

# KIC 008212251

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008212251-01	OBS	No	1.548741	131.864636	35.7	8.706	10.4	7.7	1.54	6714	0.94	4951.27
008212251-02	OBS	No	1.548990	132.559894	68.0	6.815	15.3	14.3	1.54	6714	1.35	4950.21

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008212251-01	OBS	FP	0.00	1	0	0	0	LPP_DV
008212251-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_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.

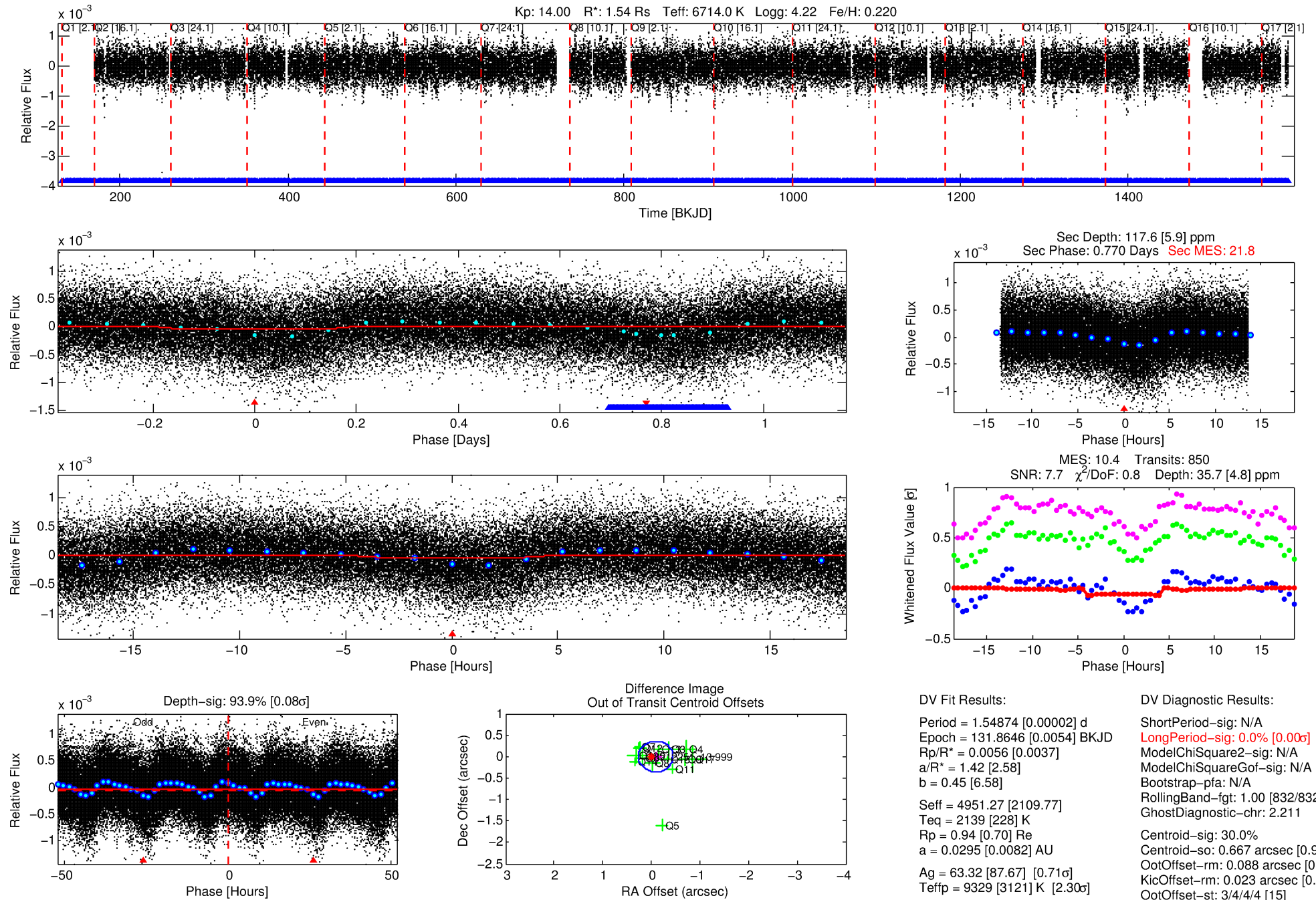
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008212251-01

No Significant Match Found

# DV One-Page Summary

KIC: 8212251 Candidate: 1 of 2 Period: 1.549 d



## DV Fit Results:

Period = 1.54874 [0.00002] d  
Epoch = 131.8646 [0.0054] BKJD  
Rp/R\* = 0.0056 [0.0037]  
a/R\* = 1.42 [2.58]  
b = 0.45 [6.58]  
Seff = 4951.27 [2109.77]  
Teff = 2139 [228] K  
Rp = 0.94 [0.70] Re  
a = 0.0295 [0.0082] AU  
Ag = 63.32 [87.67] [0.71 $\sigma$ ]  
Teffp = 9329 [3121] K [2.30 $\sigma$ ]

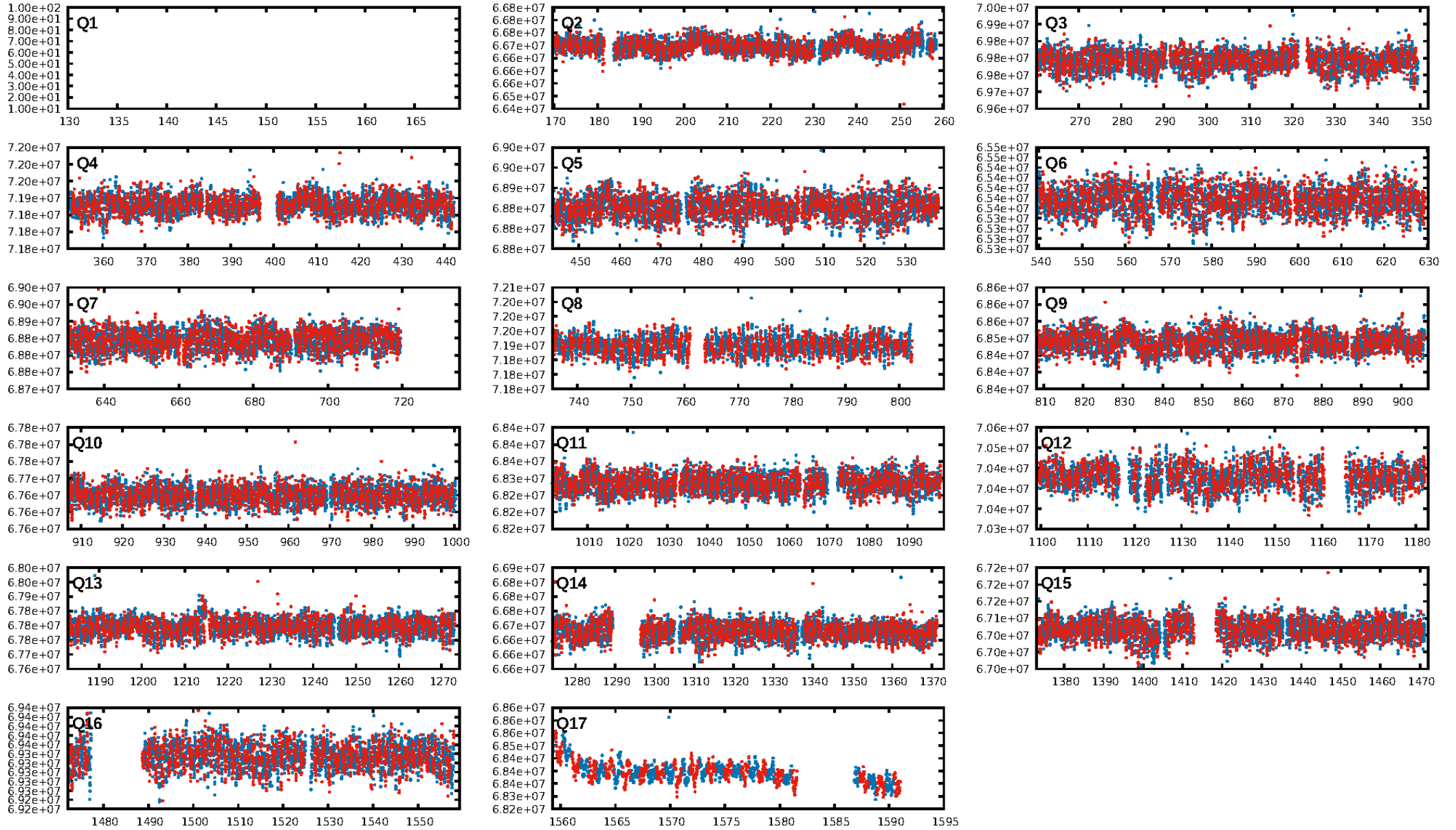
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [832/832]  
GhostDiagnostic-chr: 2.211  
Centroid-sig: 30.0%  
Centroid-so: 0.667 arcsec [0.92 $\sigma$ ]  
OotOffset-rm: 0.088 arcsec [0.74 $\sigma$ ]  
KicOffset-rm: 0.023 arcsec [0.20 $\sigma$ ]  
OotOffset-st: 3/4/4/4 [15]  
KicOffset-st: 3/4/4/4 [15]  
DiffImageQuality-fgm: 1.00 [15/15]  
DiffImageOverlap-fno: 0.00 [0/16]

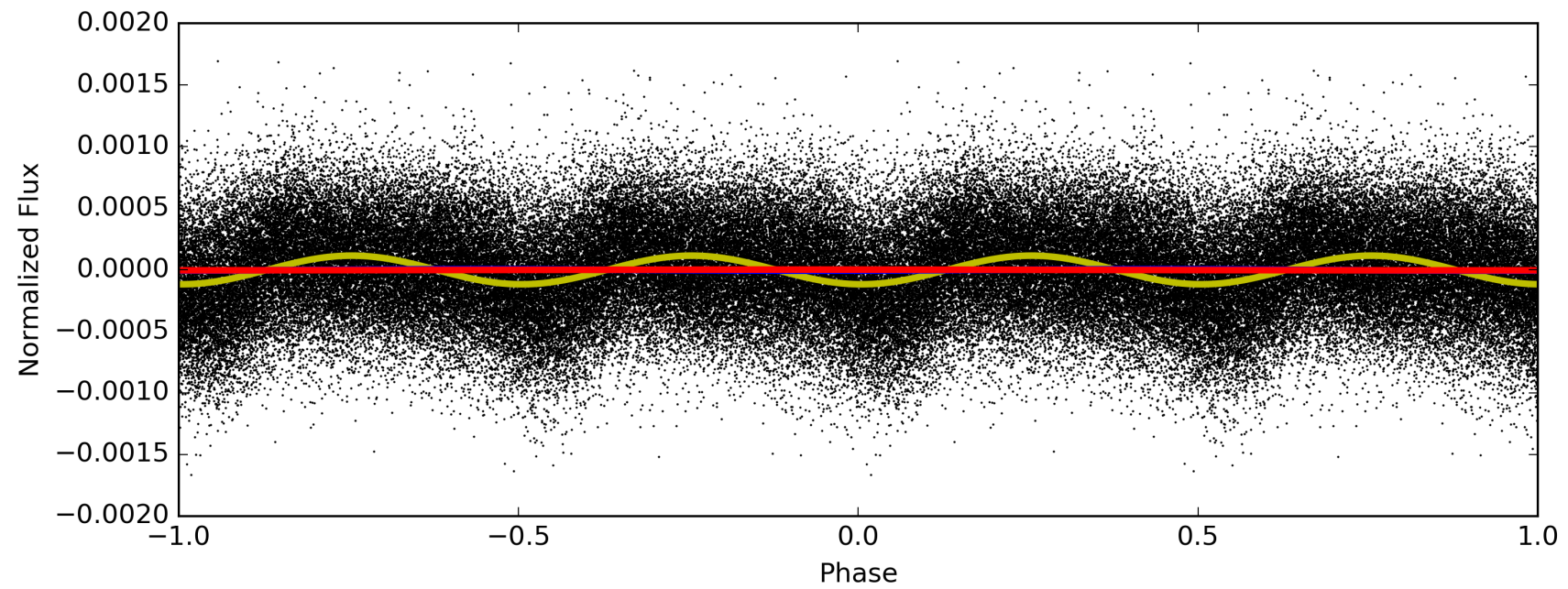
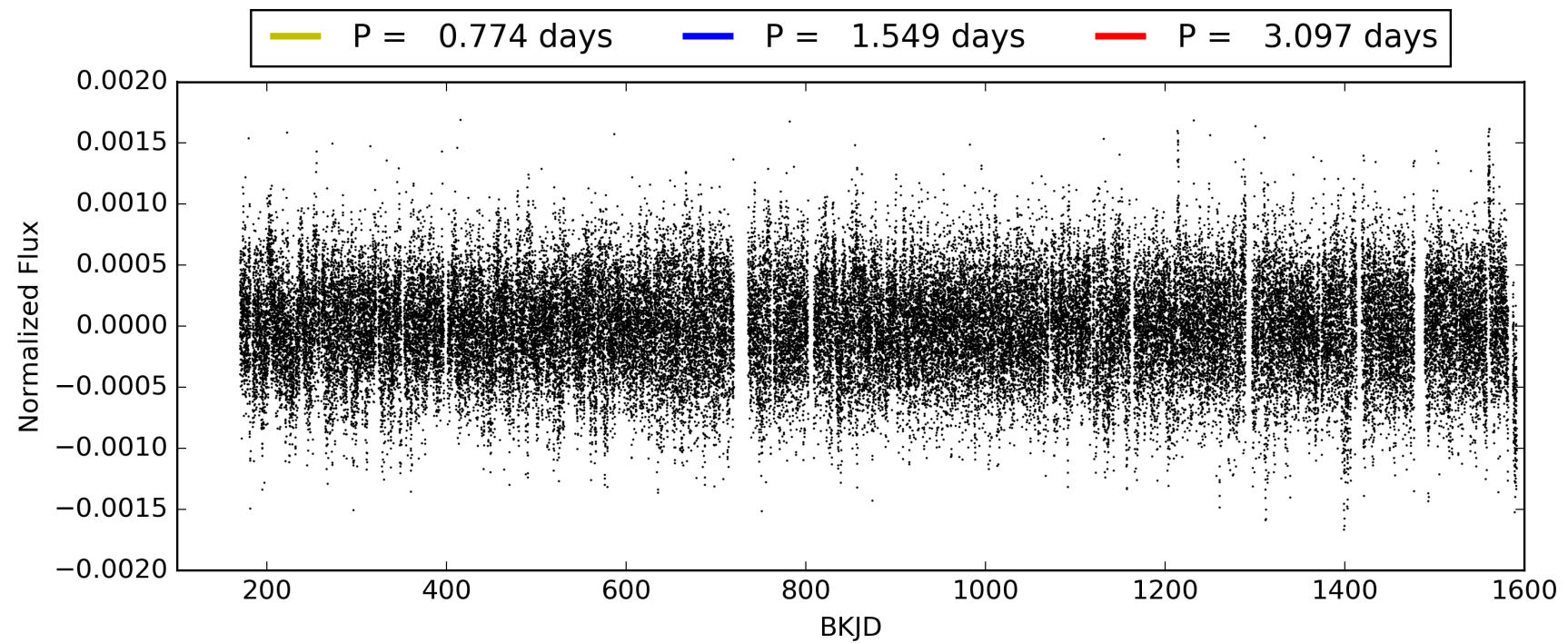
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 09:18:25 Z

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

# TCE 008212251-01, PDC Light Curves

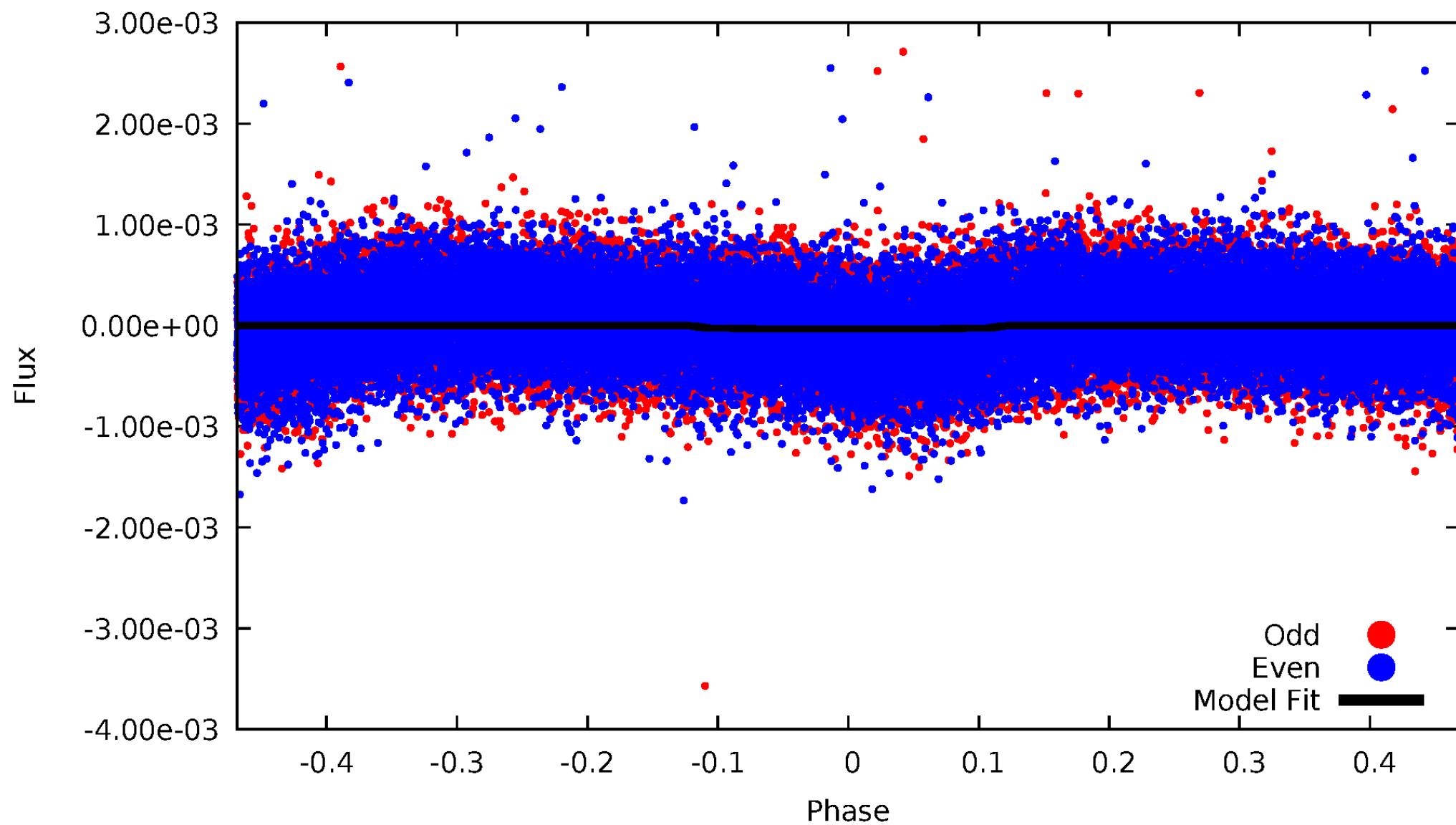


TCE 008212251-01



# DV Odd/Even

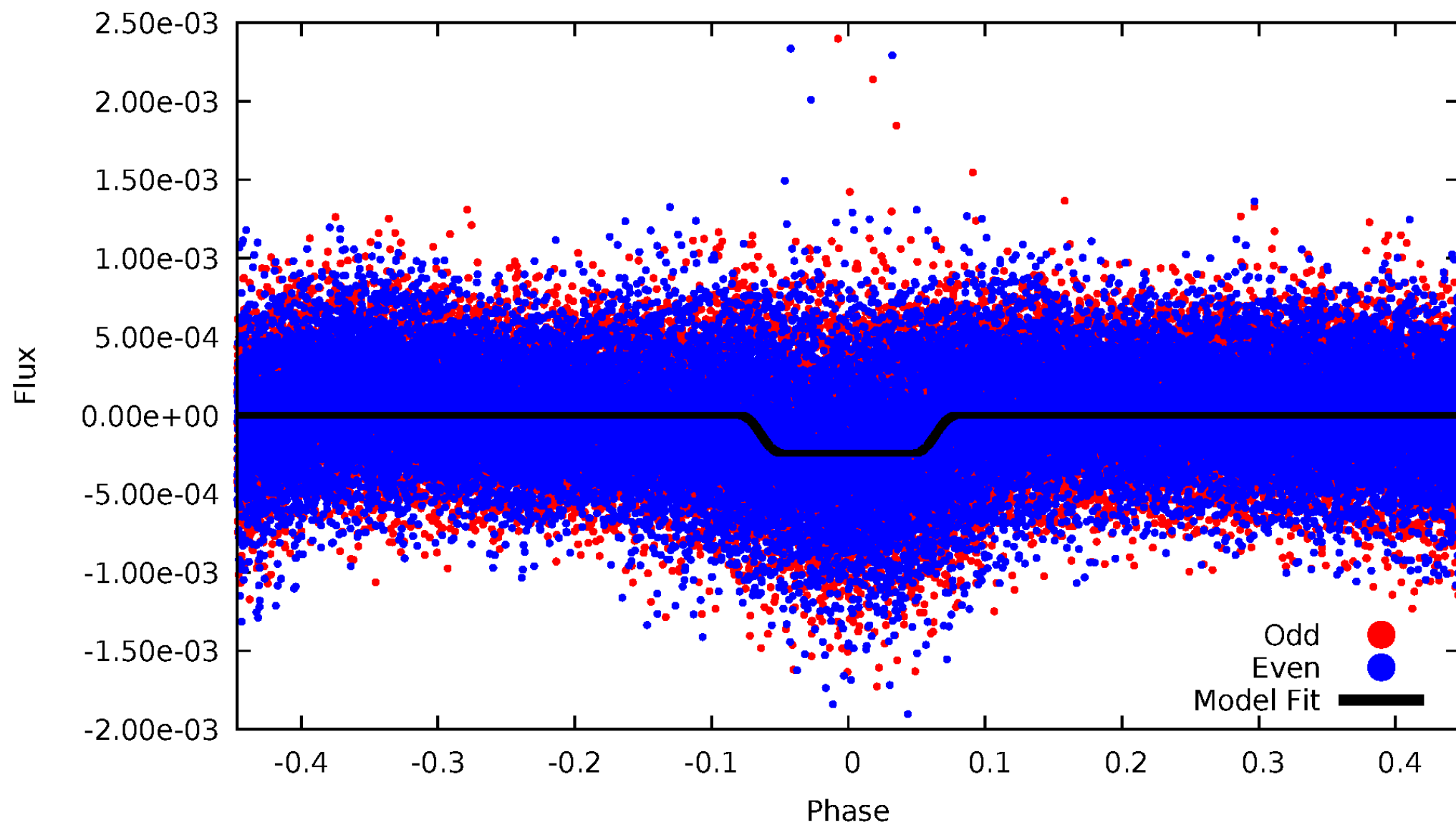
TCE 008212251-01





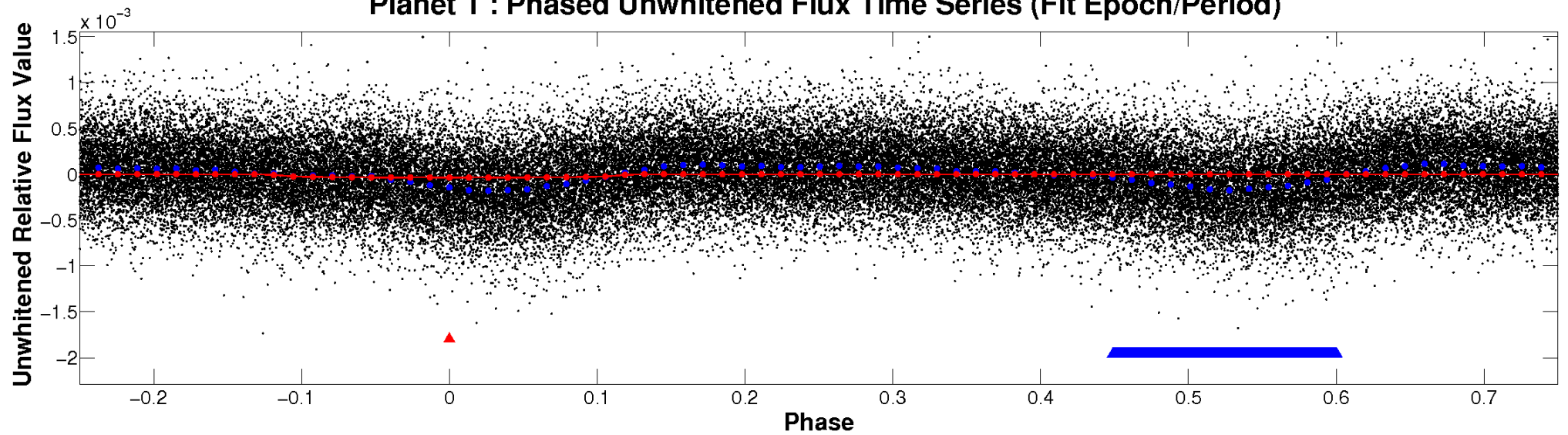
# ALT Odd/Even

TCE 008212251-01

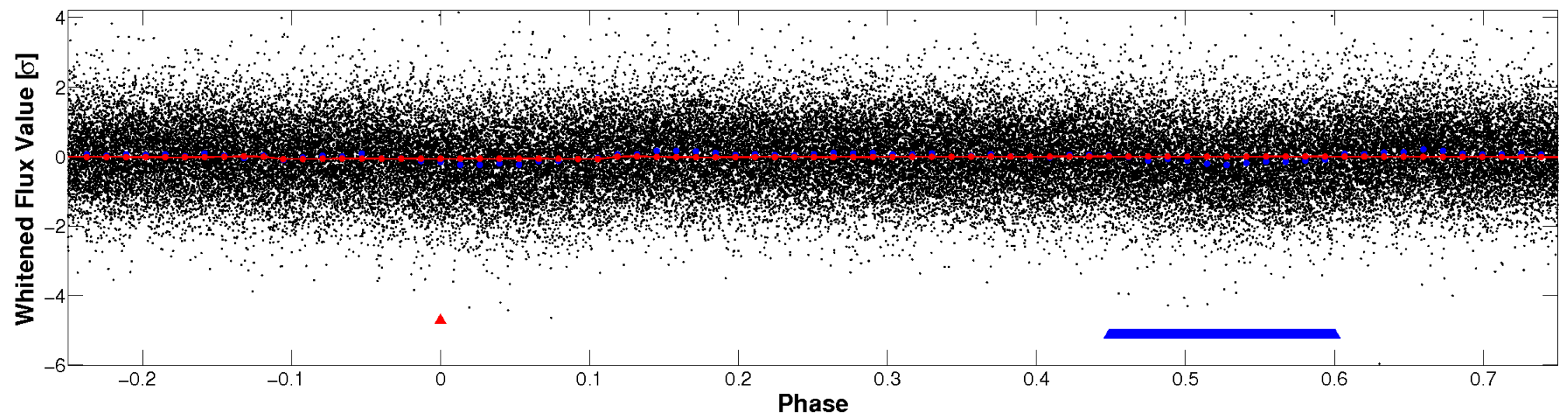


# Non-Whitened Vs. Whitened Light Curve

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

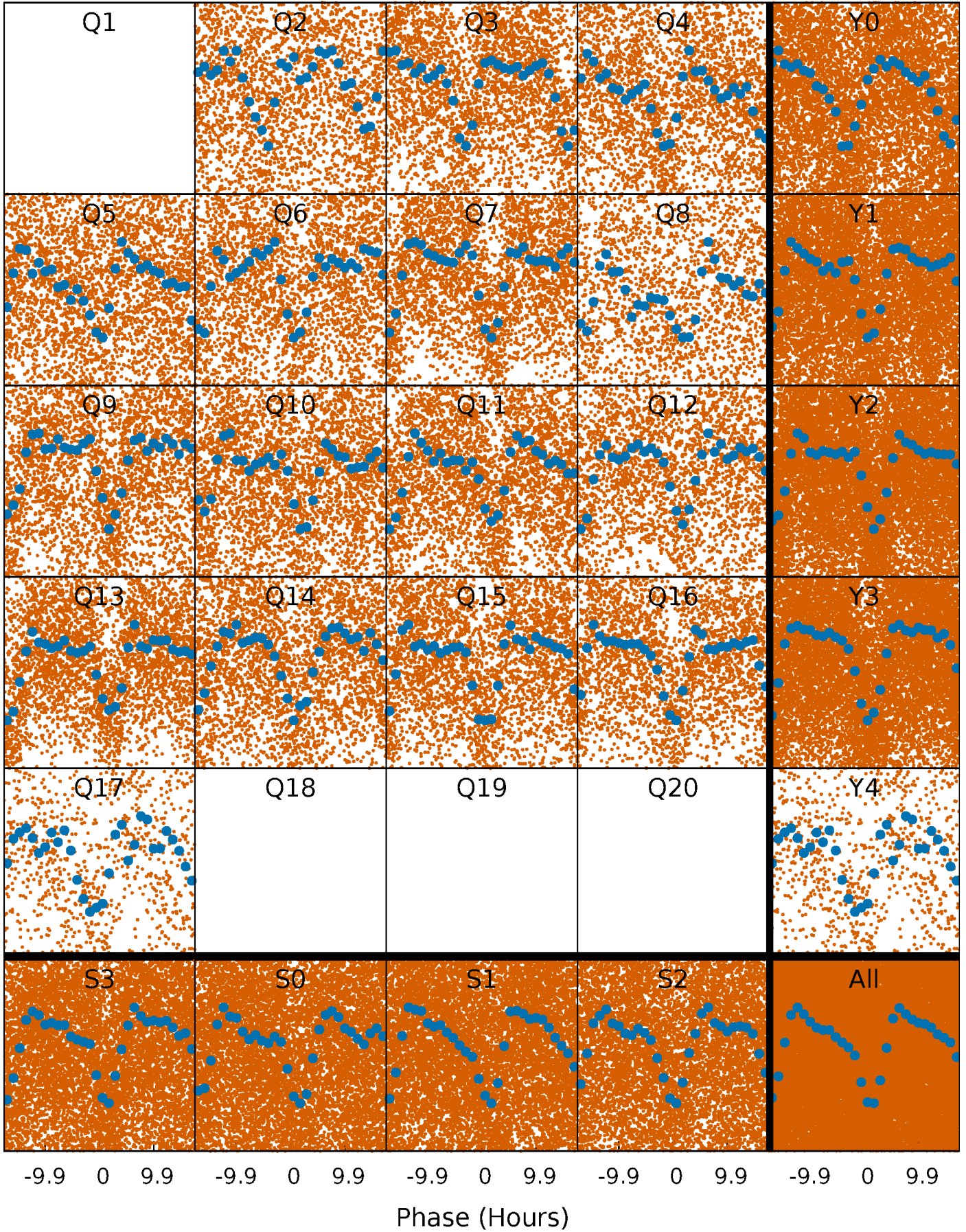


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

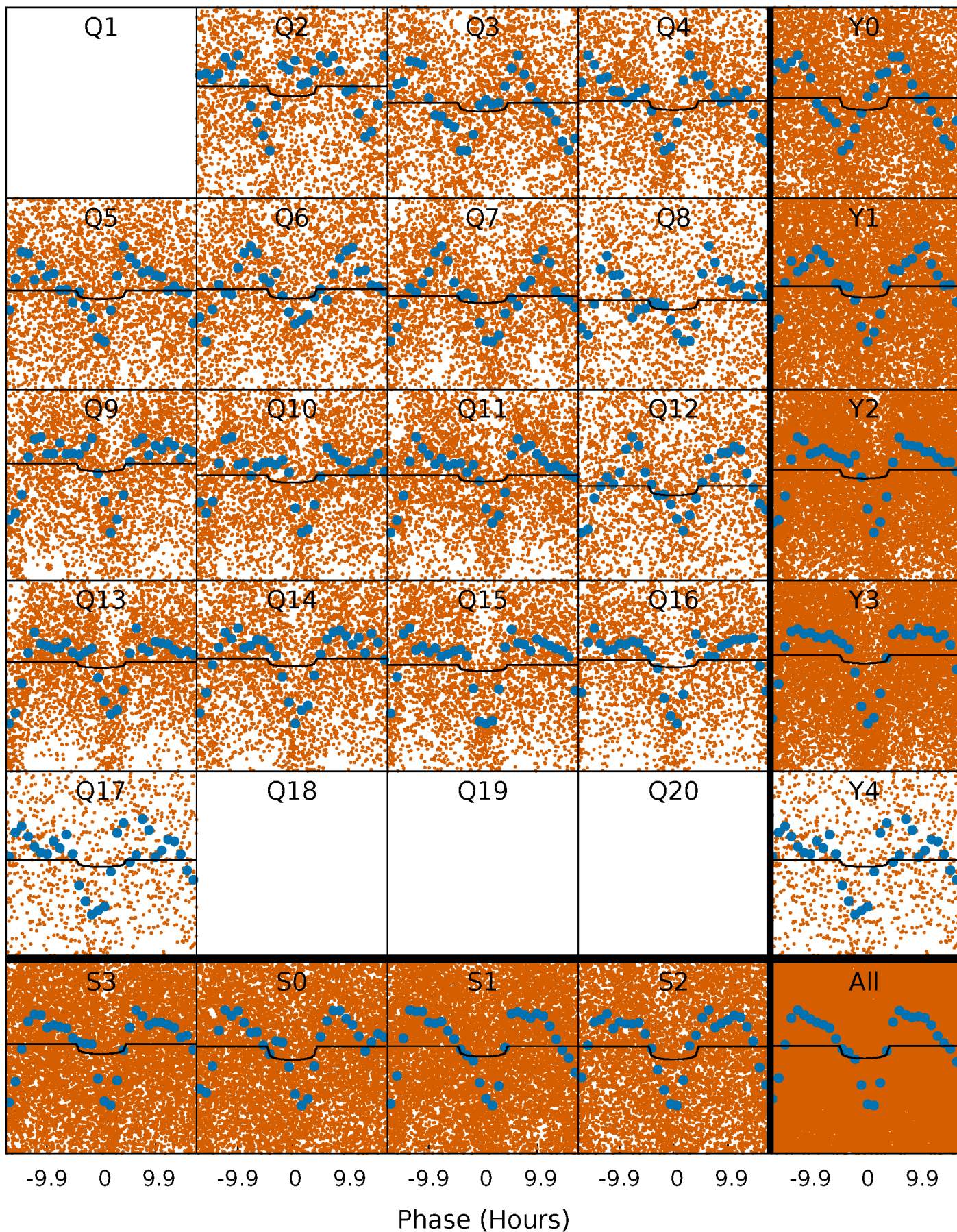
TCE 008212251-01 P= 1.548741 Days  $T_0=131.864636$  (BKJD)





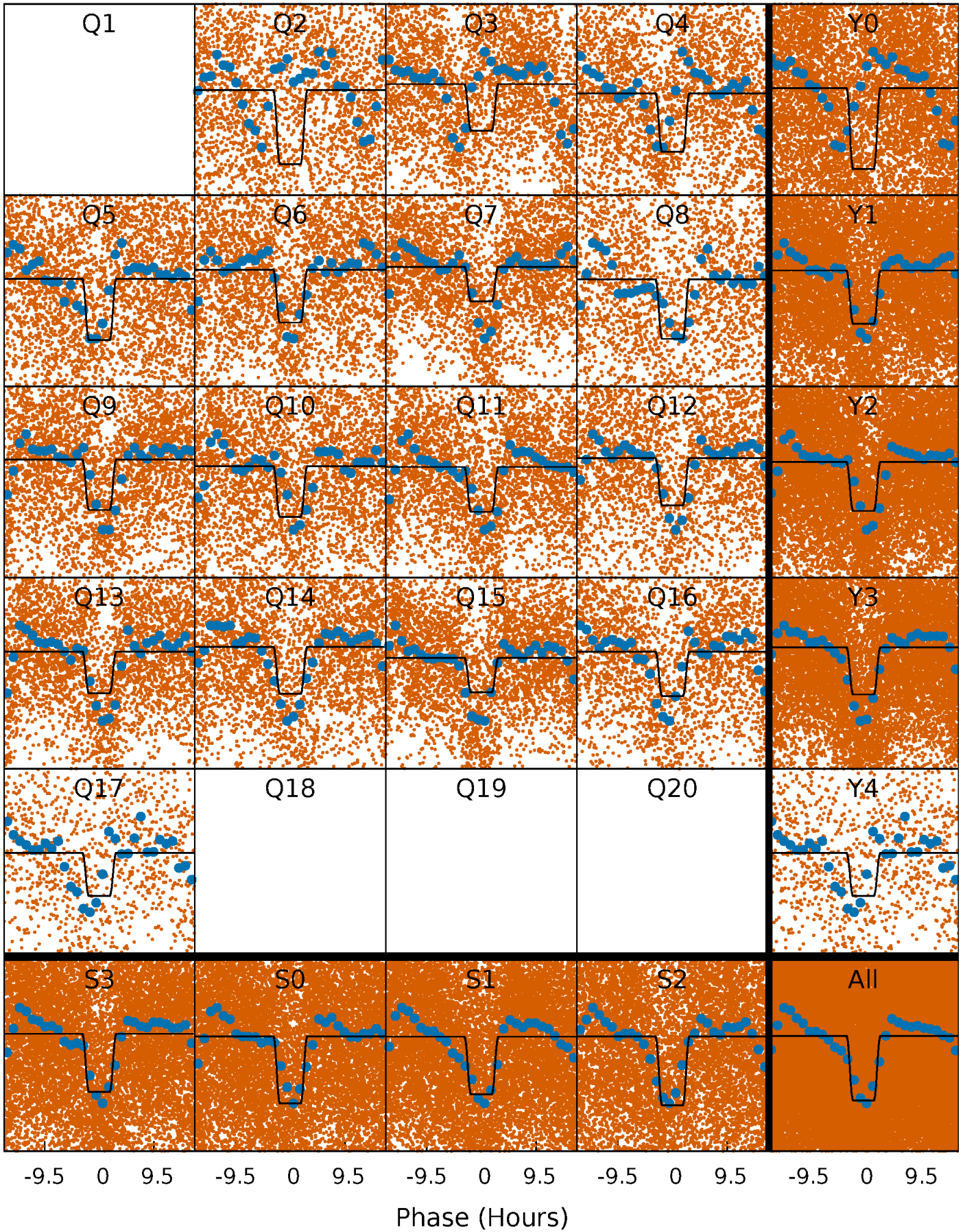
# DV Quarter-Phased Transit Curves

TCE 008212251-01 P= 1.548741 Days  $T_0=131.864636$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 008212251-01 P= 1.548758 Days  $T_0=131.896513$  (BKJD)

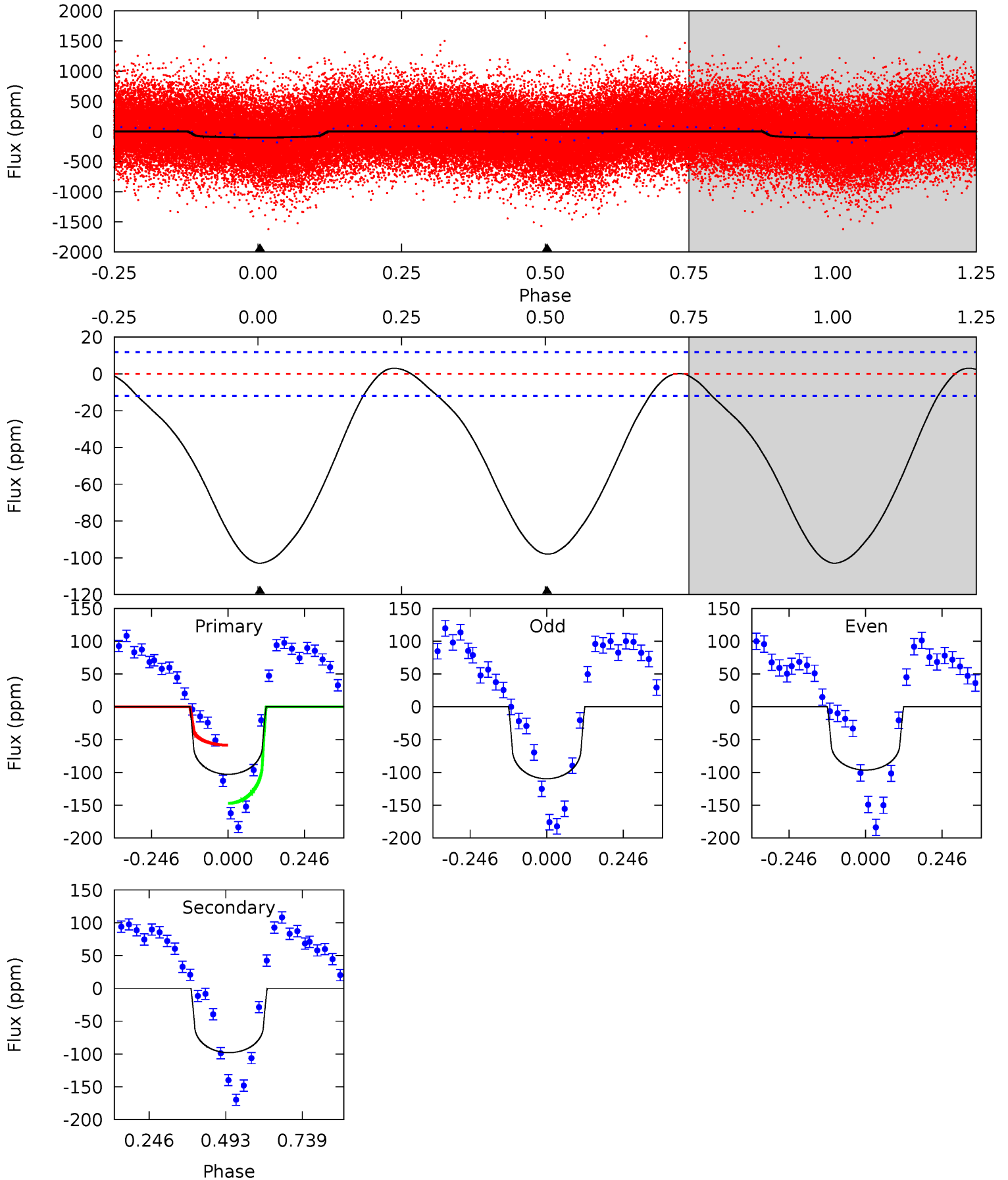




# DV Model-Shift Uniqueness Test

008212251-01, P = 1.548741 Days, E = 131.864636 Days

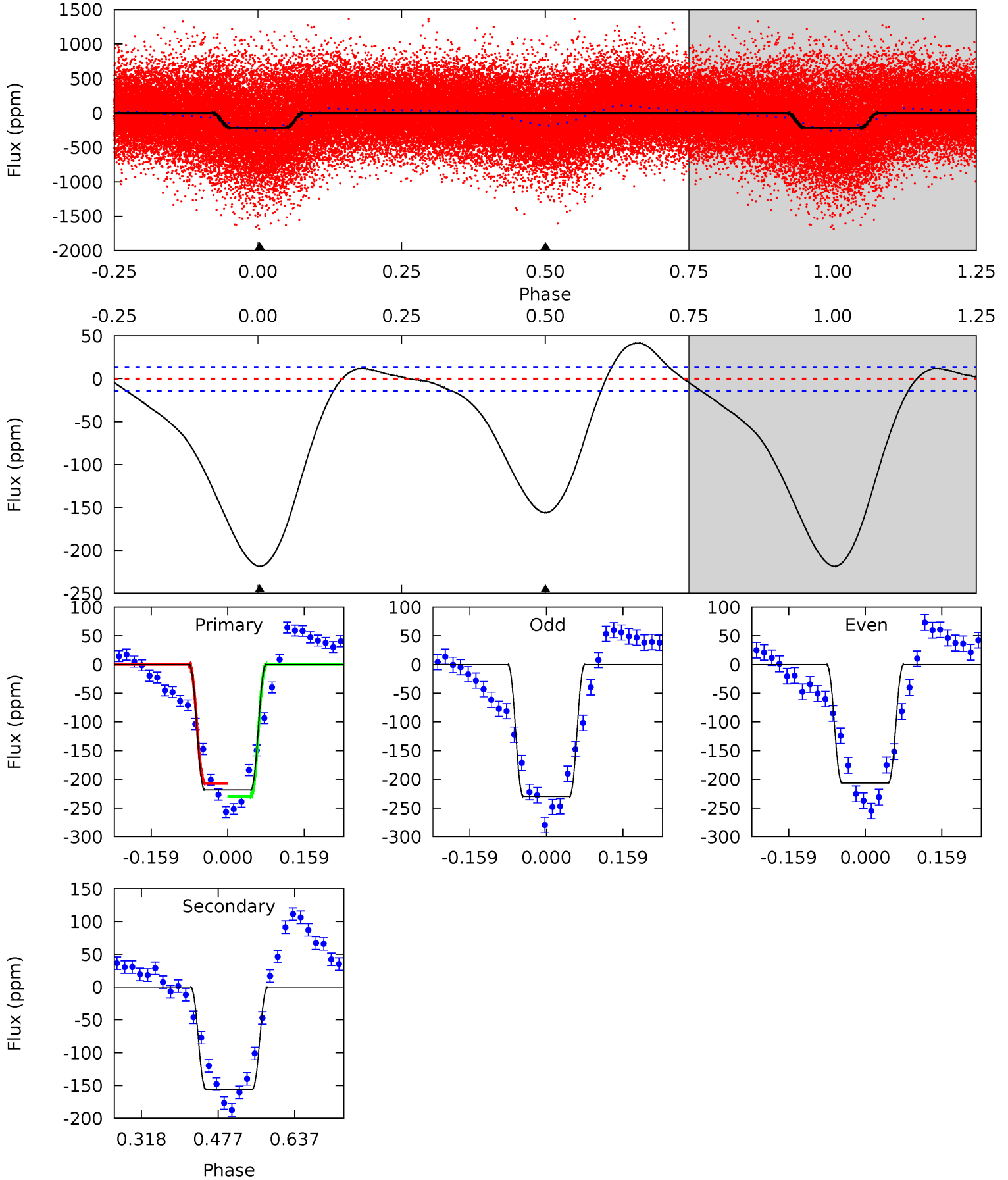
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
37.9	36.1	0	0	4.37	1.16	1.09	37.9	37.9	36.1	36.1	2.40	1.06	0.03	15.7



# Alt Model-Shift Uniqueness Test

008212251-01, P = 1.548758 Days, E = 131.896513 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
70.6	50.5	0	0	4.47	1.41	6.56	70.6	70.6	50.5	50.5	3.79	0.96	0.16	3.69





### Stellar Parameters For KIC 008212251

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6714^{+185}_{-278}$	$4.219^{+0.105}_{-0.210}$	$0.220^{+0.200}_{-0.350}$	$1.541^{+0.518}_{-0.279}$	$1.433^{+0.197}_{-0.219}$	$0.551^{+0.282}_{-0.297}$
	+3%/-4%	+2%/-5%	+91%/-159%	+34%/-18%	+14%/-15%	+51%/-54%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 008212251-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-98 \pm 3$	$1.03^{+0.66}_{-0.60}$	$3023^{+238}_{-191}$	$8891^{+10175}_{-2101}$	$42^{+221}_{-26}$
Alt.	$-156 \pm 3$	$2.62^{+0.83}_{-0.65}$	$3015^{+237}_{-167}$	$6000^{+944}_{-643}$	$11^{+8}_{-4}$

$T_{max}$  = 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

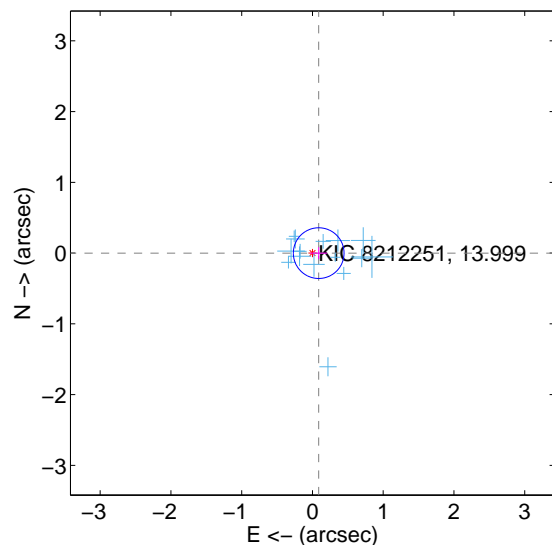
Supplemental centroid analysis for 008212251-01. Kepler magnitude: 14.00. Transit SNR 7.66

There are 15 quarters with good PRF difference image offsets

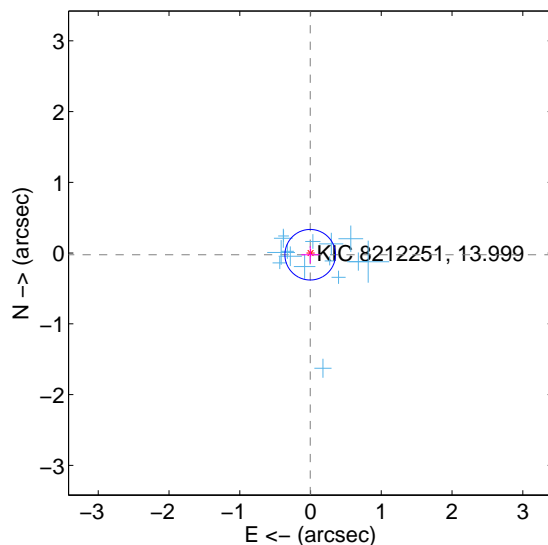
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.088 \pm 0.119$	0.74	$-0.088 \pm 0.119$	$-0.000 \pm 0.084$
PRF-fit source offset from KIC position	$0.023 \pm 0.119$	0.20	$0.005 \pm 0.126$	$-0.023 \pm 0.122$
photometric centroid source offset	$0.67 \pm 0.73$	0.92	$0.41 \pm 0.75$	$0.52 \pm 0.71$

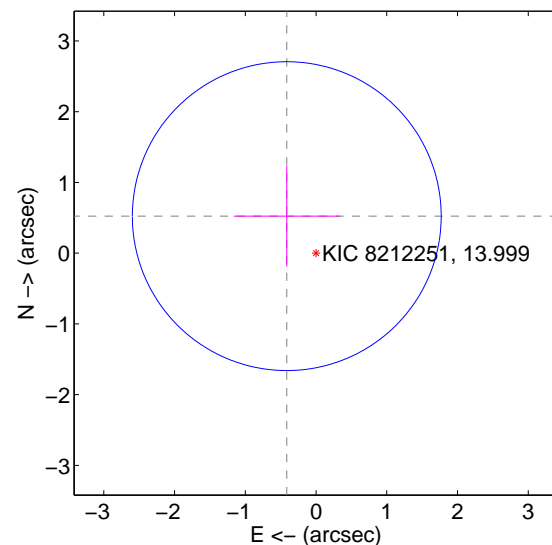
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

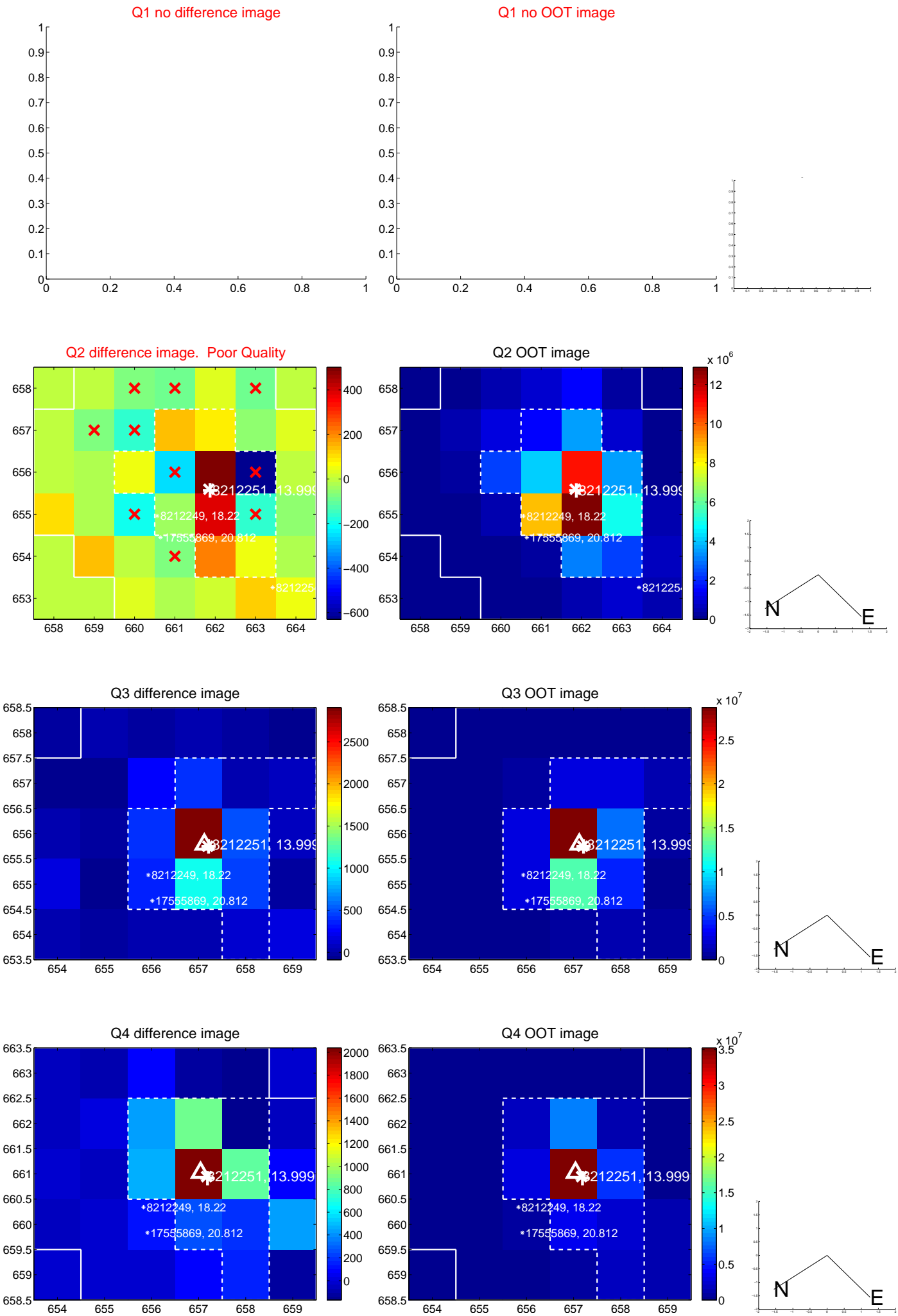


offset from photometric centroids

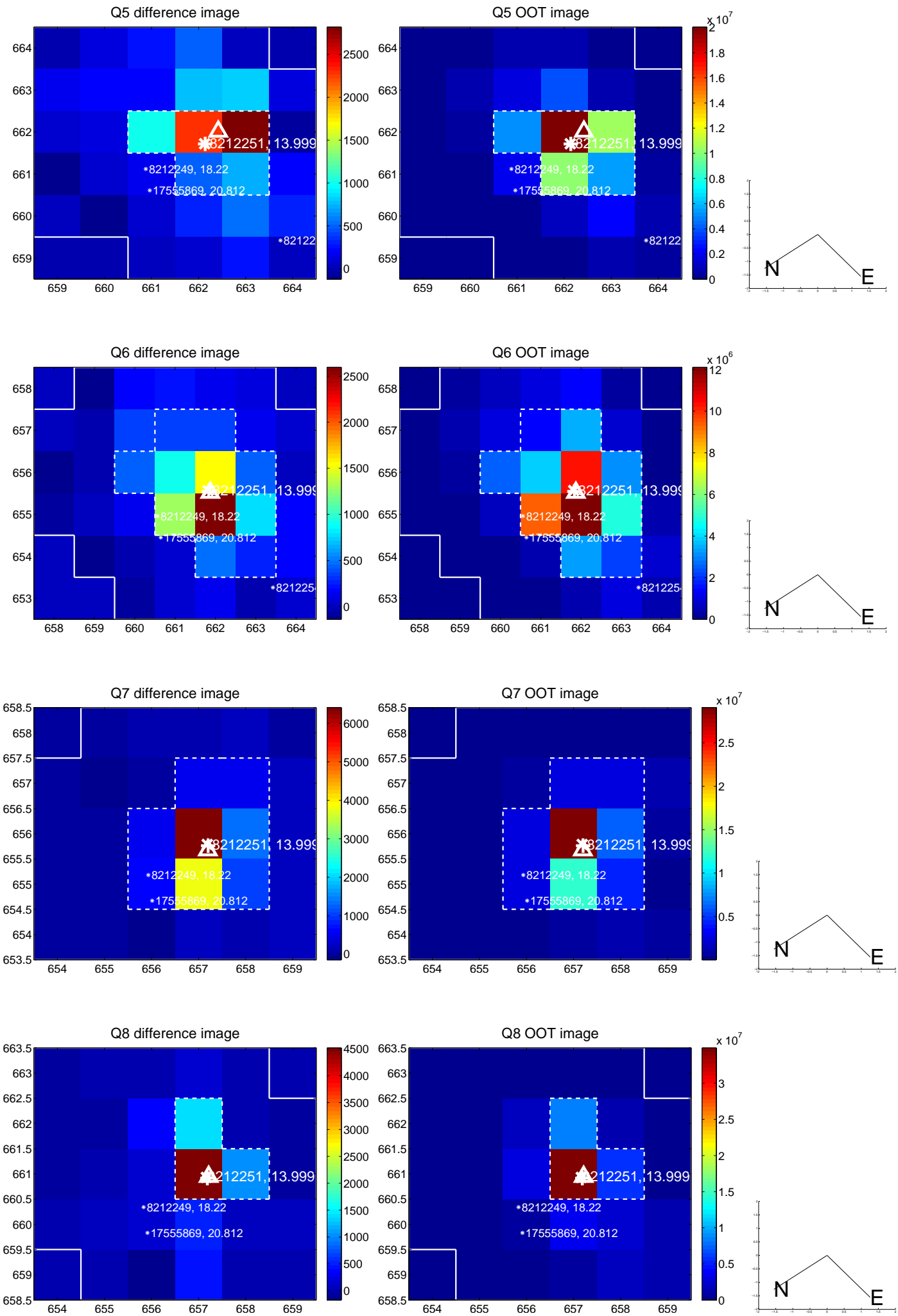


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

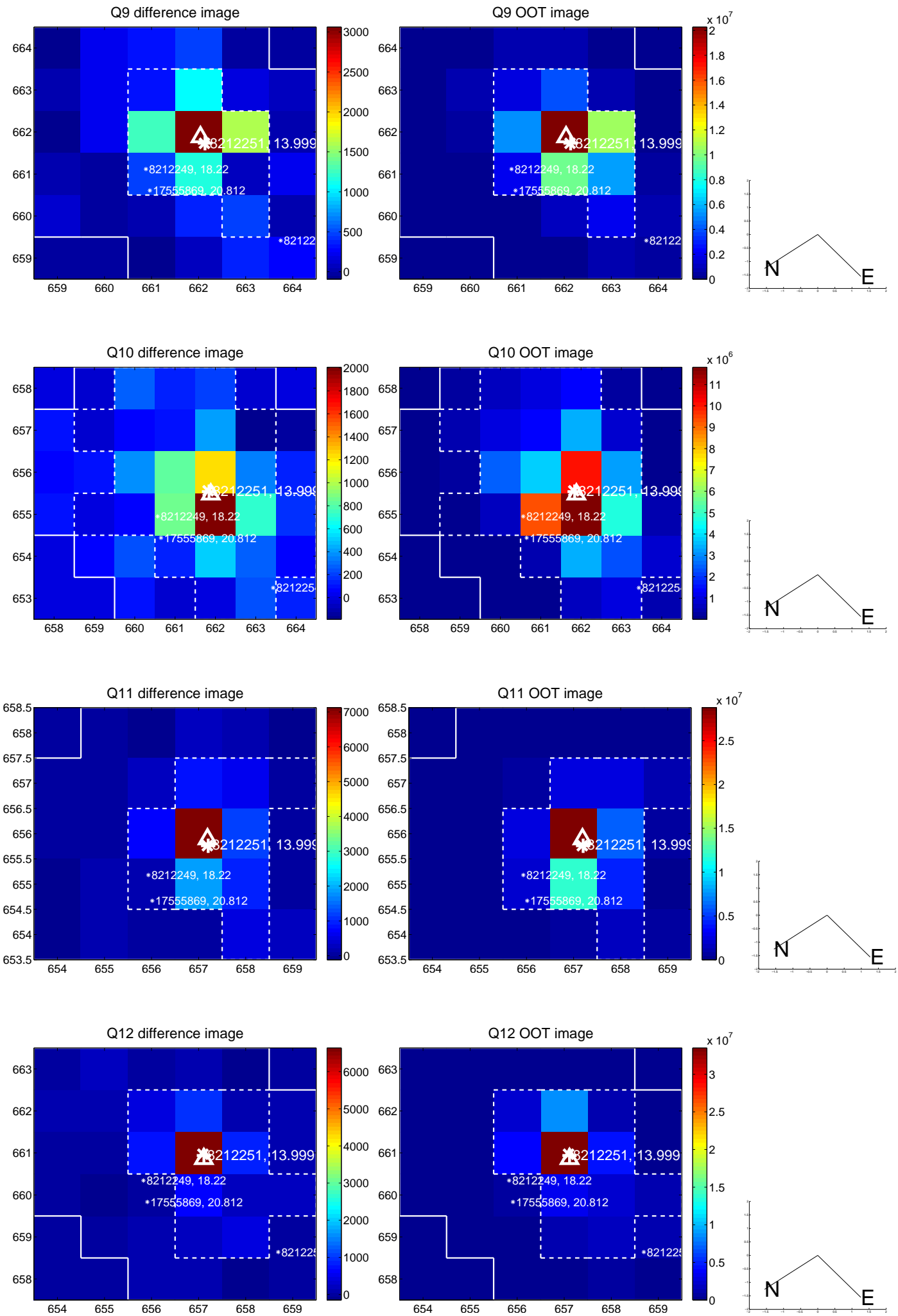


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

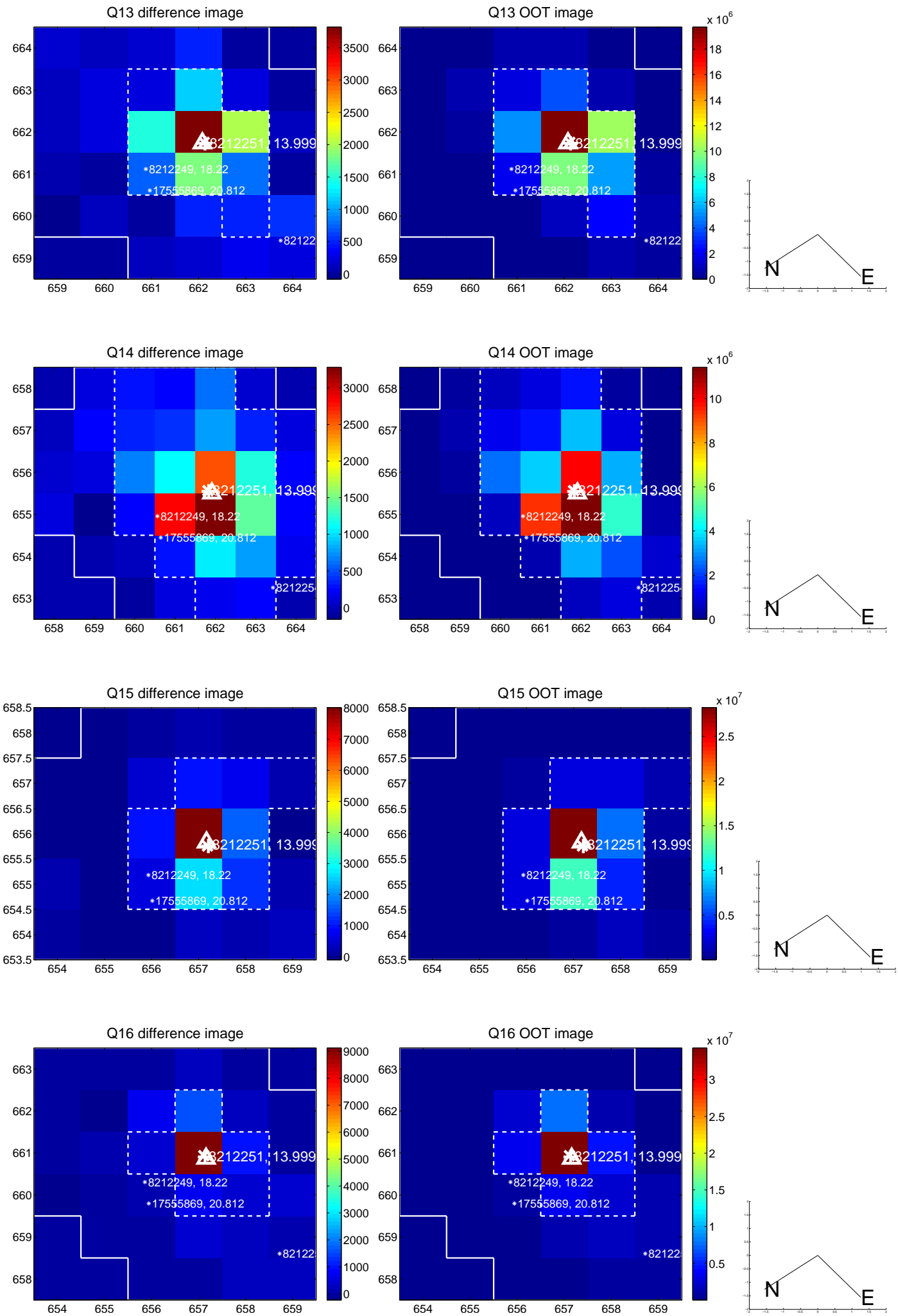




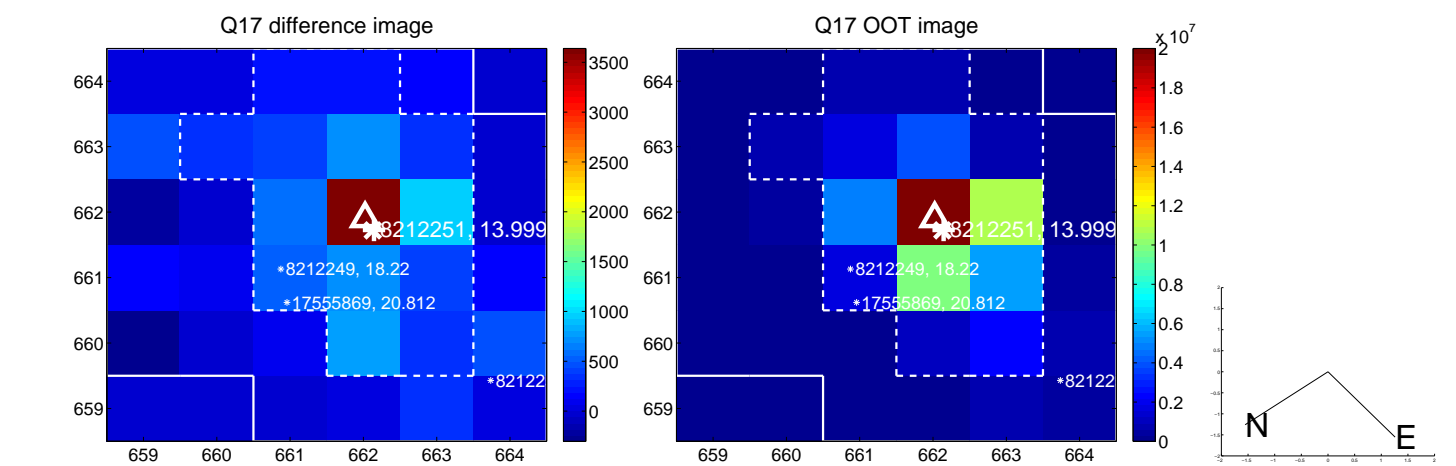
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



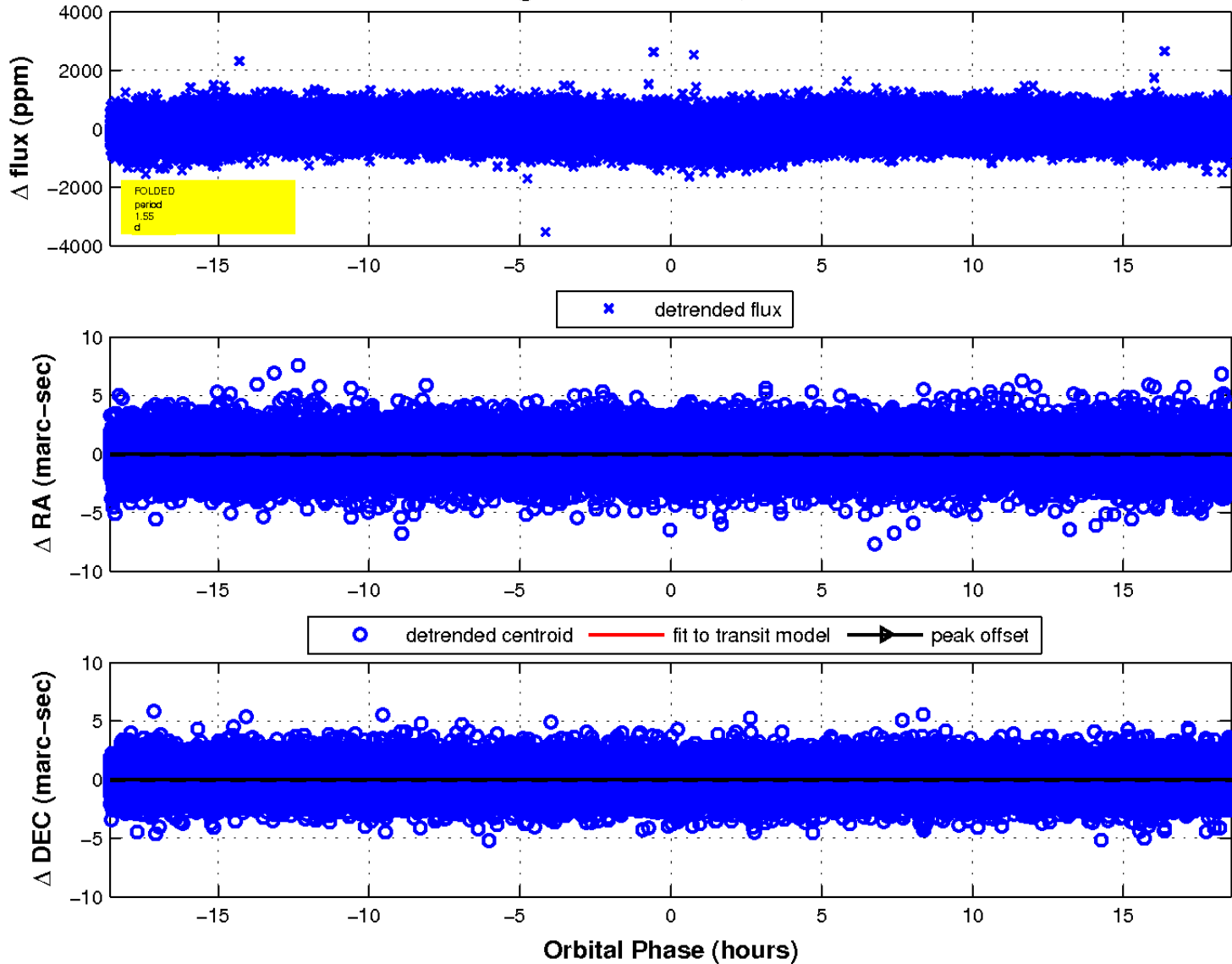
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

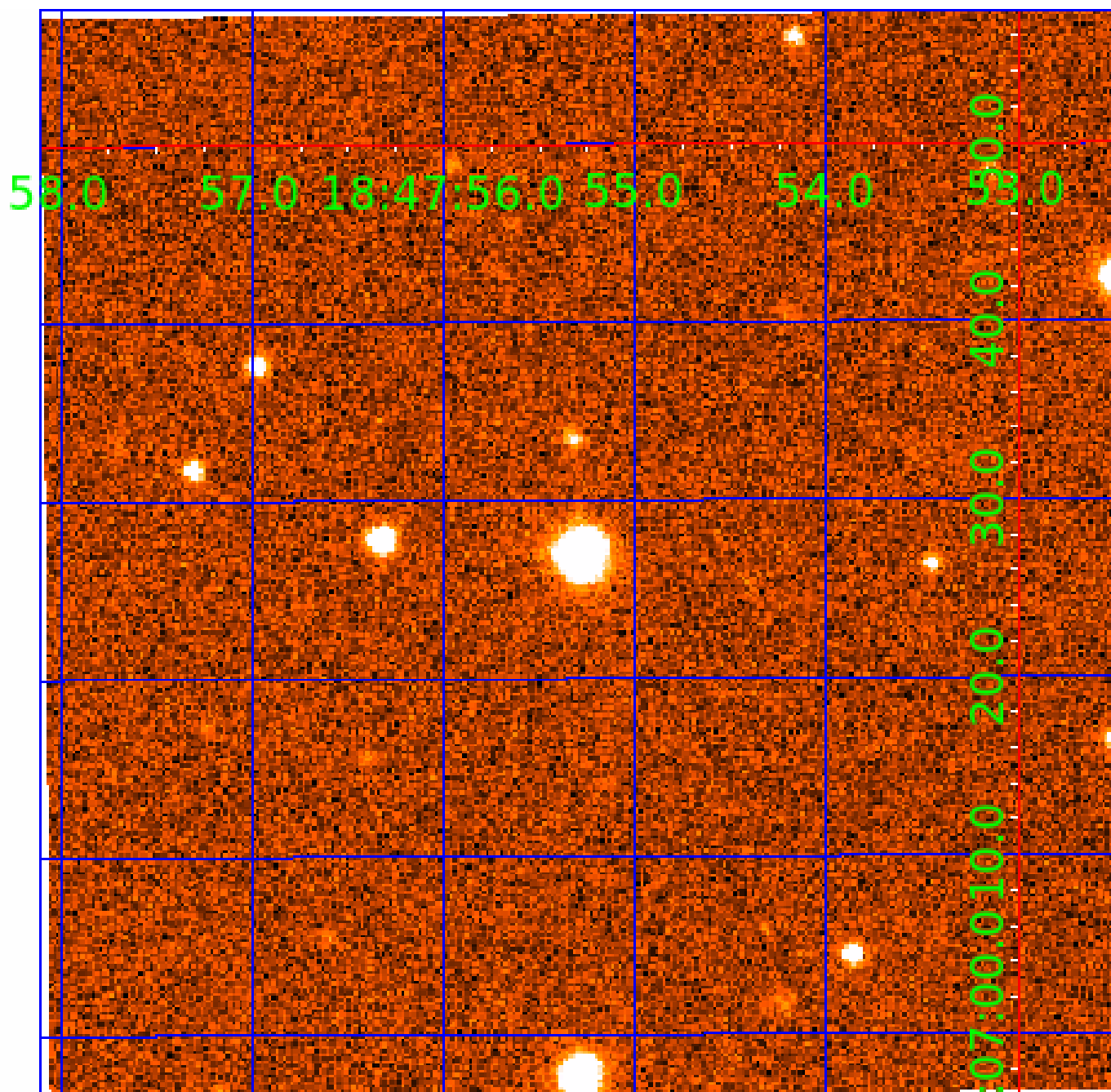


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 008212251

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008212251-01	OBS	No	1.548741	131.864636	35.7	8.706	10.4	7.7	1.54	6714	0.94	4951.27
008212251-02	OBS	No	1.548990	132.559894	68.0	6.815	15.3	14.3	1.54	6714	1.35	4950.21

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008212251-01	OBS	FP	0.00	1	0	0	0	LPP_DV
008212251-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_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.

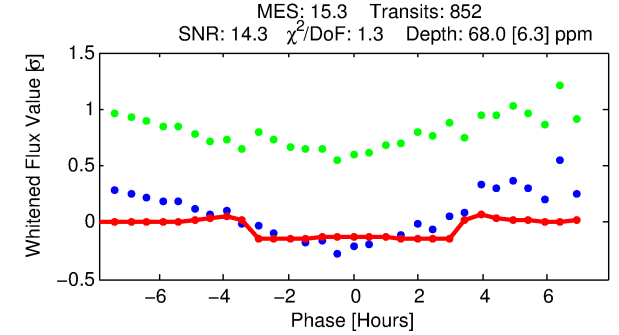
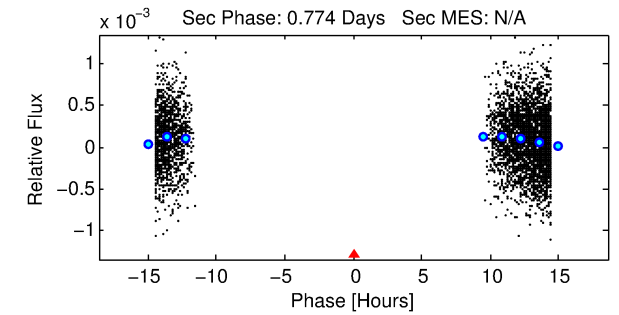
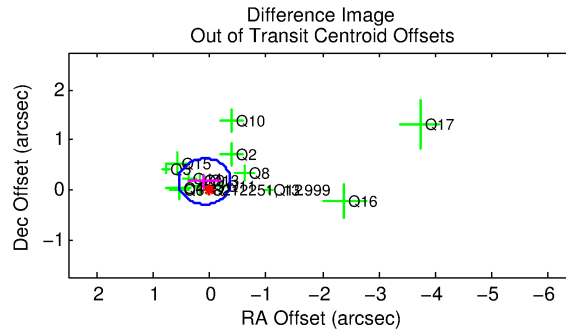
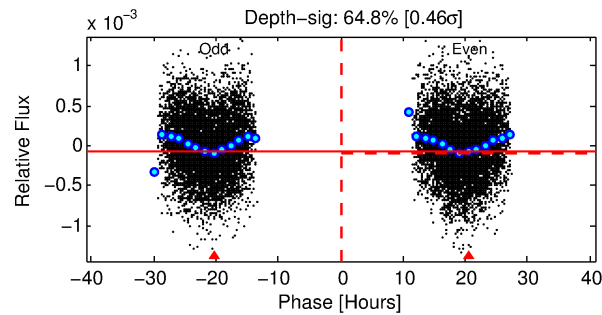
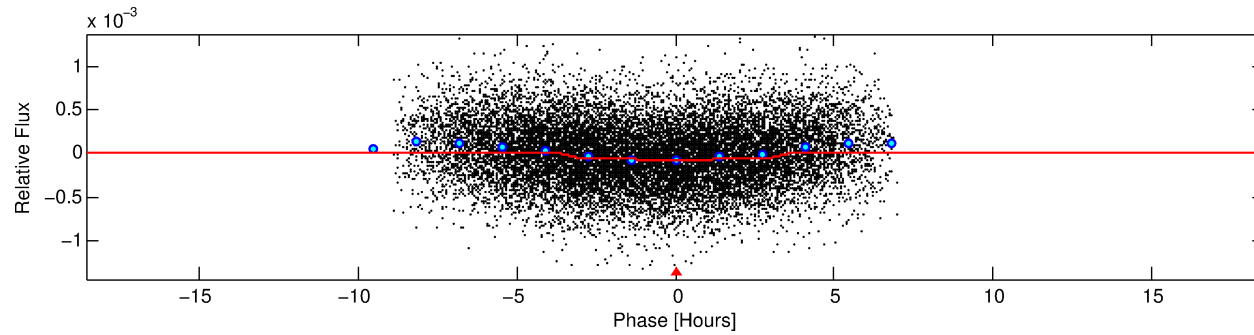
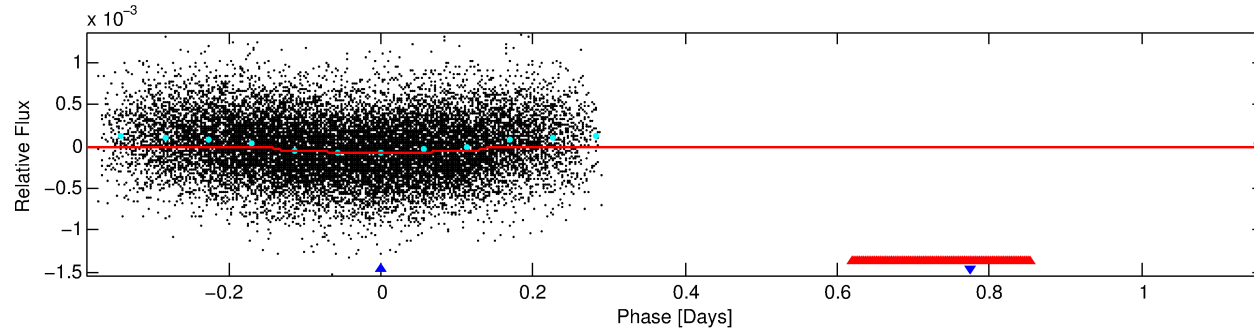
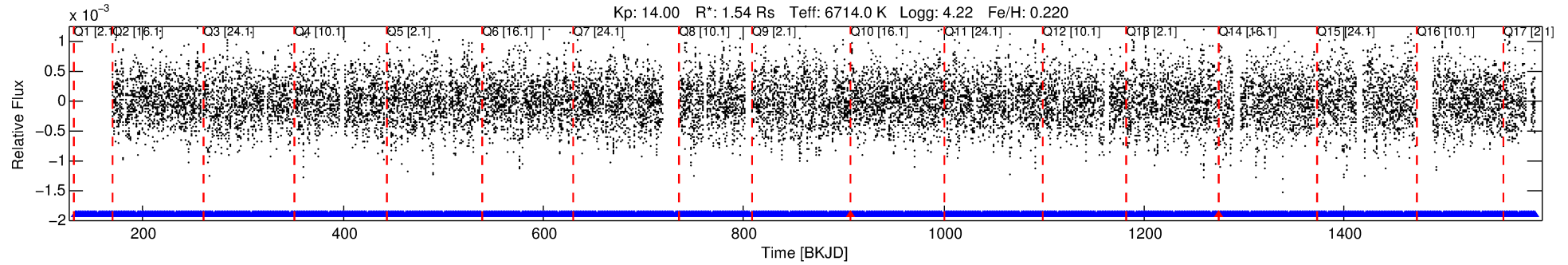
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008212251-02

No Significant Match Found

# DV One-Page Summary

KIC: 8212251 Candidate: 2 of 2 Period: 1.549 d



## DV Fit Results:

Period = 1.54899 [0.00002] d  
Epoch = 132.5599 [0.0035] BKJD  
Rp/R\* = 0.0080 [0.0029]  
a/R\* = 1.55 [1.79]  
b = 0.66 [1.73]  
Seff = 4950.21 [2109.32]  
Teff = 2139 [228] K  
Rp = 1.35 [0.66] Re  
a = 0.0296 [0.0082] AU

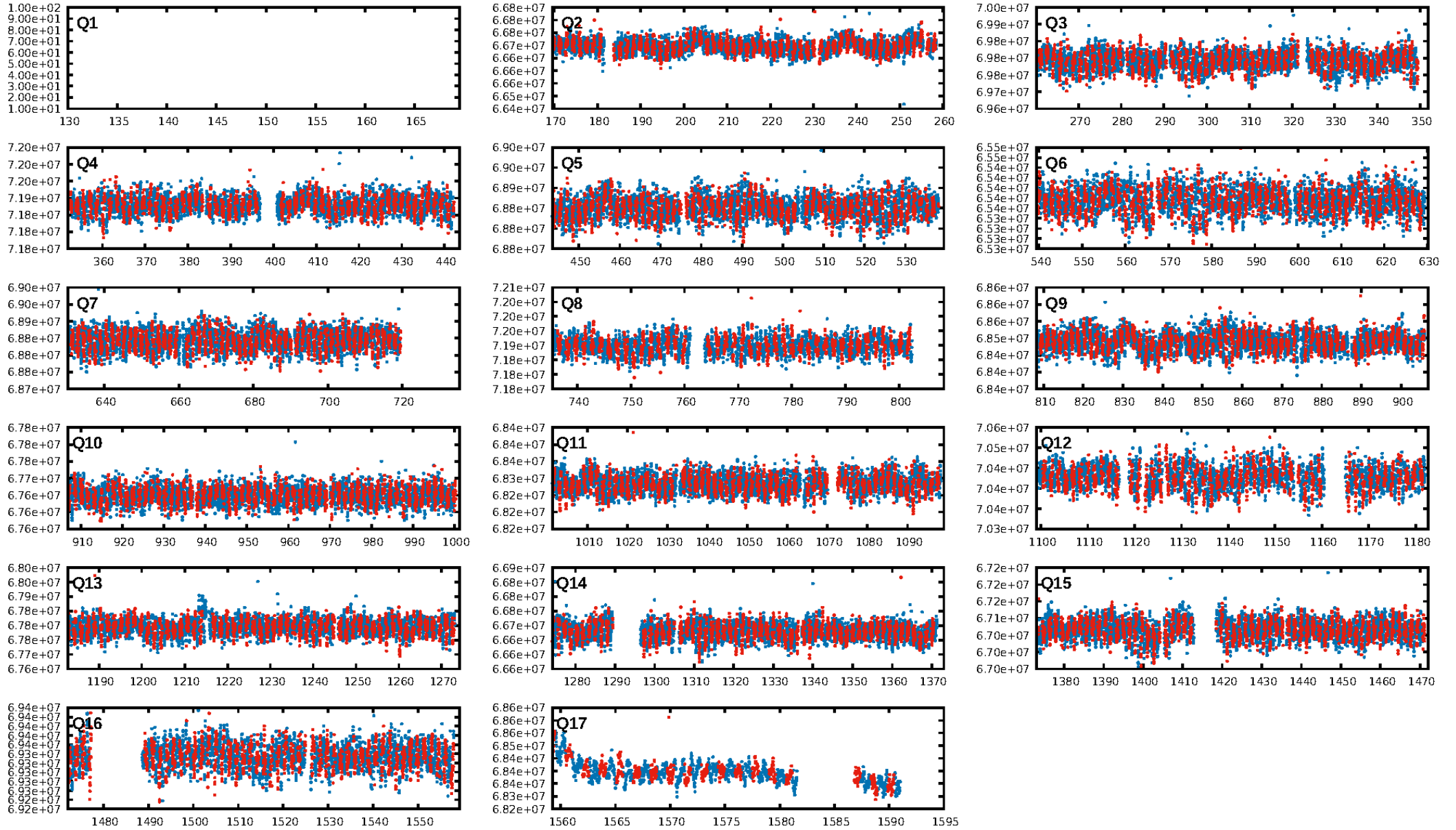
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [832/834]  
GhostDiagnostic-chr: 2.322  
Centroid-sig: 90.9%  
Centroid-so: 0.079 arcsec [0.19 $\sigma$ ]  
OotOffset-rm: 0.184 arcsec [1.20 $\sigma$ ]  
KicOffset-rm: 0.238 arcsec [1.04 $\sigma$ ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.94 [15/16]  
DiffImageOverlap-fno: 0.38 [6/16]

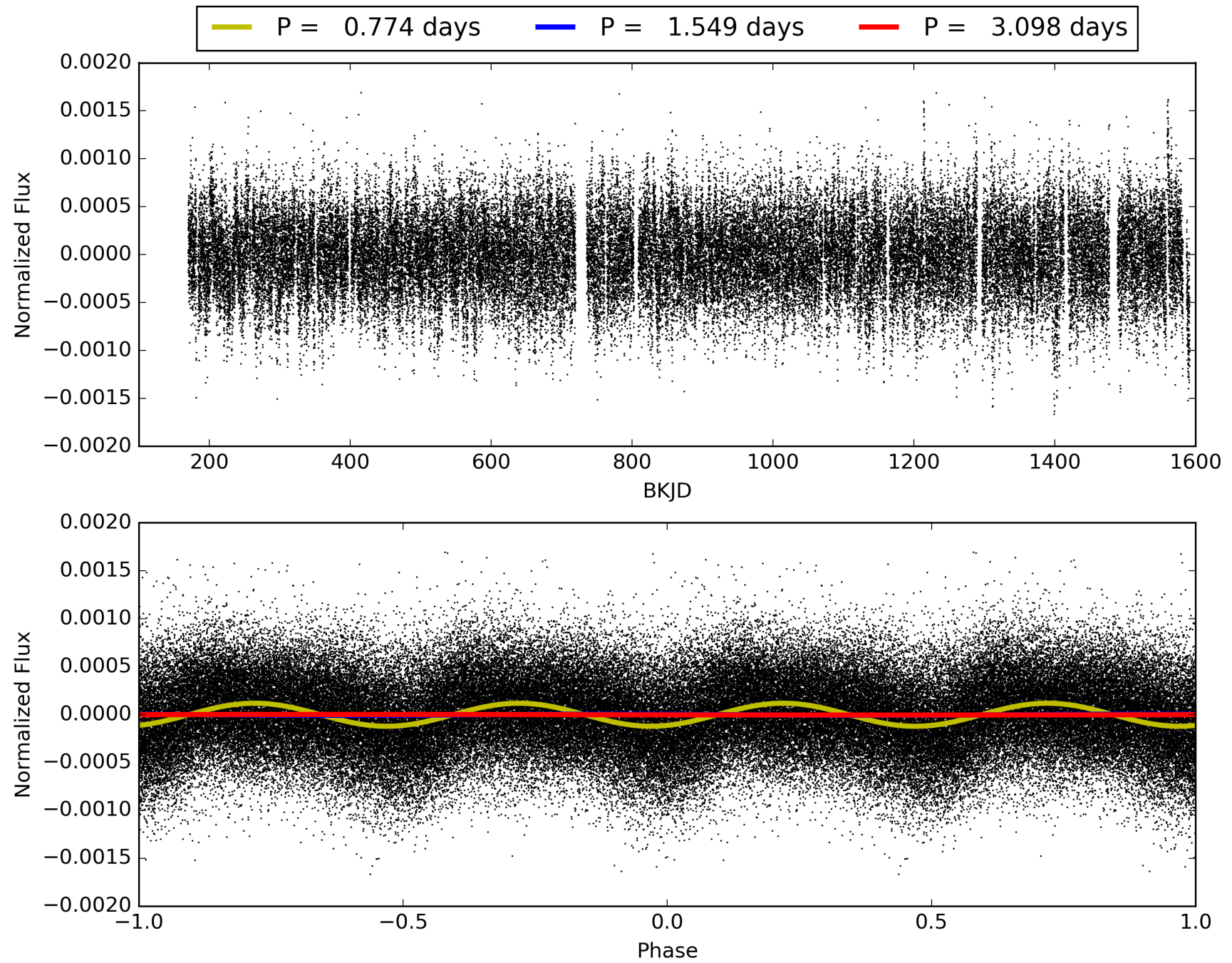
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 09:18:37 Z

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# TCE 008212251-02, PDC Light Curves



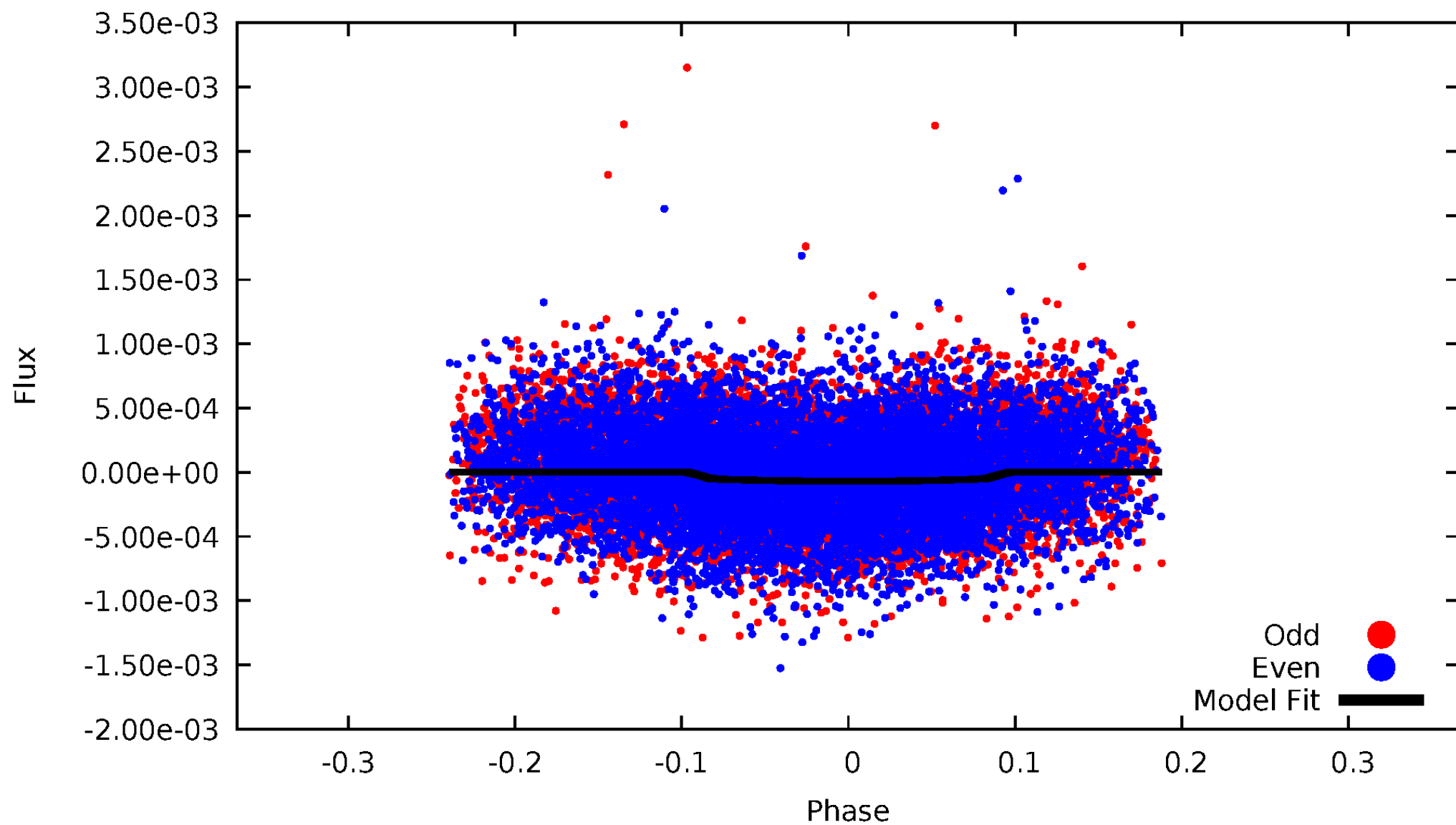
TCE 008212251-02





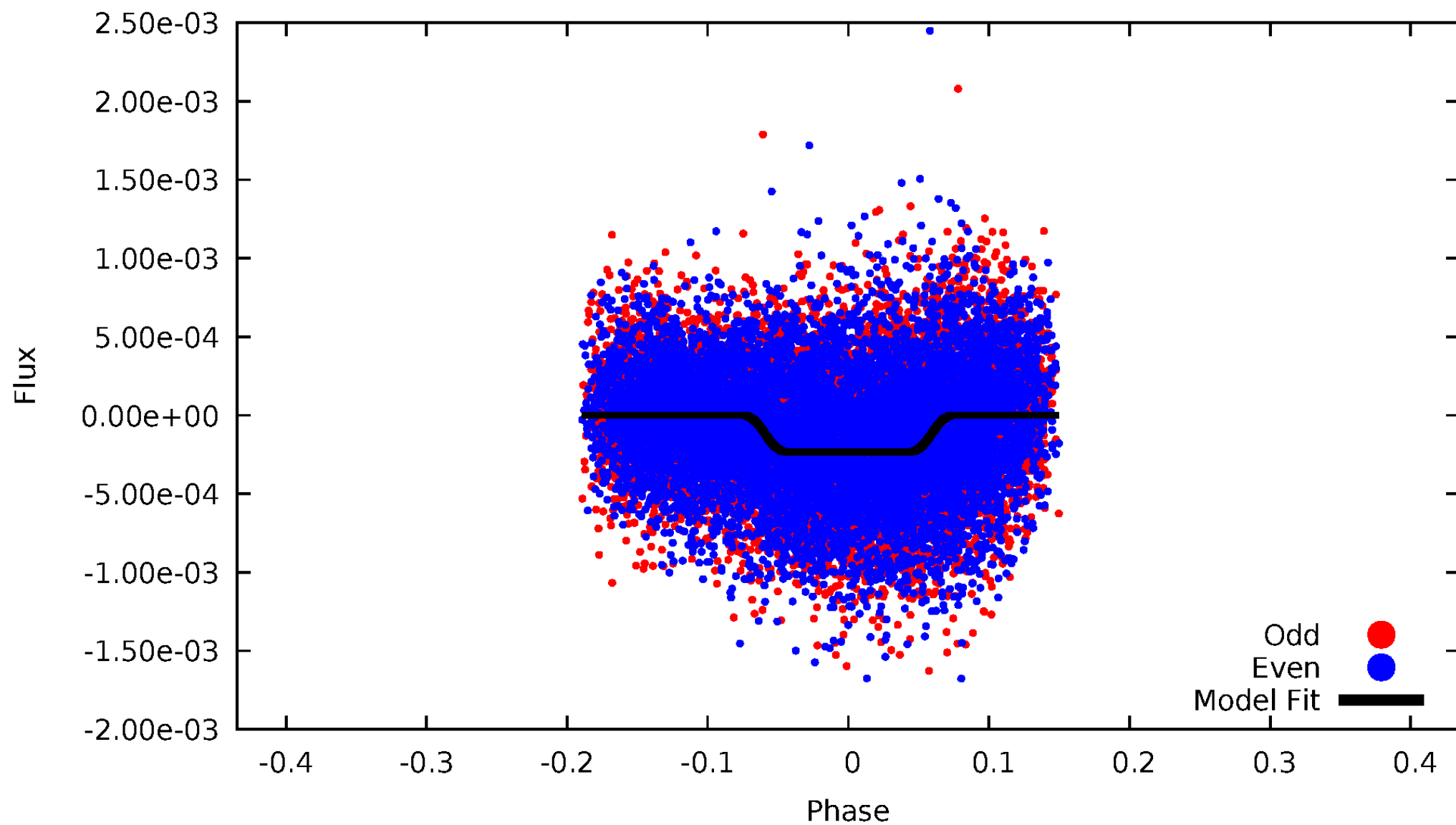
# DV Odd/Even

TCE 008212251-02



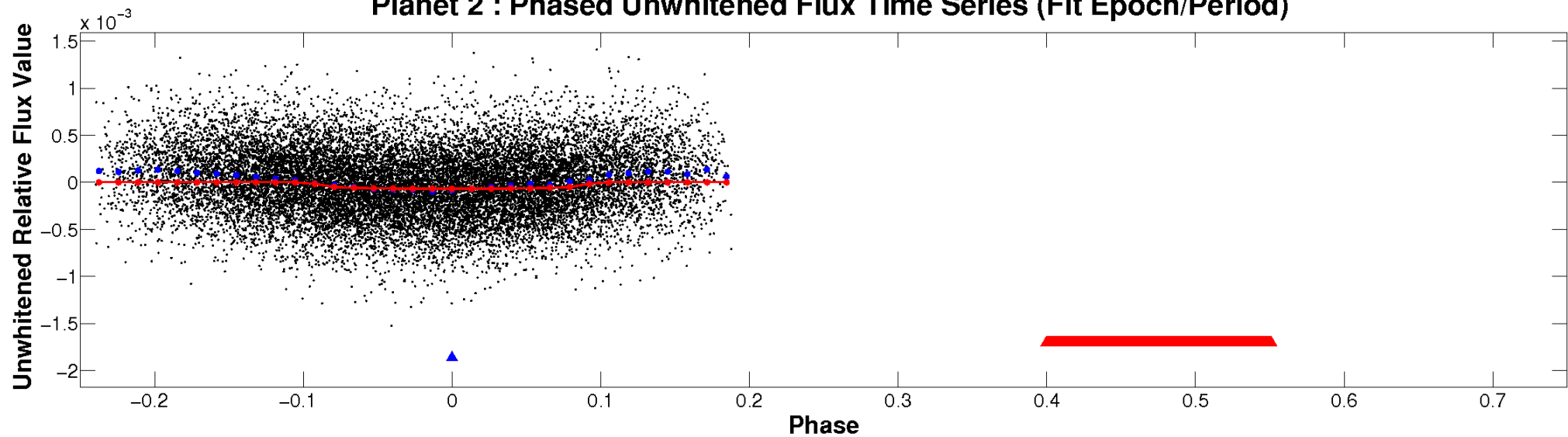
# ALT Odd/Even

TCE 008212251-02

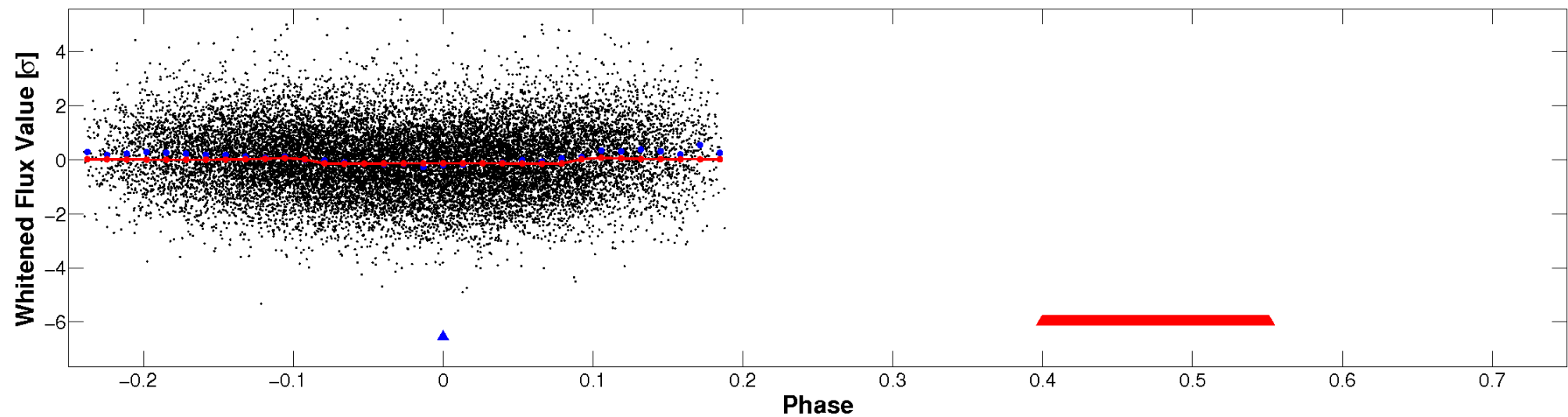


# Non-Whitened Vs. Whitened Light Curve

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

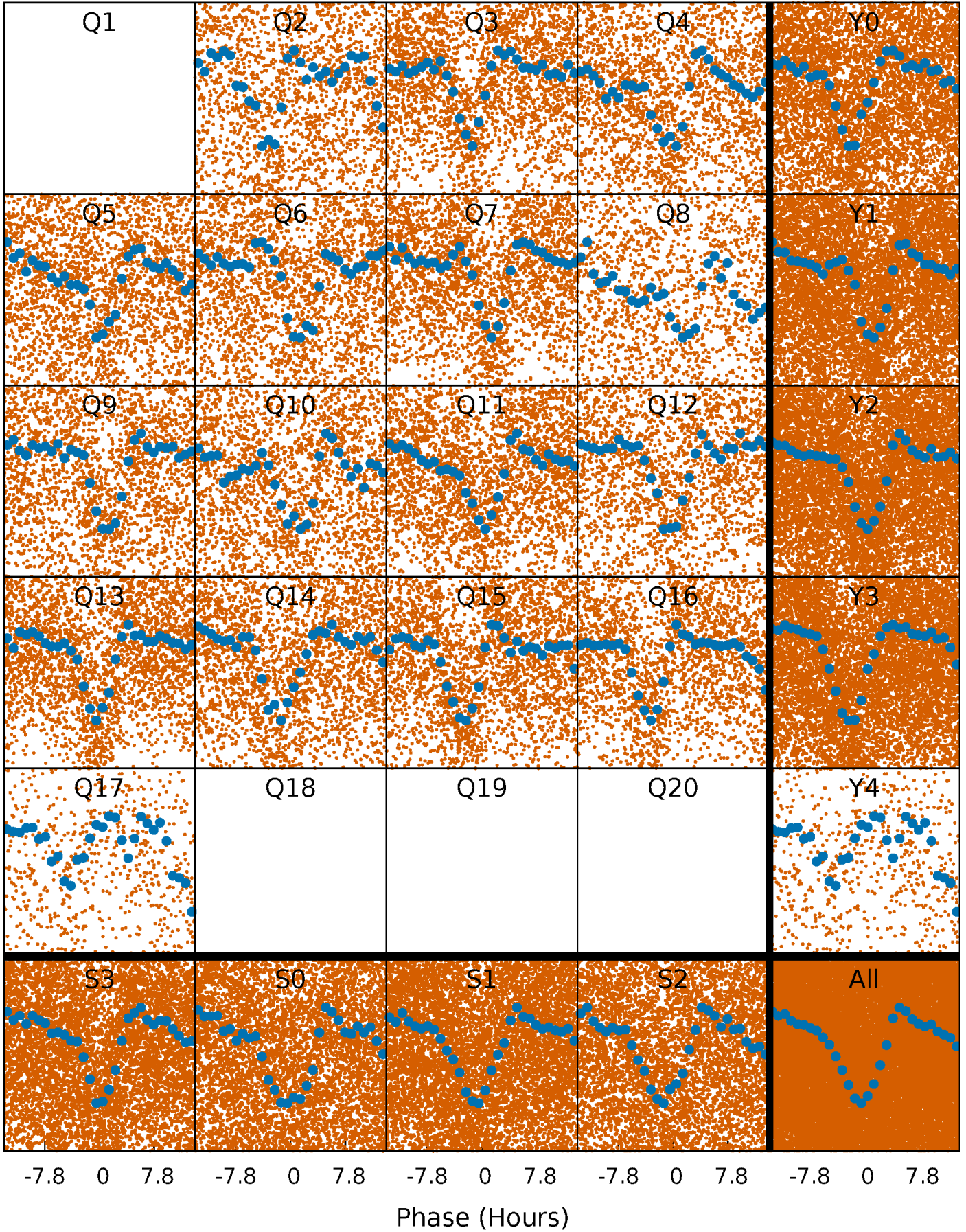


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



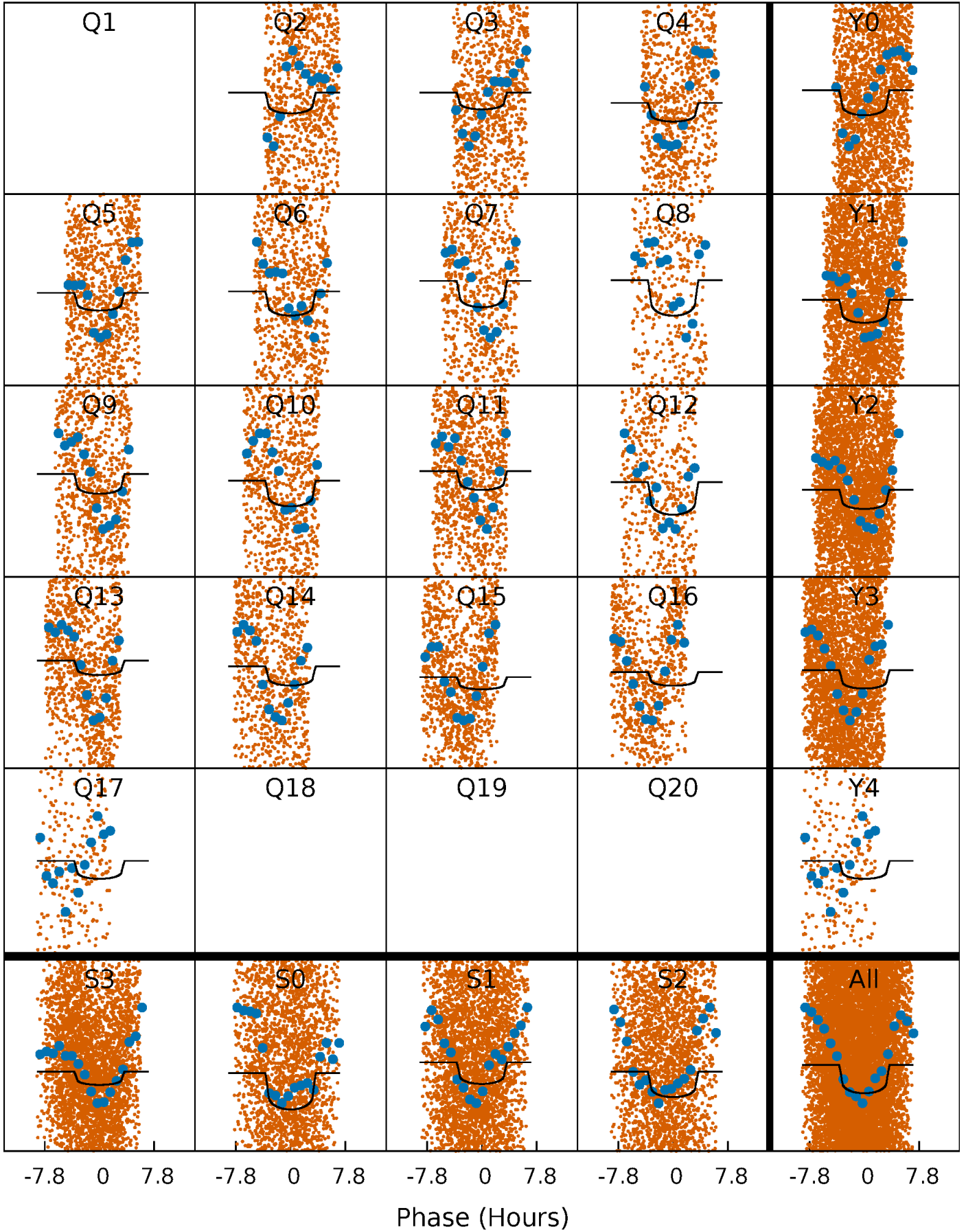
# PDC Quarter-Phased Transit Curves

TCE 008212251-02 P= 1.548990 Days  $T_0=132.559894$  (BKJD)



# DV Quarter-Phased Transit Curves

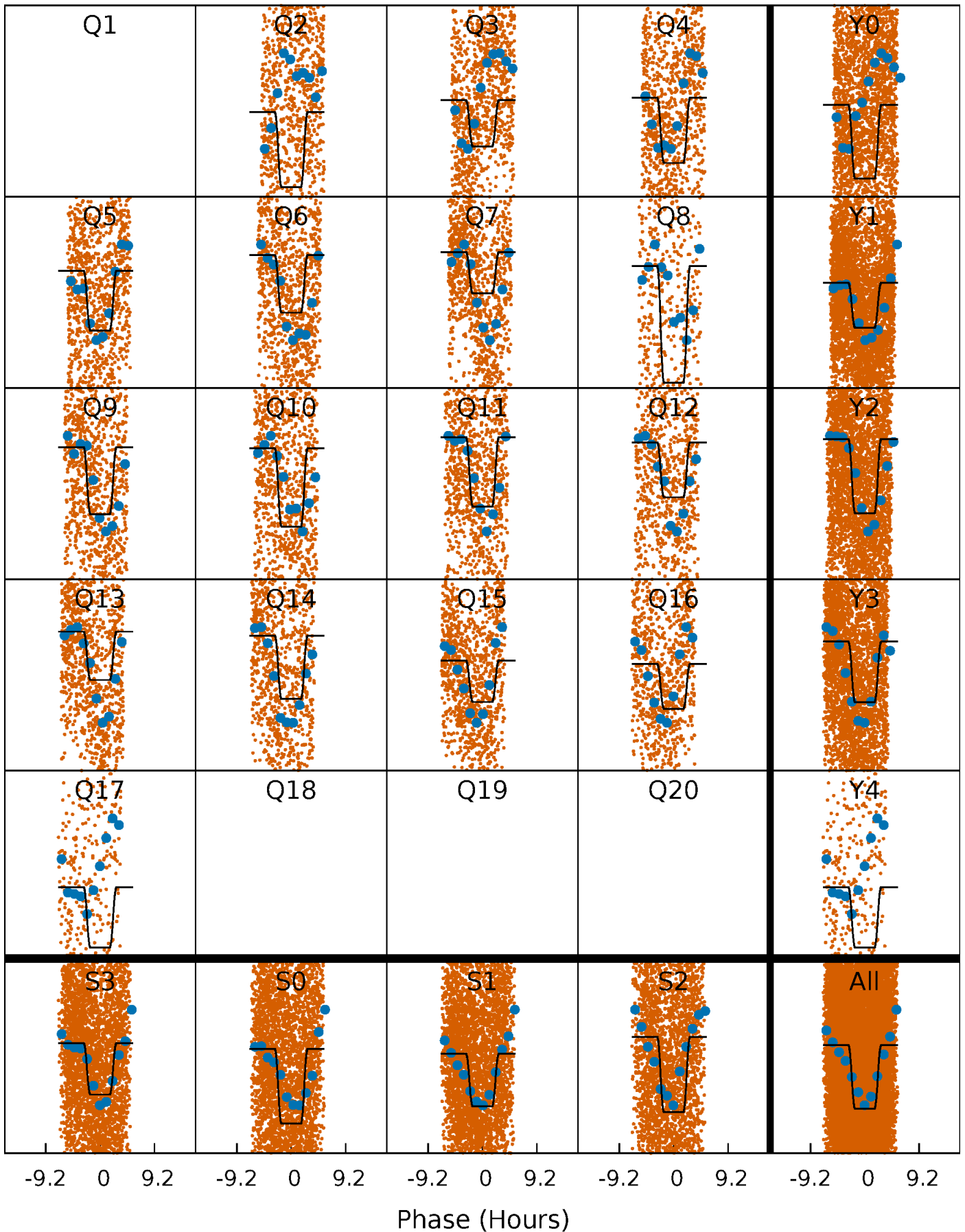
TCE 008212251-02   P= 1.548990 Days    $T_0=132.559894$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 008212251-02   P= 1.548838 Days    $T_0=132.623267$  (BKJD)

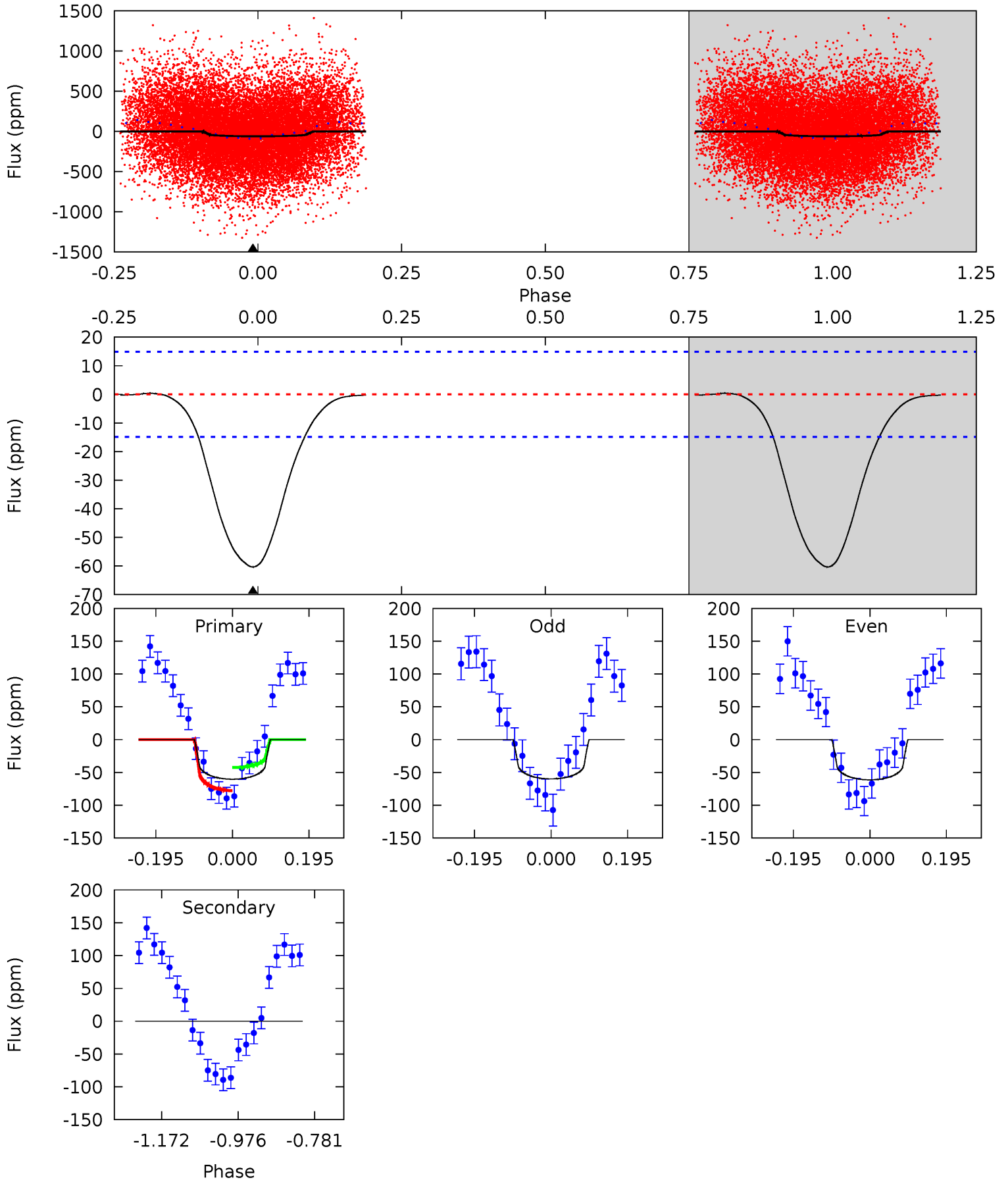




# DV Model-Shift Uniqueness Test

008212251-02, P = 1.548990 Days, E = 132.559894 Days

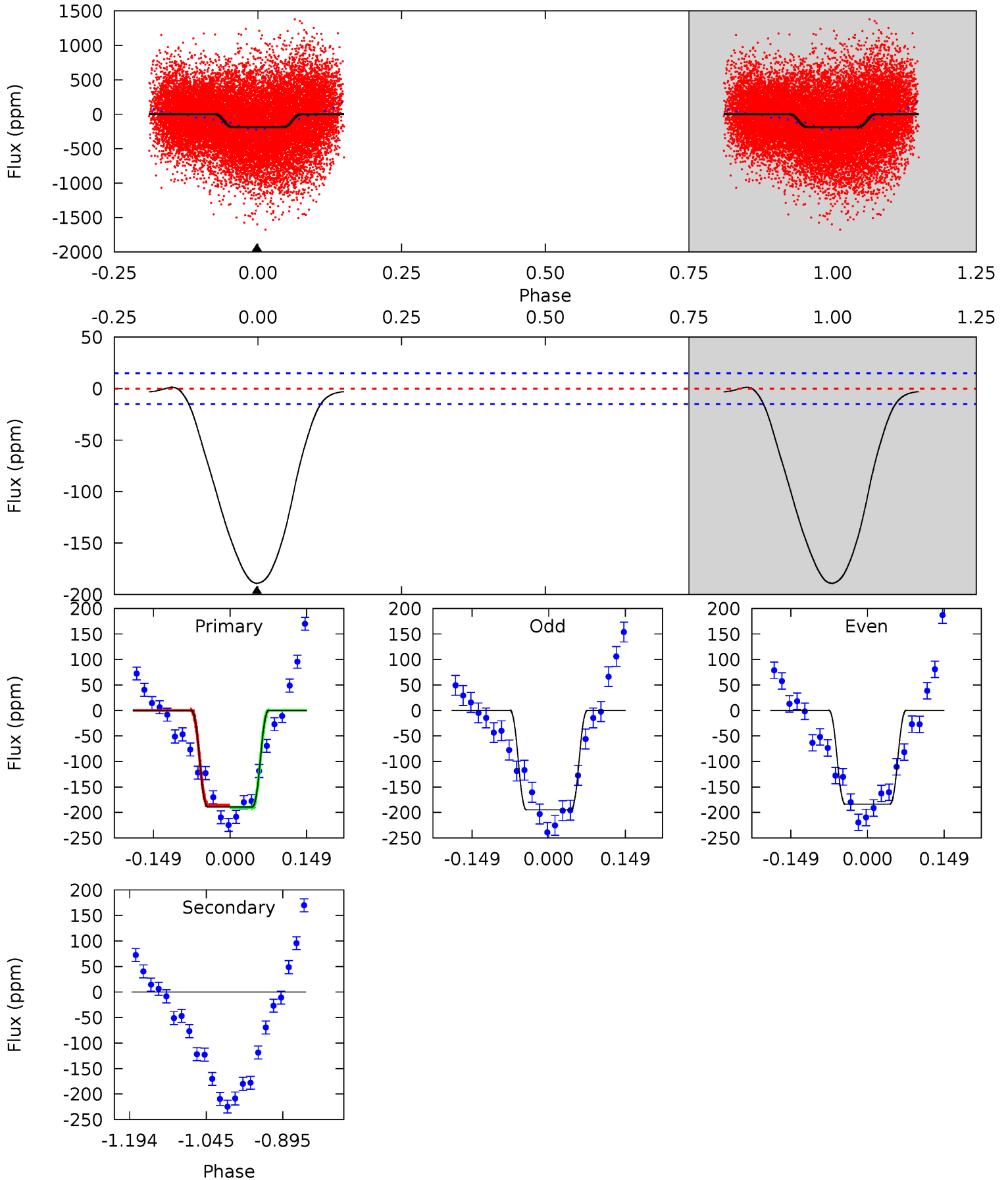
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.9	0	0	0	4.42	1.30	0.12	17.9	17.9	0	0	0.22	1.13	0.01	5.41



# Alt Model-Shift Uniqueness Test

008212251-02, P = 1.548838 Days, E = 132.623267 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
56.7	0	0	0	4.48	1.44	0.48	56.7	56.7	0	0	1.63	1.02	0.01	0.50



### Stellar Parameters For KIC 008212251

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6714^{+185}_{-278}$	$4.219^{+0.105}_{-0.210}$	$0.220^{+0.200}_{-0.350}$	$1.541^{+0.518}_{-0.279}$	$1.433^{+0.197}_{-0.219}$	$0.551^{+0.282}_{-0.297}$
	+3%/-4%	+2%/-5%	+91%/-159%	+34%/-18%	+14%/-15%	+51%/-54%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 008212251-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$0 \pm 3$	$1.36^{+0.61}_{-0.50}$	$3013^{+230}_{-180}$	$-3119^{+6580}_{-812}$	$0.011^{+0.902}_{-1.055}$
Alt.	$0 \pm 3$	$2.66^{+0.66}_{-0.58}$	$3025^{+216}_{-202}$	$-3121^{+489}_{-315}$	$-0.006^{+0.212}_{-0.231}$

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

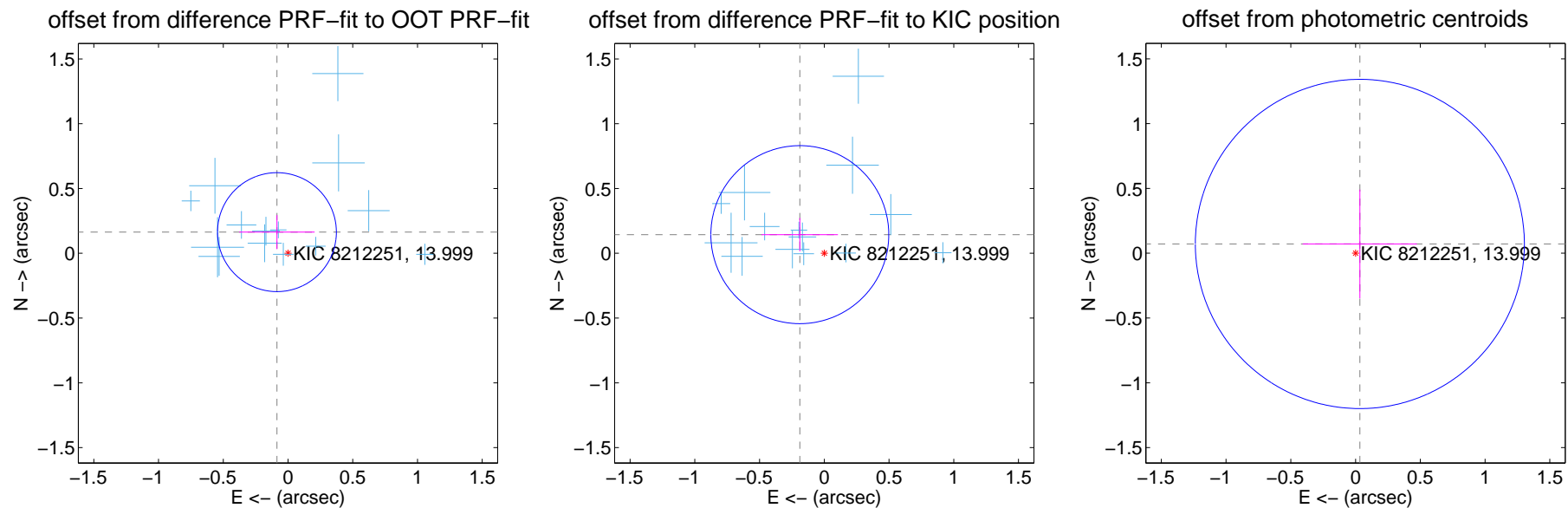
## DV Centroid Data

Supplemental centroid analysis for 008212251-02. Kepler magnitude: 14.00. Transit SNR 14.30

There are 15 quarters with good PRF difference image offsets

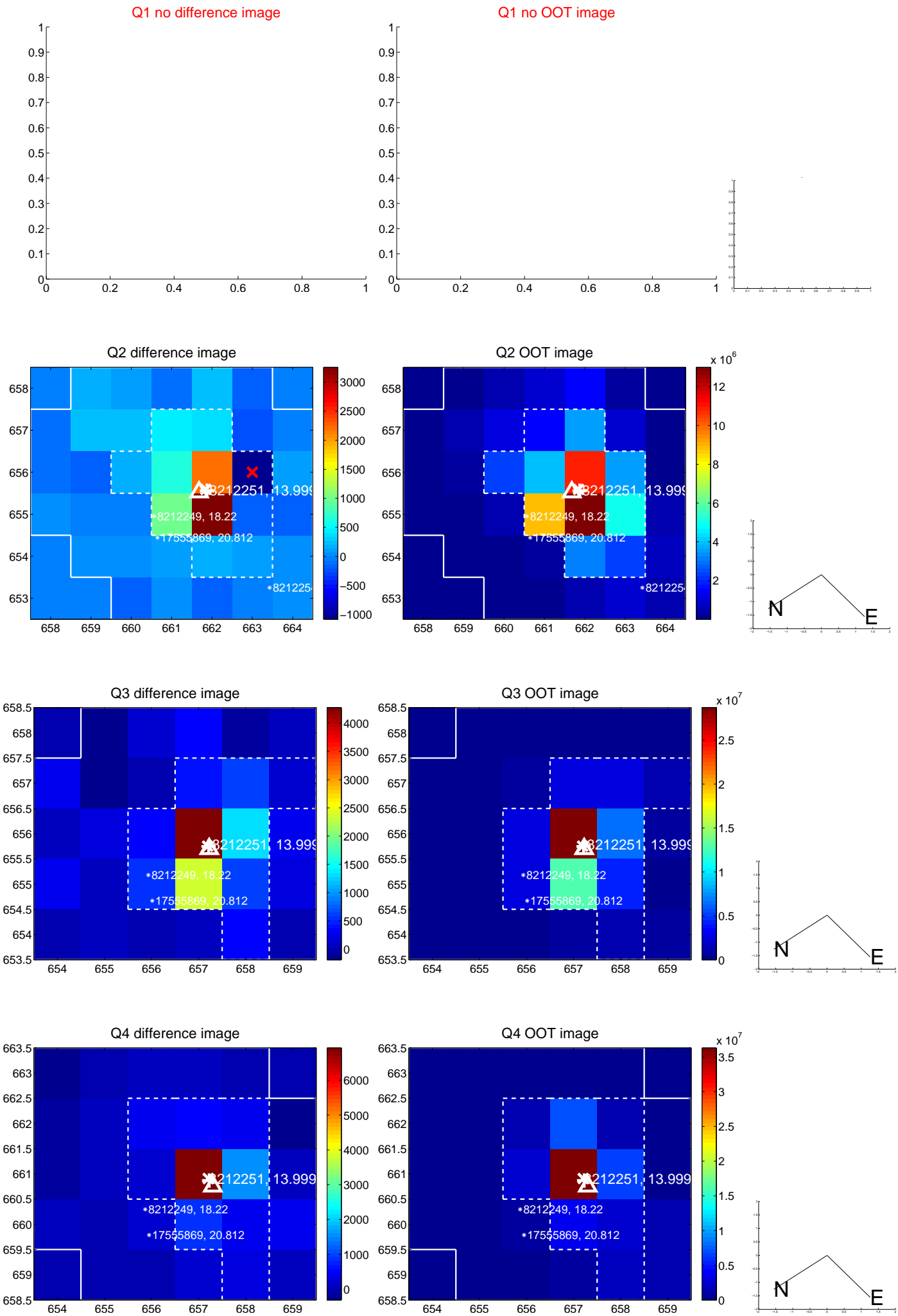
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.184 \pm 0.153$	1.20	$0.086 \pm 0.292$	$0.163 \pm 0.131$
PRF-fit source offset from KIC position	$0.238 \pm 0.229$	1.04	$0.189 \pm 0.295$	$0.144 \pm 0.129$
photometric centroid source offset	$0.08 \pm 0.42$	0.19	$-0.03 \pm 0.44$	$0.07 \pm 0.42$

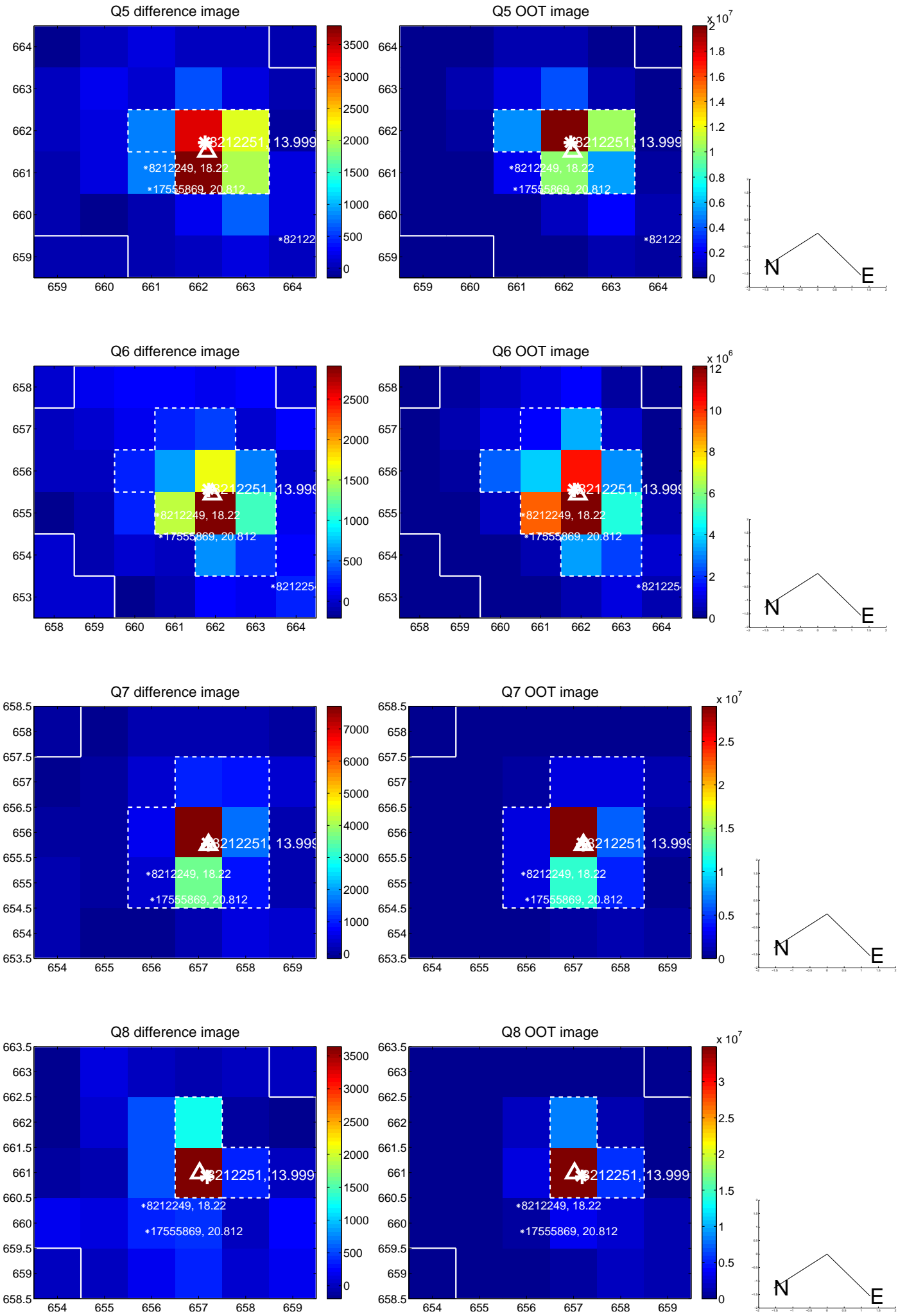


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

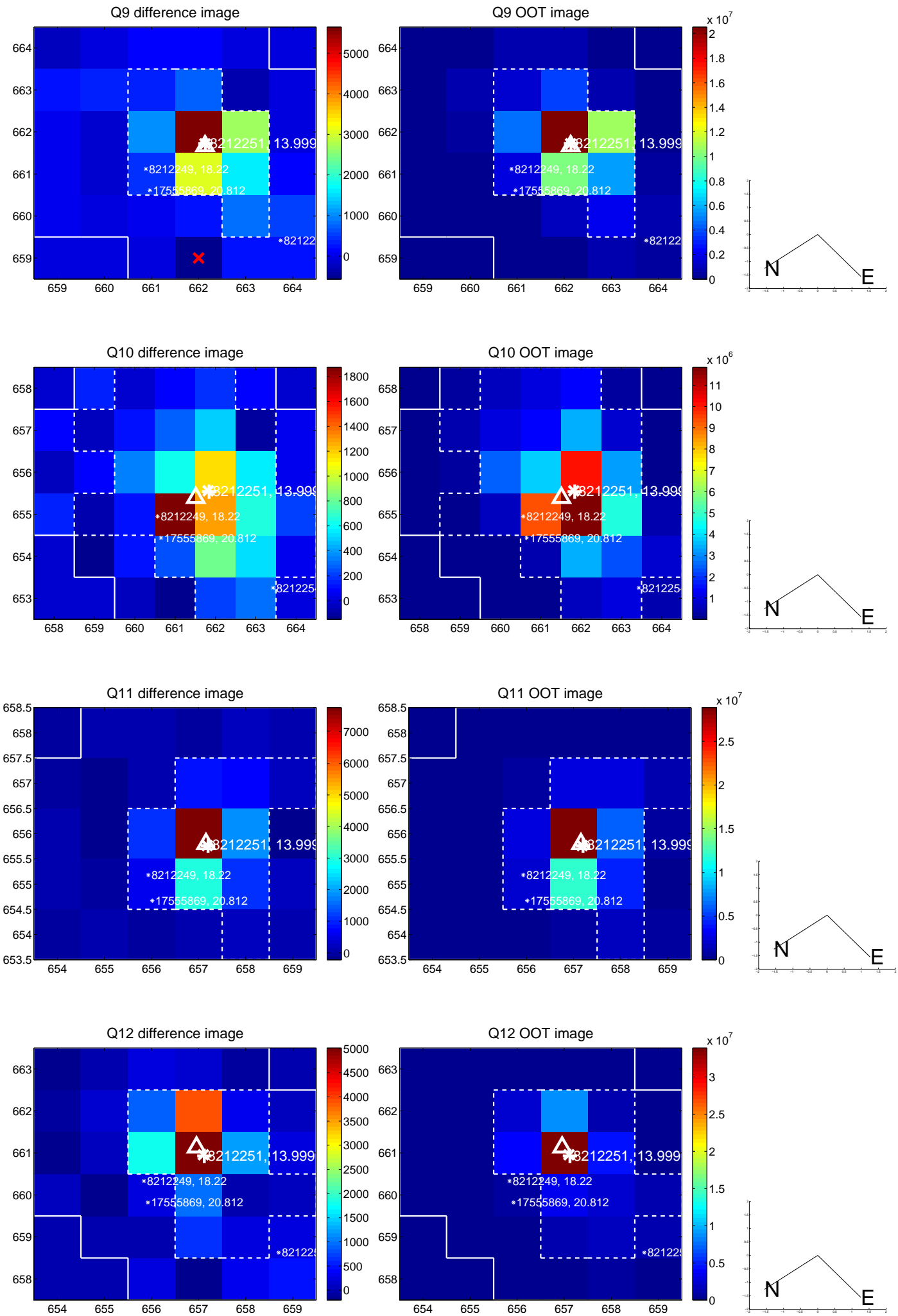


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

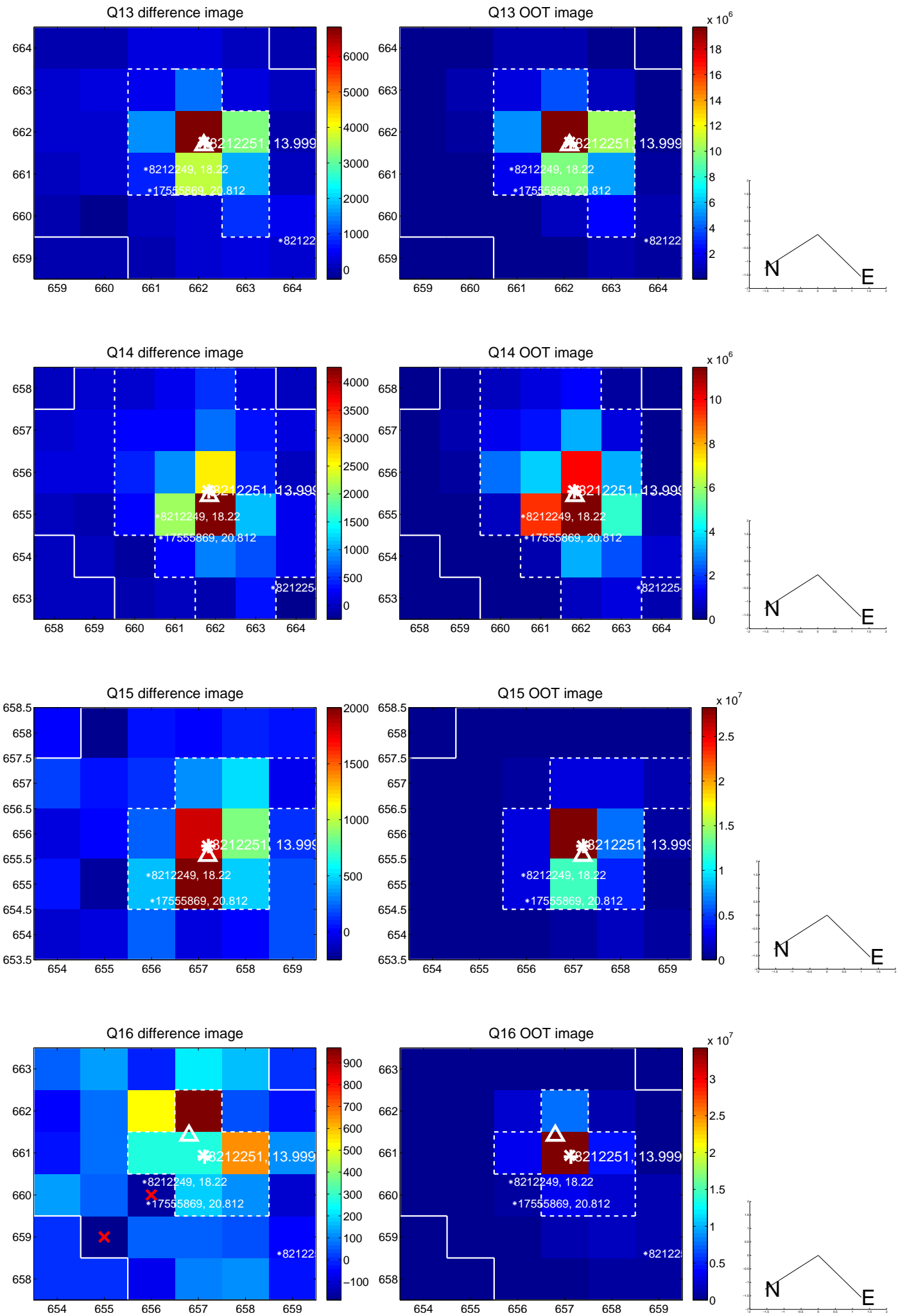




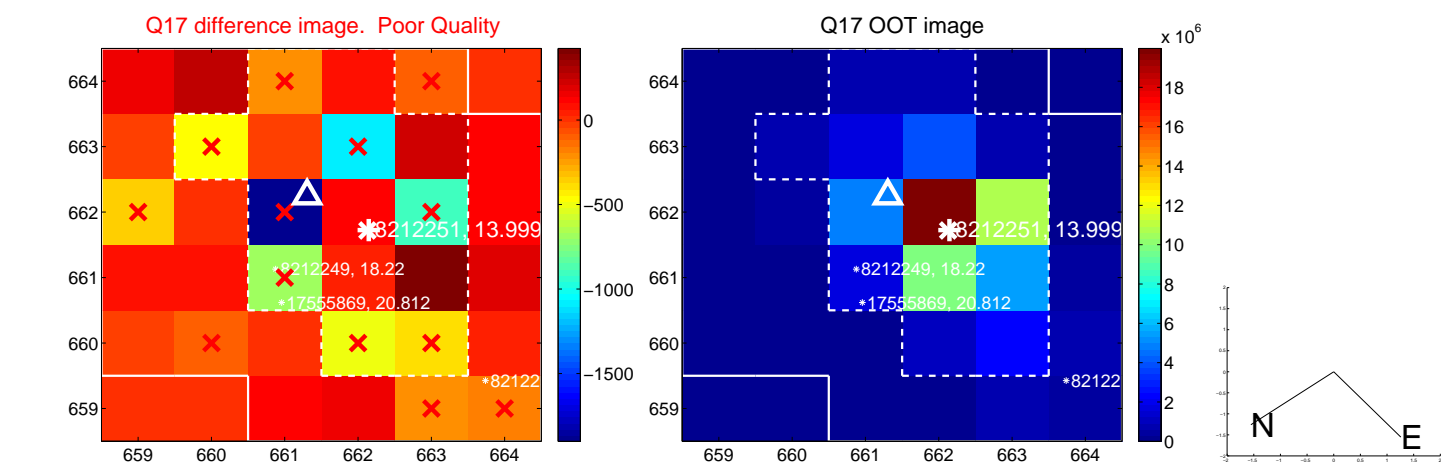
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



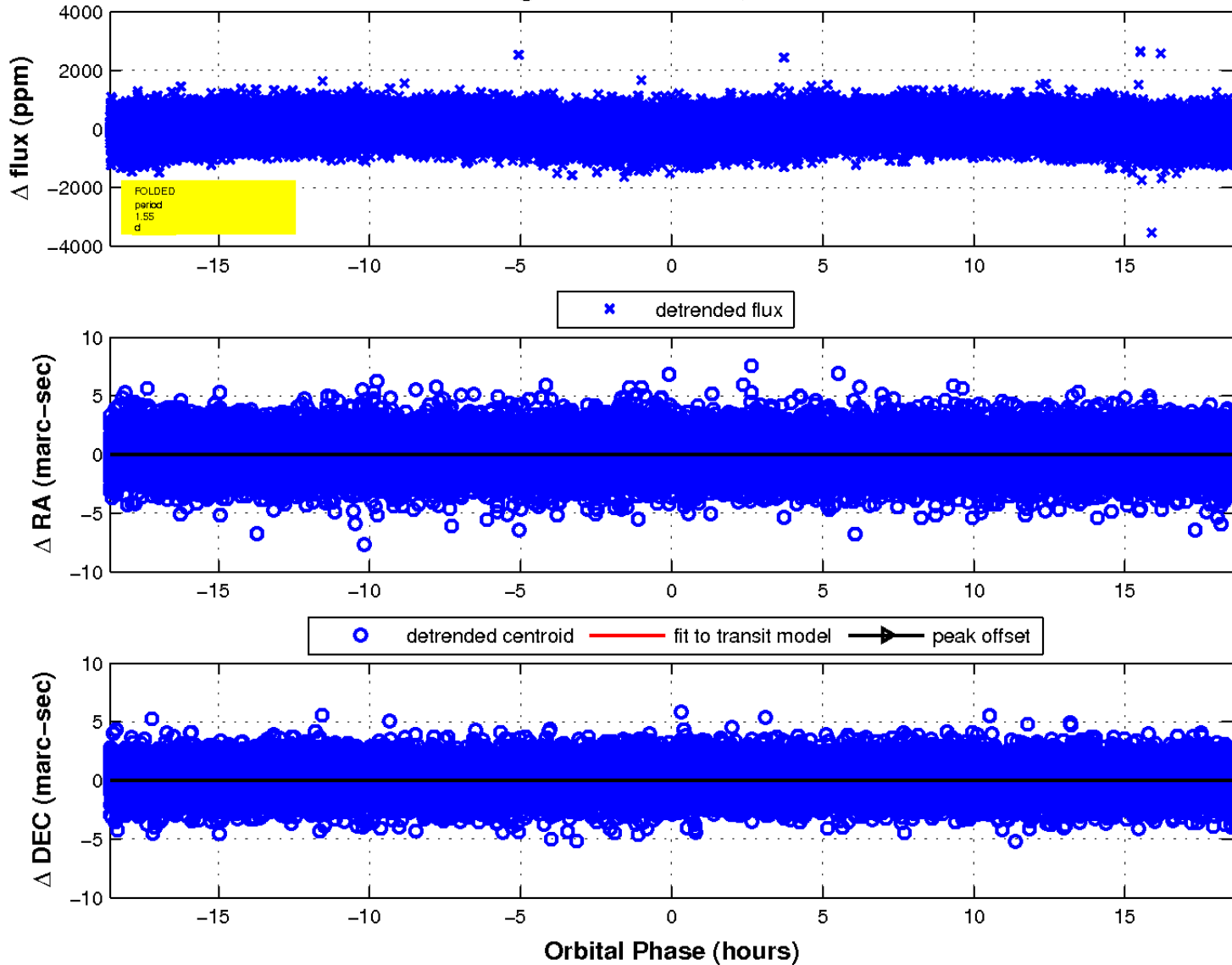
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



### fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

