

# KIC 006205405

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006205405-01	OBS	5251.01	3.722687	134.681393	63.8	16.359	13.2	14.4	0.48	3724	0.84	28.84
006205405-02	OBS	No	127.019373	239.827465	234.3	5.300	7.5	7.0	0.48	3724	0.81	0.26

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006205405-01	OBS	FP	0.00	1	0	1	1	LPP_DV—CENT_UNRESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
006205405-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_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.

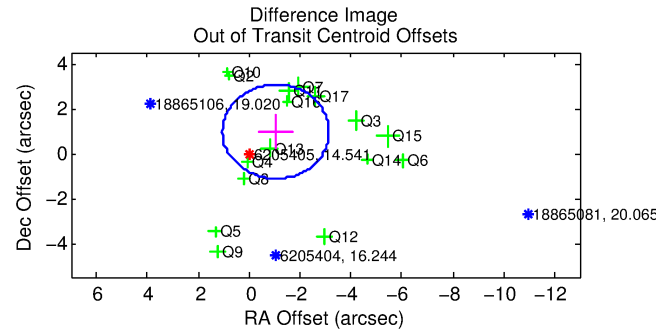
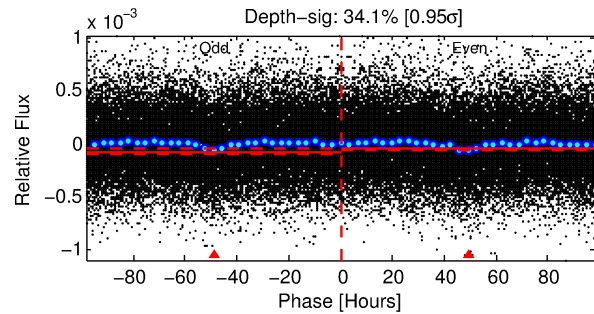
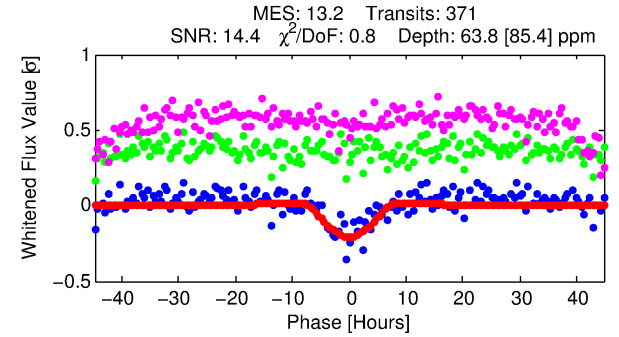
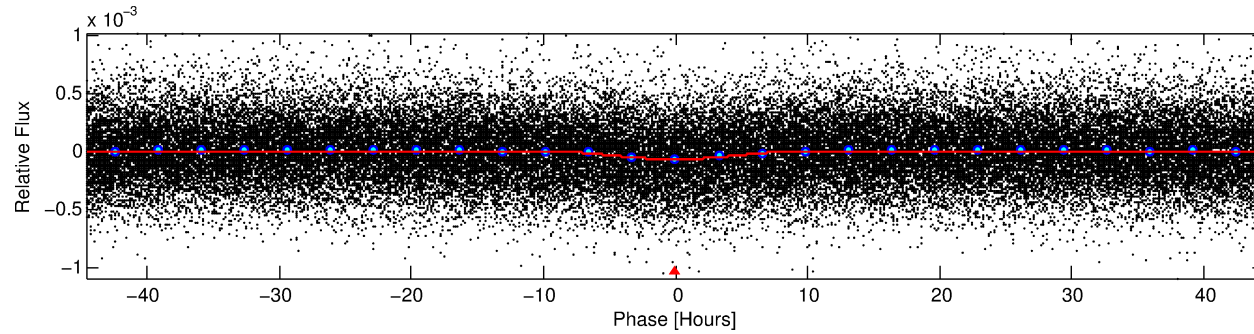
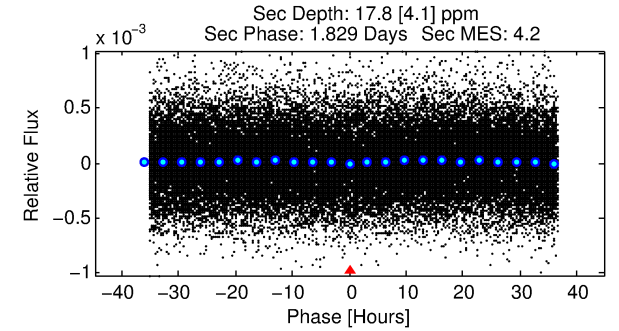
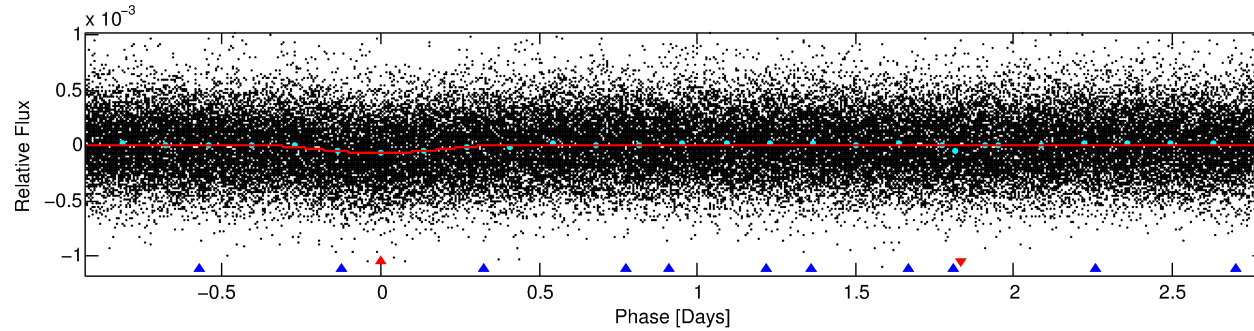
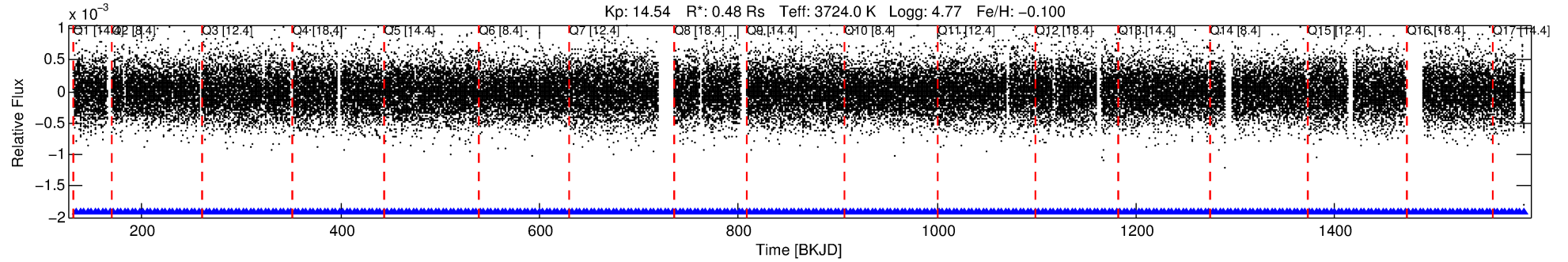
## Ephemeris Match Information For 006205405-01

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	$\sigma_P$	$\sigma_T$
006205405-01	6205405	006205460-pri	6205460	1:1	50.2	-2	-12	12.75	14.54	9731.20	Direct-PRF	0	2.18	2.63

**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: 6205405 Candidate: 1 of 2 Period: 3.723 d  
KOI: K05251.01 Corr: 0.795



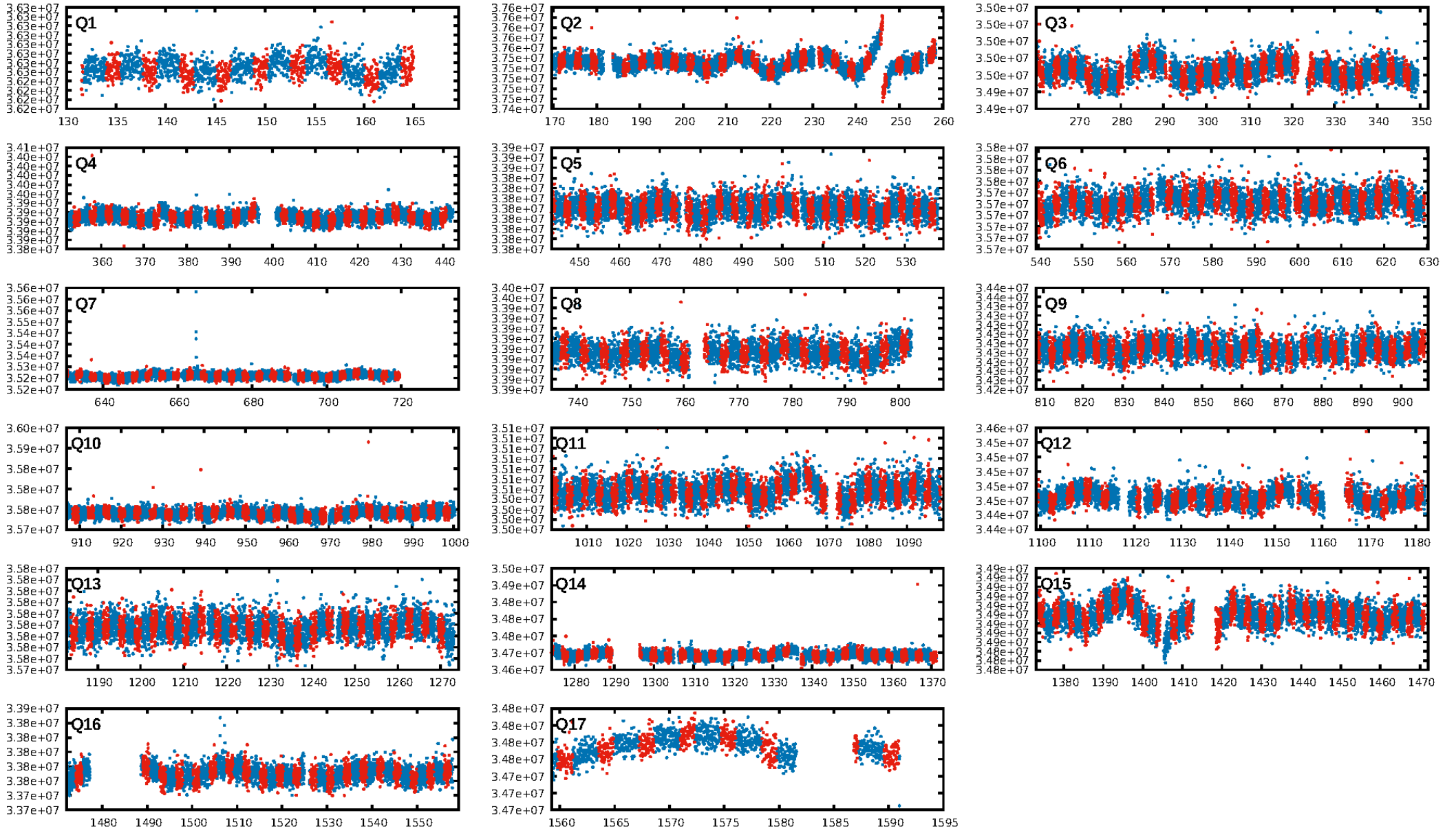
## DV Fit Results:

Period = 3.72269 [0.00012] d  
Epoch = 134.6814 [0.0254] BKJD  
Rp/R\* = 0.0161 [0.0378]  
a/R\* = 1.05 [0.01]  
b = 1.00 [0.07]  
Seff = 28.84 [3.25]  
Teff = 591 [17] K  
Rp = 0.84 [1.98] Re  
a = 0.0371 [0.0022] AU  
Ag = 18.98 [89.15] [0.20σ]  
Teffp = 1907 [2239] K [0.59σ]

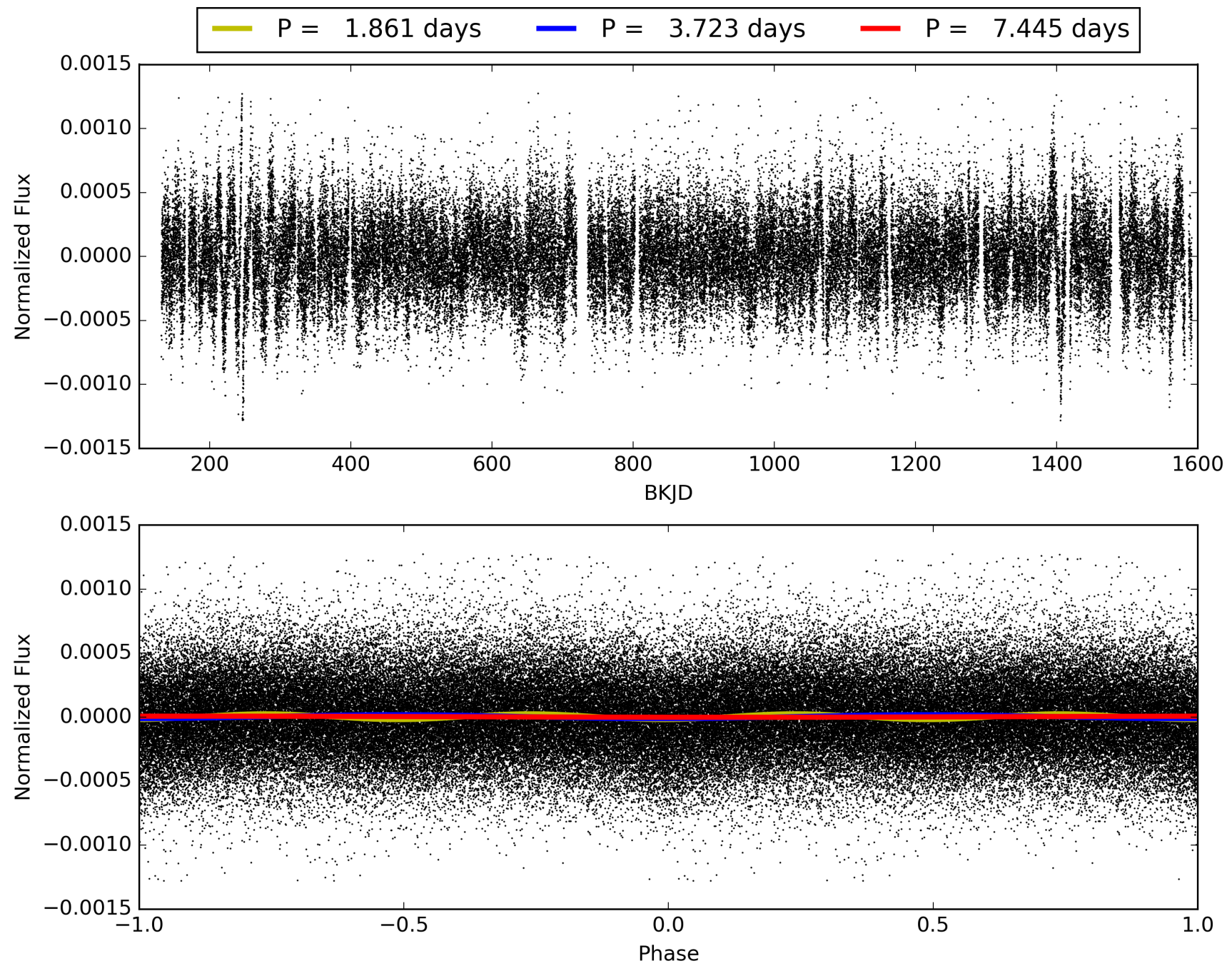
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [172.08σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.69e-30  
RollingBand-fgt: 1.00 [354/354]  
GhostDiagnostic-chr: 0.04023  
Centroid-sig: 0.0%  
Centroid-so: 1.842 arcsec [2.57σ]  
OotOffset-rm: 1.428 arcsec [2.05σ]  
KicOffset-rm: 1.676 arcsec [2.36σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.25 [4/16]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 006205405-01, PDC Light Curves



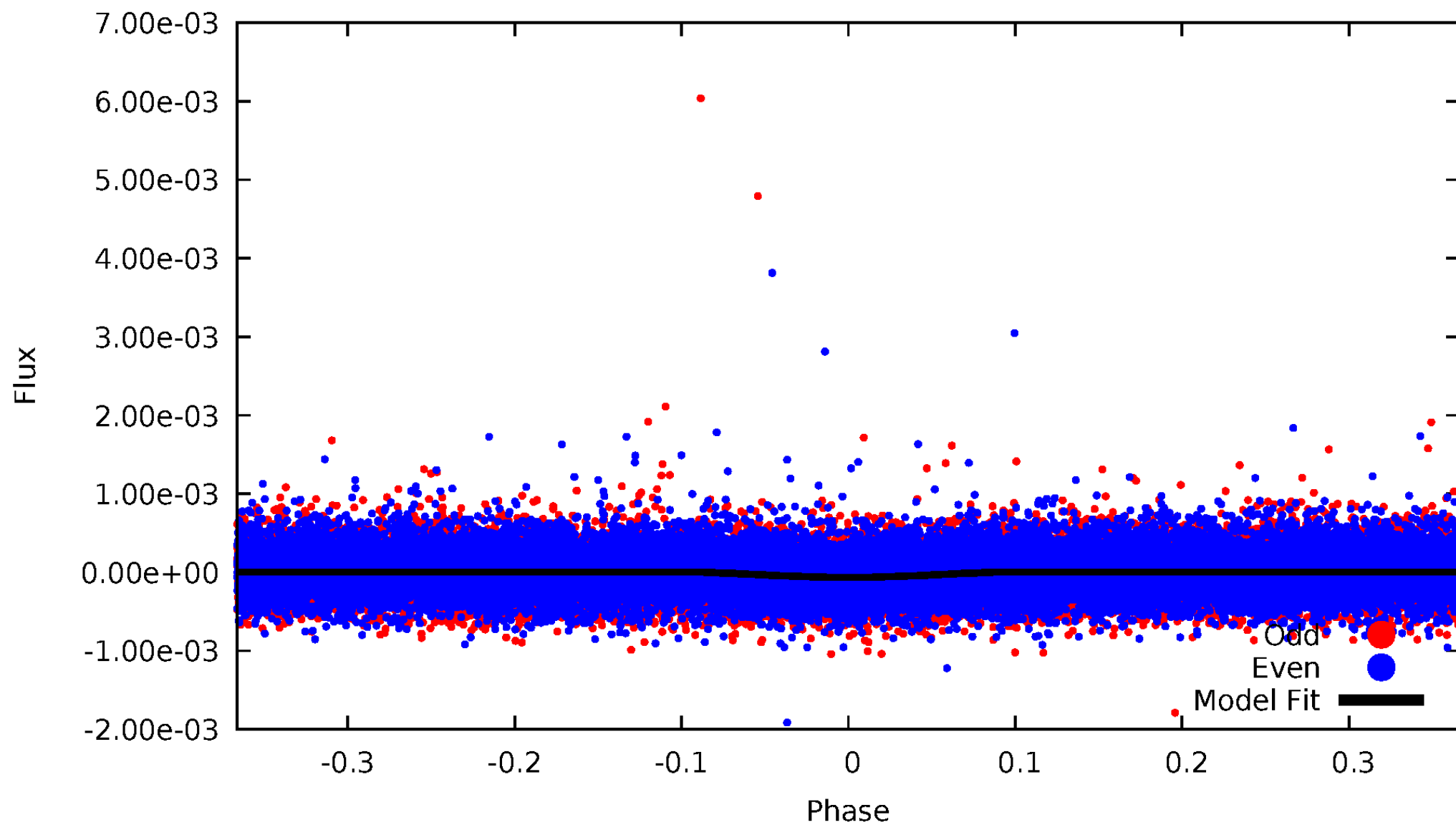
TCE 006205405-01





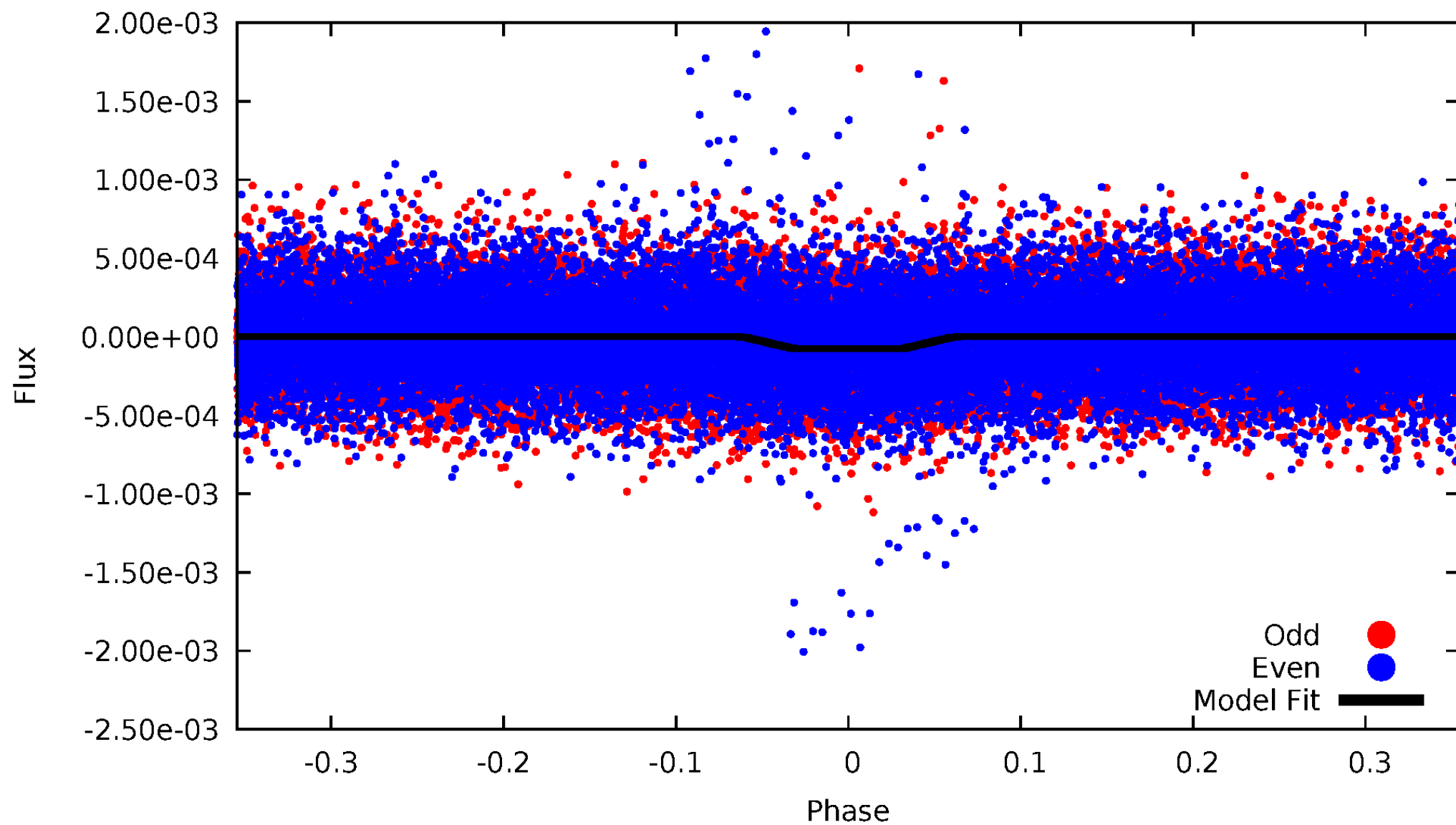
# DV Odd/Even

TCE 006205405-01

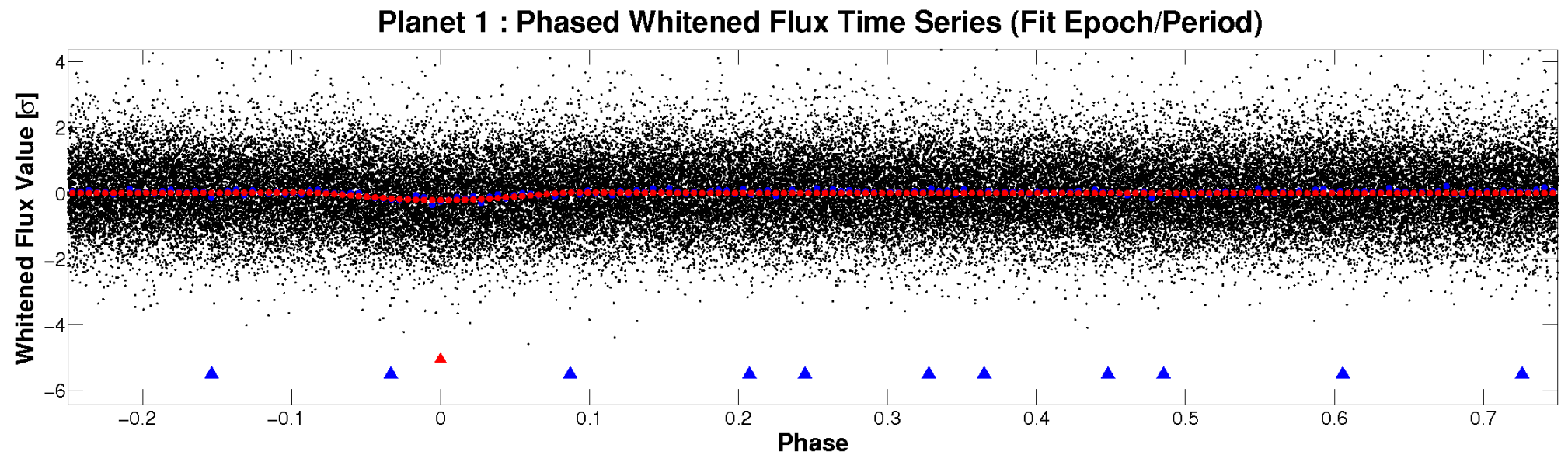
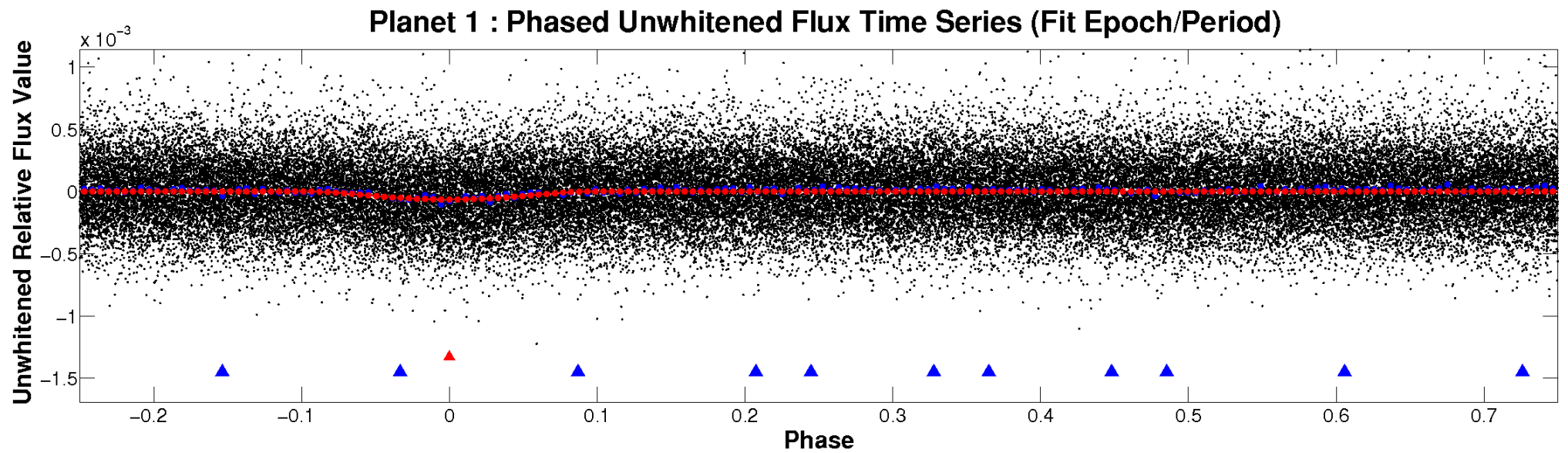


# ALT Odd/Even

TCE 006205405-01

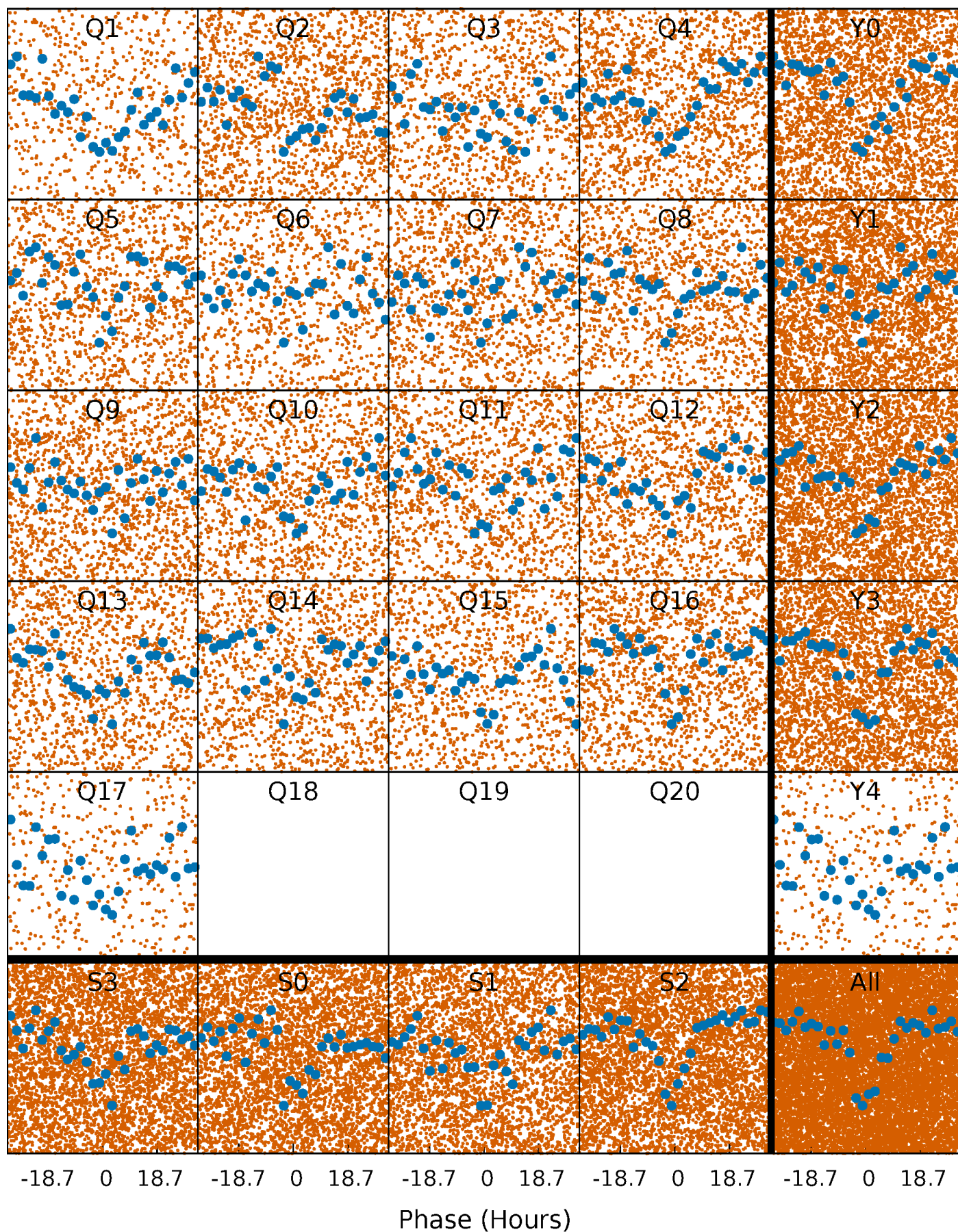


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

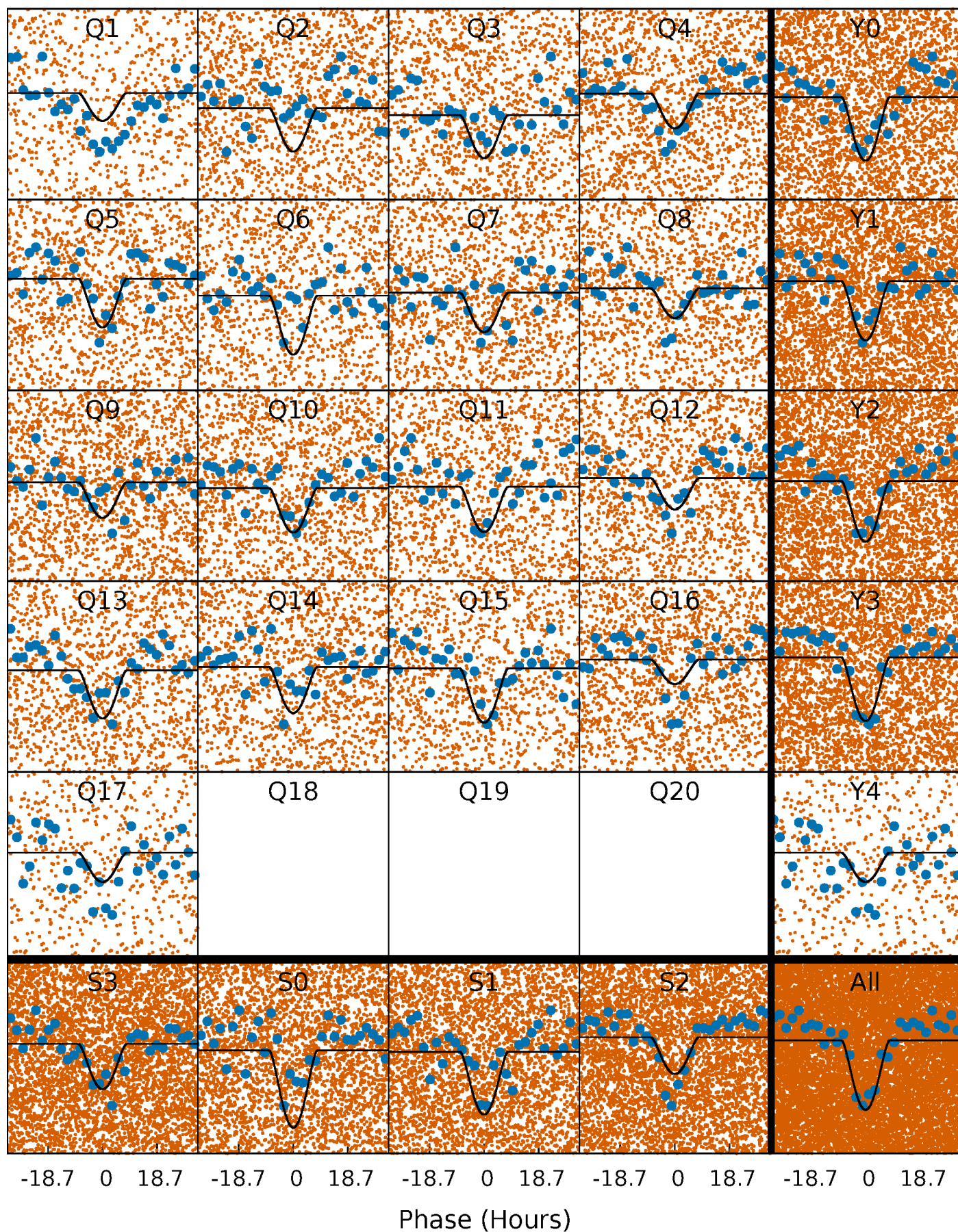
TCE 006205405-01 P= 3.722687 Days  $T_0=134.681393$  (BKJD)





# DV Quarter-Phased Transit Curves

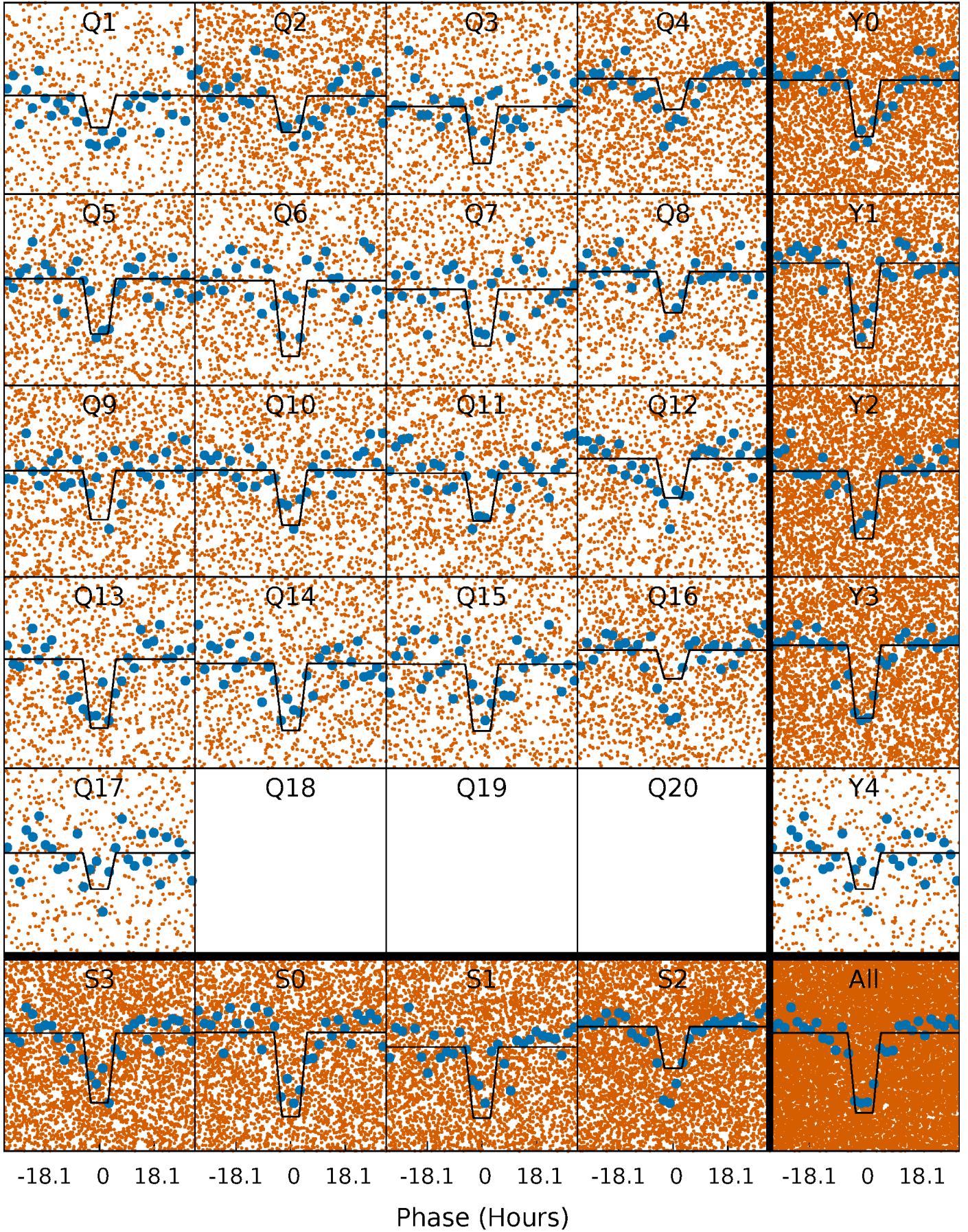
TCE 006205405-01 P= 3.722687 Days  $T_0=134.681393$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

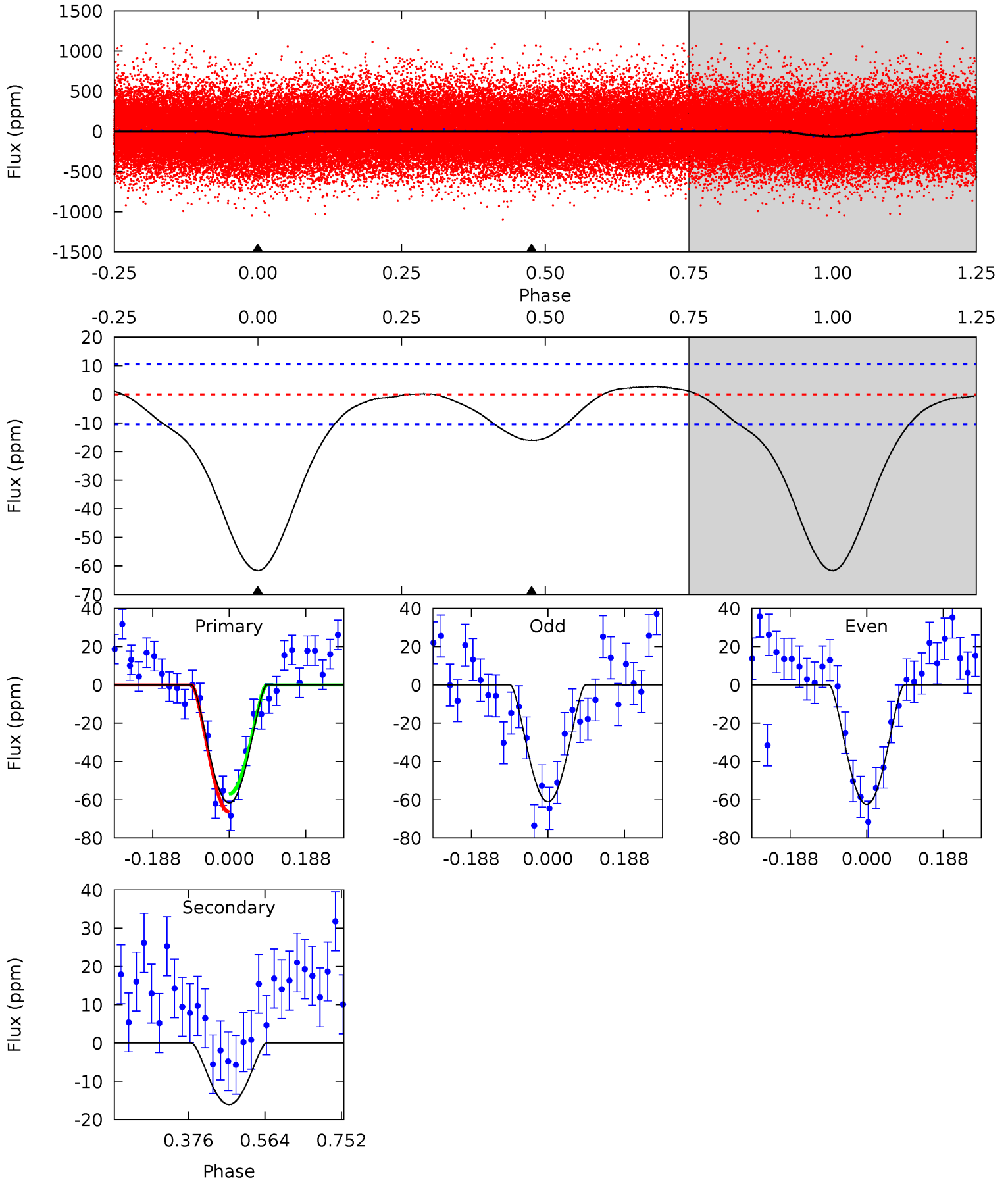
TCE 006205405-01 P= 3.722837 Days  $T_0=134.660201$  (BKJD)



# DV Model-Shift Uniqueness Test

006205405-01, P = 3.722687 Days, E = 130.958706 Days

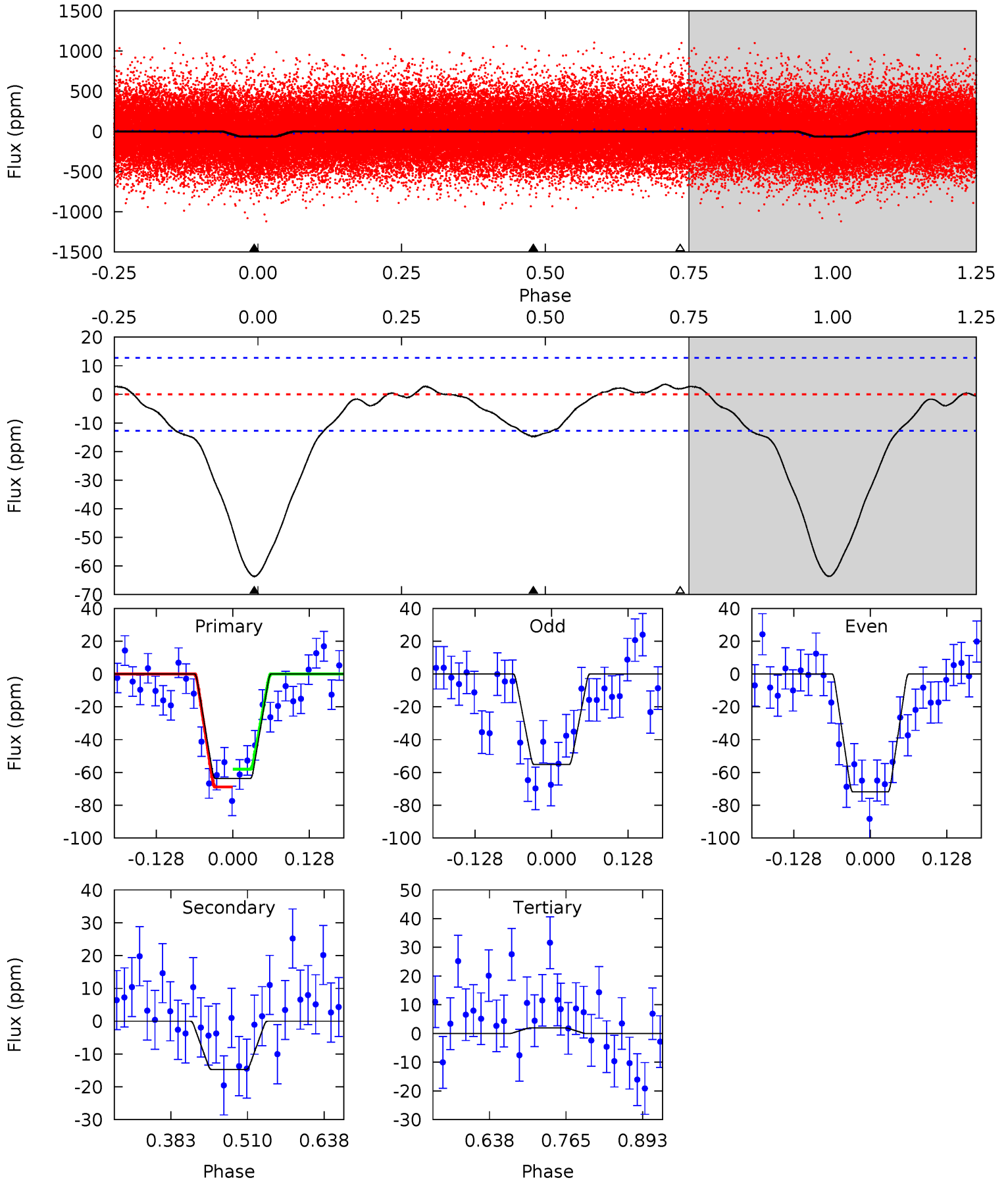
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
26.0	6.77	0	0	4.43	1.32	0.92	26.0	26.0	6.77	6.77	0.28	0.97	0.04	1.99



# Alt Model-Shift Uniqueness Test

006205405-01, P = 3.722837 Days, E = 130.937364 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
22.5	5.21	-0.68	0	4.51	1.52	1.46	23.2	22.5	5.89	5.21	2.95	1.10	0.05	1.92





### Stellar Parameters For KIC 006205405

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3724^{+73}_{-73}$	$4.767^{+0.042}_{-0.025}$	$-0.100^{+0.100}_{-0.100}$	$0.480^{+0.029}_{-0.035}$	$0.492^{+0.031}_{-0.034}$	$6.270^{+1.127}_{-0.711}$
	+2%/-2%	+1%/-1%	+100%/-100%	+6%/-7%	+6%/-7%	+18%/-11%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 006205405-01 / KOI 5251.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-16 \pm 2$	$1.68^{+1.61}_{-1.19}$	$823^{+18}_{-20}$	$2130^{+773}_{-333}$	$4.472^{+49.405}_{-3.392}$
Alt.	$-15 \pm 3$	$1.38^{+1.61}_{-0.96}$	$825^{+18}_{-20}$	$2211^{+792}_{-376}$	$6.182^{+60.612}_{-4.929}$

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

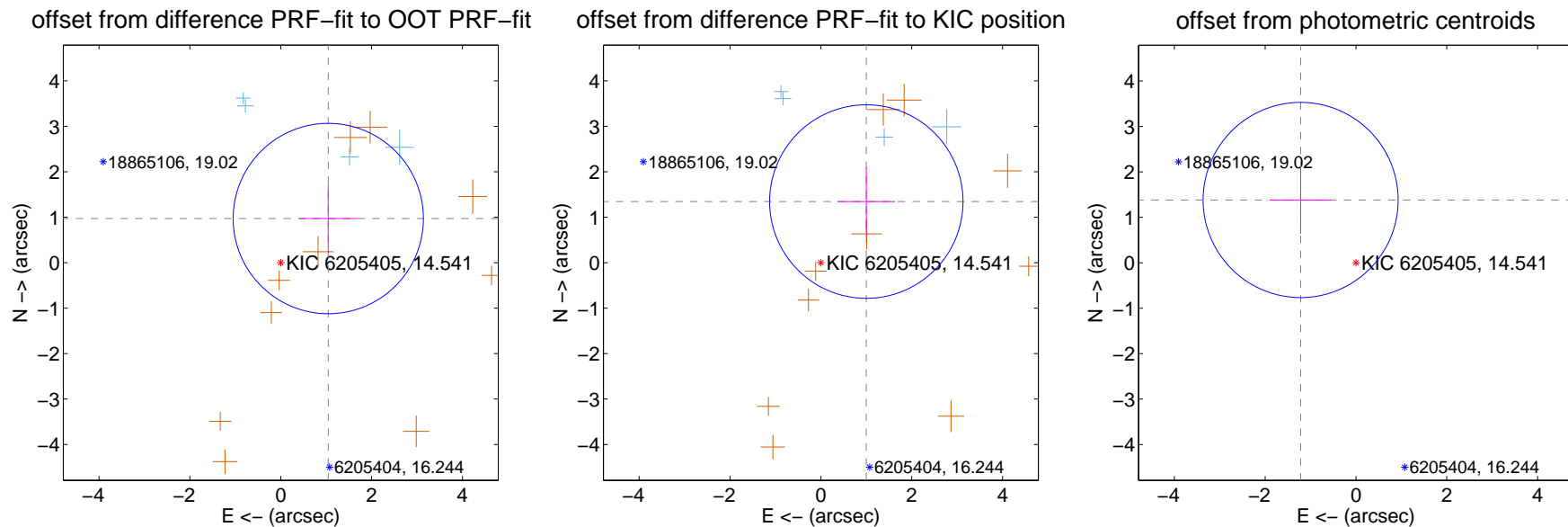
## DV Centroid Data

Supplemental centroid analysis for 006205405-01. Kepler magnitude: 14.54. Transit SNR 14.39

There are 4 quarters with good PRF difference image offsets

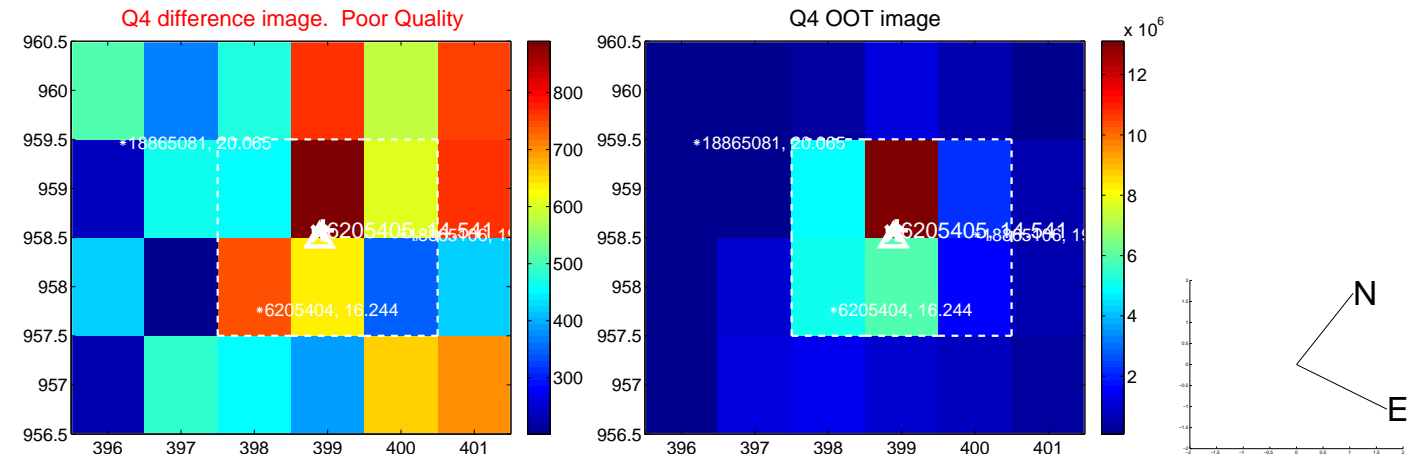
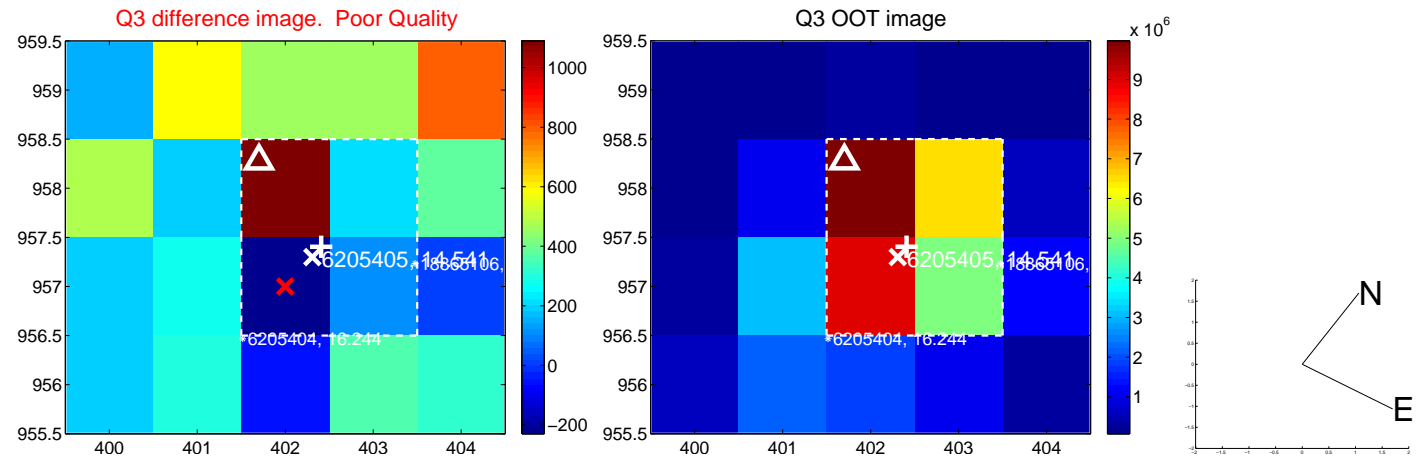
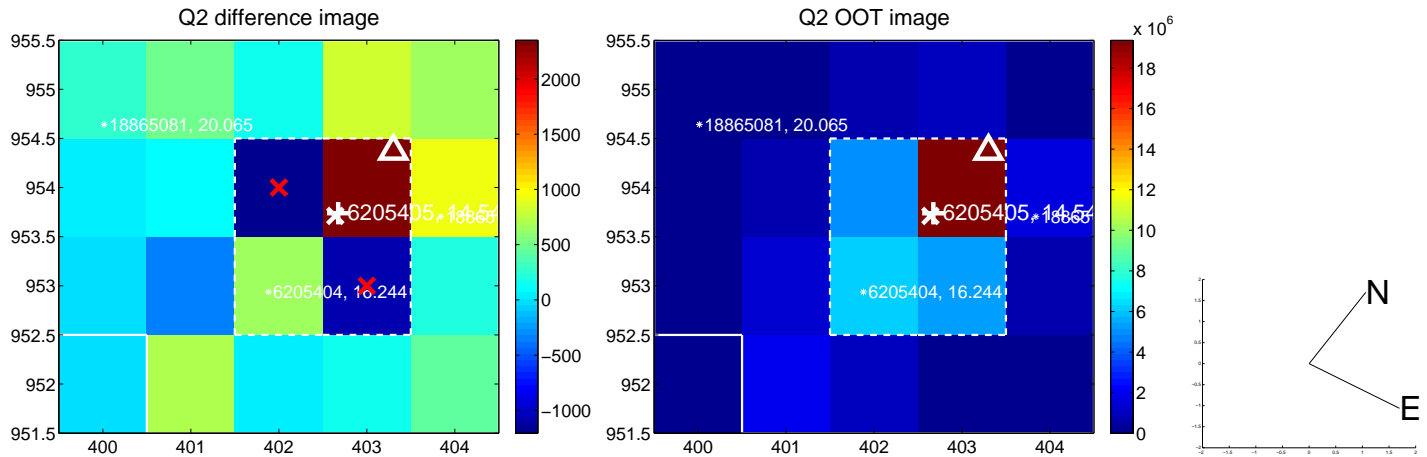
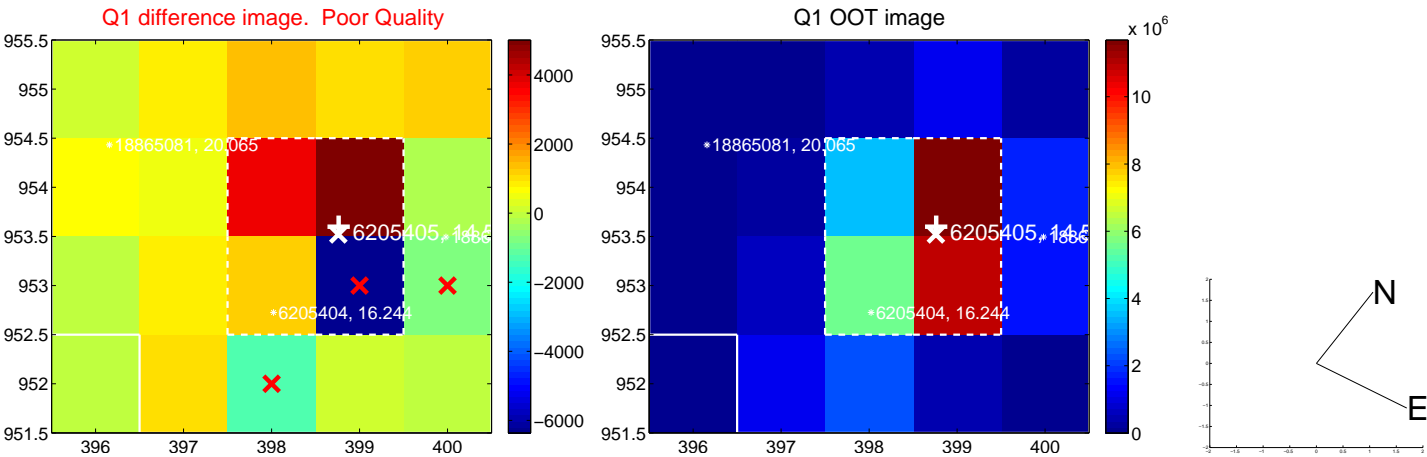
The direct PRF centroid is offset from the target star catalog position by about 0.48 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.428 \pm 0.698$	2.05	$-1.047 \pm 0.640$	$0.971 \pm 0.760$
PRF-fit source offset from KIC position	$1.676 \pm 0.710$	2.36	$-1.001 \pm 0.634$	$1.345 \pm 0.748$
photometric centroid source offset	$1.84 \pm 0.72$	2.57	$1.22 \pm 0.68$	$1.38 \pm 0.74$

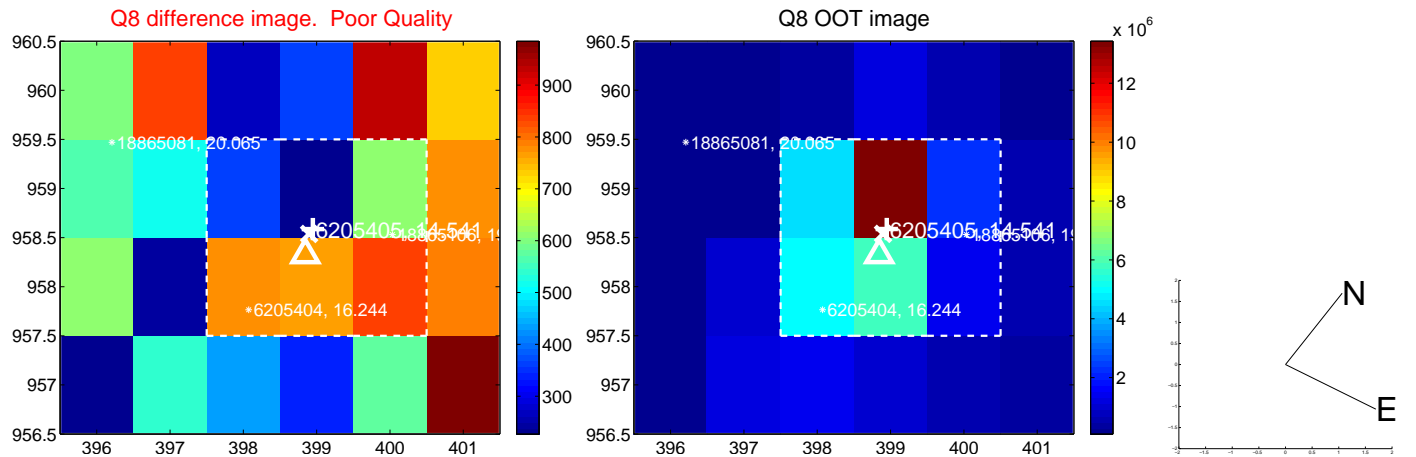
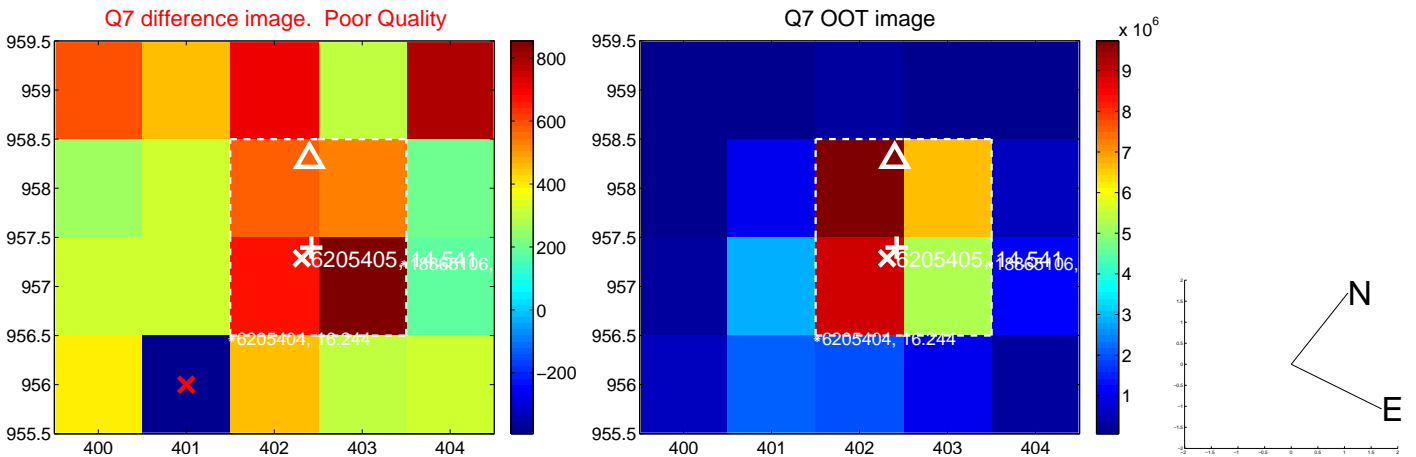
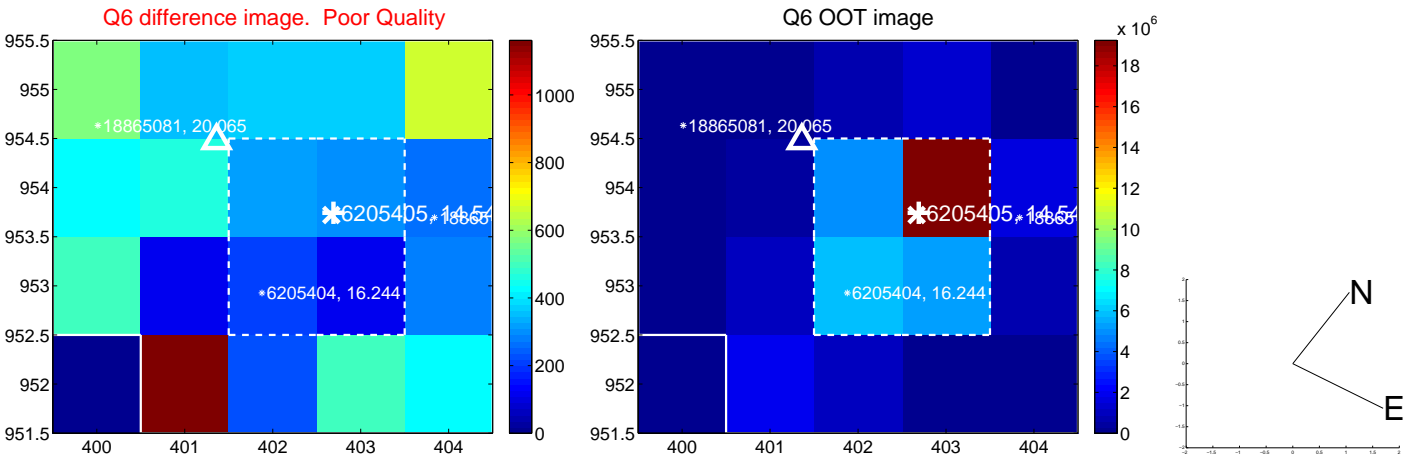
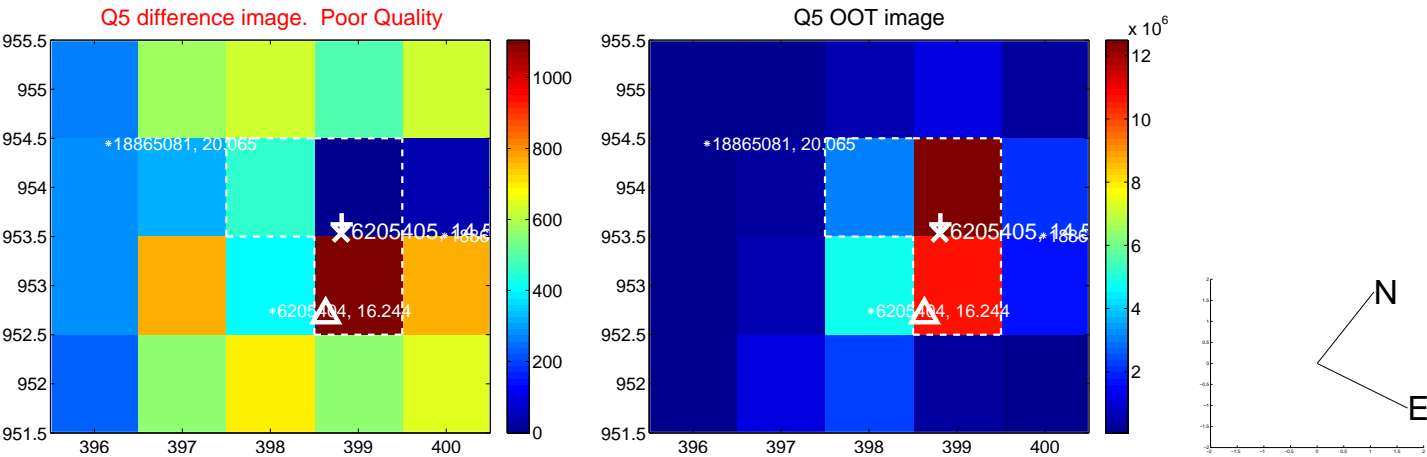


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

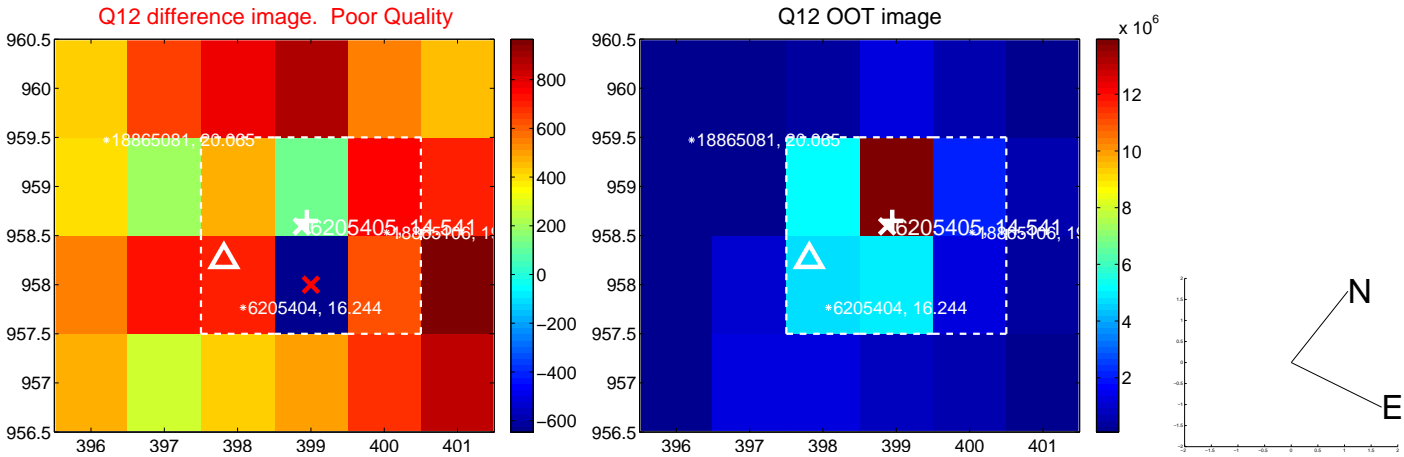
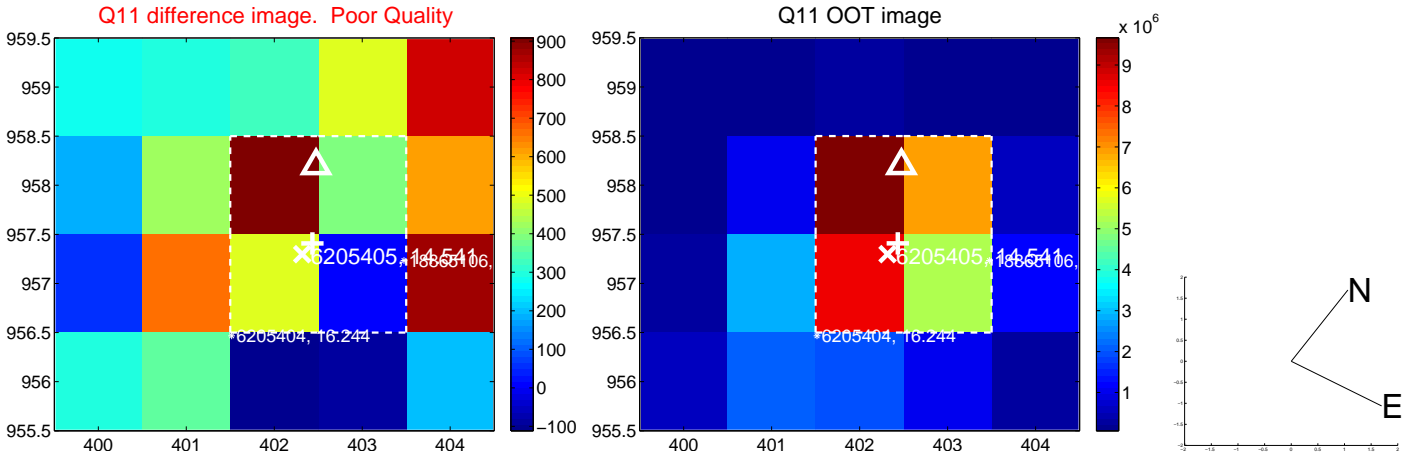
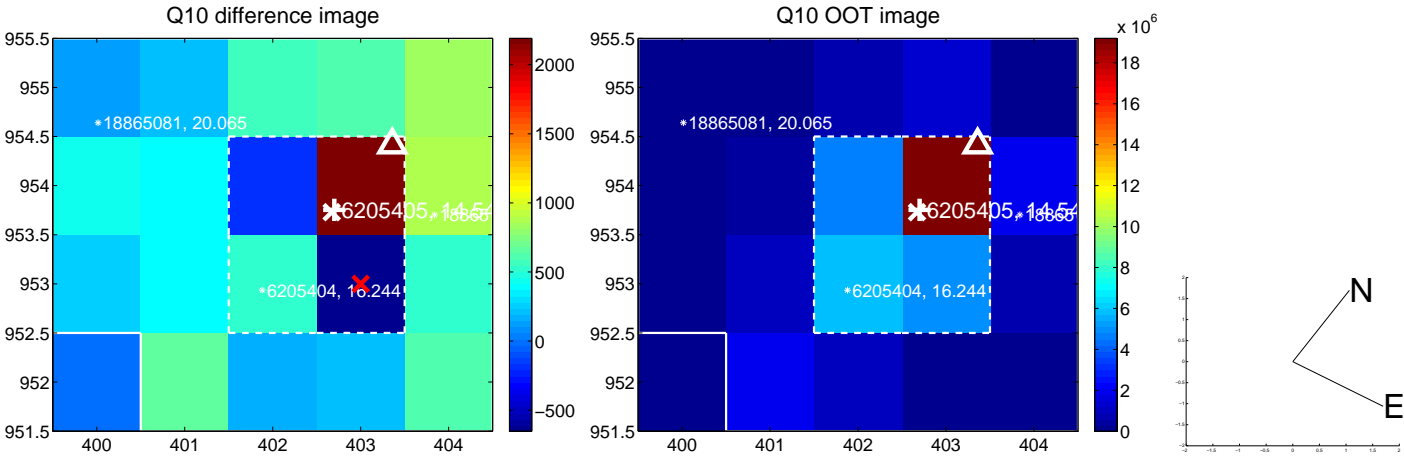
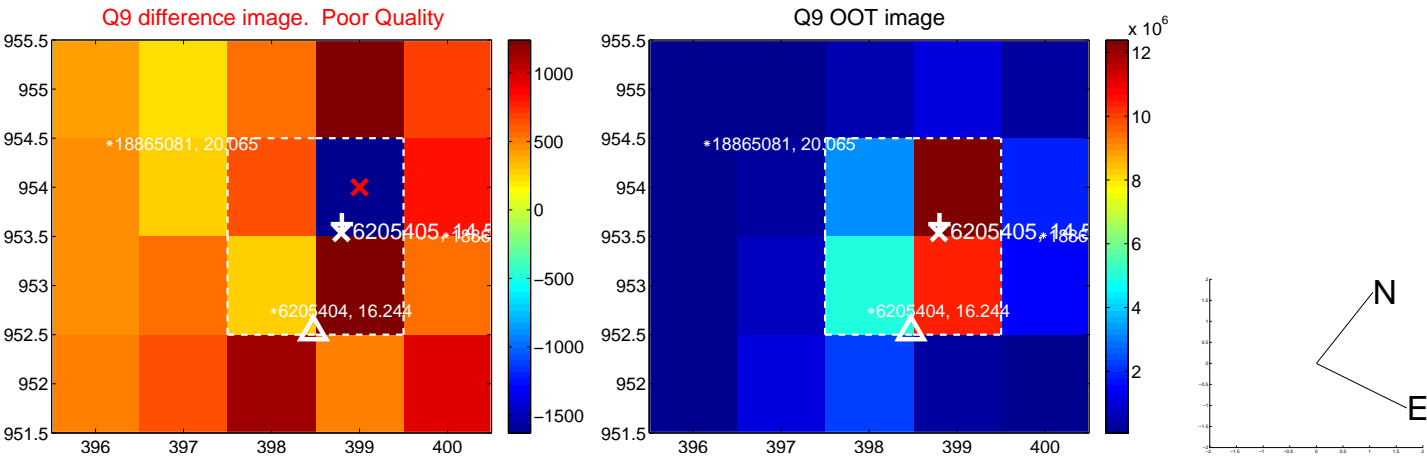


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

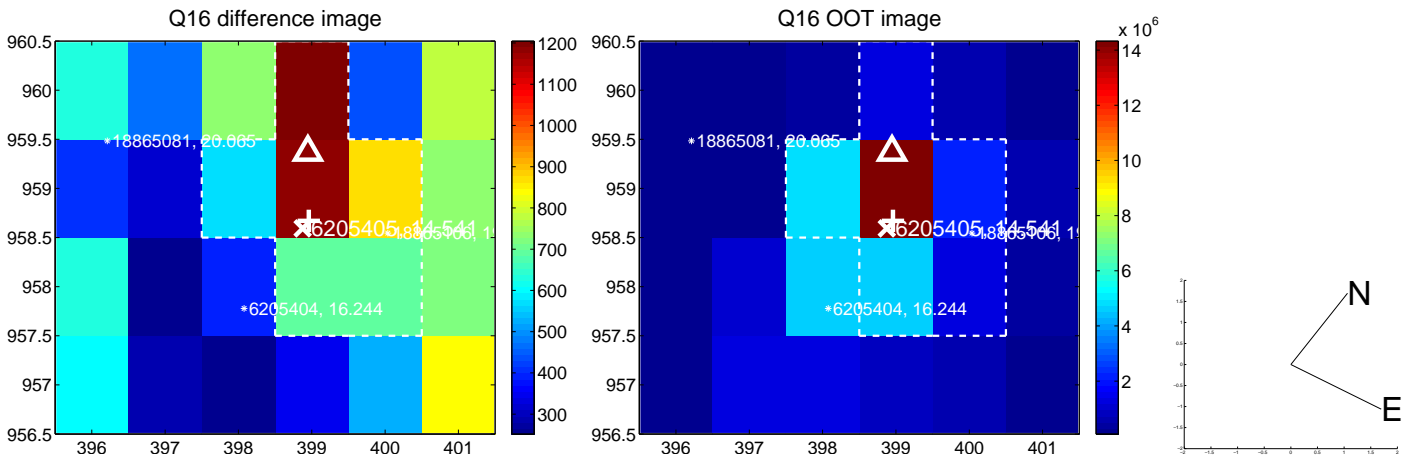
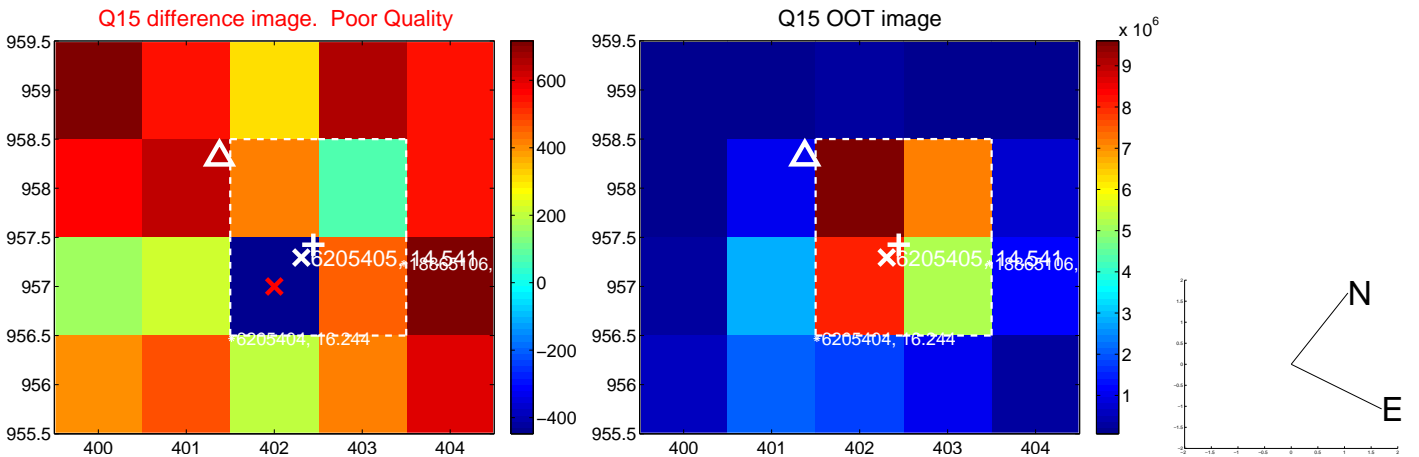
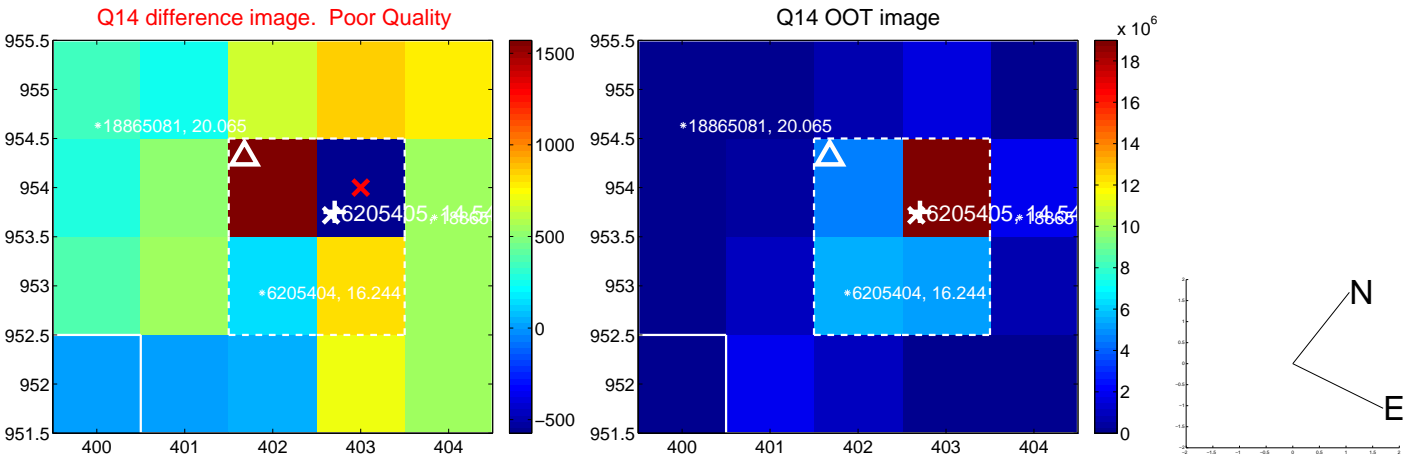
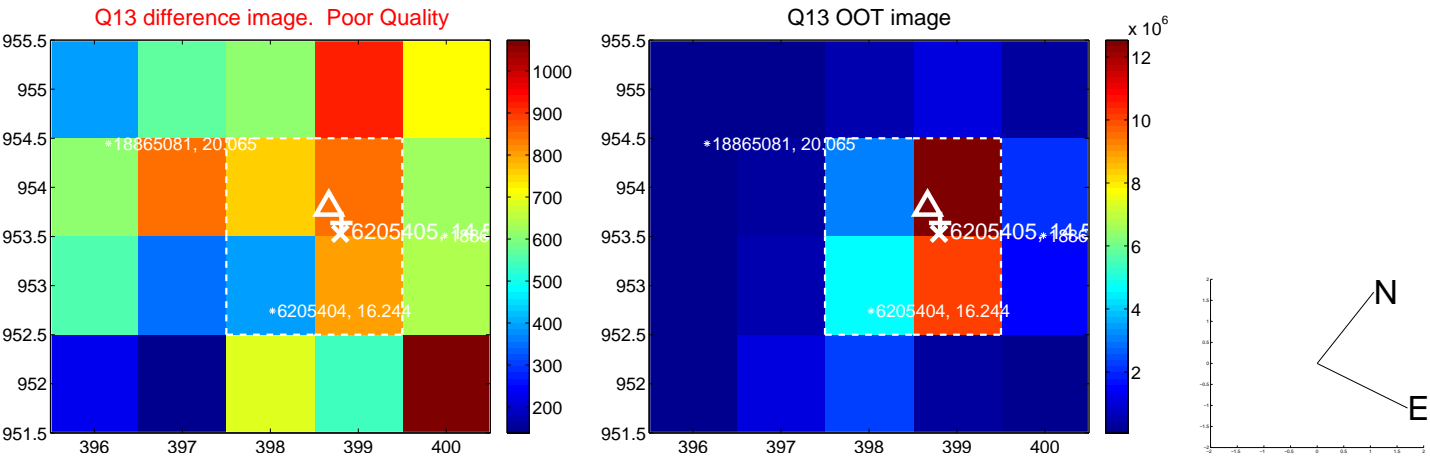




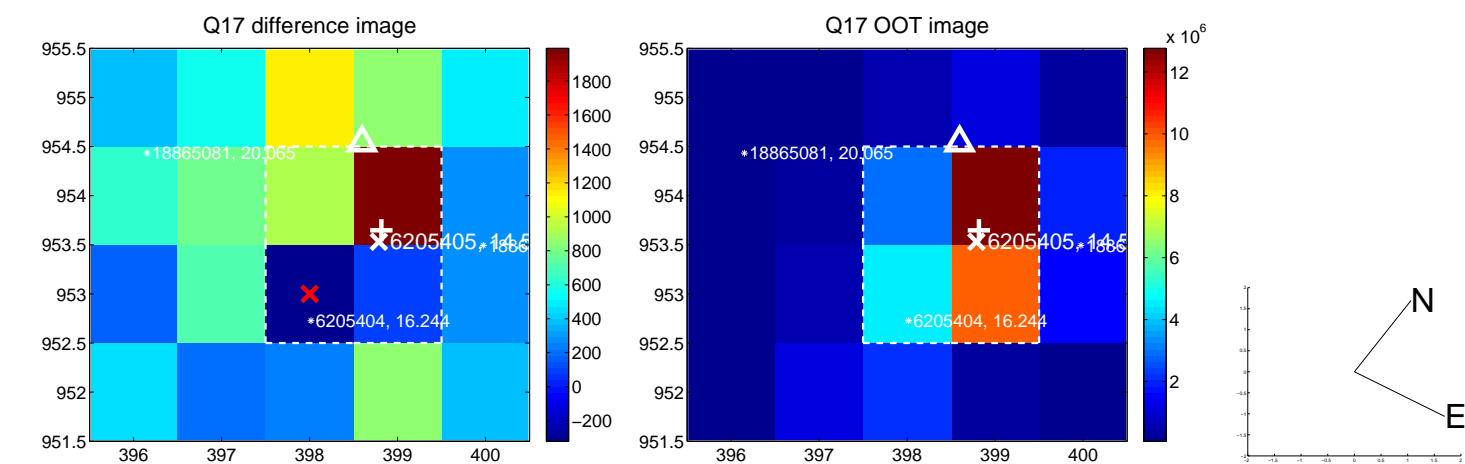
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



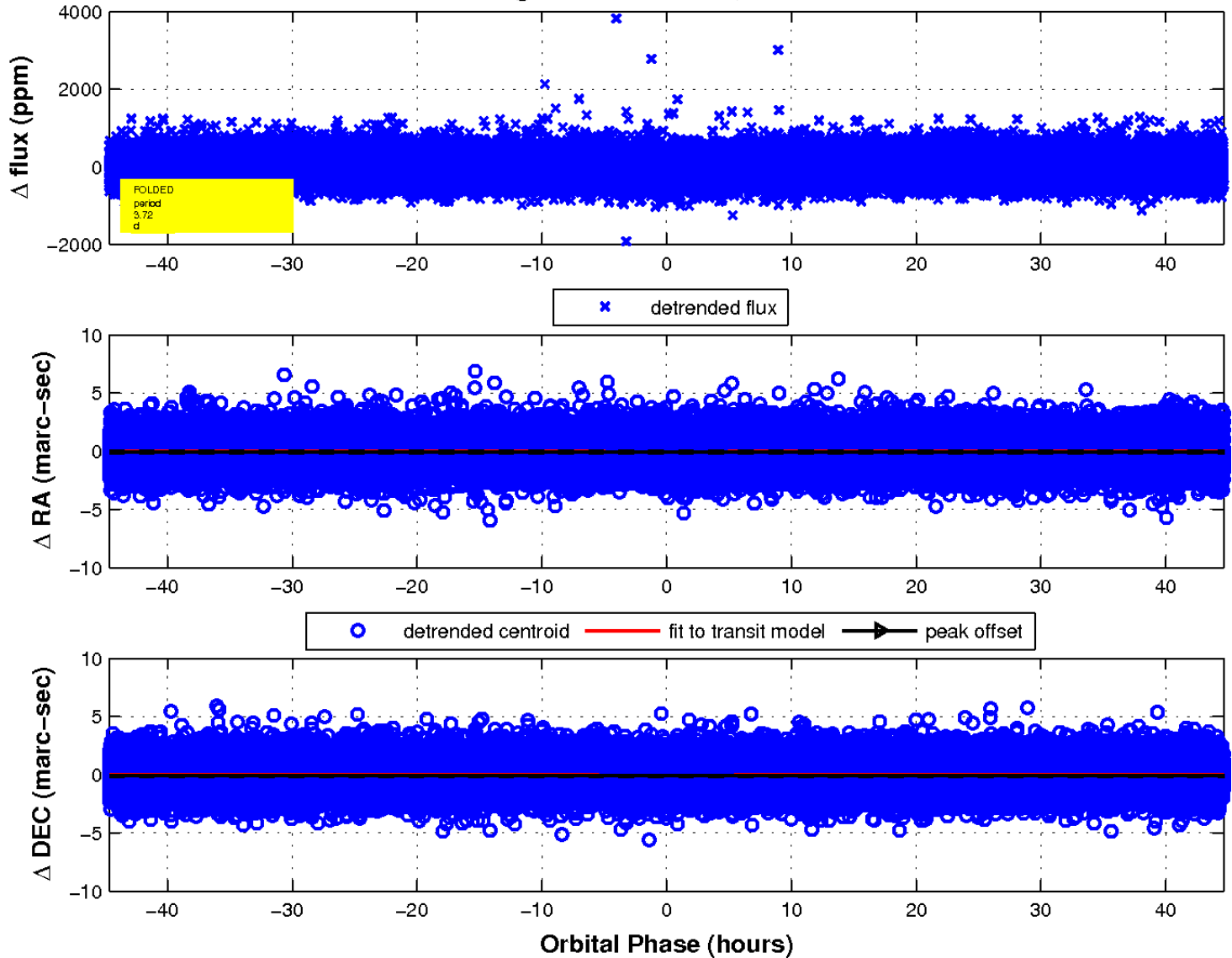
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



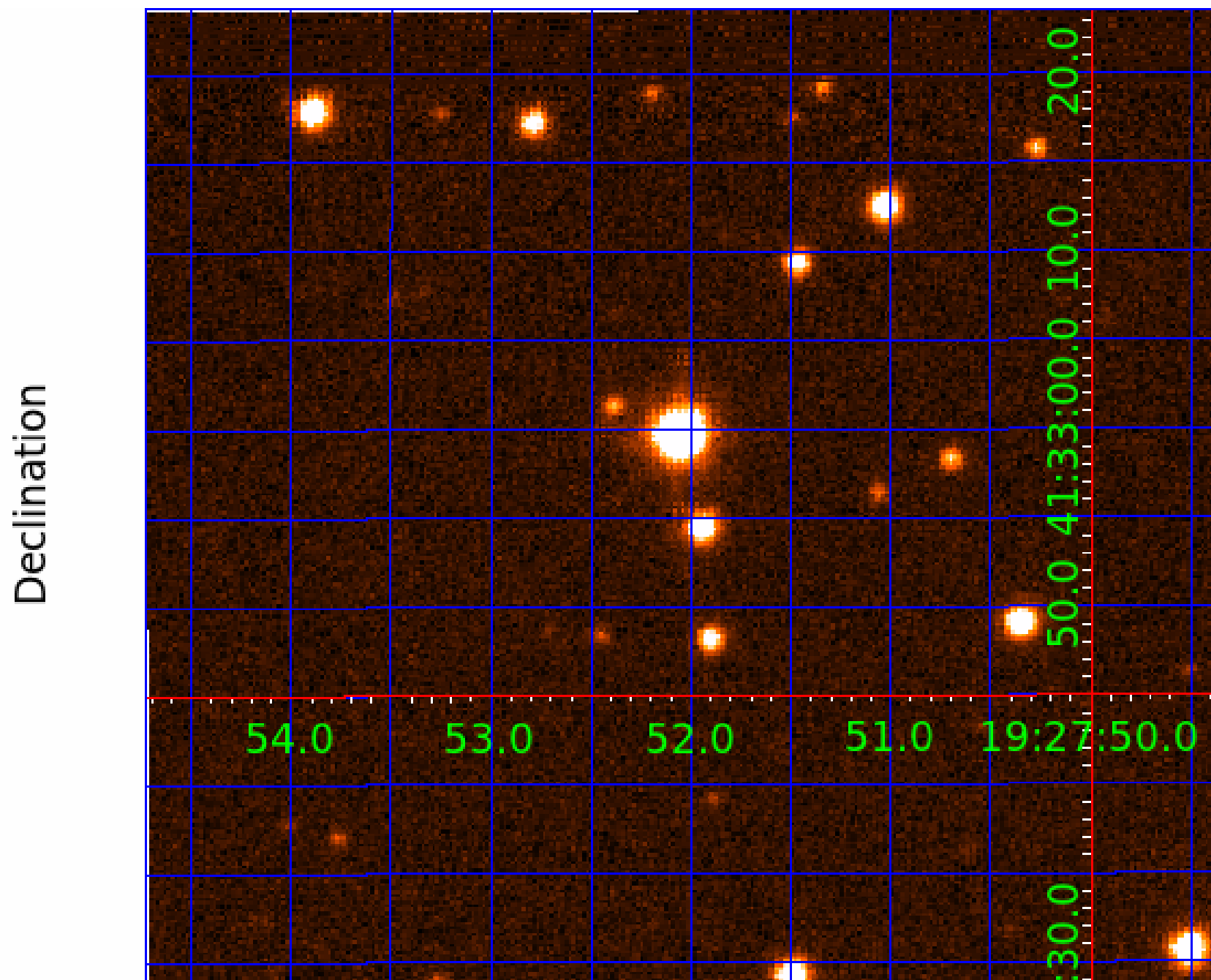
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 2



UKIRT Image





# KIC 006205405

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006205405-01	OBS	5251.01	3.722687	134.681393	63.8	16.359	13.2	14.4	0.48	3724	0.84	28.84
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006205405-01	OBS	FP	0.00	1	0	1	1	LPP_DV—CENT_UNRESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
006205405-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_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 006205405-02

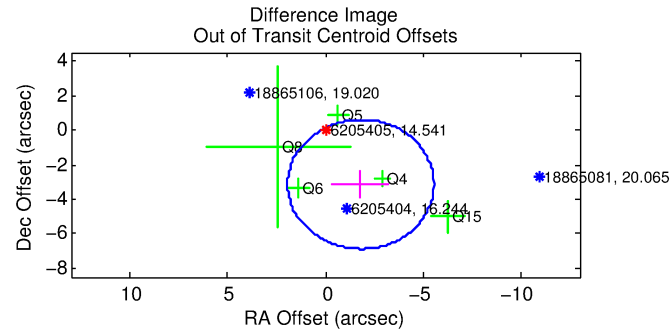
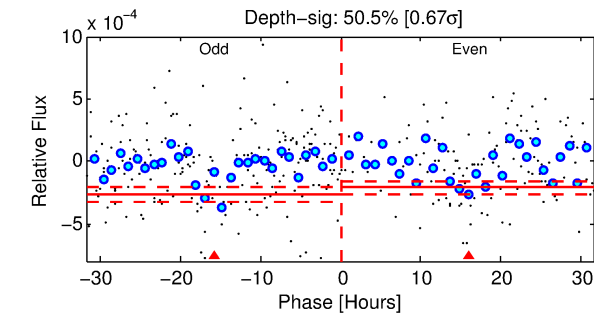
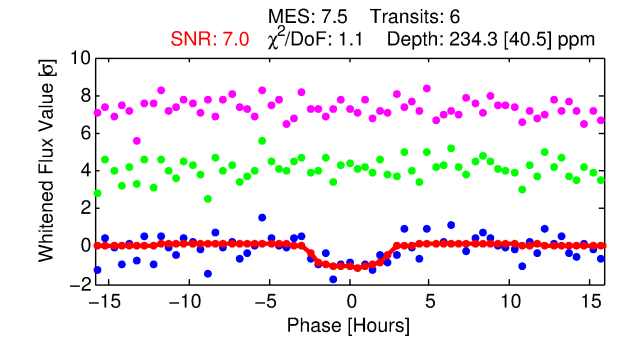
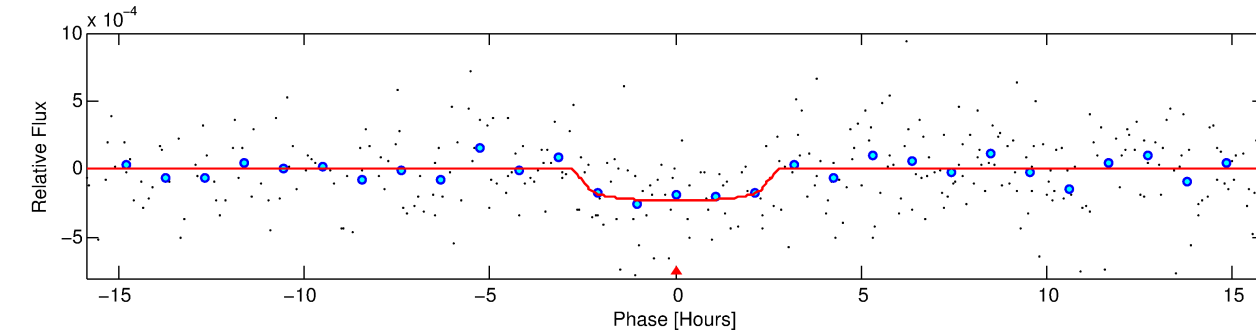
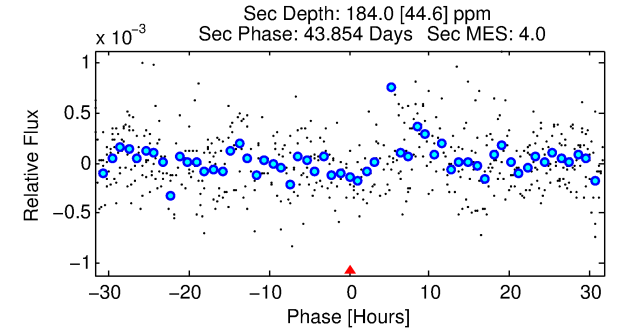
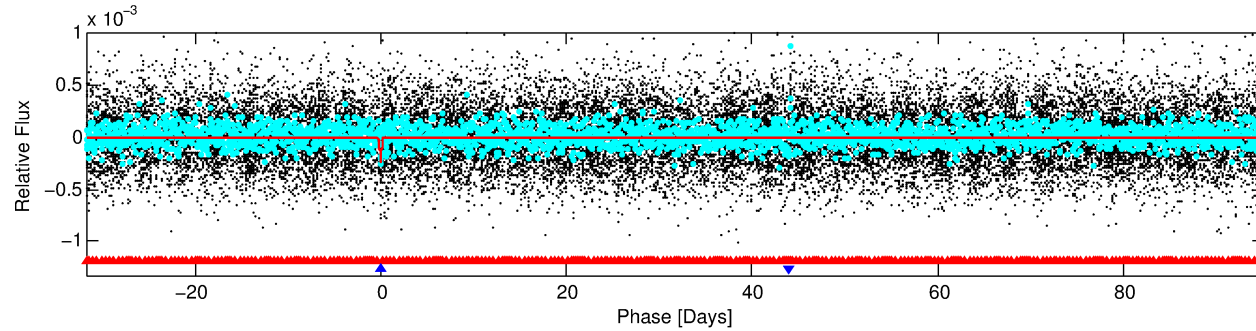
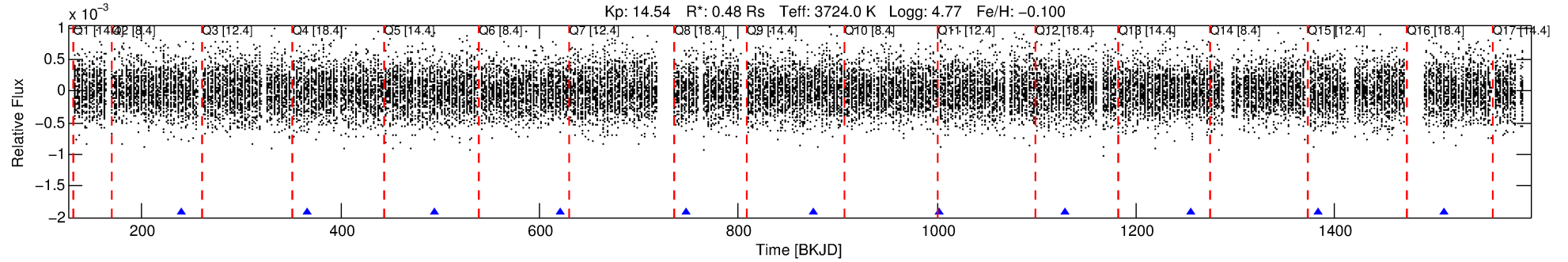
No Significant Match Found

# DV One-Page Summary

KIC: 6205405 Candidate: 2 of 2 Period: 127.019 d

KOI: K05251 Corr: No Ephemeris Match

Kp: 14.54 R\*: 0.48 Rs Teff: 3724.0 K Logg: 4.77 Fe/H: -0.100



## DV Fit Results:

Period = 127.01937 [0.00285] d  
Epoch = 239.8275 [0.0181] BKJD  
Rp/R\* = 0.0155 [0.0230]  
a/R\* = 116.02 [783.19]  
b = 0.79 [3.17]  
Seff = 0.26 [0.03]  
Teq = 182 [5] K  
Rp = 0.81 [1.21] Re  
a = 0.3903 [0.0228] AU  
Ag = 23451.17 [69999.72] [0.34σ]  
Teffp = 3486 [2601] K [1.27σ]

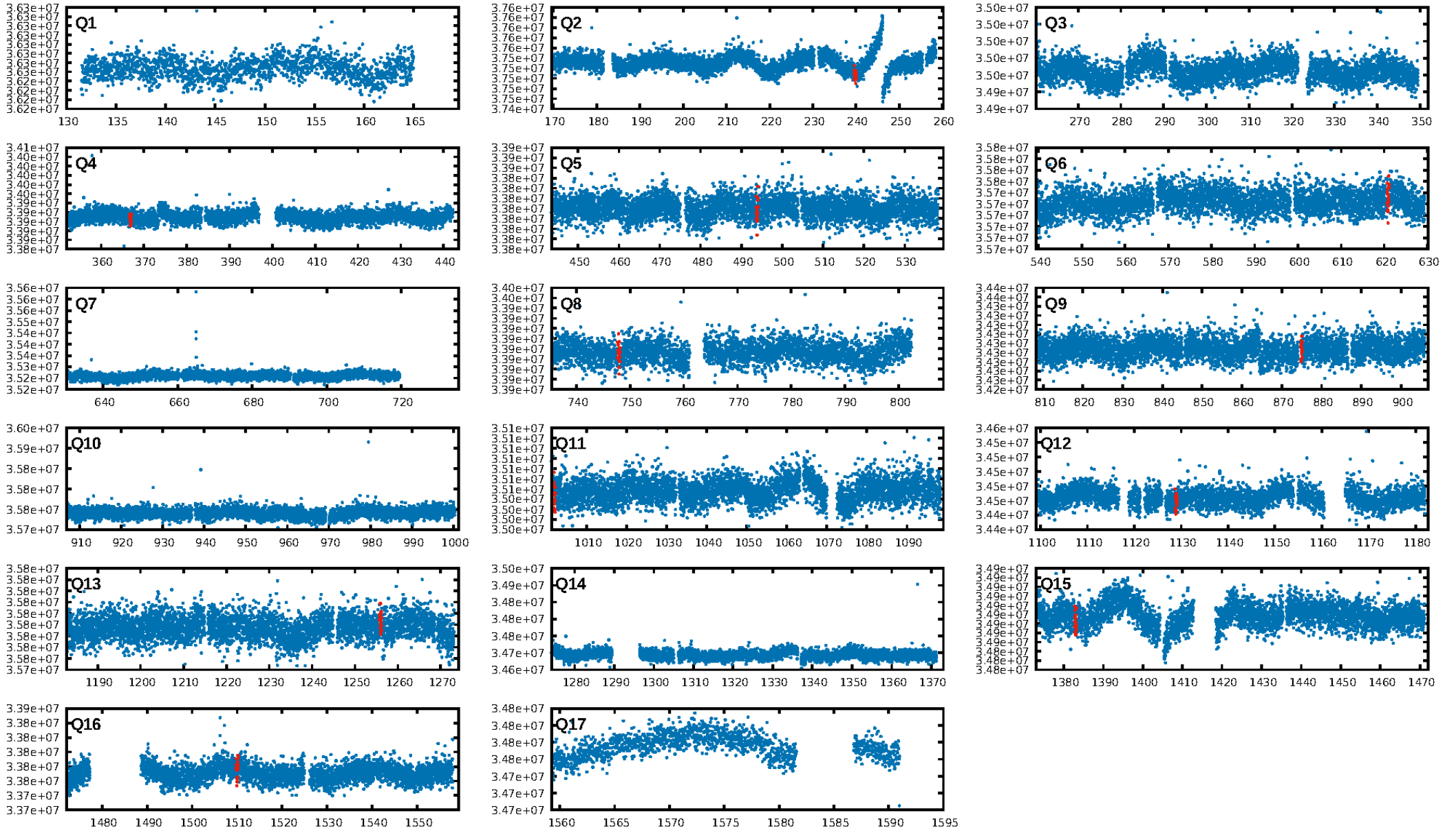
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [172.08σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 24.5%  
ModelChiSquareGof-sig: 99.0%  
**Bootstrap-pfa: 3.32e-10**  
RollingBand-fgt: 1.00 [6/6]  
**GhostDiagnostic-chr: 4.055**  
Centroid-sig: 0.7%  
Centroid-so: 2.898 arcsec [1.95σ]  
OotOffset-rm: 3.623 arcsec [2.91σ]  
OotOffset-st: 1/1/2/1 [5]  
KicOffset-rm: 3.455 arcsec [2.81σ]  
KicOffset-st: 1/1/2/1 [5]  
DiffImageQuality-fgm: 0.60 [3/5]  
DiffImageOverlap-fno: 0.75 [6/8]

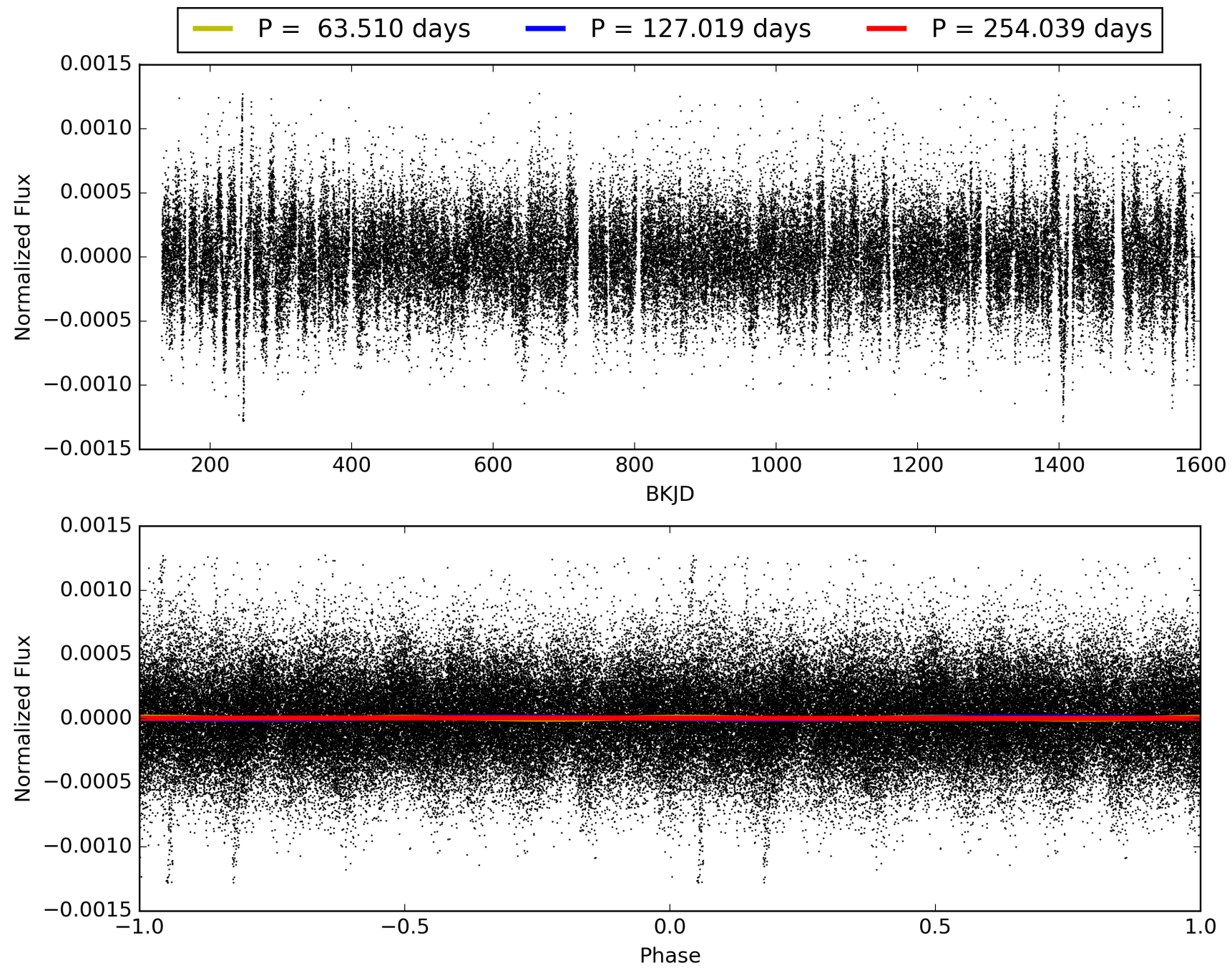
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 19:44:42 Z

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

# TCE 006205405-02, PDC Light Curves



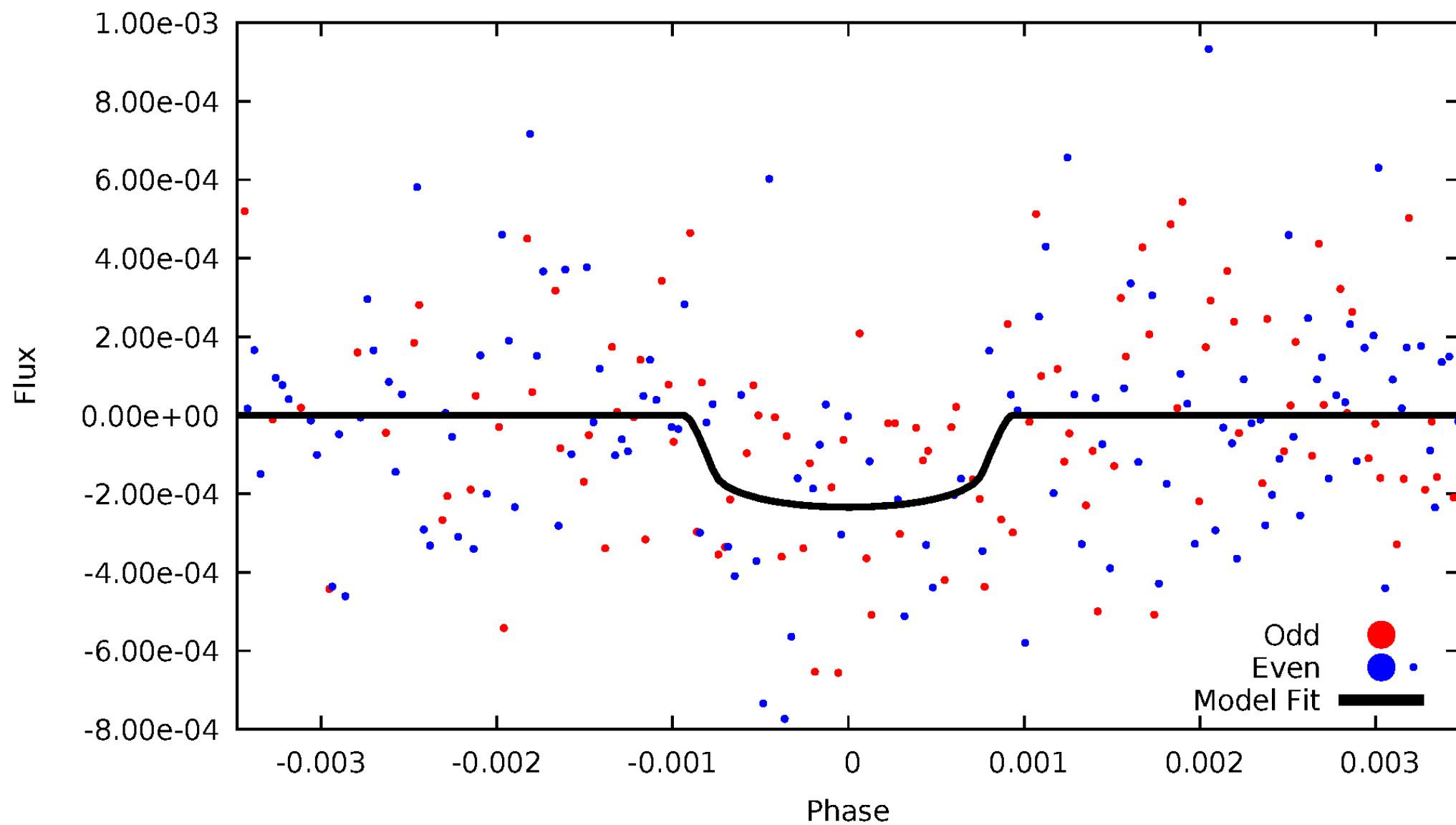
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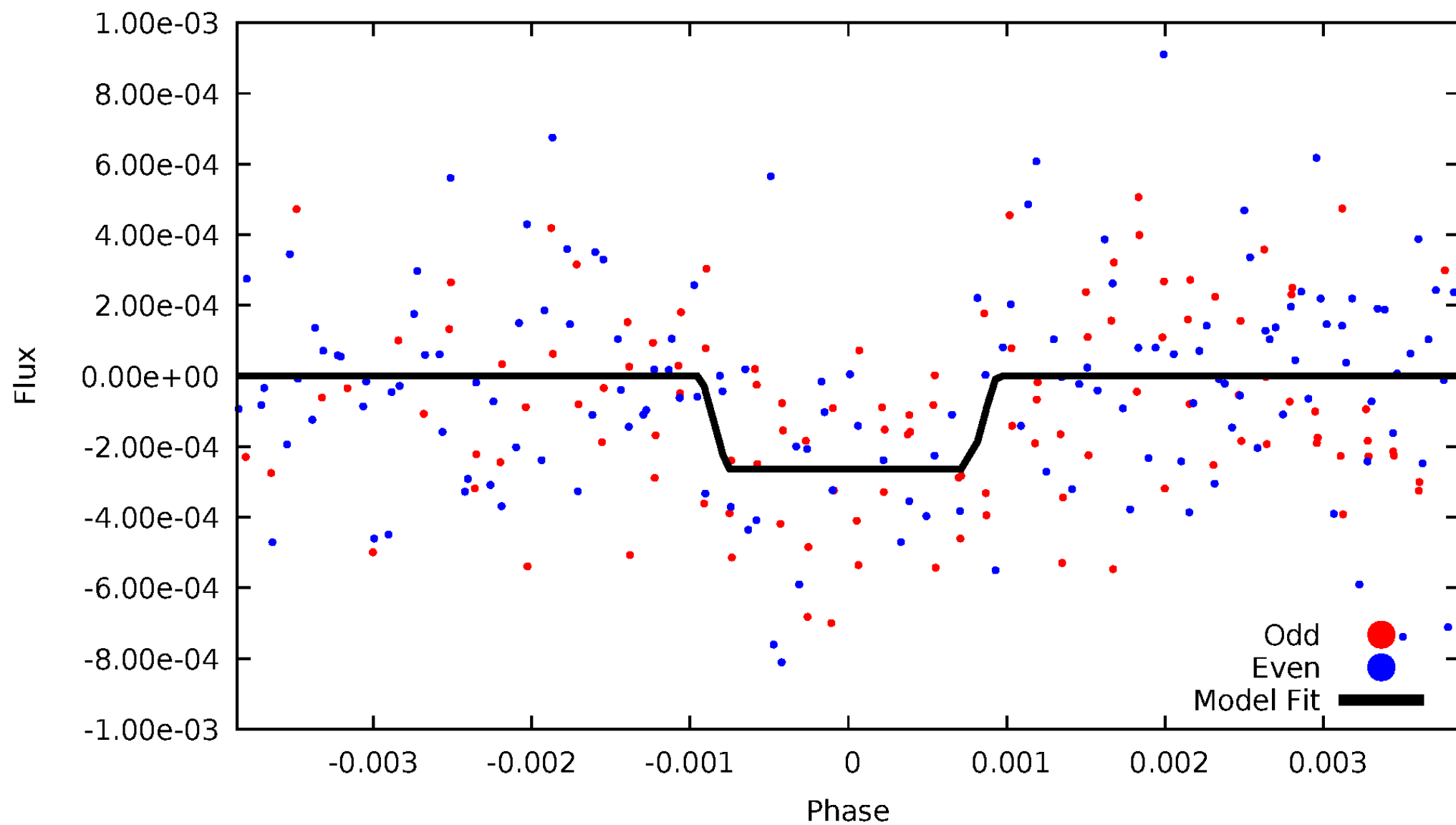
# DV Odd/Even

TCE 006205405-02



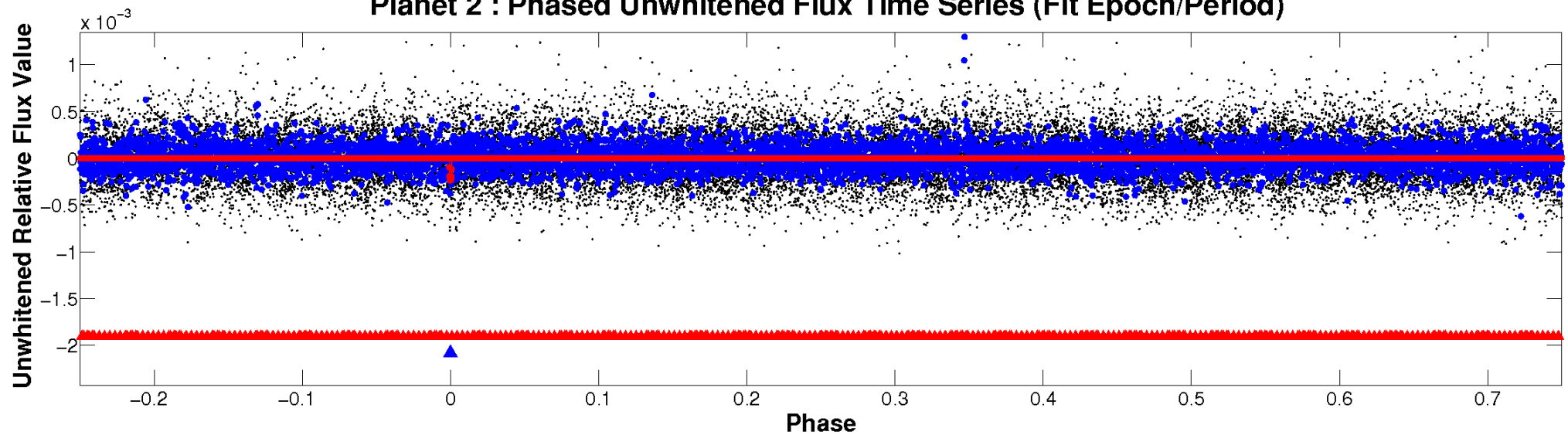
# ALT Odd/Even

TCE 006205405-02

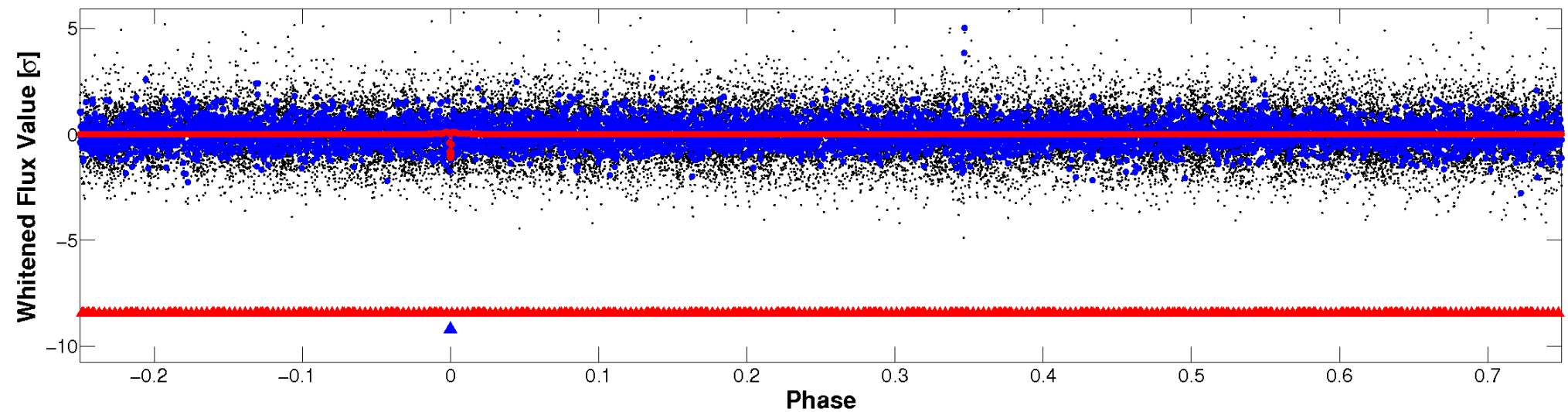


# Non-Whitened Vs. Whitened Light Curve

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

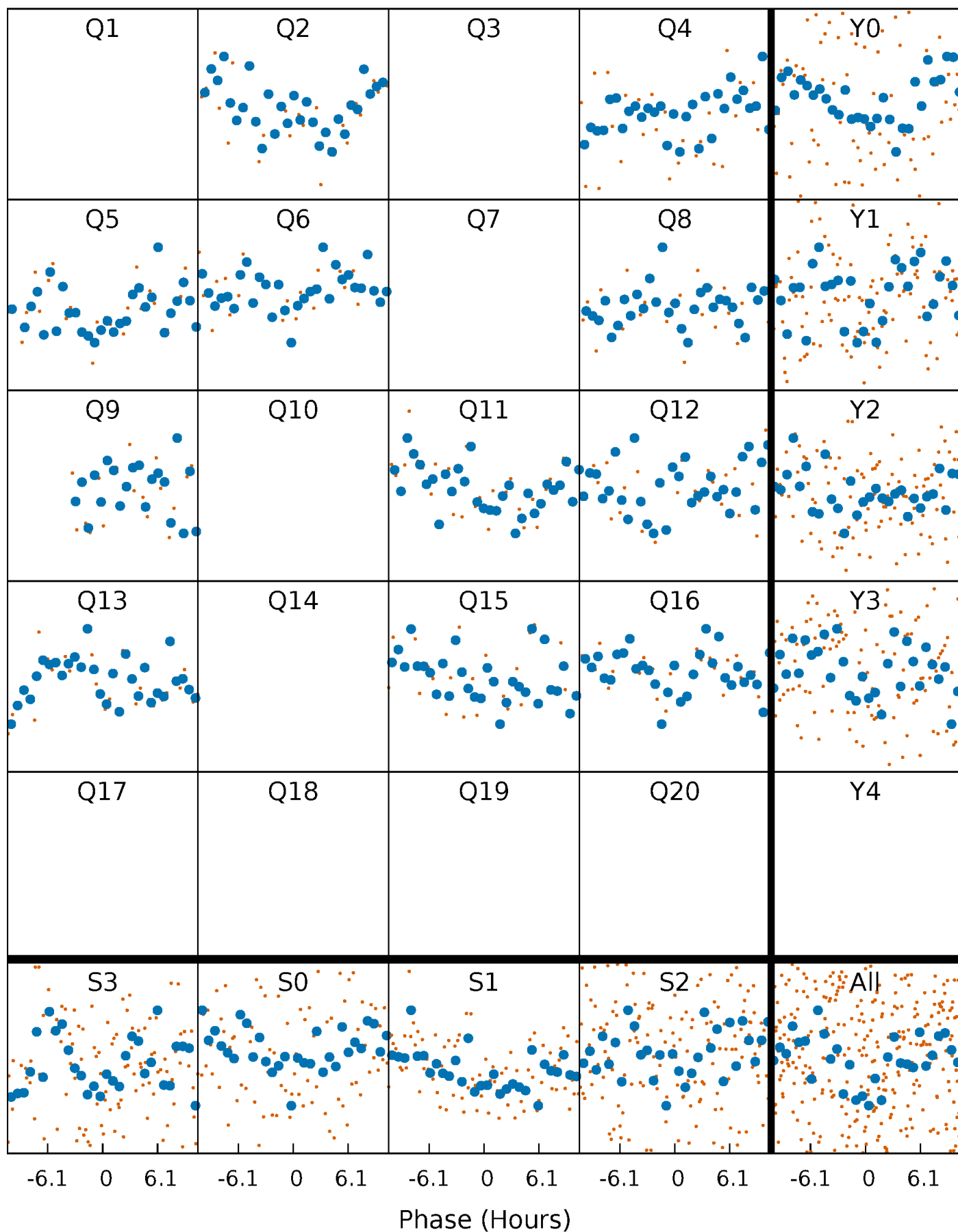


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



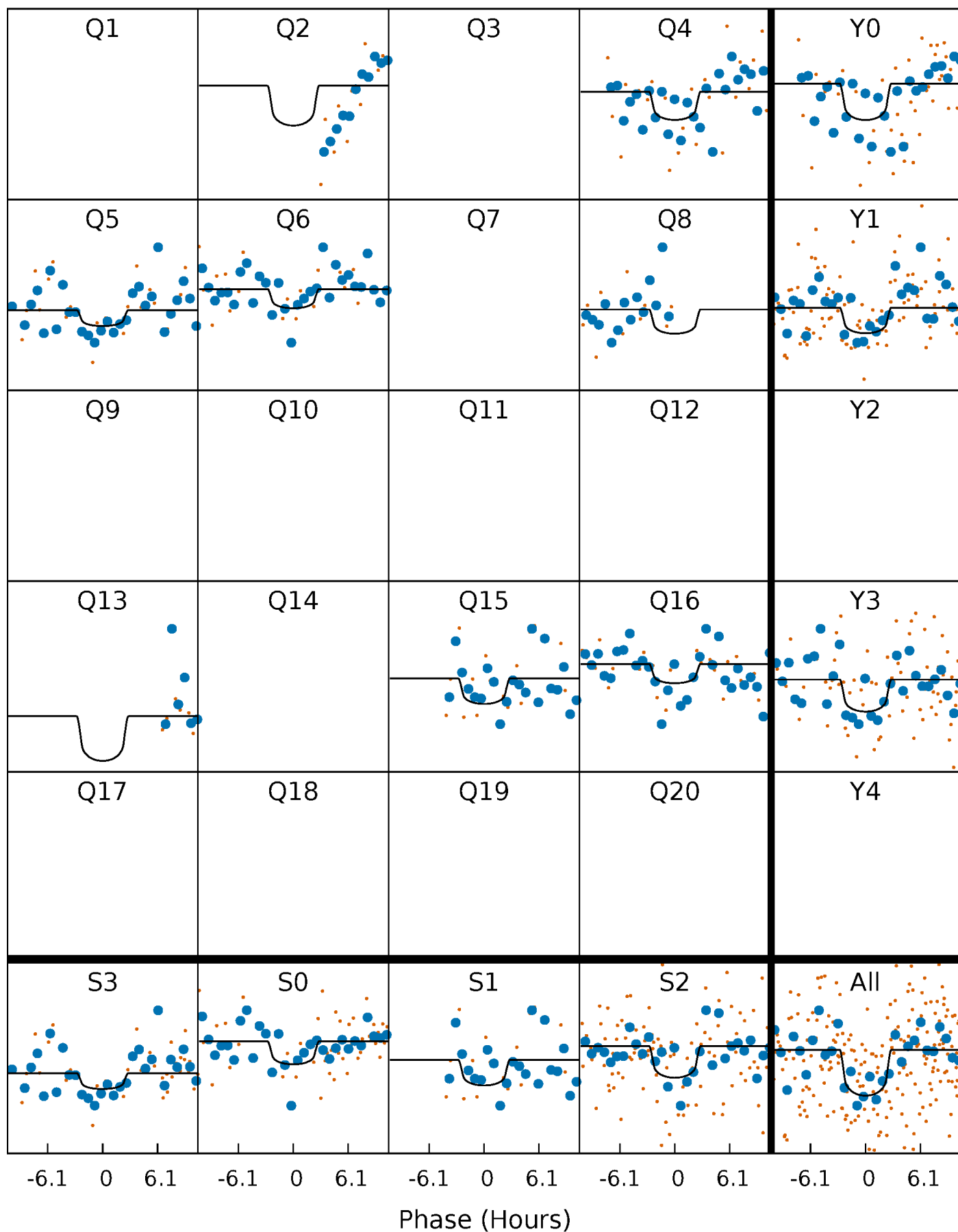
# PDC Quarter-Phased Transit Curves

TCE 006205405-02 P=127.019373 Days  $T_0=239.827465$  (BKJD)



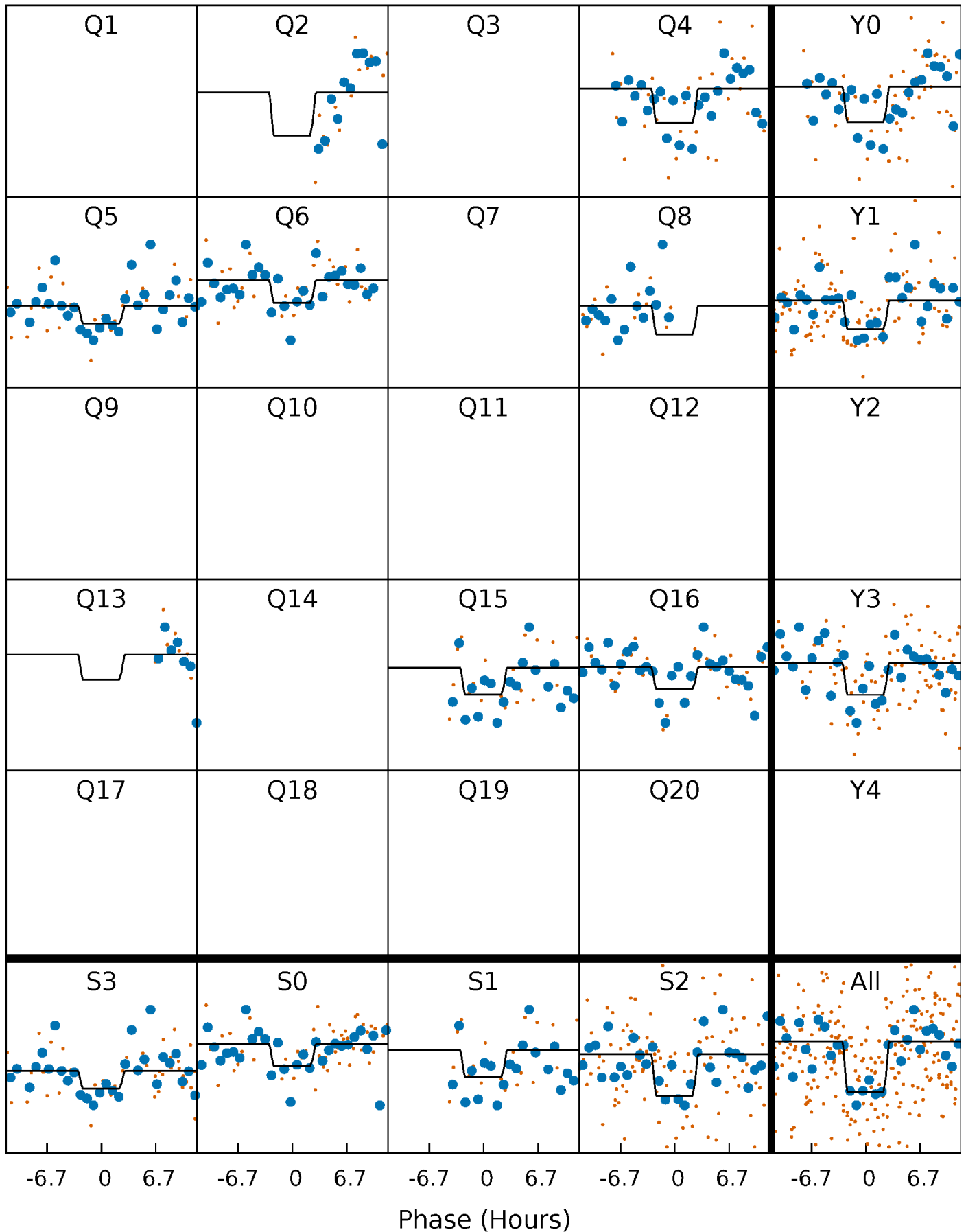
# DV Quarter-Phased Transit Curves

TCE 006205405-02 P=127.019373 Days  $T_0=239.827465$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 006205405-02 P=127.018233 Days  $T_0=239.837224$  (BKJD)

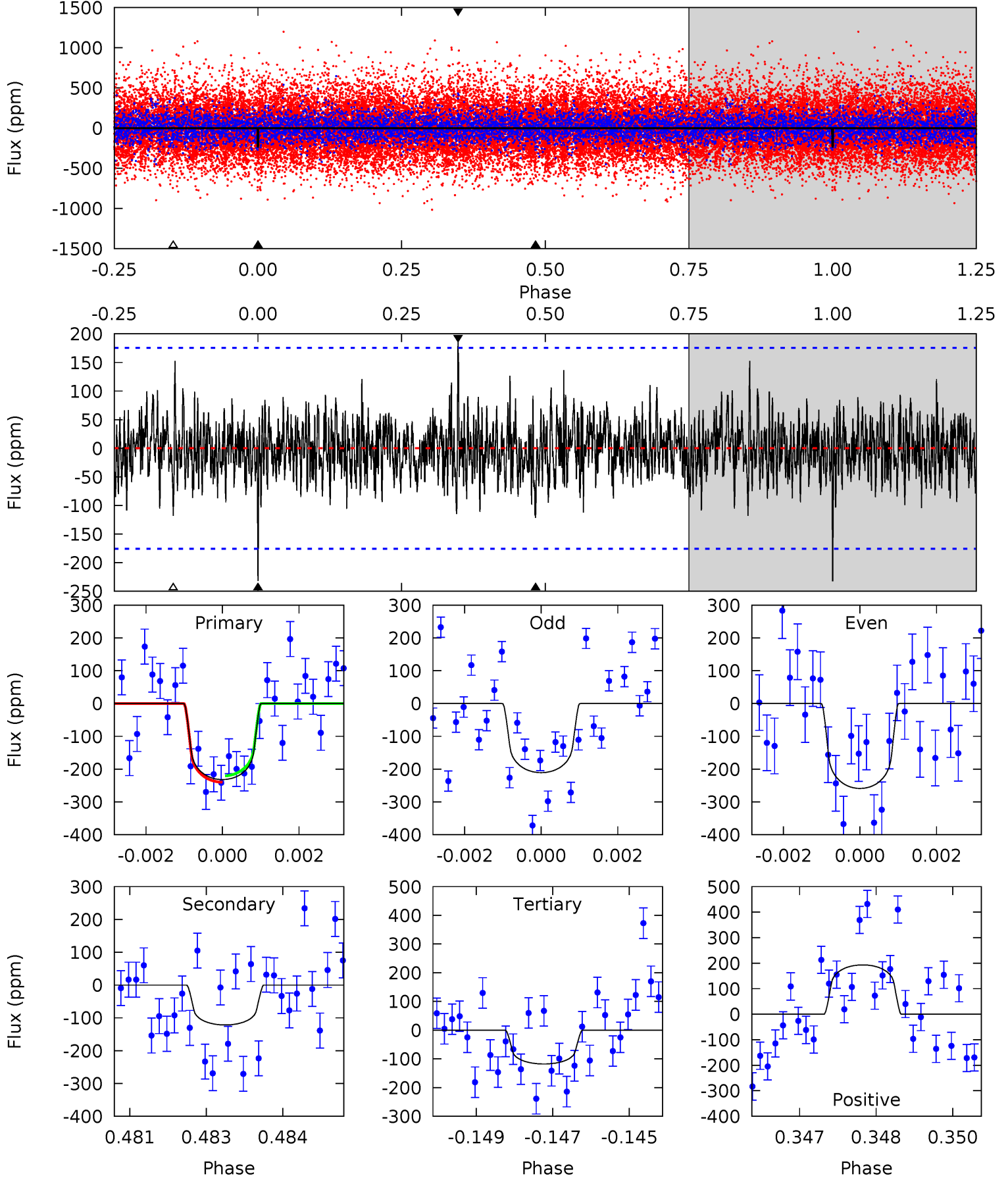




# DV Model-Shift Uniqueness Test

006205405-02, P = 127.019373 Days, E = 112.808092 Days

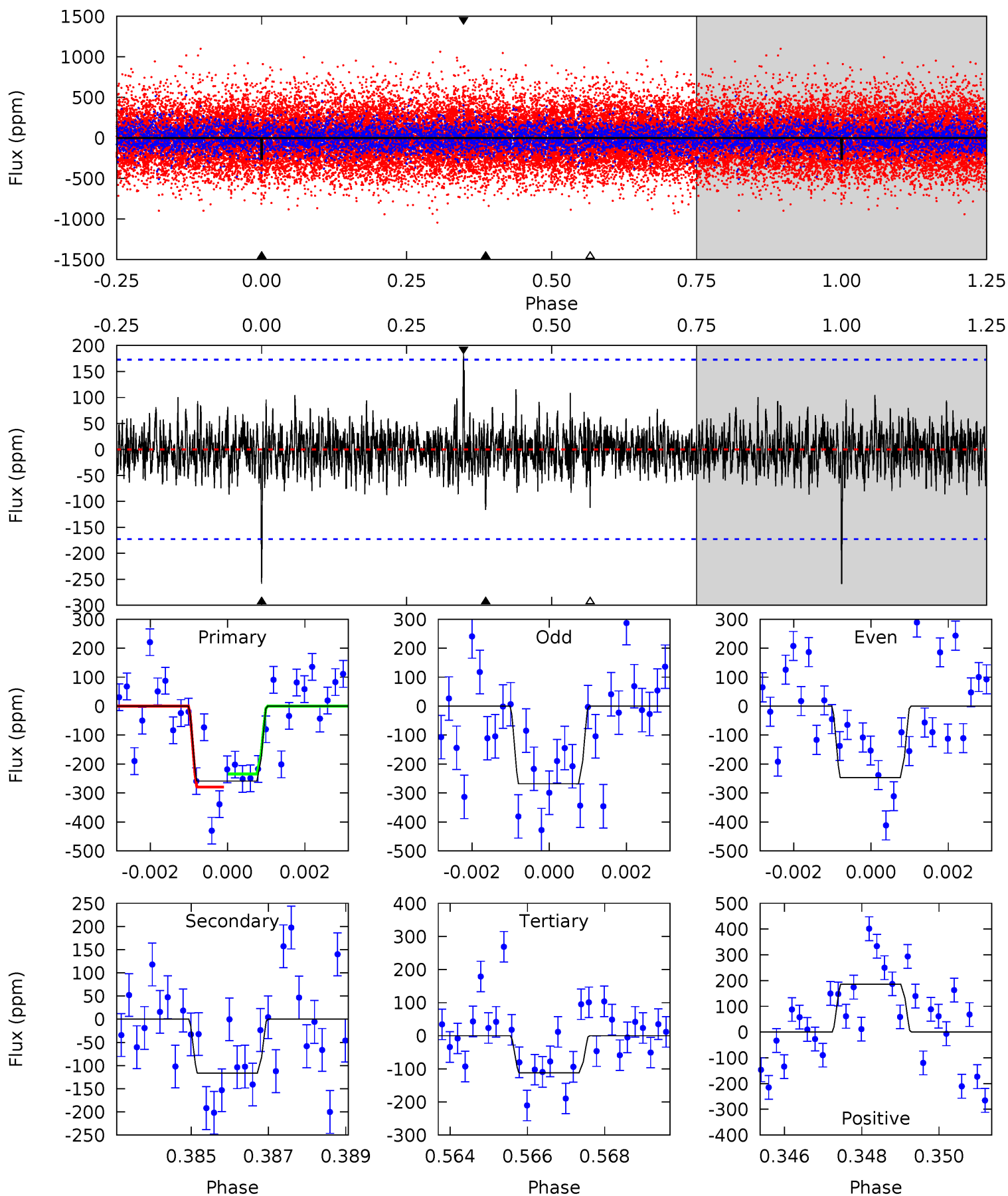
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.05	3.70	3.58	5.88	5.34	3.11	1.19	3.47	1.18	0.12	-2.18	0.73	0.83	0.45	0.29



# Alt Model-Shift Uniqueness Test

006205405-02, P = 127.018233 Days, E = 112.818991 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.00	3.59	3.46	5.75	5.34	3.11	0.94	4.54	2.25	0.13	-2.15	0.33	0.84	0.42	0.70



### Stellar Parameters For KIC 006205405

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3724^{+73}_{-73}$	$4.767^{+0.042}_{-0.025}$	$-0.100^{+0.100}_{-0.100}$	$0.480^{+0.029}_{-0.035}$	$0.492^{+0.031}_{-0.034}$	$6.270^{+1.127}_{-0.711}$
	+2%/-2%	+1%/-1%	+100%/-100%	+6%/-7%	+6%/-7%	+18%/-11%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 006205405-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-122 \pm 33$	$1.17^{+1.09}_{-0.76}$	$254^{+6}_{-6}$	$2975^{+1246}_{-481}$	$7376^{+55055}_{-5597}$
Alt.	$-116 \pm 32$	$1.25^{+0.99}_{-0.86}$	$253^{+6}_{-7}$	$2933^{+1282}_{-455}$	$6108^{+55876}_{-4338}$

$T_{max}$  = 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

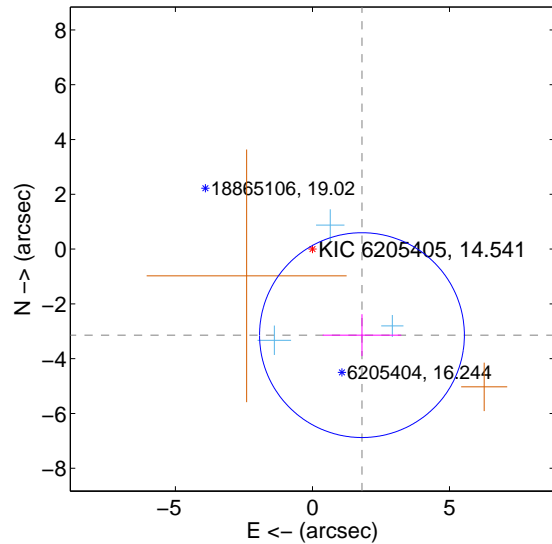
Supplemental centroid analysis for 006205405-02. Kepler magnitude: 14.54. Transit SNR 6.95

There are 3 quarters with good PRF difference image offsets

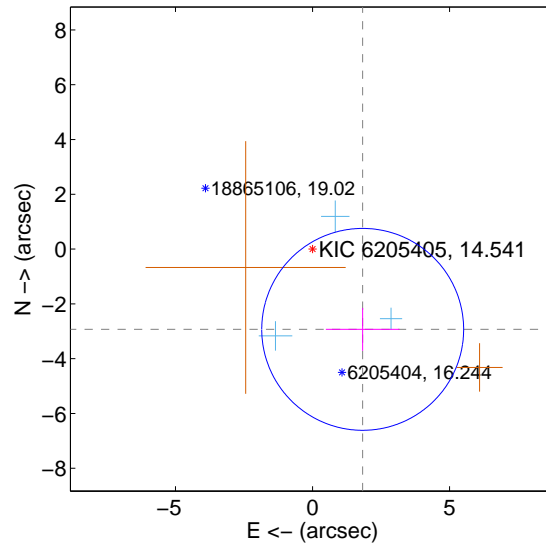
The direct PRF centroid is offset from the target star catalog position by about 0.73 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.623 \pm 1.246$	2.91	$-1.807 \pm 1.432$	$-3.140 \pm 0.764$
PRF-fit source offset from KIC position	$3.455 \pm 1.228$	2.81	$-1.831 \pm 1.343$	$-2.930 \pm 0.785$
photometric centroid source offset	$2.90 \pm 1.49$	1.95	$1.48 \pm 1.46$	$-2.49 \pm 1.50$

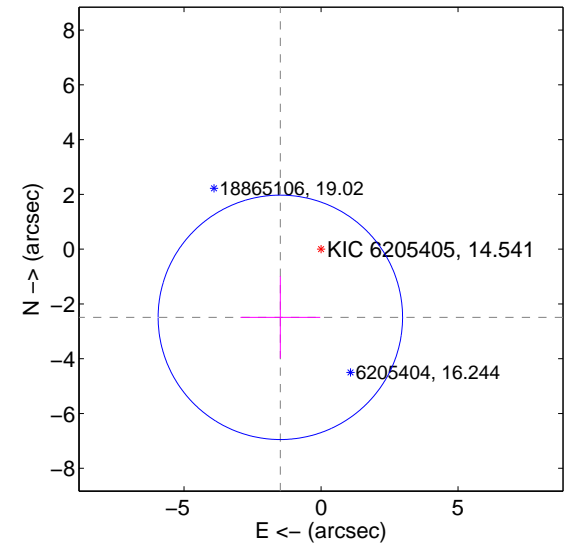
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

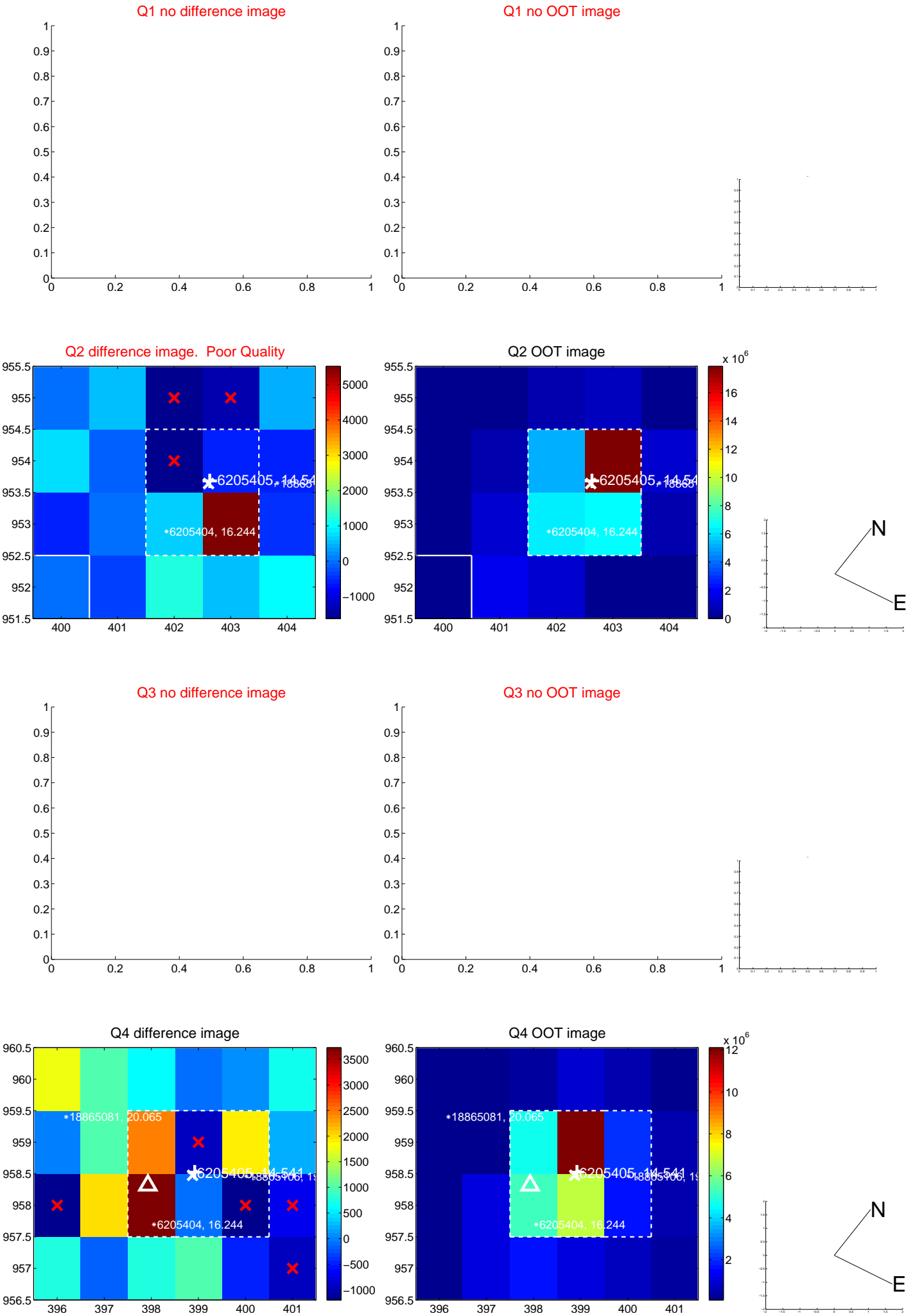


offset from photometric centroids

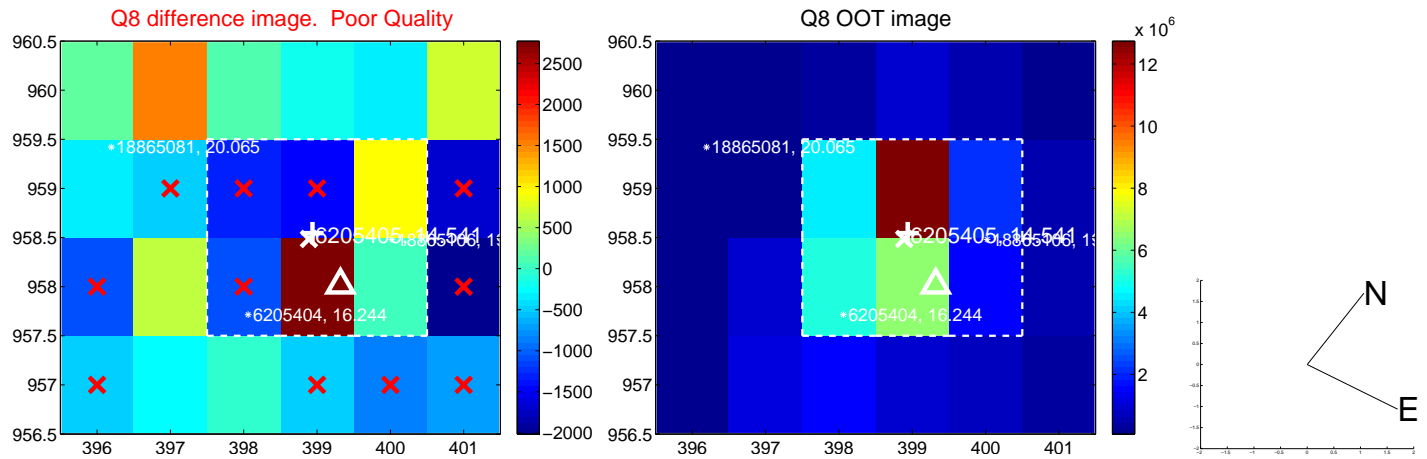
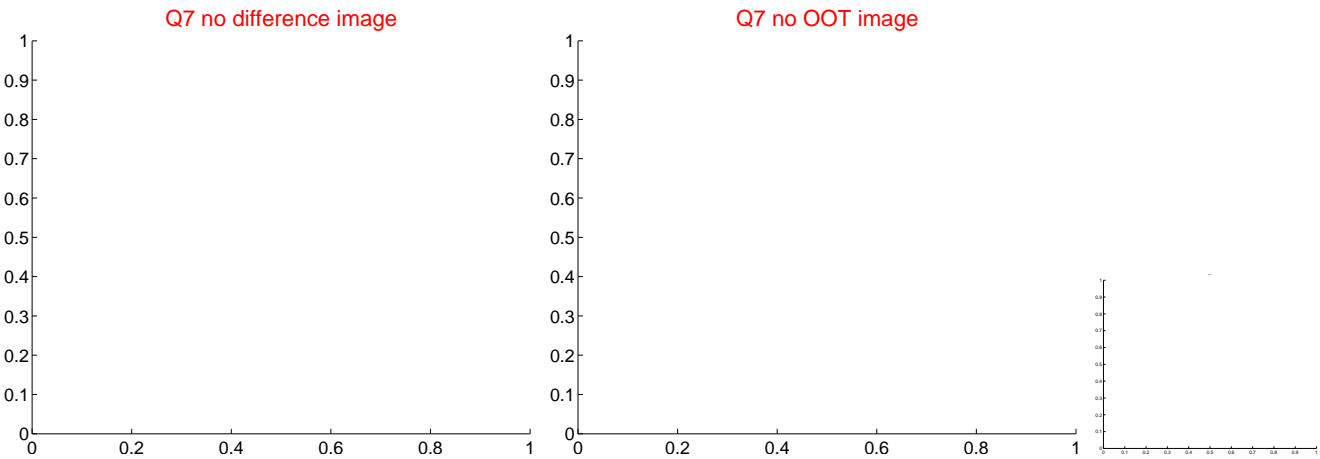
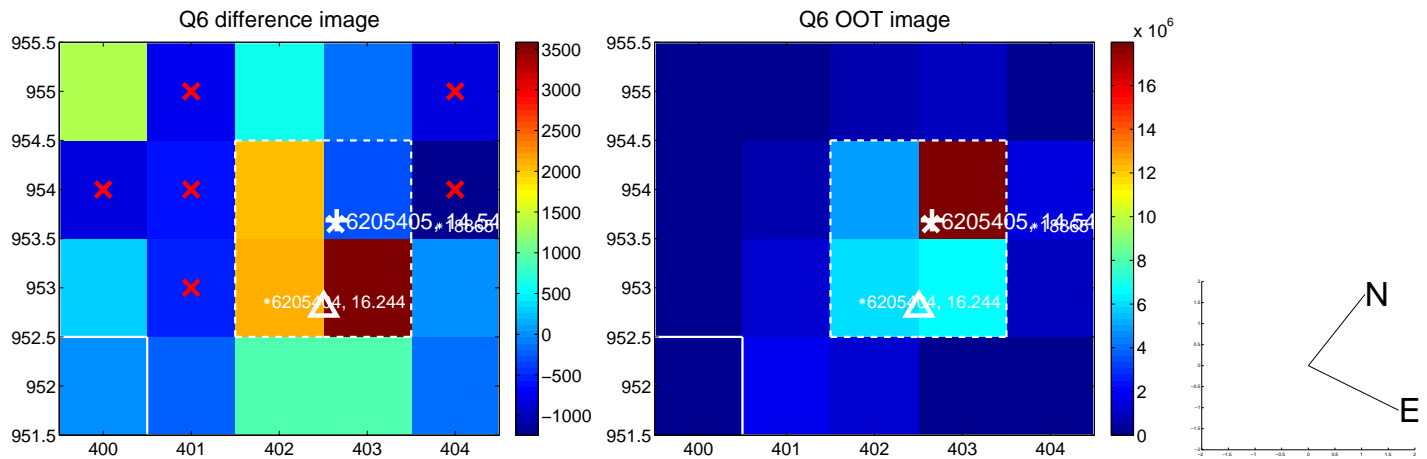
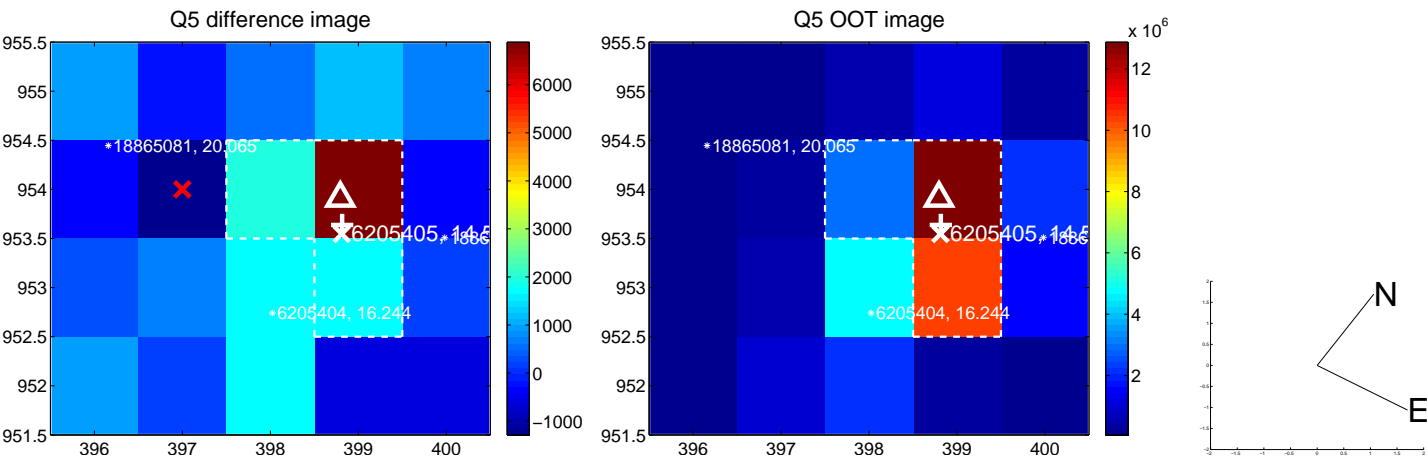


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

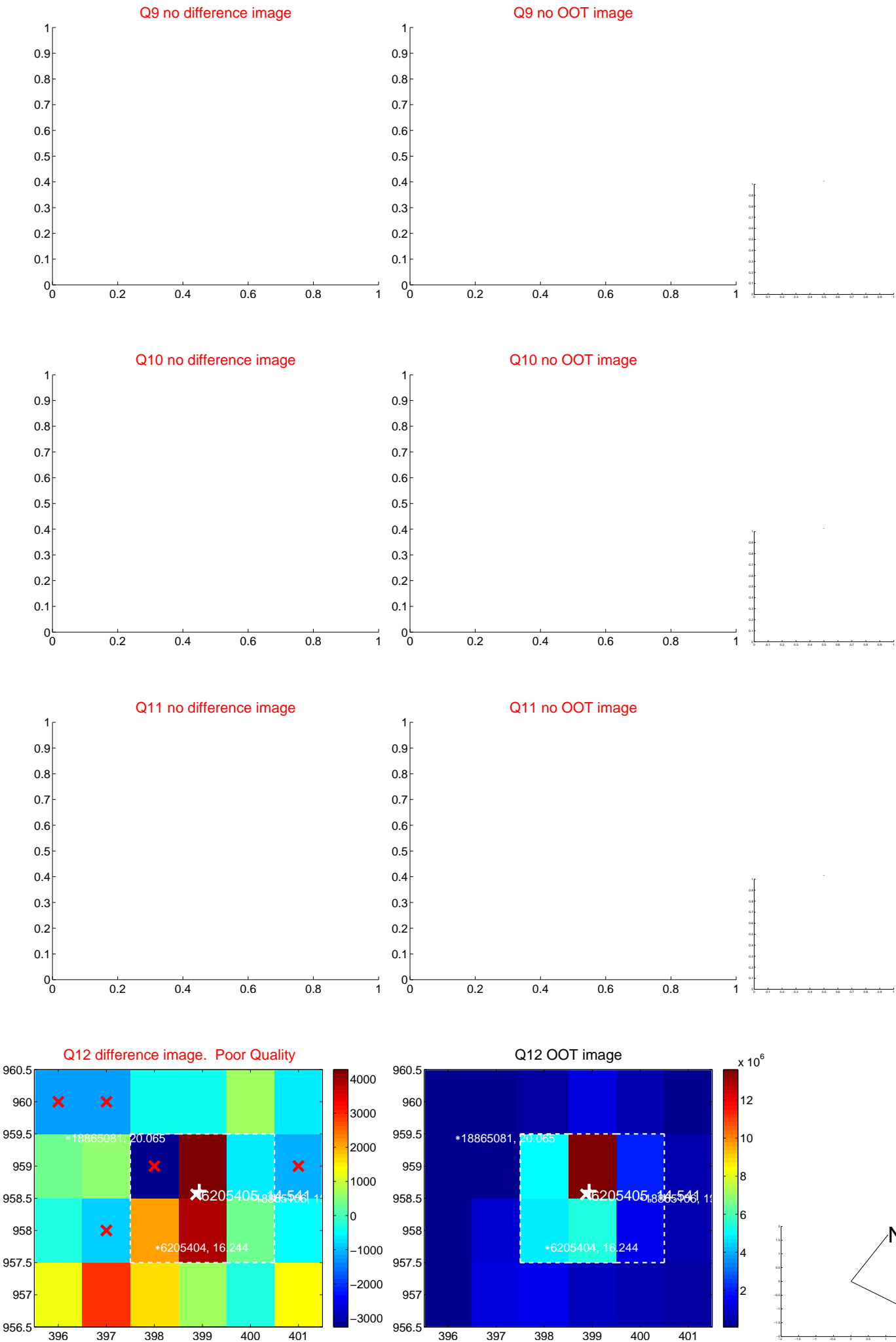


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

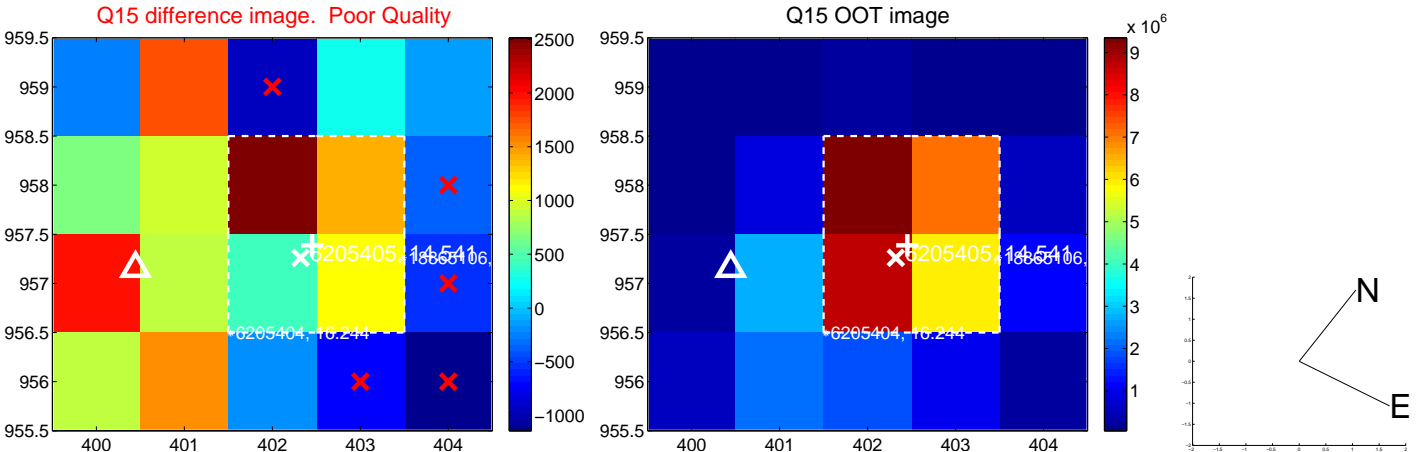
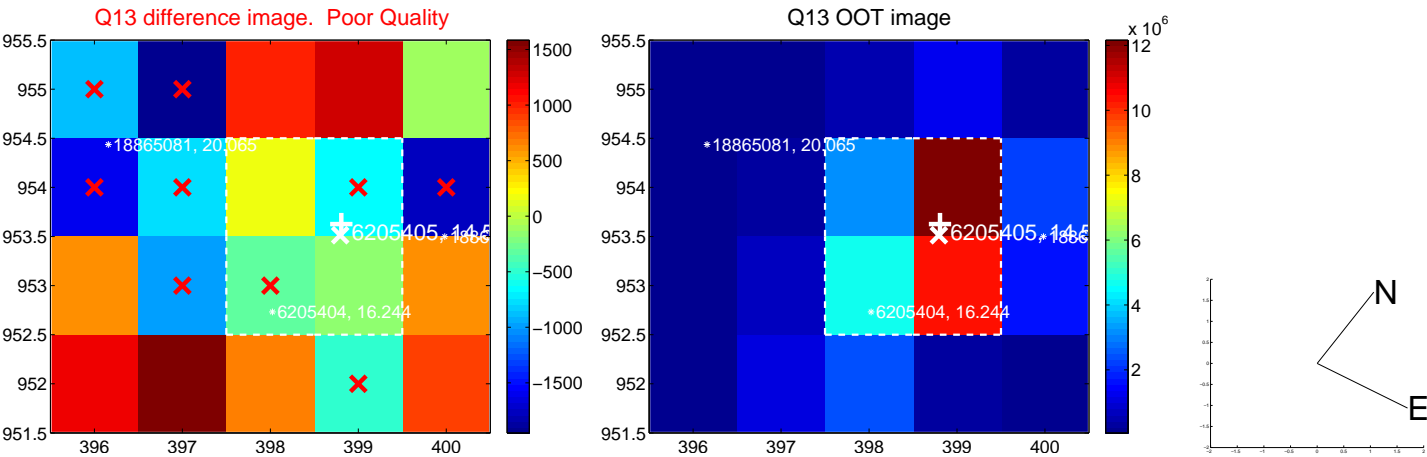




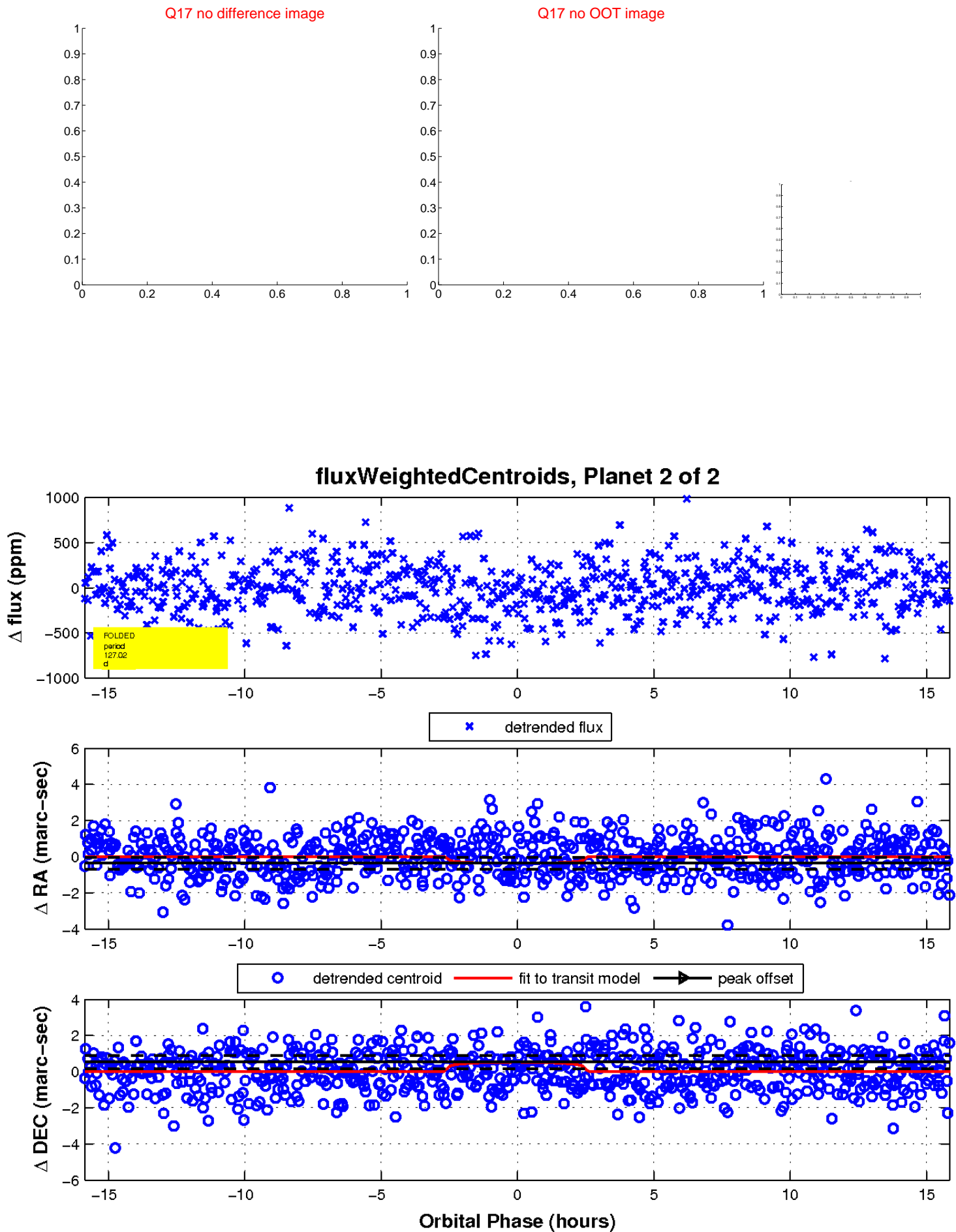
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

