

# KIC 004366913

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004366913-01	OBS	No	1.115275	132.474040	74.3	2.574	14.1	11.2	1.77	7218	1.78	11913.38
004366913-02	OBS	No	2.229891	132.582828	85.6	17.763	17.2	14.3	1.77	7218	1.96	4729.69

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004366913-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA_TRACKER—SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
004366913-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_ALT

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

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

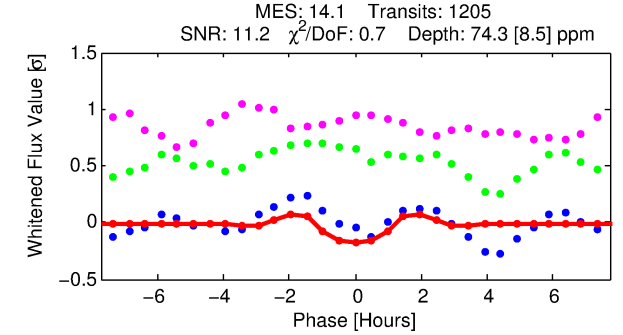
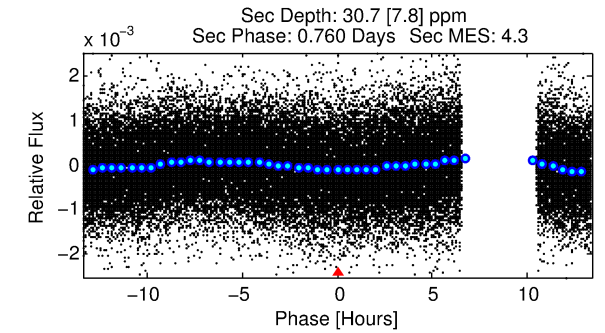
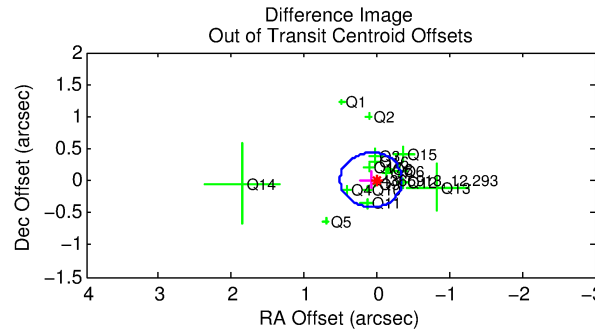
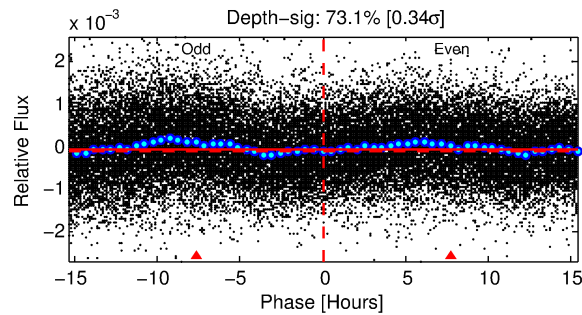
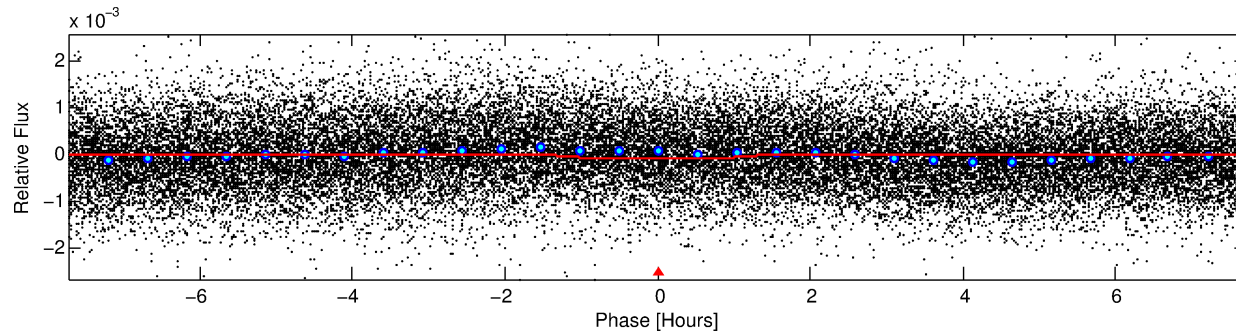
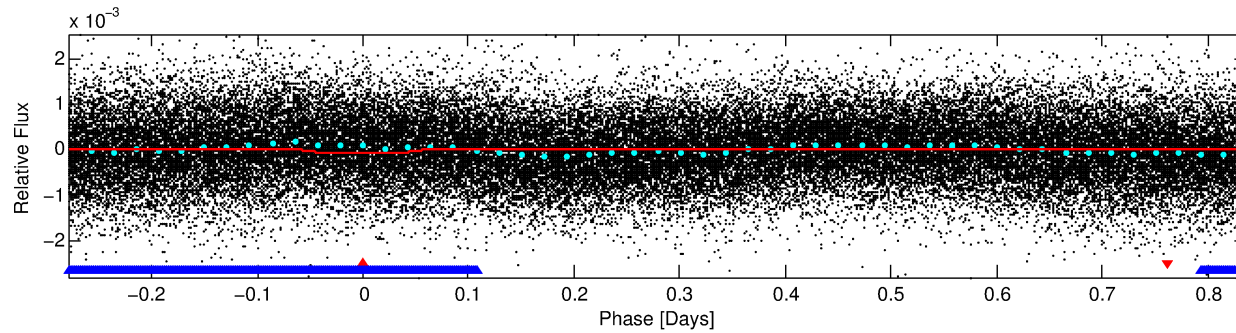
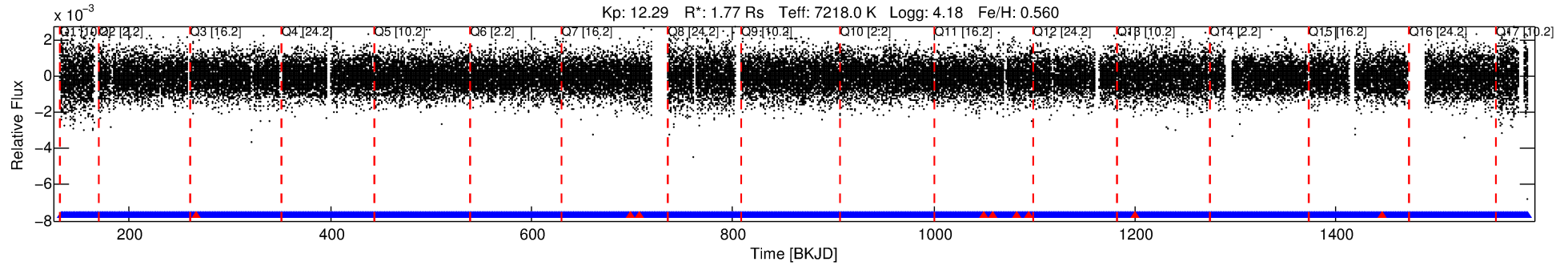
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004366913-01

No Significant Match Found

# DV One-Page Summary

KIC: 4366913 Candidate: 1 of 2 Period: 1.115 d



## DV Fit Results:

Period = 1.11527 [0.00001] d  
Epoch = 132.4740 [0.0023] BKJD  
Rp/R\* = 0.0092 [0.0037]  
a/R\* = 1.75 [2.89]  
b = 0.90 [0.50]  
Seff = 11913.38 [3214.89]  
Teff = 2664 [180] K  
Rp = 1.78 [0.81] Re  
a = 0.0253 [0.0047] AU  
Ag = 3.41 [3.00] [0.80 $\sigma$ ]  
Teffp = 5598 [1176] K [2.47 $\sigma$ ]

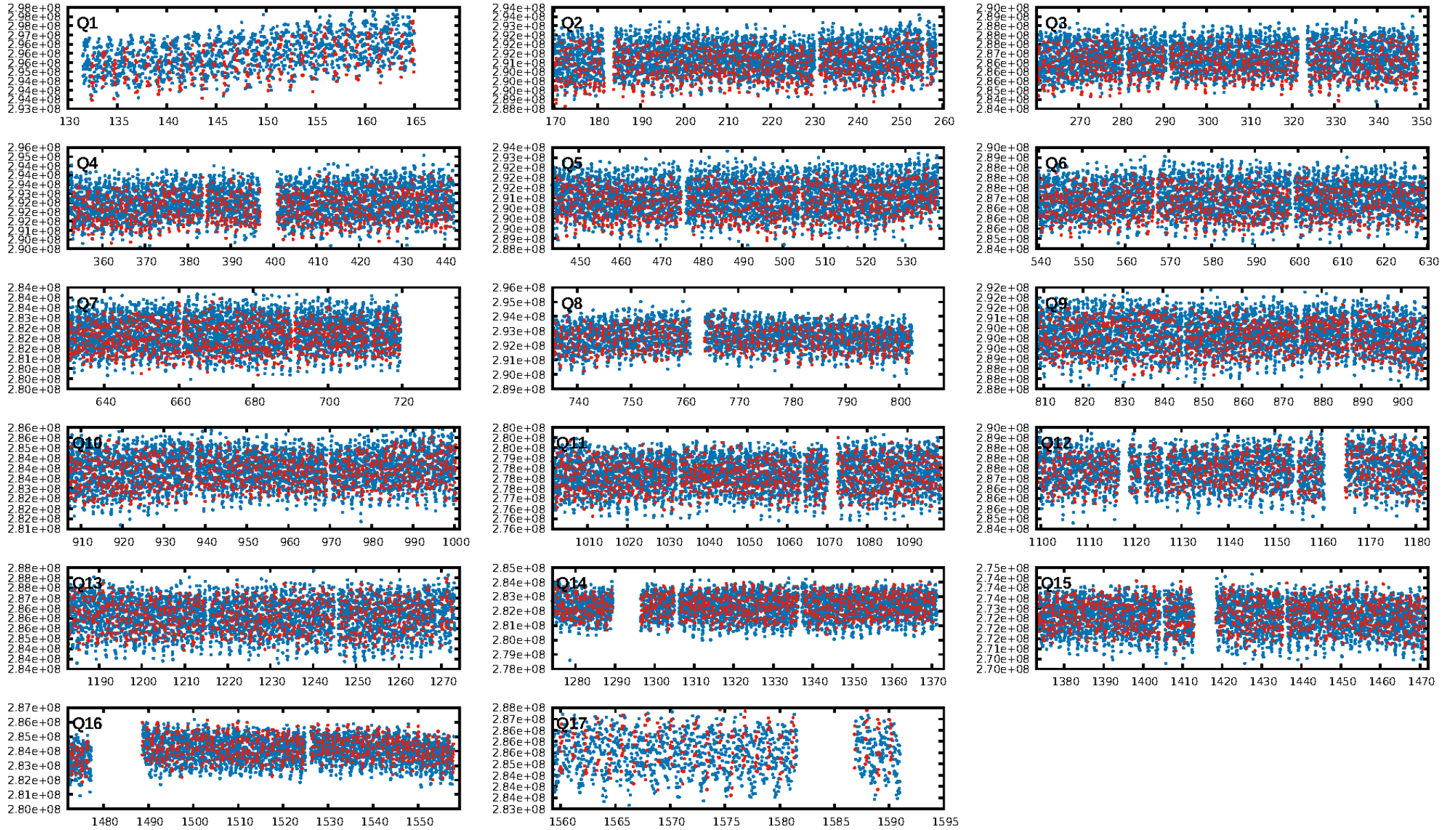
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 86.4% [1.49 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.99 [1142/1151]  
GhostDiagnostic-chr: -1.306  
Centroid-sig: 0.0%  
Centroid-so: 0.665 arcsec [2.61 $\sigma$ ]  
OotOffset-rm: 0.079 arcsec [0.55 $\sigma$ ]  
KicOffset-rm: 0.122 arcsec [0.79 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.76 [13/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 10:37:13 Z

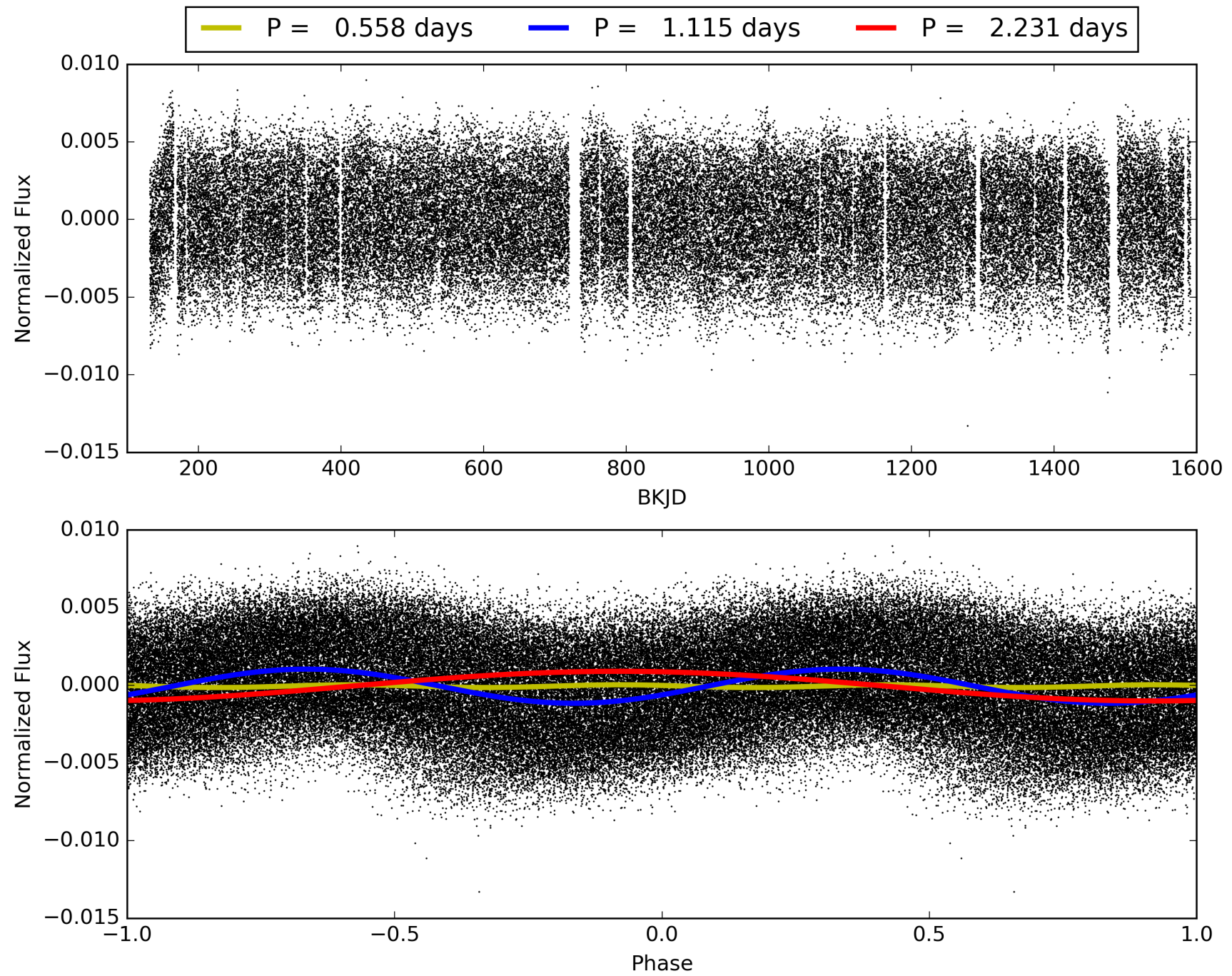
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004366913-01, PDC Light Curves



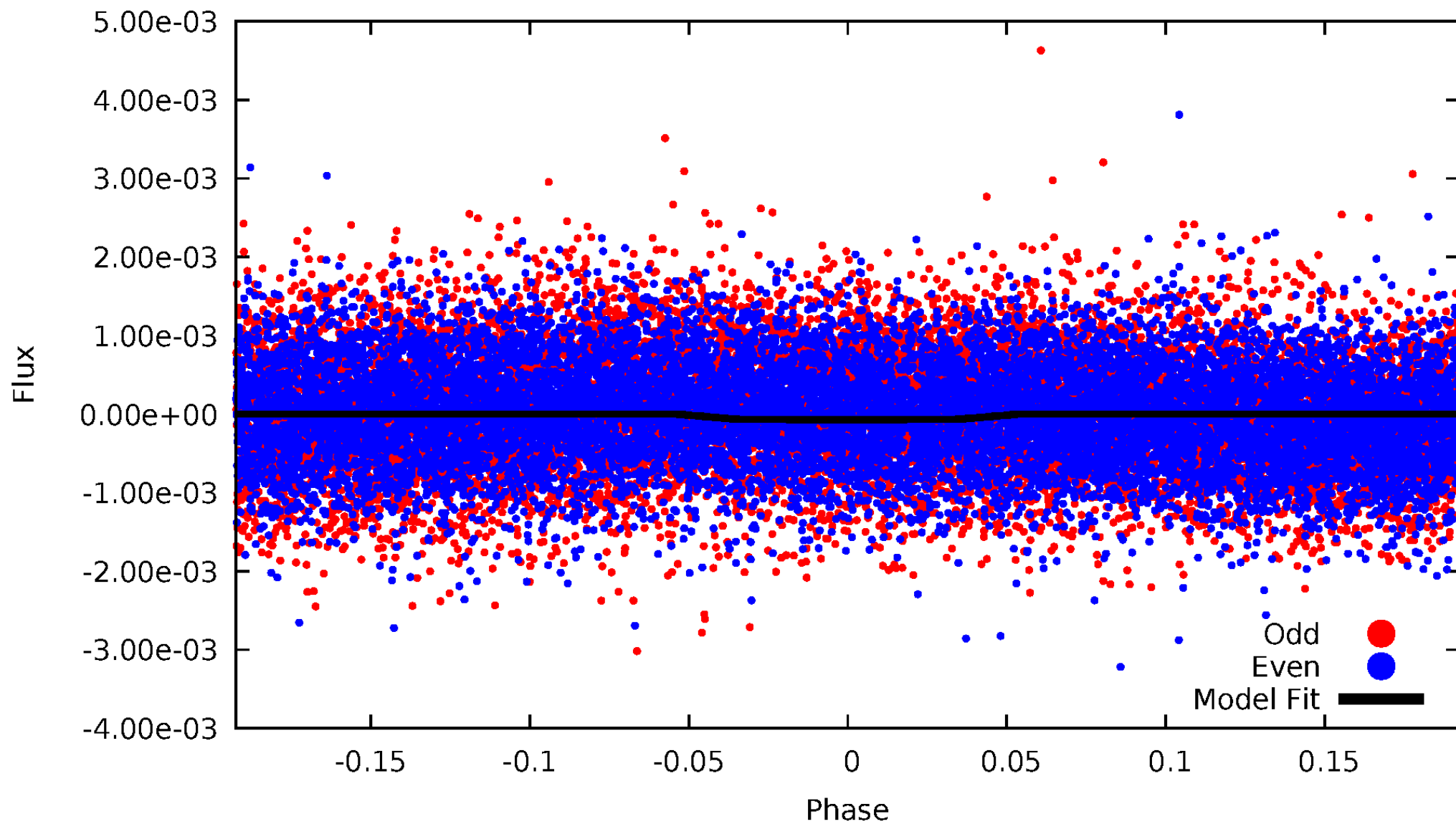


TCE 004366913-01



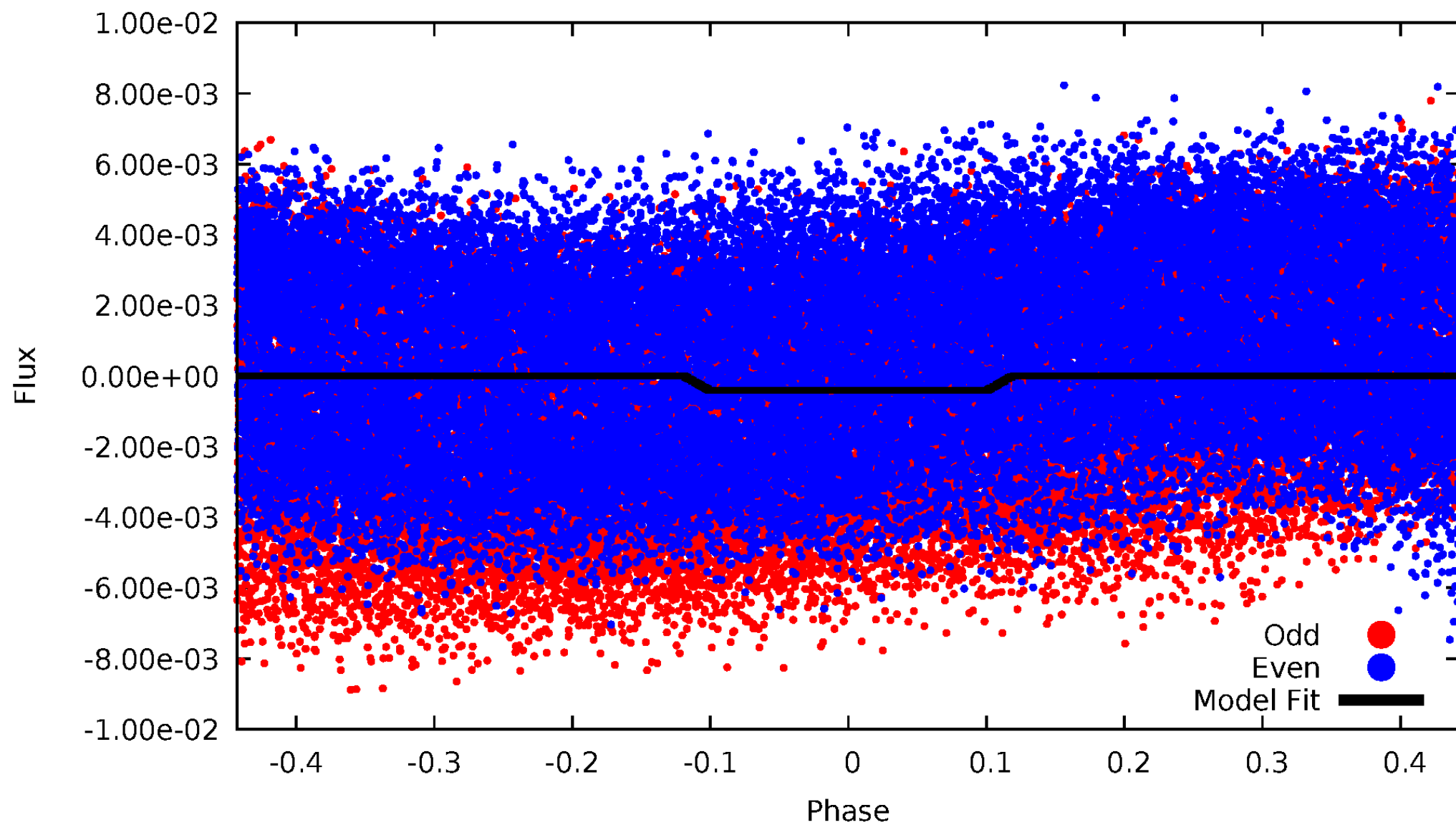
# DV Odd/Even

TCE 004366913-01



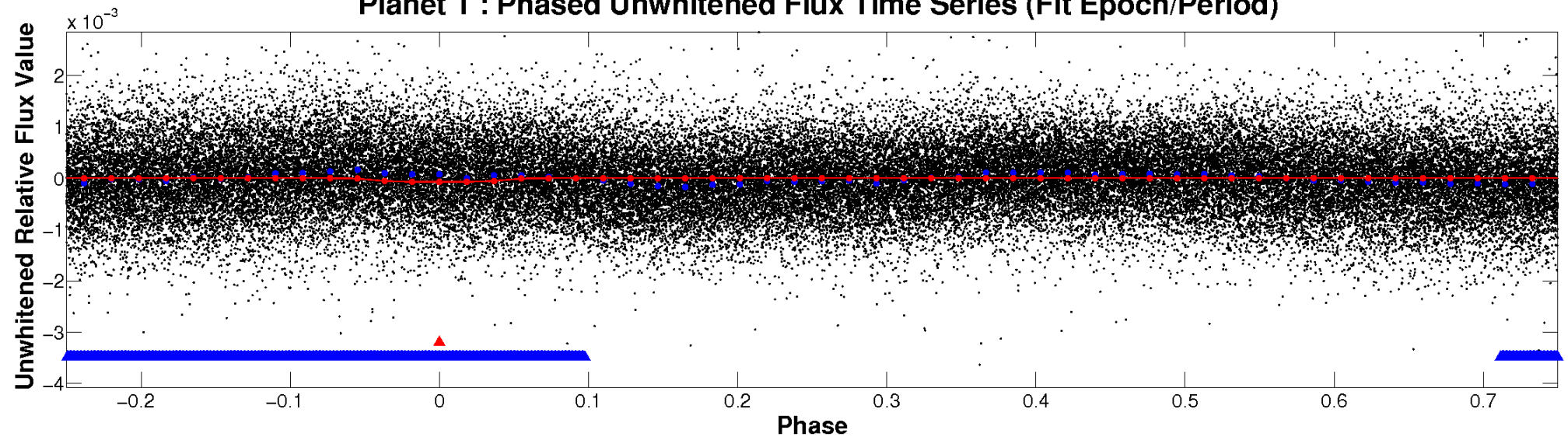
# ALT Odd/Even

TCE 004366913-01

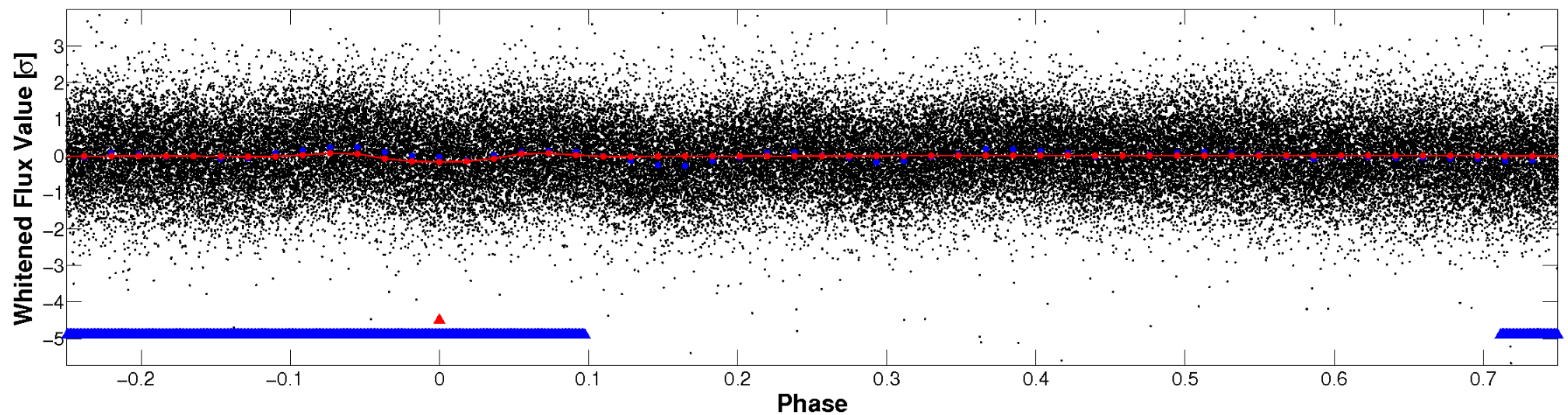


# Non-Whitened Vs. Whitened Light Curve

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



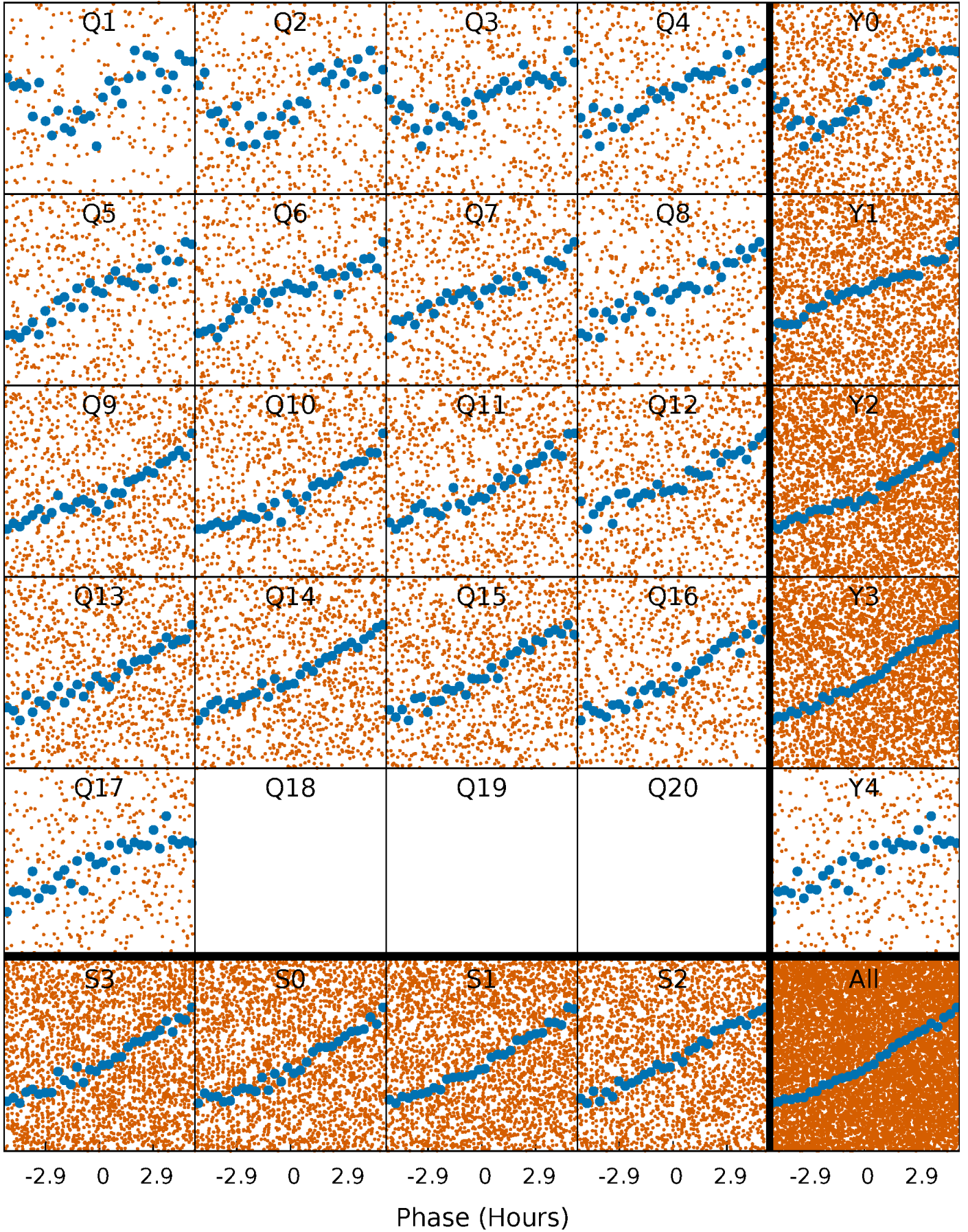
Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

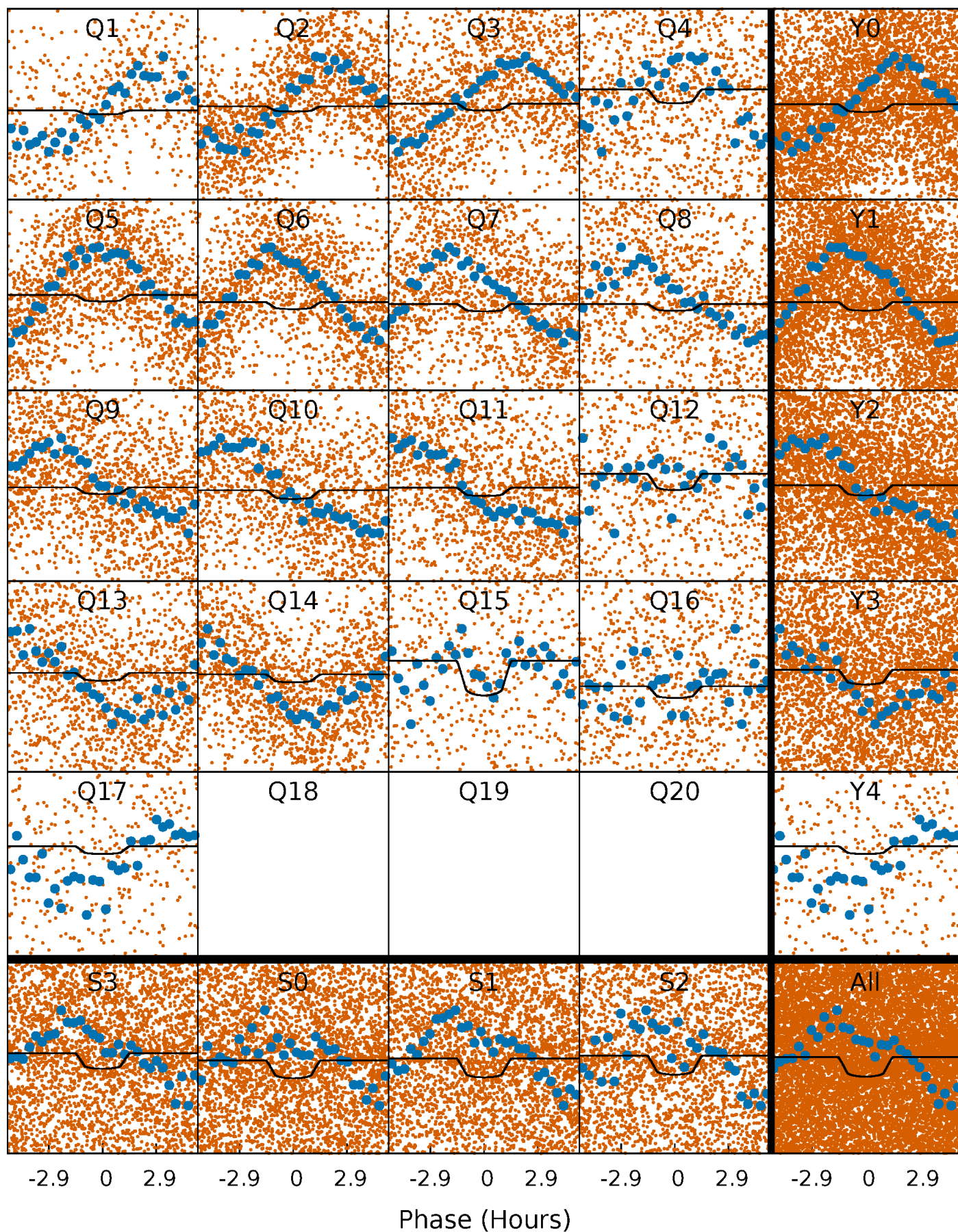
TCE 004366913-01 P= 1.115275 Days  $T_0=132.474040$  (BKJD)





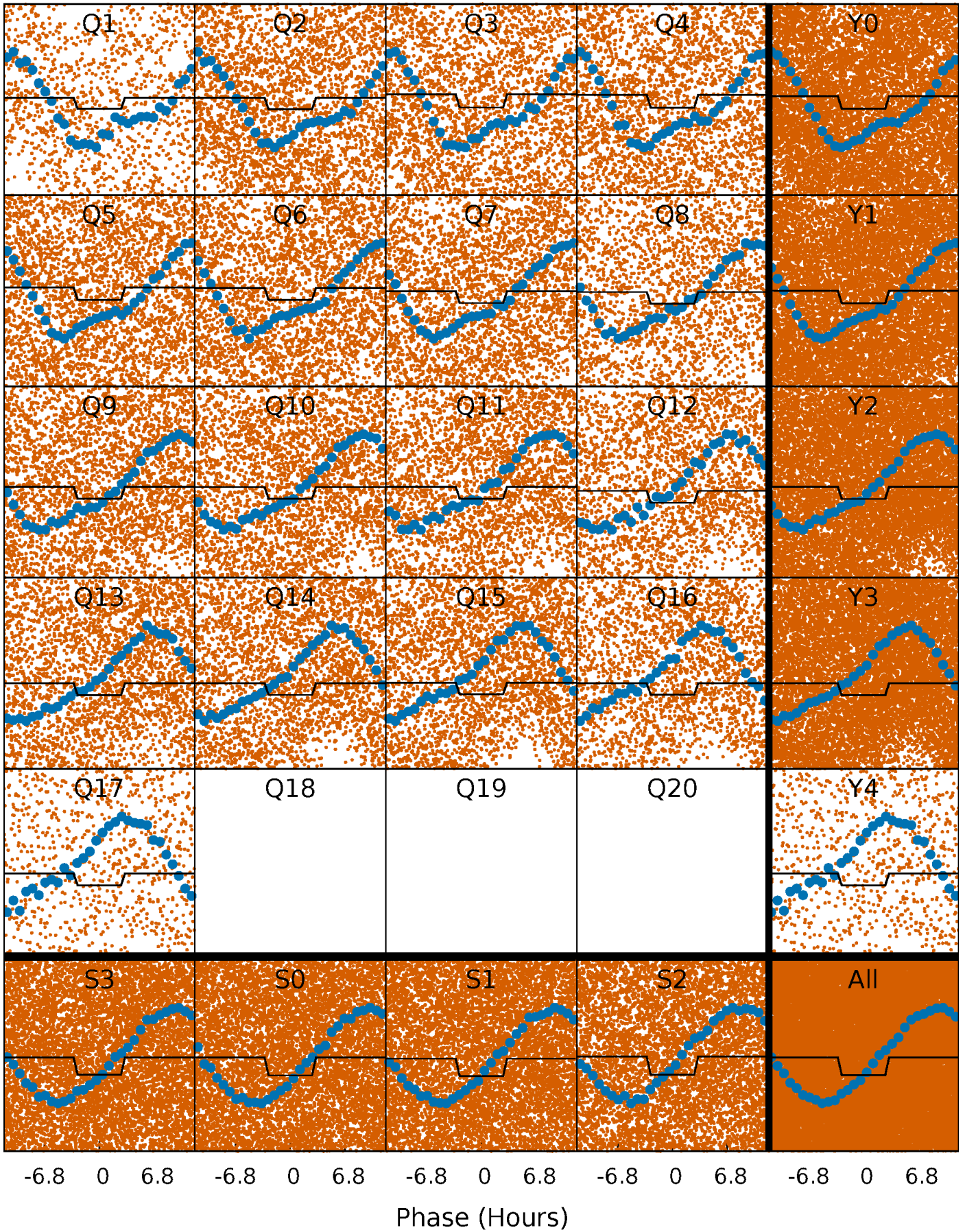
# DV Quarter-Phased Transit Curves

TCE 004366913-01 P= 1.115275 Days  $T_0=132.474040$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 004366913-01 P= 1.115298 Days  $T_0=132.471546$  (BKJD)

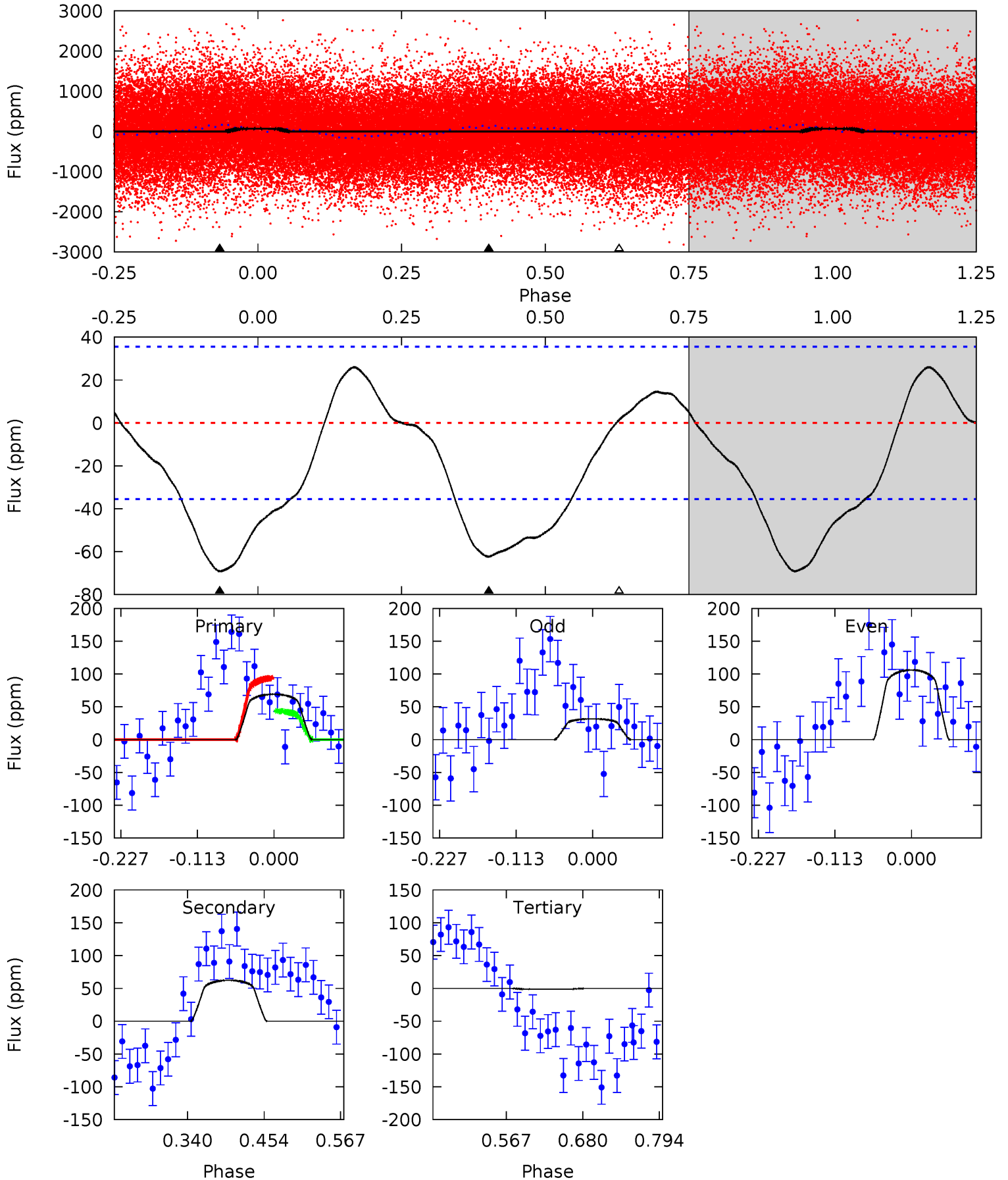




# DV Model-Shift Uniqueness Test

004366913-01, P = 1.115275 Days, E = 131.358765 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
8.83	7.96	-0.17	0	4.54	1.58	2.35	9.01	8.83	8.14	7.96	4.76	1.09	0.27	3.21

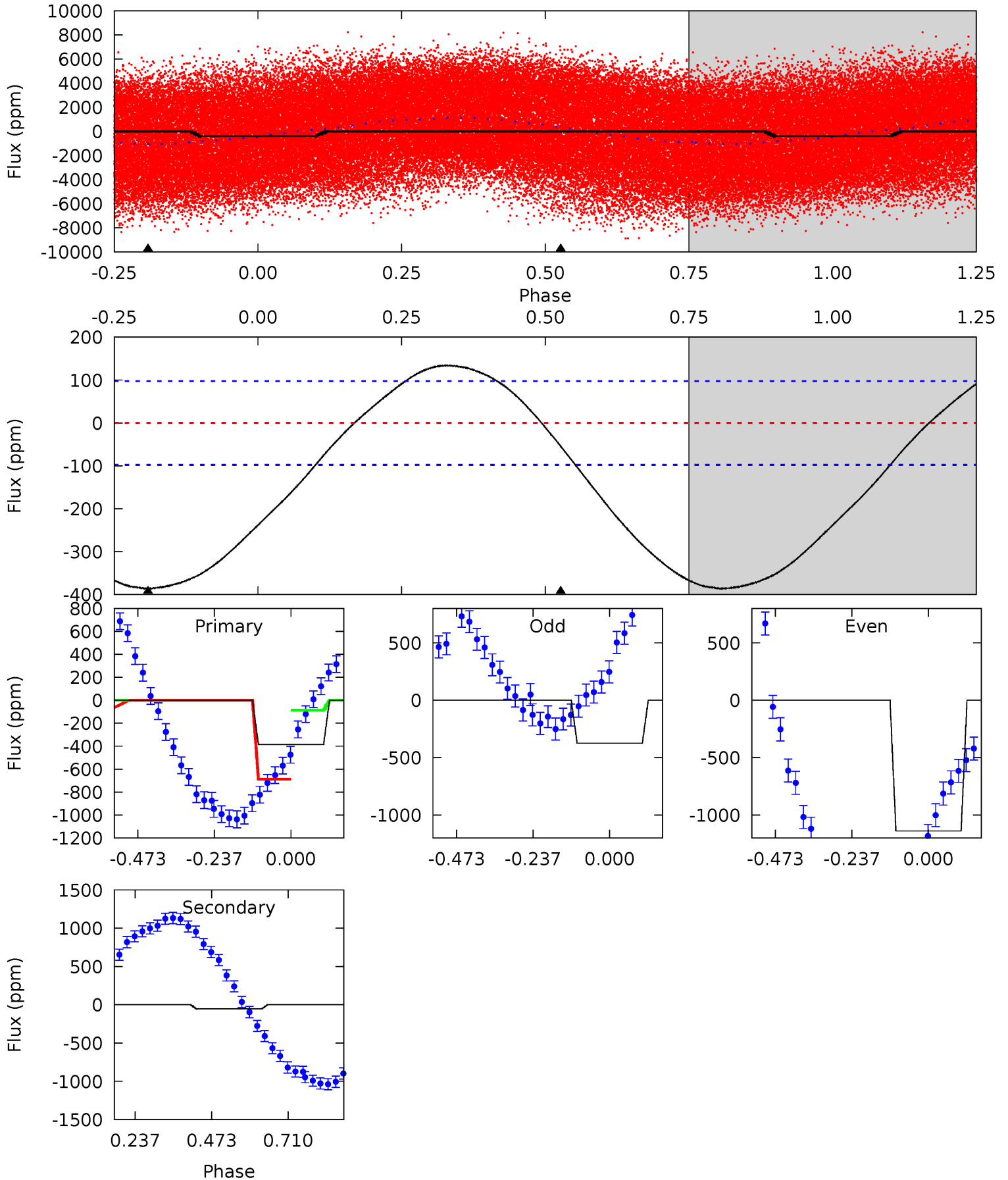




# Alt Model-Shift Uniqueness Test

004366913-01, P = 1.115298 Days, E = 131.356248 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
17.3	2.45	0	0	4.38	1.18	4.05	17.3	17.3	2.45	2.45	18.0	0.86	0.26	12.8



### Stellar Parameters For KIC 004366913

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$7218^{+79}_{-86}$	$4.181^{+0.025}_{-0.144}$	$0.560^{+0.050}_{-0.250}$	$1.770^{+0.391}_{-0.092}$	$1.734^{+0.113}_{-0.061}$	$0.440^{+0.059}_{-0.182}$
	+1%/-1%	+1%/-3%	+9%/-45%	+22%/-5%	+7%/-4%	+13%/-41%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 004366913-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-62 \pm 8$	$1.86^{+0.76}_{-0.71}$	$3775^{+192}_{-95}$	$6551^{+2286}_{-1041}$	$6.240^{+10.916}_{-3.011}$
Alt.	$-55 \pm 22$	$4.08^{+0.85}_{-0.81}$	$3768^{+194}_{-87}$	$4234^{+615}_{-657}$	$1.129^{+0.861}_{-0.536}$

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

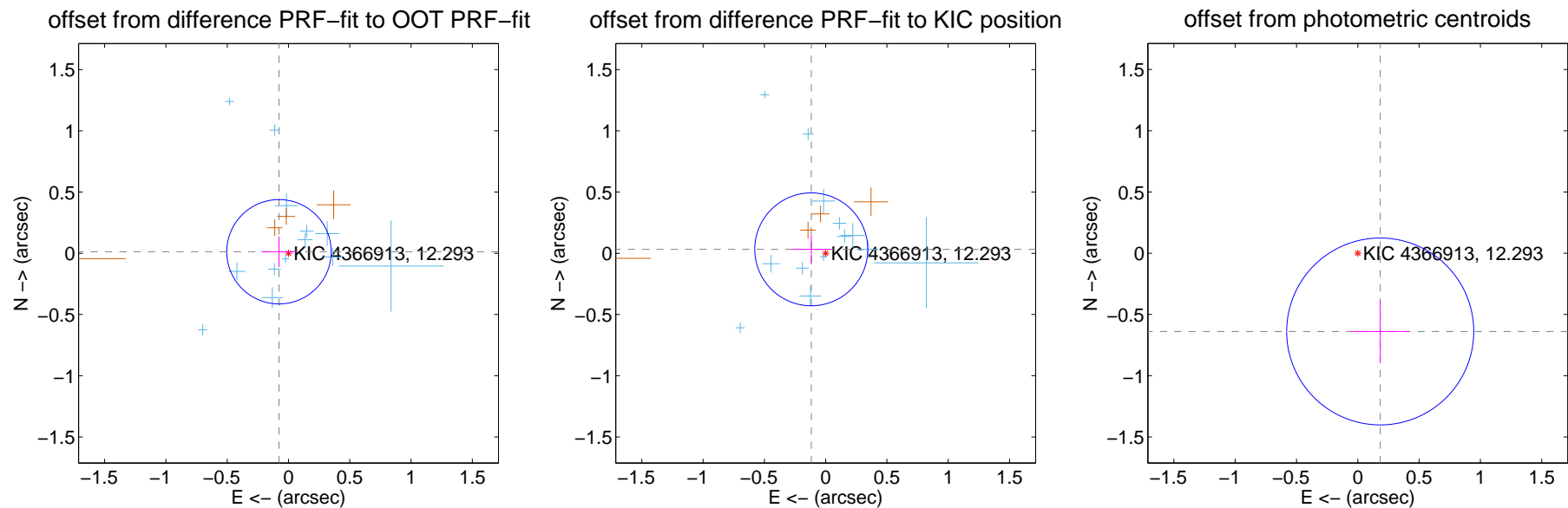
## DV Centroid Data

Supplemental centroid analysis for 004366913-01. Kepler magnitude: 12.29. Transit SNR 11.21

There are 13 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

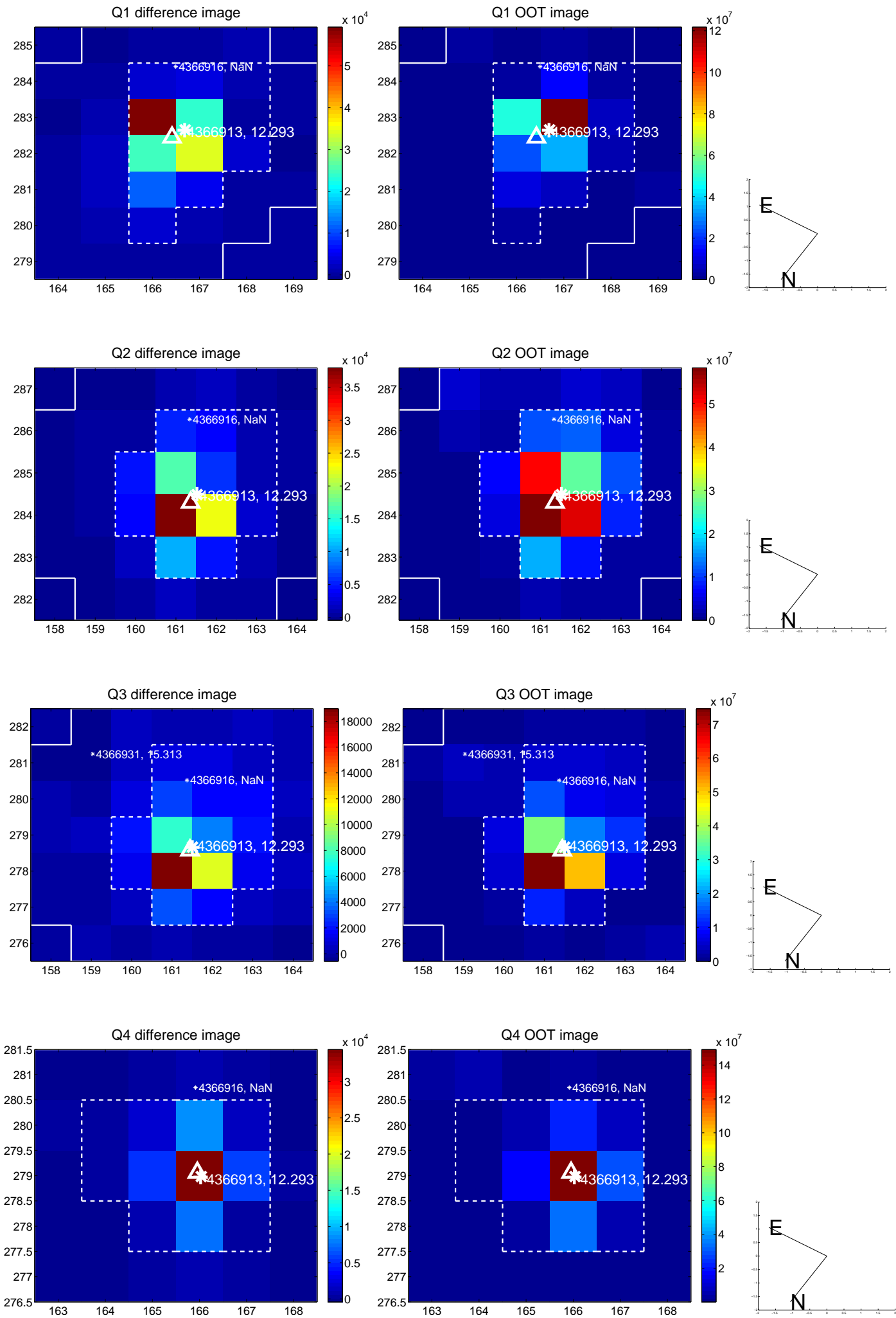
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.079 \pm 0.142$	0.55	$0.077 \pm 0.144$	$0.013 \pm 0.125$
PRF-fit source offset from KIC position	$0.122 \pm 0.154$	0.79	$0.117 \pm 0.161$	$0.032 \pm 0.120$
photometric centroid source offset	$0.66 \pm 0.25$	2.61	$-0.18 \pm 0.24$	$-0.64 \pm 0.26$



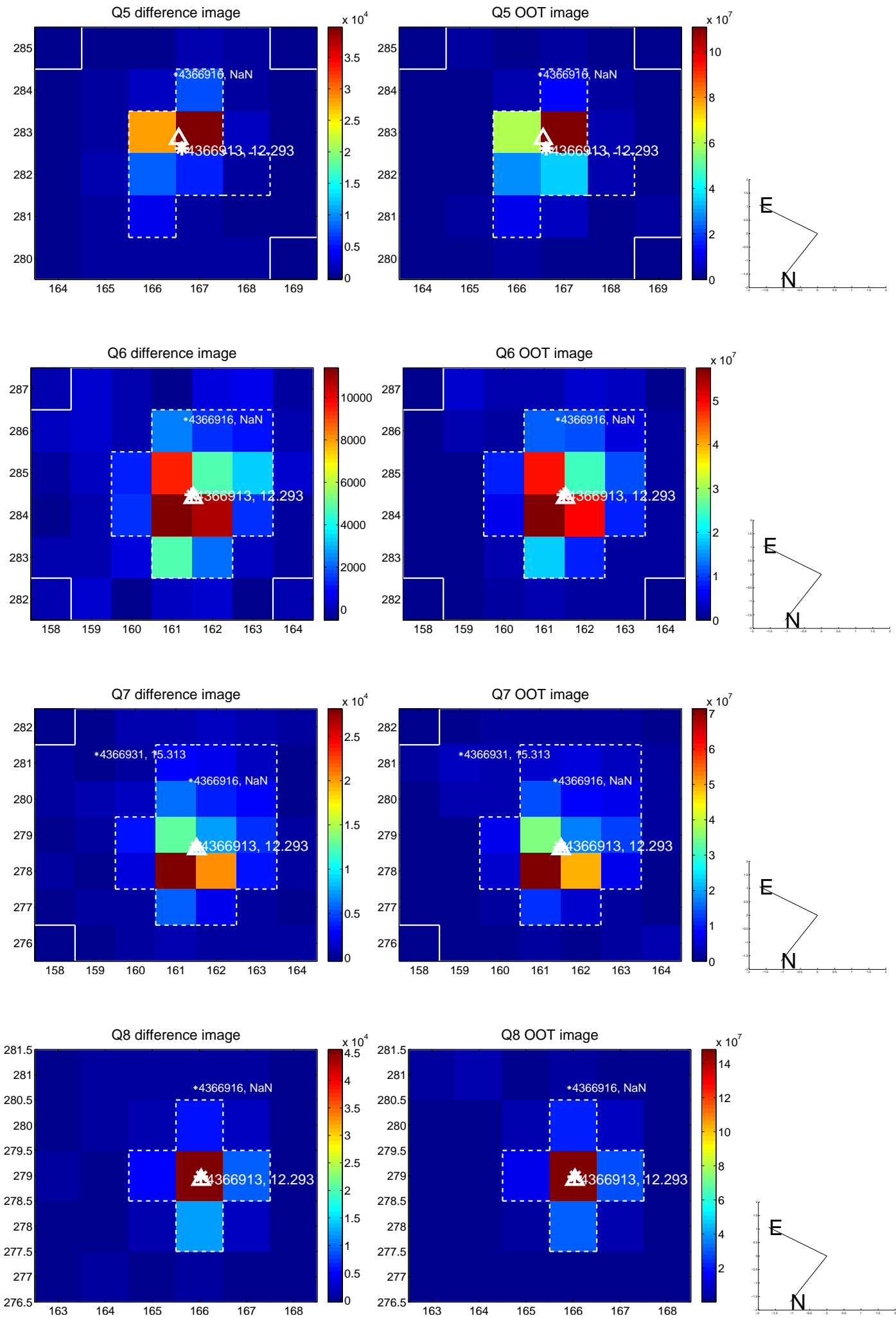
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



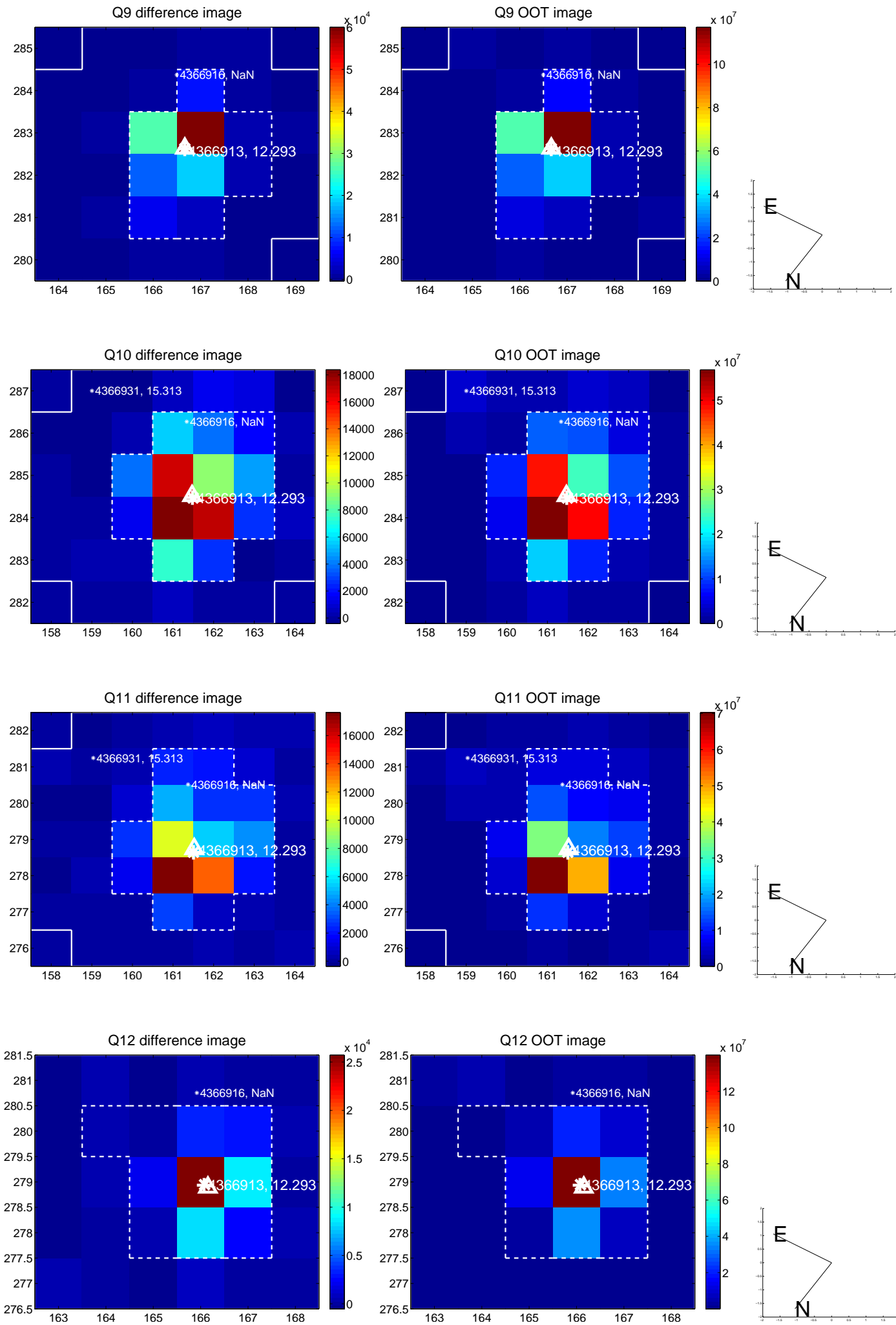
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

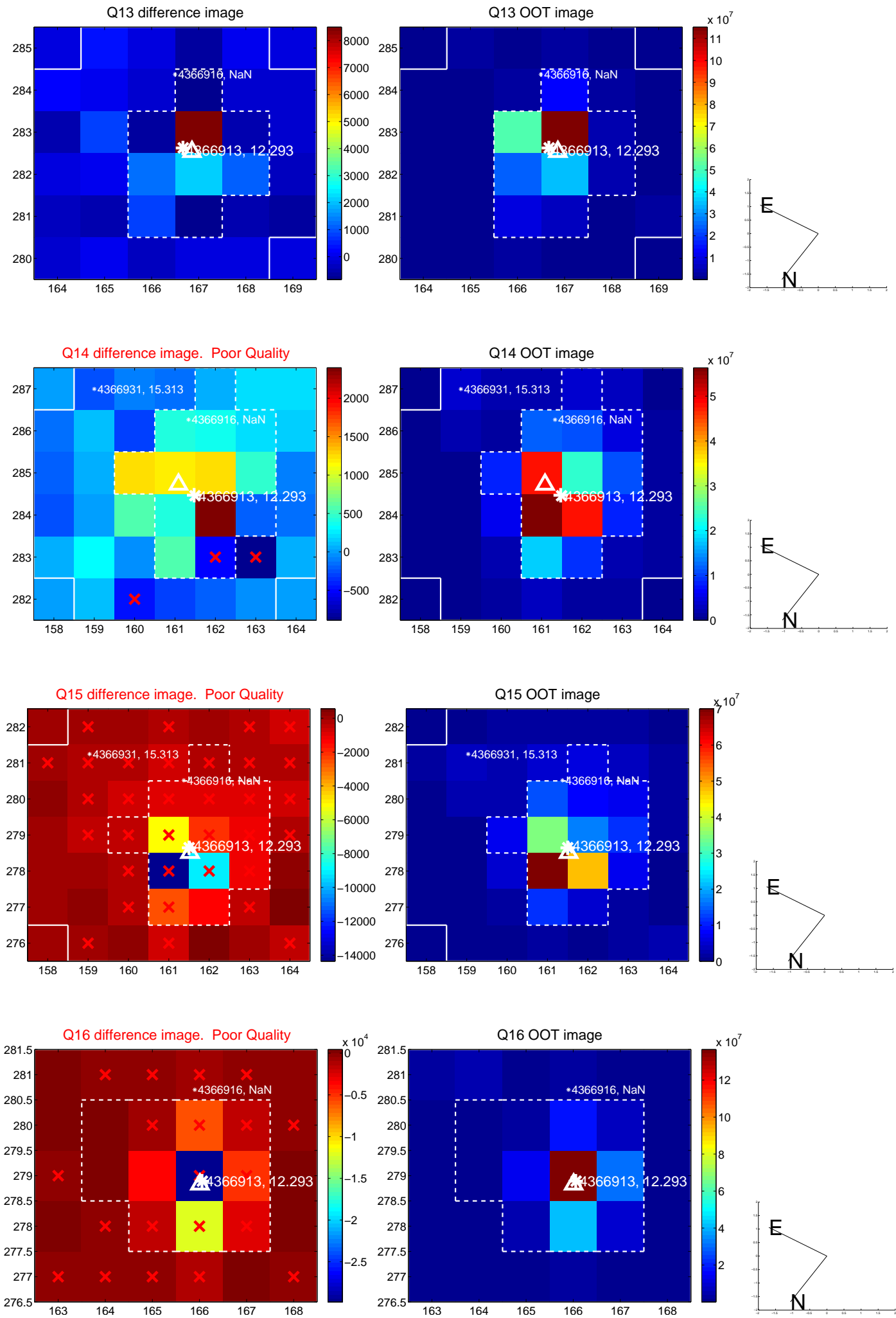


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

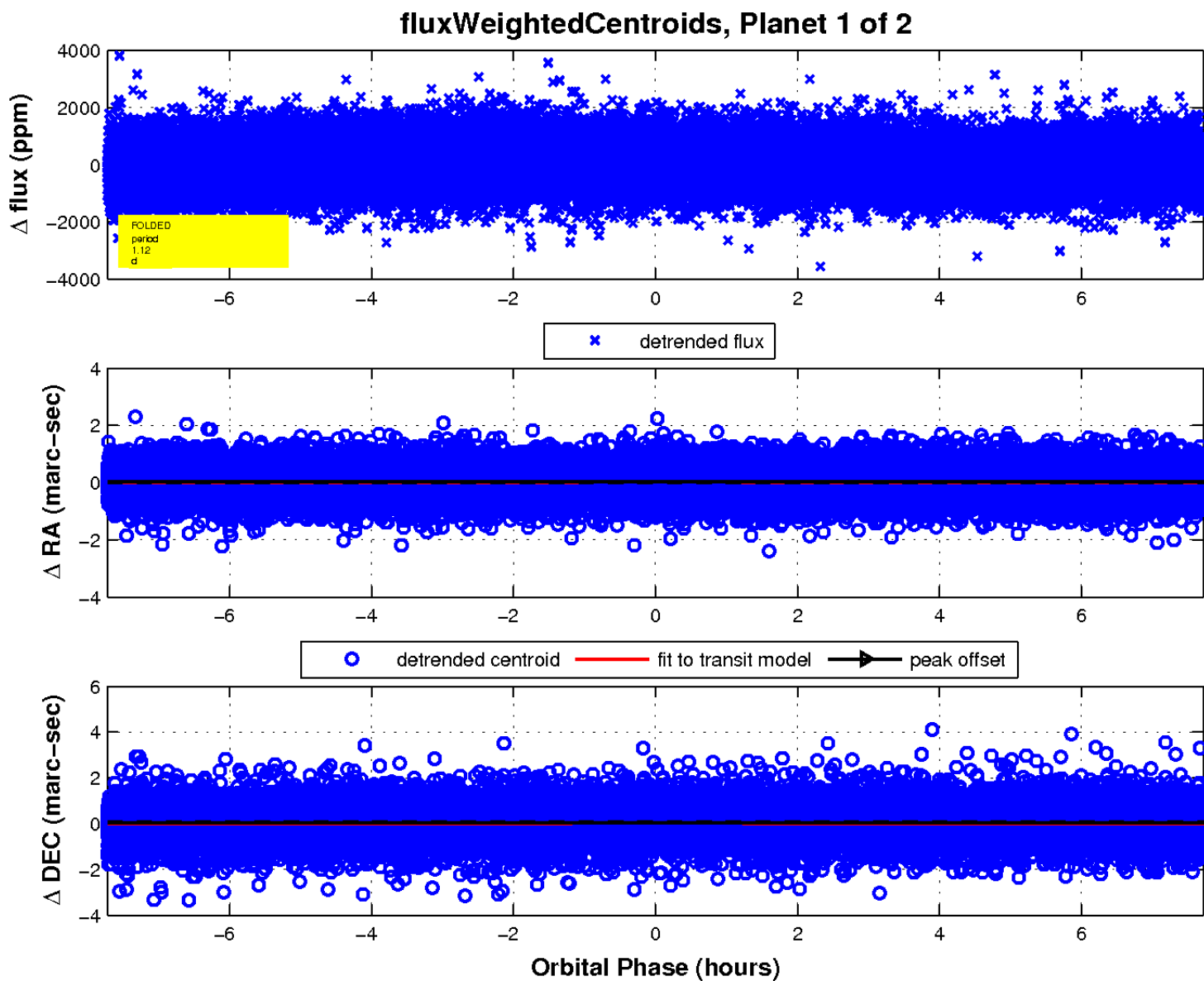
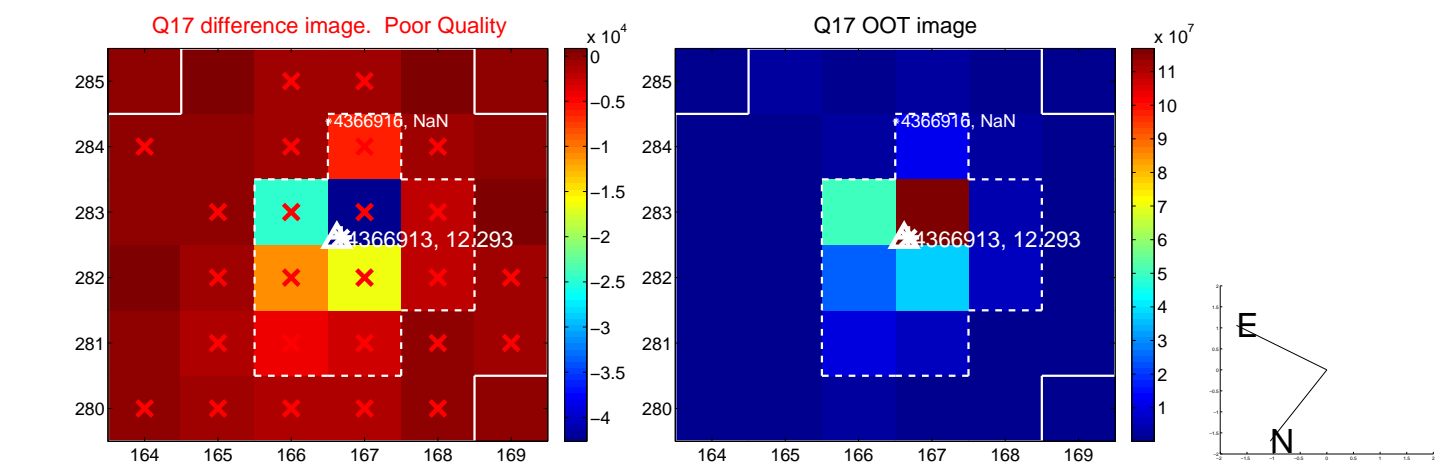




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

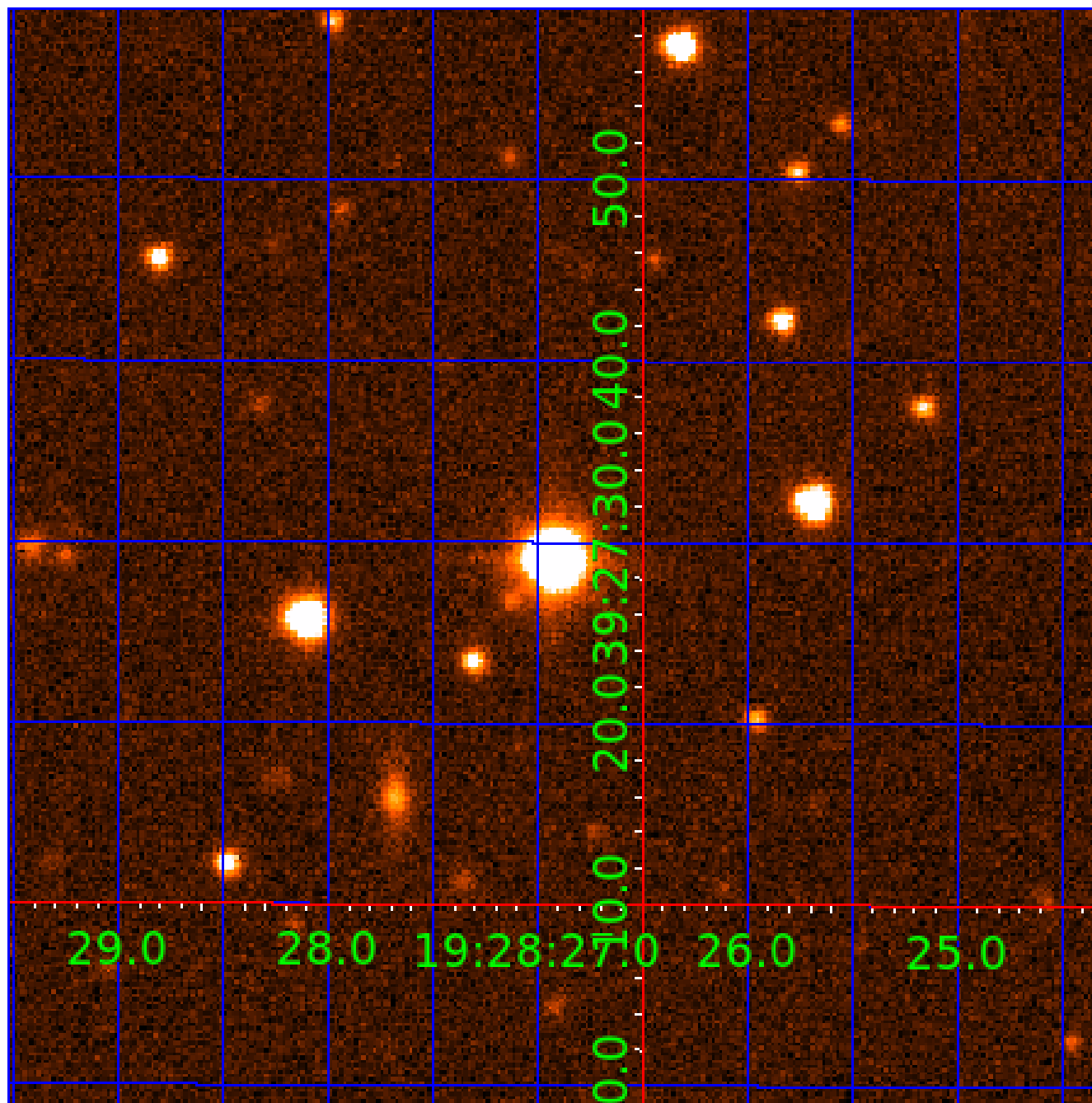


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 004366913

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004366913-01	OBS	No	1.115275	132.474040	74.3	2.574	14.1	11.2	1.77	7218	1.78	11913.38
004366913-02	OBS	No	2.229891	132.582828	85.6	17.763	17.2	14.3	1.77	7218	1.96	4729.69

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004366913-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA_TRACKER—SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
004366913-02	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_ALT

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

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

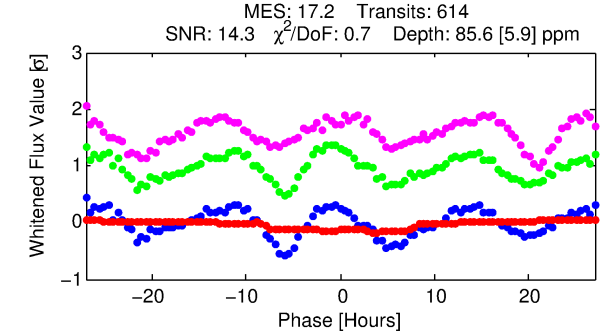
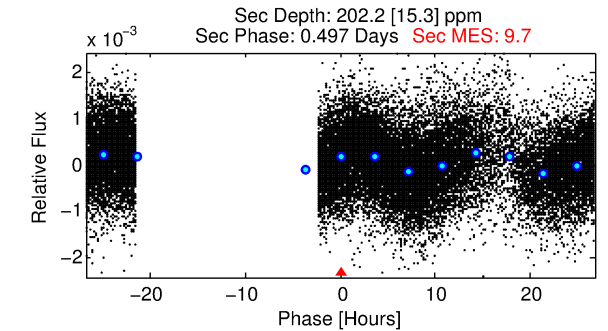
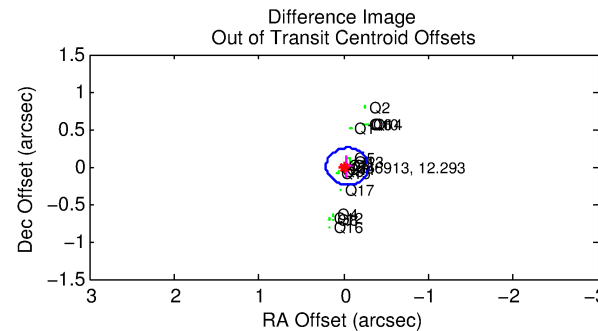
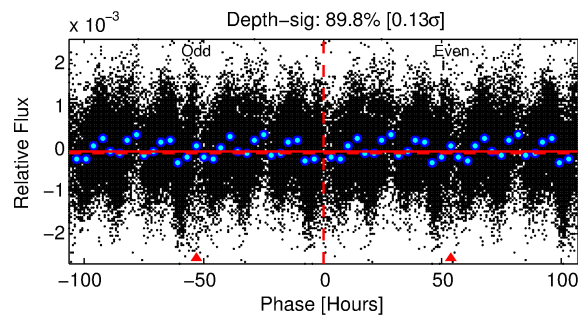
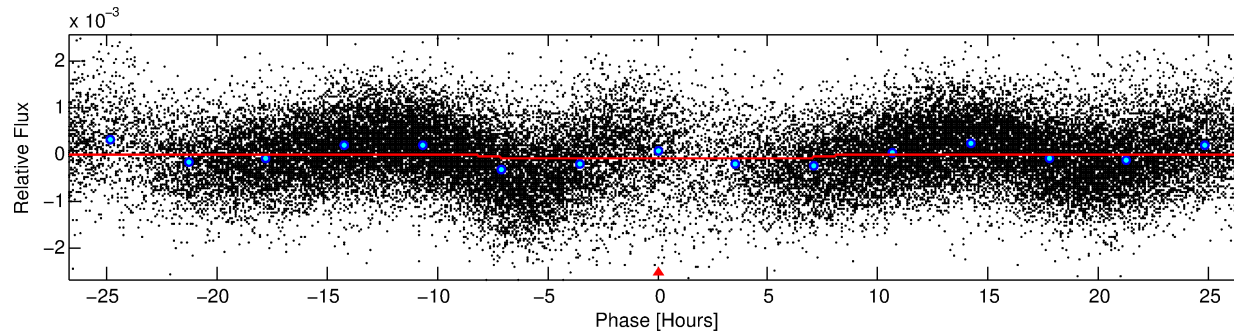
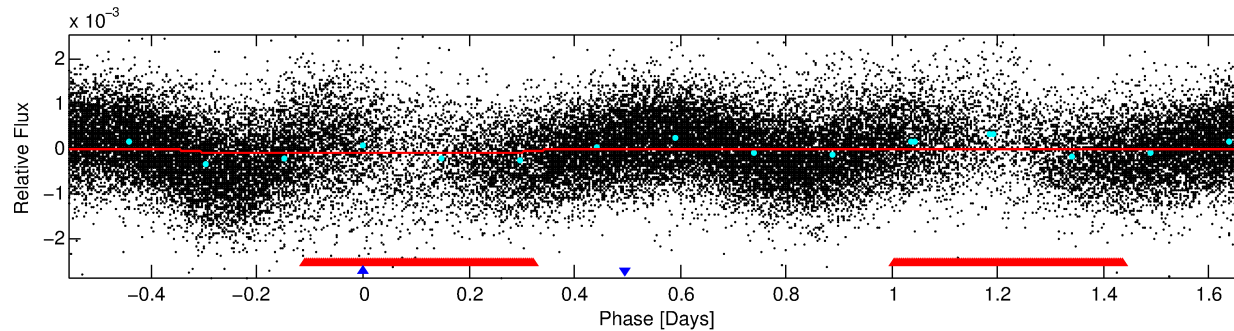
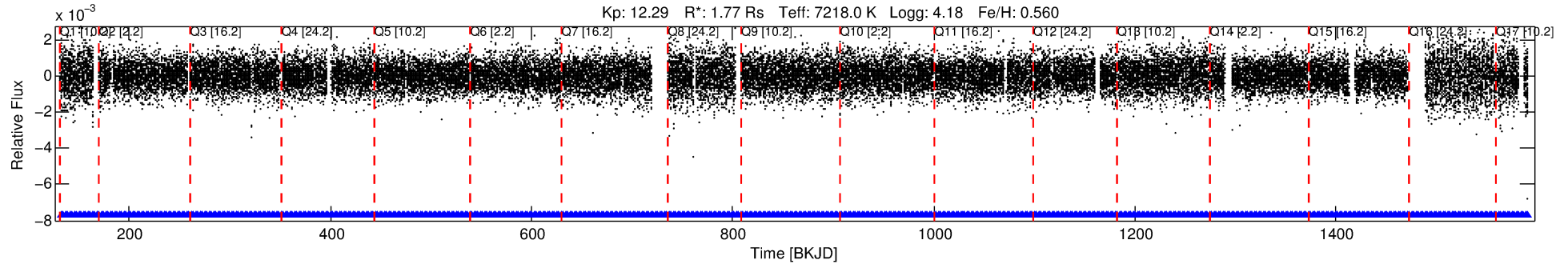
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004366913-02

No Significant Match Found

# DV One-Page Summary

KIC: 4366913 Candidate: 2 of 2 Period: 2.230 d



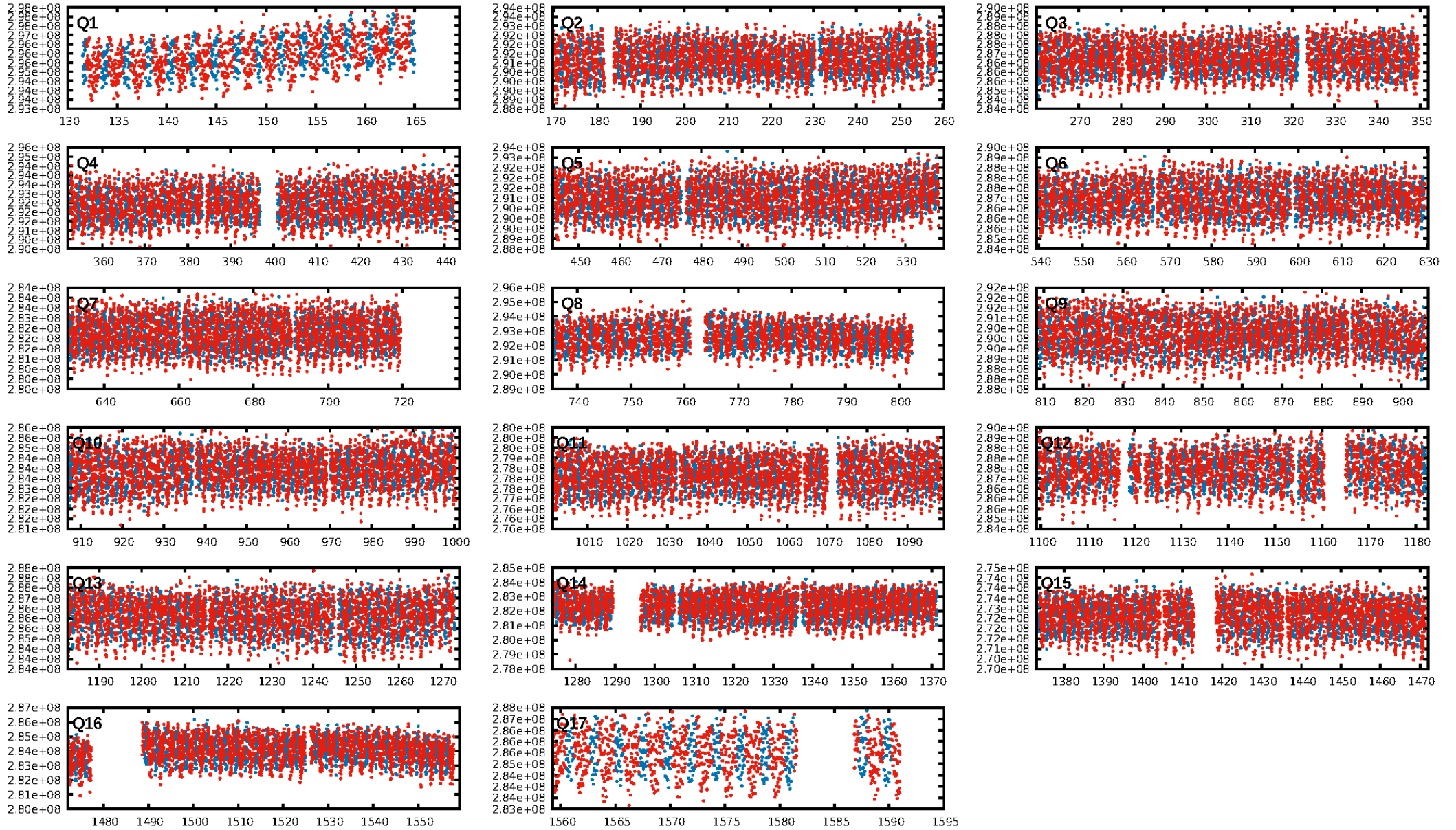
## DV Fit Results:

Period = 2.22989 [0.00004] d  
Epoch = 132.5828 [0.0110] BKJD  
Rp/R\* = 0.0101 [0.0005]  
a/R\* = 1.03 [0.01]  
b = 0.93 [0.03]  
Seff = 4729.69 [1276.33]  
Teq = 2115 [143] K  
Rp = 1.96 [0.44] Re  
a = 0.0401 [0.0074] AU  
Ag = 46.63 [13.65] [3.34 $\sigma$ ]  
Teffp = 8544 [281] K [20.37 $\sigma$ ]

## DV Diagnostic Results:

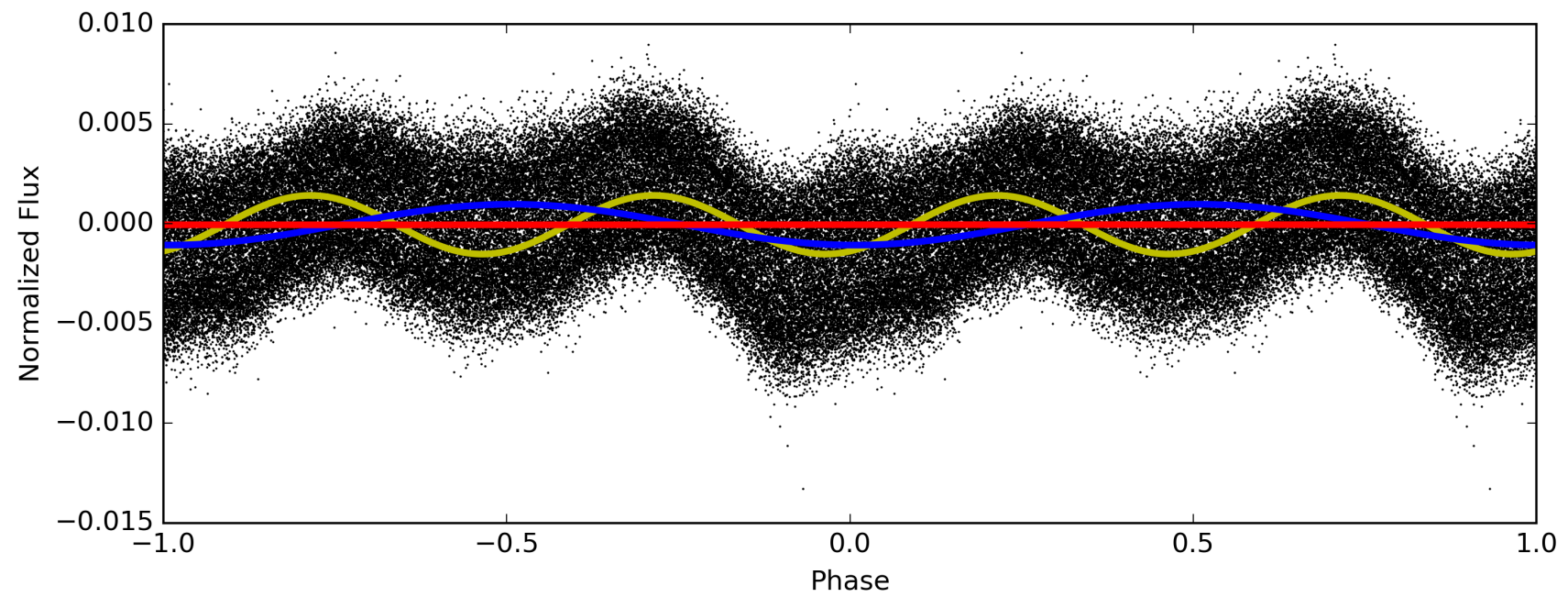
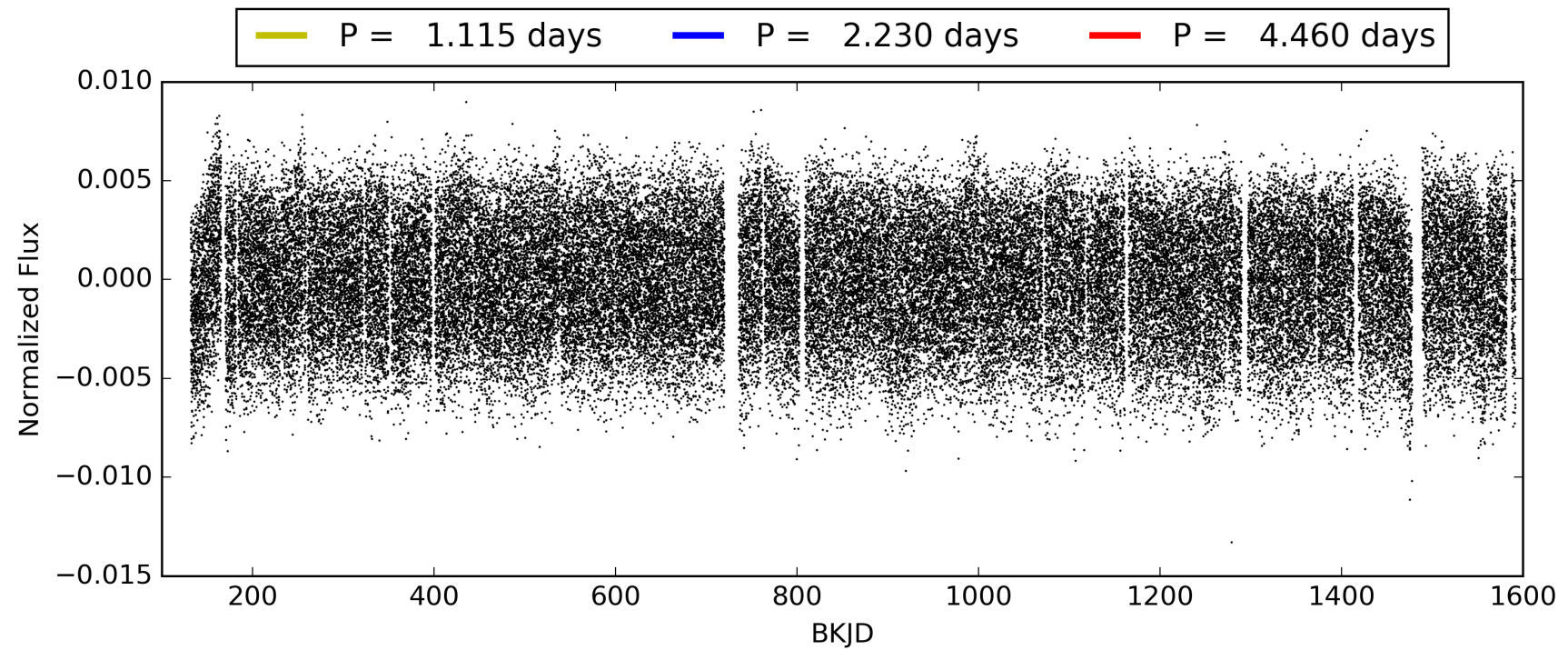
ShortPeriod-sig: 86.4% [1.49 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [587/587]  
GhostDiagnostic-chr: 3.236  
Centroid-sig: 10.4%  
Centroid-so: 0.253 arcsec [1.41 $\sigma$ ]  
OotOffset-rm: 0.043 arcsec [0.52 $\sigma$ ]  
KicOffset-rm: 0.043 arcsec [0.36 $\sigma$ ]  
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]

# TCE 004366913-02, PDC Light Curves



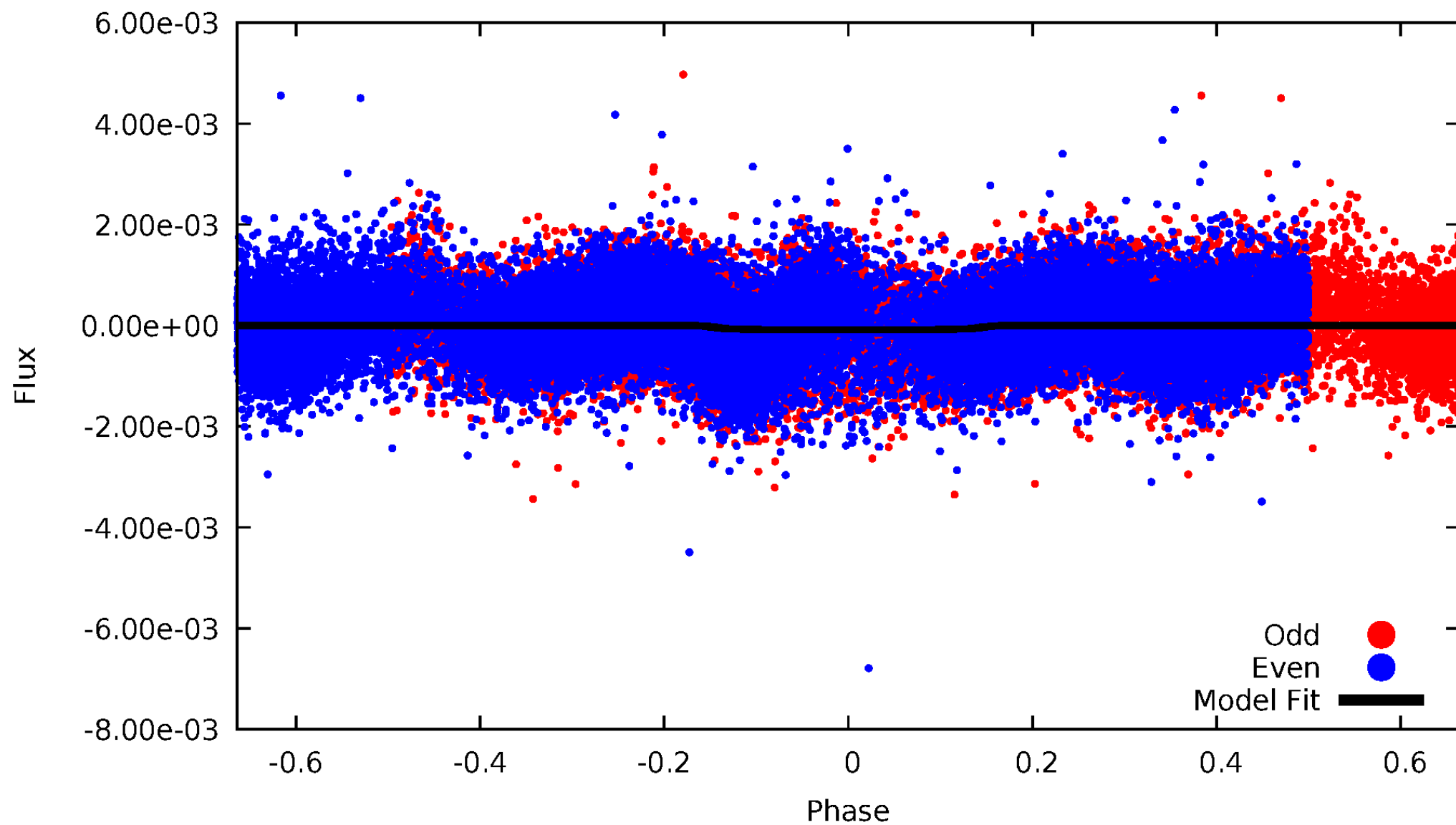


TCE 004366913-02



# DV Odd/Even

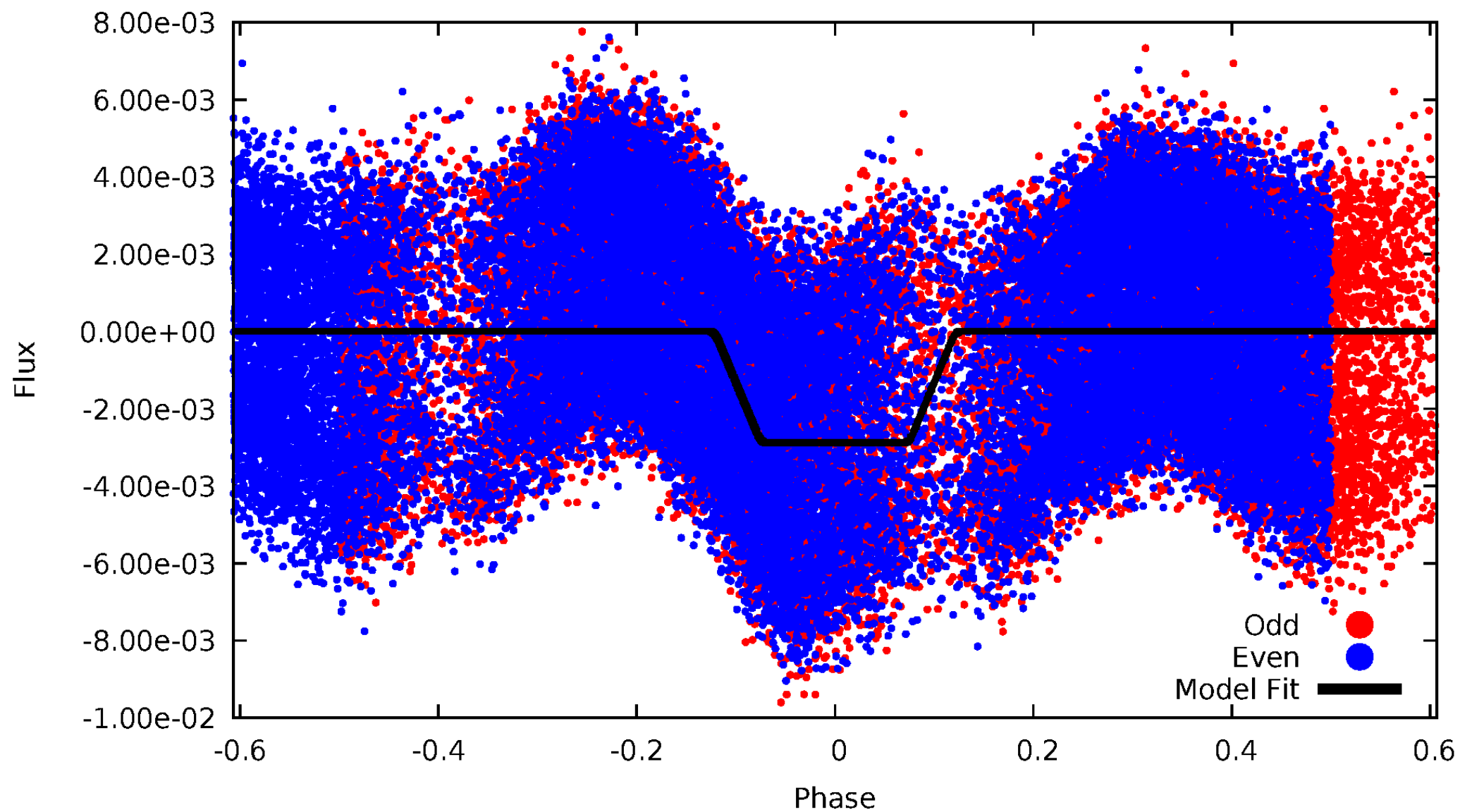
TCE 004366913-02





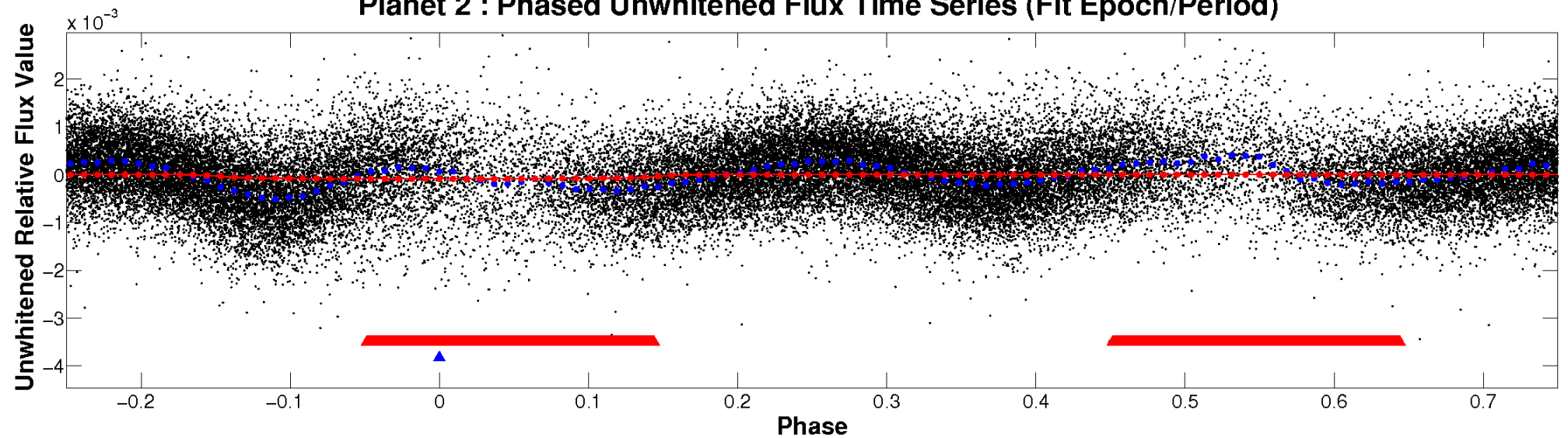
# ALT Odd/Even

TCE 004366913-02

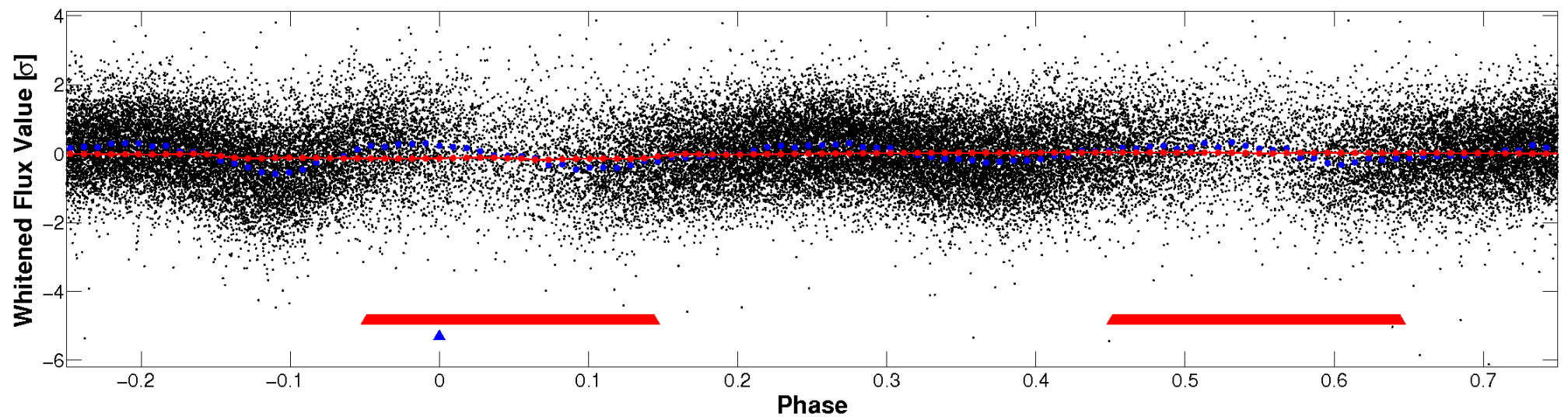


# Non-Whitened Vs. Whitened Light Curve

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

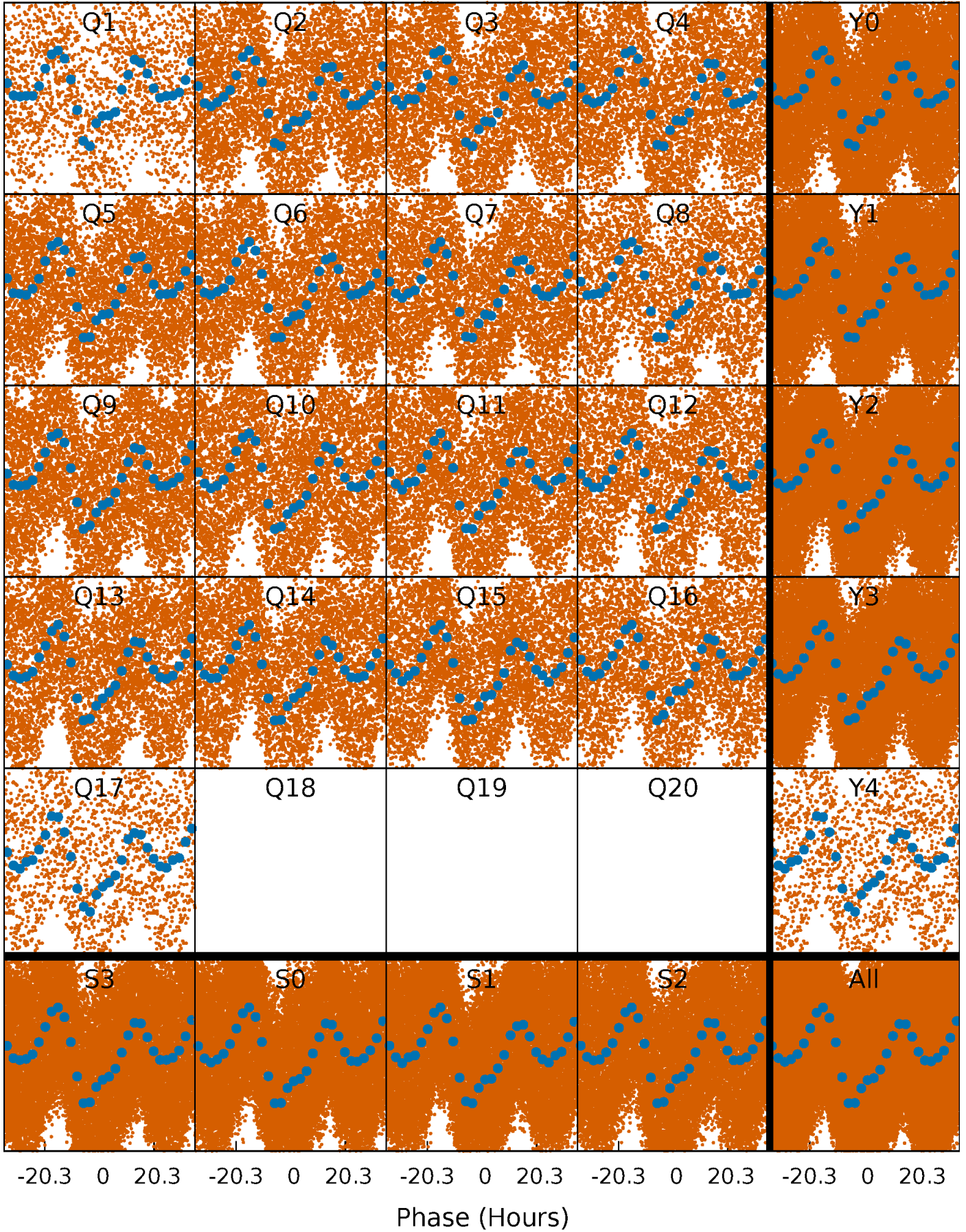


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

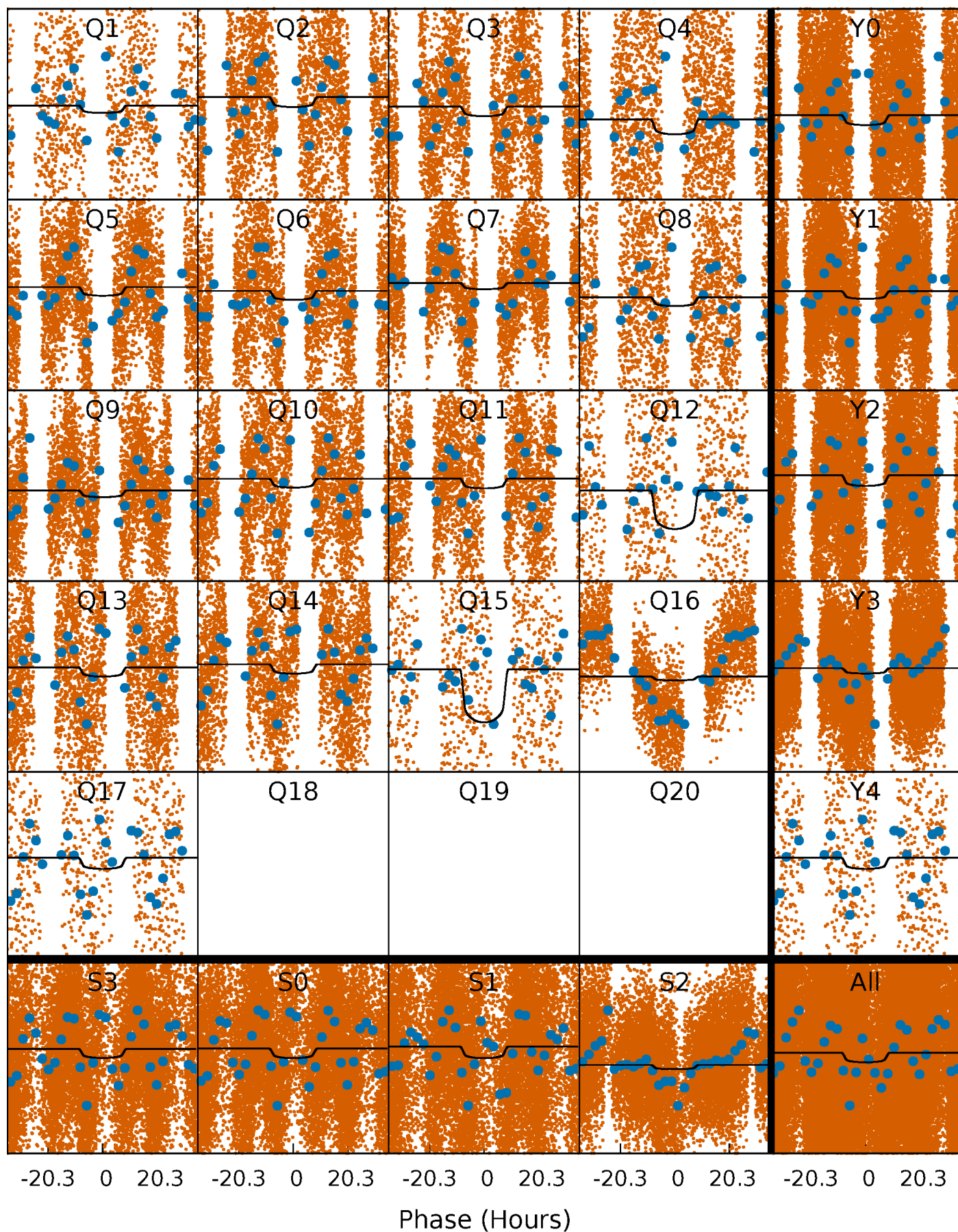
TCE 004366913-02   P= 2.229891 Days    $T_0=132.582828$  (BKJD)





# DV Quarter-Phased Transit Curves

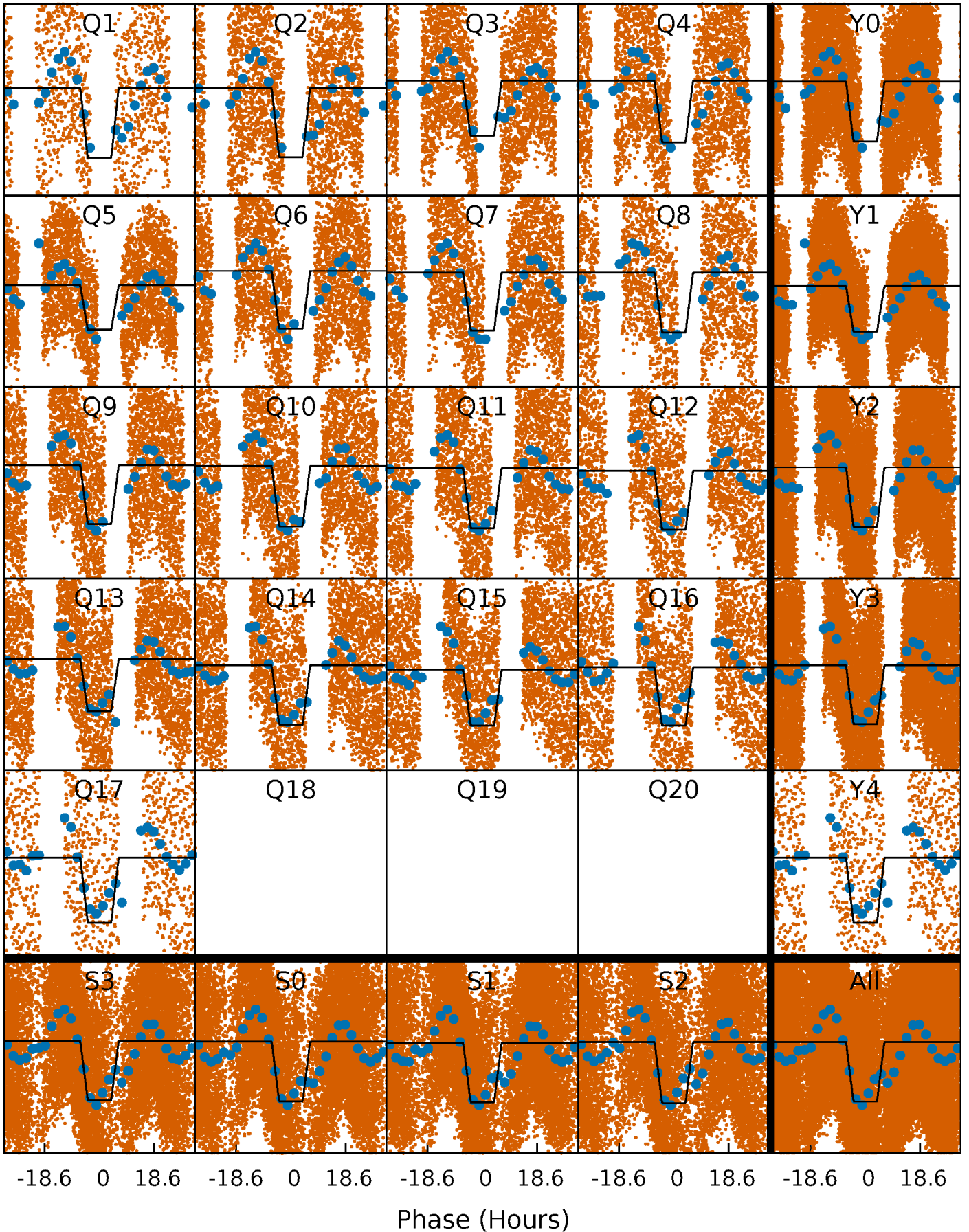
TCE 004366913-02   P= 2.229891 Days    $T_0=132.582828$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

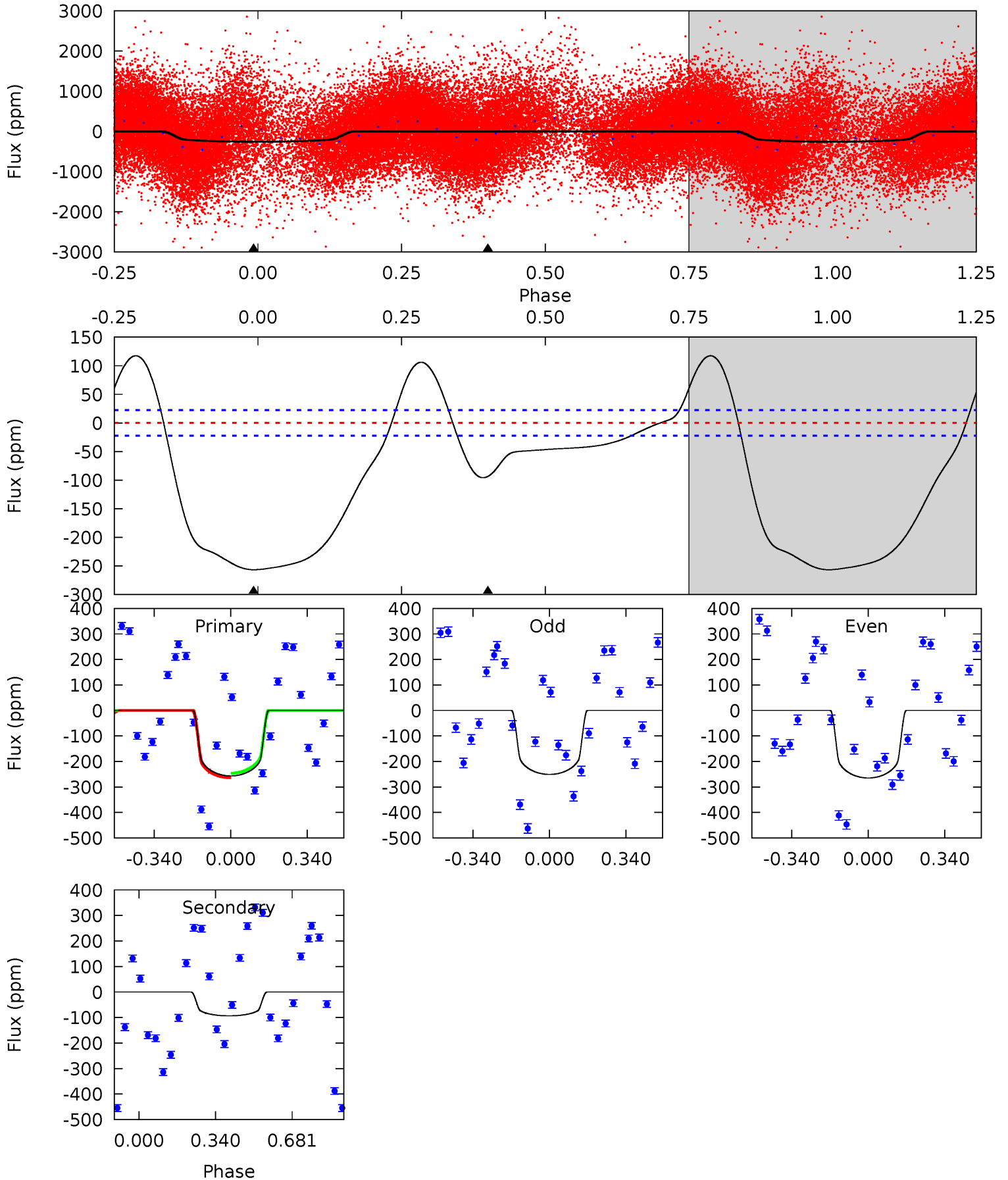
TCE 004366913-02   P= 2.229928 Days    $T_0=132.431960$  (BKJD)



# DV Model-Shift Uniqueness Test

004366913-02, P = 2.229891 Days, E = 130.352937 Days

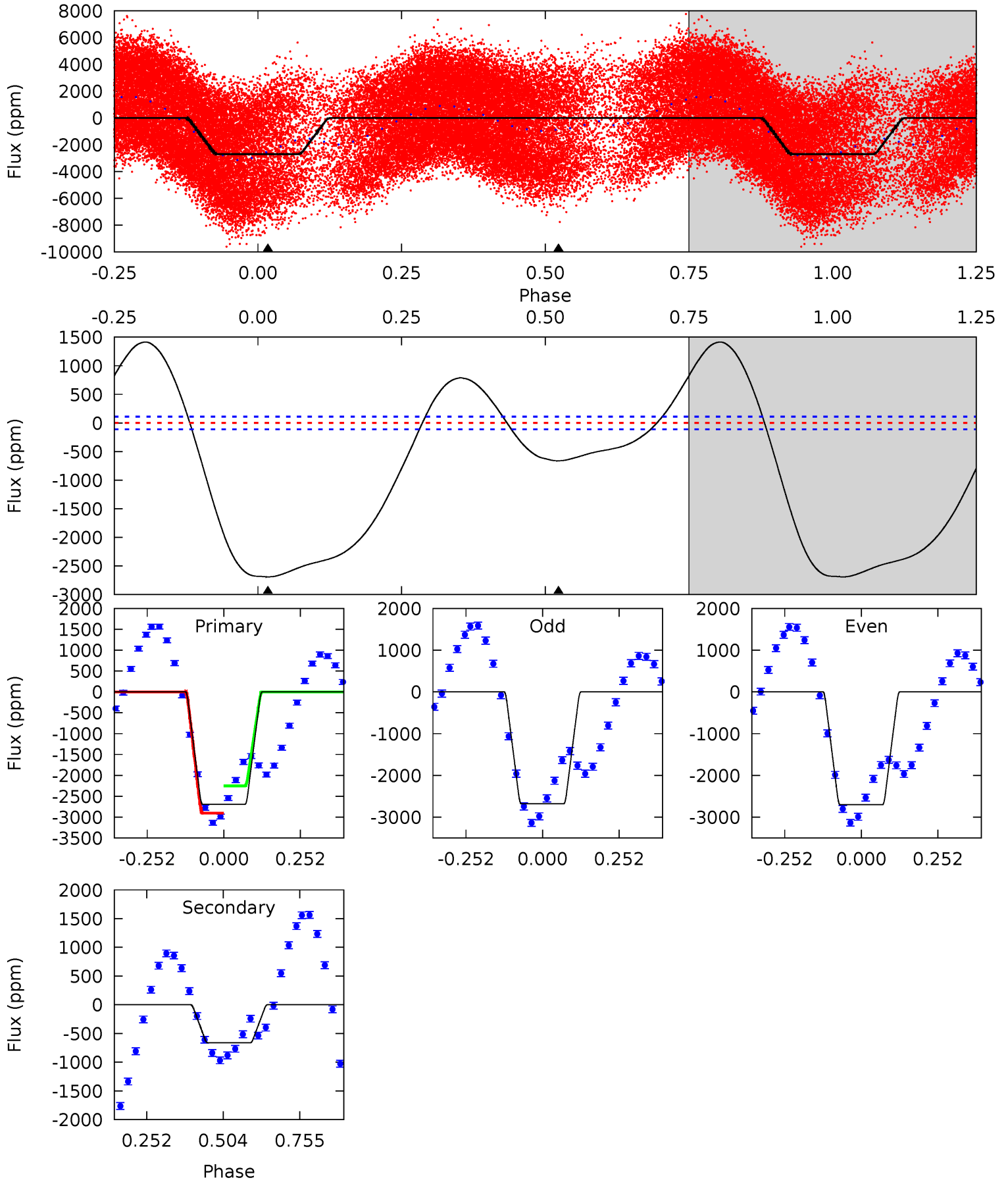
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
49.4	18.0	0	0	4.30	0.95	2.22	49.4	49.4	18.0	18.0	1.34	1.21	0.31	1.54



# Alt Model-Shift Uniqueness Test

004366913-02, P = 2.229928 Days, E = 130.202032 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
105.3	25.9	0	0	4.37	1.15	30.0	105.3	105.3	25.9	25.9	0.44	1.01	0.34	12.3



### Stellar Parameters For KIC 004366913

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7218^{+79}_{-86}$	$4.181^{+0.025}_{-0.144}$	$0.560^{+0.050}_{-0.250}$	$1.770^{+0.391}_{-0.092}$	$1.734^{+0.113}_{-0.061}$	$0.440^{+0.059}_{-0.182}$
	+1%/-1%	+1%/-3%	+9%/-45%	+22%/-5%	+7%/-4%	+13%/-41%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 004366913-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-93 \pm 5$	$2.02^{+0.23}_{-0.15}$	$2991^{+151}_{-69}$	$6990^{+246}_{-204}$	$20^{+3}_{-4}$
Alt.	$-662 \pm 26$	$10.73^{+1.22}_{-0.56}$	$3003^{+154}_{-74}$	$4967^{+63}_{-68}$	$5.099^{+0.588}_{-0.943}$

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

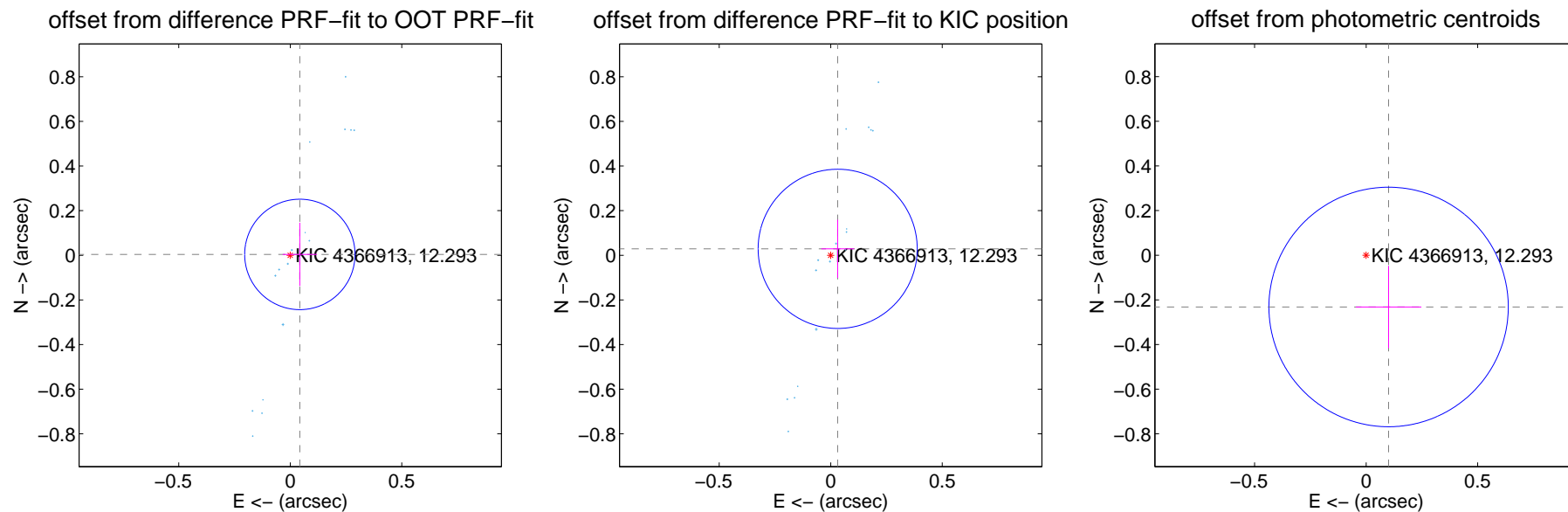
## DV Centroid Data

Supplemental centroid analysis for 004366913-02. Kepler magnitude: 12.29. Transit SNR 14.33

There are 17 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

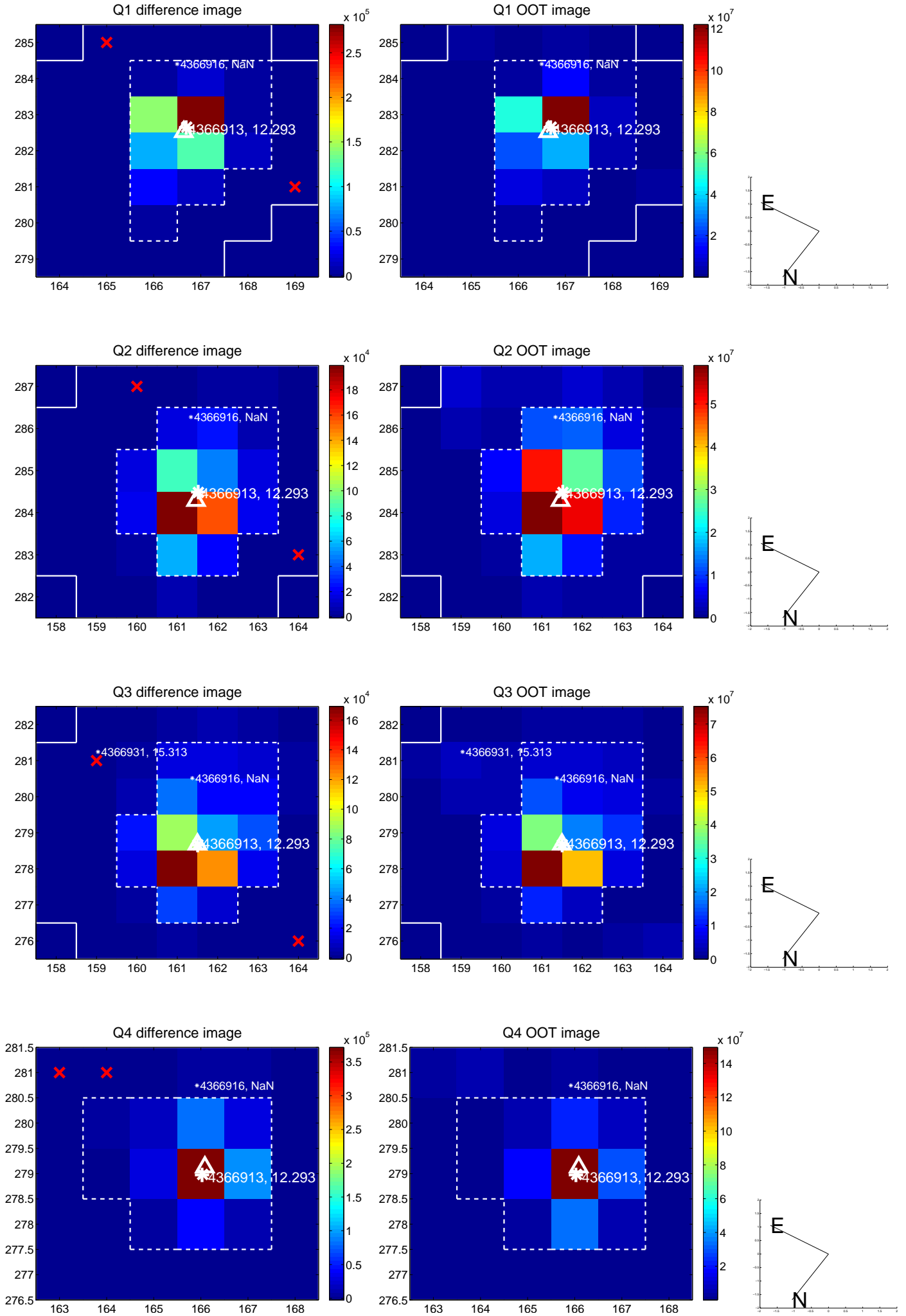
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.043 \pm 0.082$	0.52	$-0.043 \pm 0.077$	$0.004 \pm 0.142$
PRF-fit source offset from KIC position	$0.043 \pm 0.119$	0.36	$-0.031 \pm 0.074$	$0.029 \pm 0.130$
photometric centroid source offset	$0.25 \pm 0.18$	1.41	$-0.10 \pm 0.15$	$-0.23 \pm 0.18$



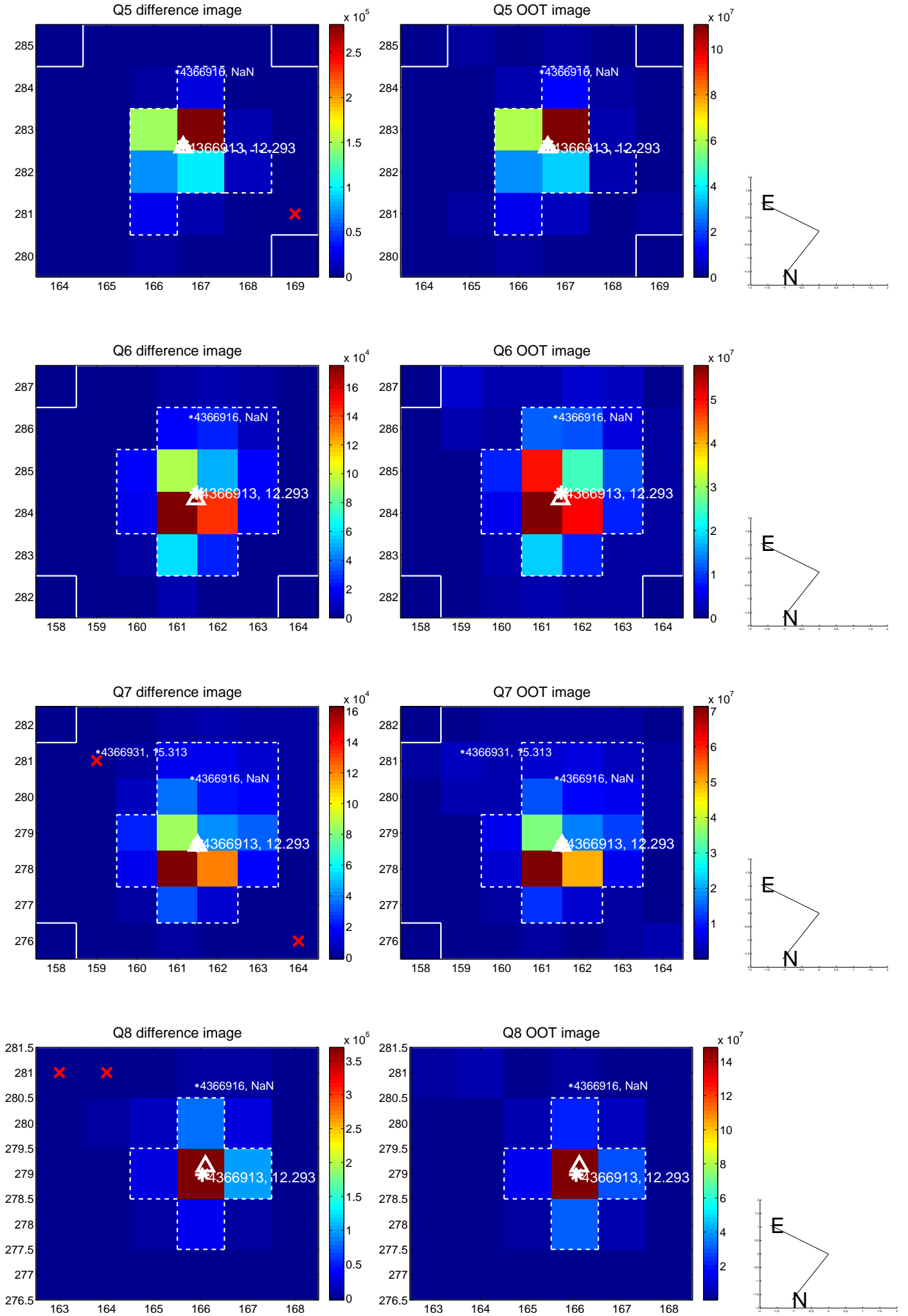
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



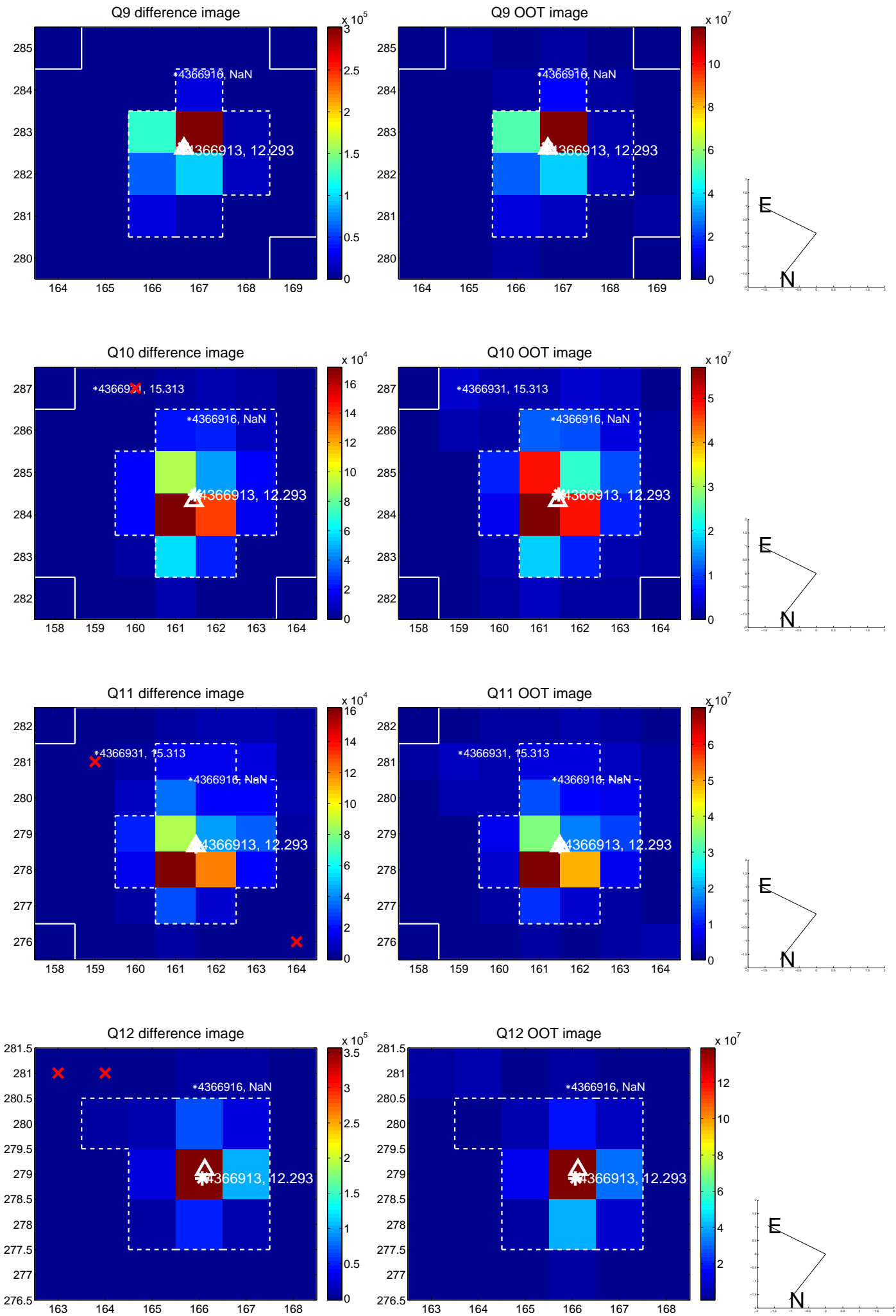
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



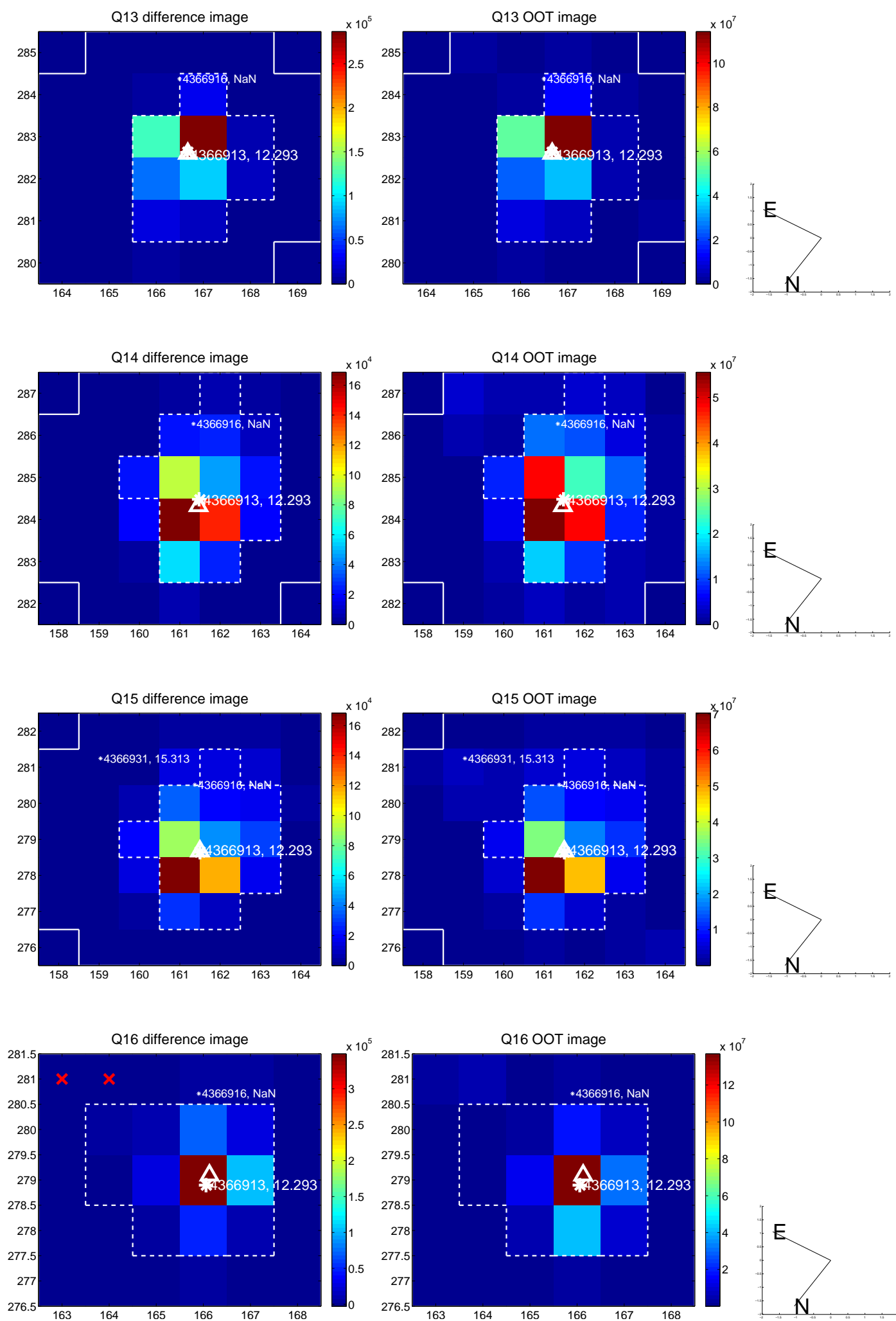
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



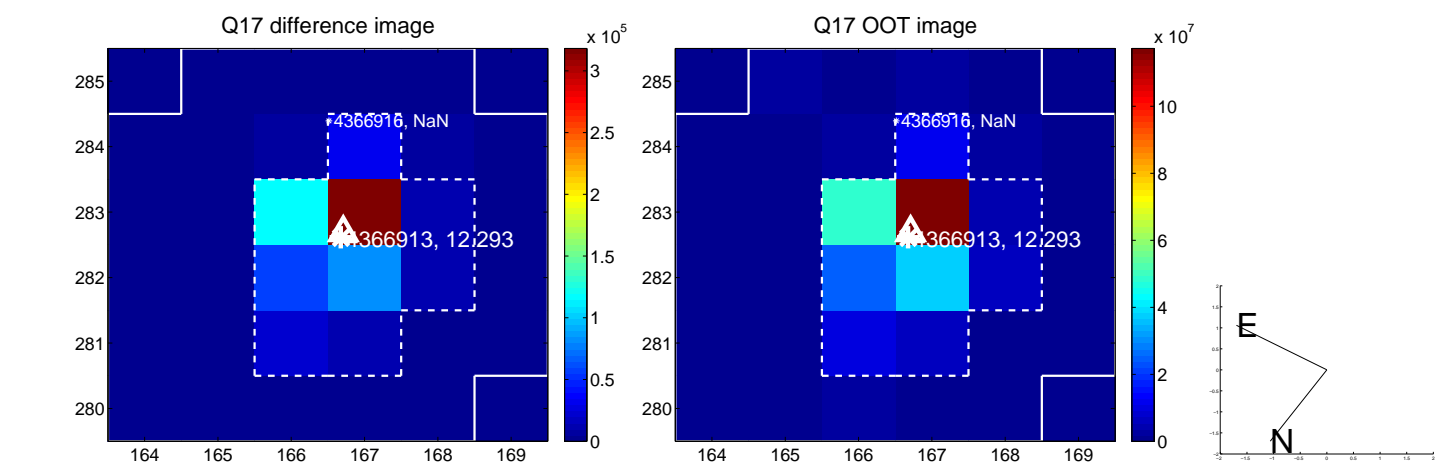
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



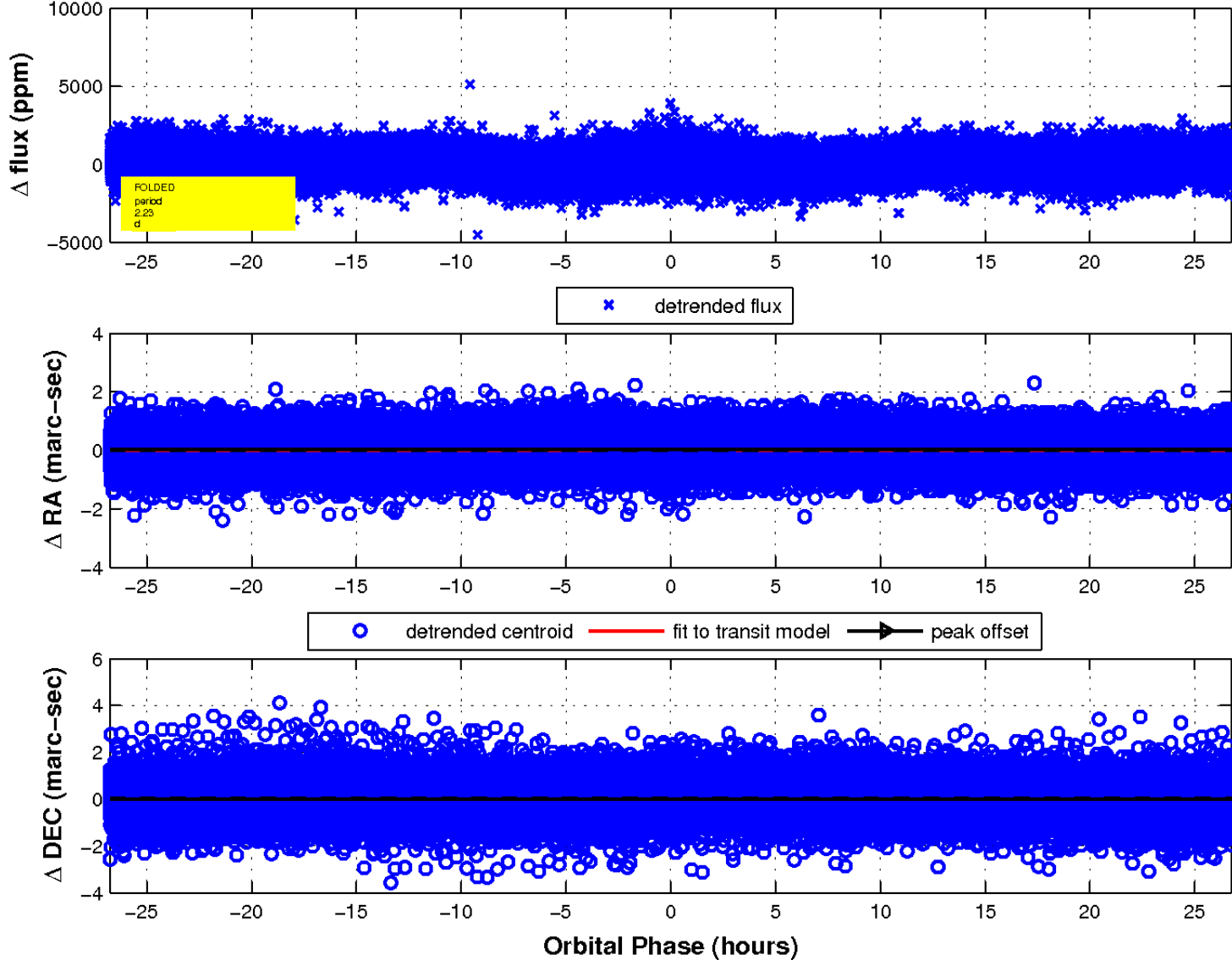
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2





UKIRT Image

Declination

