

# KIC 010873947

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010873947-01	OBS	No	0.527357	131.795567	18.0	3.647	10.8	4.4	1.89	7559	0.83	47530.62
010873947-02	OBS	No	19.689666	138.728149	610.6	2.271	12.2	13.2	1.89	7559	5.20	380.89
010873947-03	OBS	No	17.025367	144.262873	491.6	0.984	11.3	8.3	1.89	7559	4.24	462.36
010873947-04	OBS	No	22.211661	140.942347	695.4	1.426	10.7	10.2	1.89	7559	8.87	324.34
010873947-05	OBS	No	36.184555	138.348466	580.2	3.091	12.0	10.0	1.89	7559	8.71	169.21
010873947-06	OBS	No	37.054013	149.861374	542.1	2.239	10.5	9.4	1.89	7559	4.88	163.93
010873947-07	OBS	No	49.229353	155.691611	1022.6	4.506	10.1	12.3	1.89	7559	11.36	112.24
010873947-09	OBS	No	32.616633	140.133048	594.1	1.655	10.3	9.4	1.89	7559	4.78	194.32

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010873947-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
010873947-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
010873947-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV
010873947-04	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
010873947-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010873947-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010873947-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV
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**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

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

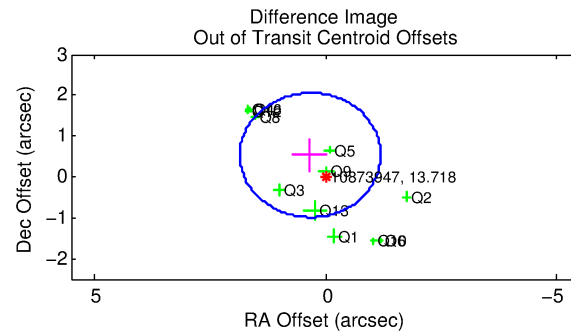
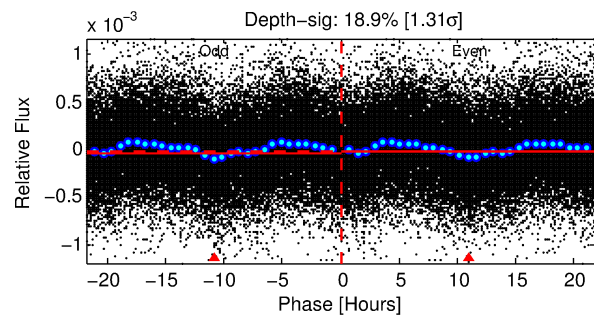
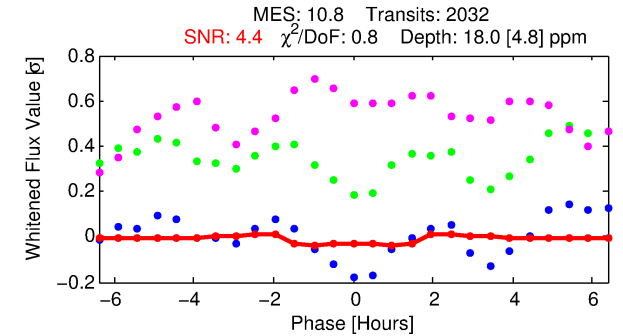
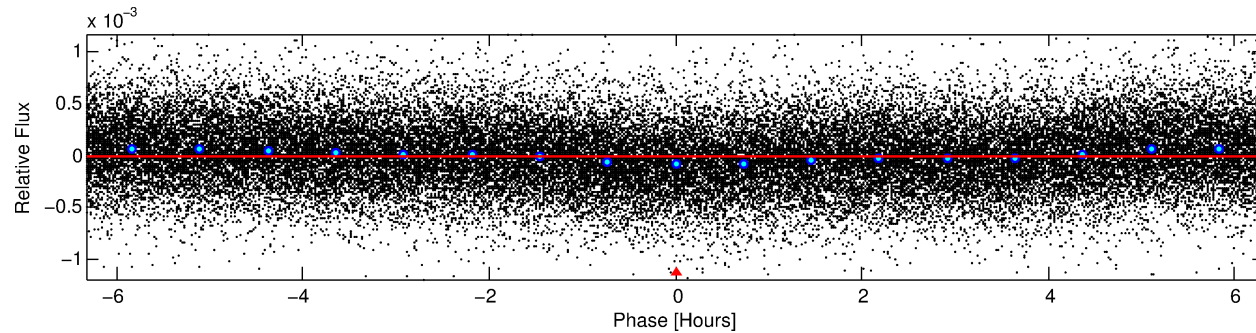
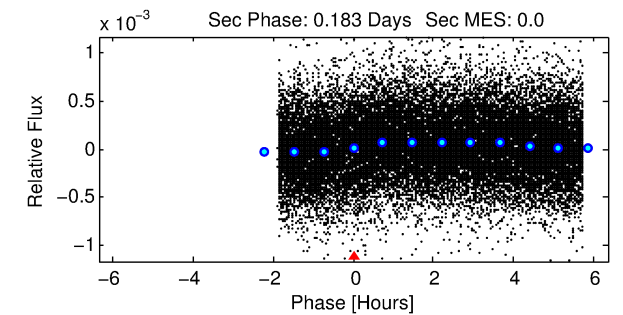
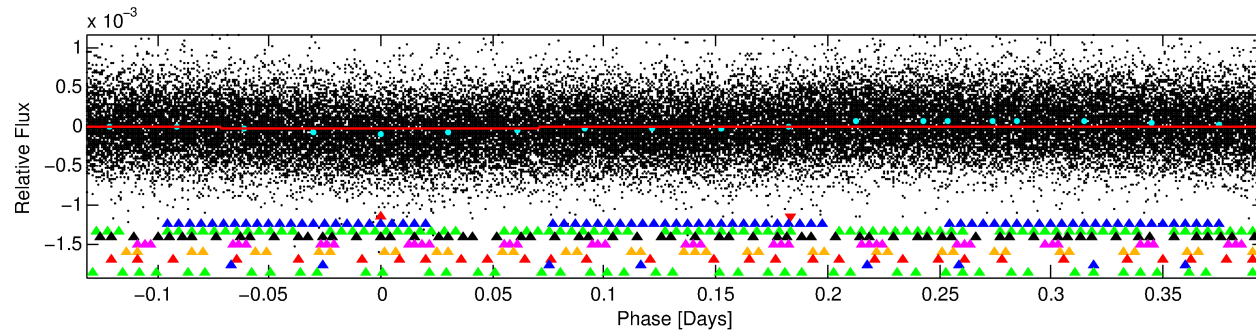
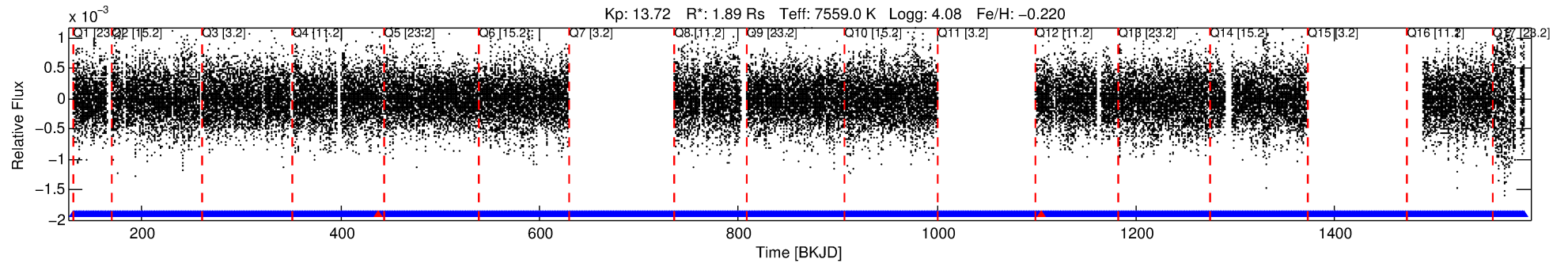
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010873947-01

No Significant Match Found

# DV One-Page Summary

KIC: 10873947 Candidate: 1 of 9 Period: 0.527 d



## DV Fit Results:

Period = 0.52736 [0.00002] d  
Epoch = 131.7956 [0.0050] BKJD  
Rp/R\* = 0.0040 [0.0031]  
a/R\* = 1.21 [1.59]  
b = 0.50 [6.18]  
Seff = 47530.62 [17310.03]  
Teff = 3765 [343] K  
Rp = 0.83 [0.68] Re  
a = 0.0148 [0.0034] AU  
Ag = N/A  
Teffp = N/A

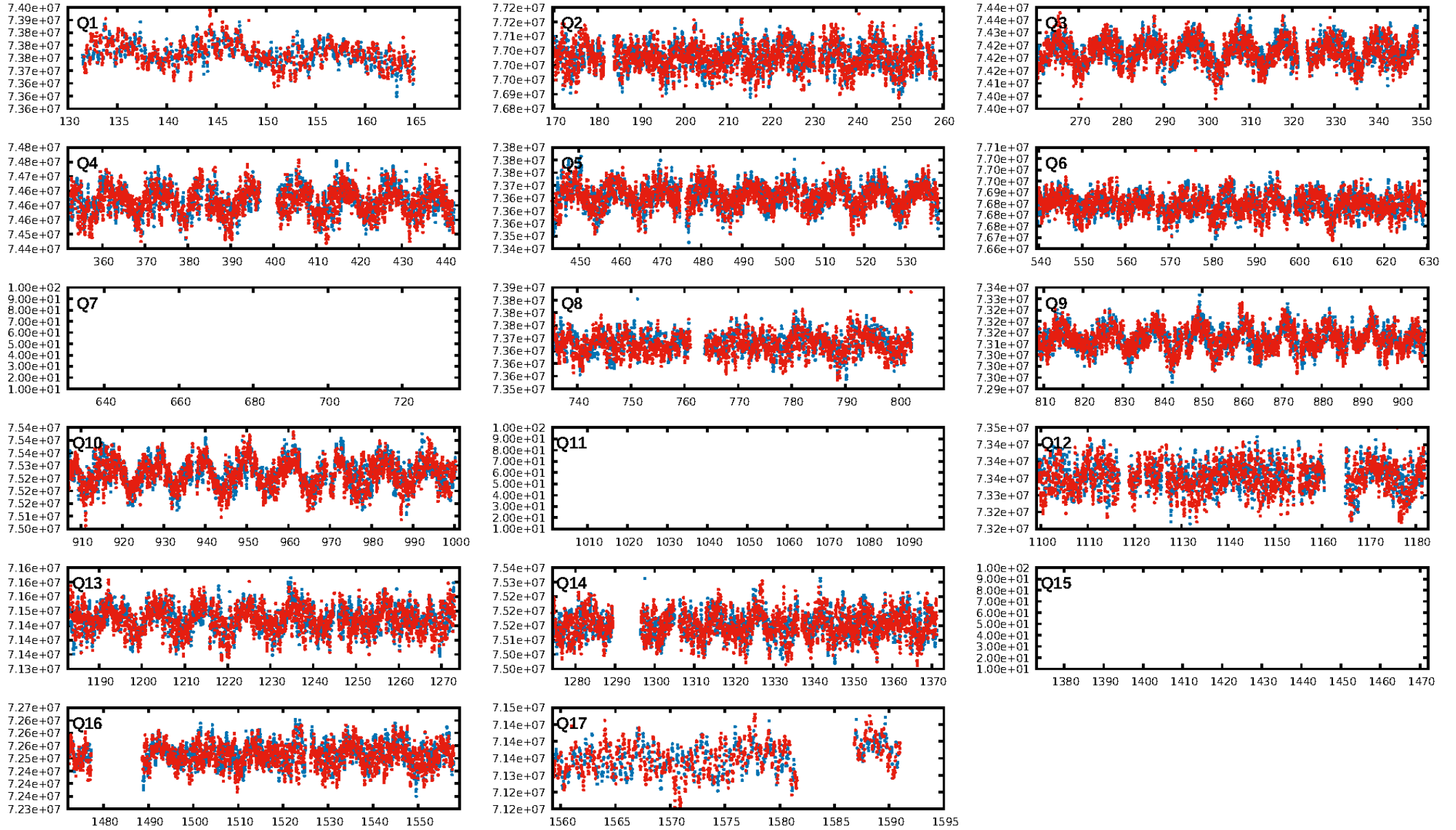
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [104.81σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [1914/1916]  
GhostDiagnostic-chr: 1.337  
Centroid-sig: 51.0%  
Centroid-so: 0.852 arcsec [0.76σ]  
OotOffset-rm: 0.624 arcsec [1.23σ]  
KicOffset-rm: 0.695 arcsec [1.54σ]  
OotOffset-st: 3/1/4/4 [12]  
KicOffset-st: 3/1/4/4 [12]  
DiffImageQuality-fgm: 1.00 [12/12]  
DiffImageOverlap-fno: 1.00 [14/14]

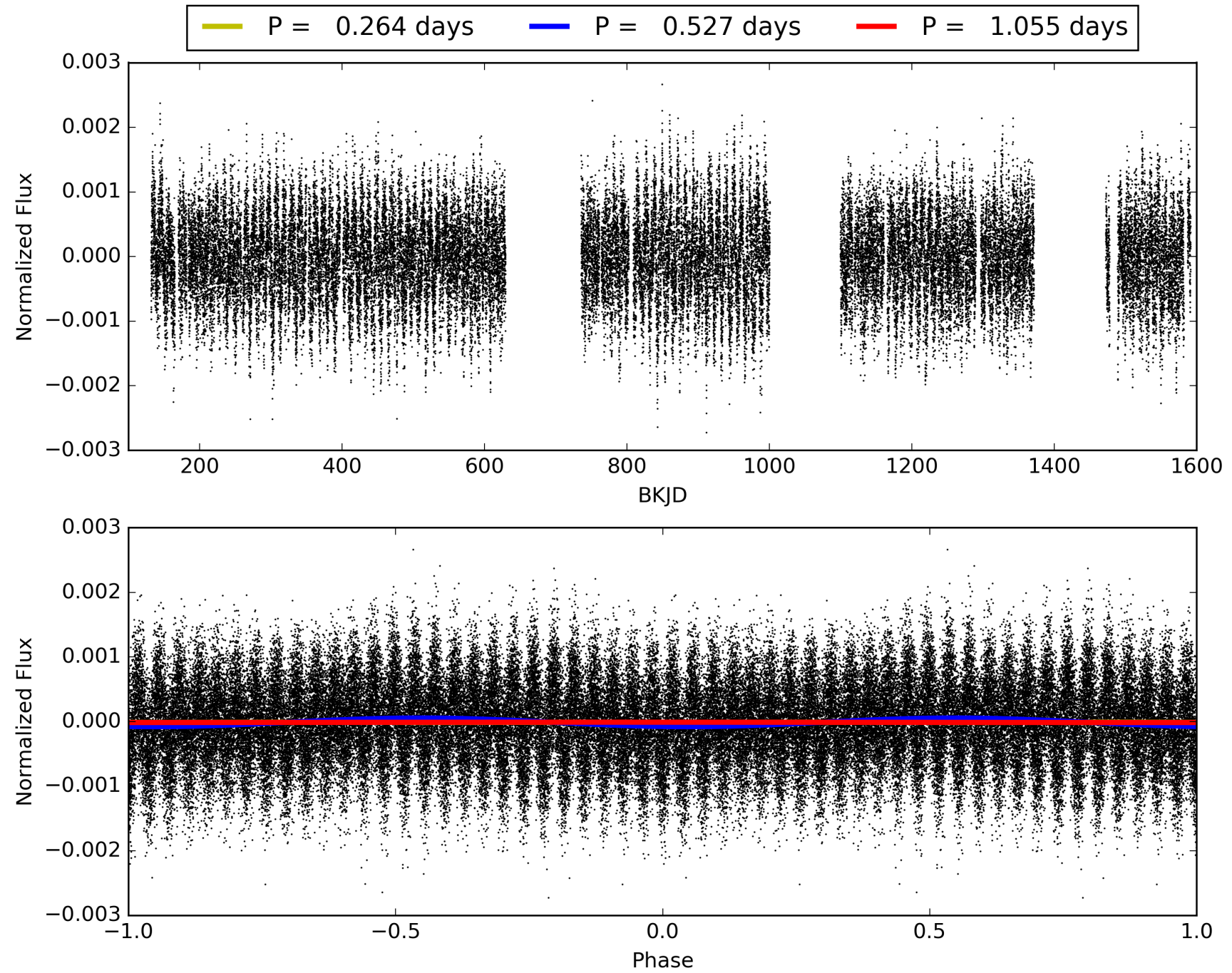
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:30:32 Z

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

# TCE 010873947-01, PDC Light Curves



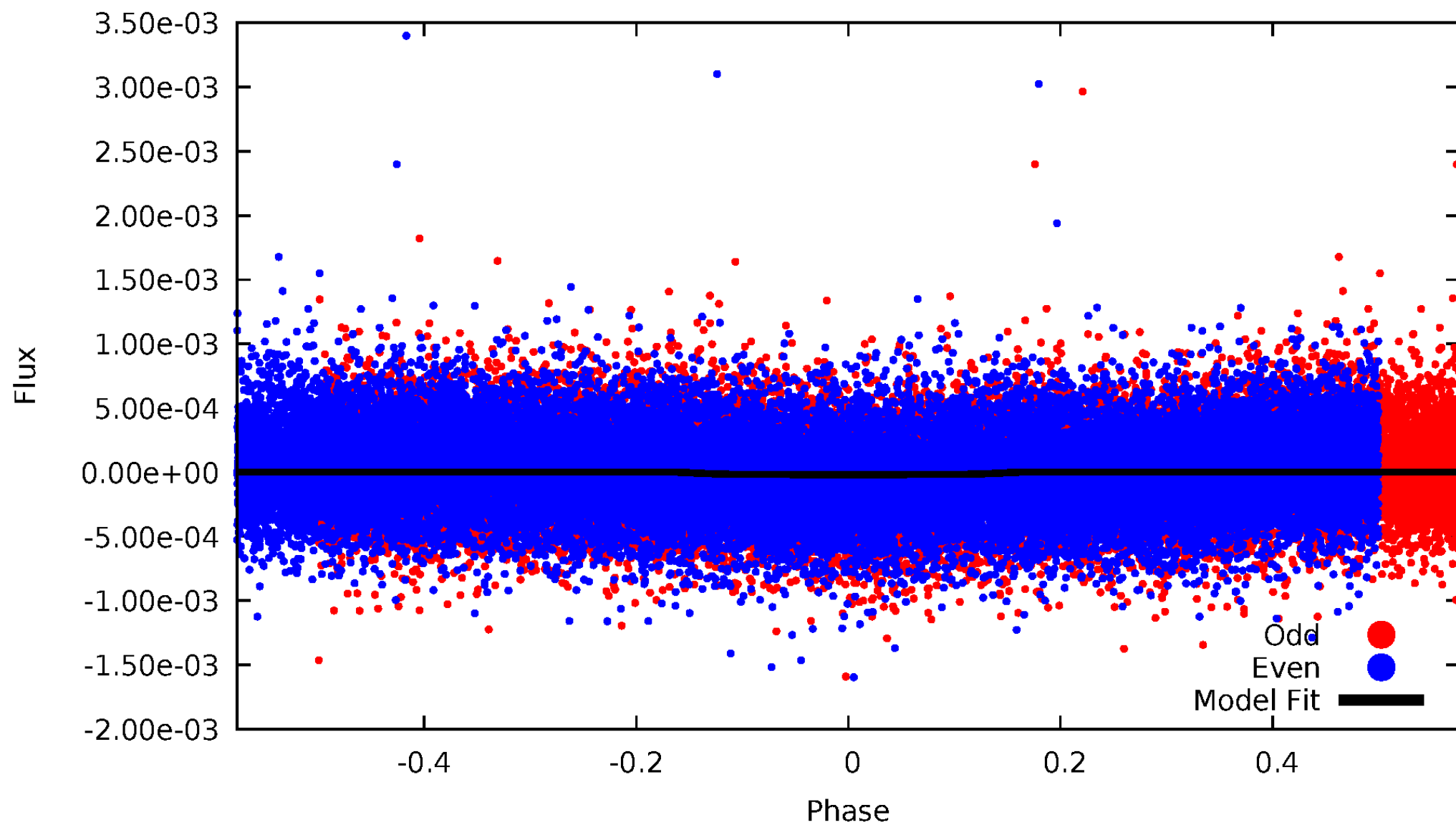
TCE 010873947-01





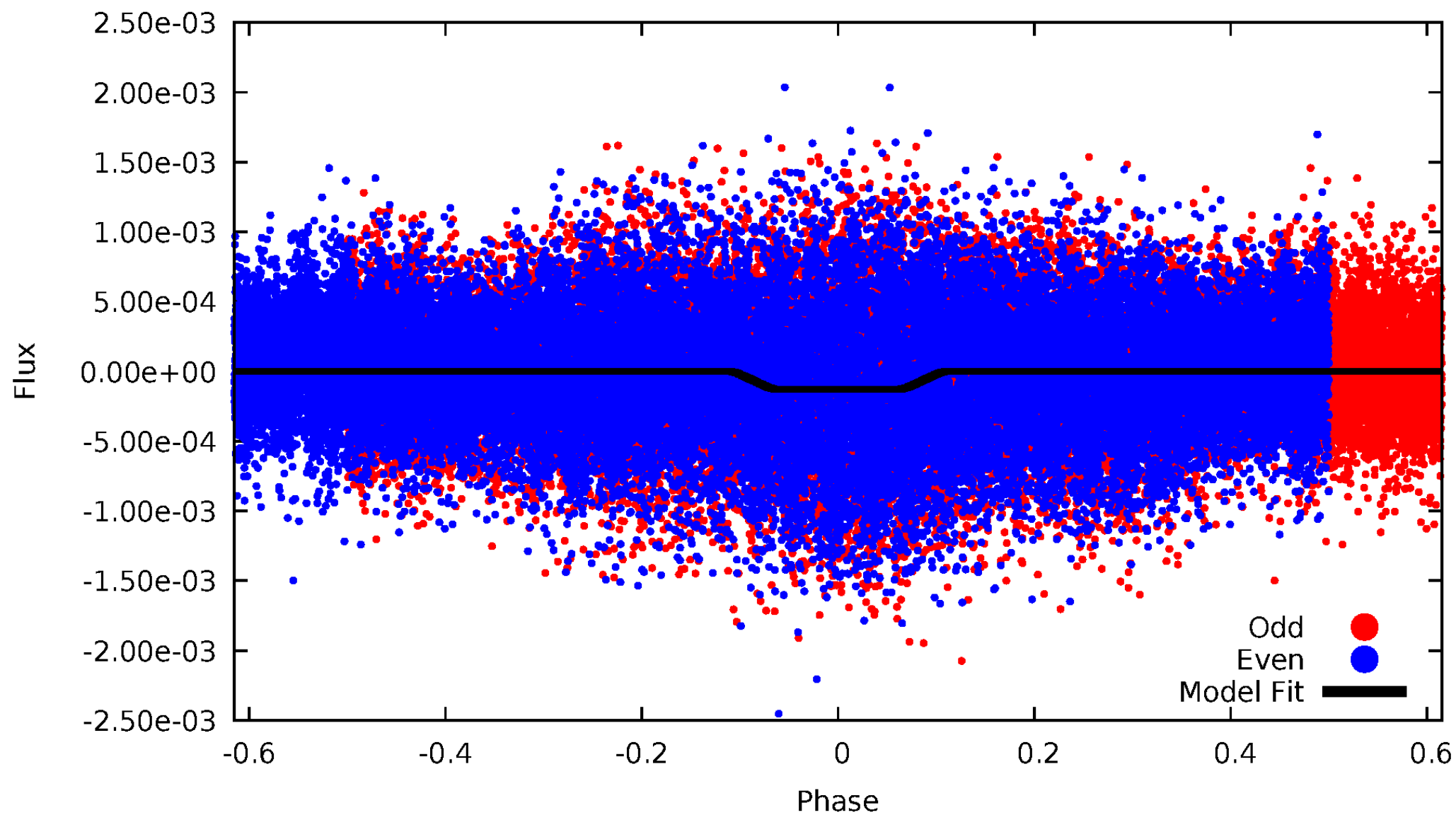
# DV Odd/Even

TCE 010873947-01

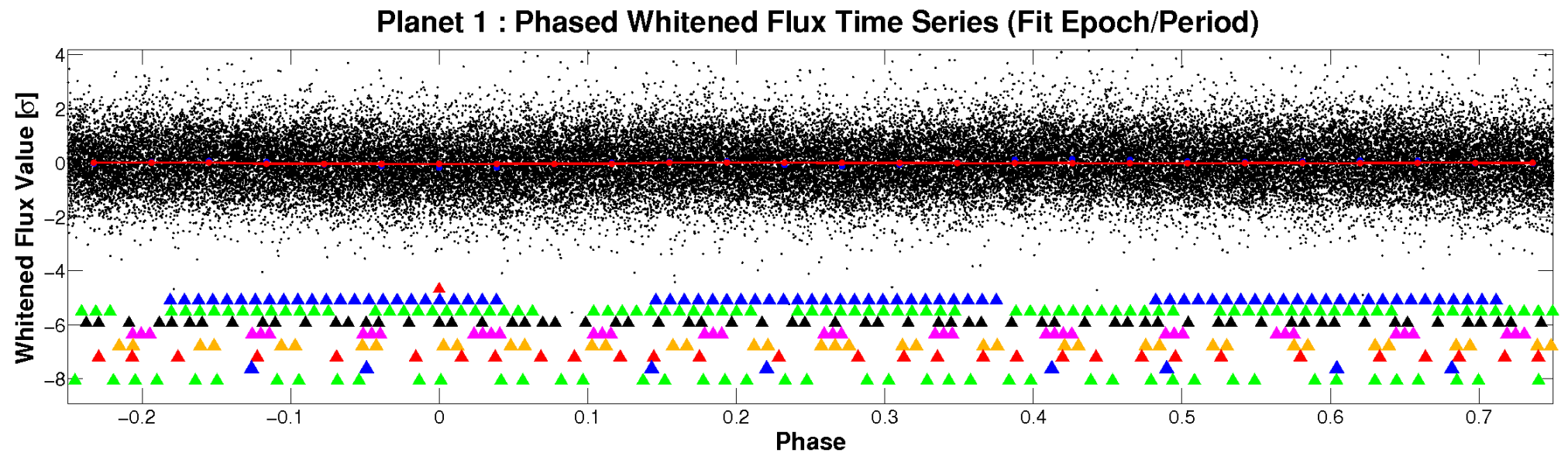
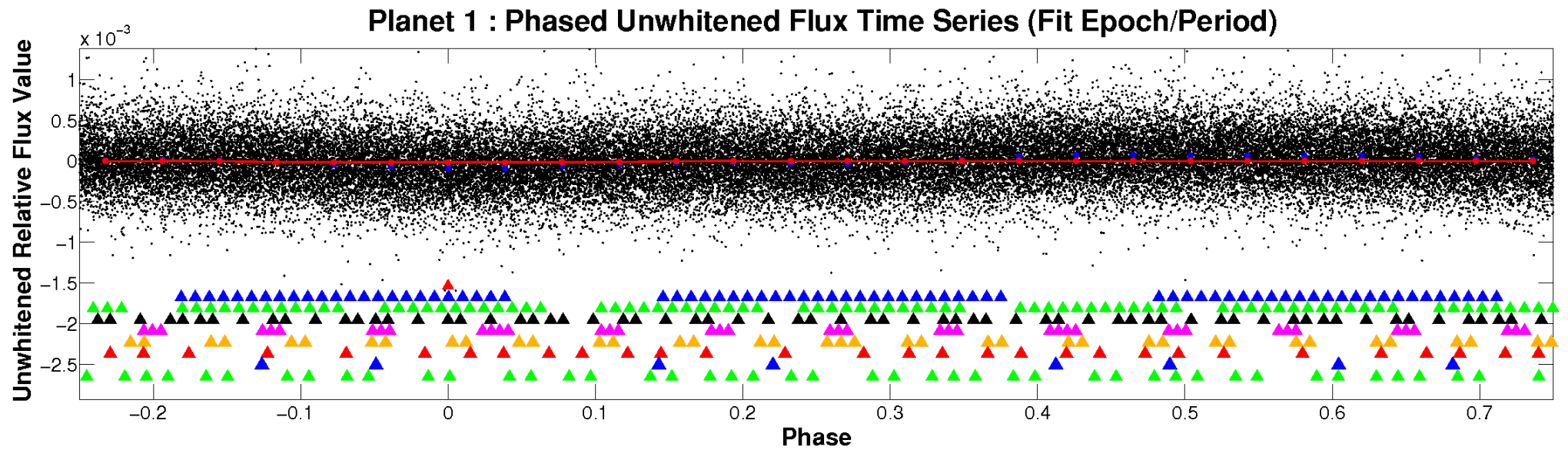


# ALT Odd/Even

TCE 010873947-01

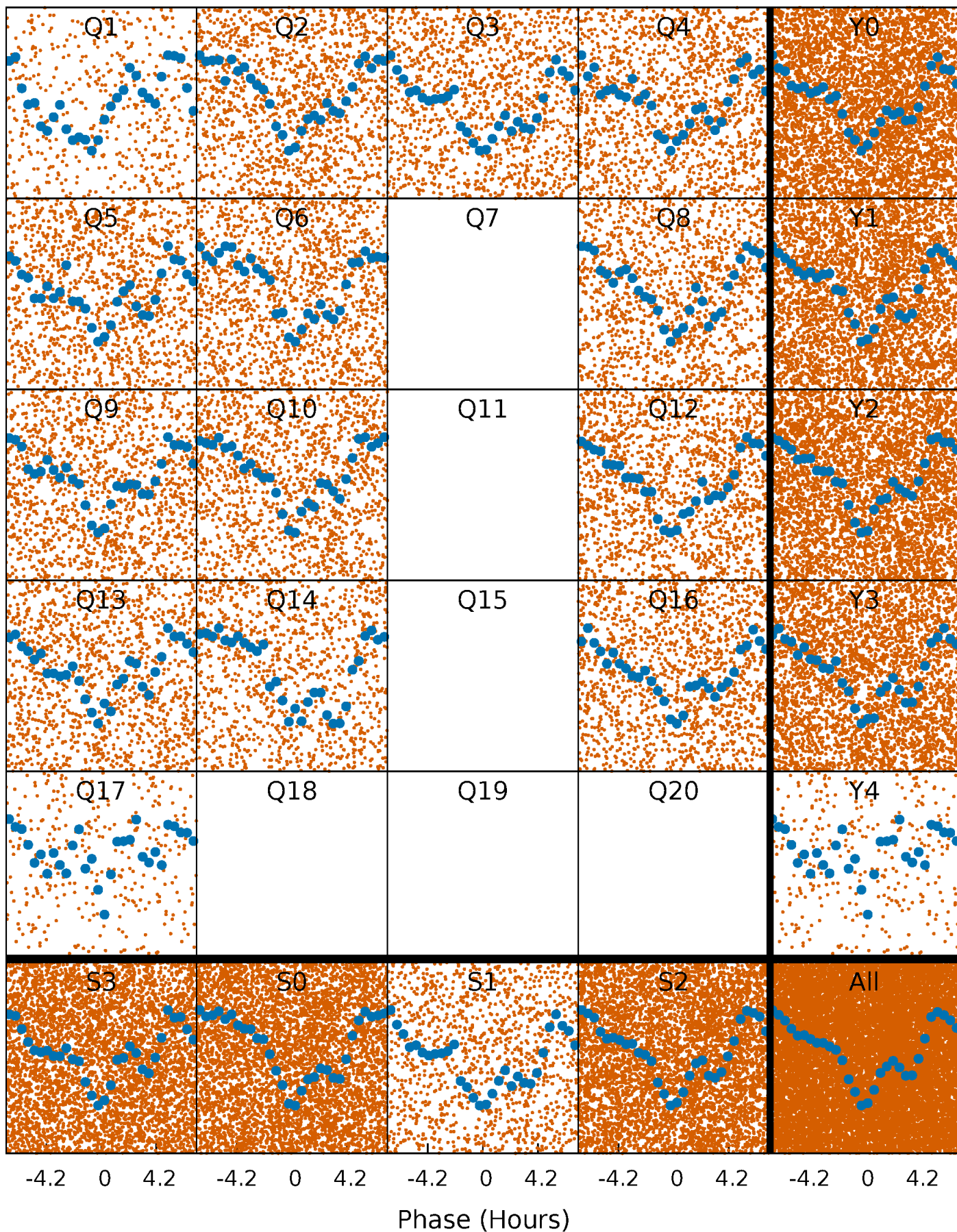


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

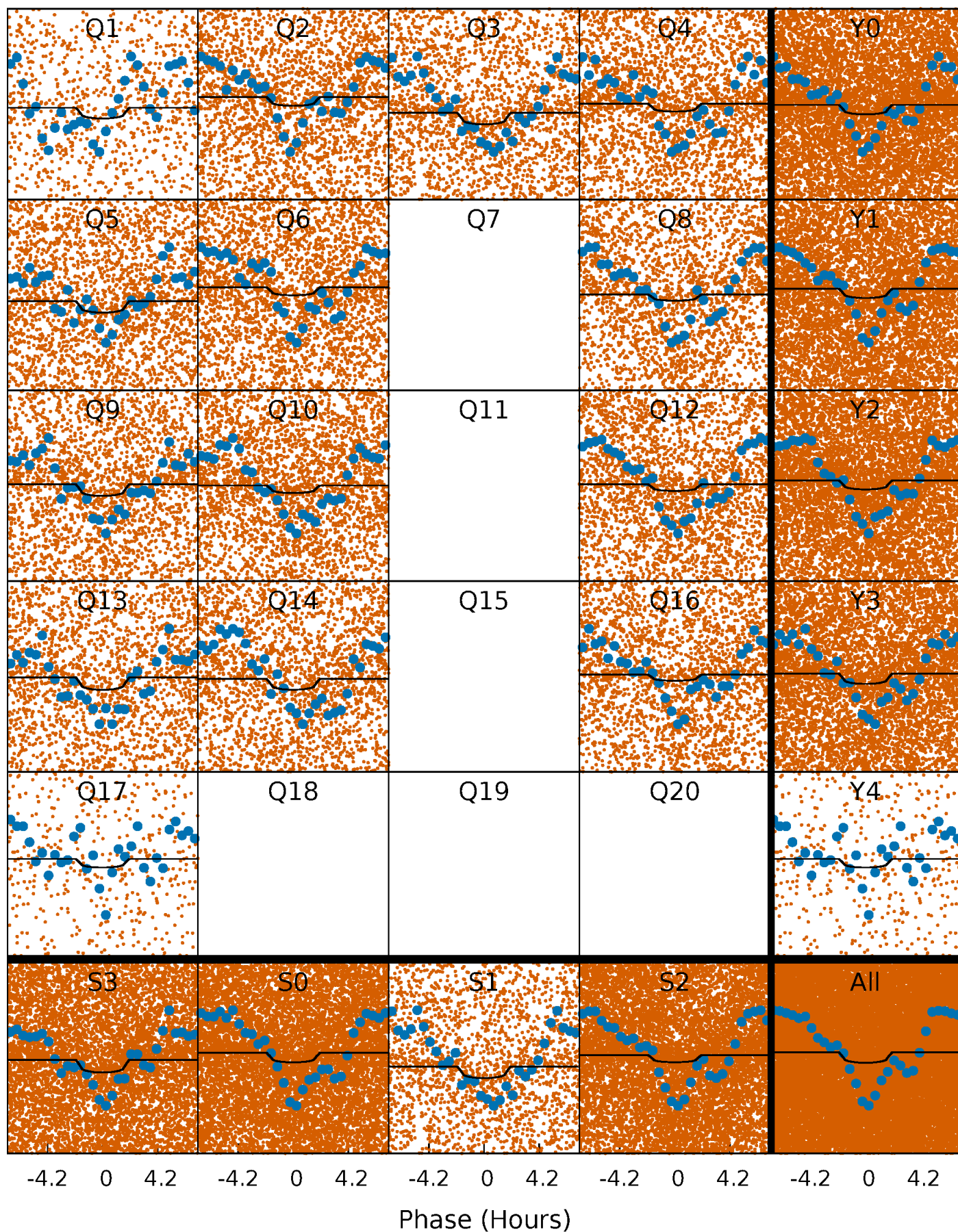
TCE 010873947-01 P= 0.527357 Days  $T_0=131.795567$  (BKJD)





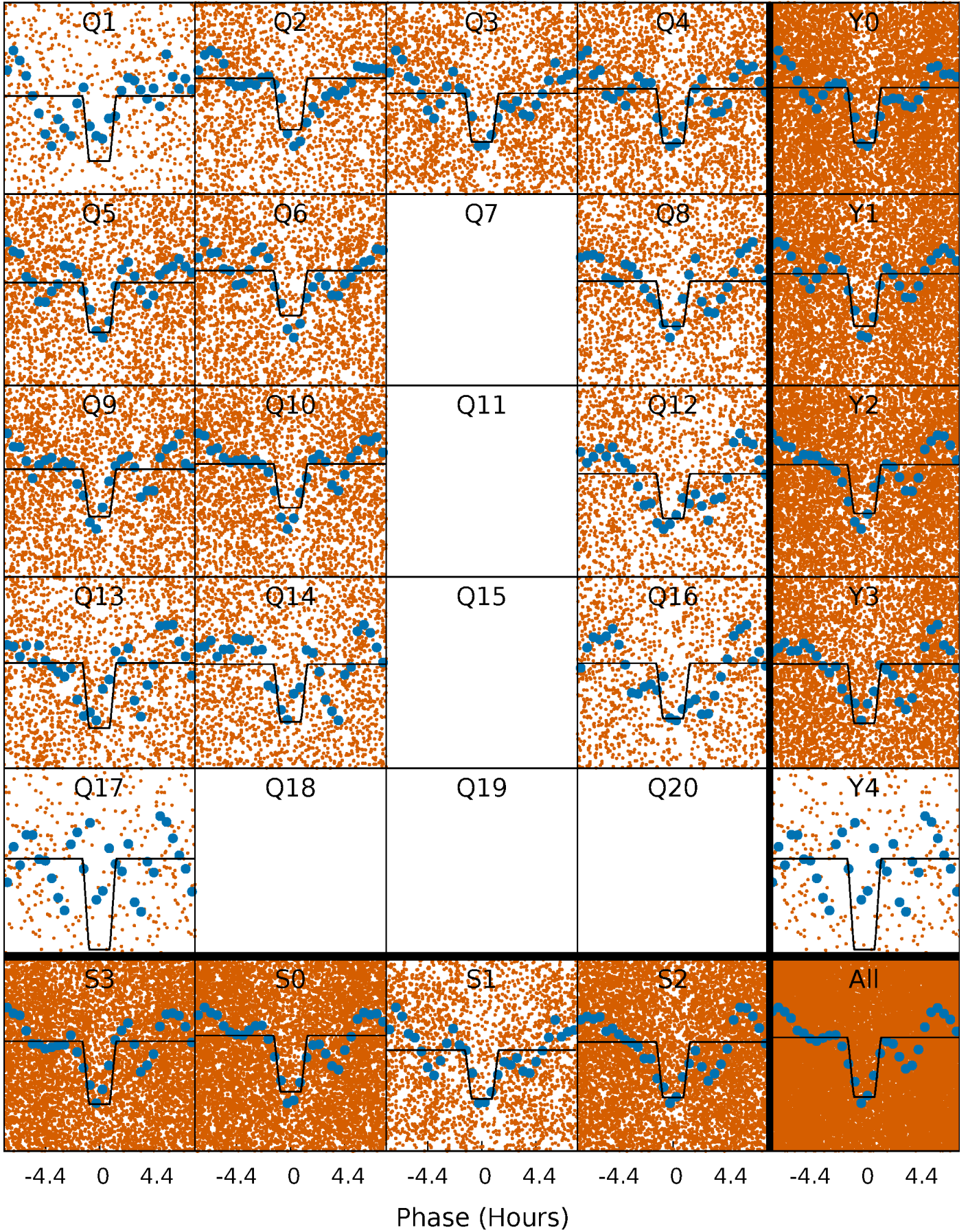
# DV Quarter-Phased Transit Curves

TCE 010873947-01   P= 0.527357 Days    $T_0=131.795567$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 010873947-01 P= 0.527362 Days  $T_0=131.791366$  (BKJD)

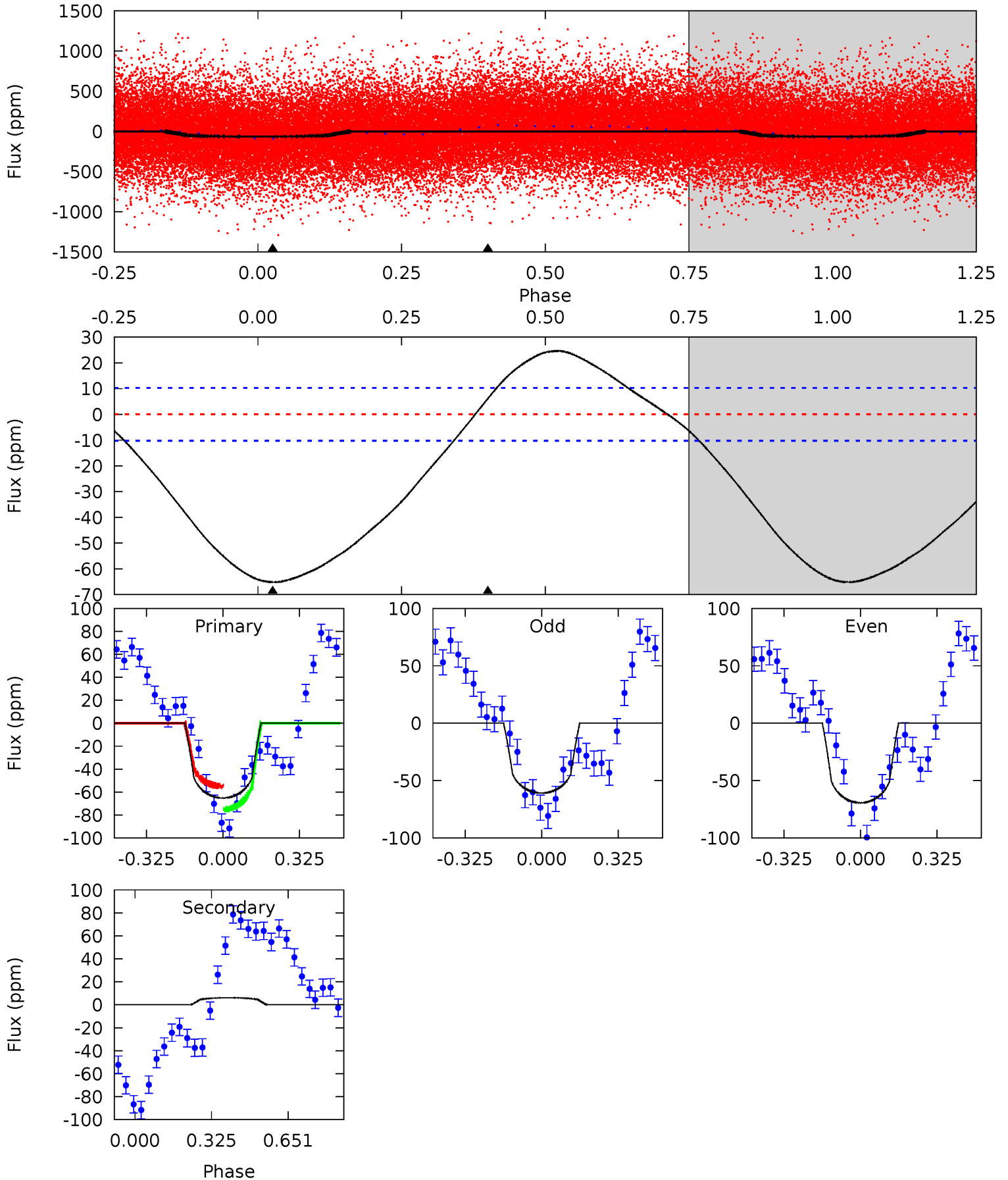




# DV Model-Shift Uniqueness Test

010873947-01, P = 0.527357 Days, E = 131.268210 Days

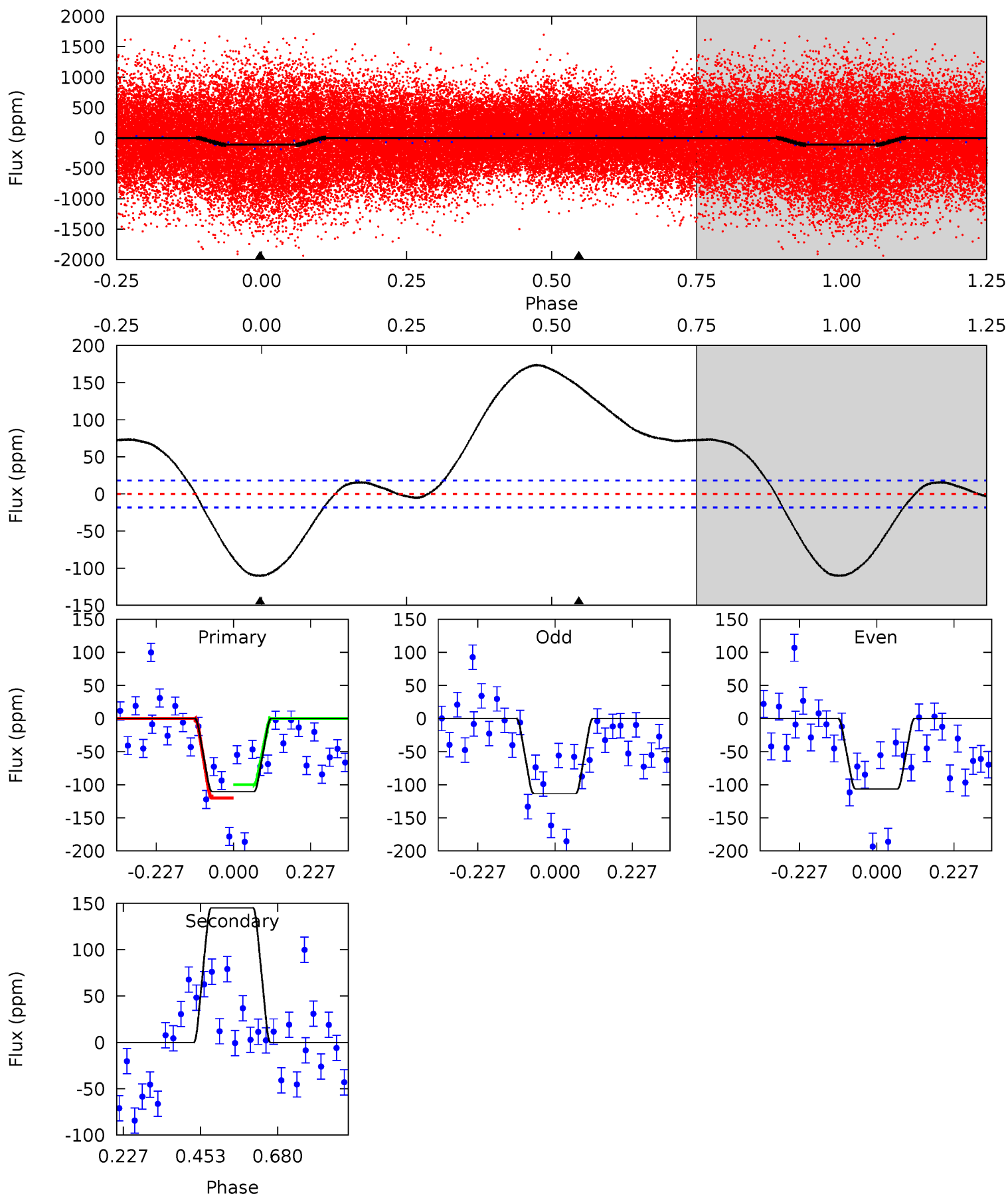
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
27.4	-2.57	0	0	4.31	0.98	1.99	27.4	27.4	-2.57	-2.57	1.79	1.05	0.27	4.25



# Alt Model-Shift Uniqueness Test

010873947-01, P = 0.527362 Days, E = 131.264004 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
26.7	-35.1	0	0	4.39	1.21	3.02	26.7	26.7	-35.1	-35.1	0.87	0.96	0.61	2.41





### Stellar Parameters For KIC 010873947

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$7559^{+237}_{-316}$	$4.078^{+0.170}_{-0.170}$	$-0.220^{+0.250}_{-0.350}$	$1.886^{+0.541}_{-0.443}$	$1.551^{+0.210}_{-0.257}$	$0.326^{+0.339}_{-0.143}$
	+3%/-4%	+4%/-4%	+114%/-159%	+29%/-23%	+14%/-17%	+104%/-44%
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 010873947-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$6\pm 2$	$0.88^{+0.66}_{-0.52}$	$5226^{+376}_{-385}$	$-5948^{+904}_{-3440}$	$-0.903^{+0.632}_{-4.487}$
Alt.	$145\pm 4$	$2.29^{+0.73}_{-0.67}$	$5252^{+403}_{-370}$	$-8043^{+945}_{-1866}$	$-3.275^{+1.351}_{-3.138}$

$T_{max}$  = 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

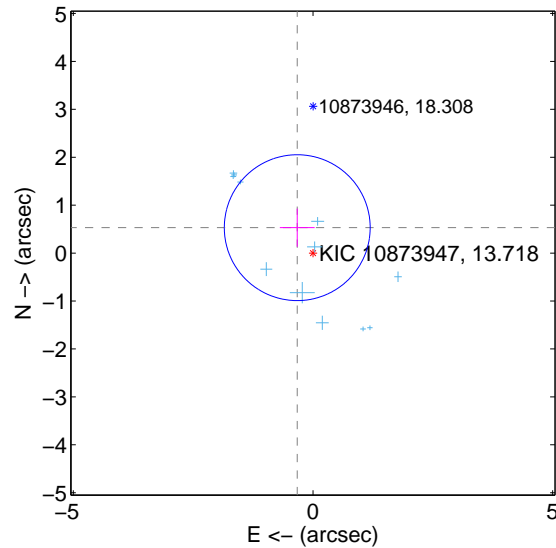
Supplemental centroid analysis for 010873947-01. Kepler magnitude: 13.72. Transit SNR 4.41

There are 12 quarters with good PRF difference image offsets

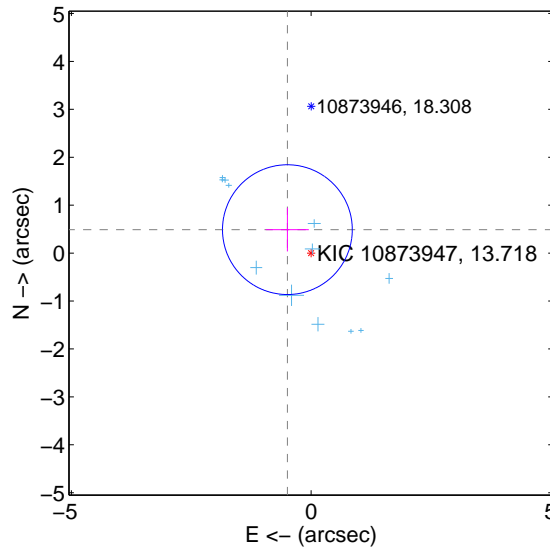
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.624 \pm 0.507$	1.23	$0.328 \pm 0.364$	$0.531 \pm 0.398$
PRF-fit source offset from KIC position	$0.695 \pm 0.451$	1.54	$0.494 \pm 0.448$	$0.489 \pm 0.455$
photometric centroid source offset	$0.85 \pm 1.12$	0.76	$-0.11 \pm 1.11$	$-0.85 \pm 1.12$

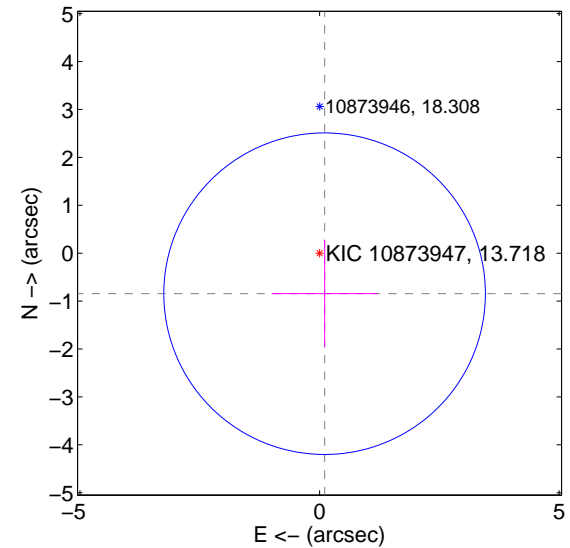
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

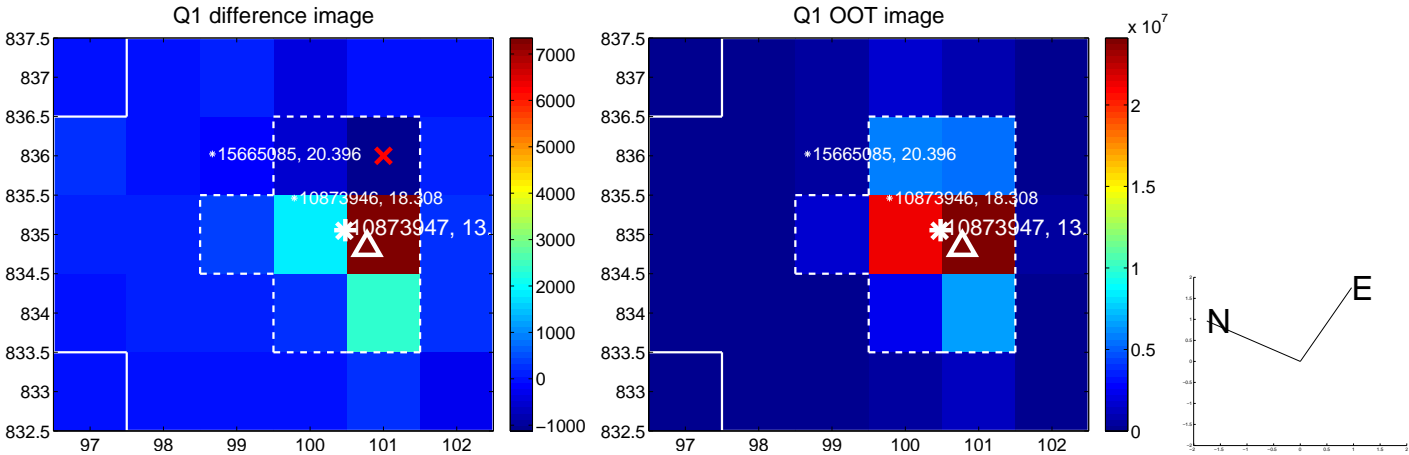


offset from photometric centroids

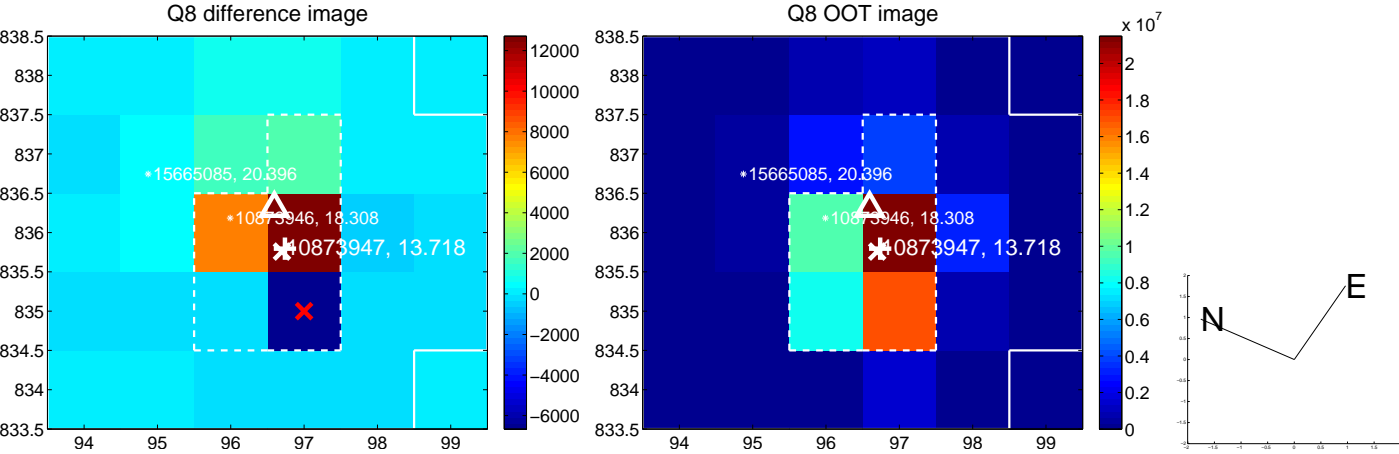
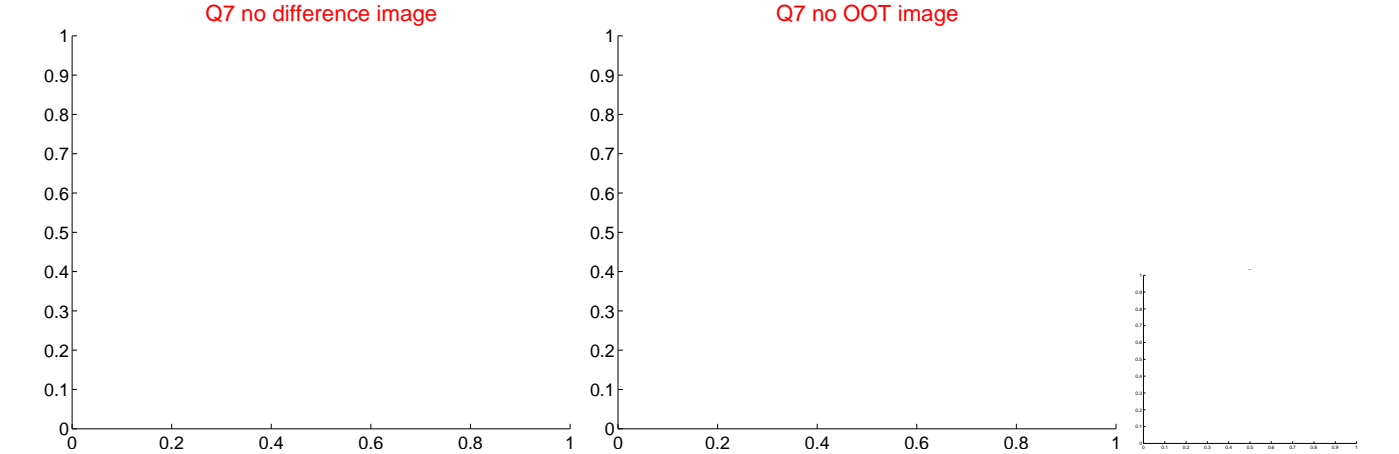
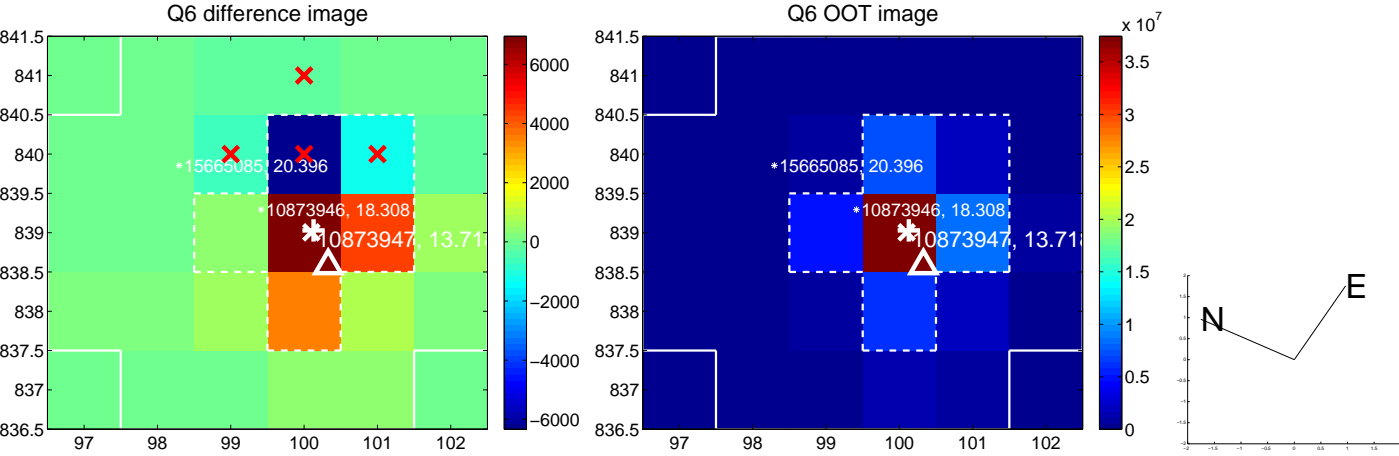
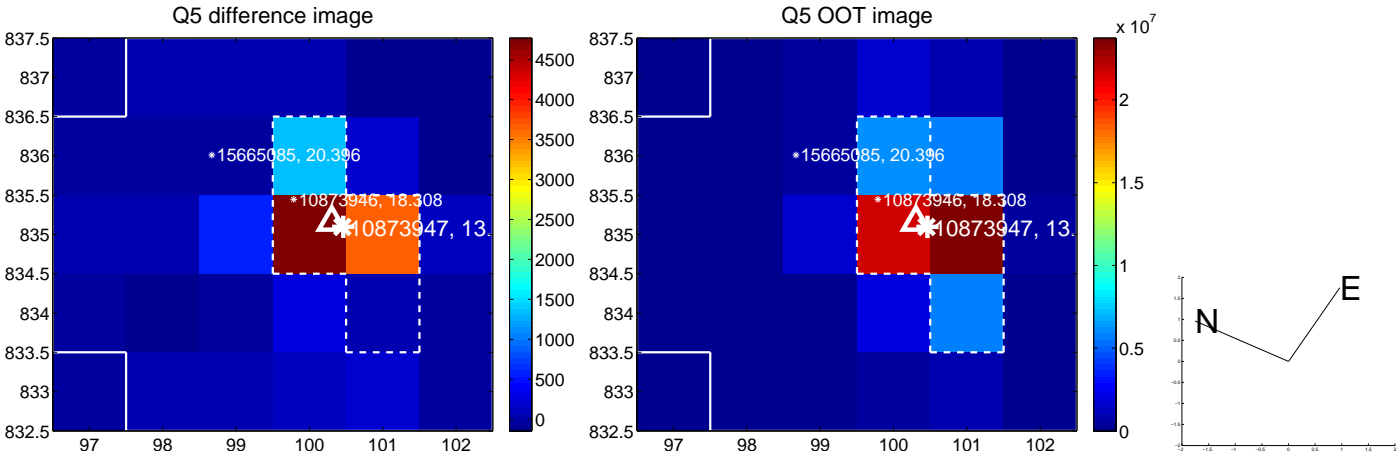


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

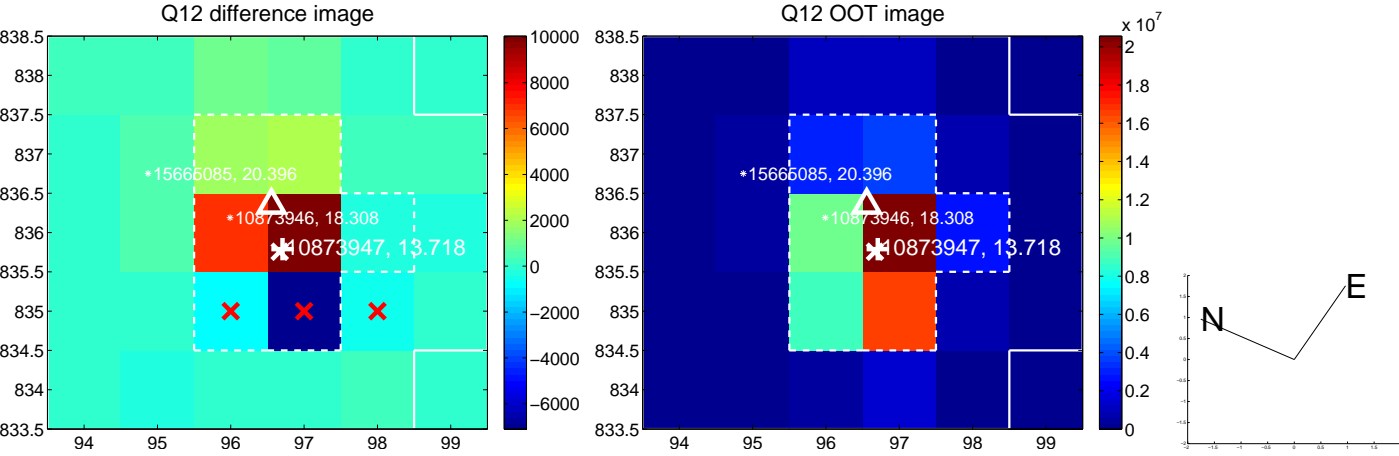
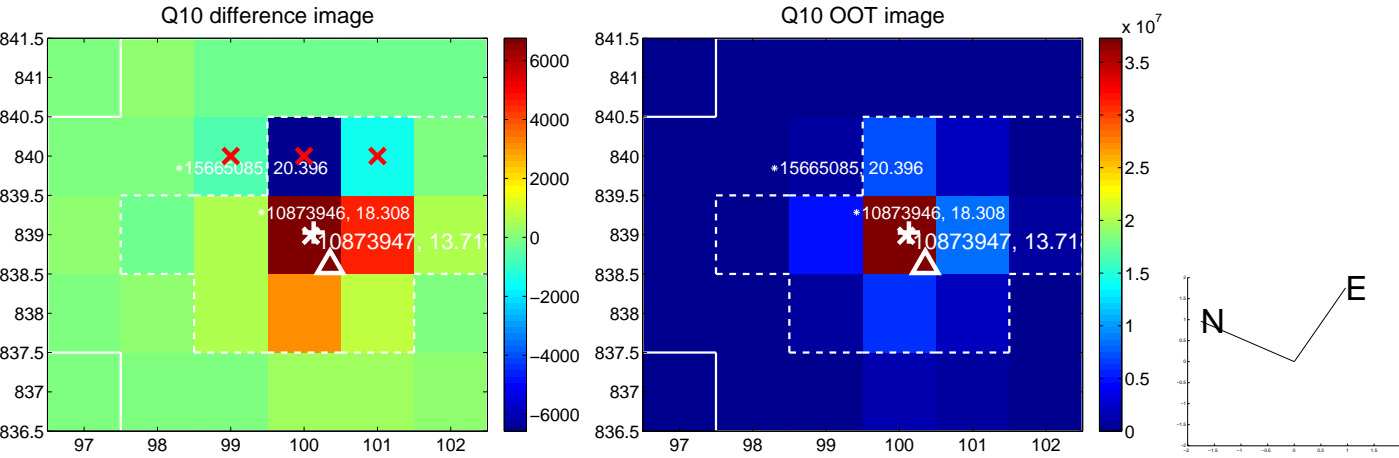
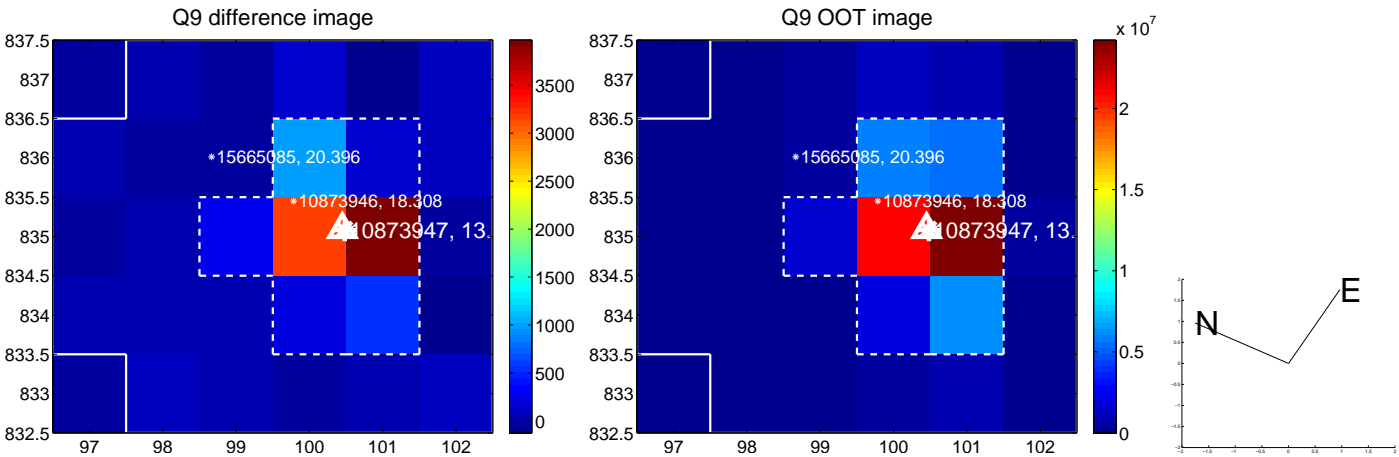


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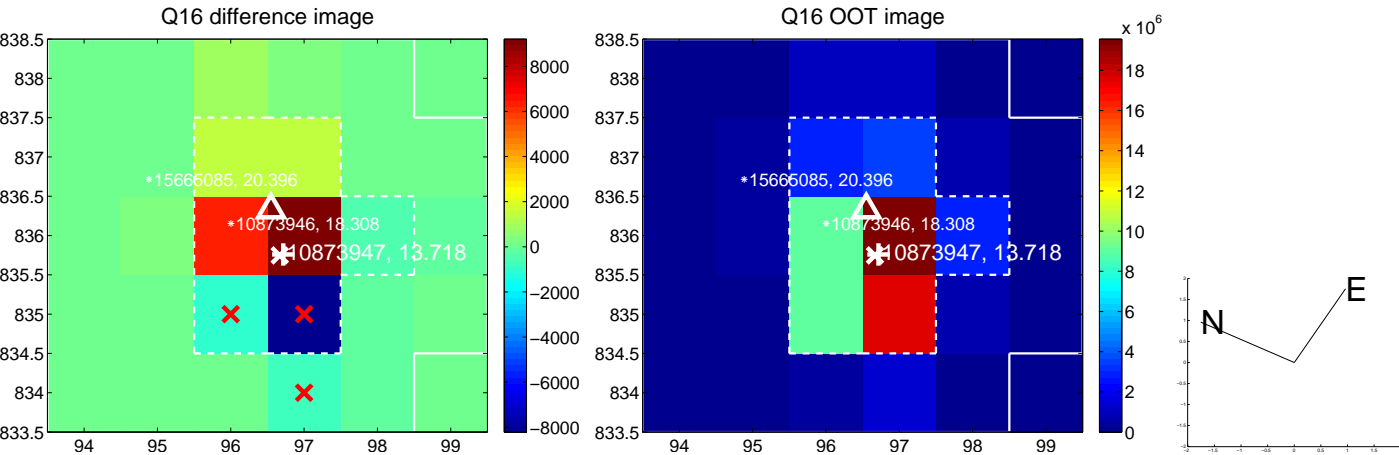
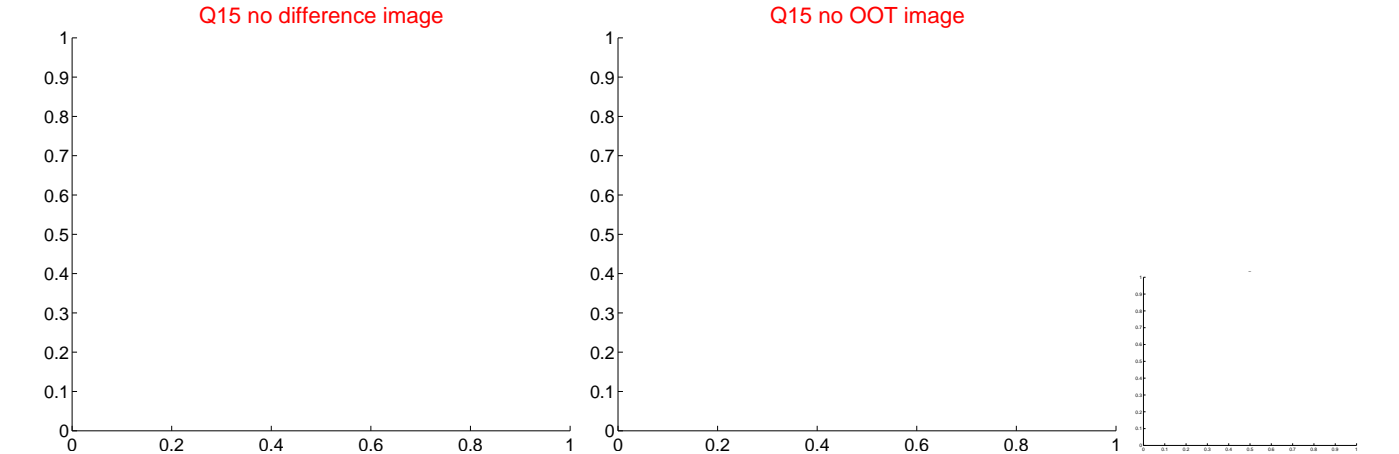
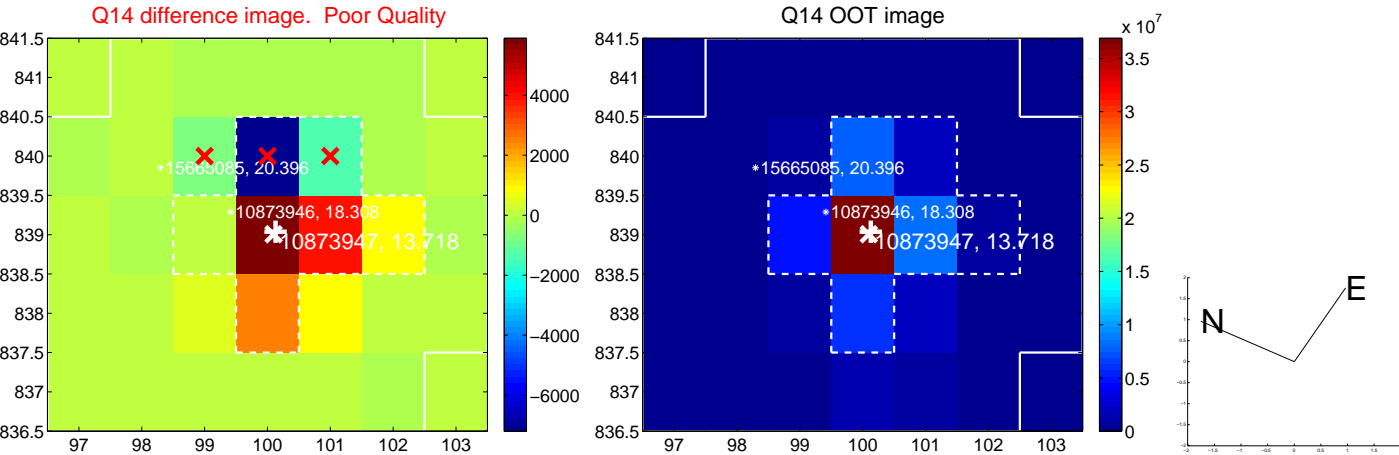
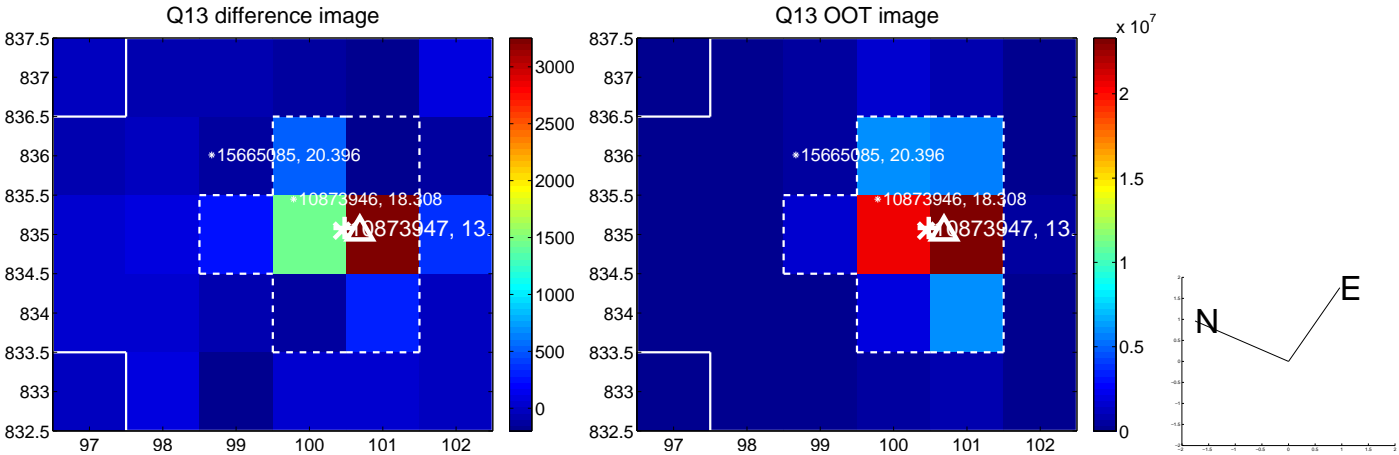




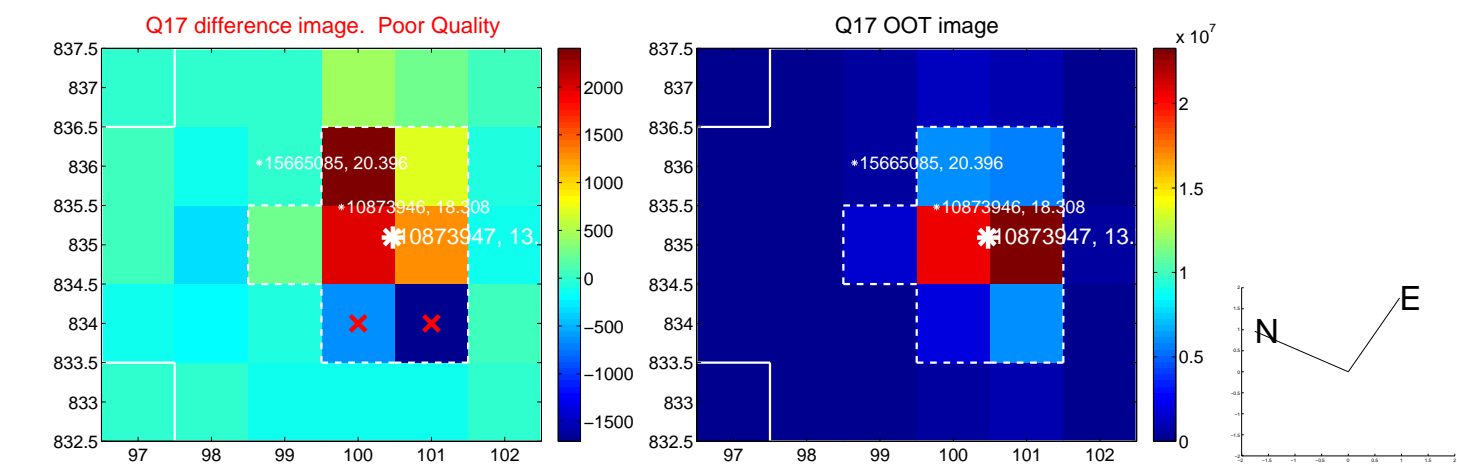
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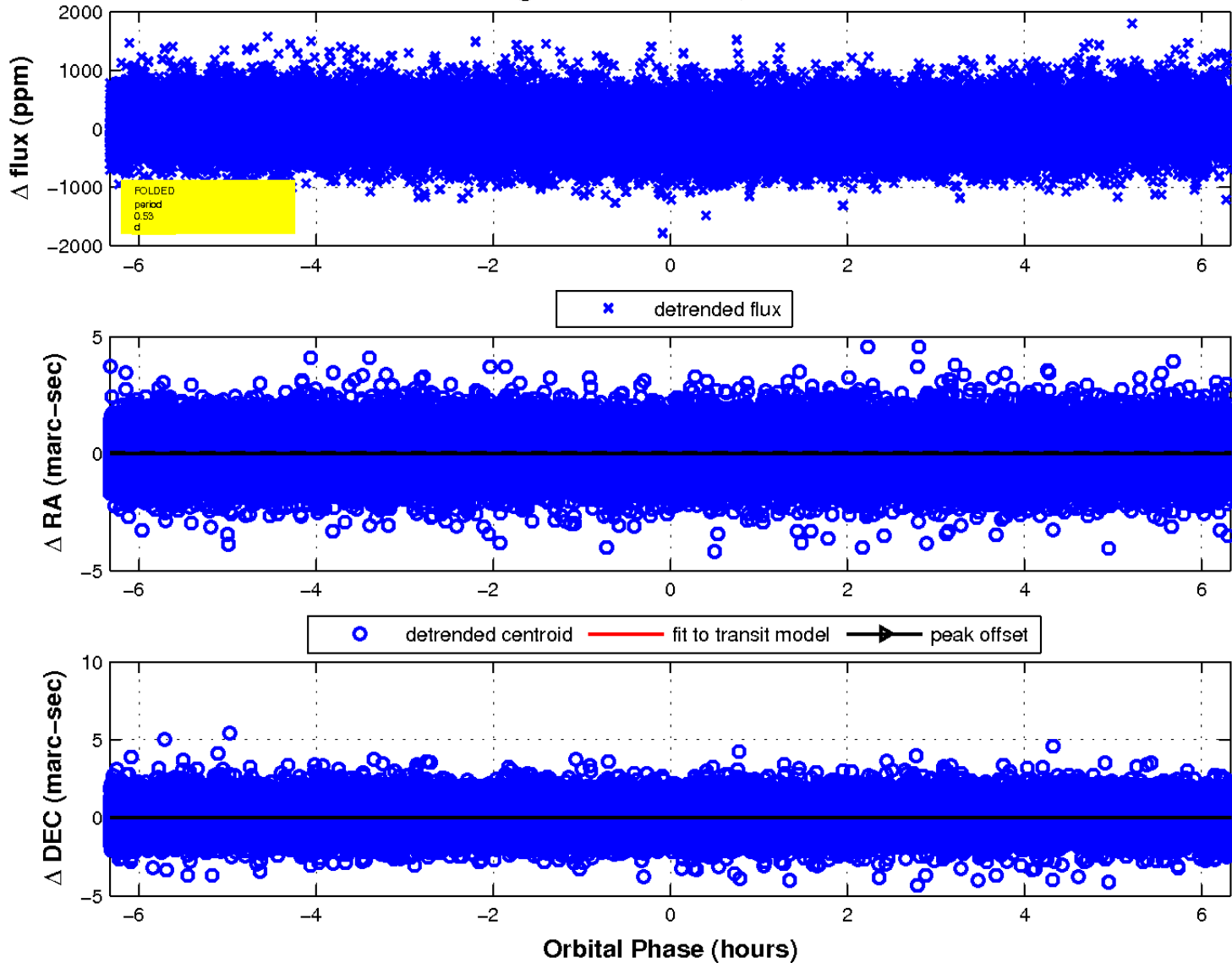
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



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



fluxWeightedCentroids, Planet 1 of 9



Declination



# KIC 010873947

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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010873947-04	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
010873947-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010873947-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010873947-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV
010873947-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV

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

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

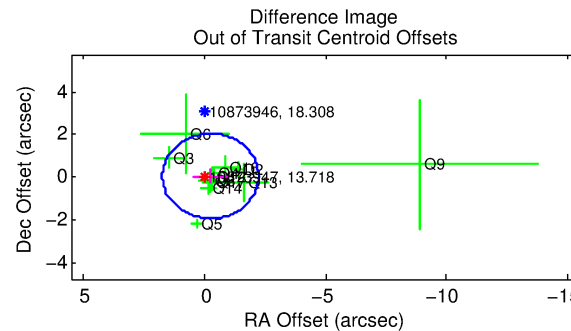
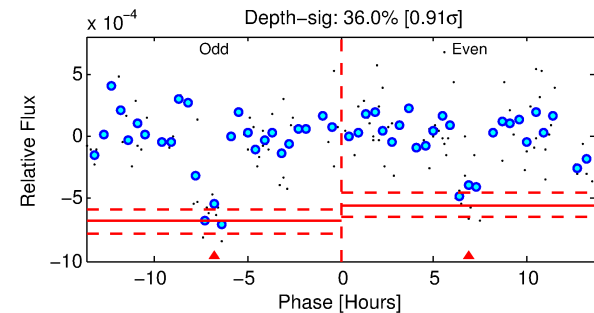
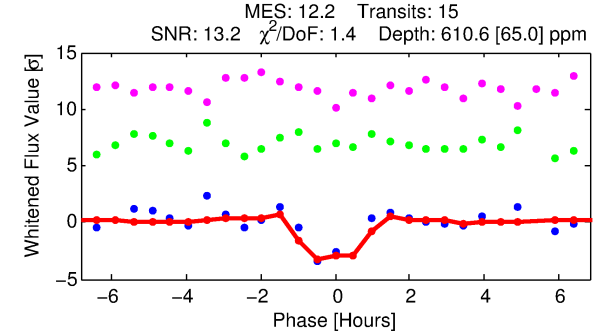
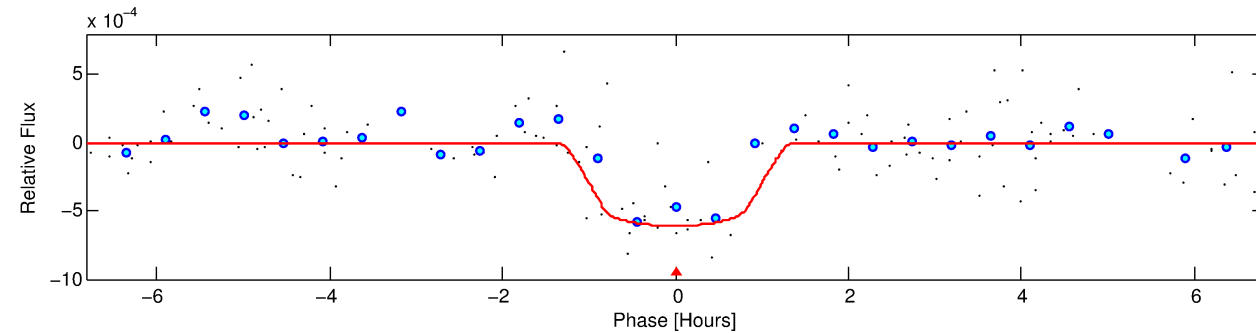
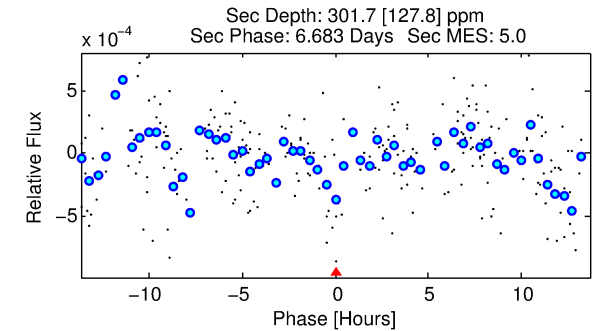
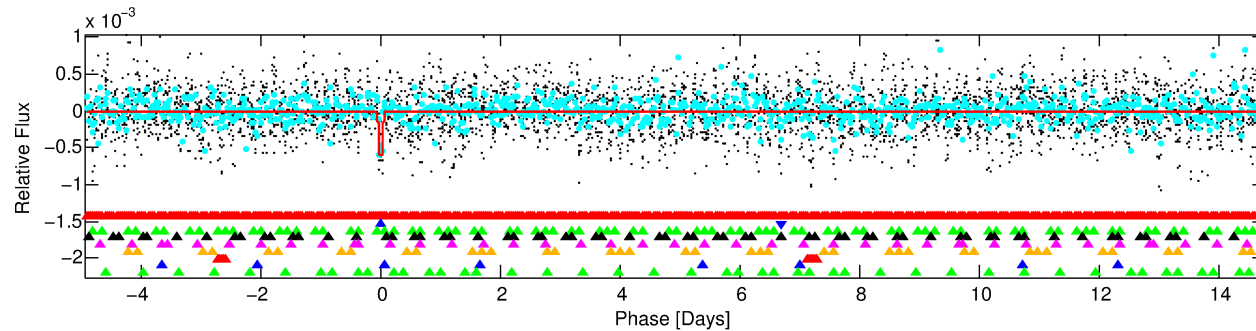
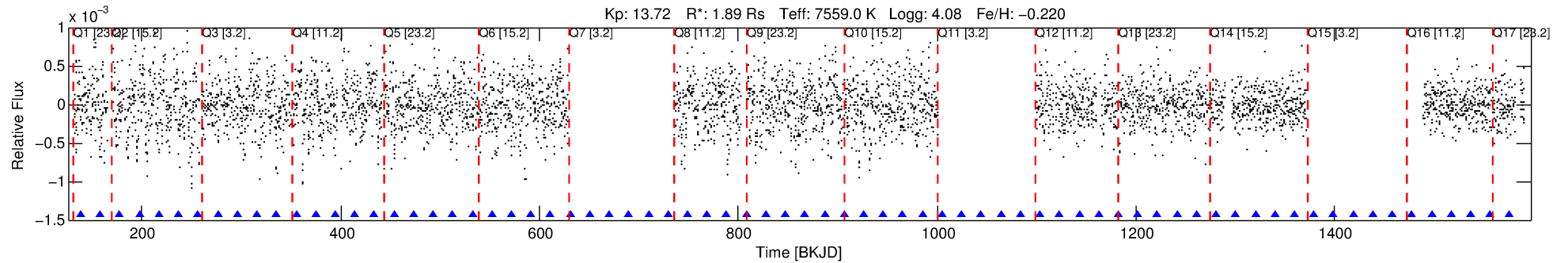
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Ephemeris Match Information For 010873947-02

No Significant Match Found

# DV One-Page Summary

KIC: 10873947 Candidate: 2 of 9 Period: 19.690 d



## DV Fit Results:

Period = 19.68967 [0.00021] d  
Epoch = 138.7281 [0.0117] BKJD  
Rp/R\* = 0.0253 [0.0157]  
a/R\* = 41.02 [134.94]  
b = 0.82 [1.38]  
Seff = 380.89 [138.71]  
Teq = 1126 [103] K  
Rp = 5.20 [3.56] Re  
a = 0.1653 [0.0383] AU  
Ag = 167.80 [227.35] [0.73 $\sigma$ ]  
Teffp = 6269 [2078] K [2.47 $\sigma$ ]

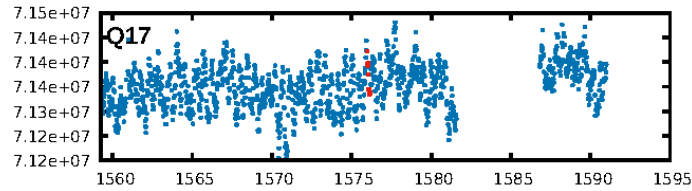
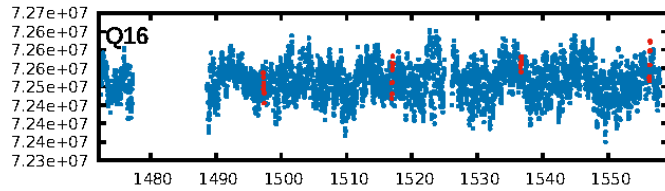
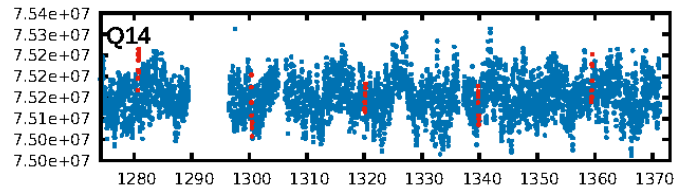
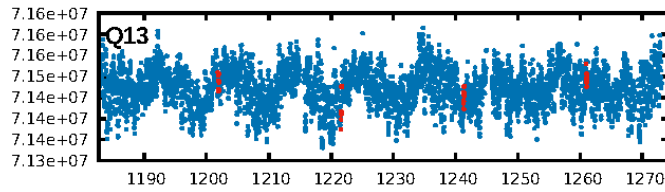
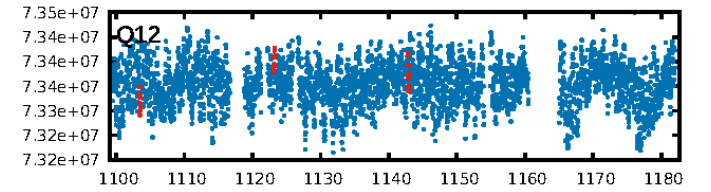
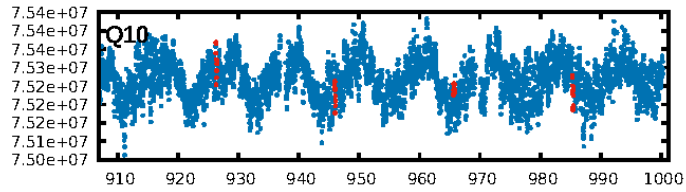
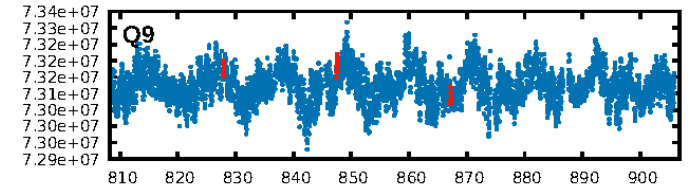
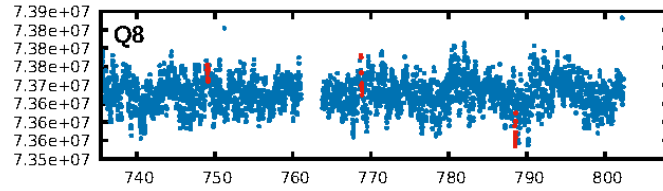
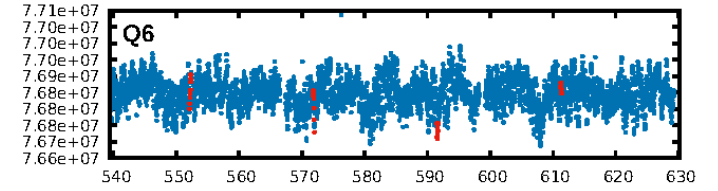
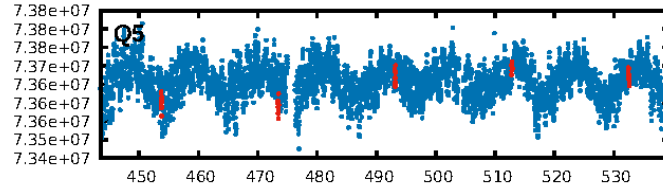
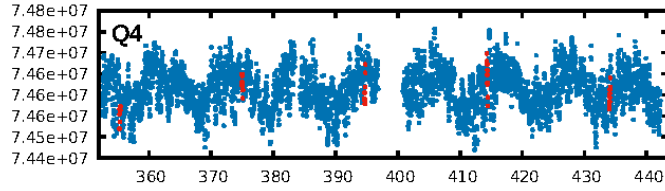
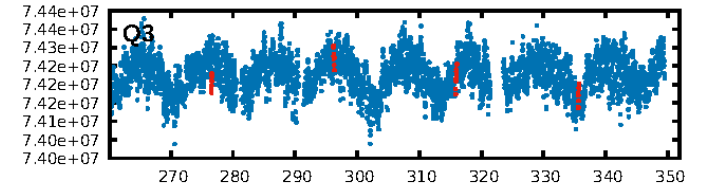
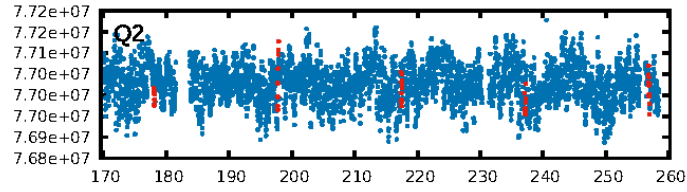
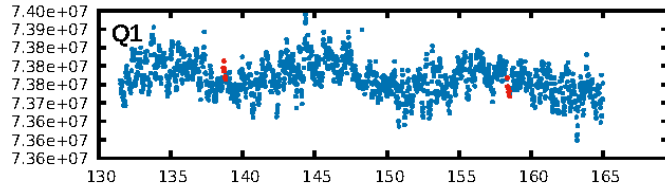
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [25.84 $\sigma$ ]  
LongPeriod-sig: 100.0% [22.57 $\sigma$ ]  
ModelChiSquare2-sig: 27.1%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [14/14]  
GhostDiagnostic-chr: 0.7629  
Centroid-sig: 93.1%  
Centroid-so: 0.177 arcsec [0.67 $\sigma$ ]  
OotOffset-rm: 0.258 arcsec [0.39 $\sigma$ ]  
KicOffset-rm: 0.095 arcsec [0.13 $\sigma$ ]  
OotOffset-st: 3/1/4/4 [12]  
KicOffset-st: 3/1/4/4 [12]  
DiffImageQuality-fgm: 0.58 [7/12]  
DiffImageOverlap-fno: 0.00 [0/14]

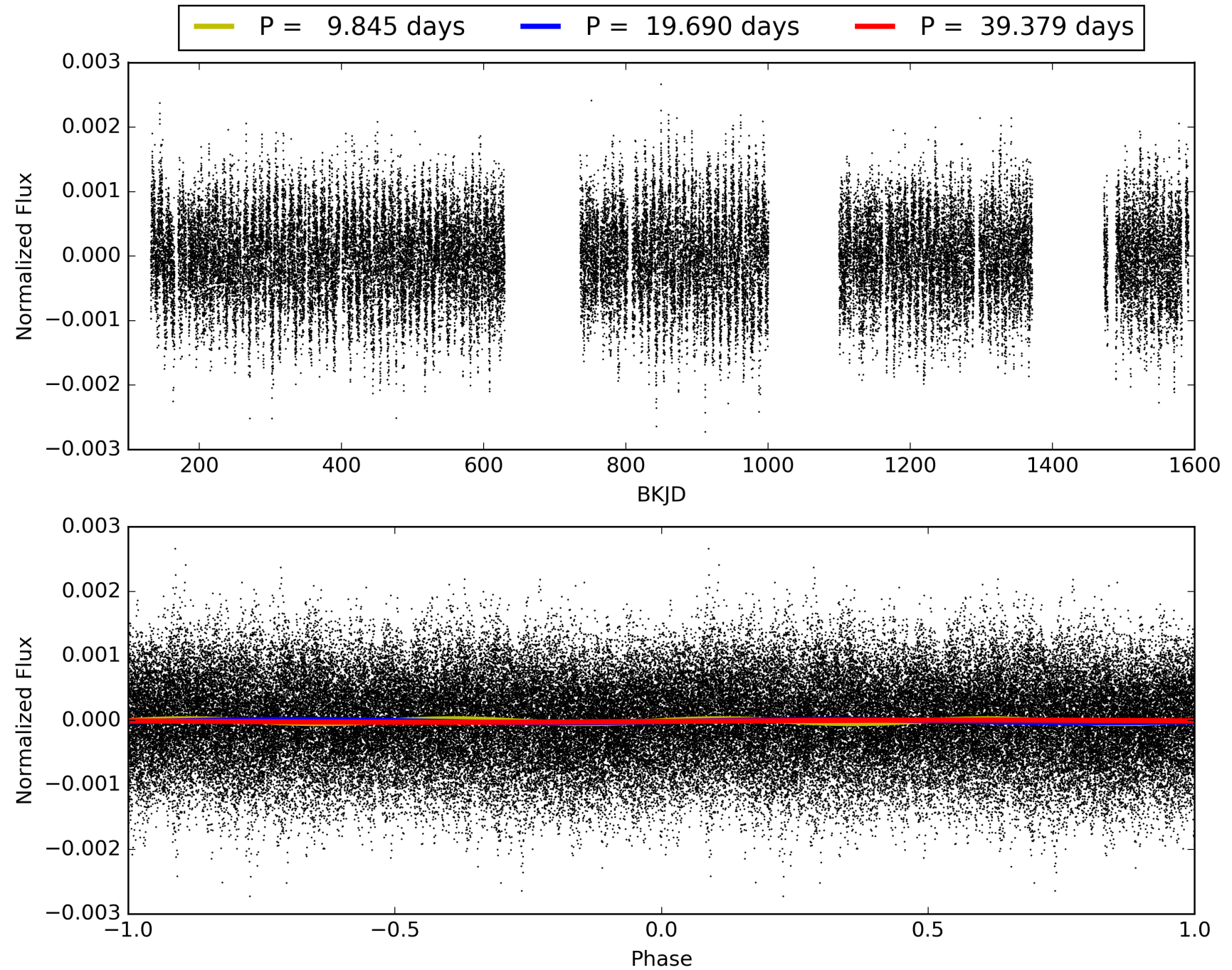
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:30:41 Z

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

# TCE 010873947-02, PDC Light Curves

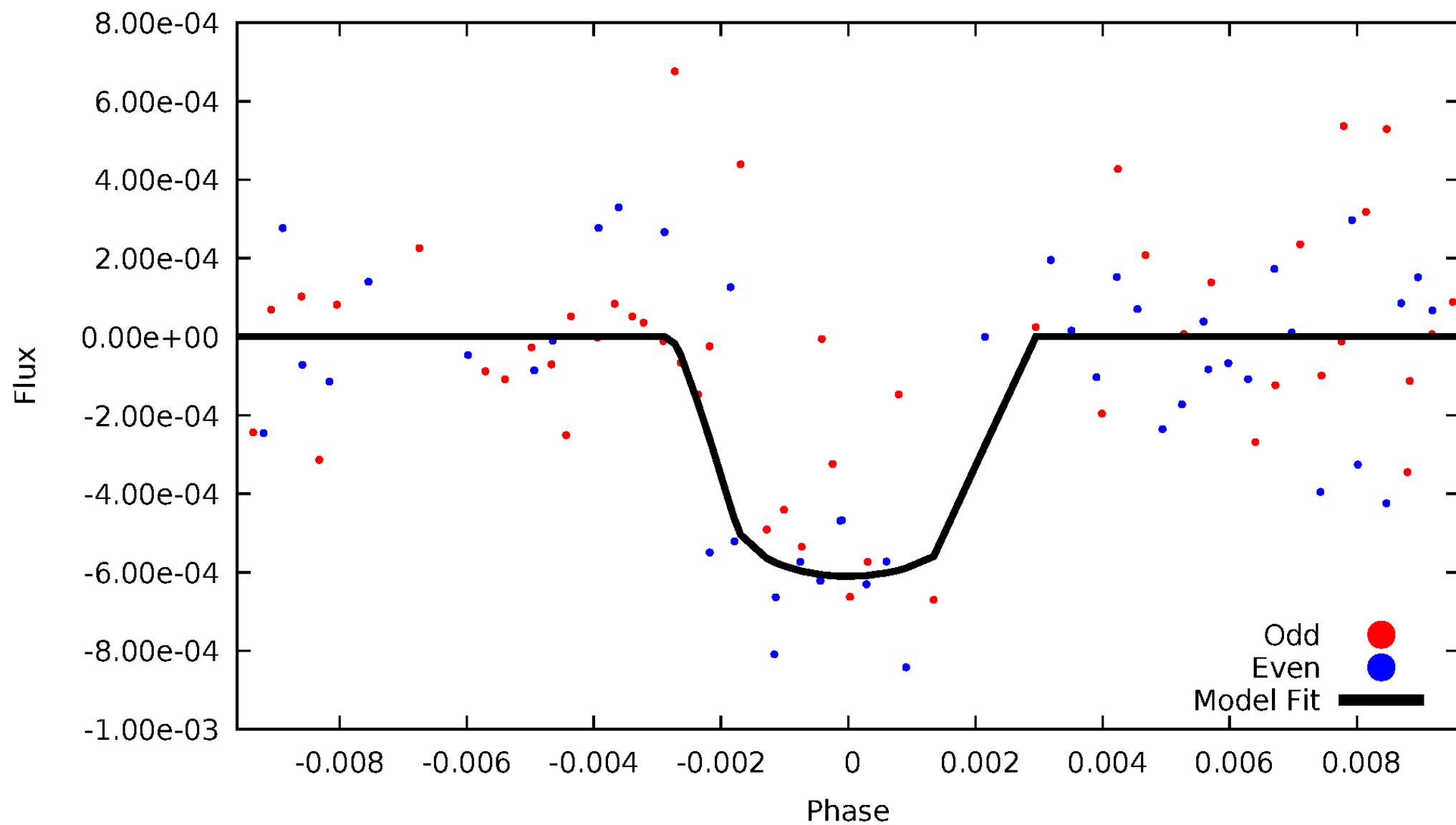


# TCE 010873947-02



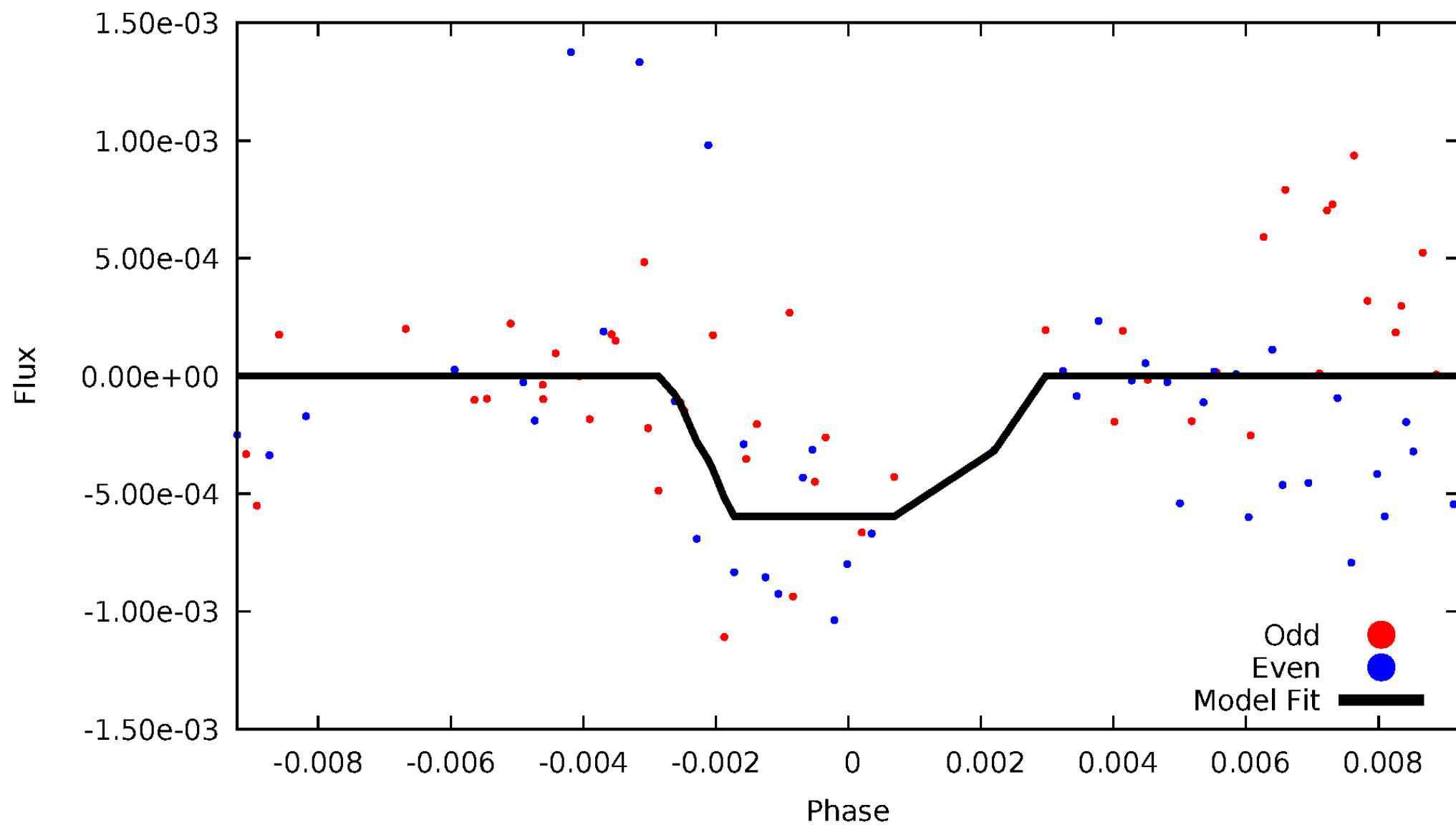
# DV Odd/Even

TCE 010873947-02



# ALT Odd/Even

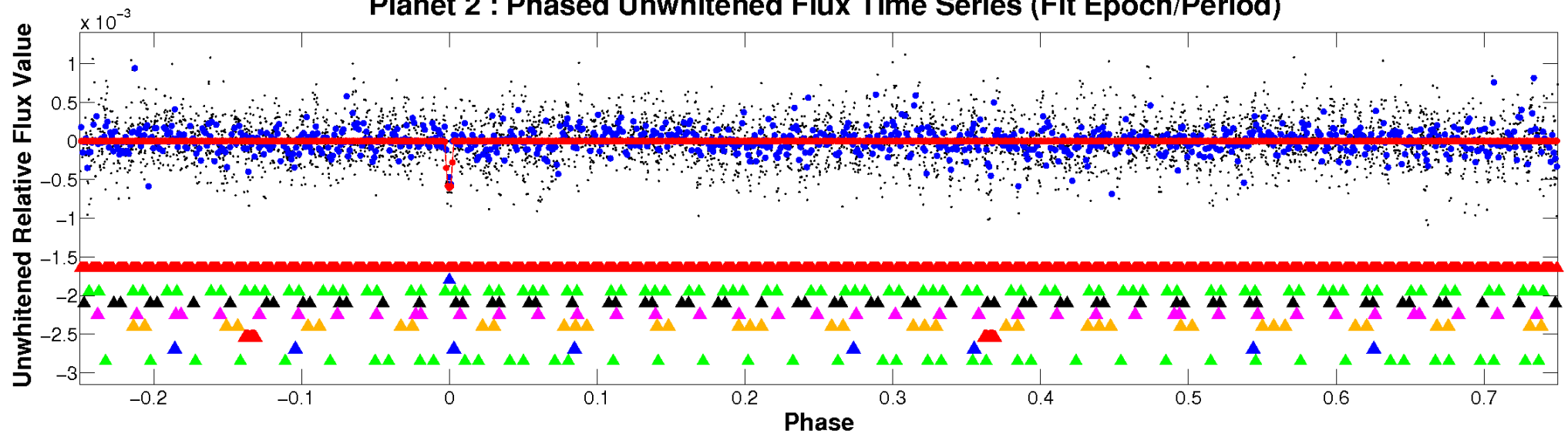
TCE 010873947-02



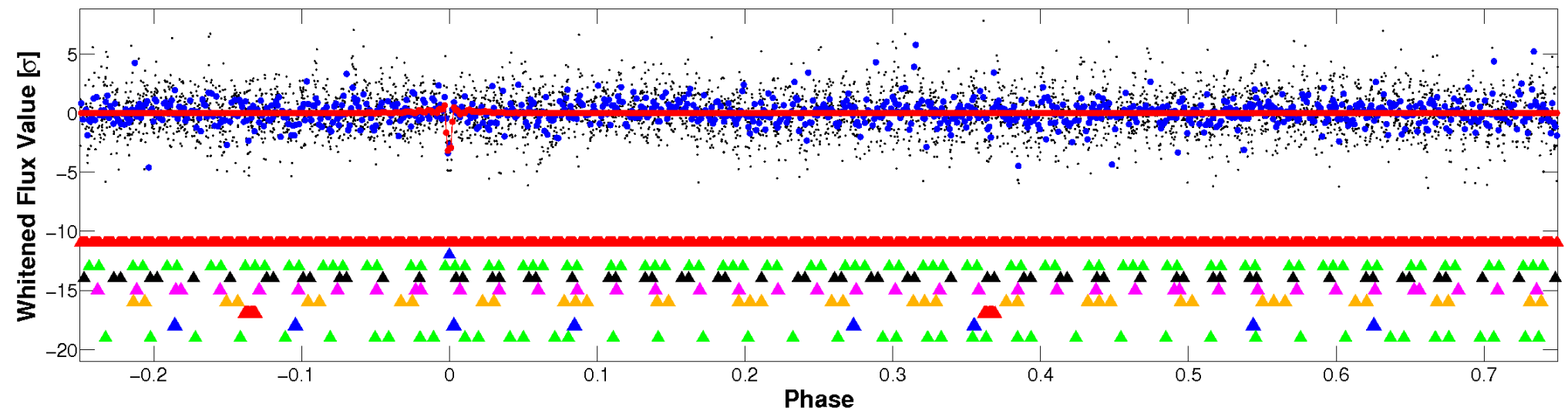


# Non-Whitened Vs. Whitened Light Curve

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

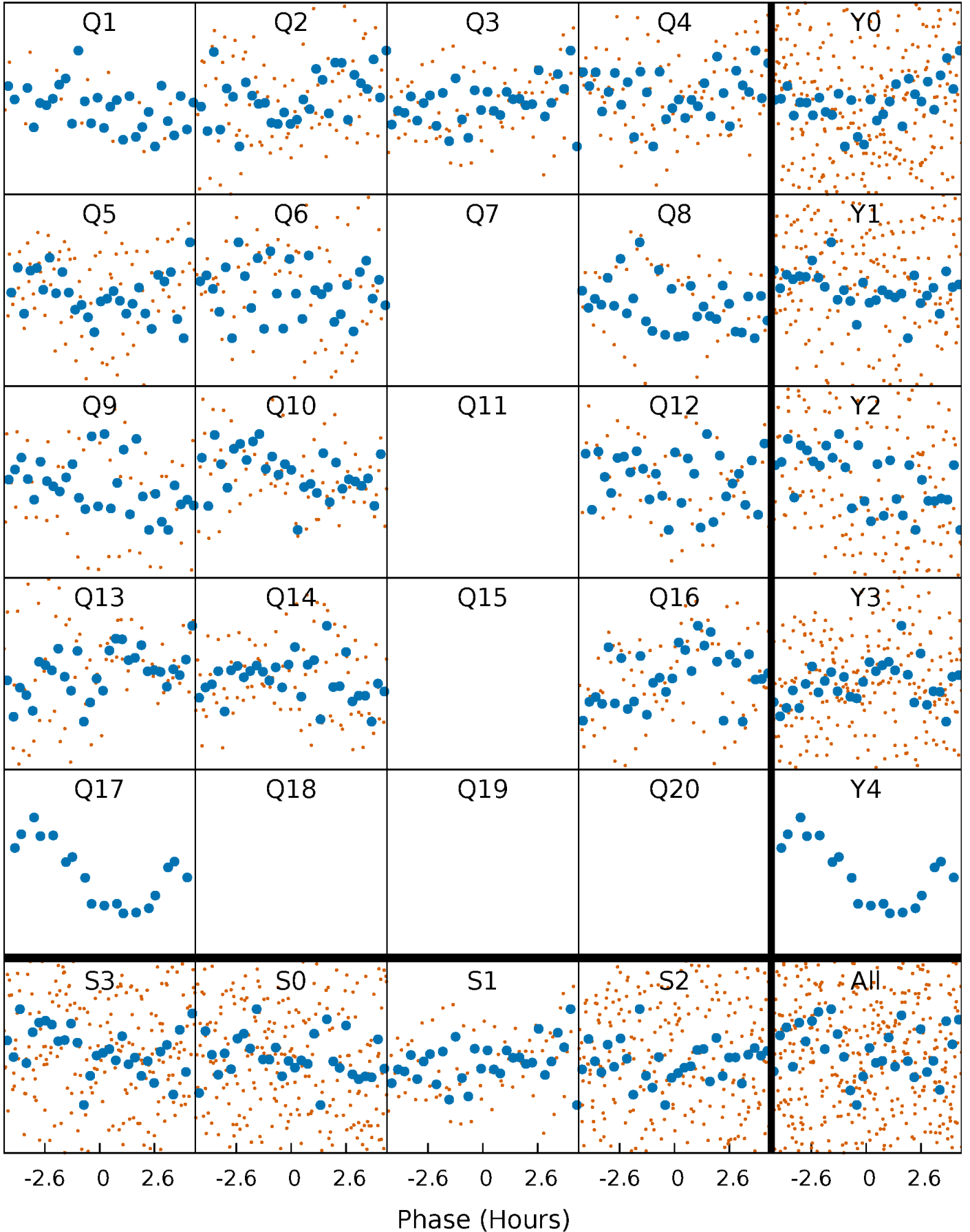


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



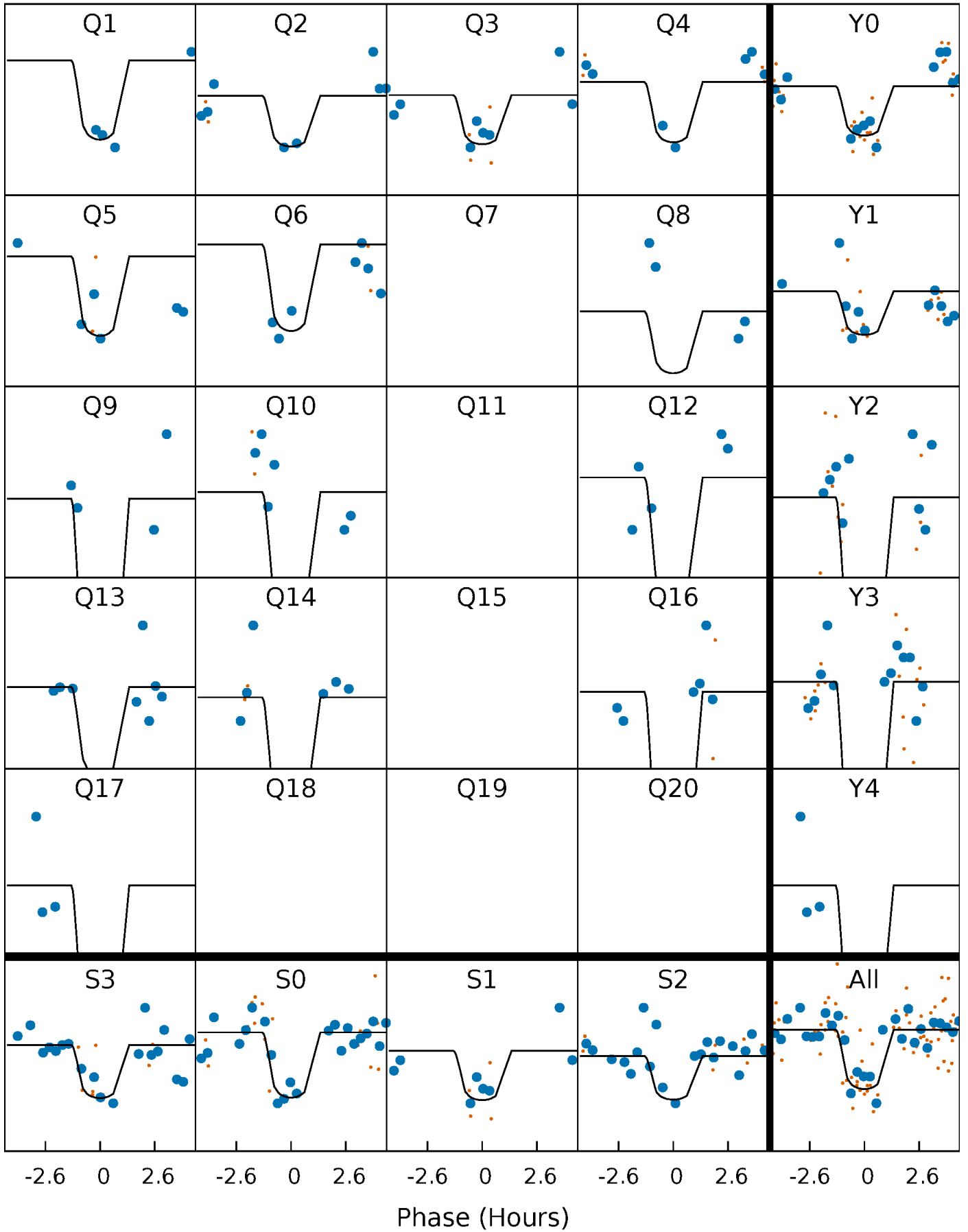
# PDC Quarter-Phased Transit Curves

TCE 010873947-02     $P = 19.689666$  Days     $T_0 = 138.728150$  (BKJD)



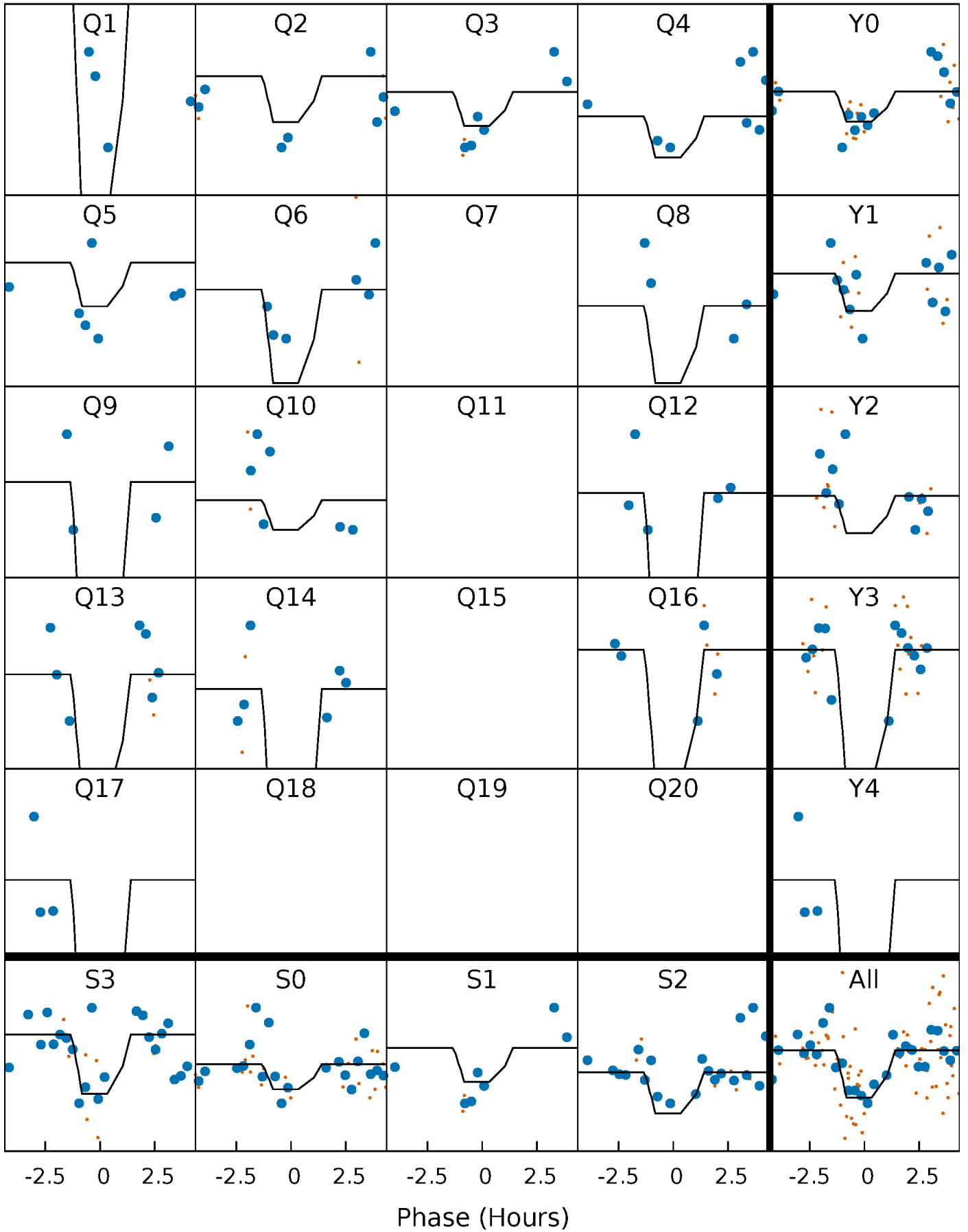
# DV Quarter-Phased Transit Curves

TCE 010873947-02   P= 19.689666 Days    $T_0=138.728150$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

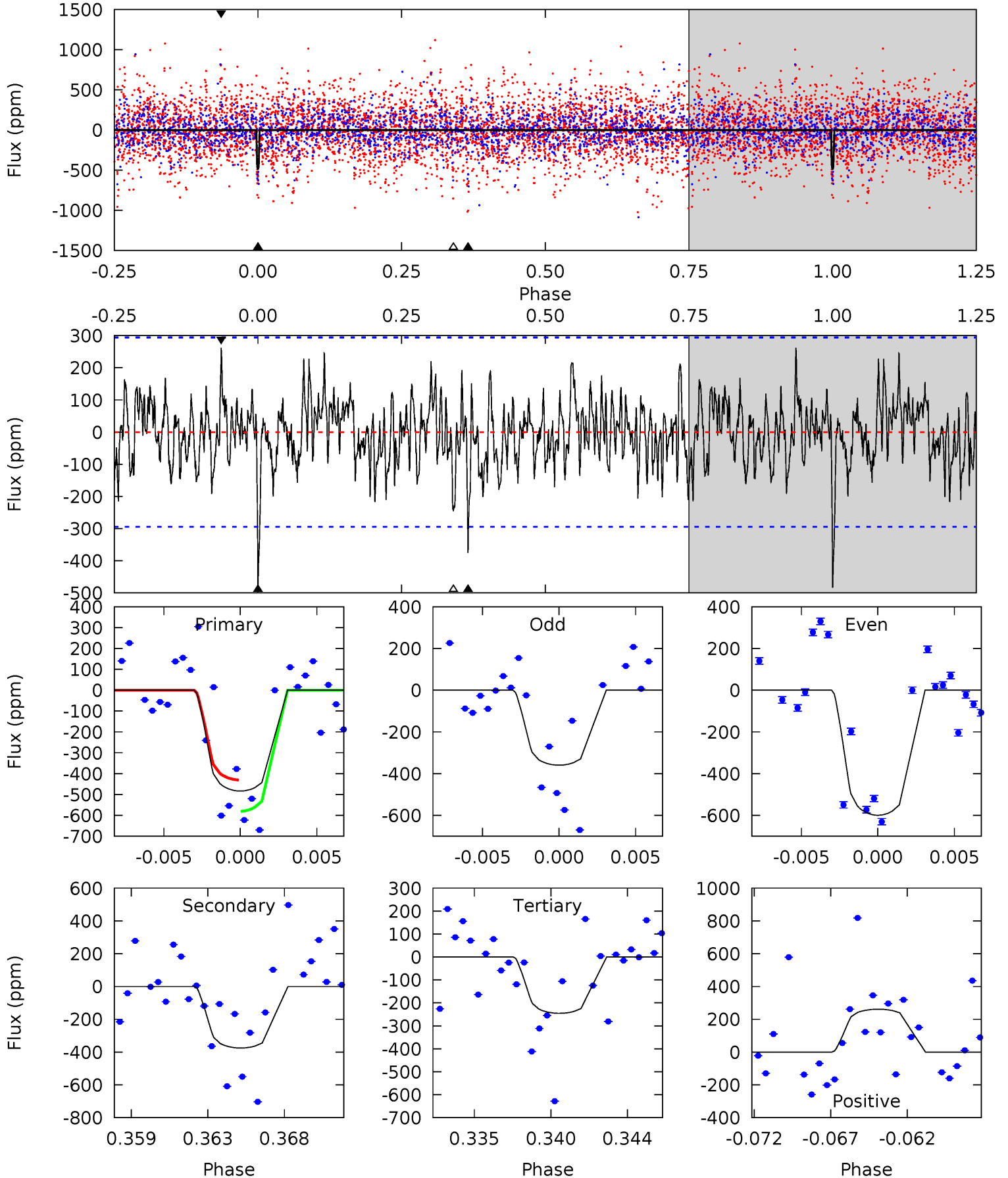
TCE 010873947-02     $P = 19.689471$  Days     $T_0 = 138.741108$  (BKJD)



# DV Model-Shift Uniqueness Test

010873947-02,  $P = 19.689666$  Days,  $E = 119.038484$  Days

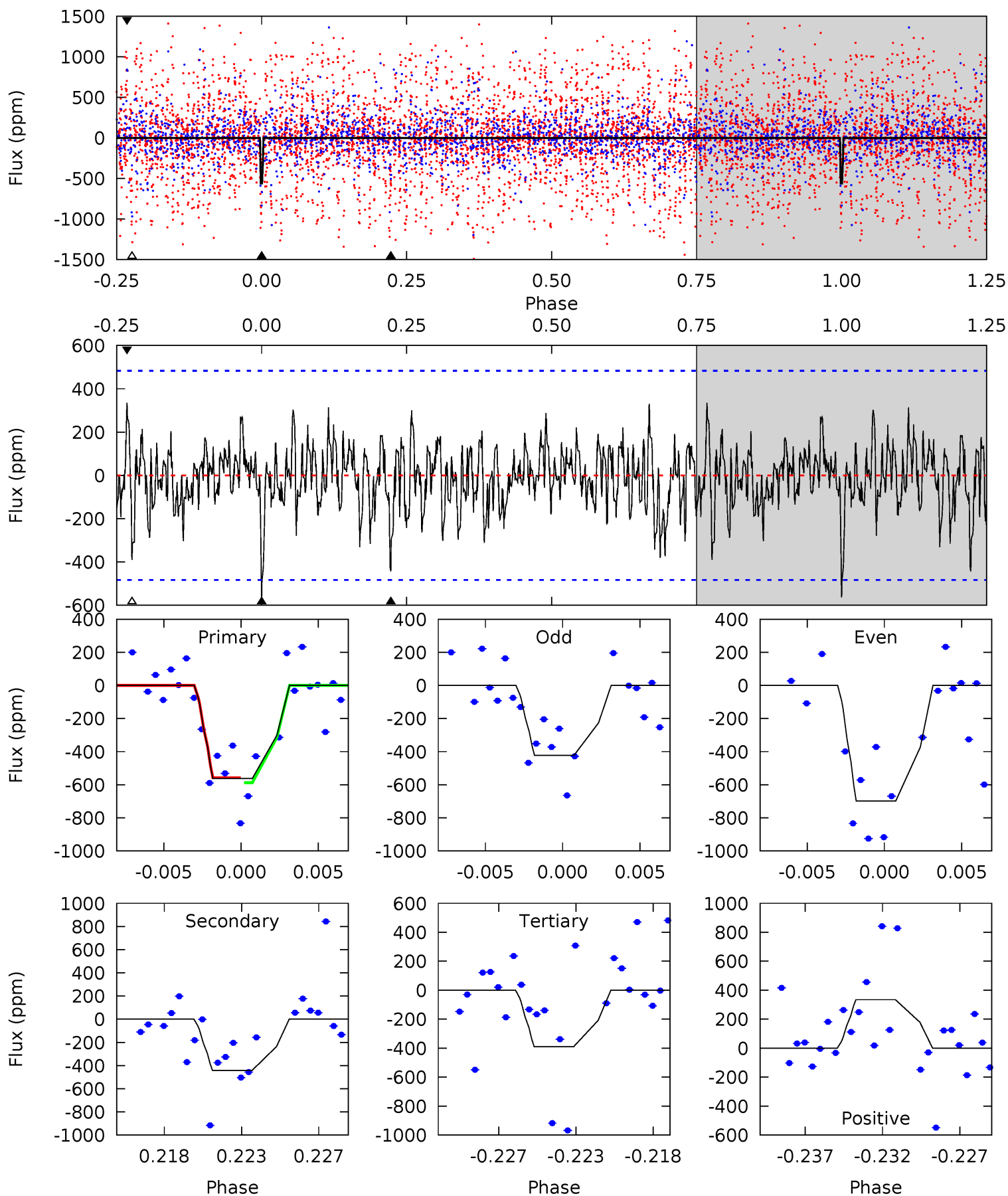
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.49	6.59	4.31	4.59	5.17	2.82	1.50	4.18	3.90	2.28	2.00	2.11	0.73	0.35	1.19



# Alt Model-Shift Uniqueness Test

010873947-02, P = 19.689471 Days, E = 119.051637 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
6.01	4.73	4.17	3.58	5.17	2.82	1.22	1.84	2.43	0.56	1.15	1.44	0.98	0.37	0.12





### Stellar Parameters For KIC 010873947

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7559^{+237}_{-316}$	$4.078^{+0.170}_{-0.170}$	$-0.220^{+0.250}_{-0.350}$	$1.886^{+0.541}_{-0.443}$	$1.551^{+0.210}_{-0.257}$	$0.326^{+0.339}_{-0.143}$
	+3%/-4%	+4%/-4%	+114%/-159%	+29%/-23%	+14%/-17%	+104%/-44%
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 010873947-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-376 \pm 57$	$5.32^{+3.53}_{-3.11}$	$1572^{+108}_{-114}$	$6404^{+4732}_{-1300}$	$198^{+979}_{-126}$
Alt.	$-443 \pm 94$	$5.23^{+3.66}_{-2.99}$	$1572^{+113}_{-115}$	$6682^{+4723}_{-1466}$	$238^{+1010}_{-156}$

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

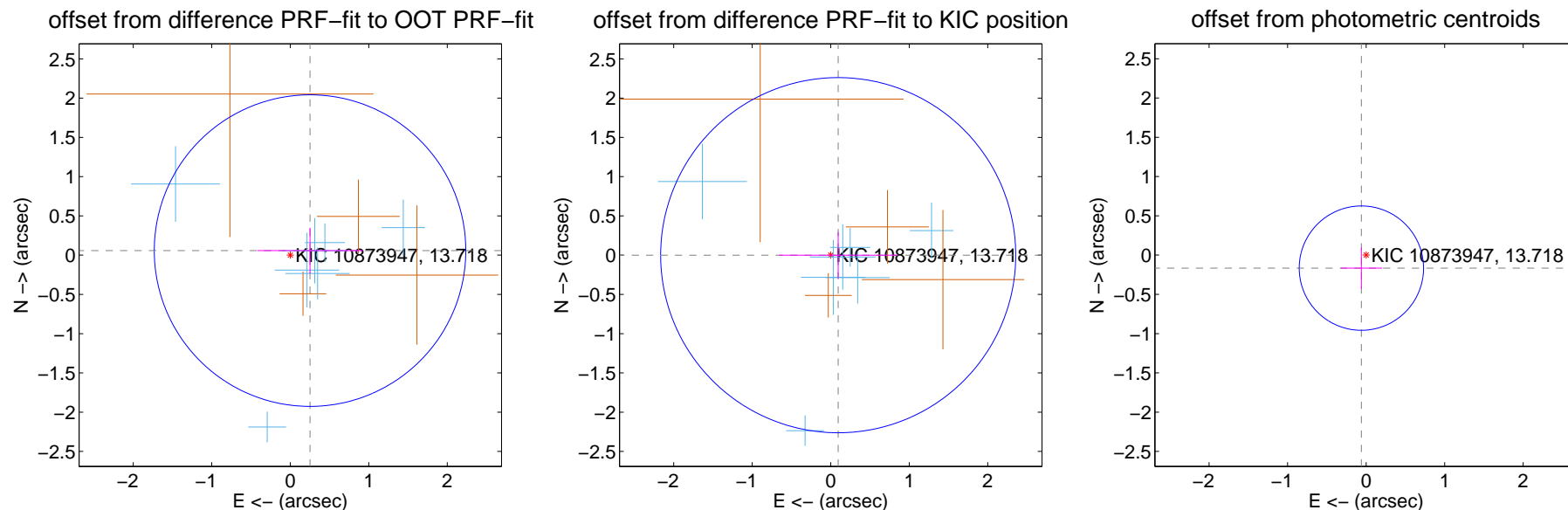
## DV Centroid Data

Supplemental centroid analysis for 010873947-02. Kepler magnitude: 13.72. Transit SNR 13.16

There are 7 quarters with good PRF difference image offsets

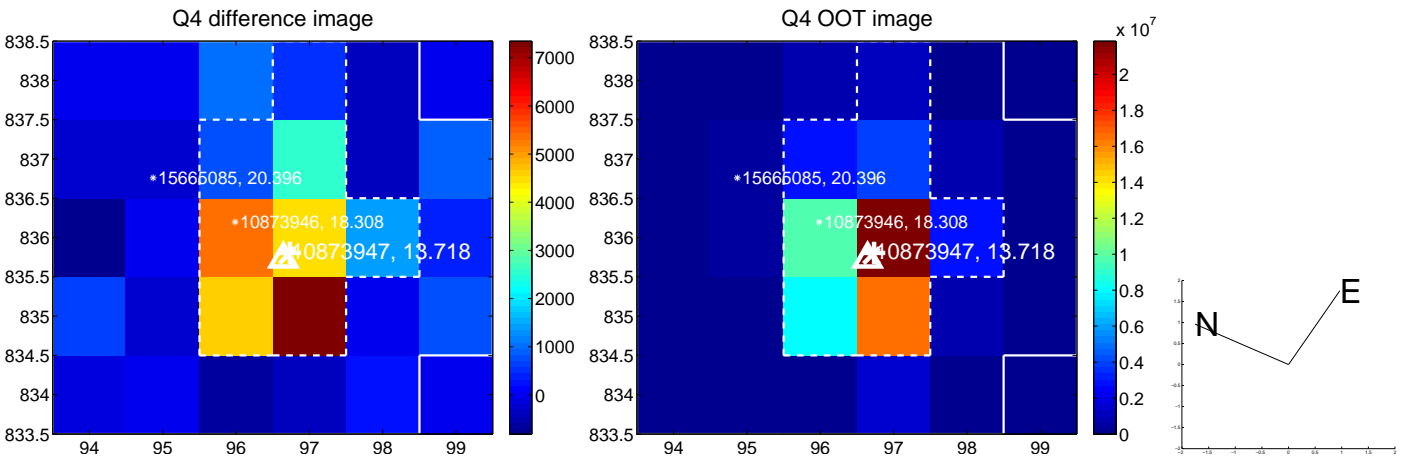
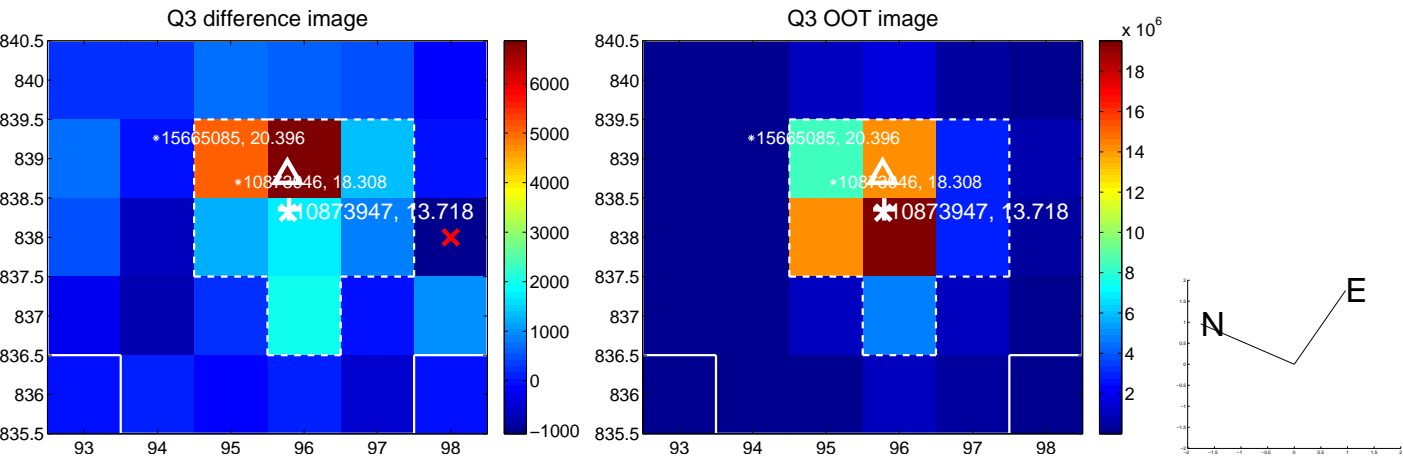
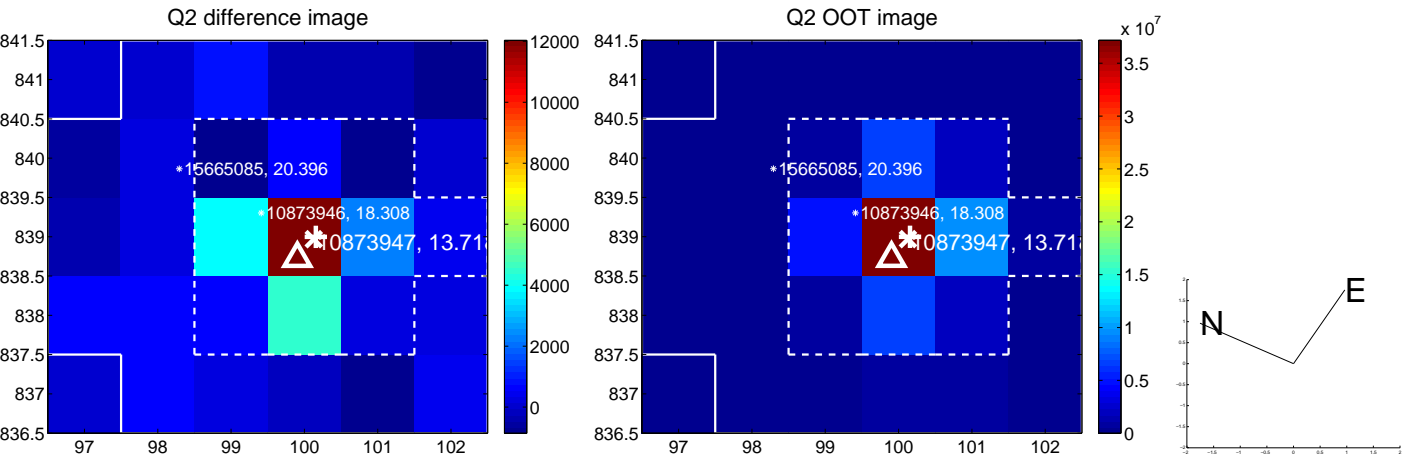
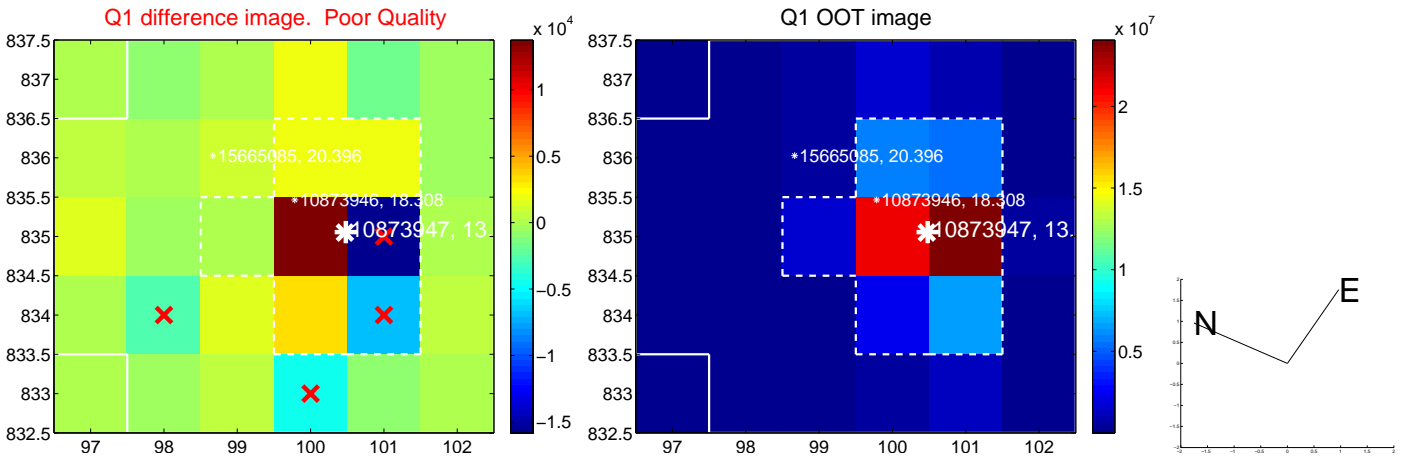
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.258 \pm 0.661$	0.39	$-0.252 \pm 0.671$	$0.058 \pm 0.292$
PRF-fit source offset from KIC position	$0.095 \pm 0.754$	0.13	$-0.095 \pm 0.754$	$-0.000 \pm 0.295$
photometric centroid source offset	$0.18 \pm 0.26$	0.67	$0.06 \pm 0.26$	$-0.17 \pm 0.26$

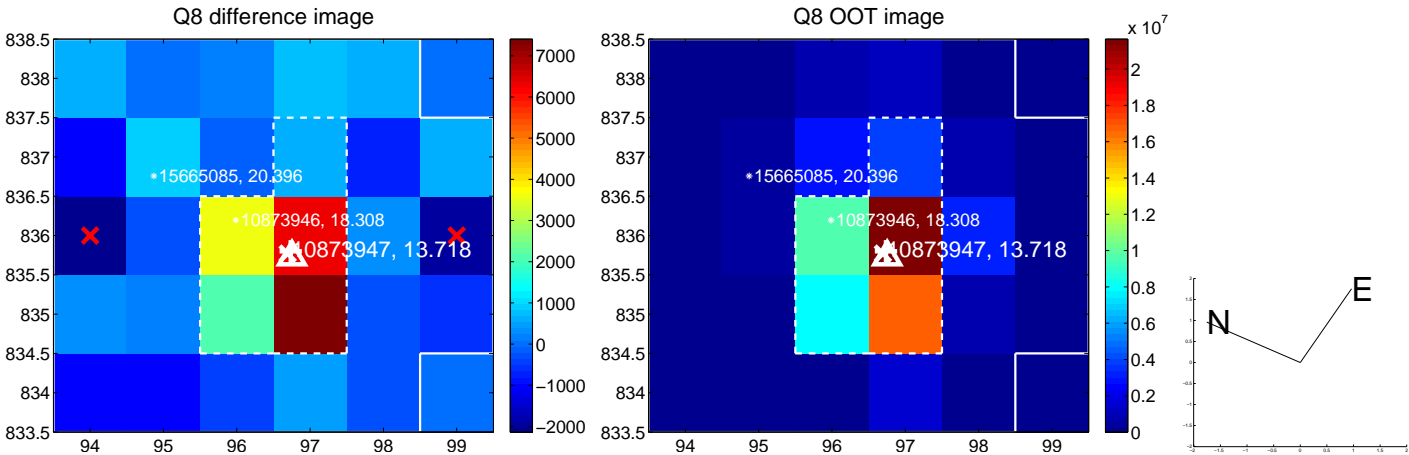
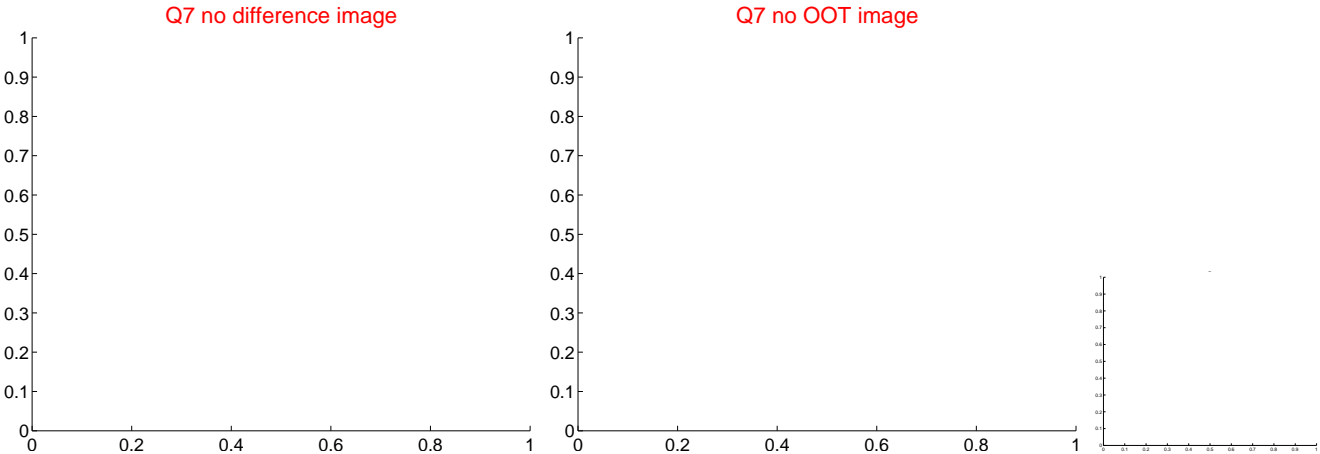
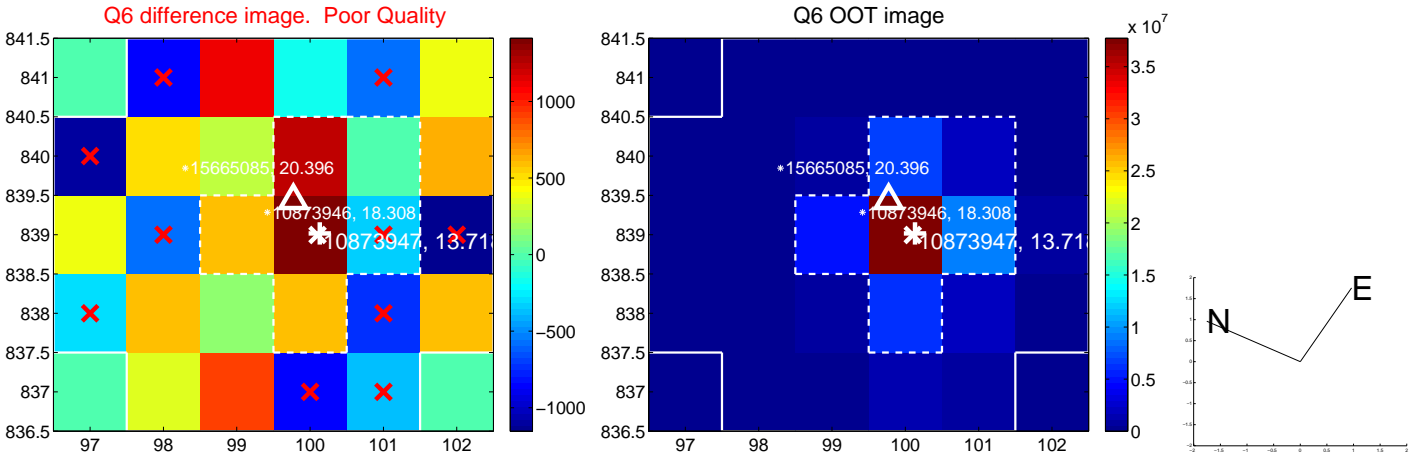
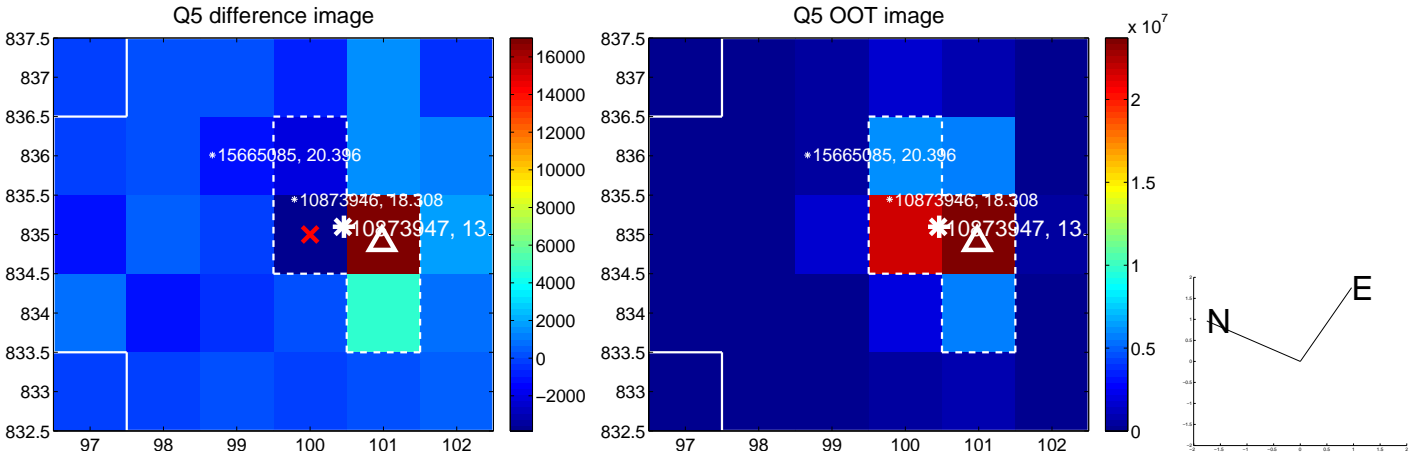


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

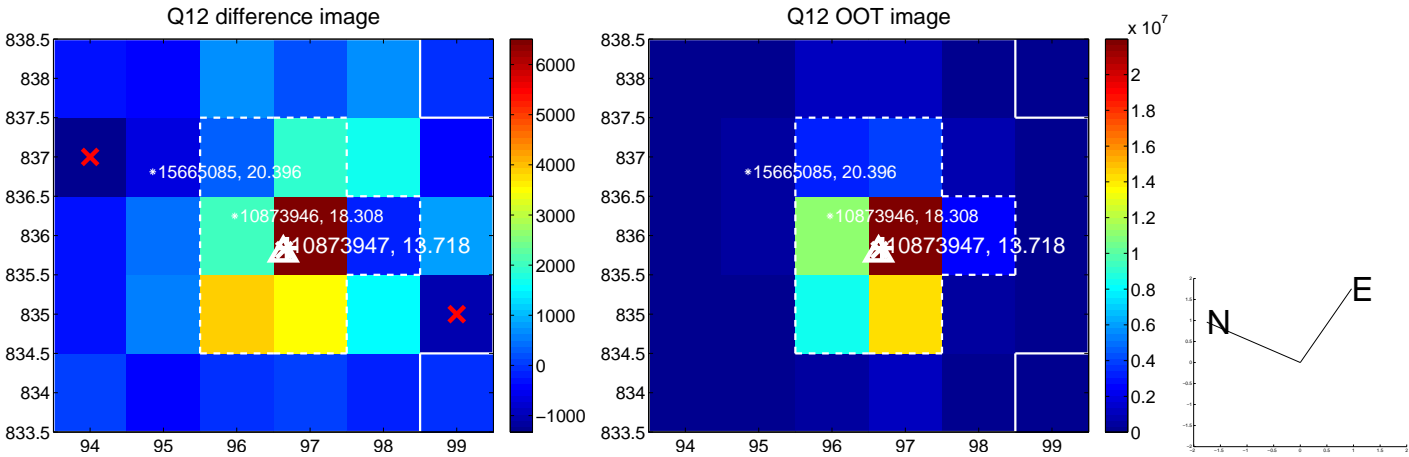
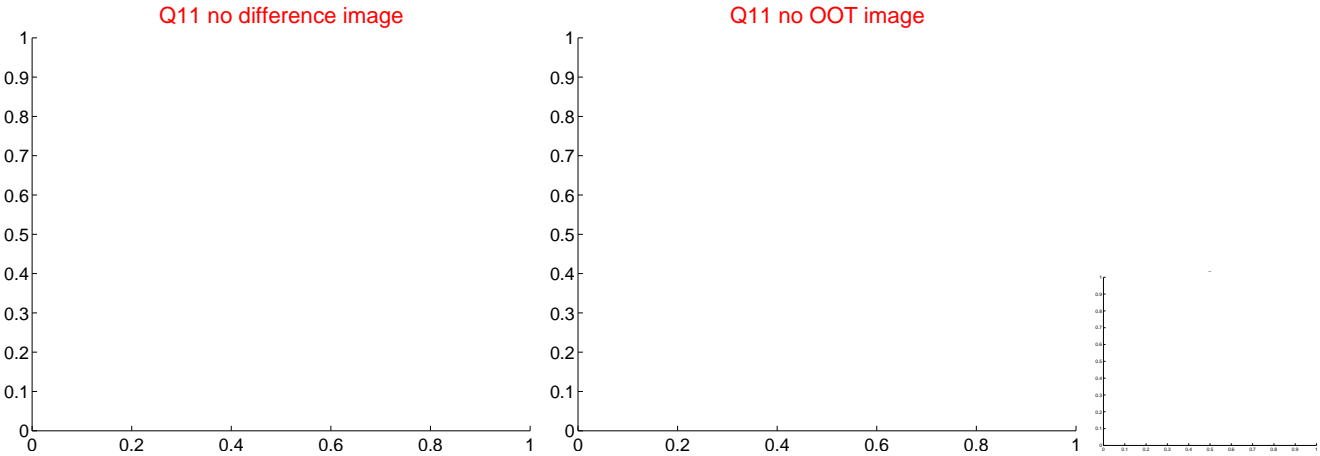
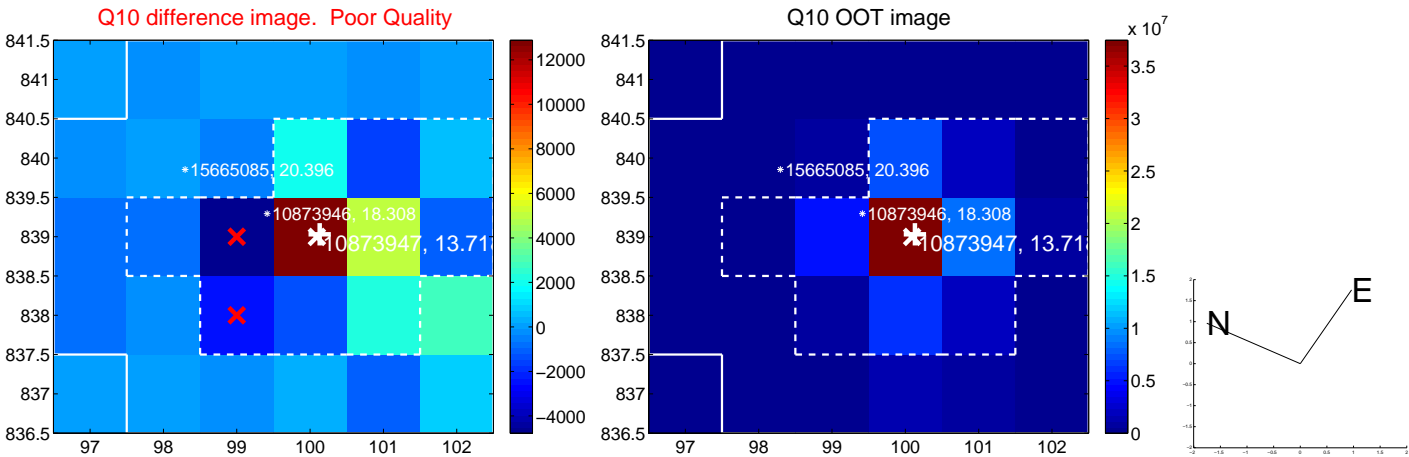
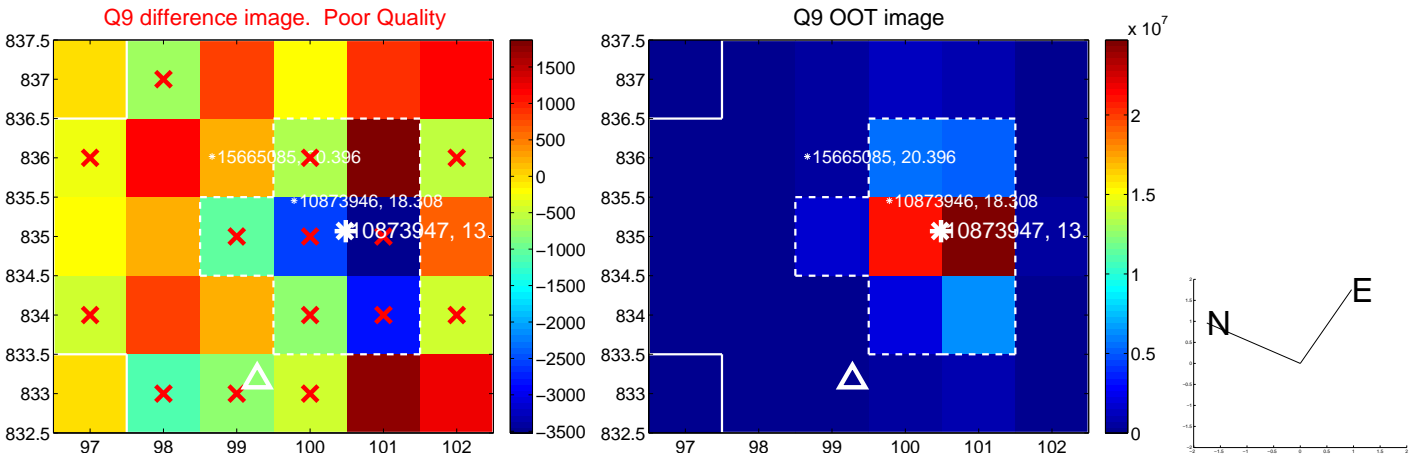
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



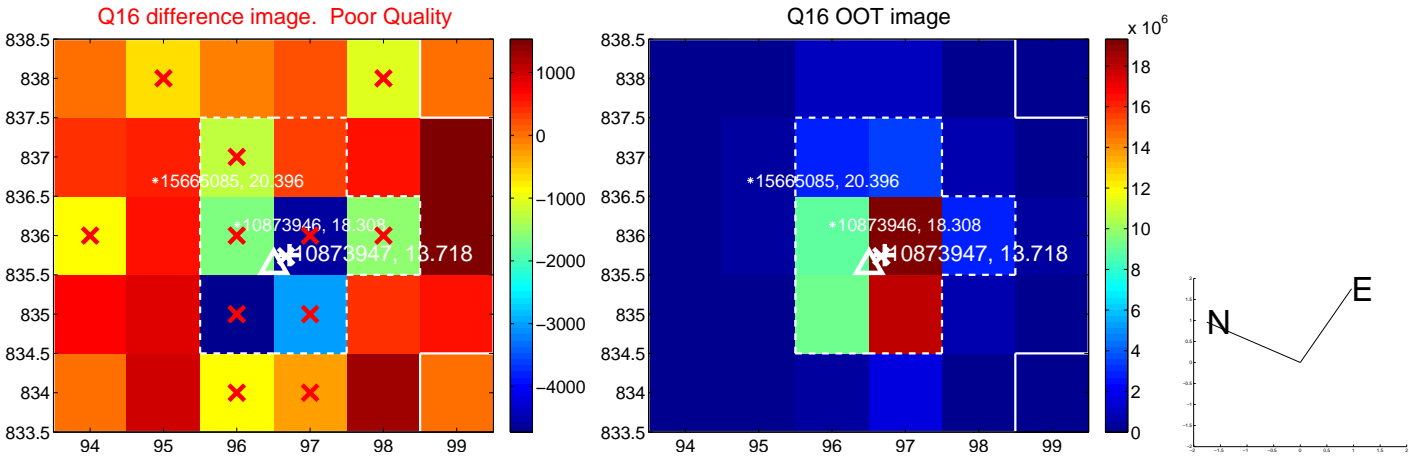
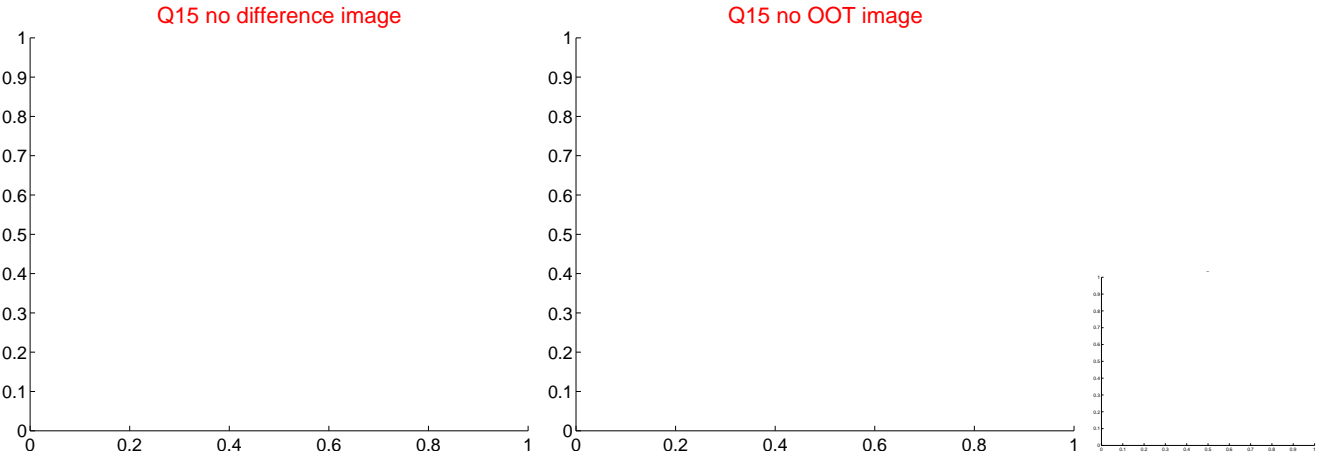
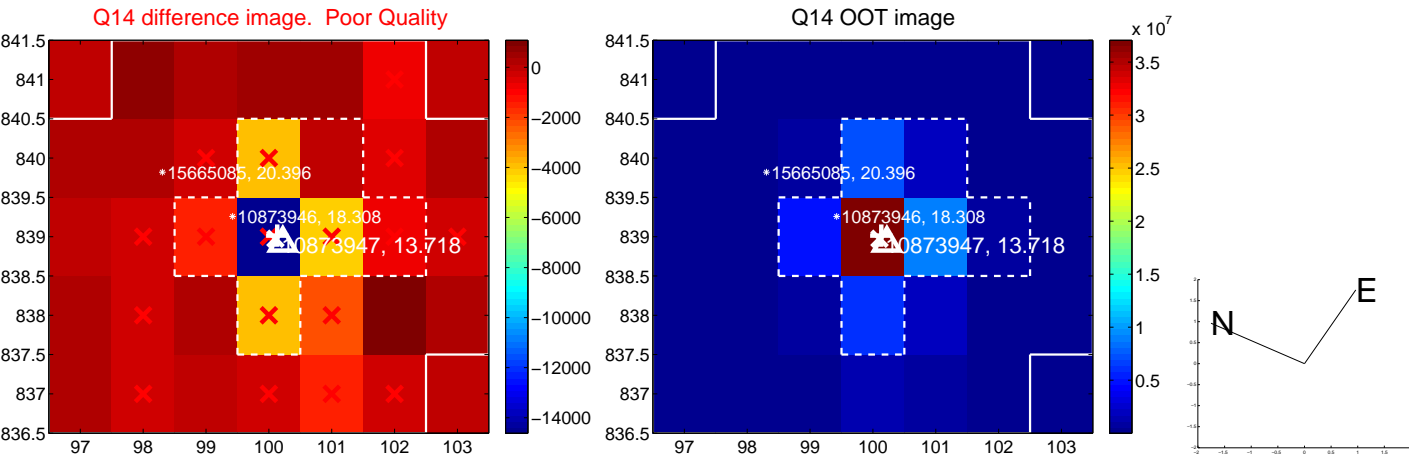
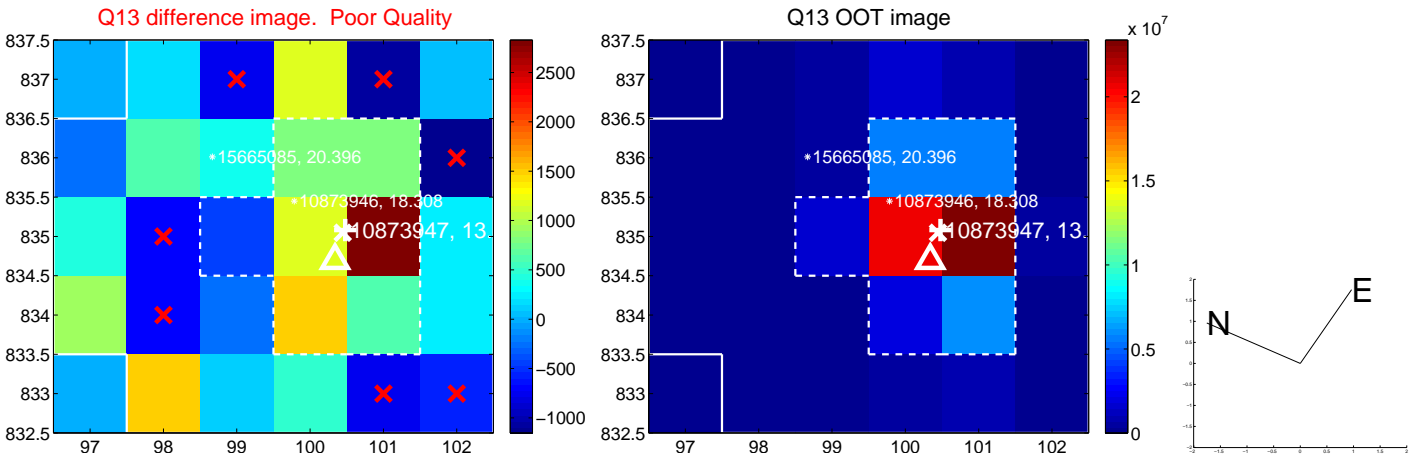
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

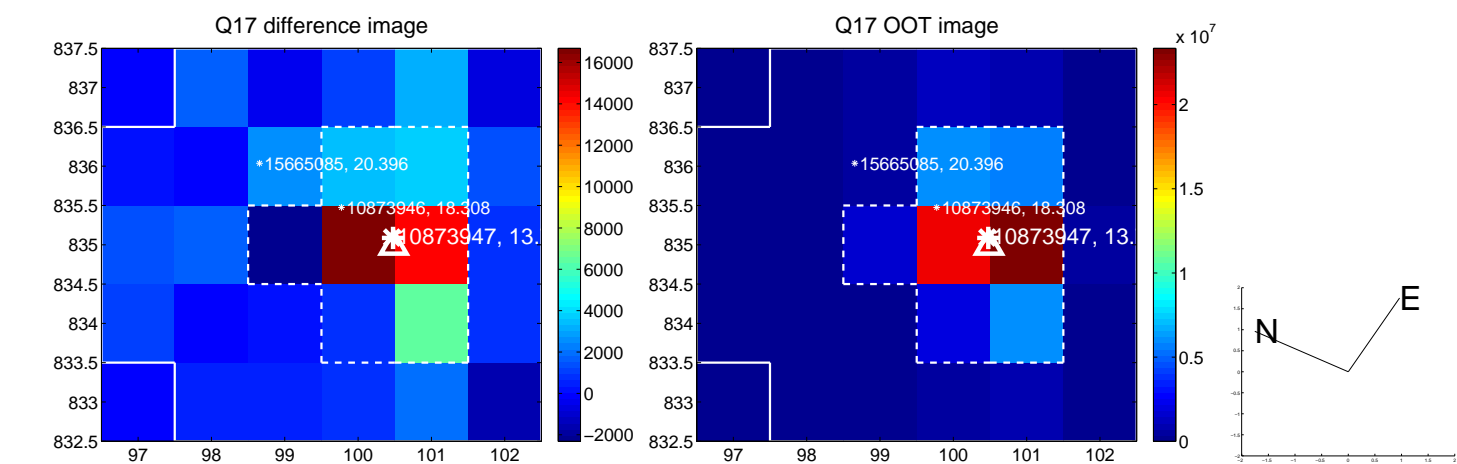


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

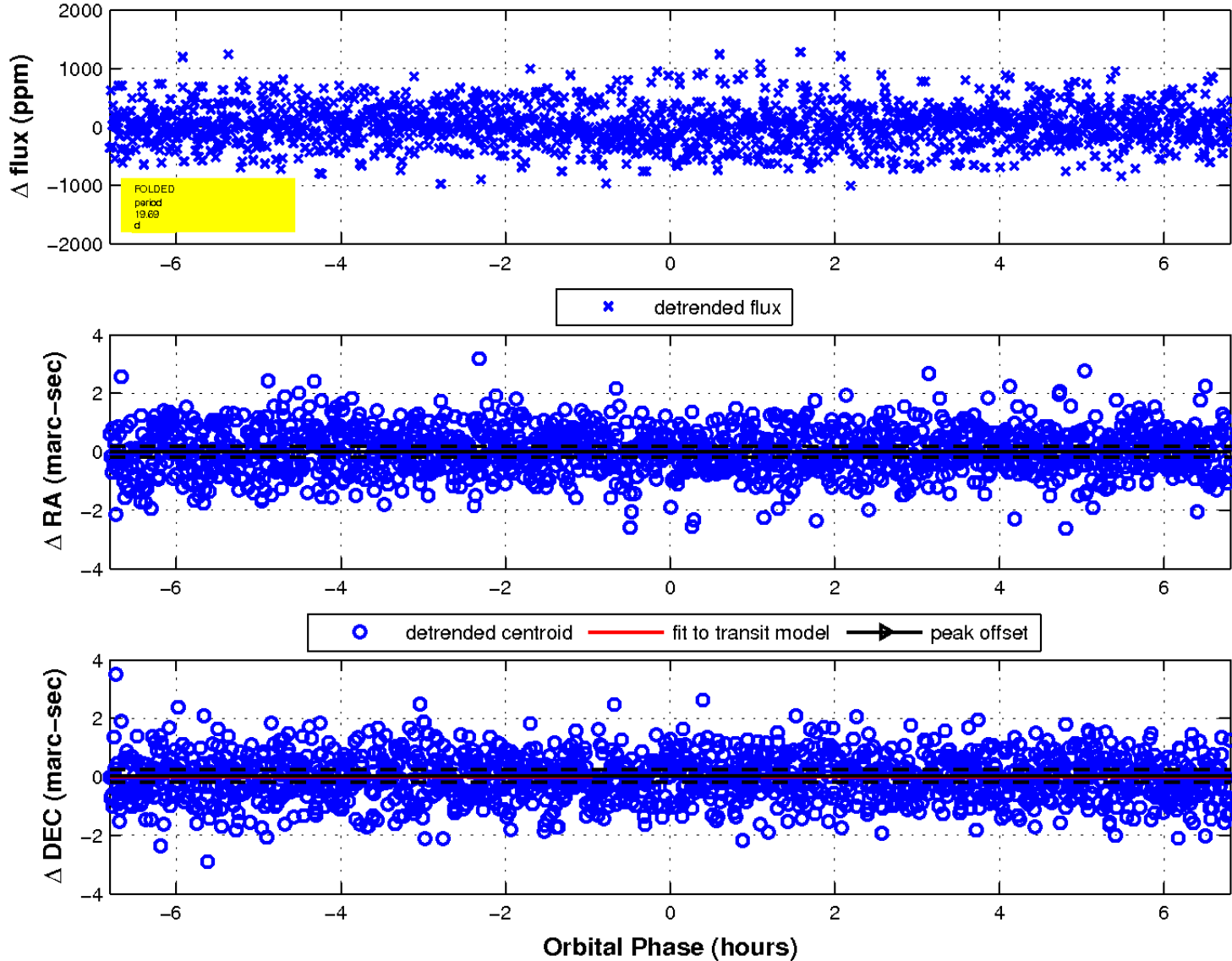




white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



fluxWeightedCentroids, Planet 2 of 9



Declination

# KIC 010873947

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010873947-01	OBS	No	0.527357	131.795567	18.0	3.647	10.8	4.4	1.89	7559	0.83	47530.62
010873947-02	OBS	No	19.689666	138.728149	610.6	2.271	12.2	13.2	1.89	7559	5.20	380.89
010873947-03	OBS	No	17.025367	144.262873	491.6	0.984	11.3	8.3	1.89	7559	4.24	462.36
010873947-04	OBS	No	22.211661	140.942347	695.4	1.426	10.7	10.2	1.89	7559	8.87	324.34
010873947-05	OBS	No	36.184555	138.348466	580.2	3.091	12.0	10.0	1.89	7559	8.71	169.21
010873947-06	OBS	No	37.054013	149.861374	542.1	2.239	10.5	9.4	1.89	7559	4.88	163.93
010873947-07	OBS	No	49.229353	155.691611	1022.6	4.506	10.1	12.3	1.89	7559	11.36	112.24
010873947-09	OBS	No	32.616633	140.133048	594.1	1.655	10.3	9.4	1.89	7559	4.78	194.32

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010873947-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
010873947-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
010873947-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV
010873947-04	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
010873947-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010873947-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010873947-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV
010873947-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV

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

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

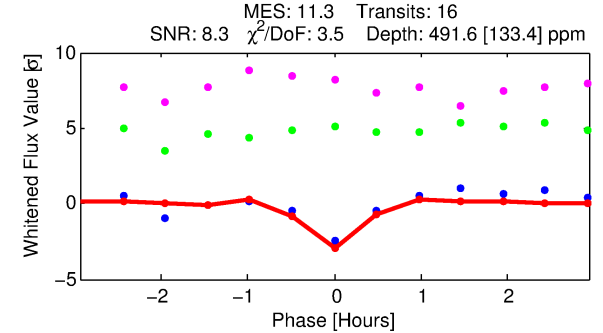
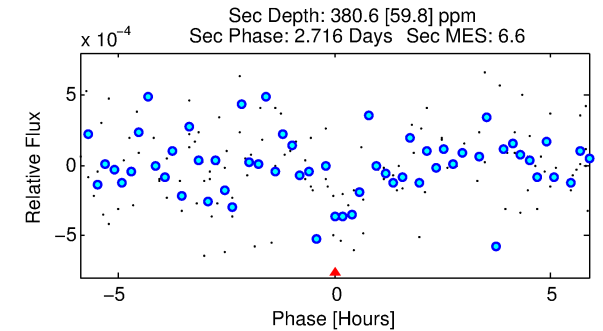
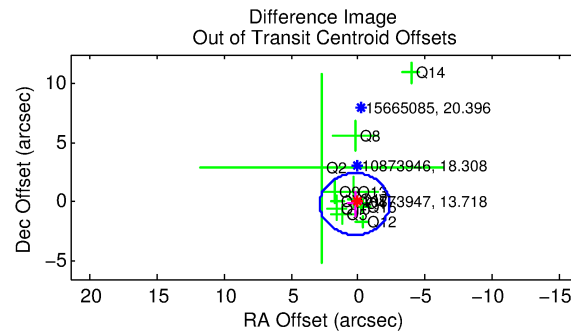
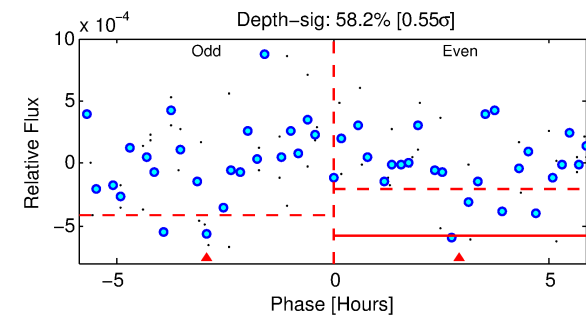
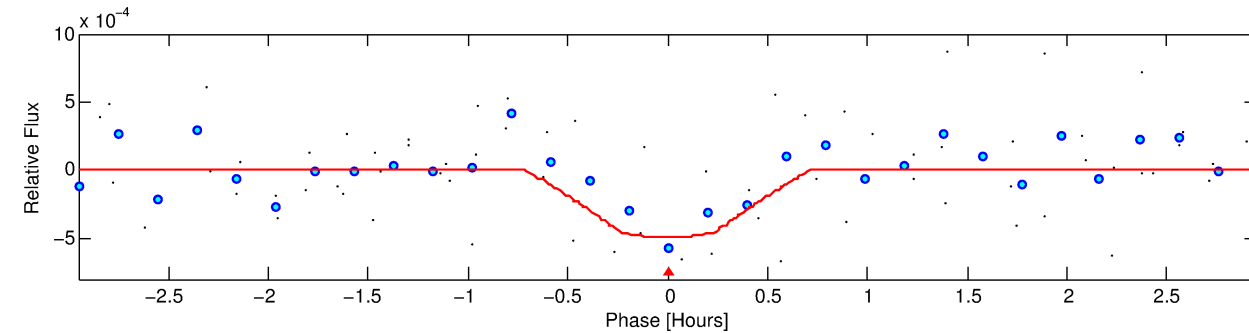
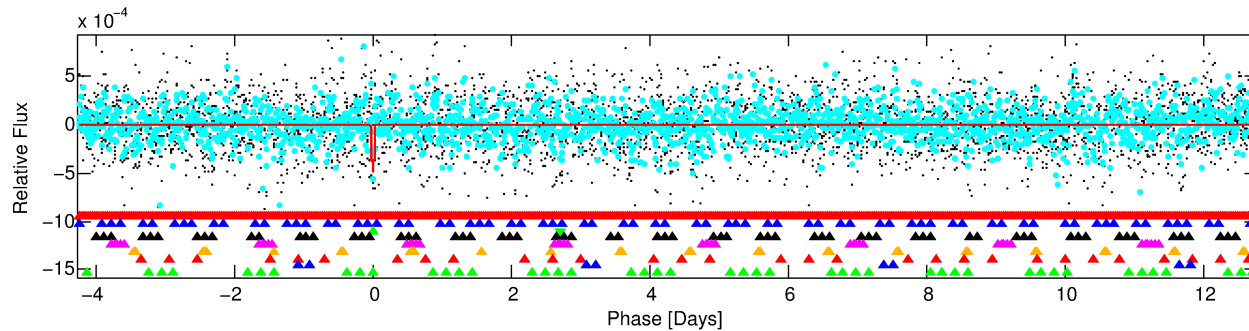
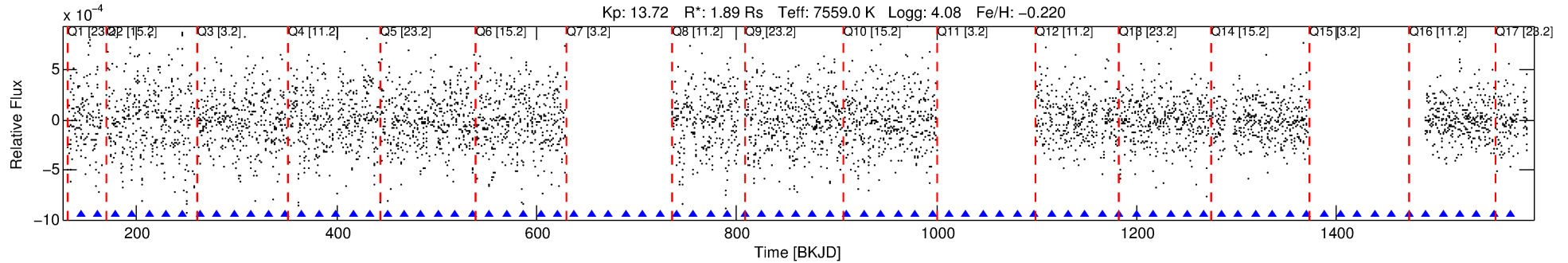
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010873947-03

No Significant Match Found

# DV One-Page Summary

KIC: 10873947 Candidate: 3 of 9 Period: 17.025 d



## DV Fit Results:

Period = 17.02537 [0.00018] d  
Epoch = 144.2629 [0.0085] BKJD  
Rp/R\* = 0.0206 [0.0583]  
a/R\* = 134.58 [2075.11]  
b = 0.07 [213.11]  
Seff = 462.36 [168.39]  
Teq = 1182 [108] K  
Rp = 4.24 [12.07] Re  
a = 0.1500 [0.0347] AU  
Ag = 262.25 [1488.78] [0.18 $\sigma$ ]  
Teffp = 7357 [10429] K [0.59 $\sigma$ ]

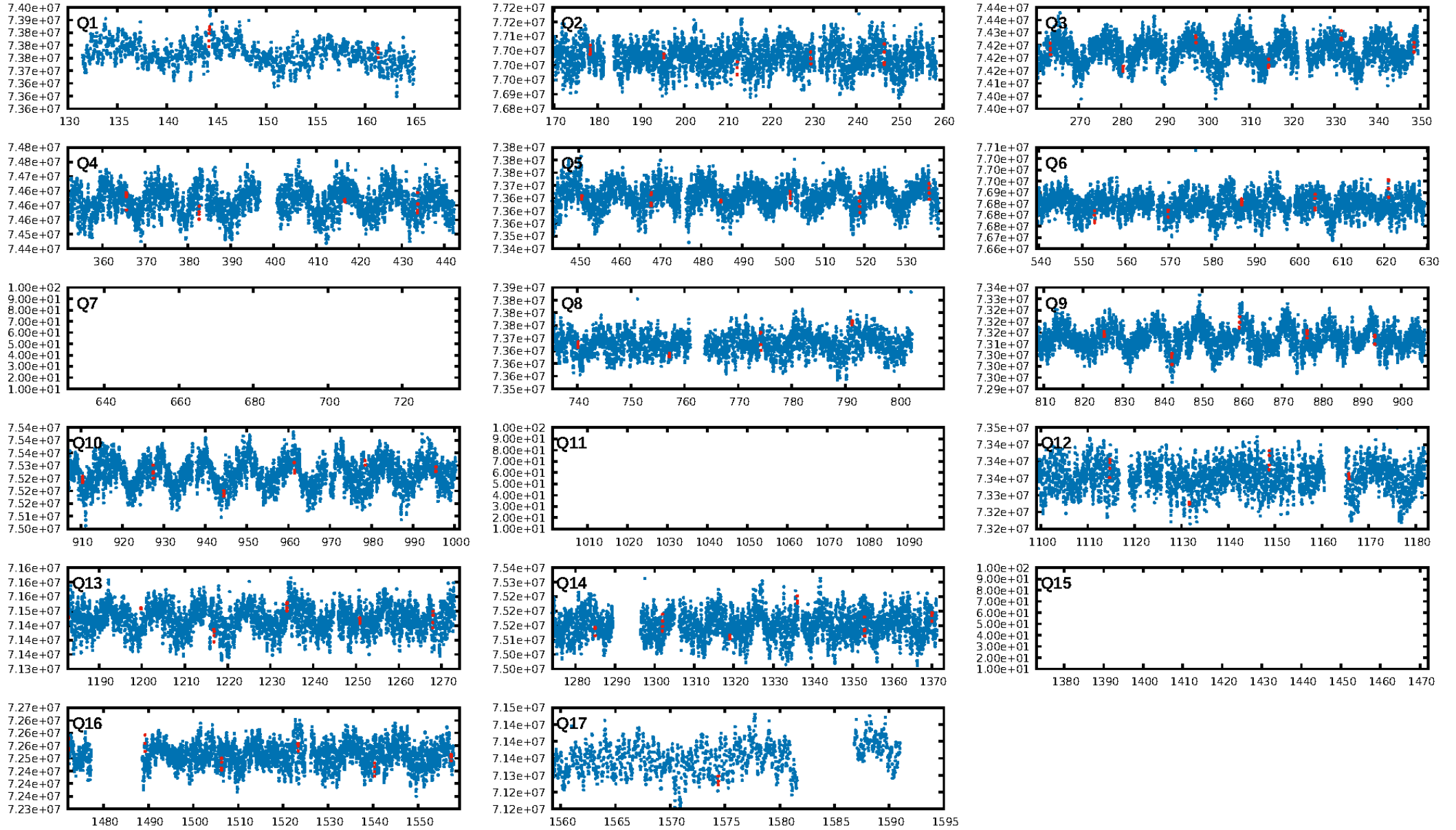
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [104.81 $\sigma$ ]  
LongPeriod-sig: 100.0% [25.84 $\sigma$ ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 39.1%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [15/15]  
GhostDiagnostic-chr: 1.791  
Centroid-sig: 72.4%  
Centroid-so: 0.384 arcsec [0.86 $\sigma$ ]  
OotOffset-rm: 0.306 arcsec [0.35 $\sigma$ ]  
KicOffset-rm: 0.504 arcsec [0.60 $\sigma$ ]  
OotOffset-st: 3/0/4/5 [12]  
KicOffset-st: 3/0/4/5 [12]  
DiffImageQuality-fgm: 0.33 [4/12]  
DiffImageOverlap-fno: 0.00 [0/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:30:44 Z

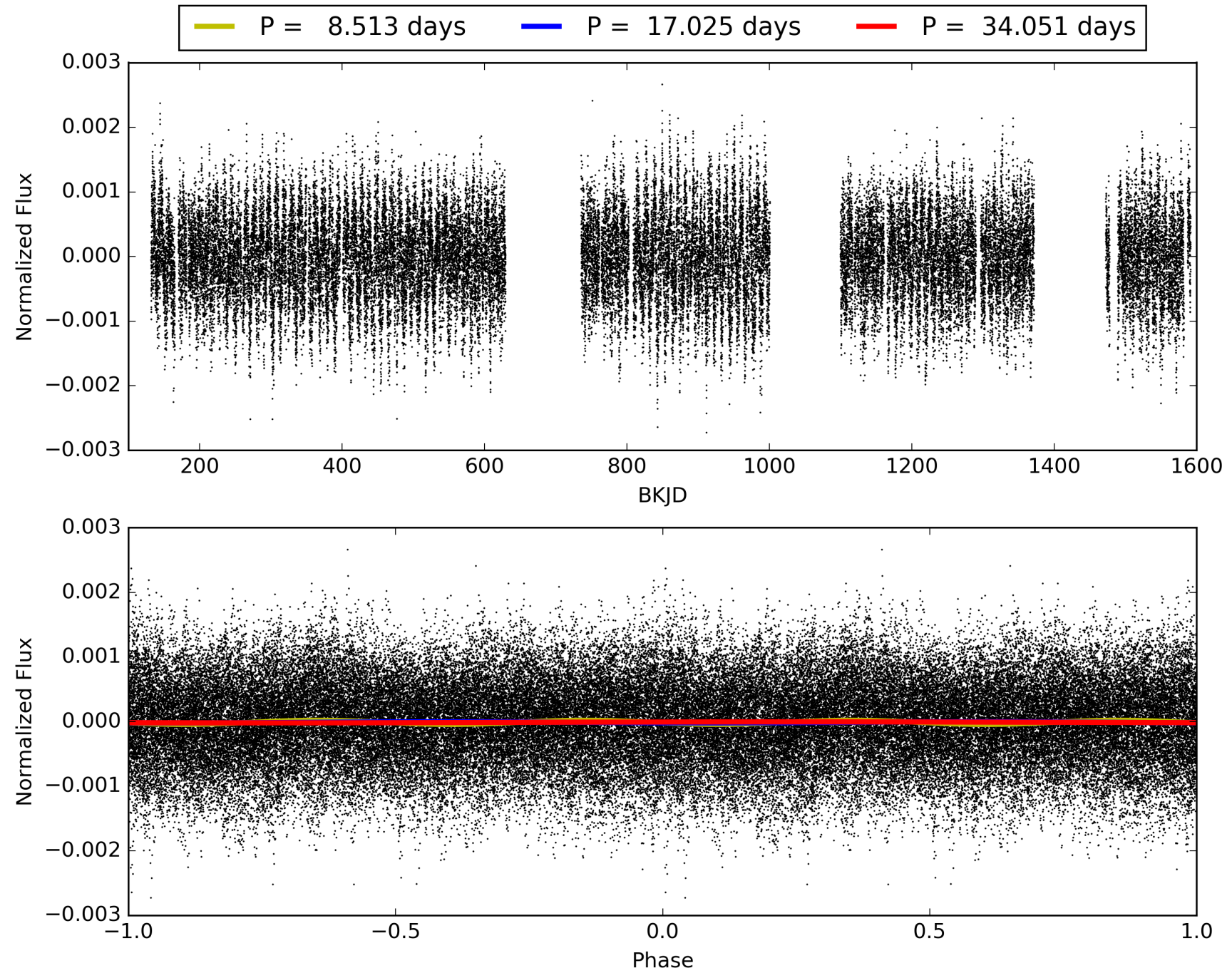
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010873947-03, PDC Light Curves



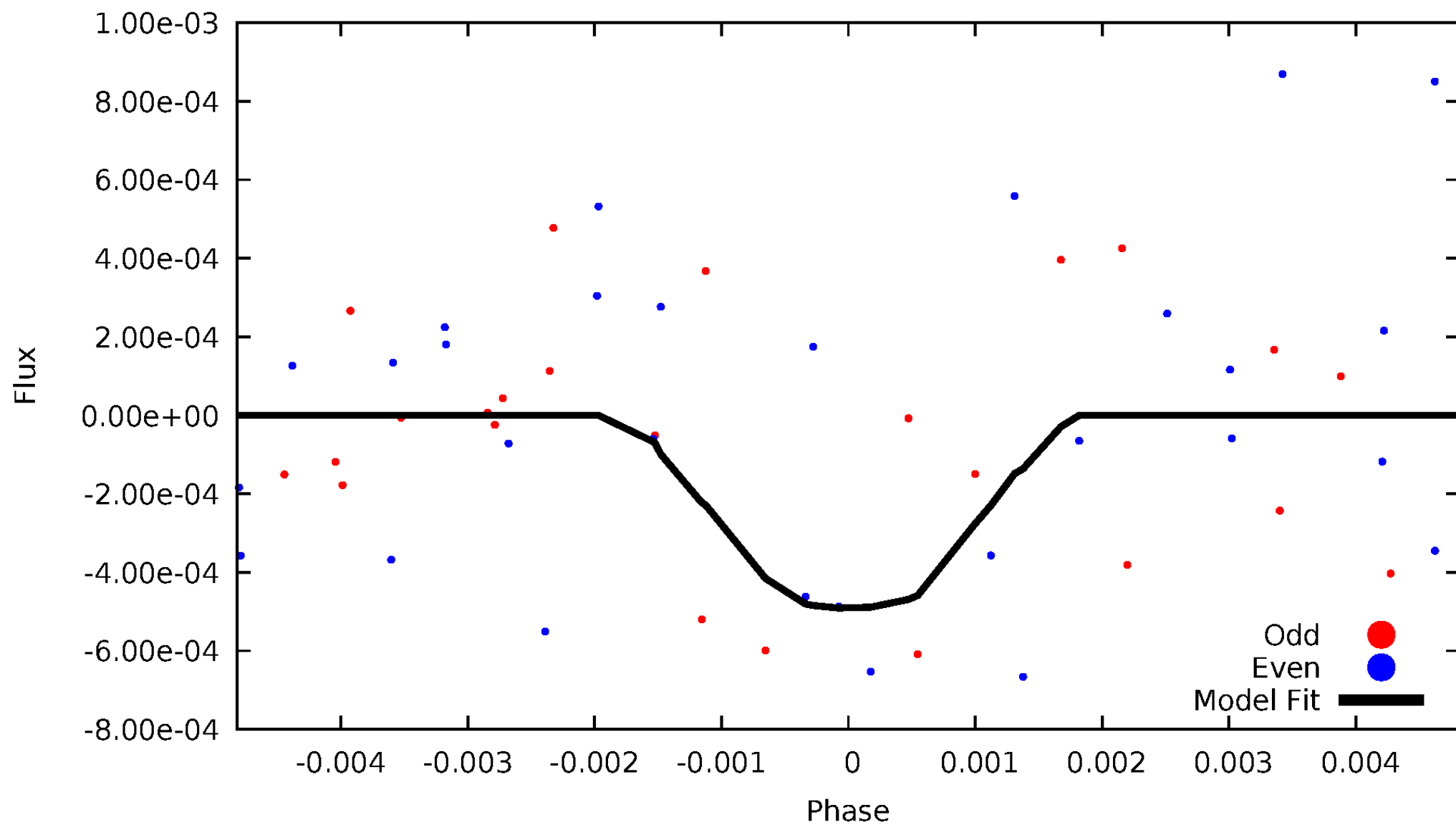


TCE 010873947-03



# DV Odd/Even

TCE 010873947-03



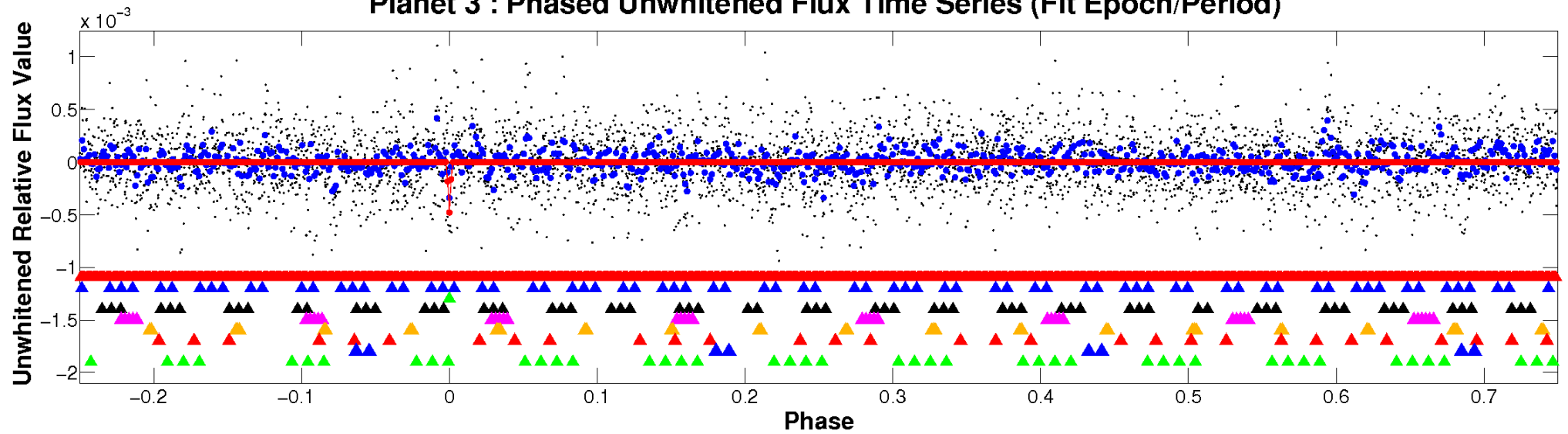


ALT Odd/Even

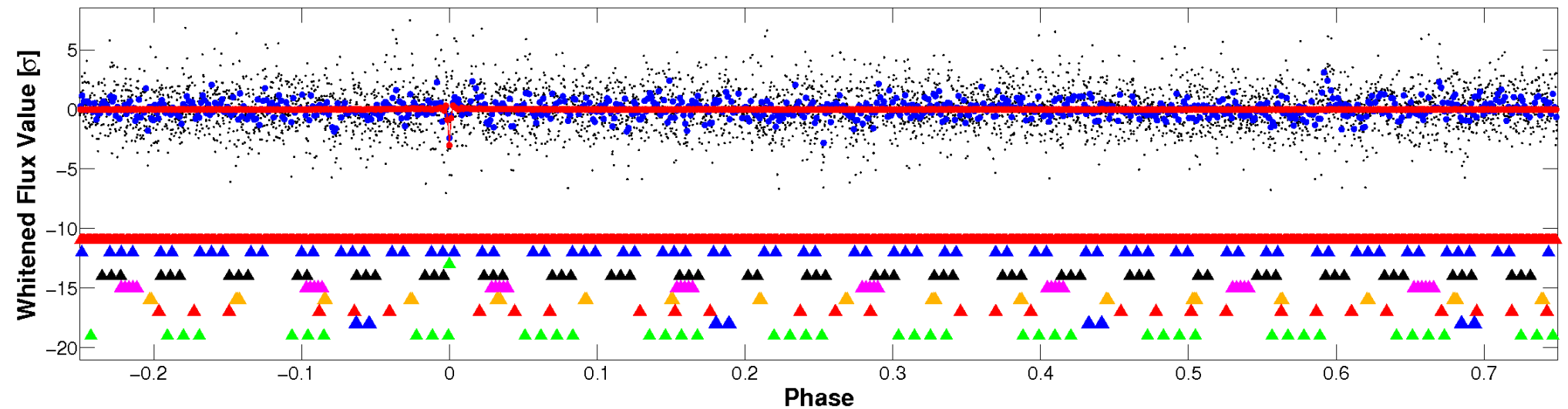
This plot does not exist for this TCE.

# Non-Whitened Vs. Whitened Light Curve

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

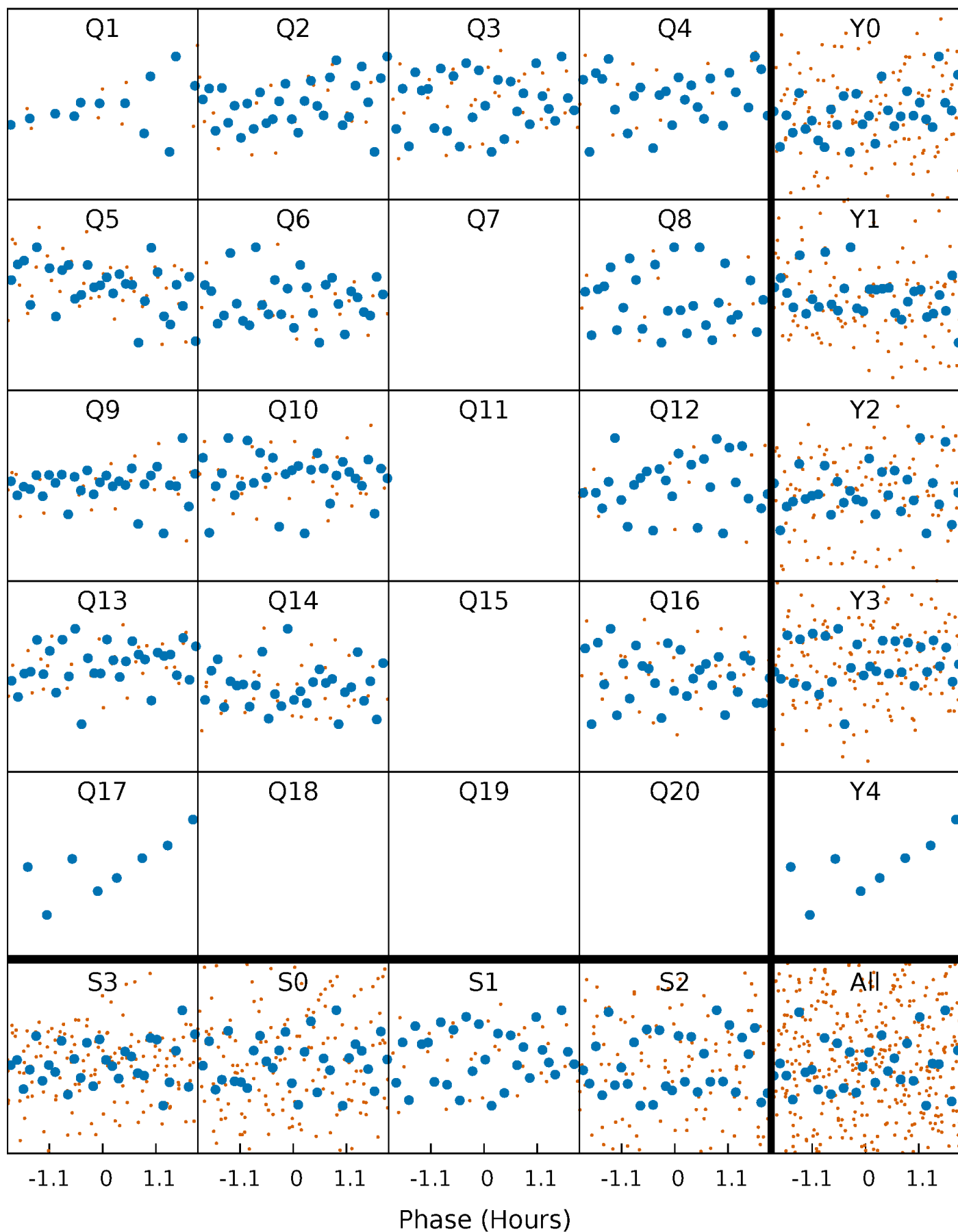


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

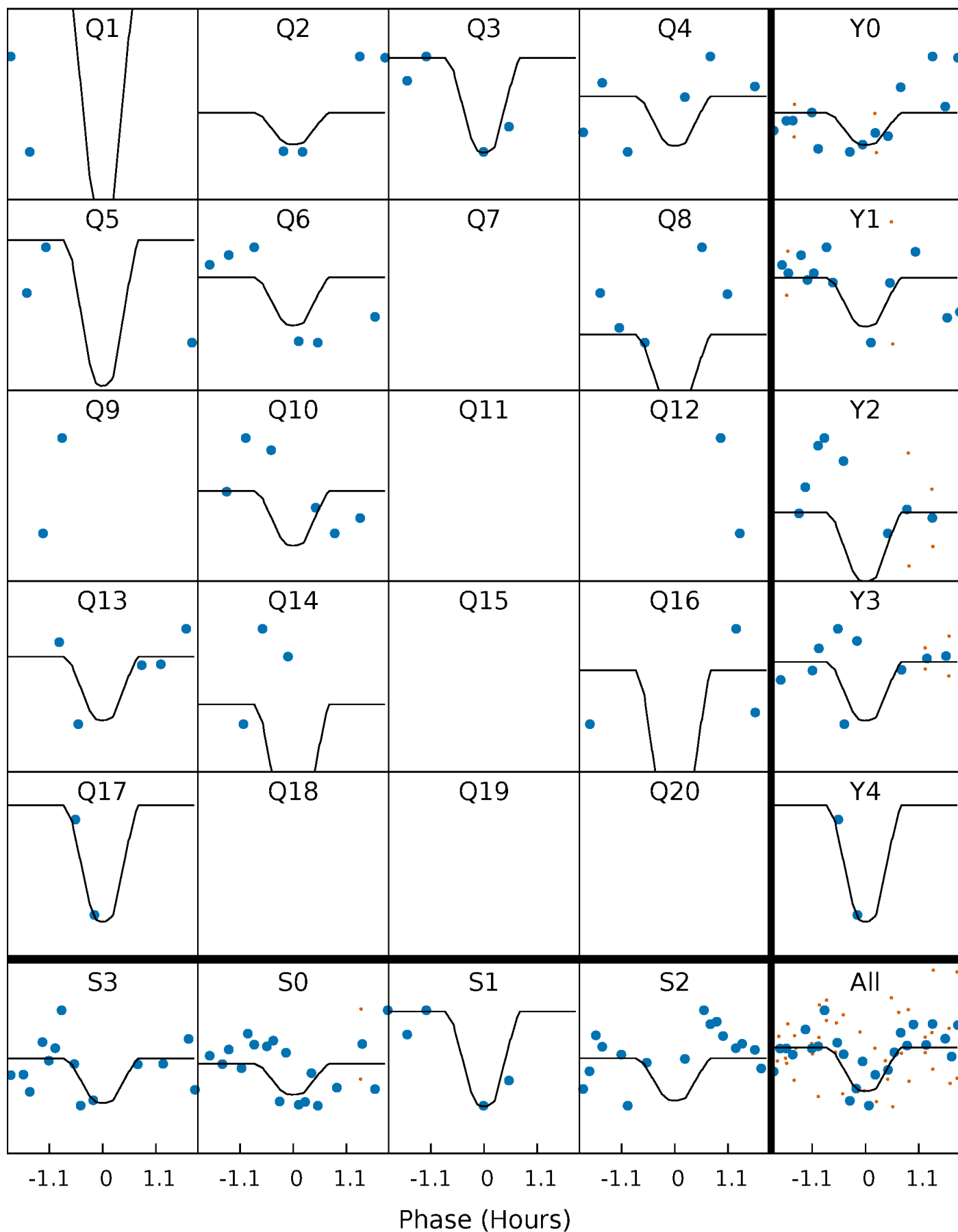
TCE 010873947-03   P= 17.025367 Days    $T_0=144.262873$  (BKJD)





# DV Quarter-Phased Transit Curves

TCE 010873947-03   P= 17.025367 Days    $T_0=144.262873$  (BKJD)

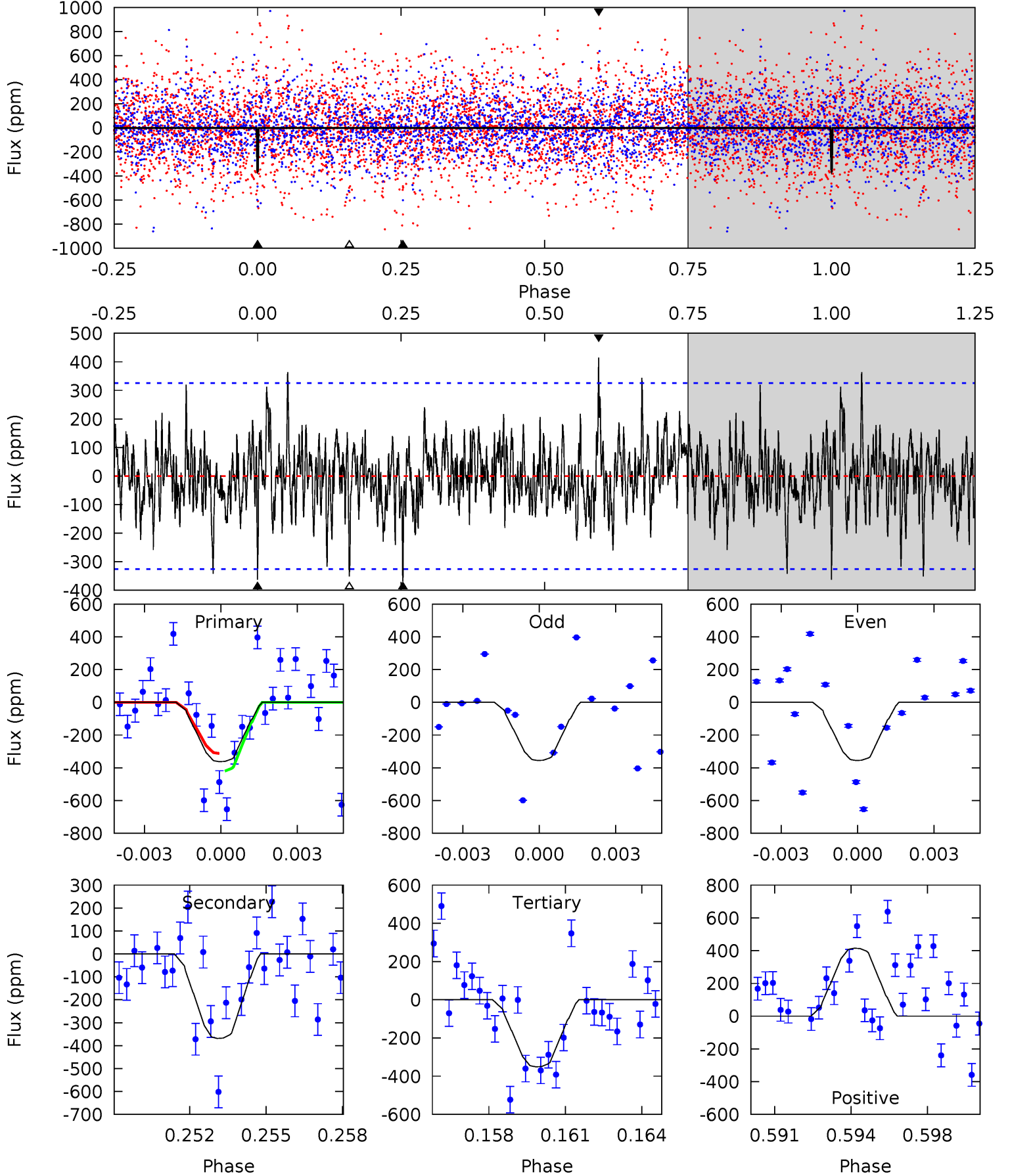


This plot does not exist for this TCE.

# DV Model-Shift Uniqueness Test

010873947-03,  $P = 17.025367$  Days,  $E = 127.237506$  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
5.82	5.92	5.63	6.66	5.23	2.93	1.57	0.19	-0.84	0.29	-0.74	0.00	0.74	0.53	0.87



## Alt Model-Shift Uniqueness Test

This plot does not exist for this TCE.

### Stellar Parameters For KIC 010873947

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7559^{+237}_{-316}$	$4.078^{+0.170}_{-0.170}$	$-0.220^{+0.250}_{-0.350}$	$1.886^{+0.541}_{-0.443}$	$1.551^{+0.210}_{-0.257}$	$0.326^{+0.339}_{-0.143}$
	+3%/-4%	+4%/-4%	+114%/-159%	+29%/-23%	+14%/-17%	+104%/-44%
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 010873947-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-369 \pm 62$	$10.04^{+9.86}_{-6.46}$	$1652^{+125}_{-119}$	$4766^{+3523}_{-1058}$	$46^{+336}_{-35}$
Alt.	N/A	N/A	N/A	N/A	N/A

$T_{max}$  = 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

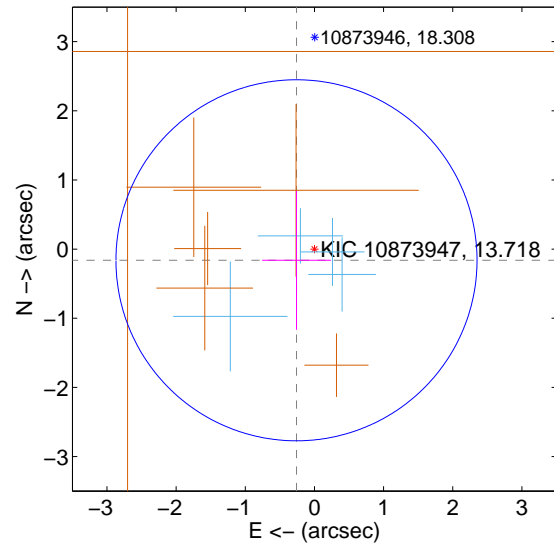
Supplemental centroid analysis for 010873947-03. Kepler magnitude: 13.72. Transit SNR 8.27

There are 4 quarters with good PRF difference image offsets

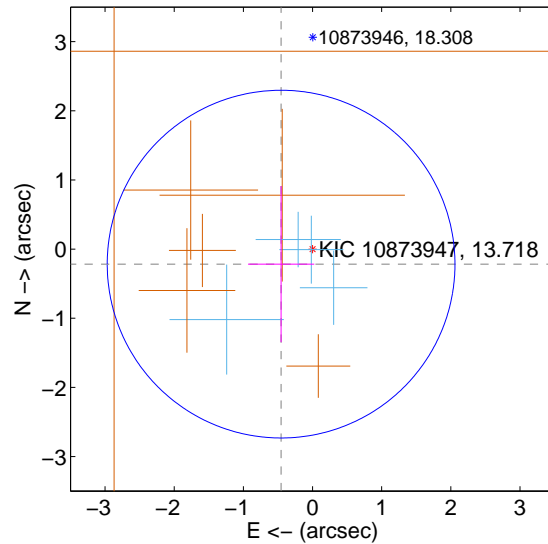
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.306 \pm 0.870$	0.35	$0.260 \pm 0.497$	$-0.162 \pm 1.005$
PRF-fit source offset from KIC position	$0.504 \pm 0.838$	0.60	$0.454 \pm 0.479$	$-0.217 \pm 1.129$
photometric centroid source offset	$0.38 \pm 0.45$	0.86	$0.34 \pm 0.44$	$-0.18 \pm 0.45$

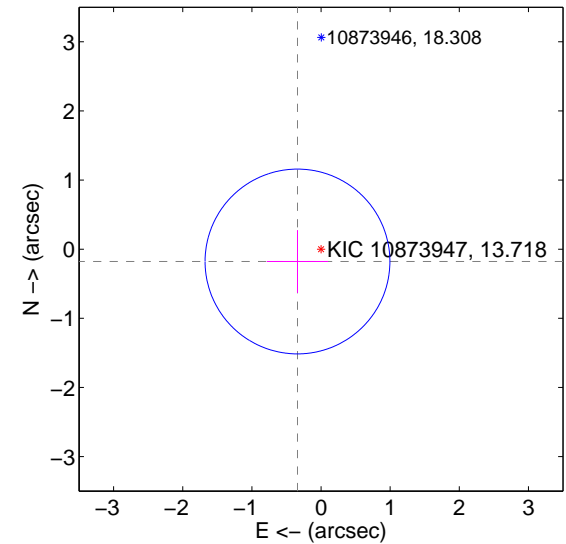
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



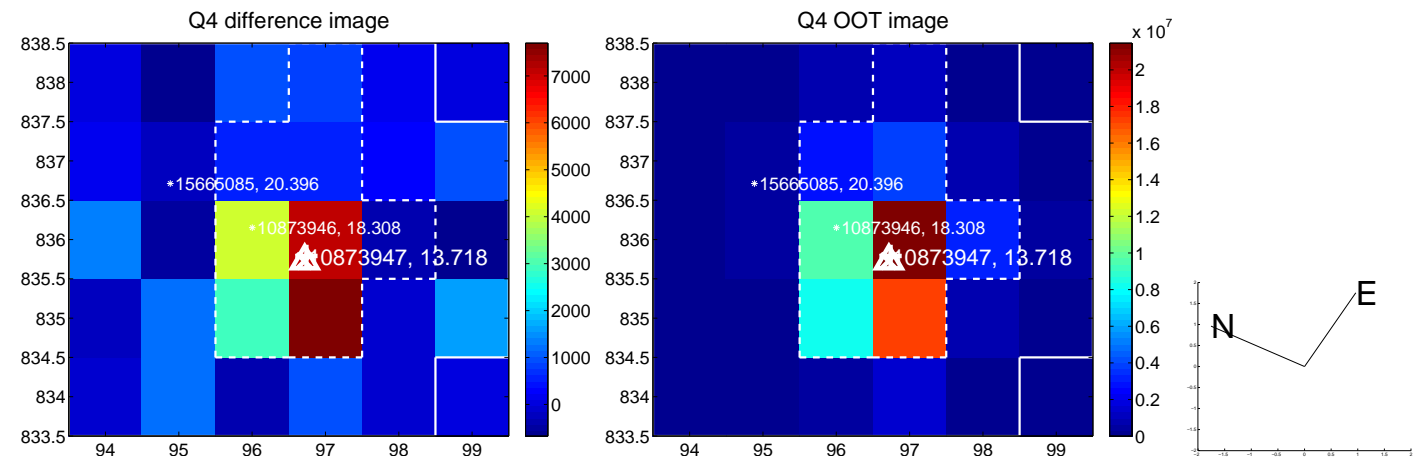
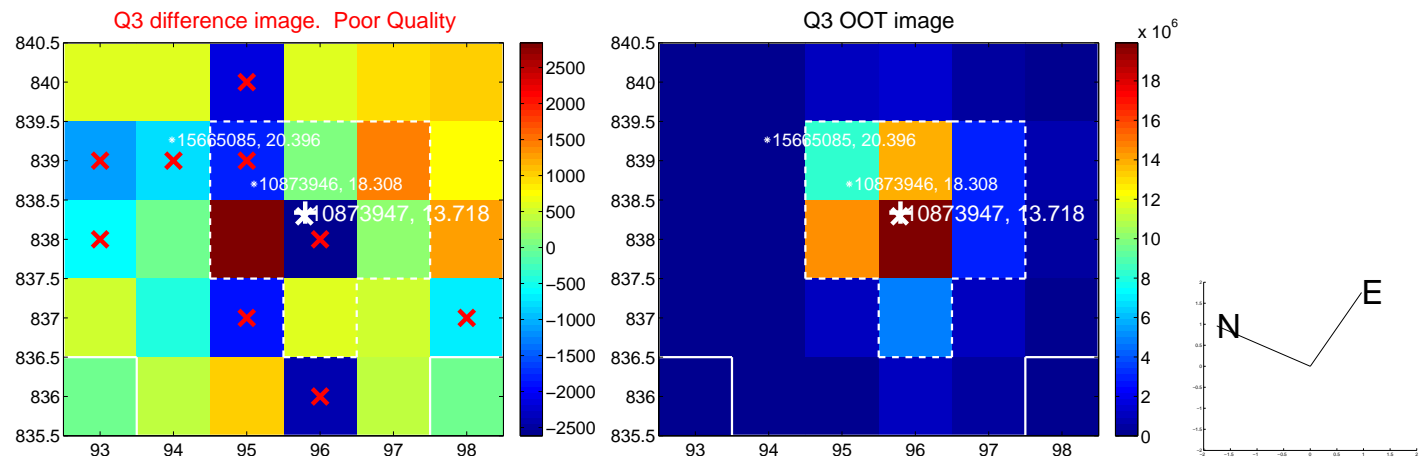
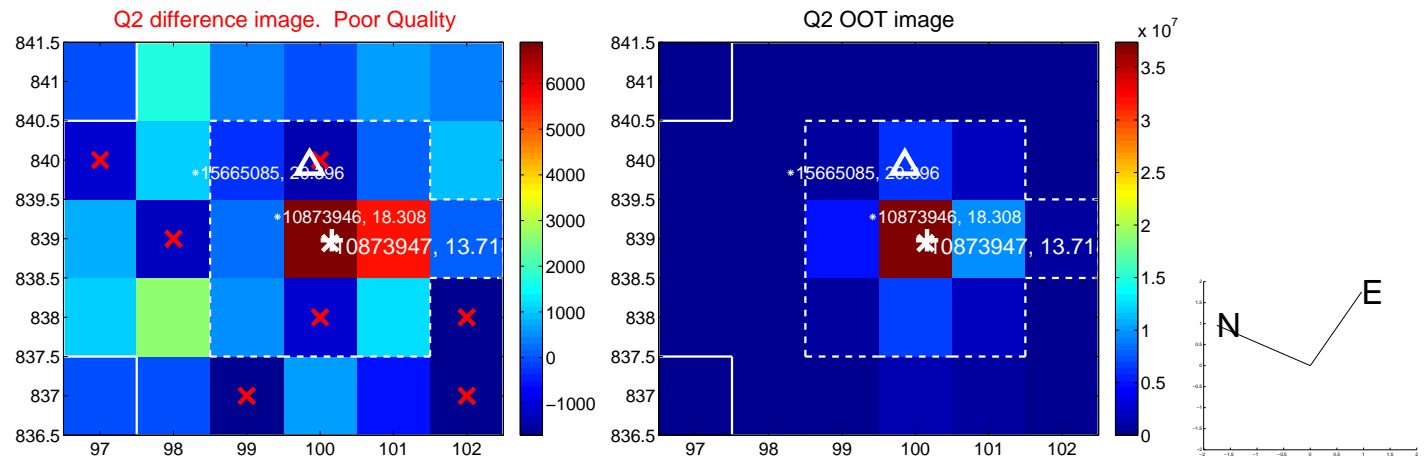
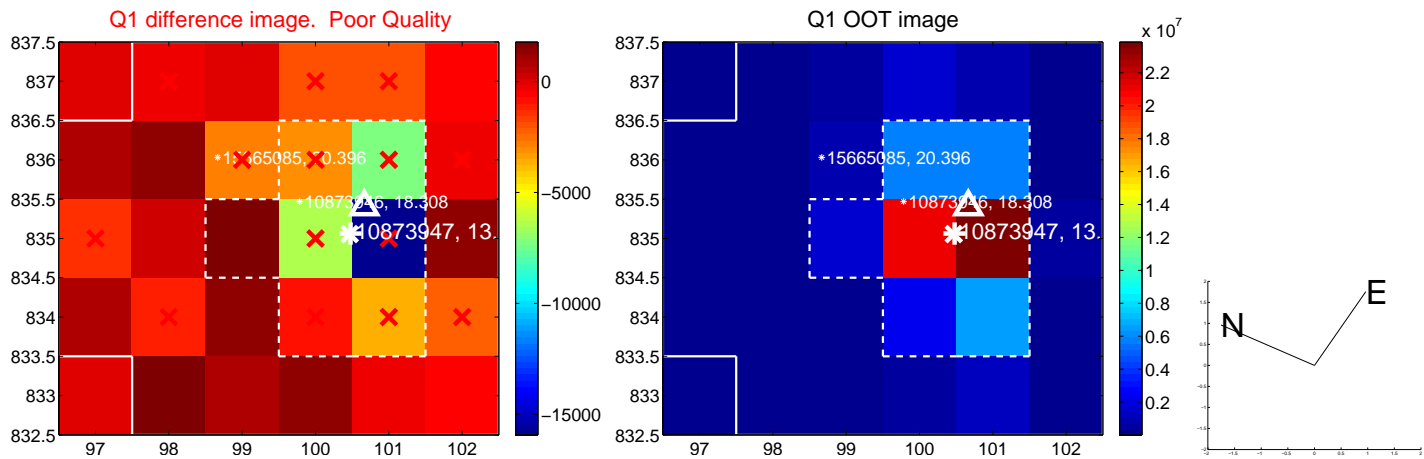
offset from photometric centroids



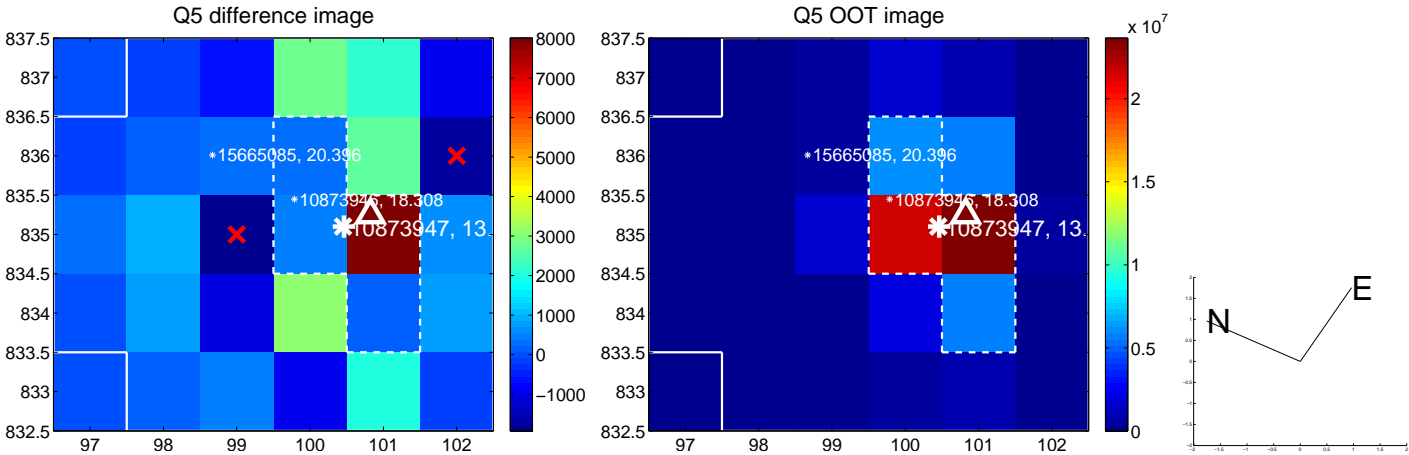
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



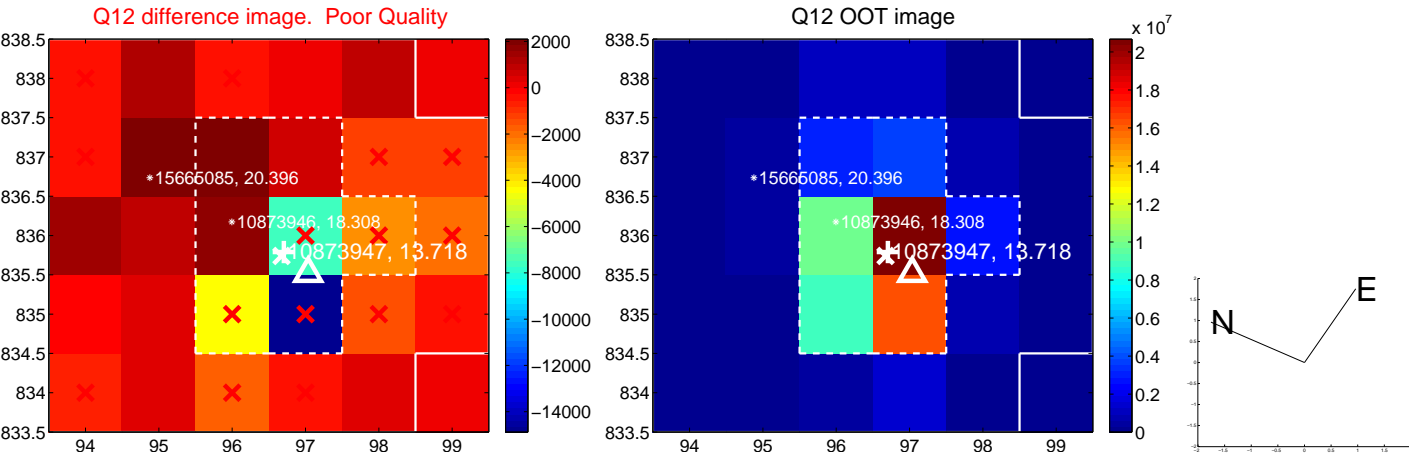
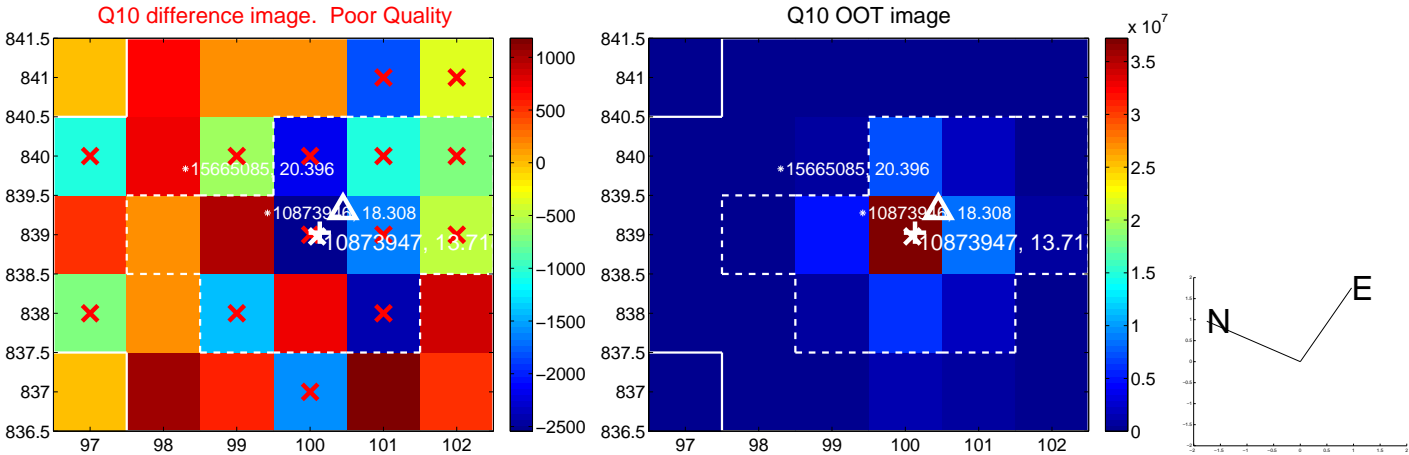
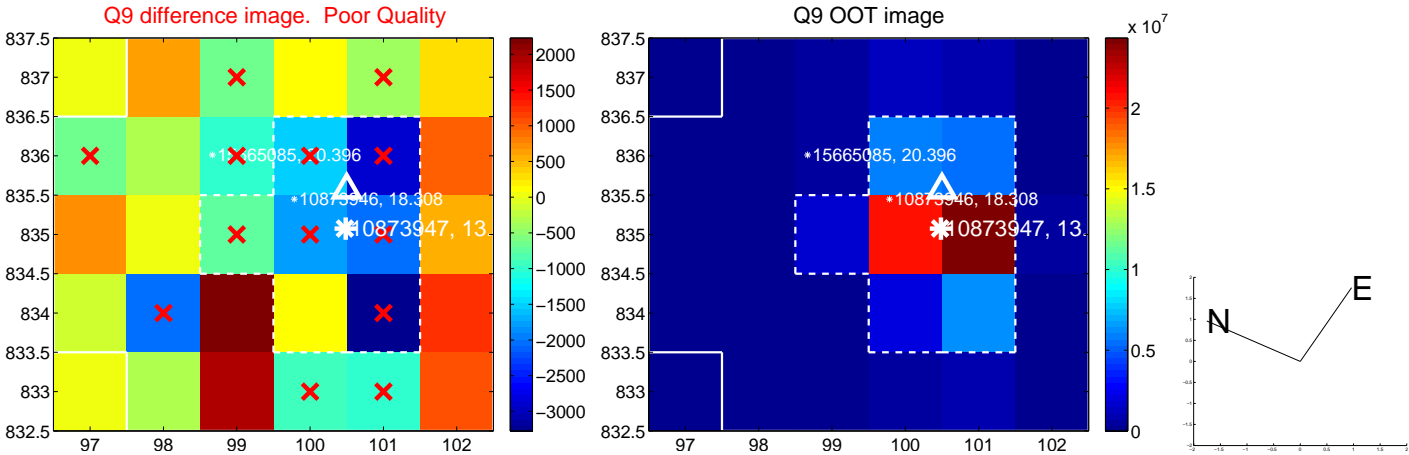
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



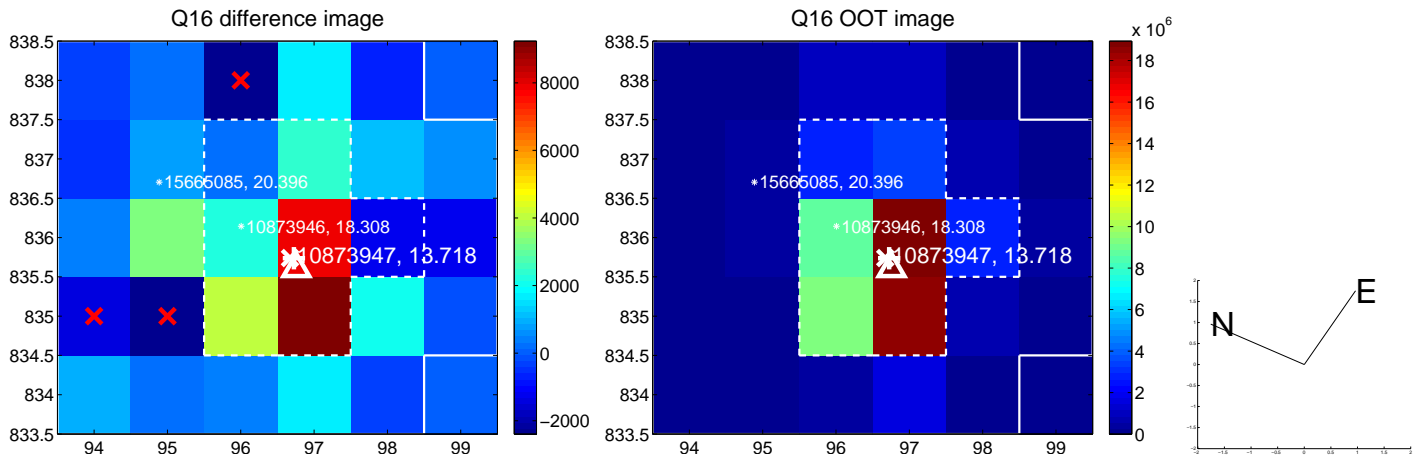
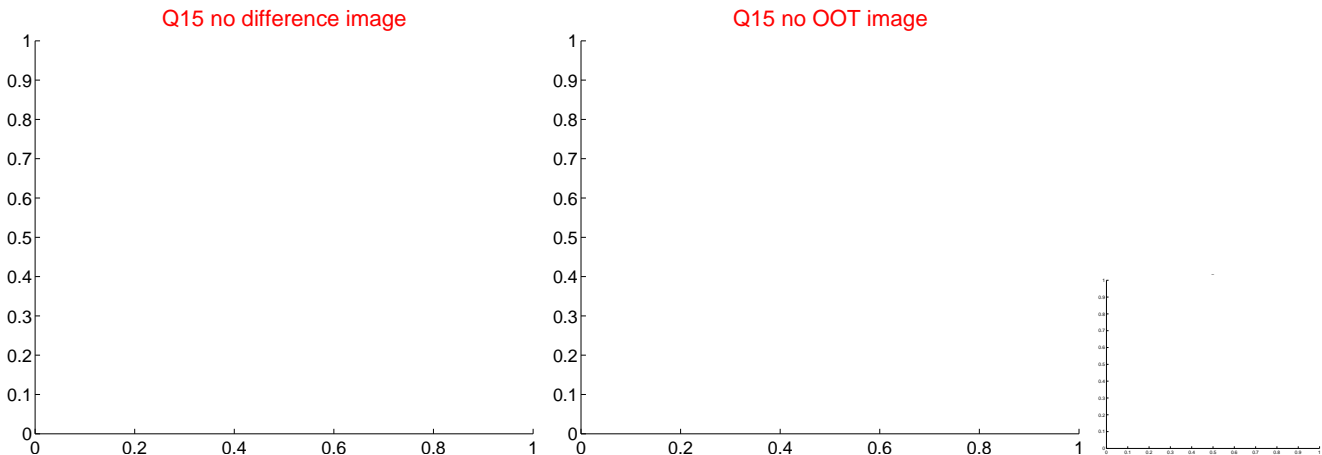
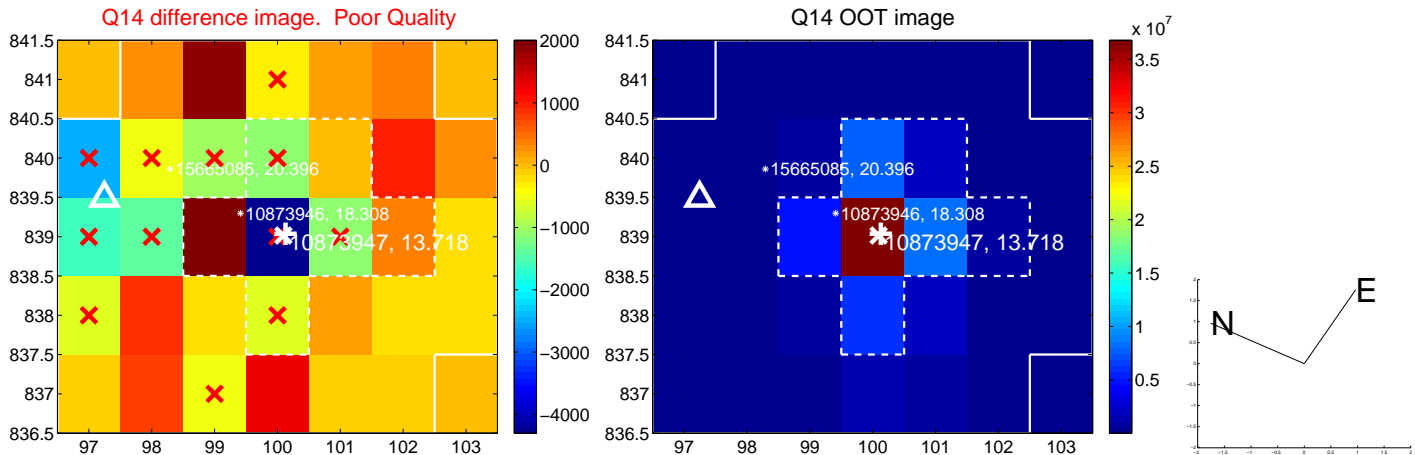
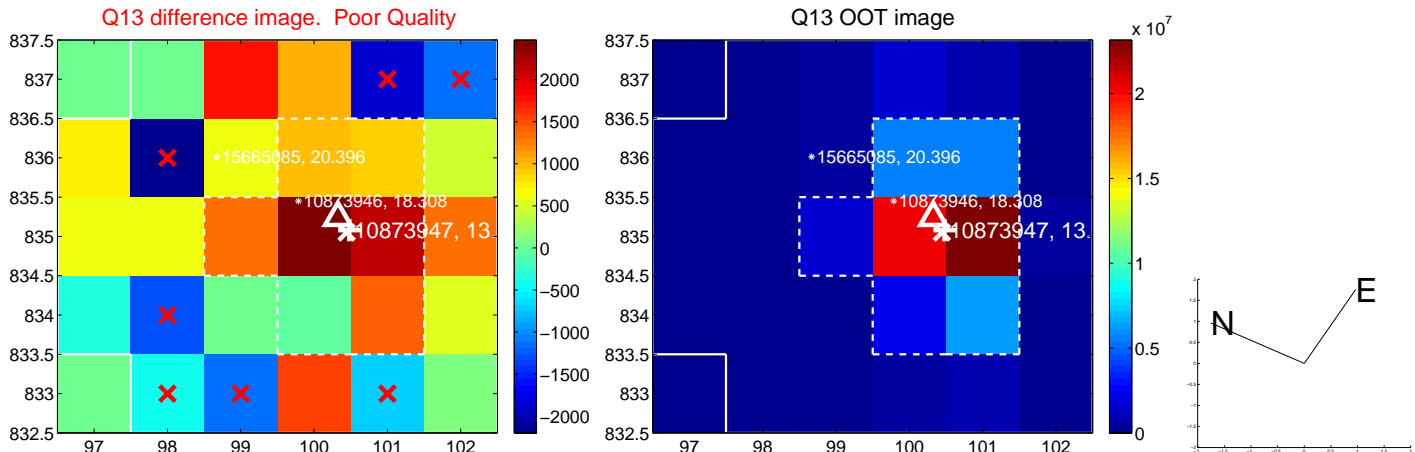
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



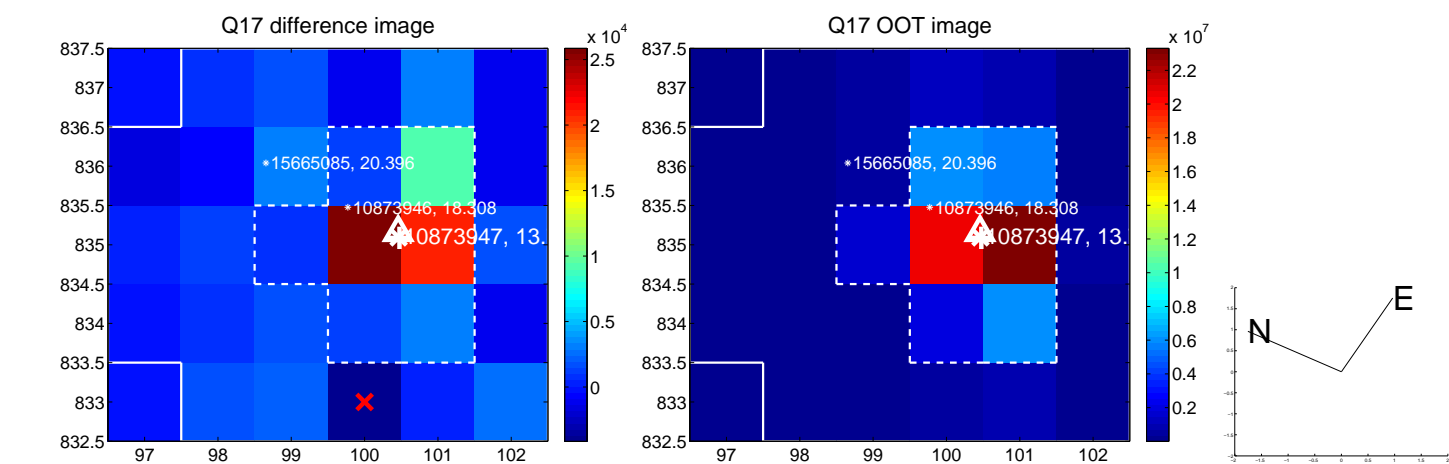
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



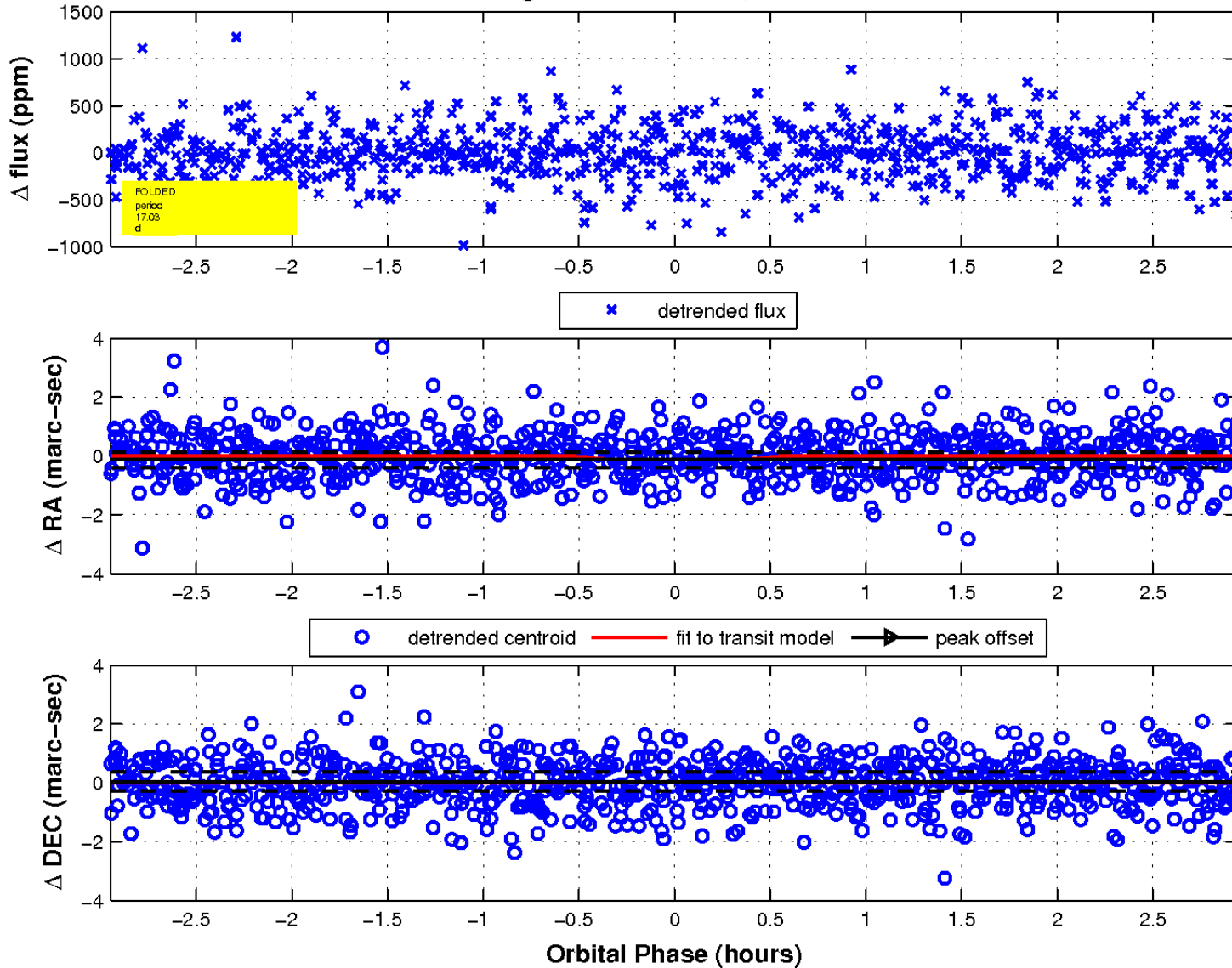
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



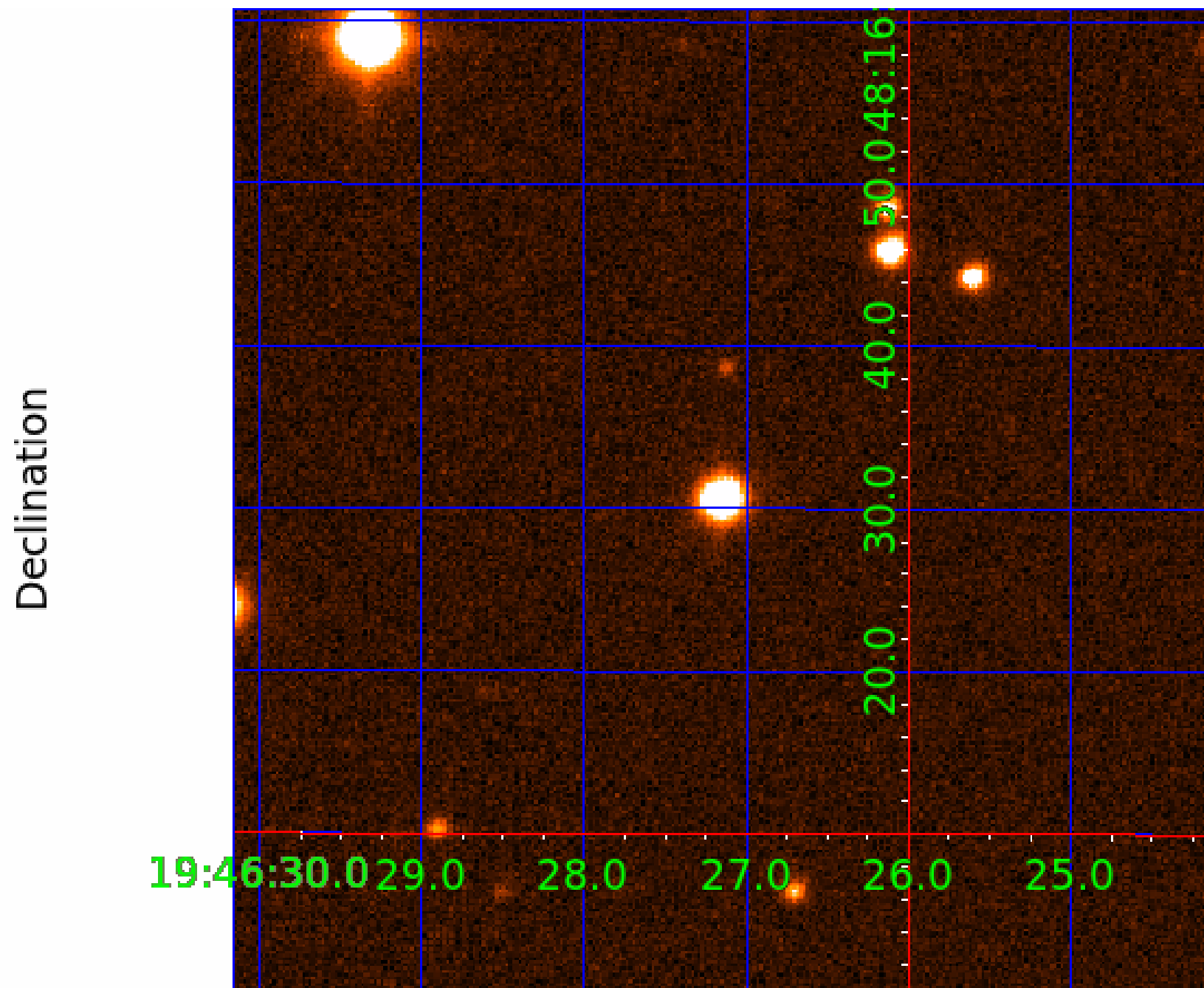
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 3 of 9



UKIRT Image





# KIC 010873947

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010873947-01	OBS	No	0.527357	131.795567	18.0	3.647	10.8	4.4	1.89	7559	0.83	47530.62
010873947-02	OBS	No	19.689666	138.728149	610.6	2.271	12.2	13.2	1.89	7559	5.20	380.89
010873947-03	OBS	No	17.025367	144.262873	491.6	0.984	11.3	8.3	1.89	7559	4.24	462.36
010873947-04	OBS	No	22.211661	140.942347	695.4	1.426	10.7	10.2	1.89	7559	8.87	324.34
010873947-05	OBS	No	36.184555	138.348466	580.2	3.091	12.0	10.0	1.89	7559	8.71	169.21
010873947-06	OBS	No	37.054013	149.861374	542.1	2.239	10.5	9.4	1.89	7559	4.88	163.93
010873947-07	OBS	No	49.229353	155.691611	1022.6	4.506	10.1	12.3	1.89	7559	11.36	112.24
010873947-09	OBS	No	32.616633	140.133048	594.1	1.655	10.3	9.4	1.89	7559	4.78	194.32

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010873947-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
010873947-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
010873947-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV
010873947-04	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
010873947-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010873947-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010873947-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV
010873947-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV

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

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

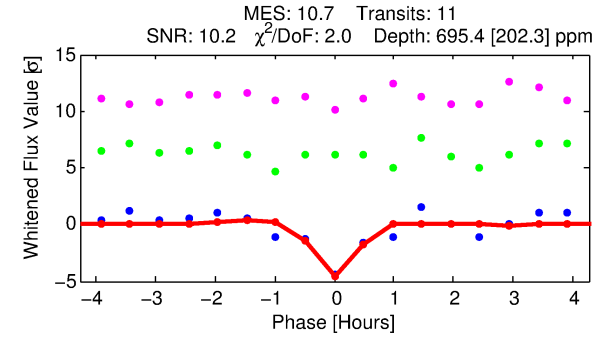
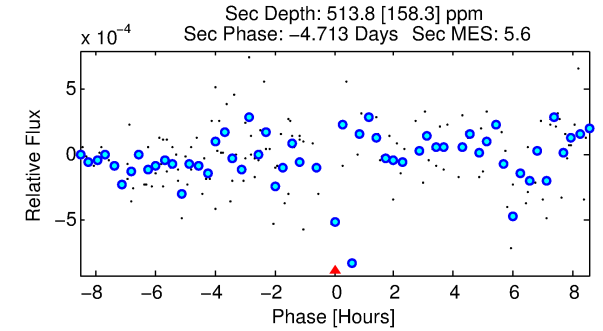
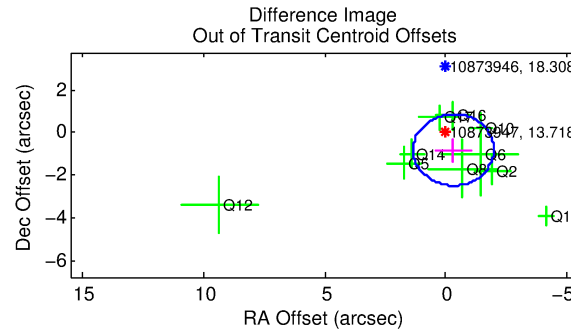
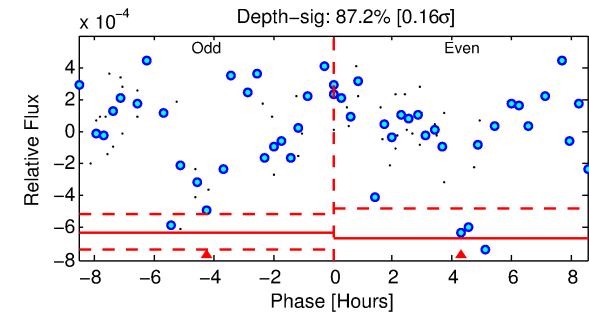
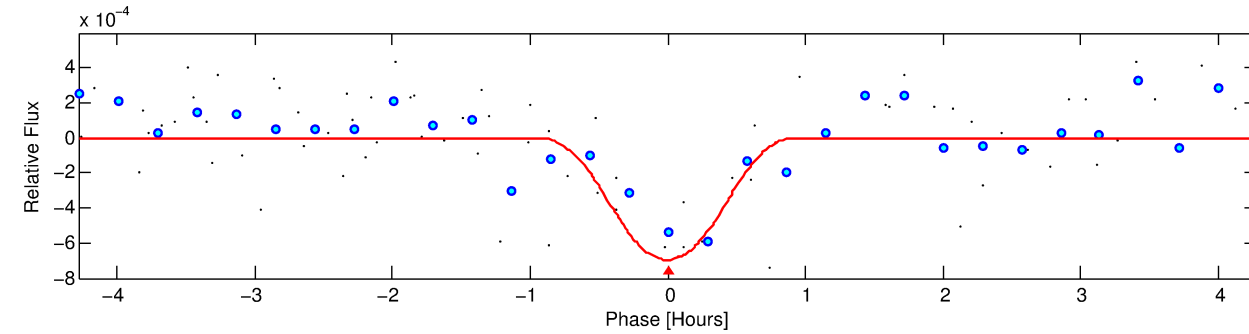
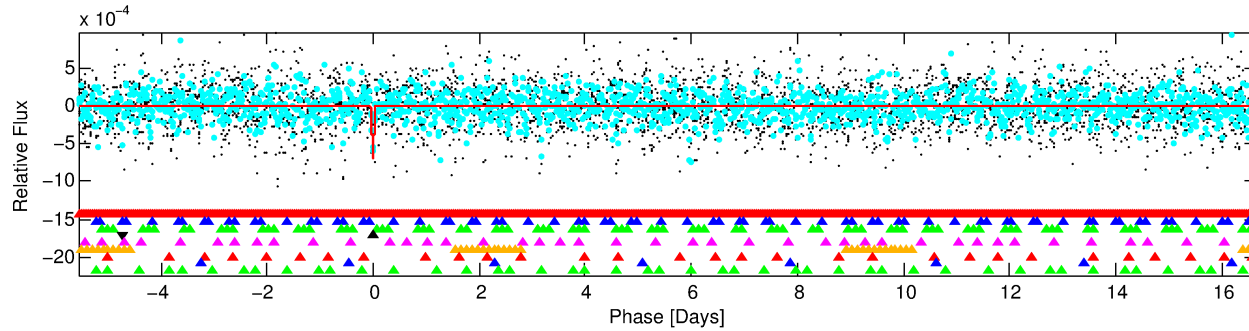
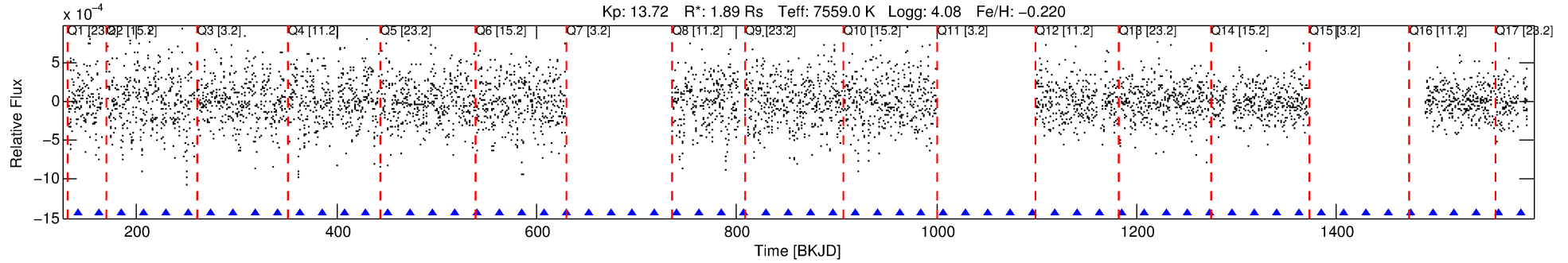
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010873947-04

No Significant Match Found

# DV One-Page Summary

KIC: 10873947 Candidate: 4 of 9 Period: 22.212 d



## DV Fit Results:

Period = 22.21166 [0.00023] d  
Epoch = 140.9423 [0.0061] BKJD  
Rp/R\* = 0.0431 [0.4337]  
a/R\* = 37.72 [111.54]  
b = 0.99 [0.70]  
Seff = 324.34 [118.12]  
Teq = 1082 [99] K  
Rp = 8.87 [89.30] Re  
a = 0.1791 [0.0415] AU  
Ag = 115.33 [2322.71] [0.05σ]  
Teffp = 5483 [27603] K [0.16σ]

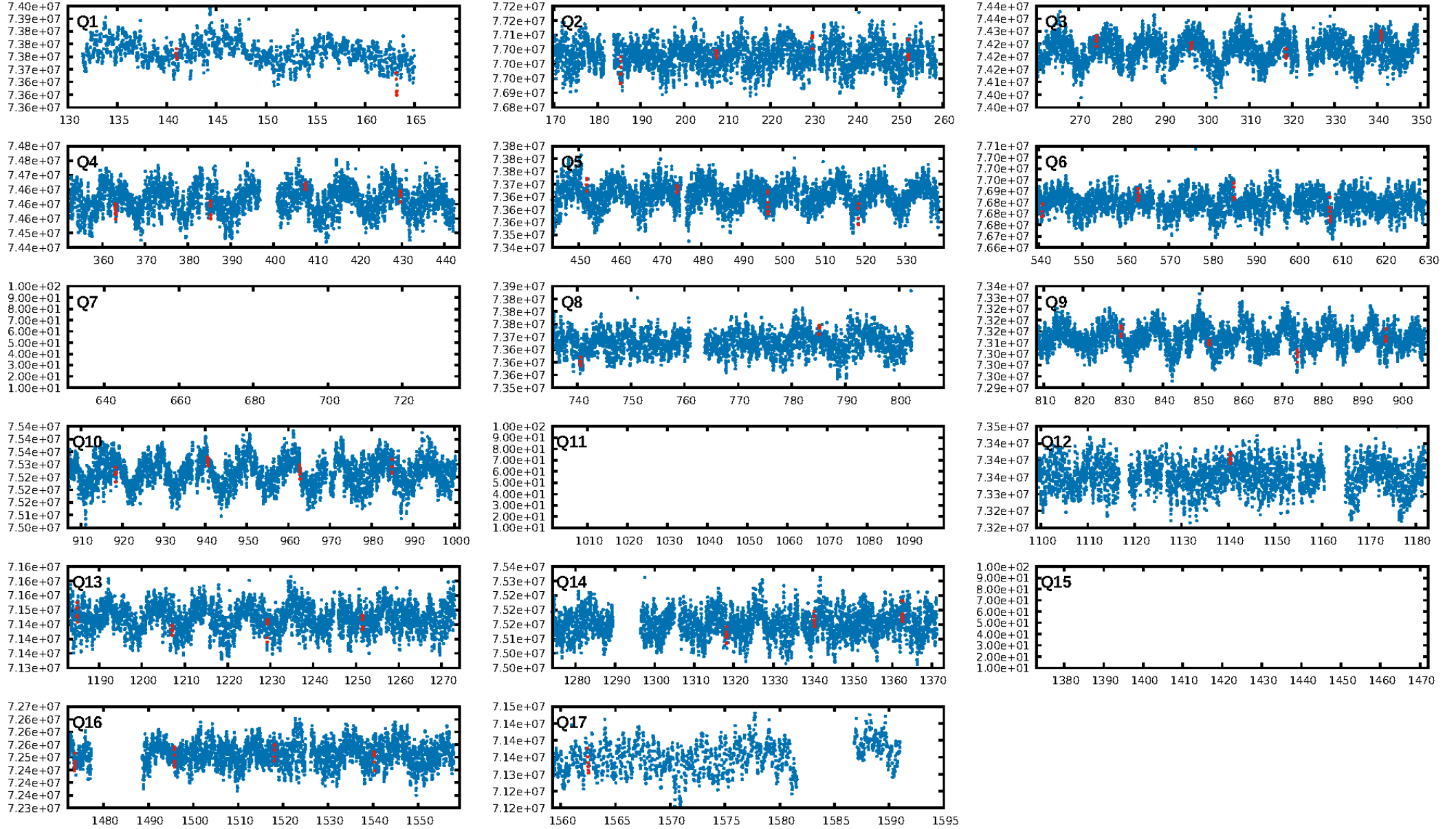
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [22.57σ]  
LongPeriod-sig: 100.0% [114.28σ]  
ModelChiSquare2-sig: 73.7%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [10/10]  
GhostDiagnostic-chr: 1.702  
Centroid-sig: 21.6%  
Centroid-so: 0.520 arcsec [1.31σ]  
OotOffset-rm: 0.871 arcsec [1.57σ]  
KicOffset-rm: 0.892 arcsec [1.71σ]  
OotOffset-st: 4/0/3/3 [10]  
KicOffset-st: 4/0/3/3 [10]  
DiffImageQuality-fgm: 0.40 [4/10]  
DiffImageOverlap-fno: 0.00 [0/14]

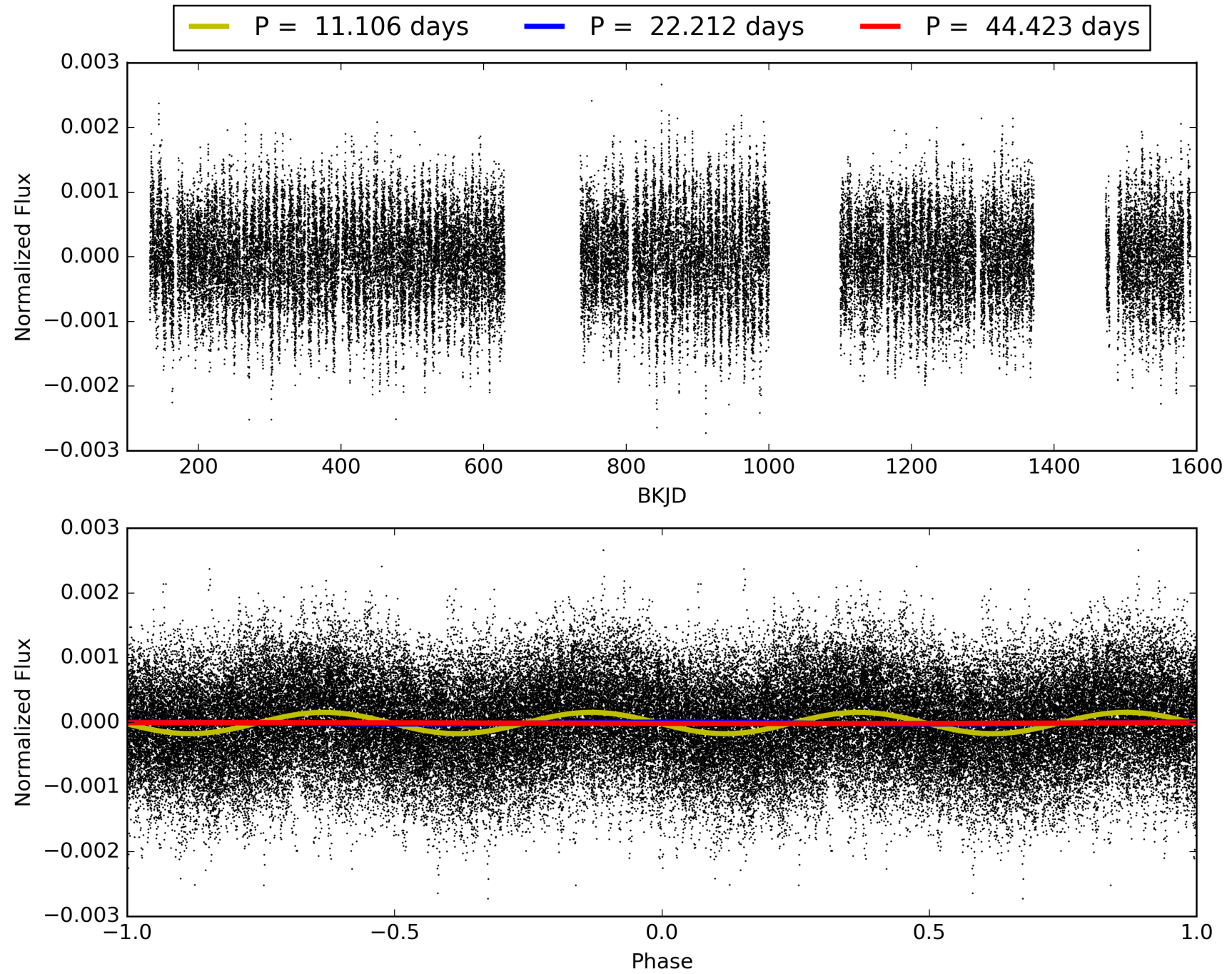
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:30:47 Z

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

# TCE 010873947-04, PDC Light Curves

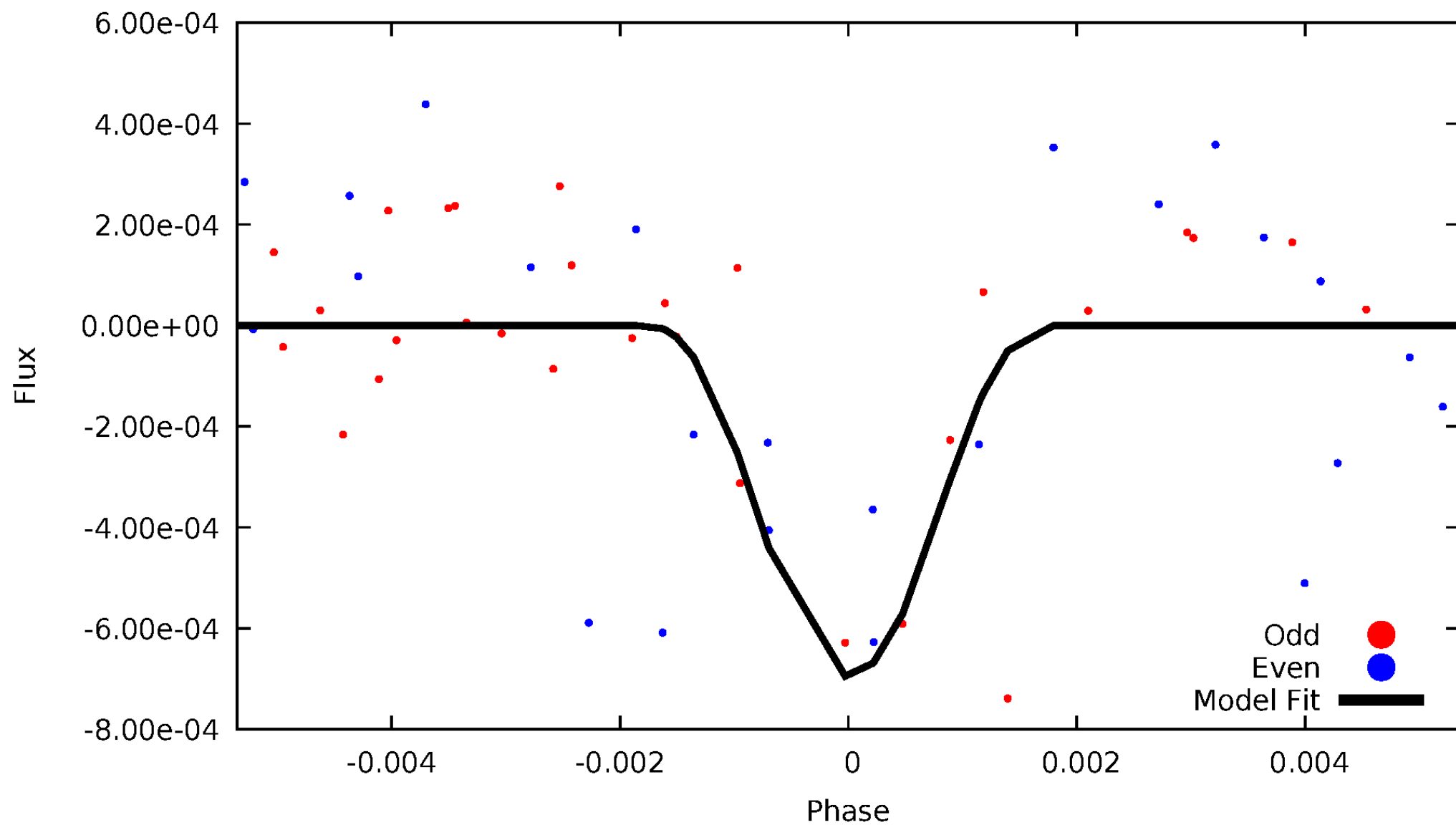


TCE 010873947-04



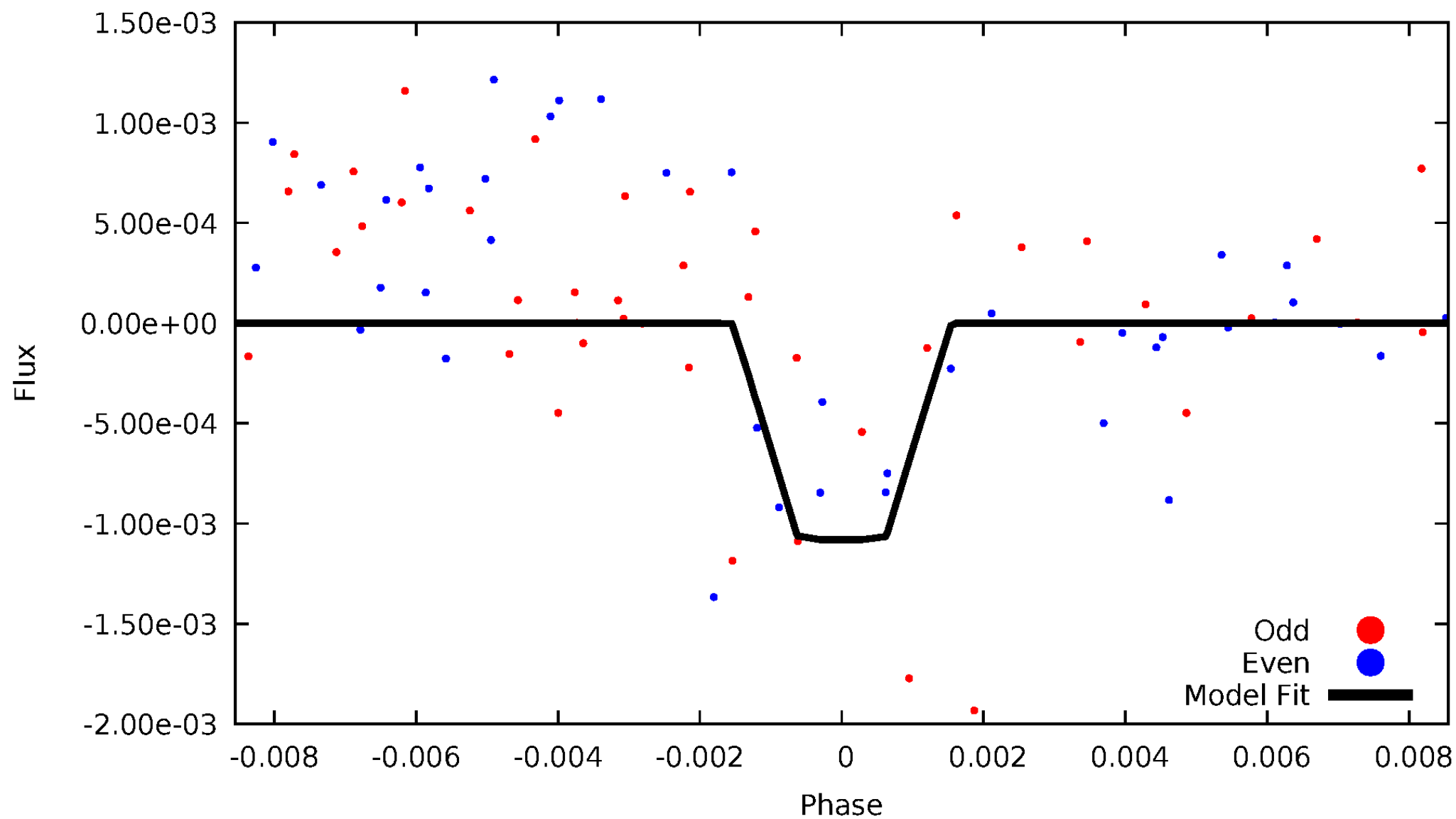
# DV Odd/Even

TCE 010873947-04



# ALT Odd/Even

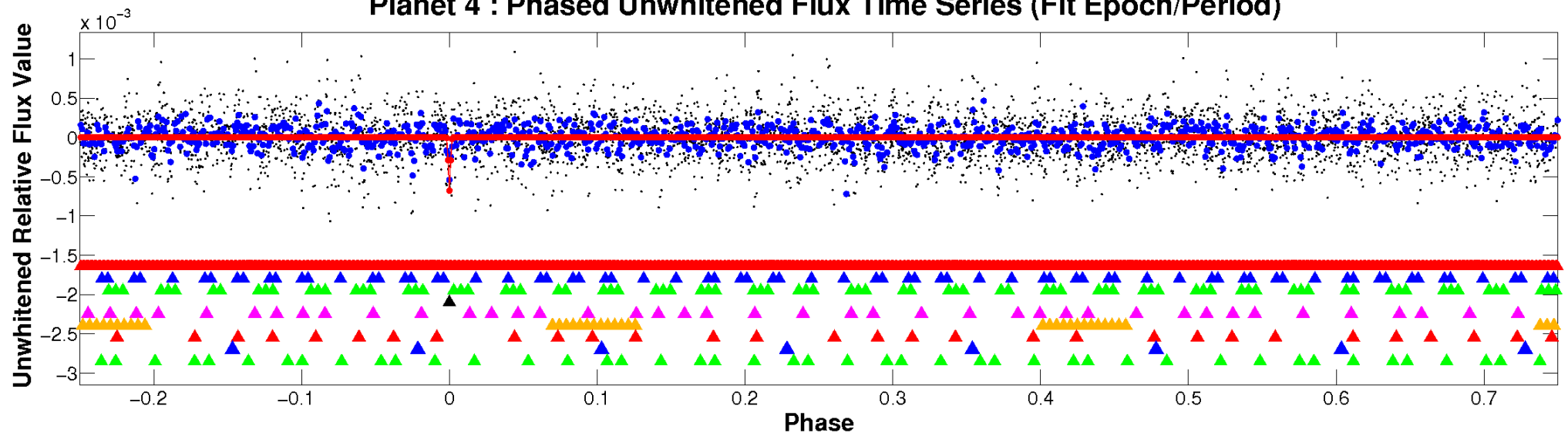
TCE 010873947-04



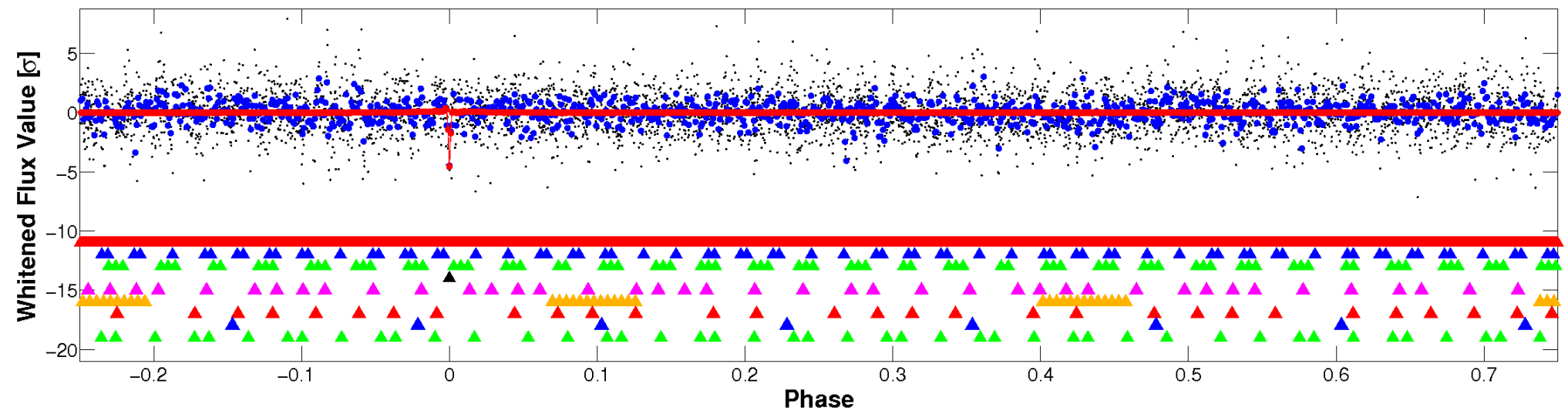


# Non-Whitened Vs. Whitened Light Curve

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

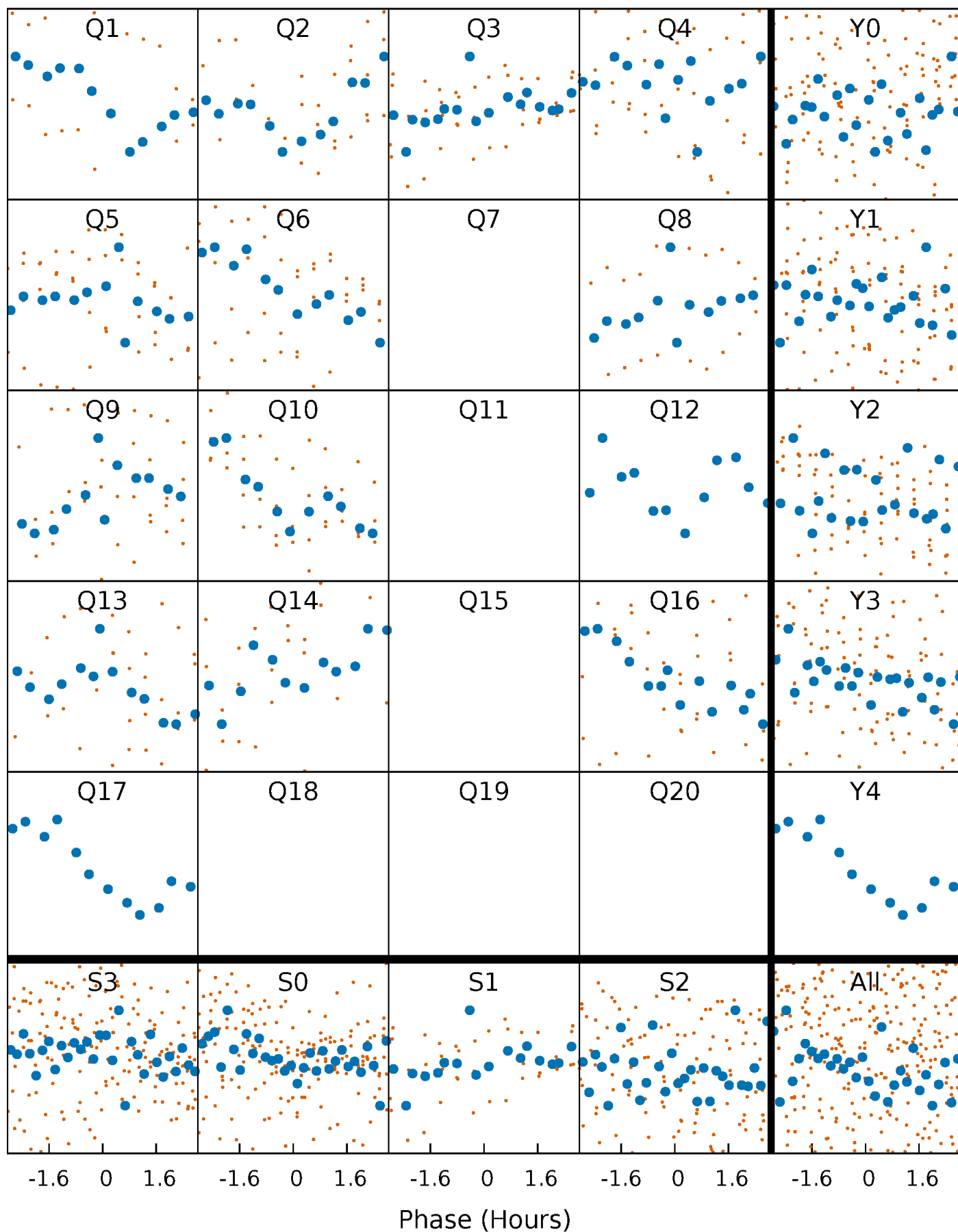


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



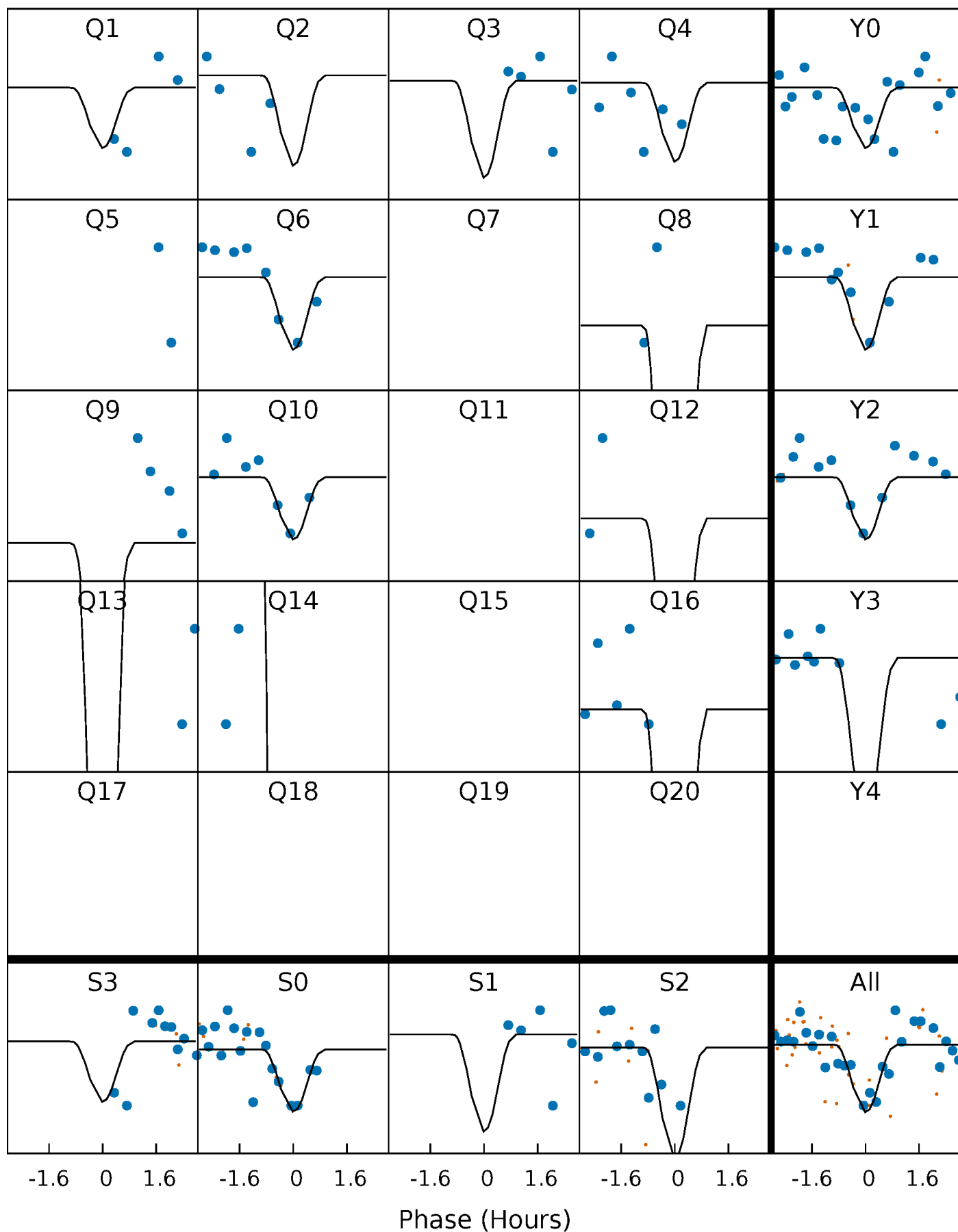
# PDC Quarter-Phased Transit Curves

TCE 010873947-04 P= 22.211661 Days  $T_0=140.942347$  (BKJD)



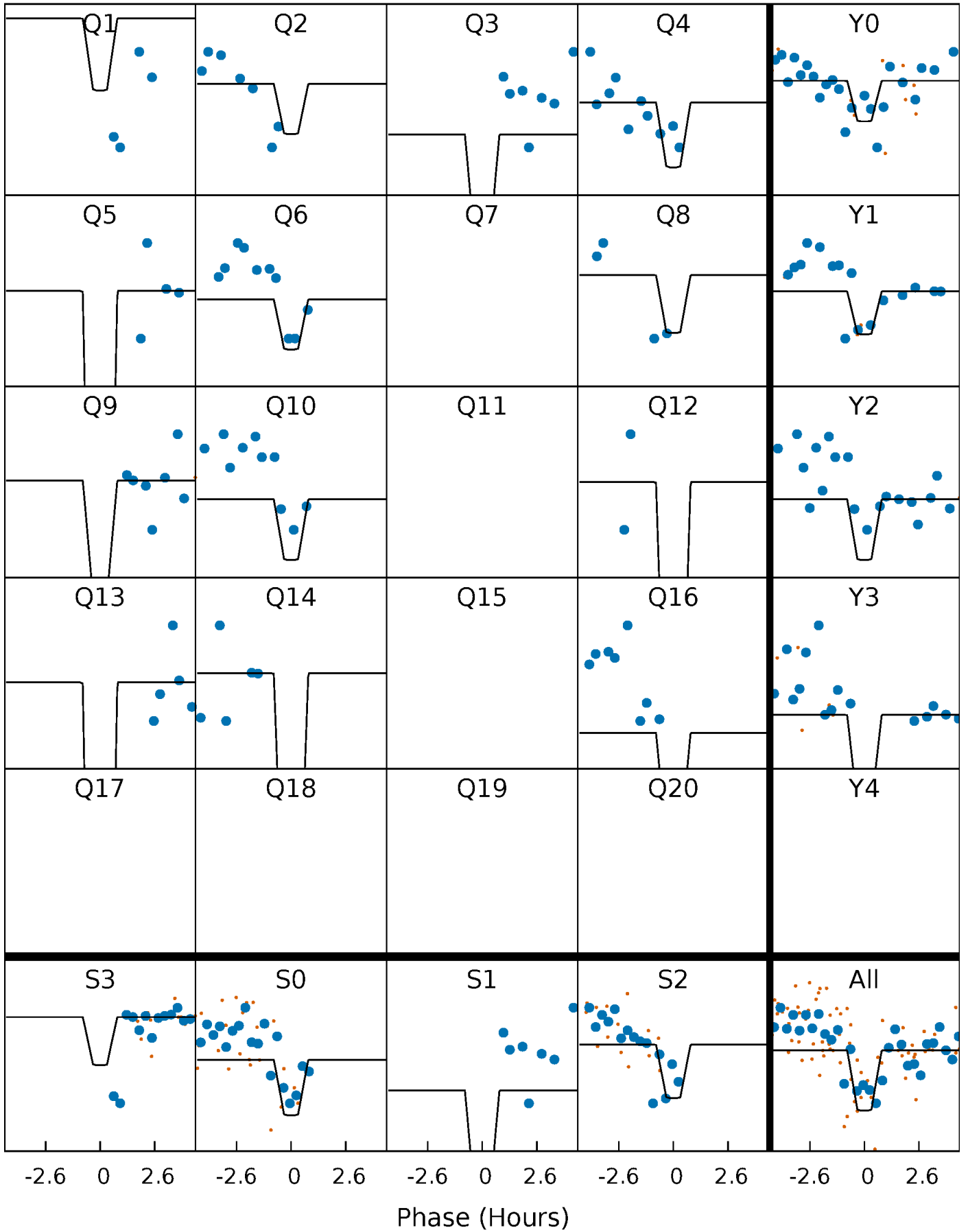
# DV Quarter-Phased Transit Curves

TCE 010873947-04 P= 22.211661 Days  $T_0=140.942347$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

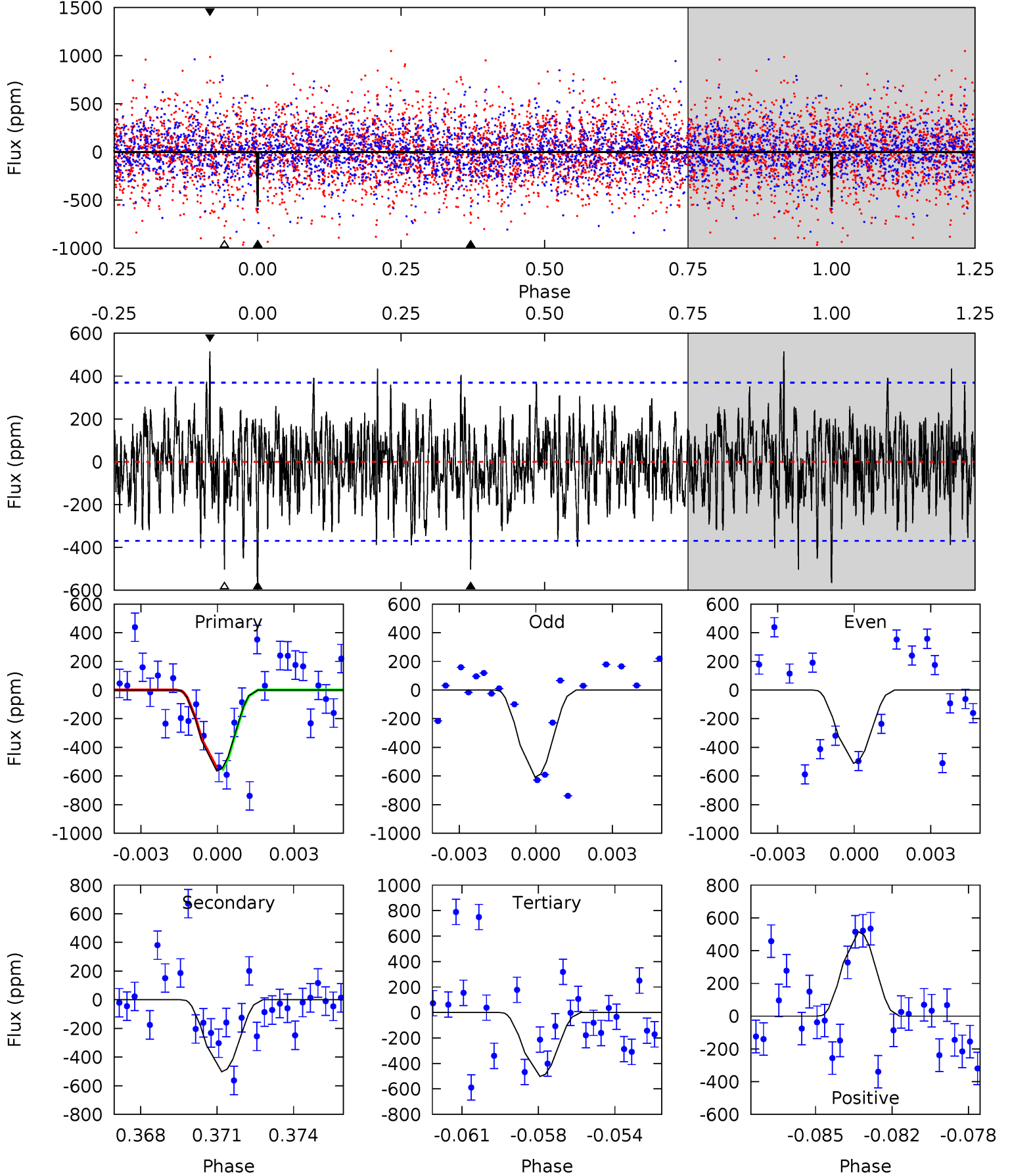
TCE 010873947-04   P= 22.211766 Days    $T_0=140.931717$  (BKJD)



# DV Model-Shift Uniqueness Test

010873947-04, P = 22.211661 Days, E = 118.730686 Days

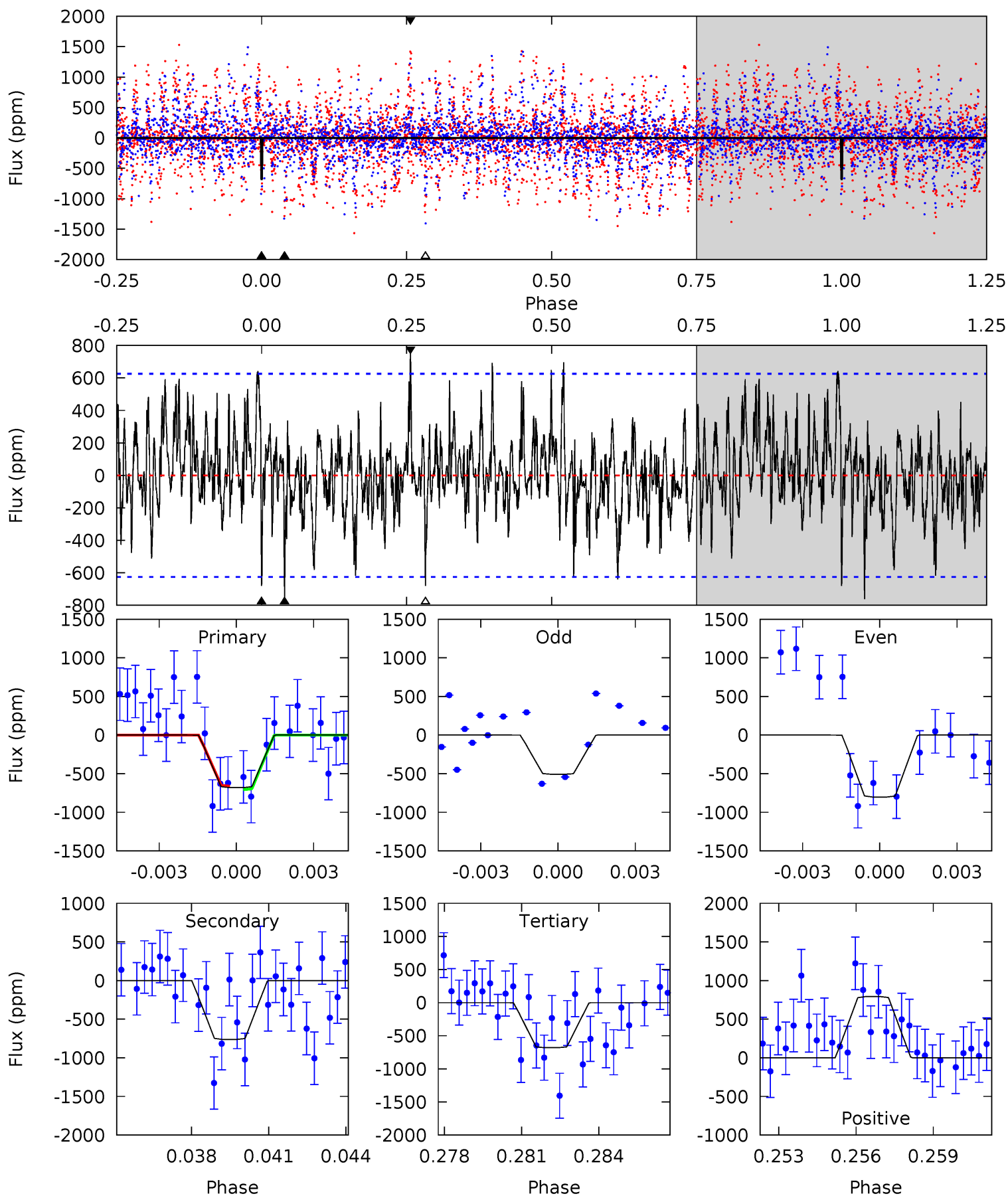
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.01	7.12	7.11	7.29	5.23	2.93	1.91	0.89	0.72	0.00	-0.17	0.71	0.95	0.48	0.10



# Alt Model-Shift Uniqueness Test

010873947-04, P = 22.211766 Days, E = 118.719951 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
5.69	6.38	5.70	6.64	5.24	2.95	1.84	-0.00	-0.95	0.69	-0.25	1.21	1.00	0.51	0.19



### Stellar Parameters For KIC 010873947

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7559^{+237}_{-316}$	$4.078^{+0.170}_{-0.170}$	$-0.220^{+0.250}_{-0.350}$	$1.886^{+0.541}_{-0.443}$	$1.551^{+0.210}_{-0.257}$	$0.326^{+0.339}_{-0.143}$
	+3%/-4%	+4%/-4%	+114%/-159%	+29%/-23%	+14%/-17%	+104%/-44%
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 010873947-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-503 \pm 71$	$63.63^{+70.22}_{-45.29}$	$1508^{+122}_{-103}$	$2698^{+1274}_{-651}$	$2.103^{+24.058}_{-1.627}$
Alt.	$-762 \pm 119$	$62.95^{+69.79}_{-43.73}$	$1515^{+115}_{-114}$	$2874^{+1447}_{-598}$	$3.308^{+32.786}_{-2.582}$

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



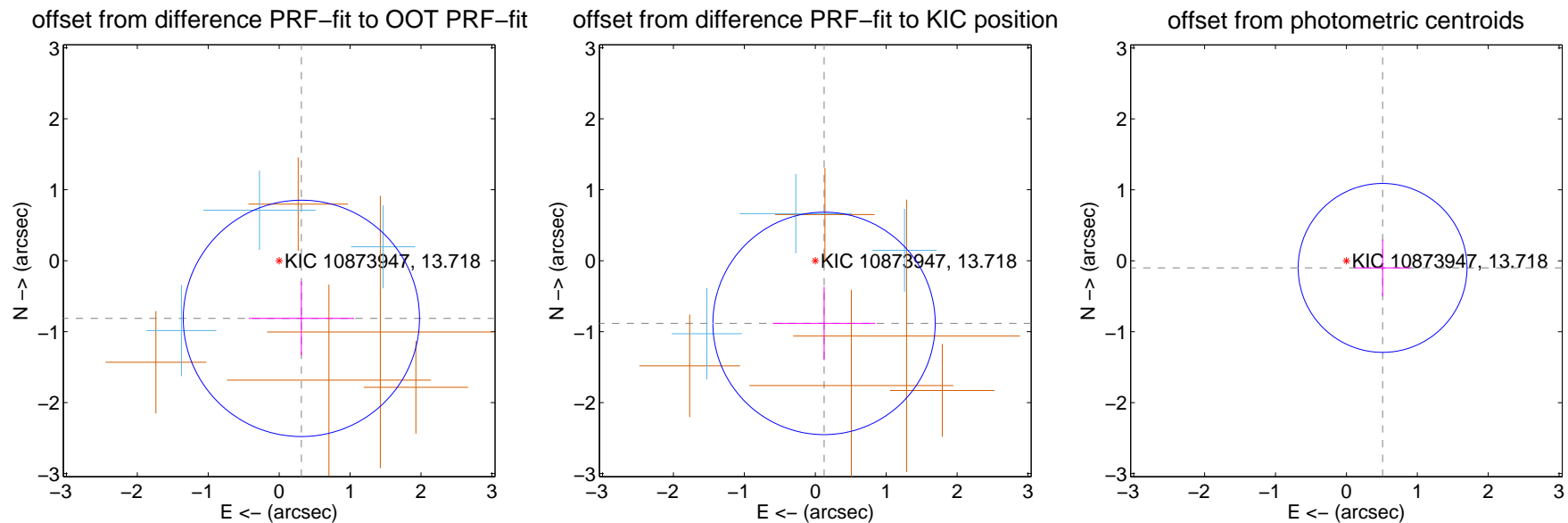
## DV Centroid Data

Supplemental centroid analysis for 010873947-04. Kepler magnitude: 13.72. Transit SNR 10.17

There are 4 quarters with good PRF difference image offsets

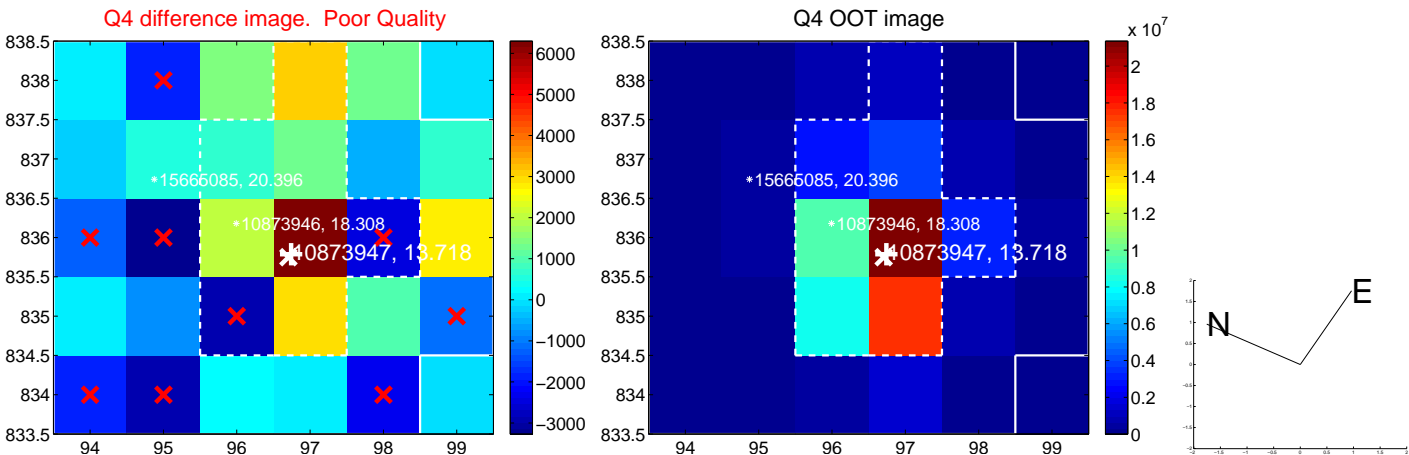
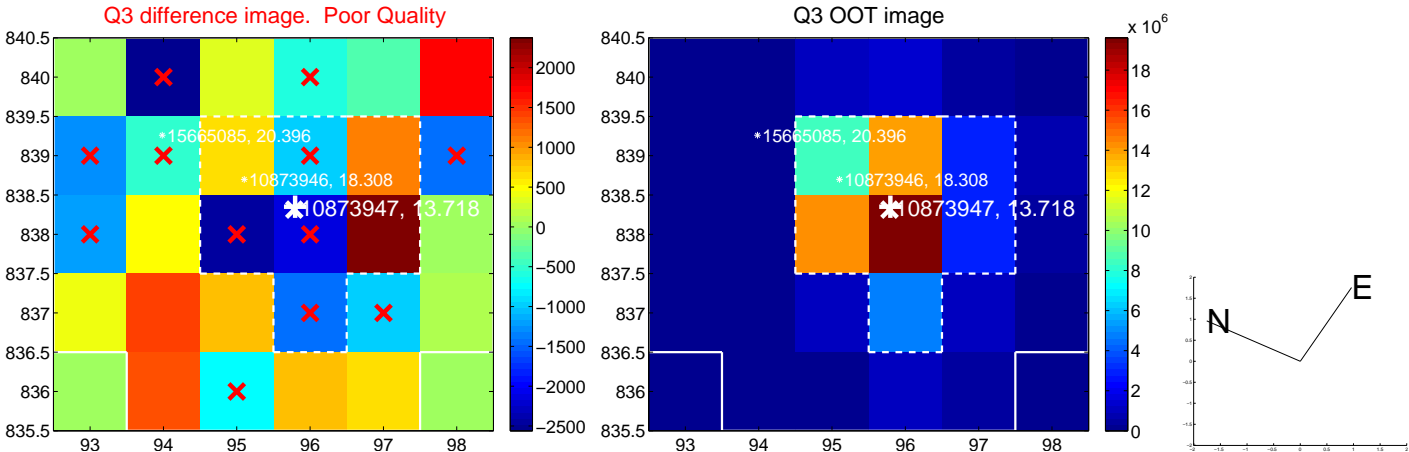
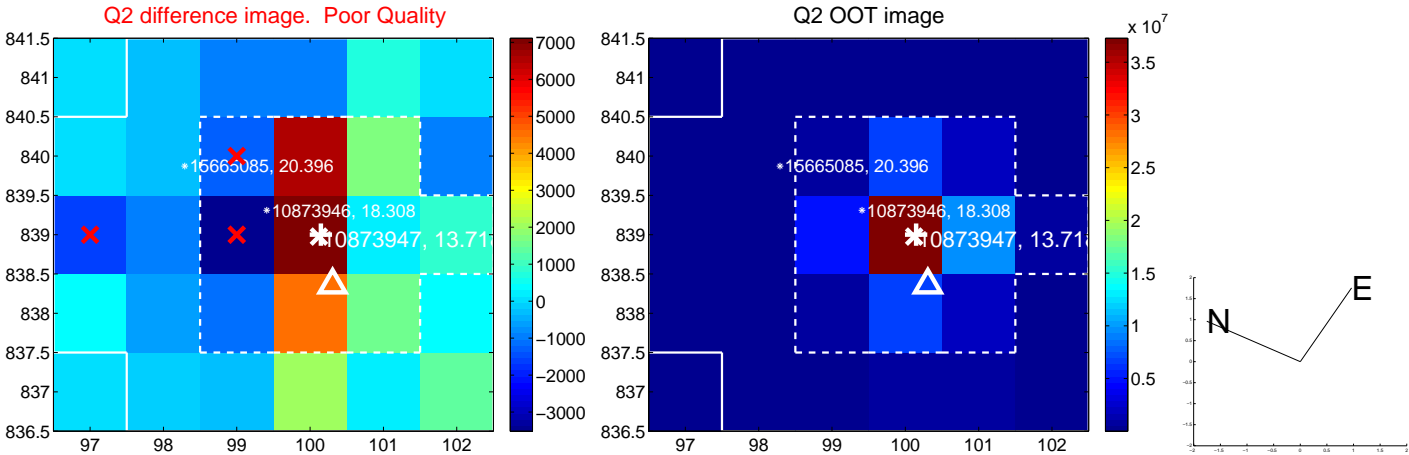
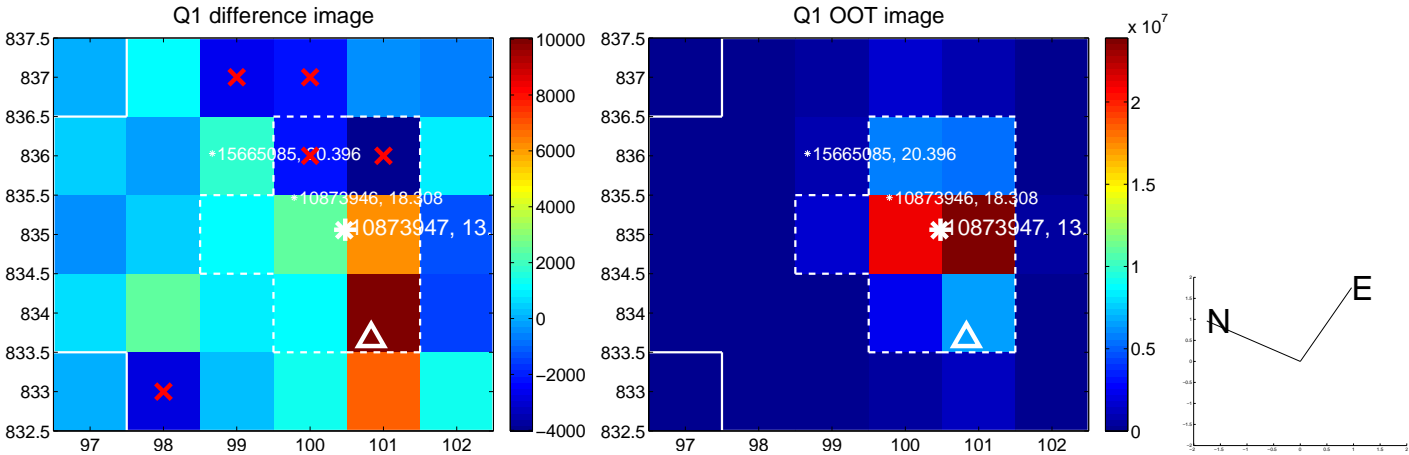
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.871 \pm 0.555$	1.57	$-0.313 \pm 0.743$	$-0.813 \pm 0.521$
PRF-fit source offset from KIC position	$0.892 \pm 0.522$	1.71	$-0.124 \pm 0.724$	$-0.884 \pm 0.518$
photometric centroid source offset	$0.52 \pm 0.40$	1.31	$-0.51 \pm 0.40$	$-0.10 \pm 0.40$

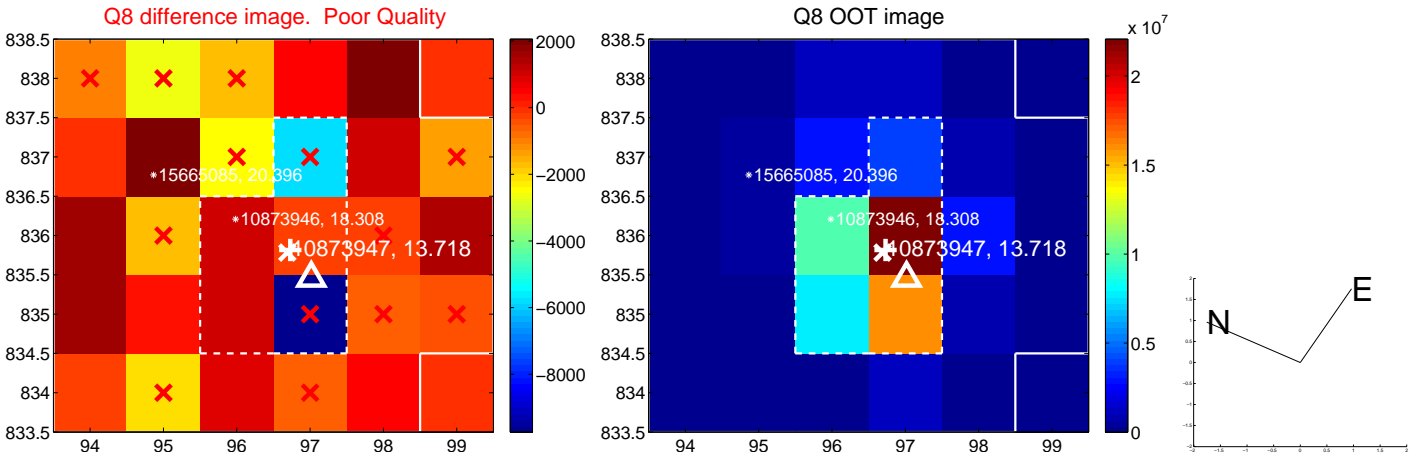
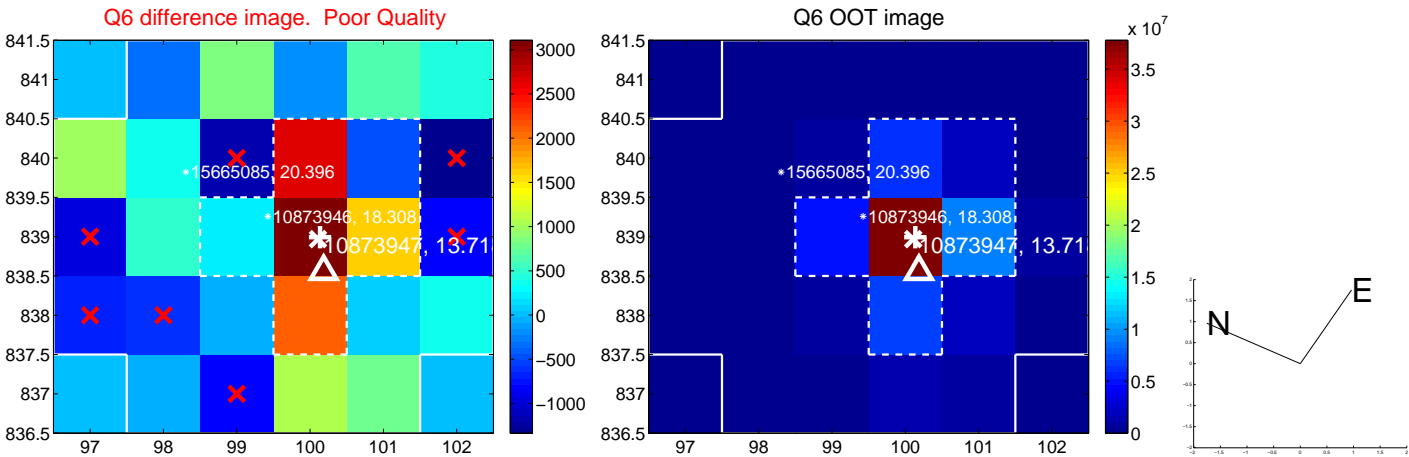
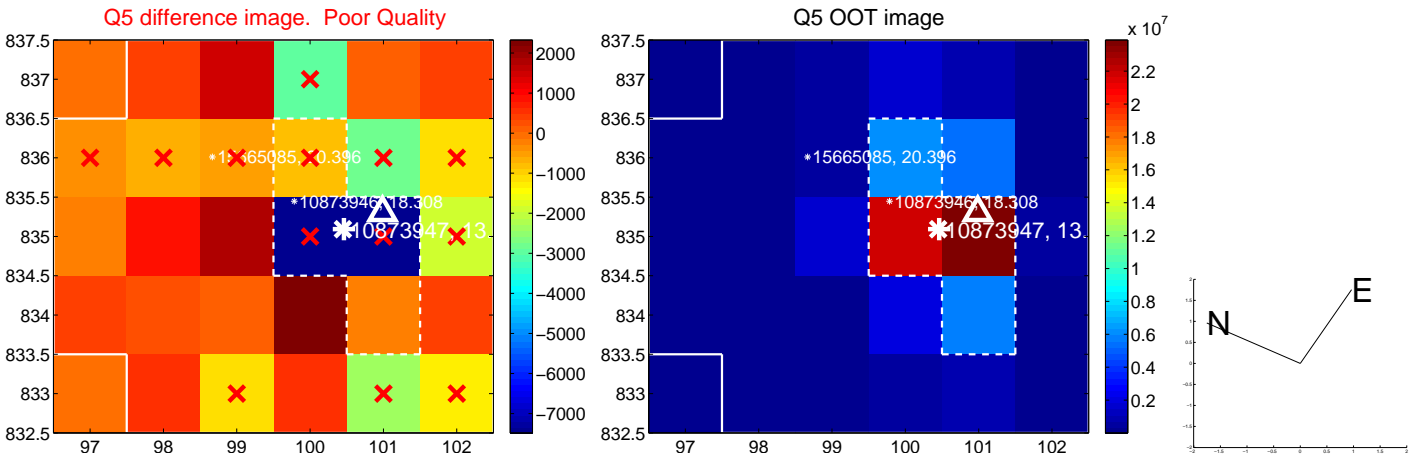


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

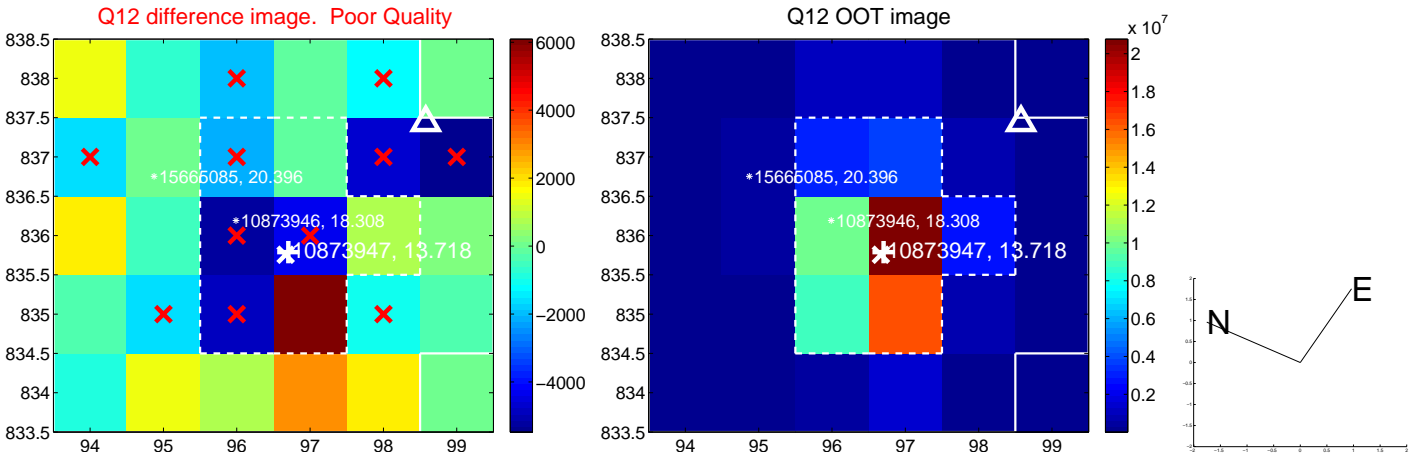
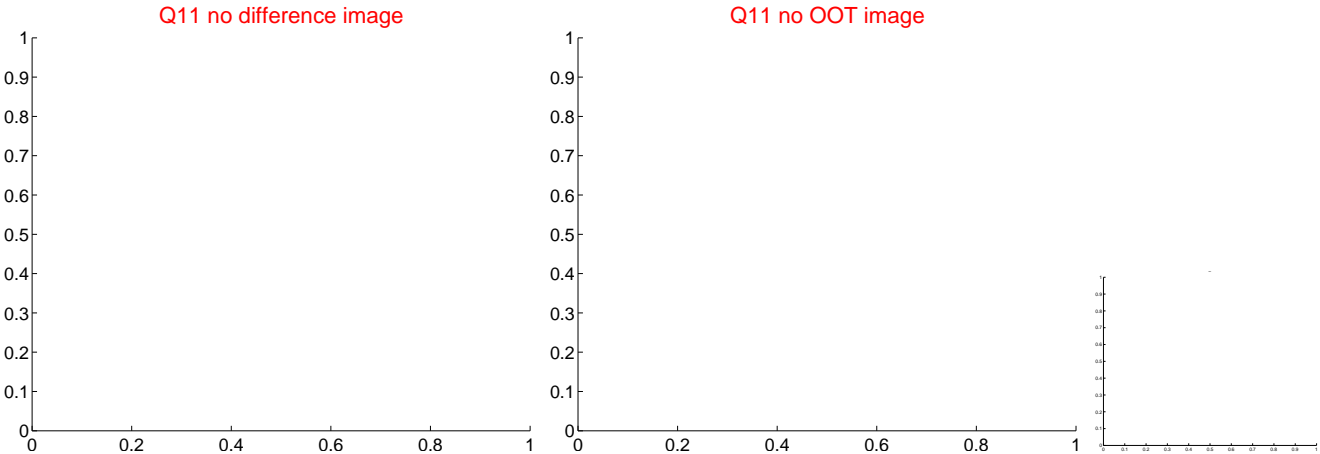
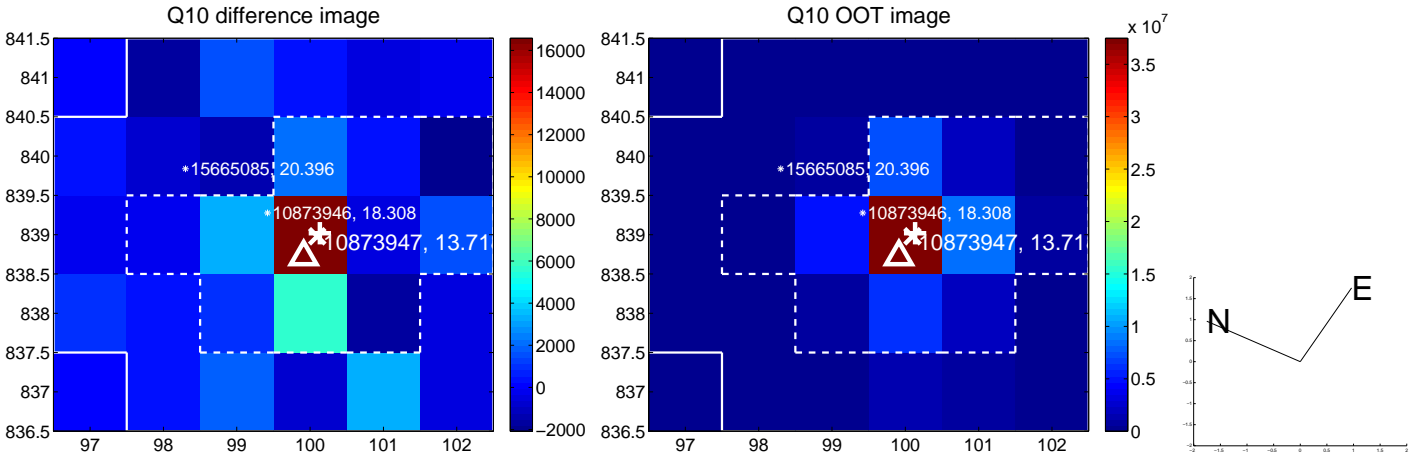
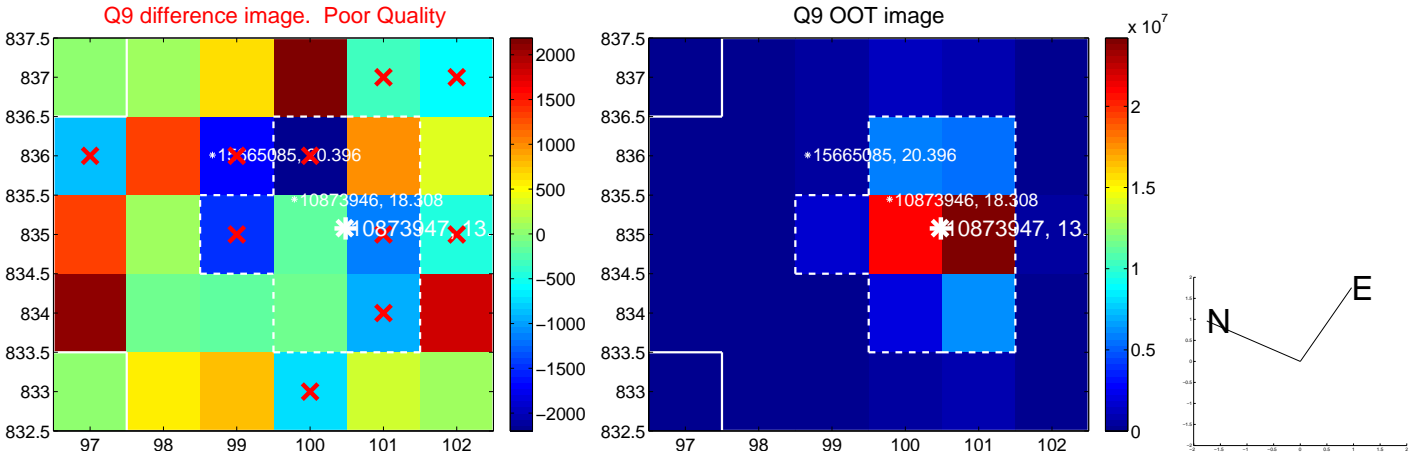
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



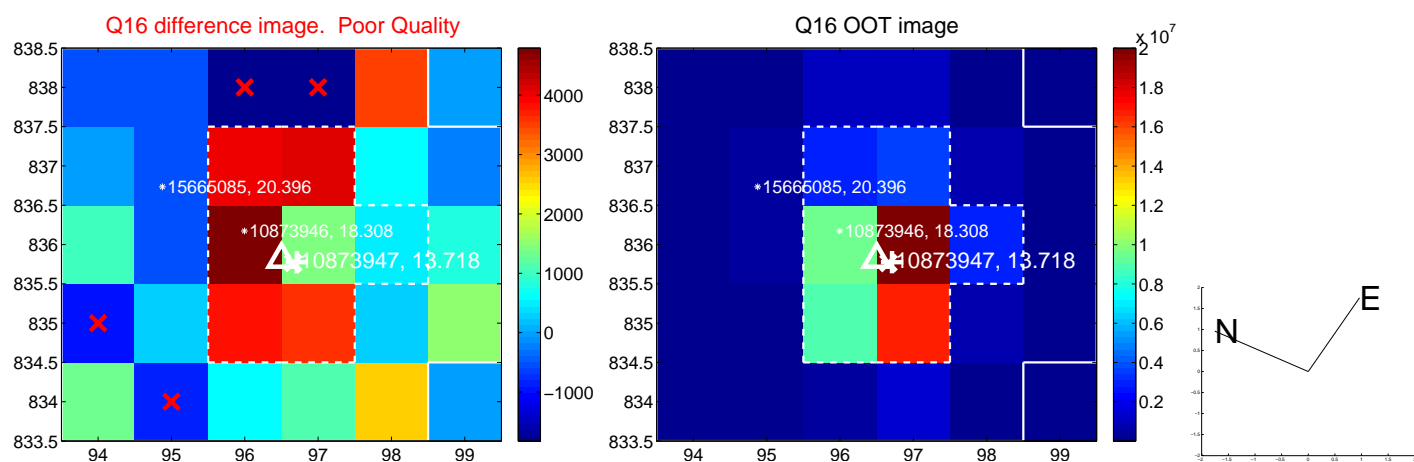
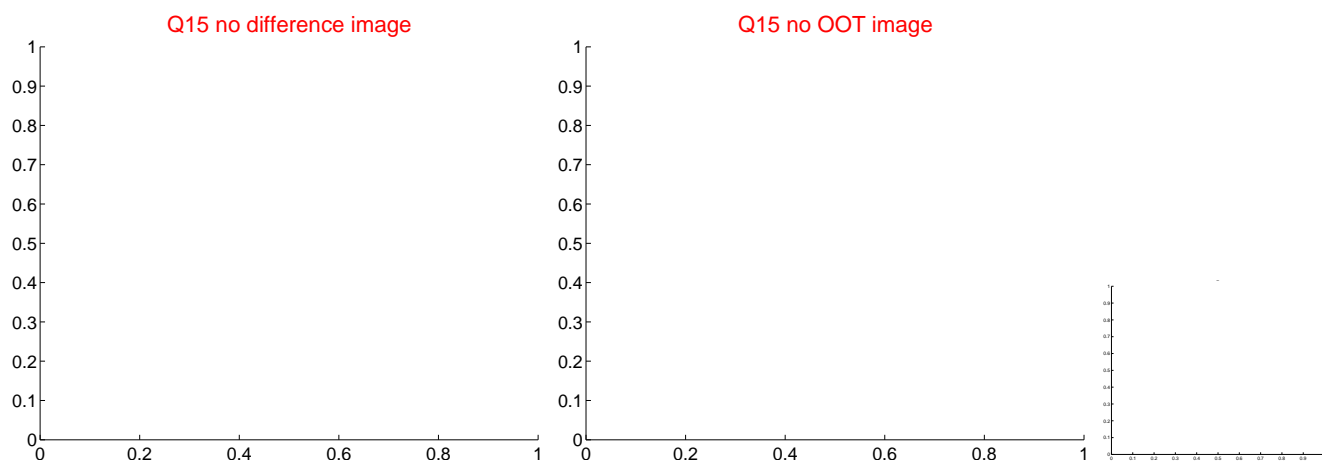
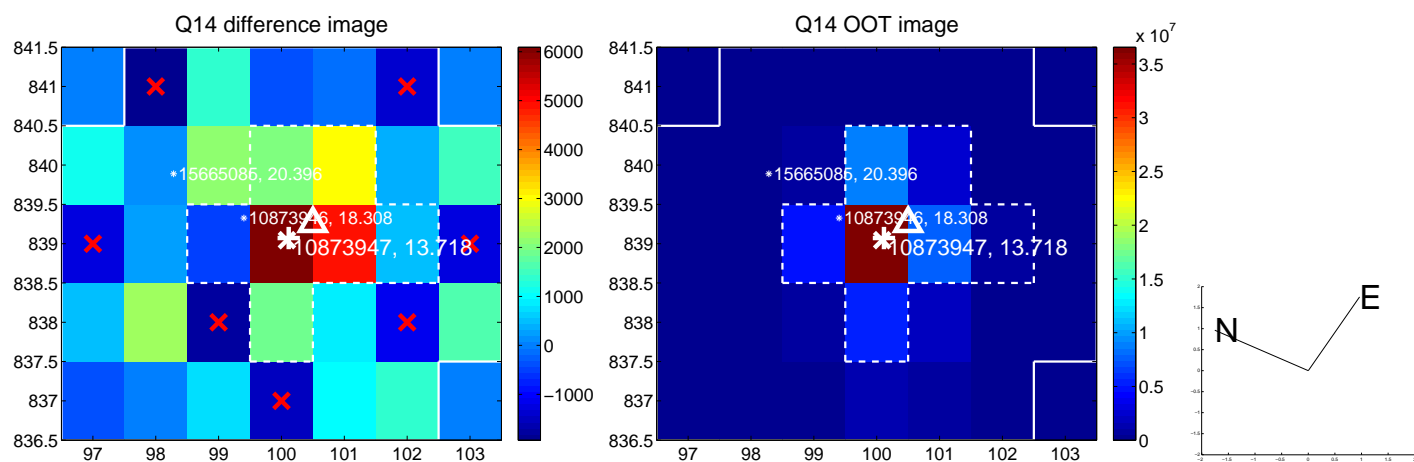
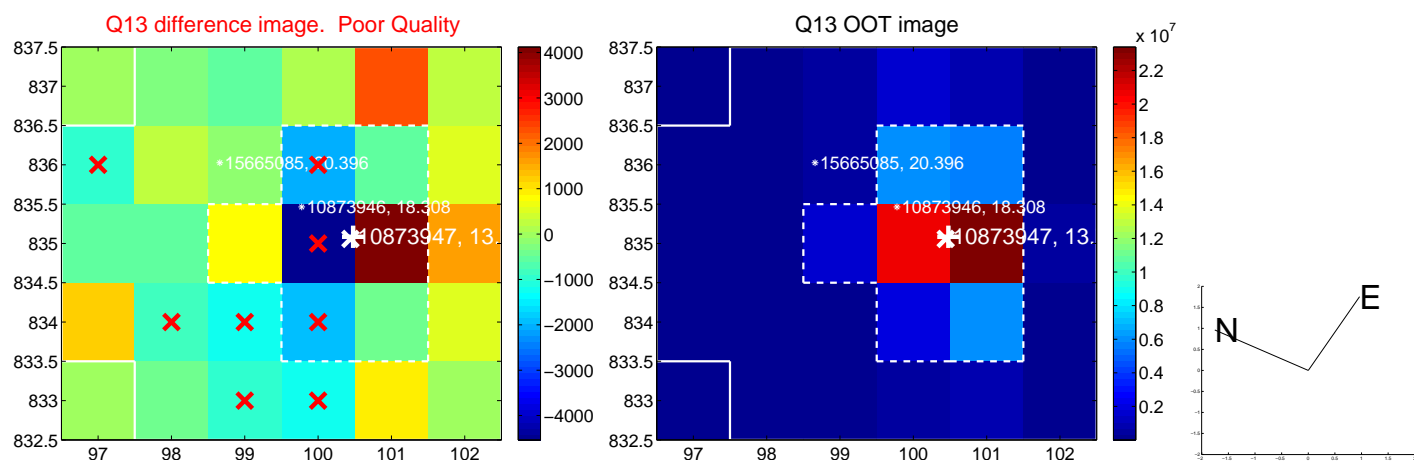
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



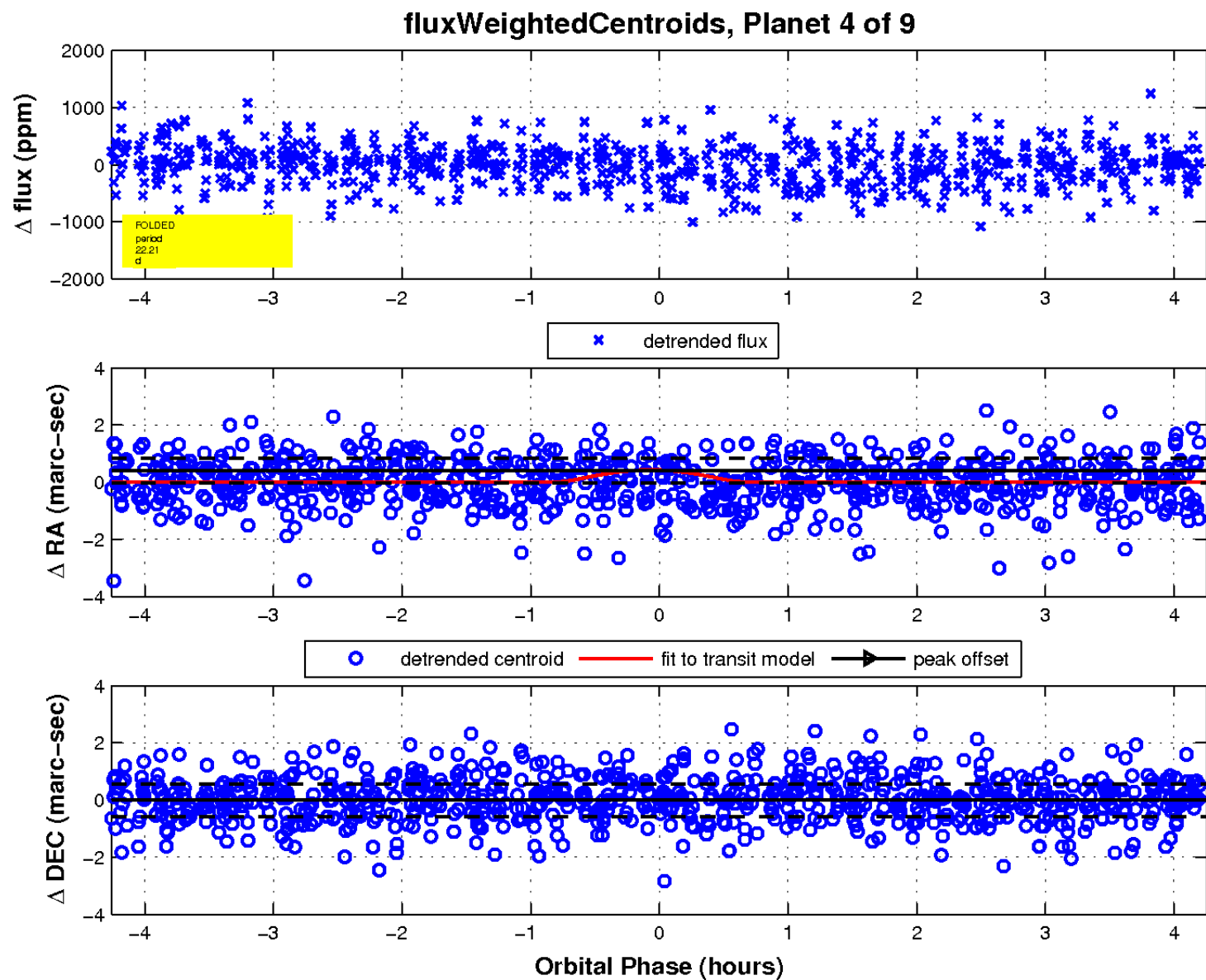
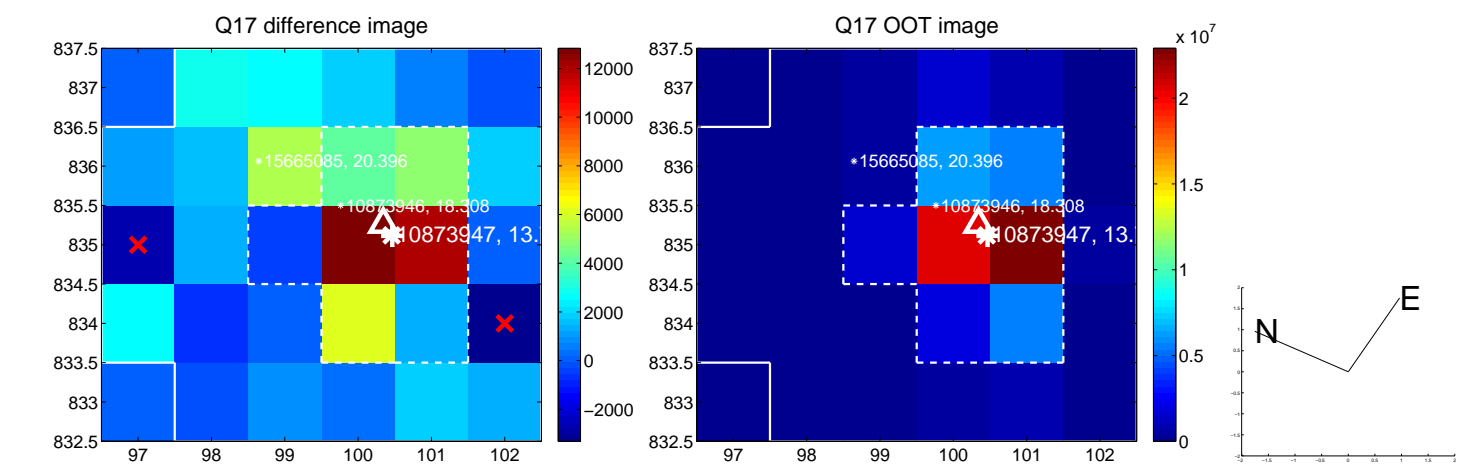
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



Declination



# KIC 010873947

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010873947-01	OBS	No	0.527357	131.795567	18.0	3.647	10.8	4.4	1.89	7559	0.83	47530.62
010873947-02	OBS	No	19.689666	138.728149	610.6	2.271	12.2	13.2	1.89	7559	5.20	380.89
010873947-03	OBS	No	17.025367	144.262873	491.6	0.984	11.3	8.3	1.89	7559	4.24	462.36
010873947-04	OBS	No	22.211661	140.942347	695.4	1.426	10.7	10.2	1.89	7559	8.87	324.34
010873947-05	OBS	No	36.184555	138.348466	580.2	3.091	12.0	10.0	1.89	7559	8.71	169.21
010873947-06	OBS	No	37.054013	149.861374	542.1	2.239	10.5	9.4	1.89	7559	4.88	163.93
010873947-07	OBS	No	49.229353	155.691611	1022.6	4.506	10.1	12.3	1.89	7559	11.36	112.24
010873947-09	OBS	No	32.616633	140.133048	594.1	1.655	10.3	9.4	1.89	7559	4.78	194.32

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010873947-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
010873947-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
010873947-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV
010873947-04	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
010873947-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010873947-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010873947-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV
010873947-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV

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

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

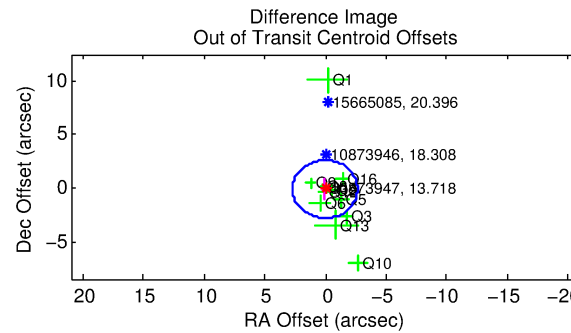
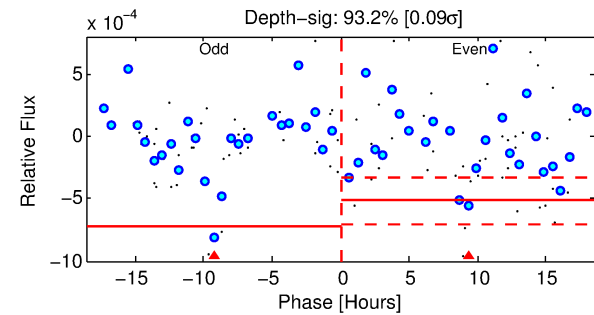
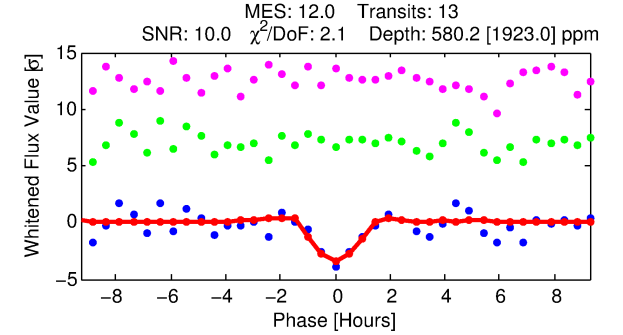
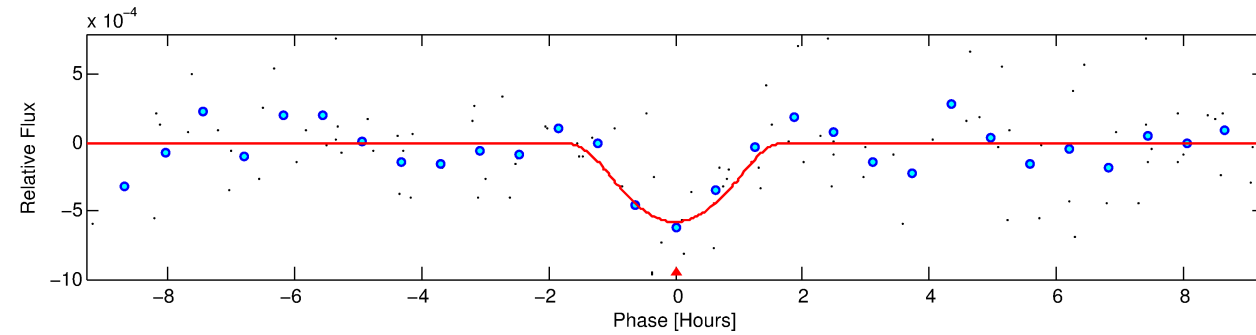
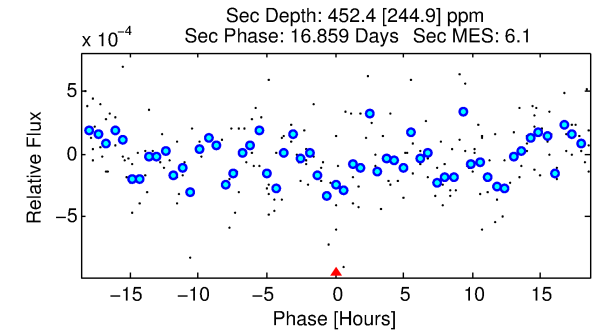
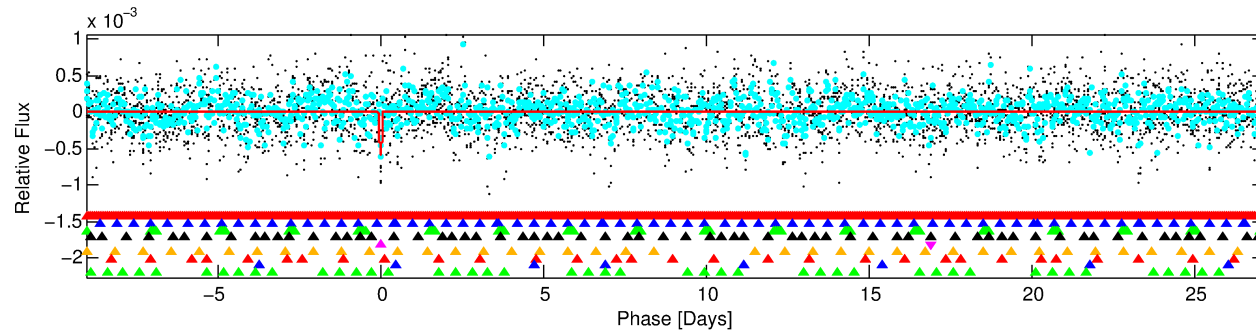
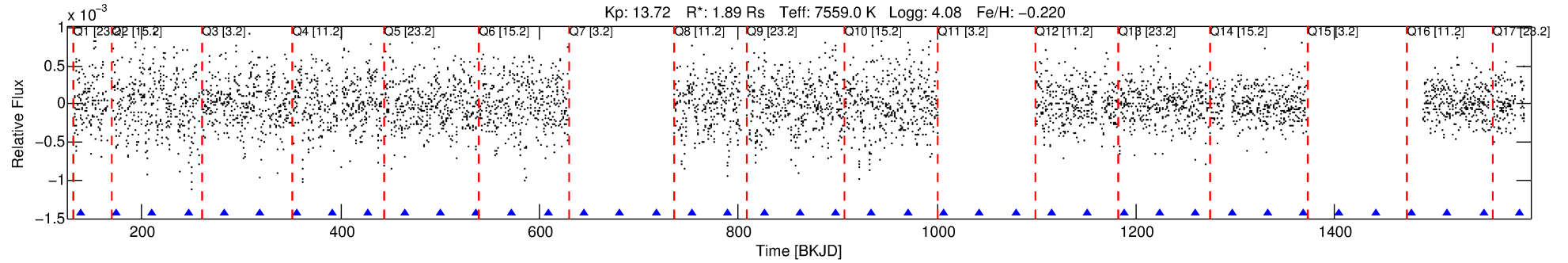
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010873947-05

No Significant Match Found

# DV One-Page Summary

KIC: 10873947 Candidate: 5 of 9 Period: 36.185 d



## DV Fit Results:

Period = 36.18456 [0.00044] d  
Epoch = 138.3485 [0.0106] BKJD  
Rp/R\* = 0.0423 [0.2379]  
a/R\* = 26.32 [37.90]  
b = 1.00 [0.25]  
Seff = 169.21 [61.62]  
Teff = 920 [84] K  
Rp = 8.72 [49.03] Re  
a = 0.2480 [0.0574] AU  
Ag = 201.52 [2268.31] [0.09 $\sigma$ ]  
Teffp = 5357 [15071] K [0.29 $\sigma$ ]

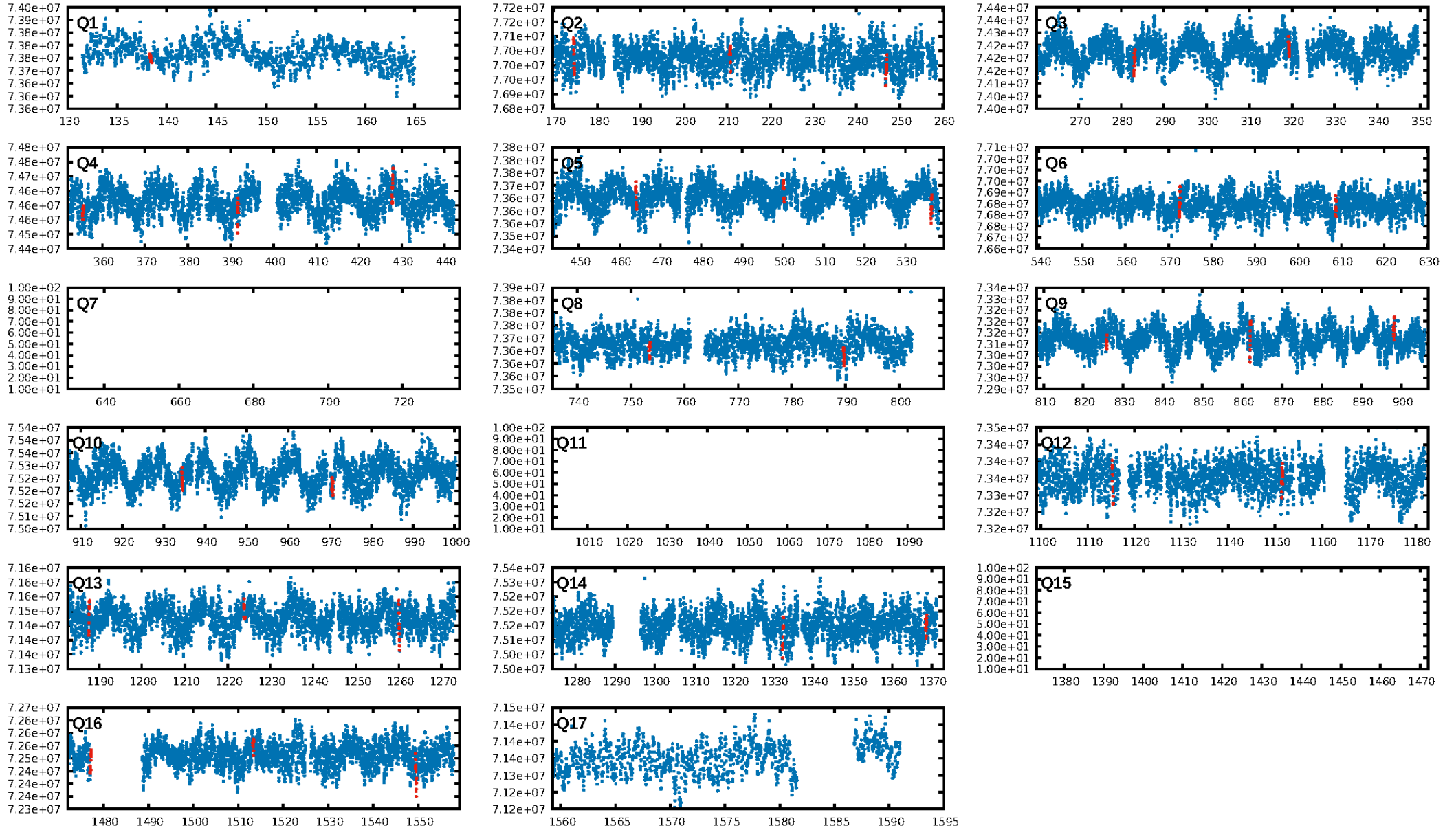
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [24.42 $\sigma$ ]  
LongPeriod-sig: 100.0% [5.47 $\sigma$ ]  
ModelChiSquare2-sig: 1.3%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [12/12]  
GhostDiagnostic-chr: 3.434  
Centroid-sig: 5.0%  
Centroid-so: 0.630 arcsec [1.60 $\sigma$ ]  
OotOffset-rm: 0.109 arcsec [0.12 $\sigma$ ]  
KicOffset-rm: 0.242 arcsec [0.39 $\sigma$ ]  
OotOffset-st: 4/1/3/4 [12]  
KicOffset-st: 4/1/3/4 [12]  
DiffImageQuality-fgm: 0.50 [6/12]  
DiffImageOverlap-fno: 0.00 [0/13]

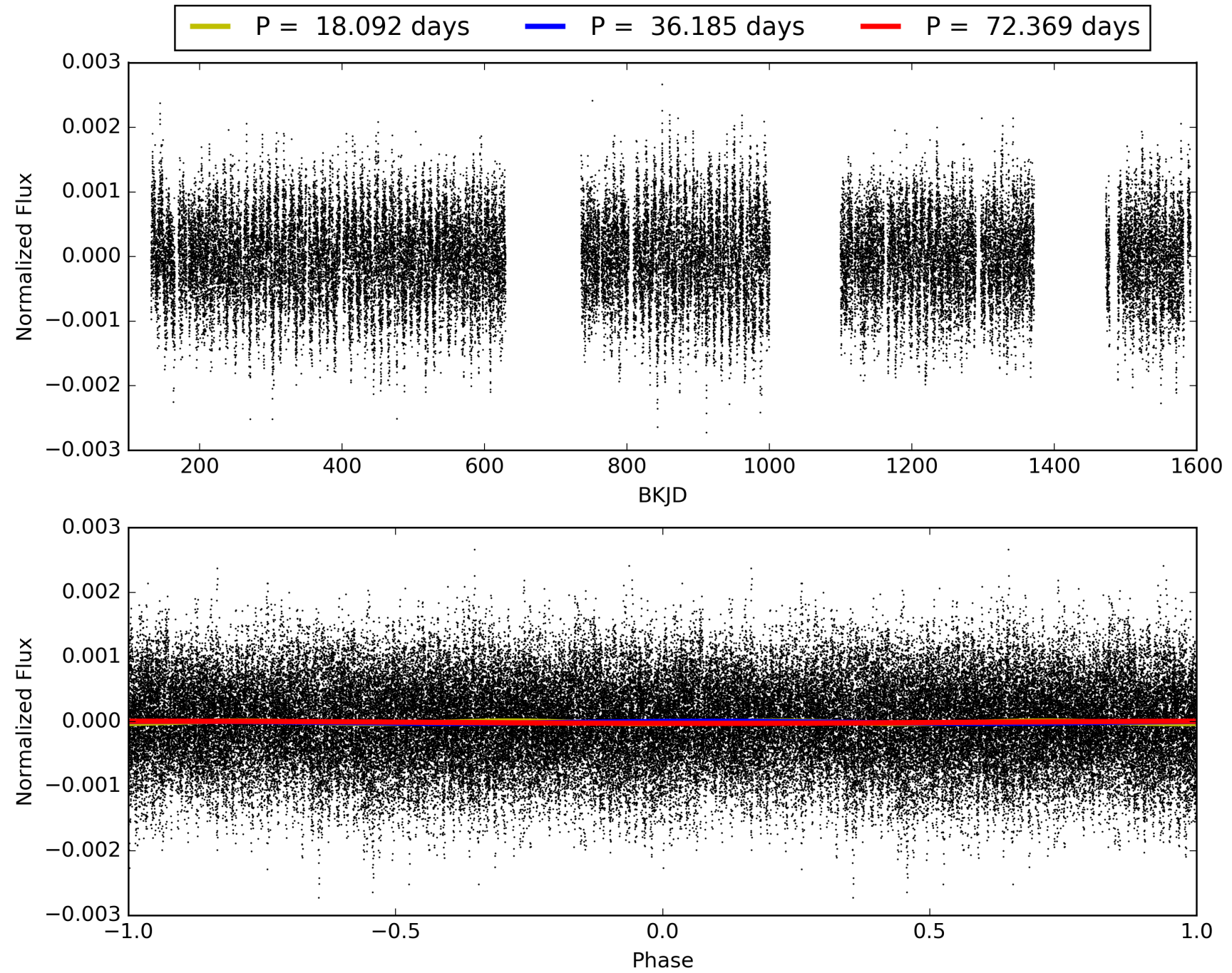
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:30:50 Z

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

# TCE 010873947-05, PDC Light Curves

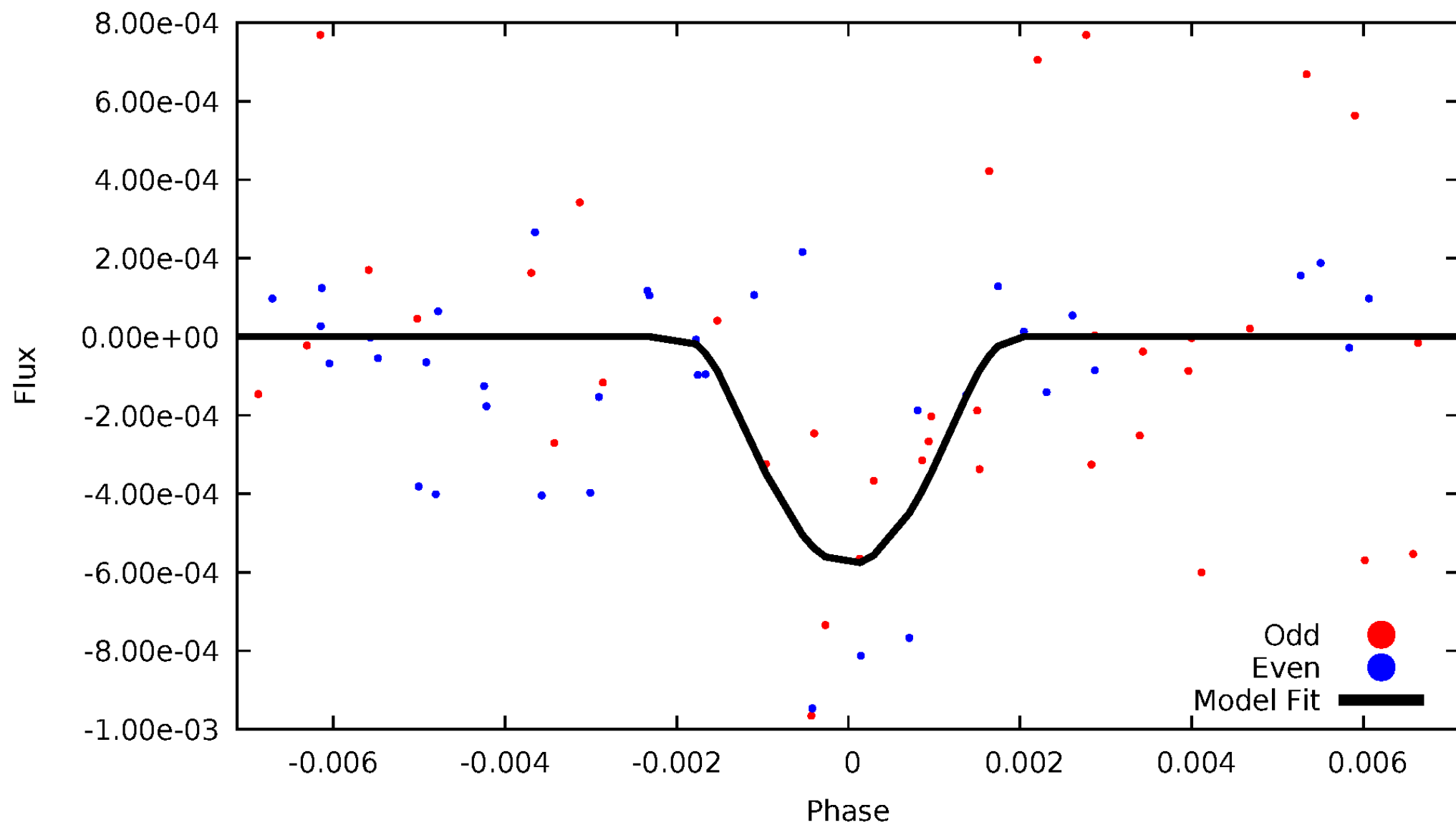


TCE 010873947-05



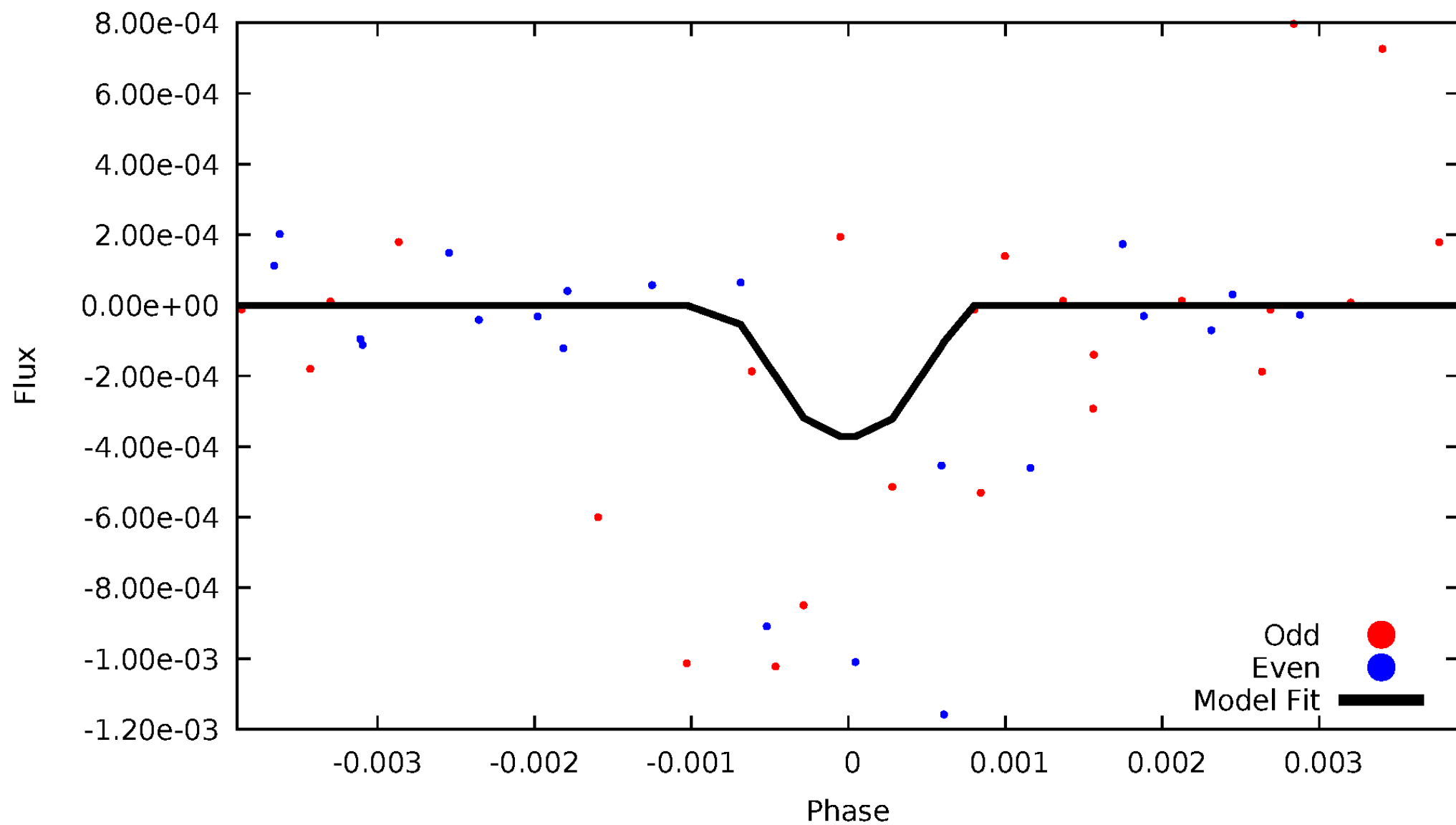
# DV Odd/Even

TCE 010873947-05



# ALT Odd/Even

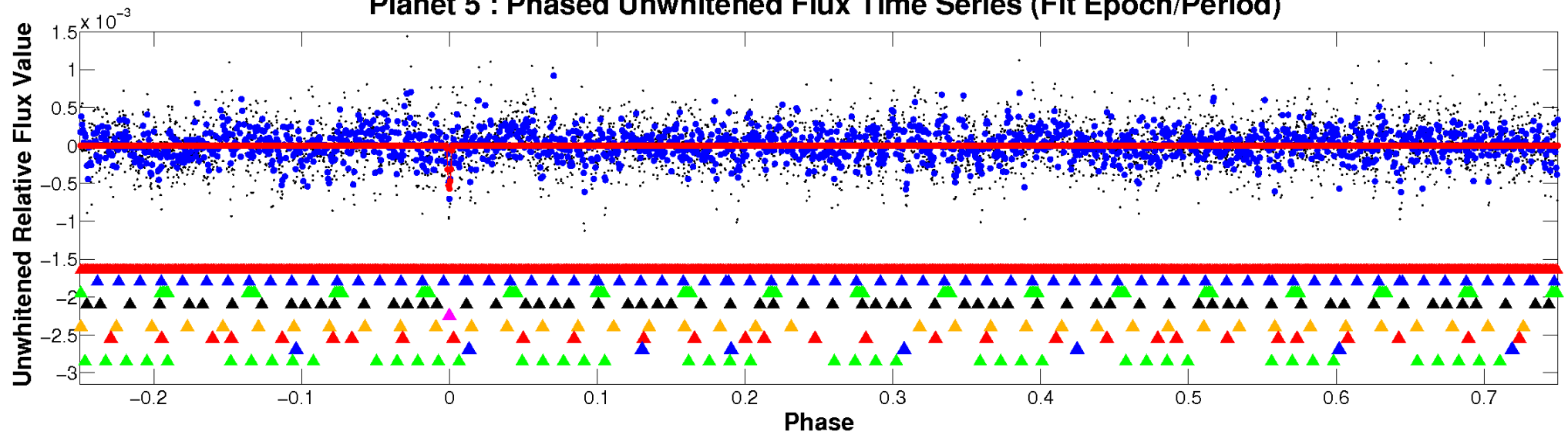
TCE 010873947-05



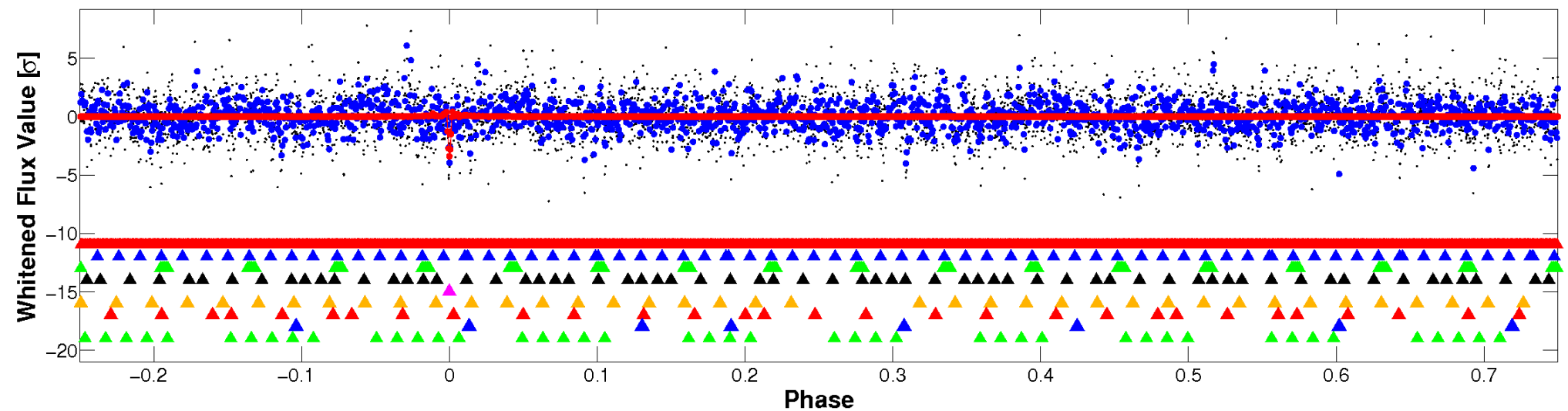


# Non-Whitened Vs. Whitened Light Curve

## Planet 5 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



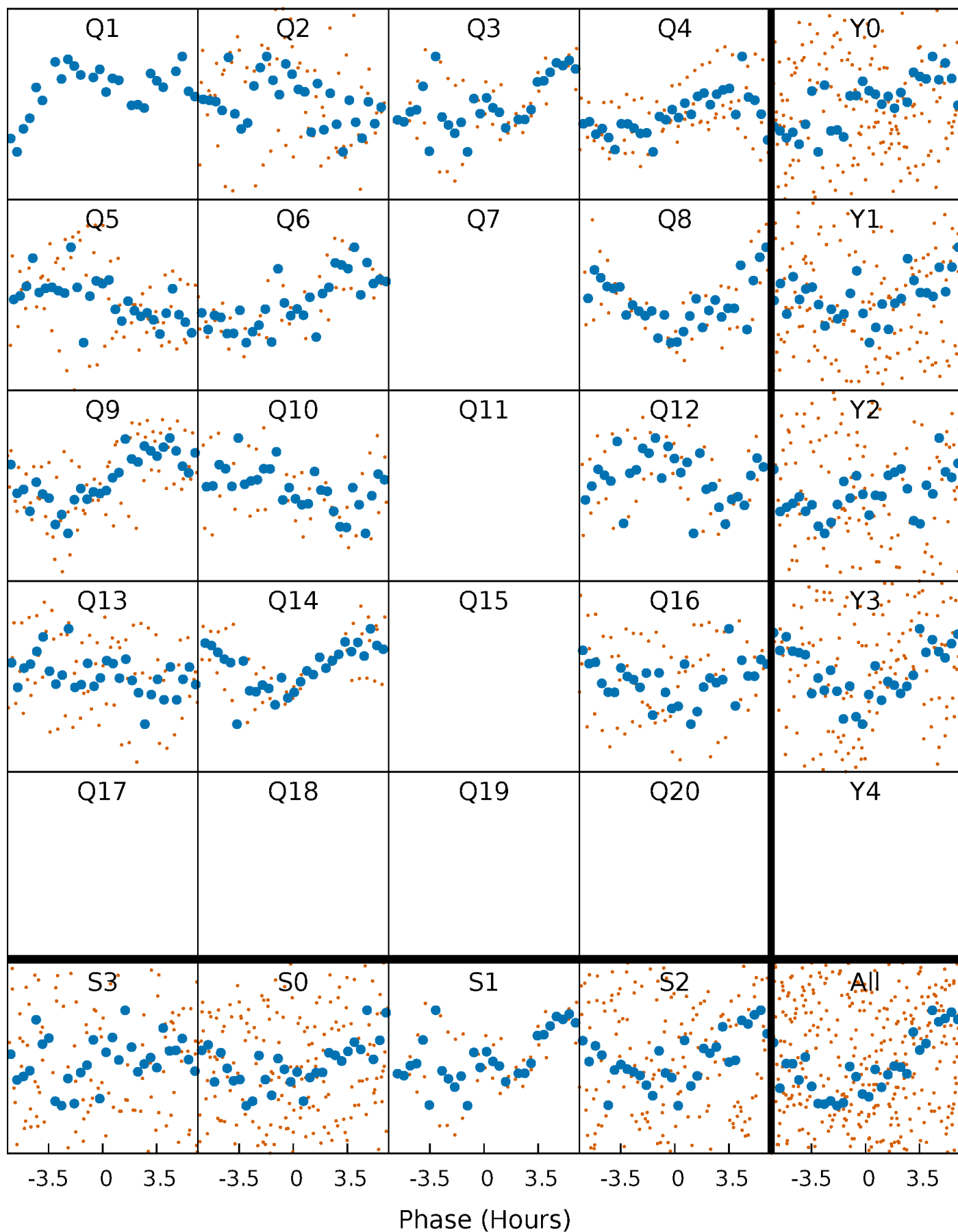
## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)





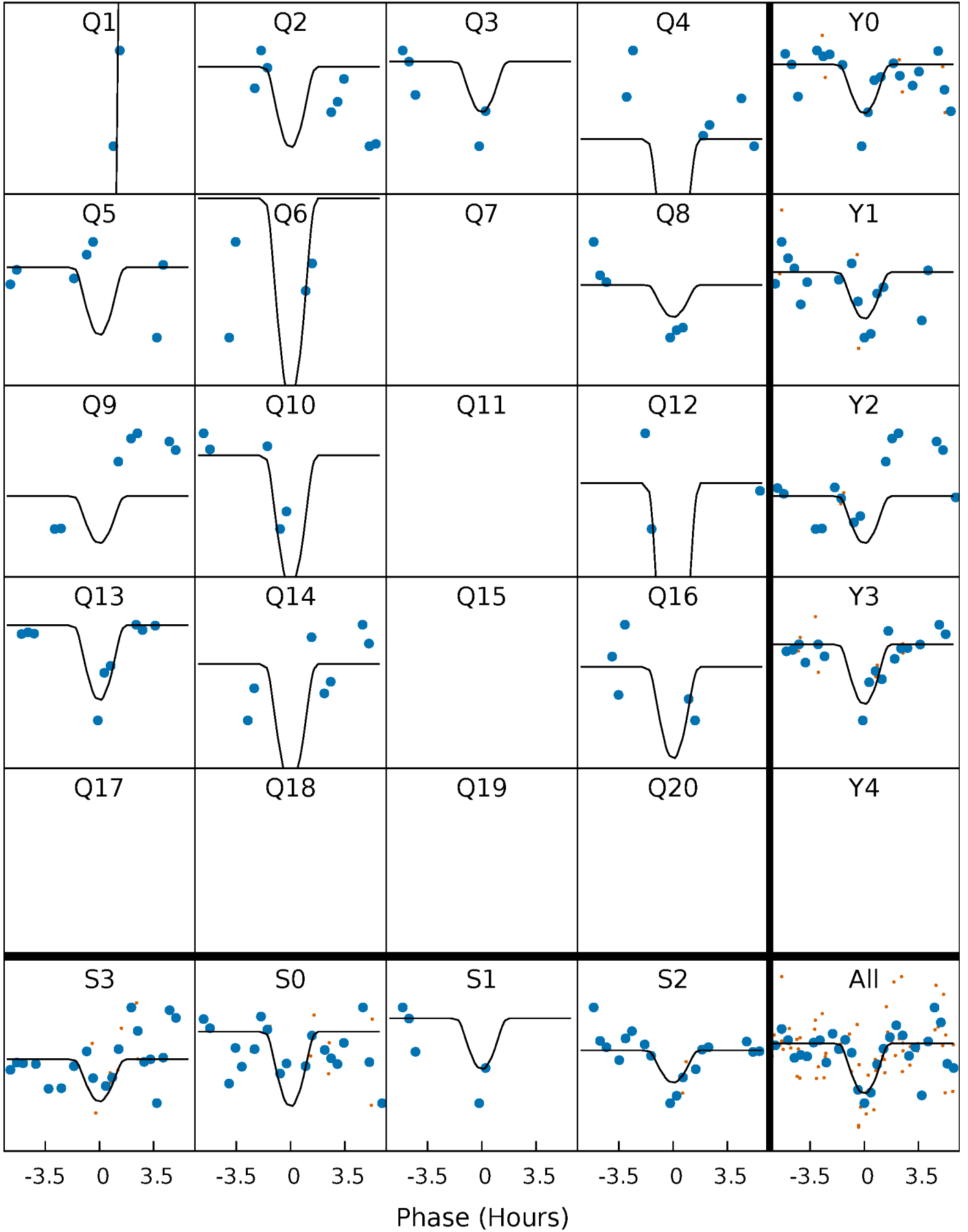
# PDC Quarter-Phased Transit Curves

TCE 010873947-05     $P = 36.184555$  Days     $T_0 = 138.348466$  (BKJD)



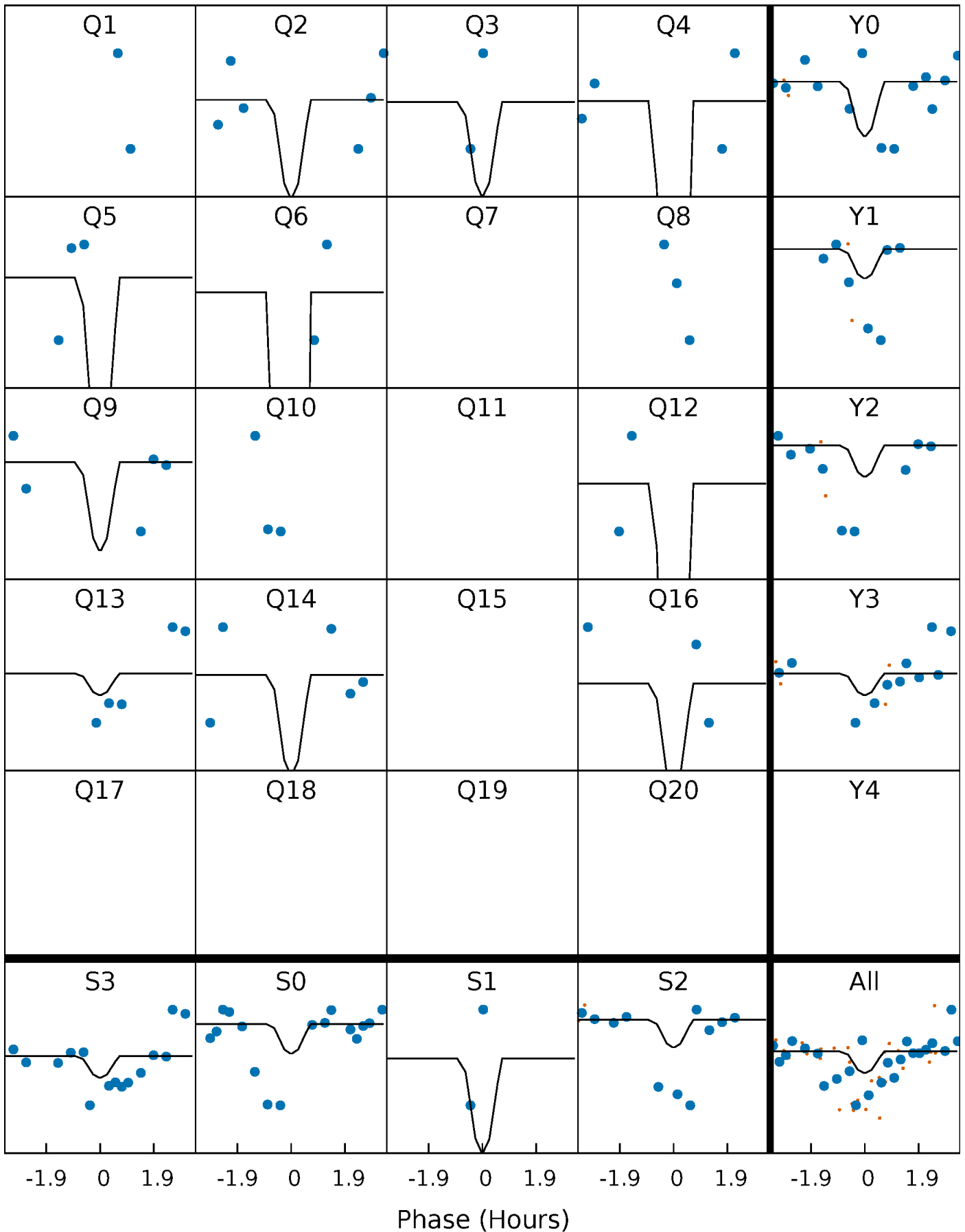
# DV Quarter-Phased Transit Curves

TCE 010873947-05     $P = 36.184555$  Days     $T_0 = 138.348466$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

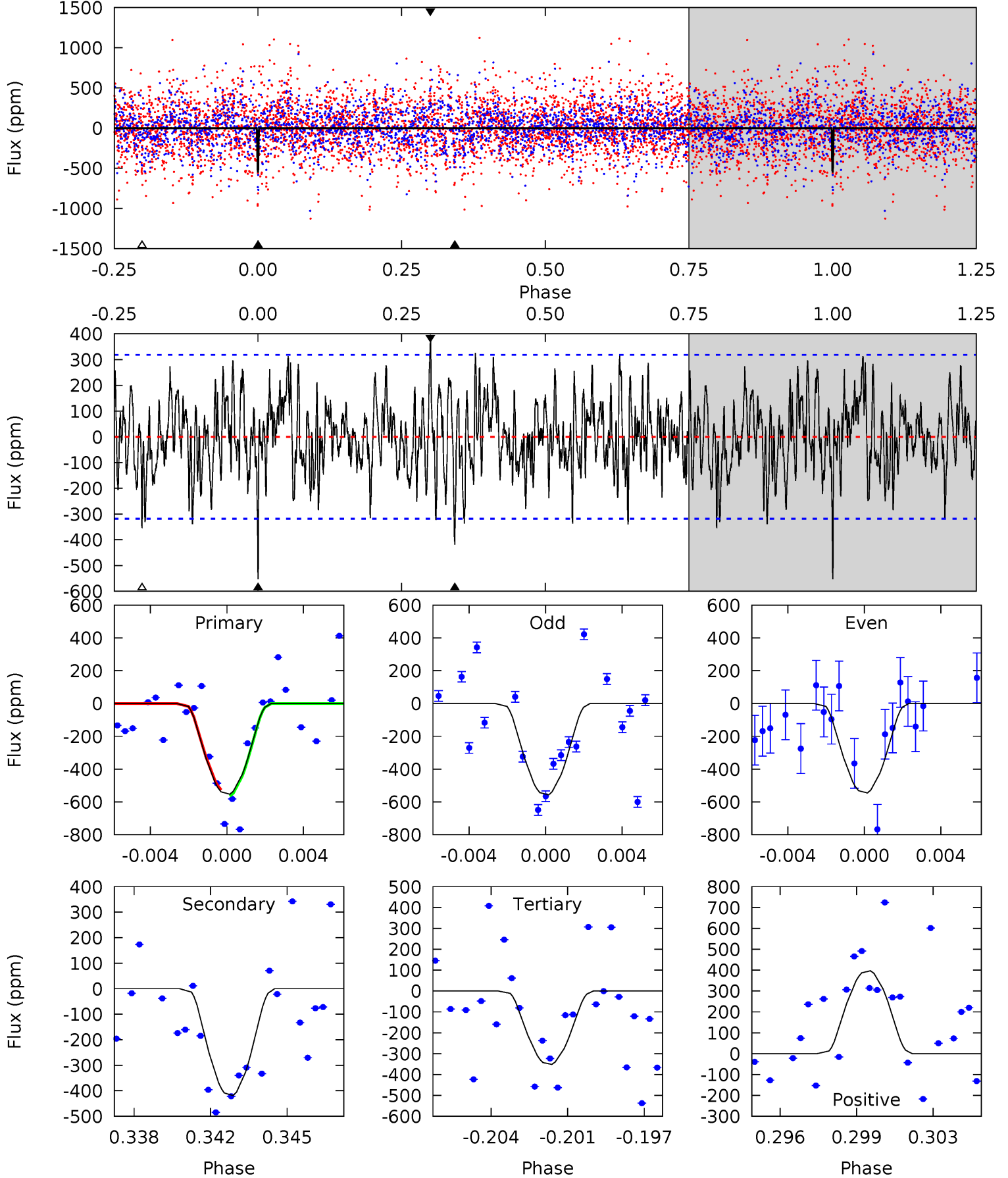
TCE 010873947-05     $P = 36.184324$  Days     $T_0 = 138.356268$  (BKJD)



# DV Model-Shift Uniqueness Test

010873947-05, P = 36.184555 Days, E = 102.163911 Days

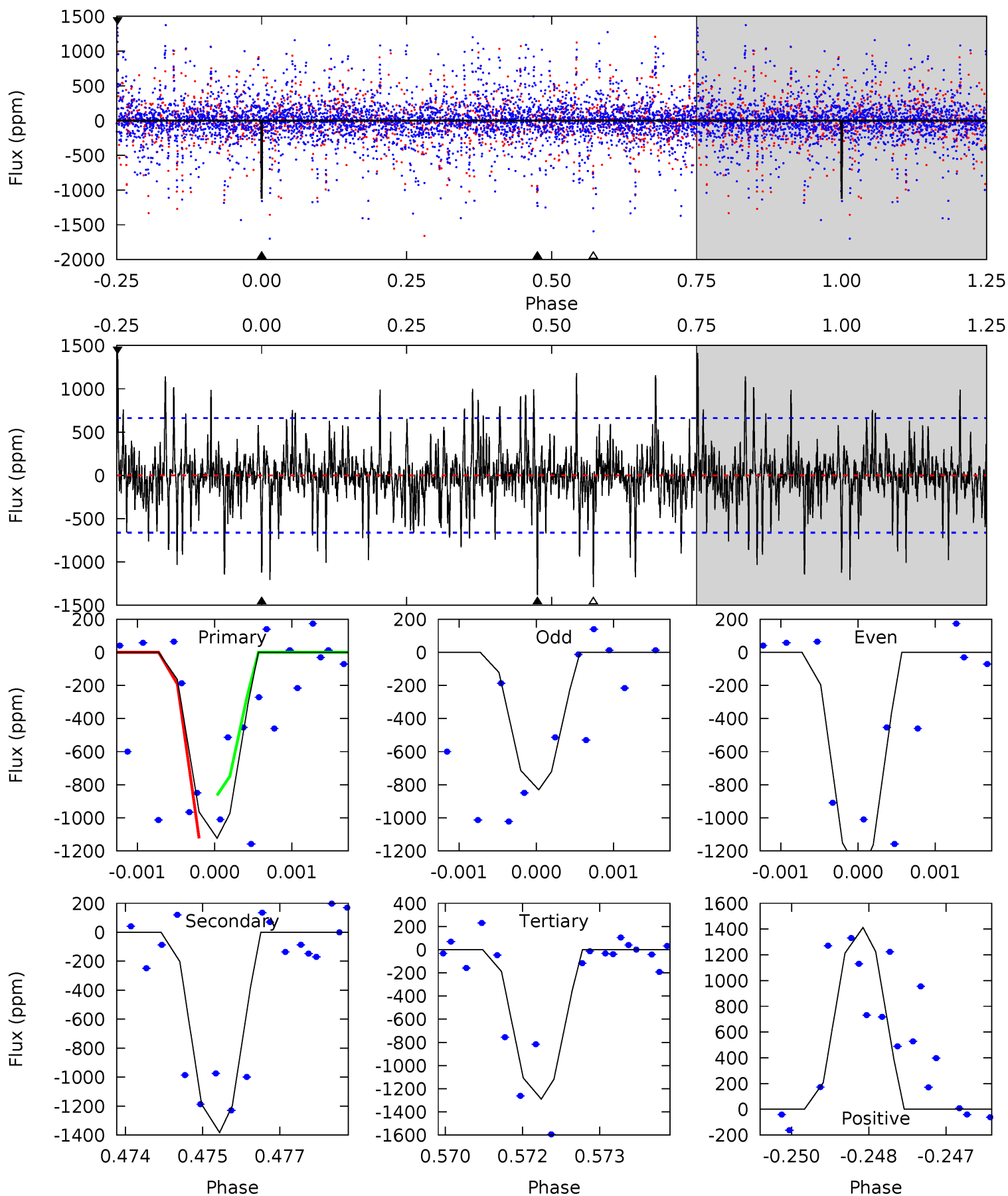
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.08	6.88	5.77	6.52	5.22	2.92	2.02	3.31	2.56	1.11	0.36	0.10	0.97	0.42	0.31



# Alt Model-Shift Uniqueness Test

010873947-05, P = 36.184324 Days, E = 102.171944 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
9.15	11.3	10.5	11.5	5.39	3.19	2.26	-1.35	-2.36	0.76	-0.24	1.88	0.85	0.51	0



### Stellar Parameters For KIC 010873947

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7559^{+237}_{-316}$	$4.078^{+0.170}_{-0.170}$	$-0.220^{+0.250}_{-0.350}$	$1.886^{+0.541}_{-0.443}$	$1.551^{+0.210}_{-0.257}$	$0.326^{+0.339}_{-0.143}$
	+3%/-4%	+4%/-4%	+114%/-159%	+29%/-23%	+14%/-17%	+104%/-44%
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 010873947-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-419 \pm 61$	$35.52^{+38.51}_{-24.54}$	$1284^{+105}_{-97}$	$3161^{+1552}_{-611}$	$11^{+109}_{-8}$
Alt.	$-1383 \pm 123$	$34.65^{+36.67}_{-24.13}$	$1282^{+94}_{-88}$	$3857^{+2524}_{-802}$	$40^{+390}_{-31}$

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

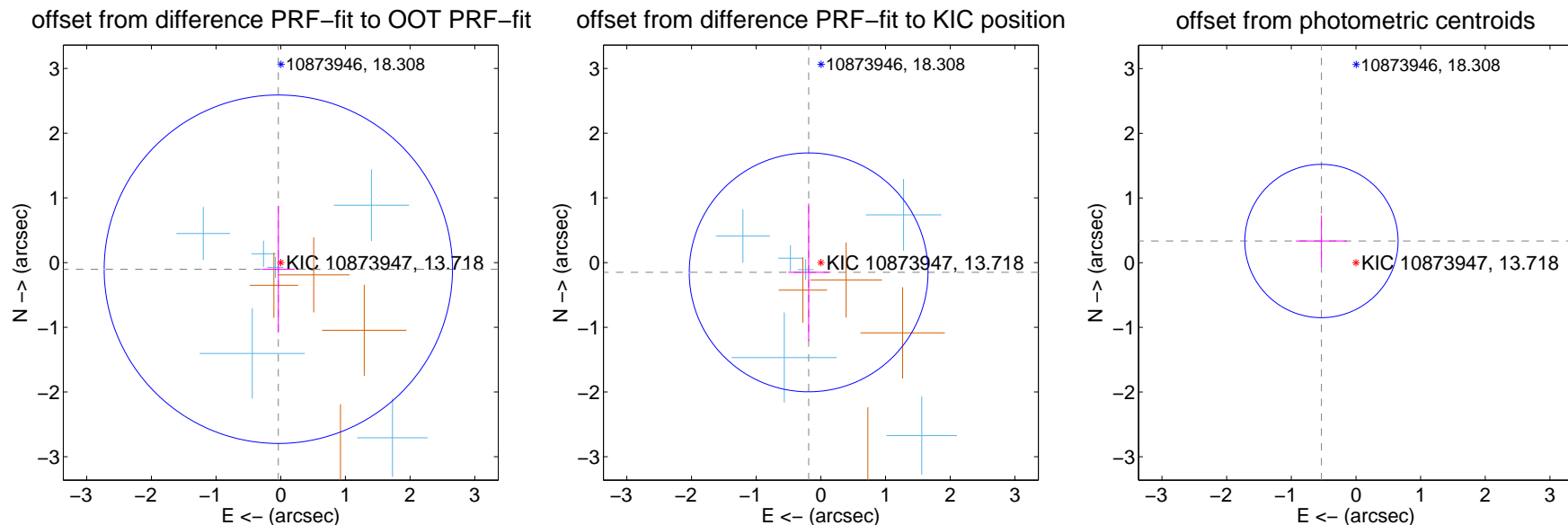
## DV Centroid Data

Supplemental centroid analysis for 010873947-05. Kepler magnitude: 13.72. Transit SNR 9.97

There are 6 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

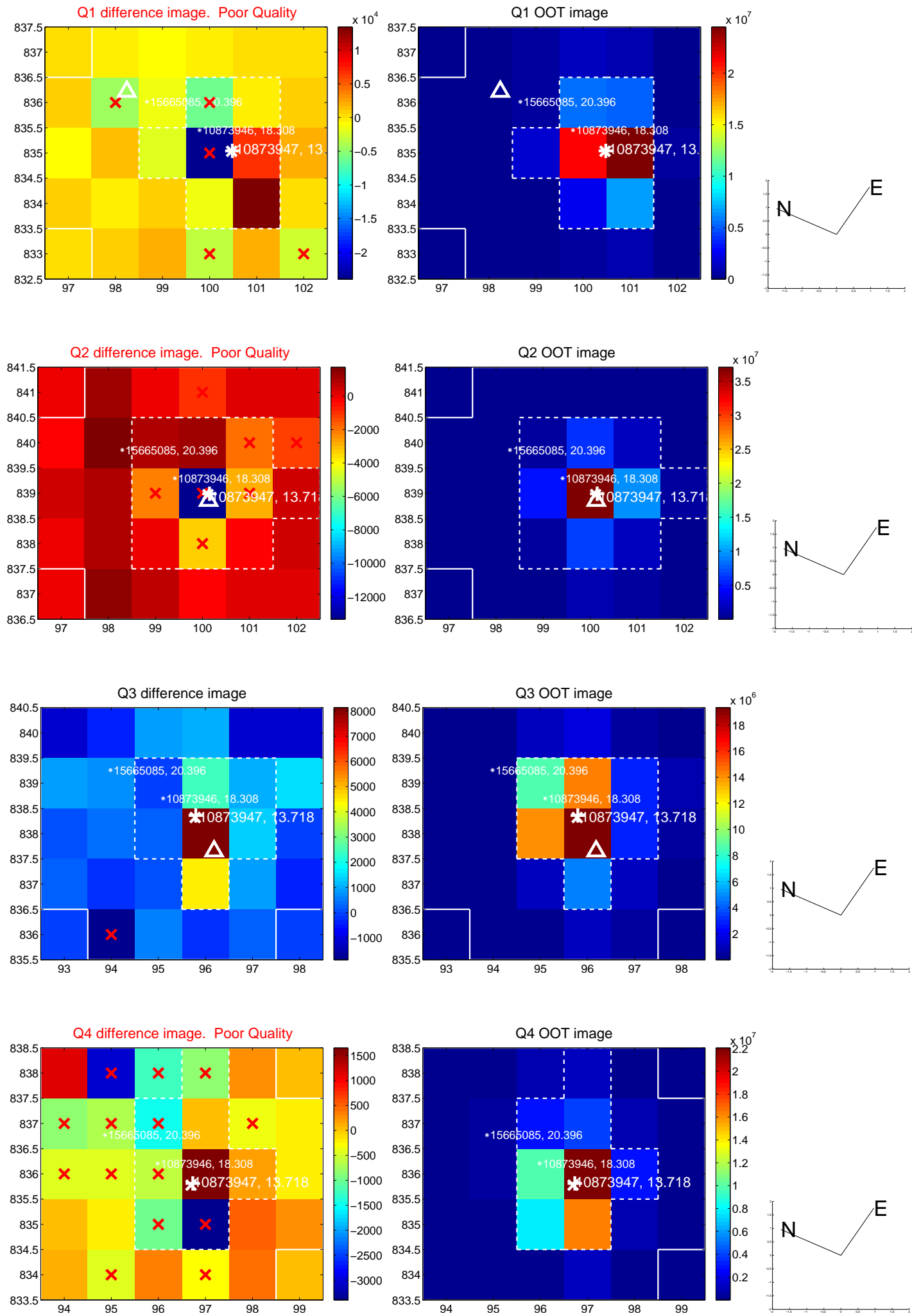
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.109 \pm 0.897$	0.12	$0.037 \pm 0.253$	$-0.103 \pm 0.978$
PRF-fit source offset from KIC position	$0.242 \pm 0.615$	0.39	$0.189 \pm 0.315$	$-0.151 \pm 1.064$
photometric centroid source offset	$0.63 \pm 0.40$	1.60	$0.53 \pm 0.39$	$0.33 \pm 0.40$



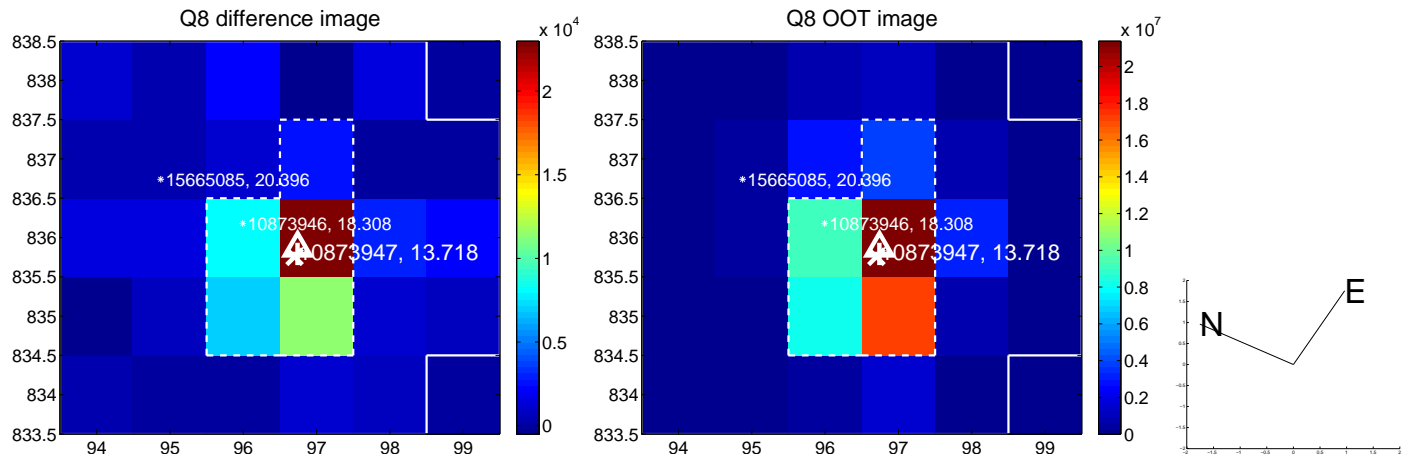
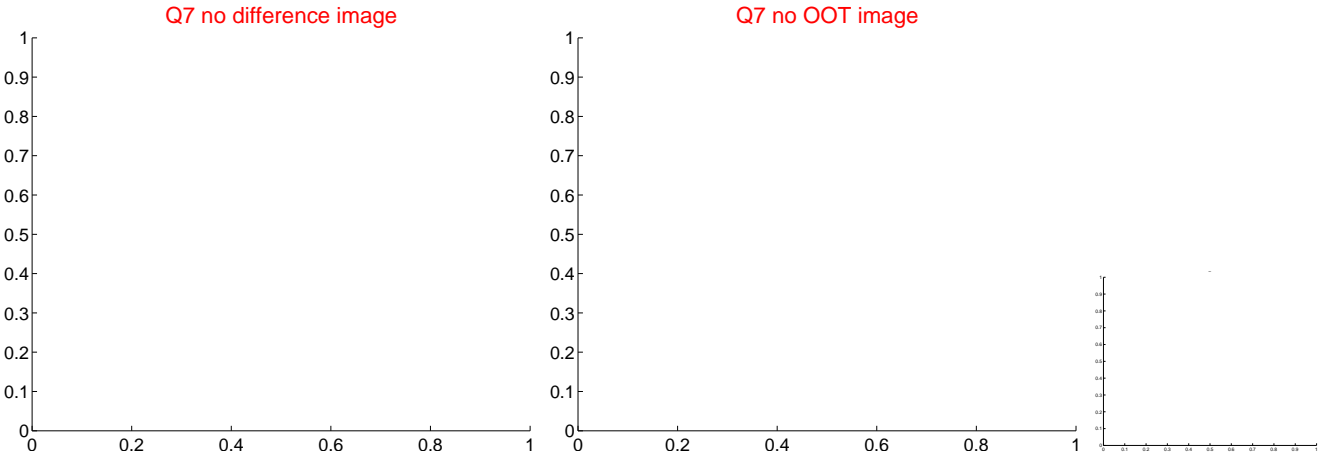
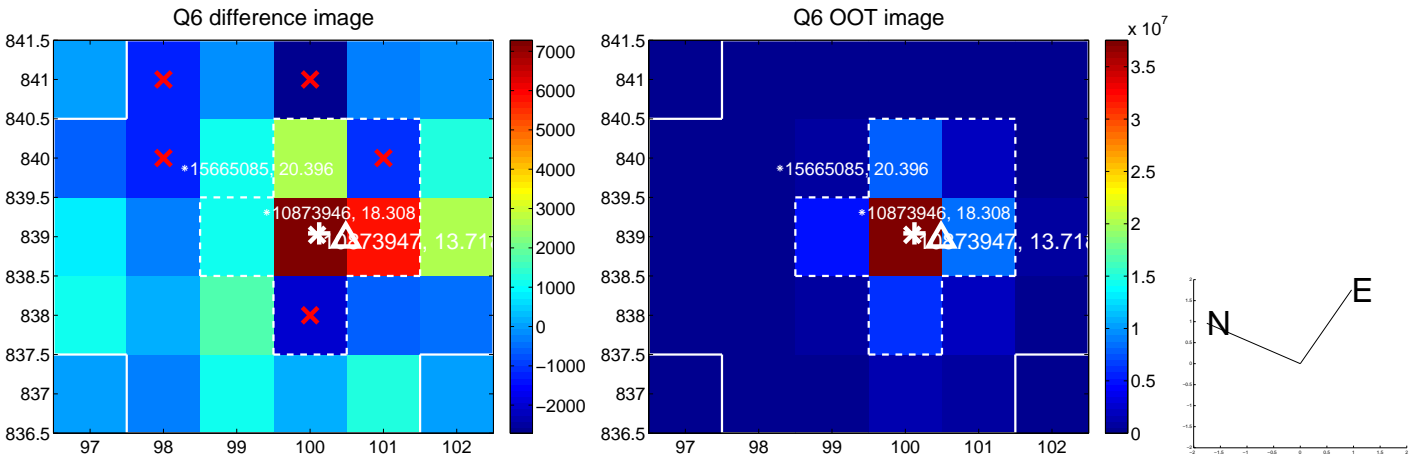
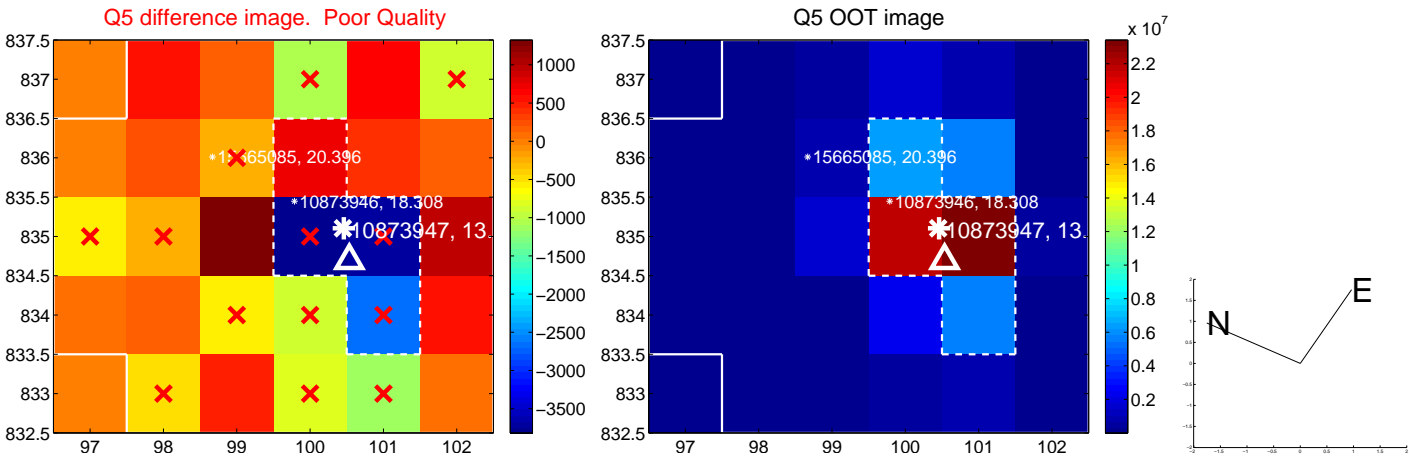
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



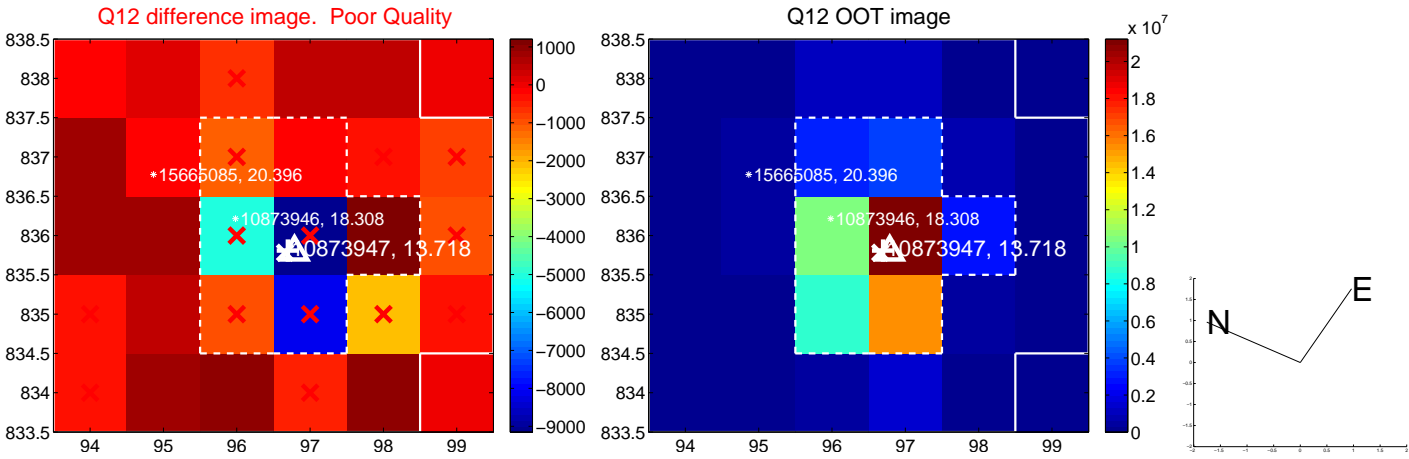
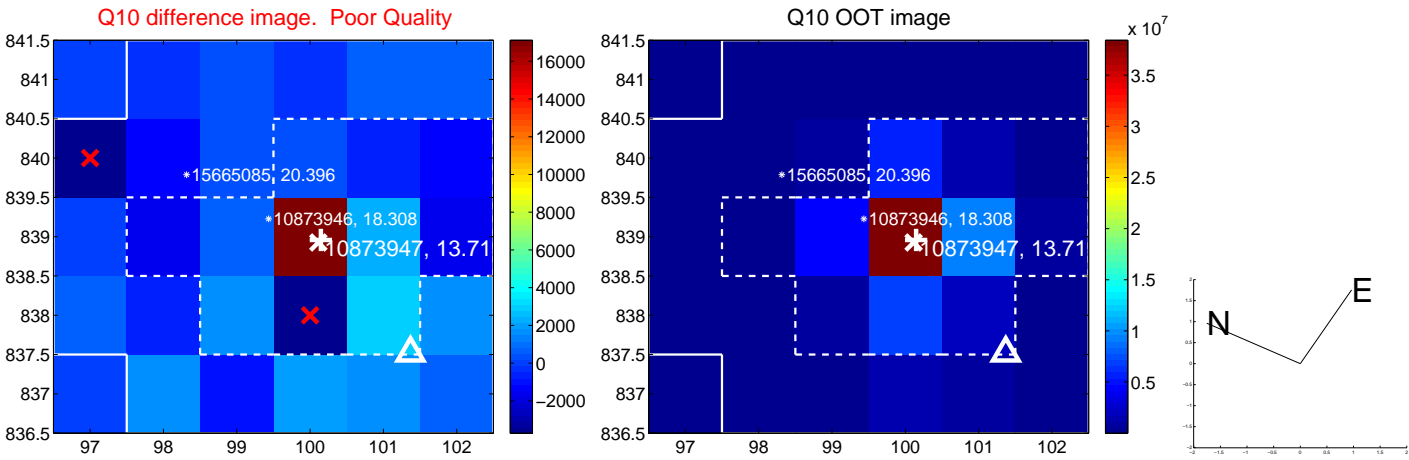
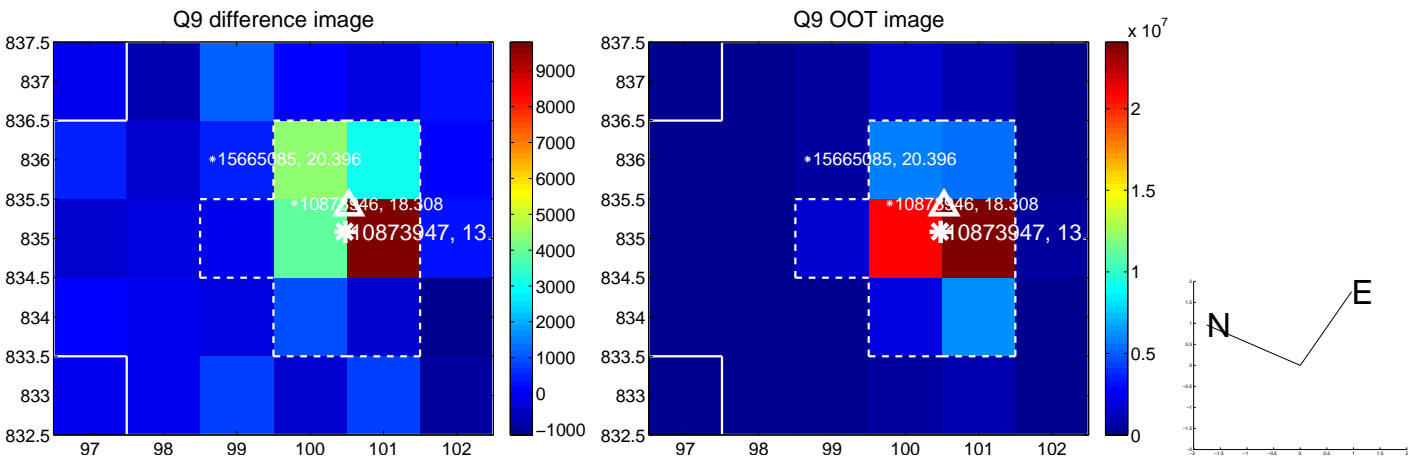
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



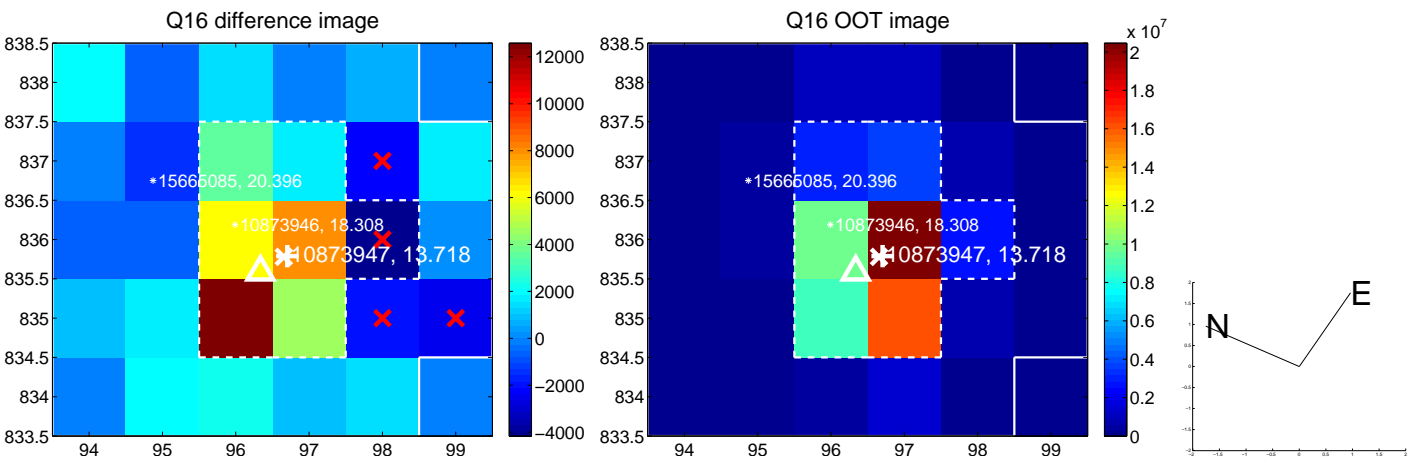
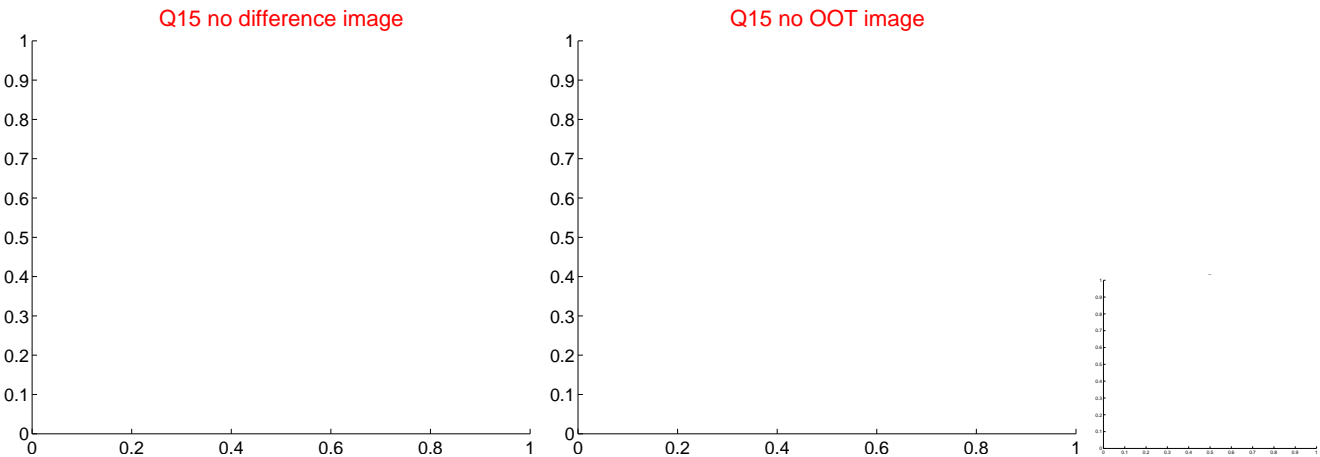
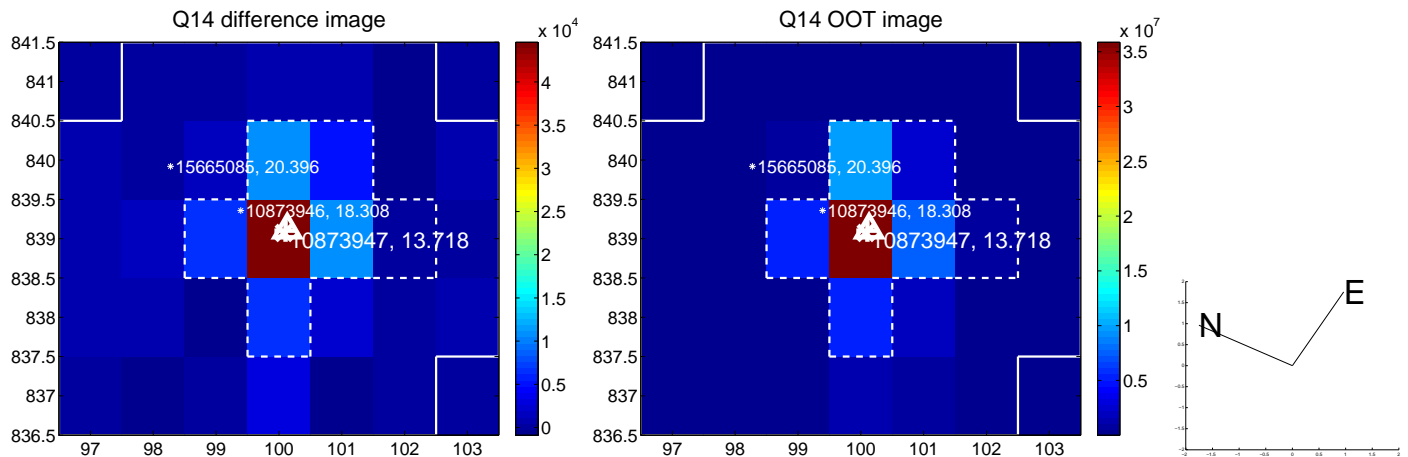
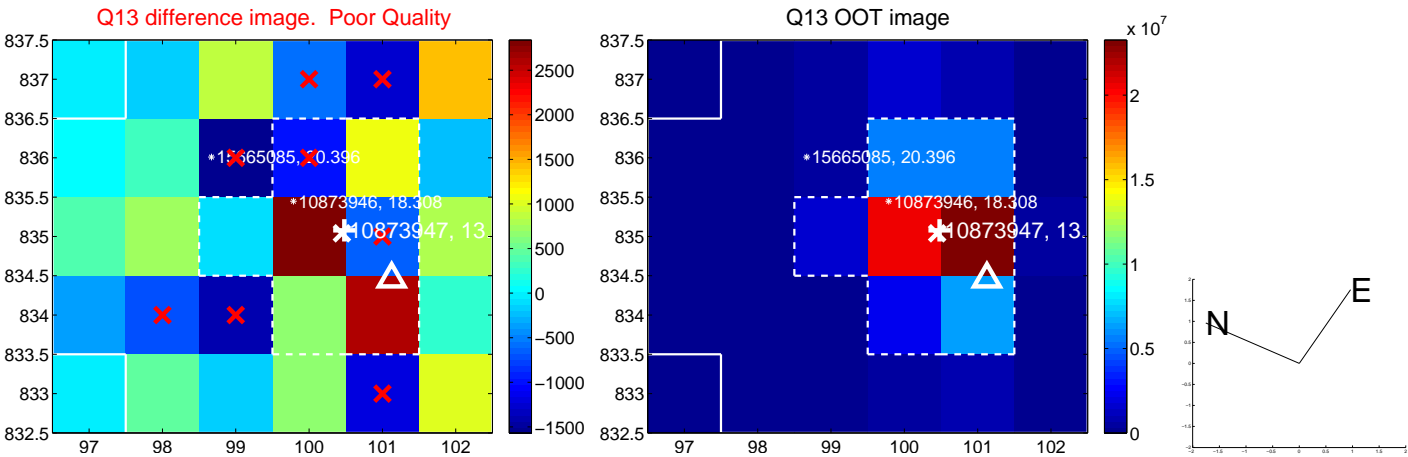
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



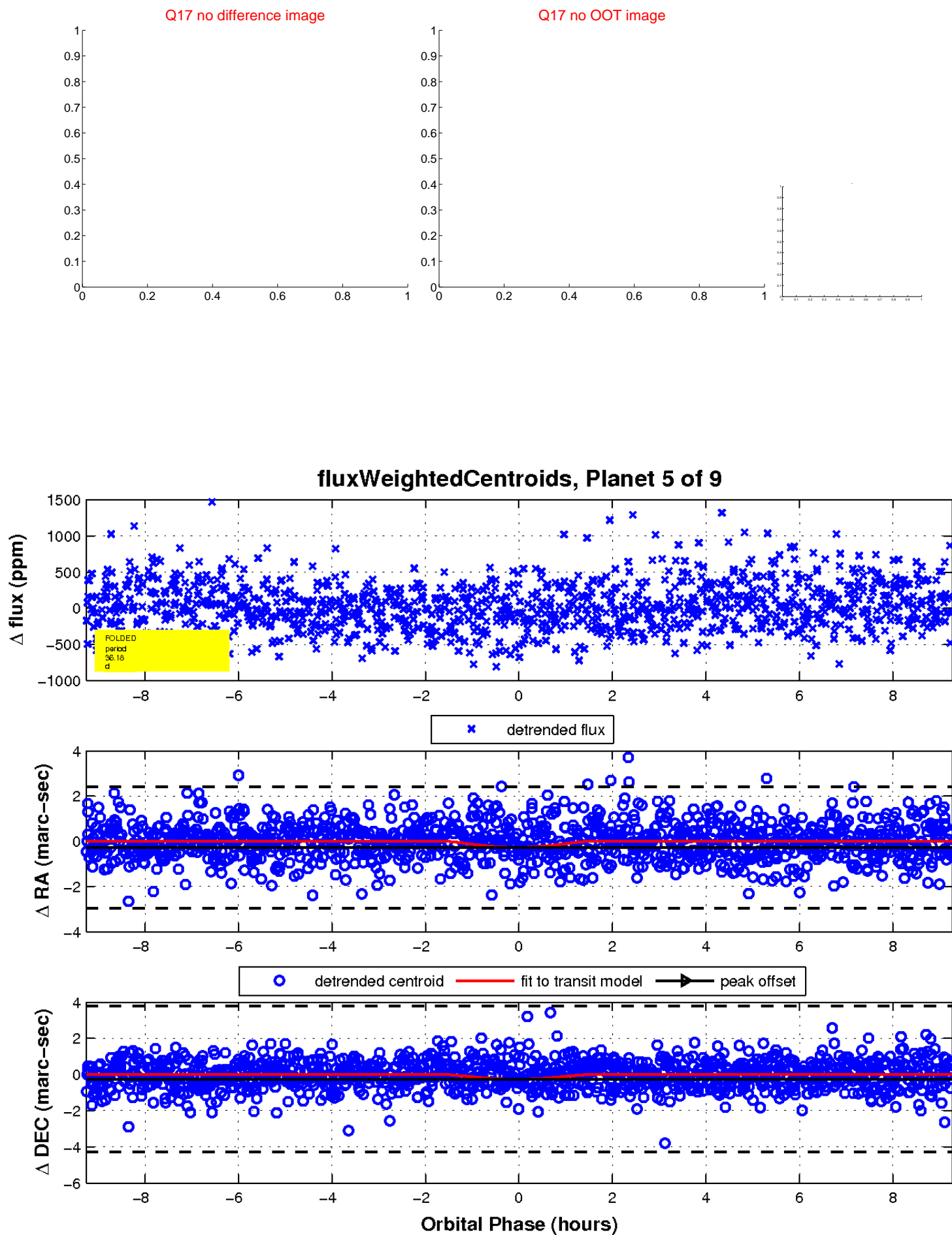
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.



Declination

# KIC 010873947

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010873947-01	OBS	No	0.527357	131.795567	18.0	3.647	10.8	4.4	1.89	7559	0.83	47530.62
010873947-02	OBS	No	19.689666	138.728149	610.6	2.271	12.2	13.2	1.89	7559	5.20	380.89
010873947-03	OBS	No	17.025367	144.262873	491.6	0.984	11.3	8.3	1.89	7559	4.24	462.36
010873947-04	OBS	No	22.211661	140.942347	695.4	1.426	10.7	10.2	1.89	7559	8.87	324.34
010873947-05	OBS	No	36.184555	138.348466	580.2	3.091	12.0	10.0	1.89	7559	8.71	169.21
010873947-06	OBS	No	37.054013	149.861374	542.1	2.239	10.5	9.4	1.89	7559	4.88	163.93
010873947-07	OBS	No	49.229353	155.691611	1022.6	4.506	10.1	12.3	1.89	7559	11.36	112.24
010873947-09	OBS	No	32.616633	140.133048	594.1	1.655	10.3	9.4	1.89	7559	4.78	194.32

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010873947-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
010873947-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
010873947-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV
010873947-04	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
010873947-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010873947-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010873947-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV
010873947-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV

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

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

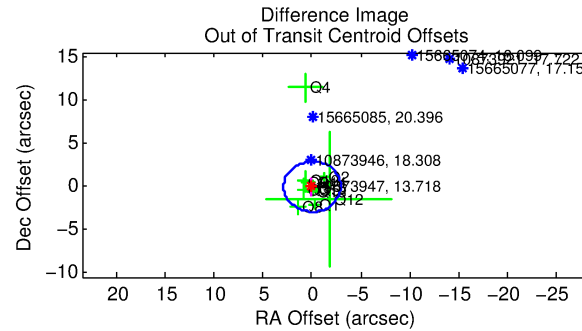
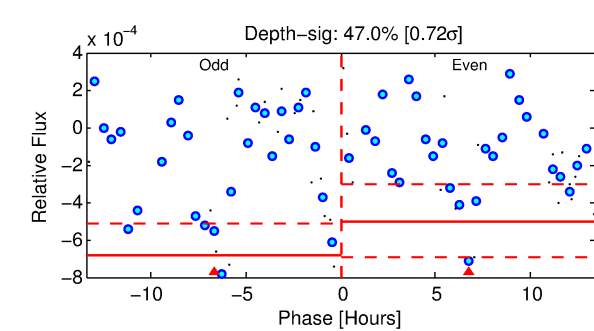
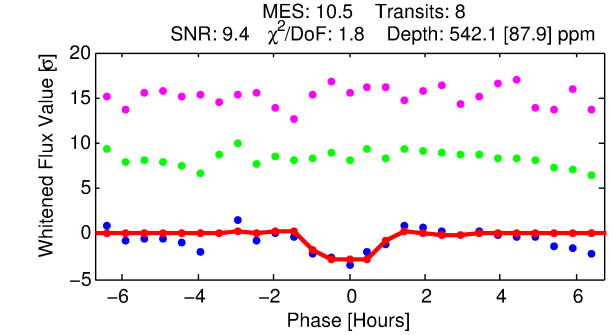
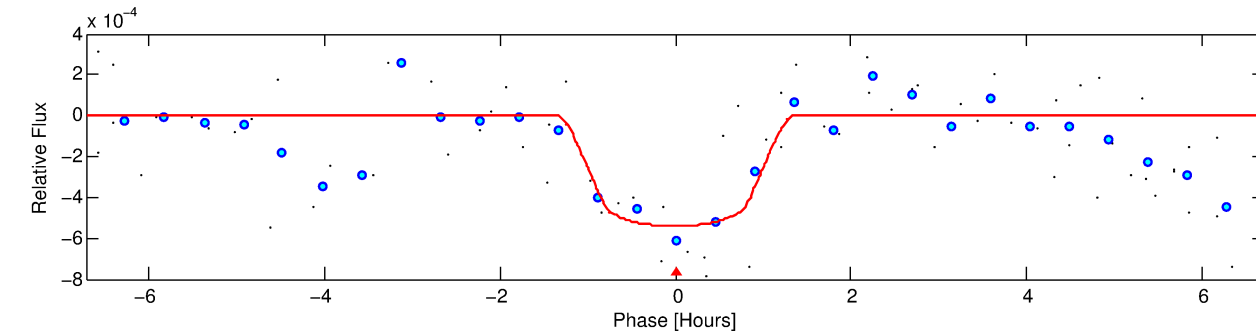
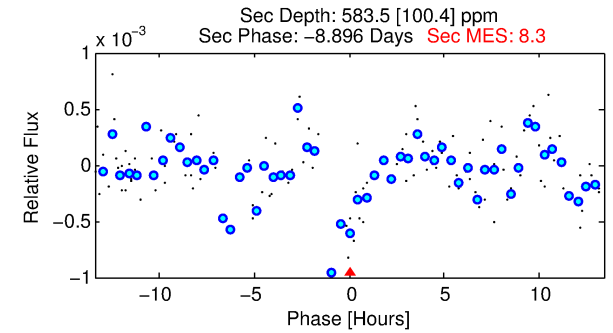
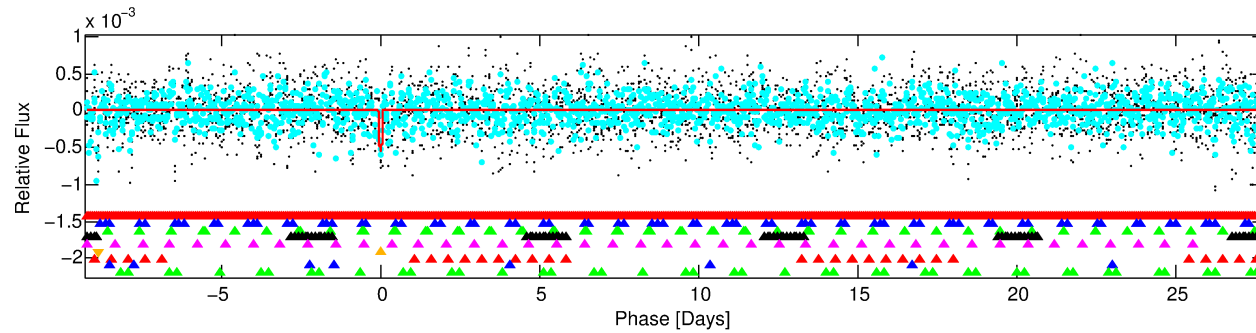
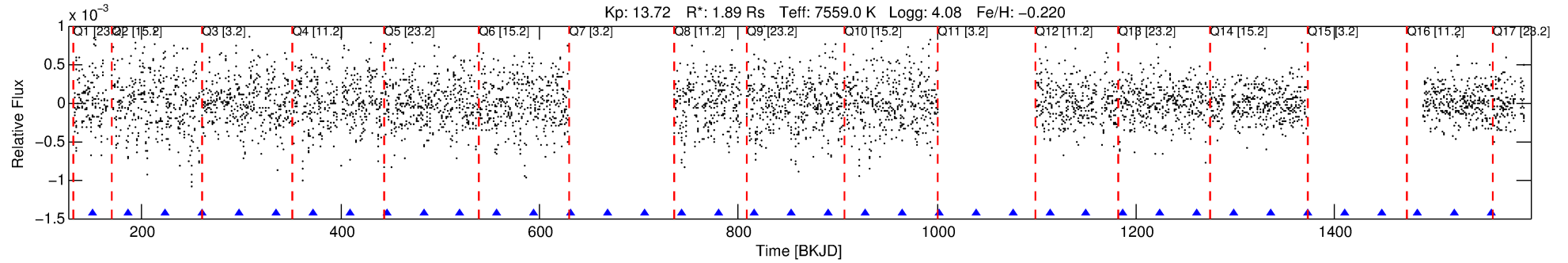
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010873947-06

No Significant Match Found

# DV One-Page Summary

KIC: 10873947 Candidate: 6 of 9 Period: 37.054 d



## DV Fit Results:

Period = 37.05401 [0.00058] d  
Epoch = 149.8614 [0.0120] BKJD  
Rp/R\* = 0.0237 [0.0361]  
a/R\* = 79.29 [644.28]  
b = 0.81 [3.51]  
Seff = 163.93 [59.70]  
Teff = 912 [83] K  
Rp = 4.88 [7.56] Re  
a = 0.2519 [0.0583] AU  
Ag = 855.37 [2621.42] [0.33 $\sigma$ ]  
Teffp = 7629 [5821] K [1.15 $\sigma$ ]

## DV Diagnostic Results:

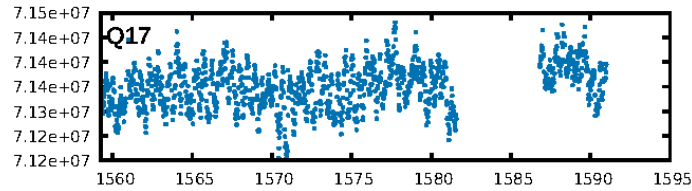
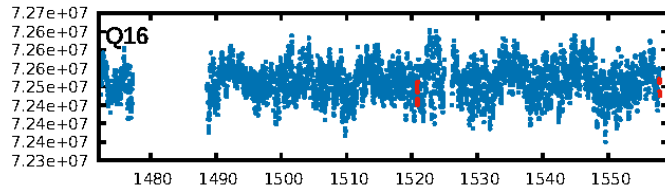
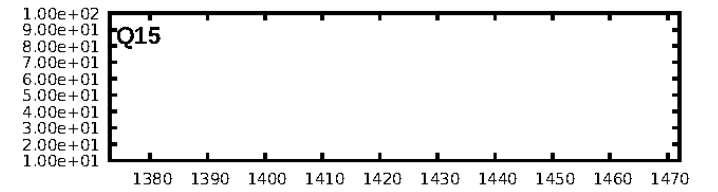
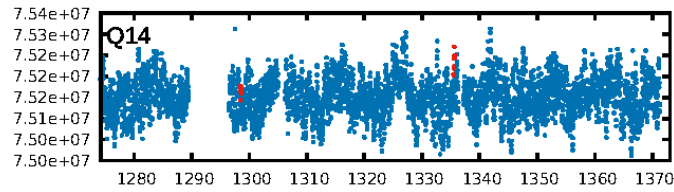
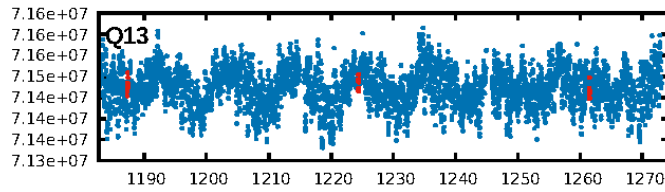
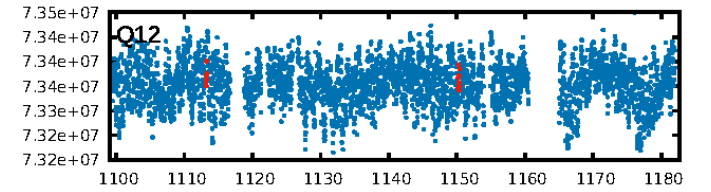
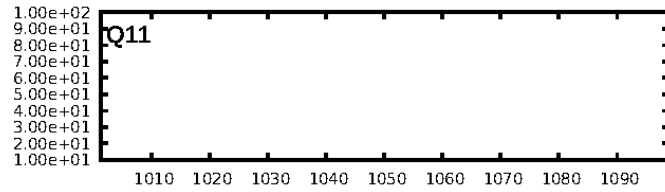
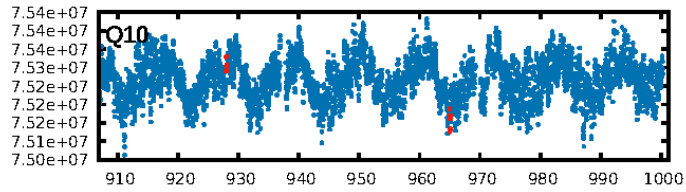
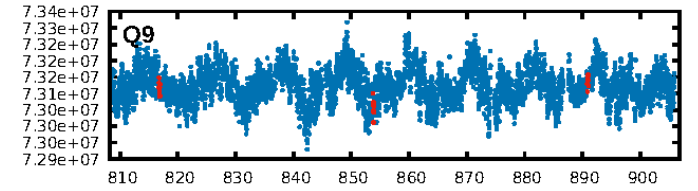
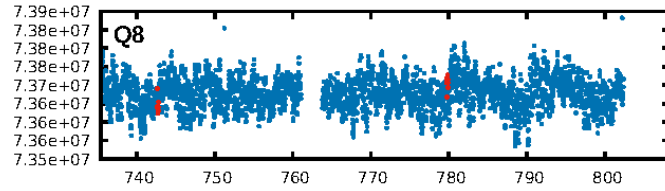
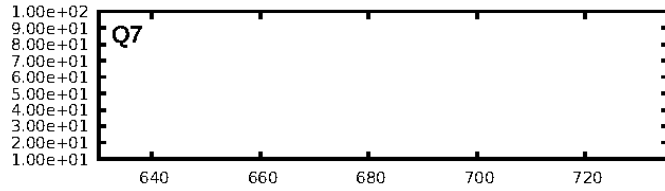
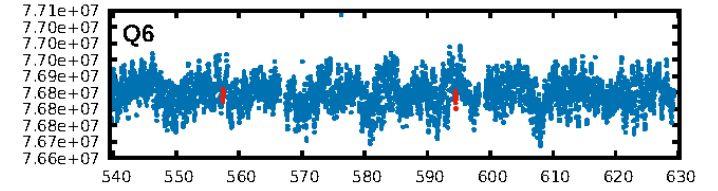
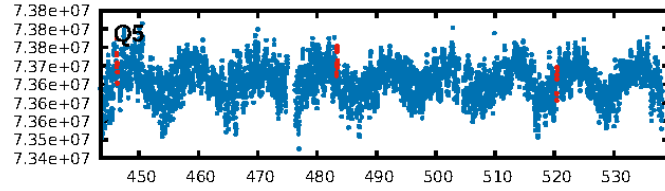
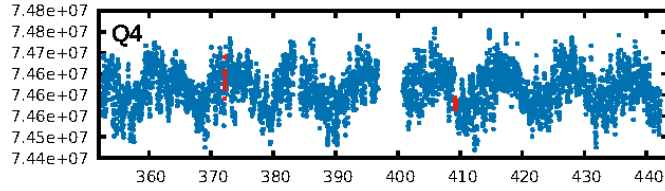
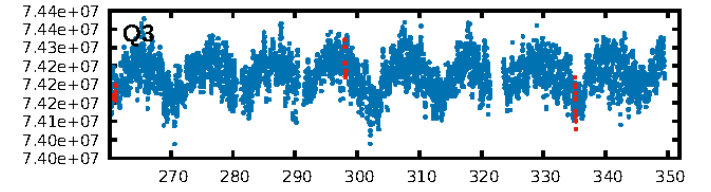
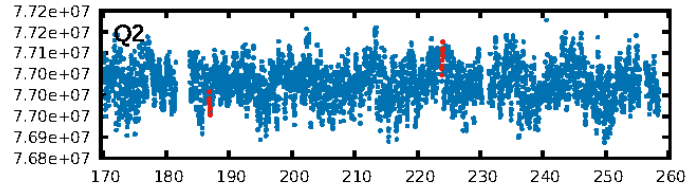
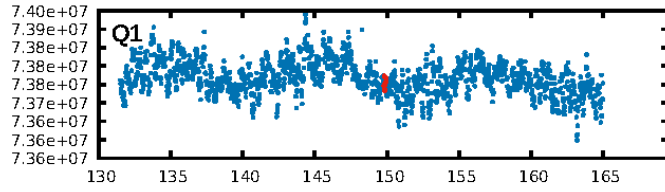
ShortPeriod-sig: 100.0% [5.47 $\sigma$ ]  
LongPeriod-sig: 100.0% [58.08 $\sigma$ ]  
ModelChiSquare2-sig: 2.2%  
ModelChiSquareGof-sig: 99.9%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [8/8]  
GhostDiagnostic-chr: -3.565  
Centroid-sig: 15.0%  
Centroid-so: 0.759 arcsec [1.86 $\sigma$ ]  
OotOffset-rm: 0.046 arcsec [0.05 $\sigma$ ]  
KicOffset-rm: 0.155 arcsec [0.25 $\sigma$ ]  
OotOffset-st: 4/1/4/4 [13]  
KicOffset-st: 4/1/4/4 [13]  
DiffImageQuality-fgm: 0.46 [6/13]  
DiffImageOverlap-fno: 0.00 [0/13]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:30:53 Z

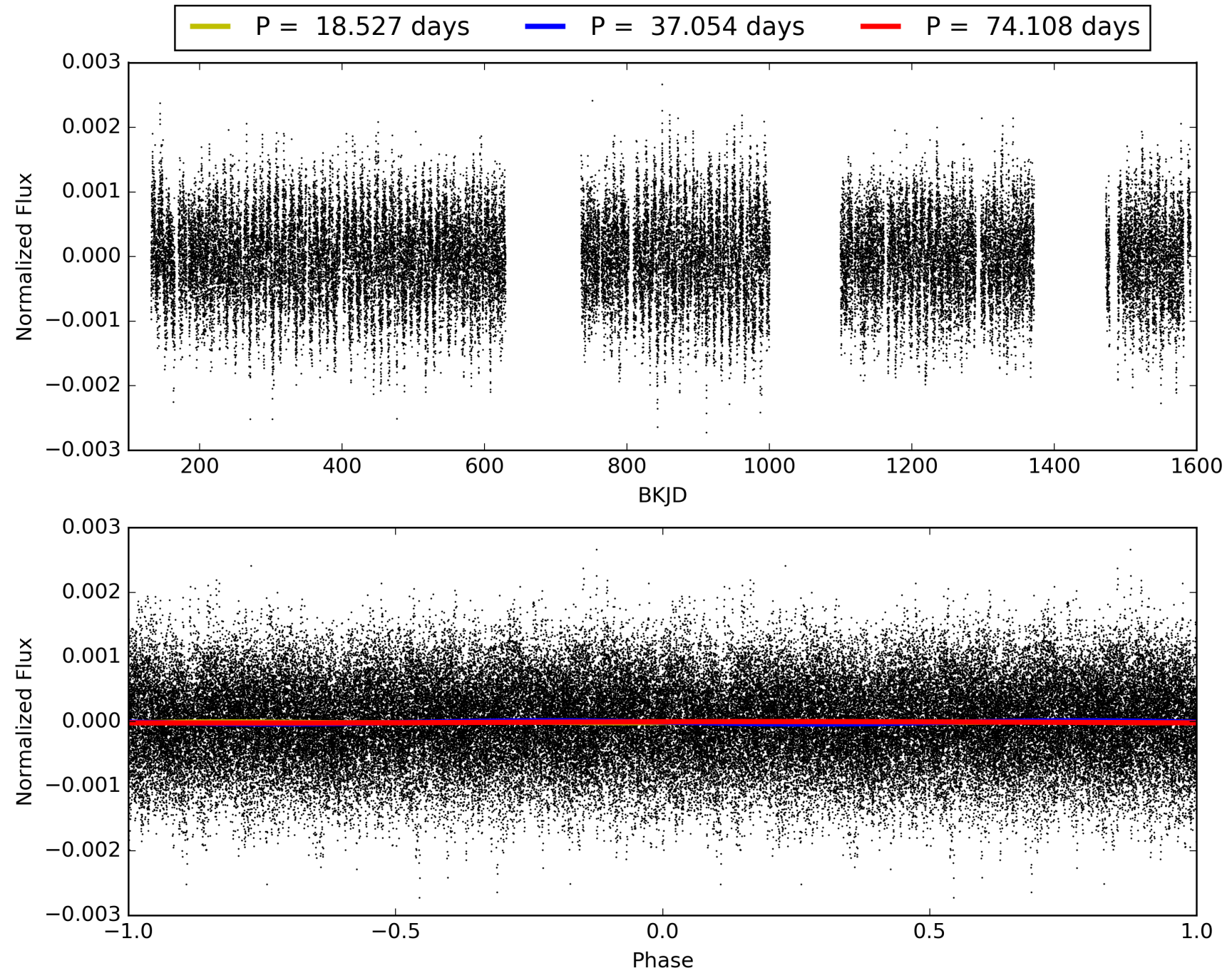
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 010873947-06, PDC Light Curves

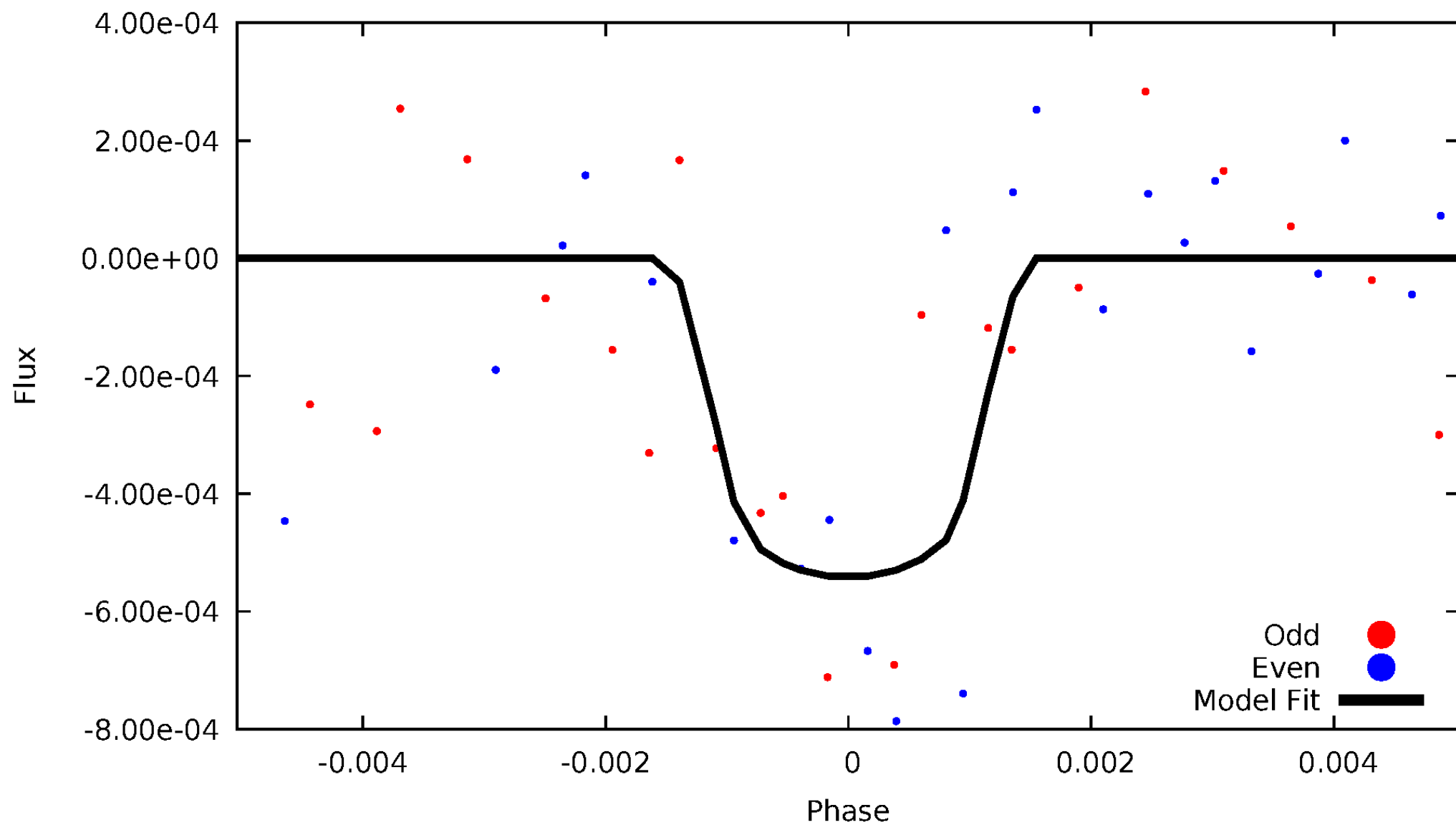


TCE 010873947-06



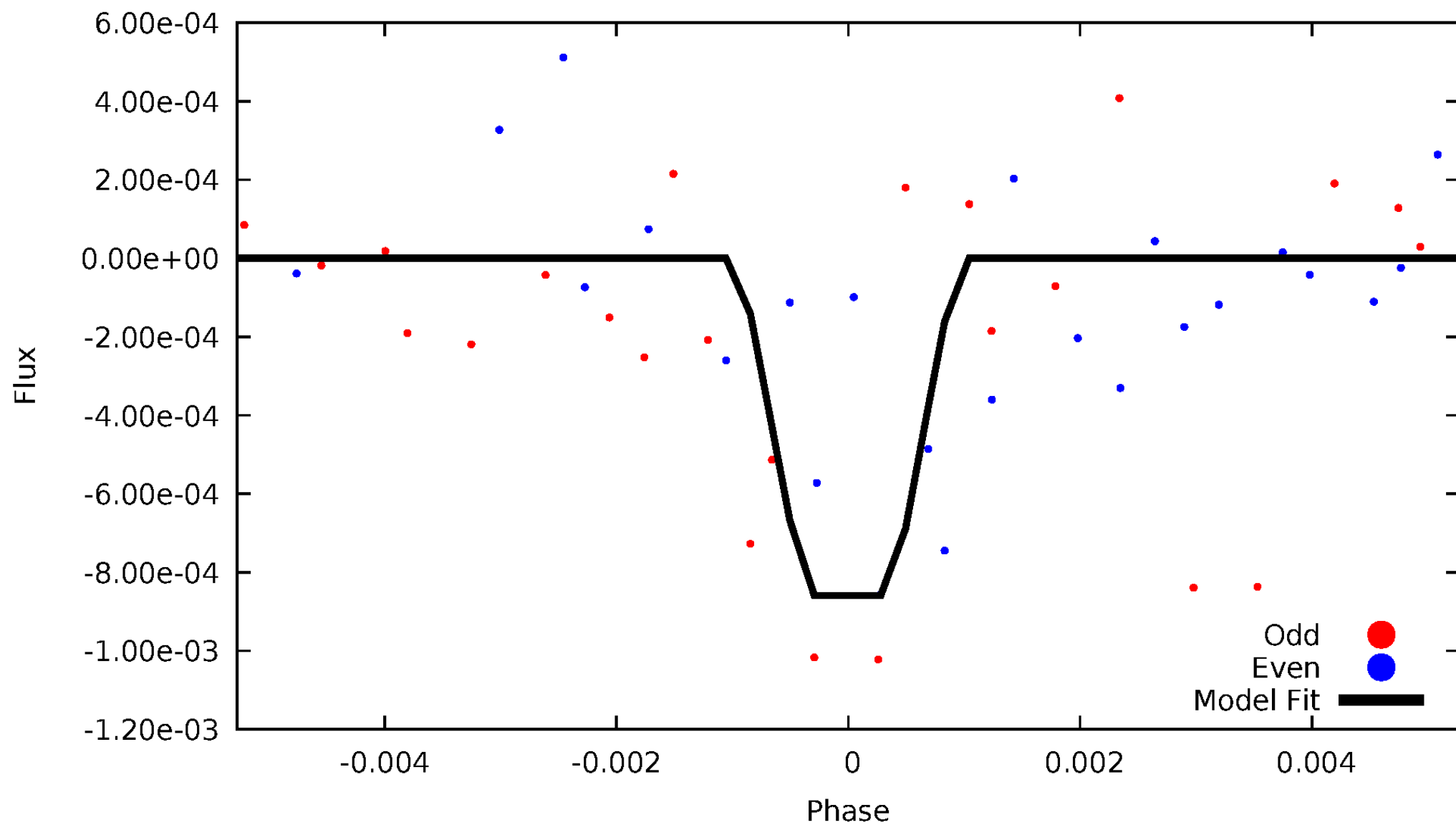
# DV Odd/Even

TCE 010873947-06



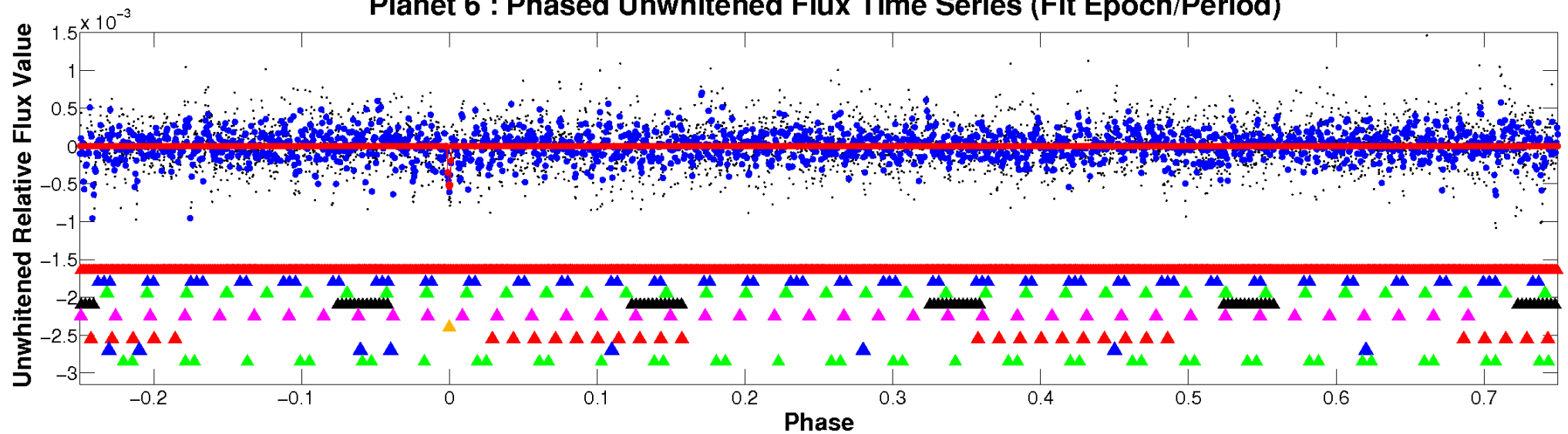
# ALT Odd/Even

TCE 010873947-06

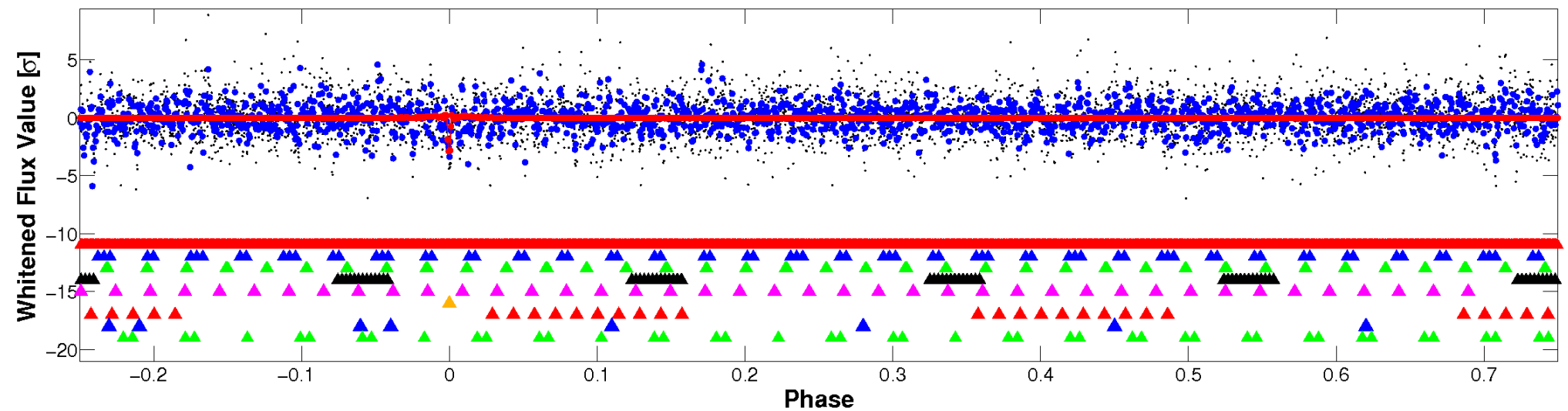


# Non-Whitened Vs. Whitened Light Curve

## Planet 6 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

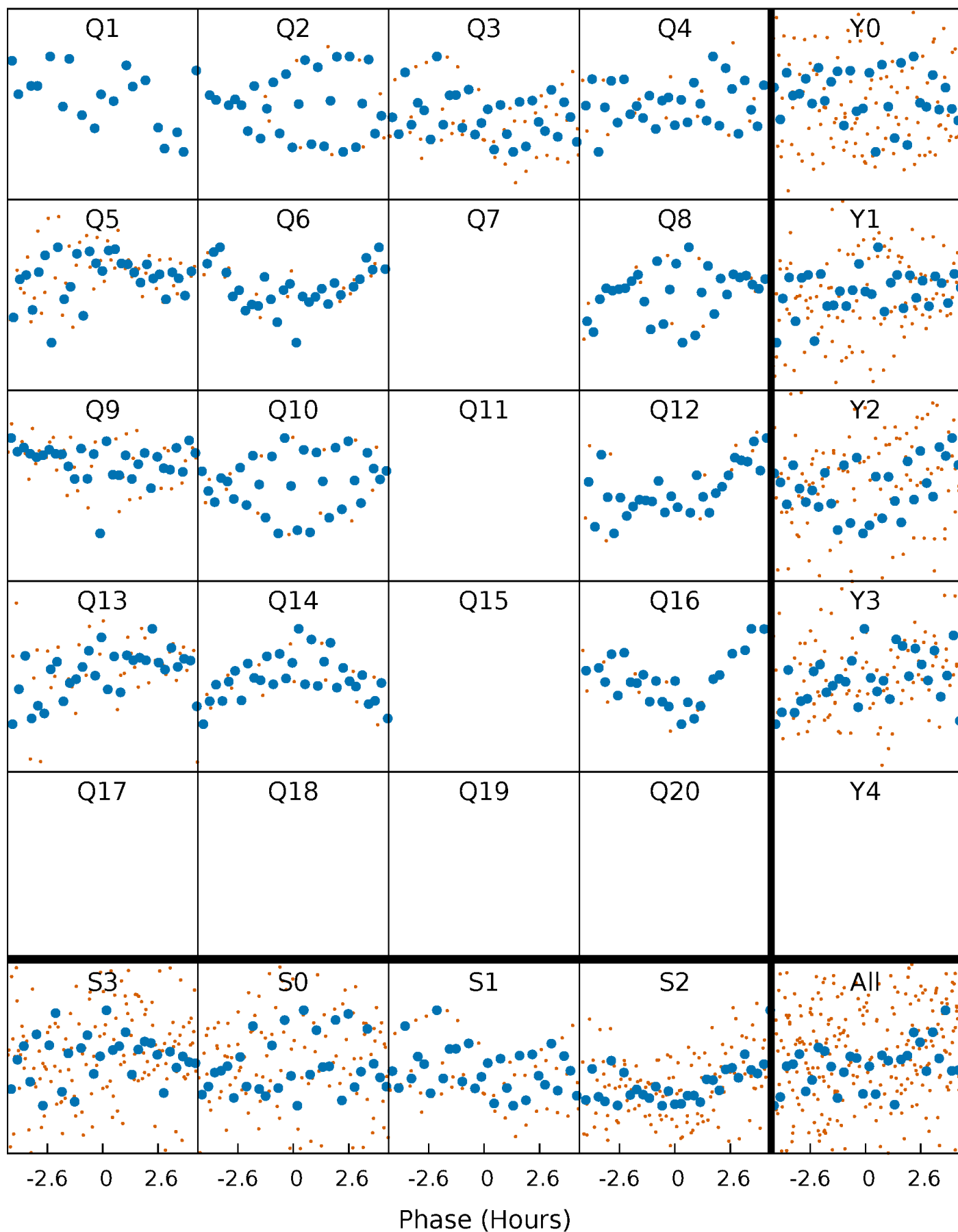


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



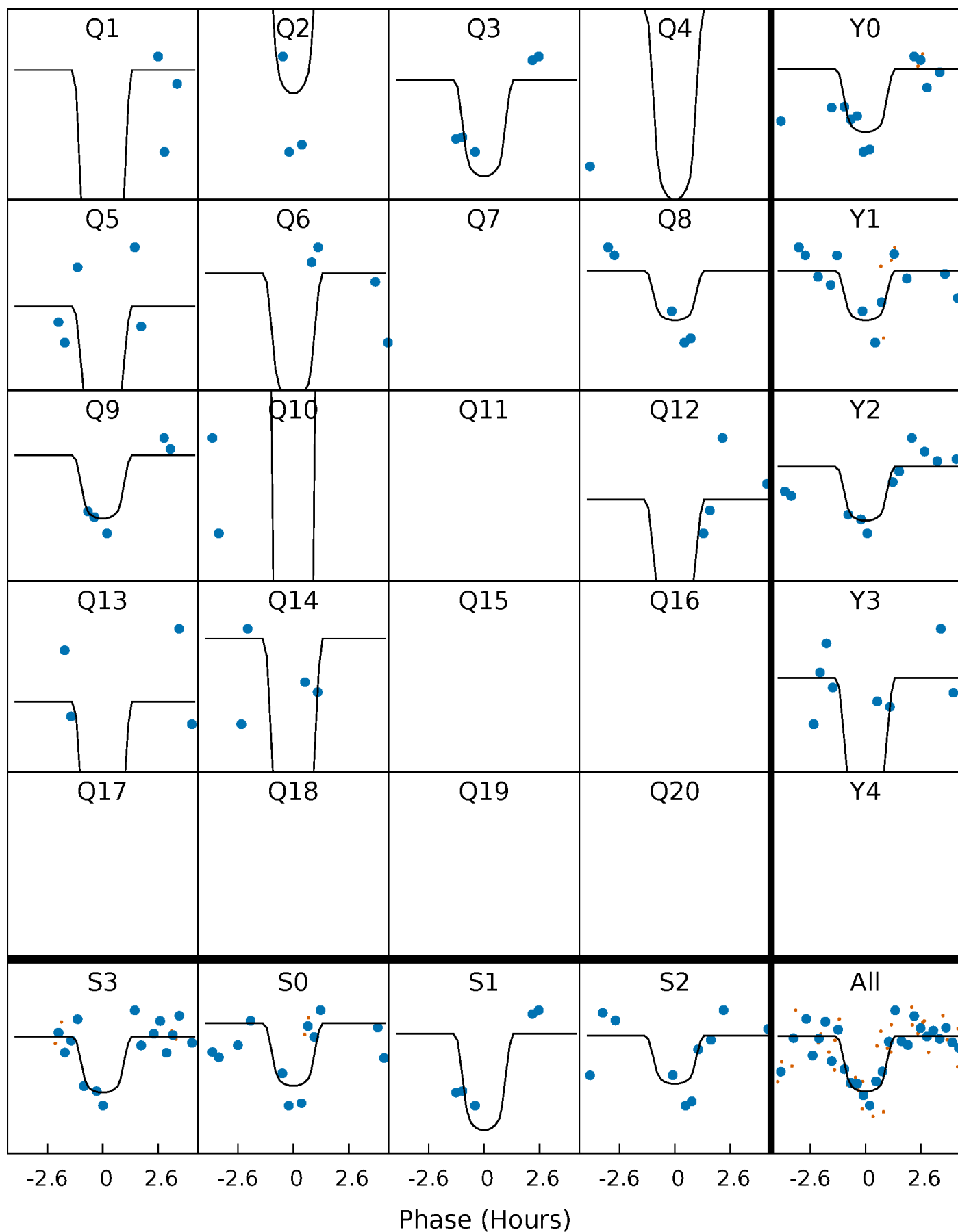
# PDC Quarter-Phased Transit Curves

TCE 010873947-06 P= 37.054013 Days  $T_0=149.861374$  (BKJD)



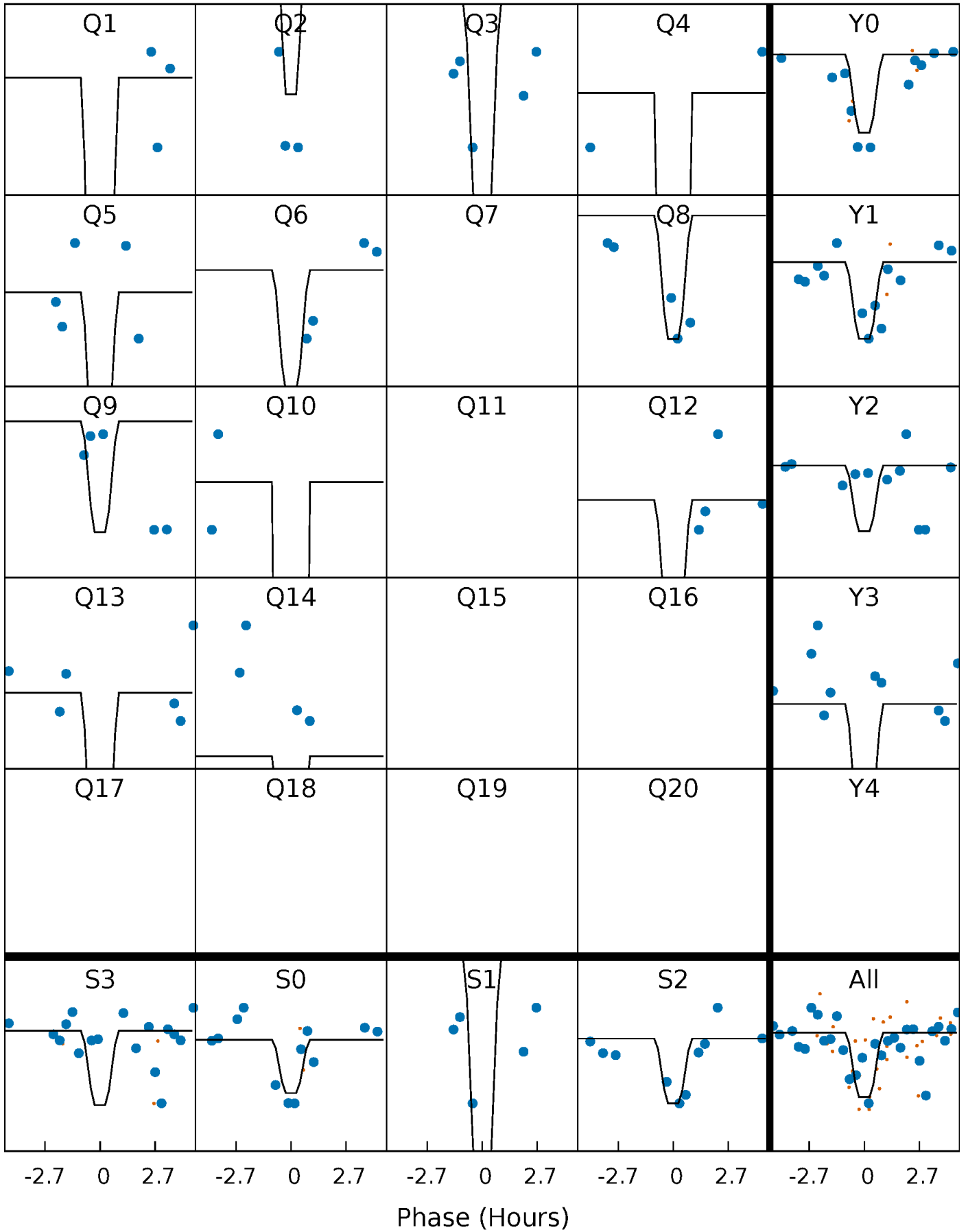
# DV Quarter-Phased Transit Curves

TCE 010873947-06 P= 37.054013 Days  $T_0=149.861374$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 010873947-06 P= 37.053995 Days  $T_0=149.865931$  (BKJD)

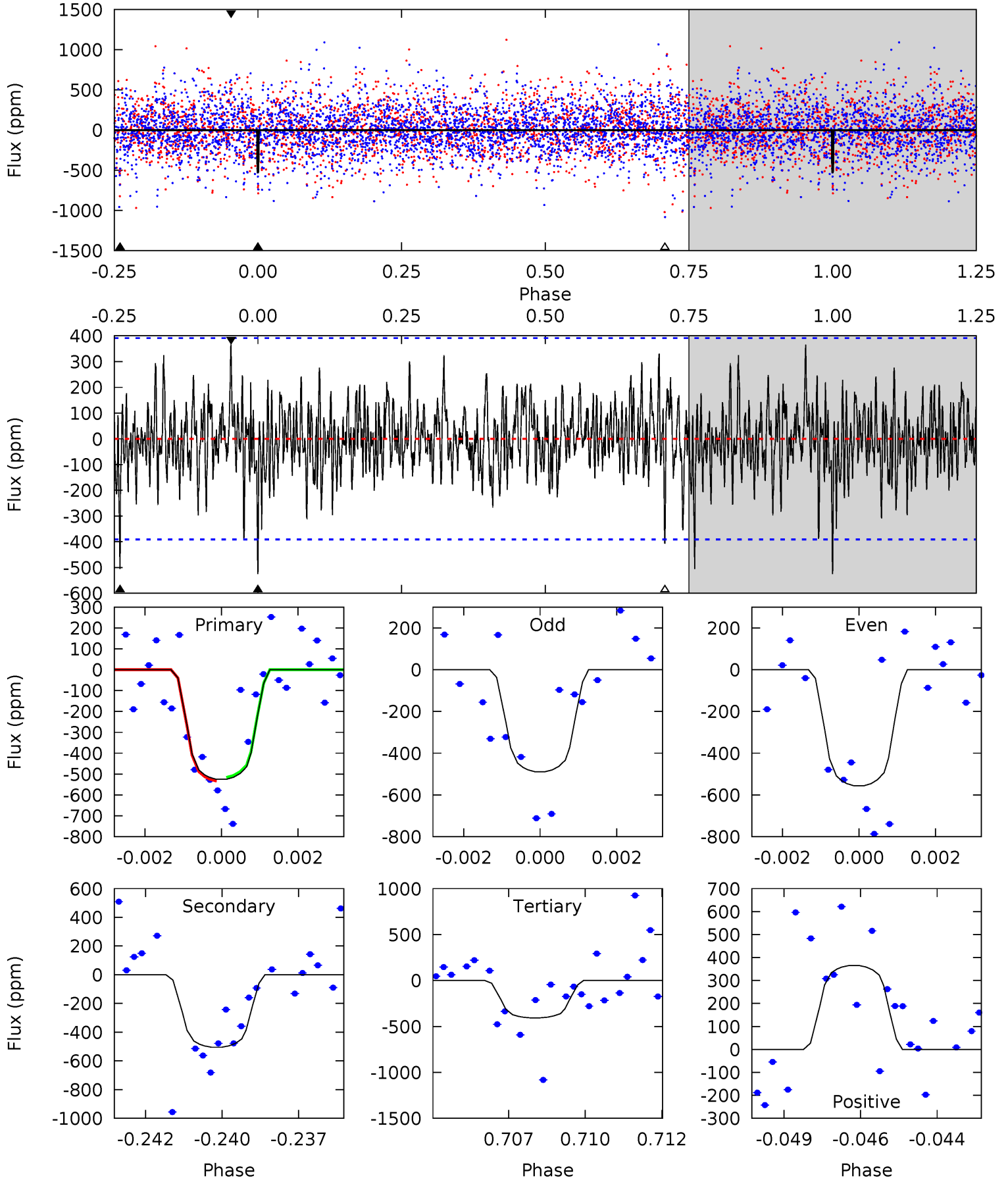




# DV Model-Shift Uniqueness Test

010873947-06, P = 37.054013 Days, E = 112.807361 Days

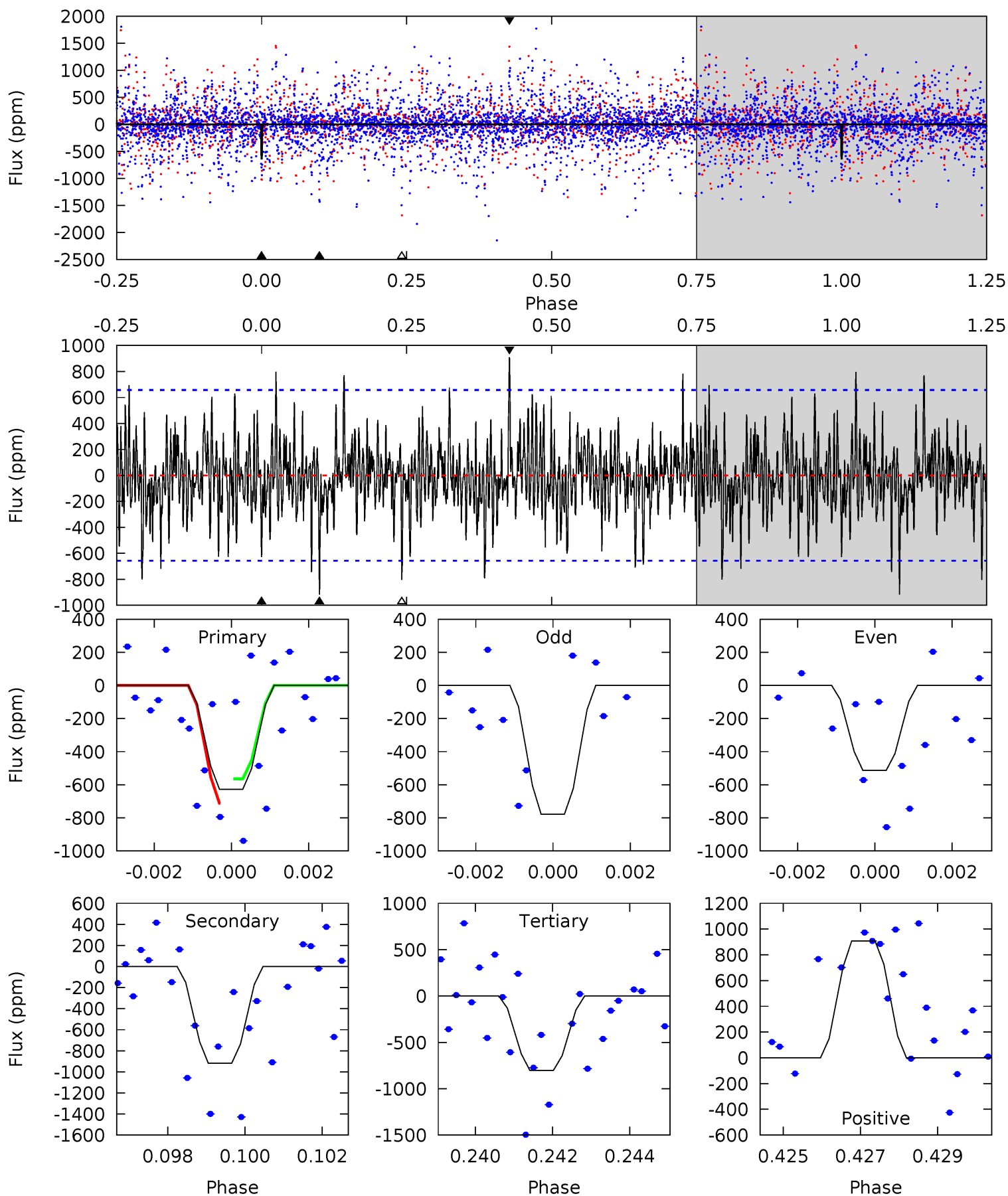
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.10	6.83	5.50	4.94	5.29	3.03	1.48	1.60	2.16	1.33	1.89	0.45	0.77	0.41	0.12



# Alt Model-Shift Uniqueness Test

010873947-06, P = 37.053995 Days, E = 112.811936 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
5.10	7.46	6.52	7.36	5.34	3.11	1.84	-1.43	-2.26	0.93	0.09	0.95	0.84	0.50	0.60



### Stellar Parameters For KIC 010873947

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7559^{+237}_{-316}$	$4.078^{+0.170}_{-0.170}$	$-0.220^{+0.250}_{-0.350}$	$1.886^{+0.541}_{-0.443}$	$1.551^{+0.210}_{-0.257}$	$0.326^{+0.339}_{-0.143}$
	+3%/-4%	+4%/-4%	+114%/-159%	+29%/-23%	+14%/-17%	+104%/-44%
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 010873947-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-505 \pm 74$	$6.73^{+6.43}_{-4.55}$	$1273^{+91}_{-89}$	$6114^{+6395}_{-1597}$	$375^{+3202}_{-277}$
Alt.	$-918 \pm 123$	$8.11^{+6.74}_{-5.41}$	$1270^{+95}_{-84}$	$6465^{+7081}_{-1558}$	$481^{+3768}_{-339}$

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

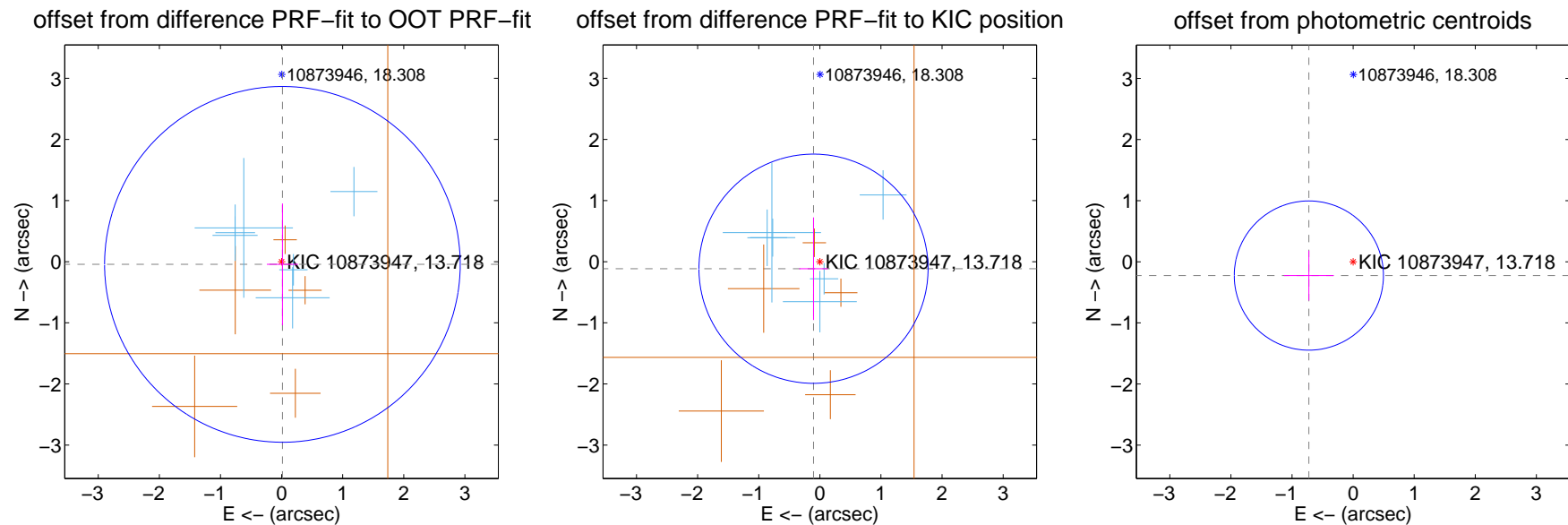
## DV Centroid Data

Supplemental centroid analysis for 010873947-06. Kepler magnitude: 13.72. Transit SNR 9.38

There are 6 quarters with good PRF difference image offsets

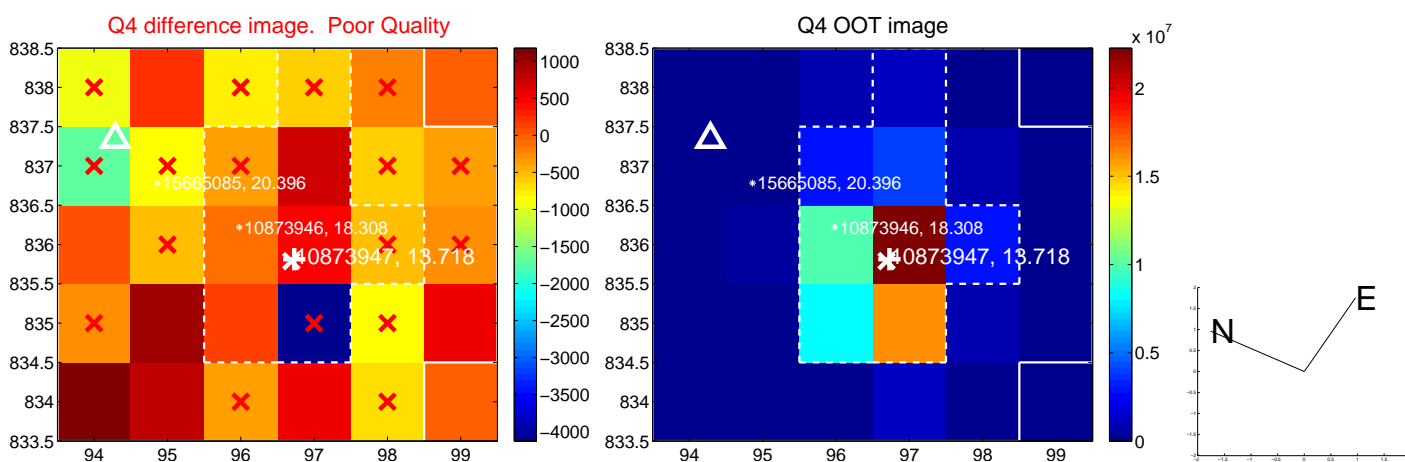
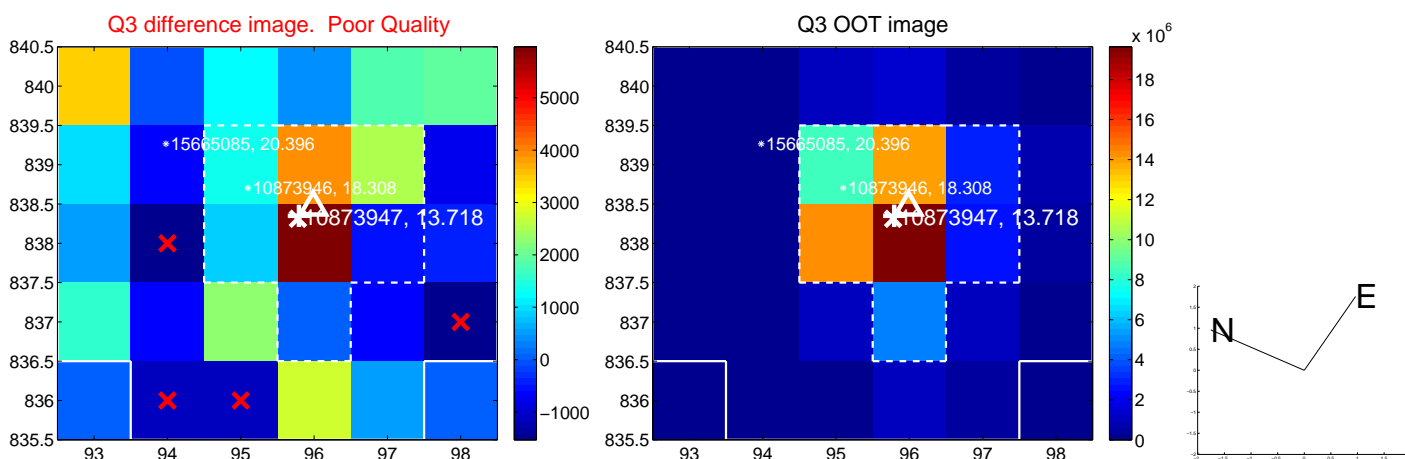
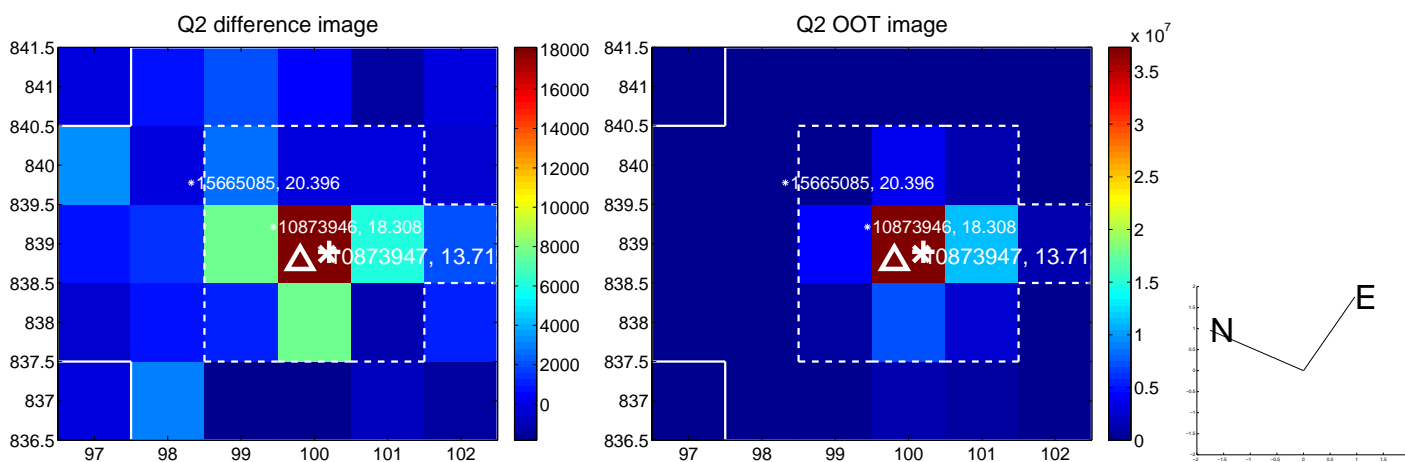
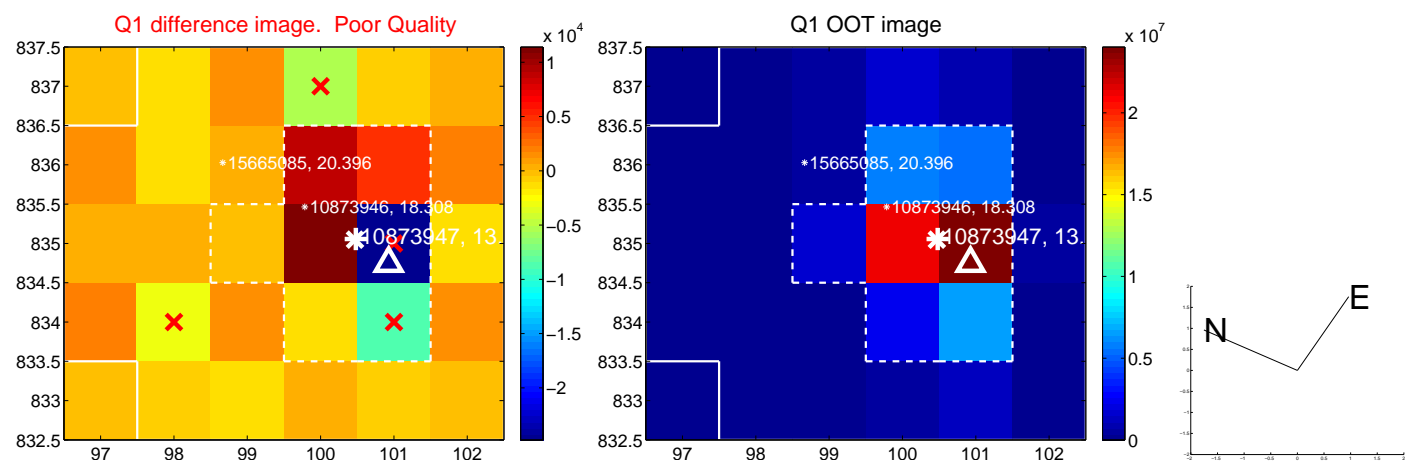
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.046 \pm 0.970$	0.05	$-0.014 \pm 0.255$	$-0.044 \pm 0.997$
PRF-fit source offset from KIC position	$0.155 \pm 0.625$	0.25	$0.104 \pm 0.235$	$-0.115 \pm 0.840$
photometric centroid source offset	$0.76 \pm 0.41$	1.86	$0.72 \pm 0.41$	$-0.23 \pm 0.41$

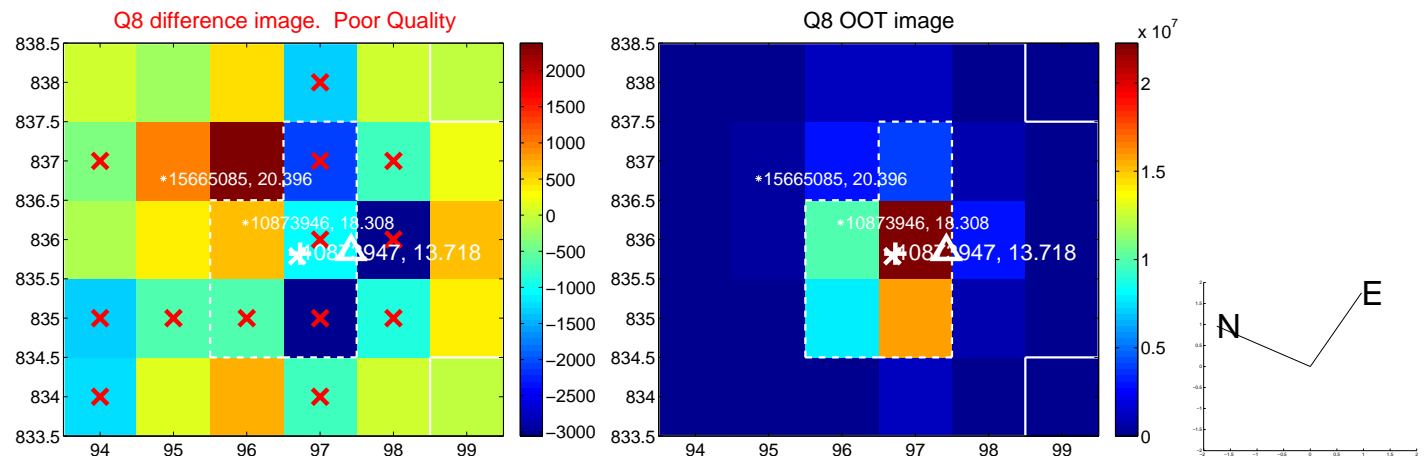
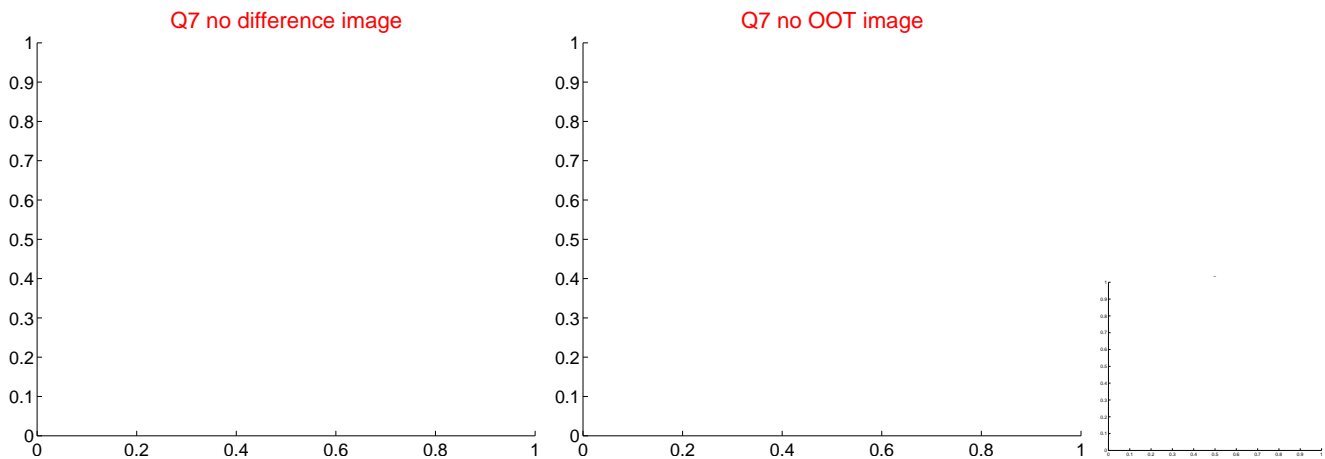
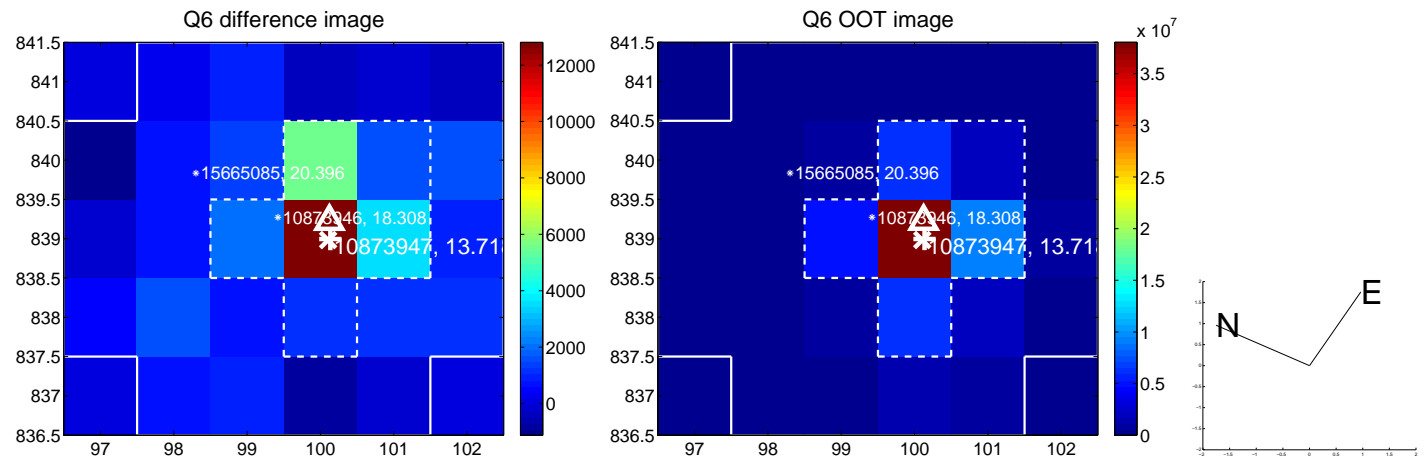
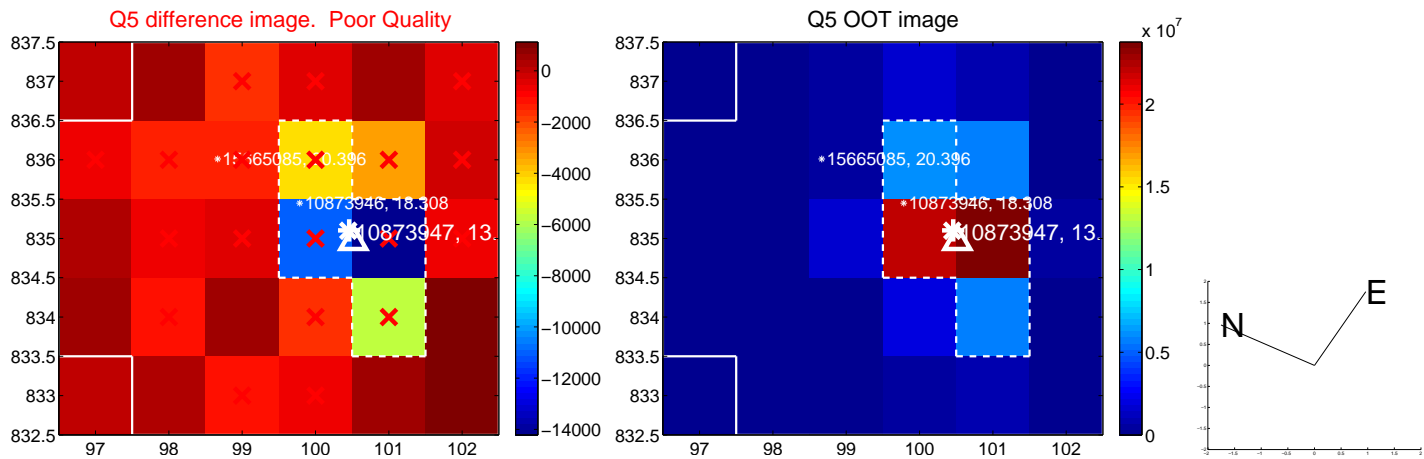


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

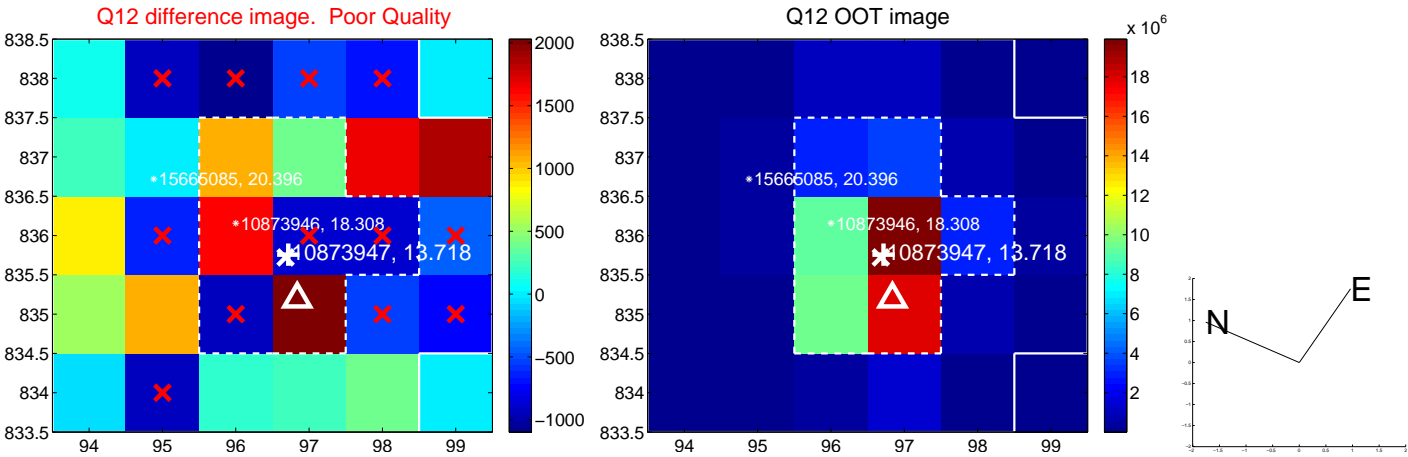
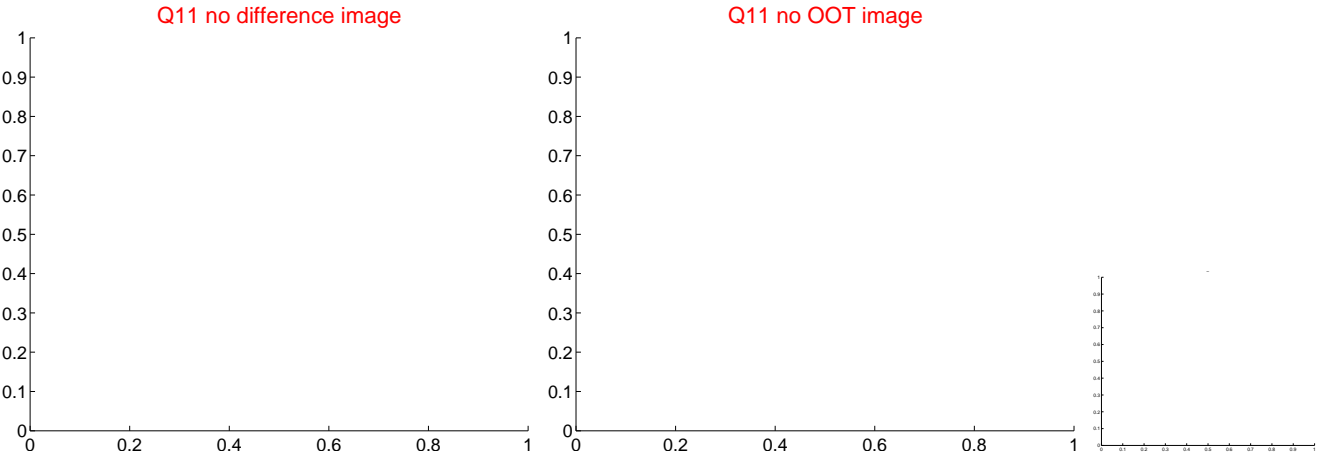
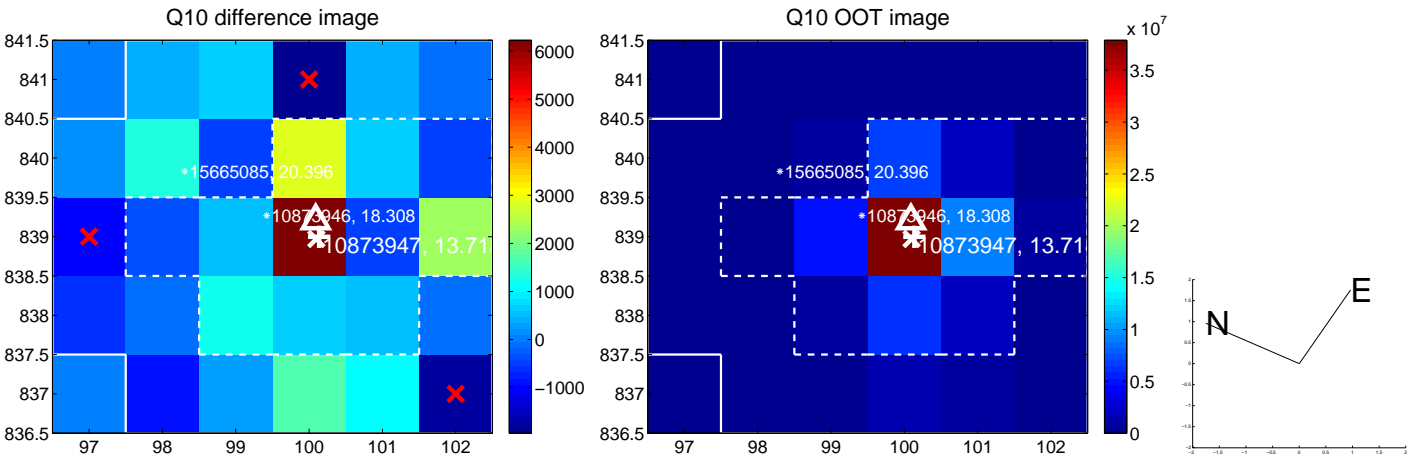
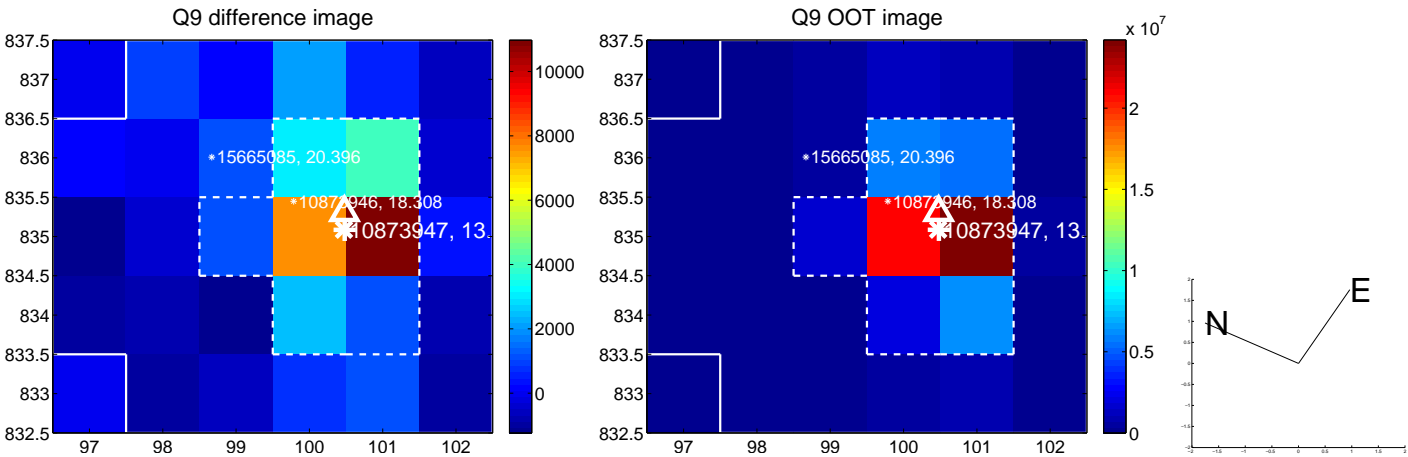
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



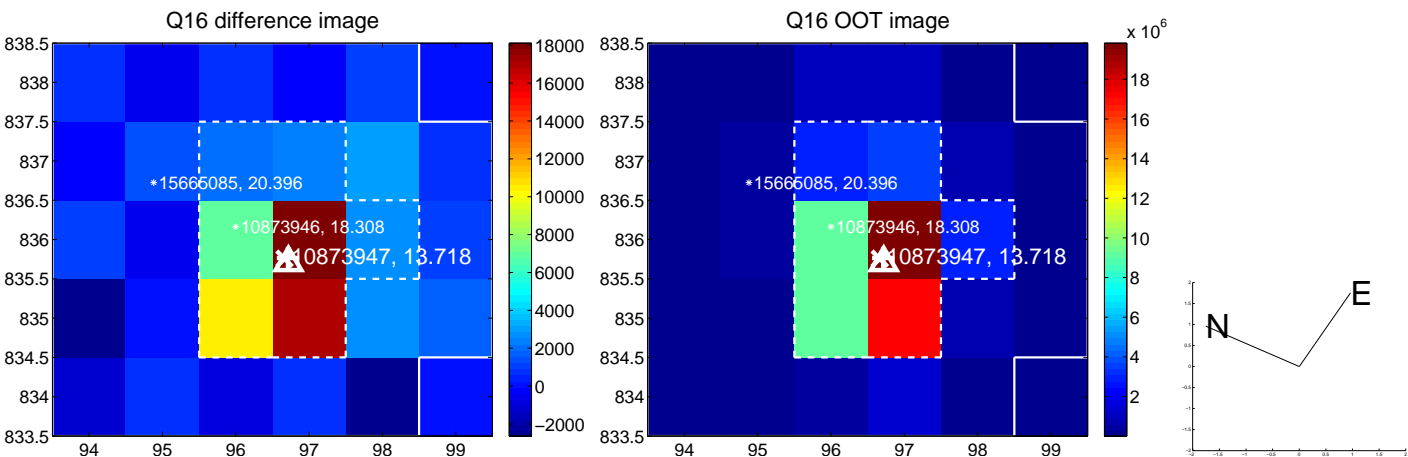
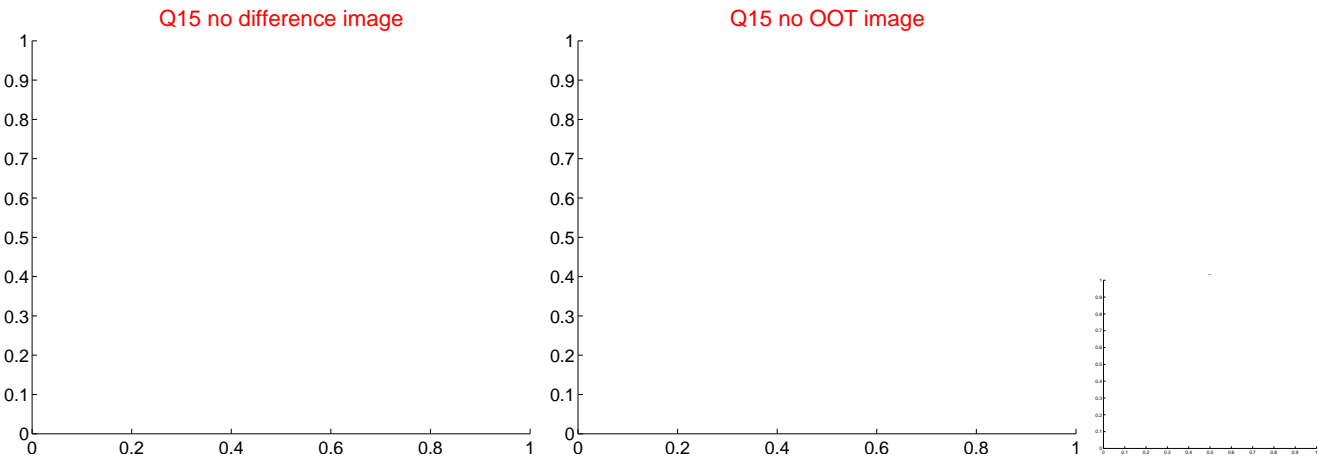
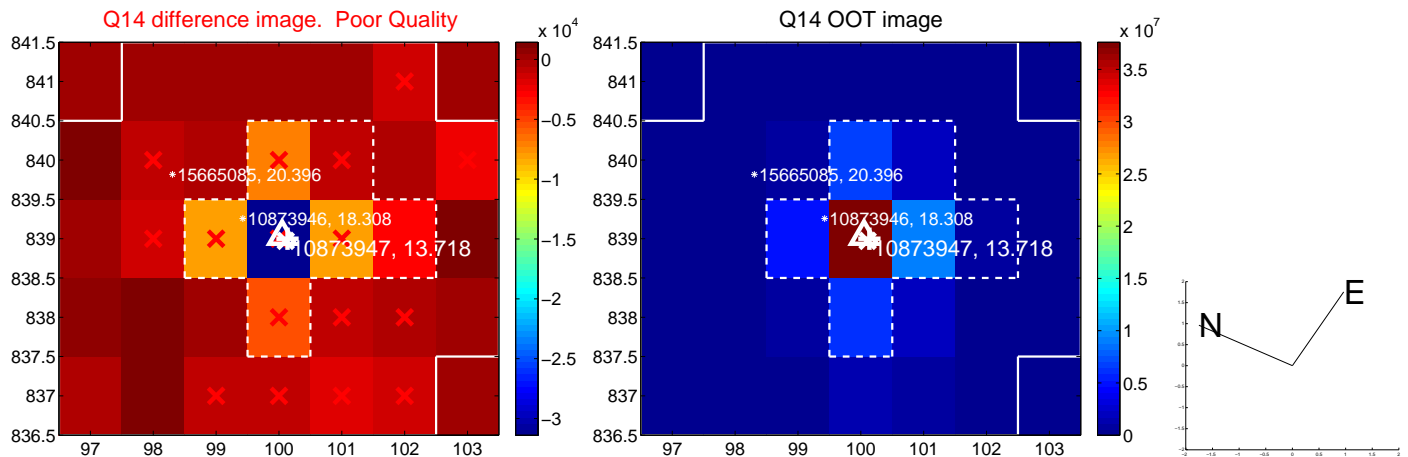
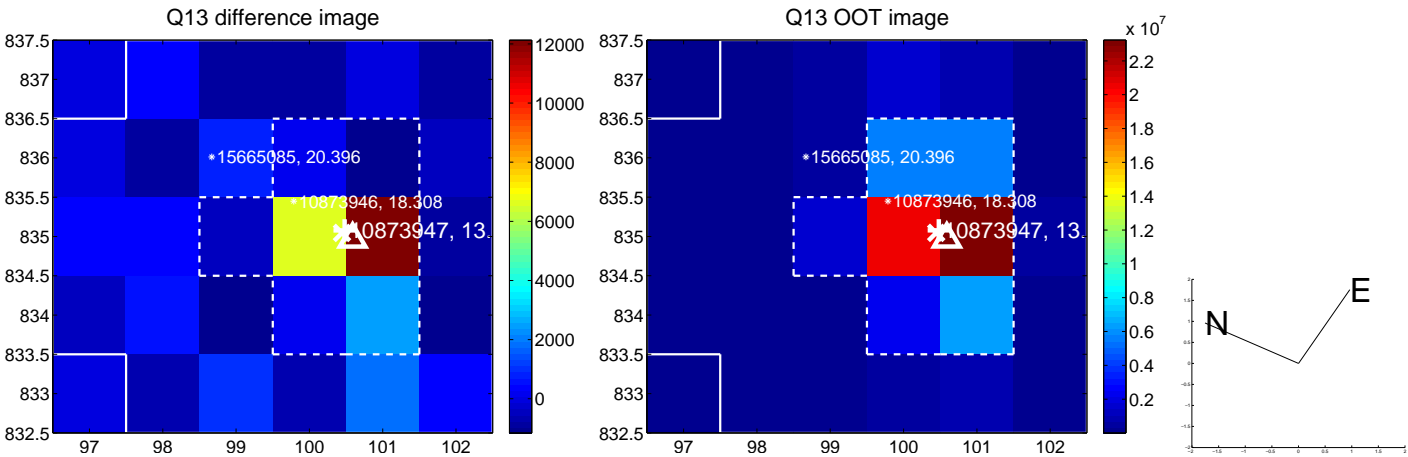
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

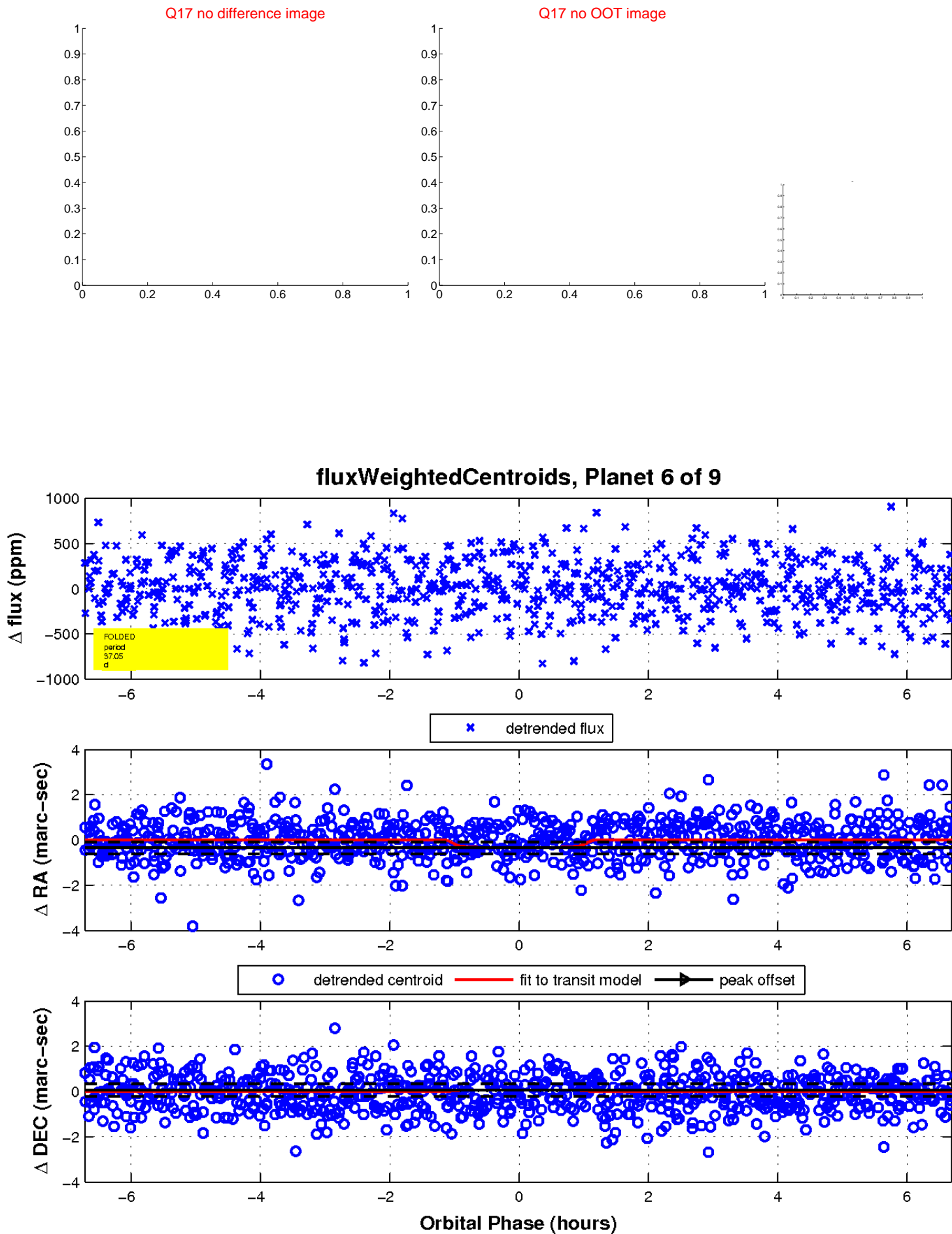


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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





# KIC 010873947

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010873947-01	OBS	No	0.527357	131.795567	18.0	3.647	10.8	4.4	1.89	7559	0.83	47530.62
010873947-02	OBS	No	19.689666	138.728149	610.6	2.271	12.2	13.2	1.89	7559	5.20	380.89
010873947-03	OBS	No	17.025367	144.262873	491.6	0.984	11.3	8.3	1.89	7559	4.24	462.36
010873947-04	OBS	No	22.211661	140.942347	695.4	1.426	10.7	10.2	1.89	7559	8.87	324.34
010873947-05	OBS	No	36.184555	138.348466	580.2	3.091	12.0	10.0	1.89	7559	8.71	169.21
010873947-06	OBS	No	37.054013	149.861374	542.1	2.239	10.5	9.4	1.89	7559	4.88	163.93
010873947-07	OBS	No	49.229353	155.691611	1022.6	4.506	10.1	12.3	1.89	7559	11.36	112.24
010873947-09	OBS	No	32.616633	140.133048	594.1	1.655	10.3	9.4	1.89	7559	4.78	194.32

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010873947-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
010873947-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
010873947-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV
010873947-04	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
010873947-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010873947-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010873947-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV
010873947-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV

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

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

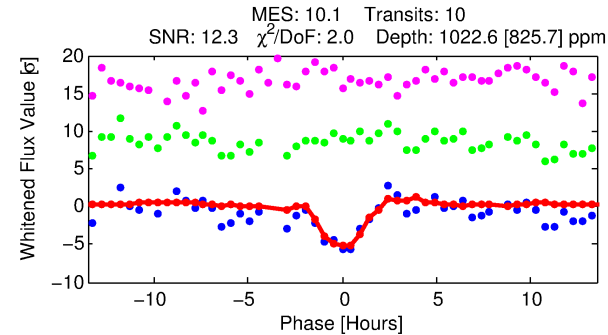
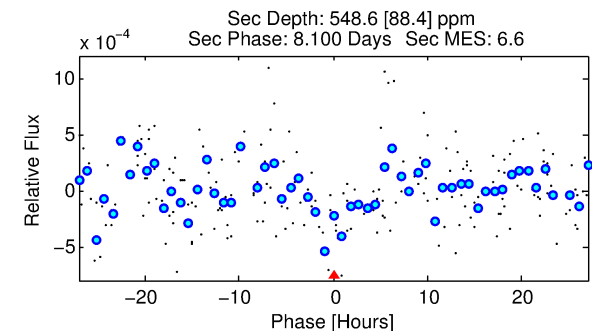
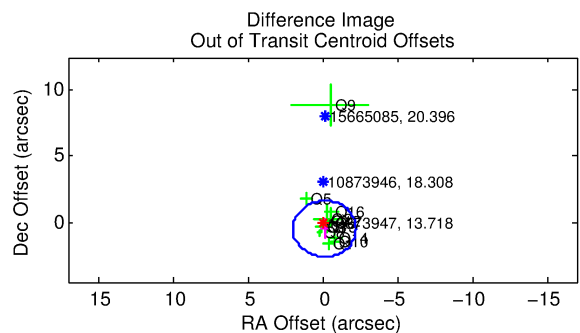
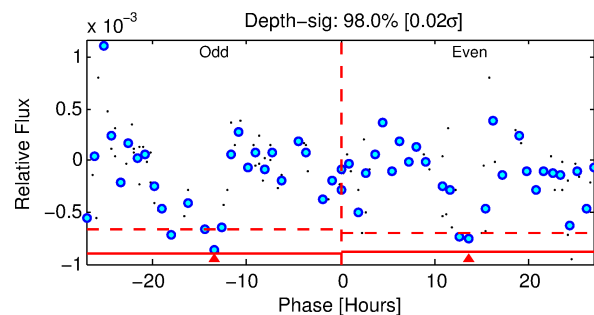
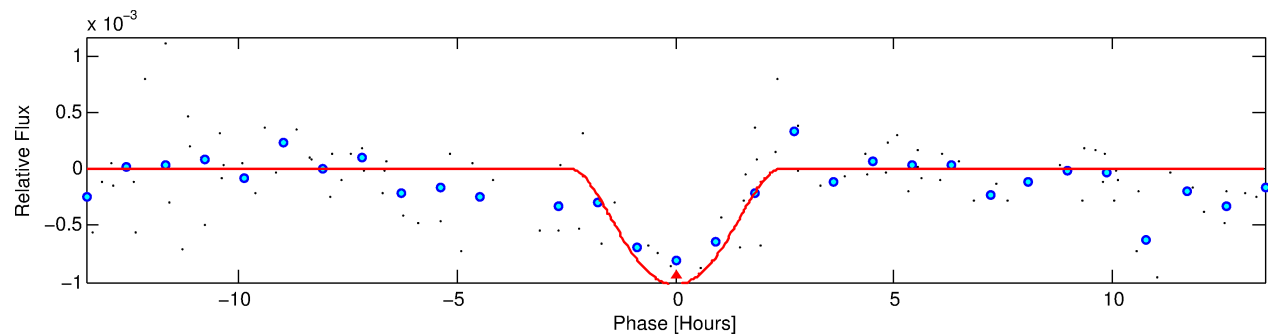
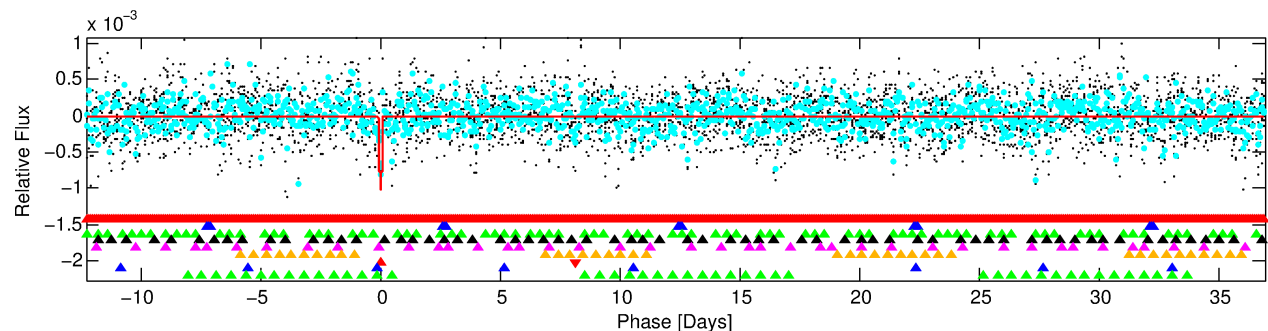
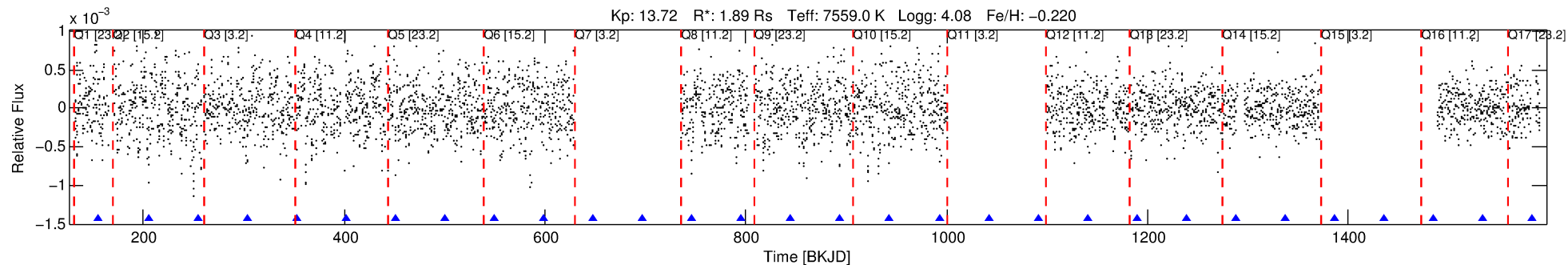
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010873947-07

No Significant Match Found

# DV One-Page Summary

KIC: 10873947 Candidate: 7 of 9 Period: 49.229 d



## DV Fit Results:

Period = 49.22935 [0.00060] d  
Epoch = 155.6916 [0.0085] BKJD  
Rp/R\* = 0.0552 [0.2120]  
a/R\* = 28.13 [26.20]  
b = 1.00 [0.28]  
Seff = 112.24 [40.88]  
Teff = 830 [76] K  
Rp = 11.36 [43.76] Re  
a = 0.3045 [0.0705] AU  
Ag = 216.83 [1667.68] [0.13σ]  
Teffp = 4924 [9462] K [0.43σ]

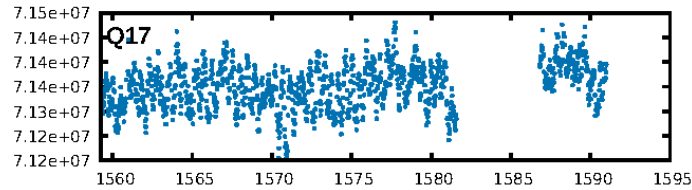
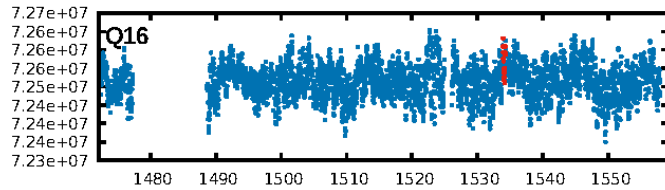
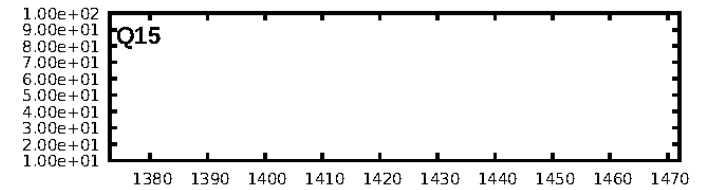
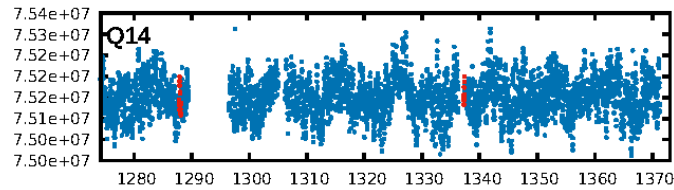
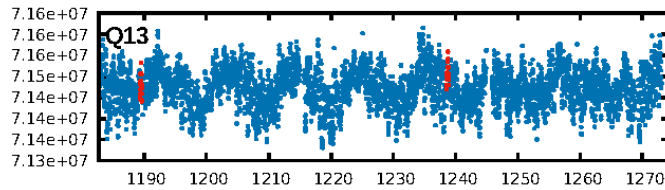
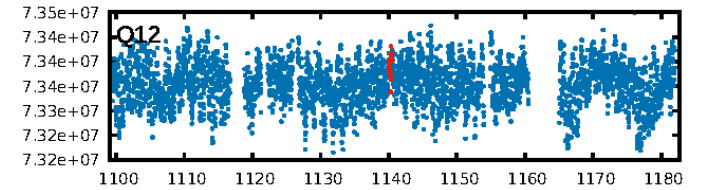
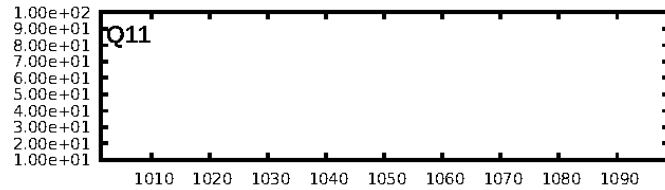
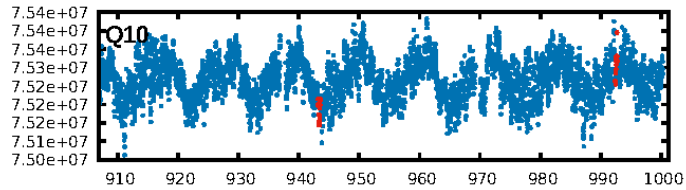
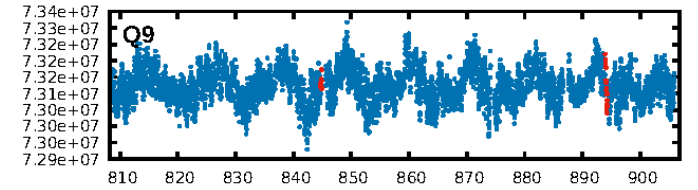
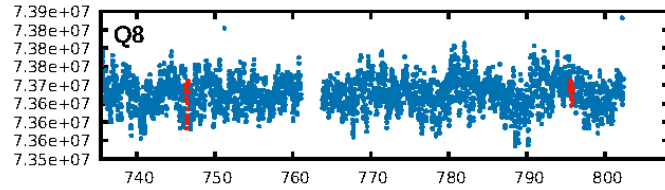
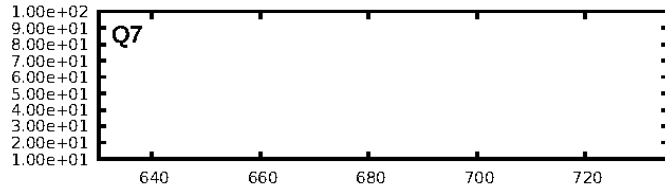
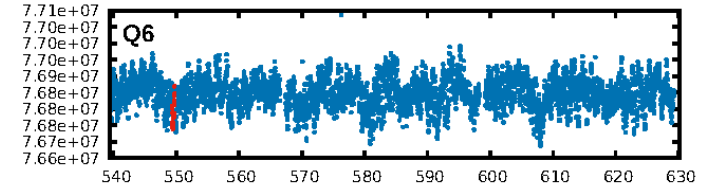
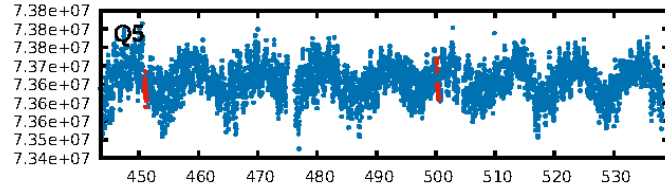
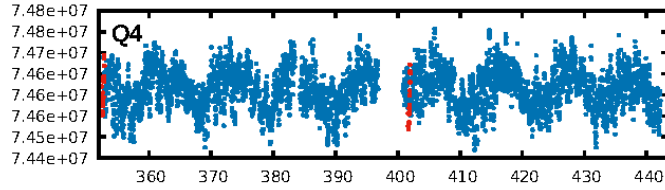
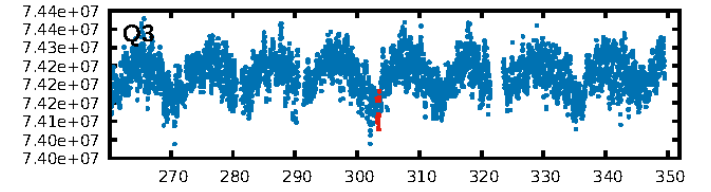
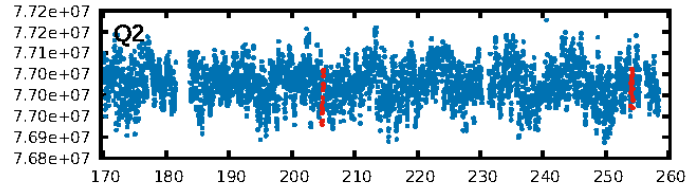
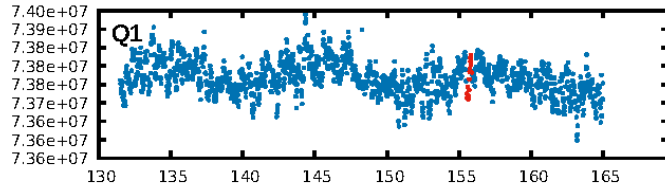
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [58.08σ]  
LongPeriod-sig: 100.0% [581.28σ]  
ModelChiSquare2-sig: 9.3%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [9/9]  
GhostDiagnostic-chr: -3.891  
Centroid-sig: 52.0%  
Centroid-so: 0.238 arcsec [1.03σ]  
OotOffset-rm: 0.490 arcsec [0.69σ]  
KicOffset-rm: 0.532 arcsec [0.64σ]  
OotOffset-st: 4/1/3/4 [12]  
KicOffset-st: 4/1/3/4 [12]  
DiffImageQuality-fgm: 0.67 [8/12]  
DiffImageOverlap-fno: 0.00 [0/12]

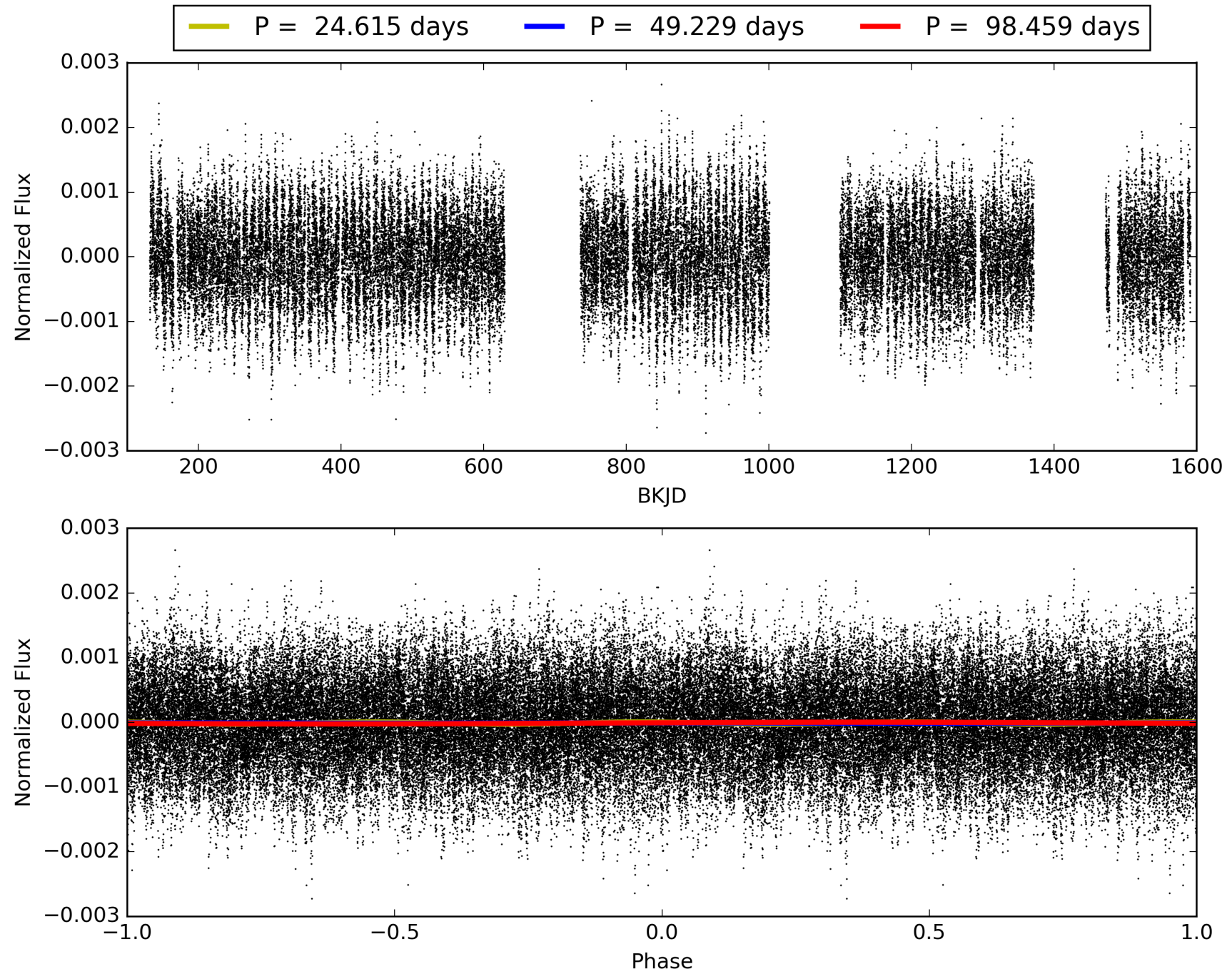
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:30:56 Z

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

# TCE 010873947-07, PDC Light Curves



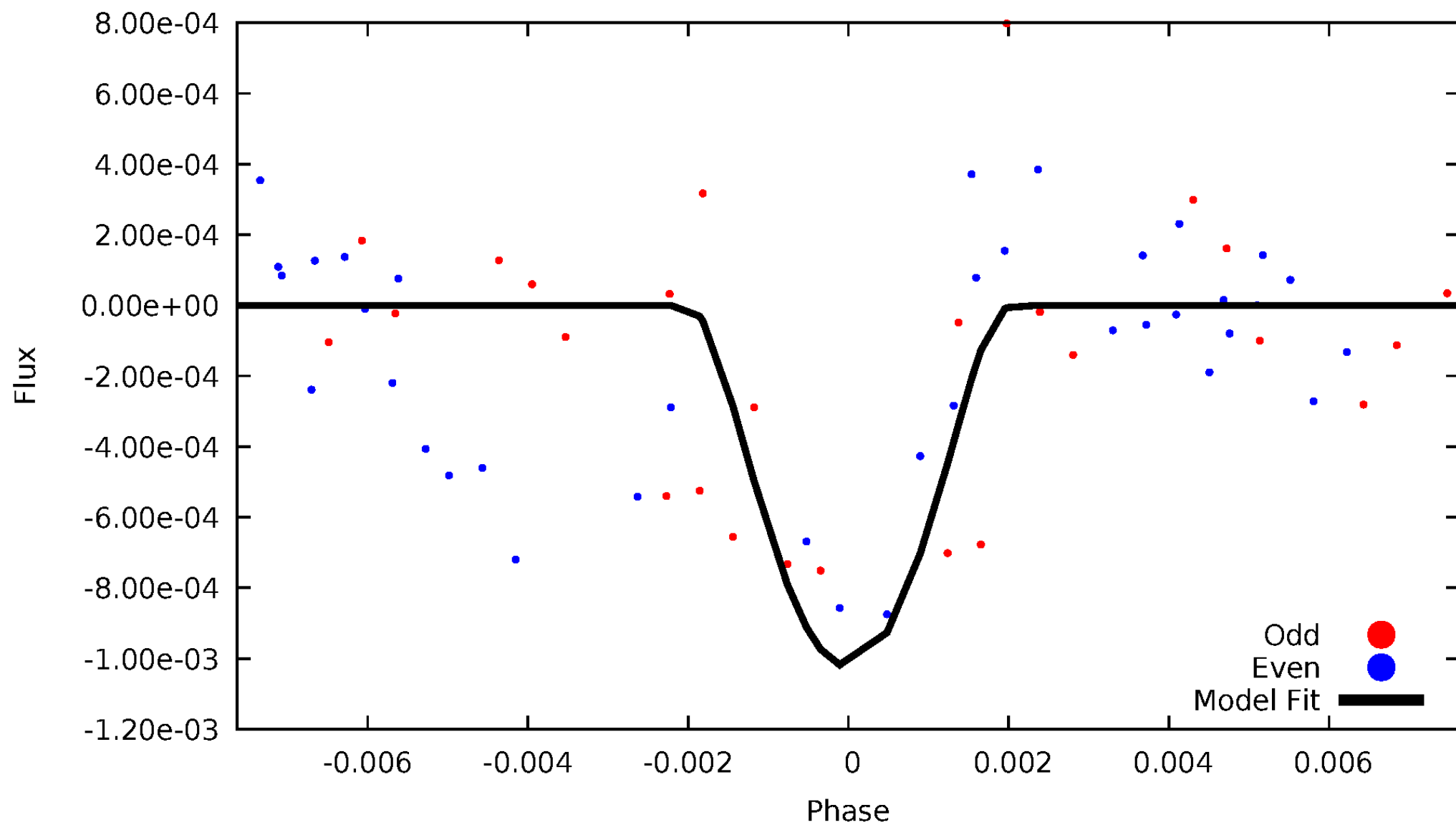
TCE 010873947-07





# DV Odd/Even

TCE 010873947-07





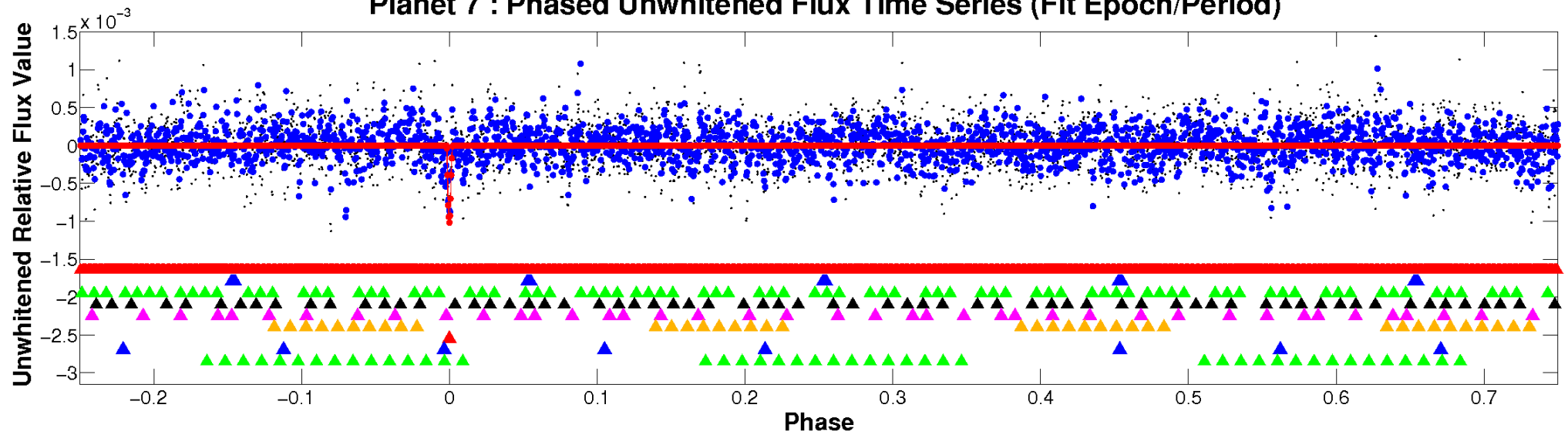


ALT Odd/Even

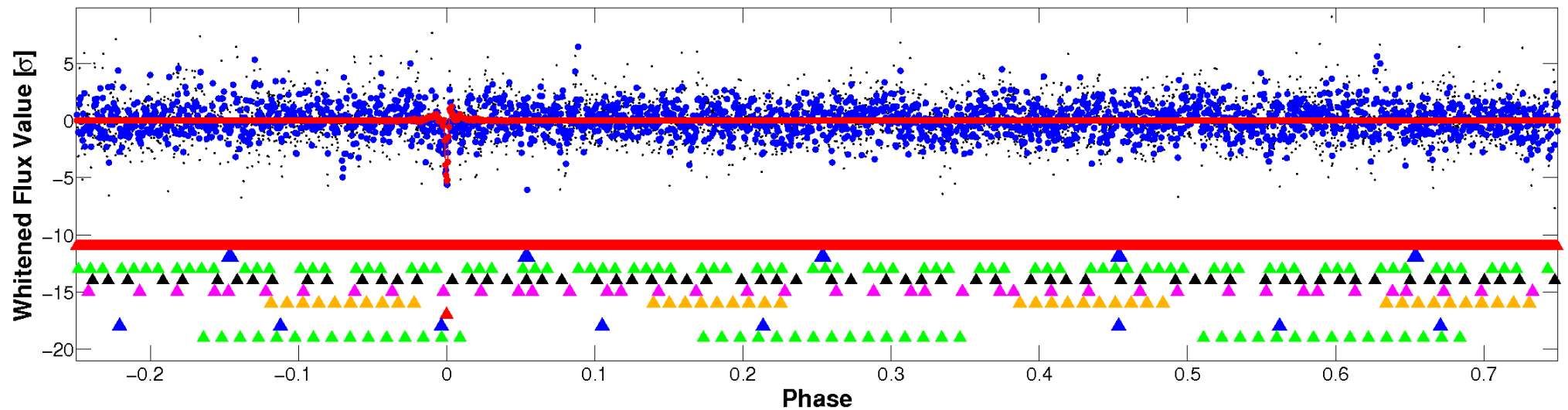
This plot does not exist for this TCE.

# Non-Whitened Vs. Whitened Light Curve

## Planet 7 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

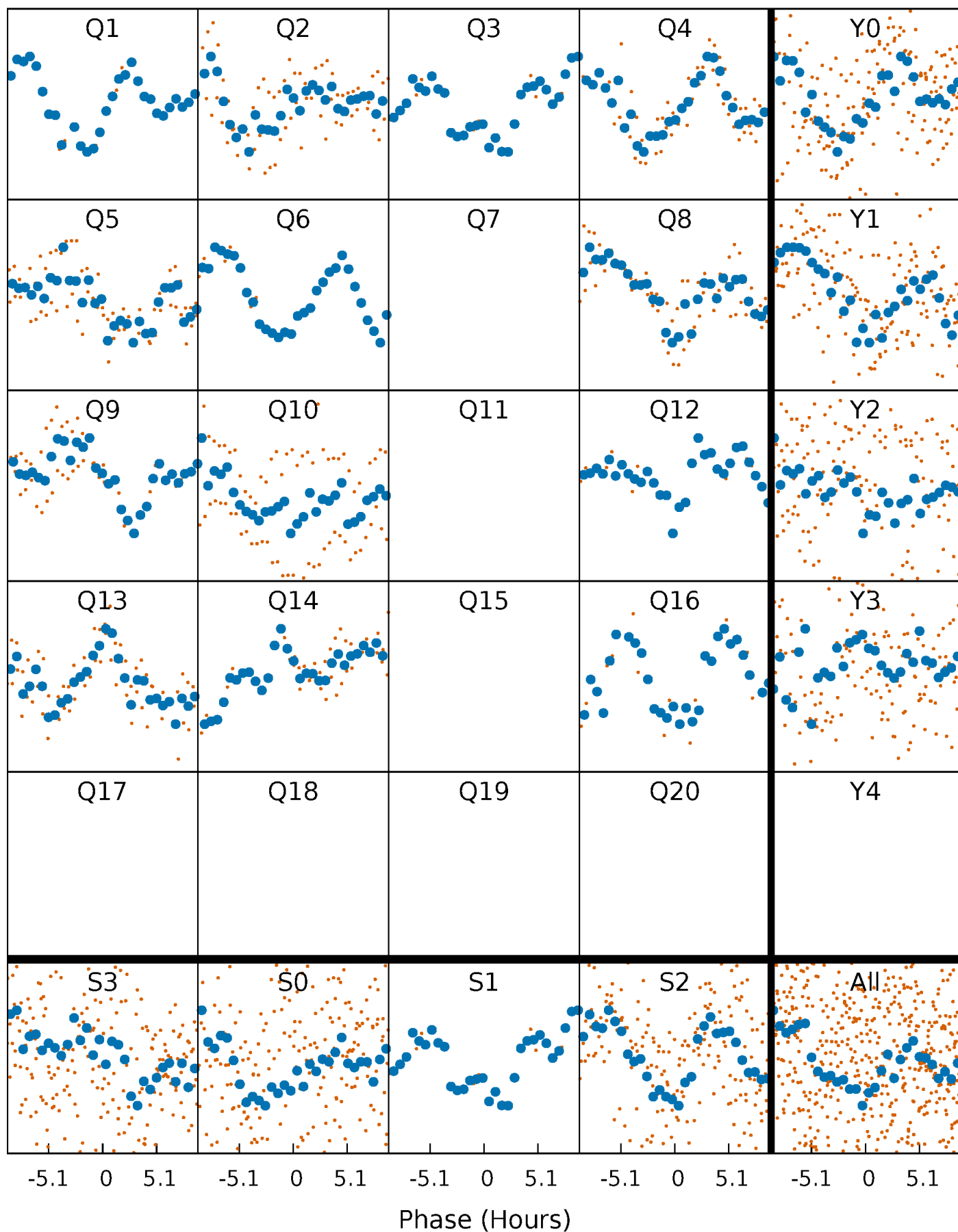


## Planet 7 : Phased Whitened Flux Time Series (Fit Epoch/Period)



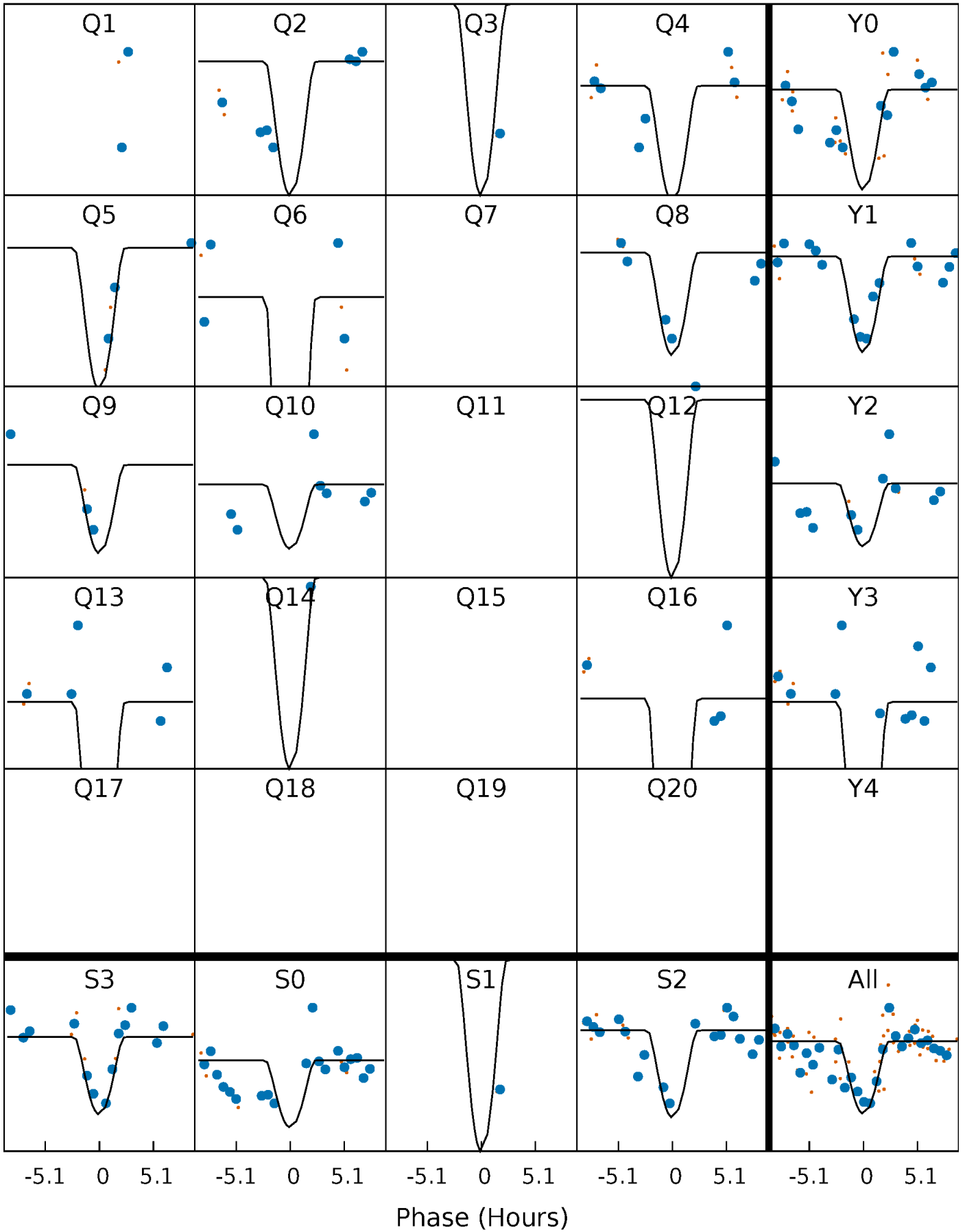
# PDC Quarter-Phased Transit Curves

TCE 010873947-07     $P = 49.229353$  Days     $T_0 = 155.691611$  (BKJD)



# DV Quarter-Phased Transit Curves

TCE 010873947-07     $P = 49.229353$  Days     $T_0 = 155.691611$  (BKJD)

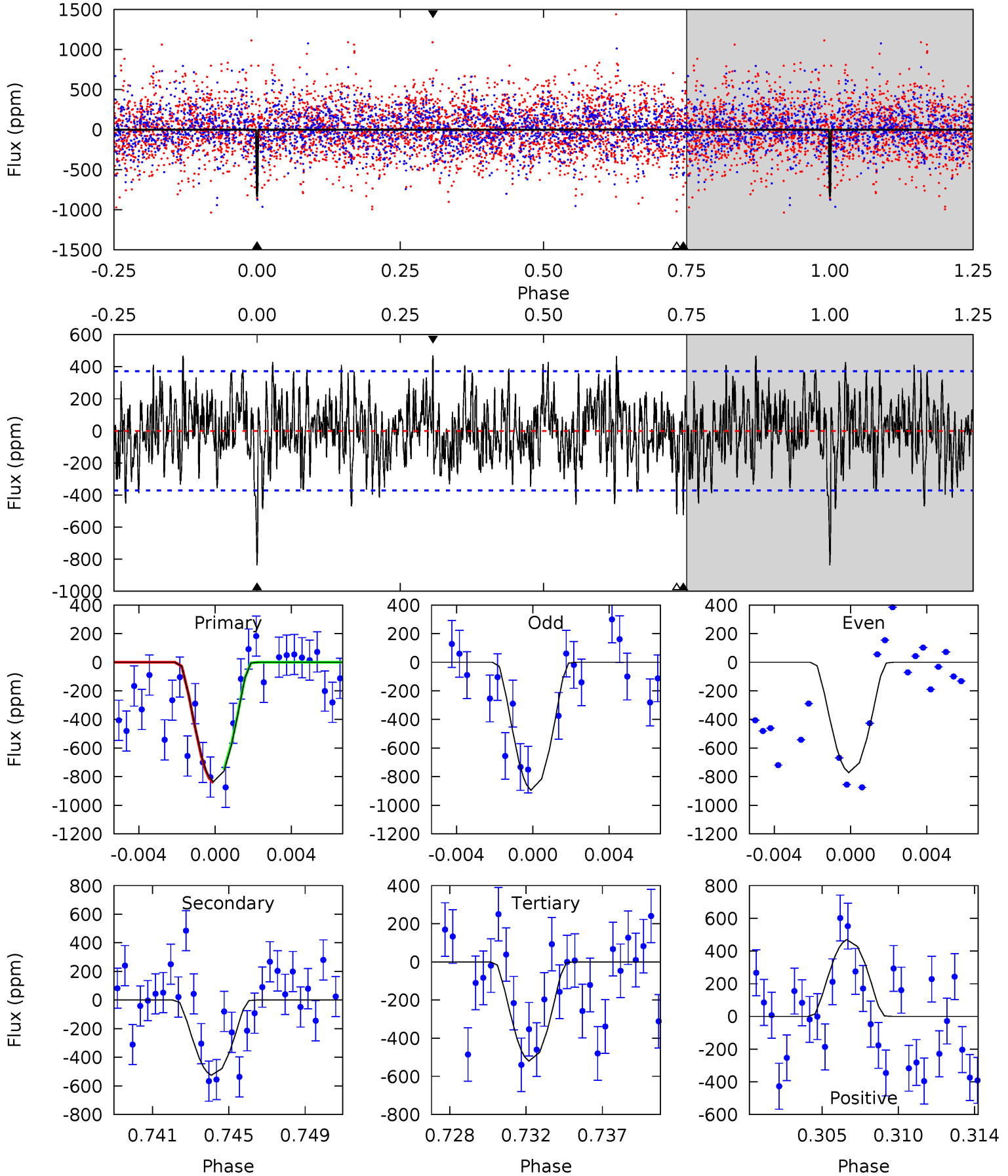


This plot does not exist for this TCE.

# DV Model-Shift Uniqueness Test

010873947-07, P = 49.229353 Days, E = 106.462258 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
11.7	7.35	7.26	6.56	5.19	2.86	2.25	4.42	5.12	0.08	0.78	0.86	1.02	0.36	0.63



## Alt Model-Shift Uniqueness Test

This plot does not exist for this TCE.

### Stellar Parameters For KIC 010873947

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7559^{+237}_{-316}$	$4.078^{+0.170}_{-0.170}$	$-0.220^{+0.250}_{-0.350}$	$1.886^{+0.541}_{-0.443}$	$1.551^{+0.210}_{-0.257}$	$0.326^{+0.339}_{-0.143}$
	+3%/-4%	+4%/-4%	+114%/-159%	+29%/-23%	+14%/-17%	+104%/-44%
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 010873947-07 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-526 \pm 72$	$33.60^{+37.29}_{-22.55}$	$1157^{+95}_{-84}$	$3315^{+1575}_{-616}$	$24^{+184}_{-19}$
Alt.	N/A	N/A	N/A	N/A	N/A

$T_{\text{max}}$  = 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

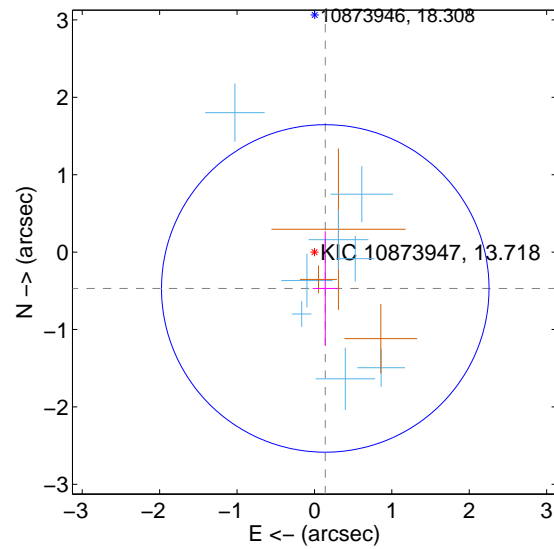
Supplemental centroid analysis for 010873947-07. Kepler magnitude: 13.72. Transit SNR 12.25

There are 8 quarters with good PRF difference image offsets

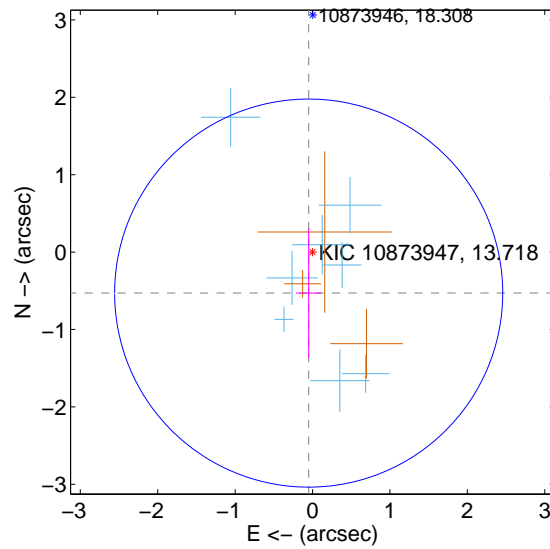
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.490 \pm 0.705$	0.69	$-0.140 \pm 0.163$	$-0.470 \pm 0.738$
PRF-fit source offset from KIC position	$0.532 \pm 0.836$	0.64	$0.050 \pm 0.166$	$-0.530 \pm 0.838$
photometric centroid source offset	$0.24 \pm 0.23$	1.03	$-0.09 \pm 0.23$	$-0.22 \pm 0.23$

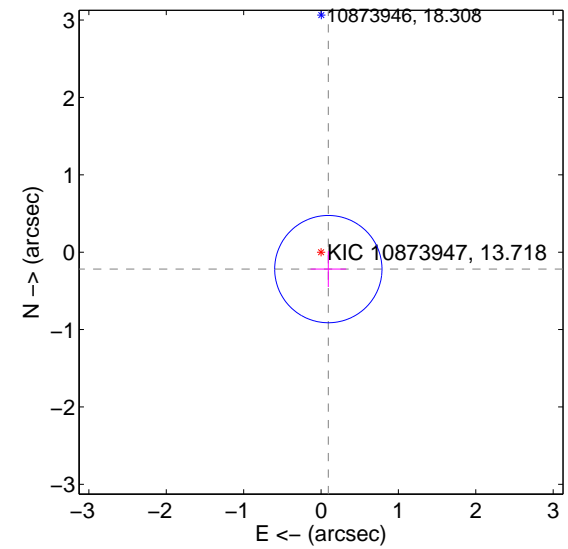
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

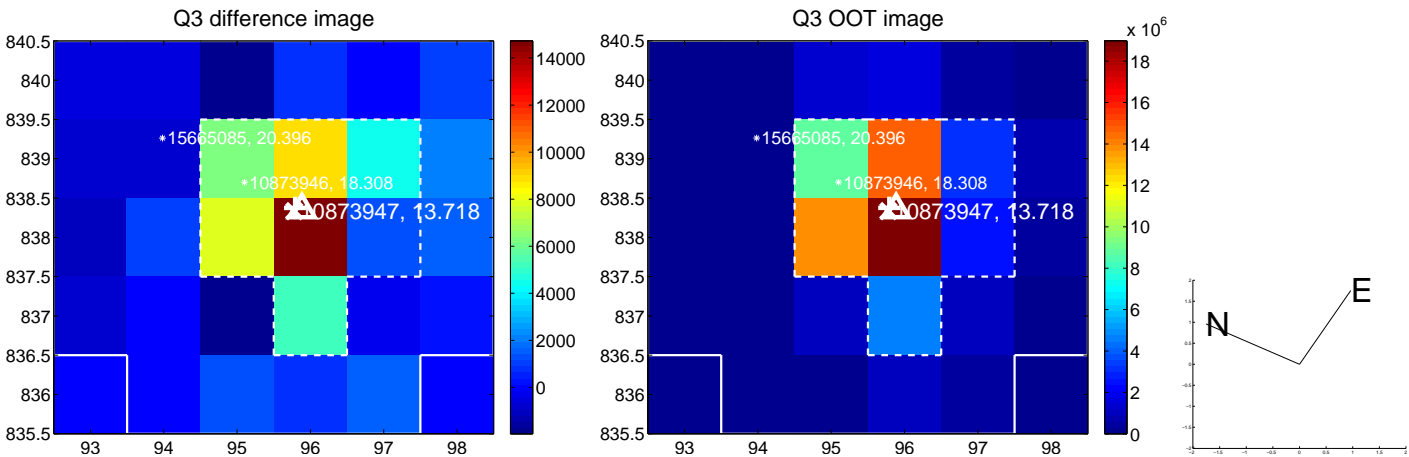
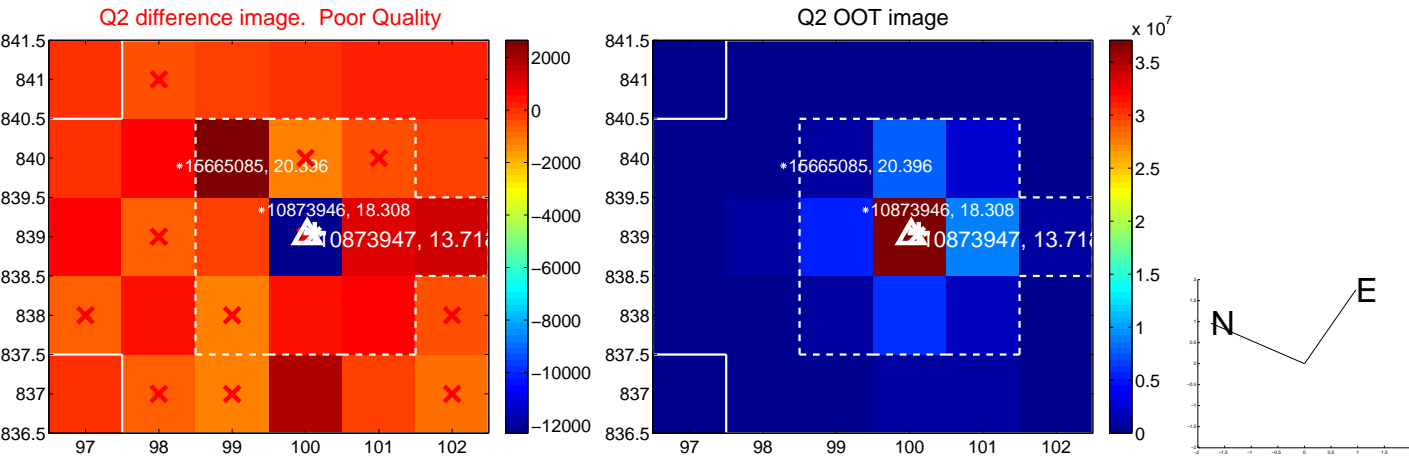
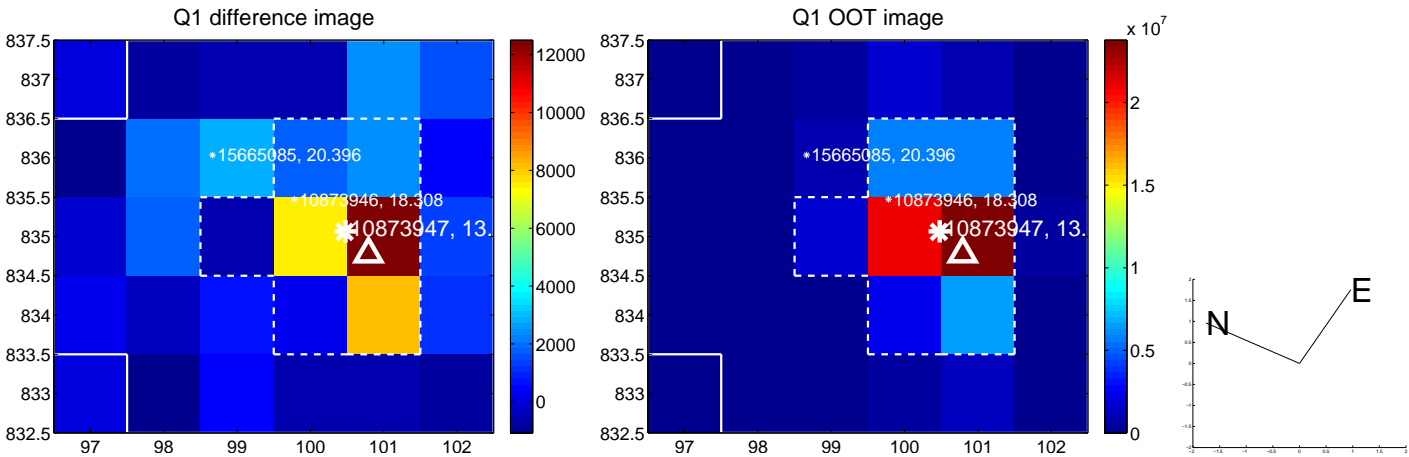


offset from photometric centroids

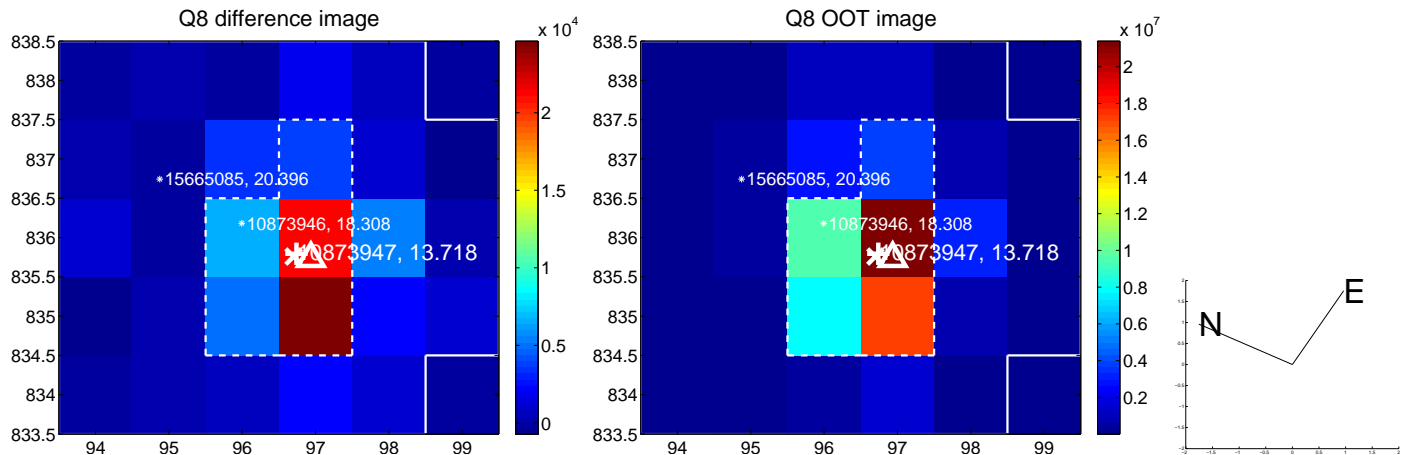
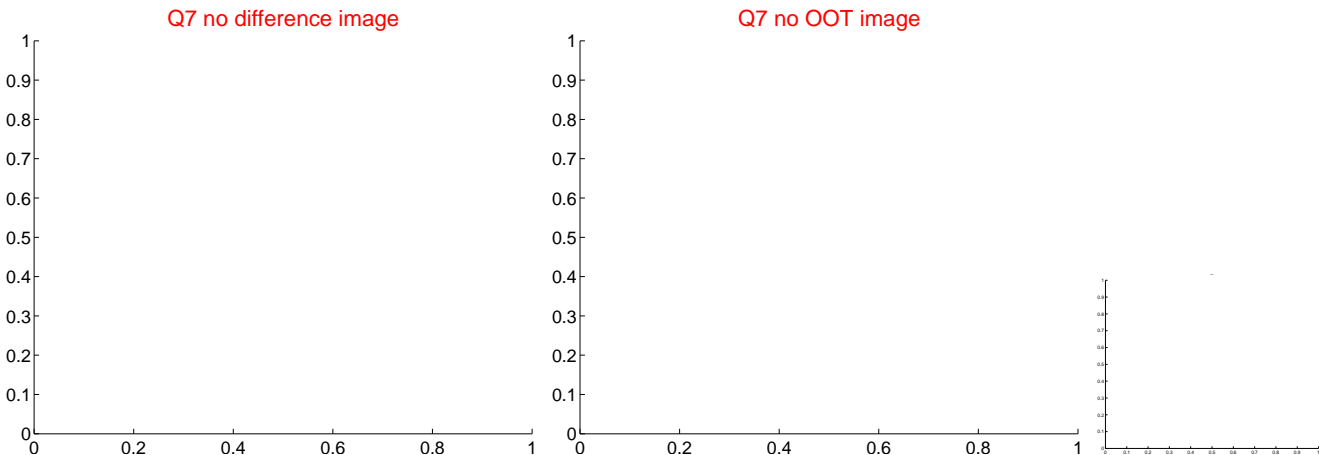
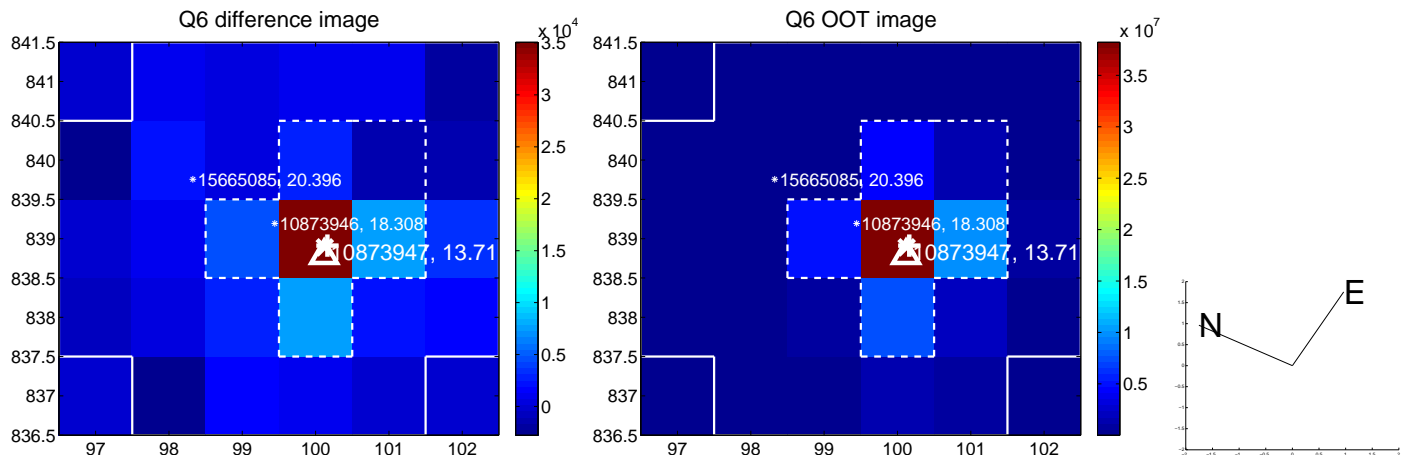
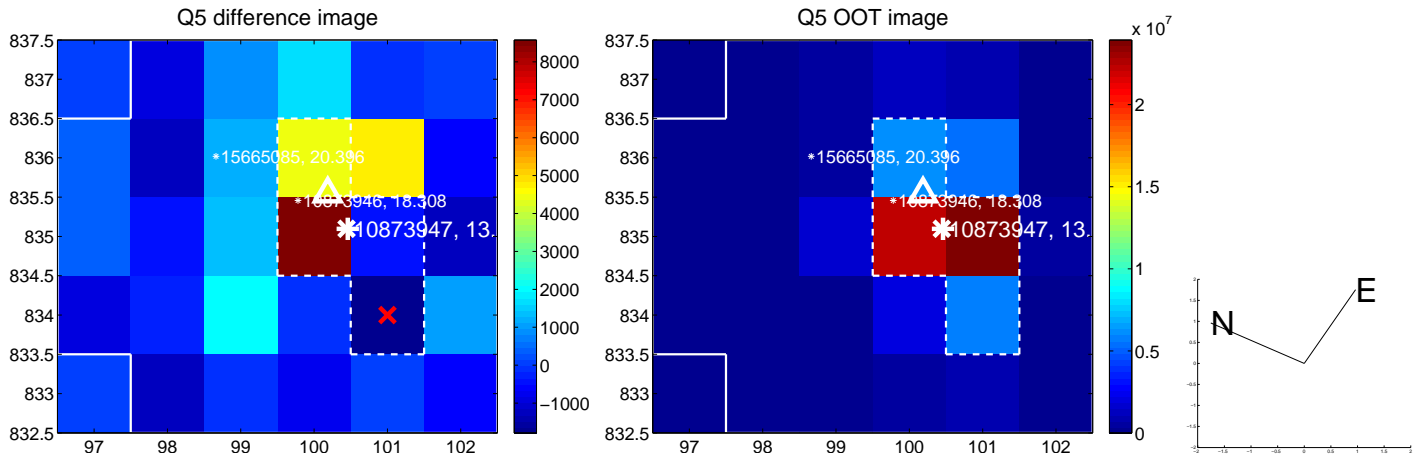


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

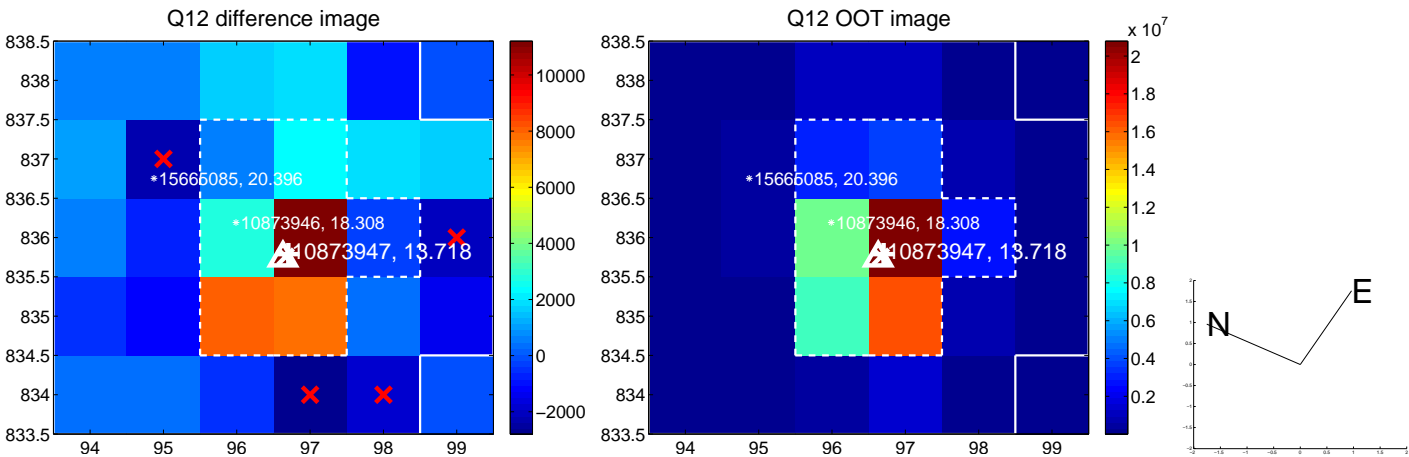
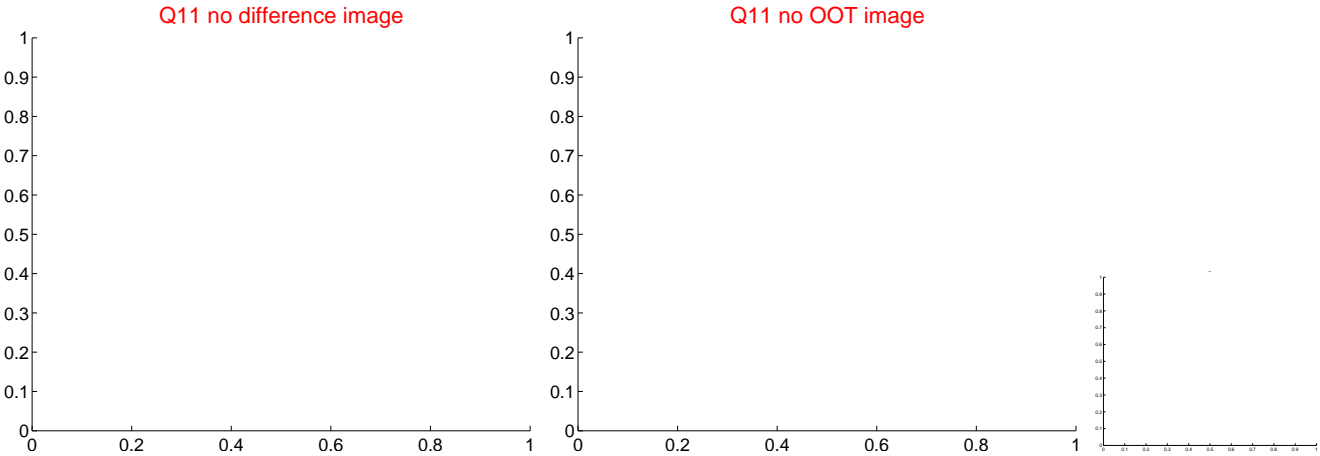
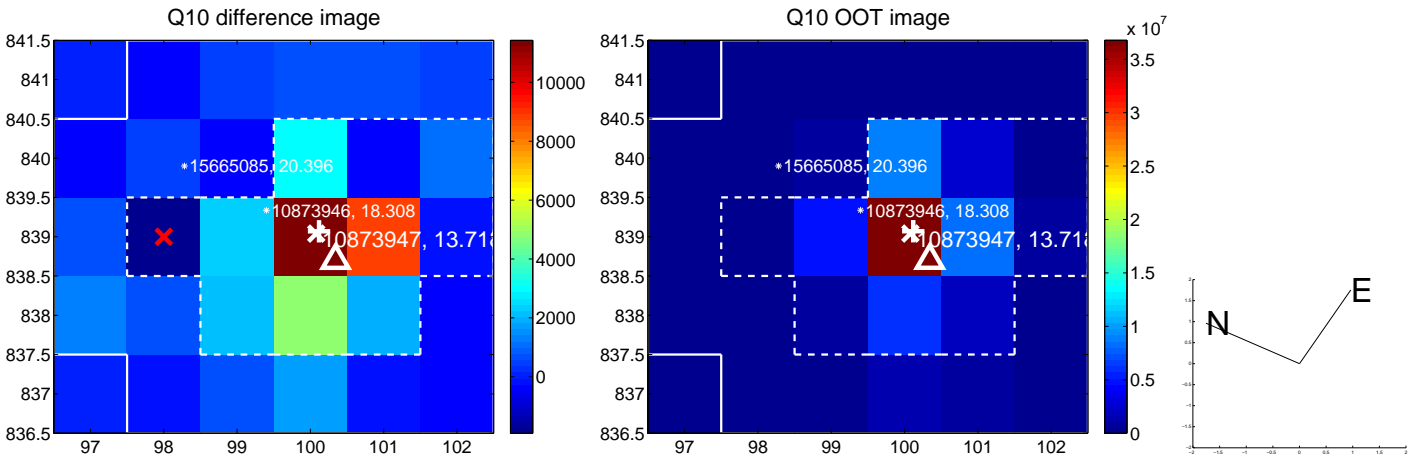
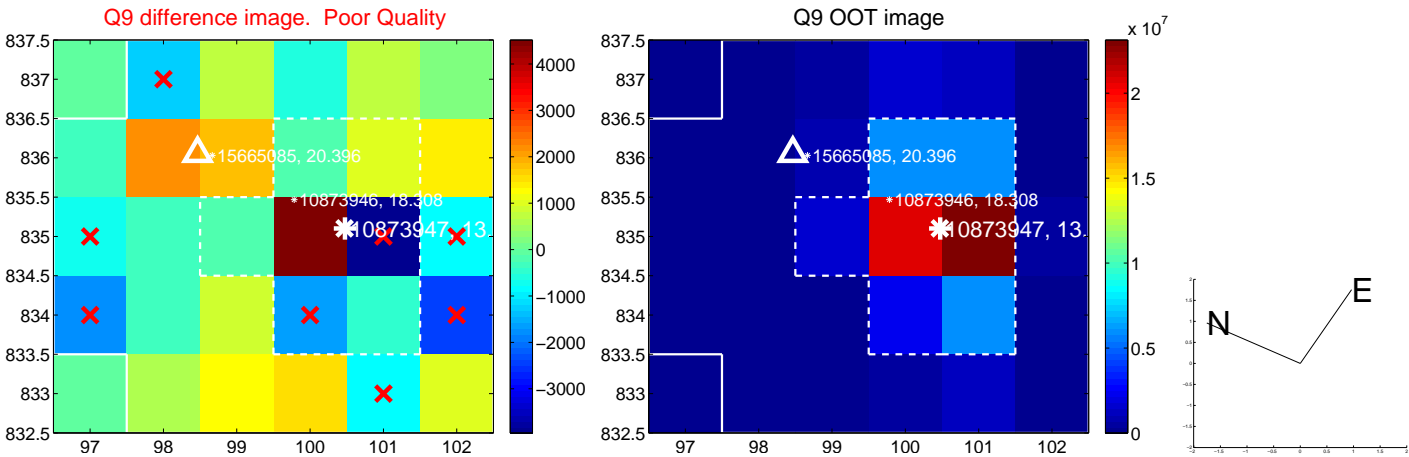
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



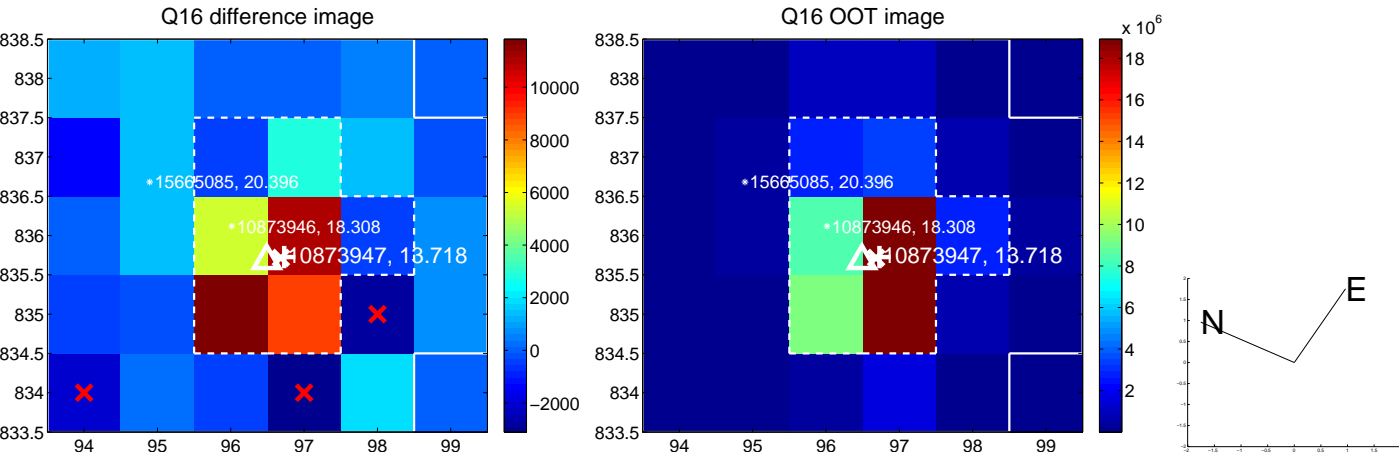
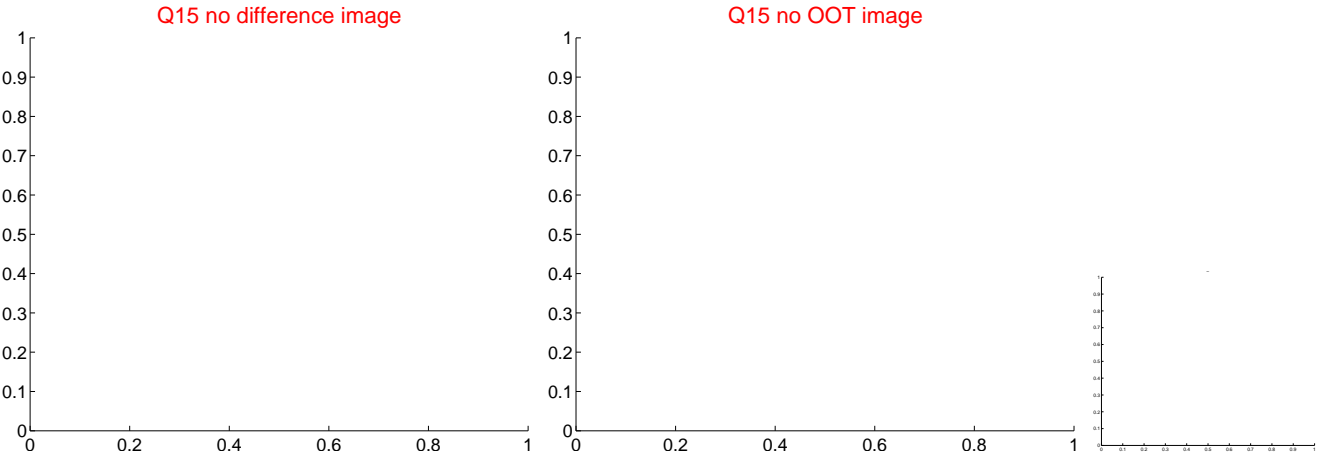
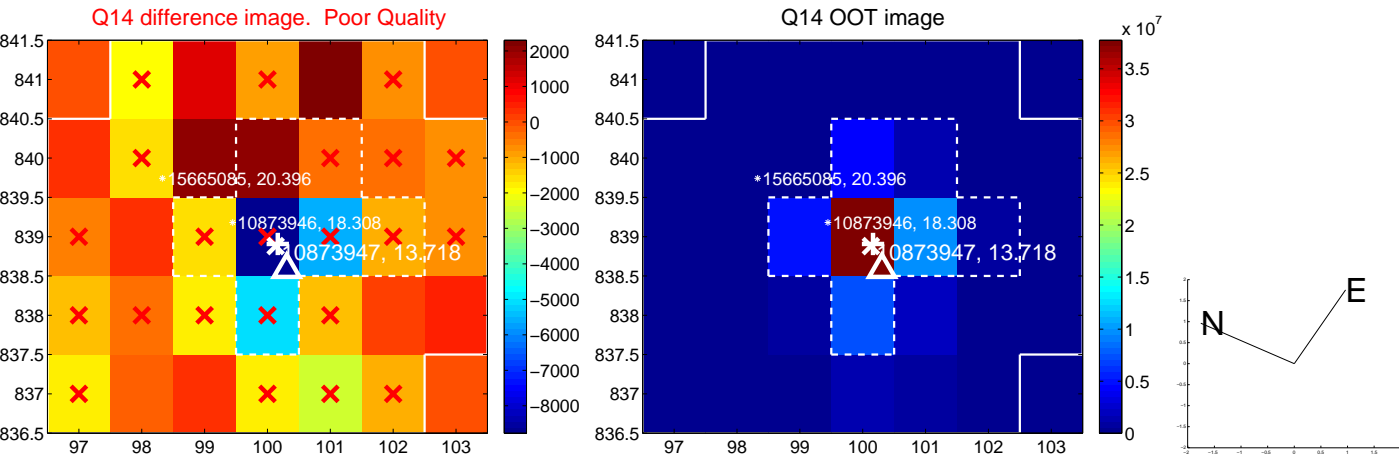
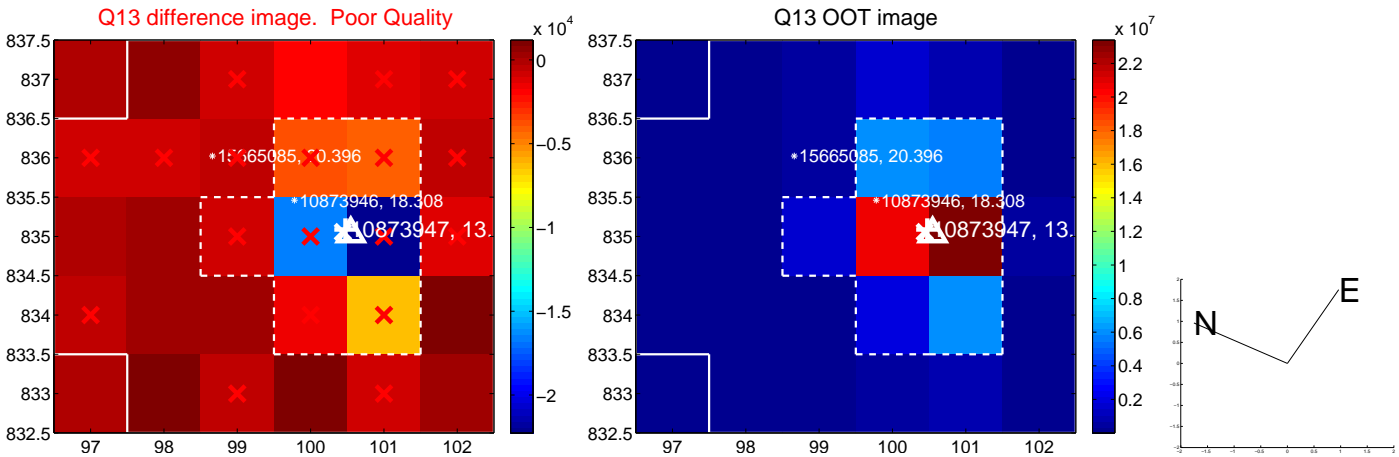
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



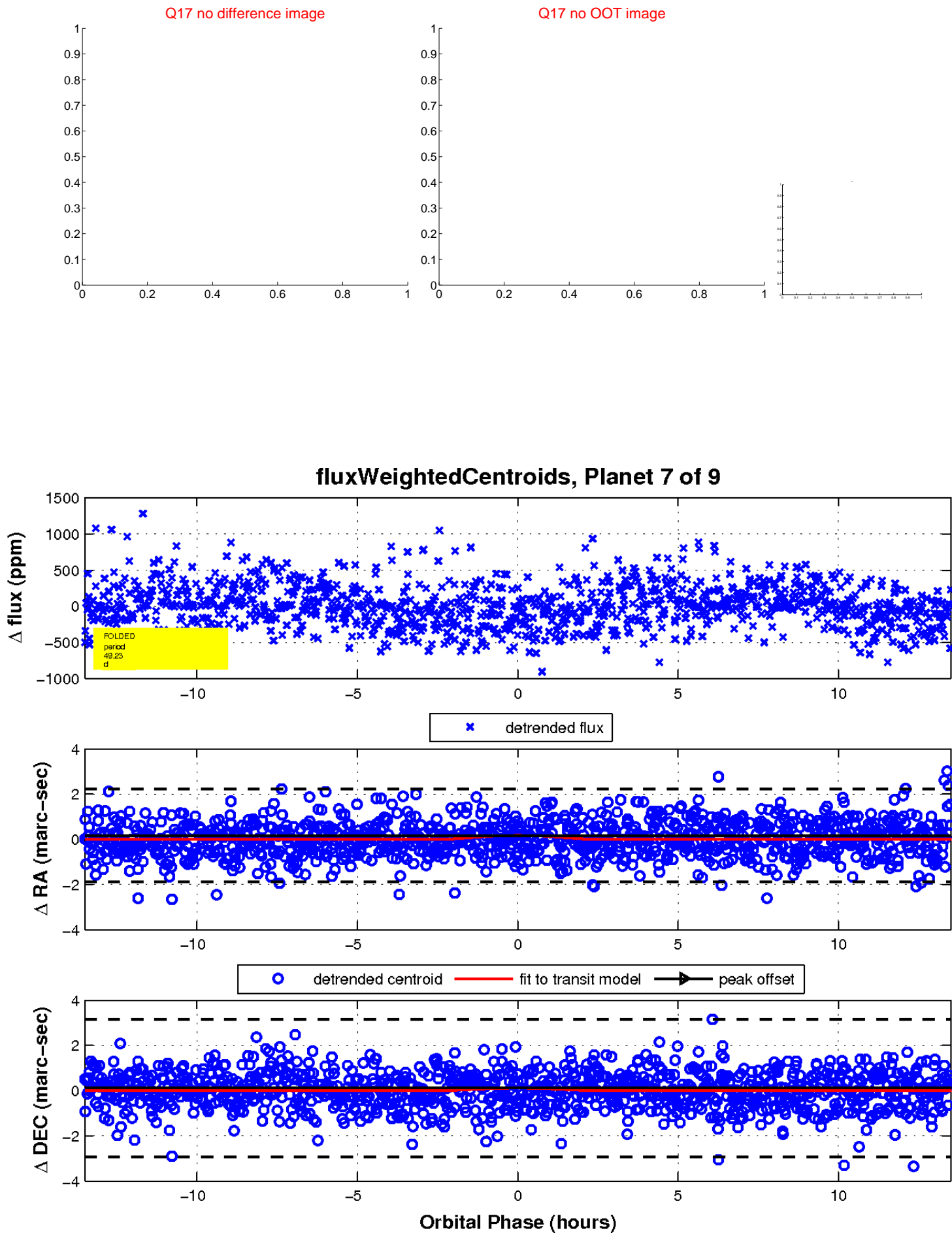
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.



Declination

# KIC 010873947

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010873947-01	OBS	No	0.527357	131.795567	18.0	3.647	10.8	4.4	1.89	7559	0.83	47530.62
010873947-02	OBS	No	19.689666	138.728149	610.6	2.271	12.2	13.2	1.89	7559	5.20	380.89
010873947-03	OBS	No	17.025367	144.262873	491.6	0.984	11.3	8.3	1.89	7559	4.24	462.36
010873947-04	OBS	No	22.211661	140.942347	695.4	1.426	10.7	10.2	1.89	7559	8.87	324.34
010873947-05	OBS	No	36.184555	138.348466	580.2	3.091	12.0	10.0	1.89	7559	8.71	169.21
010873947-06	OBS	No	37.054013	149.861374	542.1	2.239	10.5	9.4	1.89	7559	4.88	163.93
010873947-07	OBS	No	49.229353	155.691611	1022.6	4.506	10.1	12.3	1.89	7559	11.36	112.24
010873947-09	OBS	No	32.616633	140.133048	594.1	1.655	10.3	9.4	1.89	7559	4.78	194.32

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010873947-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT
010873947-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
010873947-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV
010873947-04	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
010873947-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010873947-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
010873947-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV
010873947-09	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV

**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.

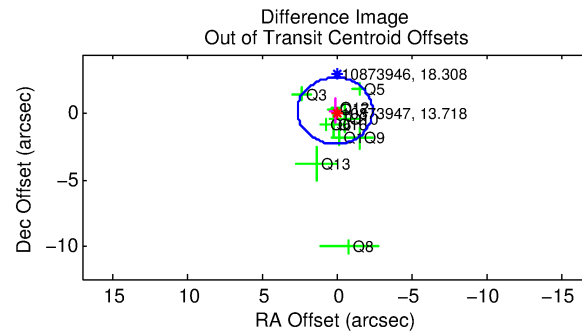
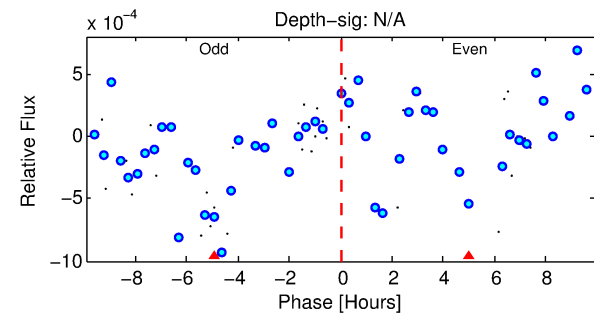
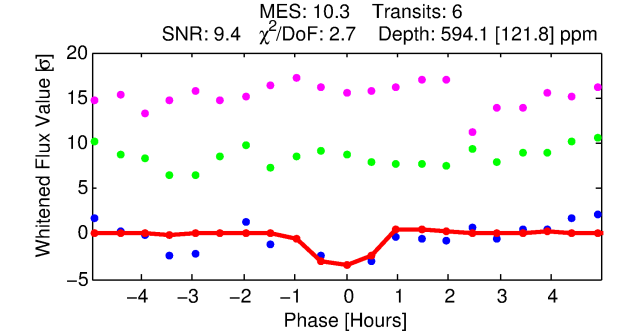
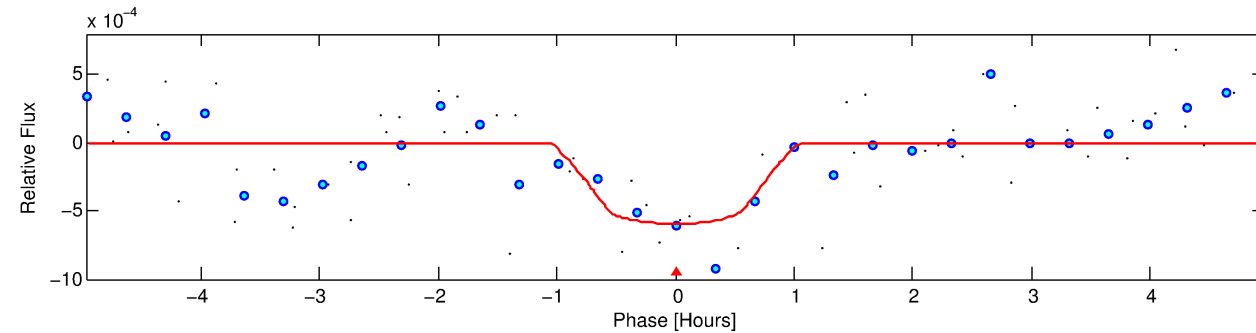
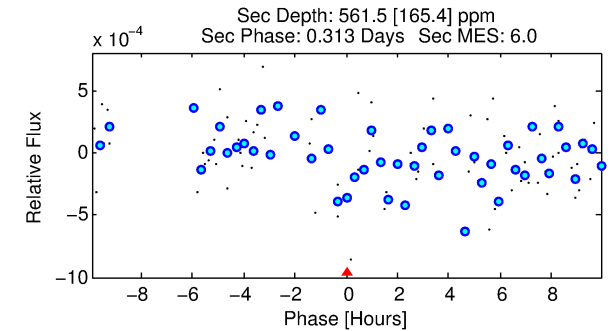
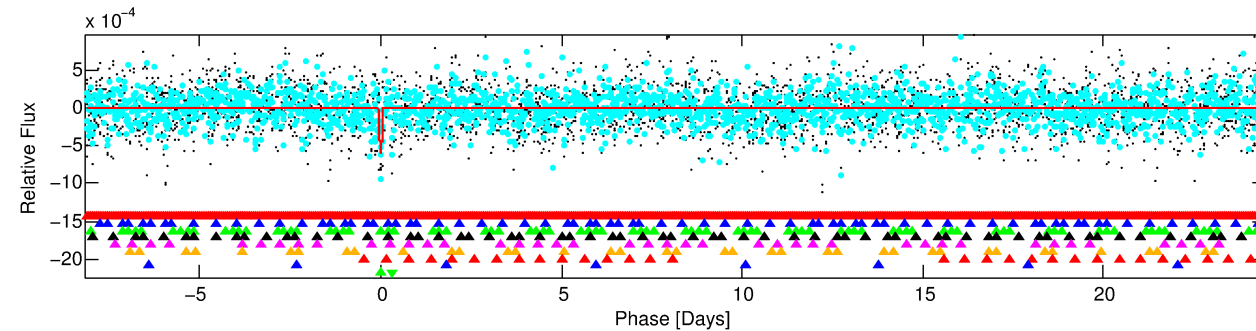
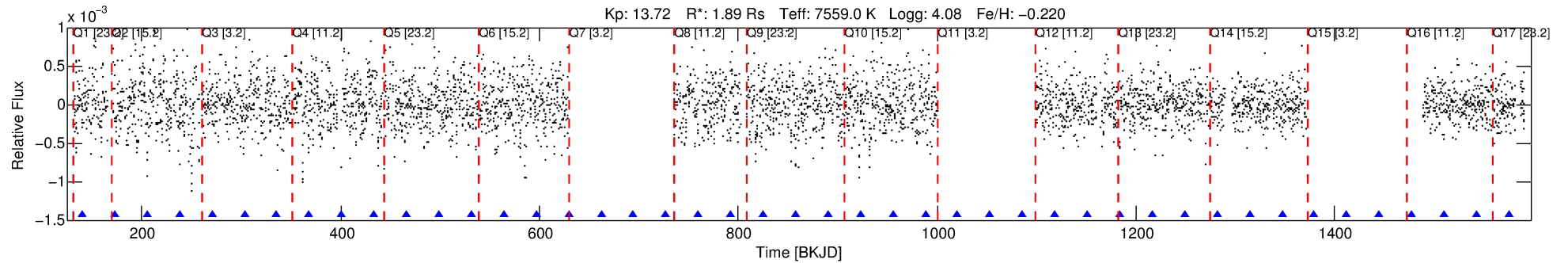
Ephemeris Match Information For 010873947-09

No Significant Match Found



# DV One-Page Summary

KIC: 10873947 Candidate: 9 of 9 Period: 32.617 d



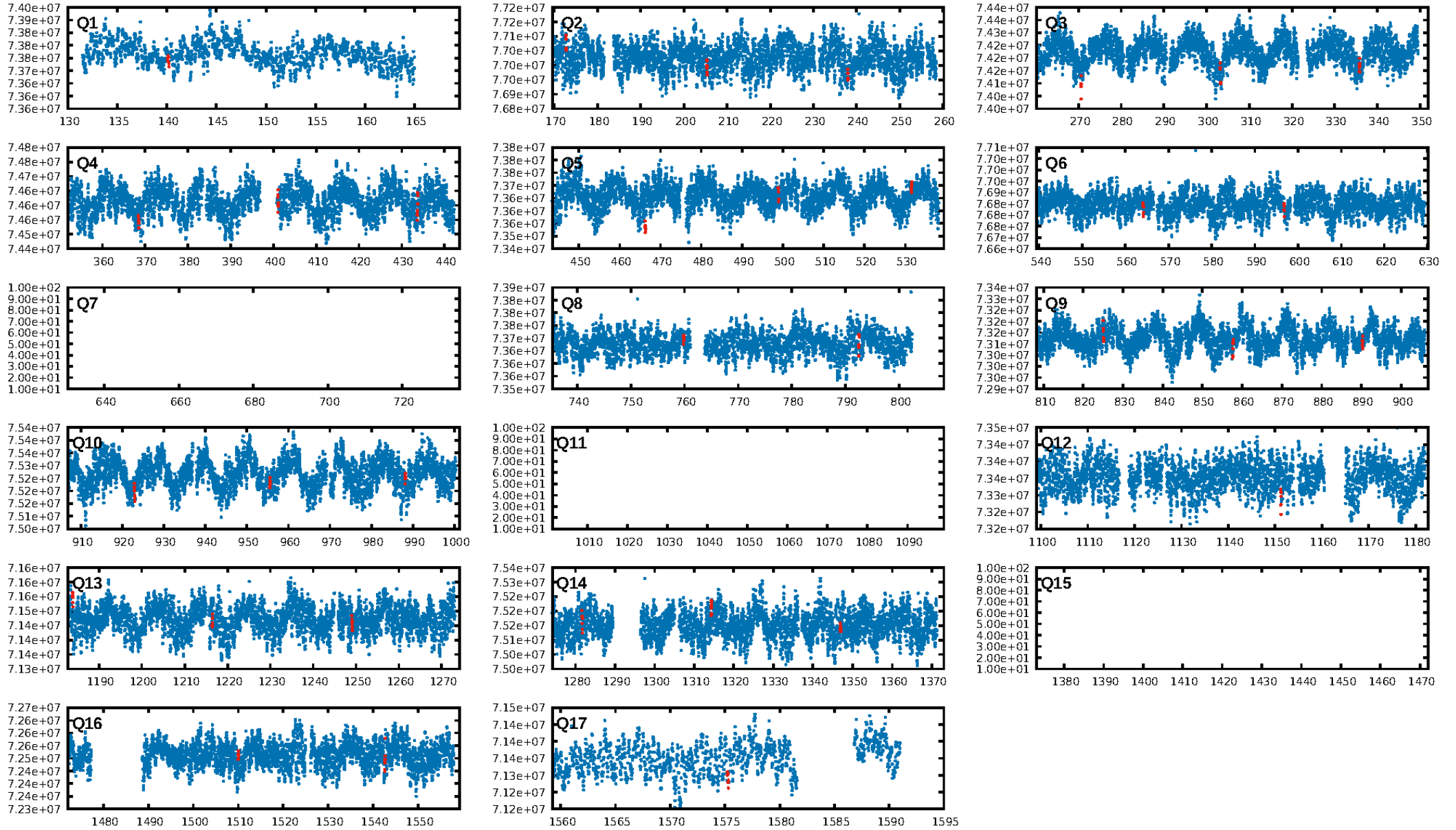
## DV Fit Results:

Period = 32.61663 [0.00046] d  
Epoch = 140.1330 [0.0127] BKJD  
Rp/R\* = 0.0232 [0.0540]  
a/R\* = 130.86 [1584.15]  
b = 0.54 [16.16]  
Seff = 194.32 [70.77]  
Teq = 952 [87] K  
Rp = 4.78 [11.19] Re  
a = 0.2314 [0.0536] AU  
Ag = 723.30 [3375.63] [0.21σ]  
Teffp = 7634 [8891] K [0.75σ]

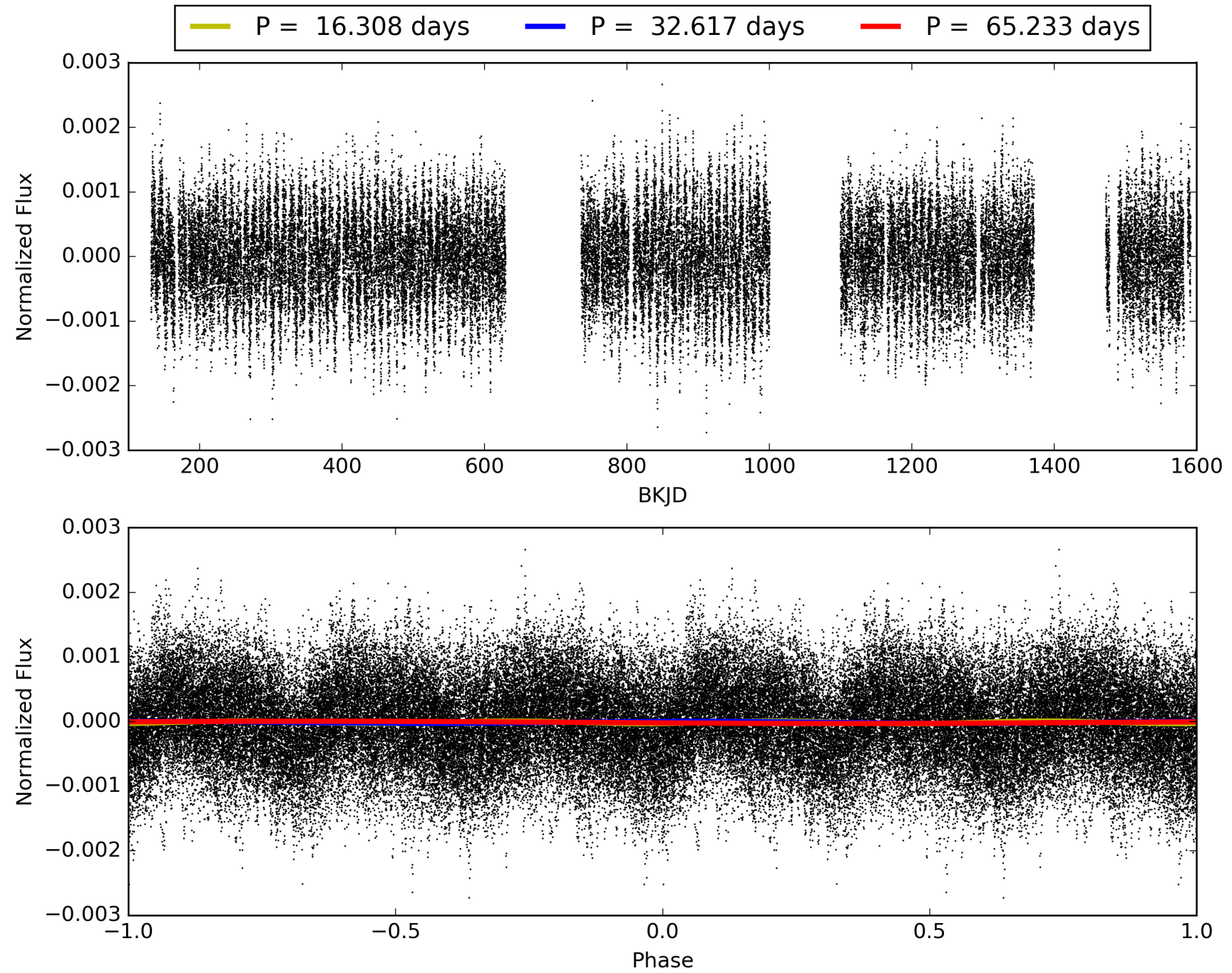
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [114.28σ]  
LongPeriod-sig: 100.0% [24.42σ]  
ModelChiSquare2-sig: 25.5%  
ModelChiSquareGof-sig: 98.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: -2.479  
Centroid-sig: 0.9%  
Centroid-so: 0.804 arcsec [2.06σ]  
OotOffset-rm: 0.244 arcsec [0.29σ]  
KicOffset-rm: 0.308 arcsec [0.51σ]  
OotOffset-st: 2/1/3/5 [11]  
KicOffset-st: 2/1/3/5 [11]  
DiffImageQuality-fgm: 0.64 [7/11]  
DiffImageOverlap-fno: 0.00 [0/14]

# TCE 010873947-09, PDC Light Curves

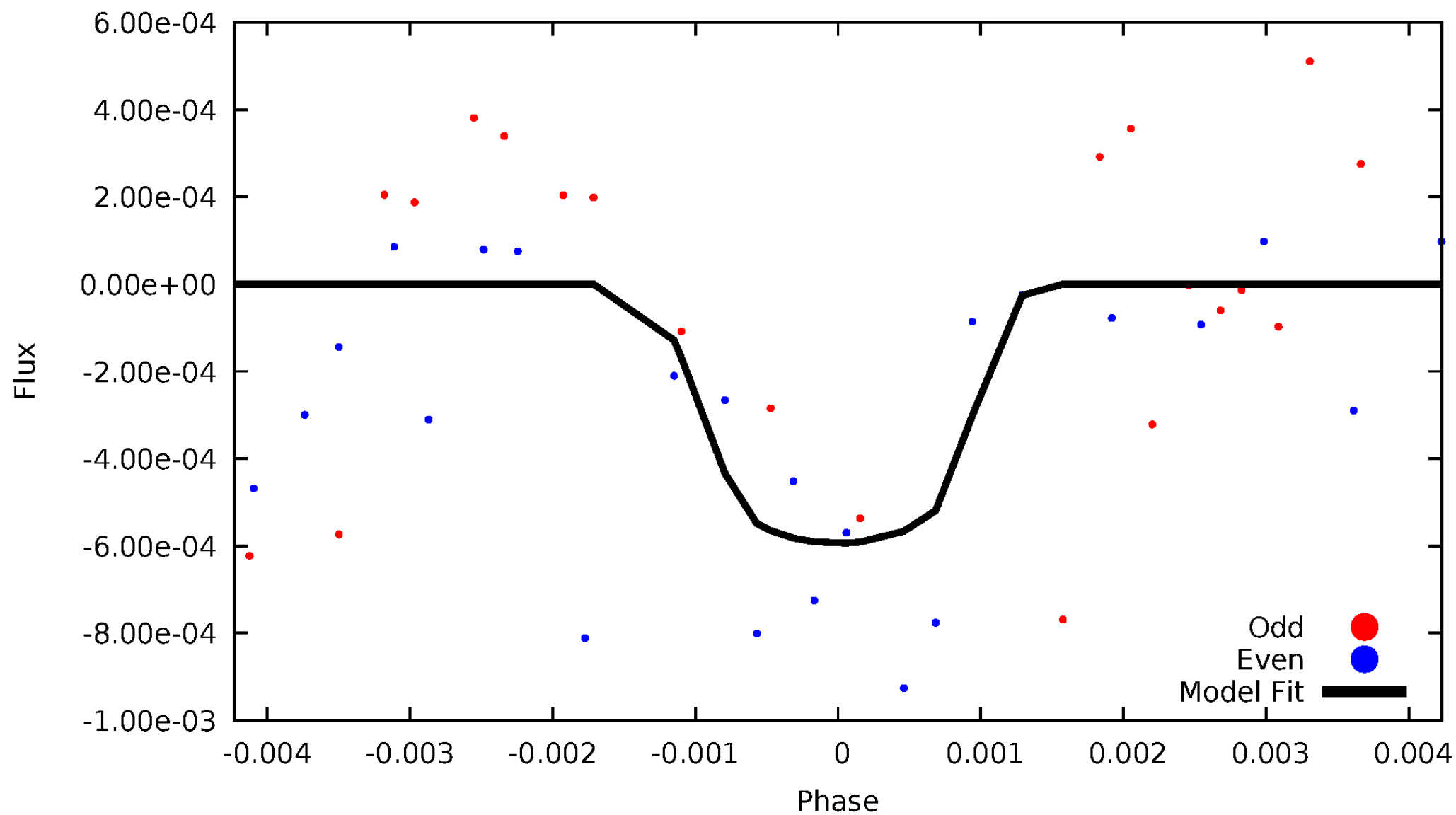


TCE 010873947-09



# DV Odd/Even

TCE 010873947-09



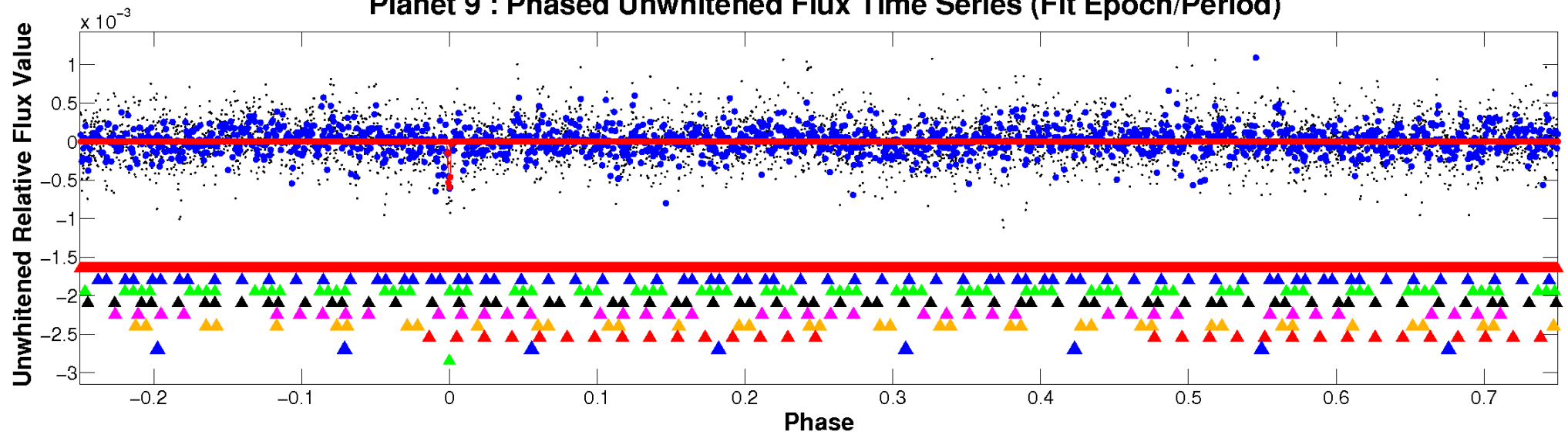


ALT Odd/Even

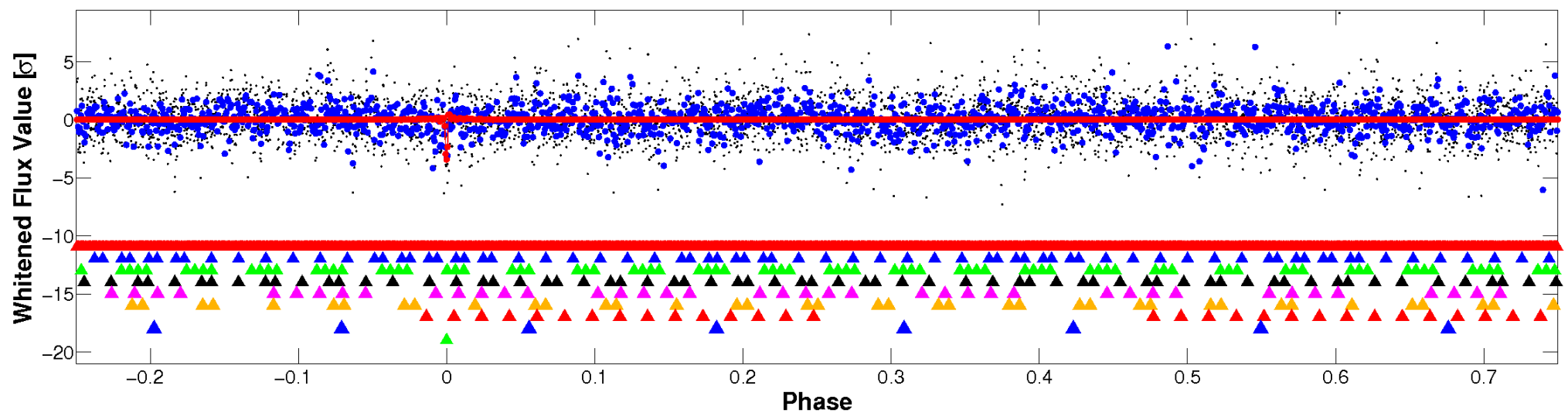
This plot does not exist for this TCE.

# Non-Whitened Vs. Whitened Light Curve

## Planet 9 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

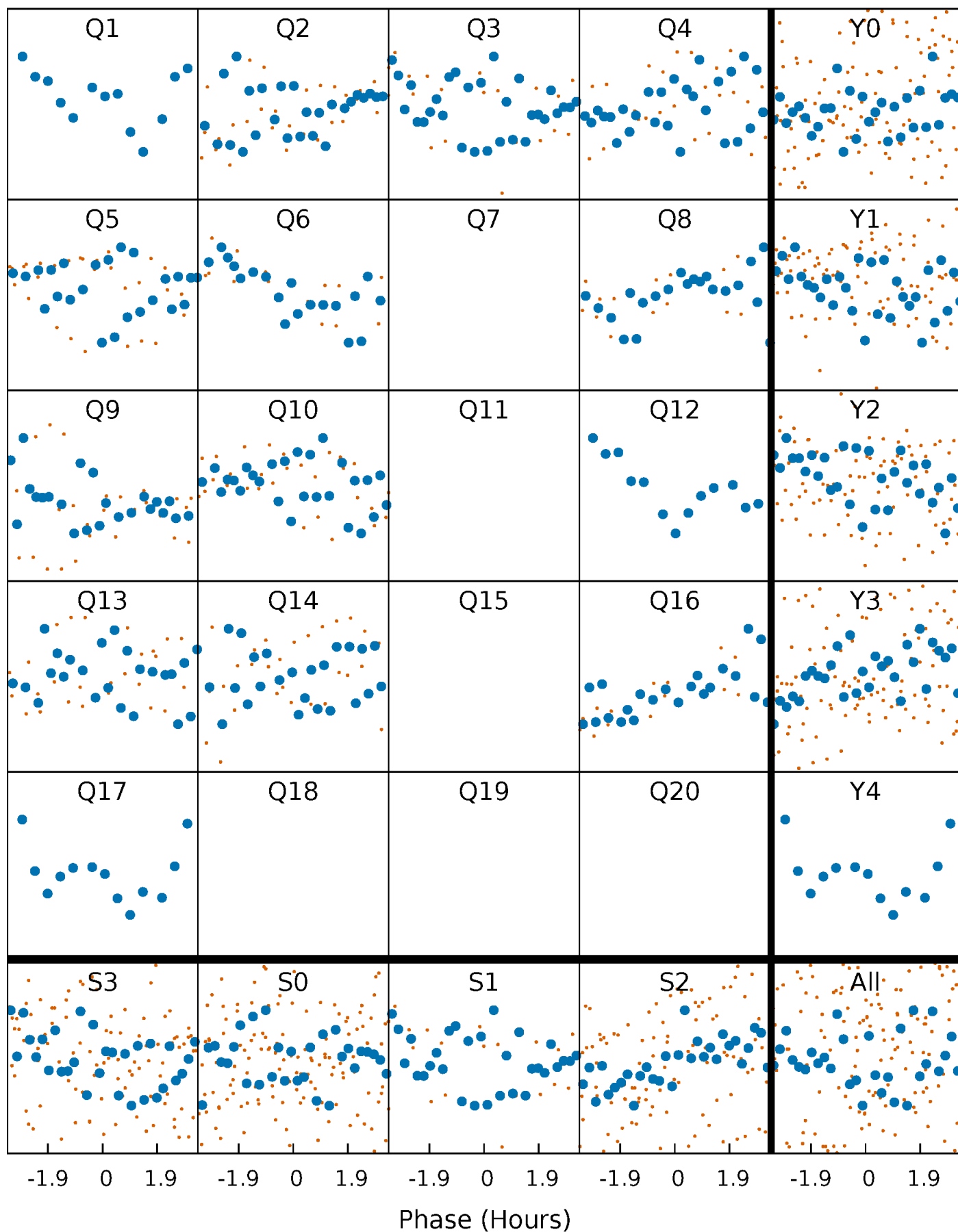


## Planet 9 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

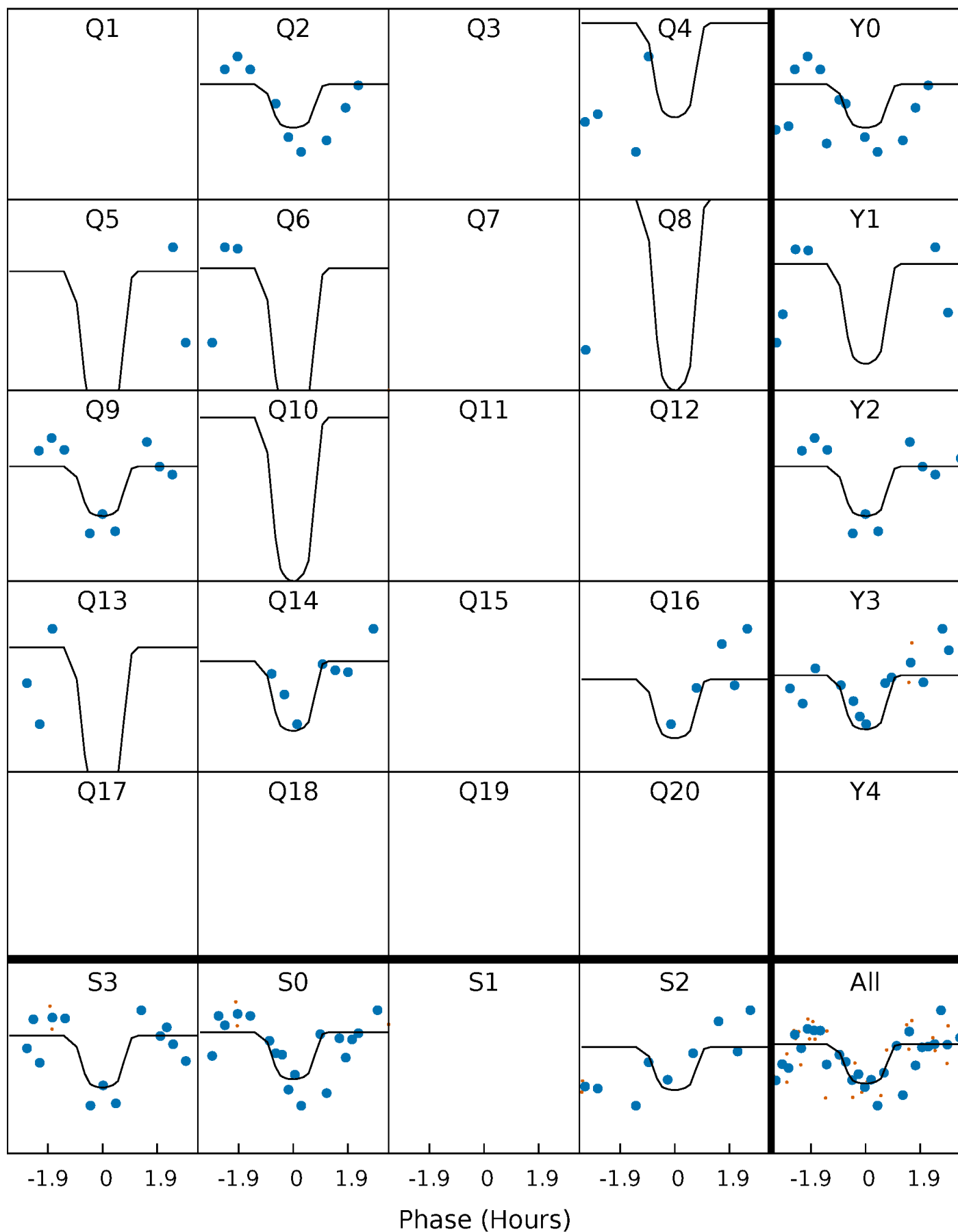
TCE 010873947-09     $P = 32.616633$  Days     $T_0 = 140.133048$  (BKJD)





# DV Quarter-Phased Transit Curves

TCE 010873947-09     $P = 32.616633$  Days     $T_0 = 140.133048$  (BKJD)

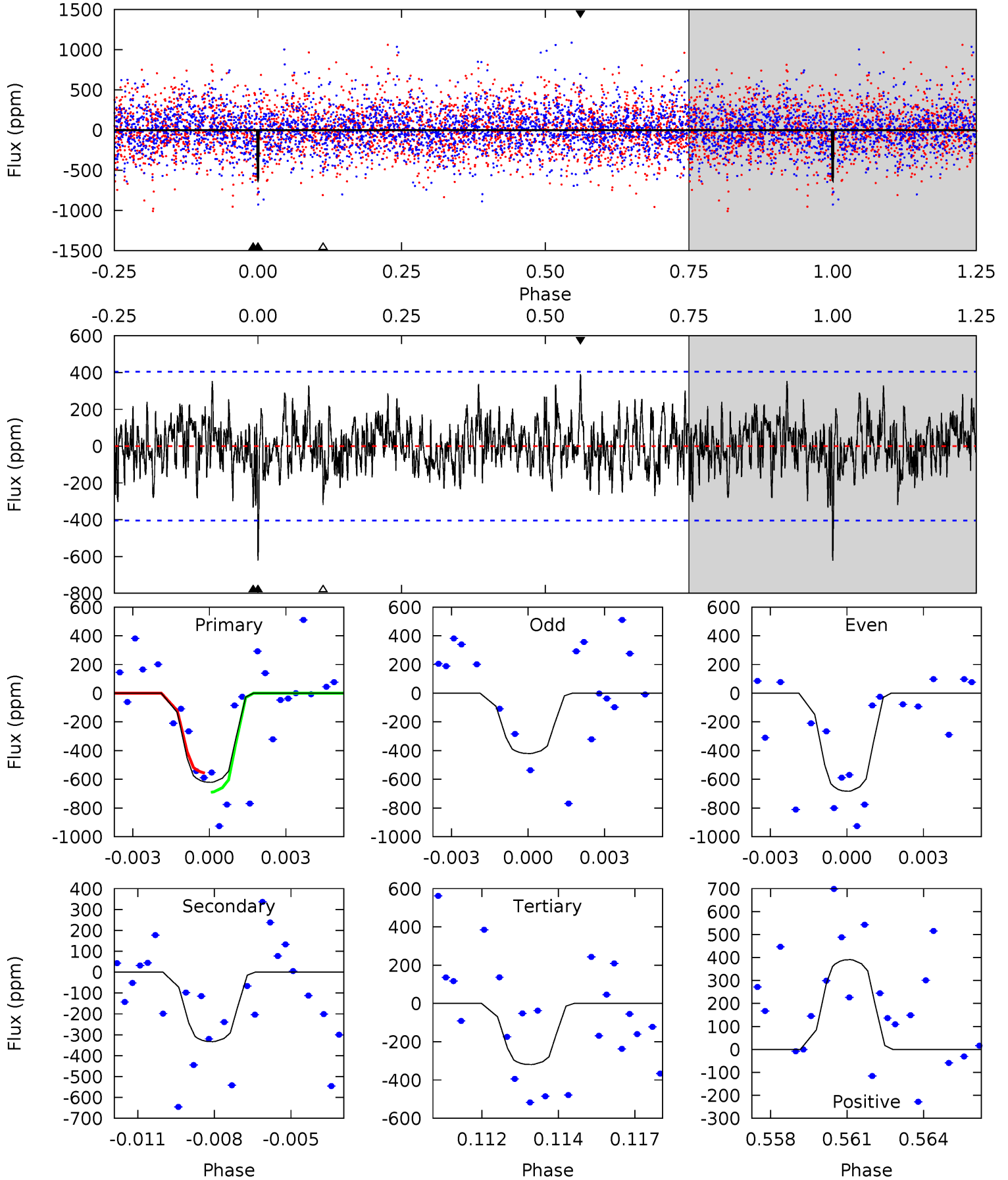


This plot does not exist for this TCE.

# DV Model-Shift Uniqueness Test

010873947-09, P = 32.616633 Days, E = 107.516415 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
8.09	4.34	4.16	5.09	5.27	3.00	1.43	3.93	3.00	0.18	-0.75	1.48	1.00	0.39	0.88



## Alt Model-Shift Uniqueness Test

This plot does not exist for this TCE.

### Stellar Parameters For KIC 010873947

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7559^{+237}_{-316}$	$4.078^{+0.170}_{-0.170}$	$-0.220^{+0.250}_{-0.350}$	$1.886^{+0.541}_{-0.443}$	$1.551^{+0.210}_{-0.257}$	$0.326^{+0.339}_{-0.143}$
	+3%/-4%	+4%/-4%	+114%/-159%	+29%/-23%	+14%/-17%	+104%/-44%
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 010873947-09 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-333 \pm 77$	$9.18^{+9.49}_{-6.50}$	$1329^{+108}_{-97}$	$4803^{+4283}_{-1082}$	$112^{+1208}_{-86}$
Alt.	N/A	N/A	N/A	N/A	N/A

$T_{\text{max}}$  = 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

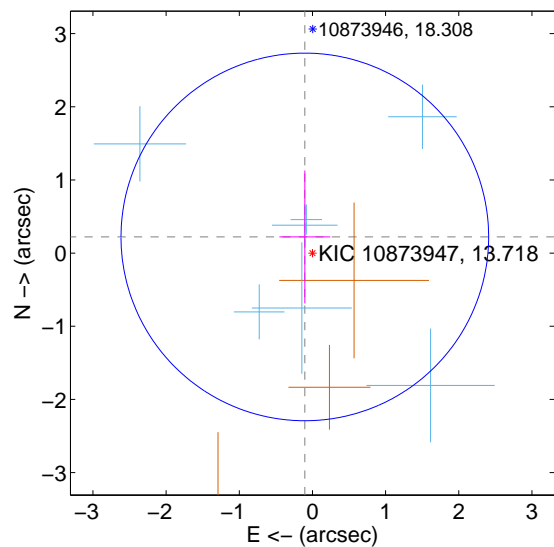
Supplemental centroid analysis for 010873947-09. Kepler magnitude: 13.72. Transit SNR 9.37

There are 7 quarters with good PRF difference image offsets

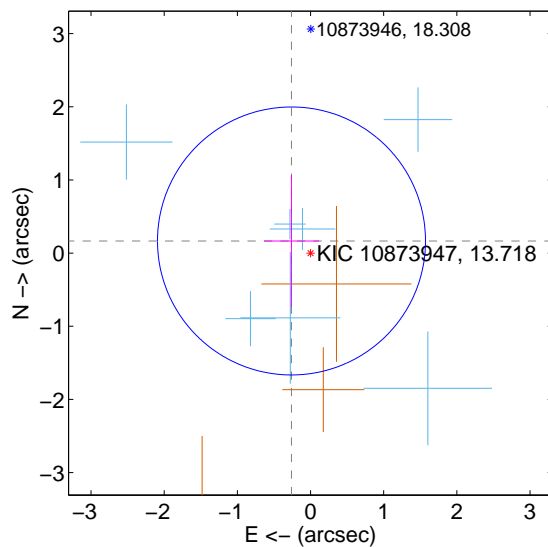
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.244 \pm 0.838$	0.29	$0.104 \pm 0.348$	$0.221 \pm 0.909$
PRF-fit source offset from KIC position	$0.308 \pm 0.611$	0.51	$0.260 \pm 0.377$	$0.166 \pm 0.902$
photometric centroid source offset	$0.80 \pm 0.39$	2.06	$-0.09 \pm 0.40$	$-0.80 \pm 0.39$

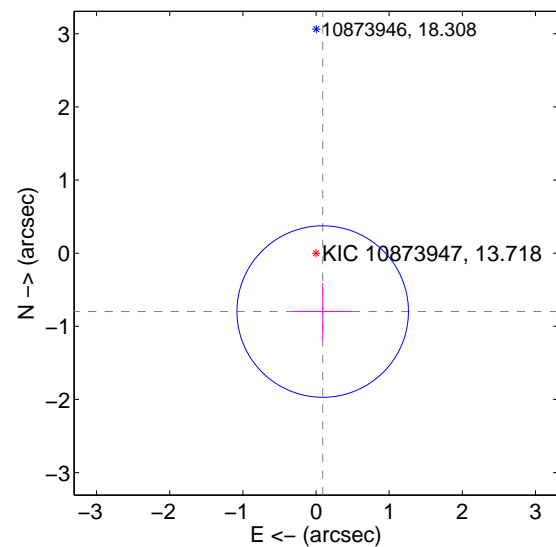
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

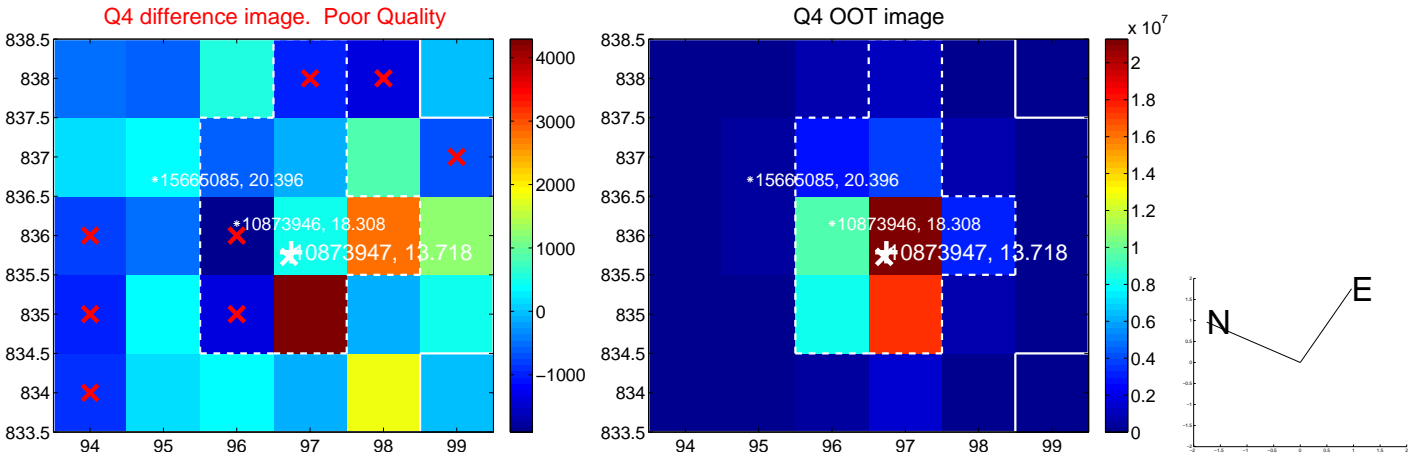
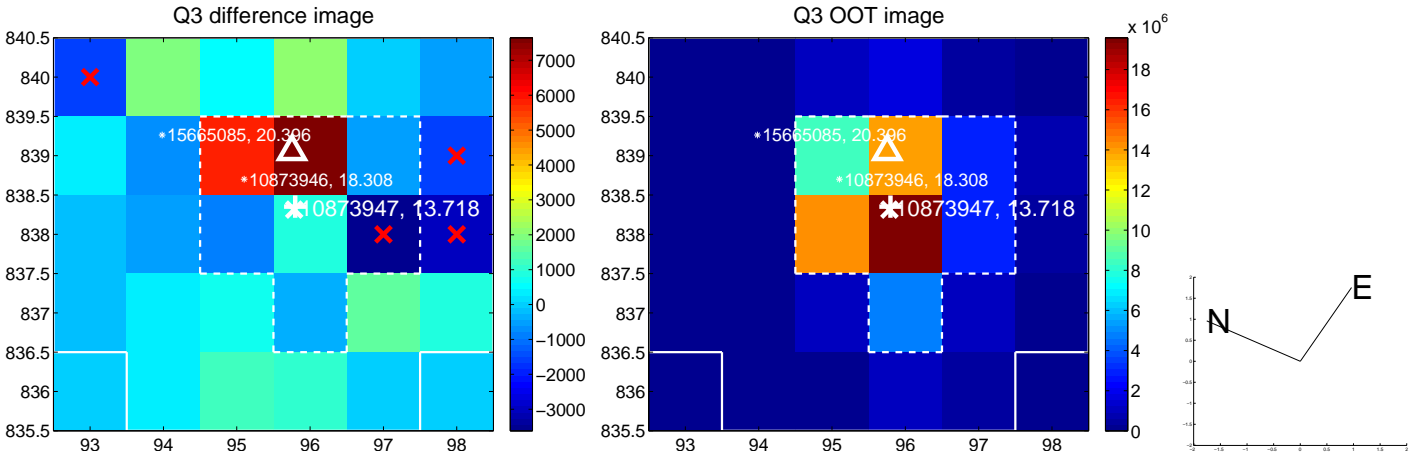
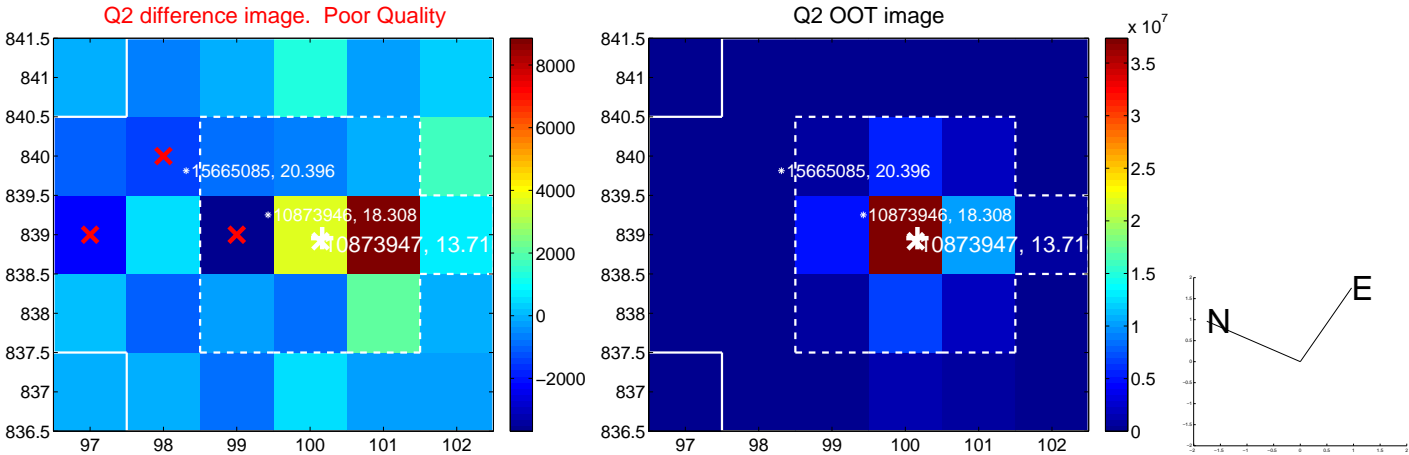
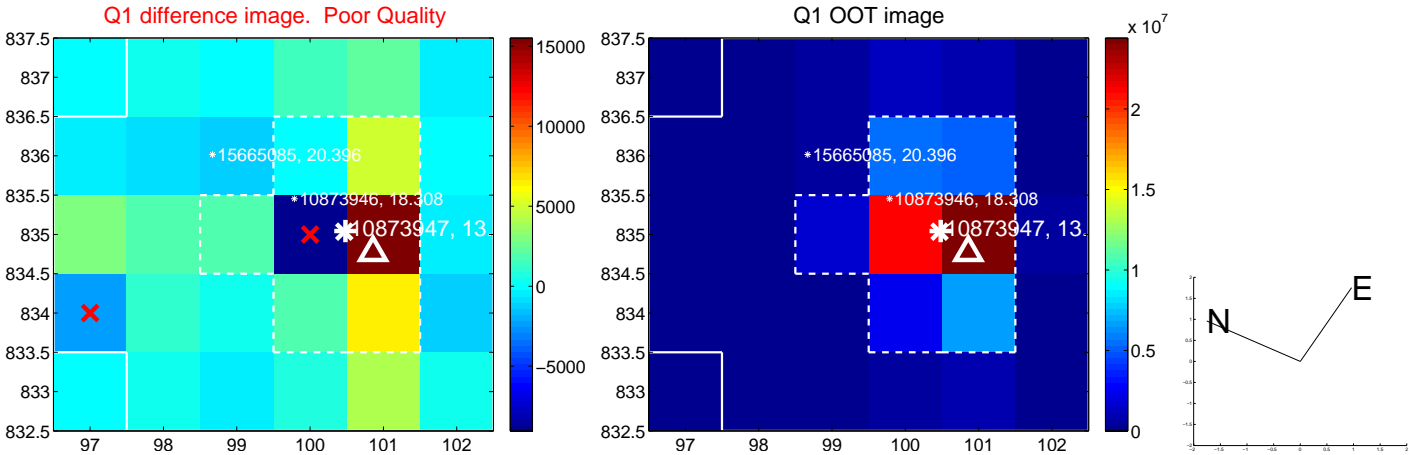


offset from photometric centroids

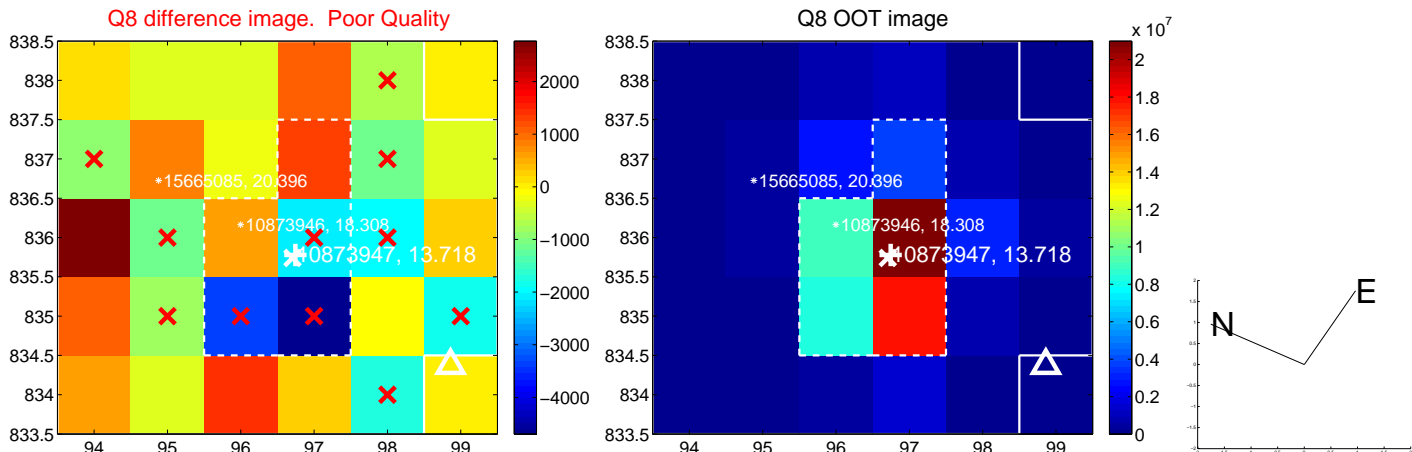
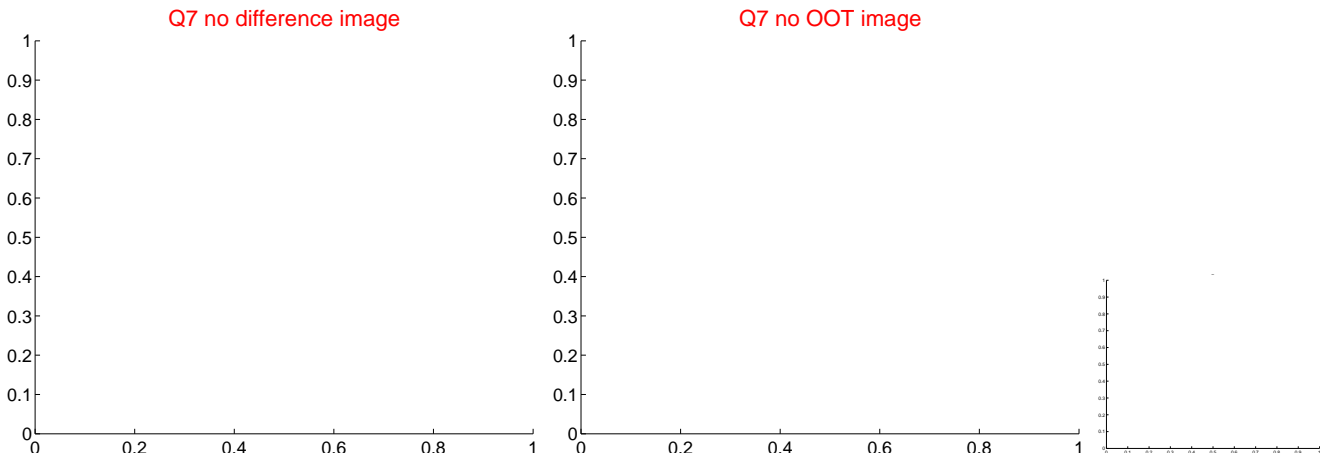
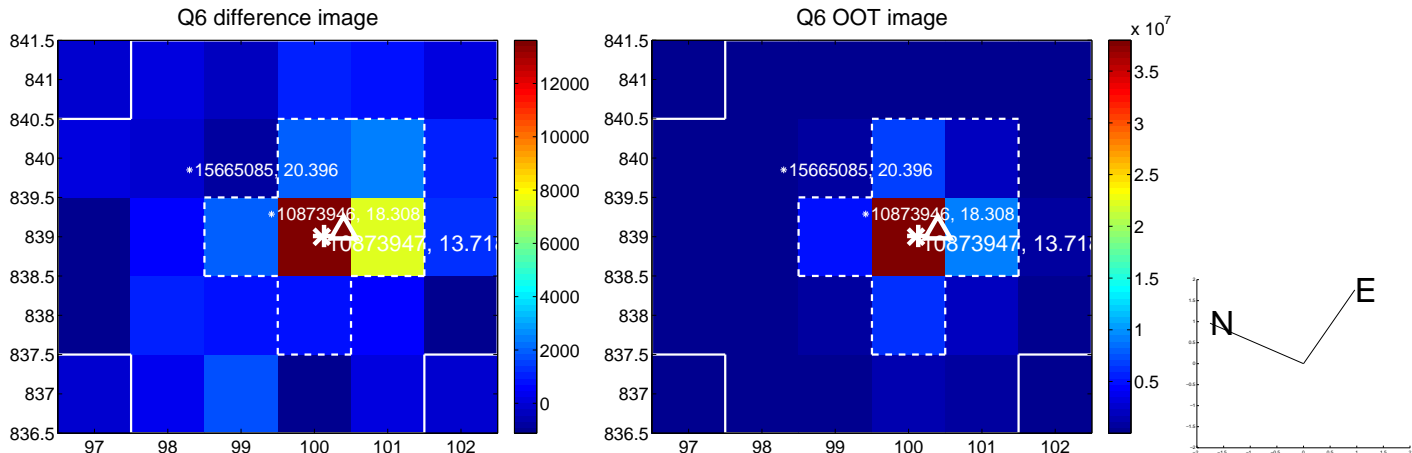
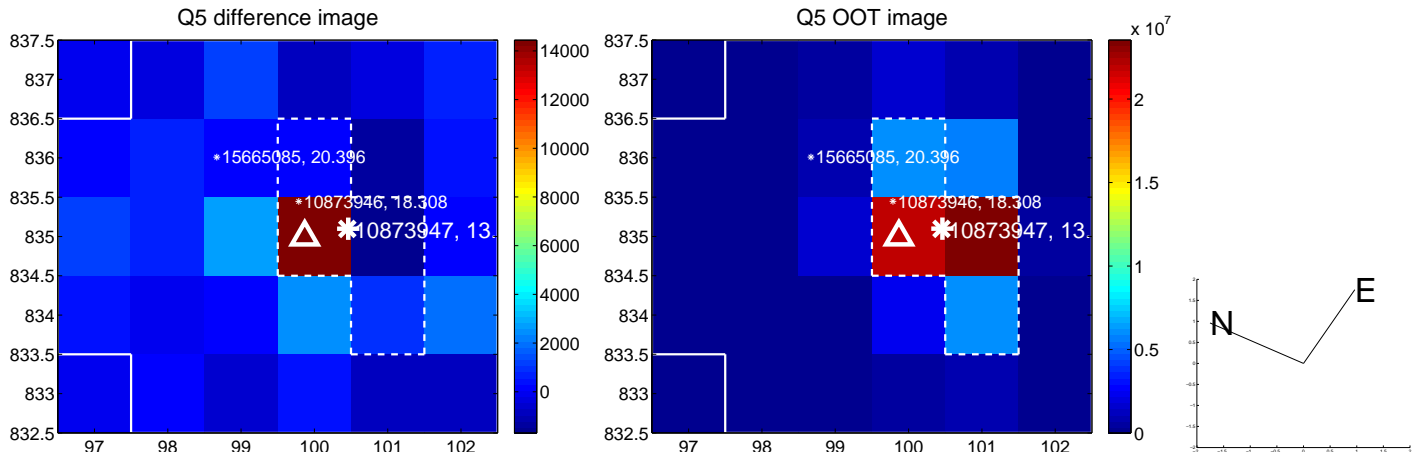


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

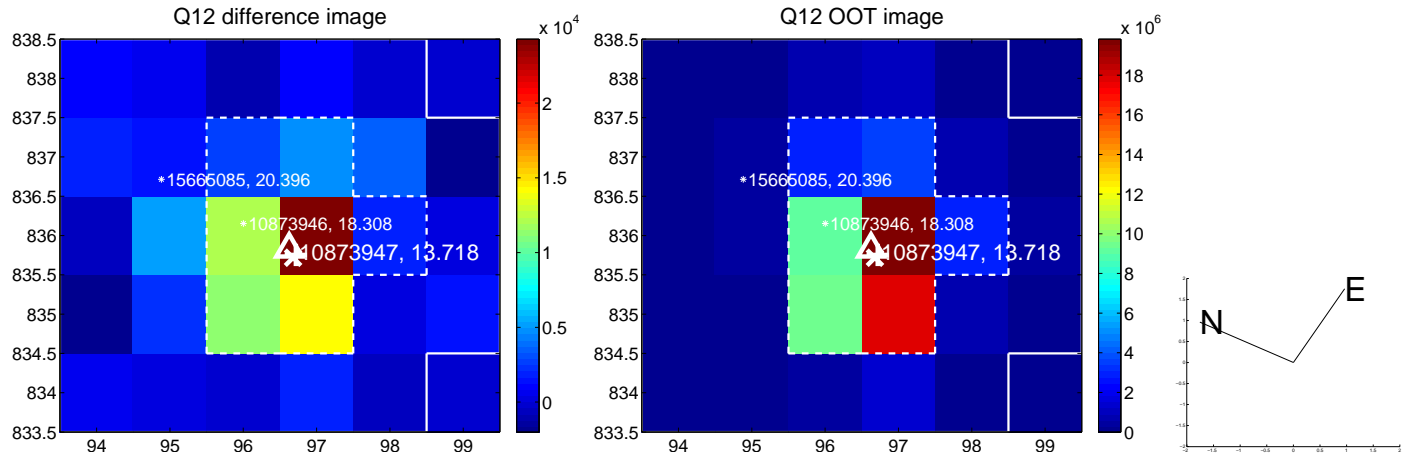
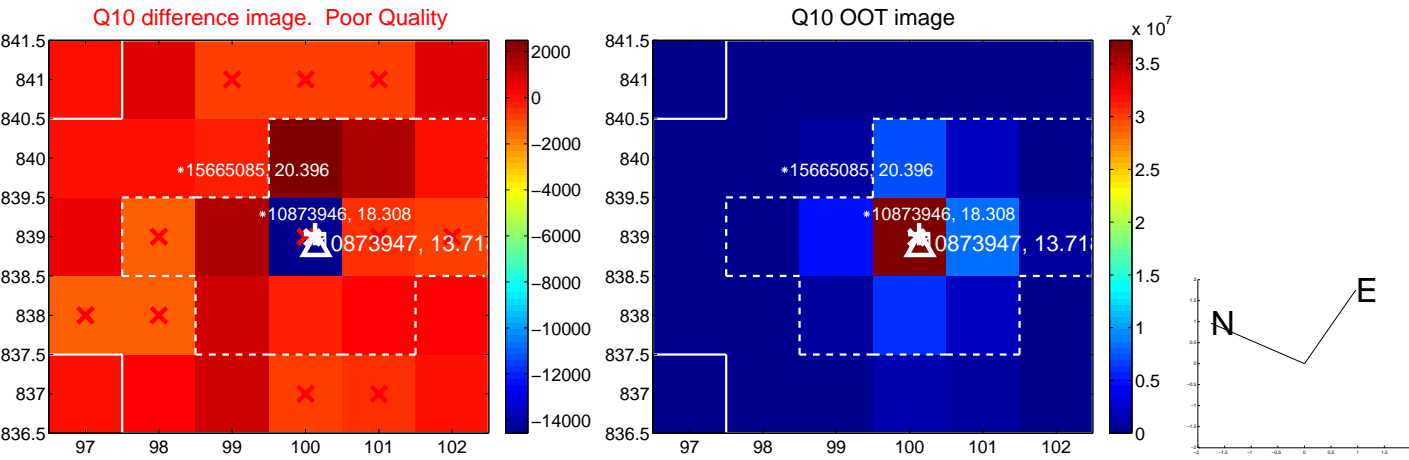
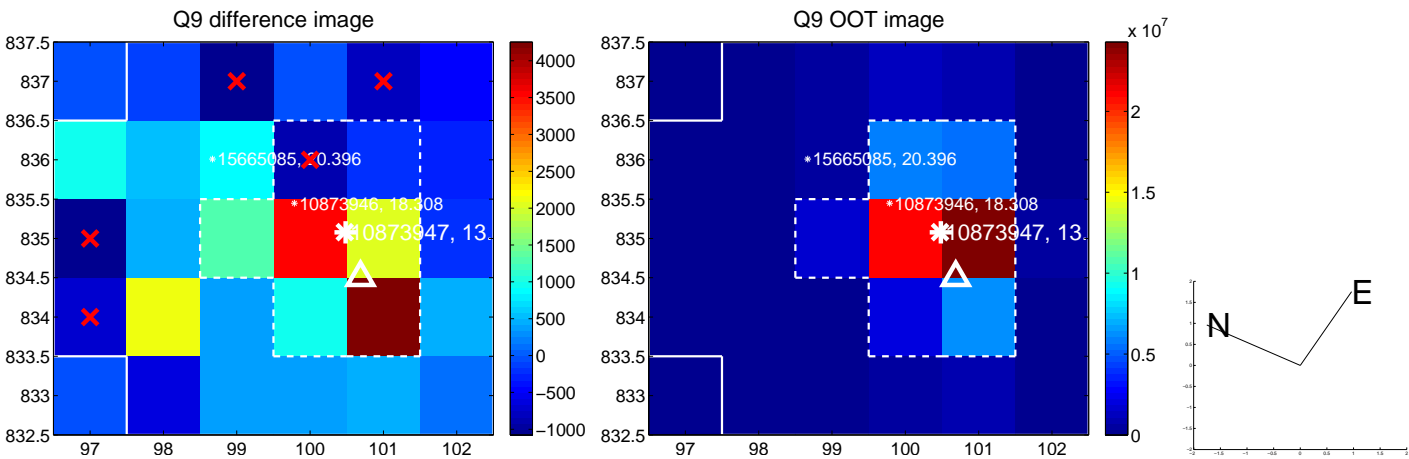


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

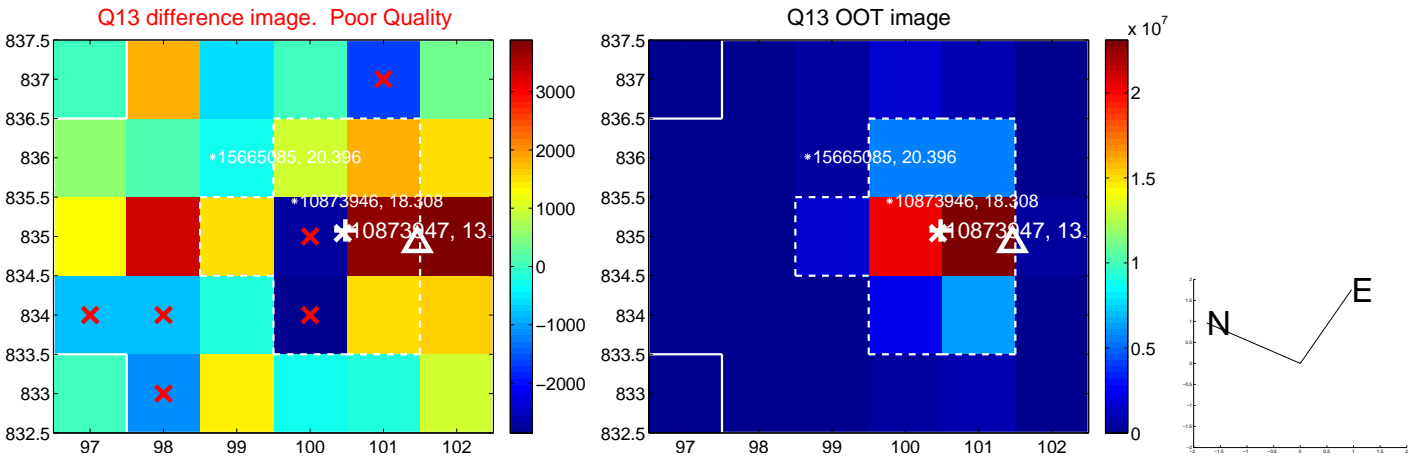




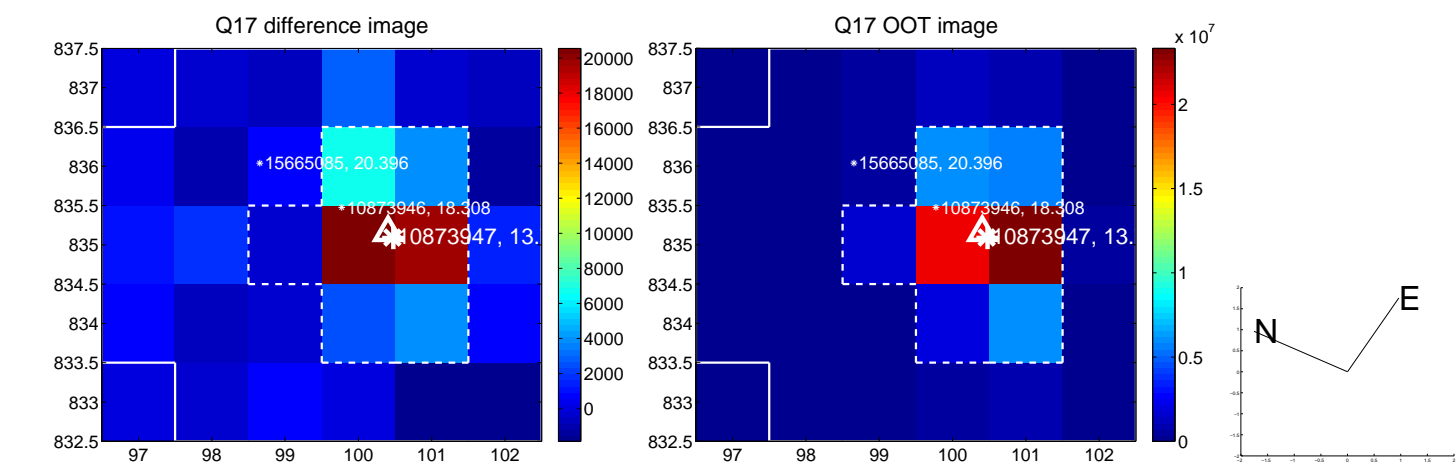
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



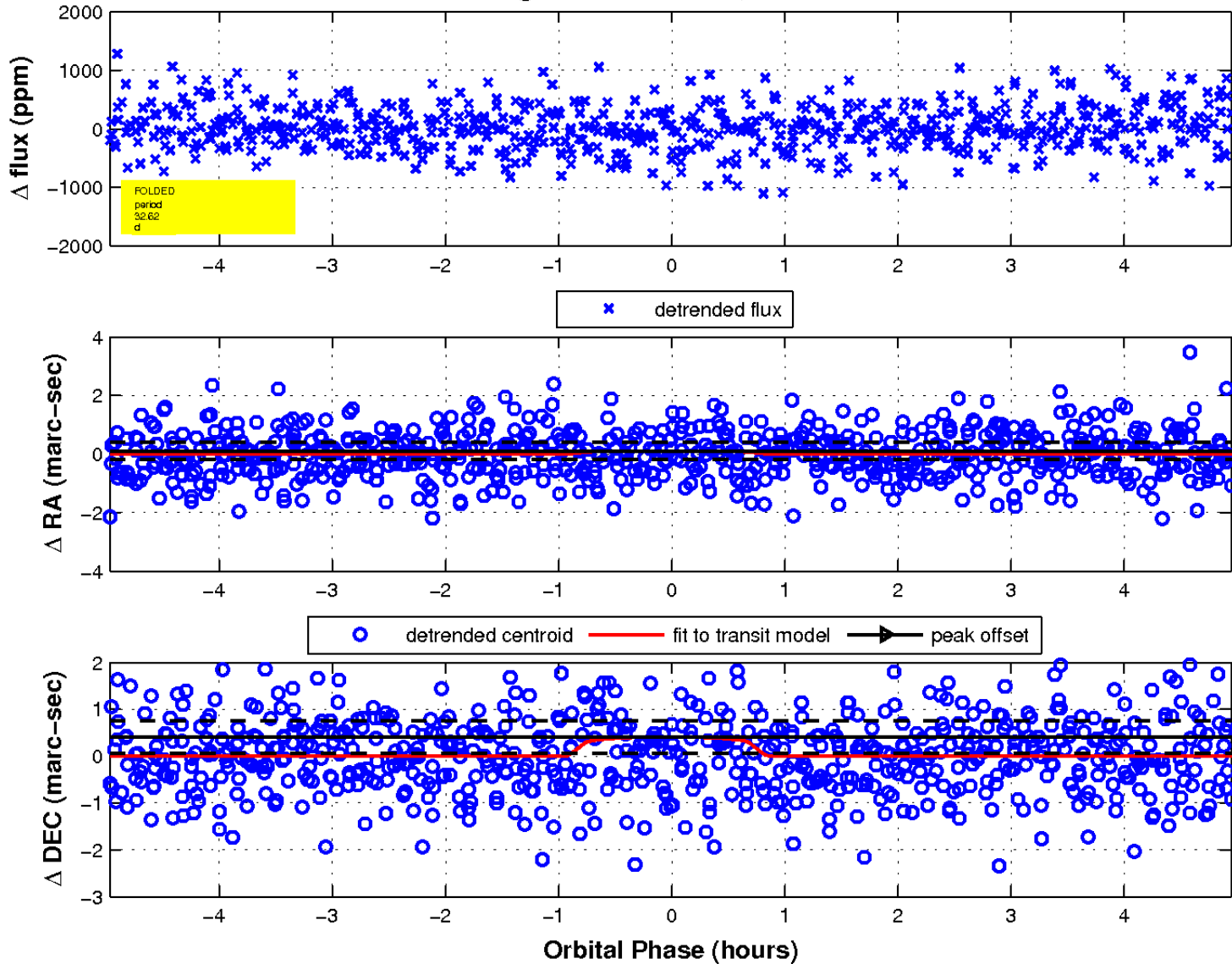
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 9 of 9



UKIRT Image

