

# KIC 011080405

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011080405-01	OBS	2442.01	25.193306	146.433672	497.5	4.659	16.2	17.3	0.84	5009	2.07	16.36
011080405-02	OBS	2442.02	12.310244	141.870380	240.3	3.890	10.4	11.0	0.84	5009	1.55	42.50

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011080405-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
011080405-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

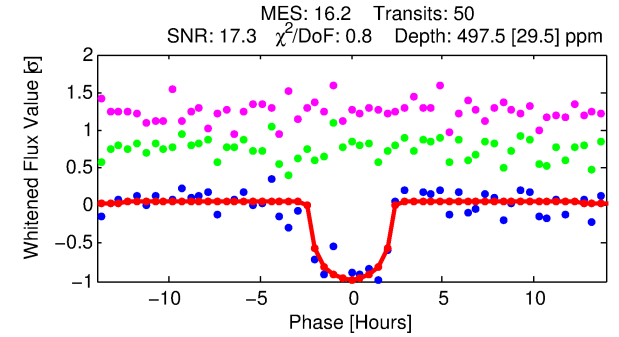
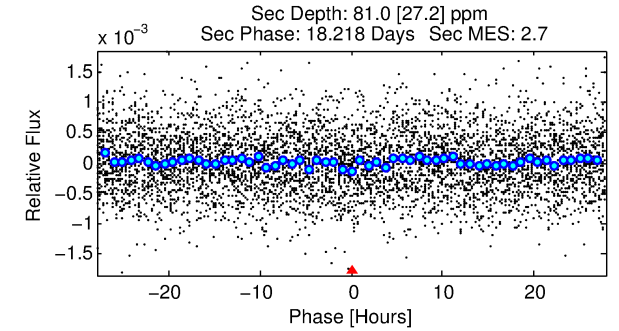
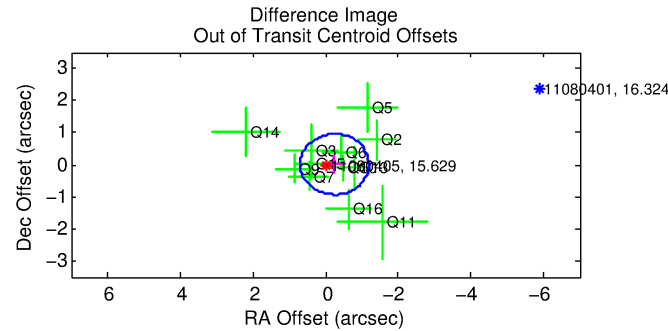
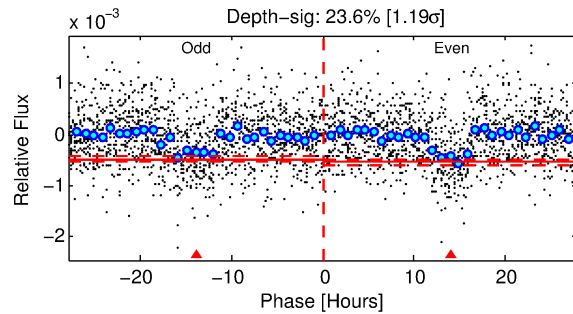
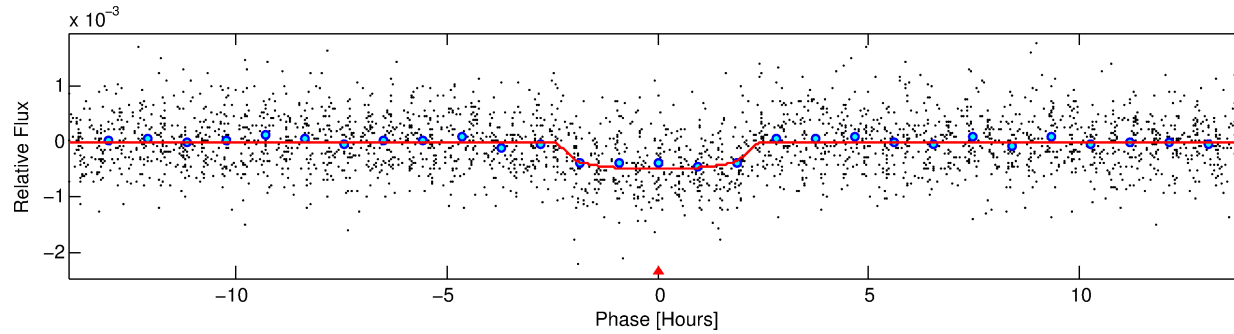
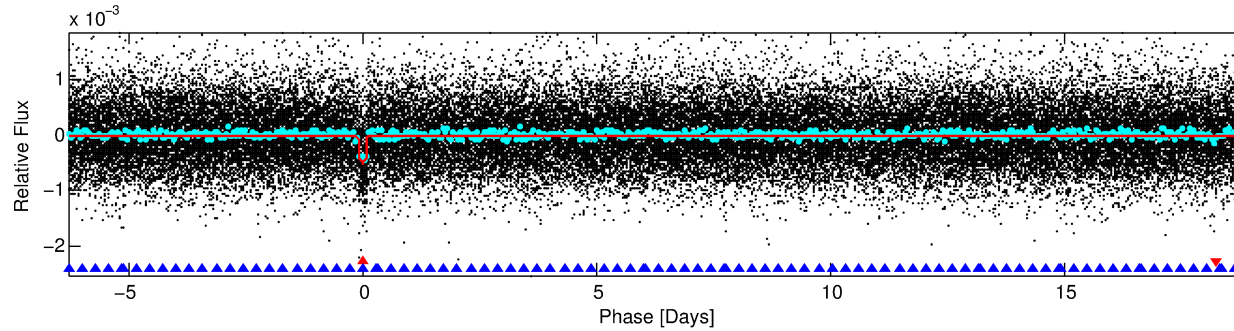
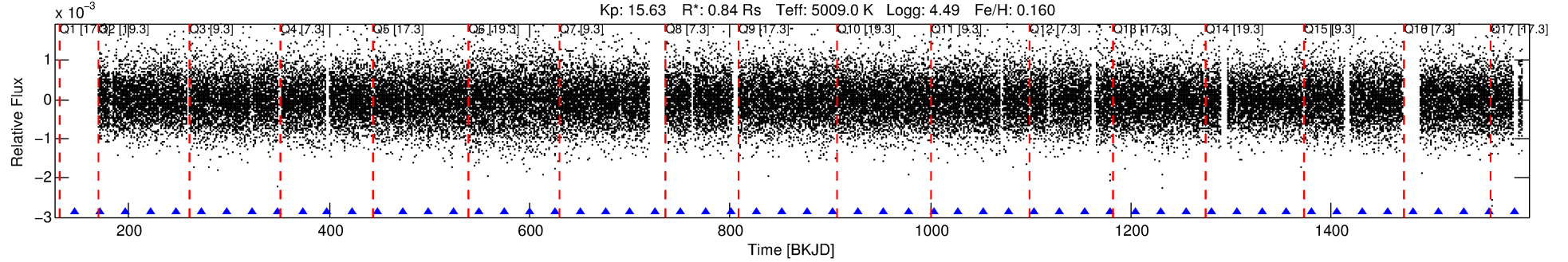
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 011080405-01

No Significant Match Found

# DV One-Page Summary

KIC: 11080405 Candidate: 1 of 2 Period: 25.193 d  
KOI: K02442.01 Name: Kepler-386c Corr: 0.988



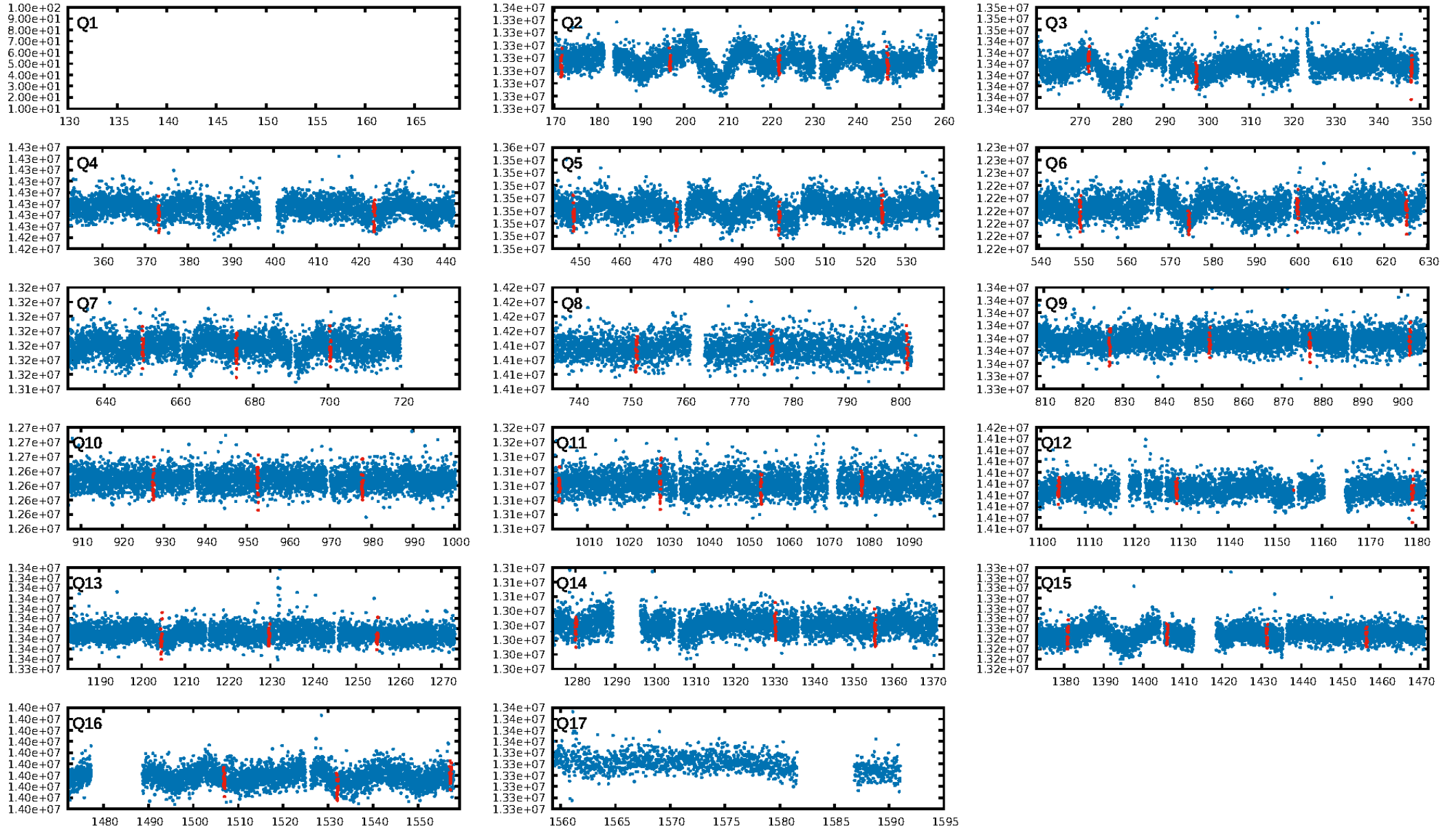
## DV Fit Results:

Period = 25.19331 [0.00019] d  
Epoch = 146.4337 [0.0063] BKJD  
Rp/R\* = 0.0226 [0.0102]  
a/R\* = 27.47 [43.50]  
b = 0.78 [0.83]  
Seff = 16.36 [2.36]  
Teq = 513 [18] K  
Rp = 2.07 [0.94] Re  
a = 0.1560 [0.0121] AU  
Ag = 252.53 [244.30] [1.03 $\sigma$ ]  
Teffp = 3161 [759] K [3.49 $\sigma$ ]

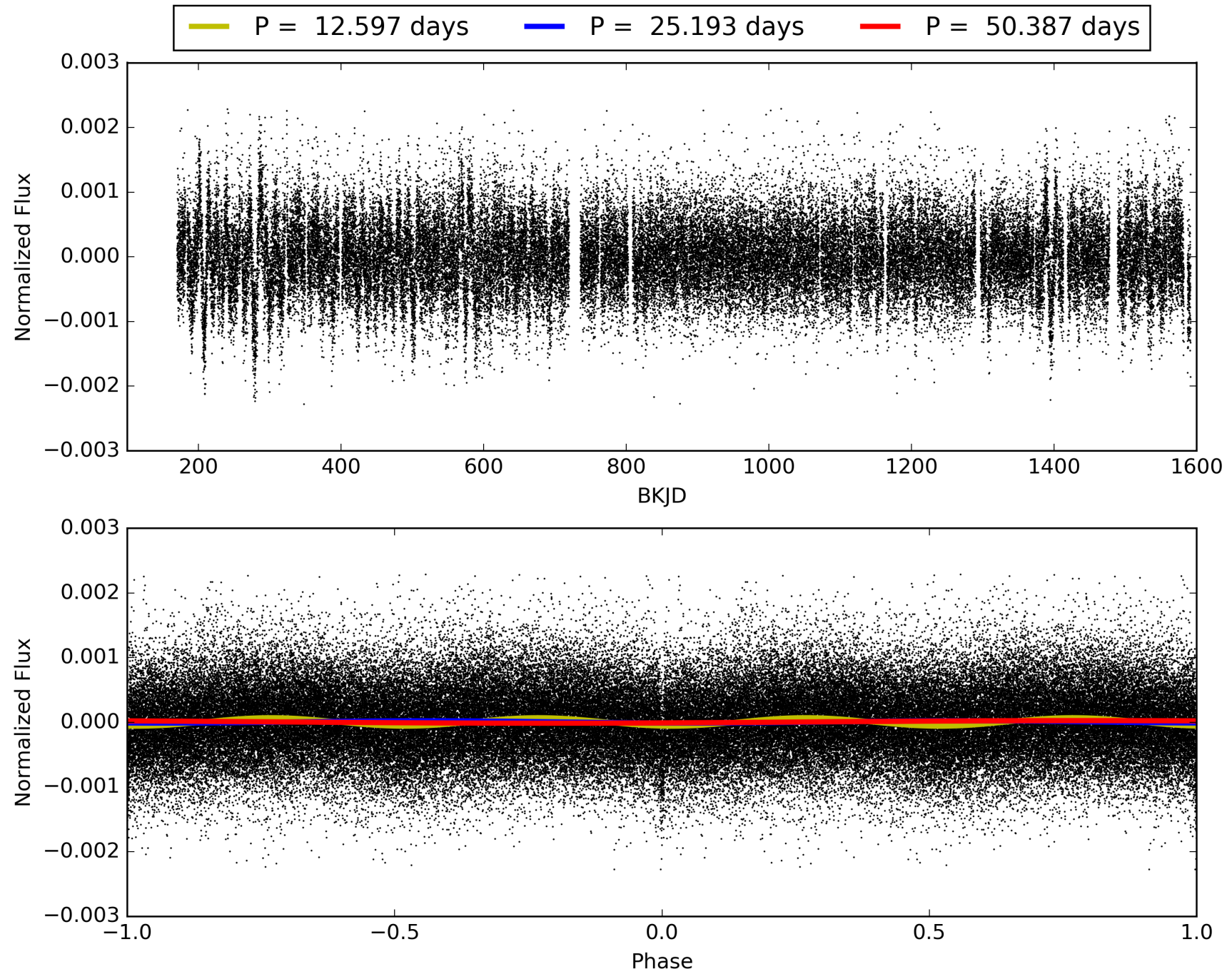
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [50.94 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 95.3%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.15e-57  
RollingBand-fgt: 1.00 [50/50]  
GhostDiagnostic-chr: 4.527  
Centroid-sig: 21.0%  
Centroid-so: 0.653 arcsec [0.92 $\sigma$ ]  
OotOffset-rm: 0.243 arcsec [0.77 $\sigma$ ]  
KicOffset-rm: 0.282 arcsec [0.92 $\sigma$ ]  
OotOffset-st: 4/4/1/3 [12]  
KicOffset-st: 4/4/1/3 [12]  
DiffImageQuality-fgm: 0.92 [11/12]  
DiffImageOverlap-fno: 1.00 [15/15]

# TCE 011080405-01, PDC Light Curves

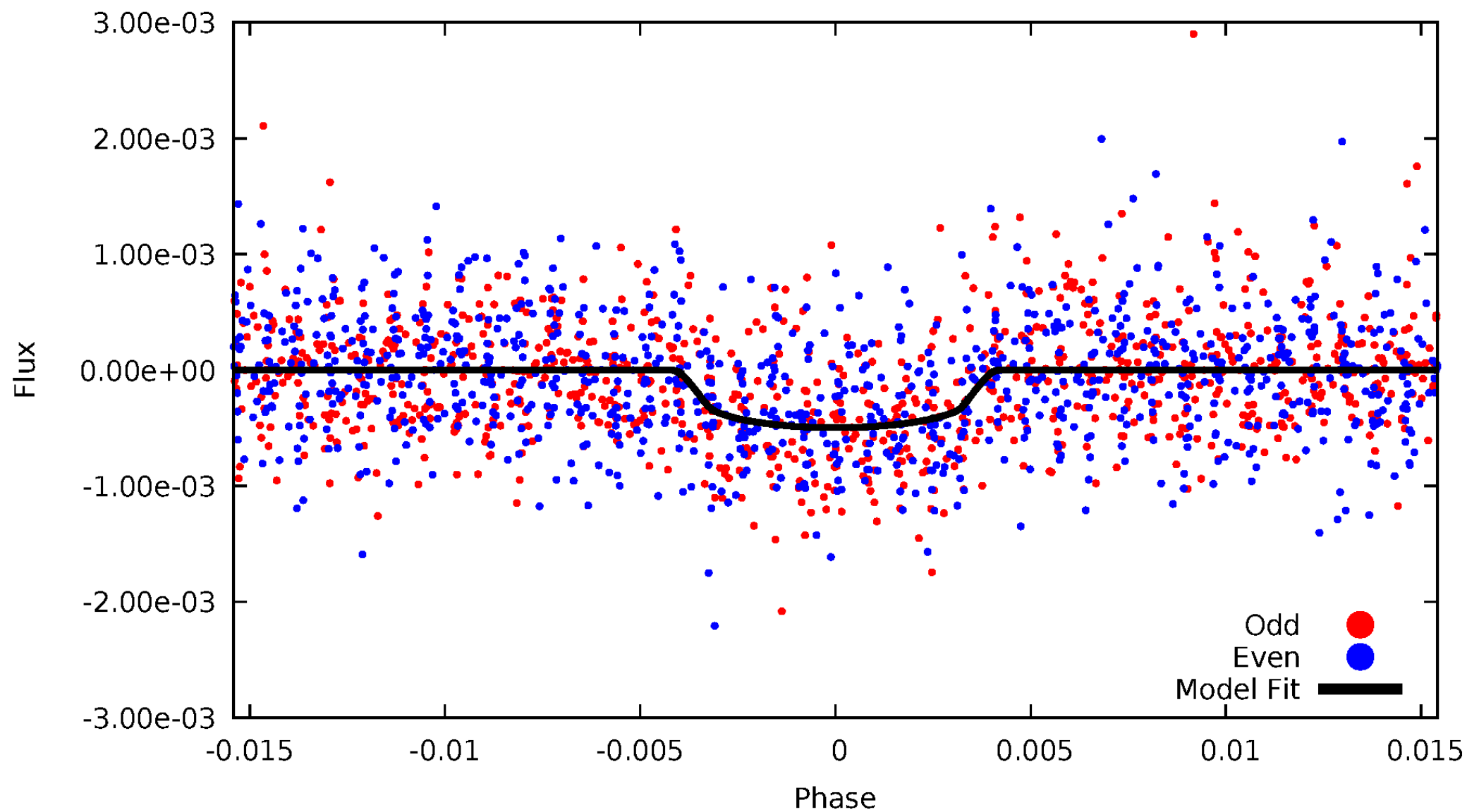


TCE 011080405-01



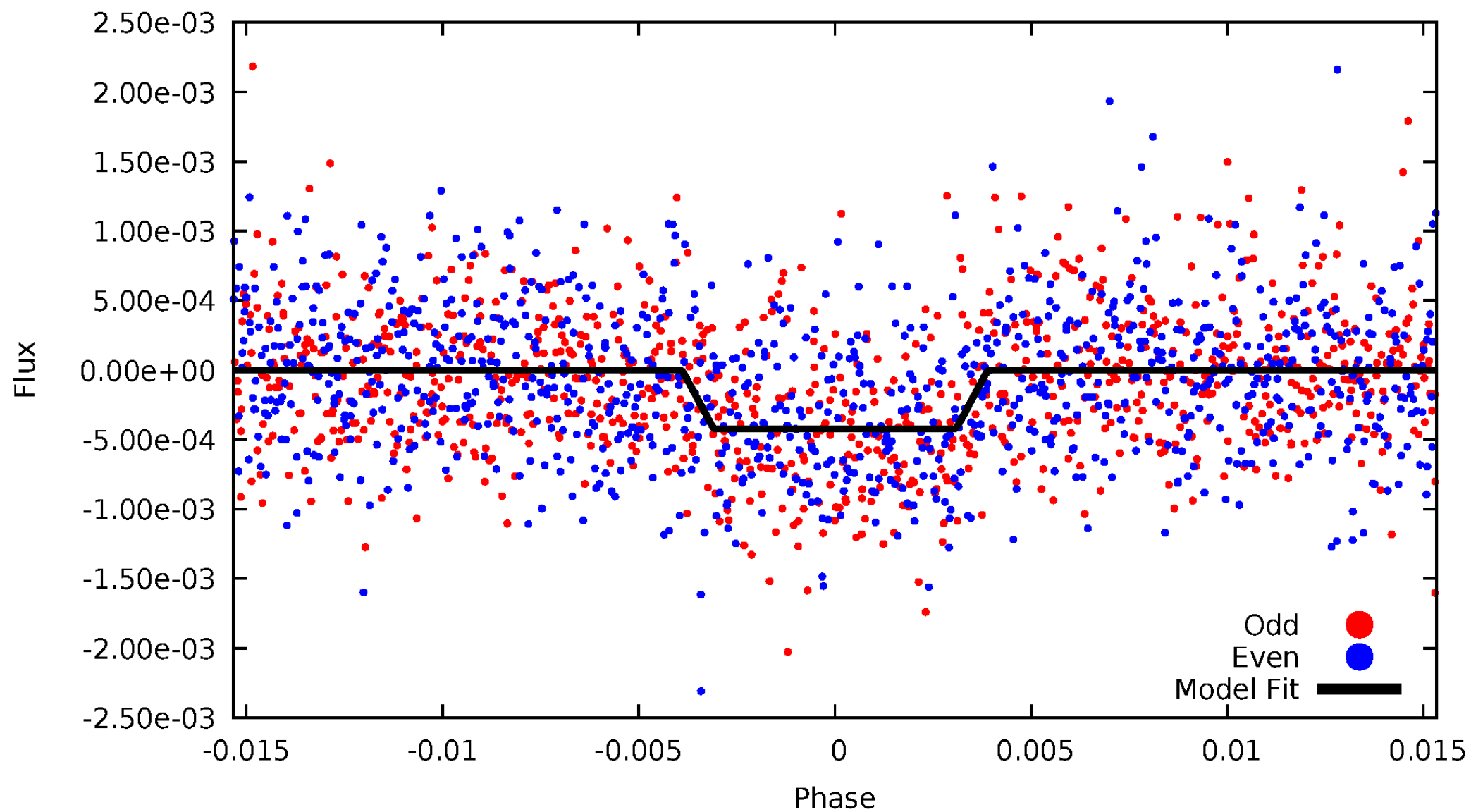
# DV Odd/Even

TCE 011080405-01



# ALT Odd/Even

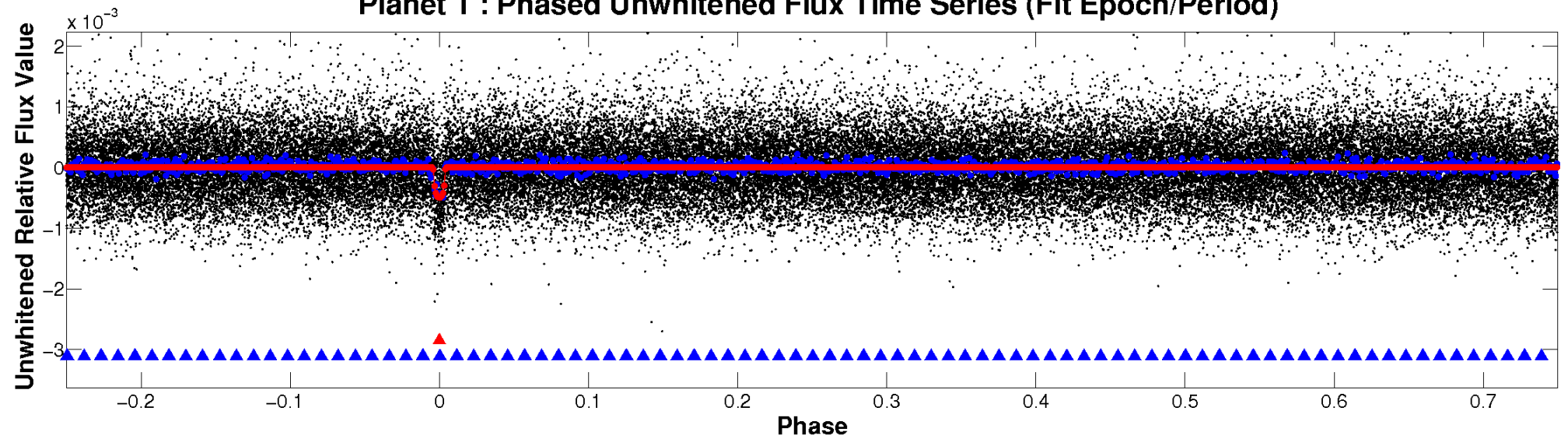
TCE 011080405-01



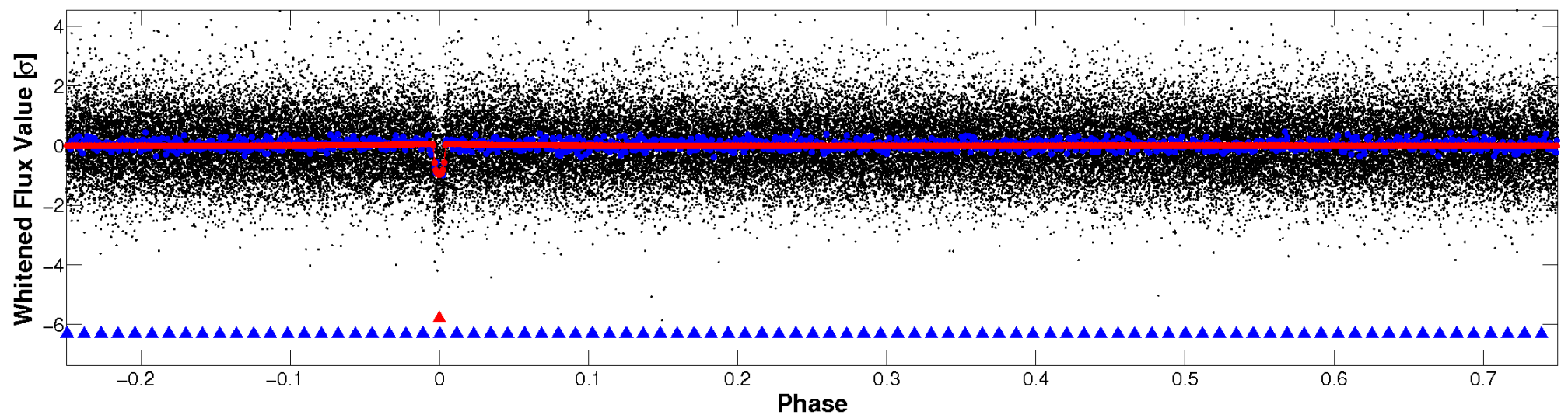


# Non-Whitened Vs. Whitened Light Curve

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

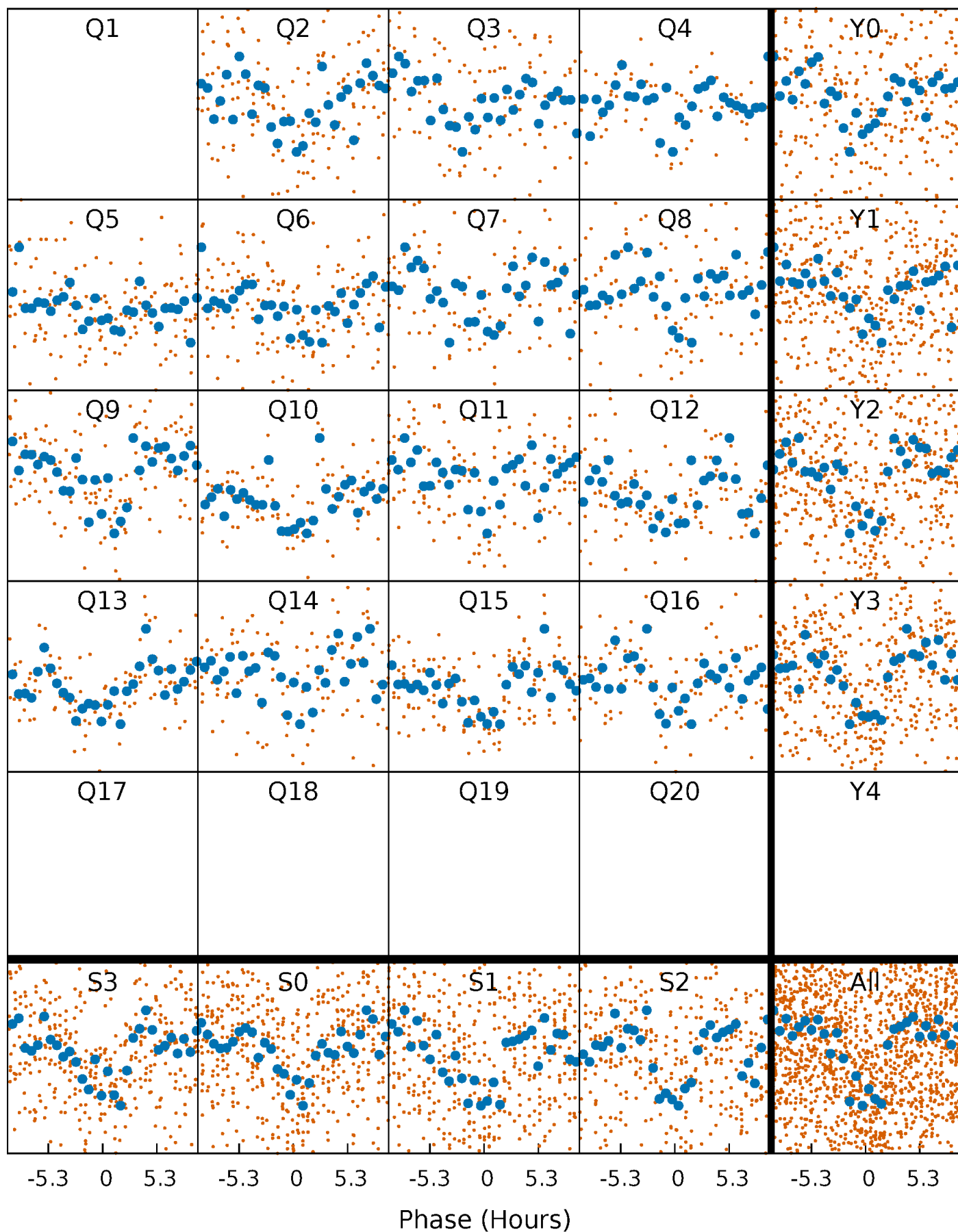


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

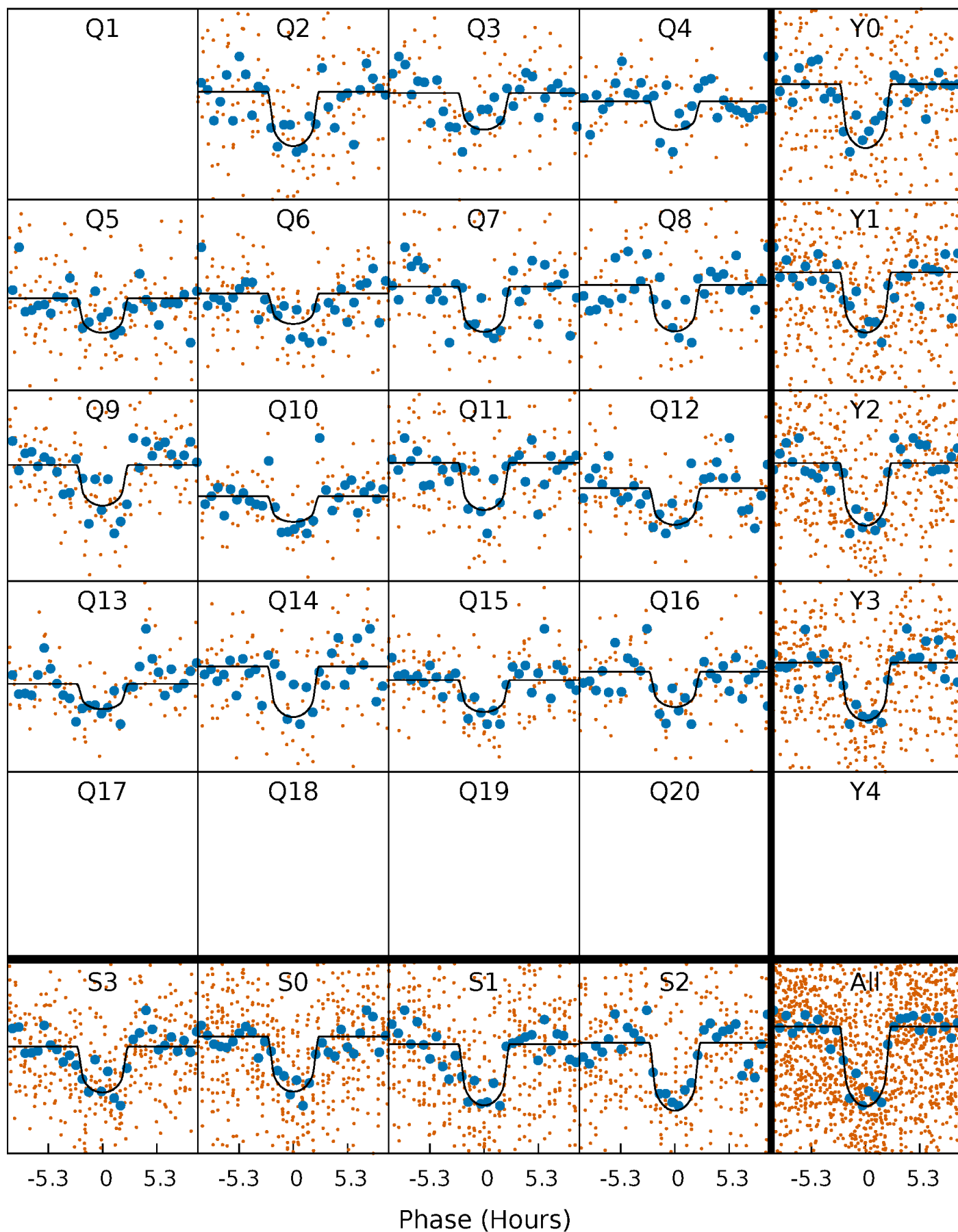
TCE 011080405-01 P= 25.193306 Days  $T_0=146.433672$  (BKJD)





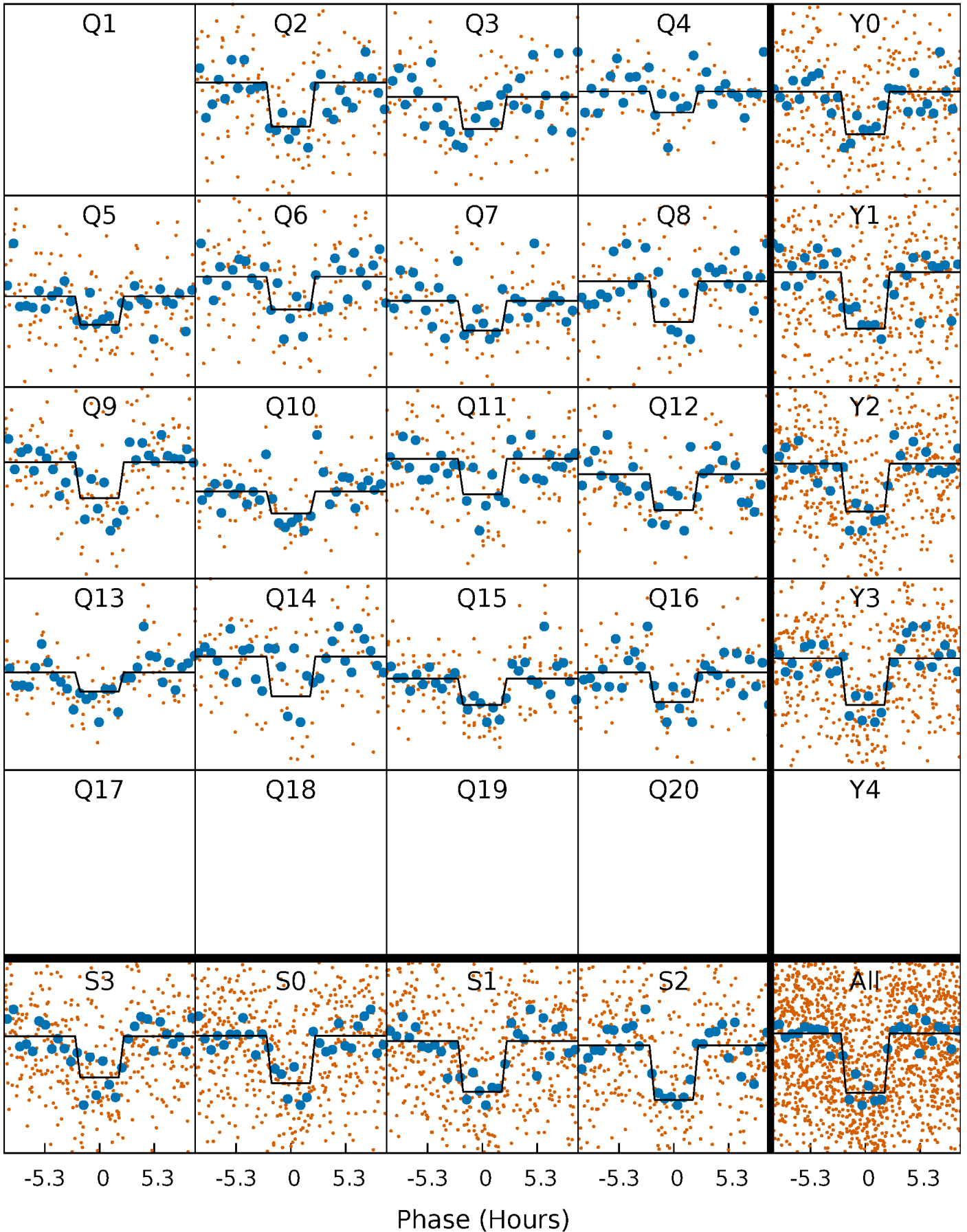
# DV Quarter-Phased Transit Curves

TCE 011080405-01 P= 25.193306 Days  $T_0=146.433672$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

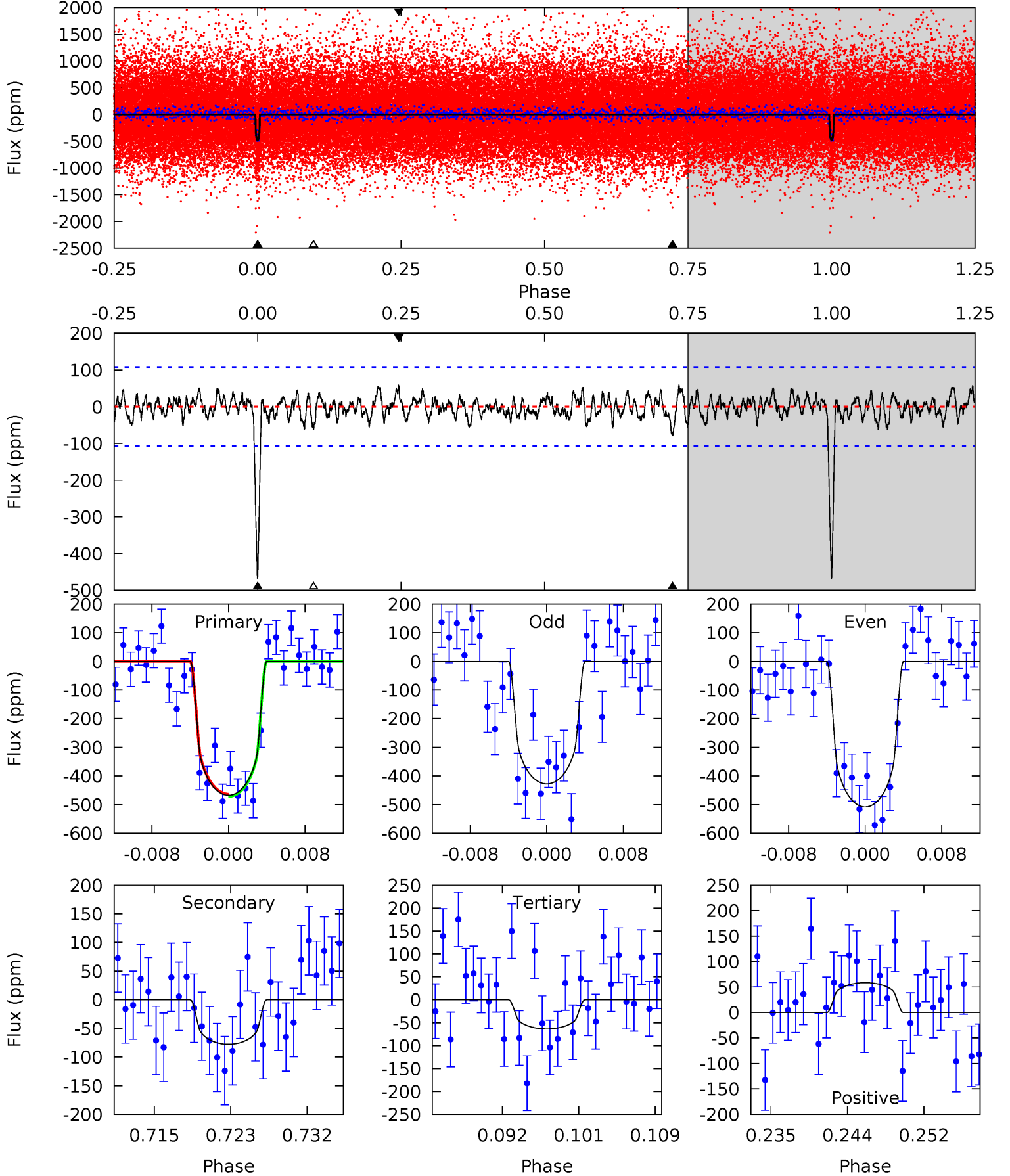
TCE 011080405-01 P= 25.192928 Days  $T_0=146.444820$  (BKJD)



# DV Model-Shift Uniqueness Test

011080405-01, P = 25.193306 Days, E = 146.433672 Days

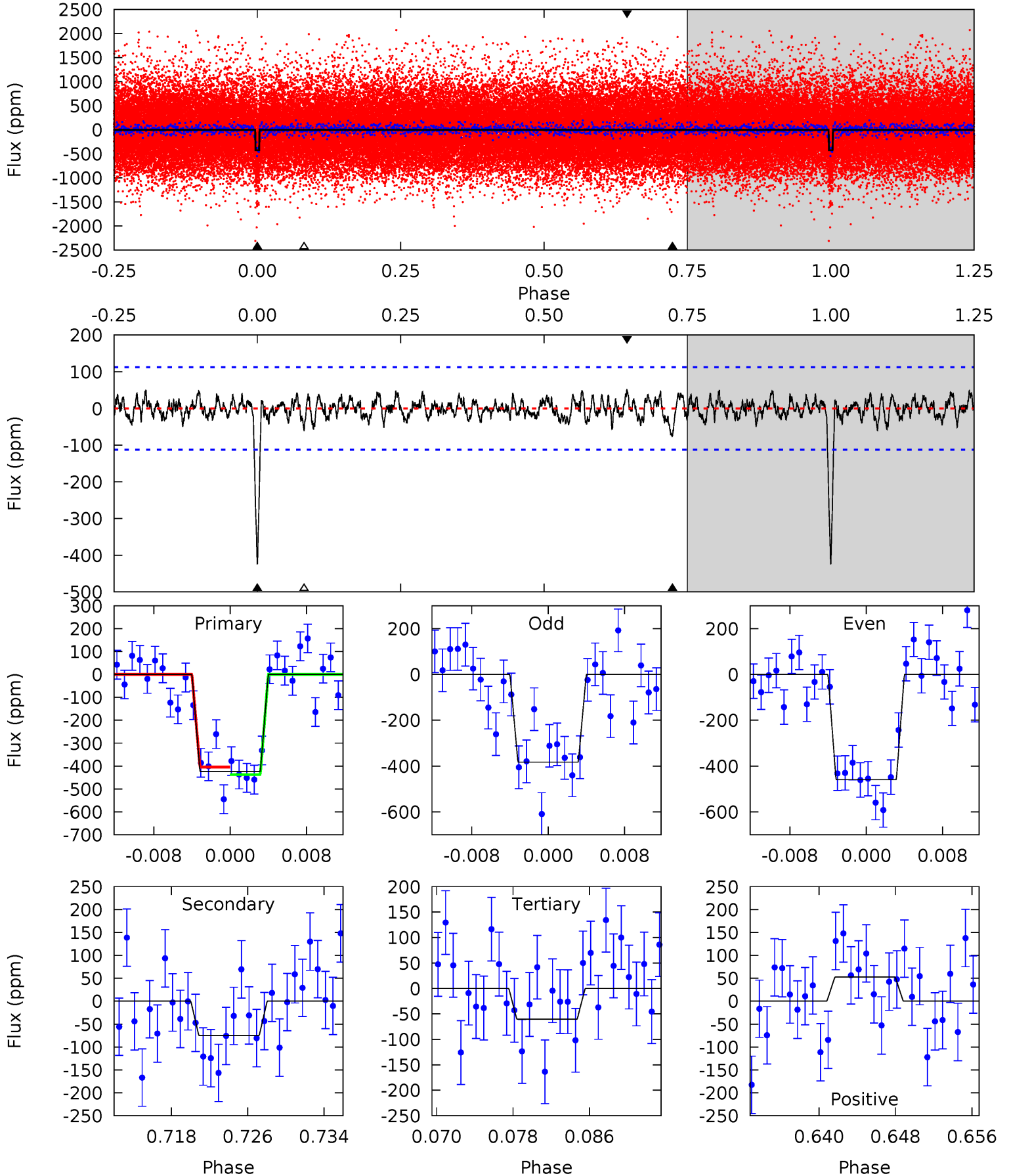
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
22.0	3.65	2.98	2.75	5.06	2.64	1.07	19.0	19.2	0.67	0.90	1.89	1.04	0.11	0.19



# Alt Model-Shift Uniqueness Test

011080405-01,  $P = 25.192928$  Days,  $E = 146.444820$  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
19.1	3.38	2.73	2.37	5.07	2.66	0.93	16.4	16.7	0.66	1.01	1.73	0.93	0.11	0.74



### Stellar Parameters For KIC 011080405

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5009^{+82}_{-75}$	$4.491^{+0.077}_{-0.028}$	$0.160^{+0.150}_{-0.150}$	$0.840^{+0.038}_{-0.063}$	$0.797^{+0.059}_{-0.025}$	$1.892^{+0.557}_{-0.198}$
	+2%/-1%	+2%/-1%	+94%/-94%	+5%/-8%	+7%/-3%	+29%/-10%
Source	SPE90	SPE90	SPE90	DSEP		

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

### Secondary Eclipse Parameters for KIC 011080405-01 / KOI 2442.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-78 \pm 21$	$2.04^{+0.94}_{-0.87}$	$712^{+15}_{-18}$	$3551^{+796}_{-434}$	$247^{+562}_{-140}$
Alt.	$-75 \pm 22$	$1.93^{+0.91}_{-0.91}$	$712^{+16}_{-17}$	$3578^{+930}_{-447}$	$270^{+698}_{-156}$

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



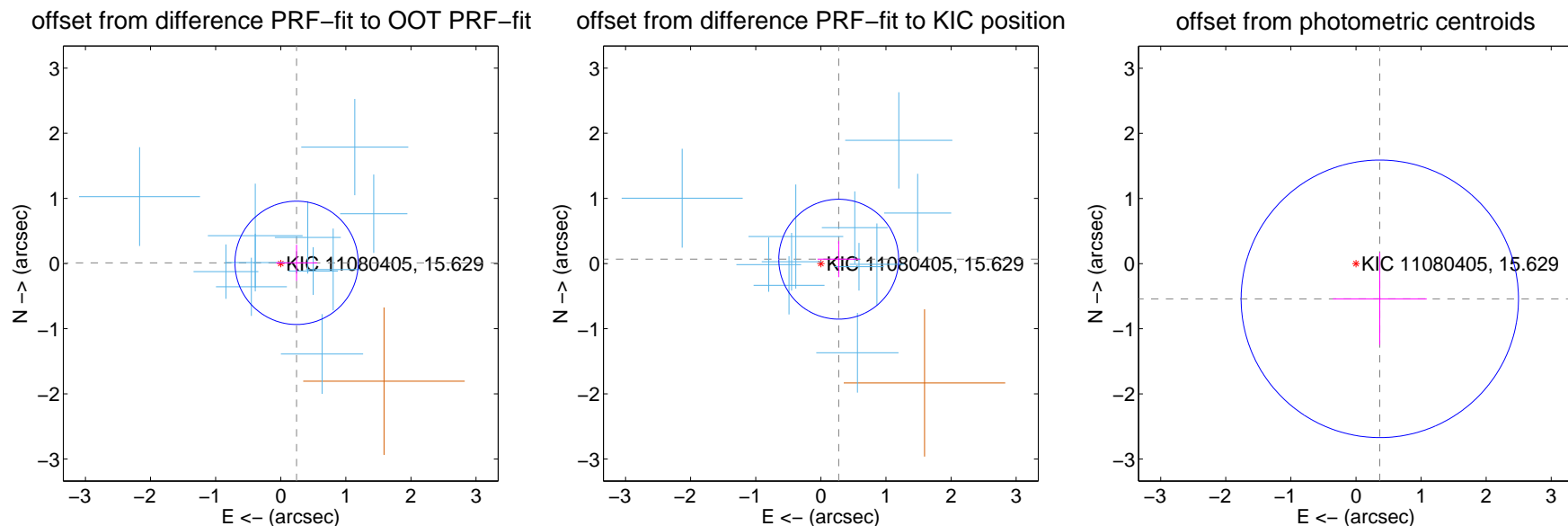
## DV Centroid Data

Supplemental centroid analysis for 011080405-01. Kepler magnitude: 15.63. Transit SNR 17.30

There are 11 quarters with good PRF difference image offsets

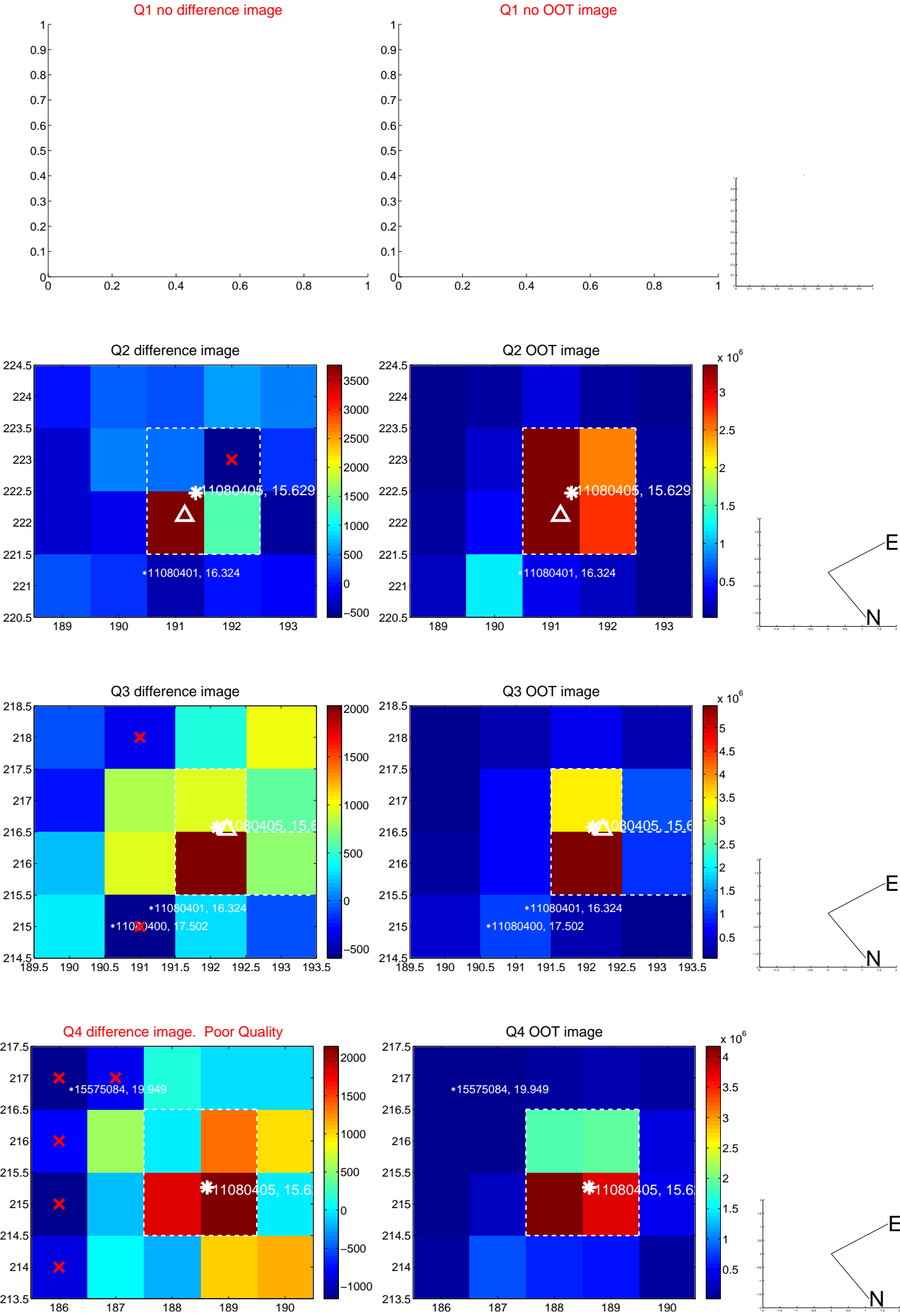
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.243 \pm 0.316$	0.77	$-0.243 \pm 0.317$	$0.011 \pm 0.277$
PRF-fit source offset from KIC position	$0.282 \pm 0.307$	0.92	$-0.274 \pm 0.325$	$0.067 \pm 0.277$
photometric centroid source offset	$0.65 \pm 0.71$	0.92	$-0.37 \pm 0.72$	$-0.54 \pm 0.71$

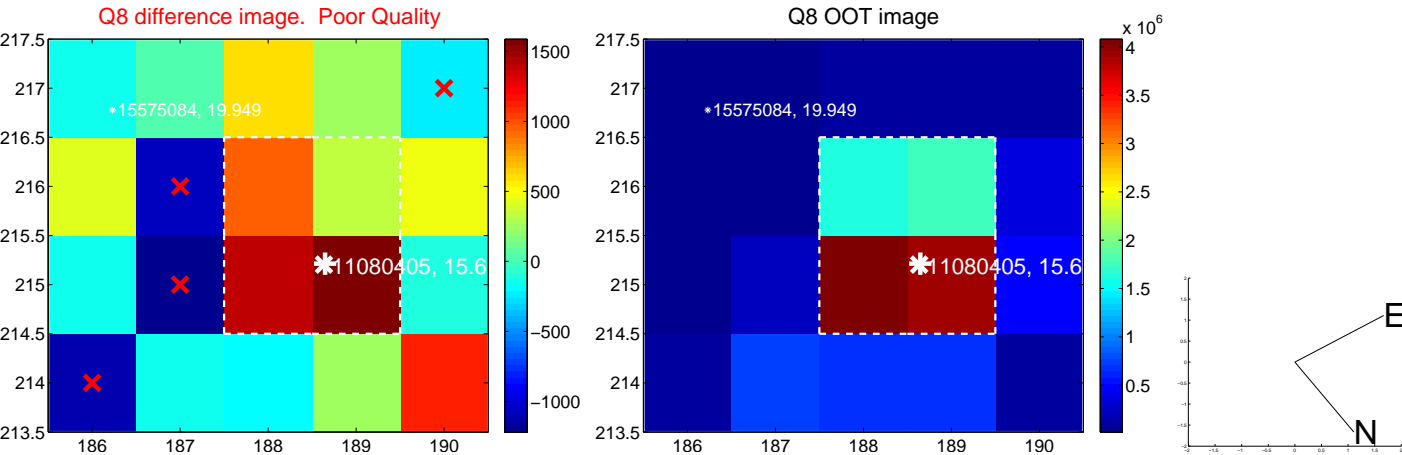
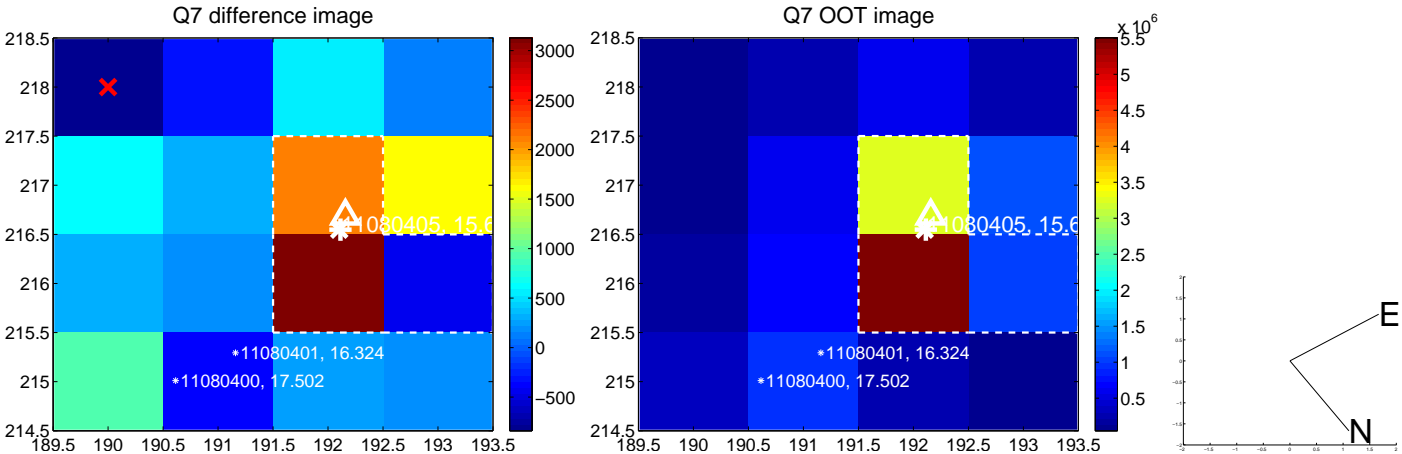
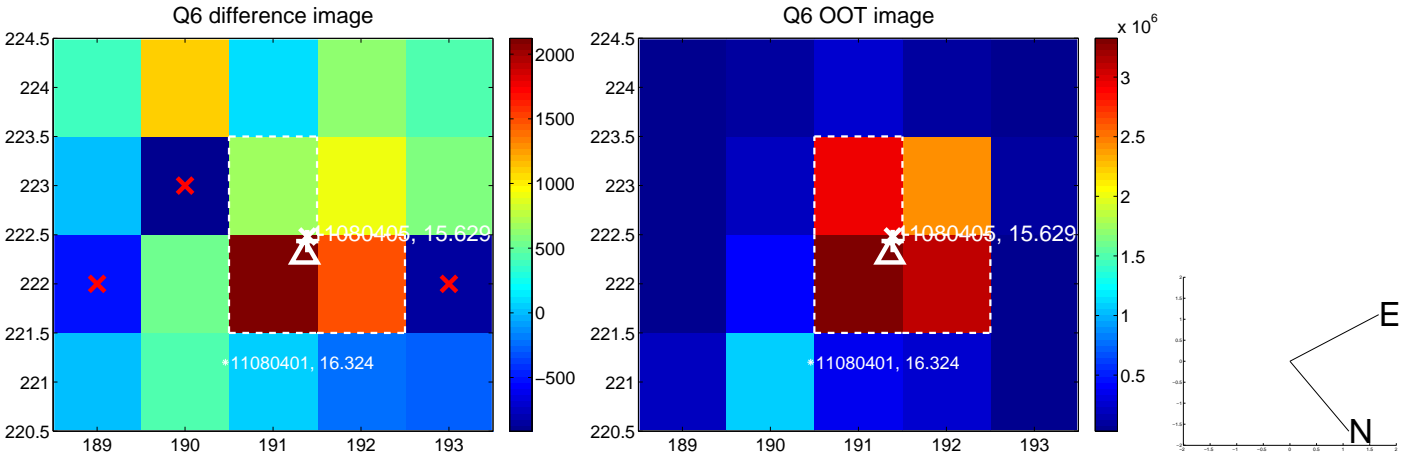
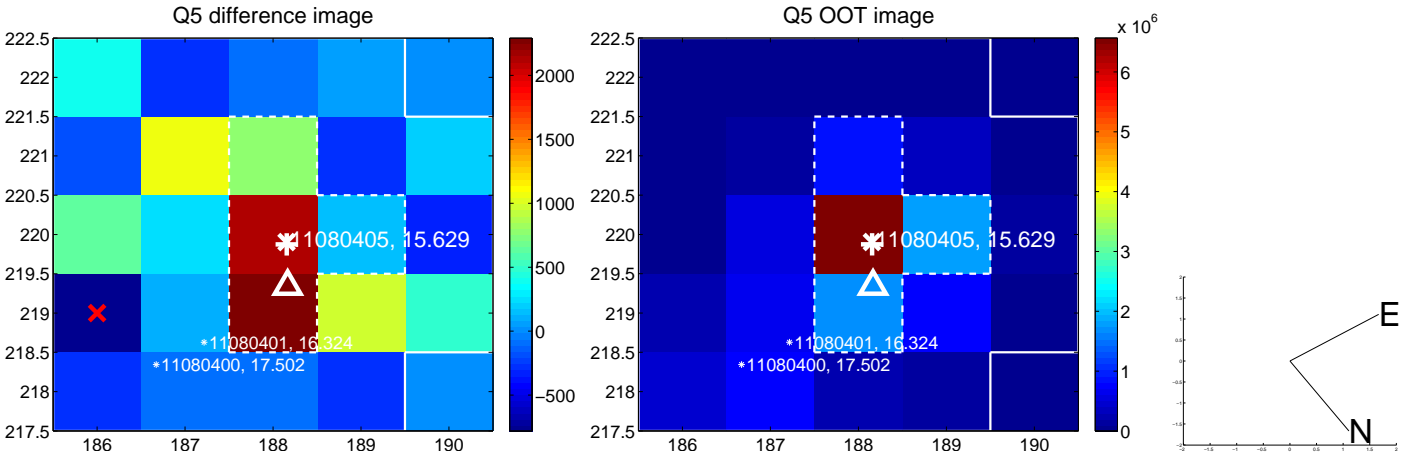


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

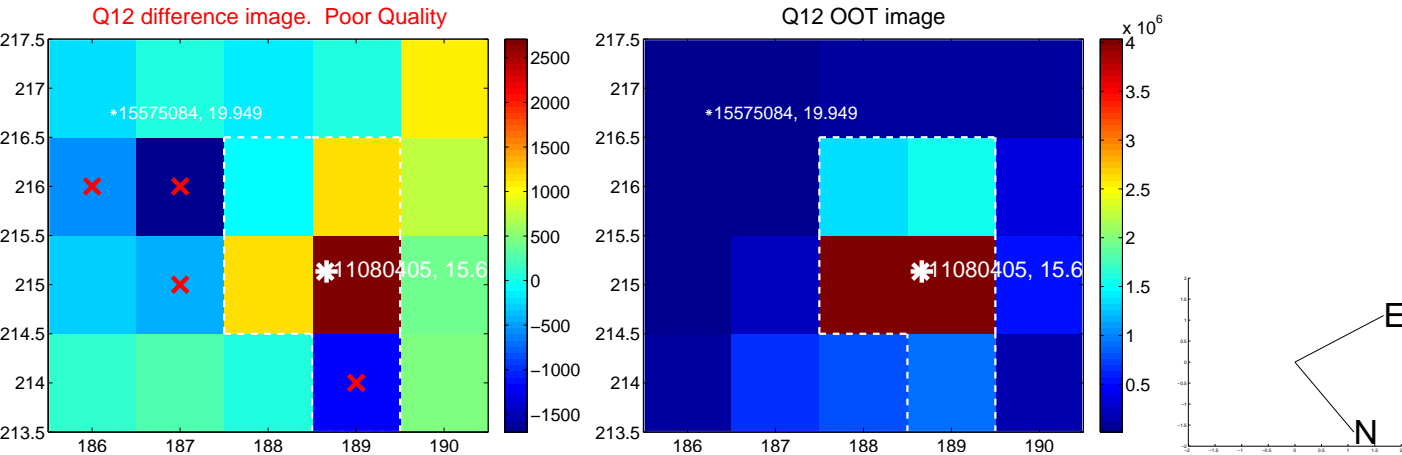
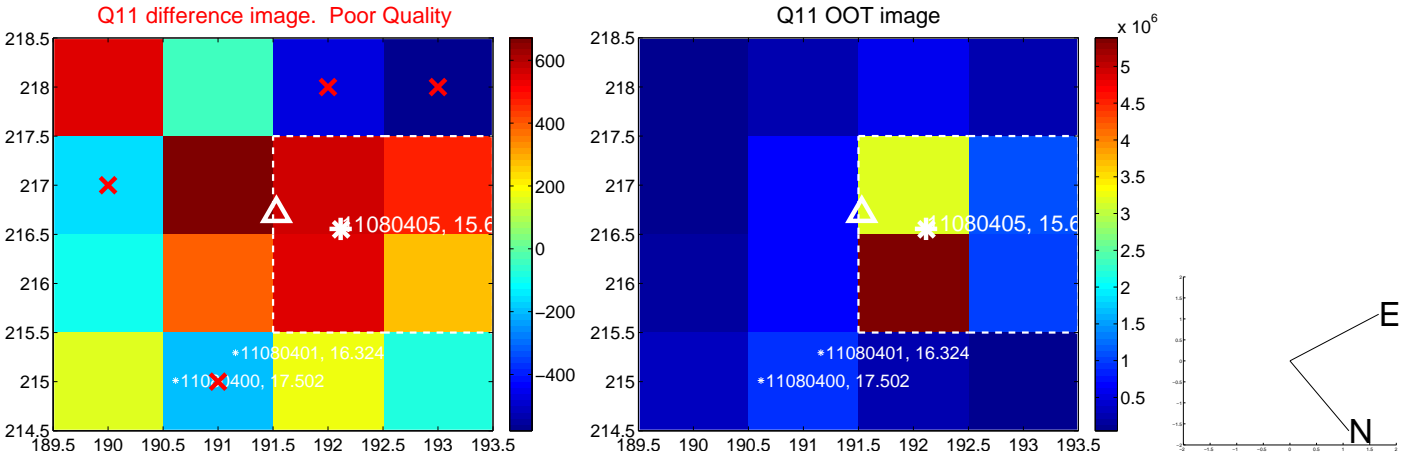
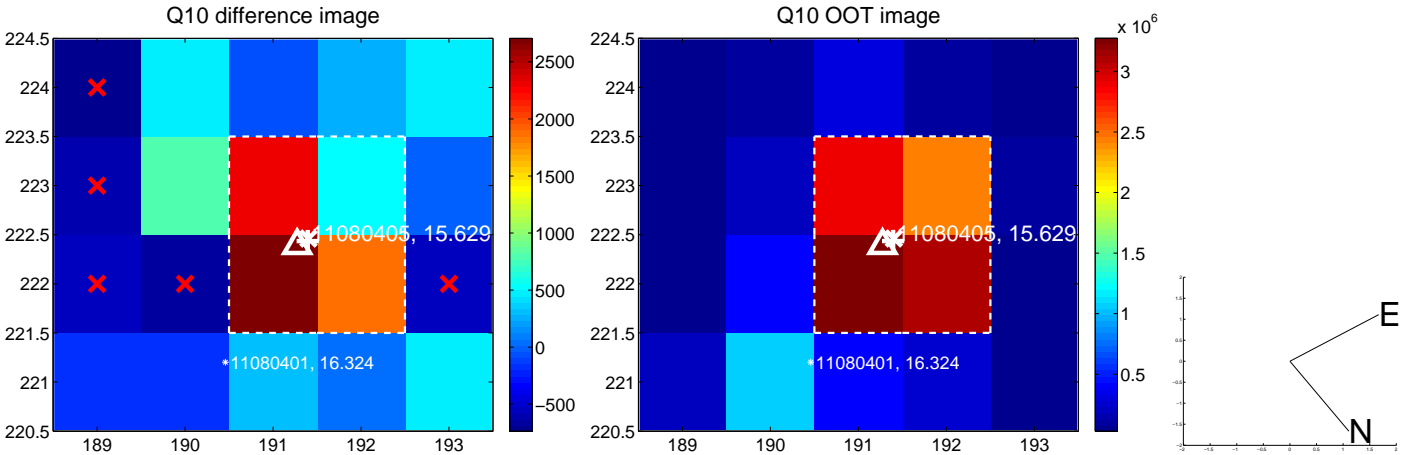
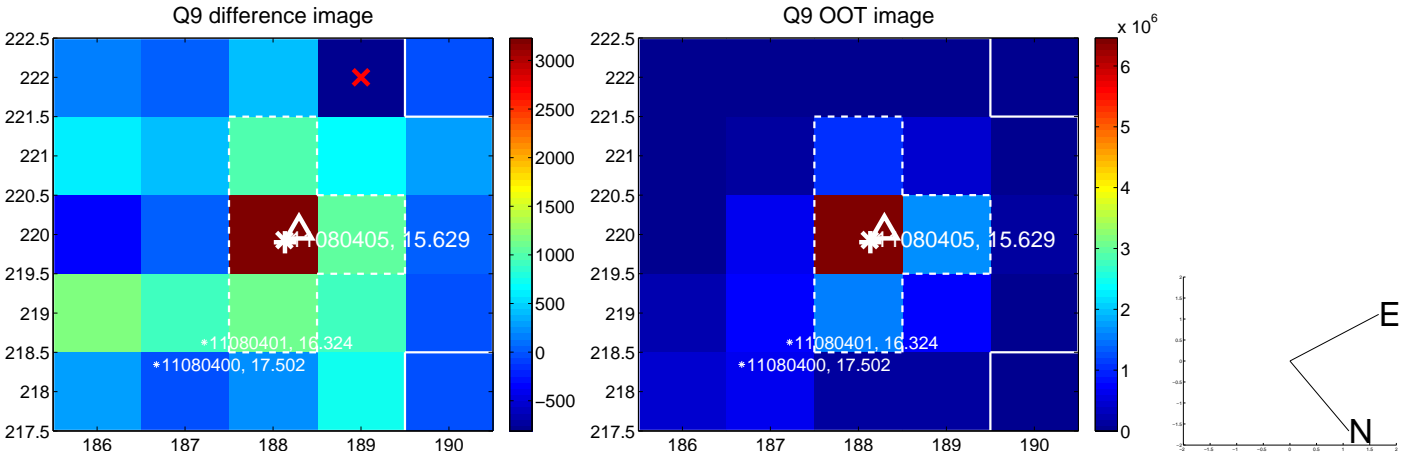
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



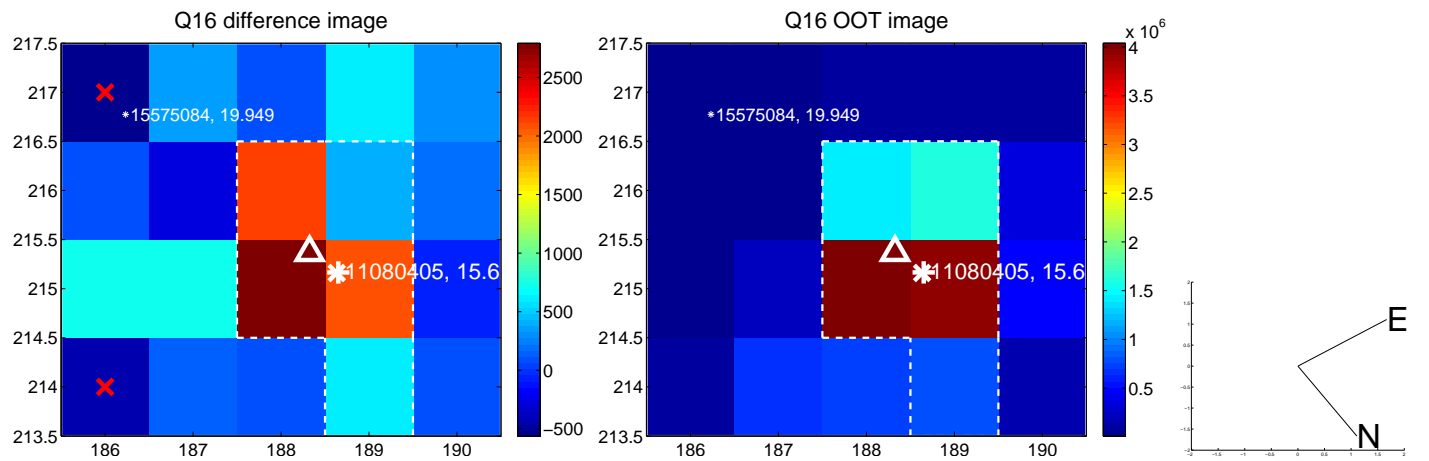
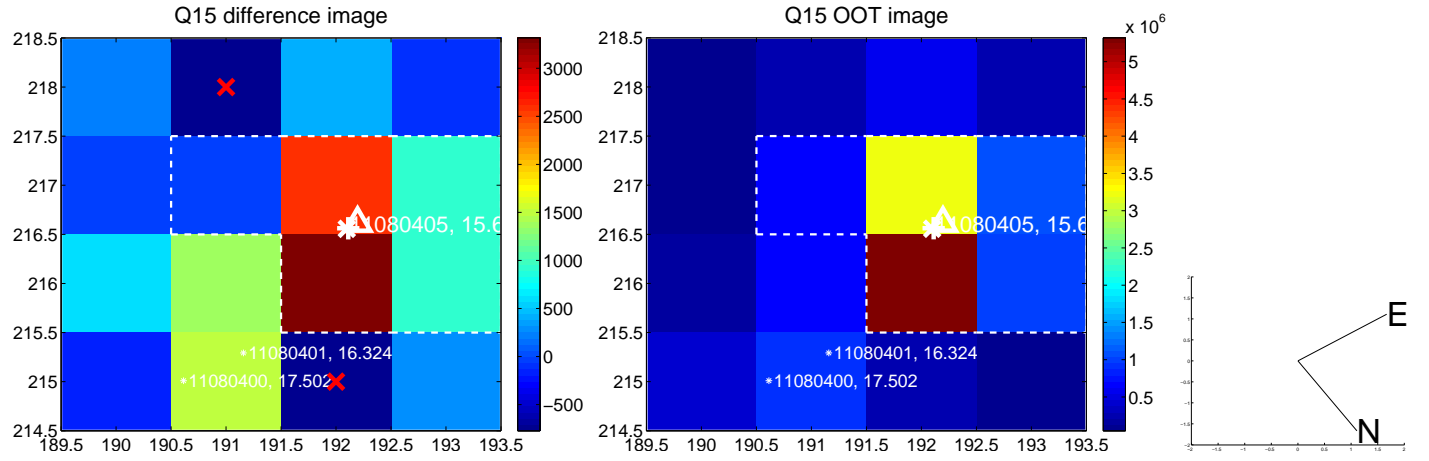
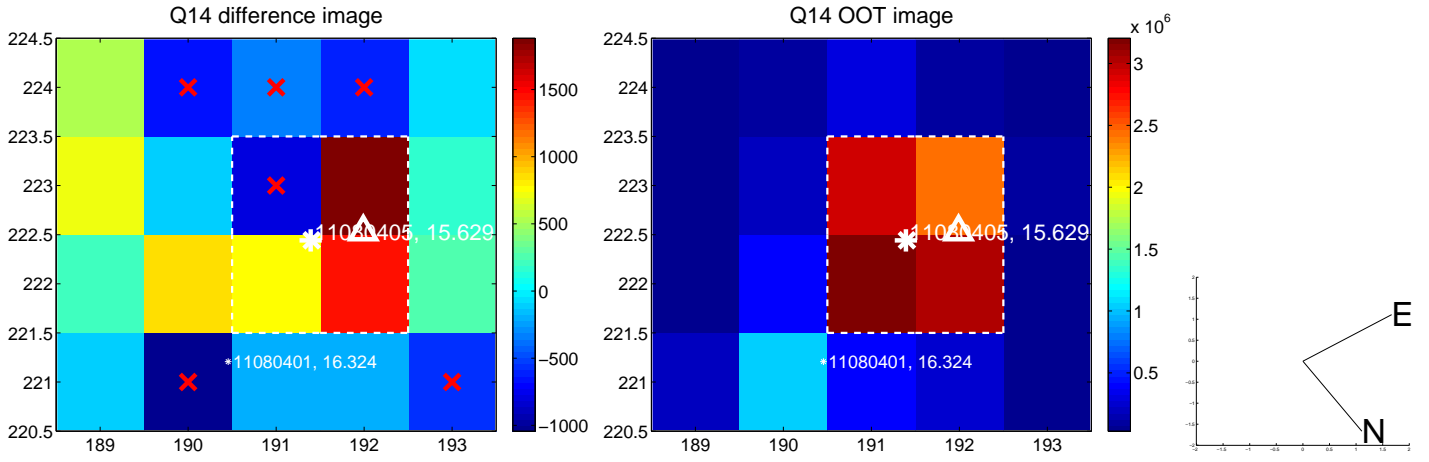
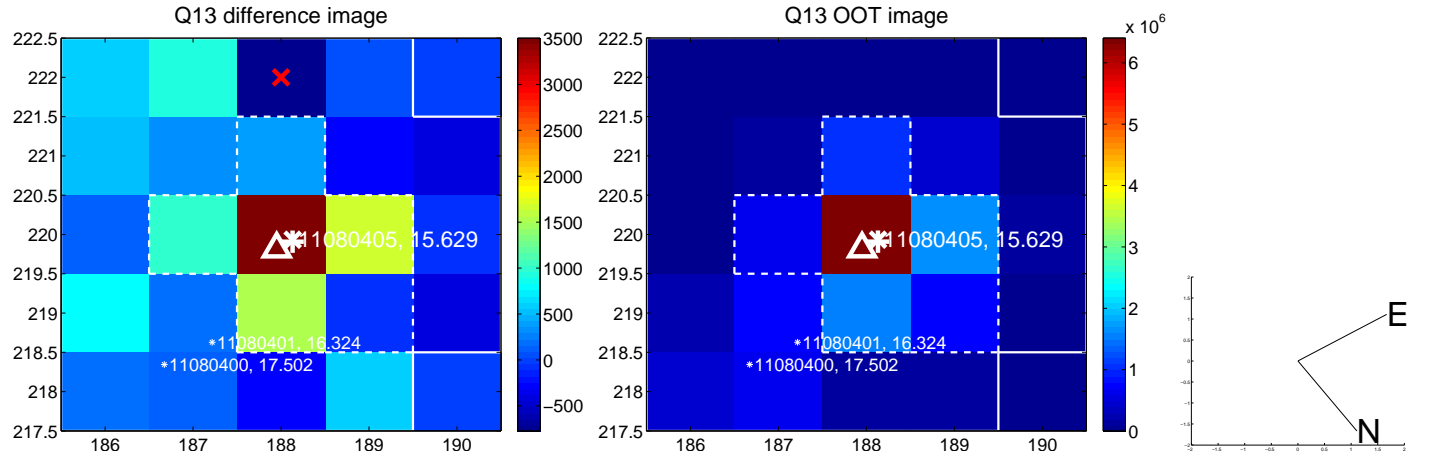
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

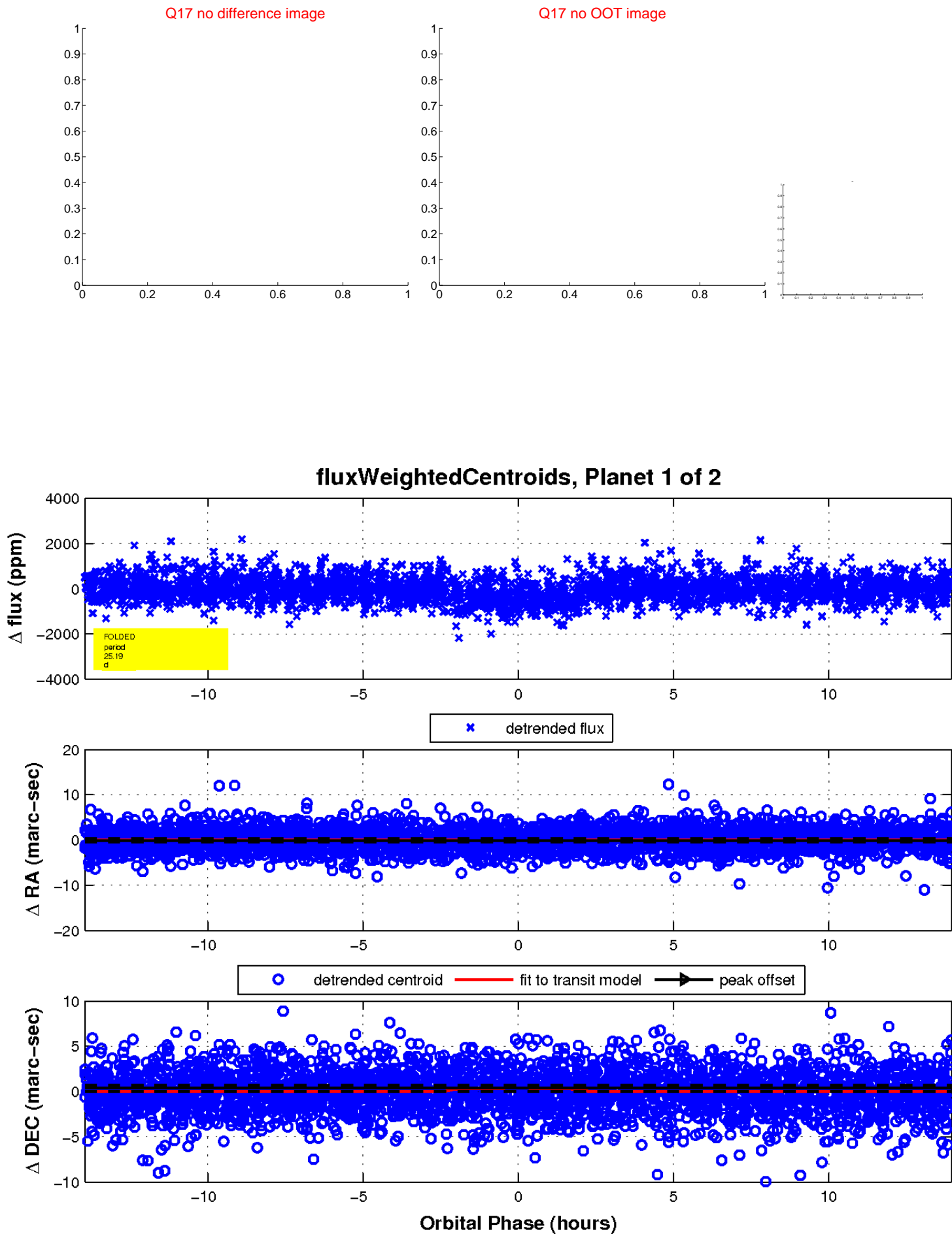


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



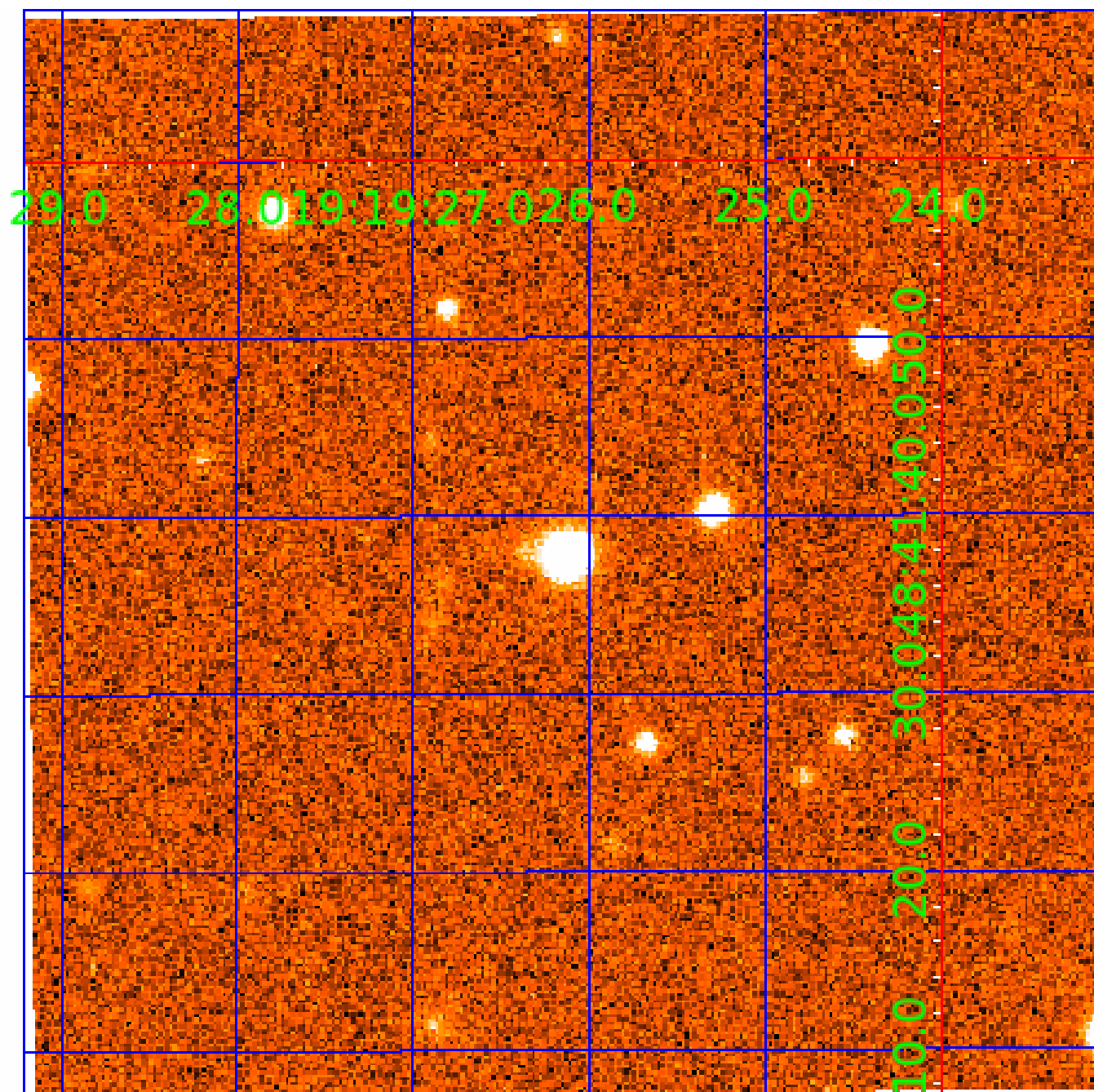


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 011080405

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
011080405-01	OBS	2442.01	25.193306	146.433672	497.5	4.659	16.2	17.3	0.84	5009	2.07	16.36
011080405-02	OBS	2442.02	12.310244	141.870380	240.3	3.890	10.4	11.0	0.84	5009	1.55	42.50

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
011080405-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
011080405-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT

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

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

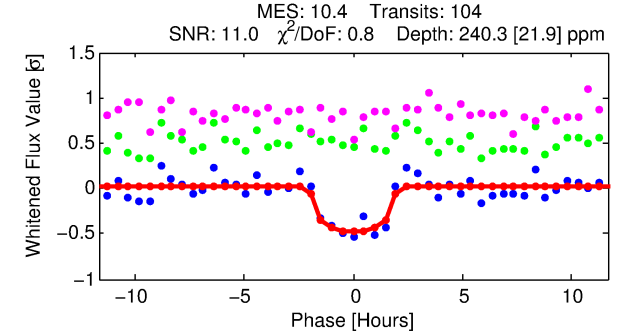
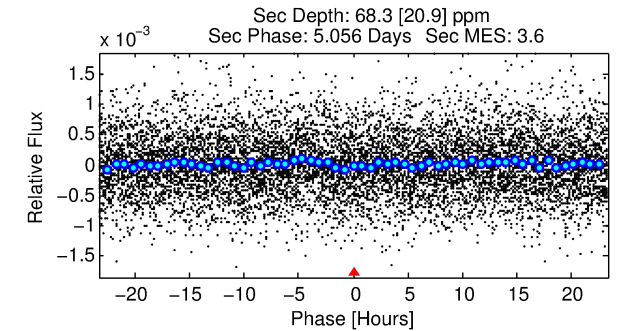
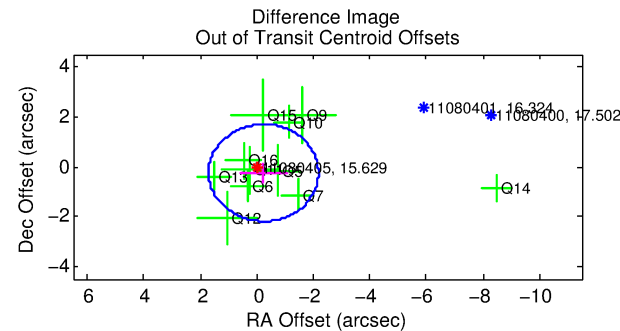
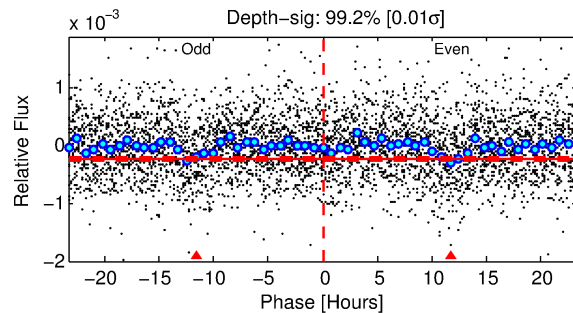
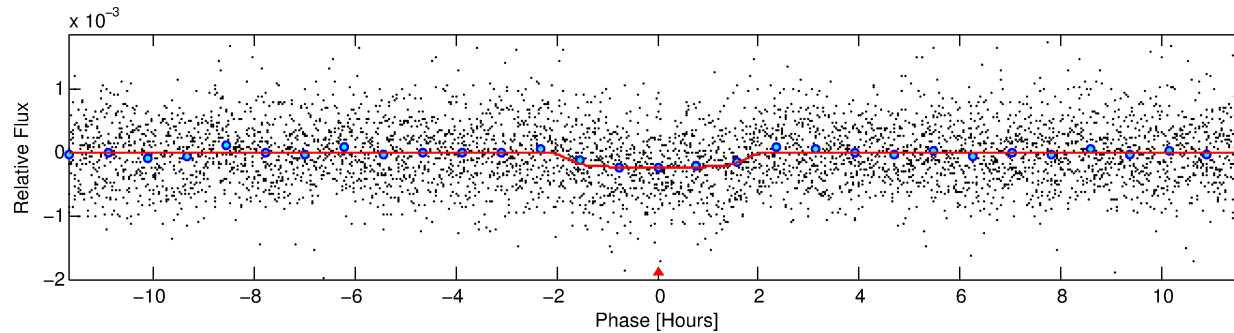
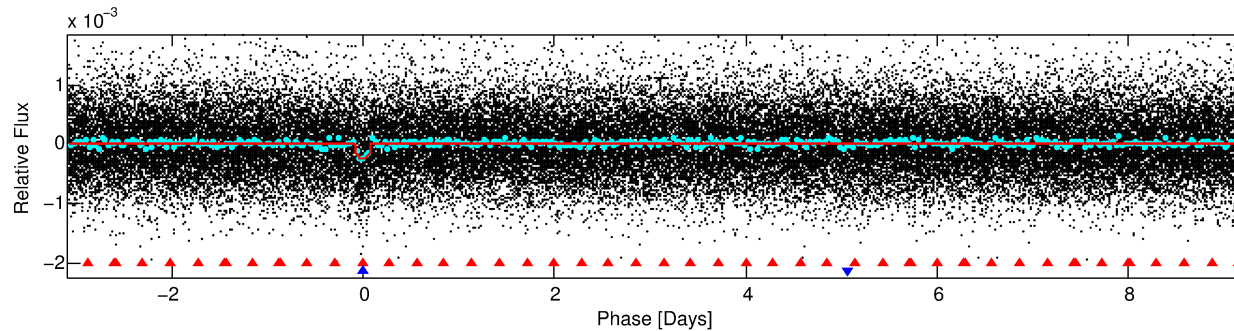
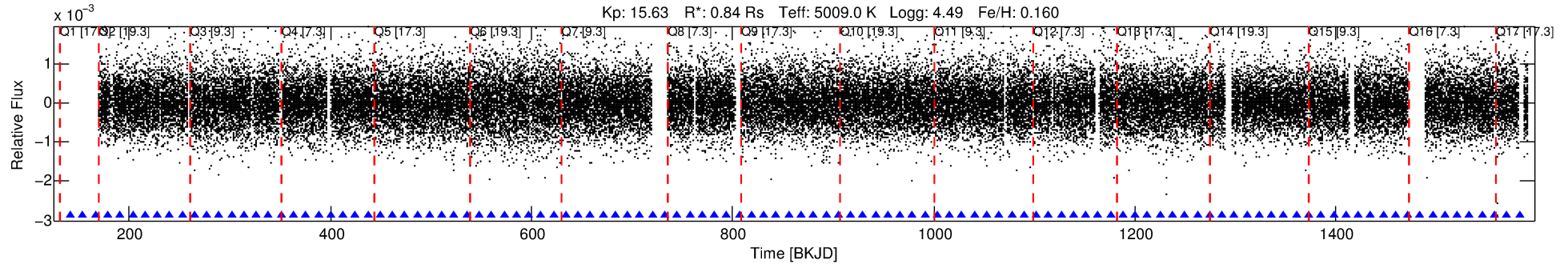
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 011080405-02

No Significant Match Found

# DV One-Page Summary

KIC: 11080405 Candidate: 2 of 2 Period: 12.310 d  
KOI: K02442.02 Name: Kepler-386b Corr: 0.965



## DV Fit Results:

Period = 12.31024 [0.00012] d  
Epoch = 141.8704 [0.0080] BKJD  
Rp/R\* = 0.0169 [0.0105]  
a/R\* = 12.52 [29.77]  
b = 0.88 [0.65]  
Seff = 42.50 [6.12]  
Teff = 651 [23] K  
Rp = 1.55 [0.97] Re  
a = 0.0968 [0.0075] AU  
Ag = 146.98 [188.87] [0.77 $\sigma$ ]  
Teffp = 3505 [1122] K [2.54 $\sigma$ ]

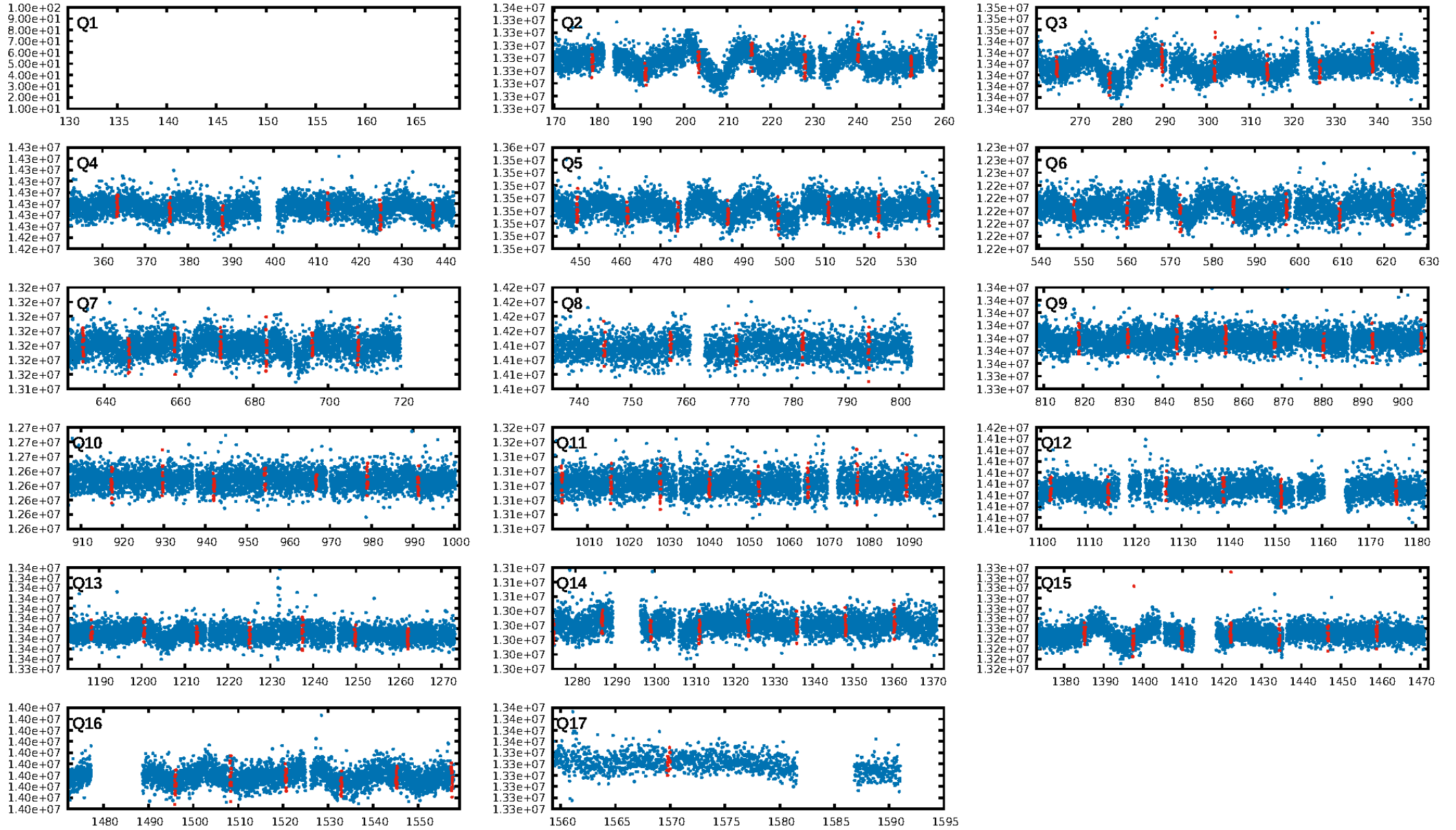
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [50.94 $\sigma$ ]  
ModelChiSquare2-sig: 98.5%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 5.31e-25  
RollingBand-fgt: 1.00 [103/103]  
GhostDiagnostic-chr: 2.596  
Centroid-sig: 54.6%  
Centroid-so: 1.328 arcsec [1.19 $\sigma$ ]  
OotOffset-rm: 0.341 arcsec [0.53 $\sigma$ ]  
KicOffset-rm: 0.320 arcsec [0.42 $\sigma$ ]  
OotOffset-st: 3/3/2/3 [11]  
KicOffset-st: 3/3/2/3 [11]  
DiffImageQuality-fgm: 0.36 [4/11]  
DiffImageOverlap-fno: 1.00 [16/16]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 28-Jan-2016 23:59:28 Z

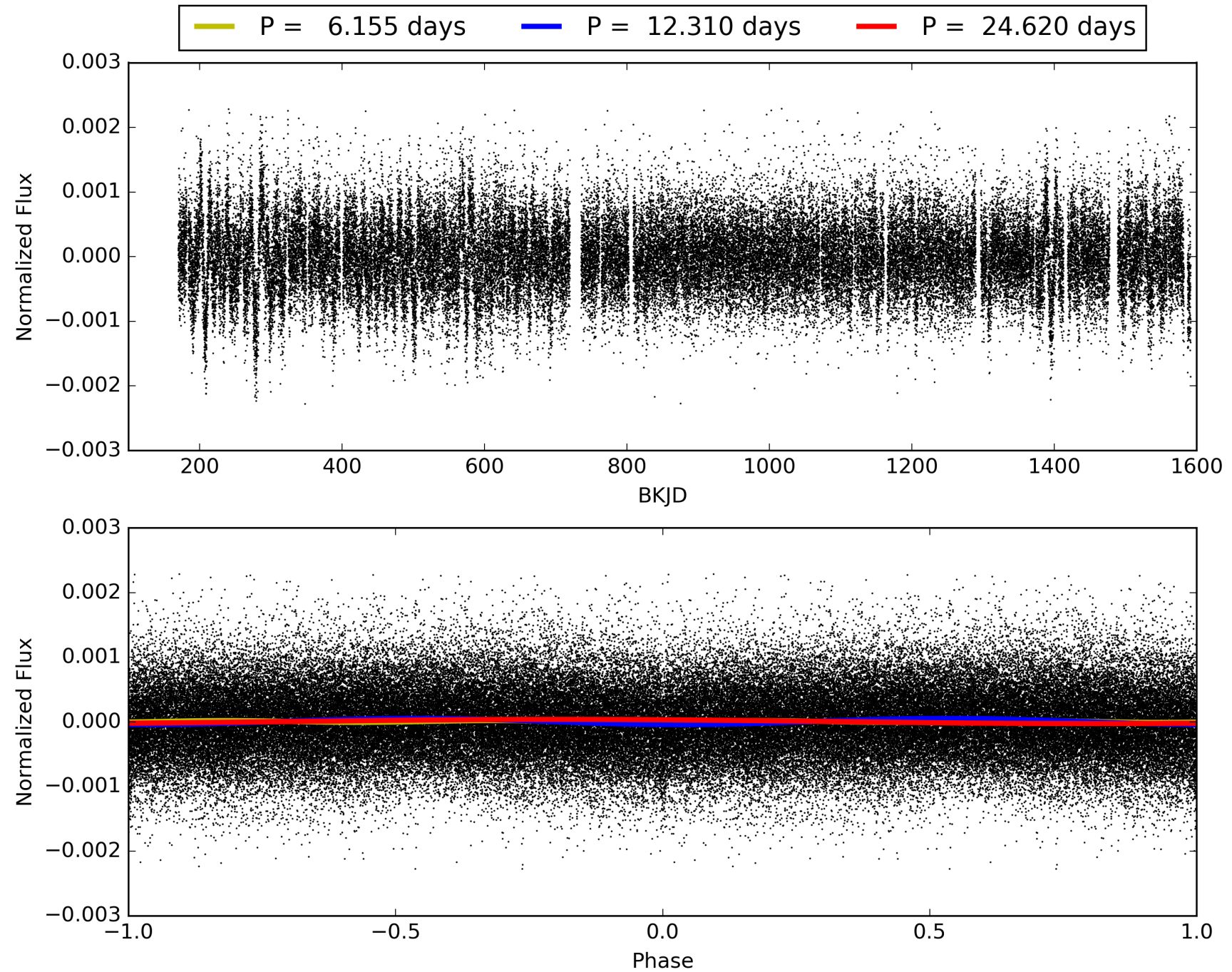
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 011080405-02, PDC Light Curves



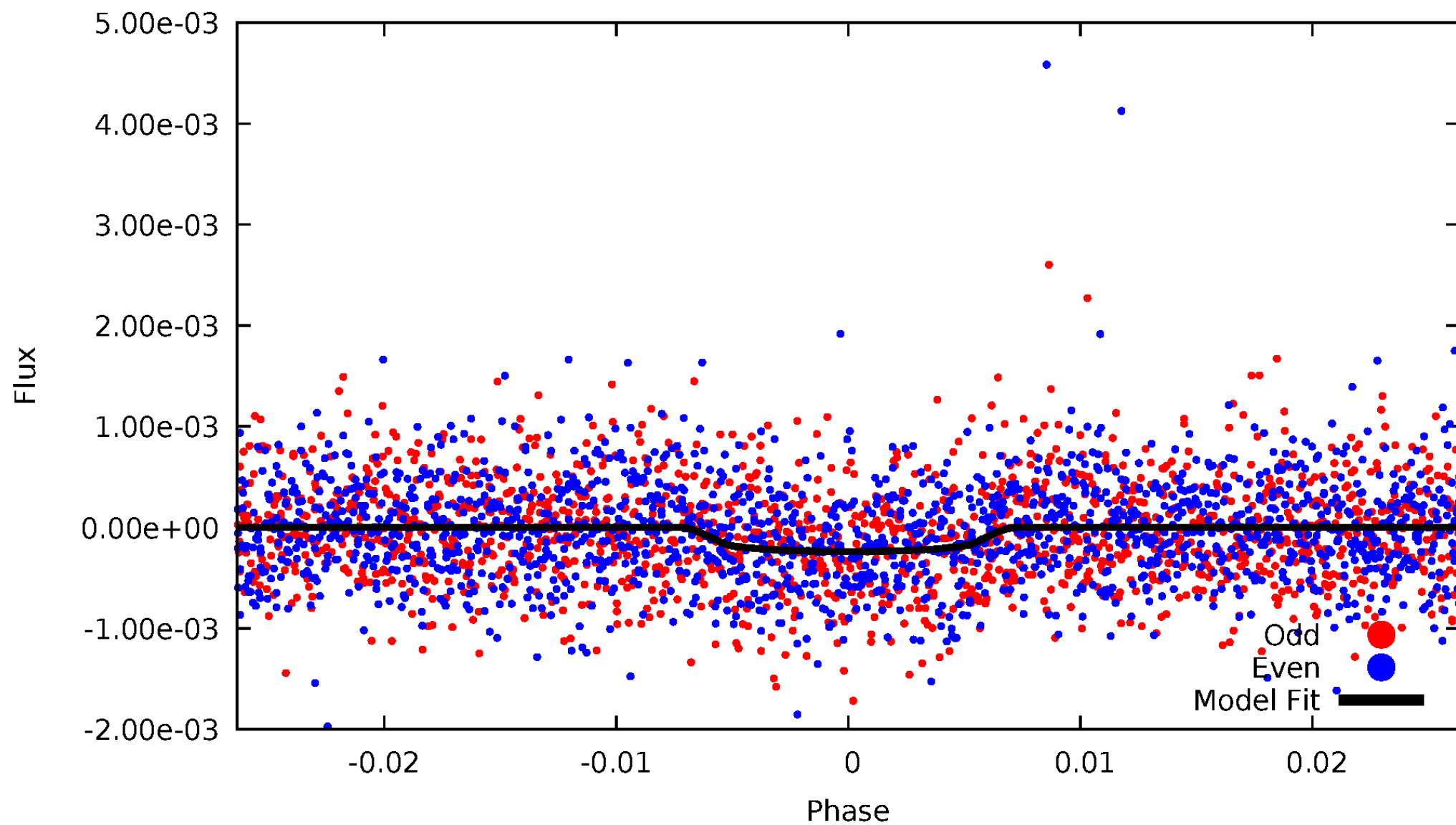


# TCE 011080405-02



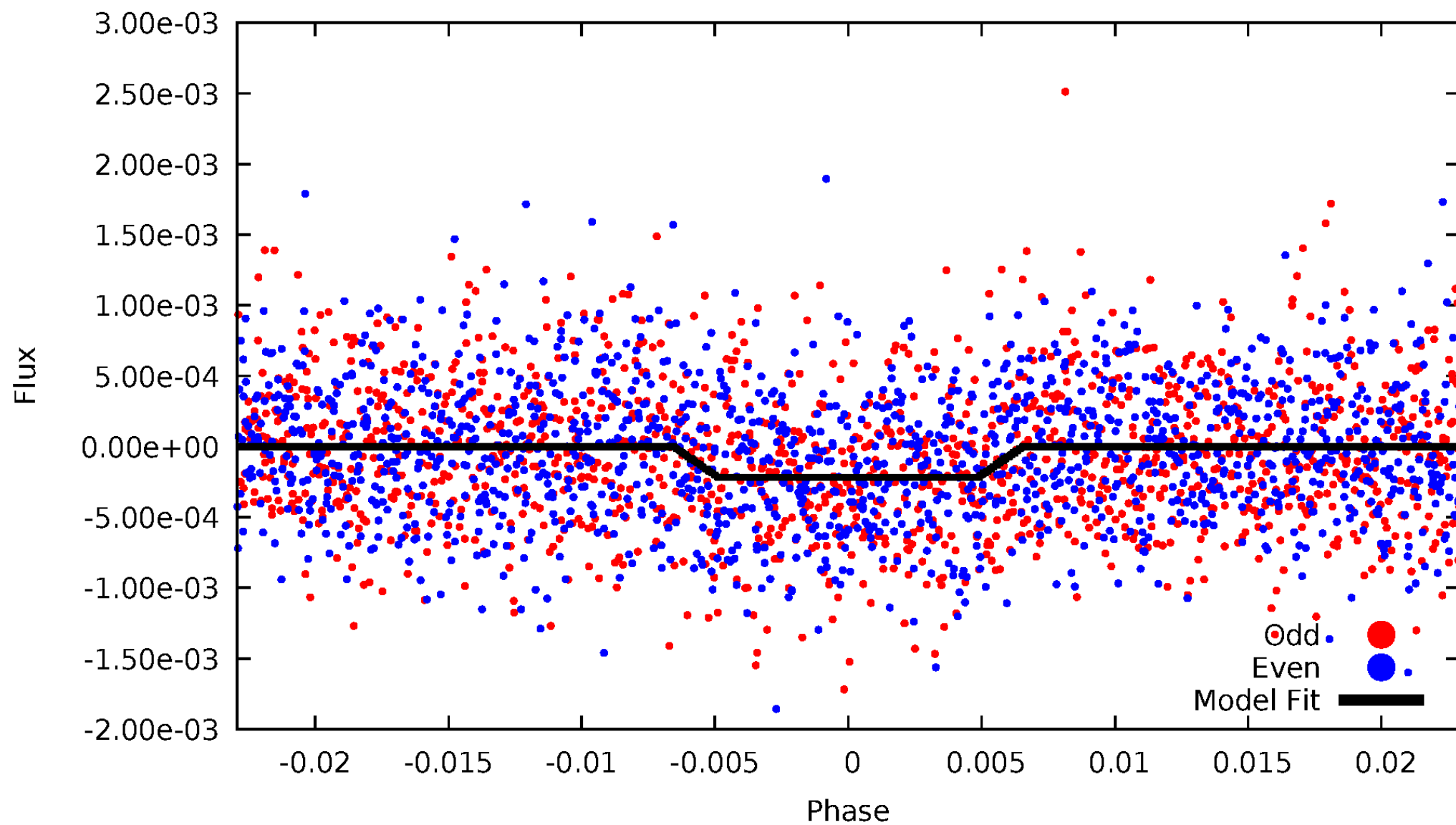
# DV Odd/Even

TCE 011080405-02



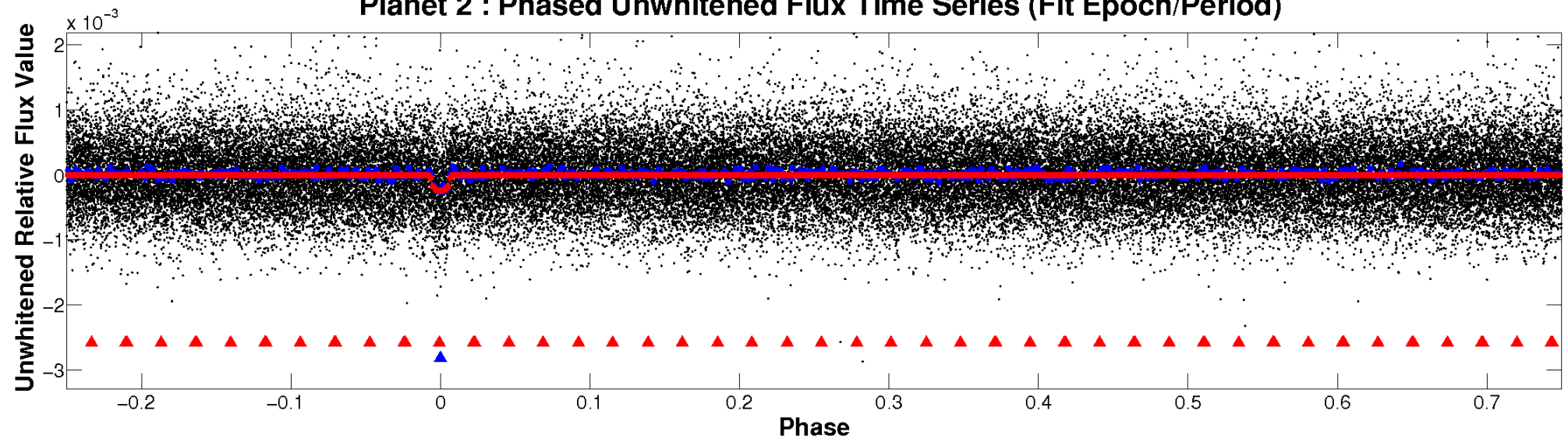
# ALT Odd/Even

TCE 011080405-02

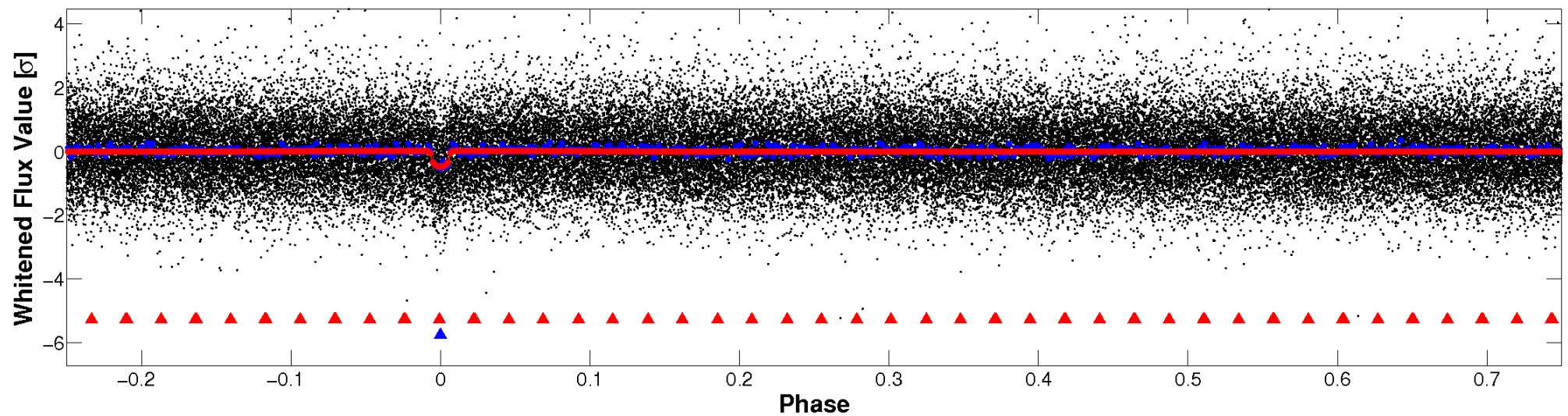


# Non-Whitened Vs. Whitened Light Curve

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

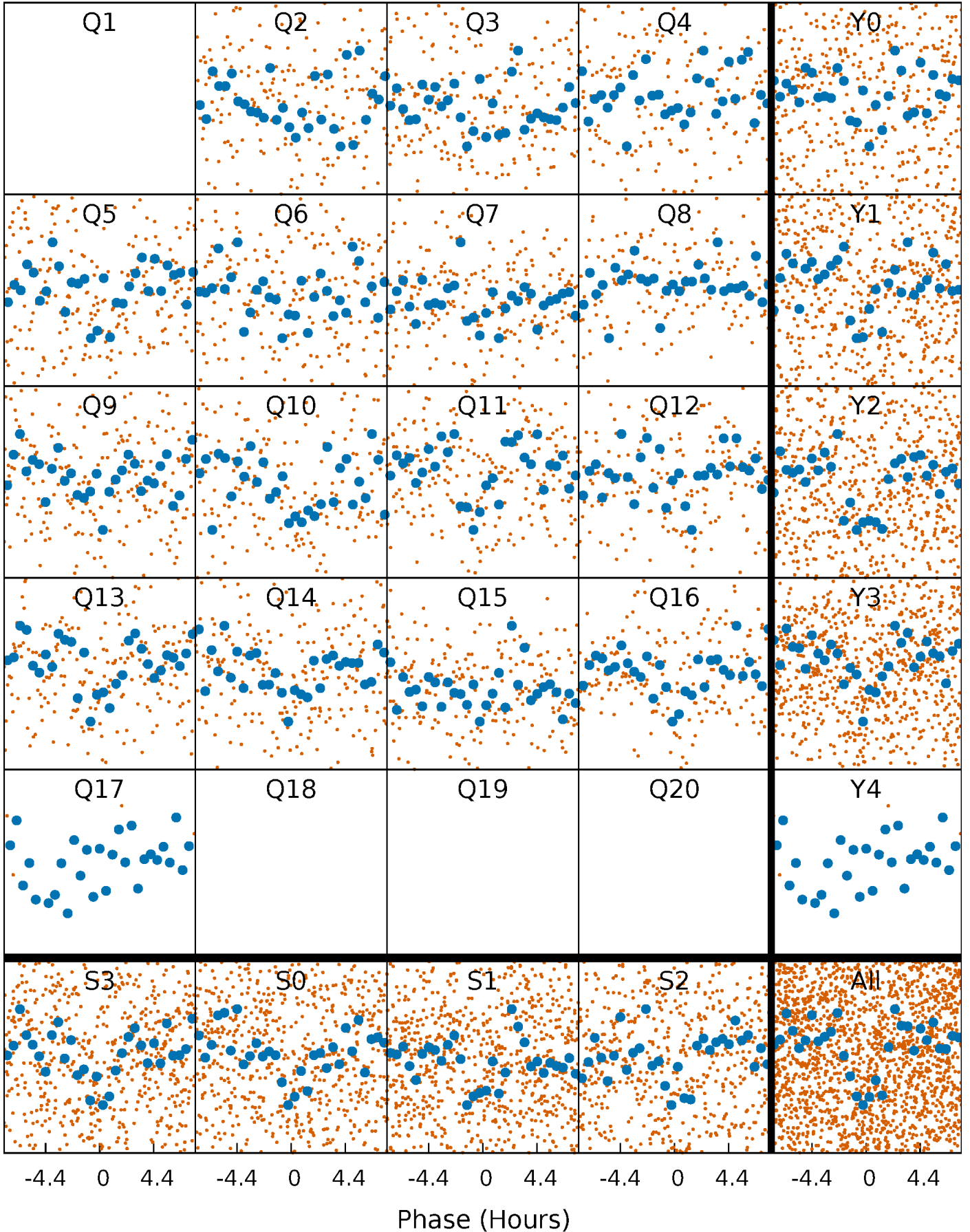


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

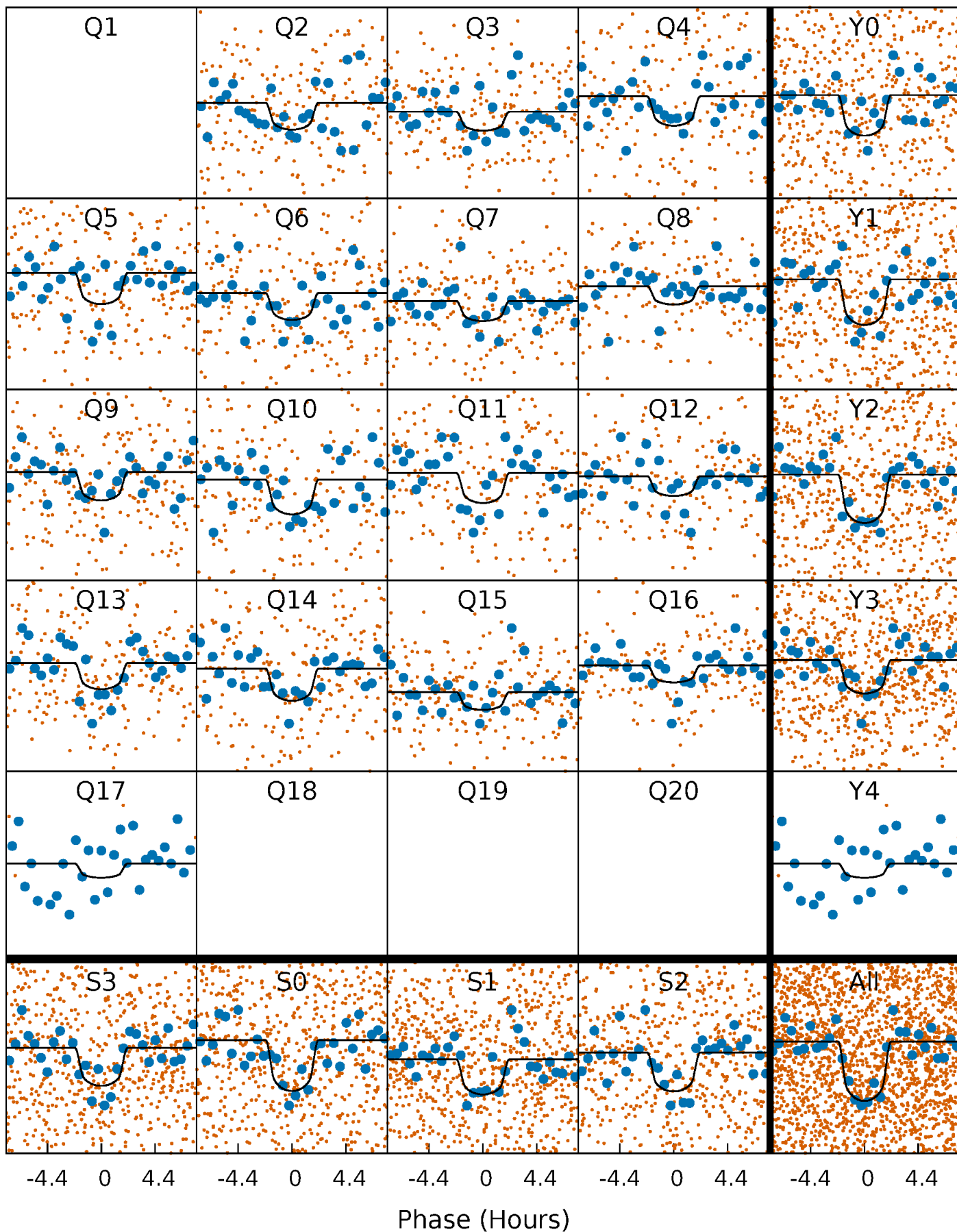
TCE 011080405-02 P= 12.310244 Days  $T_0=141.870380$  (BKJD)





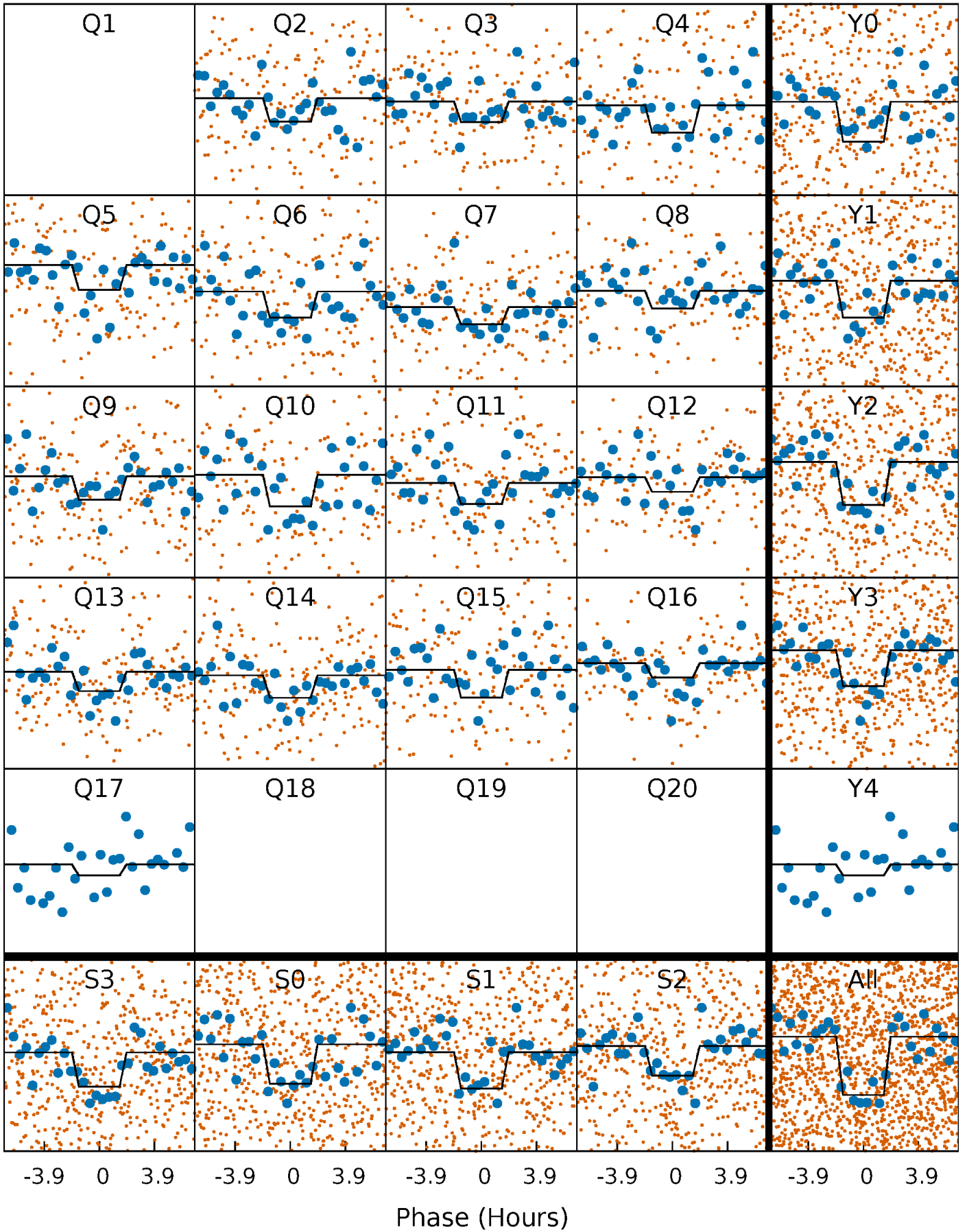
# DV Quarter-Phased Transit Curves

TCE 011080405-02 P= 12.310244 Days  $T_0=141.870380$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

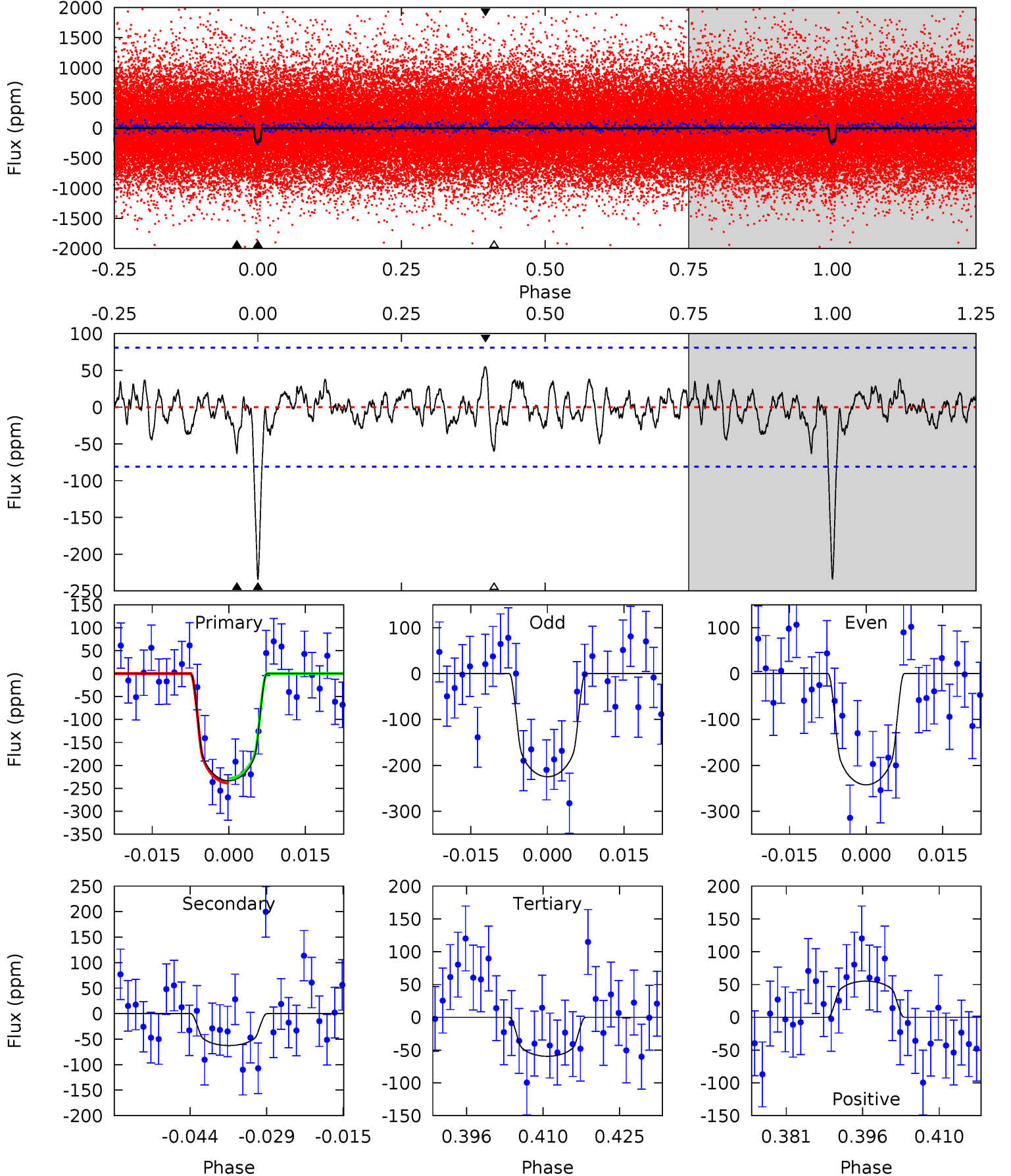
TCE 011080405-02 P= 12.310151 Days  $T_0=141.877768$  (BKJD)



# DV Model-Shift Uniqueness Test

011080405-02, P = 12.310244 Days, E = 141.870380 Days

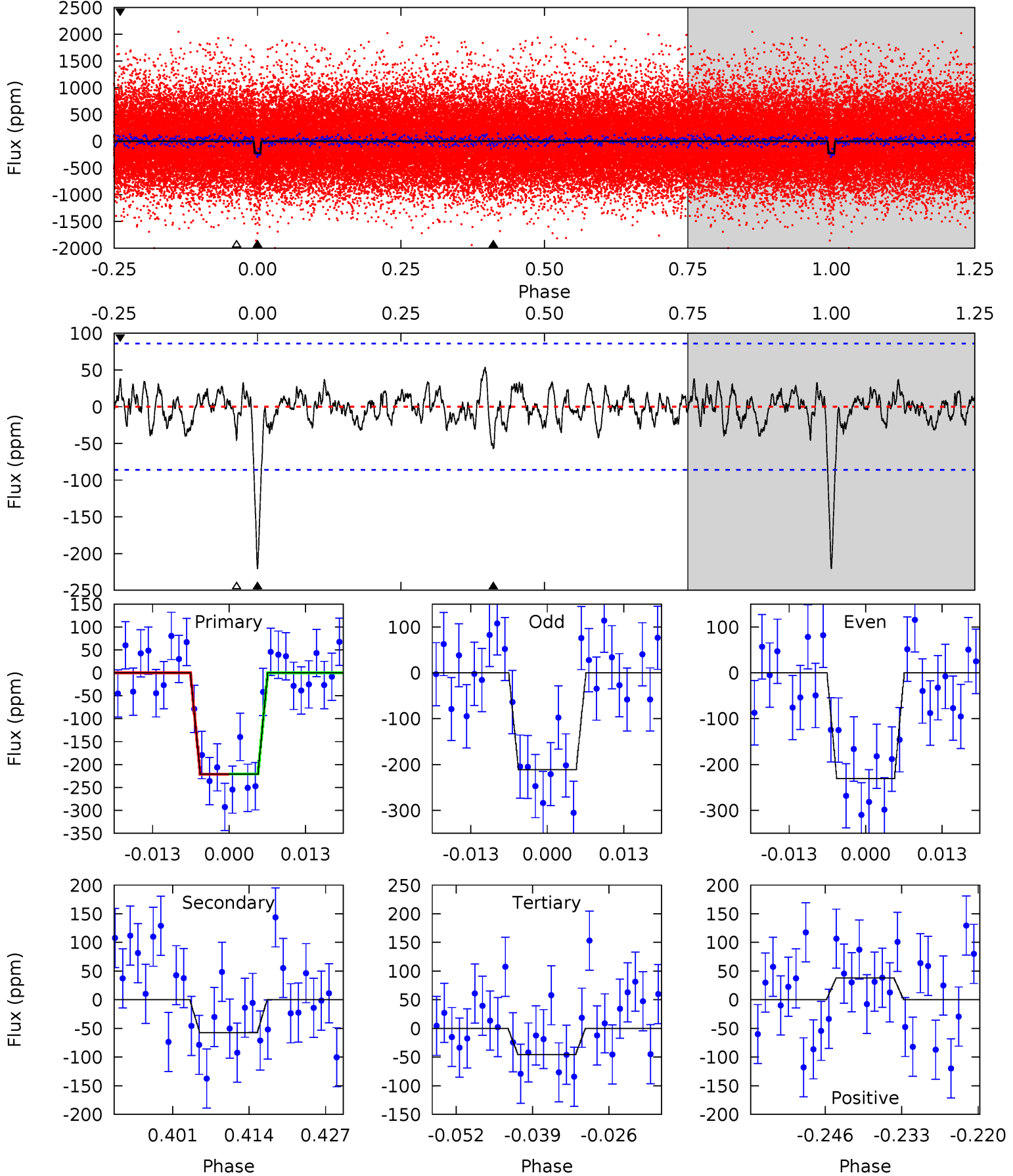
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.3	3.83	3.65	3.38	4.95	2.44	1.11	10.7	10.9	0.19	0.46	0.54	1.03	0.19	0.31



# Alt Model-Shift Uniqueness Test

011080405-02, P = 12.310151 Days, E = 141.877768 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
12.8	3.30	2.64	2.21	4.98	2.49	0.97	10.1	10.6	0.67	1.10	0.57	1.03	0.19	0.02



### Stellar Parameters For KIC 011080405

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$5009^{+82}_{-75}$	$4.491^{+0.077}_{-0.028}$	$0.160^{+0.150}_{-0.150}$	$0.840^{+0.038}_{-0.063}$	$0.797^{+0.059}_{-0.025}$	$1.892^{+0.557}_{-0.198}$
	+2%/-1%	+2%/-1%	+94%/-94%	+5%/-8%	+7%/-3%	+29%/-10%
Source	SPE90	SPE90	SPE90	DSEP		

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

### Secondary Eclipse Parameters for KIC 011080405-02 / KOI 2442.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-63 \pm 16$	$1.57^{+0.93}_{-0.83}$	$904^{+22}_{-22}$	$3740^{+1224}_{-561}$	$131^{+476}_{-84}$
Alt.	$-57 \pm 17$	$1.41^{+0.92}_{-0.81}$	$905^{+20}_{-23}$	$3804^{+1615}_{-586}$	$150^{+739}_{-98}$

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

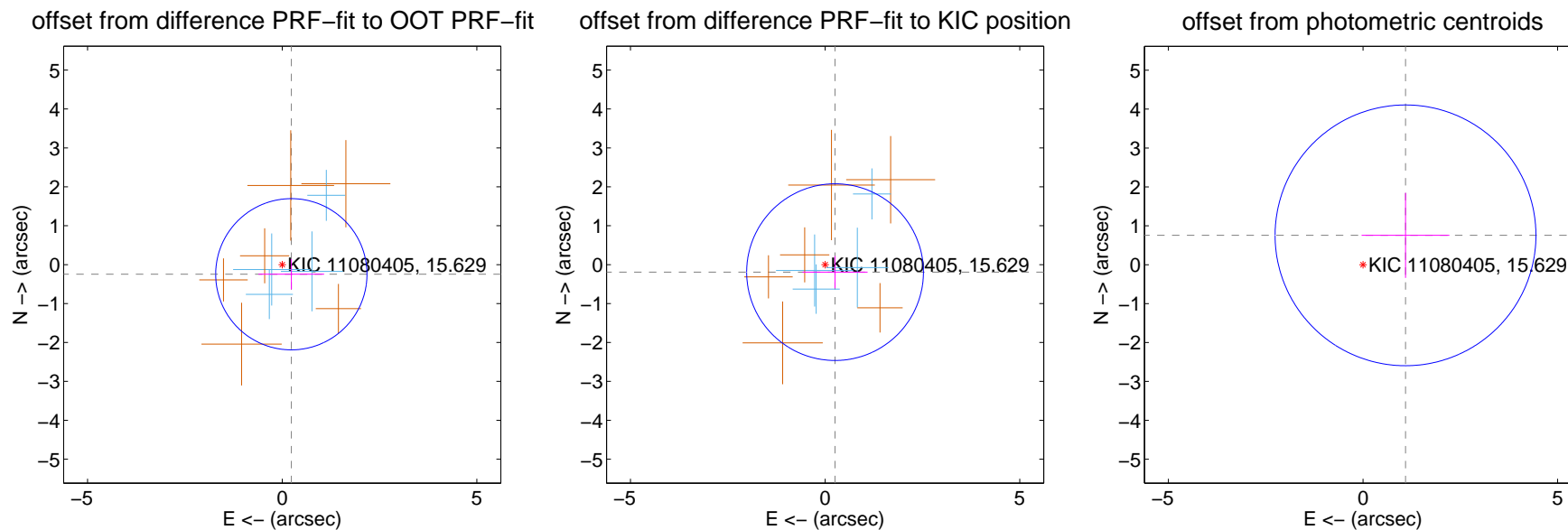
## DV Centroid Data

Supplemental centroid analysis for 011080405-02. Kepler magnitude: 15.63. Transit SNR 11.02

There are 4 quarters with good PRF difference image offsets

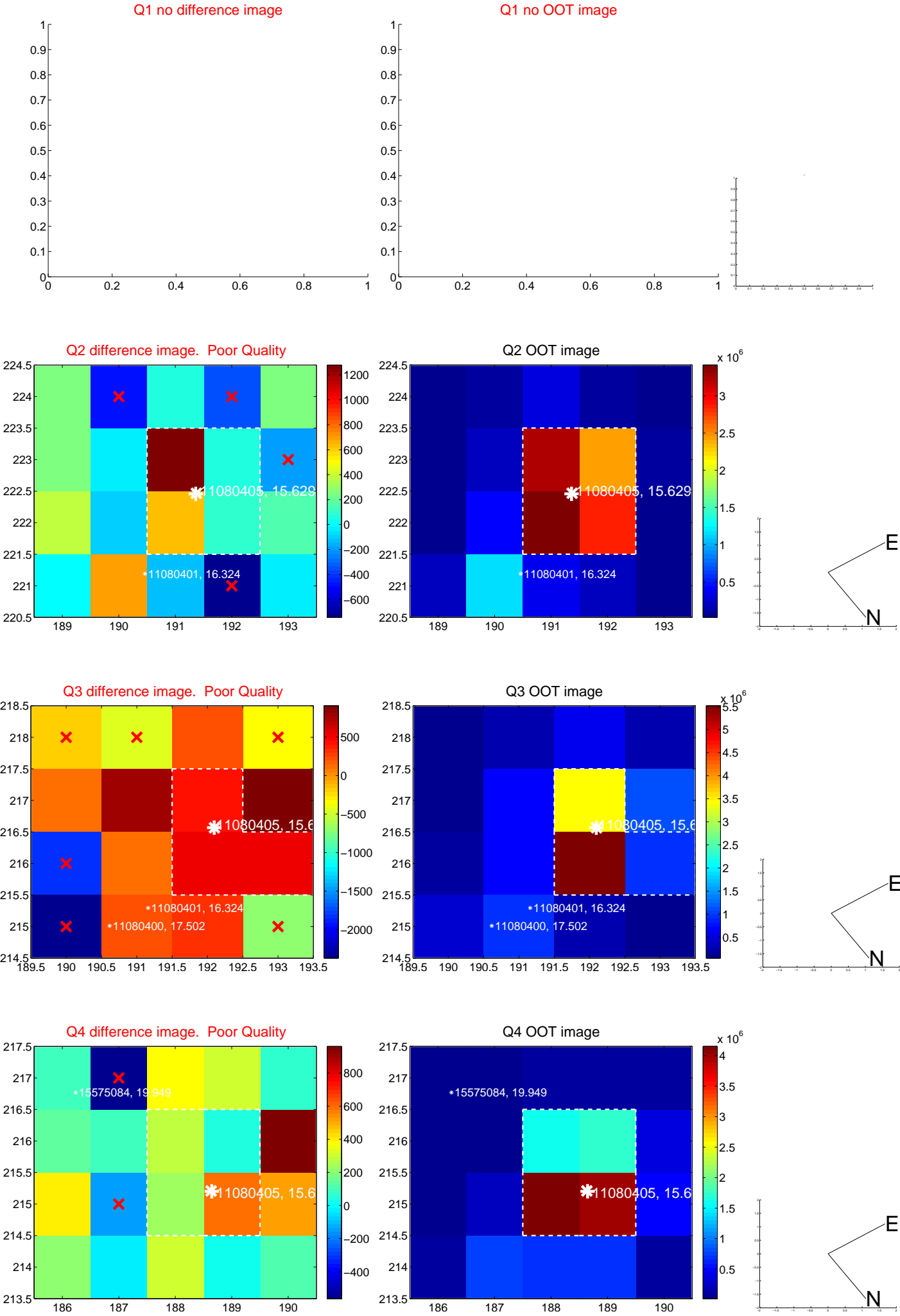
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.341 \pm 0.648$	0.53	$-0.235 \pm 0.843$	$-0.247 \pm 0.390$
PRF-fit source offset from KIC position	$0.320 \pm 0.757$	0.42	$-0.255 \pm 0.837$	$-0.193 \pm 0.414$
photometric centroid source offset	$1.33 \pm 1.12$	1.19	$-1.09 \pm 1.13$	$0.76 \pm 1.09$



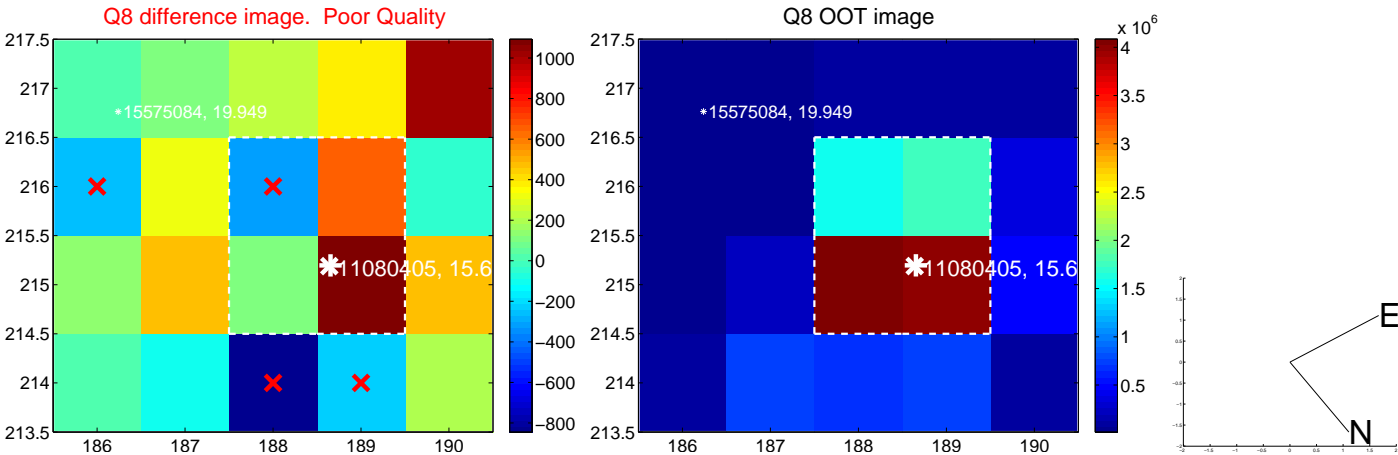
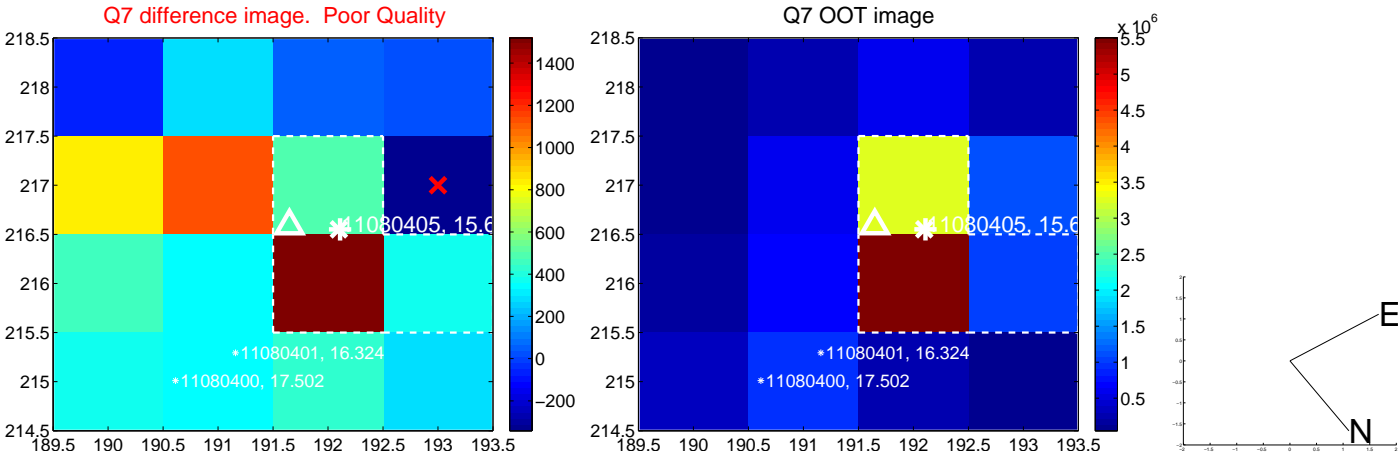
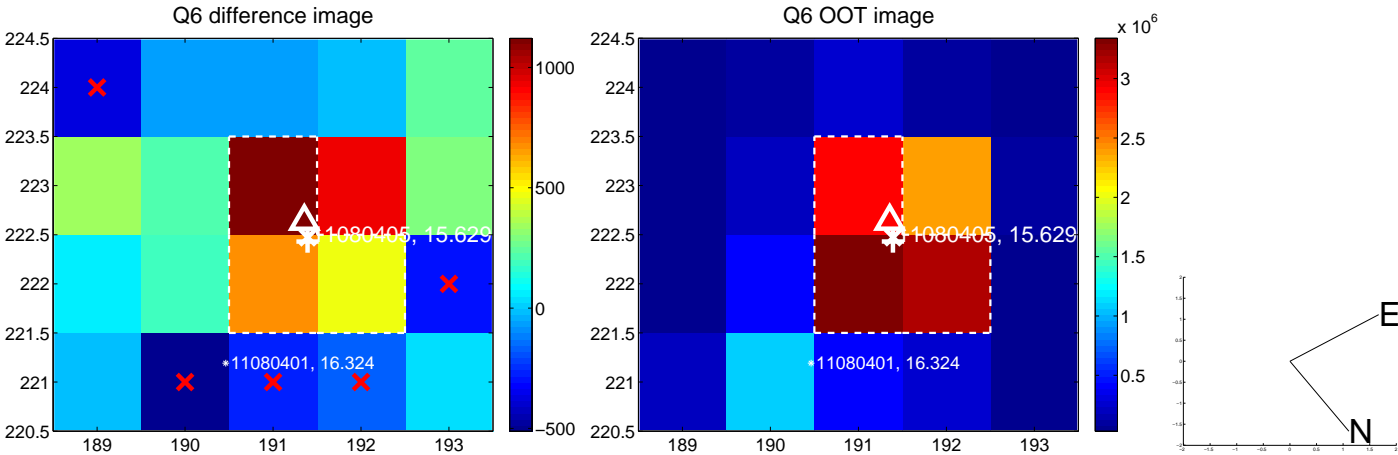
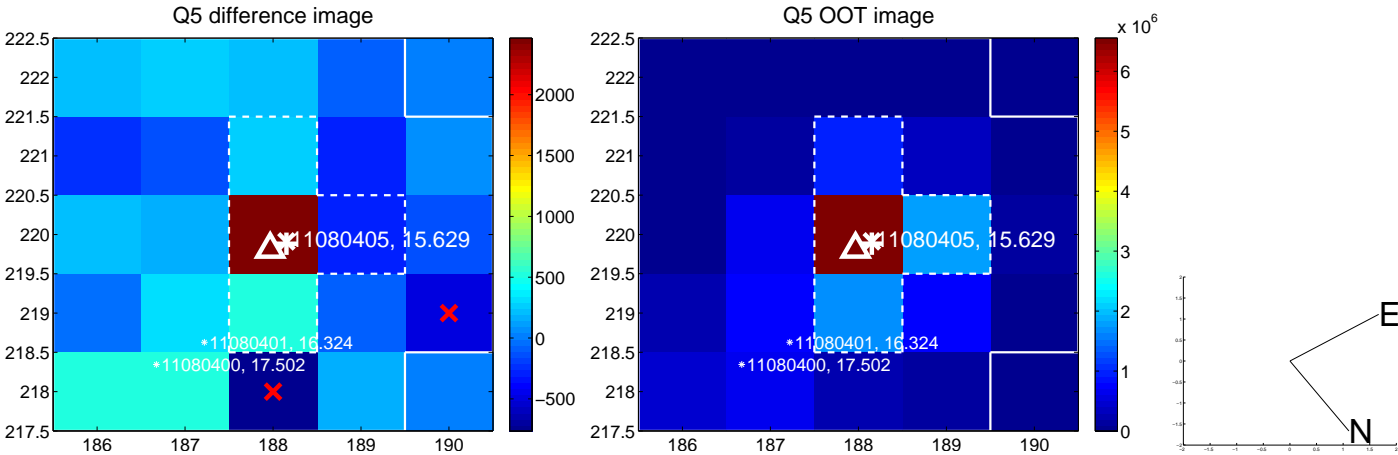
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

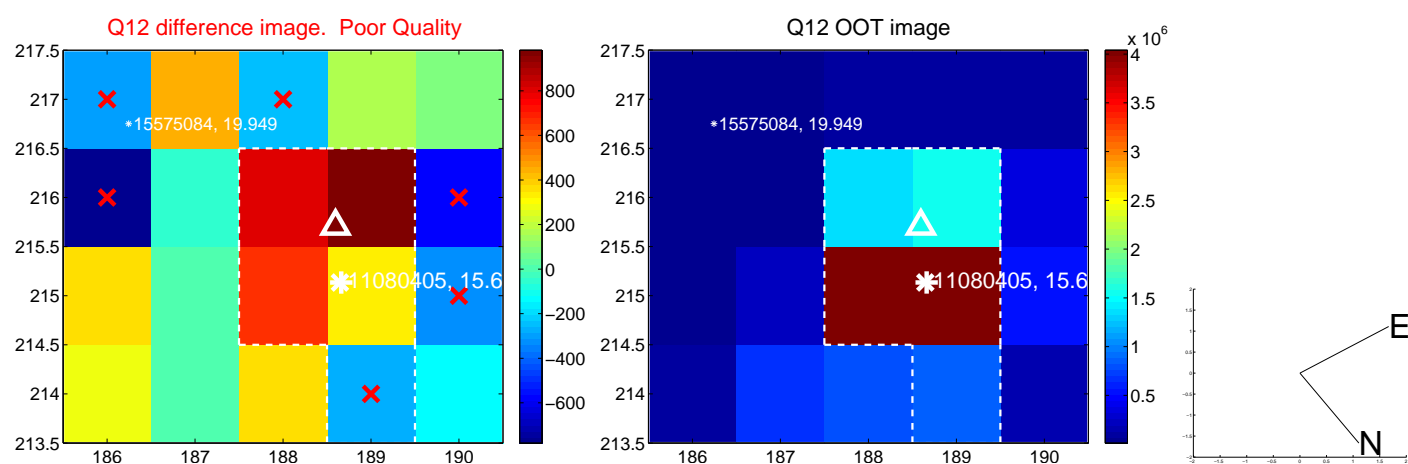
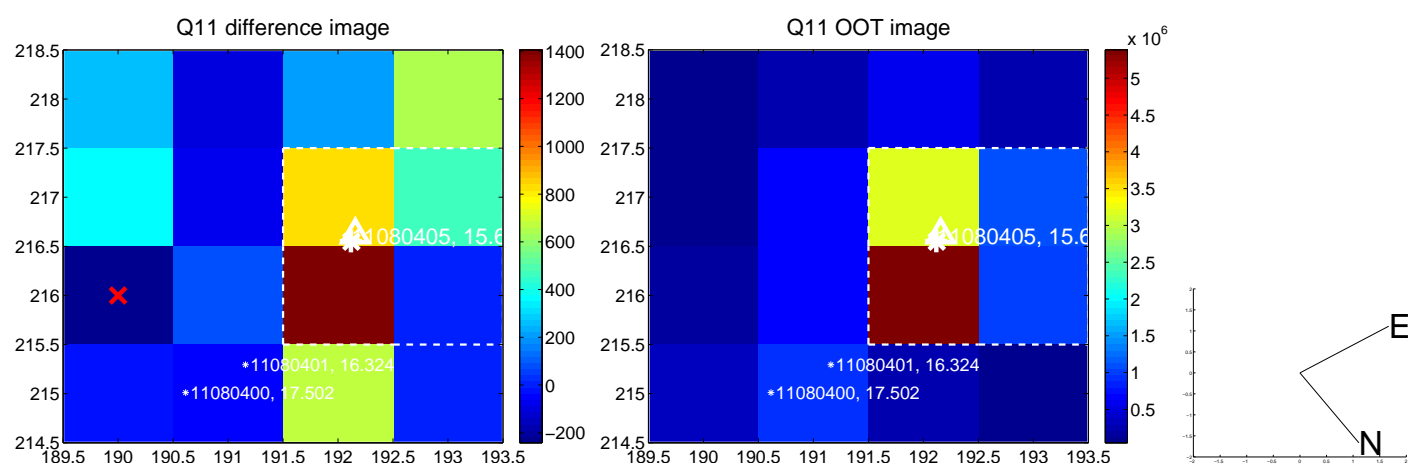
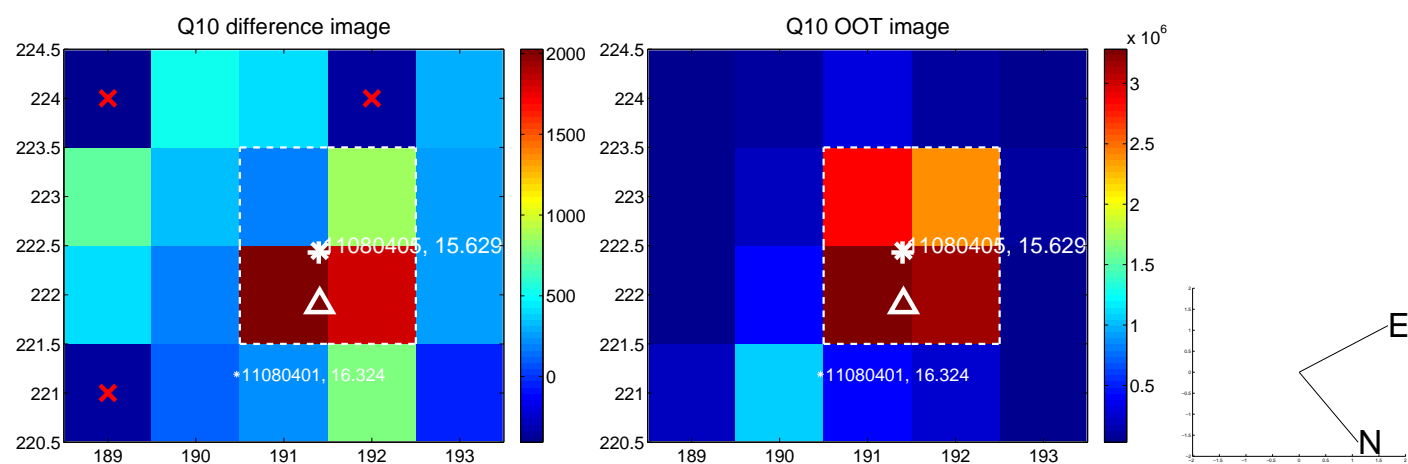
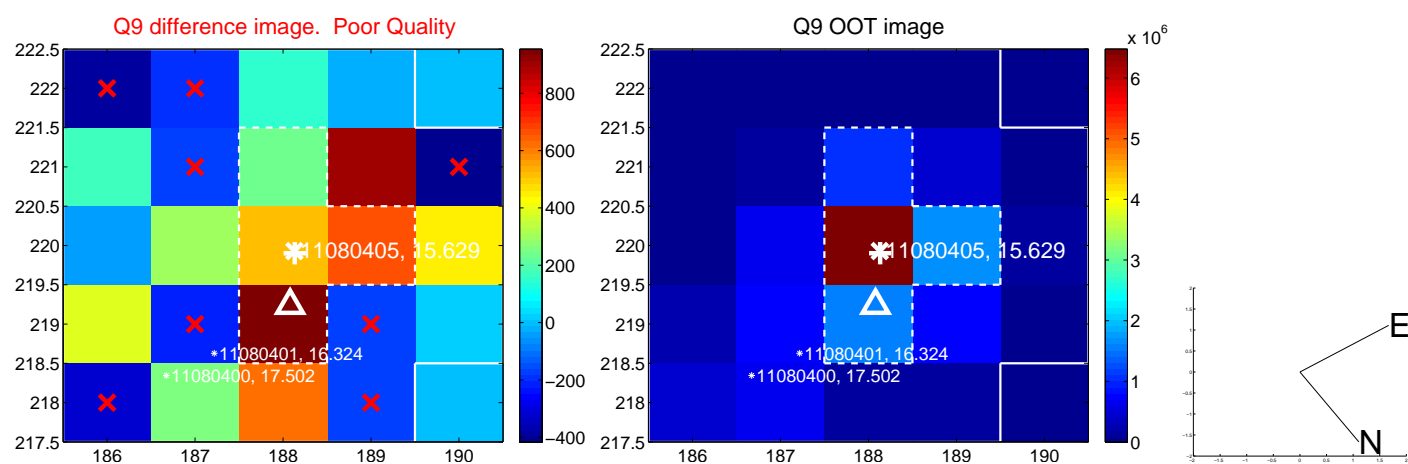




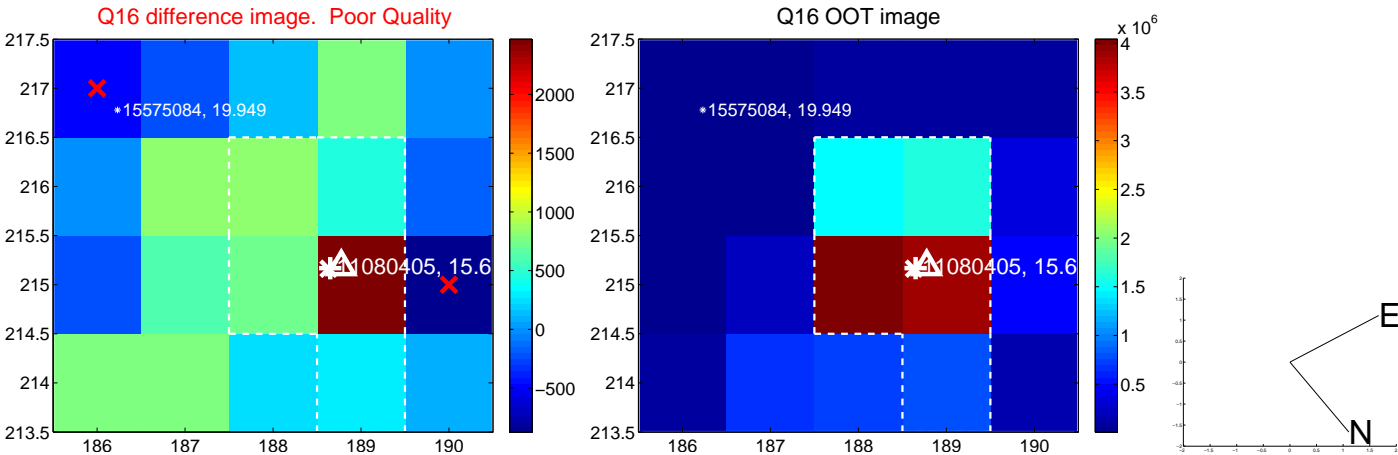
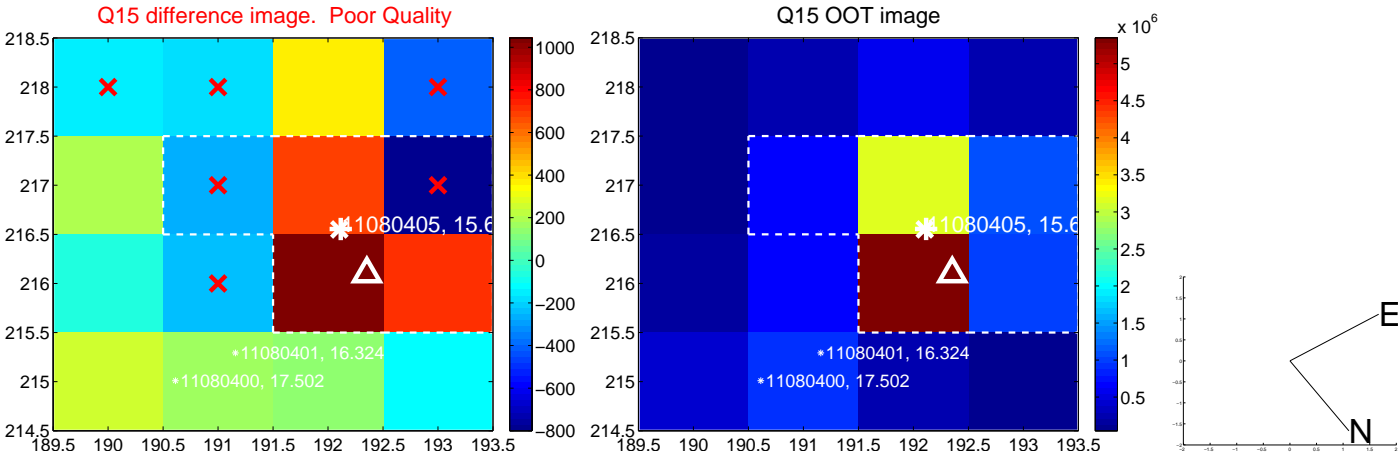
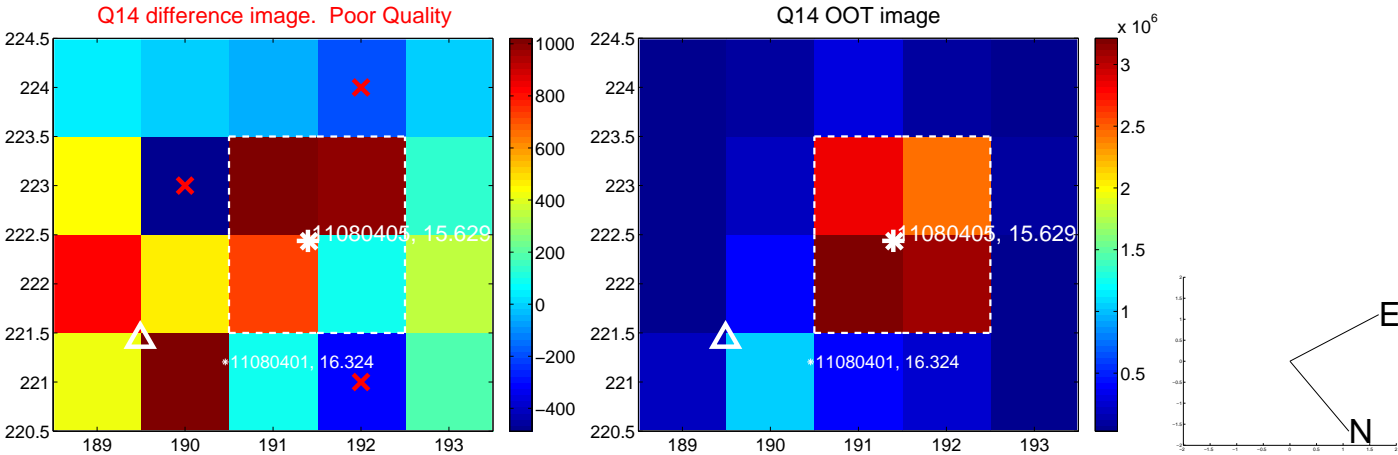
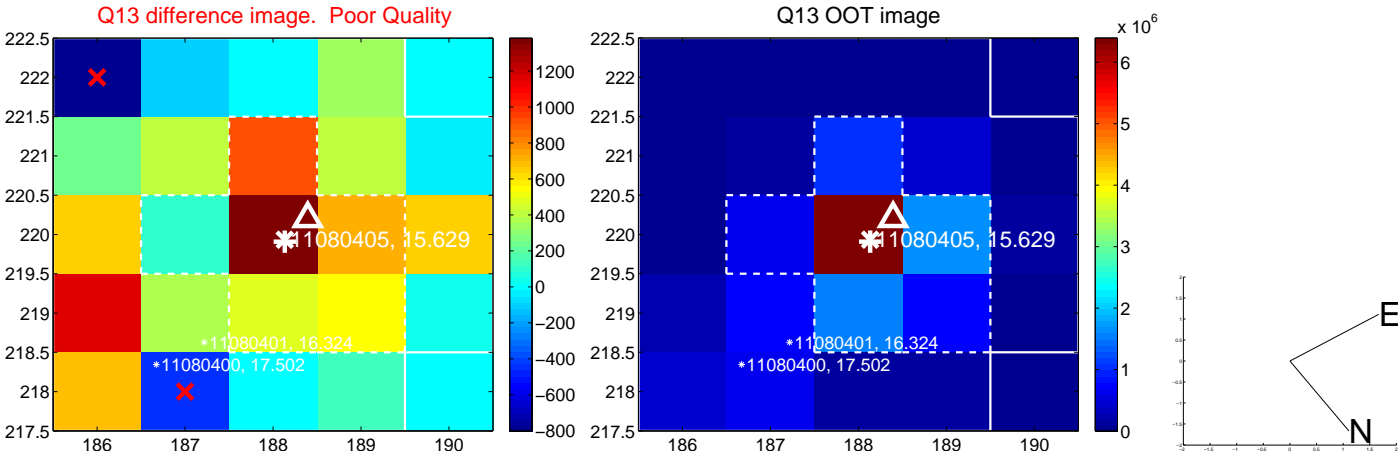
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



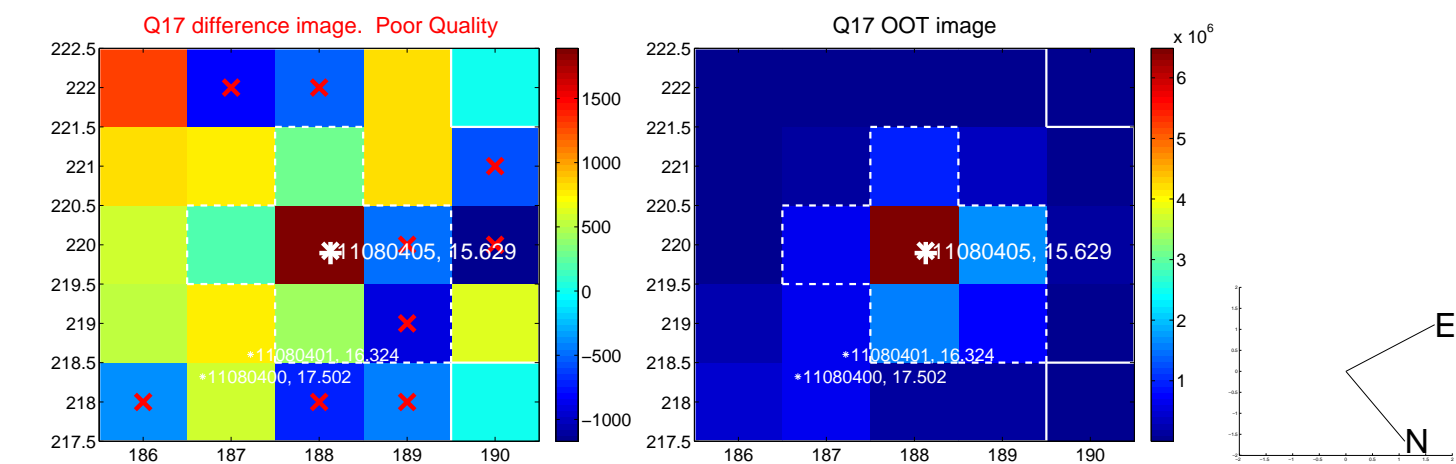
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



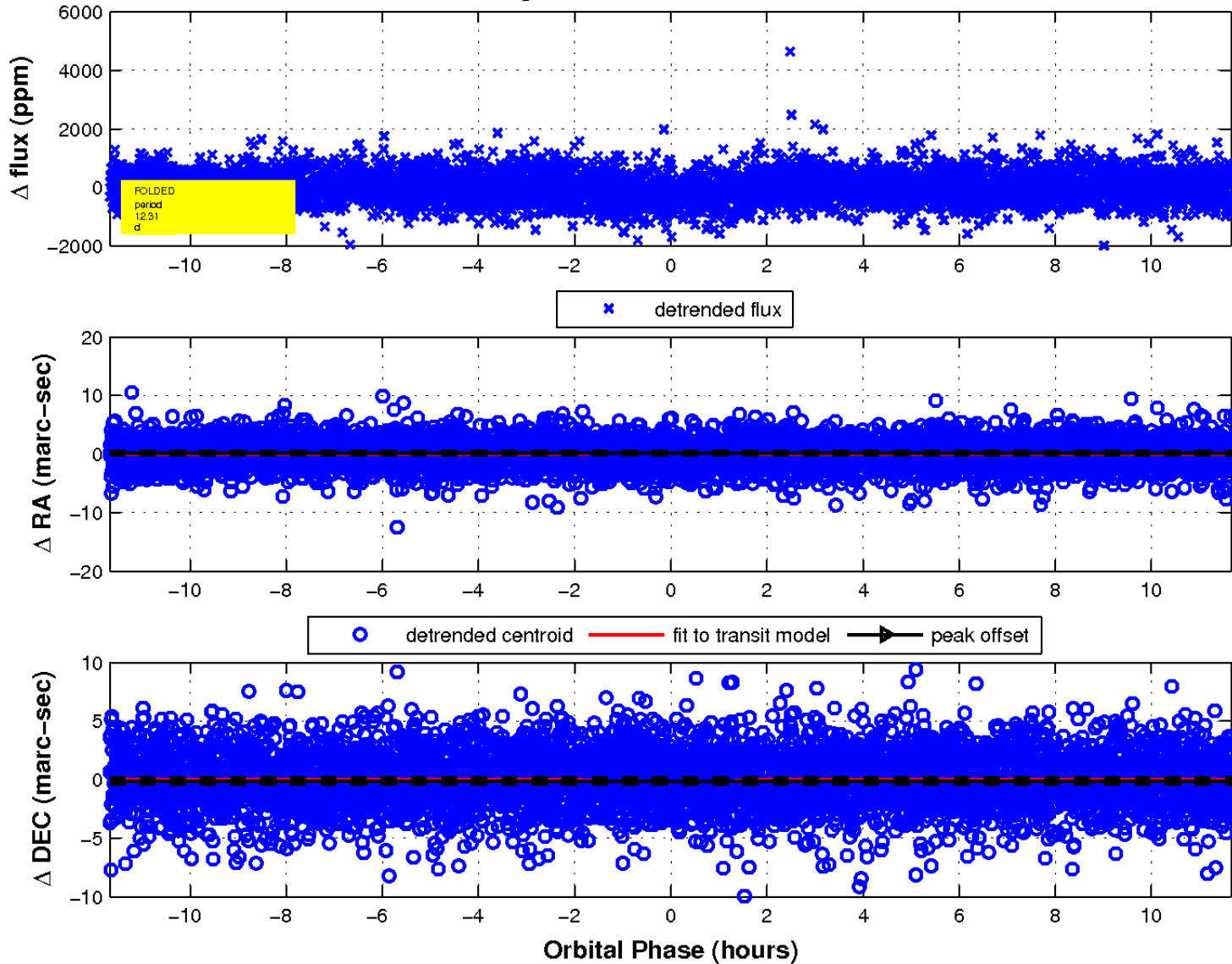
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



### fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

