

# KIC 004390744

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004390744-01	OBS	No	0.724041	131.948196	135.6	4.413	9.1	5.8	0.63	4728	0.93	982.55
004390744-02	OBS	No	54.895182	146.874453	3420.8	1.804	7.4	7.1	0.63	4728	3.91	3.06

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004390744-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390744-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

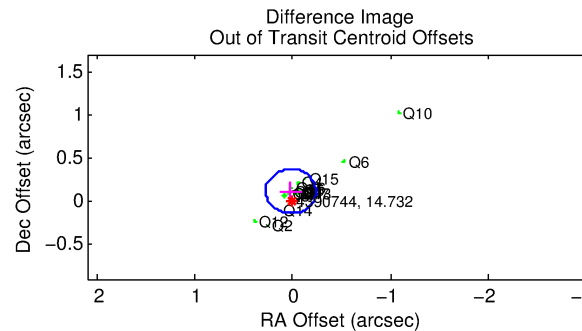
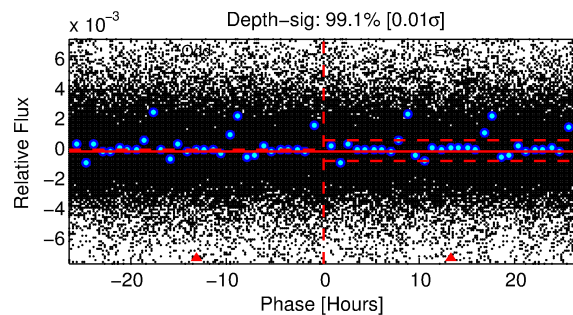
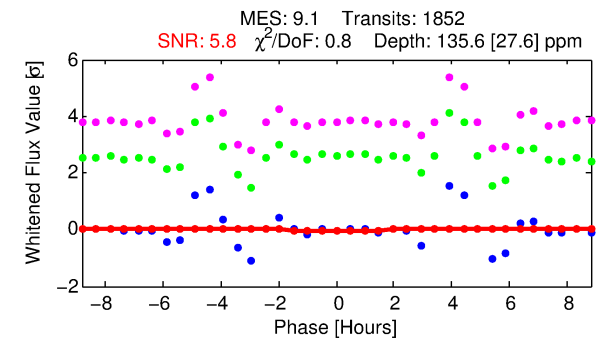
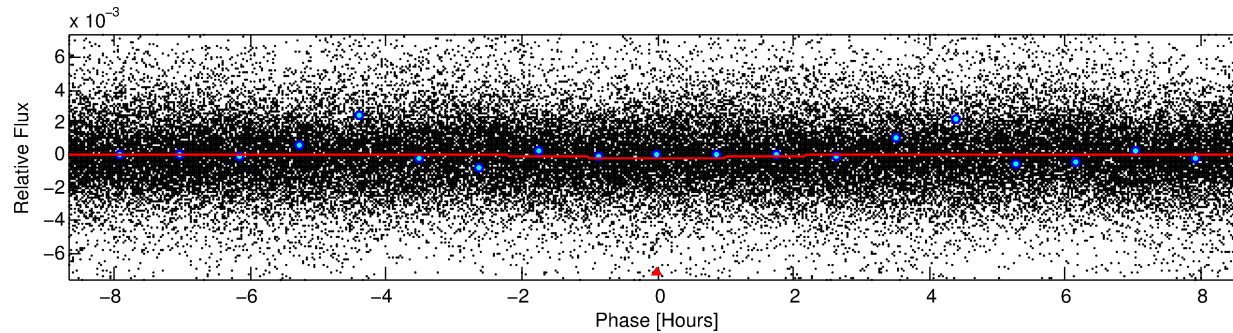
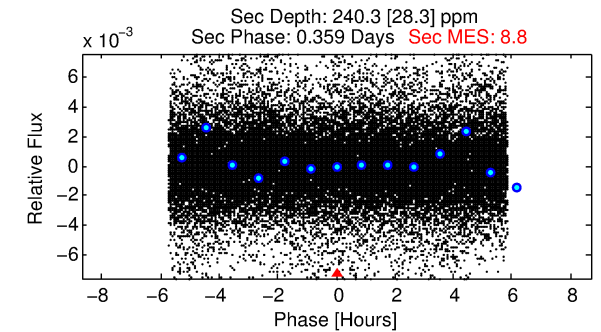
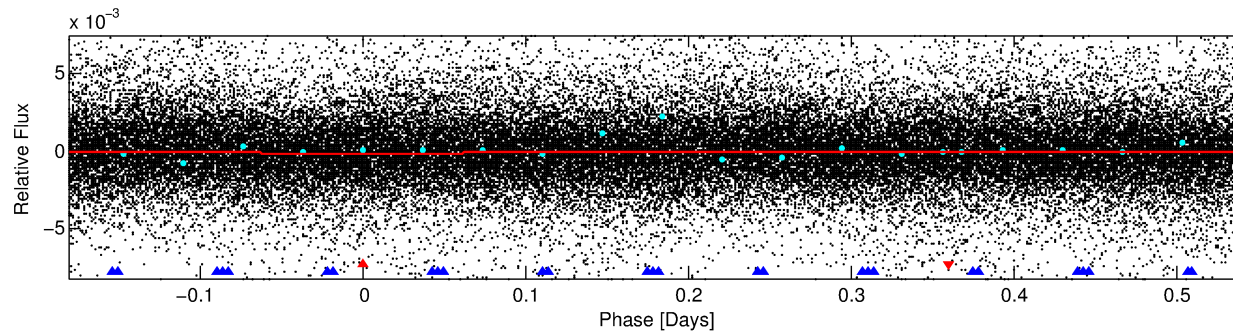
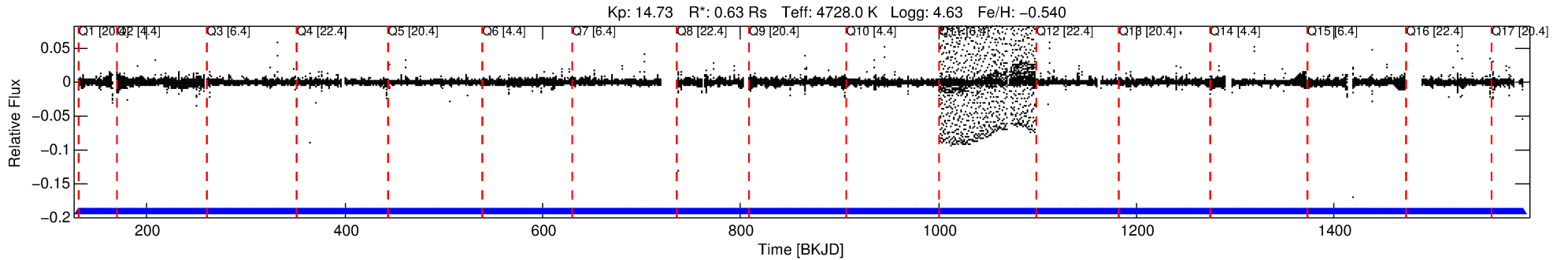
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004390744-01

No Significant Match Found

# DV One-Page Summary

KIC: 4390744 Candidate: 1 of 2 Period: 0.724 d



## DV Fit Results:

Period = 0.72404 [0.00002] d  
Epoch = 131.9482 [0.0040] BKJD  
Rp/R\* = 0.0135 [0.0027]  
a/R\* = 1.09 [0.12]  
b = 0.93 [0.11]  
Seff = 982.55 [168.10]  
Teq = 1428 [61] K  
Rp = 0.93 [0.20] Re  
a = 0.0134 [0.0010] AU  
Ag = 27.68 [12.00] [2.22σ]  
**Teffp = 5063 [557] K [6.49σ]**

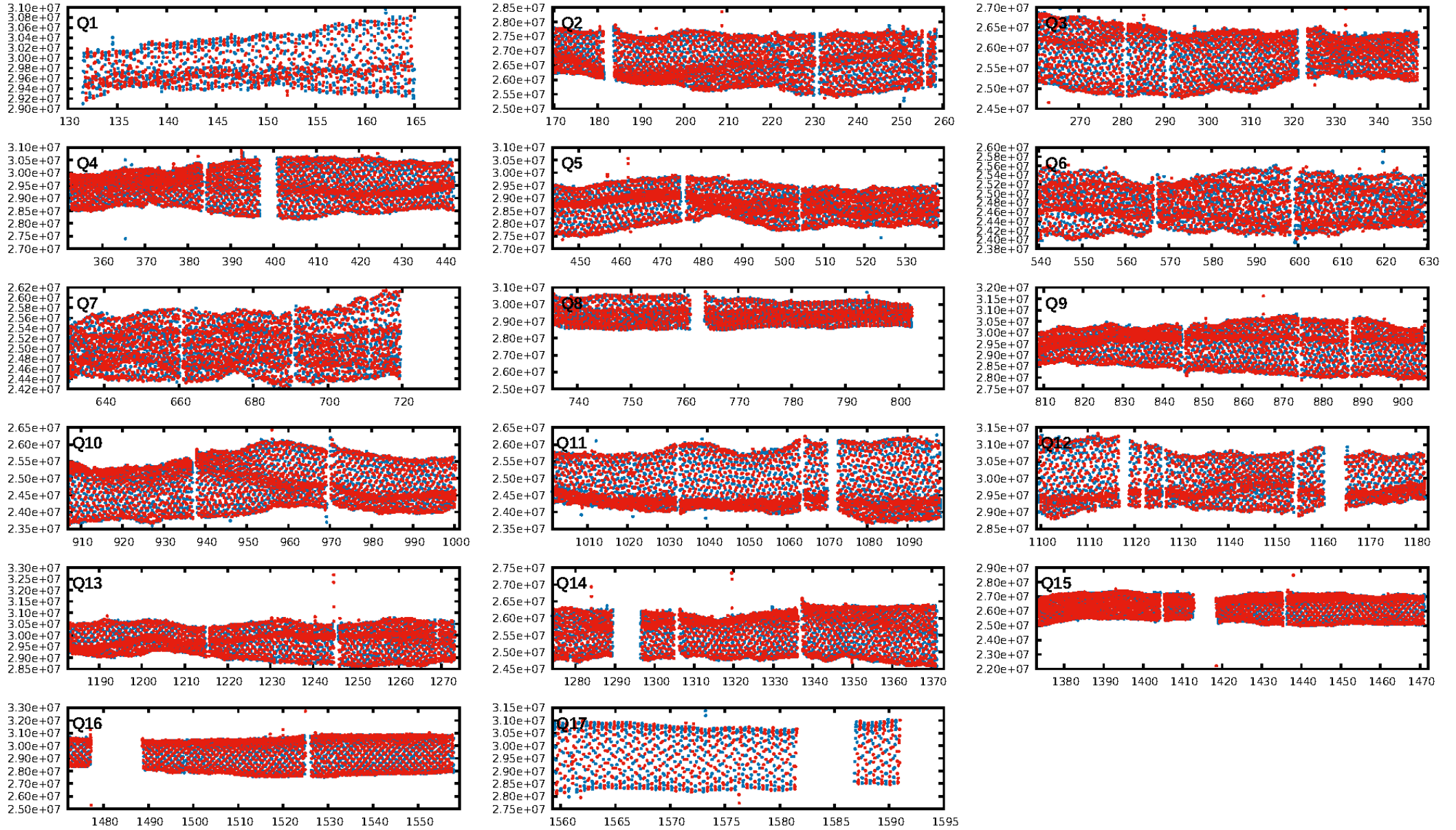
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [272.72σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 5.86e-16  
RollingBand-fgt: 1.00 [1769/1769]  
**GhostDiagnostic-chr: 1.06**  
Centroid-sig: 1.7%  
**Centroid-so: 1.175 arcsec [3.43σ]**  
OotOffset-rm: 0.117 arcsec [1.37σ]  
KicOffset-rm: 0.055 arcsec [0.64σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.41 [7/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 05:44:39 Z

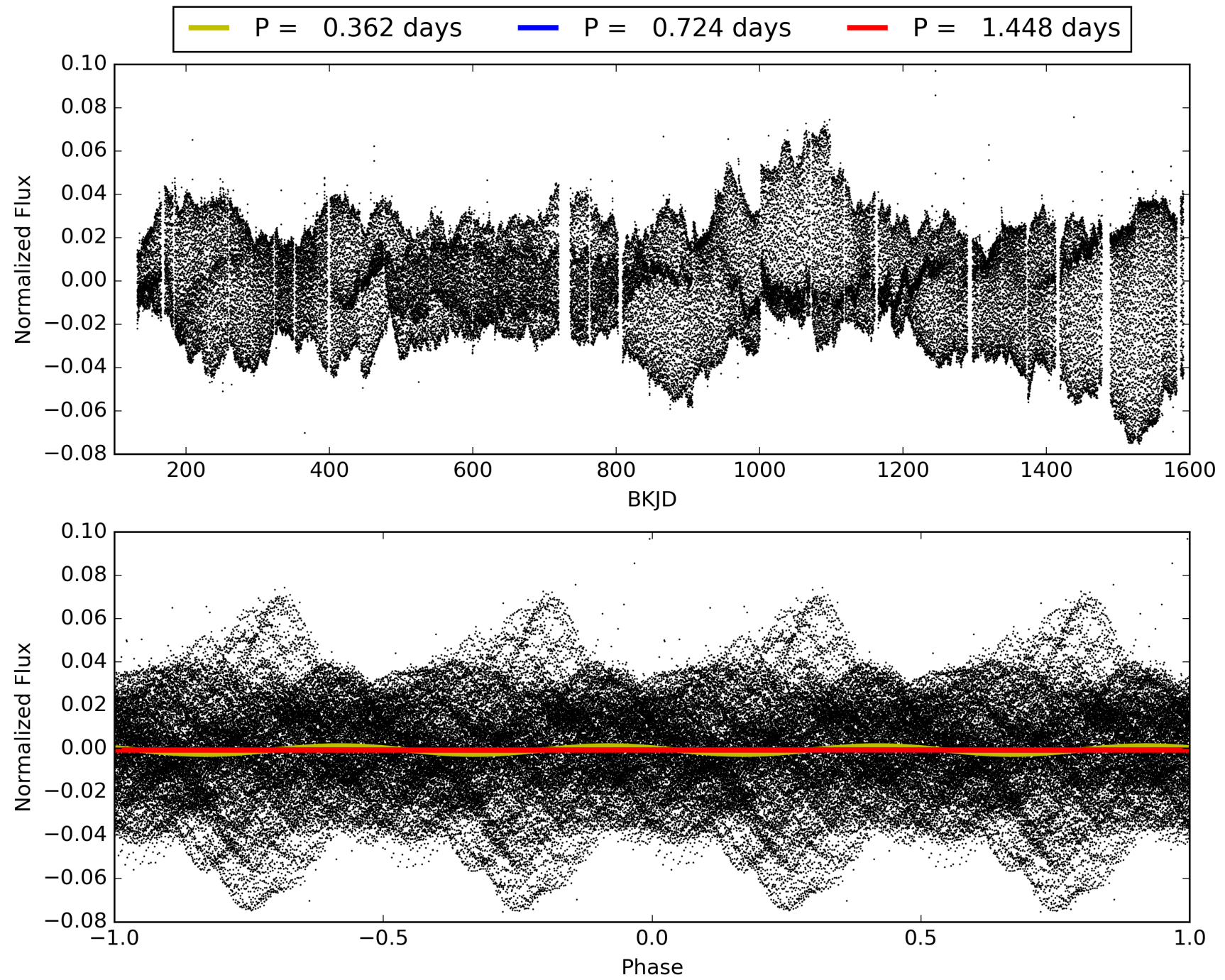
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004390744-01, PDC Light Curves



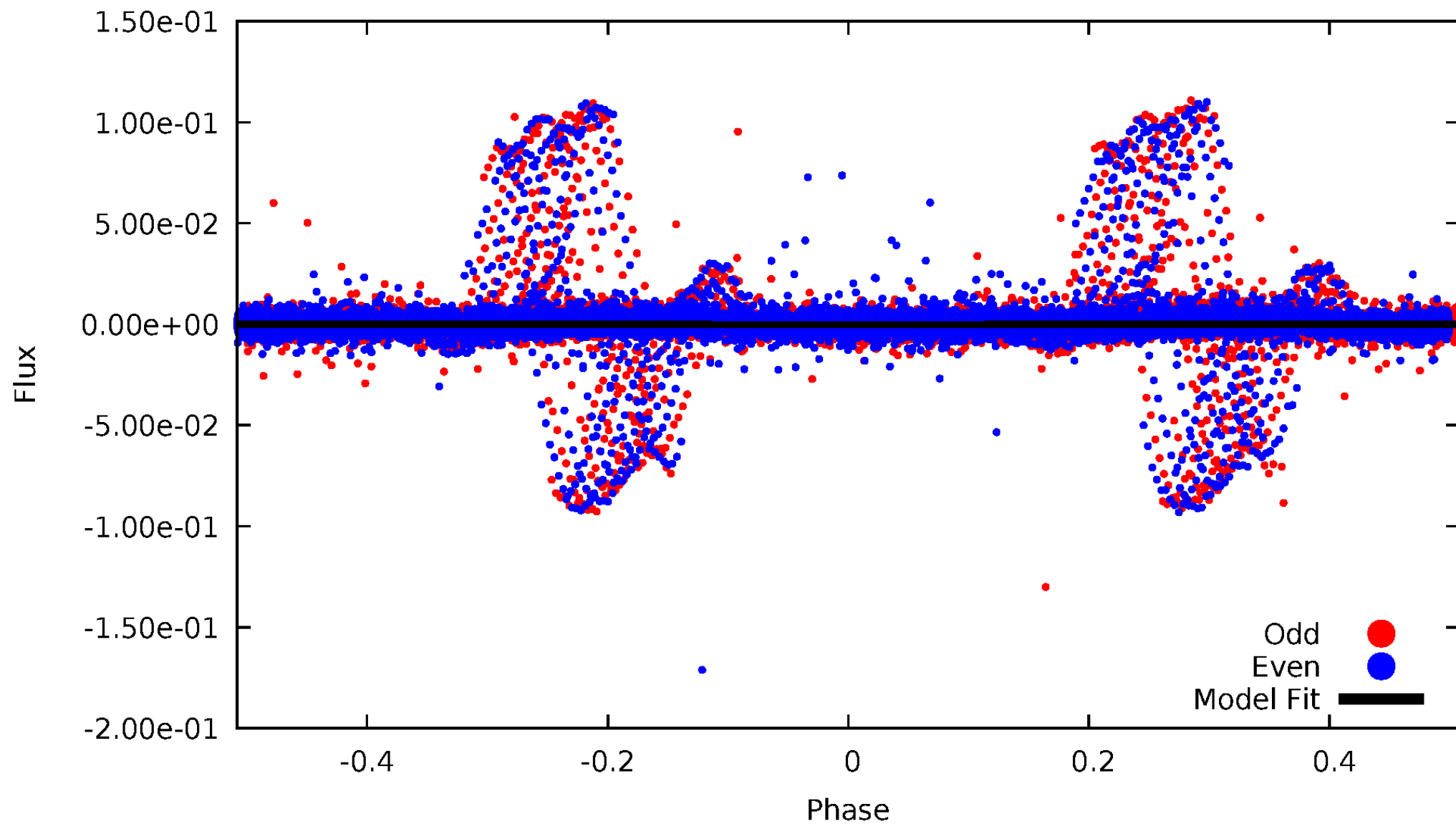


TCE 004390744-01



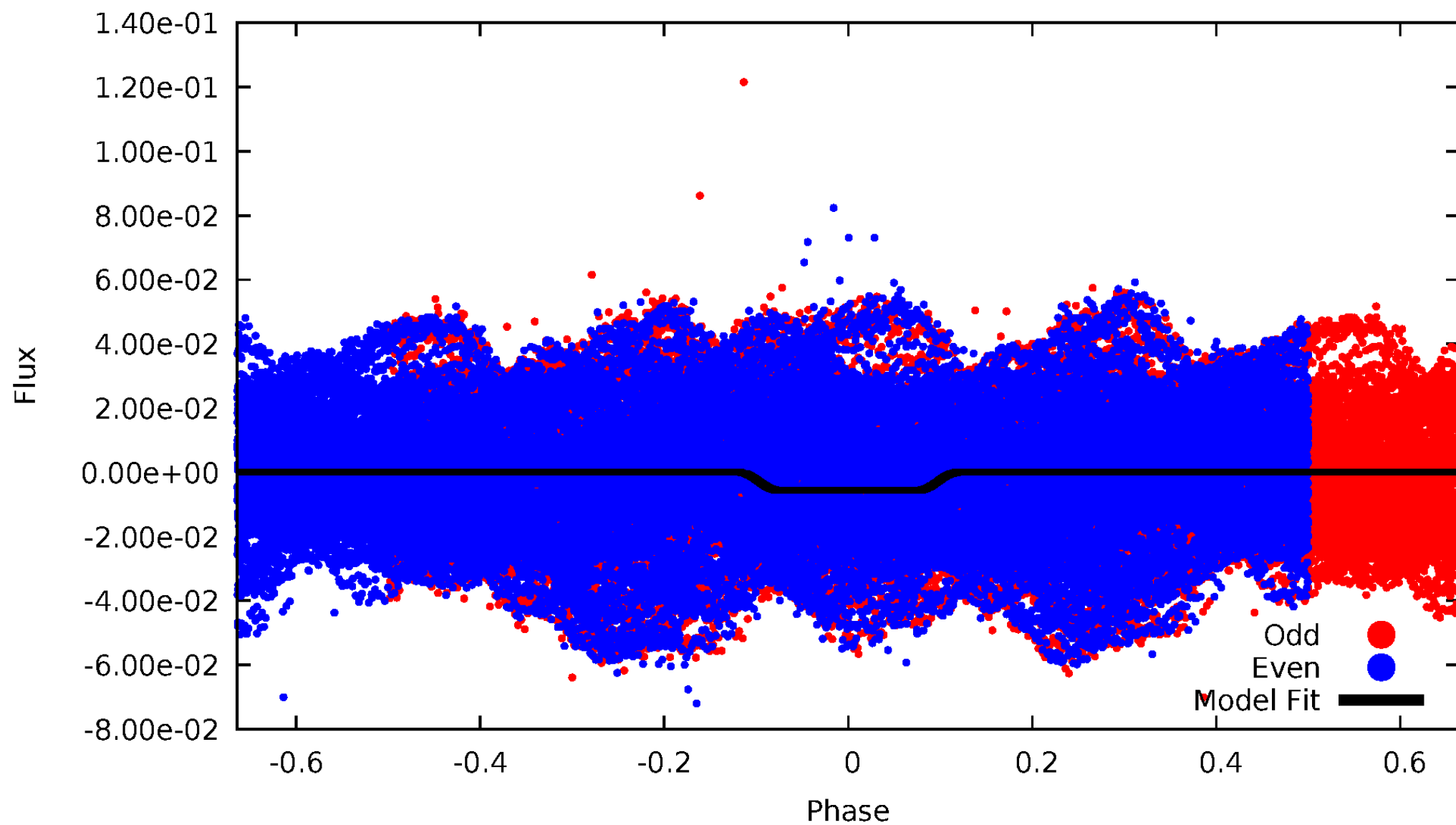
# DV Odd/Even

TCE 004390744-01



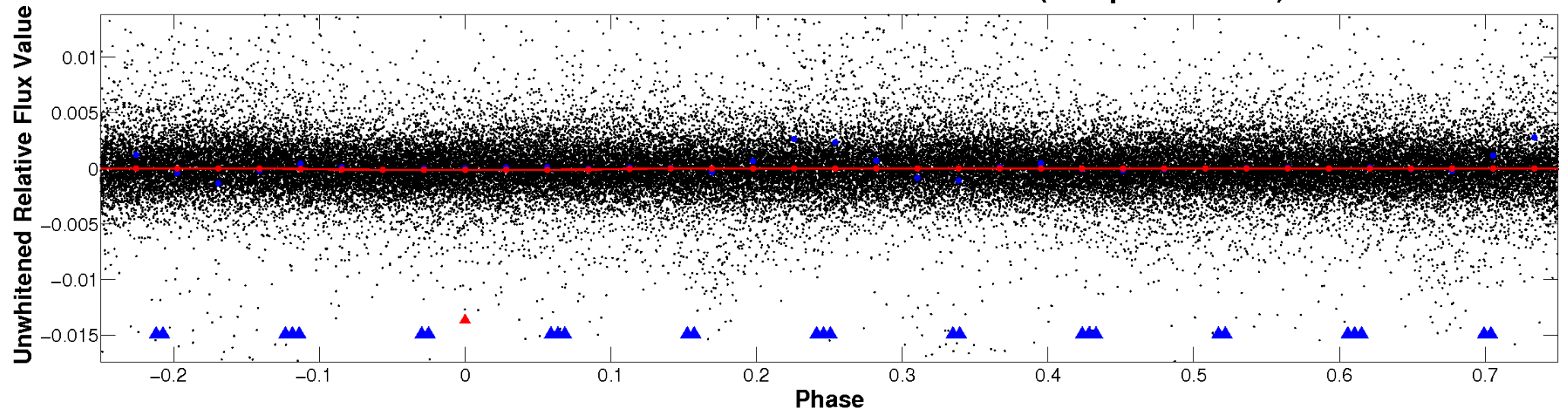
# ALT Odd/Even

TCE 004390744-01

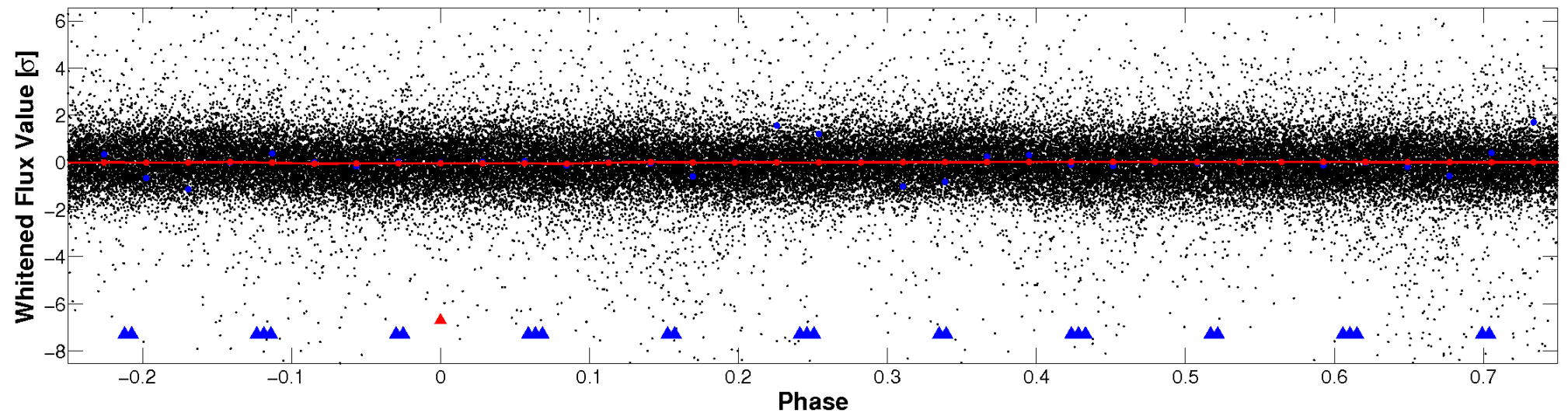


# Non-Whitened Vs. Whitened Light Curve

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



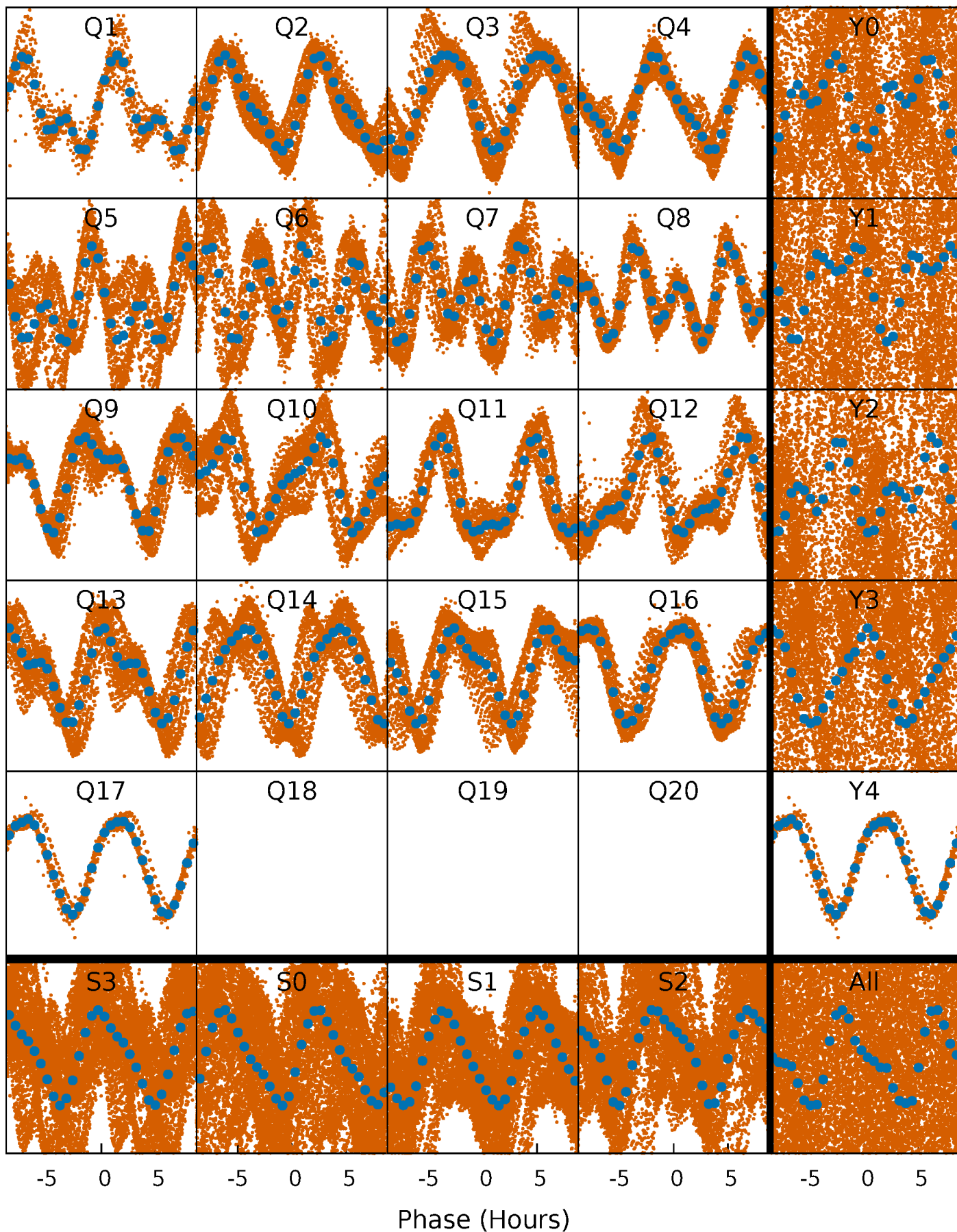
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

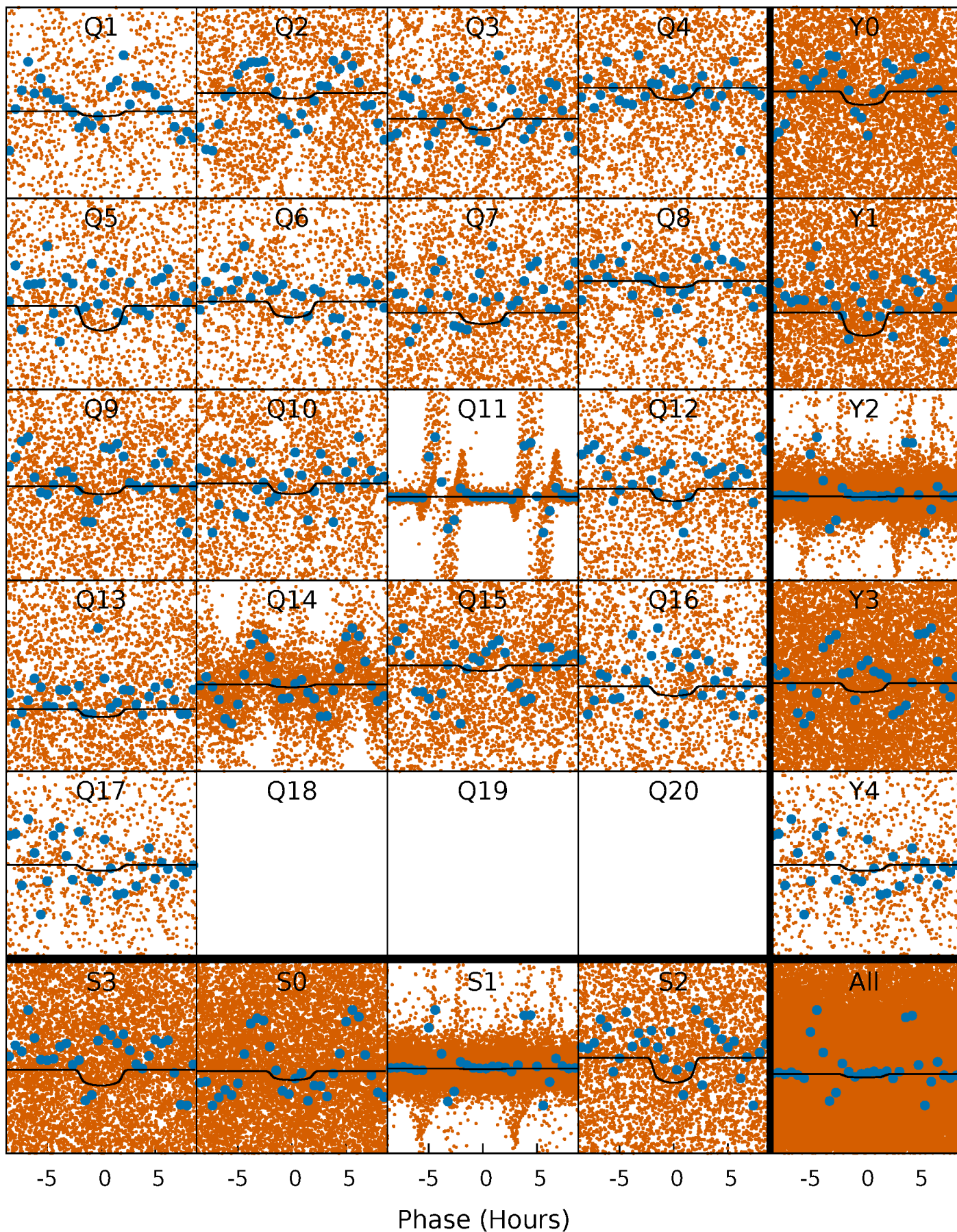
TCE 004390744-01 P= 0.724041 Days  $T_0=131.948196$  (BKJD)





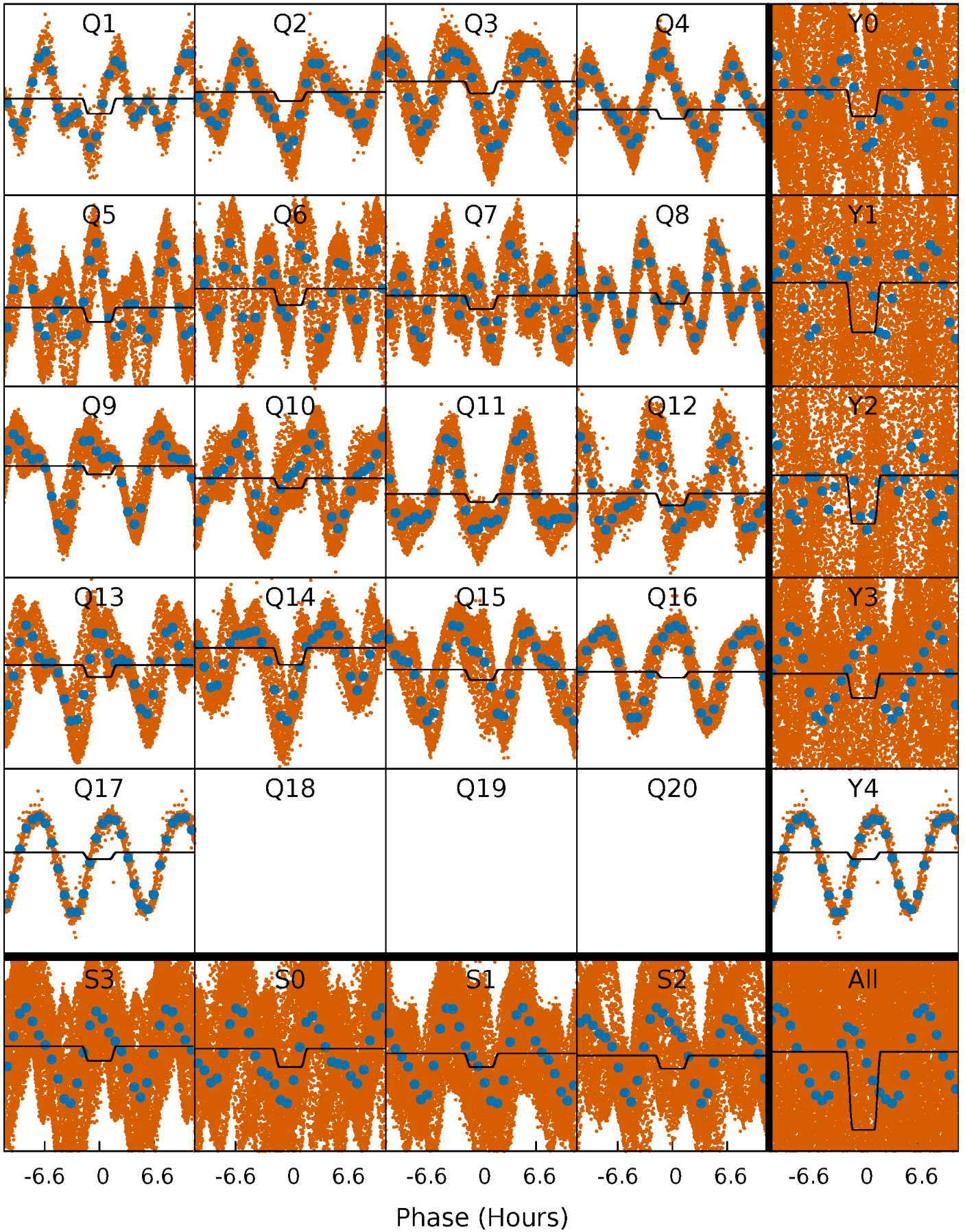
# DV Quarter-Phased Transit Curves

TCE 004390744-01 P= 0.724041 Days  $T_0=131.948196$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

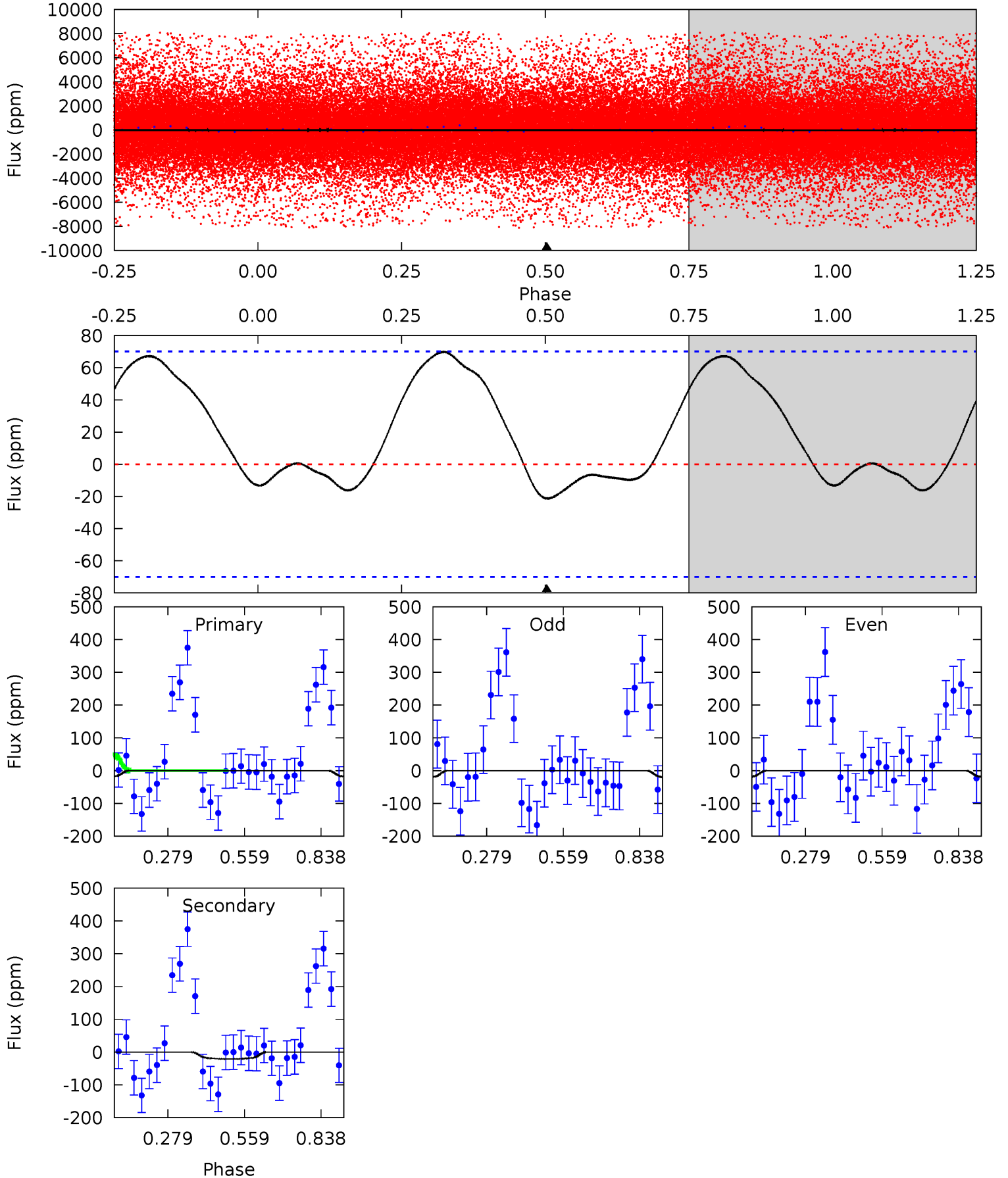
TCE 004390744-01   P= 0.724062 Days    $T_0=131.923774$  (BKJD)



# DV Model-Shift Uniqueness Test

004390744-01, P = 0.724041 Days, E = 131.224155 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
1.32	1.32	0	0	4.34	1.08	1.76	1.32	1.32	1.32	1.32	0.04	5.56	0.77	1.27

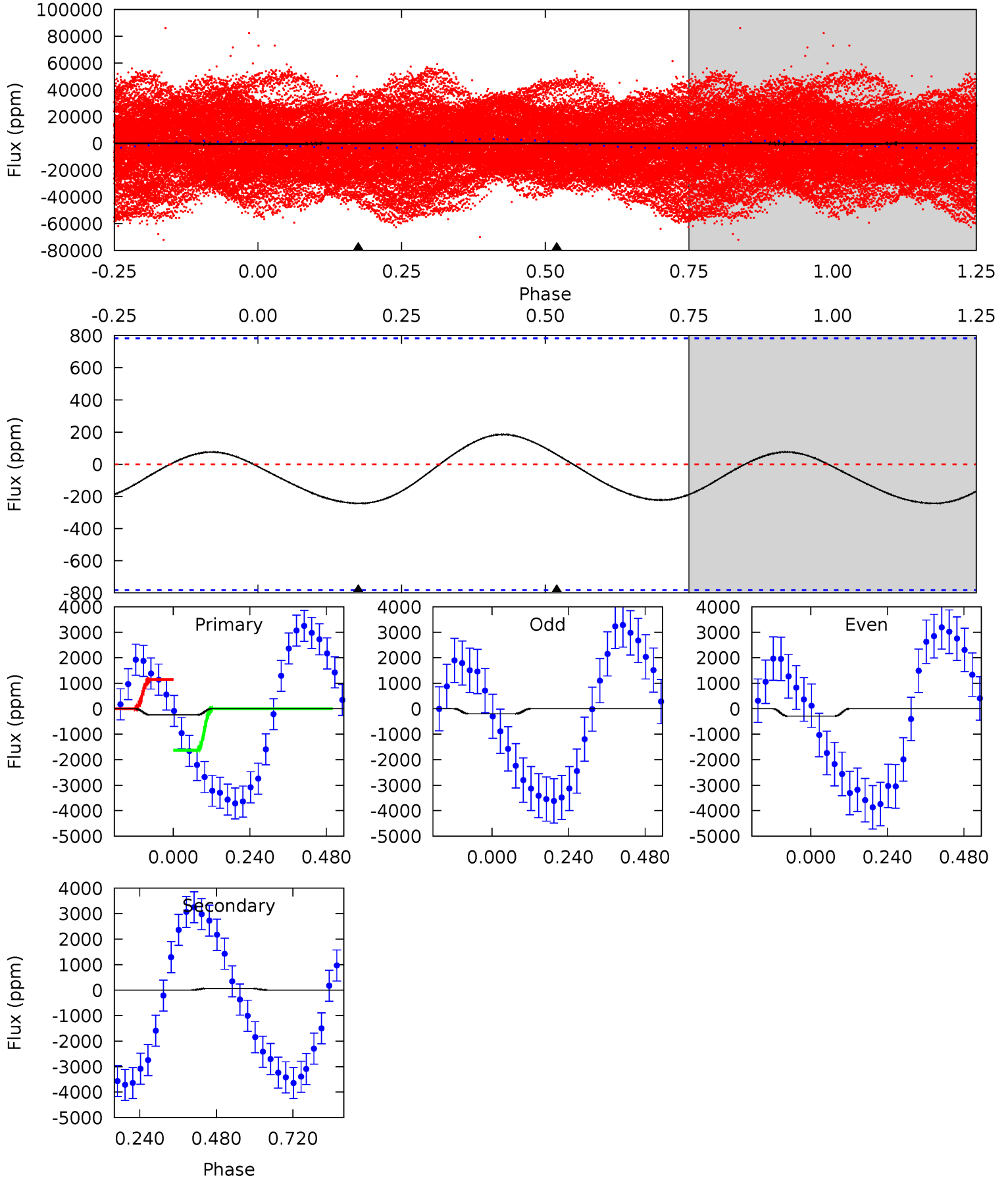




# Alt Model-Shift Uniqueness Test

004390744-01, P = 0.724062 Days, E = 131.199712 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
1.36	-0.34	0	0	4.38	1.17	0.45	1.36	1.36	-0.34	-0.34	0.27	0.11	0.43	1.32





### Stellar Parameters For KIC 004390744

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4728^{+156}_{-156}$	$4.630^{+0.059}_{-0.032}$	$-0.540^{+0.350}_{-0.300}$	$0.629^{+0.051}_{-0.057}$	$0.615^{+0.069}_{-0.040}$	$3.479^{+0.916}_{-0.502}$
	+3%/-3%	+1%/-1%	+65%/-56%	+8%/-9%	+11%/-7%	+26%/-14%
Source	PHO1	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 004390744-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-21 \pm 16$	$0.92^{+0.20}_{-0.19}$	$1977^{+79}_{-72}$	$3161^{+423}_{-806}$	$2.409^{+2.539}_{-1.900}$
Alt.	$60 \pm 179$	$5.16^{+0.31}_{-0.32}$	$1987^{+74}_{-76}$	$-2624^{+4881}_{-322}$	$-0.229^{+0.684}_{-0.705}$

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

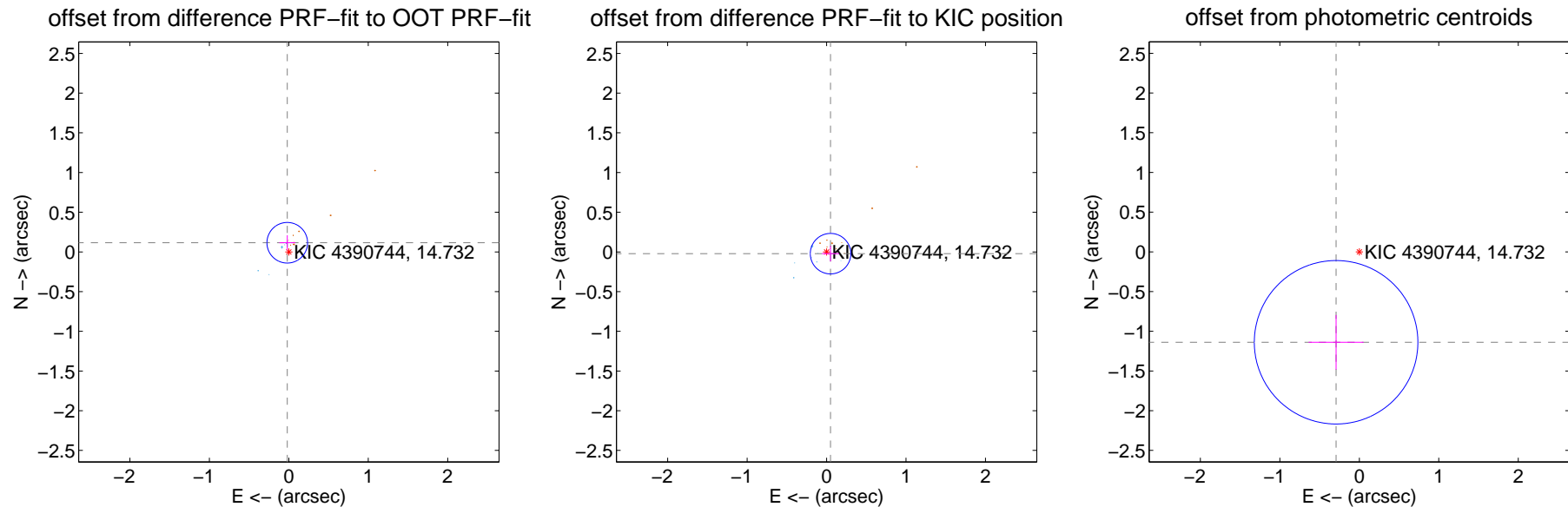
## DV Centroid Data

Supplemental centroid analysis for 004390744-01. Kepler magnitude: 14.73. Transit SNR 5.75

There are 7 quarters with good PRF difference image offsets

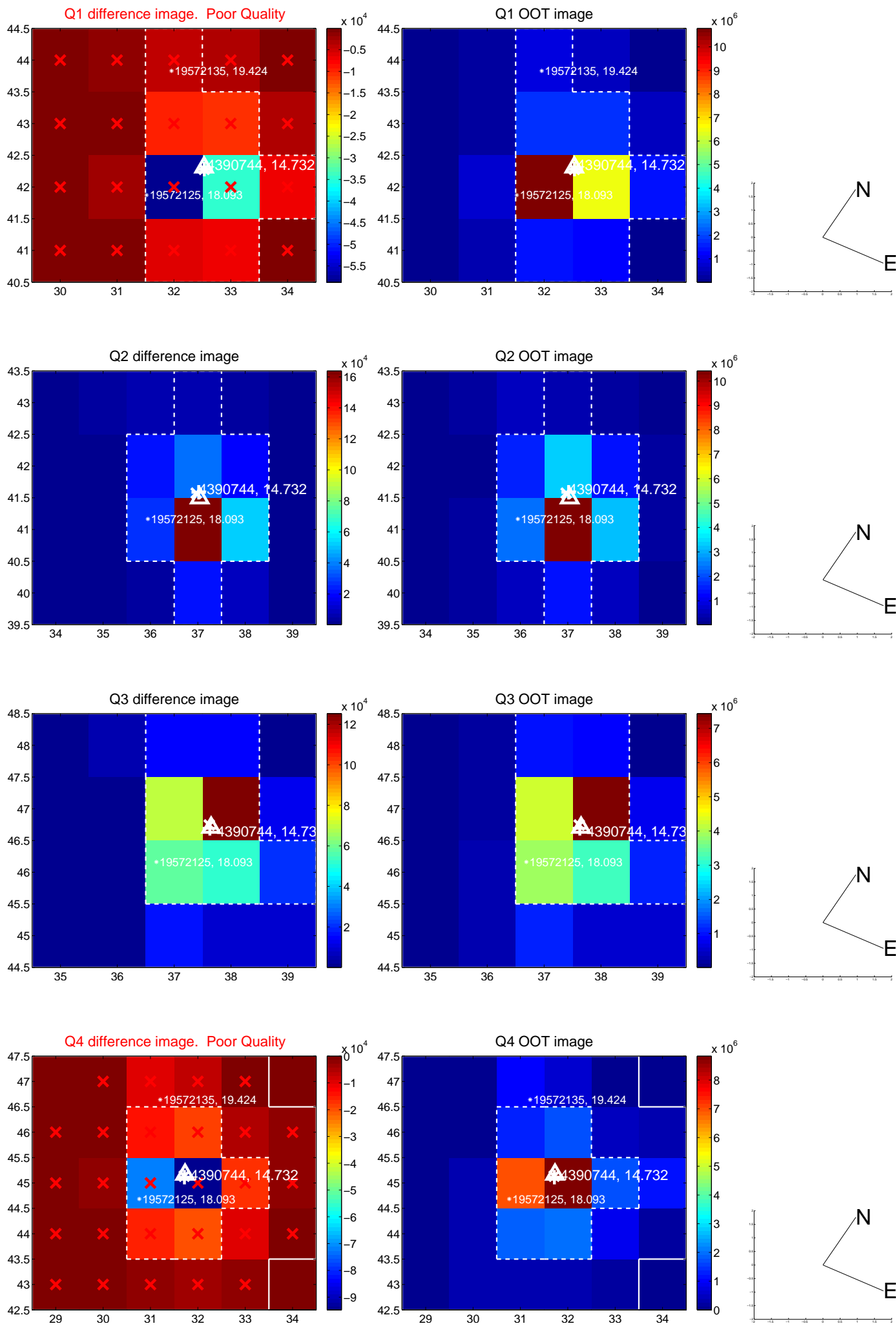
The direct PRF centroid is offset from the target star catalog position by about 0.03 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.117 \pm 0.085$	1.37	$0.020 \pm 0.100$	$0.115 \pm 0.094$
PRF-fit source offset from KIC position	$0.055 \pm 0.085$	0.64	$-0.050 \pm 0.108$	$-0.022 \pm 0.097$
photometric centroid source offset	$1.18 \pm 0.34$	3.43	$0.29 \pm 0.35$	$-1.14 \pm 0.34$

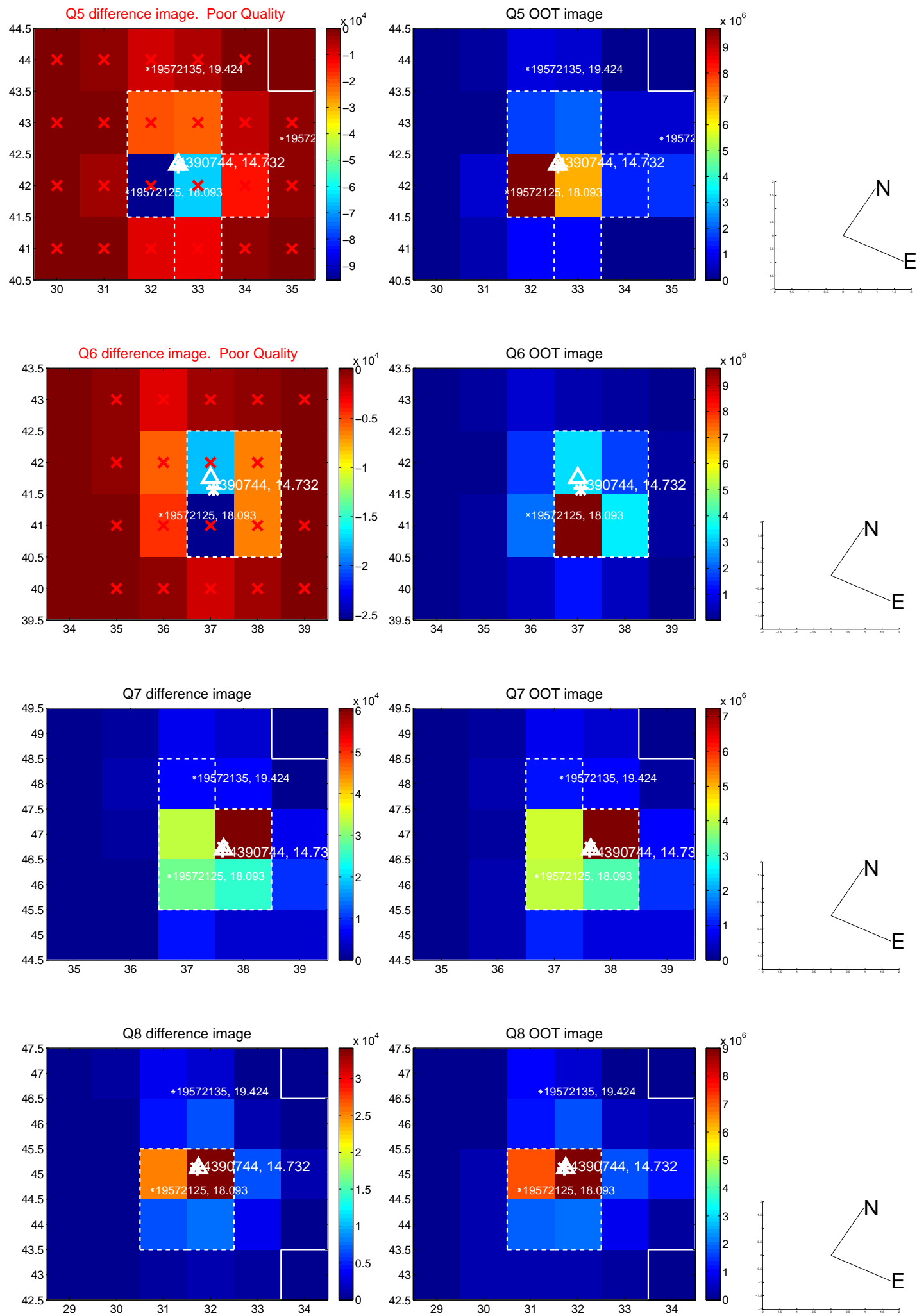


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

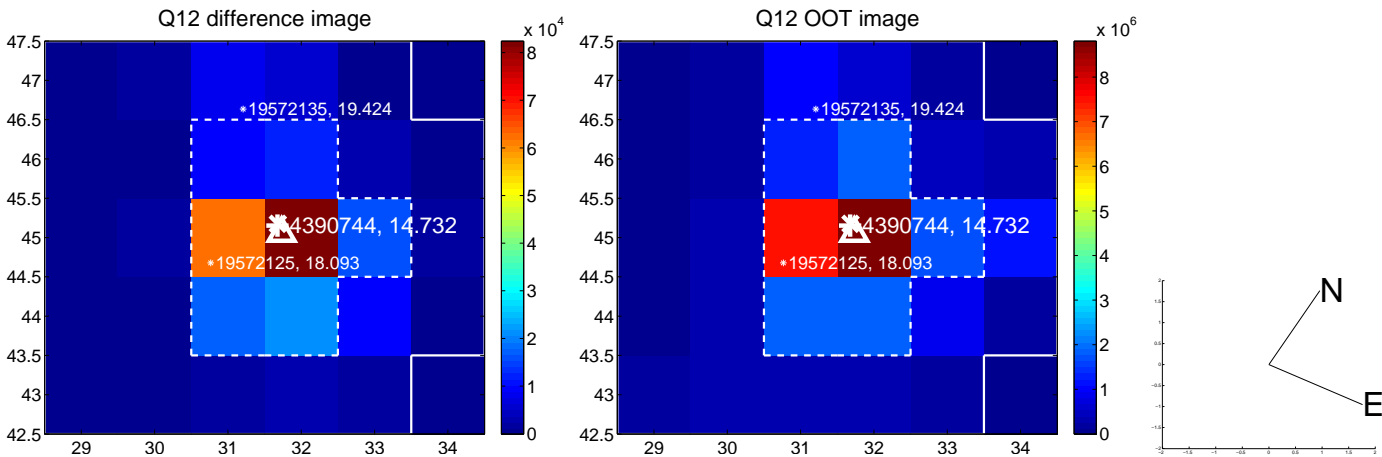
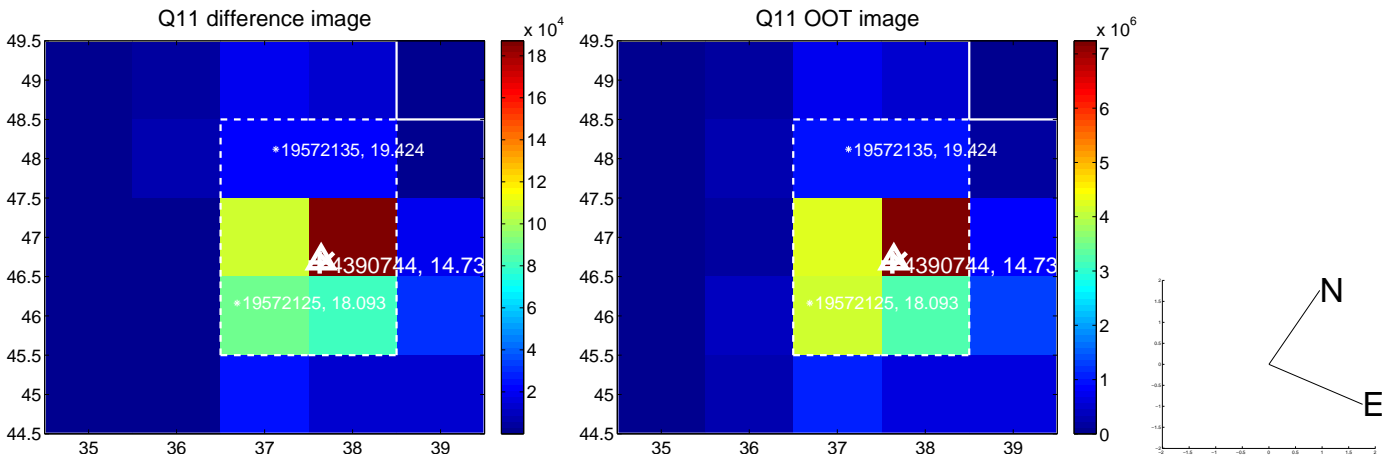
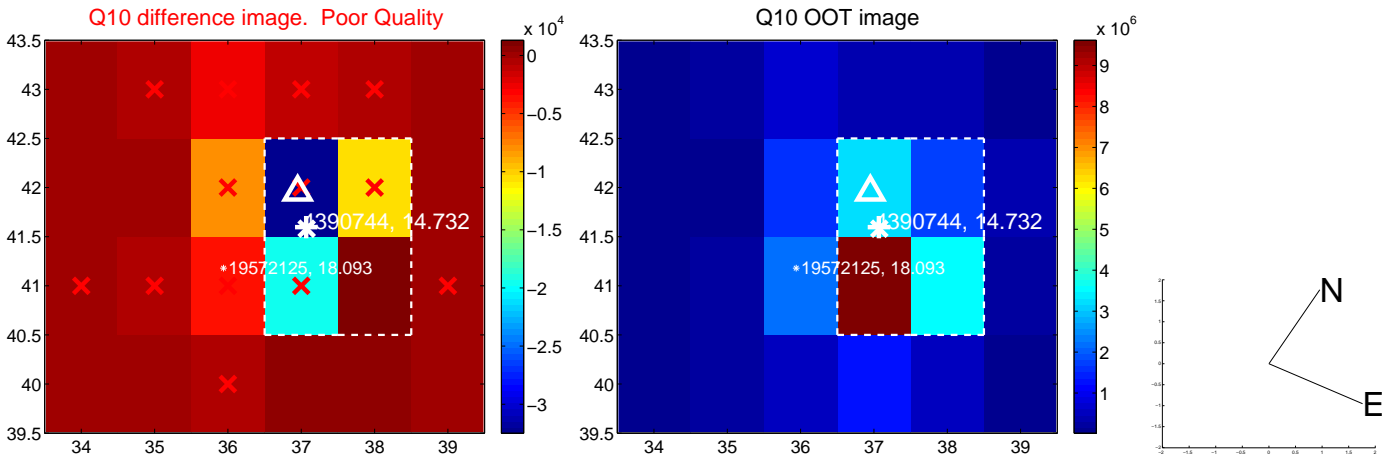
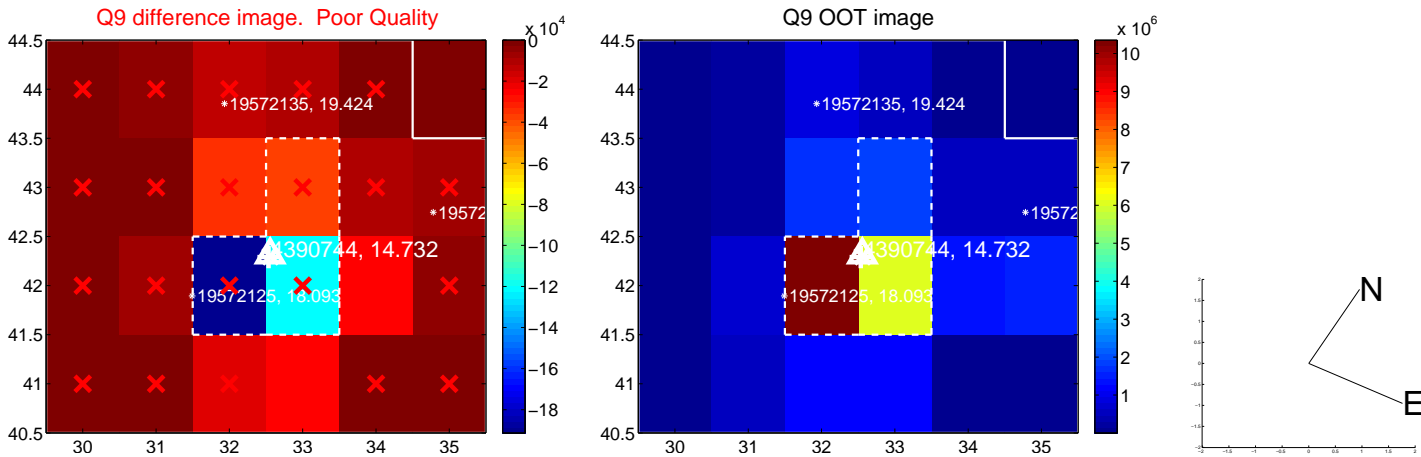


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

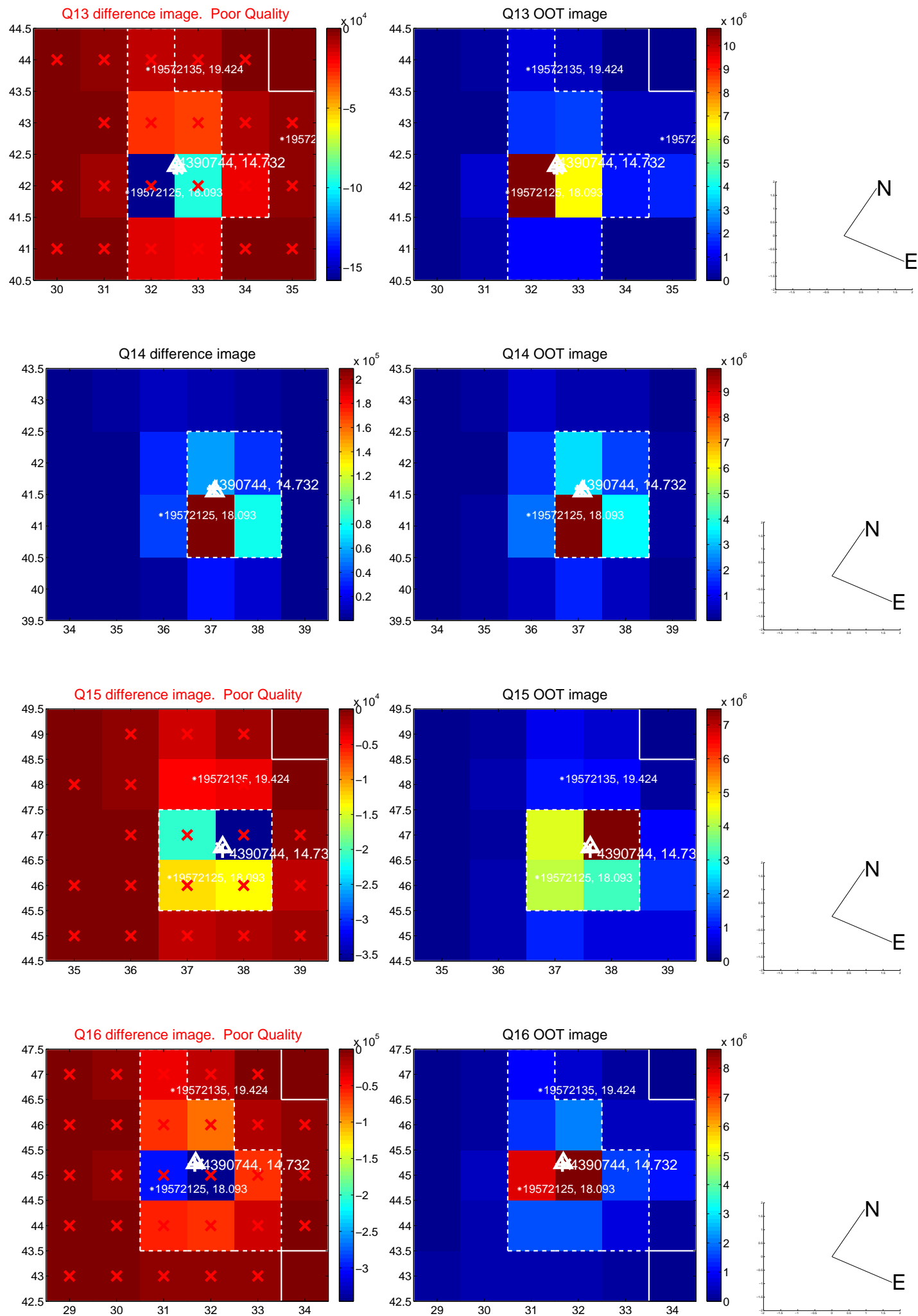




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



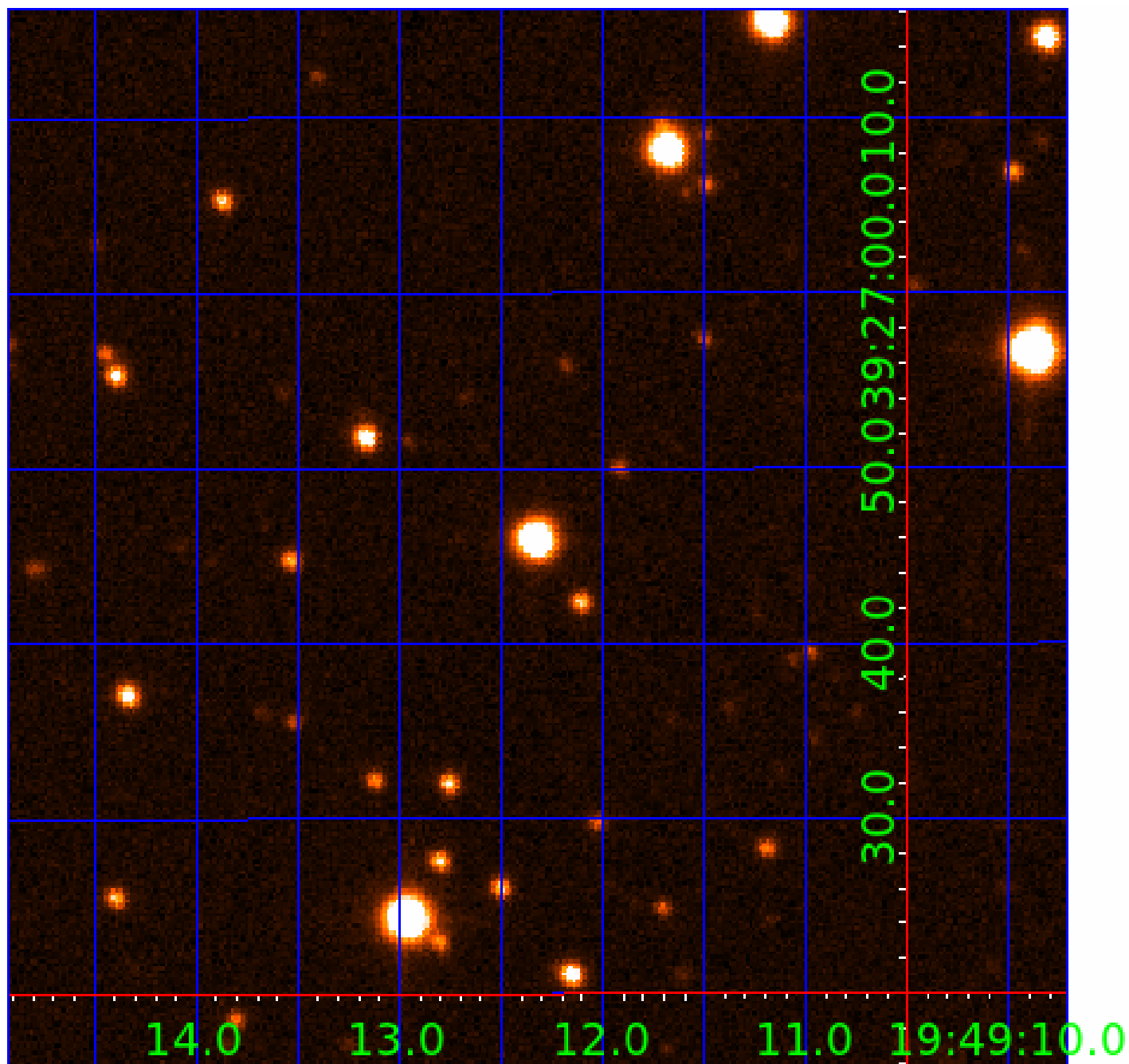
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination





# KIC 004390744

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004390744-01	OBS	No	0.724041	131.948196	135.6	4.413	9.1	5.8	0.63	4728	0.93	982.55
004390744-02	OBS	No	54.895182	146.874453	3420.8	1.804	7.4	7.1	0.63	4728	3.91	3.06

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004390744-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
004390744-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE—TRANS_GAPPED—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

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

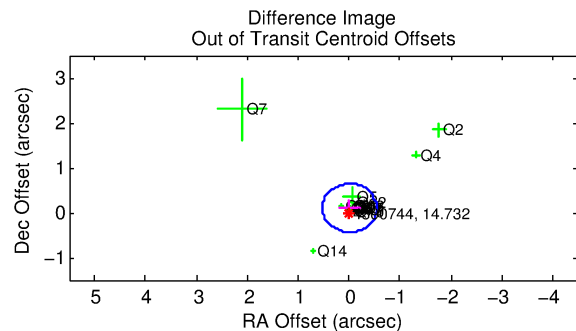
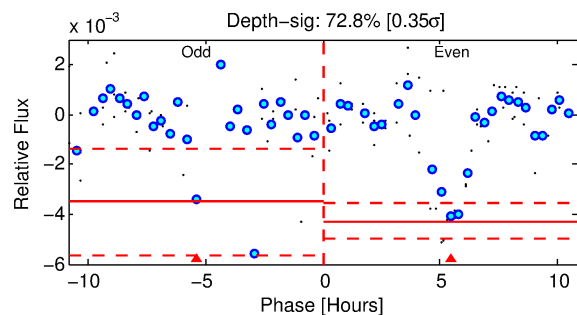
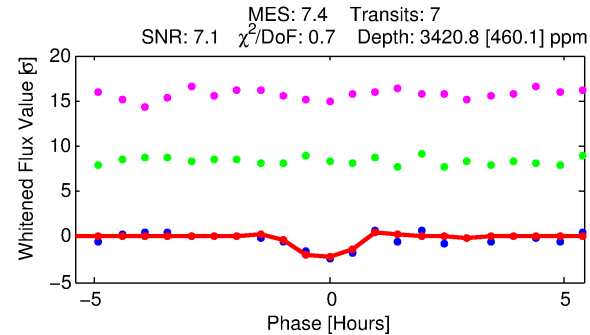
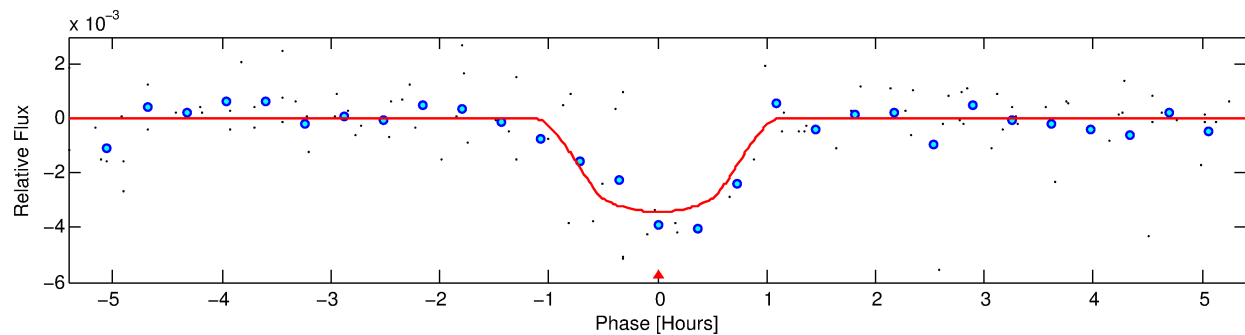
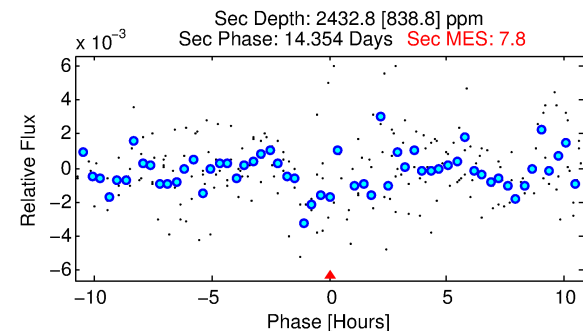
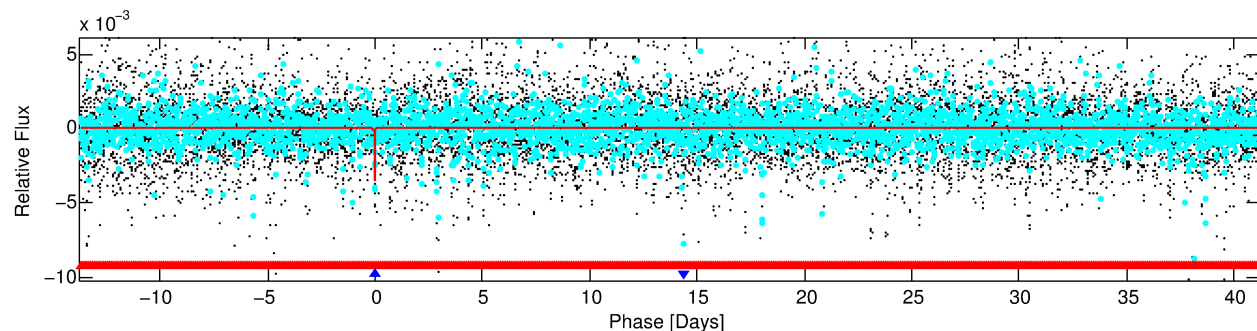
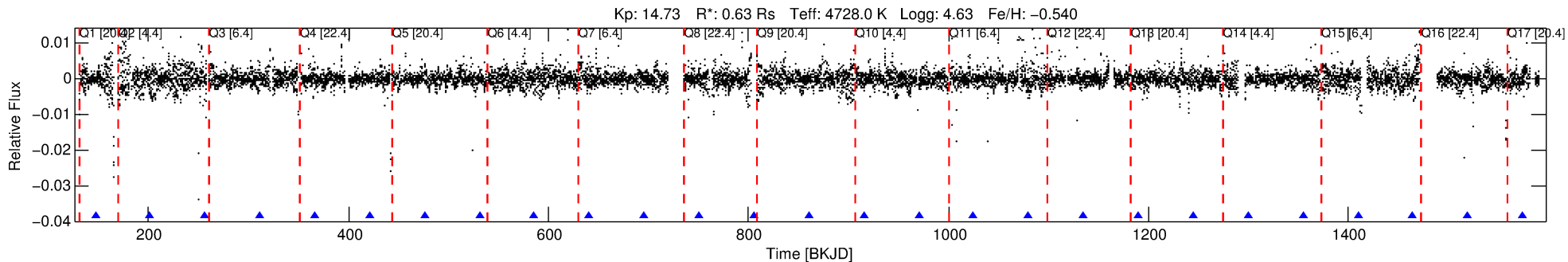
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004390744-02

No Significant Match Found

# DV One-Page Summary

KIC: 4390744 Candidate: 2 of 2 Period: 54.895 d



## DV Fit Results:

Period = 54.89518 [0.00029] d  
Epoch = 146.8745 [0.0046] BKJD  
Rp/R\* = 0.0569 [0.1633]  
a/R\* = 188.26 [1769.88]  
b = 0.68 [7.70]  
Seff = 3.06 [0.52]  
Teq = 337 [14] K  
Rp = 3.91 [11.22] Re  
a = 0.2405 [0.0182] AU  
Ag = 5067.32 [29120.87] [0.17σ]  
Teffp = 4400 [6322] K [0.64σ]

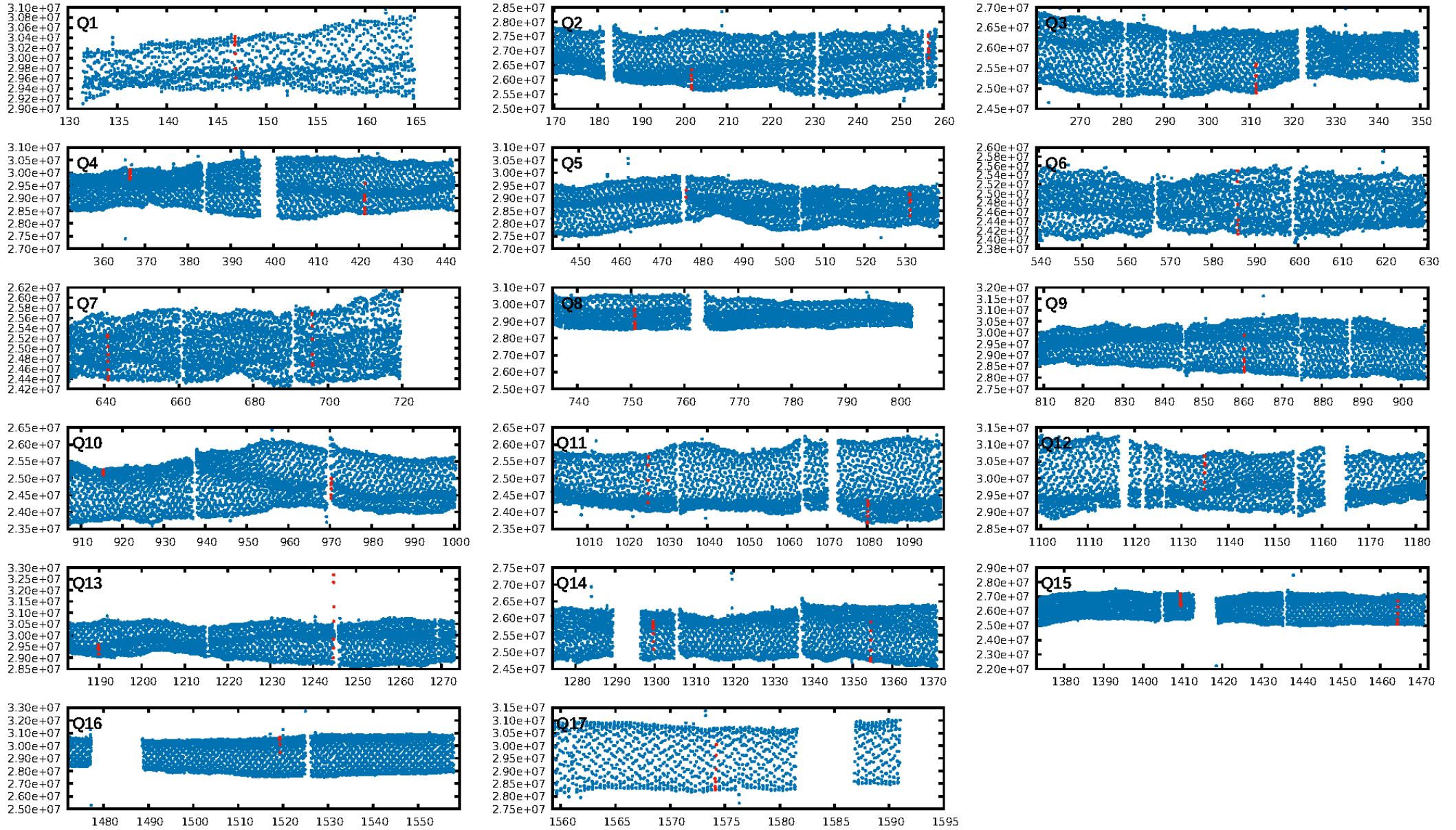
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [272.72σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 18.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 6.19e-07  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: 1.301  
Centroid-sig: 0.0%  
Centroid-so: 1.106 arcsec [5.95σ]  
OotOffset-rm: 0.102 arcsec [0.57σ]  
KicOffset-rm: 0.055 arcsec [0.30σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.76 [13/17]  
DiffImageOverlap-fno: 0.06 [1/17]

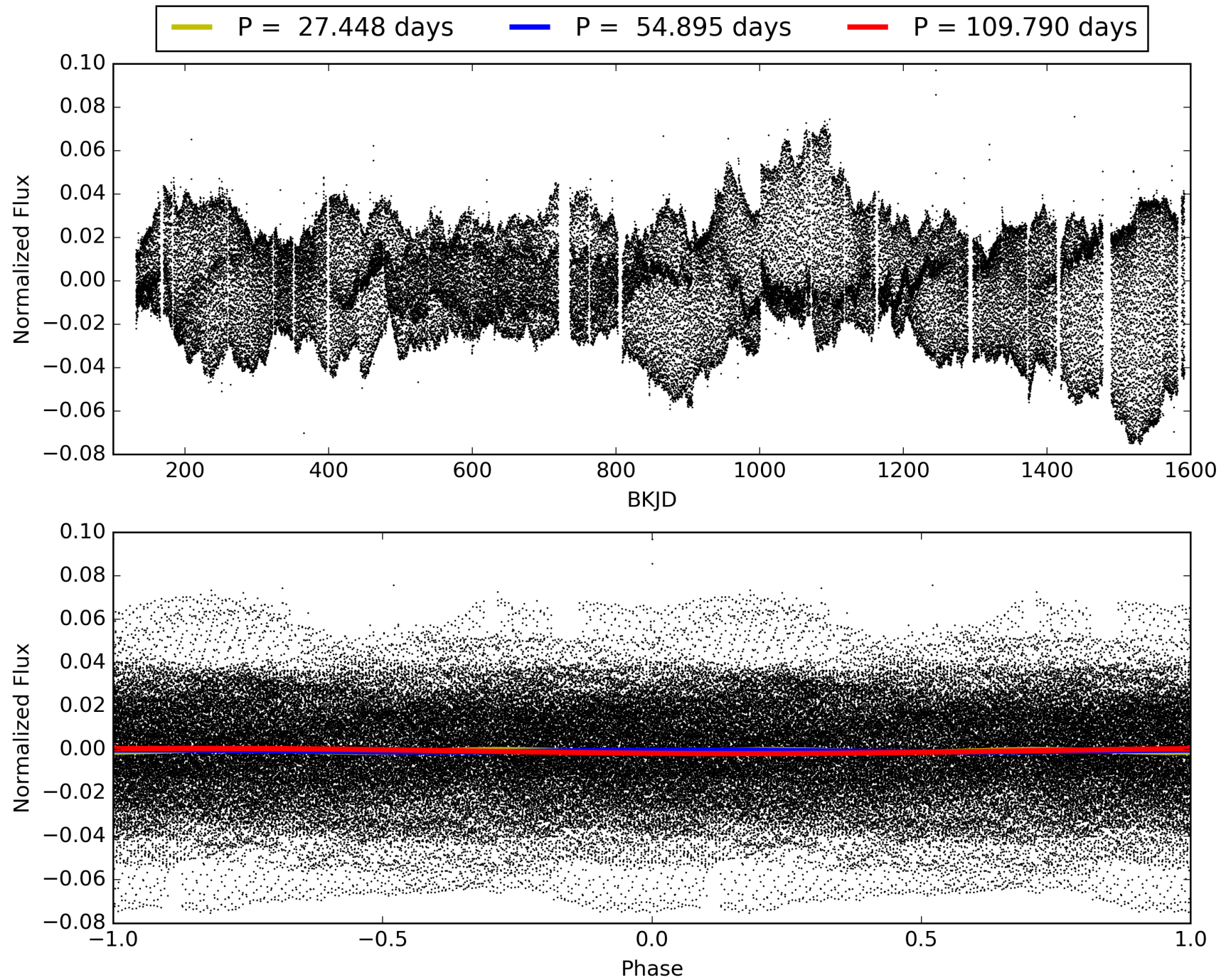
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 05:44:50 Z

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

# TCE 004390744-02, PDC Light Curves



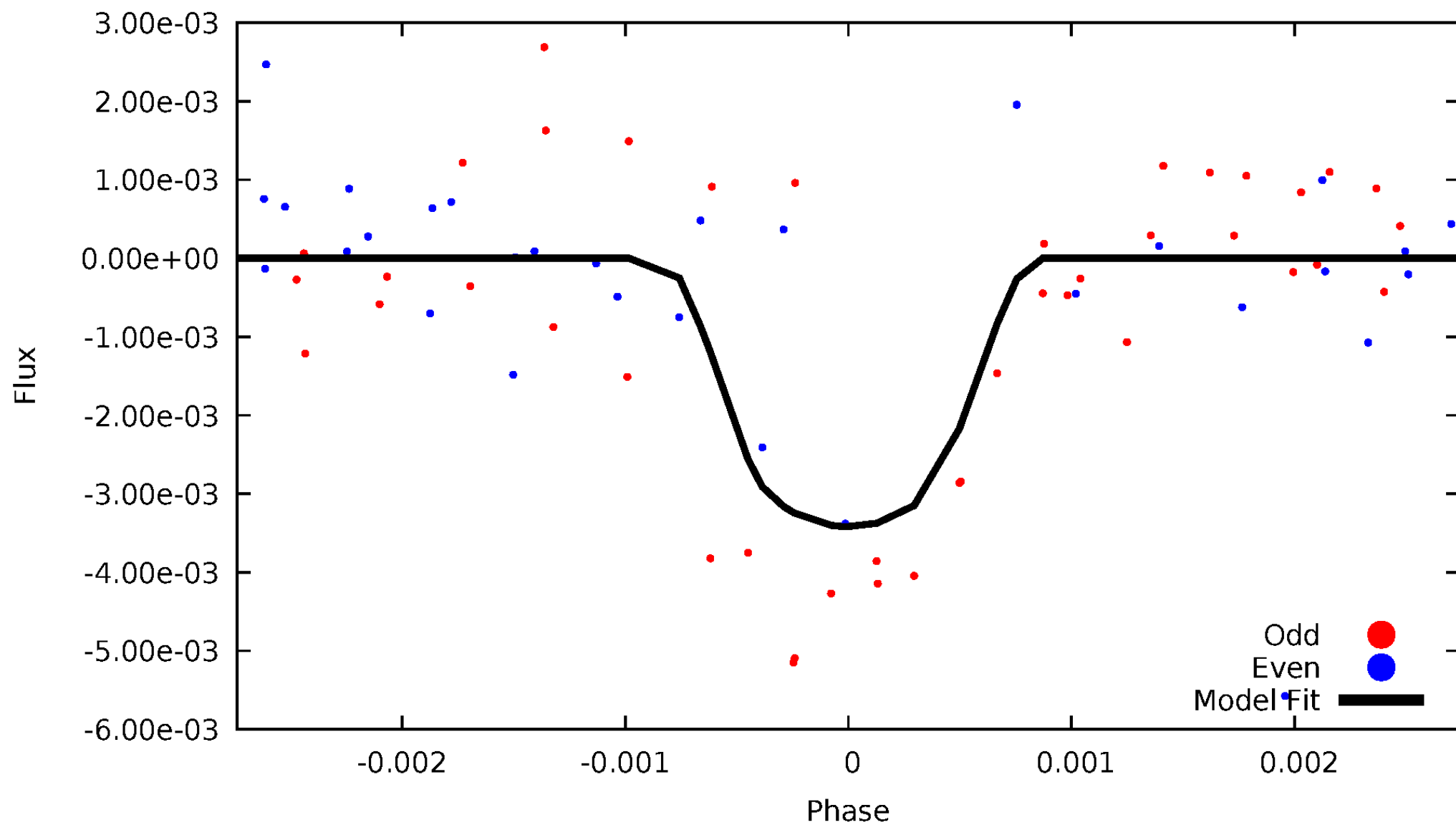
# TCE 004390744-02





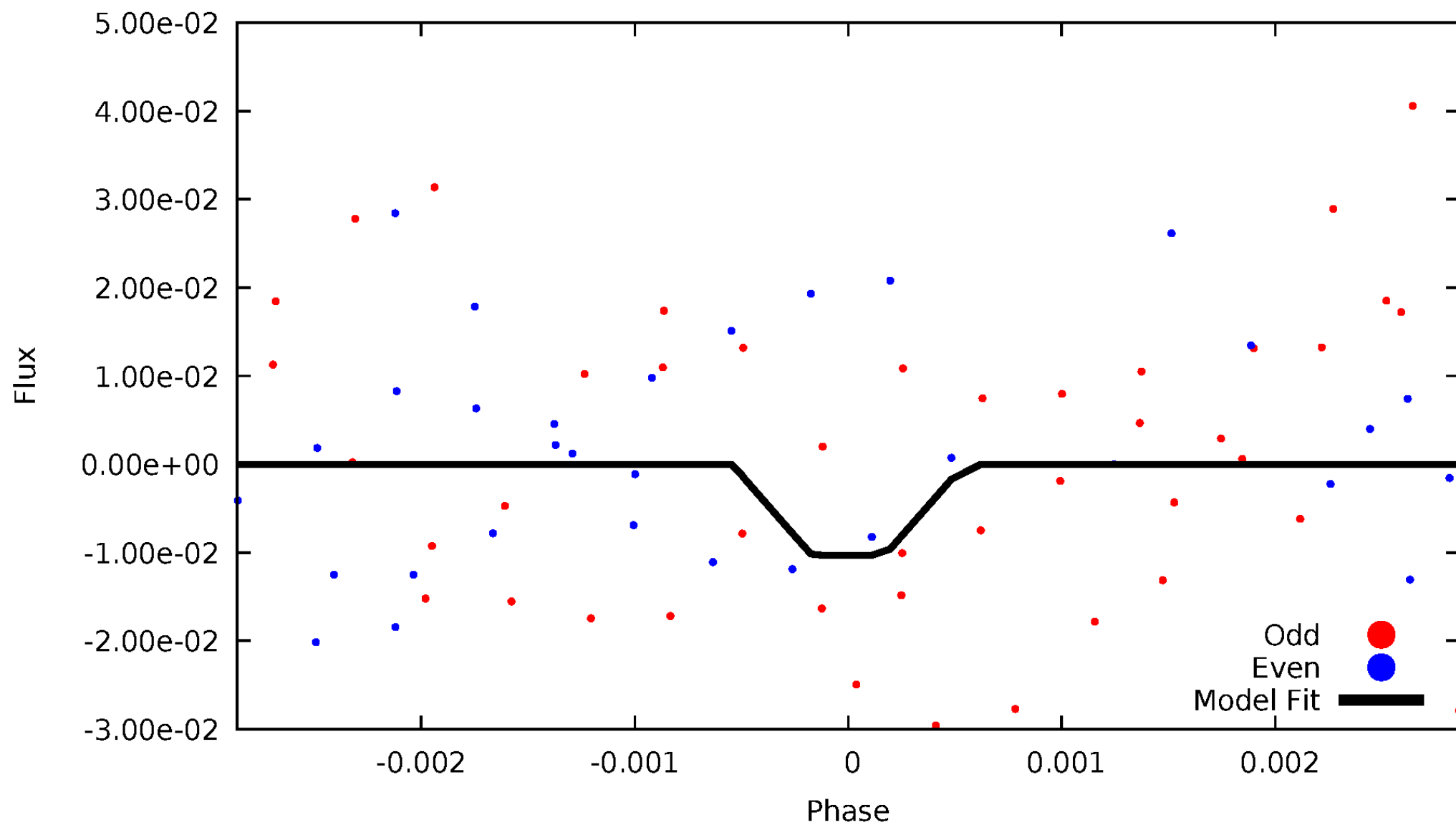
# DV Odd/Even

TCE 004390744-02



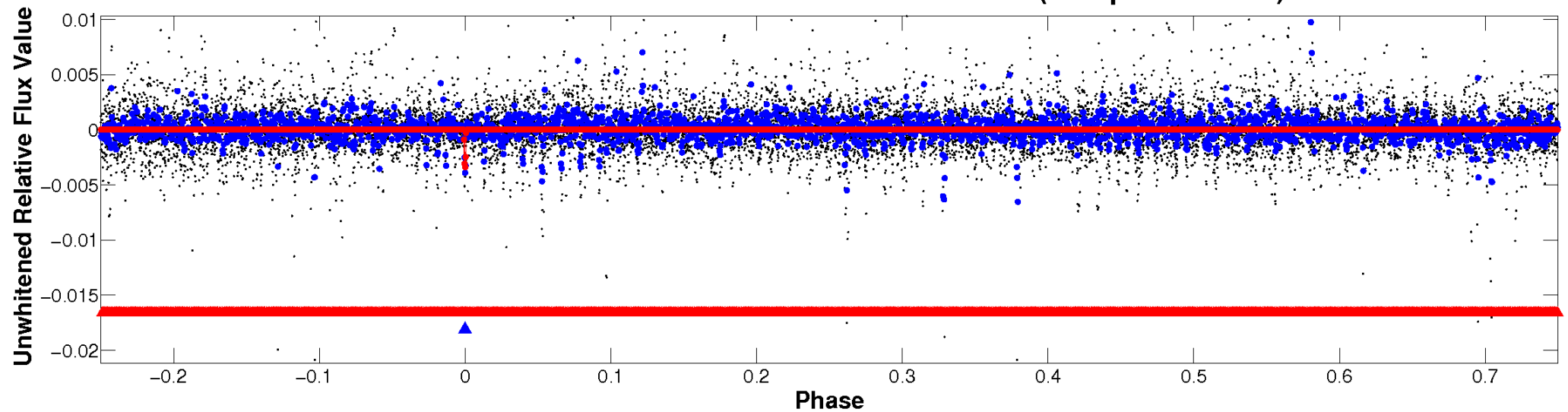
# ALT Odd/Even

TCE 004390744-02

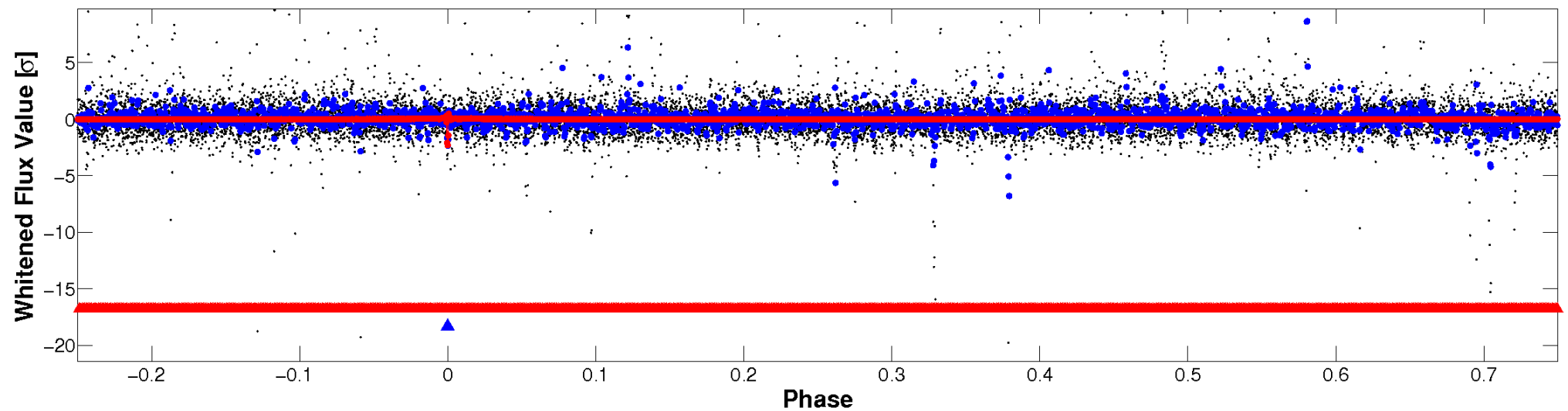


# Non-Whitened Vs. Whitened Light Curve

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

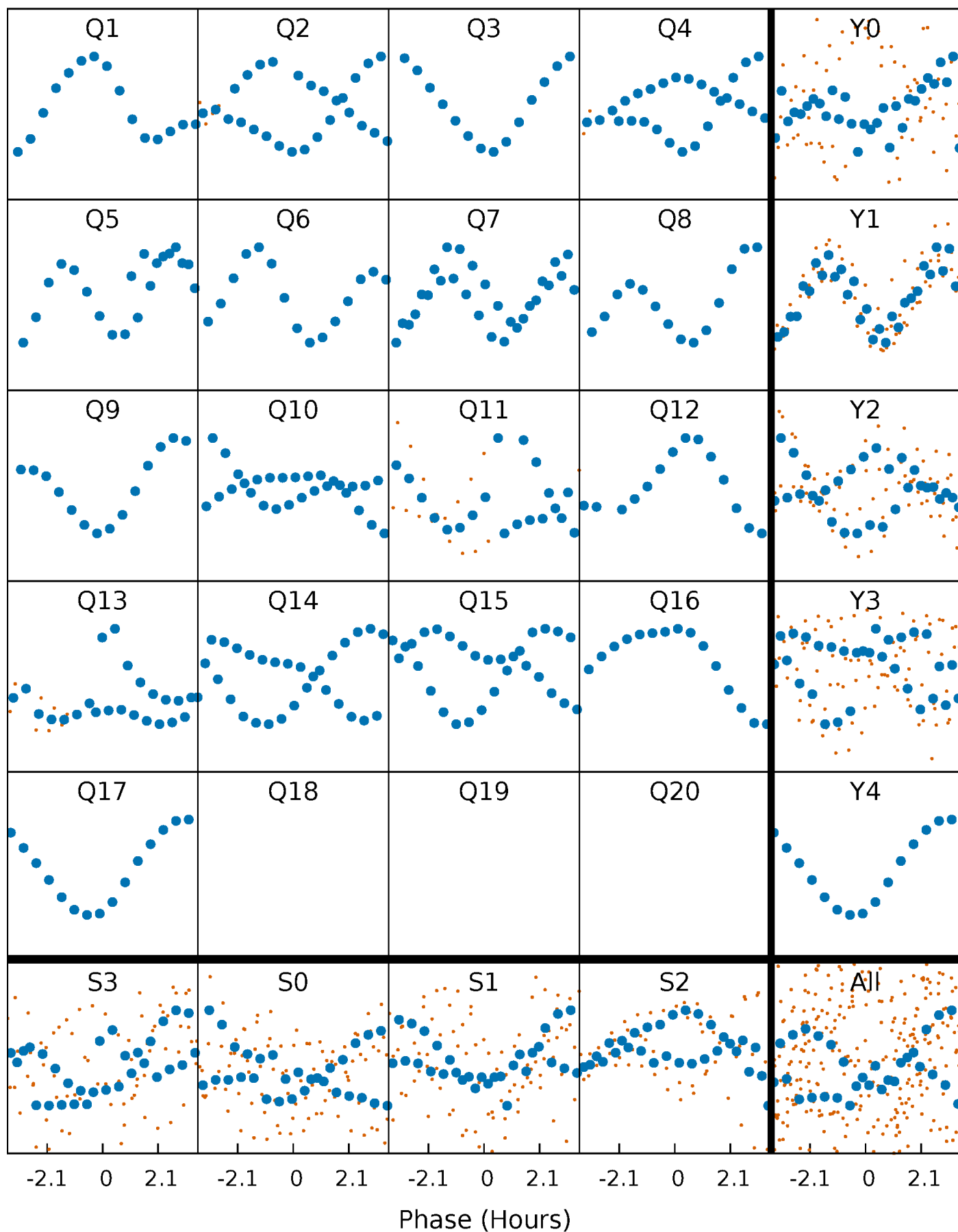


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



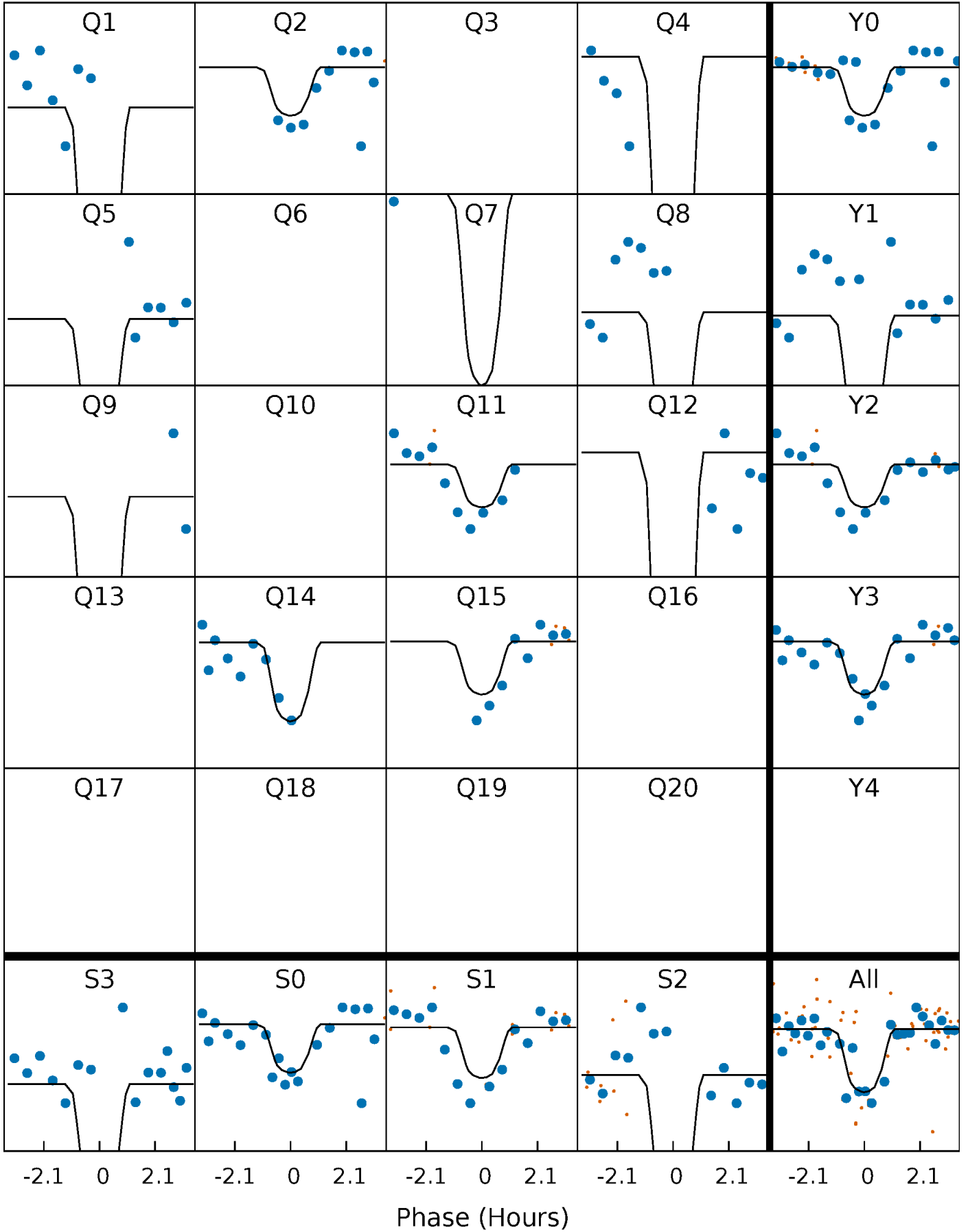
# PDC Quarter-Phased Transit Curves

TCE 004390744-02 P= 54.895182 Days  $T_0=146.874453$  (BKJD)



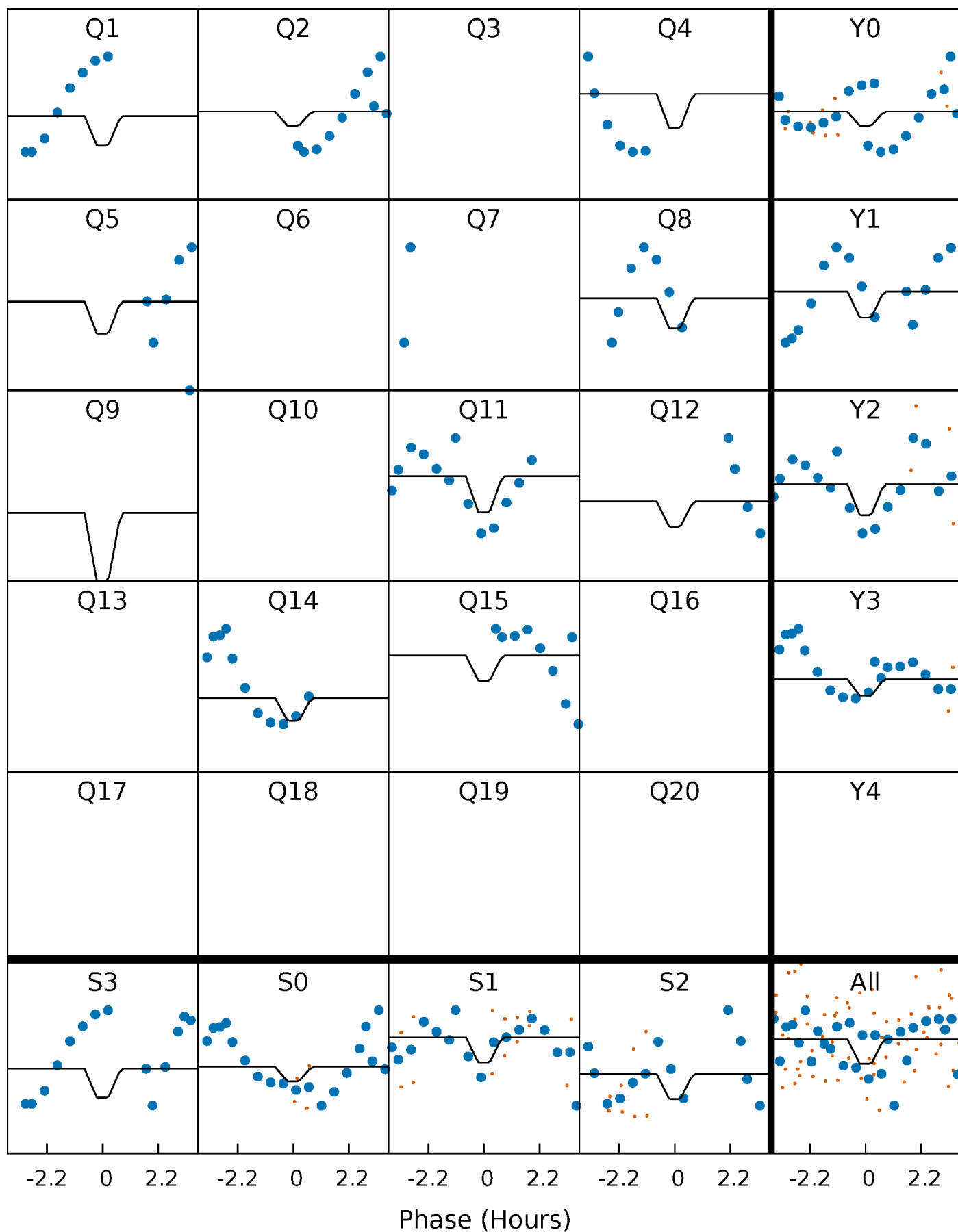
# DV Quarter-Phased Transit Curves

TCE 004390744-02 P= 54.895182 Days  $T_0=146.874453$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 004390744-02   P= 54.895159 Days    $T_0=146.847735$  (BKJD)

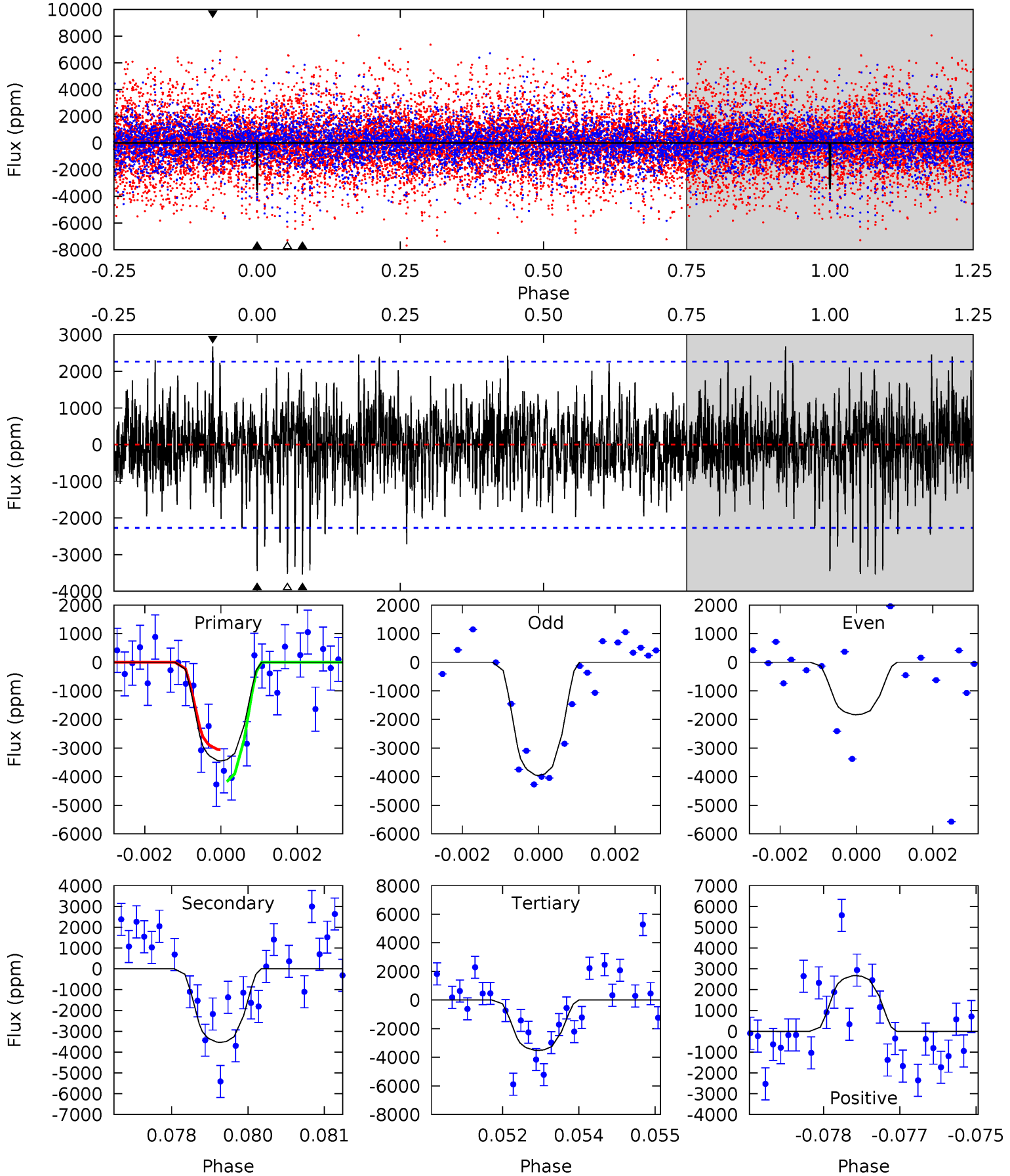




# DV Model-Shift Uniqueness Test

004390744-02, P = 54.895182 Days, E = 91.979271 Days

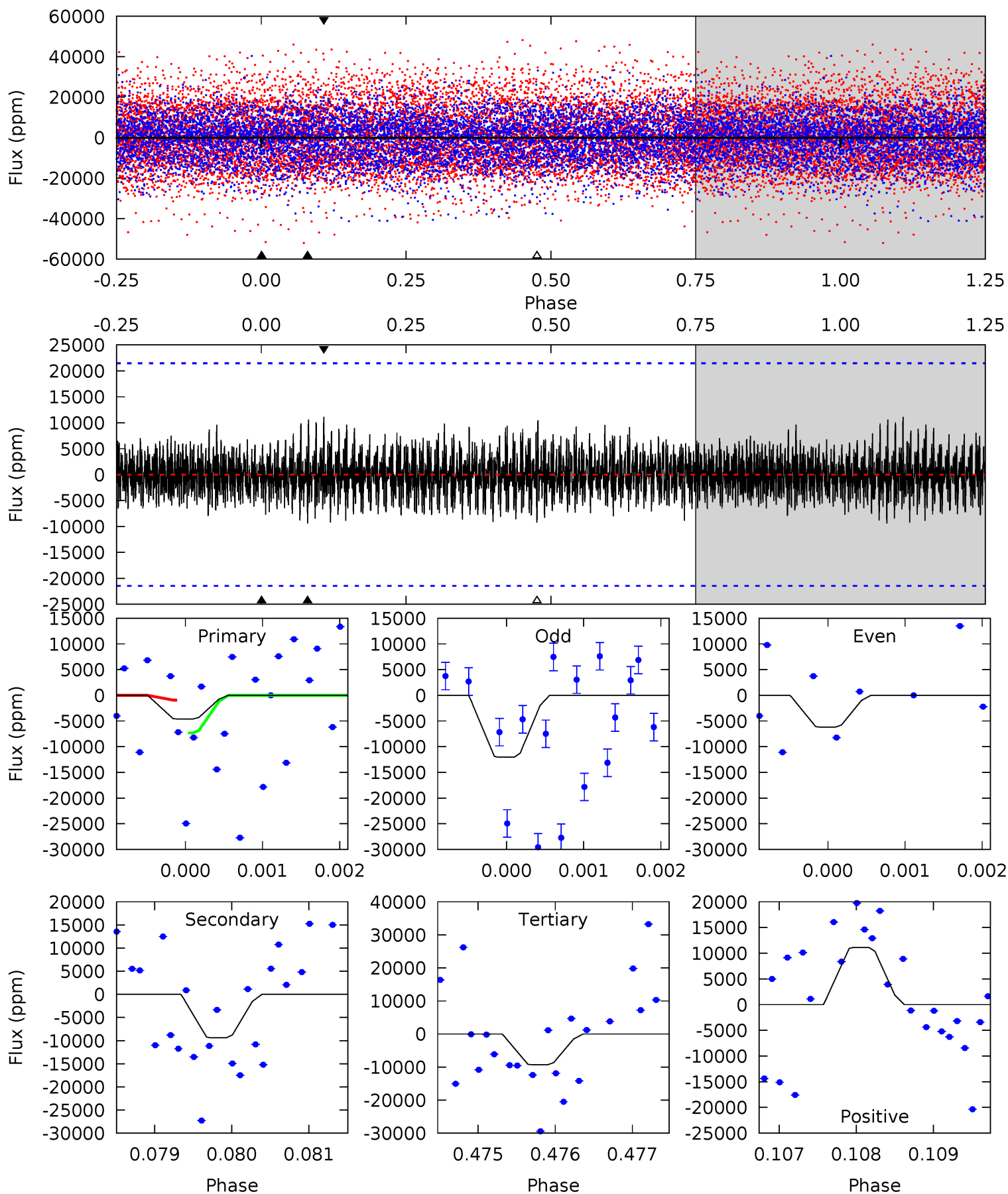
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.17	8.37	8.33	6.33	5.36	3.15	1.78	-0.16	1.84	0.04	2.04	2.15	0.68	0.43	1.29



# Alt Model-Shift Uniqueness Test

004390744-02, P = 54.895159 Days, E = 91.952576 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
1.17	2.37	2.35	2.81	5.43	3.26	0.85	-1.18	-1.64	0.03	-0.43	0.74	0.78	0.54	0.77



### Stellar Parameters For KIC 004390744

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4728^{+156}_{-156}$	$4.630^{+0.059}_{-0.032}$	$-0.540^{+0.350}_{-0.300}$	$0.629^{+0.051}_{-0.057}$	$0.615^{+0.069}_{-0.040}$	$3.479^{+0.916}_{-0.502}$
	+3%/-3%	+1%/-1%	+65%/-56%	+8%/-9%	+11%/-7%	+26%/-14%
Source	PHO1	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 004390744-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-3538 \pm 423$	$9.05^{+9.47}_{-6.10}$	$469^{+18}_{-18}$	$3557^{+1834}_{-696}$	$1416^{+11165}_{-1086}$
Alt.	$-9378 \pm 3950$	$10.64^{+9.73}_{-6.95}$	$469^{+18}_{-17}$	$3923^{+2142}_{-806}$	$2375^{+19280}_{-1759}$

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

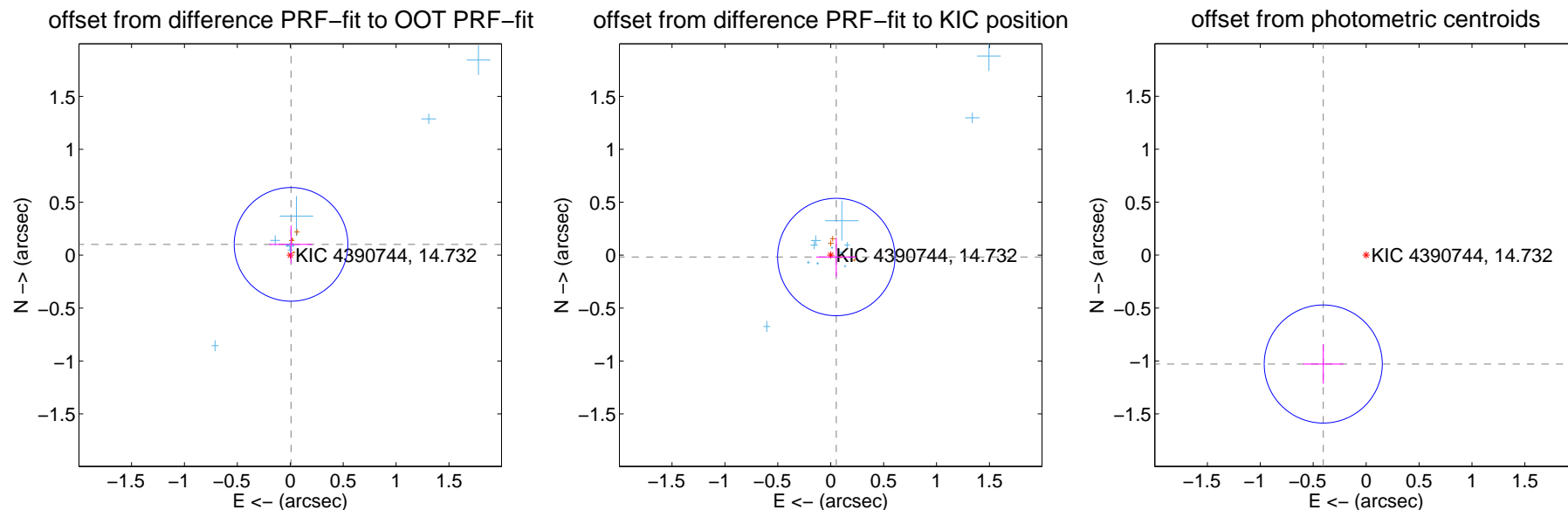
## DV Centroid Data

Supplemental centroid analysis for 004390744-02. Kepler magnitude: 14.73. Transit SNR 7.14

There are 13 quarters with good PRF difference image offsets

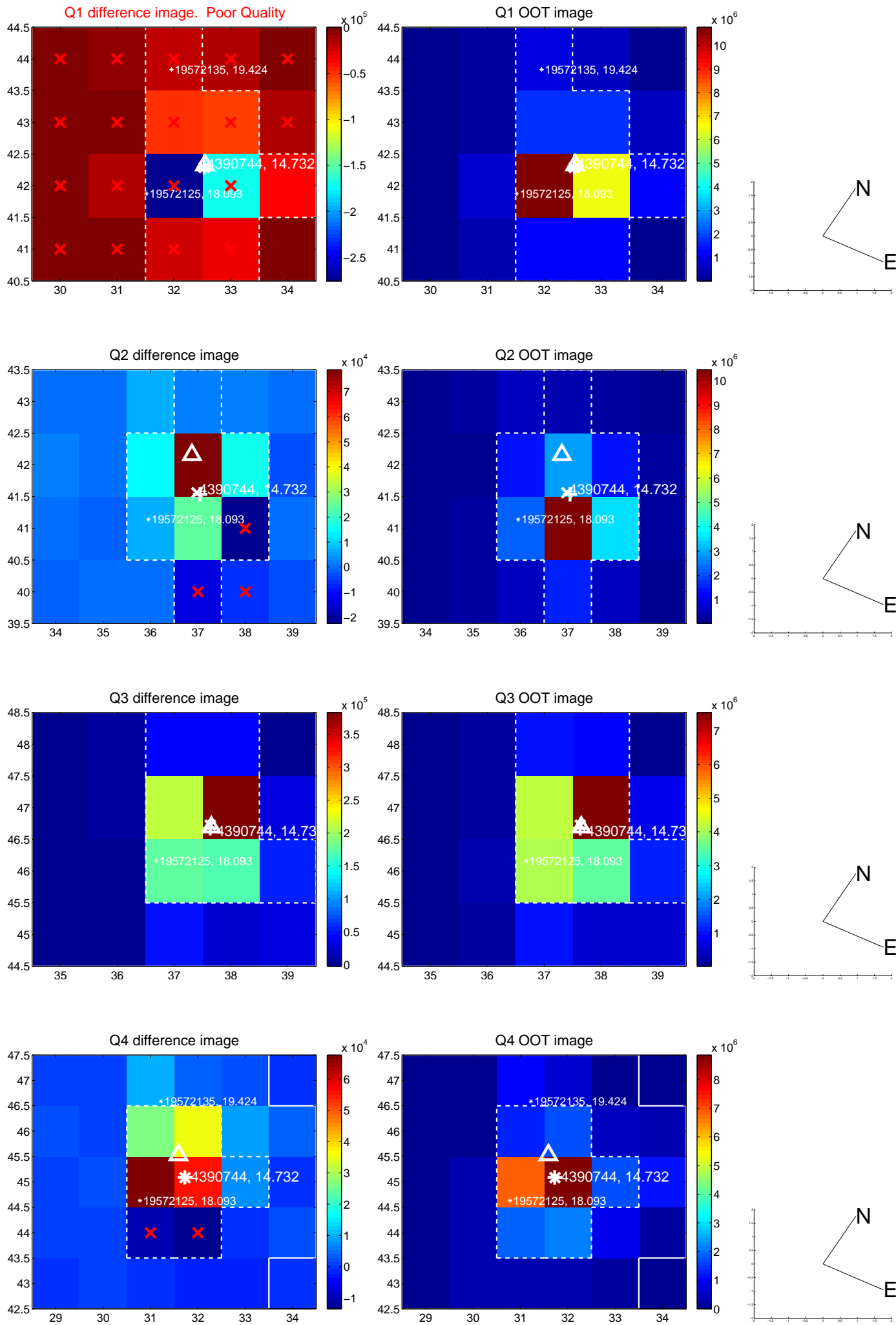
The direct PRF centroid is offset from the target star catalog position by about 0.02 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.102 \pm 0.179$	0.57	$-0.007 \pm 0.203$	$0.102 \pm 0.178$
PRF-fit source offset from KIC position	$0.055 \pm 0.185$	0.30	$-0.053 \pm 0.190$	$-0.017 \pm 0.184$
photometric centroid source offset	$1.11 \pm 0.19$	5.95	$0.41 \pm 0.19$	$-1.03 \pm 0.19$

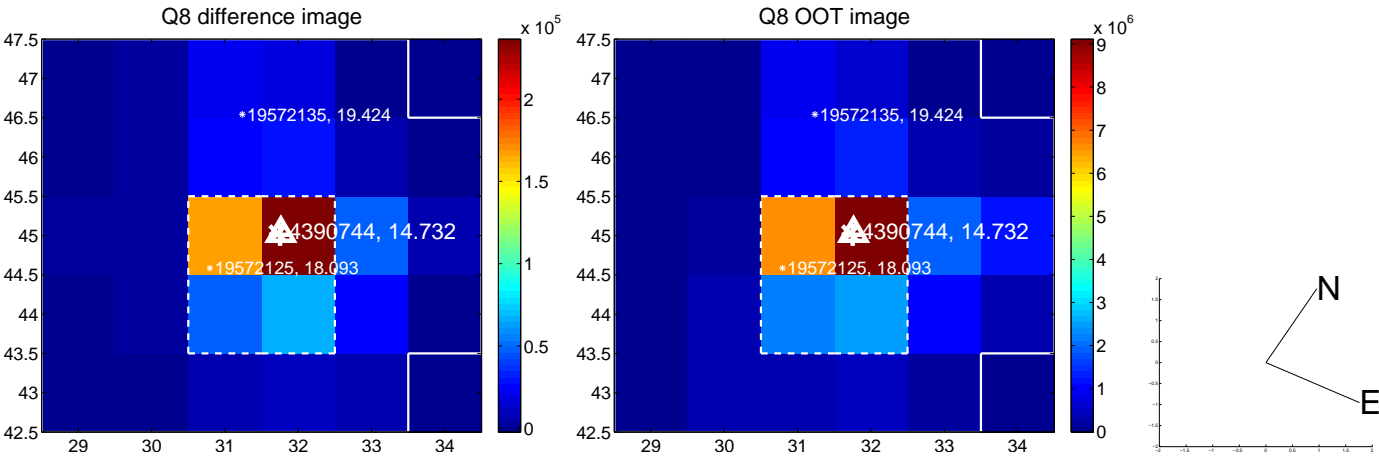
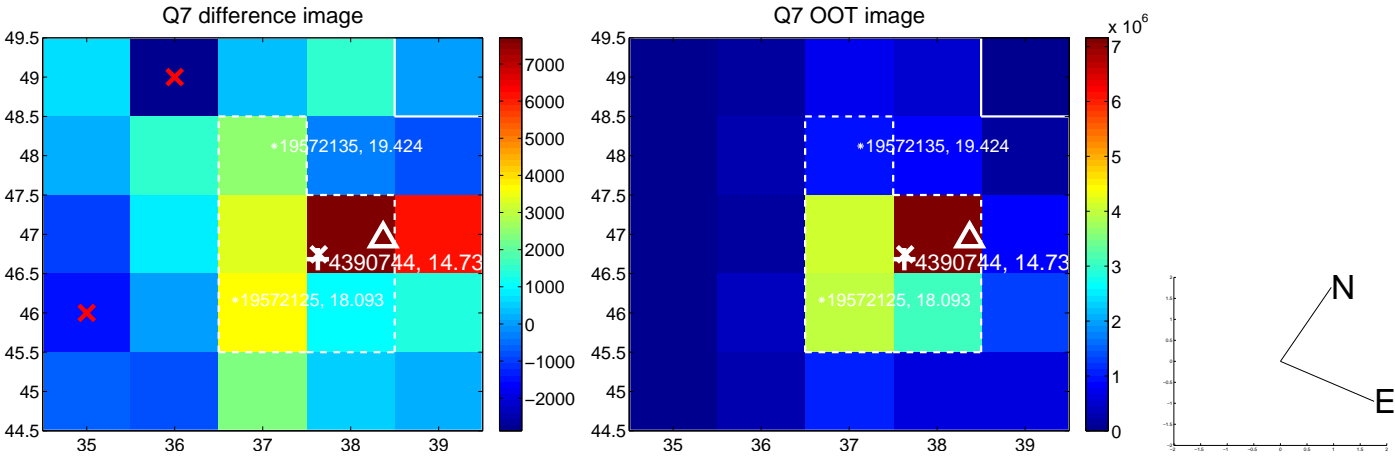
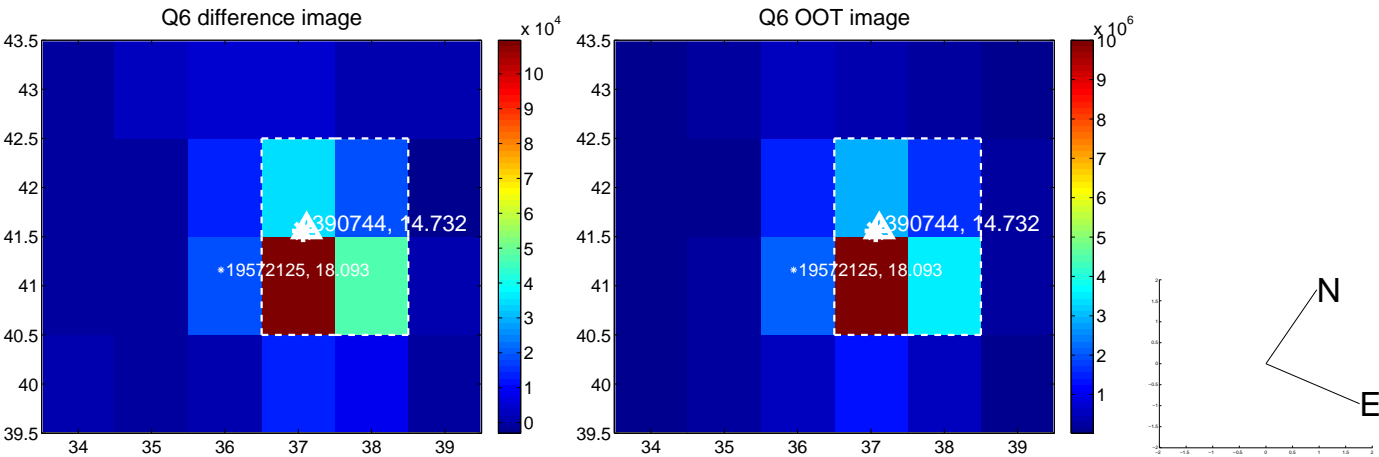
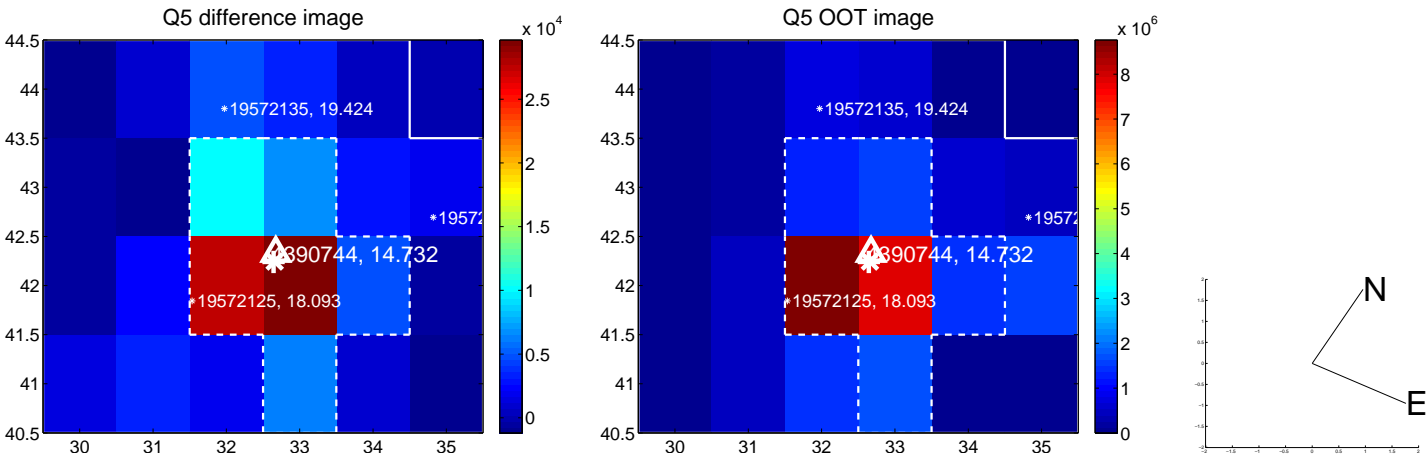


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

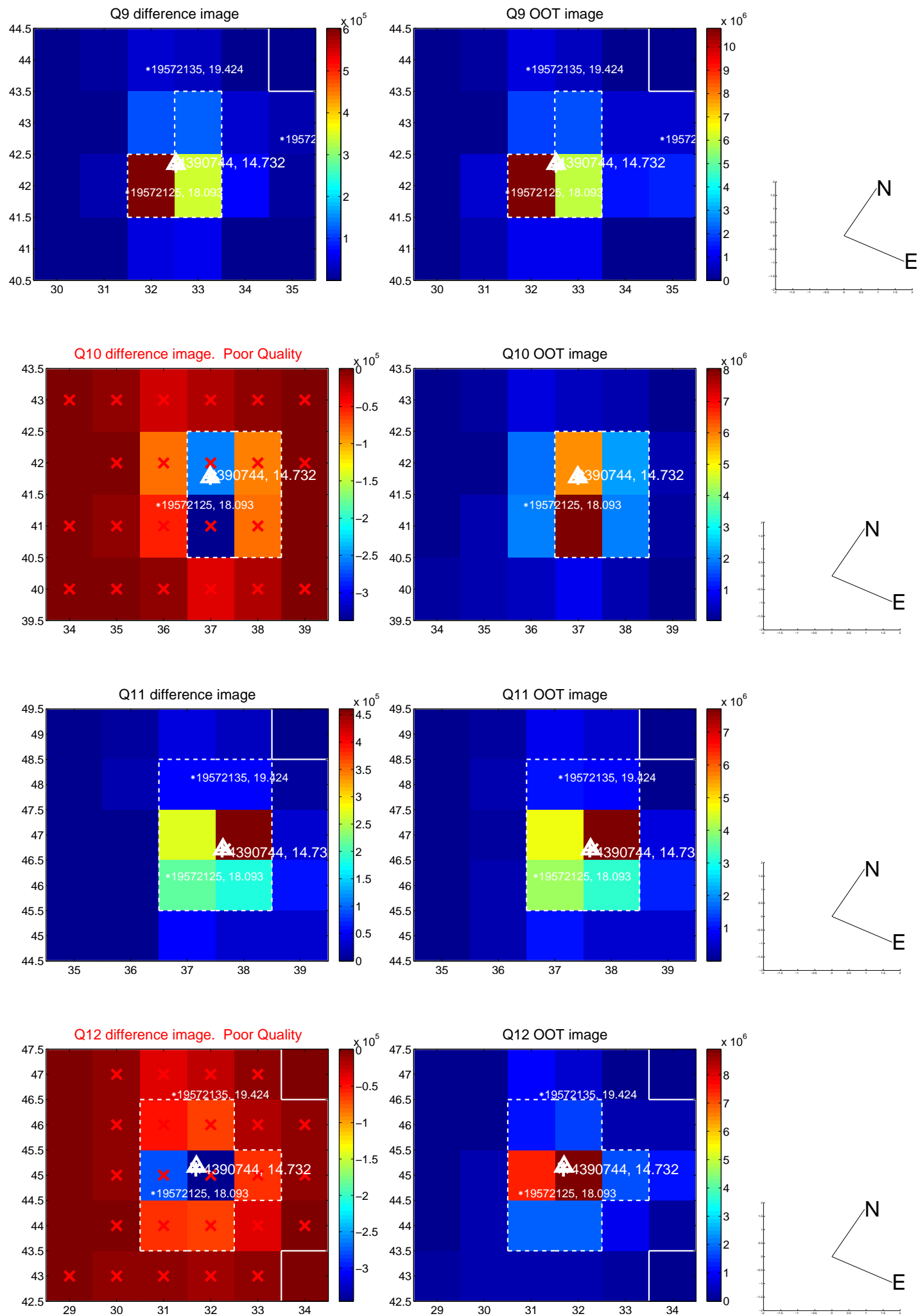


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

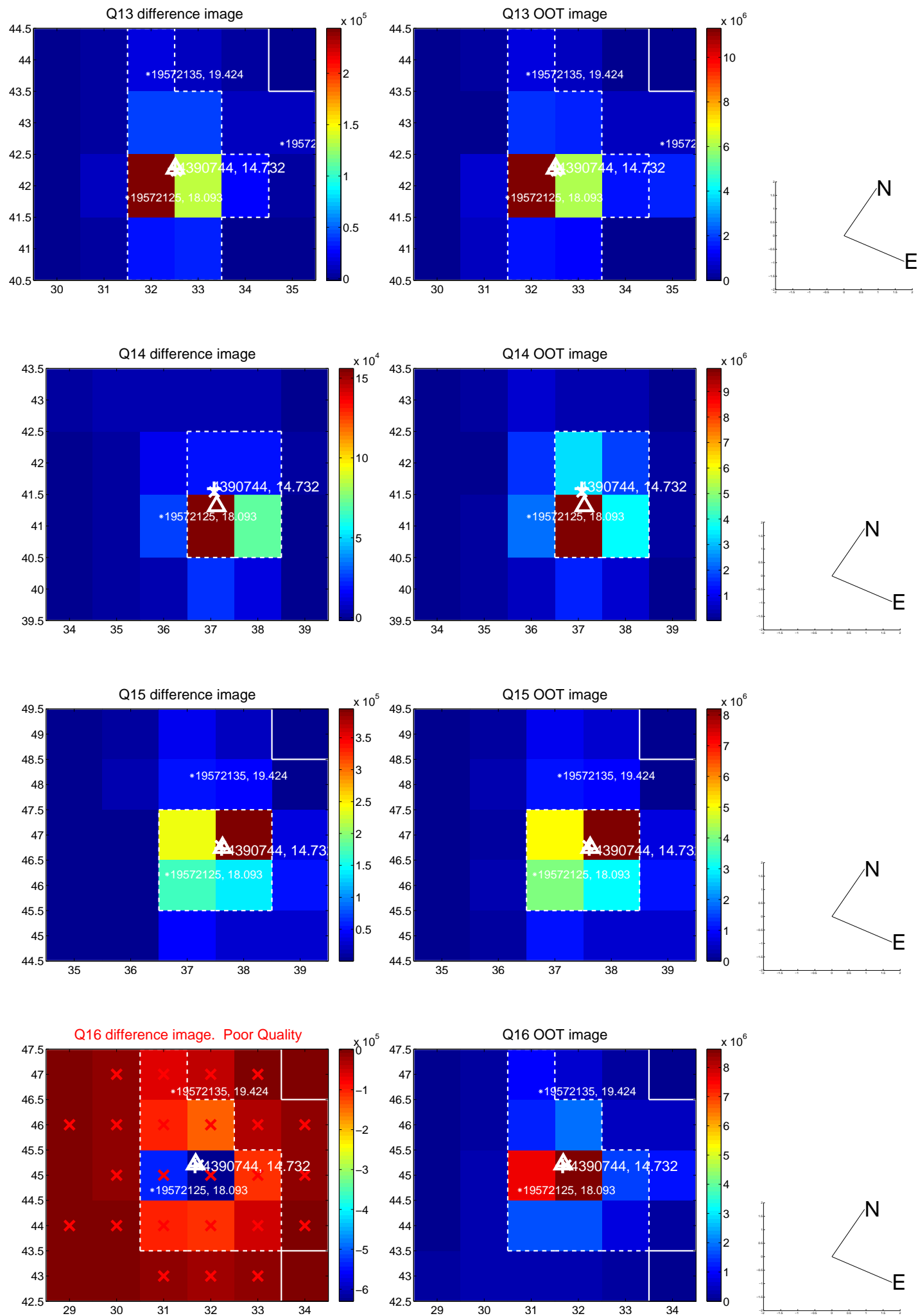




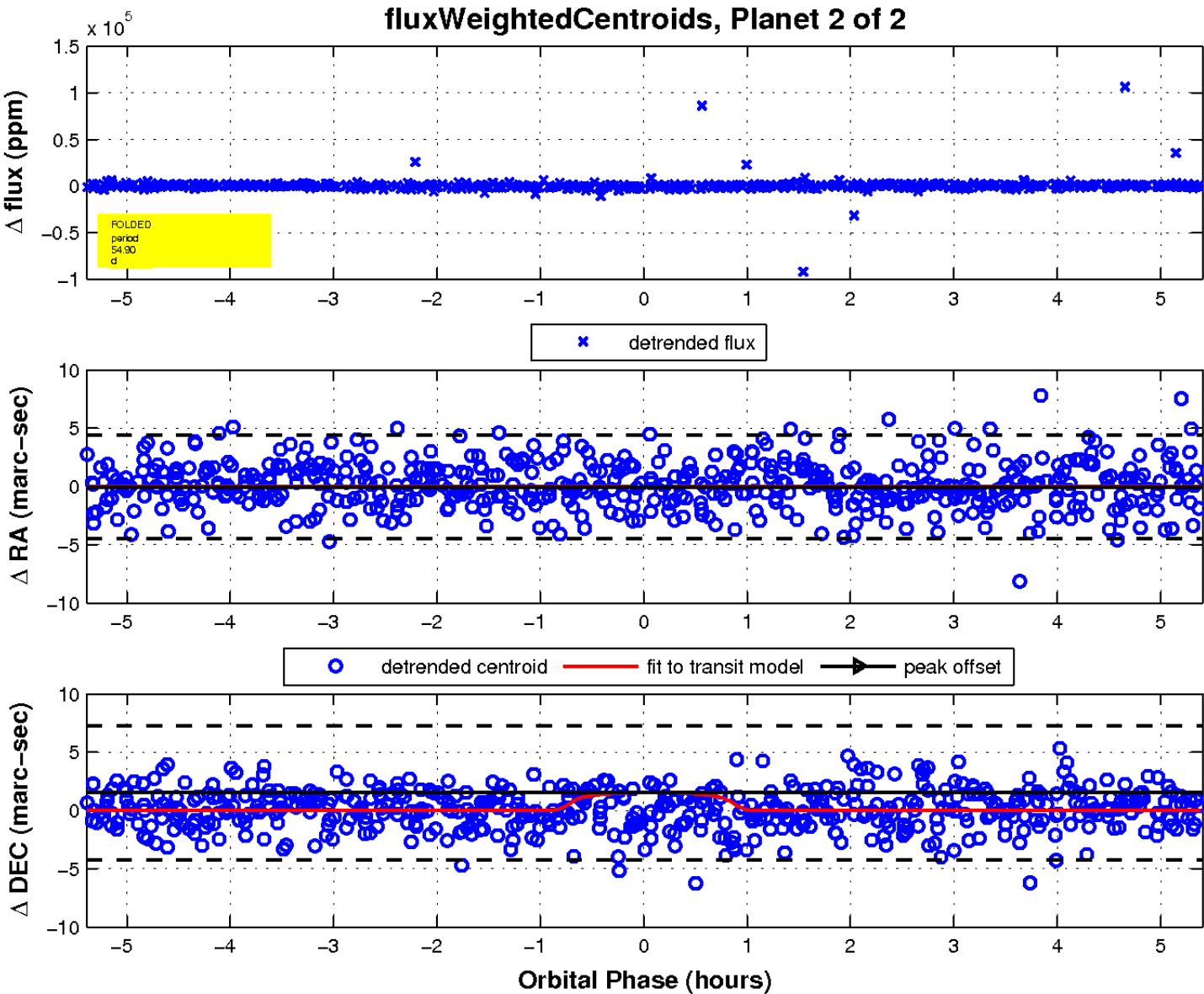
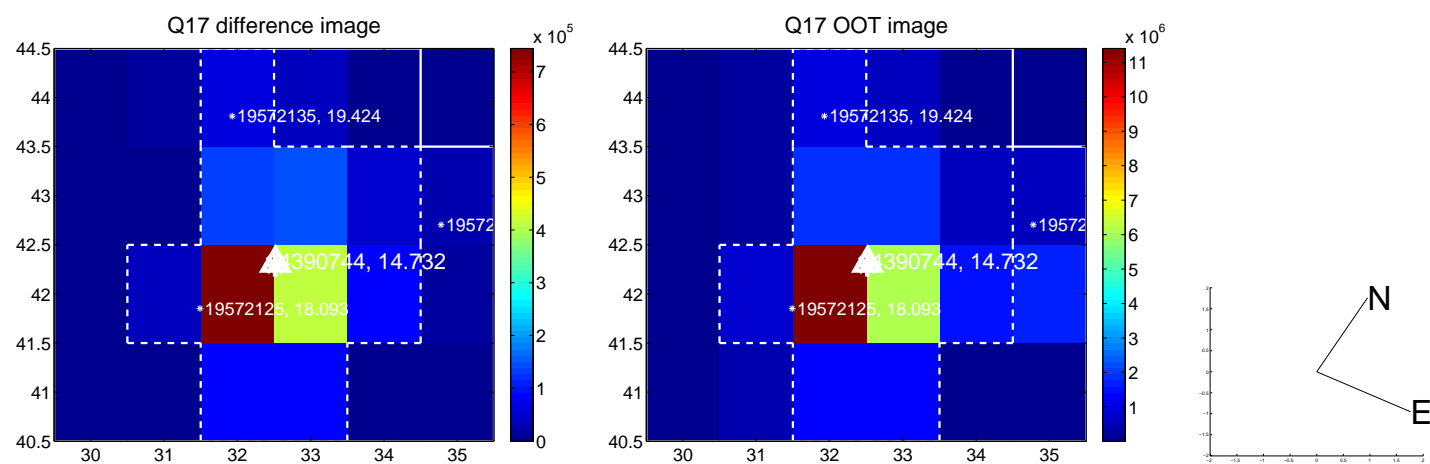
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

