

# KIC 008973067

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008973067-01	OBS	No	1.375024	132.113592	22.5	5.387	8.9	7.6	4.10	6306	2.29	28242.15
008973067-02	OBS	No	99.274837	159.926145	278.4	5.042	8.0	8.0	4.10	6306	8.11	93.94
008973067-03	OBS	No	162.388847	244.892607	256.2	5.713	7.6	6.6	4.10	6306	7.19	48.74
008973067-04	OBS	No	231.923132	148.665148	292.3	7.468	7.4	7.3	4.10	6306	7.43	30.30
008973067-05	OBS	No	559.824663	190.363673	338.6	6.874	7.9	8.0	4.10	6306	8.37	9.36
008973067-06	OBS	No	86.674371	192.032939	313.2	2.468	7.2	7.5	4.10	6306	8.43	112.58

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008973067-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
008973067-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
008973067-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT
008973067-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008973067-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS
008973067-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT

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

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

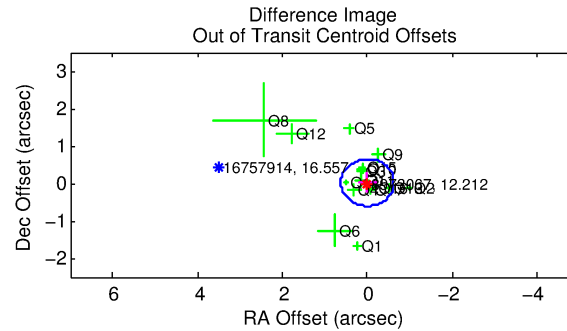
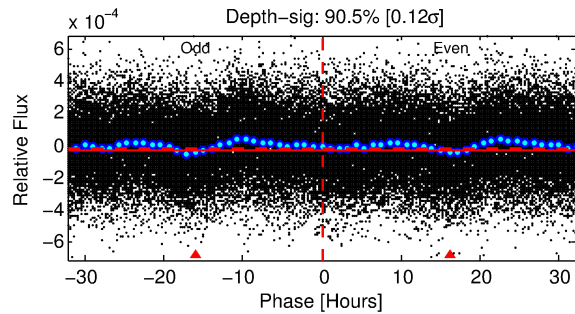
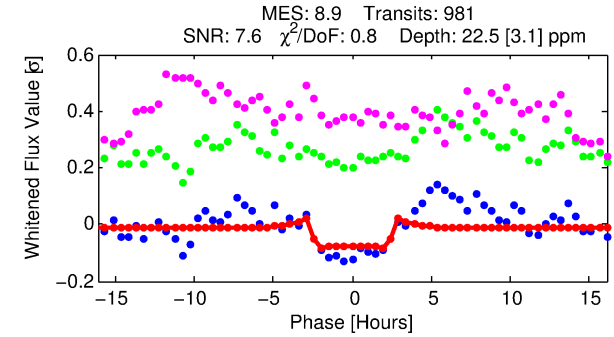
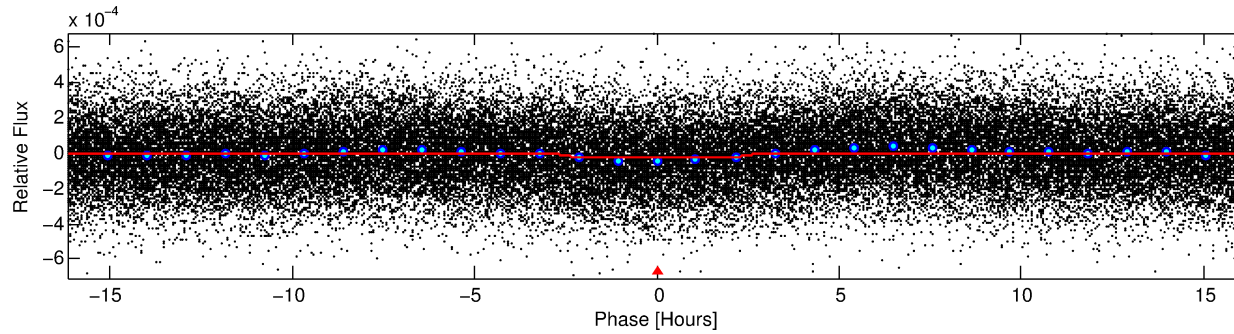
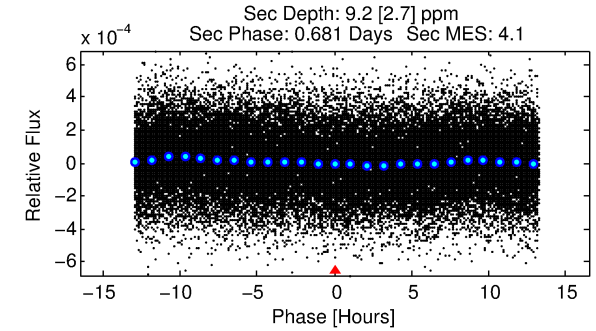
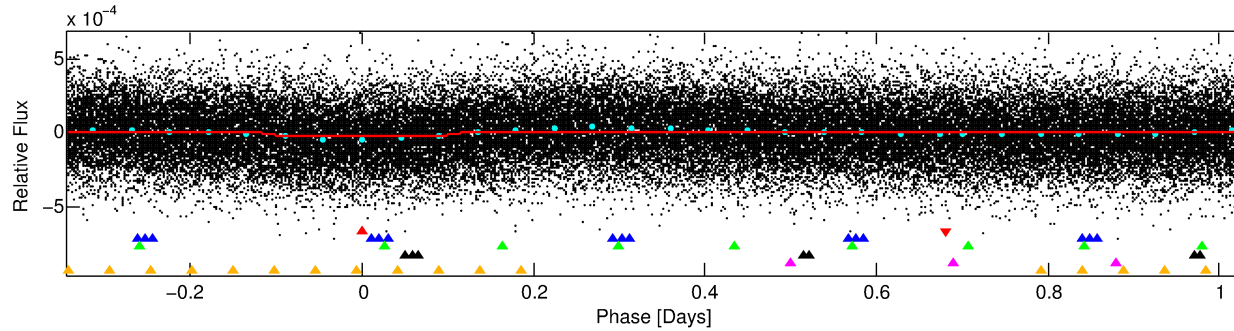
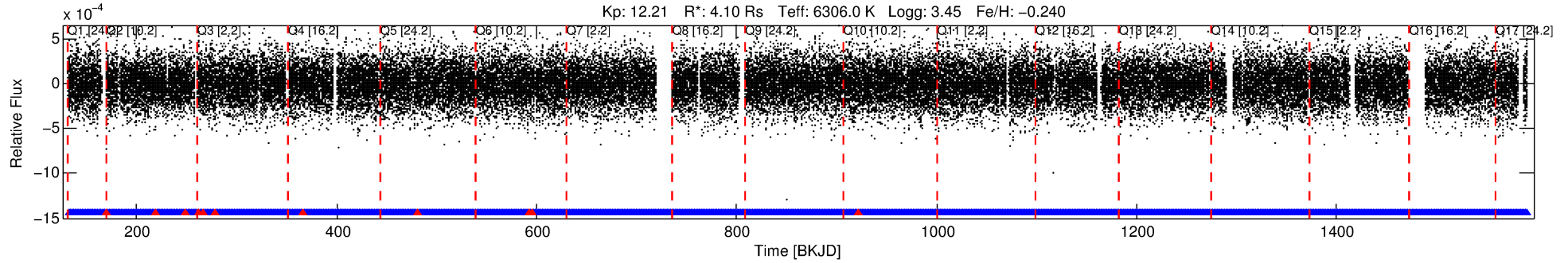
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008973067-01

No Significant Match Found

# DV One-Page Summary

KIC: 8973067 Candidate: 1 of 6 Period: 1.375 d



## DV Fit Results:

Period = 1.37502 [0.00002] d  
Epoch = 132.1136 [0.0045] BKJD  
Rp/R\* = 0.0051 [0.0016]  
a/R\* = 1.27 [0.83]  
b = 0.91 [0.35]  
Seff = 28242.15 [17939.15]  
Teq = 3306 [525] K  
Rp = 2.29 [1.17] Re  
a = 0.0291 [0.0113] AU  
Ag = 0.82 [0.76] [-0.24σ]  
Teffp = 4859 [845] K [1.56σ]

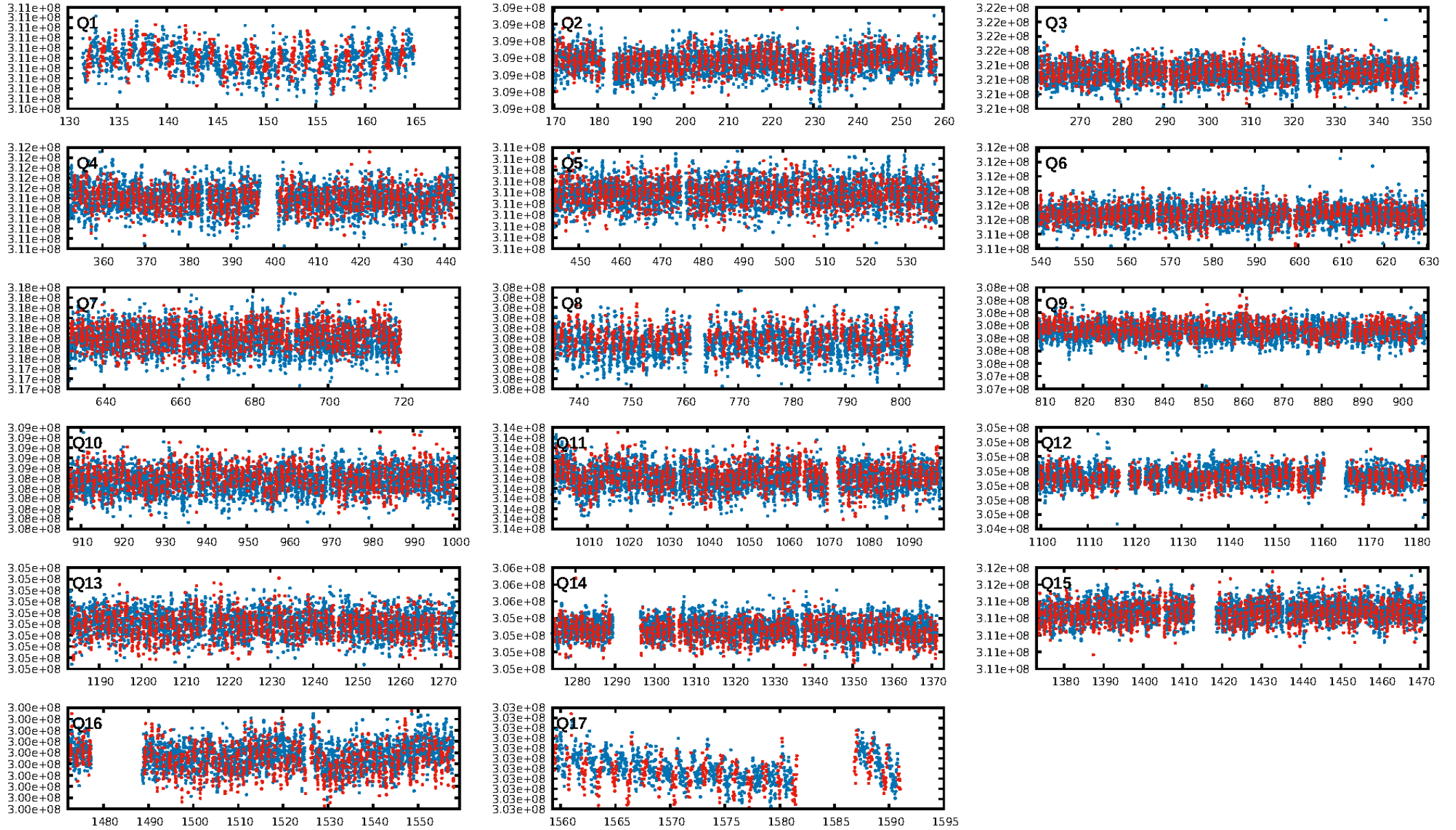
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [345.50σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 4.13e-13  
RollingBand-fgt: 0.99 [925/936]  
GhostDiagnostic-chr: 4.449  
Centroid-sig: 18.5%  
Centroid-so: 0.451 arcsec [0.79σ]  
OotOffset-rm: 0.022 arcsec [0.10σ]  
OotOffset-st: 4/3/4/5 [16]  
KicOffset-rm: 0.058 arcsec [0.35σ]  
KicOffset-st: 4/3/4/5 [16]  
DiffImageQuality-fgm: 0.56 [9/16]  
DiffImageOverlap-fno: 1.00 [17/17]

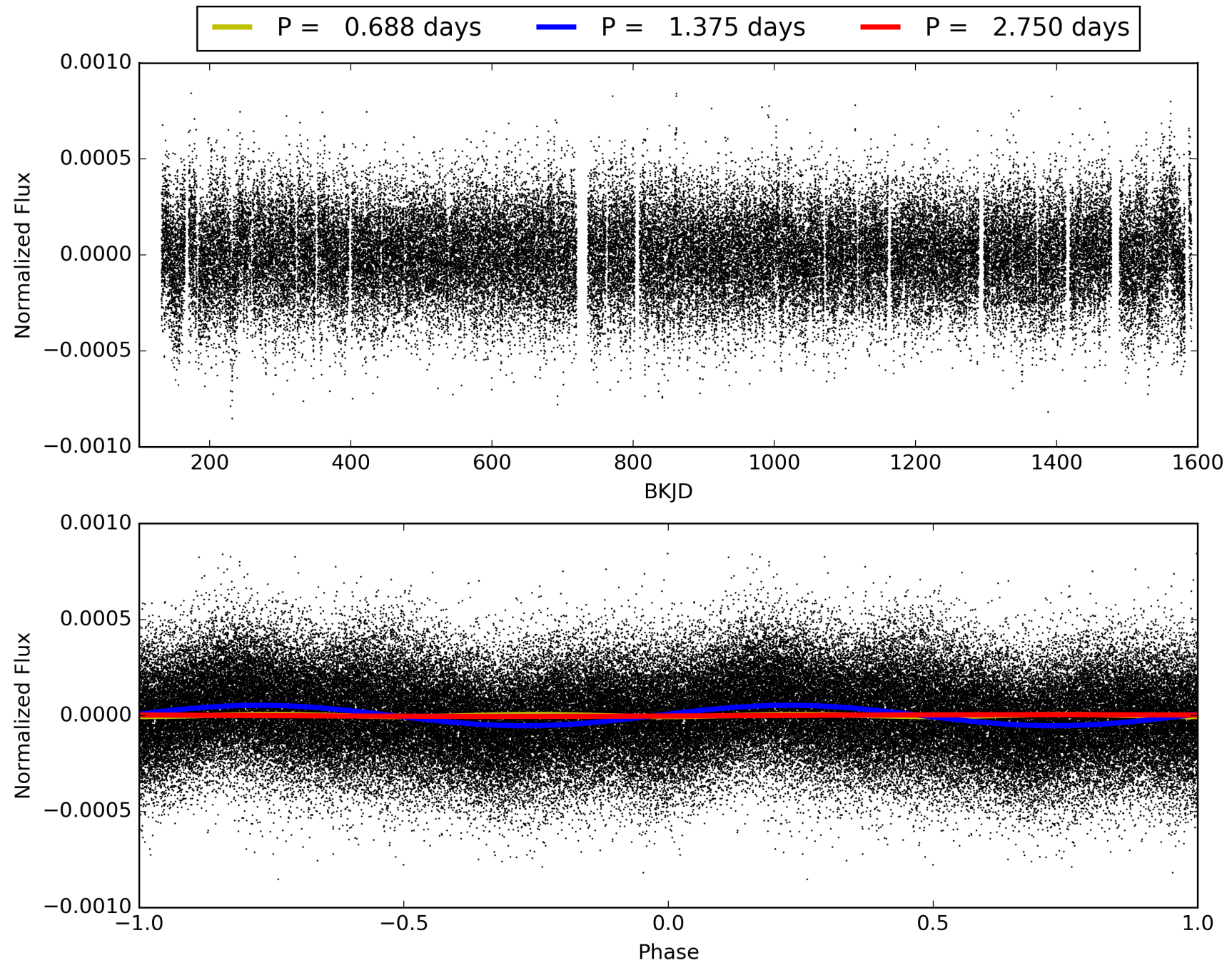
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 06:42:31 Z

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

# TCE 008973067-01, PDC Light Curves

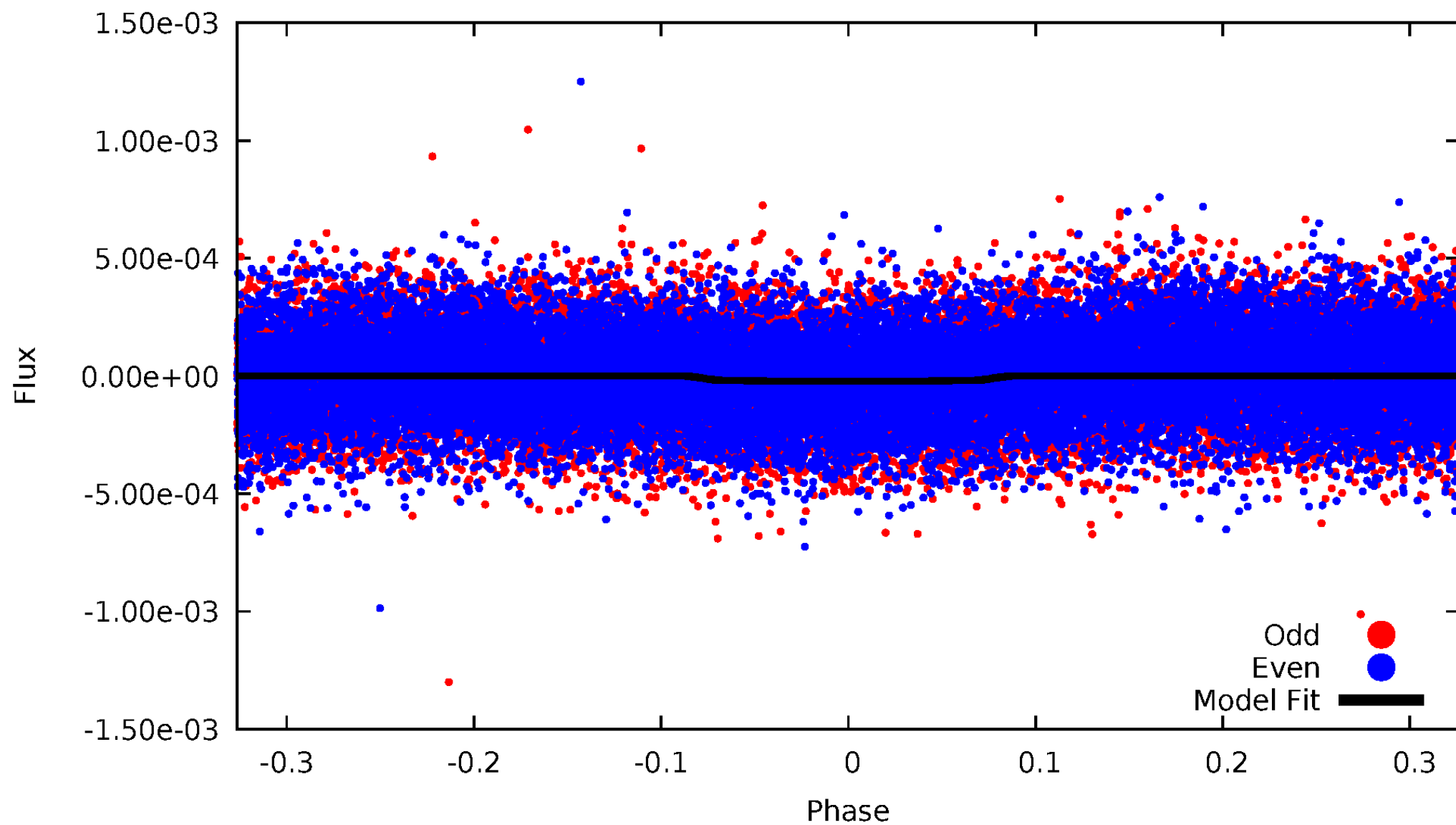


TCE 008973067-01



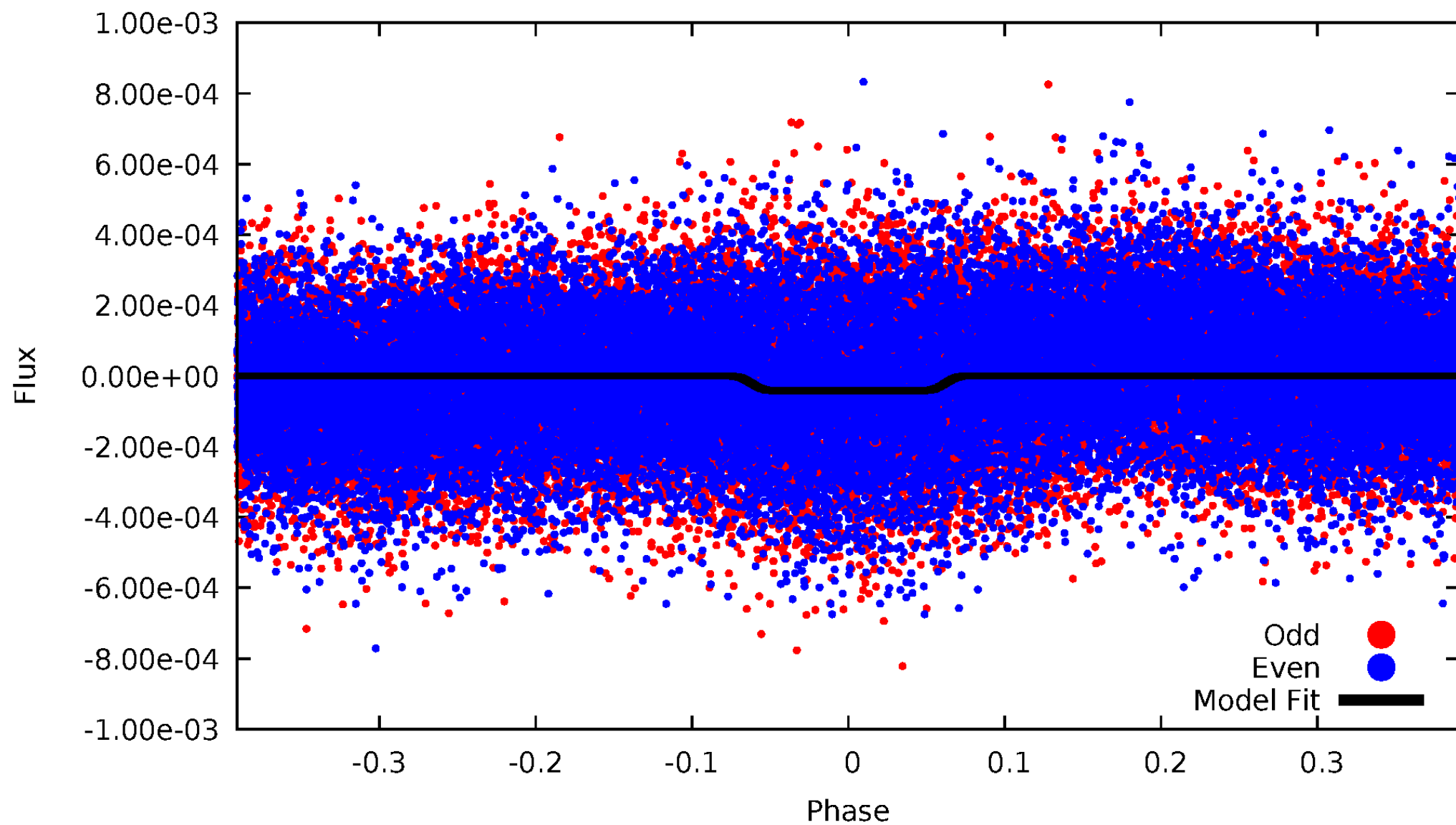
DV Odd/Even

TCE 008973067-01

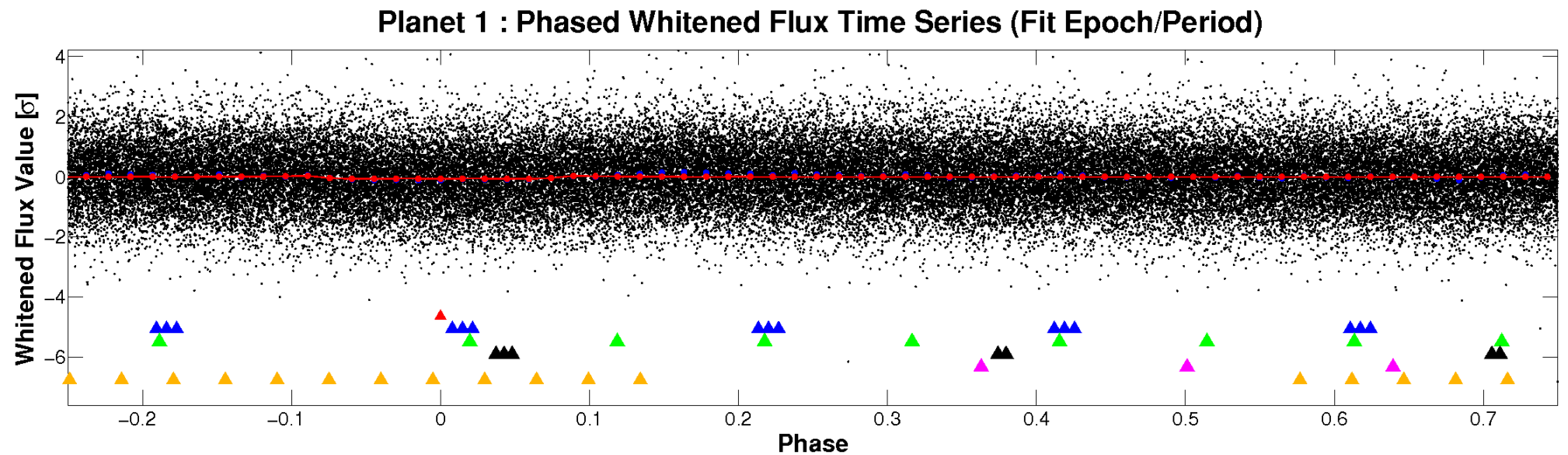
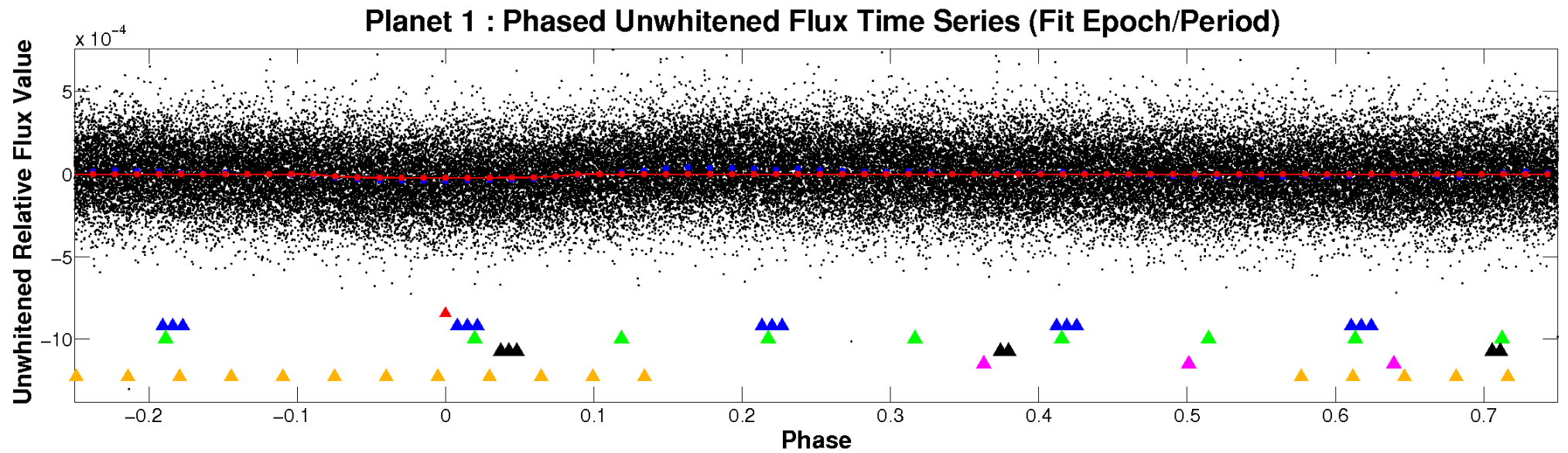


# ALT Odd/Even

TCE 008973067-01

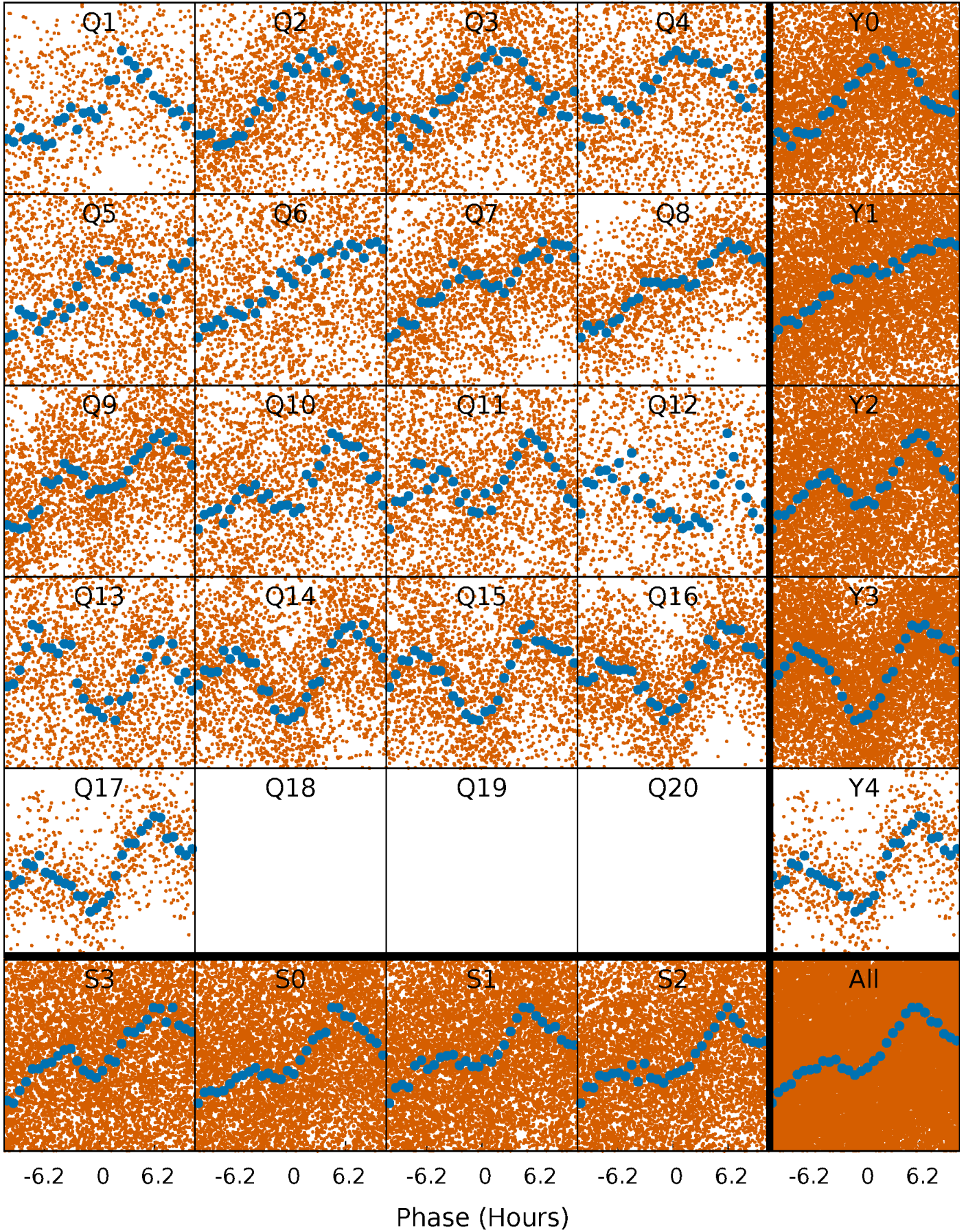


# Non-Whitened Vs. Whitened Light Curve



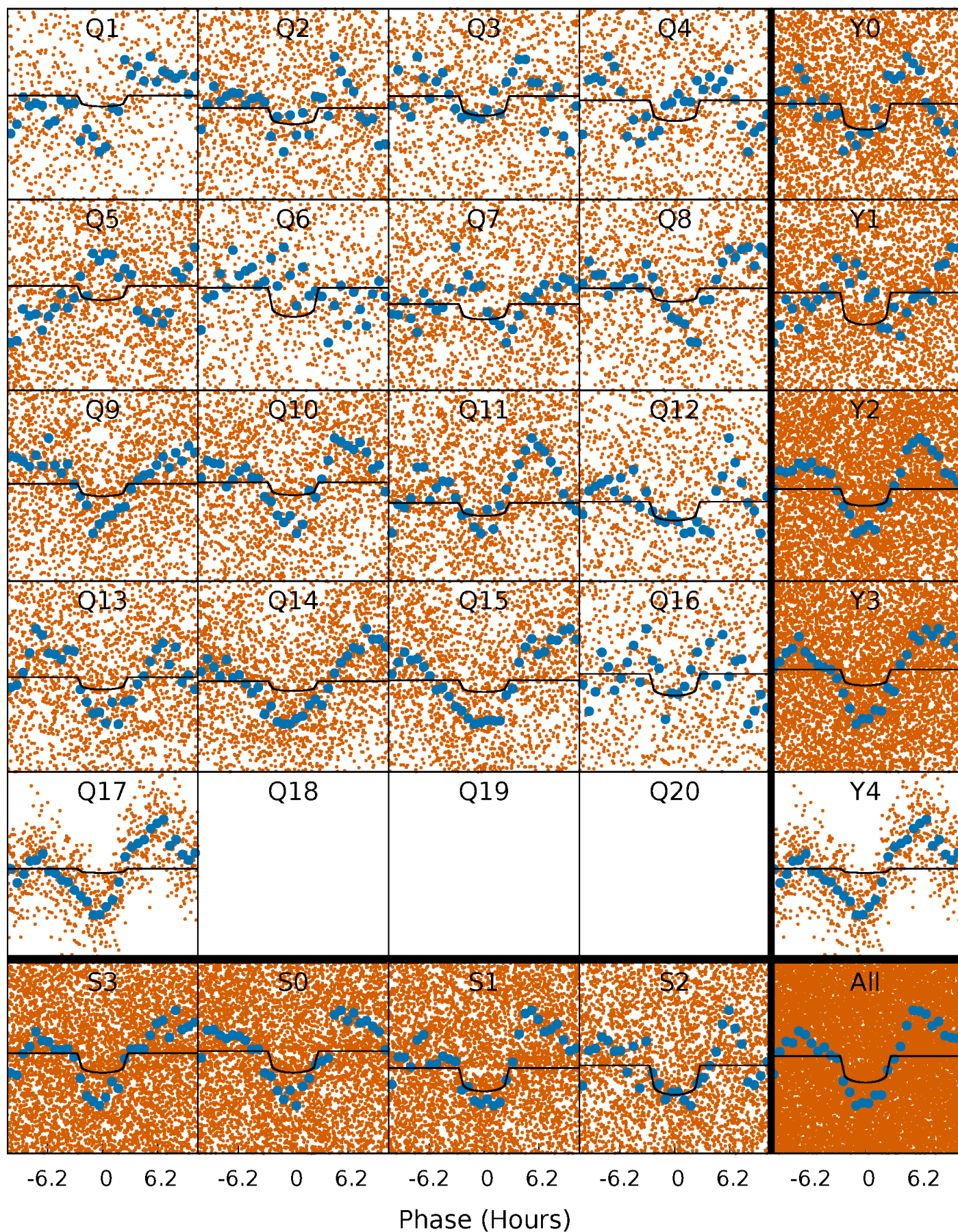
# PDC Quarter-Phased Transit Curves

TCE 008973067-01   P= 1.375024 Days    $T_0=132.113592$  (BKJD)



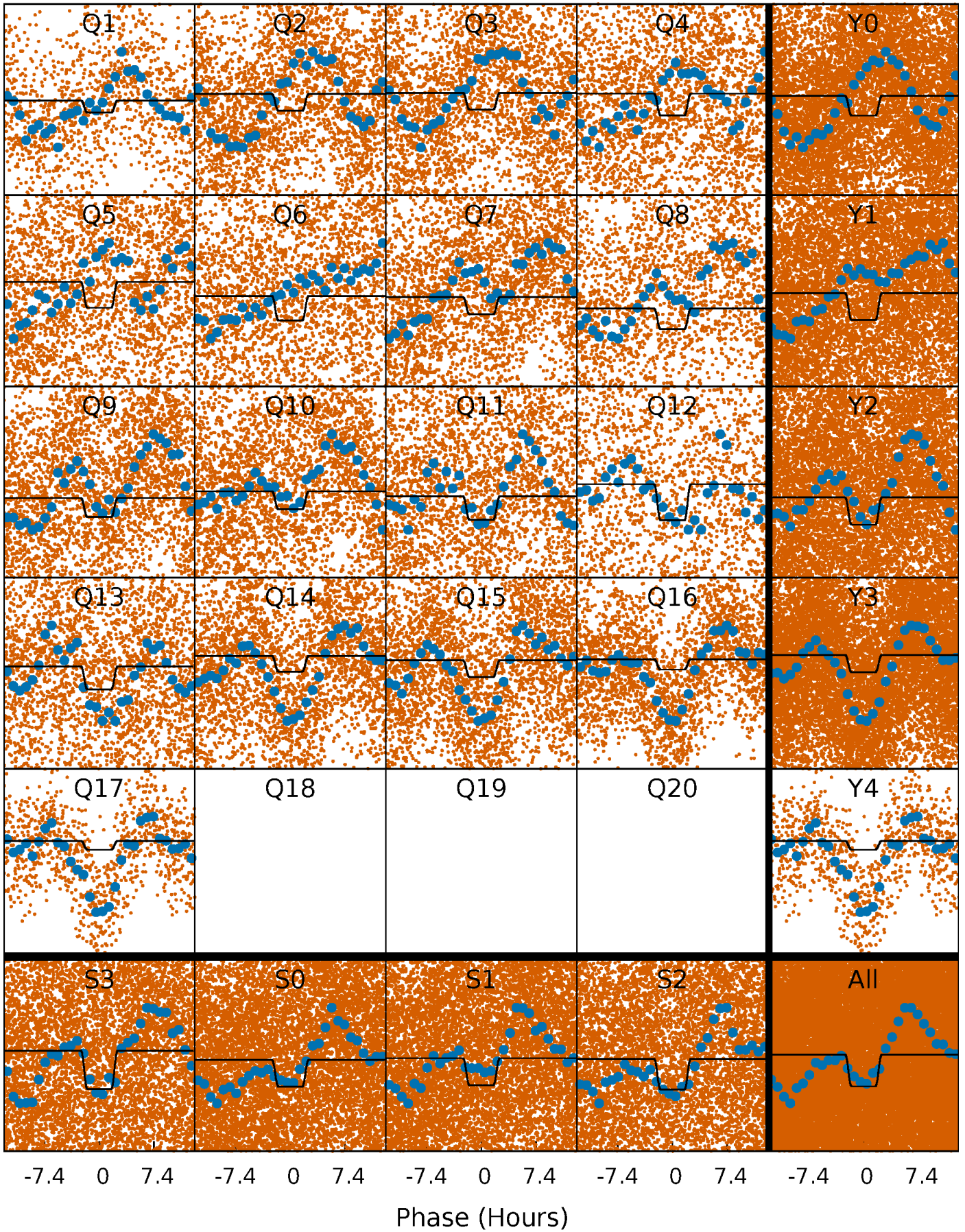
# DV Quarter-Phased Transit Curves

TCE 008973067-01 P= 1.375024 Days  $T_0=132.113592$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

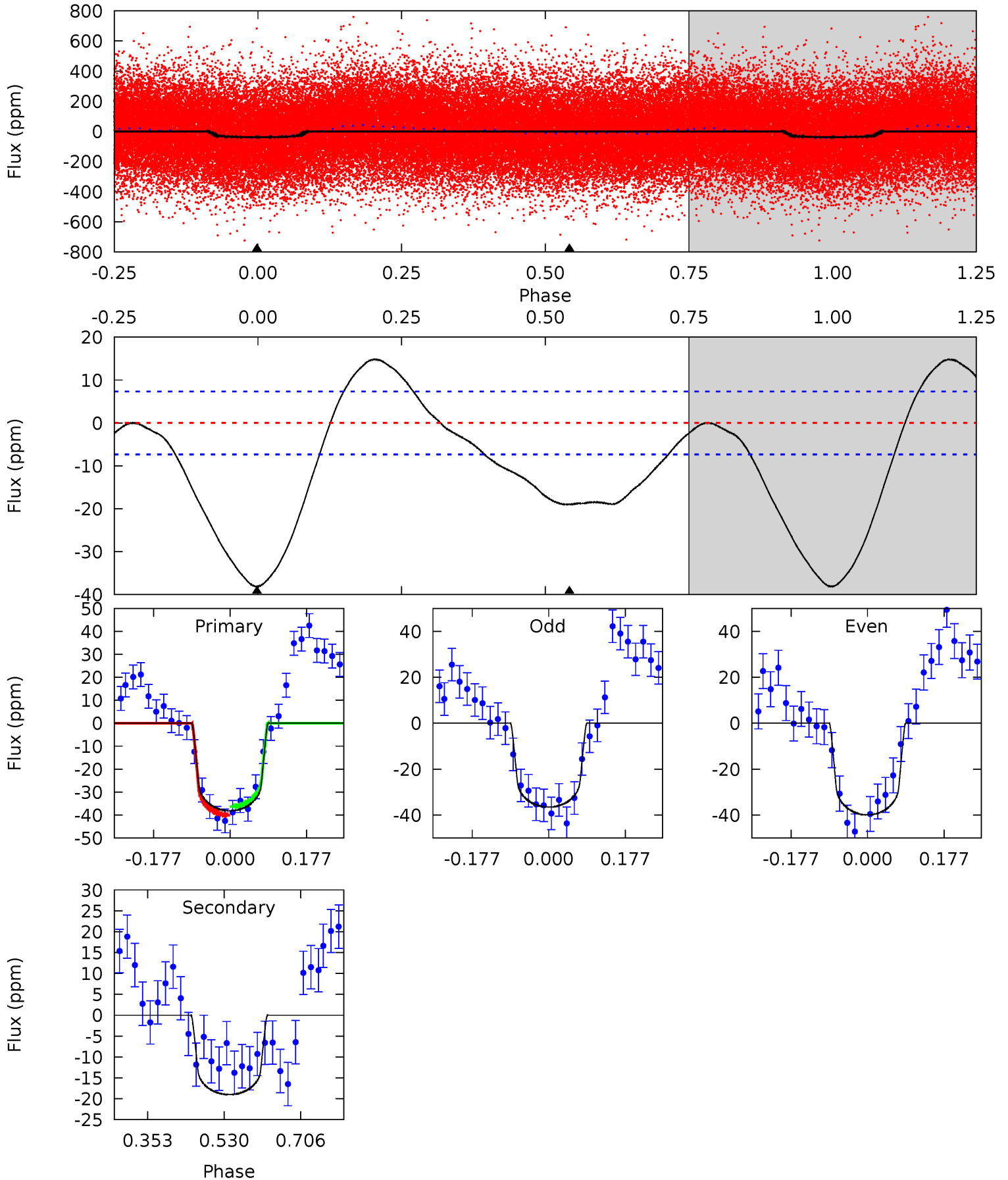
TCE 008973067-01 P= 1.375019 Days  $T_0=132.097462$  (BKJD)



# DV Model-Shift Uniqueness Test

008973067-01, P = 1.375024 Days, E = 130.738568 Days

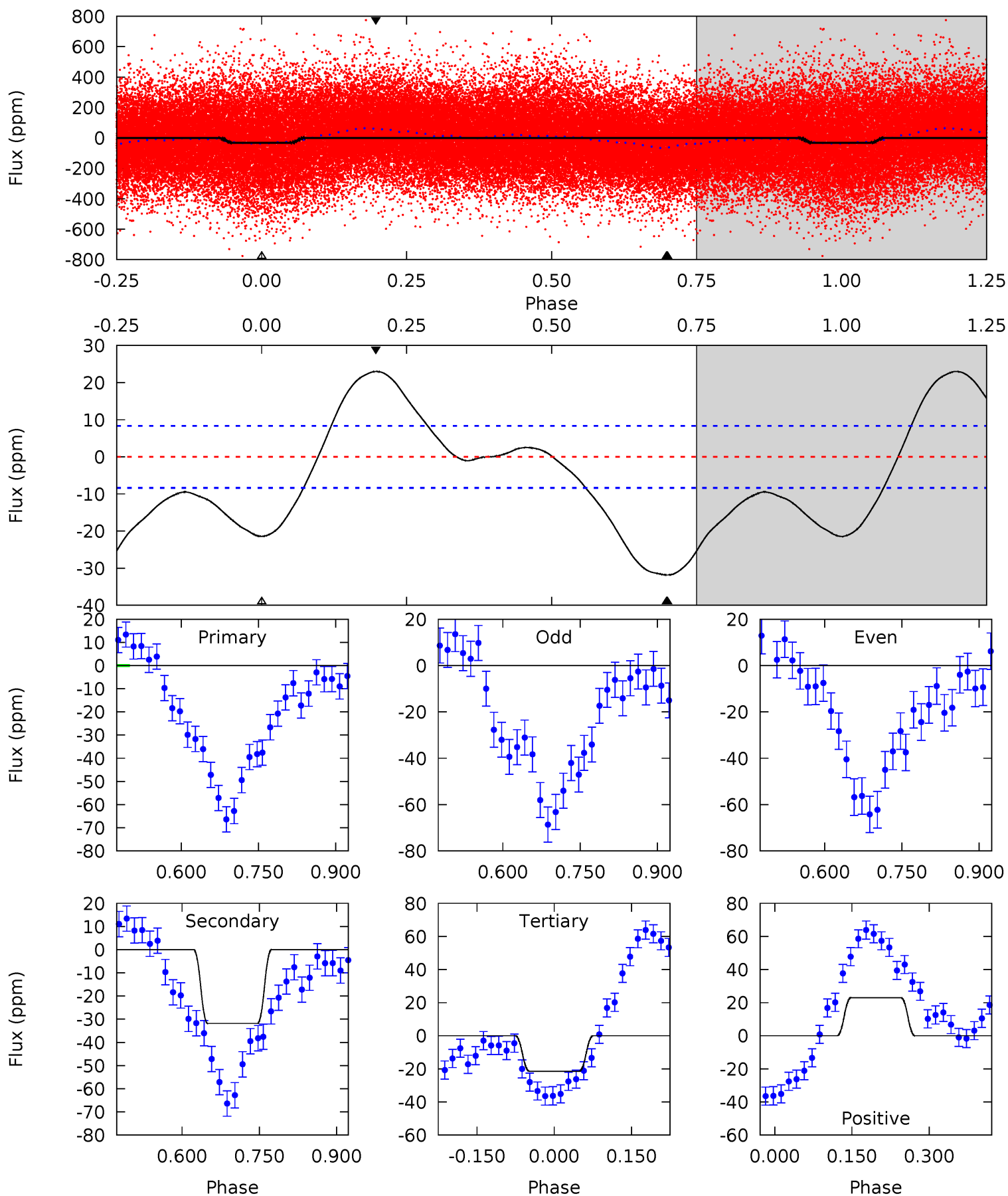
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
23.1	11.5	0	0	4.44	1.35	4.13	23.1	23.1	11.5	11.5	1.03	1.06	0.28	1.12



# Alt Model-Shift Uniqueness Test

008973067-01, P = 1.375019 Days, E = 130.722443 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
17.1	17.1	11.5	12.3	4.48	1.44	6.83	5.58	4.73	5.58	4.73	1.45	1.57	0.42	0.64



### Stellar Parameters For KIC 008973067

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6306^{+173}_{-173}$	$3.450^{+0.368}_{-0.092}$	$-0.240^{+0.350}_{-0.300}$	$4.103^{+0.591}_{-1.655}$	$1.732^{+0.184}_{-0.429}$	$0.035^{+0.110}_{-0.011}$
	+3%/-3%	+11%/-3%	+146%/-125%	+14%/-40%	+11%/-25%	+311%/-30%
Source	PHO1	FLK73	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 008973067-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-19 \pm 2$	$2.11^{+0.80}_{-0.75}$	$4524^{+293}_{-459}$	$5592^{+1293}_{-785}$	$1.986^{+2.523}_{-0.947}$
Alt.	$-32 \pm 2$	$2.64^{+0.89}_{-0.78}$	$4528^{+284}_{-445}$	$5730^{+1015}_{-781}$	$2.080^{+2.032}_{-0.889}$

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

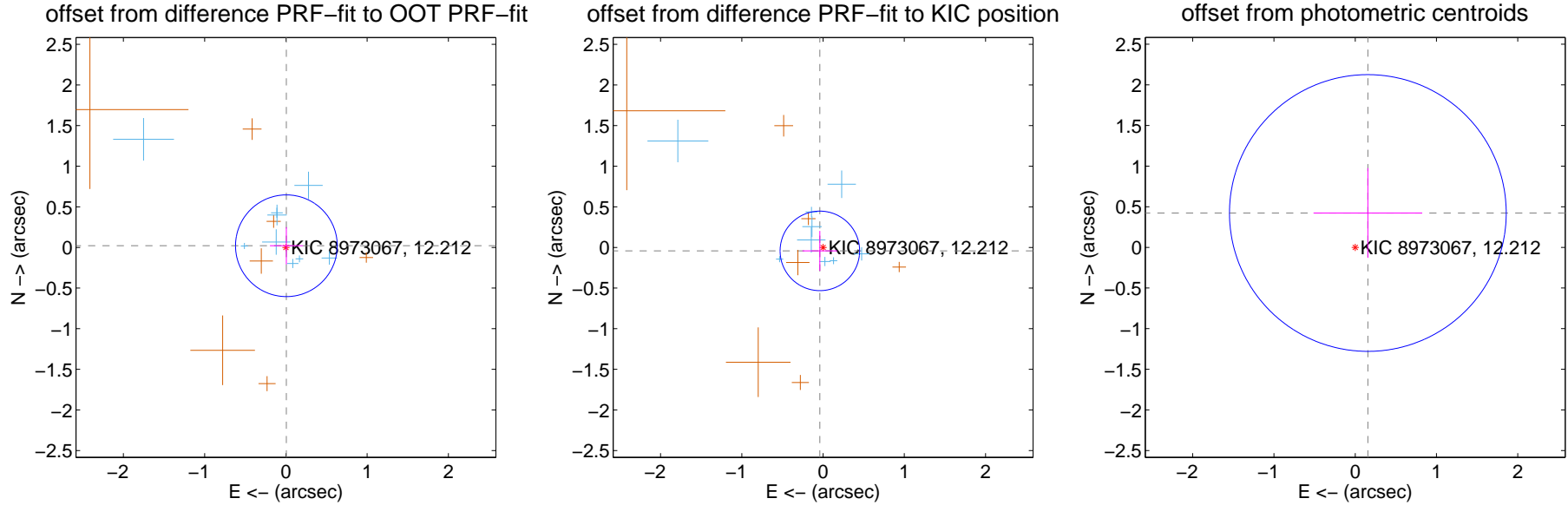
## DV Centroid Data

Supplemental centroid analysis for 008973067-01. Kepler magnitude: 12.21. Transit SNR 7.59

There are 9 quarters with good PRF difference image offsets

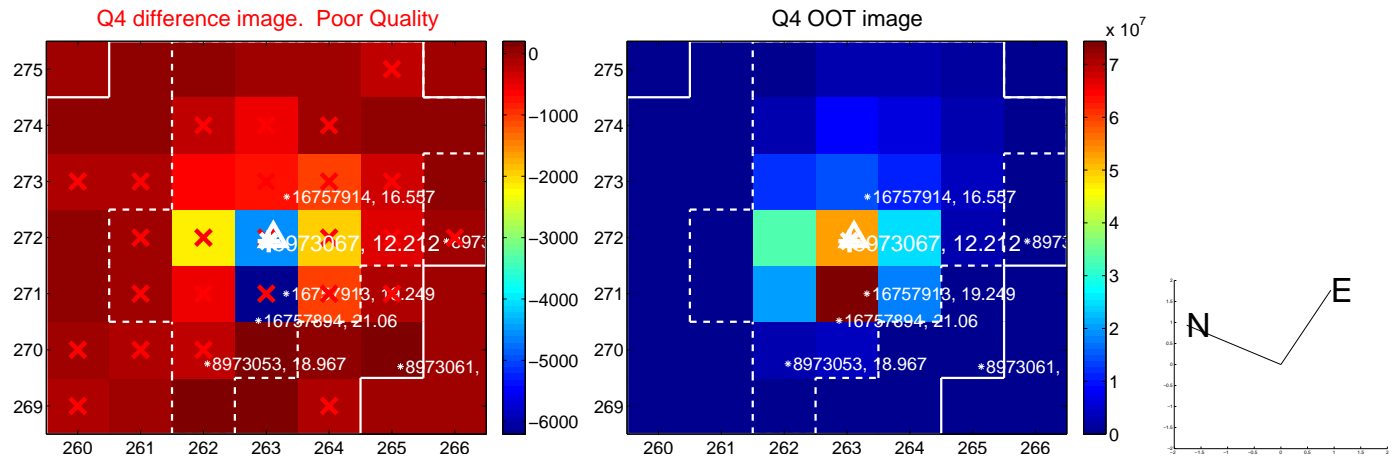
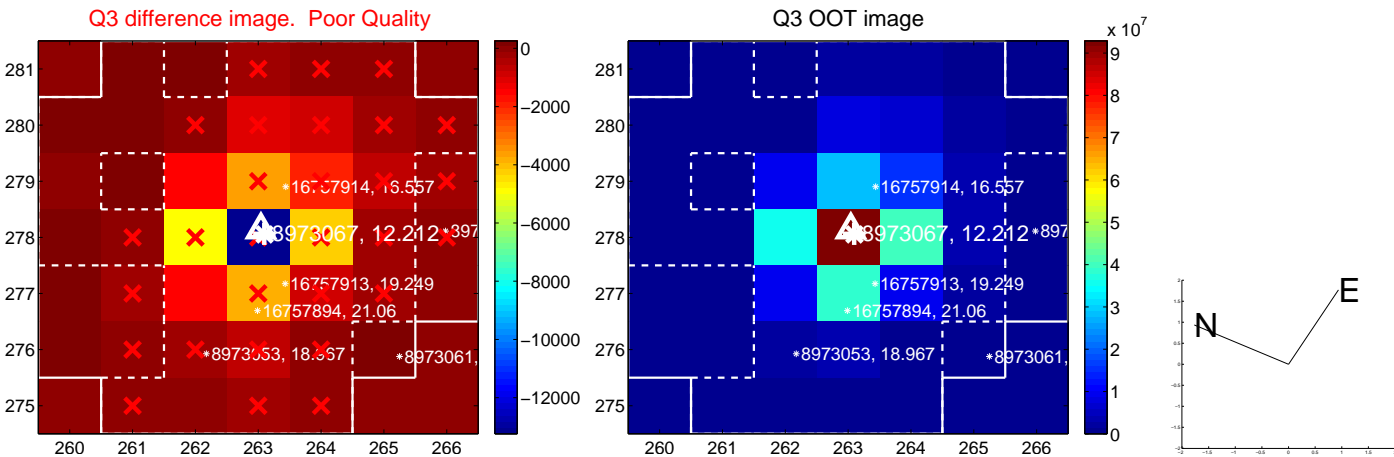
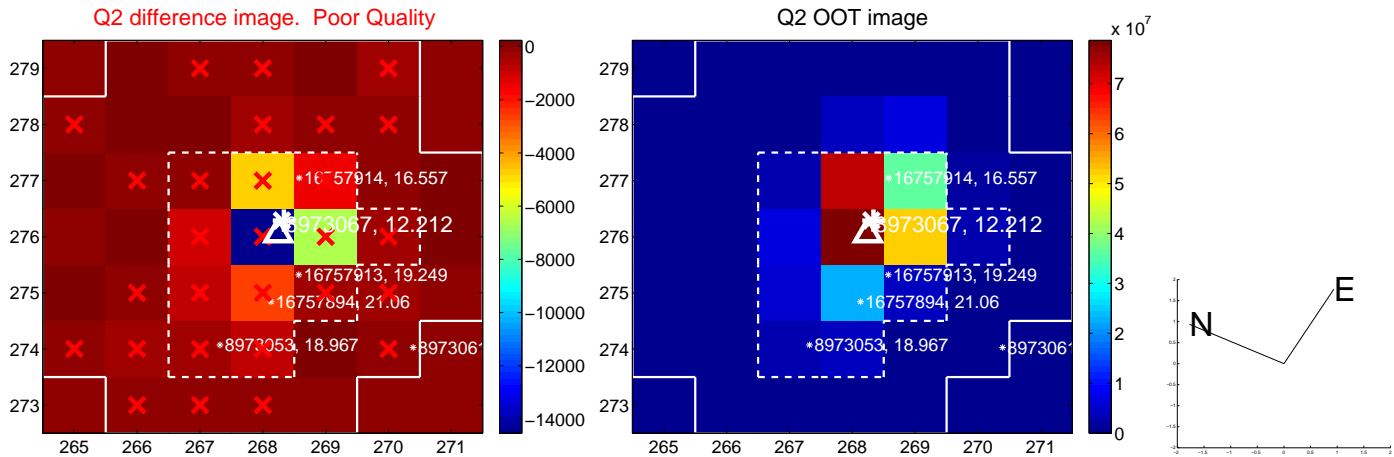
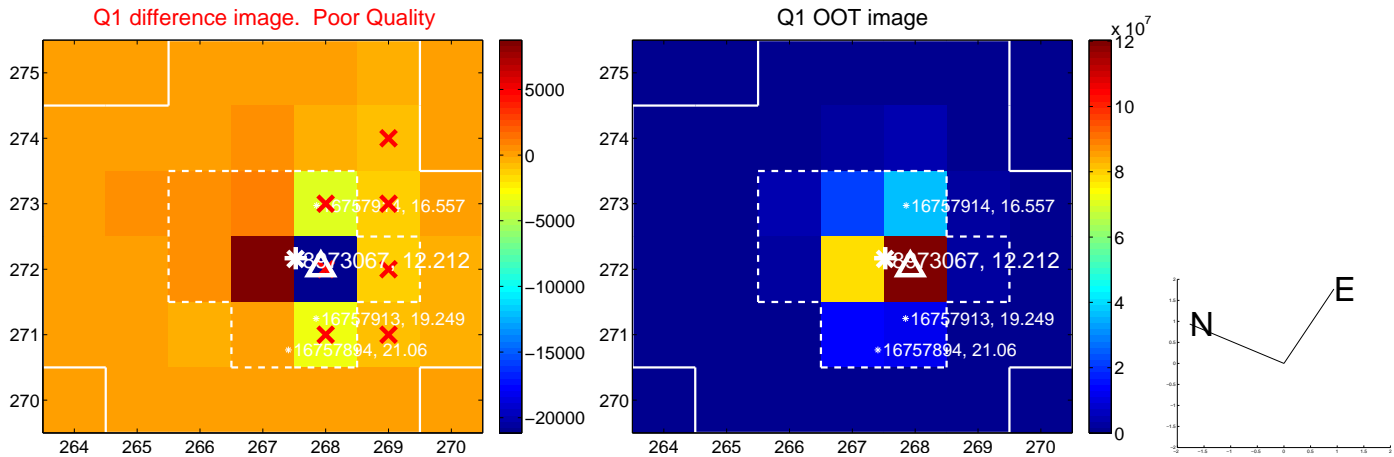
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.022 \pm 0.209$	0.10	$-0.006 \pm 0.202$	$0.021 \pm 0.230$
PRF-fit source offset from KIC position	$0.058 \pm 0.163$	0.35	$0.039 \pm 0.214$	$-0.042 \pm 0.246$
photometric centroid source offset	$0.45 \pm 0.57$	0.79	$-0.16 \pm 0.67$	$0.42 \pm 0.55$

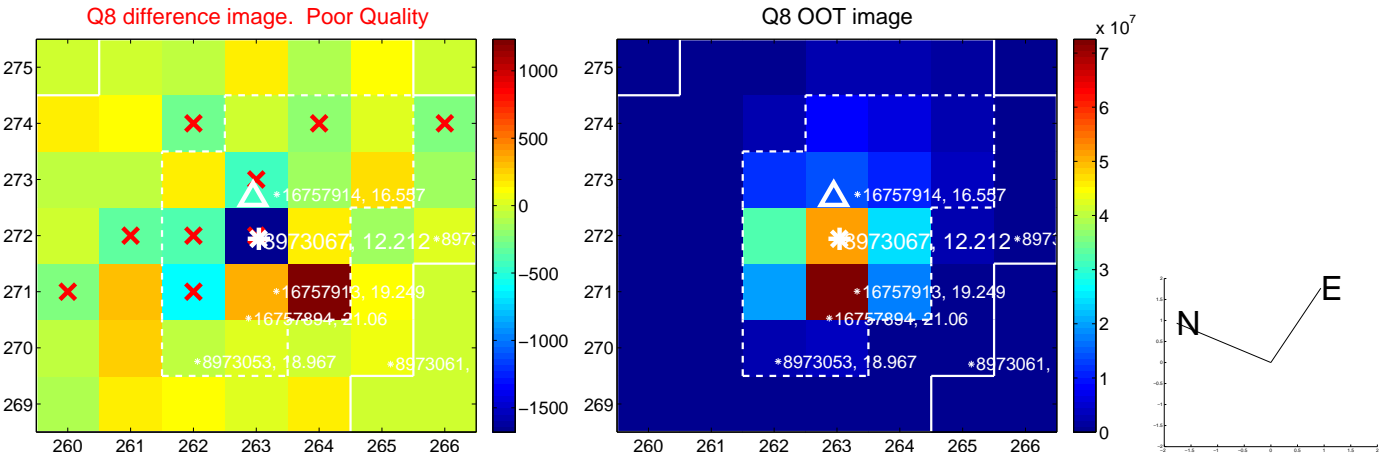
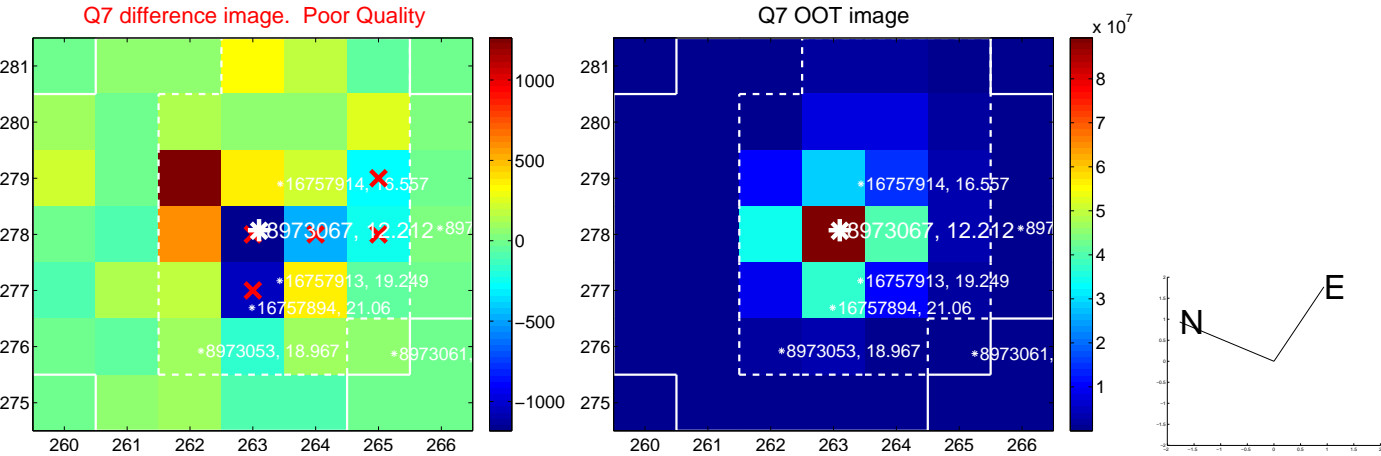
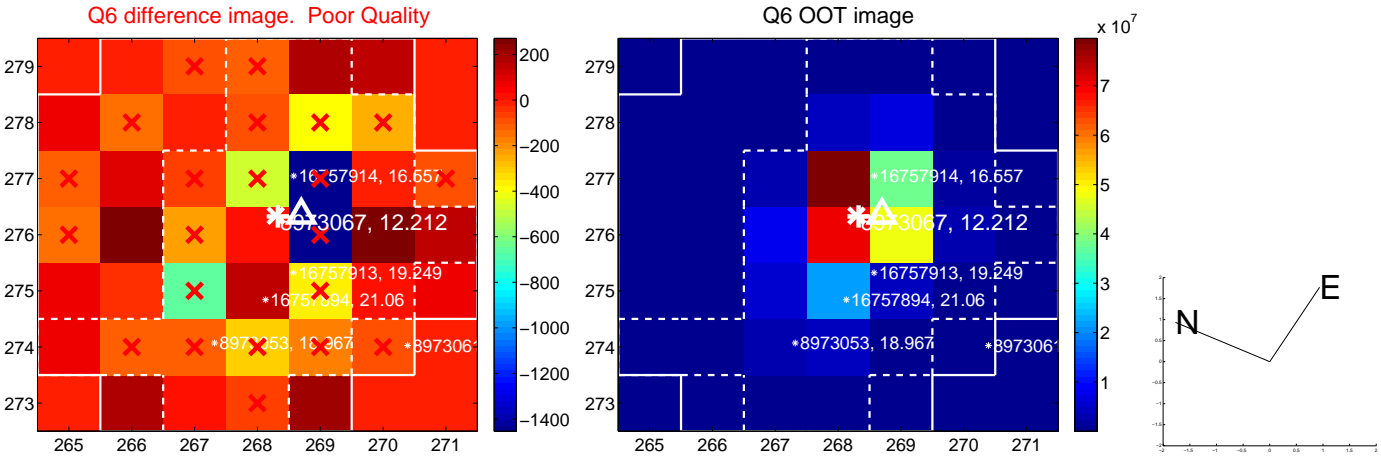
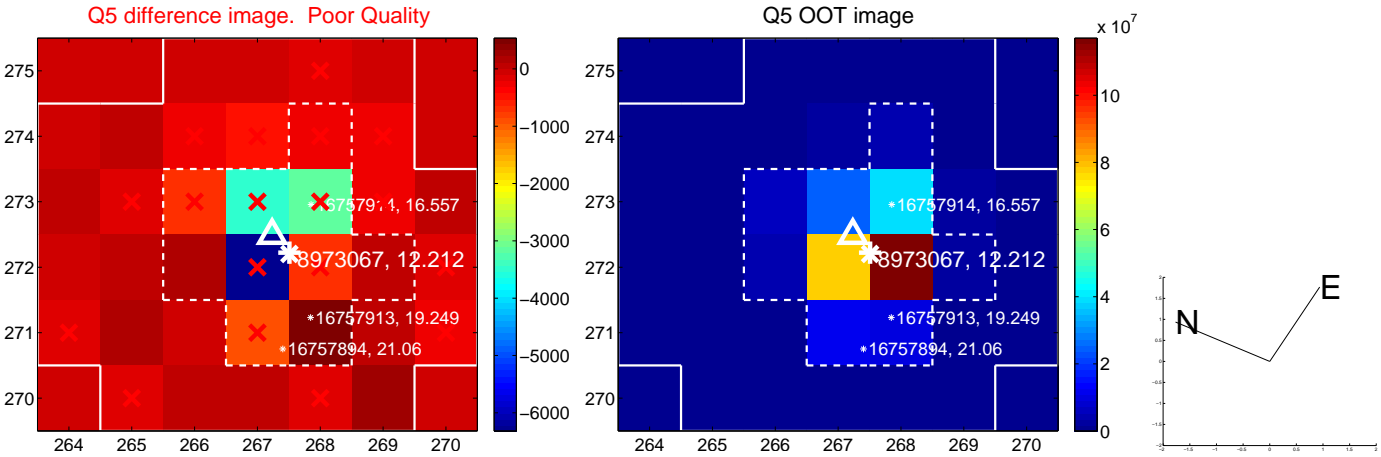


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

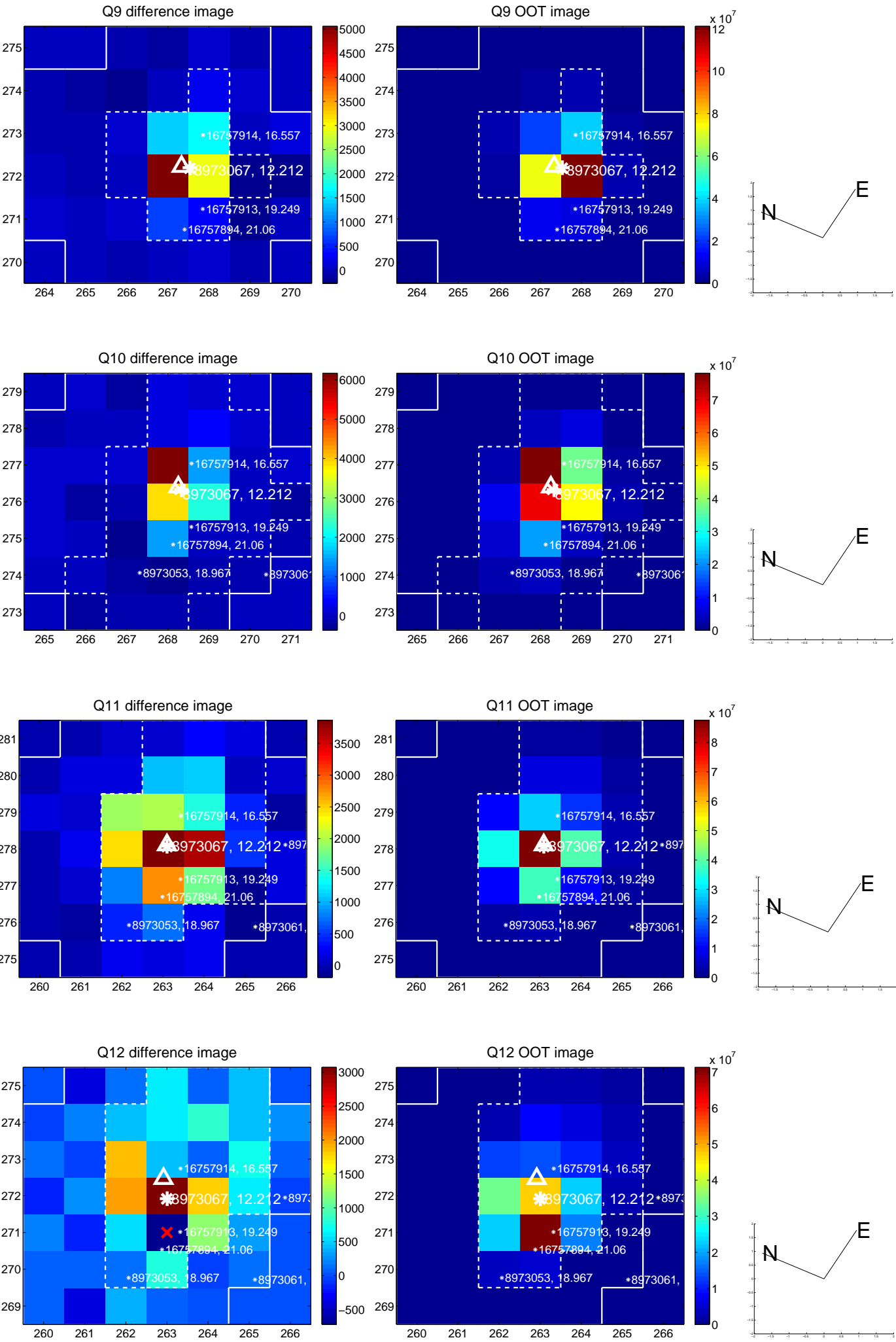
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



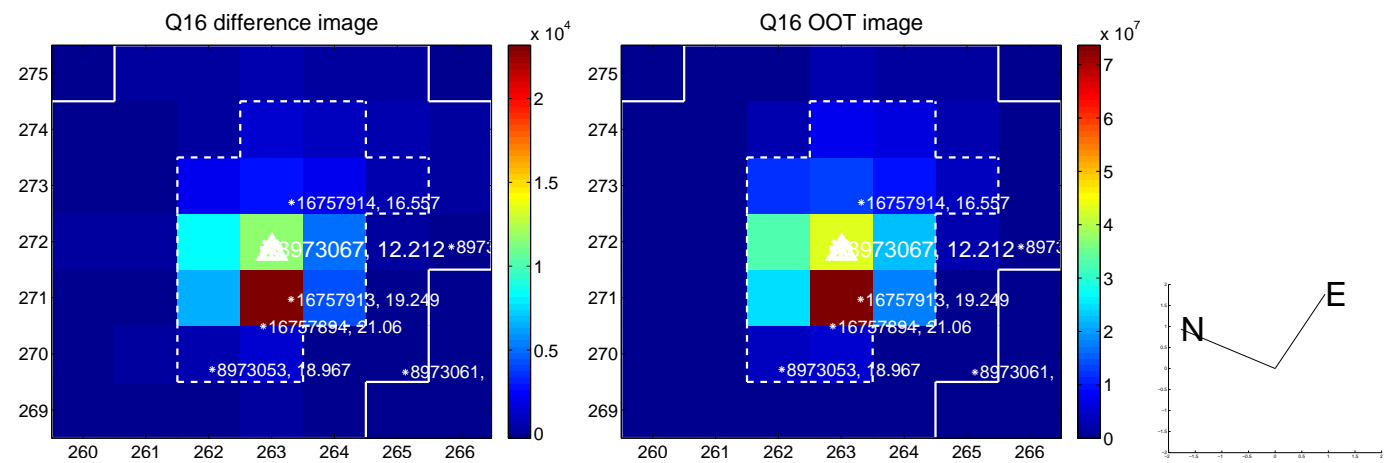
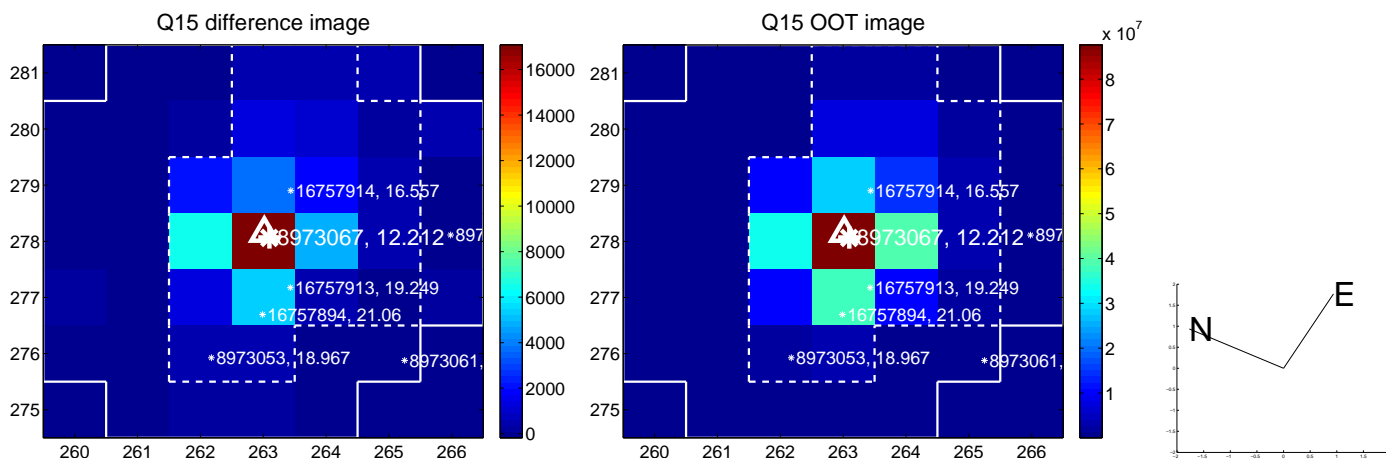
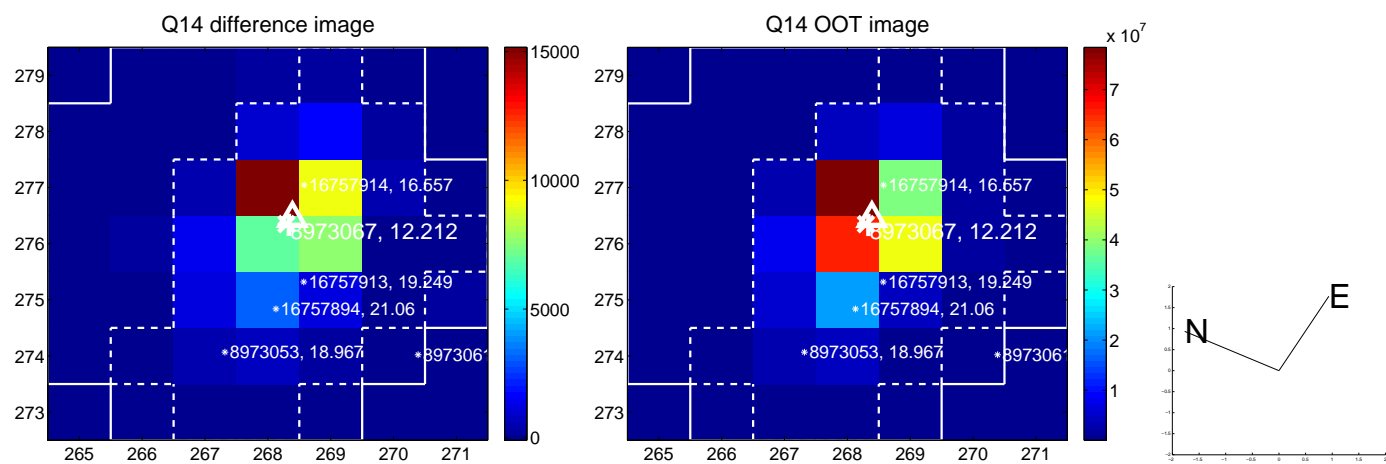
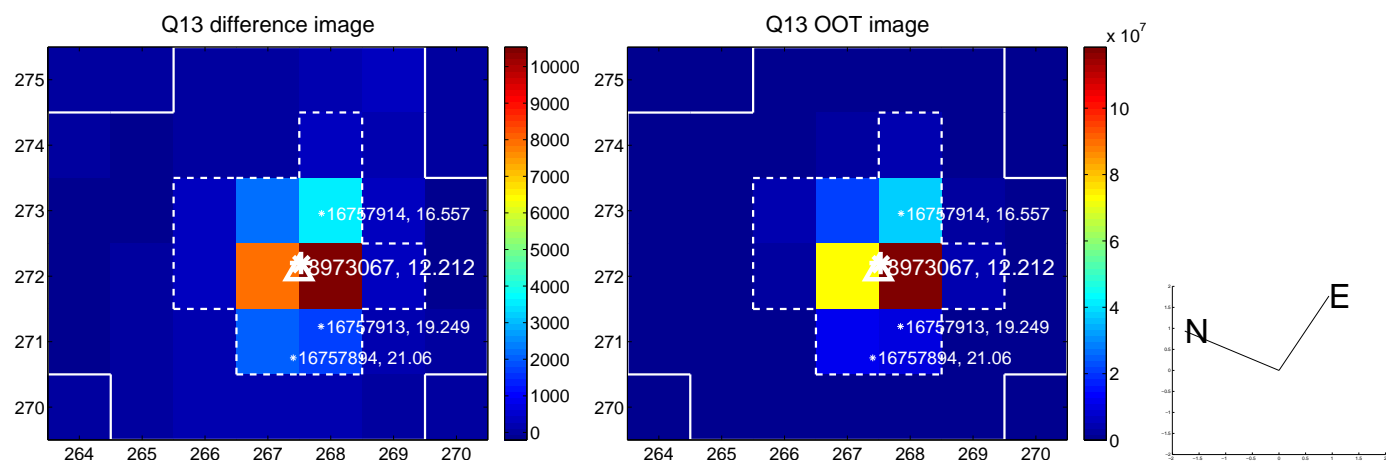
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



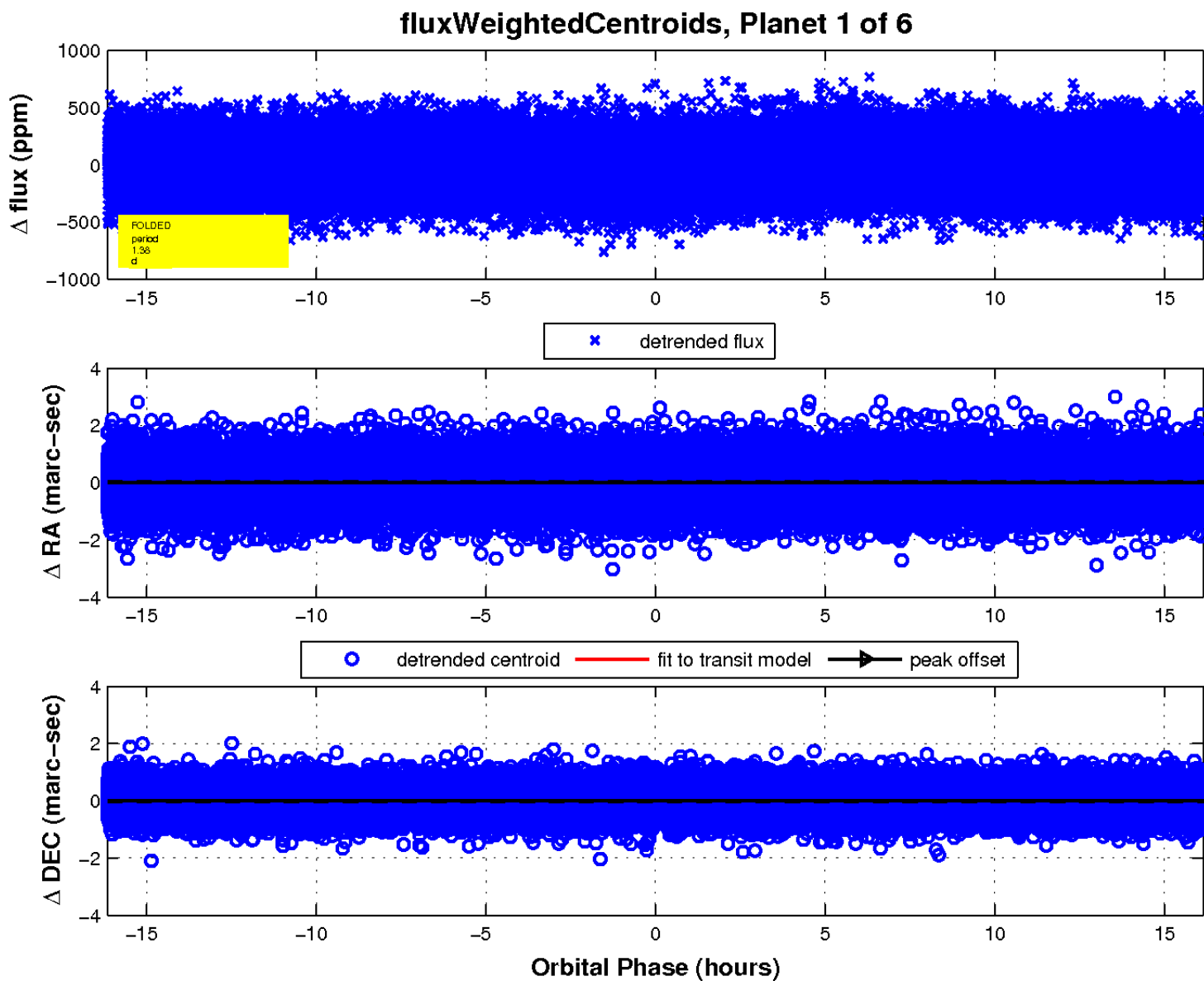
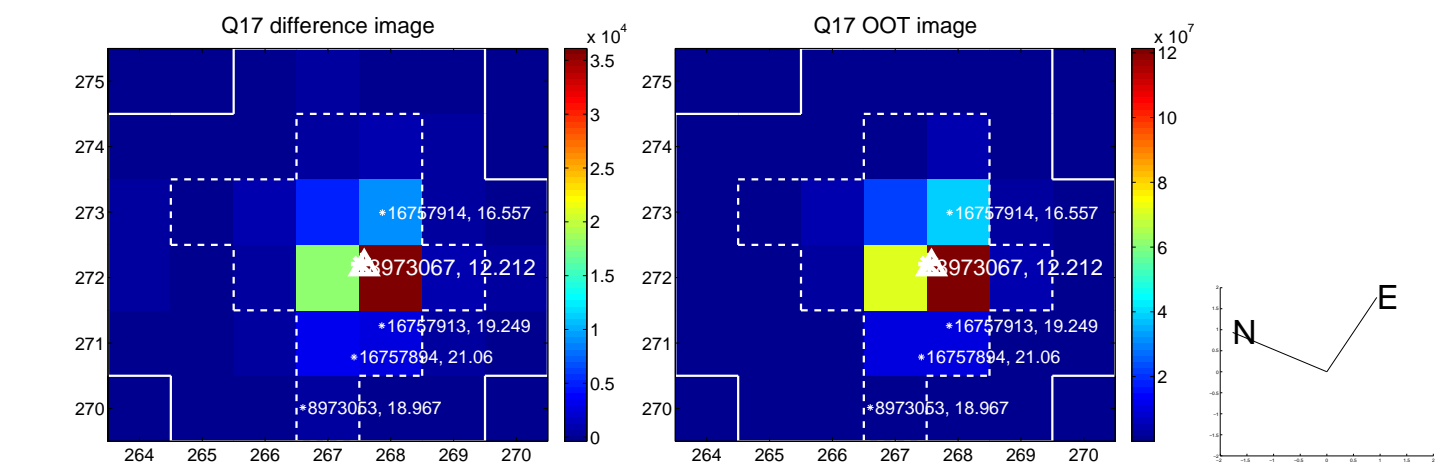
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



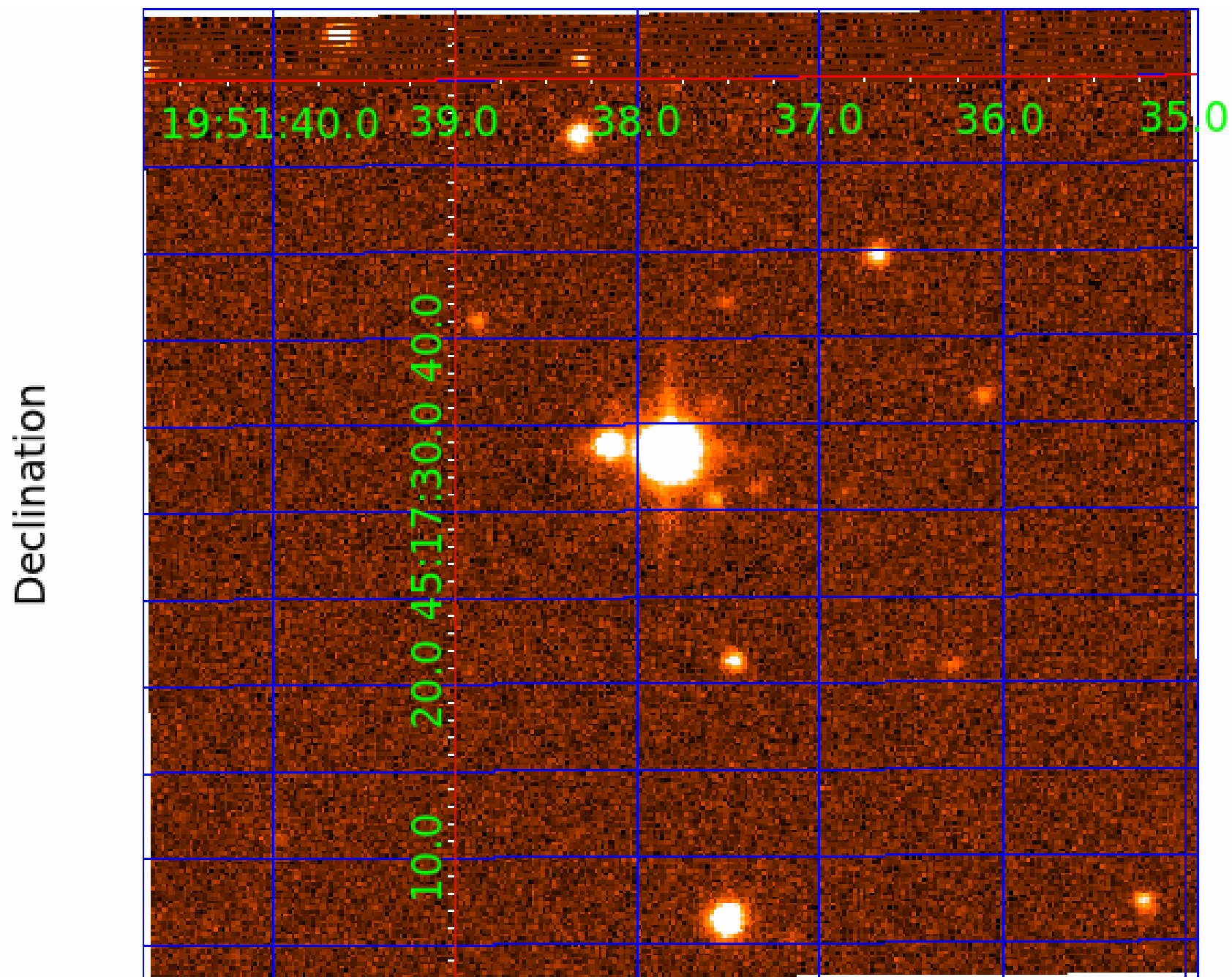
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 008973067

## 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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008973067-02	OBS	No	99.274837	159.926145	278.4	5.042	8.0	8.0	4.10	6306	8.11	93.94
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008973067-05	OBS	No	559.824663	190.363673	338.6	6.874	7.9	8.0	4.10	6306	8.37	9.36
008973067-06	OBS	No	86.674371	192.032939	313.2	2.468	7.2	7.5	4.10	6306	8.43	112.58

## Robovetter Results

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008973067-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
008973067-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT
008973067-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008973067-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS
008973067-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT

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

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

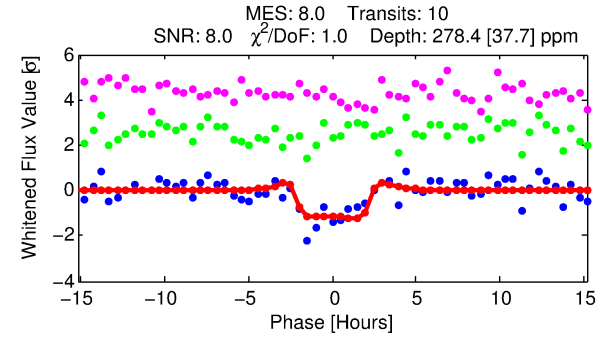
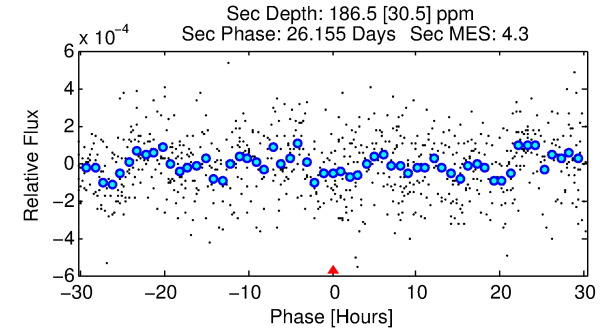
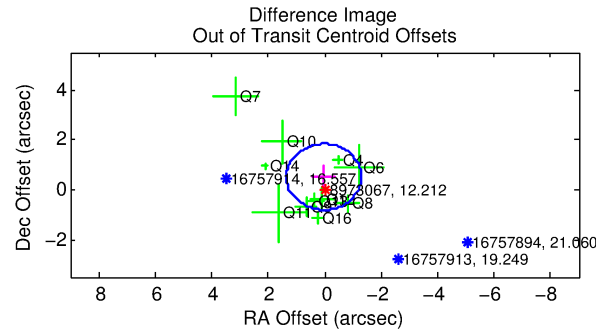
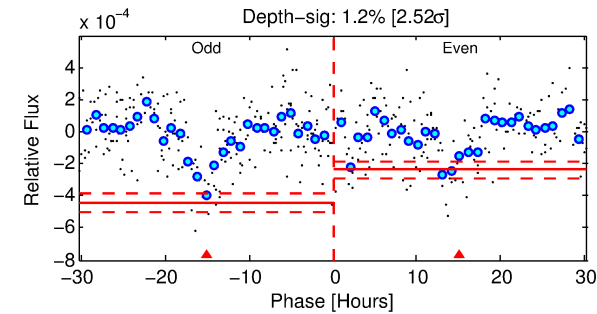
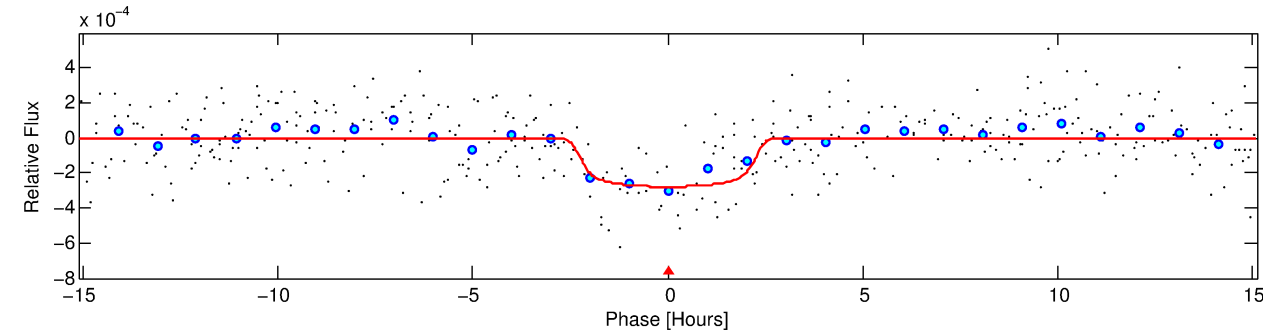
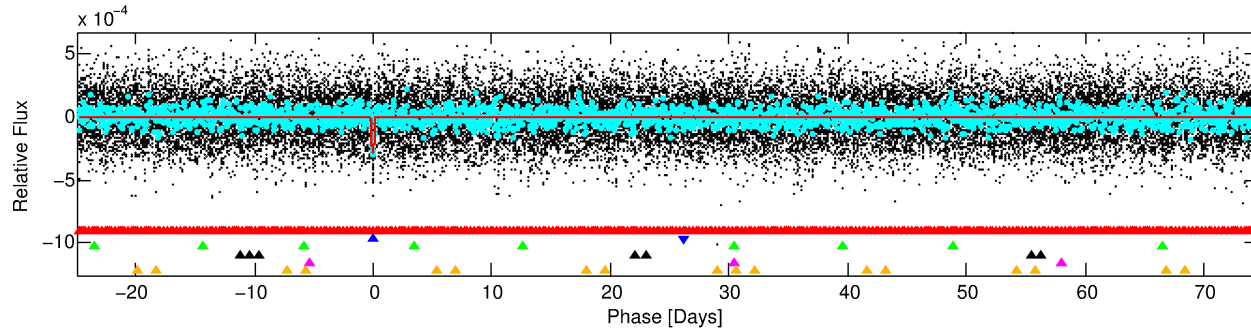
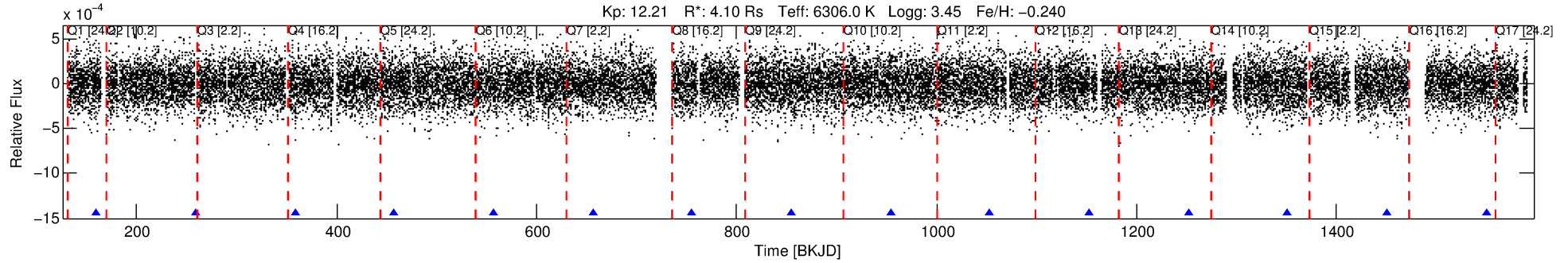
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008973067-02

No Significant Match Found

# DV One-Page Summary

KIC: 8973067 Candidate: 2 of 6 Period: 99.275 d



## DV Fit Results:

Period = 99.27484 [0.00121] d  
Epoch = 159.9261 [0.0107] BKJD  
Rp/R\* = 0.0181 [0.0030]  
a/R\* = 67.65 [54.36]  
b = 0.91 [0.15]  
Seff = 93.94 [59.67]  
Teq = 794 [126] K  
Rp = 8.11 [3.54] Re  
a = 0.5039 [0.1965] AU  
Ag = 396.09 [288.13] [1.37σ]  
Teffp = 5476 [530] K [8.60σ]

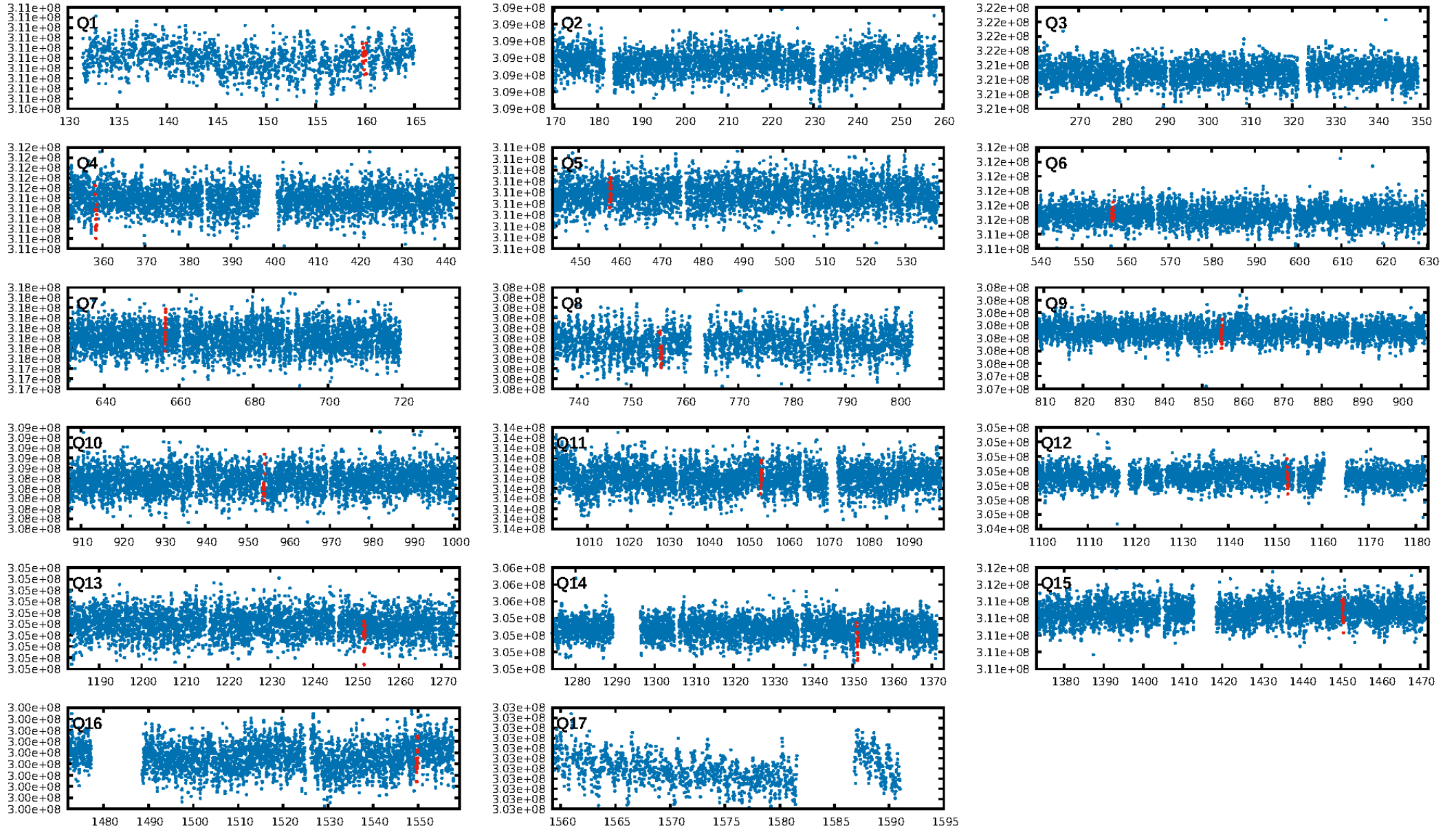
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [53.87σ]  
LongPeriod-sig: 100.0% [198.78σ]  
ModelChiSquare2-sig: 37.1%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.51e-10**  
RollingBand-fgt: 1.00 [9/9]  
GhostDiagnostic-chr: 1.046  
Centroid-sig: 6.4%  
Centroid-so: 0.538 arcsec [1.38σ]  
OotOffset-rm: 0.509 arcsec [1.16σ]  
KicOffset-rm: 0.436 arcsec [0.91σ]  
OotOffset-st: 3/2/4/2 [11]  
KicOffset-st: 3/2/4/2 [11]  
DiffImageQuality-fgm: 0.73 [8/11]  
DiffImageOverlap-fno: 0.15 [2/13]

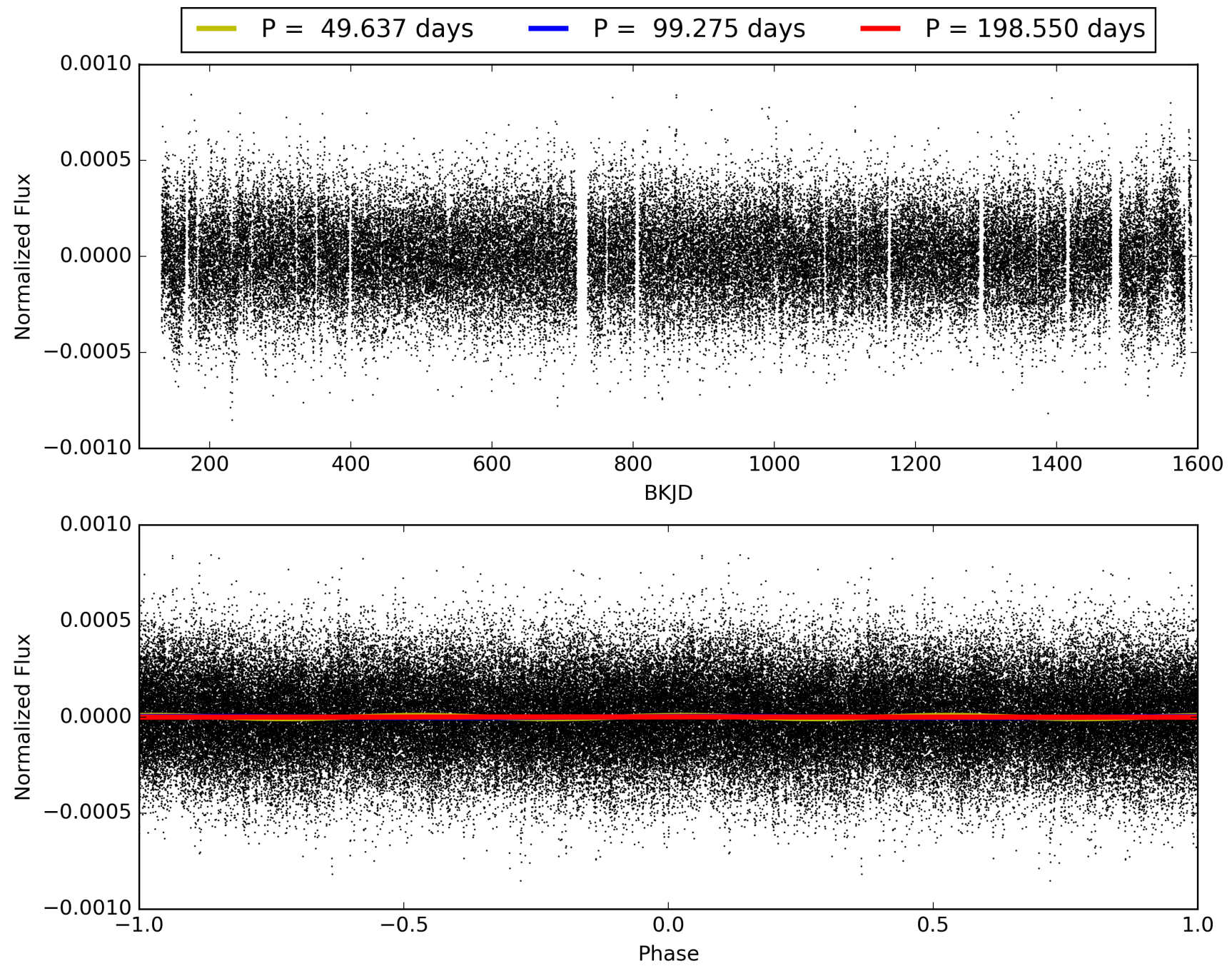
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 06:42:42 Z

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

# TCE 008973067-02, PDC Light Curves

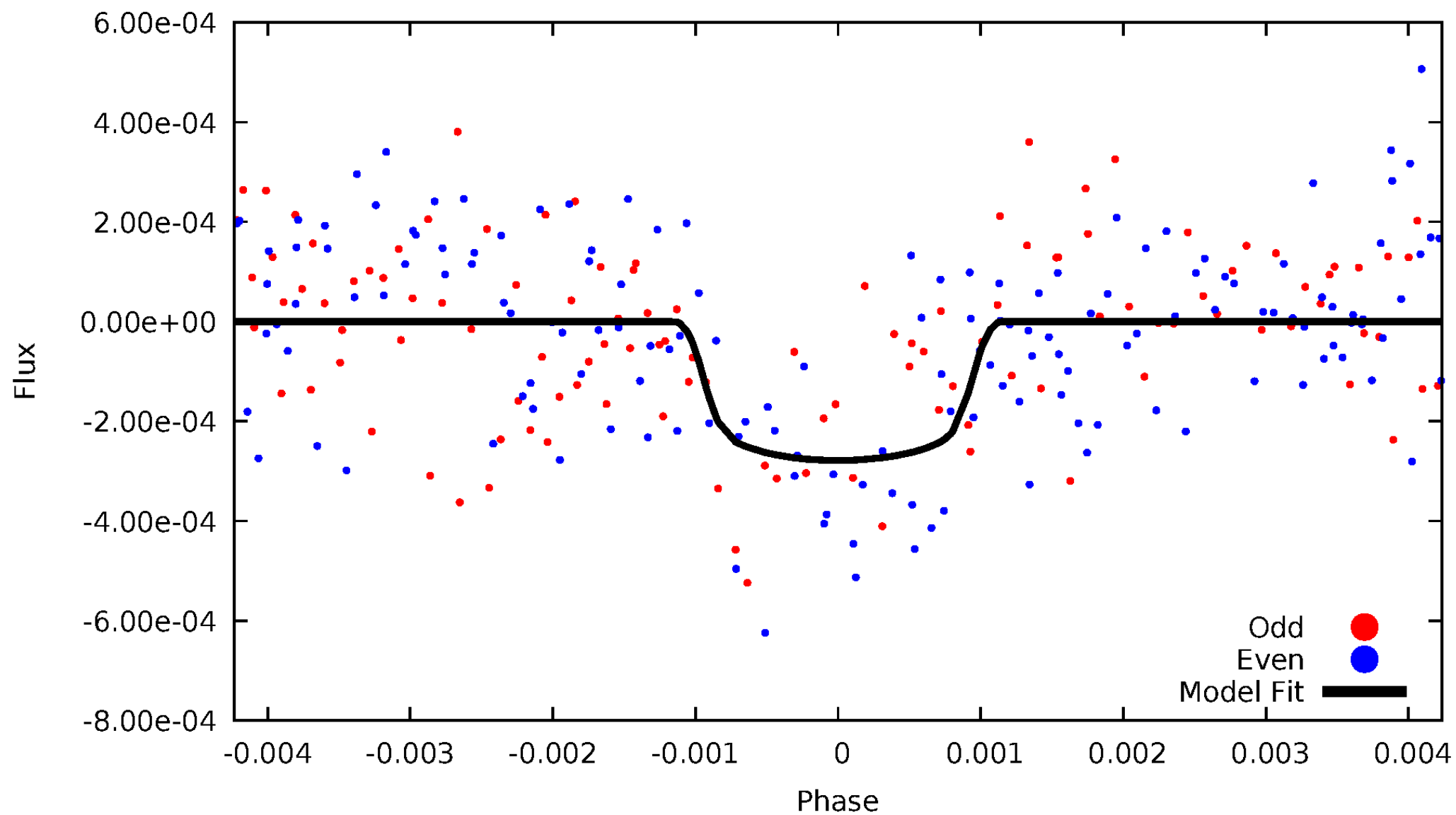


TCE 008973067-02



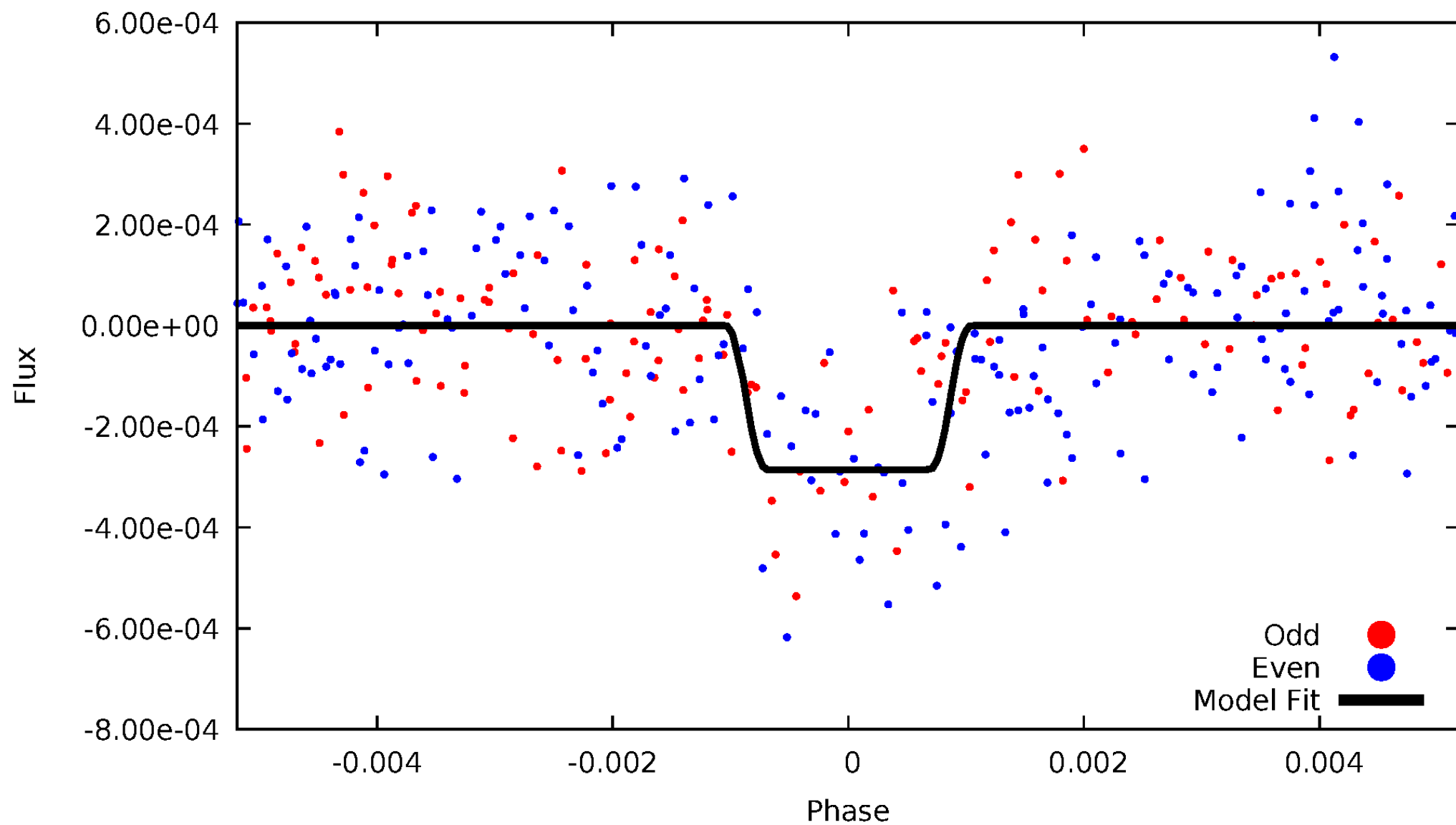
# DV Odd/Even

TCE 008973067-02



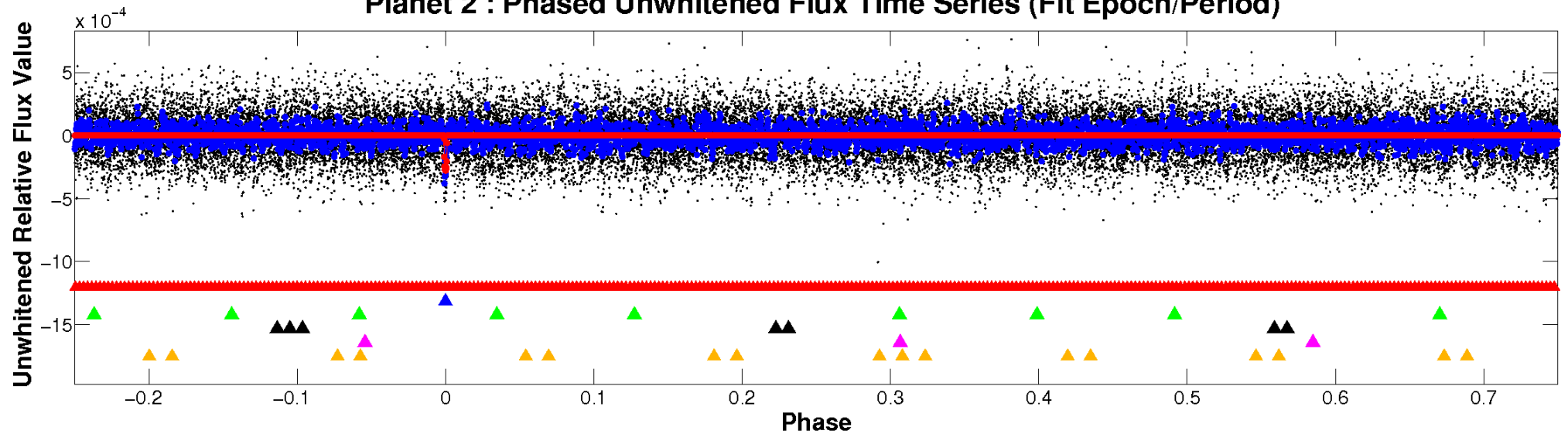
# ALT Odd/Even

TCE 008973067-02

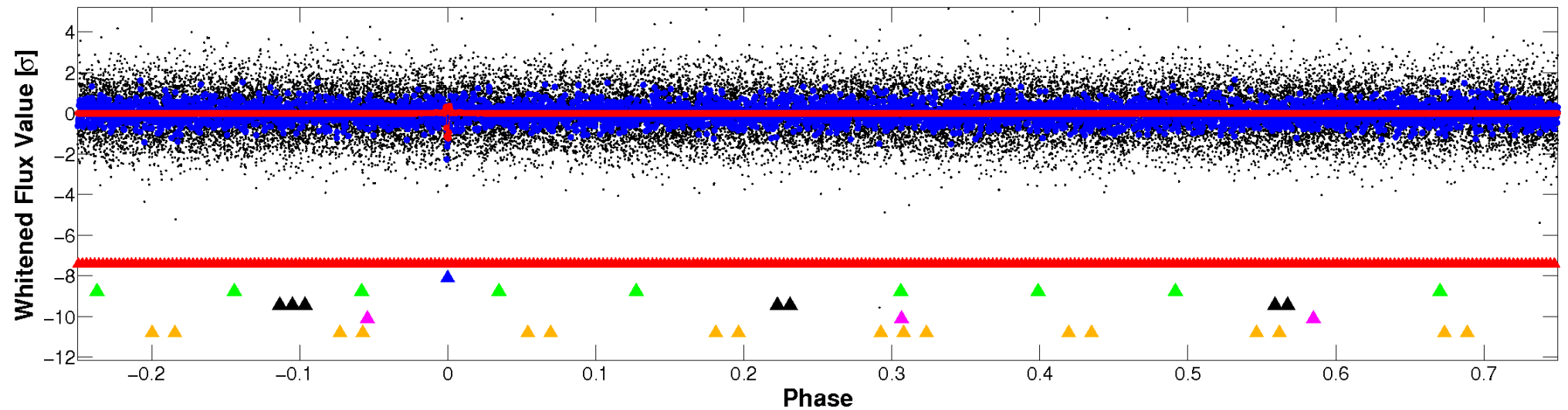


# Non-Whitened Vs. Whitened Light Curve

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

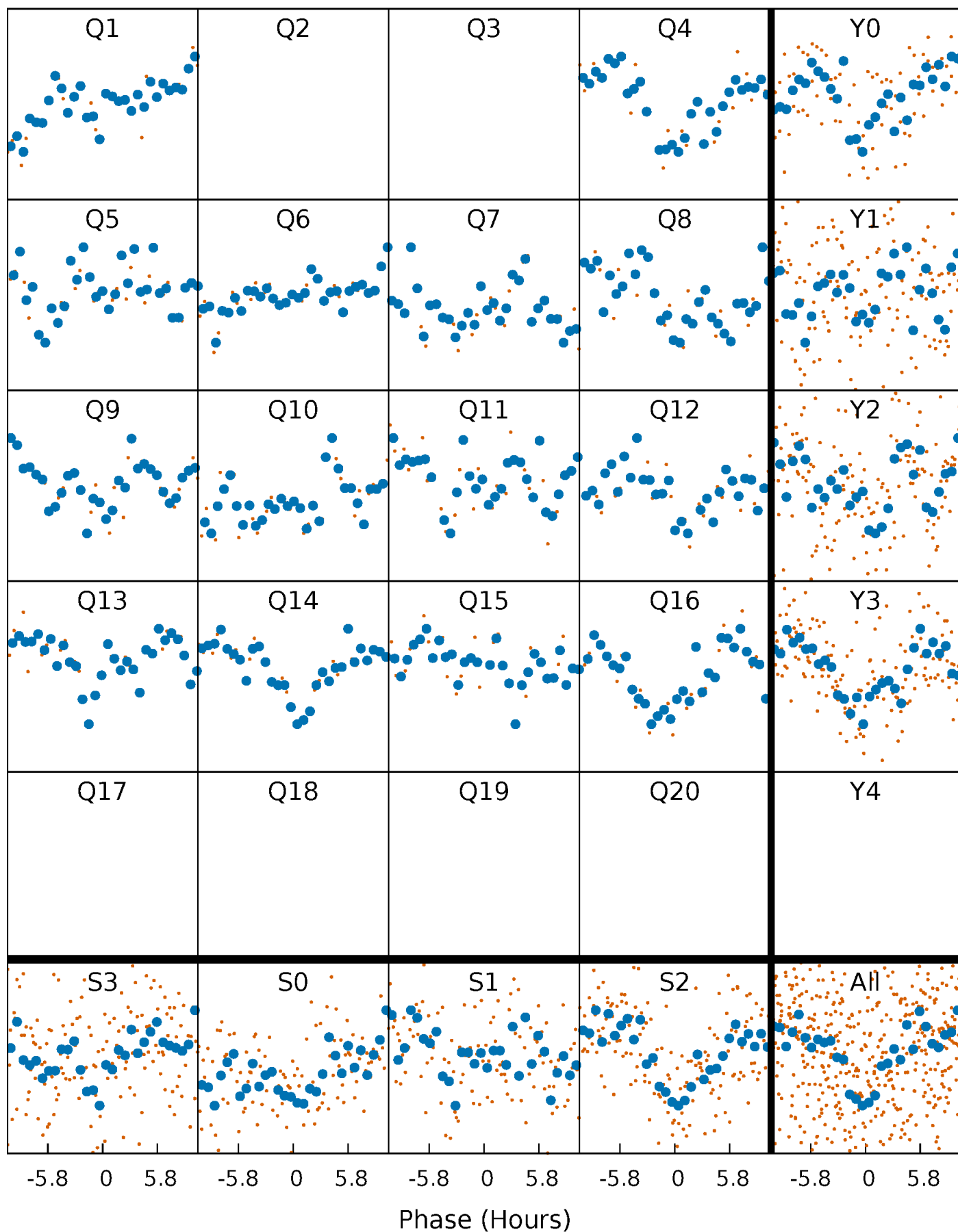


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



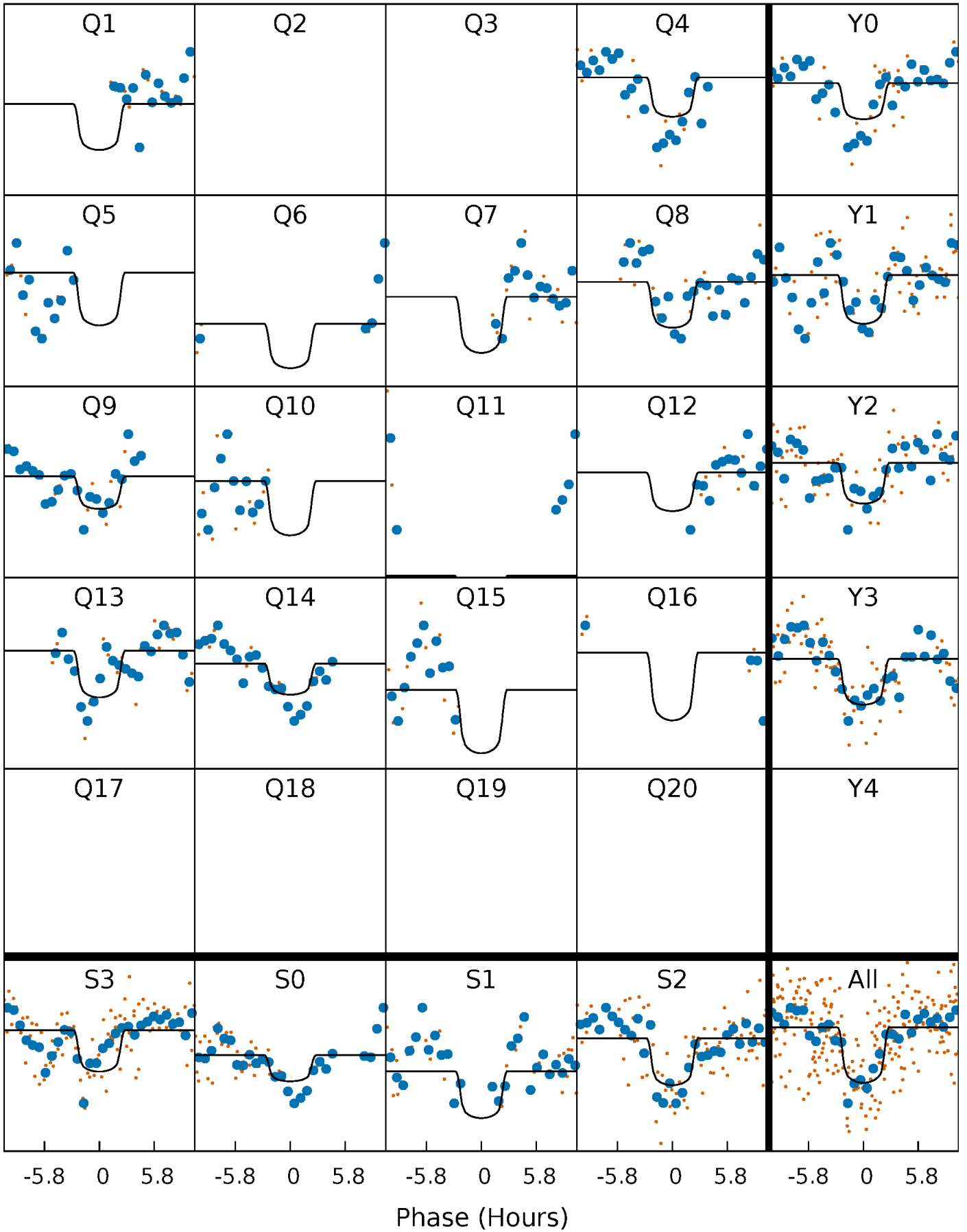
# PDC Quarter-Phased Transit Curves

TCE 008973067-02     $P = 99.274837$  Days     $T_0 = 159.926145$  (BKJD)



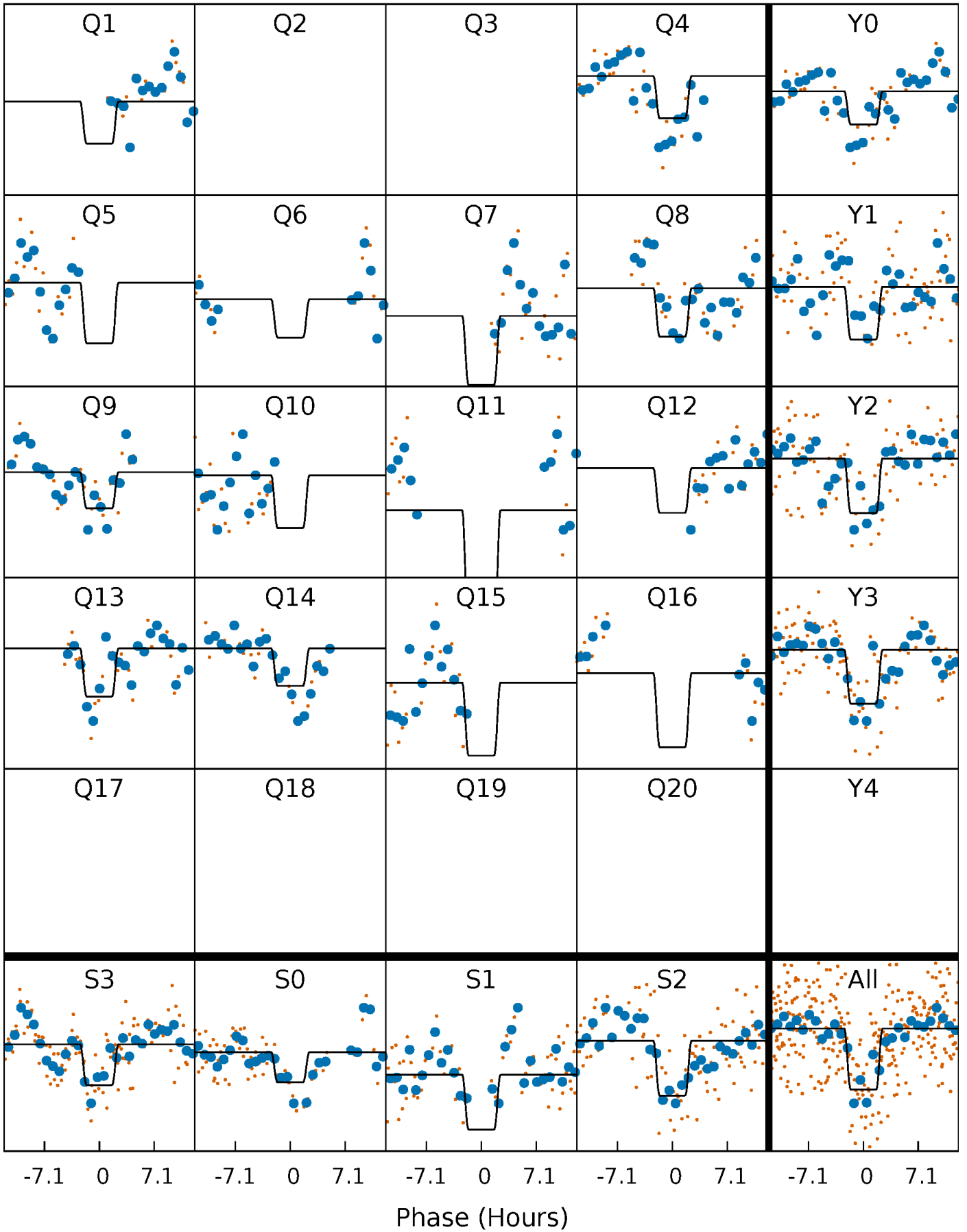
# DV Quarter-Phased Transit Curves

TCE 008973067-02 P= 99.274837 Days  $T_0=159.926145$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

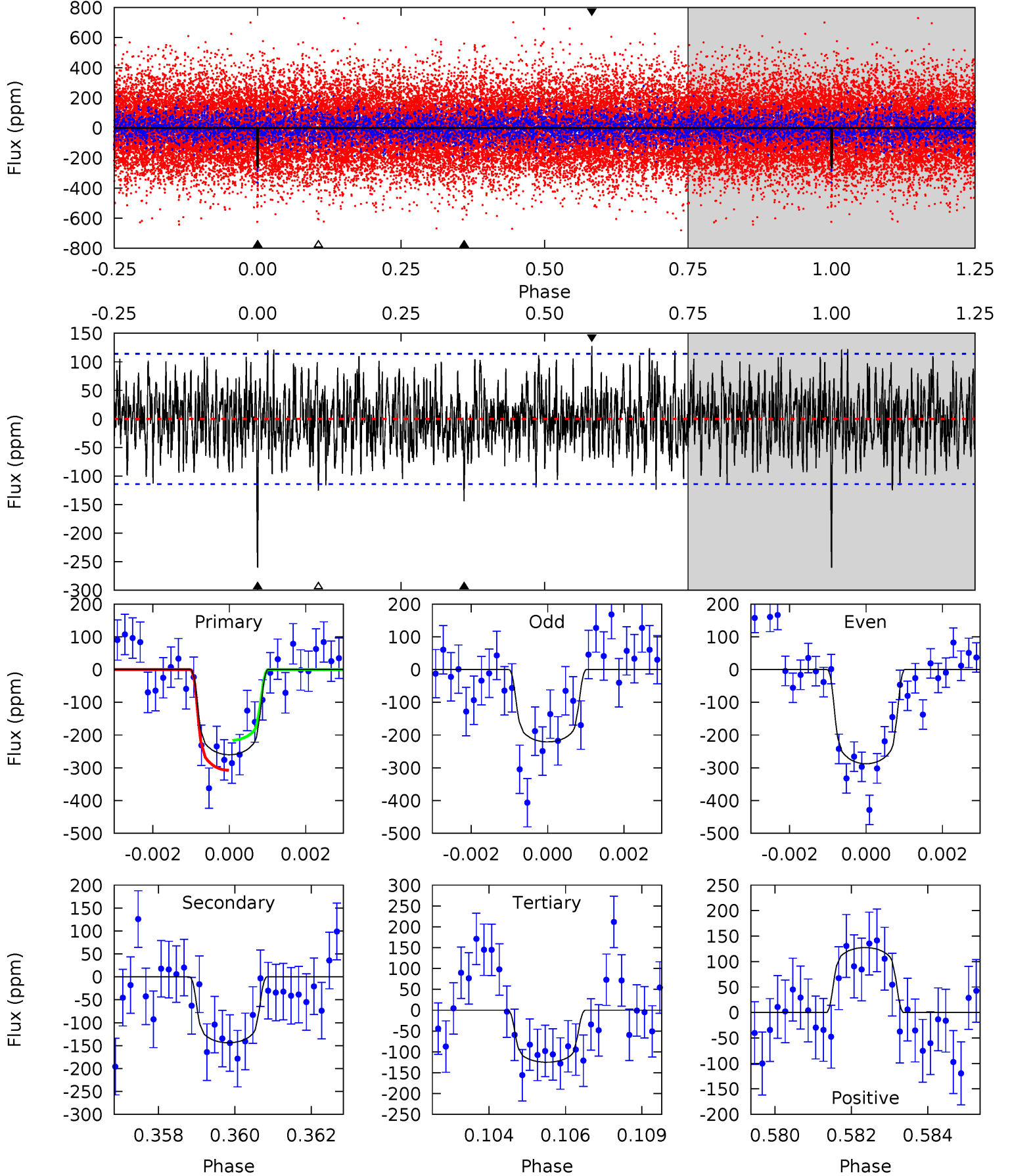
TCE 008973067-02 P= 99.272600 Days  $T_0=159.931721$  (BKJD)



# DV Model-Shift Uniqueness Test

008973067-02, P = 99.274837 Days, E = 60.651308 Days

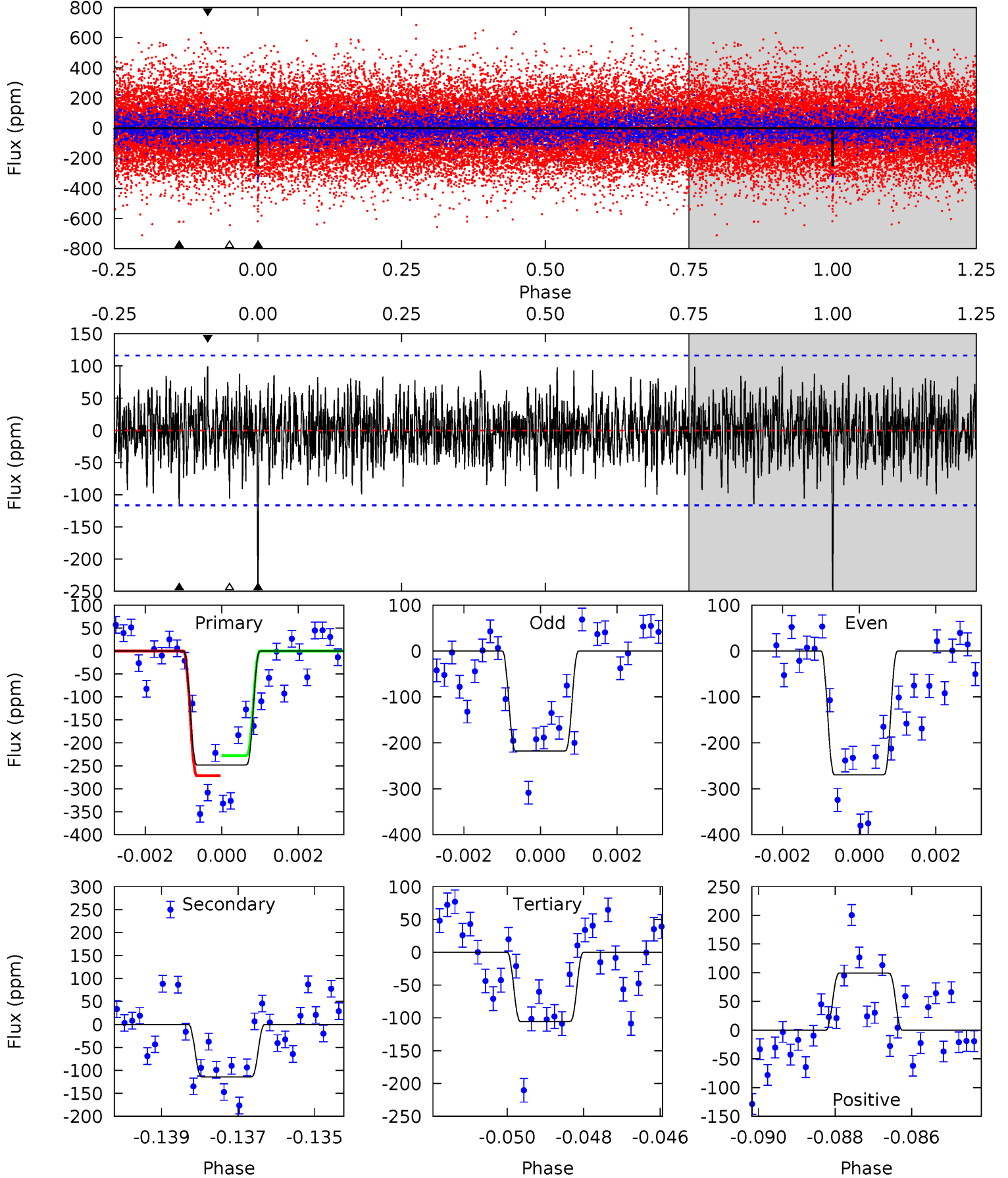
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.1	6.69	5.81	5.93	5.30	3.05	1.97	6.29	6.17	0.88	0.76	1.54	1.07	0.33	2.12



# Alt Model-Shift Uniqueness Test

008973067-02, P = 99.272600 Days, E = 60.659121 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
11.3	5.22	4.82	4.53	5.32	3.08	1.51	6.50	6.79	0.40	0.68	1.16	1.05	0.29	1.00



### Stellar Parameters For KIC 008973067

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6306^{+173}_{-173}$	$3.450^{+0.368}_{-0.092}$	$-0.240^{+0.350}_{-0.300}$	$4.103^{+0.591}_{-1.655}$	$1.732^{+0.184}_{-0.429}$	$0.035^{+0.110}_{-0.011}$
	+3%/-3%	+11%/-3%	+146%/-125%	+14%/-40%	+11%/-25%	+311%/-30%
Source	PHO1	FLK73	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 008973067-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-144 \pm 21$	$7.63^{+1.82}_{-1.95}$	$1088^{+61}_{-112}$	$5168^{+521}_{-382}$	$347^{+232}_{-121}$
Alt.	$-114 \pm 22$	$6.99^{+1.82}_{-1.75}$	$1084^{+69}_{-124}$	$5086^{+503}_{-400}$	$320^{+248}_{-123}$

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

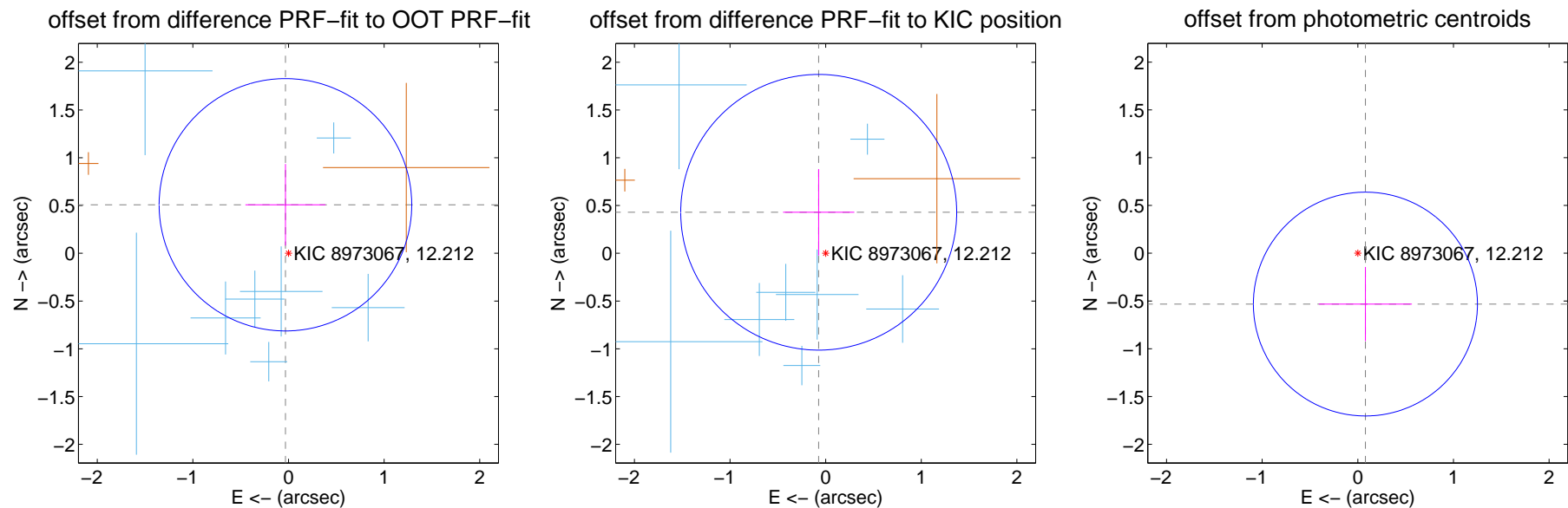
## DV Centroid Data

Supplemental centroid analysis for 008973067-02. Kepler magnitude: 12.21. Transit SNR 8.02

There are 8 quarters with good PRF difference image offsets

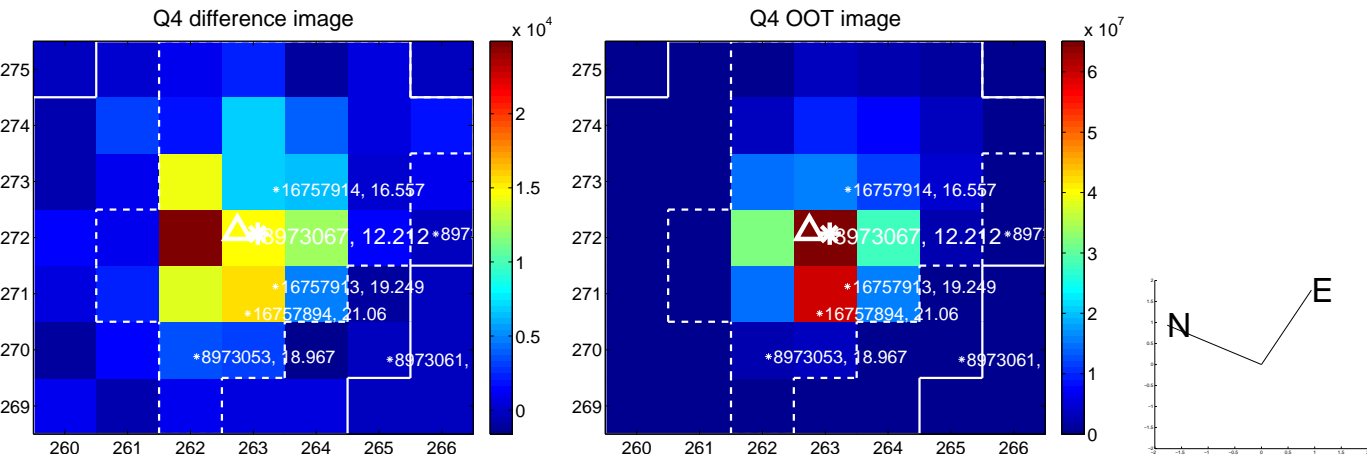
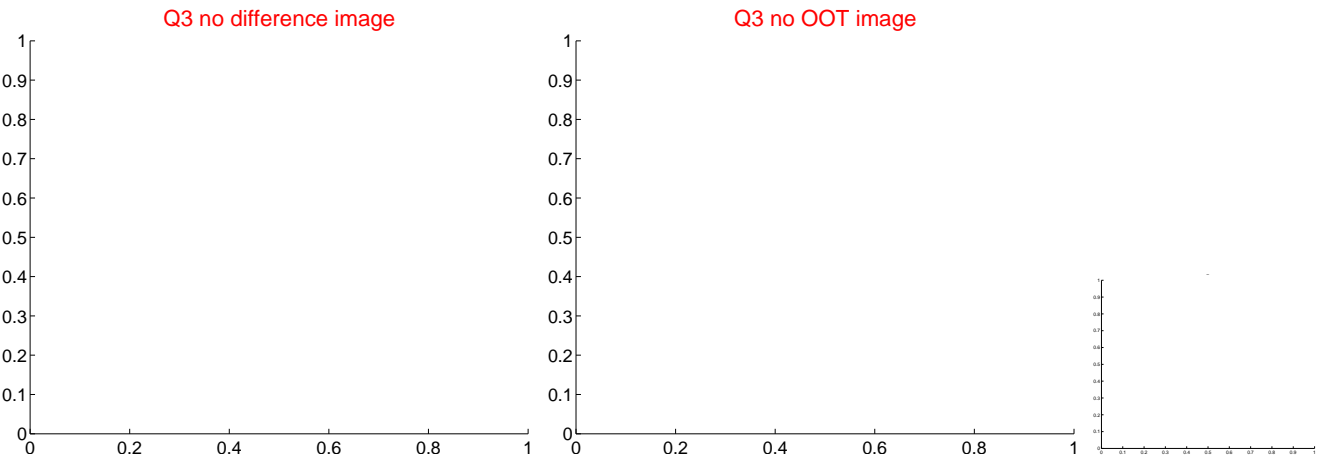
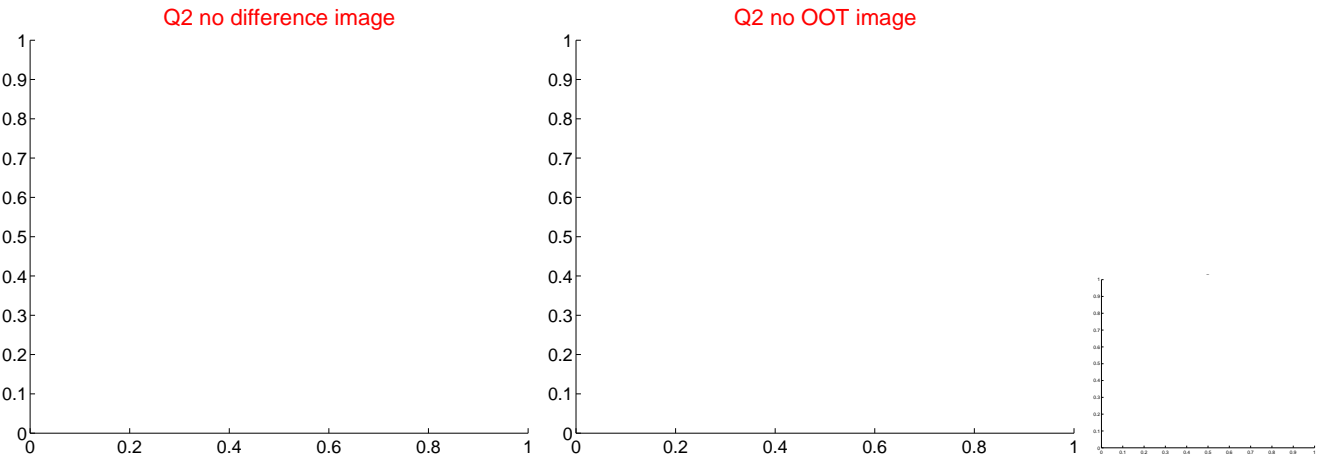
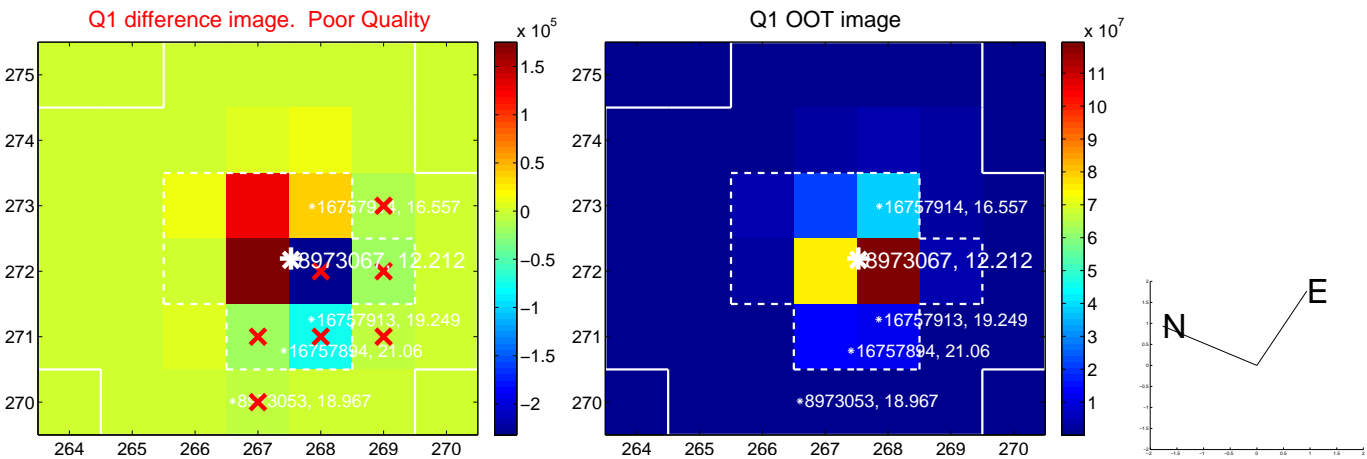
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.509 \pm 0.440$	1.16	$0.032 \pm 0.418$	$0.508 \pm 0.427$
PRF-fit source offset from KIC position	$0.436 \pm 0.481$	0.91	$0.073 \pm 0.372$	$0.429 \pm 0.453$
photometric centroid source offset	$0.54 \pm 0.39$	1.38	$-0.08 \pm 0.49$	$-0.53 \pm 0.39$

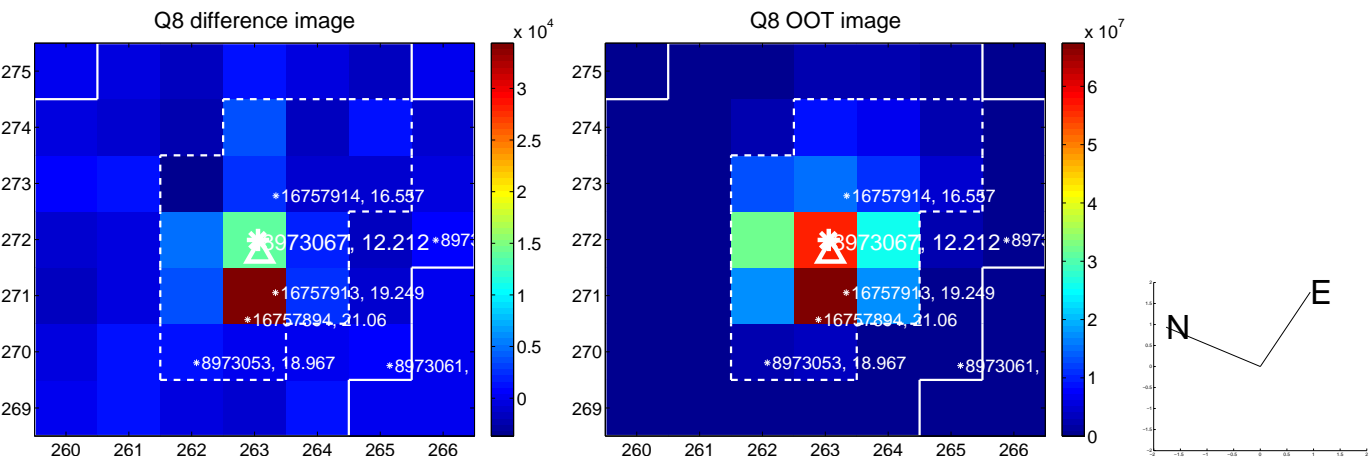
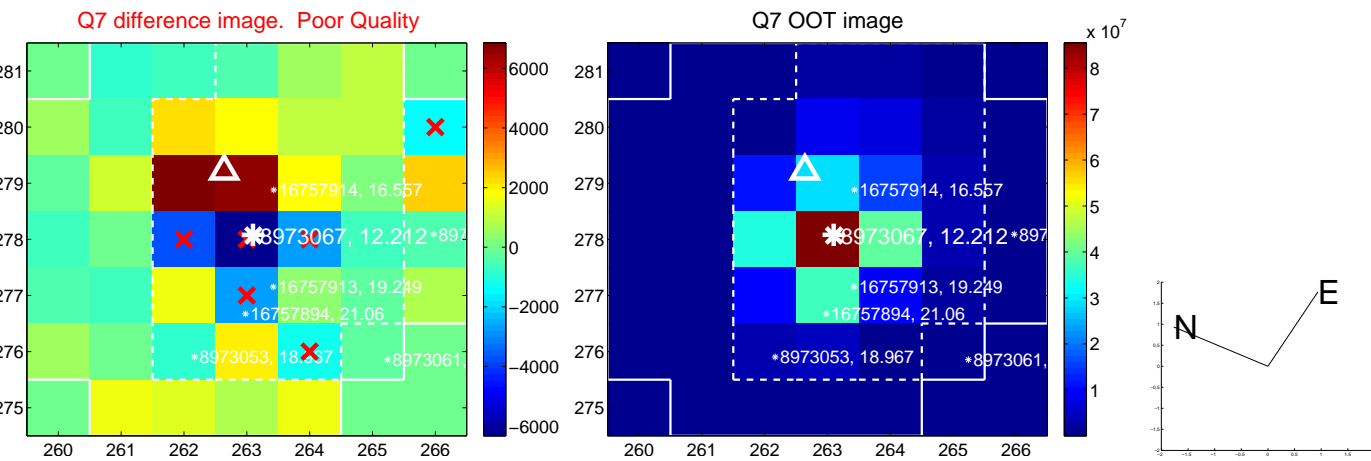
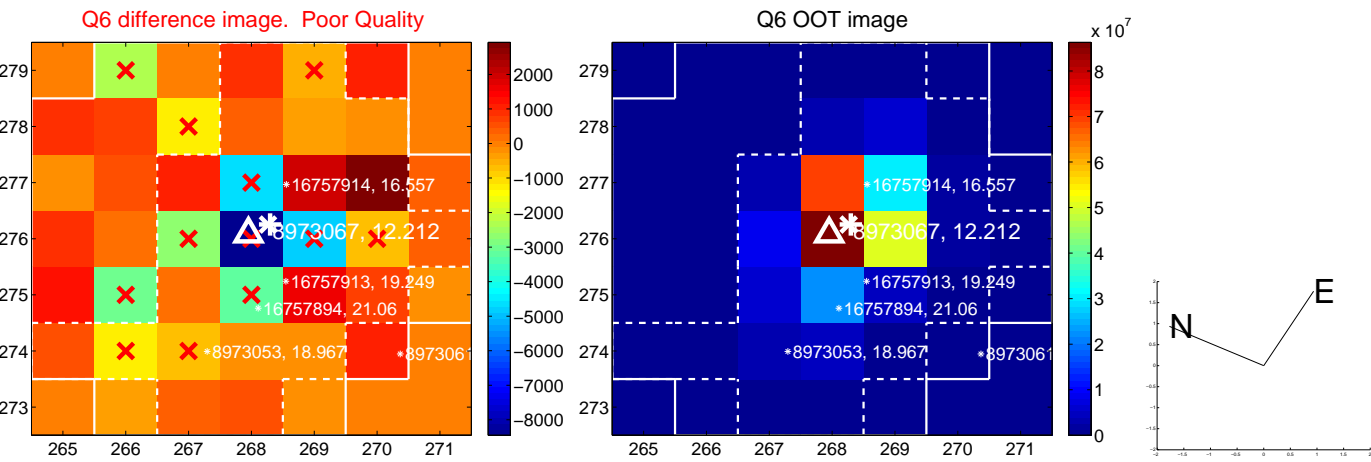
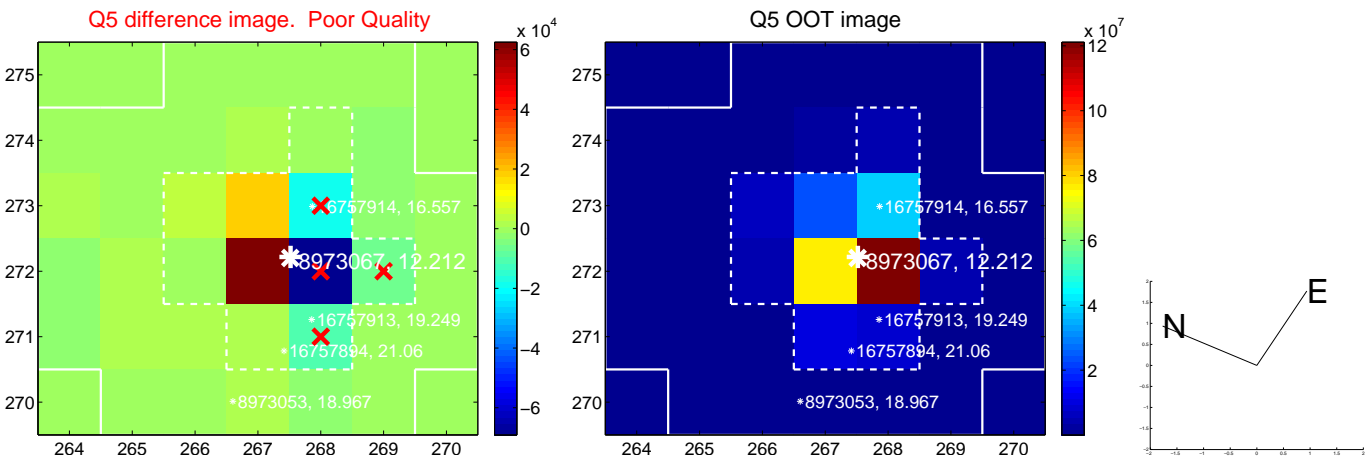


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

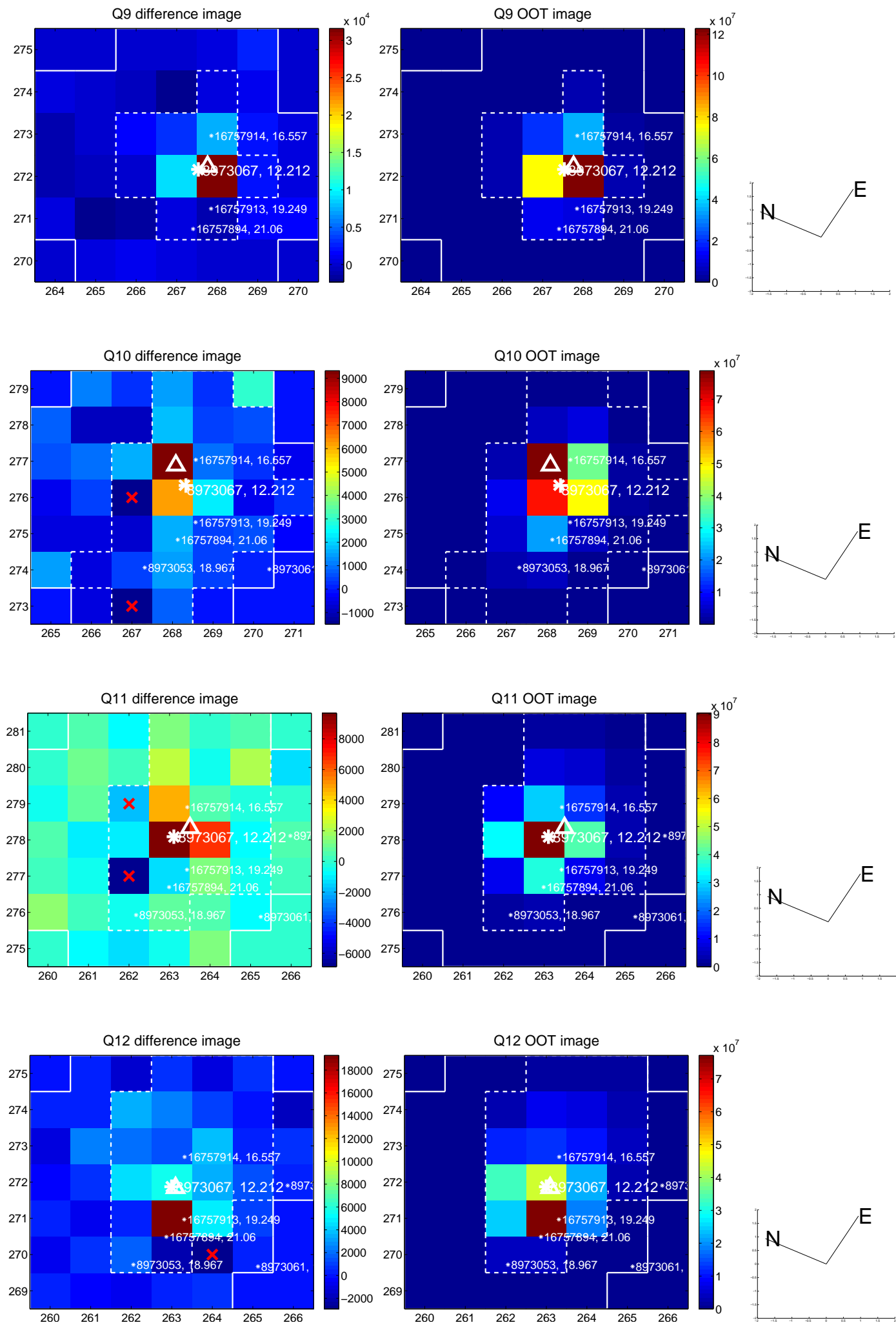
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



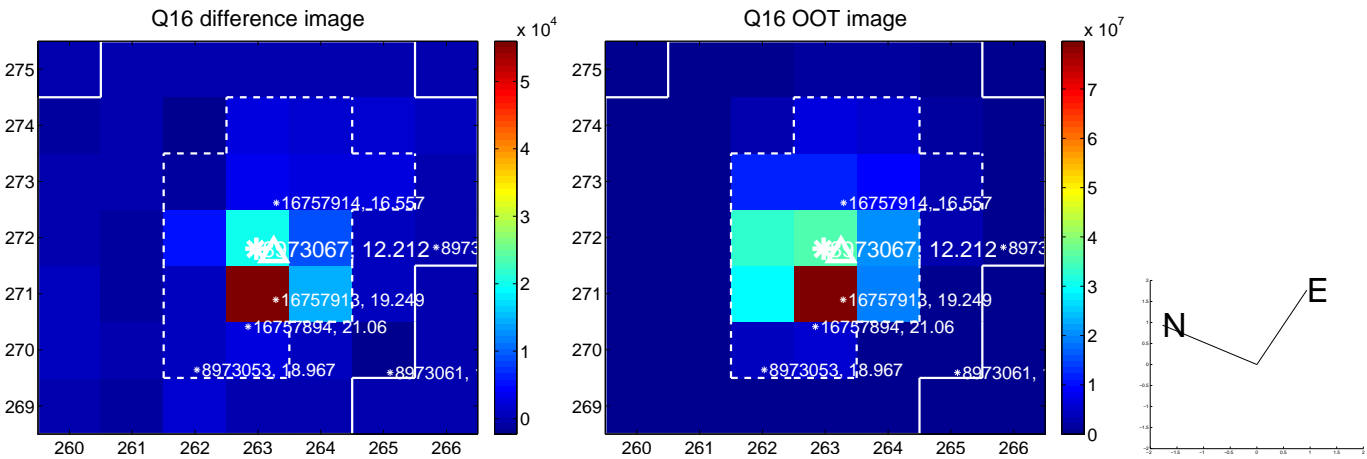
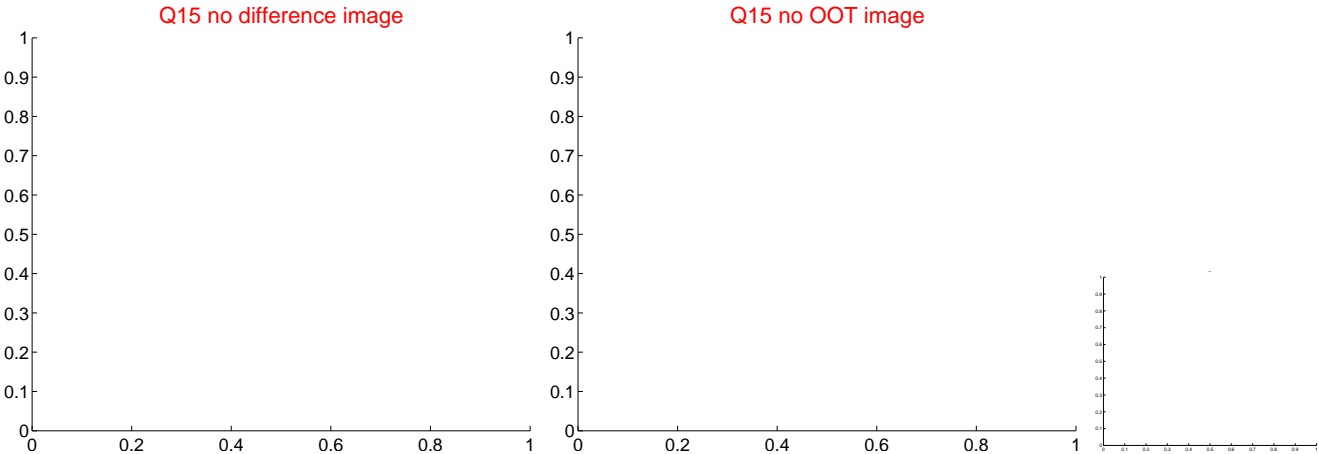
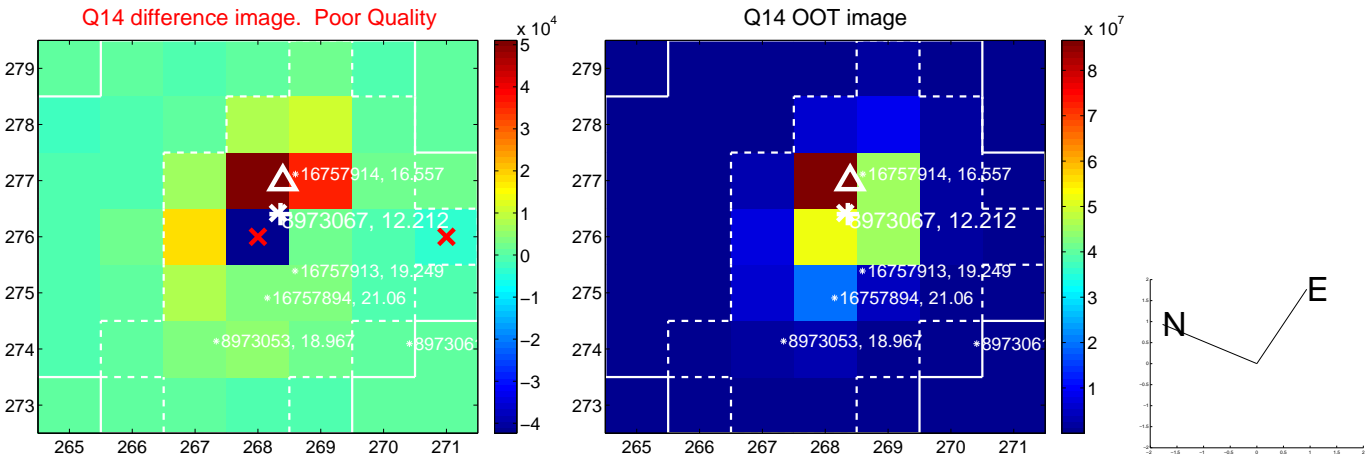
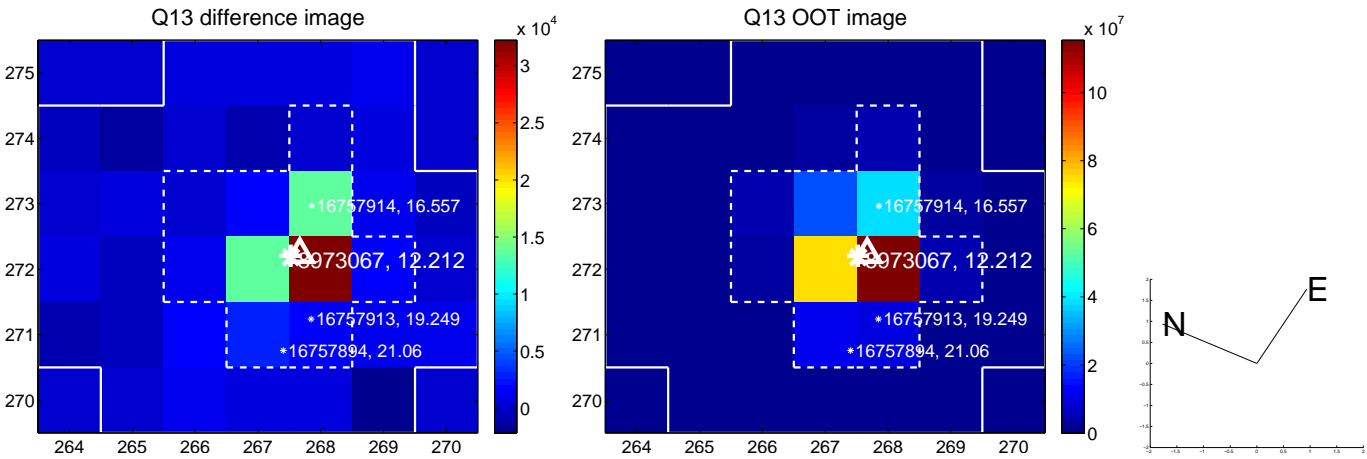
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



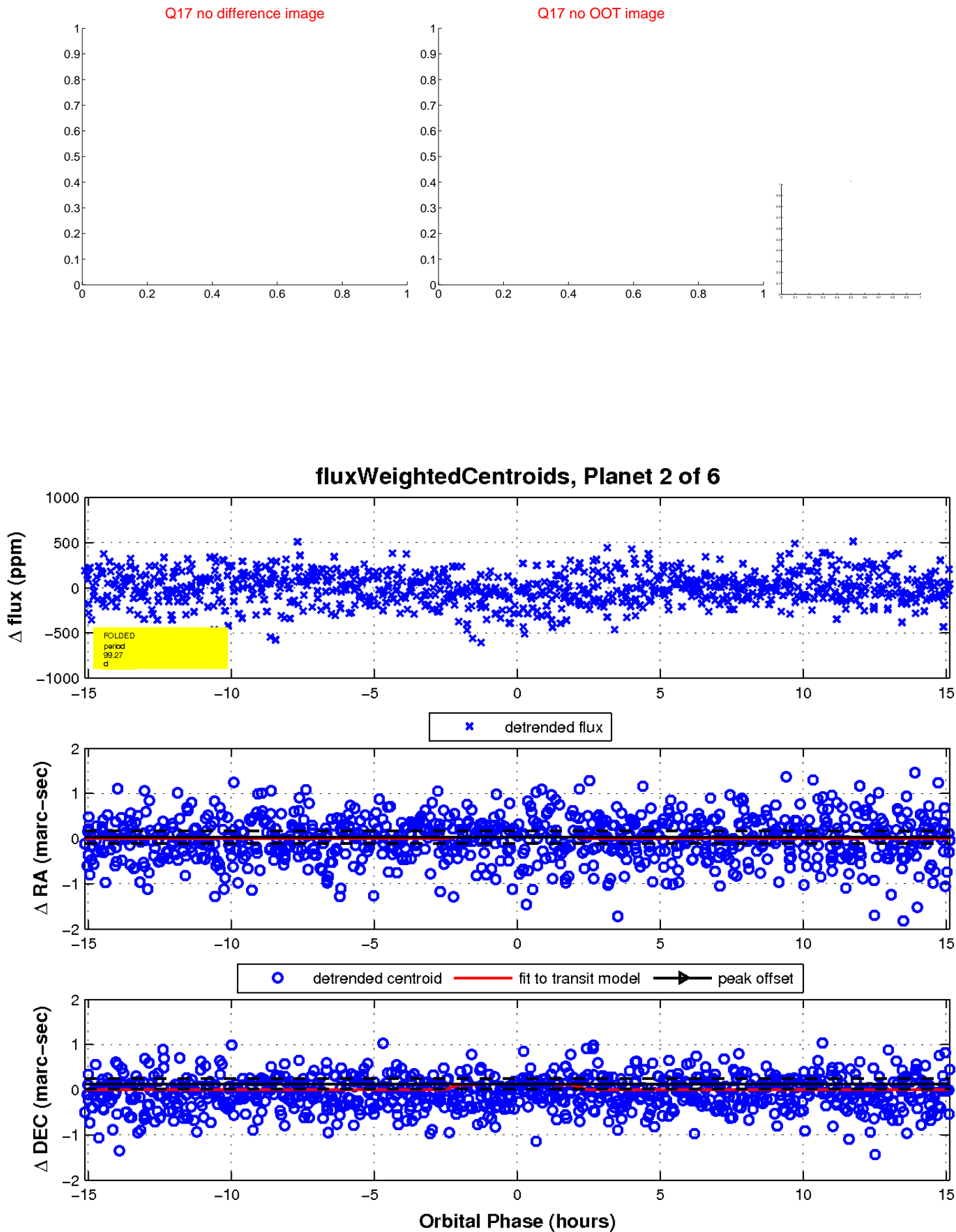
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



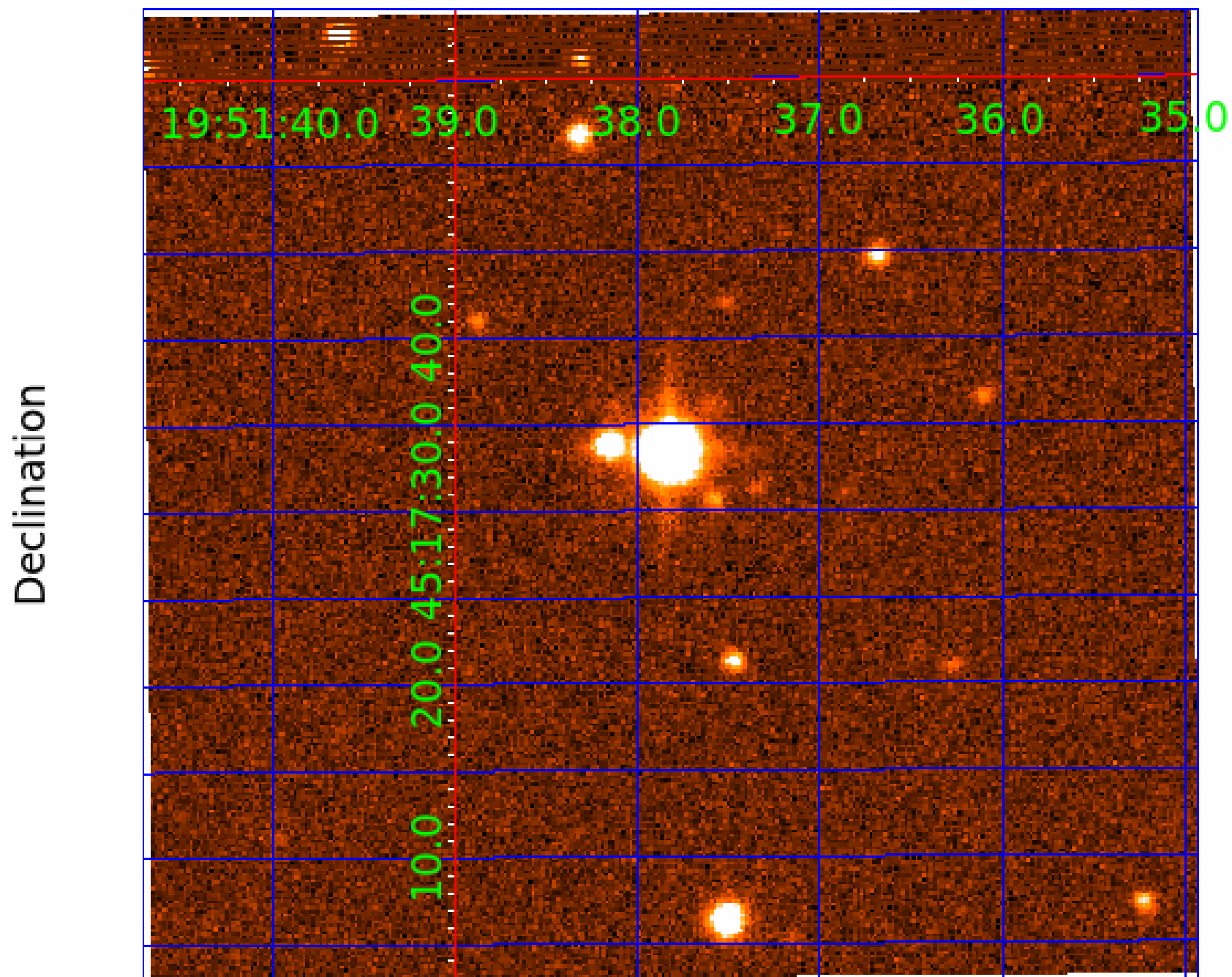
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 008973067

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008973067-01	OBS	No	1.375024	132.113592	22.5	5.387	8.9	7.6	4.10	6306	2.29	28242.15
008973067-02	OBS	No	99.274837	159.926145	278.4	5.042	8.0	8.0	4.10	6306	8.11	93.94
008973067-03	OBS	No	162.388847	244.892607	256.2	5.713	7.6	6.6	4.10	6306	7.19	48.74
008973067-04	OBS	No	231.923132	148.665148	292.3	7.468	7.4	7.3	4.10	6306	7.43	30.30
008973067-05	OBS	No	559.824663	190.363673	338.6	6.874	7.9	8.0	4.10	6306	8.37	9.36
008973067-06	OBS	No	86.674371	192.032939	313.2	2.468	7.2	7.5	4.10	6306	8.43	112.58

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008973067-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
008973067-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
008973067-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT
008973067-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008973067-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS
008973067-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT

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

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

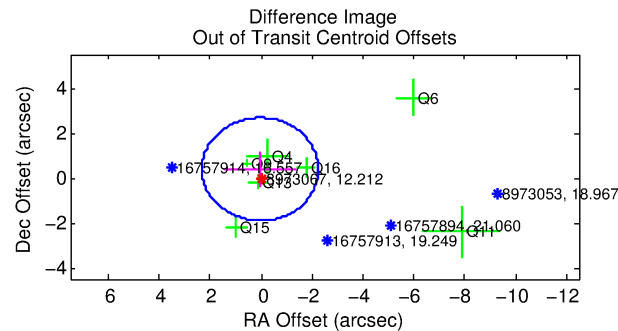
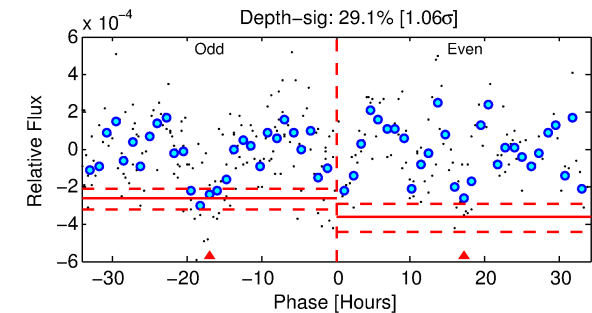
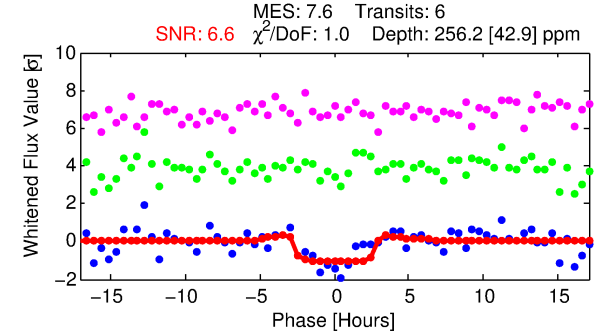
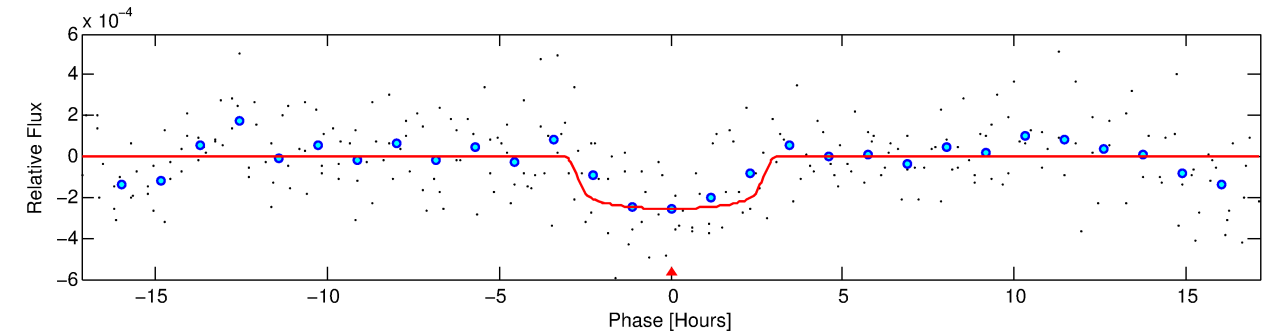
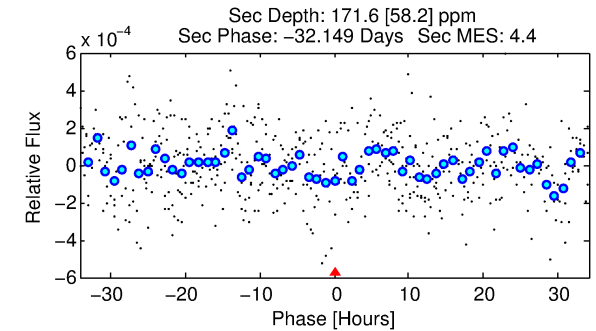
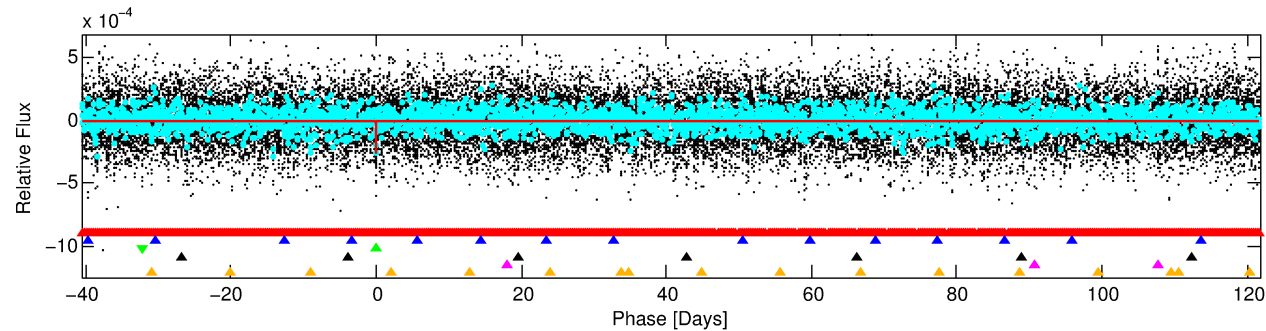
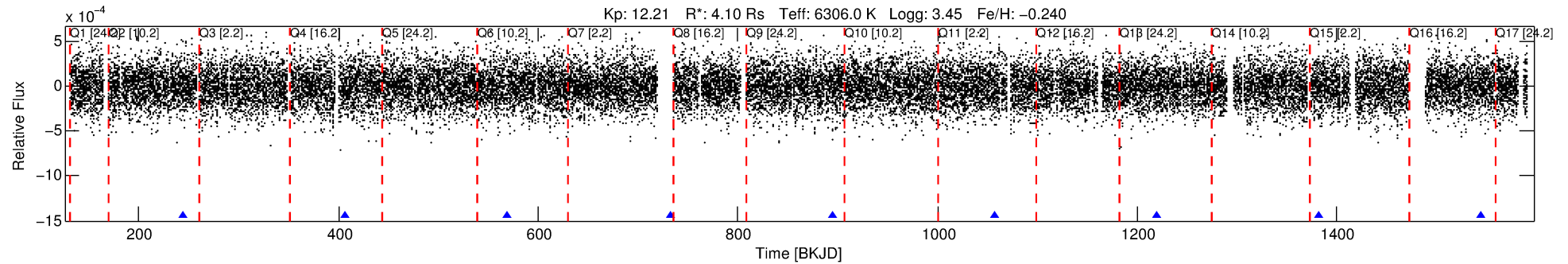
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008973067-03

No Significant Match Found

# DV One-Page Summary

KIC: 8973067 Candidate: 3 of 6 Period: 162.389 d



## DV Fit Results:

Period = 162.38885 [0.00470] d  
Epoch = 244.8926 [0.0265] BKJD  
Rp/R\* = 0.0161 [0.0140]  
a/R\* = 143.02 [677.13]  
b = 0.77 [2.47]  
Seff = 48.74 [30.96]  
Teq = 674 [107] K  
Rp = 7.19 [6.93] Re  
a = 0.6995 [0.2728] AU  
Ag = 894.71 [1690.60] [0.53σ]  
Teffp = 5697 [2544] K [1.97σ]

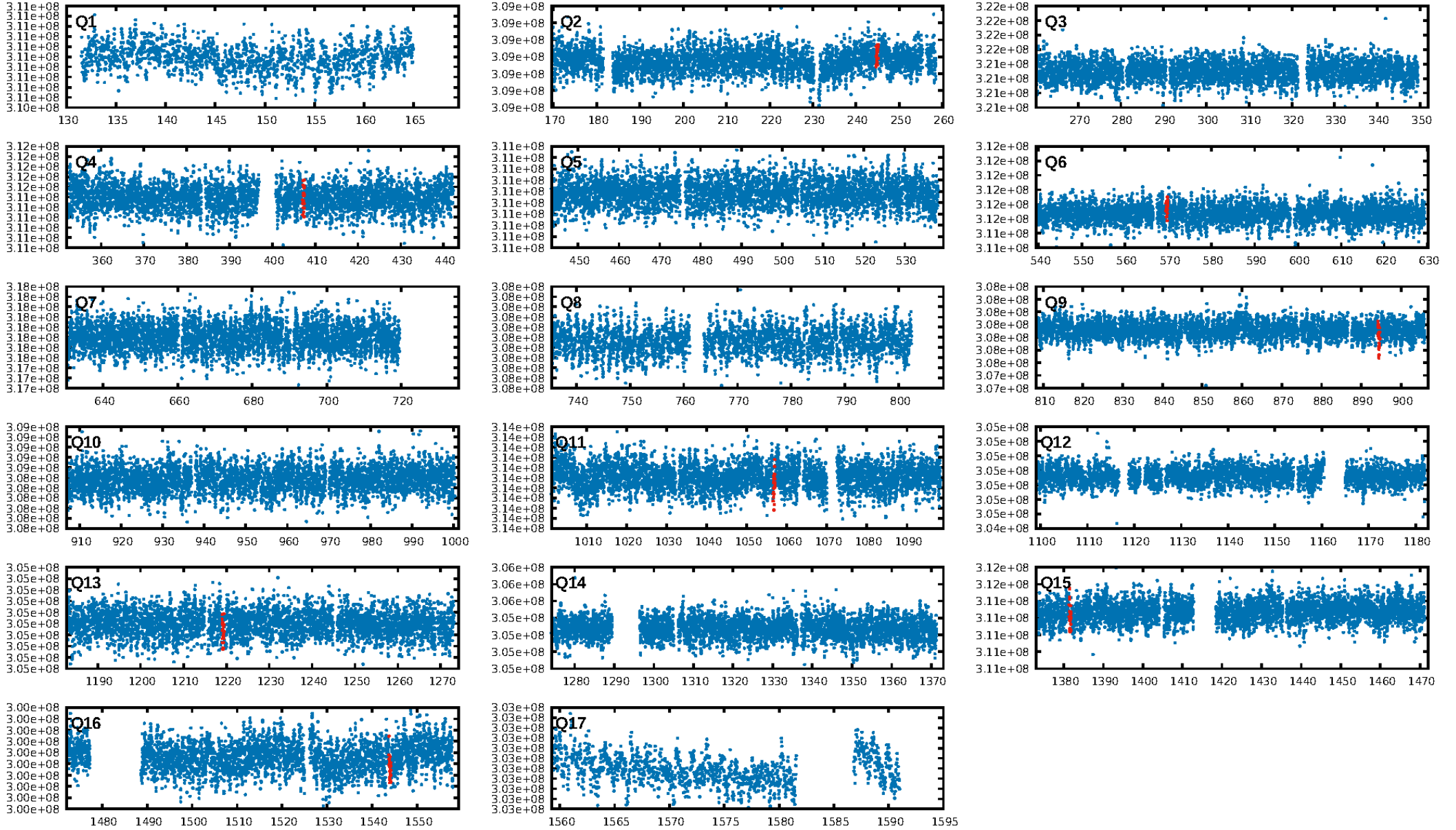
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [198.78σ]  
LongPeriod-sig: 100.0% [177.47σ]  
ModelChiSquare2-sig: 73.6%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 8.64e-10**  
RollingBand-fgt: 1.00 [6/6]  
**GhostDiagnostic-chr: 0.4912**  
Centroid-sig: 2.8%  
Centroid-so: 0.868 arcsec [1.52σ]  
OotOffset-rm: 0.387 arcsec [0.51σ]  
OotOffset-st: 1/2/2/2 [7]  
KicOffset-rm: 0.435 arcsec [0.68σ]  
KicOffset-st: 1/2/2/2 [7]  
DiffImageQuality-fgm: 0.71 [5/7]  
DiffImageOverlap-fno: 0.12 [1/8]

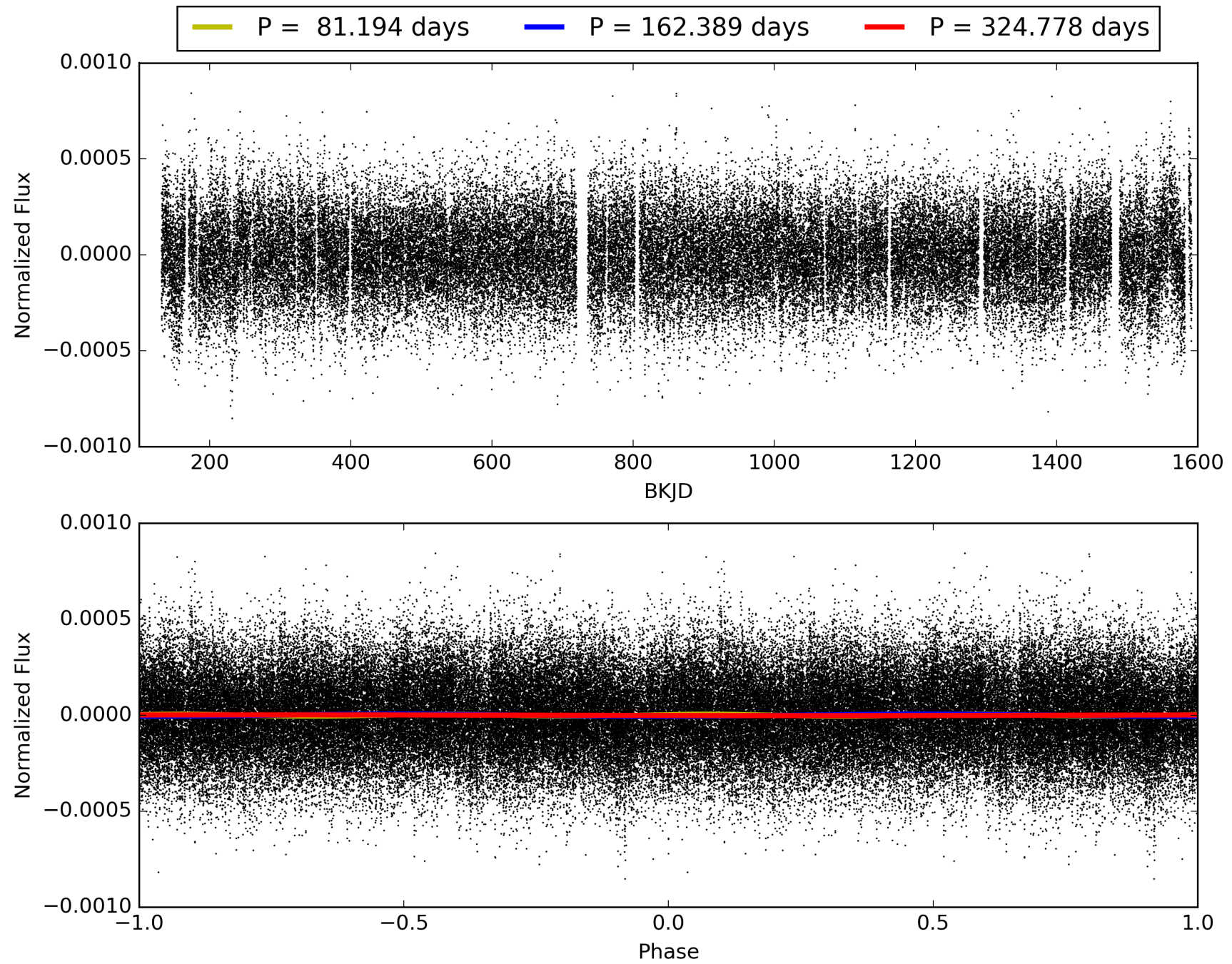
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 06:42:48 Z

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

# TCE 008973067-03, PDC Light Curves

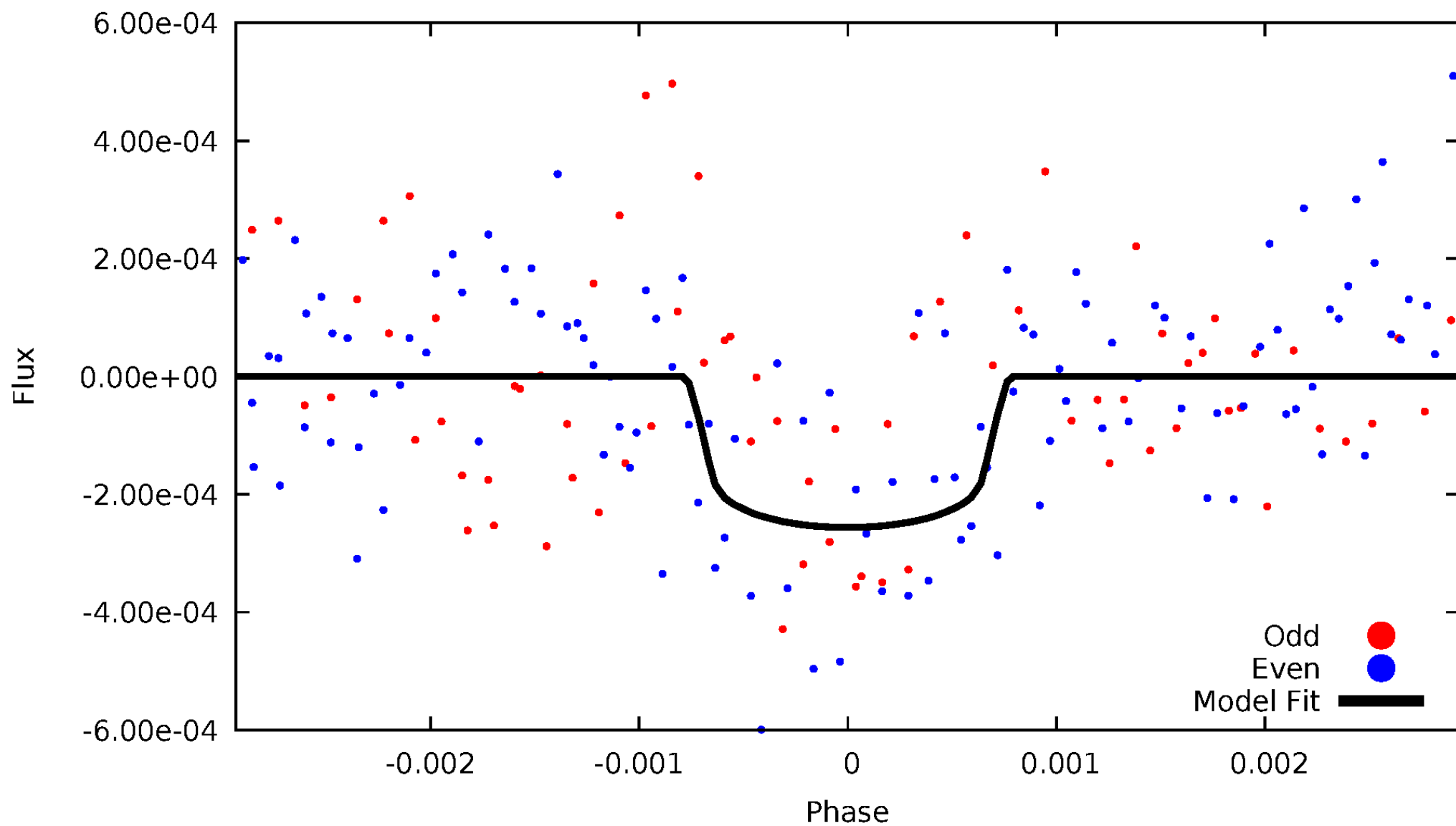


TCE 008973067-03



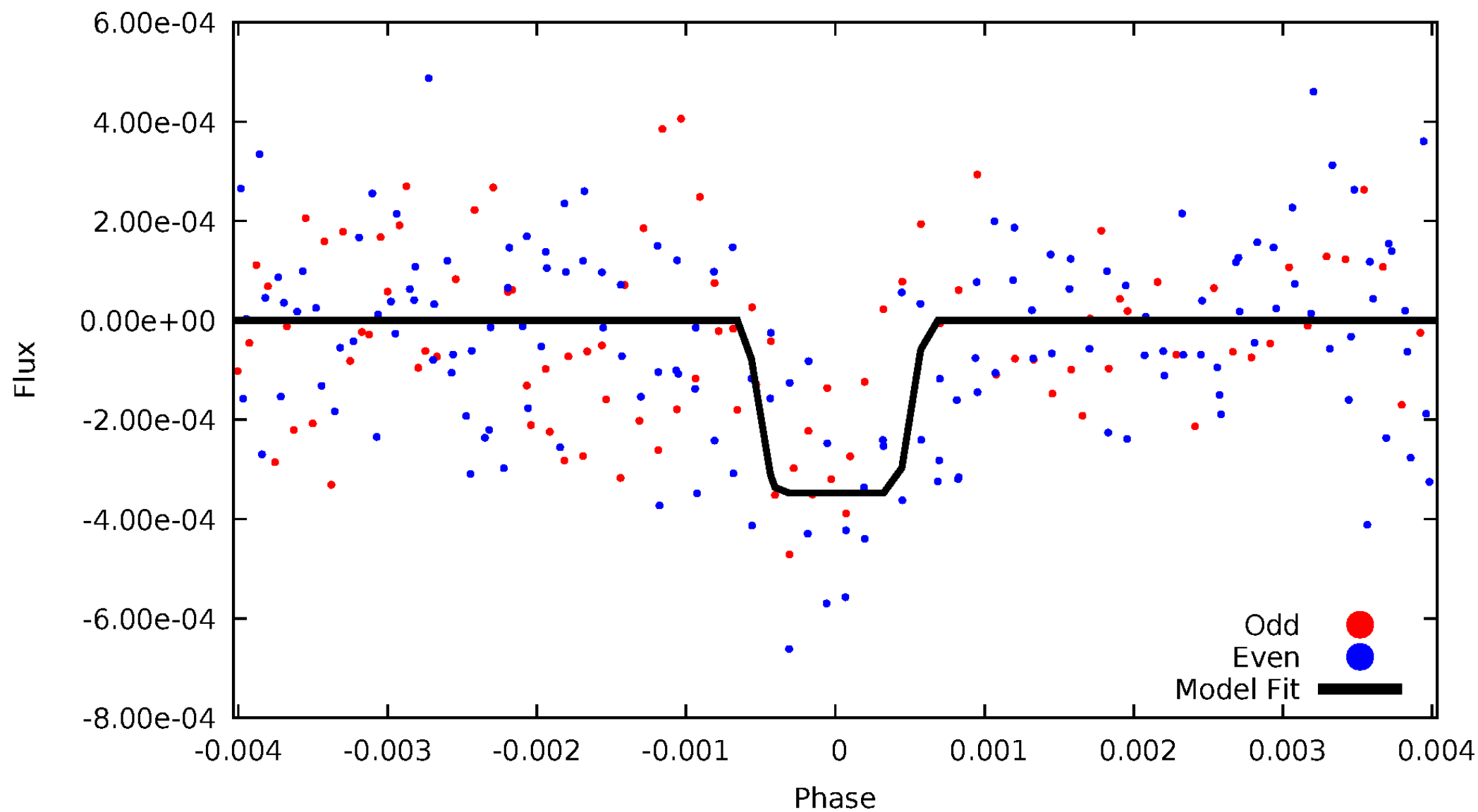
# DV Odd/Even

TCE 008973067-03



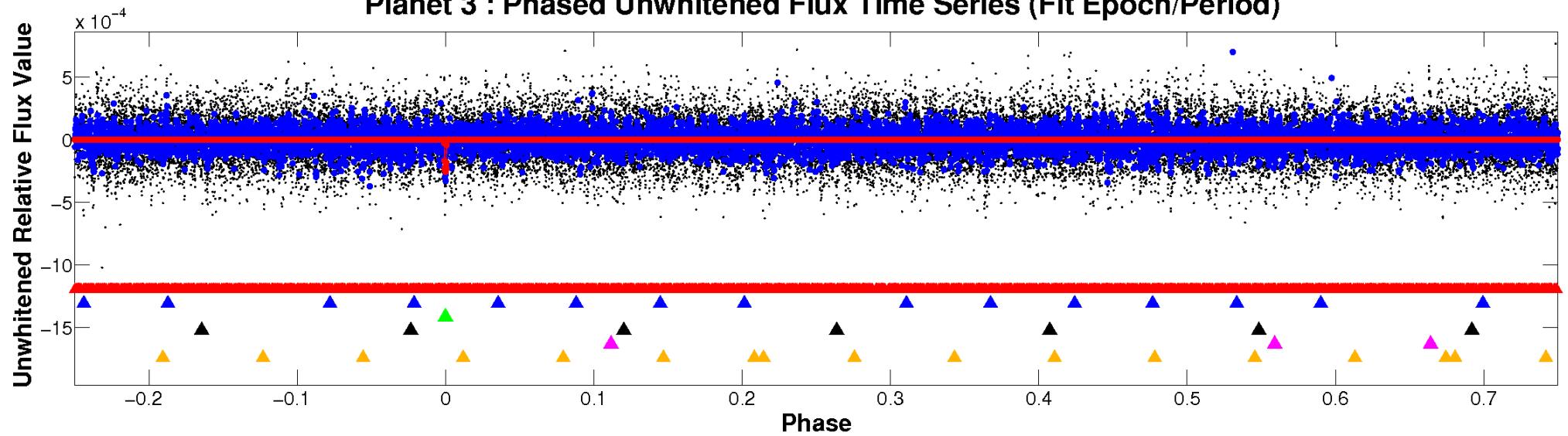
# ALT Odd/Even

TCE 008973067-03

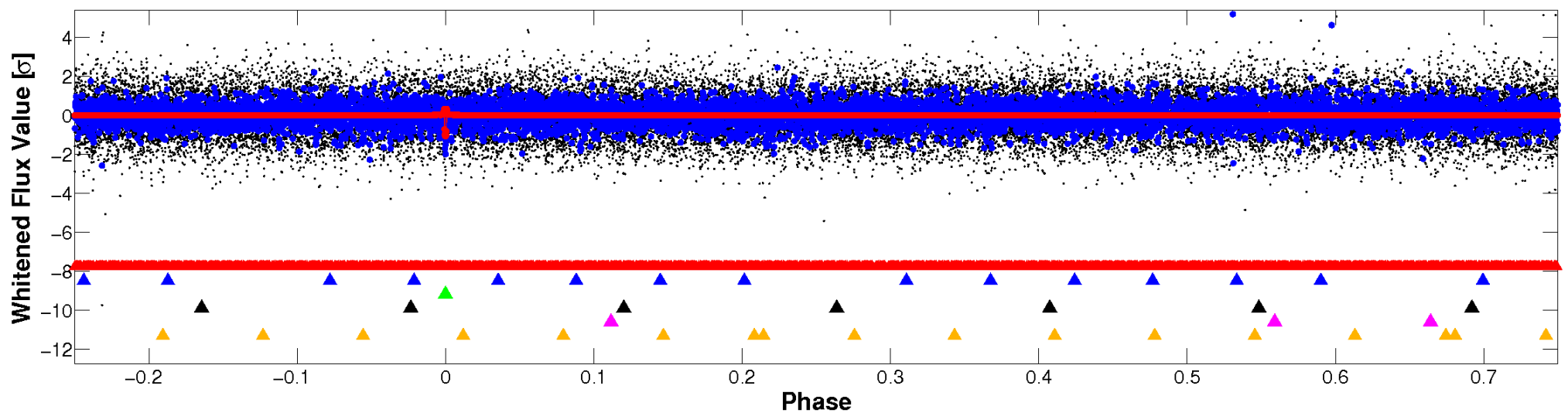


# Non-Whitened Vs. Whitened Light Curve

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

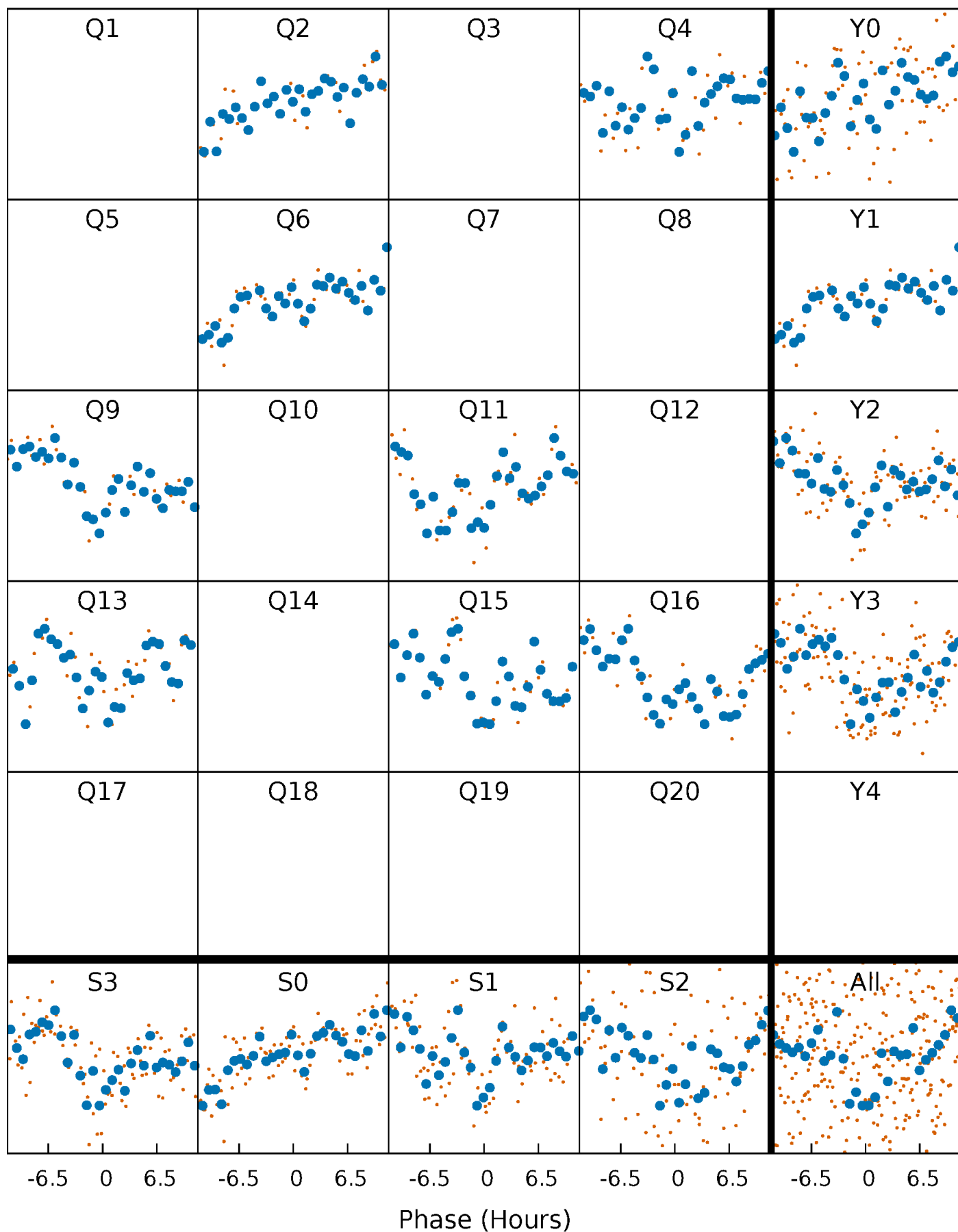


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



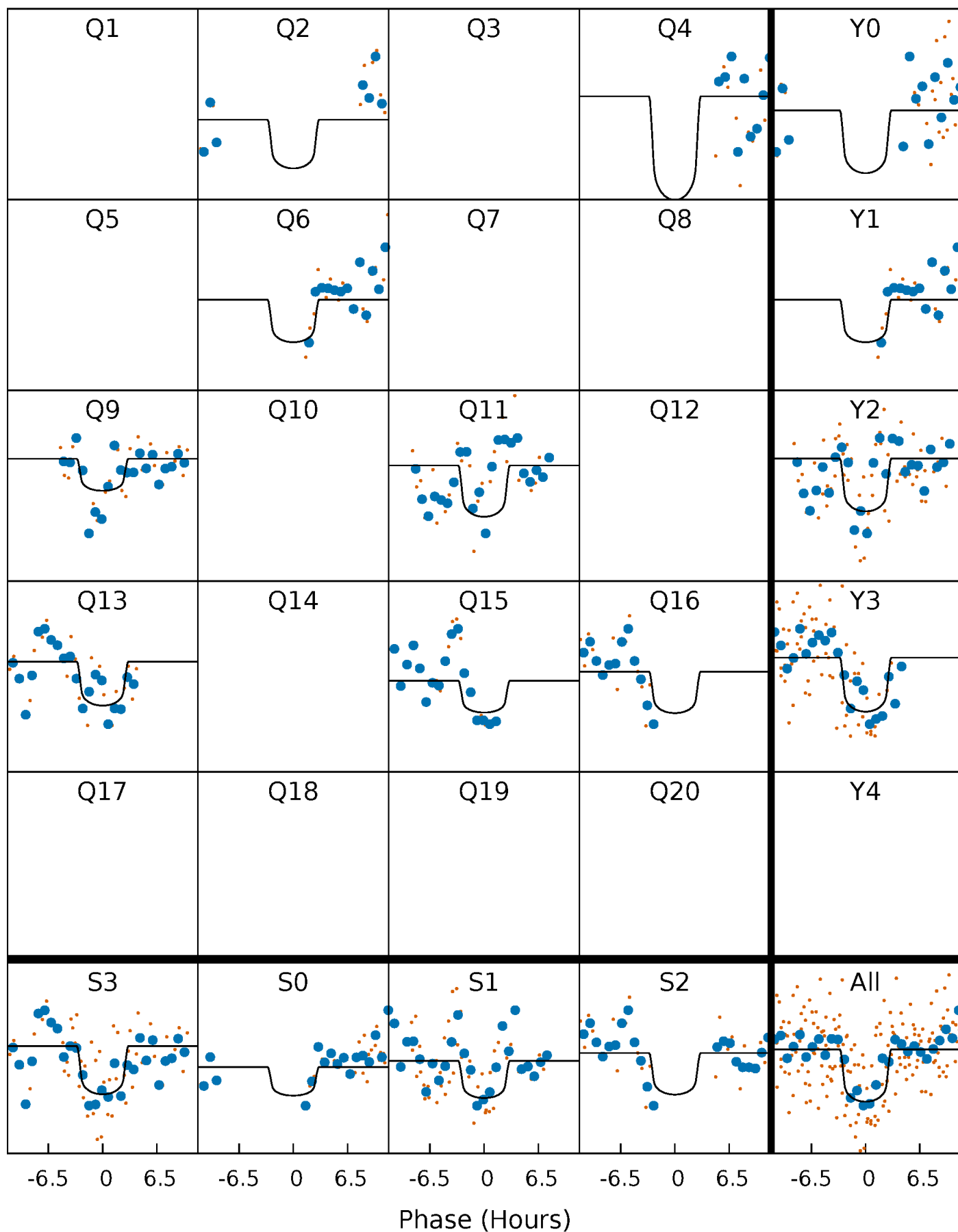
# PDC Quarter-Phased Transit Curves

TCE 008973067-03 P=162.388847 Days  $T_0=244.892607$  (BKJD)



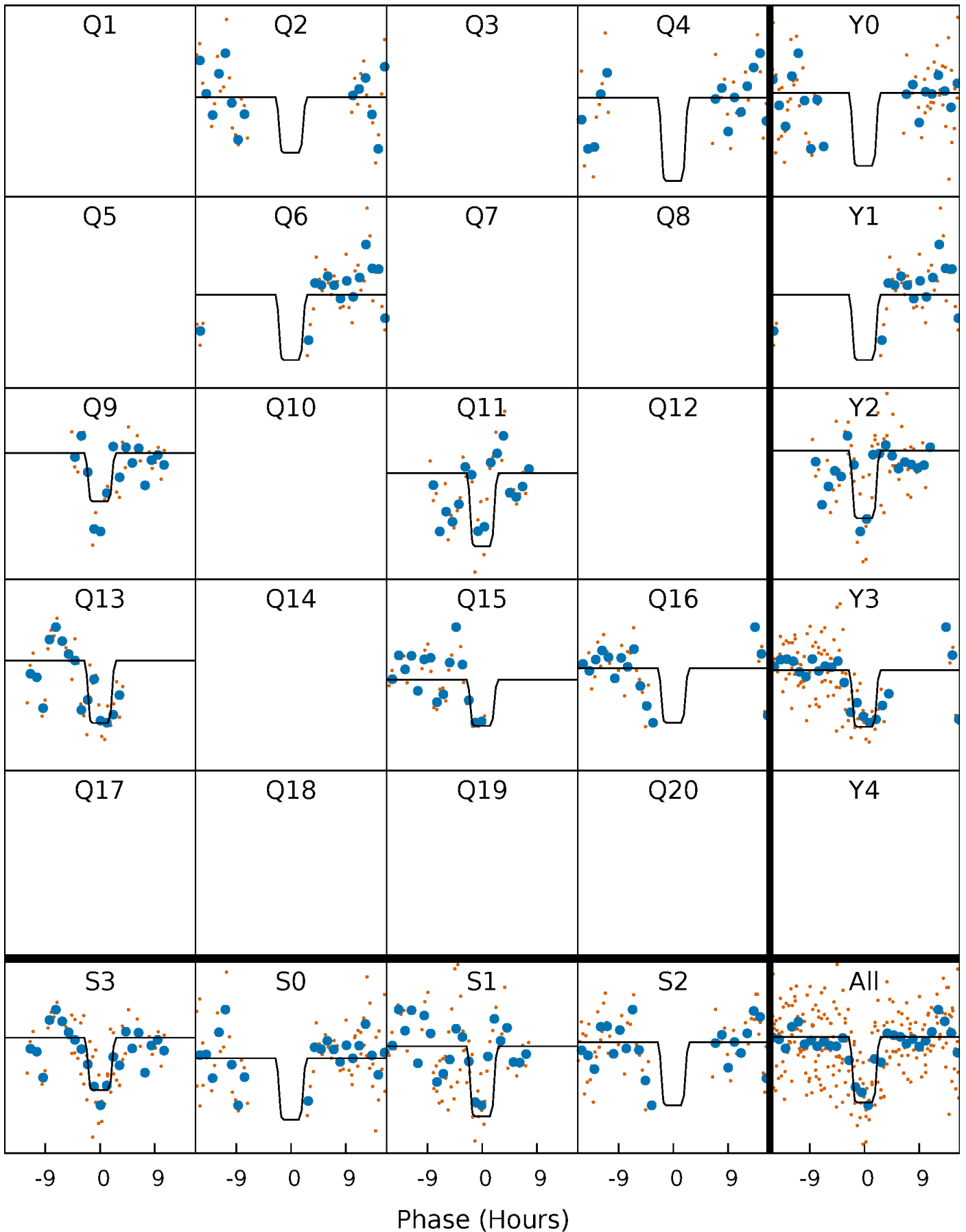
# DV Quarter-Phased Transit Curves

TCE 008973067-03   P=162.388847 Days    $T_0=244.892607$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

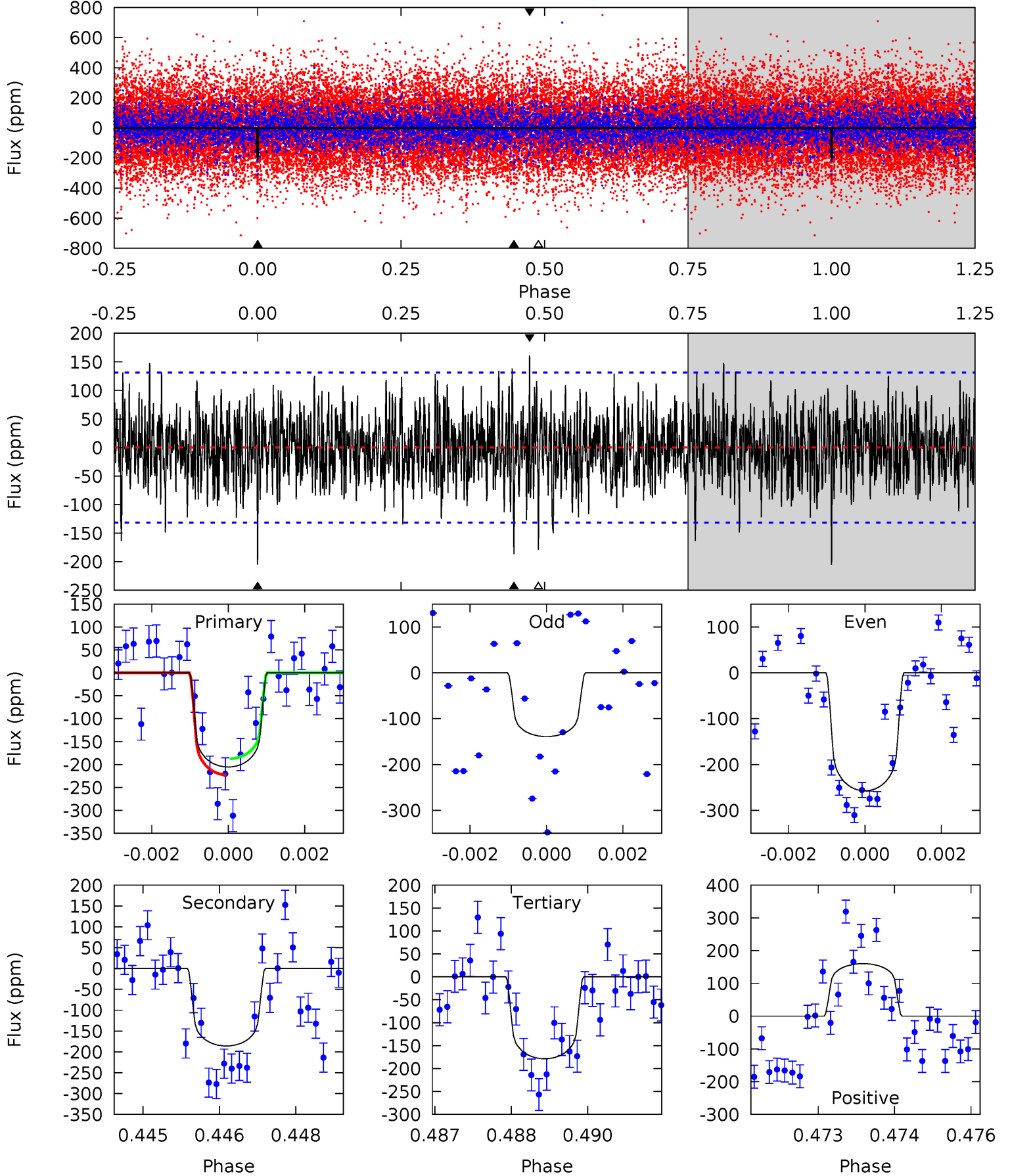
TCE 008973067-03   P=162.404877 Days    $T_0=244.811503$  (BKJD)



# DV Model-Shift Uniqueness Test

008973067-03,  $P = 162.388847$  Days,  $E = 82.503760$  Days

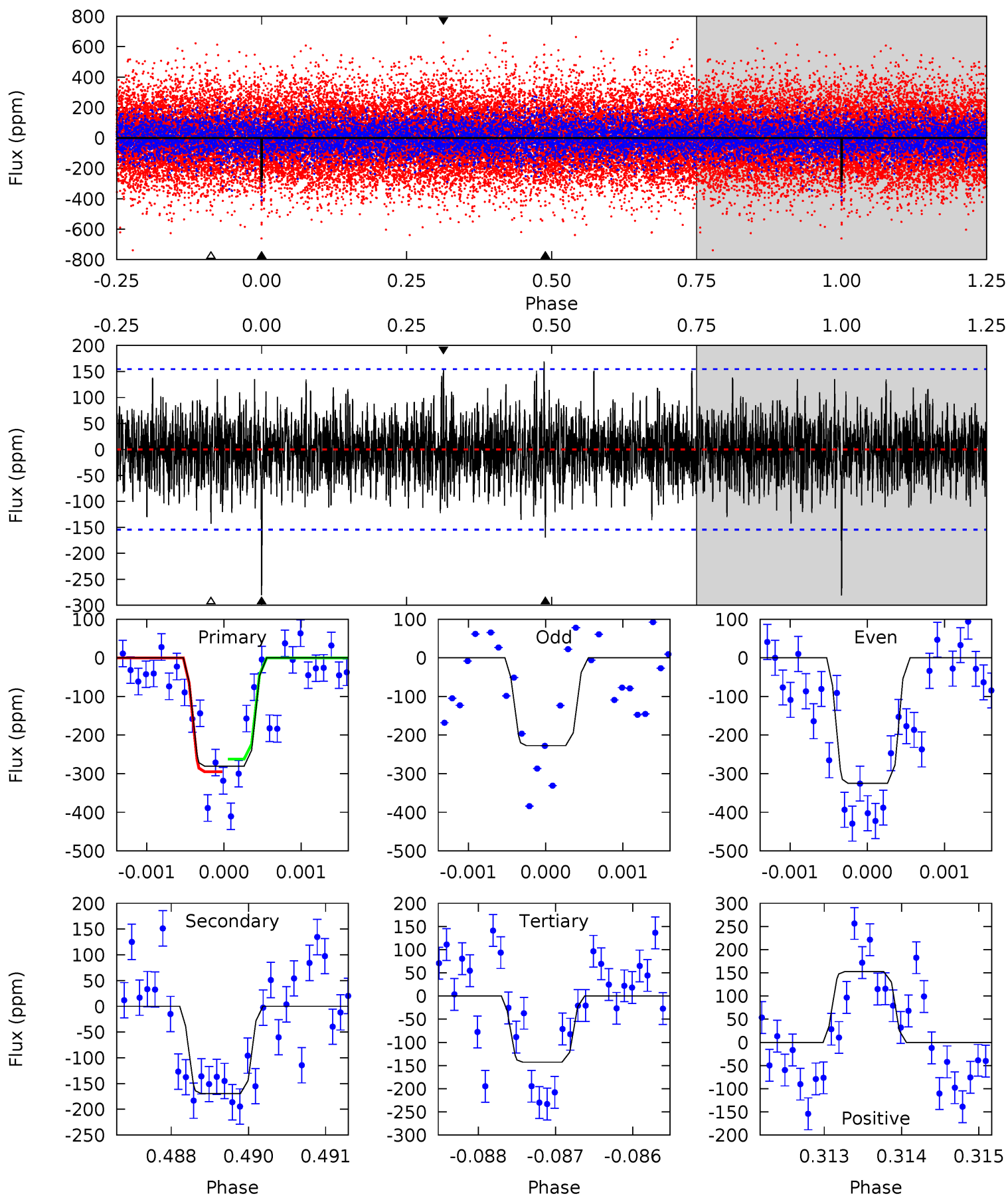
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.40	7.60	7.31	6.55	5.37	3.16	1.93	1.09	1.85	0.29	1.05	2.38	1.06	0.44	0.73



# Alt Model-Shift Uniqueness Test

008973067-03, P = 162.404877 Days, E = 82.406626 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
9.84	5.94	5.00	5.34	5.41	3.23	1.56	4.84	4.50	0.94	0.60	1.70	0.97	0.38	0.58



### Stellar Parameters For KIC 008973067

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6306^{+173}_{-173}$	$3.450^{+0.368}_{-0.092}$	$-0.240^{+0.350}_{-0.300}$	$4.103^{+0.591}_{-1.655}$	$1.732^{+0.184}_{-0.429}$	$0.035^{+0.110}_{-0.011}$
	+3%/-3%	+11%/-3%	+146%/-125%	+14%/-40%	+11%/-25%	+311%/-30%
Source	PHO1	FLK73	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 008973067-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-186 \pm 24$	$7.26^{+5.61}_{-4.58}$	$922^{+56}_{-88}$	$5534^{+4065}_{-1123}$	$946^{+5575}_{-649}$
Alt.	$-170 \pm 29$	$7.90^{+6.06}_{-4.69}$	$914^{+61}_{-98}$	$5128^{+2973}_{-932}$	$705^{+3284}_{-484}$

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

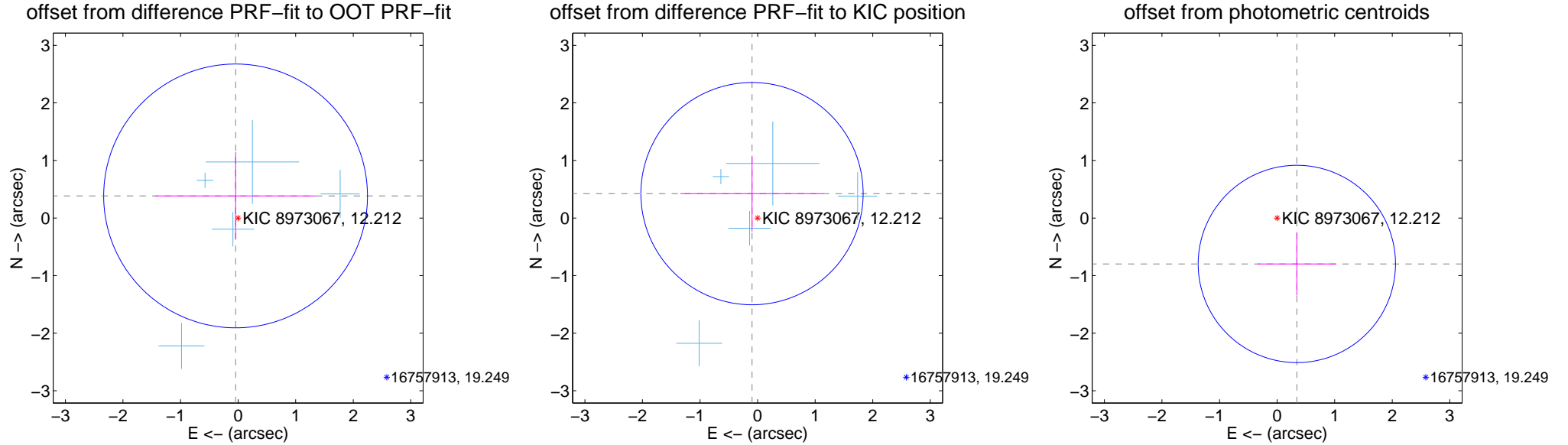
## DV Centroid Data

Supplemental centroid analysis for 008973067-03. Kepler magnitude: 12.21. Transit SNR 6.62

There are 5 quarters with good PRF difference image offsets

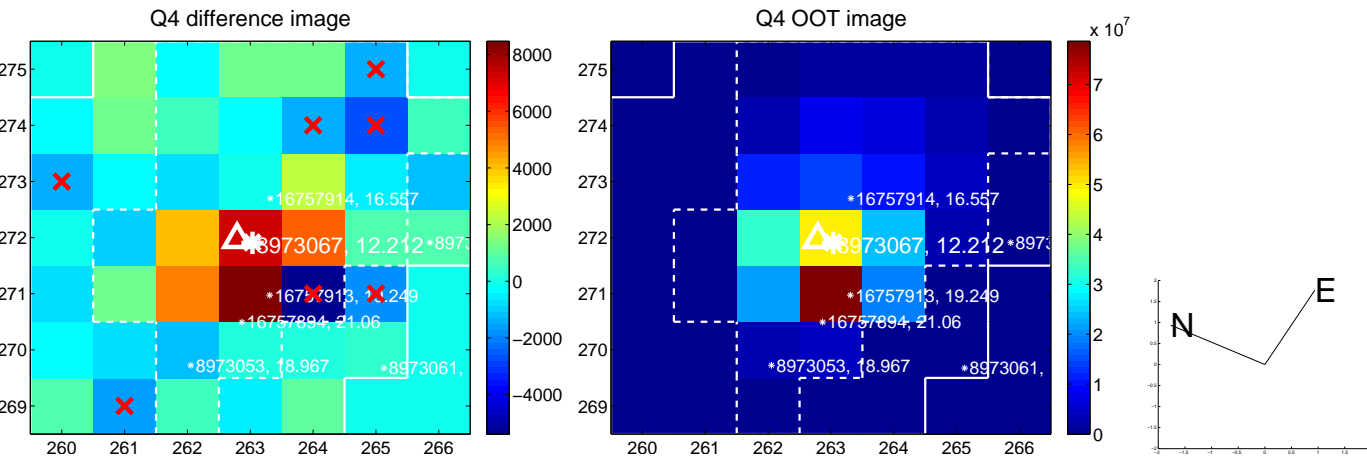
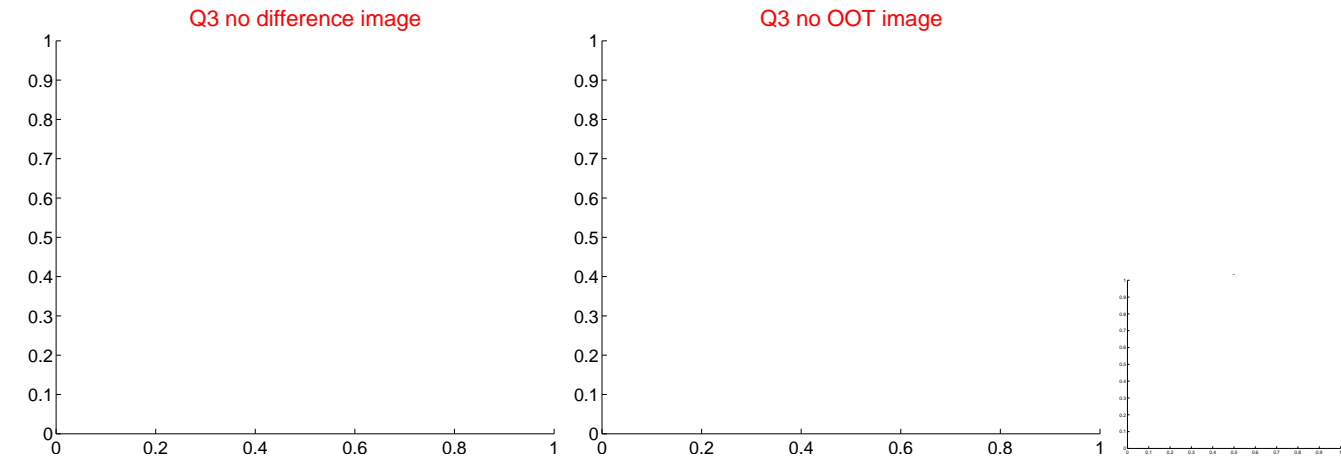
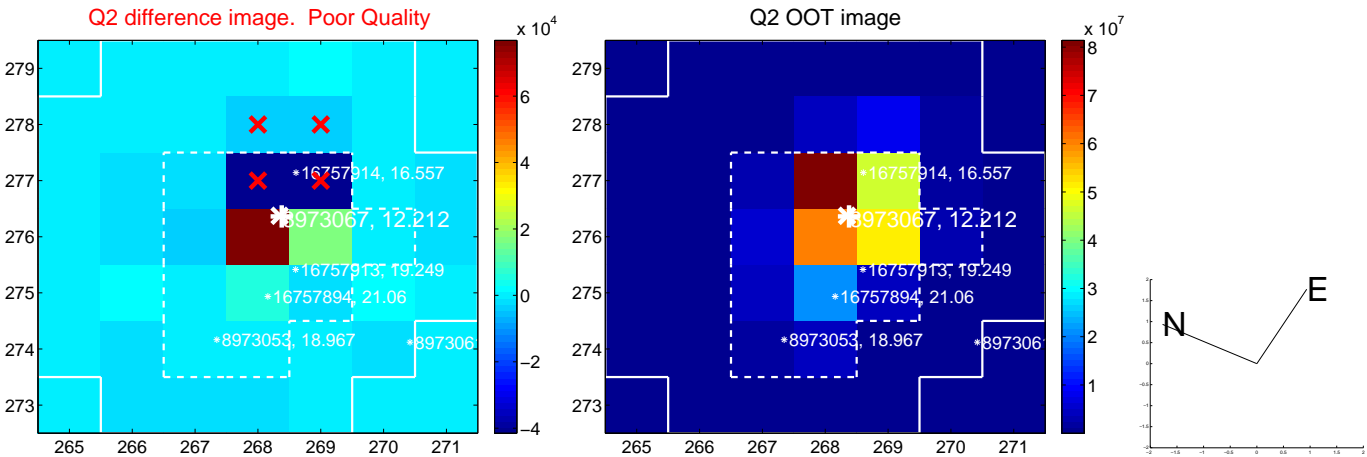
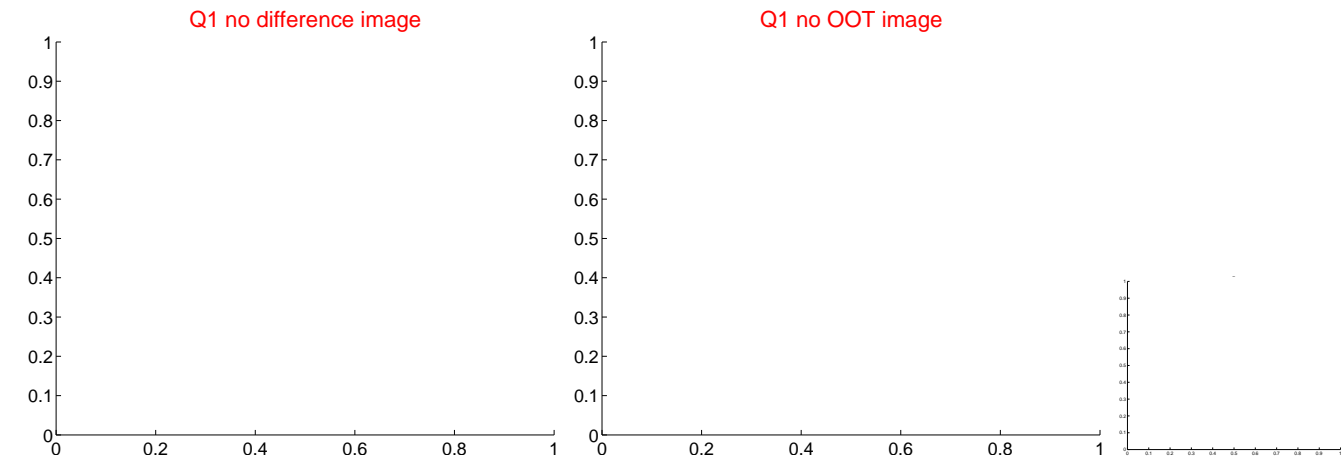
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.387 \pm 0.764$	0.51	$0.044 \pm 1.395$	$0.384 \pm 0.759$
PRF-fit source offset from KIC position	$0.435 \pm 0.643$	0.68	$0.097 \pm 1.244$	$0.424 \pm 0.658$
photometric centroid source offset	$0.87 \pm 0.57$	1.52	$-0.34 \pm 0.68$	$-0.80 \pm 0.55$

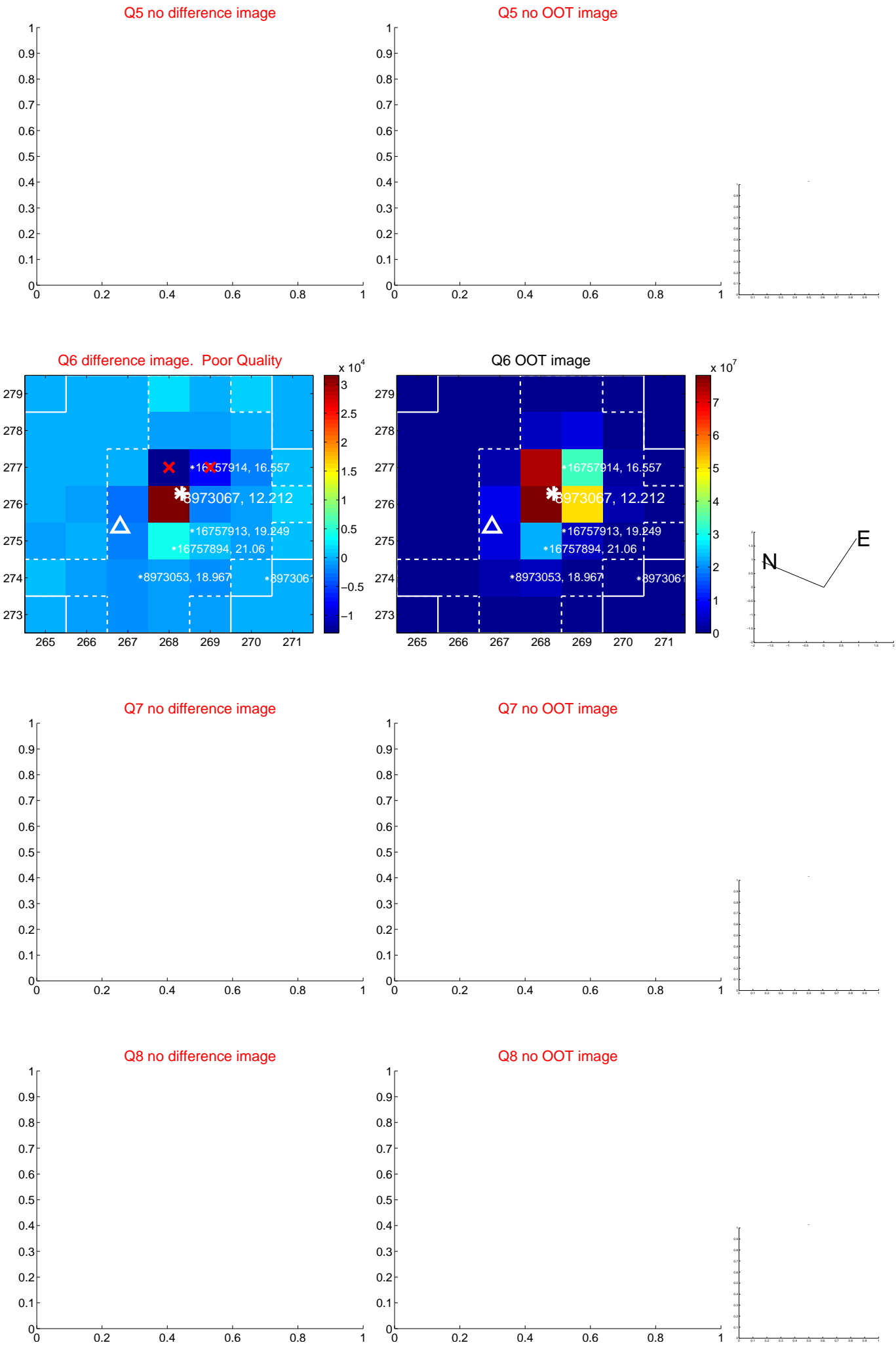


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

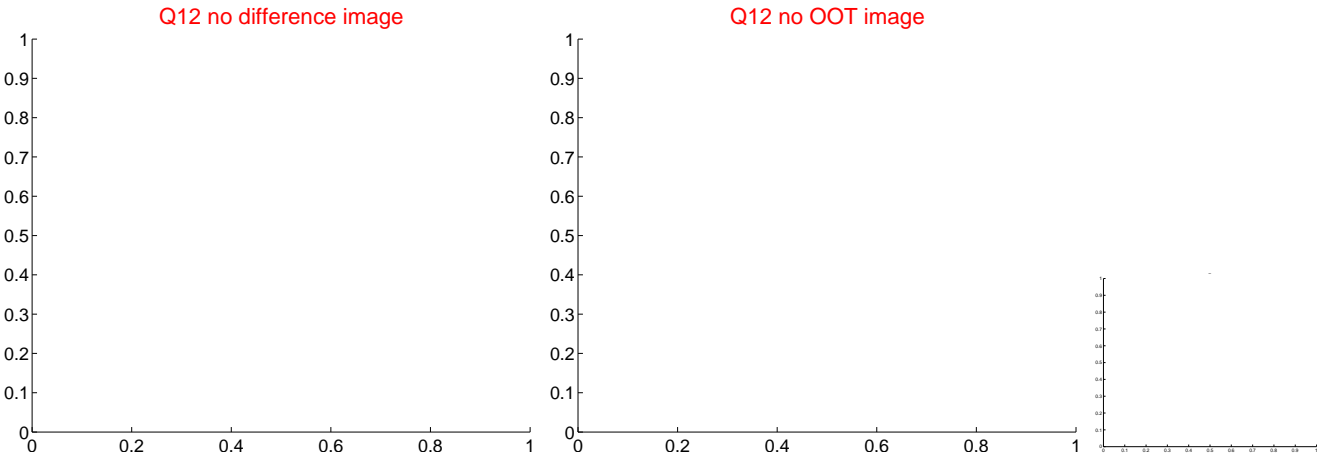
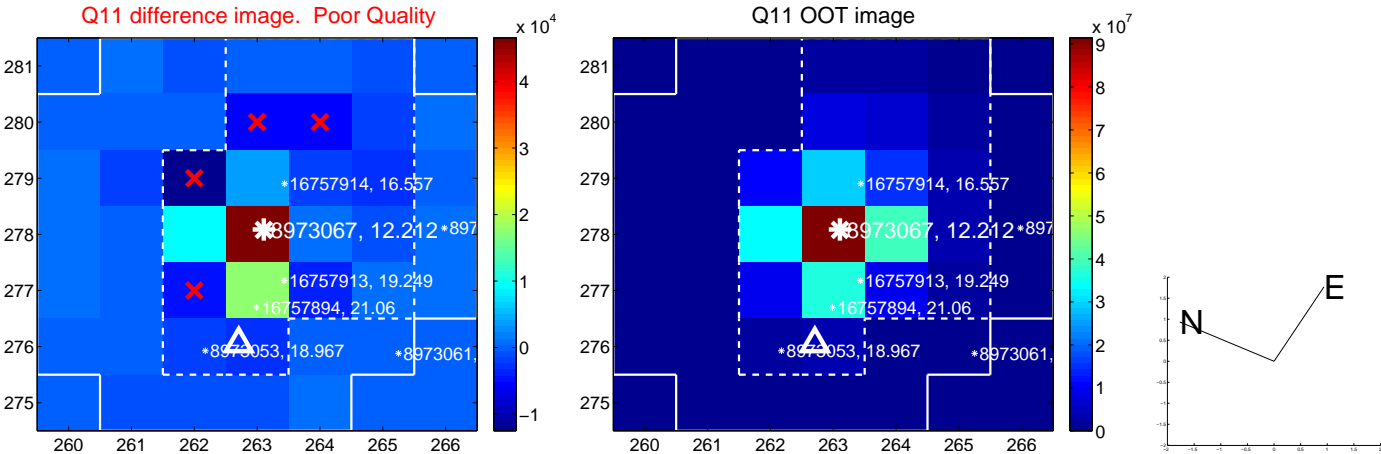
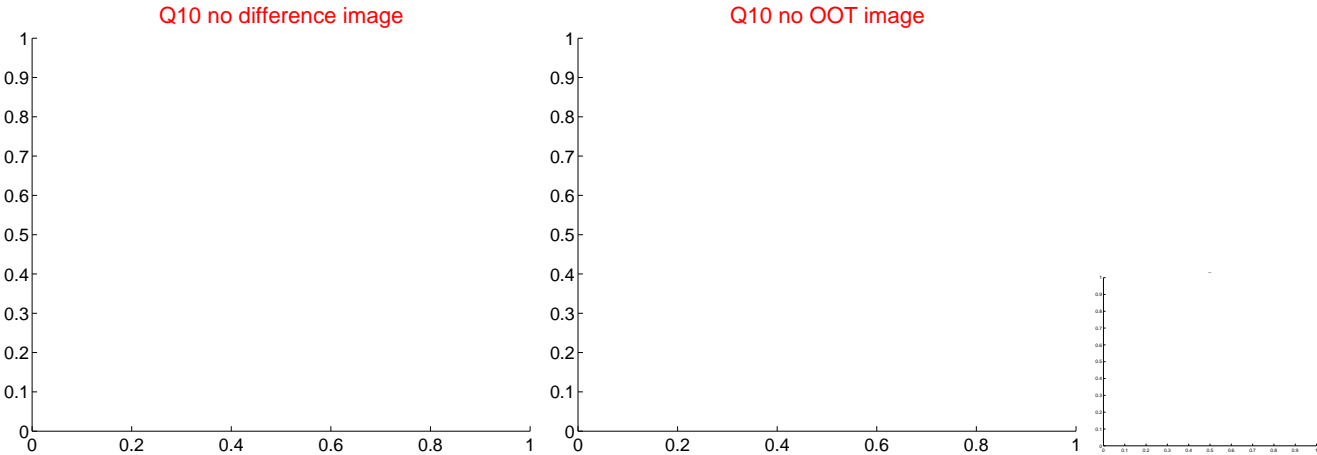
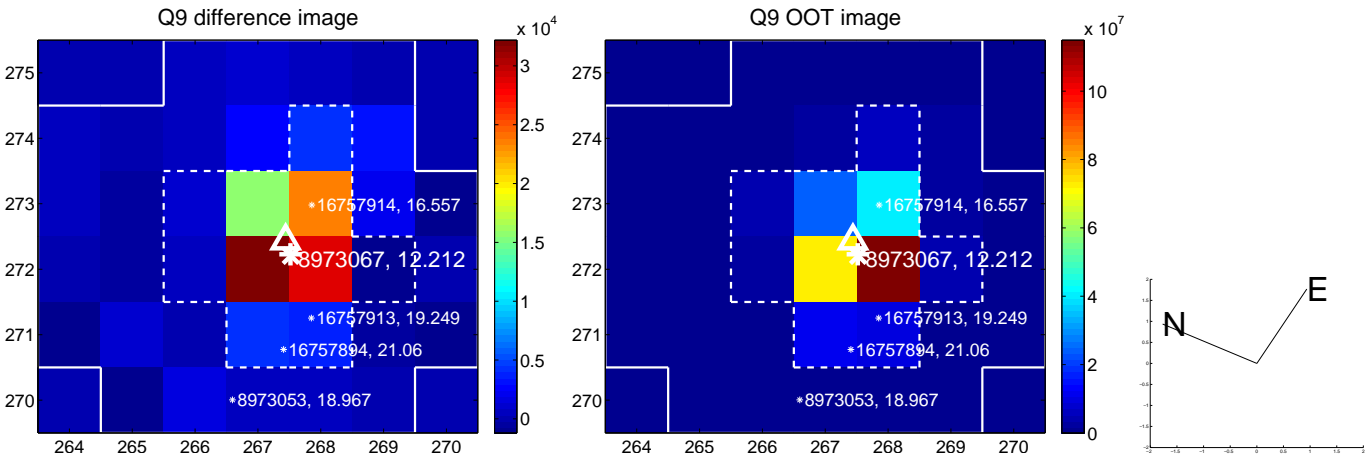
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



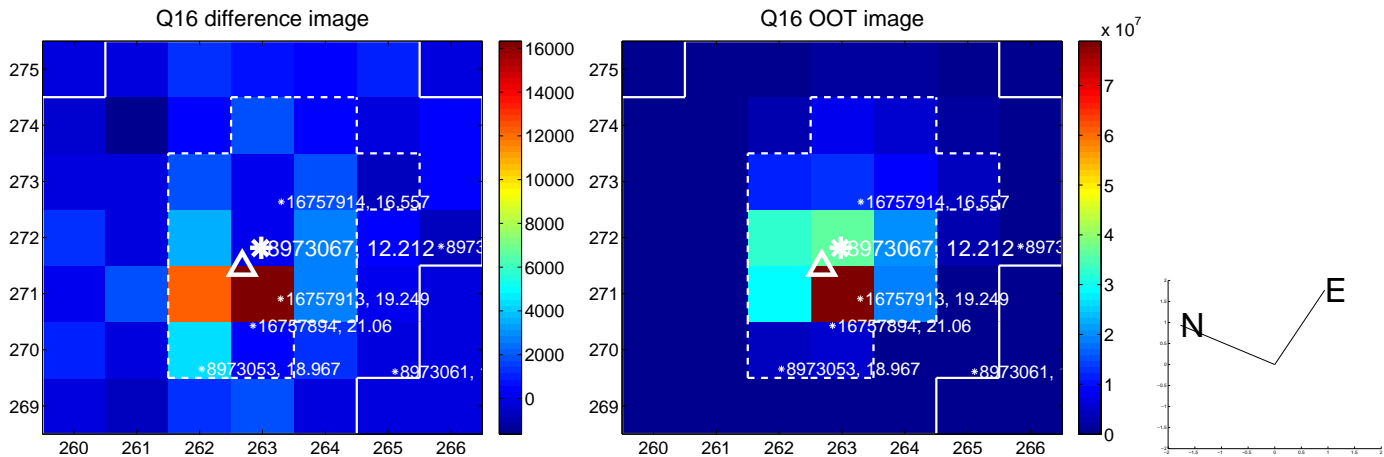
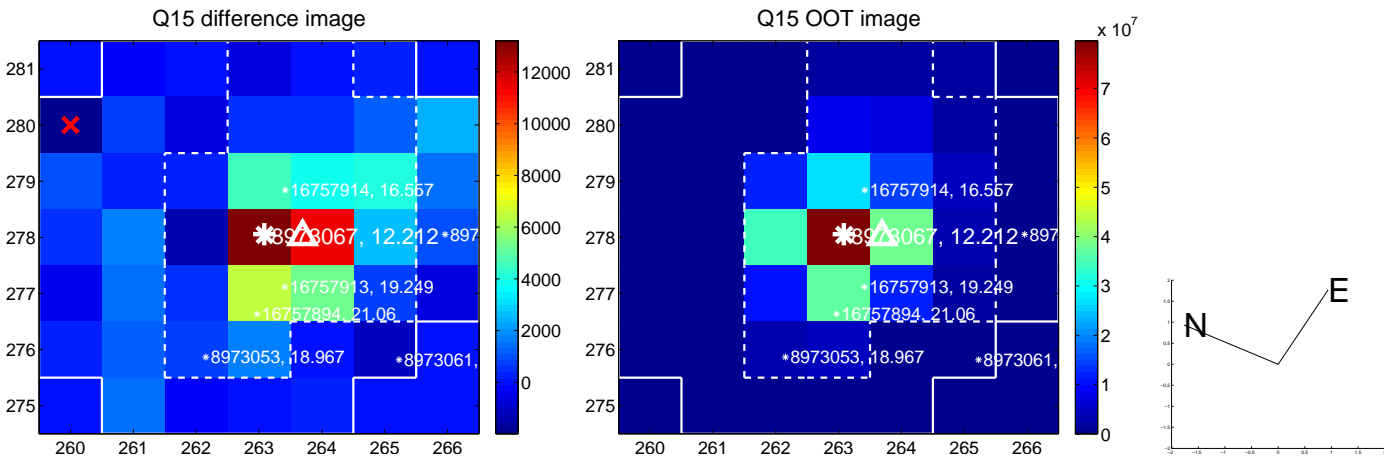
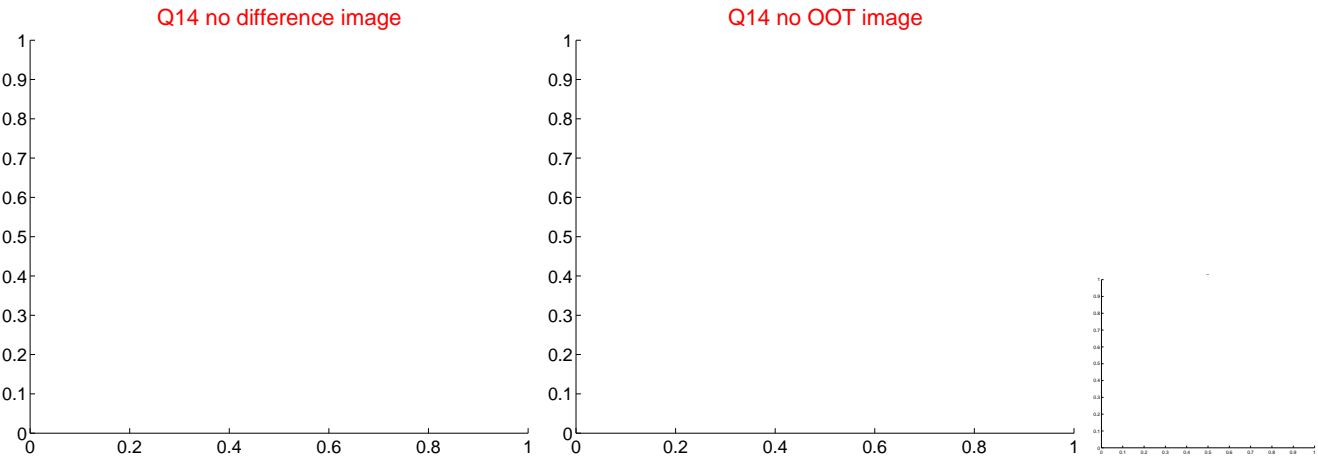
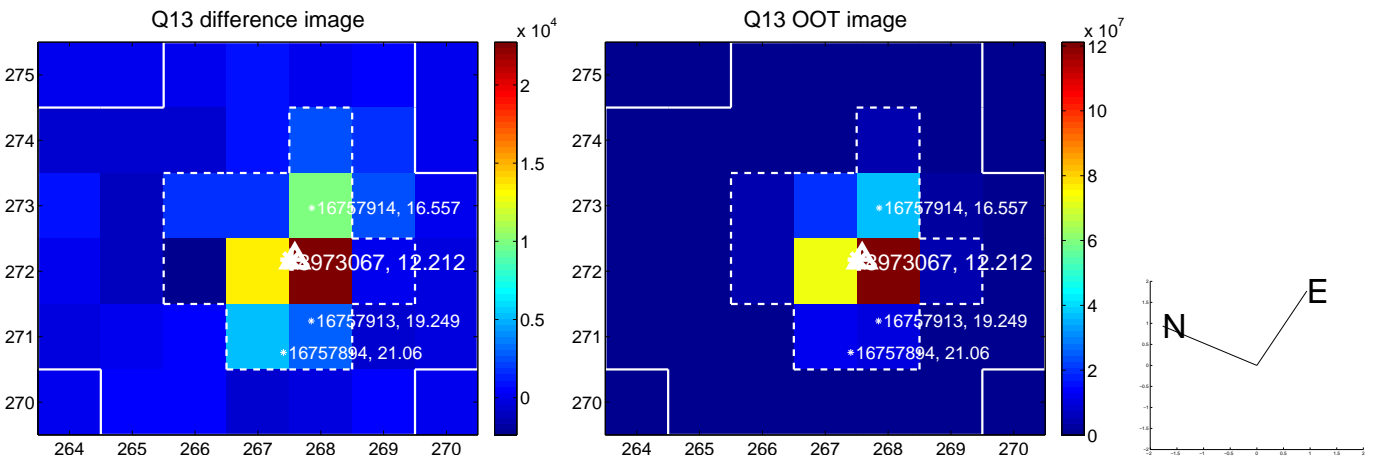
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



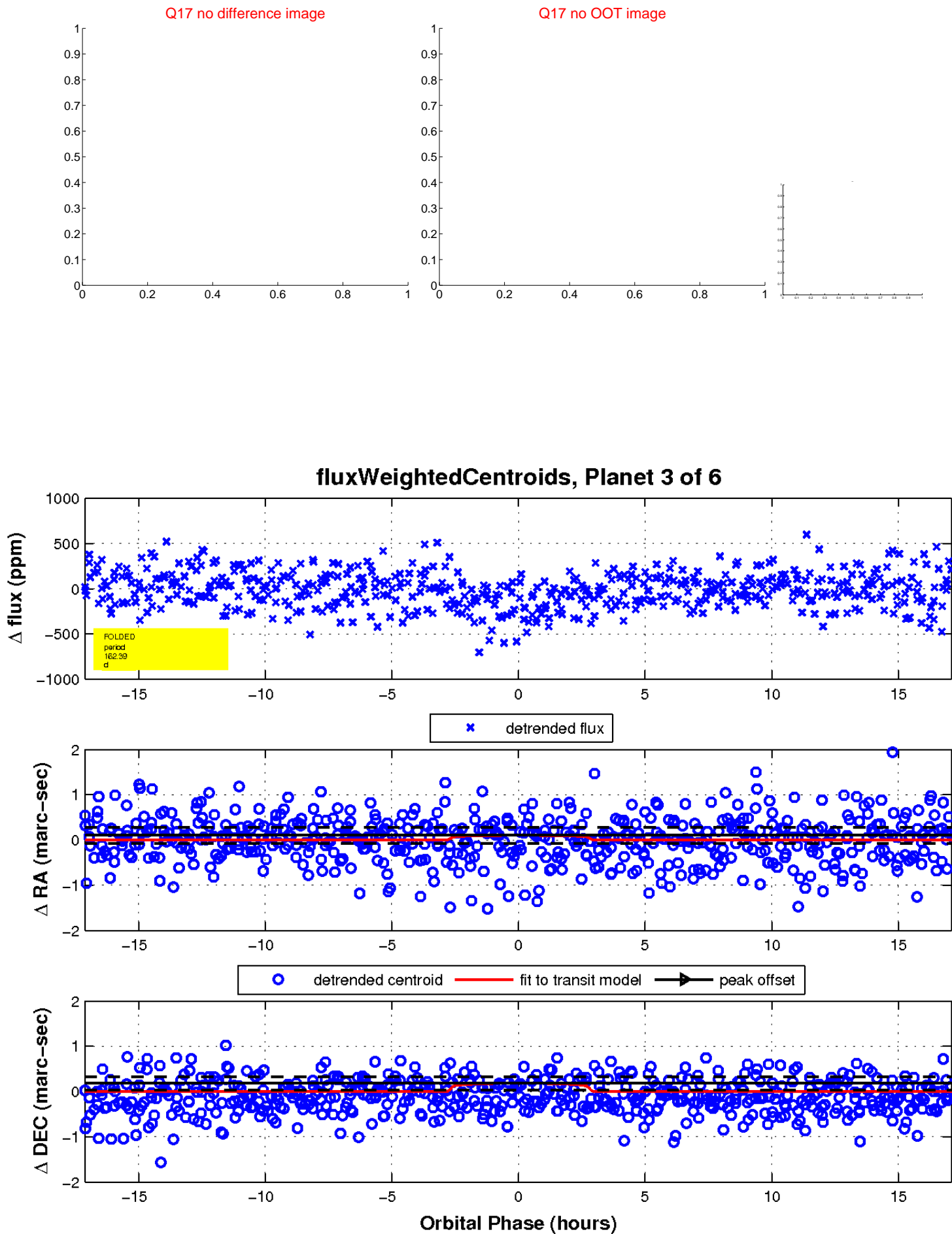
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



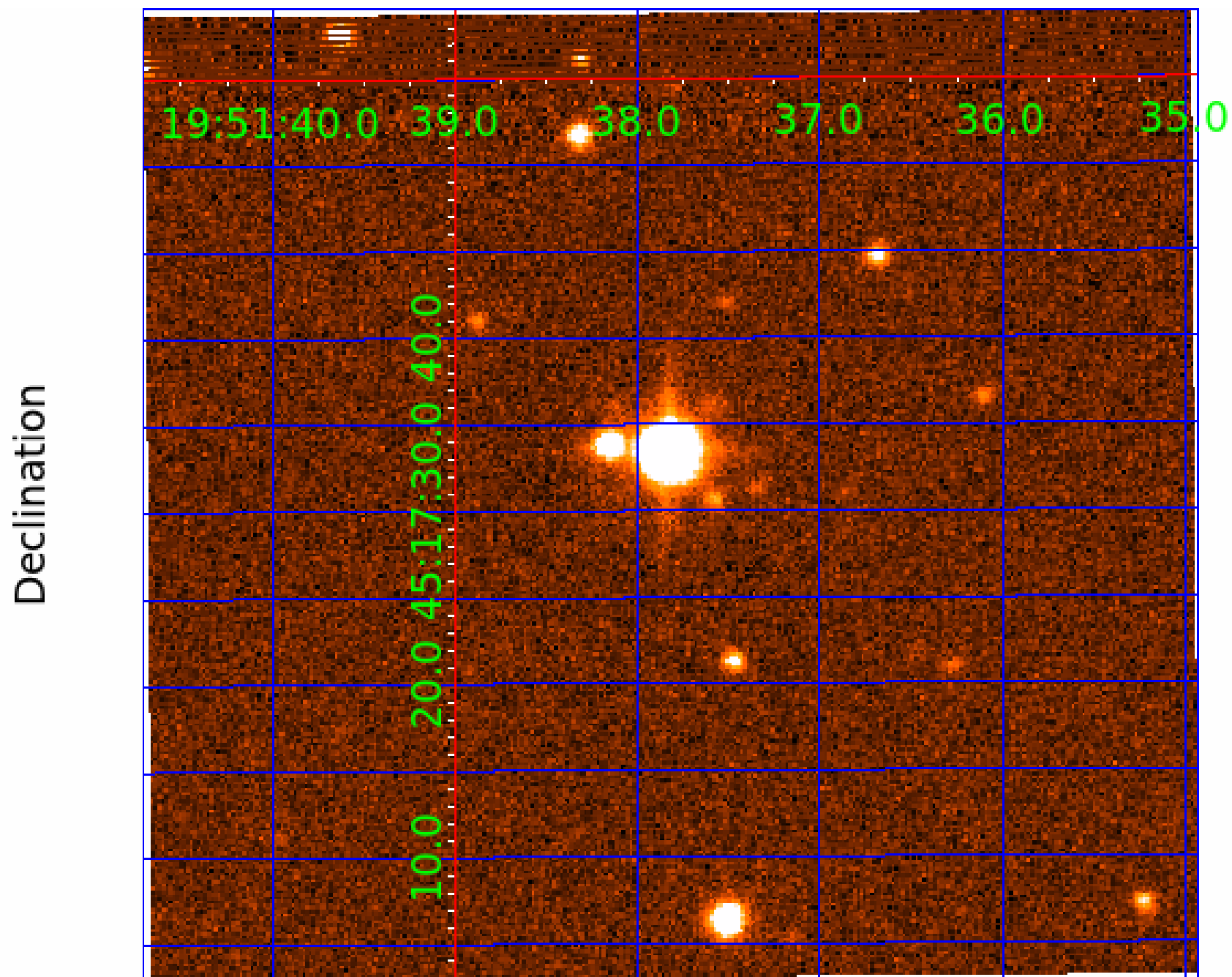
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 008973067

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008973067-01	OBS	No	1.375024	132.113592	22.5	5.387	8.9	7.6	4.10	6306	2.29	28242.15
008973067-02	OBS	No	99.274837	159.926145	278.4	5.042	8.0	8.0	4.10	6306	8.11	93.94
008973067-03	OBS	No	162.388847	244.892607	256.2	5.713	7.6	6.6	4.10	6306	7.19	48.74
008973067-04	OBS	No	231.923132	148.665148	292.3	7.468	7.4	7.3	4.10	6306	7.43	30.30
008973067-05	OBS	No	559.824663	190.363673	338.6	6.874	7.9	8.0	4.10	6306	8.37	9.36
008973067-06	OBS	No	86.674371	192.032939	313.2	2.468	7.2	7.5	4.10	6306	8.43	112.58

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008973067-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
008973067-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
008973067-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT
008973067-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008973067-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS
008973067-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT

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

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

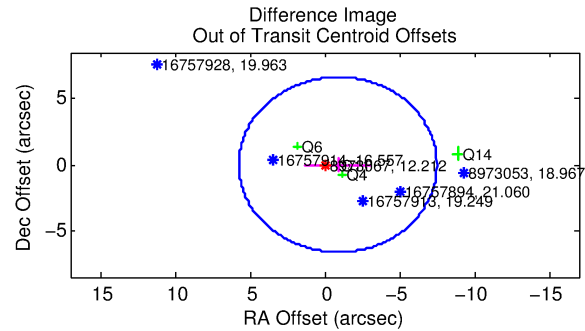
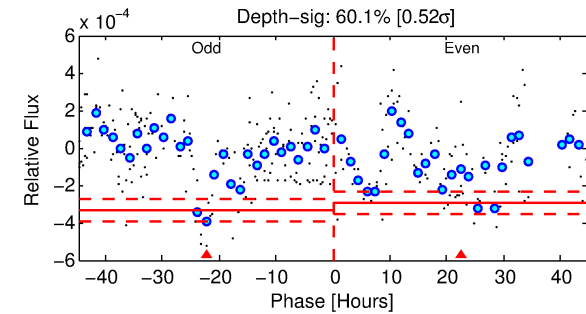
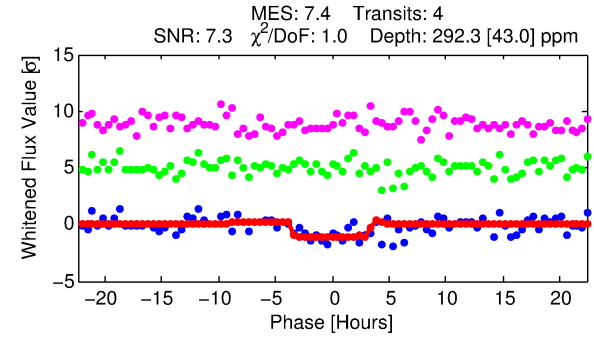
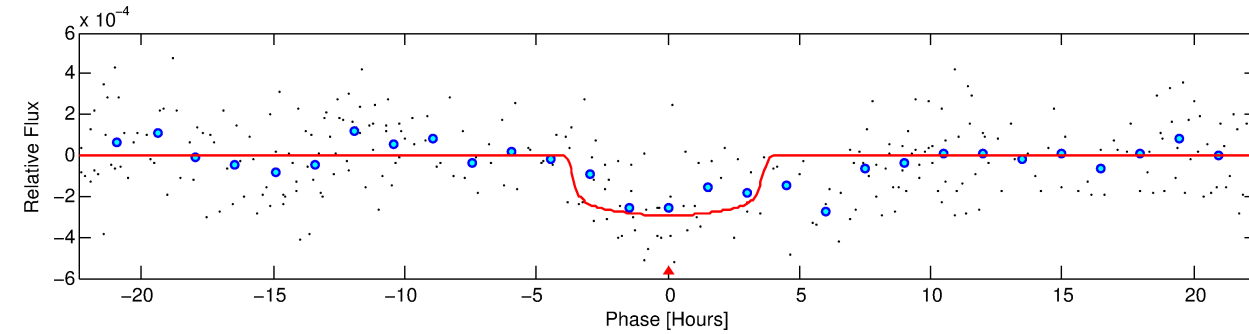
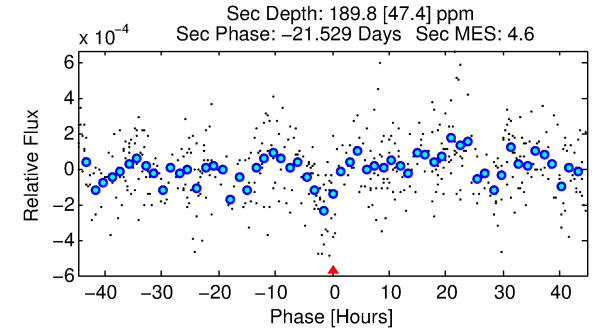
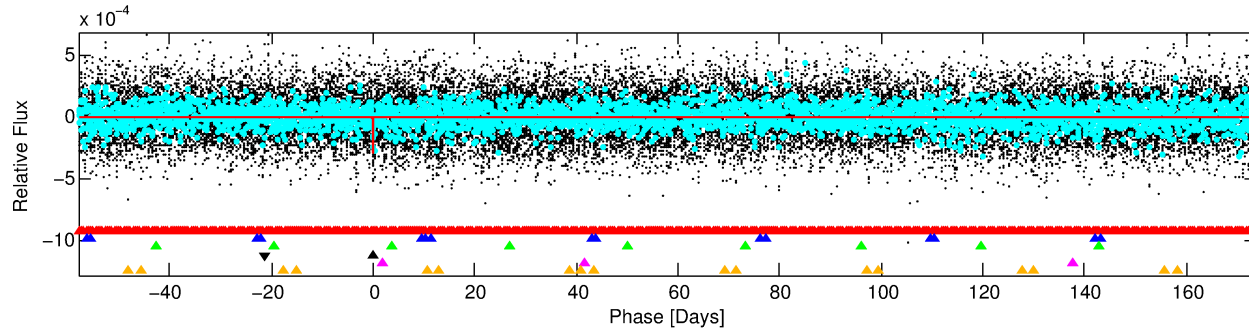
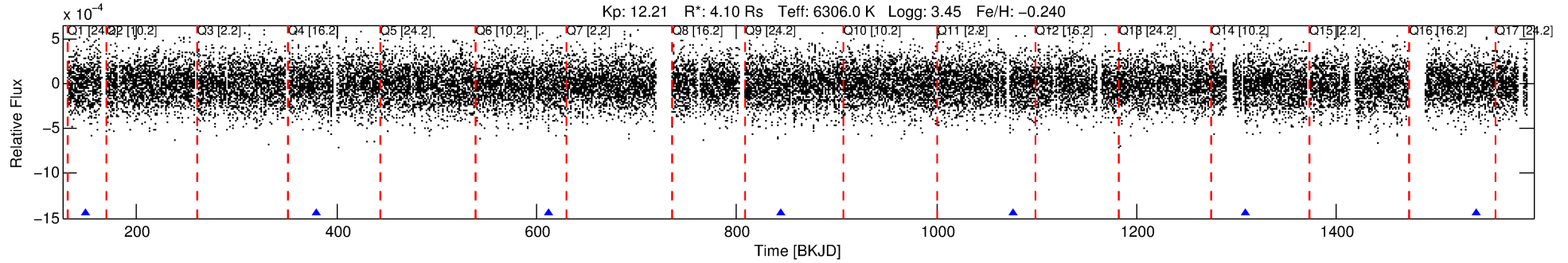
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008973067-04

No Significant Match Found

# DV One-Page Summary

KIC: 8973067 Candidate: 4 of 6 Period: 231.923 d



## DV Fit Results:

Period = 231.92313 [0.00460] d  
Epoch = 148.6651 [0.0172] BKJD  
Rp/R\* = 0.0166 [0.0124]  
a/R\* = 184.49 [729.20]  
b = 0.65 [3.47]  
Seff = 30.31 [19.25]  
Teq = 598 [95] K  
Rp = 7.43 [6.32] Re  
a = 0.8871 [0.3460] AU  
Ag = 1490.37 [2450.67] [0.61σ]  
Teffp = 5747 [2191] K [2.35σ]

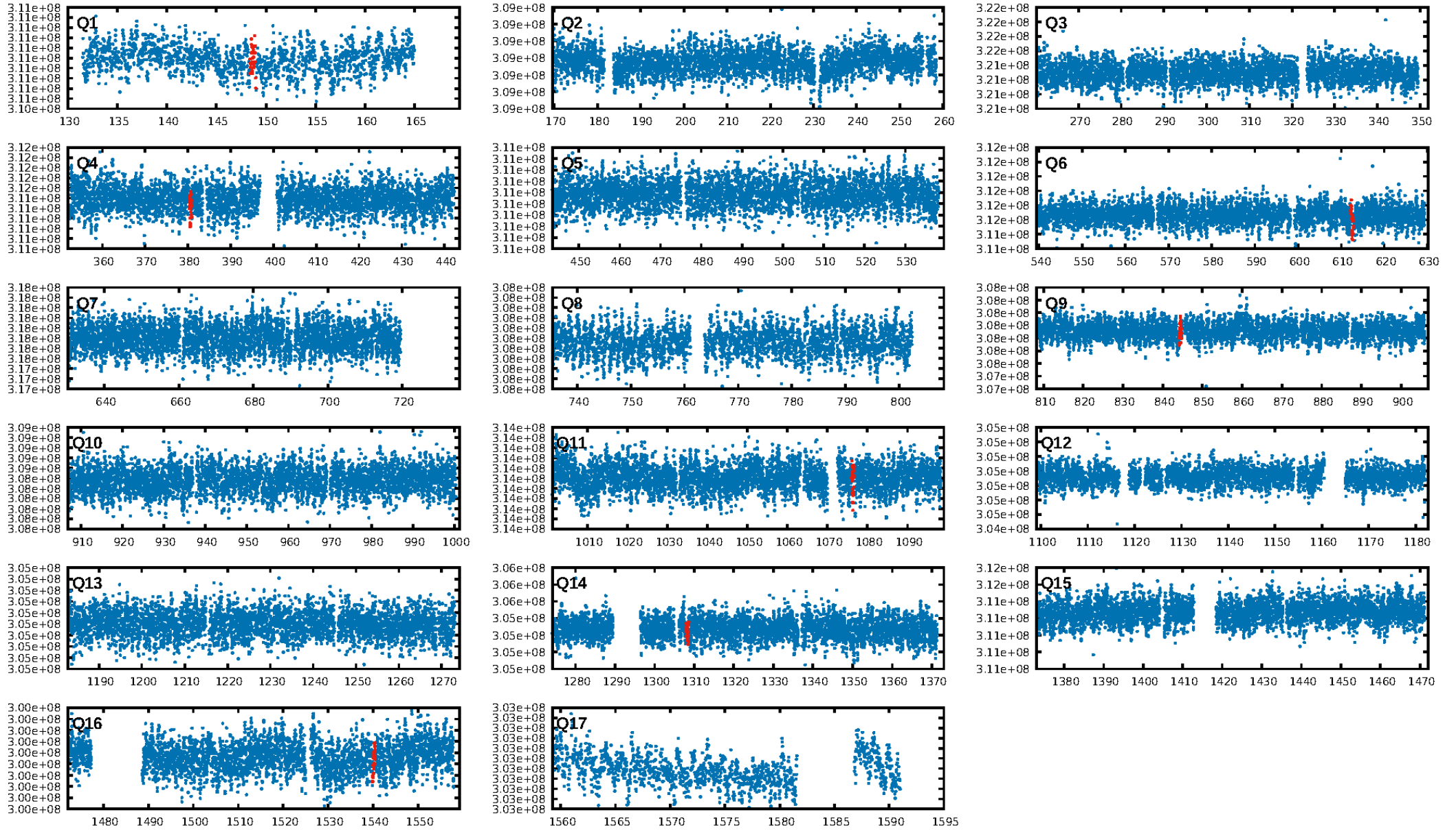
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [177.47σ]  
LongPeriod-sig: 100.0% [775.32σ]  
ModelChiSquare2-sig: 80.3%  
ModelChiSquareGof-sig: 99.9%  
**Bootstrap-pfa: 1.93e-09**  
**RollingBand-fgt: 1.00 [4/4]**  
**GhostDiagnostic-chr: 1.877**  
Centroid-sig: 70.8%  
Centroid-so: 0.340 arcsec [0.67σ]  
OotOffset-rm: 0.888 arcsec [0.40σ]  
KicOffset-rm: 0.859 arcsec [0.39σ]  
OotOffset-st: 2/1/1/0 [4]  
KicOffset-st: 2/1/1/0 [4]  
DiffImageQuality-fgm: 0.50 [2/4]  
DiffImageOverlap-fno: 0.00 [0/6]

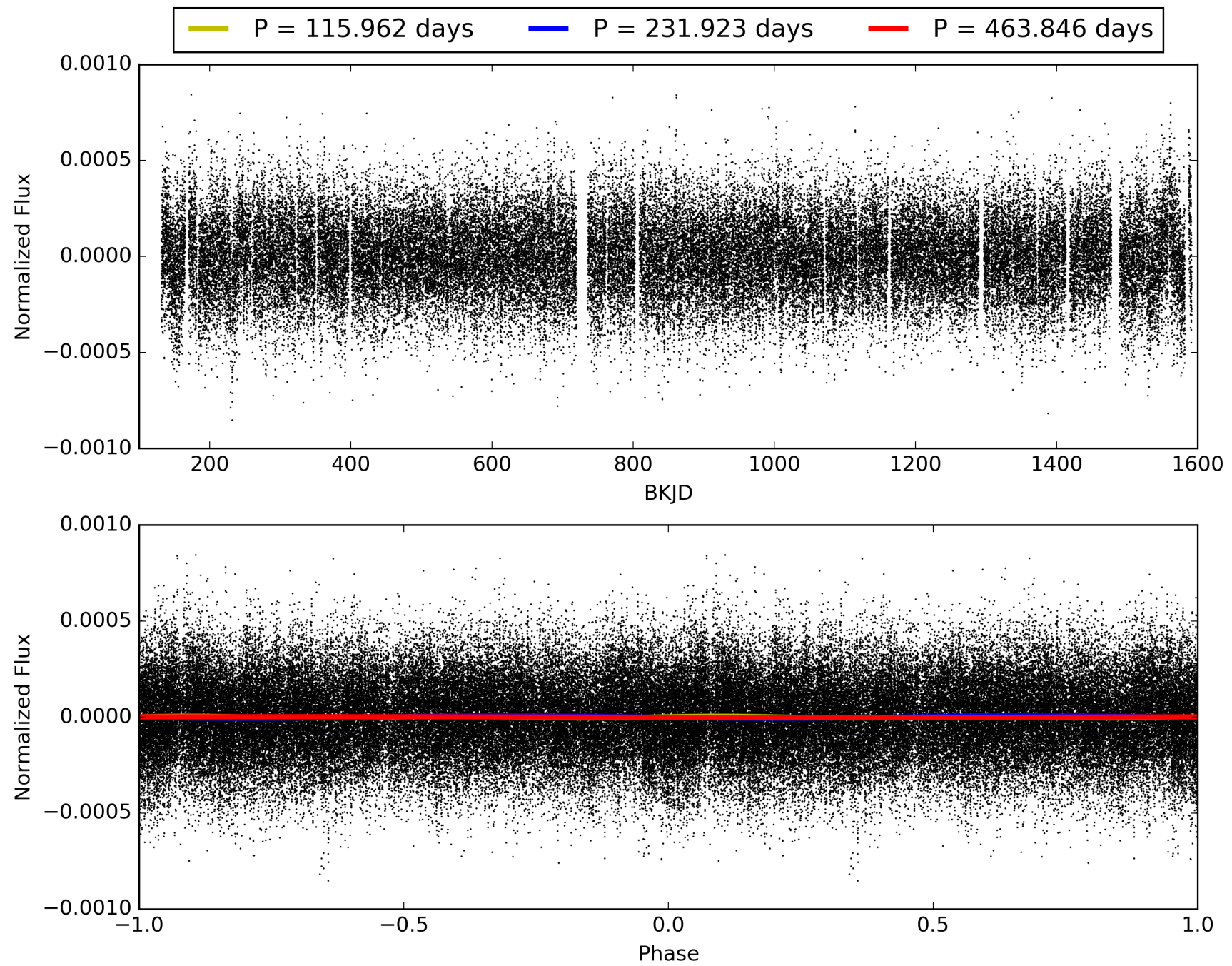
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 06:42:54 Z

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

# TCE 008973067-04, PDC Light Curves

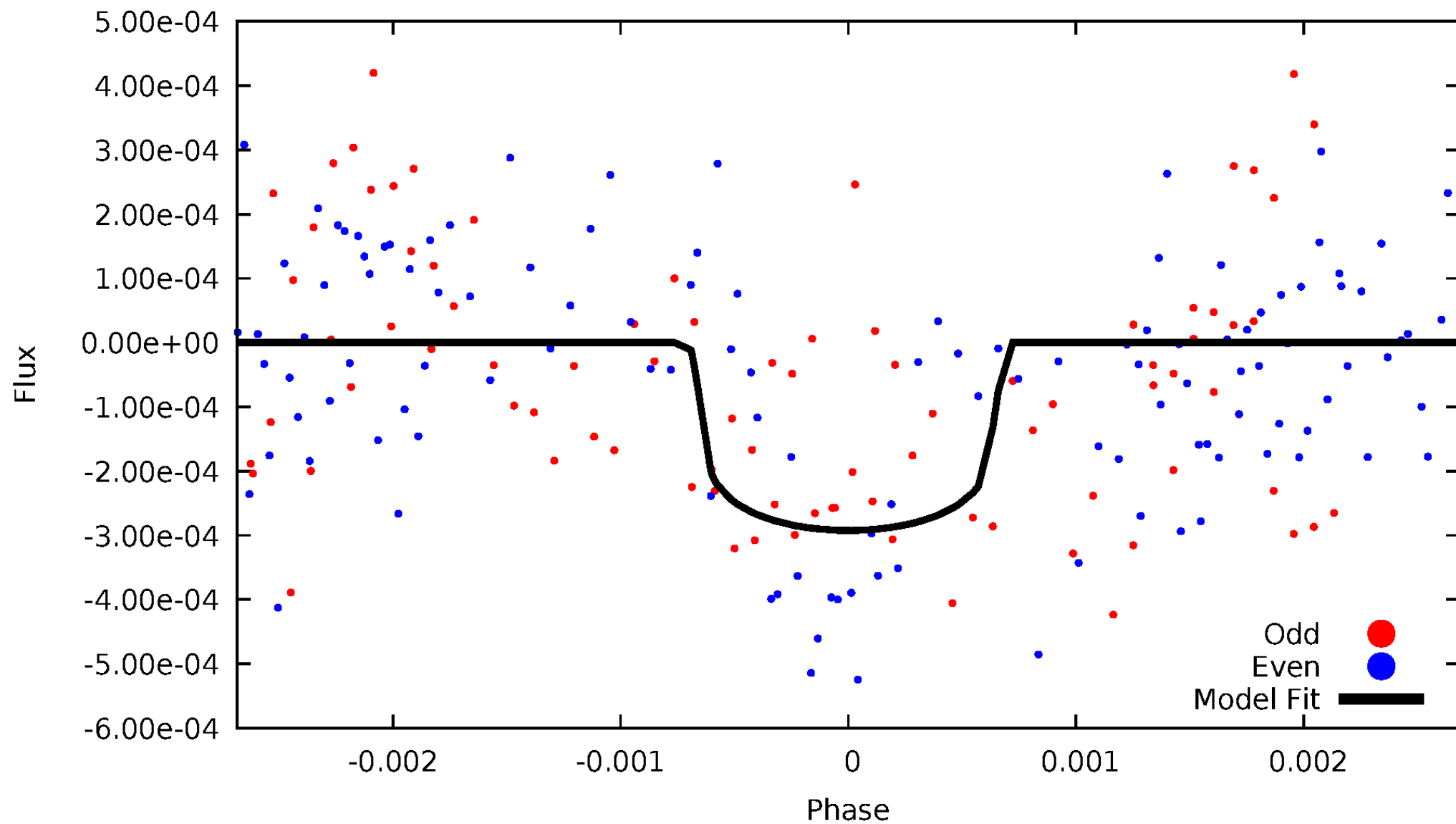


TCE 008973067-04



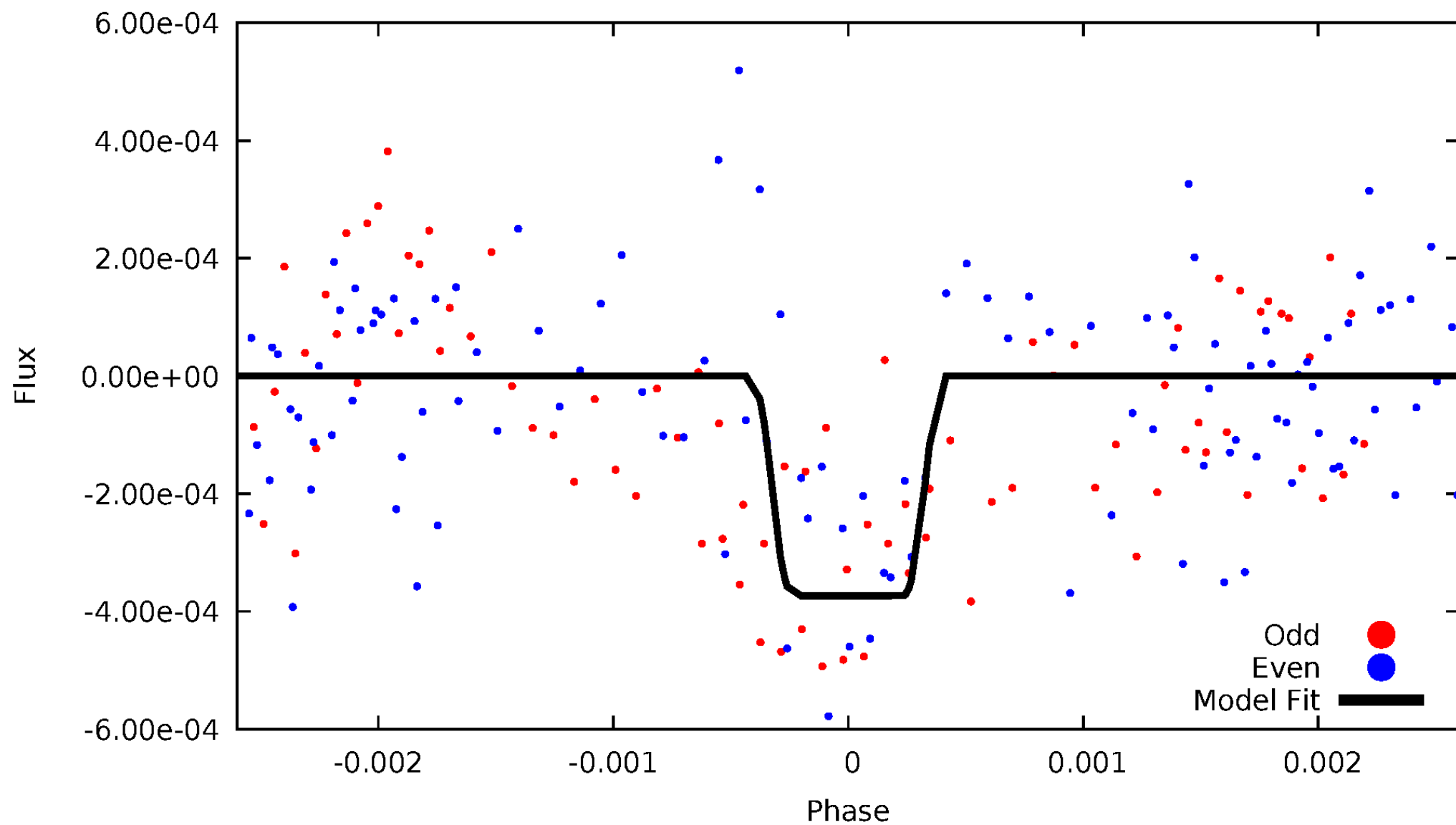
# DV Odd/Even

TCE 008973067-04



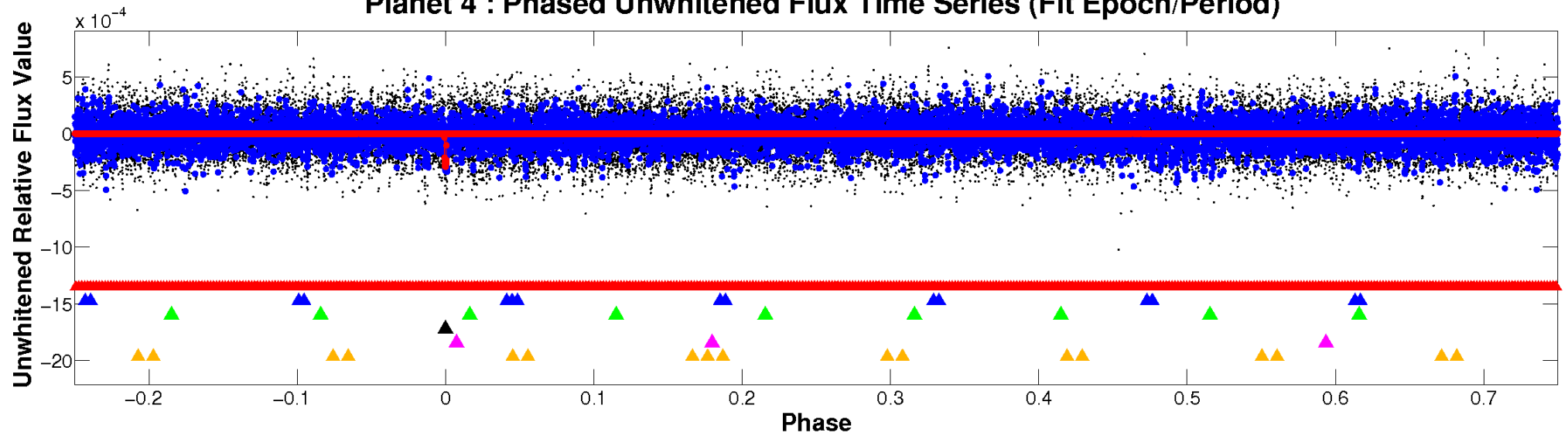
# ALT Odd/Even

TCE 008973067-04

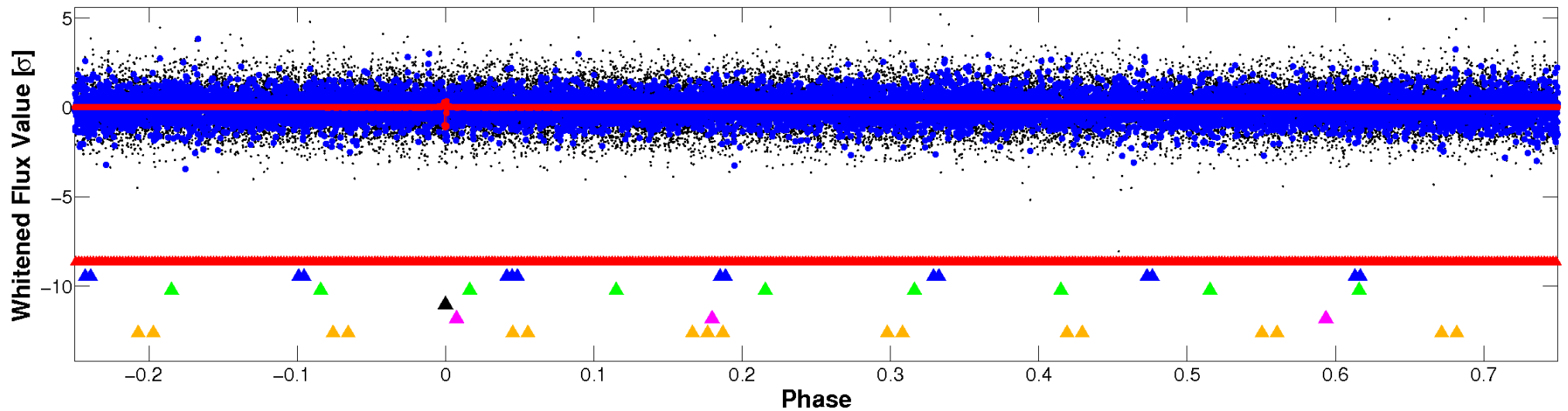


# Non-Whitened Vs. Whitened Light Curve

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

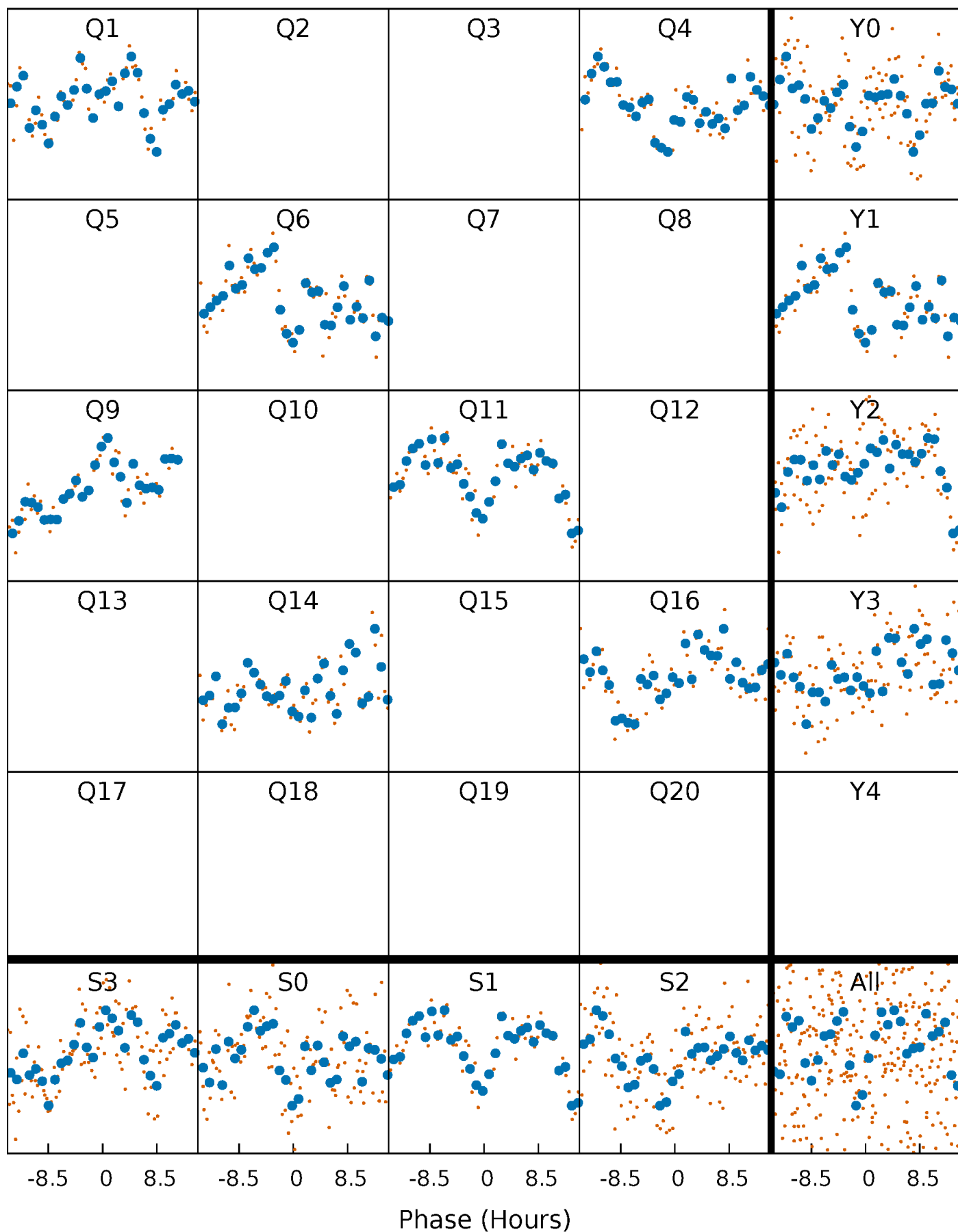


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



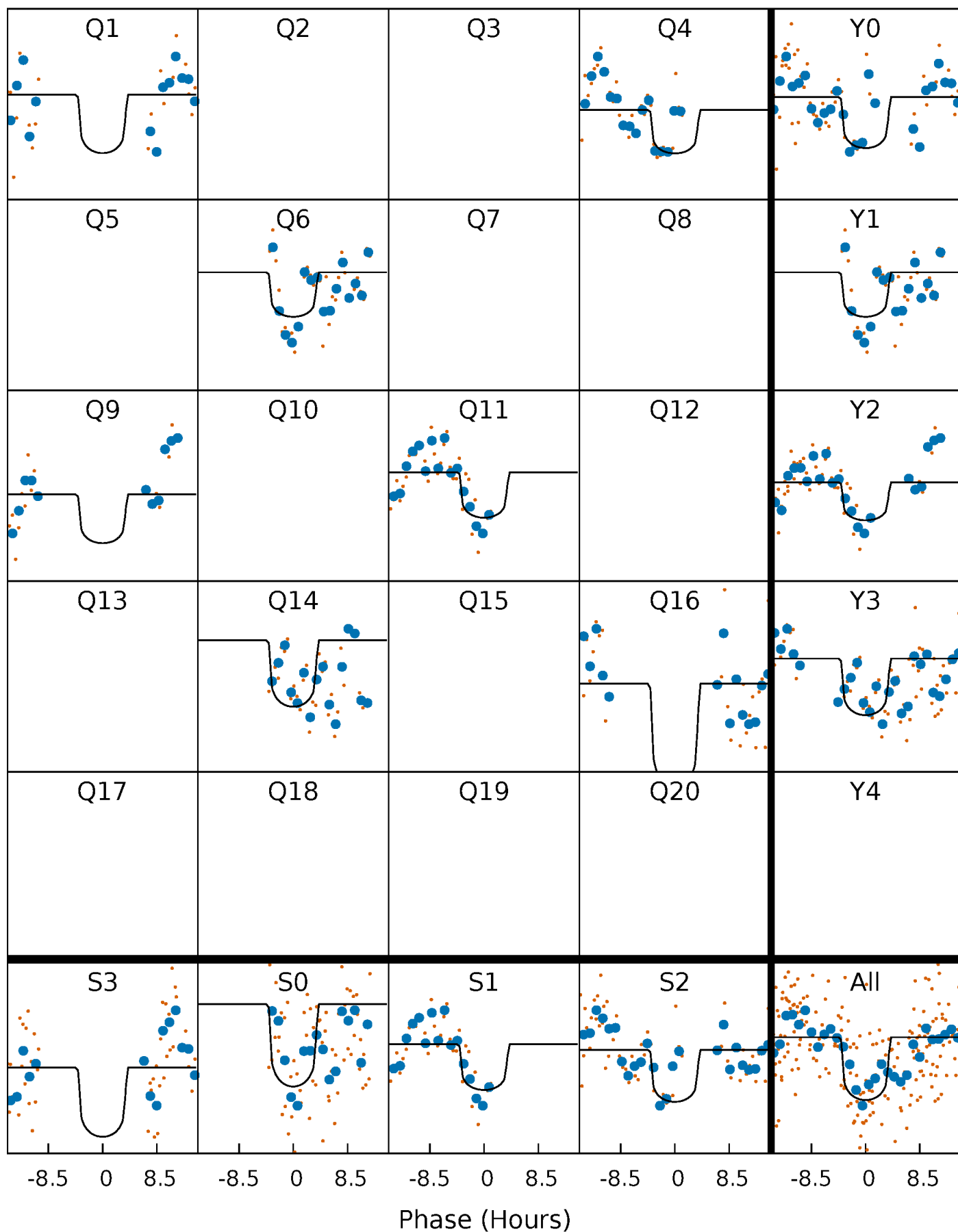
# PDC Quarter-Phased Transit Curves

TCE 008973067-04   P=231.923132 Days    $T_0=148.665148$  (BKJD)



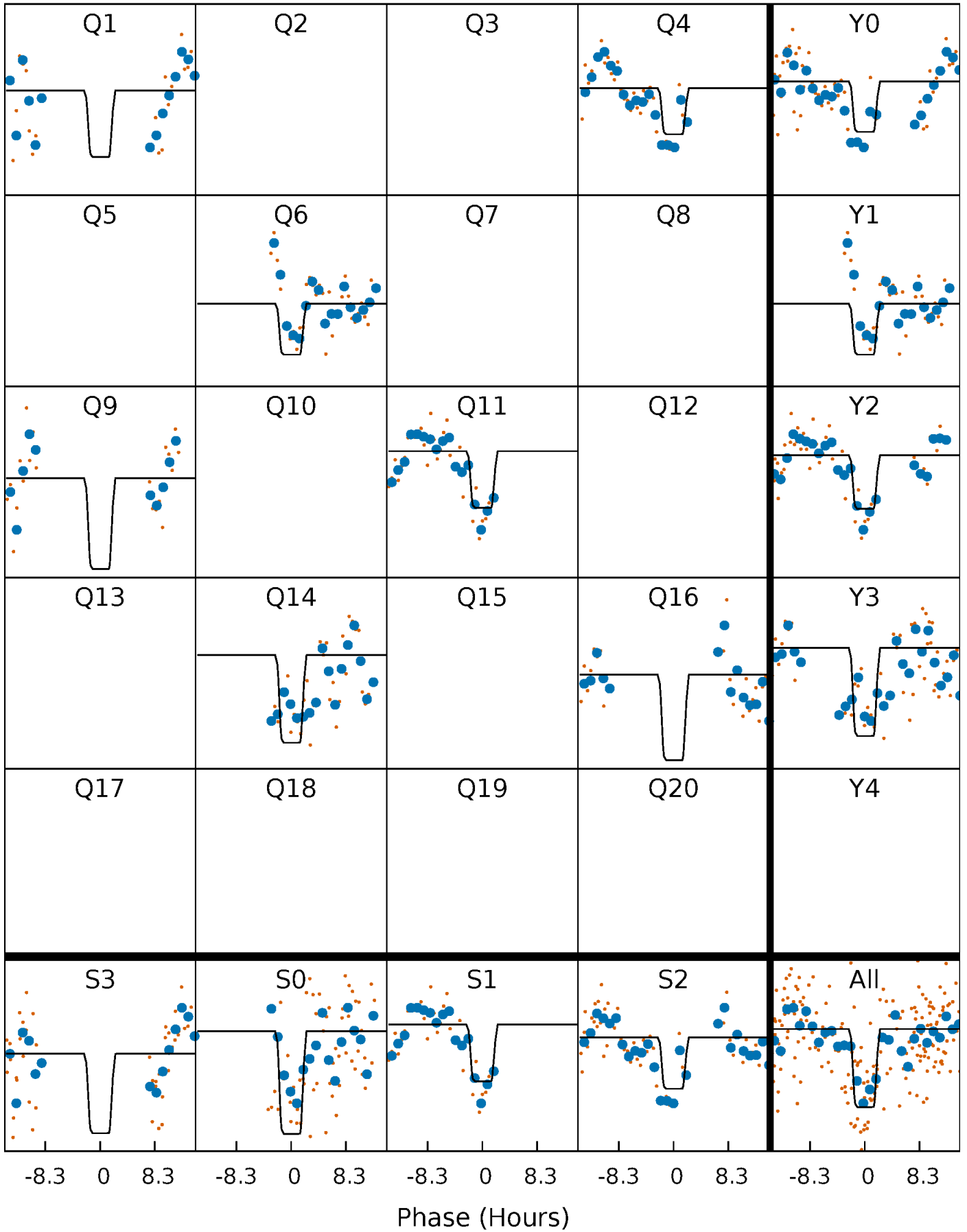
# DV Quarter-Phased Transit Curves

TCE 008973067-04     $P=231.923132$  Days     $T_0=148.665148$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

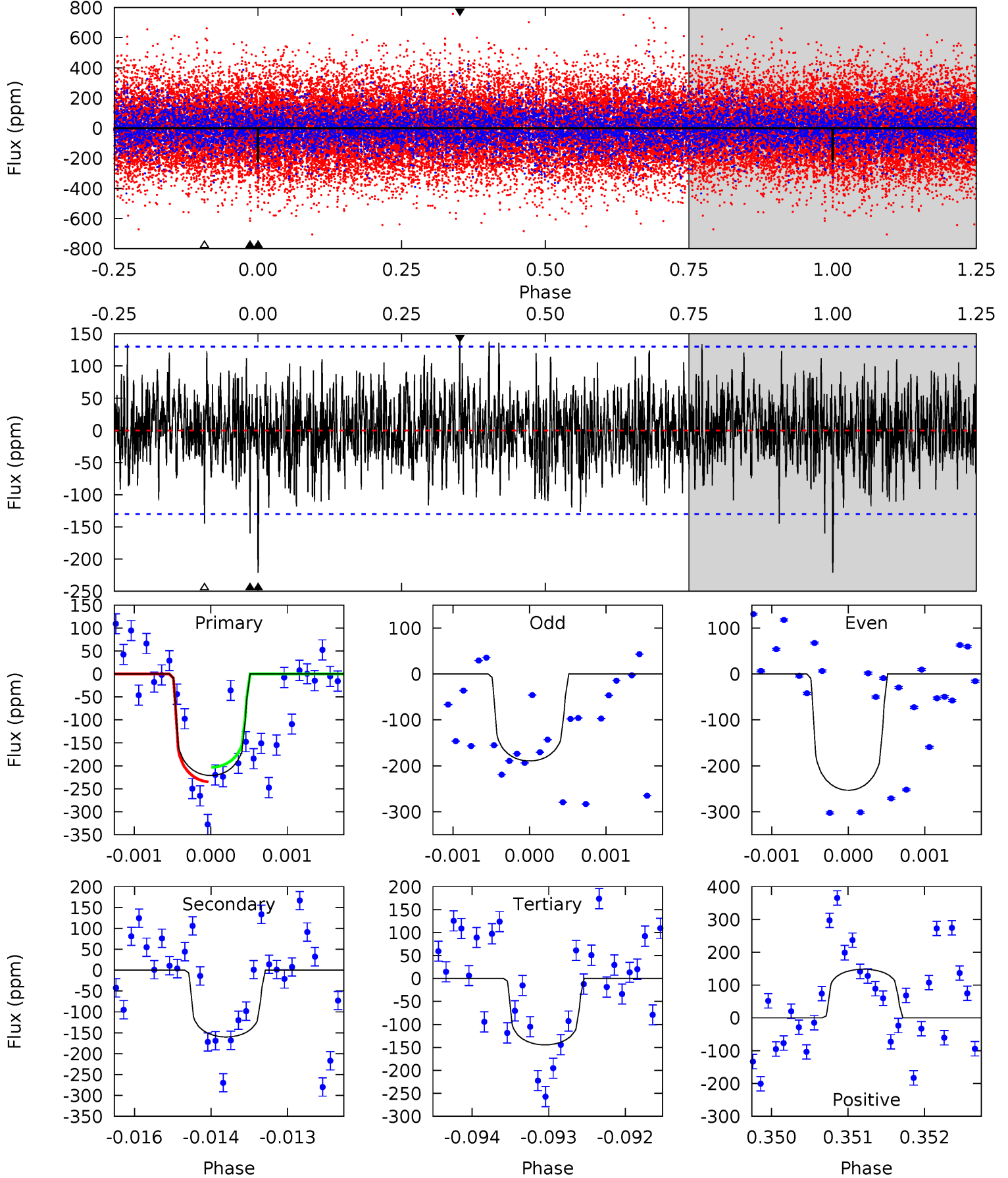
TCE 008973067-04     $P=231.926696$  Days     $T_0=148.632549$  (BKJD)



# DV Model-Shift Uniqueness Test

008973067-04, P = 231.923132 Days, E = 148.665148 Days

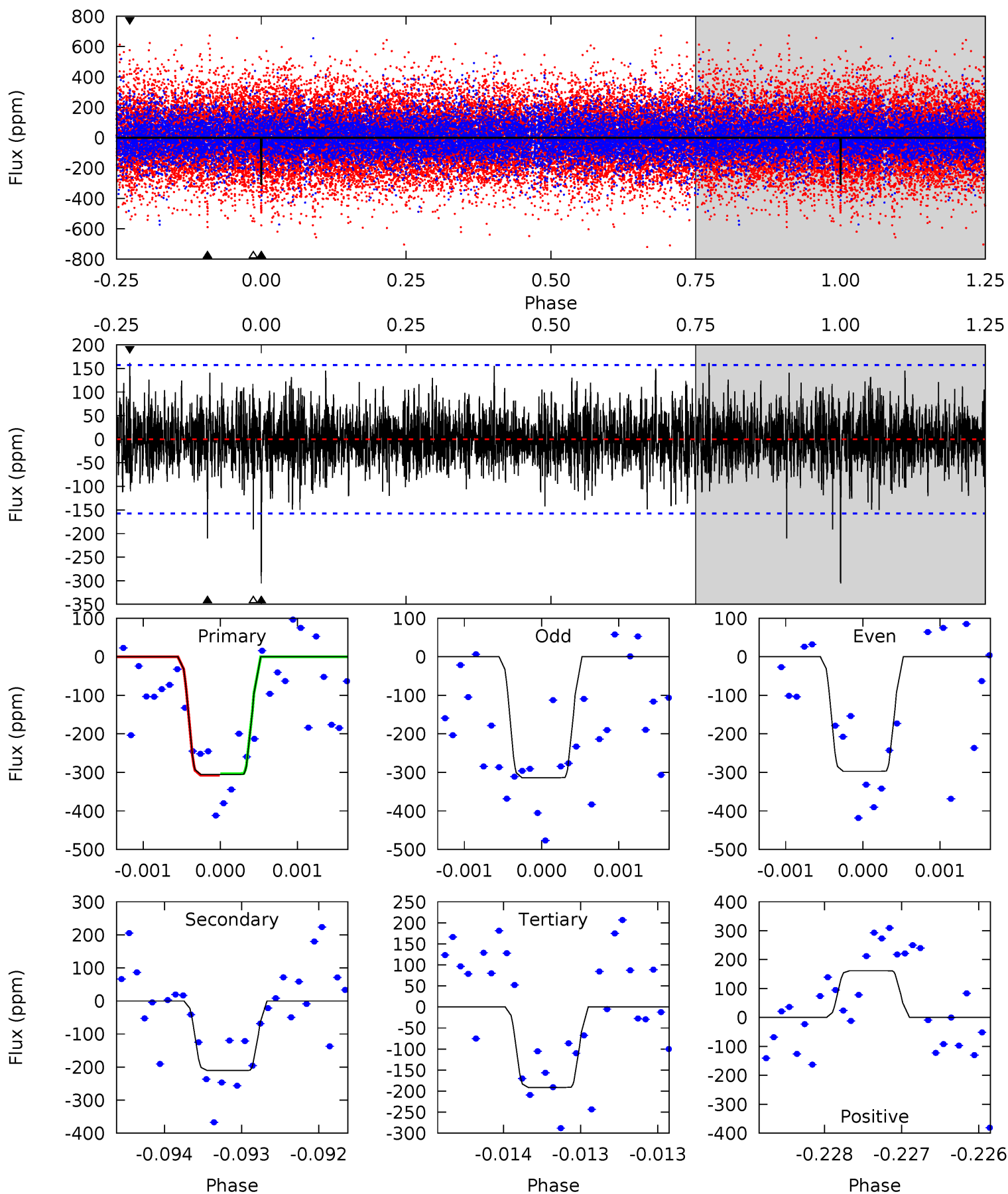
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.17	6.63	5.99	6.15	5.39	3.19	1.74	3.17	3.02	0.64	0.49	1.32	1.06	0.40	0.65



# Alt Model-Shift Uniqueness Test

008973067-04, P = 231.926696 Days, E = 148.632549 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
10.7	7.34	6.68	5.64	5.49	3.36	1.52	3.99	5.03	0.67	1.70	0.29	0.97	0.35	0.07



### Stellar Parameters For KIC 008973067

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6306^{+173}_{-173}$	$3.450^{+0.368}_{-0.092}$	$-0.240^{+0.350}_{-0.300}$	$4.103^{+0.591}_{-1.655}$	$1.732^{+0.184}_{-0.429}$	$0.035^{+0.110}_{-0.011}$
	+3%/-3%	+11%/-3%	+146%/-125%	+14%/-40%	+11%/-25%	+311%/-30%
Source	PHO1	FLK73	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 008973067-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-160 \pm 24$	$7.54^{+5.26}_{-4.41}$	$820^{+47}_{-80}$	$5271^{+2953}_{-979}$	$1202^{+5443}_{-788}$
Alt.	$-210 \pm 29$	$8.24^{+5.37}_{-4.65}$	$820^{+50}_{-86}$	$5382^{+2569}_{-971}$	$1324^{+5497}_{-838}$

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

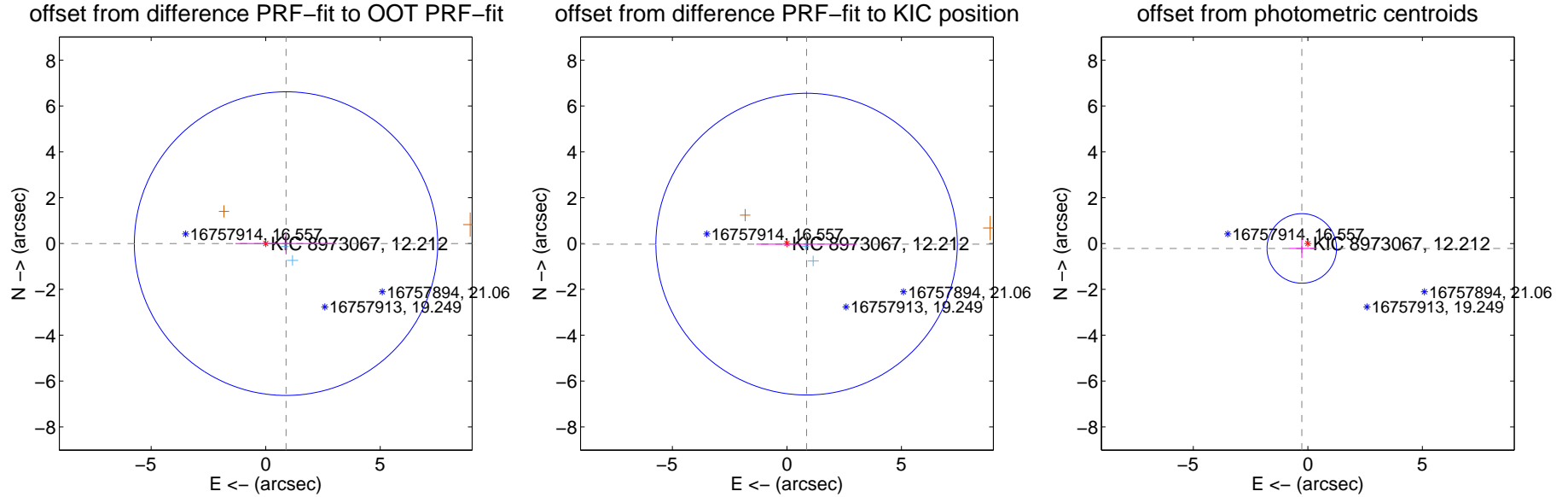
## DV Centroid Data

Supplemental centroid analysis for 008973067-04. Kepler magnitude: 12.21. Transit SNR 7.30

There are 2 quarters with good PRF difference image offsets

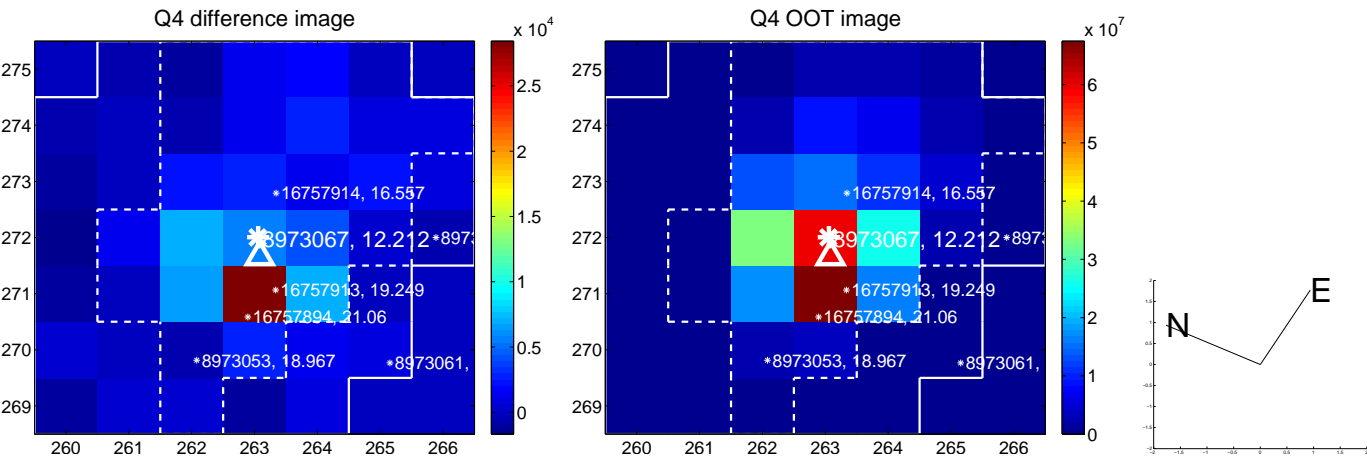
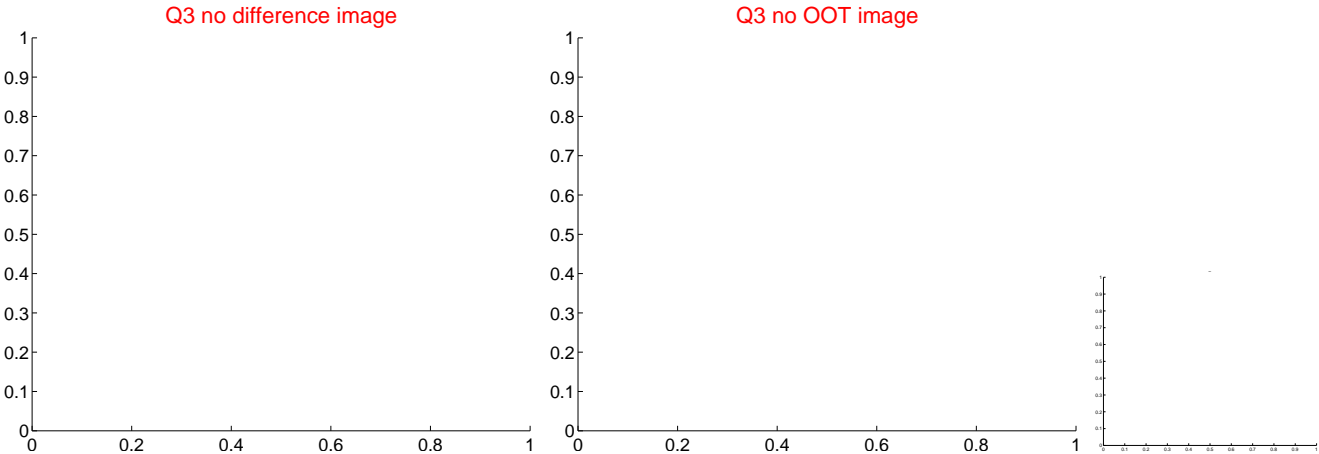
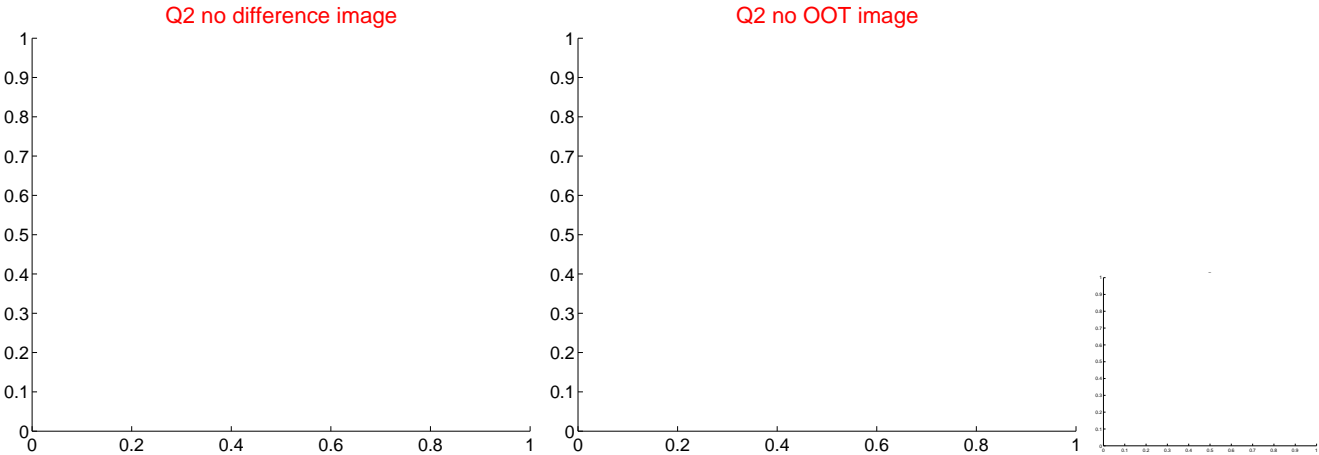
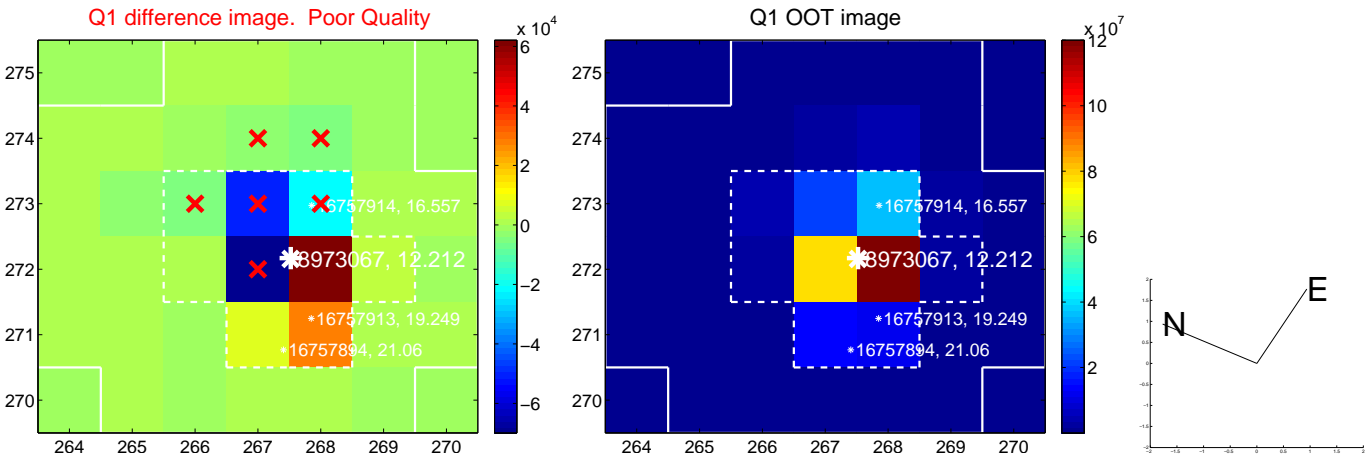
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.888 \pm 2.207$	0.40	$-0.888 \pm 2.207$	$-0.004 \pm 0.473$
PRF-fit source offset from KIC position	$0.859 \pm 2.193$	0.39	$-0.859 \pm 2.194$	$-0.026 \pm 0.432$
photometric centroid source offset	$0.34 \pm 0.51$	0.67	$0.26 \pm 0.55$	$-0.21 \pm 0.42$

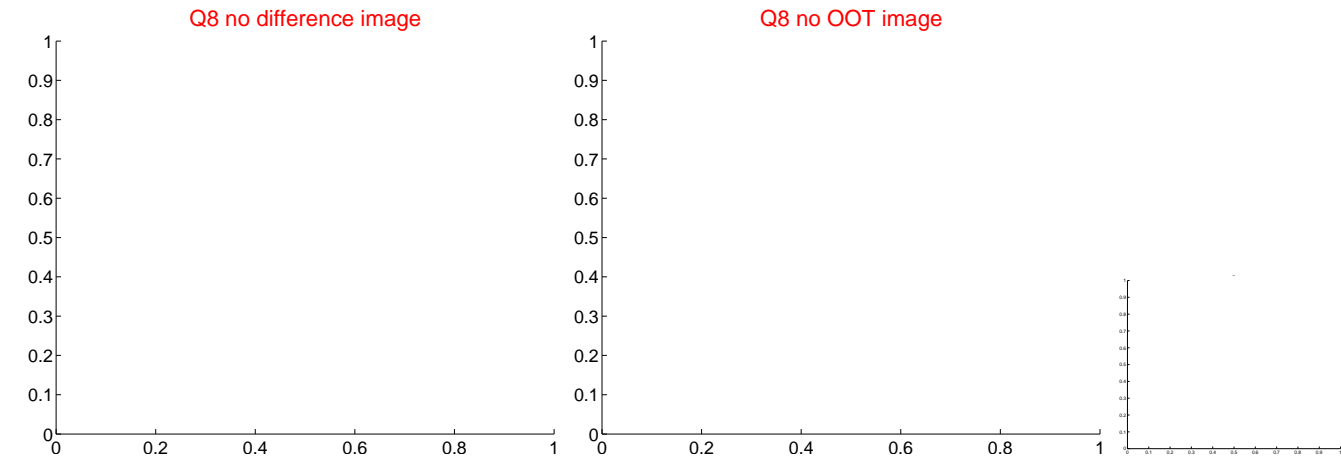
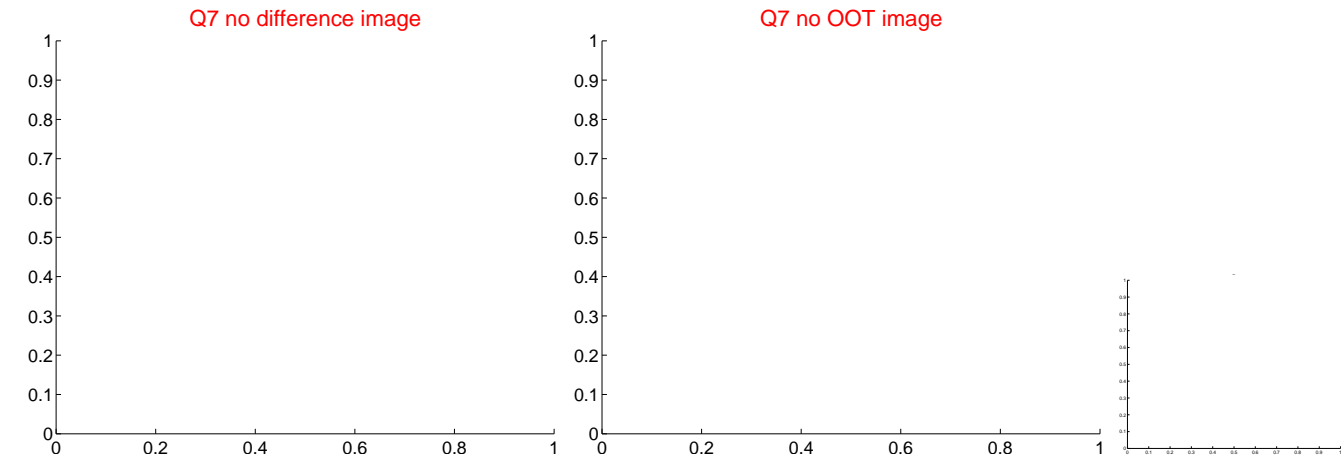
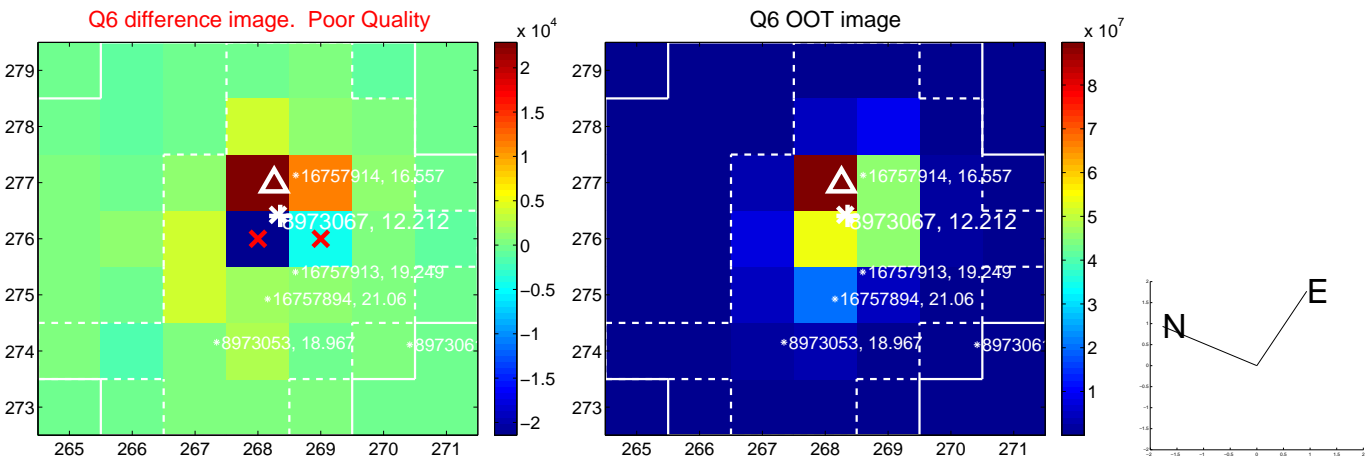
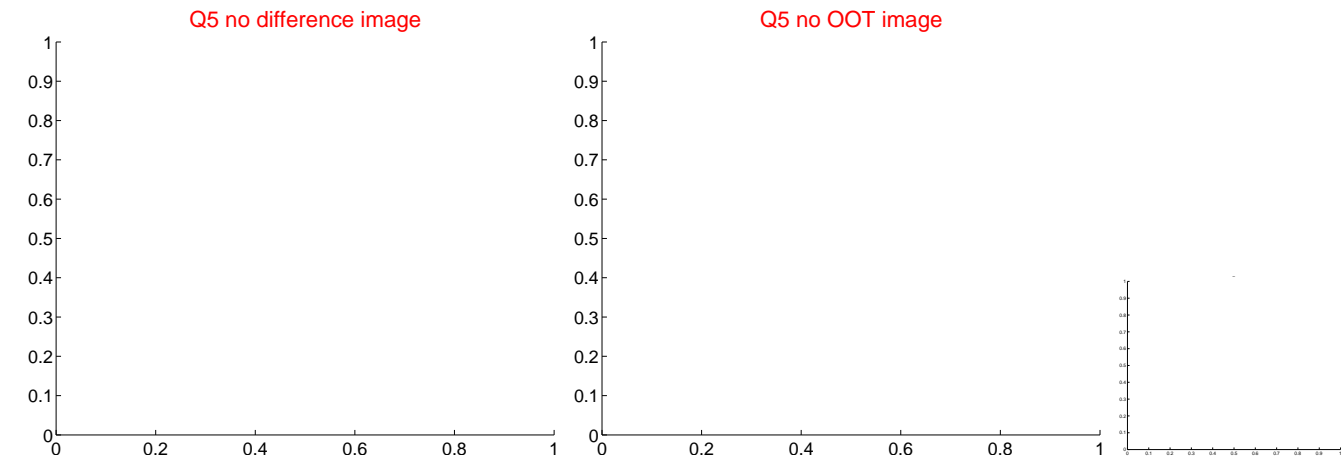


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

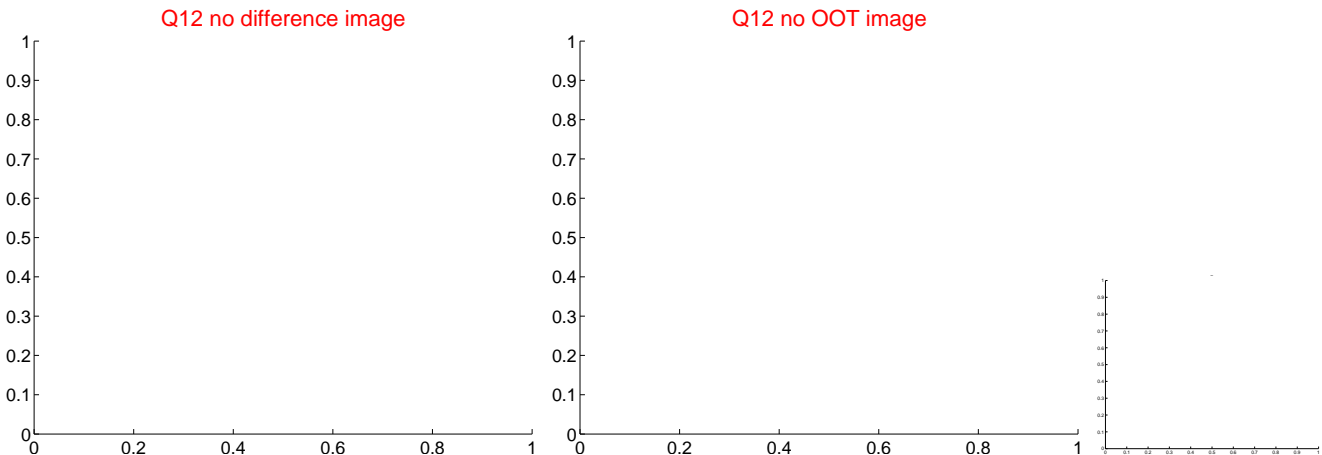
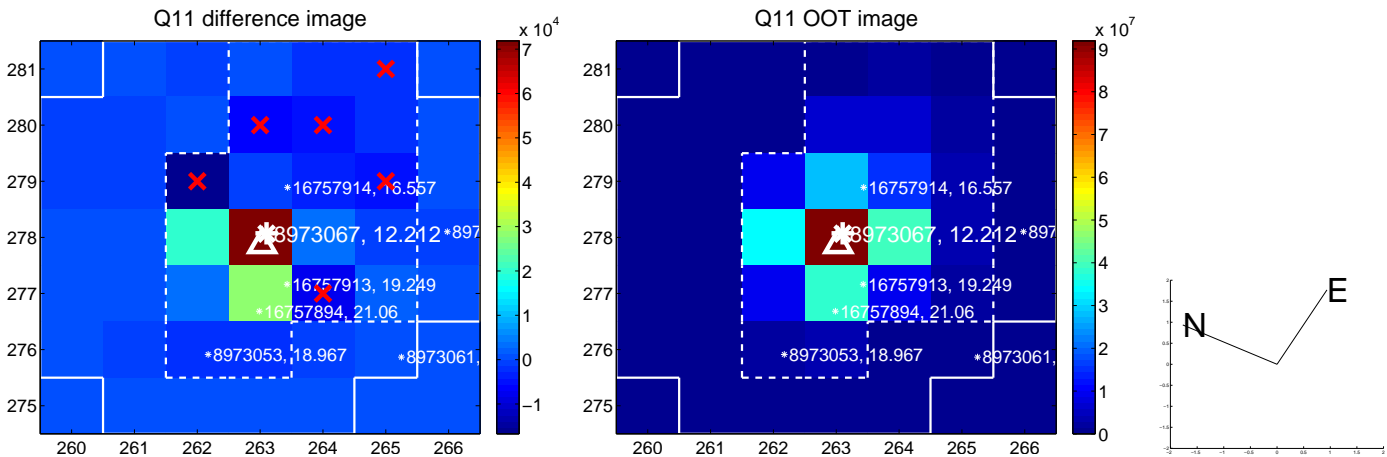
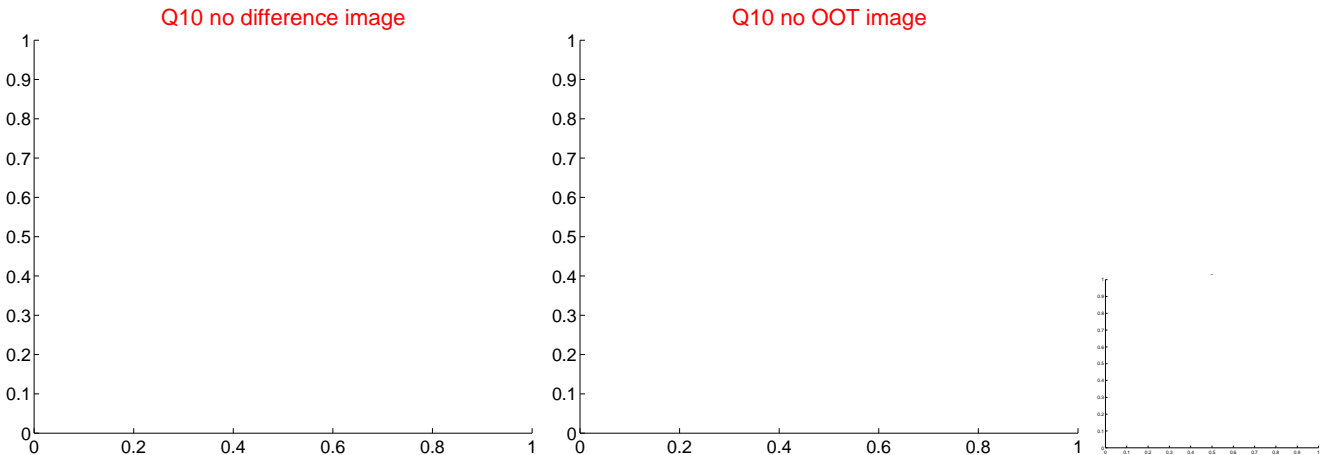
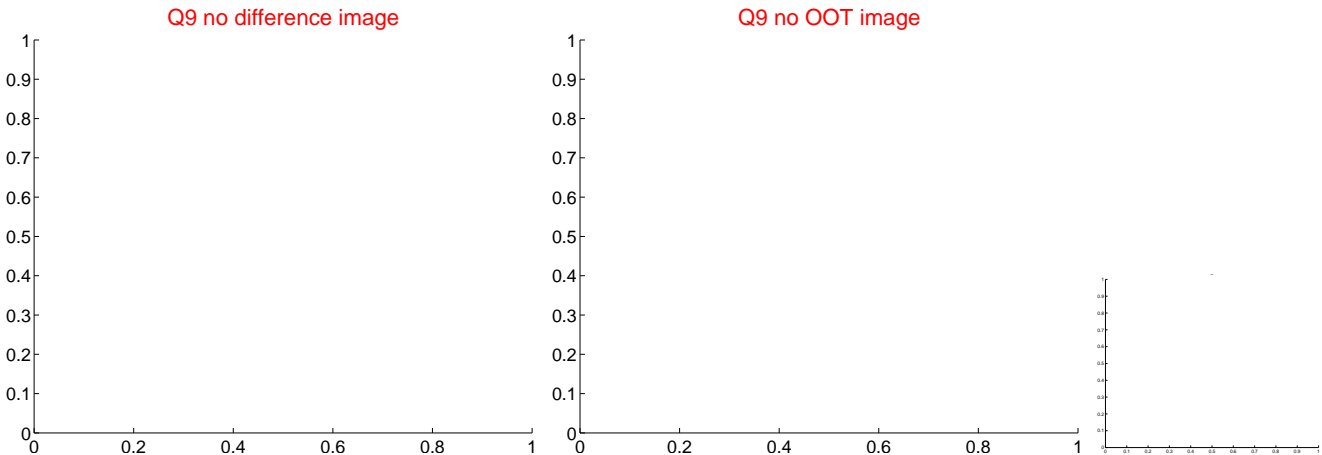
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



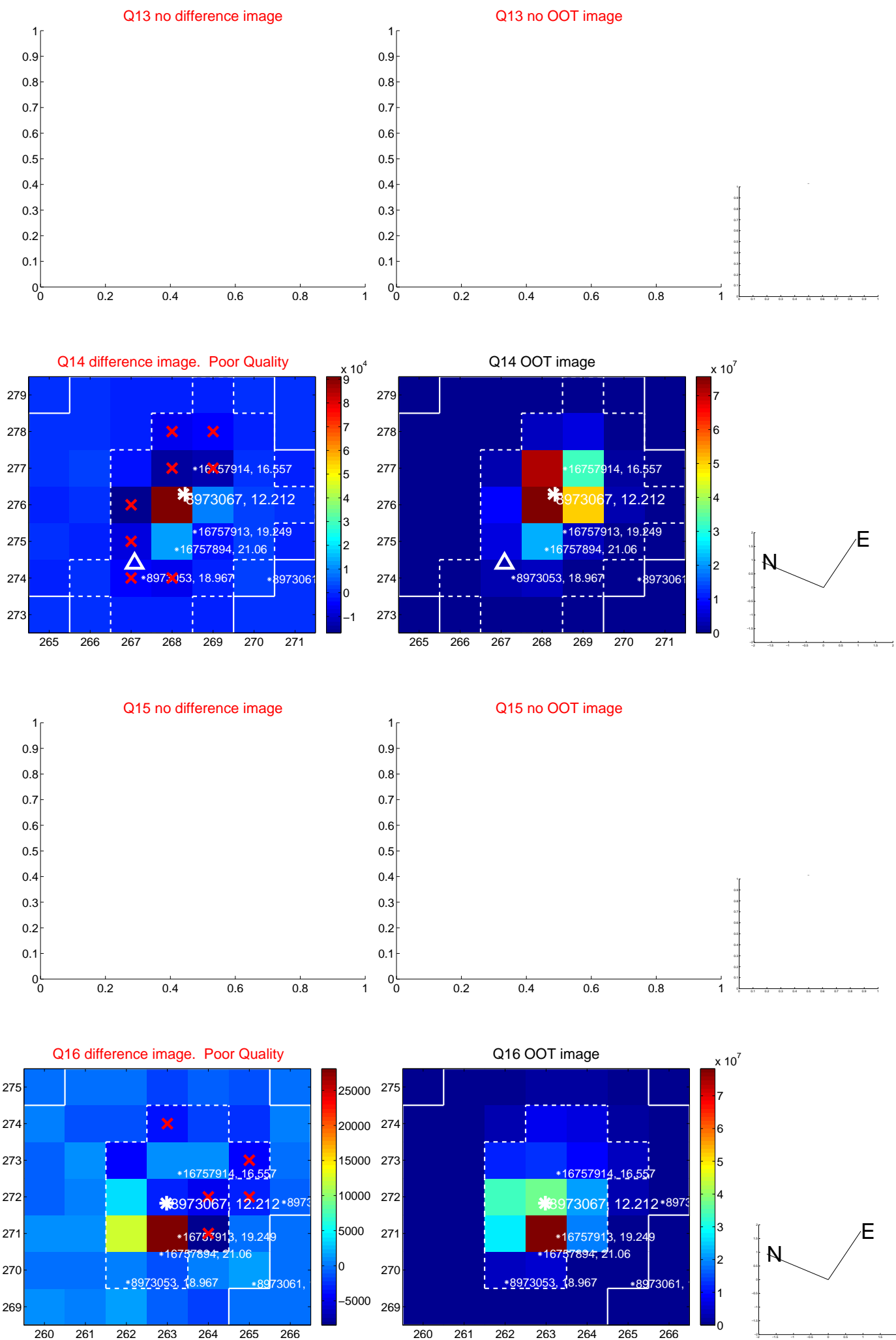
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



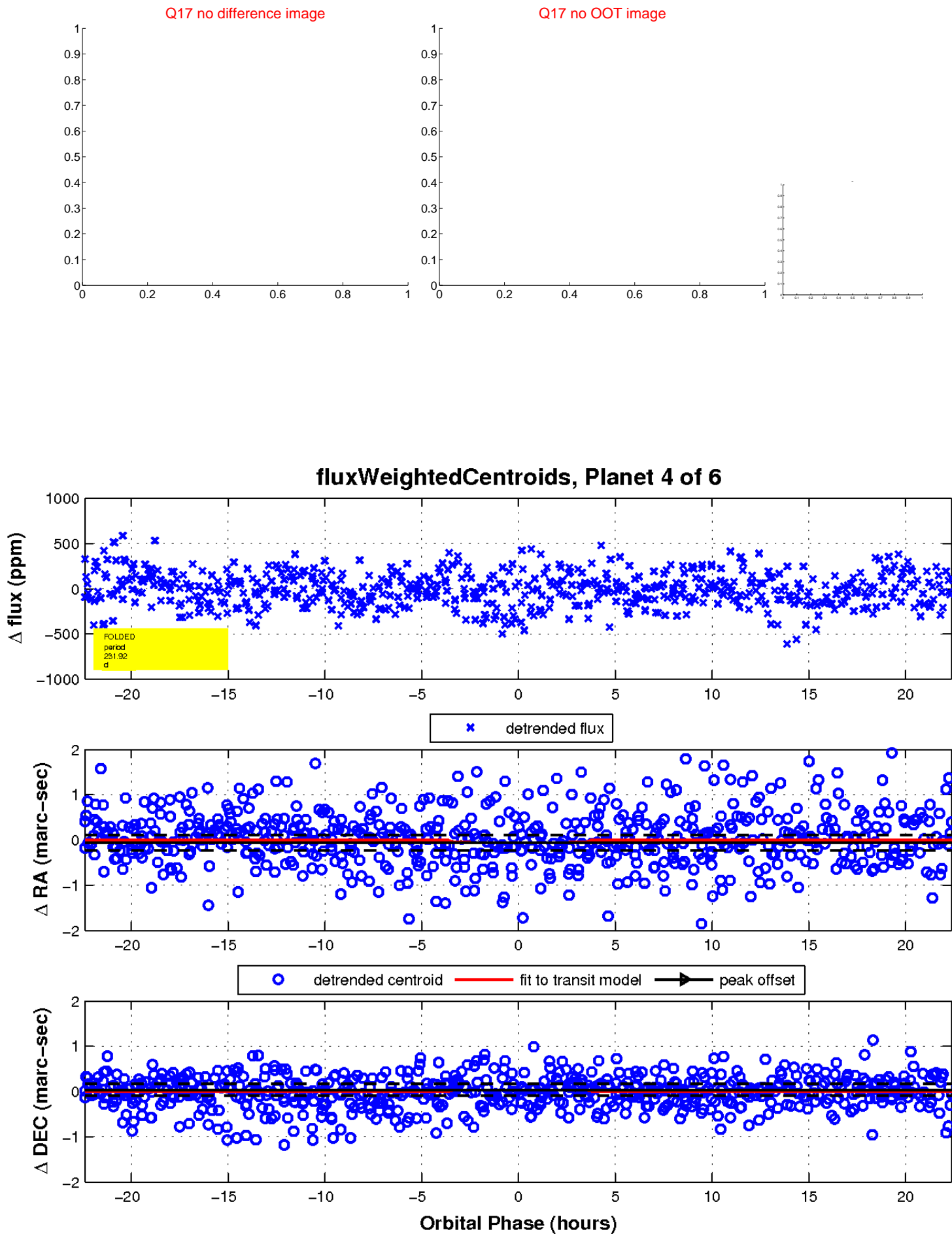
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



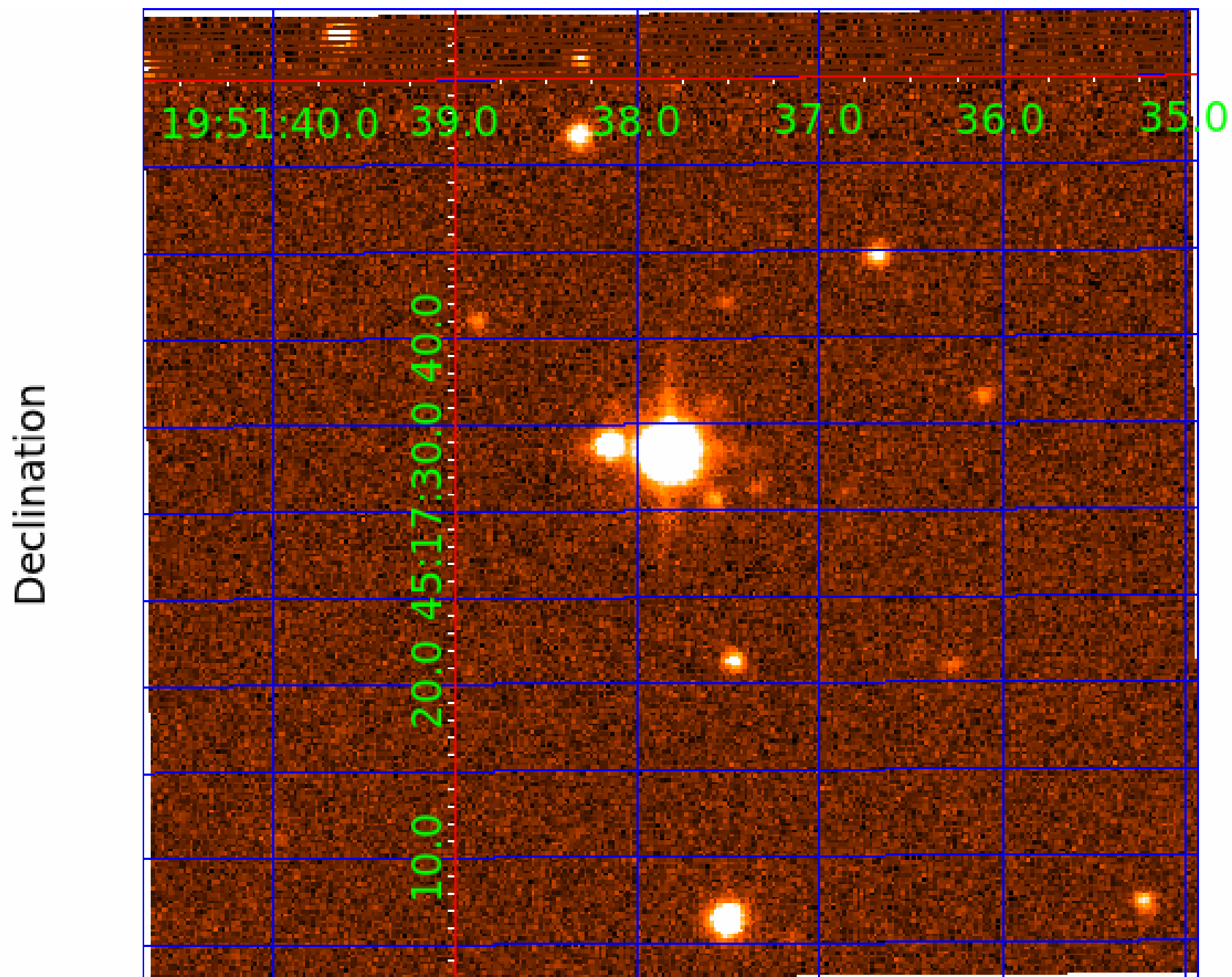
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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



UKIRT Image



# KIC 008973067

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008973067-01	OBS	No	1.375024	132.113592	22.5	5.387	8.9	7.6	4.10	6306	2.29	28242.15
008973067-02	OBS	No	99.274837	159.926145	278.4	5.042	8.0	8.0	4.10	6306	8.11	93.94
008973067-03	OBS	No	162.388847	244.892607	256.2	5.713	7.6	6.6	4.10	6306	7.19	48.74
008973067-04	OBS	No	231.923132	148.665148	292.3	7.468	7.4	7.3	4.10	6306	7.43	30.30
008973067-05	OBS	No	559.824663	190.363673	338.6	6.874	7.9	8.0	4.10	6306	8.37	9.36
008973067-06	OBS	No	86.674371	192.032939	313.2	2.468	7.2	7.5	4.10	6306	8.43	112.58

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008973067-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
008973067-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
008973067-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT
008973067-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008973067-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS
008973067-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT

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

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

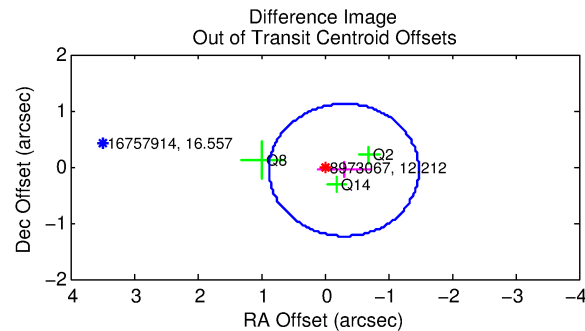
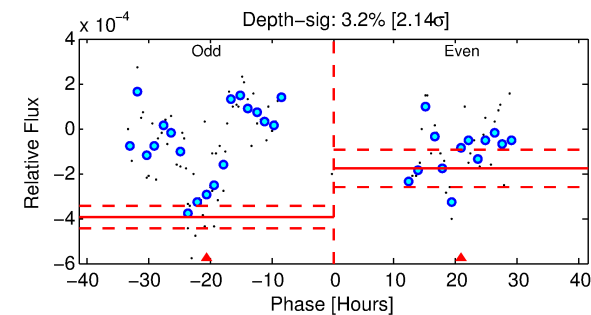
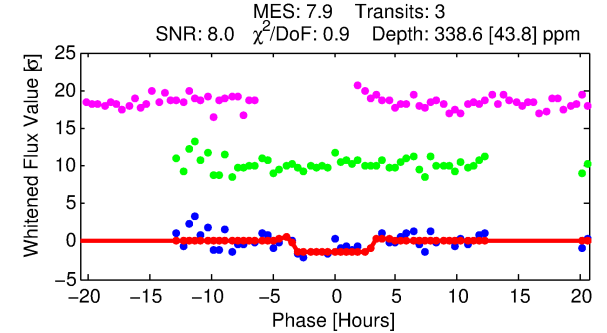
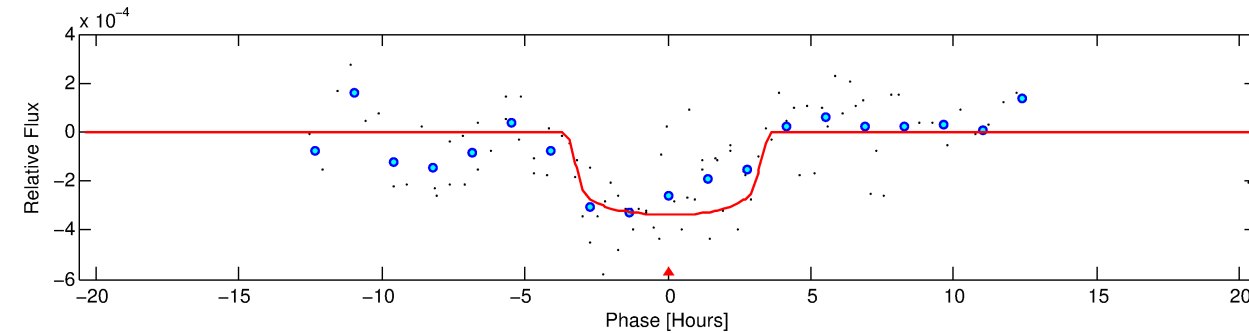
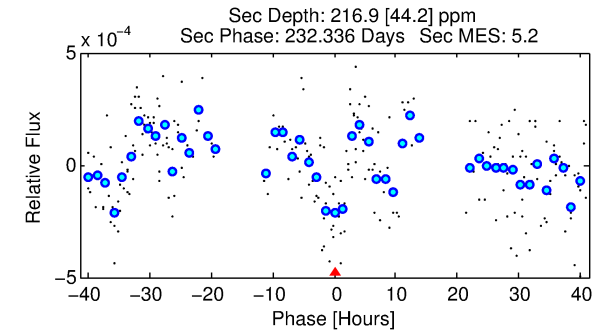
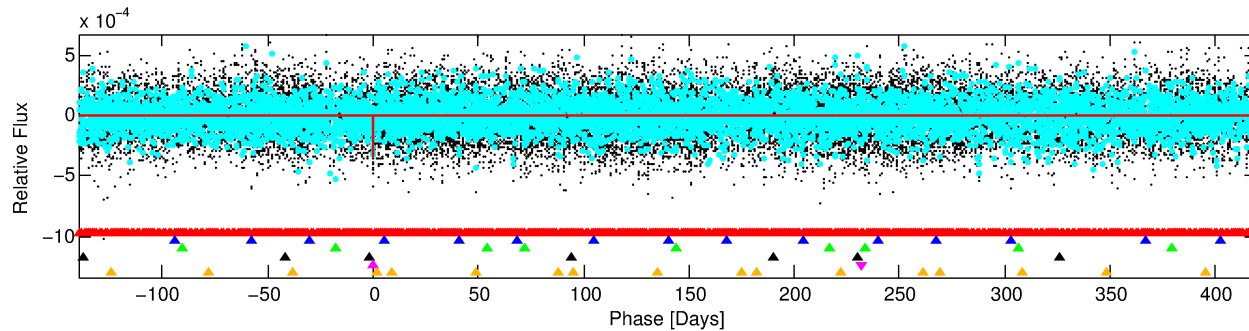
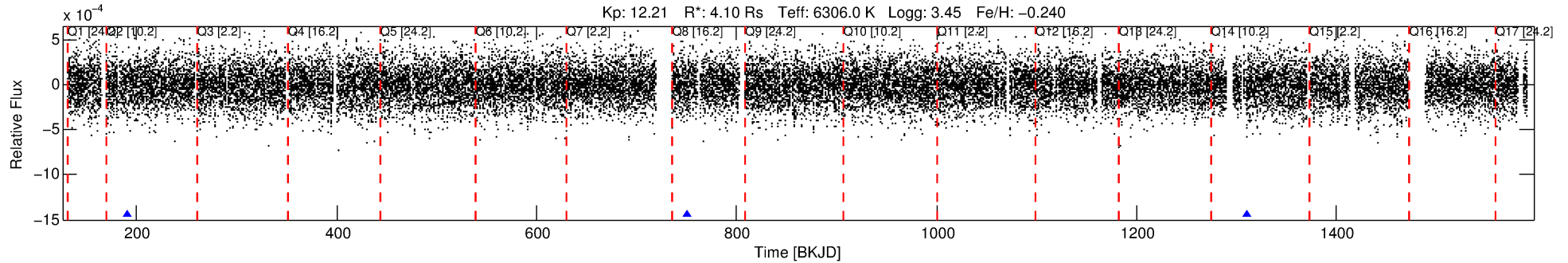
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008973067-05

No Significant Match Found

# DV One-Page Summary

KIC: 8973067 Candidate: 5 of 6 Period: 559.825 d



## DV Fit Results:

Period = 559.82466 [0.00574] d  
Epoch = 190.3637 [0.0086] BKJD  
Rp/R\* = 0.0187 [0.0057]  
a/R\* = 387.06 [615.60]  
b = 0.81 [0.69]  
Seff = 9.36 [5.94]  
Teq = 446 [71] K  
Rp = 8.37 [4.23] Re  
a = 1.5964 [0.6226] AU  
Ag = 4342.33 [3895.26] [1.11σ]  
Teffp = 5598 [913] K [5.63σ]

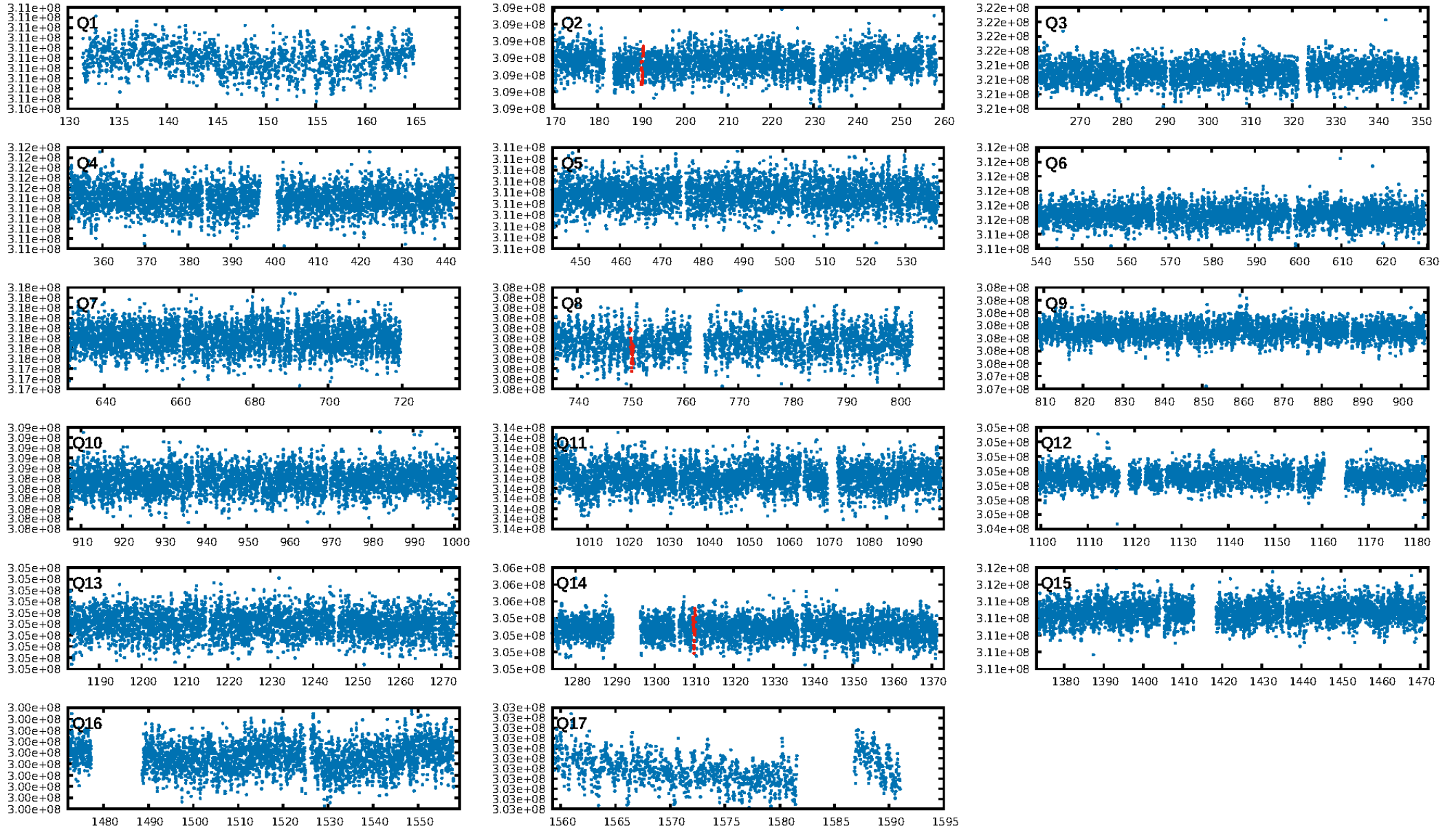
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [775.32σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 18.4%  
ModelChiSquareGof-sig: 99.3%  
**Bootstrap-pfa: 4.41e-12**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 2.322  
Centroid-sig: 27.6%  
Centroid-so: 1.214 arcsec [1.21σ]  
OotOffset-rm: 0.311 arcsec [0.79σ]  
KicOffset-rm: 0.306 arcsec [0.79σ]  
OotOffset-st: 2/0/1/0 [3]  
KicOffset-st: 2/0/1/0 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 0.33 [1/3]

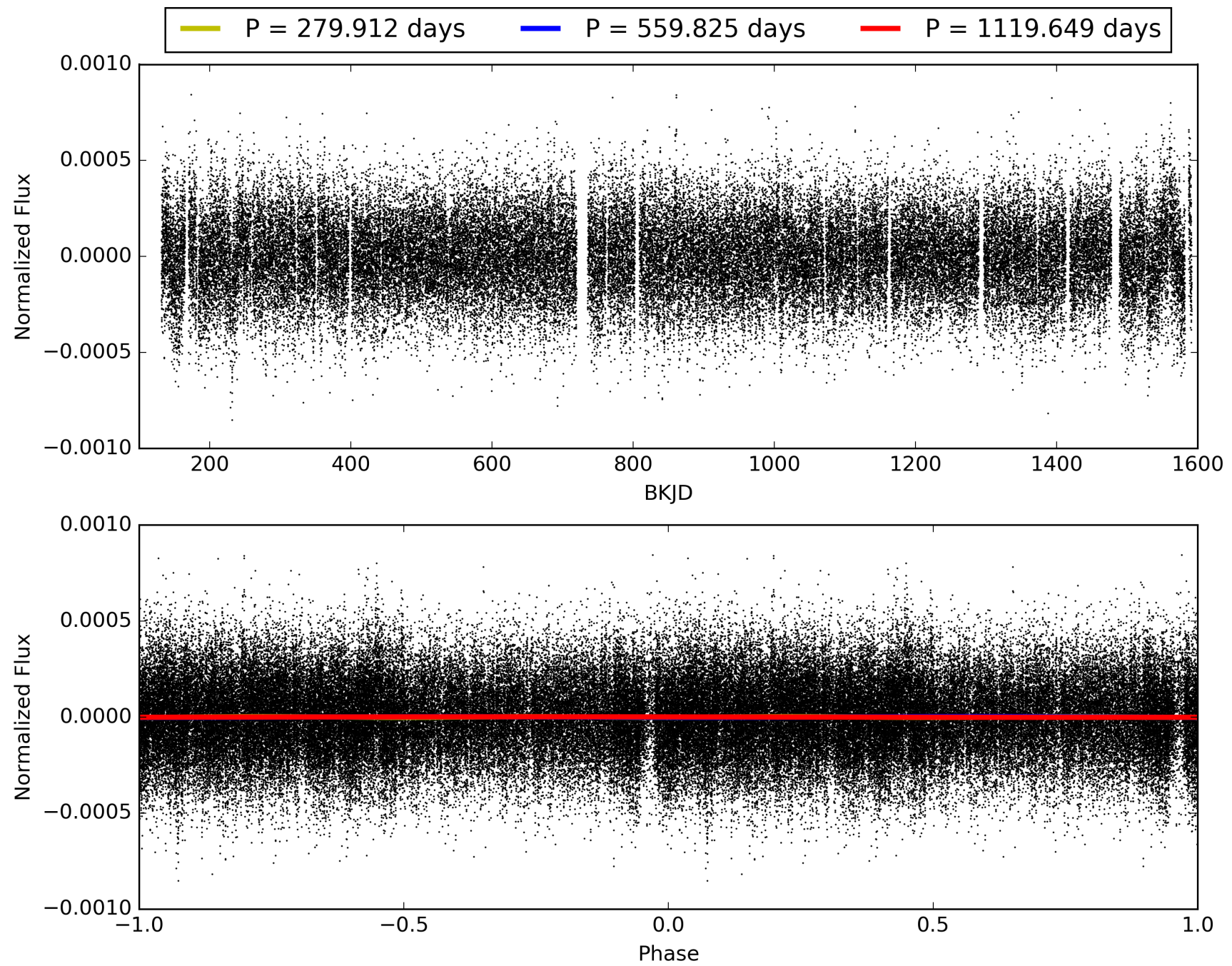
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 06:43:03 Z

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

# TCE 008973067-05, PDC Light Curves

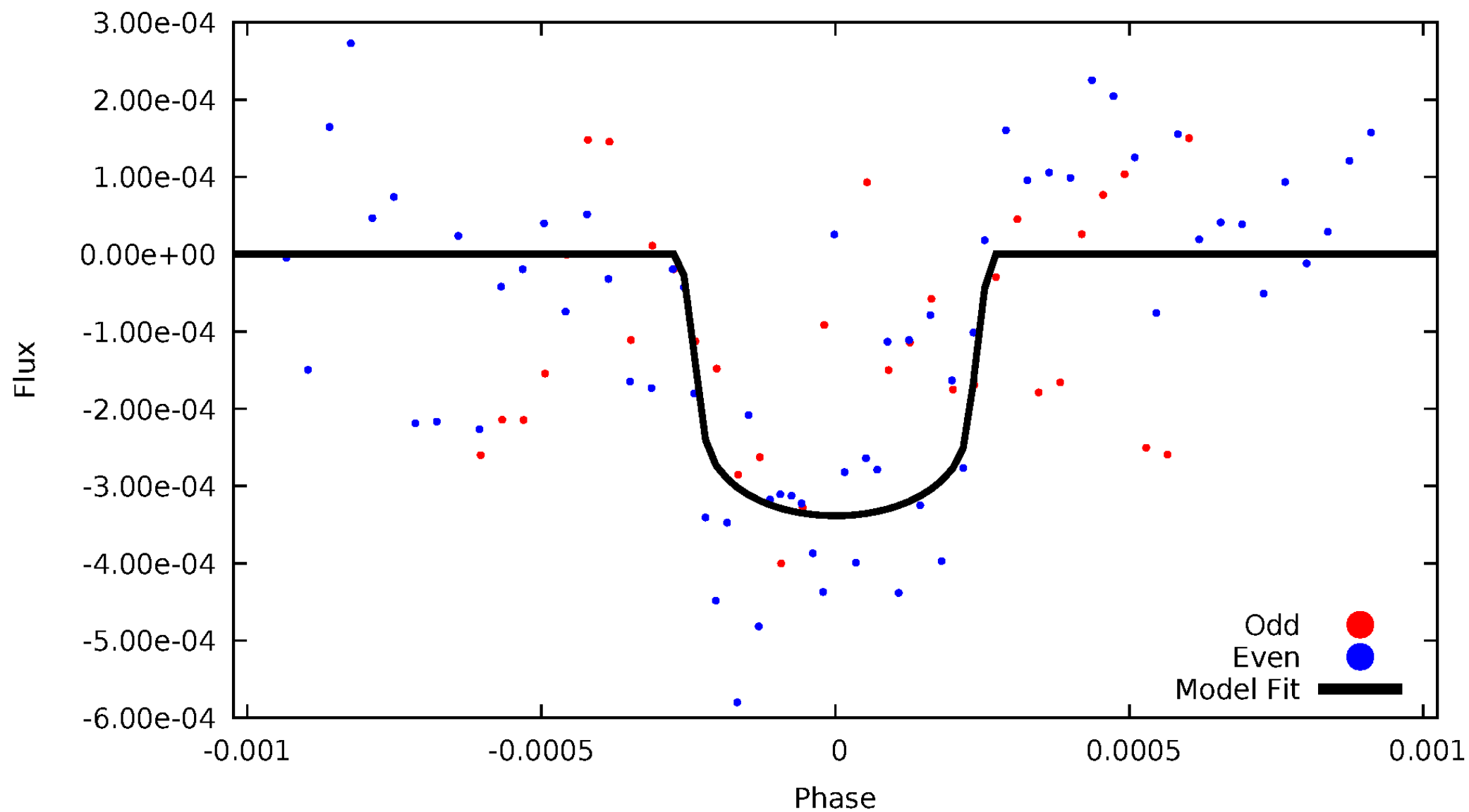


TCE 008973067-05



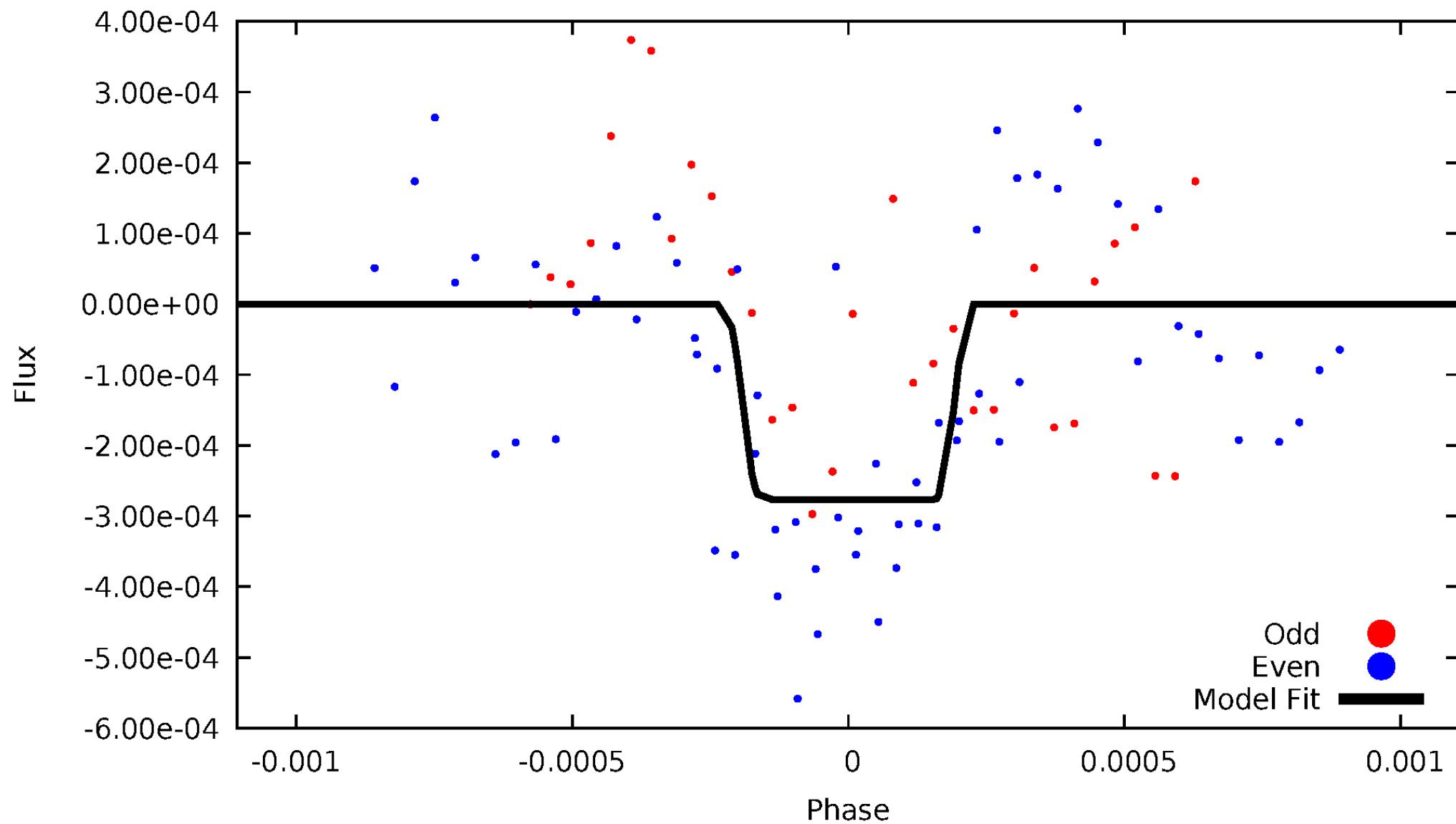
# DV Odd/Even

TCE 008973067-05



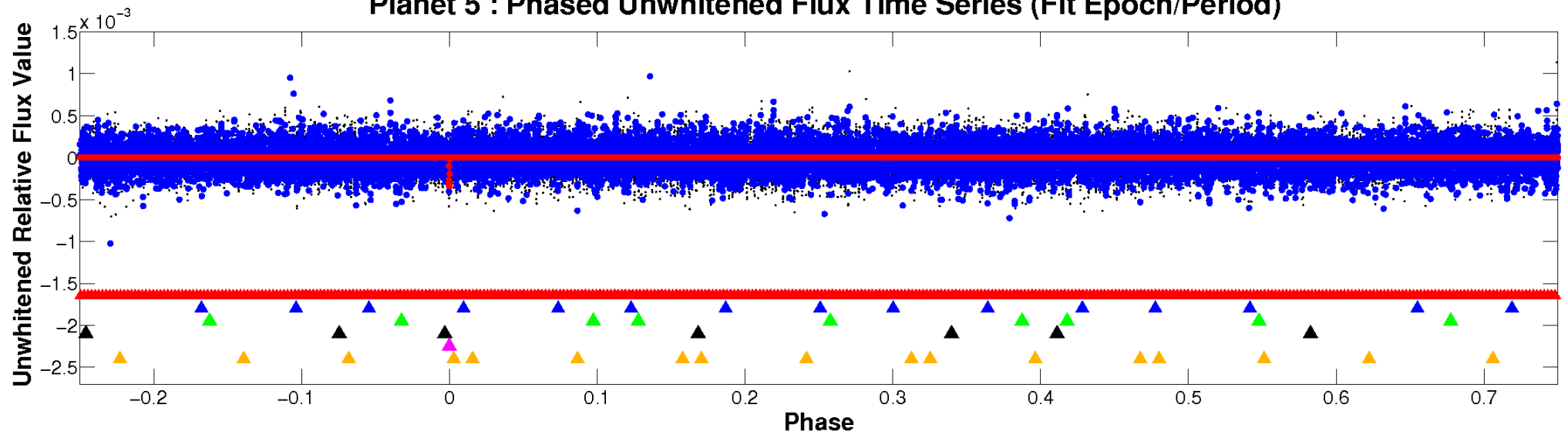
# ALT Odd/Even

TCE 008973067-05

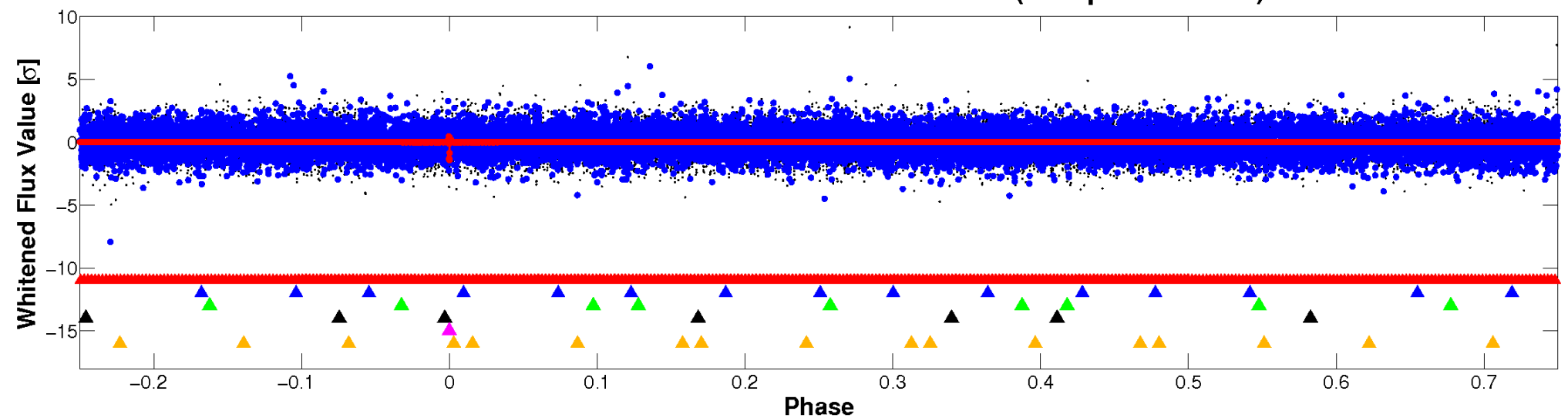


# Non-Whitened Vs. Whitened Light Curve

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

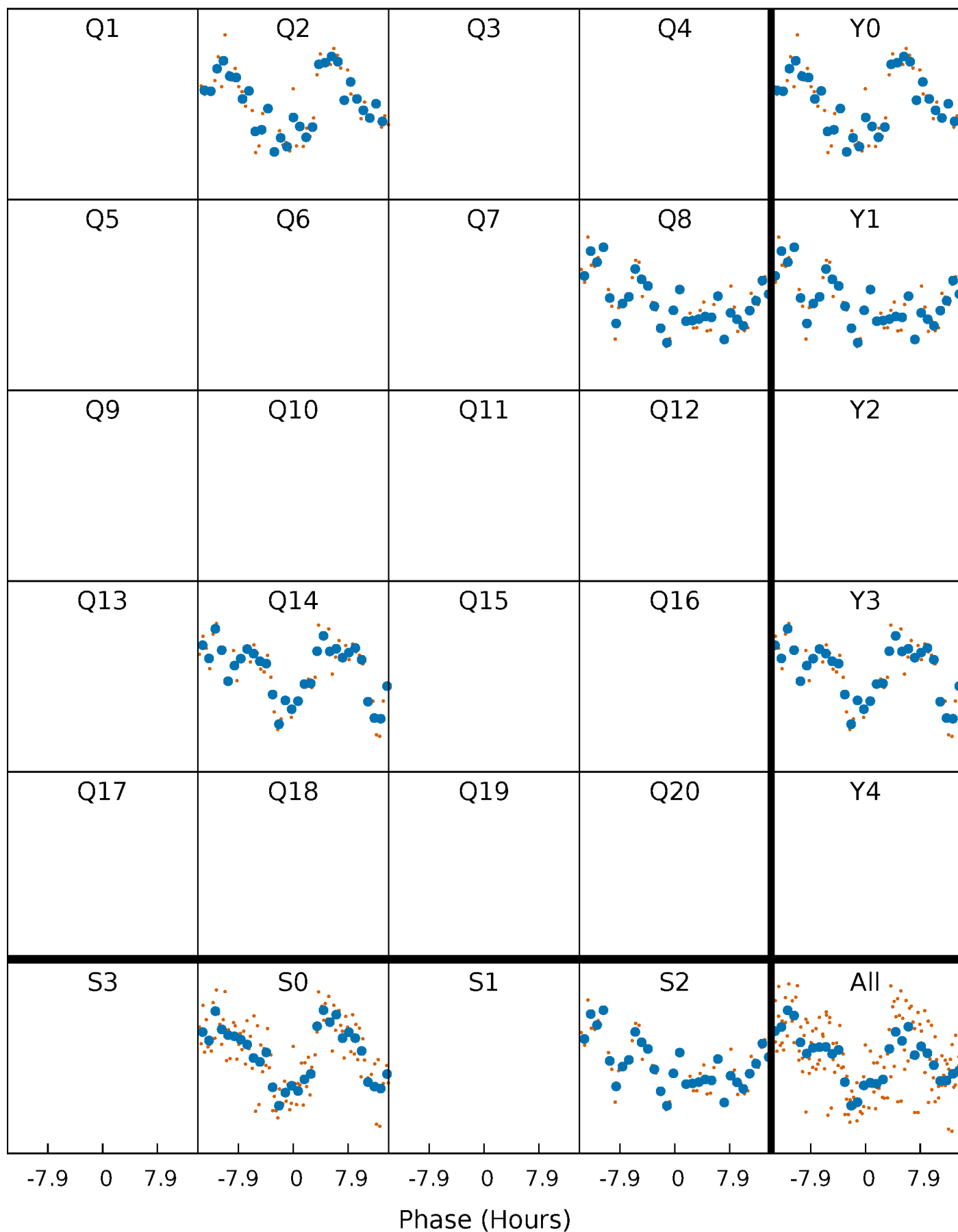


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



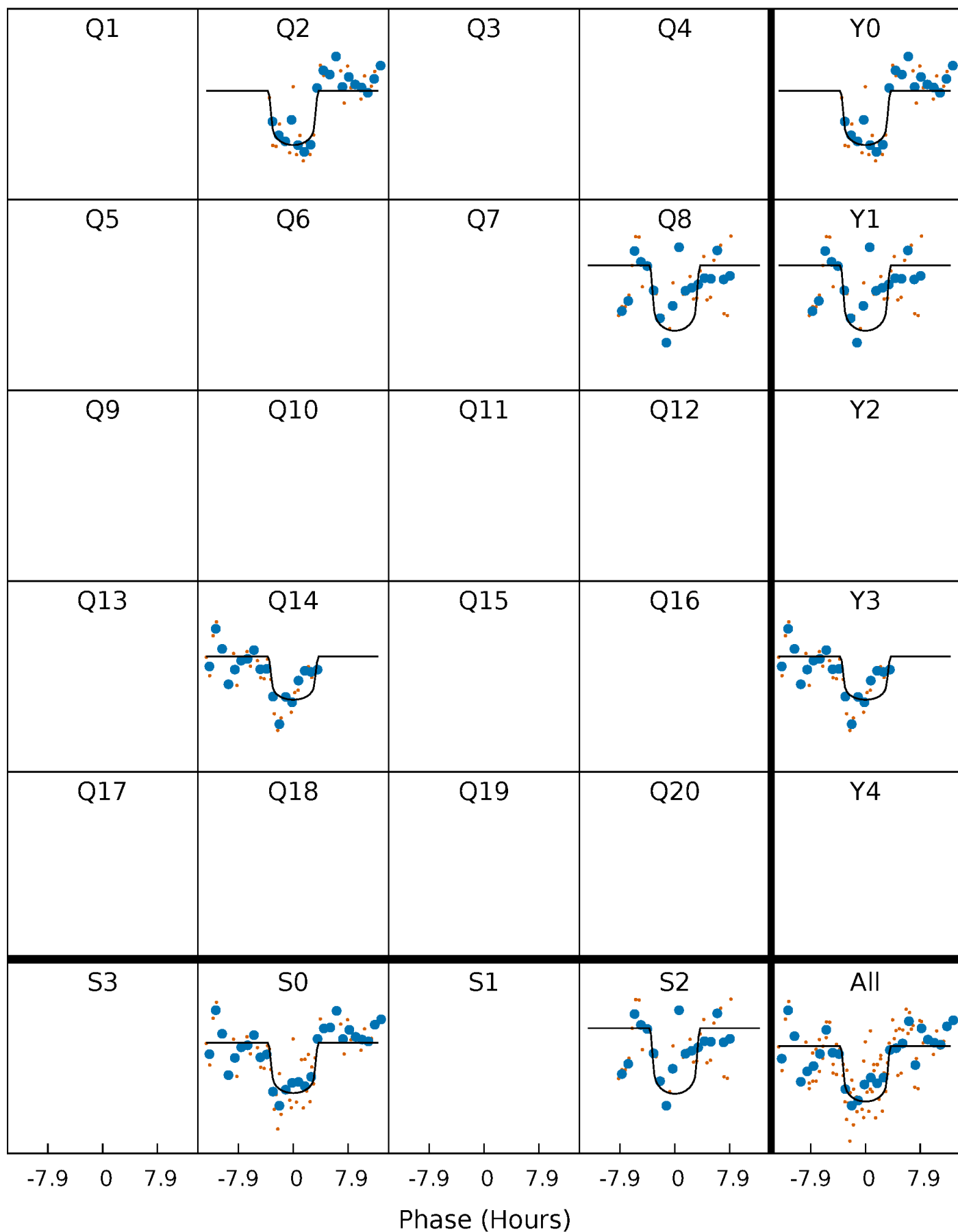
# PDC Quarter-Phased Transit Curves

TCE 008973067-05     $P=559.824663$  Days     $T_0=190.363673$  (BKJD)



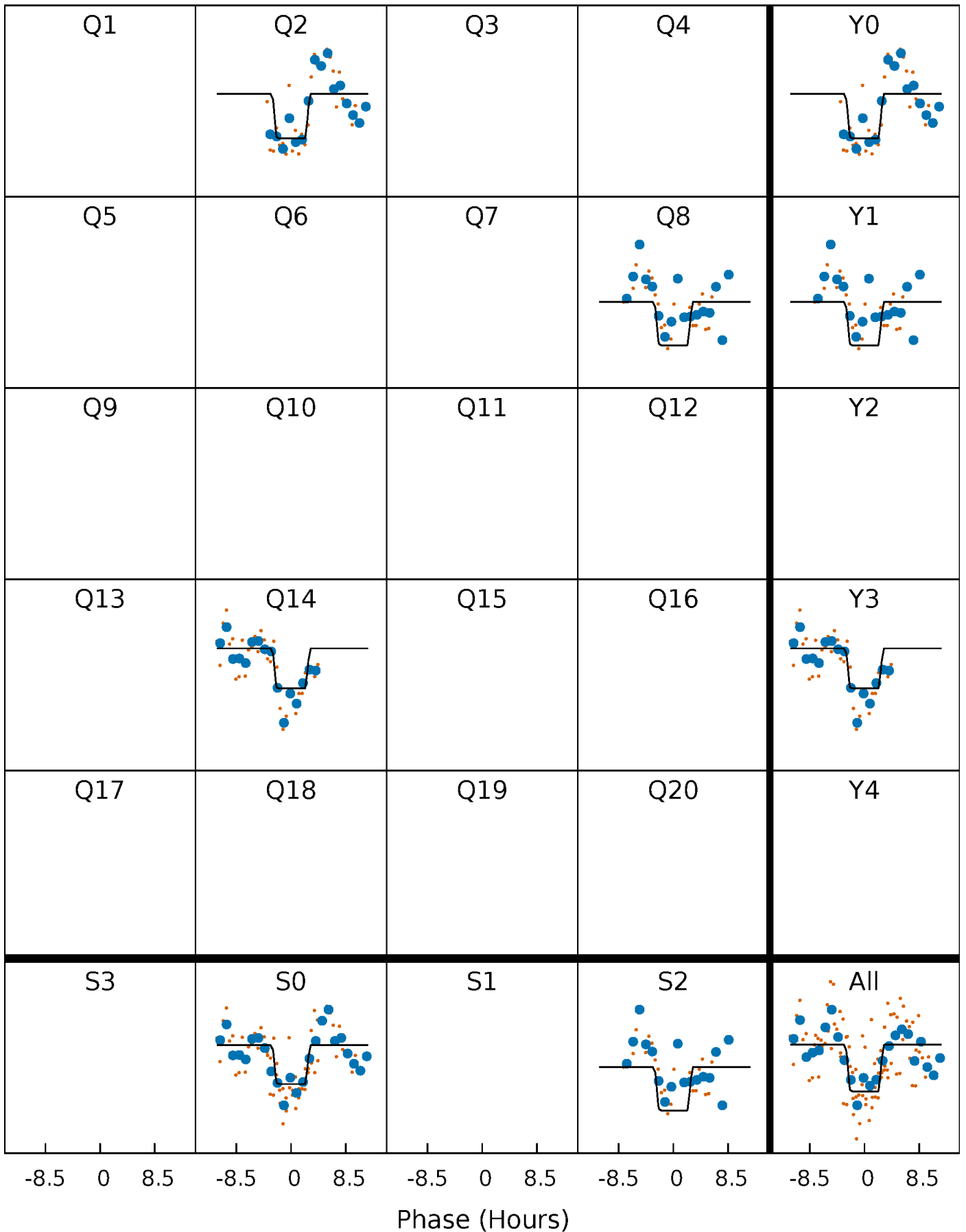
# DV Quarter-Phased Transit Curves

TCE 008973067-05     $P=559.824663$  Days     $T_0=190.363673$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

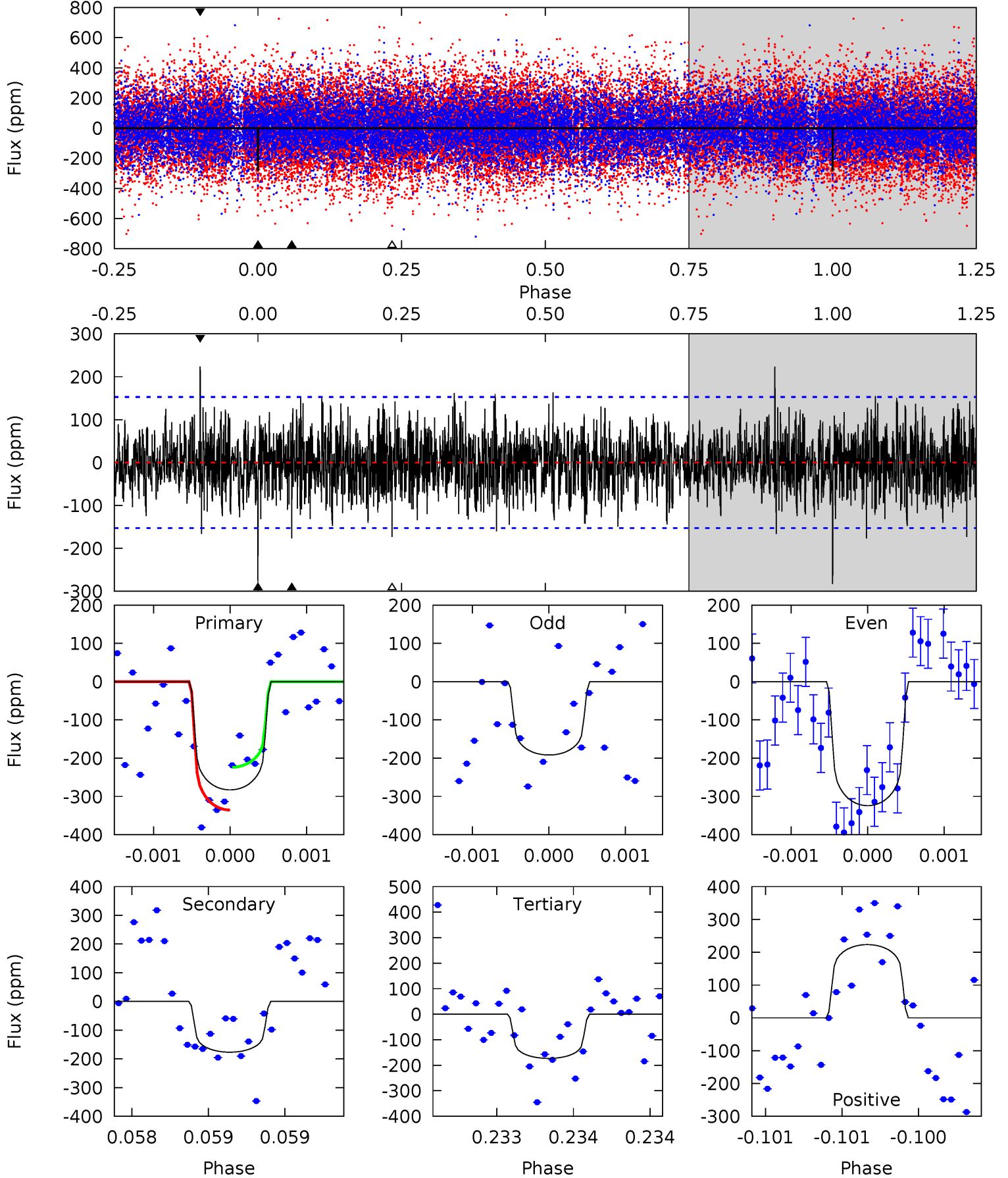
TCE 008973067-05     $P=559.797810$  Days     $T_0=190.375317$  (BKJD)



# DV Model-Shift Uniqueness Test

008973067-05, P = 559.824663 Days, E = 190.363673 Days

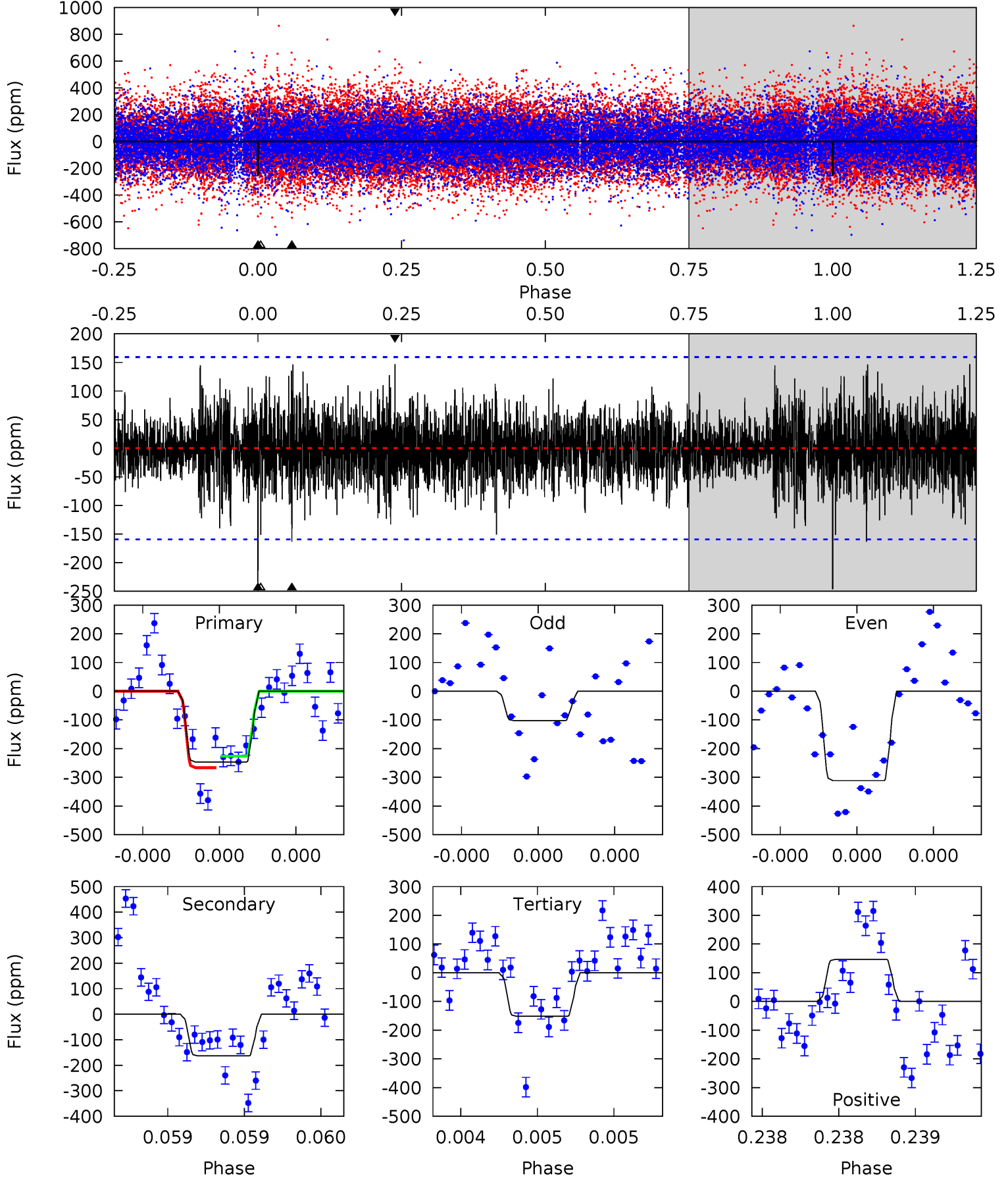
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.3	6.44	6.31	8.14	5.57	3.47	1.85	4.00	2.18	0.13	-1.70	2.26	0.88	0.44	2.03



# Alt Model-Shift Uniqueness Test

008973067-05, P = 559.797810 Days, E = 190.375317 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
8.67	5.74	5.32	5.16	5.60	3.52	1.40	3.35	3.51	0.42	0.58	3.47	0.86	0.37	0.71



### Stellar Parameters For KIC 008973067

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6306^{+173}_{-173}$	$3.450^{+0.368}_{-0.092}$	$-0.240^{+0.350}_{-0.300}$	$4.103^{+0.591}_{-1.655}$	$1.732^{+0.184}_{-0.429}$	$0.035^{+0.110}_{-0.011}$
	+3%/-3%	+11%/-3%	+146%/-125%	+14%/-40%	+11%/-25%	+311%/-30%
Source	PHO1	FLK73	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 008973067-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-177 \pm 27$	$7.76^{+2.88}_{-2.81}$	$613^{+36}_{-60}$	$5351^{+1037}_{-597}$	$4134^{+5271}_{-1992}$
Alt.	$-163 \pm 28$	$6.87^{+3.06}_{-2.65}$	$606^{+39}_{-59}$	$5484^{+1296}_{-727}$	$4645^{+7553}_{-2345}$

$T_{\text{max}}$  = 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

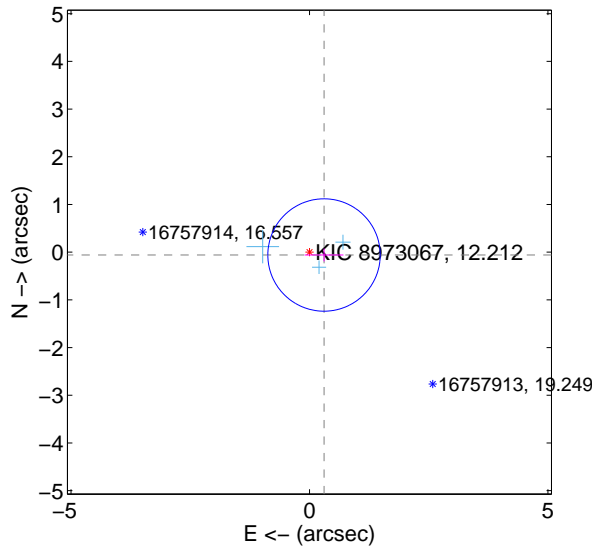
Supplemental centroid analysis for 008973067-05. Kepler magnitude: 12.21. Transit SNR 7.96

There are 3 quarters with good PRF difference image offsets

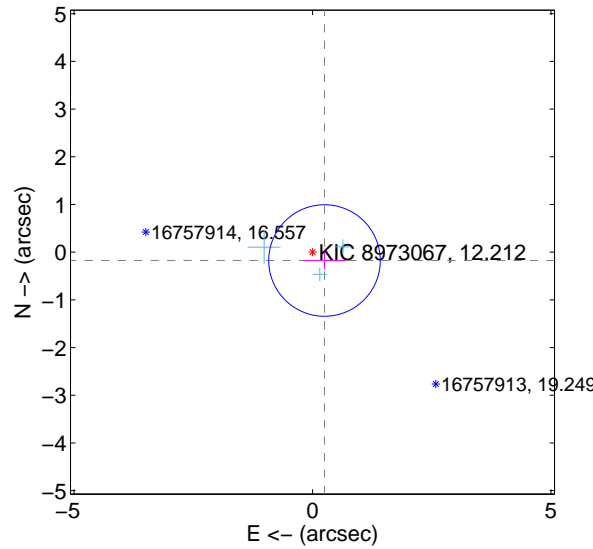
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.311 \pm 0.393$	0.79	$-0.305 \pm 0.408$	$-0.059 \pm 0.135$
PRF-fit source offset from KIC position	$0.306 \pm 0.390$	0.79	$-0.251 \pm 0.455$	$-0.175 \pm 0.179$
photometric centroid source offset	$1.21 \pm 1.00$	1.21	$-1.20 \pm 1.01$	$-0.18 \pm 0.68$

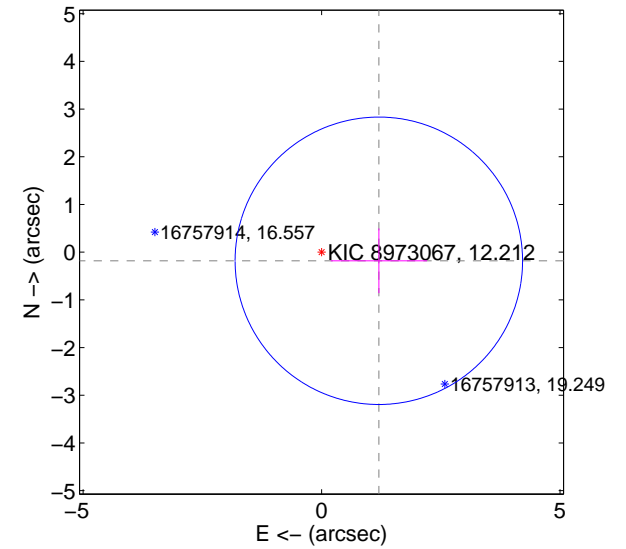
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

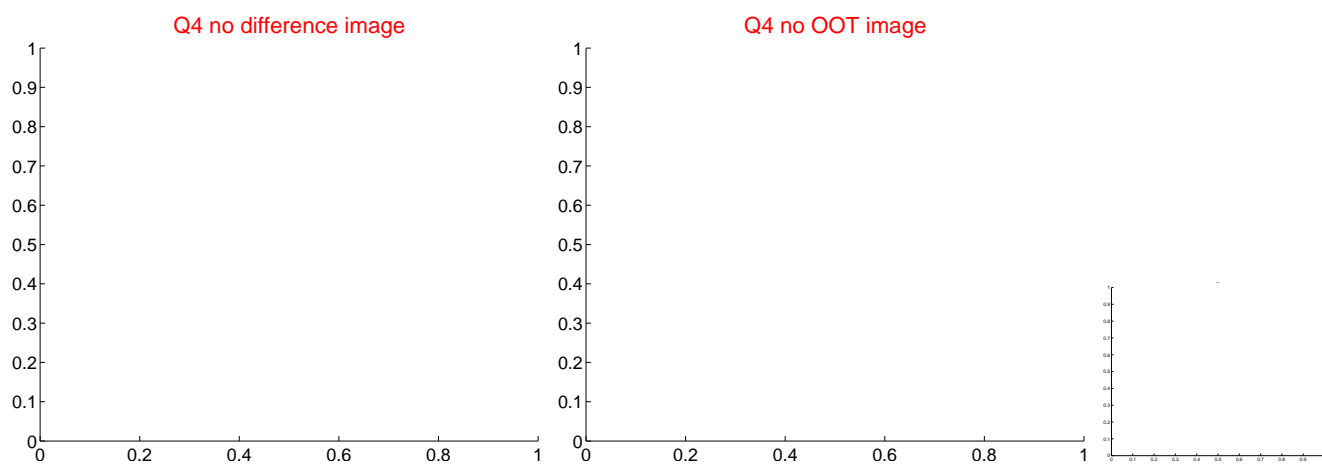
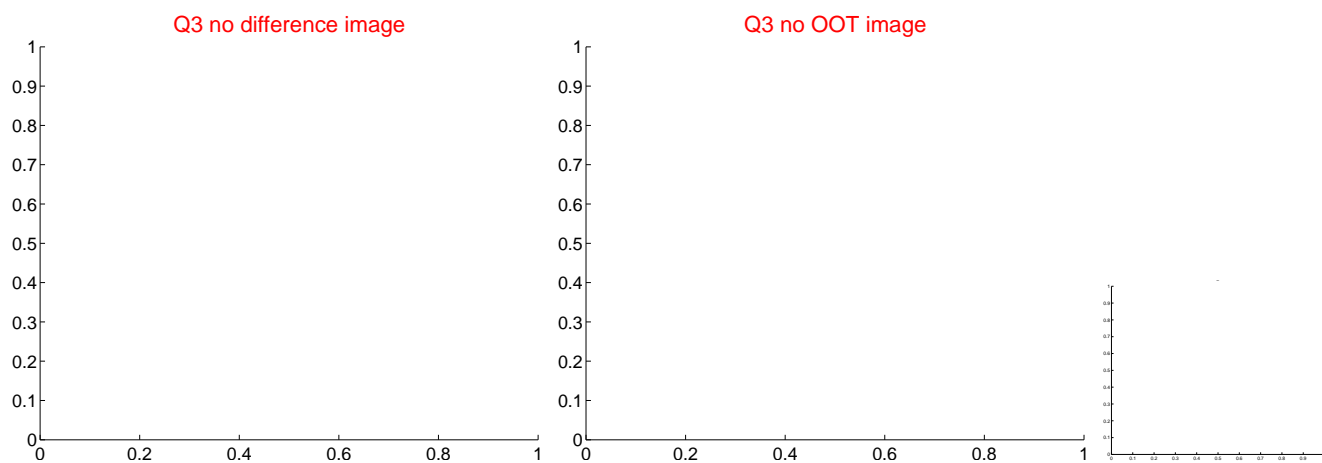
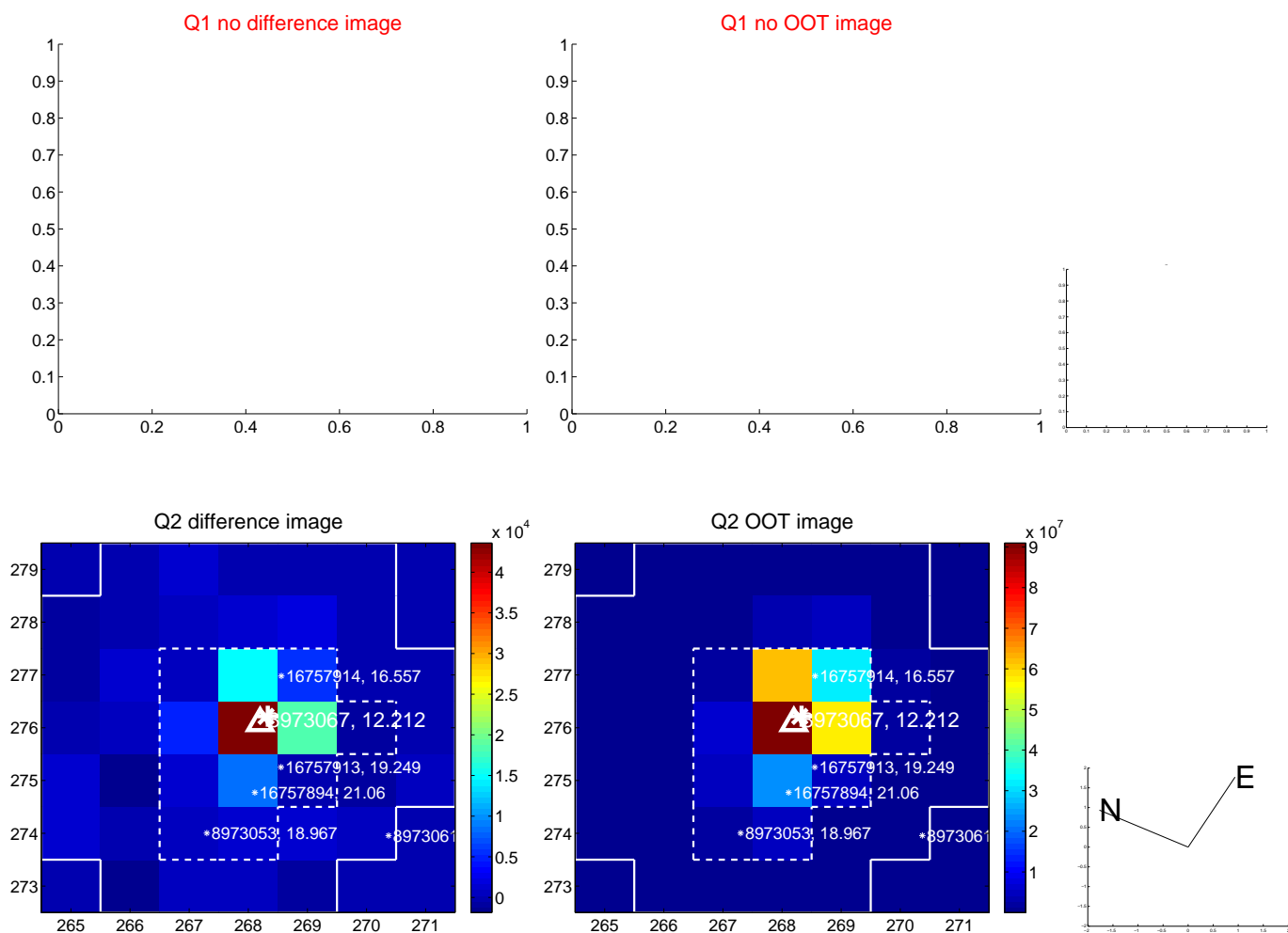


offset from photometric centroids

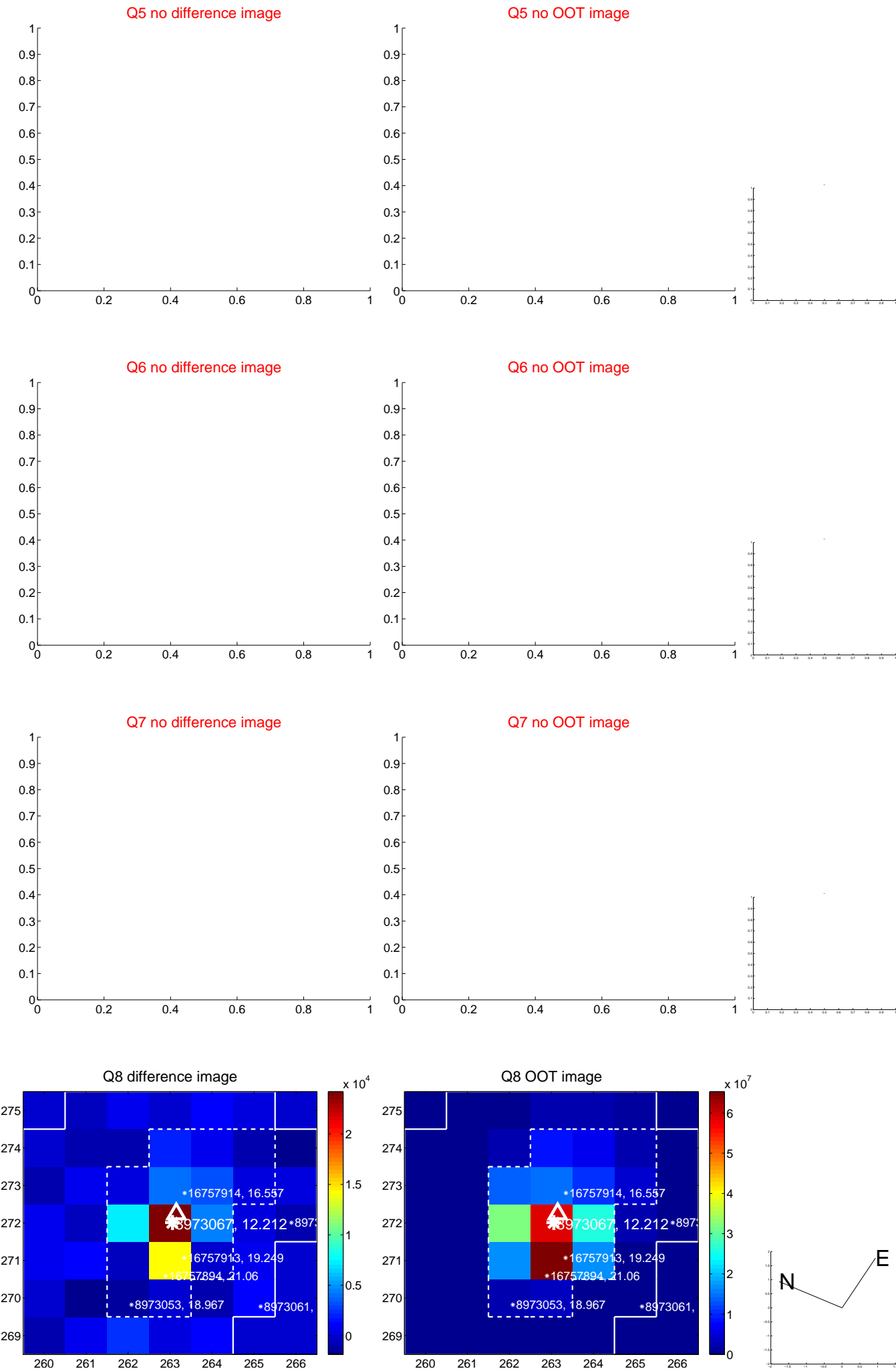


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

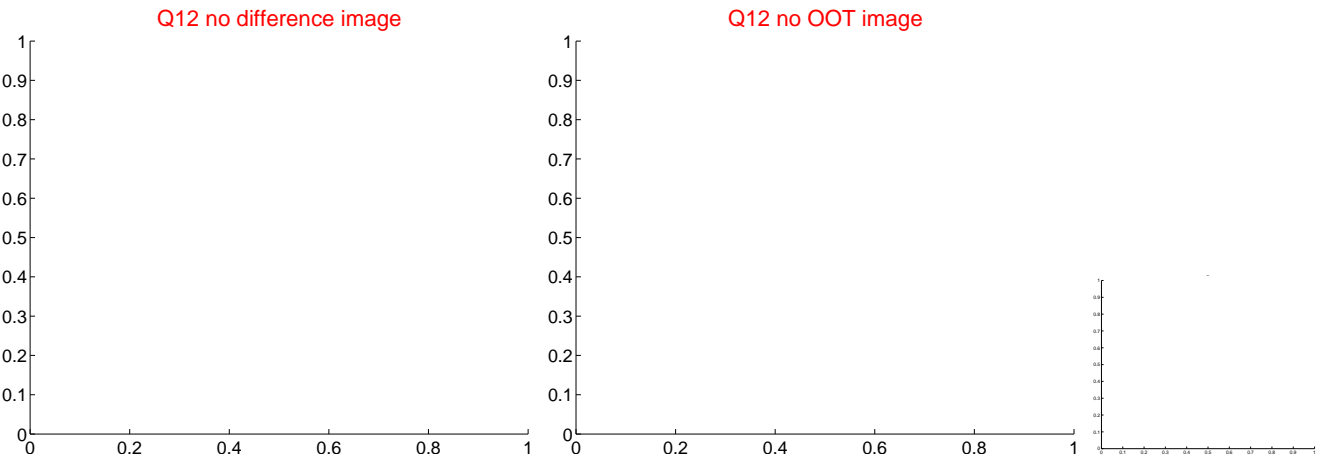
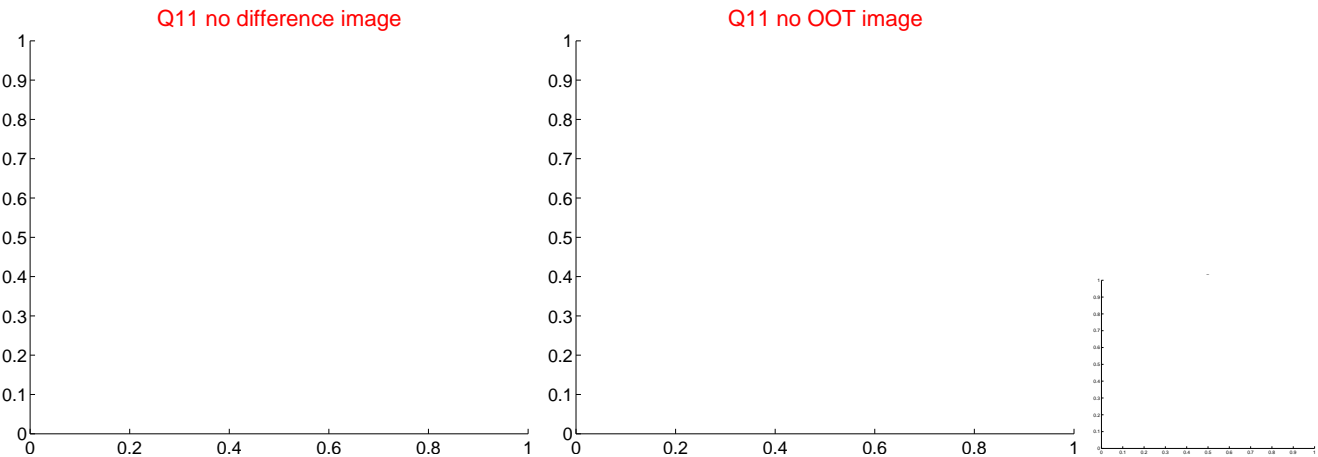
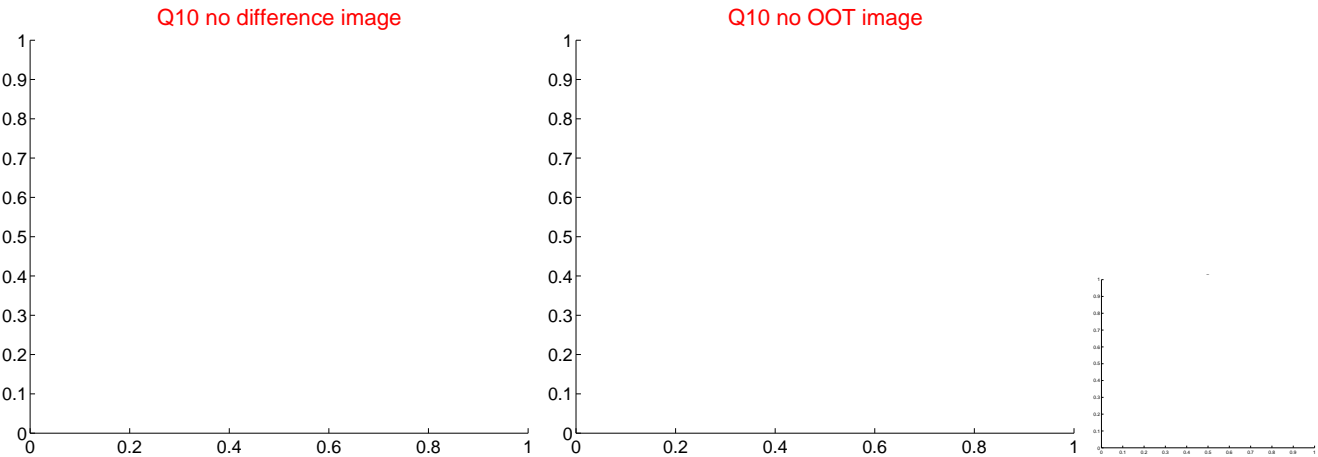
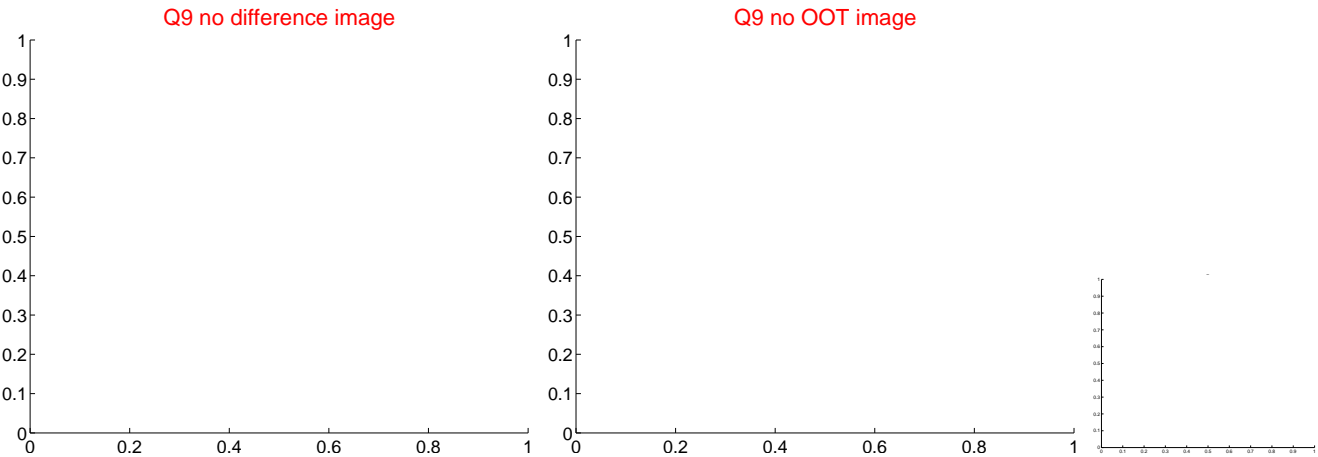
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



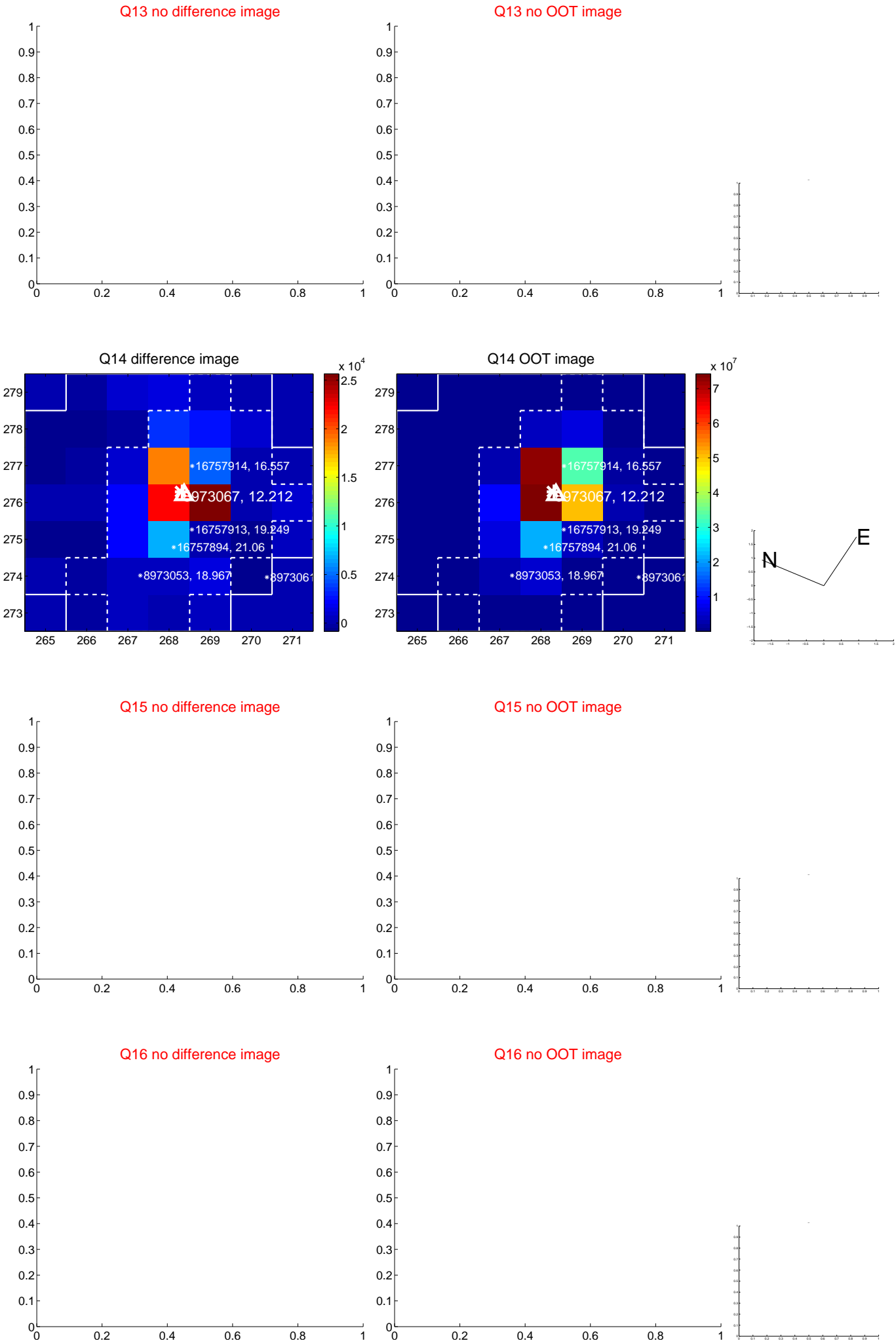
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



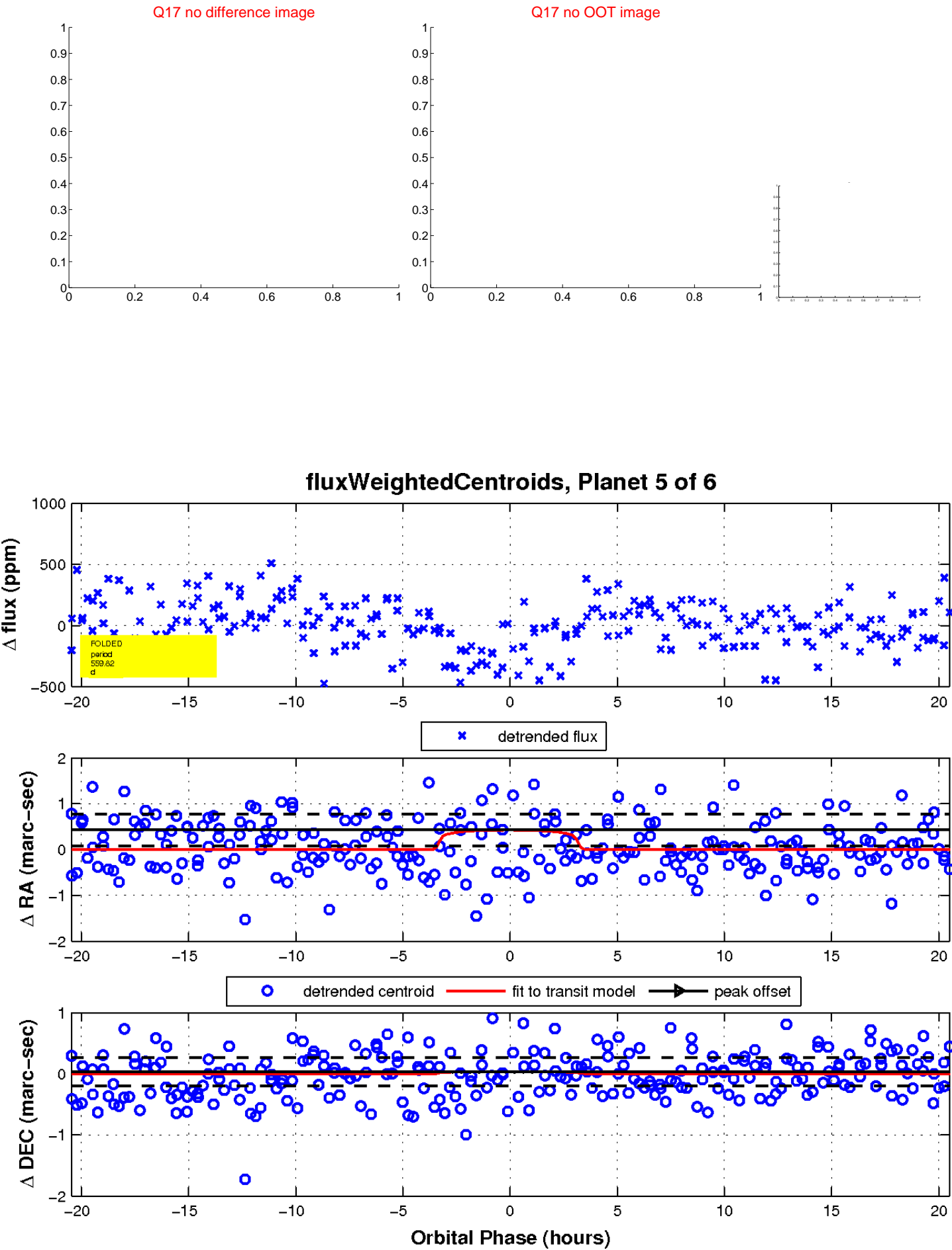
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



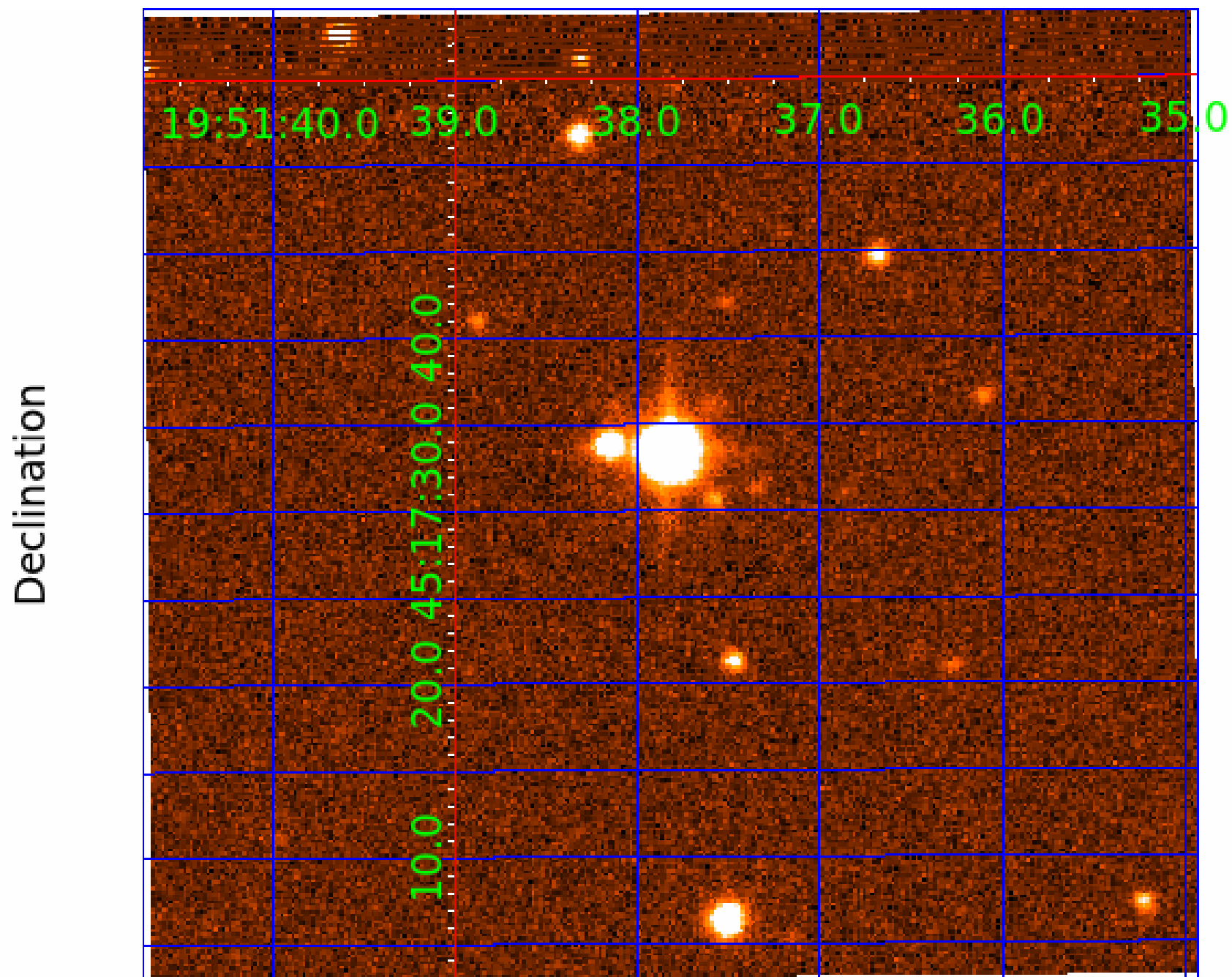
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 008973067

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008973067-01	OBS	No	1.375024	132.113592	22.5	5.387	8.9	7.6	4.10	6306	2.29	28242.15
008973067-02	OBS	No	99.274837	159.926145	278.4	5.042	8.0	8.0	4.10	6306	8.11	93.94
008973067-03	OBS	No	162.388847	244.892607	256.2	5.713	7.6	6.6	4.10	6306	7.19	48.74
008973067-04	OBS	No	231.923132	148.665148	292.3	7.468	7.4	7.3	4.10	6306	7.43	30.30
008973067-05	OBS	No	559.824663	190.363673	338.6	6.874	7.9	8.0	4.10	6306	8.37	9.36
008973067-06	OBS	No	86.674371	192.032939	313.2	2.468	7.2	7.5	4.10	6306	8.43	112.58

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008973067-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT
008973067-02	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—MOD_NONUNIQ_ALT
008973067-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES—TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT
008973067-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT
008973067-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS
008973067-06	OBS	FP	0.00	1	0	0	0	TRANS_GAPPED—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT

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

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

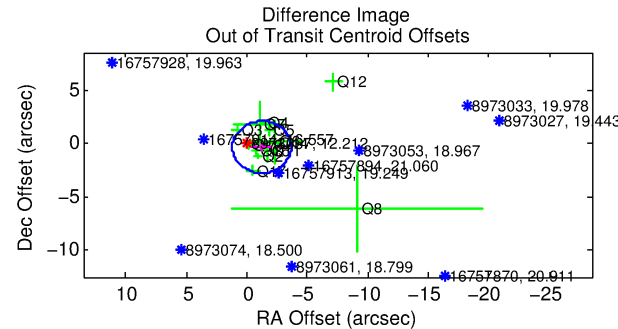
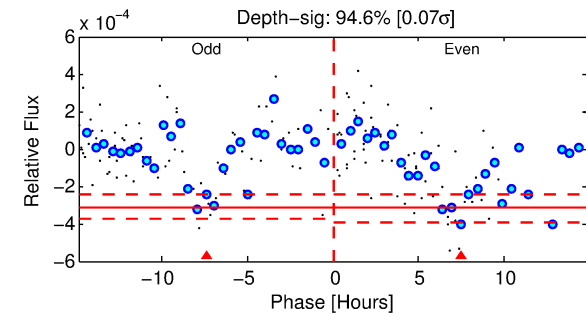
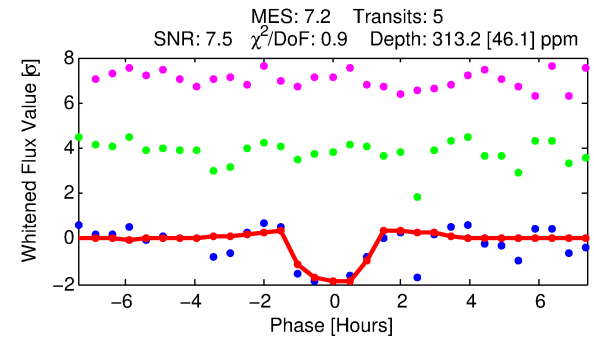
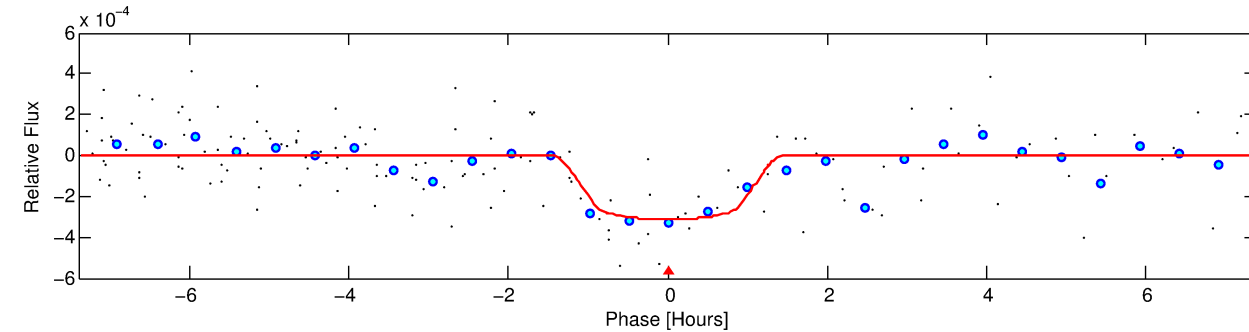
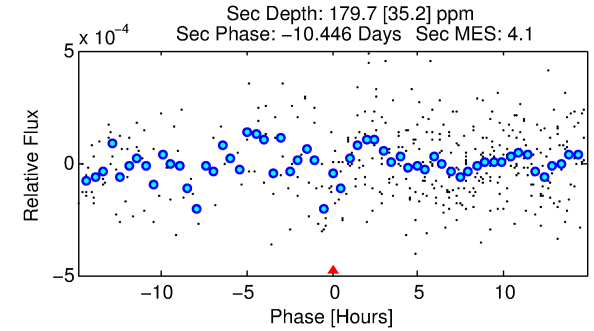
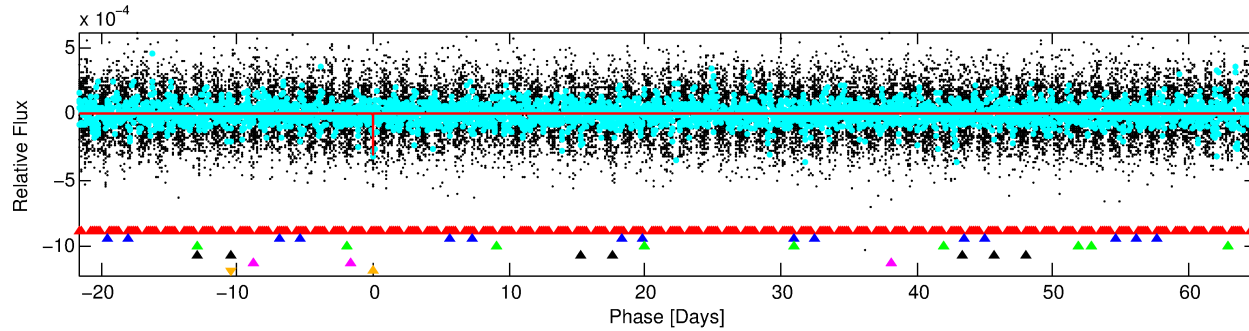
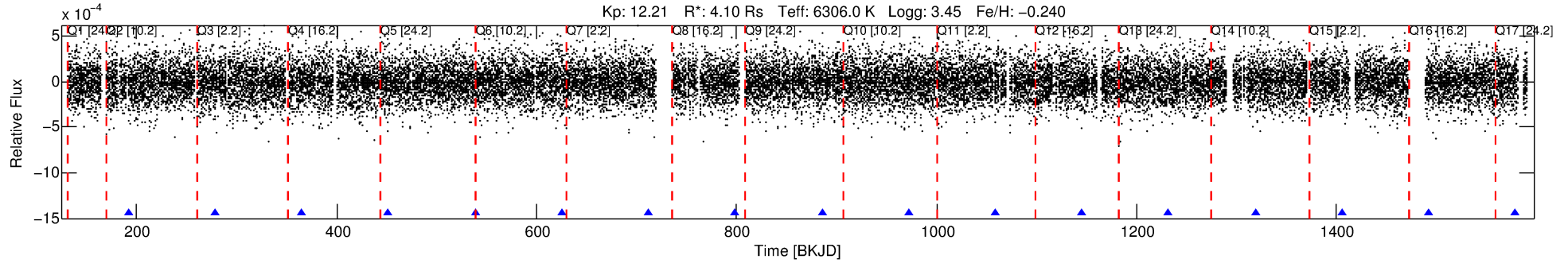
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008973067-06

No Significant Match Found

# DV One-Page Summary

KIC: 8973067 Candidate: 6 of 6 Period: 86.674 d



## DV Fit Results:

Period = 86.67437 [0.00268] d  
Epoch = 192.0329 [0.0059] BKJD  
Rp/R\* = 0.0188 [0.0094]  
a/R\* = 134.09 [364.58]  
b = 0.89 [0.65]  
Seff = 112.58 [71.51]  
Teq = 831 [132] K  
Rp = 8.43 [5.41] Re  
a = 0.4603 [0.1795] AU  
Ag = 294.88 [352.43] [0.83σ]  
Teffp = 5322 [1363] K [3.28σ]

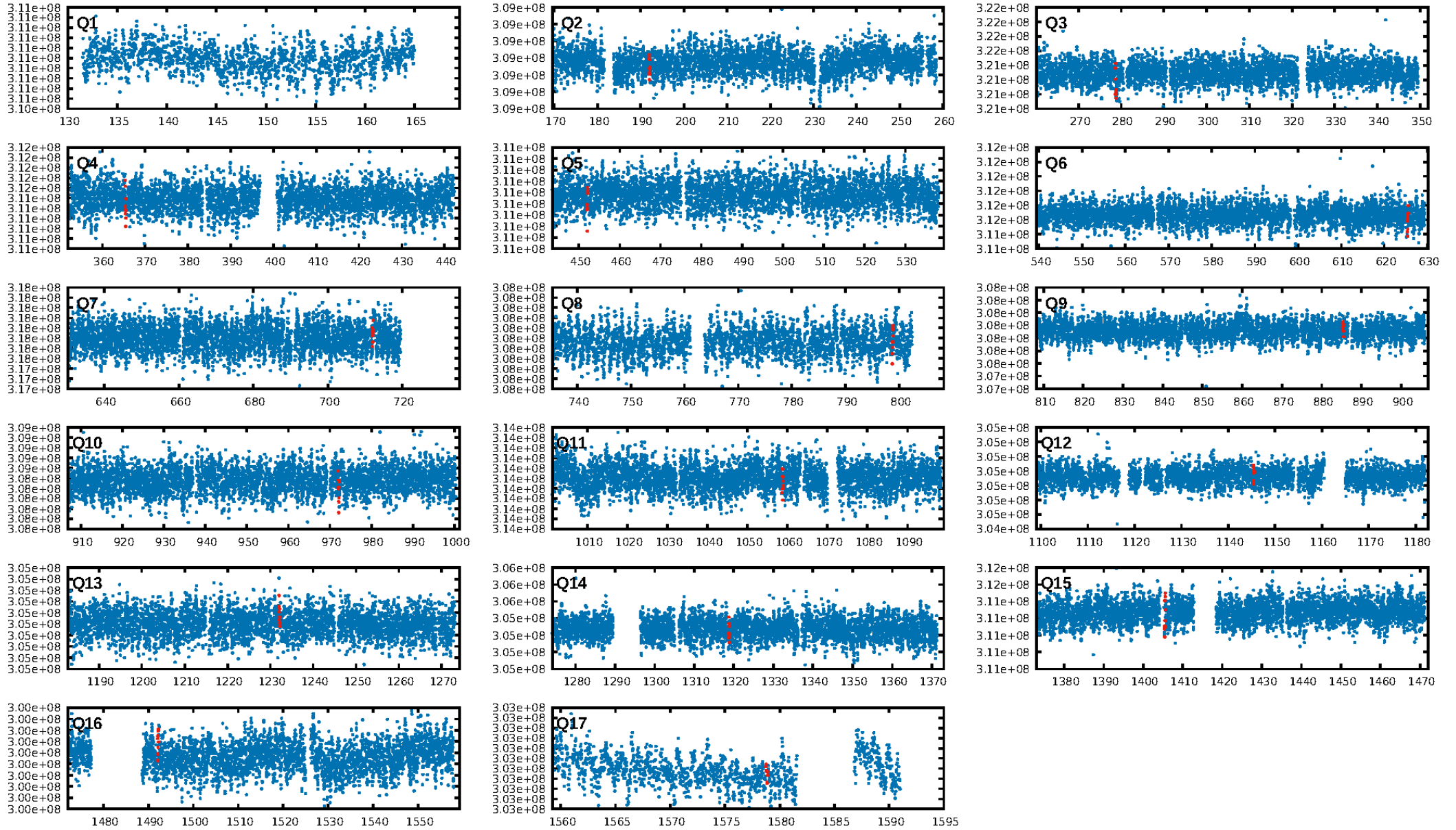
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [345.50σ]  
LongPeriod-sig: 100.0% [53.87σ]  
ModelChiSquare2-sig: 95.3%  
ModelChiSquareGo-sig: 99.0%  
**Bootstrap-pfa: 2.71e-09**  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -0.3291  
Centroid-sig: 1.5%  
Centroid-so: 0.858 arcsec [1.65σ]  
OotOffset-rm: 1.286 arcsec [1.59σ]  
KicOffset-rm: 1.281 arcsec [1.62σ]  
OotOffset-st: 4/3/4/2 [13]  
KicOffset-st: 4/3/4/2 [13]  
DiffImageQuality-fgm: 0.31 [4/13]  
DiffImageOverlap-fno: 0.27 [4/15]

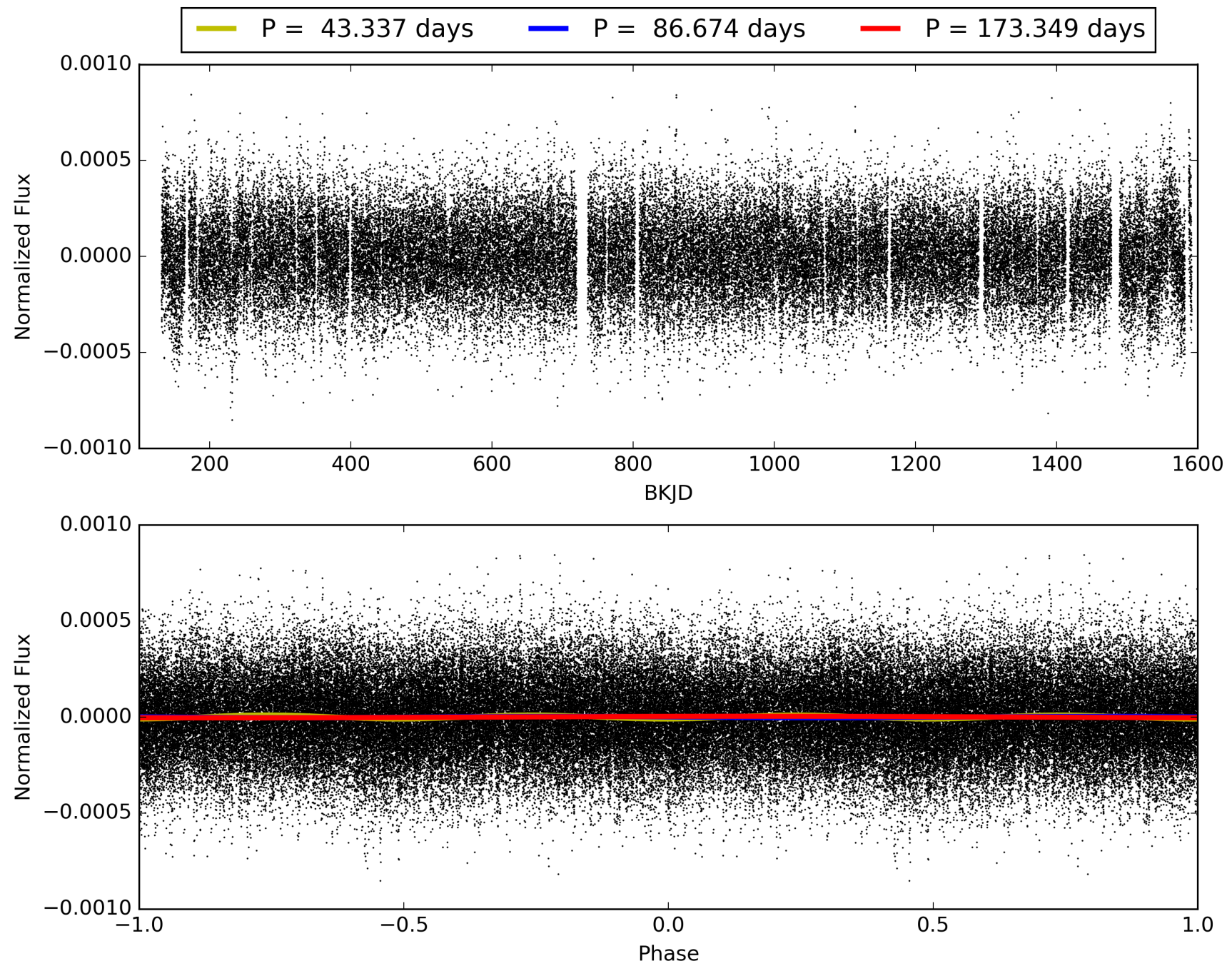
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 06:43:09 Z

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

# TCE 008973067-06, PDC Light Curves

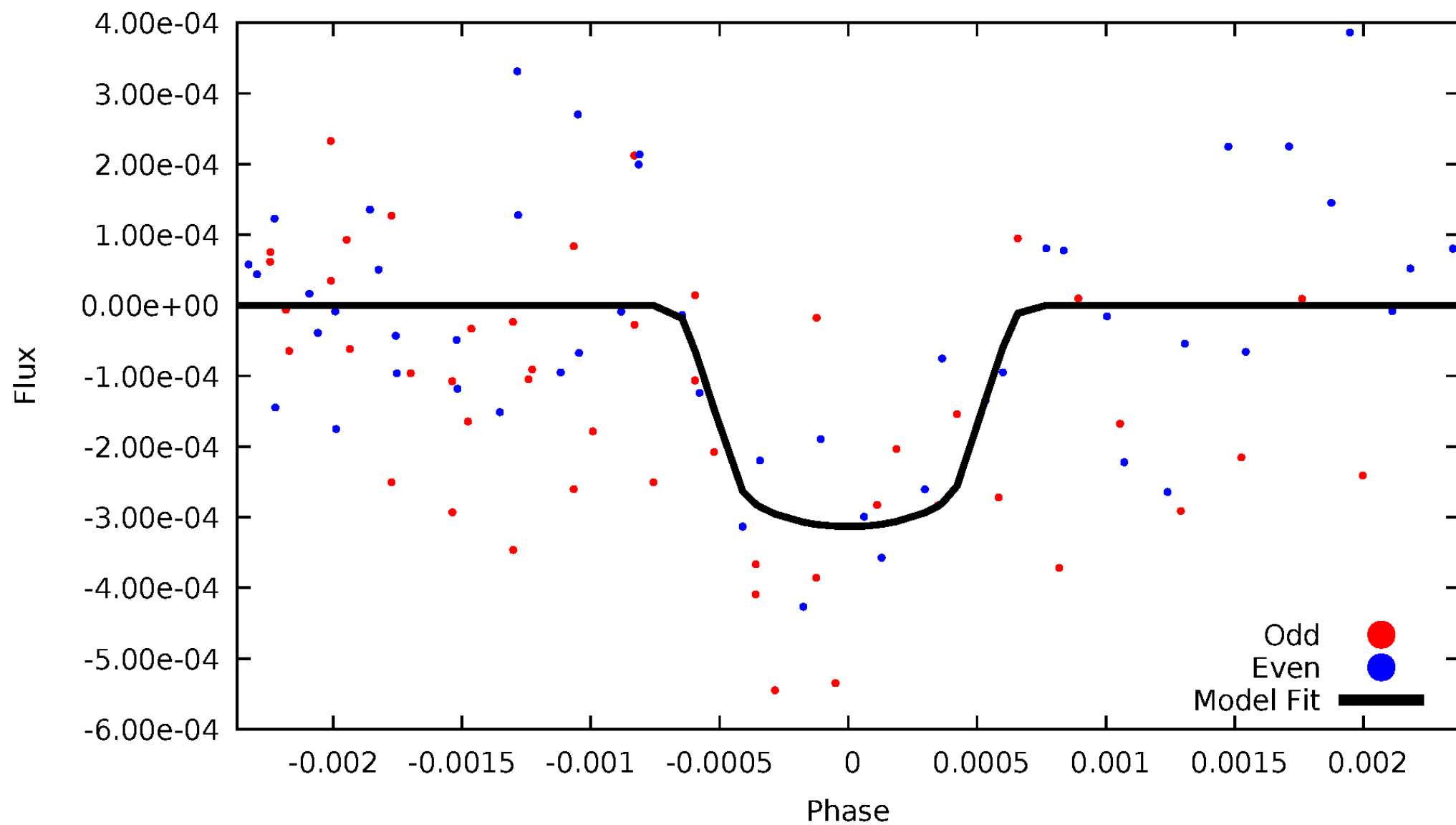


TCE 008973067-06



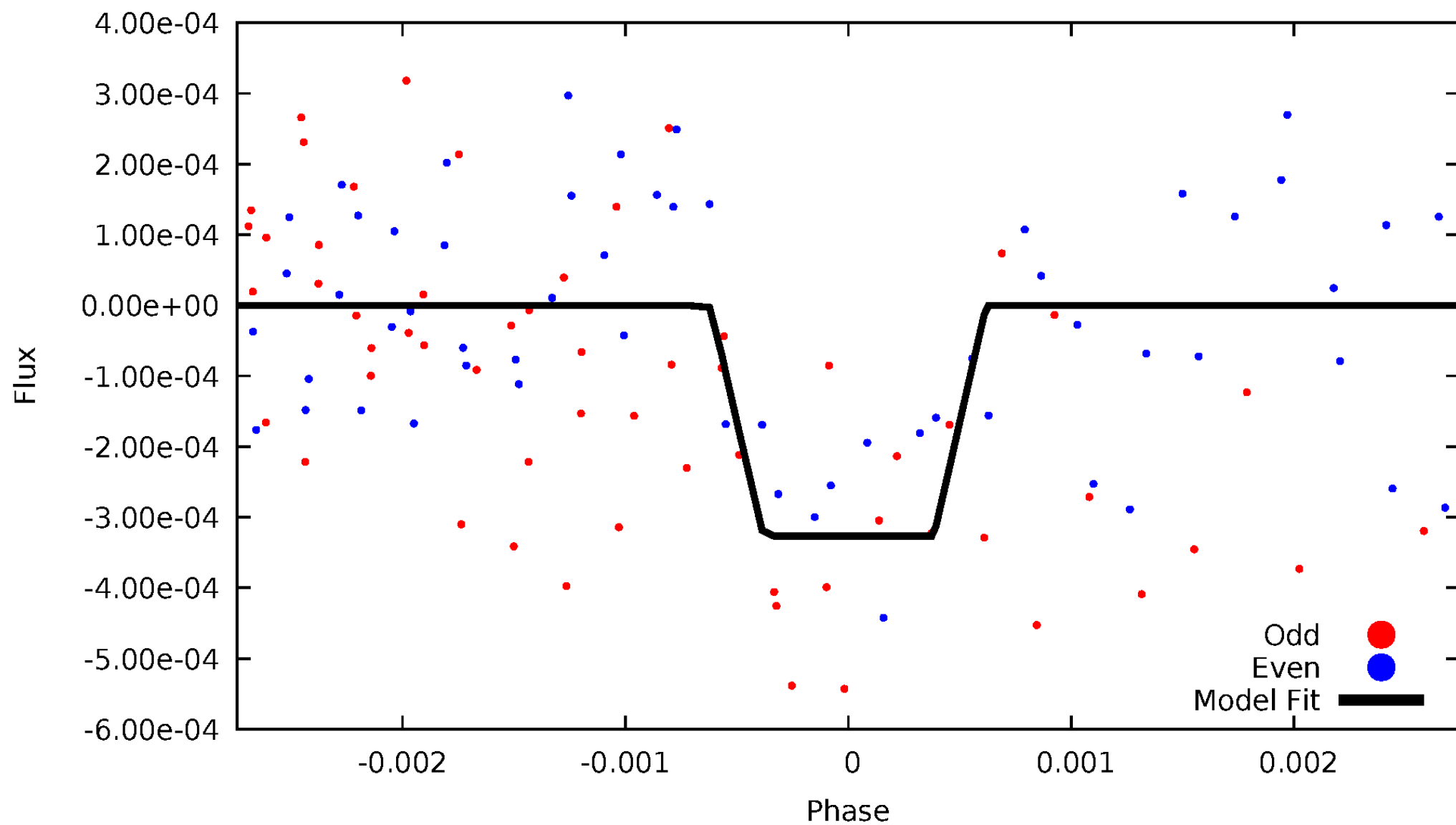
# DV Odd/Even

TCE 008973067-06



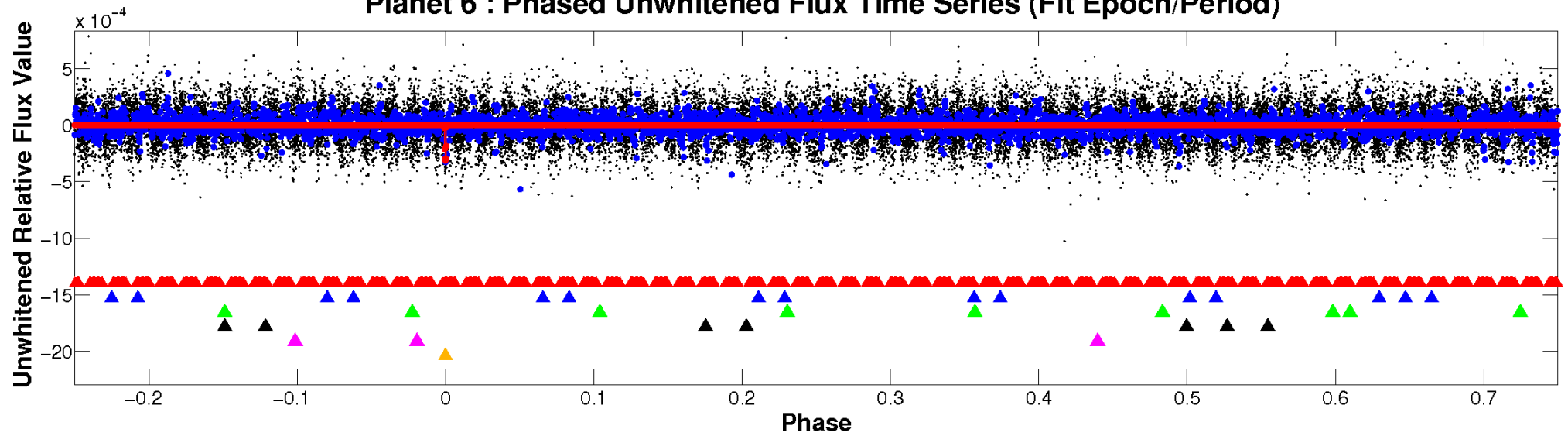
# ALT Odd/Even

TCE 008973067-06

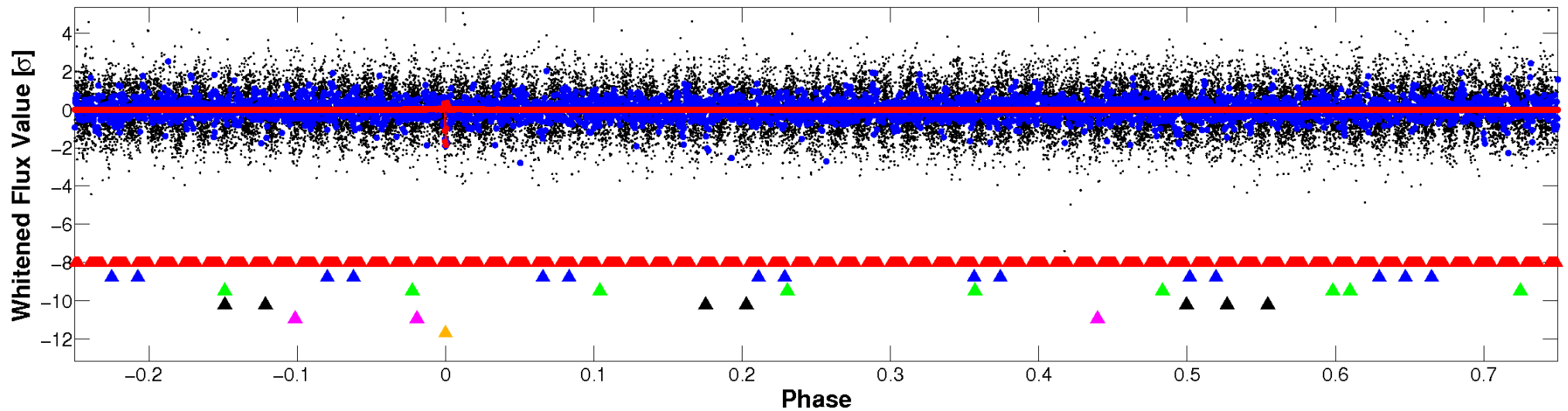


# Non-Whitened Vs. Whitened Light Curve

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

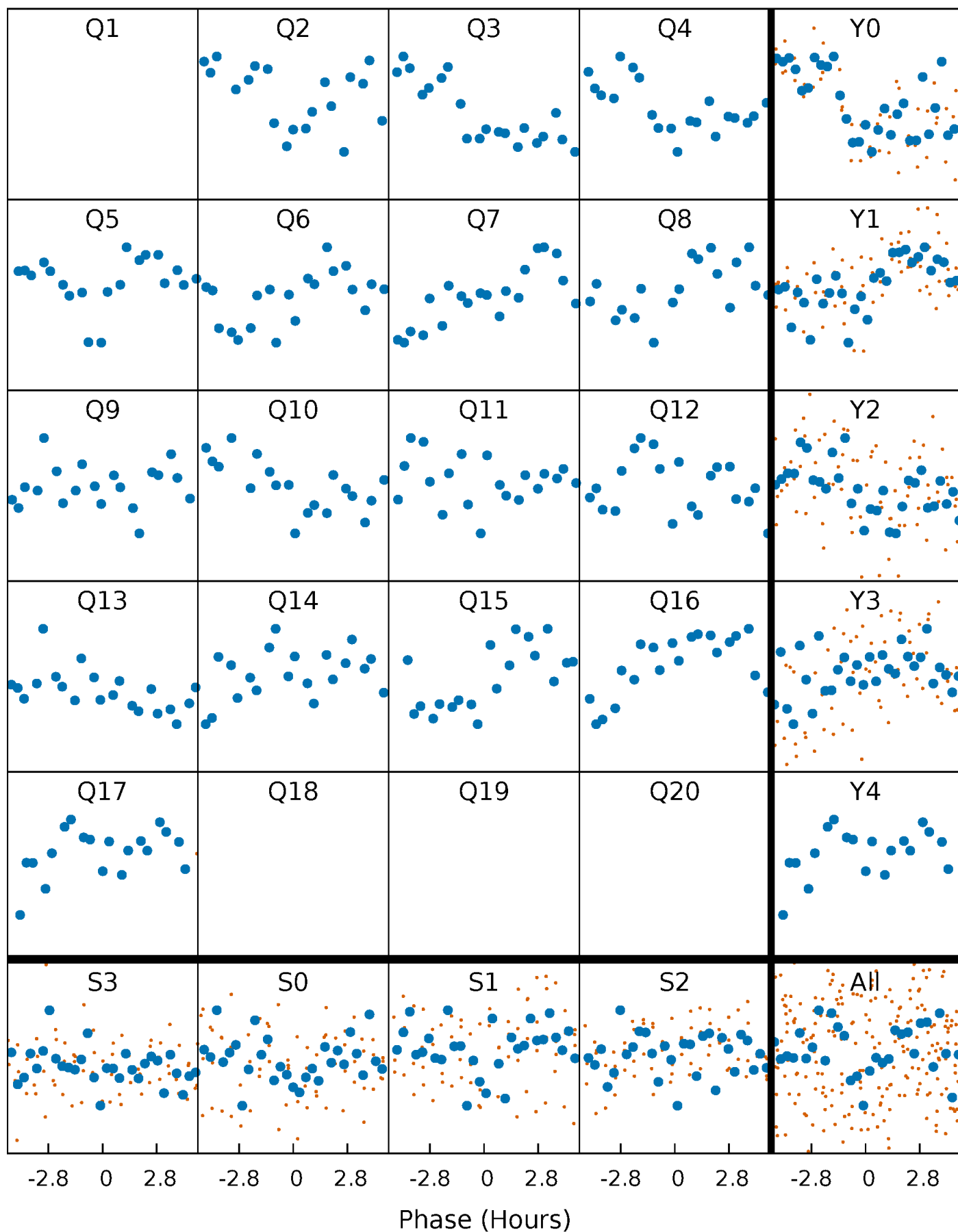


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



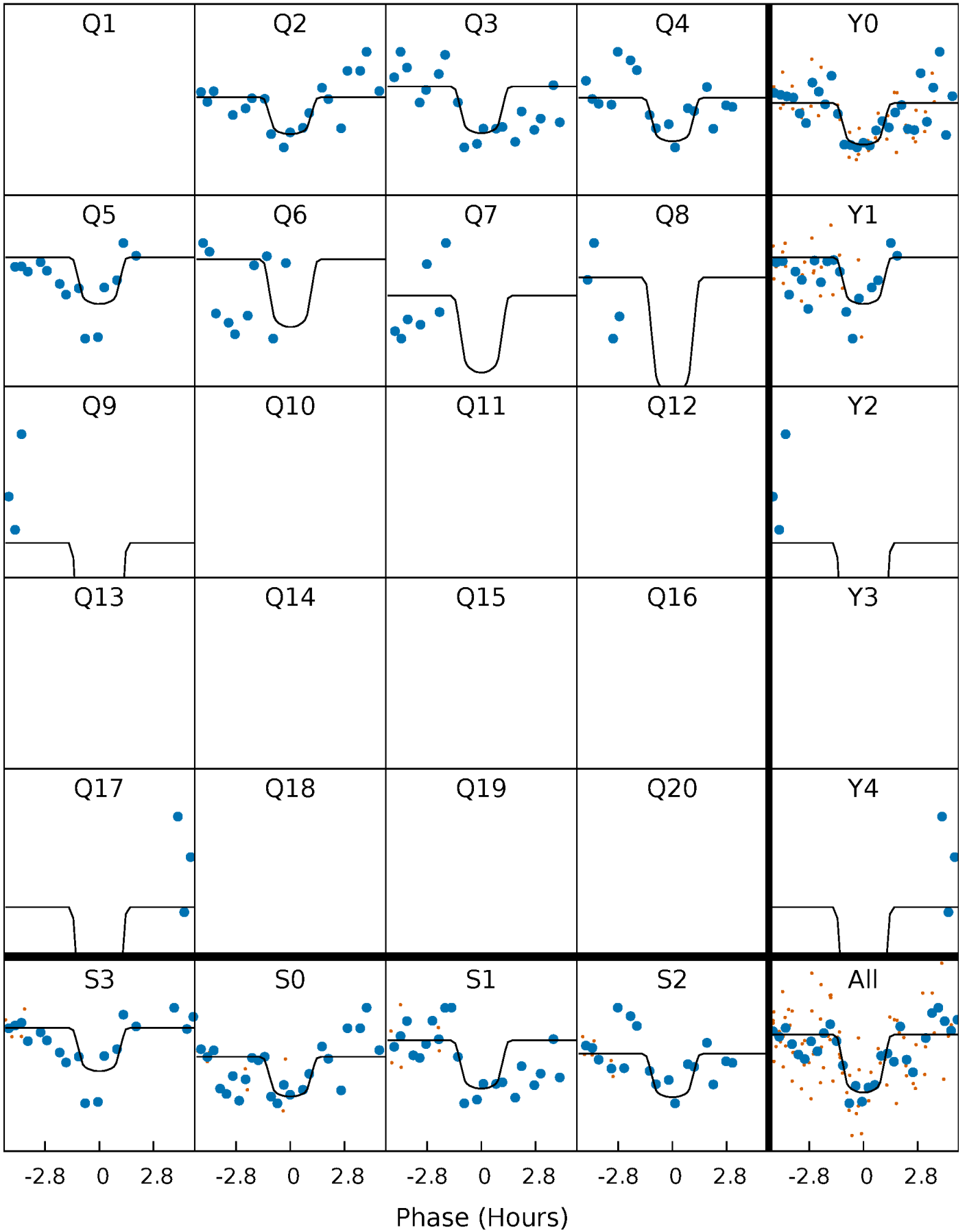
# PDC Quarter-Phased Transit Curves

TCE 008973067-06   P= 86.674371 Days    $T_0=192.032939$  (BKJD)



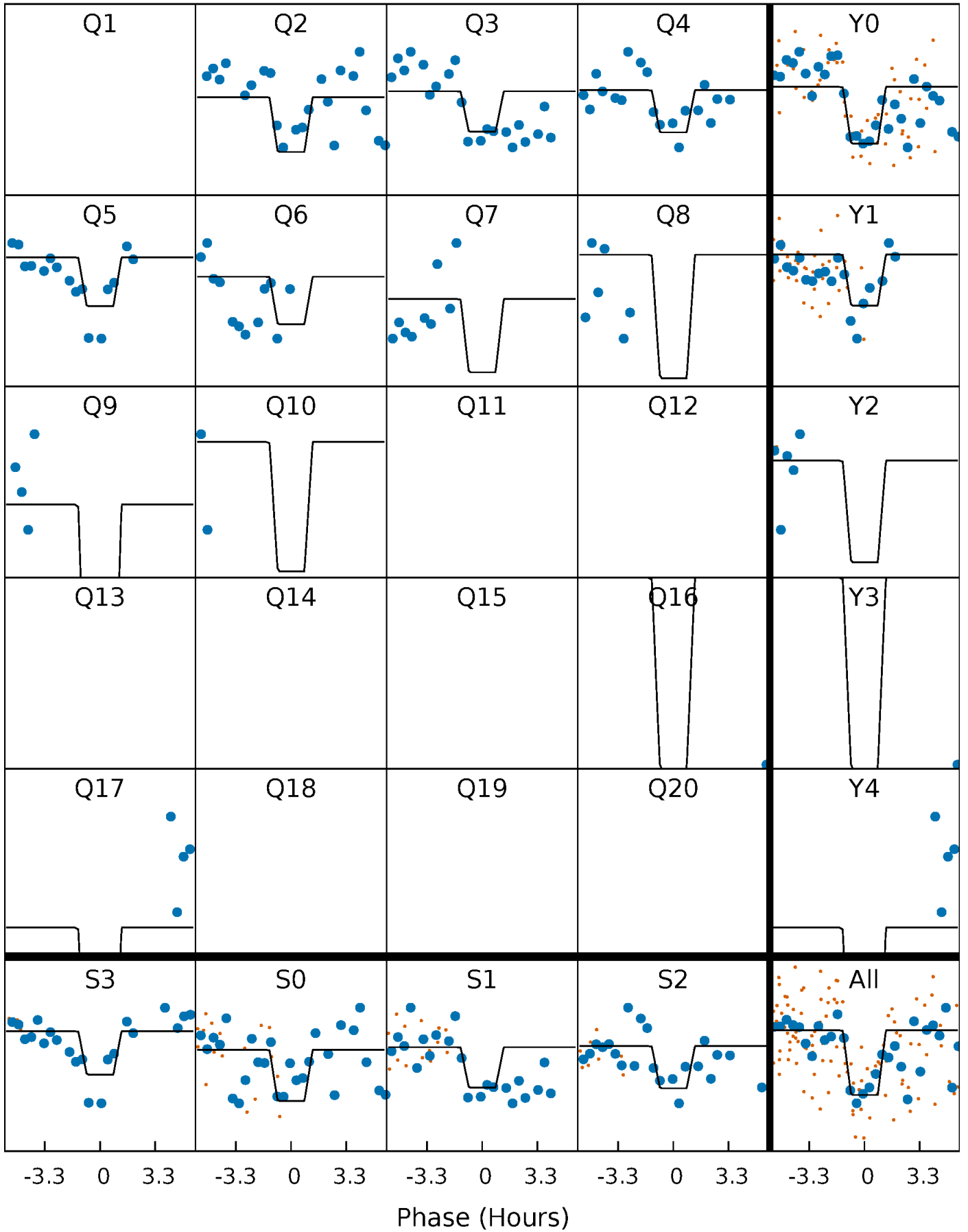
# DV Quarter-Phased Transit Curves

TCE 008973067-06 P= 86.674371 Days  $T_0=192.032939$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

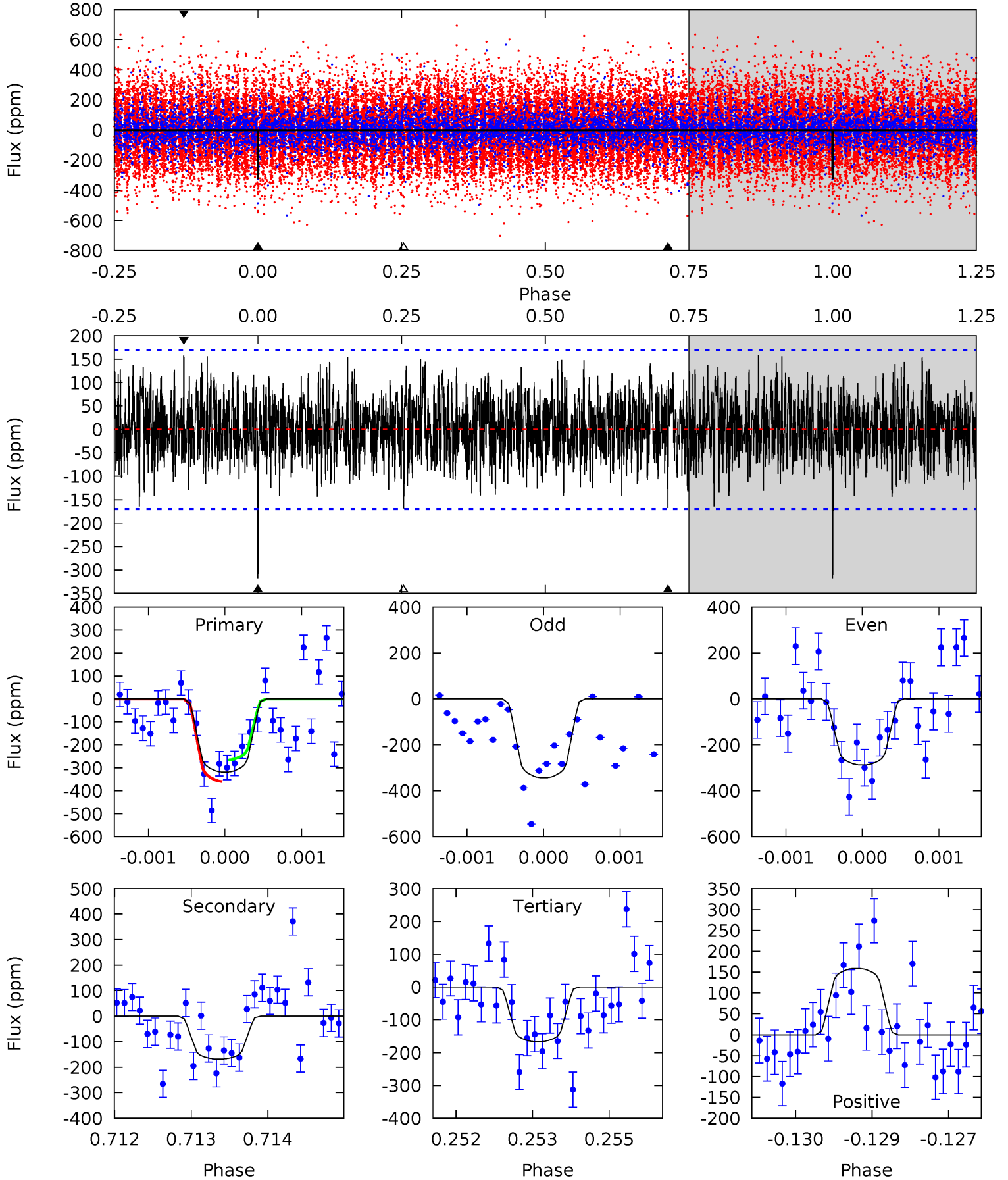
TCE 008973067-06 P= 86.674139 Days  $T_0=192.030916$  (BKJD)



# DV Model-Shift Uniqueness Test

008973067-06,  $P = 86.674371$  Days,  $E = 105.358568$  Days

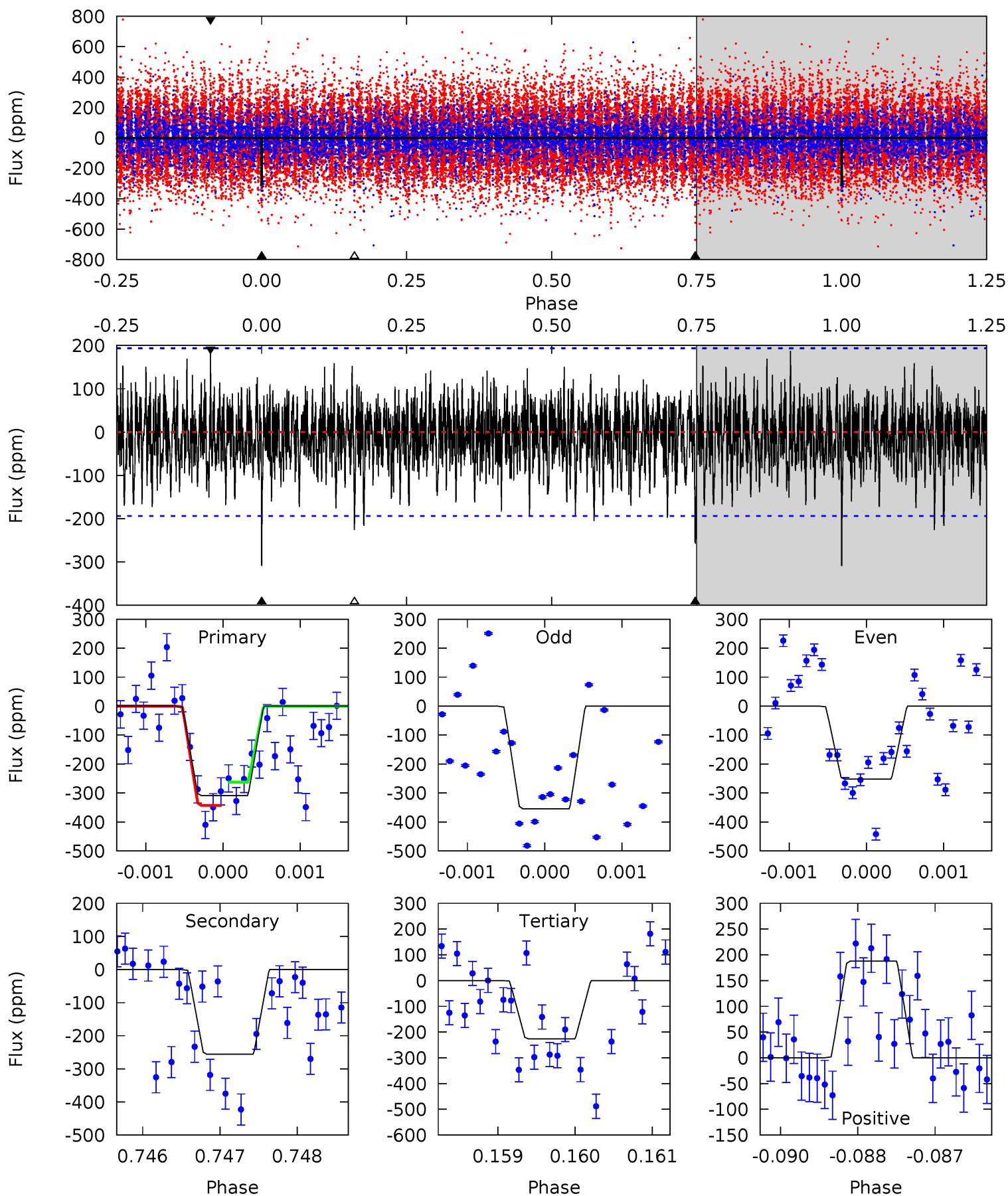
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.1	5.32	5.28	5.04	5.39	3.19	1.58	4.82	5.06	0.03	0.28	0.87	0.89	0.33	1.48



# Alt Model-Shift Uniqueness Test

008973067-06, P = 86.674139 Days, E = 105.356777 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
8.64	7.16	6.32	5.25	5.42	3.24	1.47	2.31	3.39	0.83	1.91	1.43	1.05	0.38	1.10



### Stellar Parameters For KIC 008973067

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6306^{+173}_{-173}$	$3.450^{+0.368}_{-0.092}$	$-0.240^{+0.350}_{-0.300}$	$4.103^{+0.591}_{-1.655}$	$1.732^{+0.184}_{-0.429}$	$0.035^{+0.110}_{-0.011}$
	+3%/-3%	+11%/-3%	+146%/-125%	+14%/-40%	+11%/-25%	+311%/-30%
Source	PHO1	FLK73	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 008973067-06 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-168 \pm 32$	$7.64^{+4.68}_{-3.84}$	$1141^{+69}_{-113}$	$5348^{+1995}_{-938}$	$330^{+936}_{-207}$
Alt.	$-256 \pm 36$	$7.57^{+4.27}_{-3.57}$	$1135^{+69}_{-119}$	$5841^{+2249}_{-1000}$	$516^{+1222}_{-315}$

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

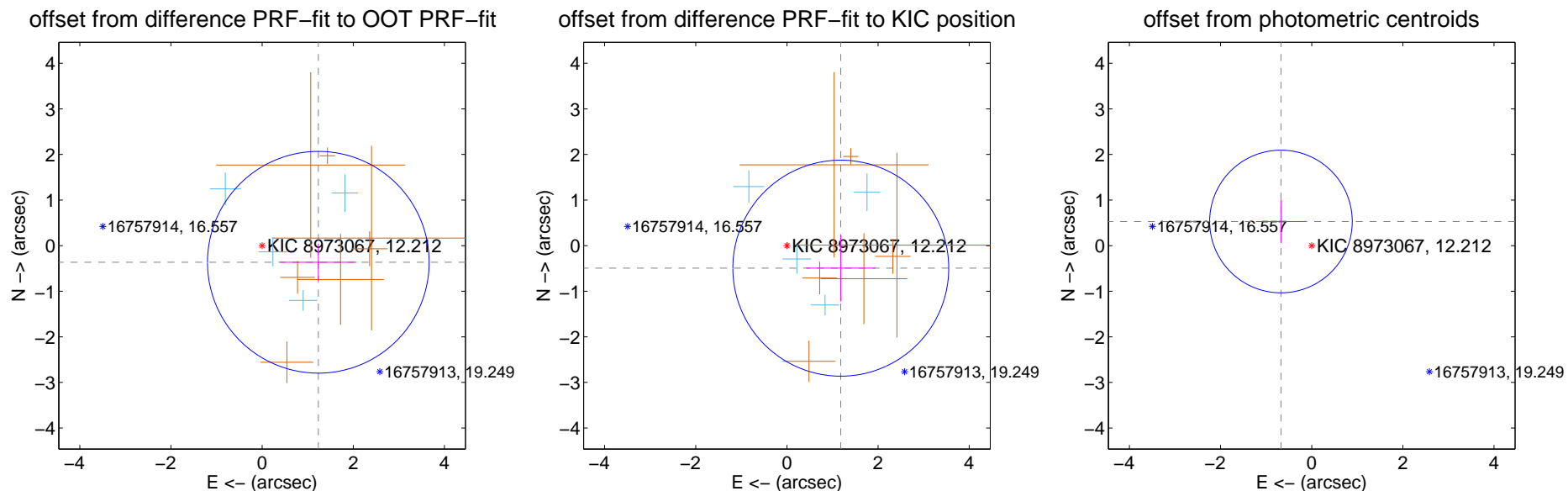
## DV Centroid Data

Supplemental centroid analysis for 008973067-06. Kepler magnitude: 12.21. Transit SNR 7.48

There are 4 quarters with good PRF difference image offsets

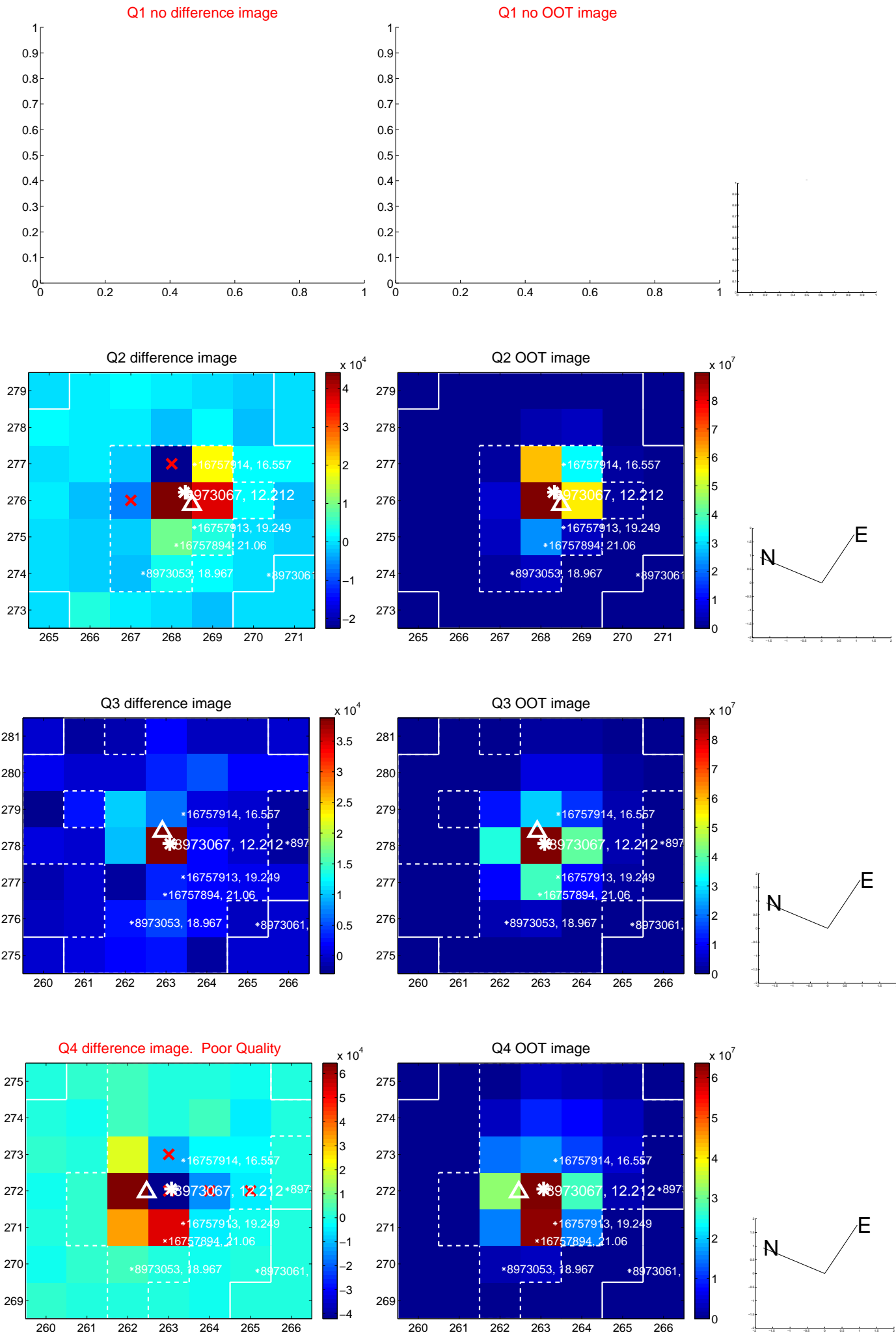
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.286 \pm 0.811$	1.59	$-1.233 \pm 0.837$	$-0.365 \pm 0.405$
PRF-fit source offset from KIC position	$1.281 \pm 0.790$	1.62	$-1.182 \pm 0.759$	$-0.494 \pm 0.729$
photometric centroid source offset	$0.86 \pm 0.52$	1.65	$0.67 \pm 0.55$	$0.53 \pm 0.47$

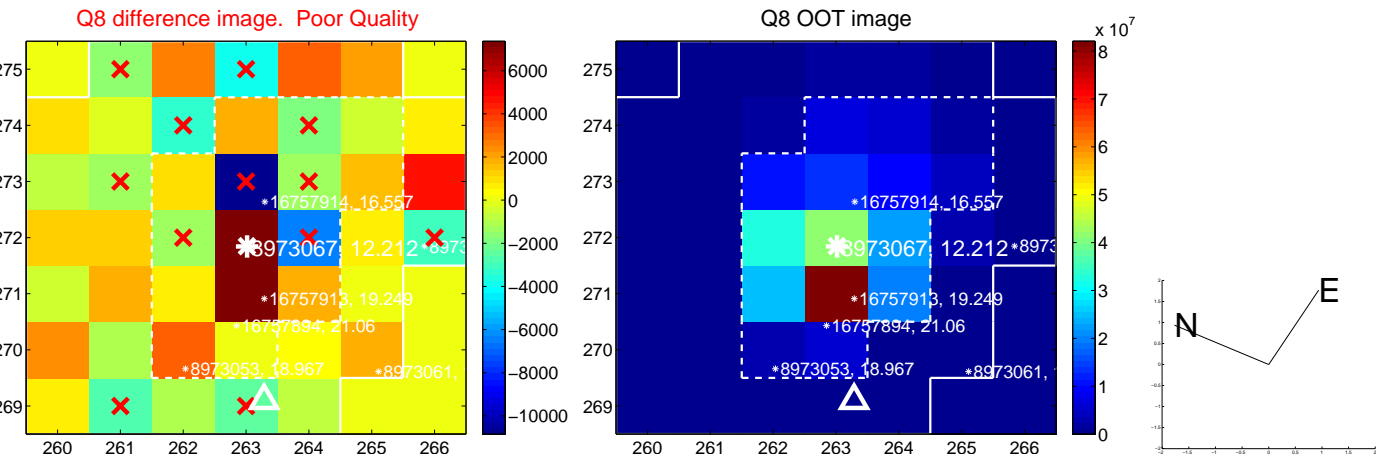
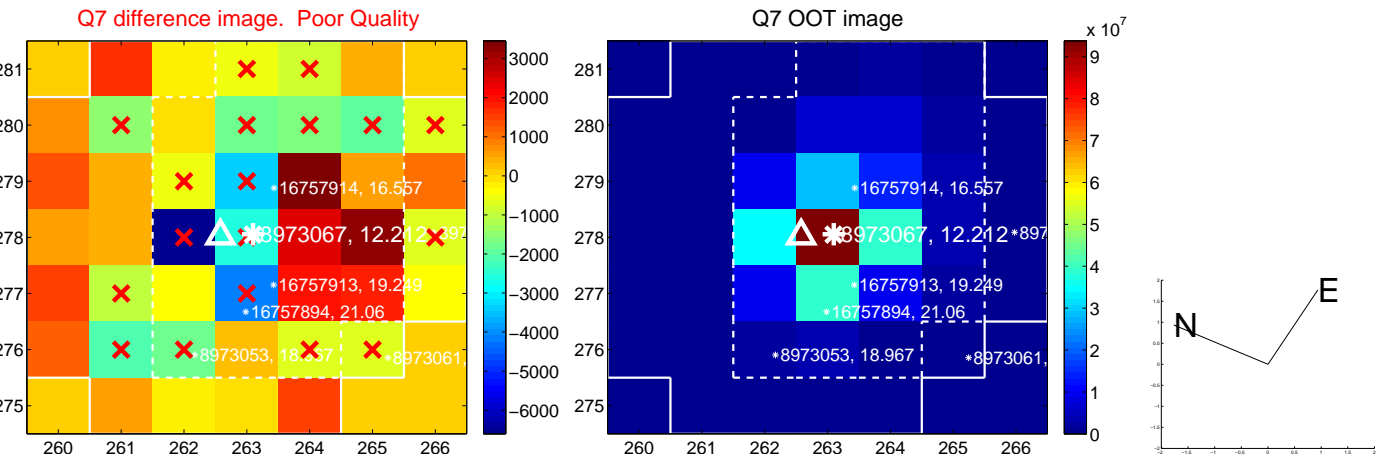
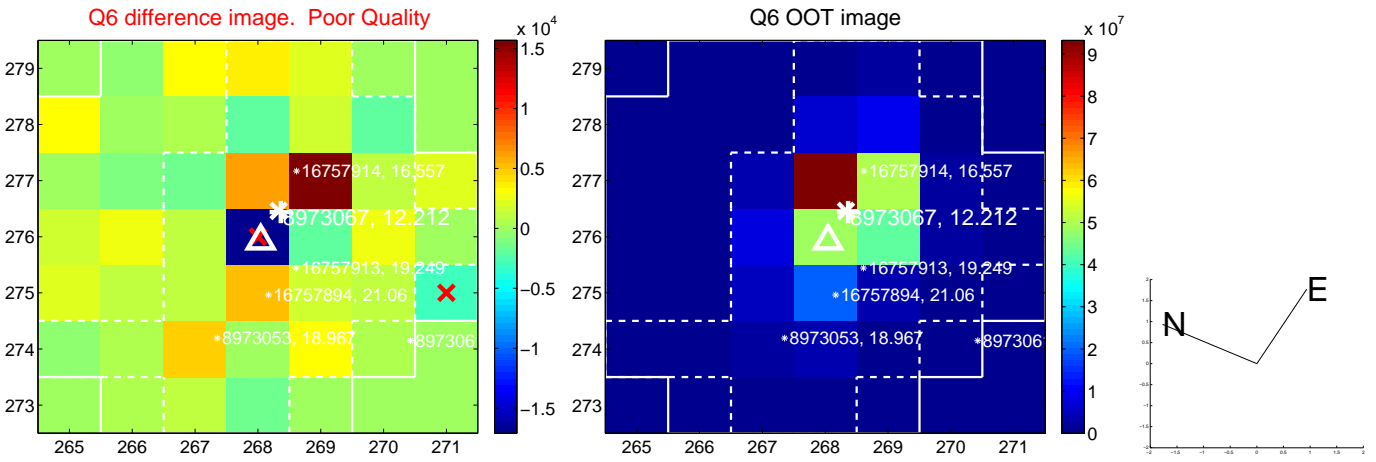
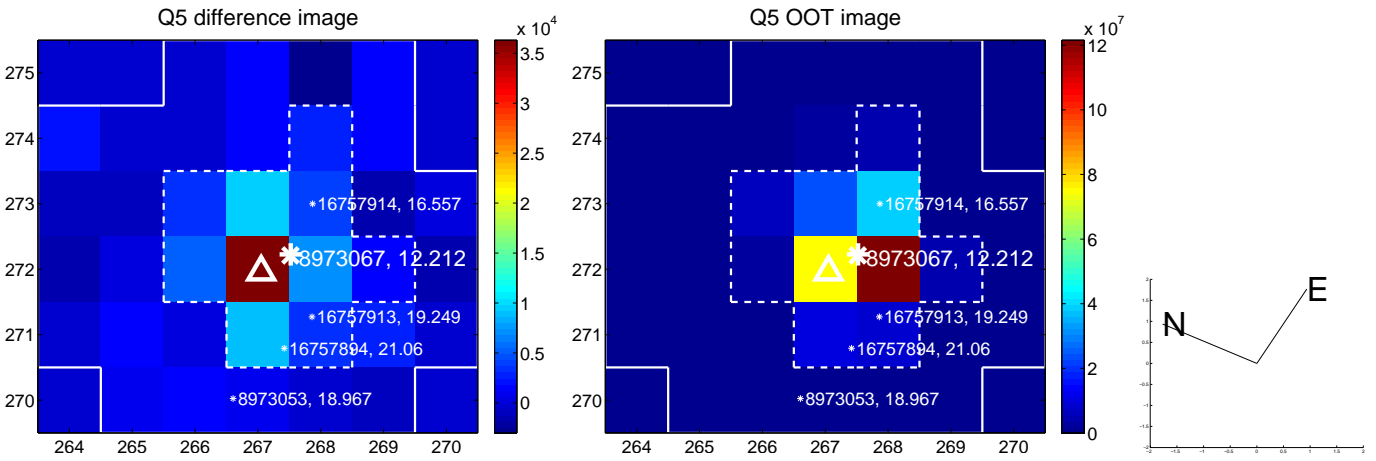


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

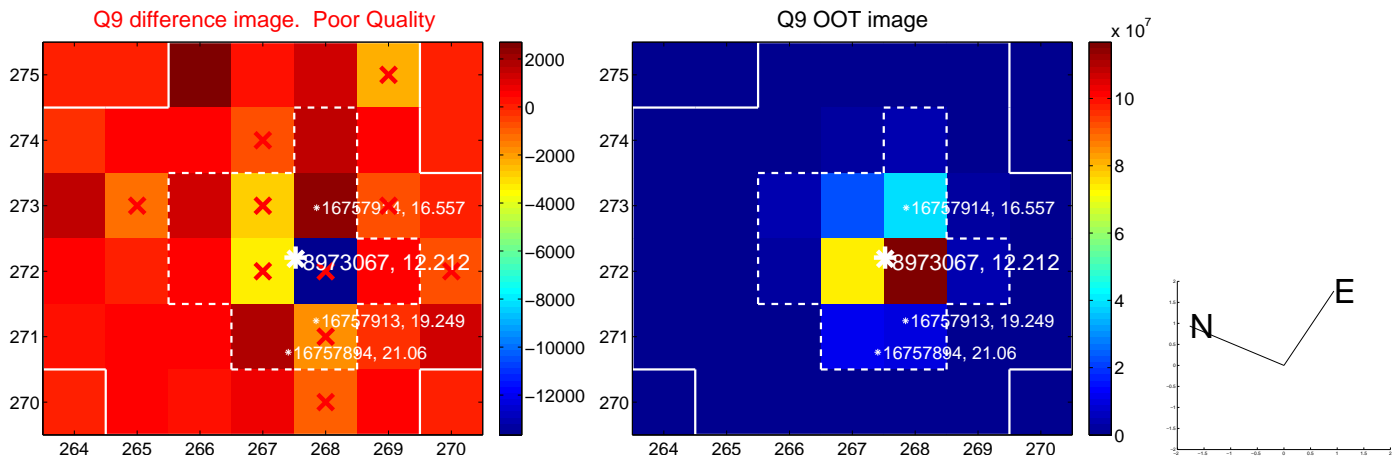
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



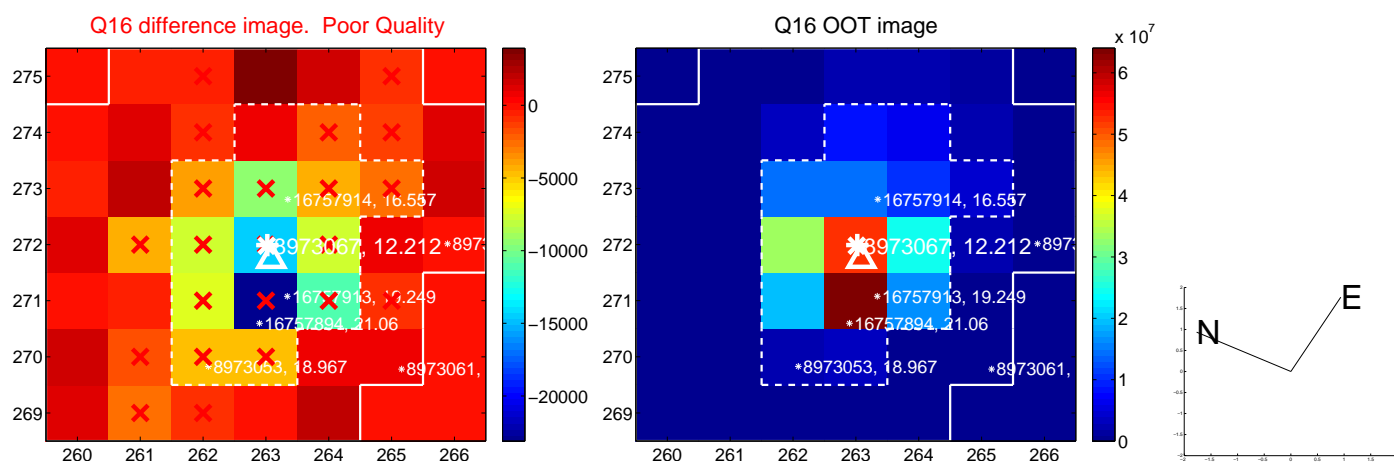
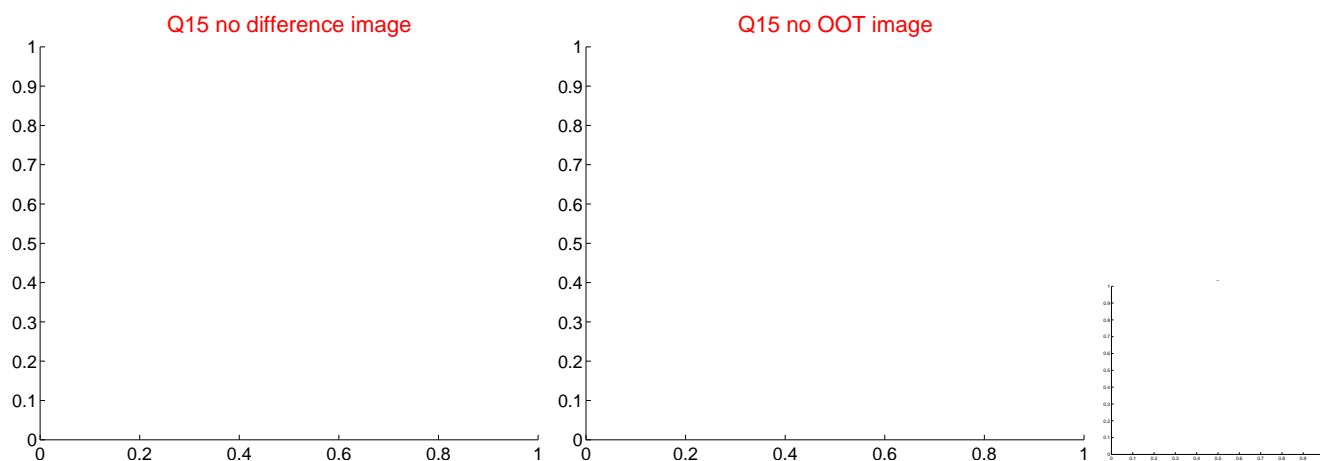
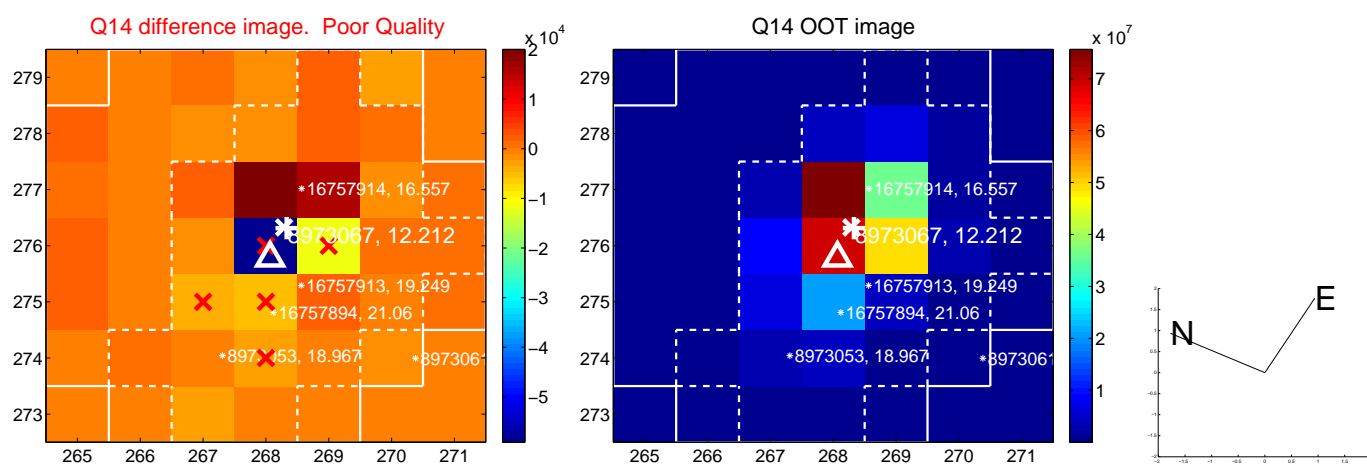
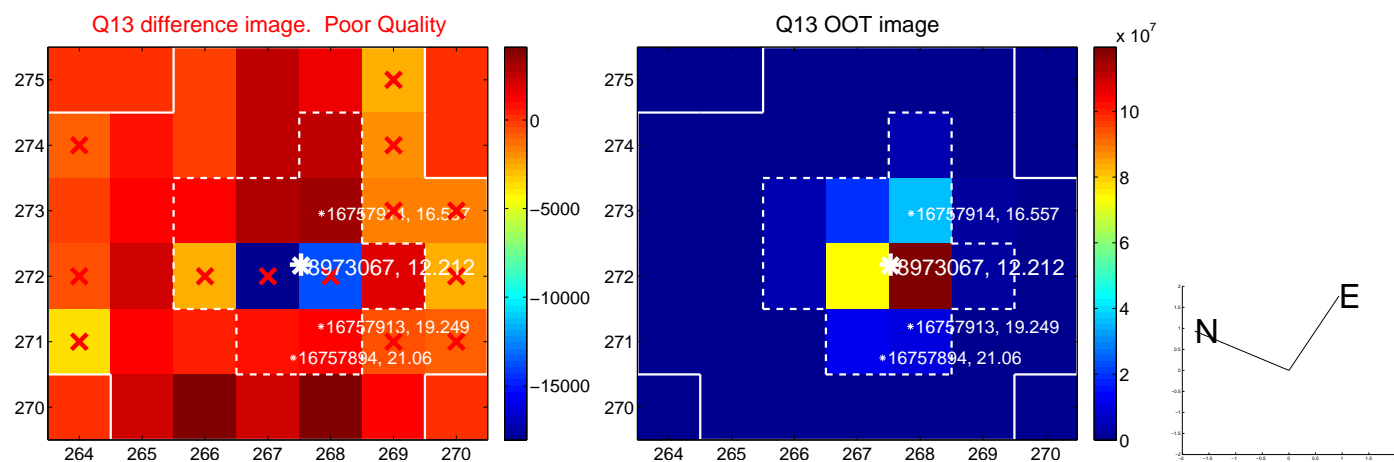
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



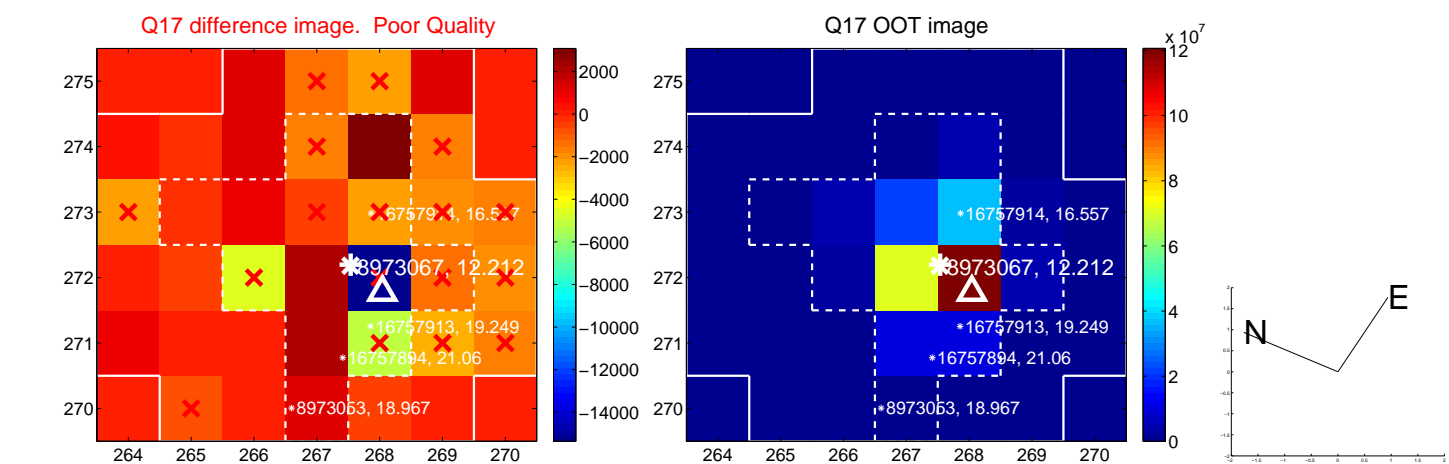
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



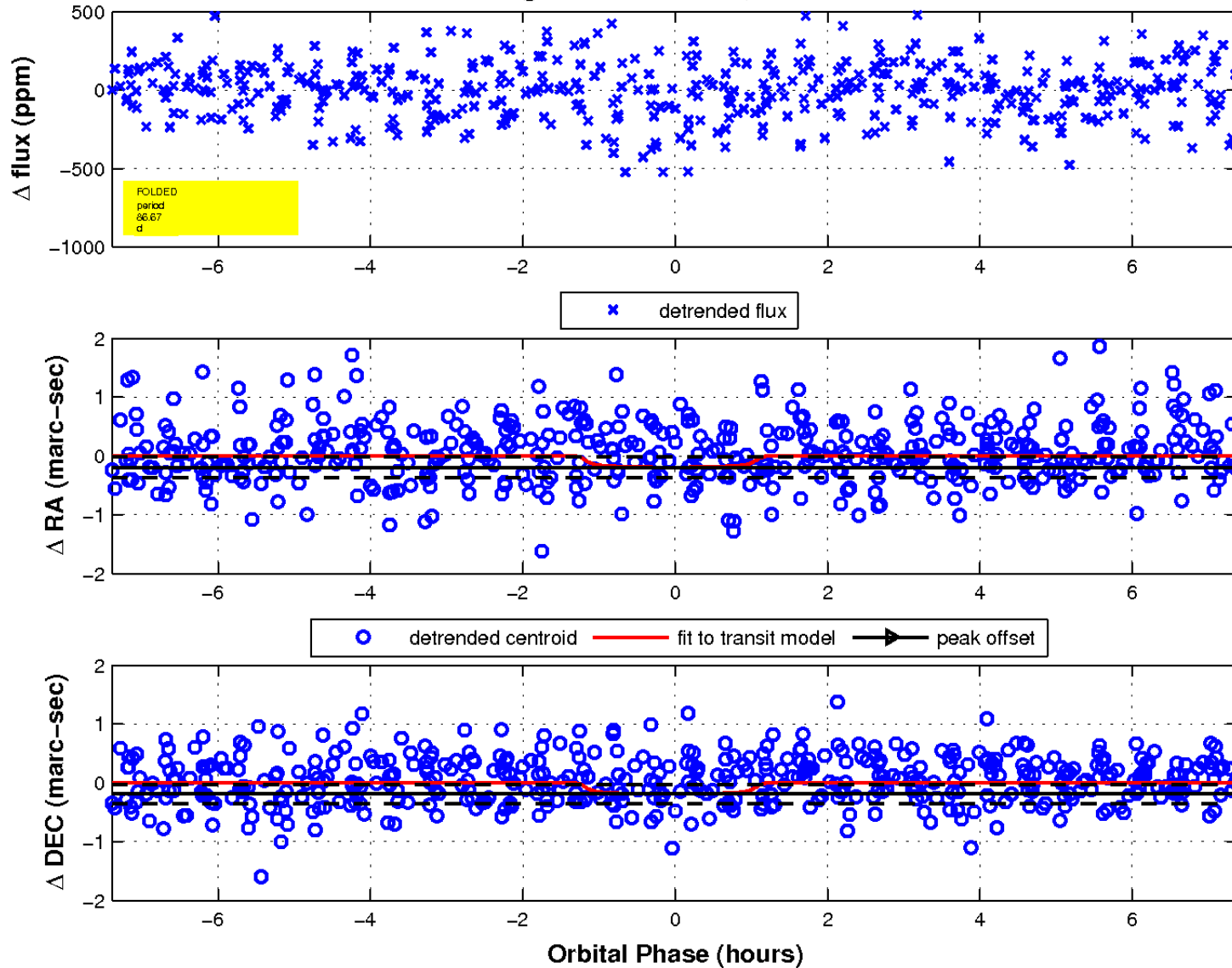
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 6 of 6



UKIRT Image

