

# KIC 007031208

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007031208-01	OBS	7574.01	0.566731	131.884247	17.4	3.627	10.3	4.5	1.03	6319	0.44	8006.42
007031208-02	OBS	No	50.639637	140.347383	655.8	1.685	7.7	7.4	1.03	6319	3.09	20.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007031208-01	OBS	FP	0.00	1	0	0	1	LPP_DV—EPHEM_MATCH
007031208-02	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—CENT_FEW_MEAS

**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 007031208-01

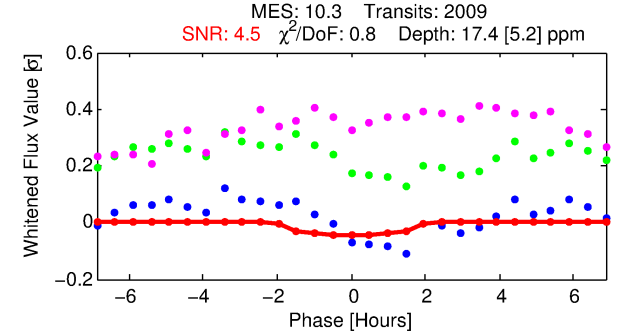
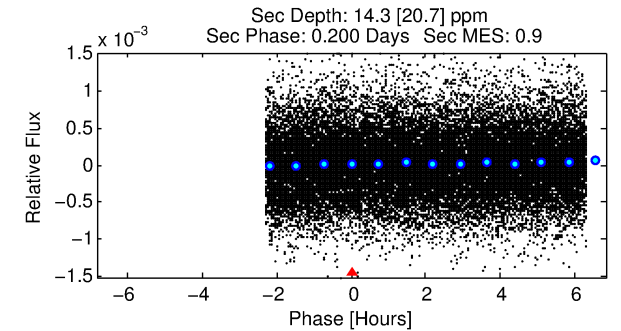
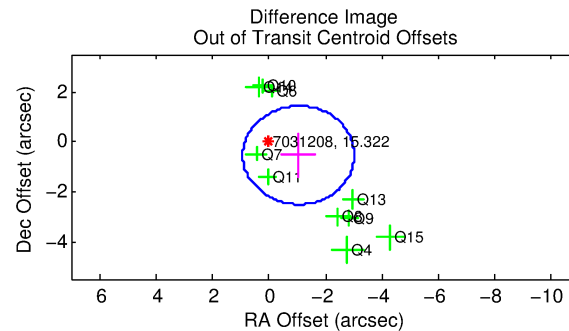
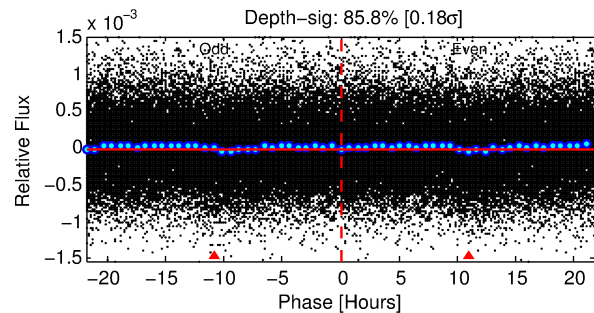
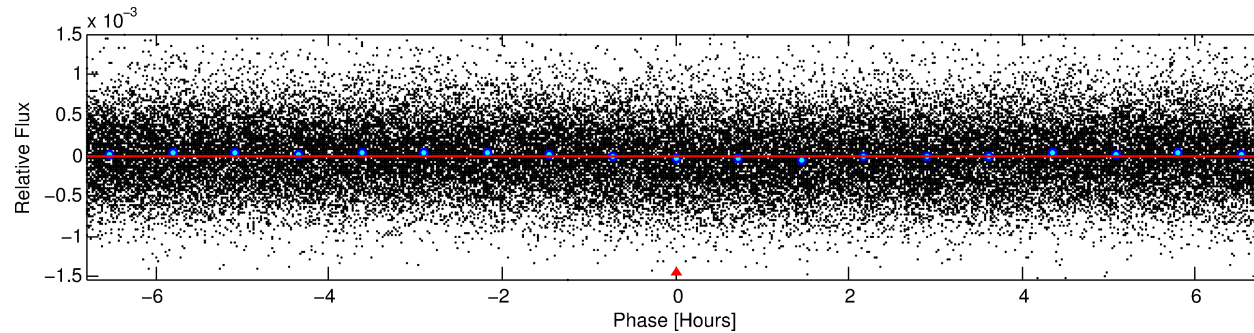
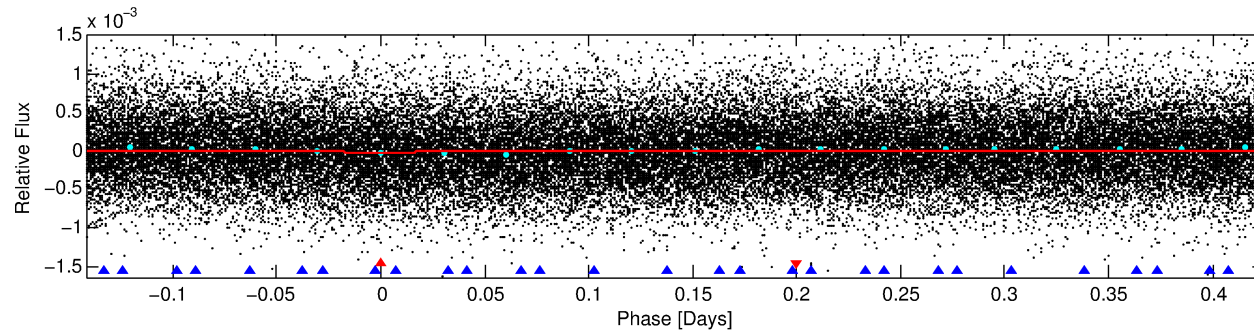
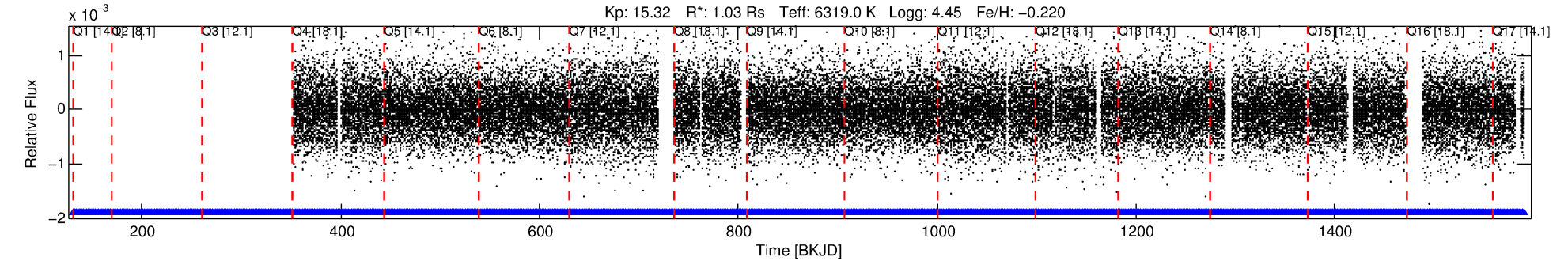
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
007031208-01	7031208	RR-Lyr-pri	7198959	1:1	1253.1	48	-312	7.86	15.32	36664.00	Direct-PRF	0	3.41	20.03

**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  and  $\sigma_T$  are the significance of the match in period and epoch. For a match to be considered significant  $\sigma_P < 5.0$  and  $\sigma_T < 5.0$ . Matches which have  $\sigma_P$  and  $\sigma_T$  very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

# DV One-Page Summary

KIC: 7031208 Candidate: 1 of 2 Period: 0.567 d

KOI: K07574.01 Corr: 0.769



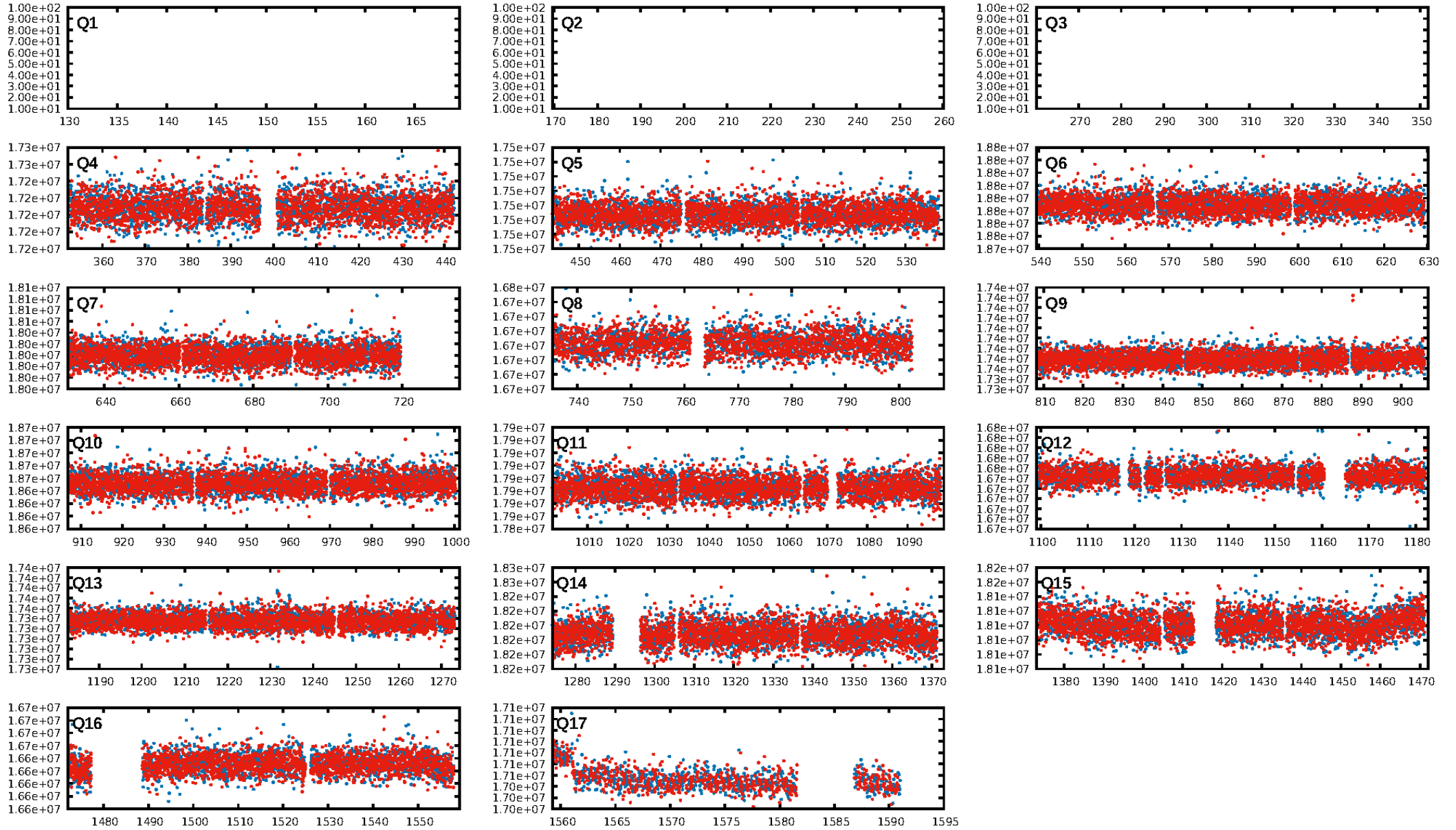
## DV Fit Results:

Period = 0.56673 [0.00002] d  
Epoch = 131.8842 [0.0098] BKJD  
Rp/R\* = 0.0039 [0.0075]  
a/R\* = 1.30 [5.28]  
b = 0.41 [20.62]  
Seff = 8006.42 [3397.27]  
Teff = 2412 [256] K  
Rp = 0.44 [0.85] Re  
a = 0.0138 [0.0038] AU  
Ag = 7.72 [31.71] [0.21 $\sigma$ ]  
Teffp = 6217 [6356] K [0.60 $\sigma$ ]

## DV Diagnostic Results:

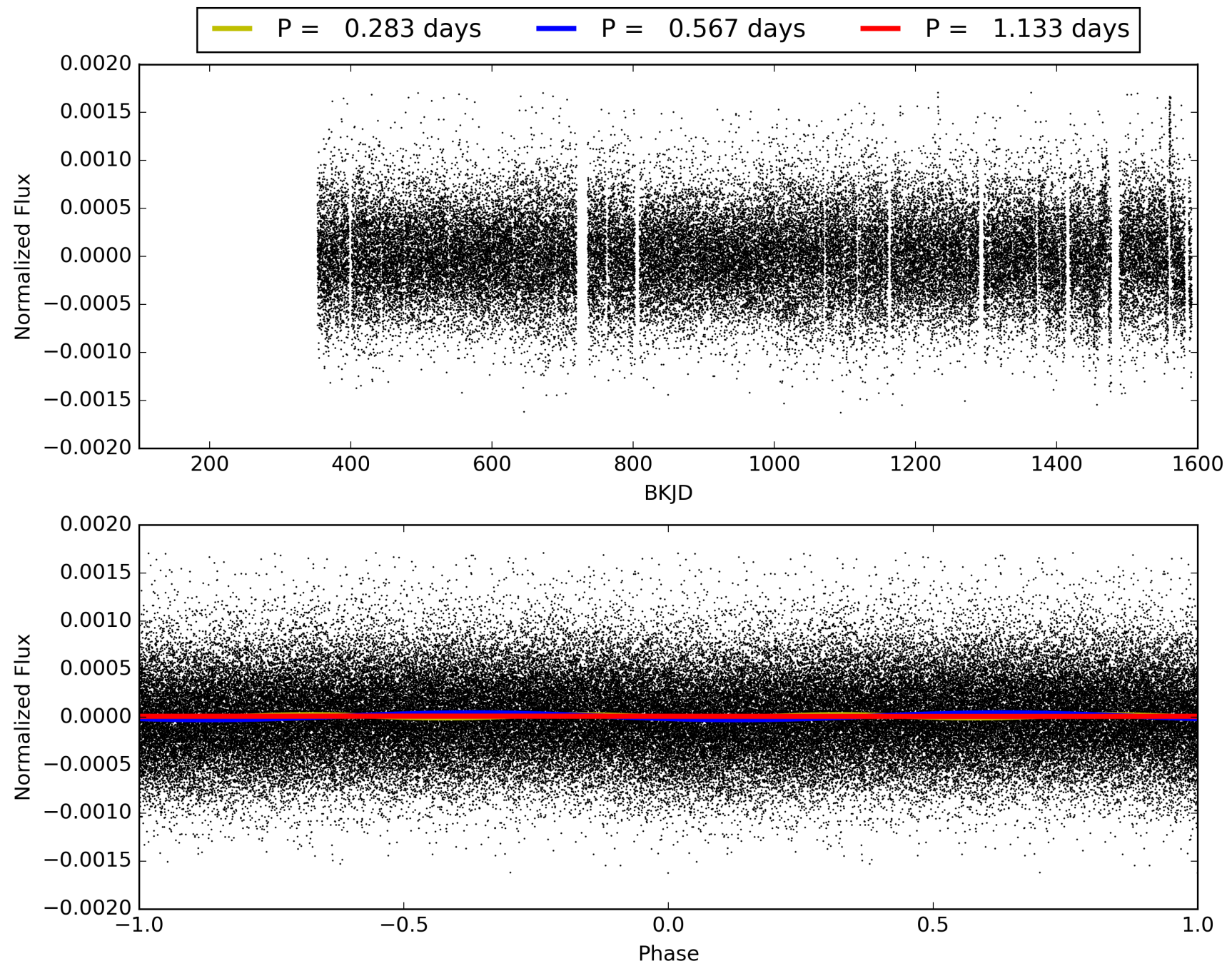
ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [300.50 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.25e-17  
RollingBand-fgt: 1.00 [1962/1962]  
**GhostDiagnostic-chr: 0.3451**  
Centroid-sig: 0.0%  
Centroid-so: 8.704 arcsec [2.82 $\sigma$ ]  
OotOffset-rm: 1.177 arcsec [1.79 $\sigma$ ]  
KicOffset-rm: 1.037 arcsec [1.59 $\sigma$ ]  
OotOffset-st: 3/3/2/2 [10]  
KicOffset-st: 3/3/2/2 [10]  
DiffImageQuality-fgm: 0.30 [3/10]  
DiffImageOverlap-fno: 1.00 [14/14]

# TCE 007031208-01, PDC Light Curves



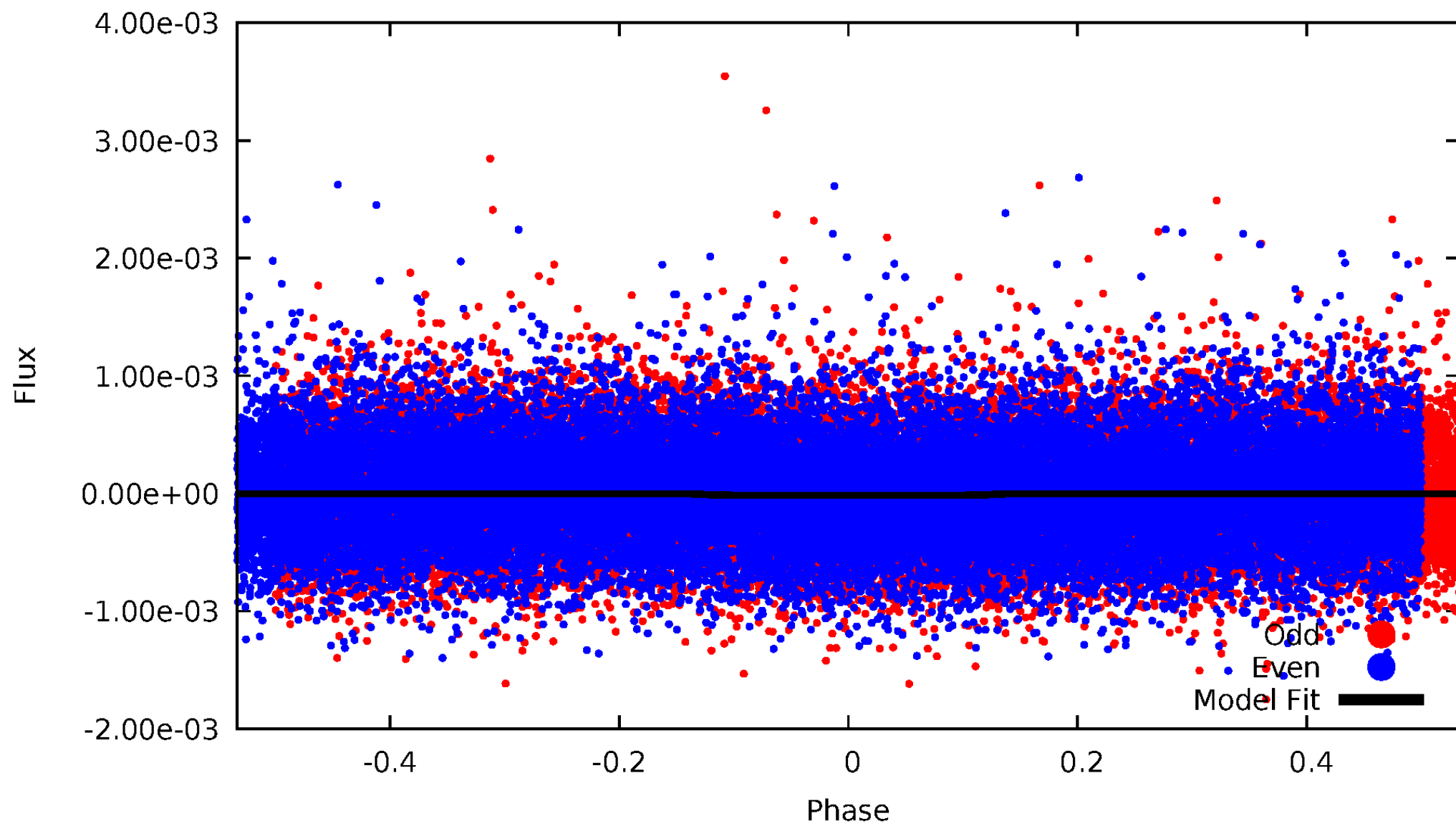


TCE 007031208-01



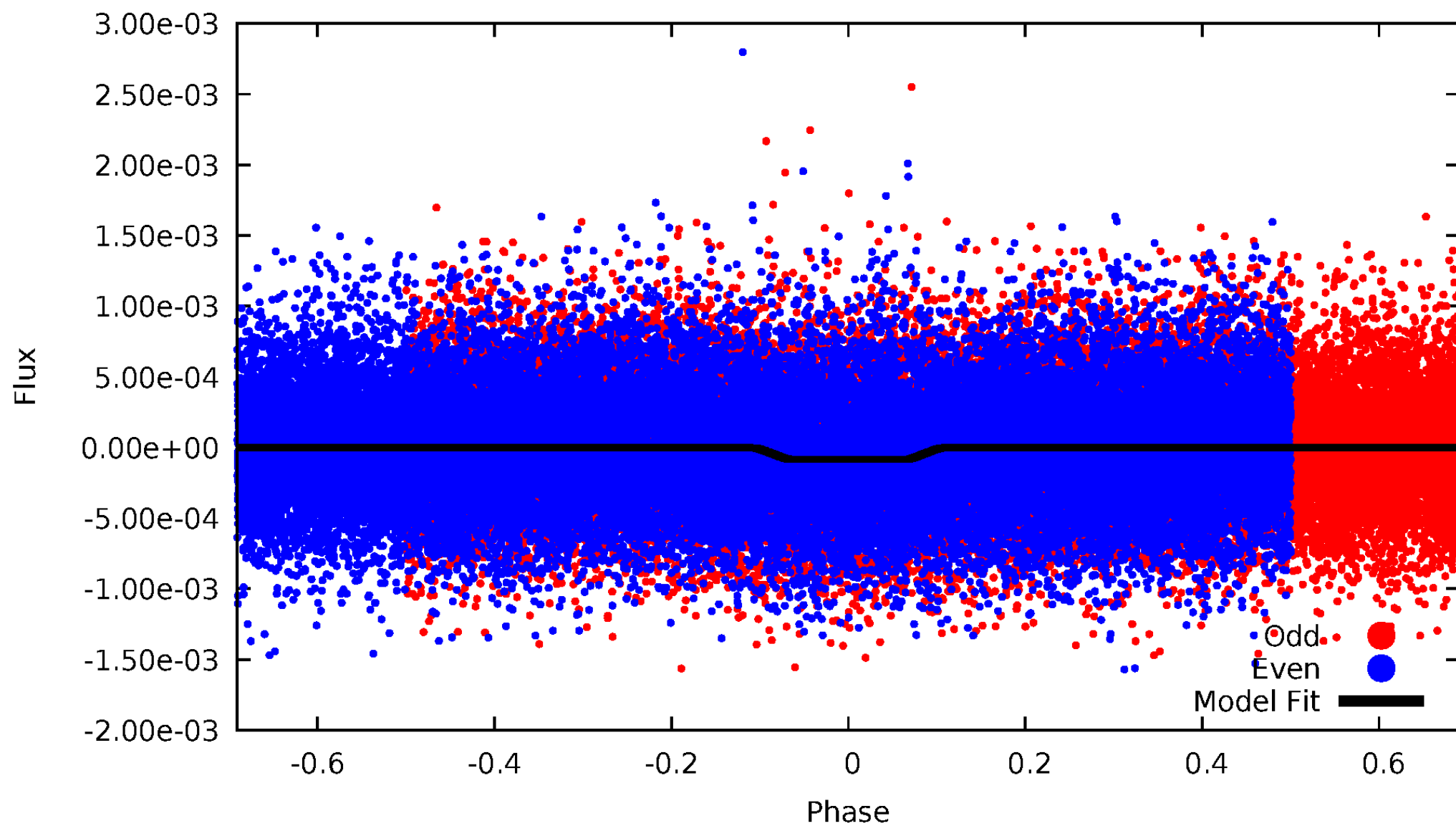
# DV Odd/Even

TCE 007031208-01



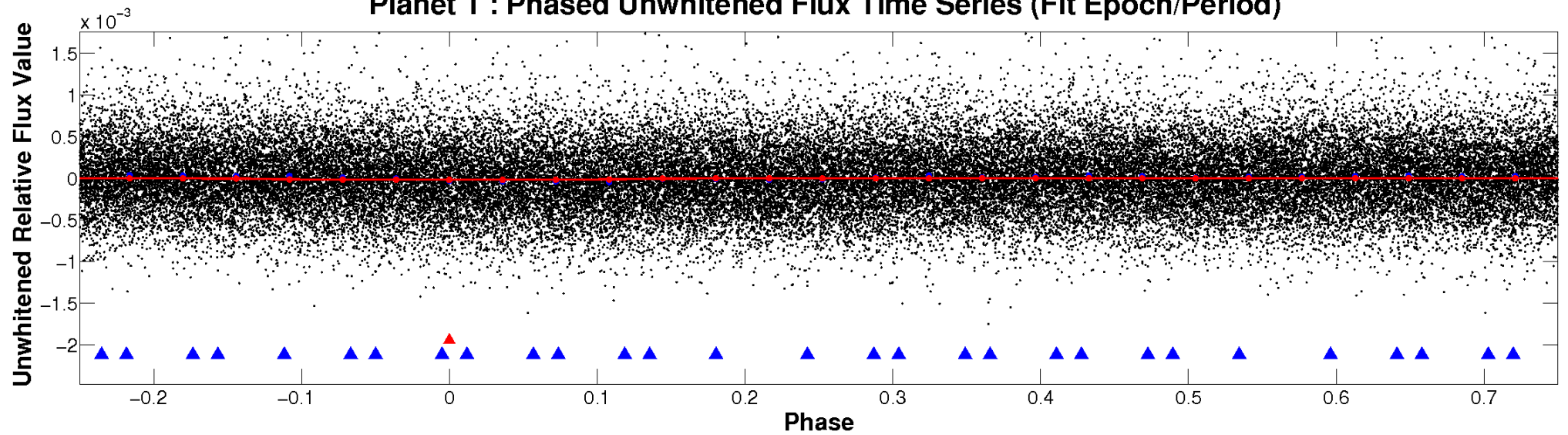
# ALT Odd/Even

TCE 007031208-01

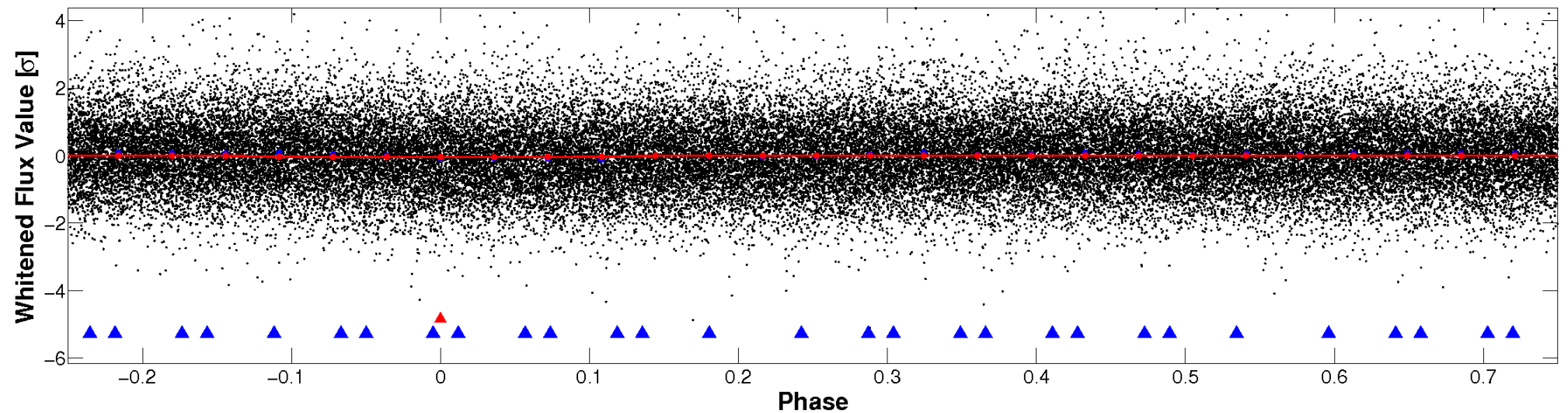


# Non-Whitened Vs. Whitened Light Curve

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



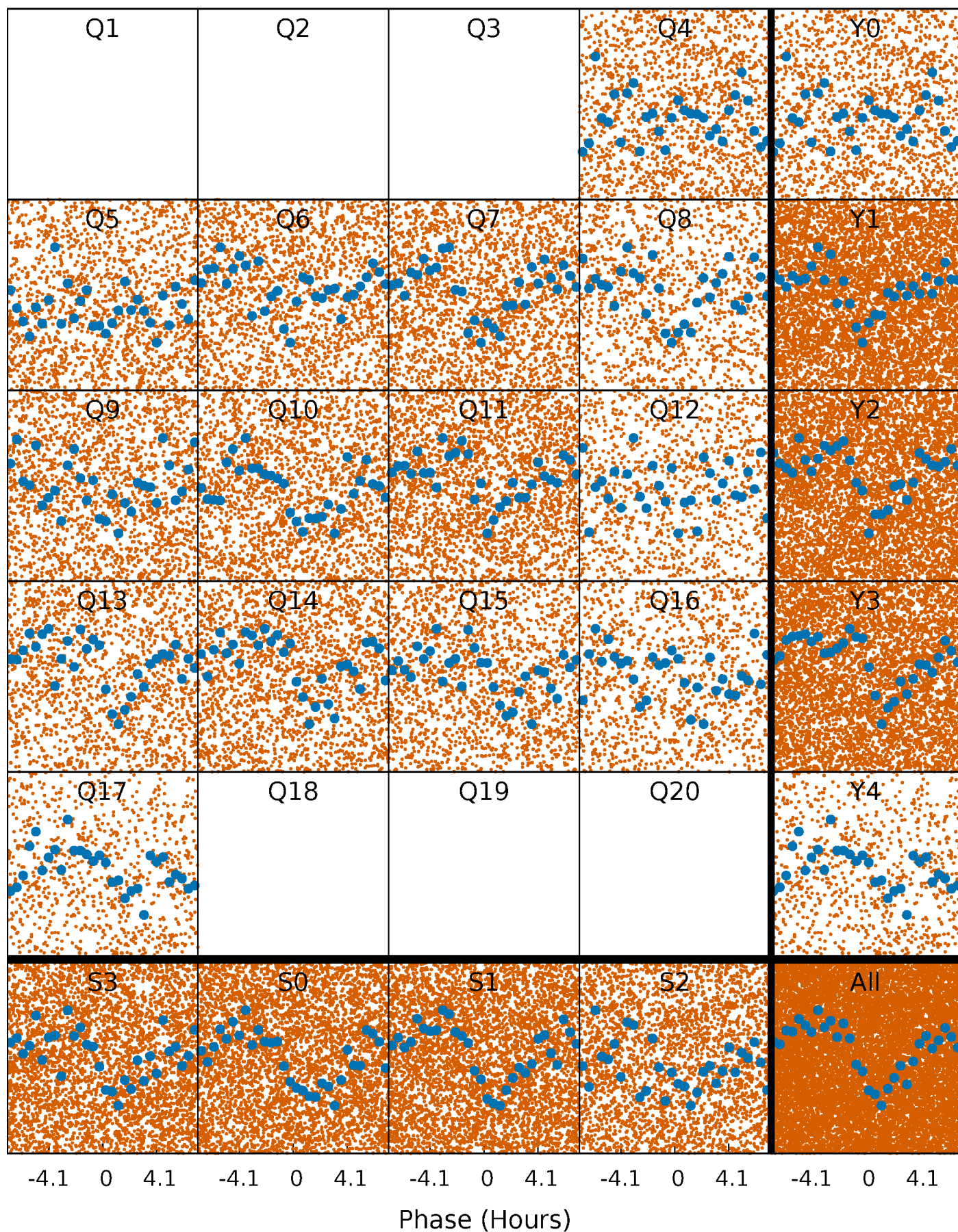
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

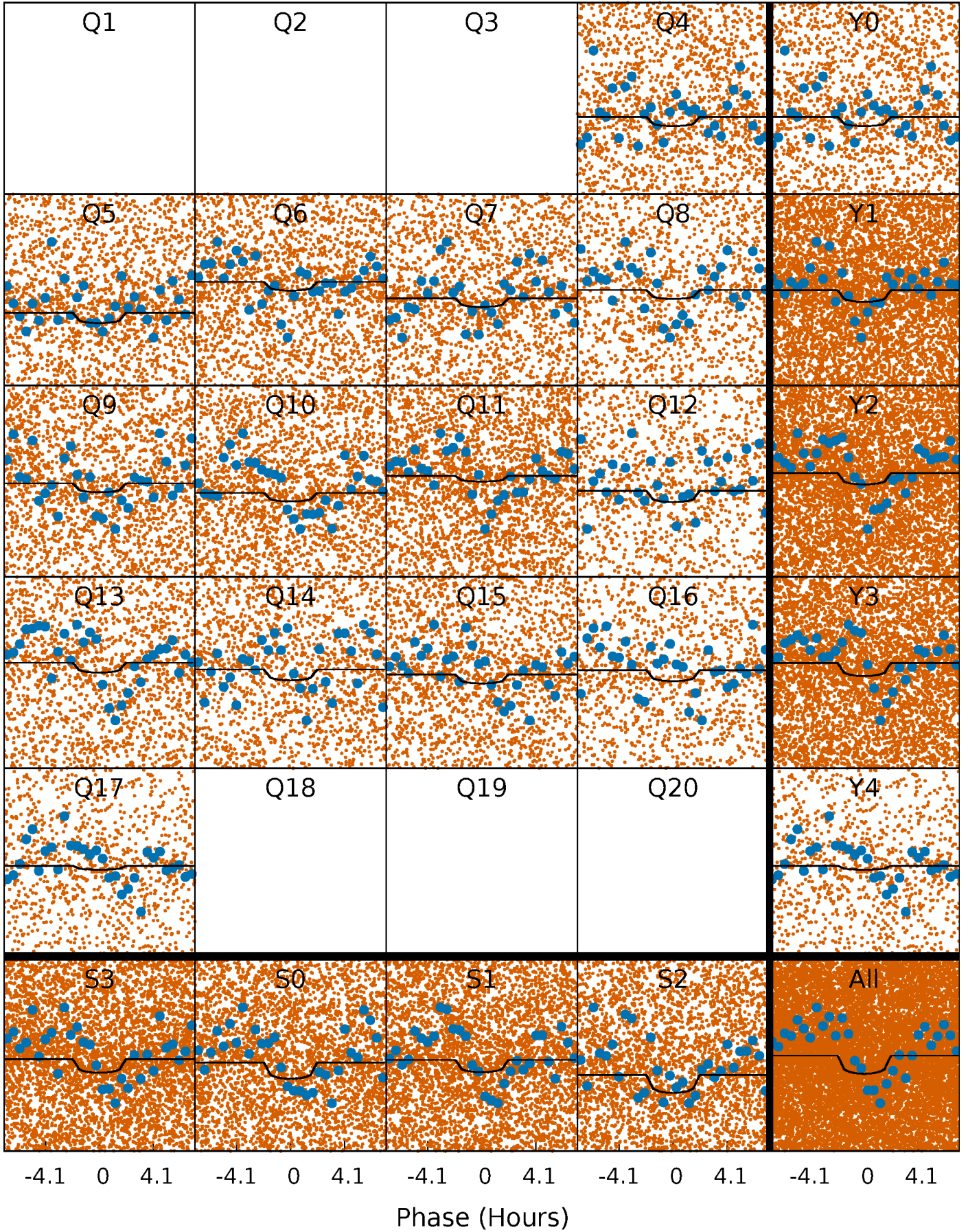
TCE 007031208-01 P= 0.566731 Days  $T_0=131.884247$  (BKJD)





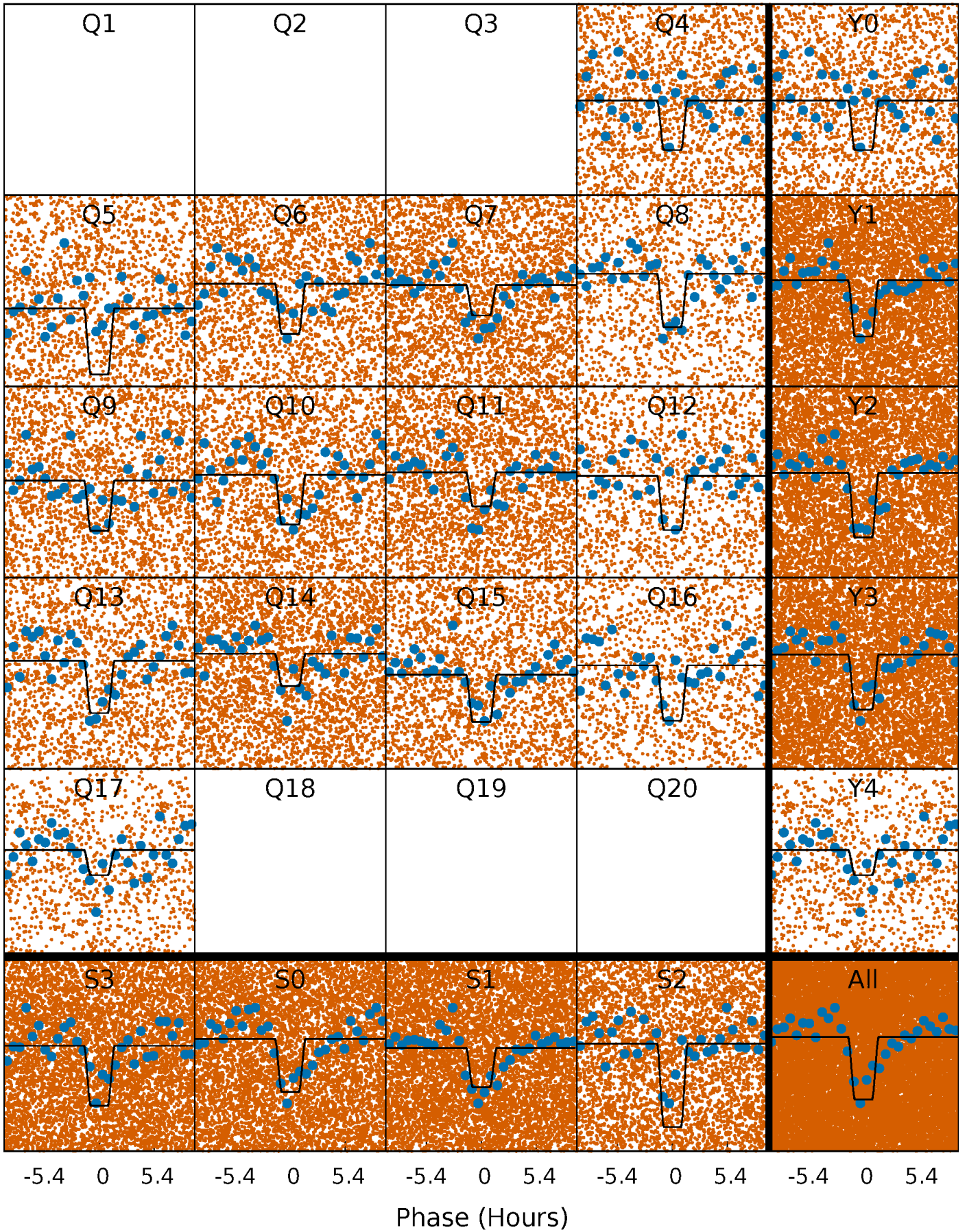
# DV Quarter-Phased Transit Curves

TCE 007031208-01 P= 0.566731 Days  $T_0=131.884247$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 007031208-01 P= 0.566788 Days  $T_0=131.833471$  (BKJD)

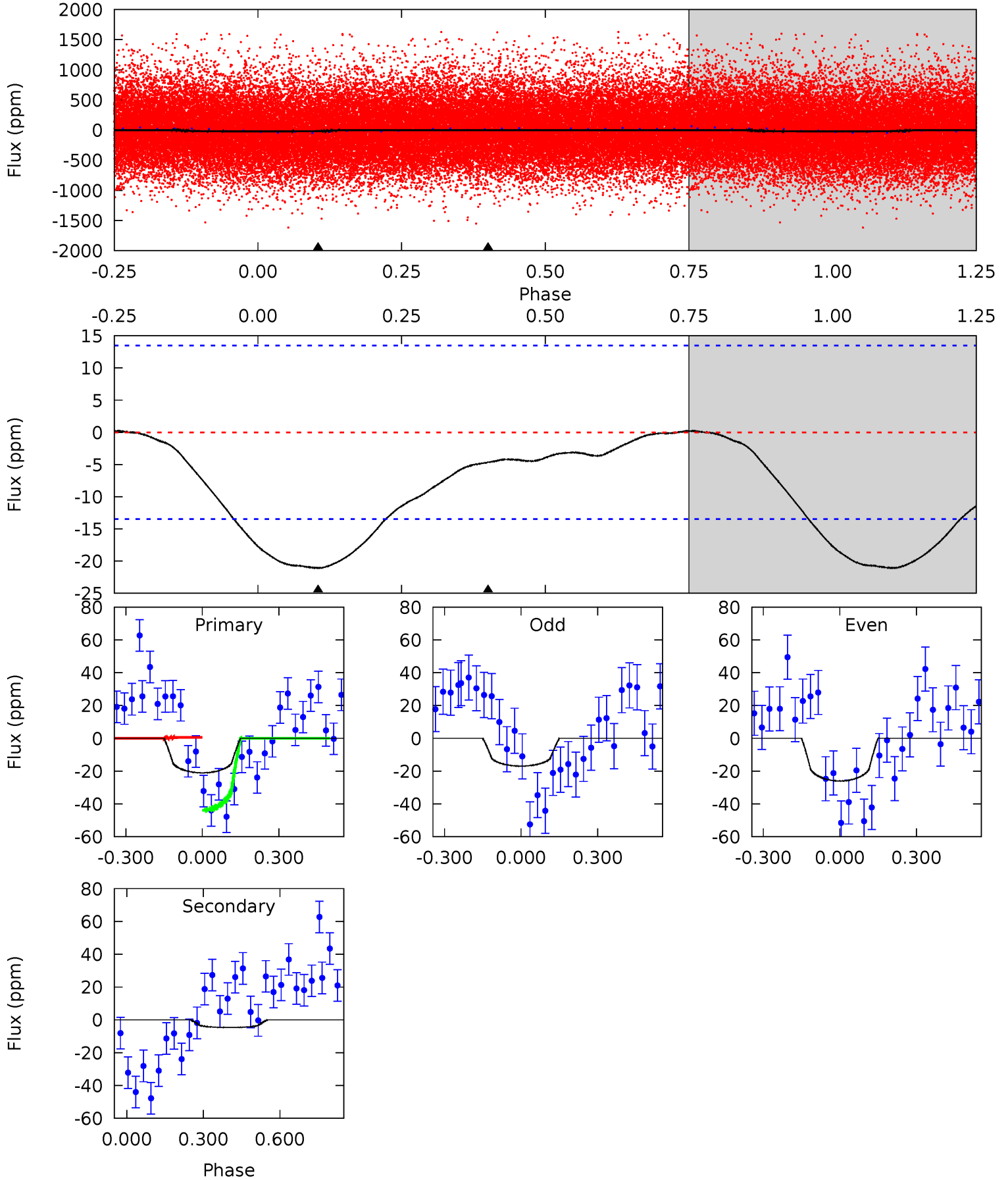




# DV Model-Shift Uniqueness Test

007031208-01, P = 0.566731 Days, E = 131.884247 Days

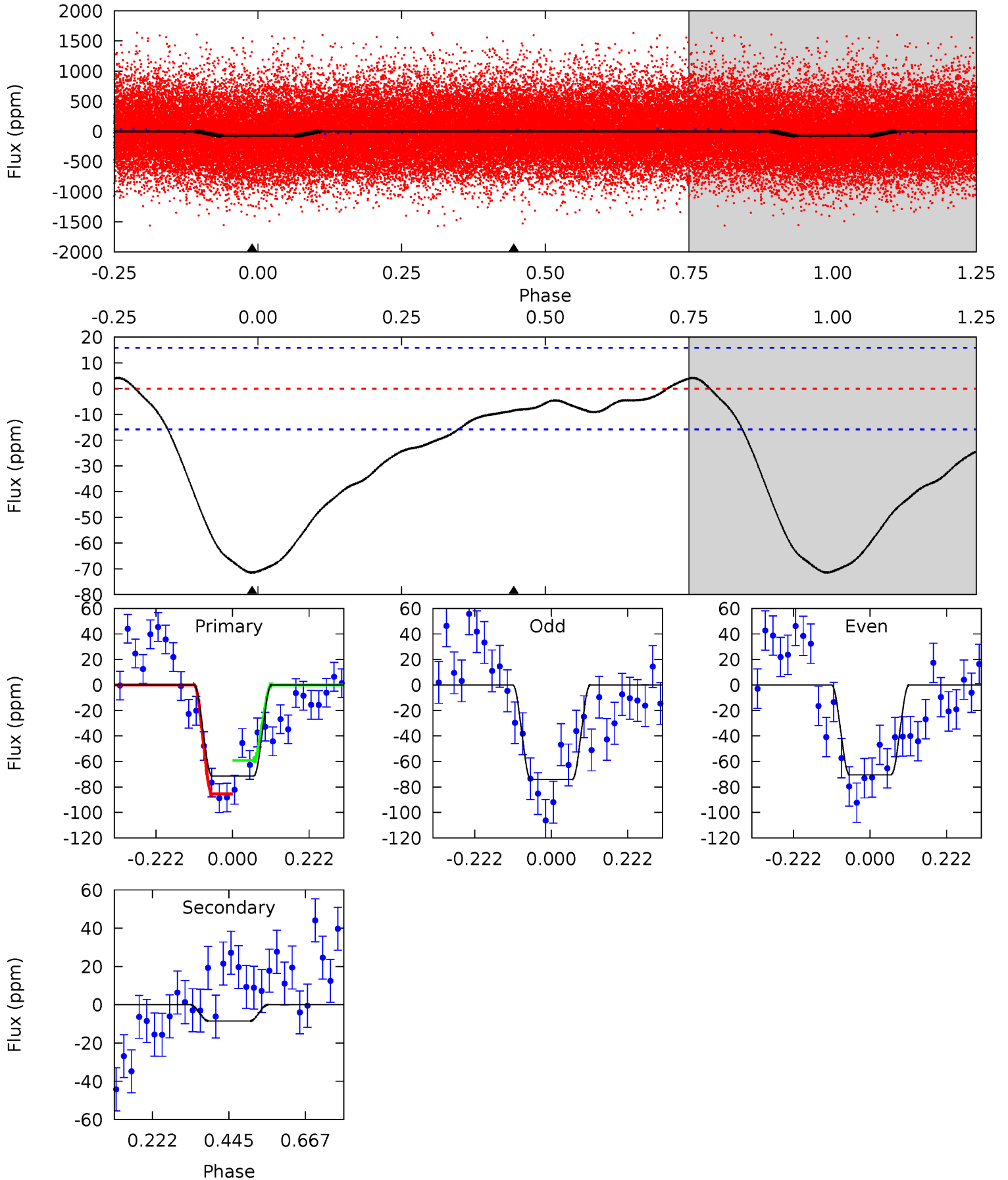
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.77	1.50	0	0	4.33	1.04	0.05	6.77	6.77	1.50	1.50	1.47	0.96	0.01	6.85



# Alt Model-Shift Uniqueness Test

007031208-01, P = 0.566788 Days, E = 131.833471 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
19.8	2.36	0	0	4.39	1.22	2.50	19.8	19.8	2.36	2.36	0.52	0.97	0.06	3.64





### Stellar Parameters For KIC 007031208

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6319^{+197}_{-241}$	$4.447^{+0.054}_{-0.216}$	$-0.220^{+0.250}_{-0.300}$	$1.032^{+0.335}_{-0.112}$	$1.084^{+0.154}_{-0.154}$	$1.389^{+0.384}_{-0.717}$
	+3%/-4%	+1%/-5%	+114%/-136%	+32%/-11%	+14%/-14%	+28%/-52%
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 007031208-01 / KOI 7574.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-5 \pm 3$	$0.85^{+0.73}_{-0.56}$	$3446^{+264}_{-178}$	$3220^{+2356}_{-6397}$	$0.533^{+4.233}_{-0.427}$
Alt.	$-9 \pm 4$	$1.23^{+0.85}_{-0.77}$	$3449^{+294}_{-187}$	$3340^{+1853}_{-6346}$	$0.585^{+2.626}_{-0.422}$

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

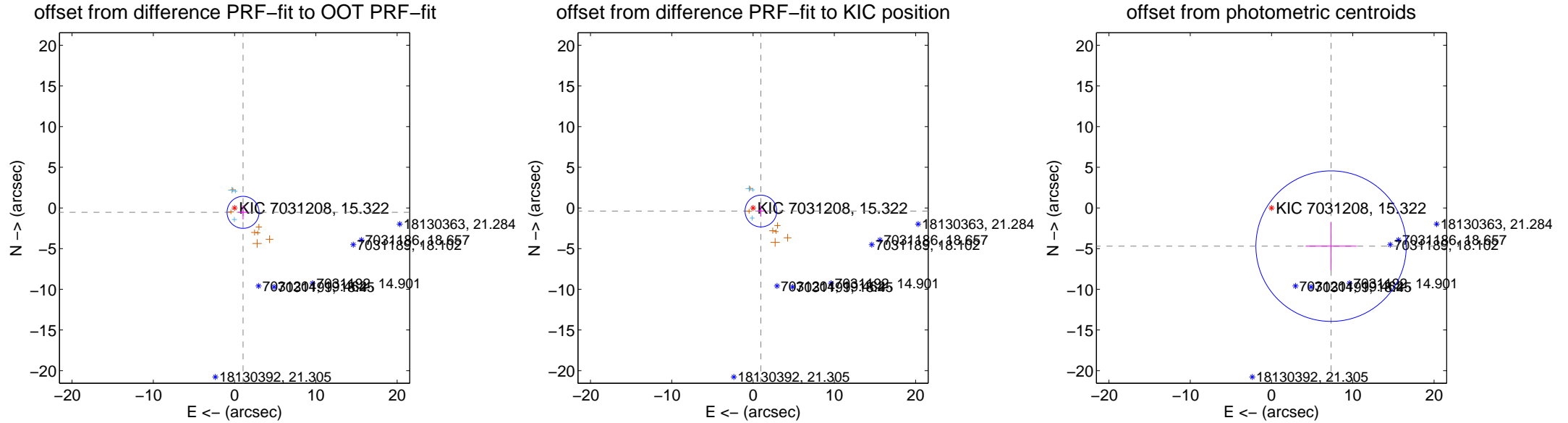
## DV Centroid Data

Supplemental centroid analysis for 007031208-01. Kepler magnitude: 15.32. Transit SNR 4.46

There are 3 quarters with good PRF difference image offsets

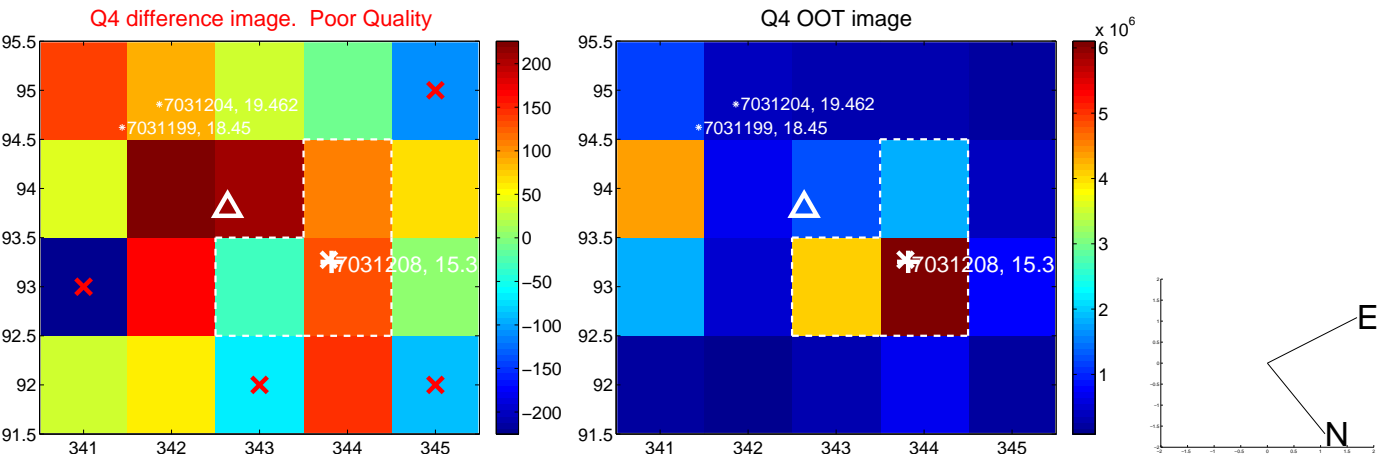
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.177 \pm 0.656$	1.79	$-1.046 \pm 0.587$	$-0.540 \pm 0.868$
PRF-fit source offset from KIC position	$1.037 \pm 0.651$	1.59	$-0.965 \pm 0.461$	$-0.380 \pm 0.684$
photometric centroid source offset	$8.70 \pm 3.08$	2.82	$-7.33 \pm 3.13$	$-4.70 \pm 2.96$

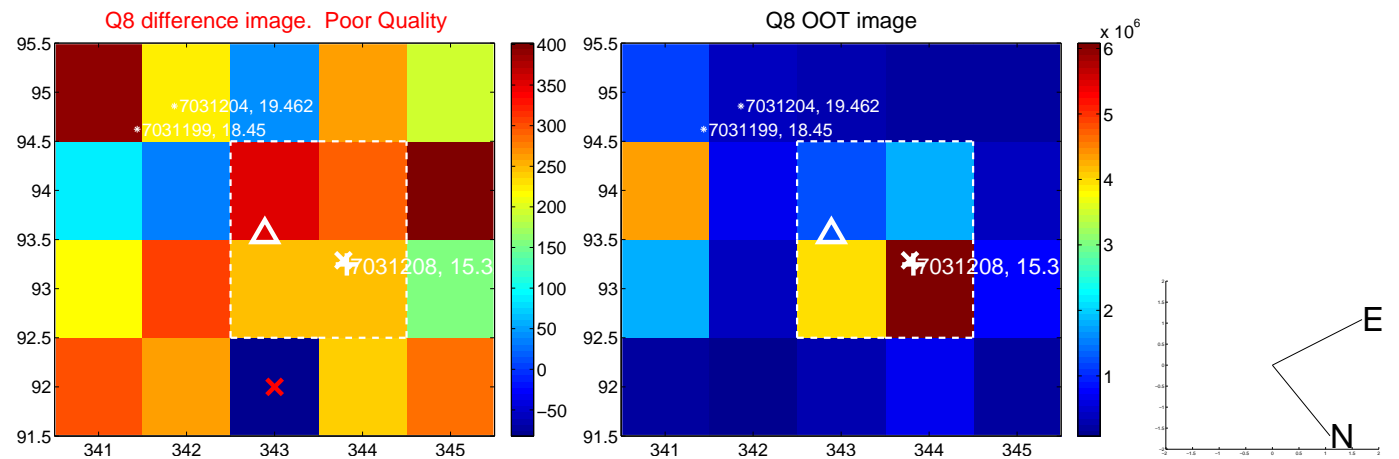
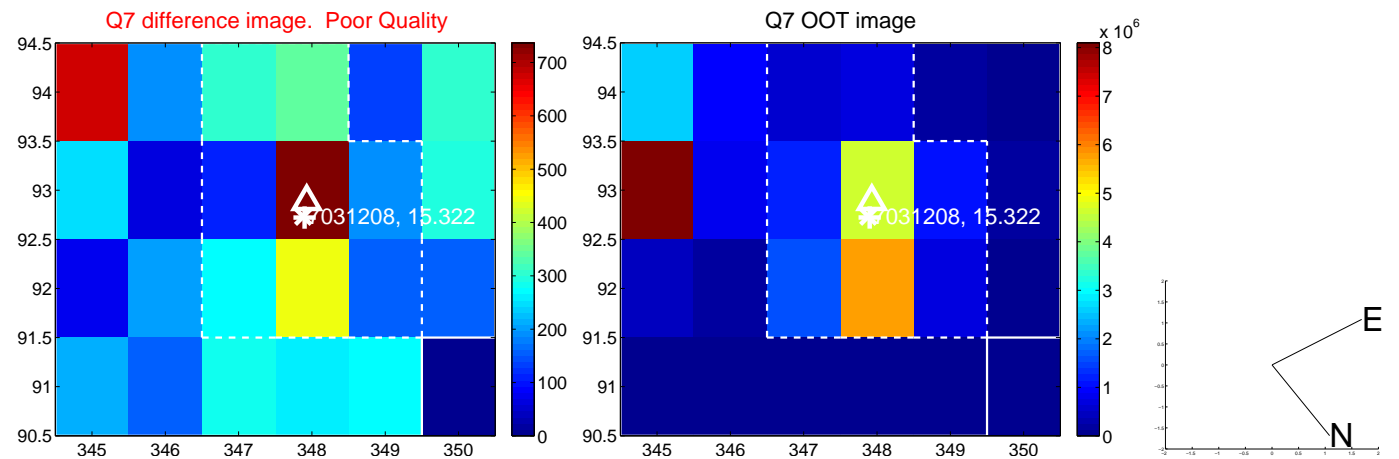
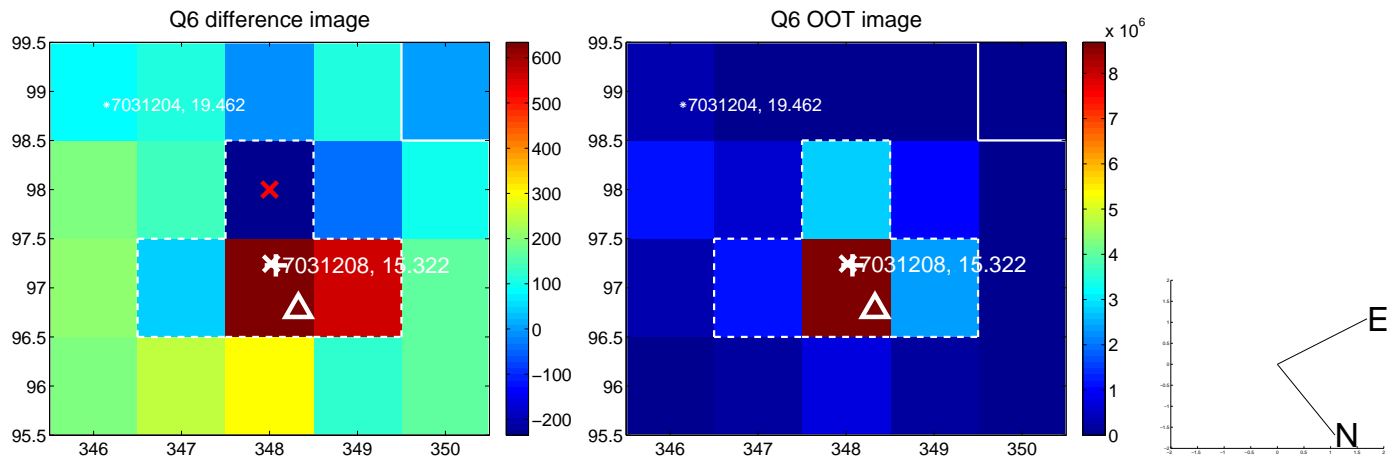
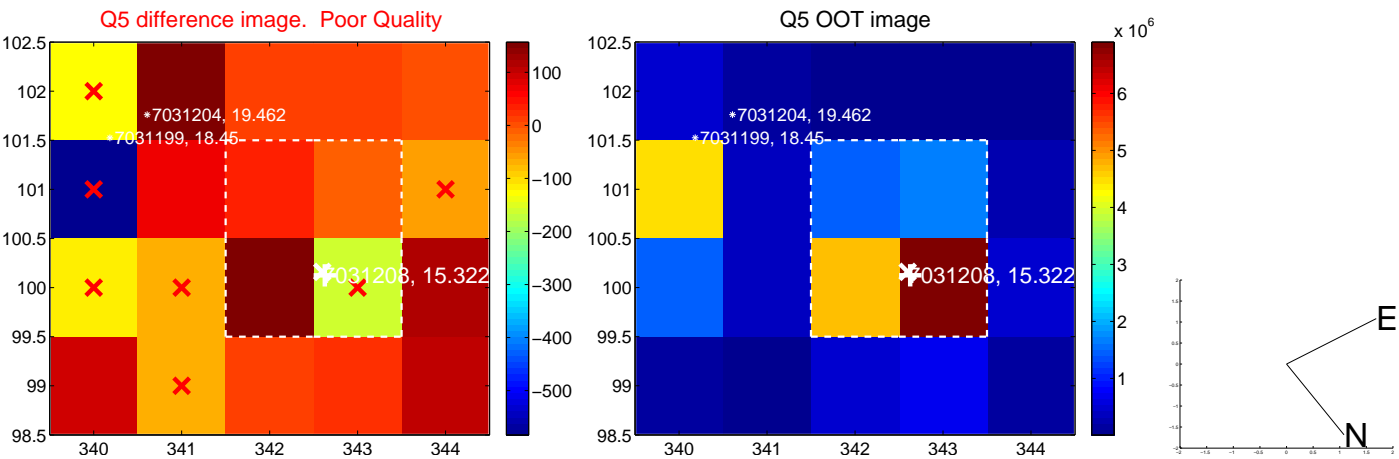


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . 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 ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

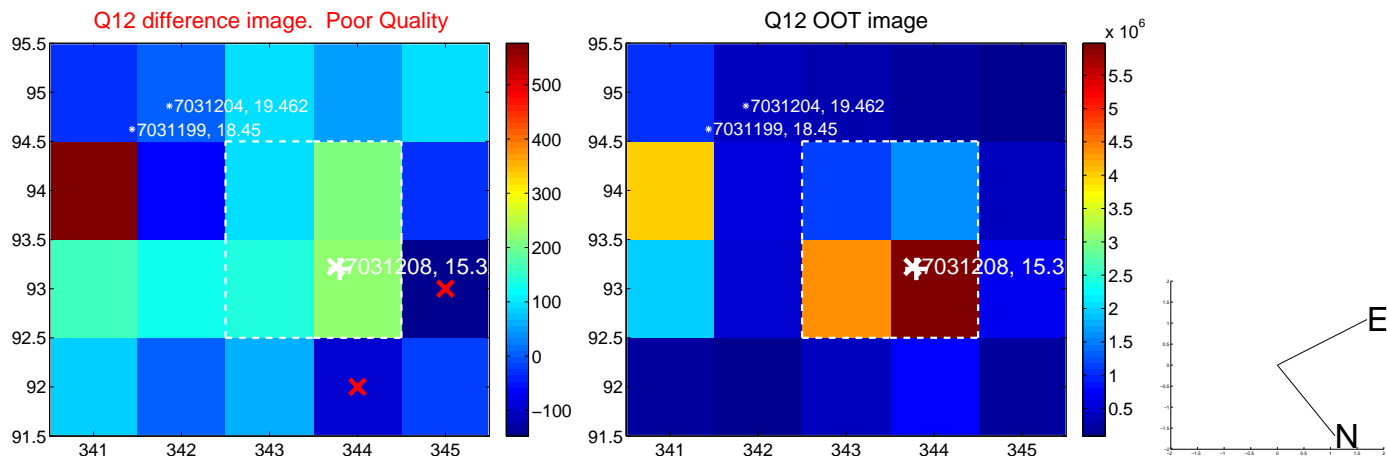
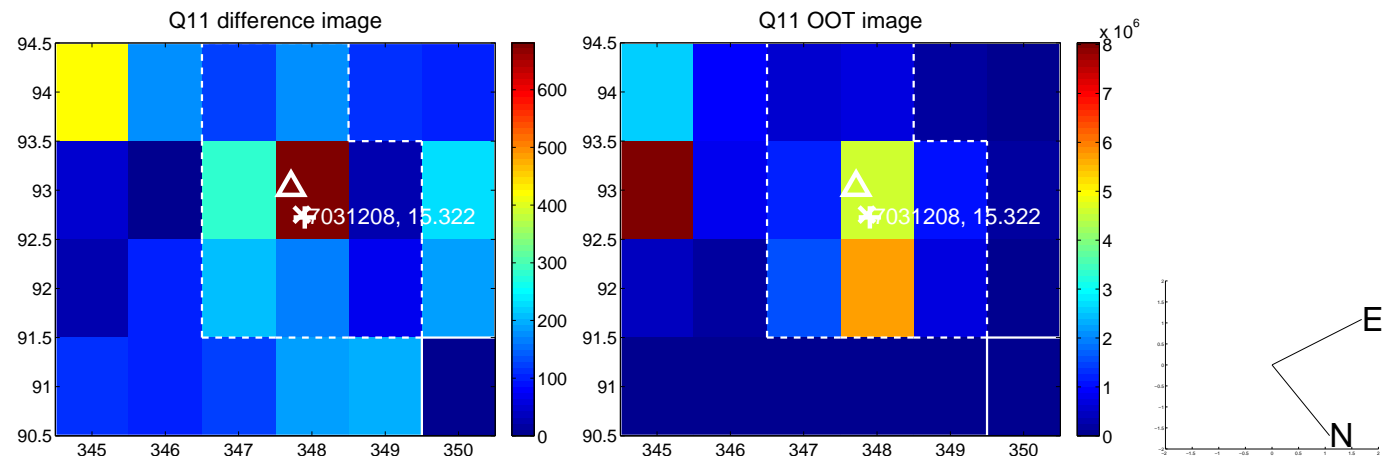
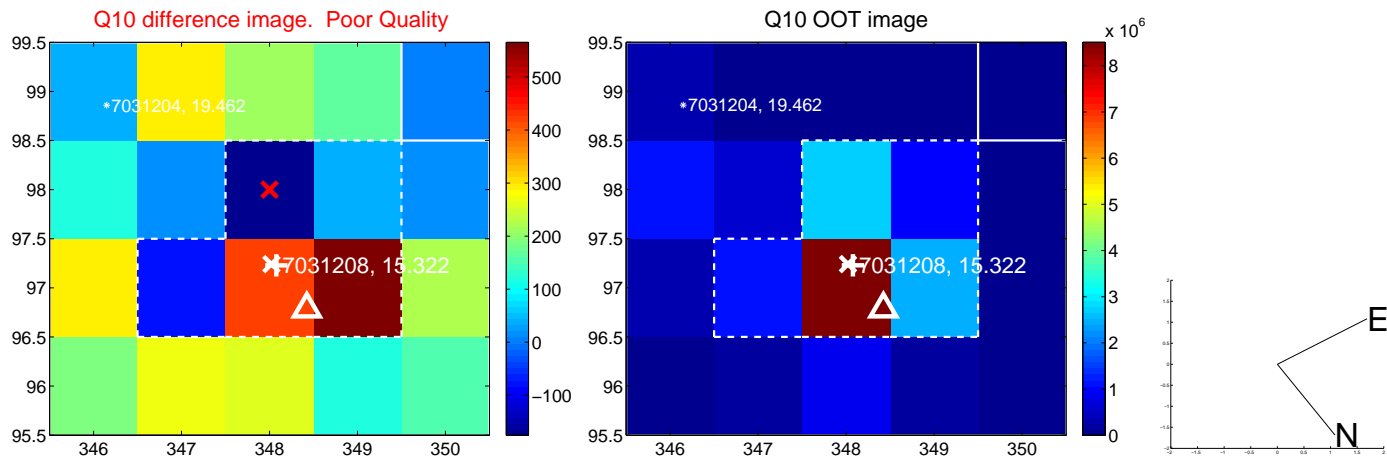
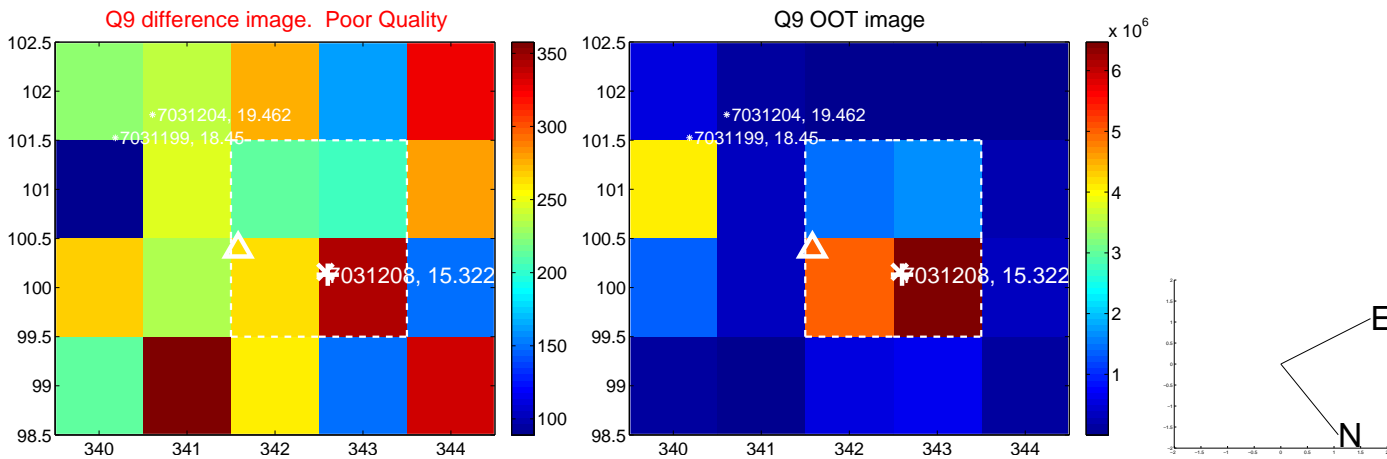


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

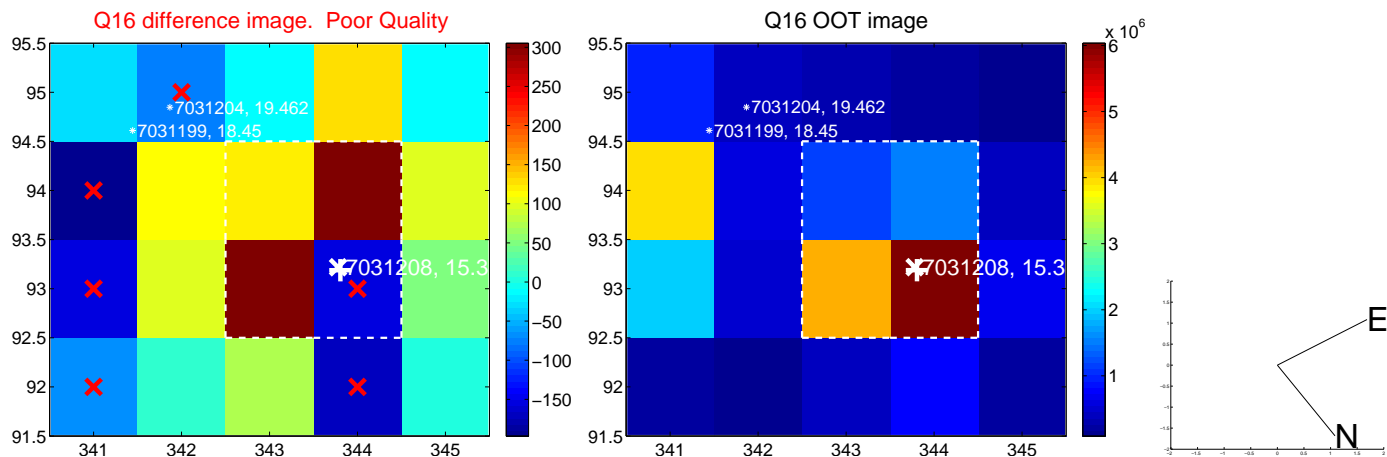
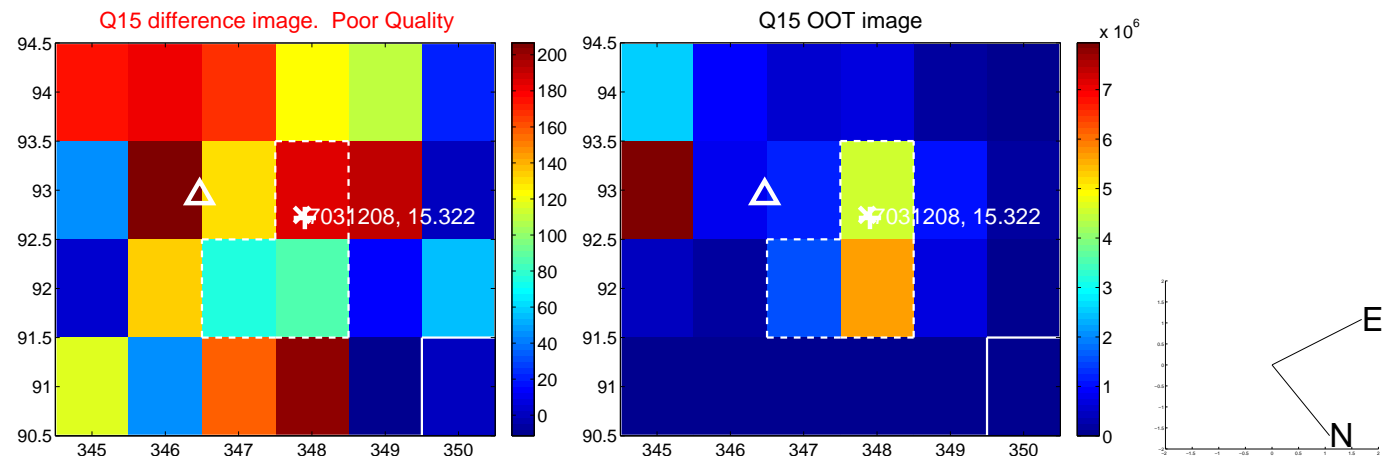
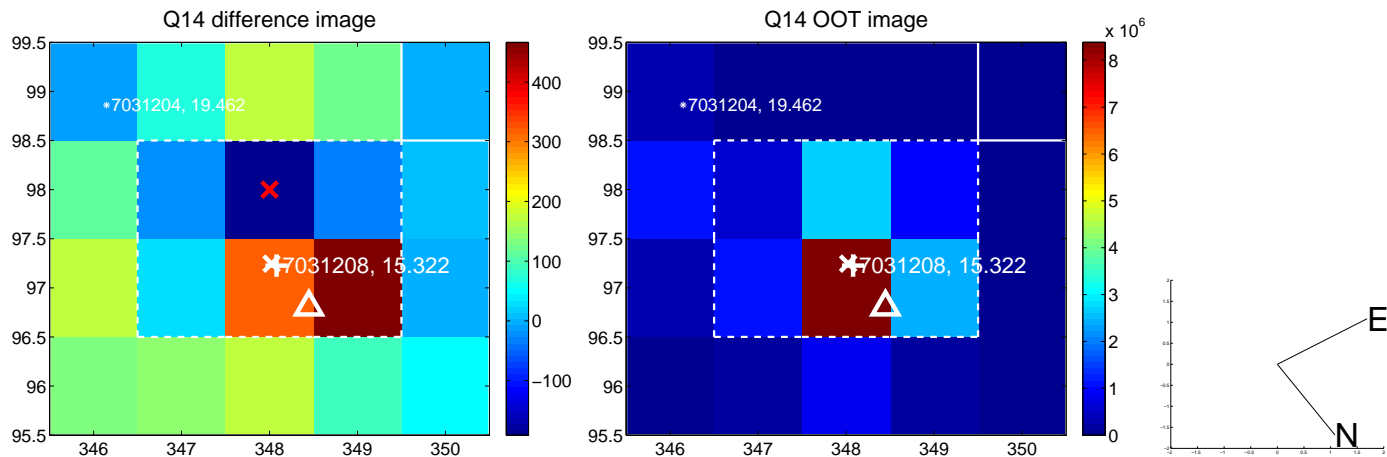
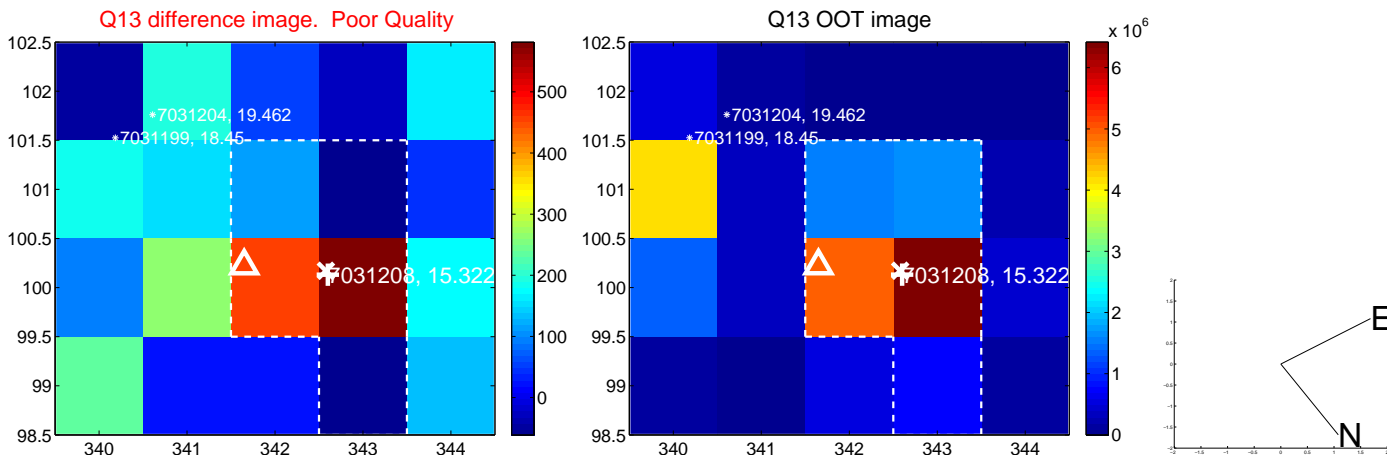




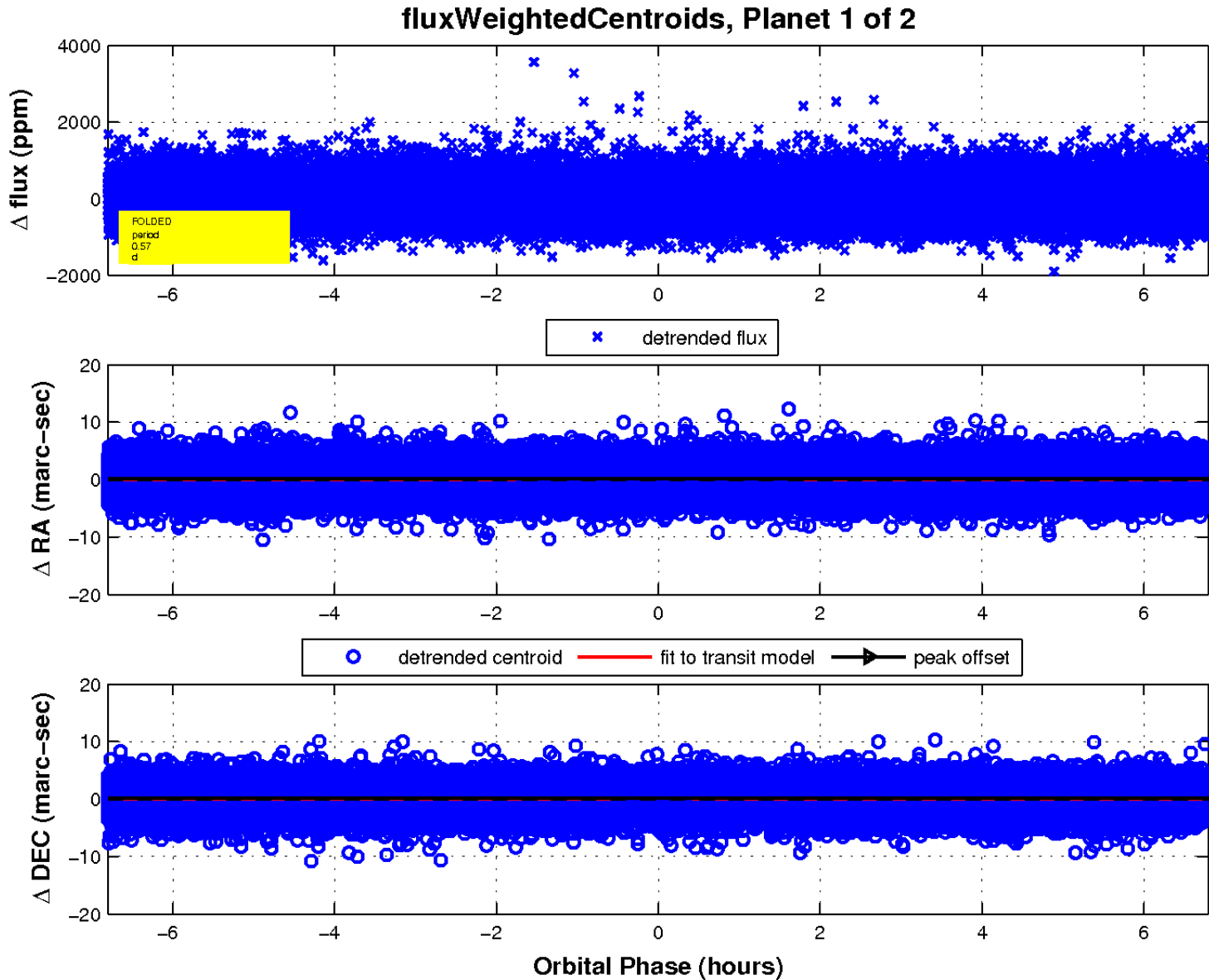
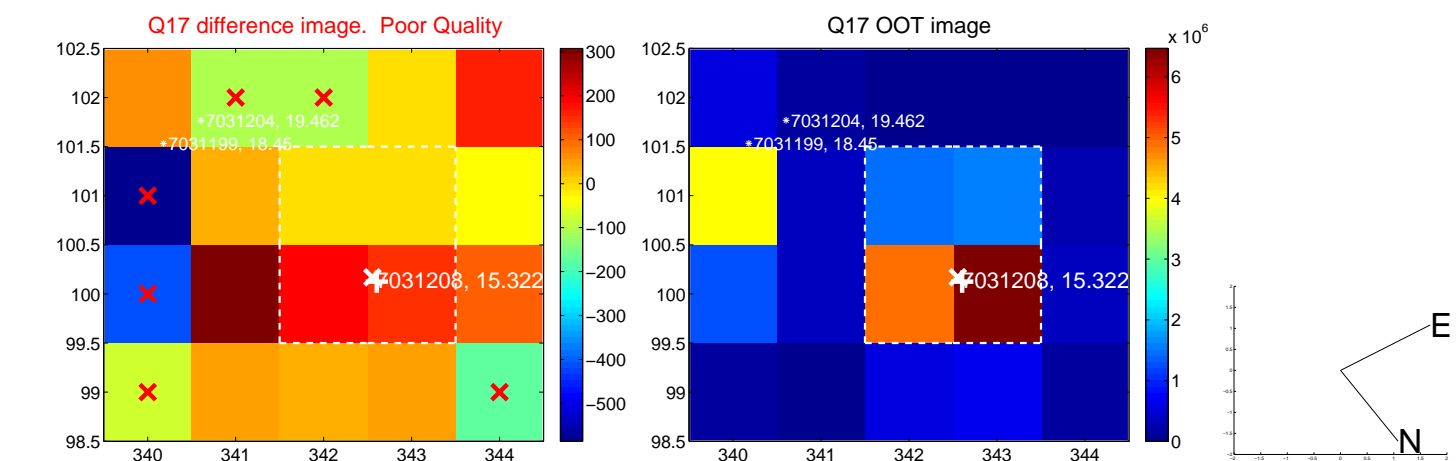
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

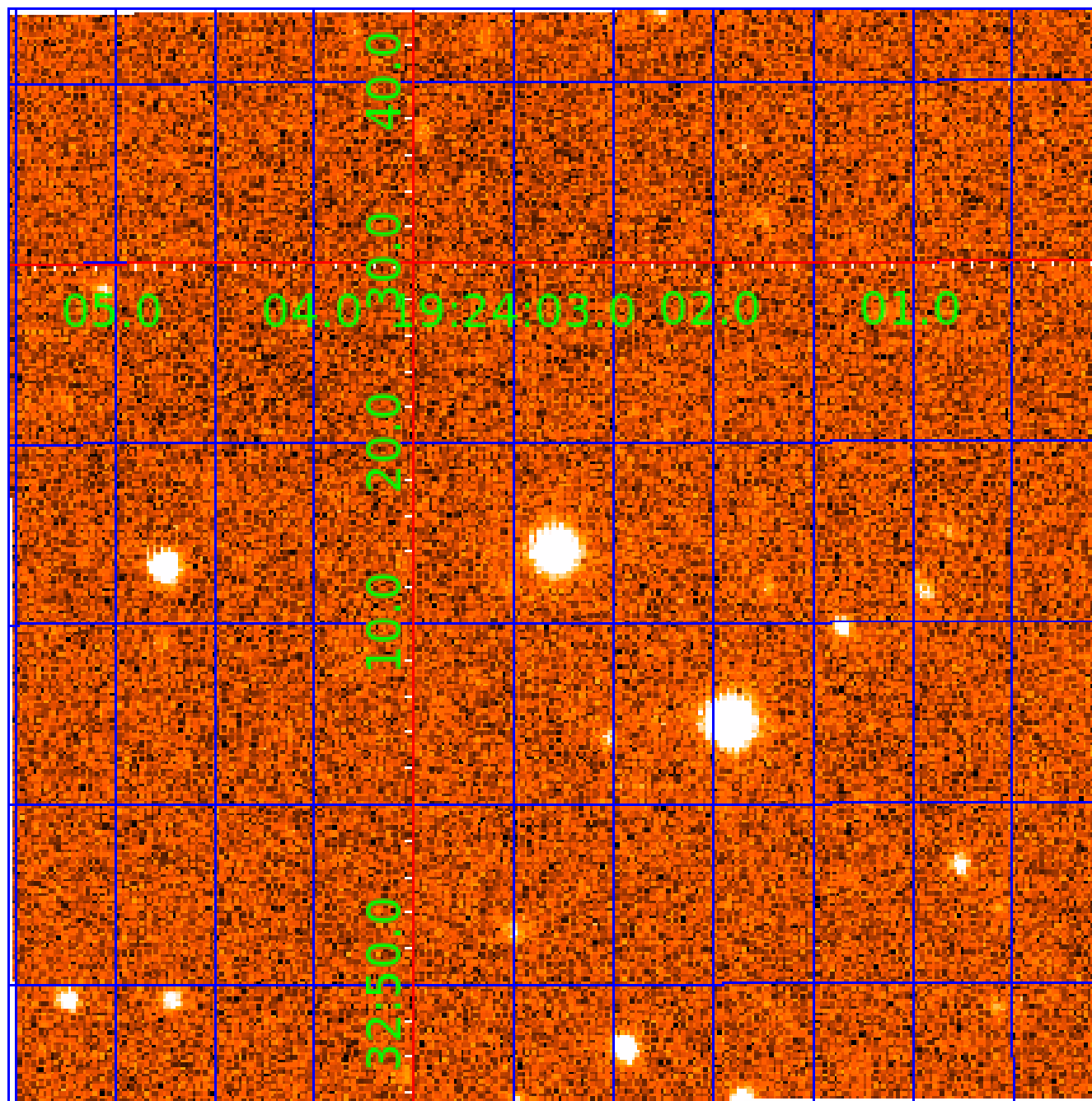


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination





# KIC 007031208

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007031208-01	OBS	7574.01	0.566731	131.884247	17.4	3.627	10.3	4.5	1.03	6319	0.44	8006.42
007031208-02	OBS	No	50.639637	140.347383	655.8	1.685	7.7	7.4	1.03	6319	3.09	20.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007031208-01	OBS	FP	0.00	1	0	0	1	LPP_DV—EPHEM_MATCH
007031208-02	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—CENT_FEW_MEAS

**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 007031208-02

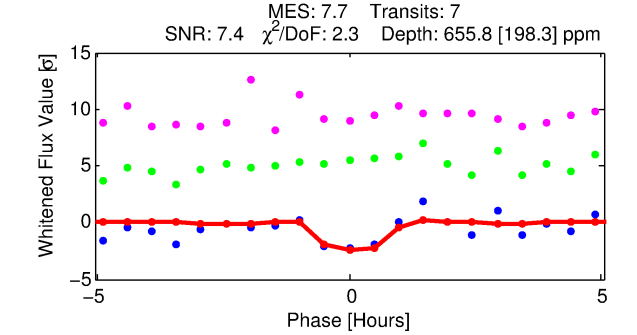
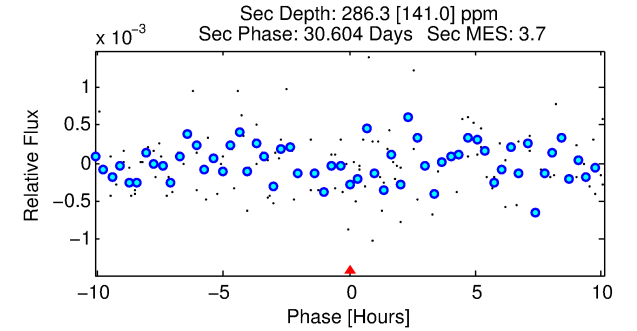
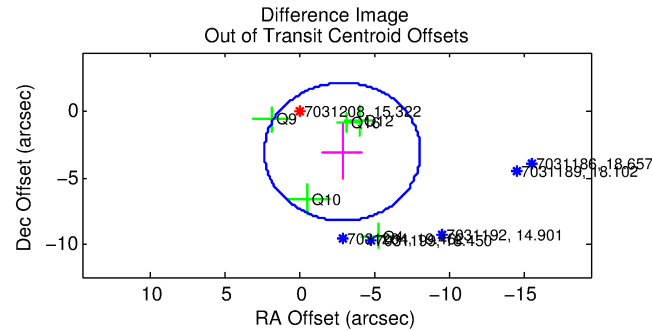
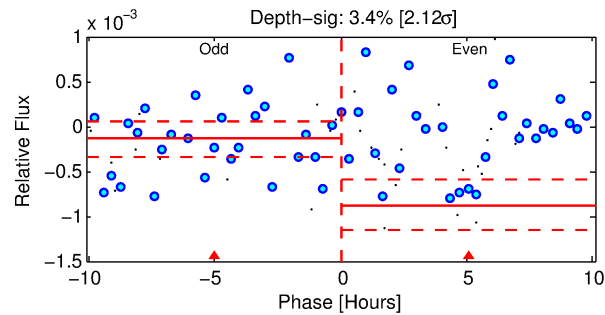
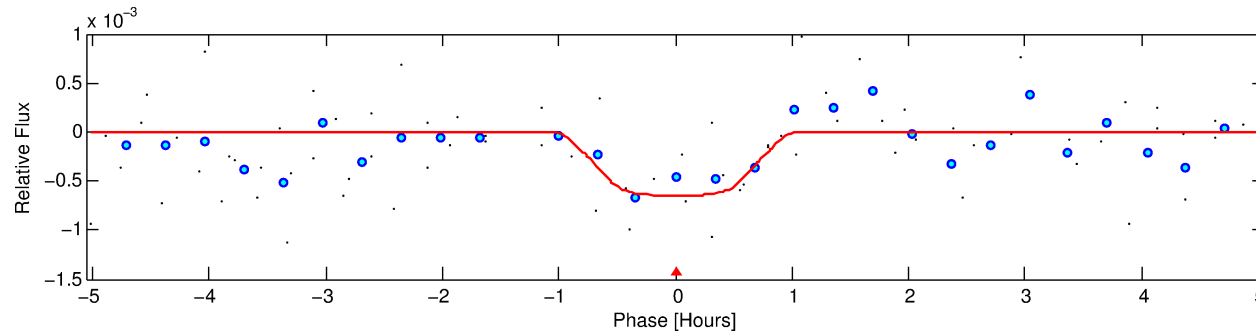
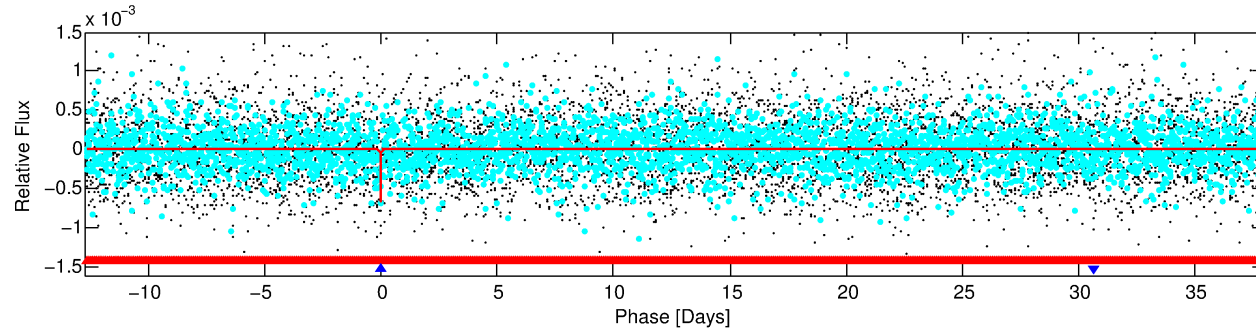
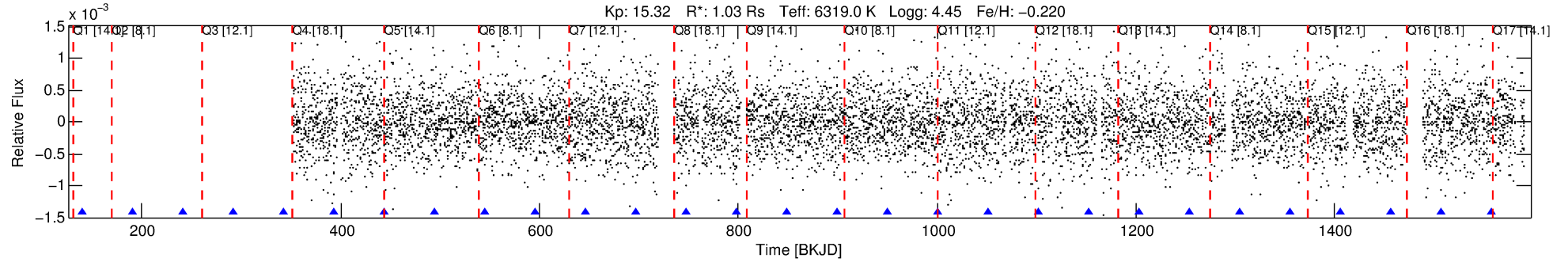
No Significant Match Found

# DV One-Page Summary

KIC: 7031208 Candidate: 2 of 2 Period: 50.640 d

KOI: K07574 Corr: No Ephemeris Match

Kp: 15.32 R\*: 1.03 Rs Teff: 6319.0 K Logg: 4.45 Fe/H: -0.220



## DV Fit Results:

Period = 50.63964 [0.00082] d  
Epoch = 140.3474 [0.0152] BKJD  
Rp/R\* = 0.0274 [0.0578]  
a/R\* = 116.30 [1329.27]  
b = 0.89 [2.60]  
Seff = 20.04 [8.50]  
Teff = 540 [57] K  
Rp = 3.09 [6.58] Re  
a = 0.2755 [0.0751] AU  
Ag = 1251.80 [5329.14] [0.23σ]  
Teffp = 4962 [5261] K [0.84σ]

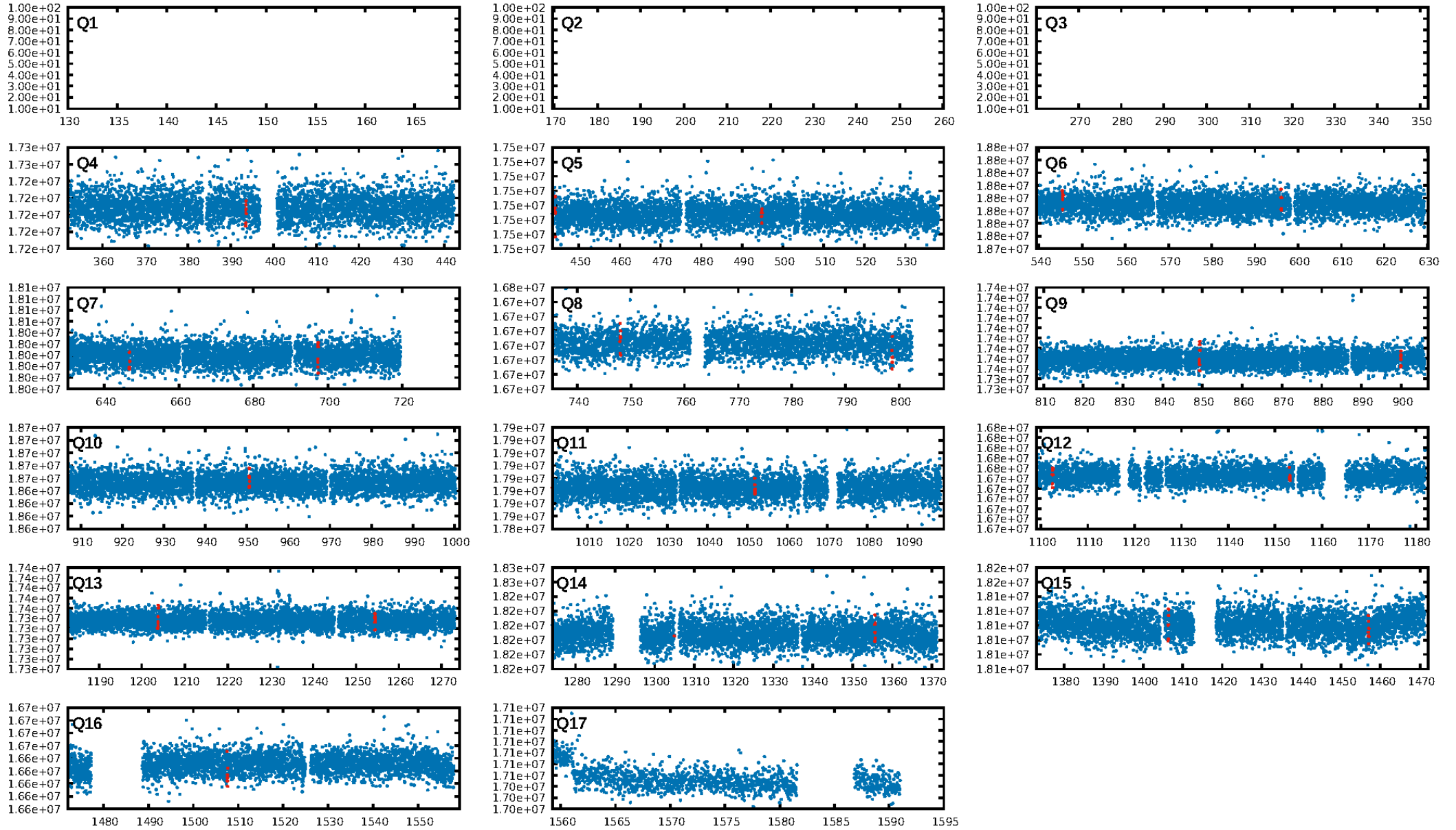
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [300.50σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 2.3%  
ModelChiSquareGof-sig: 96.5%  
**Bootstrap-pfa: 6.74e-09**  
RollingBand-fgt: 1.00 [7/7]  
**GhostDiagnostic-chr: 0.3309**  
Centroid-sig: 58.3%  
Centroid-so: 0.561 arcsec [0.46σ]  
OotOffset-rm: 4.193 arcsec [2.41σ]  
OotOffset-st: 1/0/3/1 [5]  
KicOffset-rm: 4.031 arcsec [1.98σ]  
KicOffset-st: 1/0/3/1 [5]  
DiffImageQuality-fgm: 0.40 [2/5]  
DiffImageOverlap-fno: 0.00 [0/13]

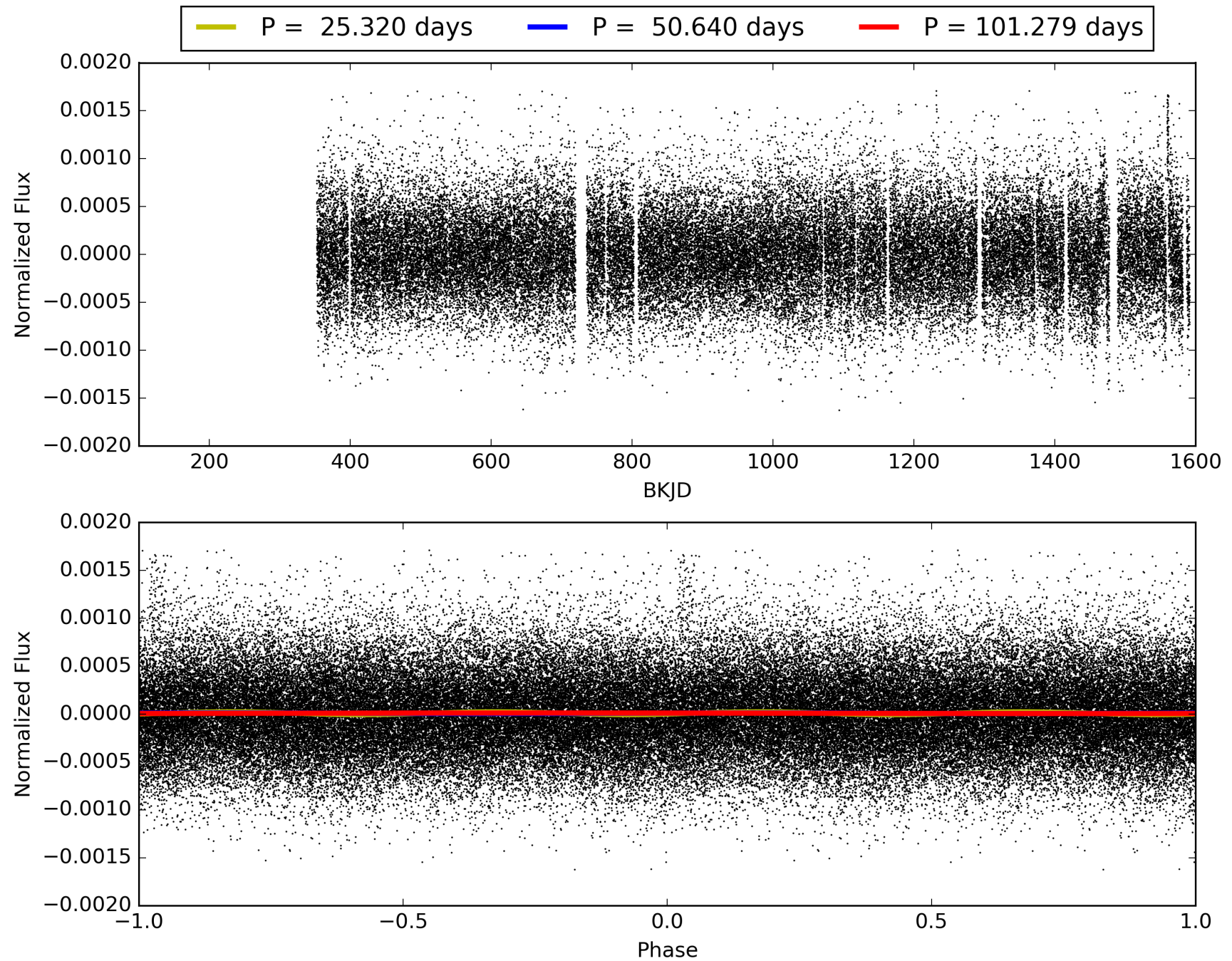
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 11:42:42 Z

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

# TCE 007031208-02, PDC Light Curves

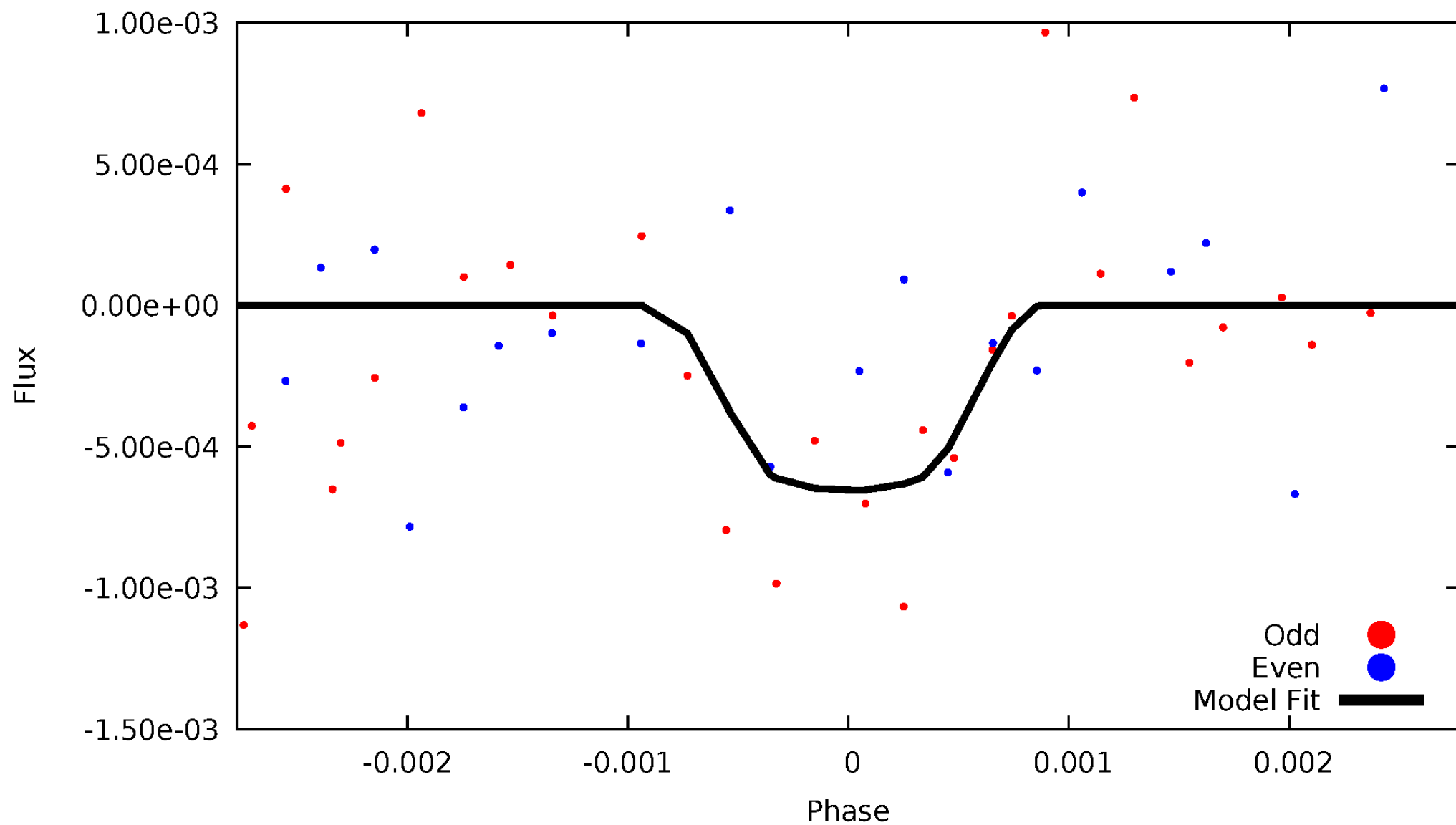


# TCE 007031208-02



# DV Odd/Even

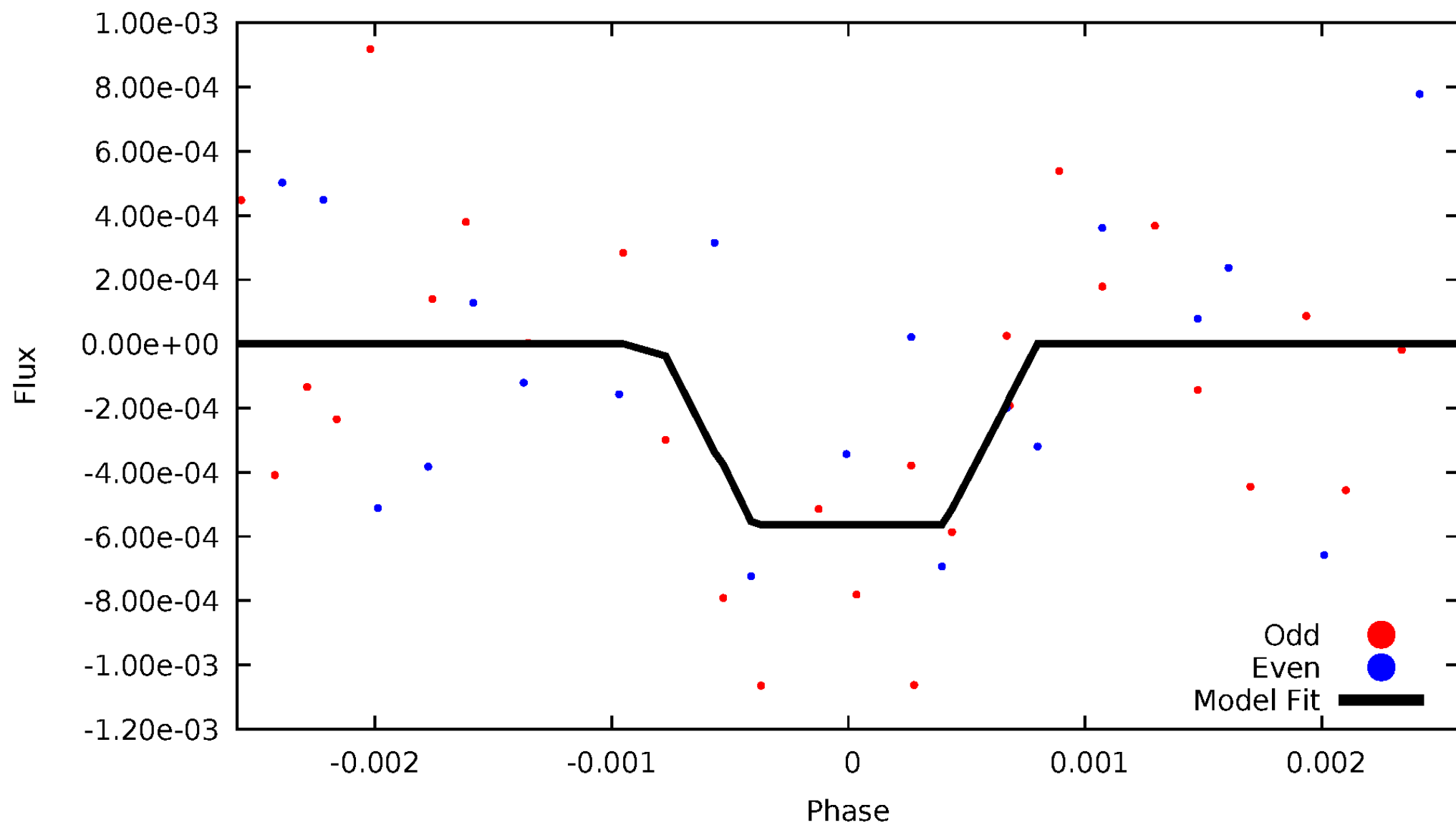
TCE 007031208-02





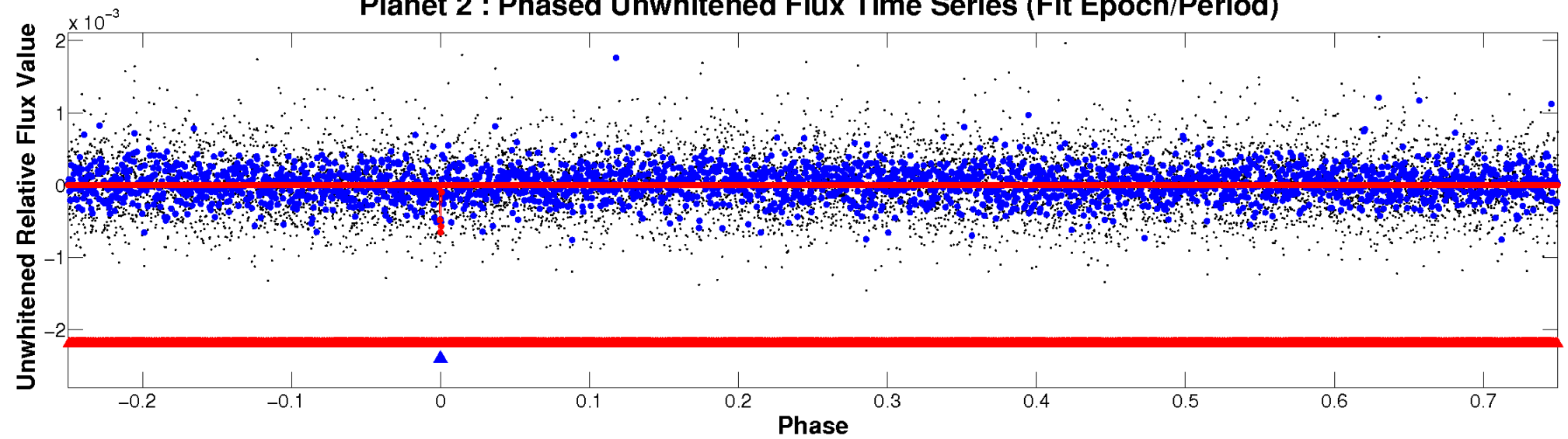
# ALT Odd/Even

TCE 007031208-02

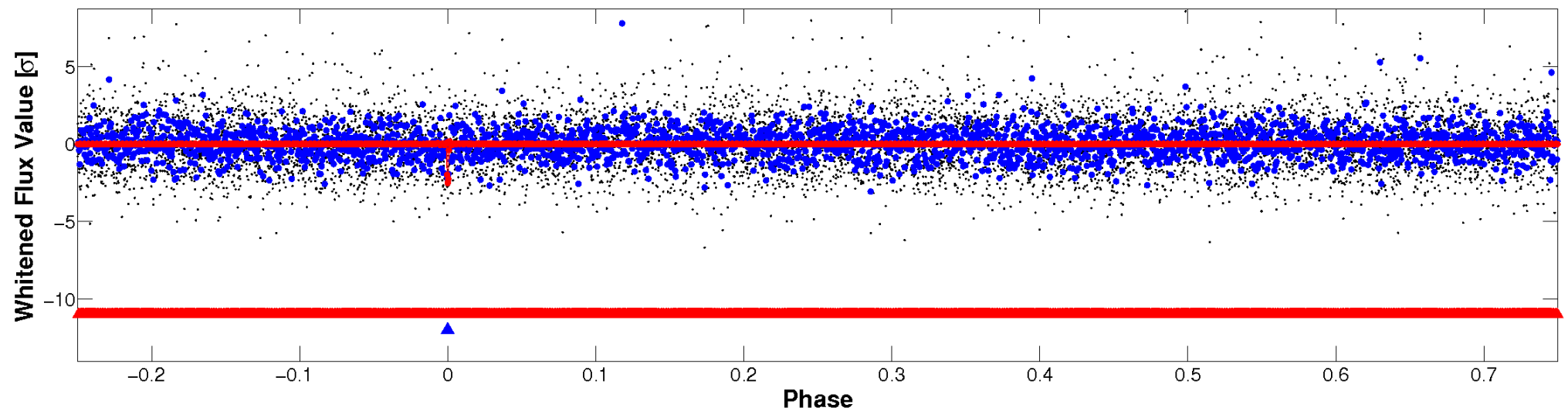


# Non-Whitened Vs. Whitened Light Curve

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

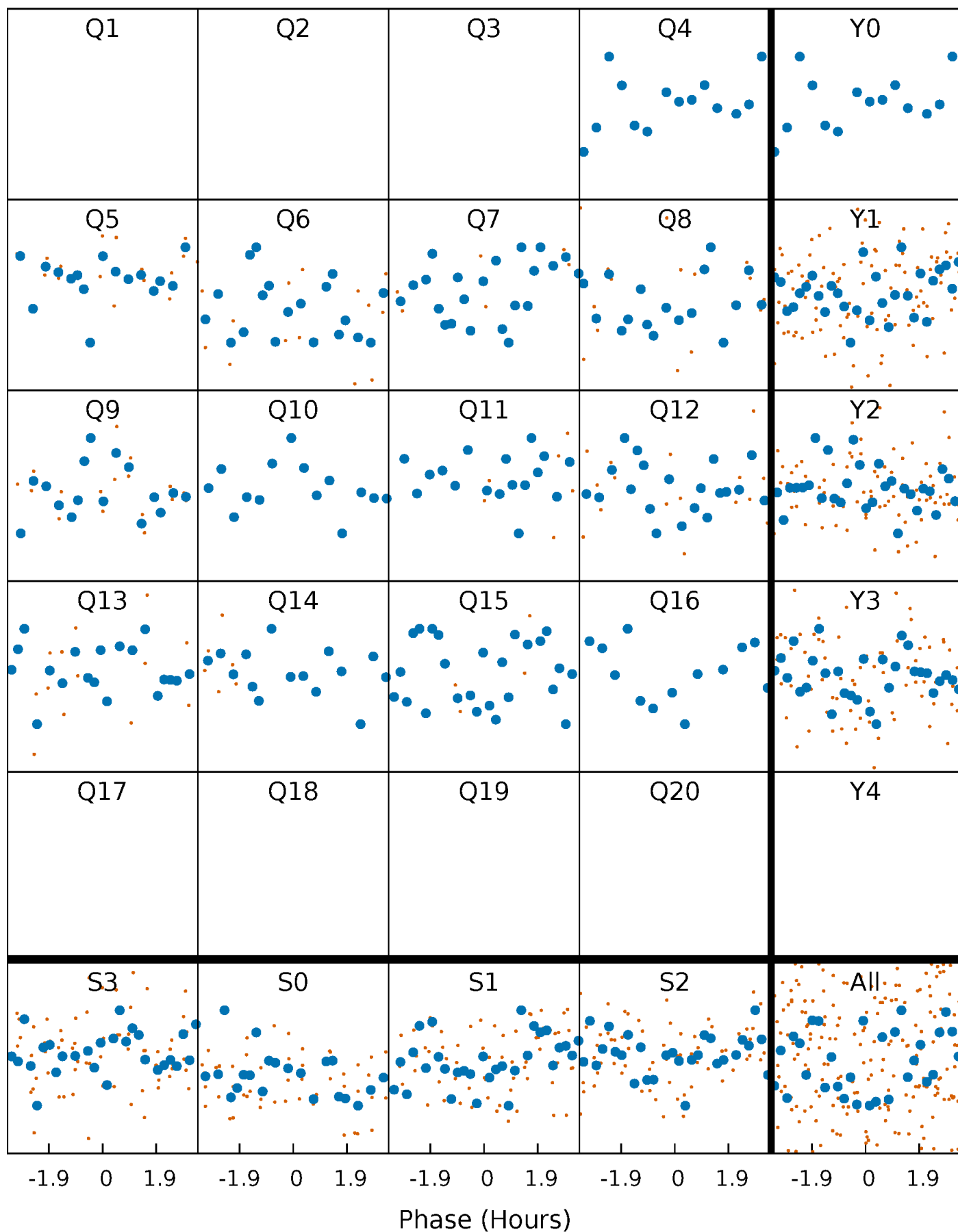


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



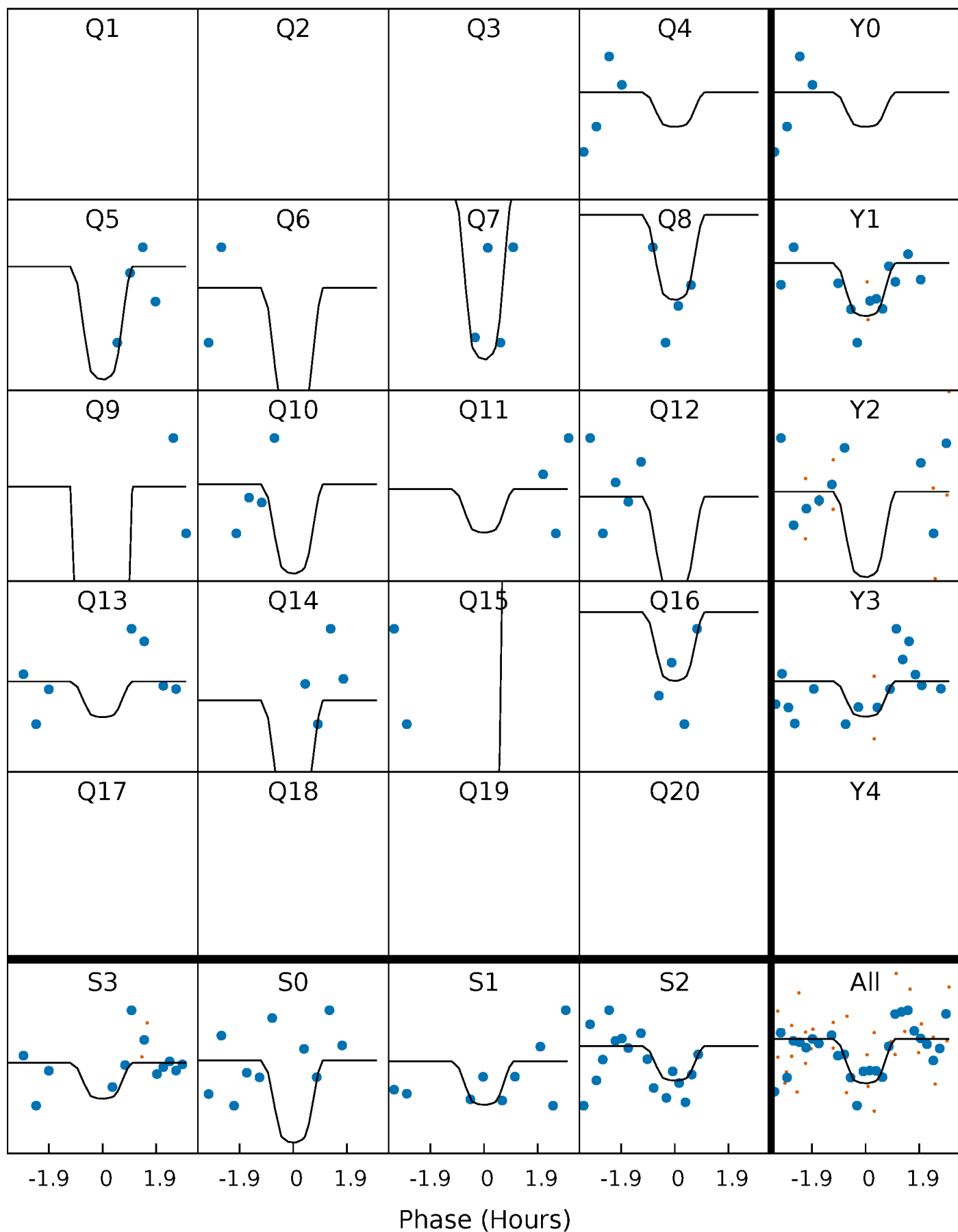
# PDC Quarter-Phased Transit Curves

TCE 007031208-02 P= 50.639637 Days  $T_0=140.347383$  (BKJD)



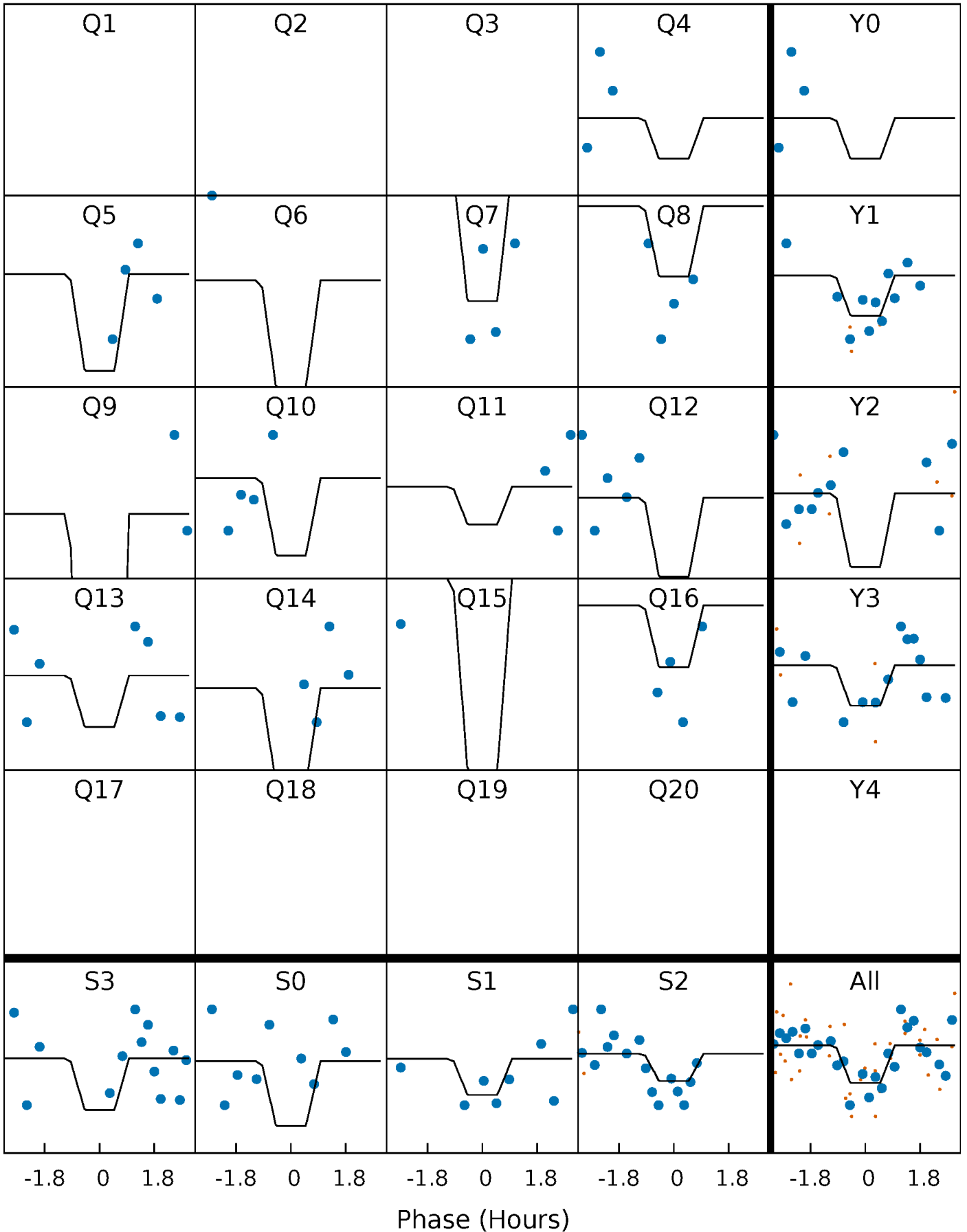
# DV Quarter-Phased Transit Curves

TCE 007031208-02 P= 50.639637 Days  $T_0=140.347383$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 007031208-02 P= 50.639386 Days  $T_0=140.352780$  (BKJD)

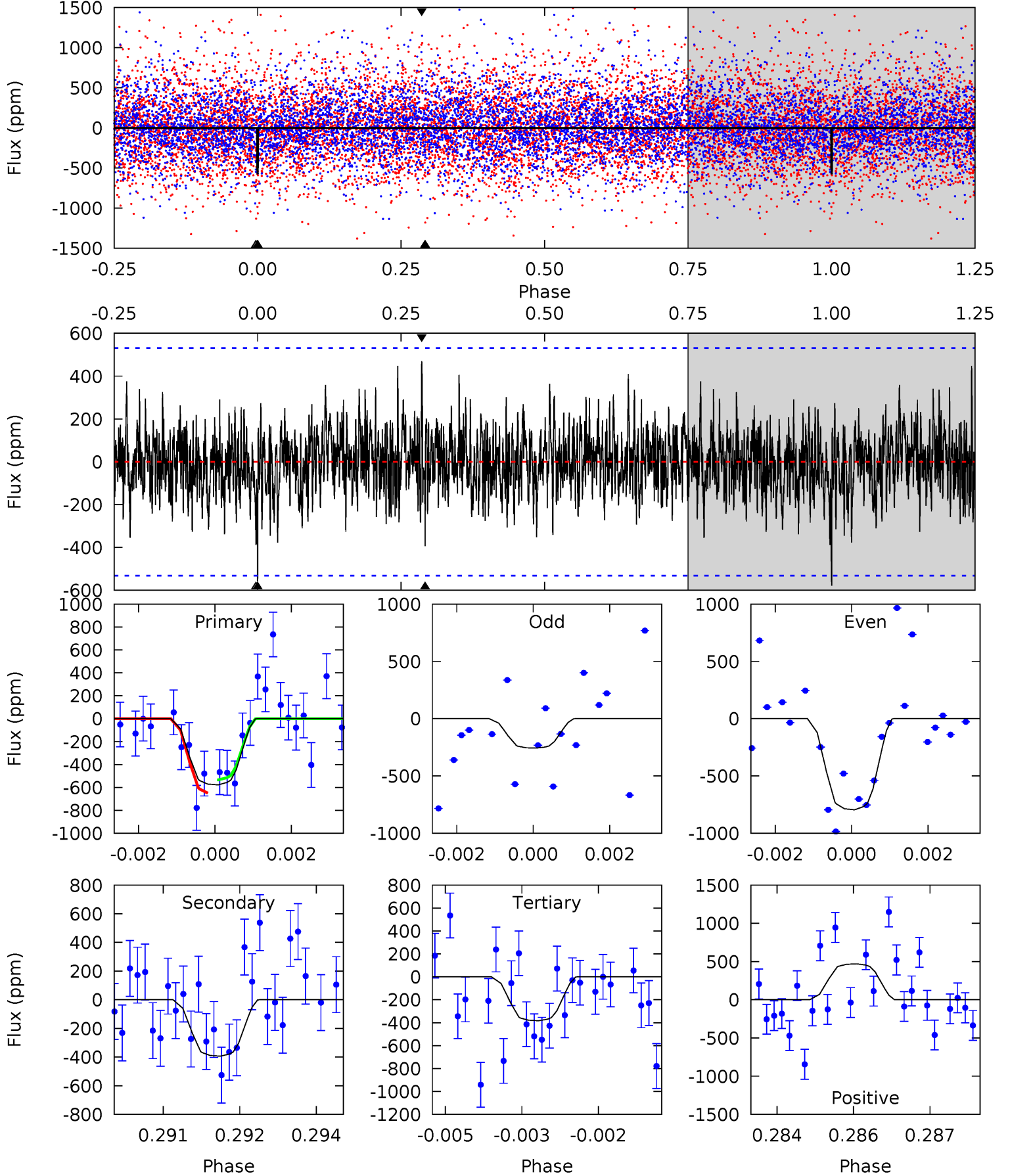




# DV Model-Shift Uniqueness Test

007031208-02, P = 50.639637 Days, E = 140.347383 Days

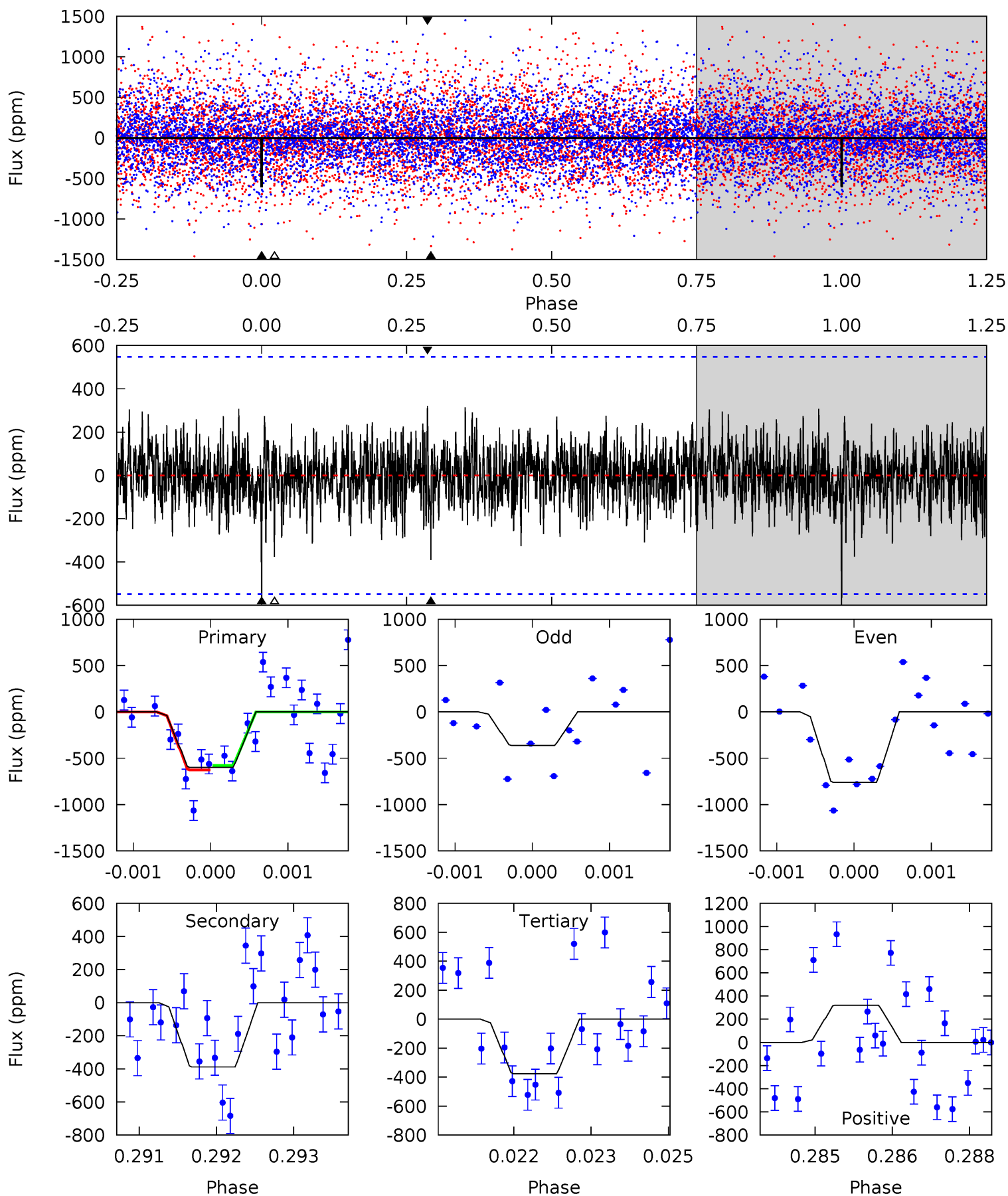
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.83	3.97	3.87	4.74	5.36	3.15	1.24	1.96	1.09	0.10	-0.77	2.70	1.06	0.45	0.54



# Alt Model-Shift Uniqueness Test

007031208-02, P = 50.639386 Days, E = 140.352780 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
5.89	3.83	3.70	3.16	5.40	3.20	1.00	2.19	2.73	0.13	0.67	1.89	0.90	0.35	0.23



### Stellar Parameters For KIC 007031208

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6319^{+197}_{-241}$	$4.447^{+0.054}_{-0.216}$	$-0.220^{+0.250}_{-0.300}$	$1.032^{+0.335}_{-0.112}$	$1.084^{+0.154}_{-0.154}$	$1.389^{+0.384}_{-0.717}$
	+3%/-4%	+1%/-5%	+114%/-136%	+32%/-11%	+14%/-14%	+28%/-52%
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 007031208-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-393 \pm 99$	$6.18^{+6.23}_{-3.94}$	$771^{+62}_{-43}$	$4092^{+2471}_{-803}$	$419^{+2966}_{-321}$
Alt.	$-389 \pm 102$	$6.21^{+6.15}_{-4.17}$	$771^{+52}_{-40}$	$4168^{+2506}_{-855}$	$411^{+3299}_{-308}$

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

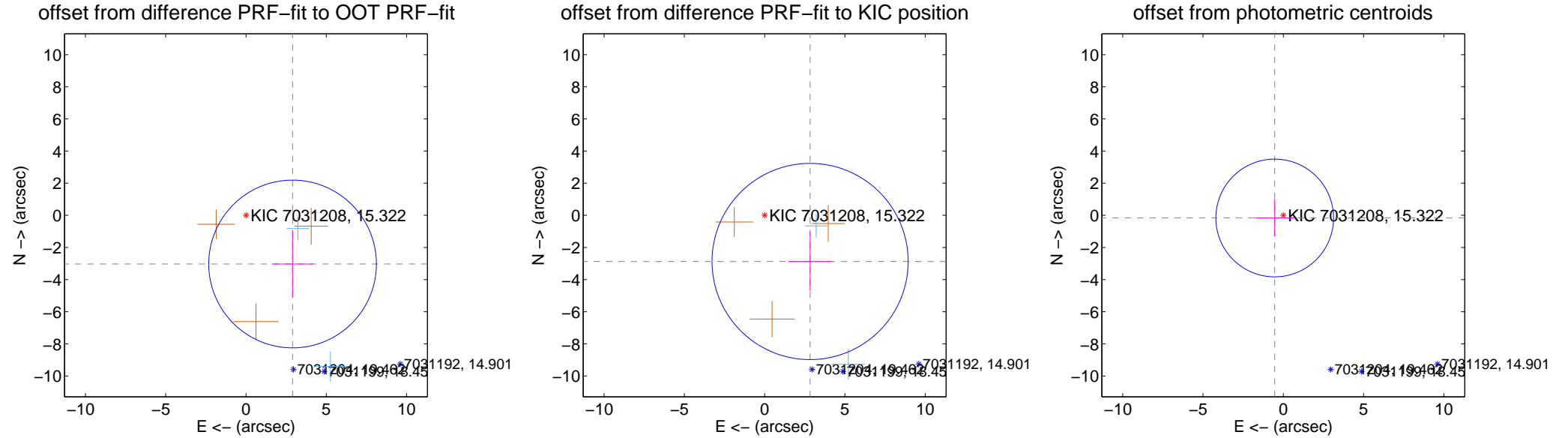
## DV Centroid Data

Supplemental centroid analysis for 007031208-02. Kepler magnitude: 15.32. Transit SNR 7.44

There are 2 quarters with good PRF difference image offsets

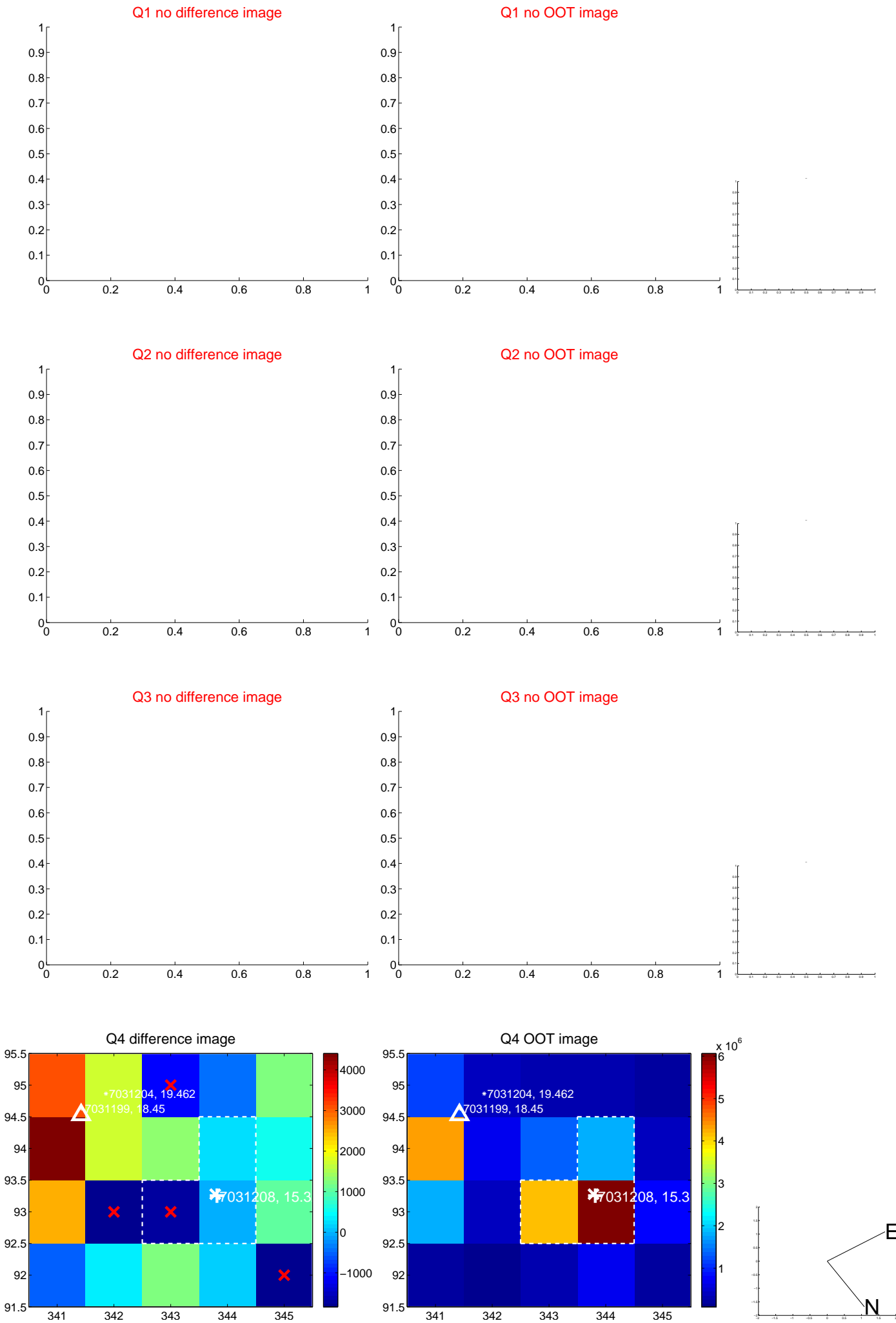
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.193 \pm 1.740$	2.41	$-2.899 \pm 1.282$	$-3.028 \pm 2.072$
PRF-fit source offset from KIC position	$4.031 \pm 2.035$	1.98	$-2.829 \pm 1.341$	$-2.872 \pm 1.828$
photometric centroid source offset	$0.56 \pm 1.22$	0.46	$0.54 \pm 1.23$	$-0.17 \pm 1.16$



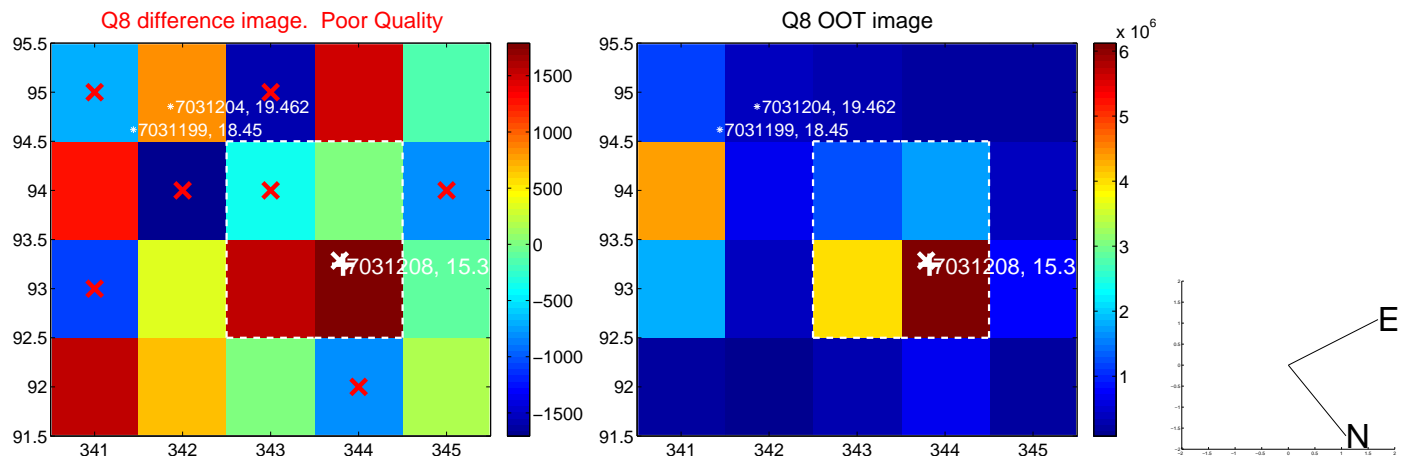
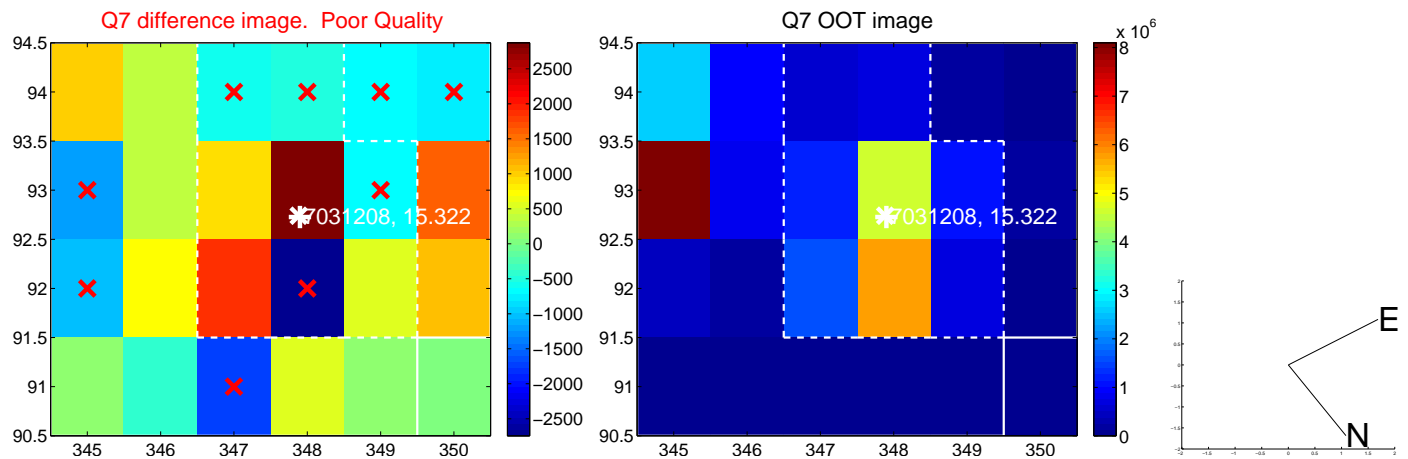
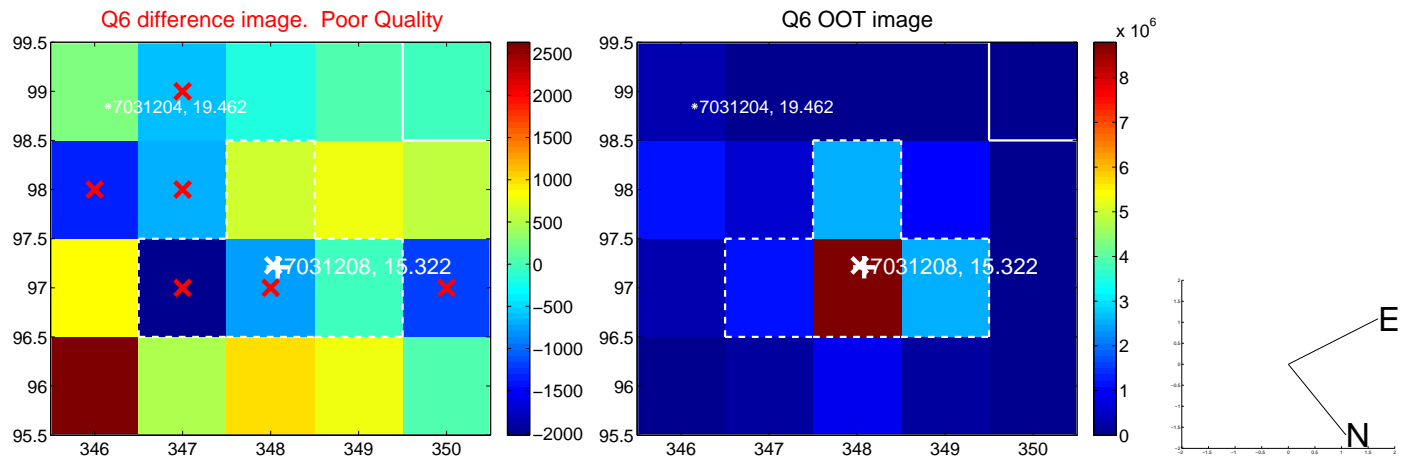
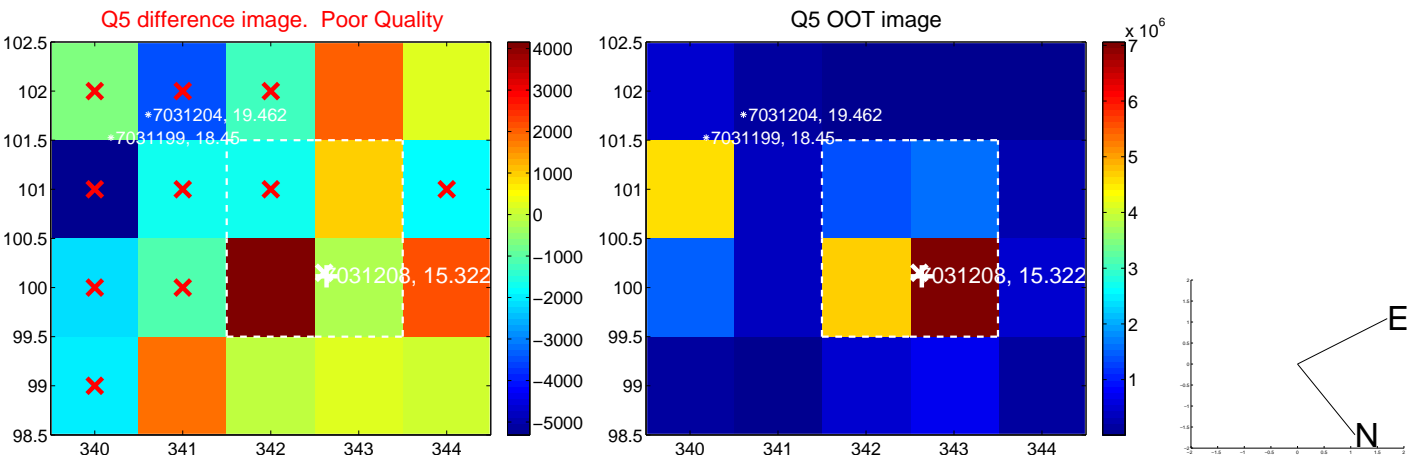
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

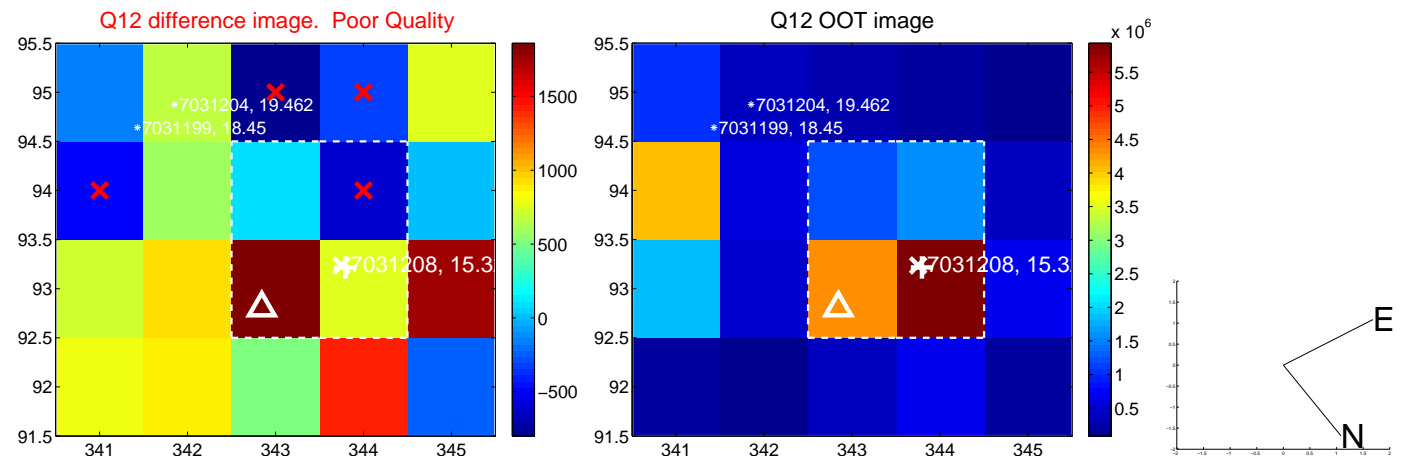
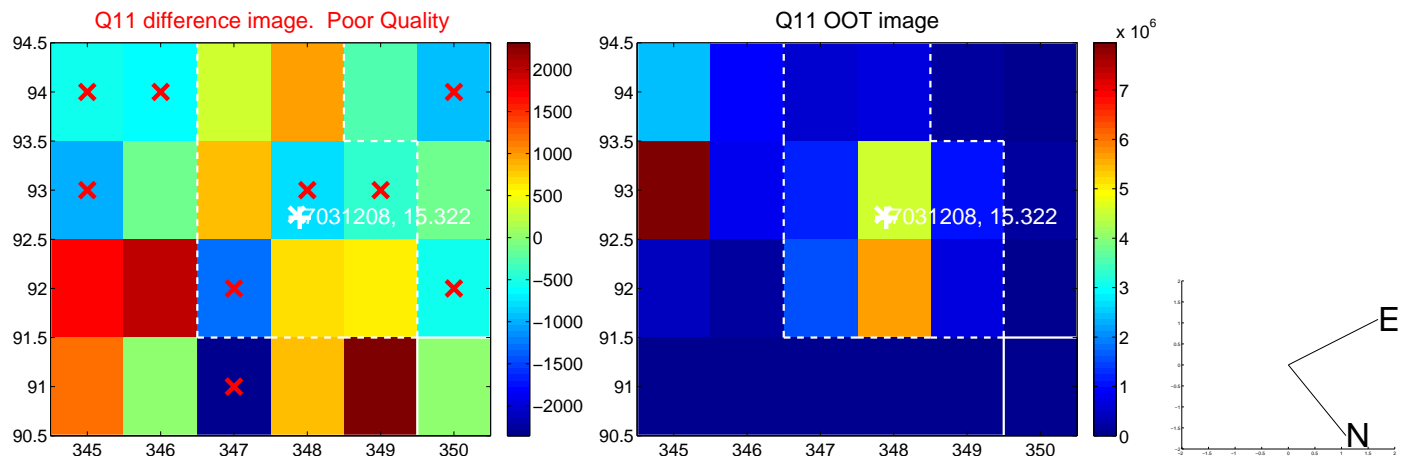
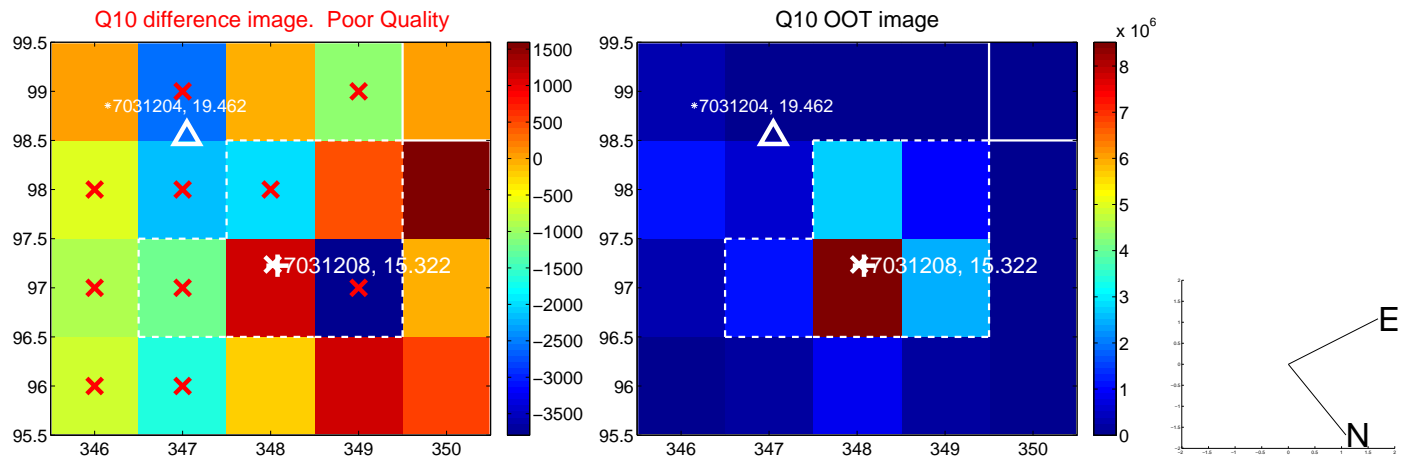
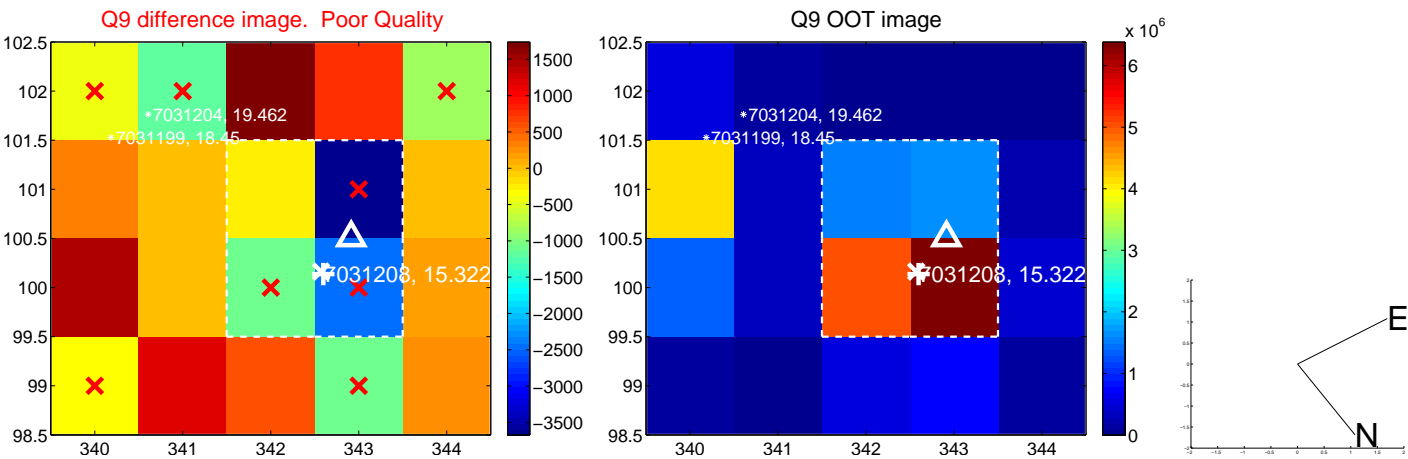




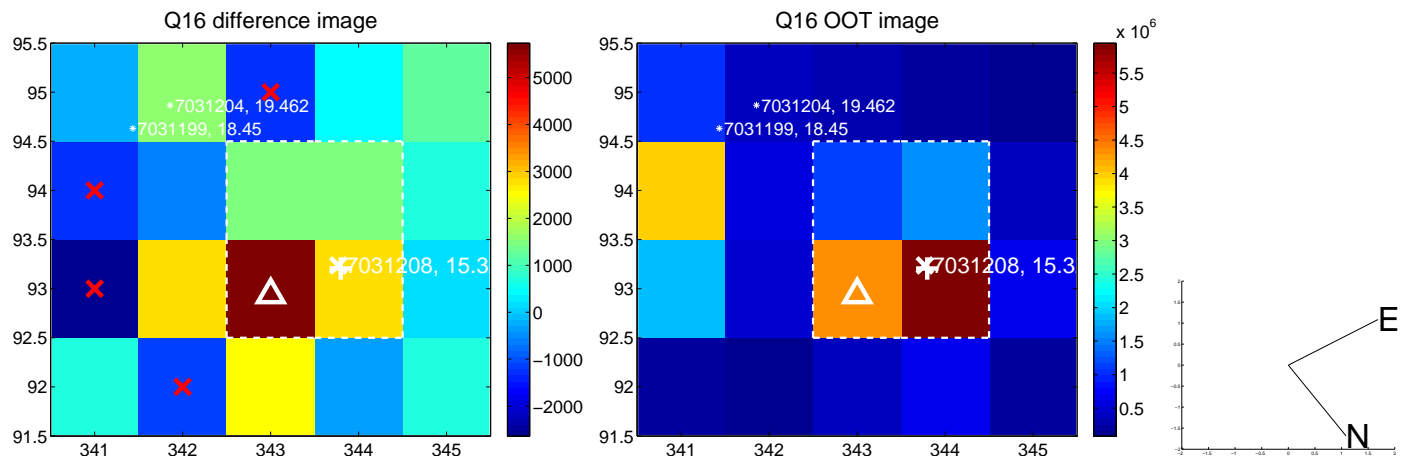
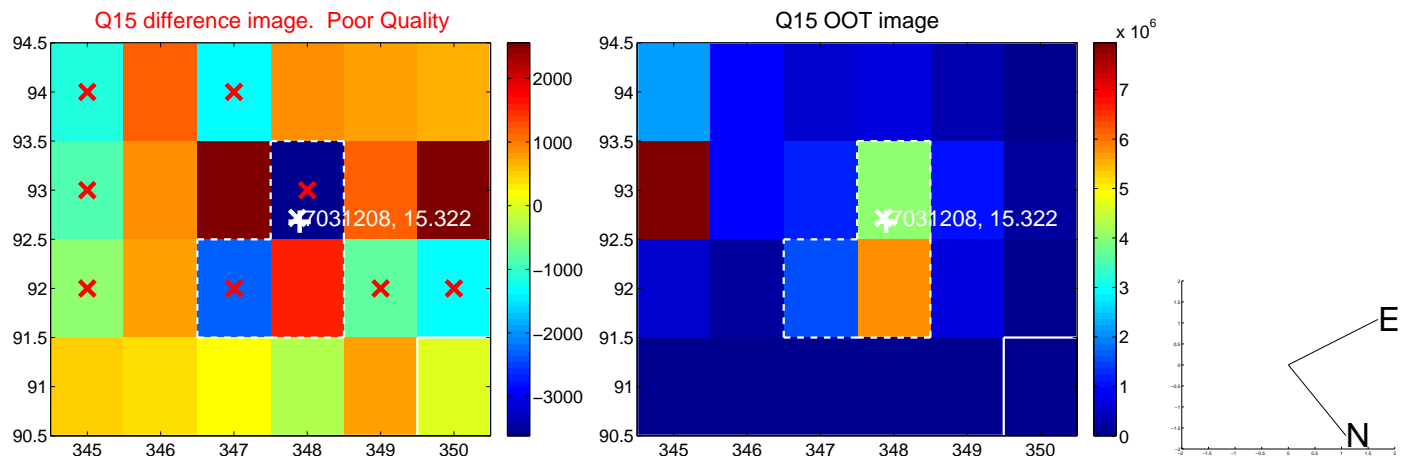
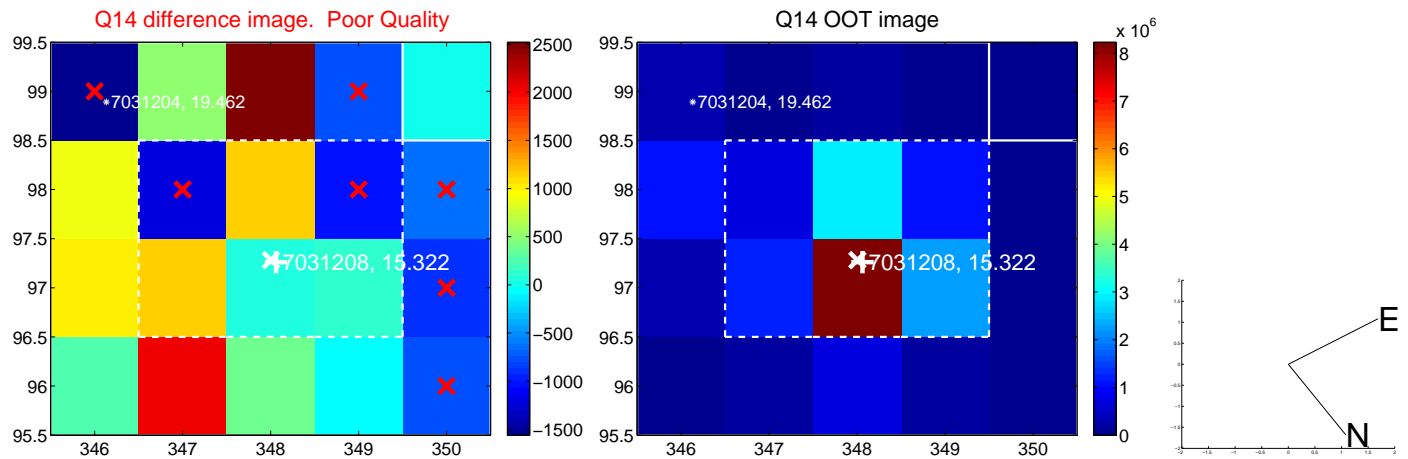
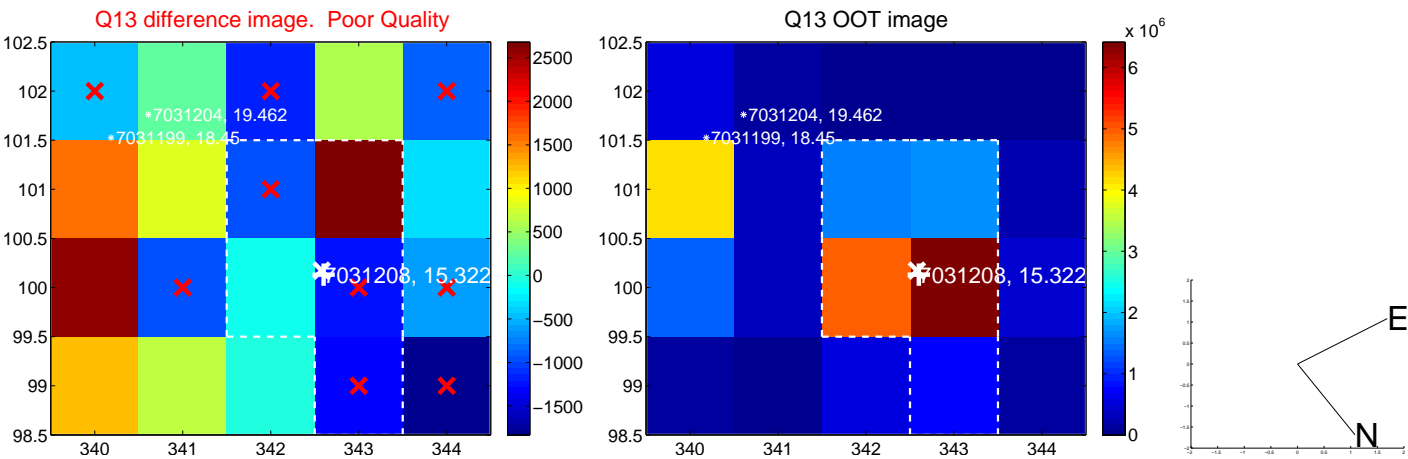
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



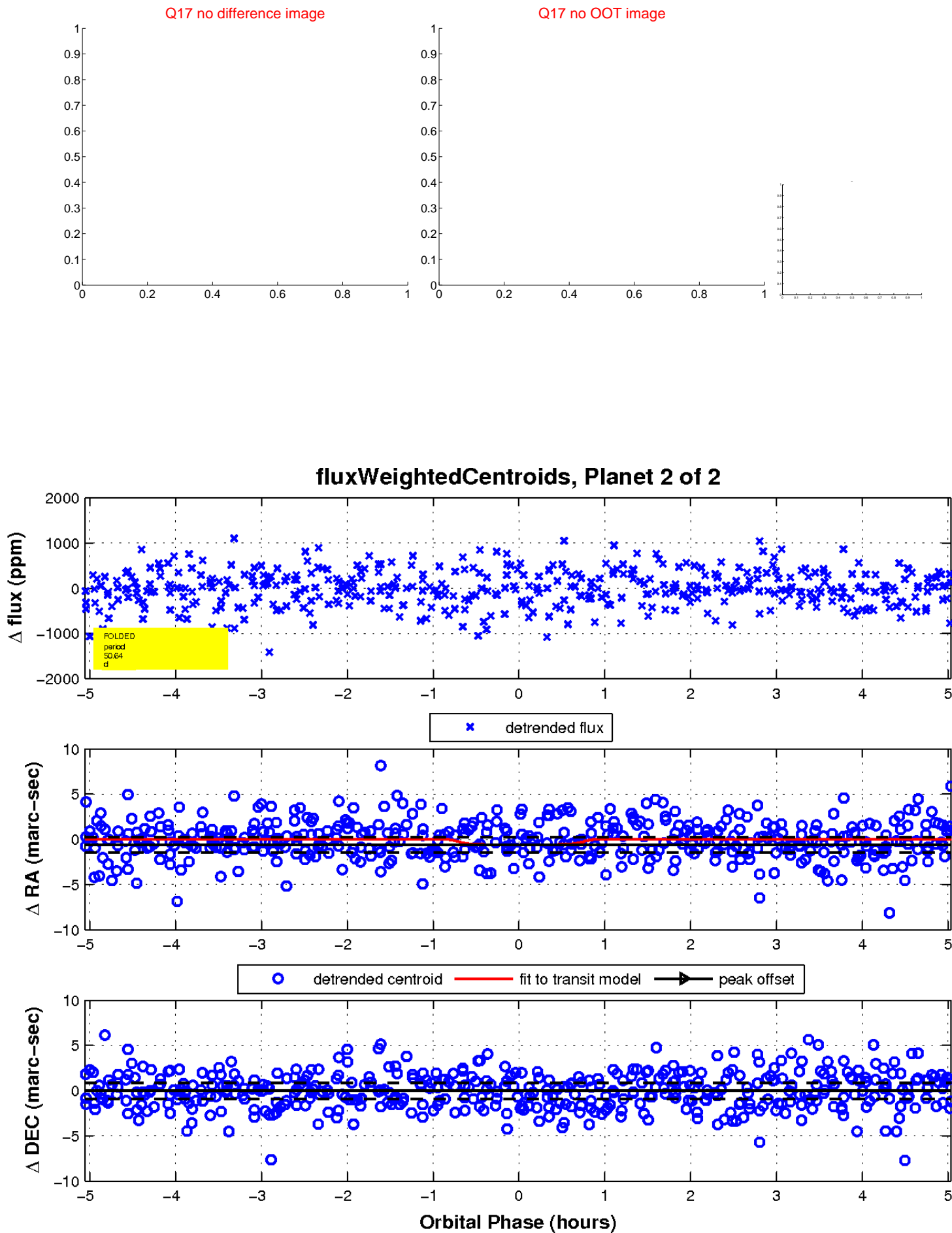
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

