

# KIC 012111004

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012111004-01	OBS	No	1.129142	132.019991	96.3	2.158	10.0	8.2	2.69	7680	3.07	32264.46
012111004-02	OBS	No	1.129153	132.485532	93.2	2.533	9.1	7.4	2.69	7680	3.02	32264.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012111004-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
012111004-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—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.

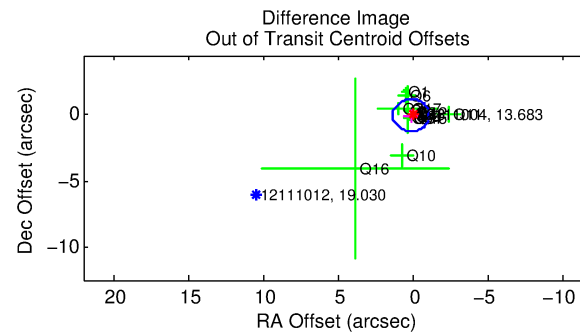
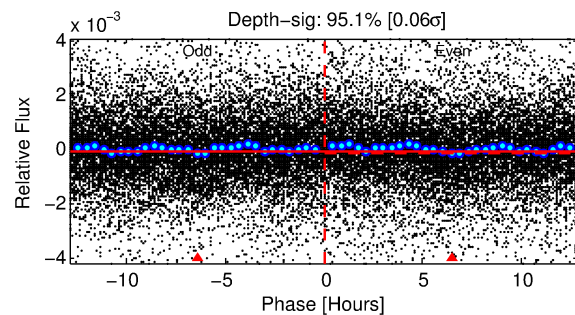
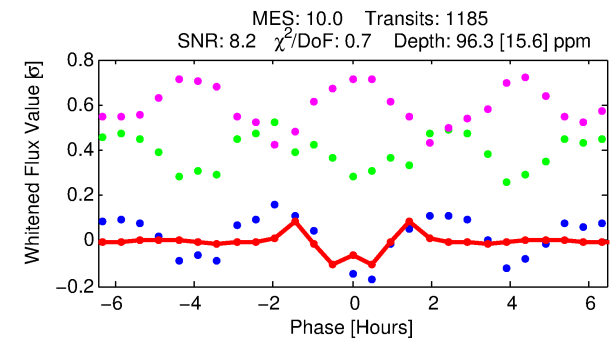
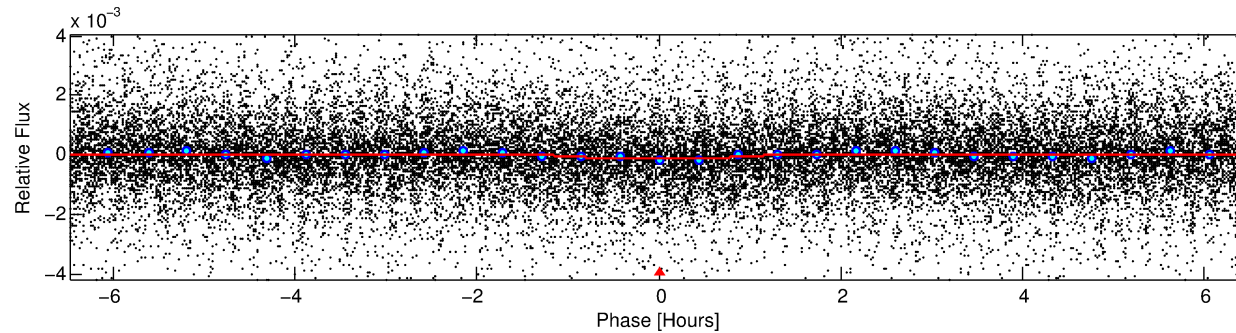
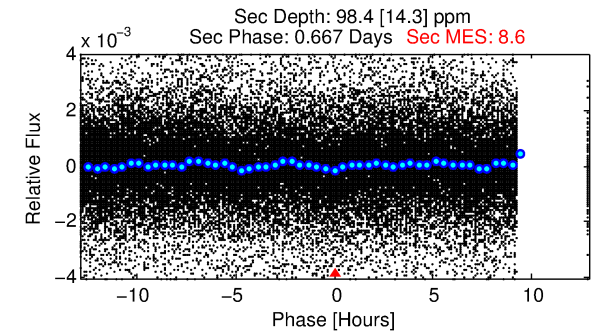
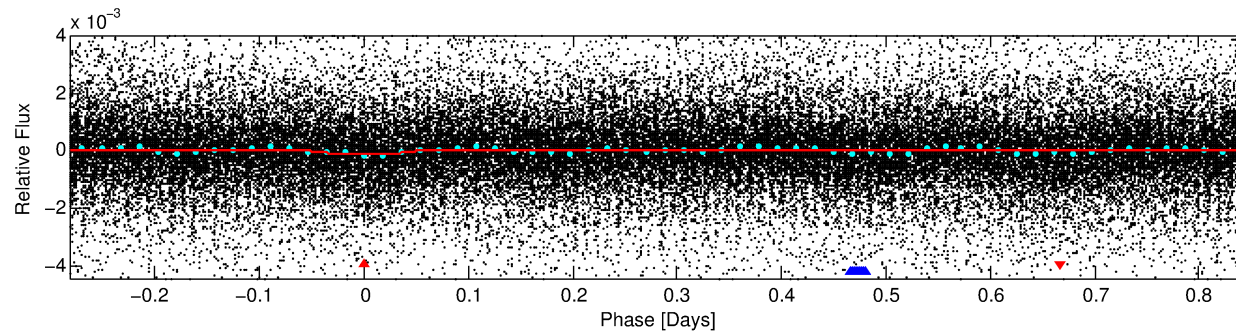
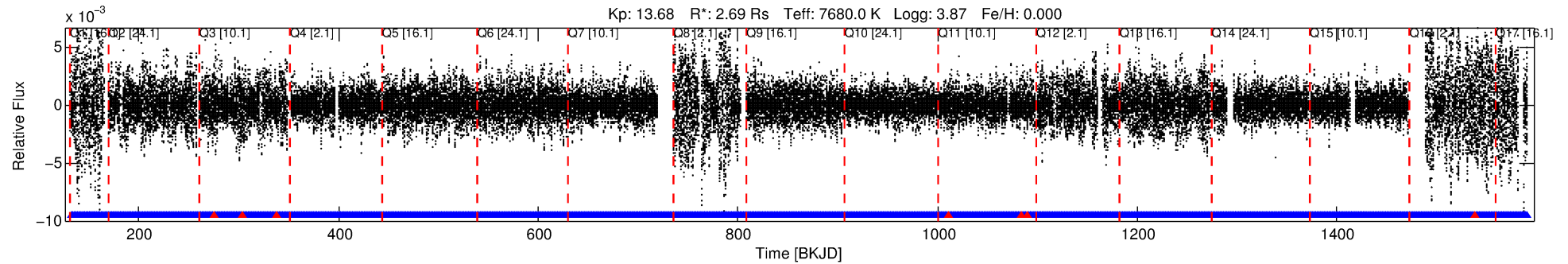
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 012111004-01

No Significant Match Found

# DV One-Page Summary

KIC: 12111004 Candidate: 1 of 2 Period: 1.129 d



## DV Fit Results:

Period = 1.12914 [0.00001] d  
Epoch = 132.0200 [0.0013] BKJD  
Rp/R\* = 0.0104 [0.0024]  
a/R\* = 2.06 [2.12]  
b = 0.90 [0.29]  
Seff = 32264.46 [17765.38]  
Teq = 3417 [470] K  
Rp = 3.07 [1.39] Re  
a = 0.0265 [0.0091] AU  
Ag = 4.03 [2.88] [1.05σ]  
Teffp = 7486 [977] K [3.75σ]

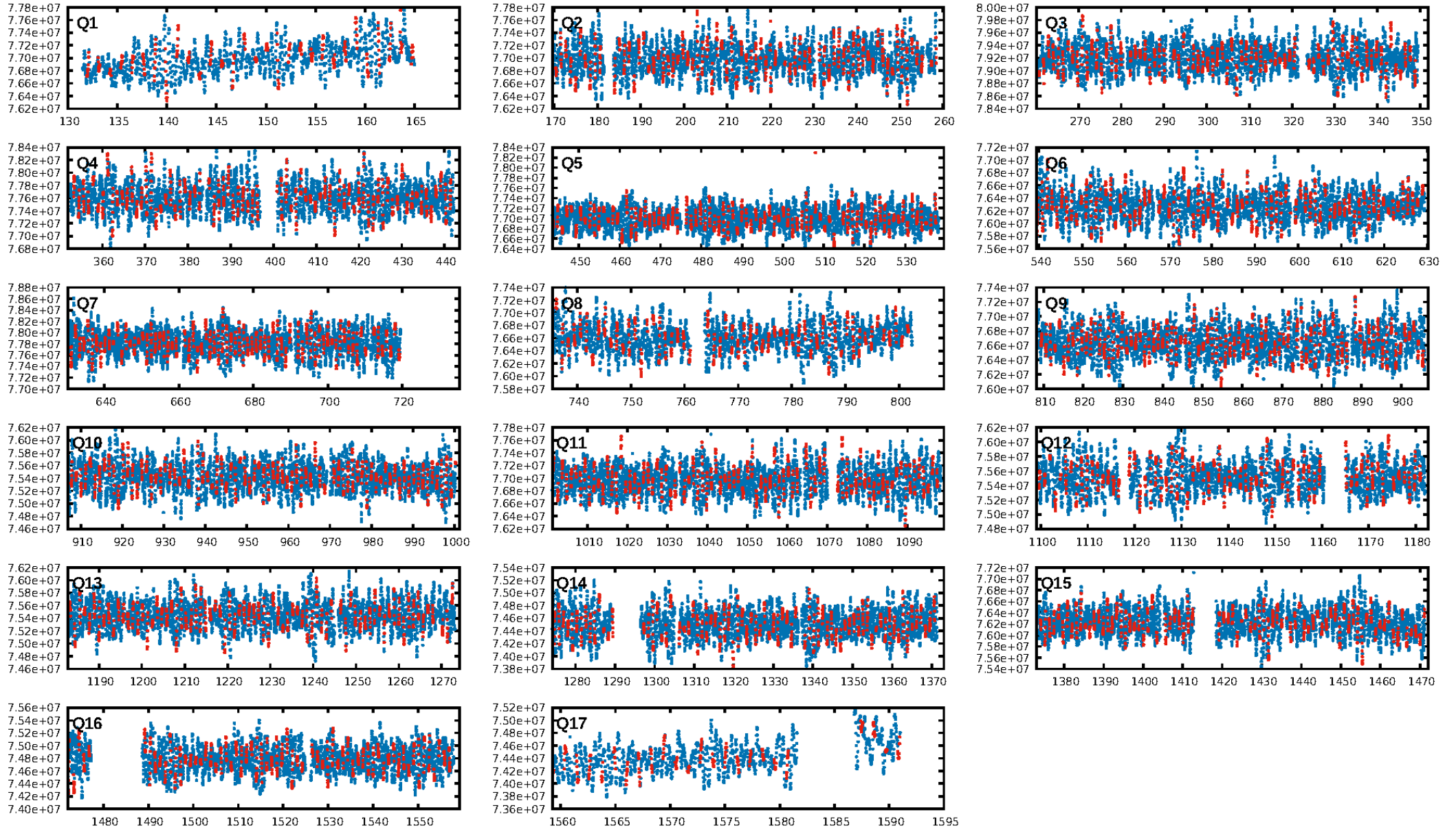
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 5.82e-23  
RollingBand-fgt: 0.99 [1124/1131]  
GhostDiagnostic-chr: 2.315  
Centroid-sig: 73.9%  
Centroid-so: 0.367 arcsec [0.75σ]  
OotOffset-rm: 0.112 arcsec [0.28σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-rm: 0.163 arcsec [0.39σ]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.47 [8/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 08:18:36 Z

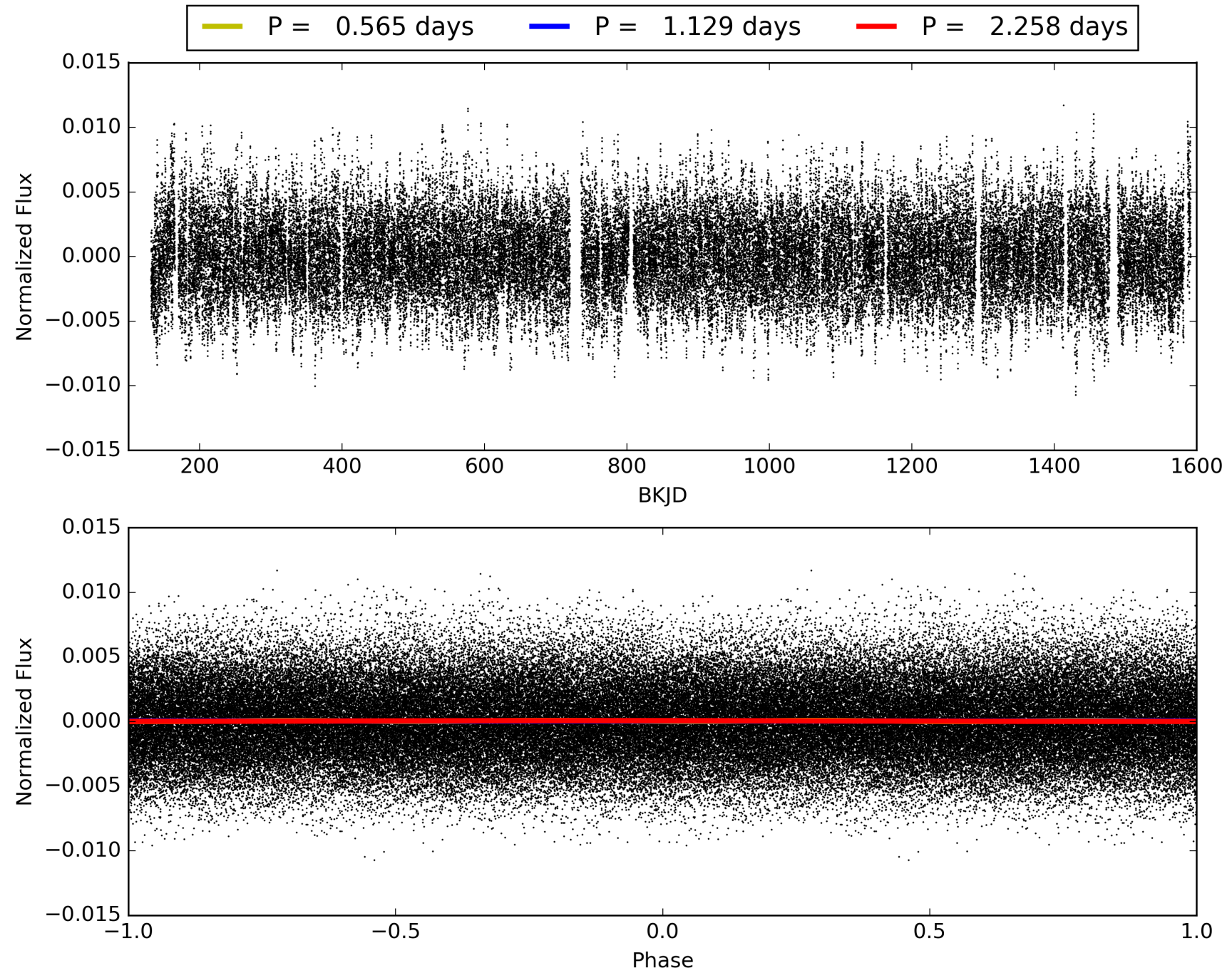
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 012111004-01, PDC Light Curves



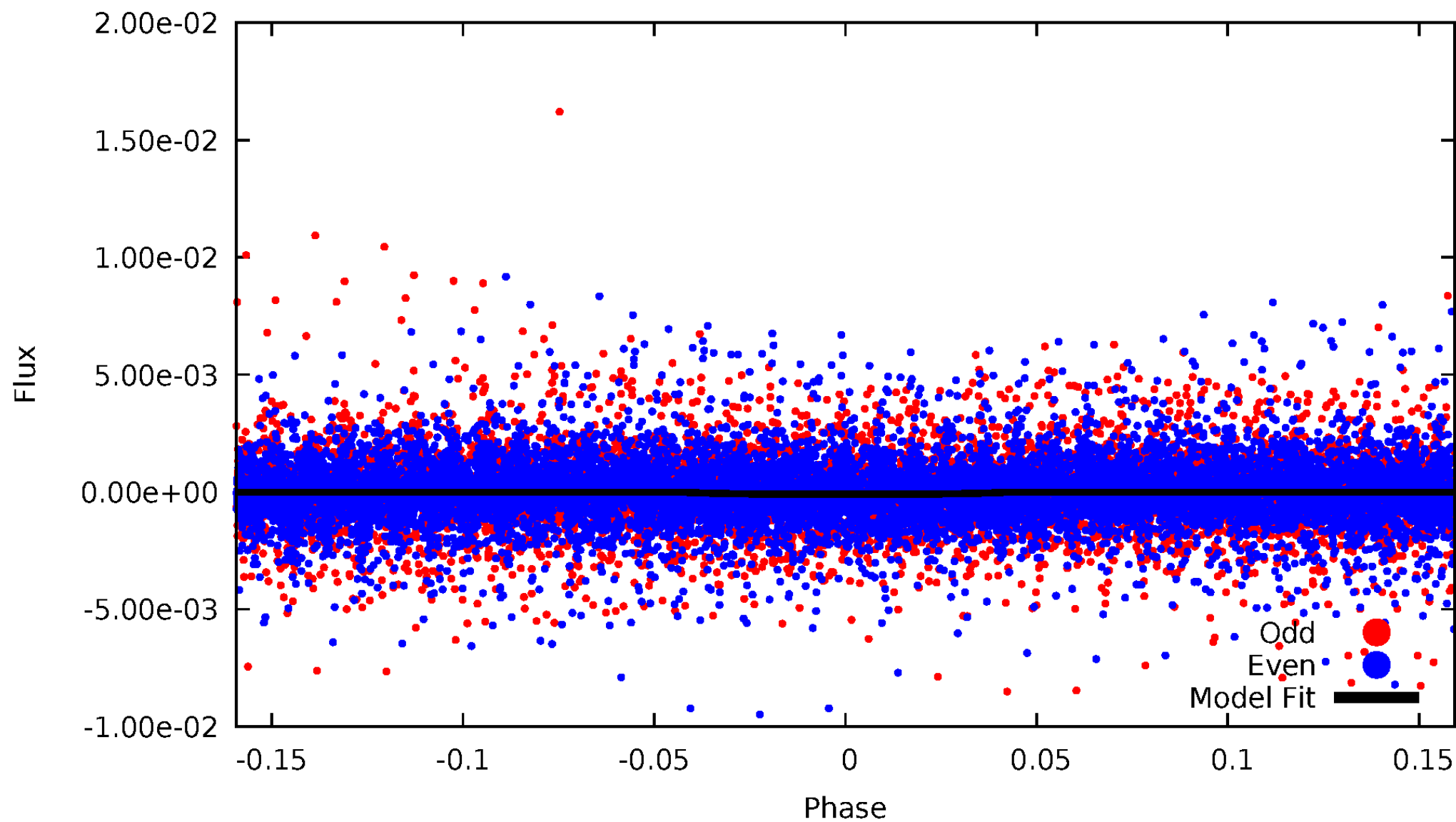


TCE 012111004-01



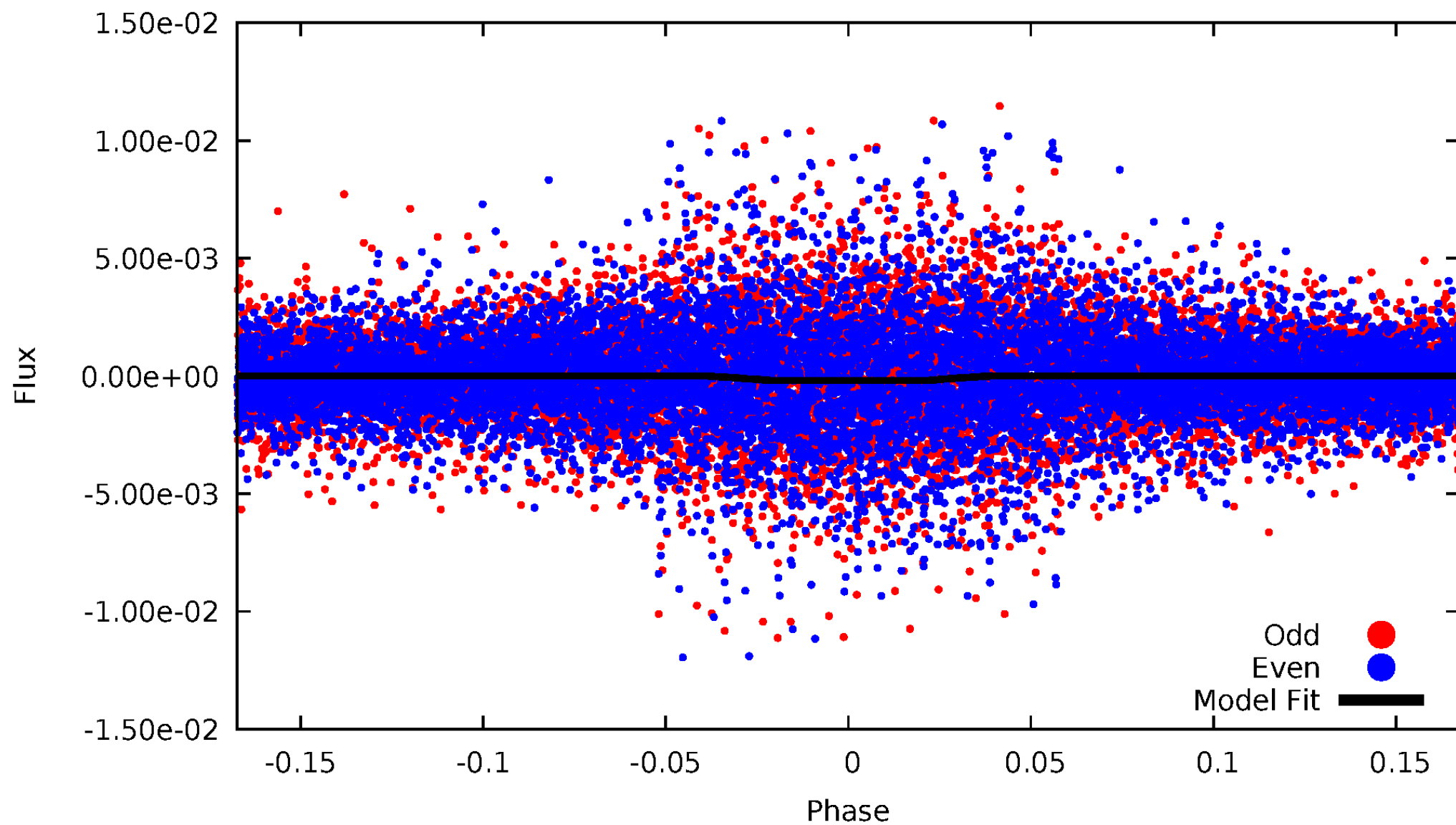
# DV Odd/Even

TCE 012111004-01



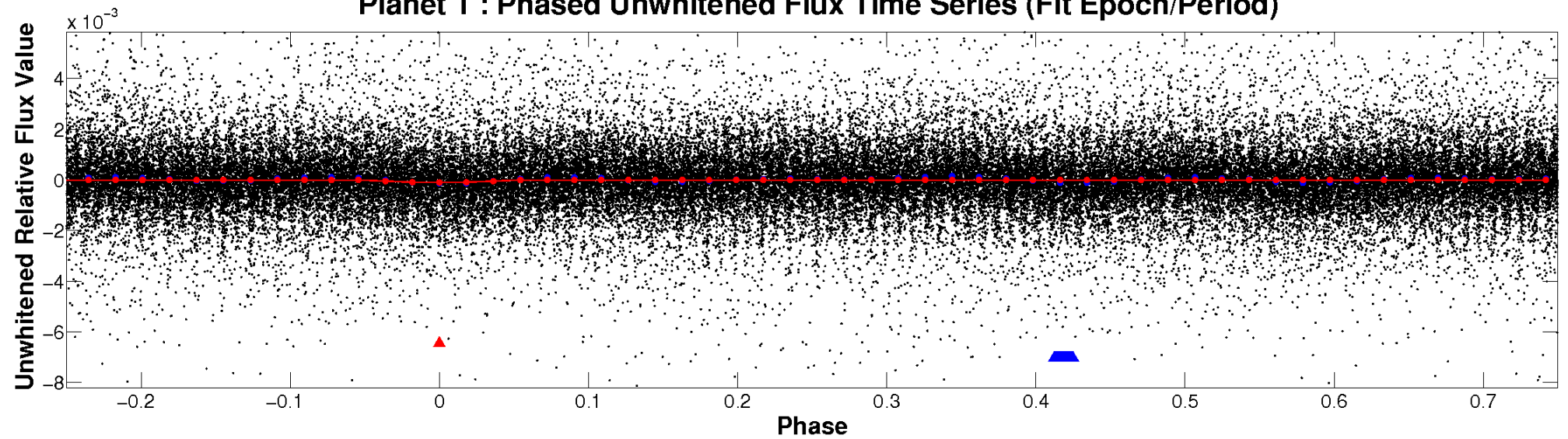
# ALT Odd/Even

TCE 012111004-01

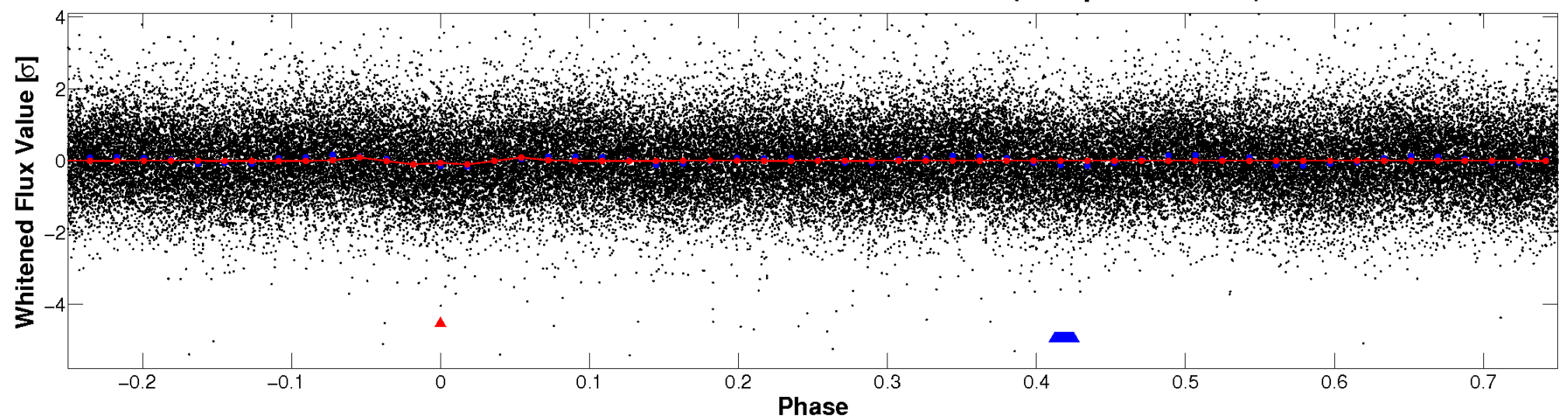


# Non-Whitened Vs. Whitened Light Curve

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



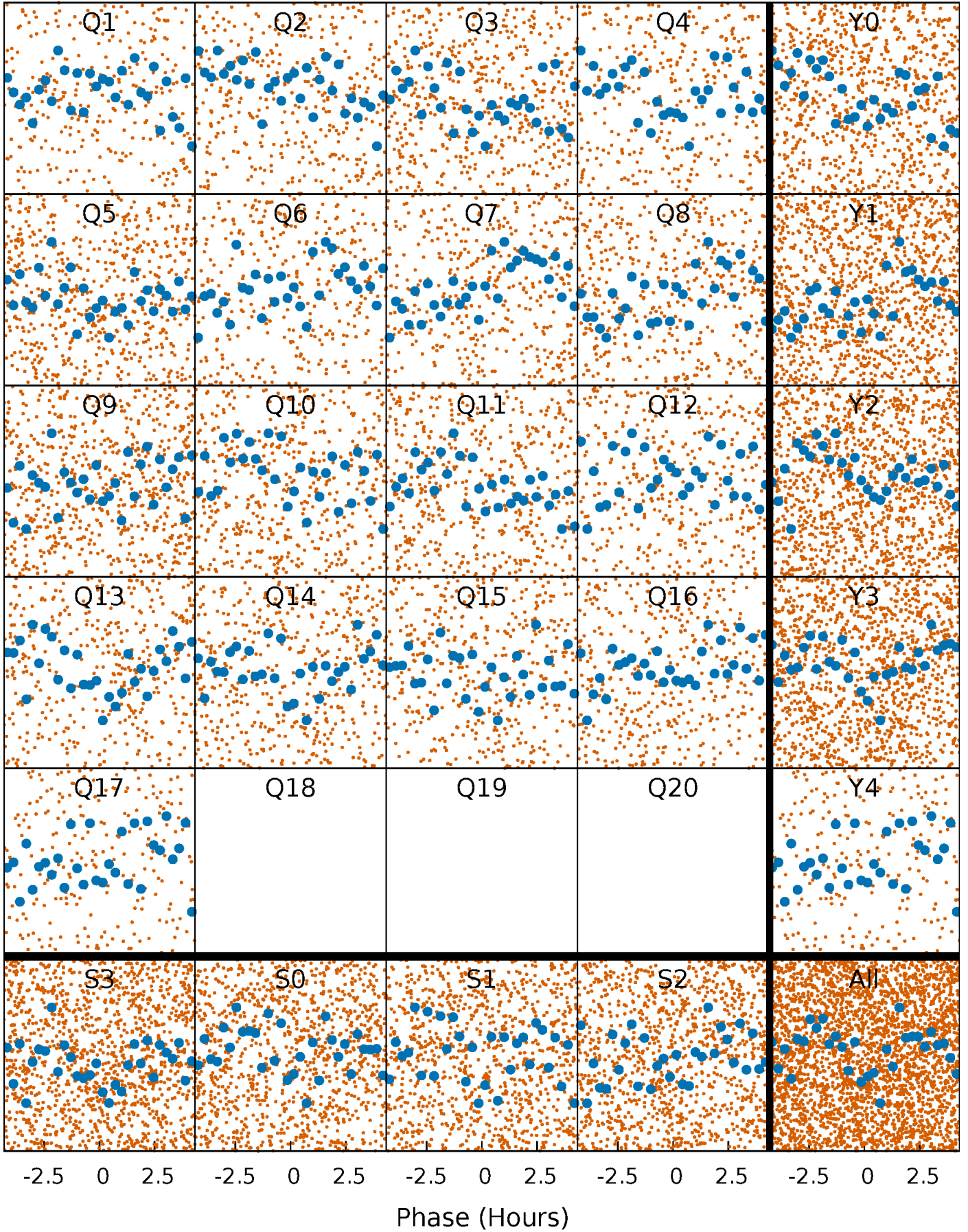
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

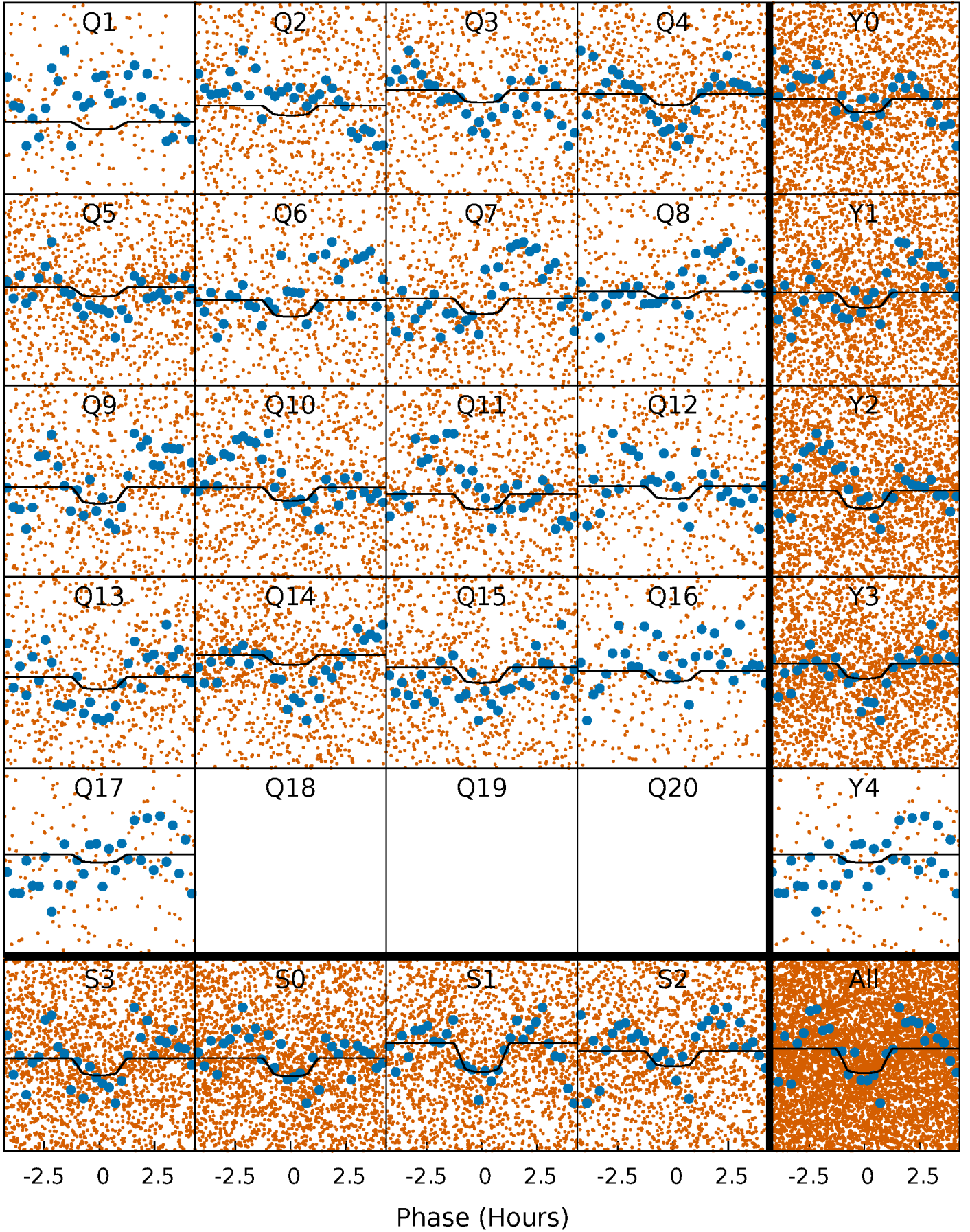
TCE 012111004-01 P= 1.129142 Days  $T_0=132.019991$  (BKJD)





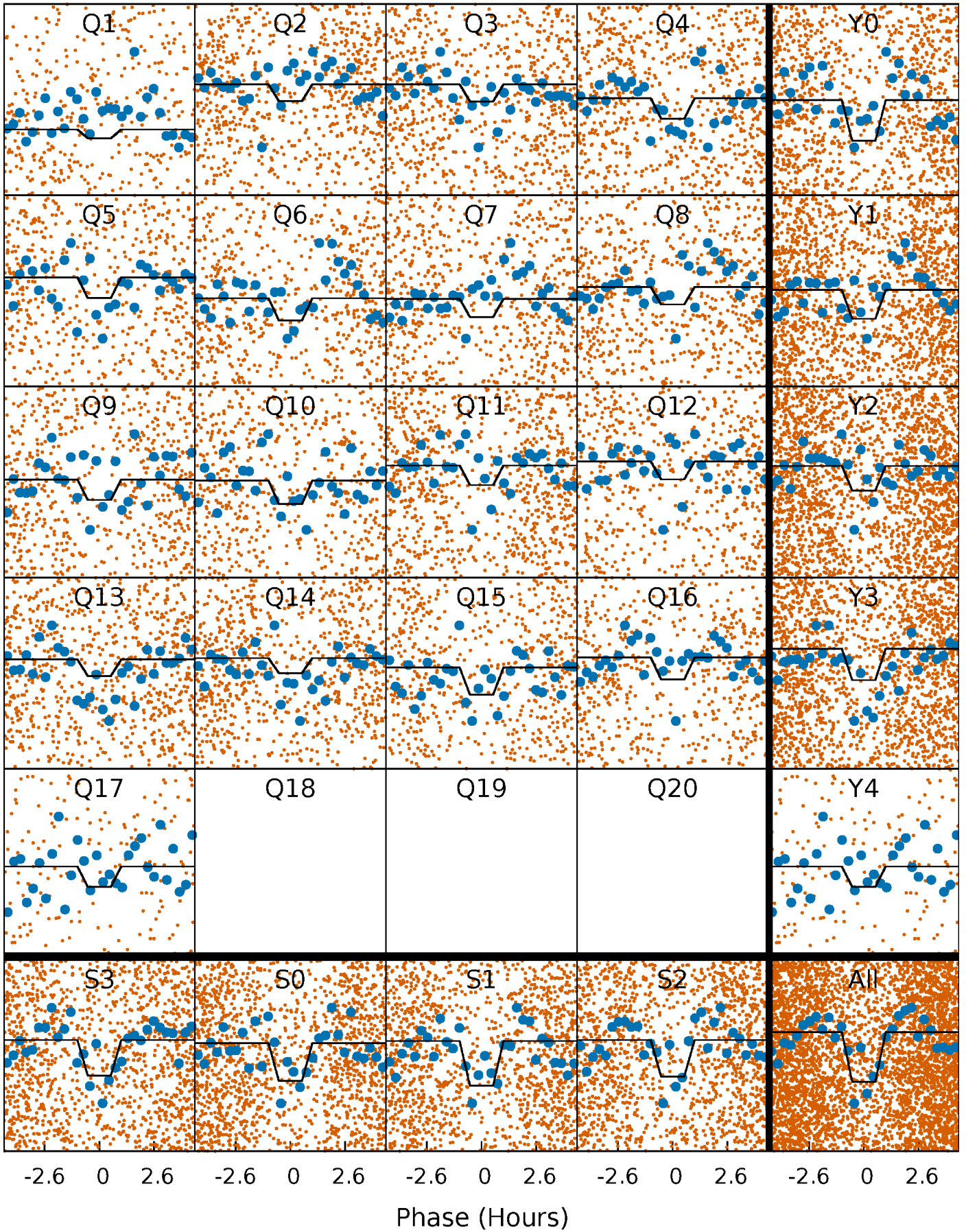
# DV Quarter-Phased Transit Curves

TCE 012111004-01 P= 1.129142 Days  $T_0=132.019991$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

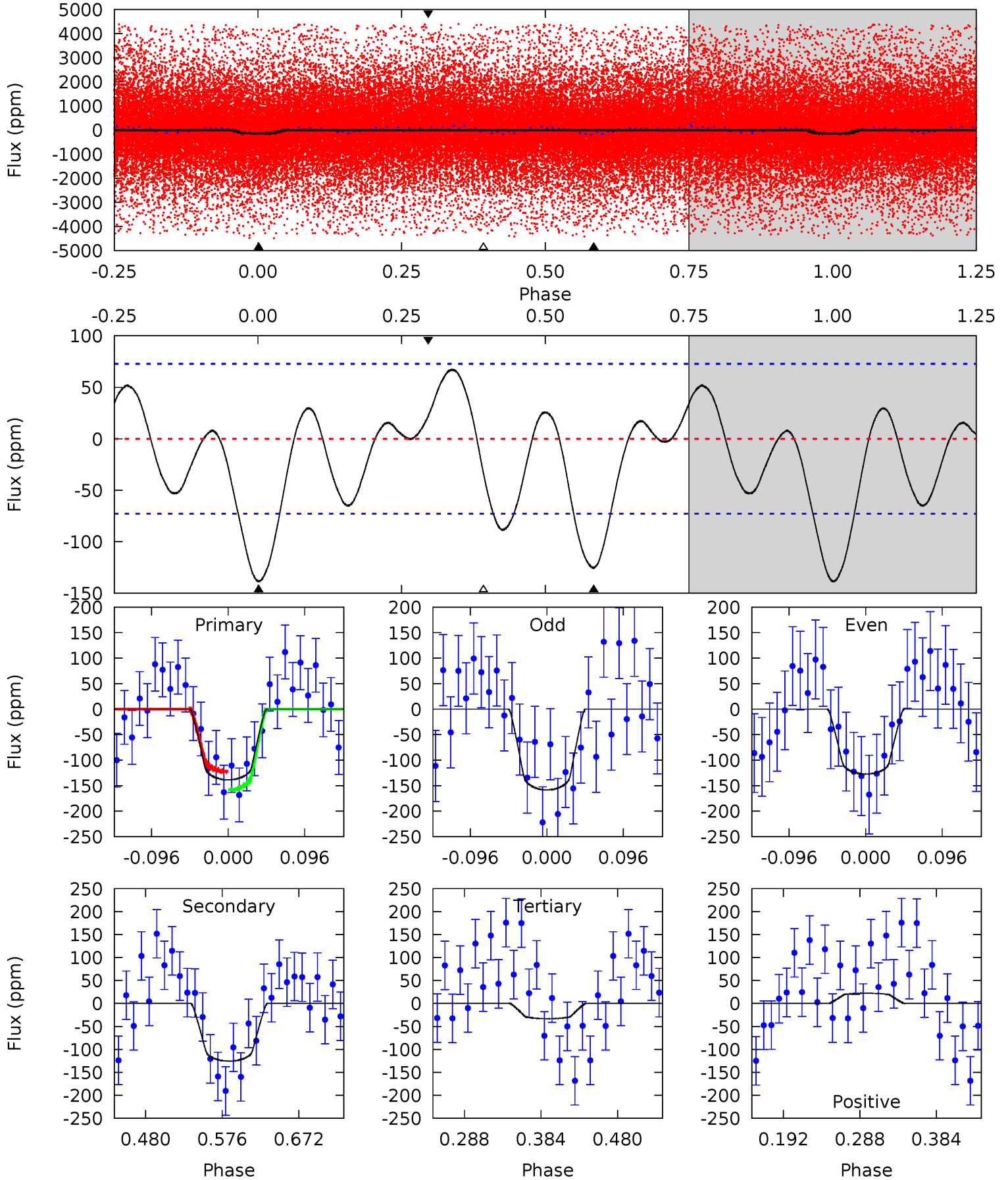
TCE 012111004-01 P= 1.129153 Days  $T_0=132.019330$  (BKJD)



# DV Model-Shift Uniqueness Test

012111004-01, P = 1.129142 Days, E = 130.890849 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
8.70	7.88	2.09	1.39	4.57	1.66	2.51	6.61	7.31	5.79	6.49	0.99	0.81	0.33	1.15

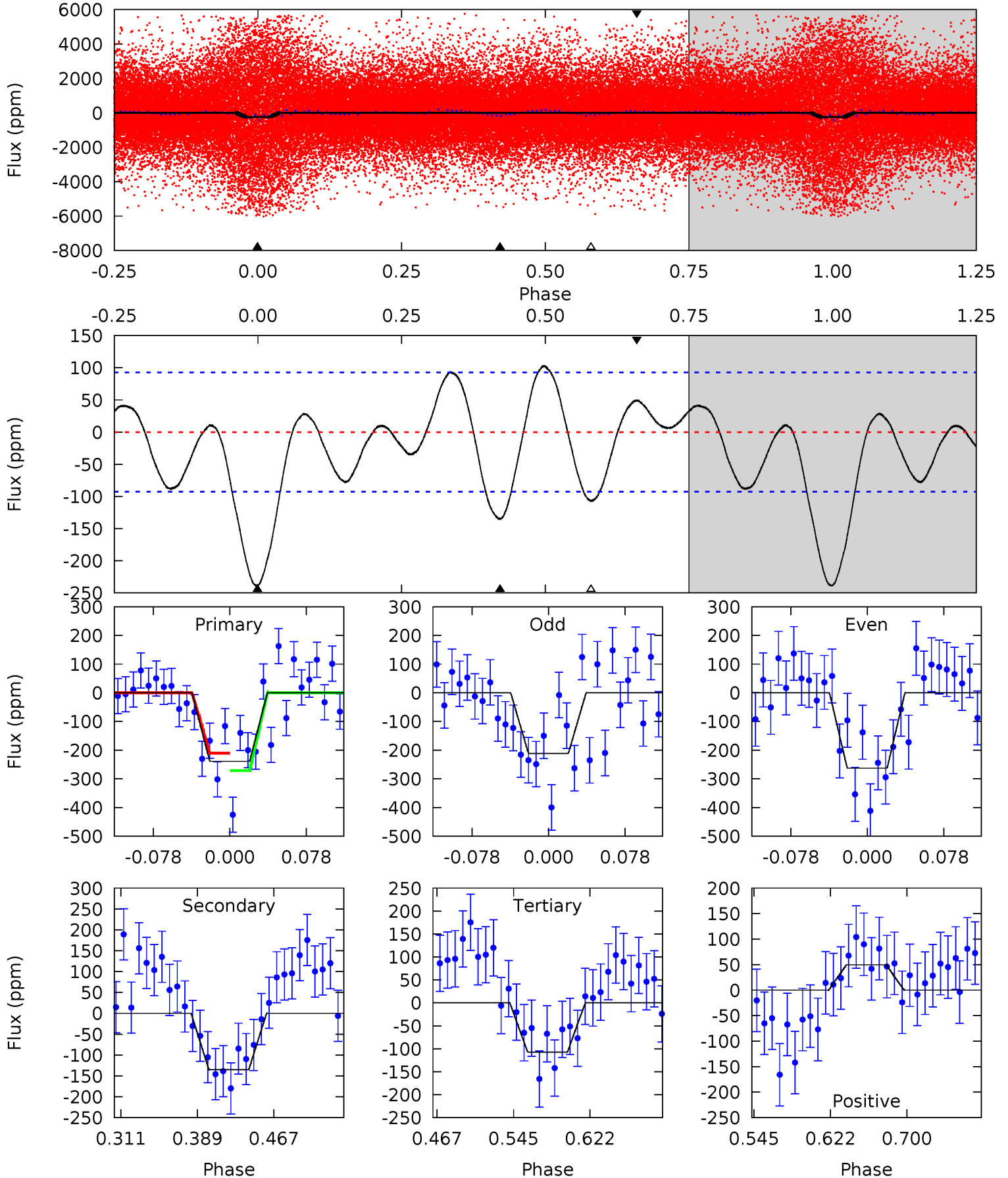




# Alt Model-Shift Uniqueness Test

012111004-01, P = 1.129153 Days, E = 130.890177 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
11.9	6.74	5.34	2.47	4.62	1.76	2.47	6.57	9.44	1.40	4.27	1.28	0.70	0.30	1.52





### Stellar Parameters For KIC 012111004

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7680^{+214}_{-349}$	$3.865^{+0.294}_{-0.105}$	$0.000^{+0.200}_{-0.350}$	$2.692^{+0.446}_{-1.041}$	$1.939^{+0.082}_{-0.467}$	$0.140^{+0.322}_{-0.047}$
	+3%/-5%	+8%/-3%	+inf%/-inf%	+17%/-39%	+4%/-24%	+230%/-33%
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 012111004-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-125 \pm 16$	$2.81^{+0.90}_{-0.79}$	$4664^{+334}_{-415}$	$7862^{+1843}_{-1071}$	$5.960^{+5.649}_{-2.558}$
Alt.	$-135 \pm 20$	$3.83^{+0.93}_{-0.95}$	$4687^{+312}_{-445}$	$6690^{+883}_{-656}$	$3.428^{+2.435}_{-1.220}$

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

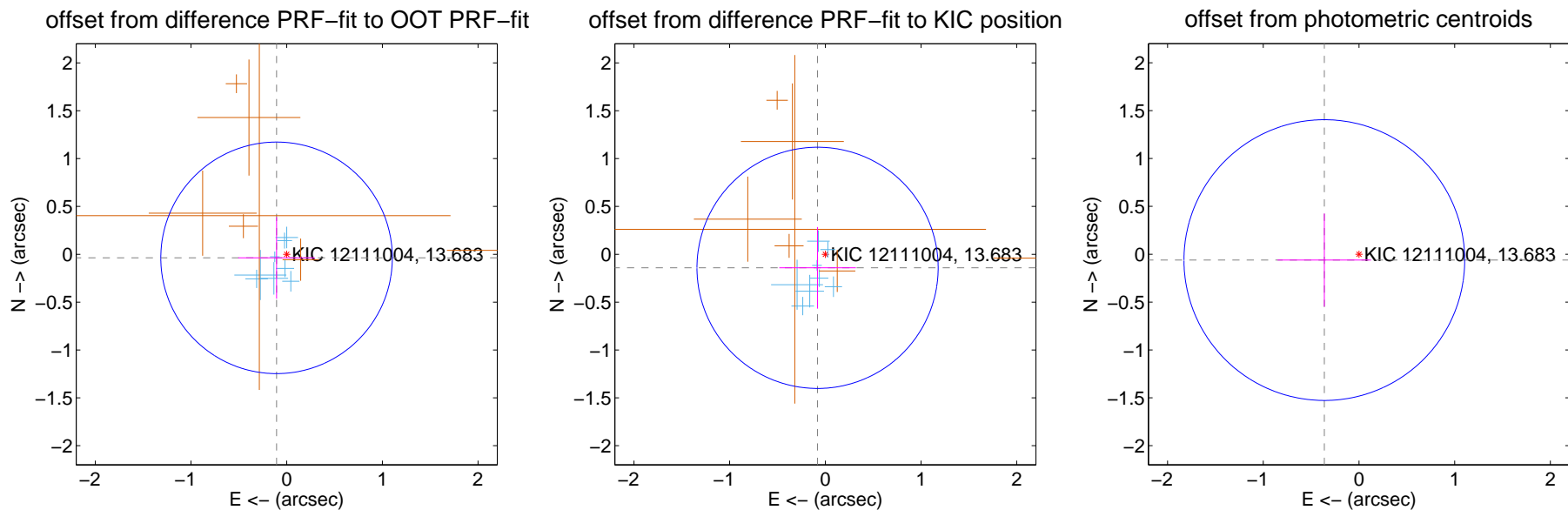
## DV Centroid Data

Supplemental centroid analysis for 012111004-01. Kepler magnitude: 13.68. Transit SNR 8.23

There are 8 quarters with good PRF difference image offsets

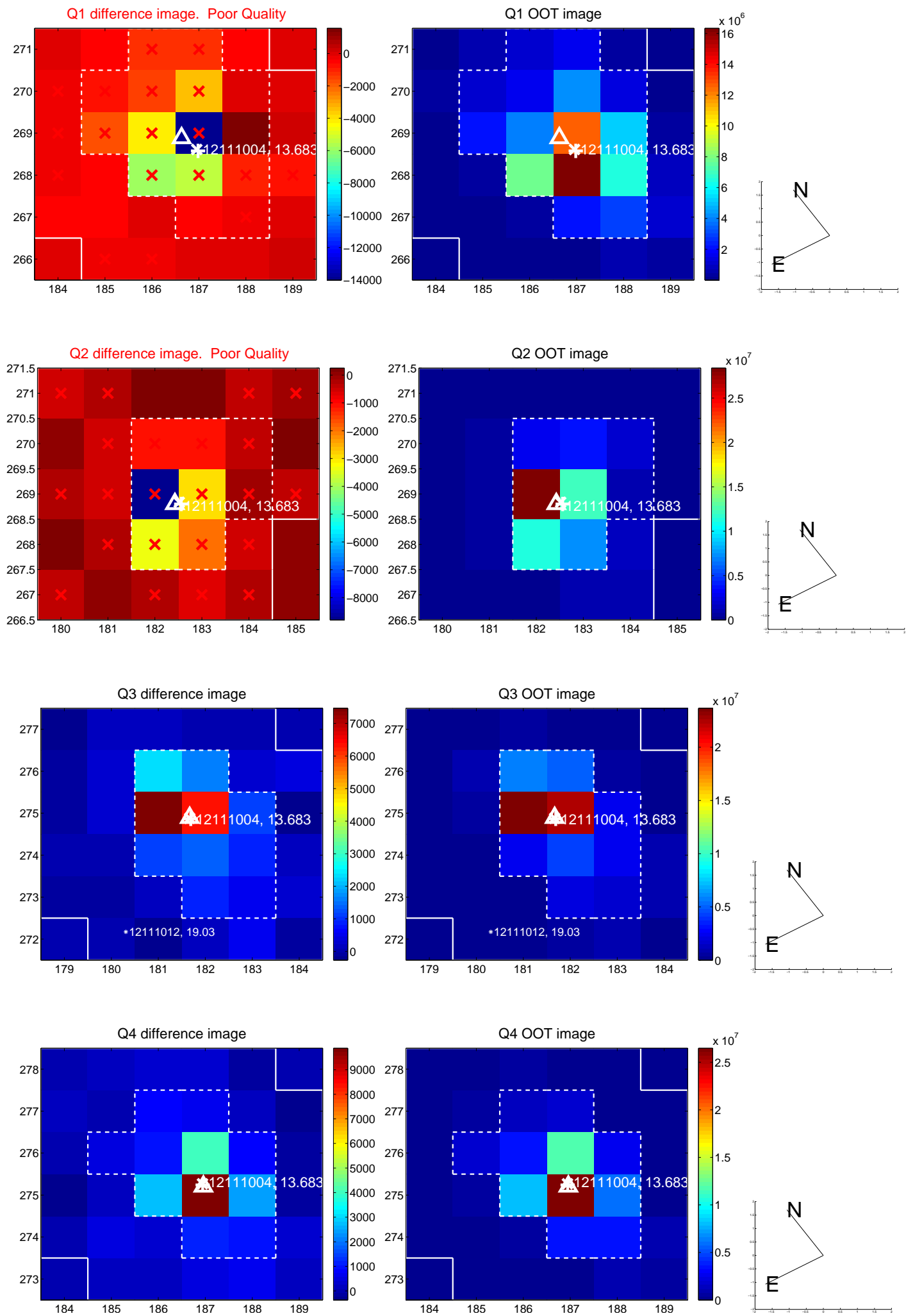
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.112 \pm 0.403$	0.28	$0.106 \pm 0.400$	$-0.037 \pm 0.426$
PRF-fit source offset from KIC position	$0.163 \pm 0.420$	0.39	$0.081 \pm 0.400$	$-0.142 \pm 0.426$
photometric centroid source offset	$0.37 \pm 0.49$	0.75	$0.36 \pm 0.49$	$-0.06 \pm 0.49$

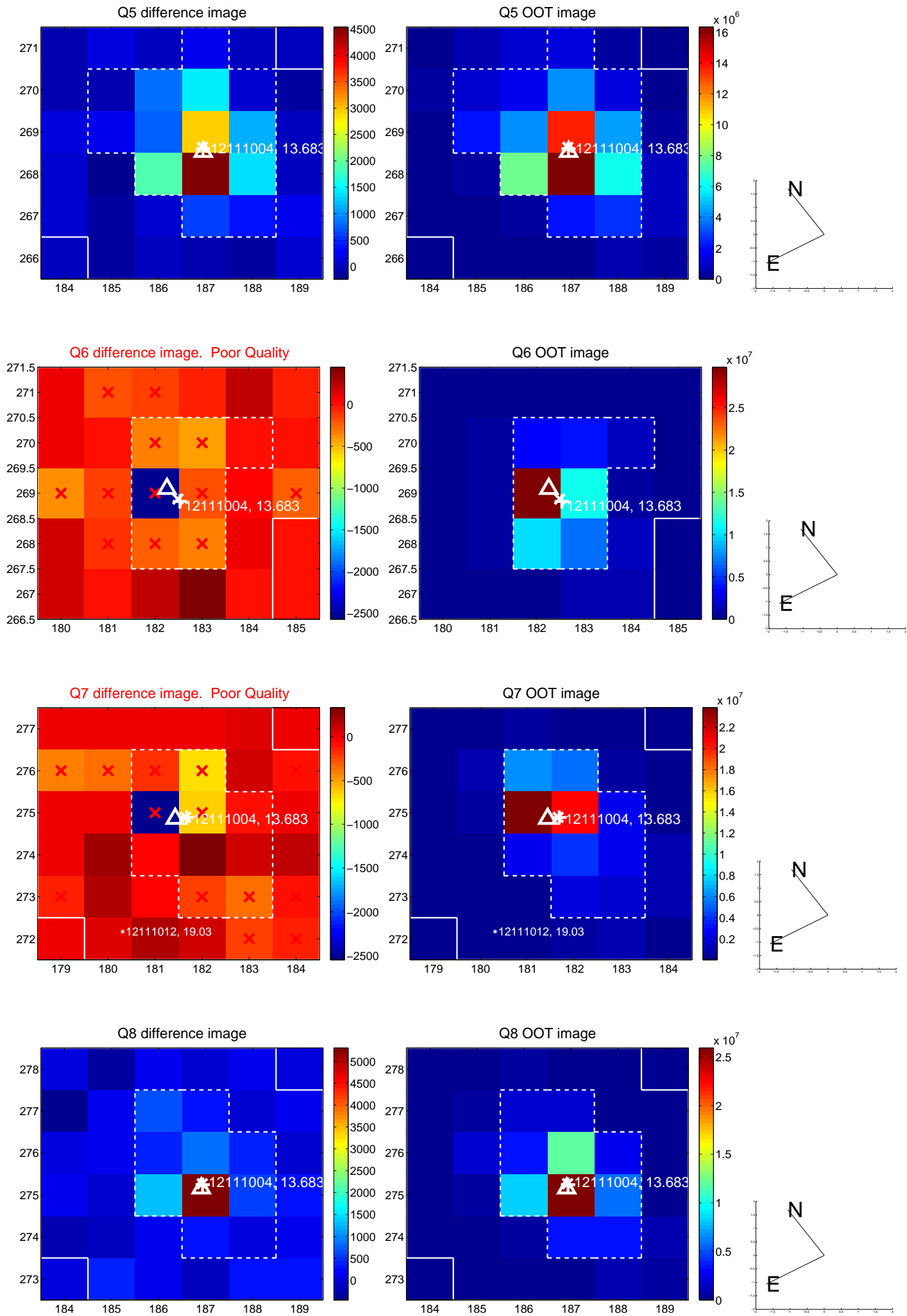


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

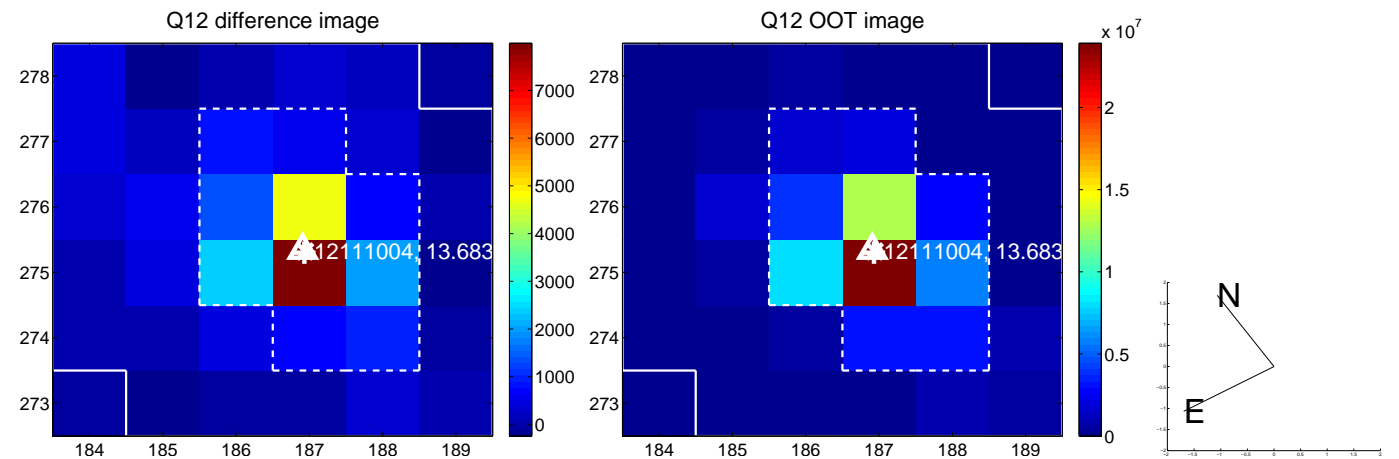
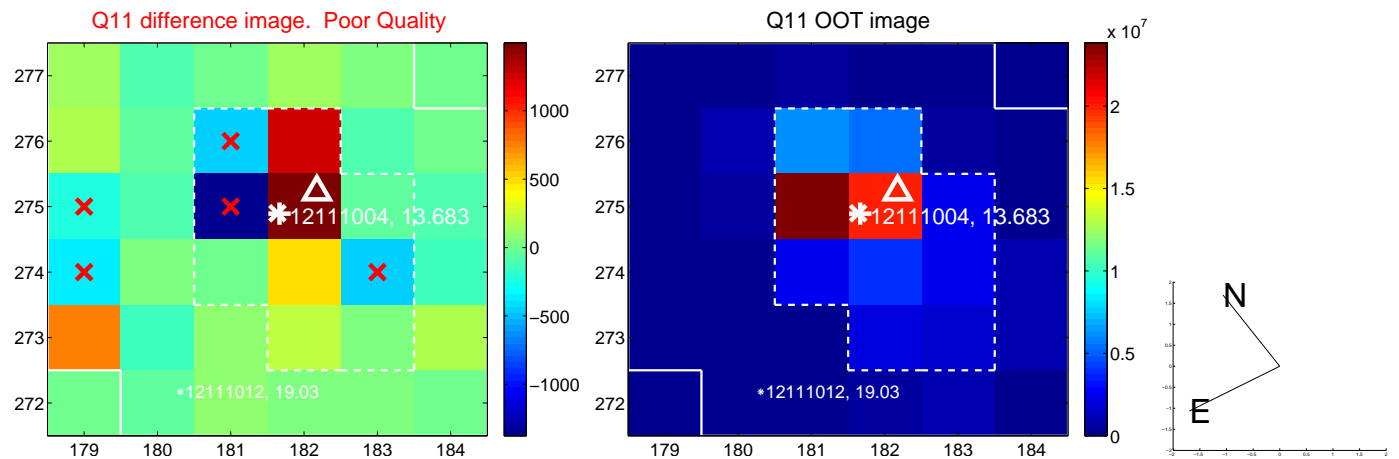
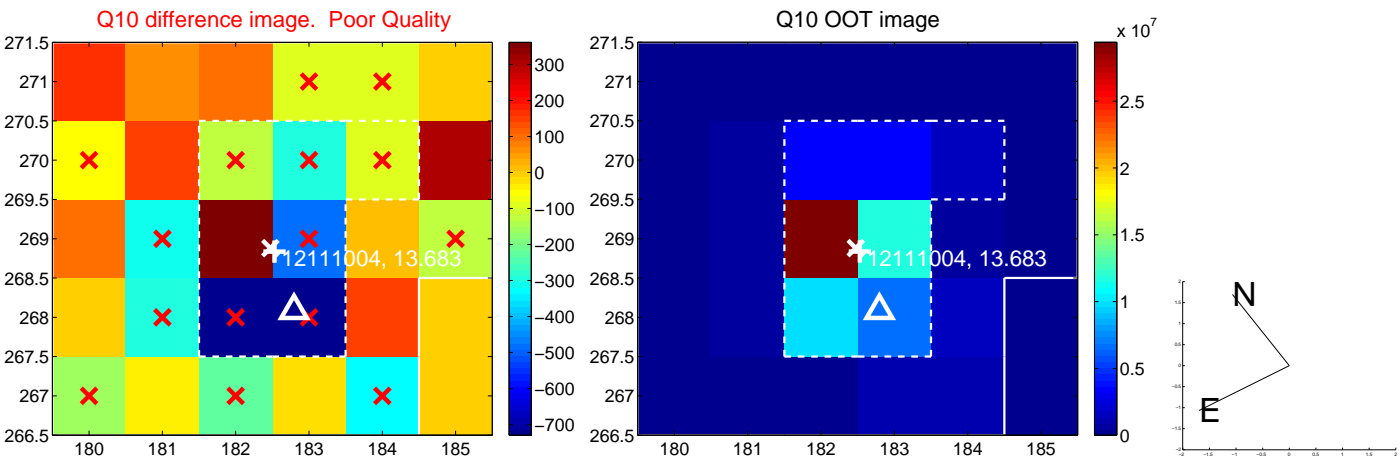
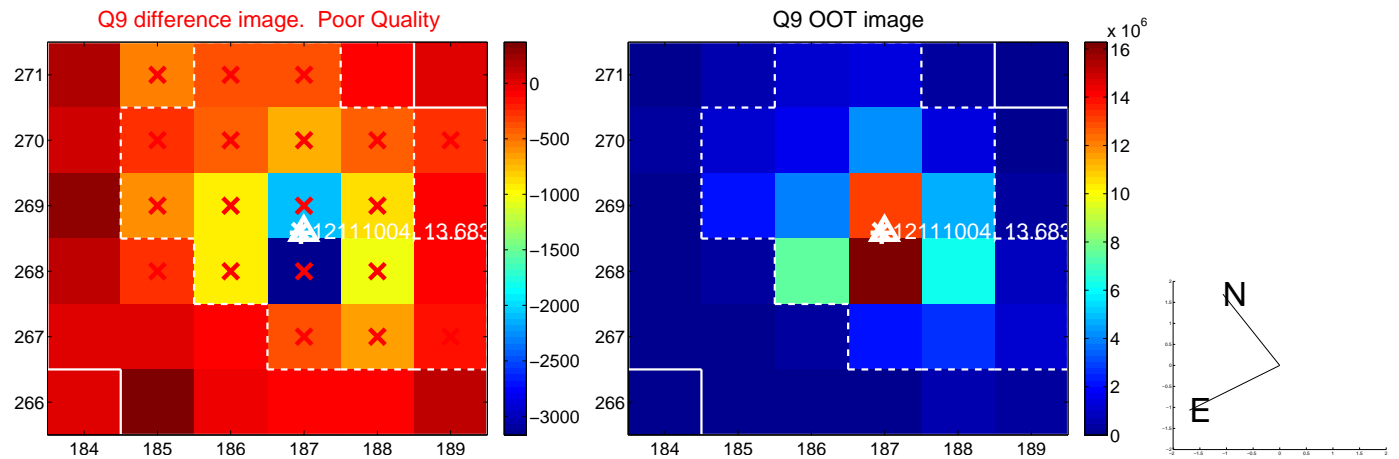


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

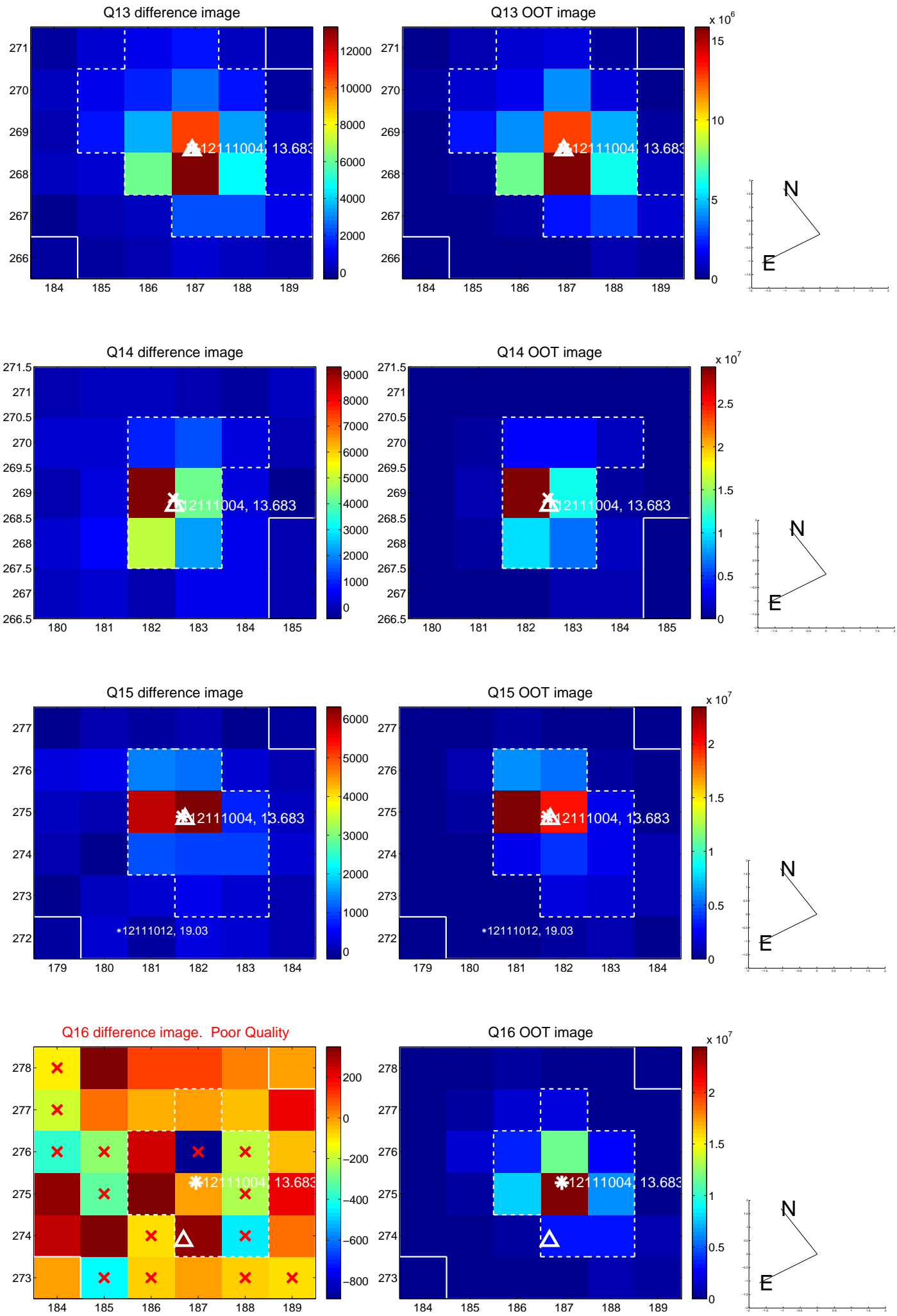




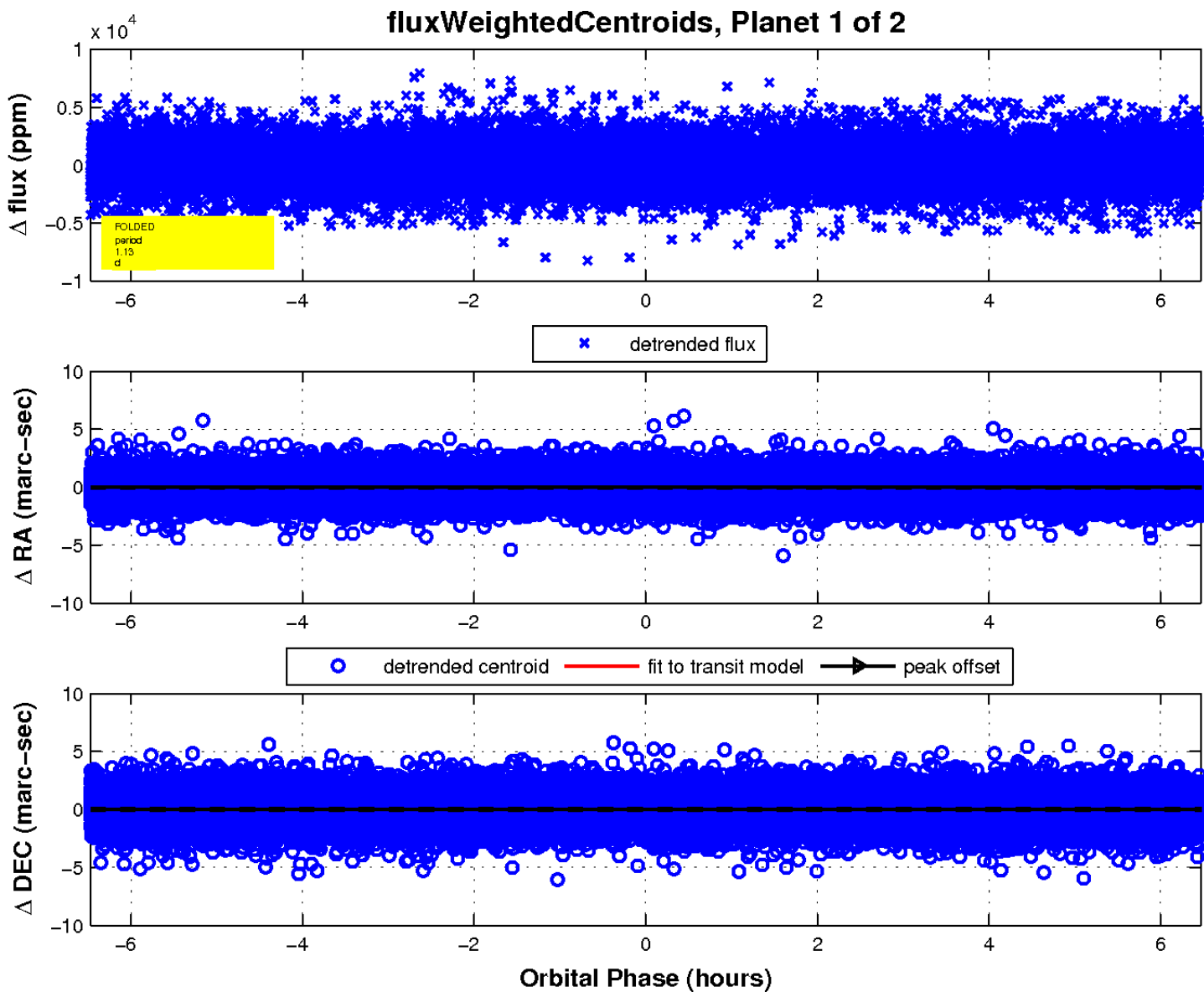
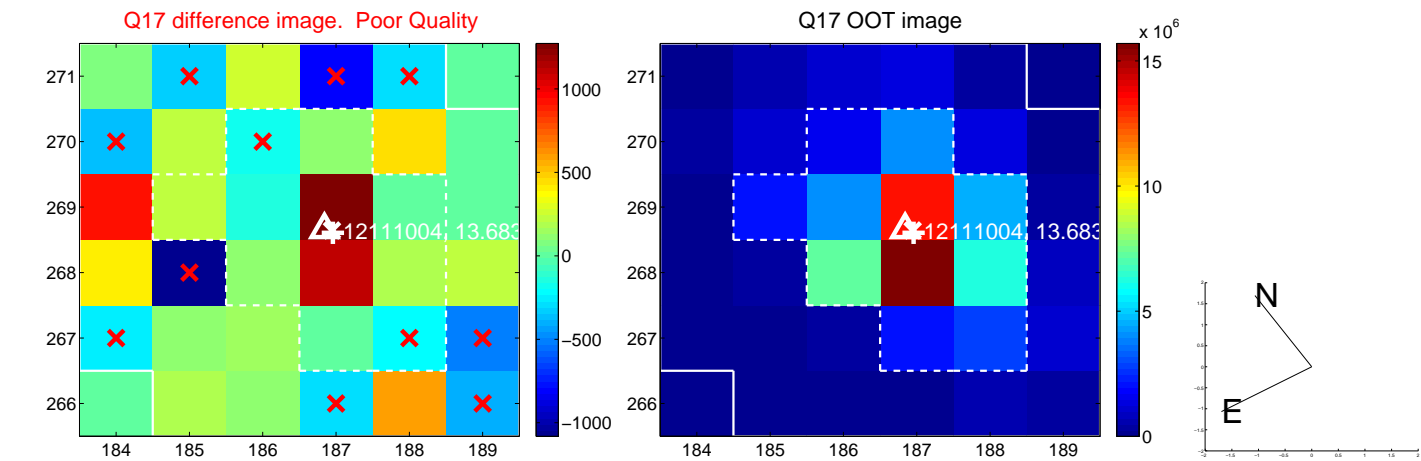
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

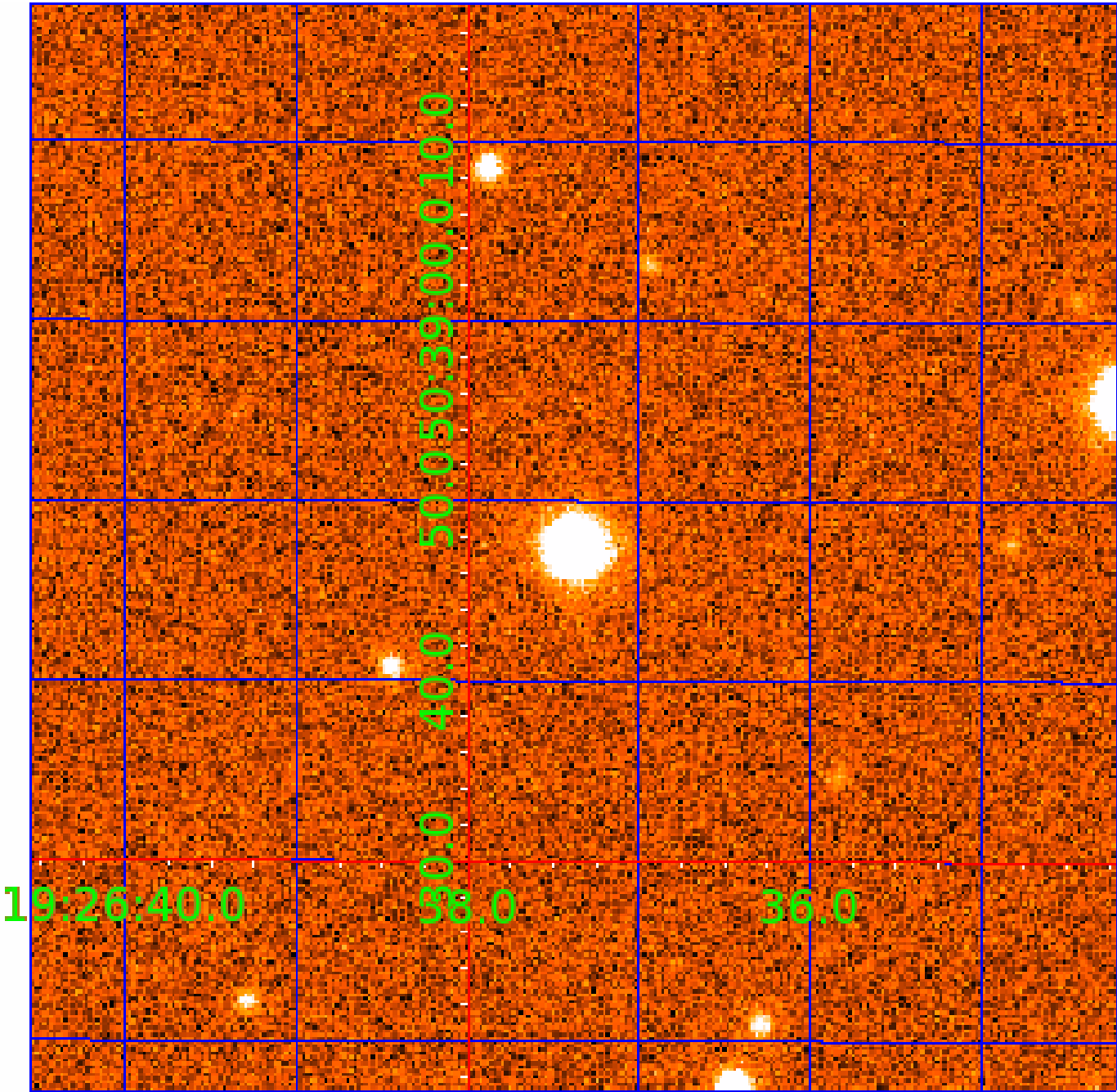


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 012111004

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012111004-01	OBS	No	1.129142	132.019991	96.3	2.158	10.0	8.2	2.69	7680	3.07	32264.46
012111004-02	OBS	No	1.129153	132.485532	93.2	2.533	9.1	7.4	2.69	7680	3.02	32264.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012111004-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
012111004-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—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.

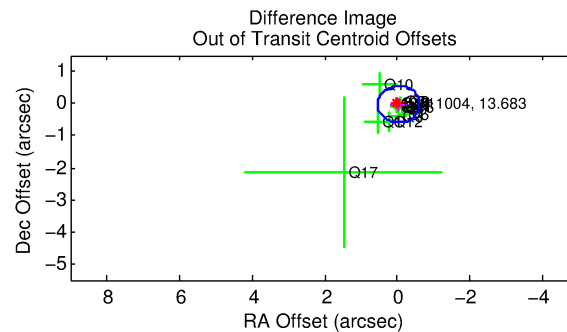
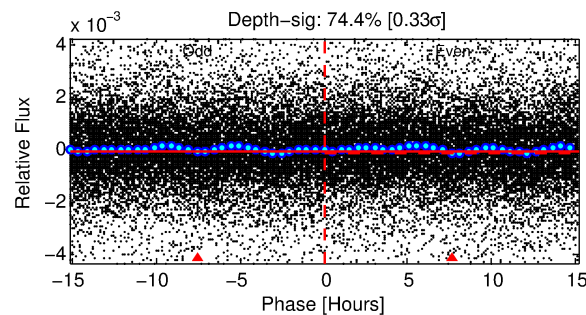
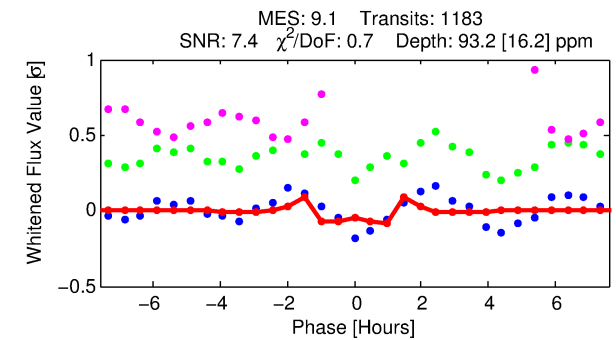
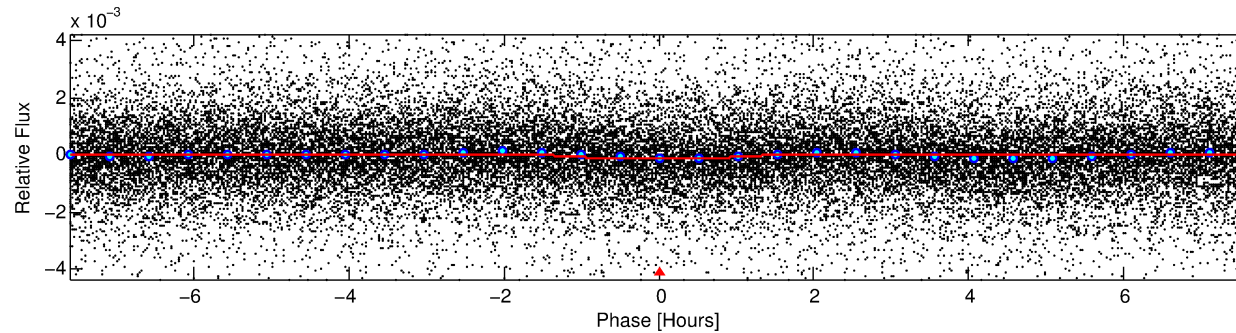
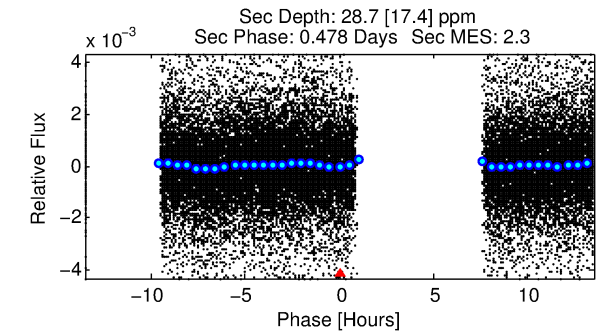
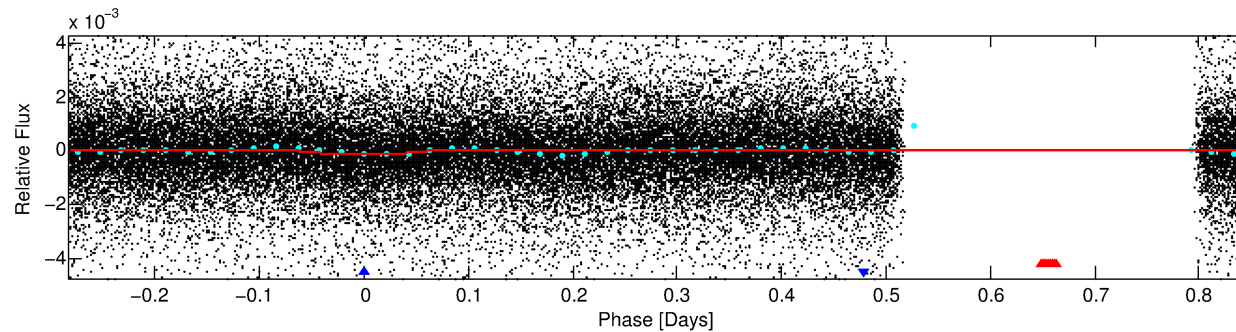
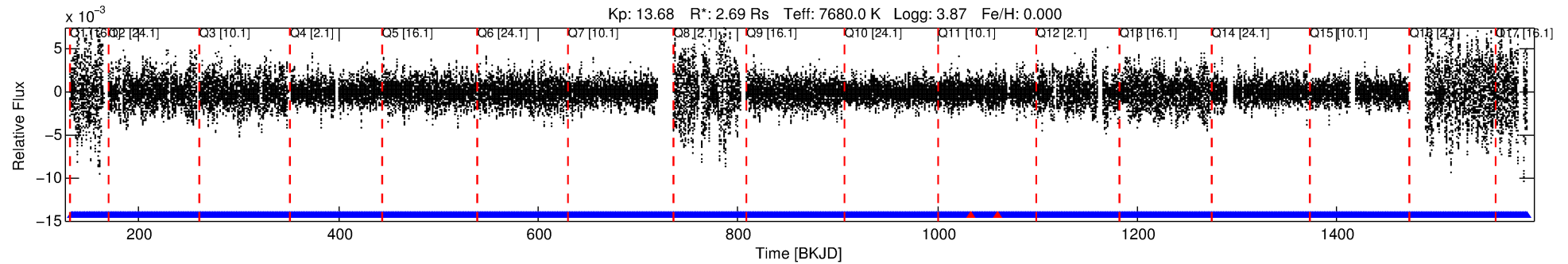
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 012111004-02

No Significant Match Found

# DV One-Page Summary

KIC: 12111004 Candidate: 2 of 2 Period: 1.129 d



## DV Fit Results:

Period = 1.12915 [0.00001] d  
Epoch = 132.4855 [0.0015] BKJD  
Rp/R\* = 0.0103 [0.0022]  
a/R\* = 1.81 [1.54]  
b = 0.90 [0.25]  
Seff = 32264.04 [17765.15]  
Teq = 3417 [470] K  
Rp = 3.02 [1.34] Re  
a = 0.0265 [0.0091] AU  
Ag = 1.21 [1.11] [0.19σ]  
Teffp = 5547 [1066] K [1.83σ]

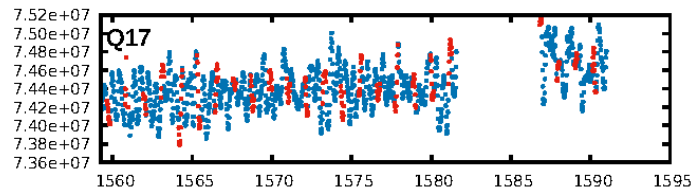
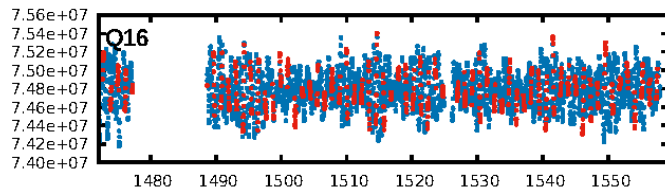
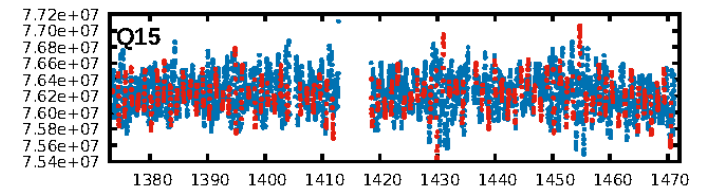
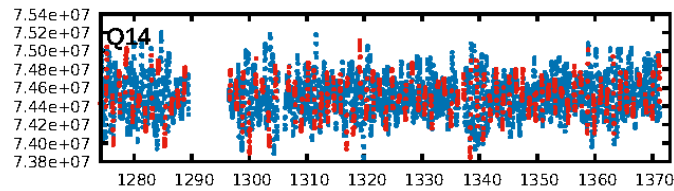
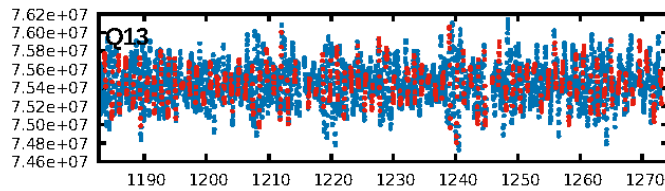
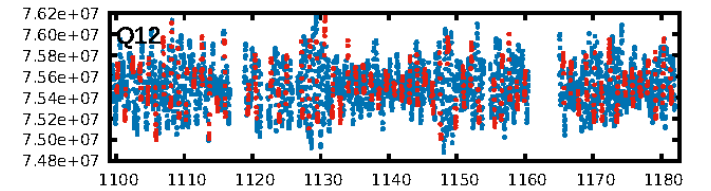
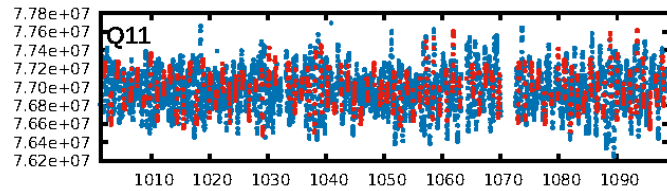
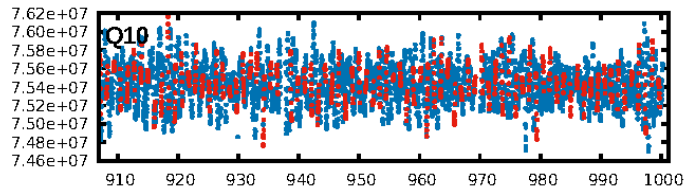
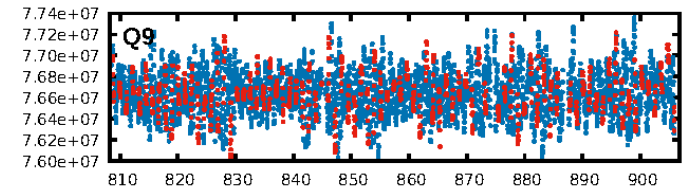
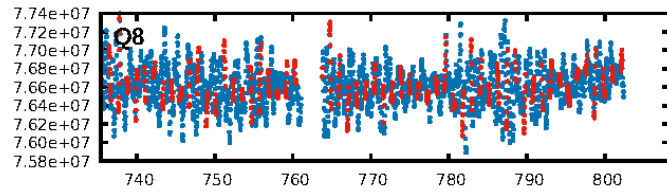
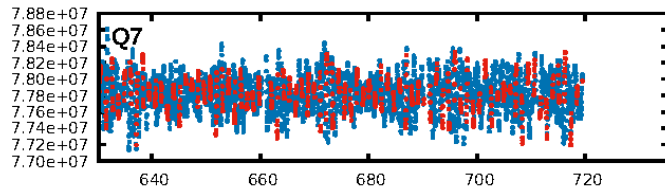
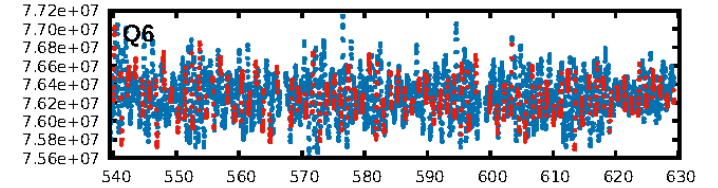
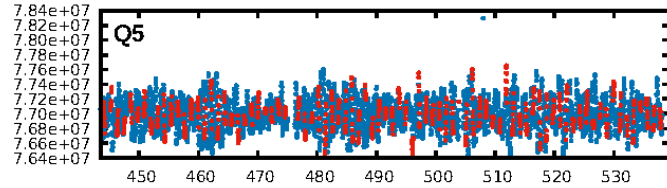
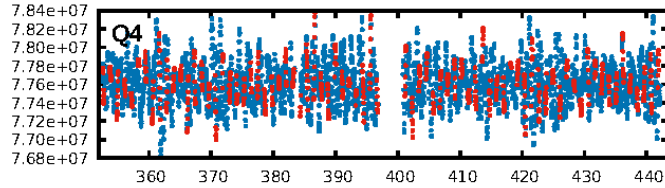
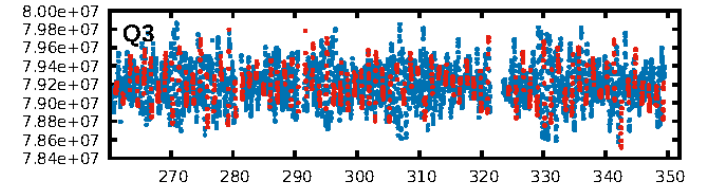
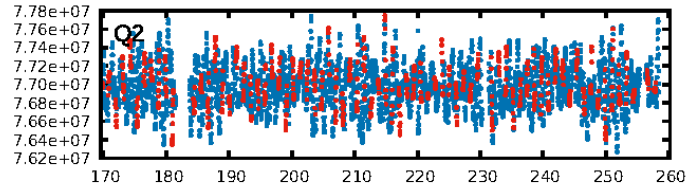
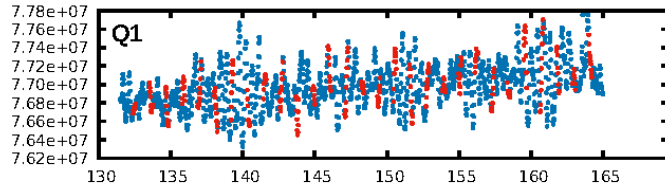
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGoF-sig: N/A  
Bootstrap-pfa: 5.39e-17  
RollingBand-fgt: 1.00 [1128/1130]  
GhostDiagnostic-chr: 0.8252  
Centroid-sig: 37.8%  
Centroid-so: 0.351 arcsec [0.75σ]  
OotOffset-rm: 0.046 arcsec [0.24σ]  
KicOffset-rm: 0.163 arcsec [0.91σ]  
OotOffset-st: 4/4/3/4 [15]  
KicOffset-st: 4/4/3/4 [15]  
DiffImageQuality-fgm: 0.67 [10/15]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 08:18:46 Z

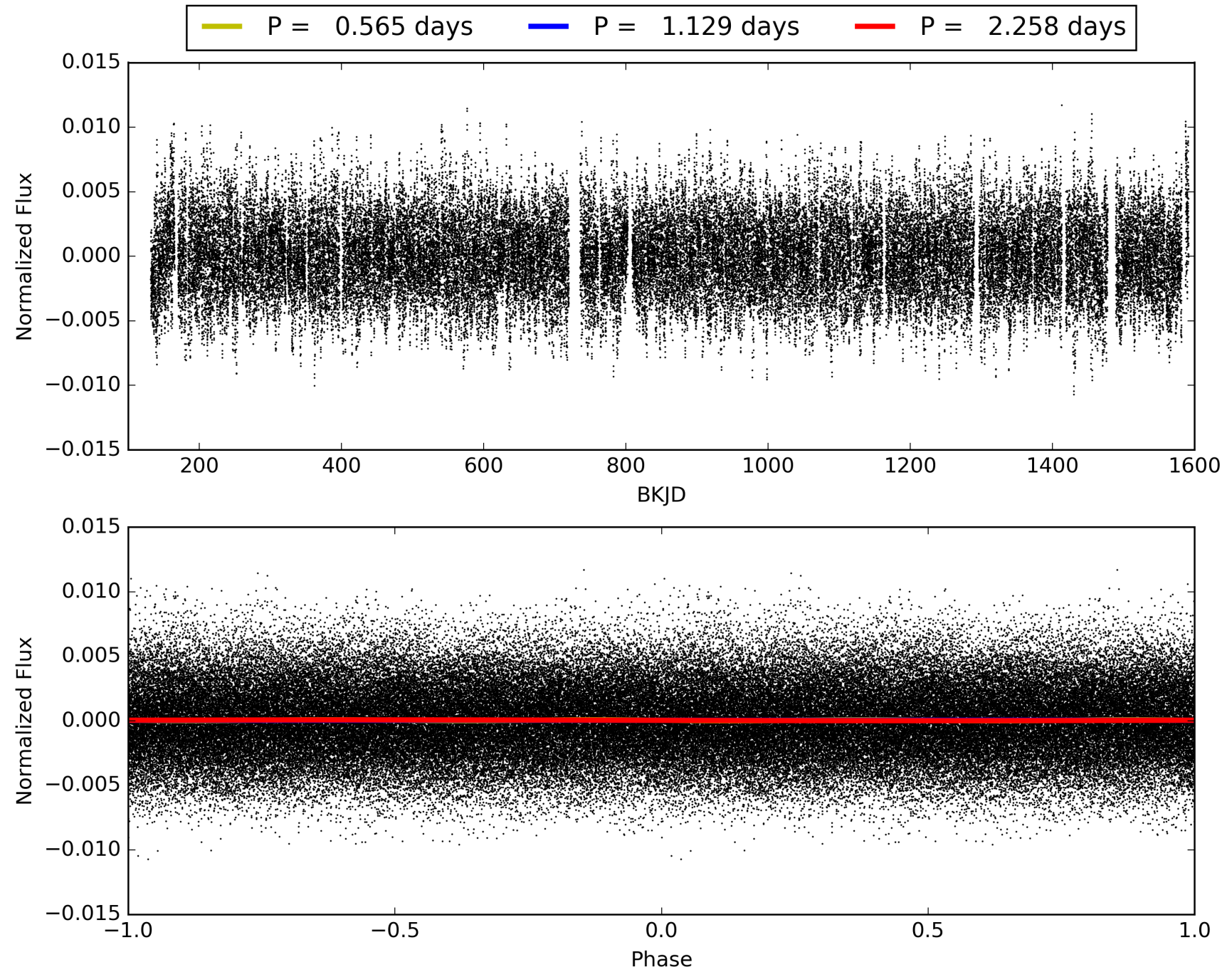
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 012111004-02, PDC Light Curves





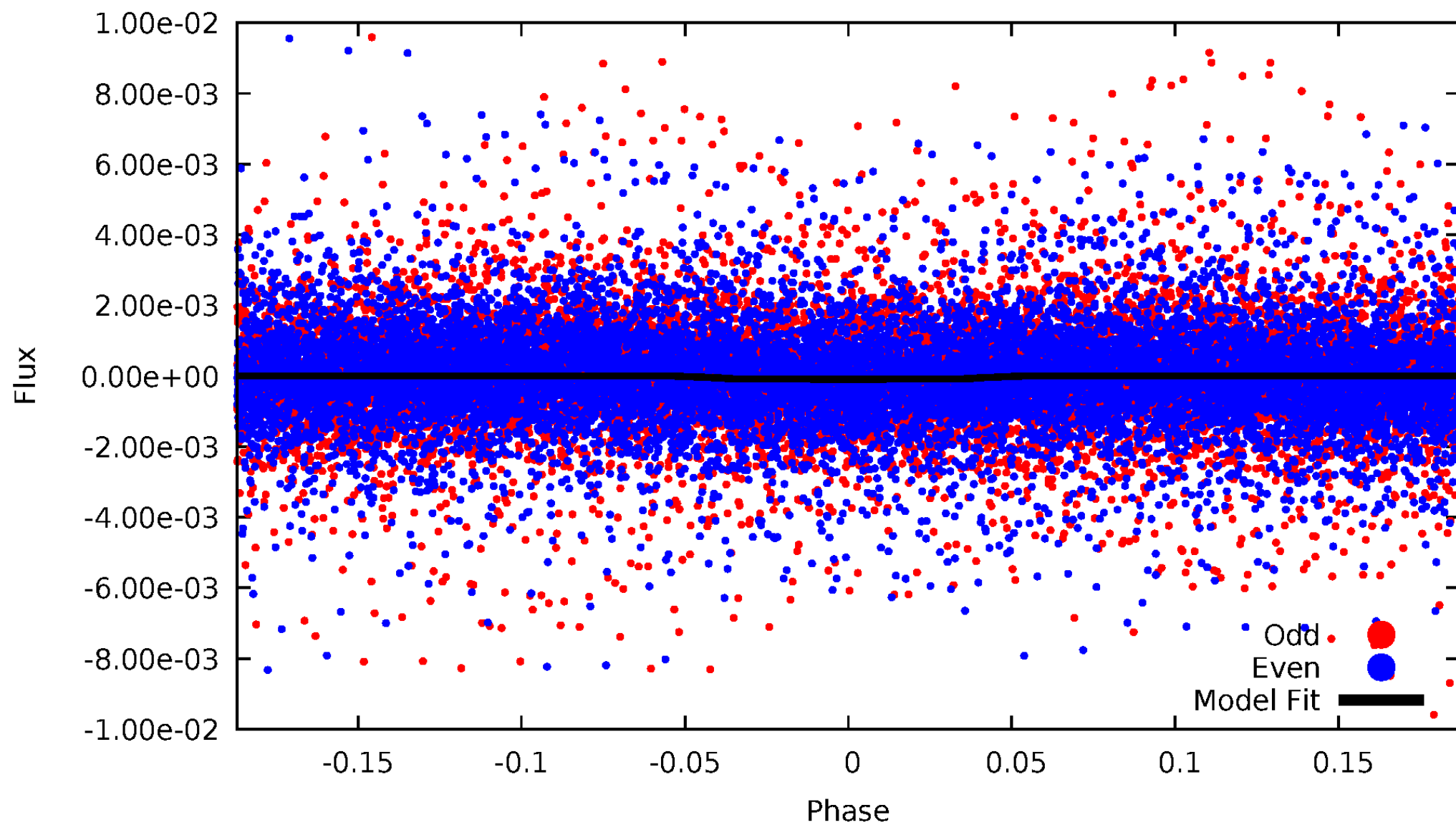
# TCE 012111004-02





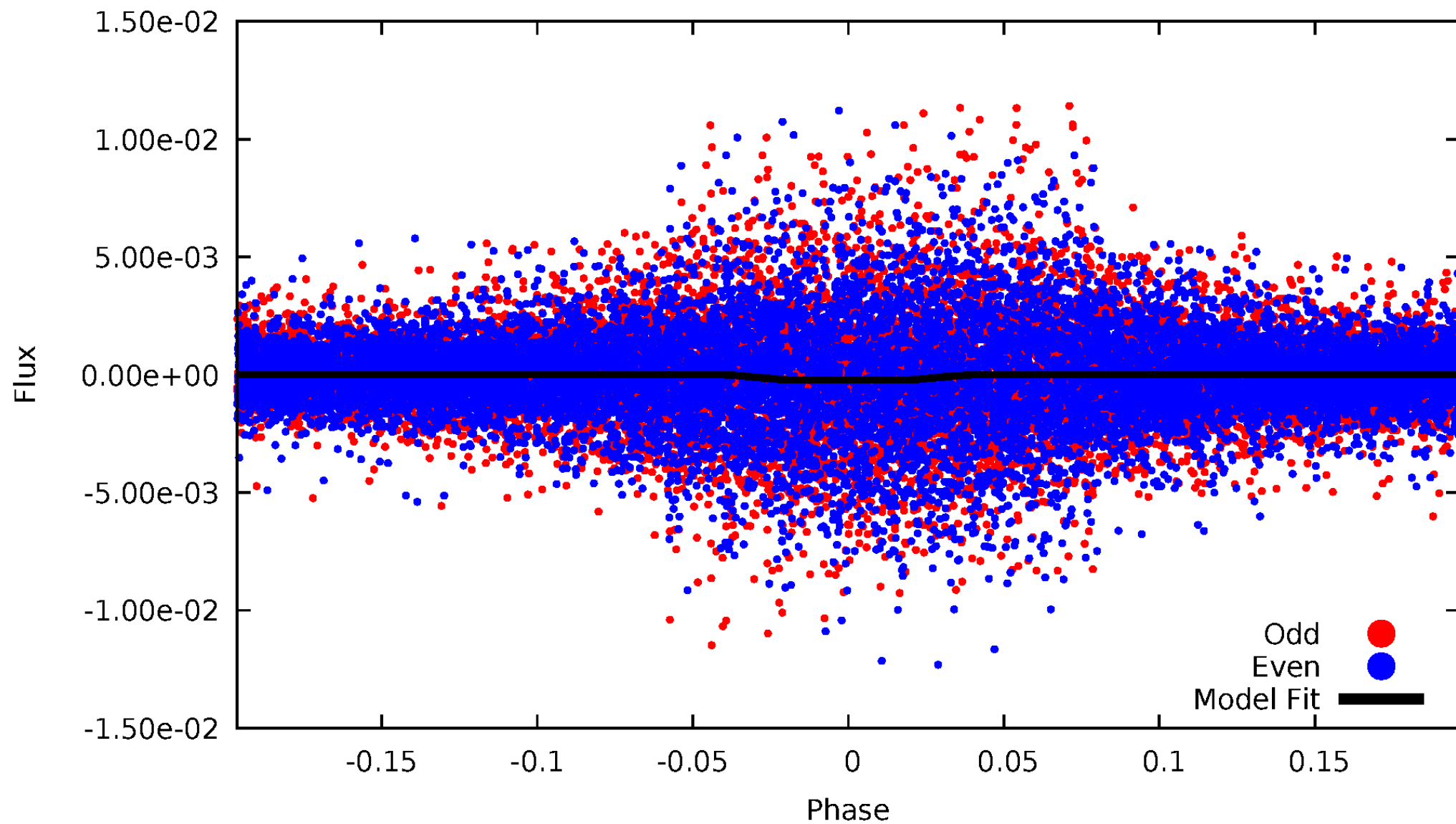
# DV Odd/Even

TCE 012111004-02



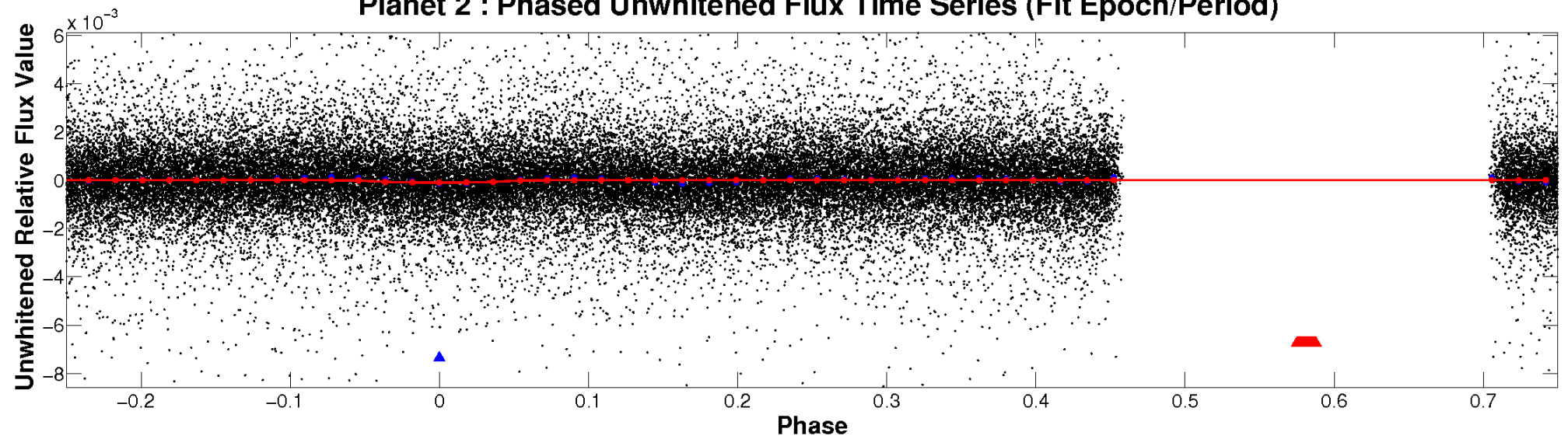
# ALT Odd/Even

TCE 012111004-02

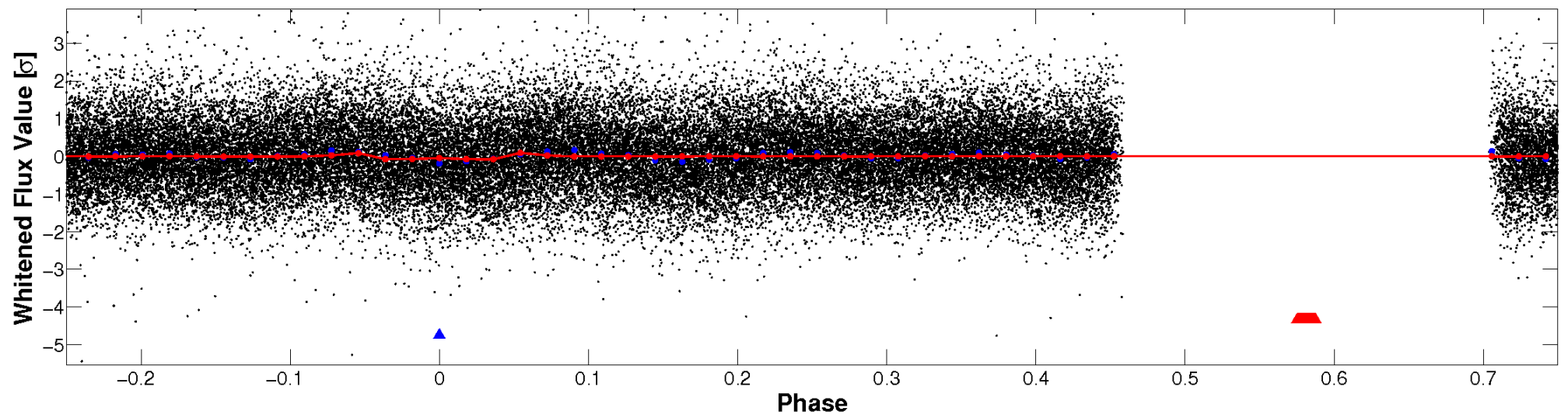


# Non-Whitened Vs. Whitened Light Curve

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

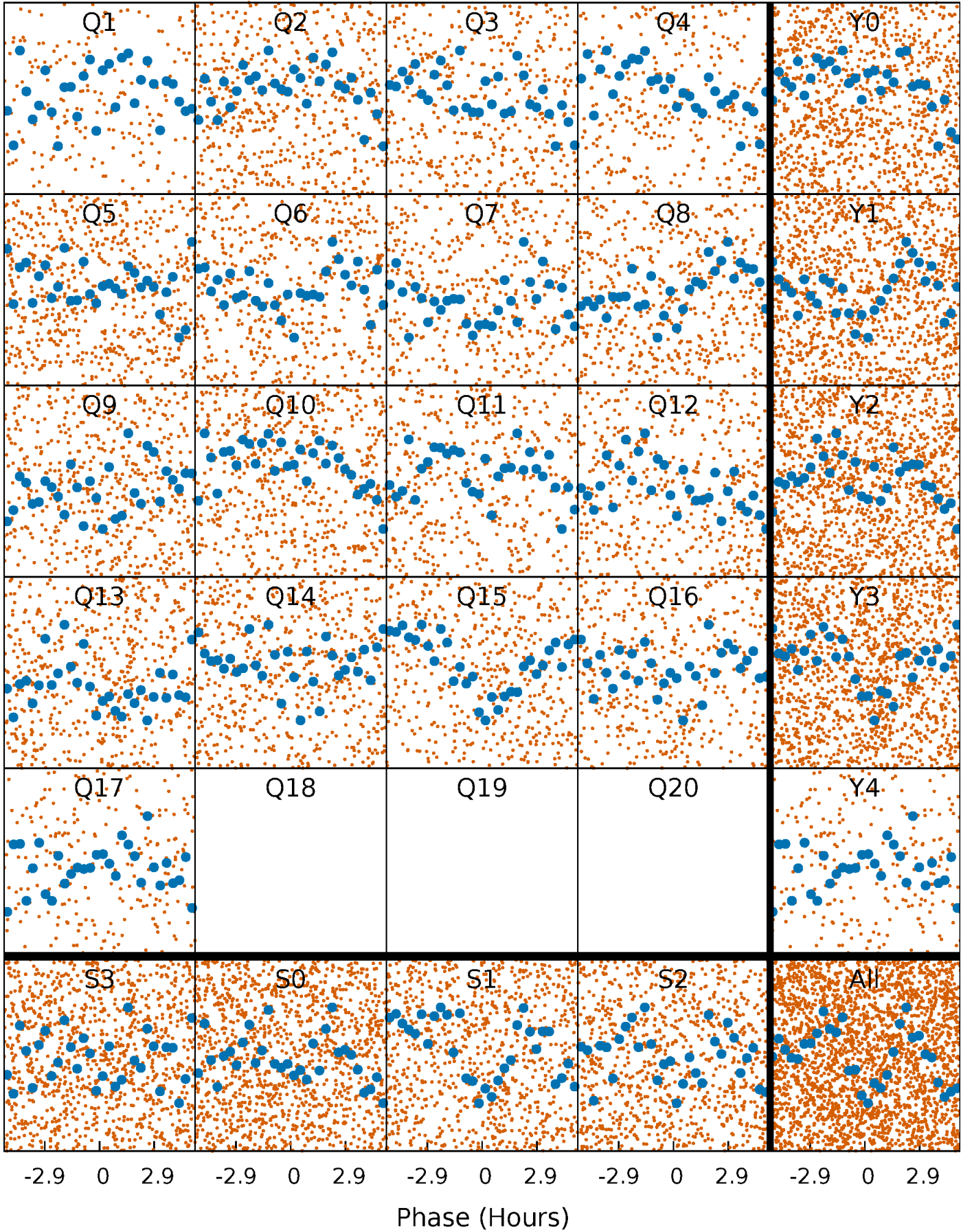


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

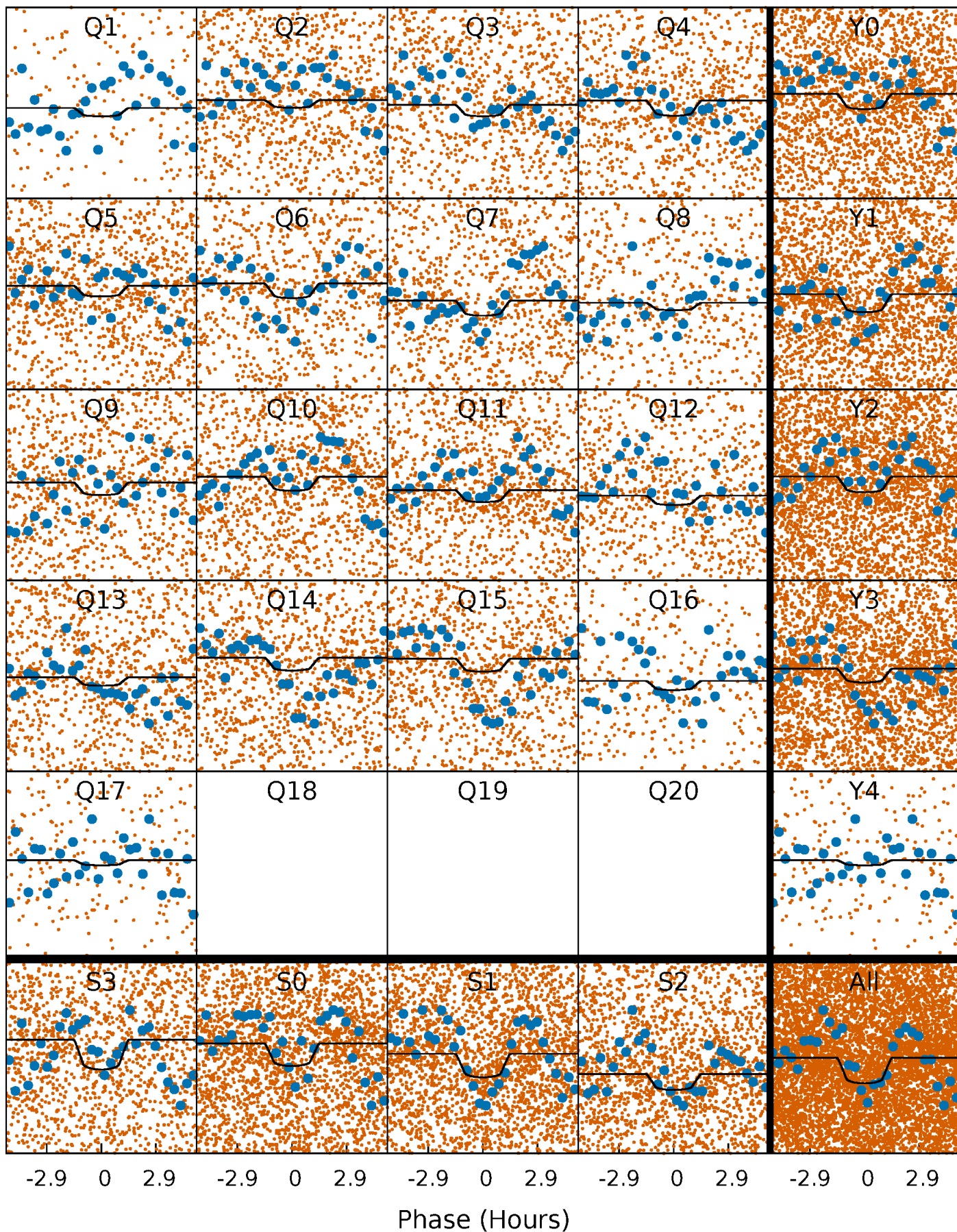
TCE 012111004-02   P= 1.129153 Days    $T_0=132.485532$  (BKJD)





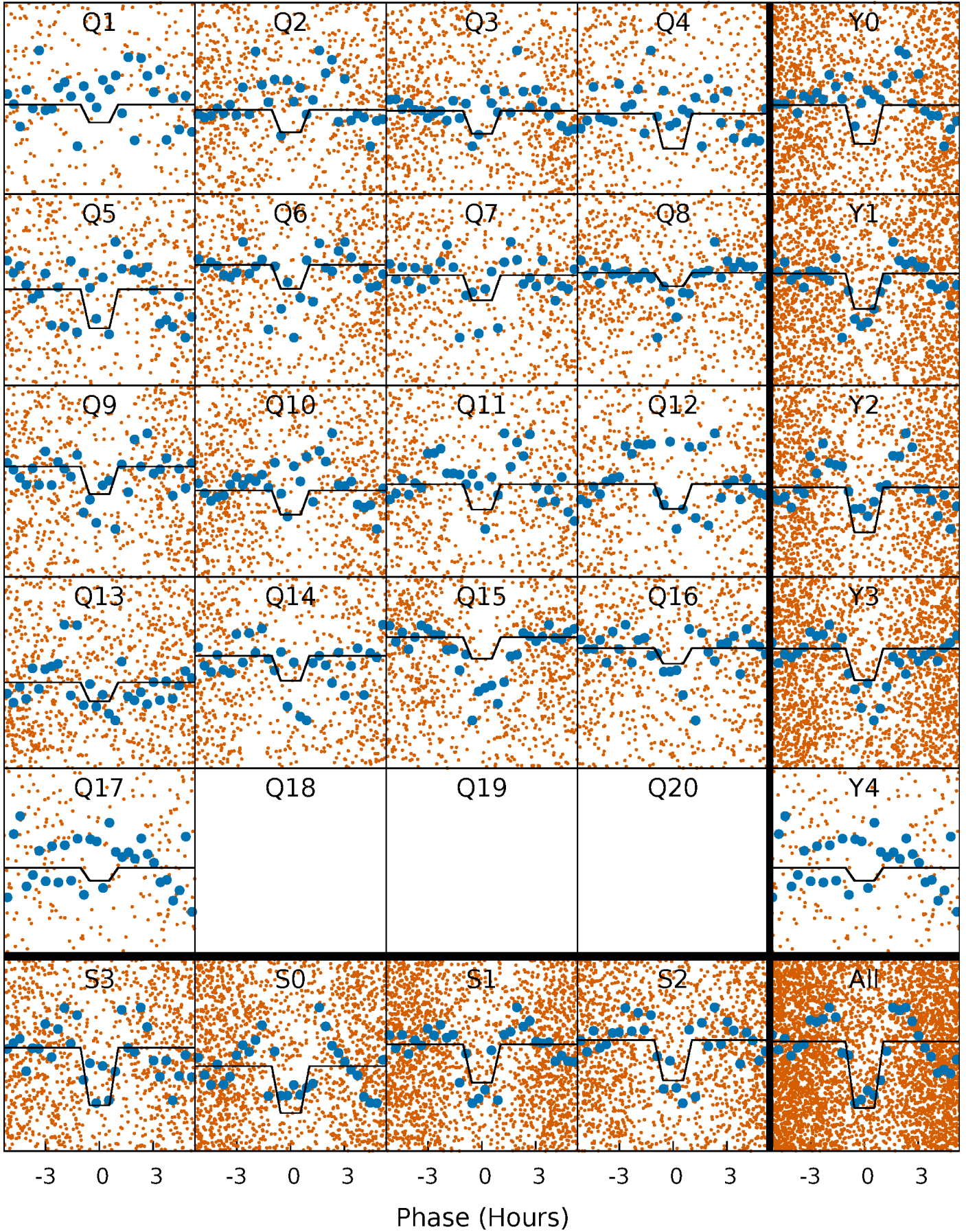
# DV Quarter-Phased Transit Curves

TCE 012111004-02 P= 1.129153 Days  $T_0=132.485532$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 012111004-02     $P = 1.129165$  Days     $T_0 = 132.480399$  (BKJD)

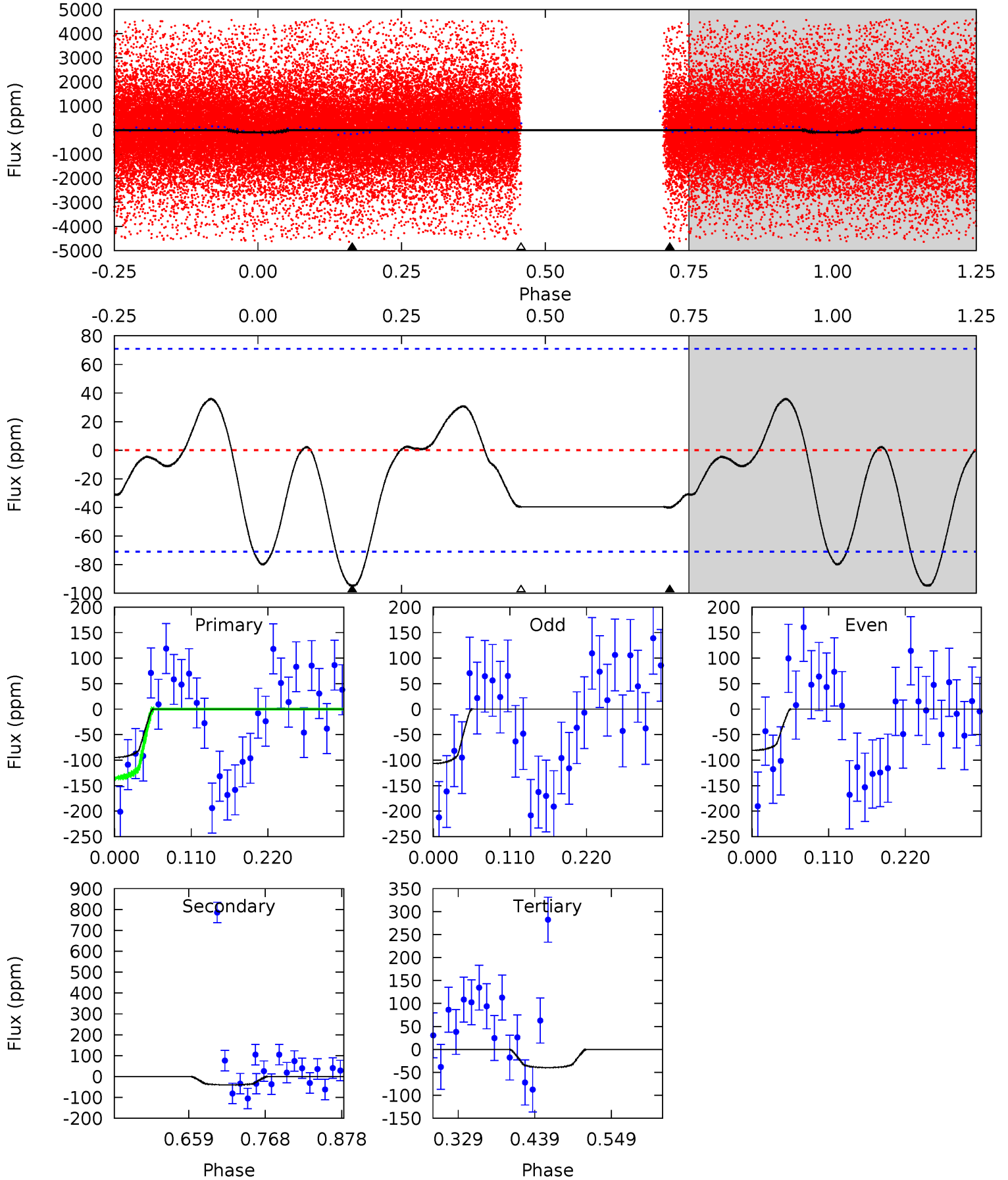




# DV Model-Shift Uniqueness Test

012111004-02, P = 1.129153 Days, E = 131.356379 Days

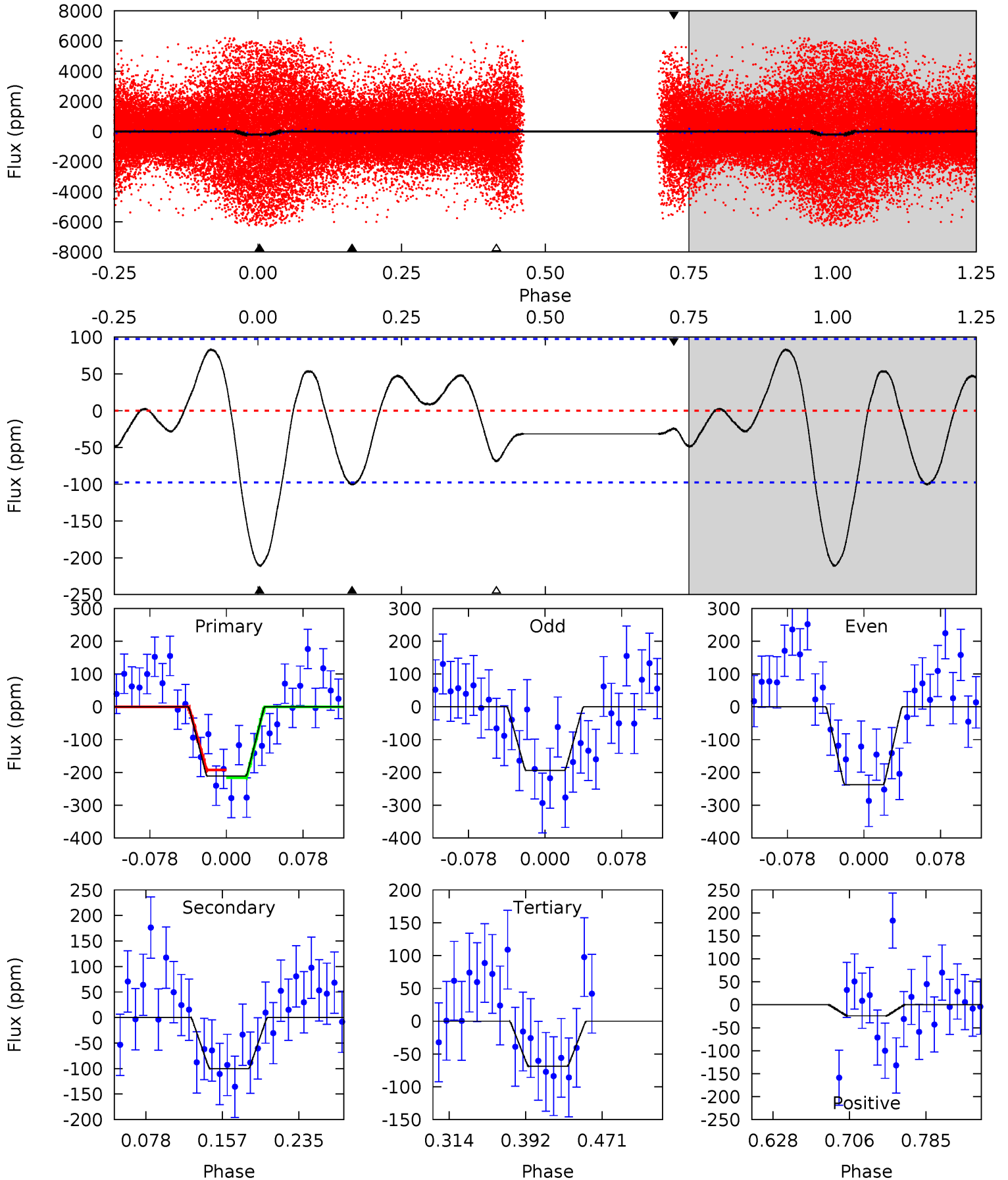
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.06	2.57	2.54	0	4.55	1.60	2.11	3.52	6.06	0.04	2.57	0.83	0.83	0.27	2.83



# Alt Model-Shift Uniqueness Test

012111004-02, P = 1.129165 Days, E = 131.351234 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
9.99	4.74	3.26	-1.14	4.62	1.76	1.75	6.74	11.1	1.48	5.88	1.02	1.26	0.28	0.61



### Stellar Parameters For KIC 012111004

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7680^{+214}_{-349}$	$3.865^{+0.294}_{-0.105}$	$0.000^{+0.200}_{-0.350}$	$2.692^{+0.446}_{-1.041}$	$1.939^{+0.082}_{-0.467}$	$0.140^{+0.322}_{-0.047}$
	+3%/-5%	+8%/-3%	+inf%/-inf%	+17%/-39%	+4%/-24%	+230%/-33%
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 012111004-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-40 \pm 16$	$2.80^{+0.80}_{-0.79}$	$4659^{+324}_{-445}$	$5632^{+1024}_{-999}$	$1.908^{+1.898}_{-1.016}$
Alt.	$-100 \pm 21$	$4.06^{+0.86}_{-0.92}$	$4670^{+321}_{-438}$	$5958^{+746}_{-586}$	$2.311^{+1.403}_{-0.797}$

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

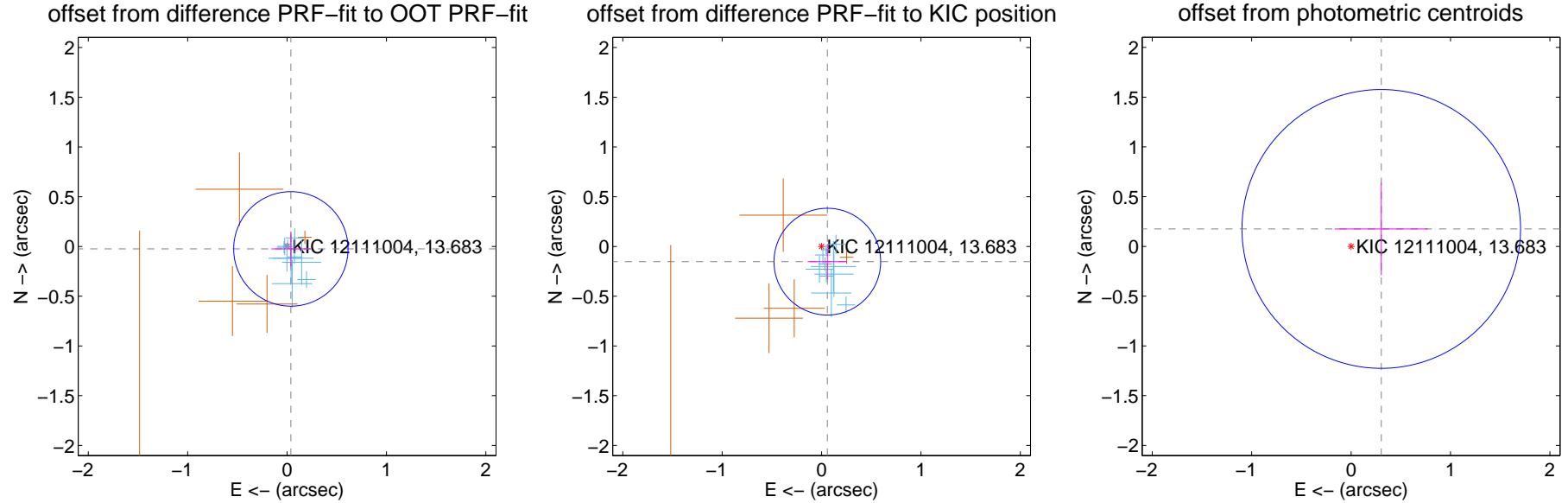
## DV Centroid Data

Supplemental centroid analysis for 012111004-02. Kepler magnitude: 13.68. Transit SNR 7.44

There are 10 quarters with good PRF difference image offsets

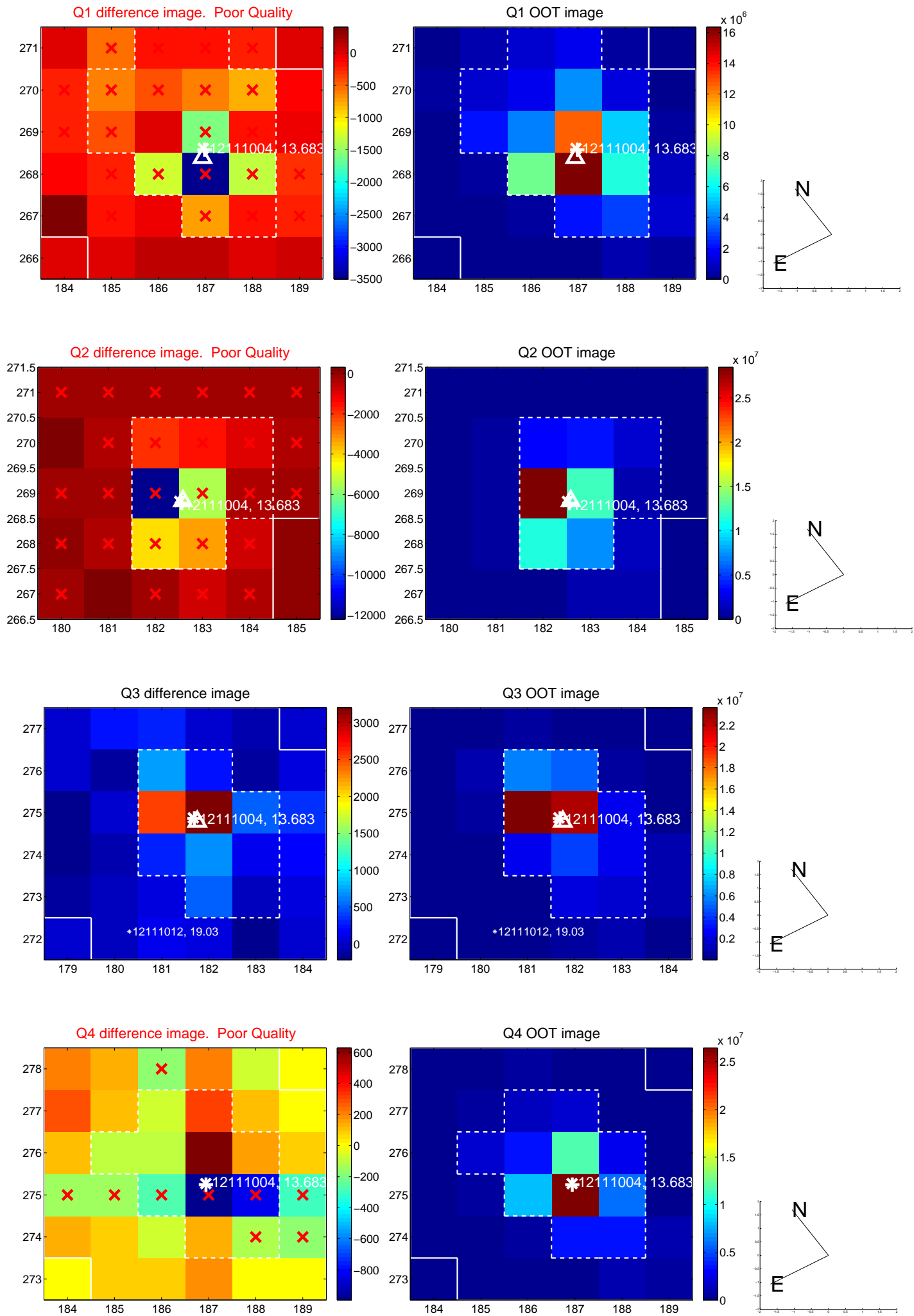
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.046 \pm 0.192$	0.24	$-0.038 \pm 0.198$	$-0.025 \pm 0.176$
PRF-fit source offset from KIC position	$0.163 \pm 0.179$	0.91	$-0.058 \pm 0.198$	$-0.153 \pm 0.176$
photometric centroid source offset	$0.35 \pm 0.47$	0.75	$-0.30 \pm 0.47$	$0.18 \pm 0.46$

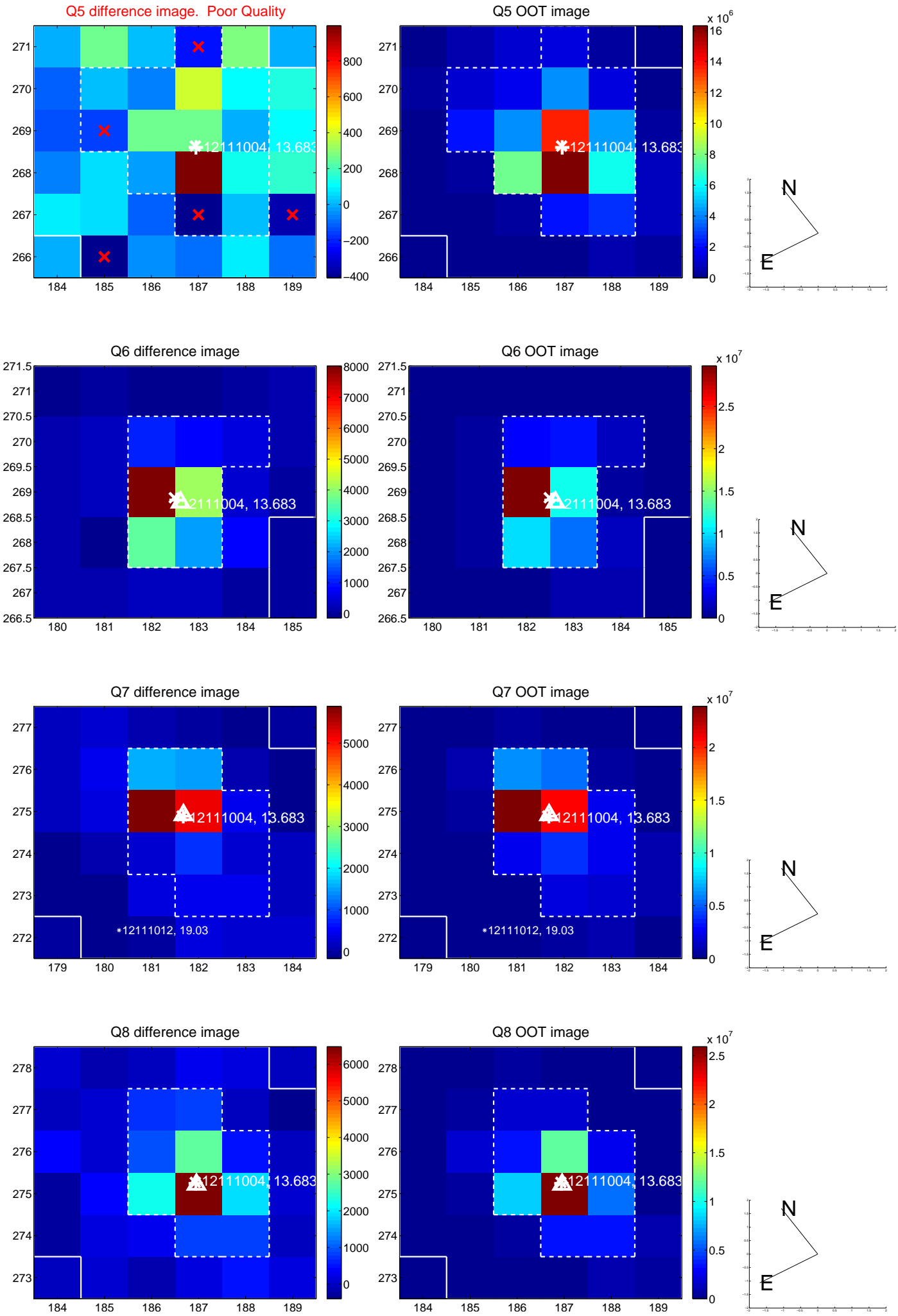


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

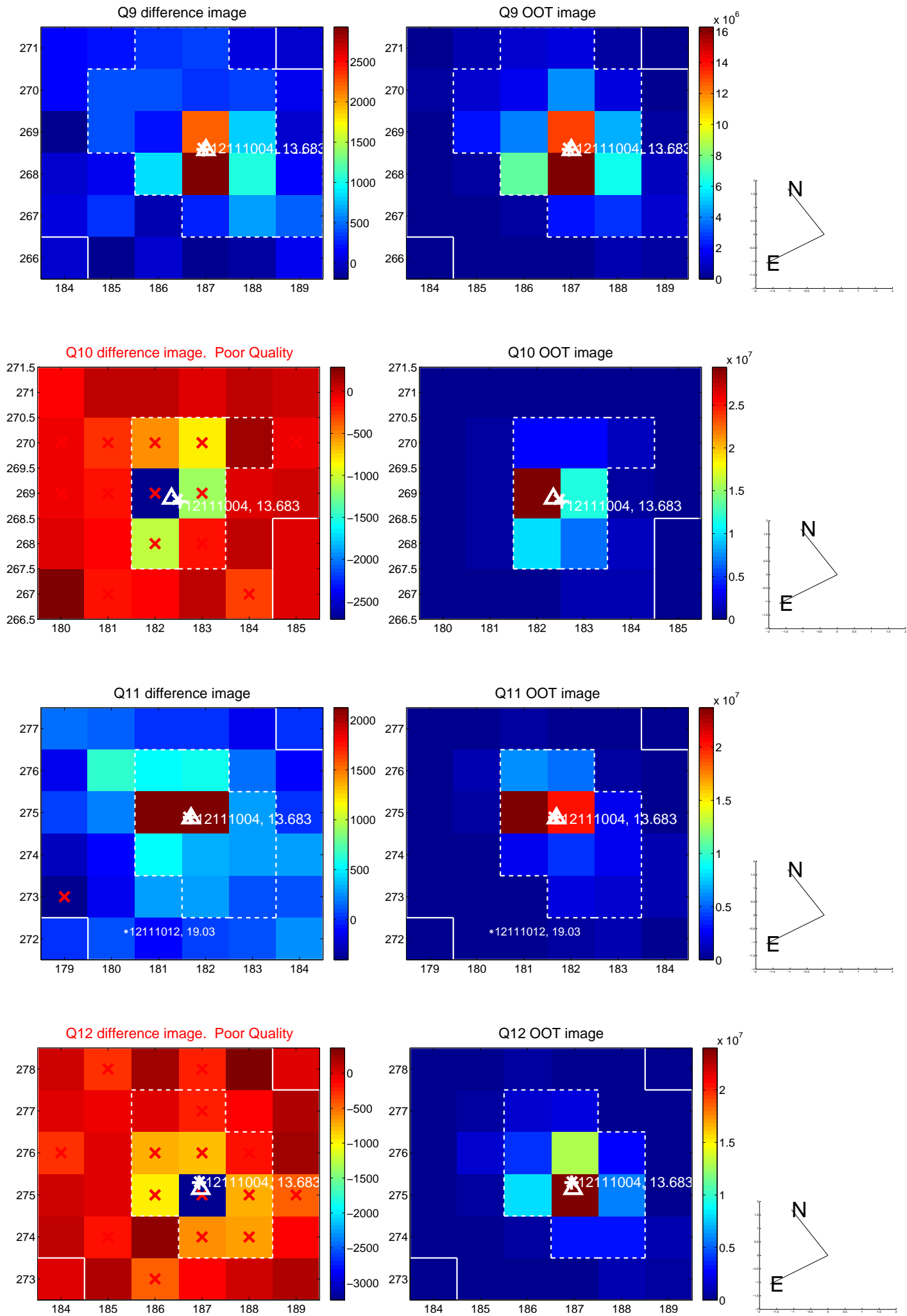


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

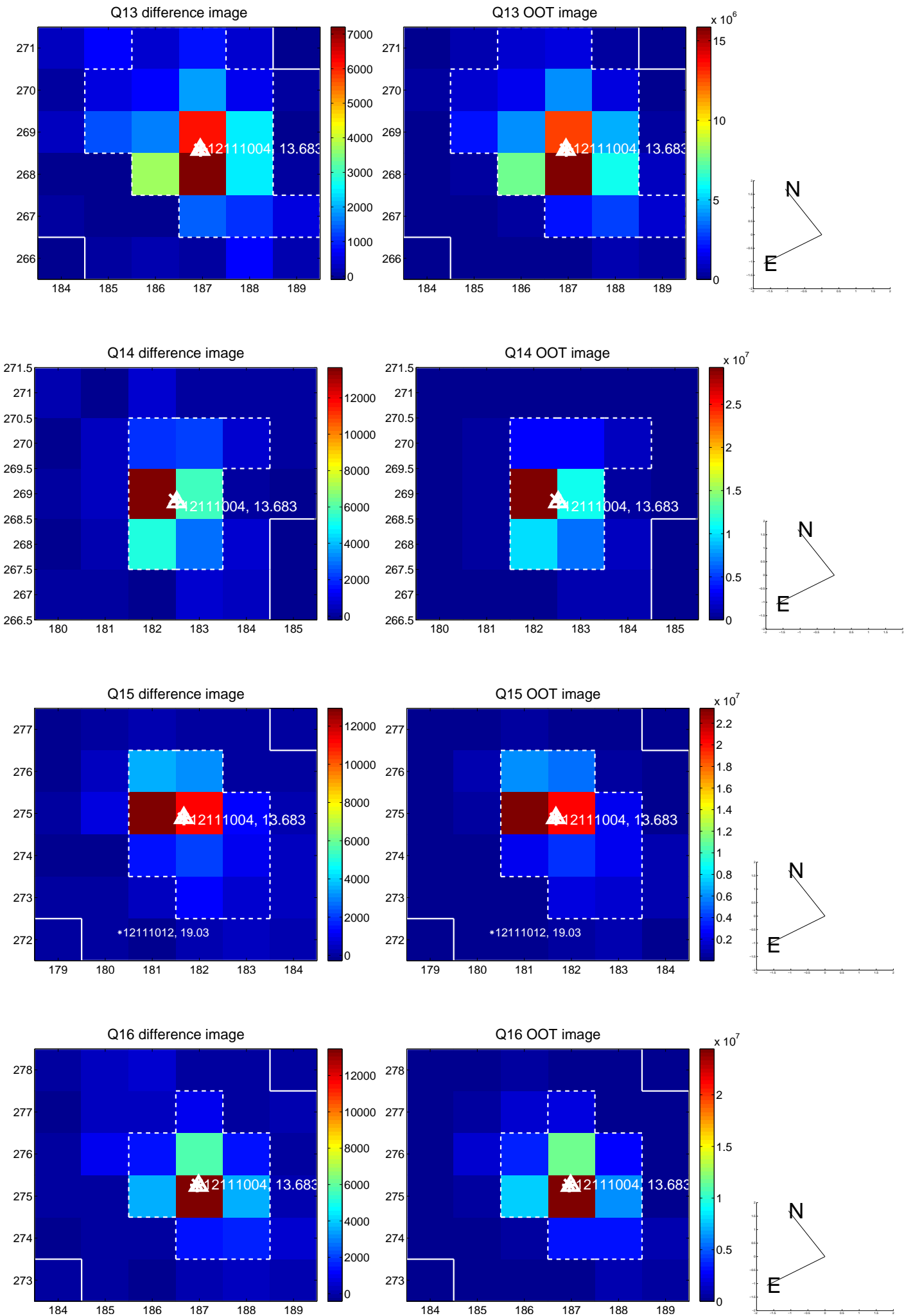




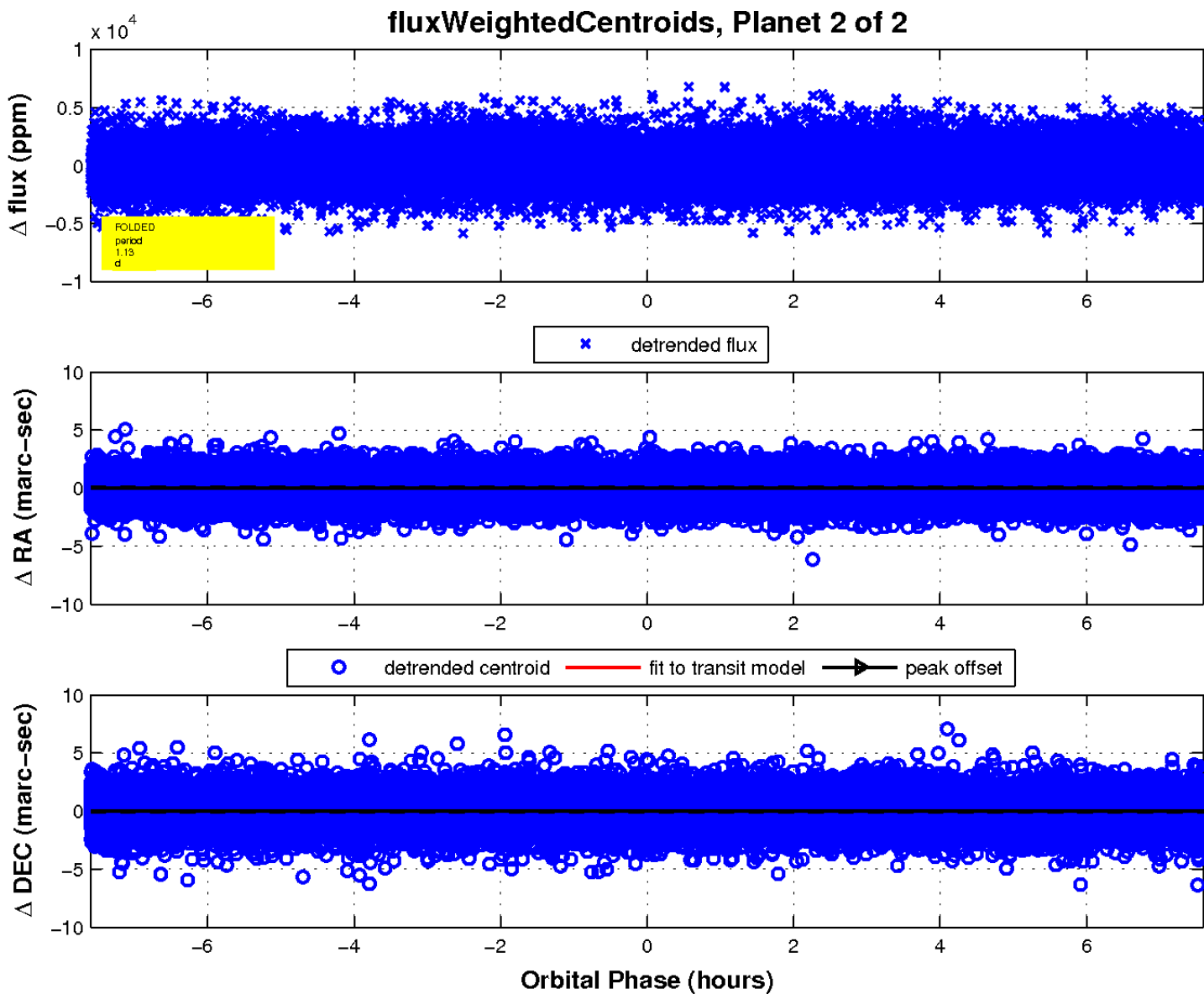
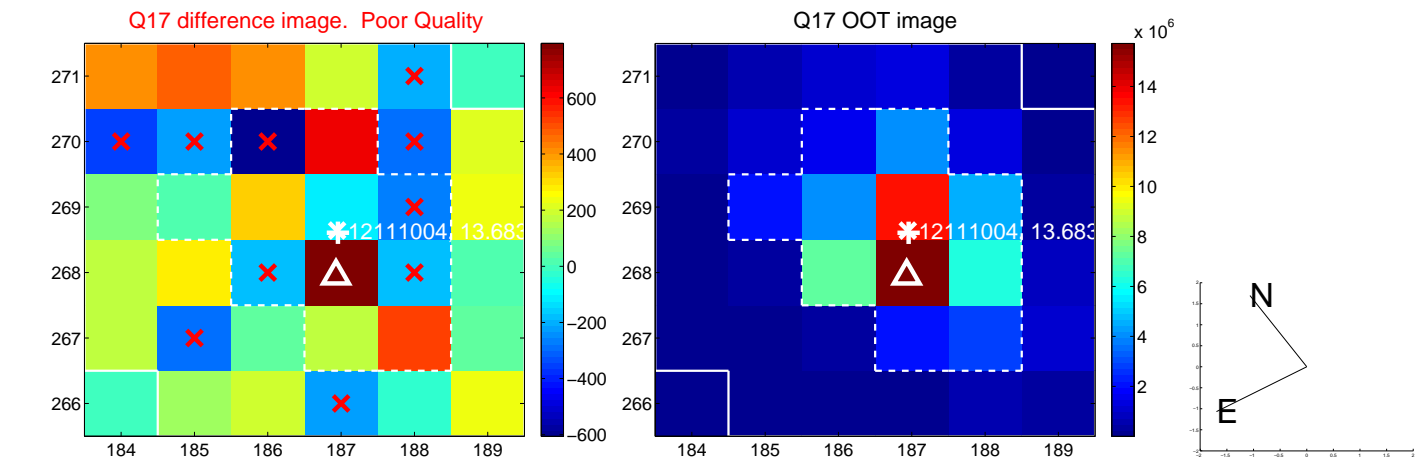
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



UKIRT Image

Declination

