

# KIC 003847077

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003847077-01	OBS	No	3.510672	134.697871	42.9	19.179	7.9	8.4	1.18	6442	0.85	911.55
003847077-02	OBS	No	165.374923	244.856952	231.0	3.194	18.9	3.0	1.18	6442	2.03	5.36
003847077-03	OBS	No	167.903463	225.255995	359.5	12.756	13.0	8.2	1.18	6442	2.64	5.25
003847077-04	OBS	No	124.223497	207.078213	229.8	5.604	7.6	6.8	1.18	6442	1.97	7.85
003847077-05	OBS	No	173.609950	297.696703	421.9	15.886	8.6	9.8	1.18	6442	2.60	5.02
003847077-06	OBS	No	14.070583	132.975133	188.3	11.235	7.8	8.7	1.18	6442	1.83	143.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003847077-01	OBS	FP	0.00	1	0	0	0	LPP_DV
003847077-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
003847077-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
003847077-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
003847077-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
003847077-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS—HALO_GHOST

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

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

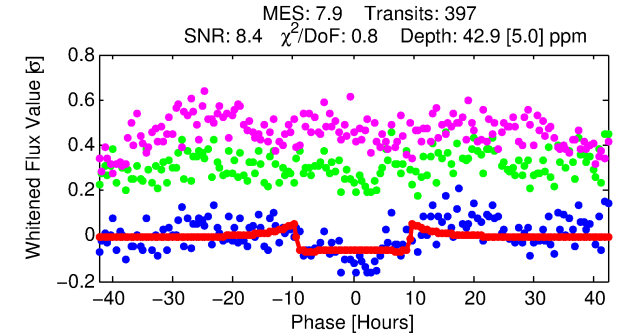
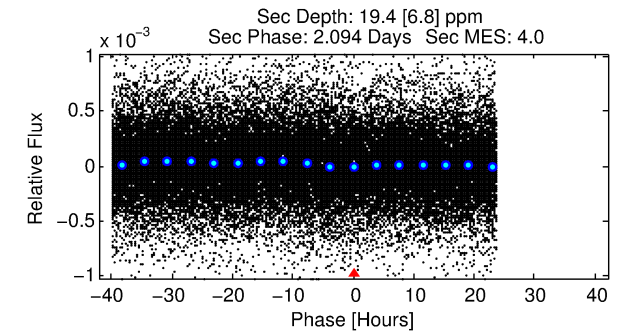
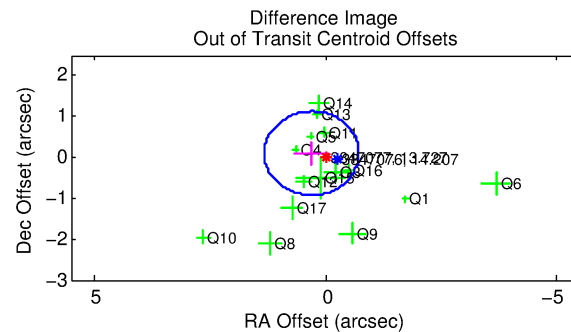
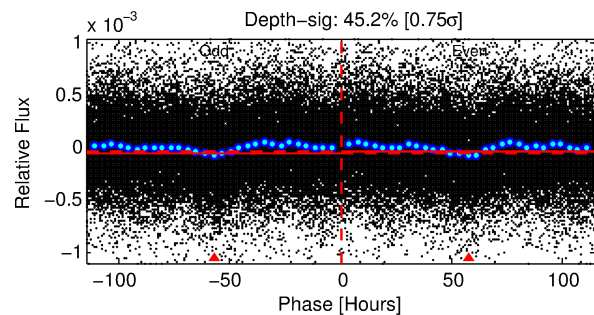
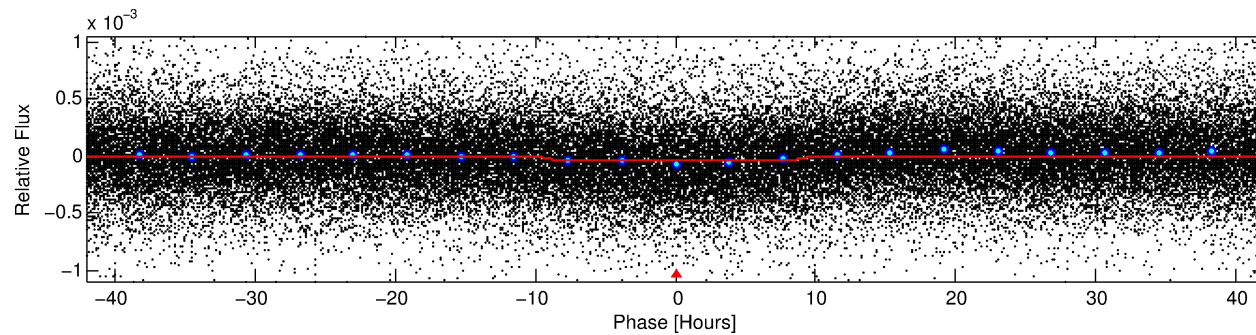
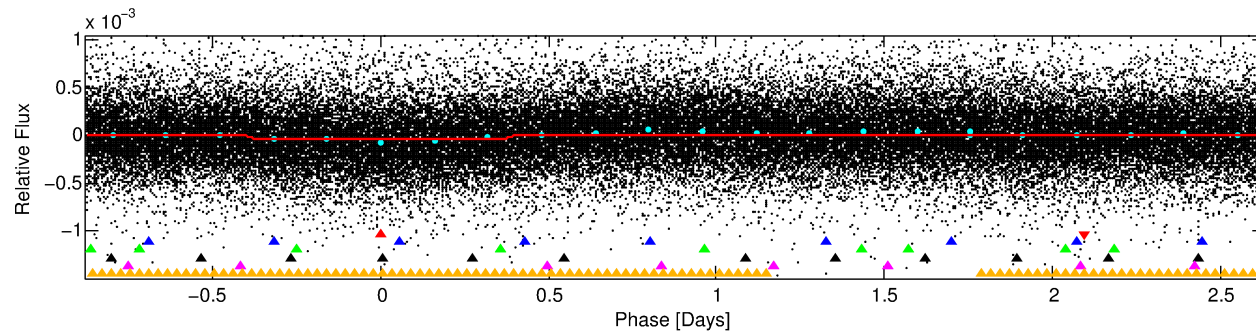
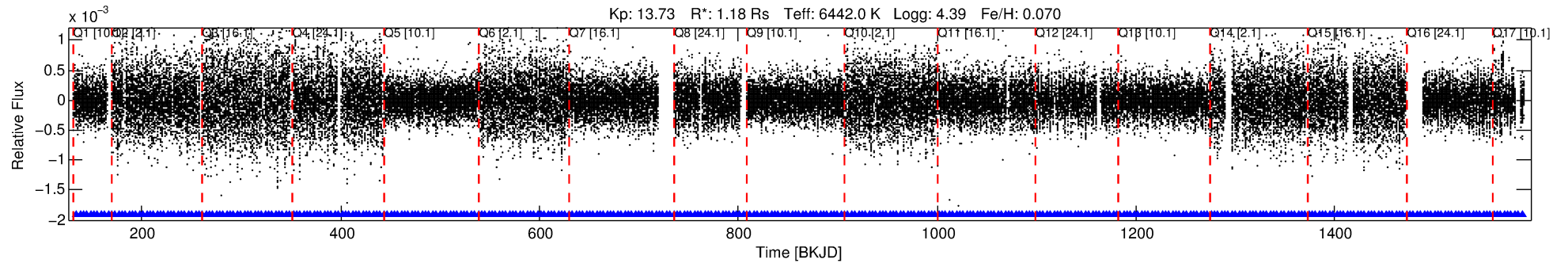
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003847077-01

No Significant Match Found

# DV One-Page Summary

KIC: 3847077 Candidate: 1 of 6 Period: 3.511 d



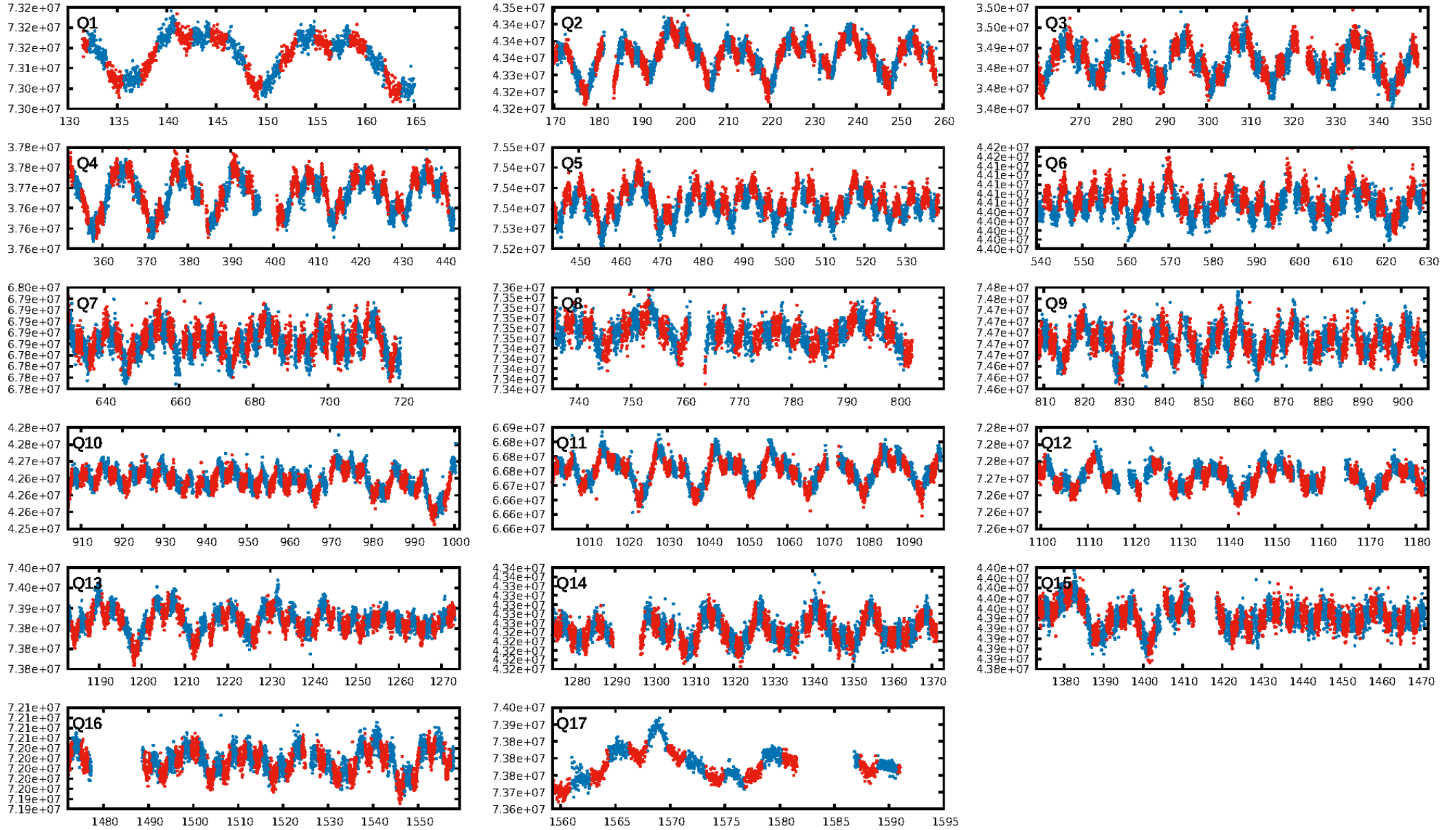
## DV Fit Results:

Period = 3.51067 [0.00005] d  
Epoch = 134.6979 [0.0097] BKJD  
Rp/R\* = 0.0066 [0.0015]  
a/R\* = 1.25 [0.53]  
b = 0.78 [0.61]  
Seff = 911.55 [401.57]  
Teff = 1401 [154] K  
Rp = 0.85 [0.37] Re  
a = 0.0487 [0.0145] AU  
Ag = 35.03 [25.03] [1.36 $\sigma$ ]  
Teffp = 5270 [780] K [4.87 $\sigma$ ]

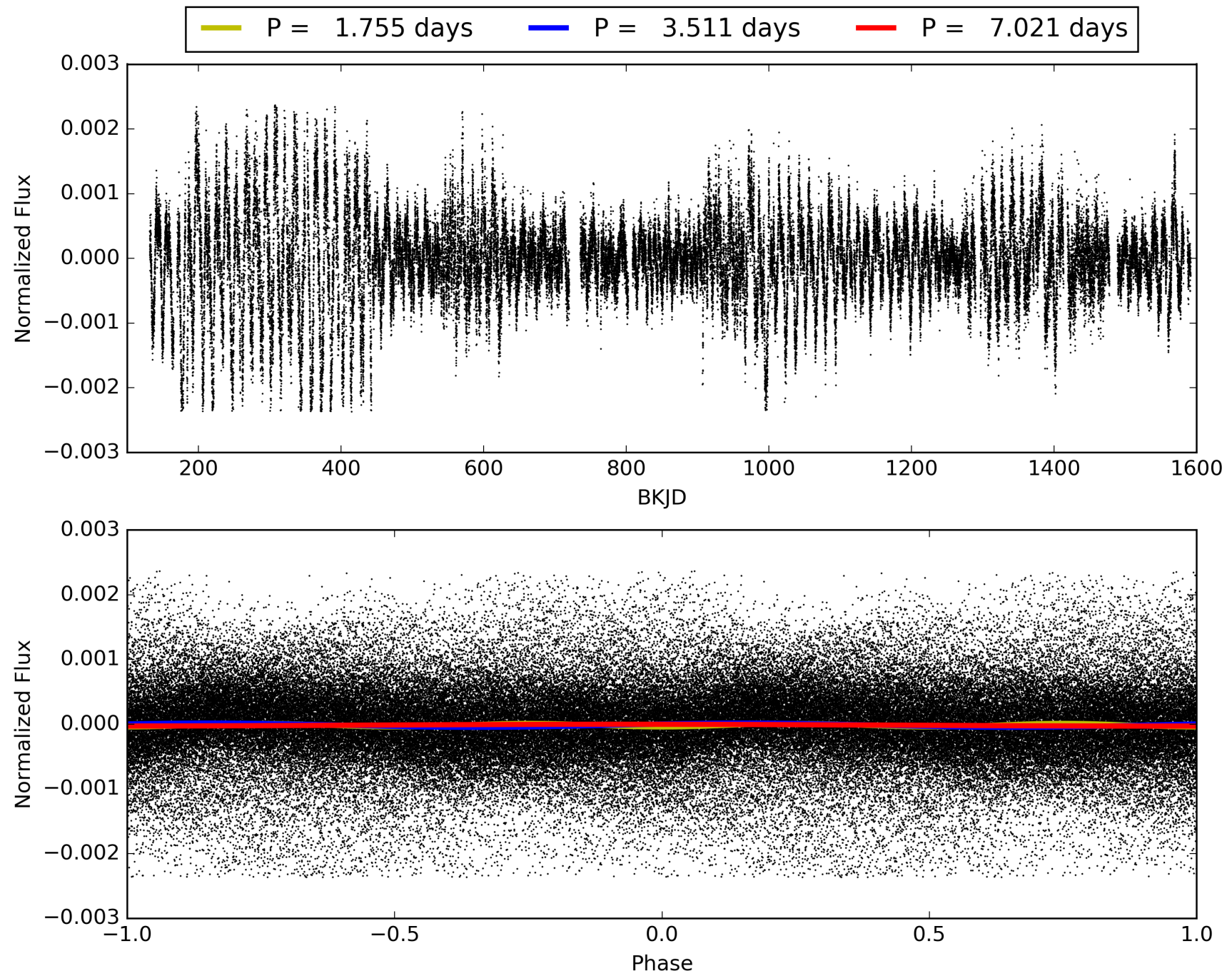
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [11.40 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
**Bootstrap-pfa: 5.33e-09**  
RollingBand-fgt: 1.00 [379/379]  
GhostDiagnostic-chr: 1.746  
**Centroid-sig: 0.0%**  
Centroid-so: 1.501 arcsec [2.31 $\sigma$ ]  
OotOffset-rm: 0.319 arcsec [0.93 $\sigma$ ]  
KicOffset-rm: 0.321 arcsec [0.84 $\sigma$ ]  
OotOffset-st: 3/3/4/5 [15]  
KicOffset-st: 3/3/4/5 [15]  
DiffImageQuality-fgm: 0.67 [10/15]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 003847077-01, PDC Light Curves



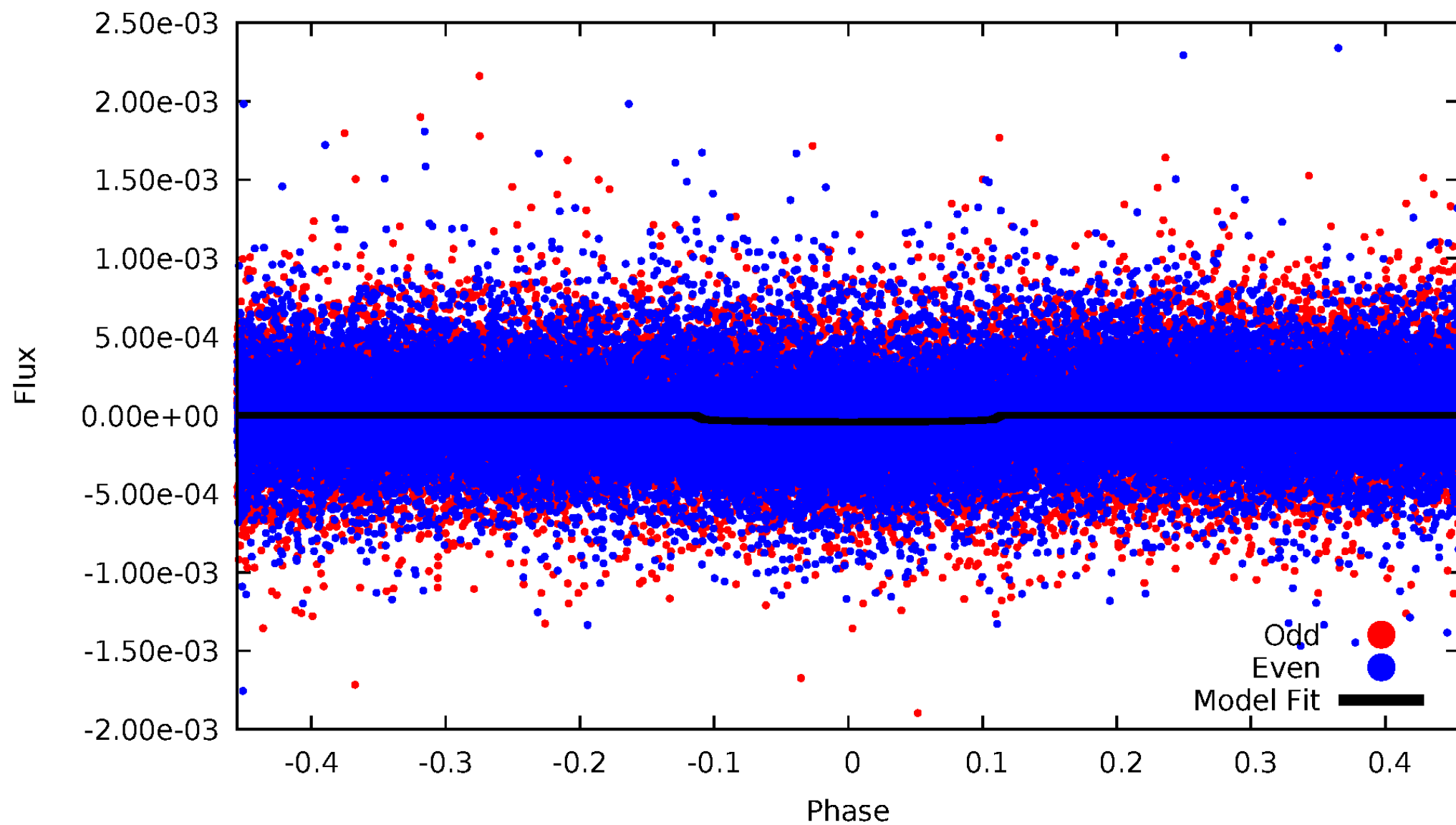
TCE 003847077-01





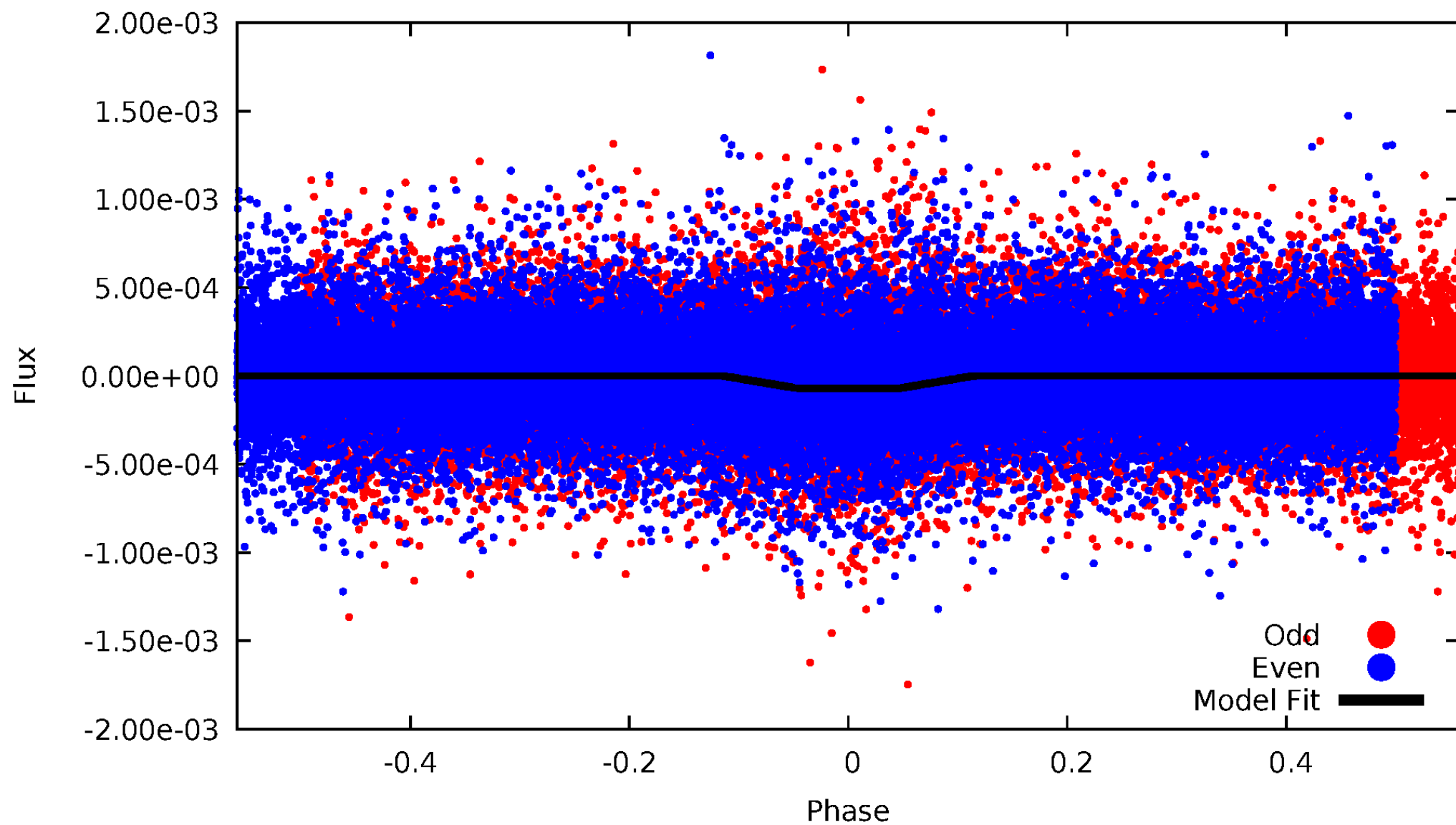
# DV Odd/Even

TCE 003847077-01



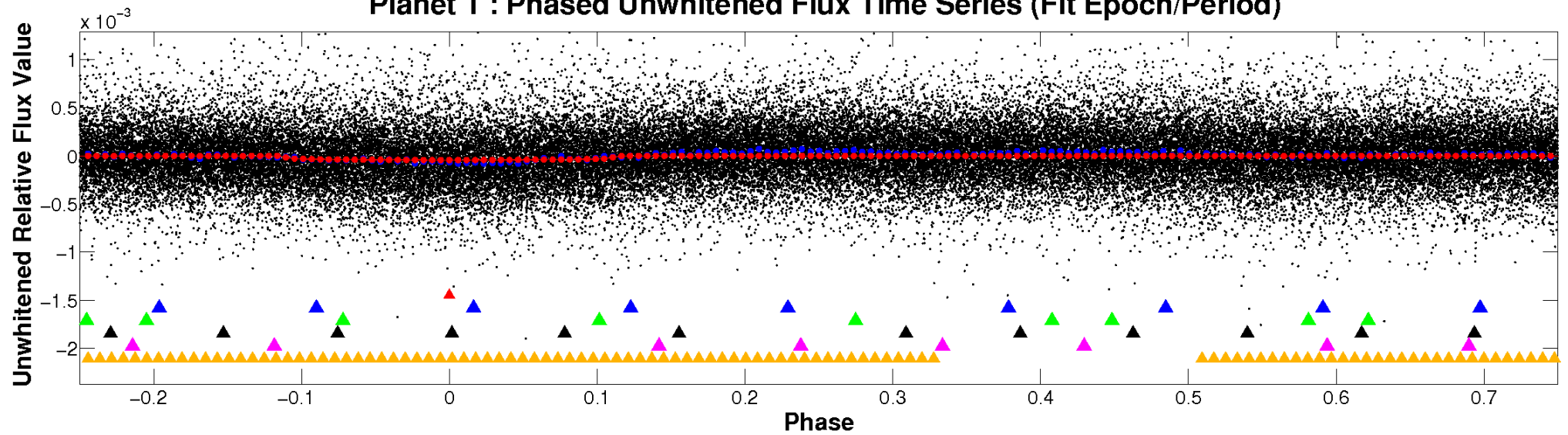
# ALT Odd/Even

TCE 003847077-01

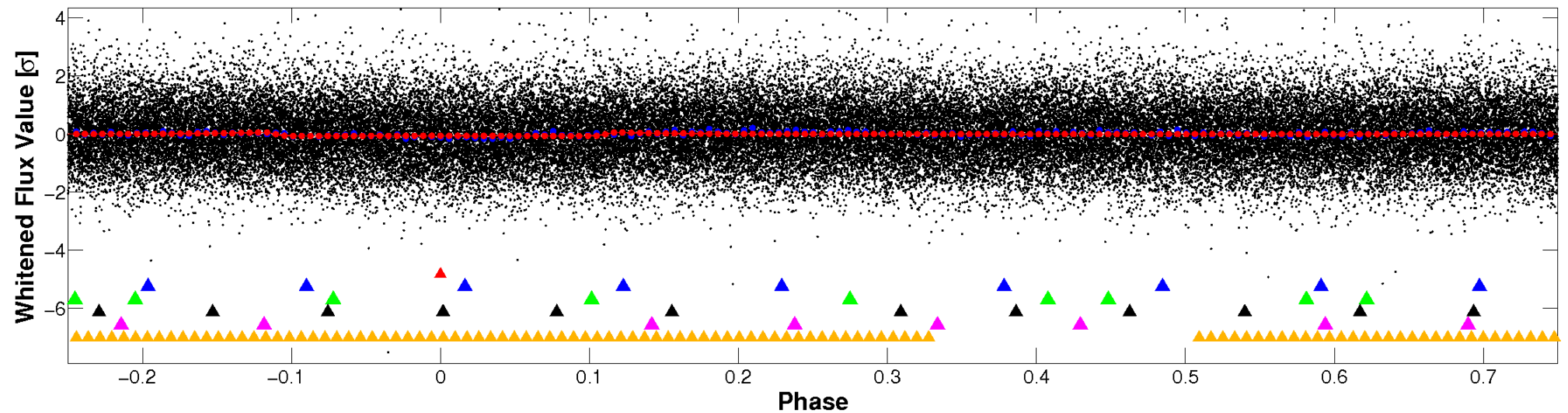


# Non-Whitened Vs. Whitened Light Curve

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

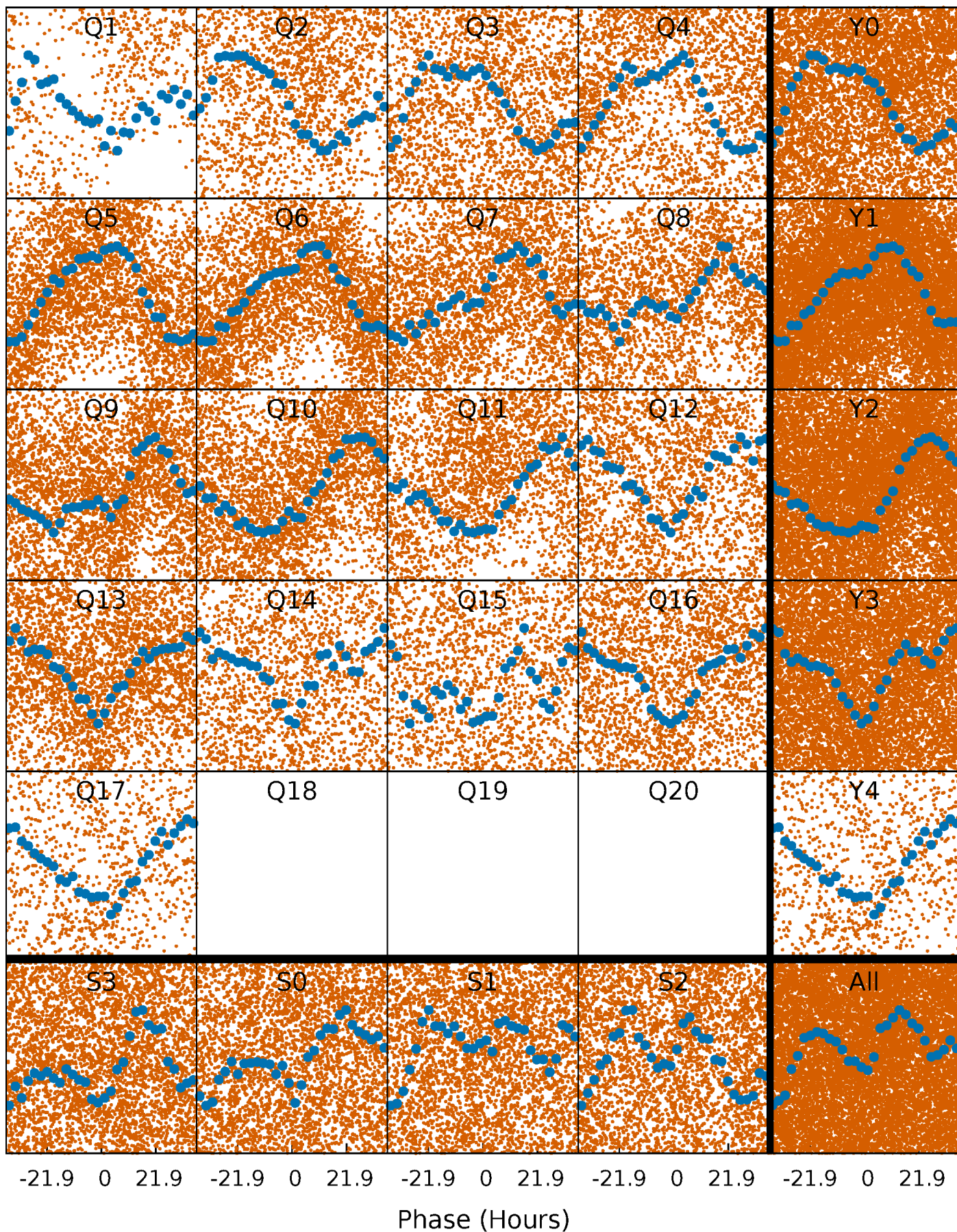


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

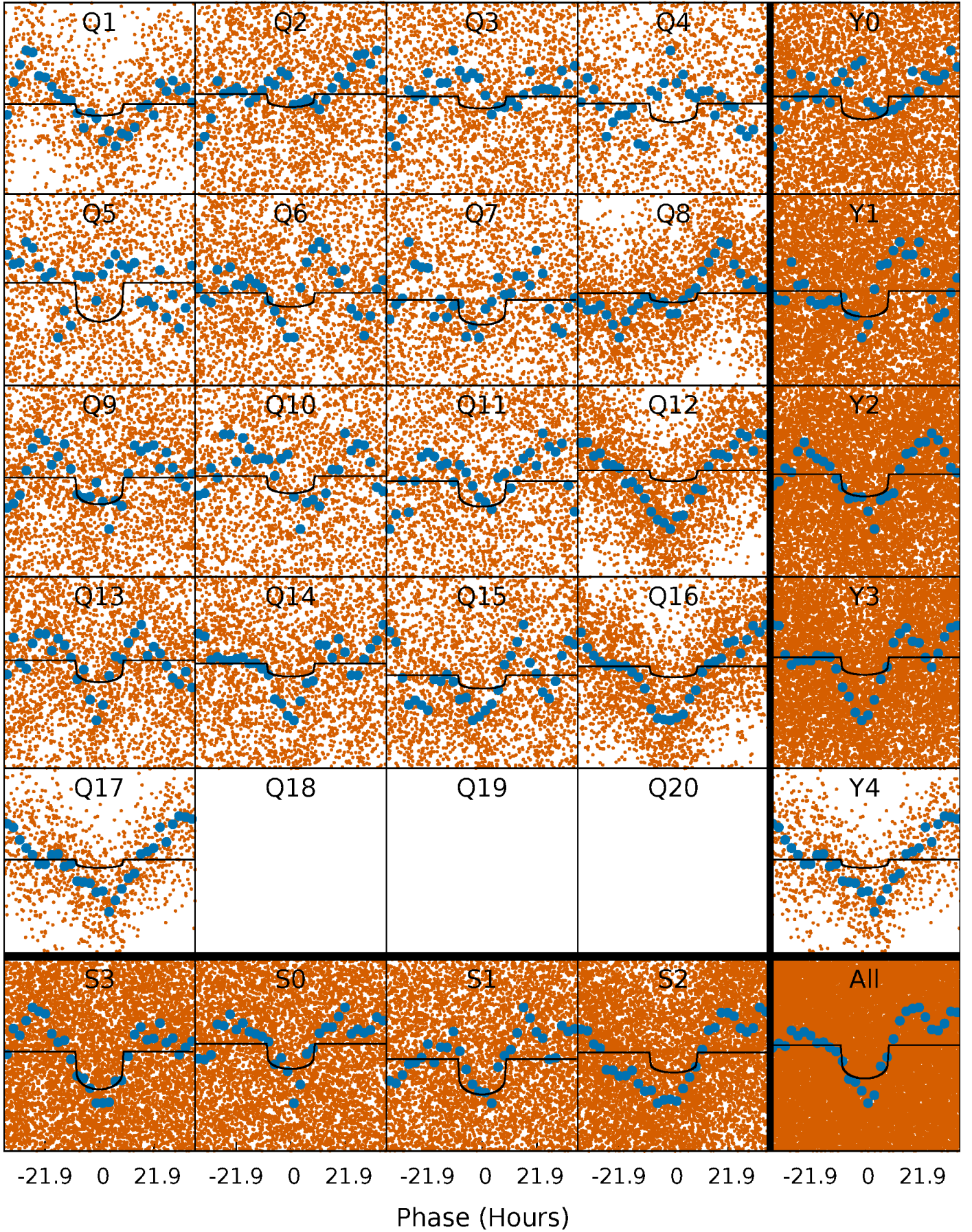
TCE 003847077-01 P= 3.510672 Days  $T_0=134.697871$  (BKJD)





# DV Quarter-Phased Transit Curves

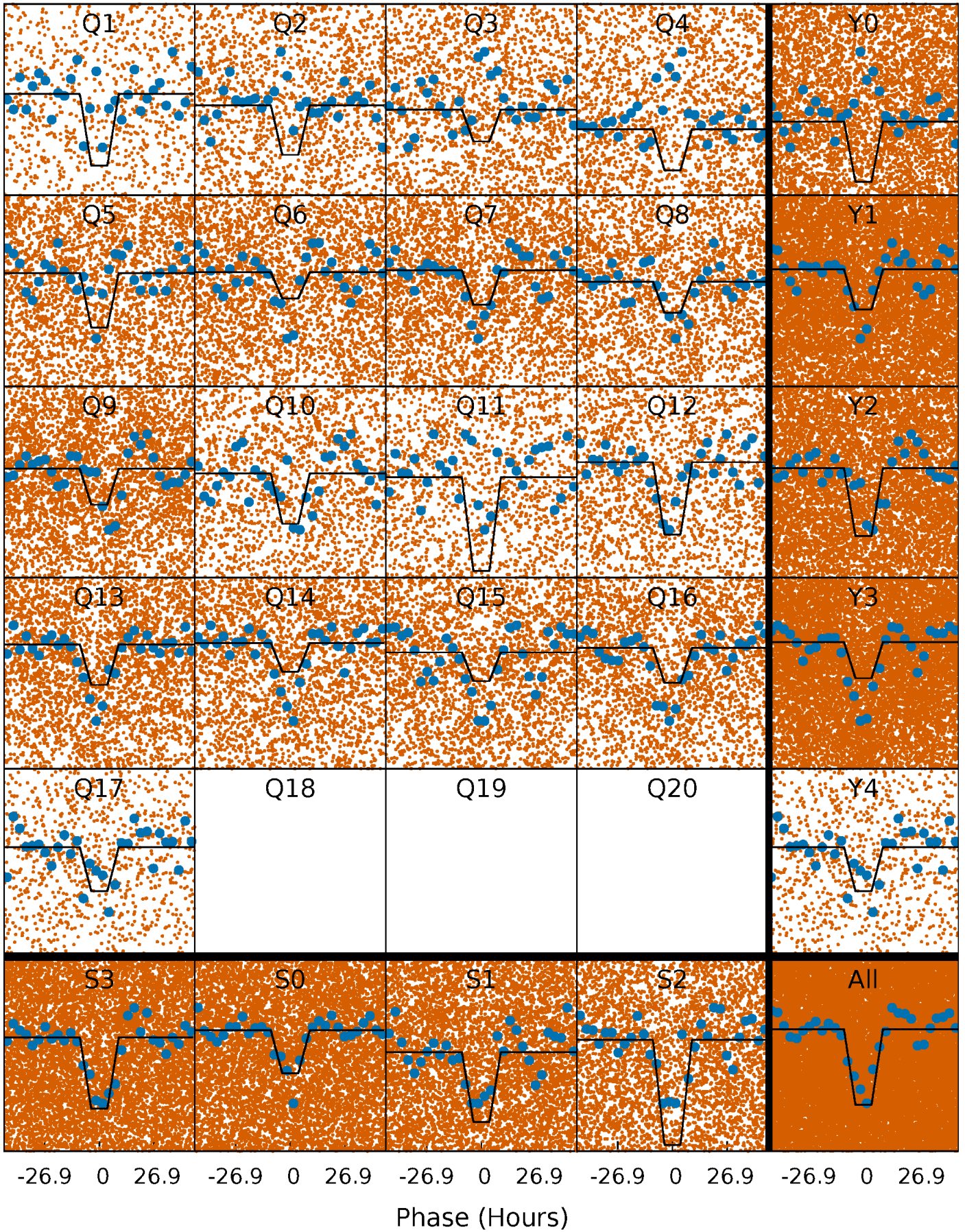
TCE 003847077-01 P= 3.510672 Days  $T_0=134.697871$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

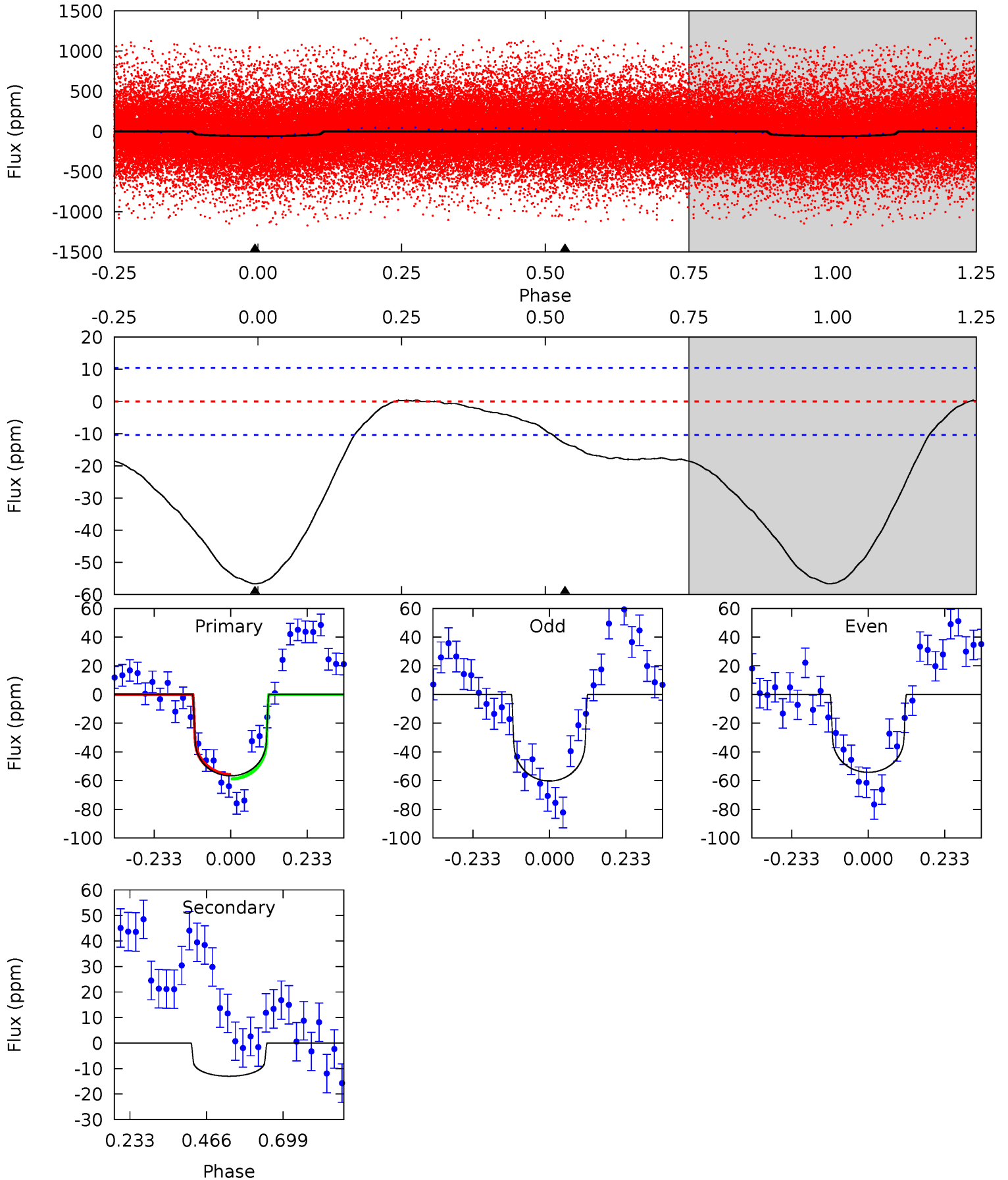
TCE 003847077-01 P= 3.510714 Days  $T_0=134.686649$  (BKJD)



# DV Model-Shift Uniqueness Test

003847077-01, P = 3.510672 Days, E = 131.187199 Days

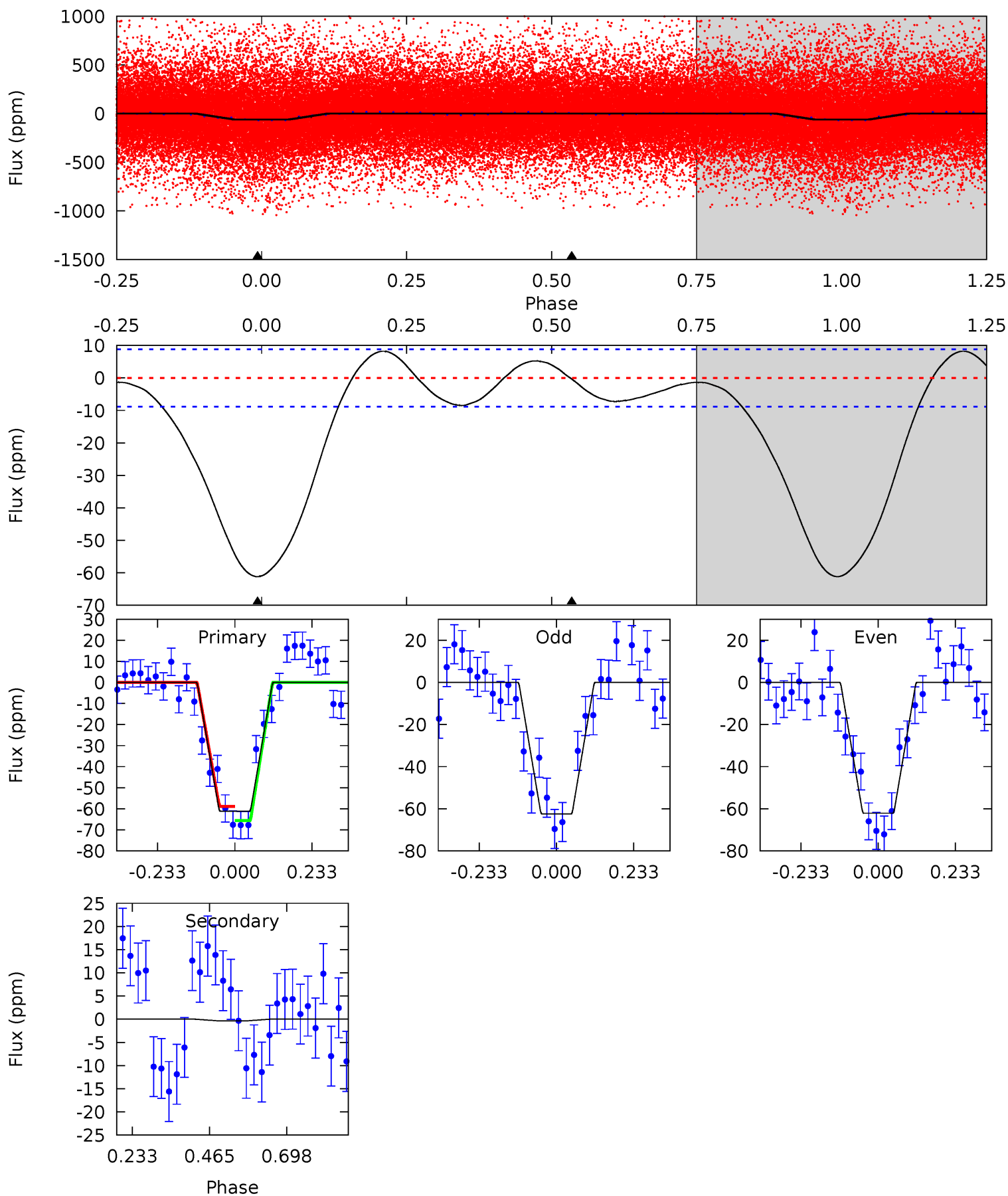
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
23.9	5.48	0	0	4.38	1.19	2.55	23.9	23.9	5.48	5.48	1.29	0.86	0.01	0.65



# Alt Model-Shift Uniqueness Test

003847077-01, P = 3.510714 Days, E = 131.175935 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
30.3	0.17	0	0	4.38	1.19	2.24	30.3	30.3	0.17	0.17	0.09	0.68	0.12	1.64





### Stellar Parameters For KIC 003847077

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6442^{+145}_{-209}$	$4.388^{+0.056}_{-0.224}$	$0.070^{+0.250}_{-0.300}$	$1.183^{+0.431}_{-0.144}$	$1.250^{+0.184}_{-0.165}$	$1.062^{+0.252}_{-0.610}$
	+2%/-3%	+1%/-5%	+357%/-429%	+36%/-12%	+15%/-13%	+24%/-57%
Source	PHO1	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 003847077-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	-13±2	$0.89^{+0.27}_{-0.21}$	$2002^{+158}_{-101}$	$4830^{+608}_{-452}$	$21^{+14}_{-9}$
Alt.	-0±2	$1.13^{+0.28}_{-0.22}$	$1997^{+142}_{-98}$	$1937^{+1294}_{-5138}$	$0.326^{+2.094}_{-1.981}$

$T_{max}$  = 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

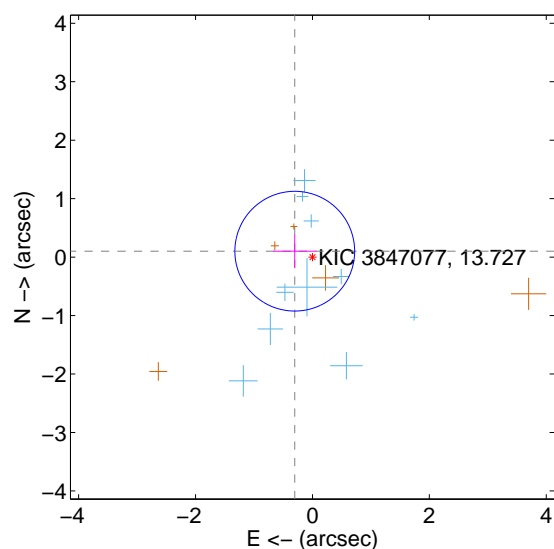
Supplemental centroid analysis for 003847077-01. Kepler magnitude: 13.73. Transit SNR 8.41

There are 10 quarters with good PRF difference image offsets

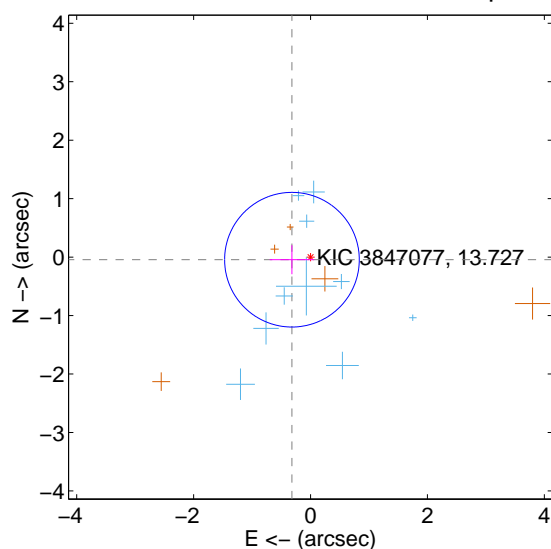
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.319 \pm 0.341$	0.93	$0.303 \pm 0.368$	$0.101 \pm 0.282$
PRF-fit source offset from KIC position	$0.321 \pm 0.384$	0.84	$0.318 \pm 0.380$	$-0.045 \pm 0.247$
photometric centroid source offset	$1.50 \pm 0.65$	2.31	$-0.86 \pm 0.52$	$1.23 \pm 0.70$

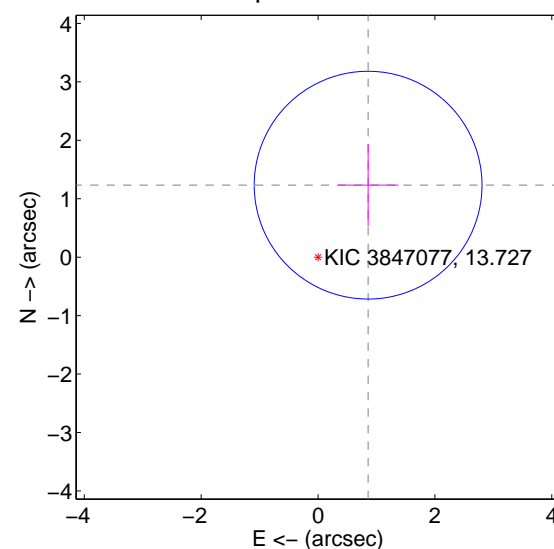
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

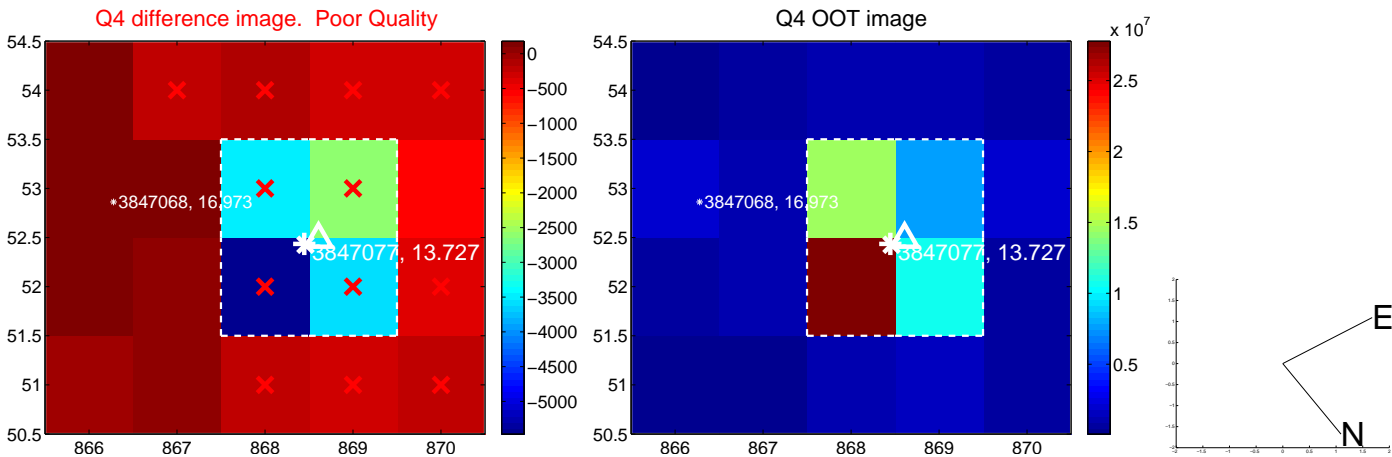
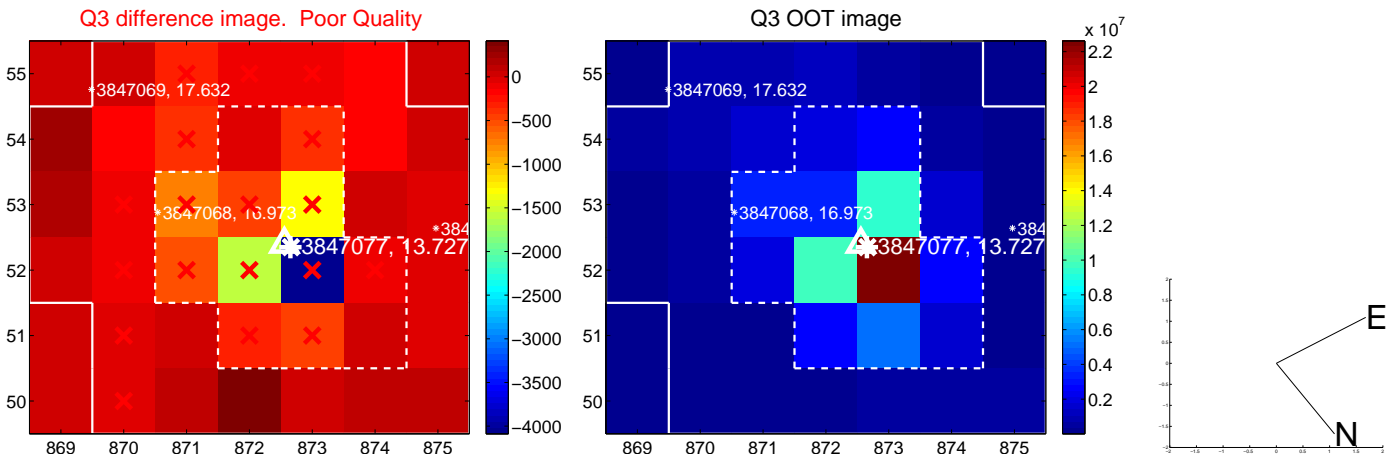
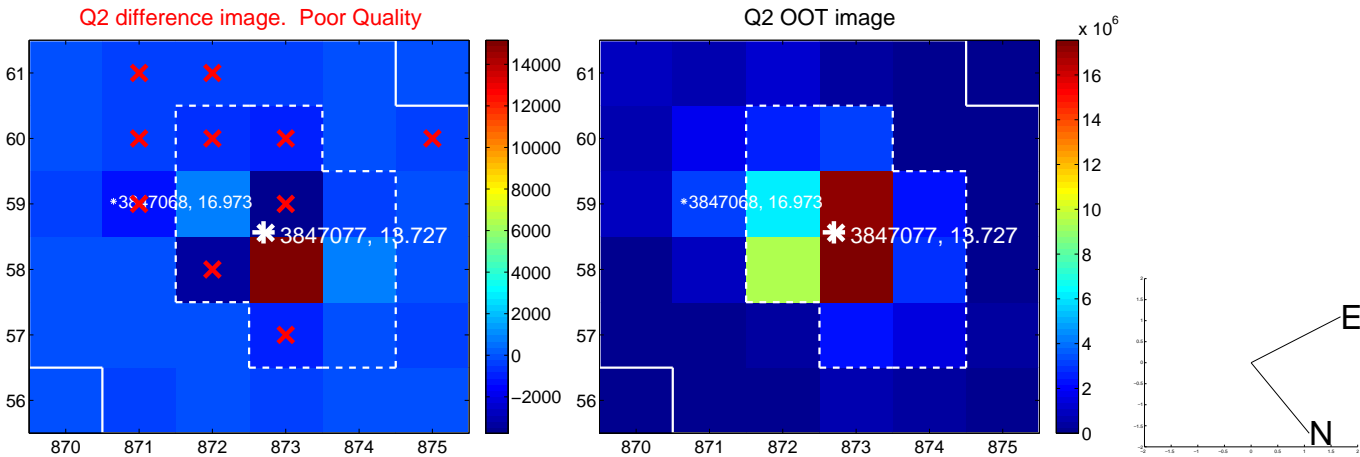
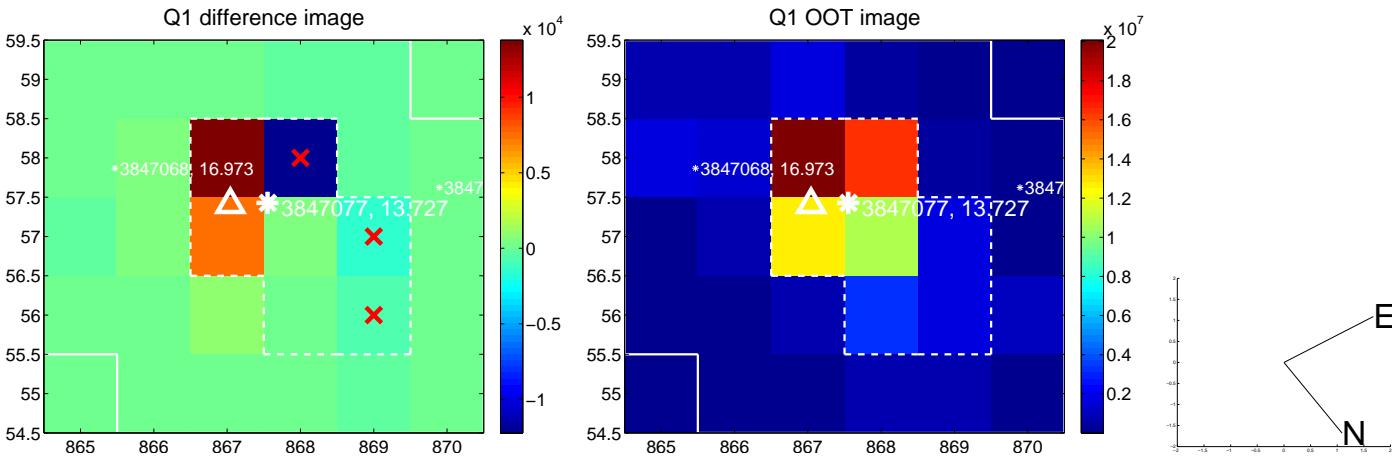


offset from photometric centroids

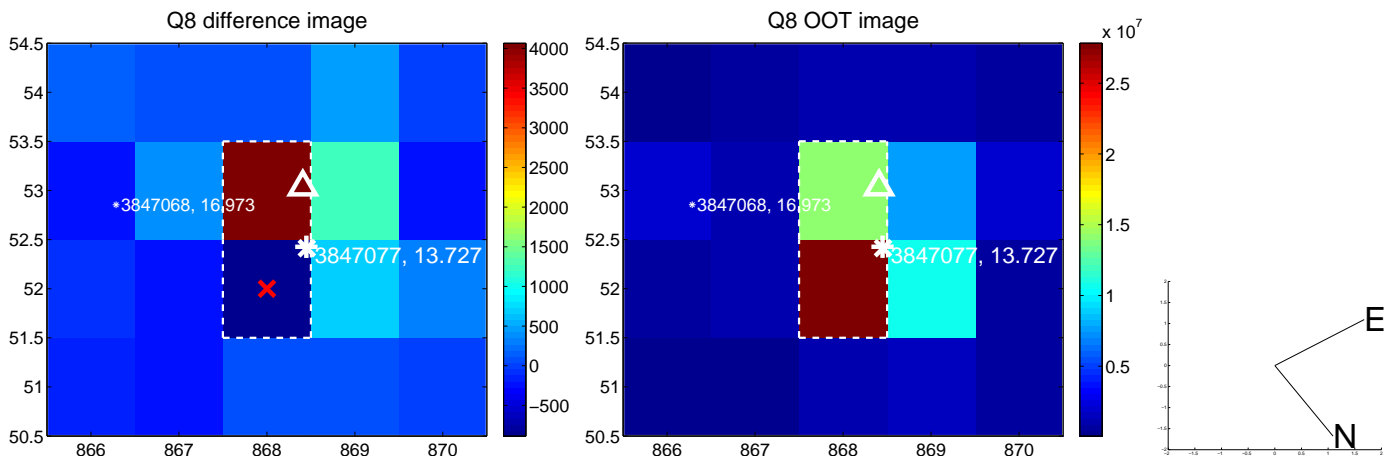
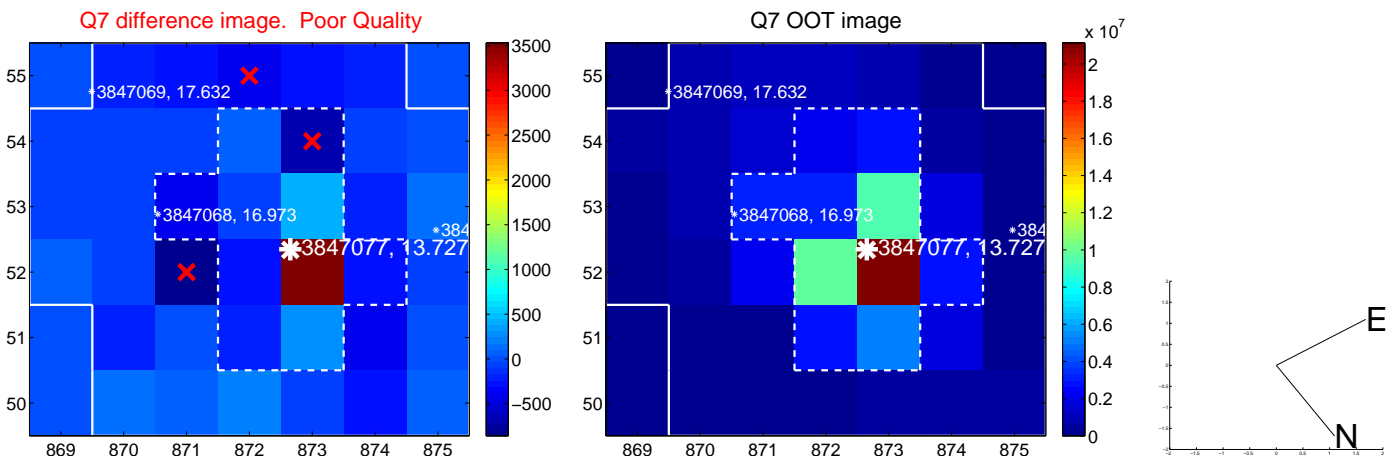
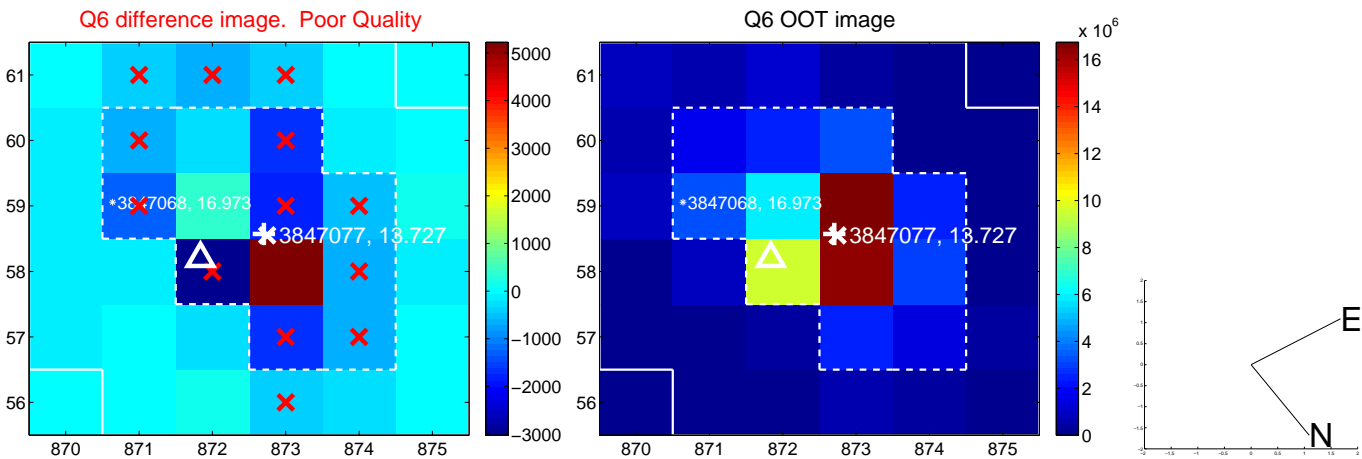
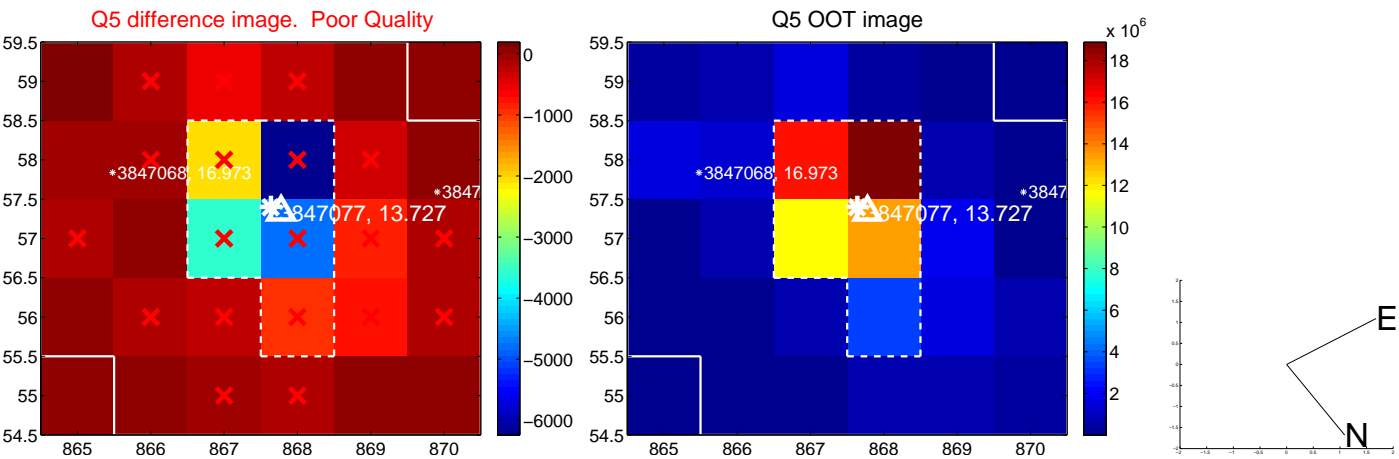


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

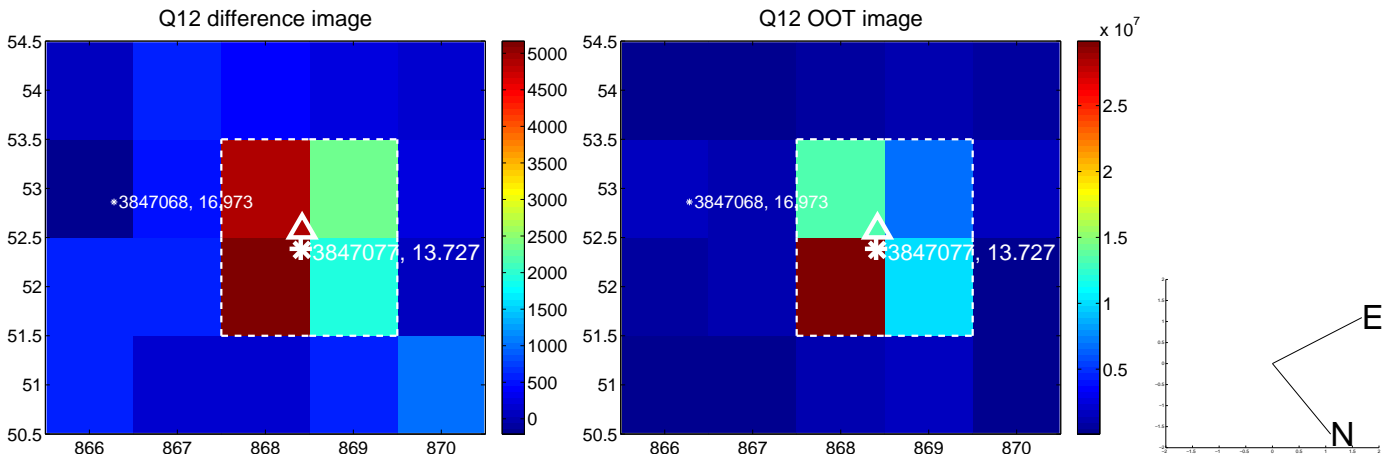
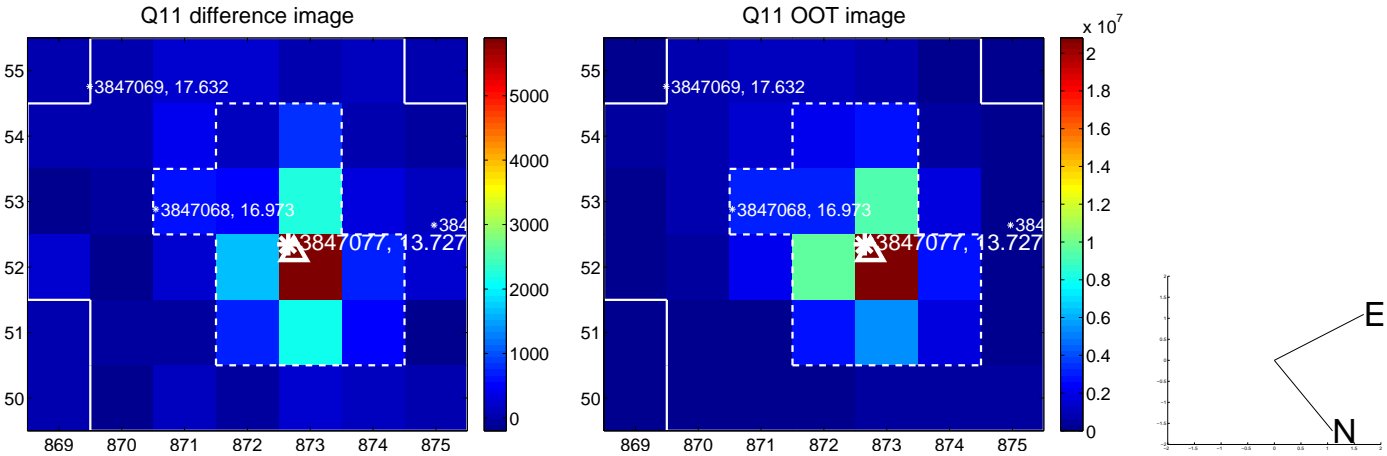
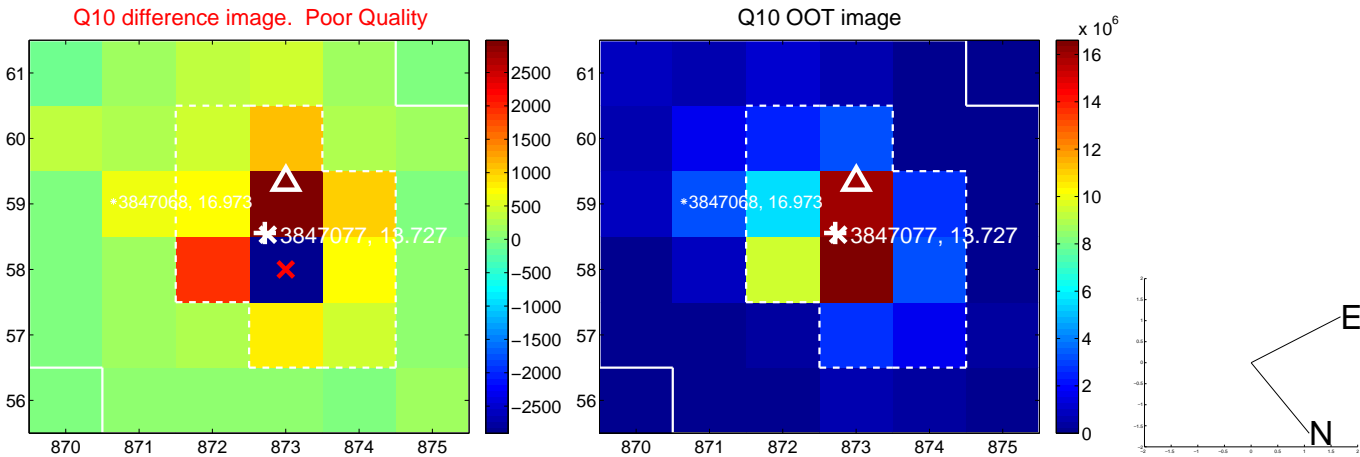
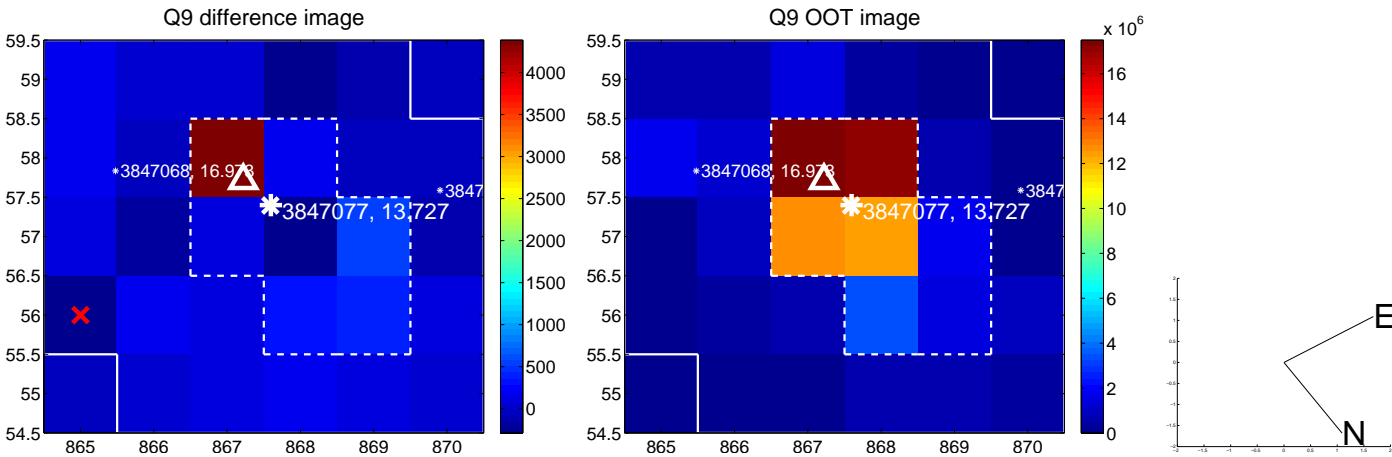


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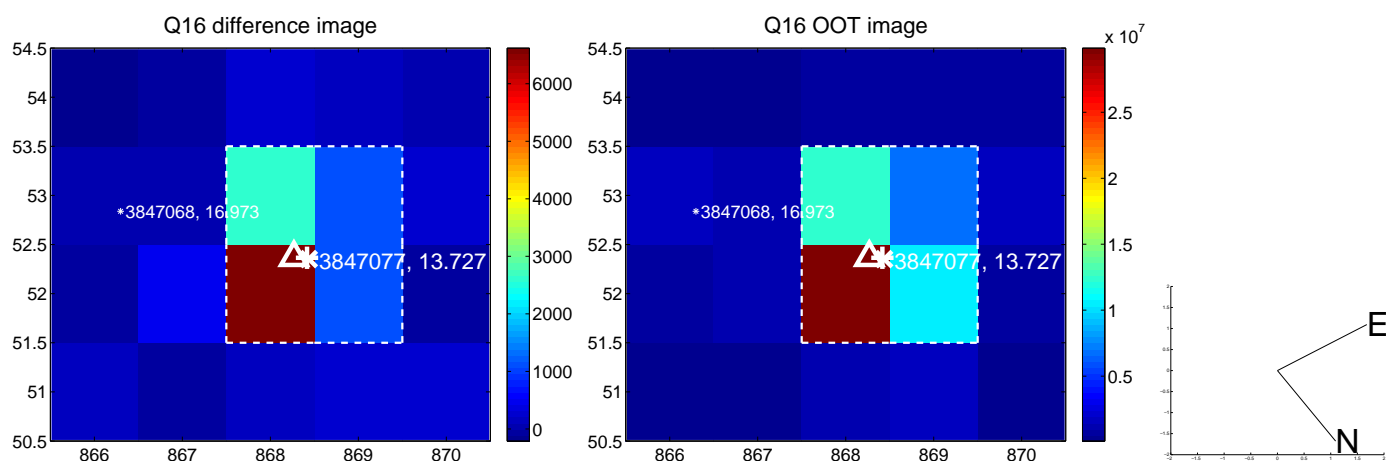
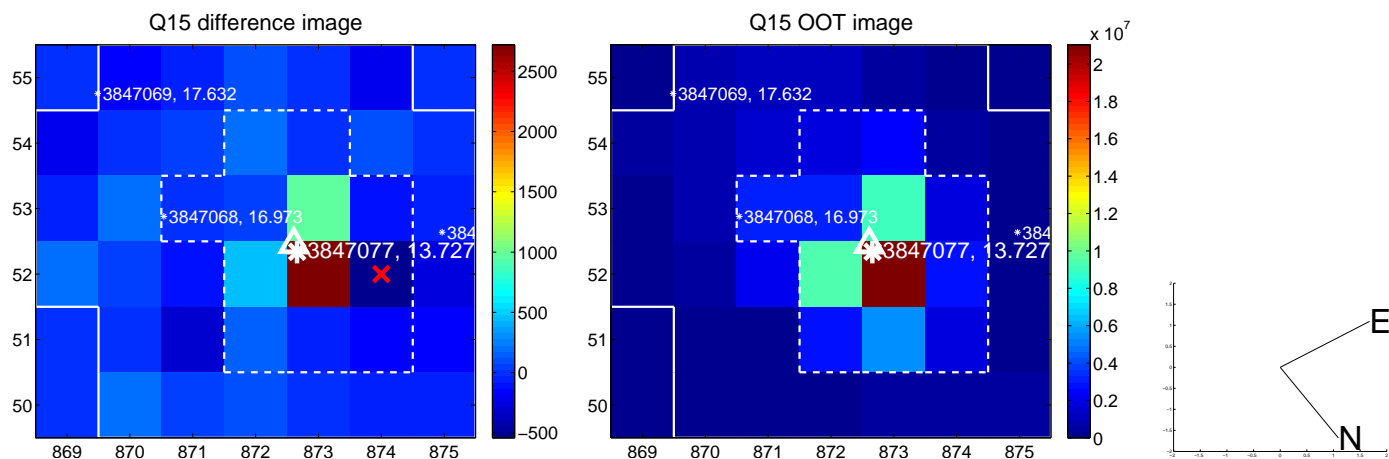
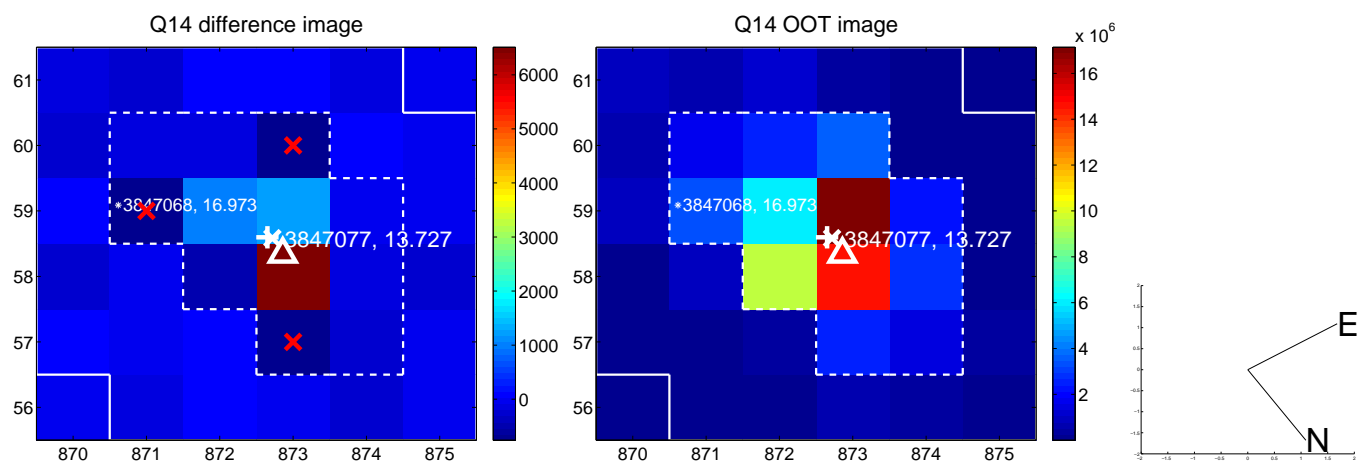
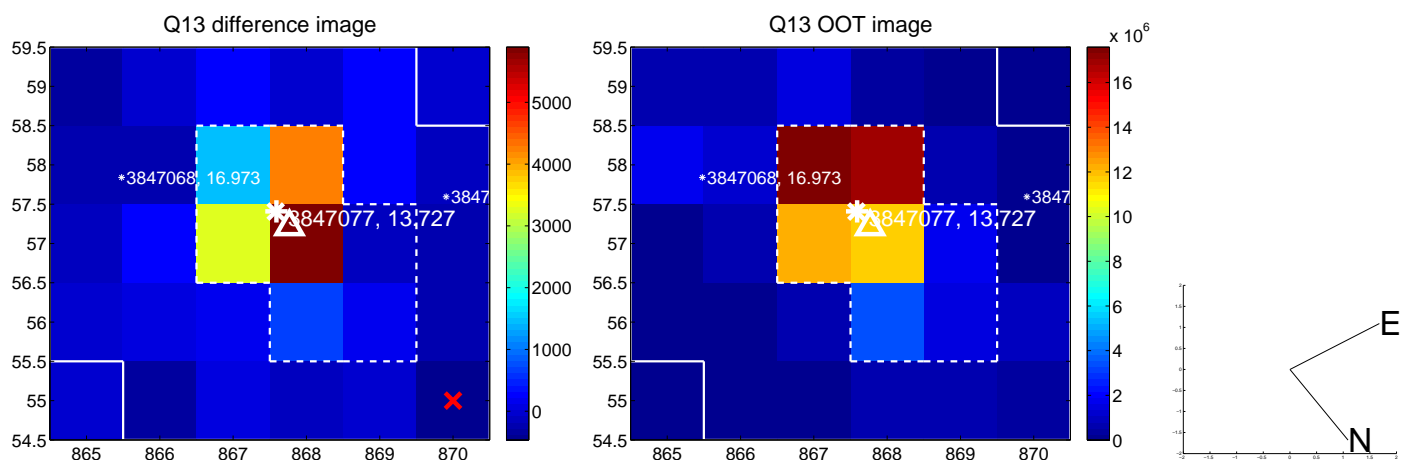




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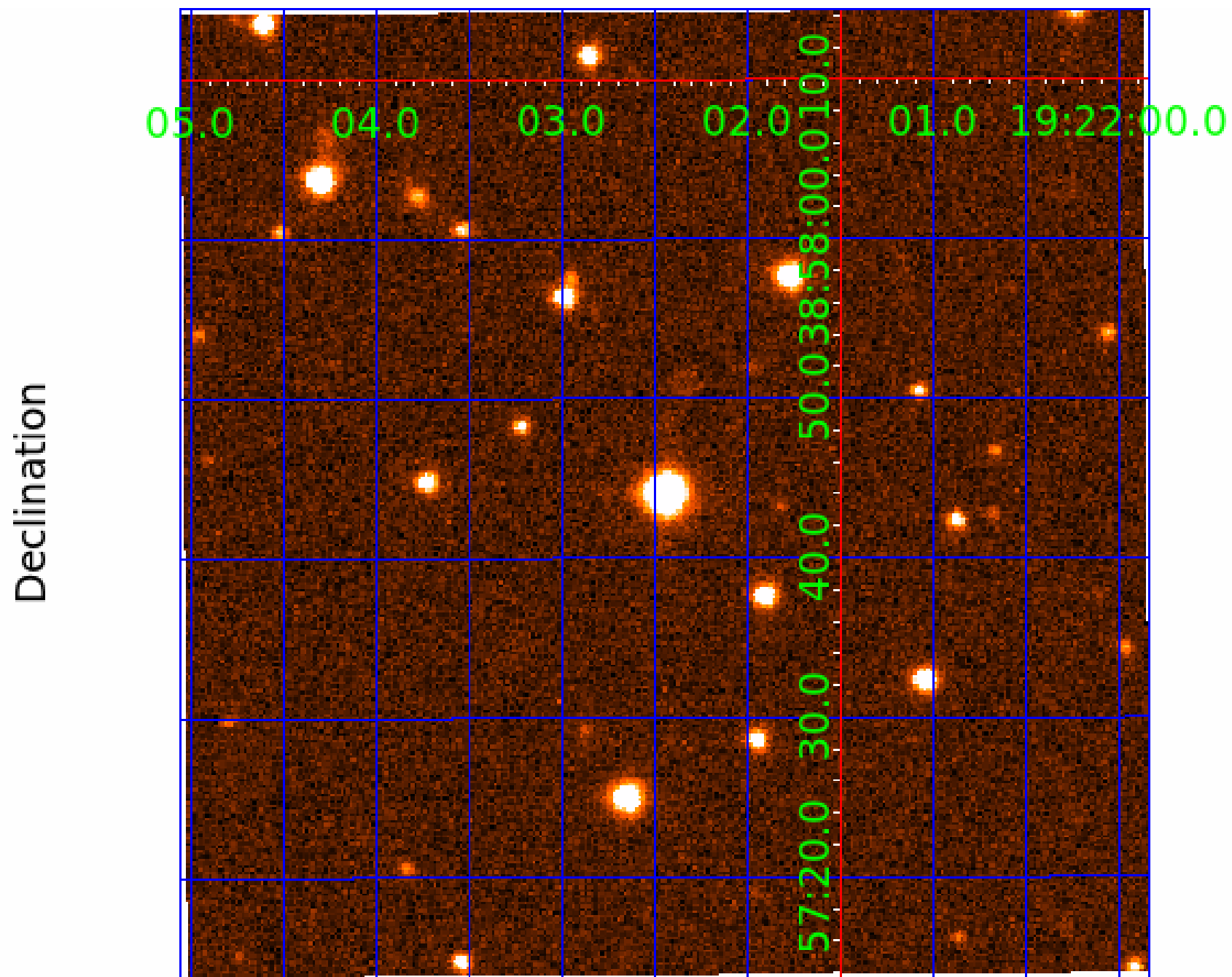


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UKIRT Image





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003847077-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
003847077-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
003847077-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
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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.

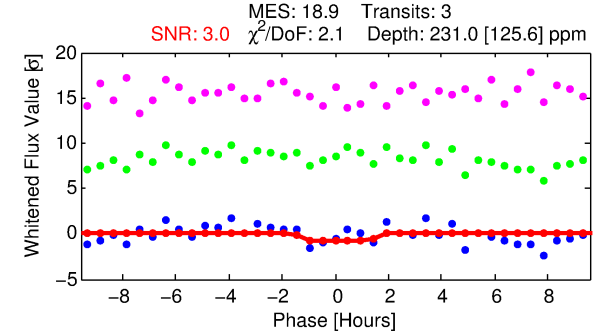
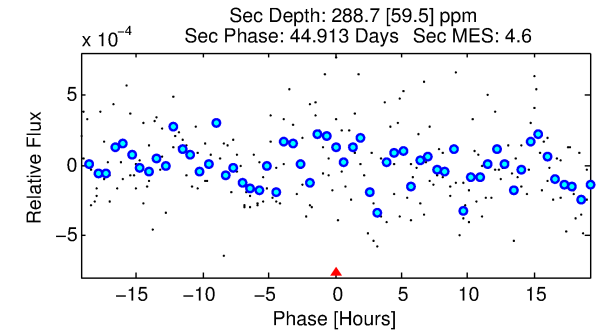
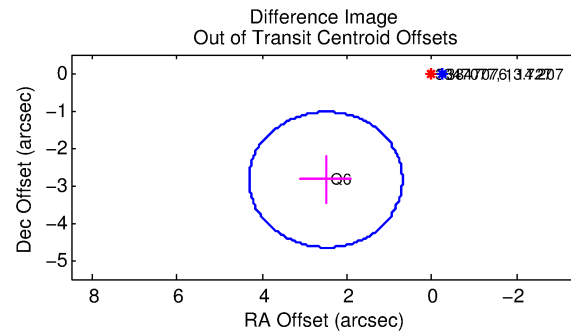
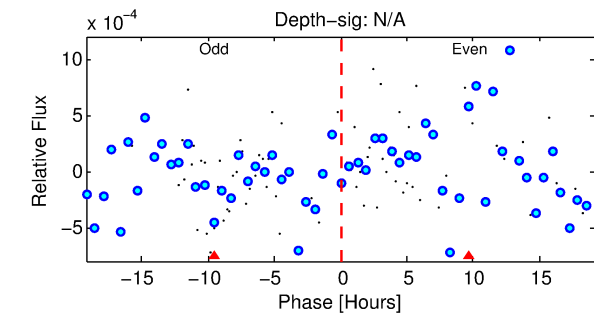
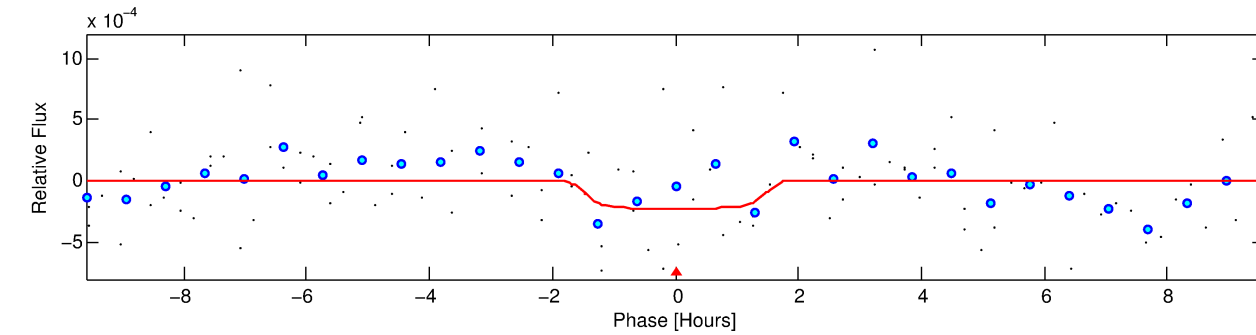
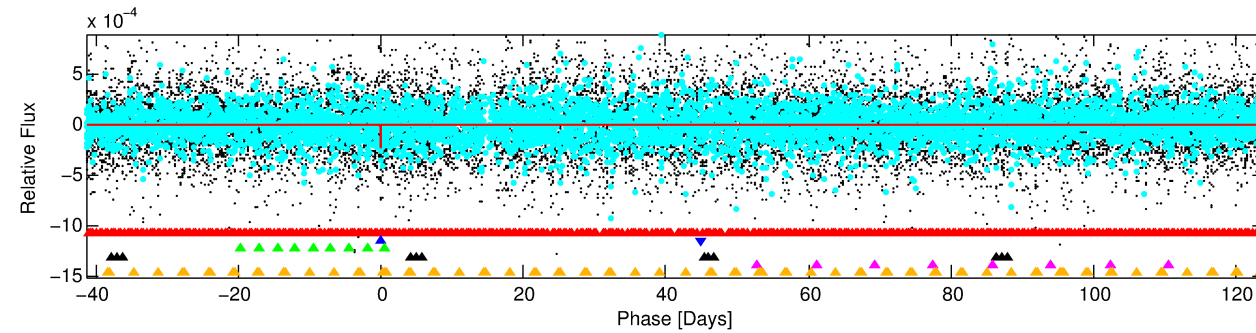
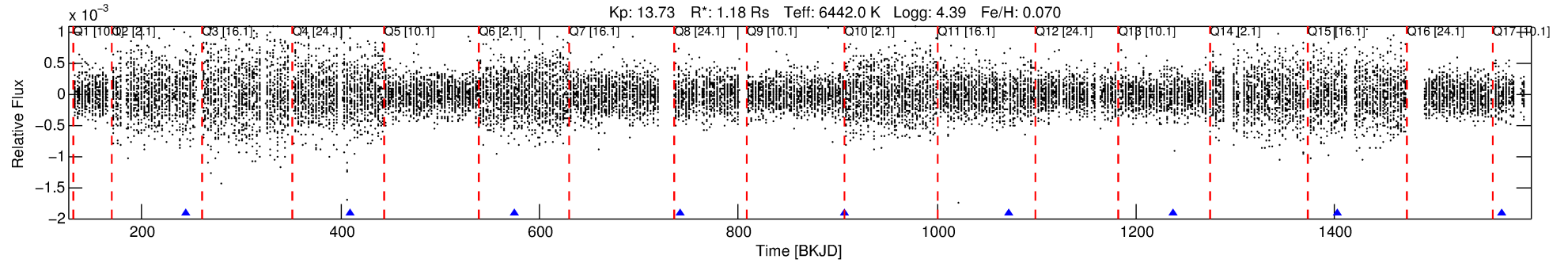
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003847077-02

No Significant Match Found

# DV One-Page Summary

KIC: 3847077 Candidate: 2 of 6 Period: 165.375 d



## DV Fit Results:

Period = 165.37492 [0.02044] d  
Epoch = 244.8570 [0.0262] BKJD  
Rp/R\* = 0.0157 [0.0380]  
a/R\* = 224.14 [2879.18]  
b = 0.84 [4.47]  
Seff = 5.36 [2.36]  
Teq = 388 [43] K  
Rp = 2.03 [4.96] Re  
a = 0.6348 [0.1889] AU  
Ag = 15547.50 [75529.32] [0.21 $\sigma$ ]  
Teffp = 6698 [8107] K [0.78 $\sigma$ ]

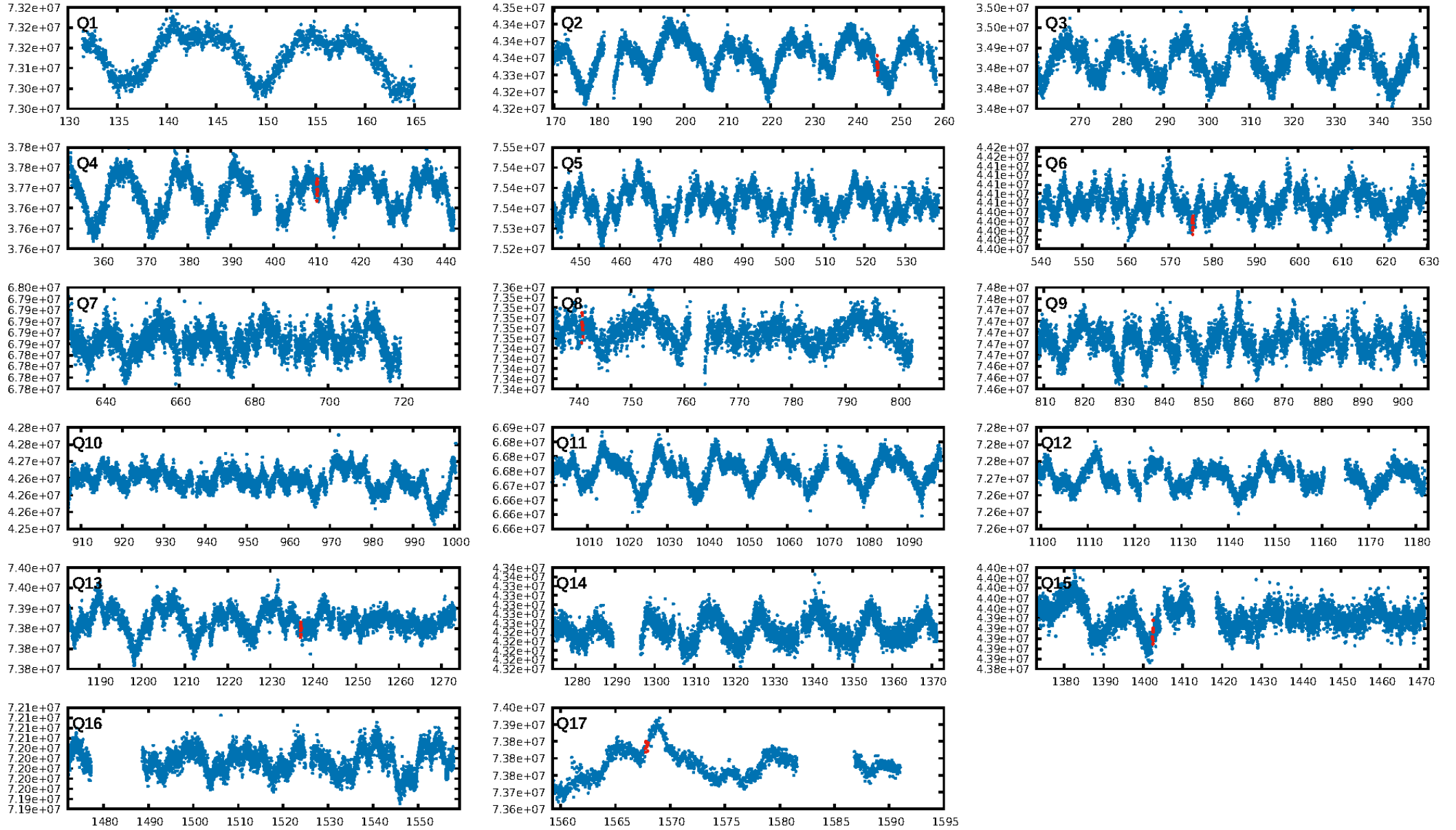
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [153.12 $\sigma$ ]  
LongPeriod-sig: 100.0% [4.61 $\sigma$ ]  
ModelChiSquare2-sig: 34.9%  
ModelChiSquareGof-sig: 6.9%  
Bootstrap-pfa: 3.45e-34  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.791  
Centroid-sig: 10.9%  
Centroid-so: 1.540 arcsec [0.81 $\sigma$ ]  
OotOffset-rm: 3.785 arcsec [6.28 $\sigma$ ]  
KicOffset-rm: 3.847 arcsec [6.38 $\sigma$ ]  
OotOffset-st: 1/0/0/0 [1]  
KicOffset-st: 1/0/0/0 [1]  
DiffImageQuality-fgm: 0.00 [0/1]  
DiffImageOverlap-fno: 0.57 [4/7]

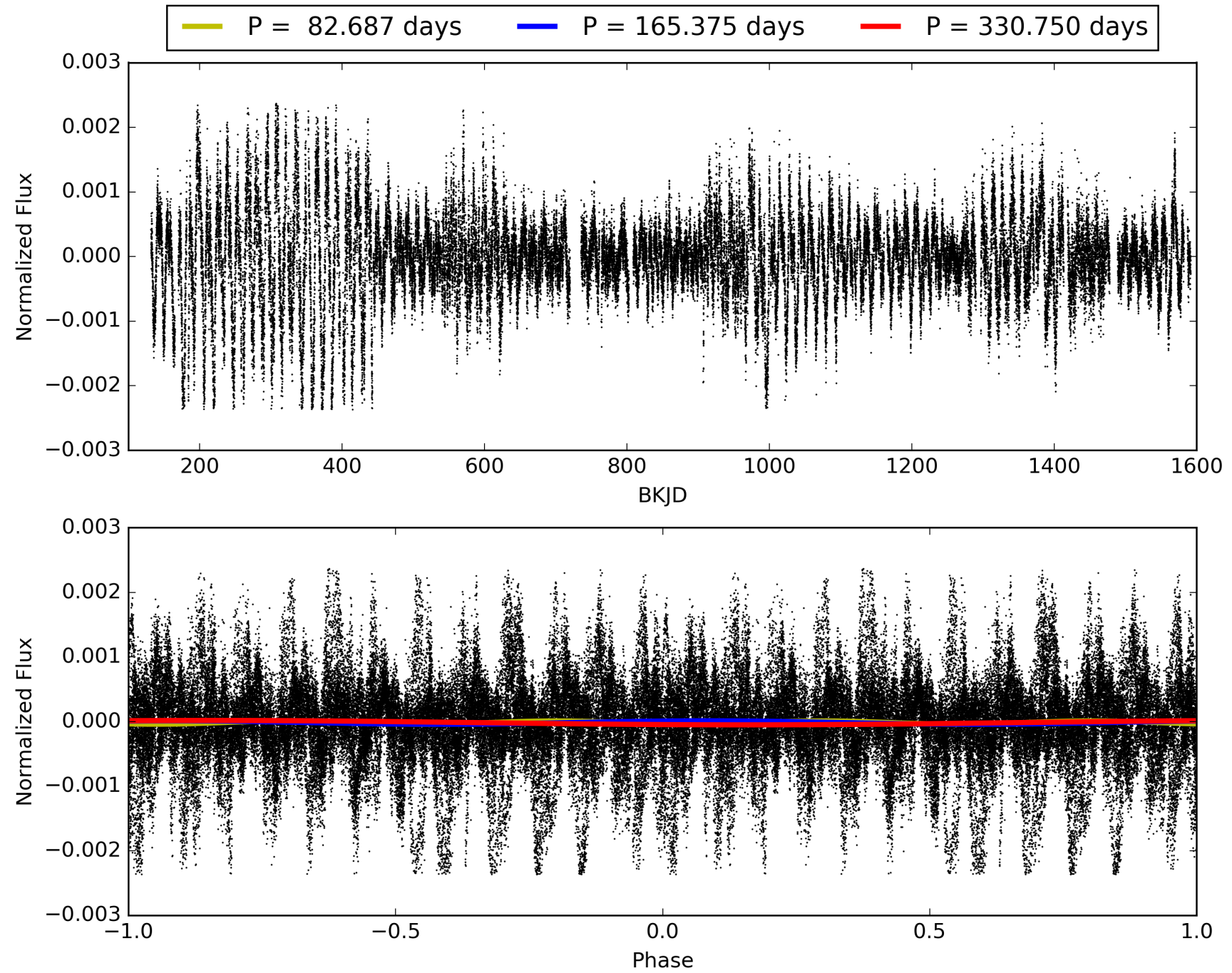
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 11:37:50 Z

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

# TCE 003847077-02, PDC Light Curves

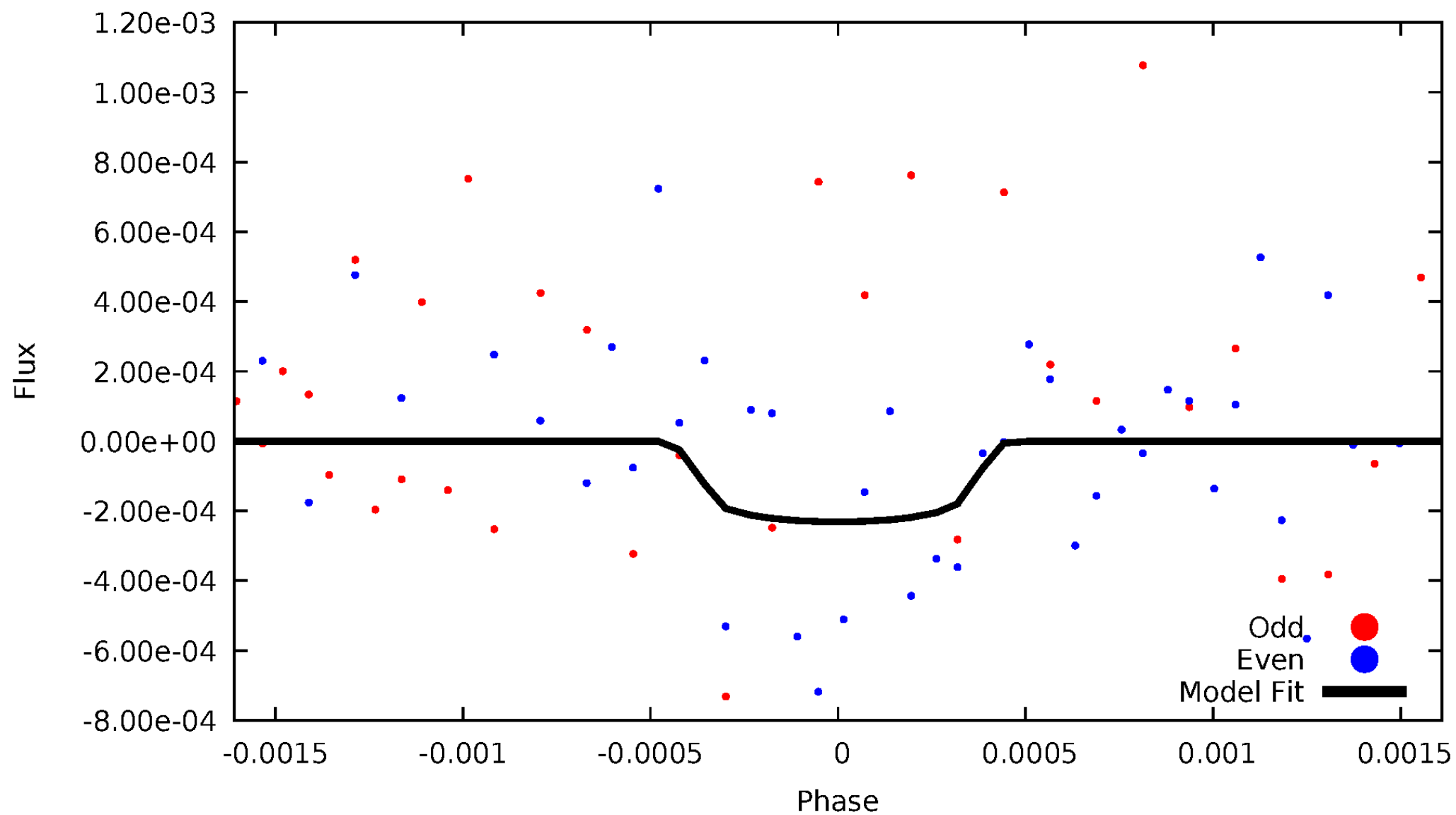


TCE 003847077-02



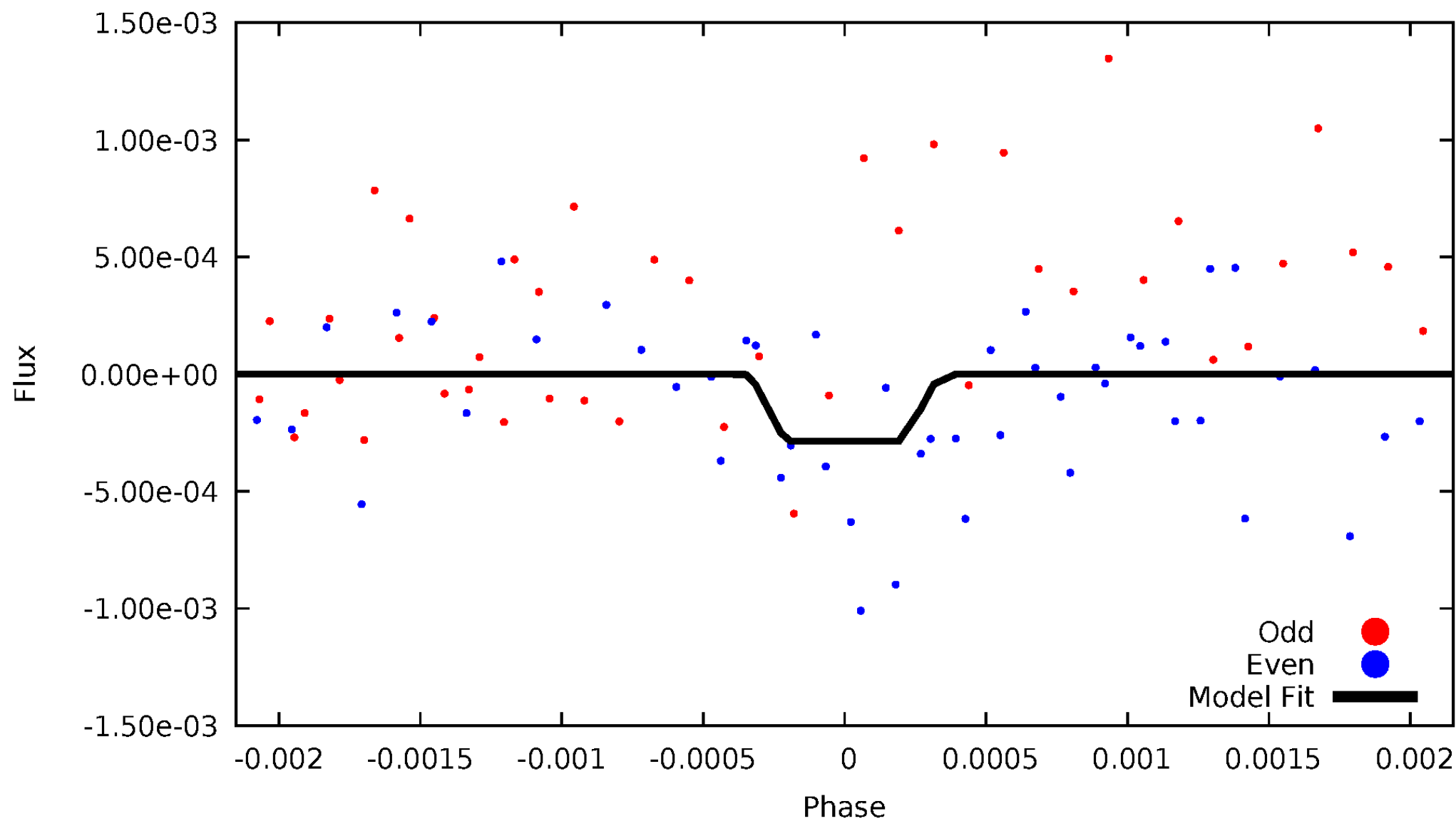
# DV Odd/Even

TCE 003847077-02



# ALT Odd/Even

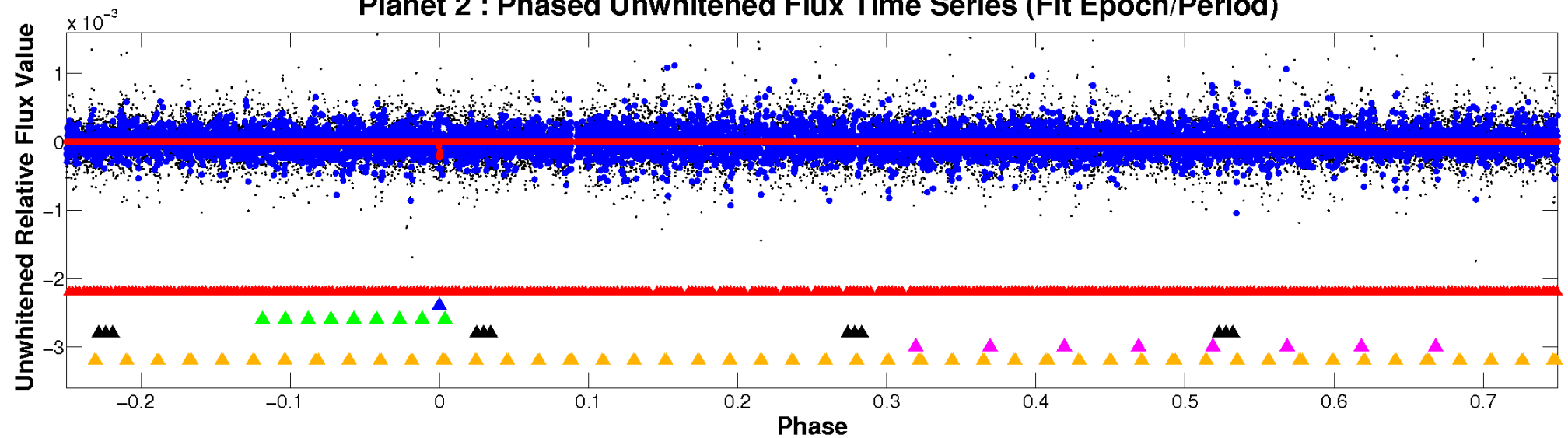
TCE 003847077-02



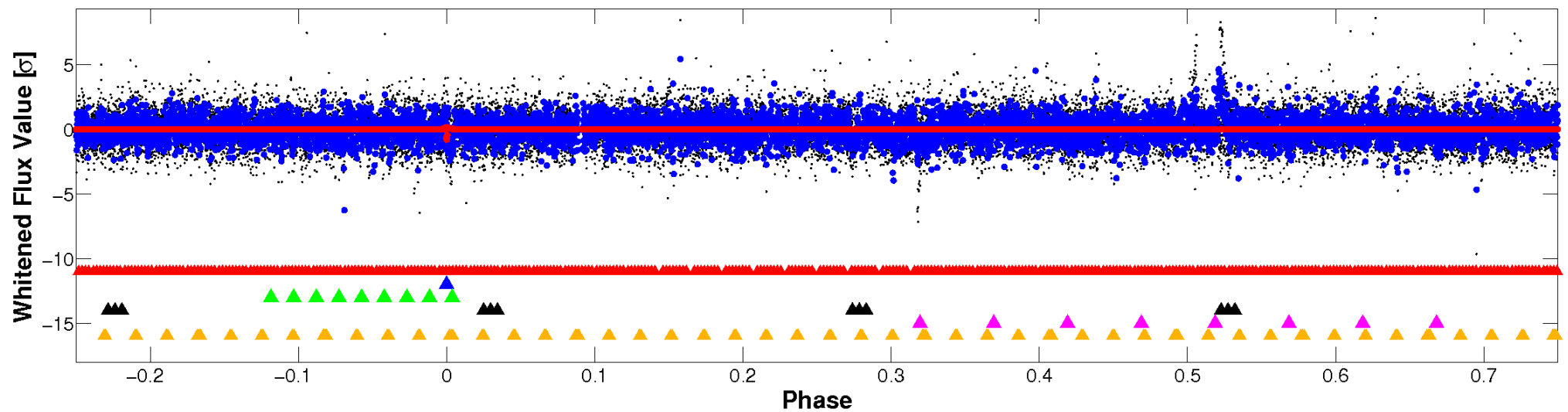


# Non-Whitened Vs. Whitened Light Curve

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

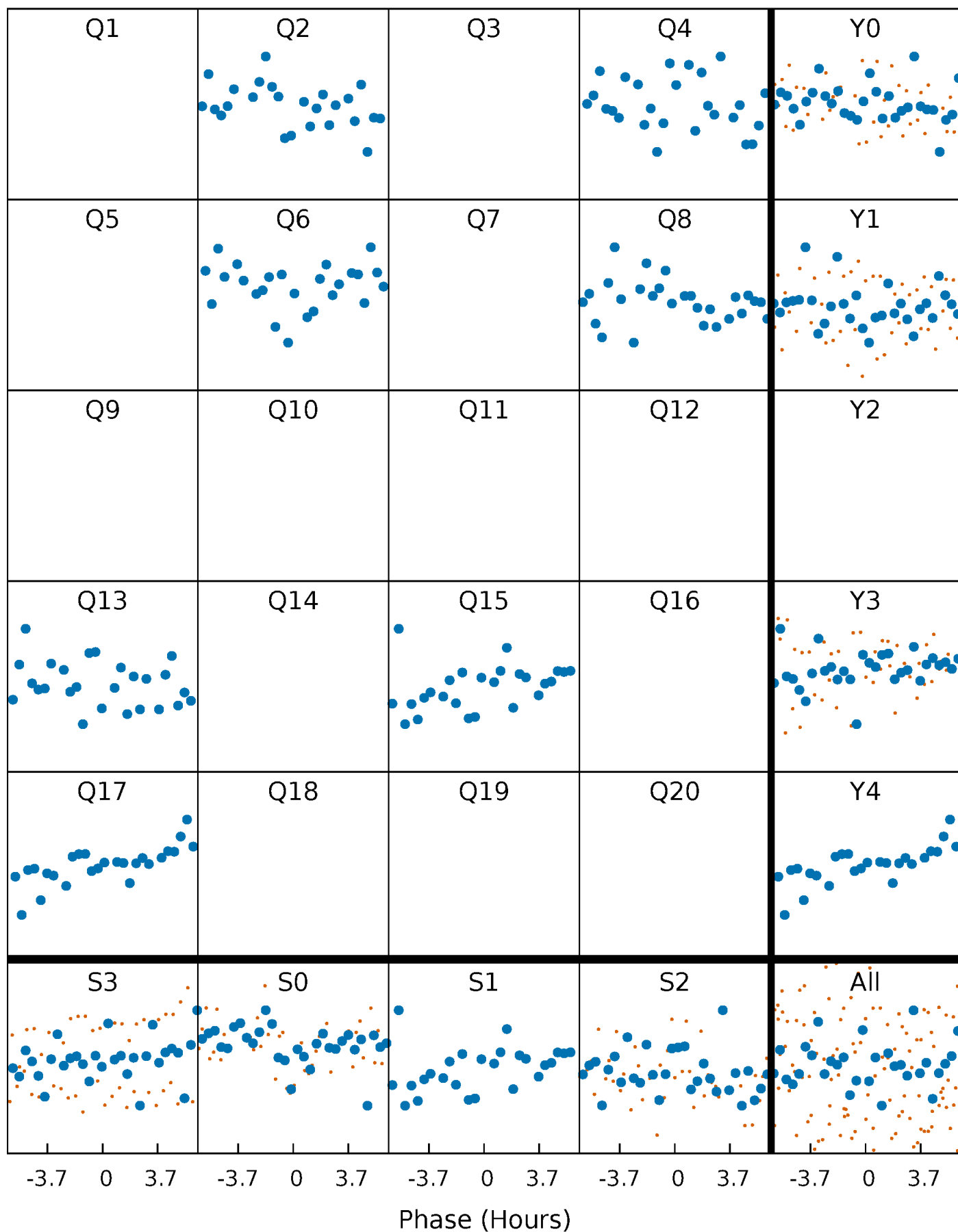


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



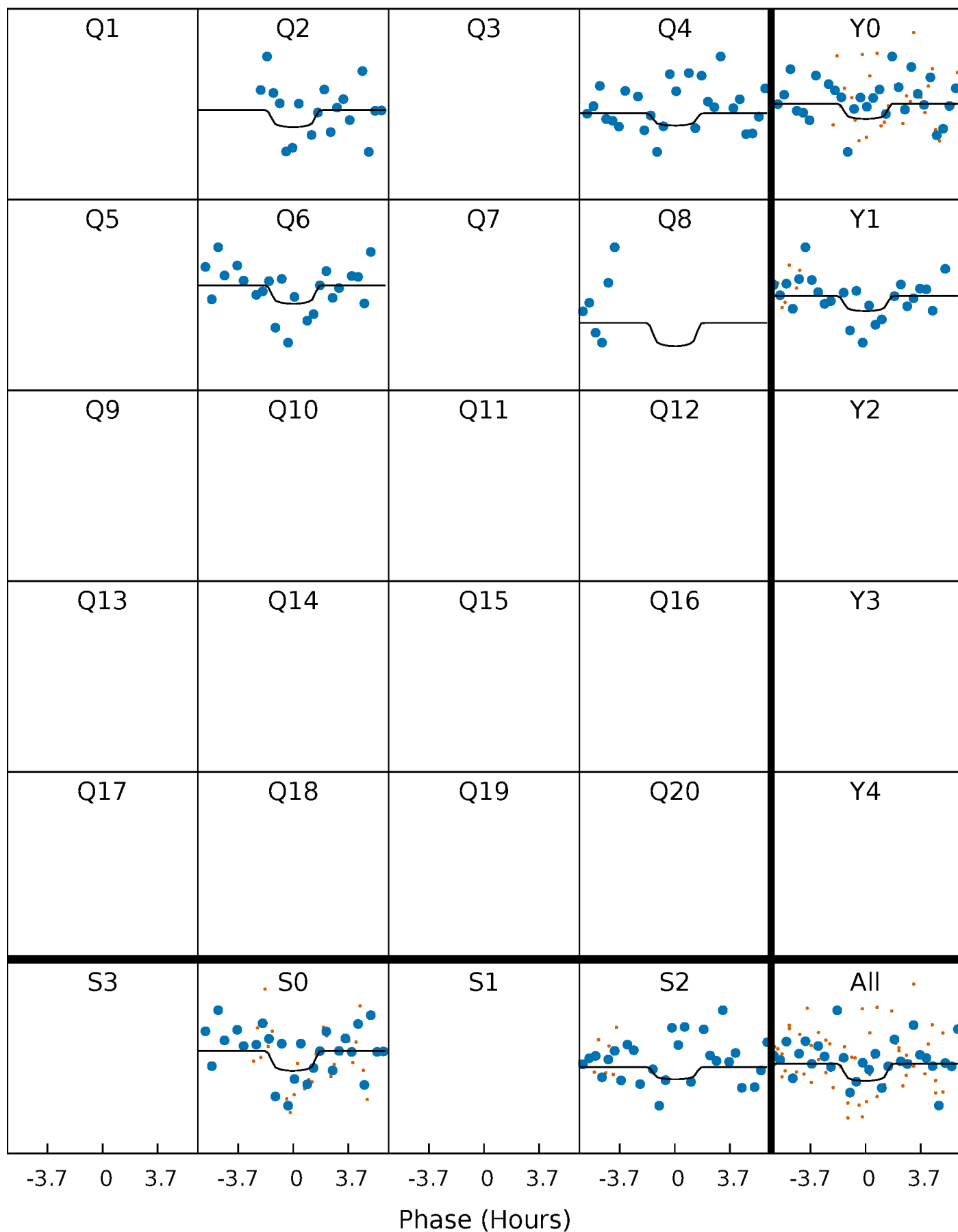
# PDC Quarter-Phased Transit Curves

TCE 003847077-02     $P=165.374923$  Days     $T_0=244.856952$  (BKJD)



# DV Quarter-Phased Transit Curves

TCE 003847077-02 P=165.374923 Days  $T_0=244.856952$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

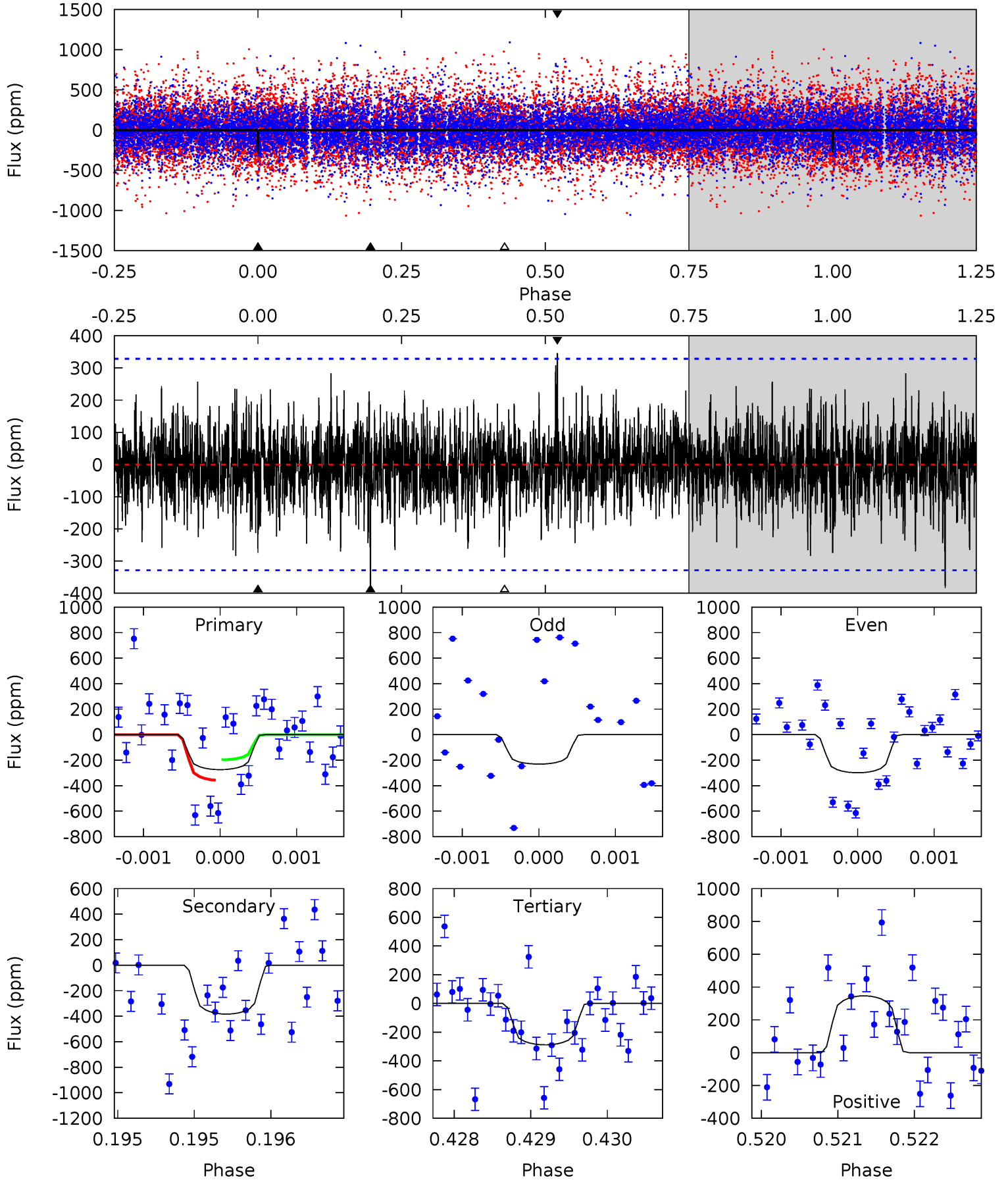
TCE 003847077-02 P=165.382423 Days  $T_0=244.829579$  (BKJD)



# DV Model-Shift Uniqueness Test

003847077-02,  $P = 165.374923$  Days,  $E = 79.482029$  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
4.58	6.39	4.81	5.77	5.48	3.33	1.33	-0.23	-1.20	1.59	0.62	0.51	0.66	0.47	0

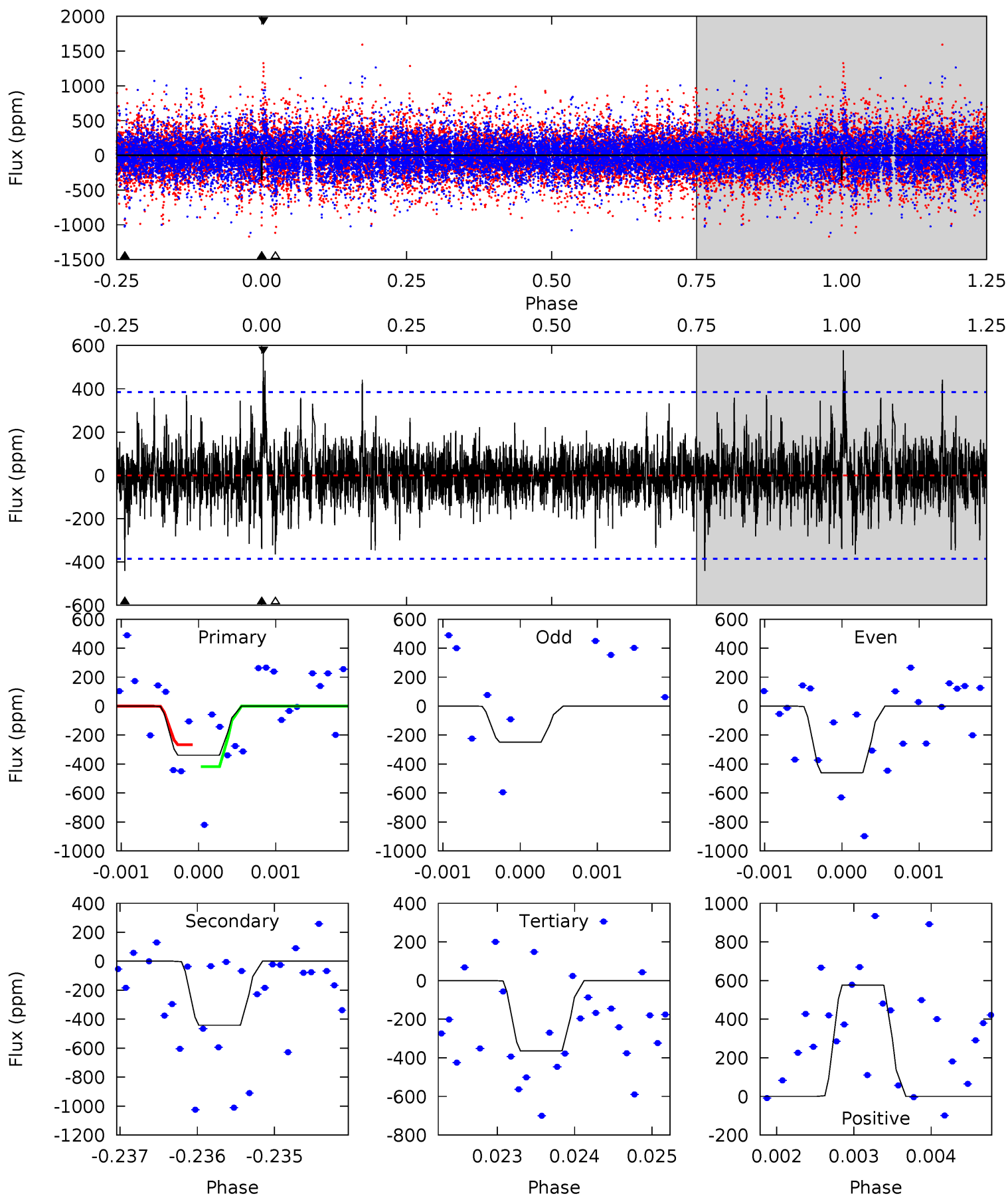




# Alt Model-Shift Uniqueness Test

003847077-02, P = 165.382423 Days, E = 79.447156 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
4.85	6.32	5.21	8.25	5.51	3.39	1.29	-0.35	-3.40	1.11	-1.94	1.58	0.83	0.57	1.09



### Stellar Parameters For KIC 003847077

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6442^{+145}_{-209}$	$4.388^{+0.056}_{-0.224}$	$0.070^{+0.250}_{-0.300}$	$1.183^{+0.431}_{-0.144}$	$1.250^{+0.184}_{-0.165}$	$1.062^{+0.252}_{-0.610}$
	+2%/-3%	+1%/-5%	+357%/-429%	+36%/-12%	+15%/-13%	+24%/-57%
Source	PHO1	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 003847077-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-384 \pm 60$	$4.33^{+3.97}_{-3.03}$	$552^{+42}_{-27}$	$5141^{+4537}_{-1198}$	$4591^{+38846}_{-3385}$
Alt.	$-441 \pm 70$	$4.58^{+4.11}_{-3.13}$	$551^{+43}_{-27}$	$5153^{+4655}_{-1198}$	$4634^{+42708}_{-3416}$

$T_{max}$  = 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

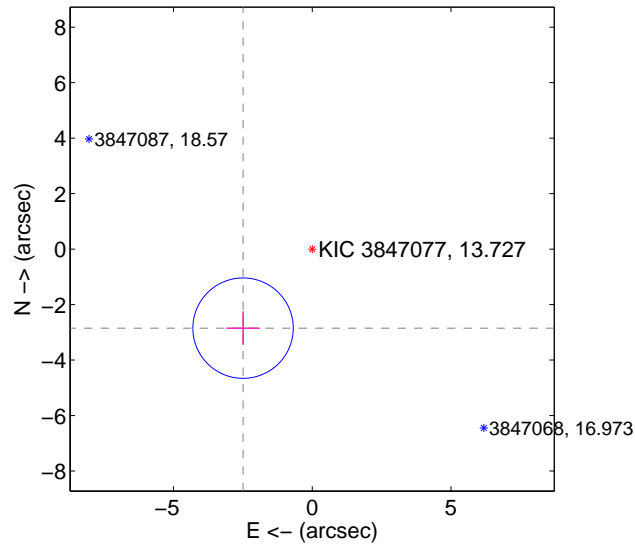
Supplemental centroid analysis for 003847077-02. Kepler magnitude: 13.73. Transit SNR 2.99

There are 0 quarters with good PRF difference image offsets

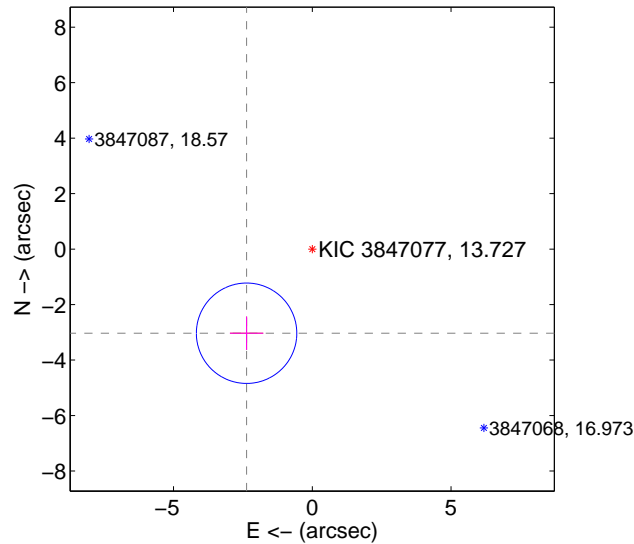
The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.785 \pm 0.603$	6.28	$2.492 \pm 0.602$	$-2.849 \pm 0.604$
PRF-fit source offset from KIC position	$3.847 \pm 0.603$	6.38	$2.368 \pm 0.602$	$-3.033 \pm 0.604$
photometric centroid source offset	$1.54 \pm 1.91$	0.81	$0.69 \pm 1.57$	$1.38 \pm 1.99$

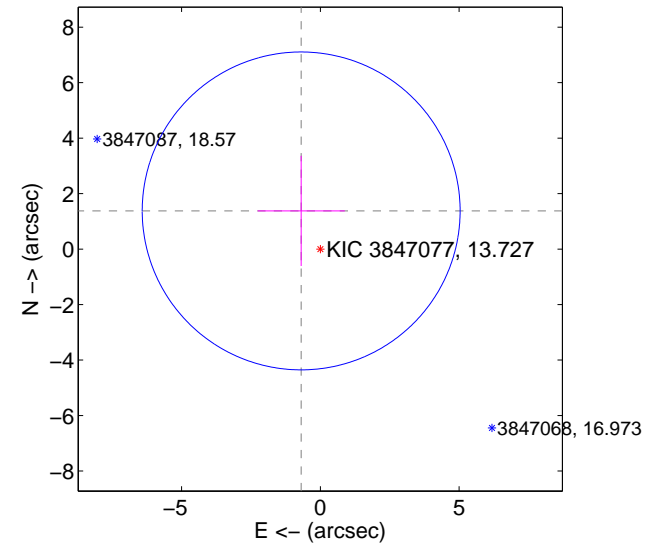
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

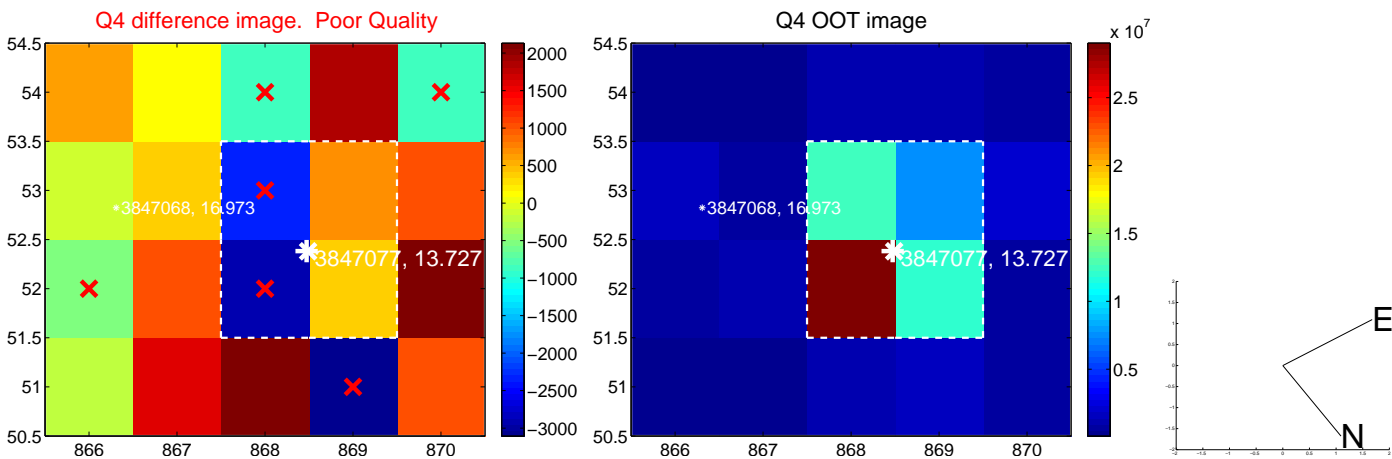
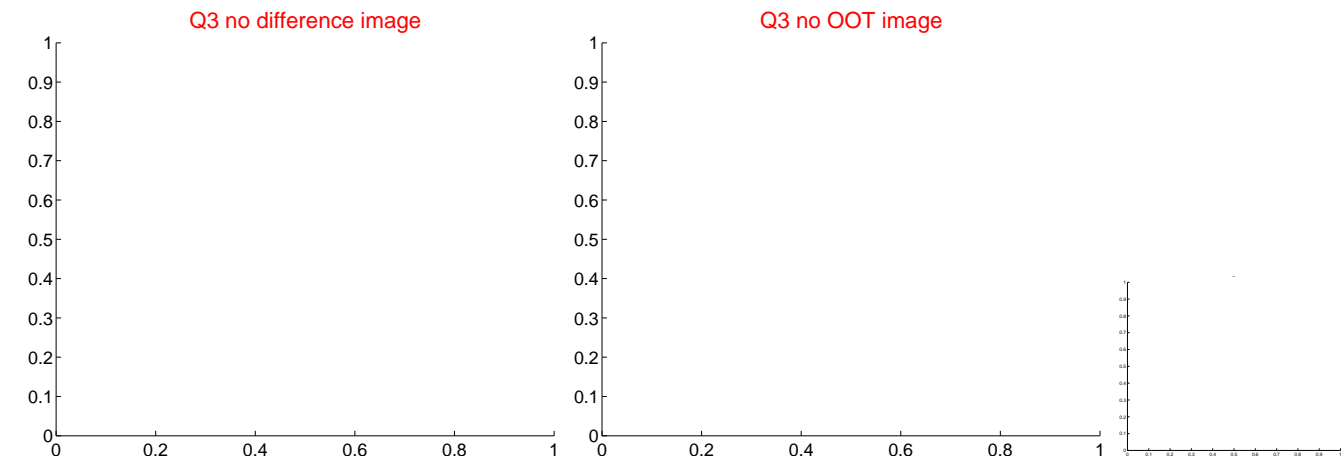
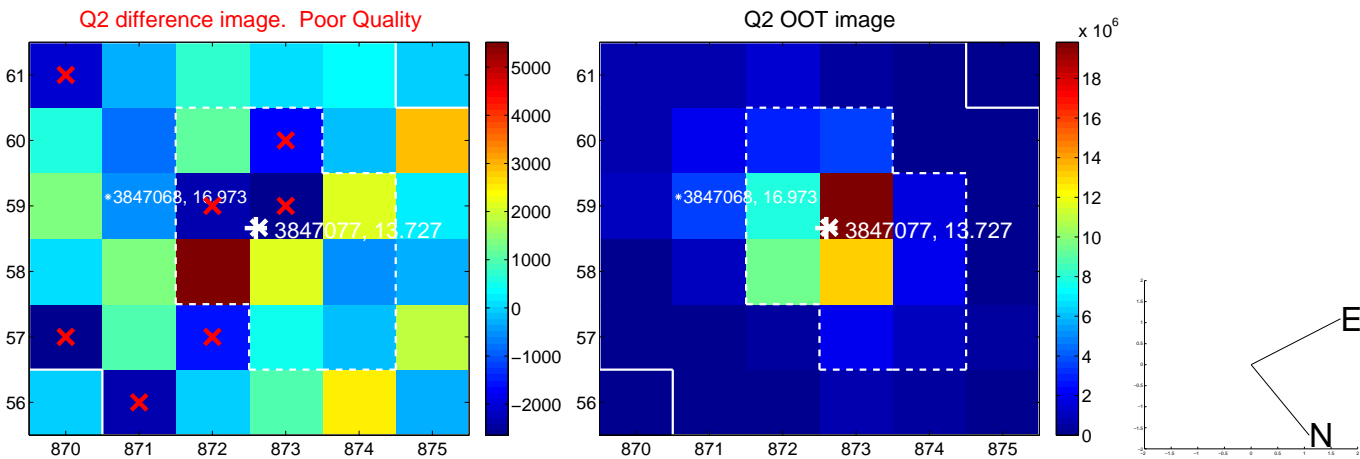


offset from photometric centroids



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.

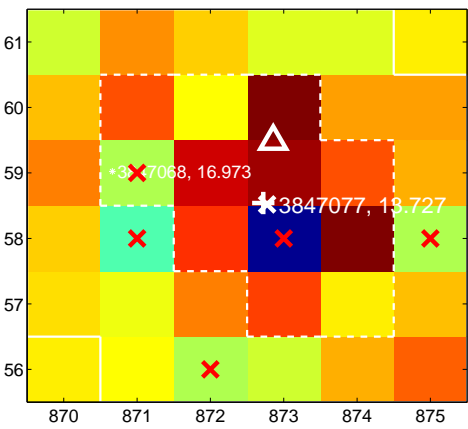
Q5 no difference image



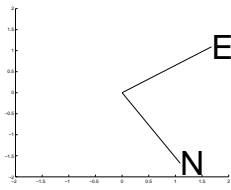
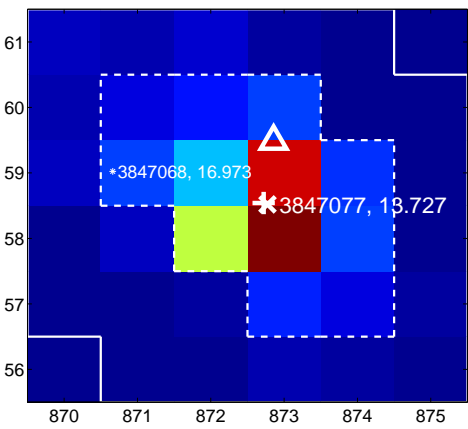
Q5 no OOT image



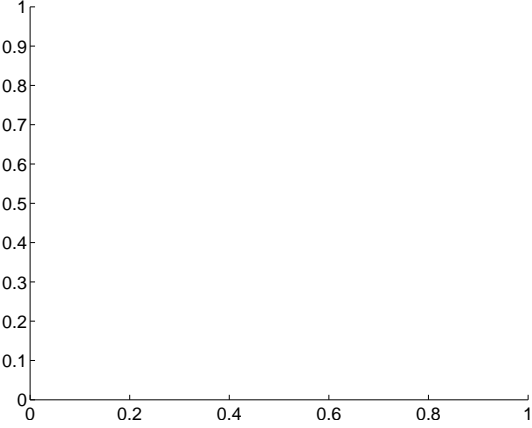
Q6 difference image. Poor Quality



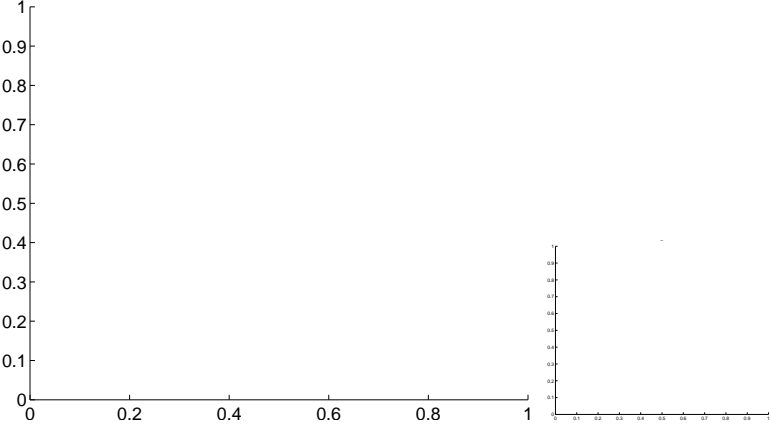
Q6 OOT image



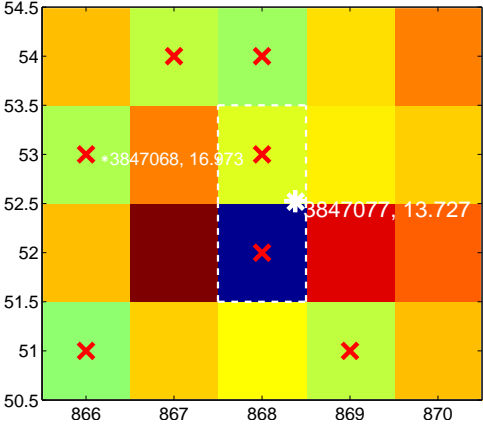
Q7 no difference image



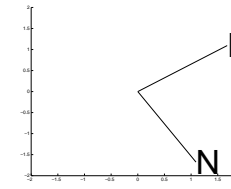
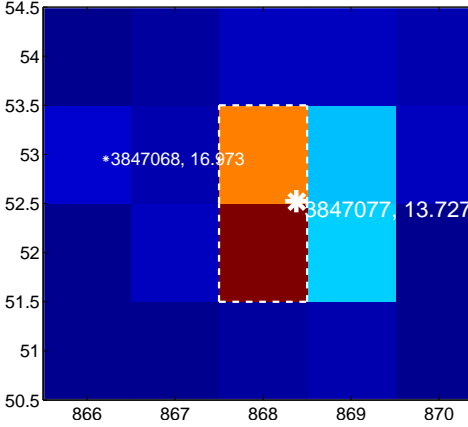
Q7 no OOT image



Q8 difference image. Poor Quality



Q8 OOT image

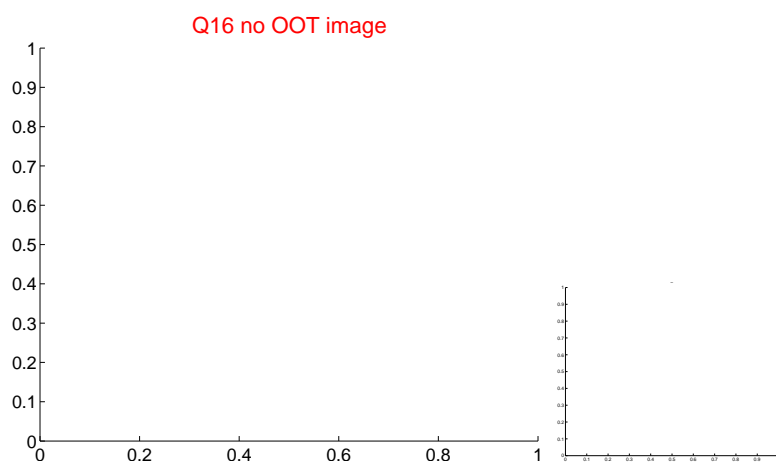
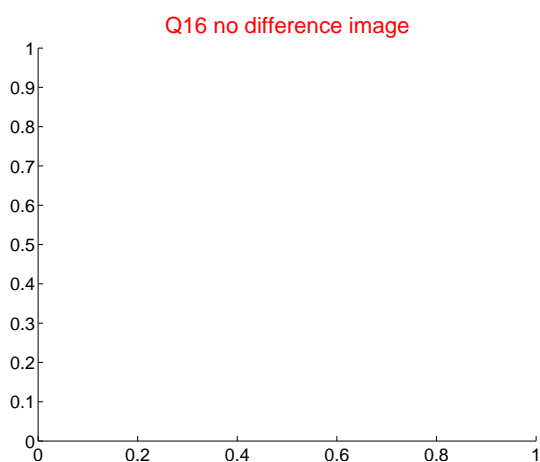
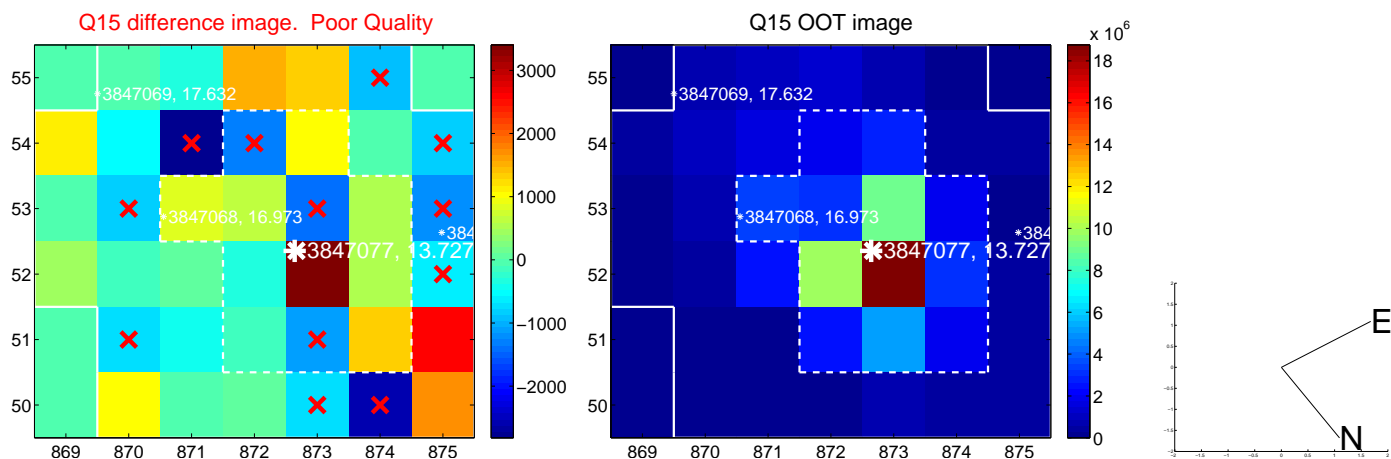
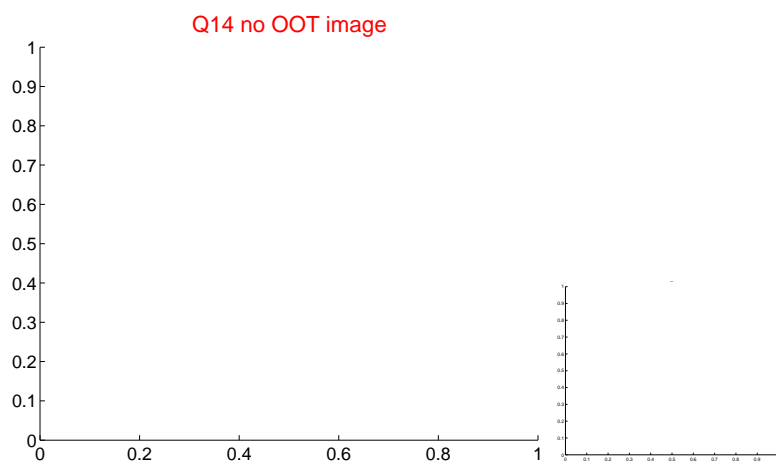
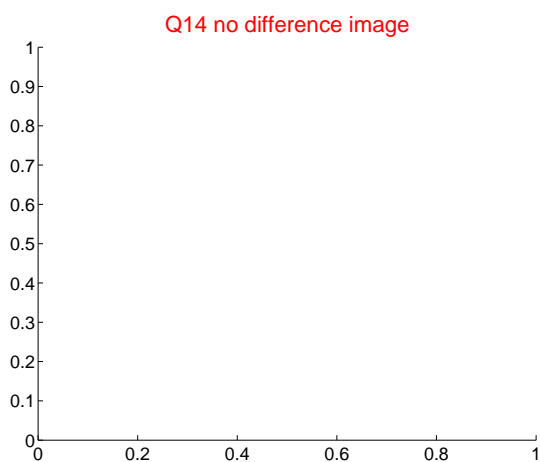
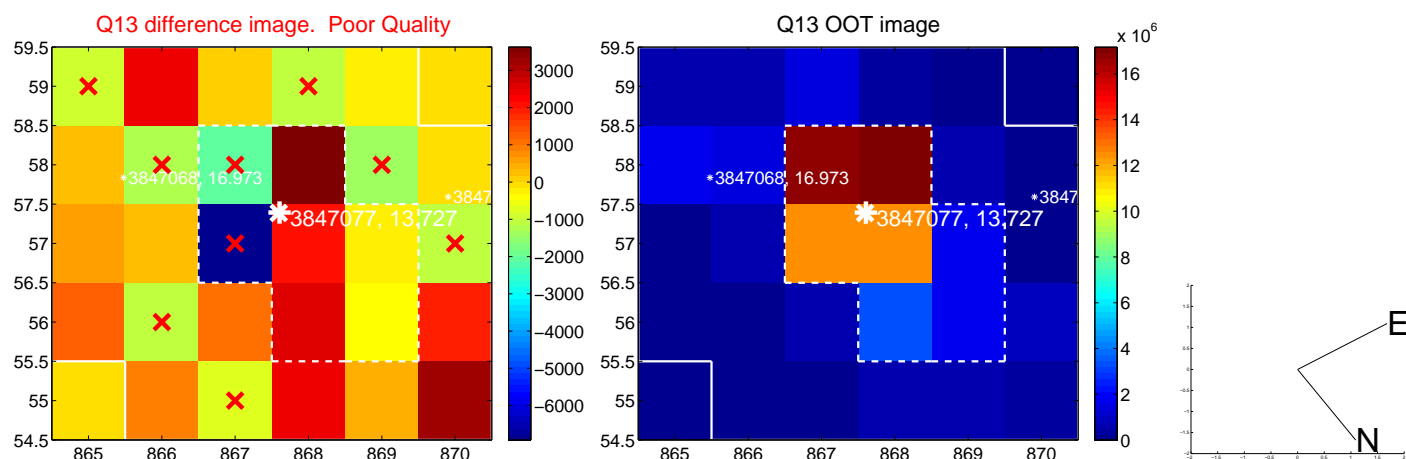




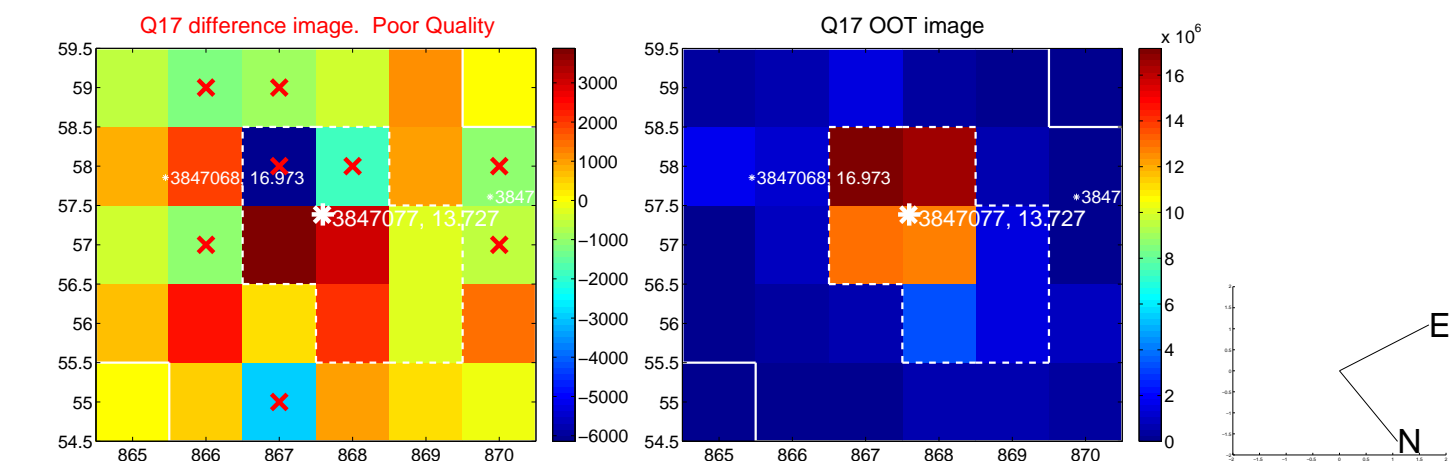
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



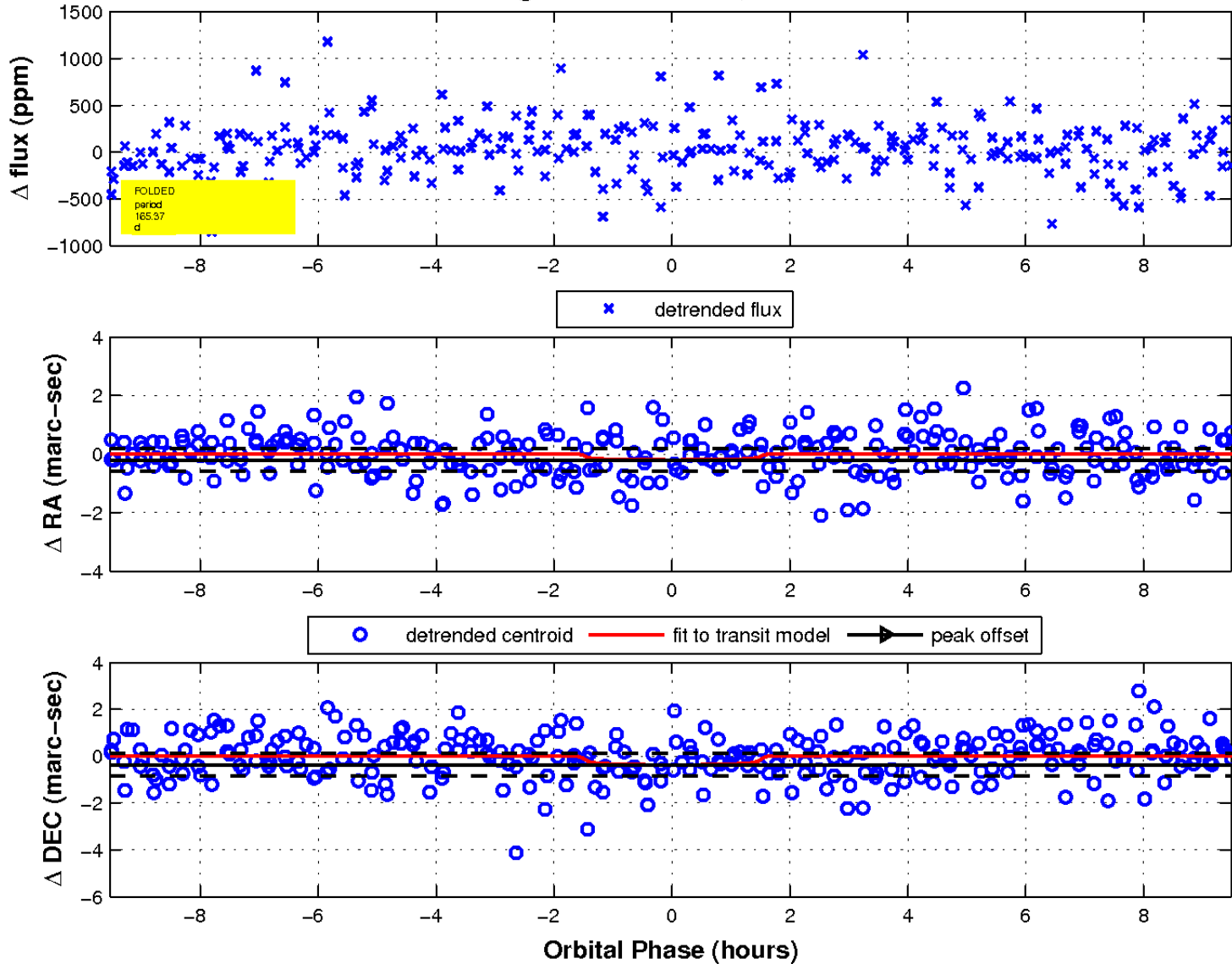
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



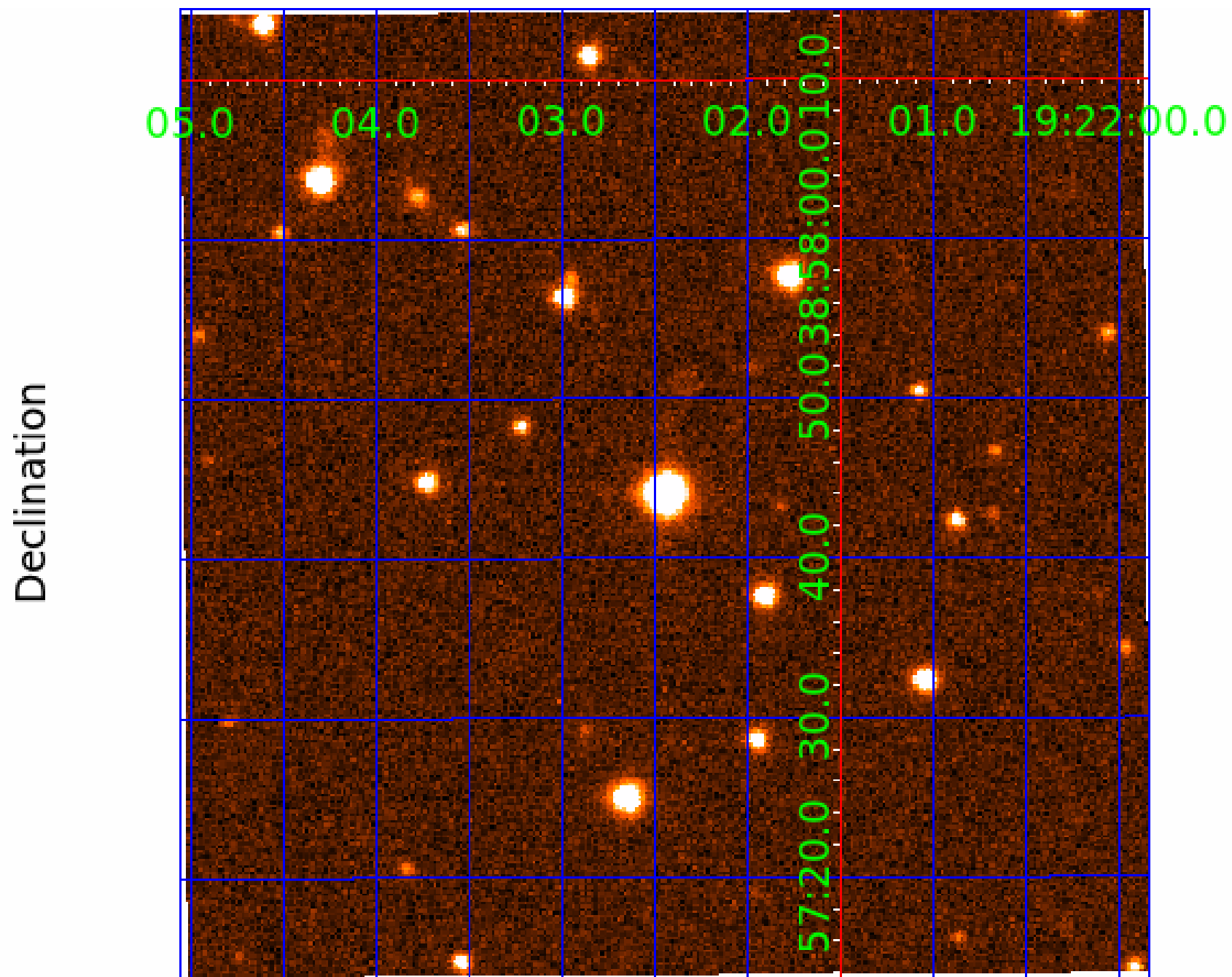
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 2 of 6



UKIRT Image



# KIC 003847077

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003847077-01	OBS	No	3.510672	134.697871	42.9	19.179	7.9	8.4	1.18	6442	0.85	911.55
003847077-02	OBS	No	165.374923	244.856952	231.0	3.194	18.9	3.0	1.18	6442	2.03	5.36
003847077-03	OBS	No	167.903463	225.255995	359.5	12.756	13.0	8.2	1.18	6442	2.64	5.25
003847077-04	OBS	No	124.223497	207.078213	229.8	5.604	7.6	6.8	1.18	6442	1.97	7.85
003847077-05	OBS	No	173.609950	297.696703	421.9	15.886	8.6	9.8	1.18	6442	2.60	5.02
003847077-06	OBS	No	14.070583	132.975133	188.3	11.235	7.8	8.7	1.18	6442	1.83	143.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003847077-01	OBS	FP	0.00	1	0	0	0	LPP_DV
003847077-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
003847077-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
003847077-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
003847077-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
003847077-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS—HALO_GHOST

**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.

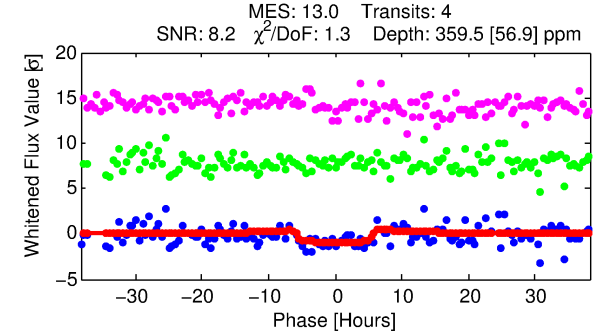
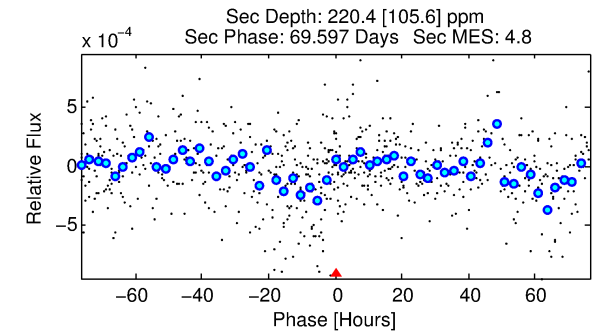
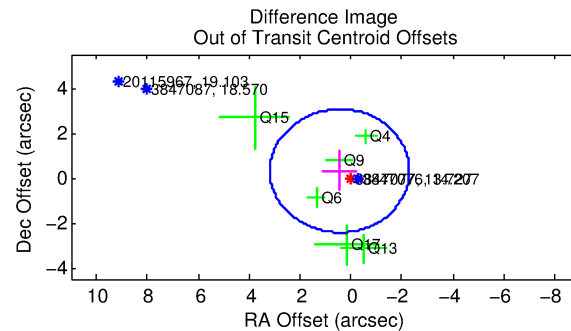
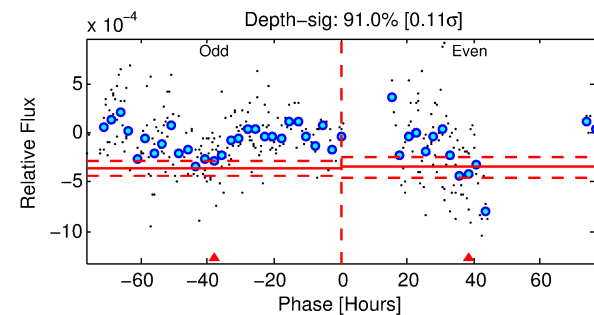
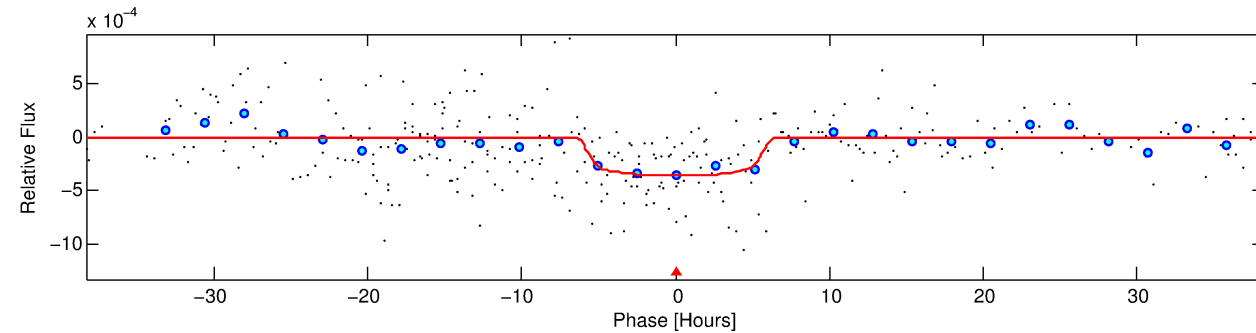
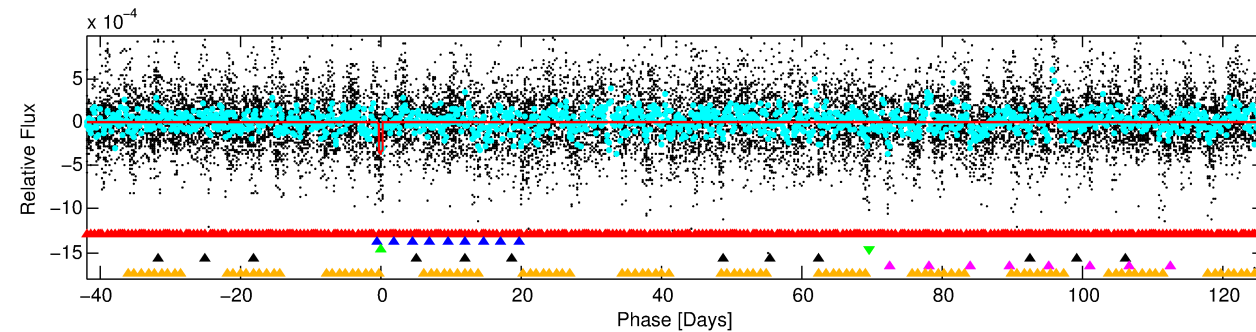
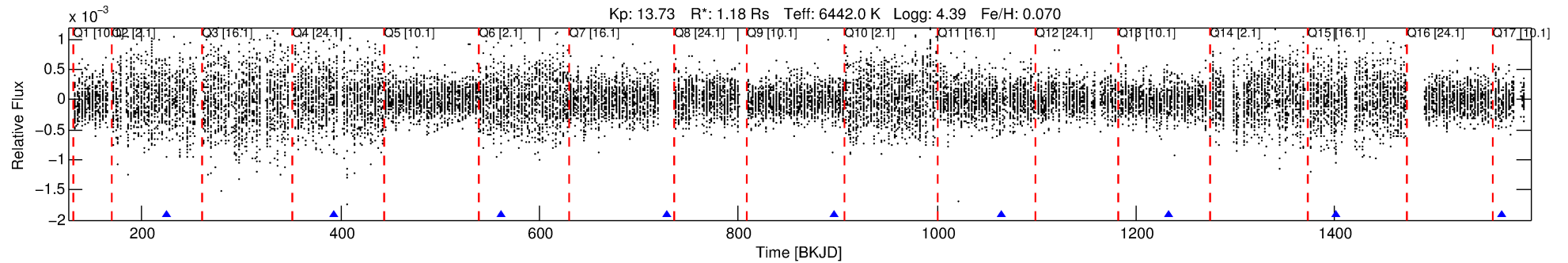
## Ephemeris Match Information For 003847077-03

No Significant Match Found



# DV One-Page Summary

KIC: 3847077 Candidate: 3 of 6 Period: 167.903 d



## DV Fit Results:

Period = 167.90346 [0.00567] d  
Epoch = 225.2560 [0.0312] BKJD  
Rp/R\* = 0.0204 [0.0031]  
a/R\* = 47.52 [31.34]  
b = 0.90 [0.13]  
Seff = 5.25 [2.31]  
Teff = 386 [43] K  
Rp = 2.64 [1.04] Re  
a = 0.6413 [0.1908] AU  
Ag = 7167.90 [5050.88] [1.42 $\sigma$ ]  
Teffp = 5491 [796] K [6.41 $\sigma$ ]

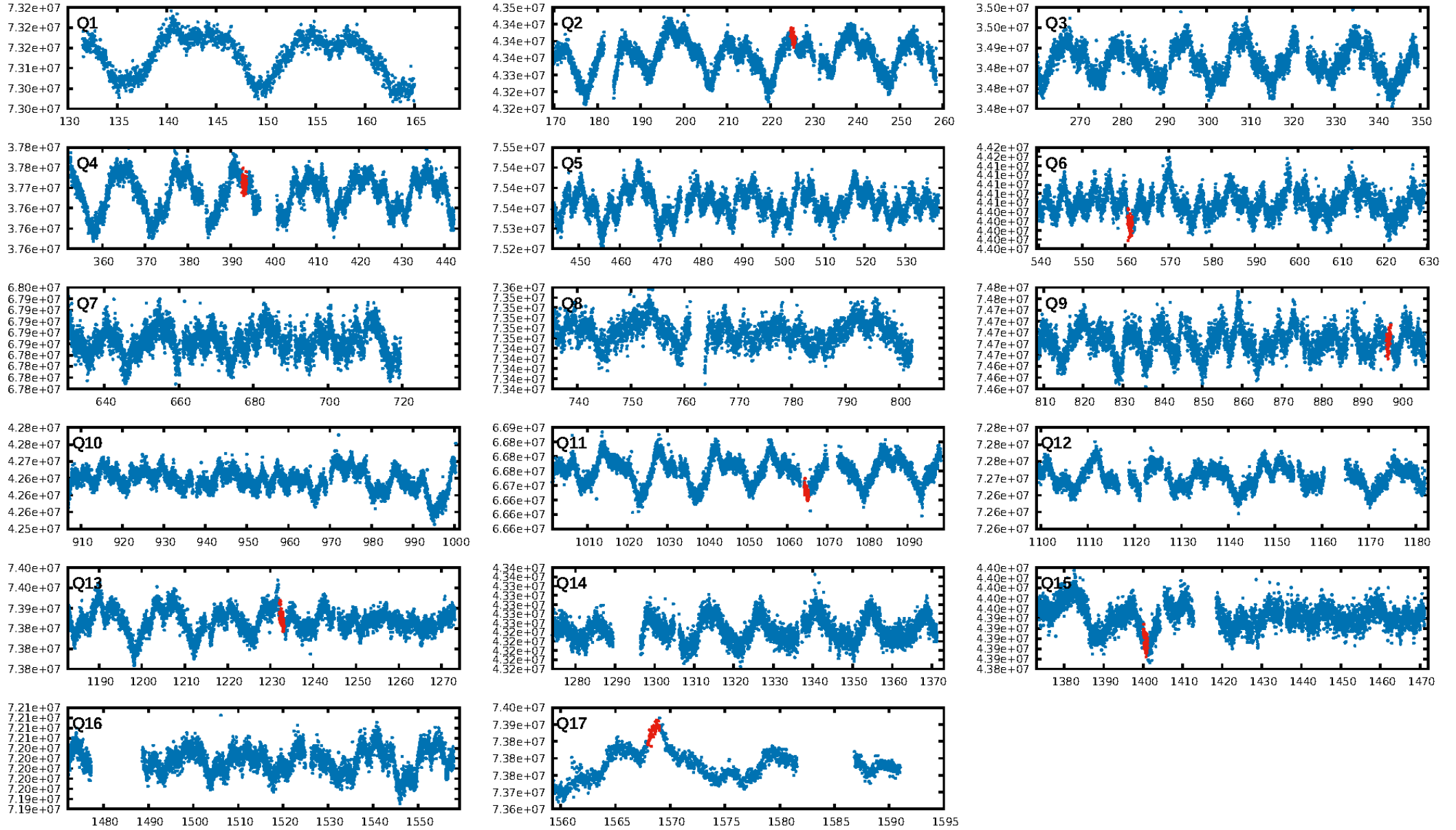
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [4.61 $\sigma$ ]  
LongPeriod-sig: 100.0% [6.72 $\sigma$ ]  
ModelChiSquare2-sig: 99.8%  
ModelChiSquareGof-sig: 99.2%  
Bootstrap-pfa: 2.66e-17  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 6.414  
Centroid-sig: 1.4%  
Centroid-so: 1.059 arcsec [1.50 $\sigma$ ]  
OotOffset-rm: 0.542 arcsec [0.59 $\sigma$ ]  
KicOffset-rm: 0.471 arcsec [0.60 $\sigma$ ]  
OotOffset-st: 1/1/1/3 [6]  
KicOffset-st: 1/1/1/3 [6]  
DiffImageQuality-fgm: 0.50 [3/6]  
DiffImageOverlap-fno: 0.29 [2/7]

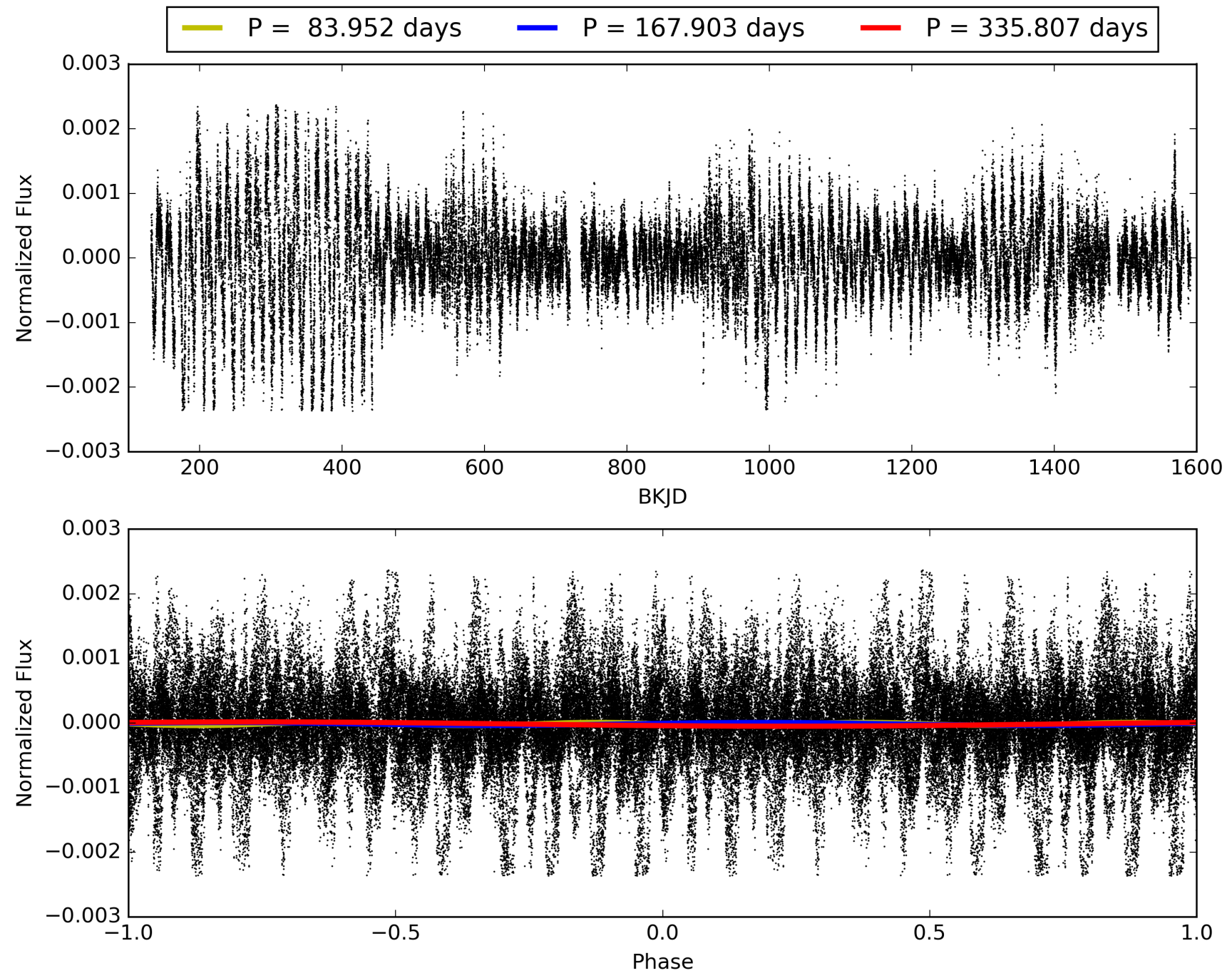
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 11:37:54 Z

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

# TCE 003847077-03, PDC Light Curves

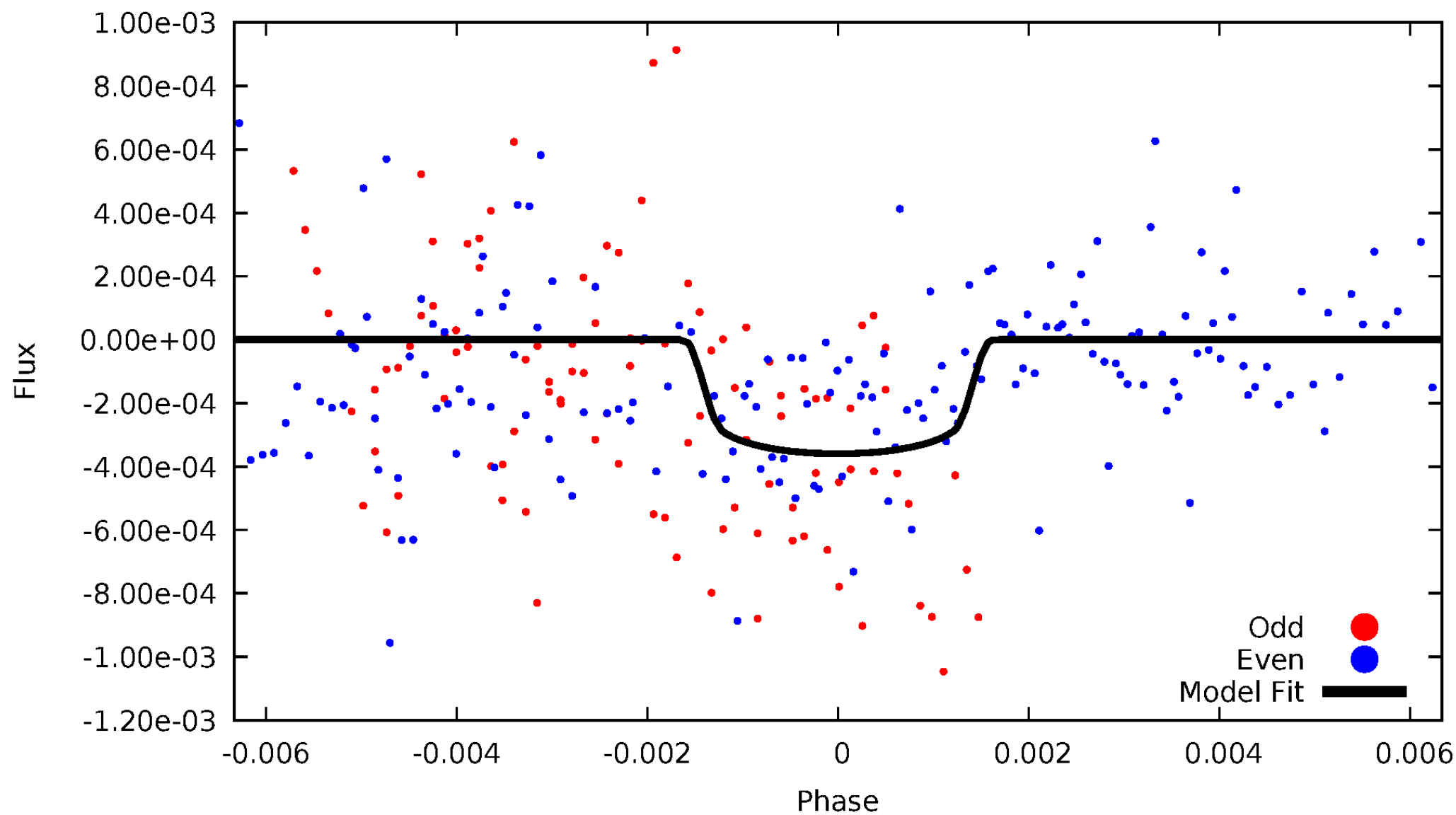


TCE 003847077-03



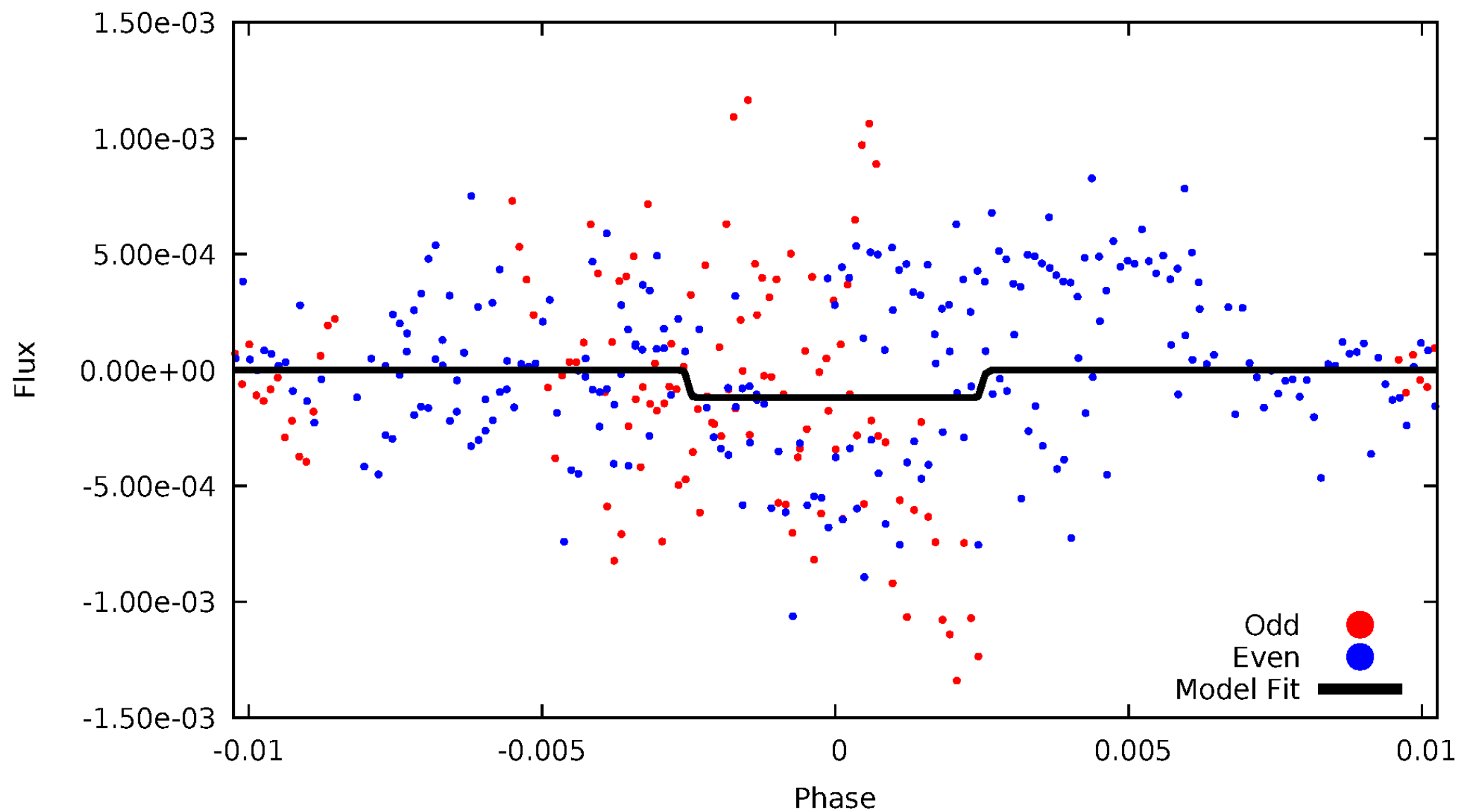
# DV Odd/Even

TCE 003847077-03



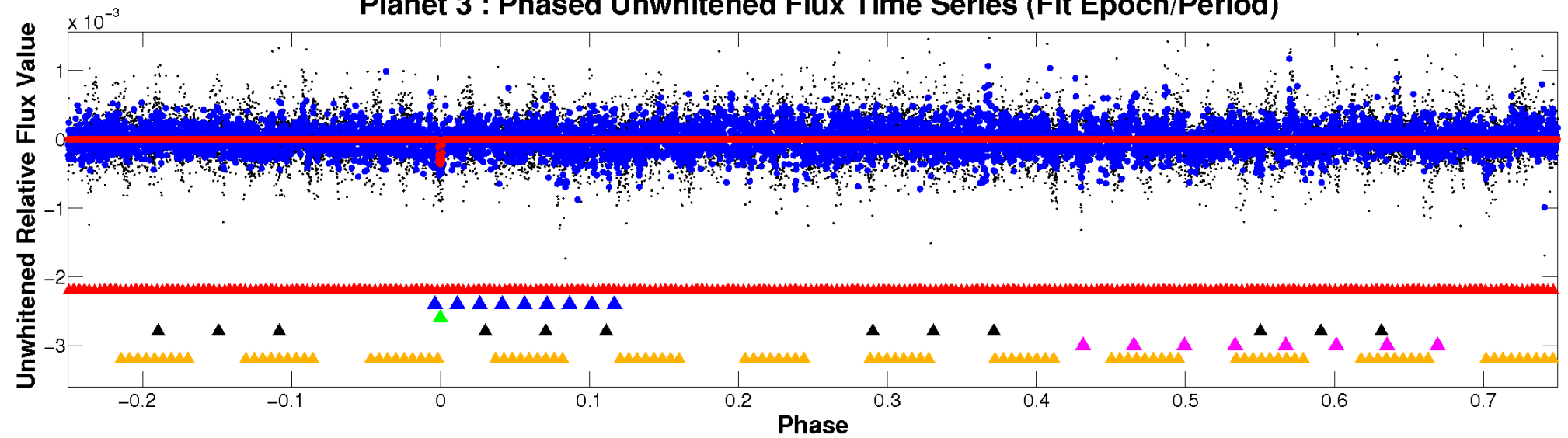
# ALT Odd/Even

TCE 003847077-03

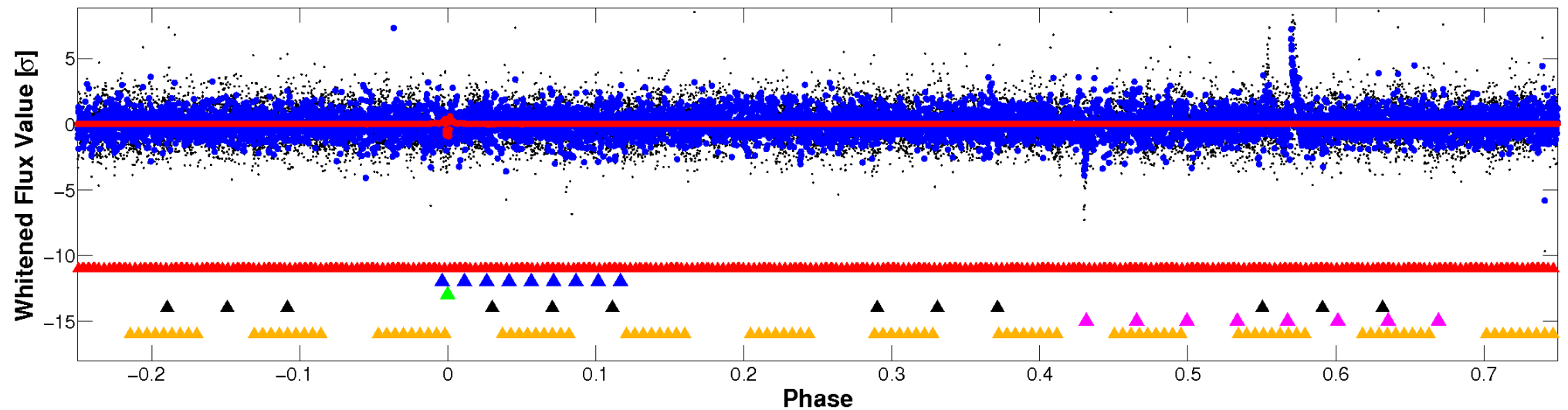


# Non-Whitened Vs. Whitened Light Curve

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



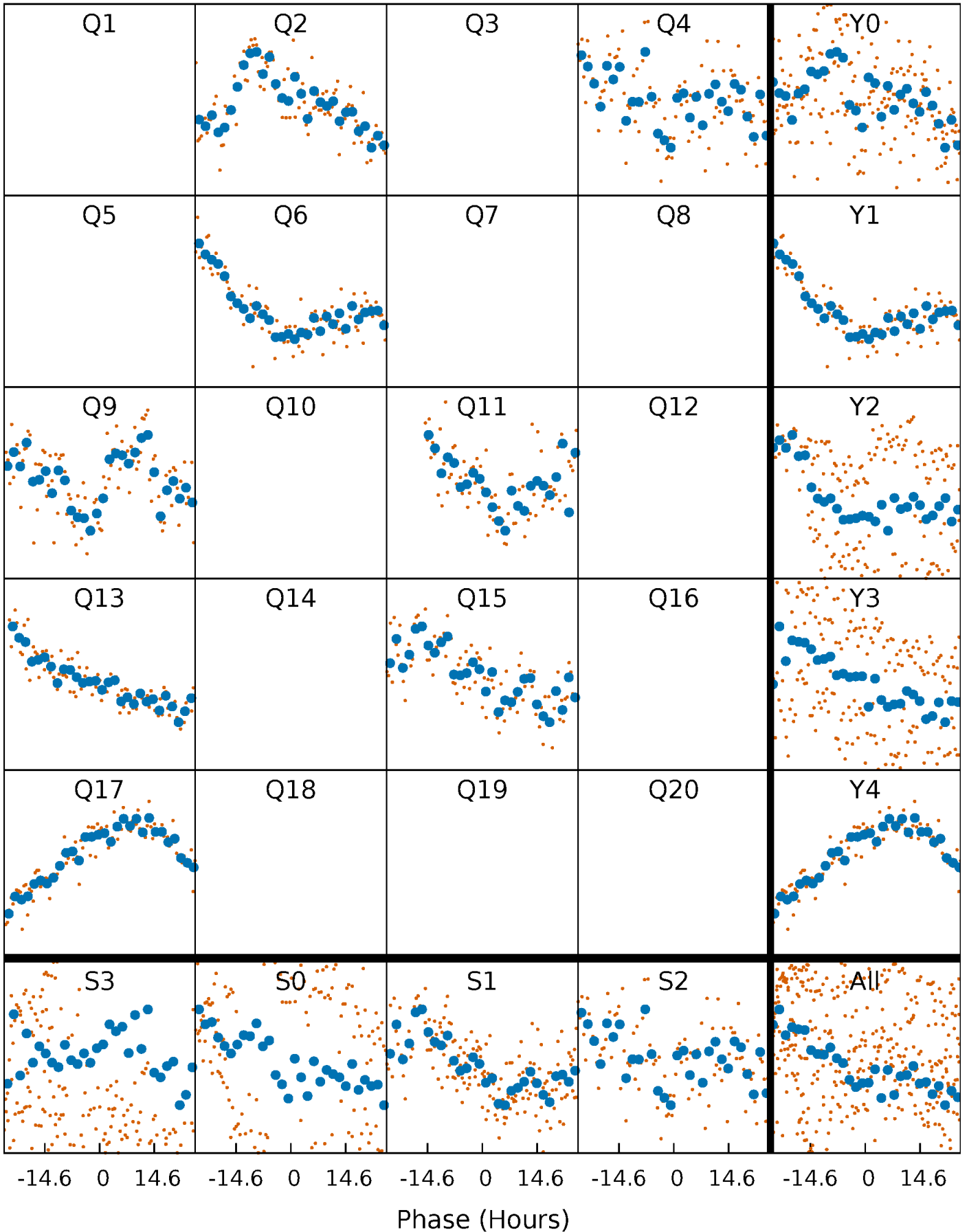
## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)





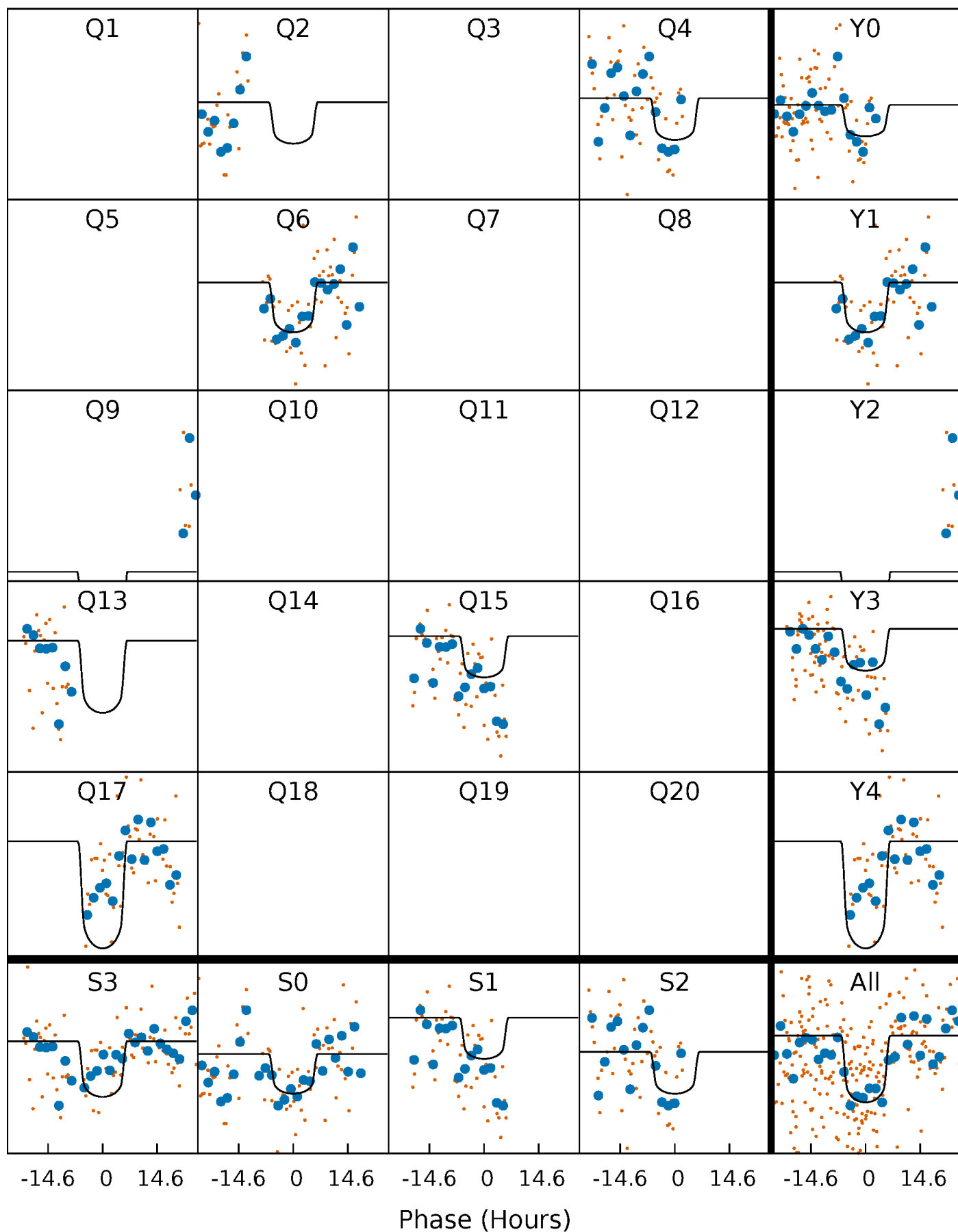
# PDC Quarter-Phased Transit Curves

TCE 003847077-03 P=167.903463 Days  $T_0=225.255995$  (BKJD)



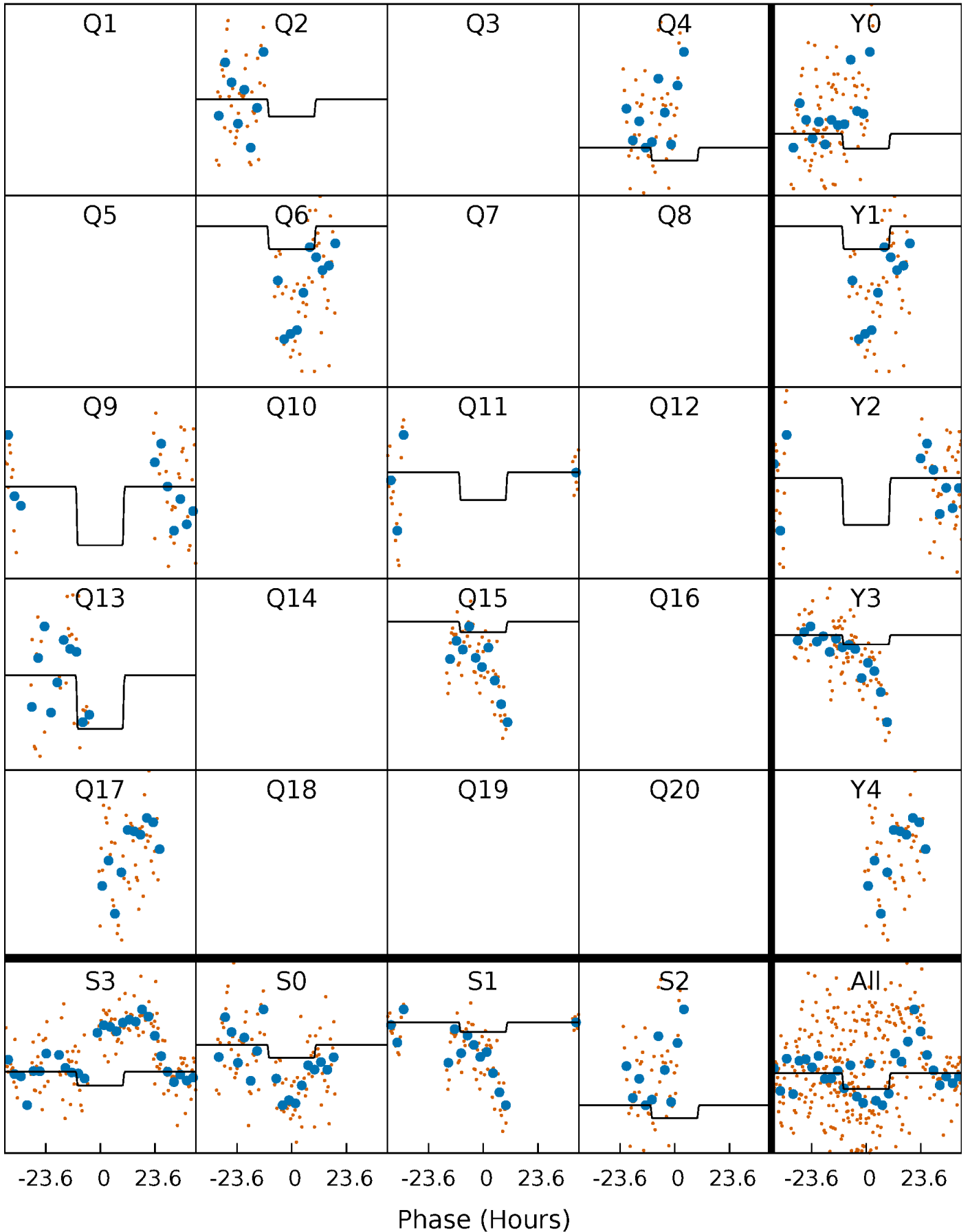
# DV Quarter-Phased Transit Curves

TCE 003847077-03 P=167.903463 Days  $T_0=225.255995$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

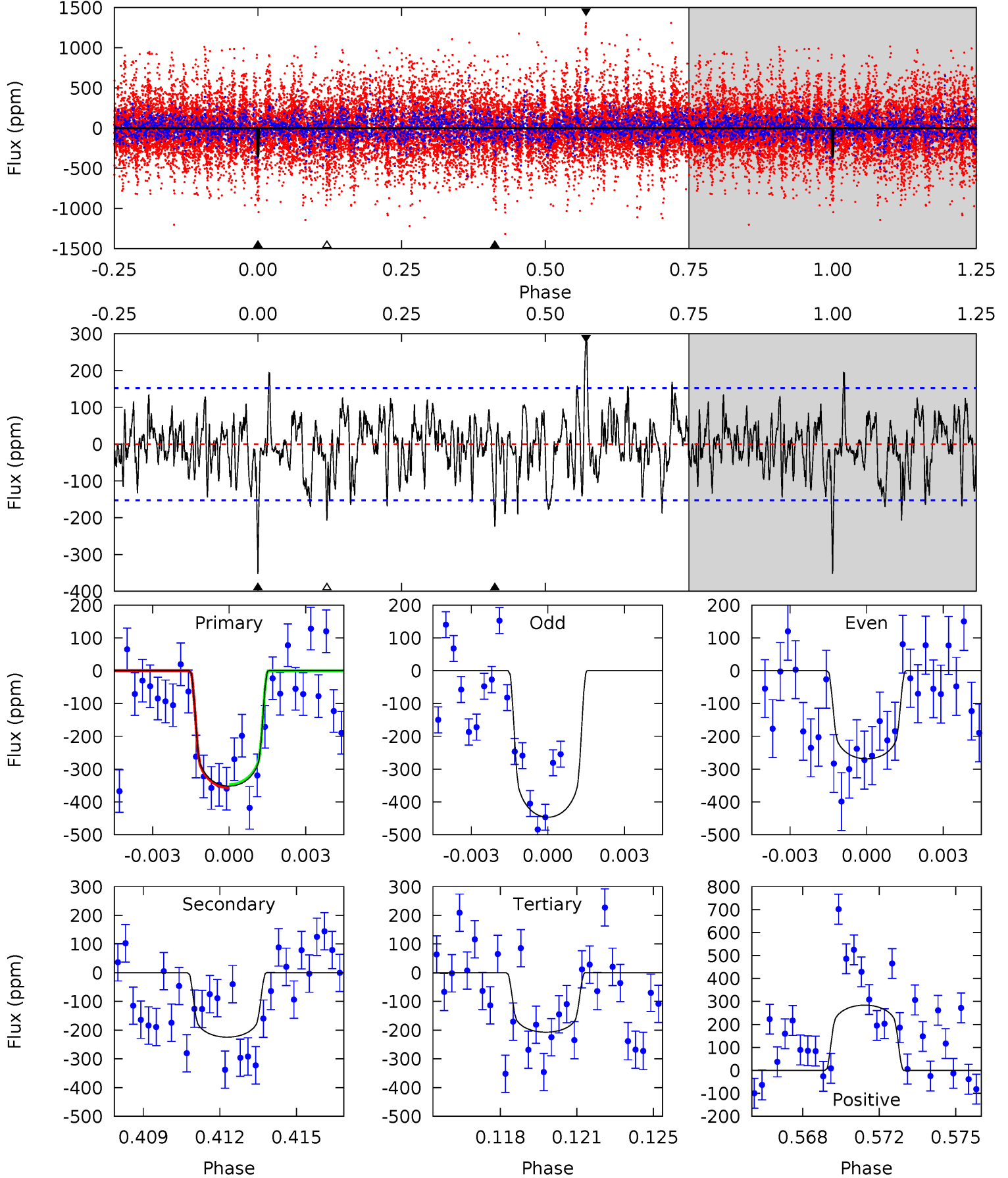
TCE 003847077-03 P=167.882129 Days  $T_0=225.243109$  (BKJD)



# DV Model-Shift Uniqueness Test

003847077-03, P = 167.903463 Days, E = 57.352532 Days

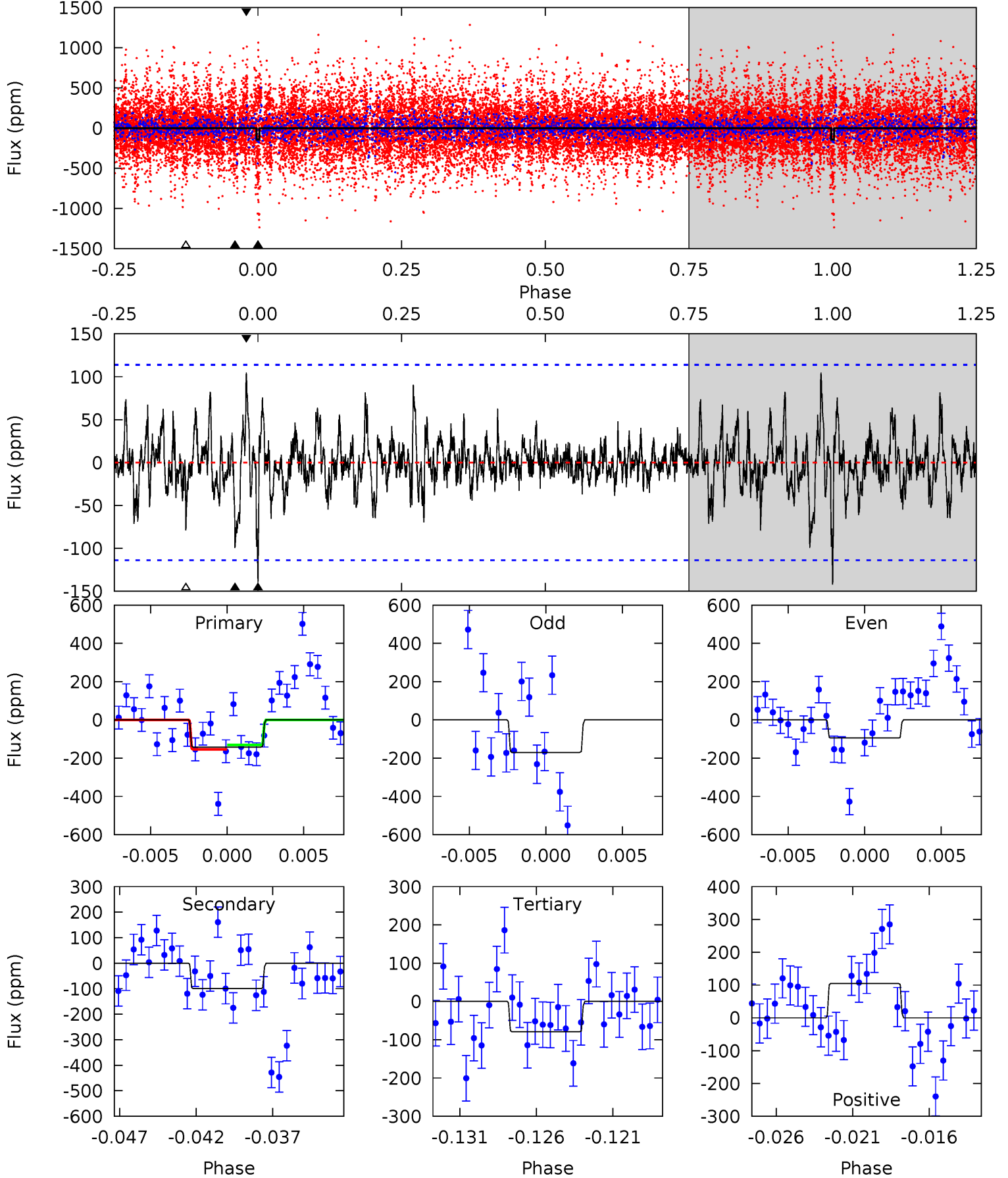
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.1	7.70	7.11	9.74	5.24	2.95	2.32	4.97	2.33	0.59	-2.04	3.03	1.00	0.45	0.16



# Alt Model-Shift Uniqueness Test

003847077-03, P = 167.882129 Days, E = 57.360980 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
6.42	4.49	3.58	4.73	5.15	2.79	1.10	2.84	1.68	0.92	-0.24	1.69	0.62	0.42	0.53



### Stellar Parameters For KIC 003847077

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6442^{+145}_{-209}$	$4.388^{+0.056}_{-0.224}$	$0.070^{+0.250}_{-0.300}$	$1.183^{+0.431}_{-0.144}$	$1.250^{+0.184}_{-0.165}$	$1.062^{+0.252}_{-0.610}$
	+2%/-3%	+1%/-5%	+357%/-429%	+36%/-12%	+15%/-13%	+24%/-57%
Source	PHO1	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 003847077-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-224 \pm 29$	$2.76^{+0.55}_{-0.45}$	$550^{+43}_{-28}$	$5512^{+492}_{-383}$	$6461^{+3081}_{-2058}$
Alt.	$-99 \pm 22$	$1.50^{+0.43}_{-0.43}$	$550^{+40}_{-28}$	$6108^{+1136}_{-753}$	$9746^{+9097}_{-4273}$

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



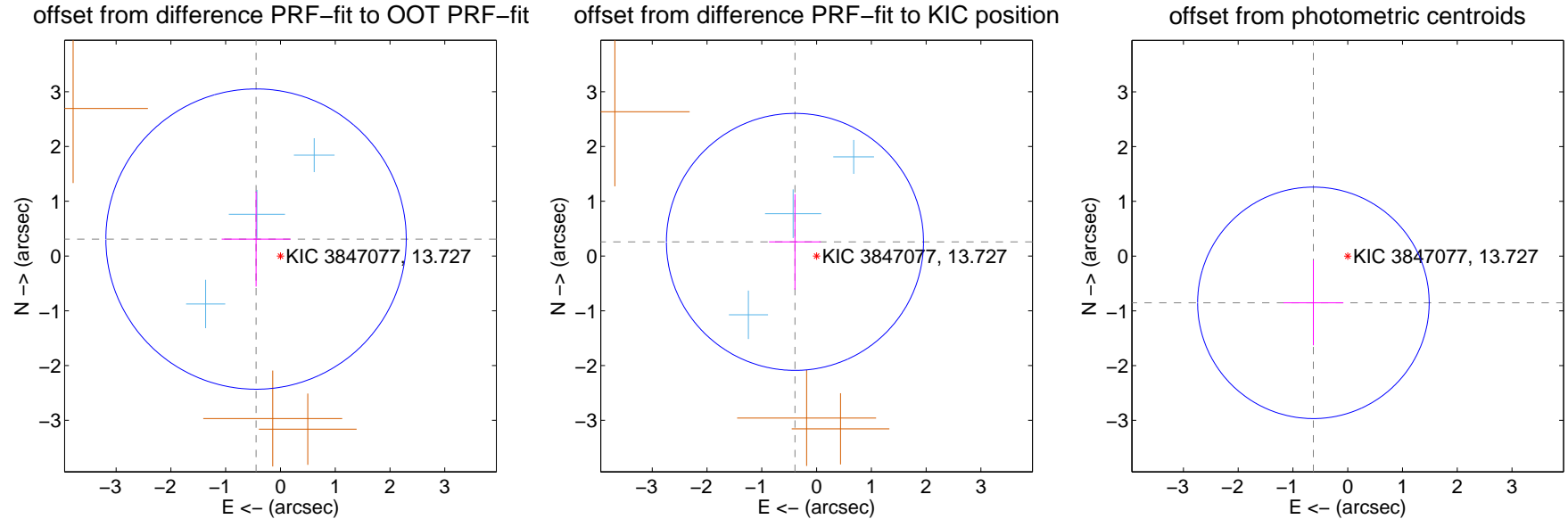
## DV Centroid Data

Supplemental centroid analysis for 003847077-03. Kepler magnitude: 13.73. Transit SNR 8.19

There are 3 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.542 \pm 0.914$	0.59	$0.446 \pm 0.629$	$0.309 \pm 0.868$
PRF-fit source offset from KIC position	$0.471 \pm 0.782$	0.60	$0.395 \pm 0.473$	$0.258 \pm 0.873$
photometric centroid source offset	$1.06 \pm 0.70$	1.50	$0.63 \pm 0.55$	$-0.85 \pm 0.78$



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.

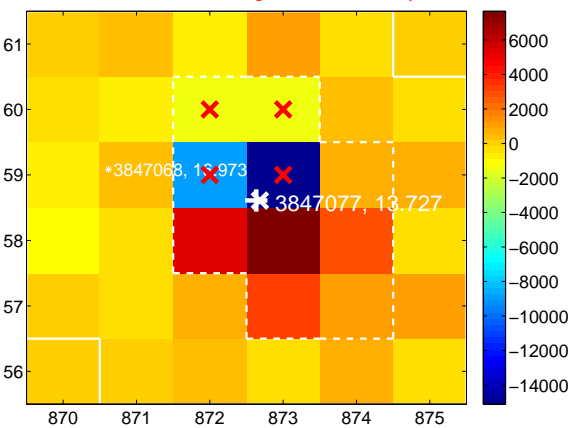
Q1 no difference image



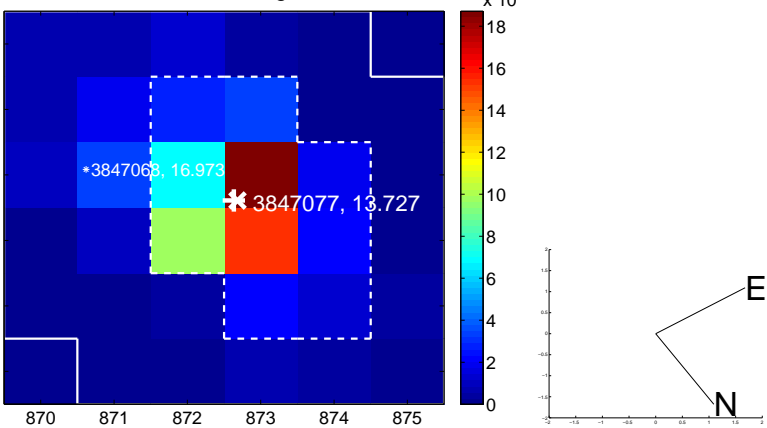
Q1 no OOT image



Q2 difference image. Poor Quality



Q2 OOT image



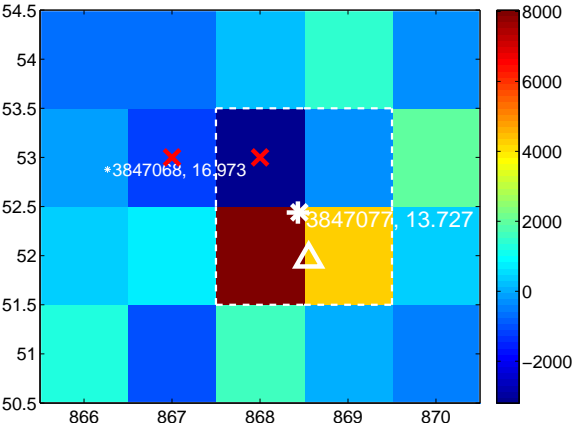
Q3 no difference image



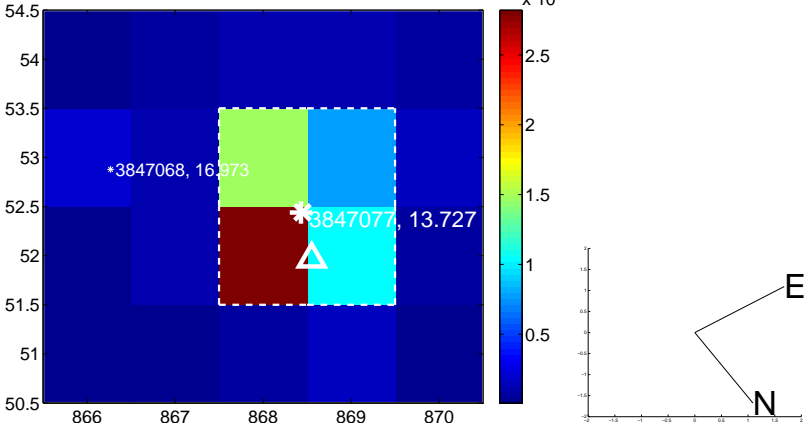
Q3 no OOT image



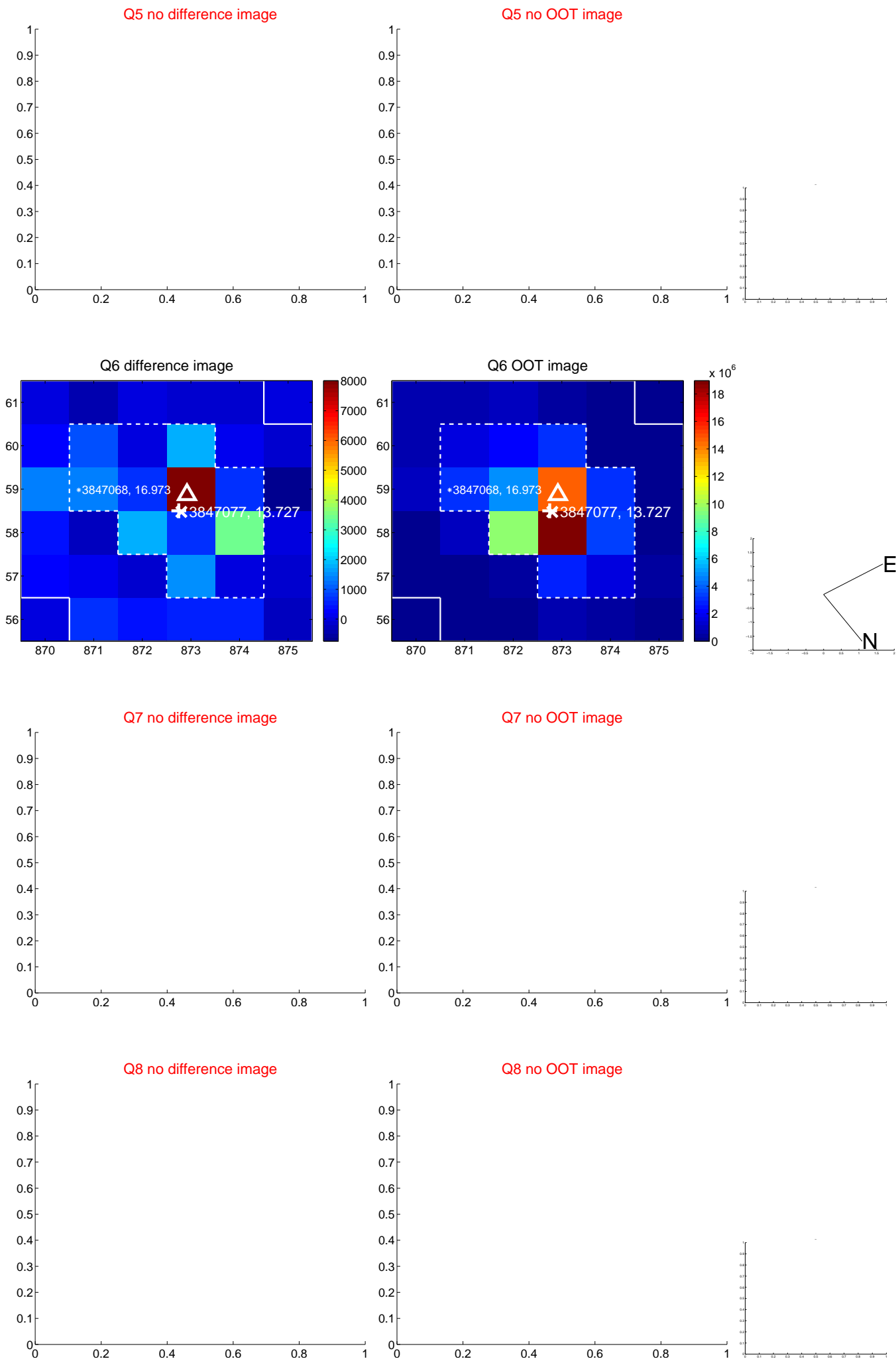
Q4 difference image



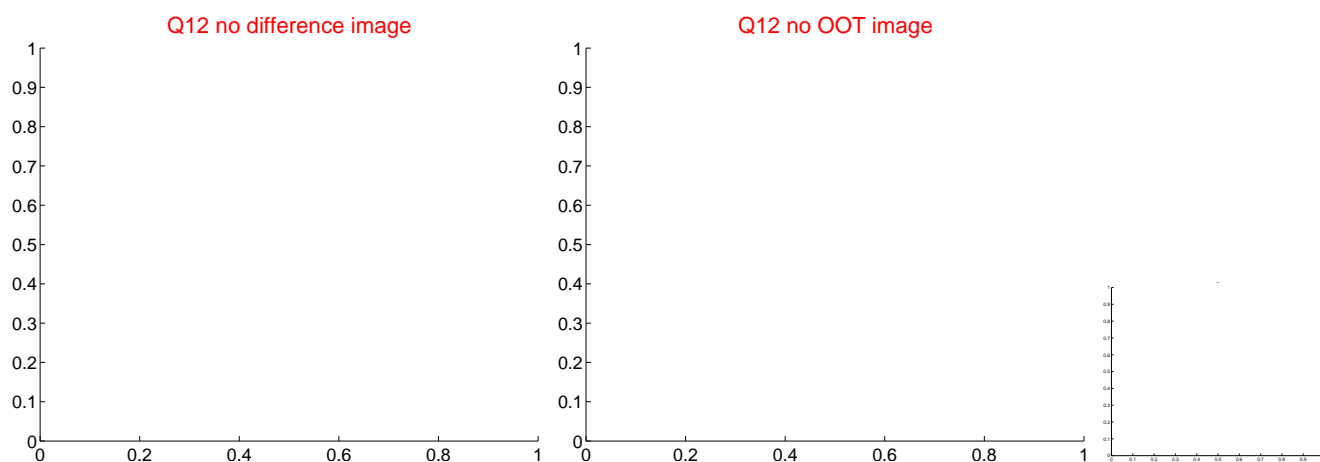
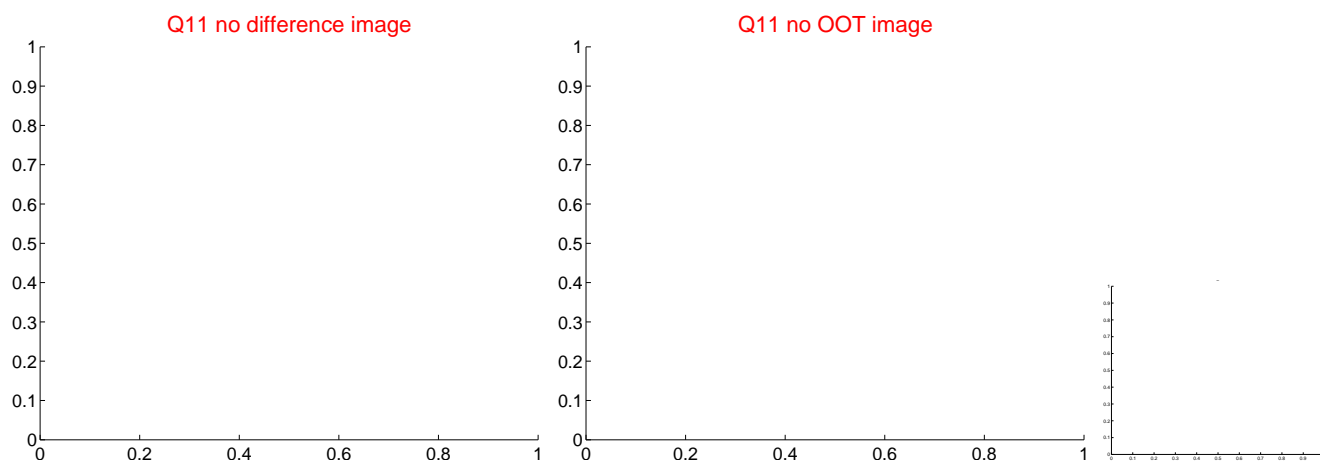
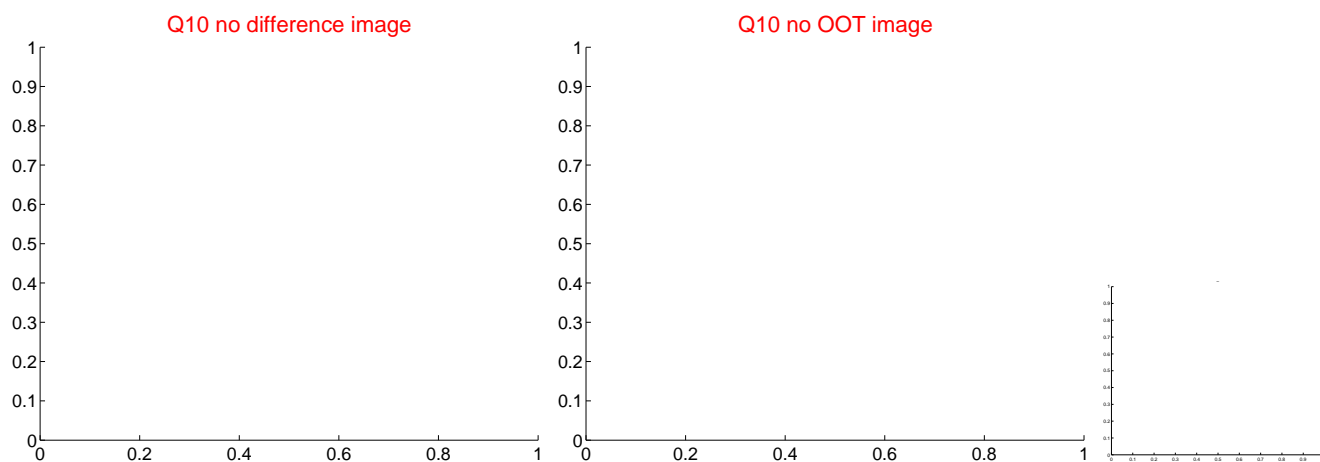
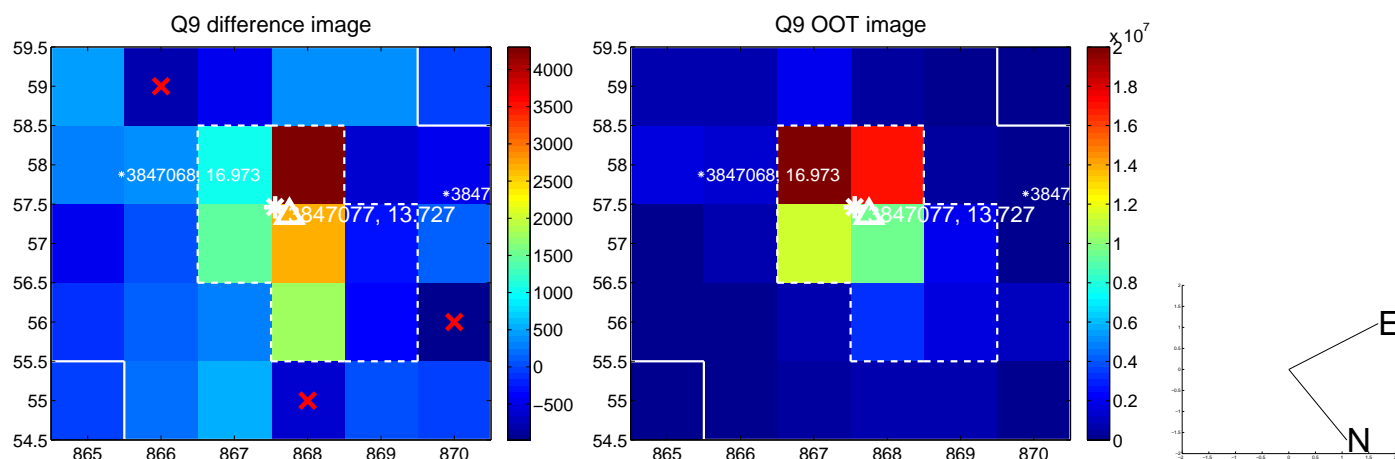
Q4 OOT image



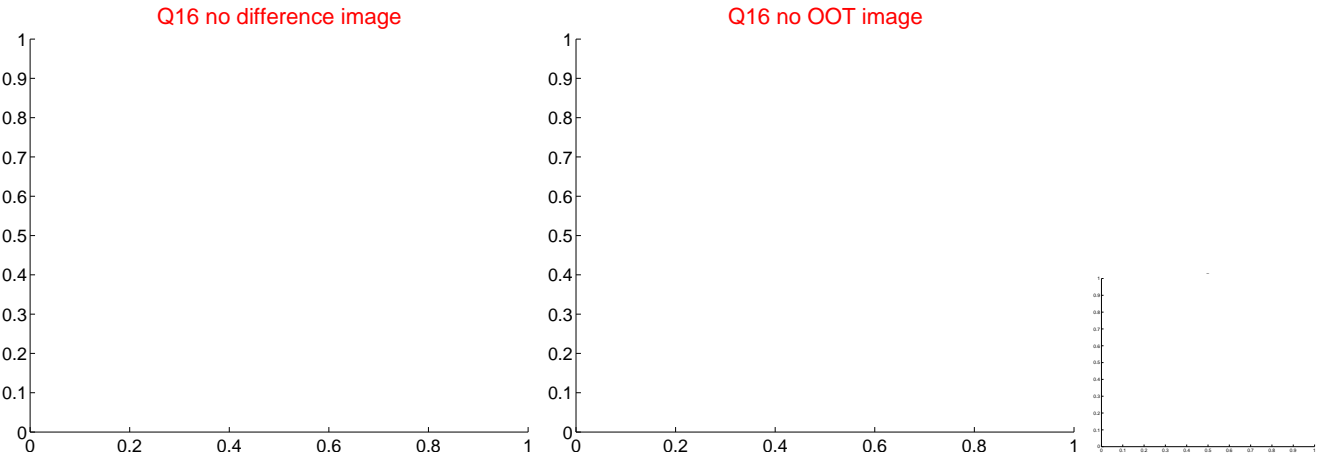
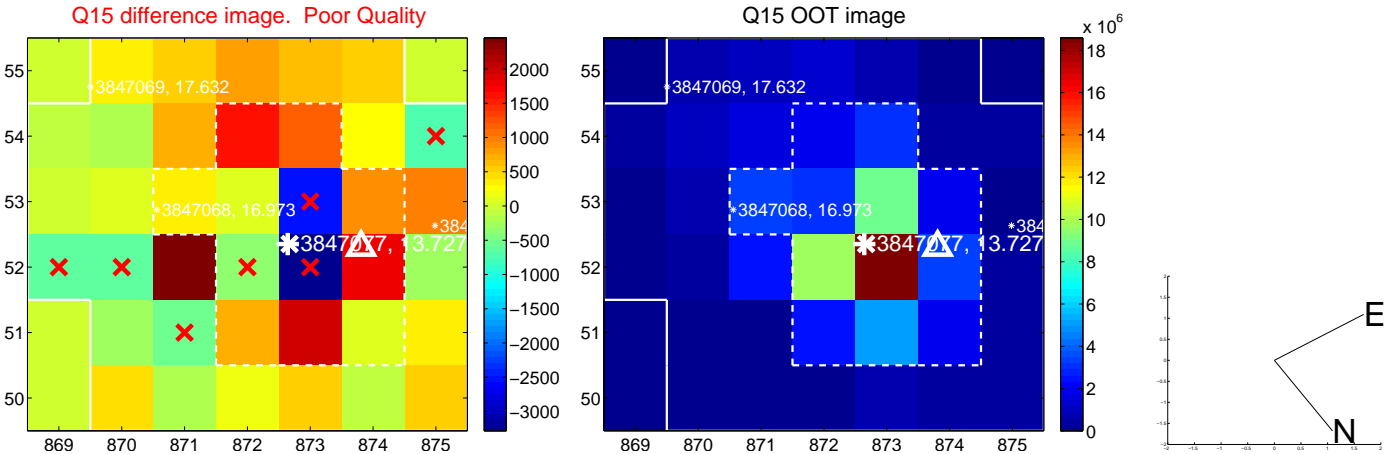
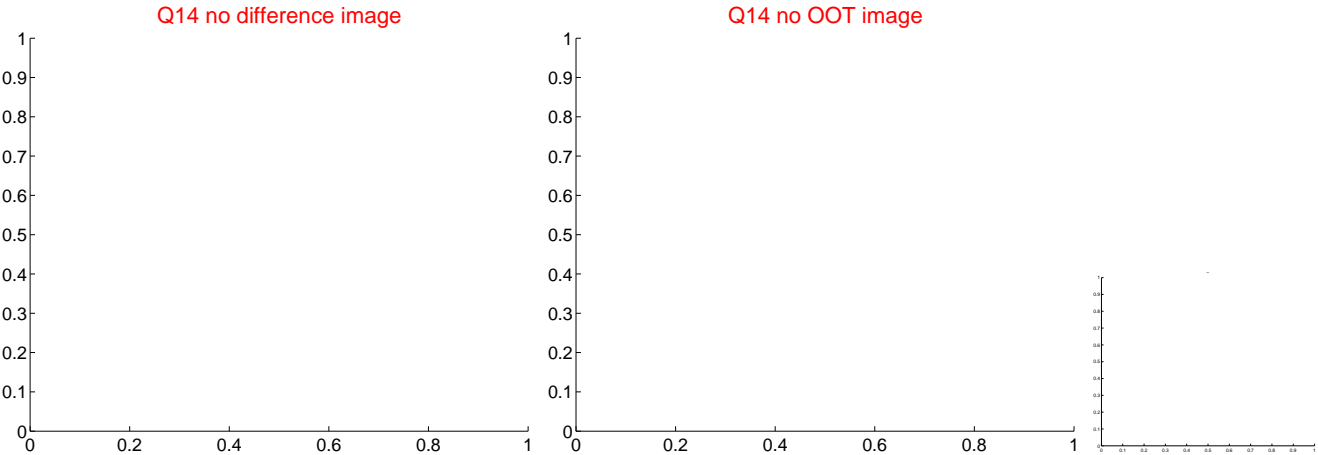
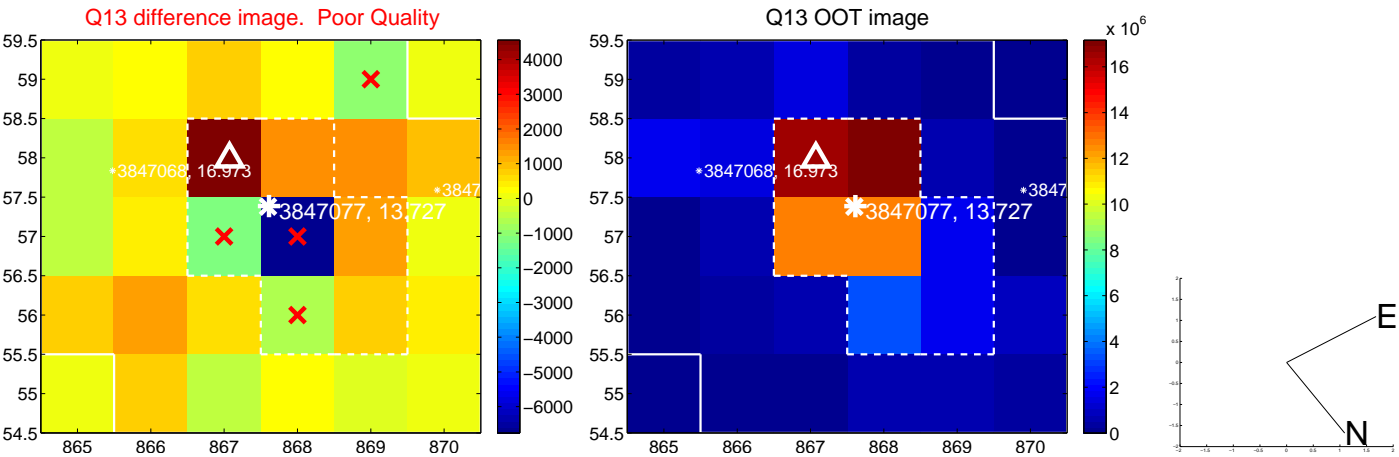
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



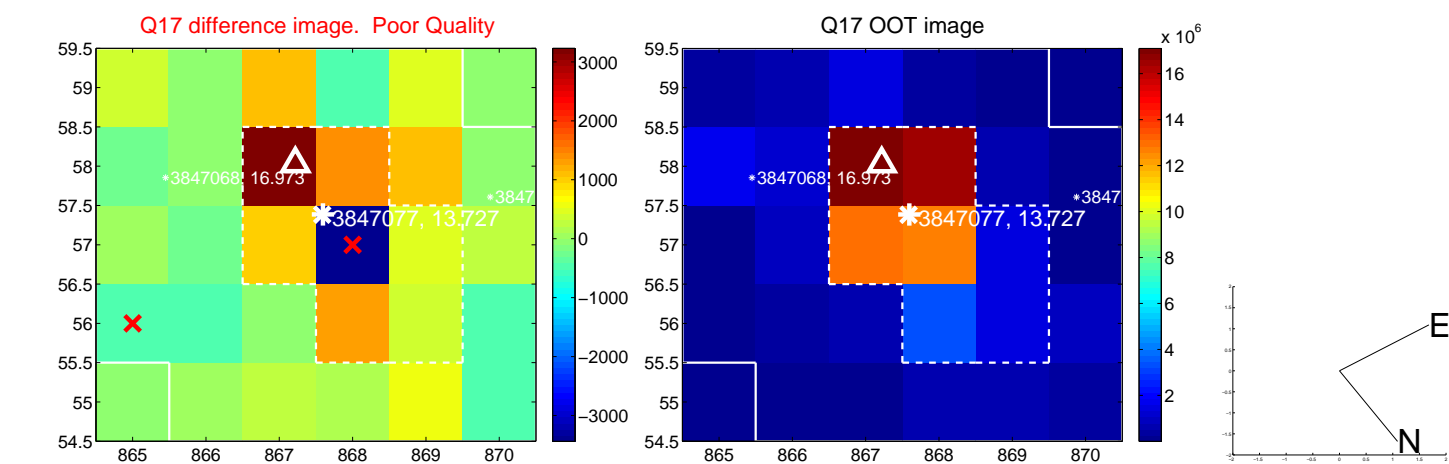
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



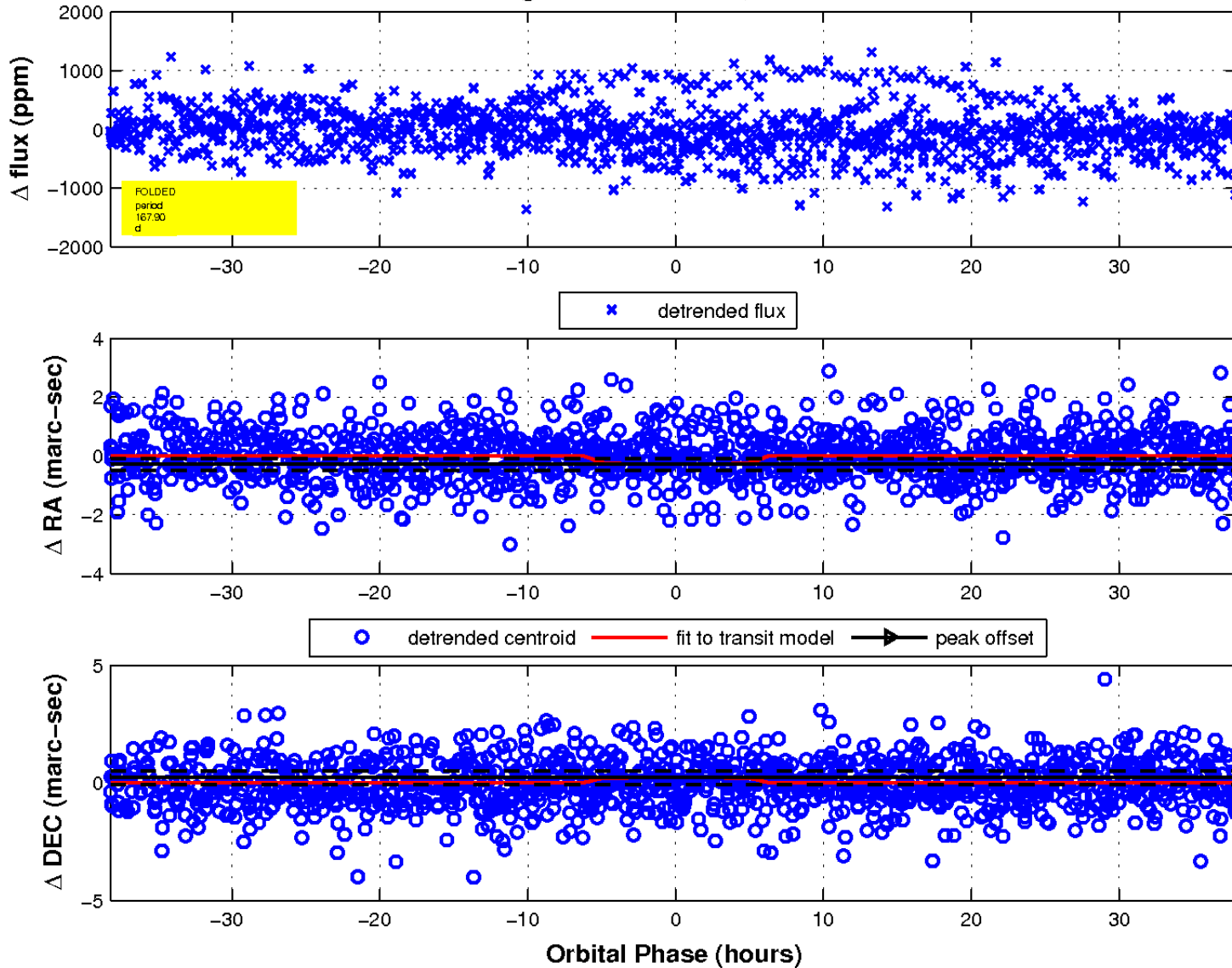
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

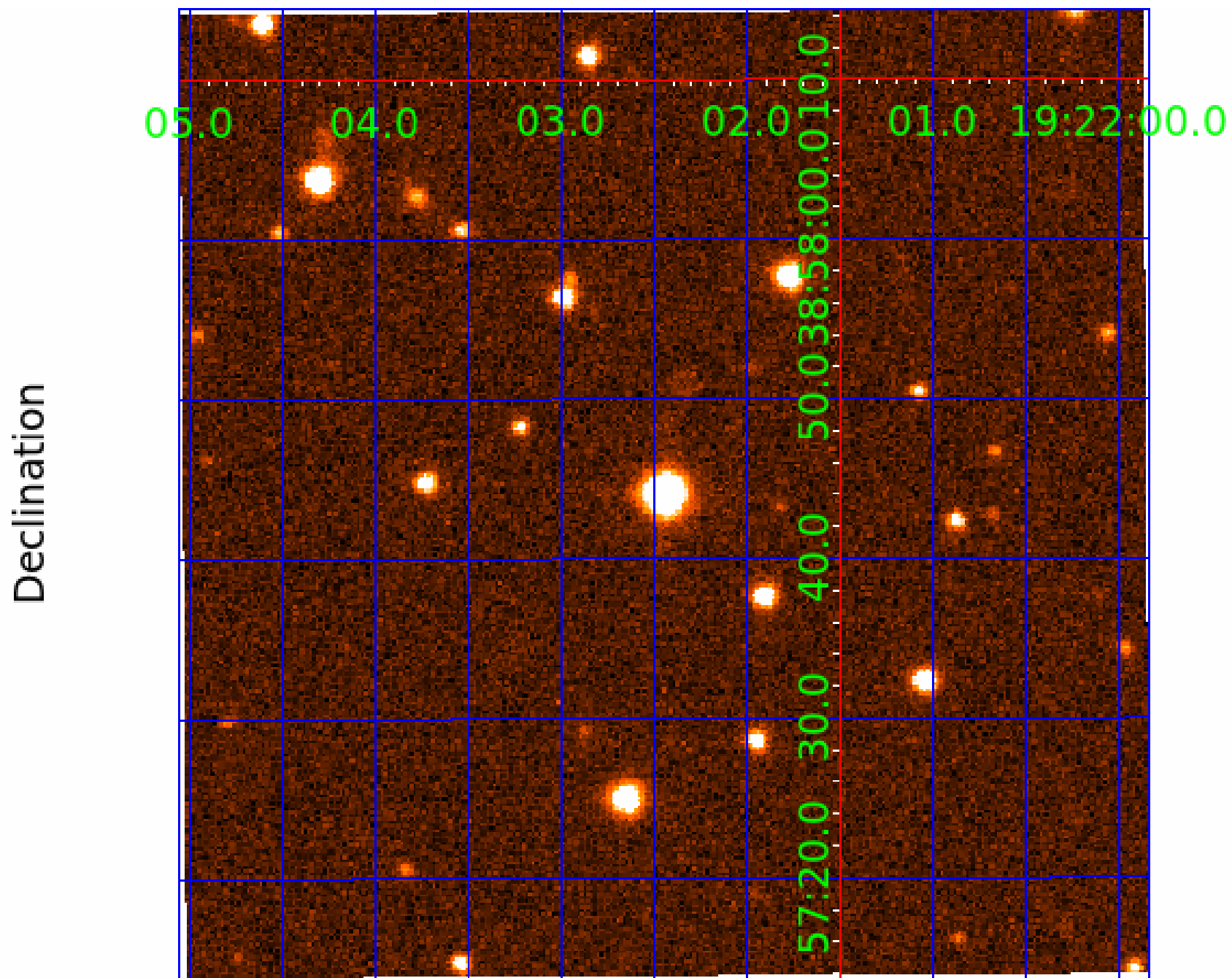


fluxWeightedCentroids, Planet 3 of 6





UKIRT Image



# KIC 003847077

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003847077-01	OBS	No	3.510672	134.697871	42.9	19.179	7.9	8.4	1.18	6442	0.85	911.55
003847077-02	OBS	No	165.374923	244.856952	231.0	3.194	18.9	3.0	1.18	6442	2.03	5.36
003847077-03	OBS	No	167.903463	225.255995	359.5	12.756	13.0	8.2	1.18	6442	2.64	5.25
003847077-04	OBS	No	124.223497	207.078213	229.8	5.604	7.6	6.8	1.18	6442	1.97	7.85
003847077-05	OBS	No	173.609950	297.696703	421.9	15.886	8.6	9.8	1.18	6442	2.60	5.02
003847077-06	OBS	No	14.070583	132.975133	188.3	11.235	7.8	8.7	1.18	6442	1.83	143.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003847077-01	OBS	FP	0.00	1	0	0	0	LPP_DV
003847077-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
003847077-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
003847077-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
003847077-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
003847077-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS—HALO_GHOST

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

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

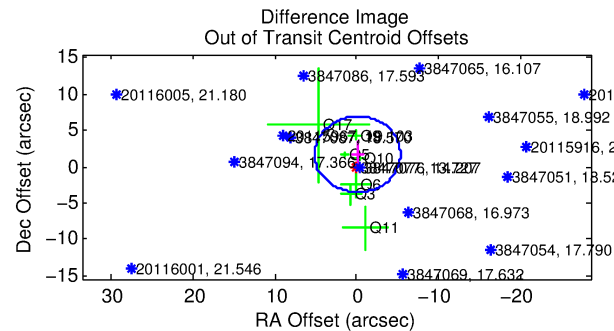
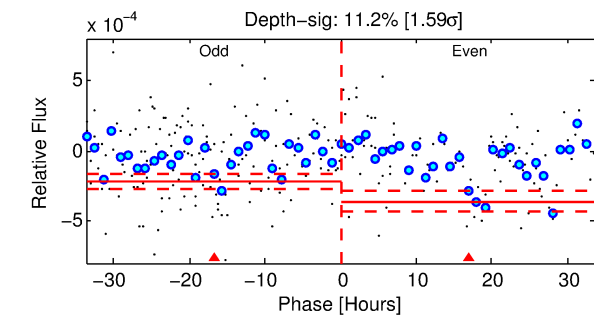
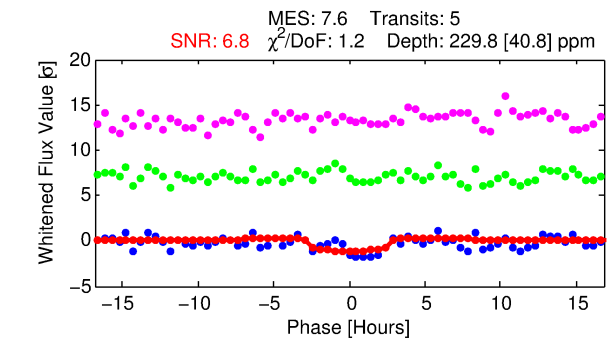
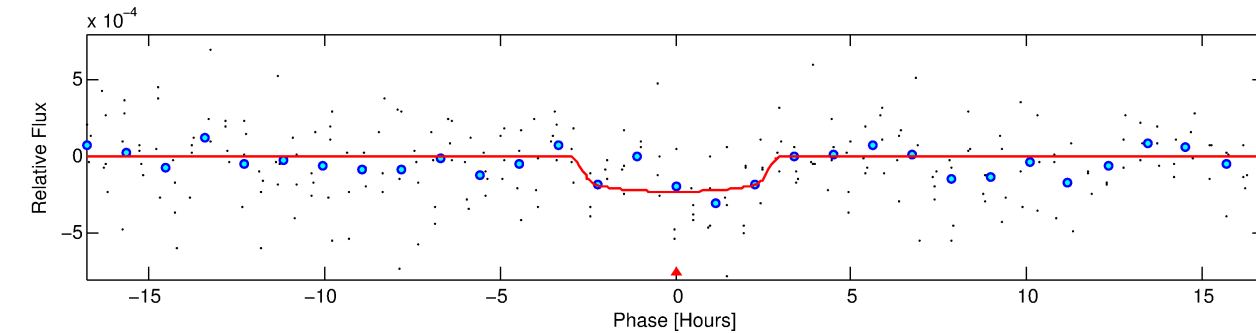
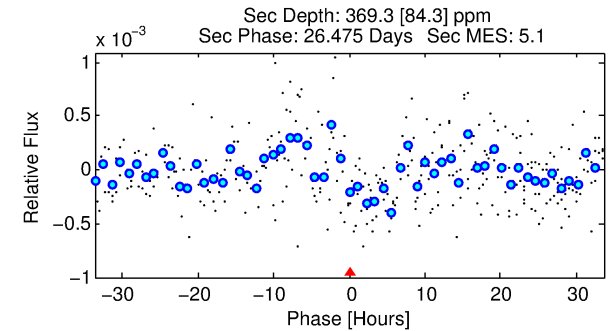
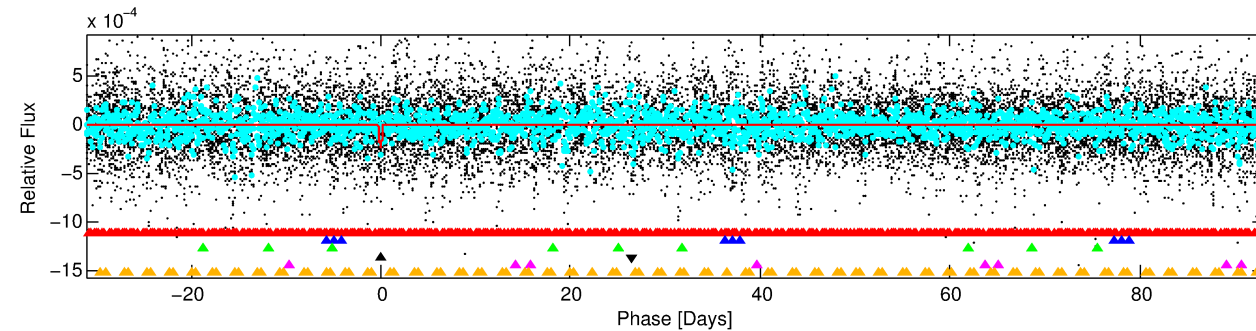
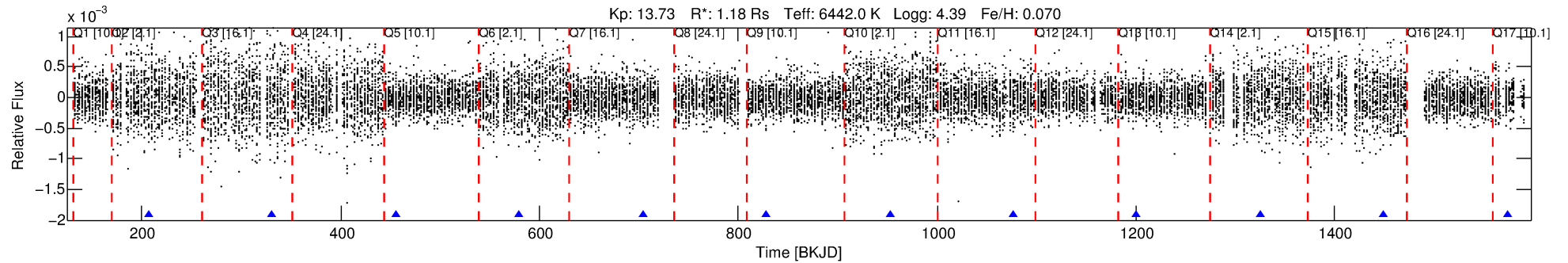
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003847077-04

No Significant Match Found

# DV One-Page Summary

KIC: 3847077 Candidate: 4 of 6 Period: 124.223 d



## DV Fit Results:

Period = 124.22350 [0.00376] d  
Epoch = 207.0782 [0.0187] BKJD  
Rp/R\* = 0.0152 [0.0112]  
a/R\* = 109.66 [421.61]  
b = 0.78 [1.92]  
Seff = 7.85 [3.46]  
Teq = 427 [47] K  
Rp = 1.97 [1.61] Re  
a = 0.5246 [0.1561] AU  
Ag = 14432.30 [22252.13] [0.65 $\sigma$ ]  
Teff = 7232 [2692] K [2.53 $\sigma$ ]

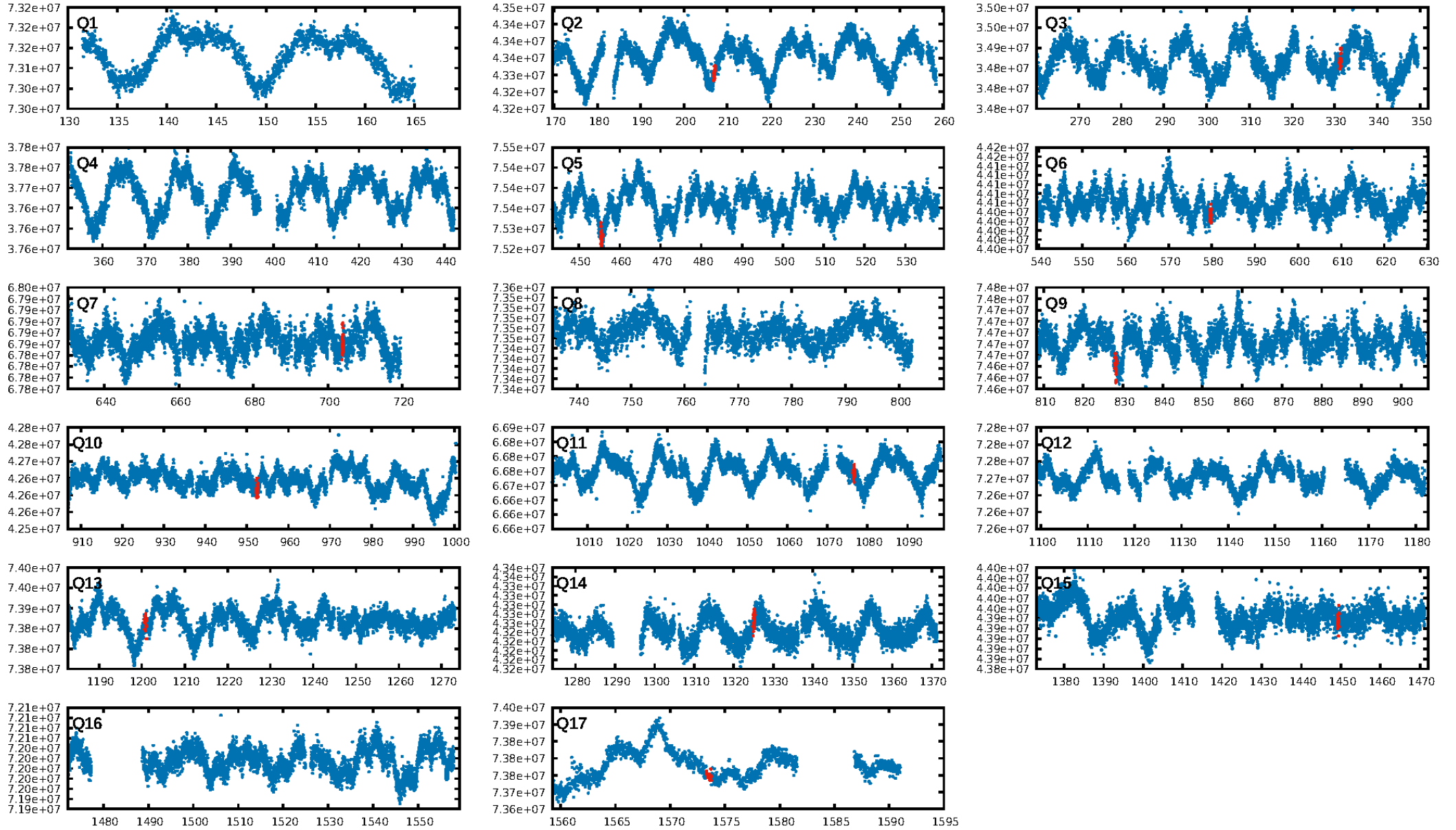
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [210.57 $\sigma$ ]  
LongPeriod-sig: 100.0% [153.12 $\sigma$ ]  
ModelChiSquare2-sig: 74.6%  
ModelChiSquareGof-sig: 99.6%  
**Bootstrap-pfa: 1.55e-08**  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -1.224  
Centroid-sig: 3.7%  
Centroid-so: 1.990 arcsec [1.93 $\sigma$ ]  
OotOffset-rm: 1.709 arcsec [0.98 $\sigma$ ]  
OotOffset-st: 2/2/0/3 [7]  
KicOffset-rm: 1.638 arcsec [0.81 $\sigma$ ]  
KicOffset-st: 2/2/0/3 [7]  
DiffImageQuality-fgm: 0.29 [2/7]  
DiffImageOverlap-fno: 0.45 [5/11]

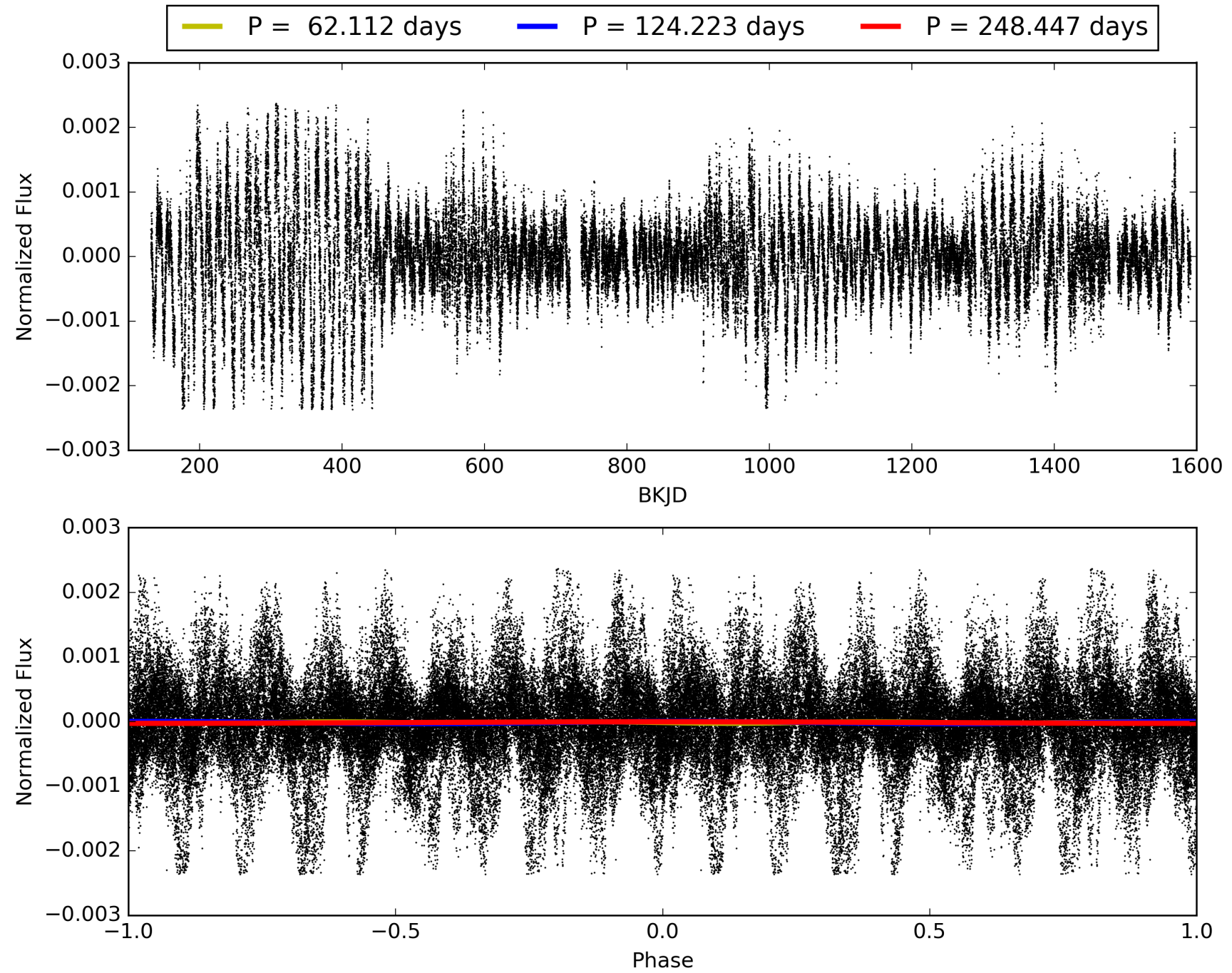
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 11:37:59 Z

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

# TCE 003847077-04, PDC Light Curves

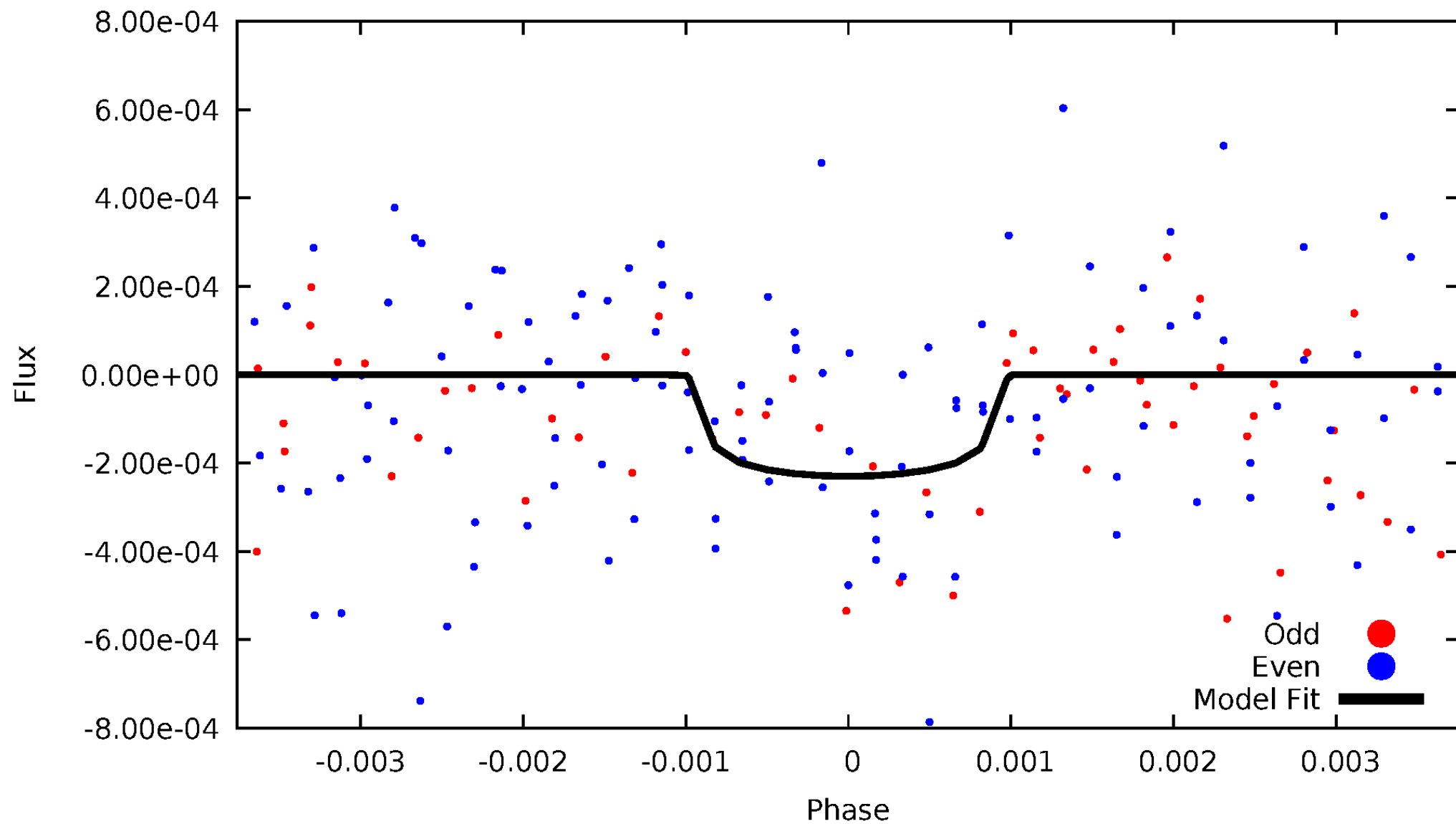


TCE 003847077-04



# DV Odd/Even

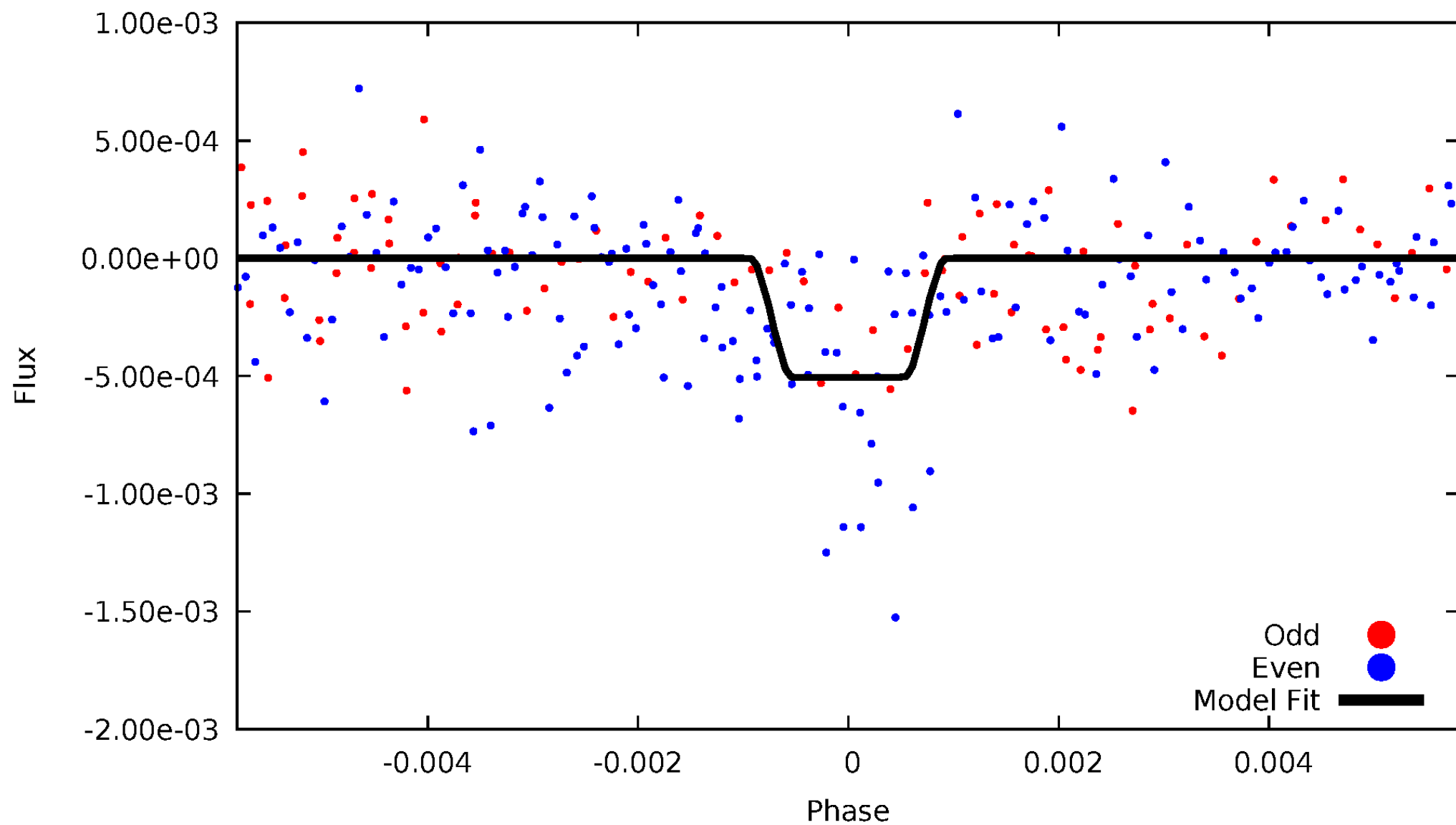
TCE 003847077-04





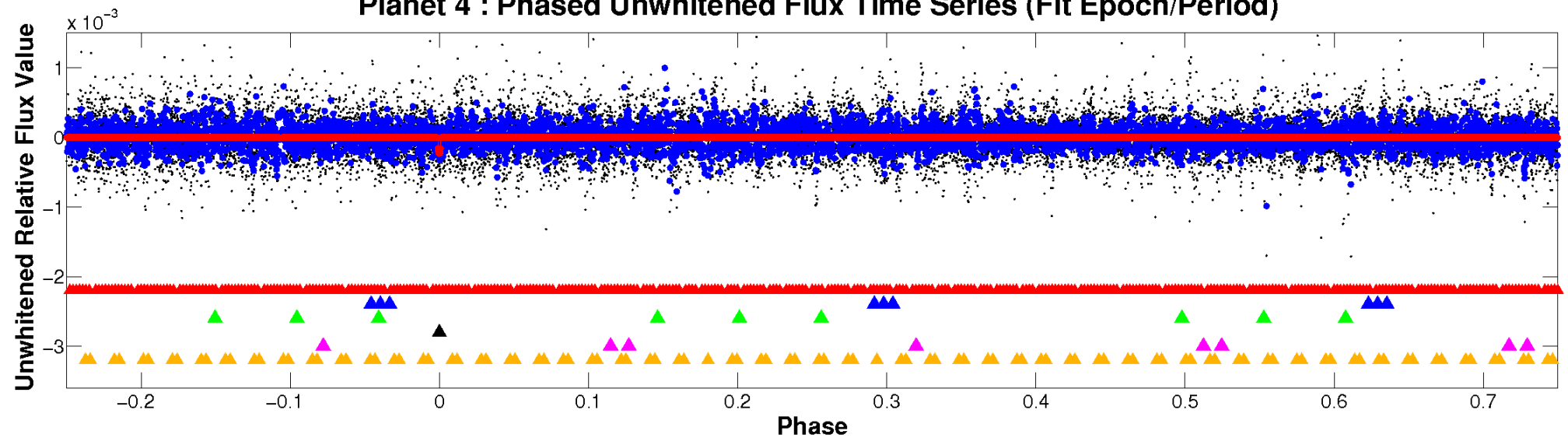
# ALT Odd/Even

TCE 003847077-04

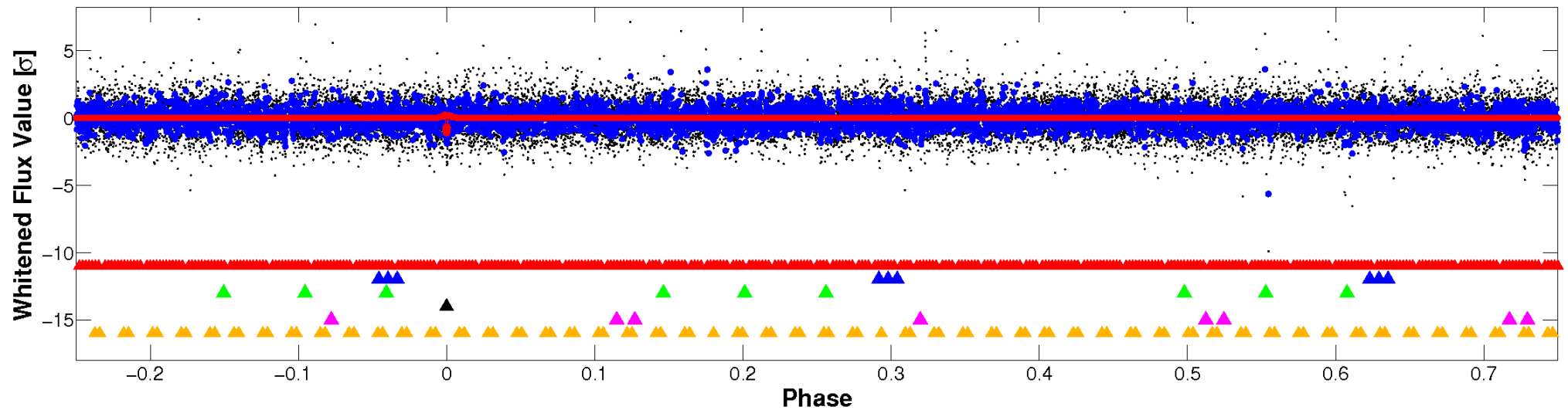


# Non-Whitened Vs. Whitened Light Curve

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

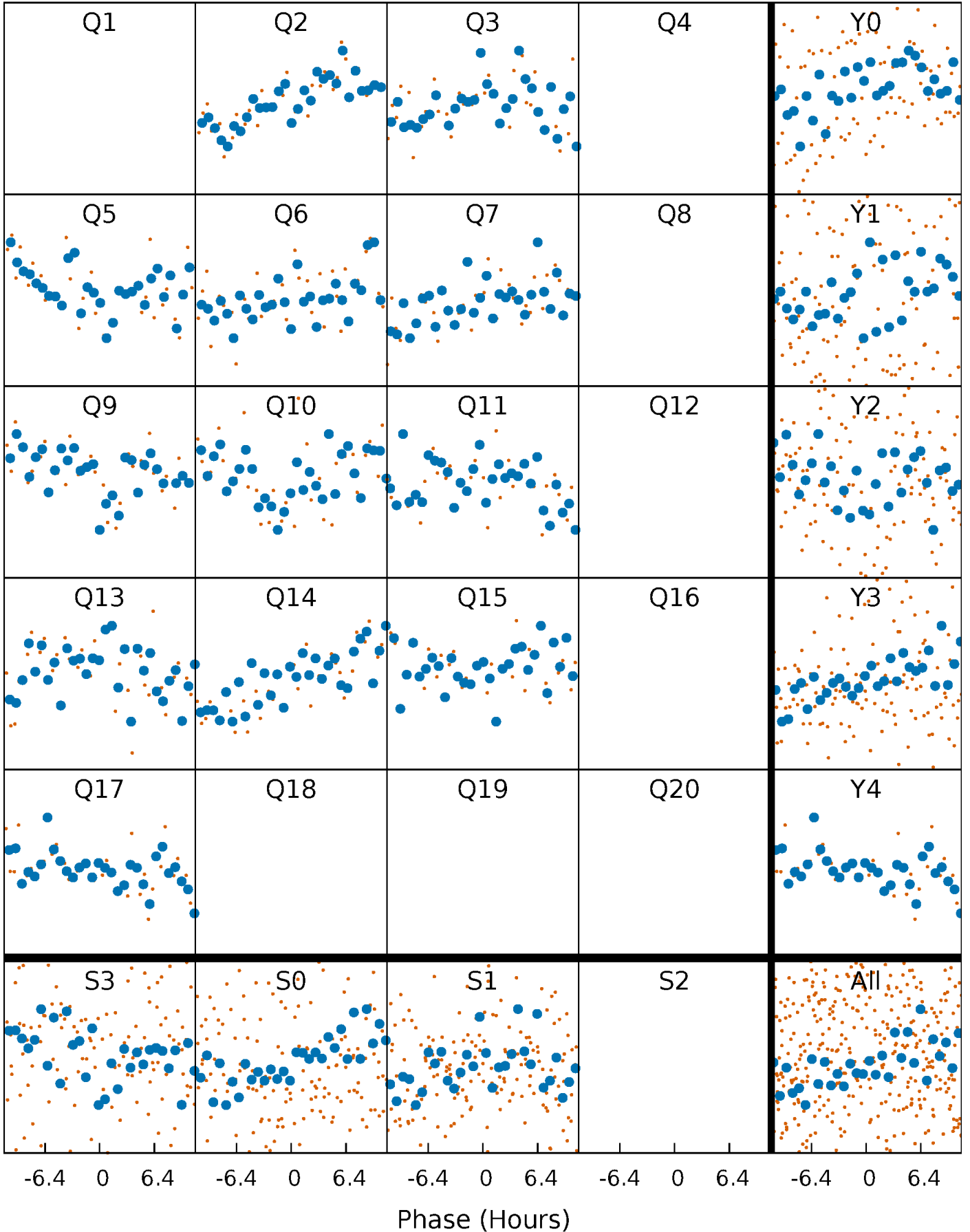


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



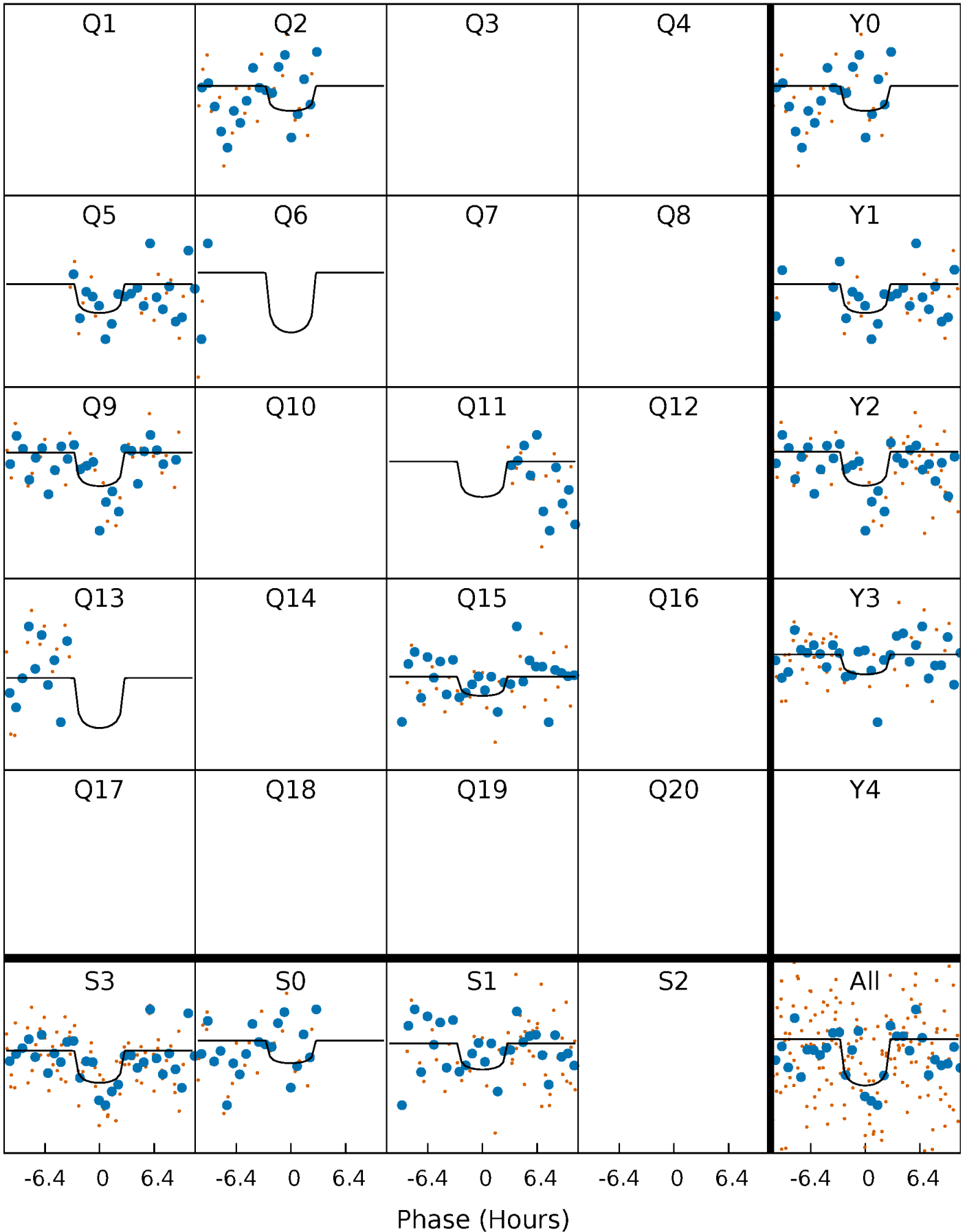
# PDC Quarter-Phased Transit Curves

TCE 003847077-04   P=124.223497 Days    $T_0=207.078213$  (BKJD)



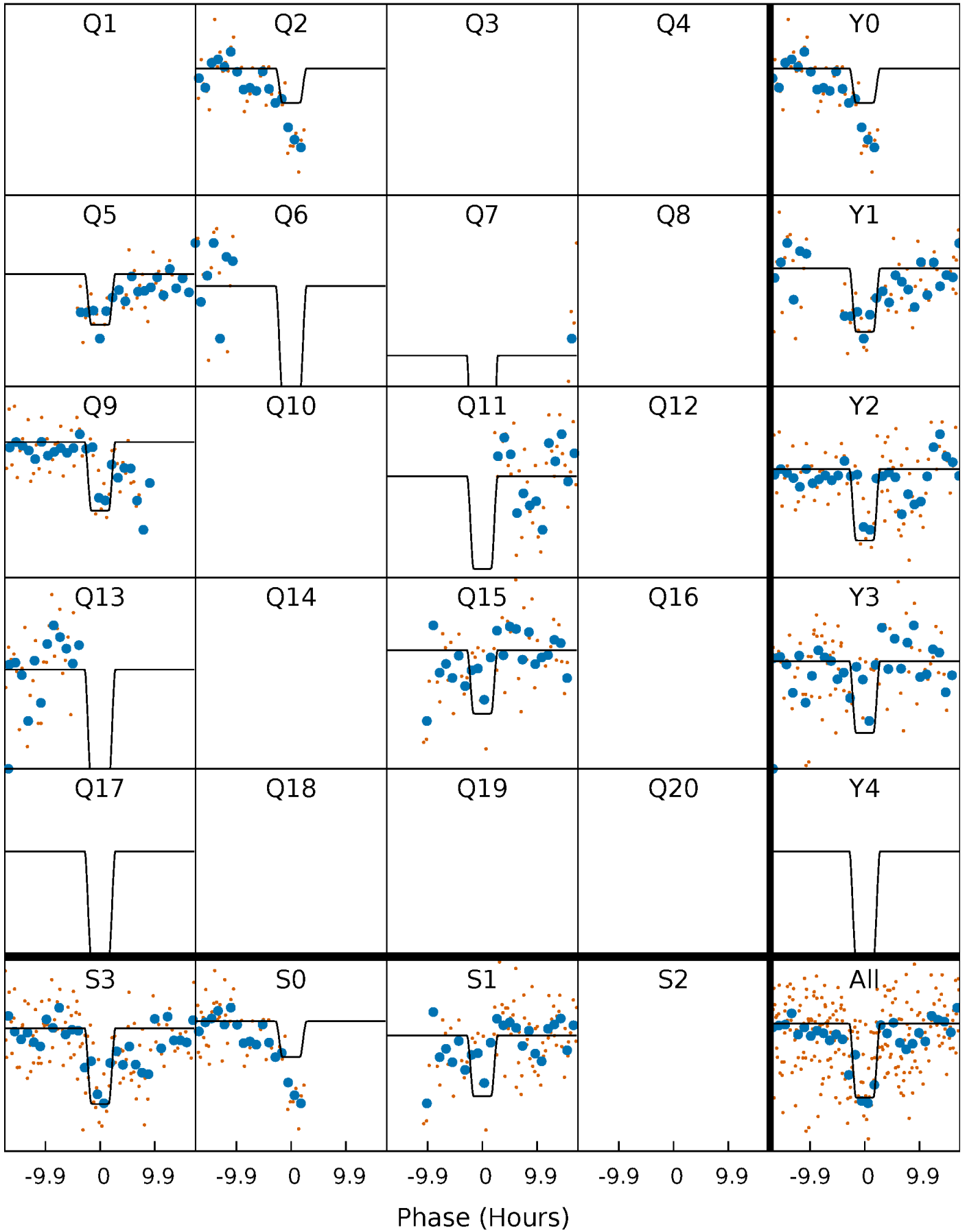
# DV Quarter-Phased Transit Curves

TCE 003847077-04 P=124.223497 Days  $T_0=207.078213$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

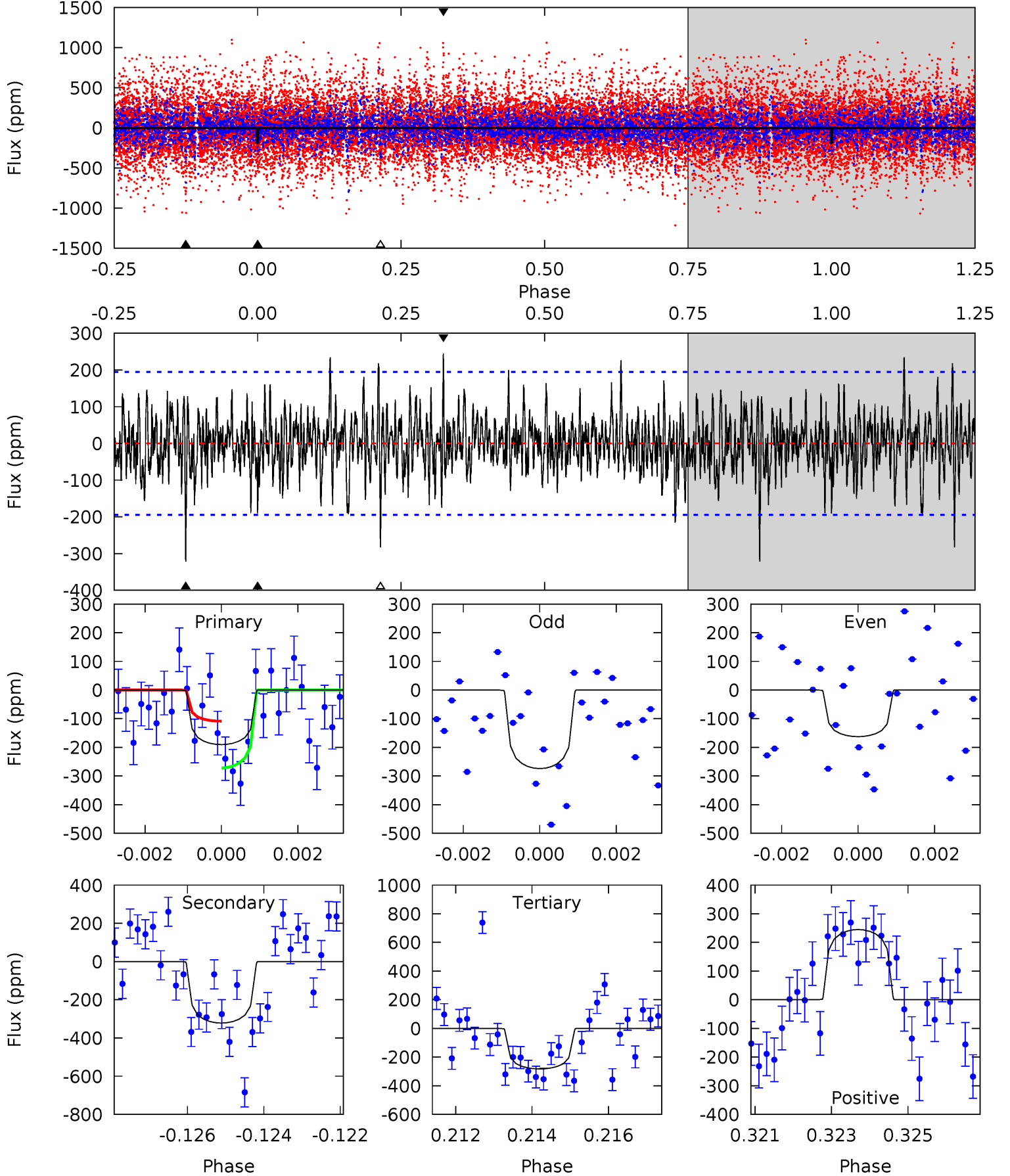
TCE 003847077-04     $P=124.224392$  Days     $T_0=207.104228$  (BKJD)



# DV Model-Shift Uniqueness Test

003847077-04,  $P = 124.223497$  Days,  $E = 82.854716$  Days

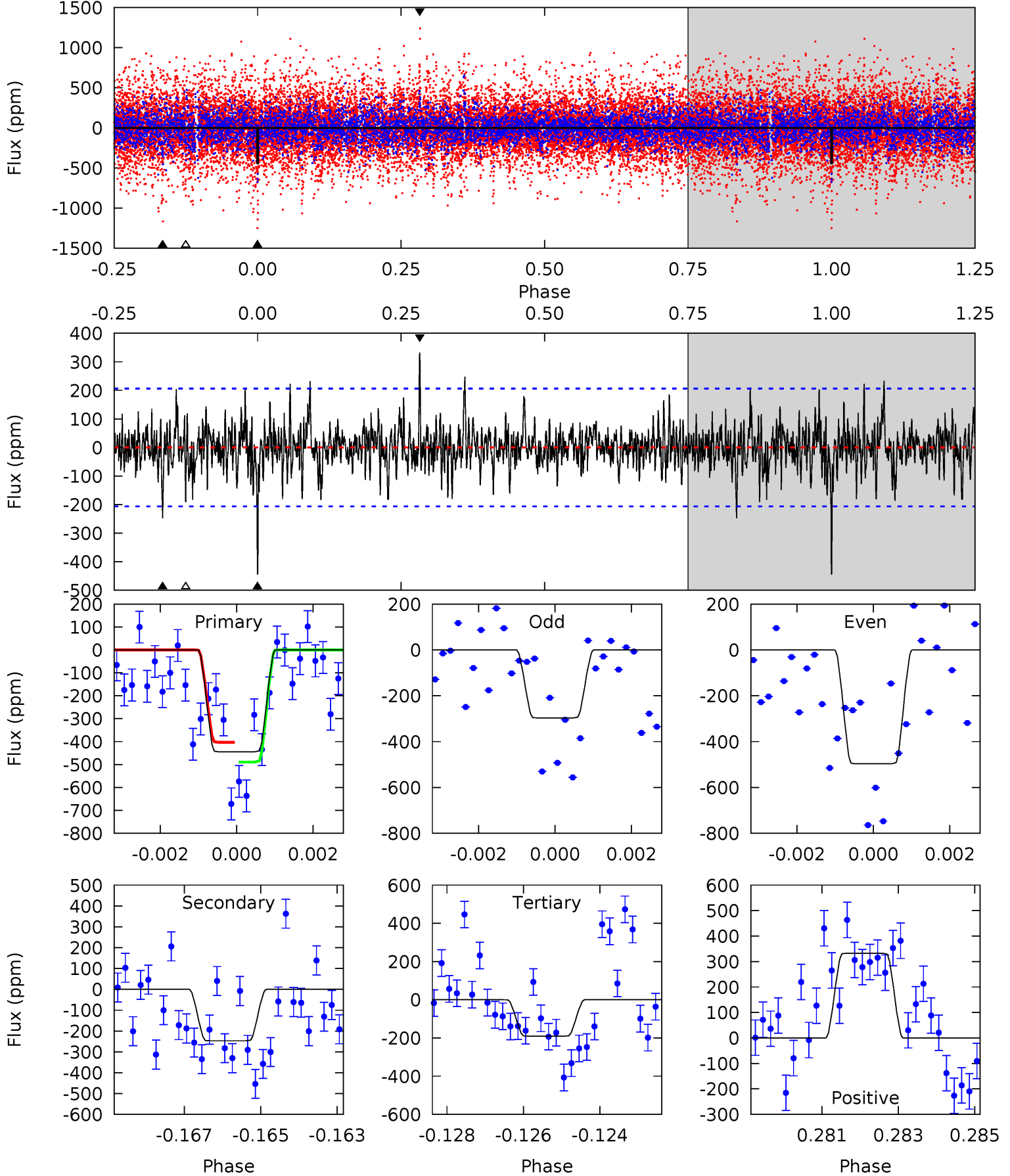
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.20	8.79	7.72	6.69	5.31	3.07	1.72	-2.52	-1.49	1.07	2.10	1.30	0.90	0.43	2.24



# Alt Model-Shift Uniqueness Test

003847077-04, P = 124.224392 Days, E = 82.879836 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
11.5	6.39	4.93	8.61	5.34	3.11	1.53	6.57	2.89	1.46	-2.22	2.37	0.86	0.43	1.12





### Stellar Parameters For KIC 003847077

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6442^{+145}_{-209}$	$4.388^{+0.056}_{-0.224}$	$0.070^{+0.250}_{-0.300}$	$1.183^{+0.431}_{-0.144}$	$1.250^{+0.184}_{-0.165}$	$1.062^{+0.252}_{-0.610}$
	+2%/-3%	+1%/-5%	+357%/-429%	+36%/-12%	+15%/-13%	+24%/-57%
Source	PHO1	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 003847077-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-322 \pm 37$	$2.29^{+1.57}_{-1.26}$	$611^{+48}_{-32}$	$6576^{+4272}_{-1313}$	$8984^{+34364}_{-5658}$
Alt.	$-247 \pm 39$	$3.20^{+1.70}_{-1.53}$	$610^{+46}_{-31}$	$5302^{+1891}_{-851}$	$3511^{+9210}_{-2013}$

$T_{max}$  = 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

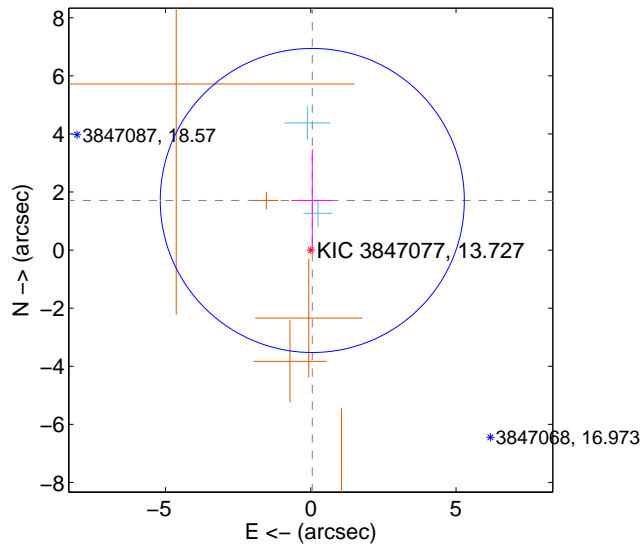
Supplemental centroid analysis for 003847077-04. Kepler magnitude: 13.73. Transit SNR 6.85

There are 2 quarters with good PRF difference image offsets

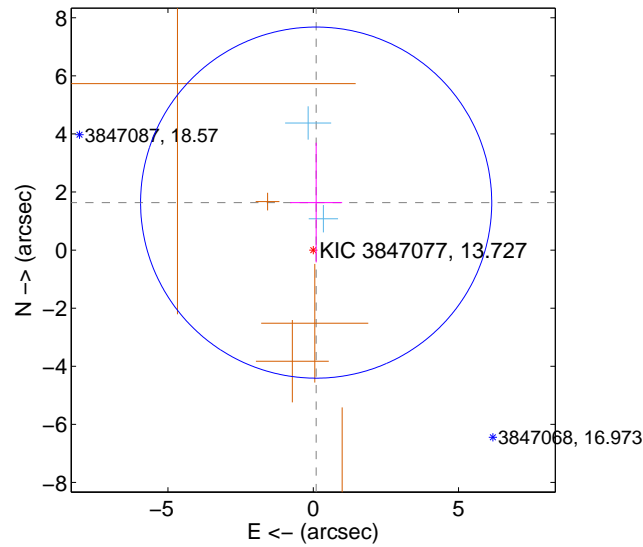
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.709 \pm 1.745$	0.98	$-0.053 \pm 0.716$	$1.708 \pm 1.759$
PRF-fit source offset from KIC position	$1.638 \pm 2.015$	0.81	$-0.100 \pm 0.895$	$1.635 \pm 2.060$
photometric centroid source offset	$1.99 \pm 1.03$	1.93	$-1.98 \pm 1.03$	$0.21 \pm 1.45$

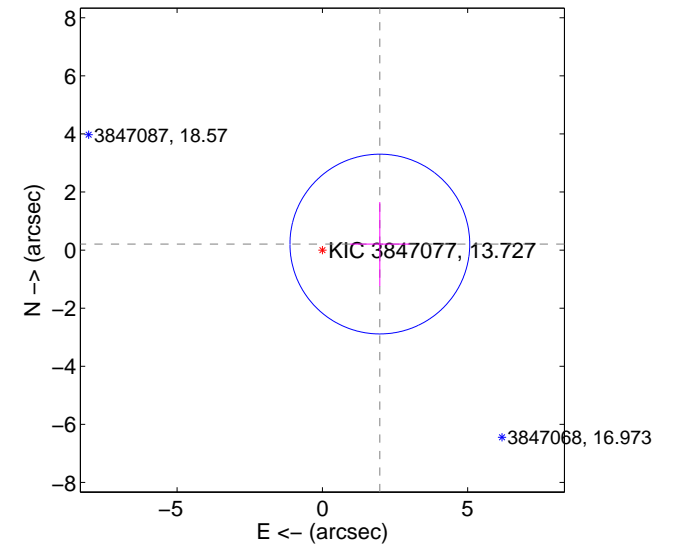
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

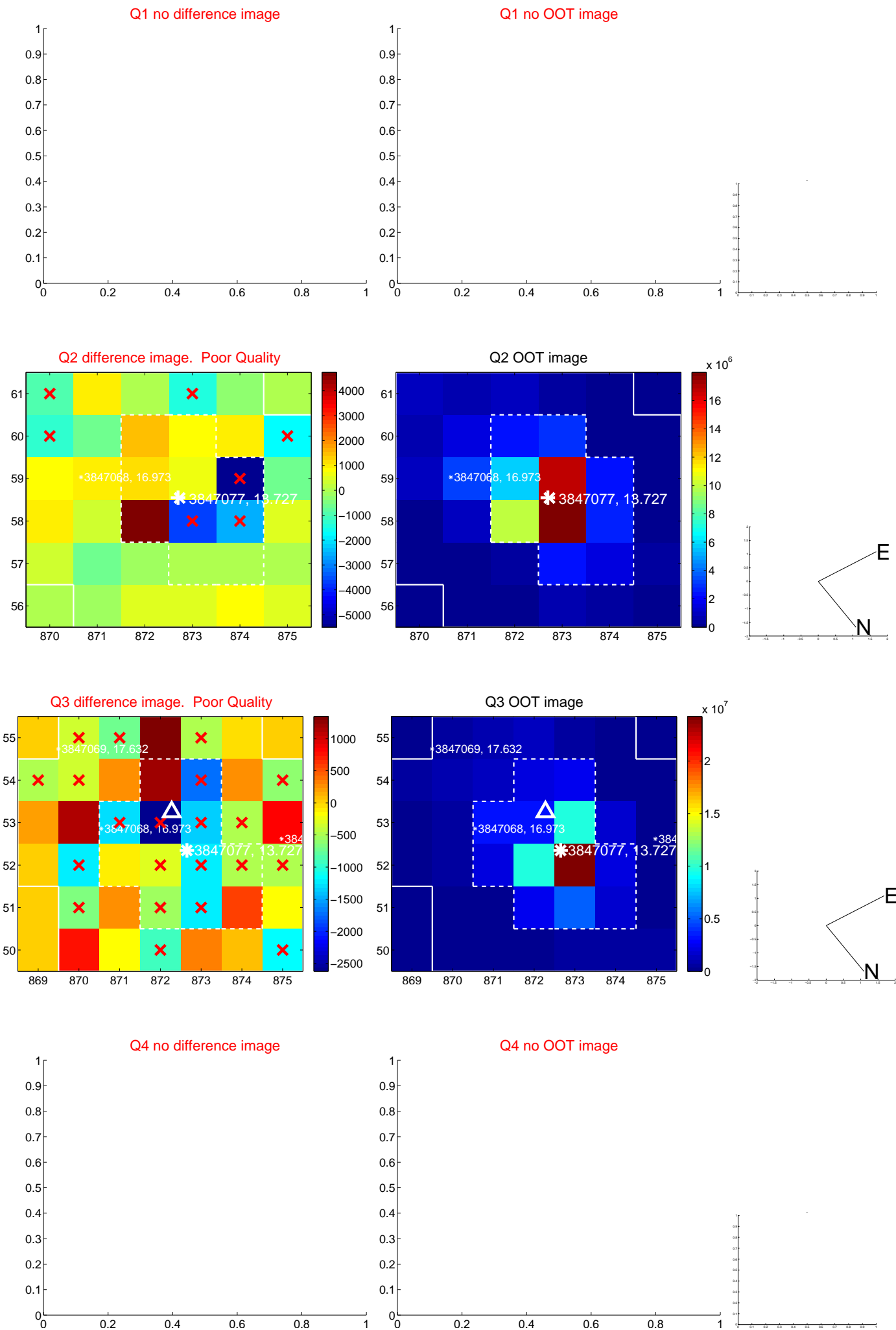


offset from photometric centroids

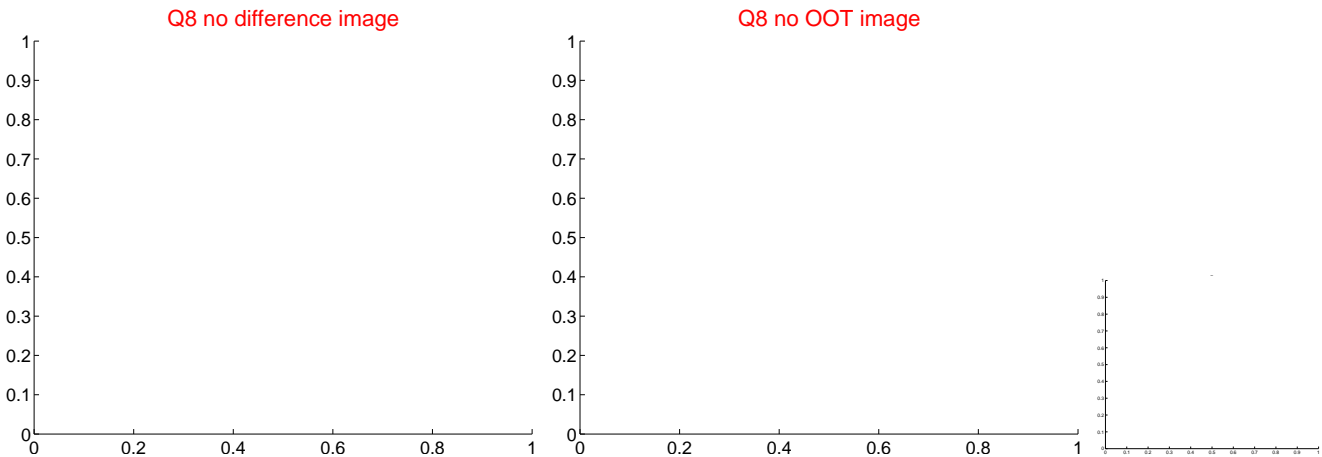
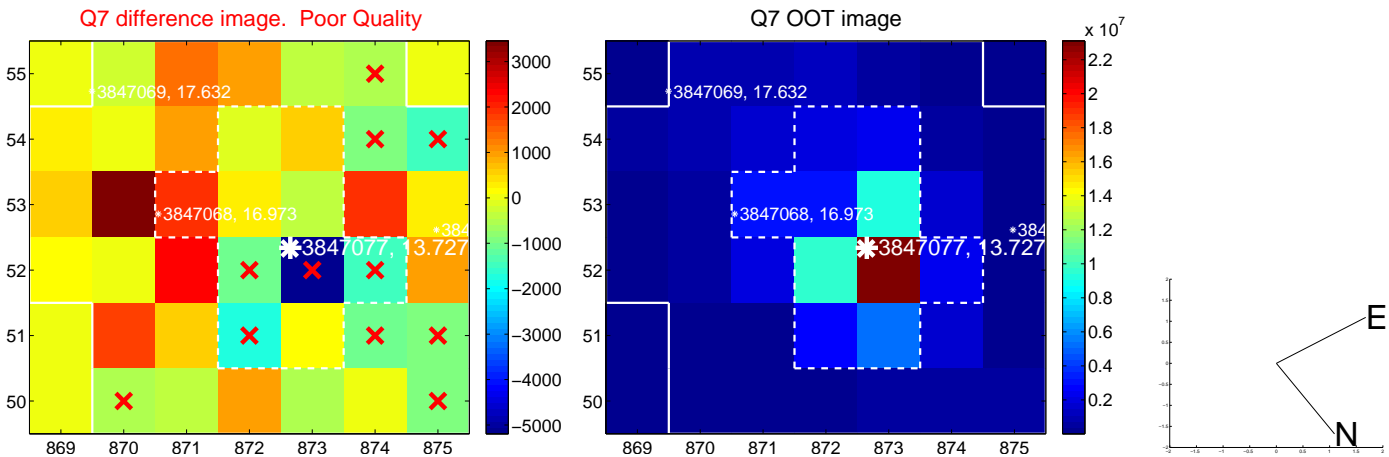
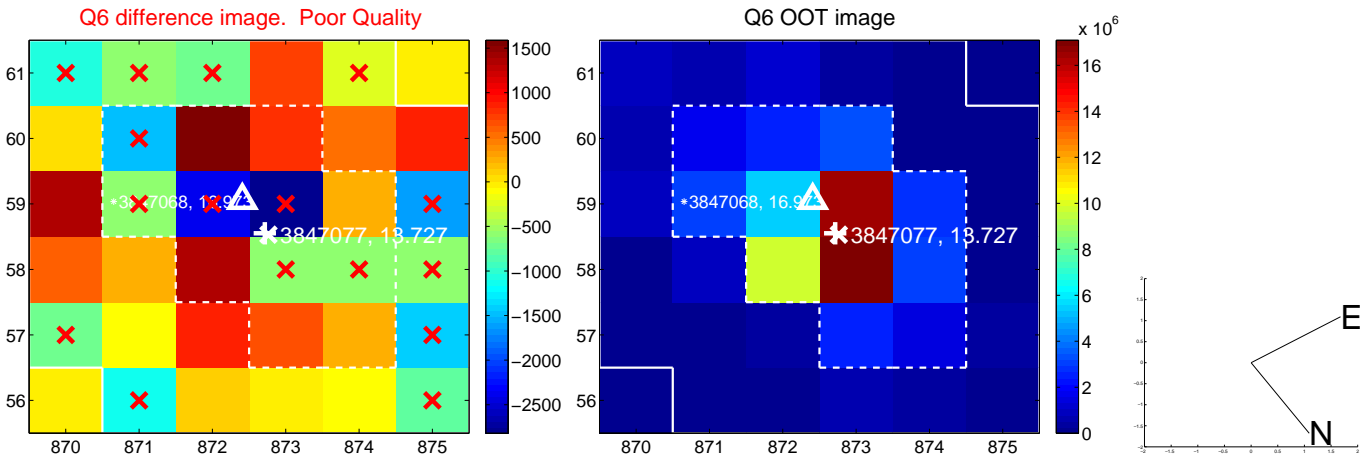
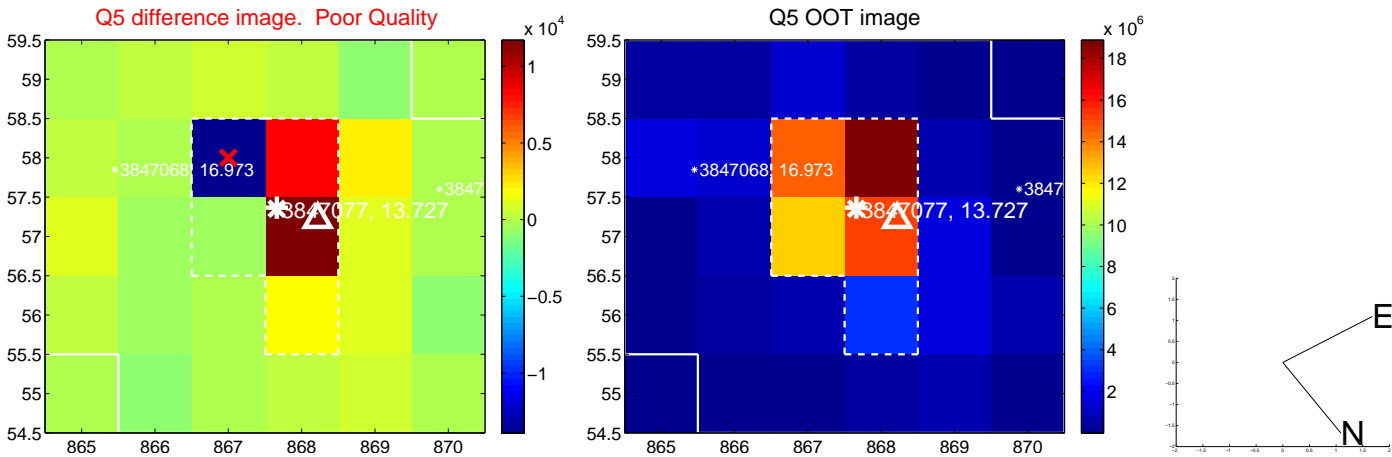


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

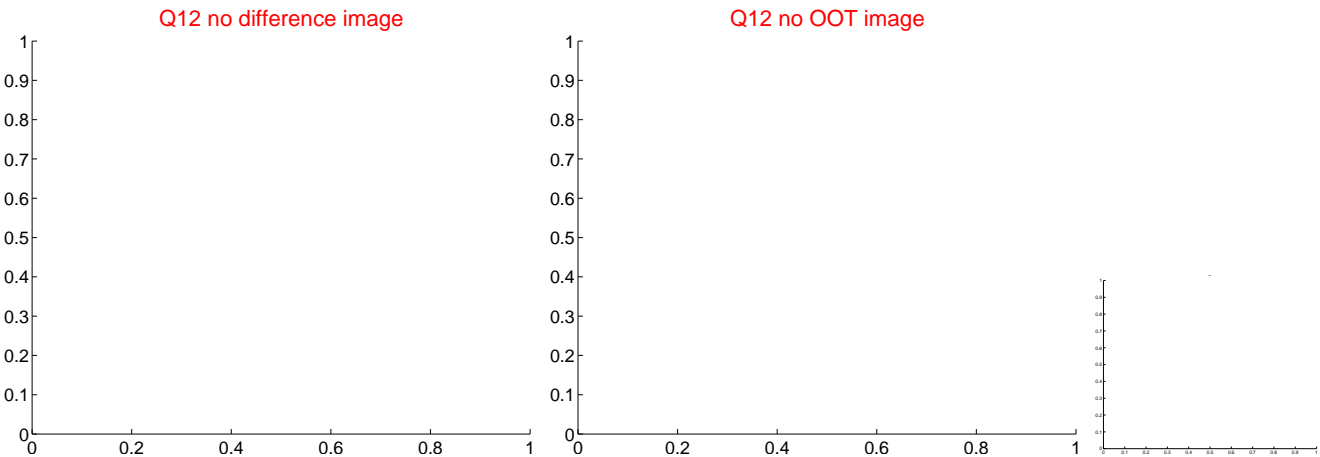
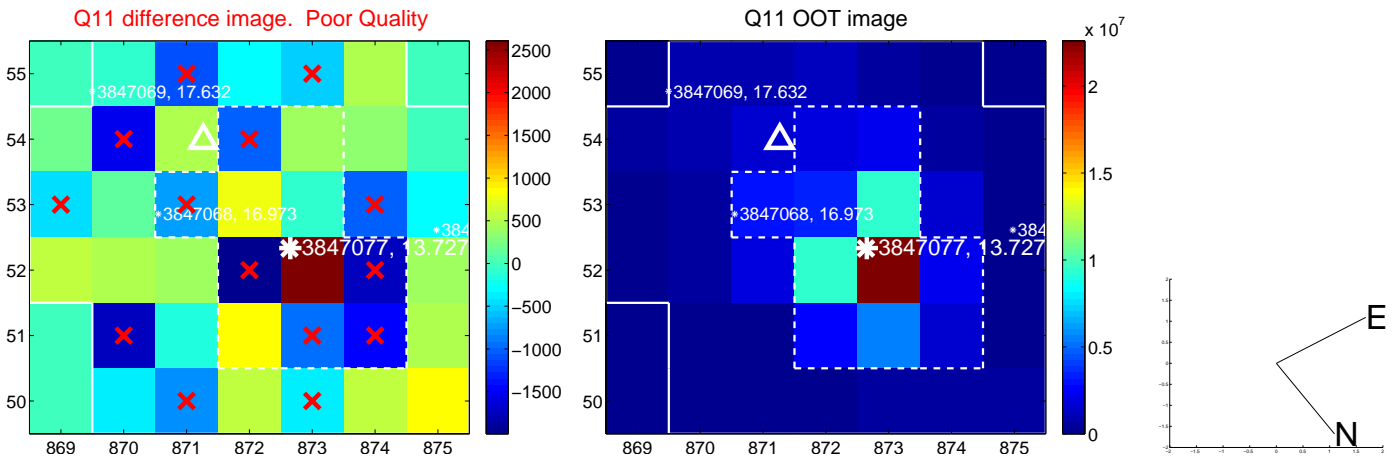
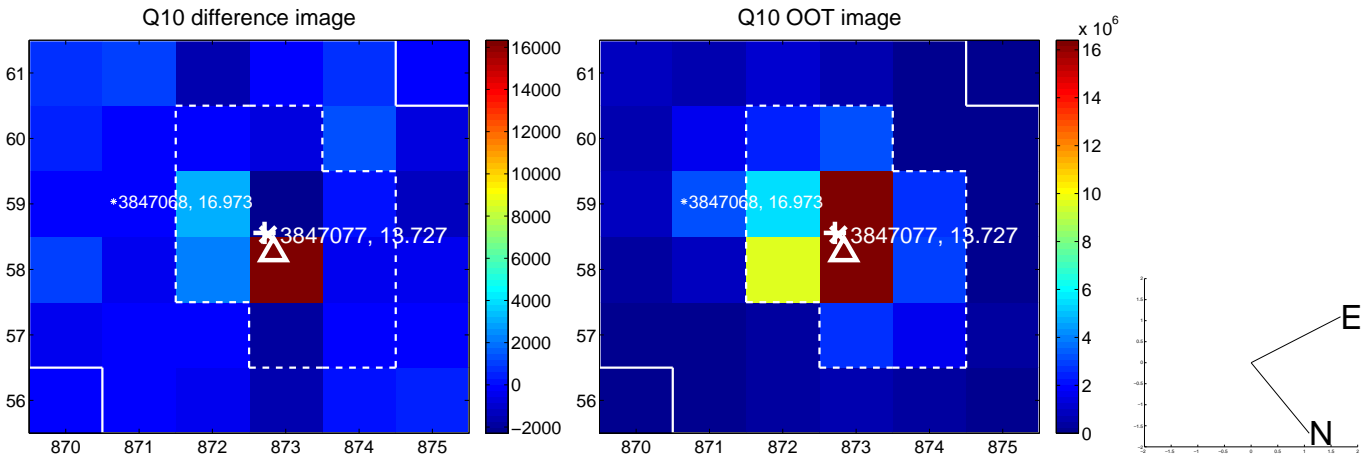
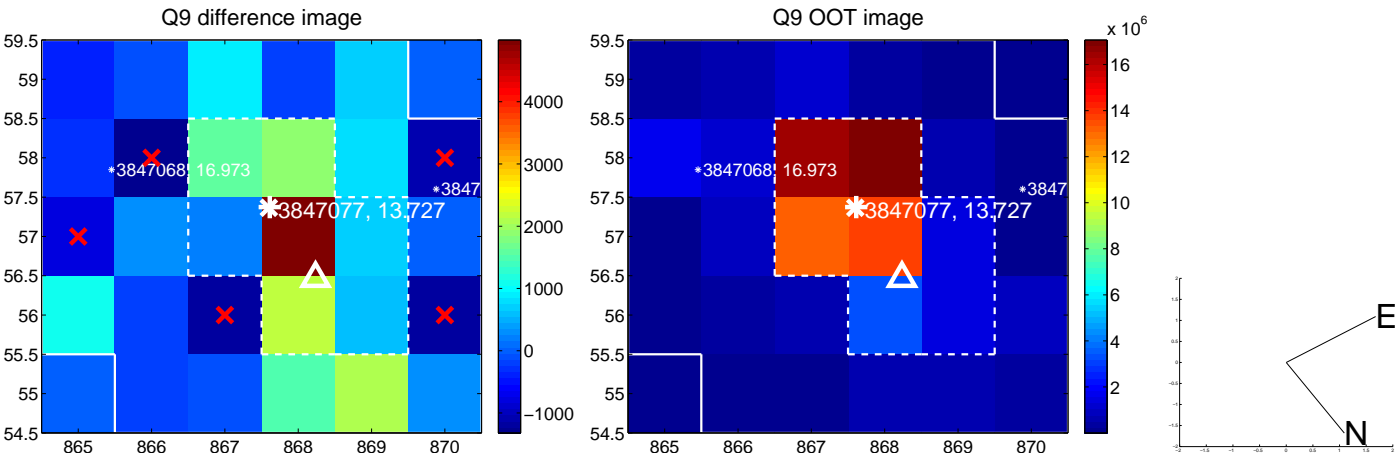
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



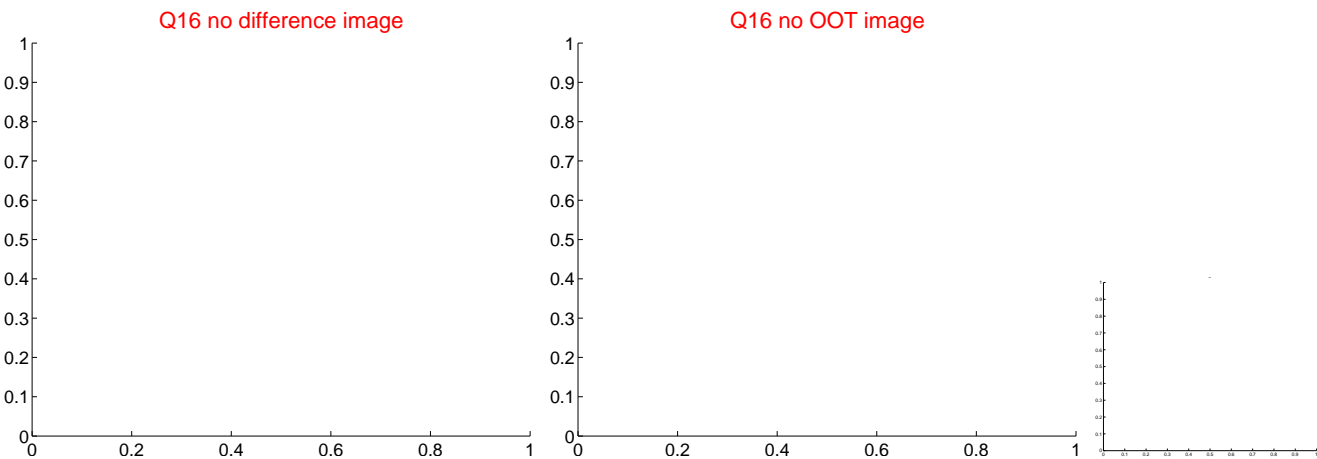
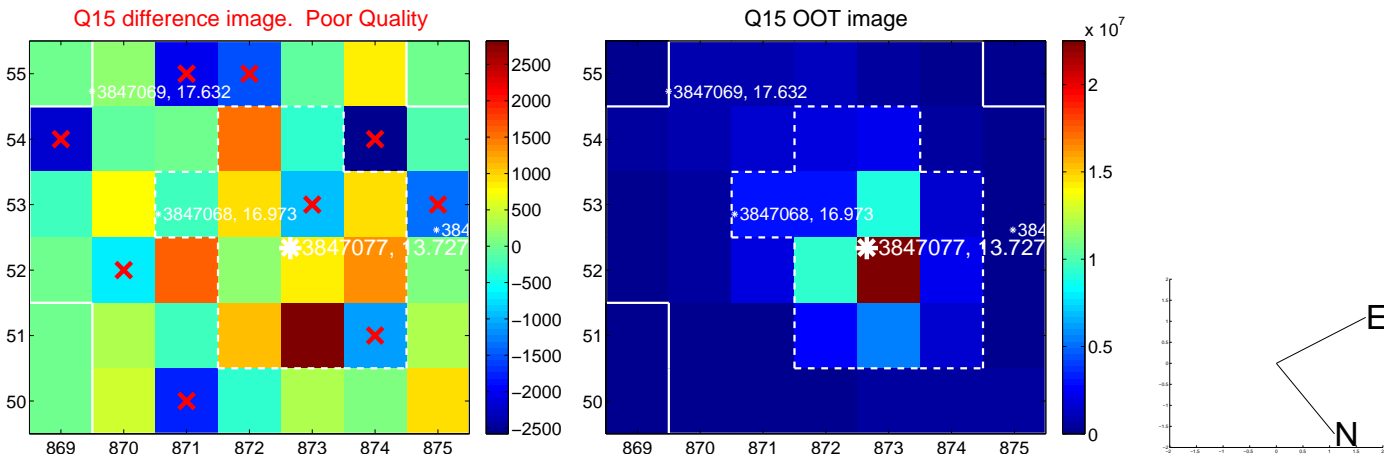
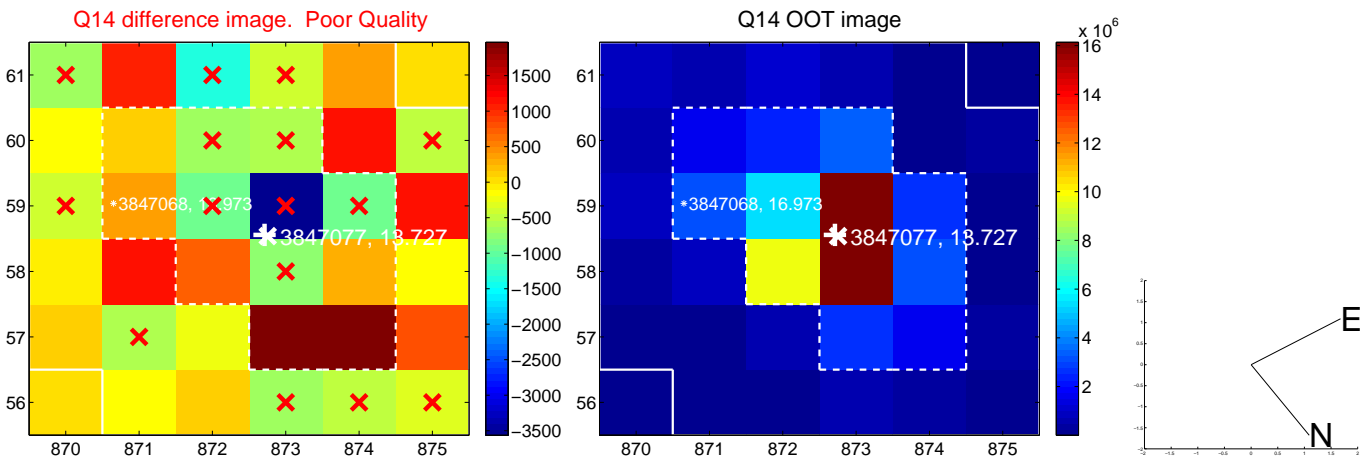
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



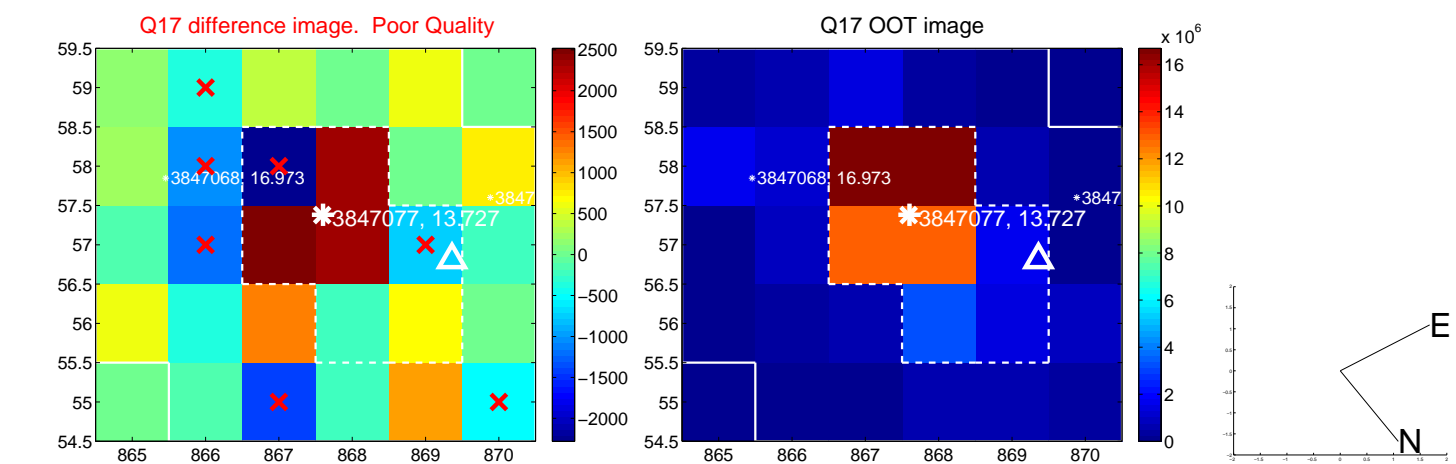
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



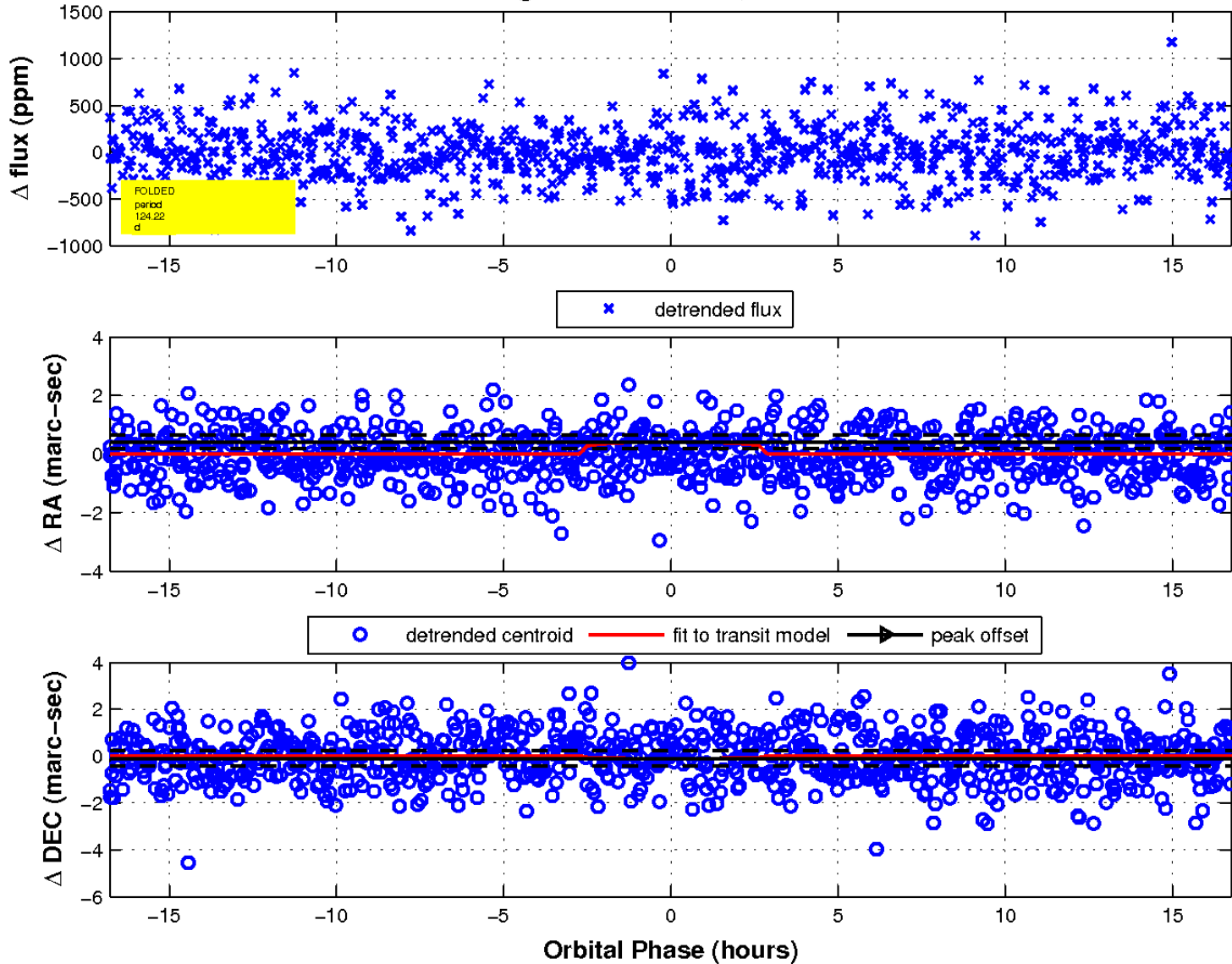
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

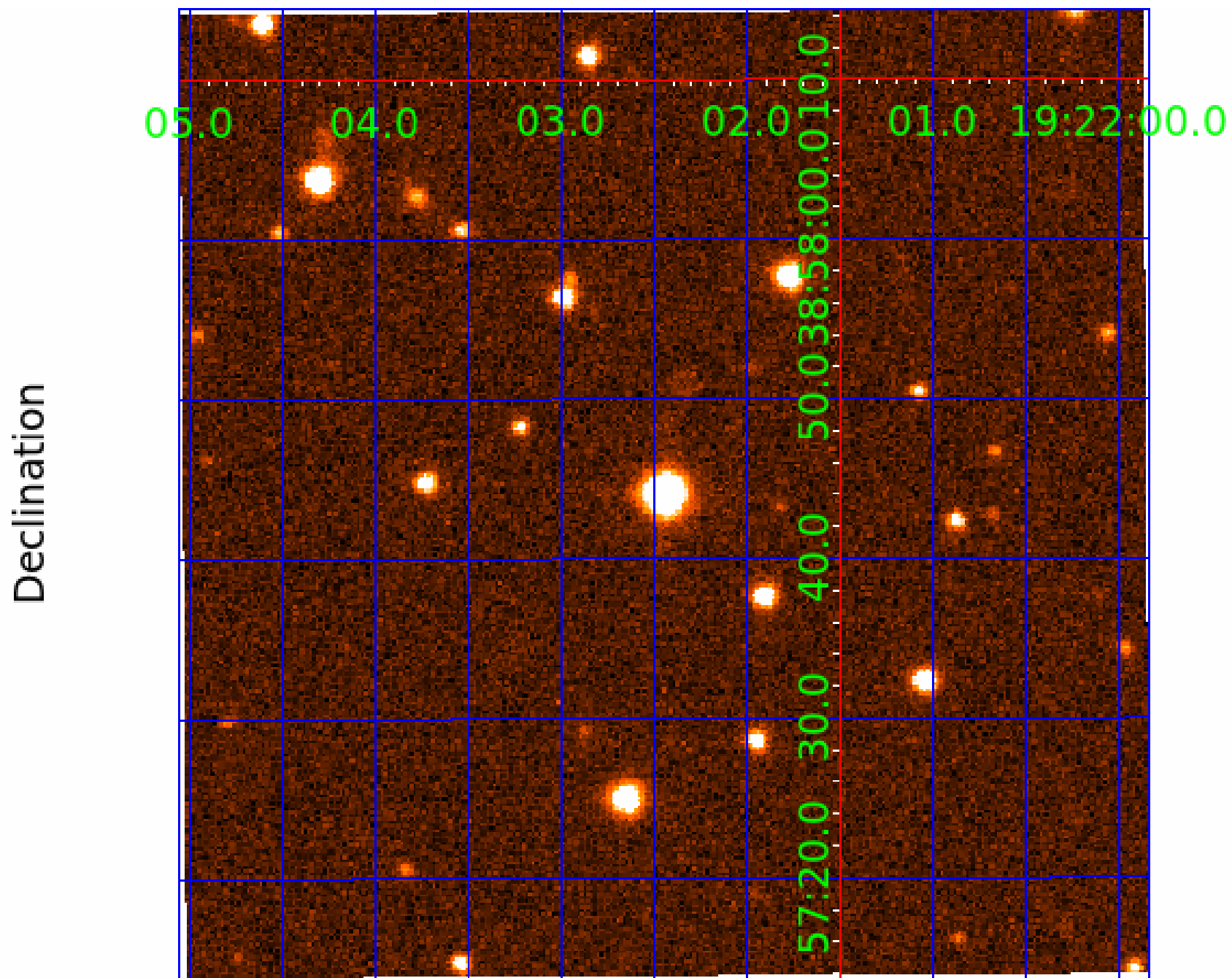


fluxWeightedCentroids, Planet 4 of 6





UKIRT Image



# KIC 003847077

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003847077-01	OBS	No	3.510672	134.697871	42.9	19.179	7.9	8.4	1.18	6442	0.85	911.55
003847077-02	OBS	No	165.374923	244.856952	231.0	3.194	18.9	3.0	1.18	6442	2.03	5.36
003847077-03	OBS	No	167.903463	225.255995	359.5	12.756	13.0	8.2	1.18	6442	2.64	5.25
003847077-04	OBS	No	124.223497	207.078213	229.8	5.604	7.6	6.8	1.18	6442	1.97	7.85
003847077-05	OBS	No	173.609950	297.696703	421.9	15.886	8.6	9.8	1.18	6442	2.60	5.02
003847077-06	OBS	No	14.070583	132.975133	188.3	11.235	7.8	8.7	1.18	6442	1.83	143.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003847077-01	OBS	FP	0.00	1	0	0	0	LPP_DV
003847077-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
003847077-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
003847077-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
003847077-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
003847077-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS—HALO_GHOST

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

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

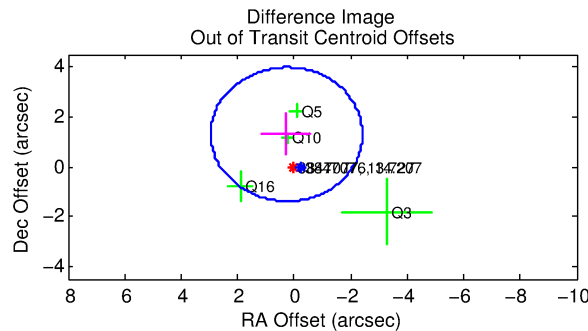
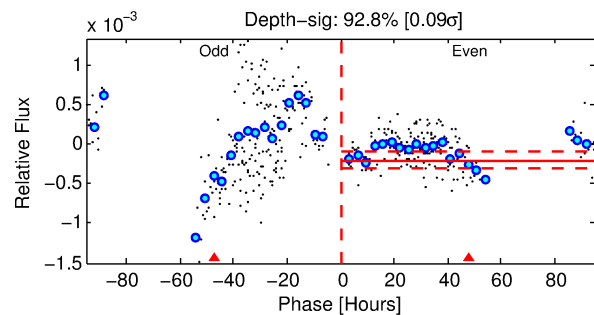
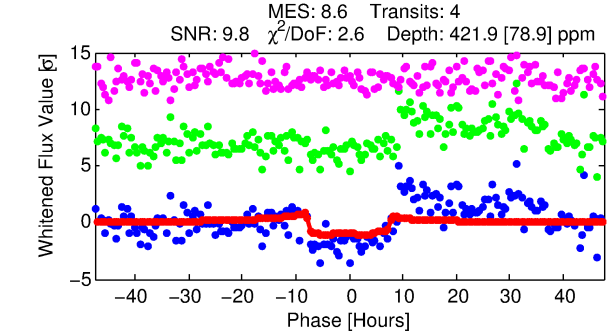
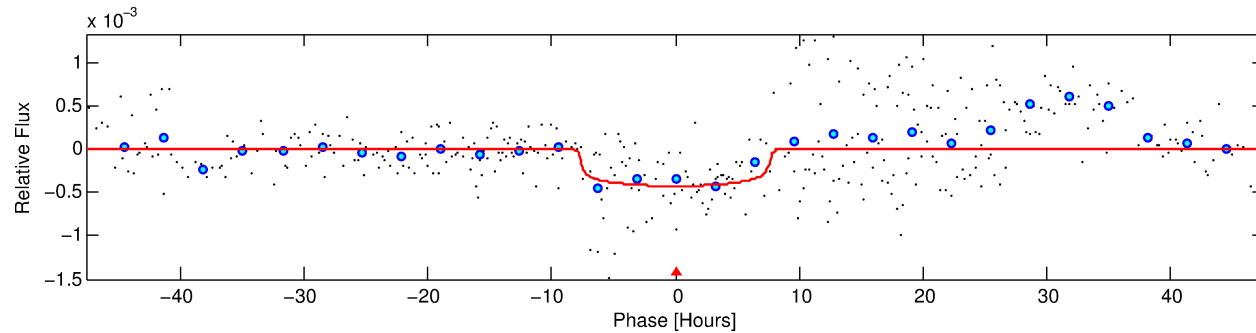
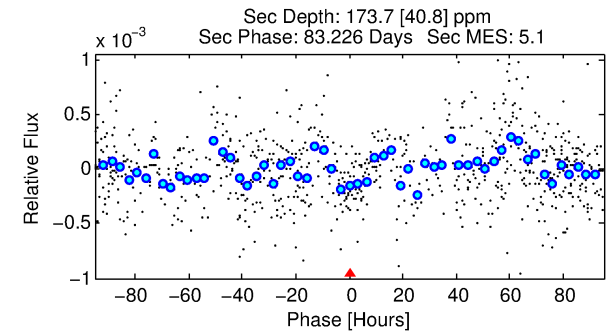
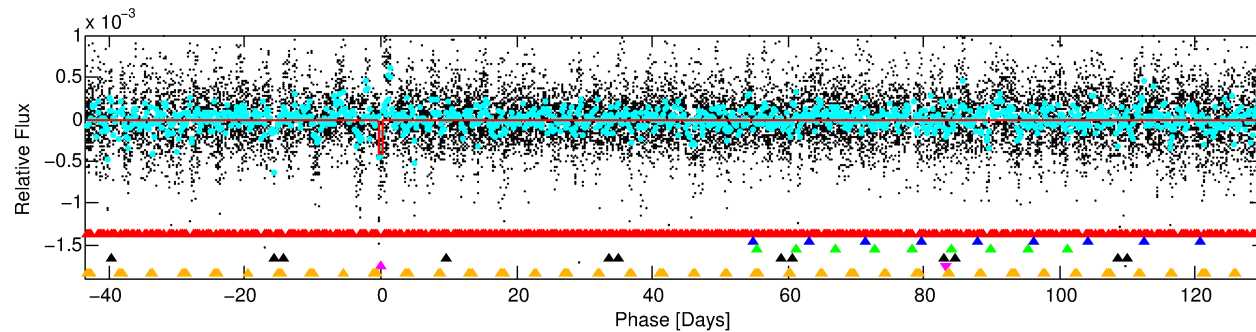
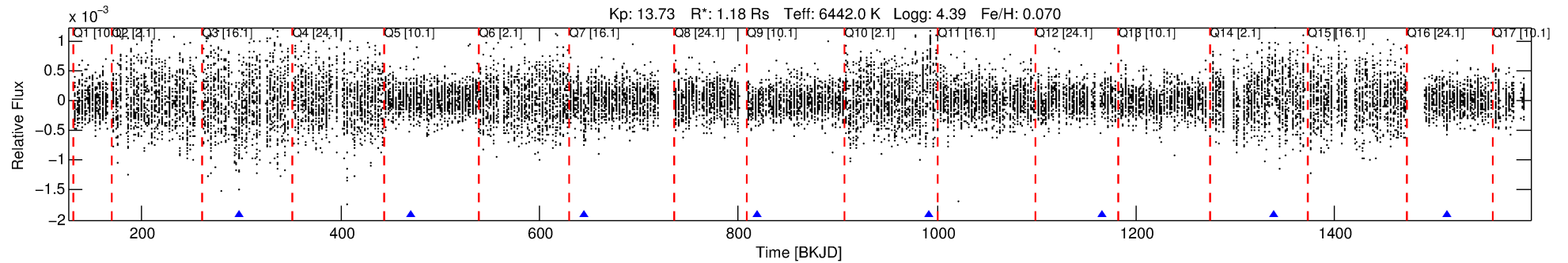
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003847077-05

No Significant Match Found

# DV One-Page Summary

KIC: 3847077 Candidate: 5 of 6 Period: 173.610 d



## DV Fit Results:

Period = 173.60995 [0.01484] d  
Epoch = 297.6967 [0.0583] BKJD  
Rp/R\* = 0.0201 [0.0075]  
a/R\* = 62.08 [116.99]  
b = 0.70 [1.38]  
Seff = 5.02 [2.21]  
Teff = 382 [42] K  
Rp = 2.60 [1.35] Re  
a = 0.6557 [0.1951] AU  
Ag = 6090.86 [5410.19] [1.13 $\sigma$ ]  
Teffp = 5214 [1033] K [4.67 $\sigma$ ]

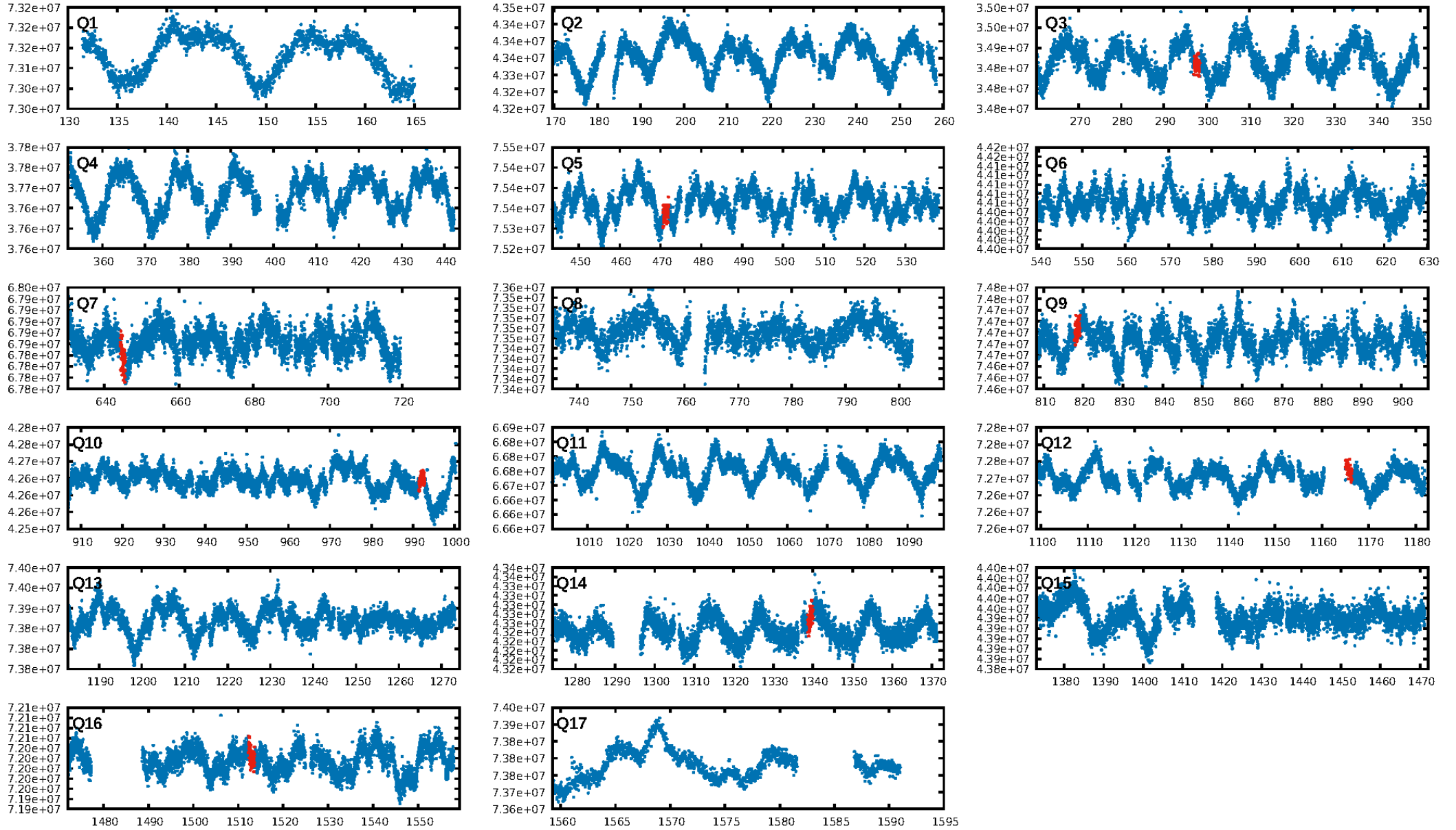
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [6.72 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 26.1%  
Bootstrap-pfa: 5.23e-09  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -1.428  
Centroid-sig: 0.0%  
Centroid-so: 0.939 arcsec [1.77 $\sigma$ ]  
OotOffset-rm: 1.323 arcsec [1.48 $\sigma$ ]  
KicOffset-rm: 1.181 arcsec [1.50 $\sigma$ ]  
OotOffset-st: 1/1/1/1 [4]  
KicOffset-st: 1/1/1/1 [4]  
DiffImageQuality-fgm: 0.25 [1/4]  
DiffImageOverlap-fno: 0.00 [0/6]

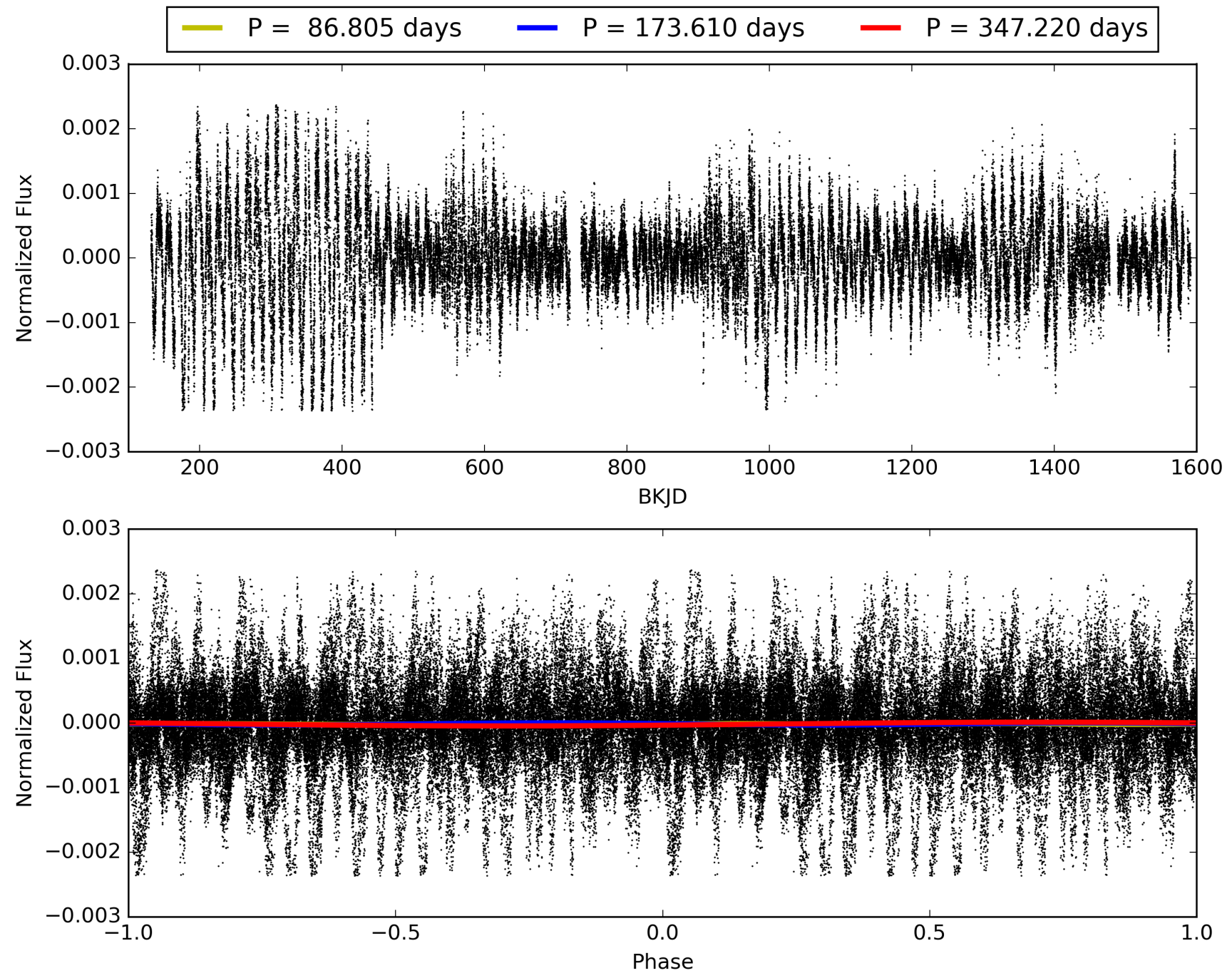
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 11:38:04 Z

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

# TCE 003847077-05, PDC Light Curves

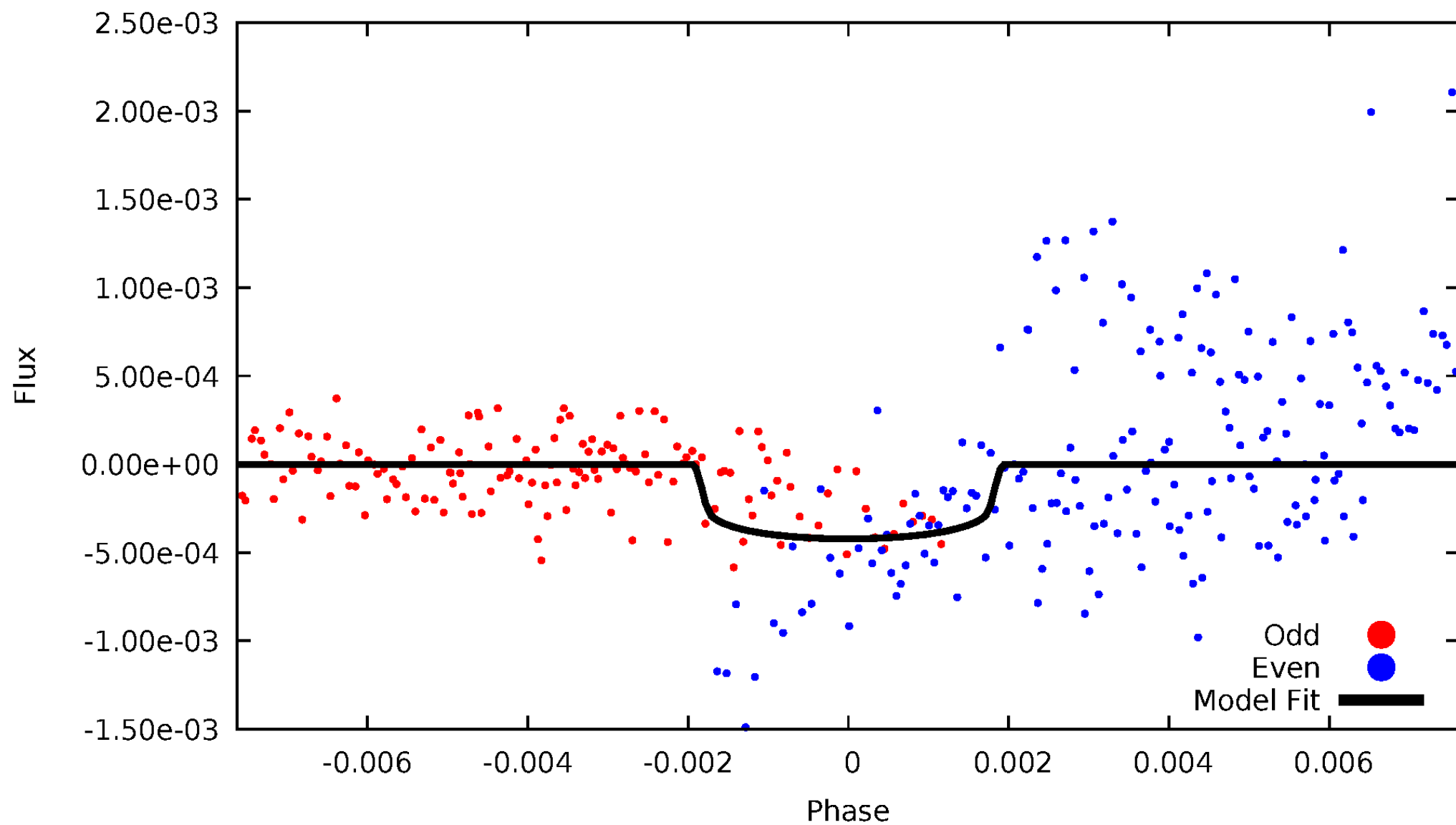


TCE 003847077-05



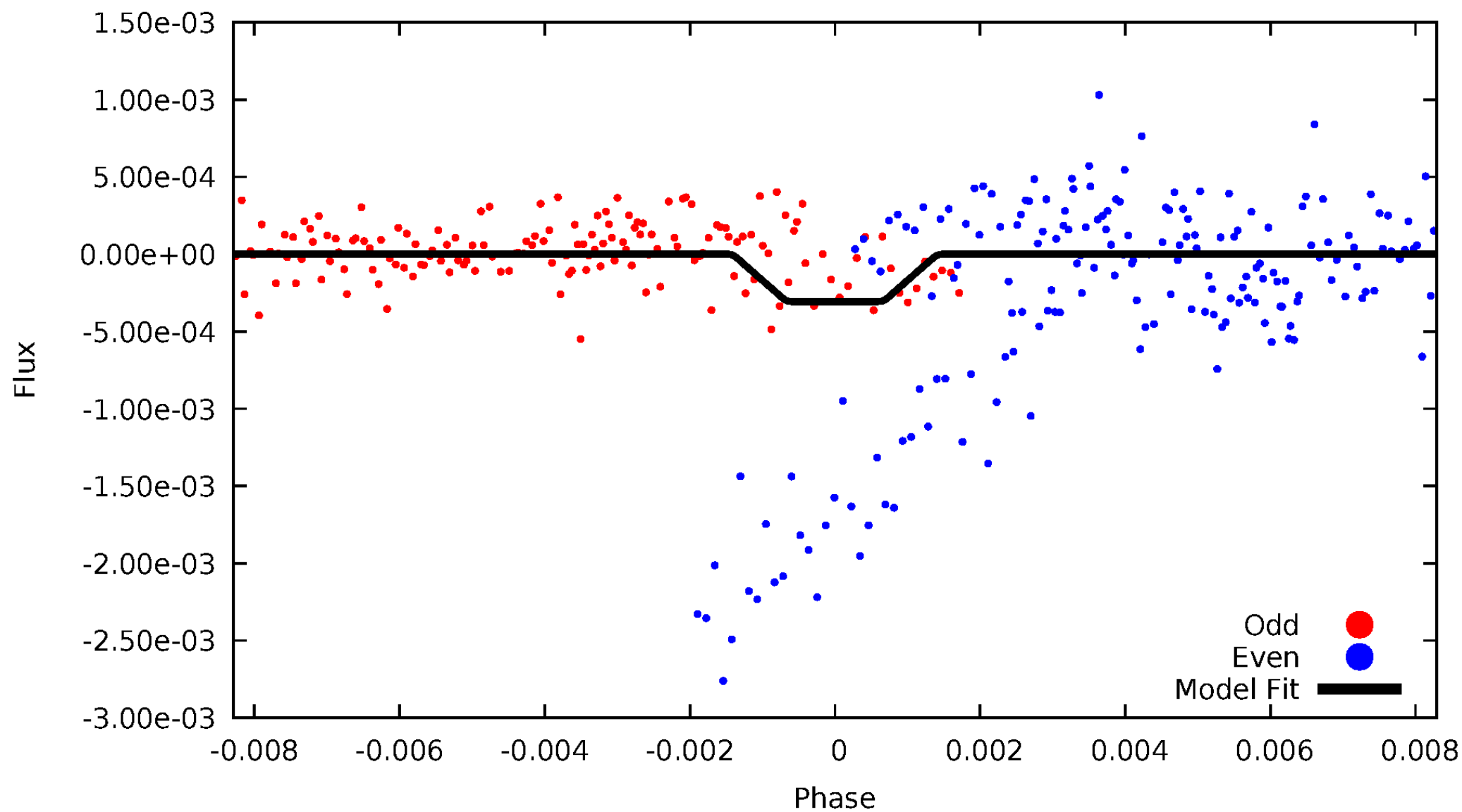
# DV Odd/Even

TCE 003847077-05



# ALT Odd/Even

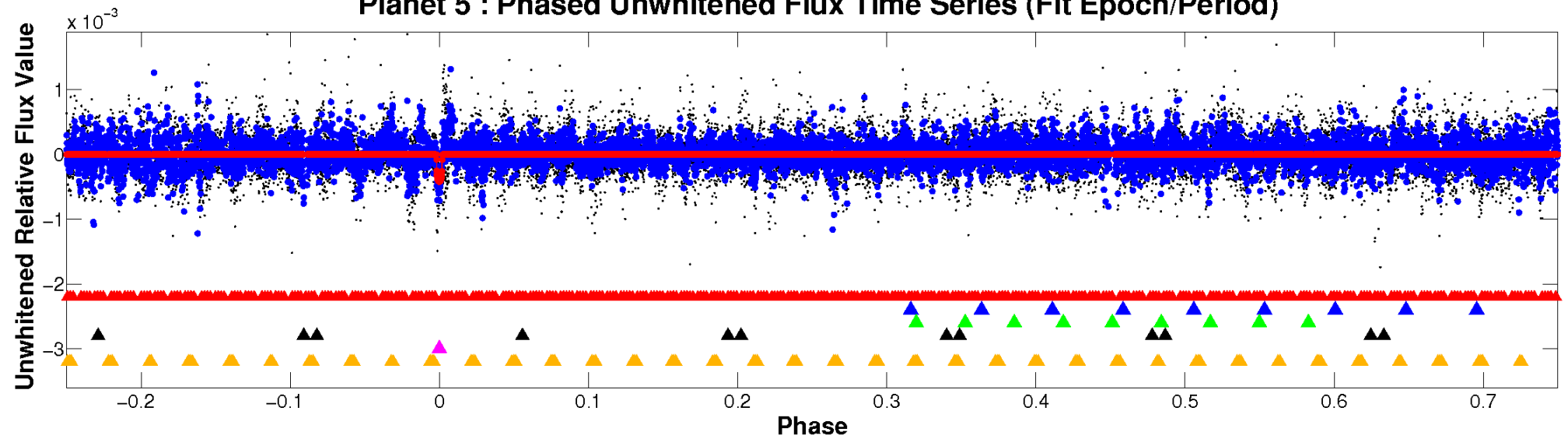
TCE 003847077-05



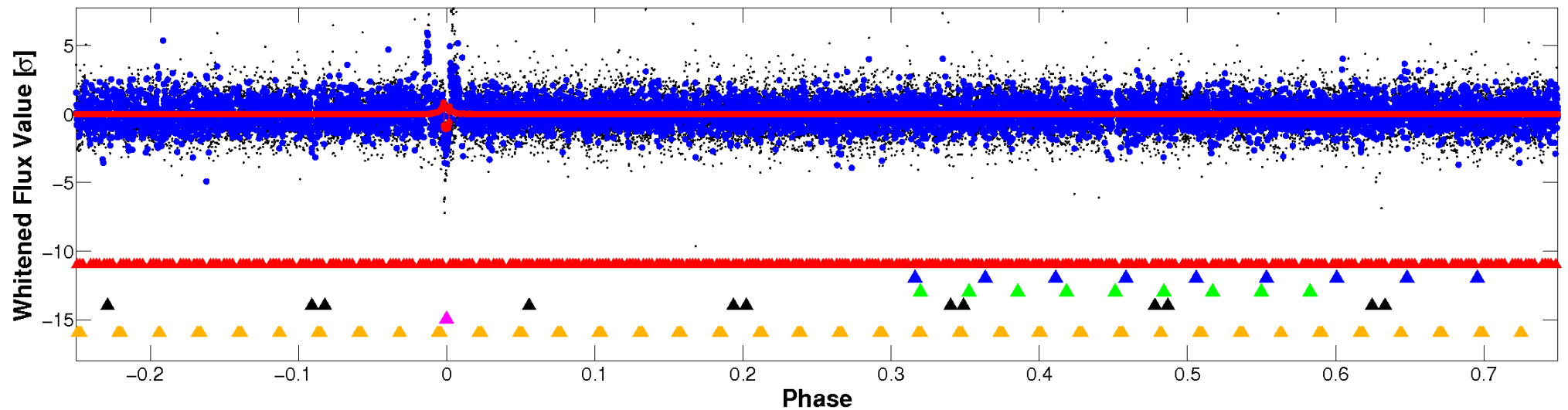


# Non-Whitened Vs. Whitened Light Curve

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

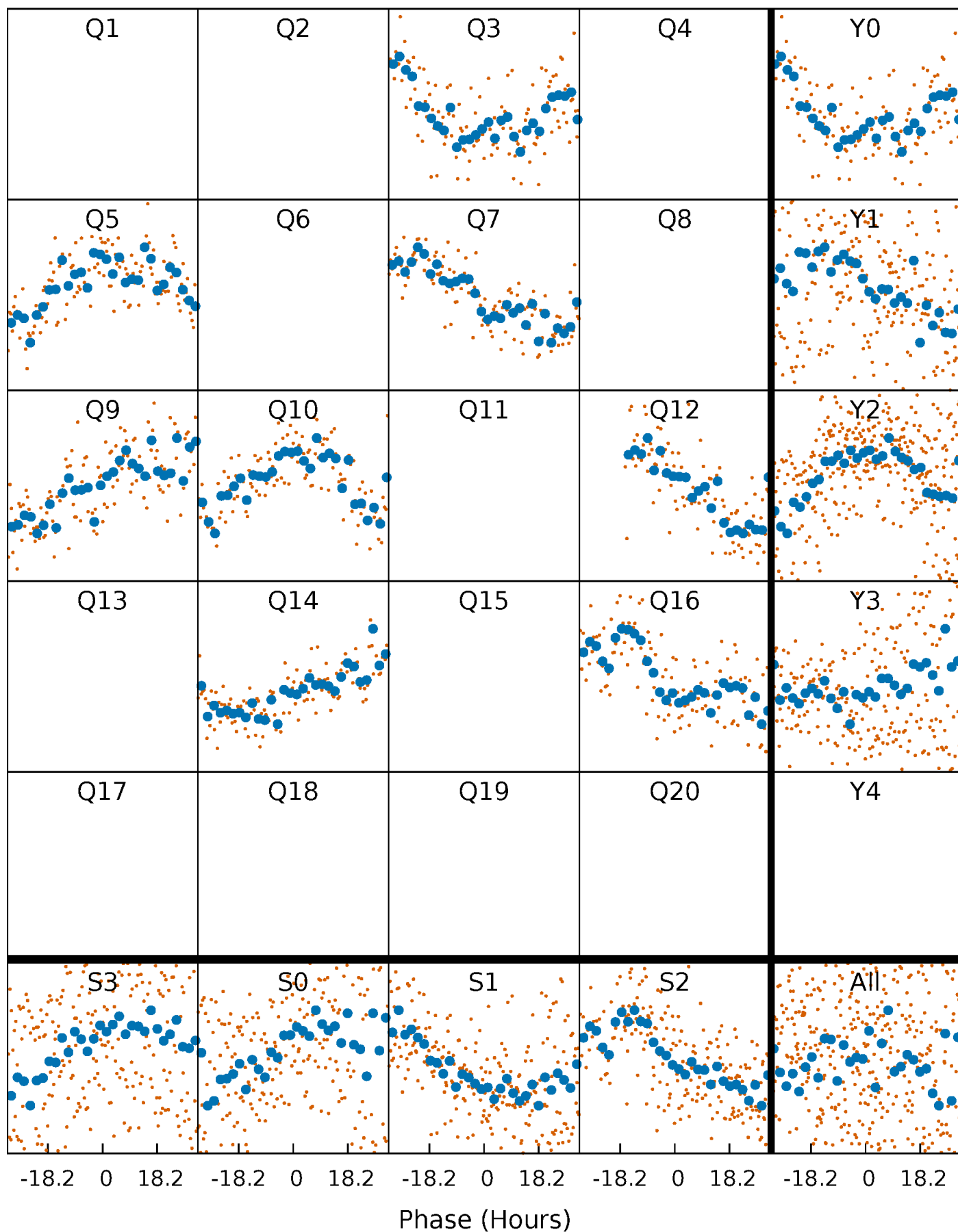


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



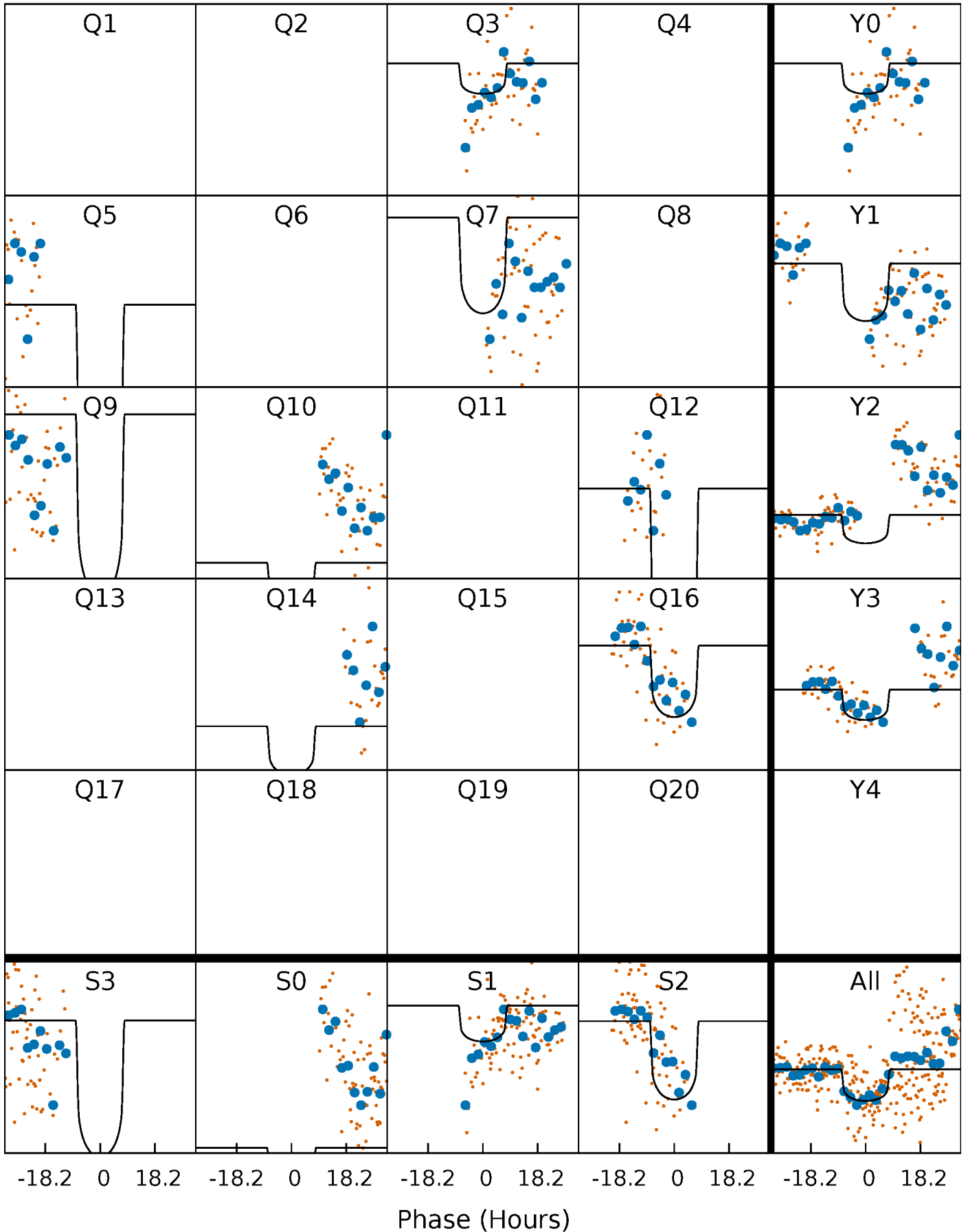
# PDC Quarter-Phased Transit Curves

TCE 003847077-05     $P=173.609950$  Days     $T_0=297.696703$  (BKJD)



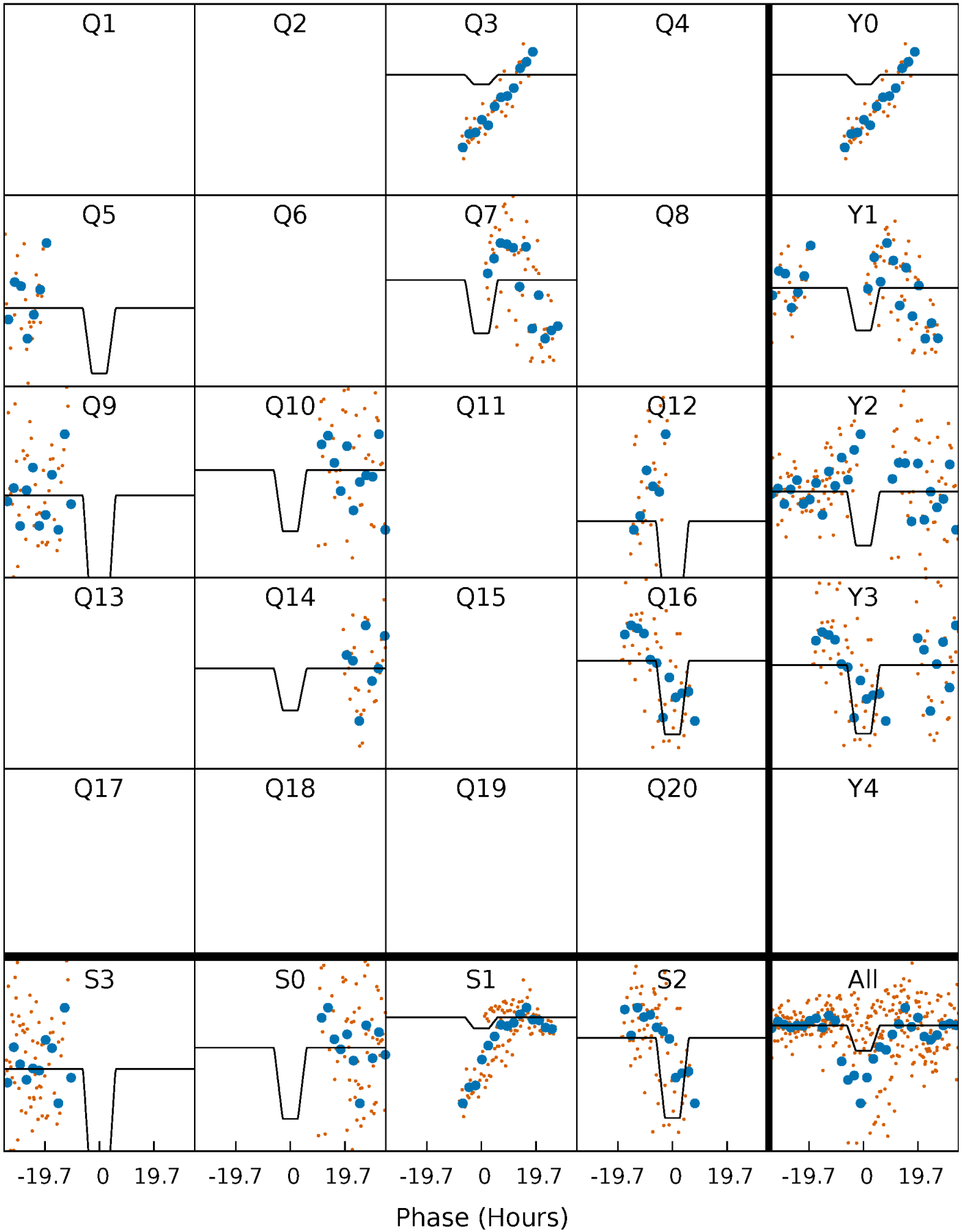
# DV Quarter-Phased Transit Curves

TCE 003847077-05     $P=173.609950$  Days     $T_0=297.696703$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

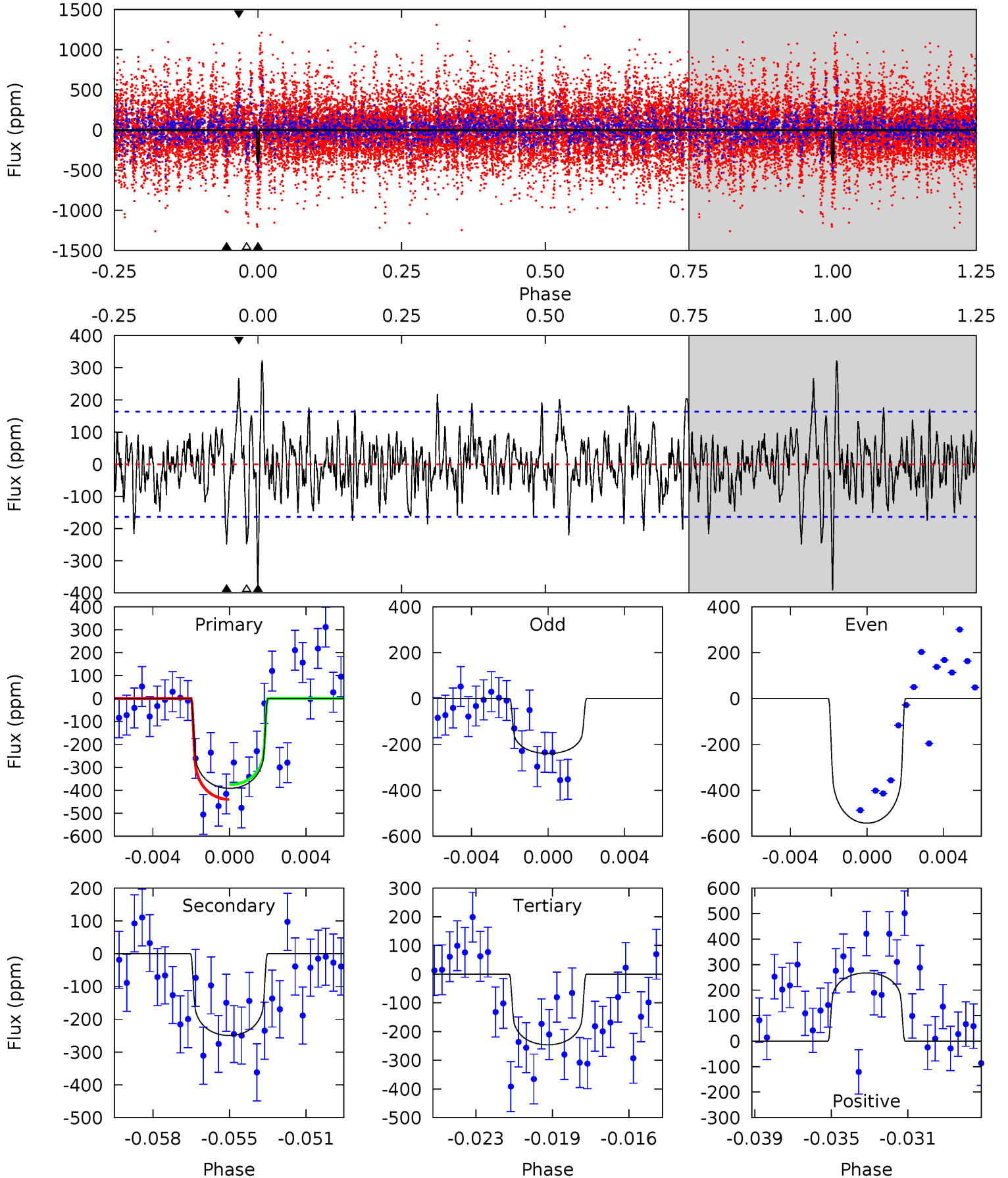
TCE 003847077-05     $P=173.589903$  Days     $T_0=297.741045$  (BKJD)



# DV Model-Shift Uniqueness Test

003847077-05, P = 173.609950 Days, E = 124.086753 Days

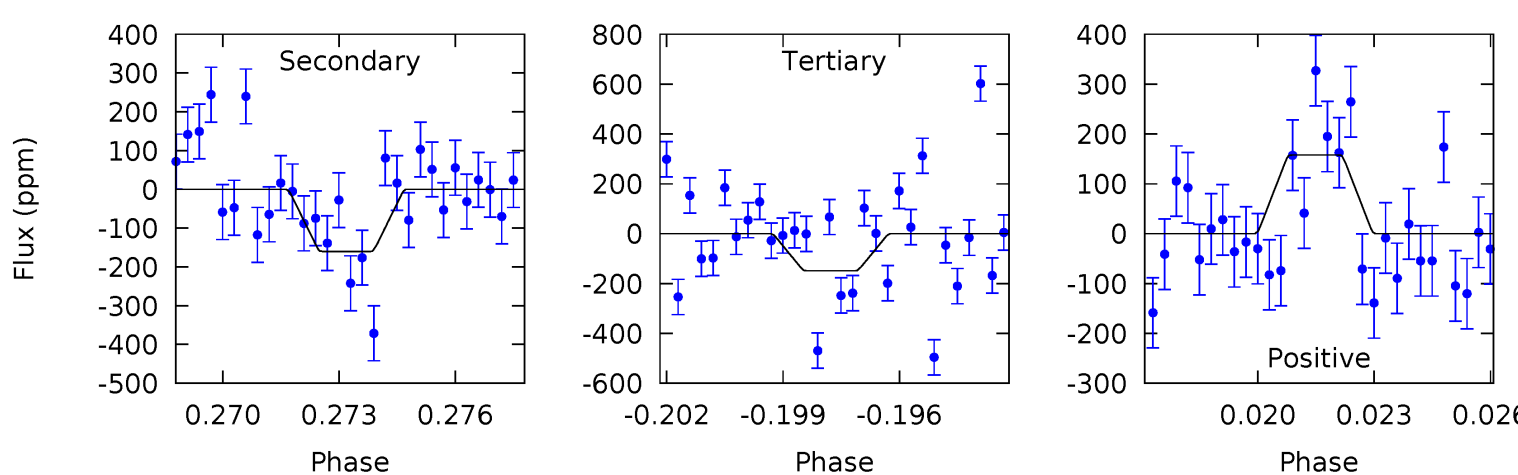
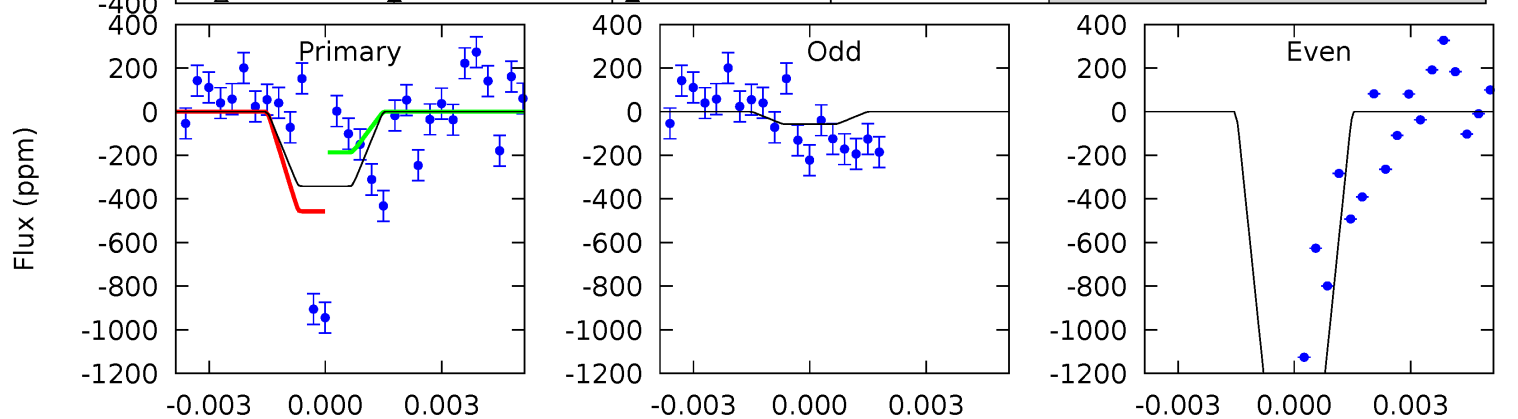
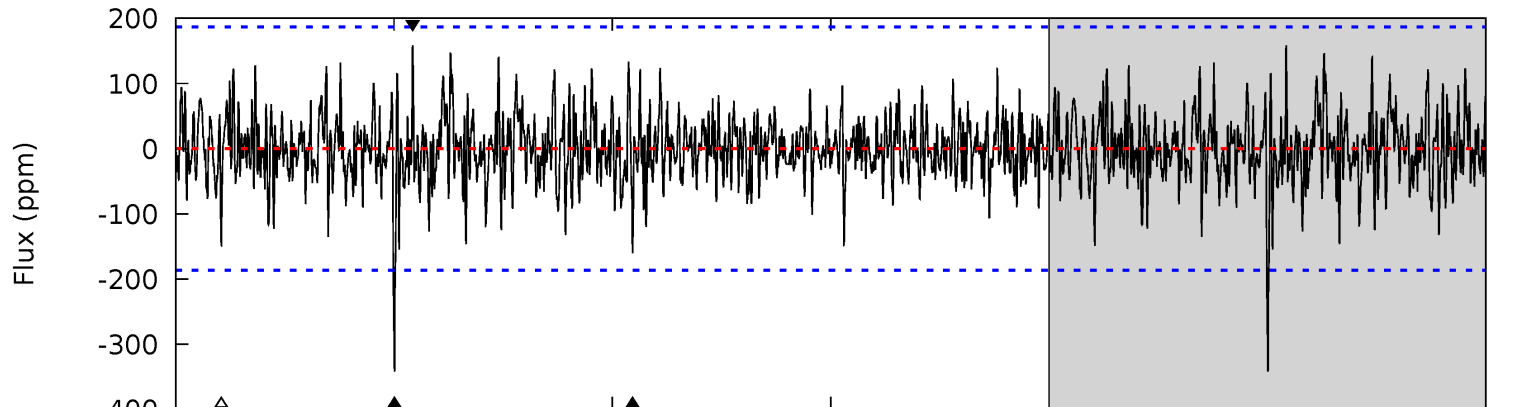
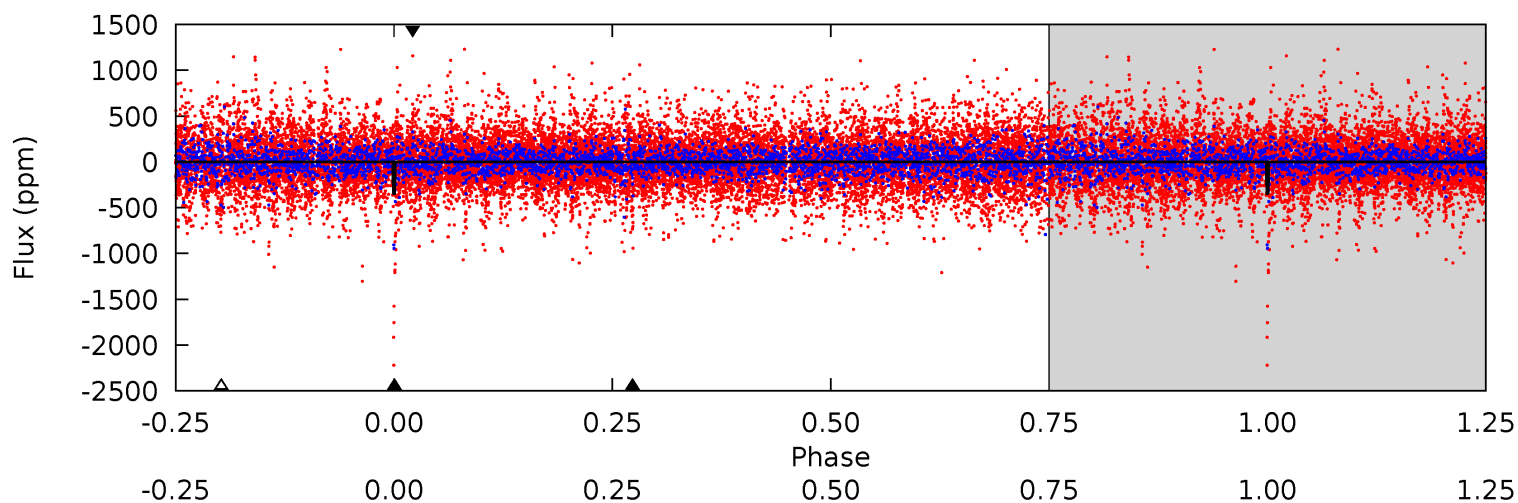
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.5	7.95	7.85	8.52	5.20	2.89	2.35	4.63	3.95	0.10	-0.57	4.86	0.87	0.45	1.03



# Alt Model-Shift Uniqueness Test

003847077-05, P = 173.589903 Days, E = 124.151142 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
9.65	4.52	4.21	4.46	5.26	2.98	1.23	5.44	5.19	0.32	0.07	20.4	14.0	0.32	3.77



### Stellar Parameters For KIC 003847077

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6442^{+145}_{-209}$	$4.388^{+0.056}_{-0.224}$	$0.070^{+0.250}_{-0.300}$	$1.183^{+0.431}_{-0.144}$	$1.250^{+0.184}_{-0.165}$	$1.062^{+0.252}_{-0.610}$
	+2%/-3%	+1%/-5%	+357%/-429%	+36%/-12%	+15%/-13%	+24%/-57%
Source	PHO1	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 003847077-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-249 \pm 31$	$2.75^{+1.17}_{-1.04}$	$544^{+43}_{-27}$	$5633^{+1605}_{-704}$	$7605^{+12532}_{-3838}$
Alt.	$-160 \pm 35$	$2.44^{+1.09}_{-1.04}$	$545^{+41}_{-26}$	$5389^{+1864}_{-765}$	$6097^{+14173}_{-3275}$

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



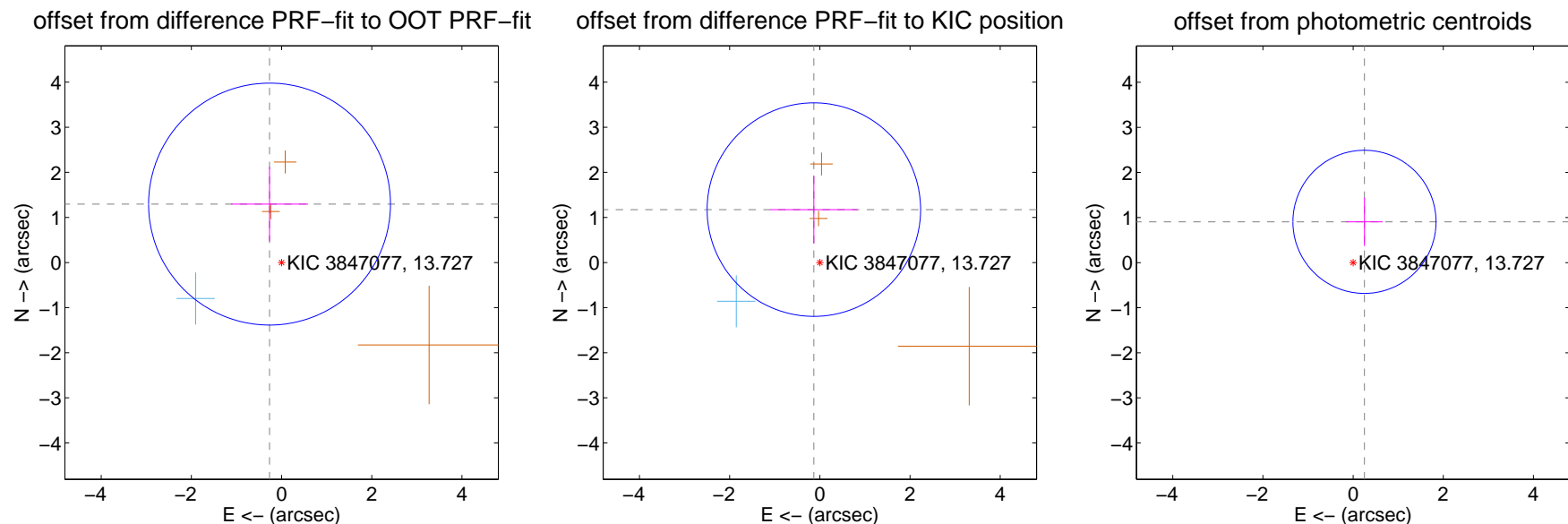
## DV Centroid Data

Supplemental centroid analysis for 003847077-05. Kepler magnitude: 13.73. Transit SNR 9.83

There are 1 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.323 \pm 0.894$	1.48	$0.267 \pm 0.856$	$1.296 \pm 0.823$
PRF-fit source offset from KIC position	$1.181 \pm 0.789$	1.50	$0.133 \pm 0.966$	$1.174 \pm 0.757$
photometric centroid source offset	$0.94 \pm 0.53$	1.77	$-0.25 \pm 0.41$	$0.90 \pm 0.54$



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.

Q1 no difference image



Q1 no OOT image



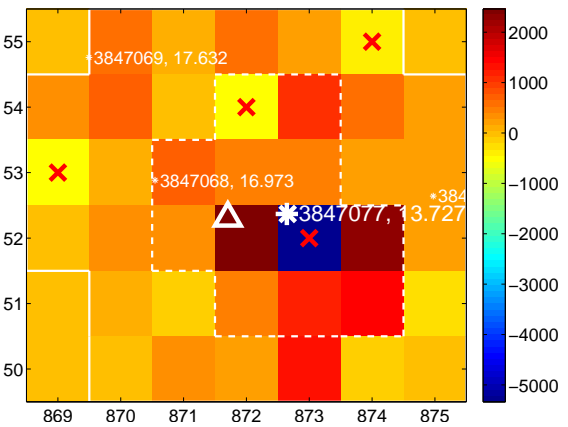
Q2 no difference image



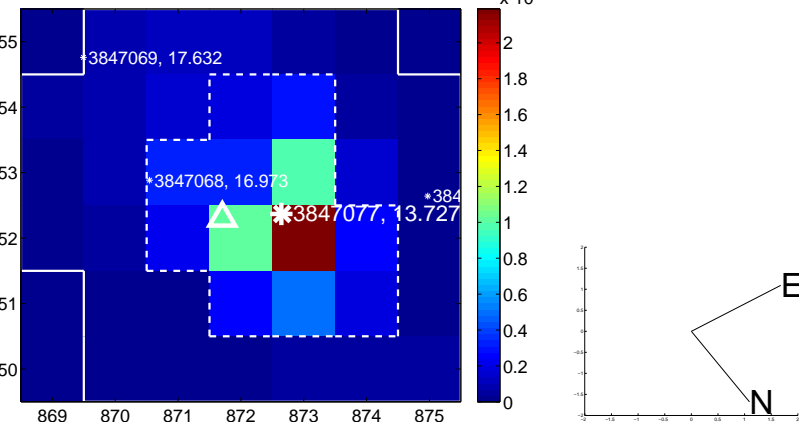
Q2 no OOT image



Q3 difference image. Poor Quality



Q3 OOT image



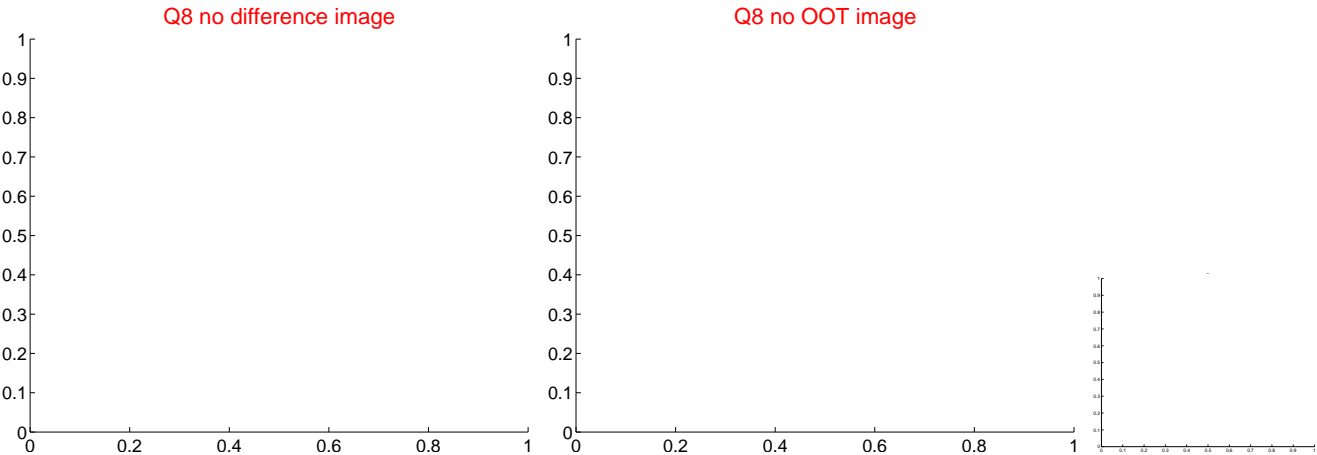
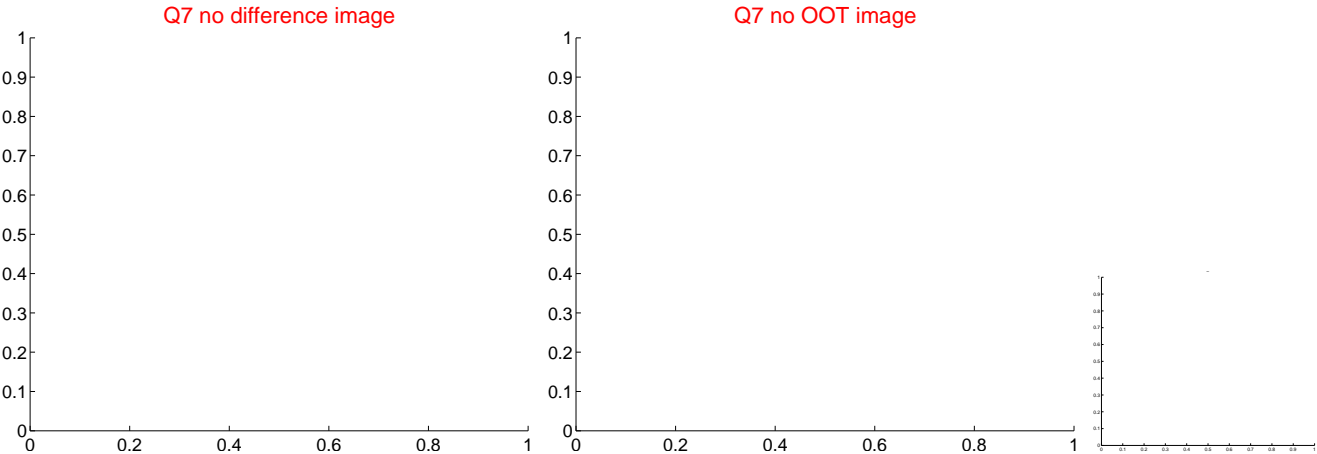
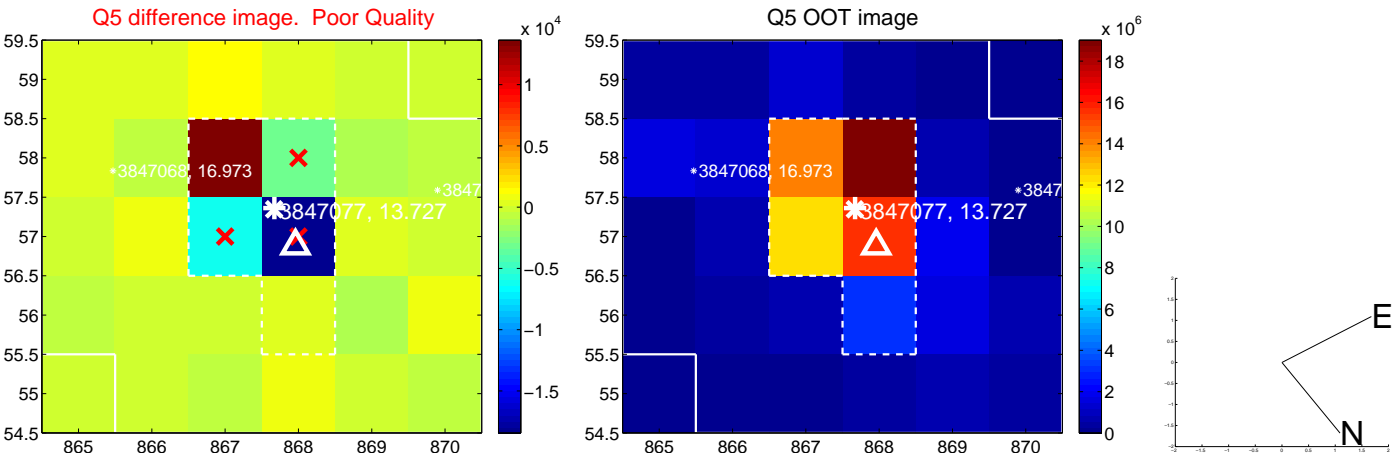
Q4 no difference image



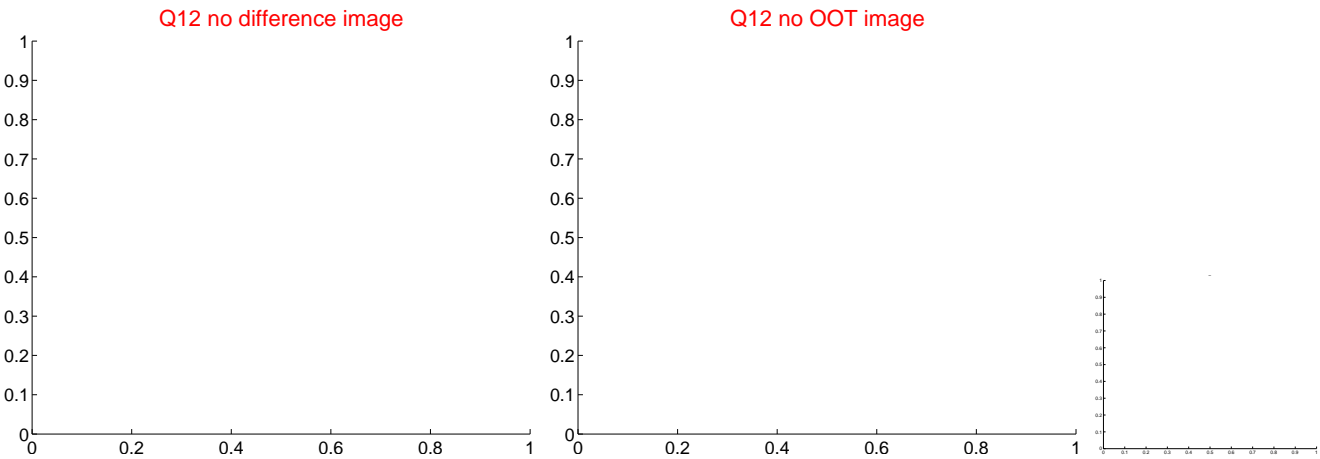
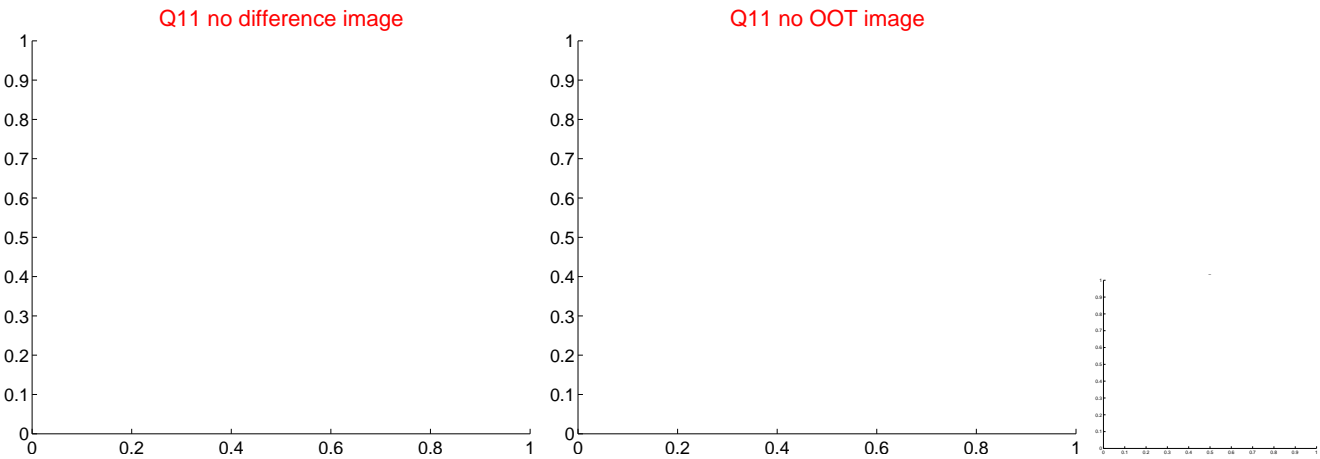
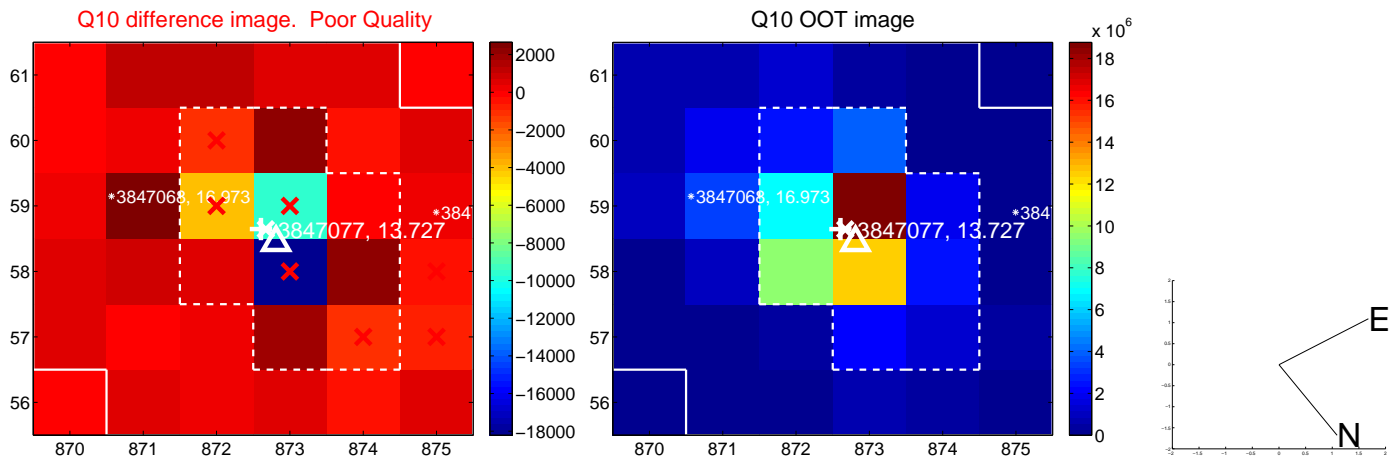
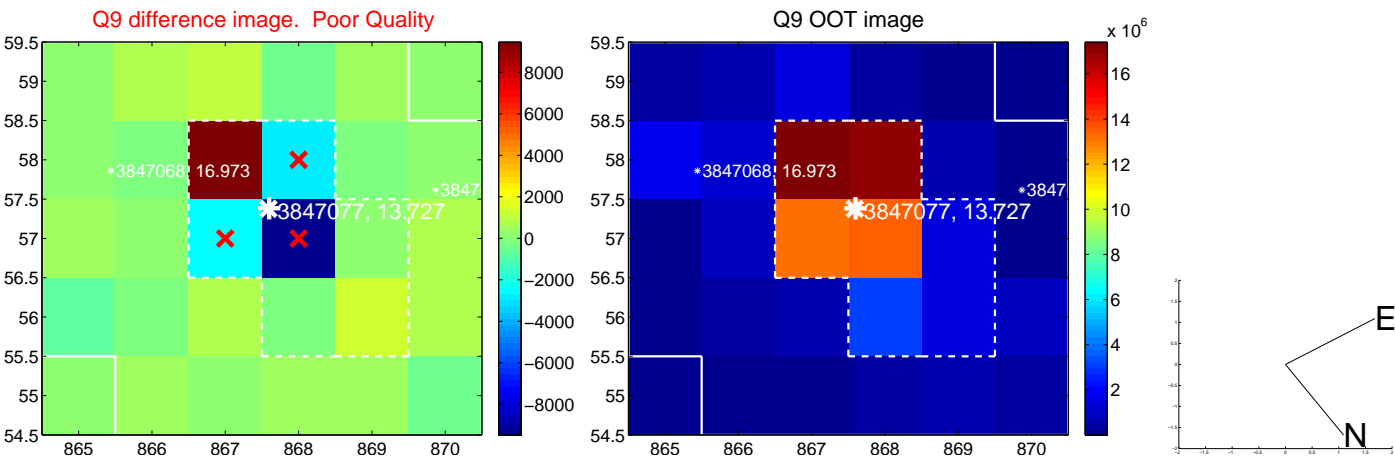
Q4 no OOT image



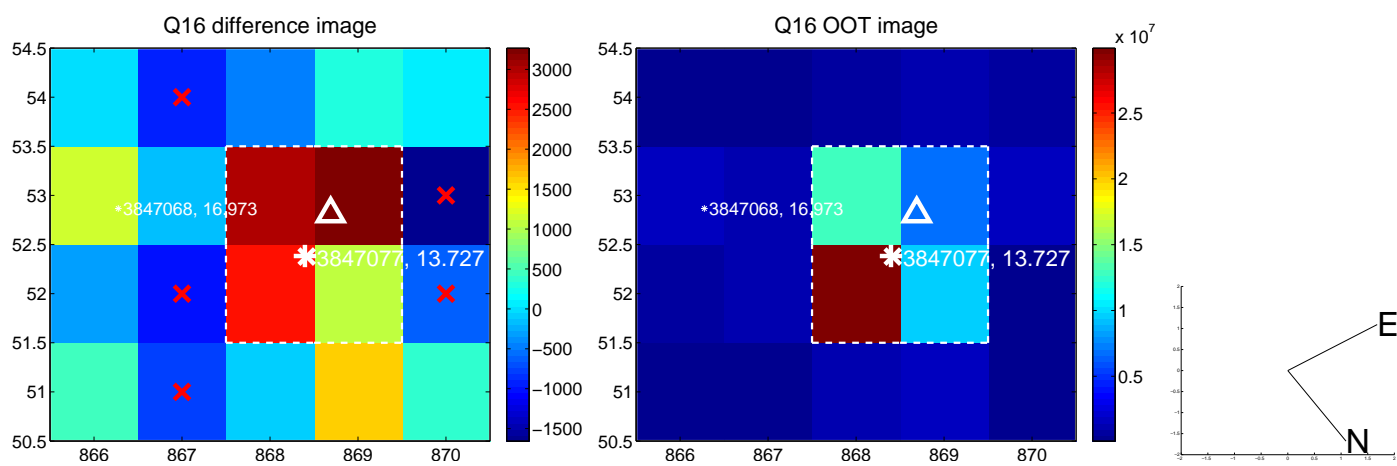
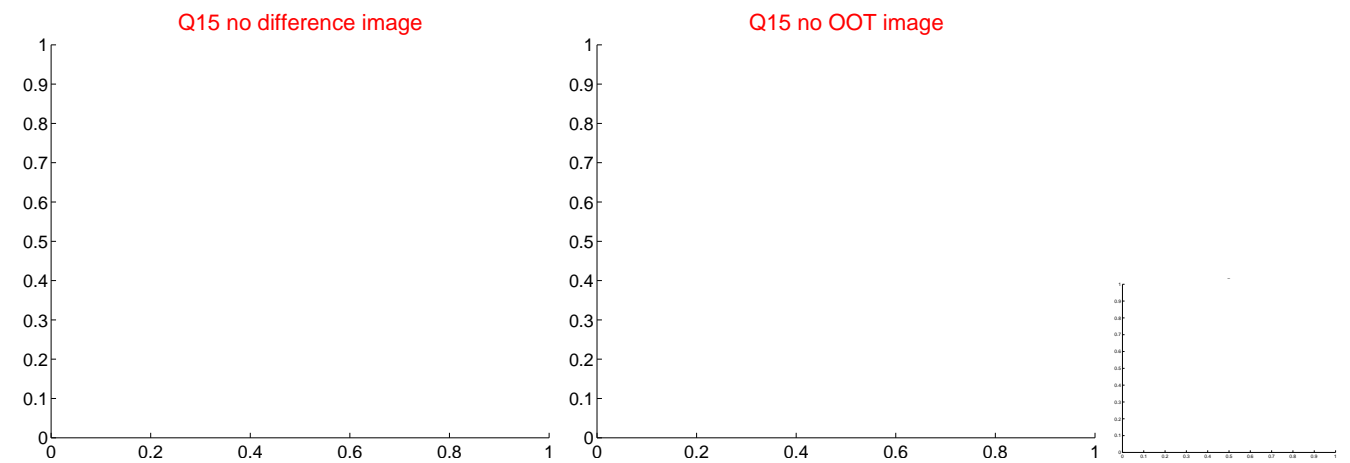
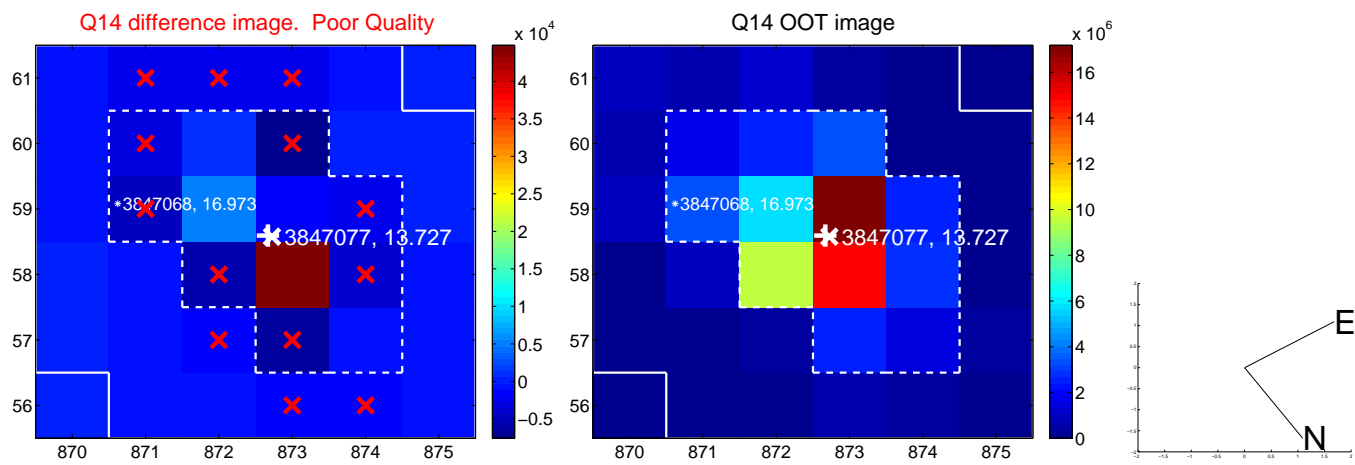
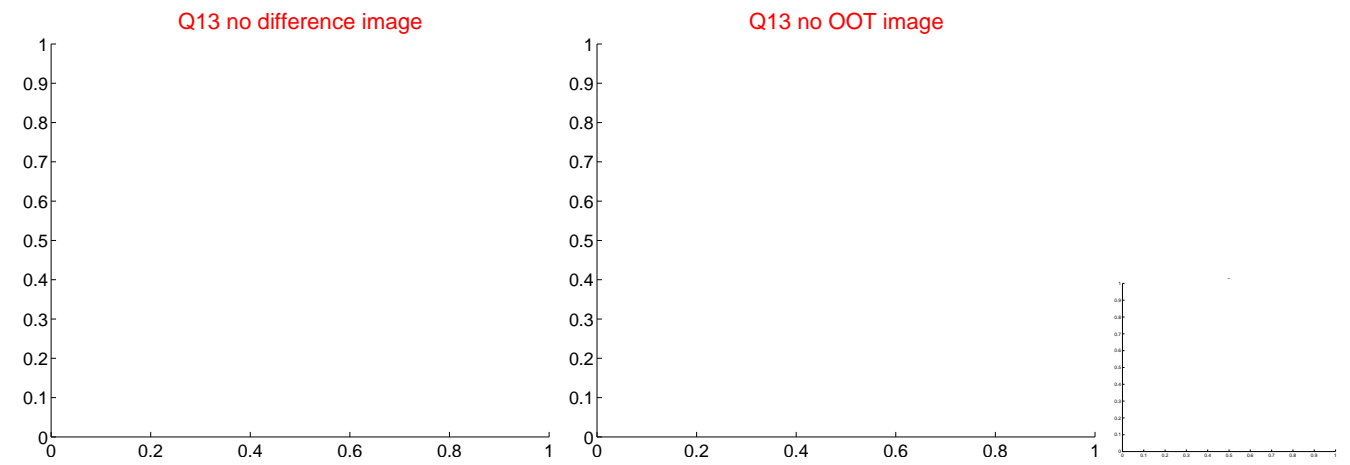
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



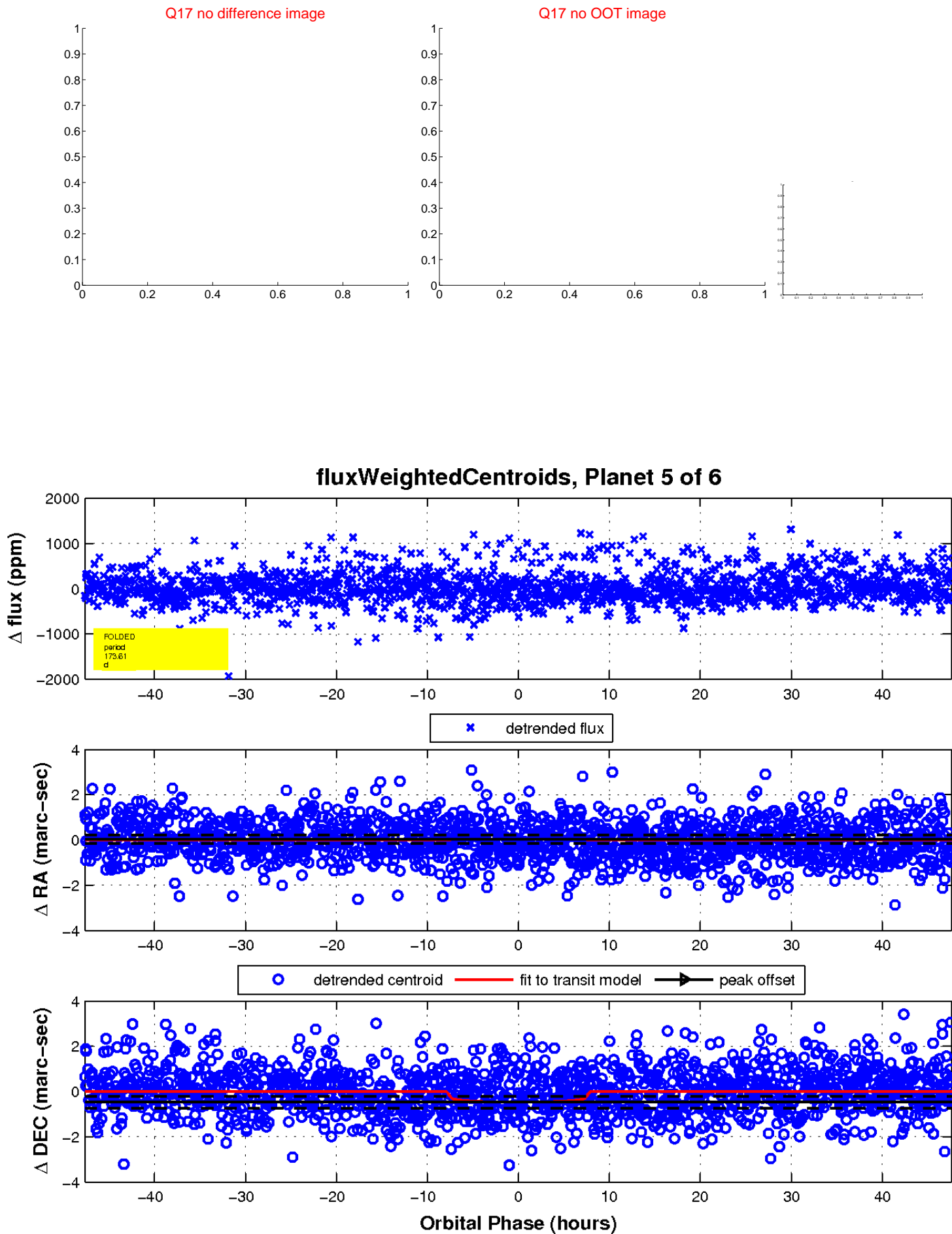
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



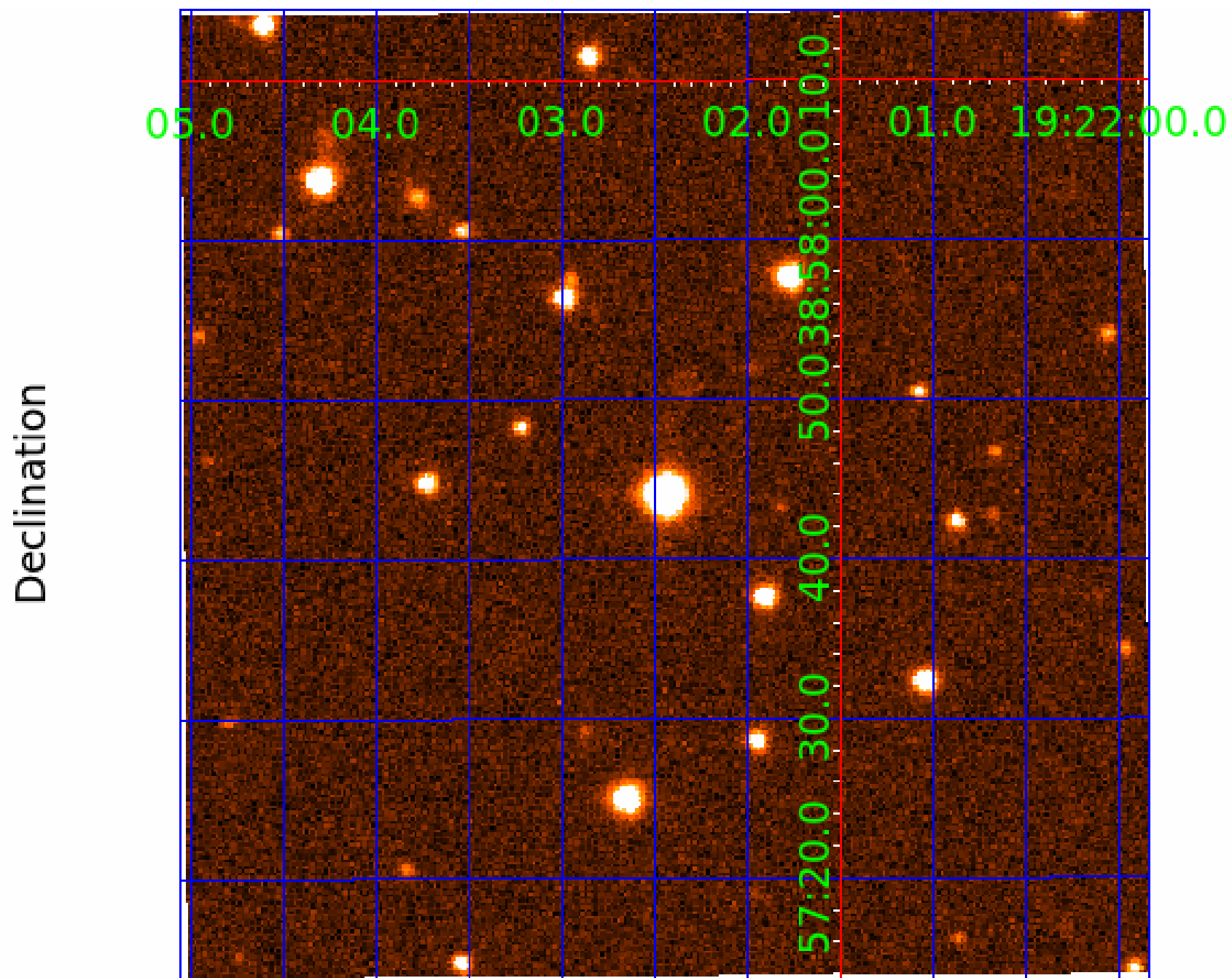
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image





# KIC 003847077

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003847077-01	OBS	No	3.510672	134.697871	42.9	19.179	7.9	8.4	1.18	6442	0.85	911.55
003847077-02	OBS	No	165.374923	244.856952	231.0	3.194	18.9	3.0	1.18	6442	2.03	5.36
003847077-03	OBS	No	167.903463	225.255995	359.5	12.756	13.0	8.2	1.18	6442	2.64	5.25
003847077-04	OBS	No	124.223497	207.078213	229.8	5.604	7.6	6.8	1.18	6442	1.97	7.85
003847077-05	OBS	No	173.609950	297.696703	421.9	15.886	8.6	9.8	1.18	6442	2.60	5.02
003847077-06	OBS	No	14.070583	132.975133	188.3	11.235	7.8	8.7	1.18	6442	1.83	143.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003847077-01	OBS	FP	0.00	1	0	0	0	LPP_DV
003847077-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
003847077-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—TRANS_GAPPED—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
003847077-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS
003847077-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
003847077-06	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_FEW_MEAS—HALO_GHOST

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

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

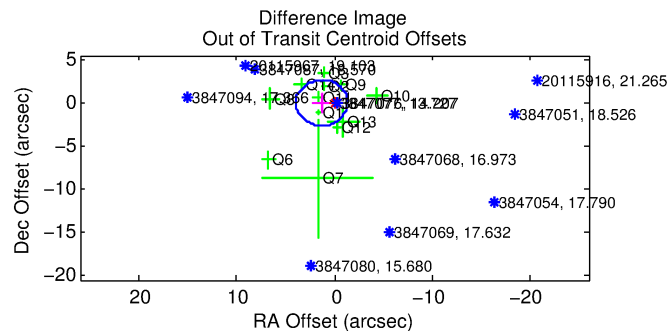
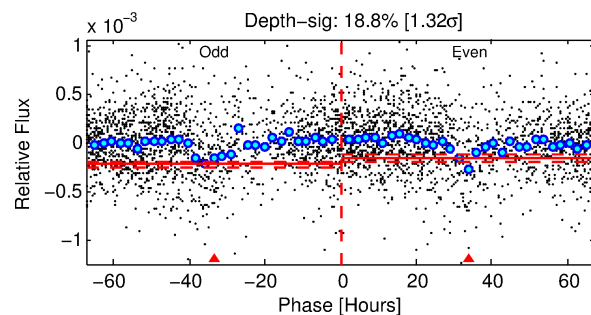
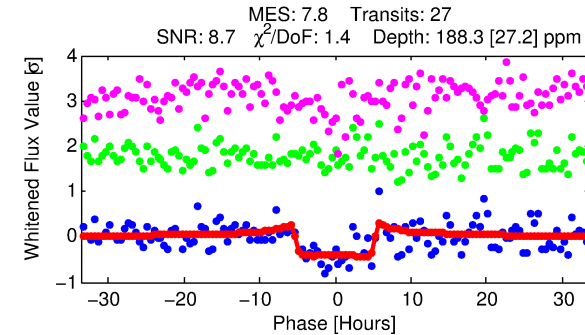
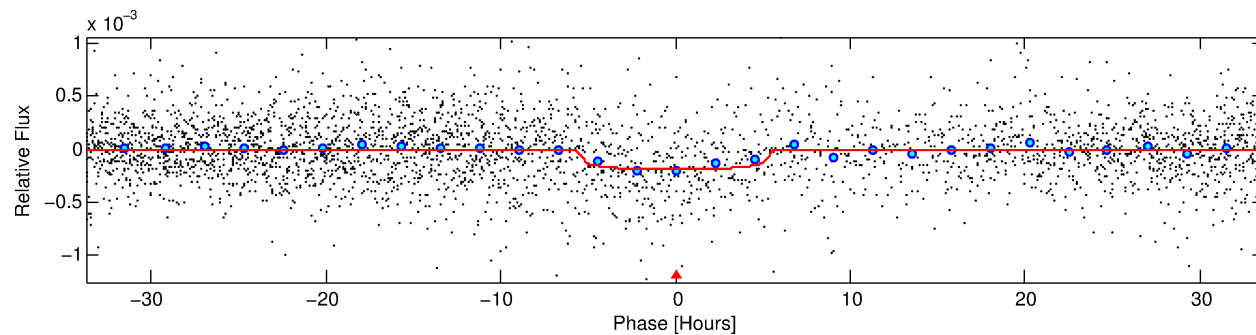
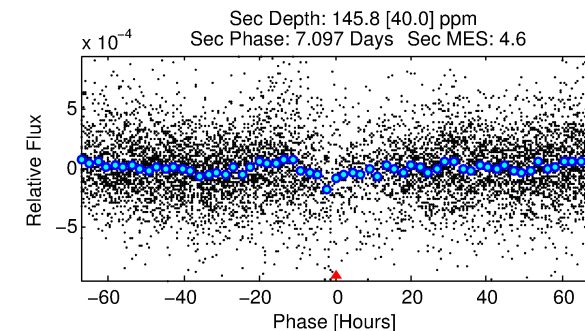
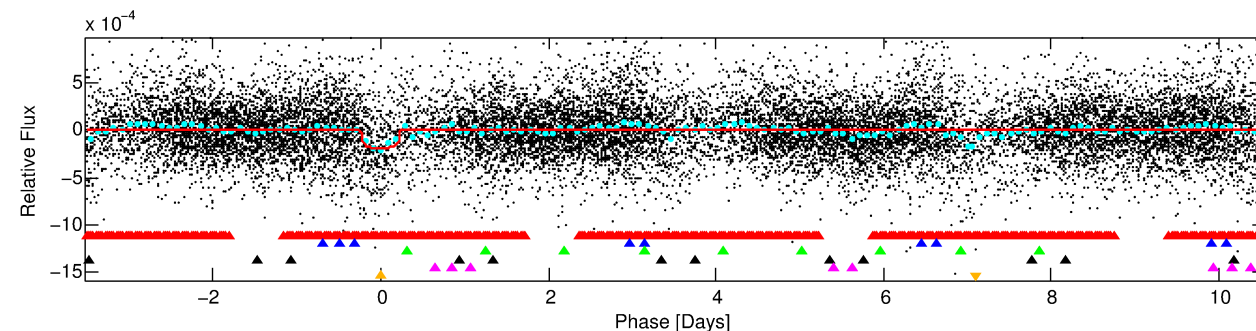
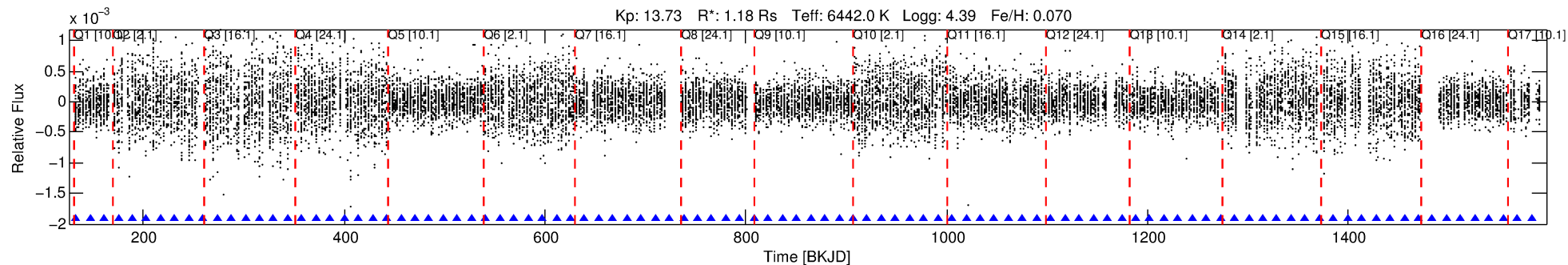
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003847077-06

No Significant Match Found

# DV One-Page Summary

KIC: 3847077 Candidate: 6 of 6 Period: 14.071 d



## DV Fit Results:

Period = 14.07058 [0.00026] d  
Epoch = 132.9751 [0.0106] BKJD  
Rp/R\* = 0.0142 [0.0030]  
a/R\* = 5.47 [5.46]  
b = 0.84 [0.36]  
Seff = 143.18 [63.08]  
Teq = 882 [97] K  
Rp = 1.83 [0.77] Re  
a = 0.1228 [0.0365] AU  
Ag = 361.22 [236.63] [1.52 $\sigma$ ]  
Teff = 5945 [771] K [6.52 $\sigma$ ]

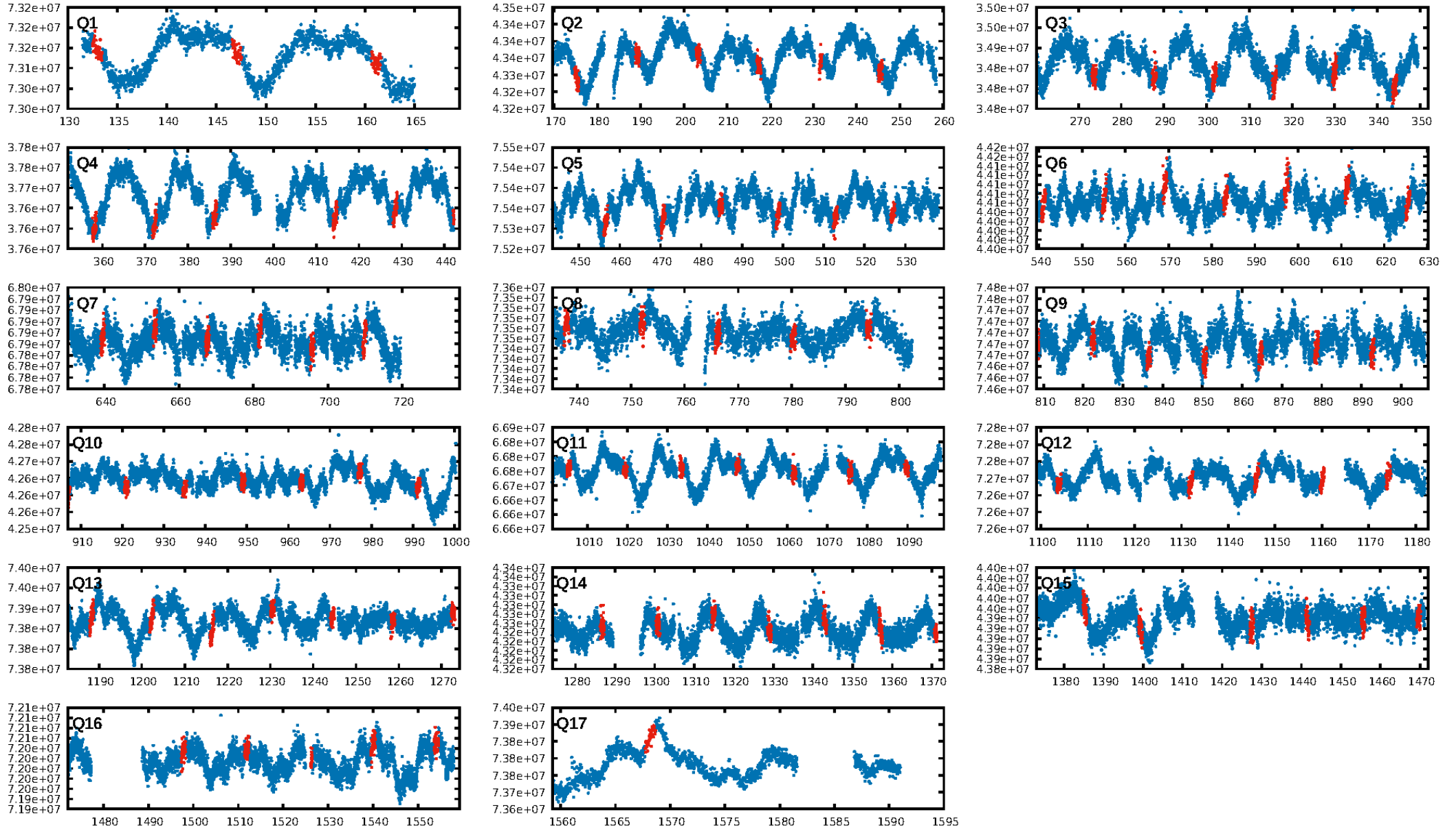
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [11.40 $\sigma$ ]  
LongPeriod-sig: 100.0% [210.57 $\sigma$ ]  
ModelChiSquare2-sig: 9.1%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 8.97e-09**  
RollingBand-fgt: 1.00 [24/24]  
**GhostDiagnostic-chr: -0.1749**  
Centroid-sig: 28.0%  
Centroid-so: 0.239 arcsec [0.63 $\sigma$ ]  
OotOffset-rm: 1.303 arcsec [1.48 $\sigma$ ]  
KicOffset-rm: 1.284 arcsec [1.43 $\sigma$ ]  
OotOffset-st: 4/3/2/3 [12]  
KicOffset-st: 4/3/2/3 [12]  
DiffImageQuality-fgm: 0.33 [4/12]  
DiffImageOverlap-fno: 0.24 [4/17]

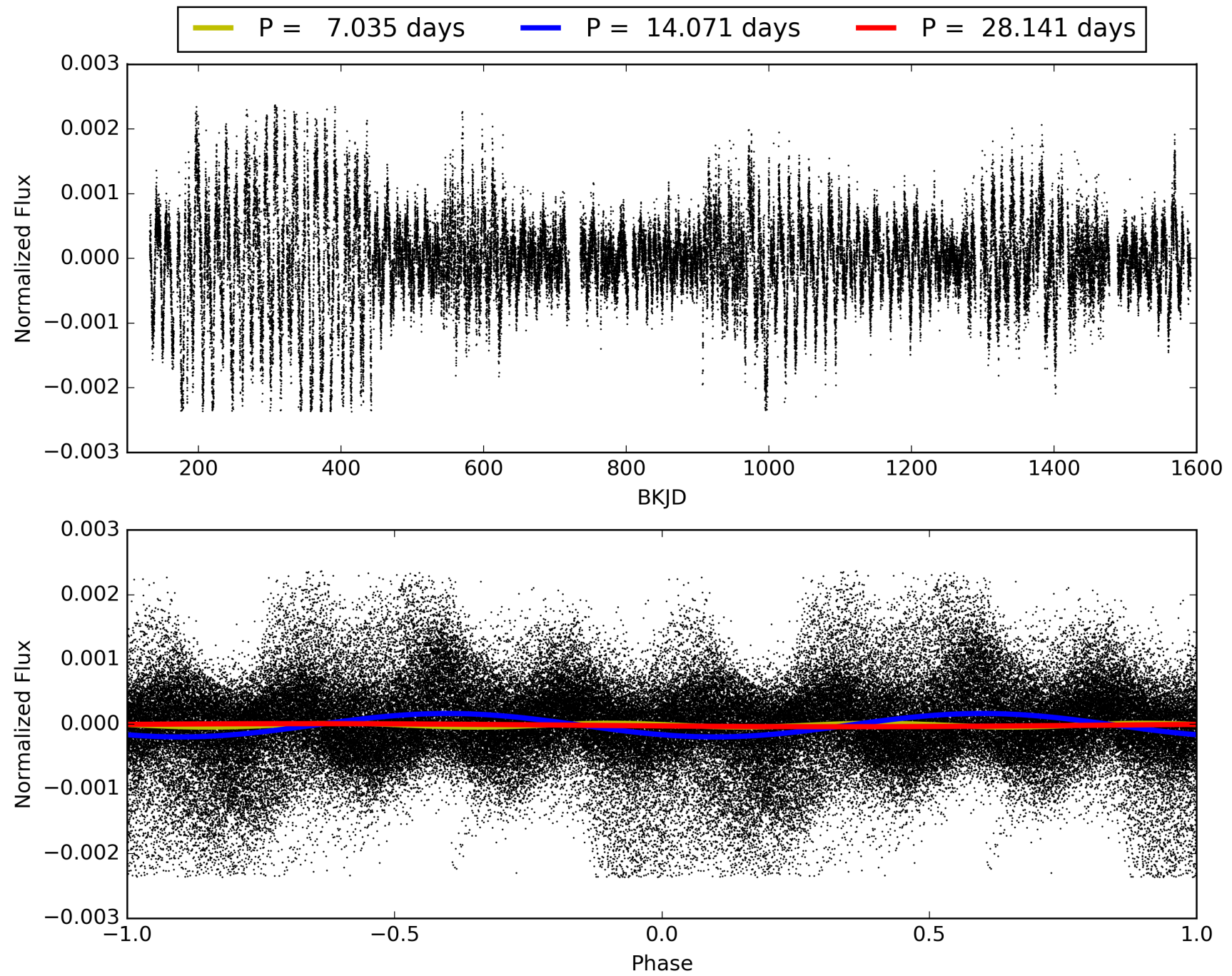
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 11:38:08 Z

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

# TCE 003847077-06, PDC Light Curves

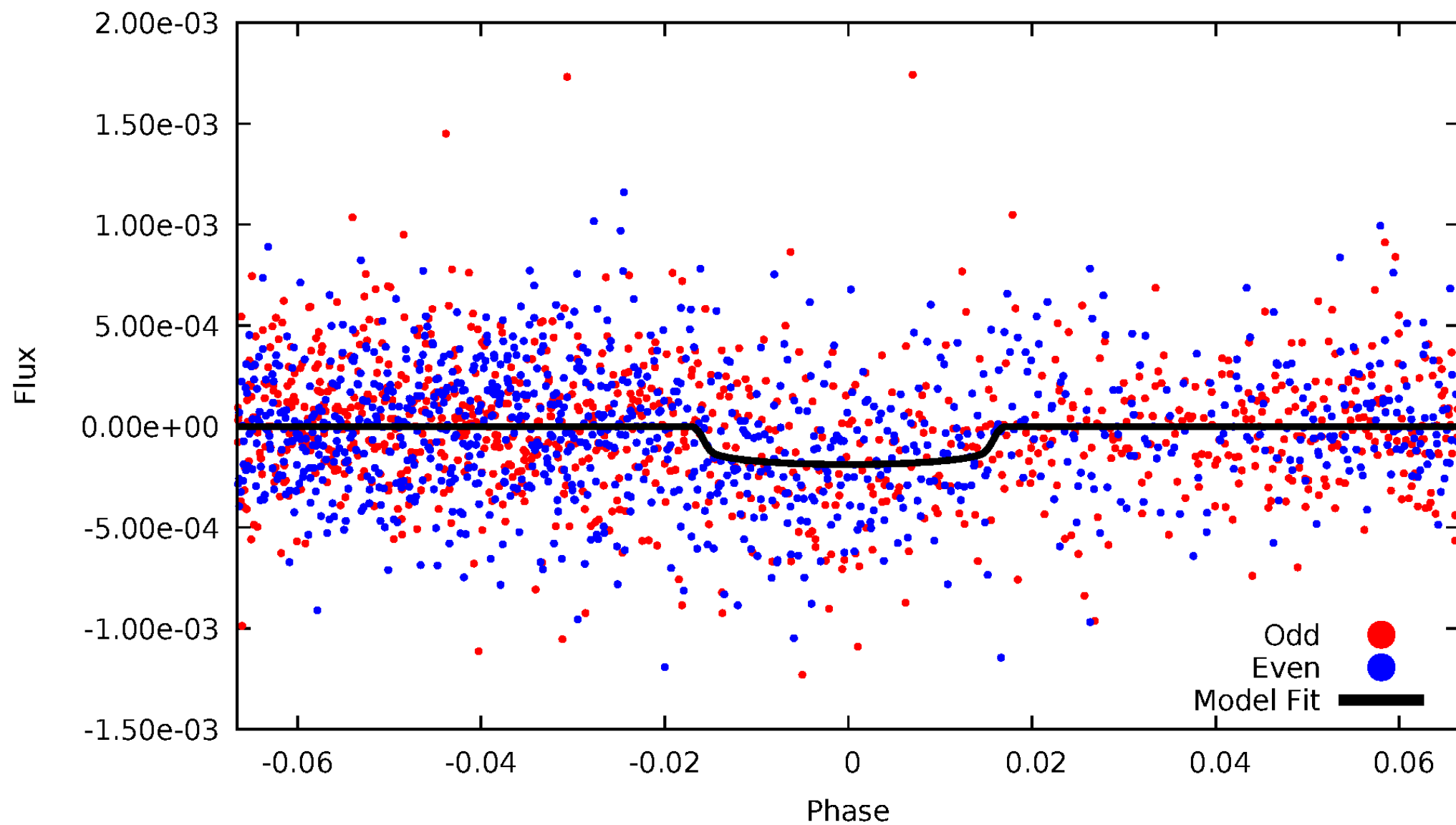


TCE 003847077-06



# DV Odd/Even

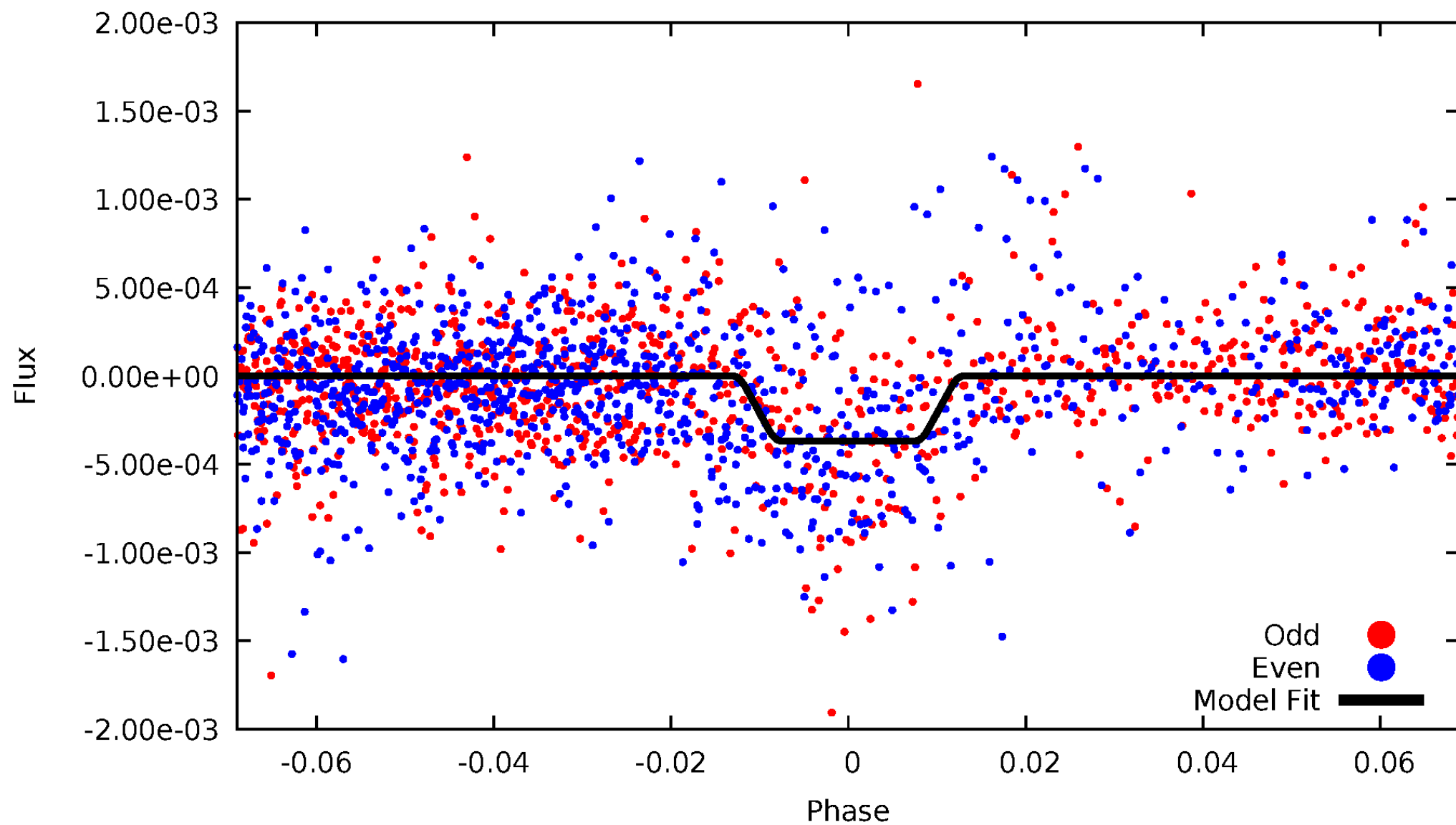
TCE 003847077-06





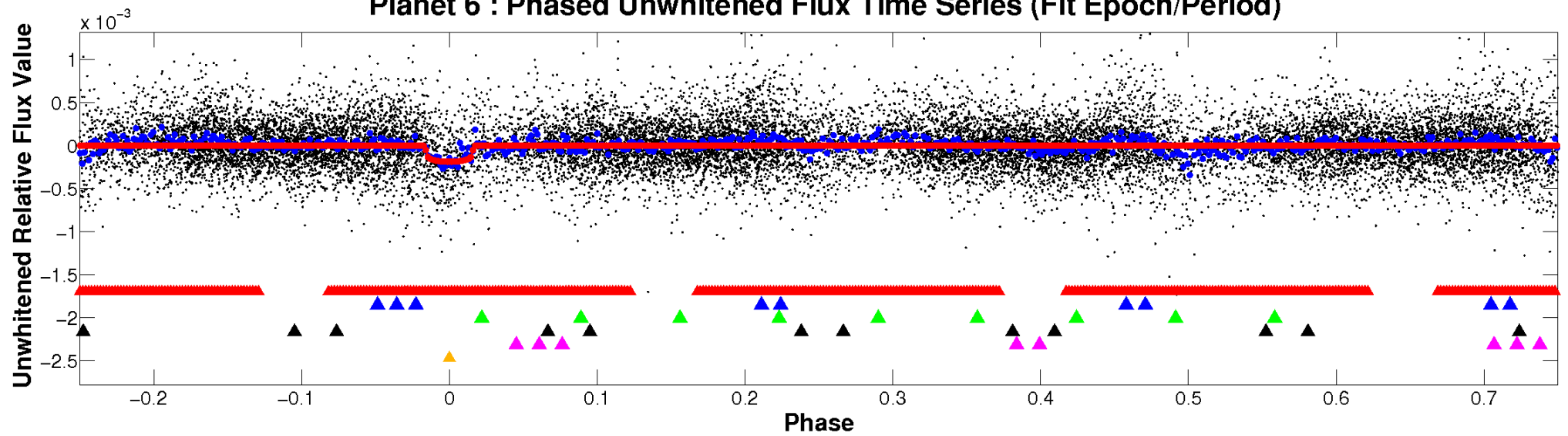
# ALT Odd/Even

TCE 003847077-06

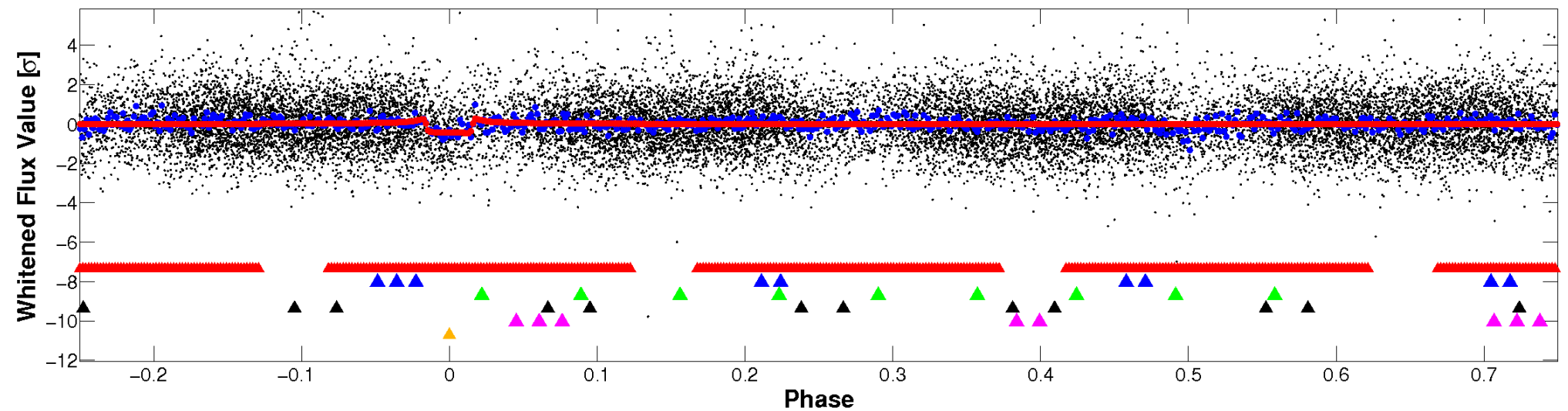


# Non-Whitened Vs. Whitened Light Curve

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

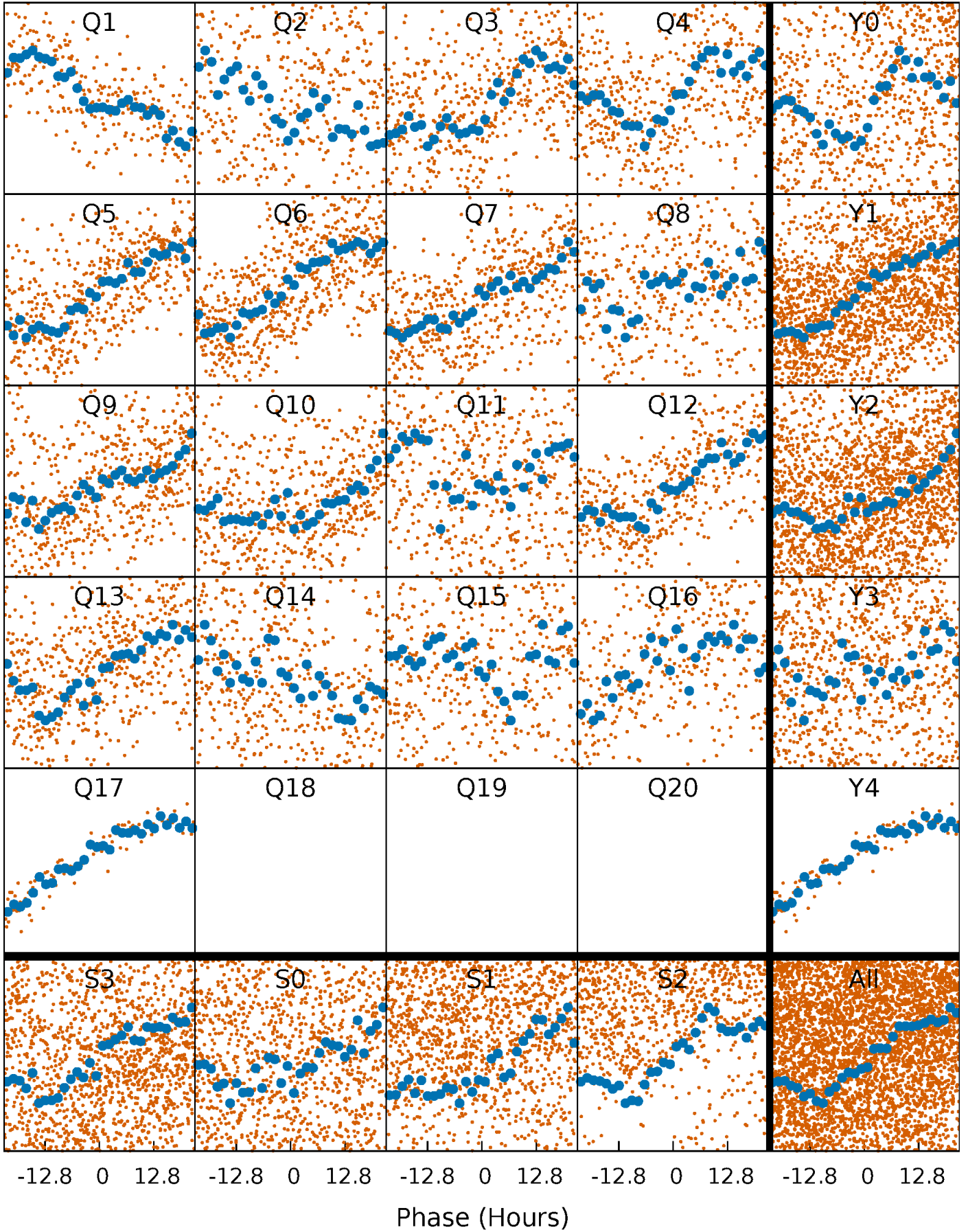


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

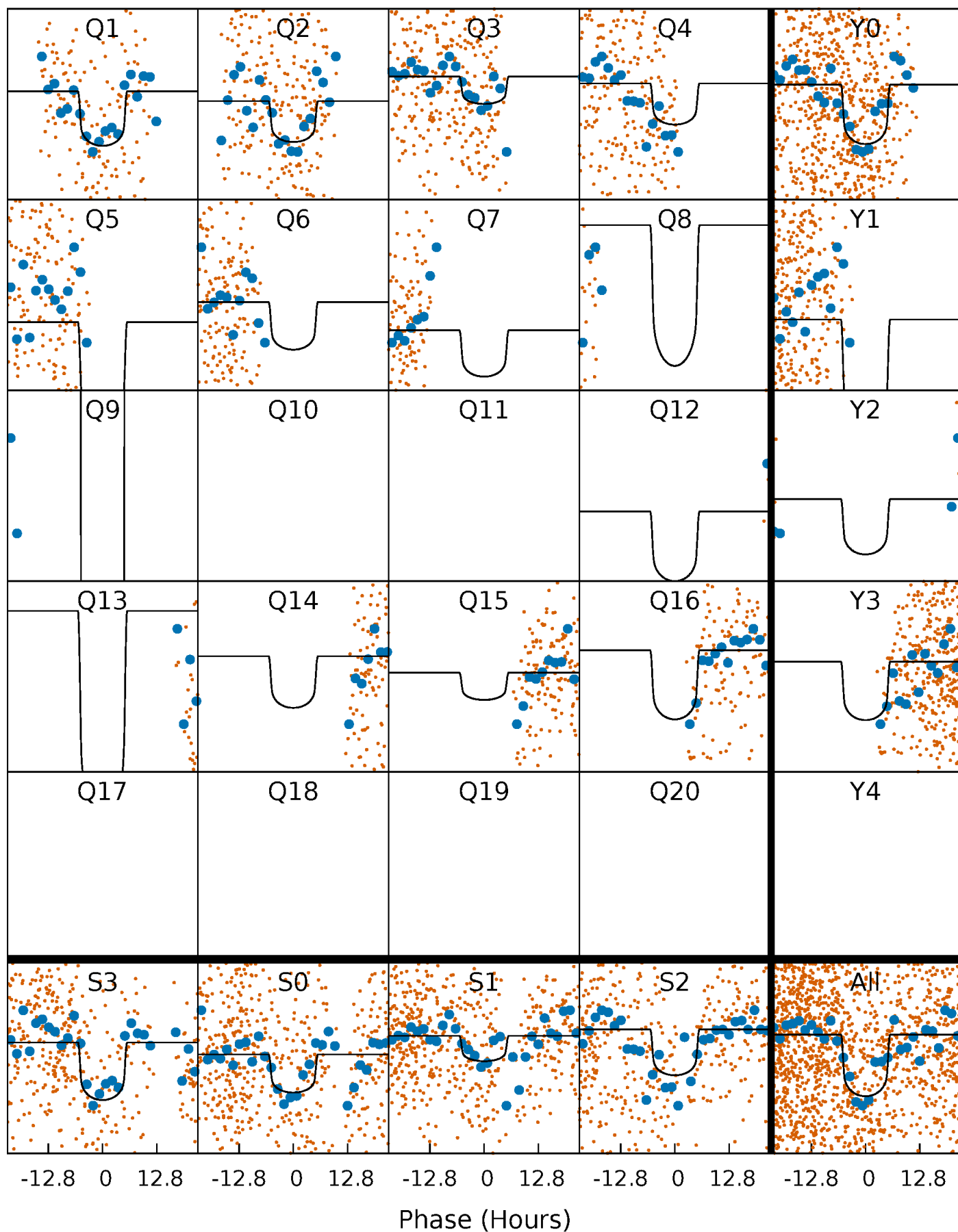
TCE 003847077-06 P= 14.070583 Days  $T_0=132.975133$  (BKJD)





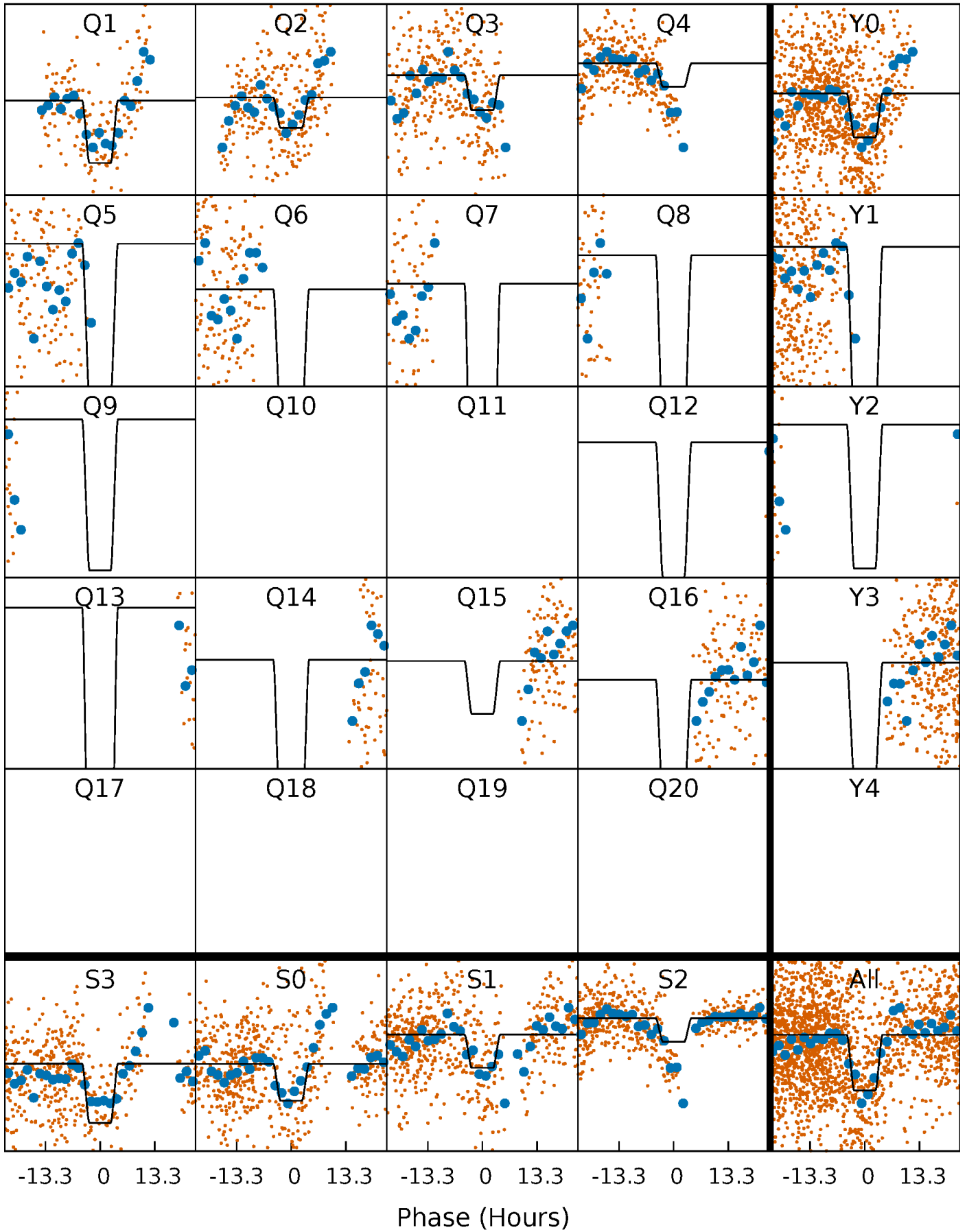
# DV Quarter-Phased Transit Curves

TCE 003847077-06 P= 14.070583 Days  $T_0=132.975133$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

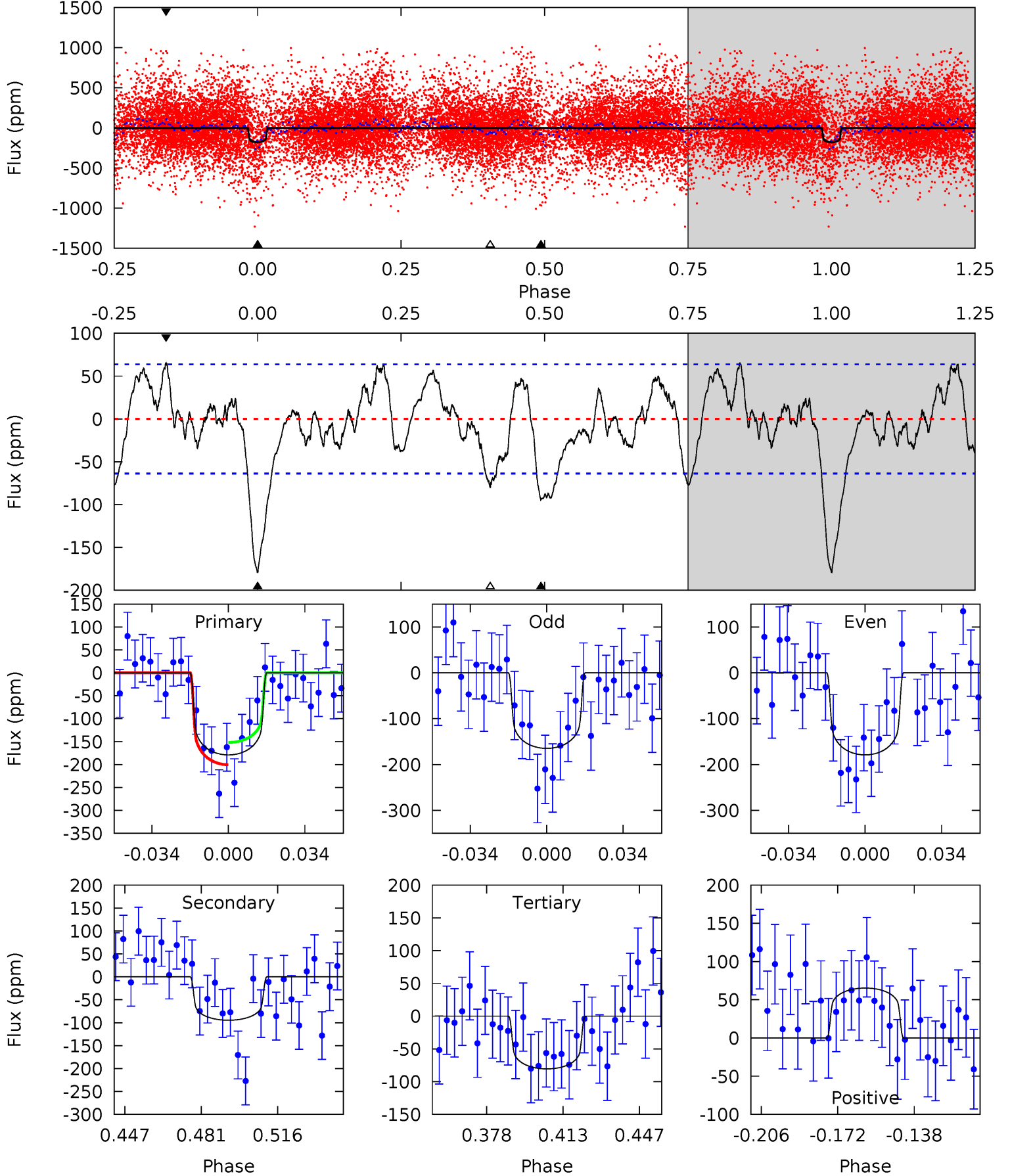
TCE 003847077-06 P= 14.069780 Days  $T_0=132.972732$  (BKJD)



# DV Model-Shift Uniqueness Test

003847077-06, P = 14.070583 Days, E = 118.904550 Days

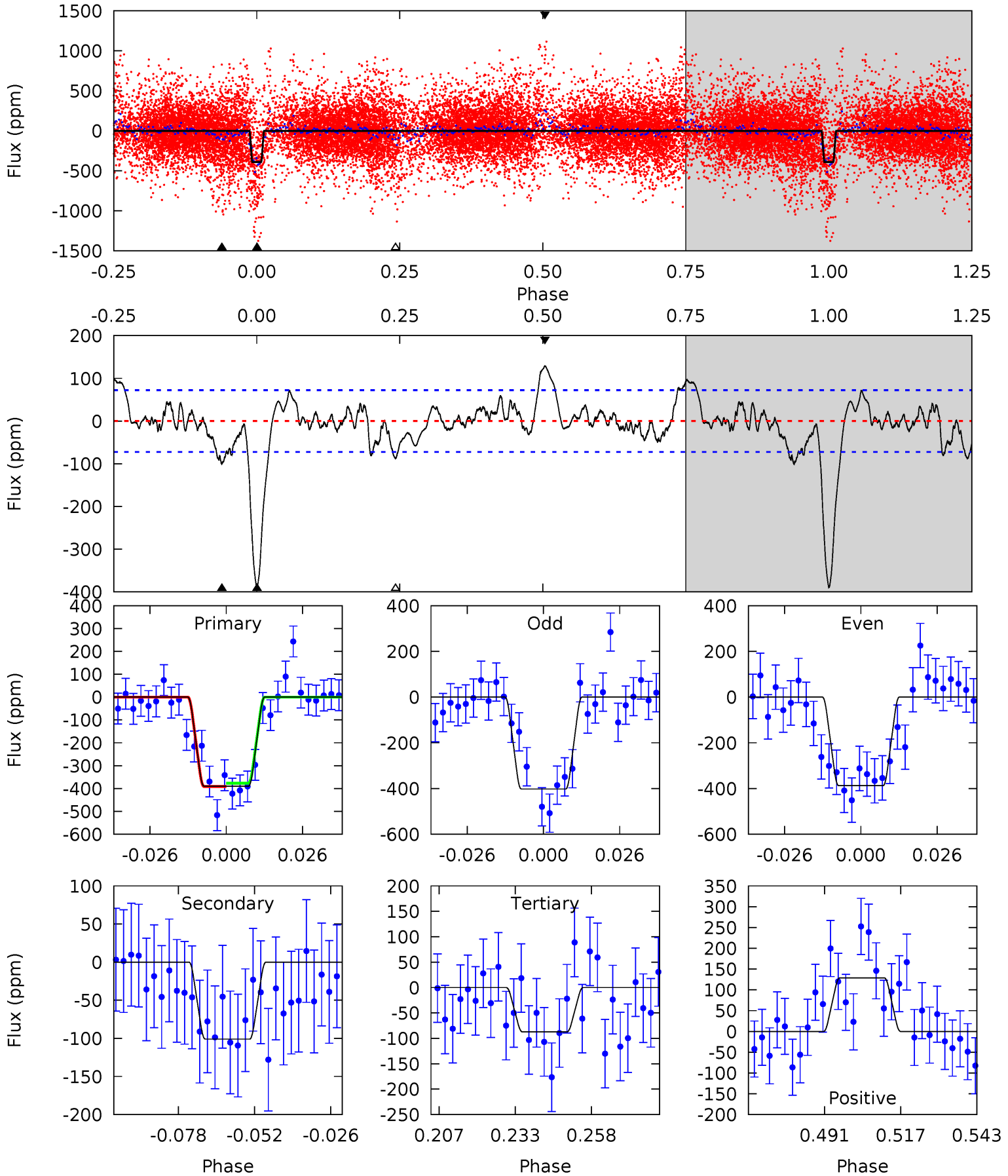
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.4	7.10	6.04	4.90	4.78	2.12	2.26	7.39	8.53	1.05	2.20	0.53	1.00	0.27	1.81



# Alt Model-Shift Uniqueness Test

003847077-06,  $P = 14.069780$  Days,  $E = 118.902952$  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
26.1	6.75	5.84	8.61	4.84	2.23	2.09	20.2	17.4	0.91	-1.85	0.49	0.84	0.25	0.47



### Stellar Parameters For KIC 003847077

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6442^{+145}_{-209}$	$4.388^{+0.056}_{-0.224}$	$0.070^{+0.250}_{-0.300}$	$1.183^{+0.431}_{-0.144}$	$1.250^{+0.184}_{-0.165}$	$1.062^{+0.252}_{-0.610}$
	+2%/-3%	+1%/-5%	+357%/-429%	+36%/-12%	+15%/-13%	+24%/-57%
Source	PHO1	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 003847077-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-95 \pm 13$	$1.91^{+0.52}_{-0.46}$	$1258^{+109}_{-60}$	$5371^{+623}_{-477}$	$207^{+150}_{-77}$
Alt.	$-101 \pm 15$	$2.59^{+0.59}_{-0.47}$	$1258^{+98}_{-63}$	$4766^{+425}_{-317}$	$120^{+60}_{-38}$

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

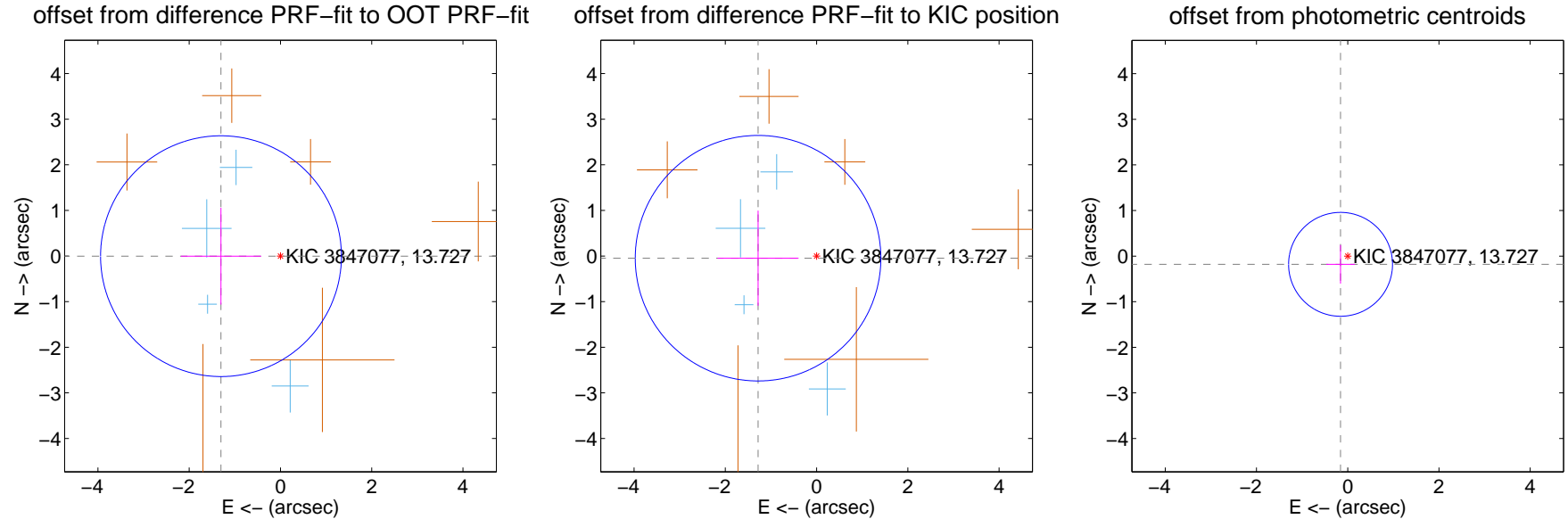
## DV Centroid Data

Supplemental centroid analysis for 003847077-06. Kepler magnitude: 13.73. Transit SNR 8.68

There are 4 quarters with good PRF difference image offsets

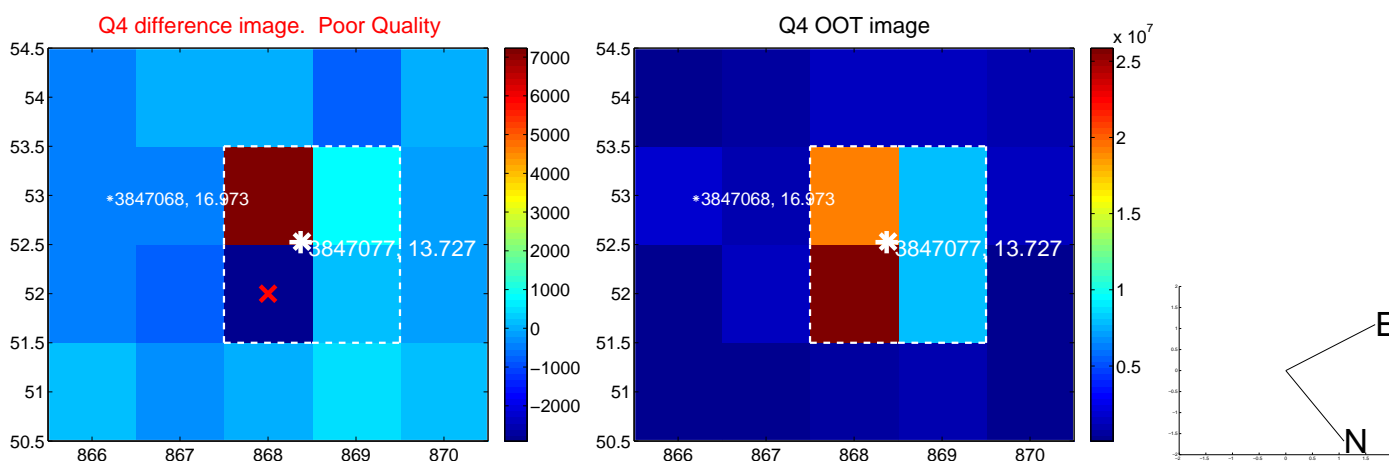
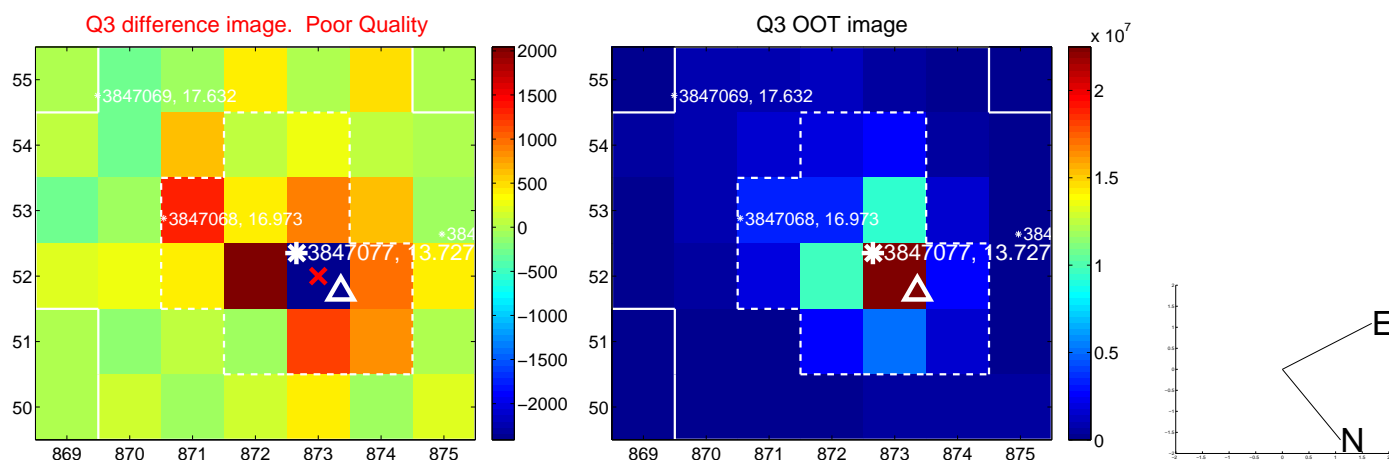
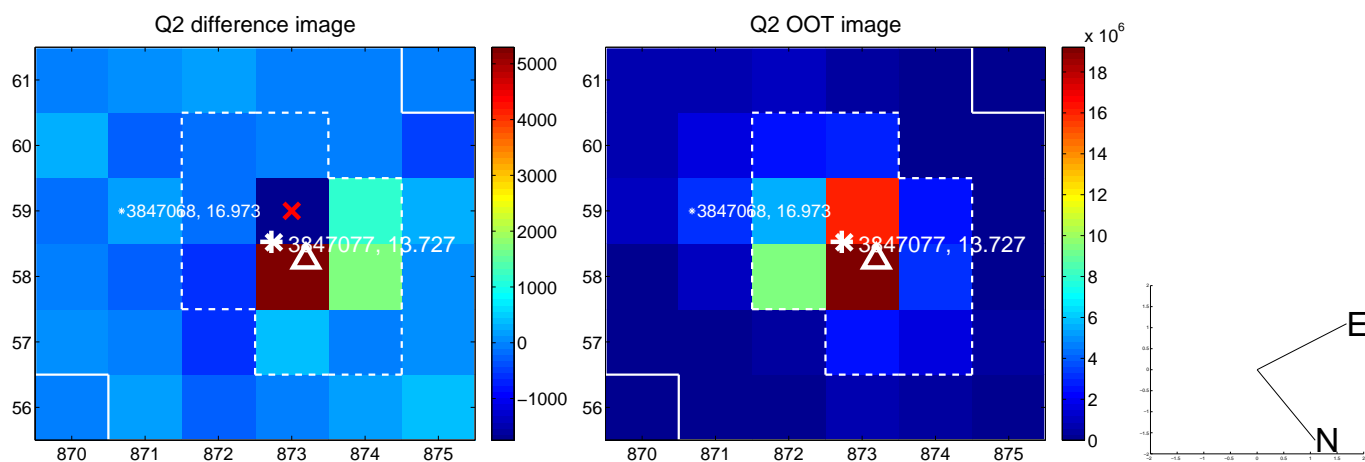
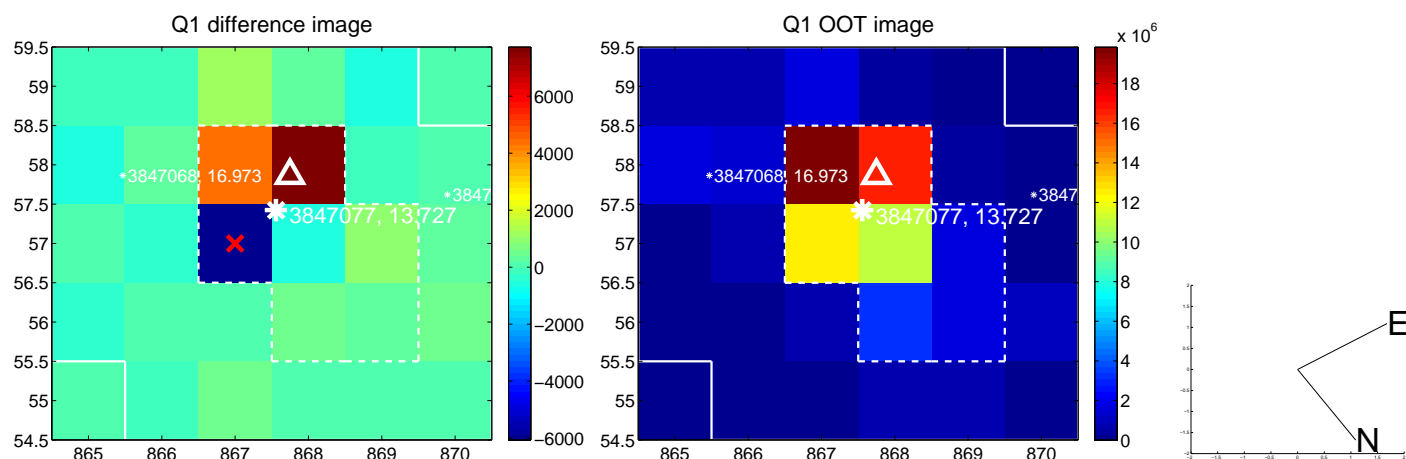
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.303 \pm 0.880$	1.48	$1.303 \pm 0.879$	$-0.003 \pm 1.061$
PRF-fit source offset from KIC position	$1.284 \pm 0.897$	1.43	$1.283 \pm 0.887$	$-0.047 \pm 1.042$
photometric centroid source offset	$0.24 \pm 0.38$	0.63	$0.16 \pm 0.31$	$-0.18 \pm 0.42$

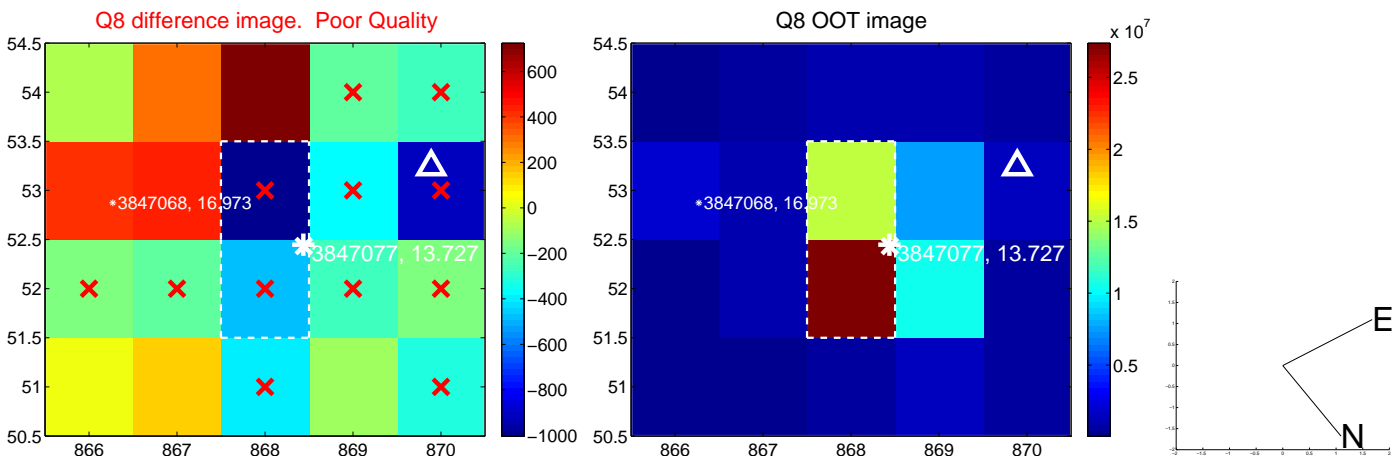
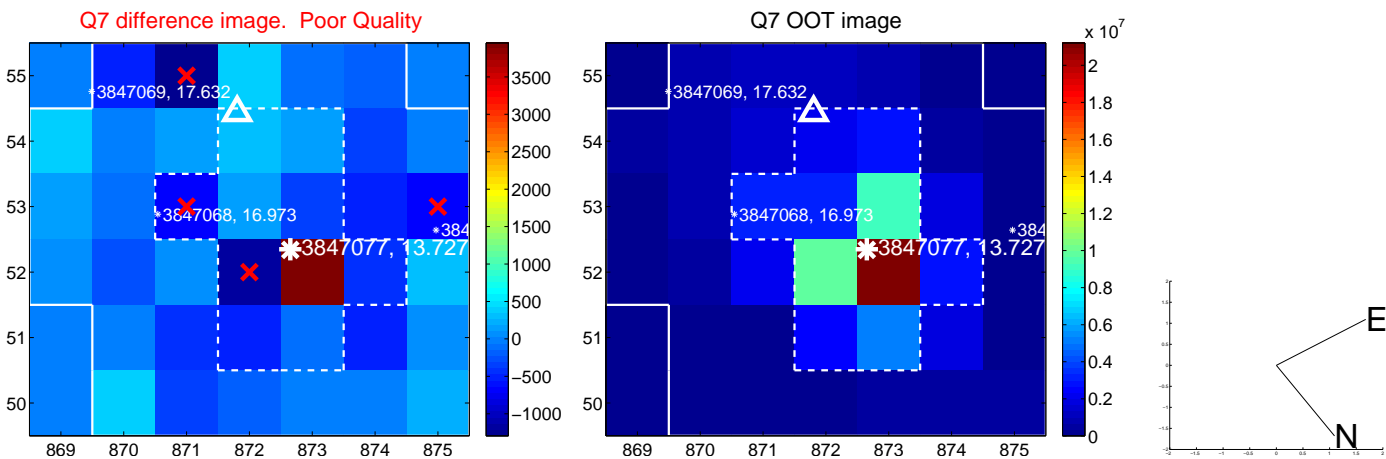
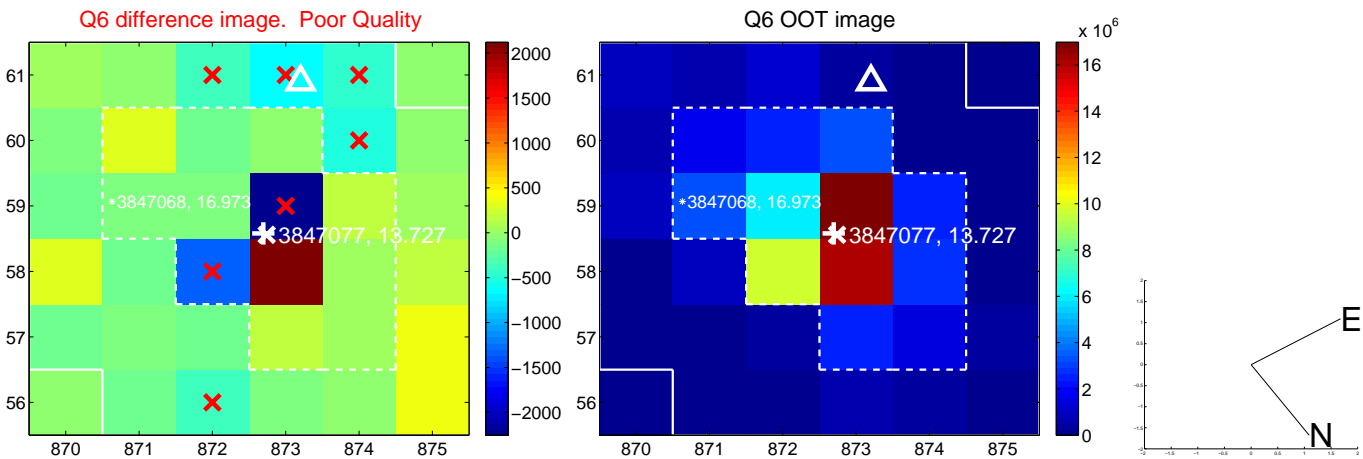
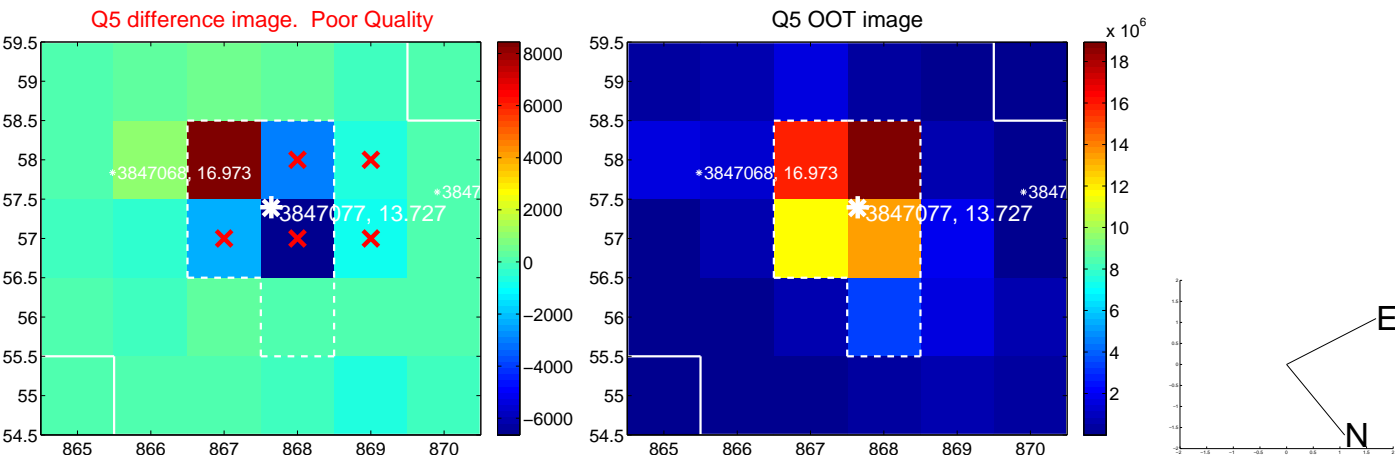


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

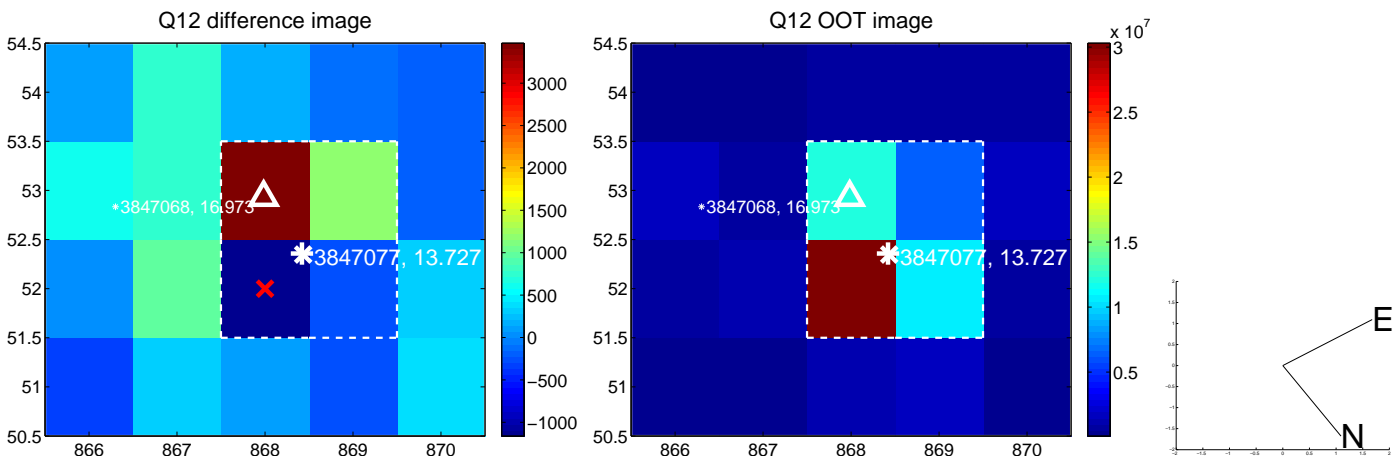
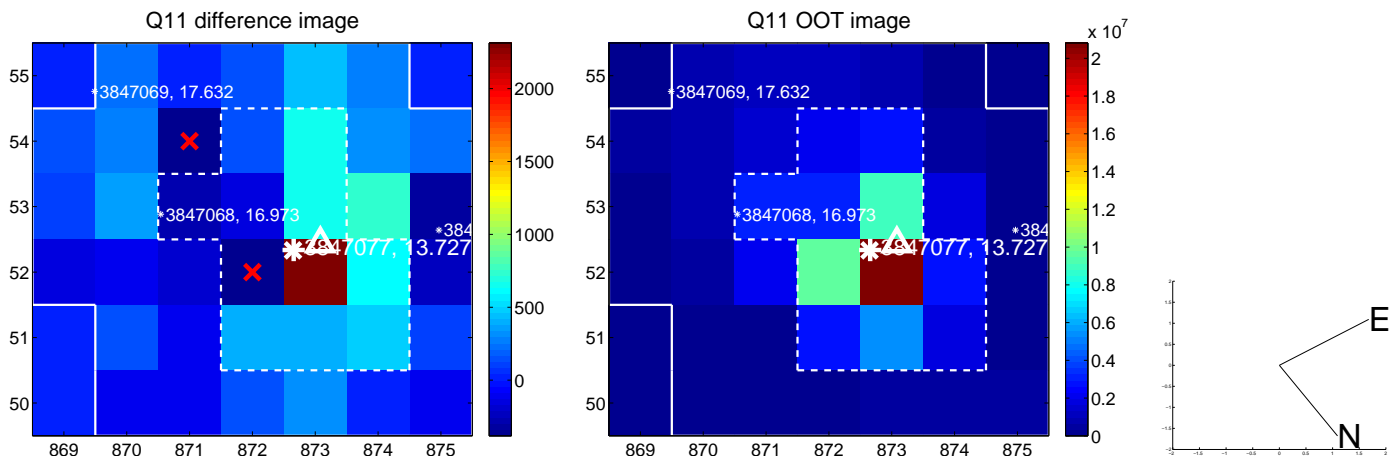
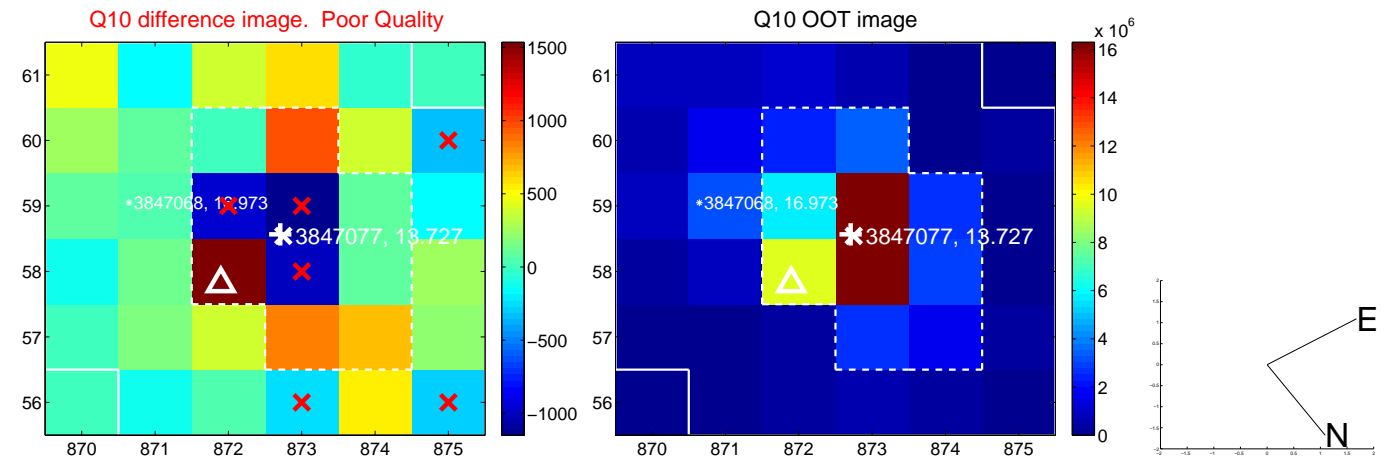
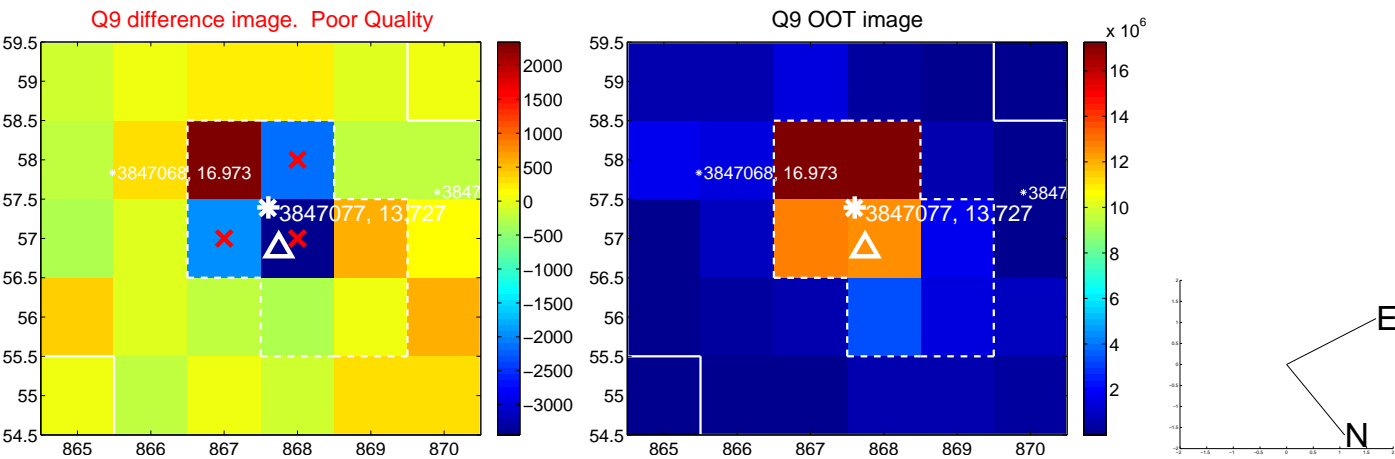


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

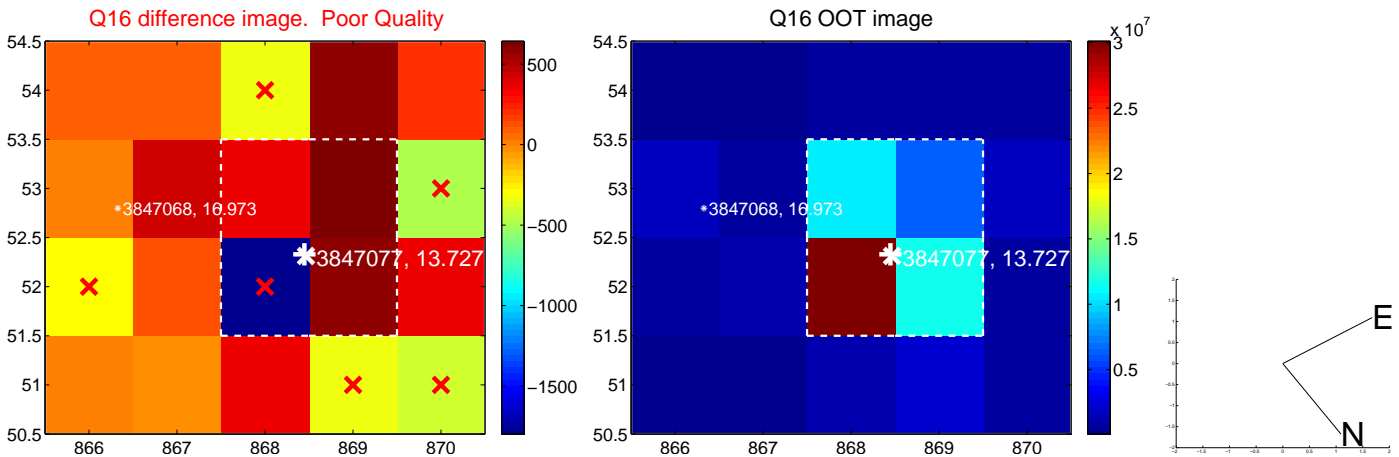
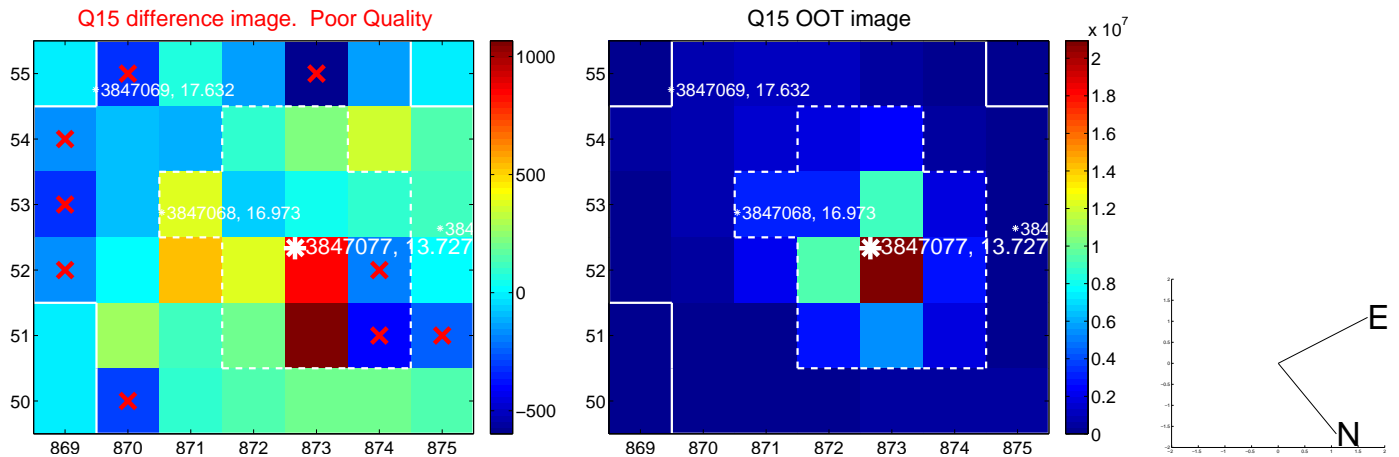
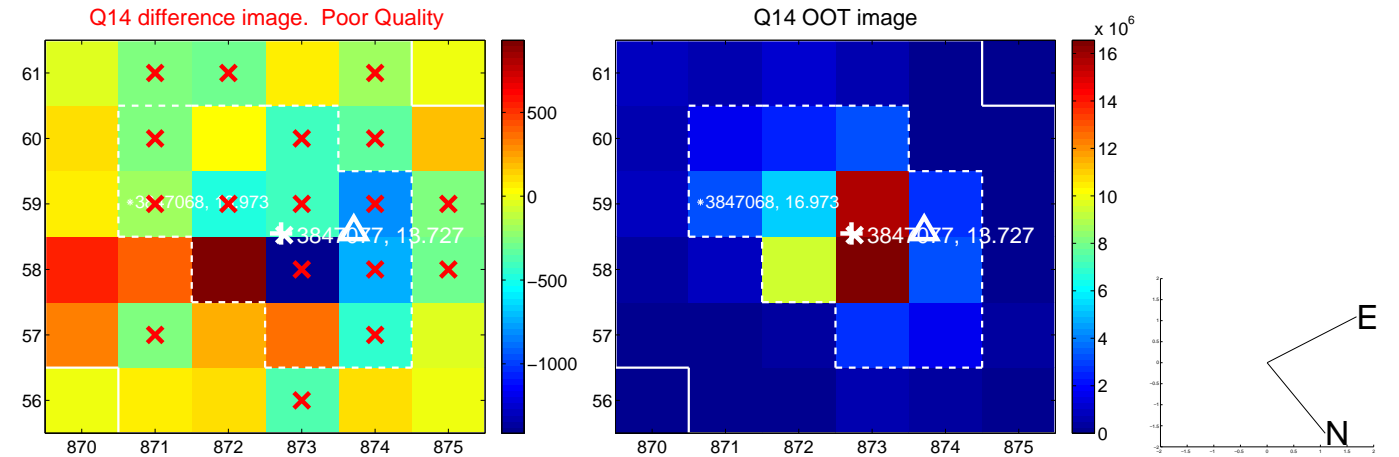
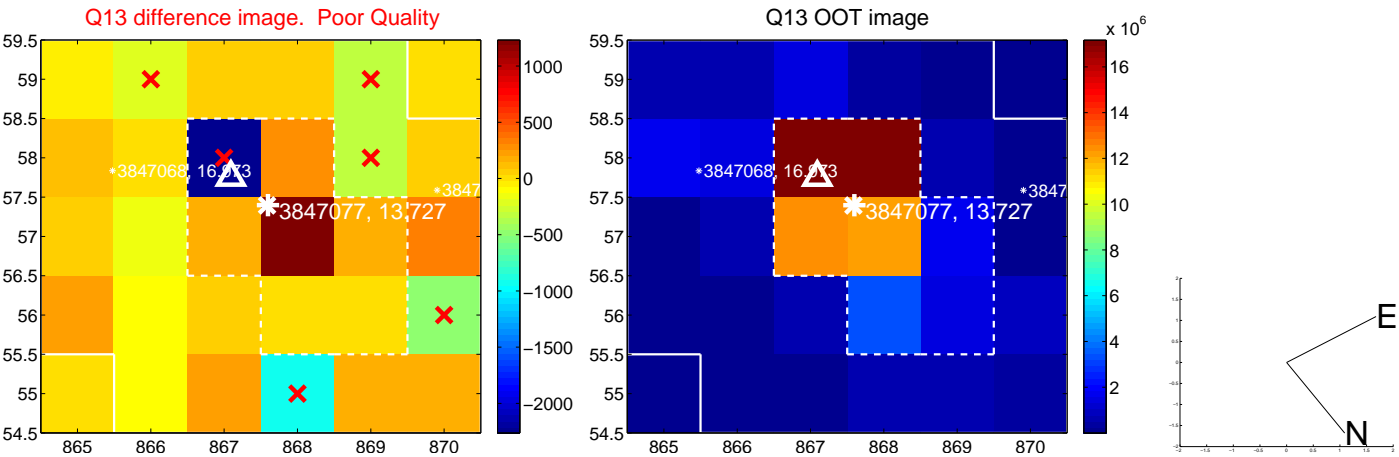




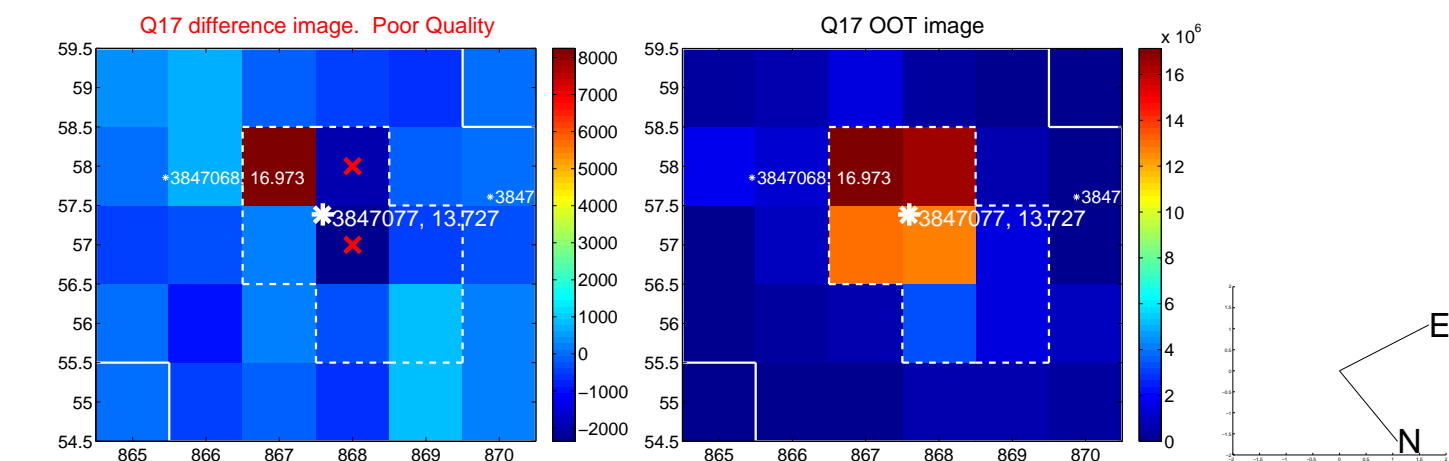
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



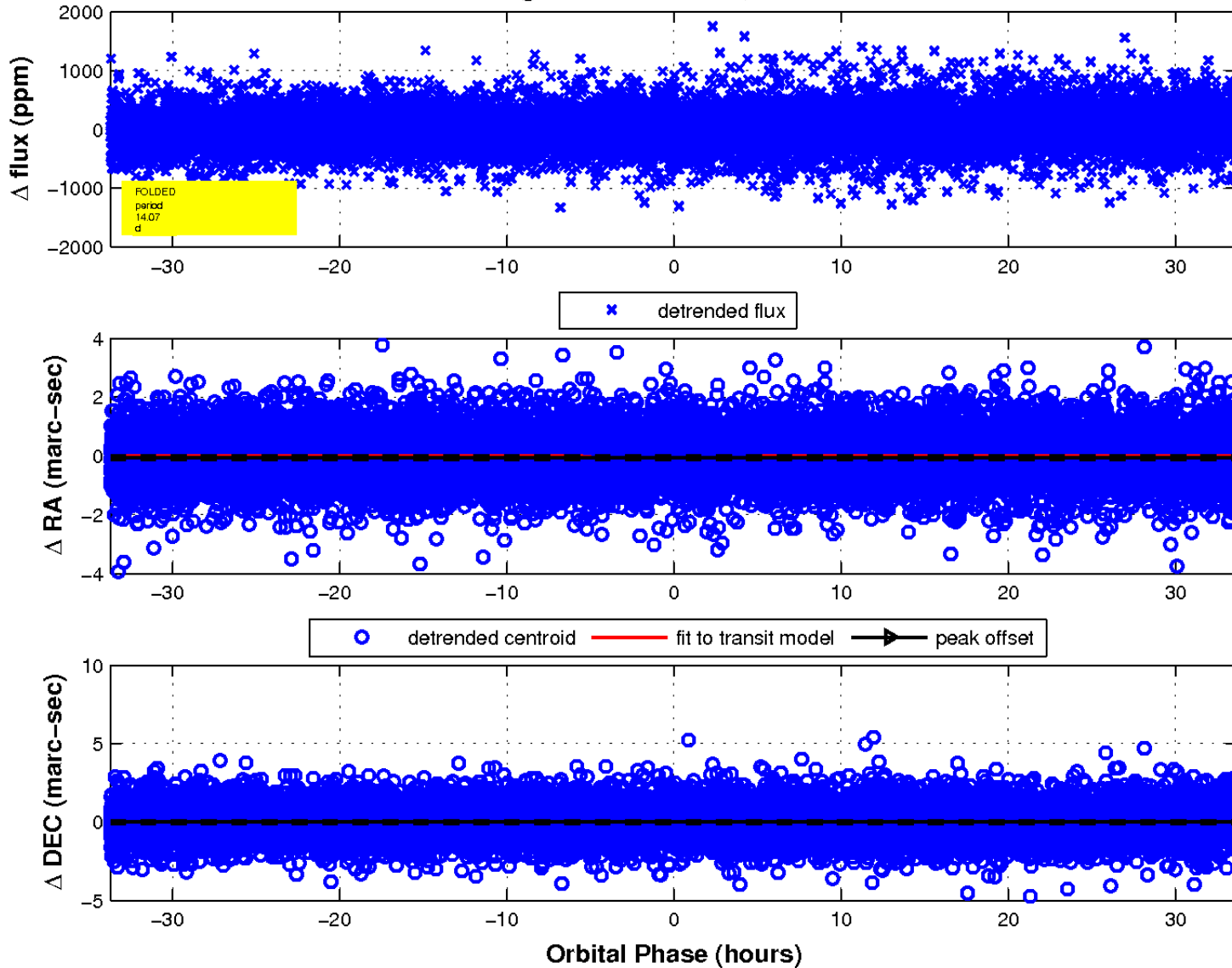
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 6 of 6



UKIRT Image

