

# KIC 002854839

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002854839-01	OBS	7639.01	1.055699	131.557018	31.5	0.703	7.8	5.8	0.75	4955	0.50	896.97
002854839-02	OBS	No	107.137396	182.876239	330.7	2.973	9.5	5.4	0.75	4955	2.39	1.90
002854839-03	OBS	No	385.343184	356.981262	490.4	4.184	10.9	7.4	0.75	4955	1.61	0.34
002854839-04	OBS	No	277.968390	364.442645	535.5	10.940	13.6	5.9	0.75	4955	1.74	0.53

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002854839-01	OBS	FP	0.33	1	0	0	0	LPP_DV
002854839-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS
002854839-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—CENT_FEW_DIFFS
002854839-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS

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

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

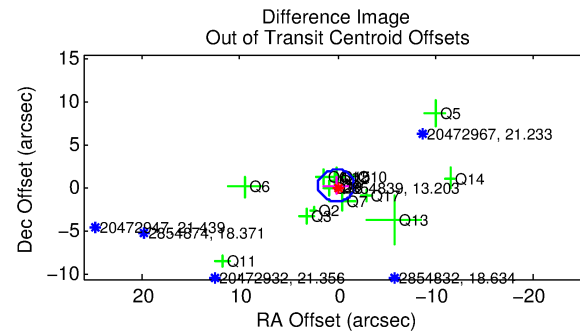
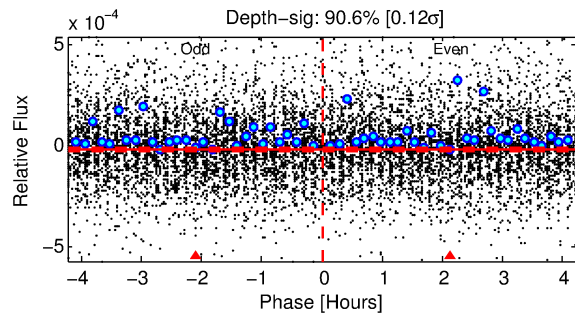
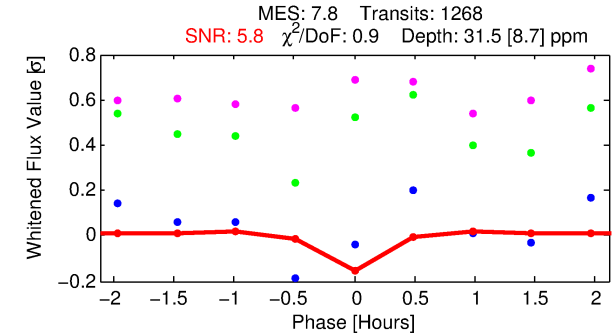
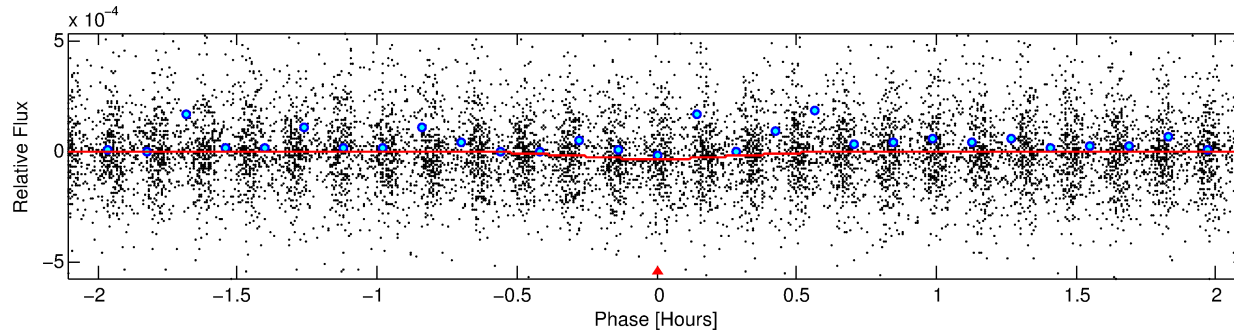
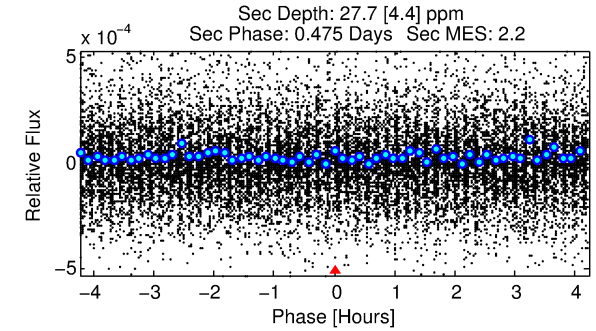
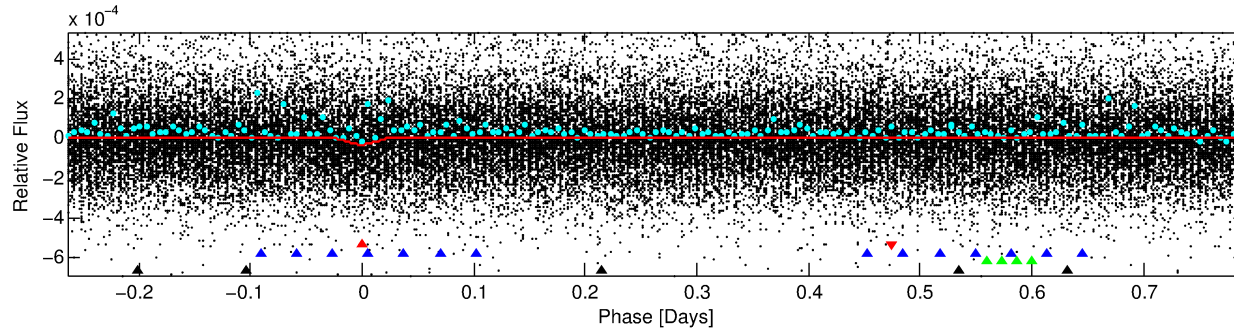
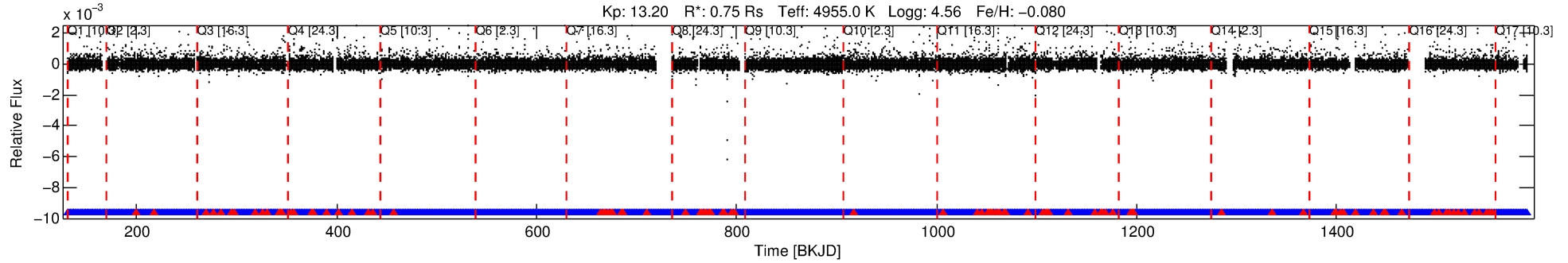
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 002854839-01

No Significant Match Found

# DV One-Page Summary

KIC: 2854839 Candidate: 1 of 4 Period: 1.056 d



## DV Fit Results:

Period = 1.05570 [0.00002] d  
Epoch = 131.5570 [0.0022] BKJD  
Rp/R\* = 0.0061 [0.0038]  
a/R\* = 6.29 [14.28]  
b = 0.85 [0.79]  
Seff = 896.96 [163.04]  
Teq = 1395 [63] K  
Rp = 0.50 [0.31] Re  
a = 0.0184 [0.0015] AU  
Ag = 20.64 [25.96] [0.76σ]  
Teffp = 4599 [1449] K [2.21σ]

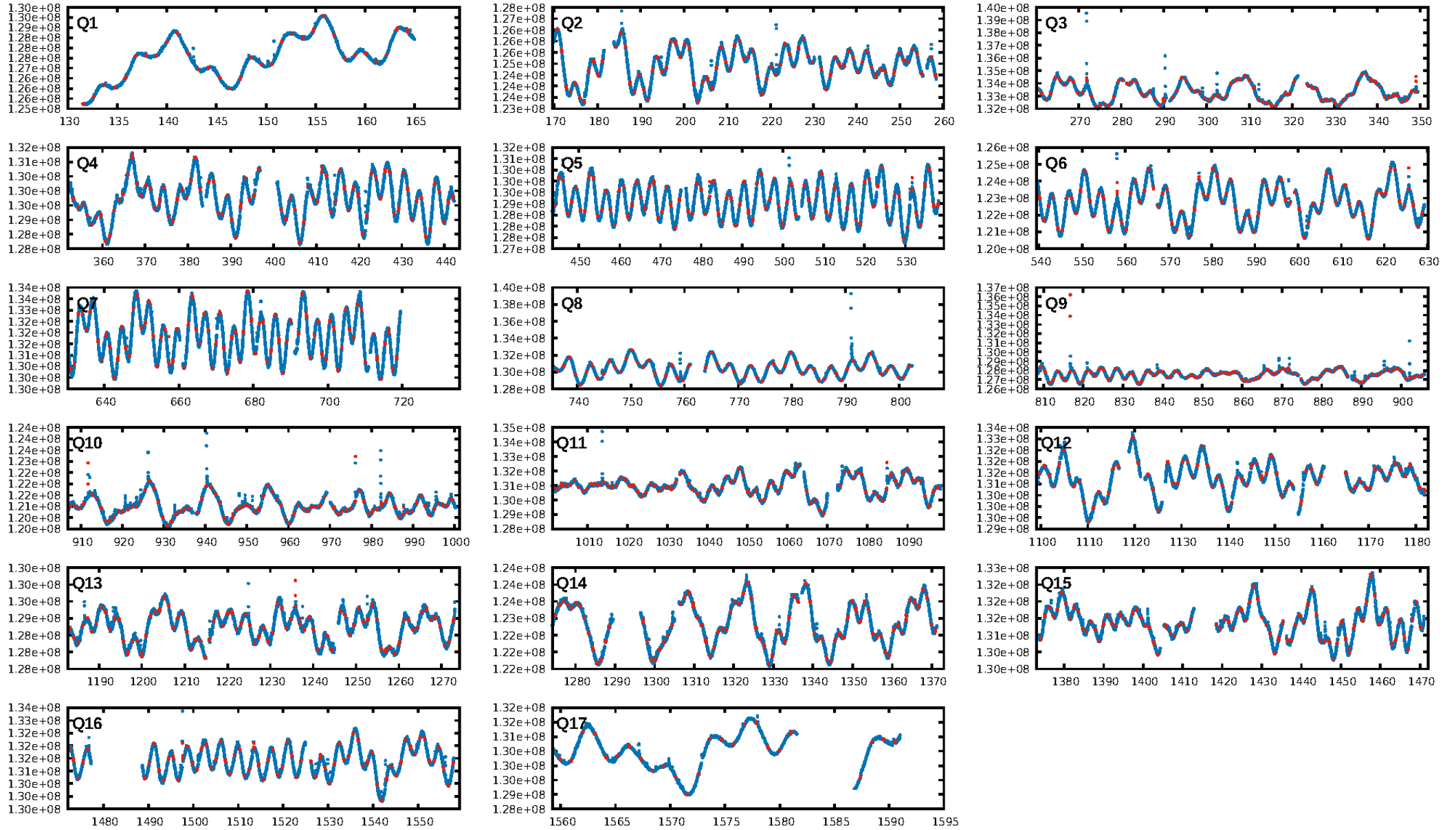
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [833.37σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.50e-10  
RollingBand-fgt: 0.92 [1114/1211]  
GhostDiagnostic-chr: 0.7638  
Centroid-sig: N/A  
Centroid-so: 0.519 arcsec [0.23σ]  
OotOffset-rm: 0.351 arcsec [0.57σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-rm: 0.308 arcsec [0.37σ]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.31 [5/16]  
DiffImageOverlap-fno: 1.00 [17/17]

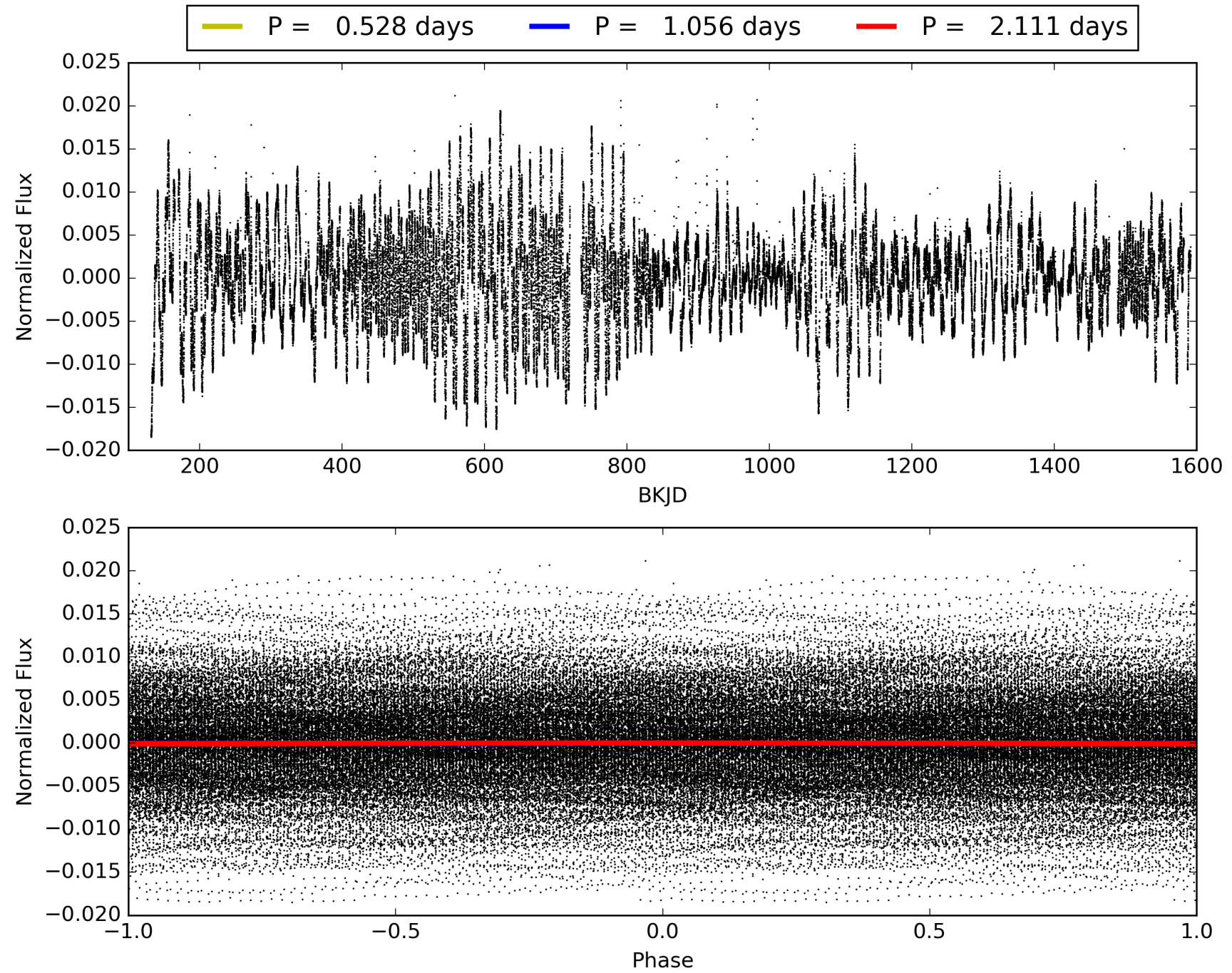
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 23:11:49 Z

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

# TCE 002854839-01, PDC Light Curves



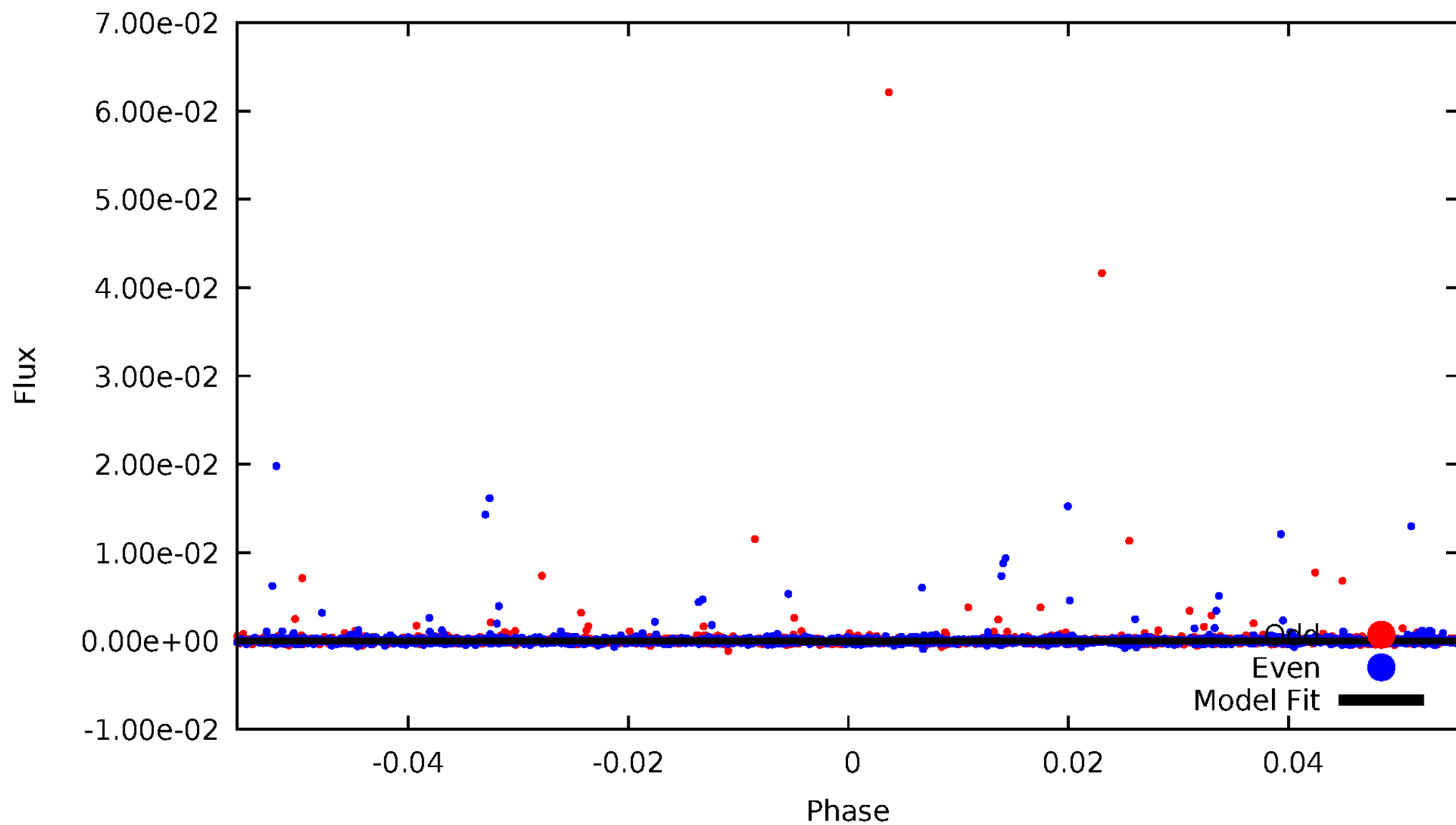
TCE 002854839-01





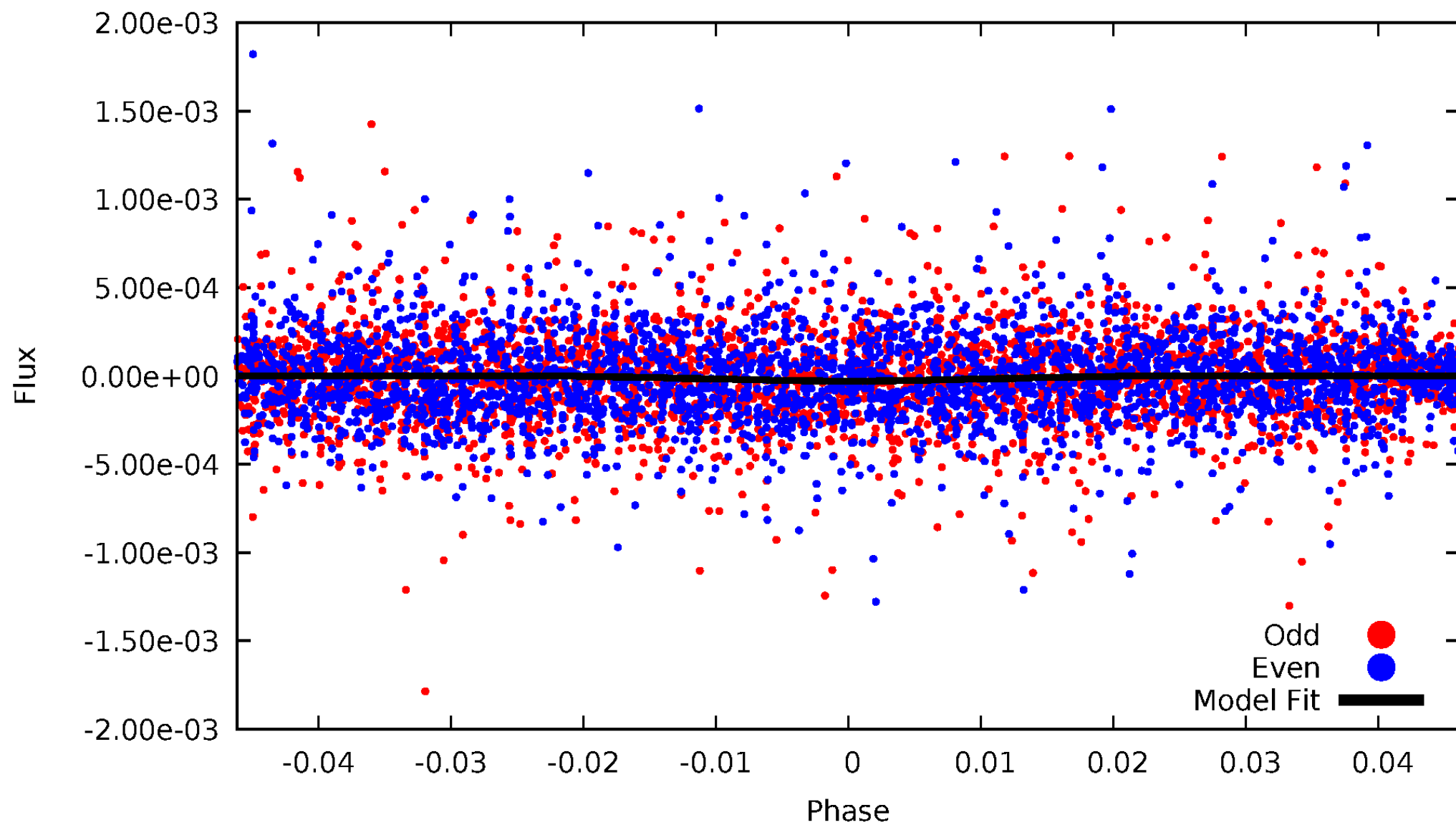
# DV Odd/Even

TCE 002854839-01

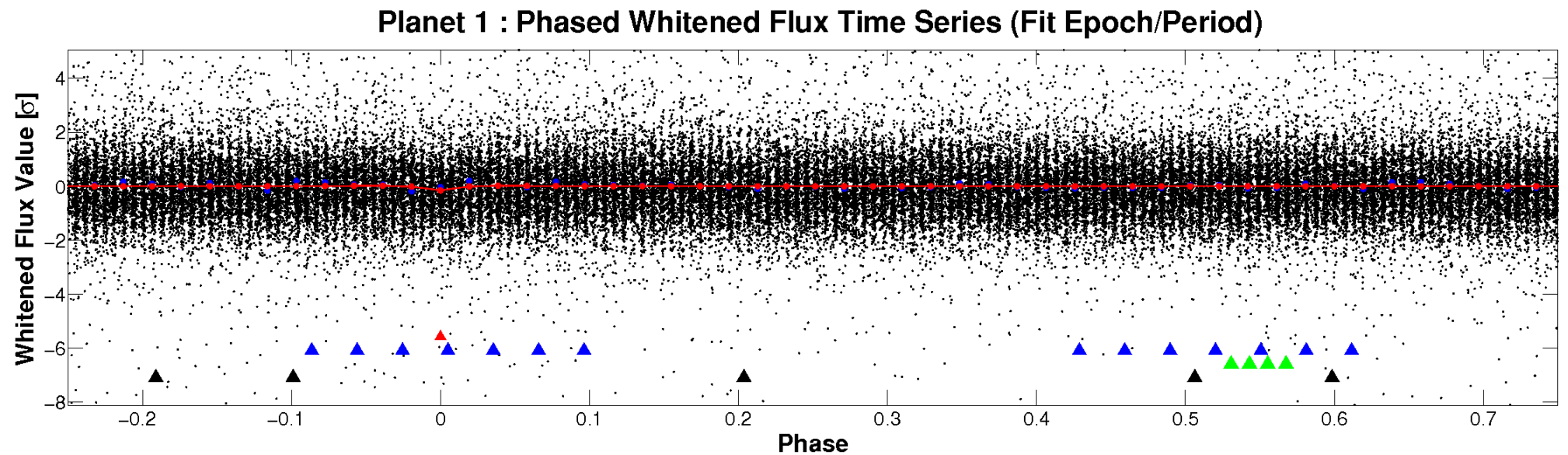
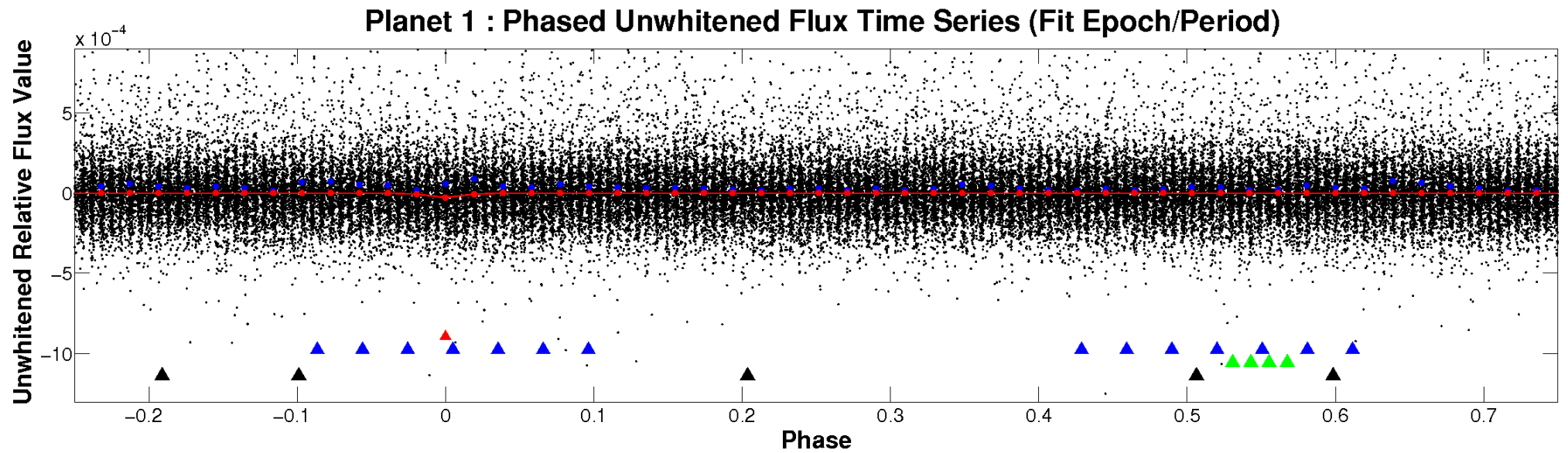


# ALT Odd/Even

TCE 002854839-01

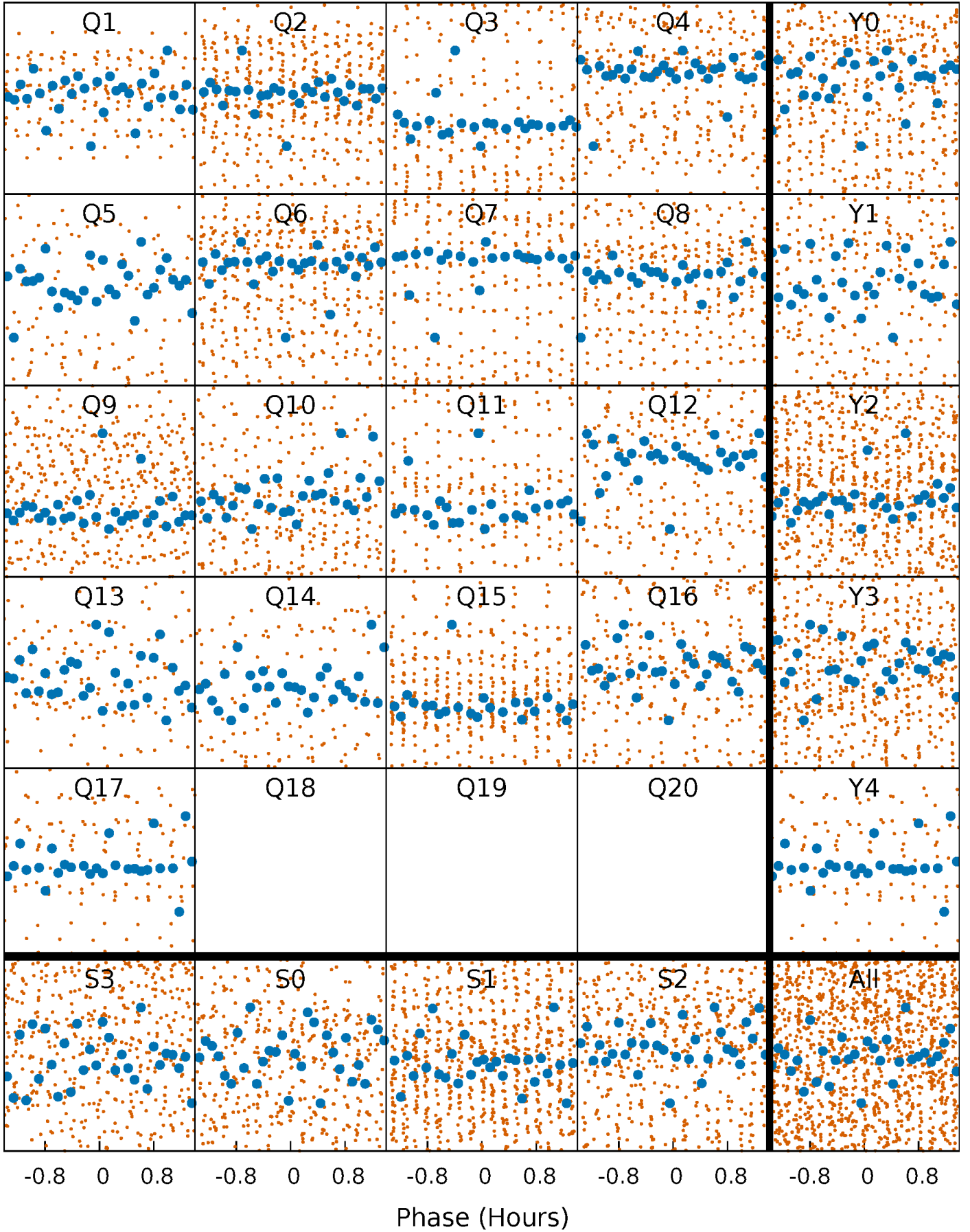


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

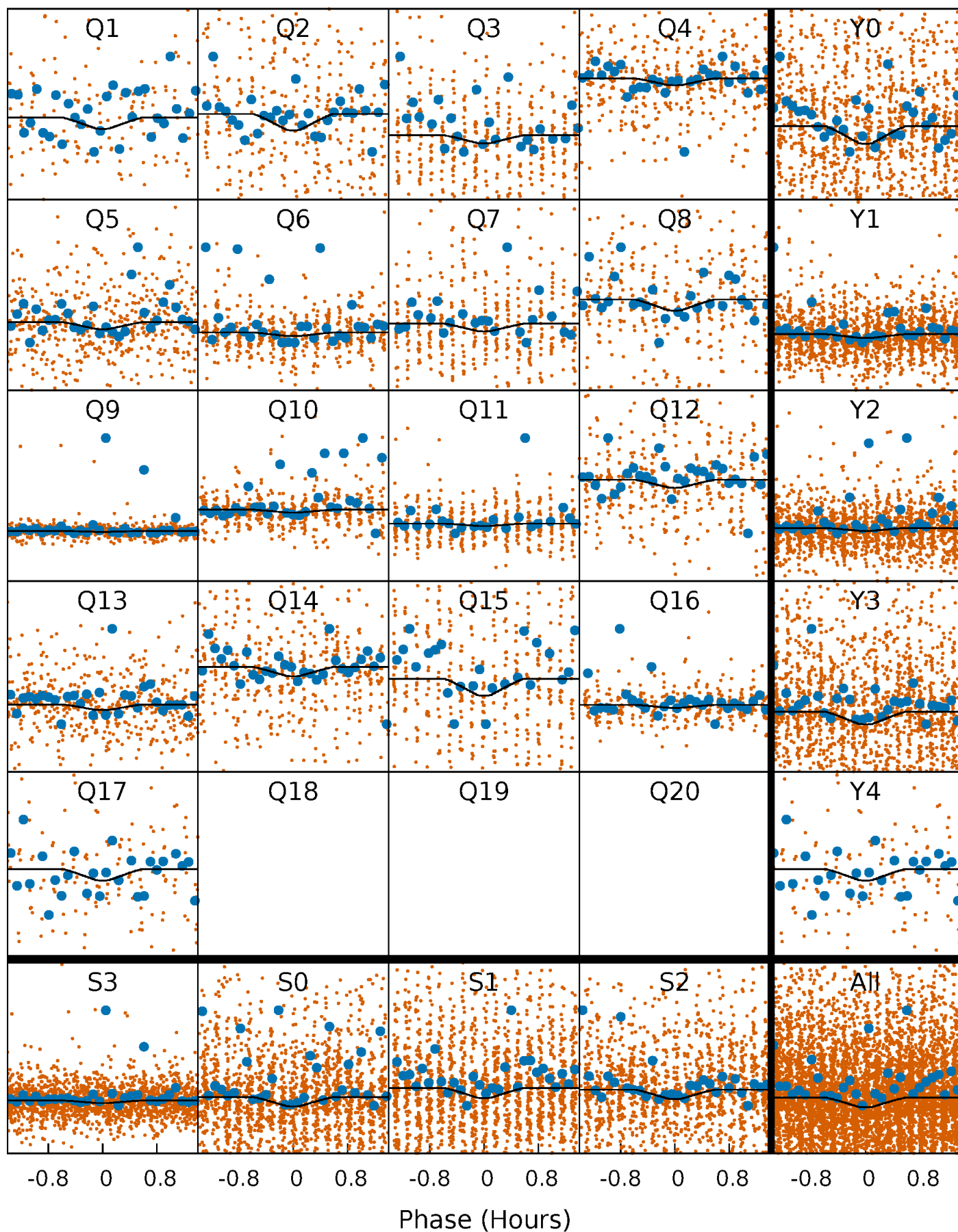
TCE 002854839-01   P= 1.055699 Days    $T_0=131.557018$  (BKJD)





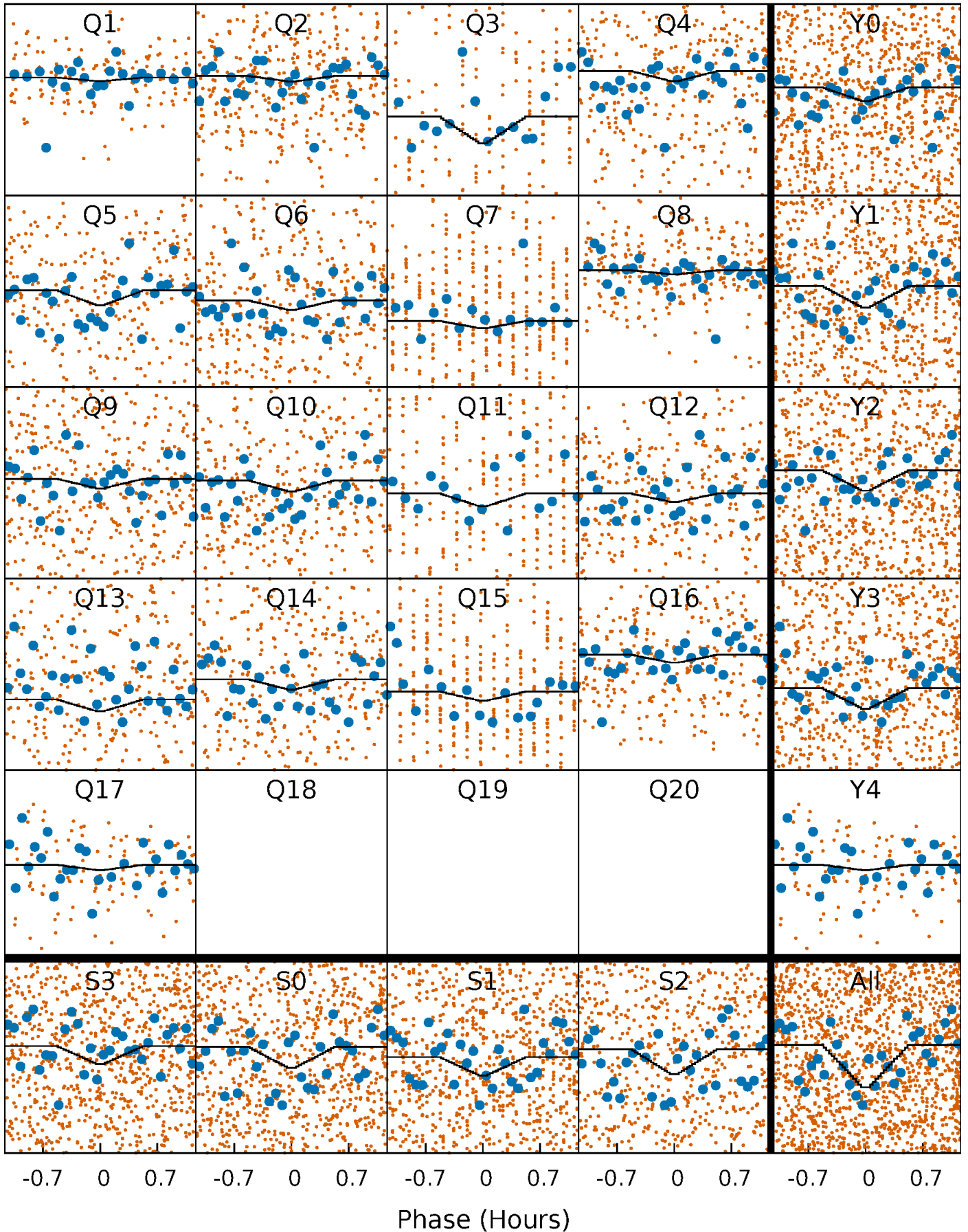
# DV Quarter-Phased Transit Curves

TCE 002854839-01 P= 1.055699 Days  $T_0=131.557018$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

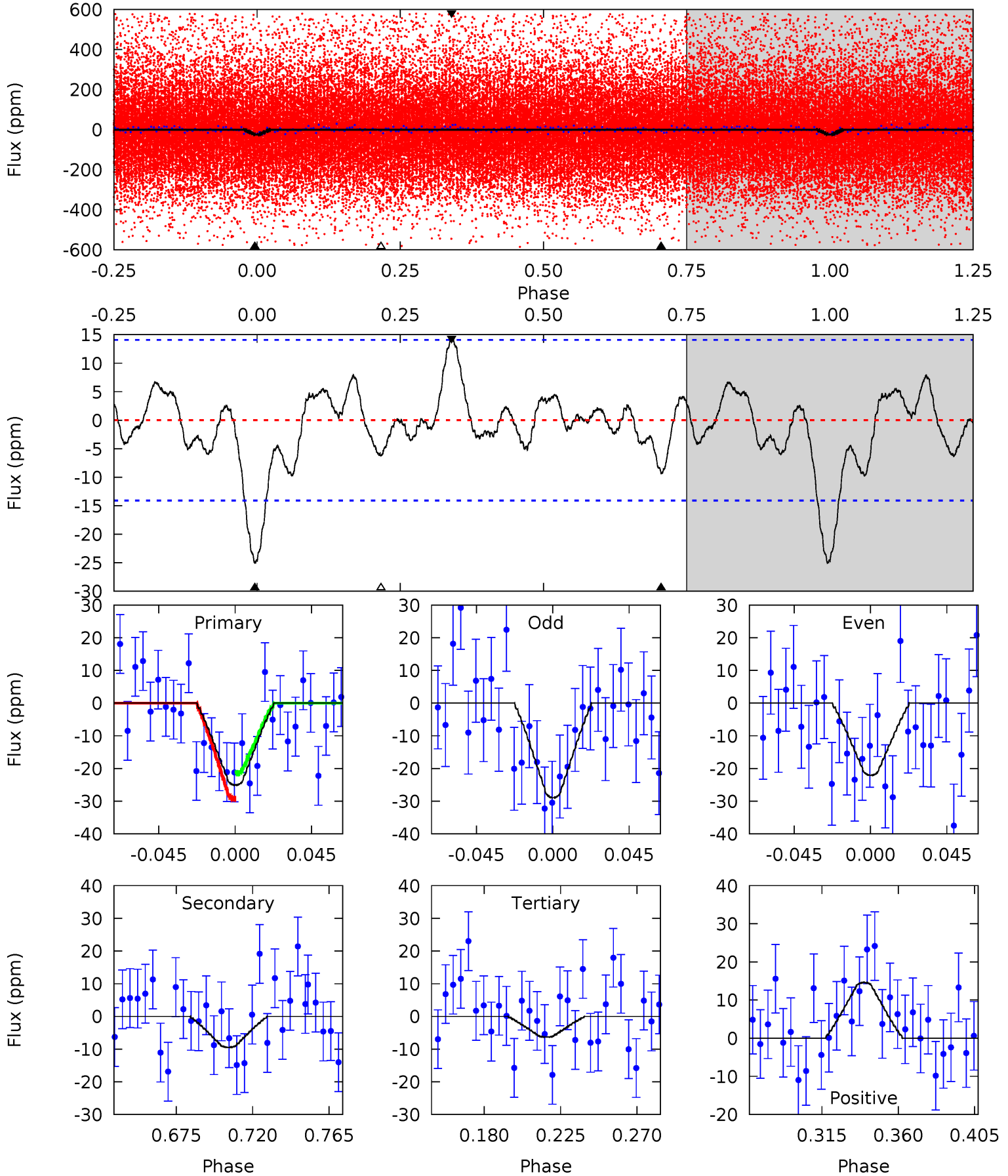
TCE 002854839-01 P= 1.055682 Days  $T_0=131.571750$  (BKJD)



# DV Model-Shift Uniqueness Test

002854839-01, P = 1.055699 Days, E = 130.501319 Days

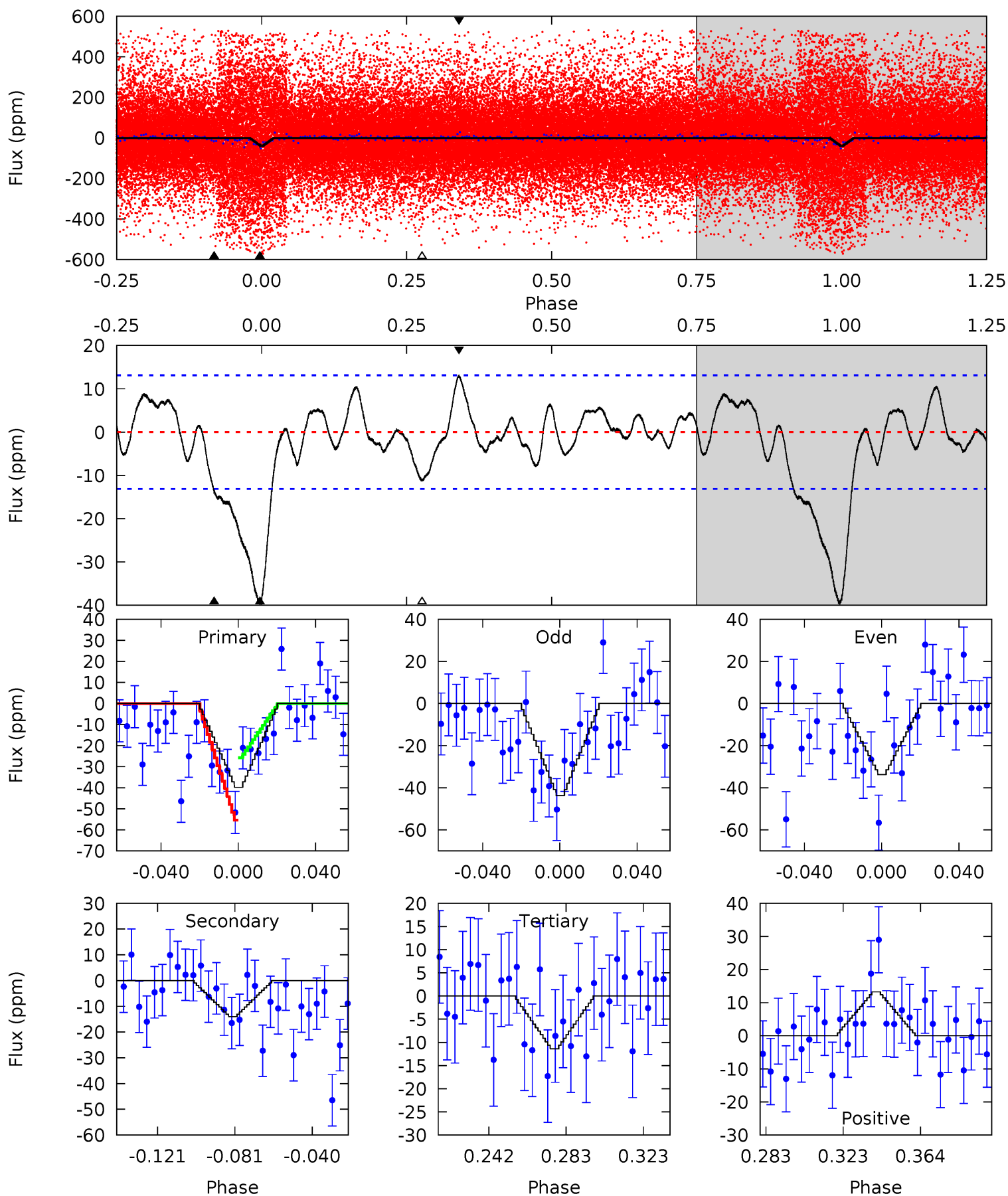
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.43	3.18	2.13	4.91	4.73	2.00	1.41	6.30	3.52	1.05	-1.73	1.16	-2.55	0.37	1.32



# Alt Model-Shift Uniqueness Test

002854839-01, P = 1.055682 Days, E = 130.516068 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14.4	5.09	4.12	4.79	4.75	2.05	1.70	10.3	9.63	0.96	0.30	1.81	0.50	0.25	5.27





### Stellar Parameters For KIC 002854839

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4955^{+176}_{-176}$	$4.561^{+0.061}_{-0.050}$	$-0.080^{+0.300}_{-0.300}$	$0.751^{+0.072}_{-0.072}$	$0.748^{+0.085}_{-0.064}$	$2.494^{+0.672}_{-0.442}$
	+4%/-4%	+1%/-1%	+375%/-375%	+10%/-10%	+11%/-9%	+27%/-18%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 002854839-01 / KOI 7639.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-9 \pm 3$	$0.51^{+0.31}_{-0.27}$	$1945^{+81}_{-78}$	$3762^{+1263}_{-602}$	$6.766^{+22.786}_{-4.289}$
Alt.	$-14 \pm 3$	$0.50^{+0.31}_{-0.28}$	$1948^{+86}_{-71}$	$4135^{+1495}_{-690}$	$11^{+41}_{-7}$

$T_{max}$  = 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

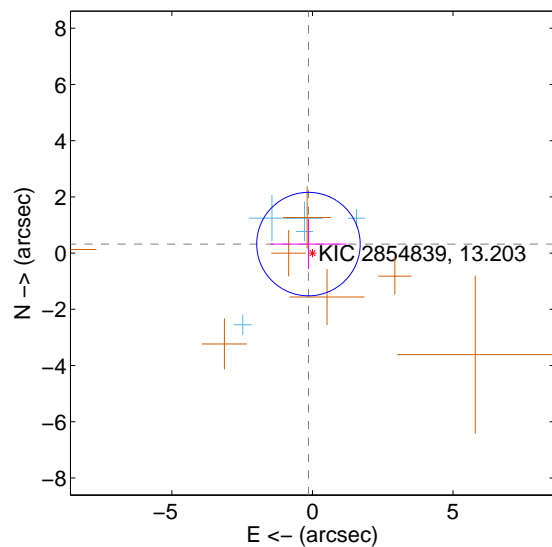
Supplemental centroid analysis for 002854839-01. Kepler magnitude: 13.20. Transit SNR 5.84

There are 5 quarters with good PRF difference image offsets

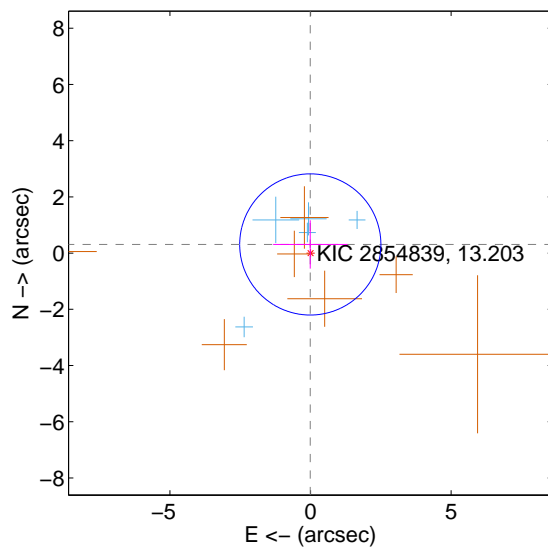
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.351 \pm 0.613$	0.57	$0.142 \pm 1.346$	$0.321 \pm 0.886$
PRF-fit source offset from KIC position	$0.308 \pm 0.837$	0.37	$0.008 \pm 1.322$	$0.308 \pm 0.859$
photometric centroid source offset	$0.52 \pm 2.22$	0.23	$0.07 \pm 2.08$	$-0.51 \pm 2.22$

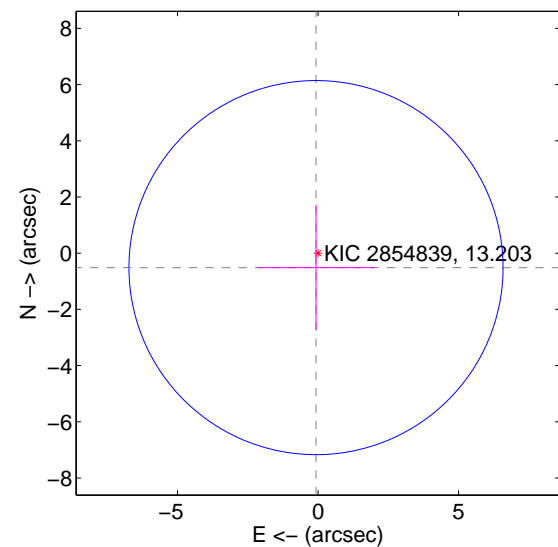
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

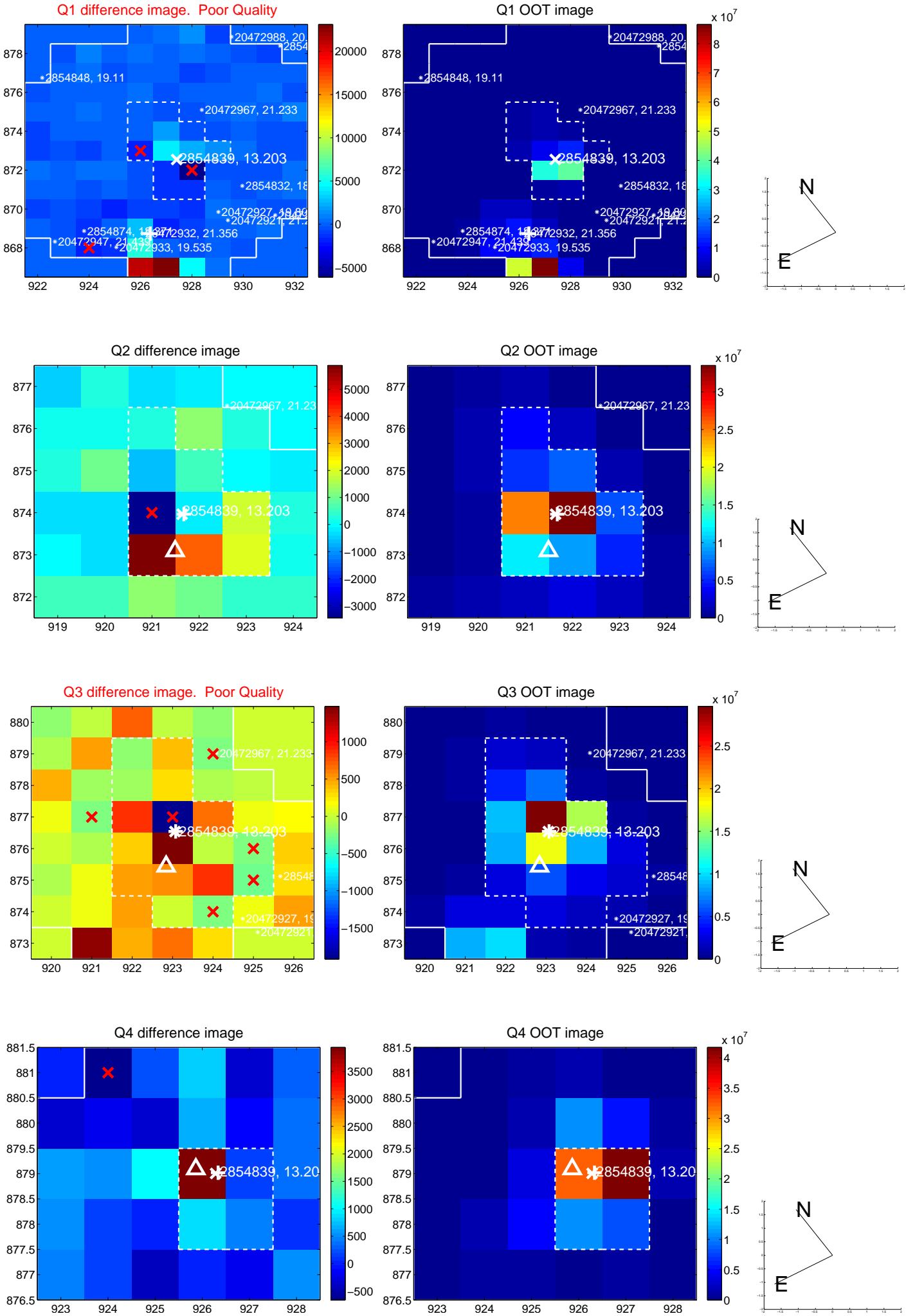


offset from photometric centroids

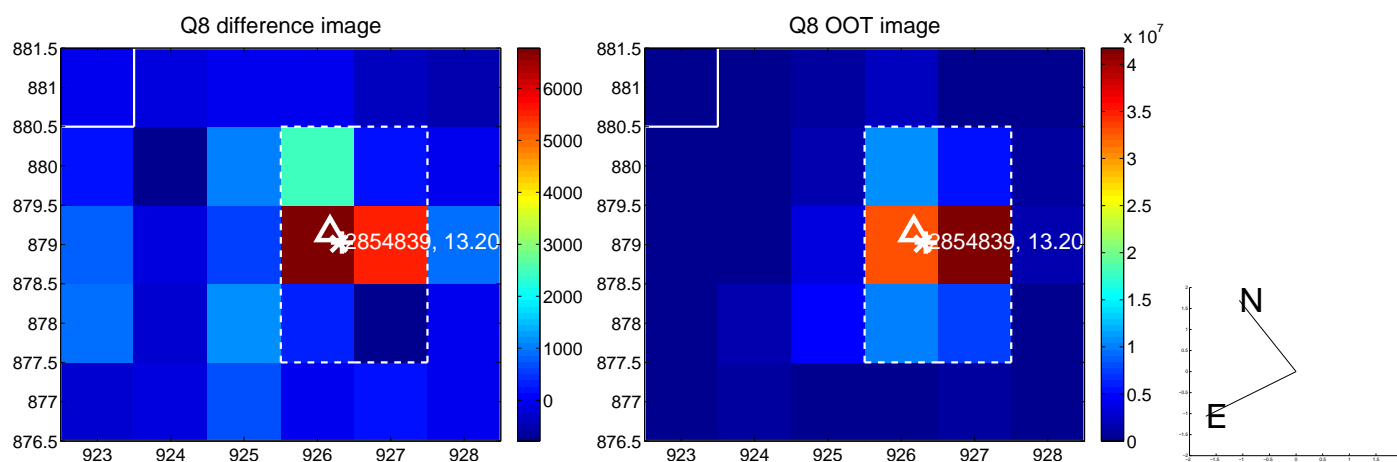
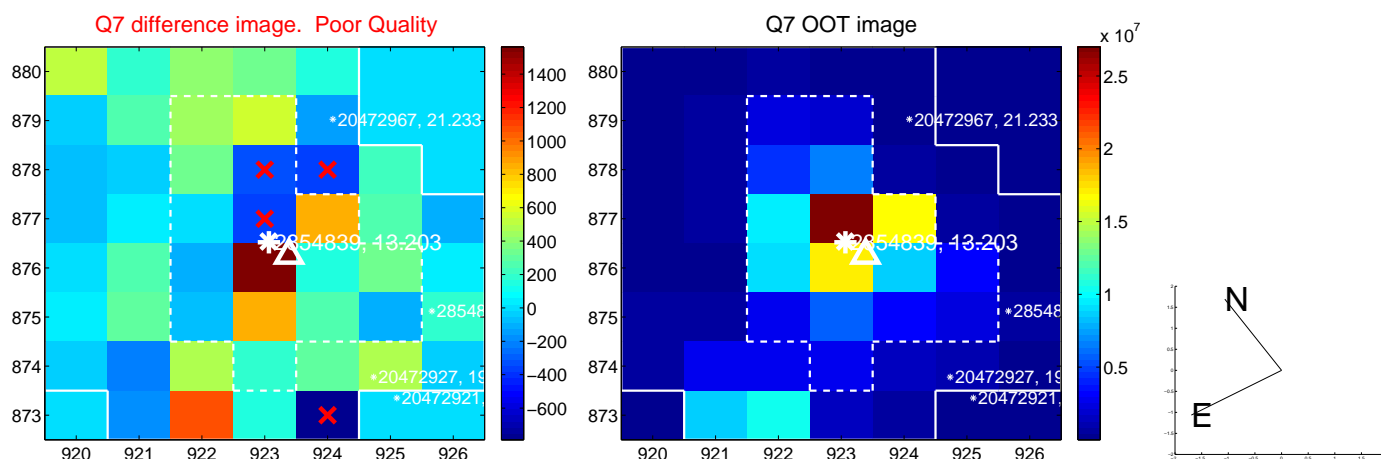
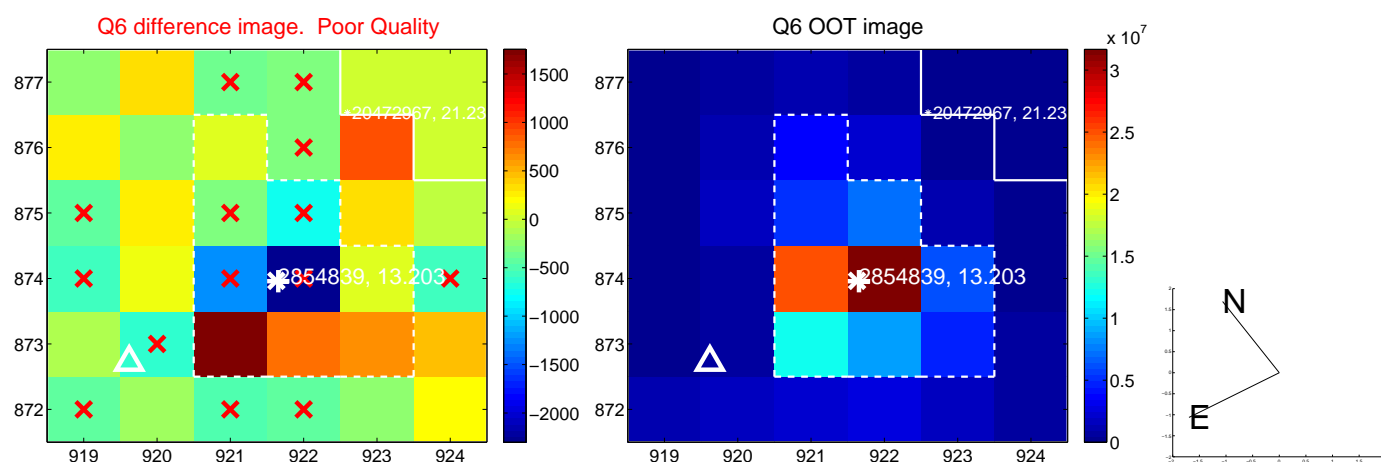
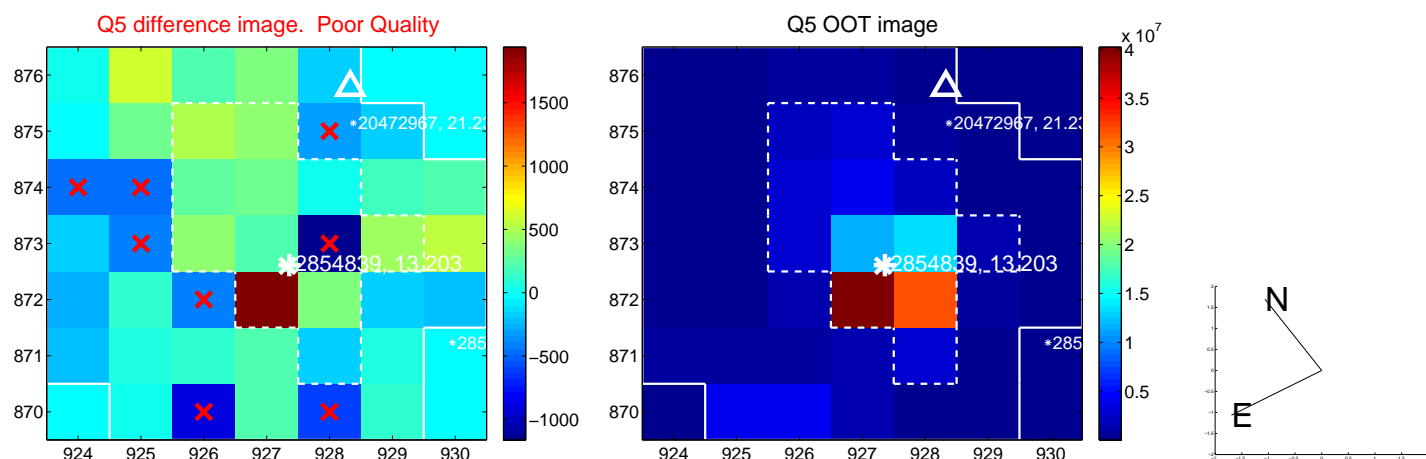


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

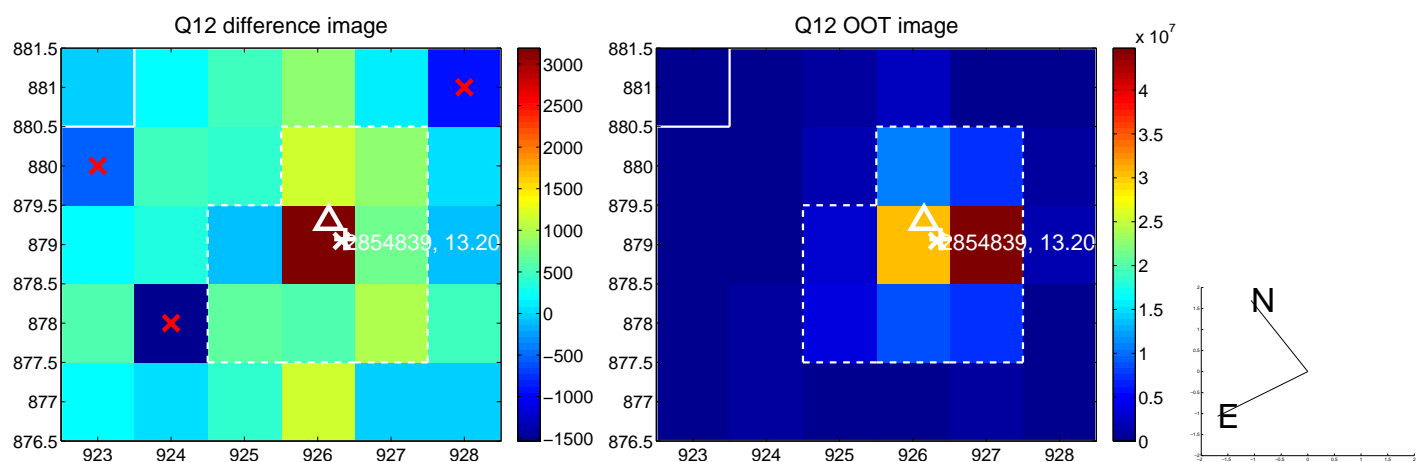
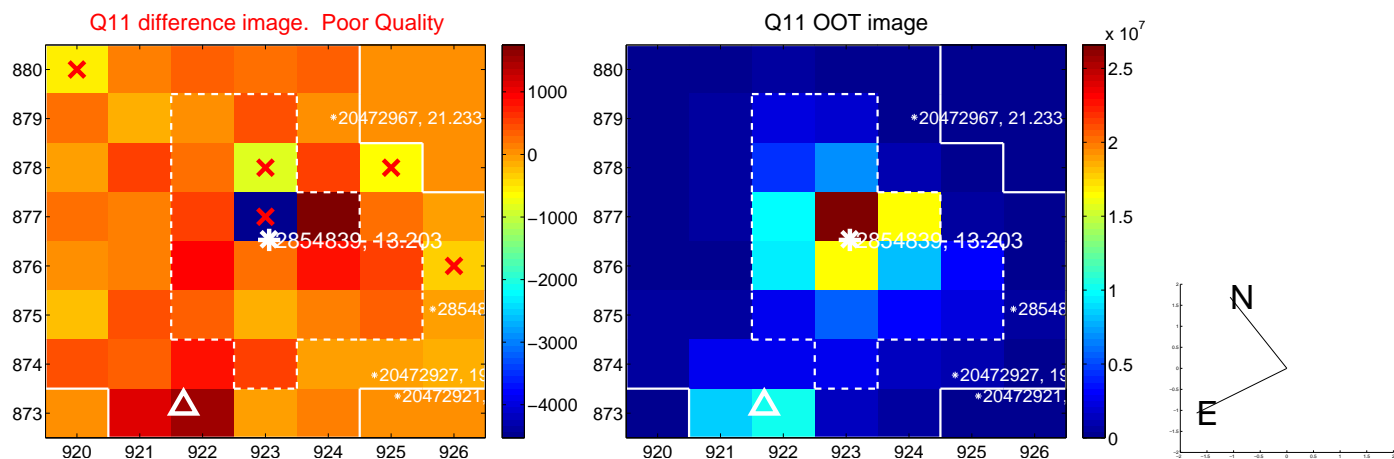
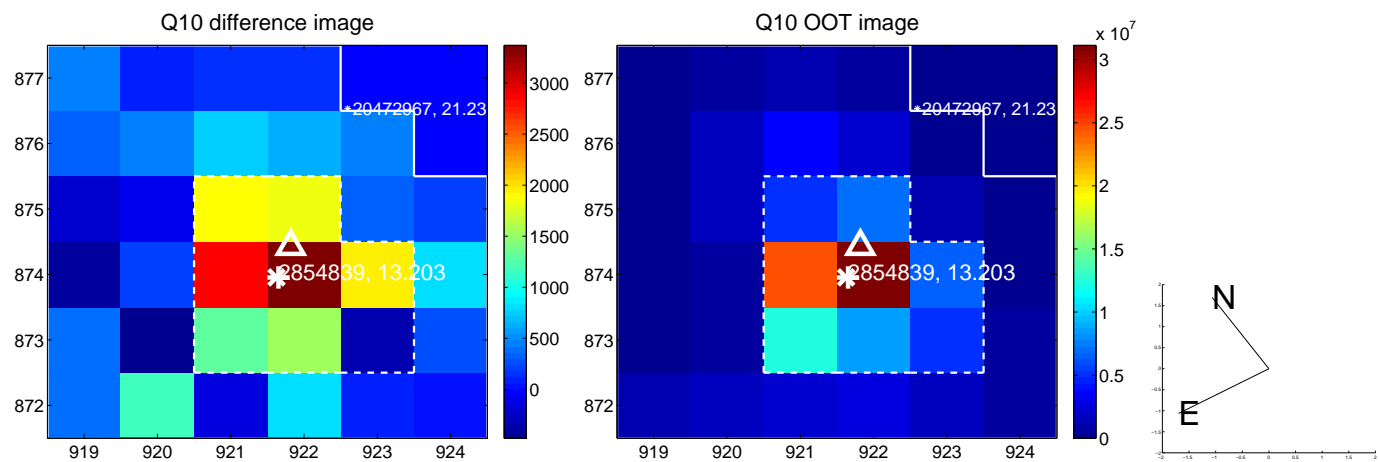
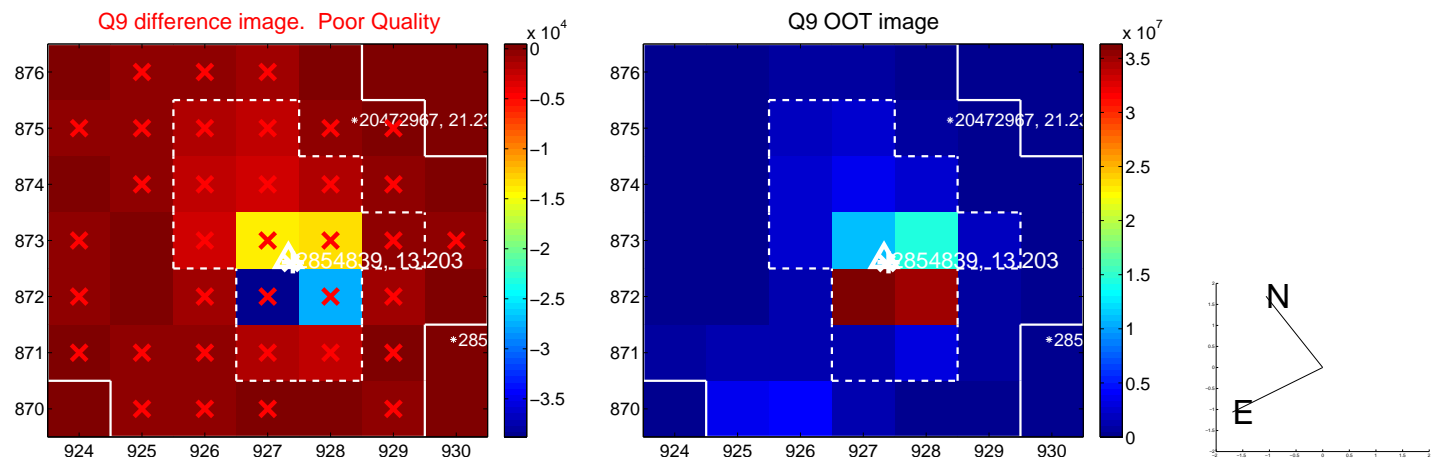


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

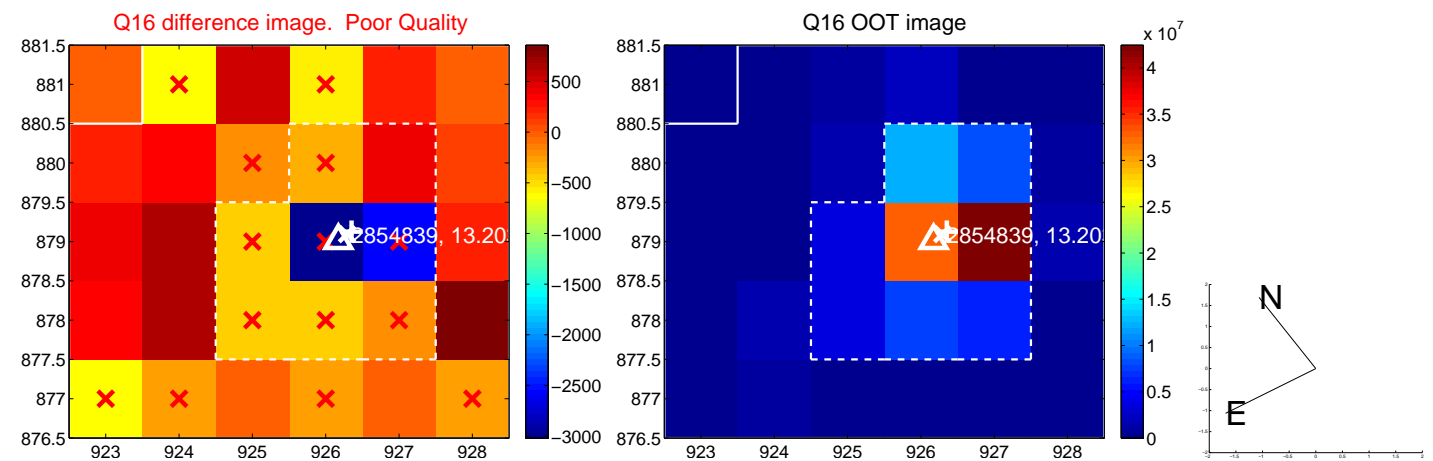
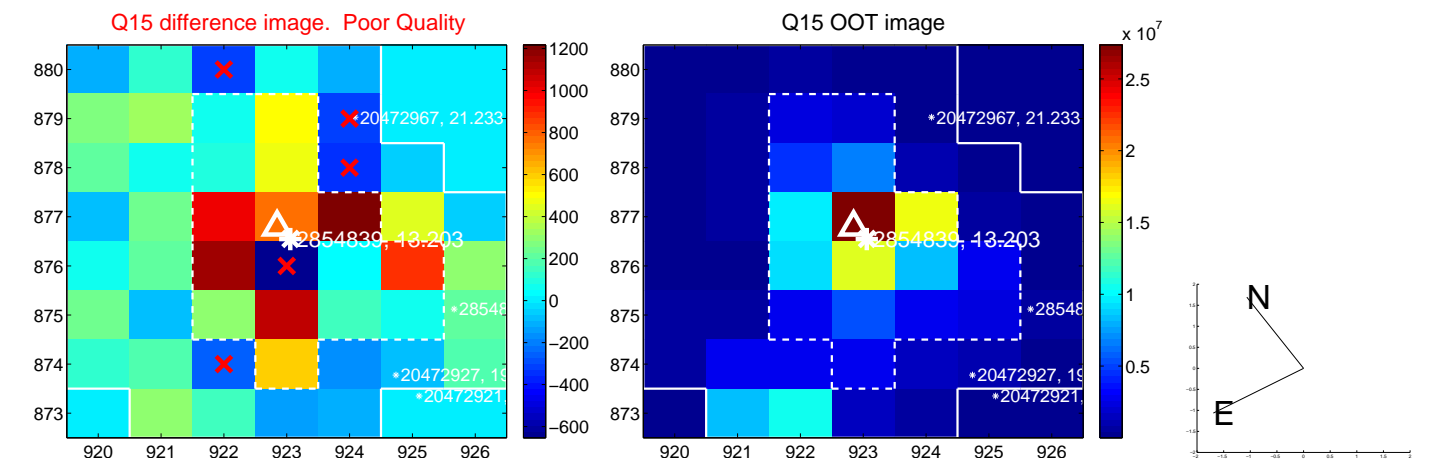
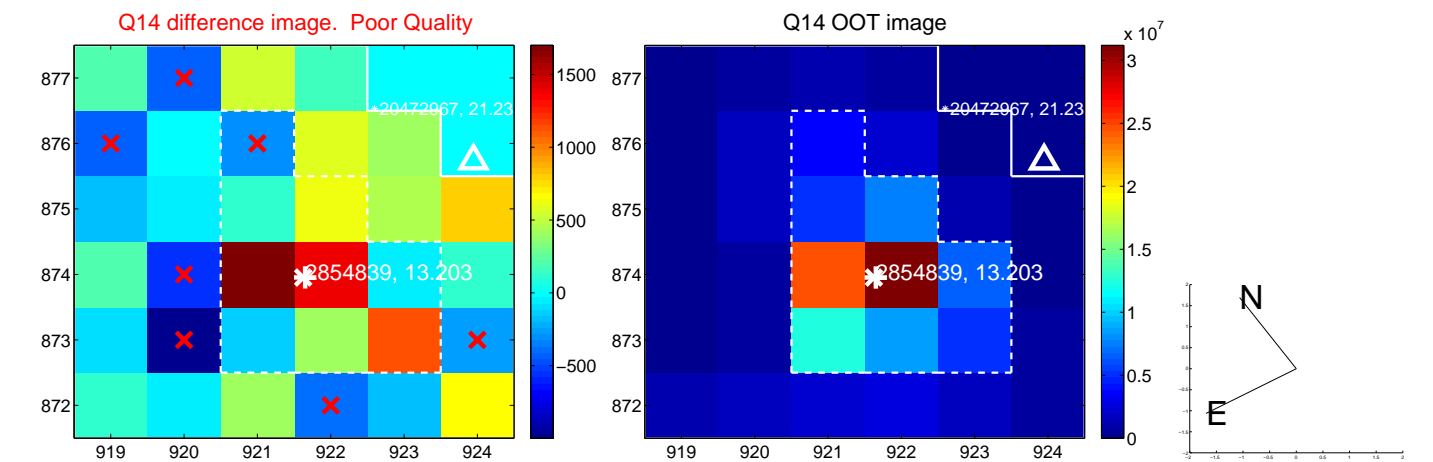
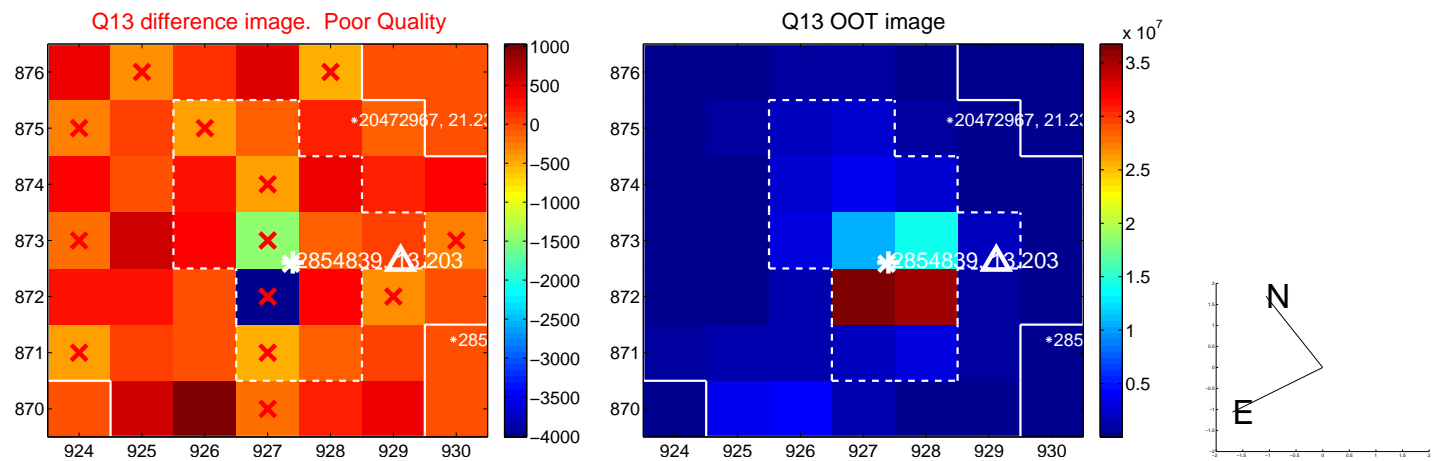




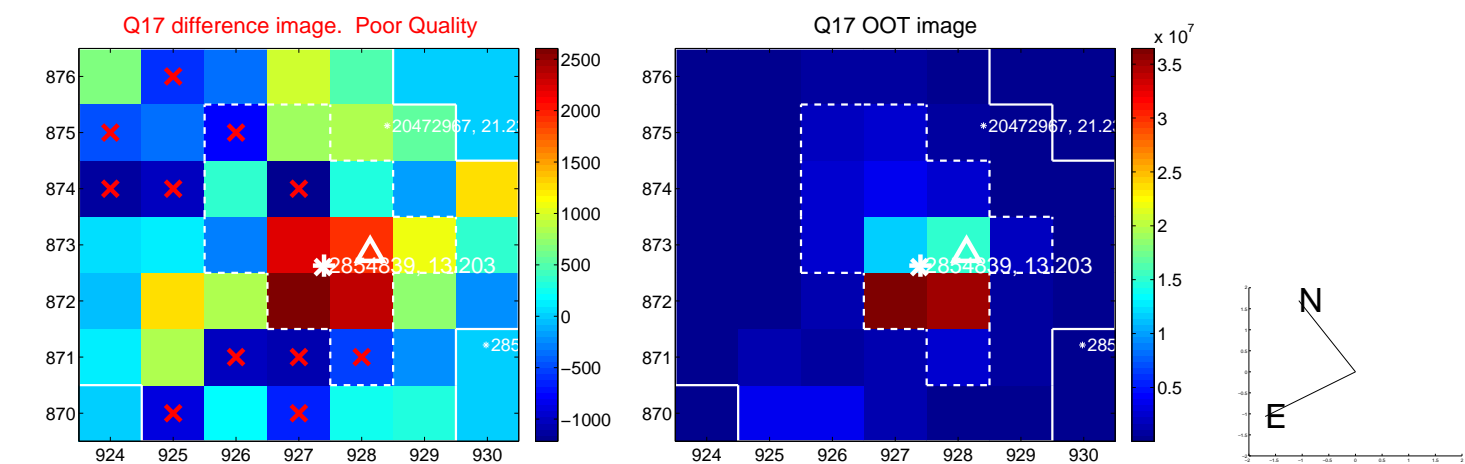
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



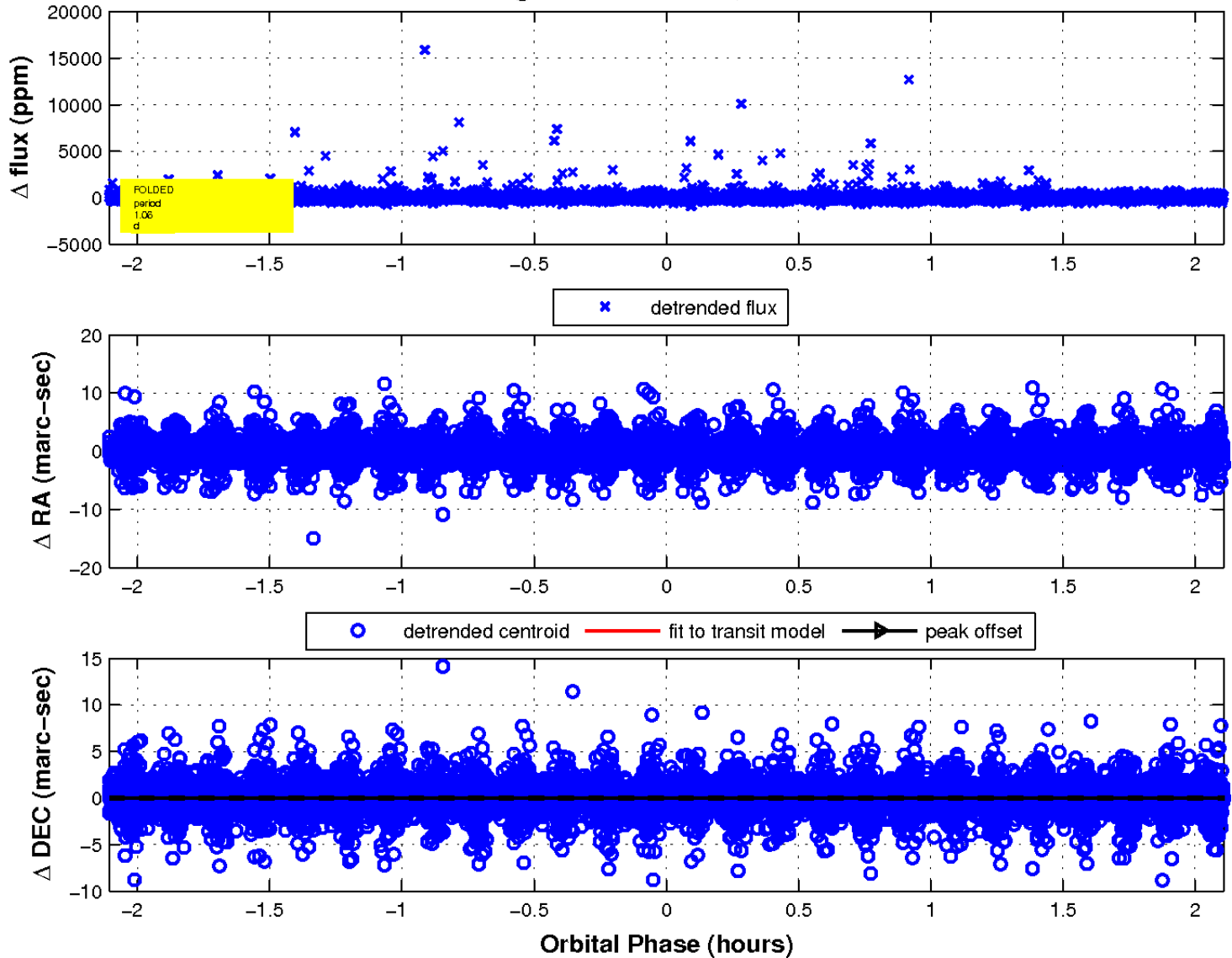
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



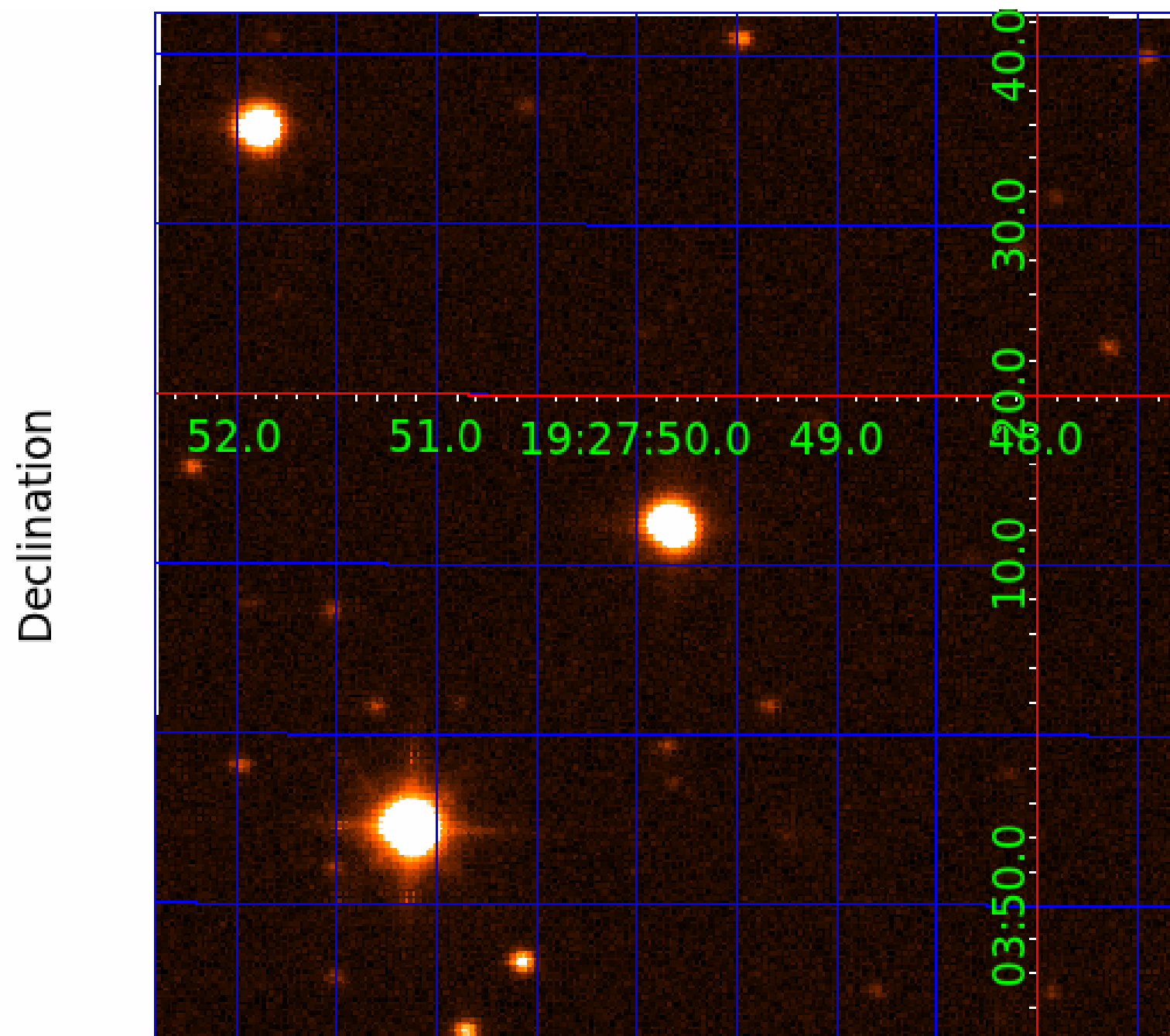
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 1 of 4



UKIRT Image





# KIC 002854839

## 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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## Robovetter Results

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002854839-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—CENT_FEW_DIFFS
002854839-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS

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

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

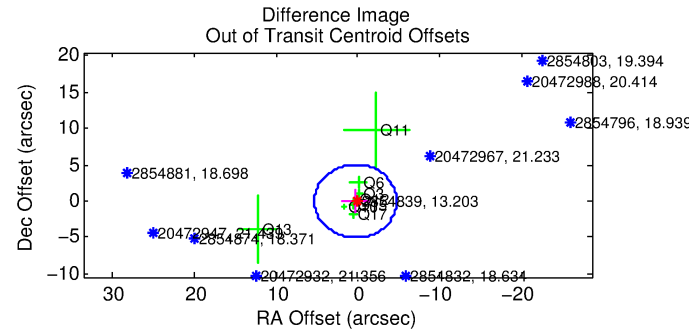
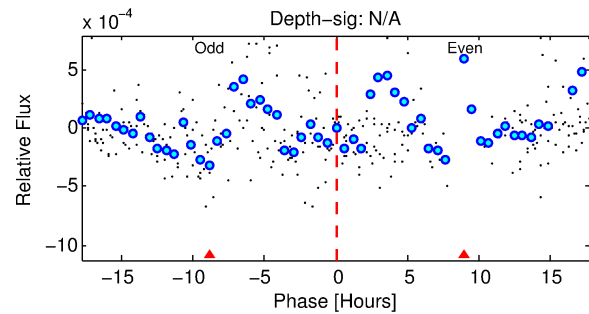
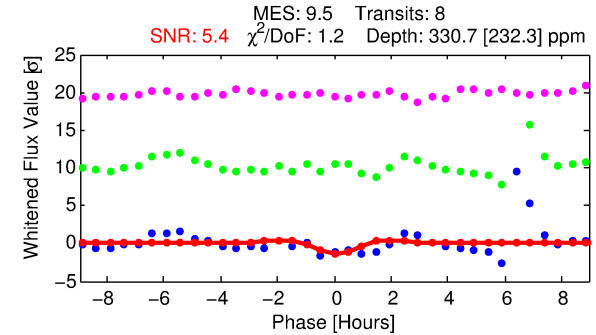
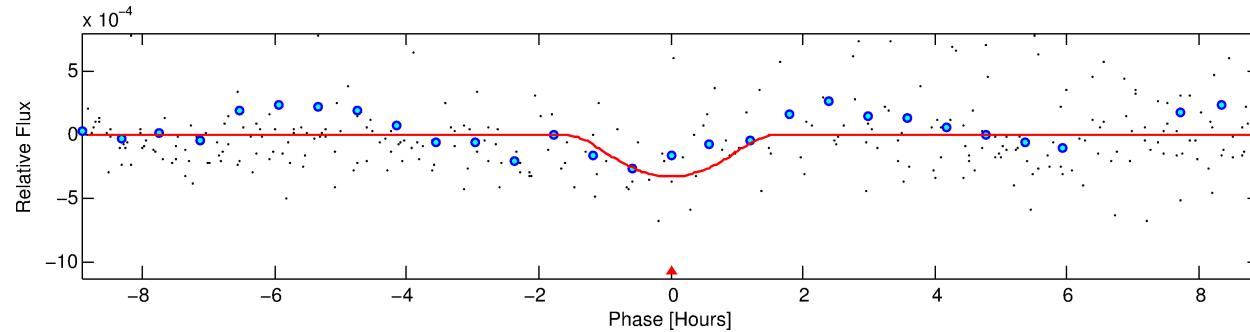
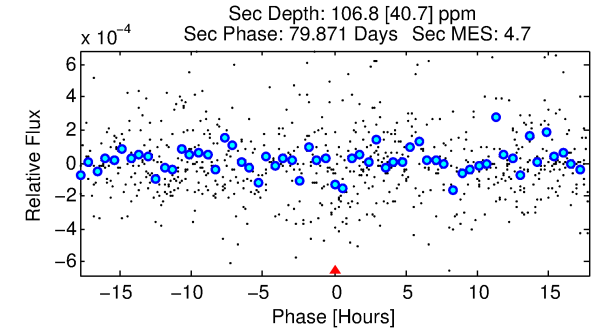
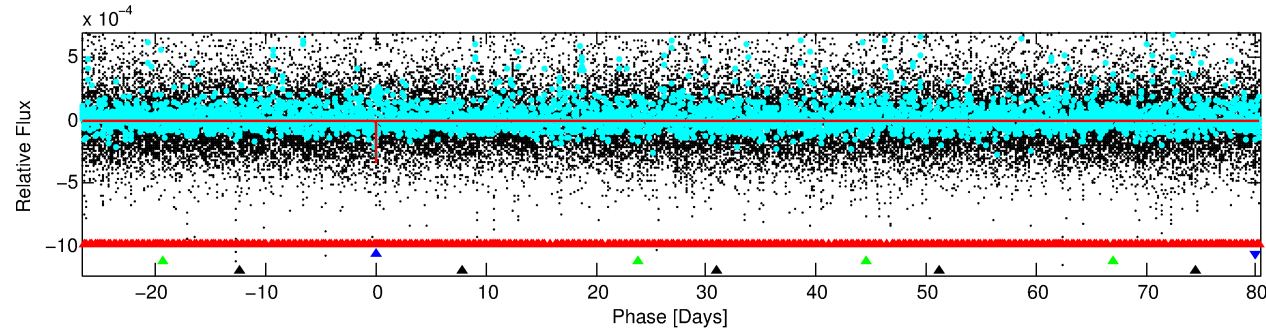
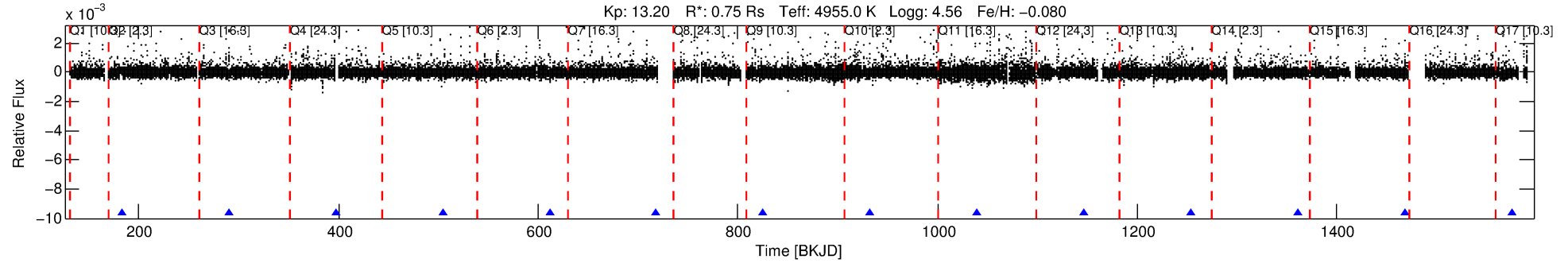
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 002854839-02

No Significant Match Found

# DV One-Page Summary

KIC: 2854839 Candidate: 2 of 4 Period: 107.137 d



## DV Fit Results:

Period = 107.13740 [0.00296] d  
Epoch = 182.8762 [0.0273] BKJD  
Rp/R\* = 0.0292 [0.1827]  
a/R\* = 77.68 [176.66]  
b = 0.99 [0.33]  
Seff = 1.89 [0.34]  
Teq = 299 [14] K  
Rp = 2.39 [14.97] Re  
a = 0.4009 [0.0318] AU  
Ag = 1652.04 [20697.78] [0.08σ]  
Teffp = 2949 [9237] K [0.29σ]

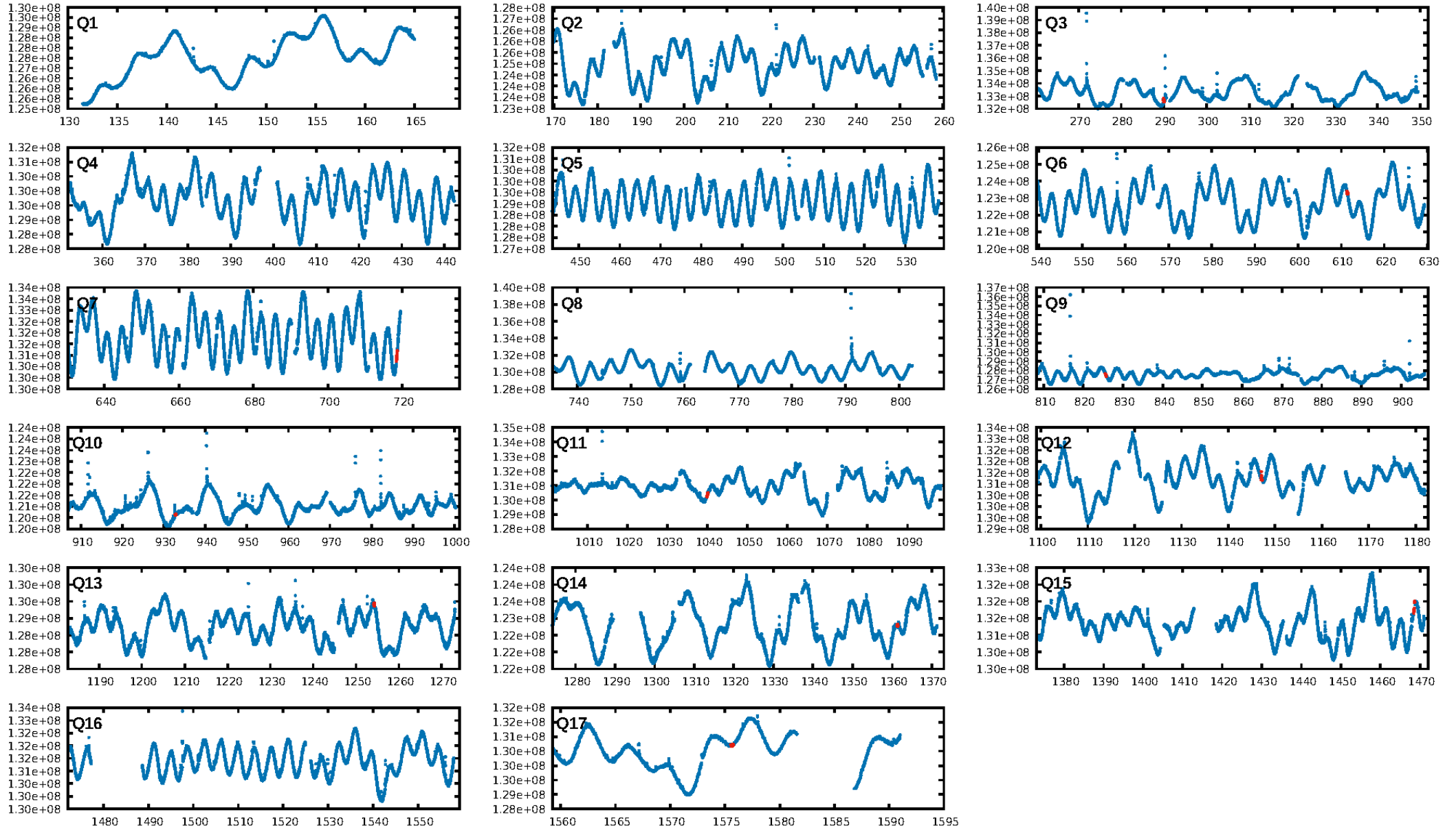
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [833.37σ]  
LongPeriod-sig: 100.0% [361.67σ]  
ModelChiSquare2-sig: 69.0%  
ModelChiSquareGof-sig: 98.9%  
**Bootstrap-pfa: 1.43e-10**  
RollingBand-fgt: 1.00 [7/7]  
GhostDiagnostic-chr: -0.2864  
Centroid-sig: N/A  
Centroid-so: 0.953 arcsec [0.62σ]  
OotOffset-rm: 0.340 arcsec [0.20σ]  
KicOffset-rm: 0.153 arcsec [0.10σ]  
OotOffset-st: 2/3/1/2 [8]  
KicOffset-st: 2/3/1/2 [8]  
DiffImageQuality-fgm: 0.38 [3/8]  
DiffImageOverlap-fno: 0.45 [5/11]

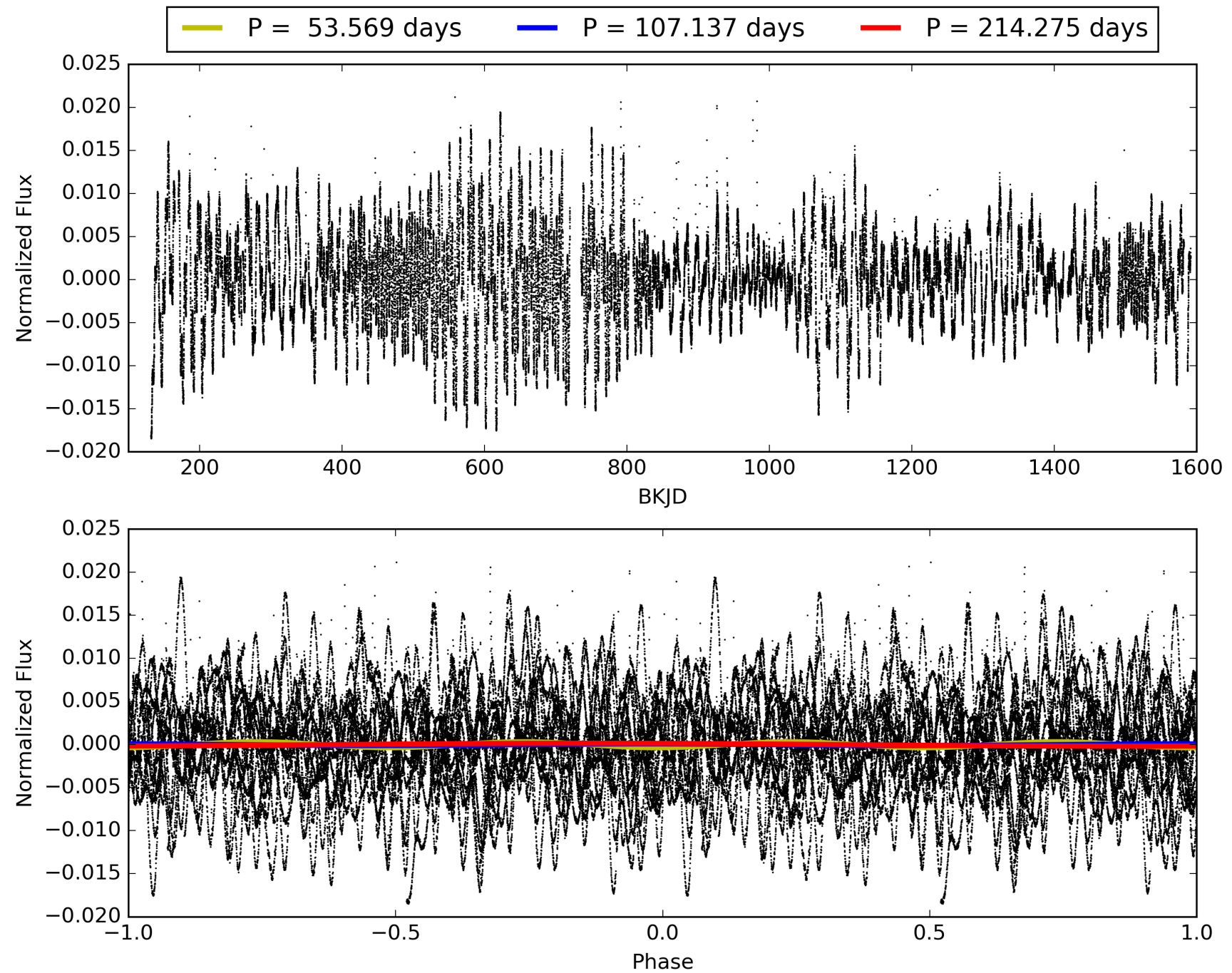
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 23:11:59 Z

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

# TCE 002854839-02, PDC Light Curves

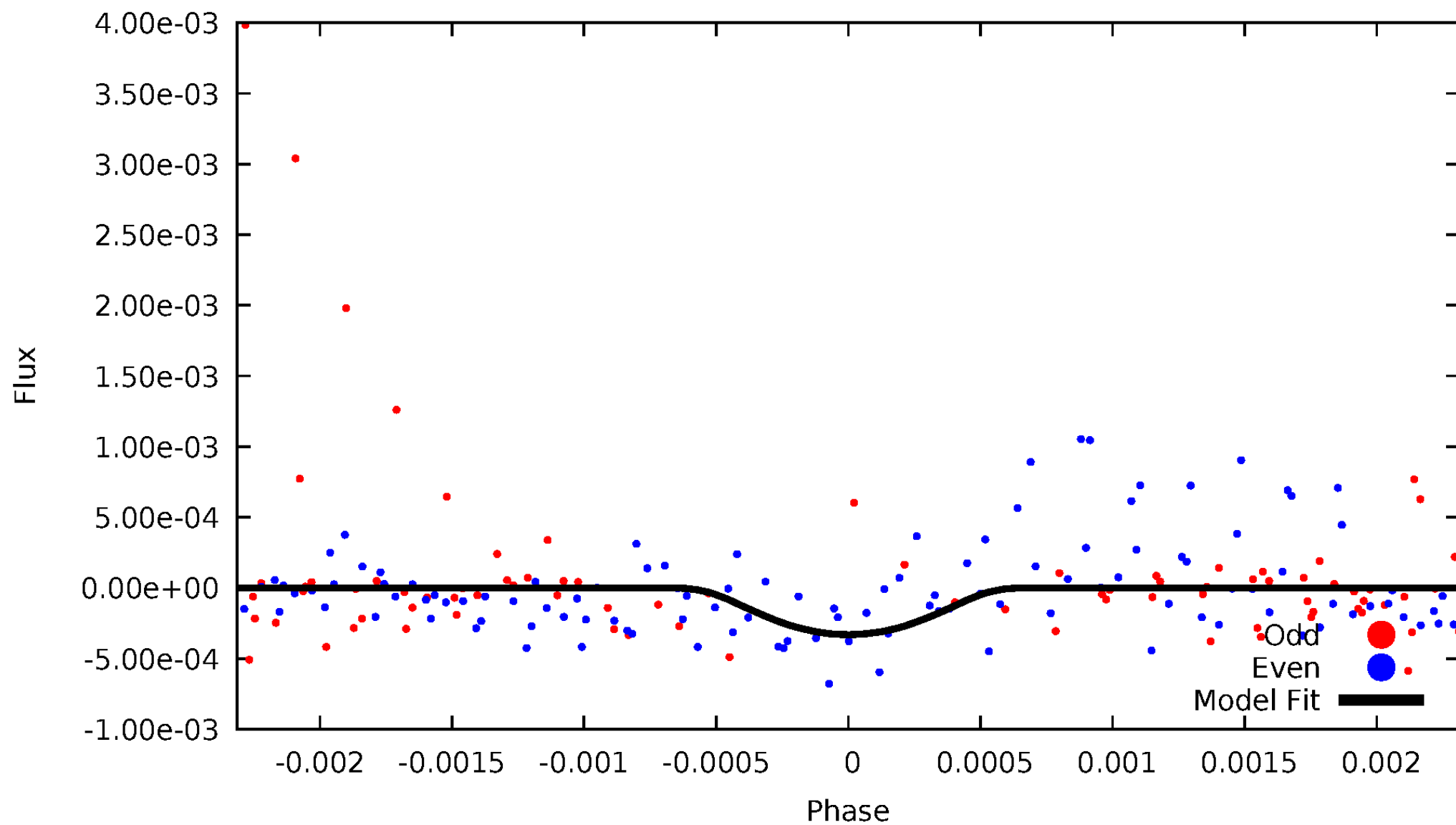


TCE 002854839-02



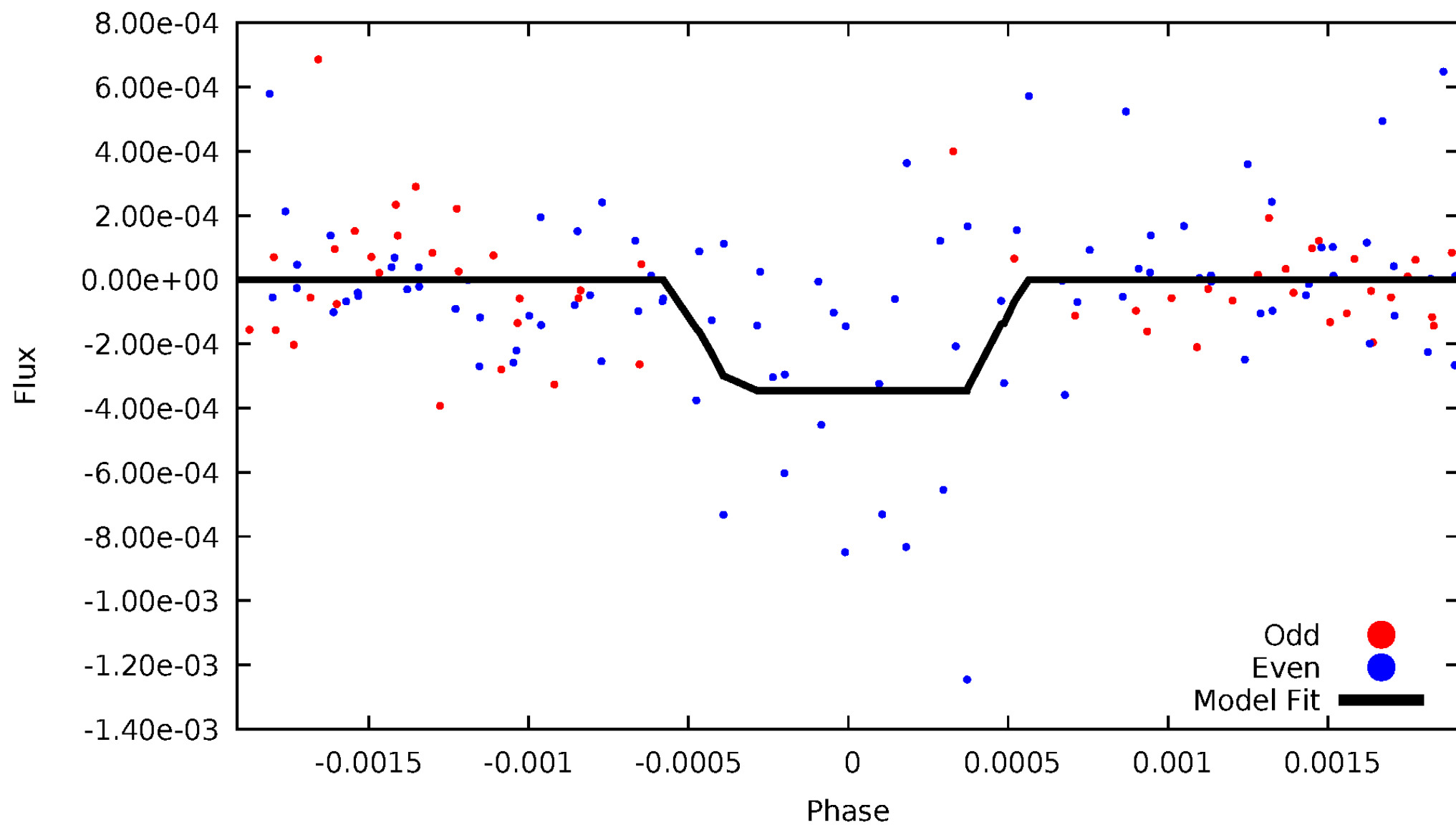
# DV Odd/Even

TCE 002854839-02



# ALT Odd/Even

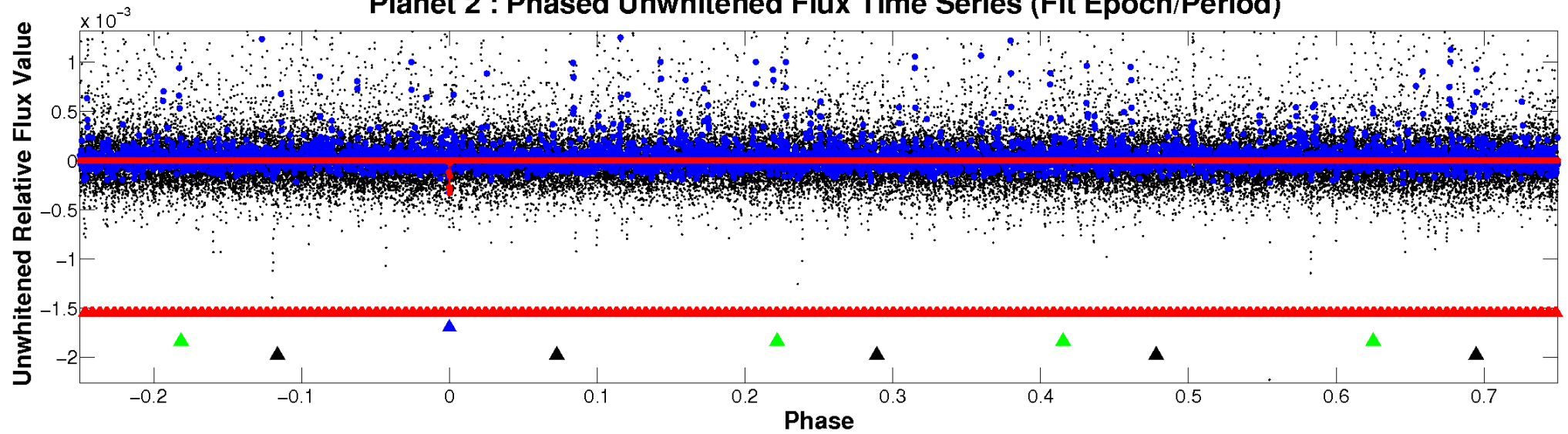
TCE 002854839-02



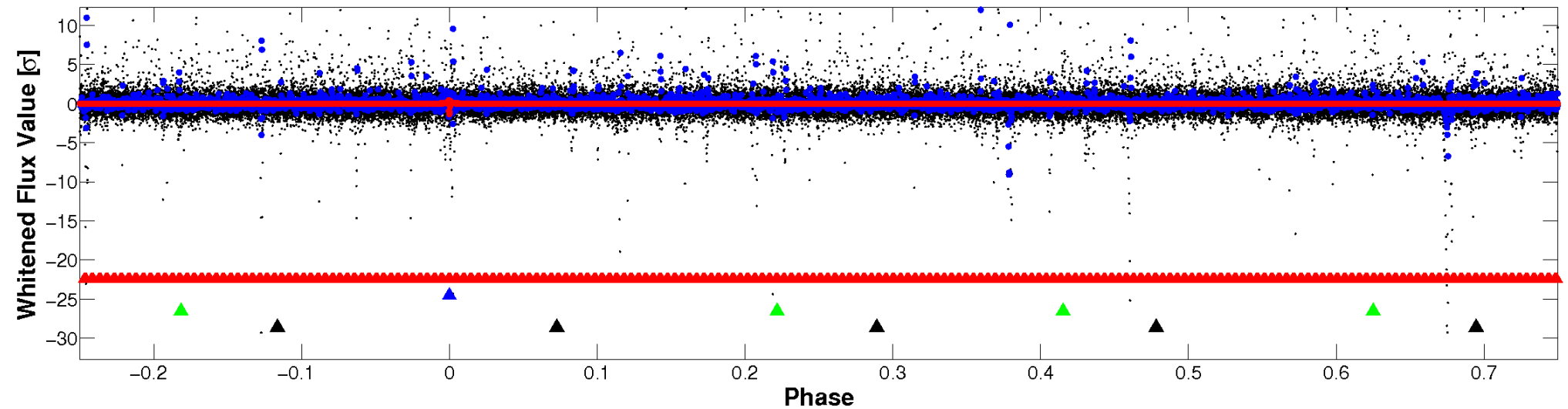


# Non-Whitened Vs. Whitened Light Curve

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

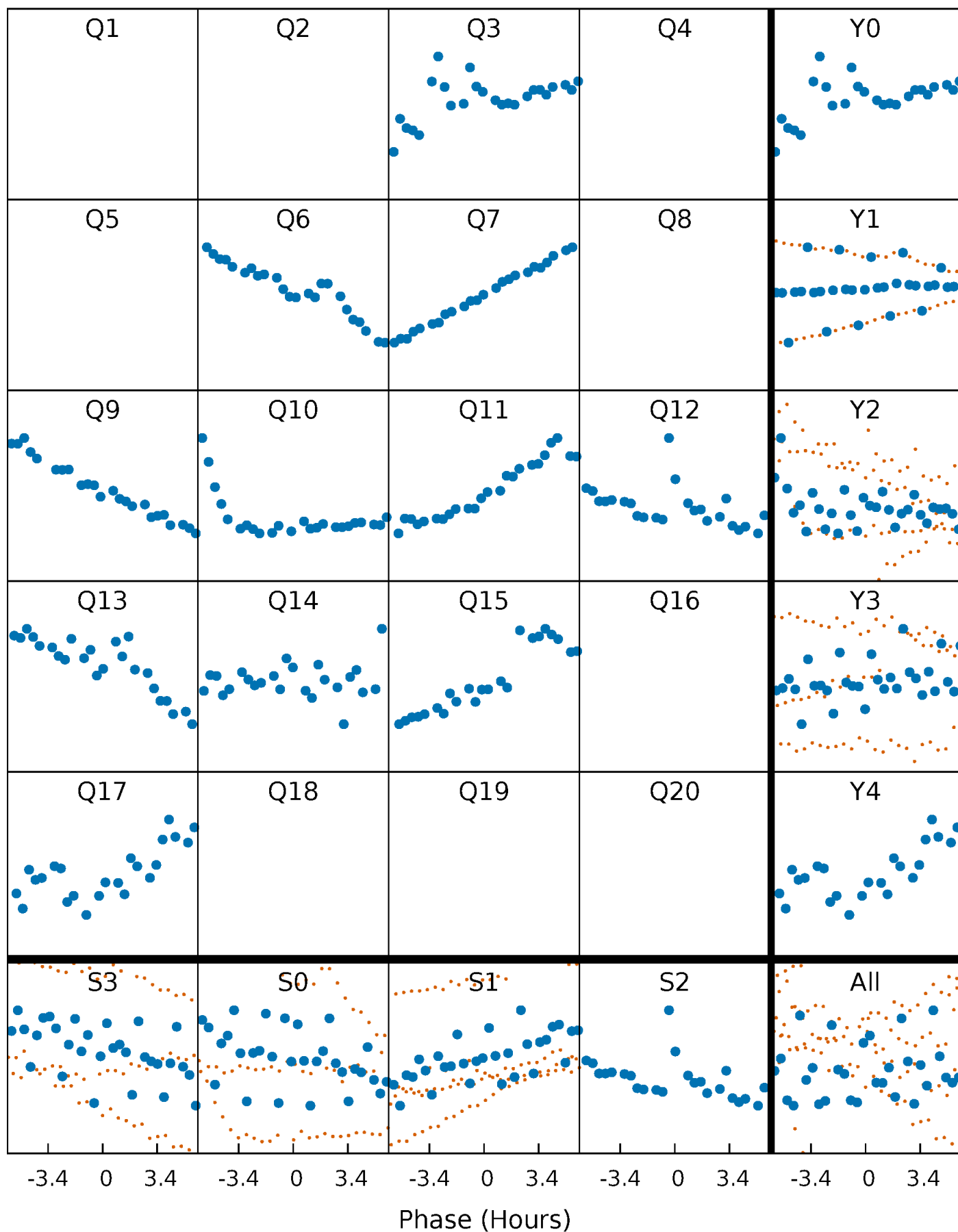


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



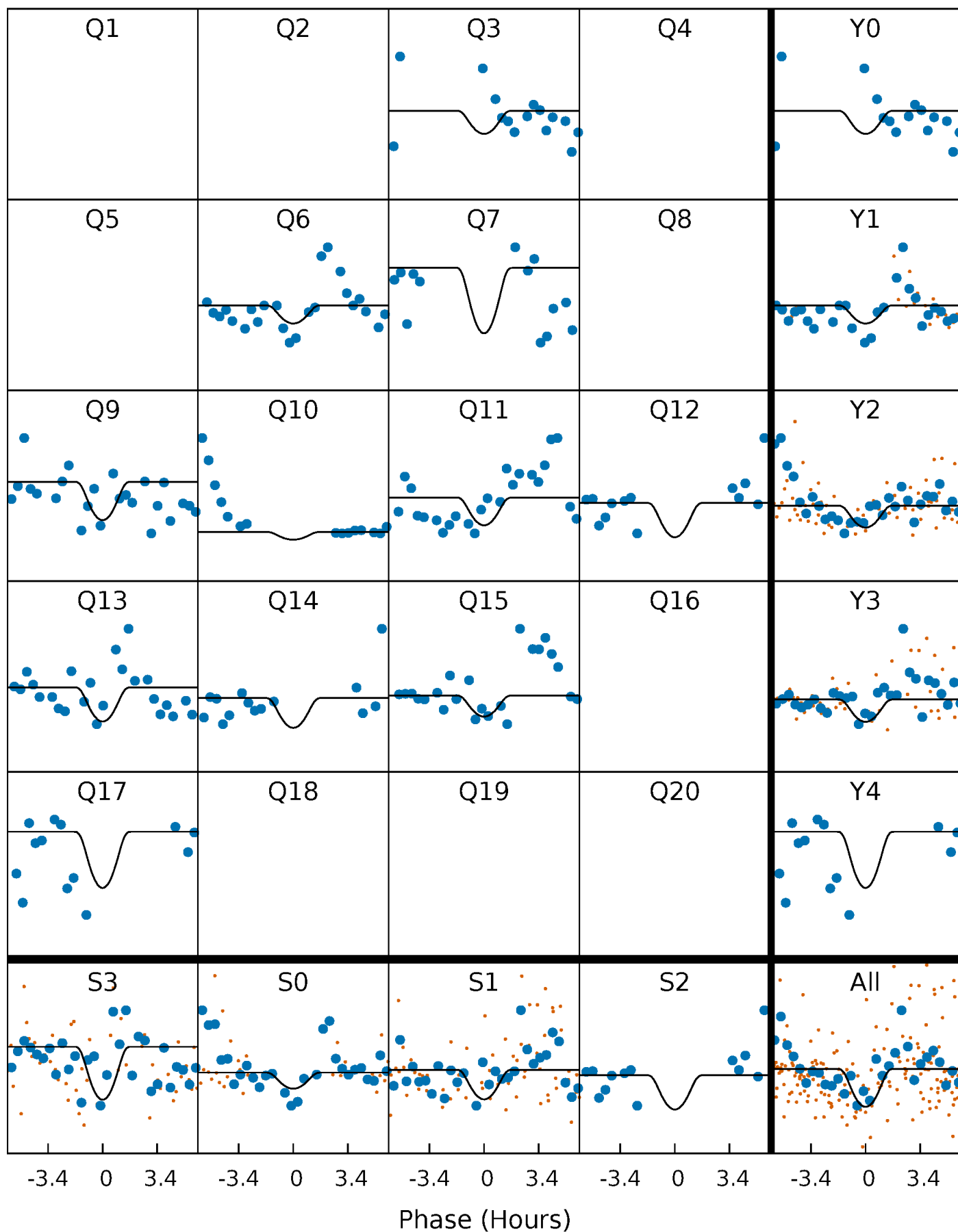
# PDC Quarter-Phased Transit Curves

TCE 002854839-02 P=107.137396 Days  $T_0=182.876239$  (BKJD)



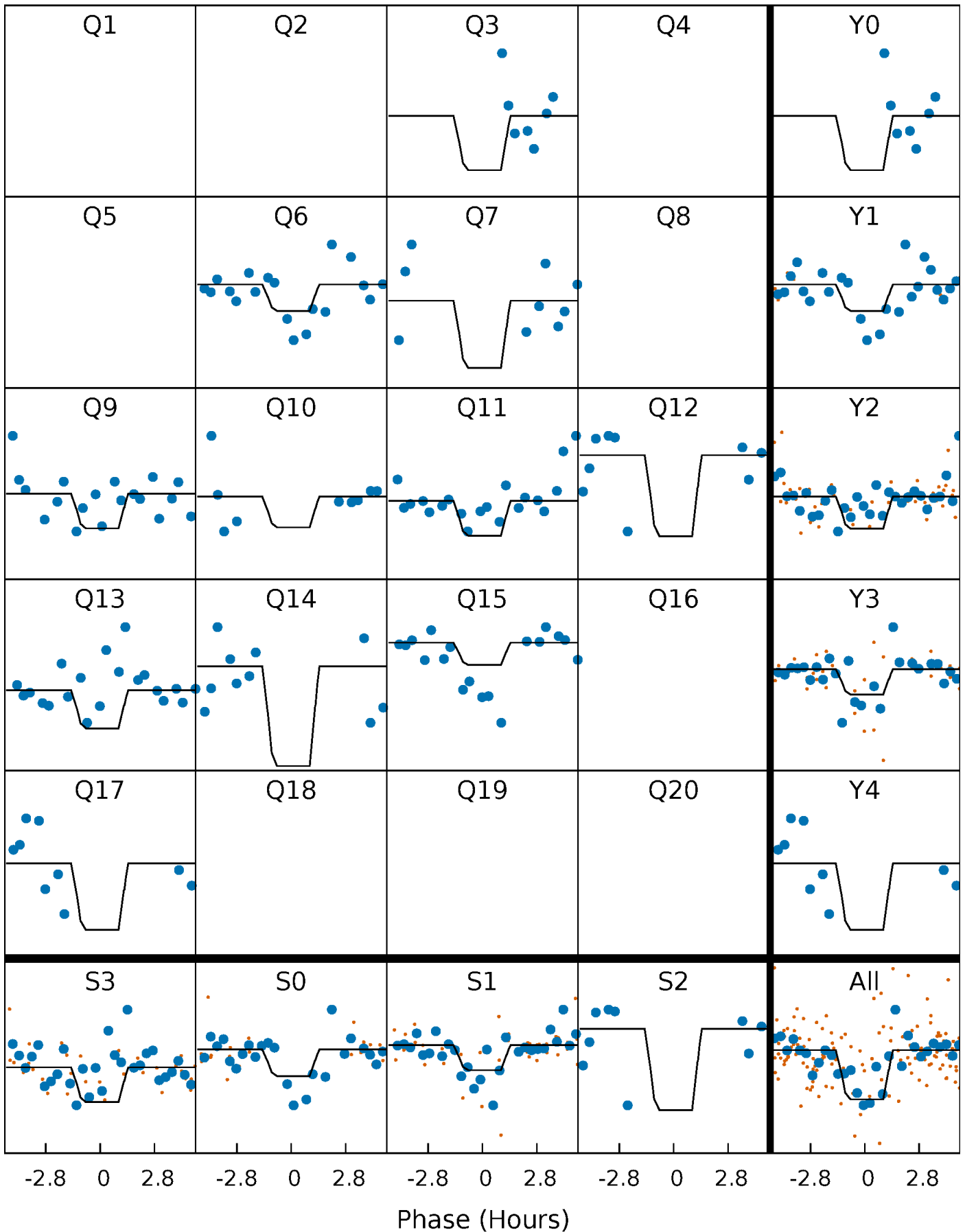
# DV Quarter-Phased Transit Curves

TCE 002854839-02   P=107.137396 Days    $T_0=182.876239$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

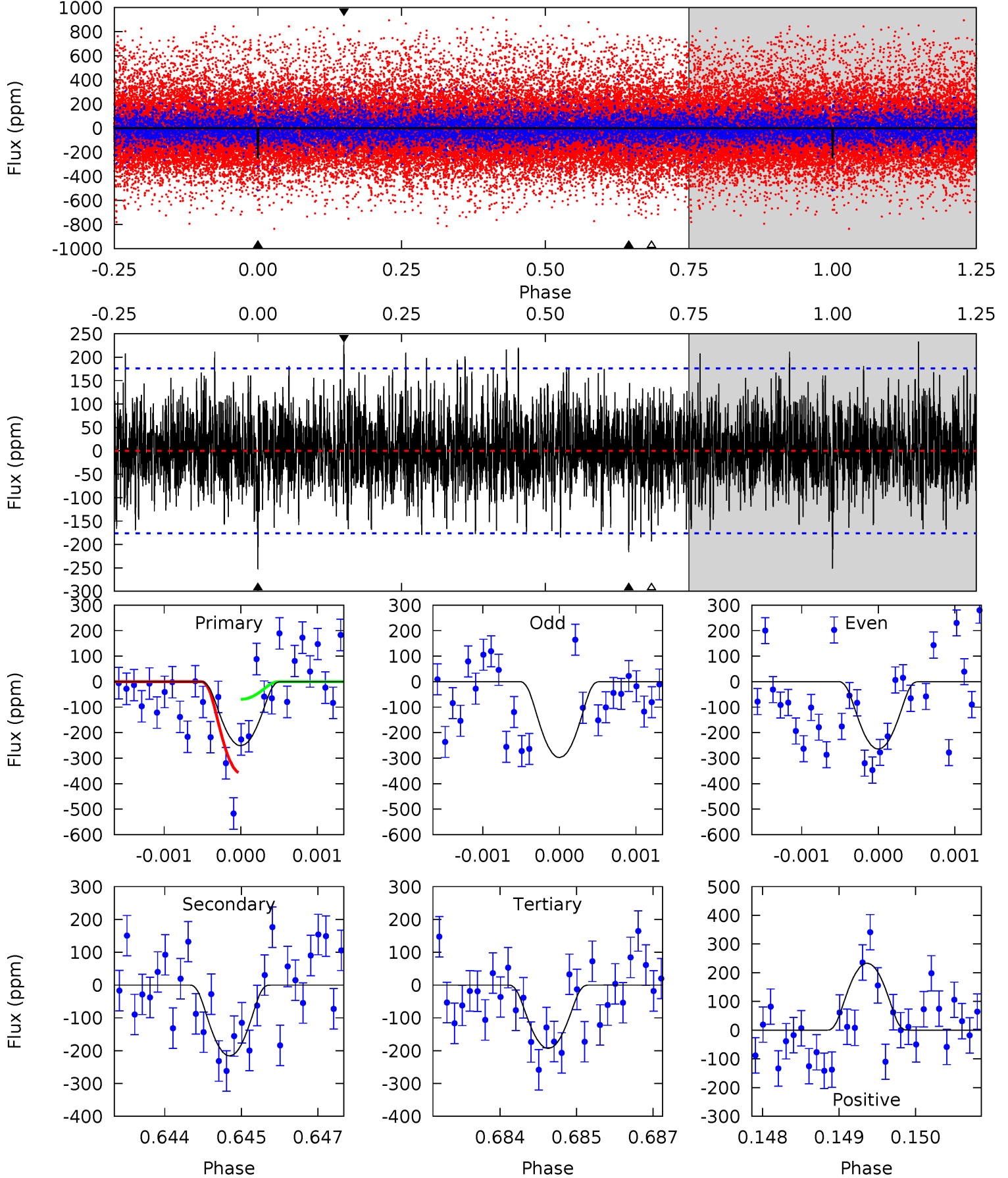
TCE 002854839-02 P=107.141948 Days  $T_0=182.838837$  (BKJD)



# DV Model-Shift Uniqueness Test

002854839-02, P = 107.137396 Days, E = 75.738843 Days

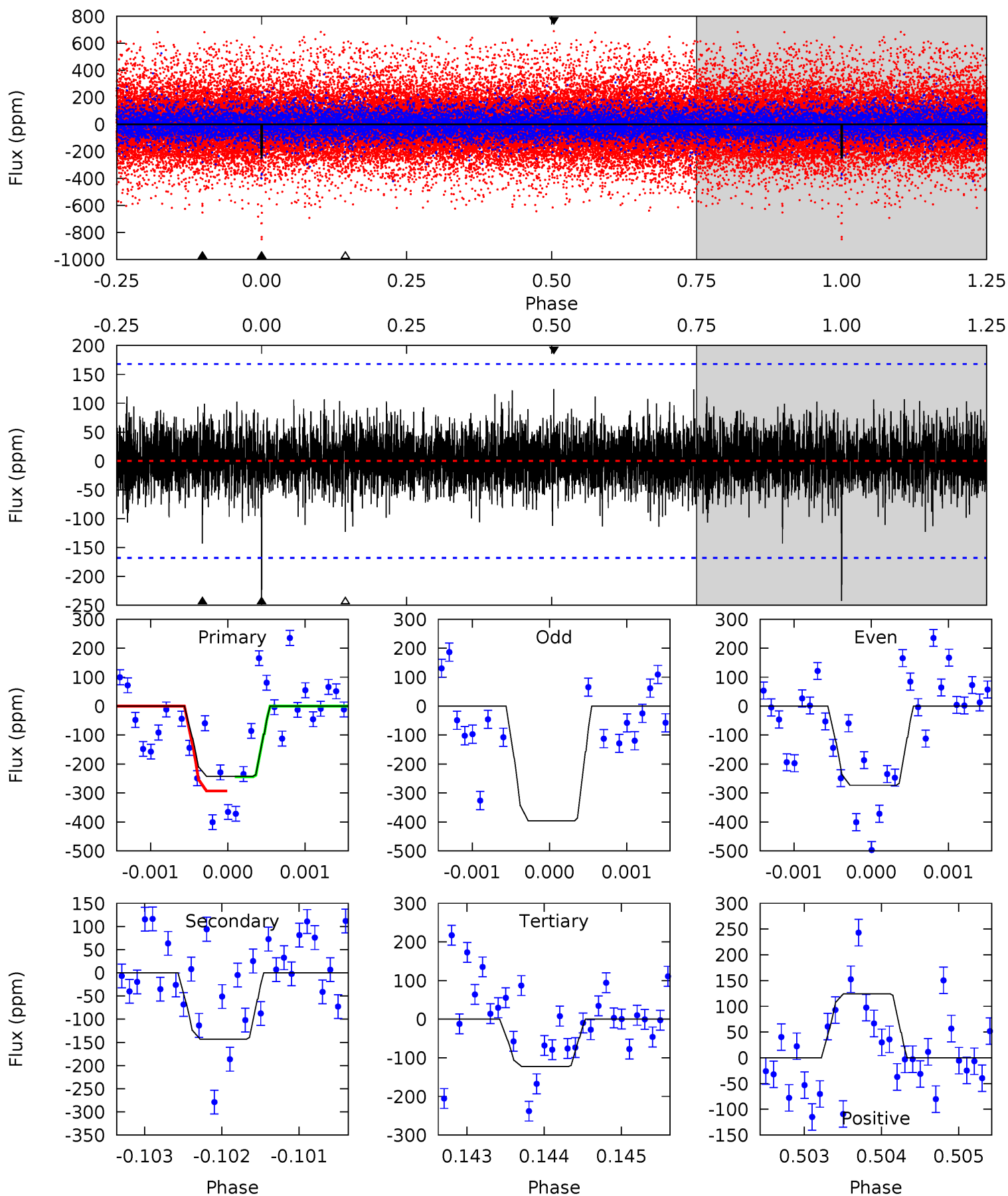
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.72	6.64	5.94	7.18	5.41	3.22	1.81	1.78	0.55	0.70	-0.54	0.41	2.05	0.48	4.50



# Alt Model-Shift Uniqueness Test

002854839-02,  $P = 107.141948$  Days,  $E = 75.696889$  Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.87	4.64	3.98	4.04	5.45	3.28	1.04	3.89	3.83	0.66	0.60	1.08	1.34	0.34	0.78





### Stellar Parameters For KIC 002854839

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4955^{+176}_{-176}$	$4.561^{+0.061}_{-0.050}$	$-0.080^{+0.300}_{-0.300}$	$0.751^{+0.072}_{-0.072}$	$0.748^{+0.085}_{-0.064}$	$2.494^{+0.672}_{-0.442}$
	+4%/-4%	+1%/-1%	+375%/-375%	+10%/-10%	+11%/-9%	+27%/-18%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 002854839-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-216 \pm 33$	$11.37^{+10.95}_{-7.13}$	$418^{+17}_{-18}$	$2443^{+748}_{-346}$	$142^{+925}_{-104}$
Alt.	$-143 \pm 31$	$10.14^{+11.13}_{-7.06}$	$417^{+18}_{-17}$	$2396^{+950}_{-376}$	$119^{+1283}_{-92}$

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

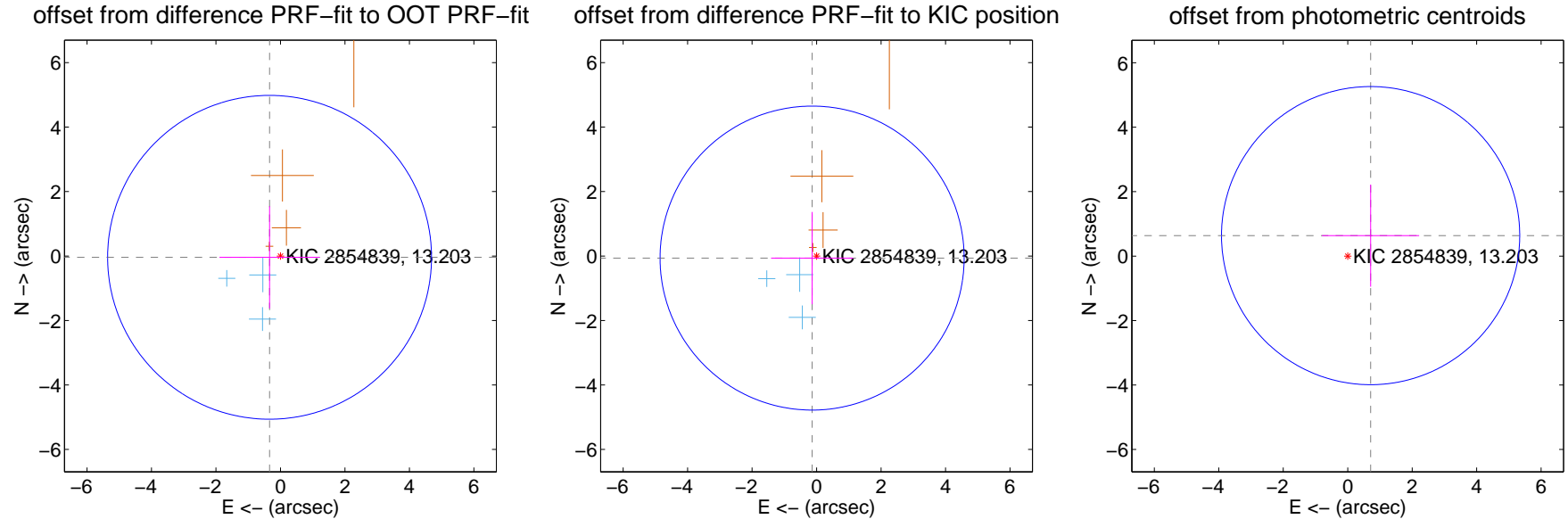
## DV Centroid Data

Supplemental centroid analysis for 002854839-02. Kepler magnitude: 13.20. Transit SNR 5.40

There are 3 quarters with good PRF difference image offsets

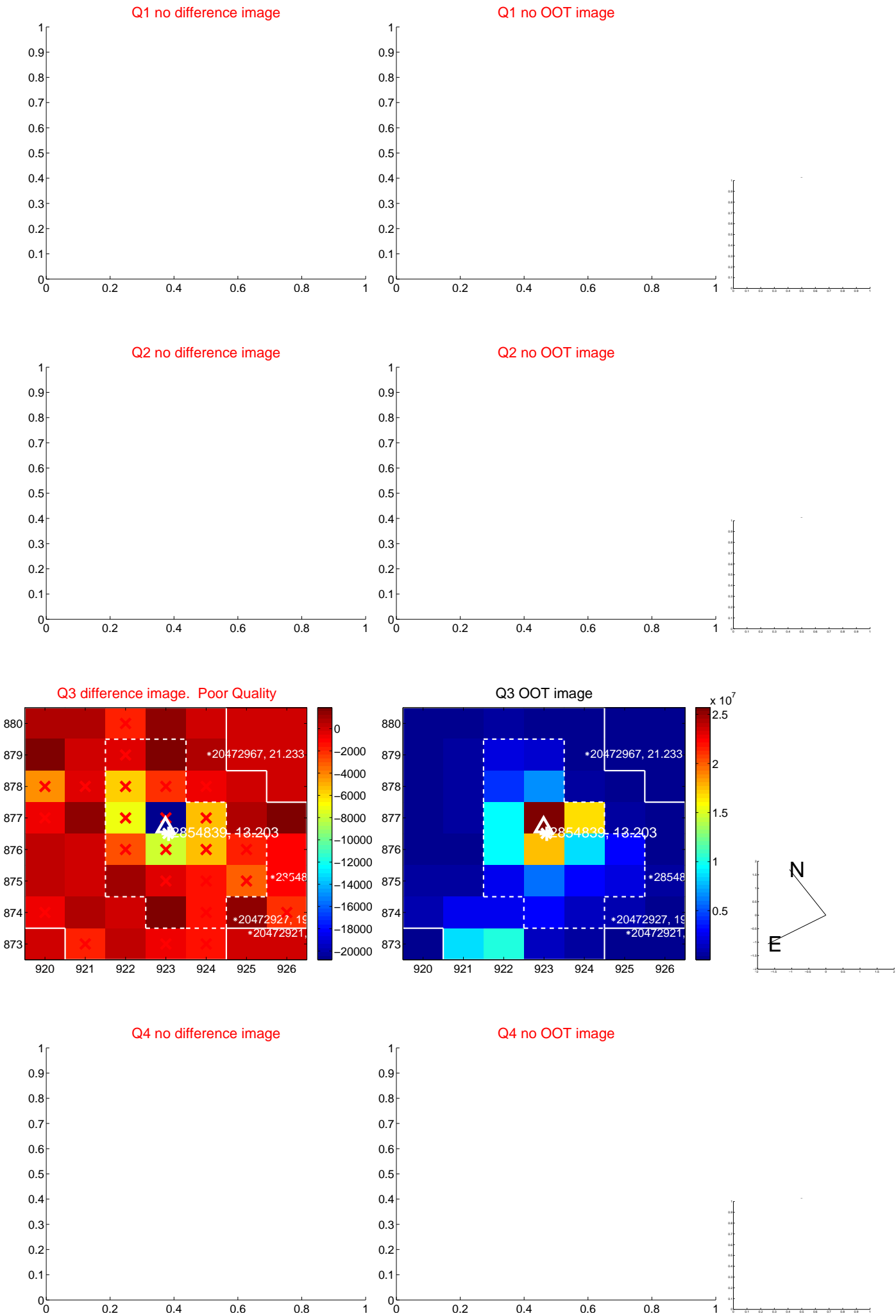
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.340 \pm 1.674$	0.20	$0.337 \pm 1.554$	$-0.040 \pm 1.585$
PRF-fit source offset from KIC position	$0.153 \pm 1.572$	0.10	$0.139 \pm 1.272$	$-0.064 \pm 1.430$
photometric centroid source offset	$0.95 \pm 1.54$	0.62	$-0.71 \pm 1.51$	$0.64 \pm 1.58$

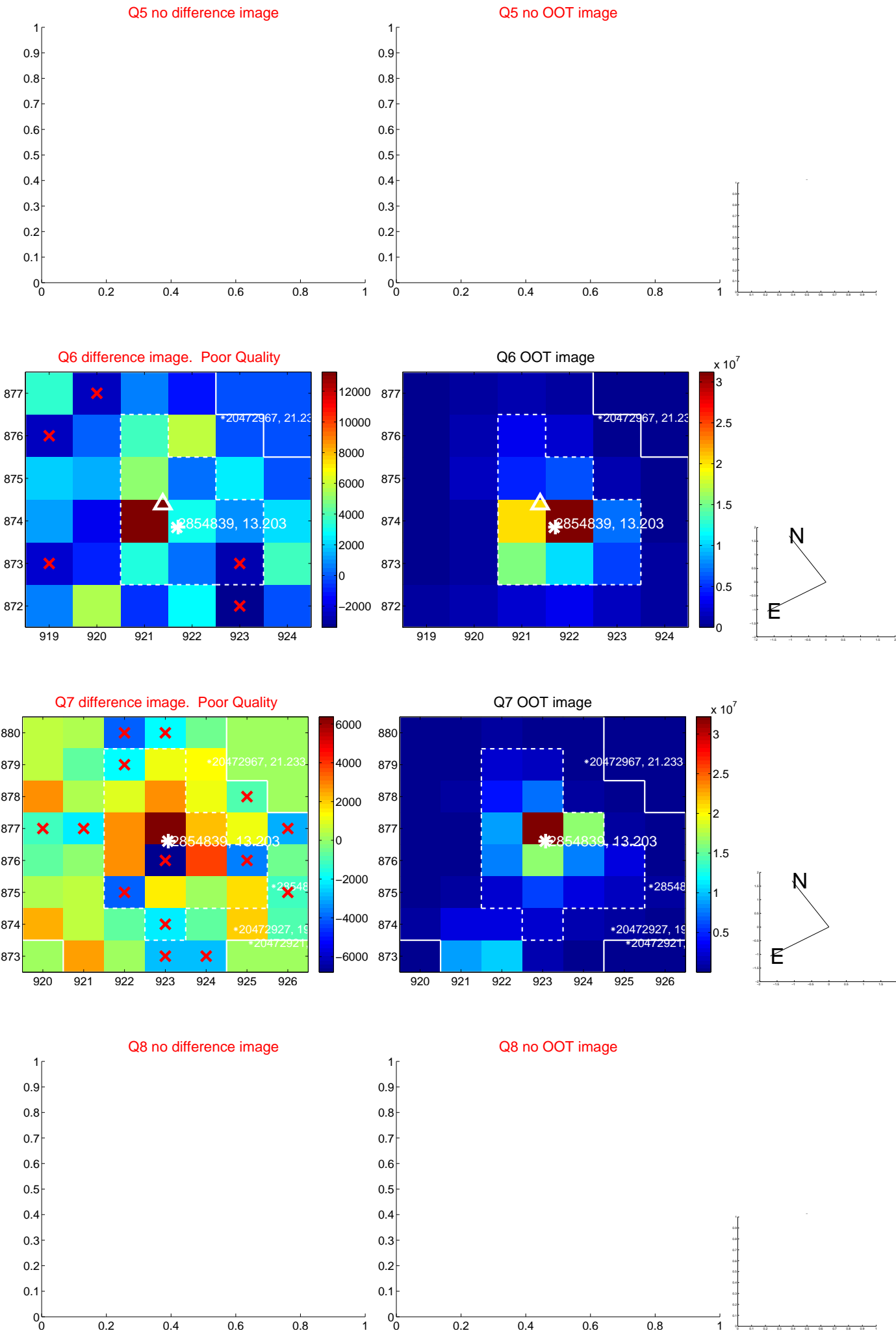


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

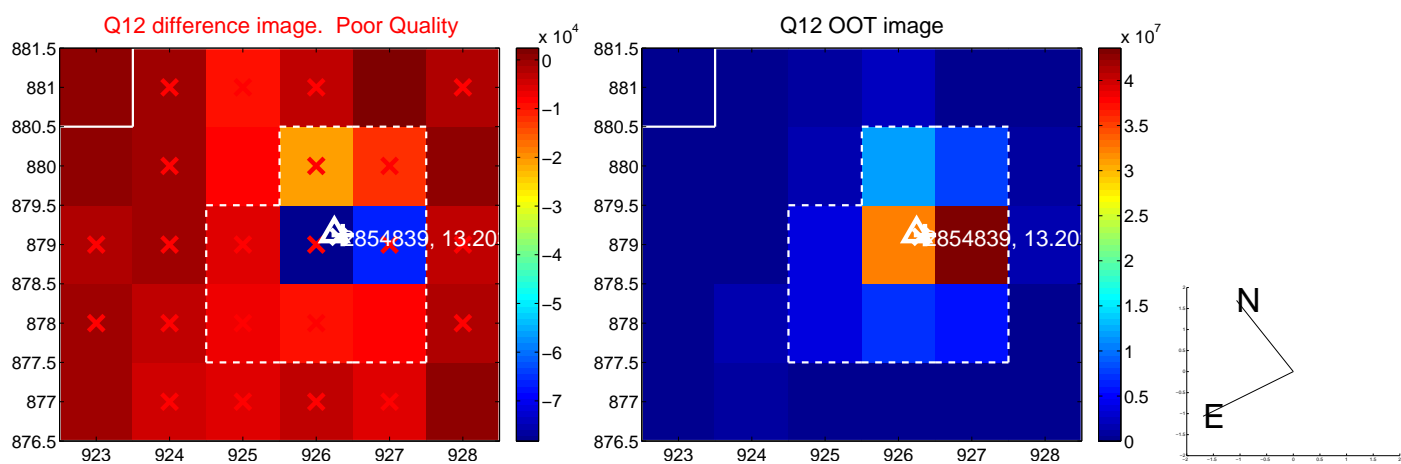
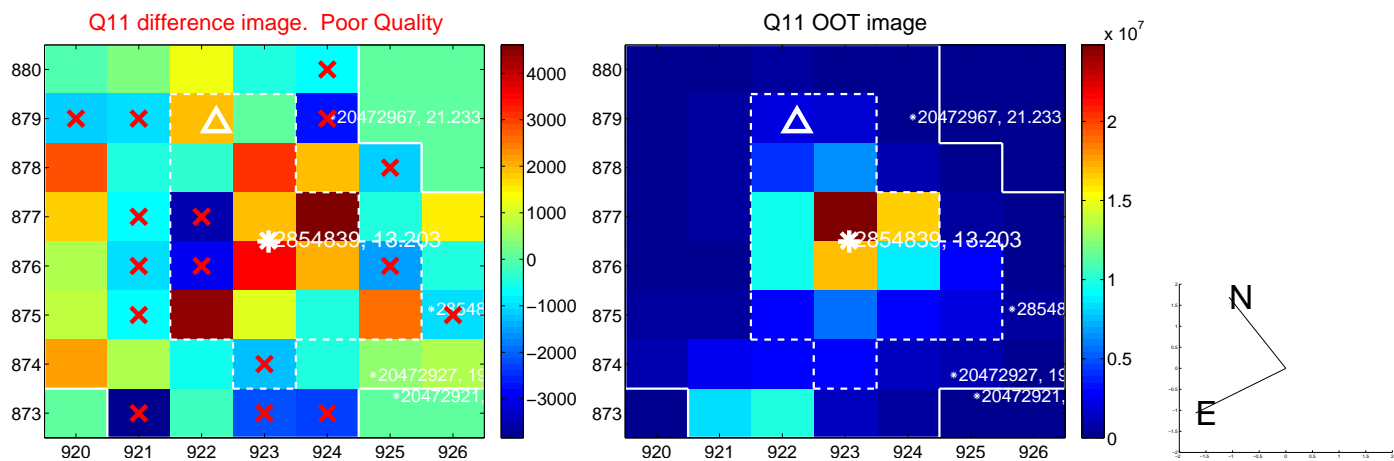
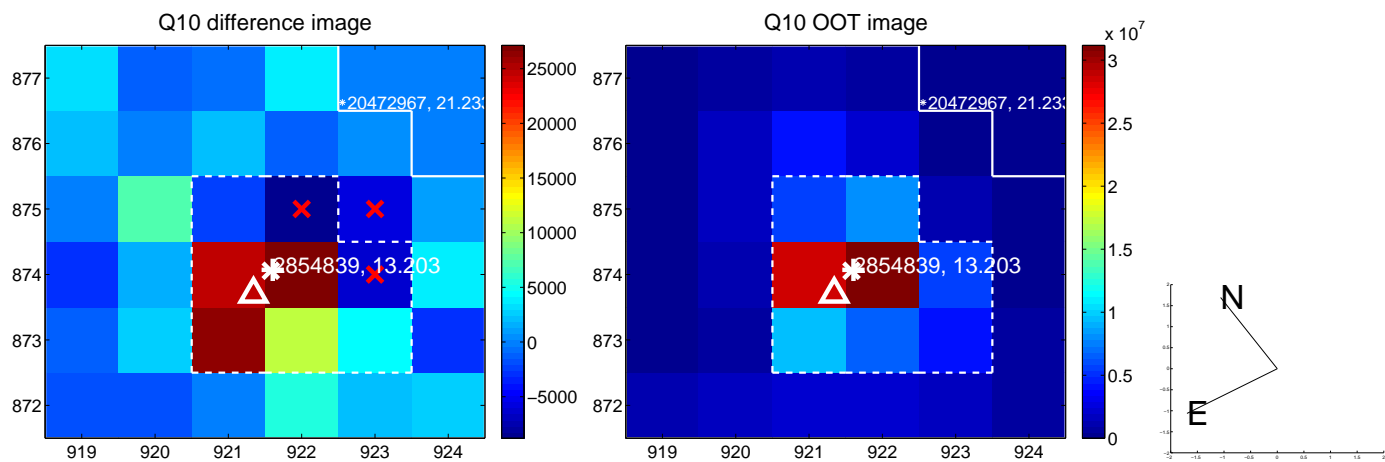
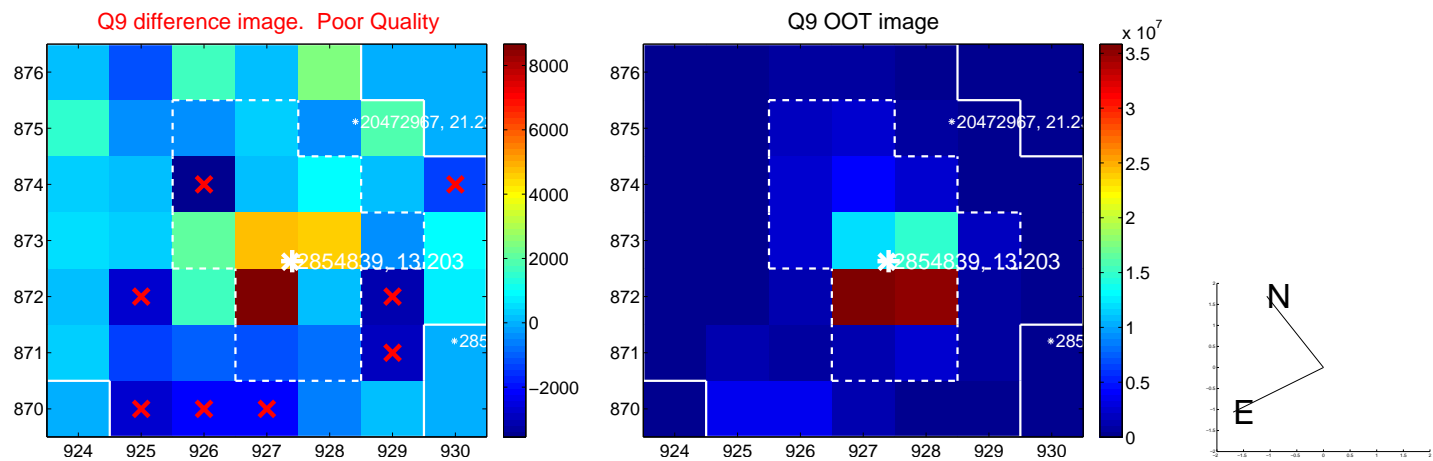
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



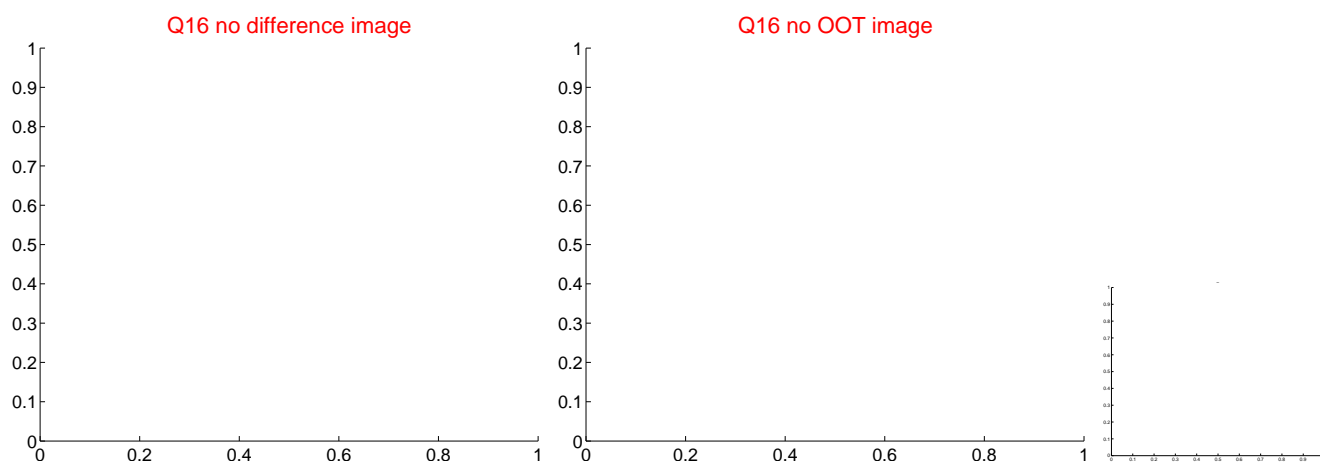
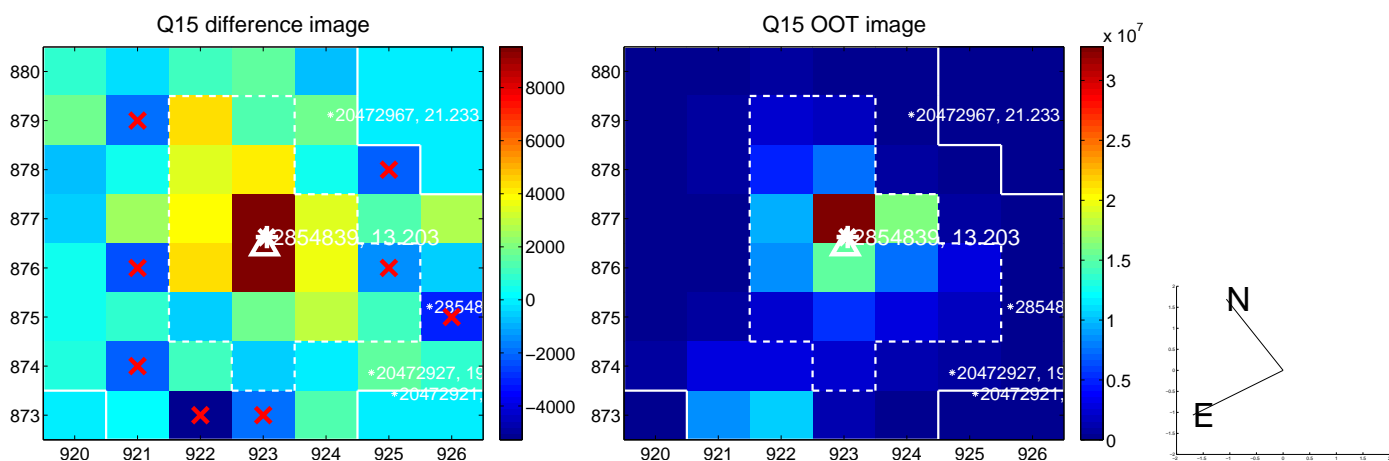
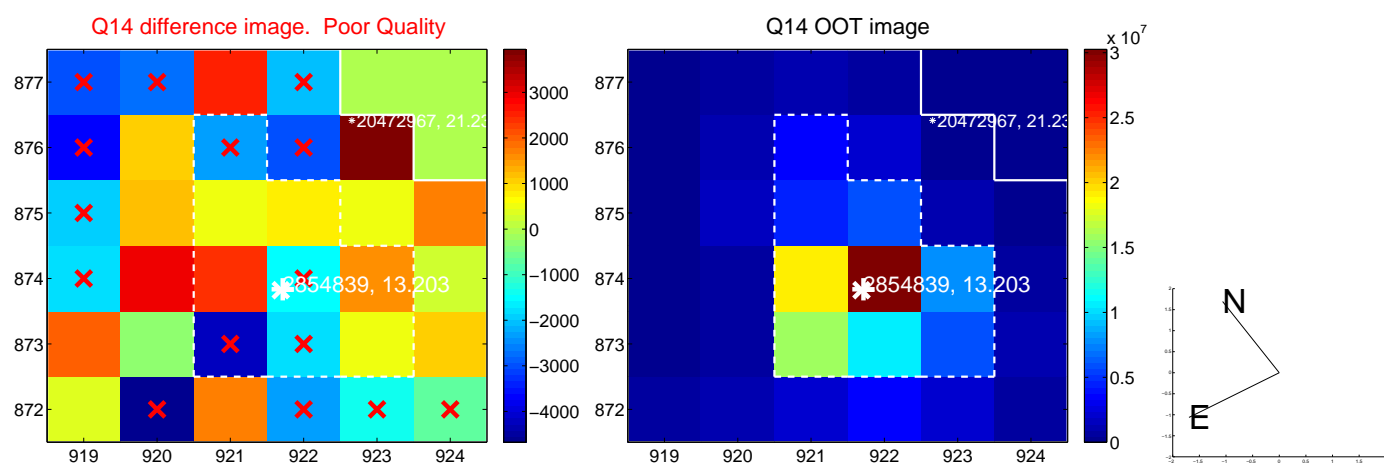
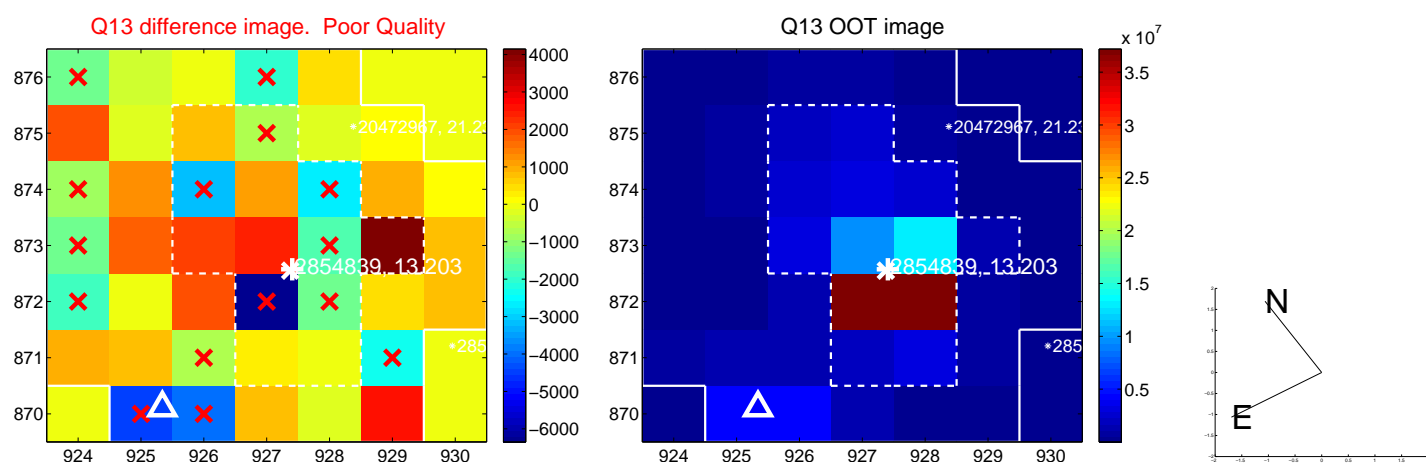
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

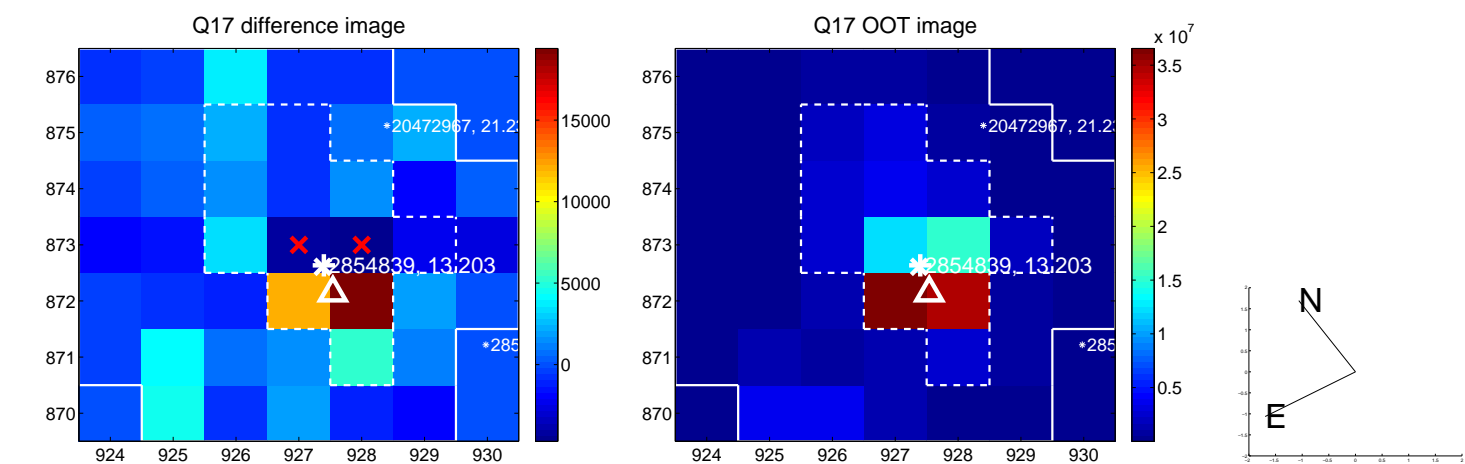


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

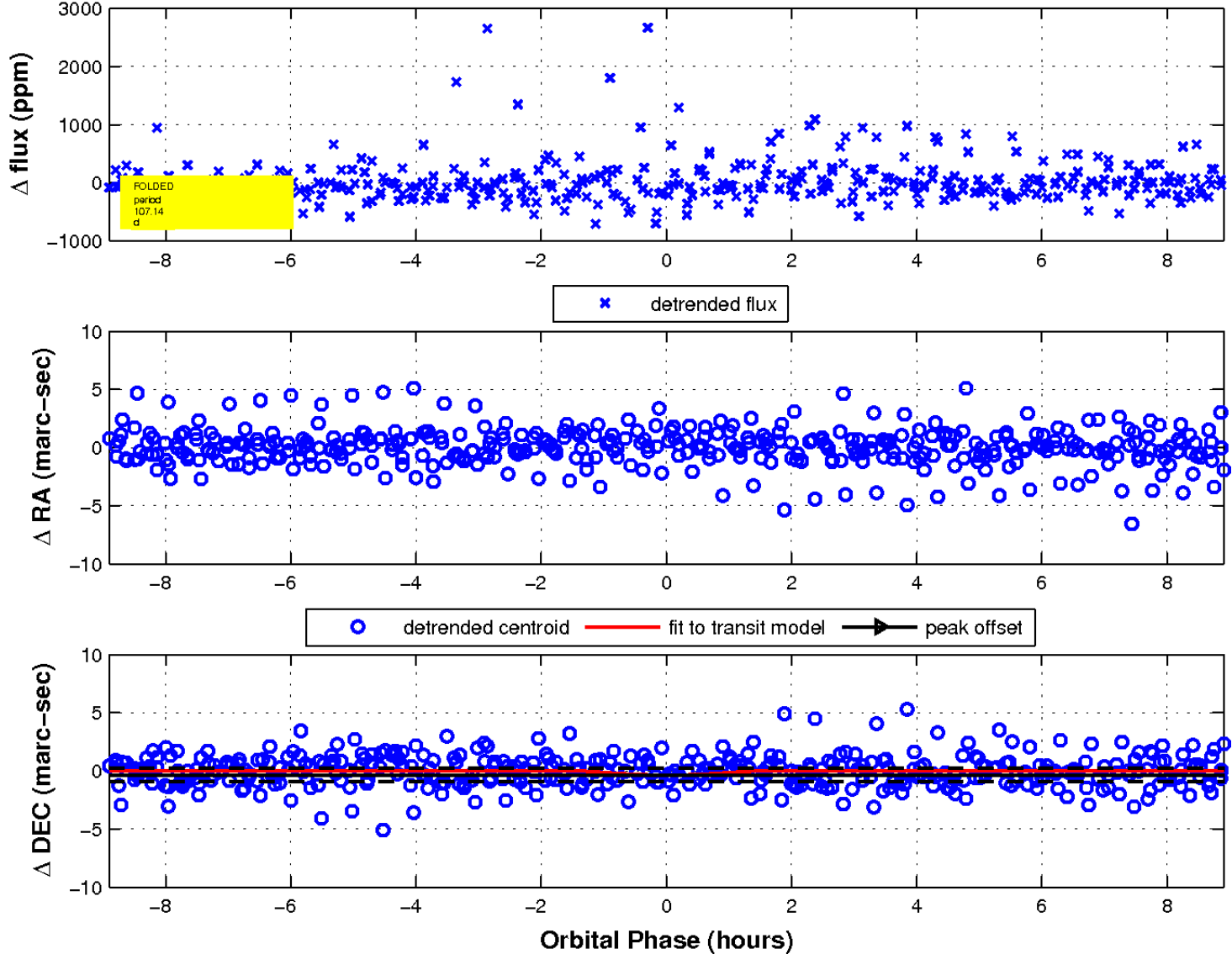




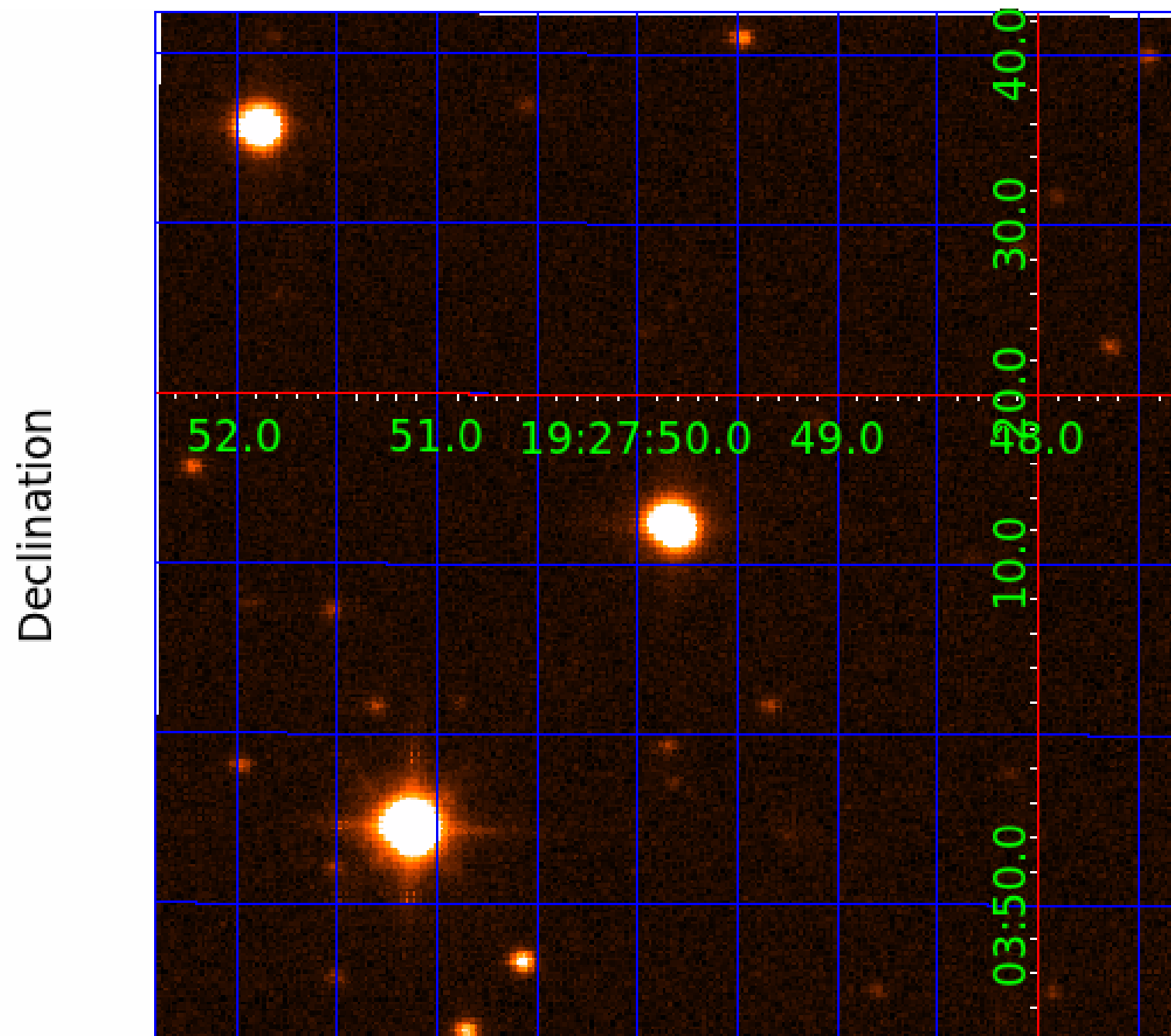
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 2 of 4



UKIRT Image



# KIC 002854839

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002854839-01	OBS	7639.01	1.055699	131.557018	31.5	0.703	7.8	5.8	0.75	4955	0.50	896.97
002854839-02	OBS	No	107.137396	182.876239	330.7	2.973	9.5	5.4	0.75	4955	2.39	1.90
002854839-03	OBS	No	385.343184	356.981262	490.4	4.184	10.9	7.4	0.75	4955	1.61	0.34
002854839-04	OBS	No	277.968390	364.442645	535.5	10.940	13.6	5.9	0.75	4955	1.74	0.53

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002854839-01	OBS	FP	0.33	1	0	0	0	LPP_DV
002854839-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS
002854839-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—CENT_FEW_DIFFS
002854839-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS

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

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

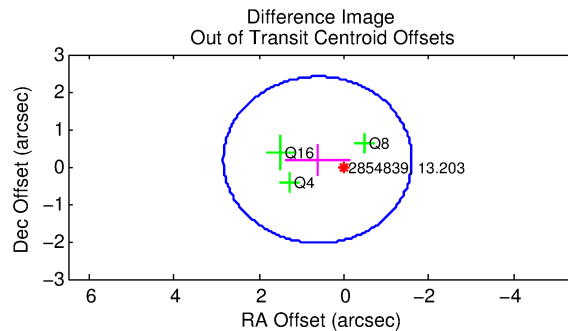
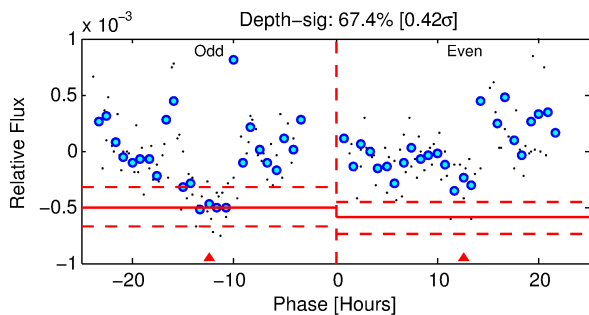
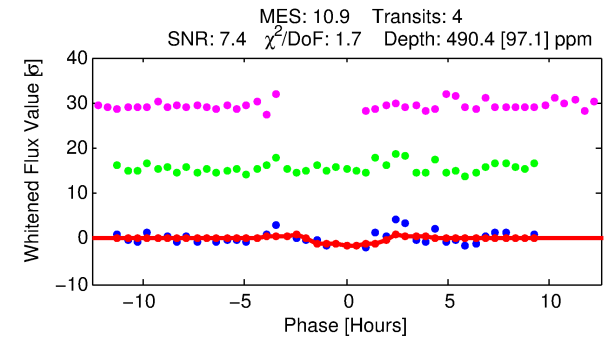
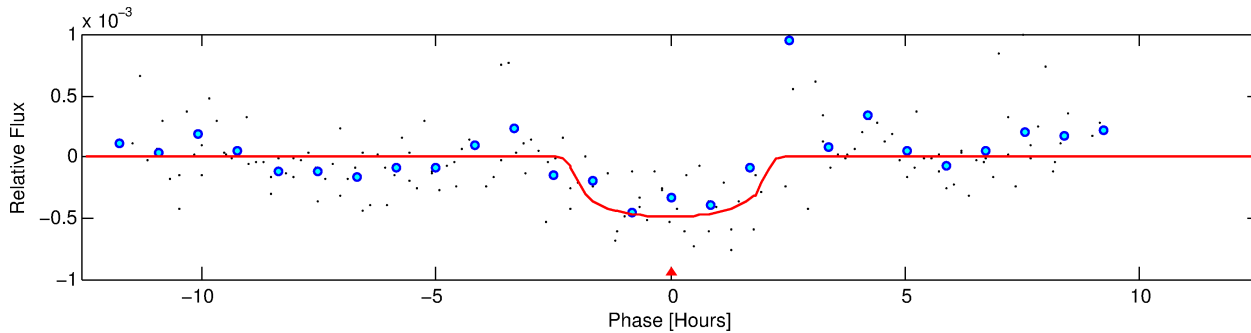
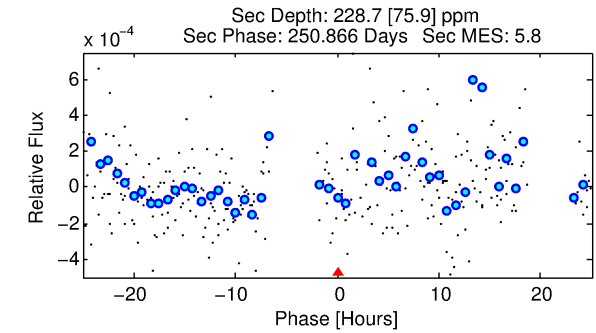
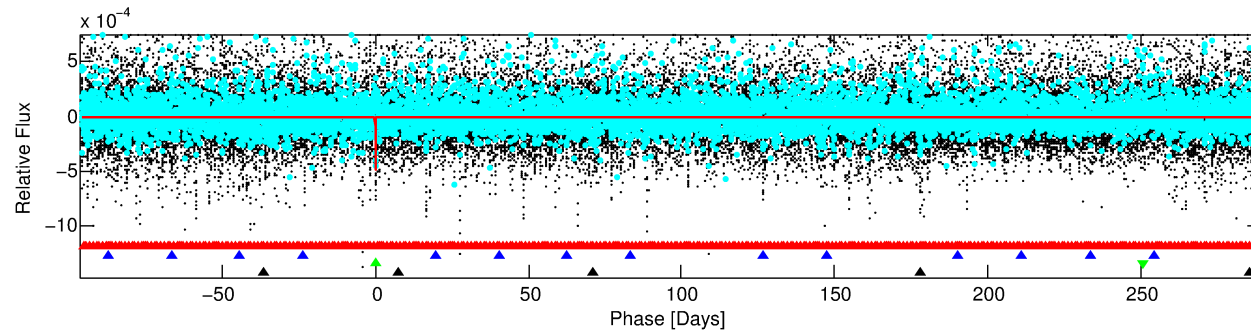
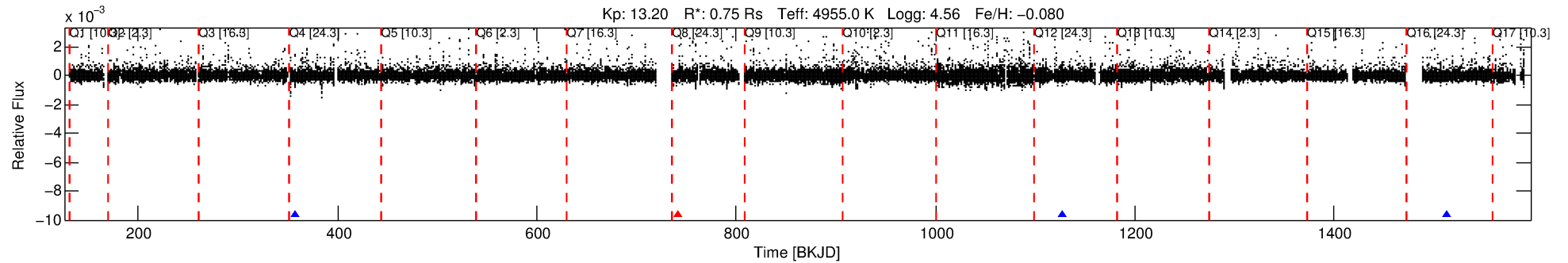
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 002854839-03

No Significant Match Found

# DV One-Page Summary

KIC: 2854839 Candidate: 3 of 4 Period: 385.343 d



## DV Fit Results:

Period = 385.34318 [0.00520] d  
Epoch = 356.9813 [0.0099] BKJD  
Rp/R\* = 0.0196 [0.0593]  
a/R\* = 716.12 [7274.42]  
b = 0.06 [172.23]  
Seff = 0.34 [0.06]  
Teq = 195 [9] K  
Rp = 1.61 [4.86] Re  
a = 0.9412 [0.0746] AU  
Ag = 43070.32 [260676.82] [0.17σ]  
Teffp = 4349 [6581] K [0.63σ]

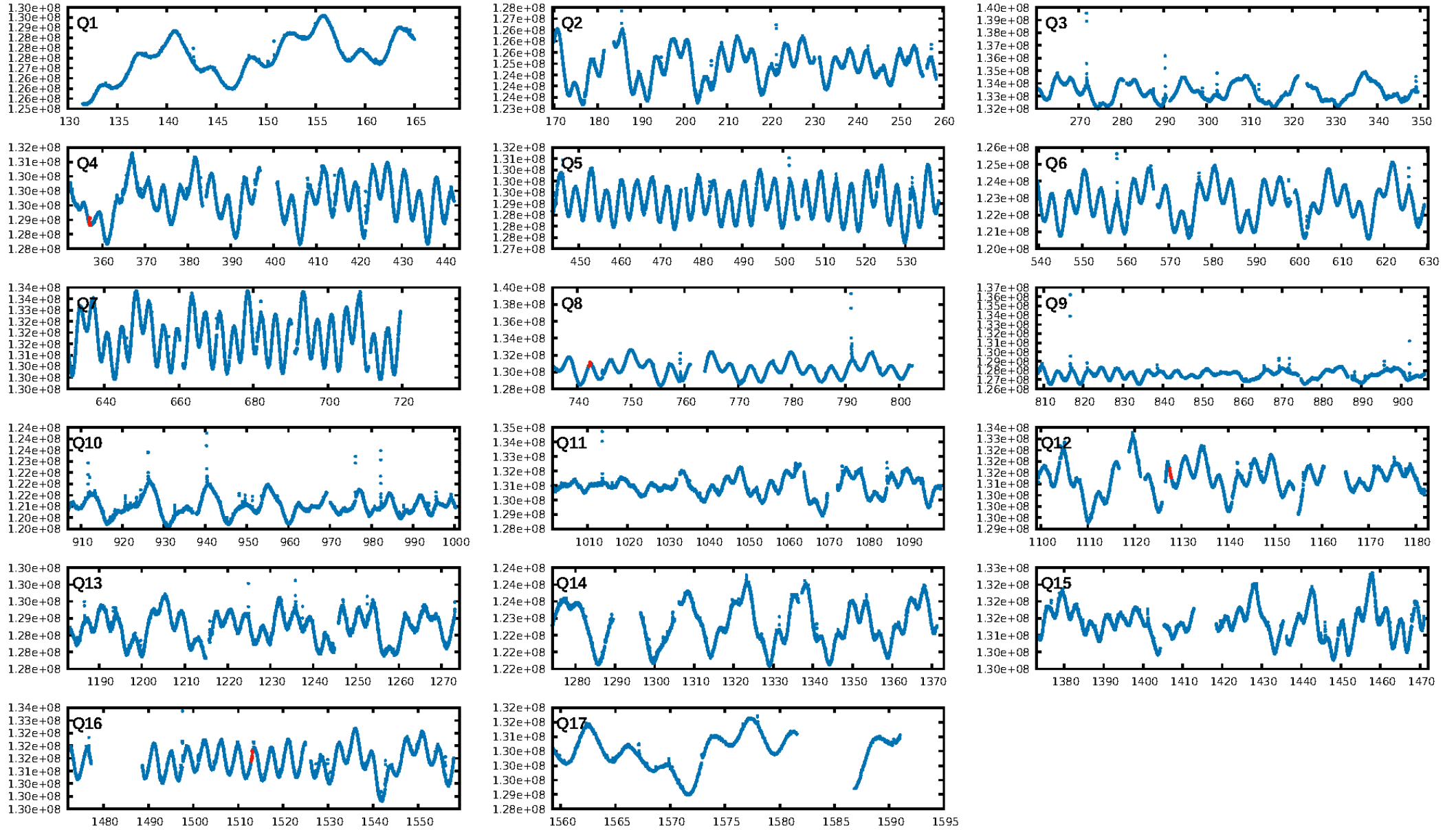
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [220.02σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 66.3%  
ModelChiSquareGof-sig: 56.6%  
**Bootstrap-pfa: 9.98e-11**  
**RollingBand-fgt: 0.75 [3/4]**  
GhostDiagnostic-chr: 1.226  
Centroid-sig: N/A  
Centroid-so: 1.919 arcsec [1.79σ]  
OotOffset-rm: 0.641 arcsec [0.86σ]  
KicOffset-rm: 0.450 arcsec [0.65σ]  
OotOffset-st: 0/0/3/0 [3]  
KicOffset-st: 0/0/3/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

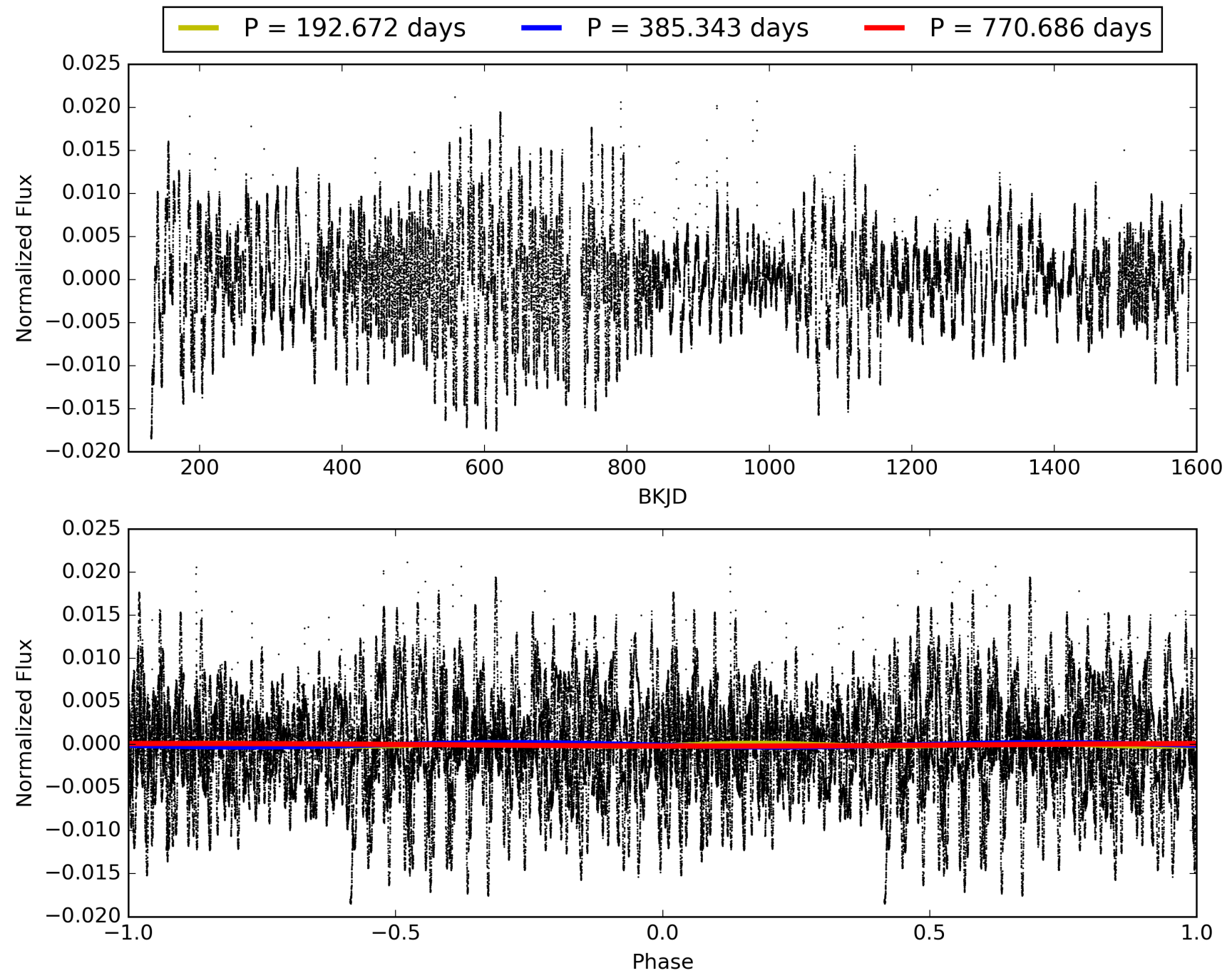
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 23:12:11 Z

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

# TCE 002854839-03, PDC Light Curves



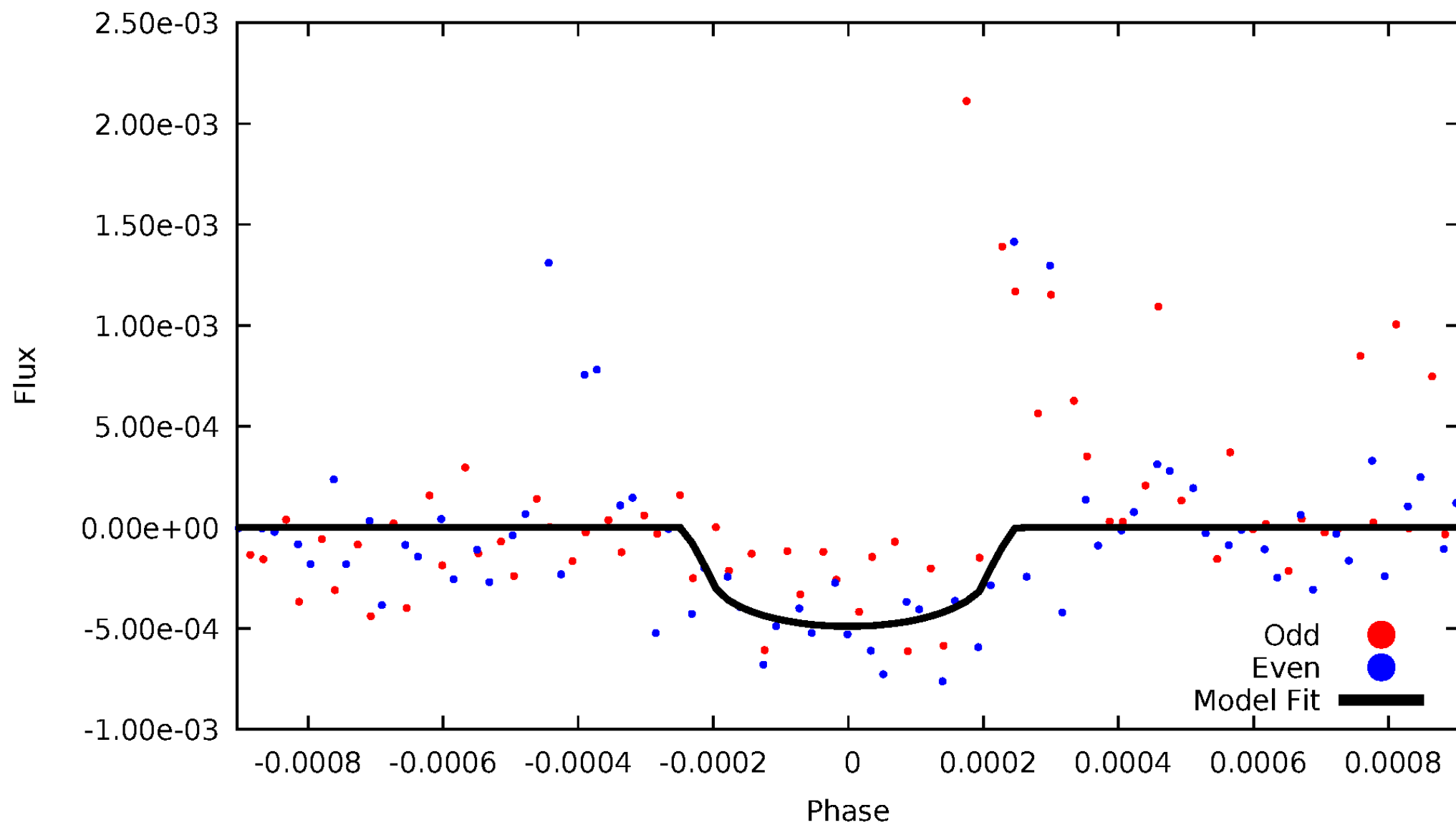
TCE 002854839-03





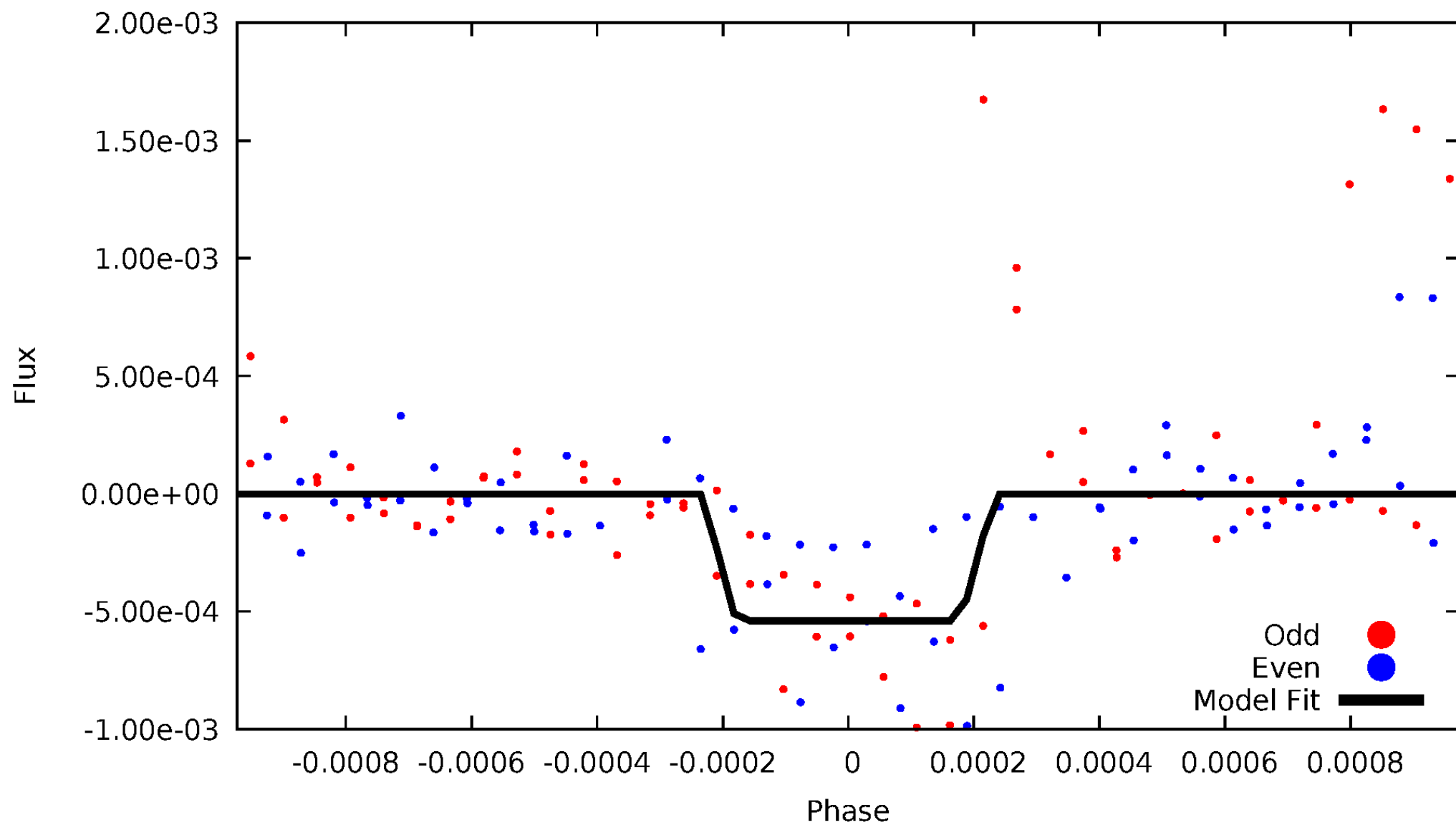
# DV Odd/Even

TCE 002854839-03



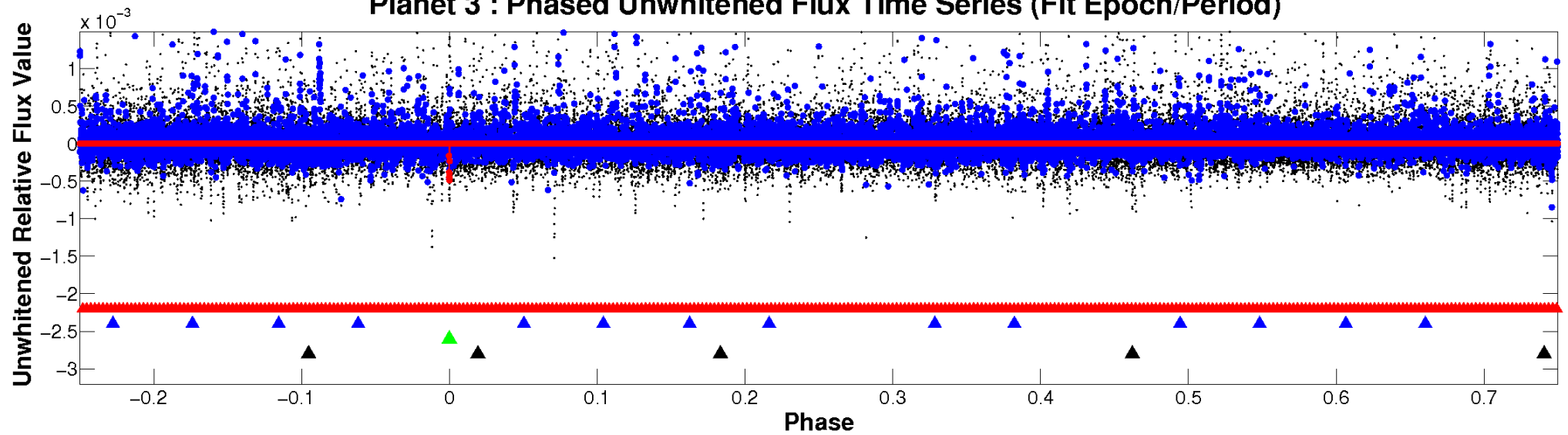
# ALT Odd/Even

TCE 002854839-03

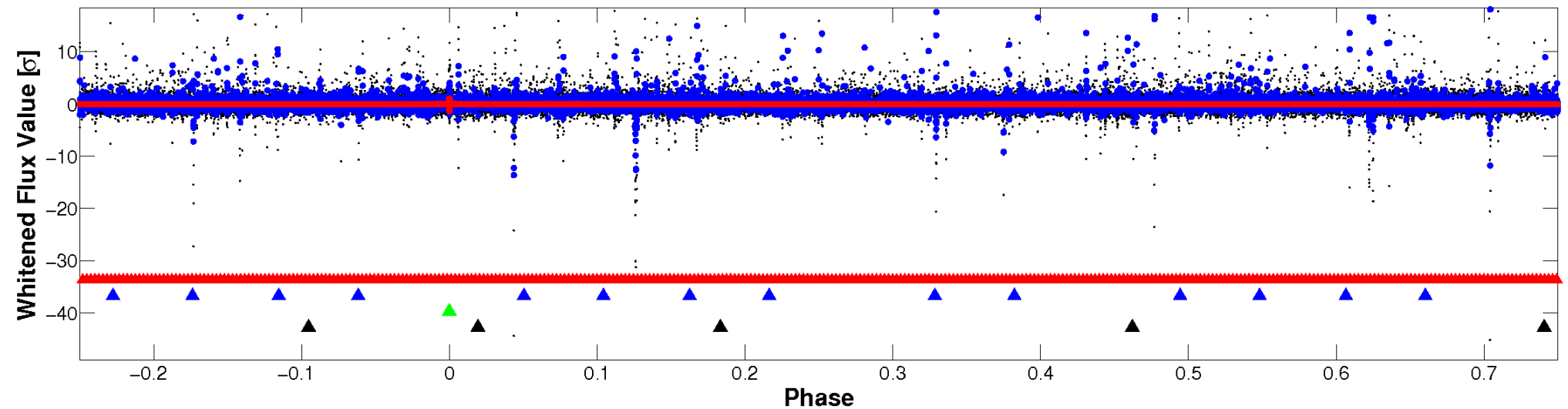


# Non-Whitened Vs. Whitened Light Curve

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

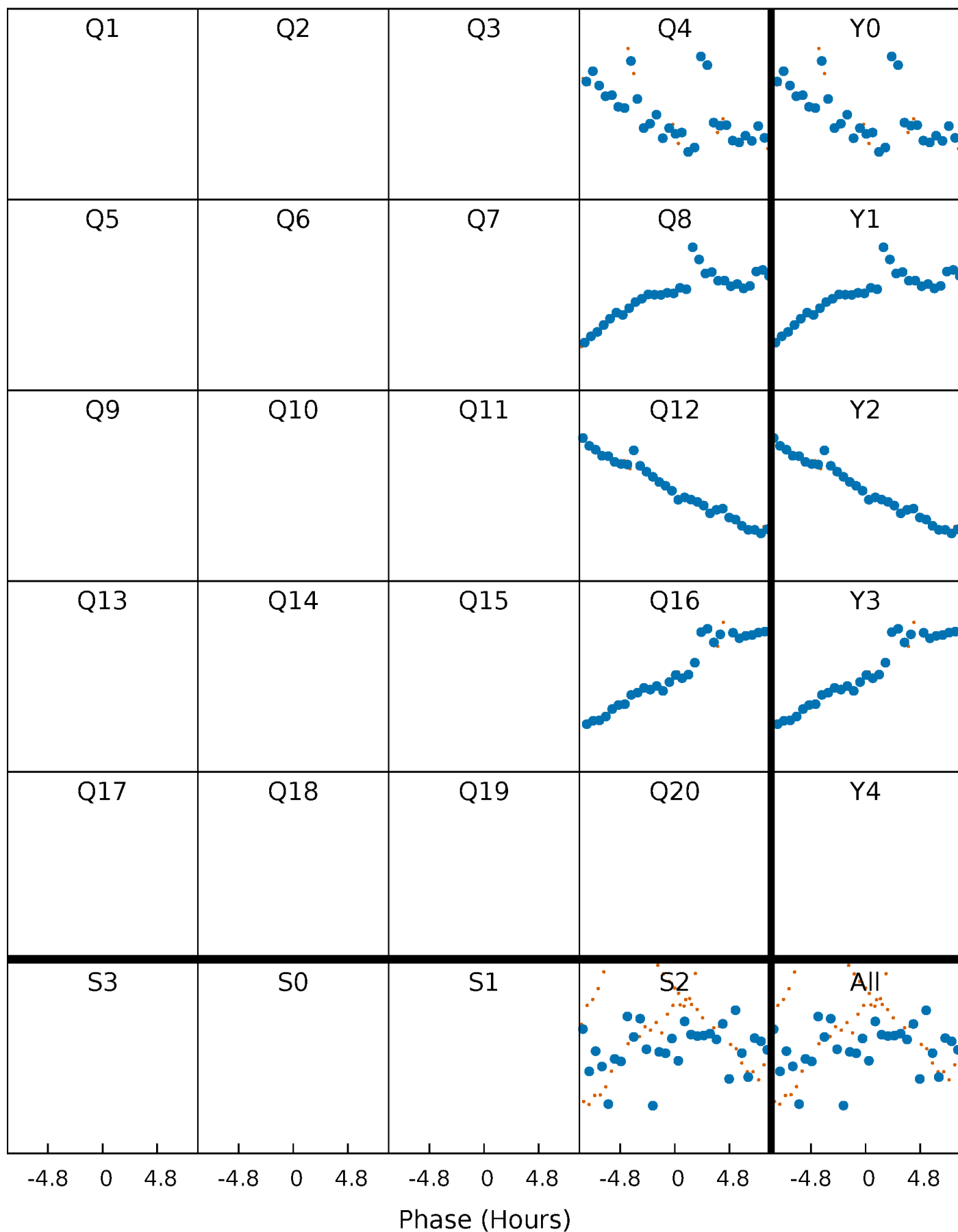


## Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



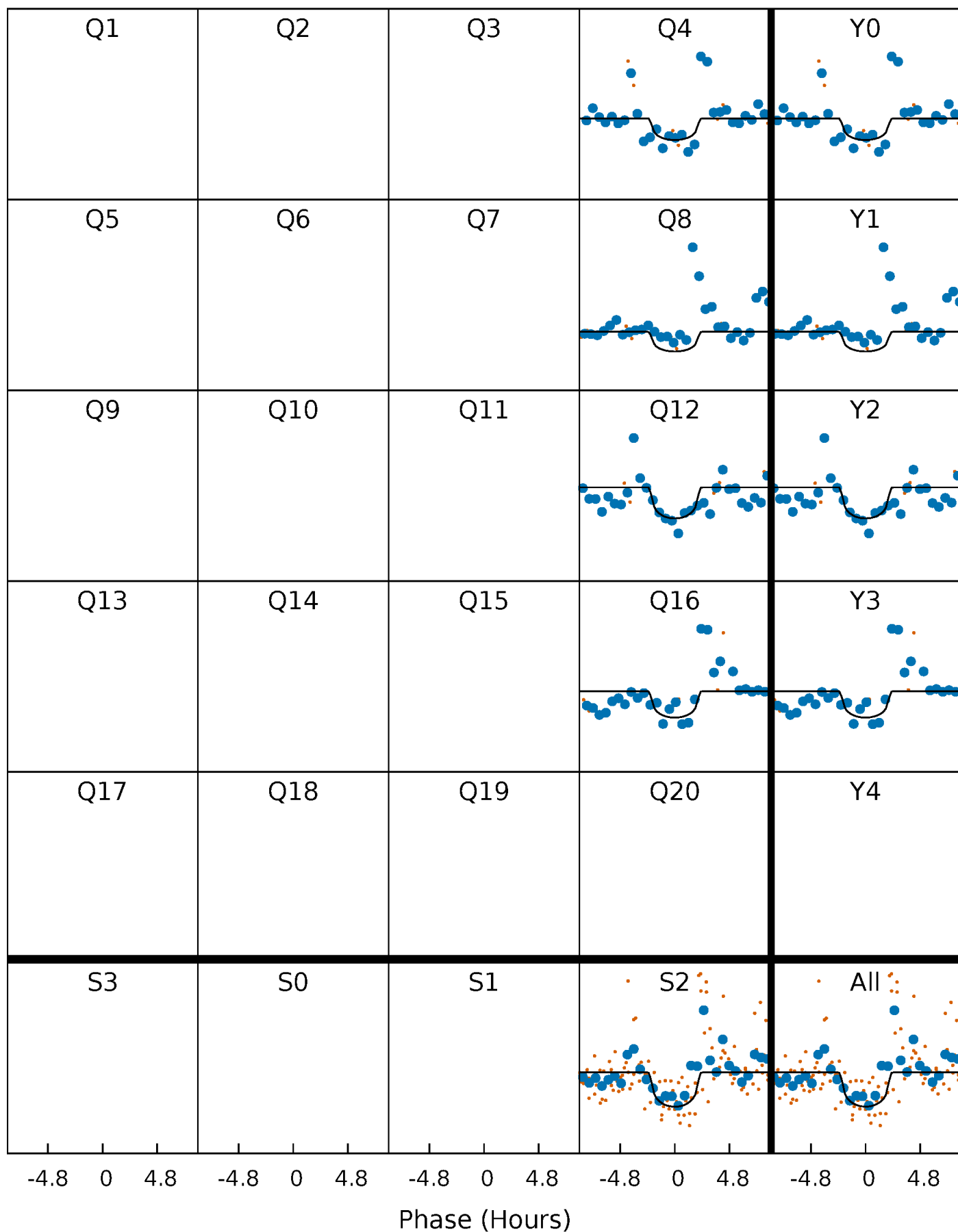
# PDC Quarter-Phased Transit Curves

TCE 002854839-03     $P=385.343184$  Days     $T_0=356.981262$  (BKJD)



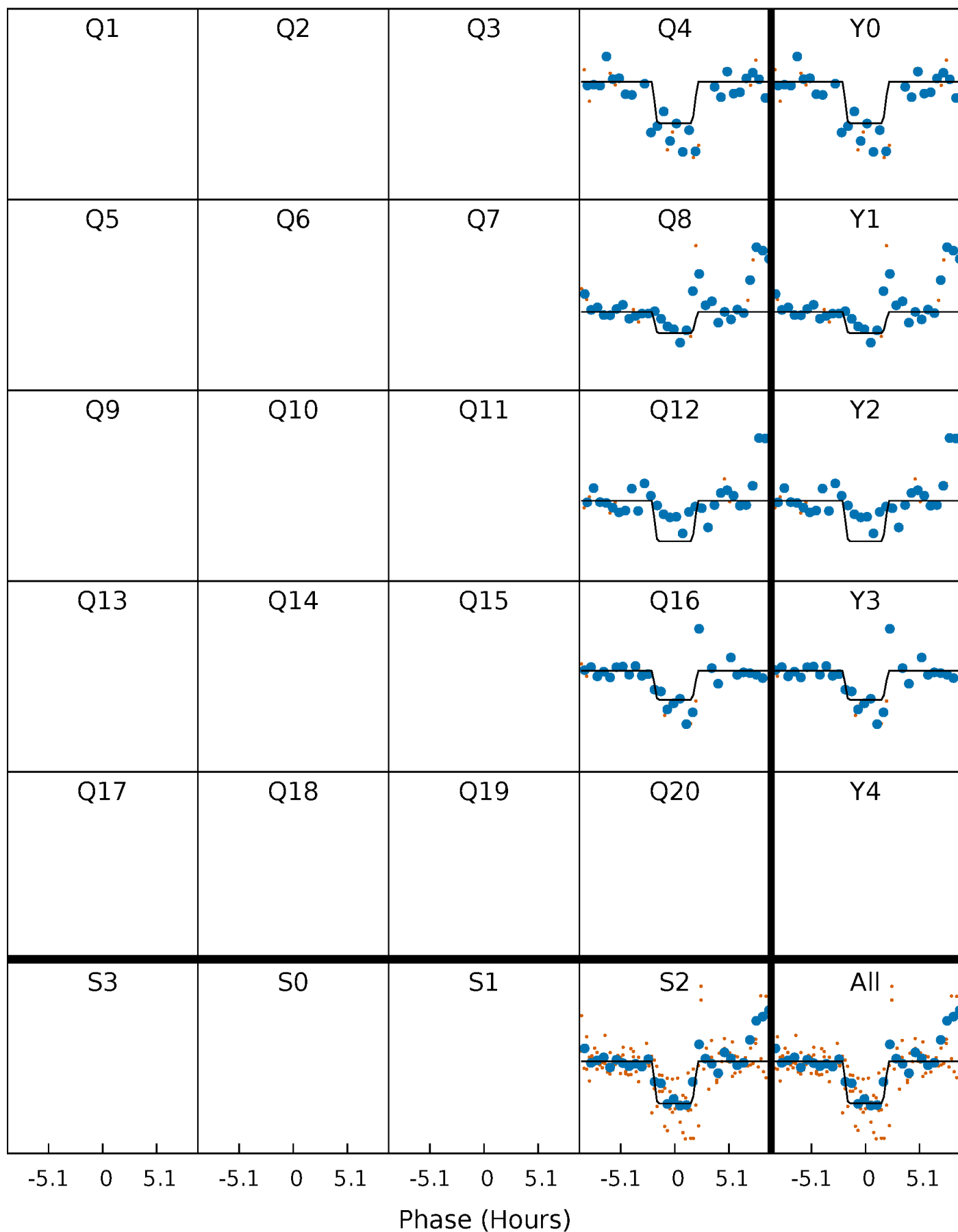
# DV Quarter-Phased Transit Curves

TCE 002854839-03 P=385.343184 Days  $T_0=356.981262$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

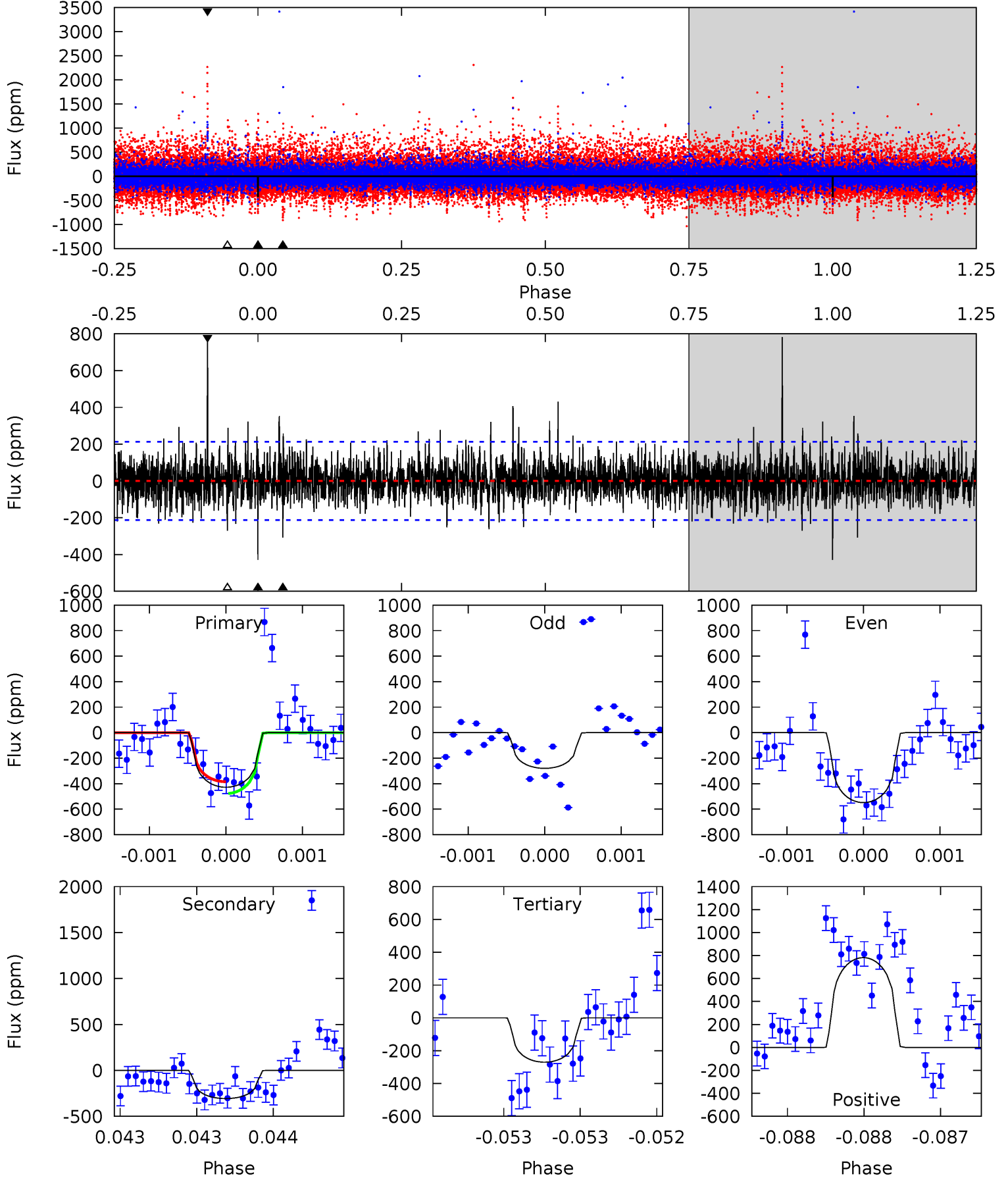
TCE 002854839-03     $P=385.346942$  Days     $T_0=356.962103$  (BKJD)



# DV Model-Shift Uniqueness Test

002854839-03, P = 385.343184 Days, E = 356.981262 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
11.2	8.04	7.07	20.4	5.57	3.47	1.99	4.13	-9.25	0.97	-12.4	2.96	0.72	0.65	1.21

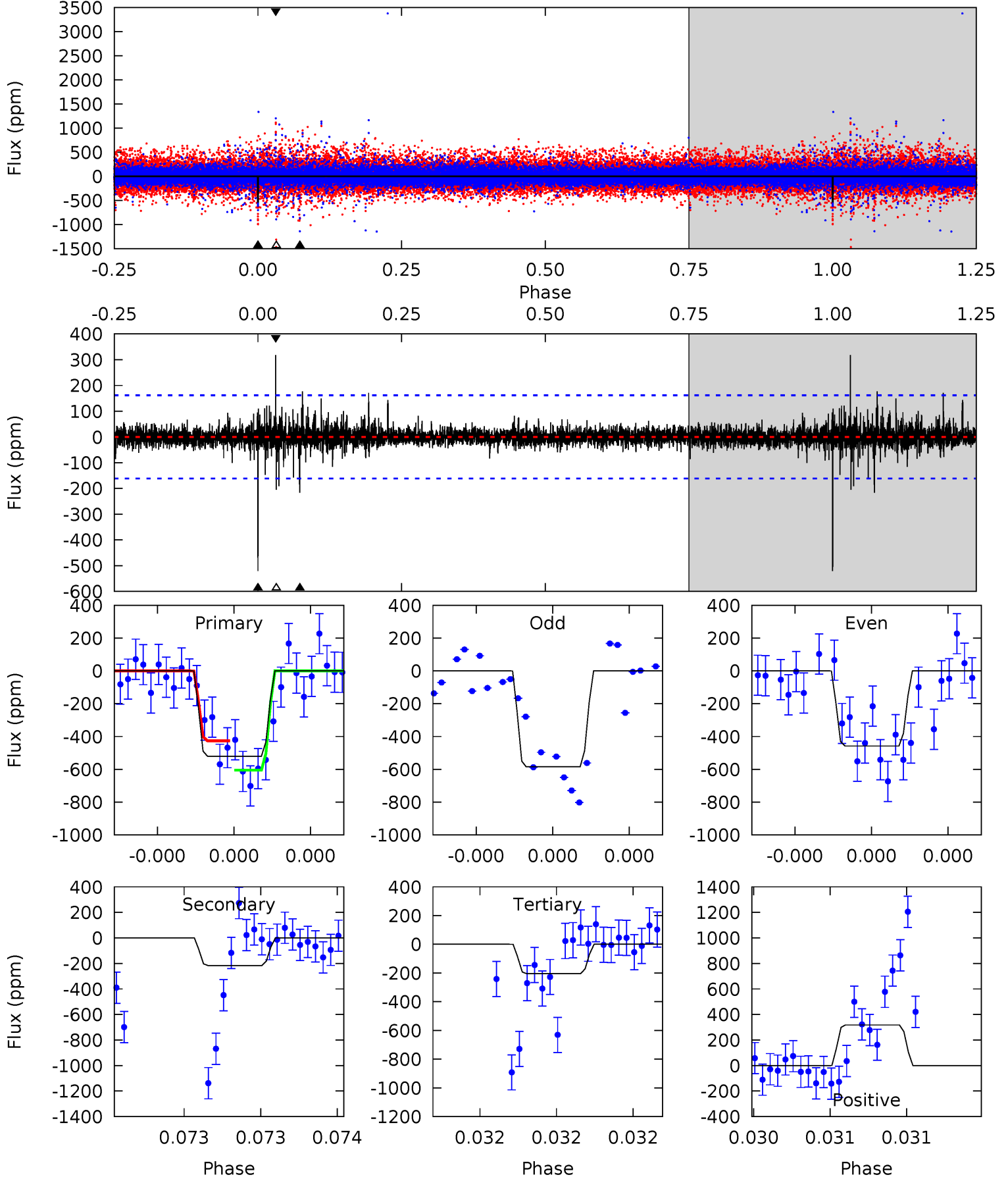




# Alt Model-Shift Uniqueness Test

002854839-03, P = 385.346942 Days, E = 356.962103 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
18.0	7.48	7.09	11.0	5.59	3.51	0.80	10.9	6.99	0.39	-3.52	2.08	0.93	0.38	3.10



### Stellar Parameters For KIC 002854839

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4955^{+176}_{-176}$	$4.561^{+0.061}_{-0.050}$	$-0.080^{+0.300}_{-0.300}$	$0.751^{+0.072}_{-0.072}$	$0.748^{+0.085}_{-0.064}$	$2.494^{+0.672}_{-0.442}$
	+4%/-4%	+1%/-1%	+375%/-375%	+10%/-10%	+11%/-9%	+27%/-18%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 002854839-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-307 \pm 38$	$3.82^{+4.16}_{-2.62}$	$272^{+12}_{-11}$	$3486^{+2008}_{-696}$	$10299^{+101862}_{-8007}$
Alt.	$-216 \pm 29$	$3.96^{+3.83}_{-2.71}$	$272^{+11}_{-12}$	$3257^{+1600}_{-582}$	$6928^{+61242}_{-5255}$

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

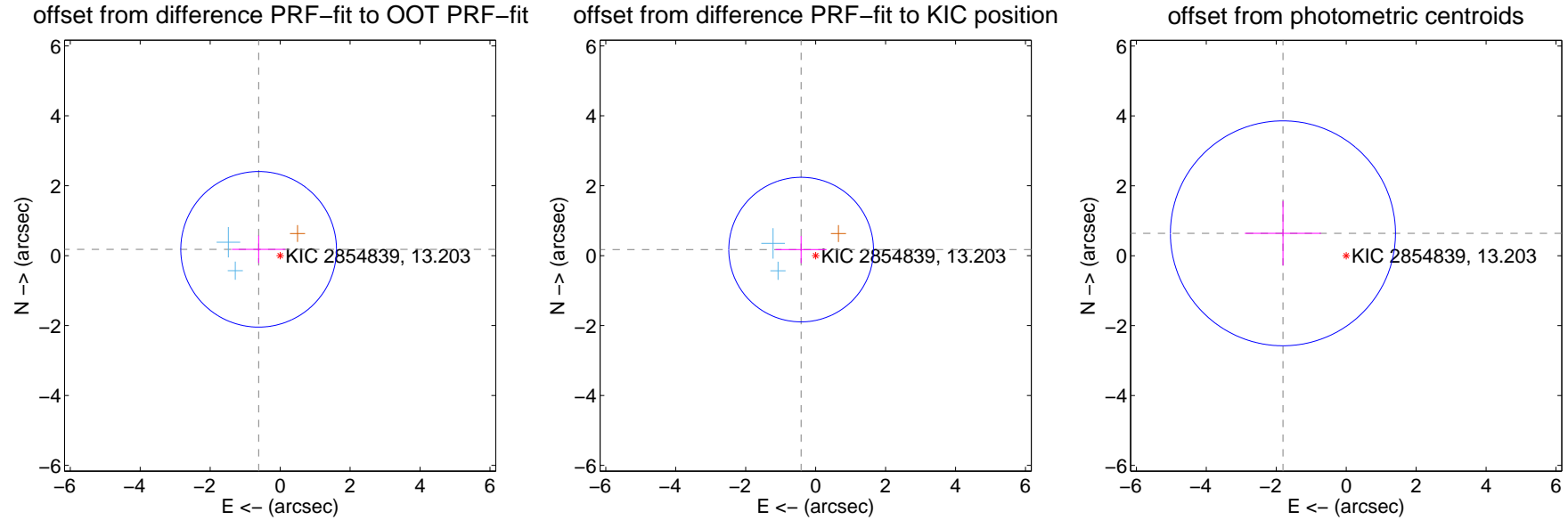
## DV Centroid Data

Supplemental centroid analysis for 002854839-03. Kepler magnitude: 13.20. Transit SNR 7.44

There are 2 quarters with good PRF difference image offsets

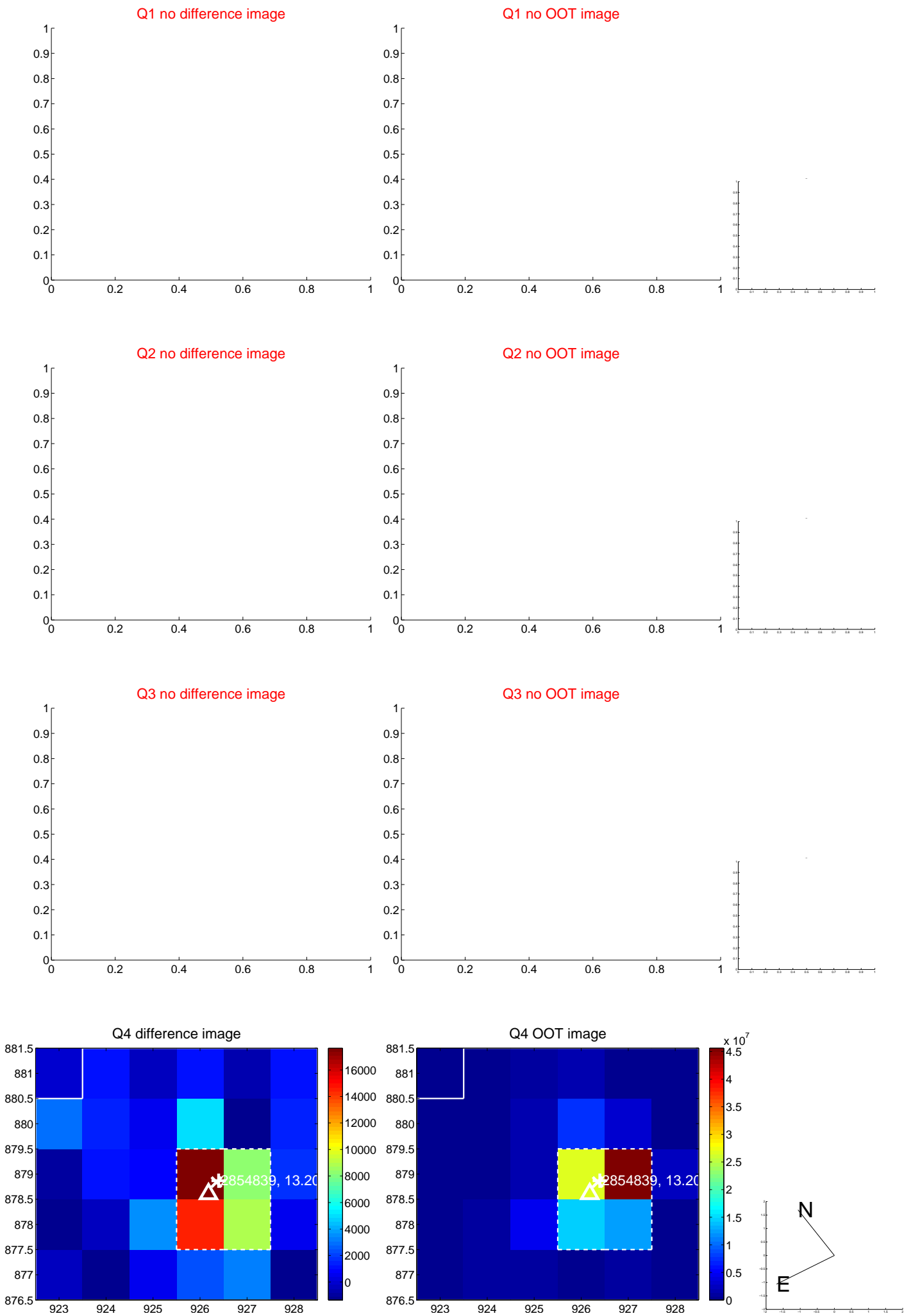
The direct PRF centroid is offset from the target star catalog position by about 0.27 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.641 \pm 0.742$	0.86	$0.615 \pm 0.764$	$0.181 \pm 0.391$
PRF-fit source offset from KIC position	$0.450 \pm 0.689$	0.65	$0.415 \pm 0.729$	$0.173 \pm 0.389$
photometric centroid source offset	$1.92 \pm 1.07$	1.79	$1.81 \pm 1.09$	$0.64 \pm 0.92$

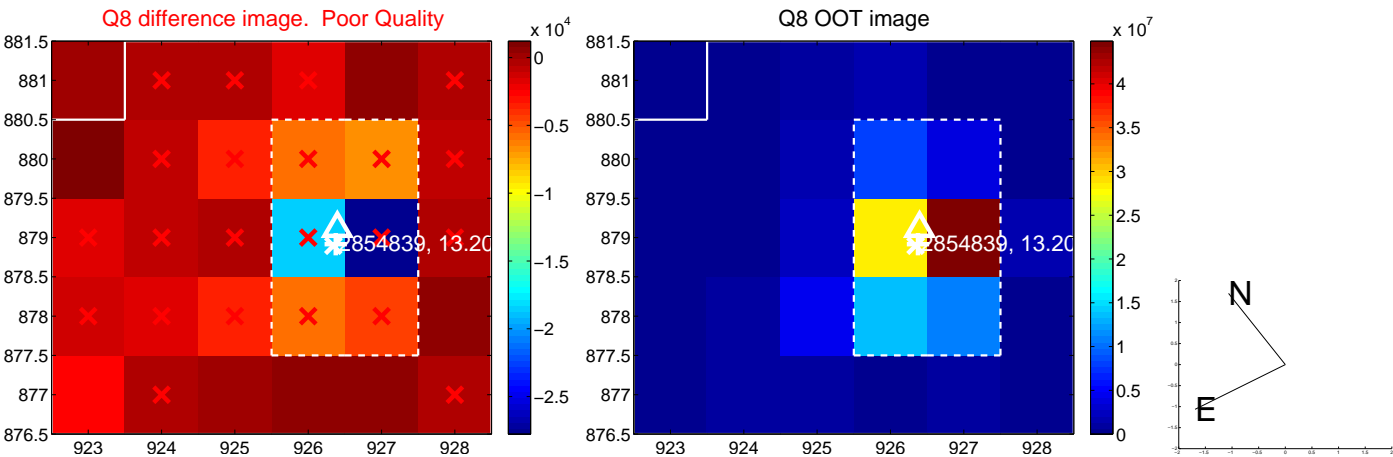


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



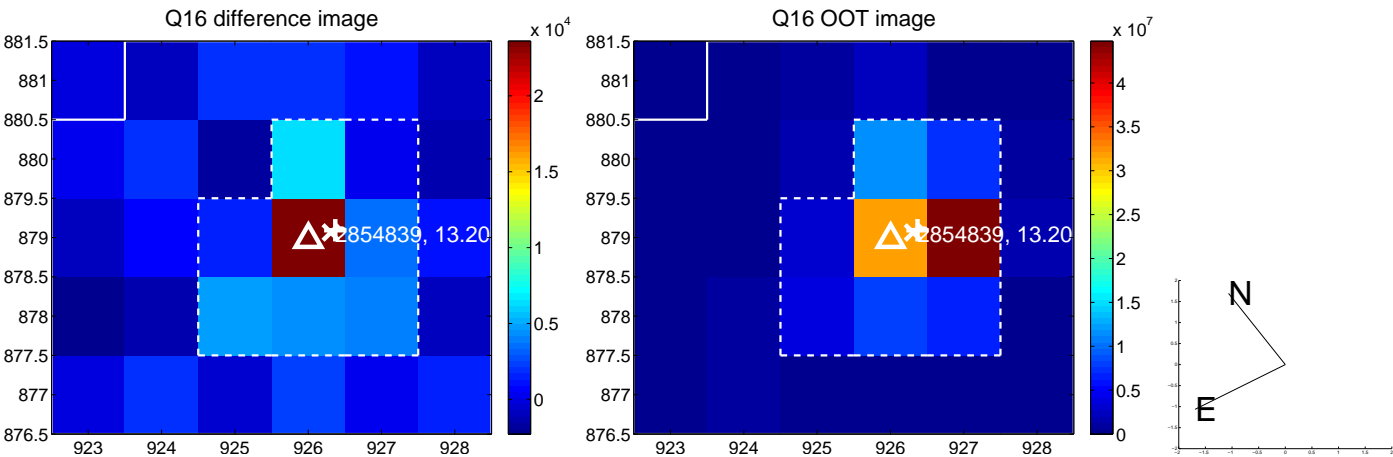
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

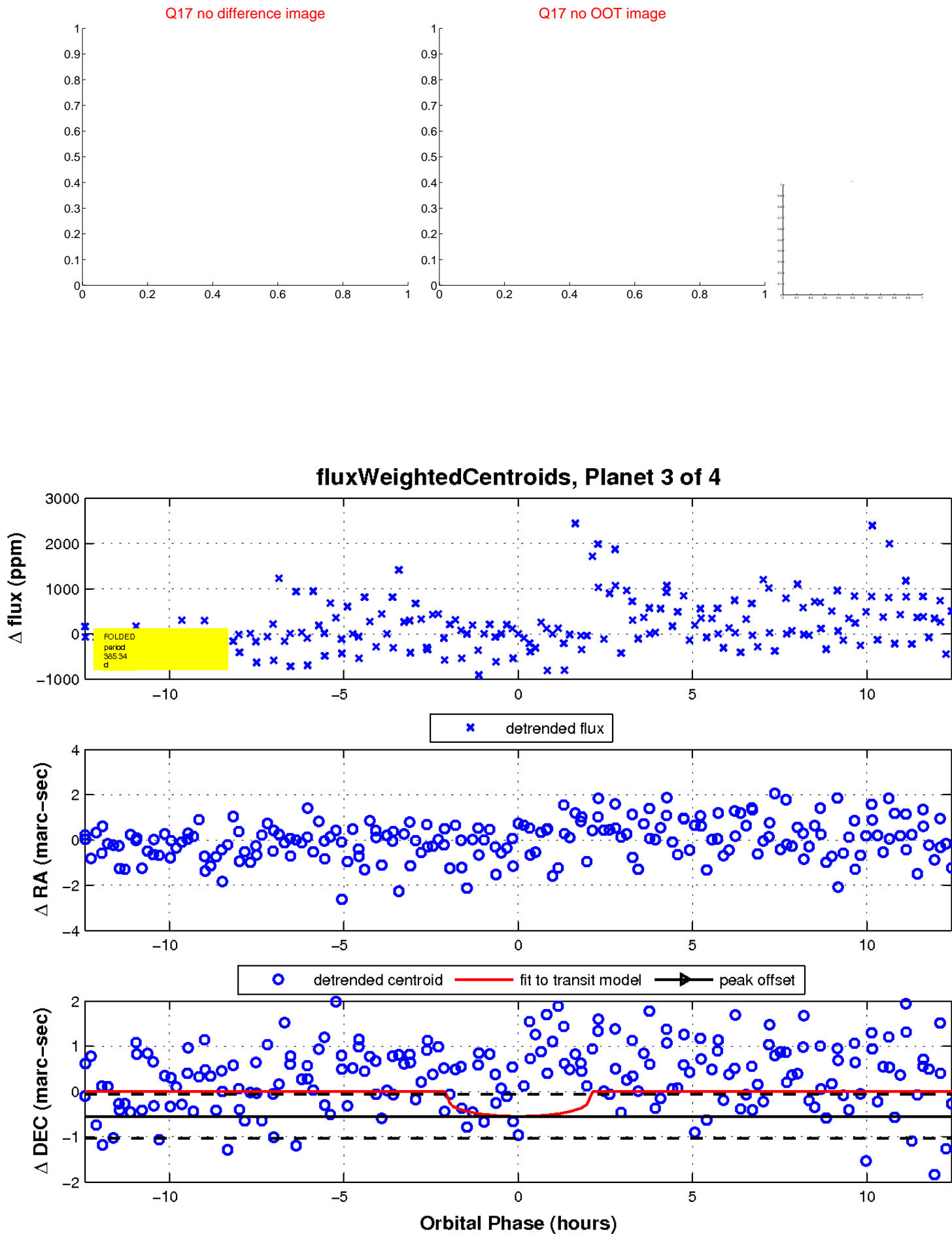


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

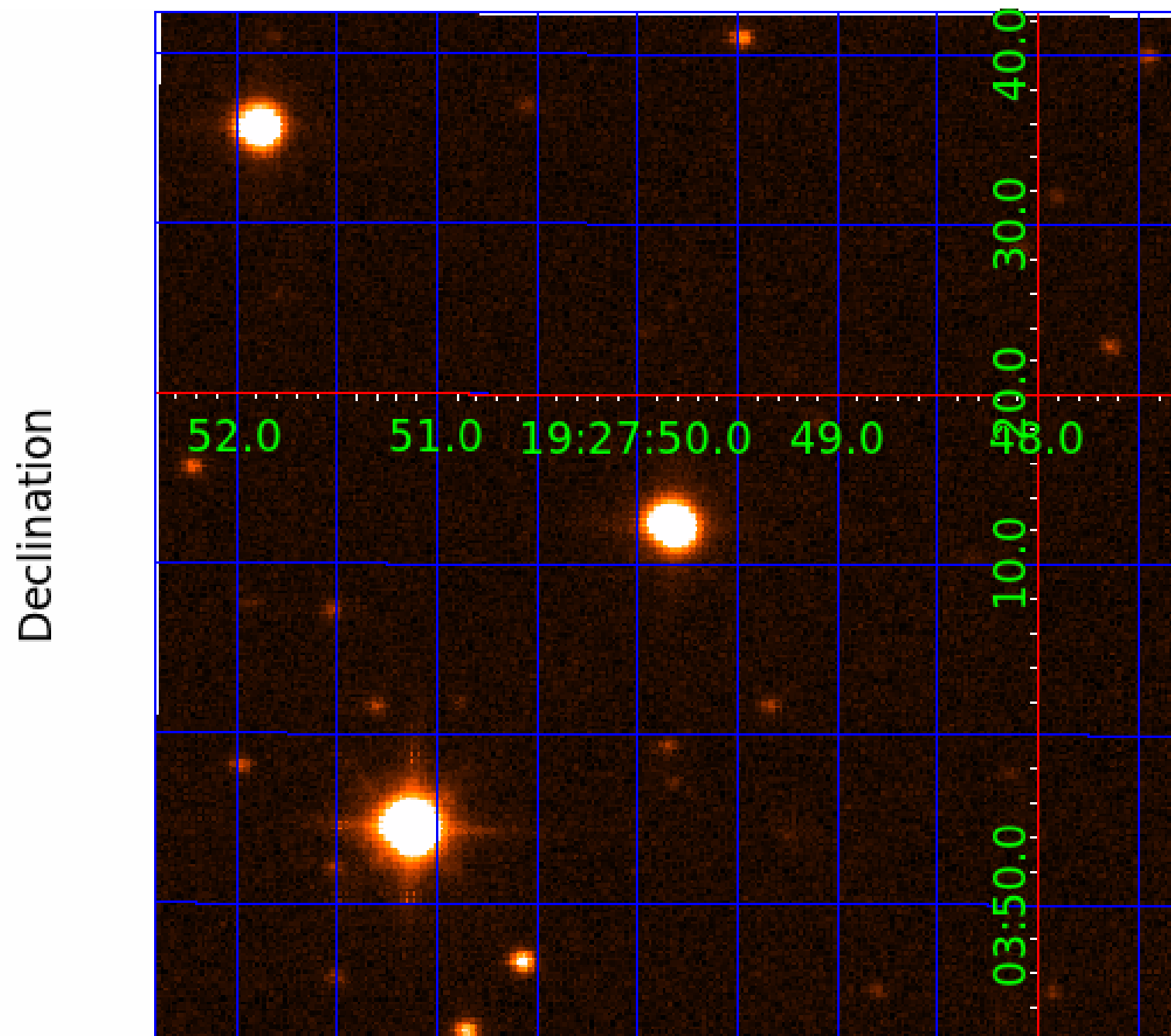




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image



# KIC 002854839

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002854839-01	OBS	7639.01	1.055699	131.557018	31.5	0.703	7.8	5.8	0.75	4955	0.50	896.97
002854839-02	OBS	No	107.137396	182.876239	330.7	2.973	9.5	5.4	0.75	4955	2.39	1.90
002854839-03	OBS	No	385.343184	356.981262	490.4	4.184	10.9	7.4	0.75	4955	1.61	0.34
002854839-04	OBS	No	277.968390	364.442645	535.5	10.940	13.6	5.9	0.75	4955	1.74	0.53

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002854839-01	OBS	FP	0.33	1	0	0	0	LPP_DV
002854839-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—TRANS_GAPPED—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS
002854839-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—CENT_FEW_DIFFS
002854839-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS

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

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

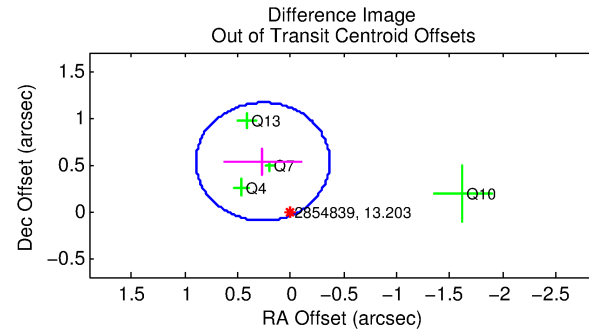
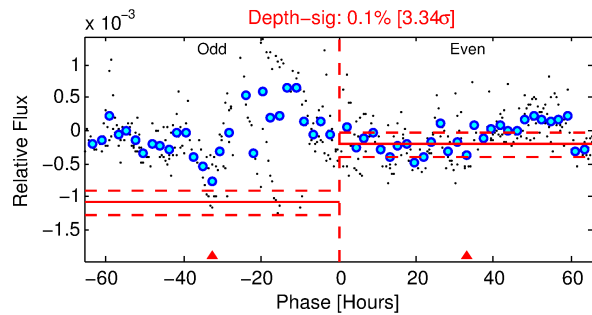
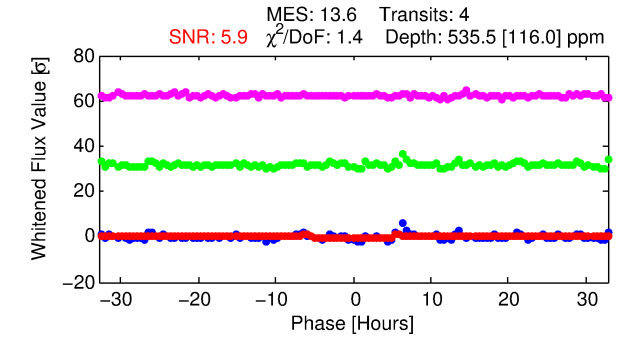
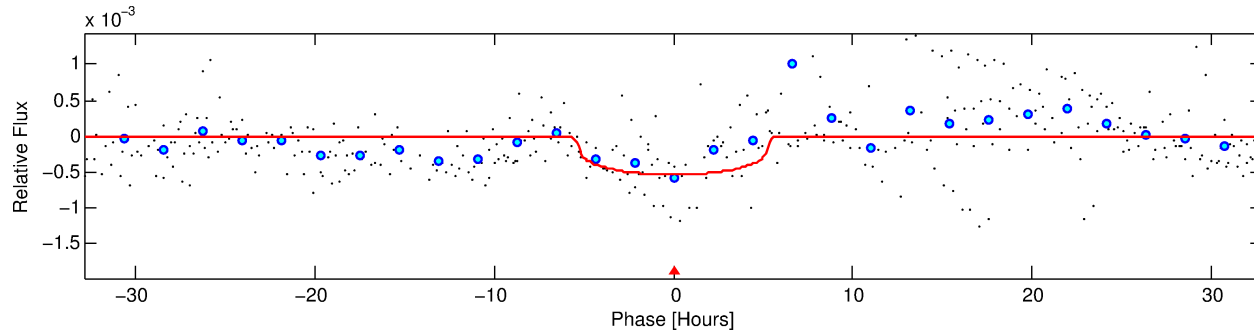
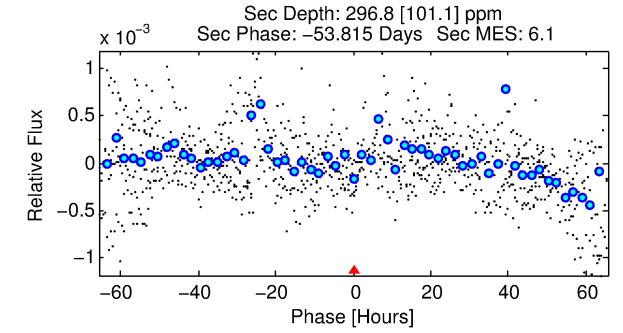
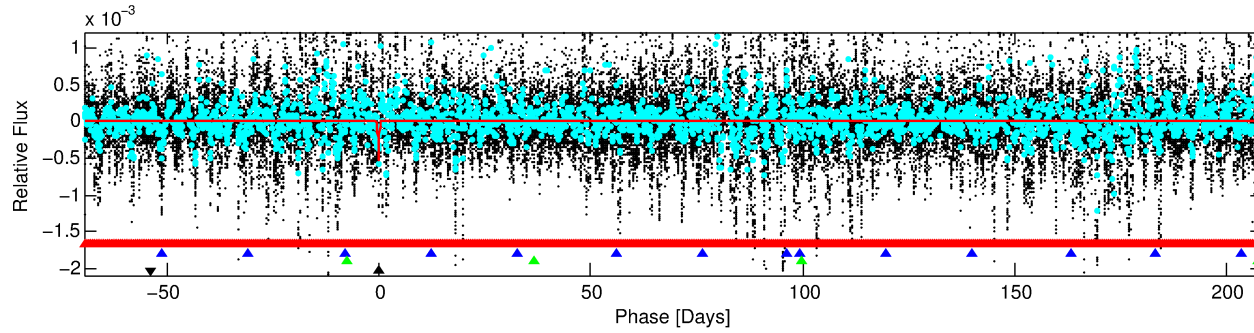
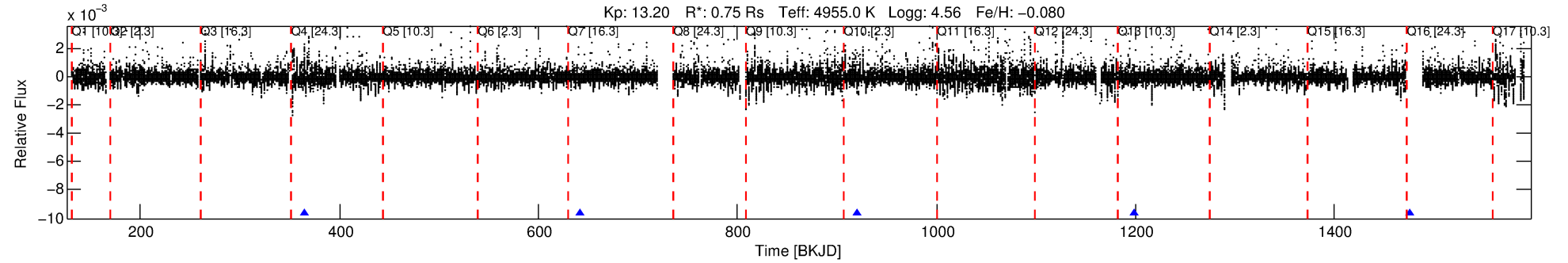
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 002854839-04

No Significant Match Found

# DV One-Page Summary

KIC: 2854839 Candidate: 4 of 4 Period: 277.968 d



## DV Fit Results:

Period = 277.96839 [0.00627] d  
Epoch = 364.4426 [0.0119] BKJD  
Rp/R\* = 0.0213 [0.0183]  
a/R\* = 175.47 [515.92]  
b = 0.48 [4.84]  
Seff = 0.53 [0.10]  
Teq = 218 [10] K  
Rp = 1.74 [1.51] Re  
a = 0.7570 [0.0600] AU  
Ag = 30789.69 [54105.71] [0.57σ]  
Teffp = 4459 [1961] K [2.16σ]

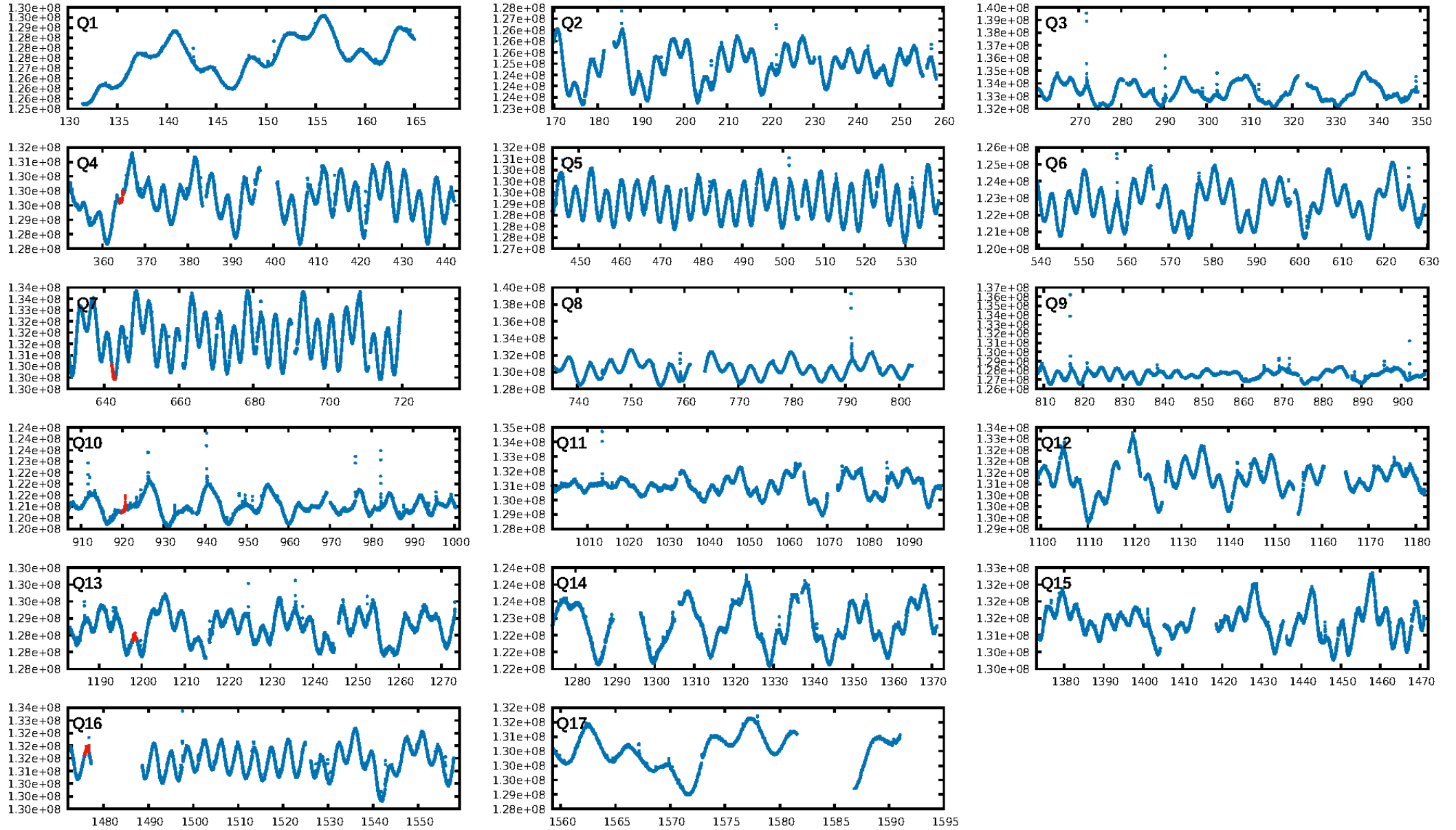
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [361.67σ]  
LongPeriod-sig: 100.0% [220.02σ]  
ModelChiSquare2-sig: 4.5%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 6.01e-14  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -1.631  
Centroid-sig: N/A  
Centroid-so: 0.991 arcsec [1.07σ]  
OotOffset-rm: 0.593 arcsec [2.82σ]  
KicOffset-rm: 0.445 arcsec [1.15σ]  
OotOffset-st: 1/1/1/1 [4]  
KicOffset-st: 1/1/1/1 [4]  
DiffImageQuality-fgm: 0.75 [3/4]  
DiffImageOverlap-fno: 0.00 [0/4]

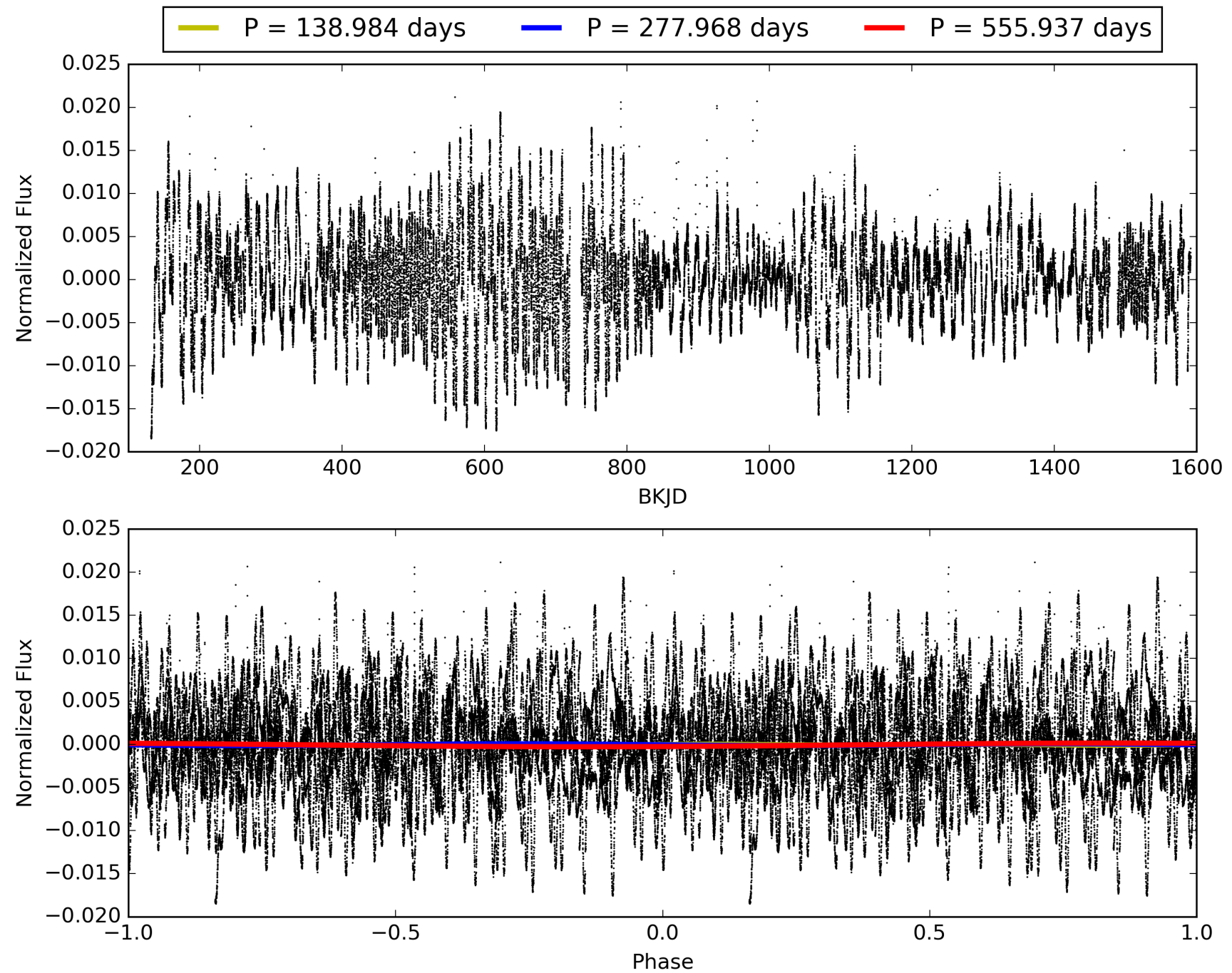
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 23:12:19 Z

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

# TCE 002854839-04, PDC Light Curves

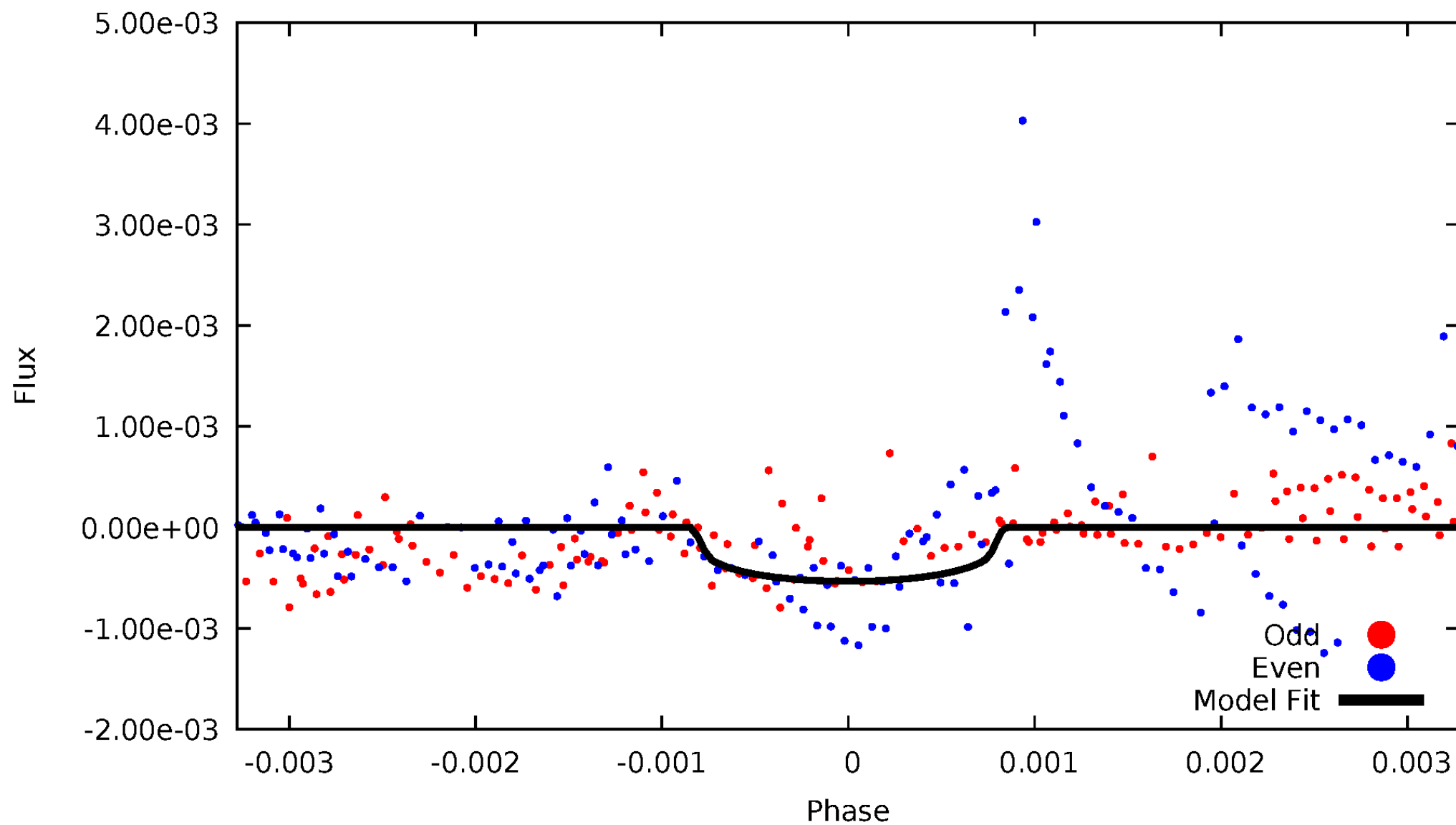


TCE 002854839-04



# DV Odd/Even

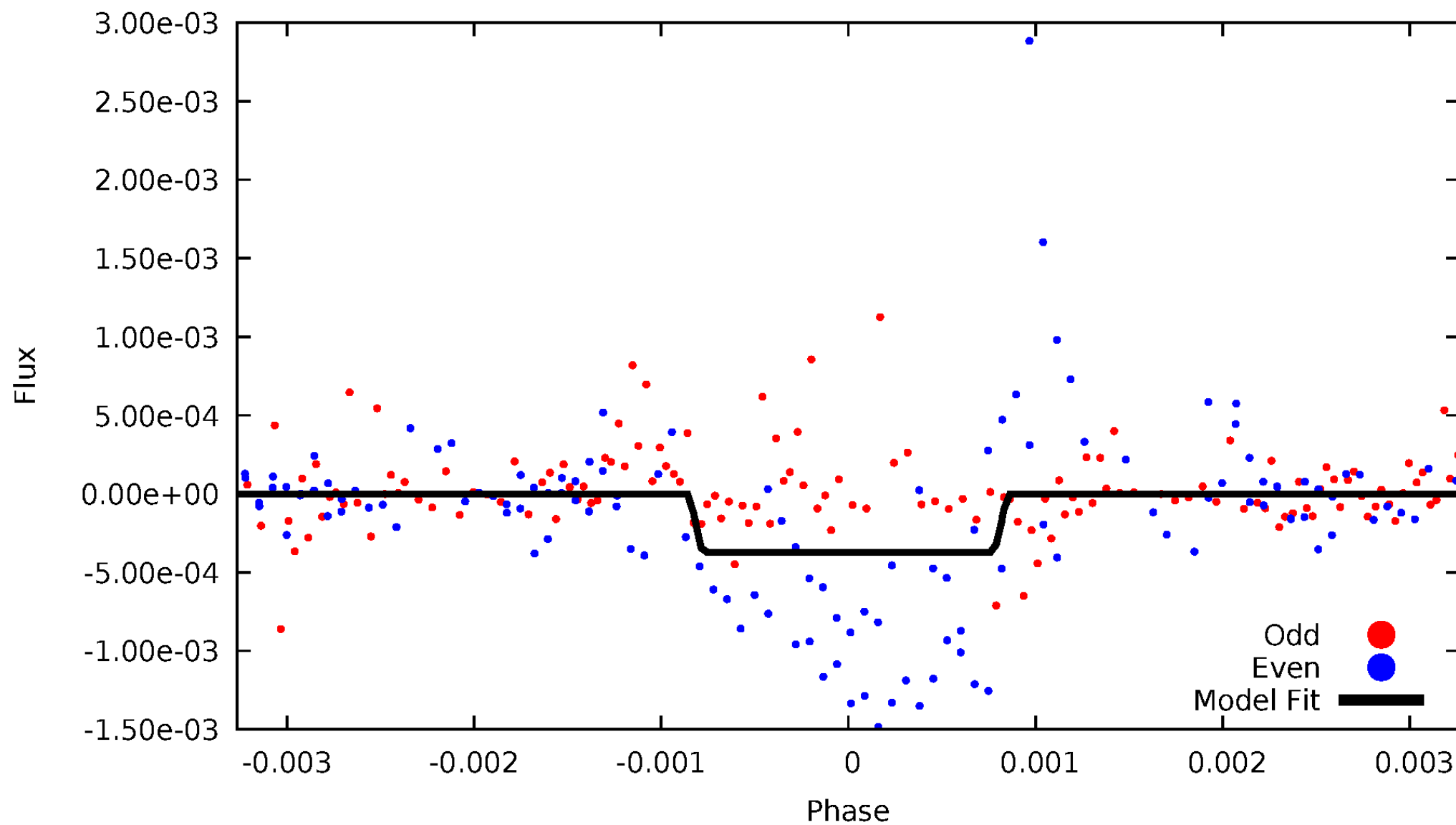
TCE 002854839-04





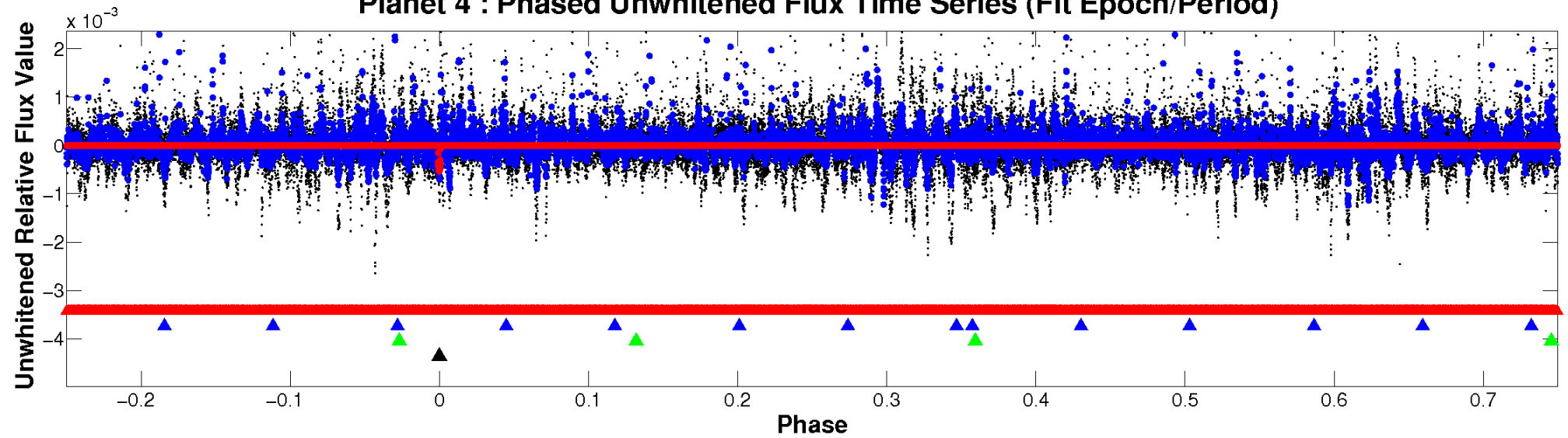
# ALT Odd/Even

TCE 002854839-04

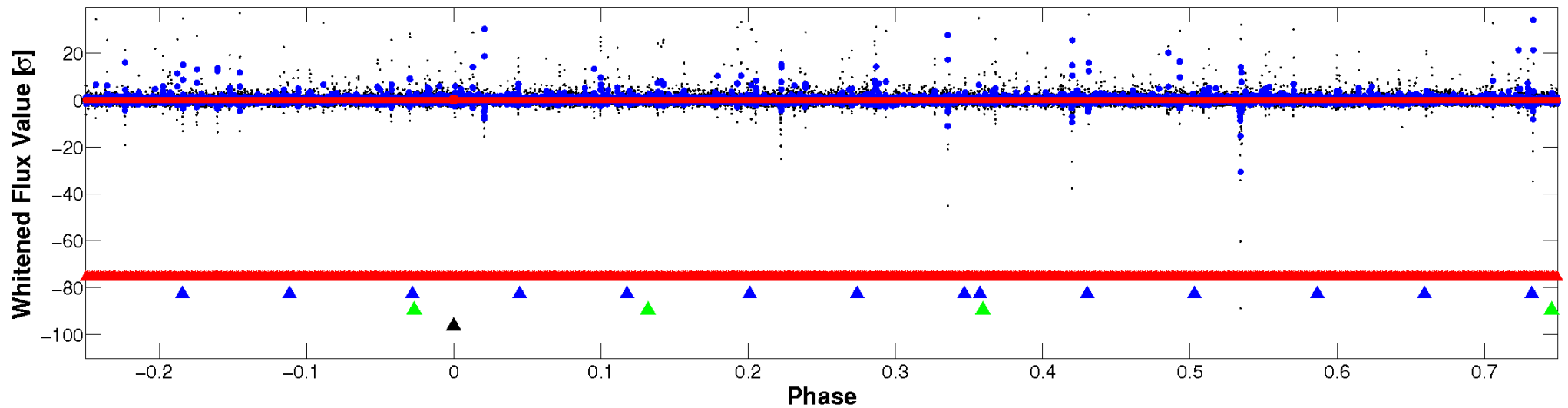


# Non-Whitened Vs. Whitened Light Curve

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

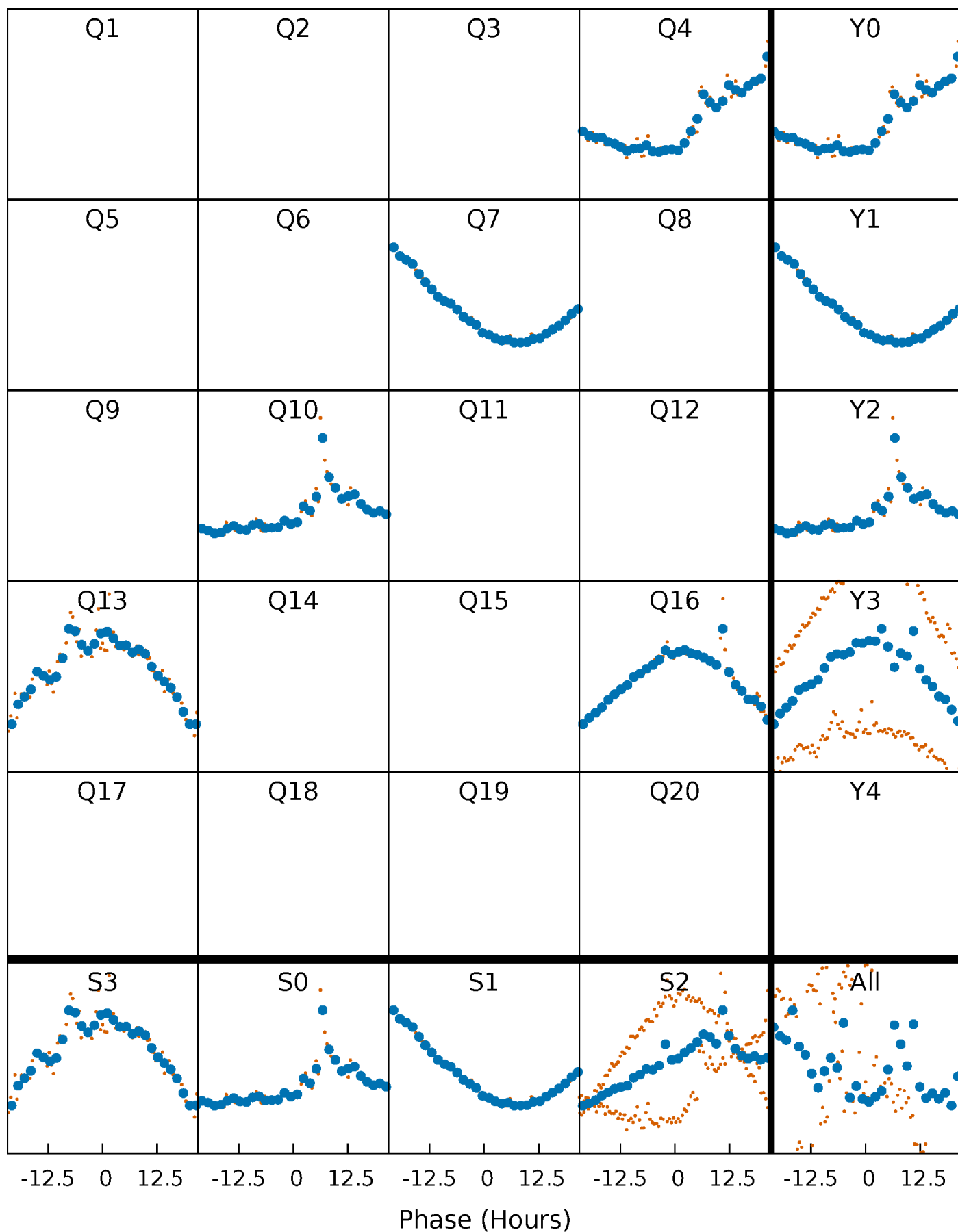


**Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



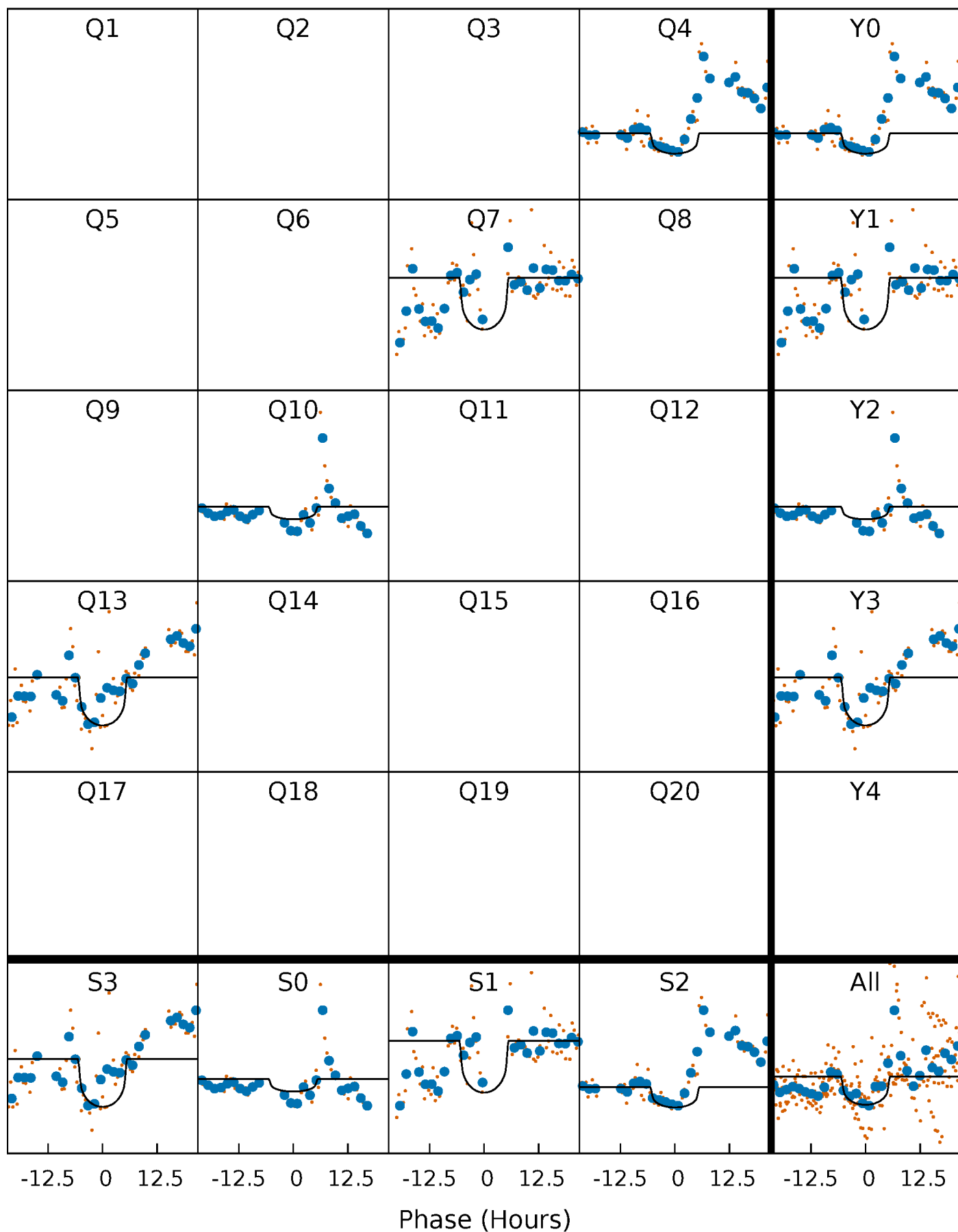
# PDC Quarter-Phased Transit Curves

TCE 002854839-04     $P=277.968390$  Days     $T_0=364.442645$  (BKJD)



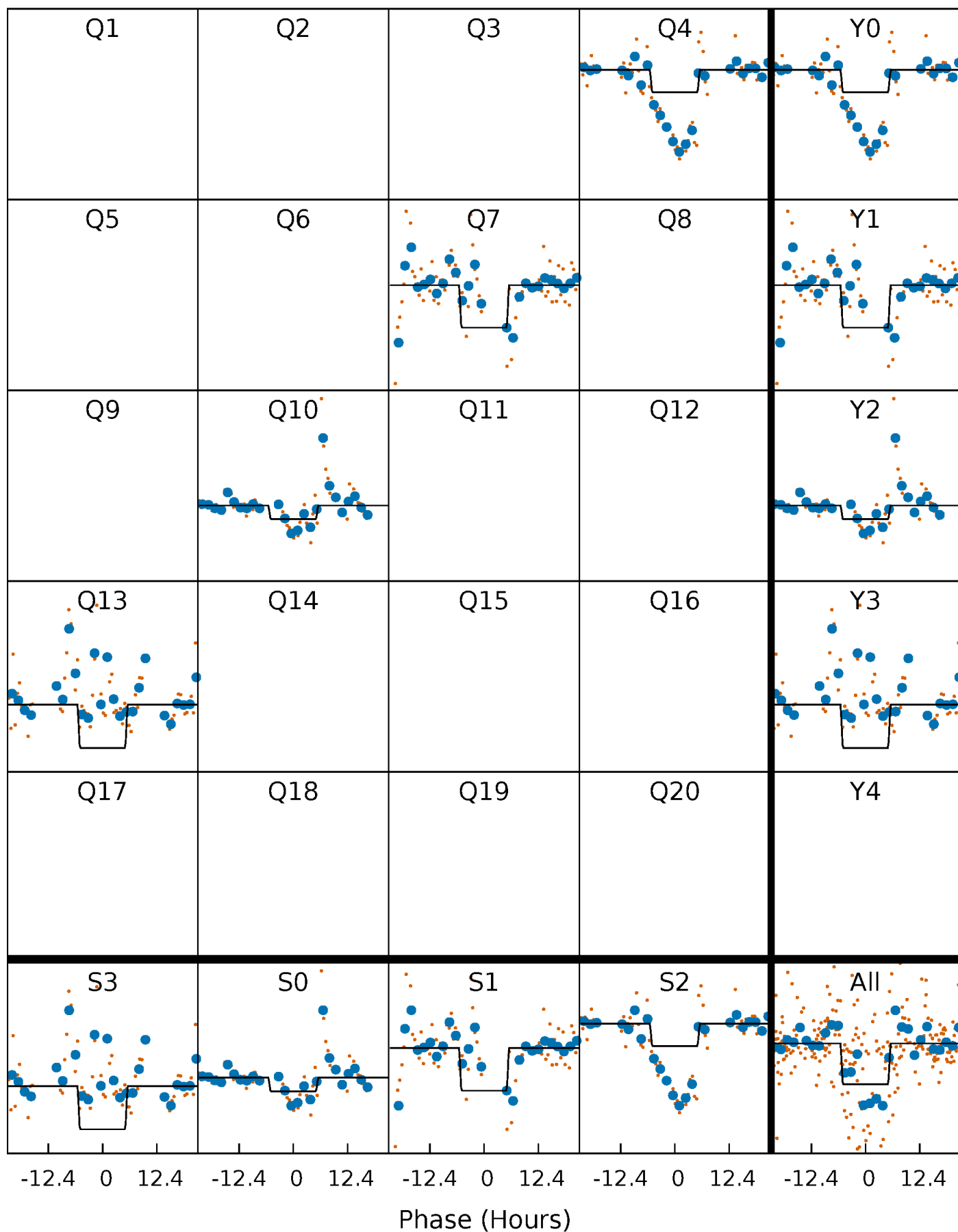
# DV Quarter-Phased Transit Curves

TCE 002854839-04     $P=277.968390$  Days     $T_0=364.442645$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

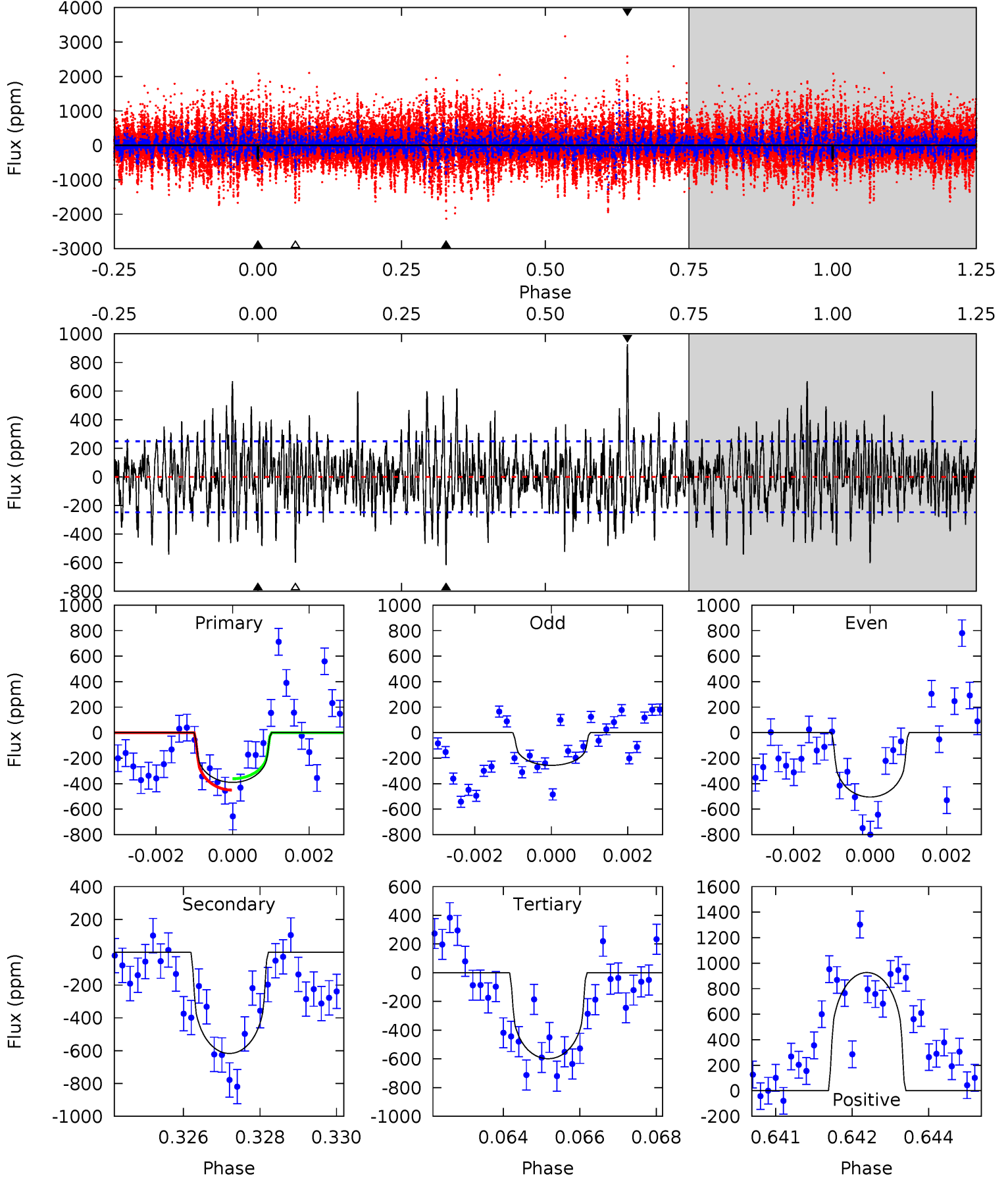
TCE 002854839-04     $P=277.971339$  Days     $T_0=364.448466$  (BKJD)



# DV Model-Shift Uniqueness Test

002854839-04, P = 277.968390 Days, E = 86.474255 Days

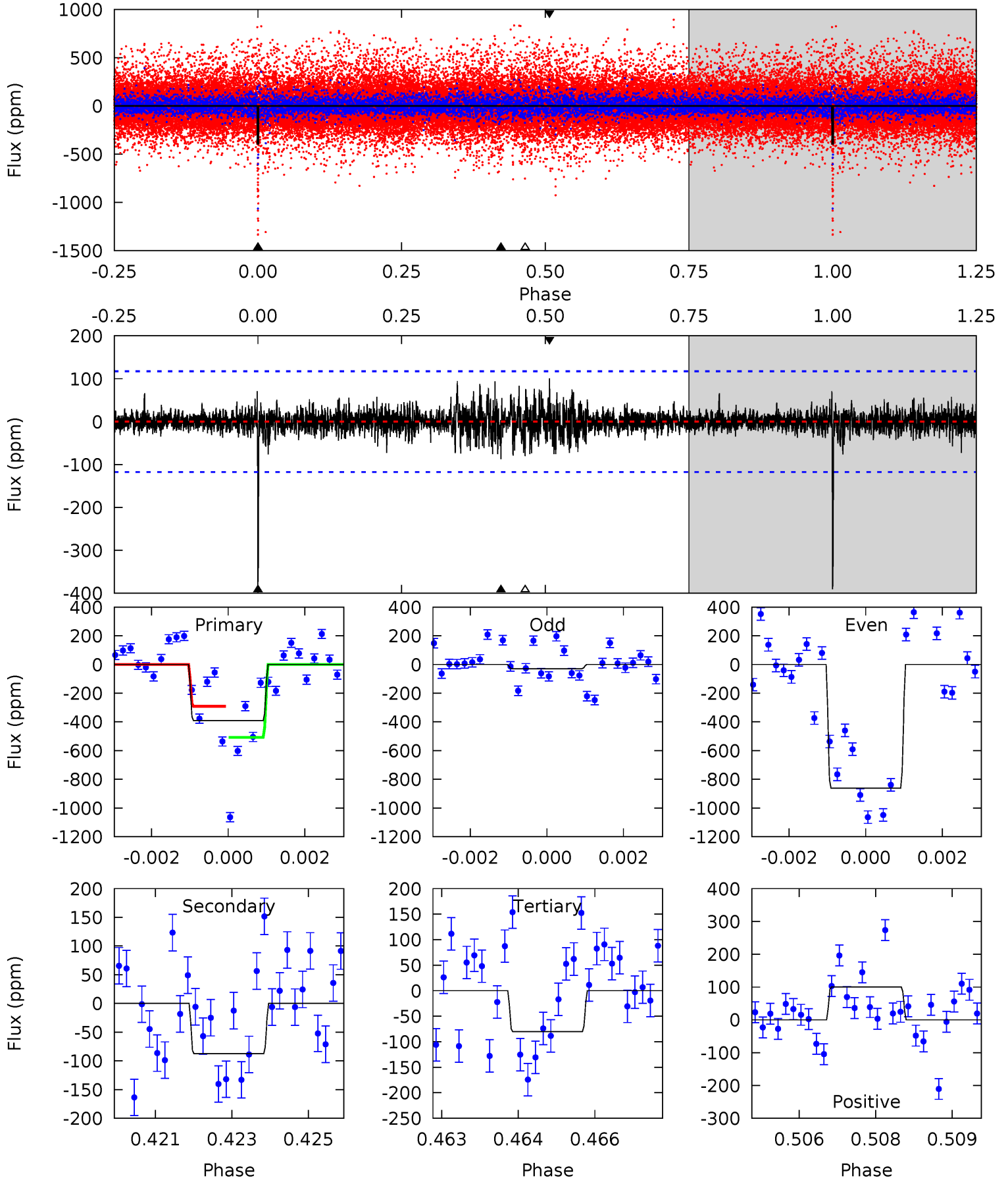
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.43	13.3	13.0	20.0	5.36	3.14	3.82	-4.52	-11.6	0.39	-6.70	2.44	1.32	0.60	0.97



# Alt Model-Shift Uniqueness Test

002854839-04, P = 277.971339 Days, E = 86.477127 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
17.8	3.99	3.65	4.58	5.36	3.15	0.93	14.2	13.2	0.34	-0.58	18.6	1.39	0.20	4.80





### Stellar Parameters For KIC 002854839

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4955^{+176}_{-176}$	$4.561^{+0.061}_{-0.050}$	$-0.080^{+0.300}_{-0.300}$	$0.751^{+0.072}_{-0.072}$	$0.748^{+0.085}_{-0.064}$	$2.494^{+0.672}_{-0.442}$
	+4%/-4%	+1%/-1%	+375%/-375%	+10%/-10%	+11%/-9%	+27%/-18%
Source	PHO54	PHO54	PHO54	DSEP		

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

### Secondary Eclipse Parameters for KIC 002854839-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-617 \pm 46$	$2.01^{+1.37}_{-1.24}$	$304^{+13}_{-13}$	$5038^{+3108}_{-950}$	$49346^{+295634}_{-32164}$
Alt.	$-88 \pm 22$	$1.88^{+1.40}_{-1.17}$	$304^{+13}_{-12}$	$3575^{+1562}_{-585}$	$7874^{+48293}_{-5437}$

$T_{max}$  = 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

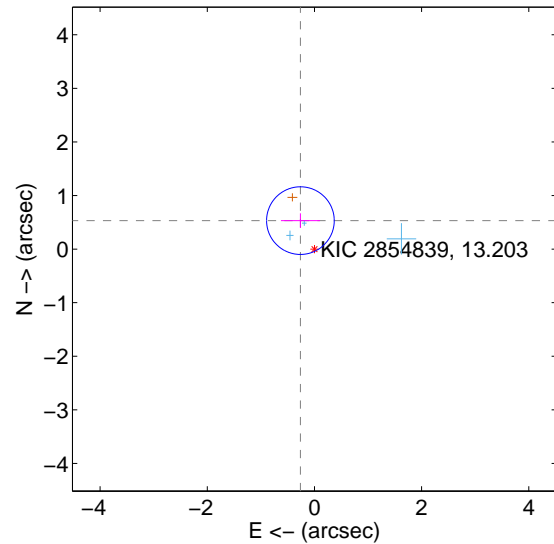
Supplemental centroid analysis for 002854839-04. Kepler magnitude: 13.20. Transit SNR 5.86

There are 3 quarters with good PRF difference image offsets

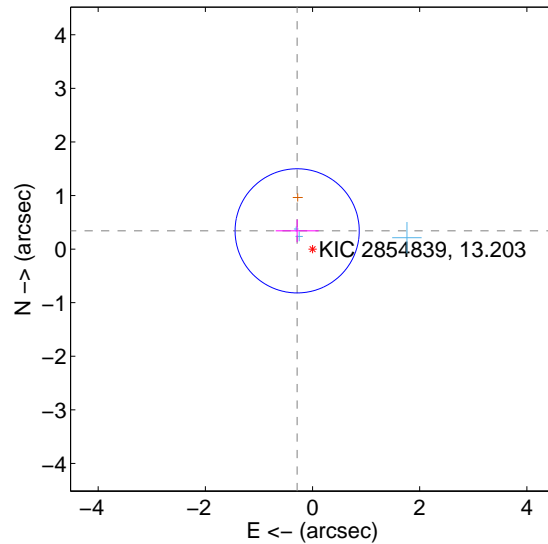
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.593 \pm 0.210$	2.82	$0.262 \pm 0.364$	$0.532 \pm 0.137$
PRF-fit source offset from KIC position	$0.445 \pm 0.386$	1.15	$0.287 \pm 0.400$	$0.341 \pm 0.212$
photometric centroid source offset	$0.99 \pm 0.92$	1.07	$-0.88 \pm 0.94$	$-0.46 \pm 0.87$

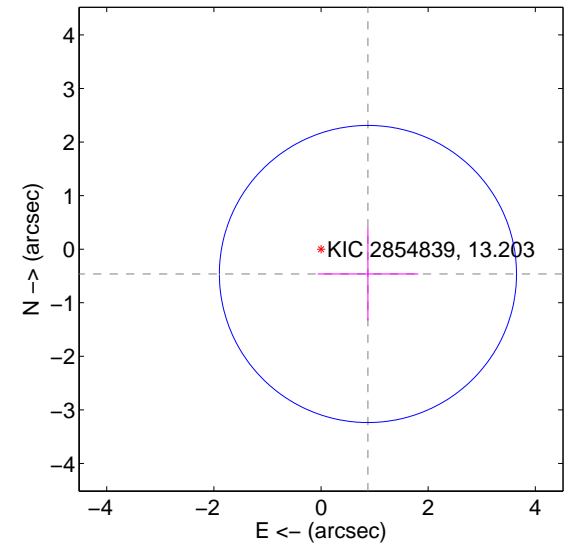
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

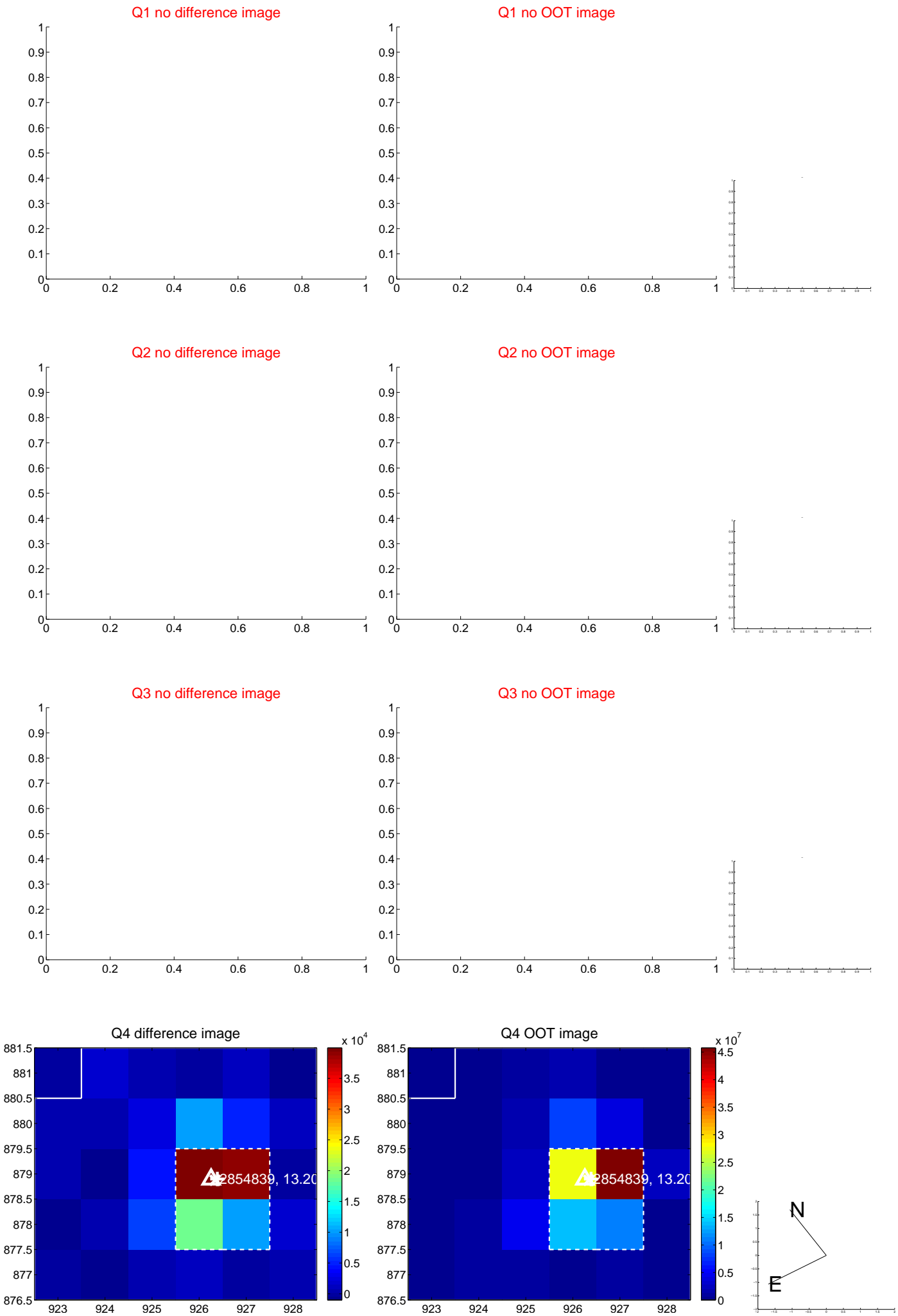


offset from photometric centroids



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



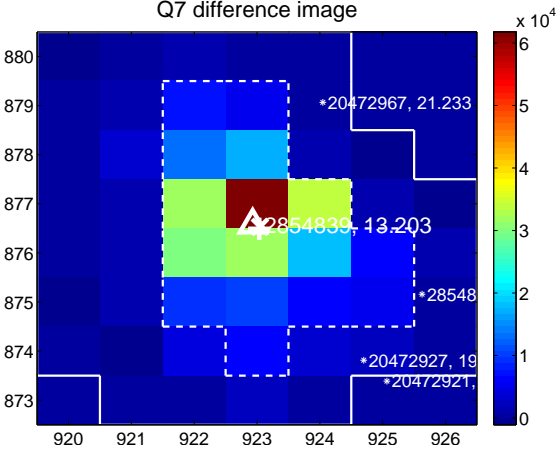
Q6 no difference image



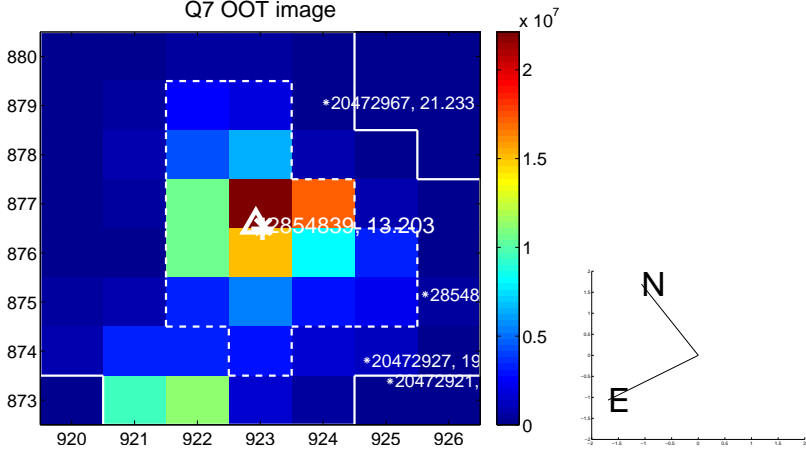
Q6 no OOT image



Q7 difference image



Q7 OOT image



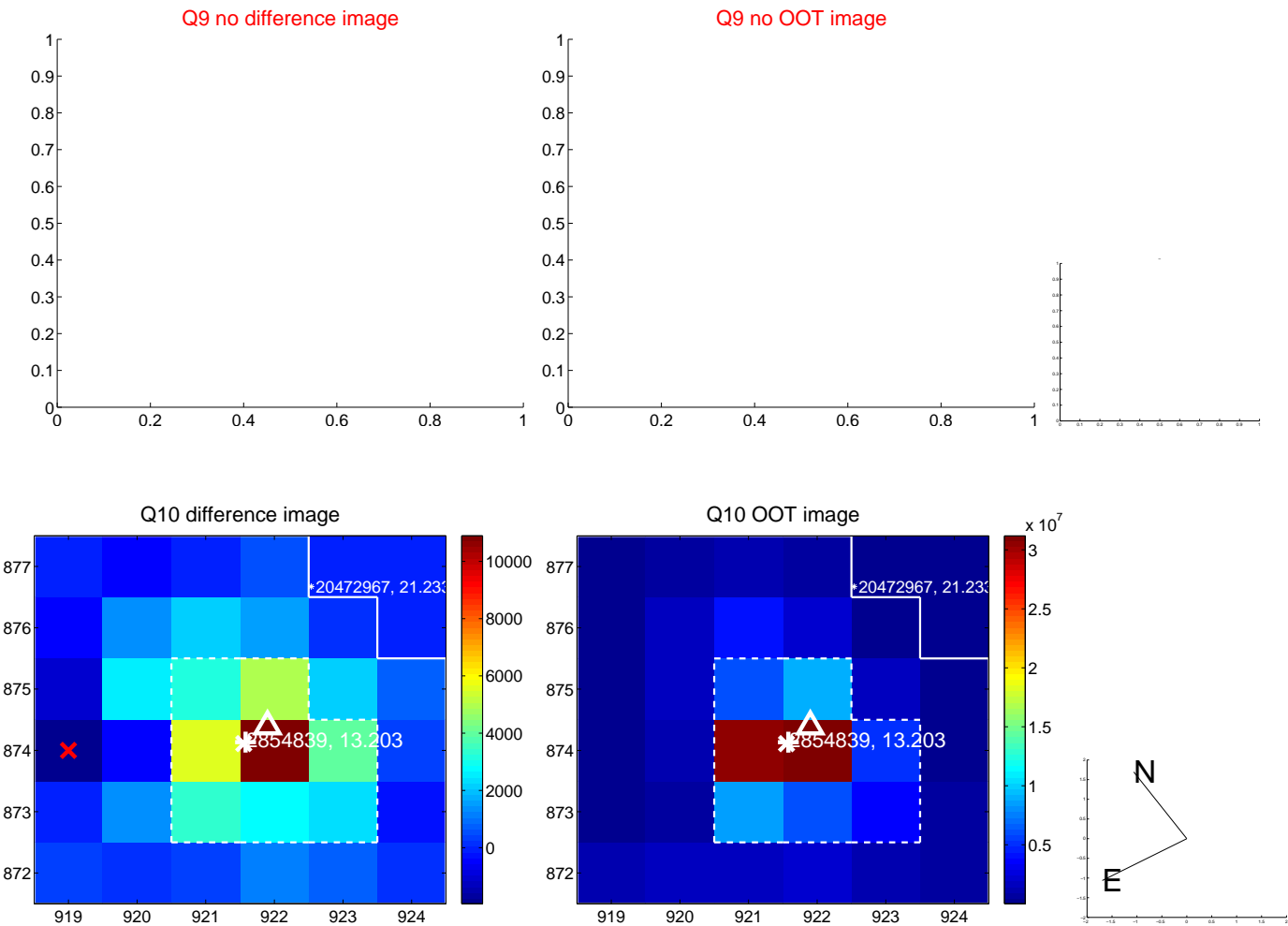
Q8 no difference image



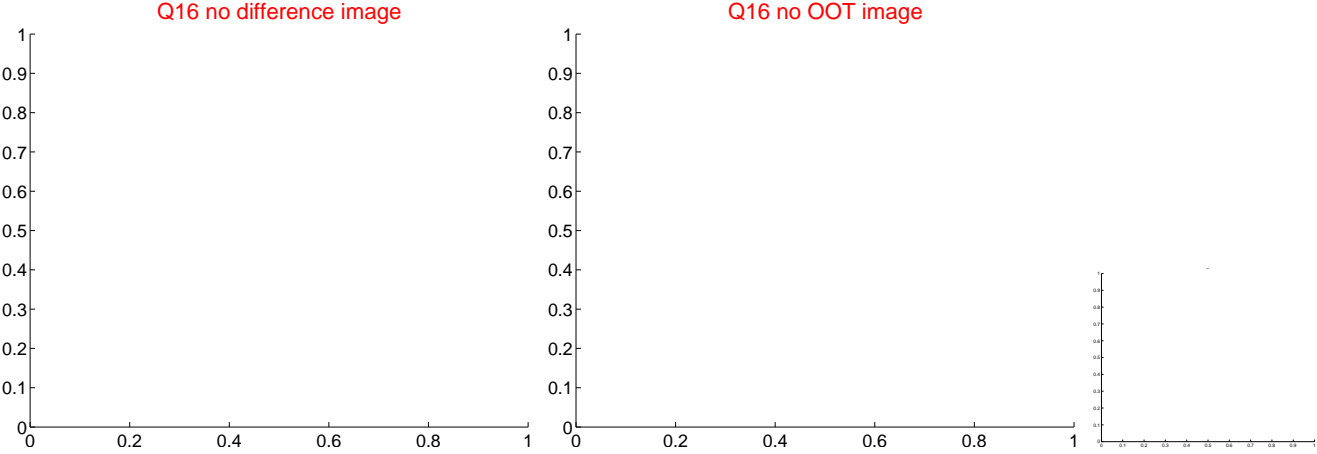
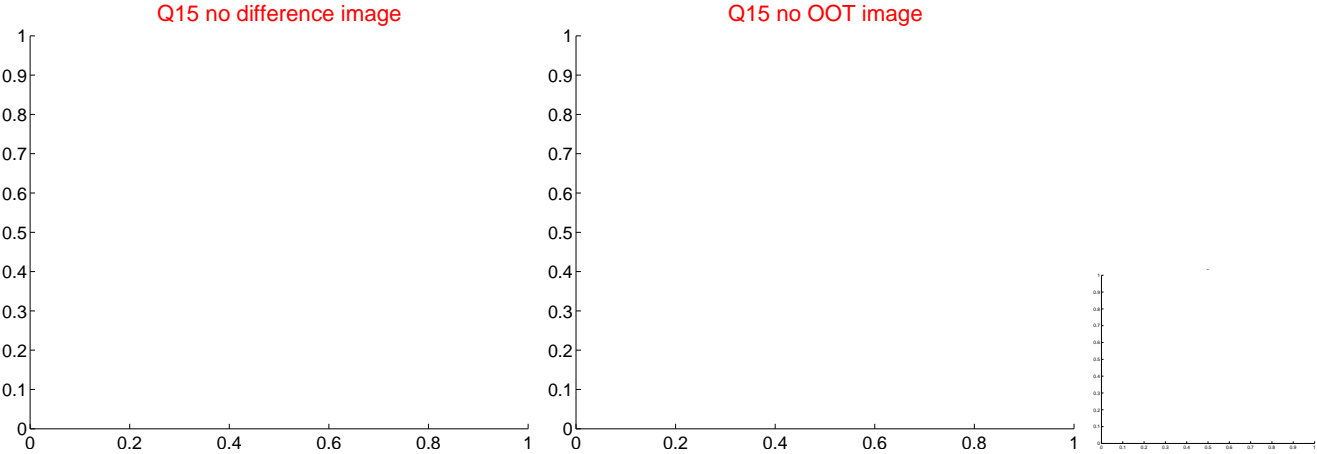
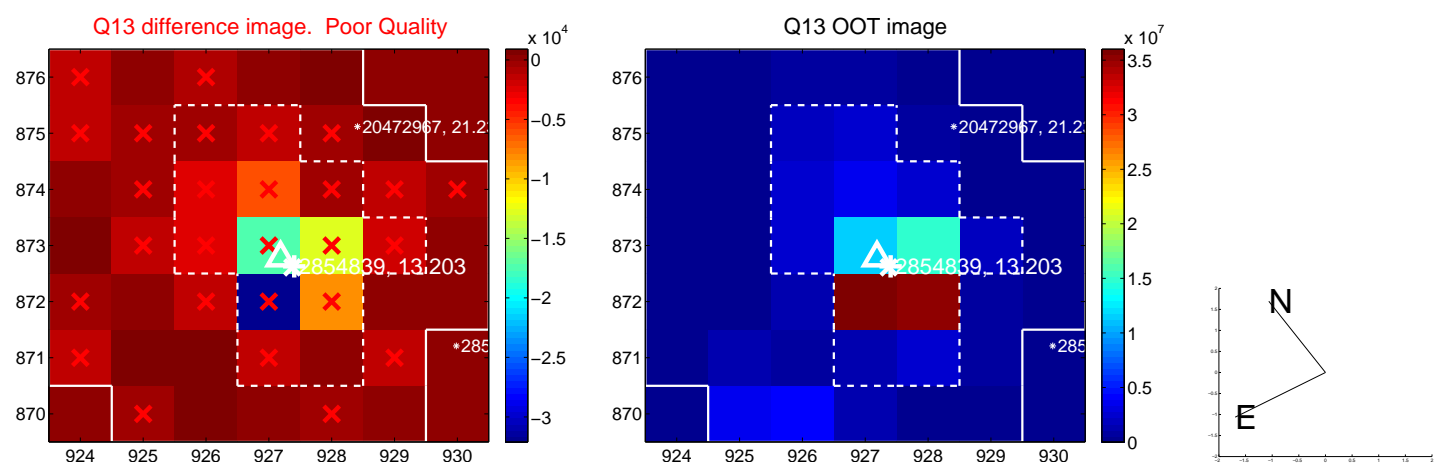
Q8 no OOT image



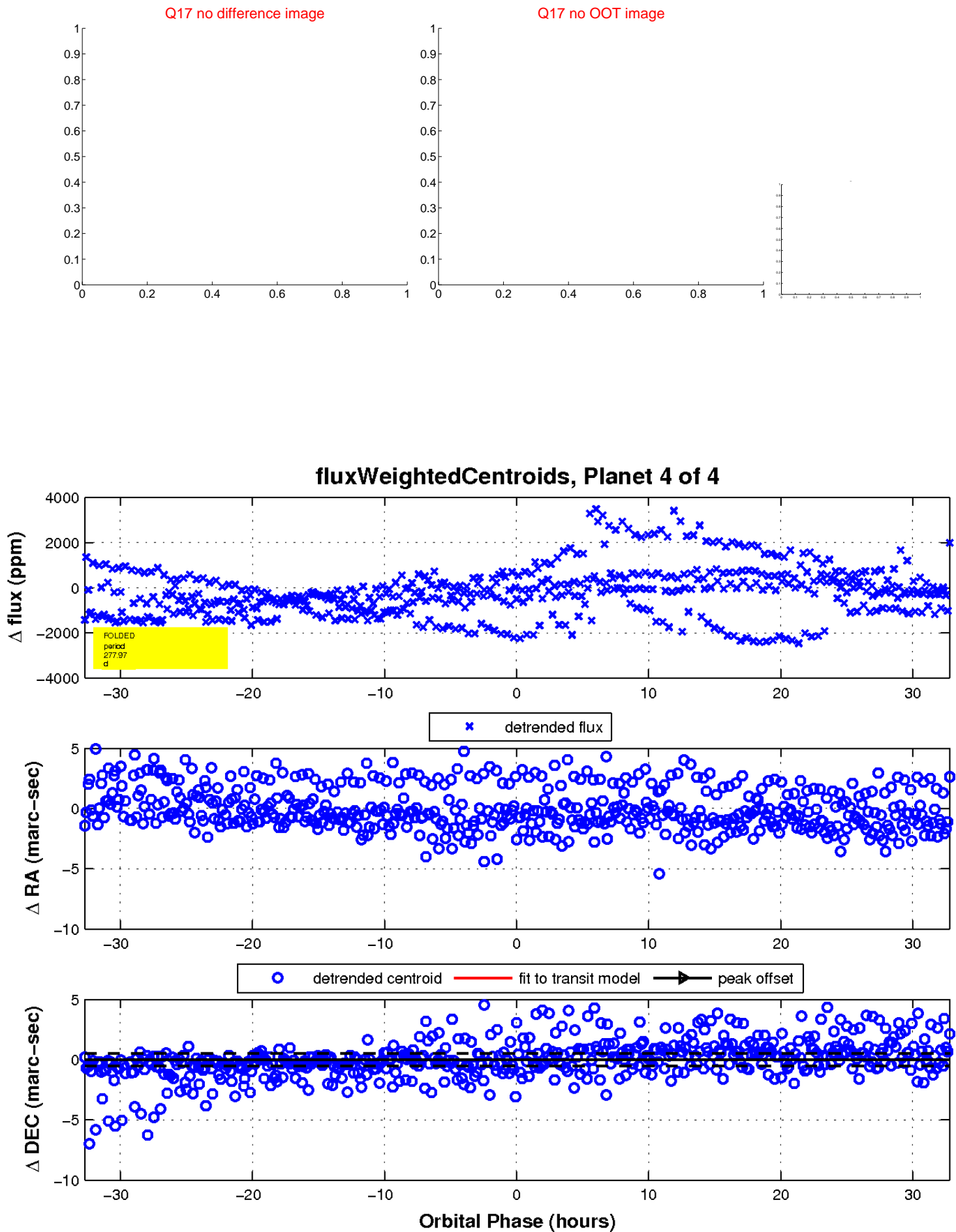
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.



UKIRT Image

