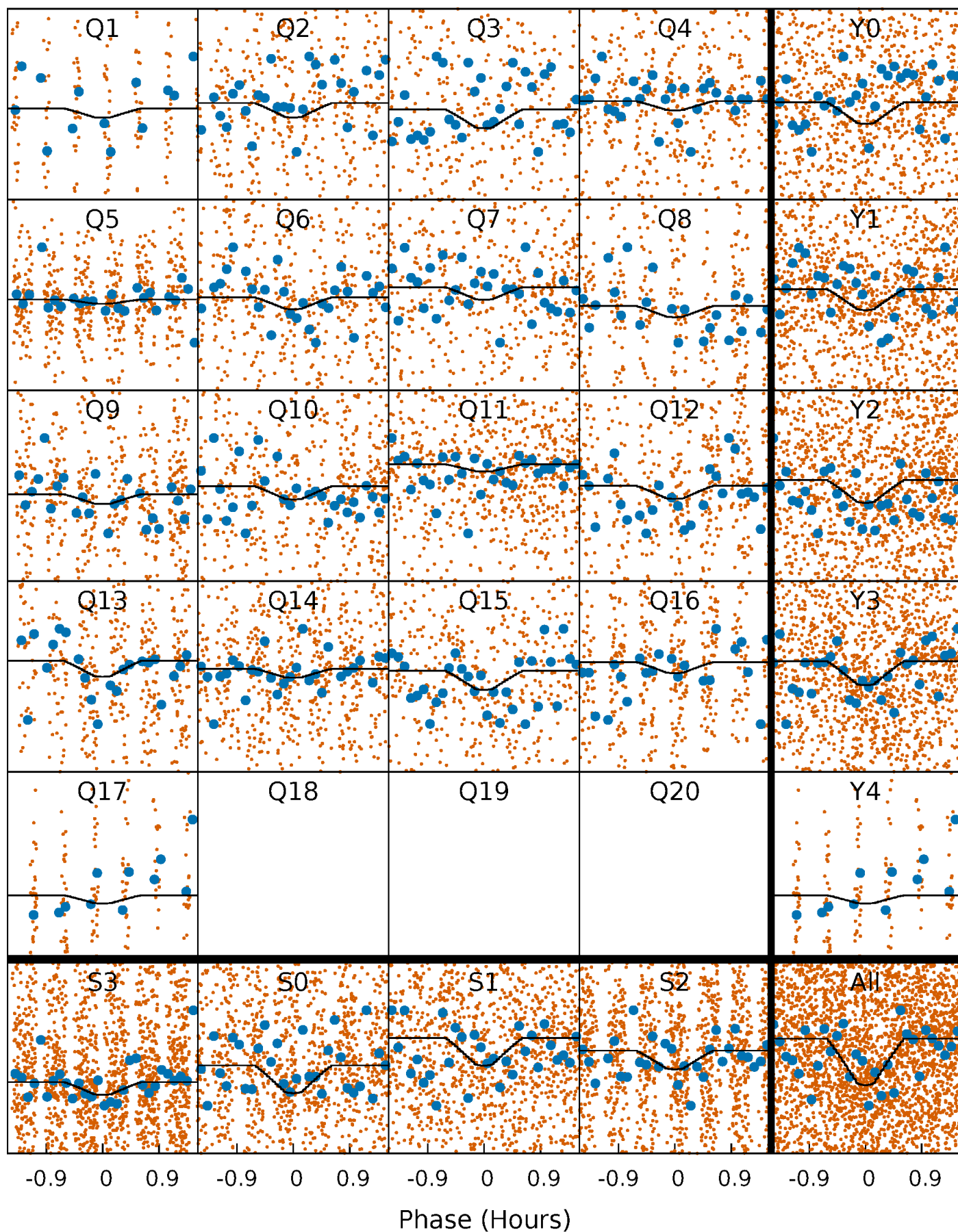
# PDC Quarter-Phased Transit Curves

TCE 011909375-02 P= 0.674418 Days  $T_0=131.833639$  (BKJD)



# DV Quarter-Phased Transit Curves

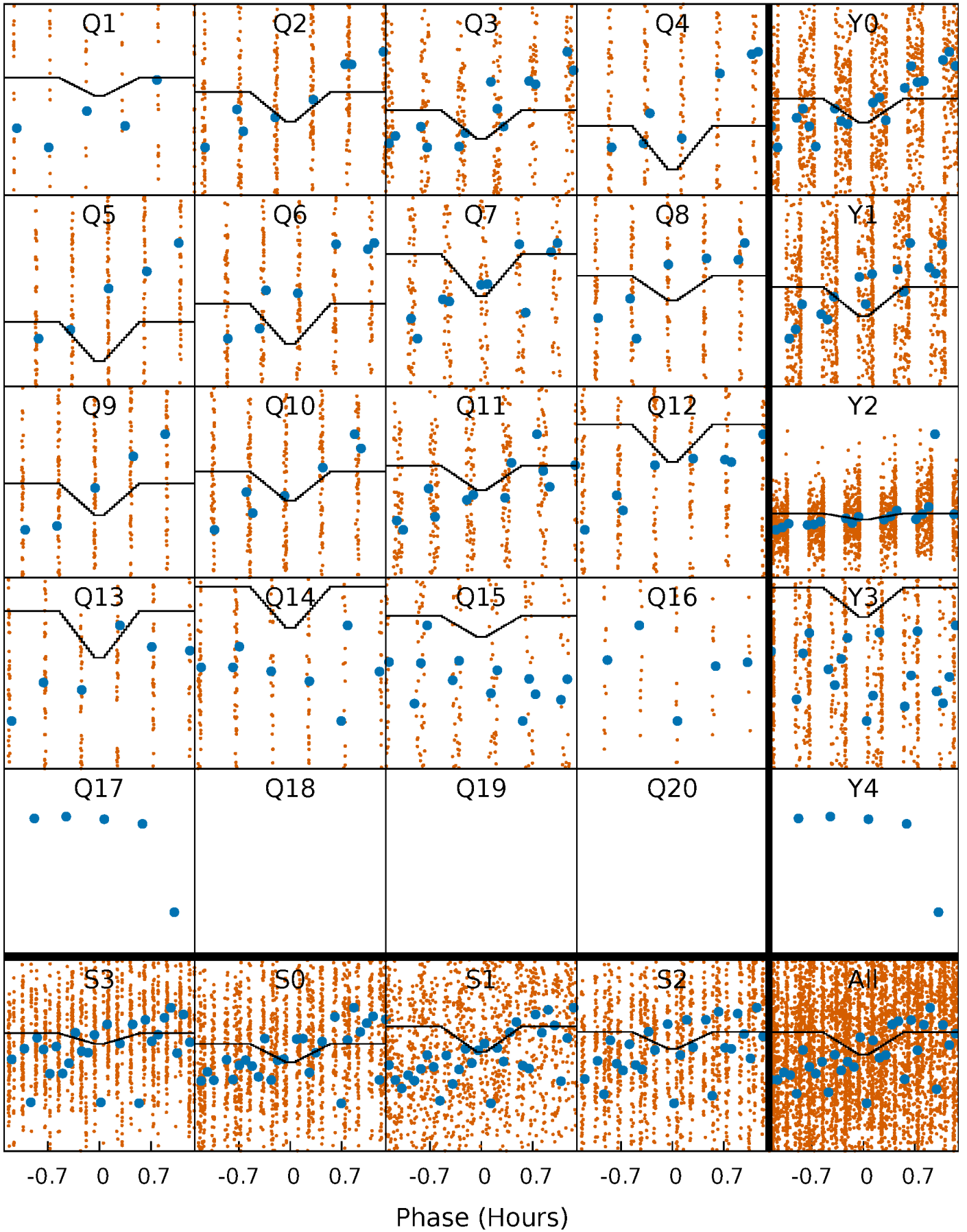
TCE 011909375-02     $P = 0.674418$  Days     $T_0 = 131.833639$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 011909375-02   P= 0.674323 Days    $T_0=131.826276$  (BKJD)

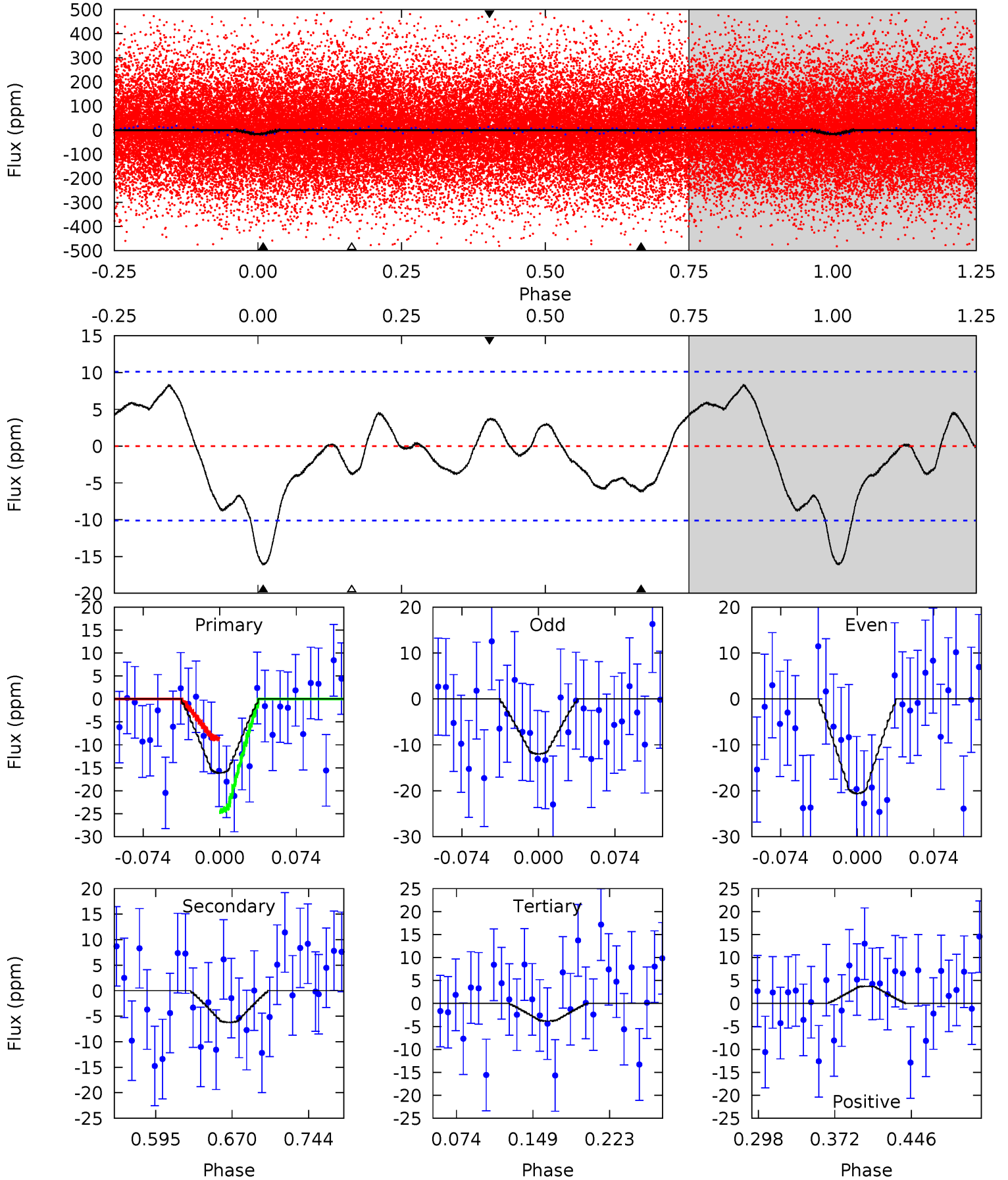




# DV Model-Shift Uniqueness Test

011909375-02, P = 0.674418 Days, E = 131.159221 Days

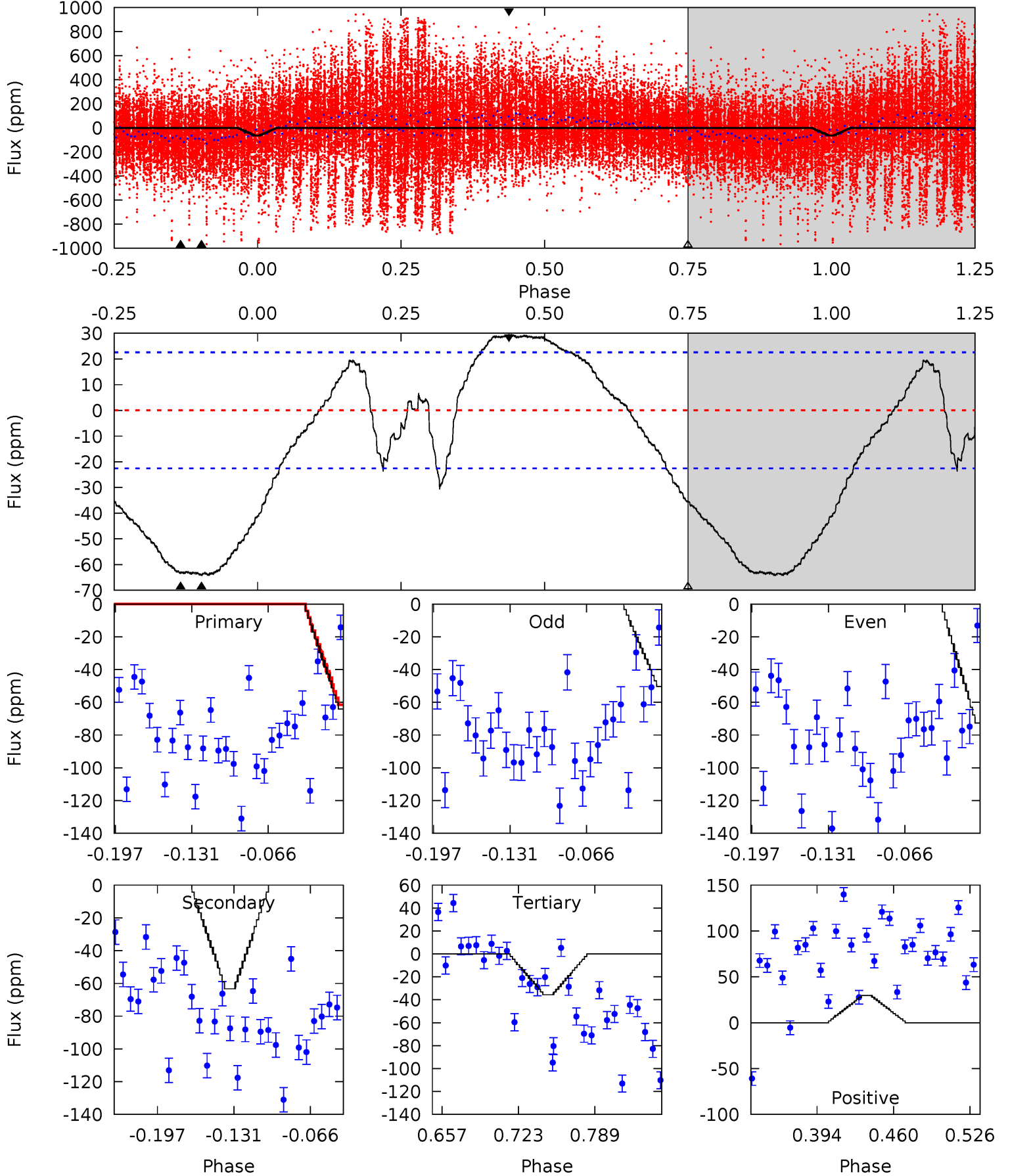
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.38	2.84	1.76	1.72	4.63	1.78	1.60	5.62	5.66	1.08	1.12	1.98	1.30	0.34	3.63



# Alt Model-Shift Uniqueness Test

011909375-02, P = 0.674323 Days, E = 131.151953 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	13.0	7.34	6.11	4.65	1.84	4.61	5.87	7.11	5.71	6.94	2.31	1.61	0.32	1.05



### Stellar Parameters For KIC 011909375

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7338^{+230}_{-307}$	$4.046^{+0.228}_{-0.171}$	$-0.240^{+0.250}_{-0.350}$	$1.926^{+0.542}_{-0.542}$	$1.503^{+0.209}_{-0.279}$	$0.296^{+0.392}_{-0.137}$
	+3%/-4%	+6%/-4%	+104%/-146%	+28%/-28%	+14%/-19%	+132%/-46%
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 011909375-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-6 \pm 2$	$0.91^{+0.75}_{-0.57}$	$4732^{+399}_{-407}$	$4928^{+3950}_{-2204}$	$1.179^{+7.142}_{-0.859}$
Alt.	$-63 \pm 5$	$1.46^{+0.79}_{-0.79}$	$4743^{+385}_{-391}$	$7597^{+5787}_{-1631}$	$4.672^{+17.753}_{-2.644}$

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

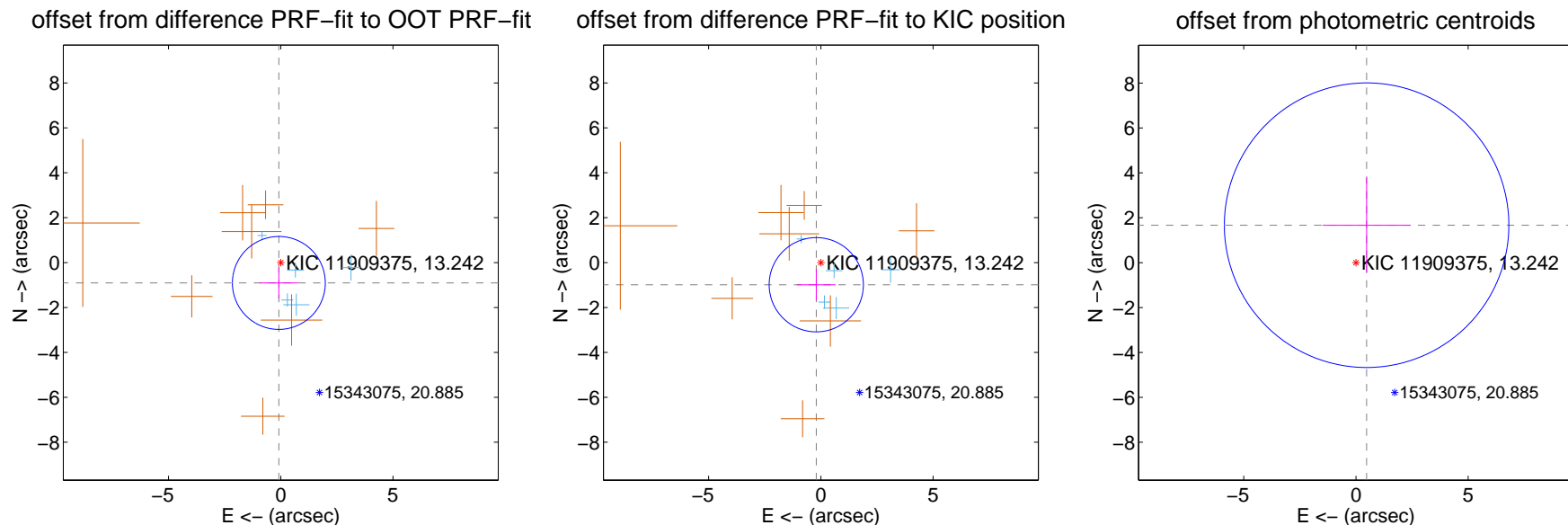
## DV Centroid Data

Supplemental centroid analysis for 011909375-02. Kepler magnitude: 13.24. Transit SNR 4.77

There are 5 quarters with good PRF difference image offsets

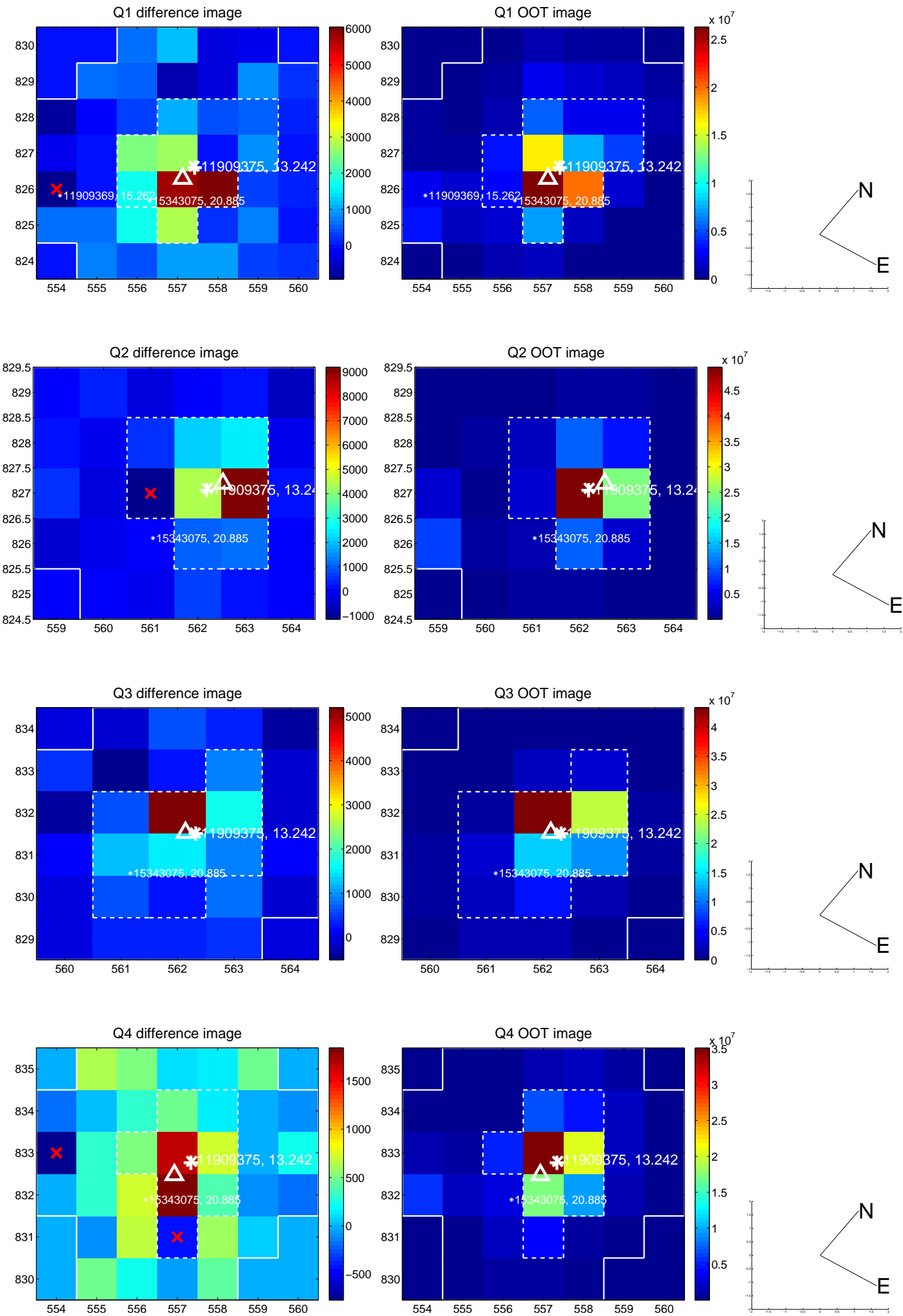
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.911 \pm 0.690$	1.32	$0.084 \pm 0.861$	$-0.907 \pm 0.696$
PRF-fit source offset from KIC position	$1.007 \pm 0.700$	1.44	$0.205 \pm 0.858$	$-0.986 \pm 0.691$
photometric centroid source offset	$1.74 \pm 2.11$	0.82	$-0.47 \pm 1.96$	$1.67 \pm 2.13$



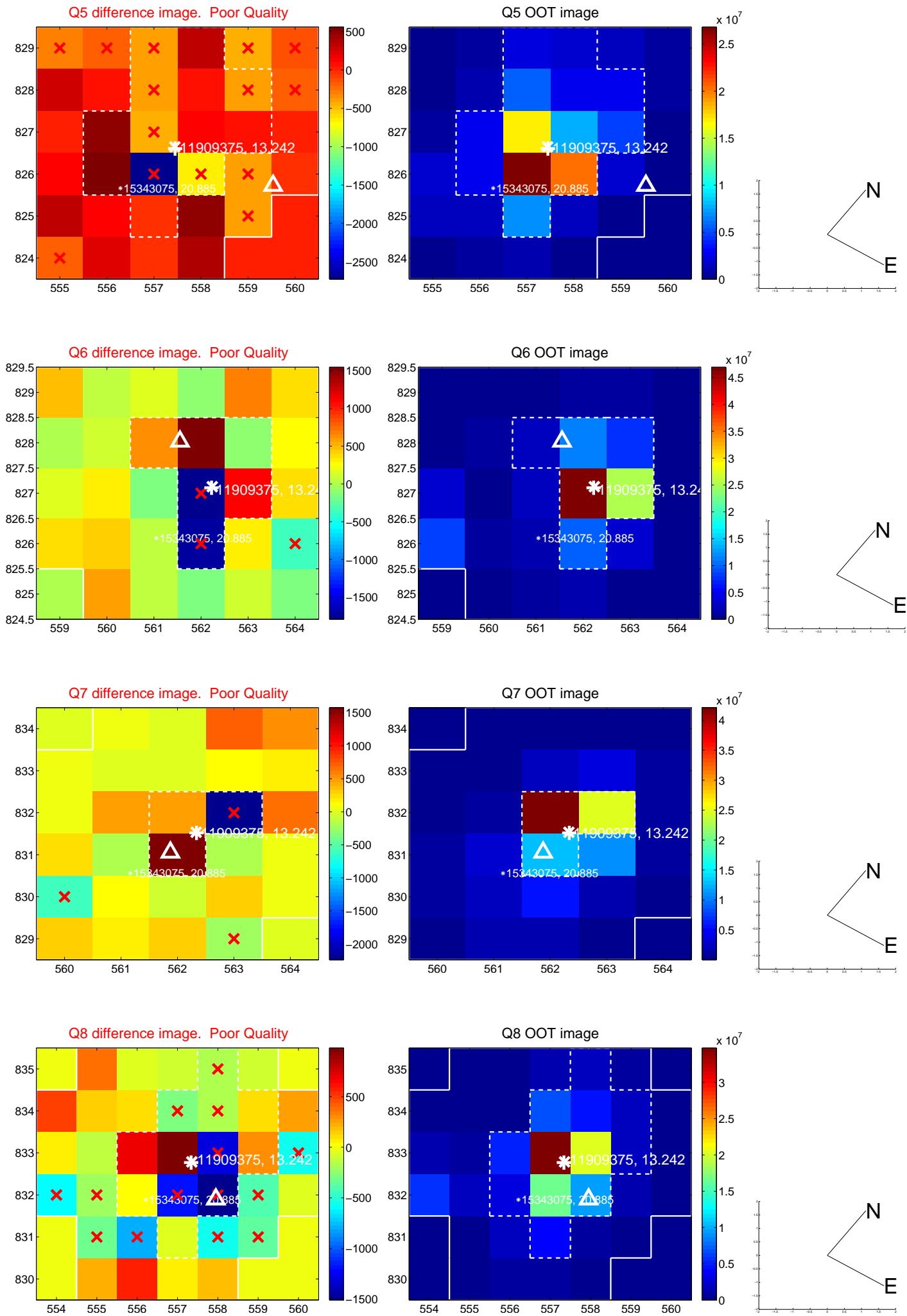
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

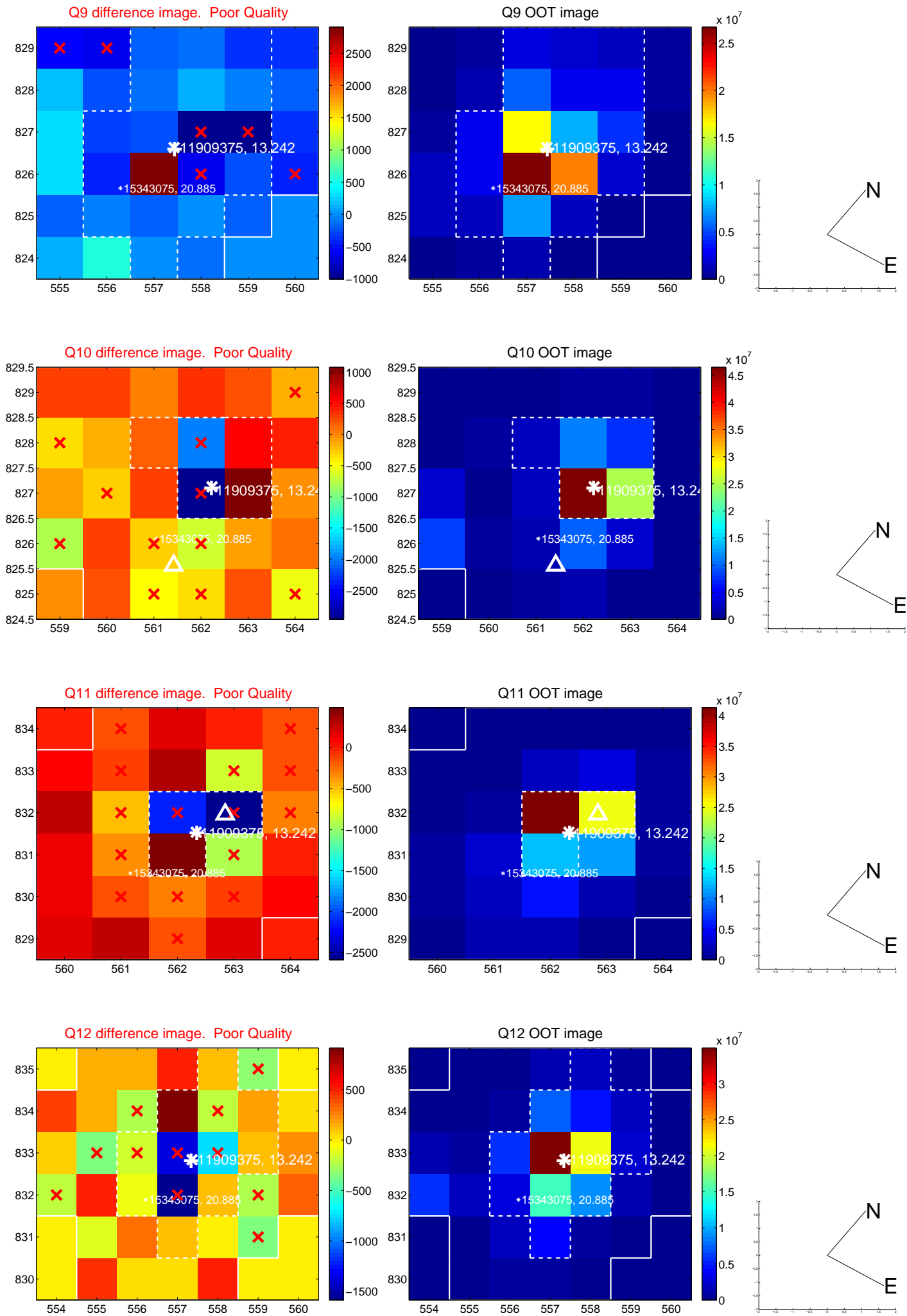




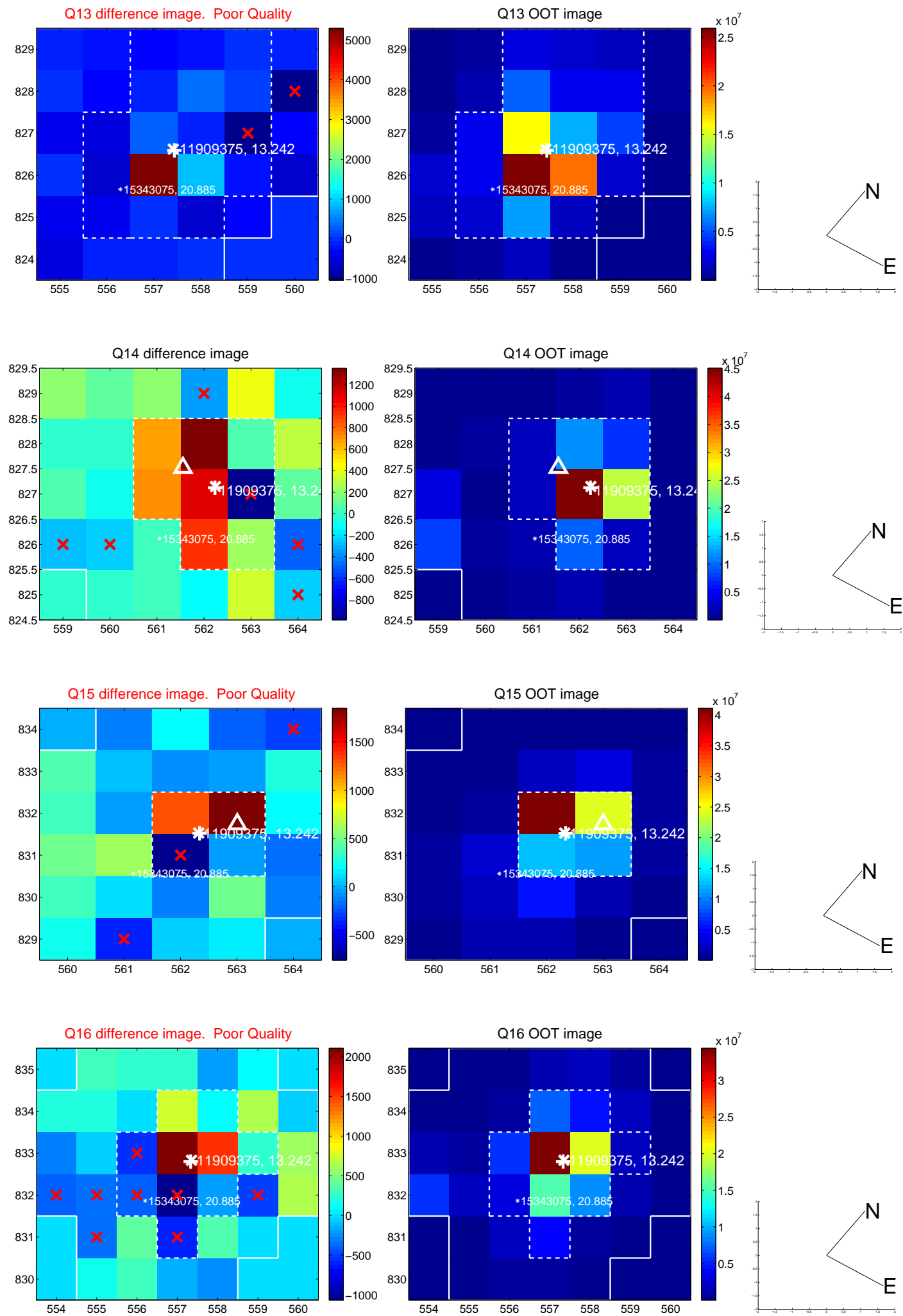
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



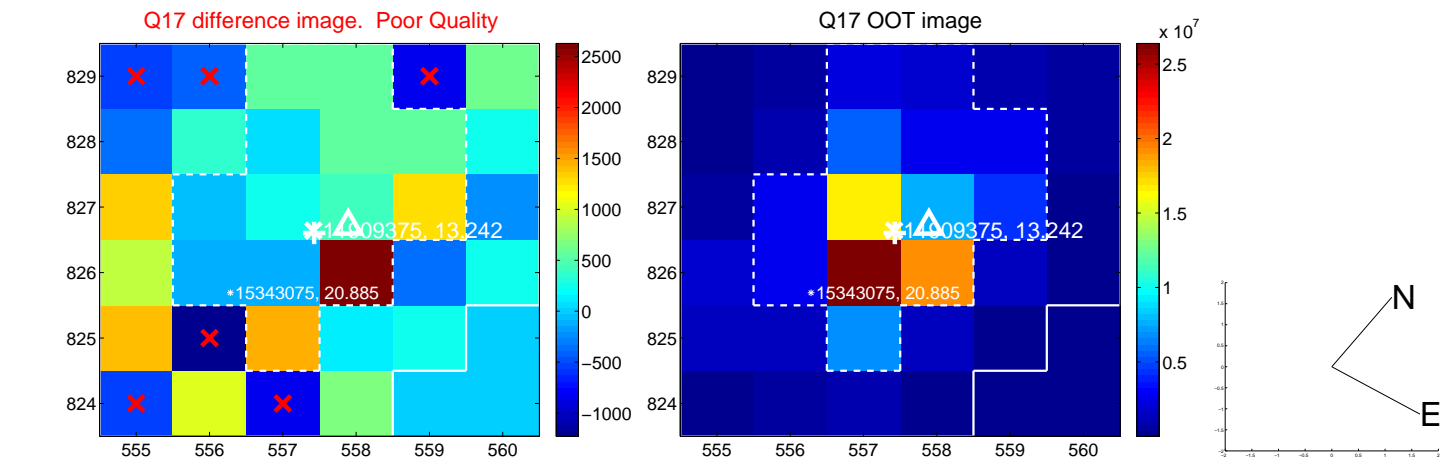
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



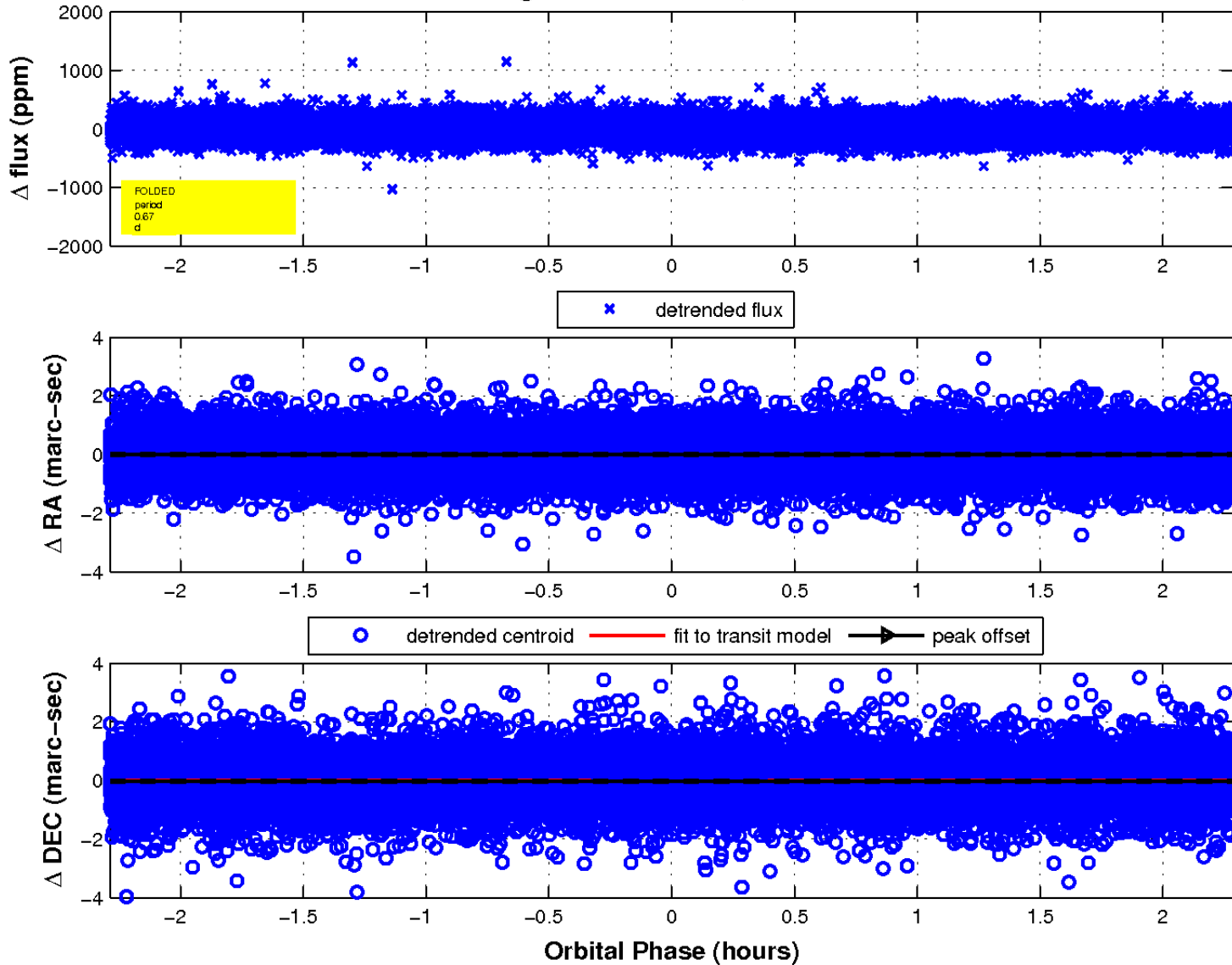
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

