

# KIC 004847691

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004847691-01	OBS	No	4.648044	132.574326	22.3	4.772	9.5	4.9	0.97	6784	0.55	667.66
004847691-02	OBS	No	4.648166	133.171788	25.6	4.946	8.1	5.9	0.97	6784	0.57	667.63

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004847691-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004847691-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE_ZUMA_TRACKER—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_SATURATED

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

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

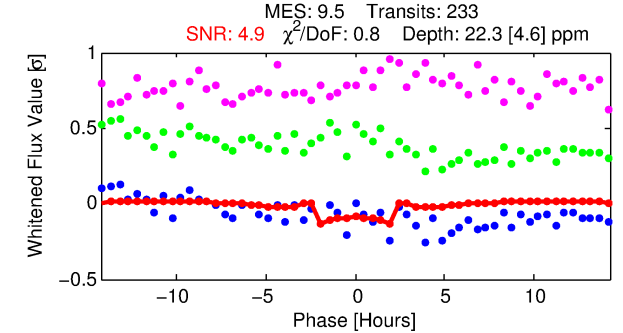
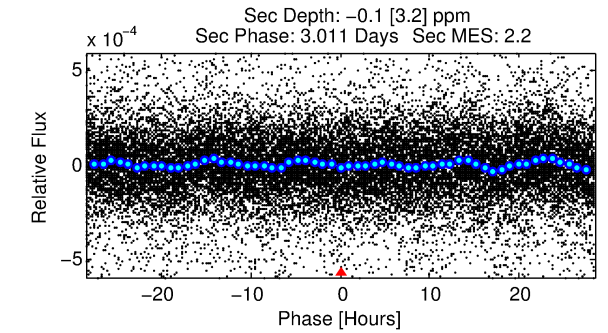
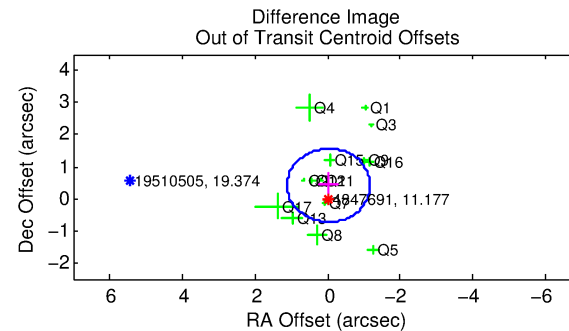
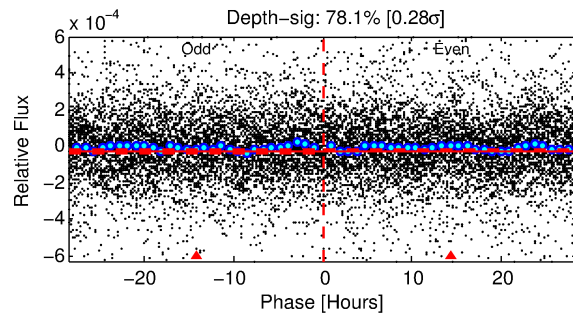
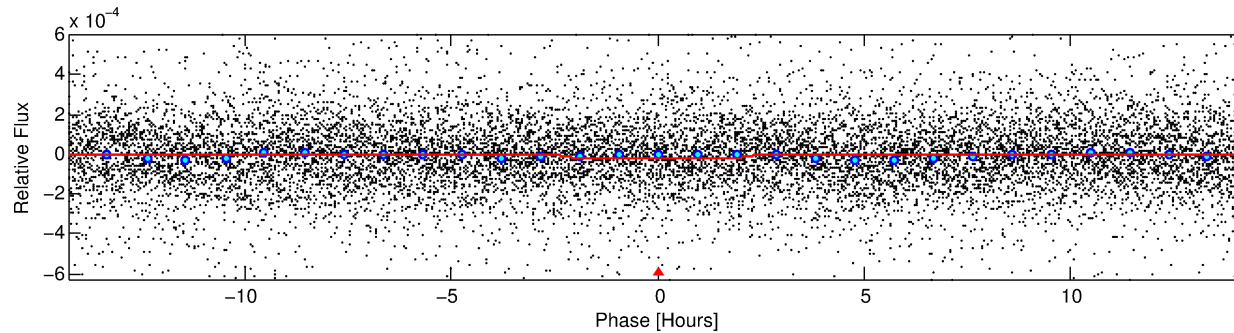
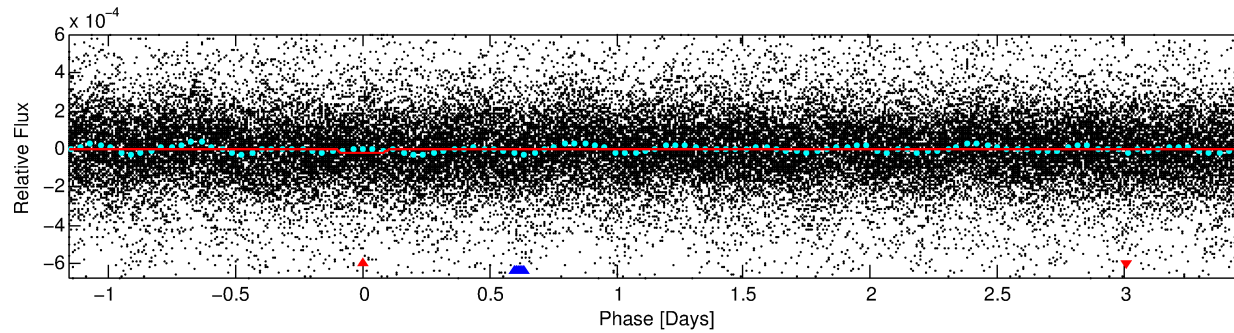
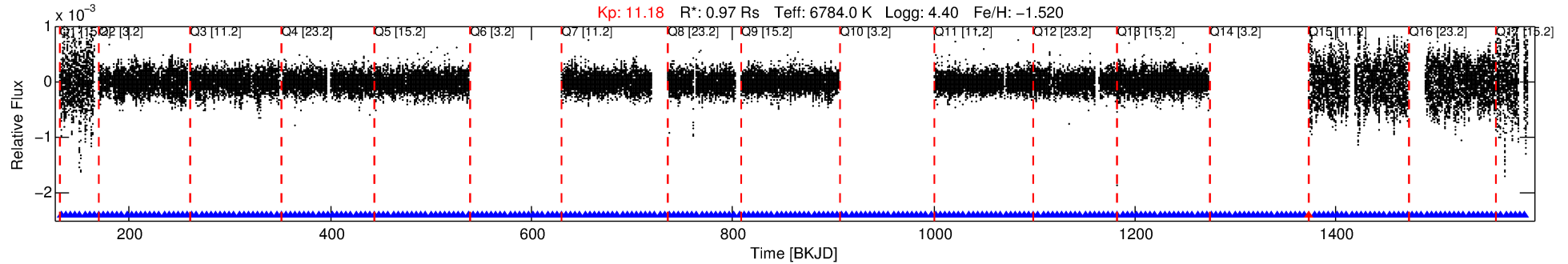
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004847691-01

No Significant Match Found

# DV One-Page Summary

KIC: 4847691 Candidate: 1 of 2 Period: 4.648 d



## DV Fit Results:

Period = 4.64804 [0.00005] d  
Epoch = 132.5743 [0.0059] BKJD  
Rp/R\* = 0.0052 [0.0014]  
a/R\* = 2.96 [4.07]  
b = 0.93 [0.22]  
Seff = 667.66 [216.12]  
Teq = 1296 [105] K  
Rp = 0.55 [0.18] Re  
a = 0.0519 [0.0094] AU  
Ag = N/A  
Teffp = N/A

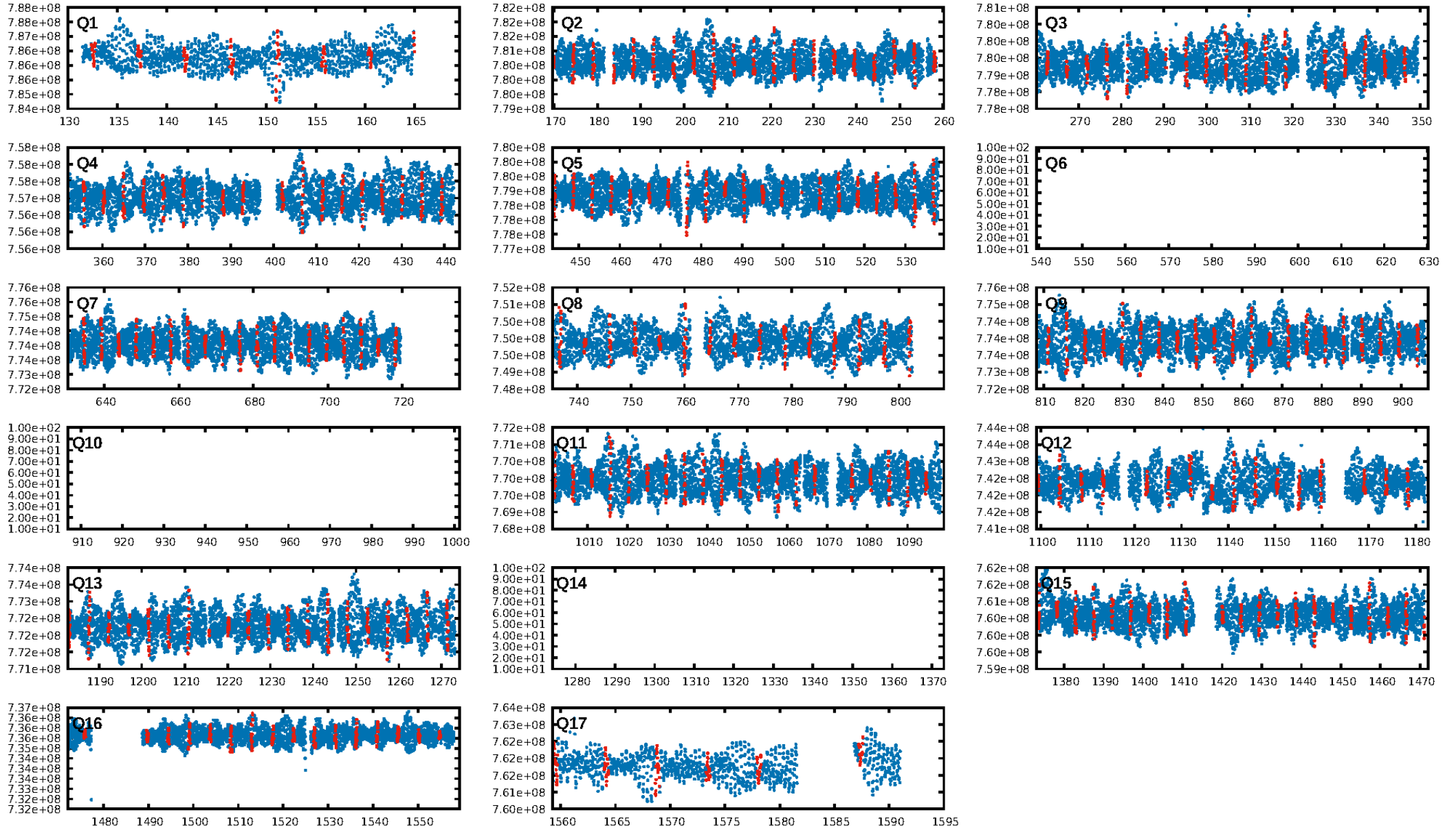
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.26e-24  
RollingBand-fgt: 1.00 [219/220]  
GhostDiagnostic-chr: 1.481  
Centroid-sig: 0.9%  
Centroid-so: 2.196 arcsec [1.92 $\sigma$ ]  
OotOffset-rm: 0.418 arcsec [1.10 $\sigma$ ]  
KicOffset-rm: 0.555 arcsec [1.64 $\sigma$ ]  
OotOffset-st: 1/4/4/5 [14]  
KicOffset-st: 1/4/4/5 [14]  
DiffImageQuality-fgm: 0.29 [4/14]  
DiffImageOverlap-fno: 1.00 [14/14]

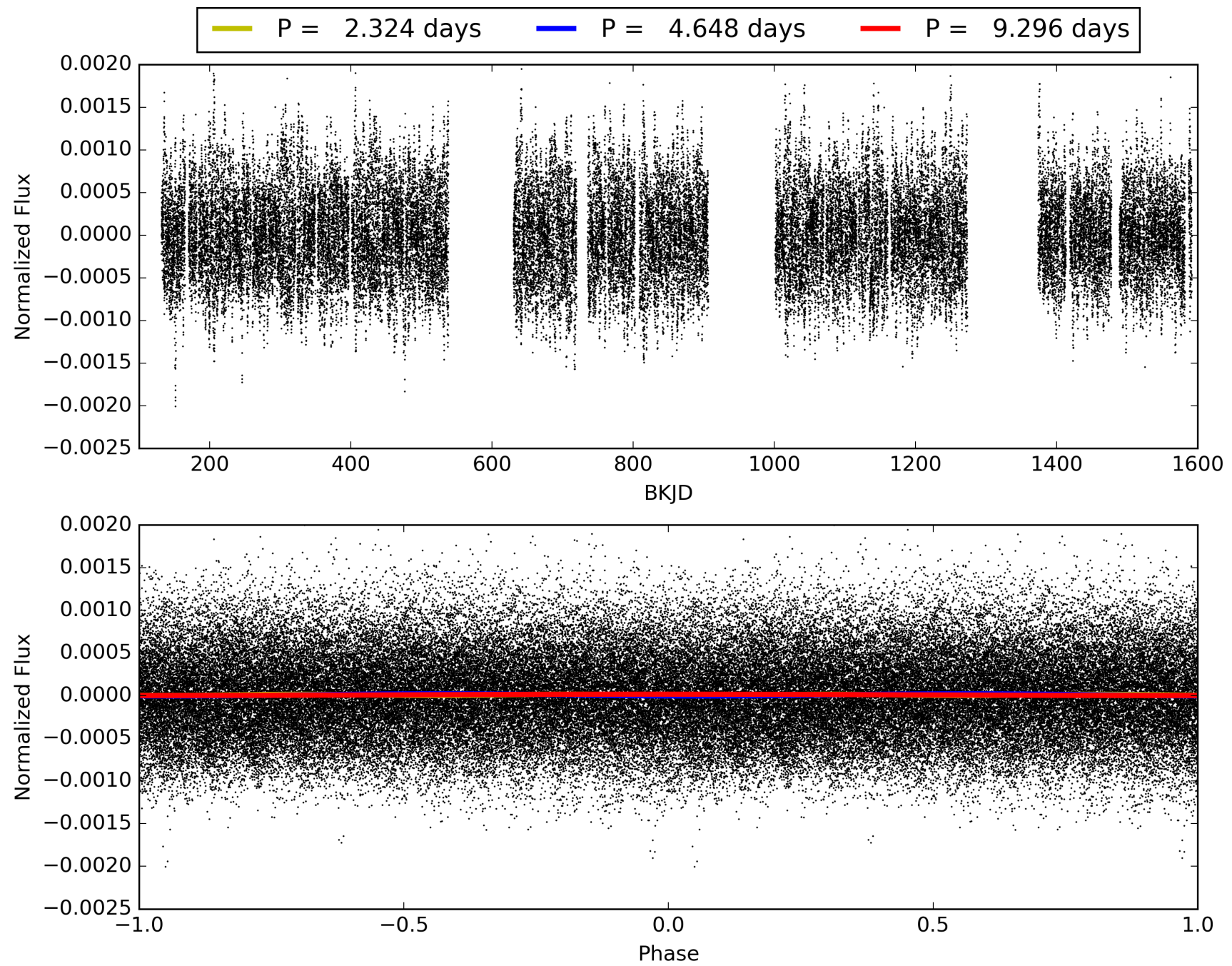
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 08:36:02 Z

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

# TCE 004847691-01, PDC Light Curves



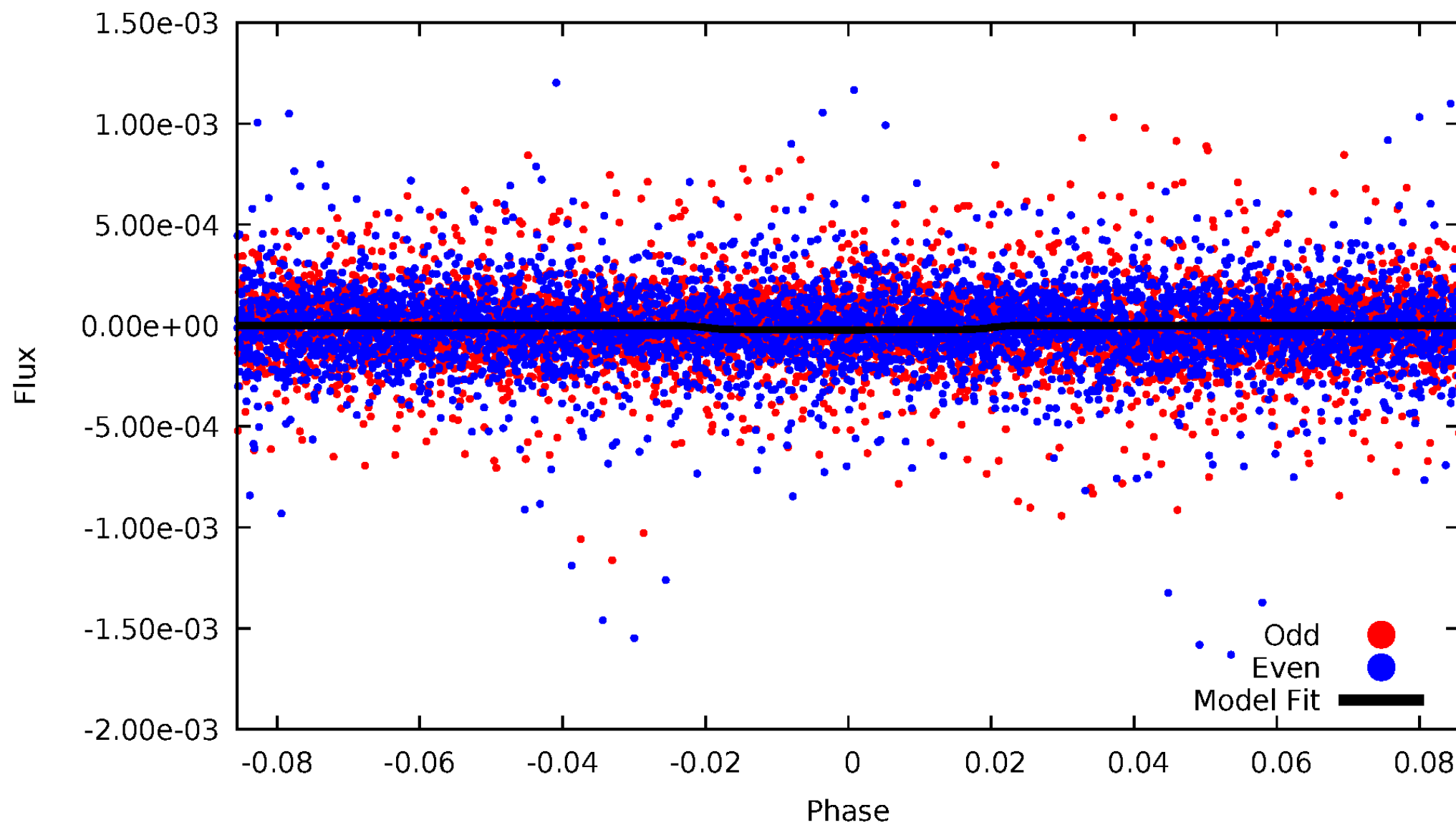
TCE 004847691-01





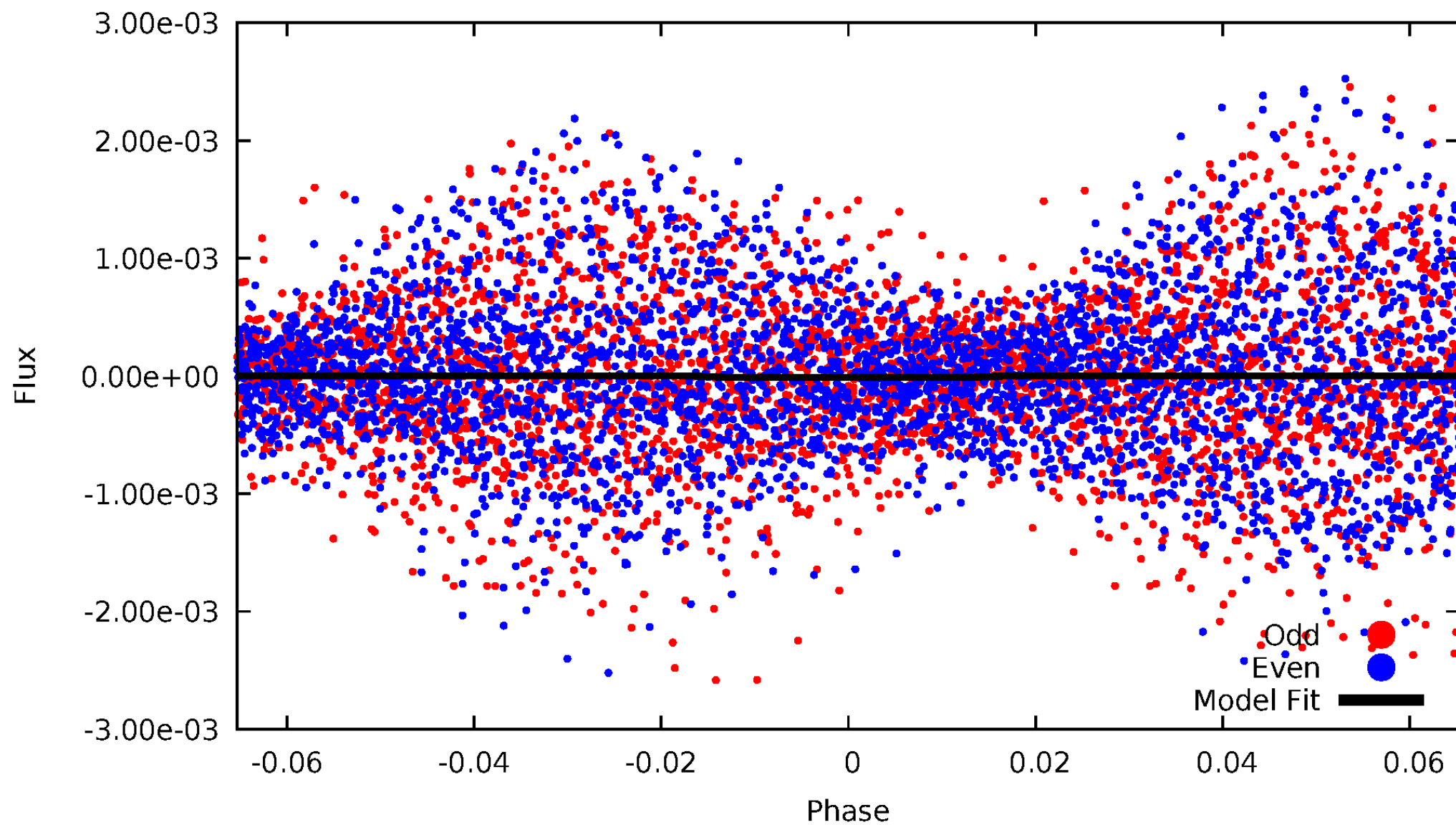
# DV Odd/Even

TCE 004847691-01



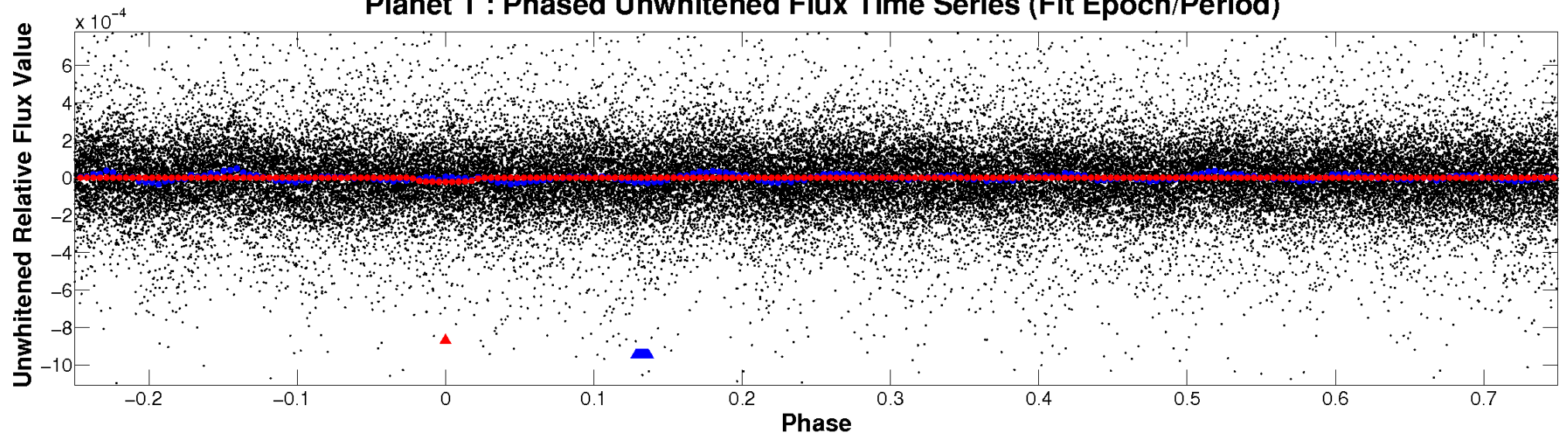
# ALT Odd/Even

TCE 004847691-01

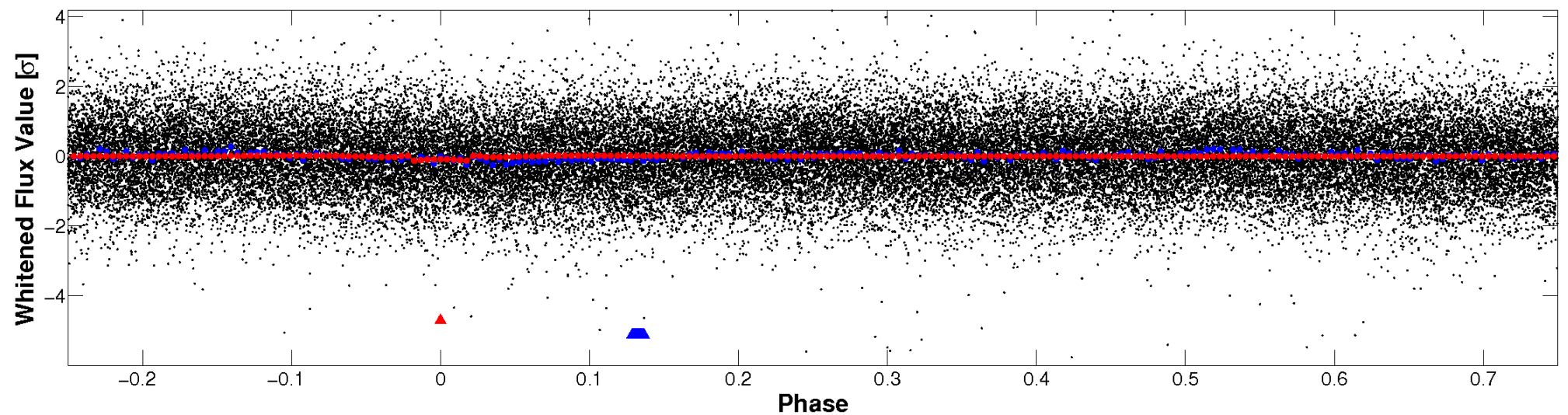


# Non-Whitened Vs. Whitened Light Curve

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

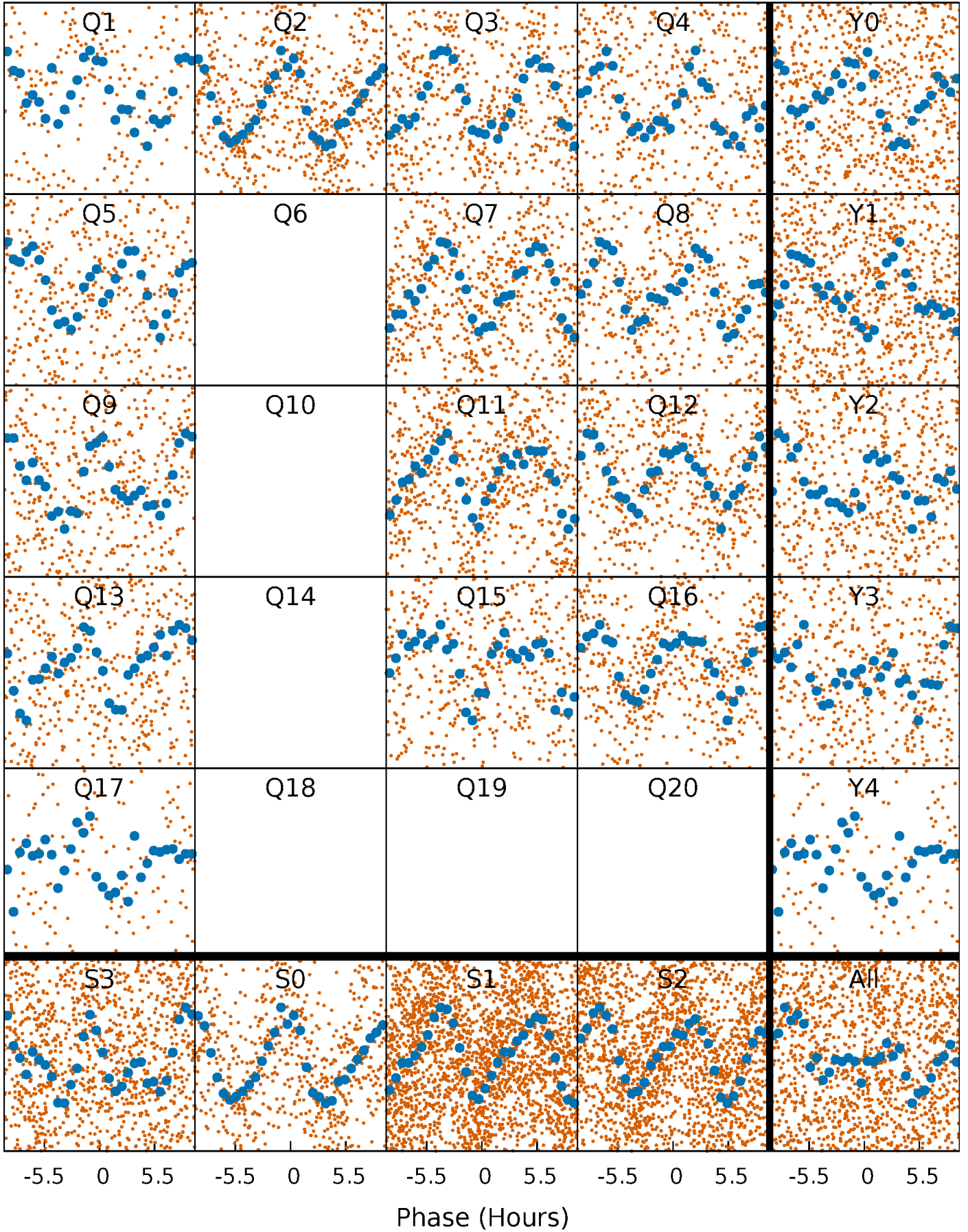


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

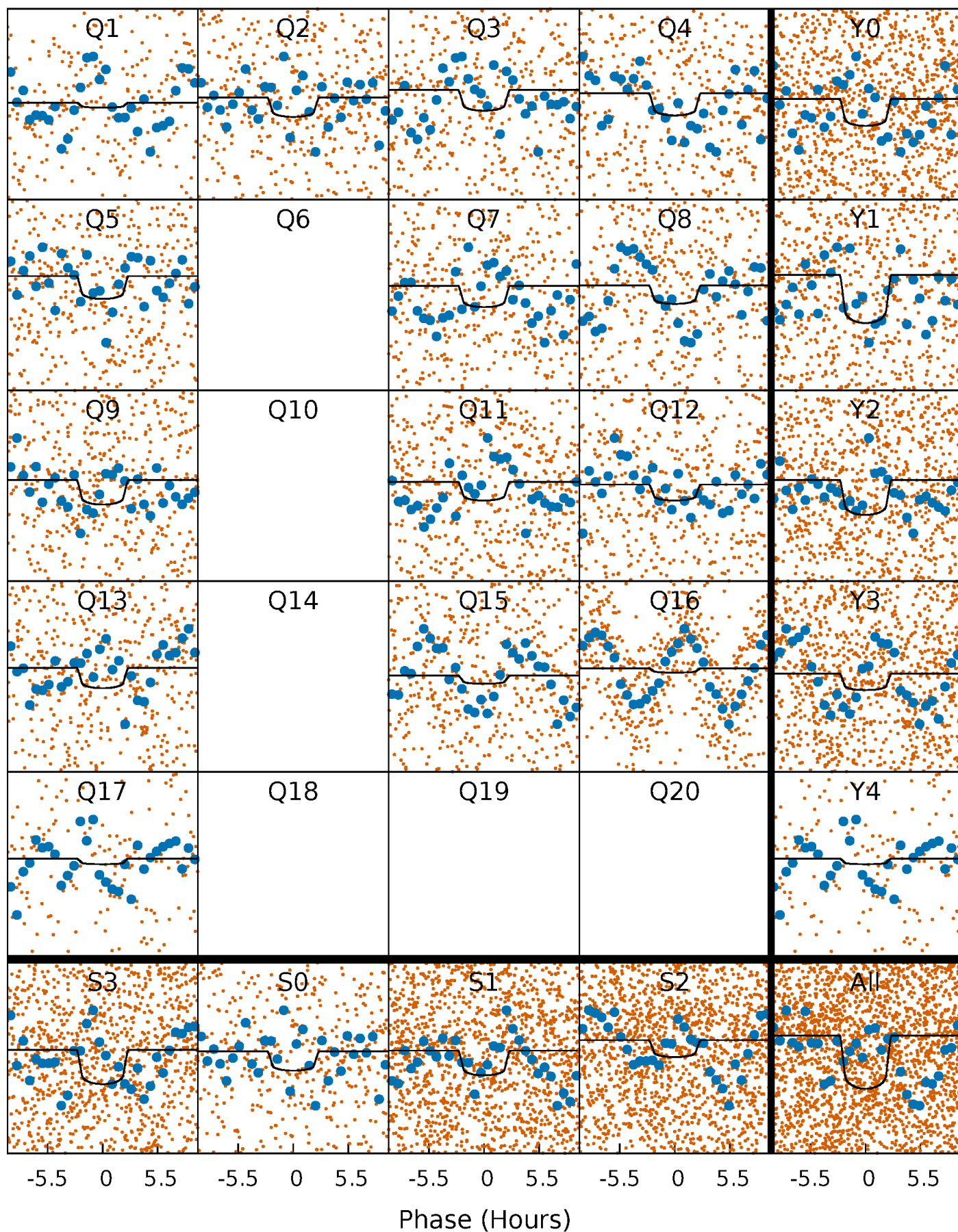
TCE 004847691-01   P= 4.648044 Days    $T_0=132.574326$  (BKJD)





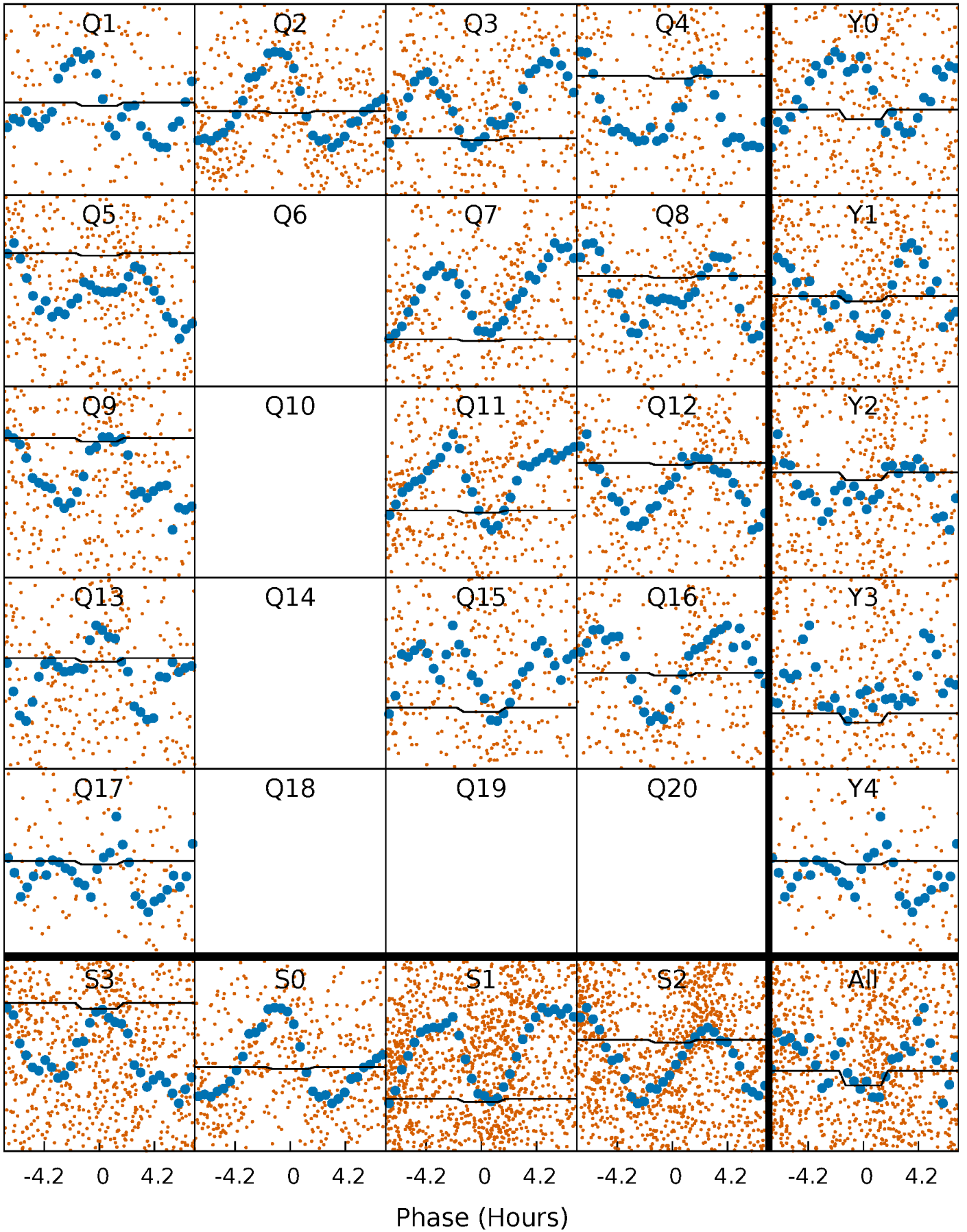
# DV Quarter-Phased Transit Curves

TCE 004847691-01 P= 4.648044 Days  $T_0=132.574326$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

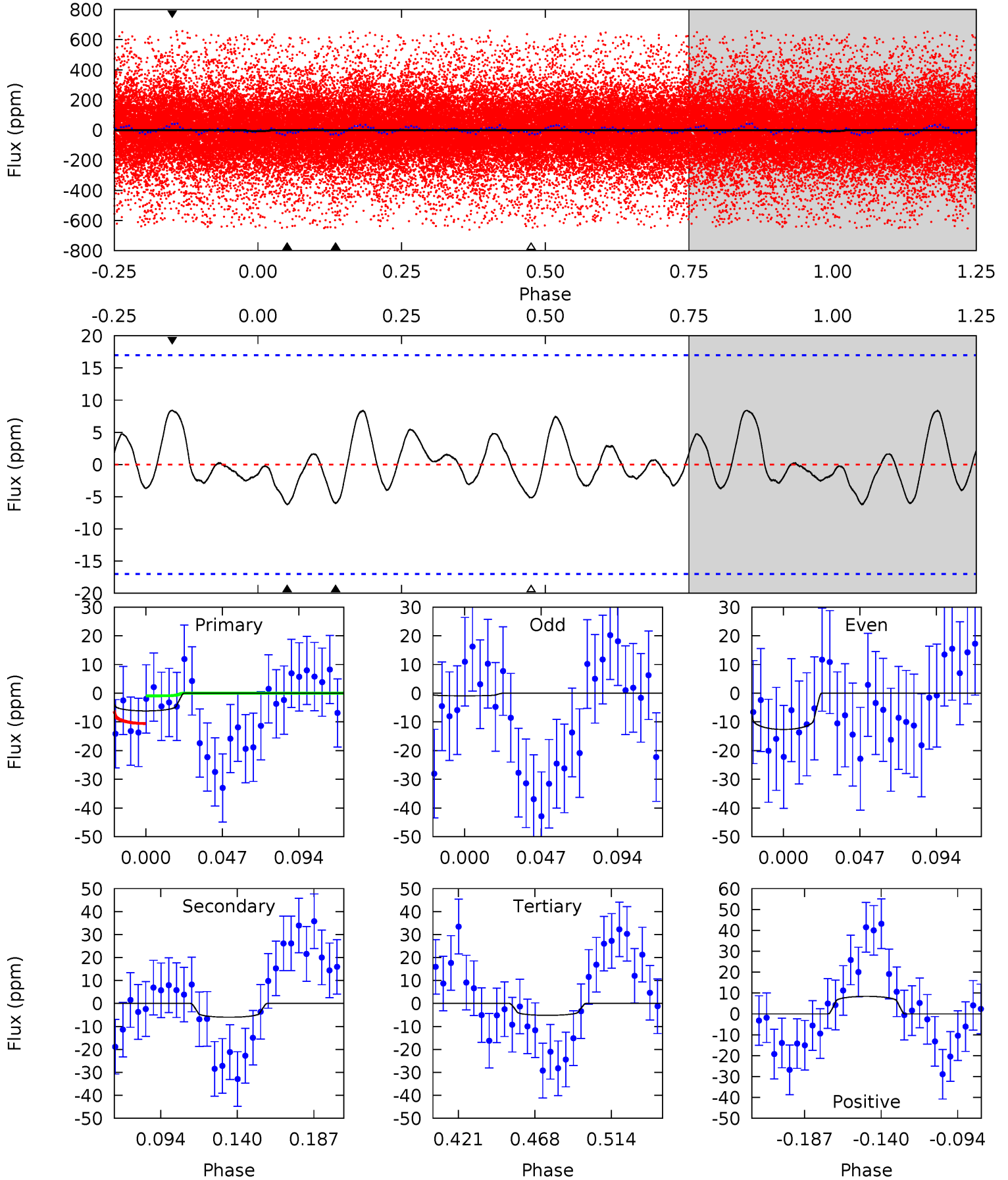
TCE 004847691-01   P= 4.647578 Days    $T_0=132.608159$  (BKJD)



# DV Model-Shift Uniqueness Test

004847691-01, P = 4.648044 Days, E = 127.926282 Days

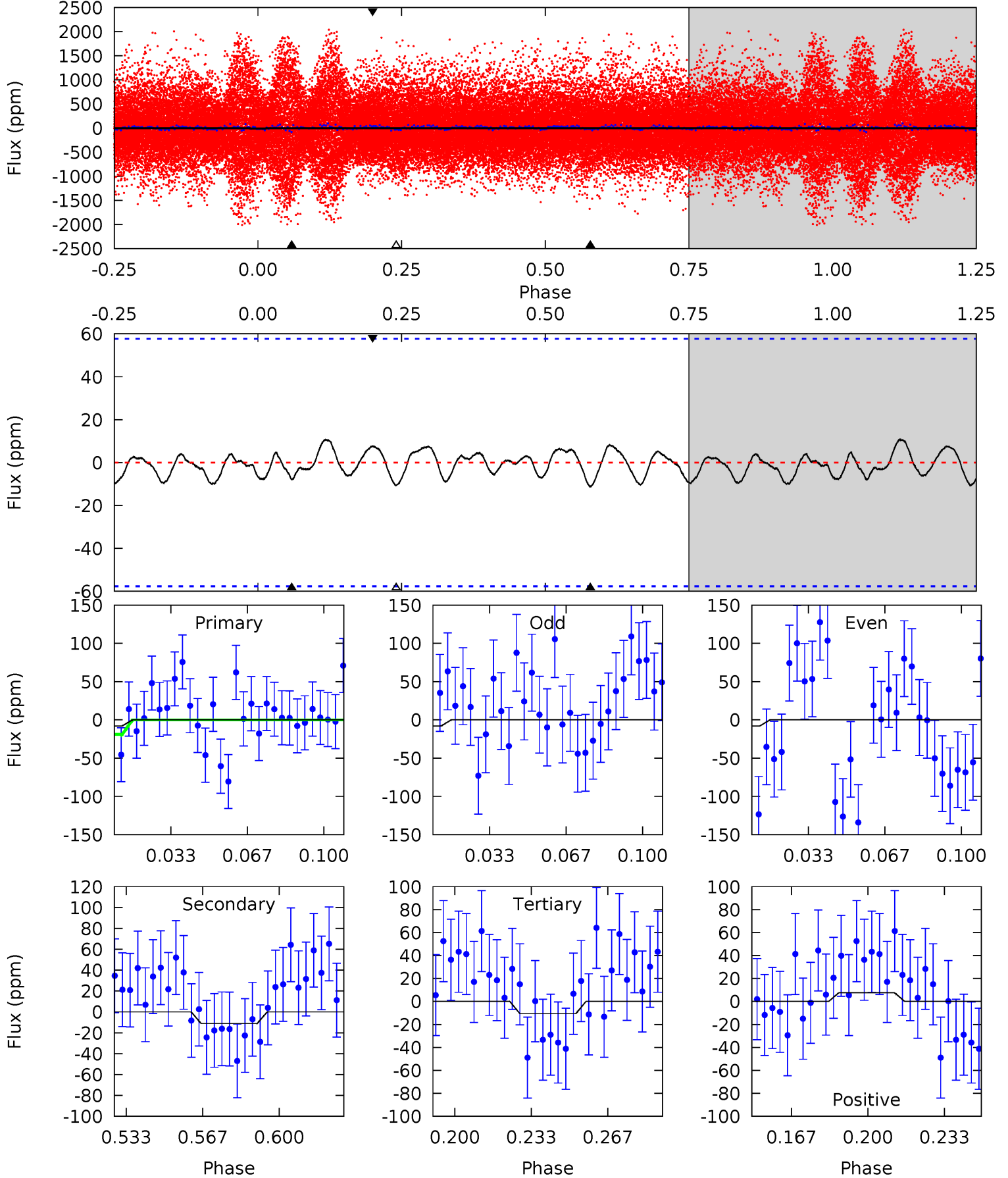
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.72	1.66	1.44	2.34	4.72	1.99	0.89	0.28	-0.62	0.23	-0.67	1.65	1.61	0.58	1.36



# Alt Model-Shift Uniqueness Test

004847691-01, P = 4.647578 Days, E = 127.960581 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
0.66	0.93	0.89	0.62	4.79	2.13	0.42	-0.23	0.03	0.04	0.30	0.01	-4.02	0.49	0.62





### Stellar Parameters For KIC 004847691

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6784^{+213}_{-260}$	$4.397^{+0.135}_{-0.165}$	$-1.520^{+0.300}_{-0.250}$	$0.973^{+0.191}_{-0.139}$	$0.861^{+0.066}_{-0.060}$	$1.317^{+0.746}_{-0.552}$
	+3%/-4%	+3%/-4%	+20%/-16%	+20%/-14%	+8%/-7%	+57%/-42%
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 004847691-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-6 \pm 4$	$0.56^{+0.17}_{-0.16}$	$1815^{+118}_{-103}$	$4736^{+907}_{-848}$	$27^{+37}_{-16}$
Alt.	$-11 \pm 12$	$0.40^{+0.16}_{-0.16}$	$1810^{+118}_{-99}$	$6305^{+2580}_{-9915}$	$101^{+224}_{-107}$

$T_{\text{max}}$  = 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

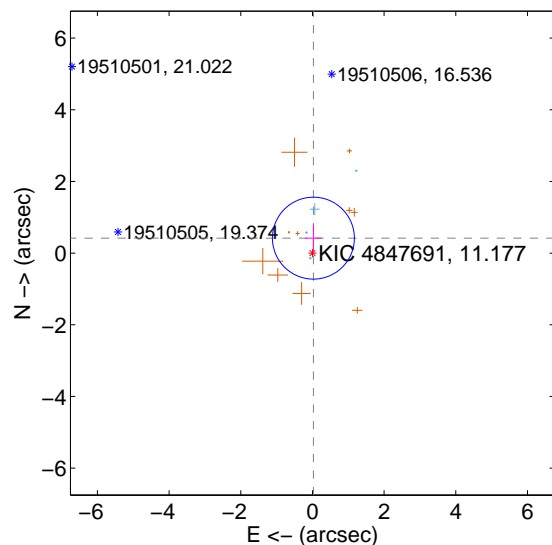
Supplemental centroid analysis for 004847691-01. **Kepler magnitude: 11.18.** Transit SNR 4.89

There are 4 quarters with good PRF difference image offsets

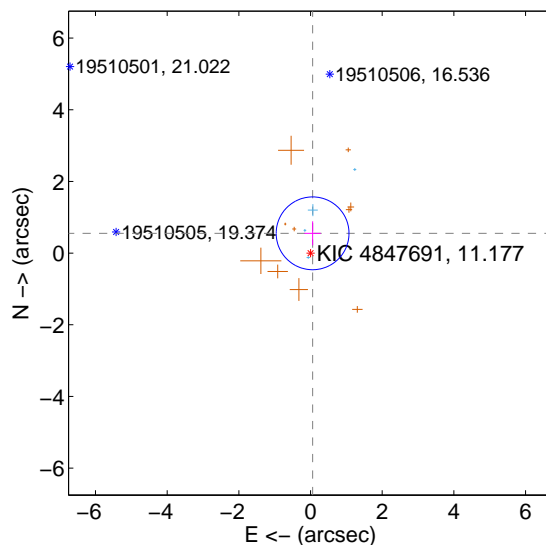
The direct PRF centroid is offset from the target star catalog position by about 0.01 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.418 \pm 0.381$	1.10	$-0.027 \pm 0.234$	$0.417 \pm 0.375$
PRF-fit source offset from KIC position	$0.555 \pm 0.339$	1.64	$-0.058 \pm 0.229$	$0.552 \pm 0.334$
photometric centroid source offset	$2.20 \pm 1.14$	1.92	$-0.79 \pm 1.01$	$2.05 \pm 1.16$

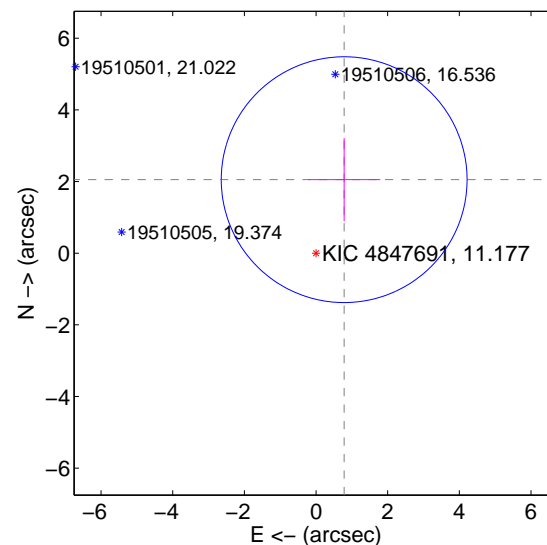
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

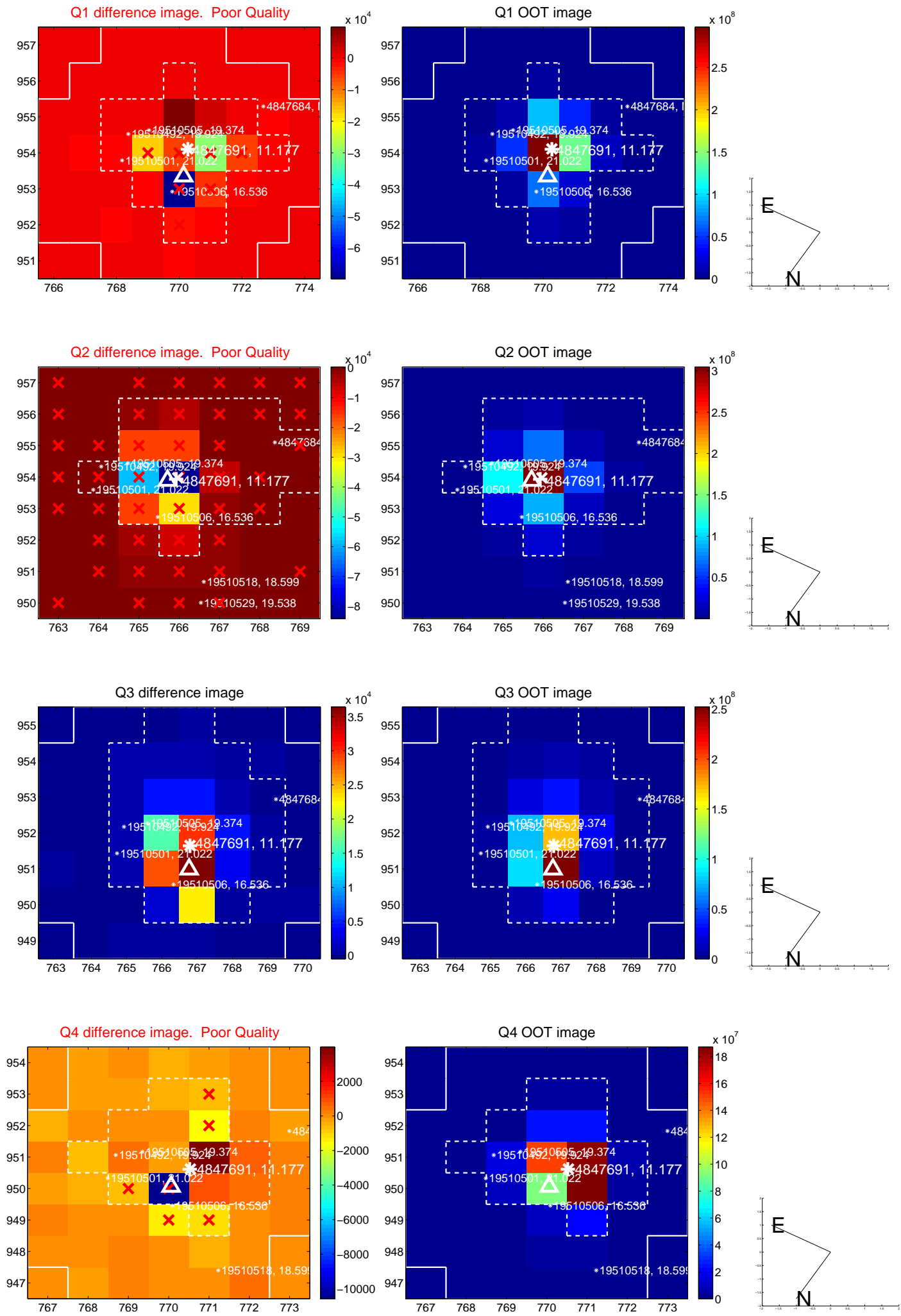


offset from photometric centroids

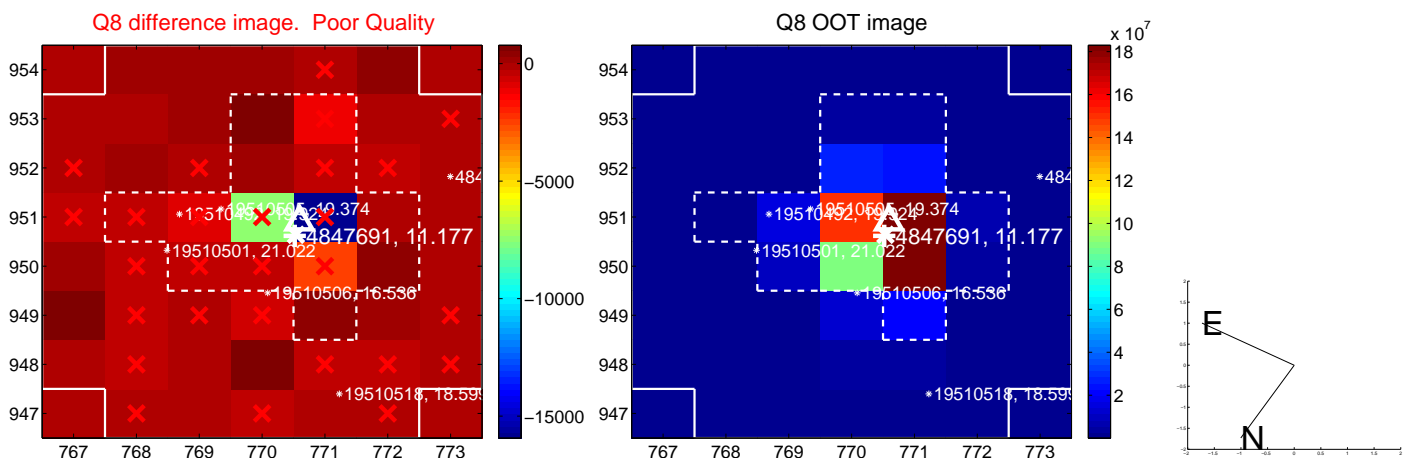
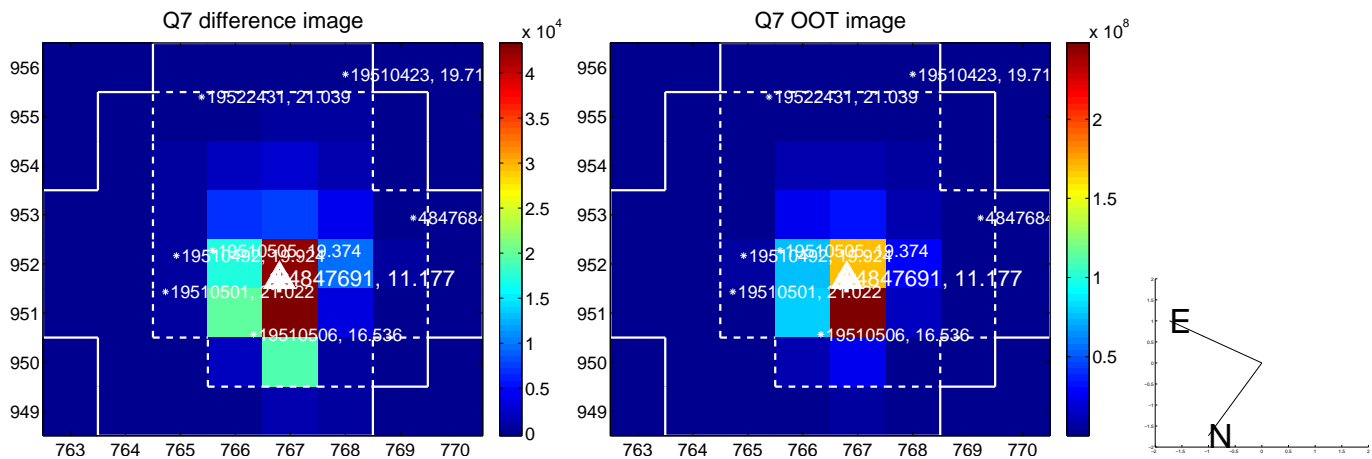
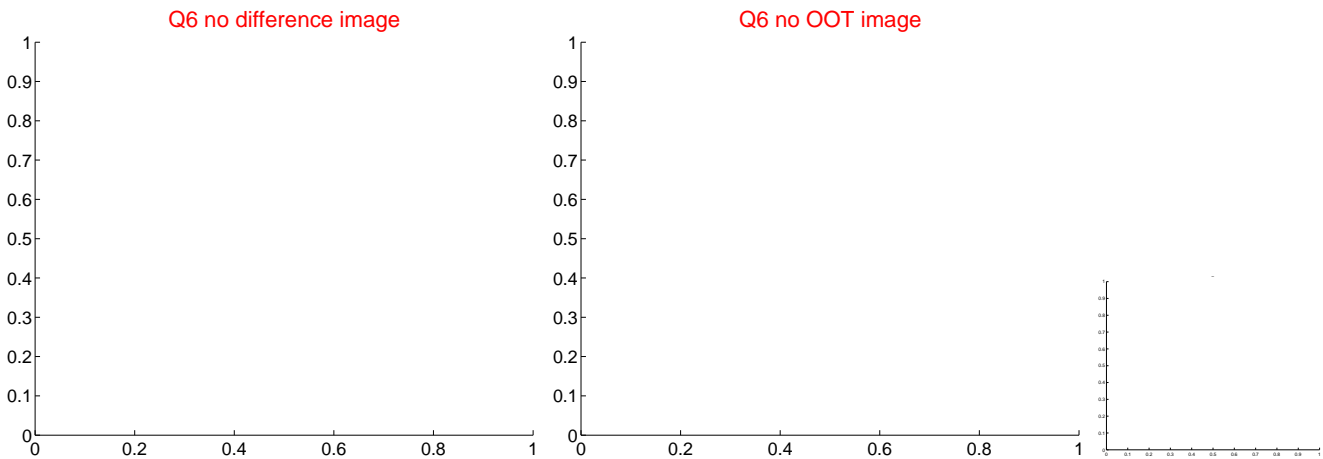
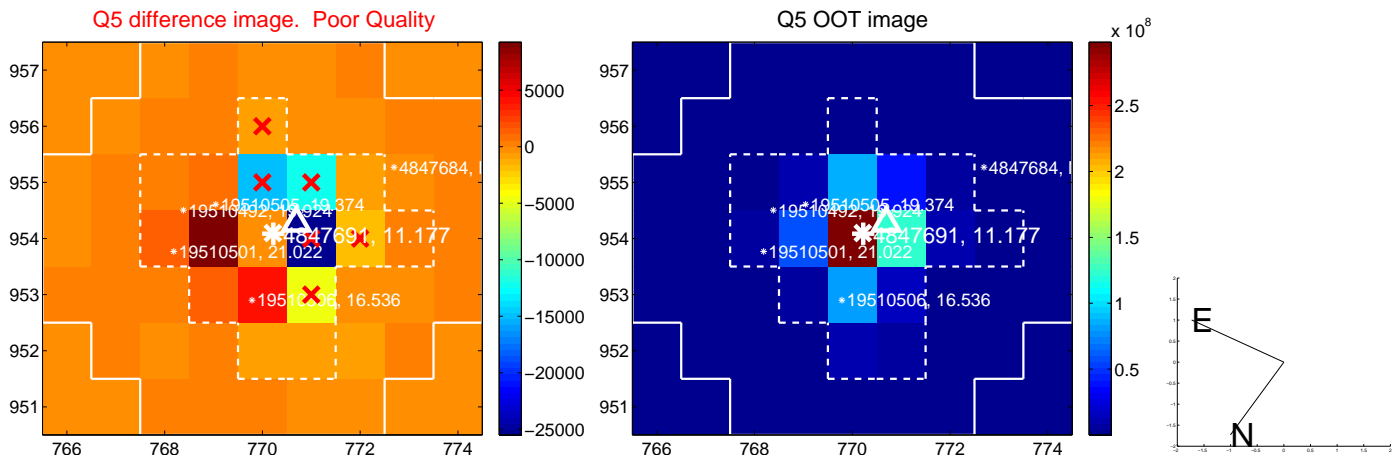


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

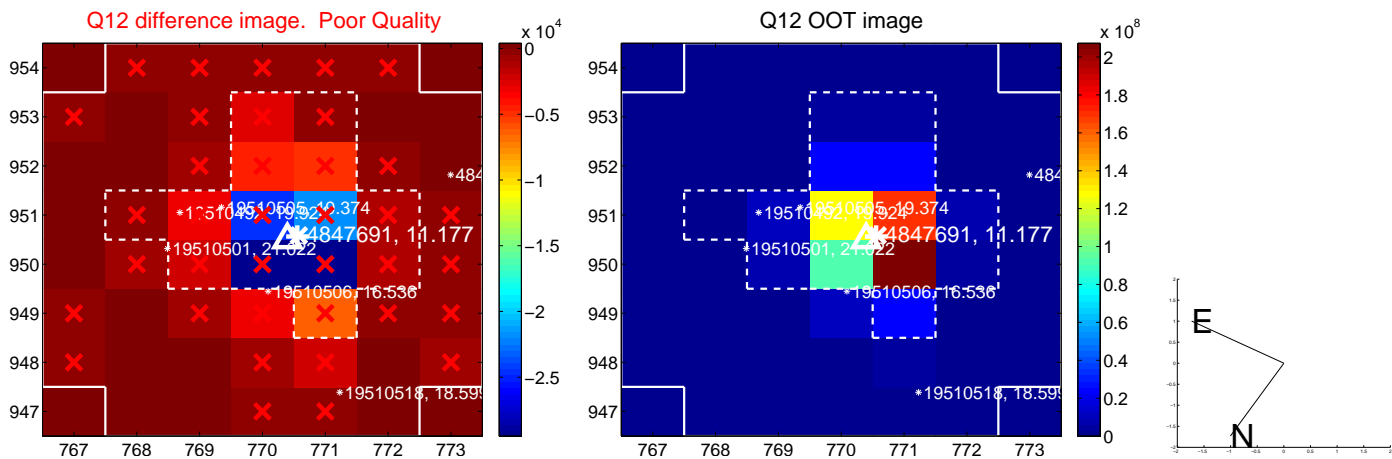
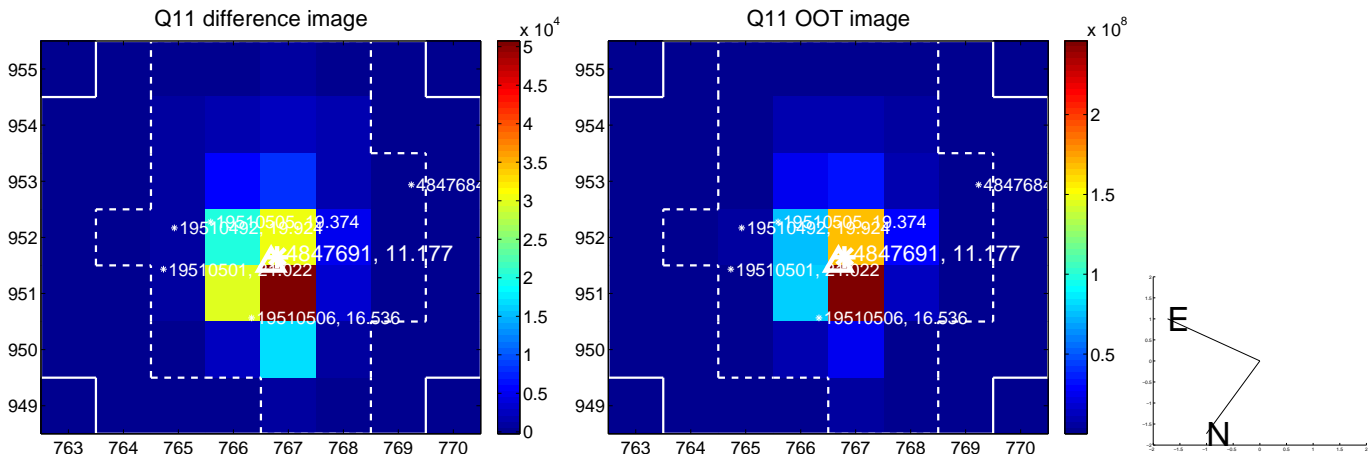
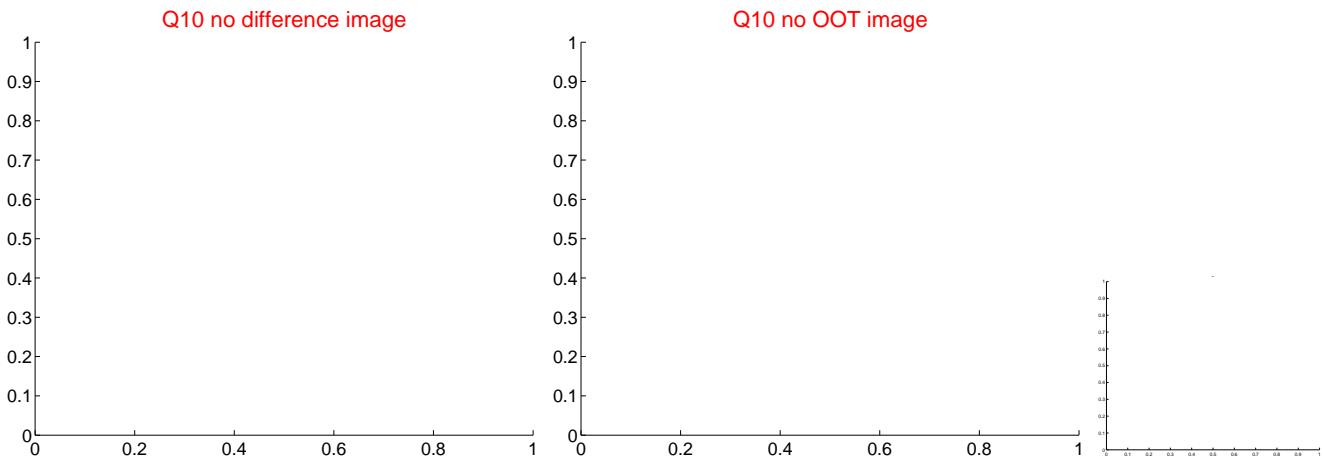
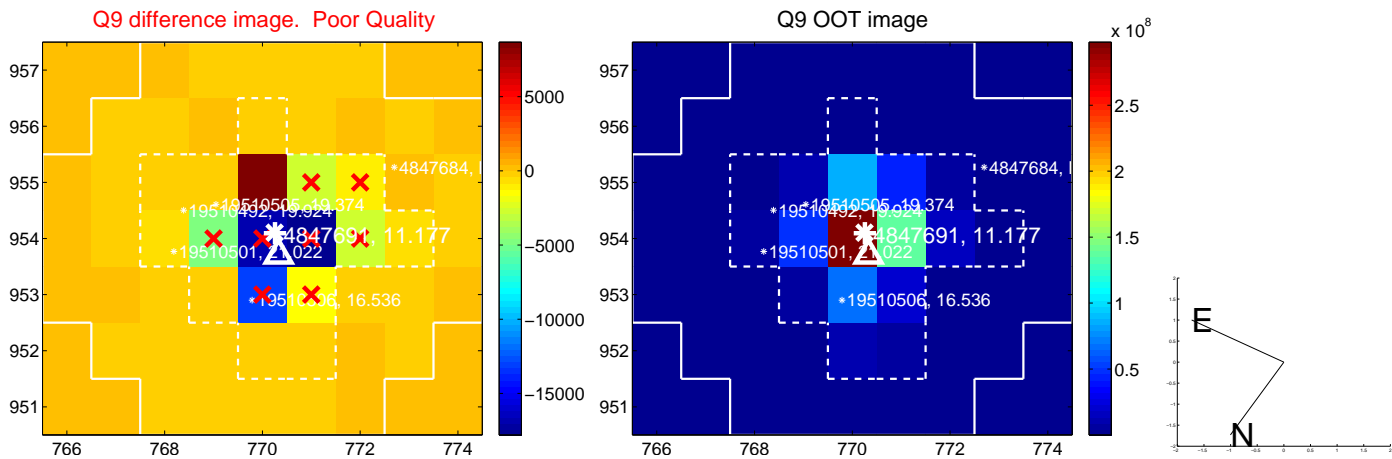


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

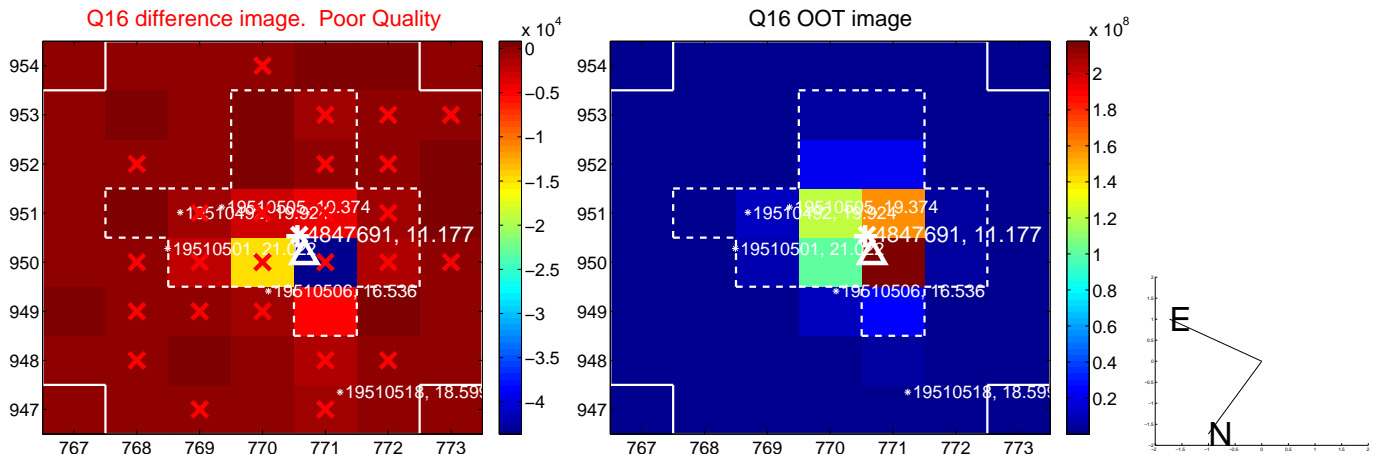
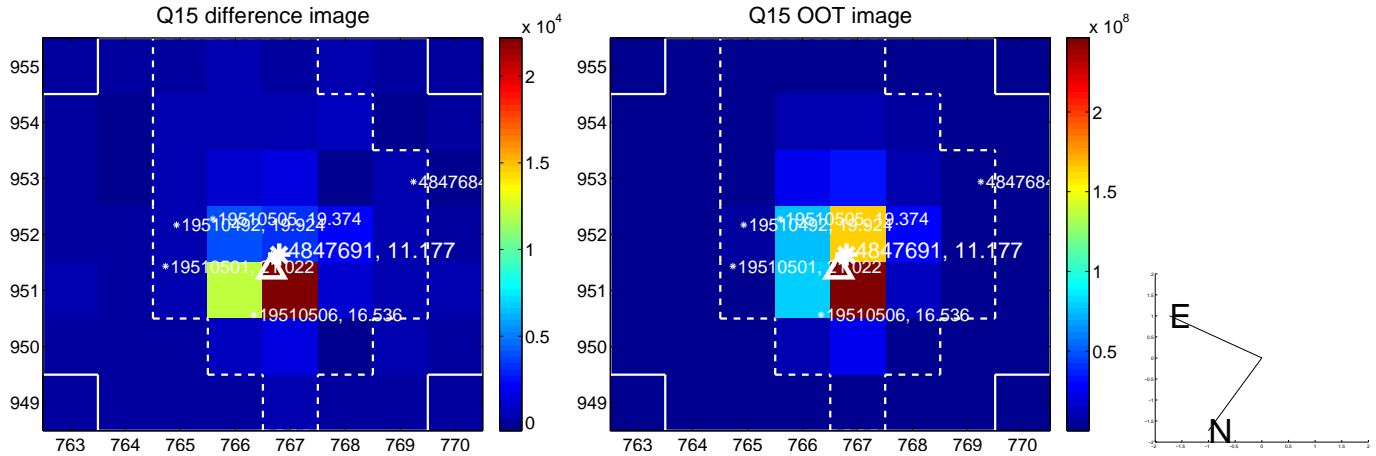
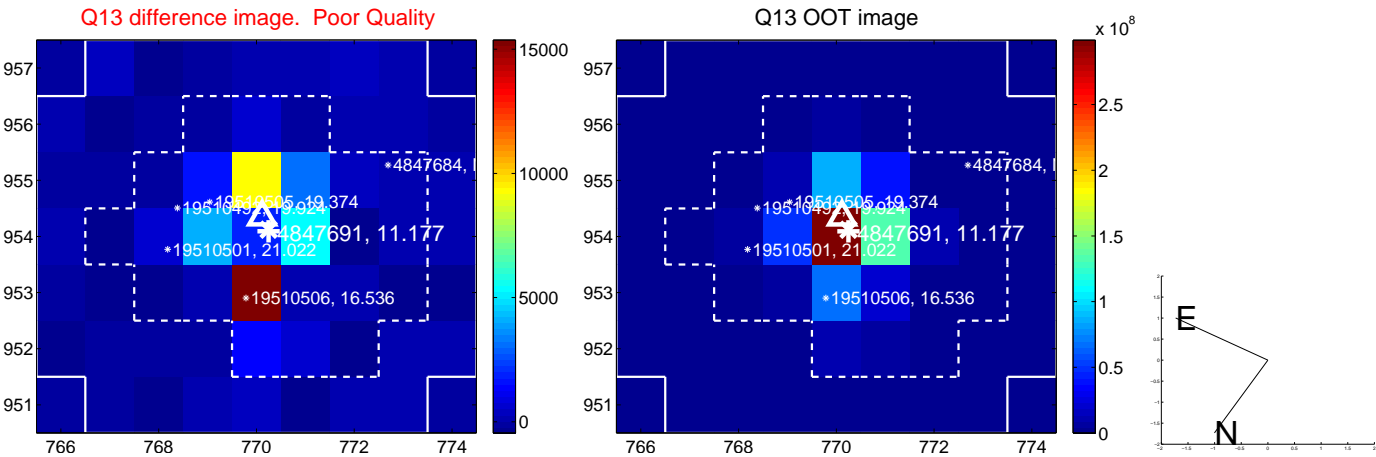




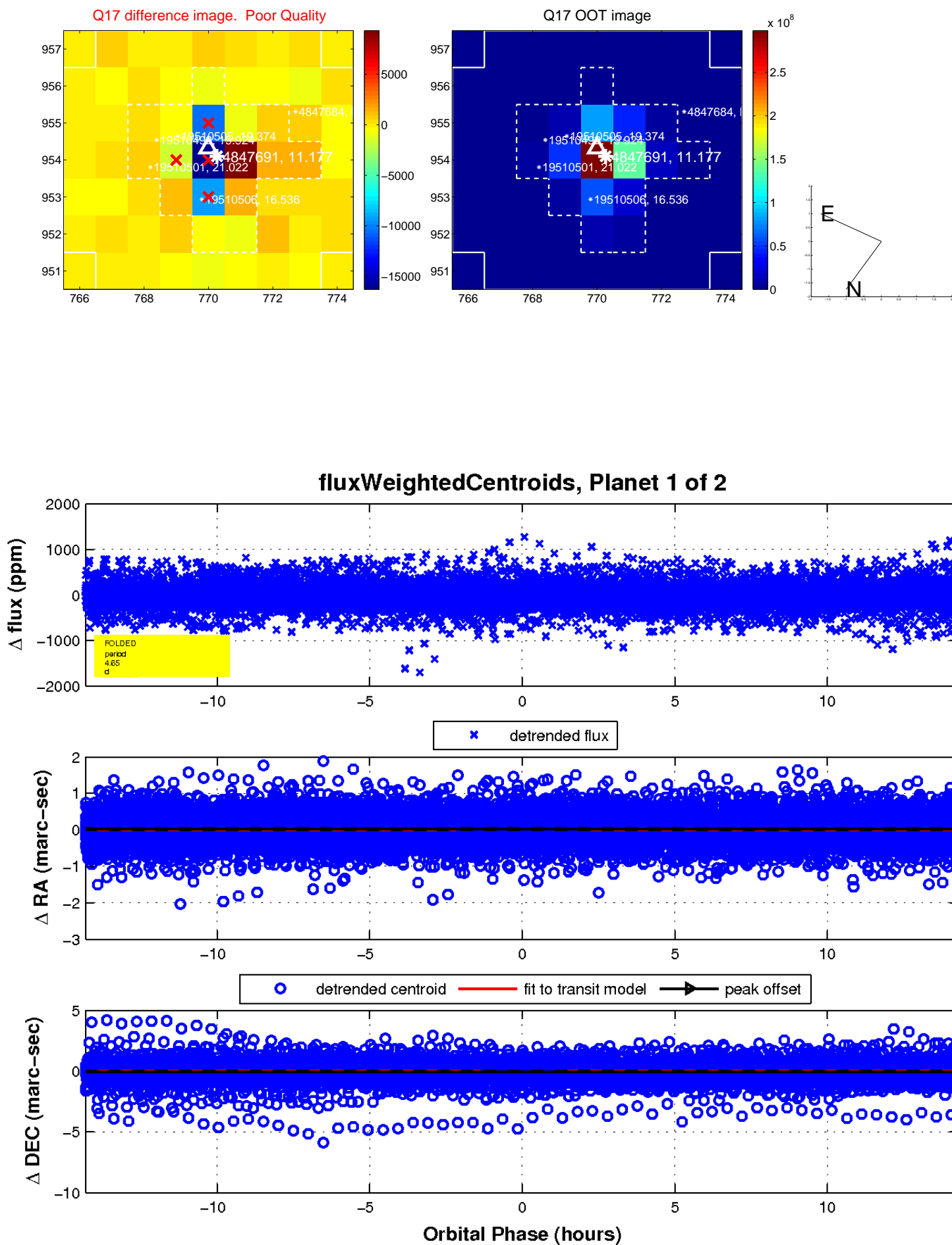
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



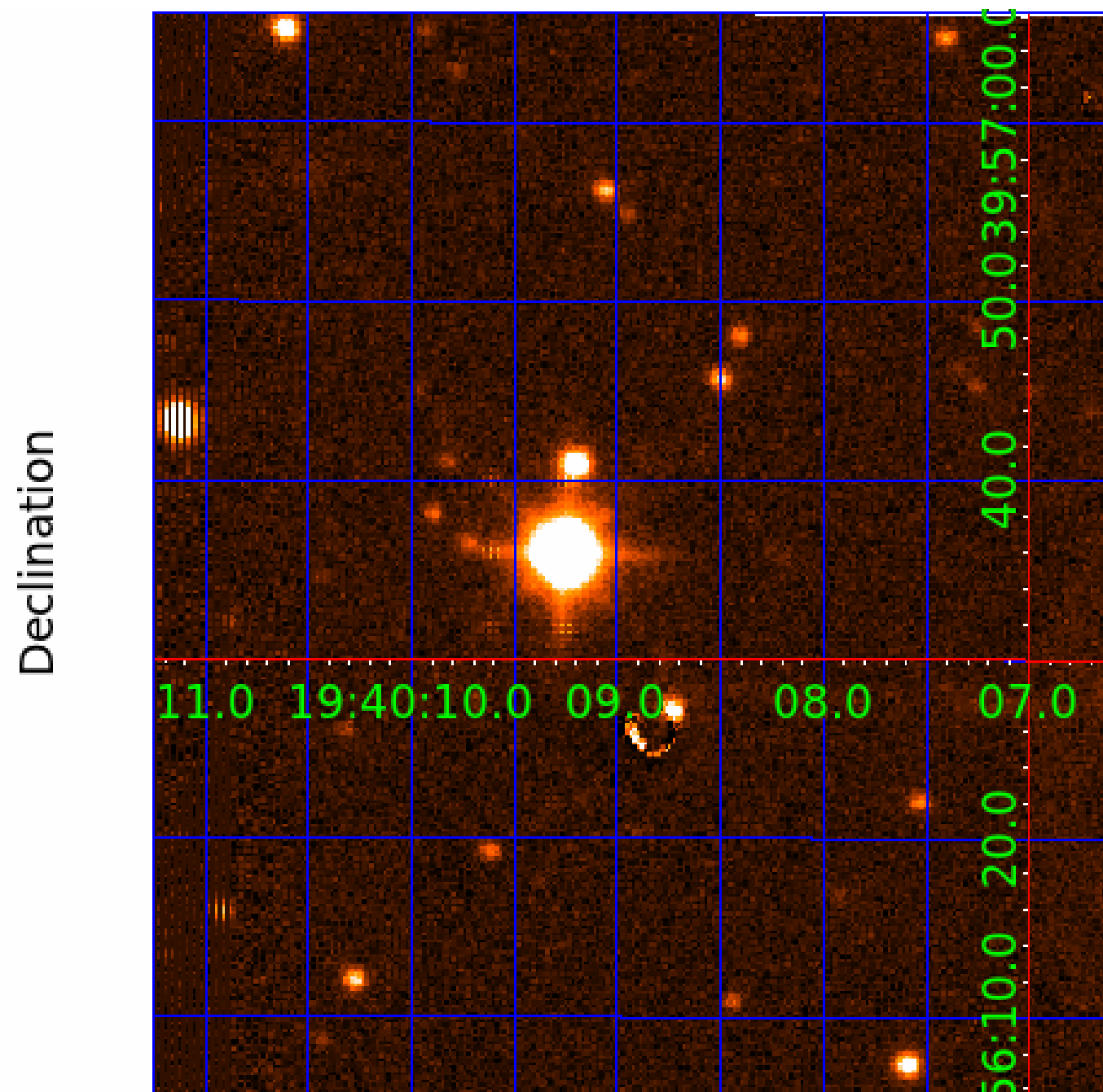
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image





# KIC 004847691

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004847691-01	OBS	No	4.648044	132.574326	22.3	4.772	9.5	4.9	0.97	6784	0.55	667.66
004847691-02	OBS	No	4.648166	133.171788	25.6	4.946	8.1	5.9	0.97	6784	0.57	667.63

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004847691-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
004847691-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE_ZUMA_TRACKER—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_SATURATED

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

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

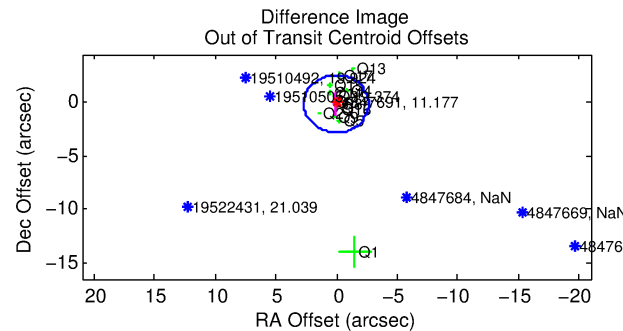
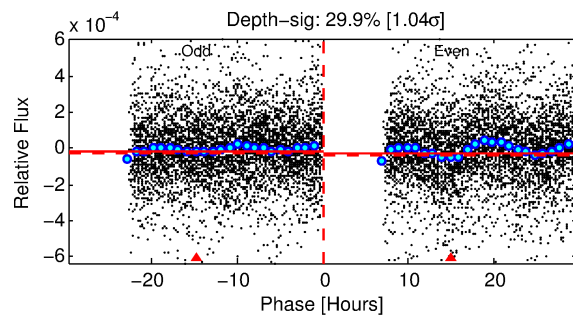
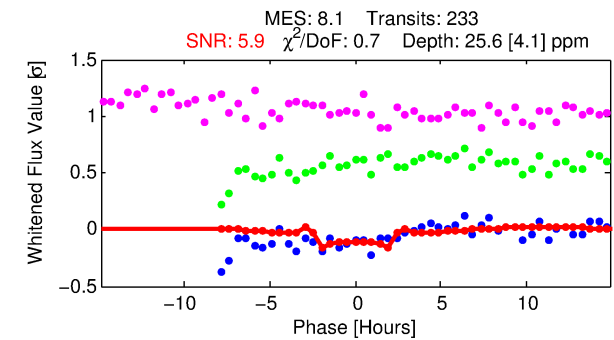
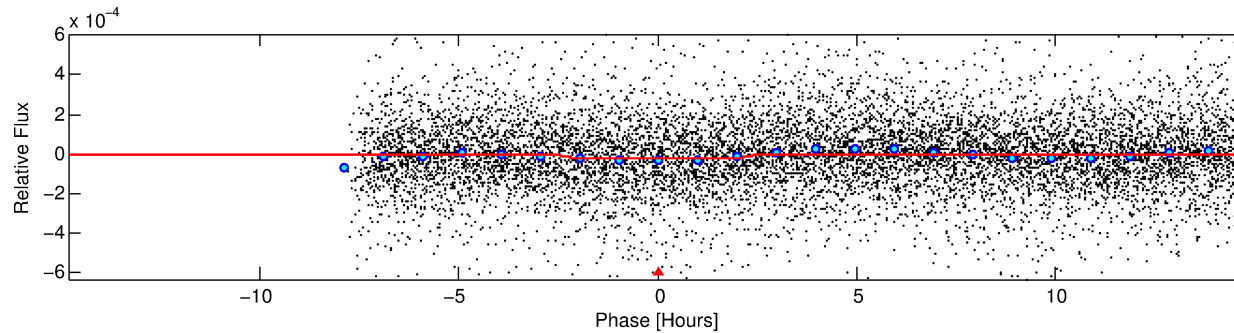
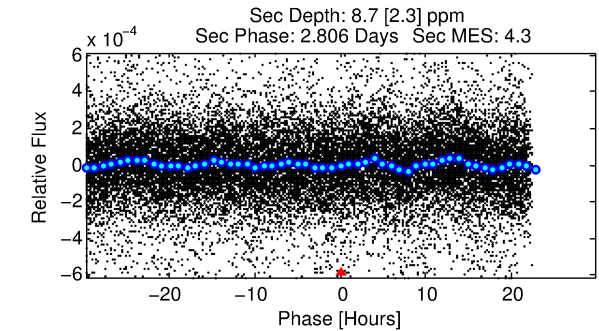
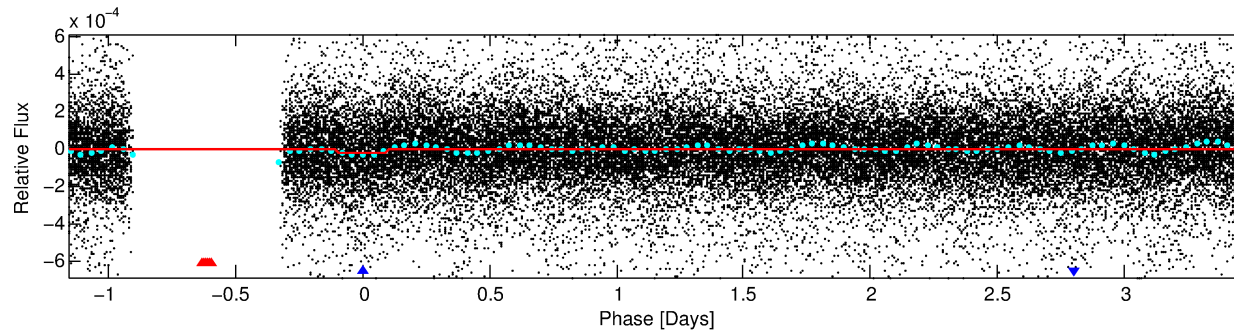
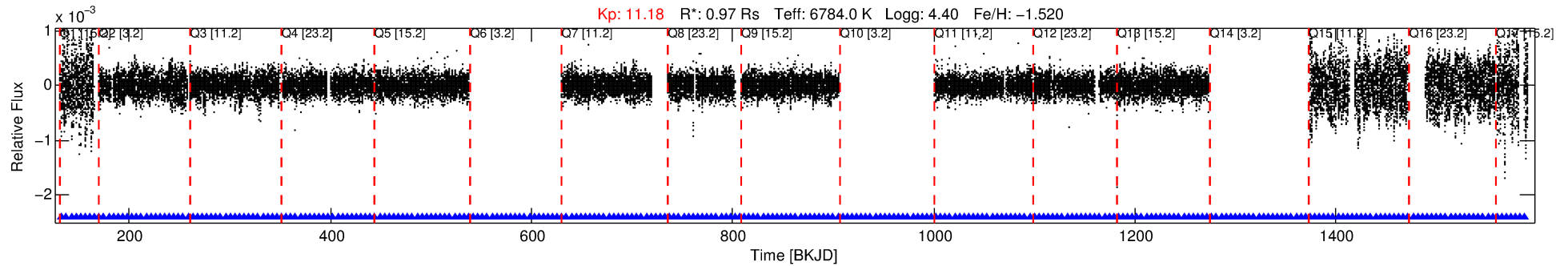
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004847691-02

No Significant Match Found

# DV One-Page Summary

KIC: 4847691 Candidate: 2 of 2 Period: 4.648 d



## DV Fit Results:

Period = 4.64817 [0.00004] d  
Epoch = 133.1718 [0.0054] BKJD  
Rp/R\* = 0.0054 [0.0014]  
a/R\* = 3.35 [4.61]  
b = 0.90 [0.32]  
Seff = 667.63 [216.11]  
Teq = 1296 [105] K  
Rp = 0.57 [0.19] Re  
a = 0.0519 [0.0094] AU  
Ag = 39.31 [25.52] [1.50 $\sigma$ ]  
Teffp = 5018 [757] K [4.87 $\sigma$ ]

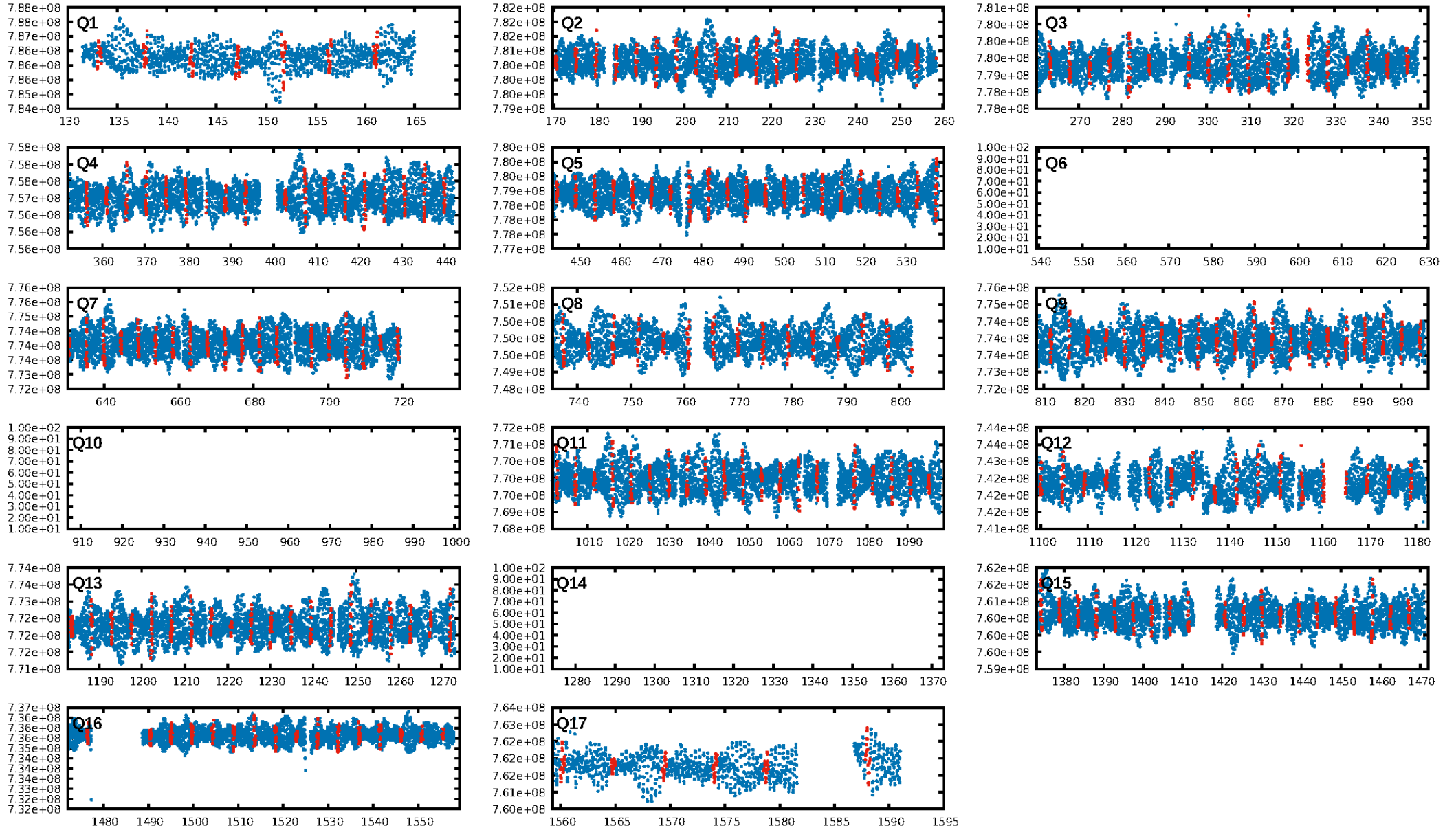
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 3.49e-18  
RollingBand-fgt: 1.00 [220/220]  
GhostDiagnostic-chr: 3.353  
Centroid-sig: 2.9%  
Centroid-so: 1.419 arcsec [1.56 $\sigma$ ]  
OotOffset-rm: 0.132 arcsec [0.15 $\sigma$ ]  
KicOffset-rm: 0.094 arcsec [0.17 $\sigma$ ]  
OotOffset-st: 1/4/4/5 [14]  
KicOffset-st: 1/4/4/5 [14]  
DiffImageQuality-fgm: 0.57 [8/14]  
DiffImageOverlap-fno: 1.00 [14/14]

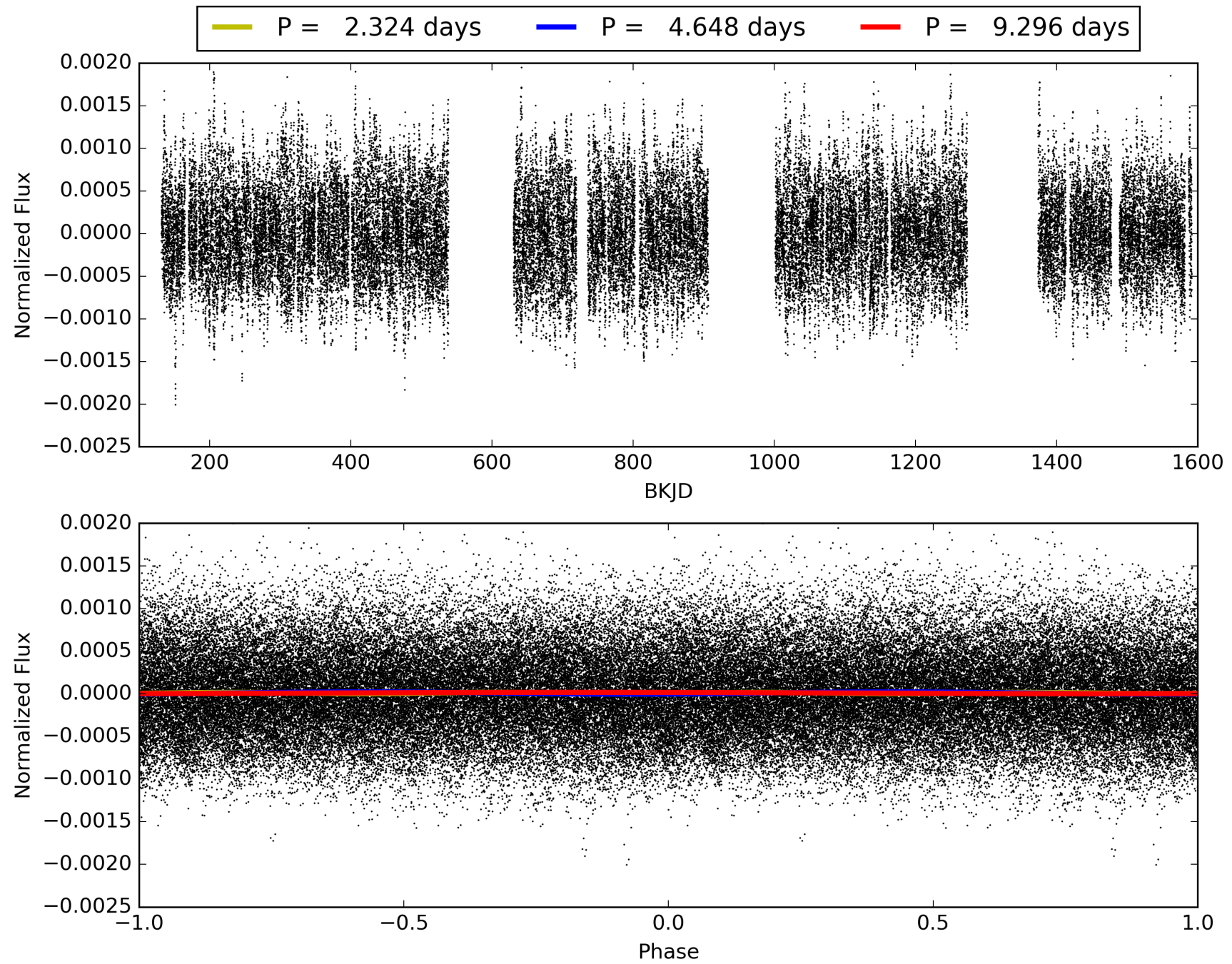
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 08:36:09 Z

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

# TCE 004847691-02, PDC Light Curves



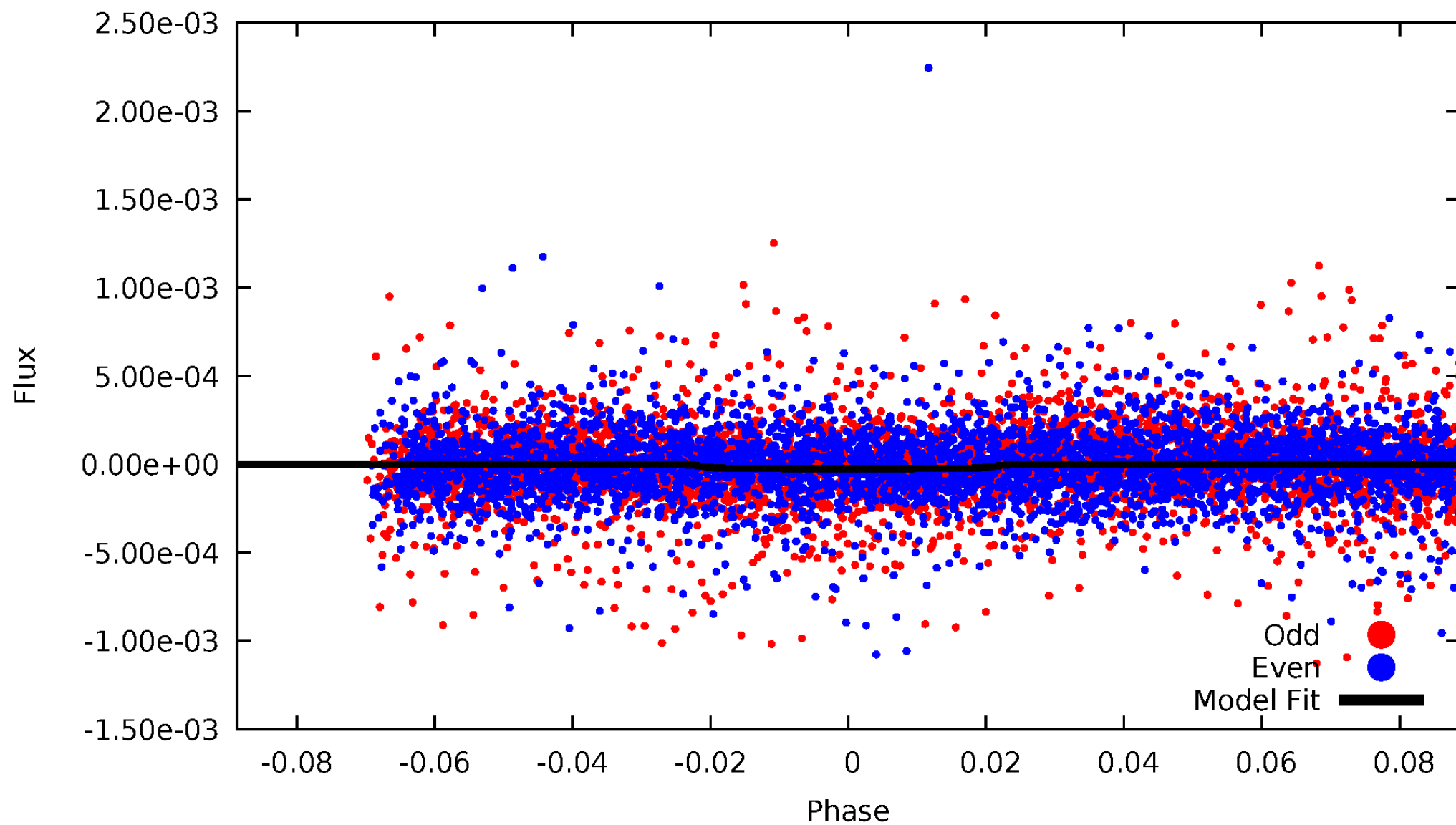
TCE 004847691-02





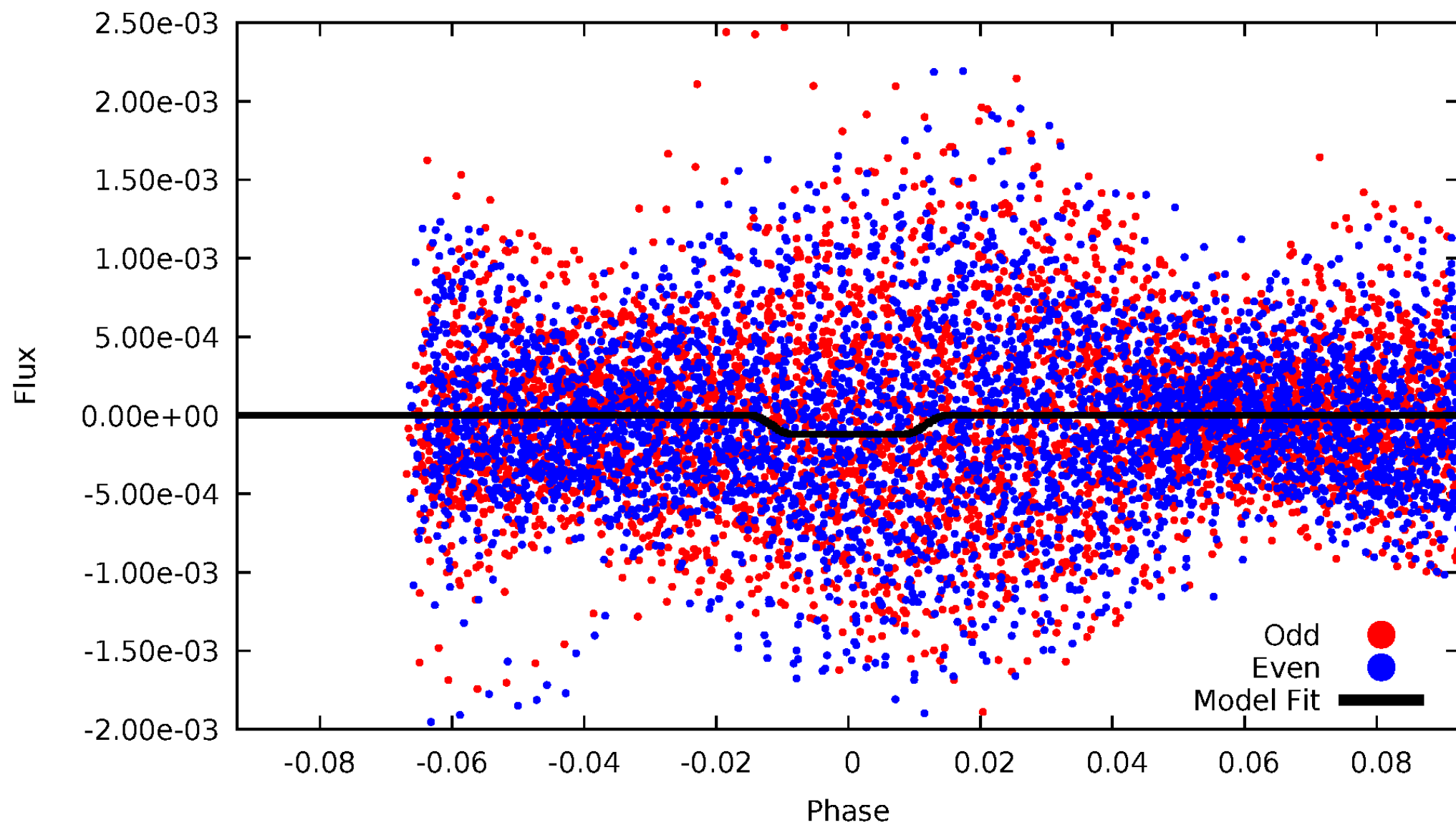
# DV Odd/Even

TCE 004847691-02



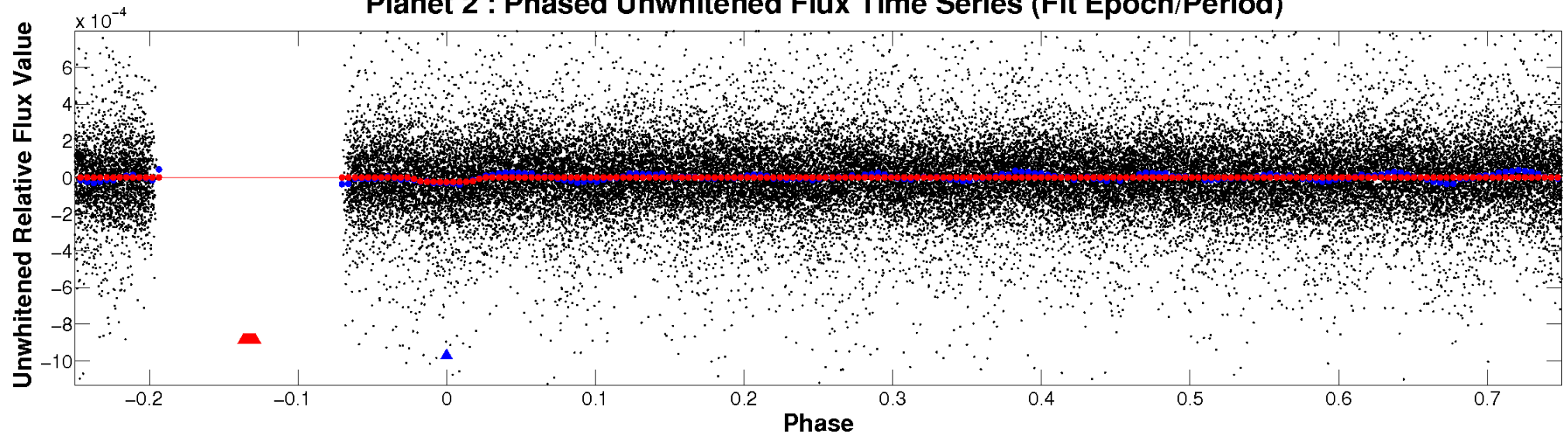
# ALT Odd/Even

TCE 004847691-02

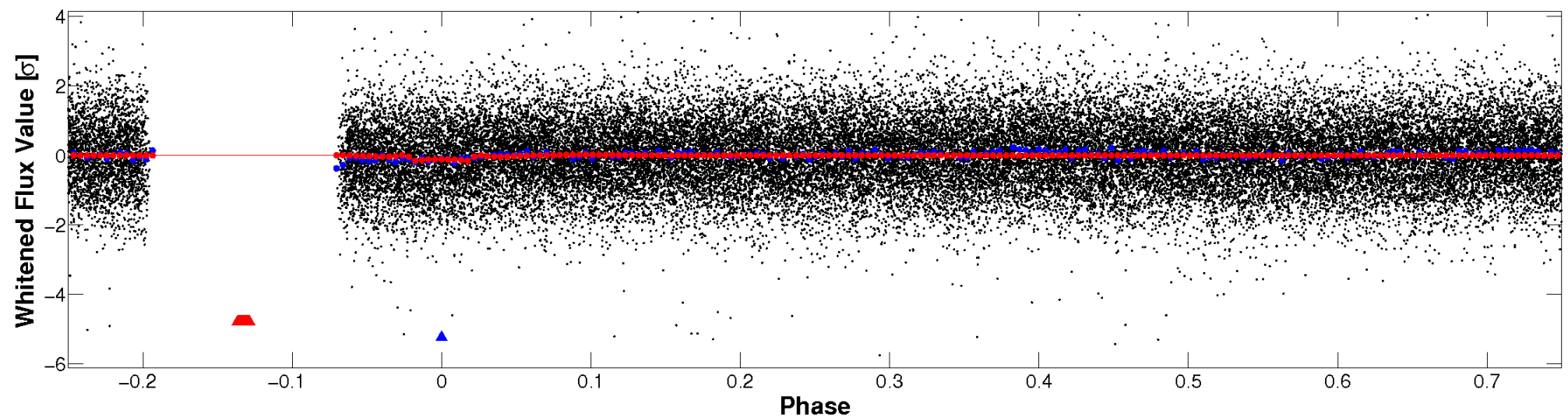


# Non-Whitened Vs. Whitened Light Curve

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

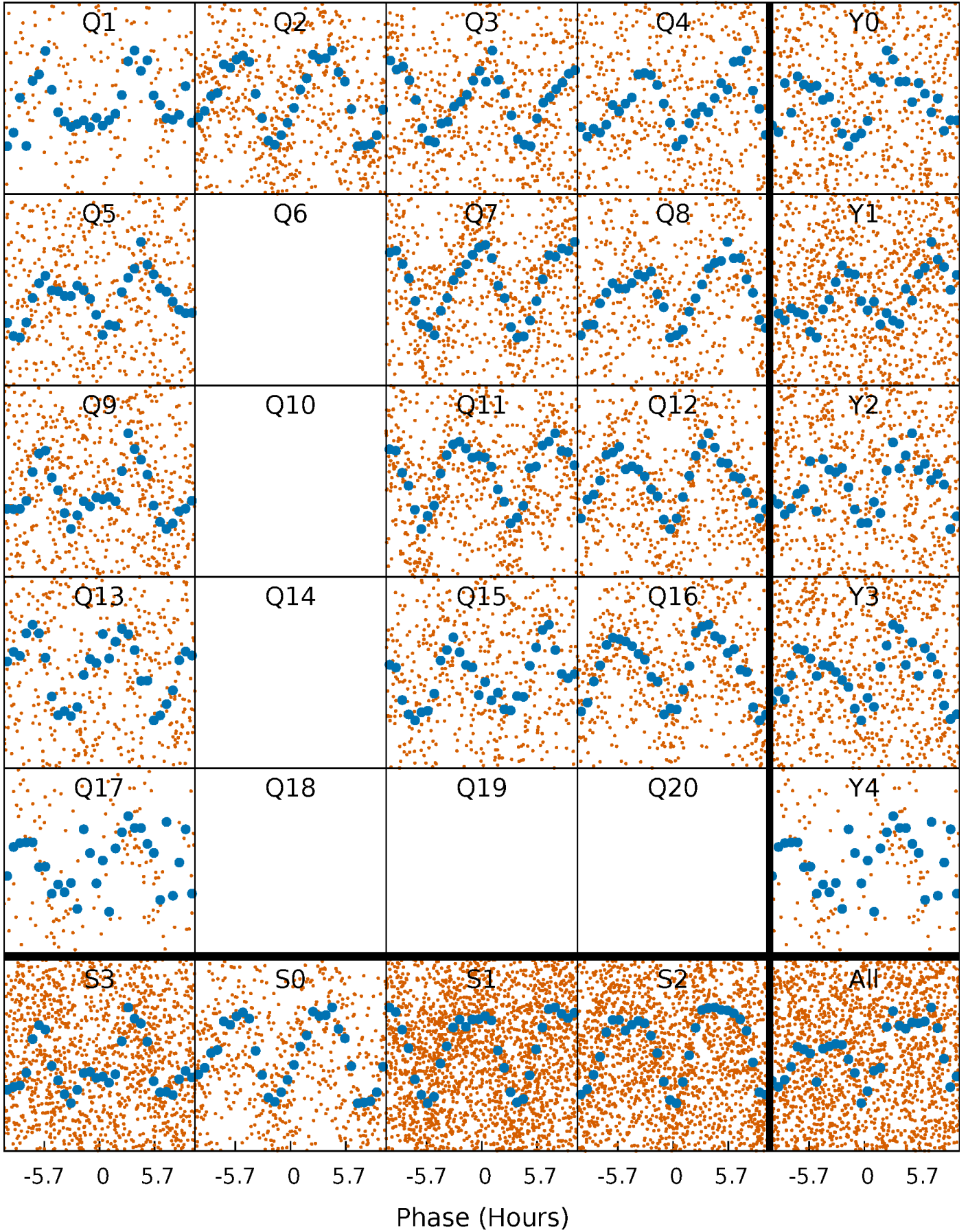


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

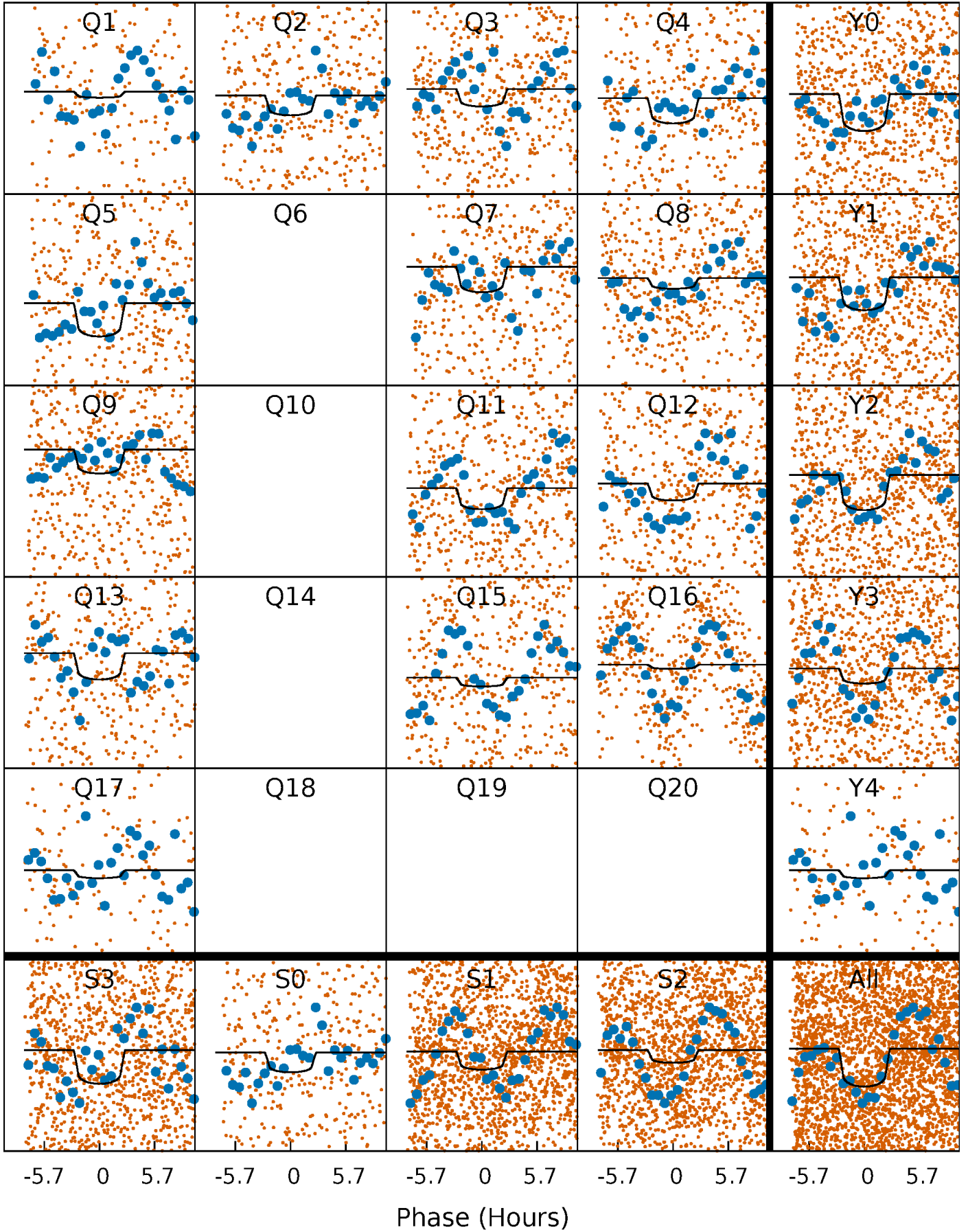
TCE 004847691-02   P= 4.648166 Days    $T_0=133.171788$  (BKJD)





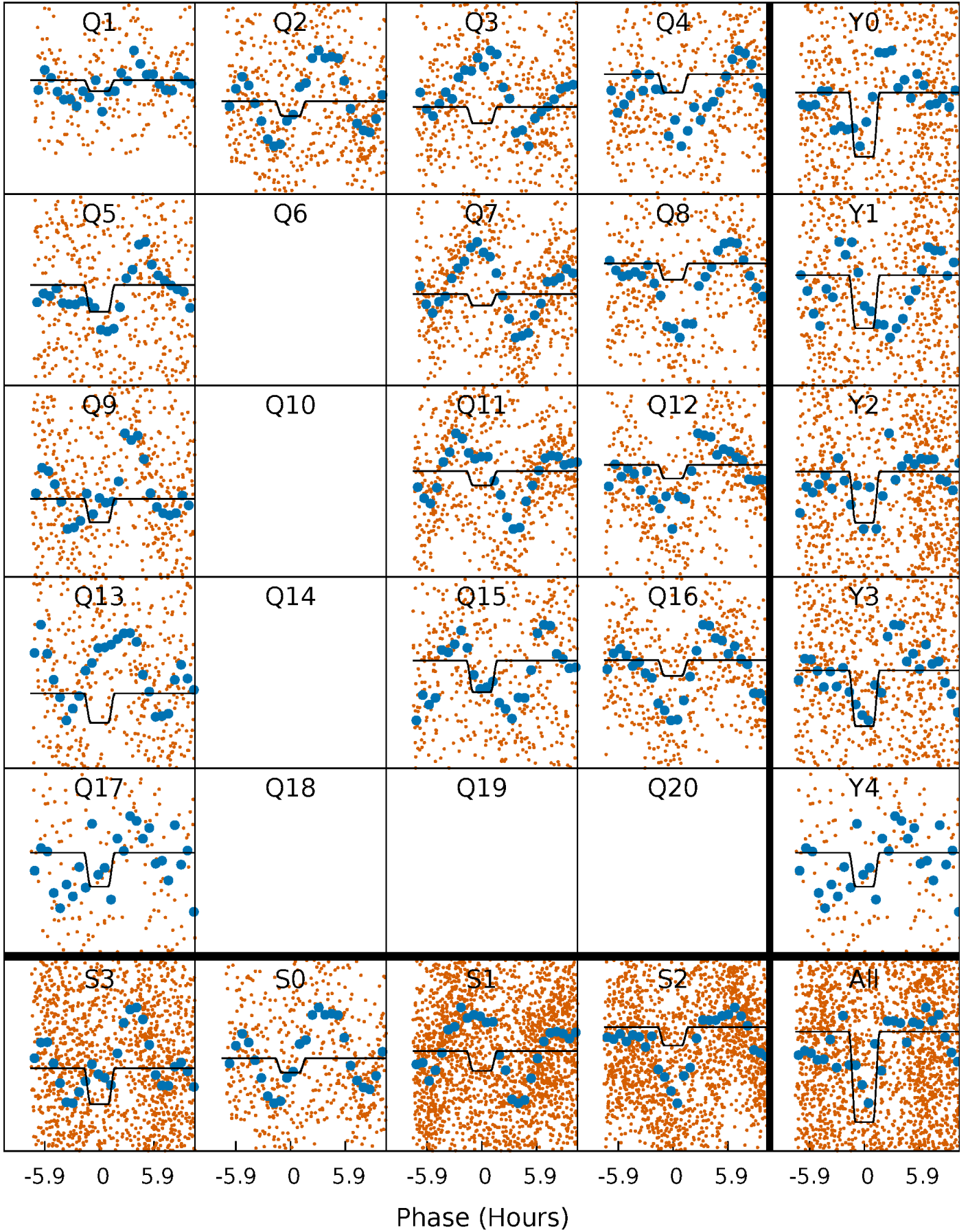
# DV Quarter-Phased Transit Curves

TCE 004847691-02     $P = 4.648166$  Days     $T_0 = 133.171788$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 004847691-02   P= 4.648119 Days    $T_0=133.171784$  (BKJD)

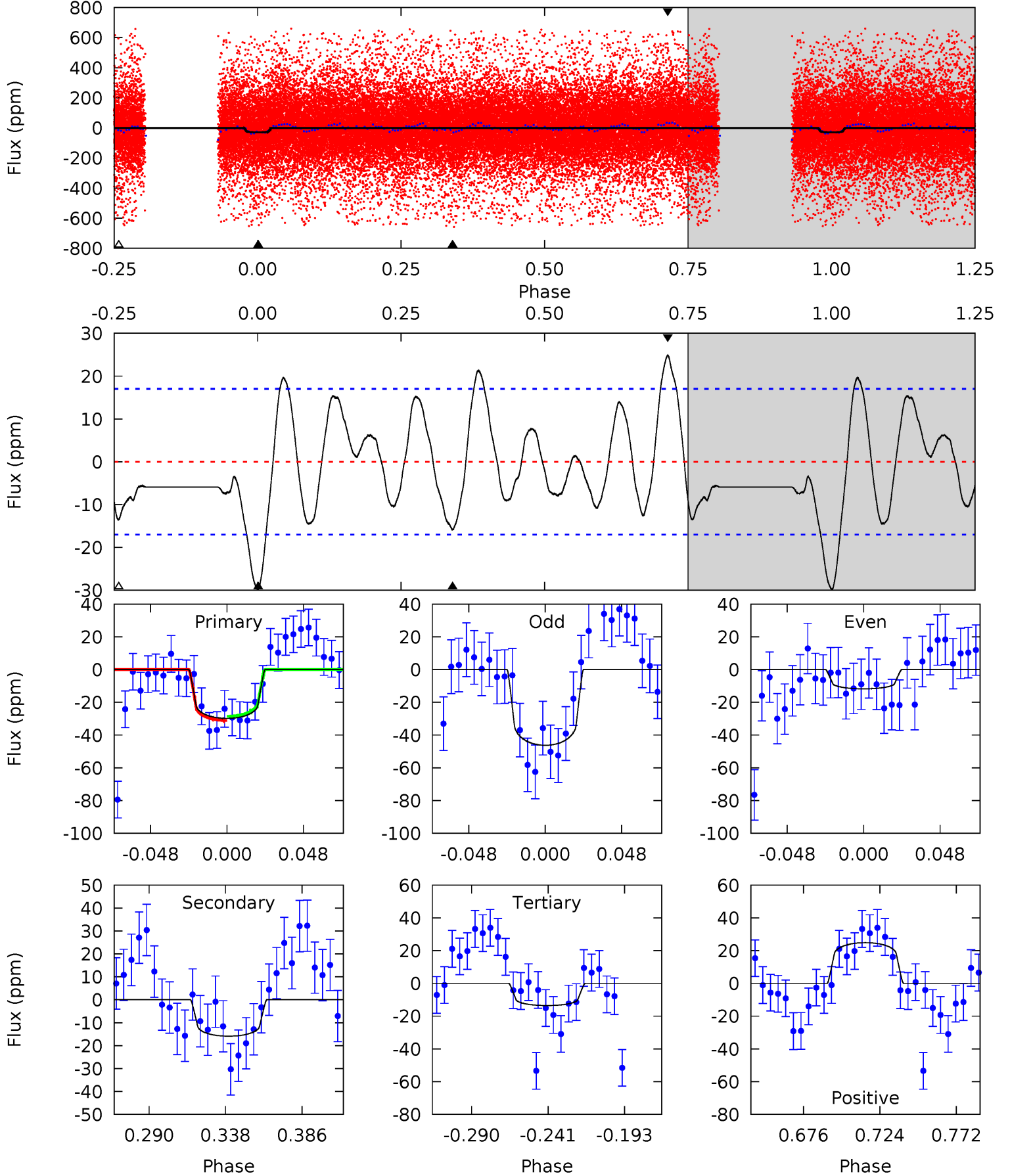




# DV Model-Shift Uniqueness Test

004847691-02, P = 4.648166 Days, E = 128.523622 Days

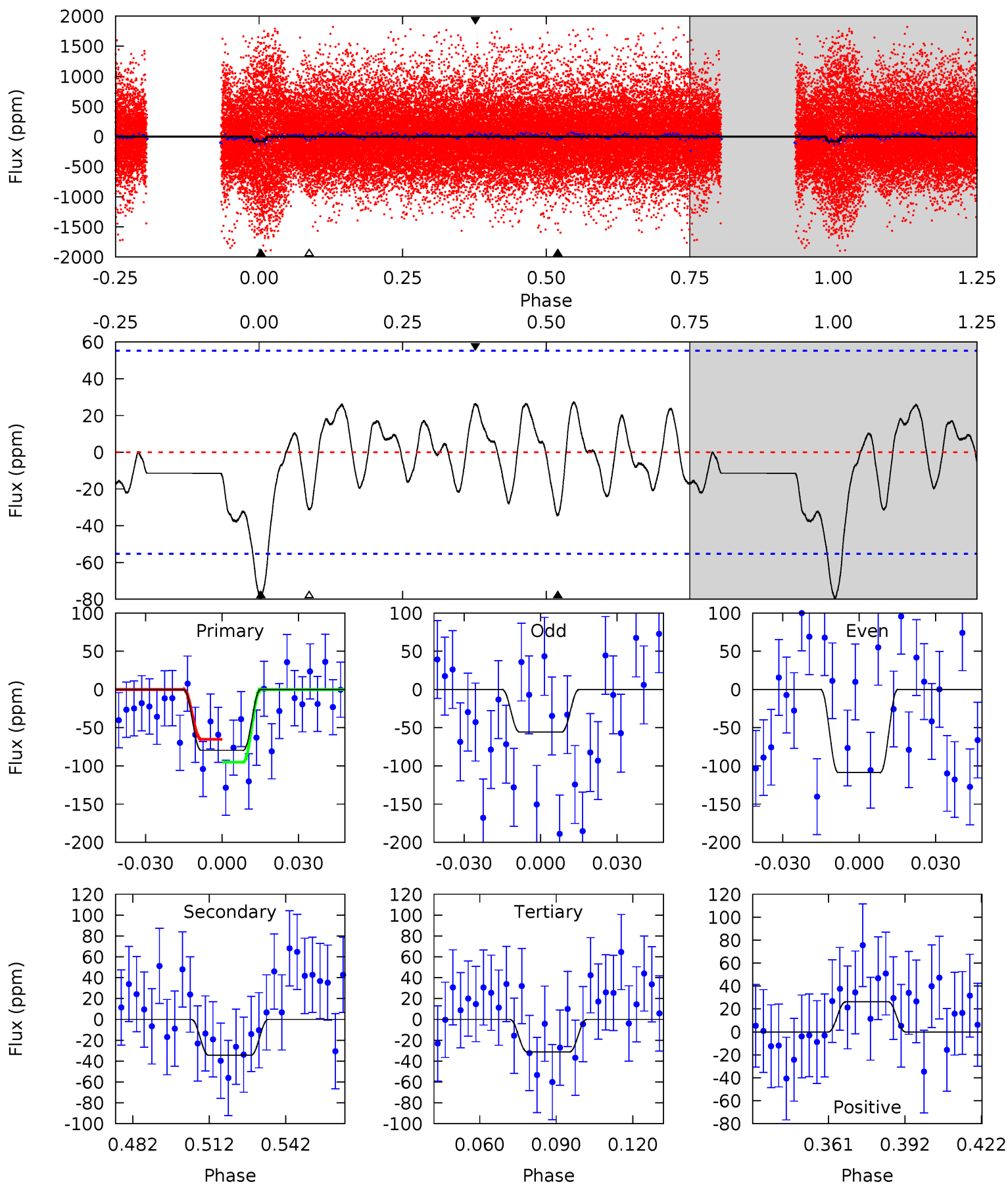
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.27	4.41	3.75	6.89	4.72	1.98	2.65	4.51	1.38	0.65	-2.49	4.83	1.29	0.45	0.36



# Alt Model-Shift Uniqueness Test

004847691-02, P = 4.648119 Days, E = 128.523665 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
6.92	3.00	2.72	2.29	4.81	2.17	1.37	4.20	4.63	0.28	0.70	2.31	0.65	0.26	1.30



### Stellar Parameters For KIC 004847691

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6784^{+213}_{-260}$	$4.397^{+0.135}_{-0.165}$	$-1.520^{+0.300}_{-0.250}$	$0.973^{+0.191}_{-0.139}$	$0.861^{+0.066}_{-0.060}$	$1.317^{+0.746}_{-0.552}$
	+3%/-4%	+3%/-4%	+20%/-16%	+20%/-14%	+8%/-7%	+57%/-42%
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 004847691-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-16 \pm 4$	$0.58^{+0.17}_{-0.16}$	$1814^{+115}_{-104}$	$5769^{+1091}_{-690}$	$69^{+71}_{-30}$
Alt.	$-34 \pm 11$	$1.17^{+0.20}_{-0.17}$	$1813^{+120}_{-110}$	$5004^{+436}_{-498}$	$36^{+19}_{-15}$

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

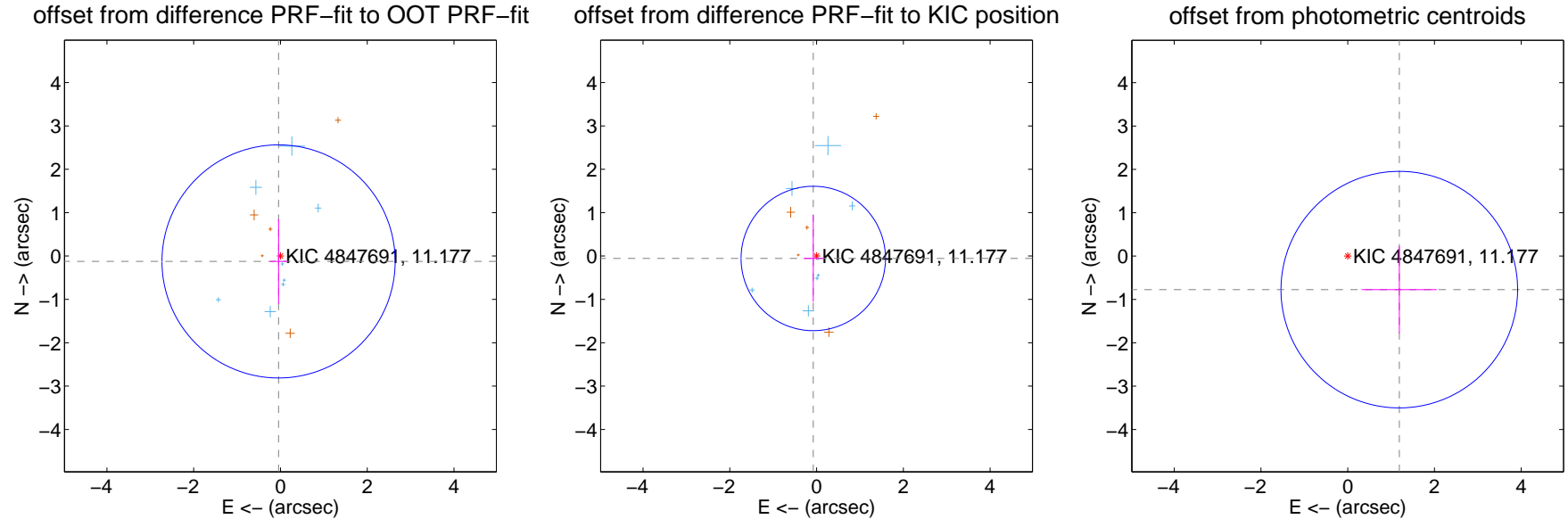
## DV Centroid Data

Supplemental centroid analysis for 004847691-02. **Kepler magnitude: 11.18.** Transit SNR 5.91

There are 8 quarters with good PRF difference image offsets

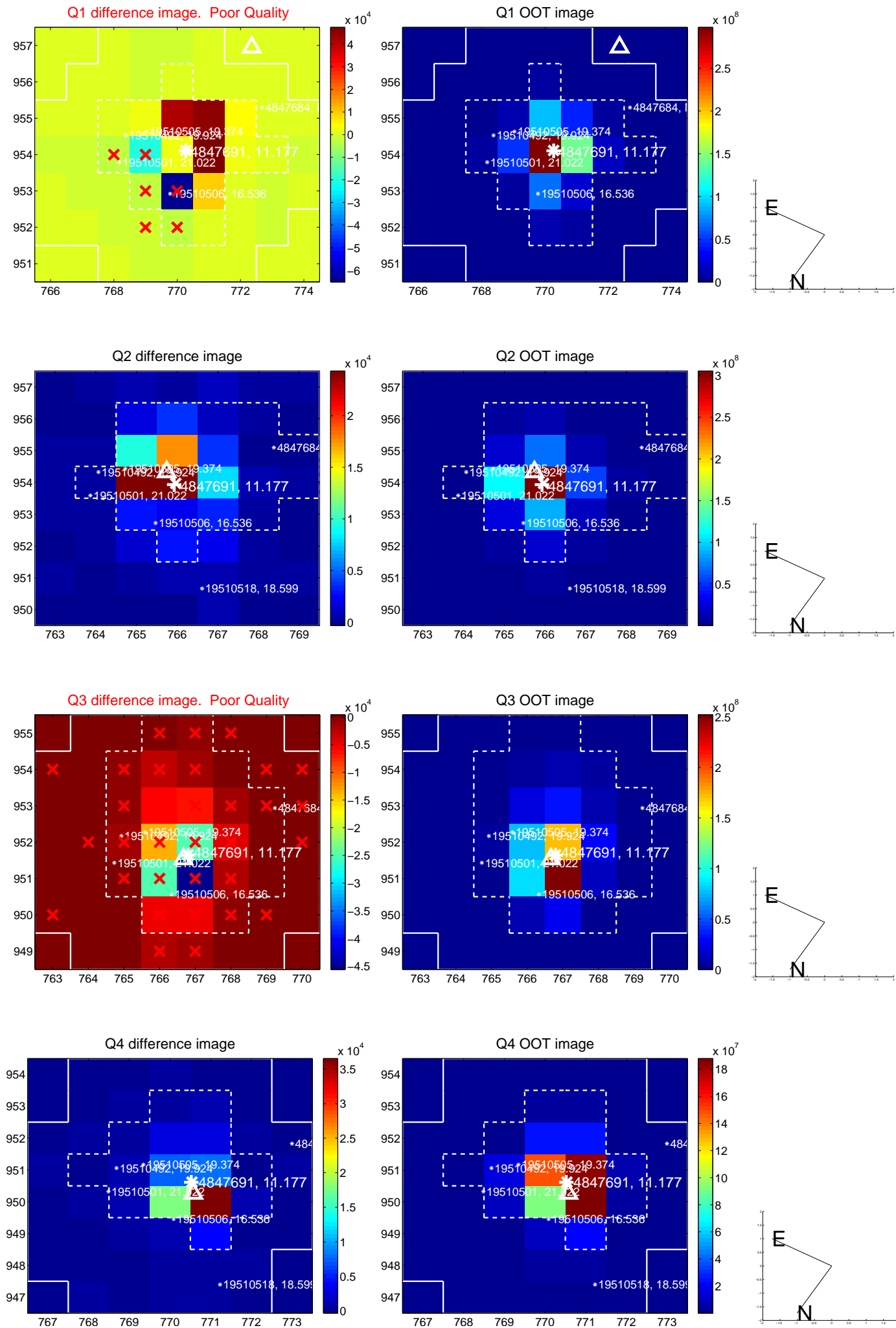
The direct PRF centroid is offset from the target star catalog position by about 0.01 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.132 \pm 0.896$	0.15	$0.044 \pm 0.198$	$-0.124 \pm 0.976$
PRF-fit source offset from KIC position	$0.094 \pm 0.555$	0.17	$0.076 \pm 0.225$	$-0.056 \pm 1.001$
photometric centroid source offset	$1.42 \pm 0.91$	1.56	$-1.19 \pm 0.87$	$-0.77 \pm 1.00$

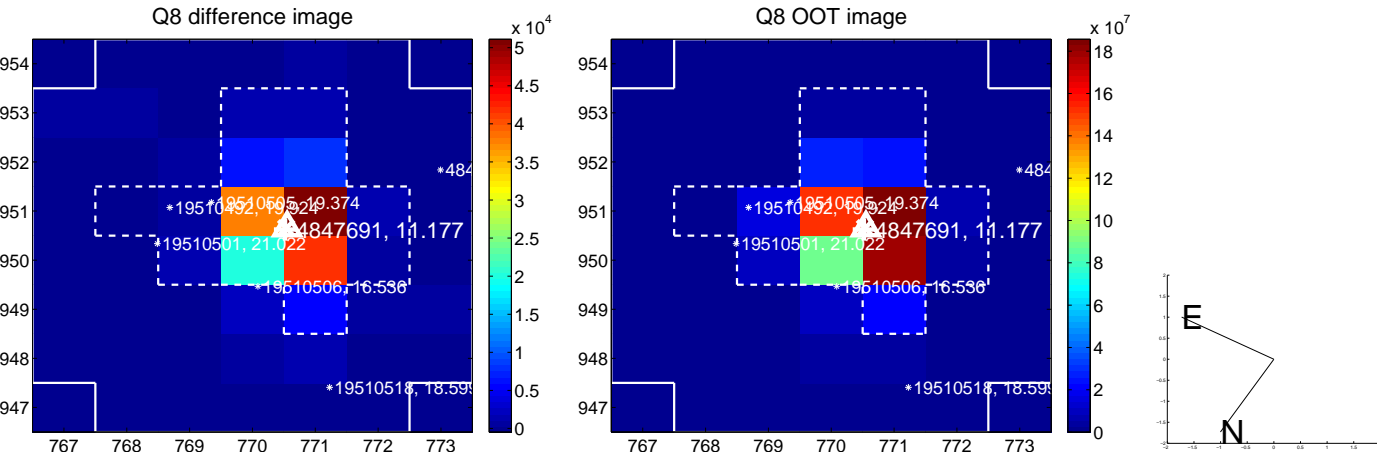
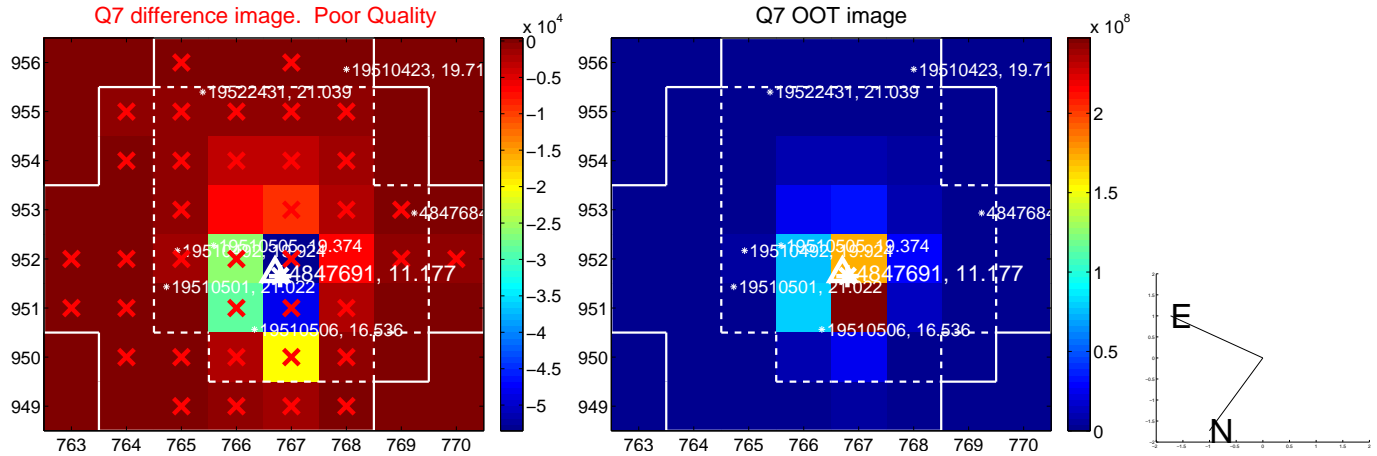
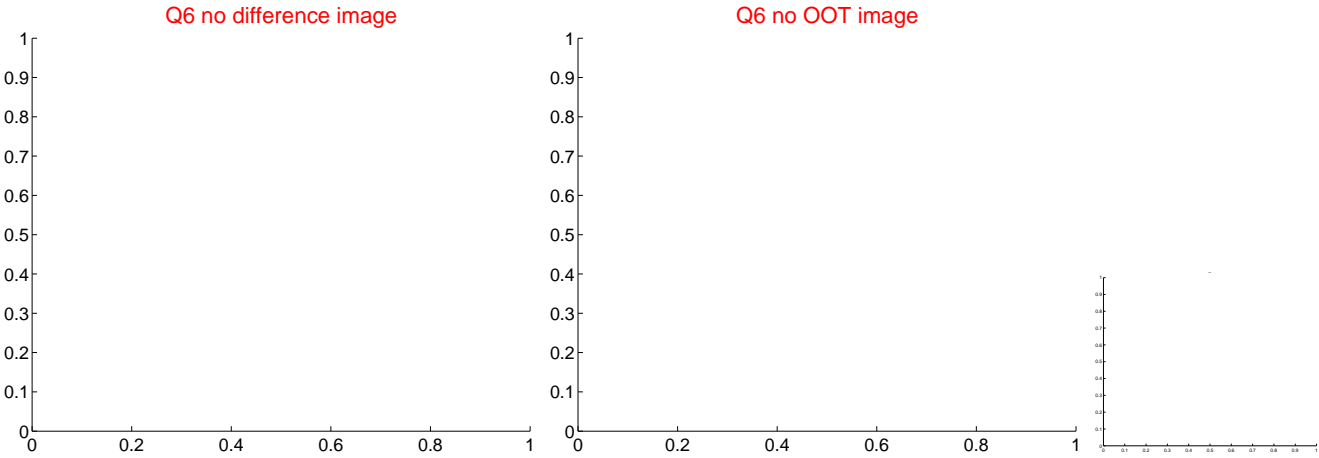
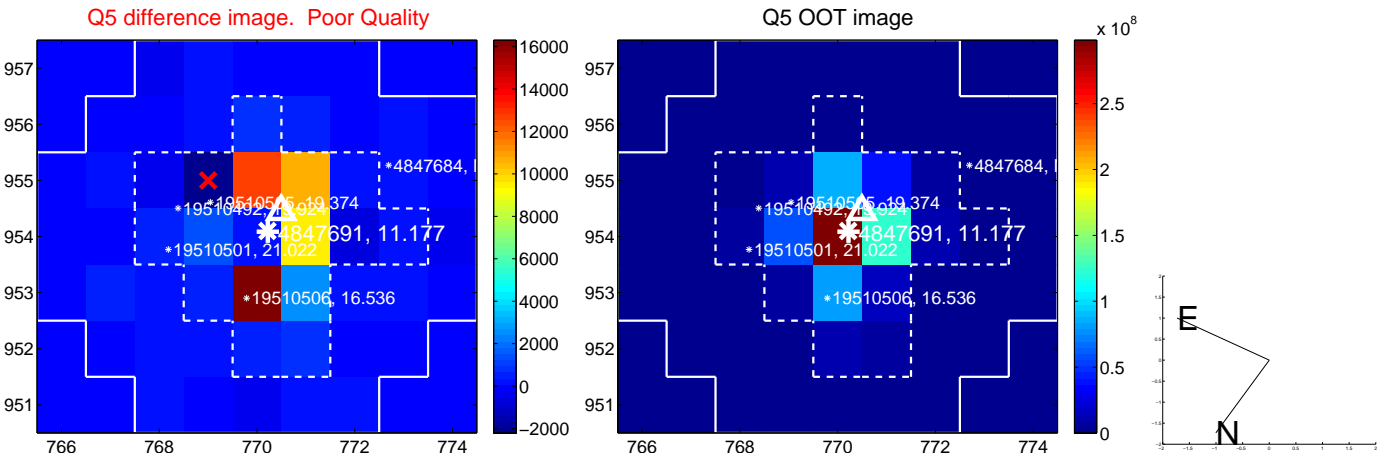


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

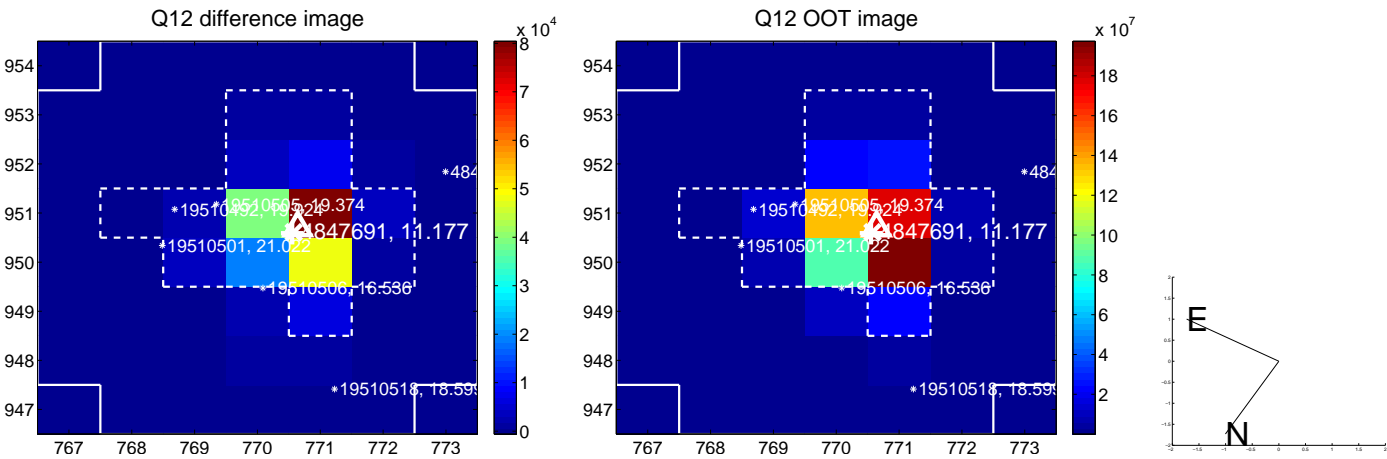
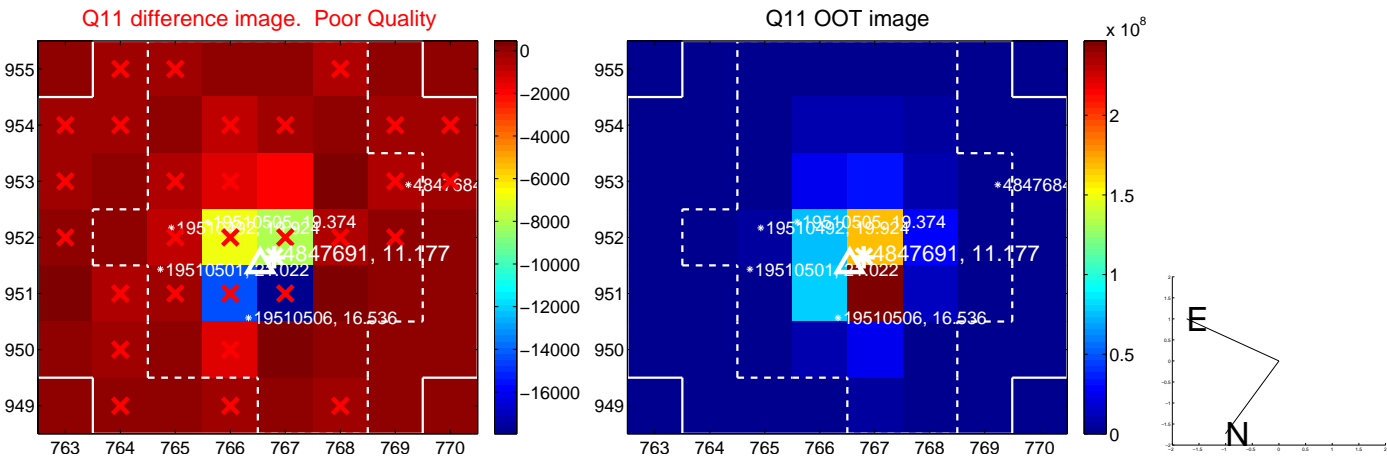
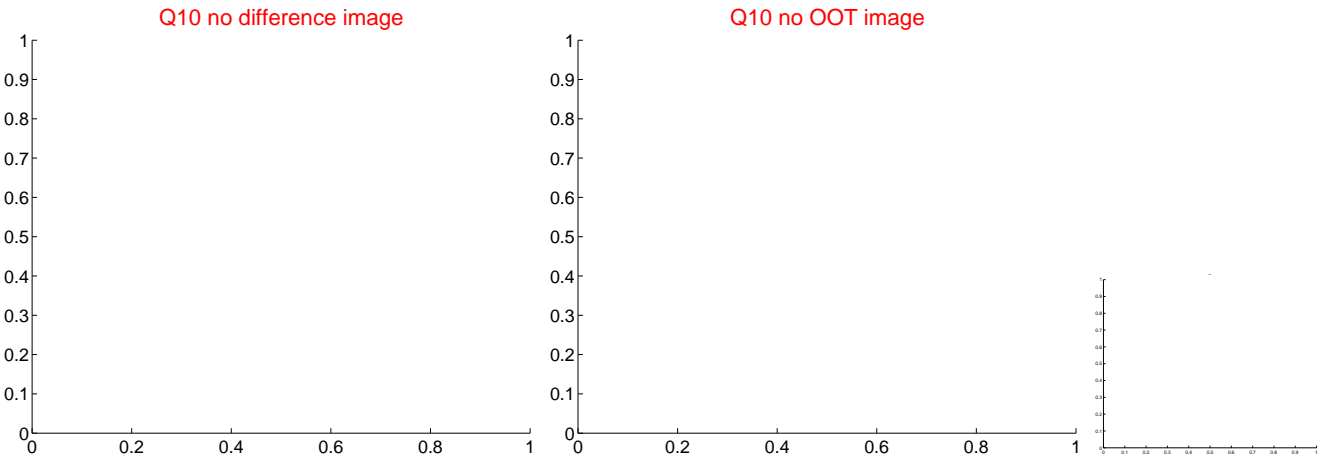
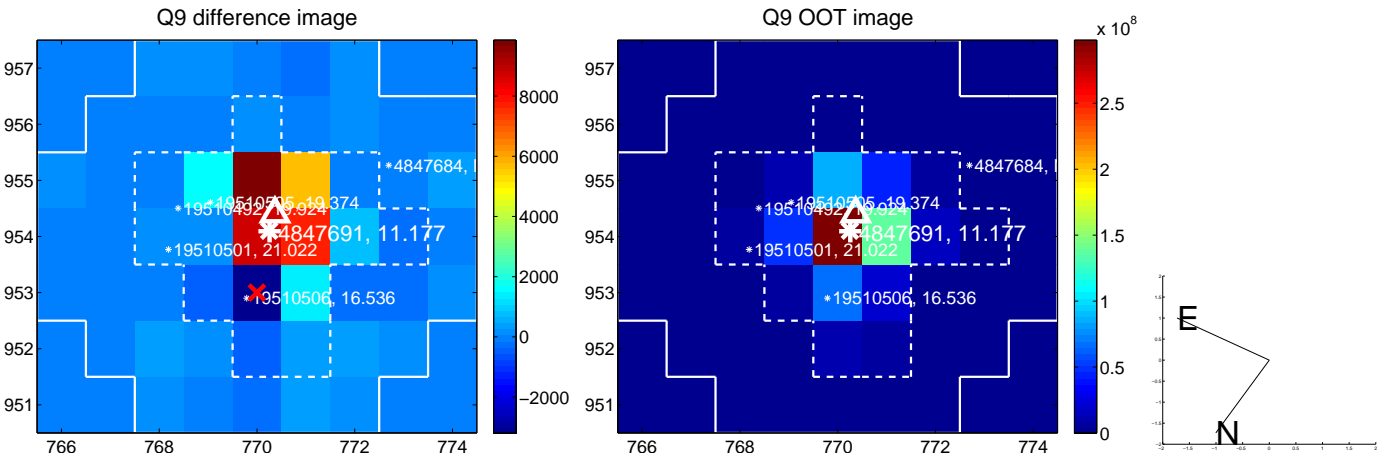


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

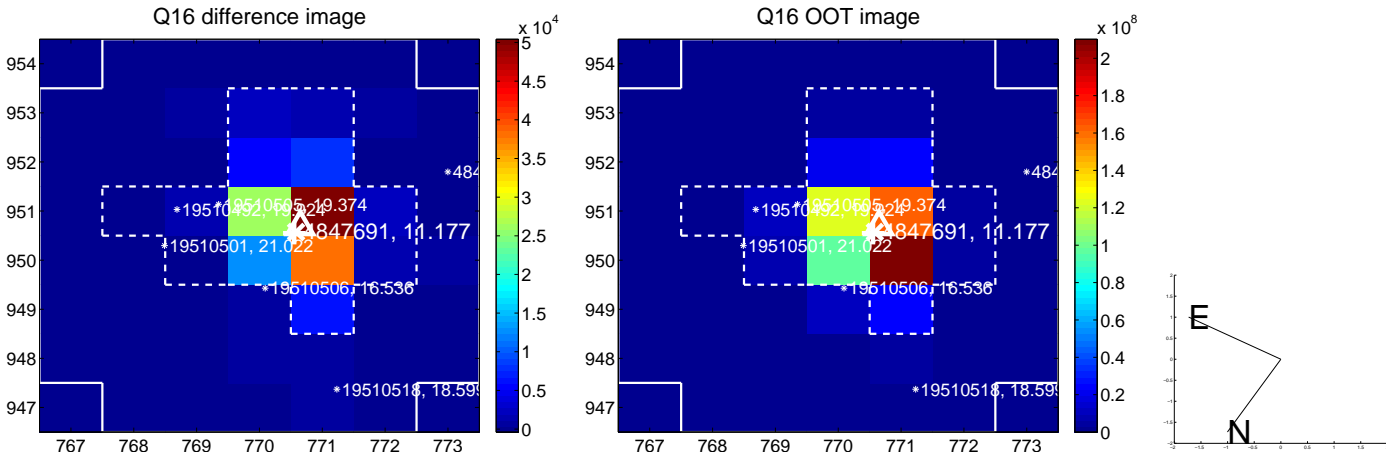
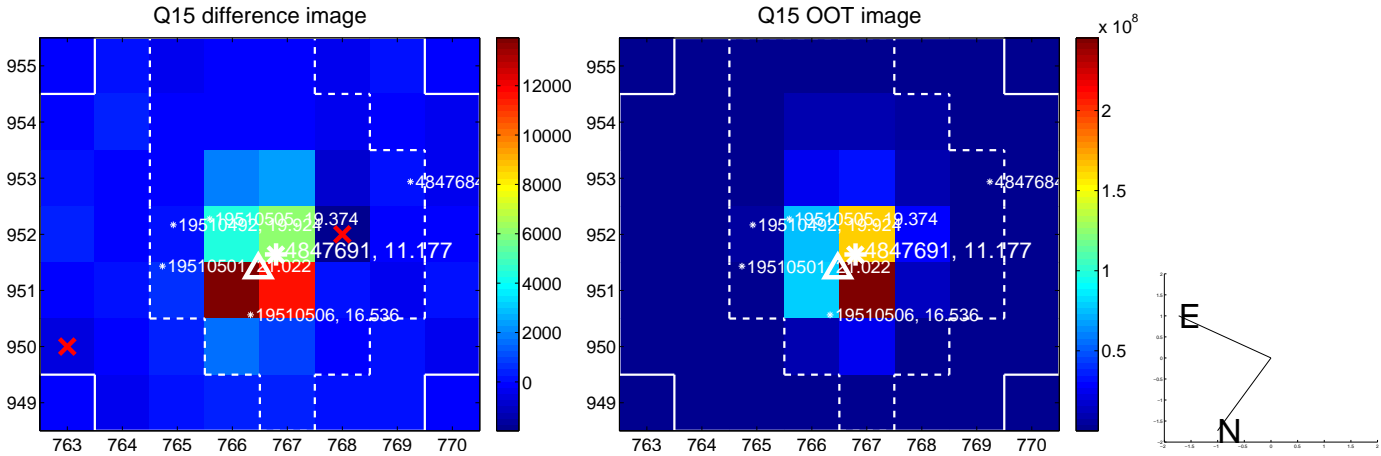
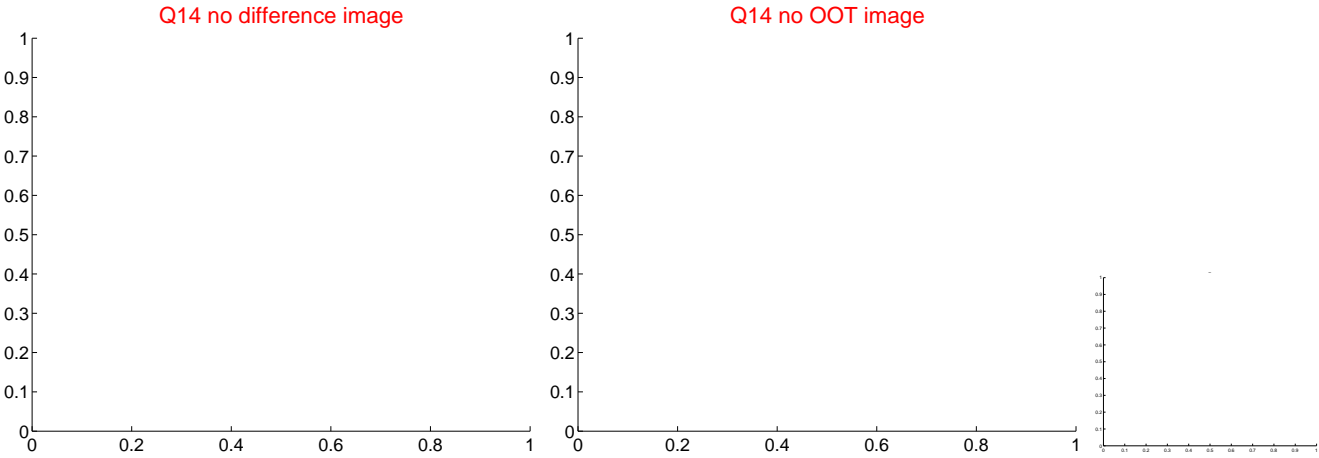
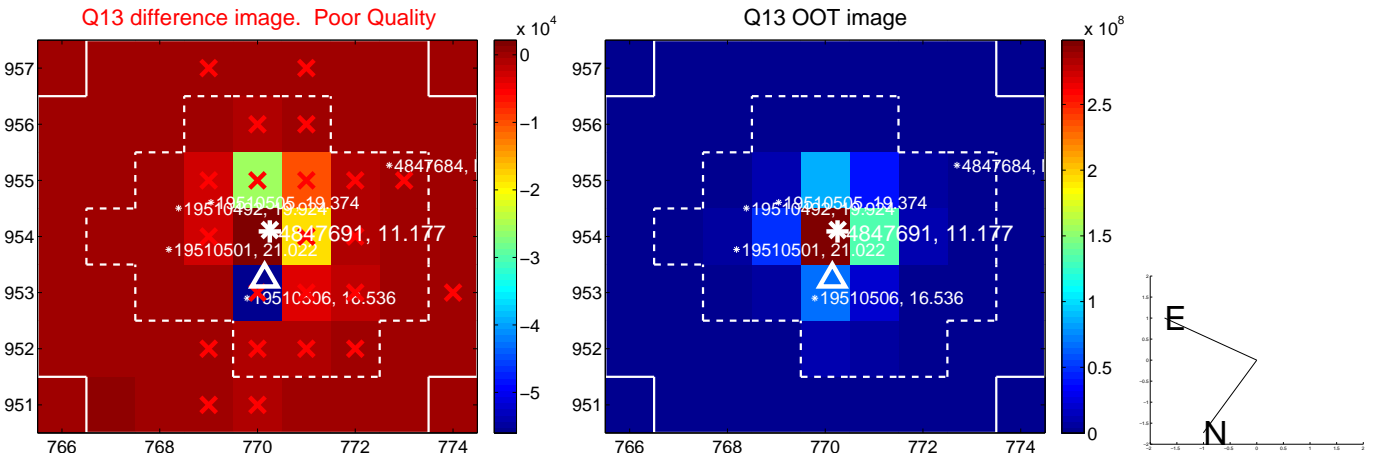




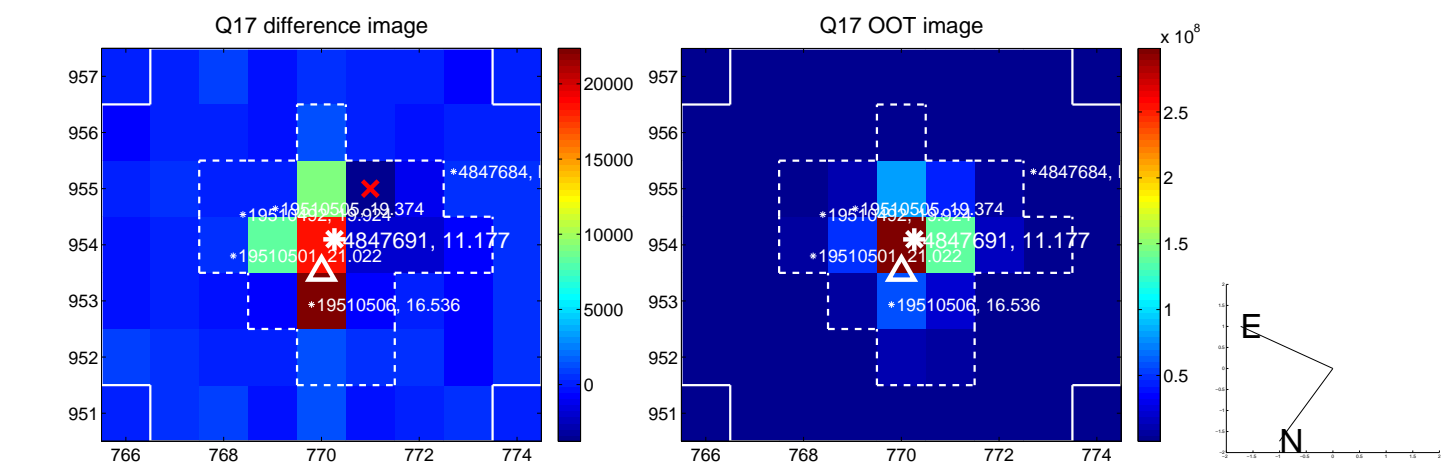
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



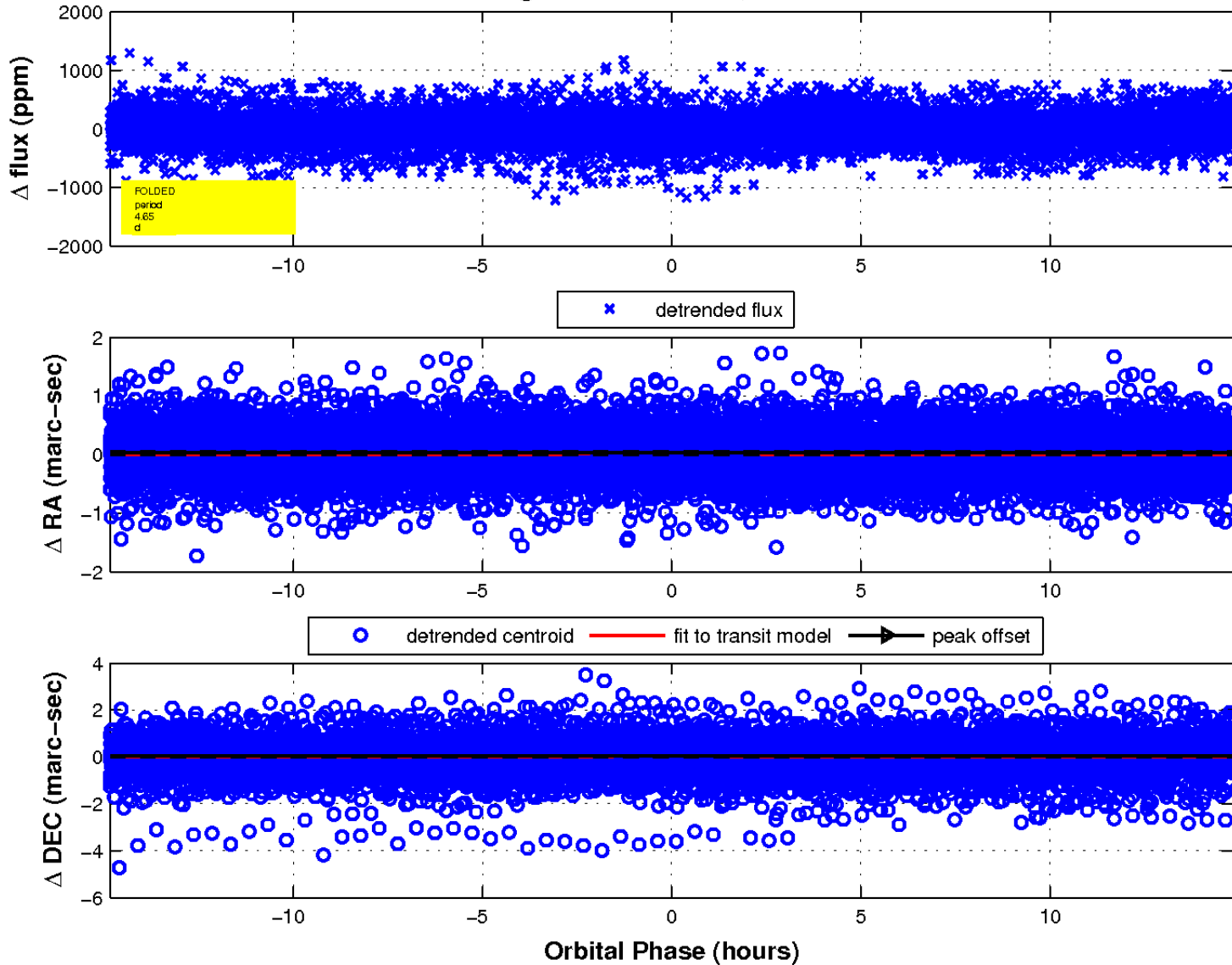
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

