

# KIC 001160891

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
001160891-01	OBS	No	0.940466	132.370168	51.7	4.020	12.2	10.4	1.60	6842	1.28	11479.31
001160891-02	OBS	No	0.940522	131.717513	53.3	2.963	12.5	11.0	1.60	6842	1.36	11478.40
001160891-03	OBS	No	65.624191	152.751190	573.1	2.712	8.4	7.4	1.60	6842	4.33	39.96
001160891-04	OBS	No	84.515418	210.647088	545.7	5.208	8.2	6.6	1.60	6842	4.19	28.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
001160891-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV
001160891-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
001160891-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
001160891-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—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.

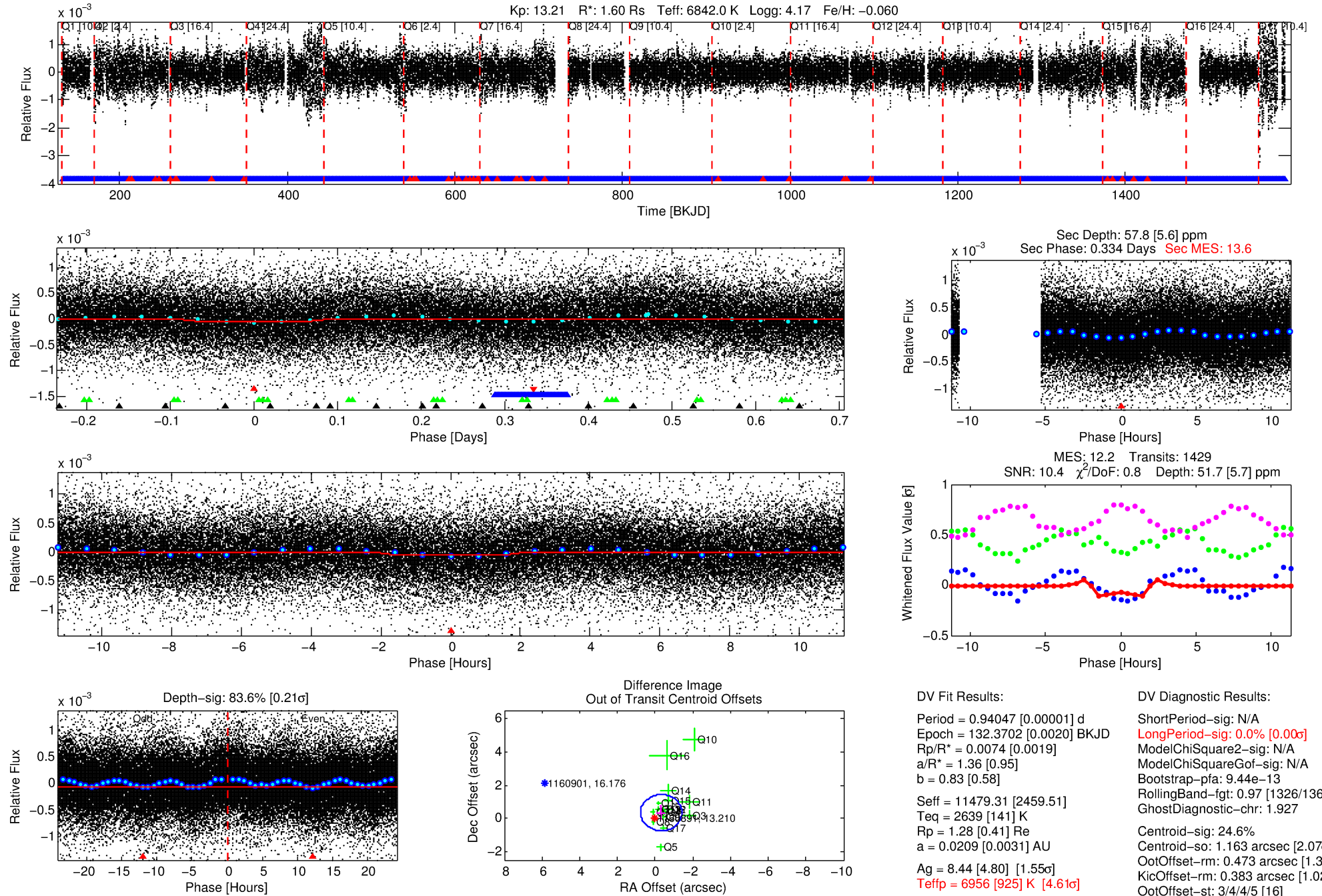
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 001160891-01

No Significant Match Found

# DV One-Page Summary

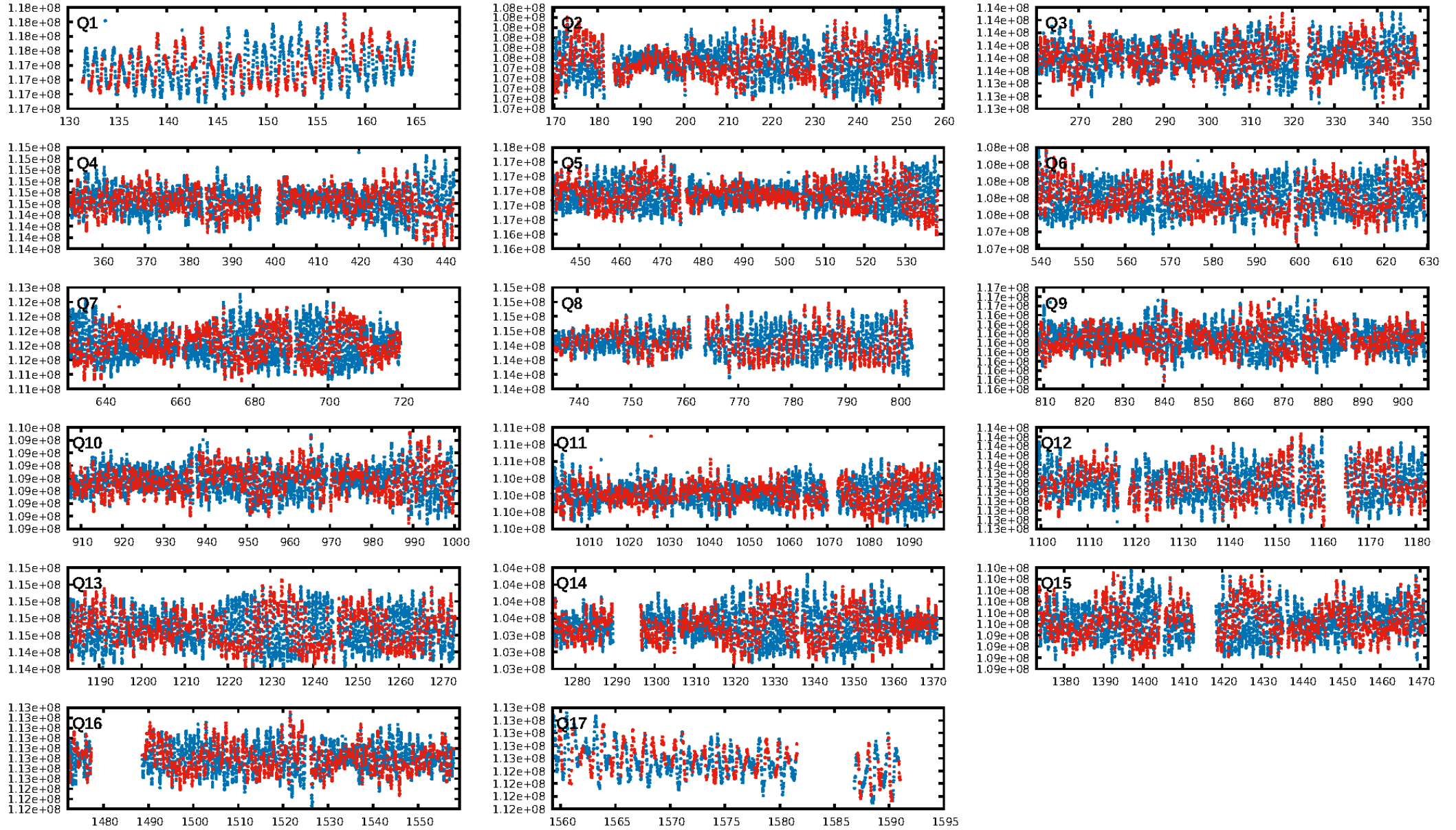
KIC: 1160891 Candidate: 1 of 4 Period: 0.940 d



Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 01:58:54 Z

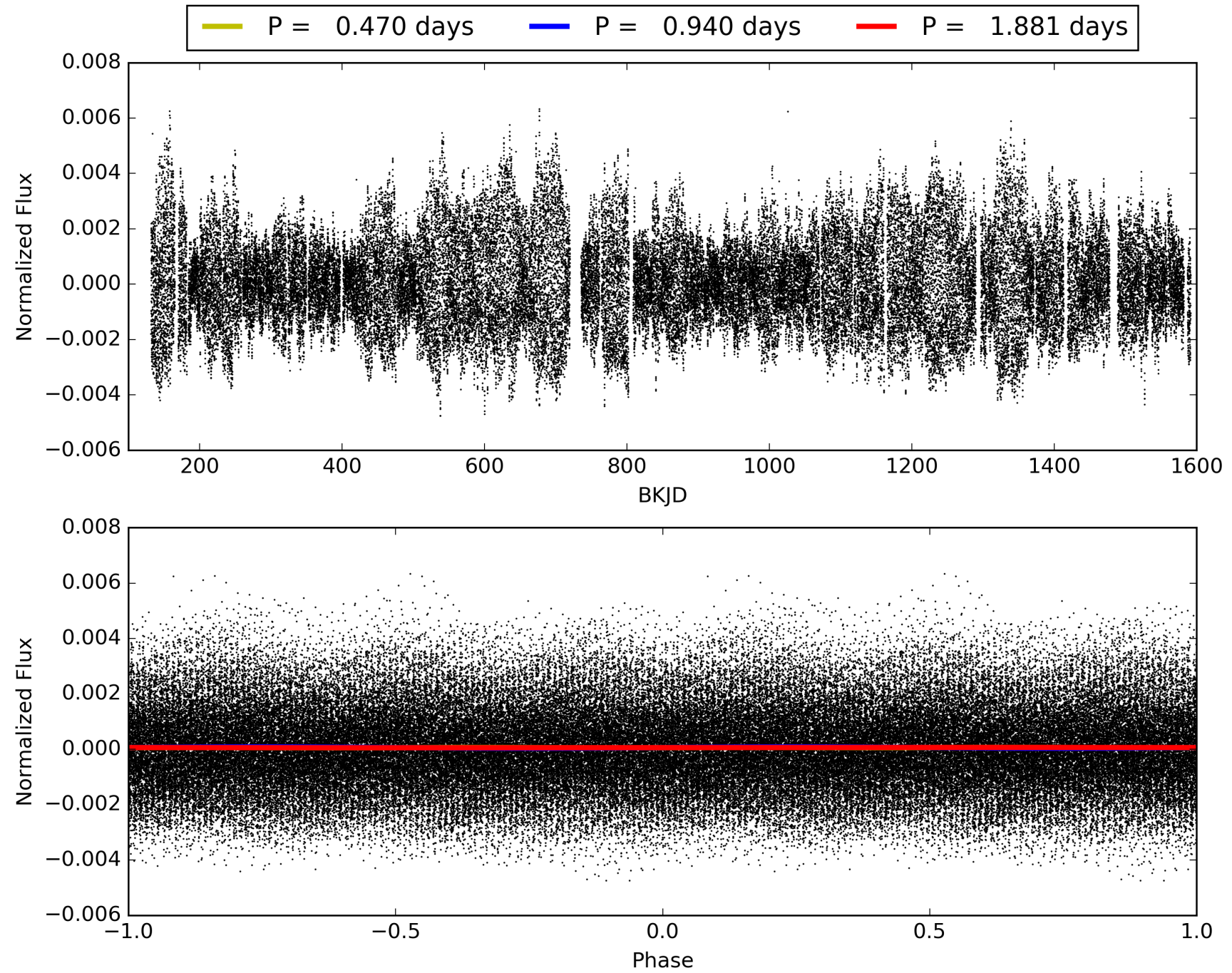
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 001160891-01, PDC Light Curves





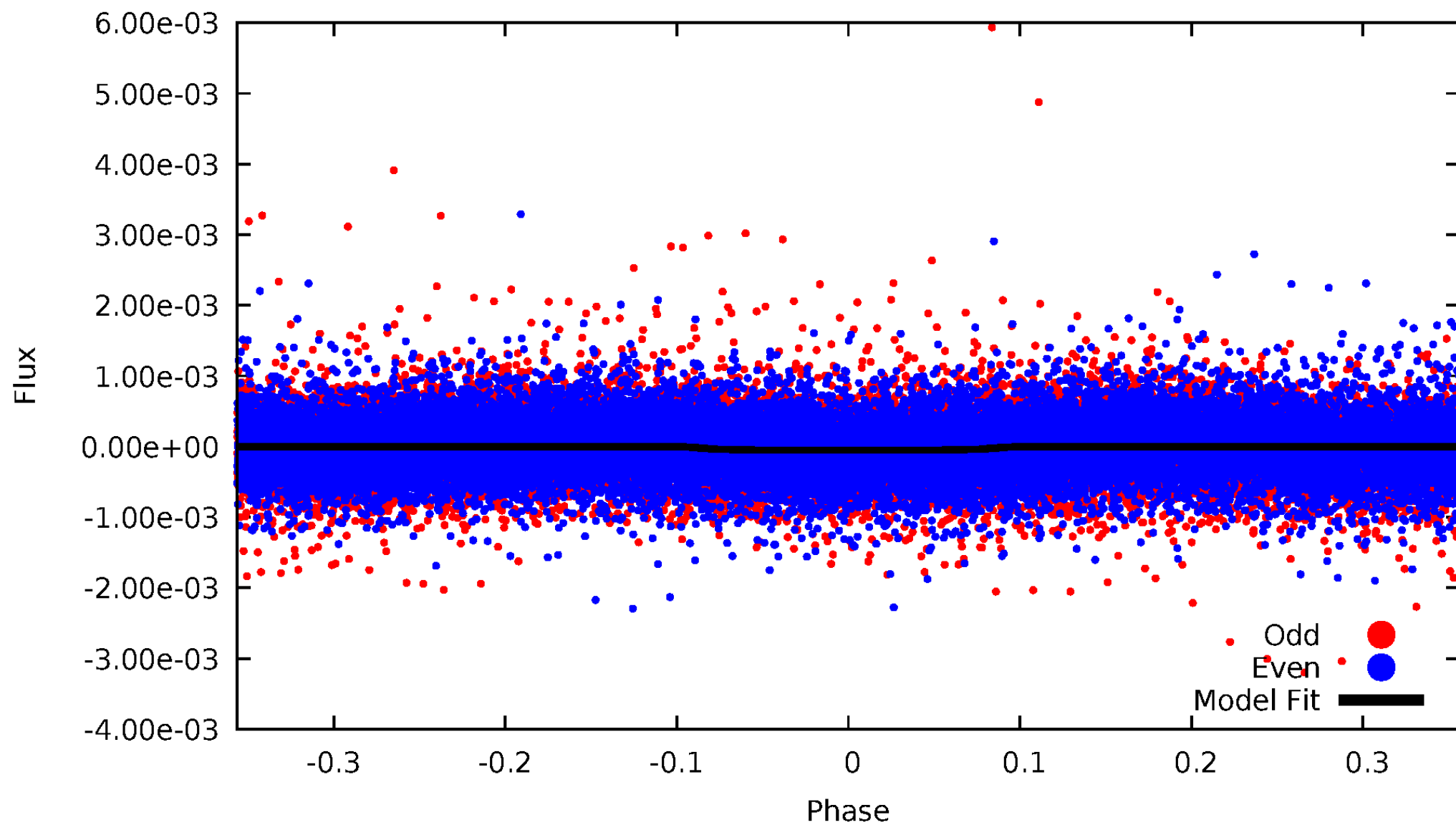
# TCE 001160891-01





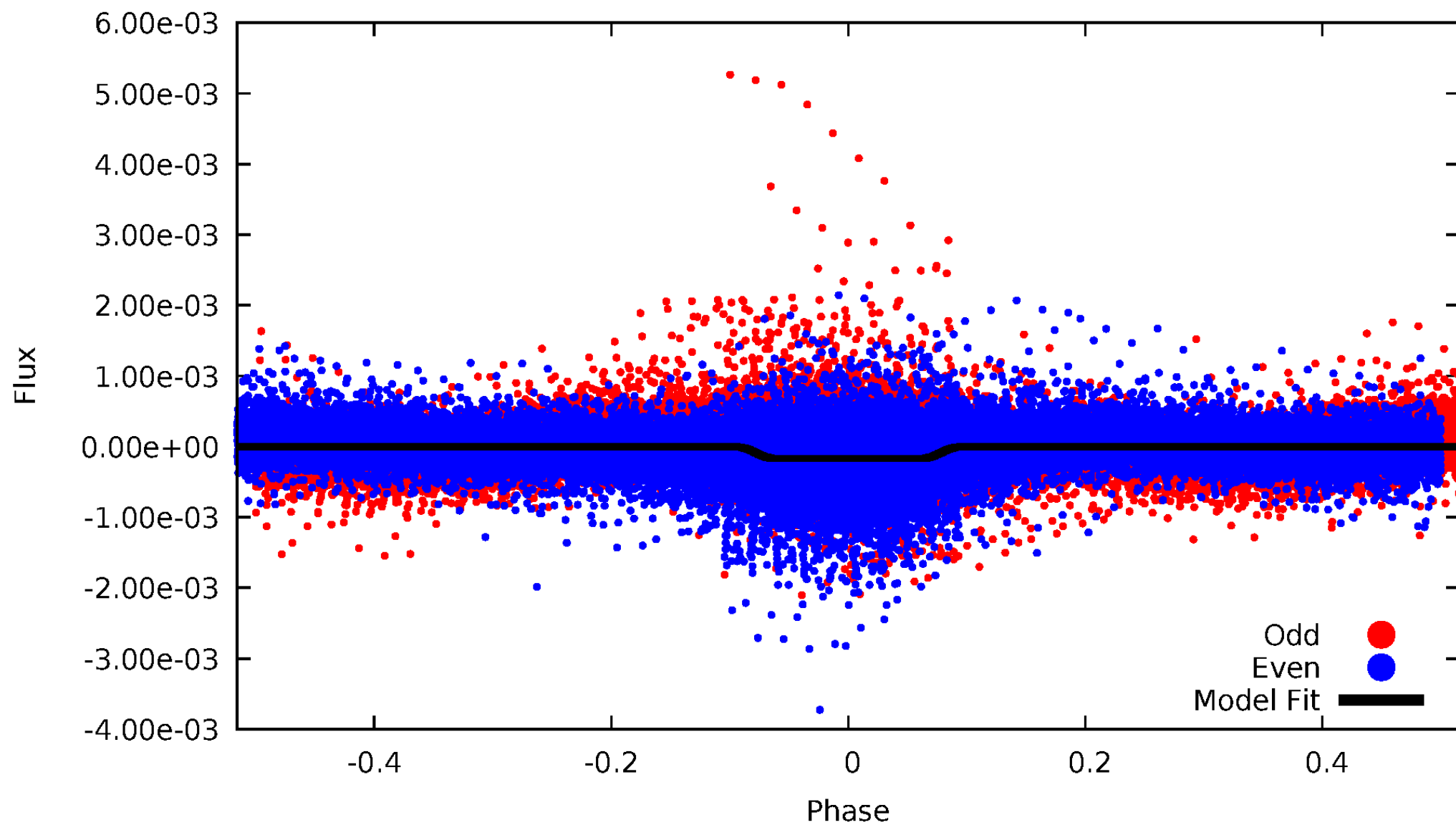
# DV Odd/Even

TCE 001160891-01



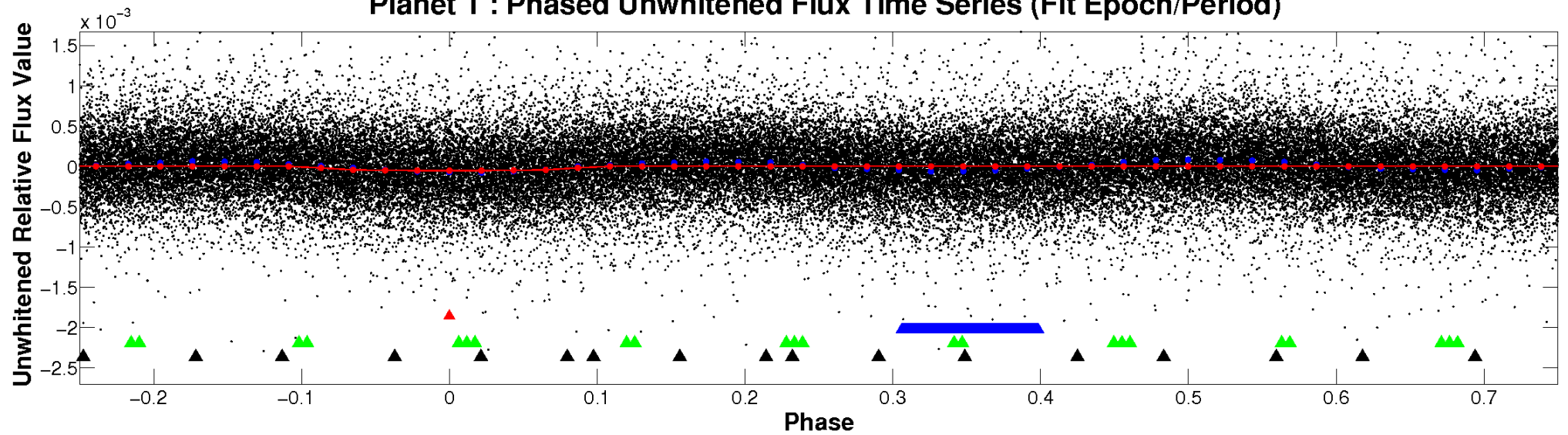
# ALT Odd/Even

TCE 001160891-01

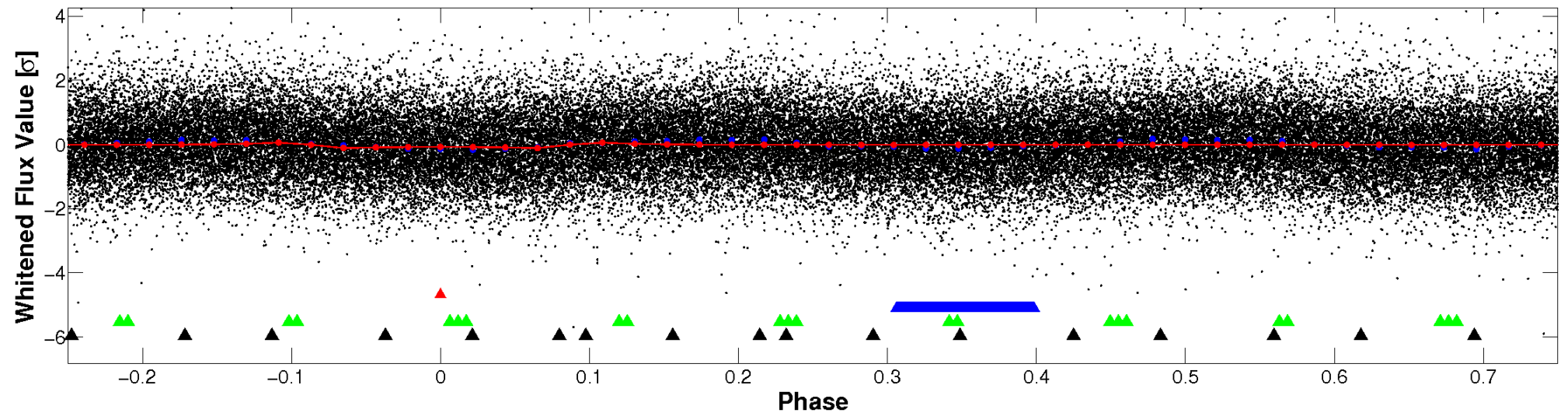


# Non-Whitened Vs. Whitened Light Curve

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



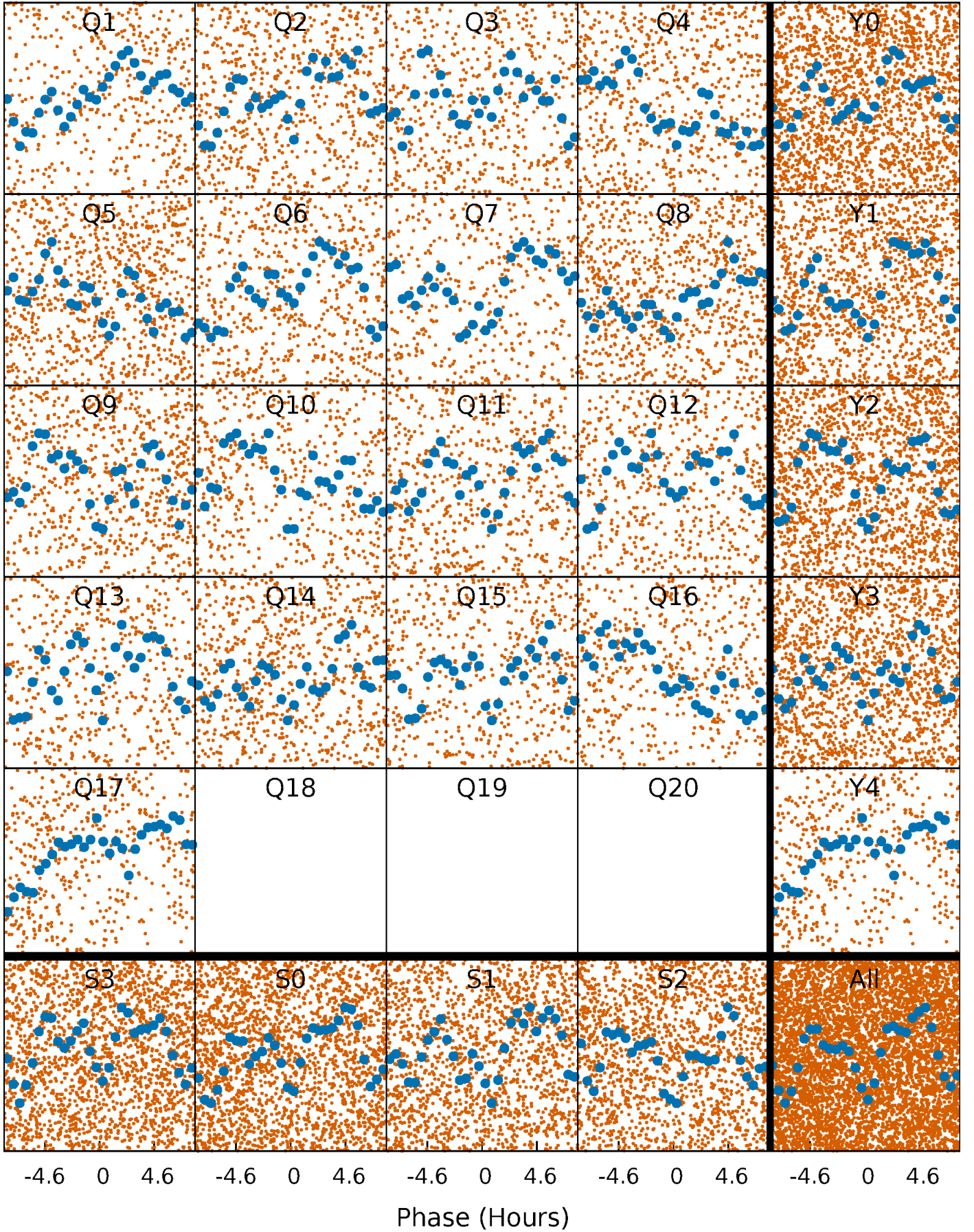
## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)





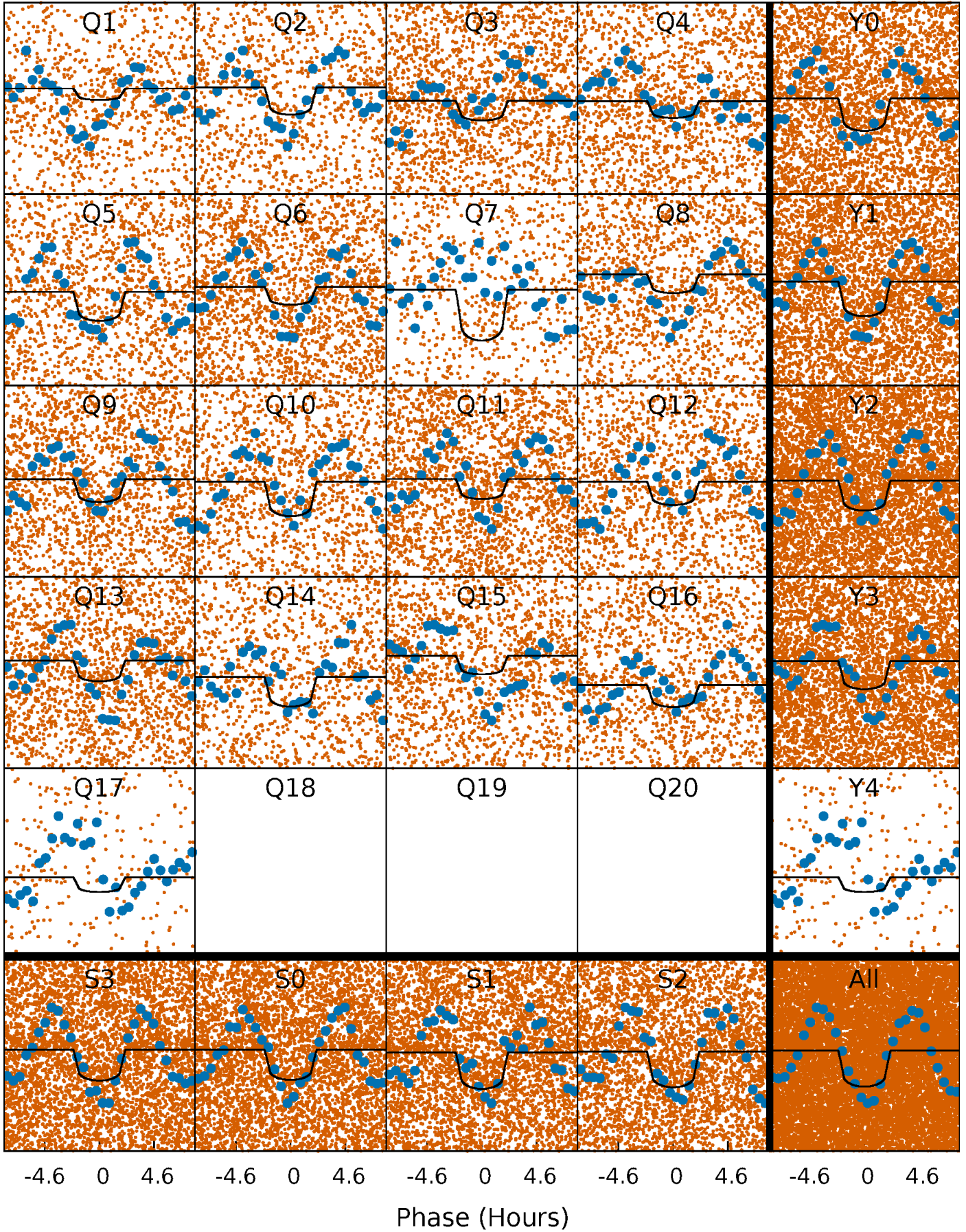
# PDC Quarter-Phased Transit Curves

TCE 001160891-01   P= 0.940466 Days    $T_0=132.370168$  (BKJD)



# DV Quarter-Phased Transit Curves

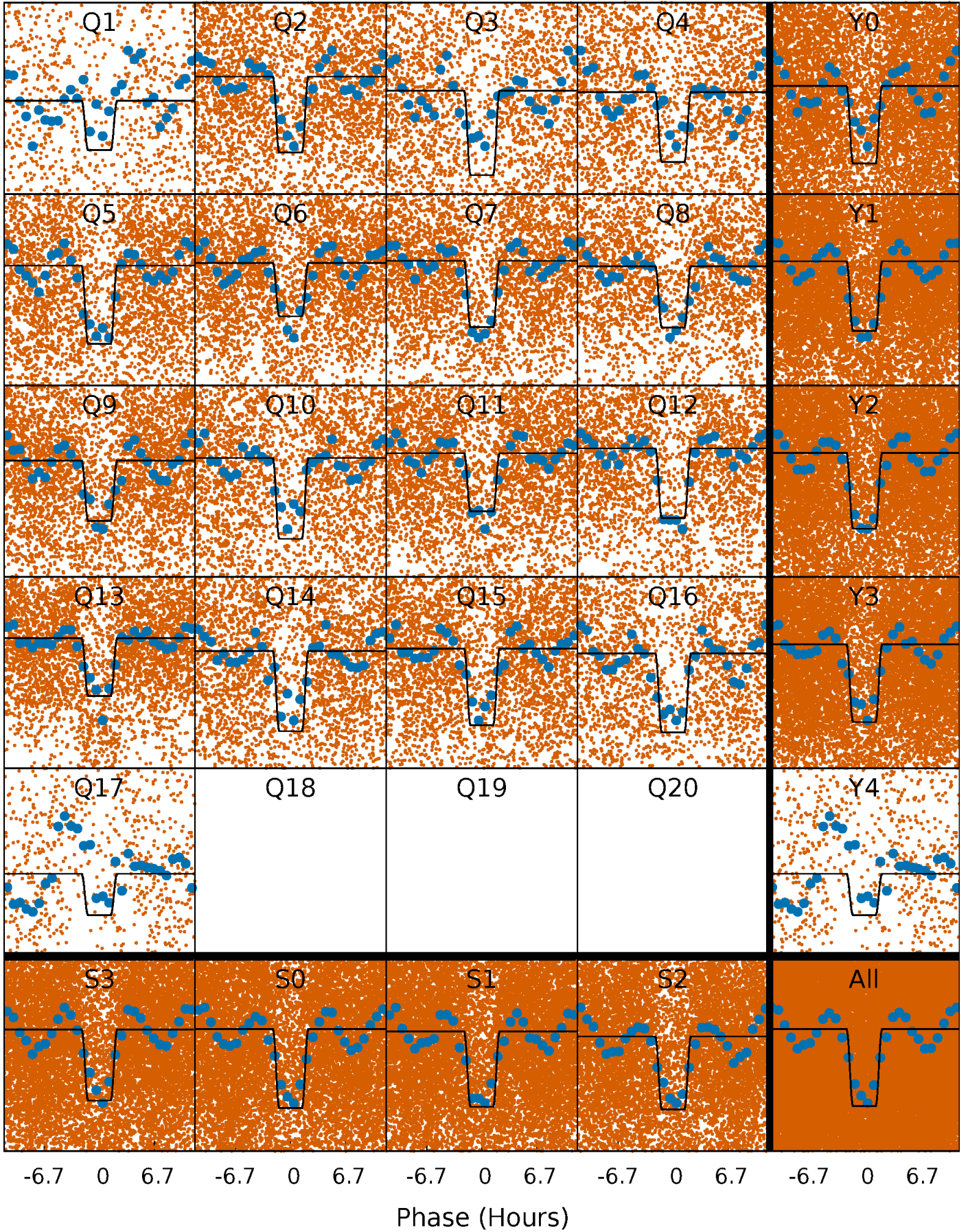
TCE 001160891-01   P= 0.940466 Days    $T_0=132.370168$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 001160891-01 P= 0.940520 Days  $T_0=132.335883$  (BKJD)

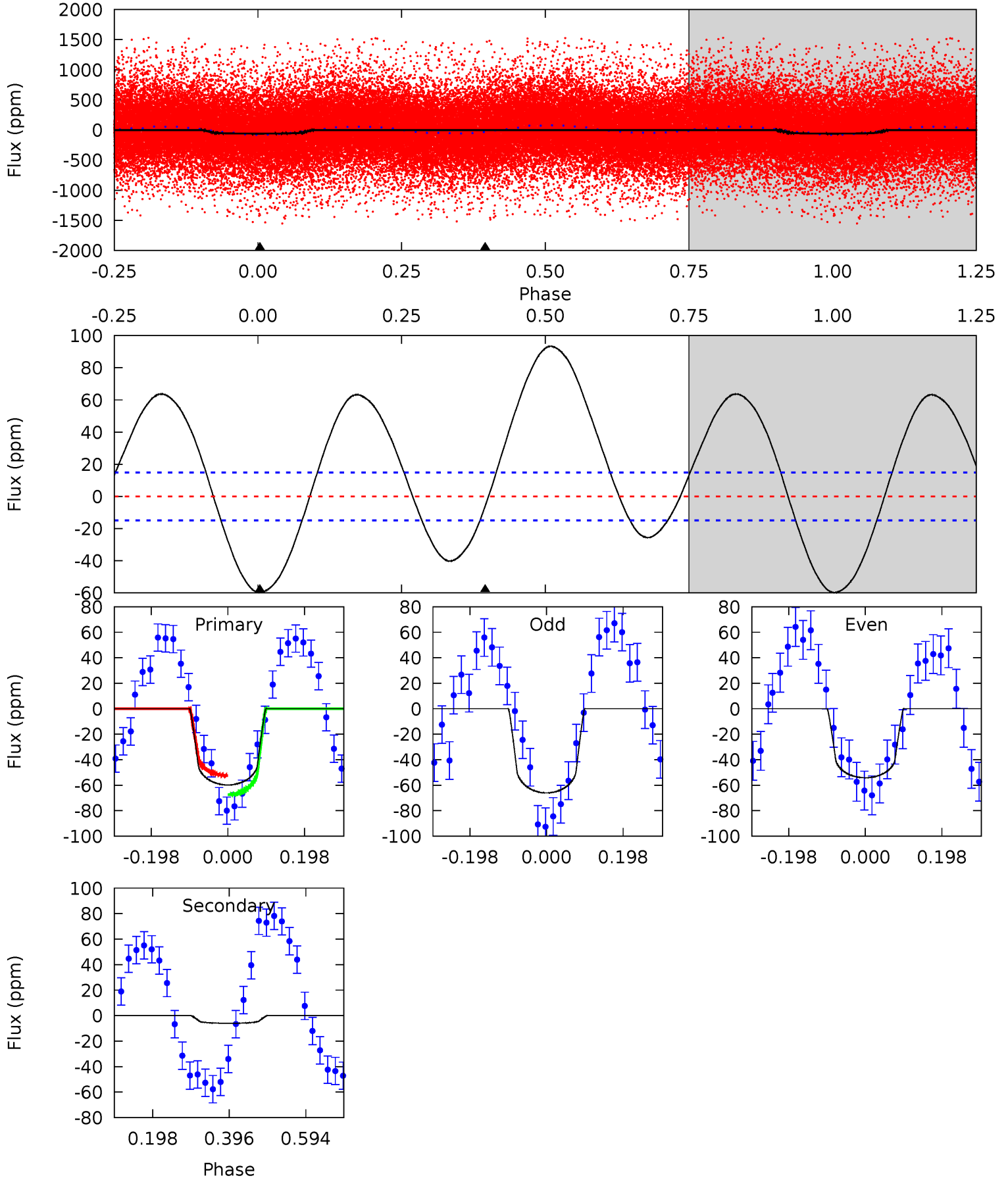




# DV Model-Shift Uniqueness Test

001160891-01, P = 0.940466 Days, E = 131.429702 Days

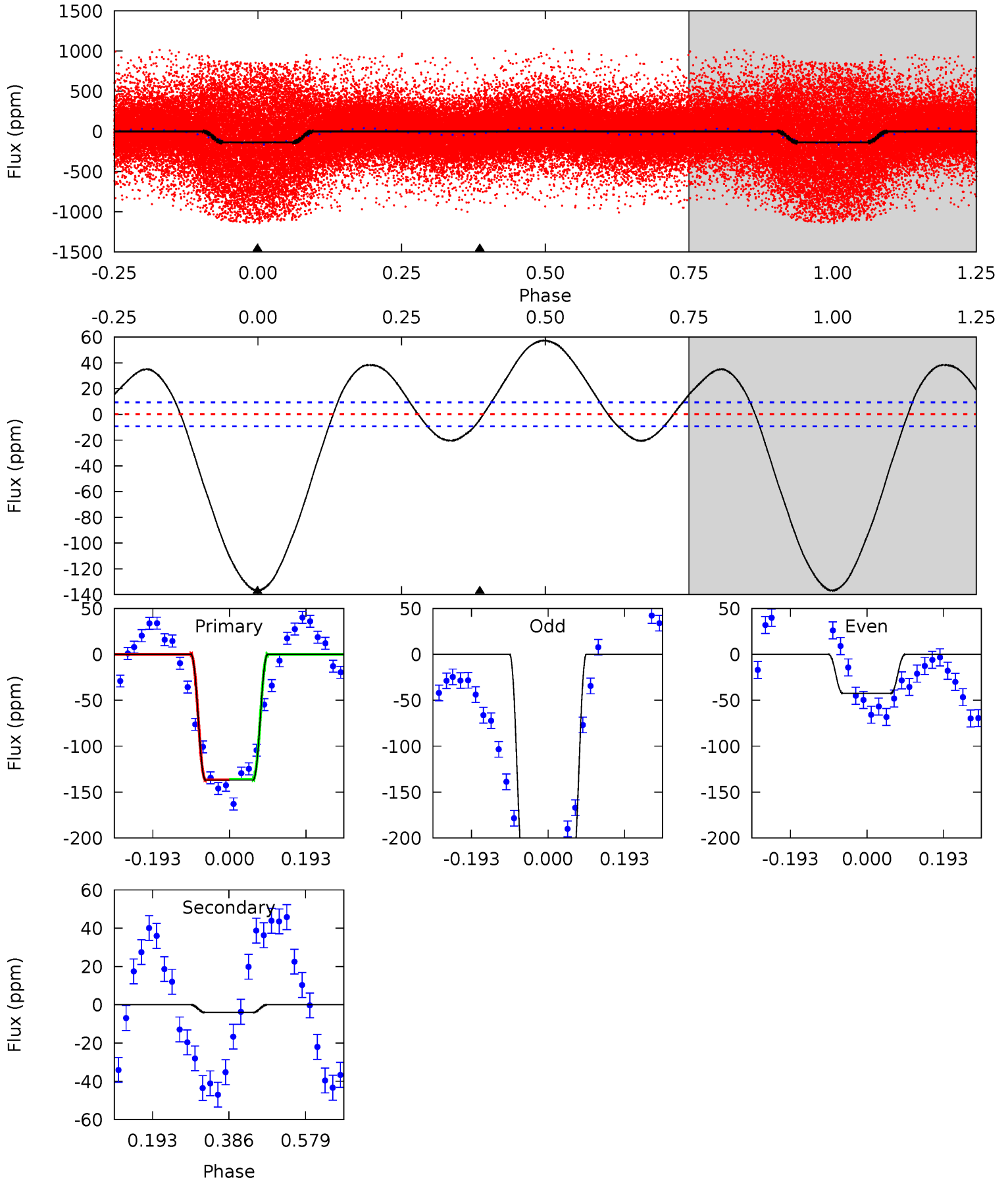
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.8	1.79	0	0	4.42	1.29	7.30	17.8	17.8	1.79	1.79	1.78	0.96	0.61	2.24



# Alt Model-Shift Uniqueness Test

001160891-01, P = 0.940520 Days, E = 131.395363 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
65.4	1.92	0	0	4.42	1.30	8.56	65.4	65.4	1.92	1.92	41.8	1.20	0.30	0.14



### Stellar Parameters For KIC 001160891

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6842^{+72}_{-92}$	$4.170^{+0.090}_{-0.110}$	$-0.060^{+0.150}_{-0.150}$	$1.600^{+0.289}_{-0.178}$	$1.389^{+0.104}_{-0.095}$	$0.477^{+0.172}_{-0.166}$
	+1%/-1%	+2%/-3%	+250%/-250%	+18%/-11%	+7%/-7%	+36%/-35%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 001160891-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-6 \pm 3$	$1.28^{+0.37}_{-0.33}$	$3680^{+151}_{-119}$	$3903^{+807}_{-1178}$	$0.881^{+0.958}_{-0.528}$
Alt.	$-4 \pm 2$	$2.29^{+0.38}_{-0.36}$	$3682^{+144}_{-118}$	$-3021^{+5448}_{-314}$	$0.185^{+0.136}_{-0.098}$

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



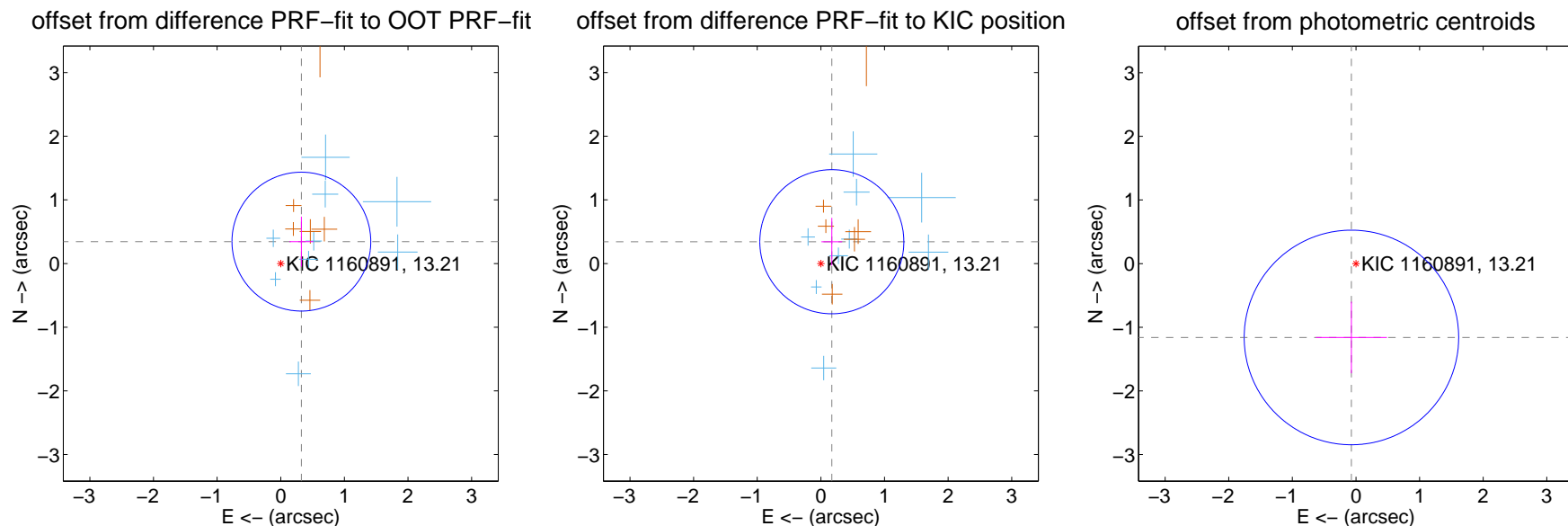
## DV Centroid Data

Supplemental centroid analysis for 001160891-01. Kepler magnitude: 13.21. Transit SNR 10.35

There are 9 quarters with good PRF difference image offsets

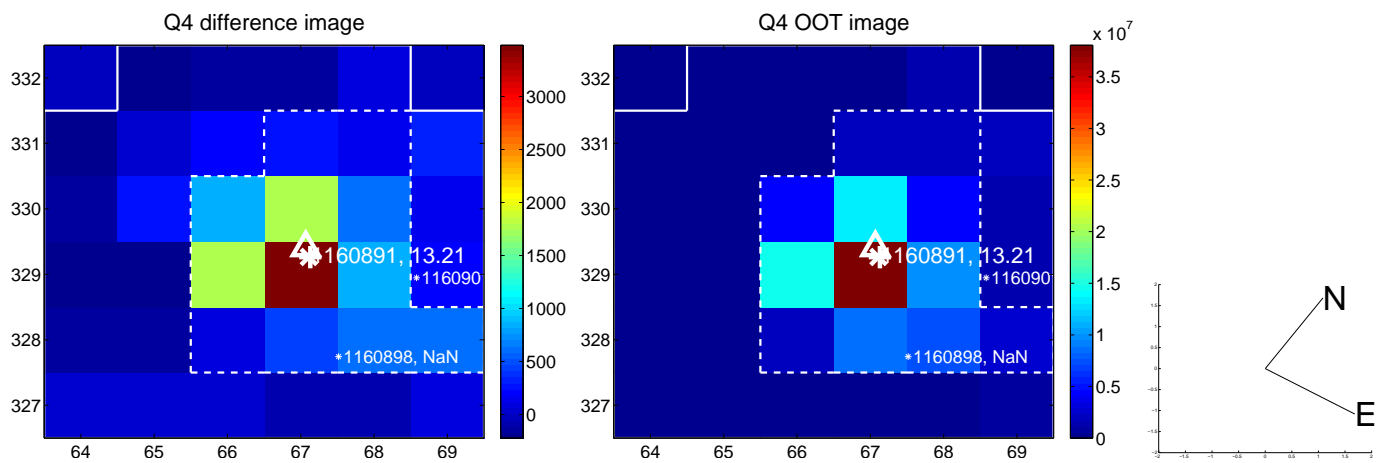
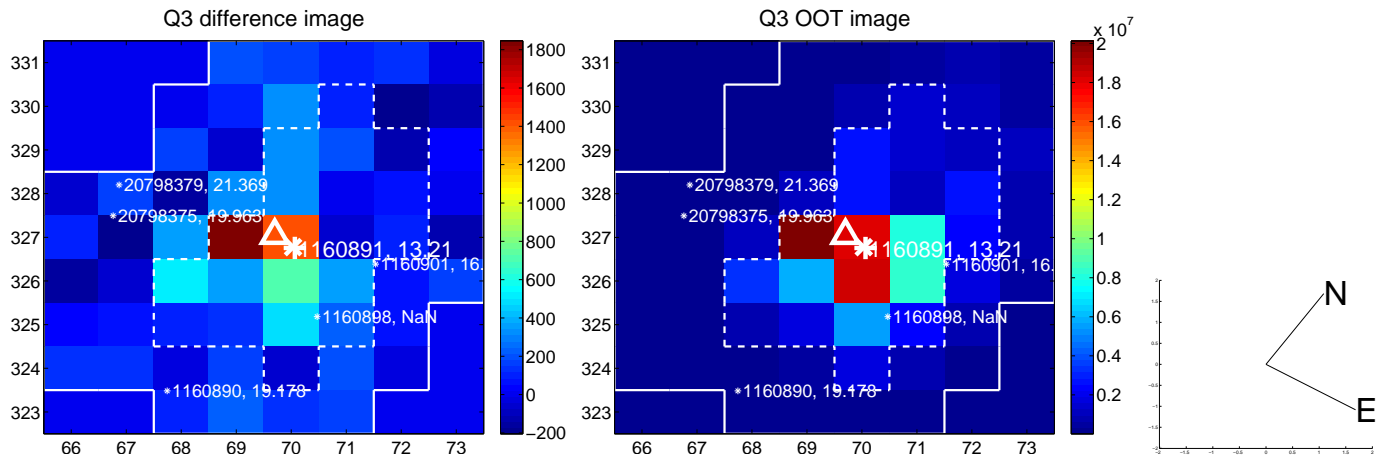
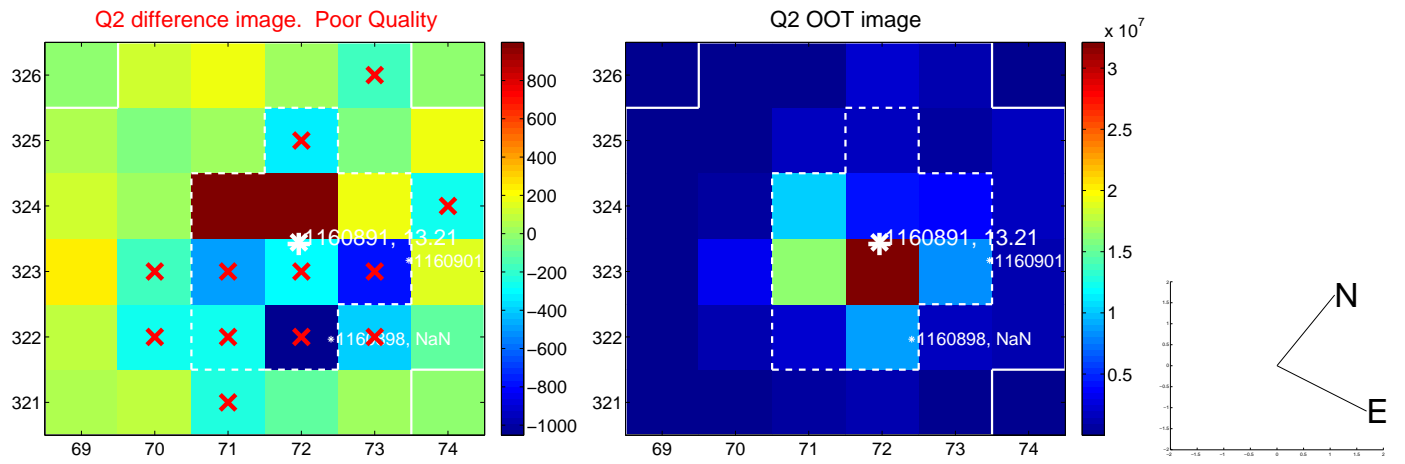
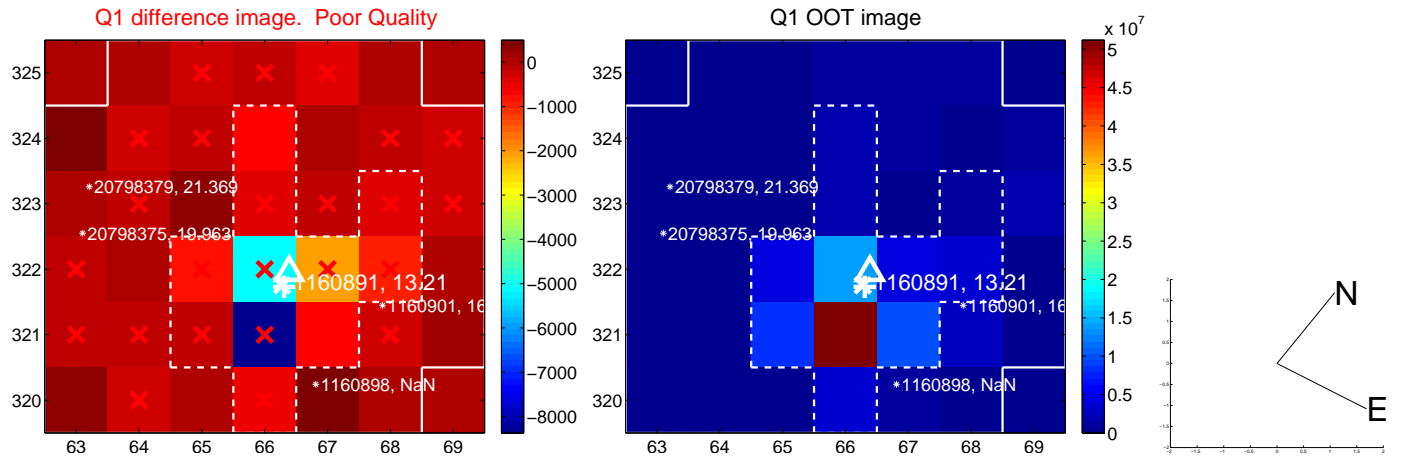
The direct PRF centroid is offset from the target star catalog position by about 0.30 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.473 \pm 0.364$	1.30	$-0.324 \pm 0.190$	$0.344 \pm 0.392$
PRF-fit source offset from KIC position	$0.383 \pm 0.377$	1.02	$-0.172 \pm 0.163$	$0.343 \pm 0.375$
photometric centroid source offset	$1.16 \pm 0.56$	2.07	$0.07 \pm 0.56$	$-1.16 \pm 0.56$

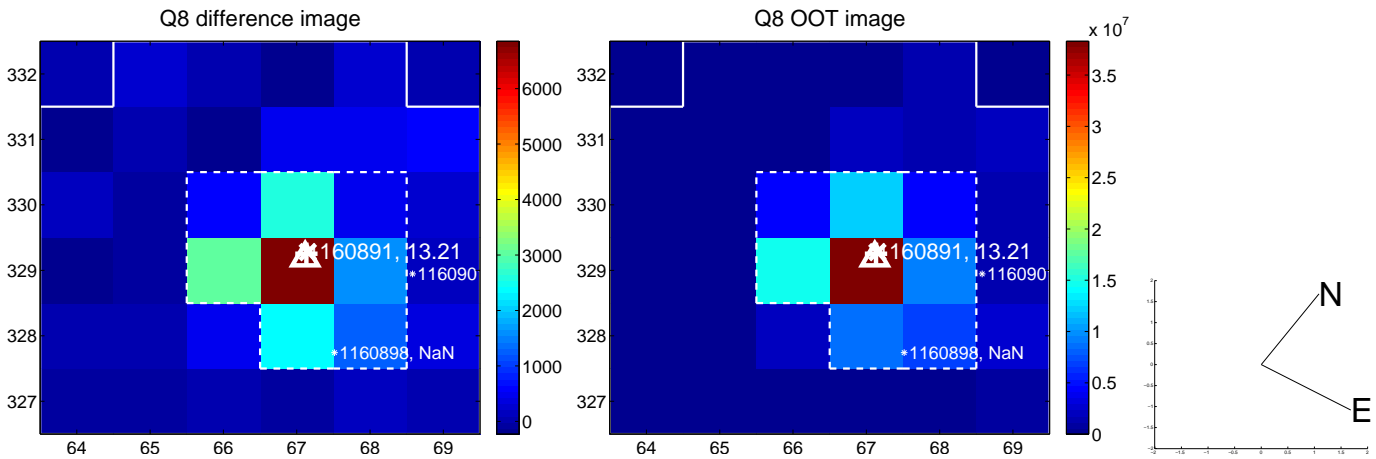
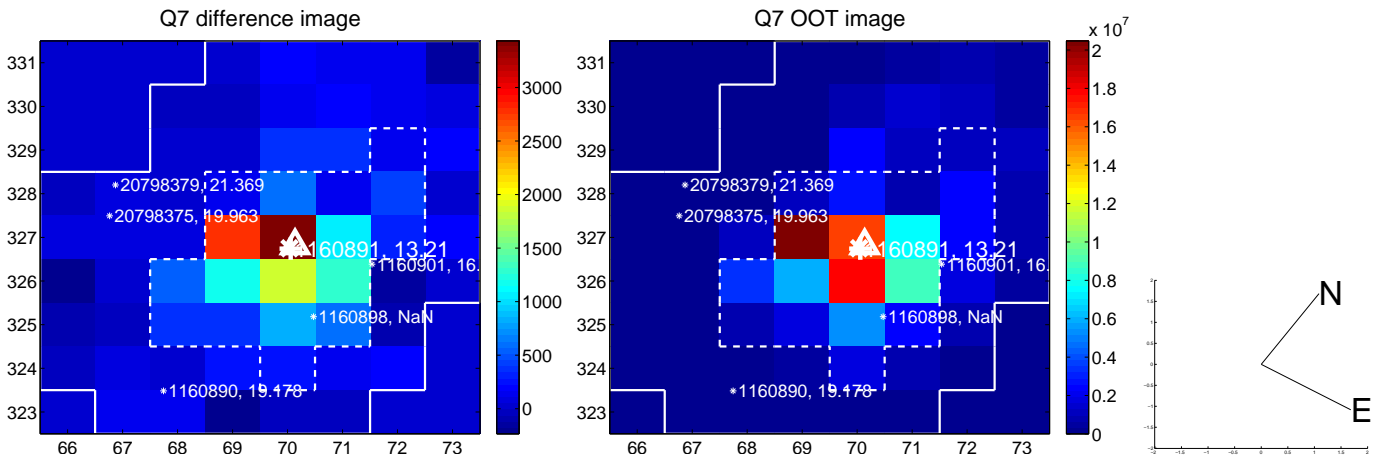
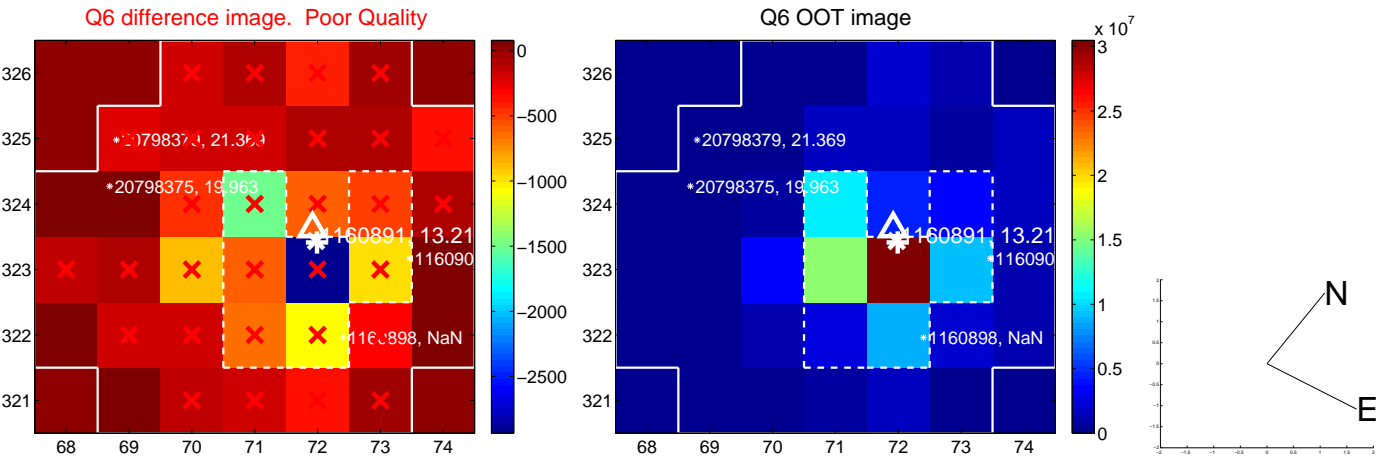
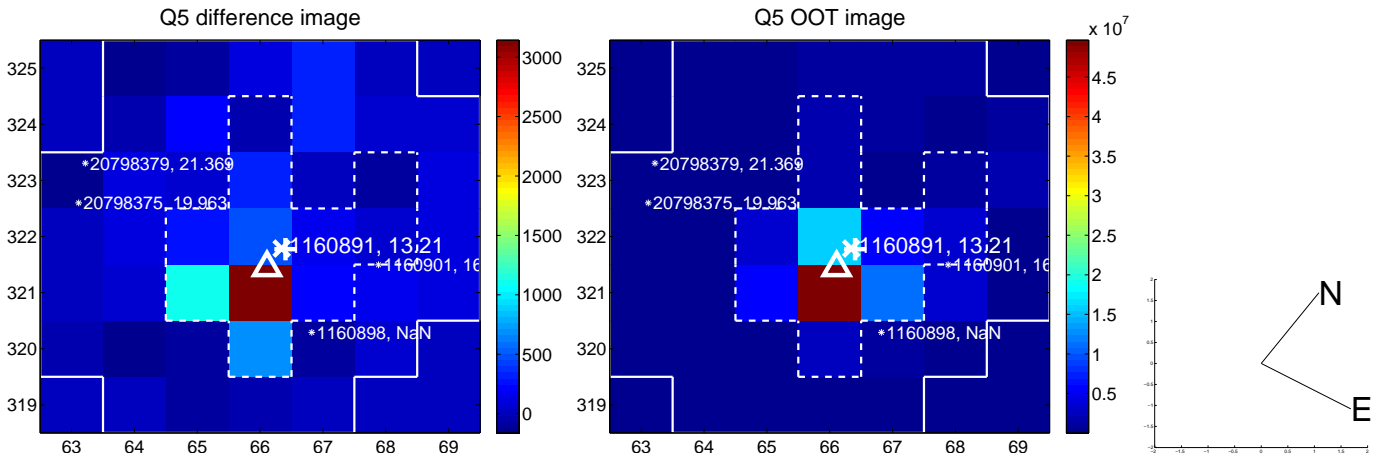


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

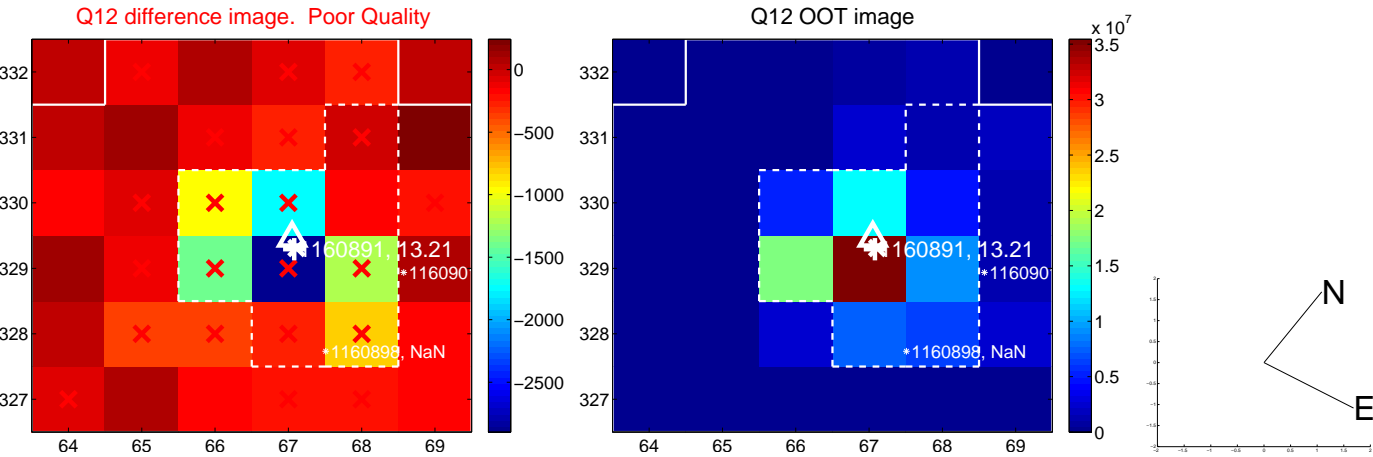
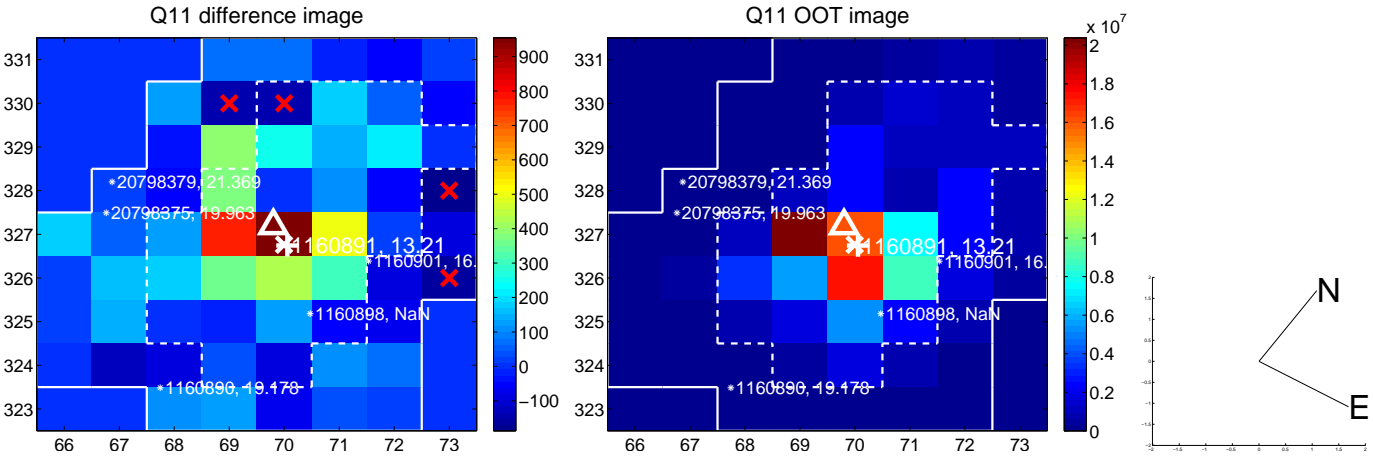
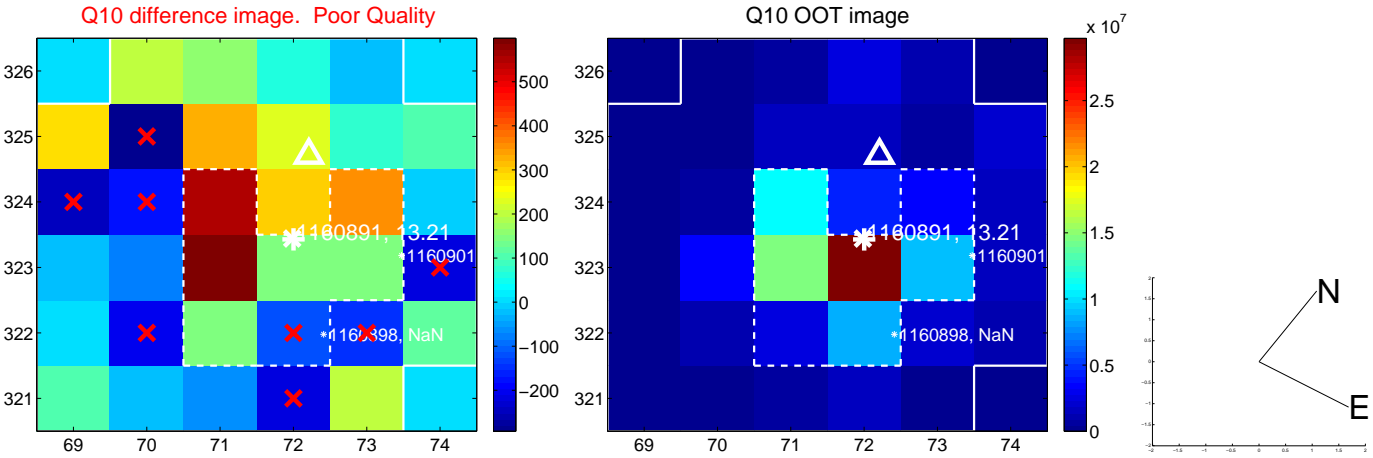
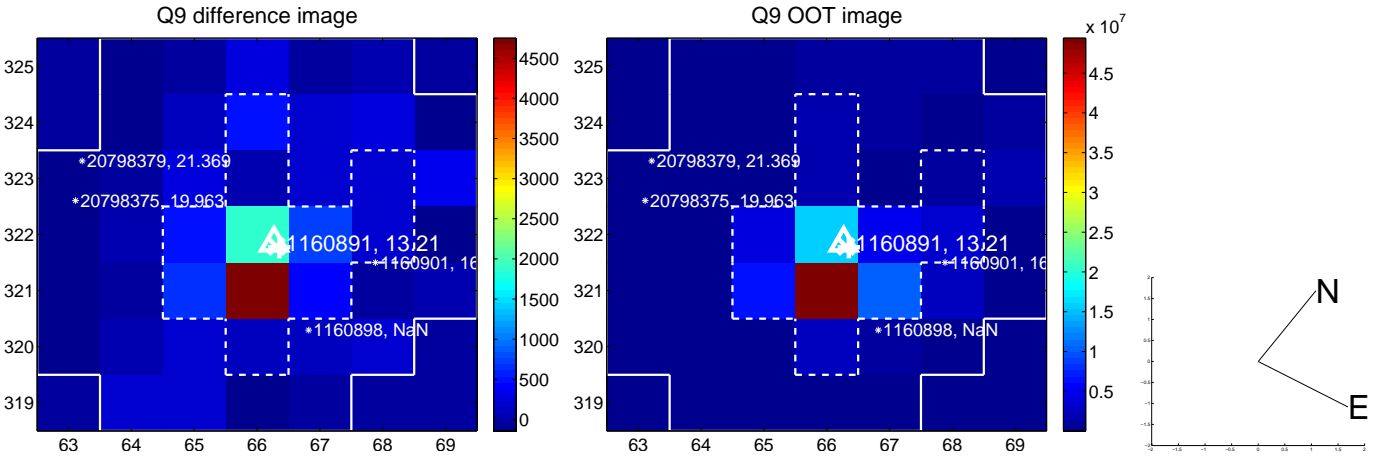
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



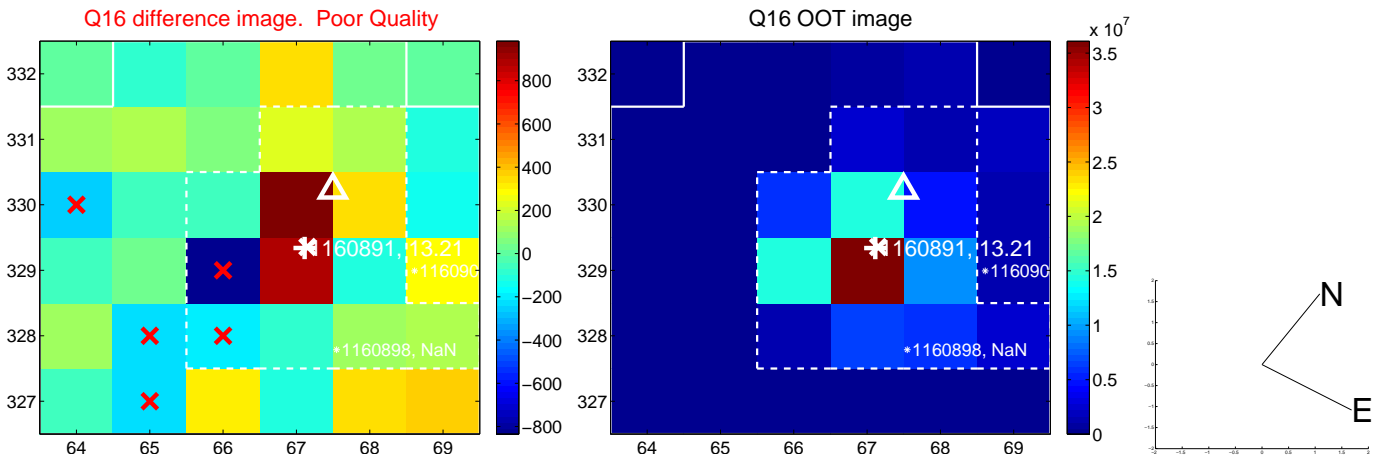
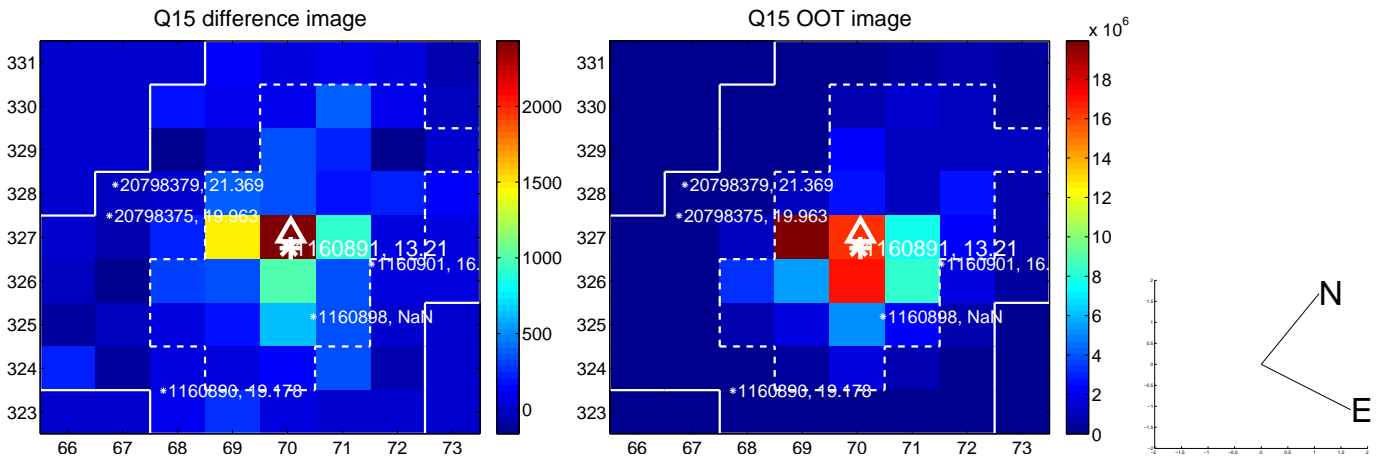
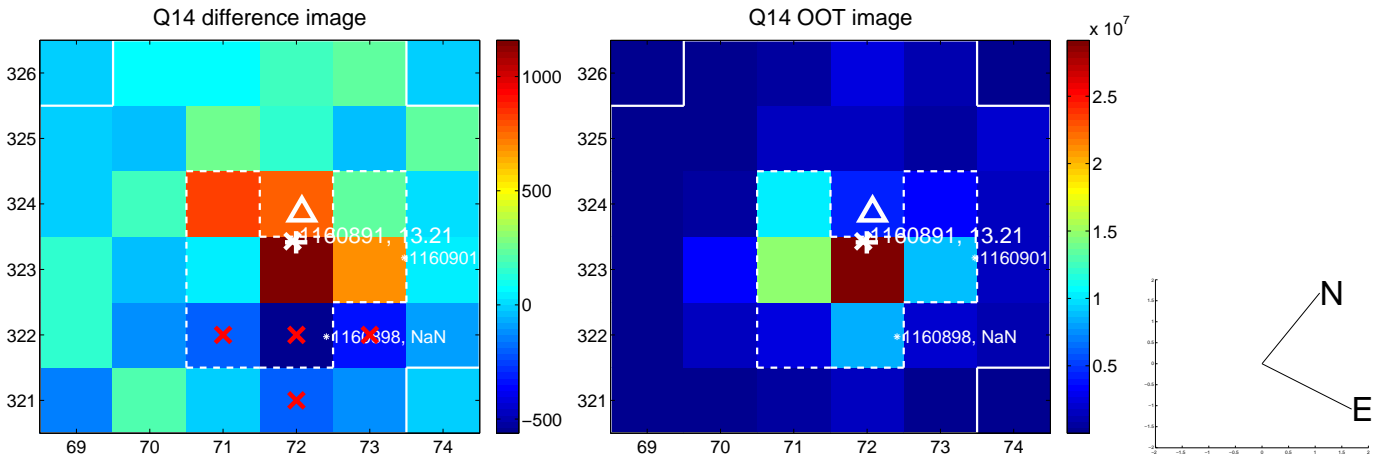
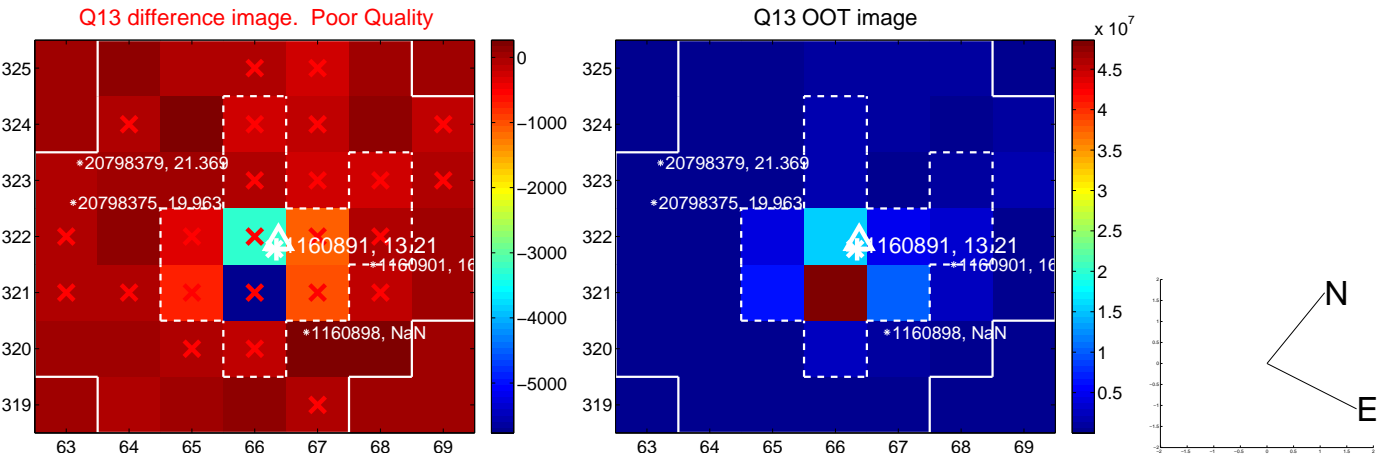
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

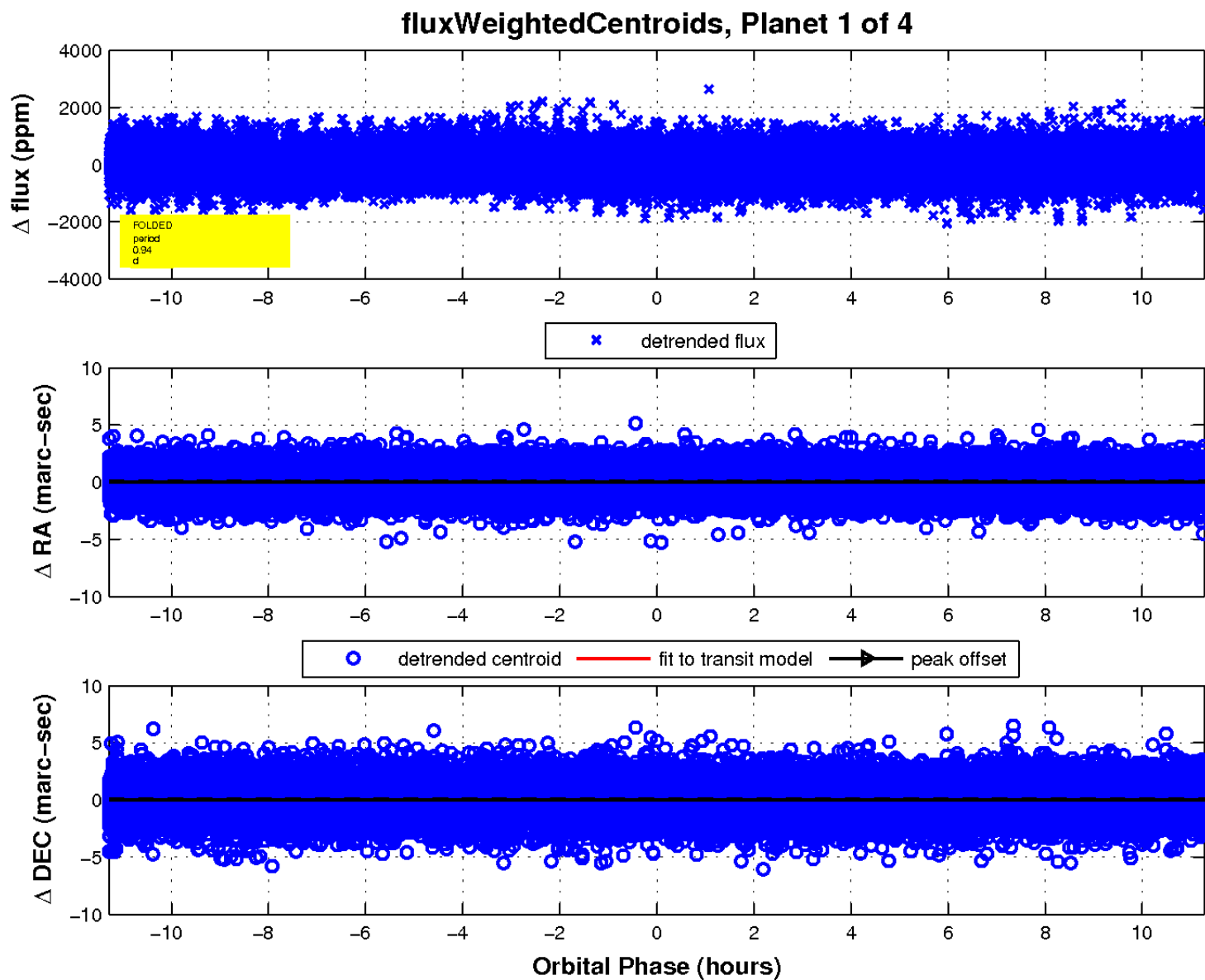
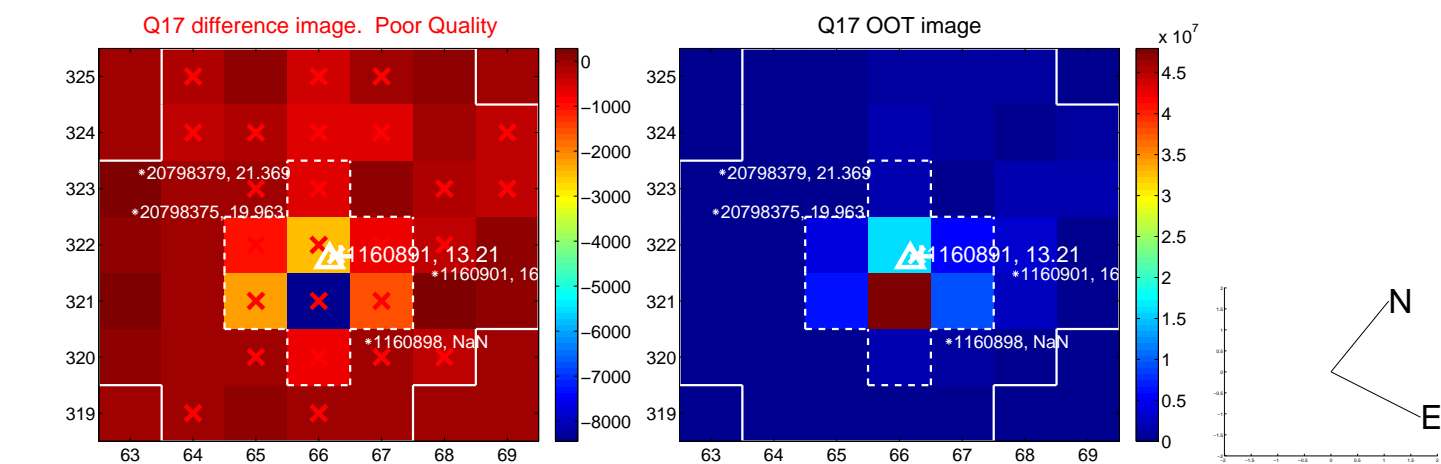


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



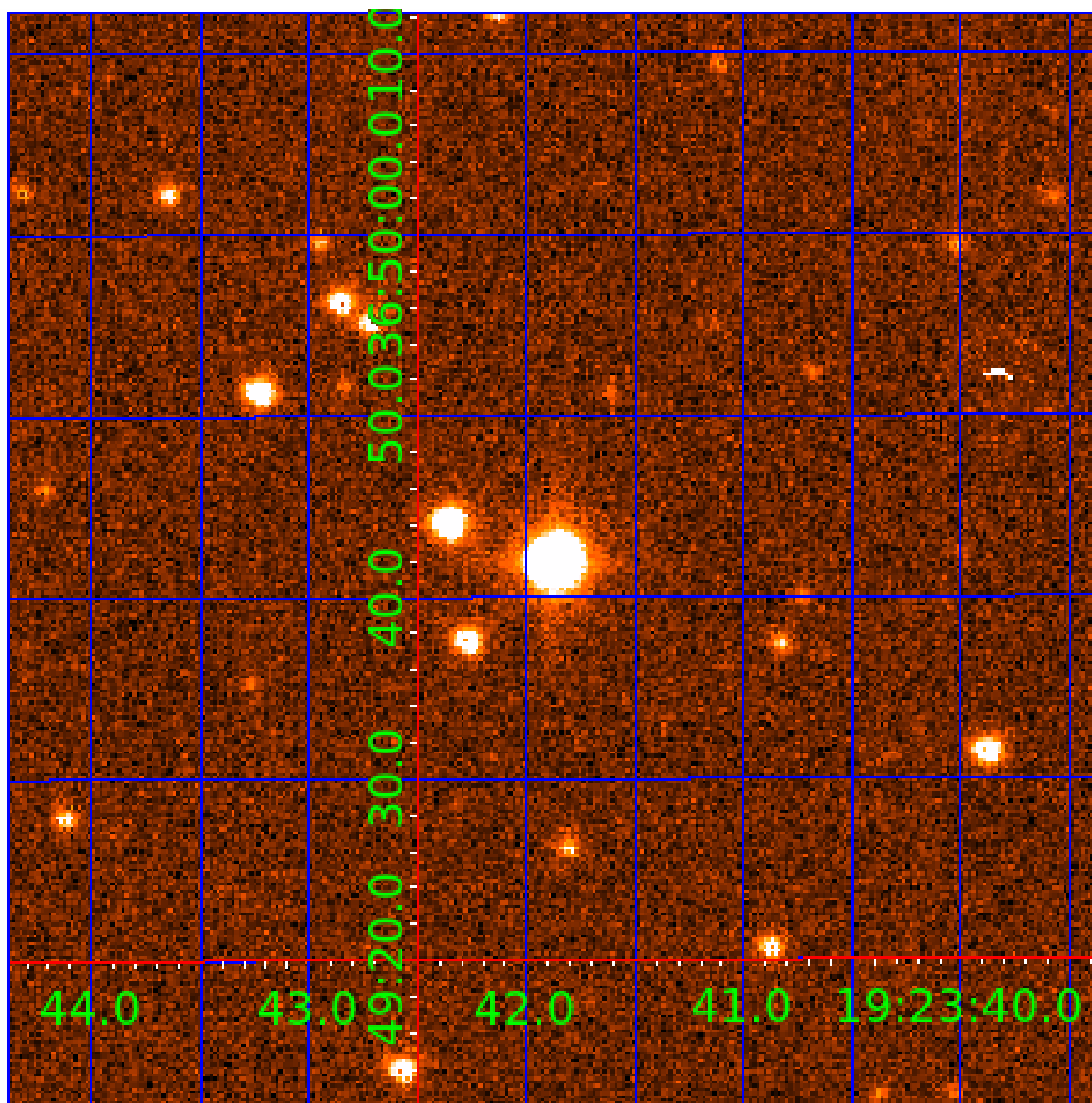


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 001160891

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
001160891-01	OBS	No	0.940466	132.370168	51.7	4.020	12.2	10.4	1.60	6842	1.28	11479.31
001160891-02	OBS	No	0.940522	131.717513	53.3	2.963	12.5	11.0	1.60	6842	1.36	11478.40
001160891-03	OBS	No	65.624191	152.751190	573.1	2.712	8.4	7.4	1.60	6842	4.33	39.96
001160891-04	OBS	No	84.515418	210.647088	545.7	5.208	8.2	6.6	1.60	6842	4.19	28.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
001160891-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV
001160891-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
001160891-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
001160891-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT

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

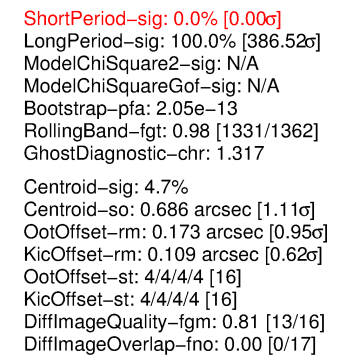
N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

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.

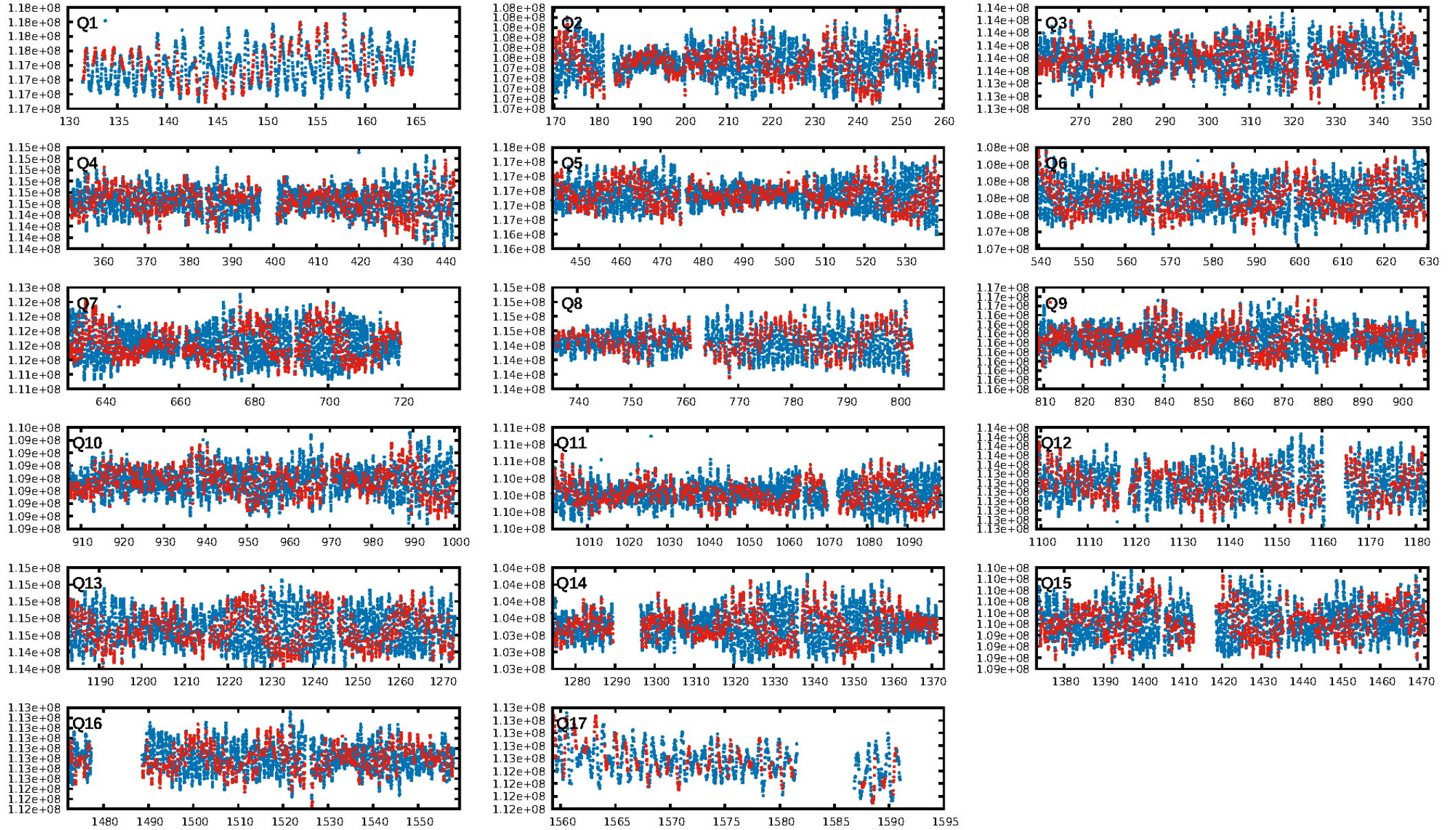
Ephemeris Match Information For 001160891-02

No Significant Match Found

## KIC: 1160891    Candidate: 2 of 4    Period: 0.941 d

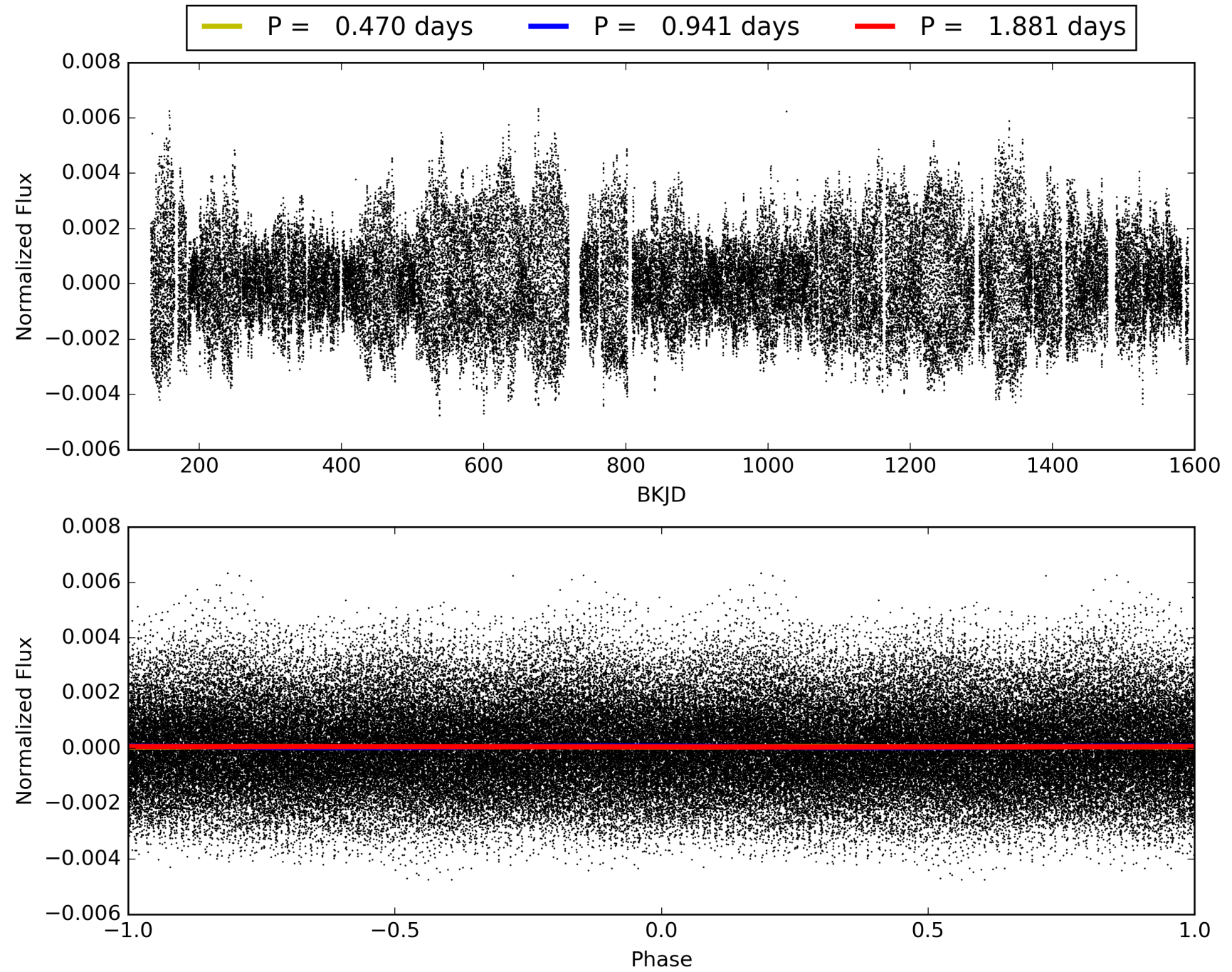


# TCE 001160891-02, PDC Light Curves



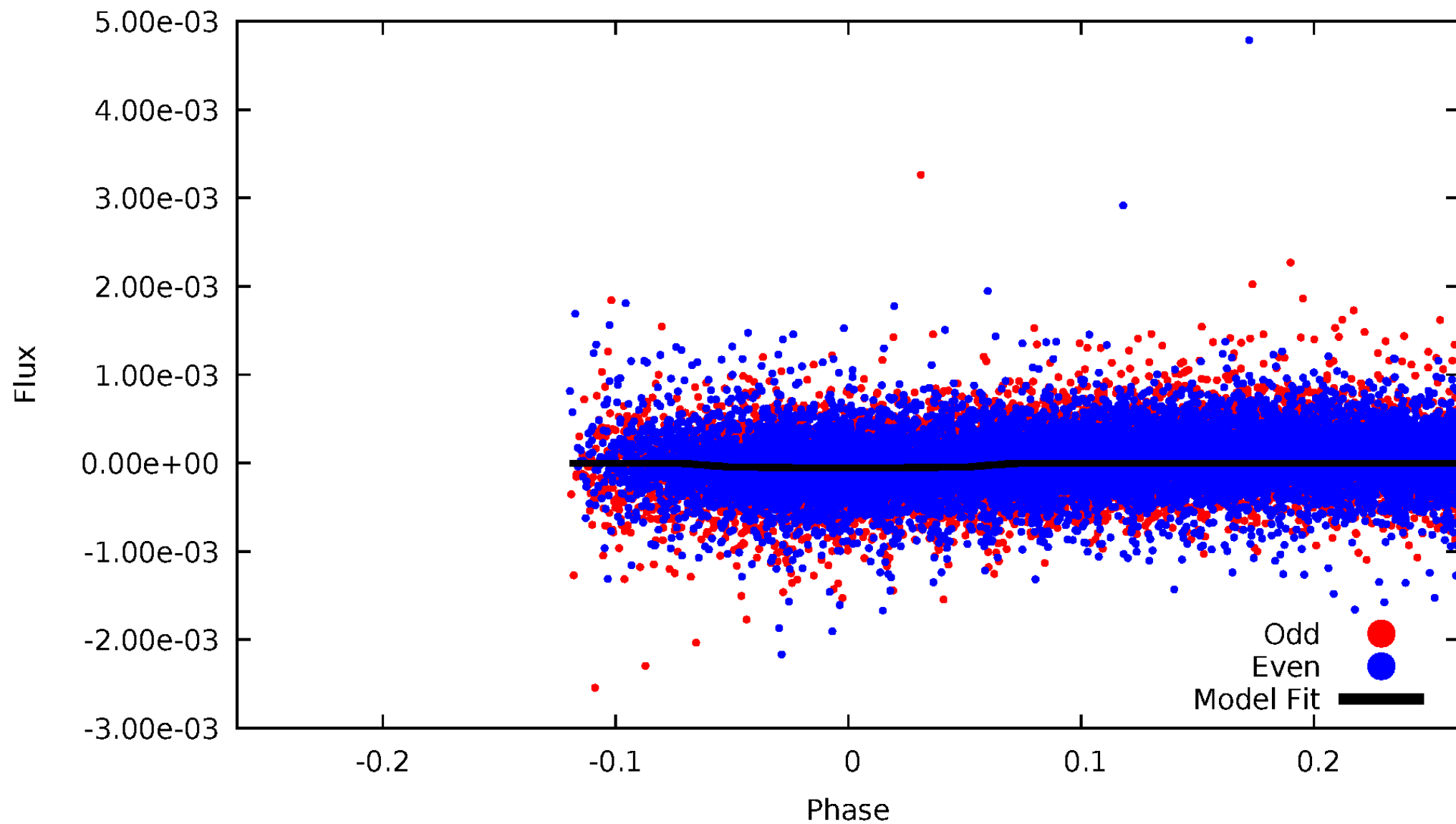


# TCE 001160891-02



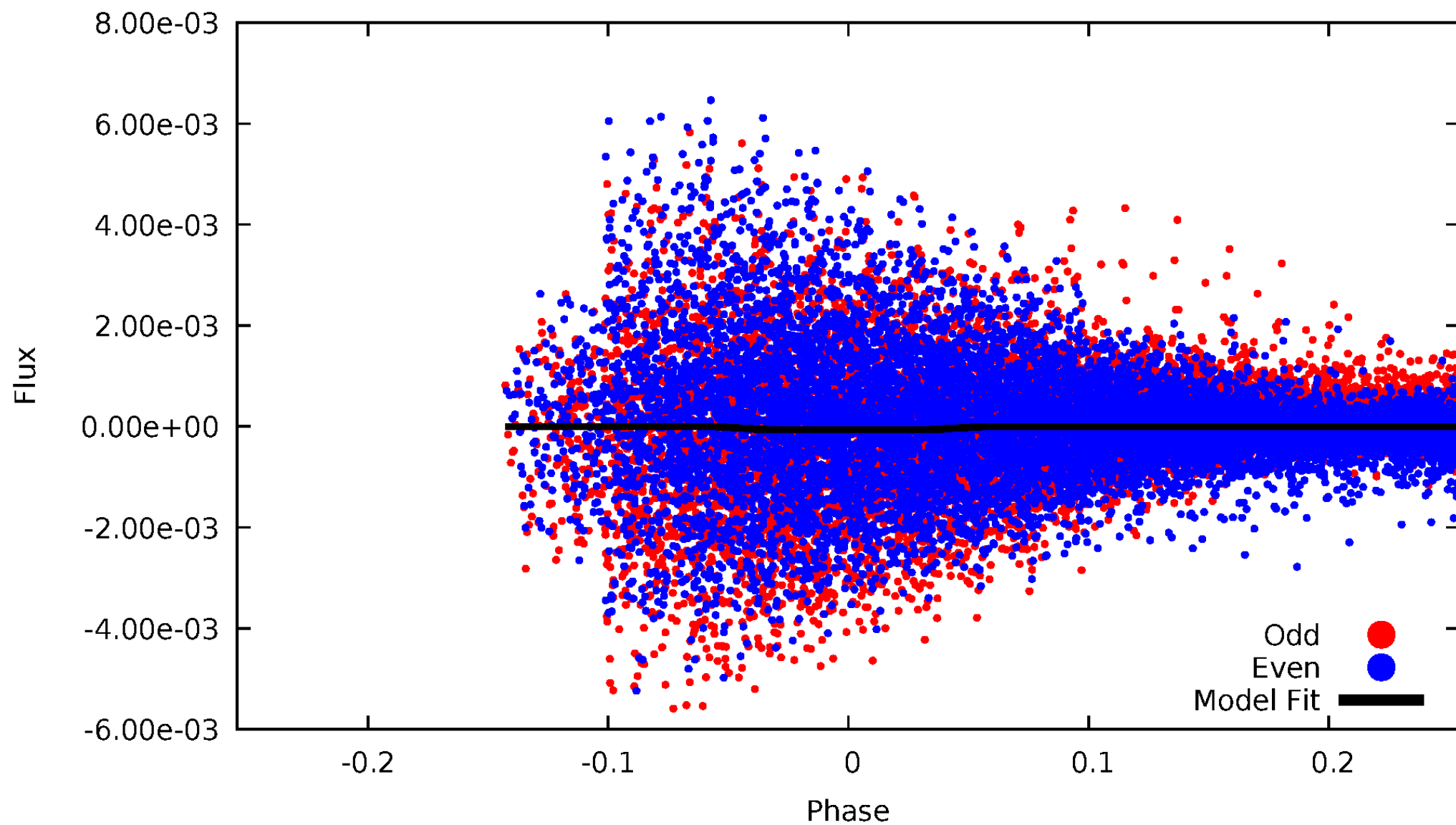
# DV Odd/Even

TCE 001160891-02



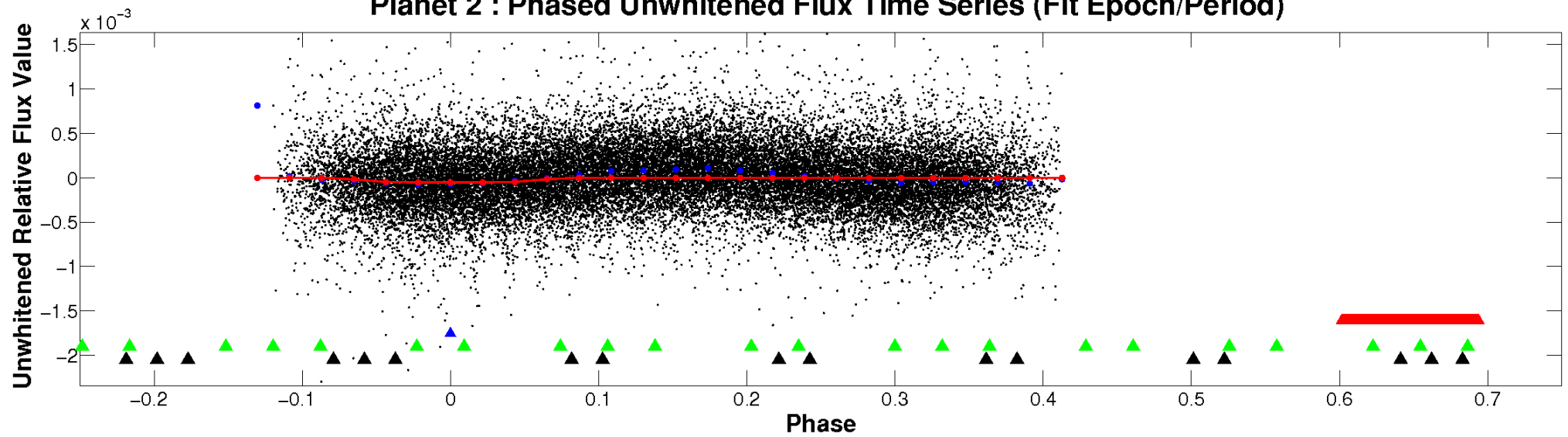
# ALT Odd/Even

TCE 001160891-02

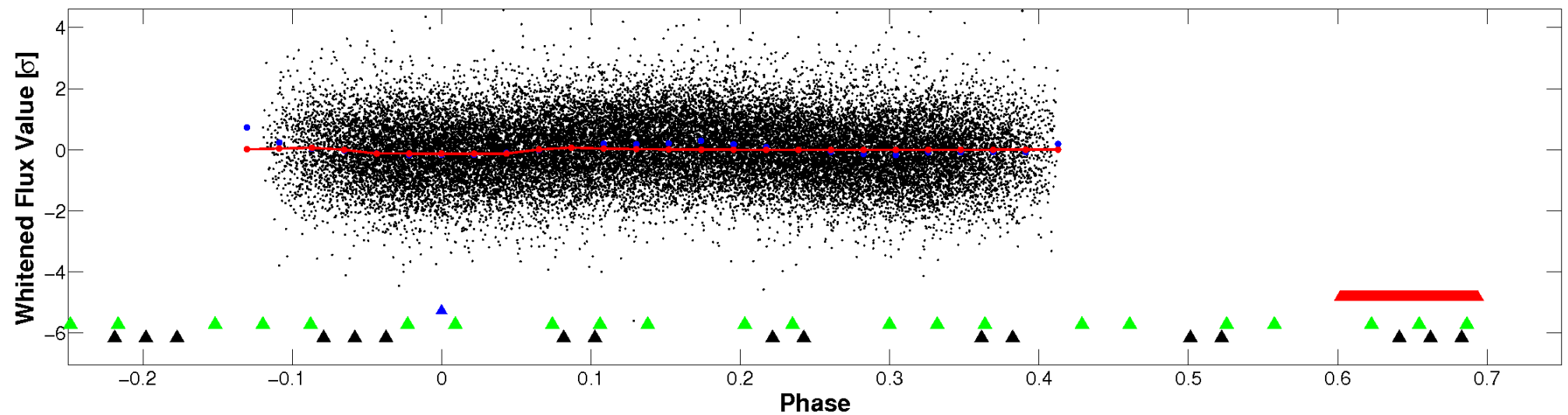


# Non-Whitened Vs. Whitened Light Curve

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



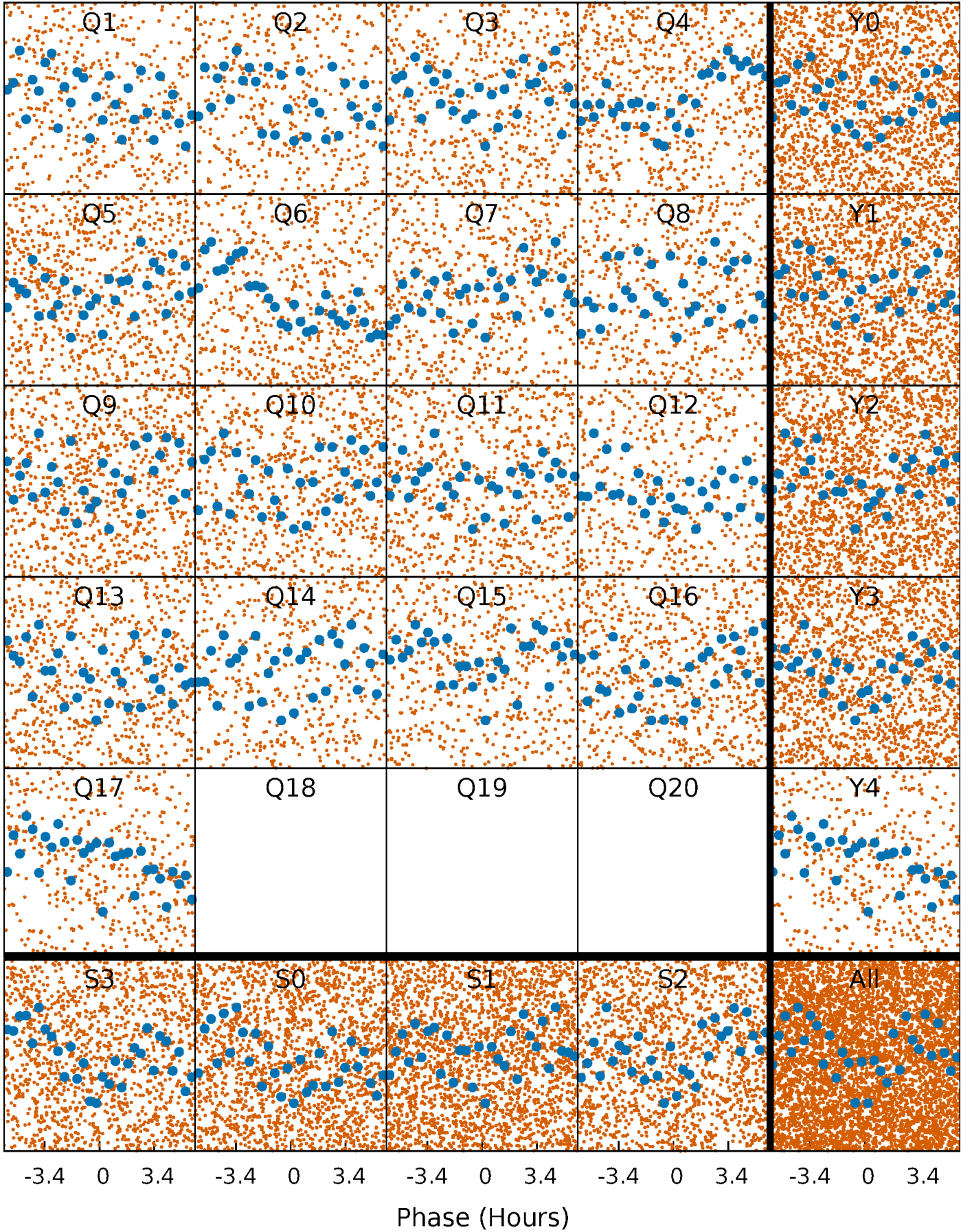
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





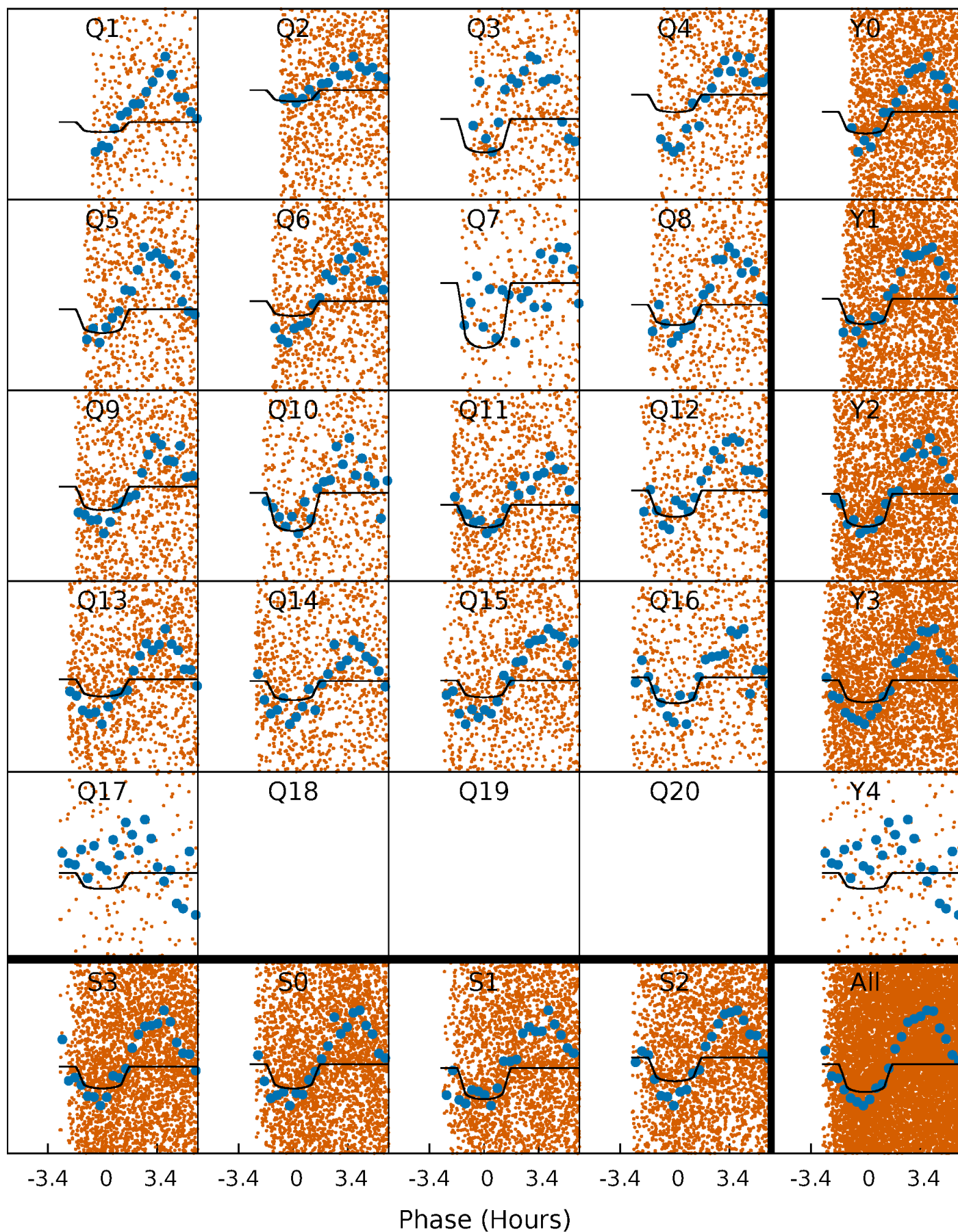
# PDC Quarter-Phased Transit Curves

TCE 001160891-02   P= 0.940522 Days    $T_0=131.717513$  (BKJD)



# DV Quarter-Phased Transit Curves

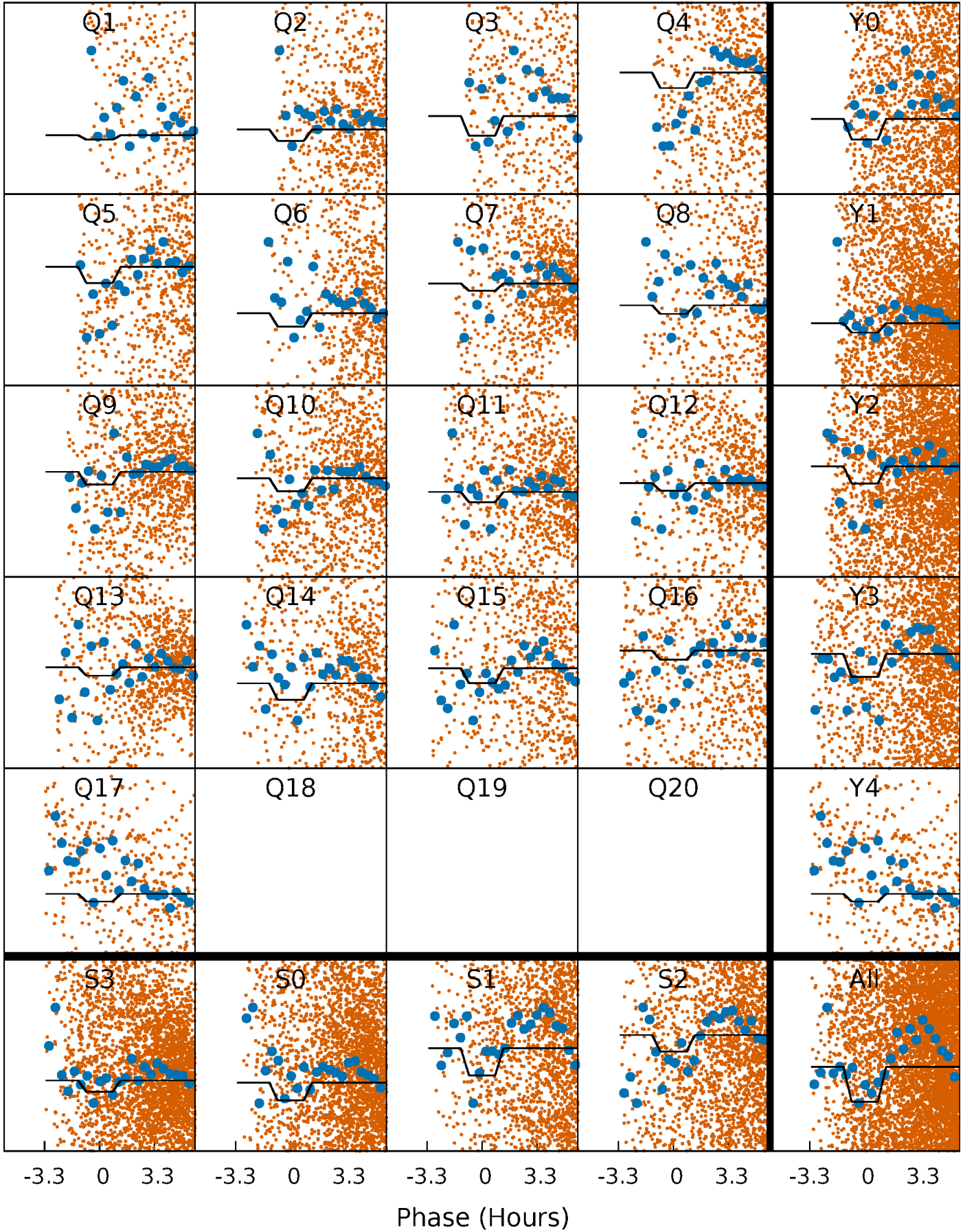
TCE 001160891-02   P= 0.940522 Days    $T_0=131.717513$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

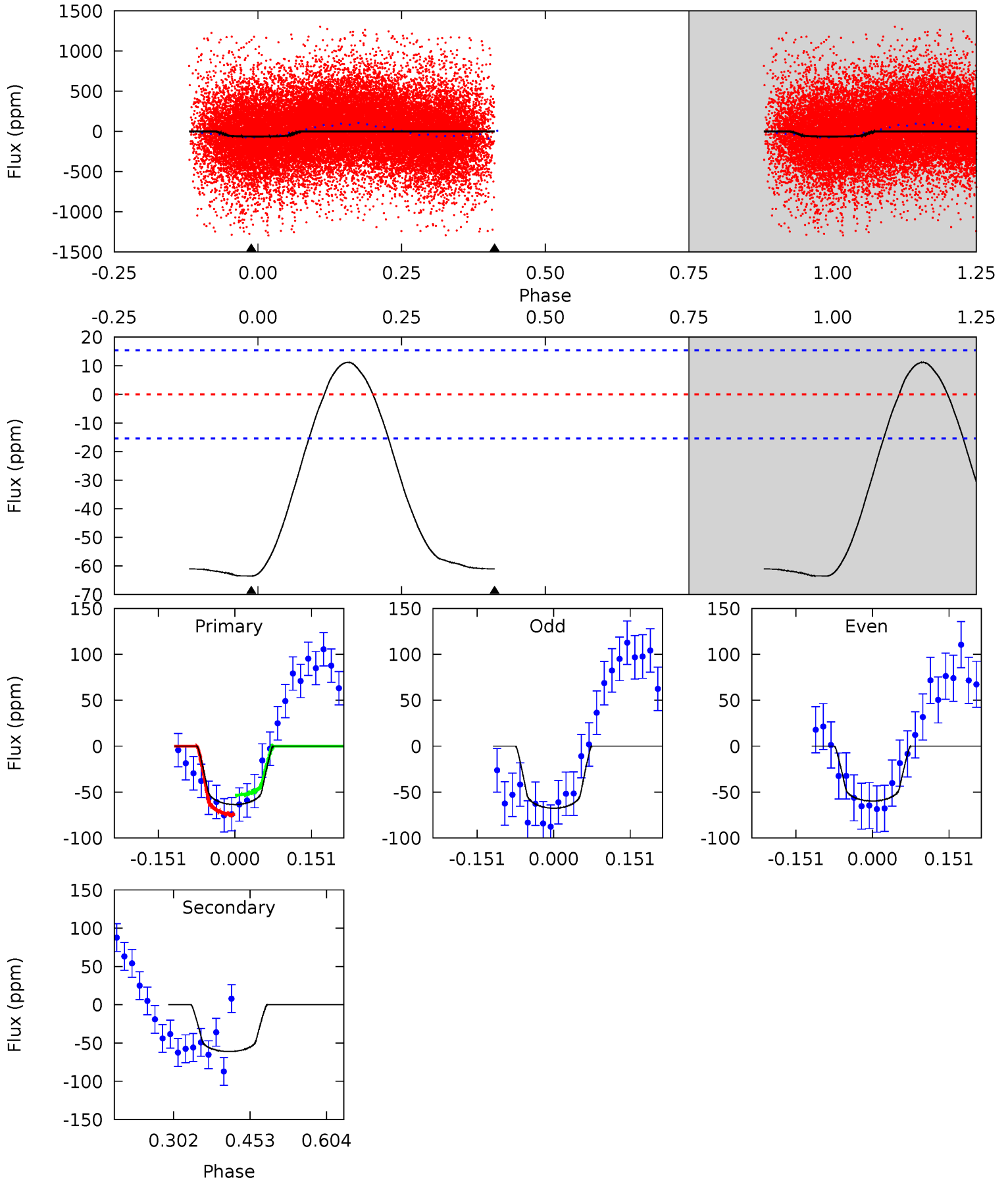
TCE 001160891-02   P= 0.940536 Days    $T_0=131.718628$  (BKJD)



# DV Model-Shift Uniqueness Test

001160891-02, P = 0.940522 Days, E = 130.776991 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
18.5	17.8	0	0	4.48	1.44	4.47	18.5	18.5	17.8	17.8	1.12	1.02	0.15	2.97

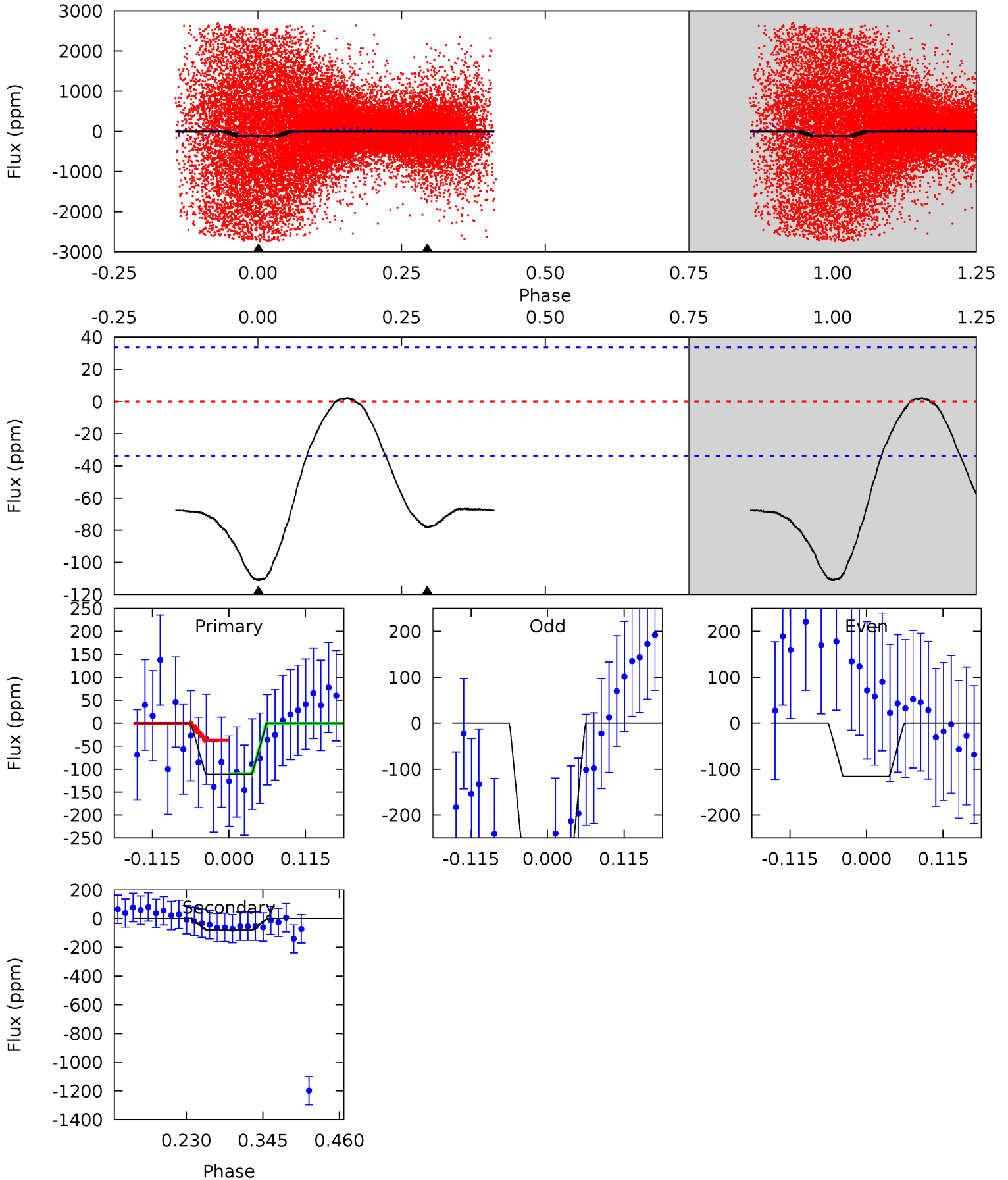




# Alt Model-Shift Uniqueness Test

001160891-02, P = 0.940536 Days, E = 130.778092 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
14.9	10.5	0	0	4.54	1.58	1.91	14.9	14.9	10.5	10.5	14.9	0.82	0.02	2.62



### Stellar Parameters For KIC 001160891

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6842^{+72}_{-92}$	$4.170^{+0.090}_{-0.110}$	$-0.060^{+0.150}_{-0.150}$	$1.600^{+0.289}_{-0.178}$	$1.389^{+0.104}_{-0.095}$	$0.477^{+0.172}_{-0.166}$
	+1%/-1%	+2%/-3%	+250%/-250%	+18%/-11%	+7%/-7%	+36%/-35%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 001160891-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-61 \pm 3$	$1.40^{+0.43}_{-0.41}$	$3689^{+165}_{-124}$	$6723^{+1406}_{-874}$	$7.503^{+7.289}_{-3.073}$
Alt.	$-78 \pm 7$	$1.41^{+0.42}_{-0.42}$	$3687^{+171}_{-121}$	$7163^{+1642}_{-926}$	$9.468^{+9.861}_{-3.857}$

$T_{max}$  = 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

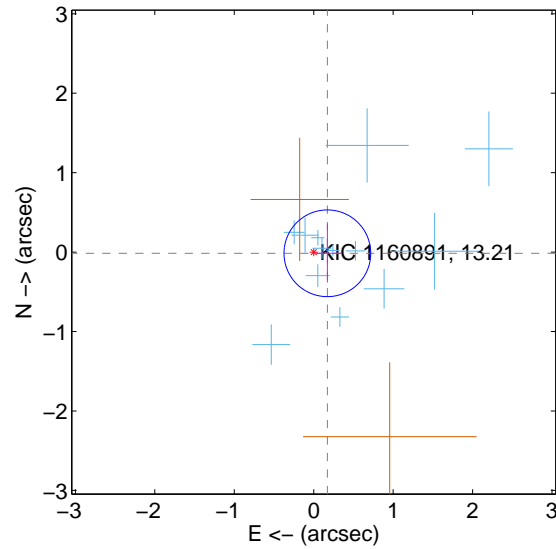
Supplemental centroid analysis for 001160891-02. Kepler magnitude: 13.21. Transit SNR 10.95

There are 13 quarters with good PRF difference image offsets

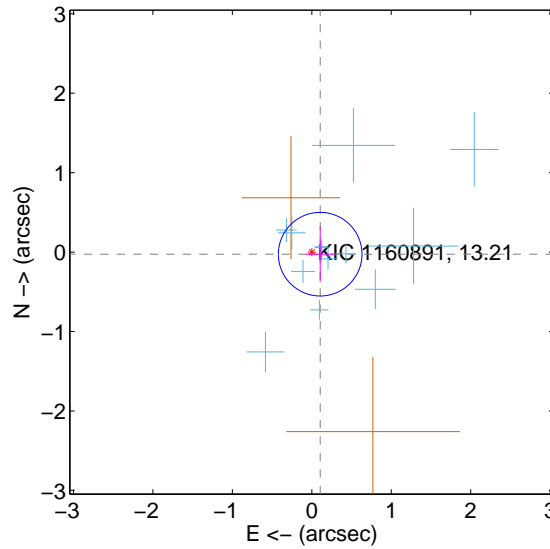
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.173 \pm 0.182$	0.95	$-0.172 \pm 0.184$	$-0.015 \pm 0.368$
PRF-fit source offset from KIC position	$0.109 \pm 0.175$	0.62	$-0.106 \pm 0.181$	$-0.026 \pm 0.347$
photometric centroid source offset	$0.69 \pm 0.62$	1.11	$0.68 \pm 0.62$	$0.10 \pm 0.63$

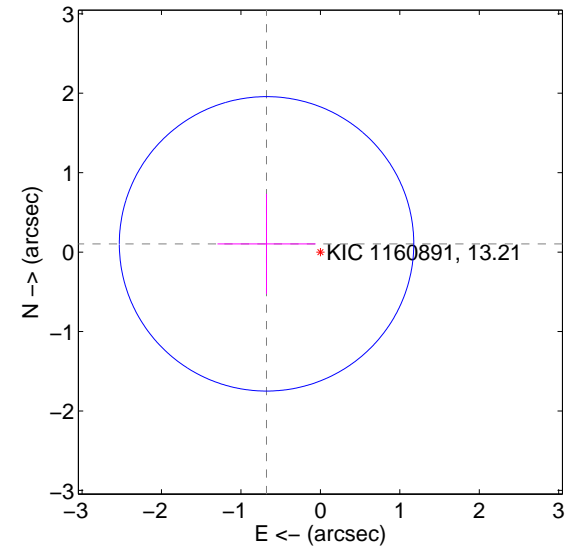
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

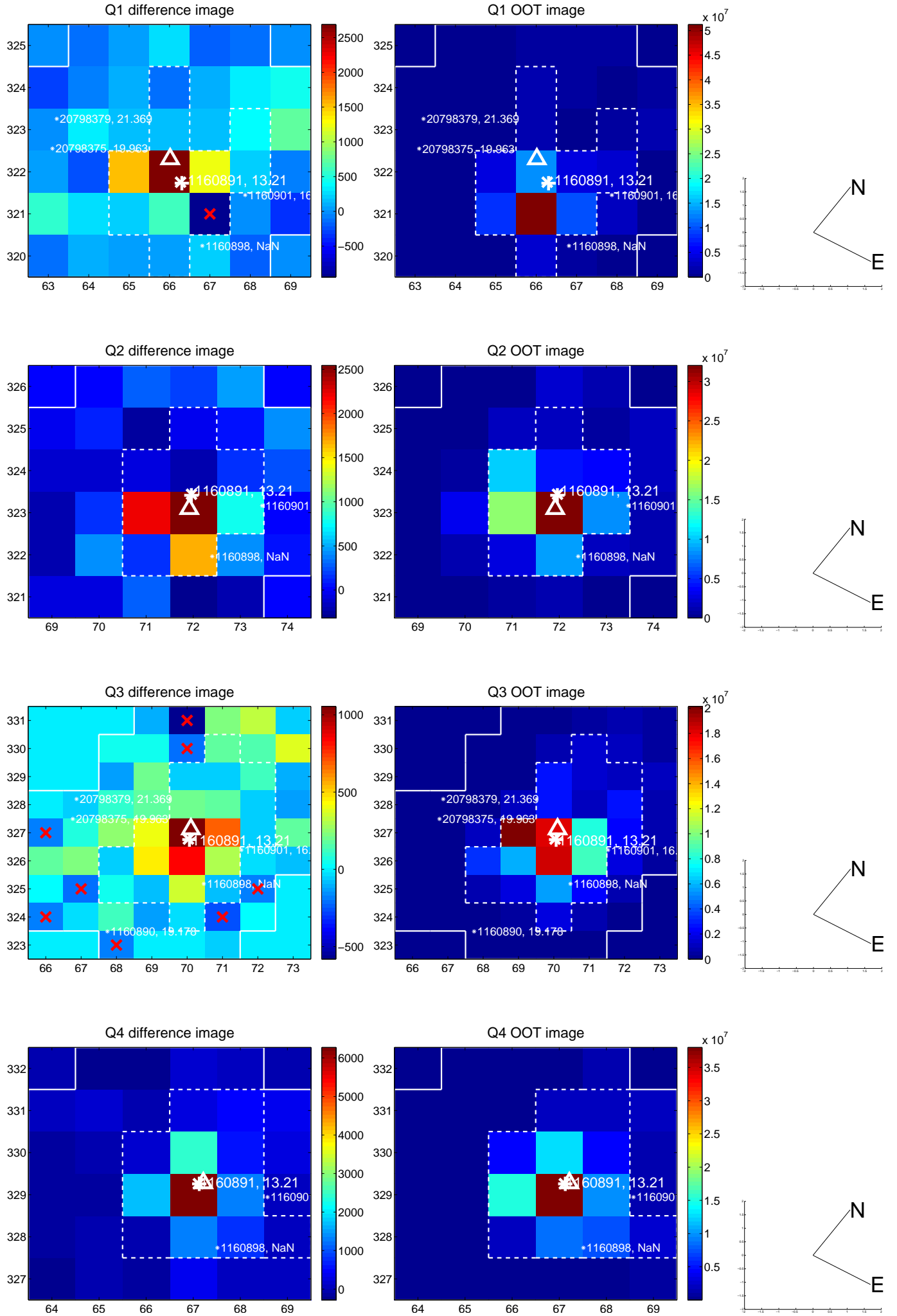


offset from photometric centroids

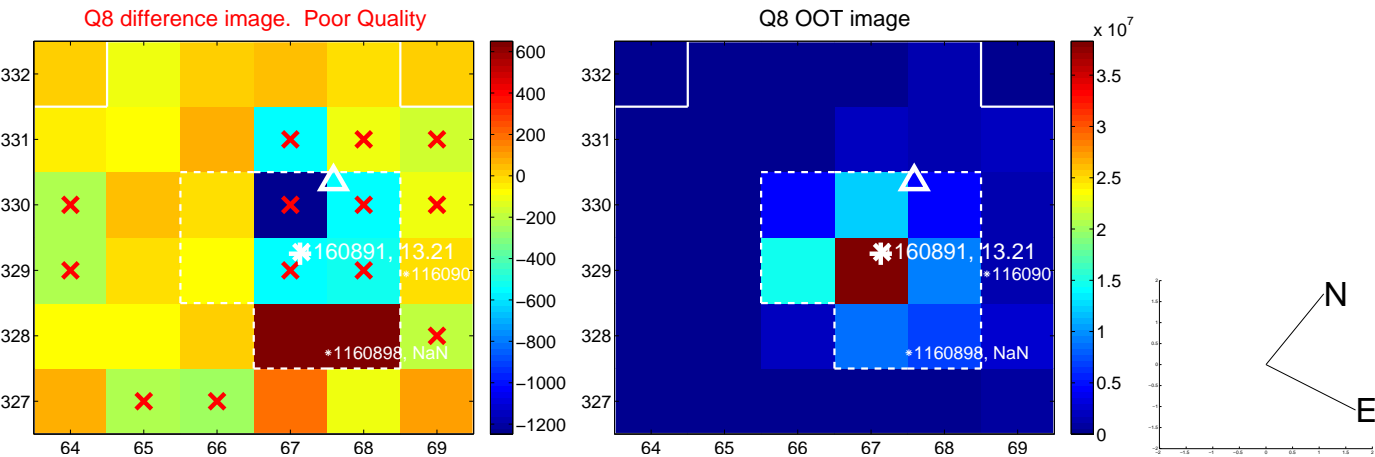
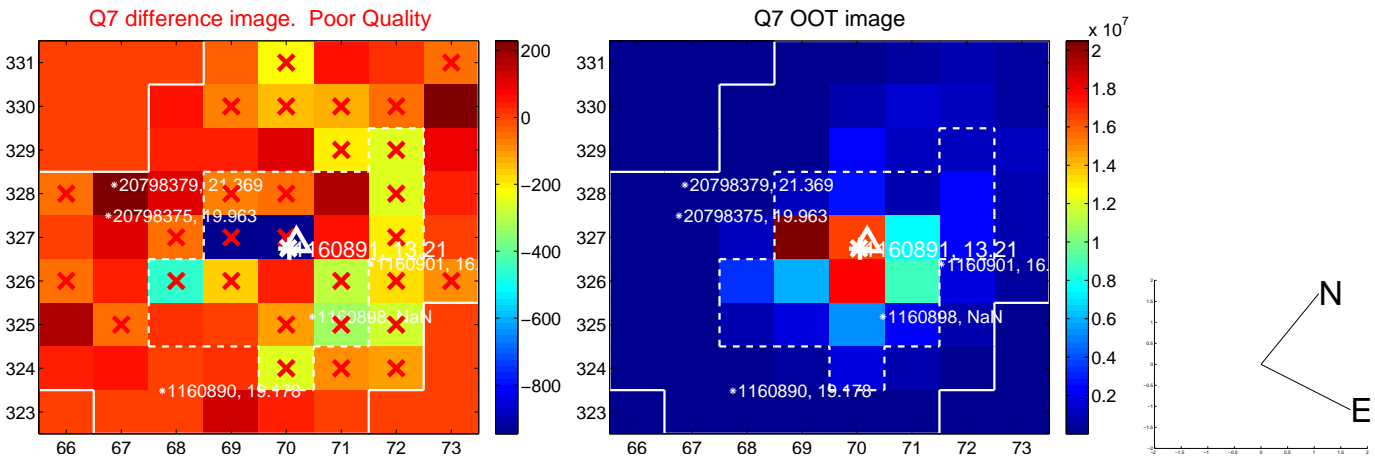
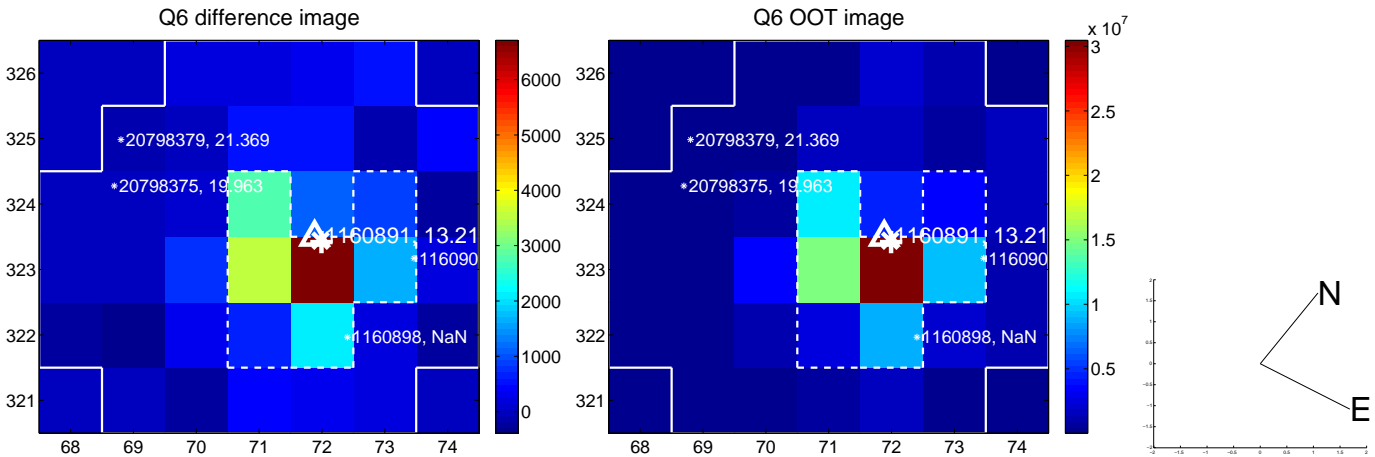
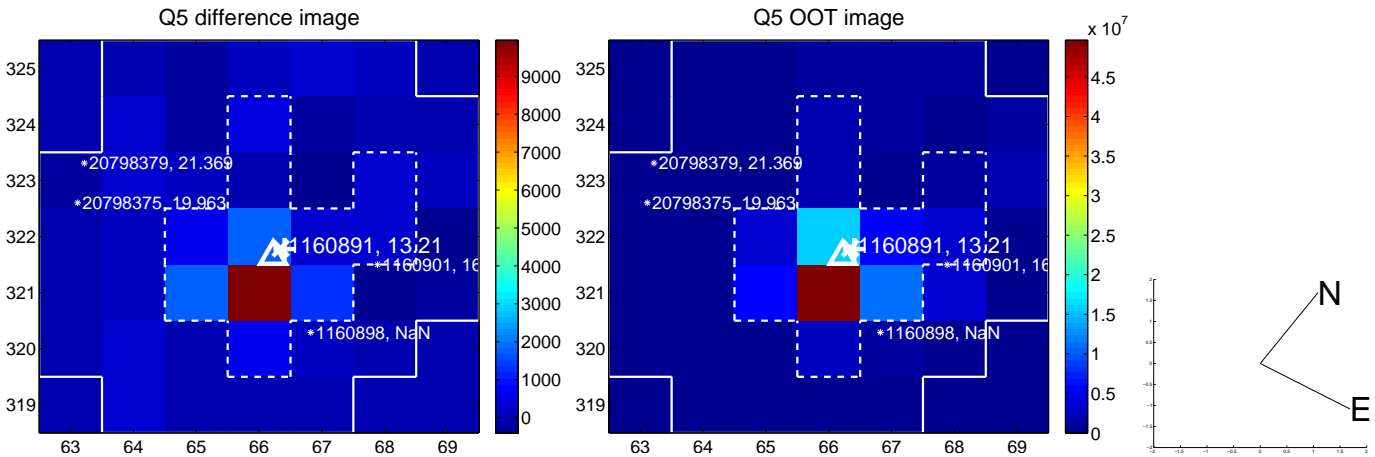


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

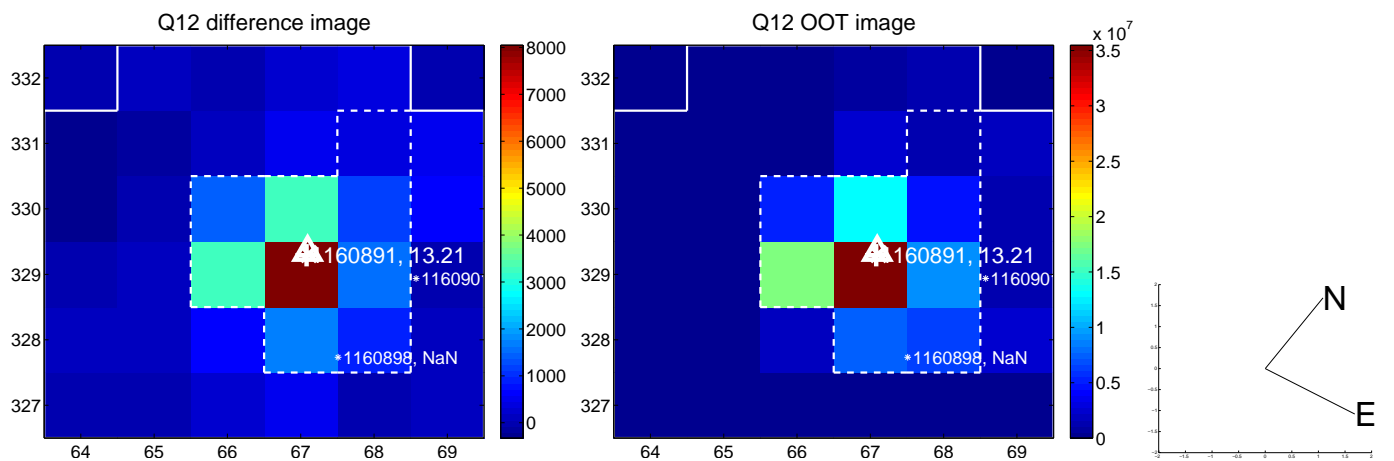
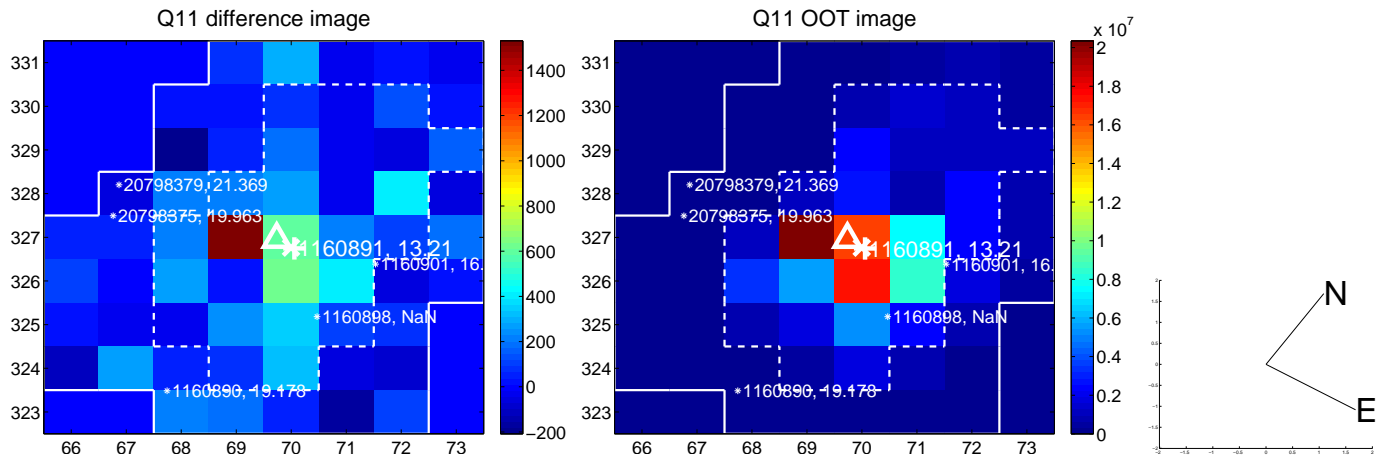
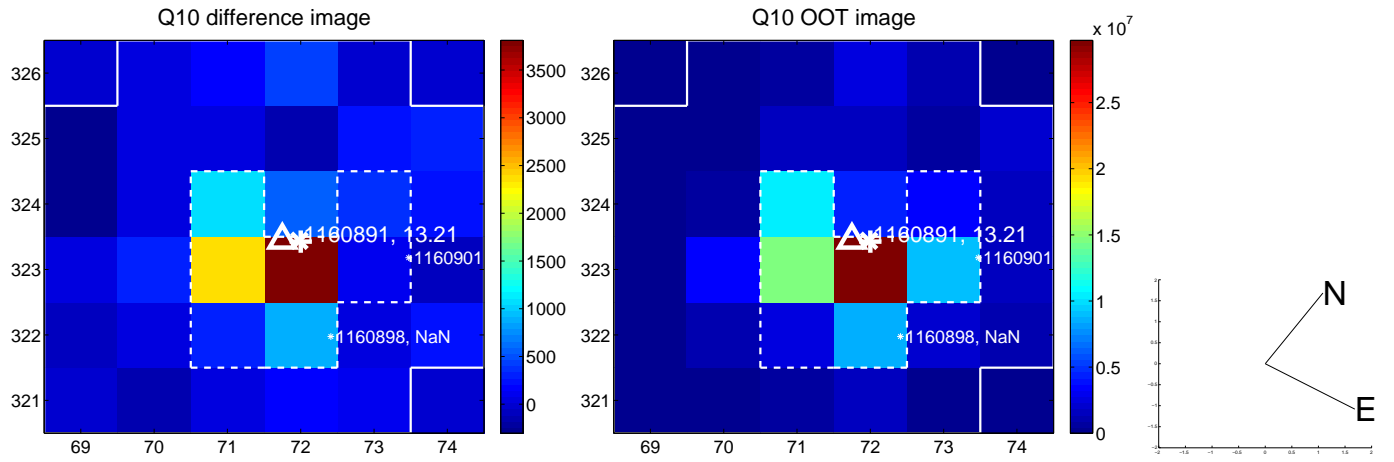
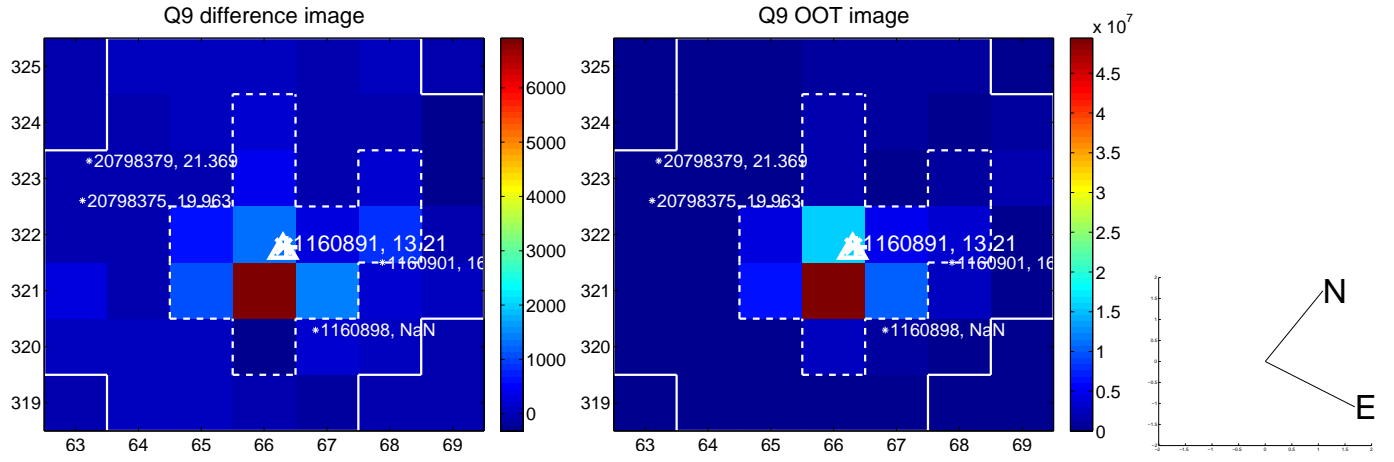


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

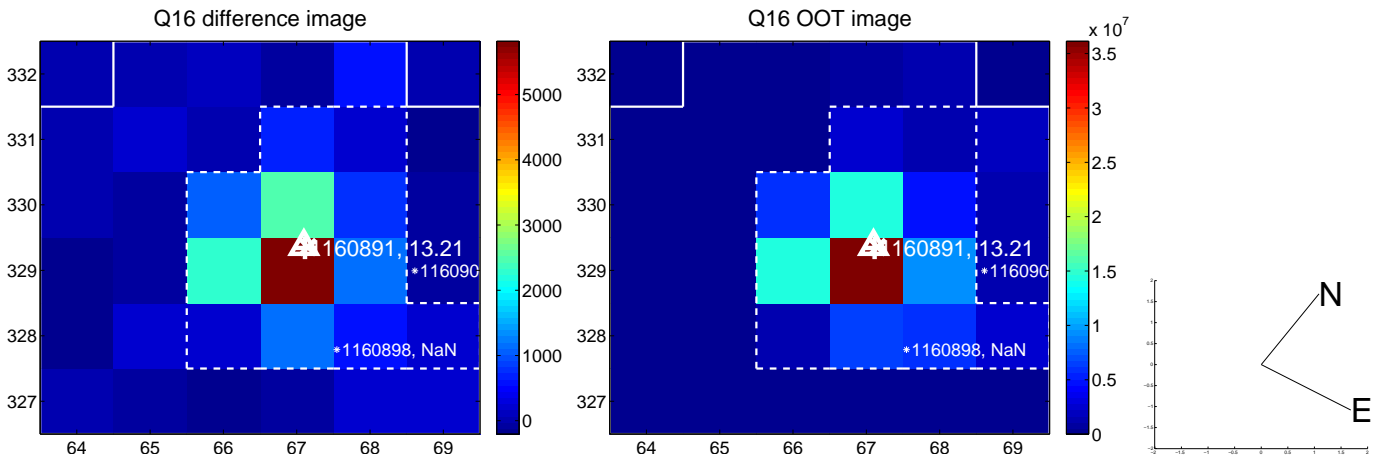
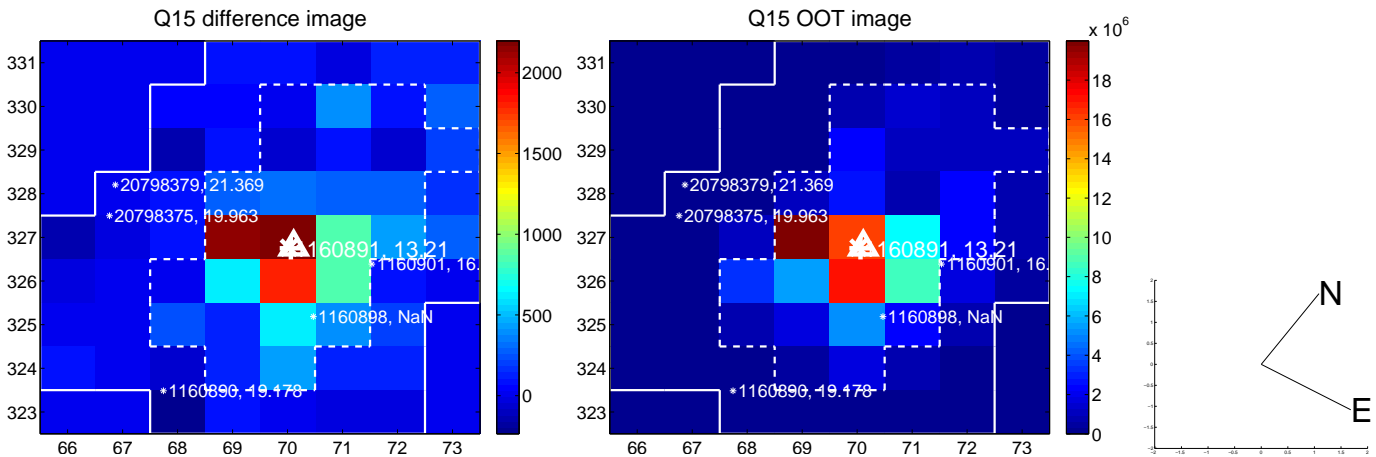
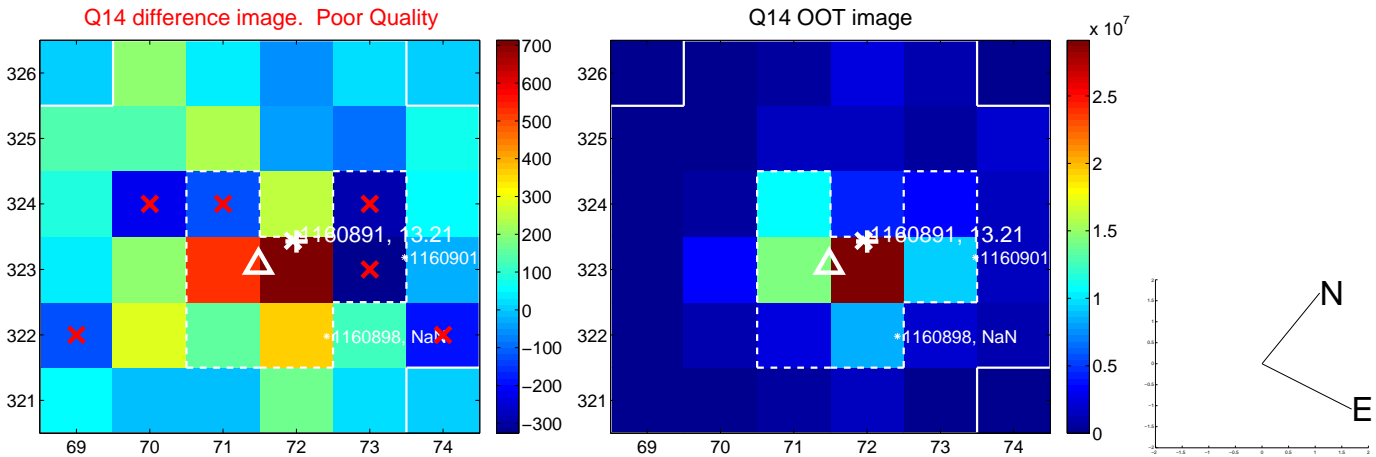
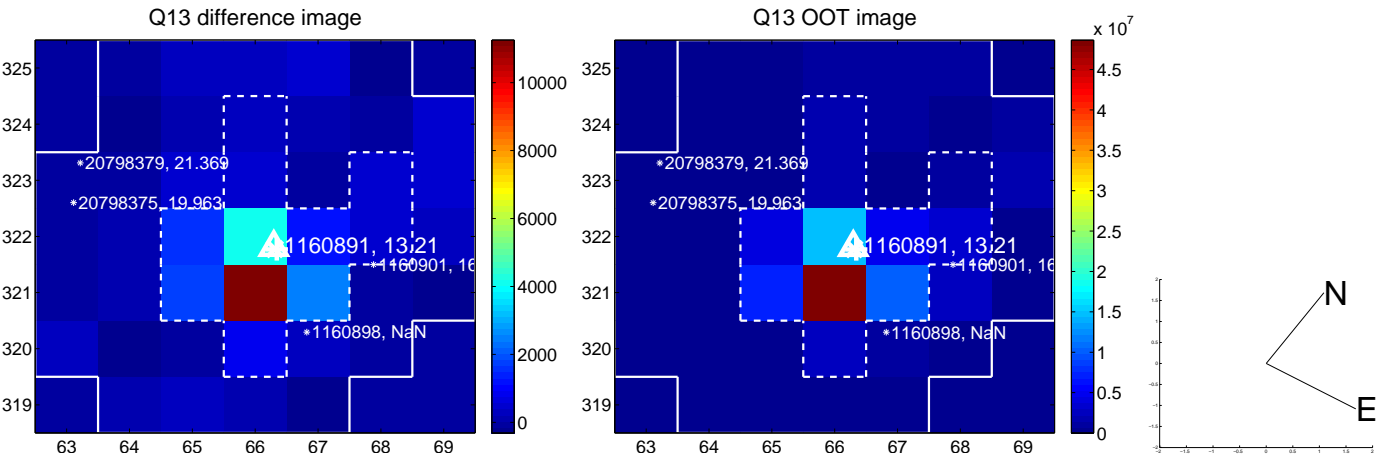




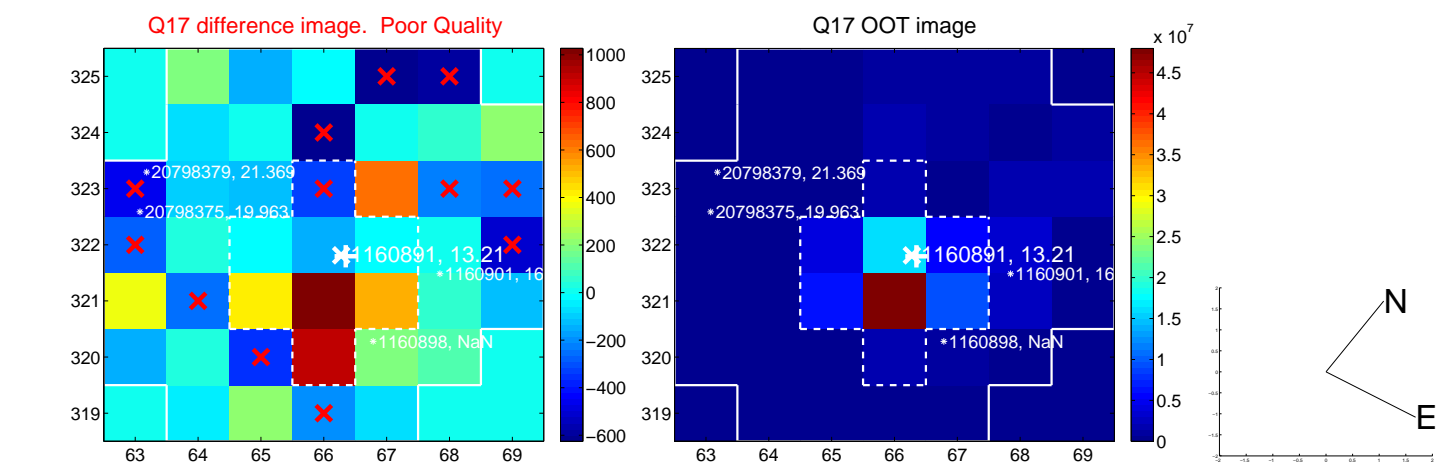
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



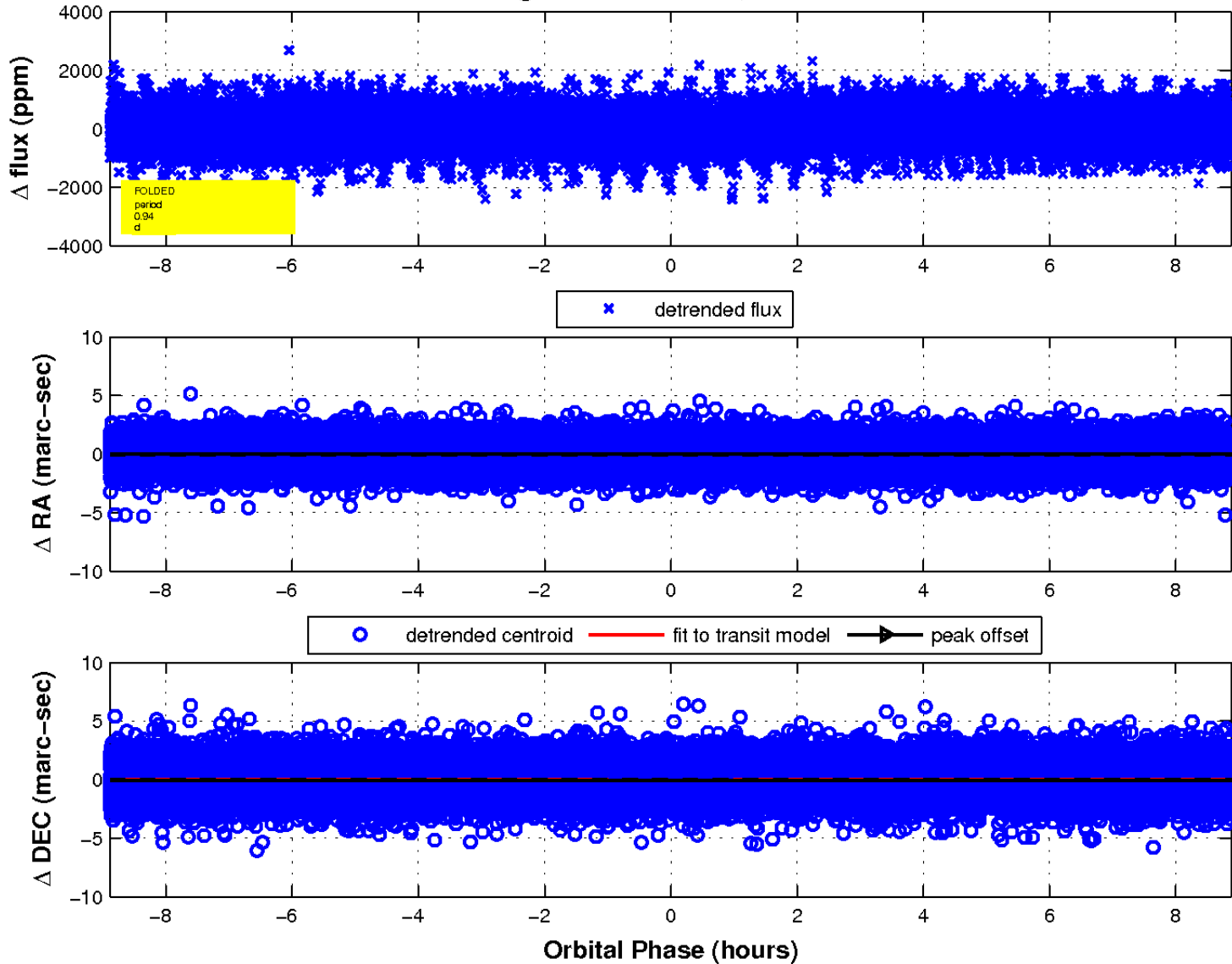
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

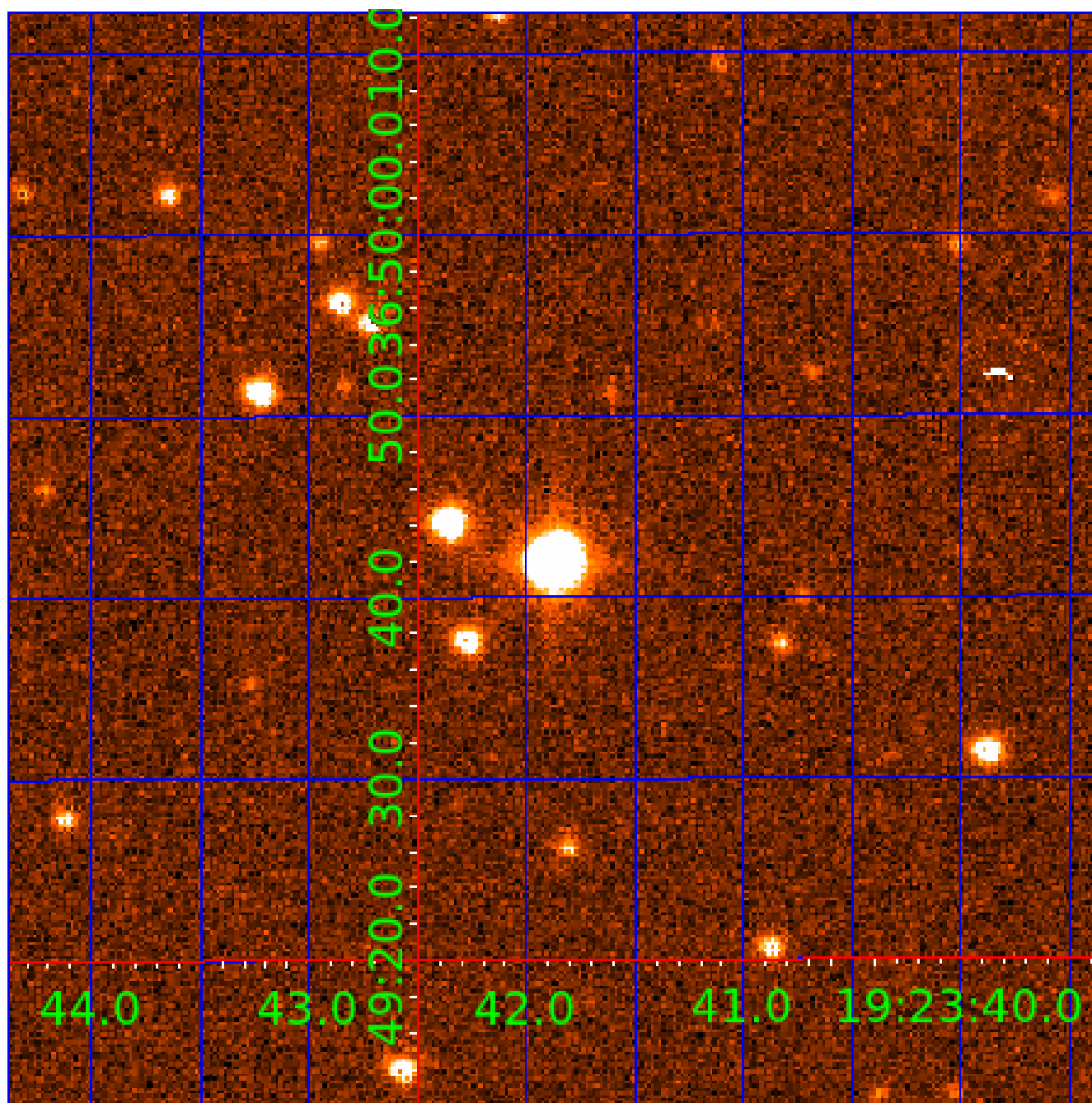


fluxWeightedCentroids, Planet 2 of 4



UKIRT Image

Declination



# KIC 001160891

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
001160891-01	OBS	No	0.940466	132.370168	51.7	4.020	12.2	10.4	1.60	6842	1.28	11479.31
001160891-02	OBS	No	0.940522	131.717513	53.3	2.963	12.5	11.0	1.60	6842	1.36	11478.40
001160891-03	OBS	No	65.624191	152.751190	573.1	2.712	8.4	7.4	1.60	6842	4.33	39.96
001160891-04	OBS	No	84.515418	210.647088	545.7	5.208	8.2	6.6	1.60	6842	4.19	28.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
001160891-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV
001160891-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
001160891-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
001160891-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—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.

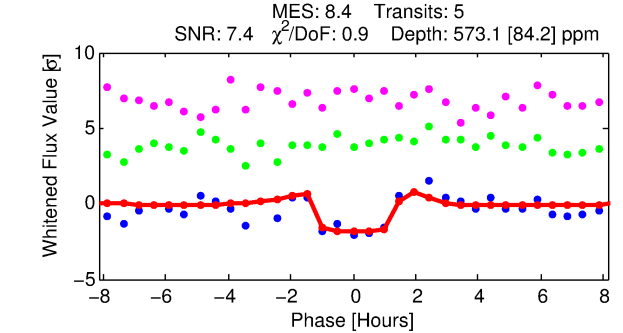
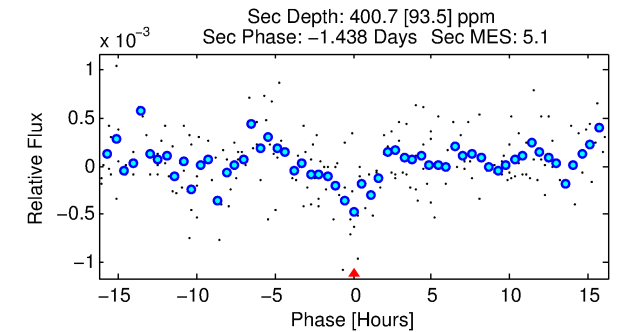
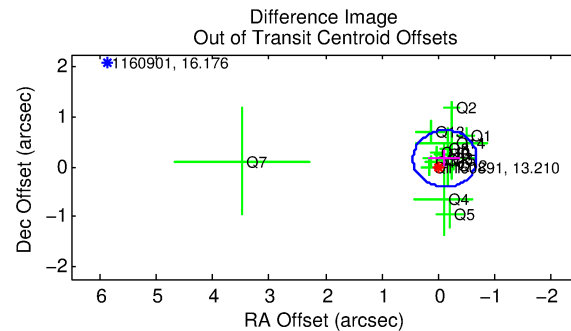
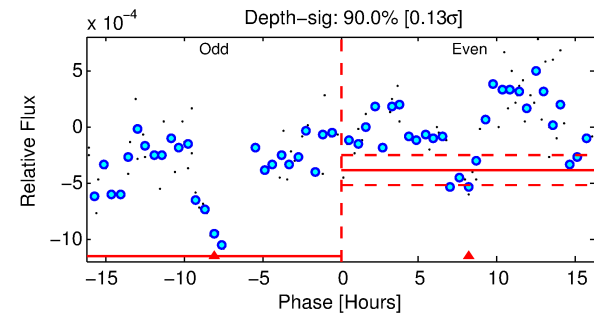
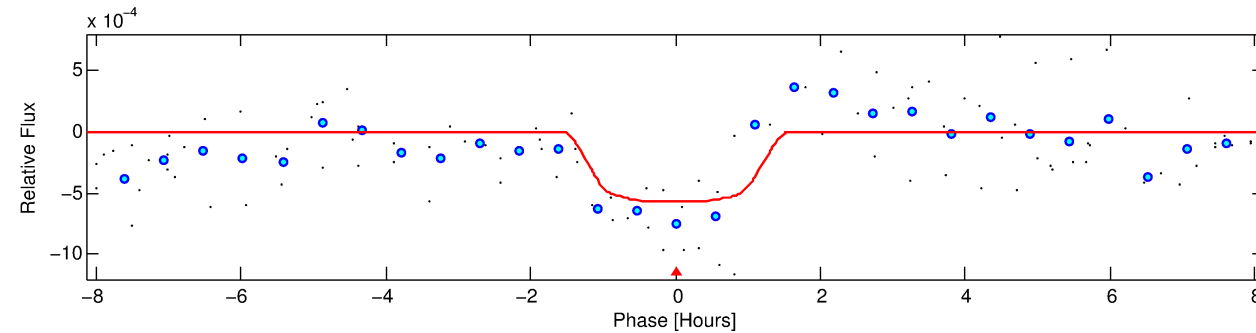
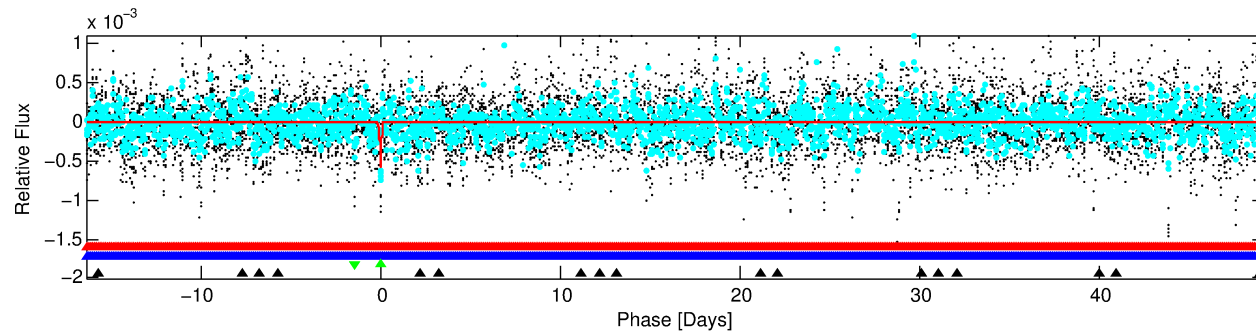
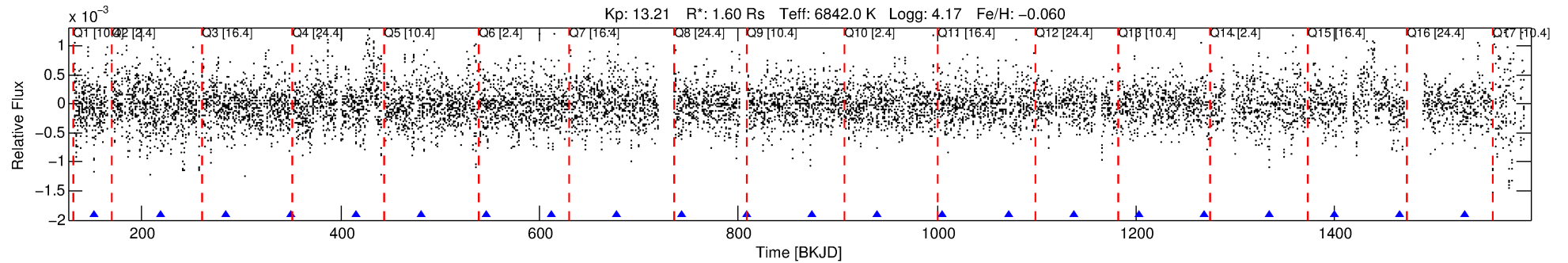
Ephemeris Match Information For 001160891-03

No Significant Match Found



# DV One-Page Summary

KIC: 1160891 Candidate: 3 of 4 Period: 65.624 d



## DV Fit Results:

Period = 65.62419 [0.00062] d  
Epoch = 152.7512 [0.0063] BKJD  
Rp/R\* = 0.0248 [0.0196]  
a/R\* = 104.77 [481.79]  
b = 0.85 [1.49]  
Seff = 39.96 [8.56]  
Teff = 641 [34] K  
Rp = 4.33 [3.52] Re  
a = 0.3547 [0.0522] AU  
Ag = 1476.13 [2379.88] [0.62 $\sigma$ ]  
Teffp = 6144 [2457] K [2.24 $\sigma$ ]

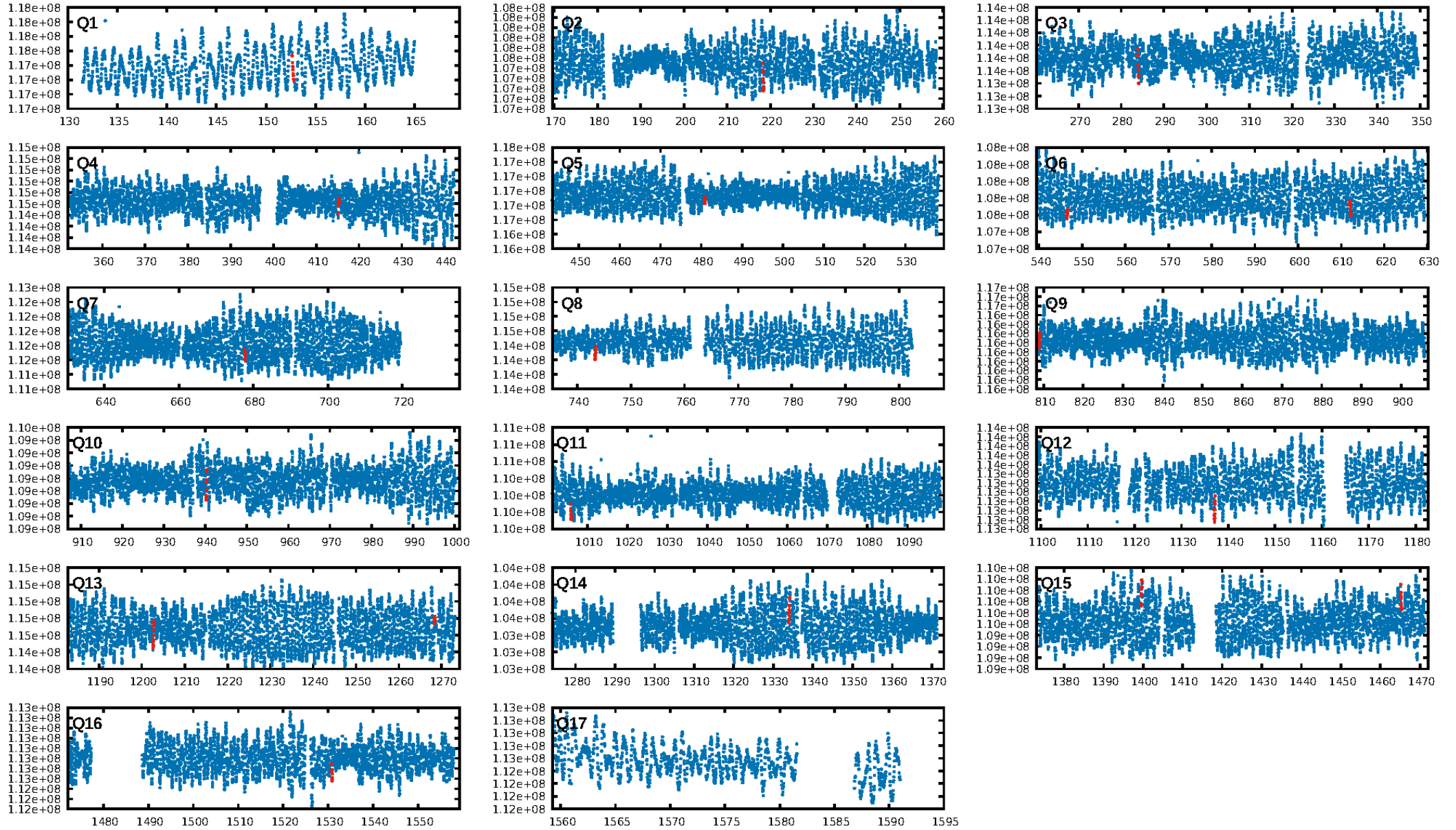
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [386.52 $\sigma$ ]  
LongPeriod-sig: 100.0% [77.22 $\sigma$ ]  
ModelChiSquare2-sig: 25.0%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 2.69e-09**  
RollingBand-fgt: 1.00 [4/4]  
**GhostDiagnostic-chr: 0.7583**  
Centroid-sig: 1.5%  
Centroid-so: 0.260 arcsec [0.48 $\sigma$ ]  
OotOffset-rm: 0.197 arcsec [1.05 $\sigma$ ]  
OotOffset-st: 4/4/4/3 [15]  
KicOffset-rm: 0.207 arcsec [1.50 $\sigma$ ]  
KicOffset-st: 4/4/4/3 [15]  
DiffImageQuality-fgm: 0.67 [10/15]  
DiffImageOverlap-fno: 0.00 [0/15]

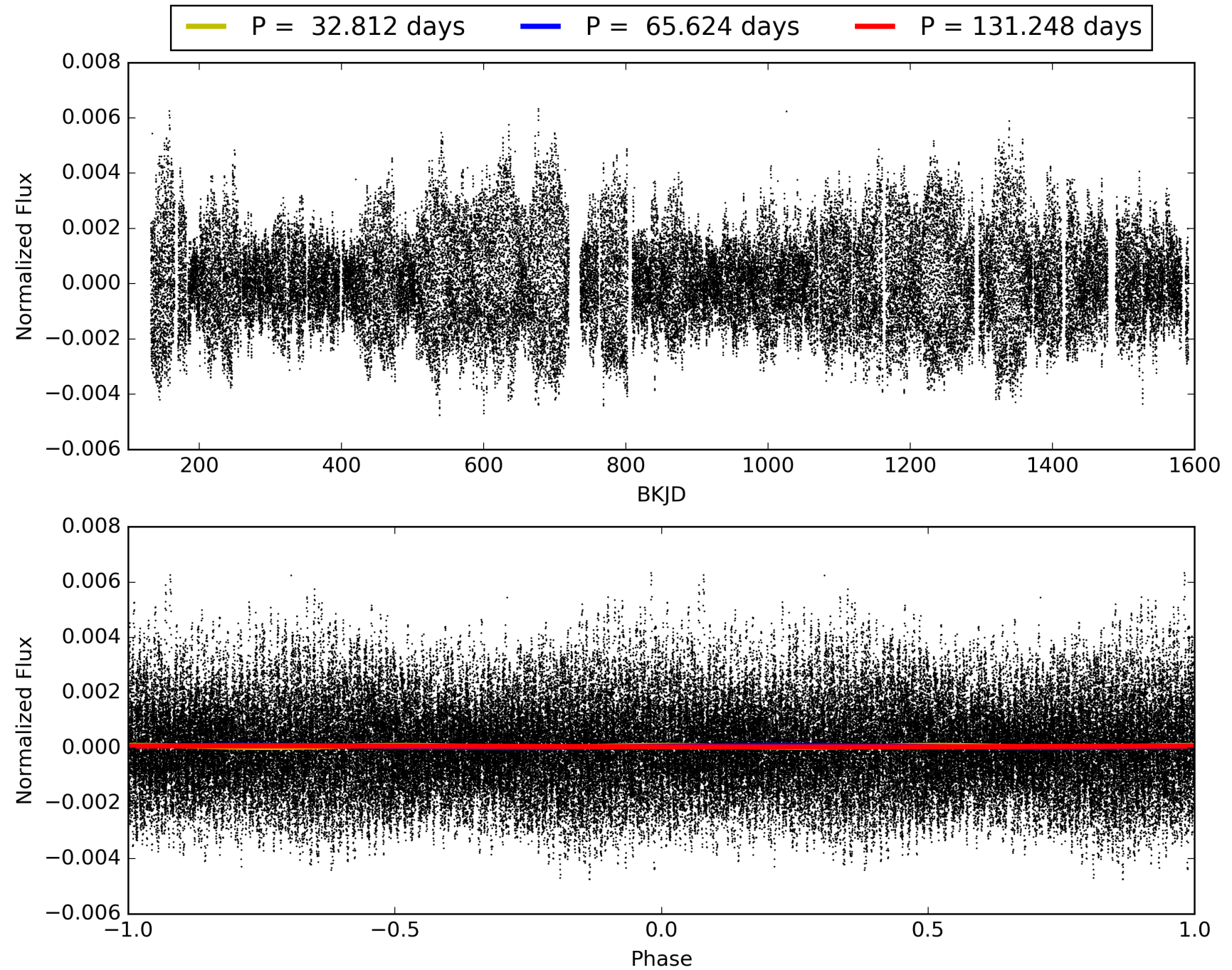
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 01:59:13 Z

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

# TCE 001160891-03, PDC Light Curves

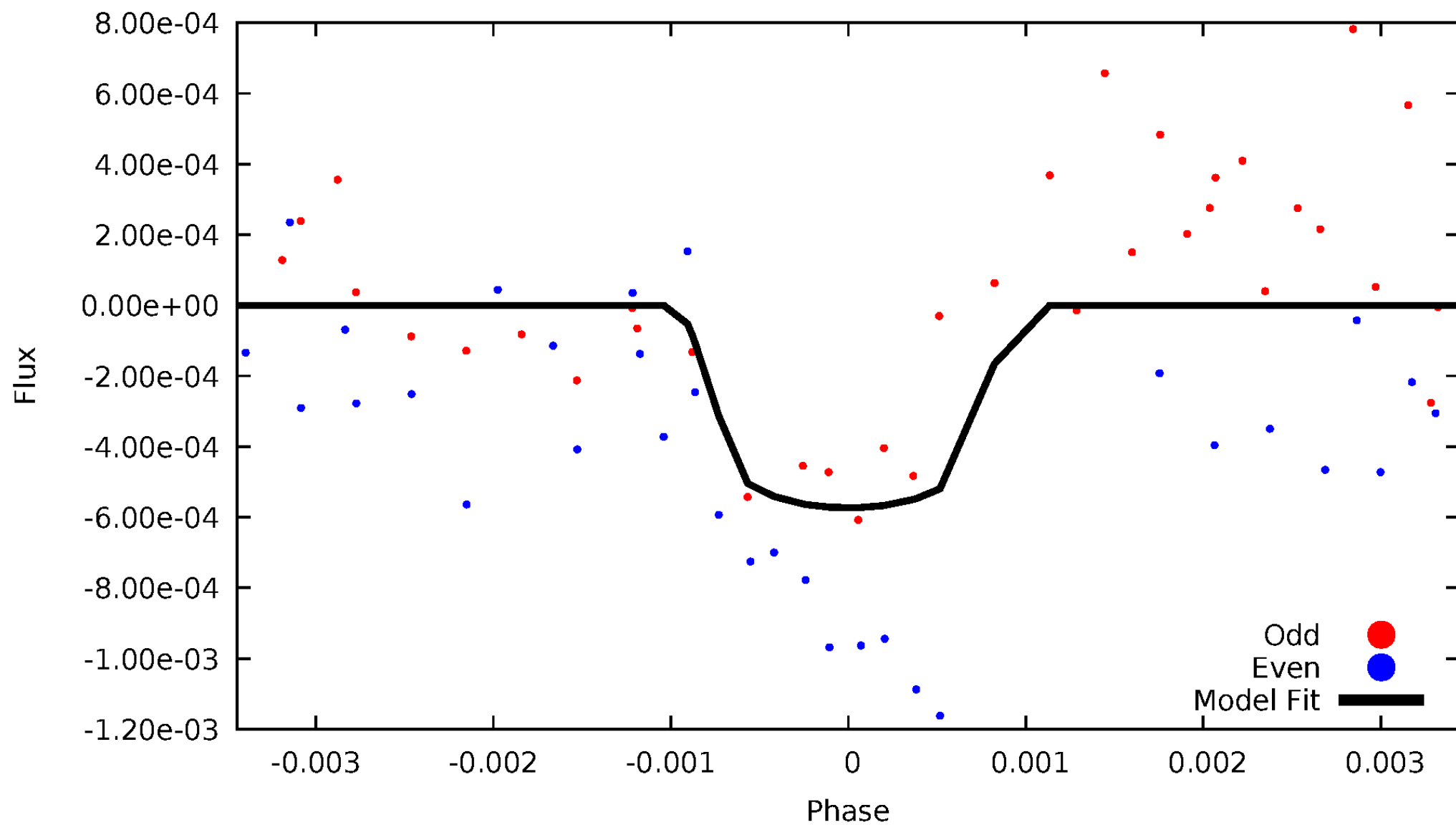


# TCE 001160891-03



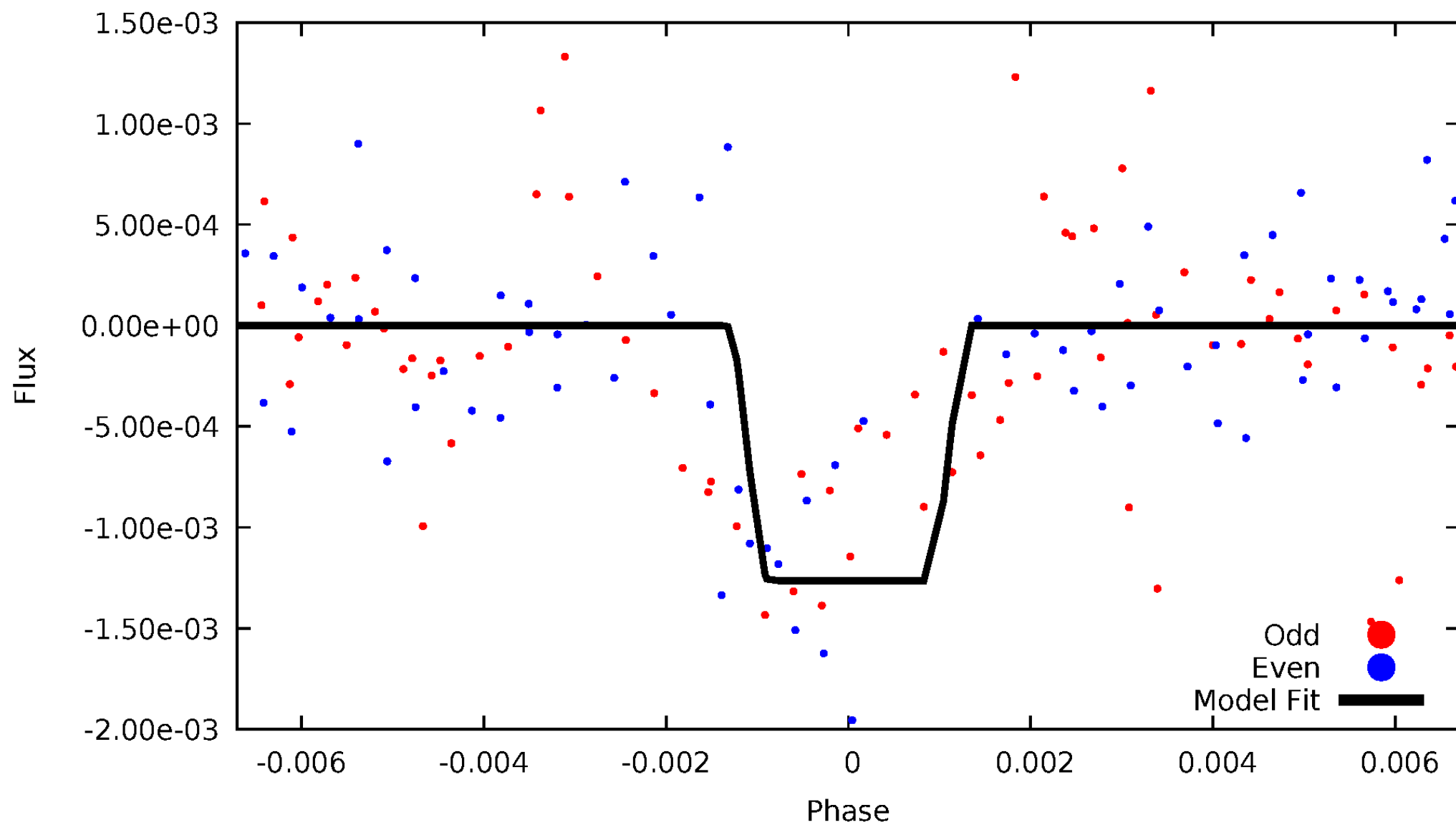
# DV Odd/Even

TCE 001160891-03



# ALT Odd/Even

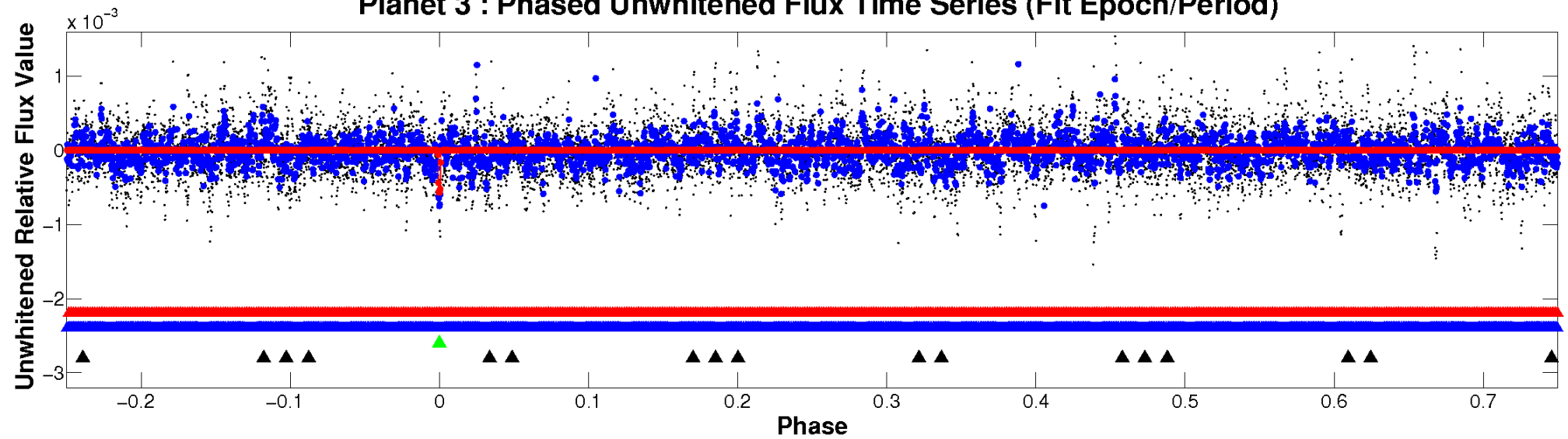
TCE 001160891-03



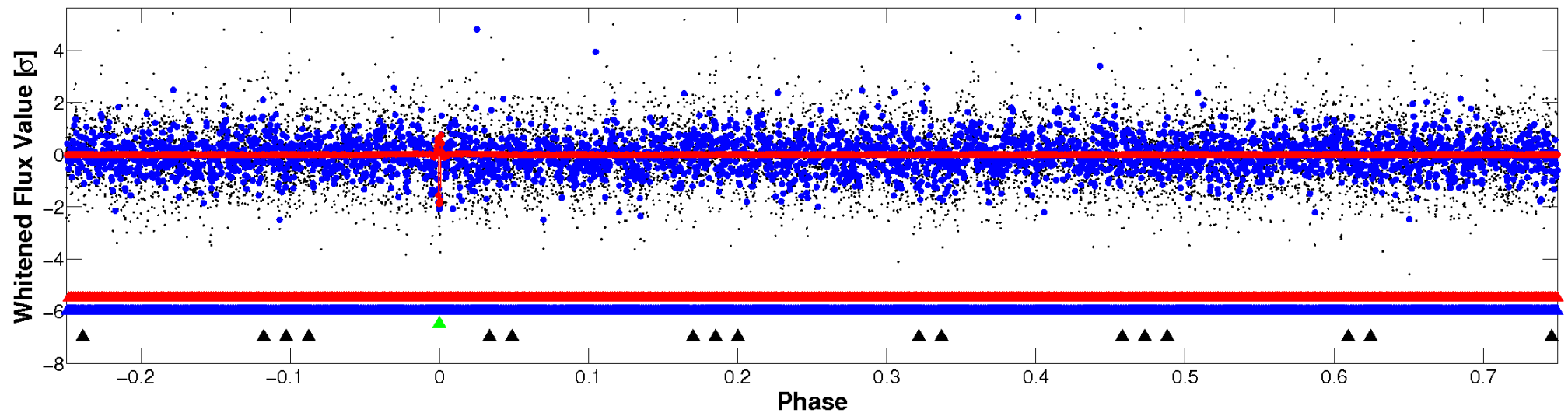


# Non-Whitened Vs. Whitened Light Curve

Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

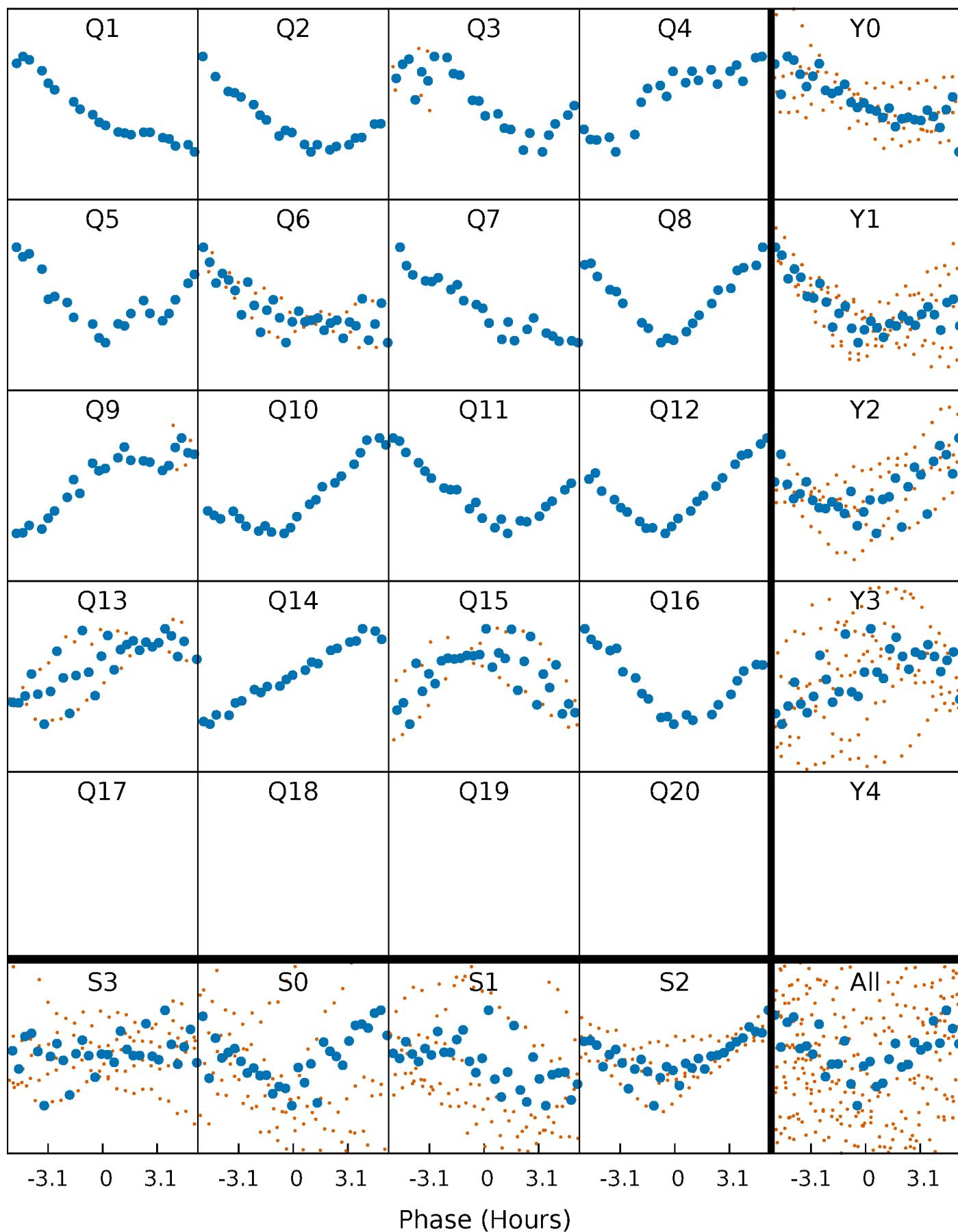


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



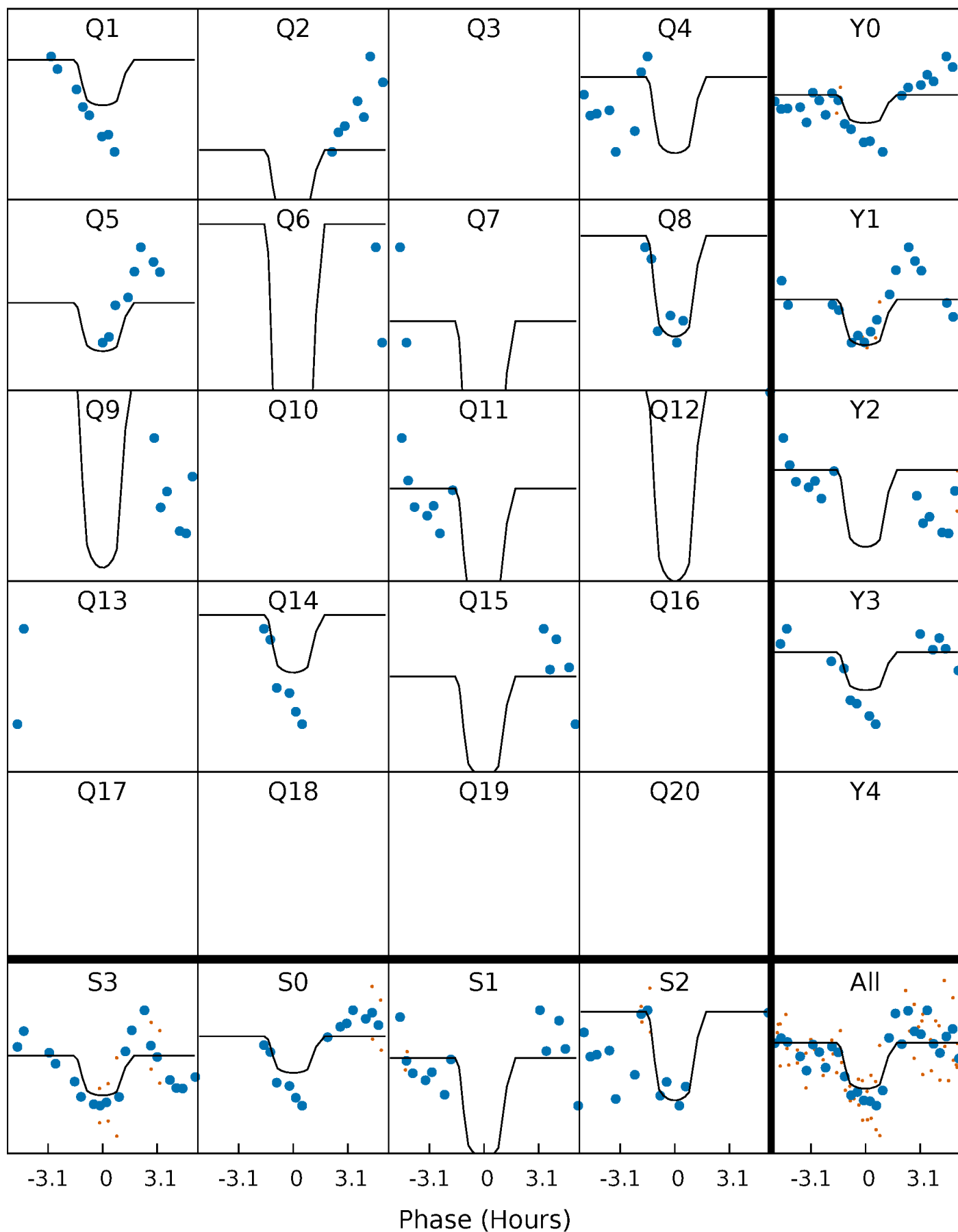
# PDC Quarter-Phased Transit Curves

TCE 001160891-03 P= 65.624191 Days  $T_0=152.751190$  (BKJD)



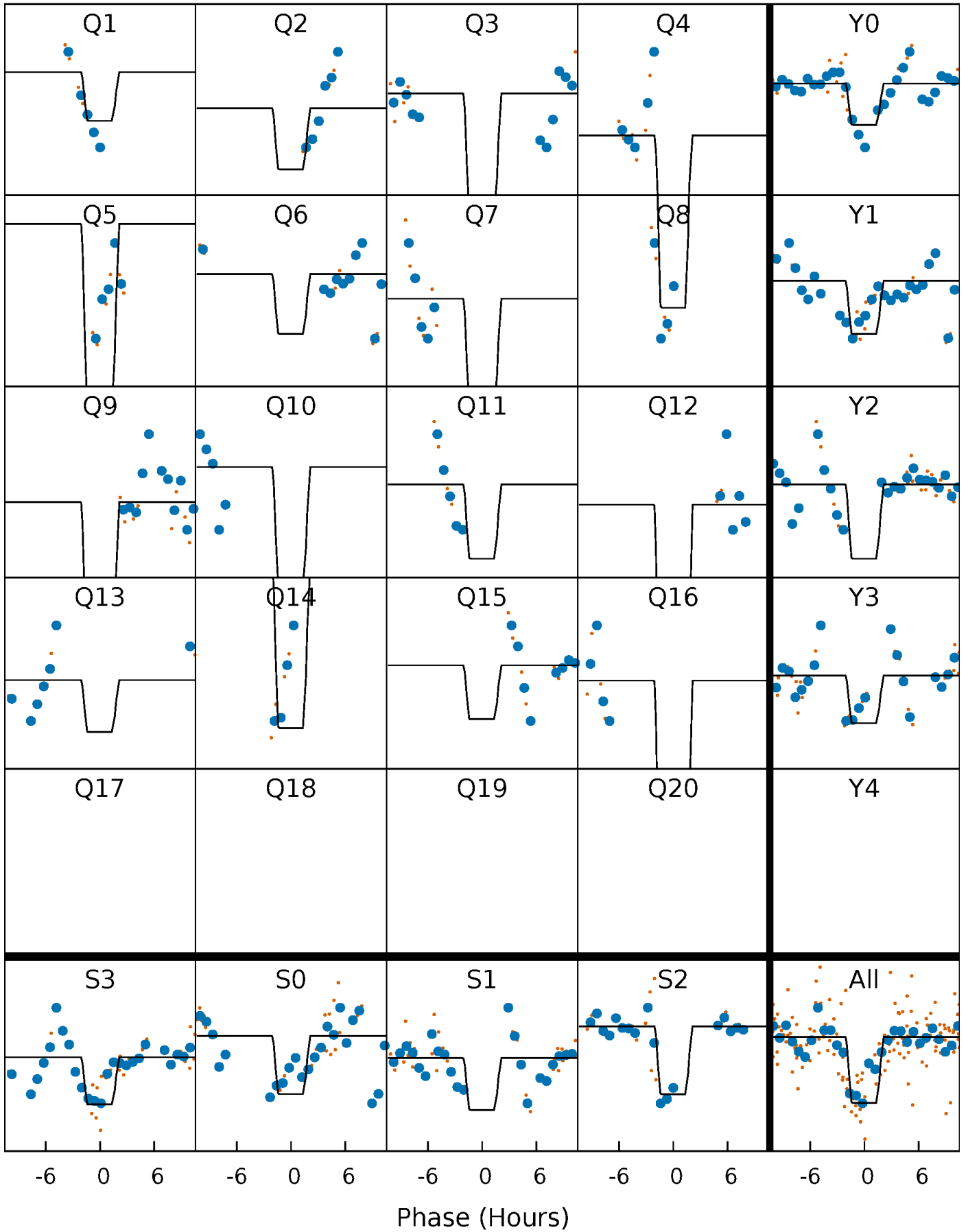
# DV Quarter-Phased Transit Curves

TCE 001160891-03 P= 65.624191 Days  $T_0=152.751190$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

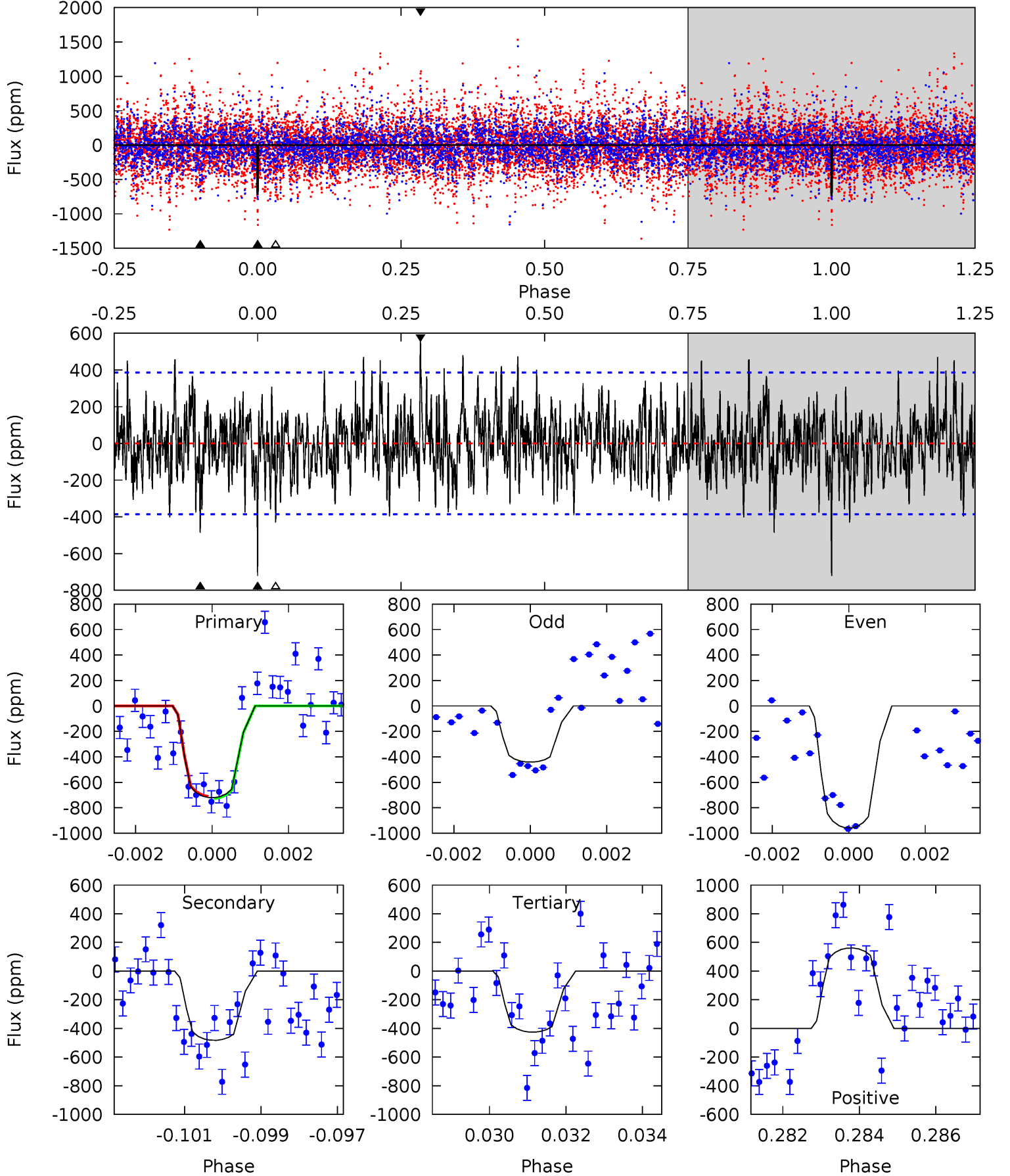
TCE 001160891-03   P= 65.623254 Days    $T_0=152.782302$  (BKJD)



# DV Model-Shift Uniqueness Test

001160891-03, P = 65.624191 Days, E = 87.126999 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
9.94	6.66	5.87	7.74	5.33	3.09	2.01	4.07	2.20	0.79	-1.08	3.54	0.94	0.44	0.11

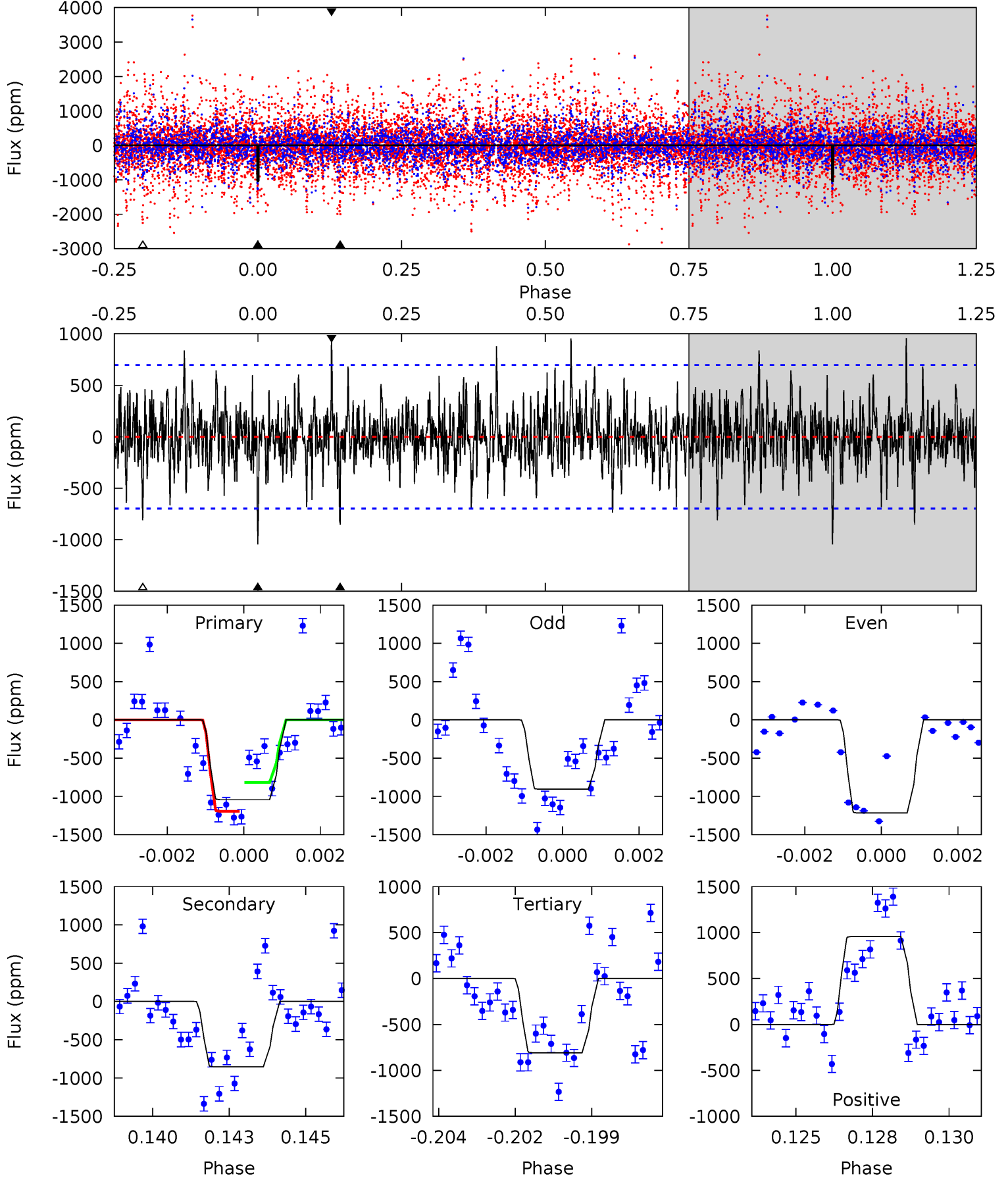




# Alt Model-Shift Uniqueness Test

001160891-03, P = 65.623254 Days, E = 87.159048 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
7.91	6.47	6.13	7.26	5.29	3.03	1.74	1.78	0.65	0.34	-0.79	1.11	1.05	0.48	1.40



### Stellar Parameters For KIC 001160891

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6842^{+72}_{-92}$	$4.170^{+0.090}_{-0.110}$	$-0.060^{+0.150}_{-0.150}$	$1.600^{+0.289}_{-0.178}$	$1.389^{+0.104}_{-0.095}$	$0.477^{+0.172}_{-0.166}$
	+1%/-1%	+2%/-3%	+250%/-250%	+18%/-11%	+7%/-7%	+36%/-35%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 001160891-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-483 \pm 72$	$4.85^{+3.20}_{-2.89}$	$895^{+39}_{-30}$	$6106^{+4316}_{-1257}$	$1475^{+6921}_{-971}$
Alt.	$-853 \pm 132$	$6.32^{+3.31}_{-3.11}$	$894^{+39}_{-30}$	$6132^{+2987}_{-1081}$	$1472^{+4194}_{-855}$

$T_{max}$  = 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

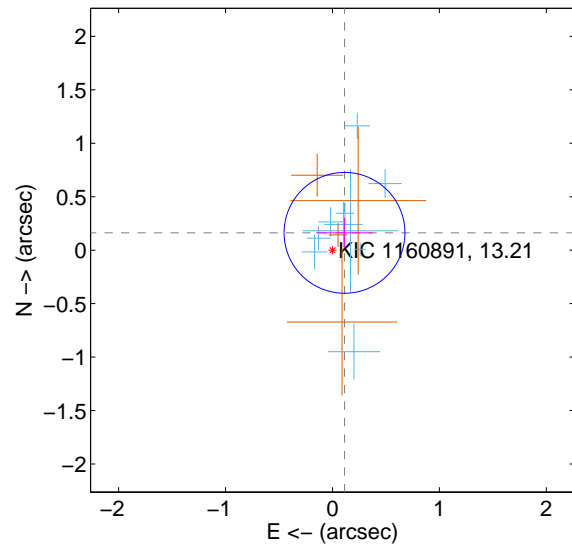
Supplemental centroid analysis for 001160891-03. Kepler magnitude: 13.21. Transit SNR 7.39

There are 10 quarters with good PRF difference image offsets

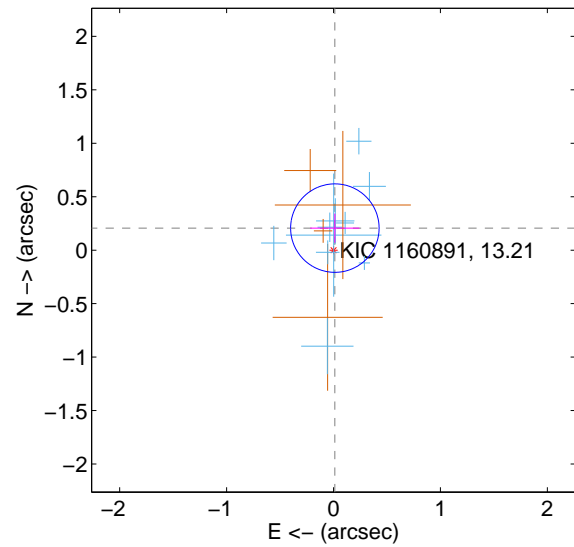
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.197 \pm 0.188$	1.05	$-0.113 \pm 0.265$	$0.162 \pm 0.141$
PRF-fit source offset from KIC position	$0.207 \pm 0.138$	1.50	$-0.013 \pm 0.230$	$0.206 \pm 0.136$
photometric centroid source offset	$0.26 \pm 0.54$	0.48	$-0.26 \pm 0.54$	$0.00 \pm 0.56$

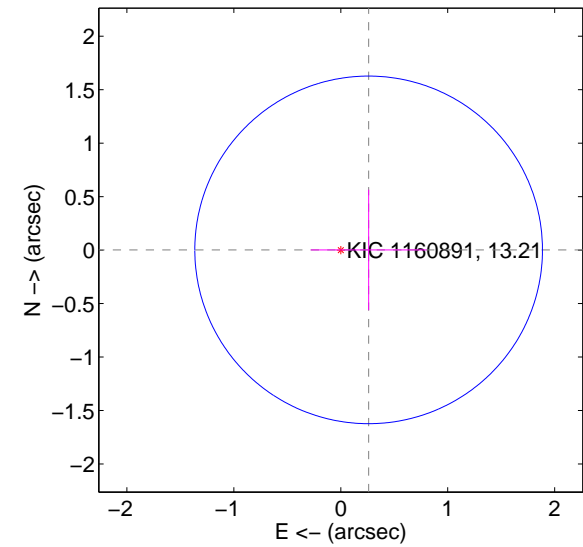
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

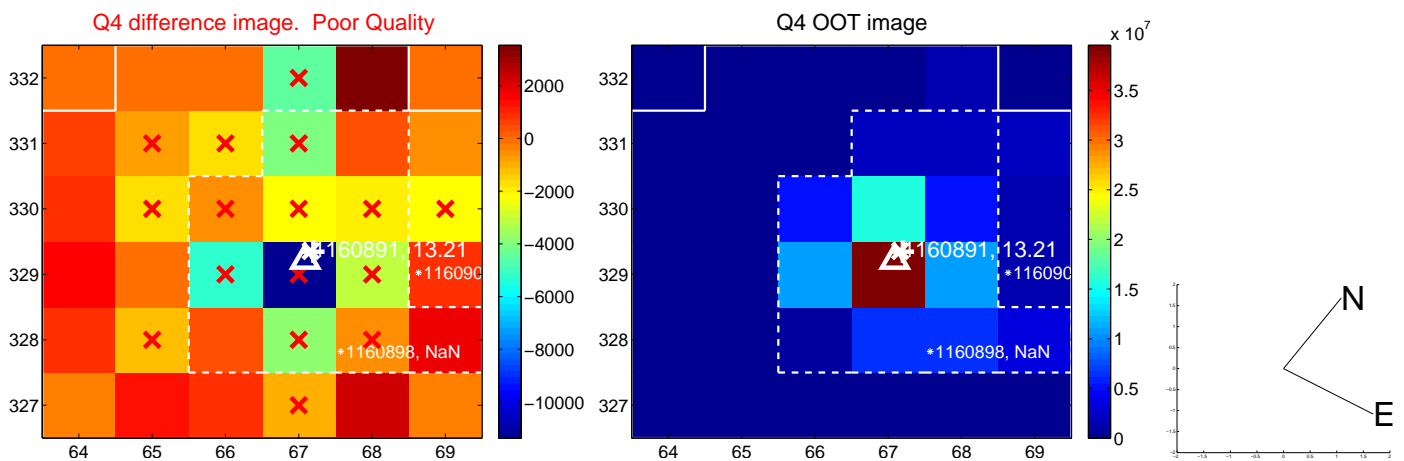
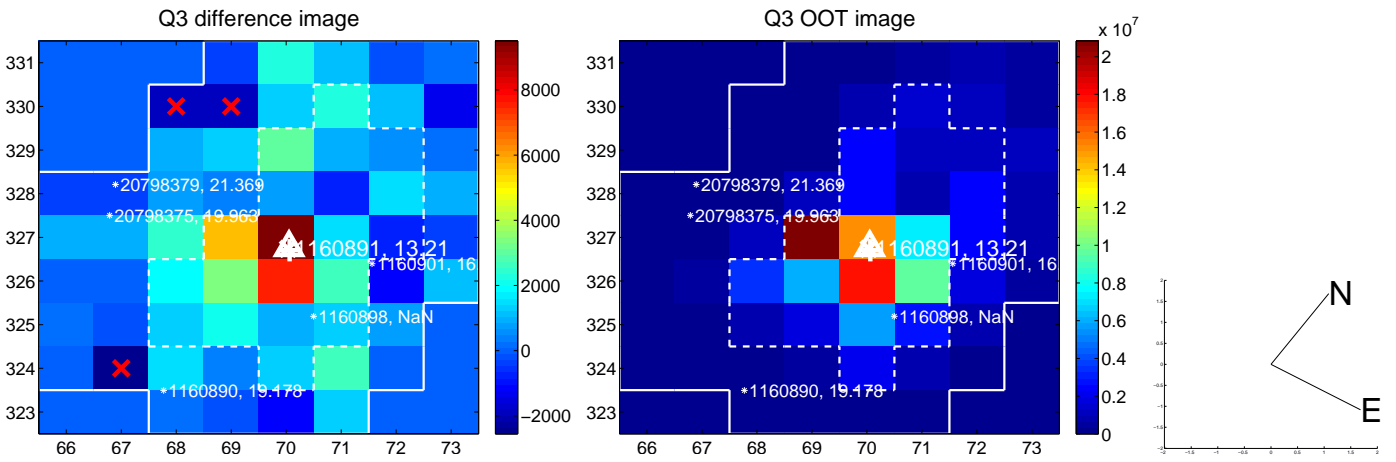
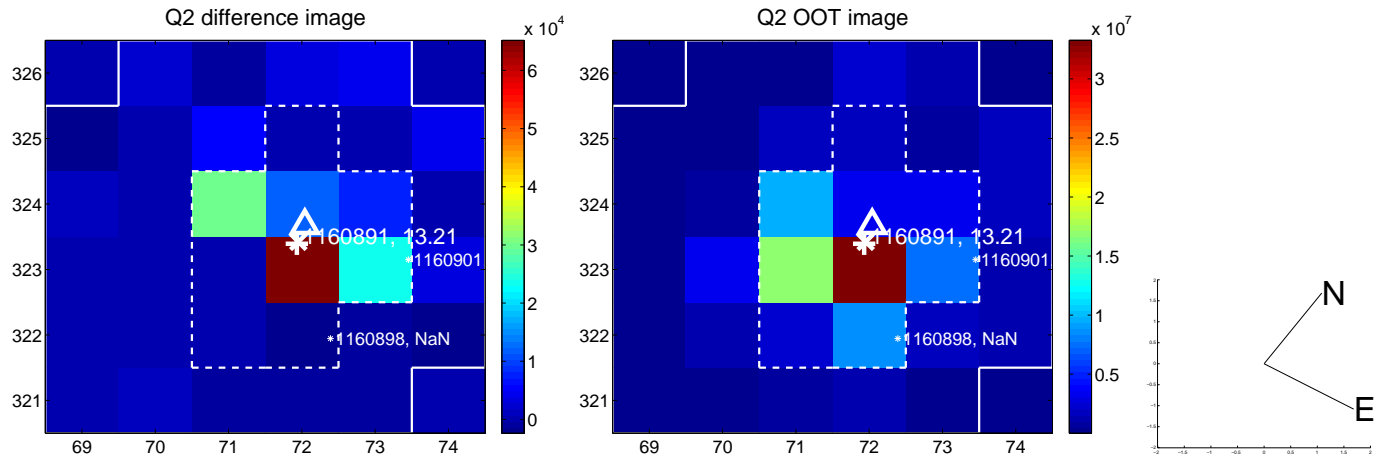
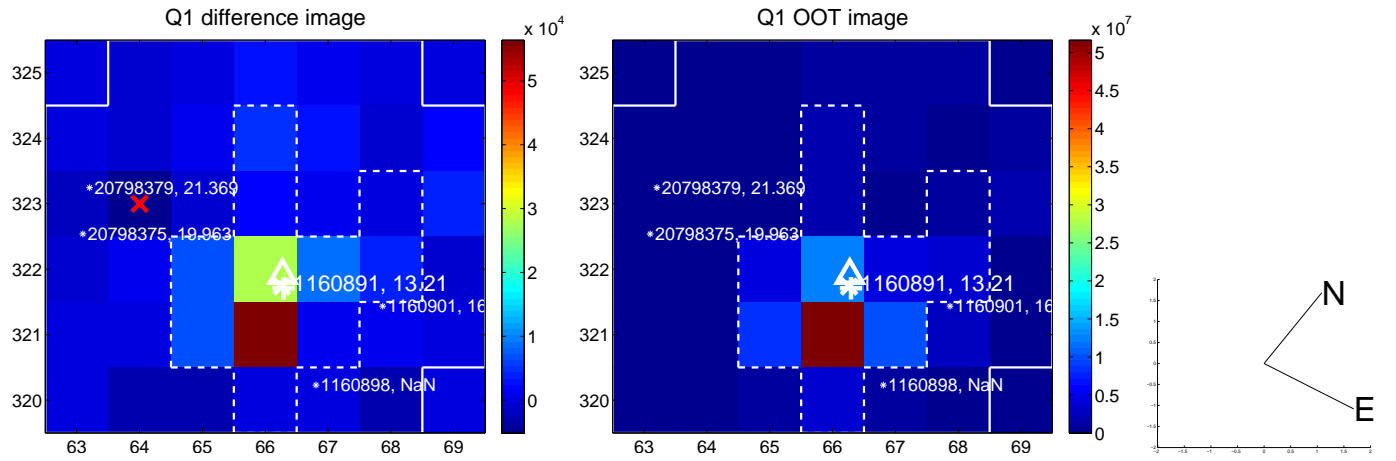


offset from photometric centroids

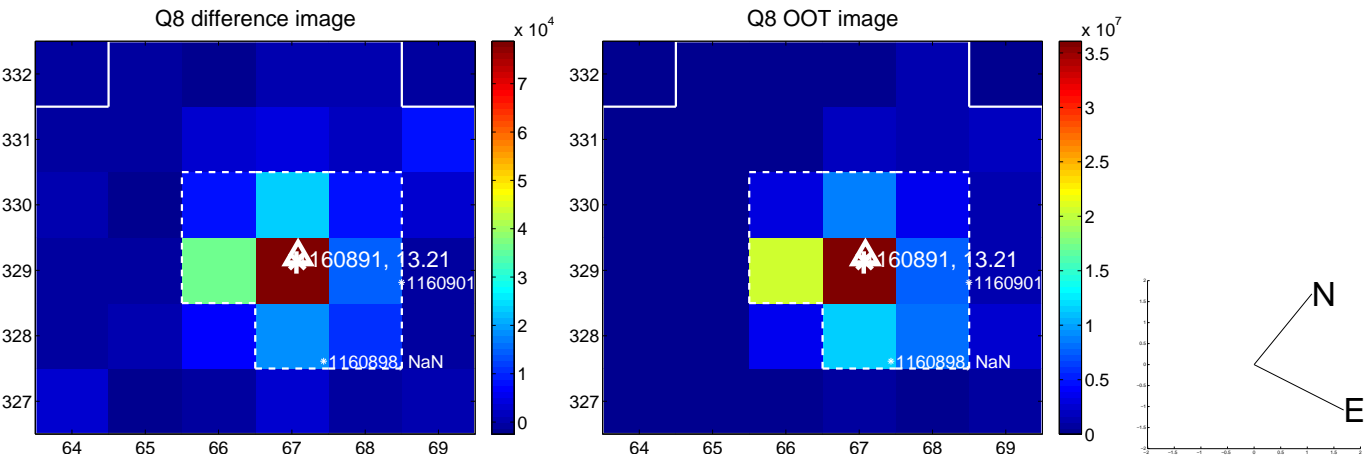
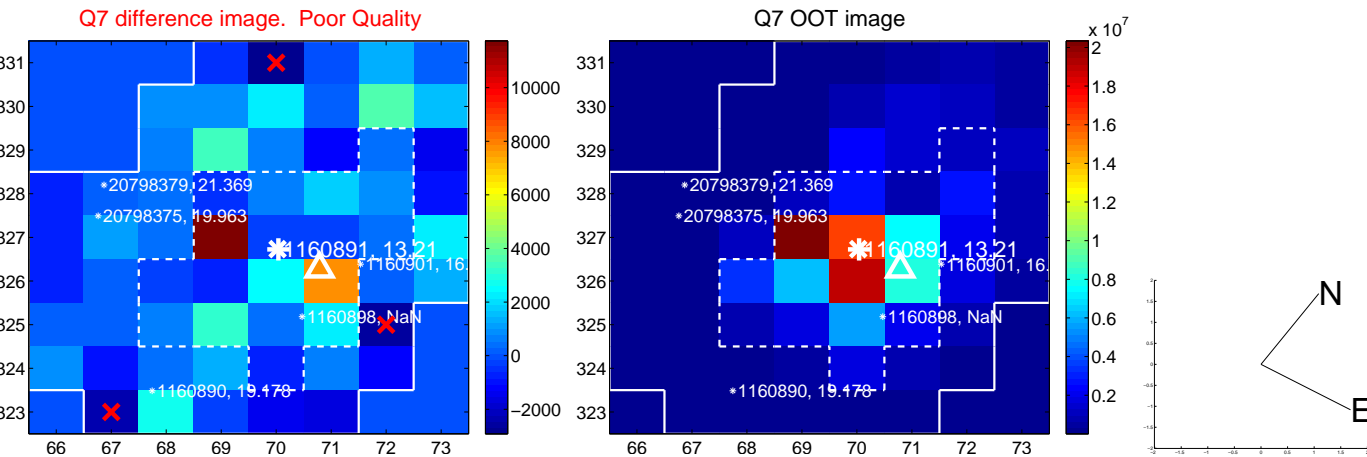
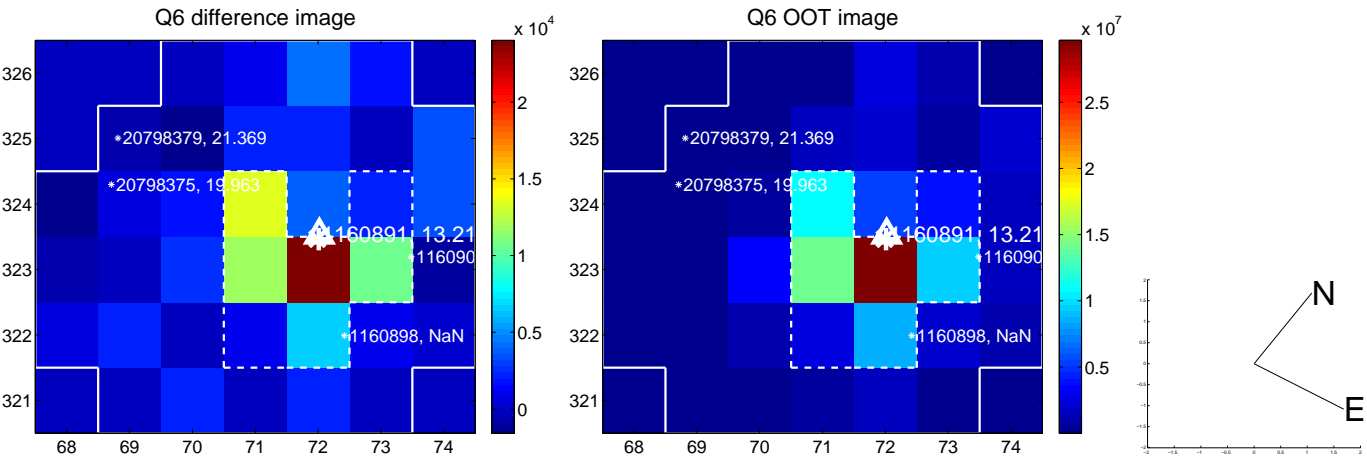
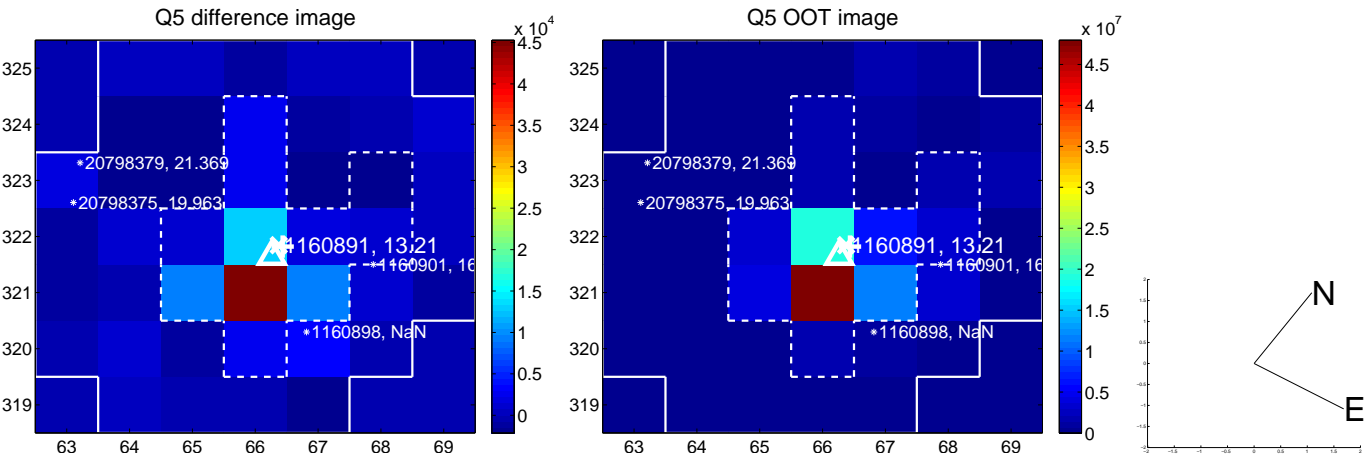


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

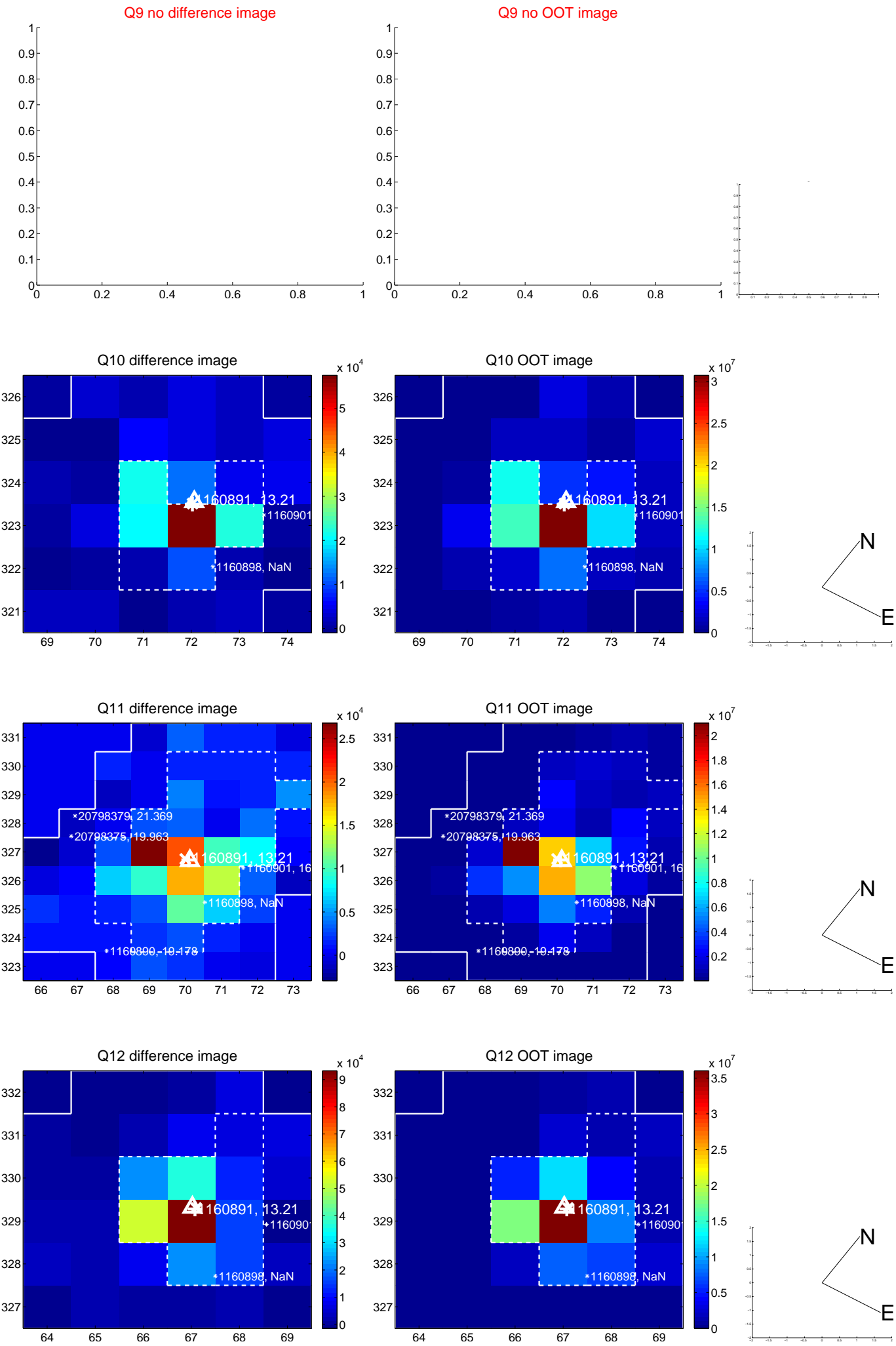


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

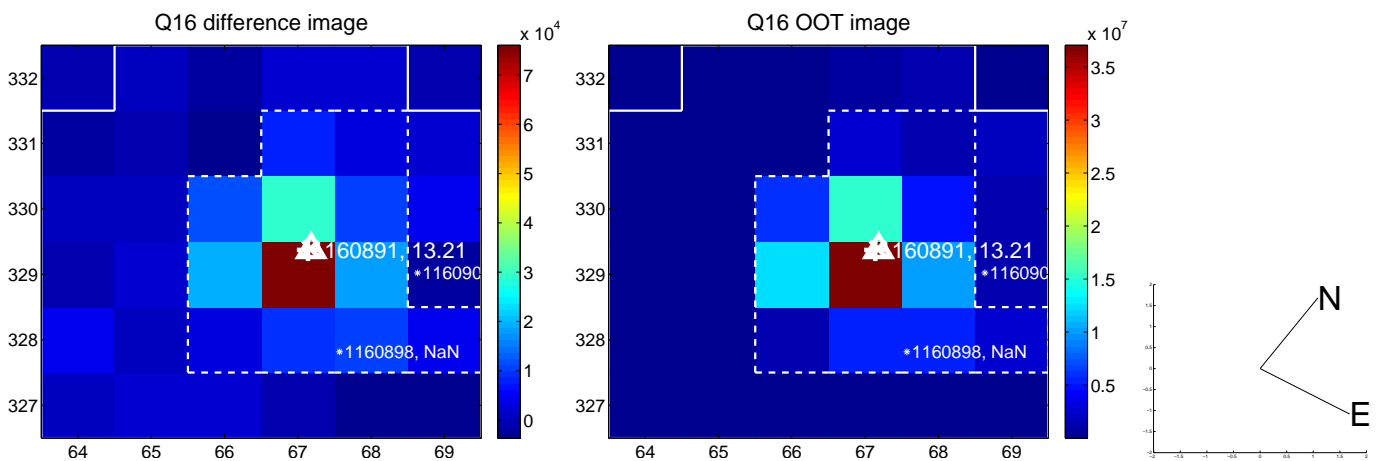
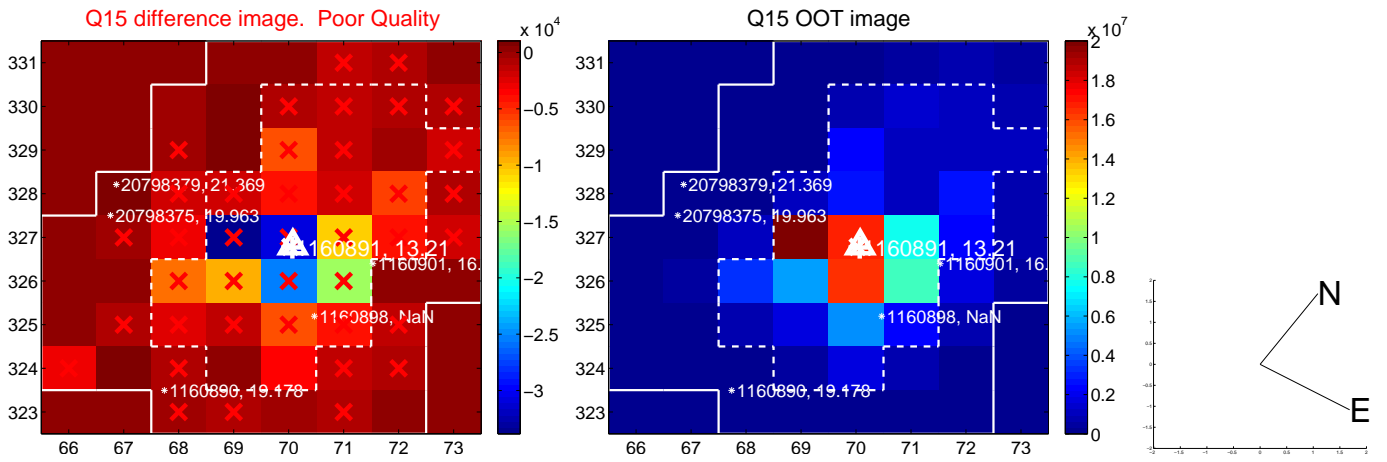
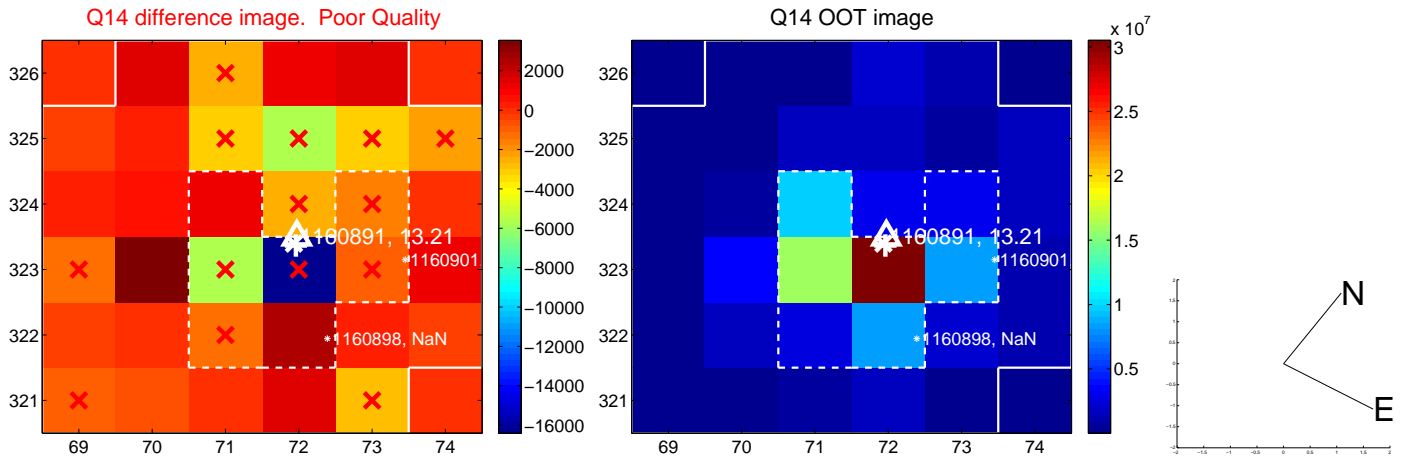
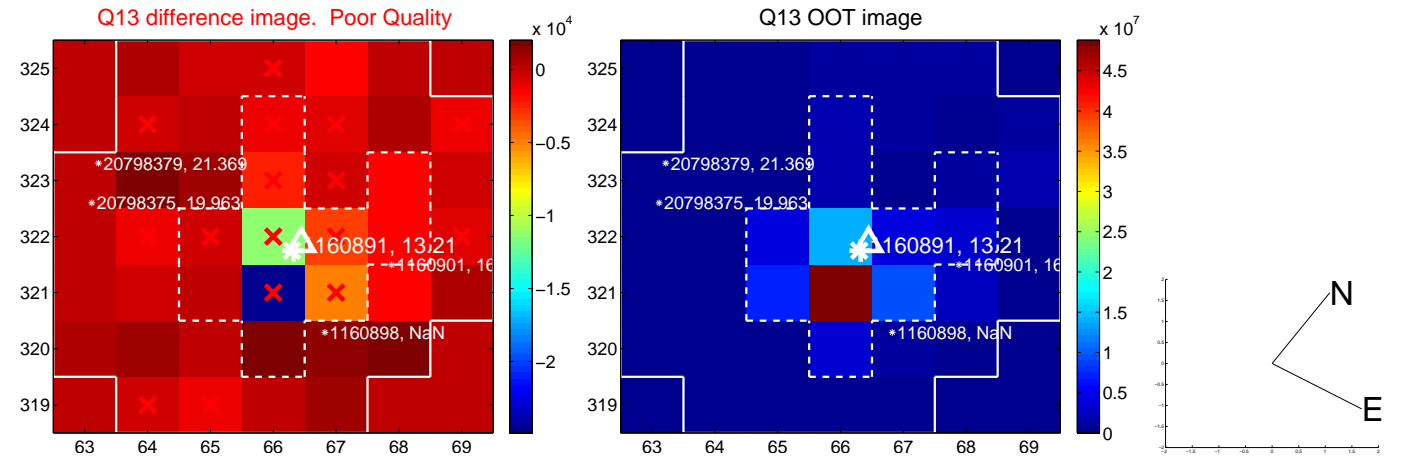




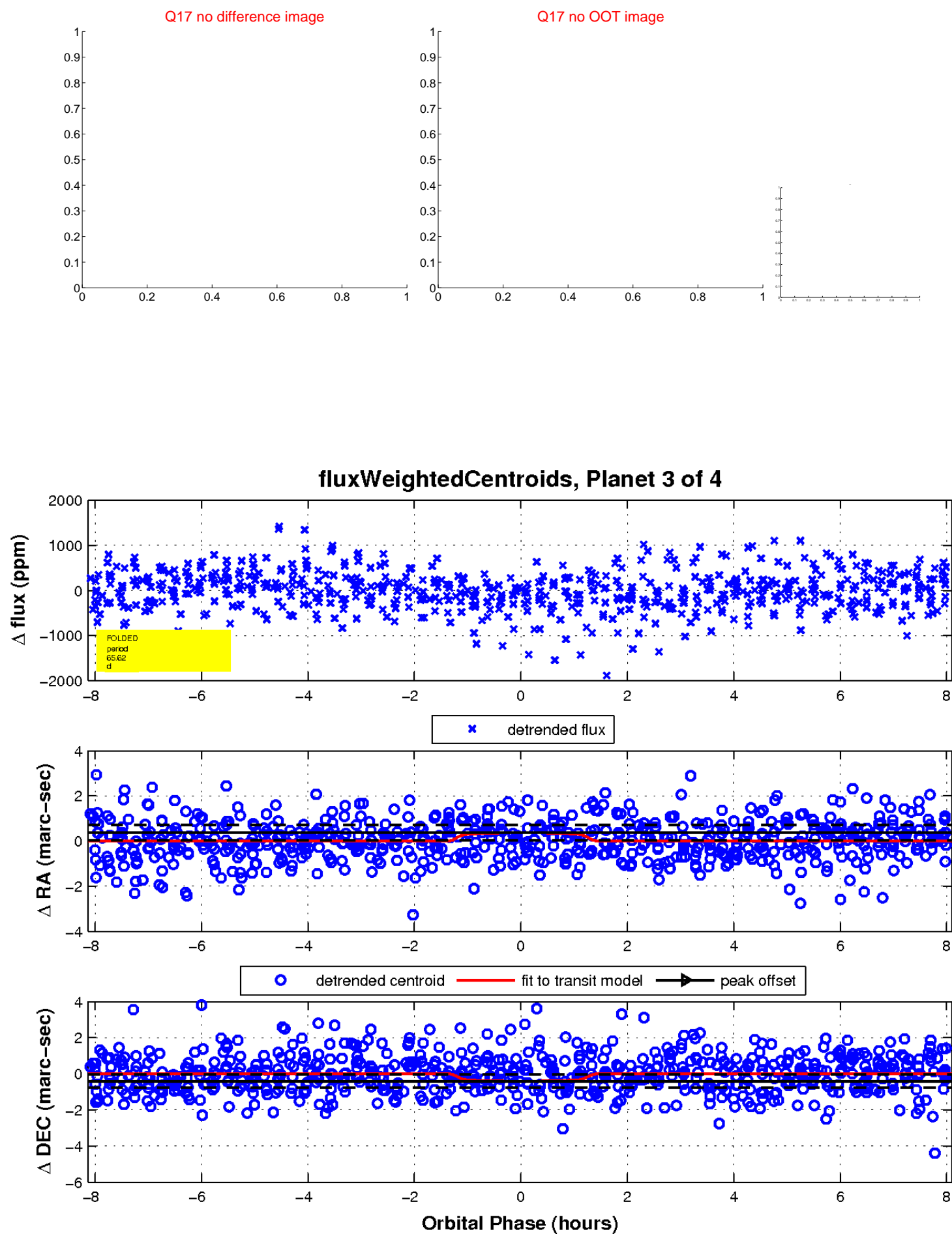
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

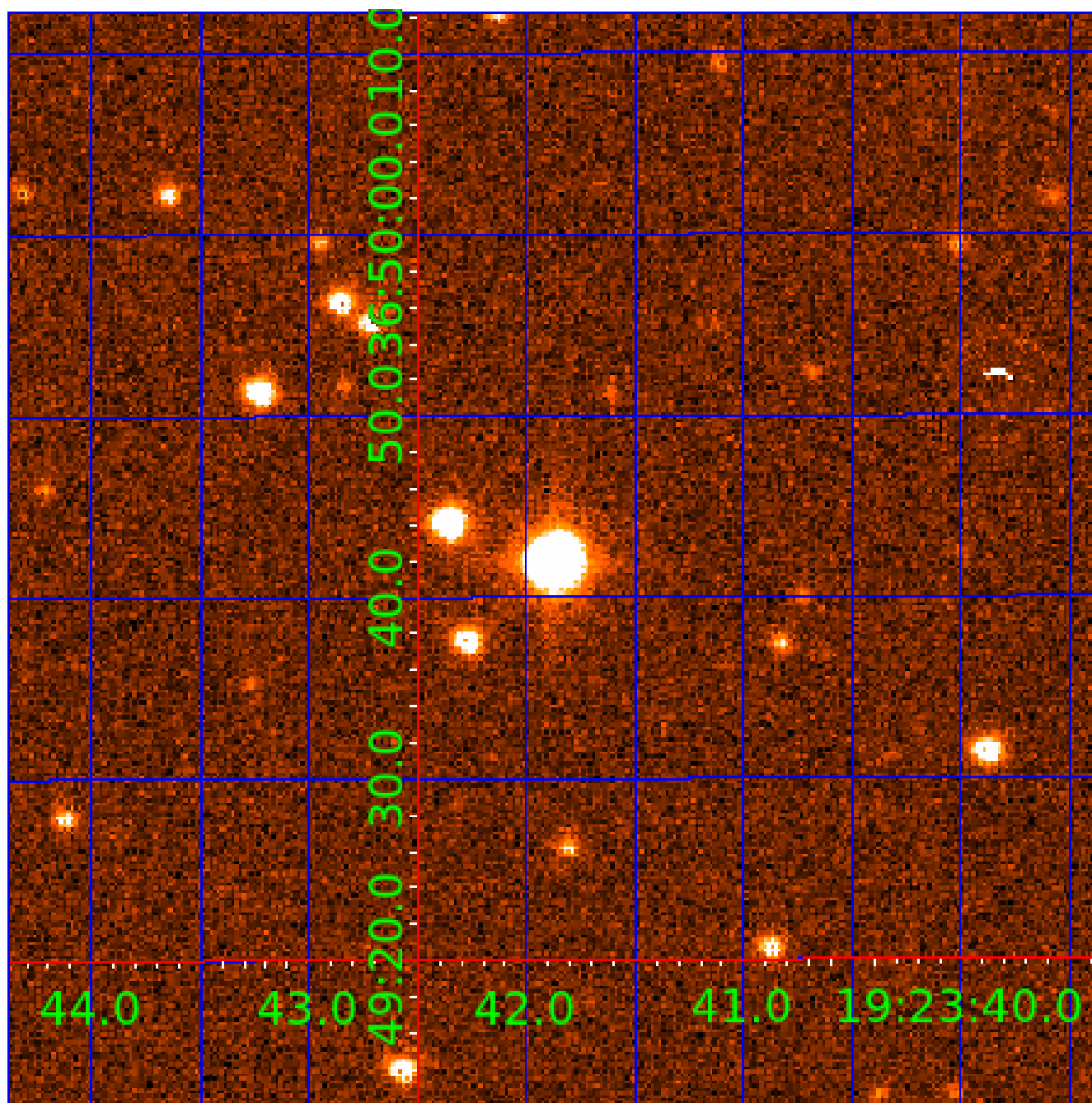


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 001160891

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
001160891-01	OBS	No	0.940466	132.370168	51.7	4.020	12.2	10.4	1.60	6842	1.28	11479.31
001160891-02	OBS	No	0.940522	131.717513	53.3	2.963	12.5	11.0	1.60	6842	1.36	11478.40
001160891-03	OBS	No	65.624191	152.751190	573.1	2.712	8.4	7.4	1.60	6842	4.33	39.96
001160891-04	OBS	No	84.515418	210.647088	545.7	5.208	8.2	6.6	1.60	6842	4.19	28.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
001160891-01	OBS	FP	0.00	1	0	0	0	LPP_DV—MOD_NONUNIQ_DV
001160891-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD
001160891-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
001160891-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—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.

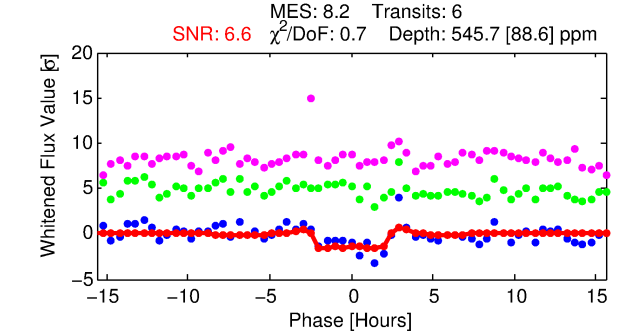
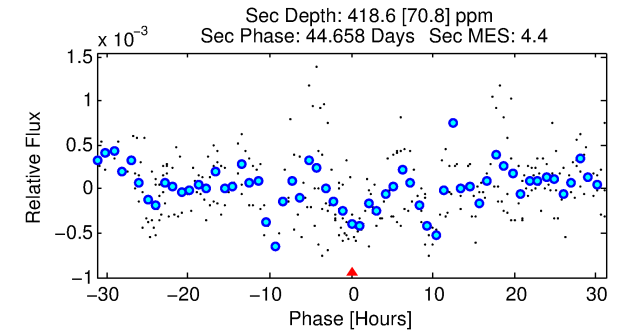
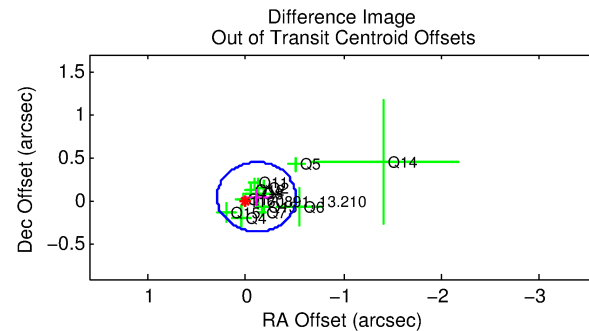
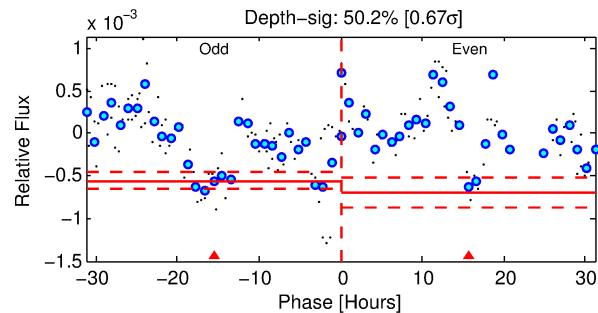
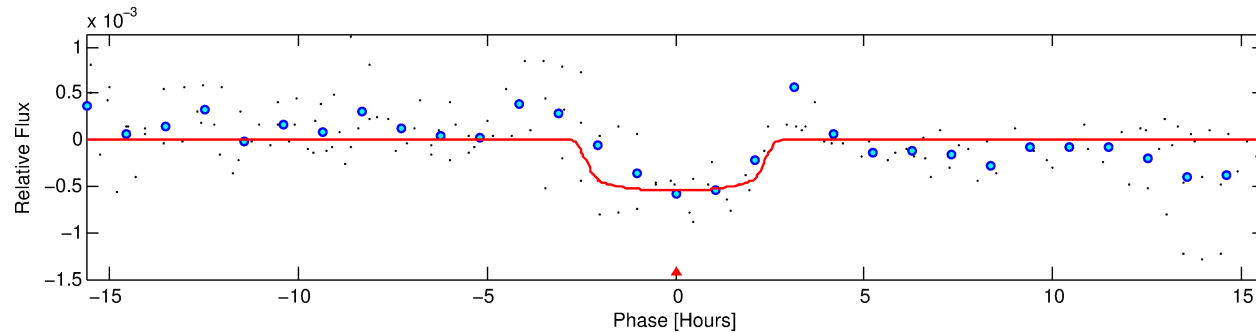
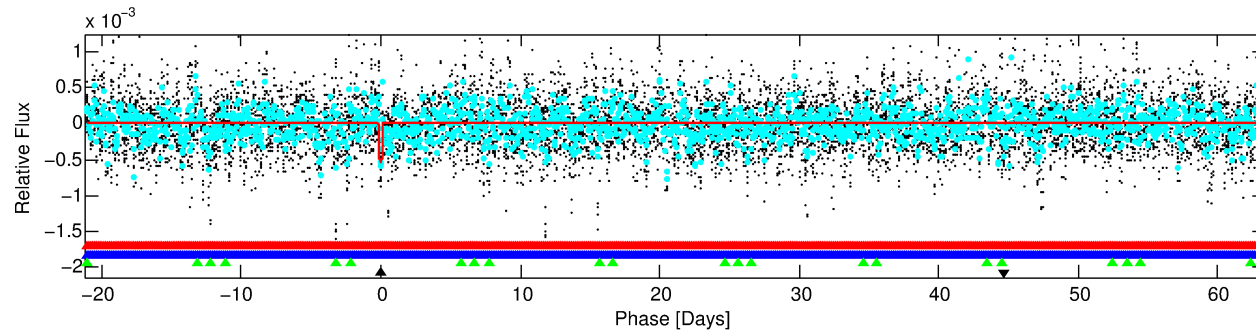
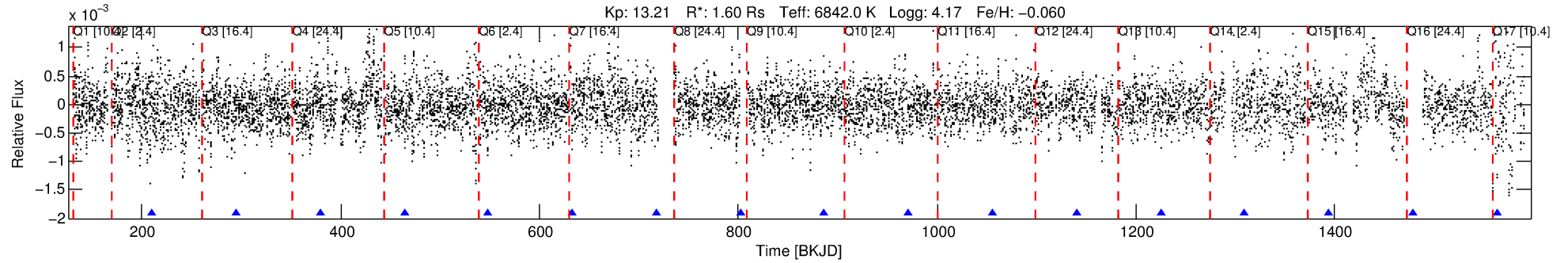
Ephemeris Match Information For 001160891-04

No Significant Match Found



# DV One-Page Summary

KIC: 1160891 Candidate: 4 of 4 Period: 84.515 d



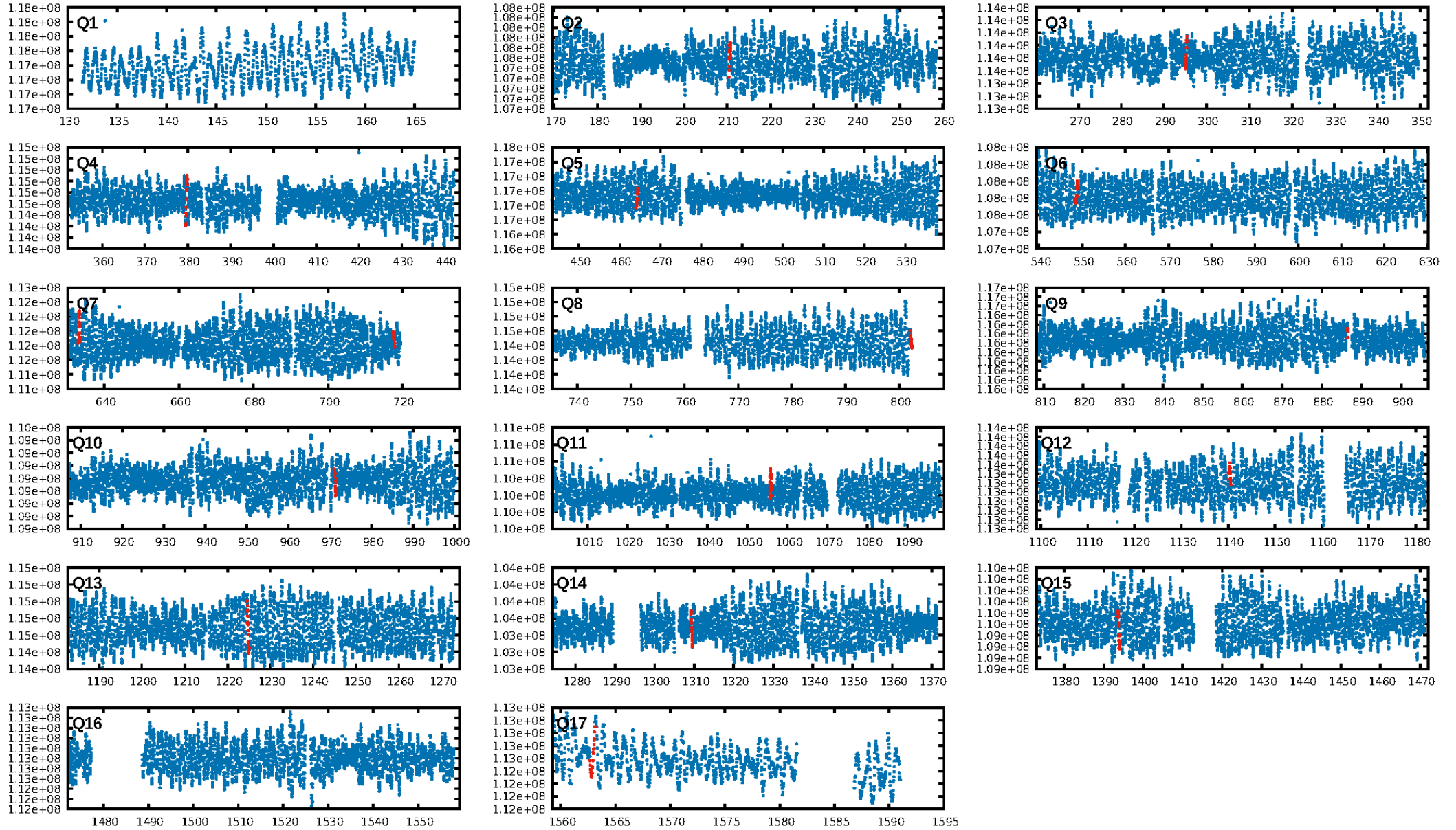
## DV Fit Results:

Period = 84.51542 [0.00148] d  
Epoch = 210.6471 [0.0138] BKJD  
Rp/R\* = 0.0240 [0.0183]  
a/R\* = 72.89 [316.51]  
b = 0.84 [1.56]  
Seff = 28.52 [6.11]  
Teff = 589 [32] K  
Rp = 4.19 [3.29] Re  
a = 0.4198 [0.0617] AU  
Ag = 2309.31 [3577.58] [0.65 $\sigma$ ]  
Teffp = 6316 [2426] K [2.36 $\sigma$ ]

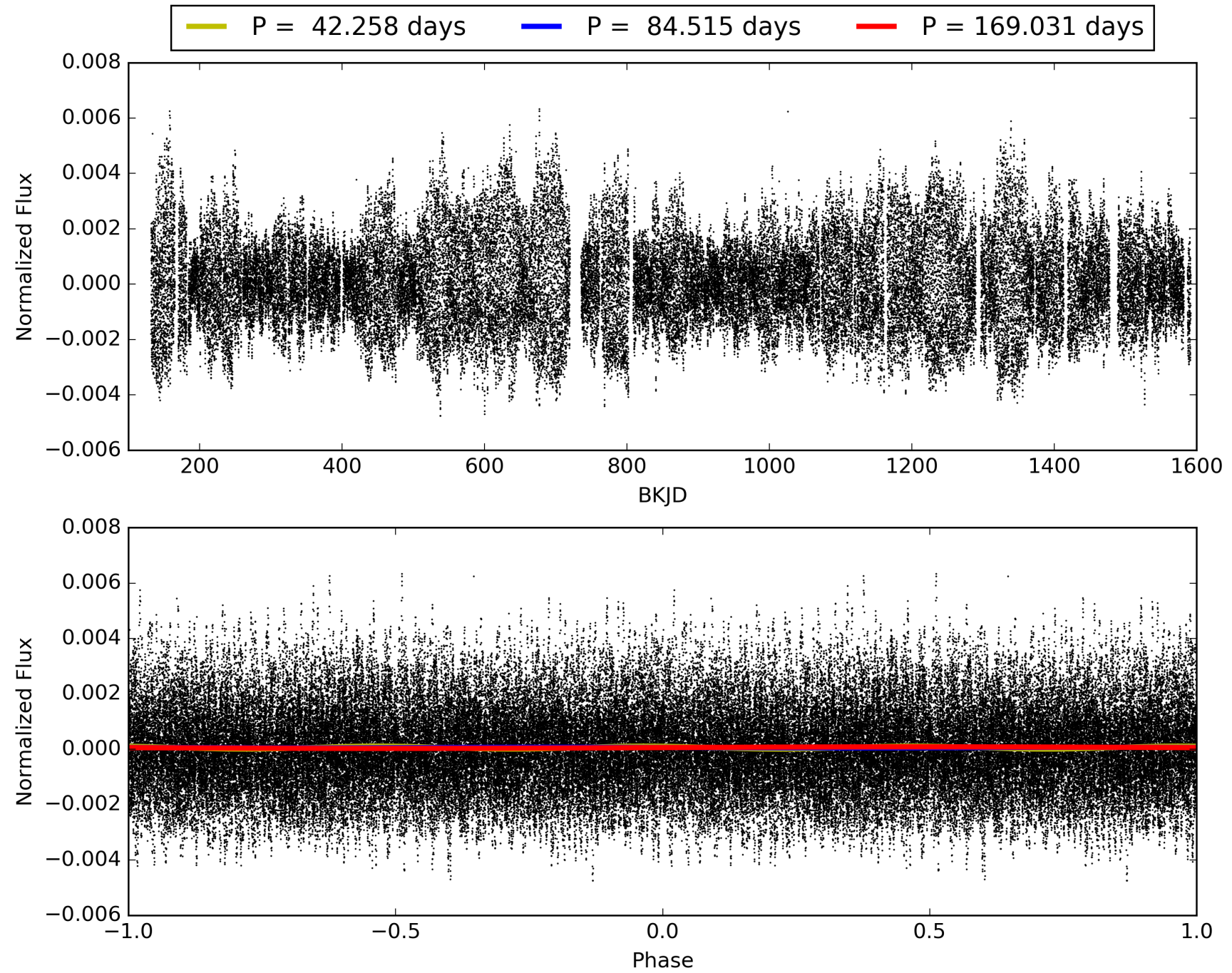
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [77.22 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 14.8%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 2.29e-08**  
RollingBand-fgt: 1.00 [6/6]  
**GhostDiagnostic-chr: -3.341**  
Centroid-sig: 28.7%  
Centroid-so: 1.182 arcsec [2.47 $\sigma$ ]  
OotOffset-rm: 0.121 arcsec [0.90 $\sigma$ ]  
OotOffset-st: 3/4/2/3 [12]  
KicOffset-rm: 0.027 arcsec [0.27 $\sigma$ ]  
KicOffset-st: 3/4/2/3 [12]  
DiffImageQuality-fgm: 0.42 [5/12]  
DiffImageOverlap-fno: 0.00 [0/12]

# TCE 001160891-04, PDC Light Curves

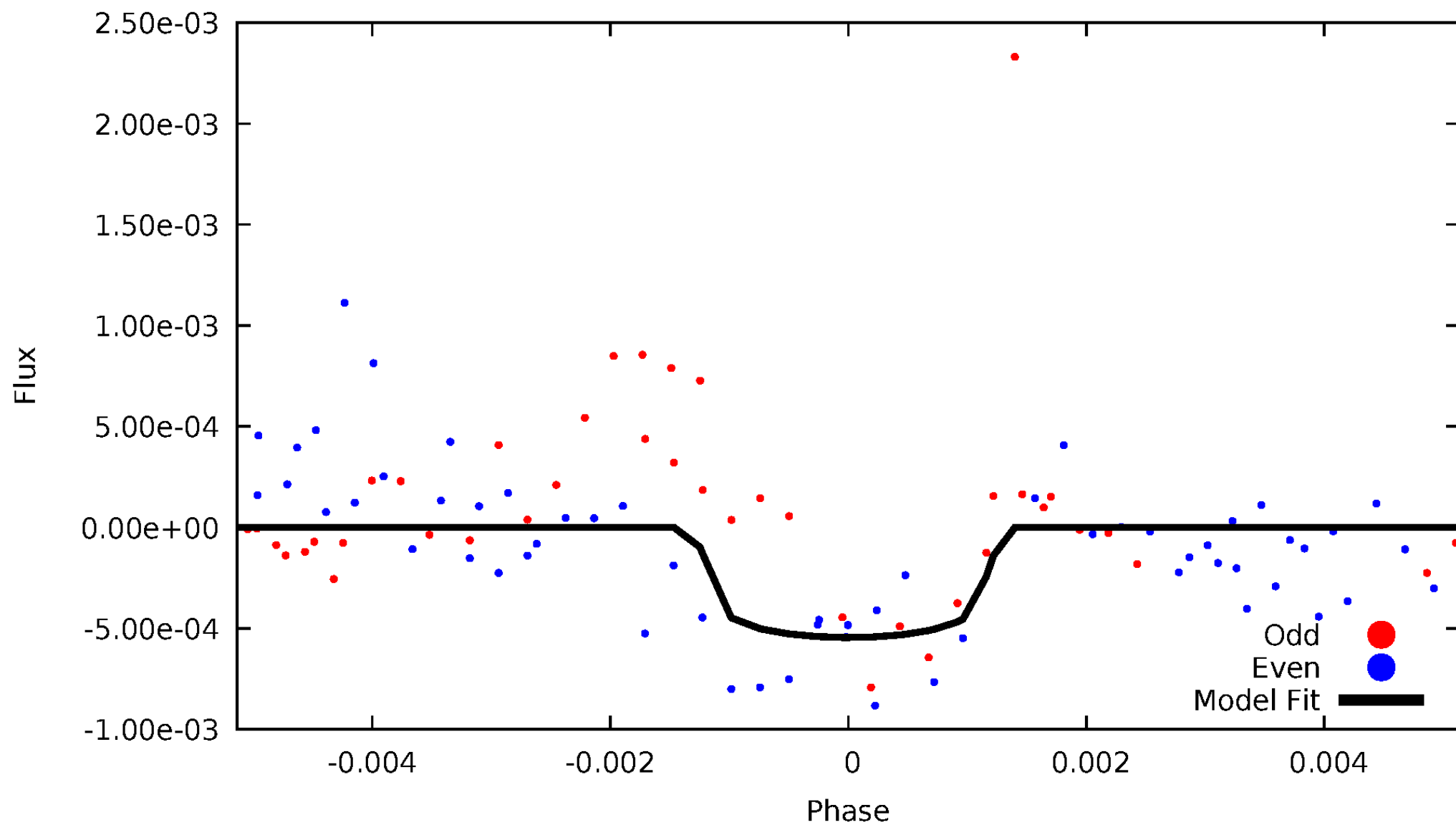


# TCE 001160891-04



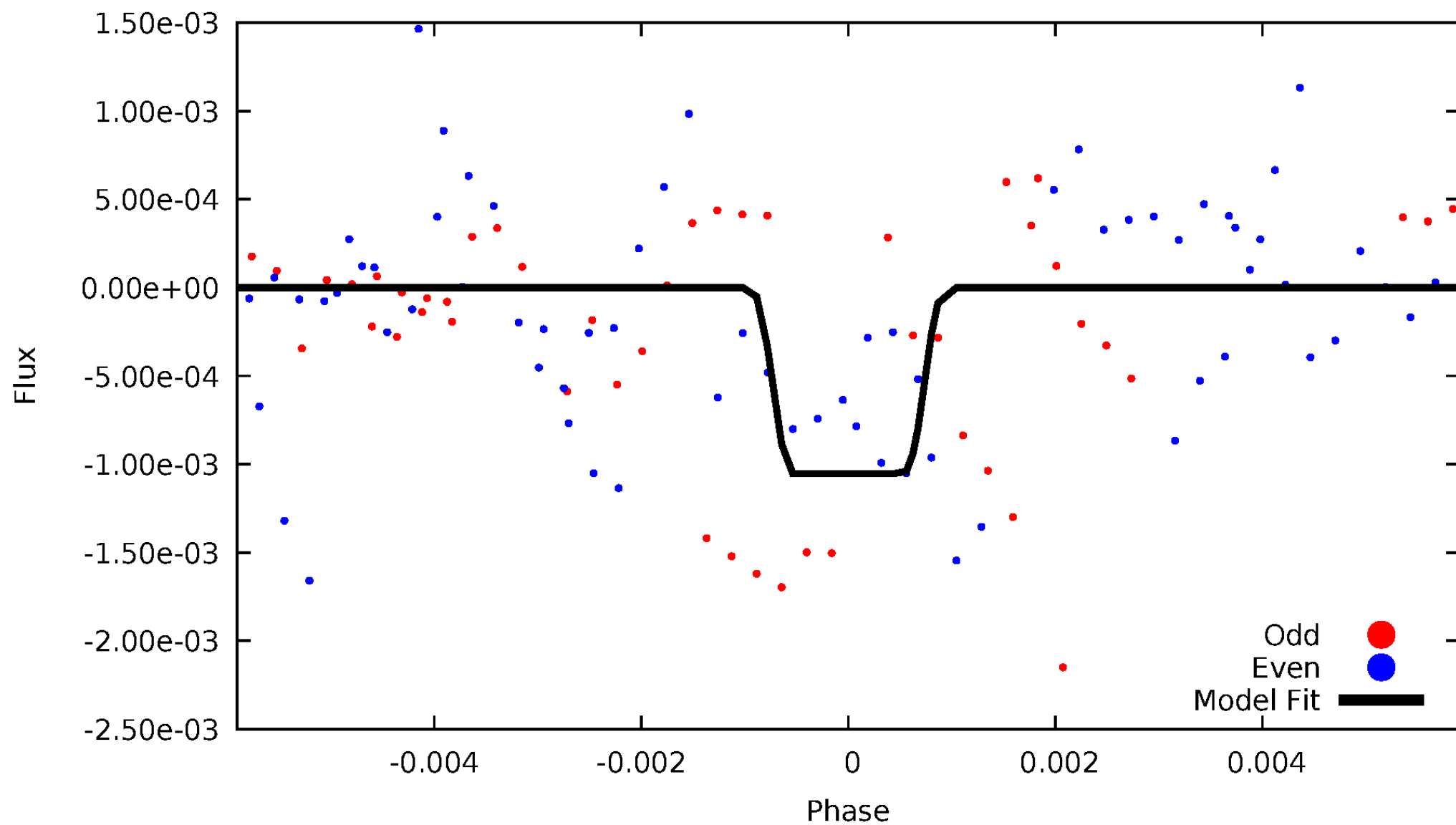
# DV Odd/Even

TCE 001160891-04



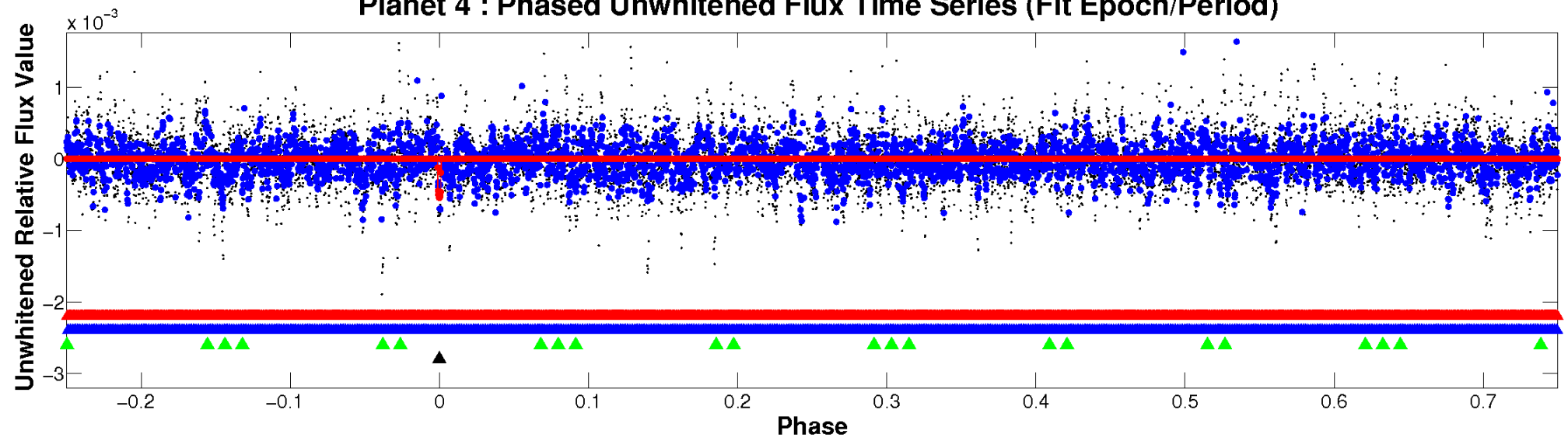
# ALT Odd/Even

TCE 001160891-04

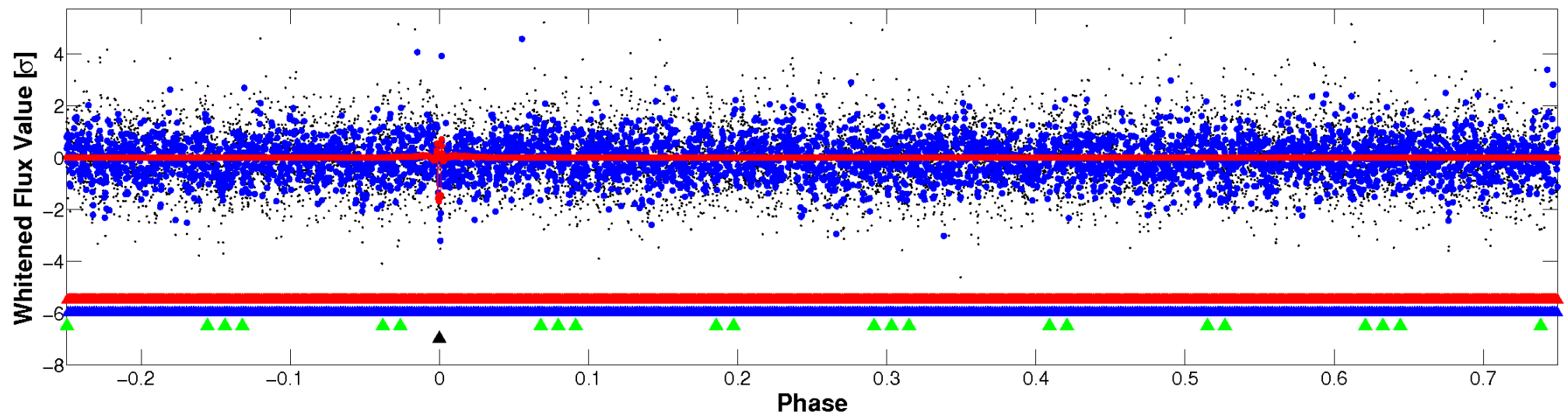


# Non-Whitened Vs. Whitened Light Curve

## Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



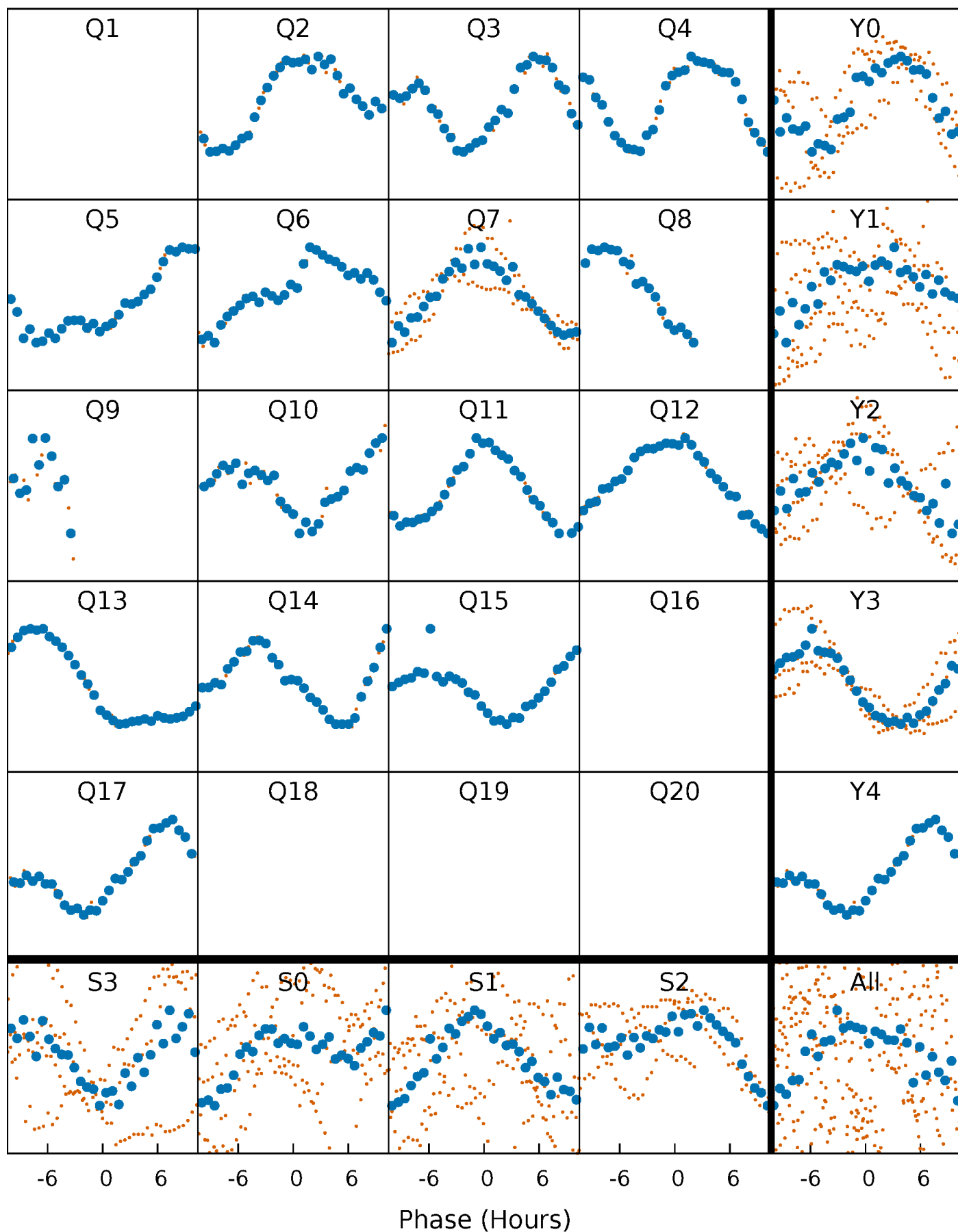
## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)





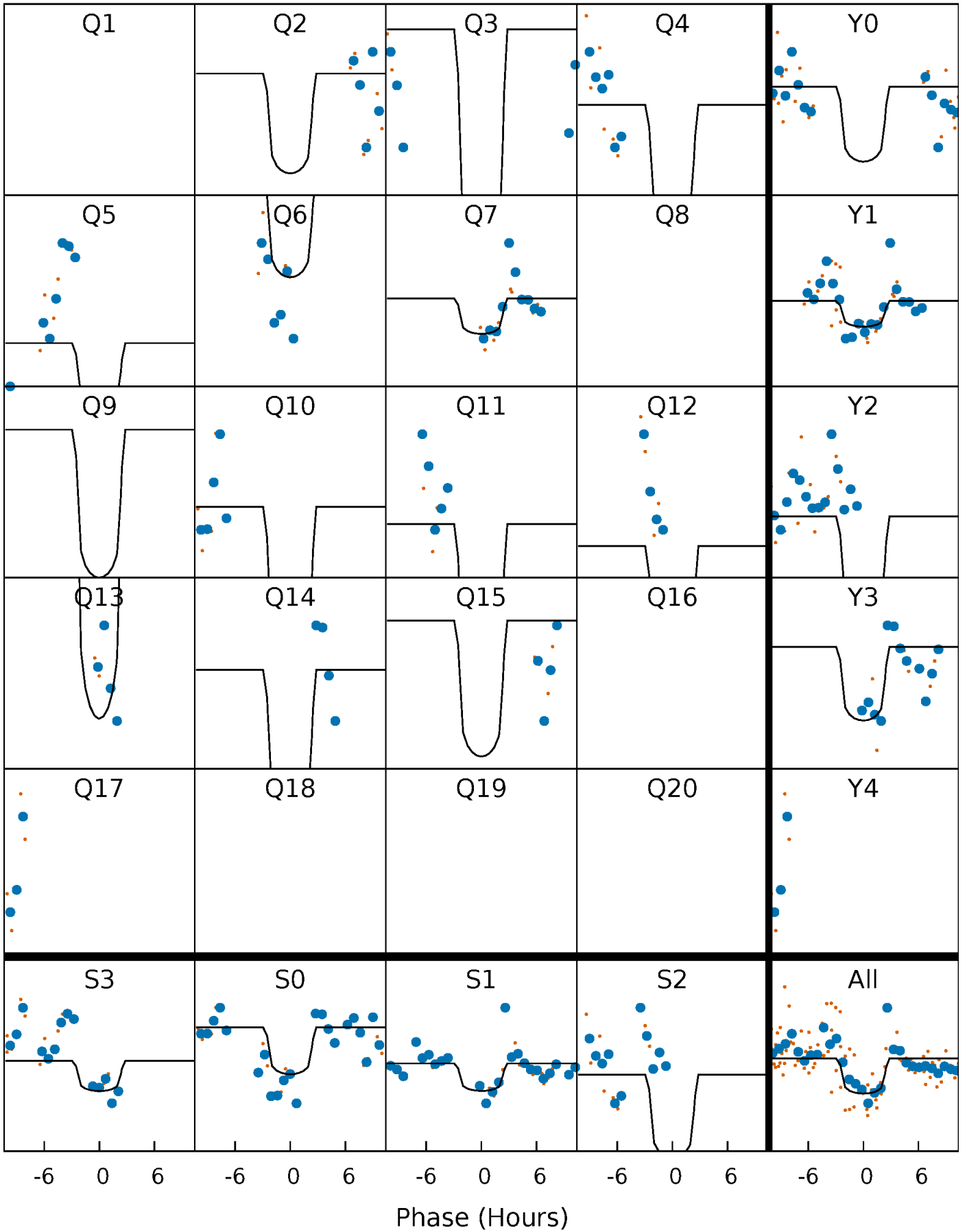
# PDC Quarter-Phased Transit Curves

TCE 001160891-04 P= 84.515418 Days  $T_0=210.647088$  (BKJD)



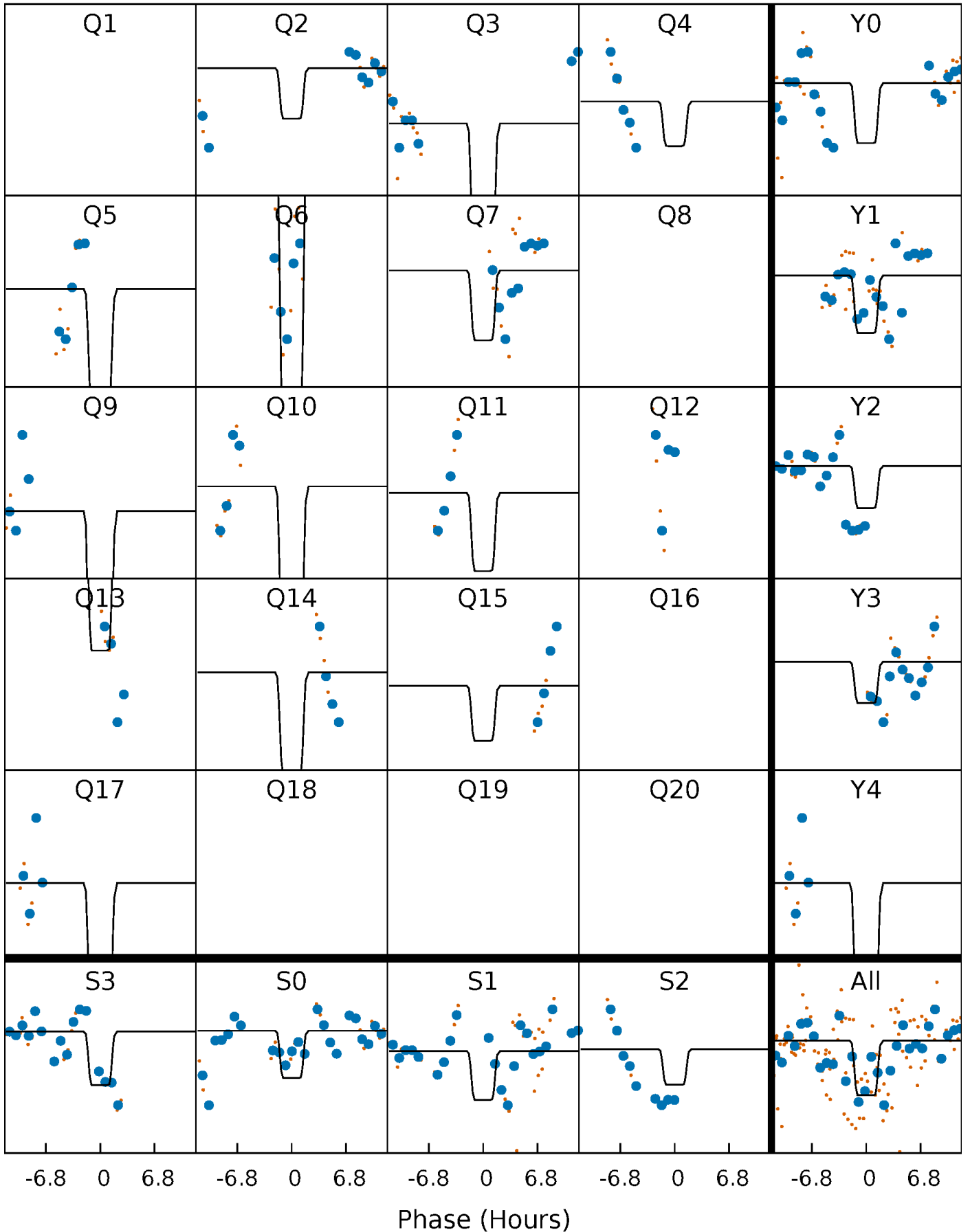
# DV Quarter-Phased Transit Curves

TCE 001160891-04 P= 84.515418 Days  $T_0=210.647088$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

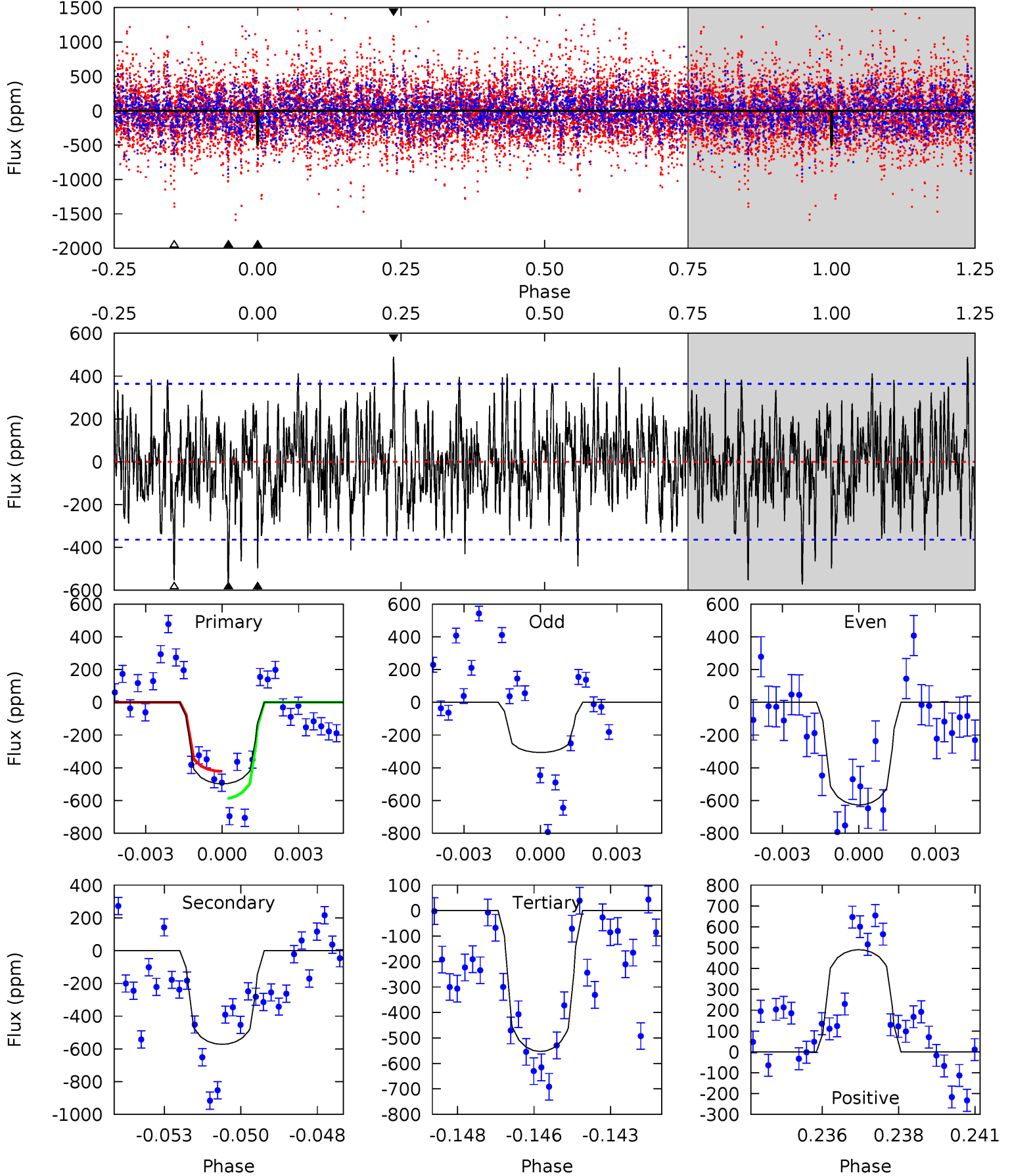
TCE 001160891-04     $P = 84.516741$  Days     $T_0 = 210.603988$  (BKJD)



# DV Model-Shift Uniqueness Test

001160891-04, P = 84.515418 Days, E = 126.131670 Days

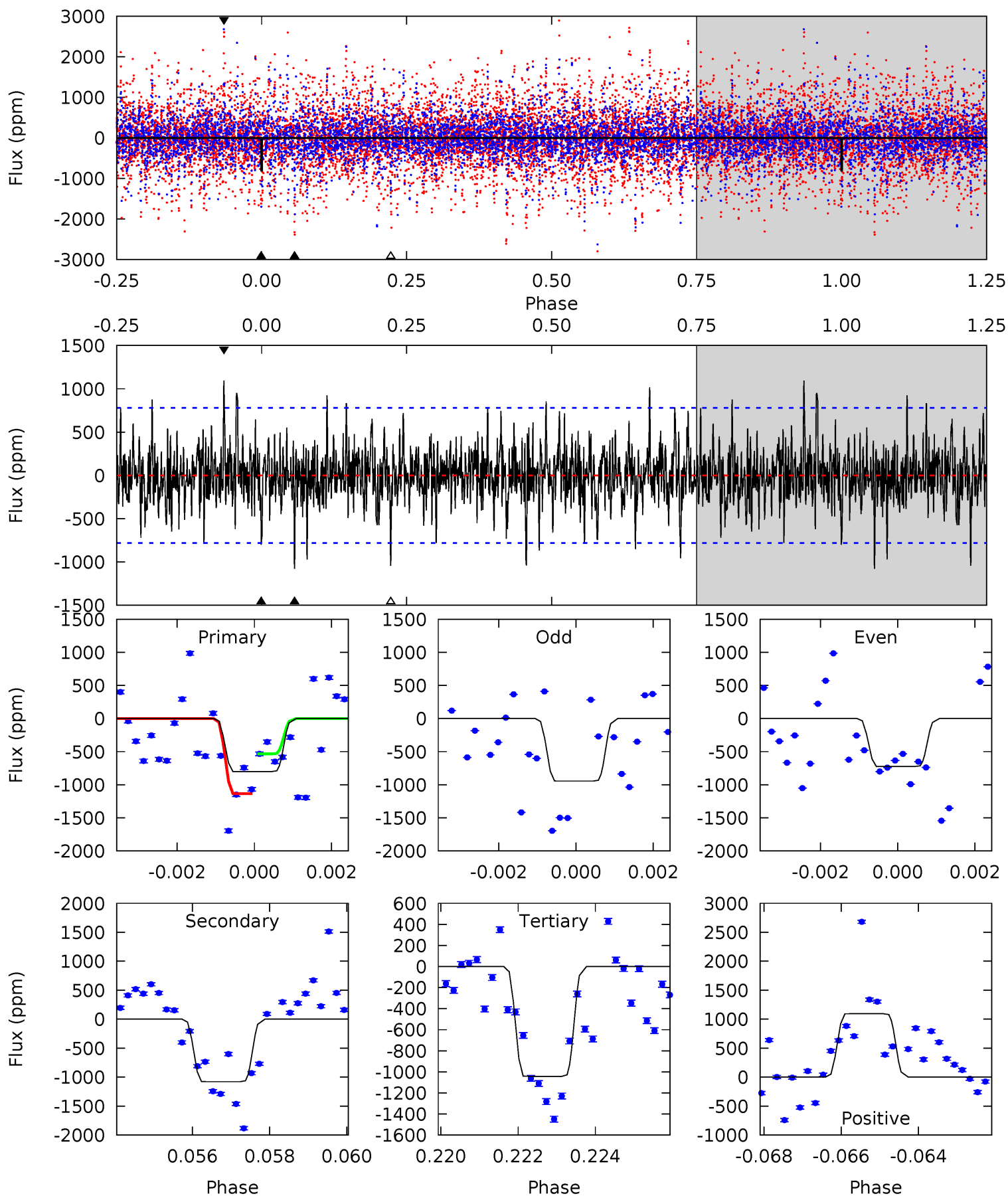
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.23	8.30	8.02	7.11	5.28	3.01	2.20	-0.80	0.12	0.28	1.19	2.30	0.80	0.46	1.21



# Alt Model-Shift Uniqueness Test

001160891-04, P = 84.516741 Days, E = 126.087247 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
5.47	7.36	7.12	7.47	5.33	3.10	1.71	-1.65	-2.00	0.24	-0.11	0.73	1.02	0.50	2.05



### Stellar Parameters For KIC 001160891

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6842^{+72}_{-92}$	$4.170^{+0.090}_{-0.110}$	$-0.060^{+0.150}_{-0.150}$	$1.600^{+0.289}_{-0.178}$	$1.389^{+0.104}_{-0.095}$	$0.477^{+0.172}_{-0.166}$
	+1%/-1%	+2%/-3%	+250%/-250%	+18%/-11%	+7%/-7%	+36%/-35%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 001160891-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-572 \pm 69$	$4.72^{+3.09}_{-2.76}$	$824^{+35}_{-29}$	$6454^{+4583}_{-1395}$	$2493^{+11801}_{-1574}$
Alt.	$-1078 \pm 146$	$5.91^{+3.18}_{-2.92}$	$823^{+36}_{-29}$	$6714^{+3548}_{-1279}$	$2960^{+8695}_{-1703}$

$T_{max}$  = 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

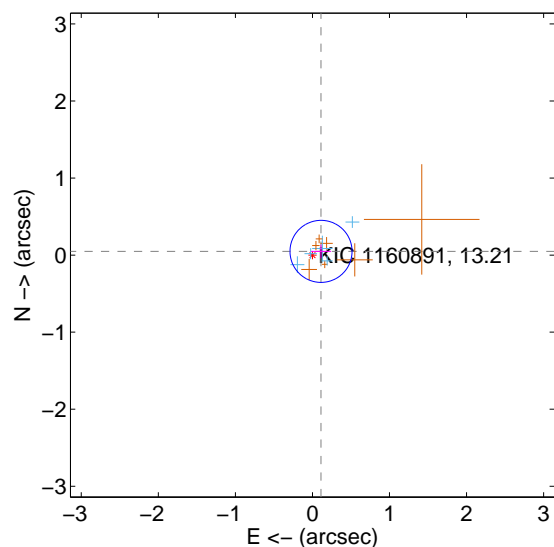
Supplemental centroid analysis for 001160891-04. Kepler magnitude: 13.21. Transit SNR 6.58

There are 5 quarters with good PRF difference image offsets

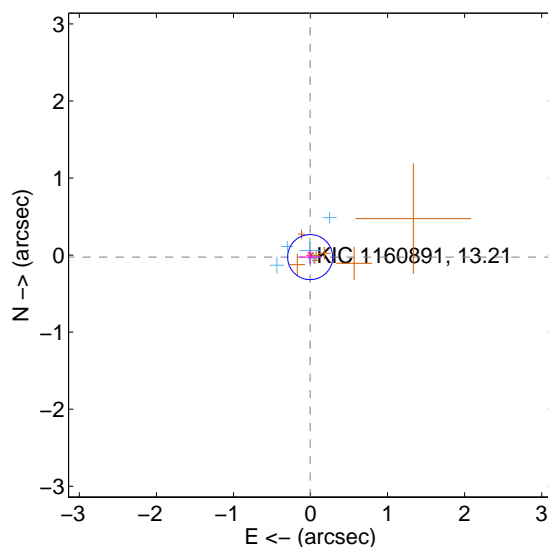
The direct PRF centroid is offset from the target star catalog position by about 0.29 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.121 \pm 0.134$	0.90	$-0.111 \pm 0.130$	$0.048 \pm 0.088$
PRF-fit source offset from KIC position	$0.027 \pm 0.097$	0.27	$0.005 \pm 0.140$	$-0.026 \pm 0.089$
photometric centroid source offset	$1.18 \pm 0.48$	2.47	$0.92 \pm 0.49$	$-0.74 \pm 0.47$

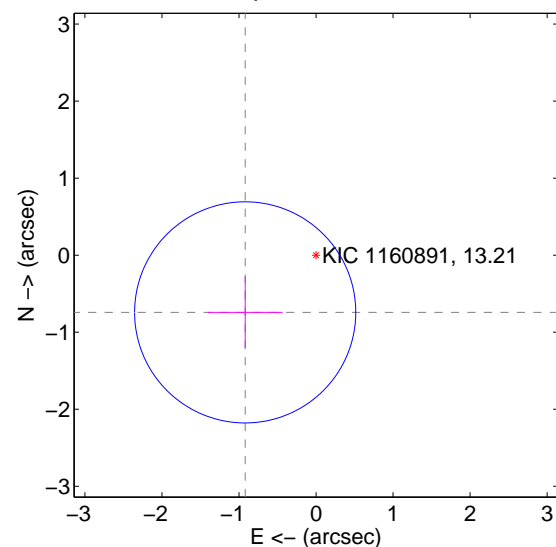
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

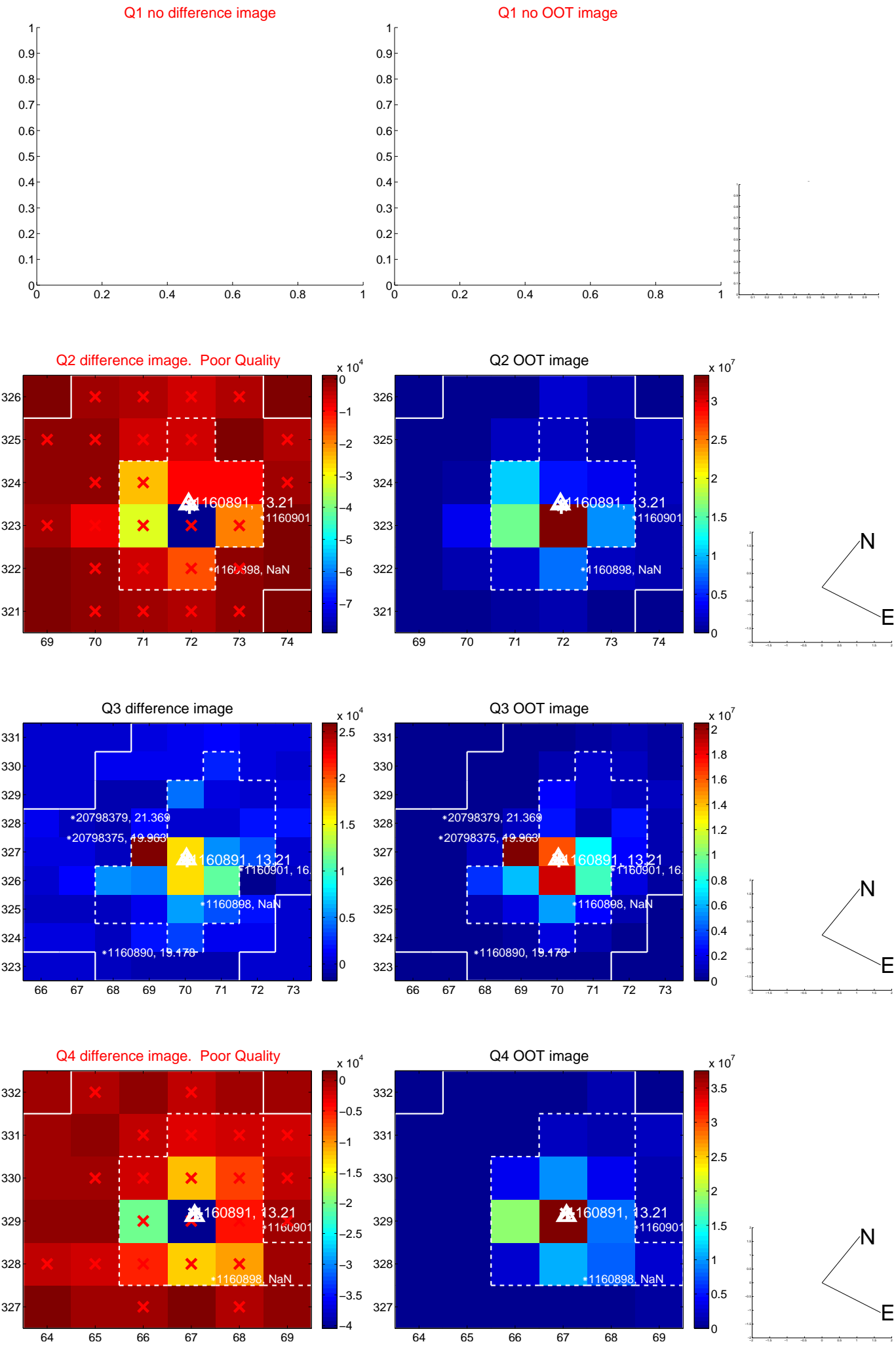


offset from photometric centroids

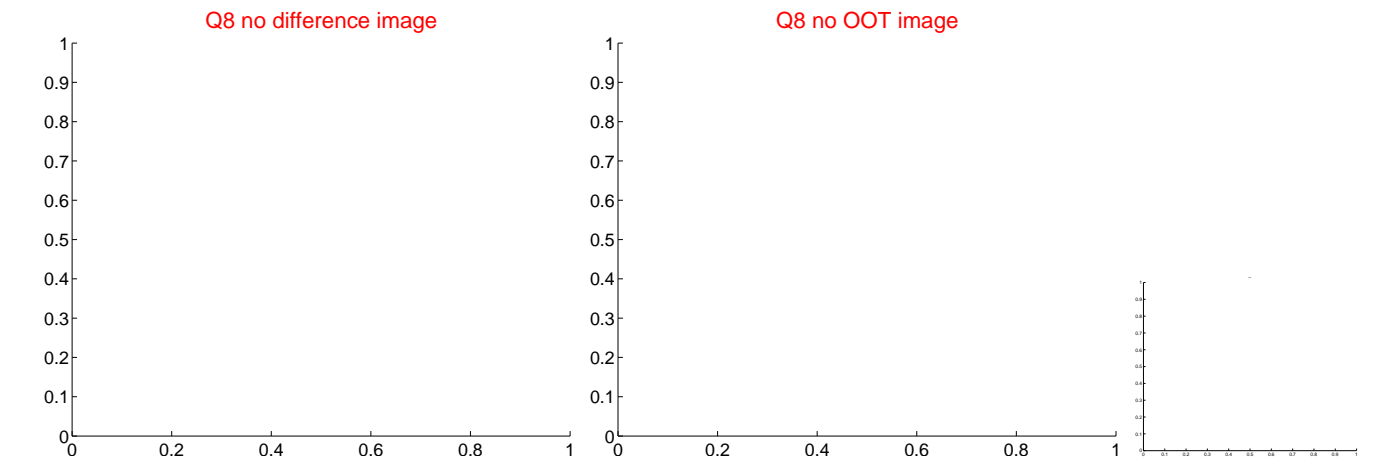
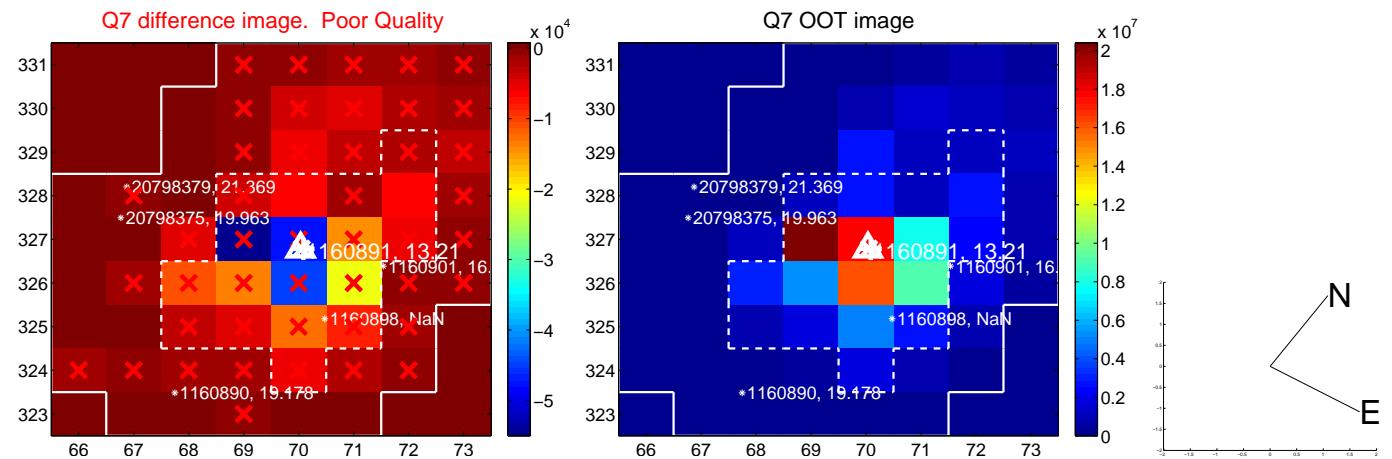
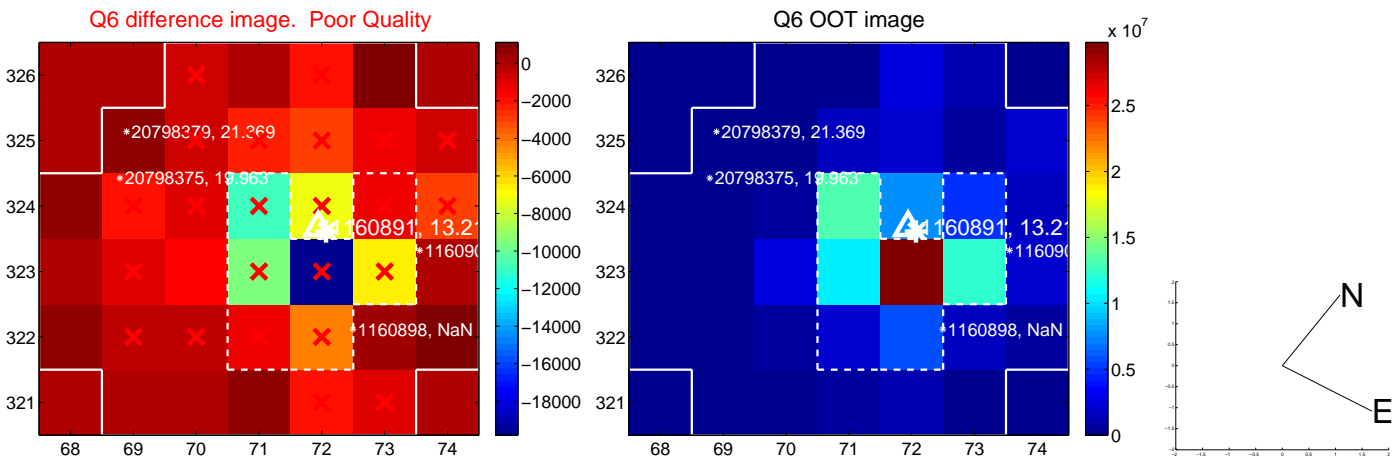
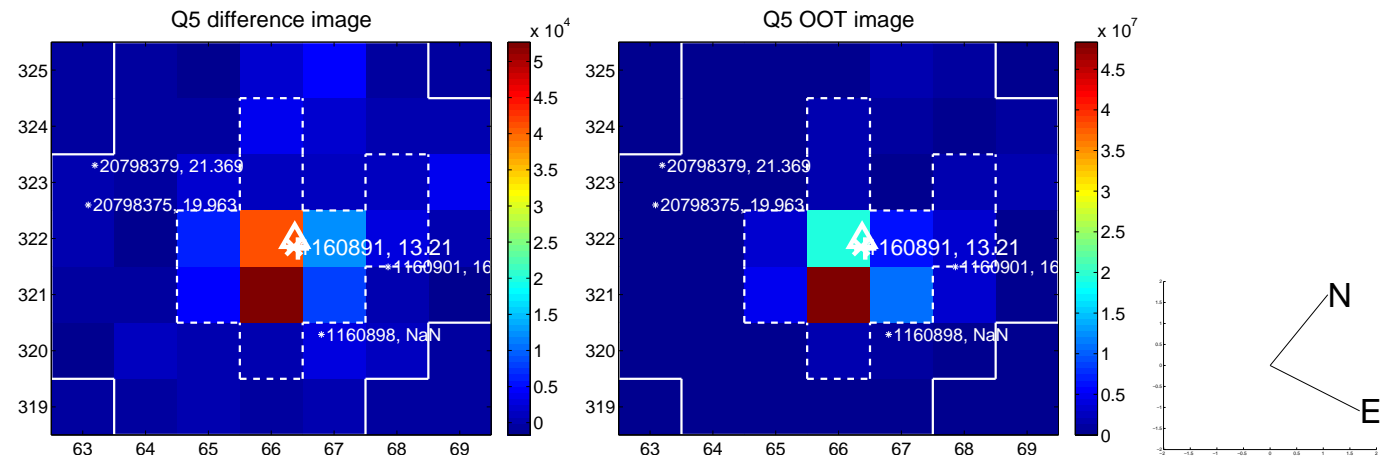


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

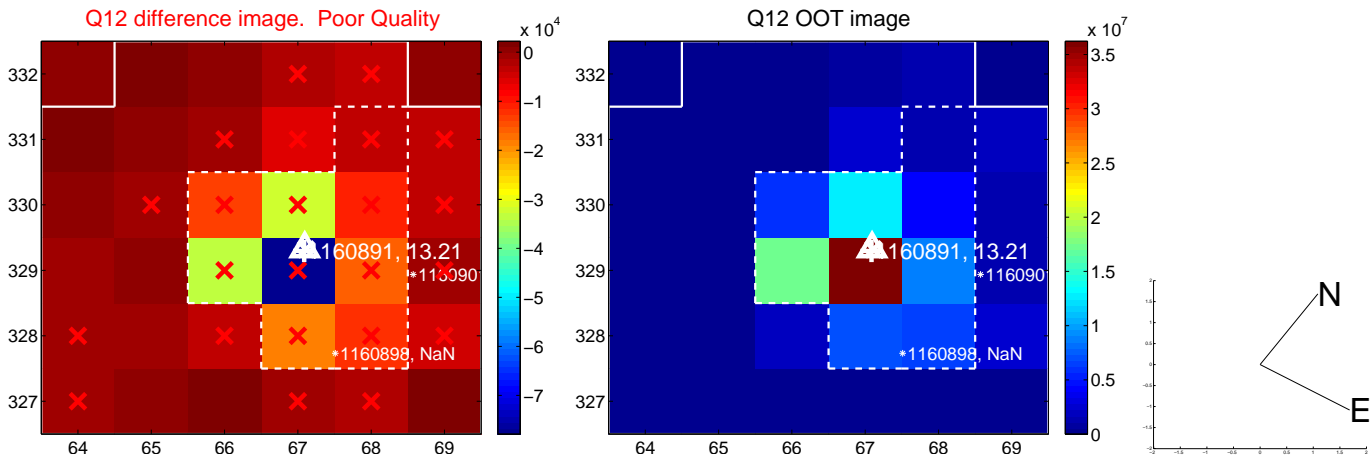
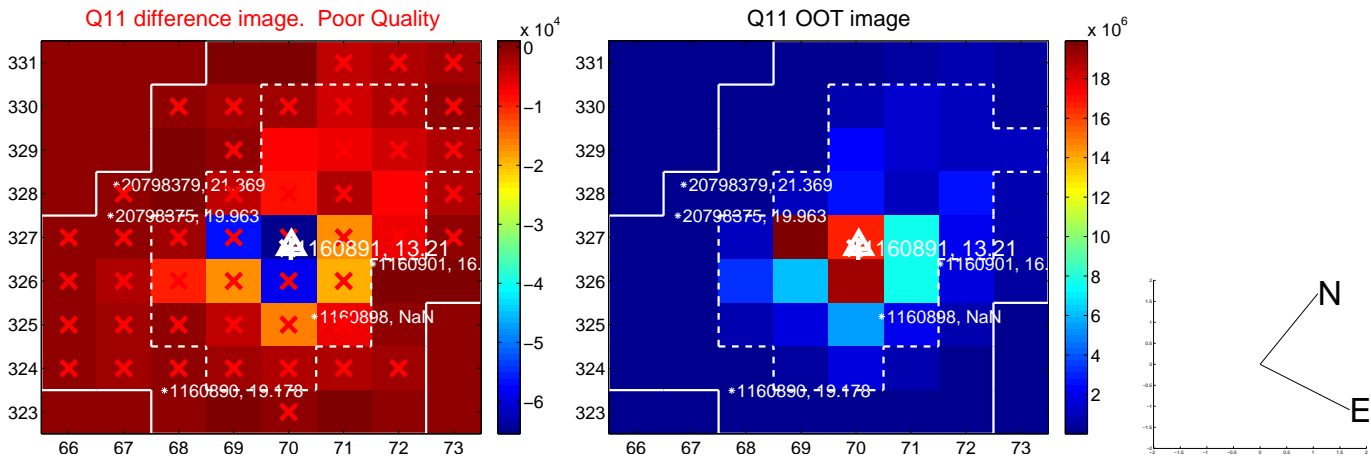
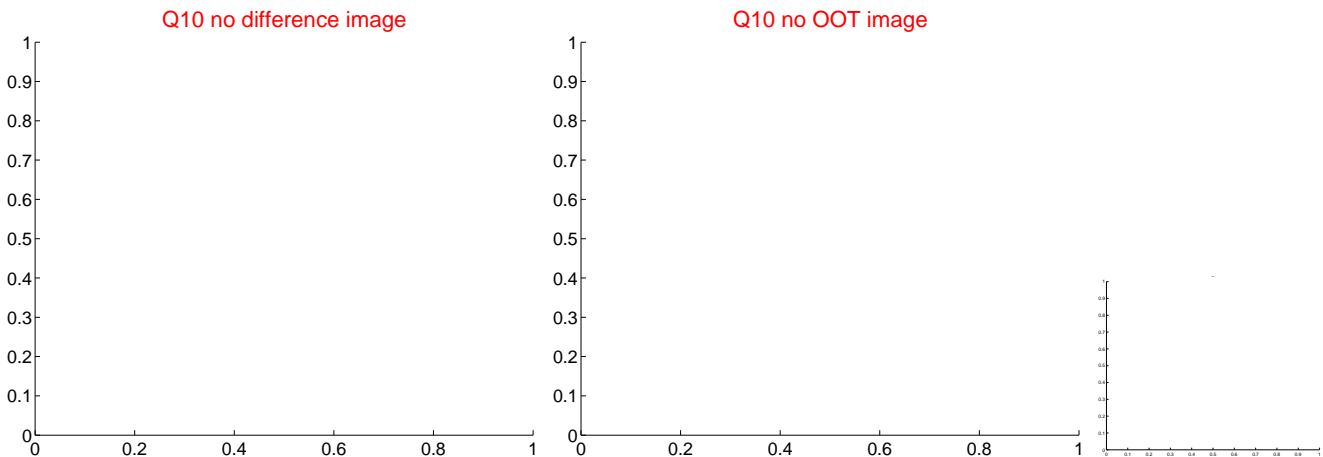
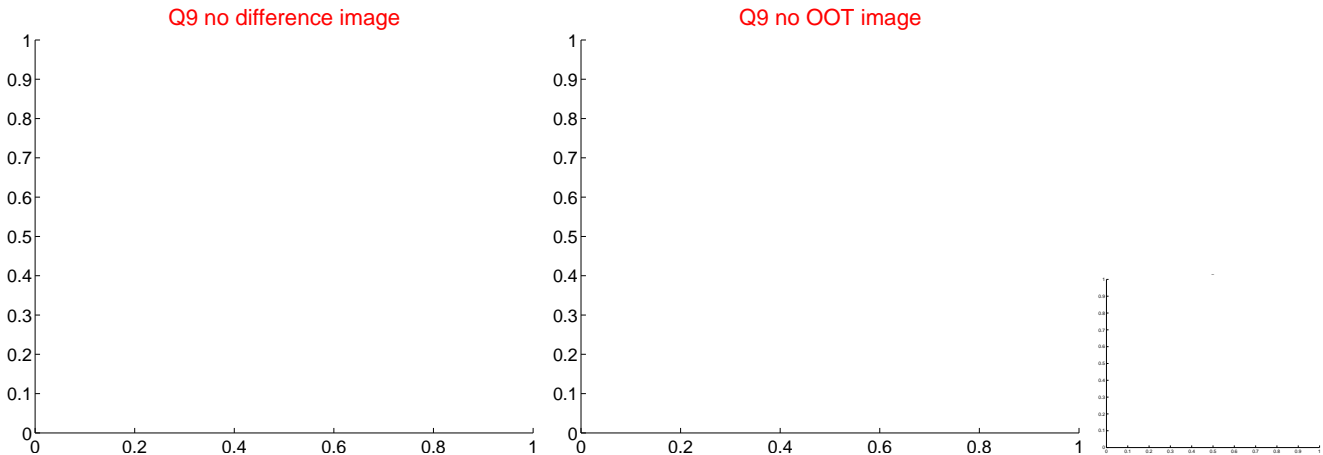
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



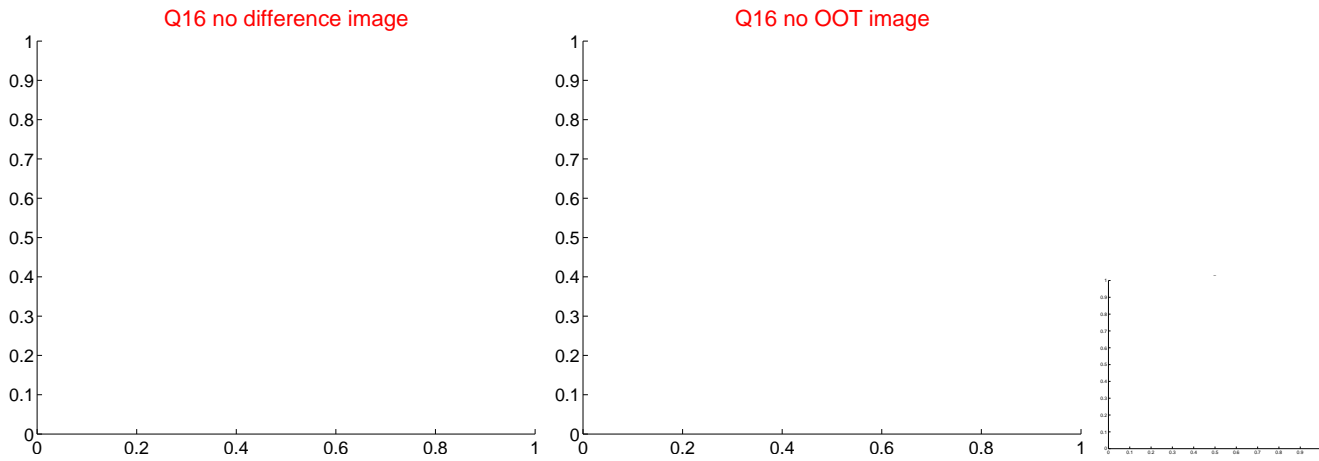
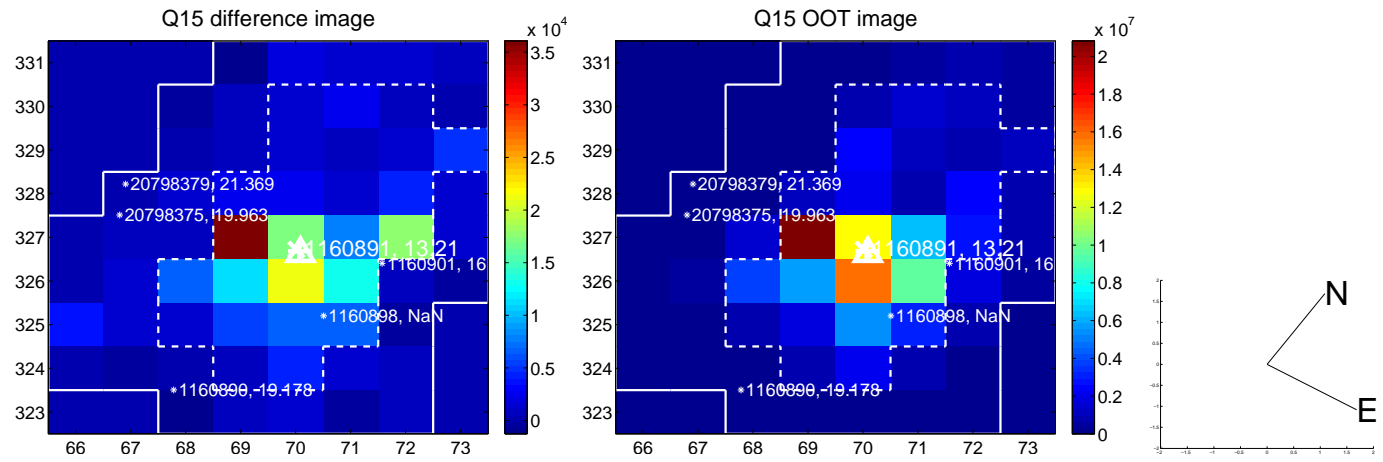
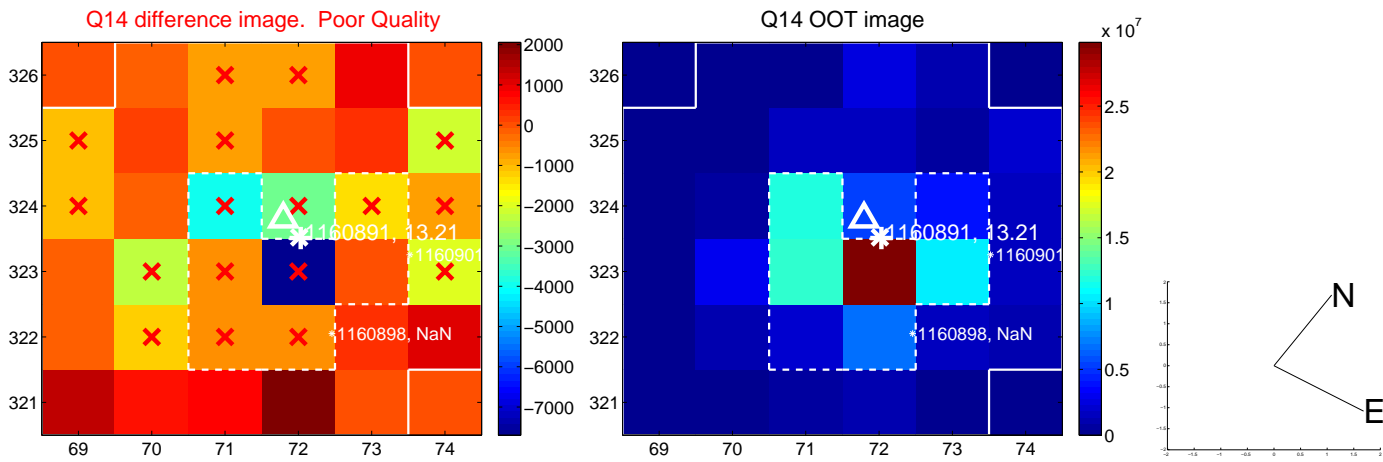
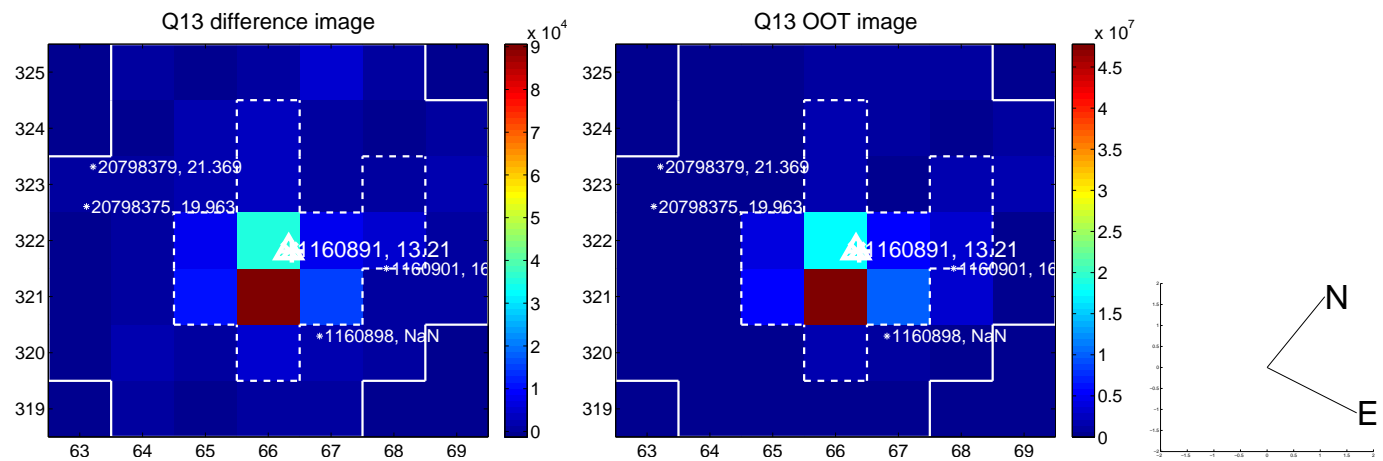
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



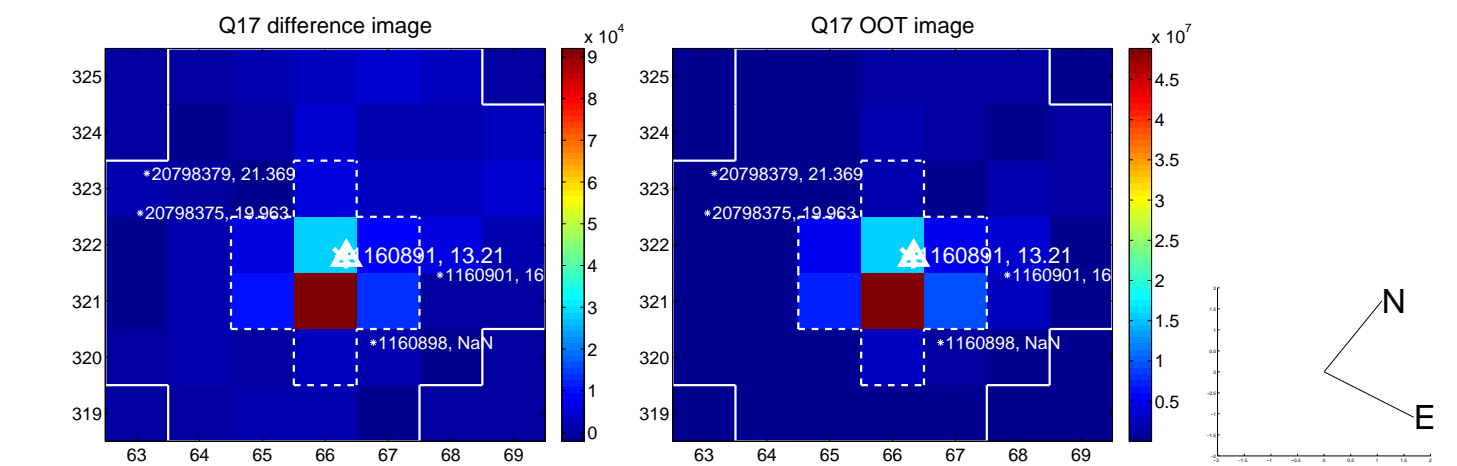
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



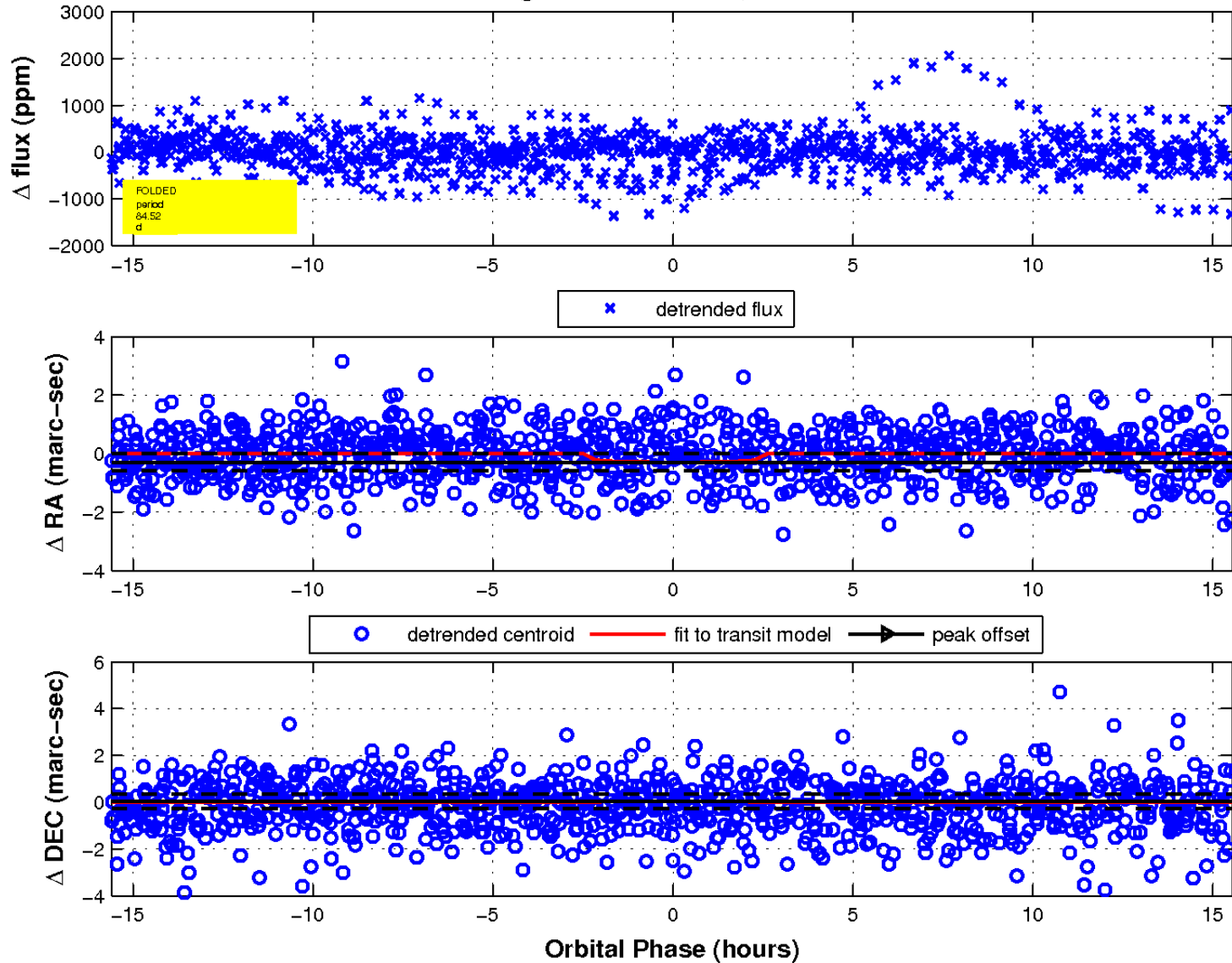
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 4 of 4





UKIRT Image

Declination

