

# KIC 008873450

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008873450-01	OBS	No	329.128908	394.473473	2360.5	6.518	14.2	6.1	0.71	4450	3.27	0.26
008873450-02	OBS	No	501.919677	527.335460	1920.0	4.728	14.9	7.1	0.71	4450	3.03	0.15
008873450-03	OBS	No	507.529446	373.557613	1979.8	4.941	14.4	6.6	0.71	4450	4.27	0.14
008873450-04	OBS	No	270.967374	207.131607	649.6	1.722	16.5	3.5	0.71	4450	2.02	0.33
008873450-05	OBS	No	425.362386	271.409345	2246.5	15.491	11.1	6.0	0.71	4450	3.19	0.18
008873450-06	OBS	7913.01	24.278231	154.518614	840.8	4.450	12.5	13.7	0.71	4450	2.39	8.29
008873450-07	OBS	No	436.671988	245.084126	792.3	5.000	11.7	-1.0	0.71	4450	1.90	0.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008873450-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008873450-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008873450-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE_ZUMA—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008873450-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS
008873450-05	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008873450-06	OBS	FP	0.00	0	0	1	0	CENT_KIC_POS—HALO_GHOST
008873450-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—CENT_NOFITS

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

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

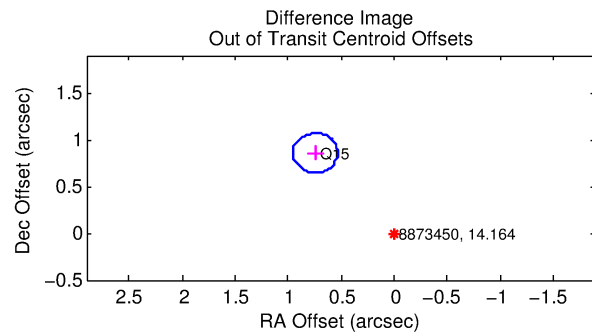
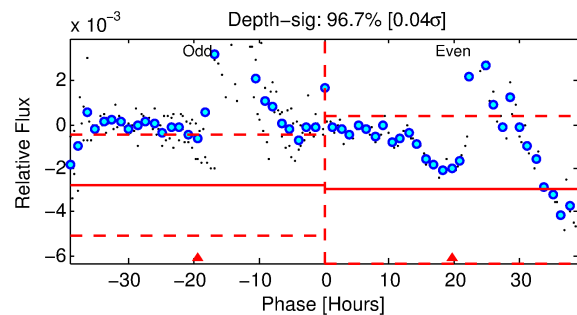
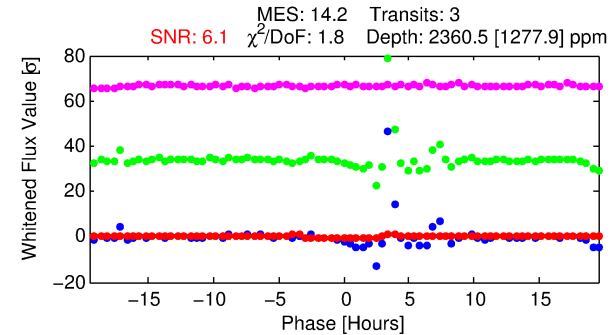
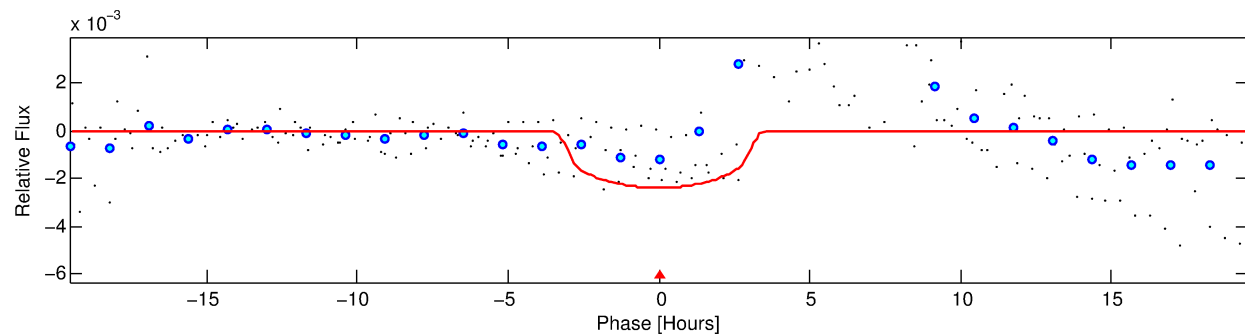
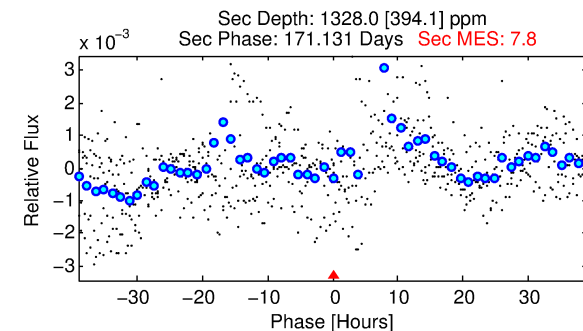
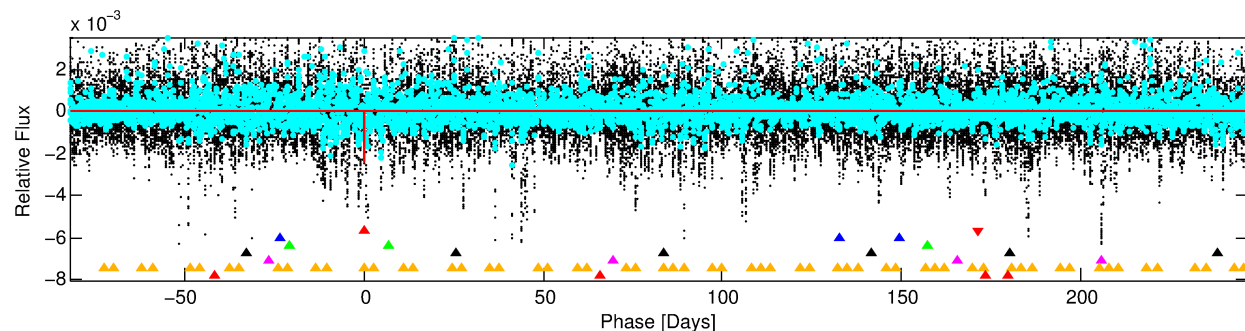
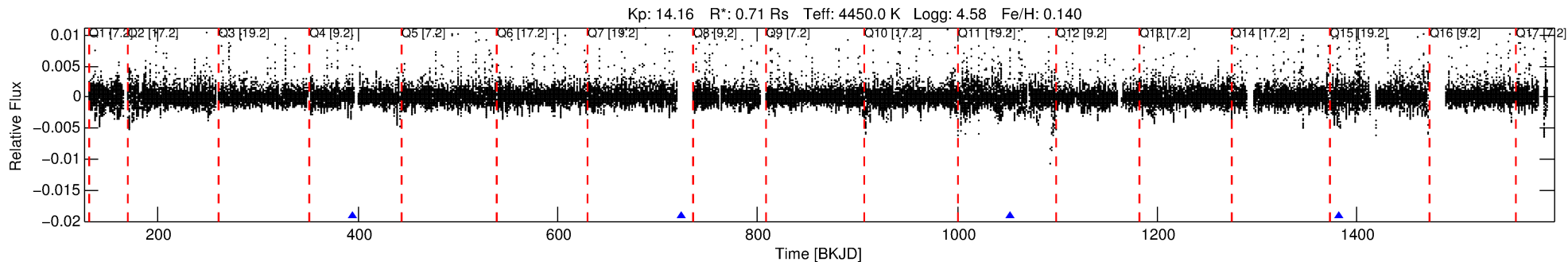
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008873450-01

No Significant Match Found

# DV One-Page Summary

KIC: 8873450 Candidate: 1 of 7 Period: 329.129 d



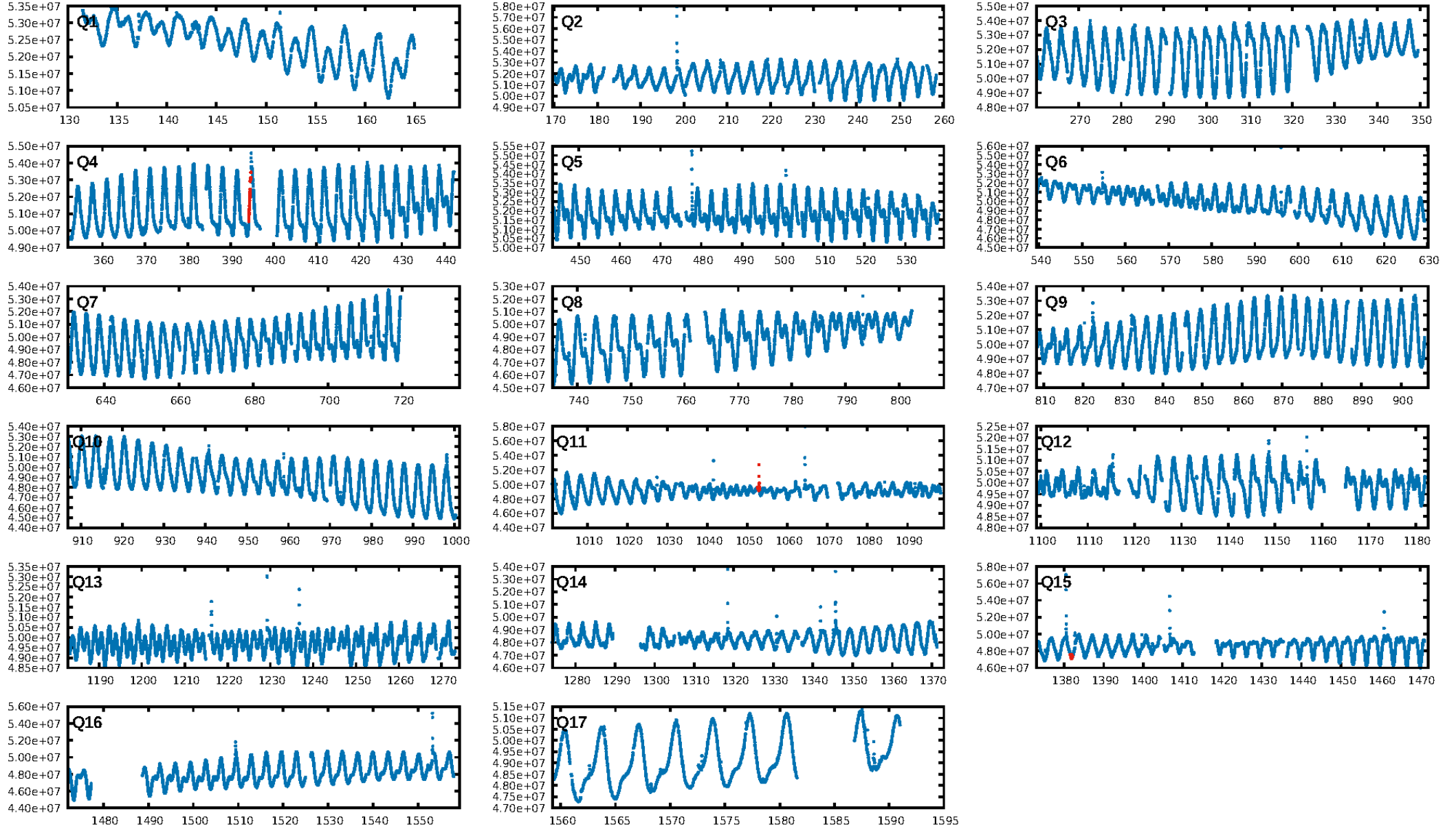
## DV Fit Results:

Period = 329.12891 [0.01052] d  
Epoch = 394.4735 [0.0220] BKJD  
Rp/R\* = 0.0423 [0.0945]  
a/R\* = 402.07 [2569.44]  
b = 0.00 [6537.19]  
Seff = 0.26 [0.04]  
Teq = 181 [7] K  
Rp = 3.27 [7.30] Re  
a = 0.8277 [0.0582] AU  
Ag = 46897.21 [209920.26] [0.22σ]  
Teffp = 4128 [4620] K [0.85σ]

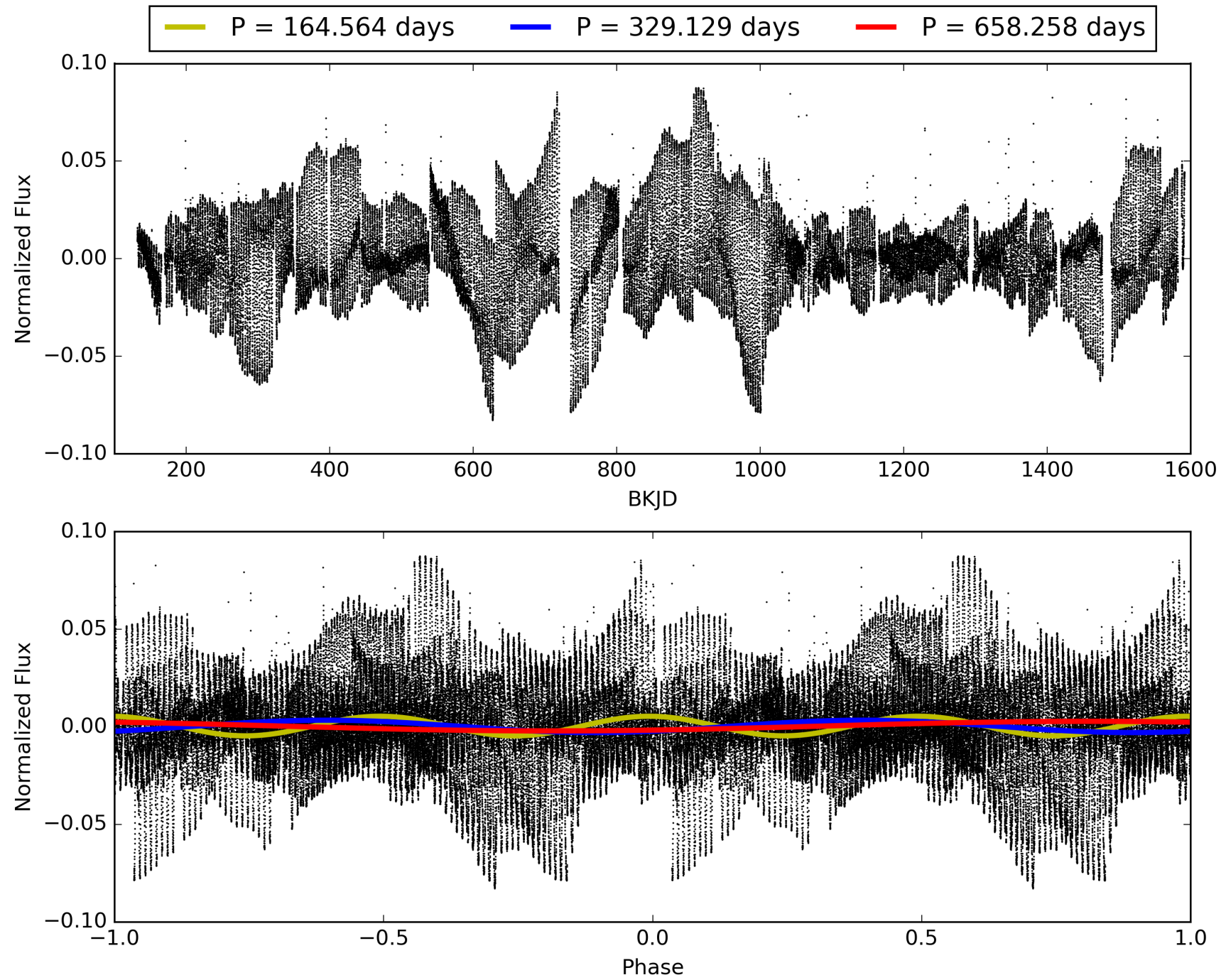
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [207.05σ]  
LongPeriod-sig: 100.0% [137.42σ]  
ModelChiSquare2-sig: 39.0%  
ModelChiSquareGof-sig: 13.1%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 5.512  
Centroid-sig: 20.1%  
Centroid-so: 0.926 arcsec [1.12σ]  
**OotOffset-rm: 1.132 arcsec [16.10σ]**  
KicOffset-rm: 0.056 arcsec [0.80σ]  
OotOffset-st: 0/1/0/0 [1]  
KicOffset-st: 0/1/0/0 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 0.67 [2/3]

# TCE 008873450-01, PDC Light Curves



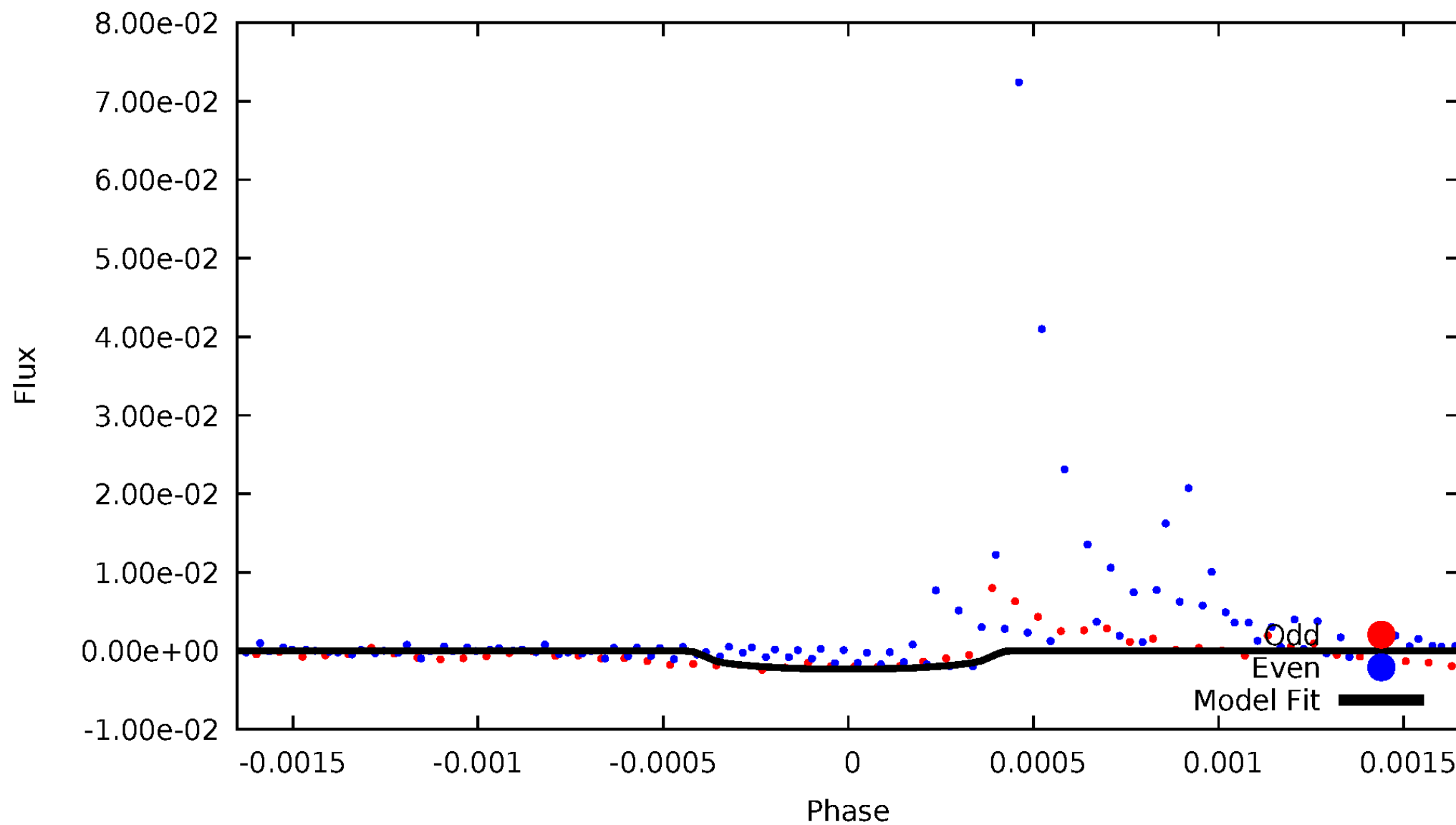
TCE 008873450-01





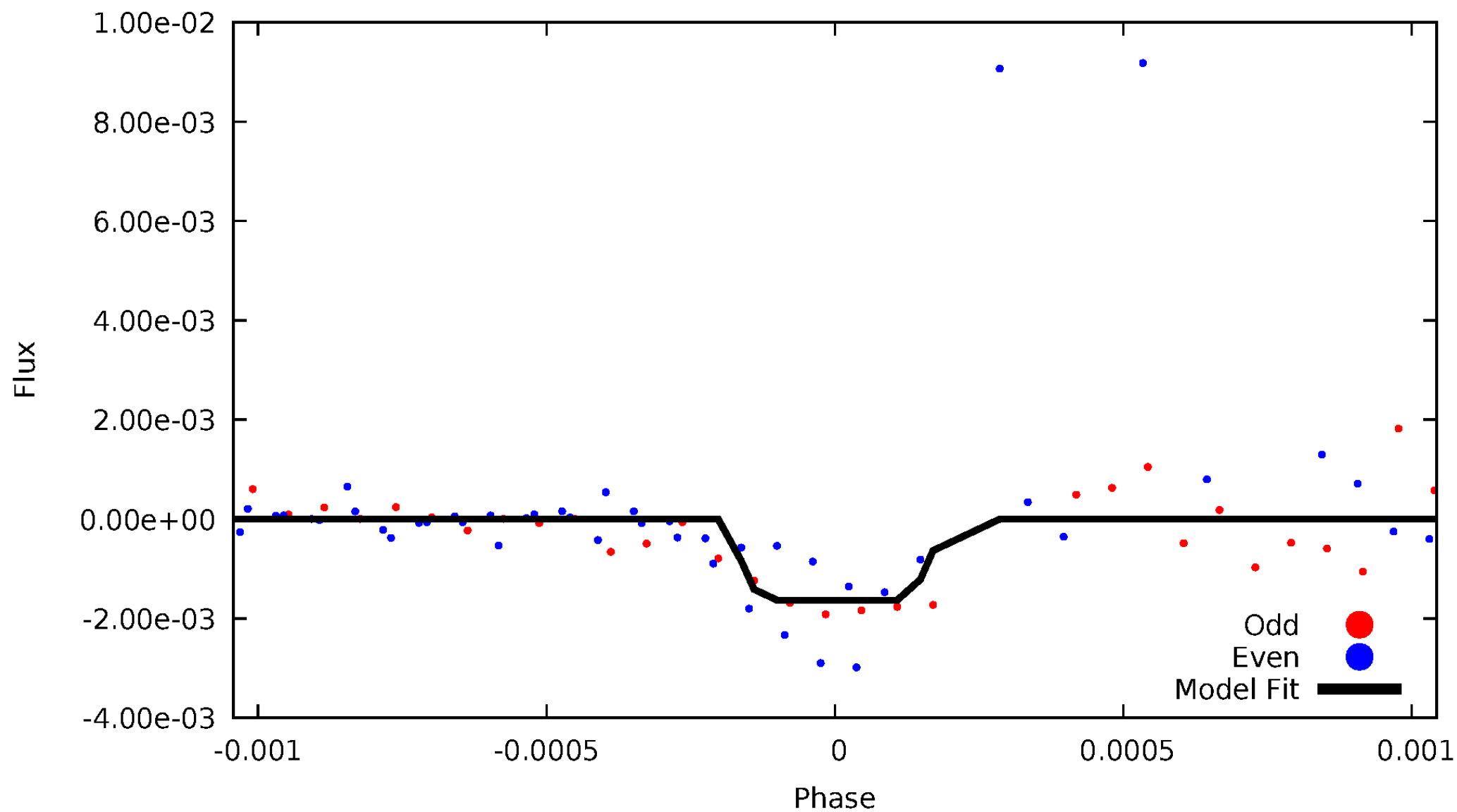
# DV Odd/Even

TCE 008873450-01



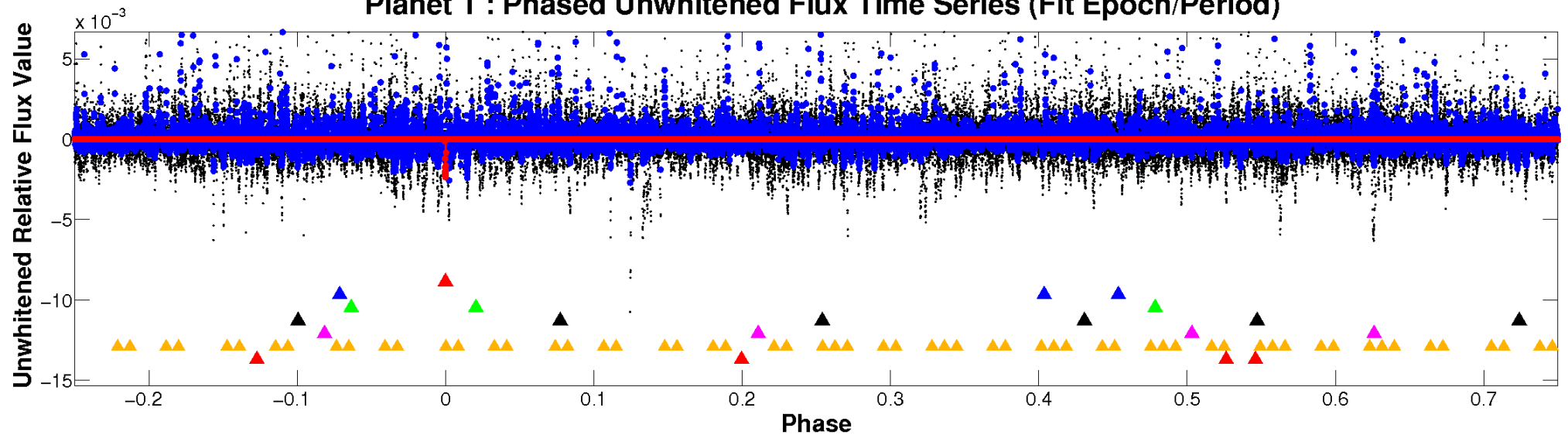
# ALT Odd/Even

TCE 008873450-01

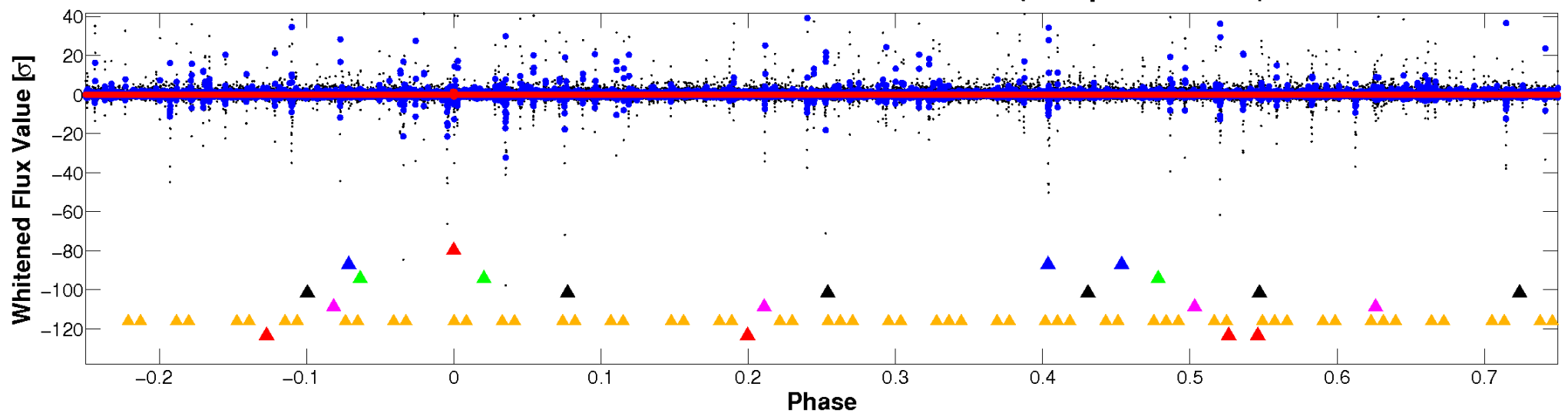


# Non-Whitened Vs. Whitened Light Curve

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



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



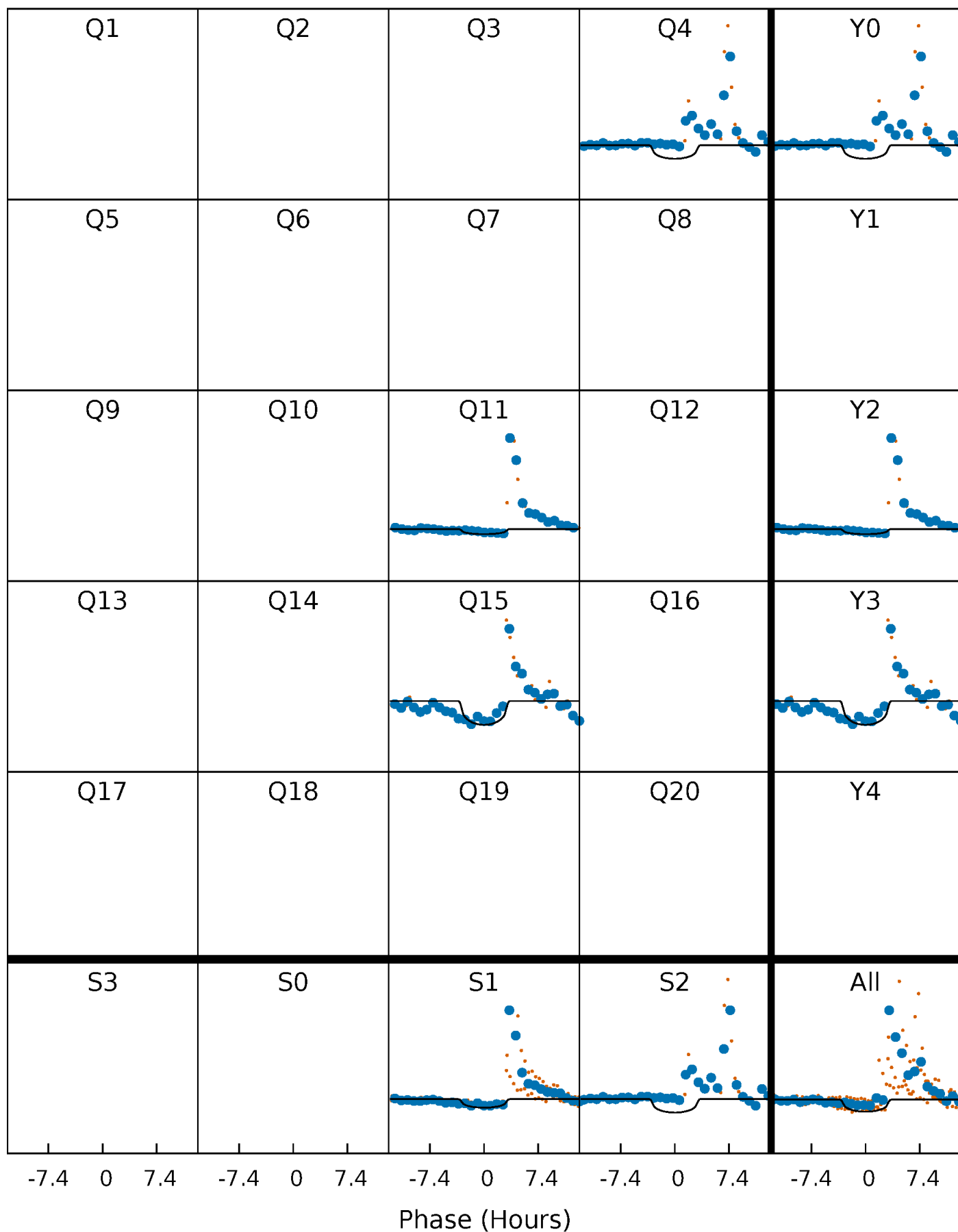
# PDC Quarter-Phased Transit Curves

TCE 008873450-01 P=329.128908 Days  $T_0=394.473473$  (BKJD)



# DV Quarter-Phased Transit Curves

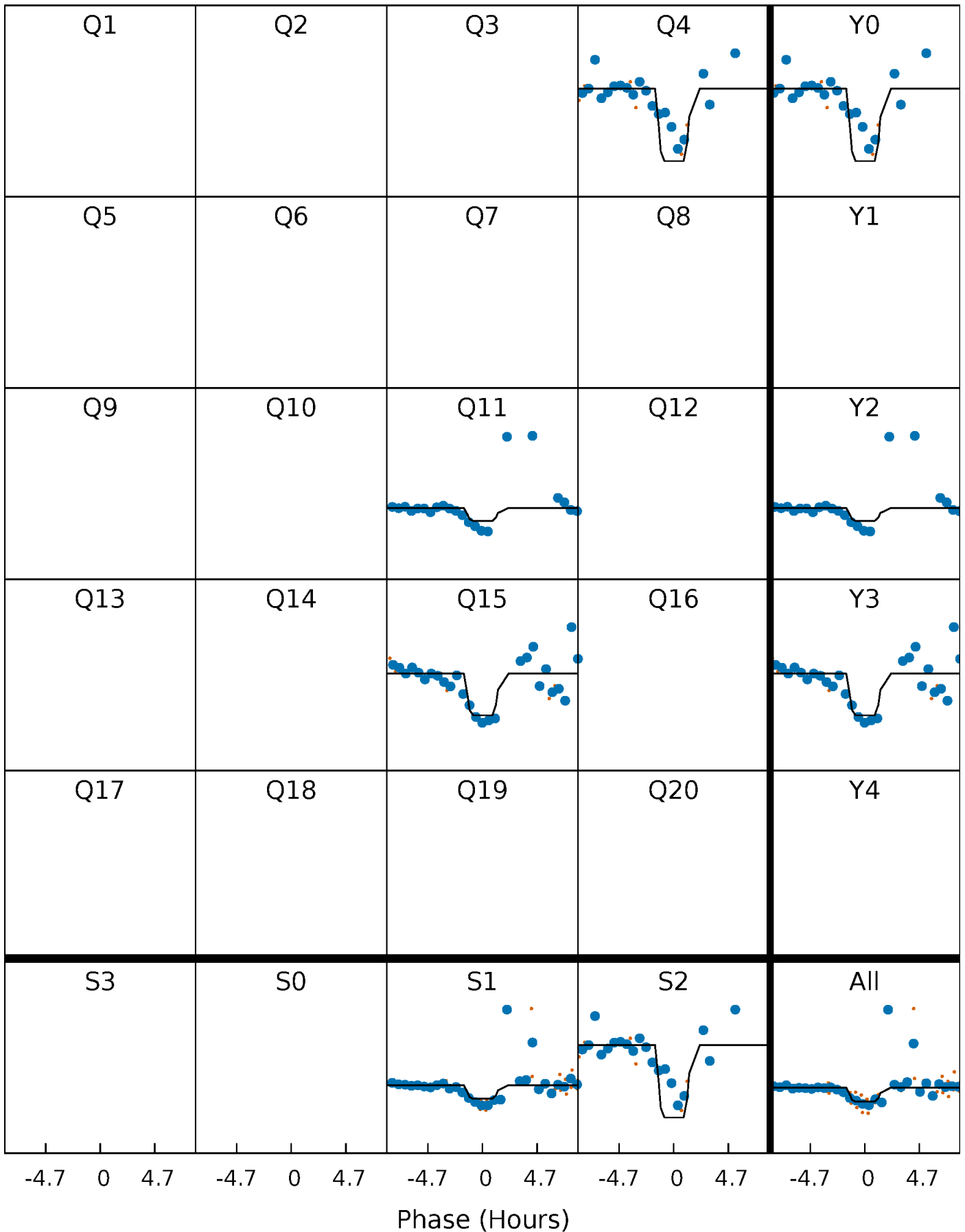
TCE 008873450-01 P=329.128908 Days  $T_0=394.473473$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

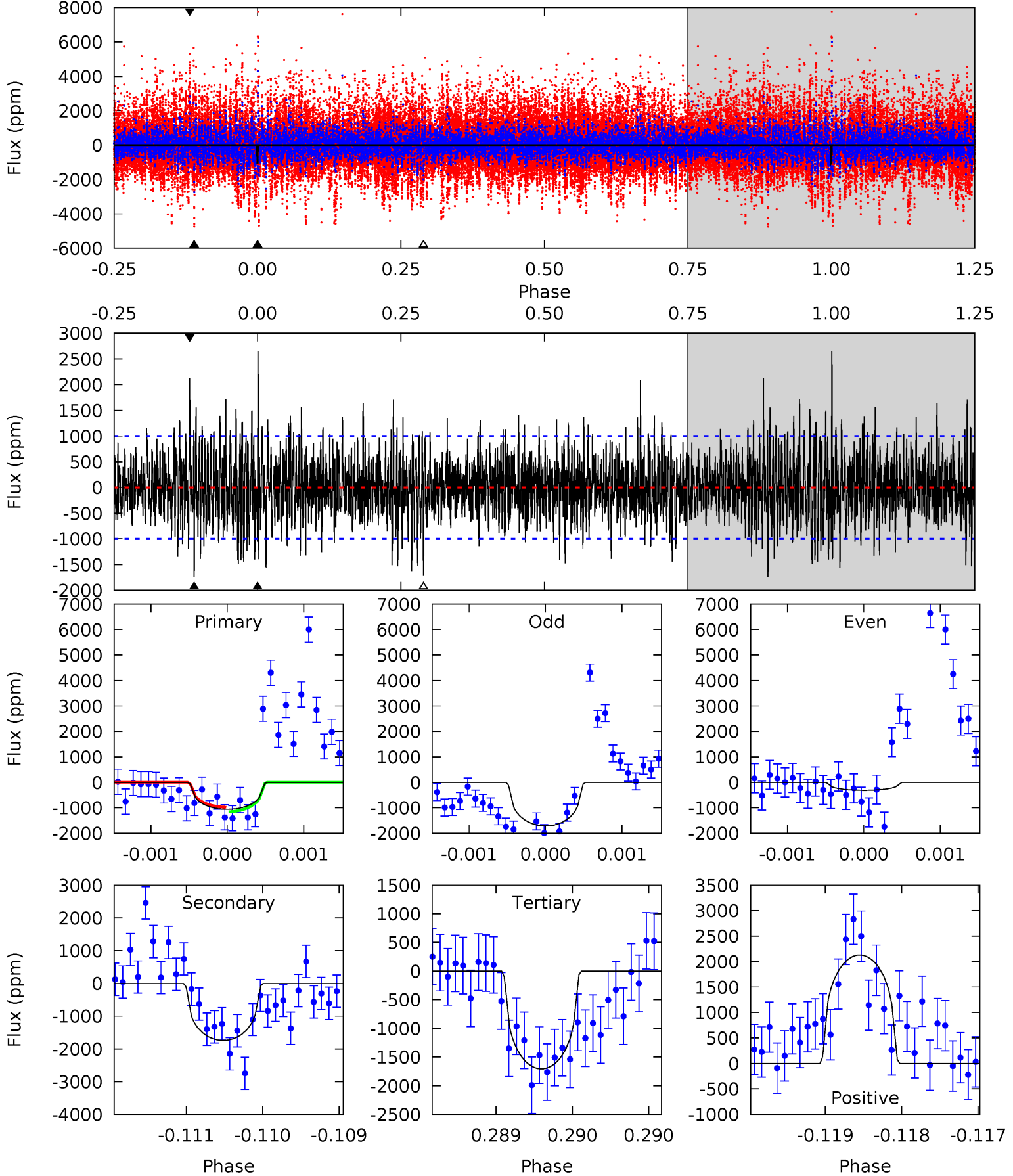
TCE 008873450-01 P=329.143178 Days  $T_0=394.482032$  (BKJD)



# DV Model-Shift Uniqueness Test

008873450-01, P = 329.128908 Days, E = 65.344565 Days

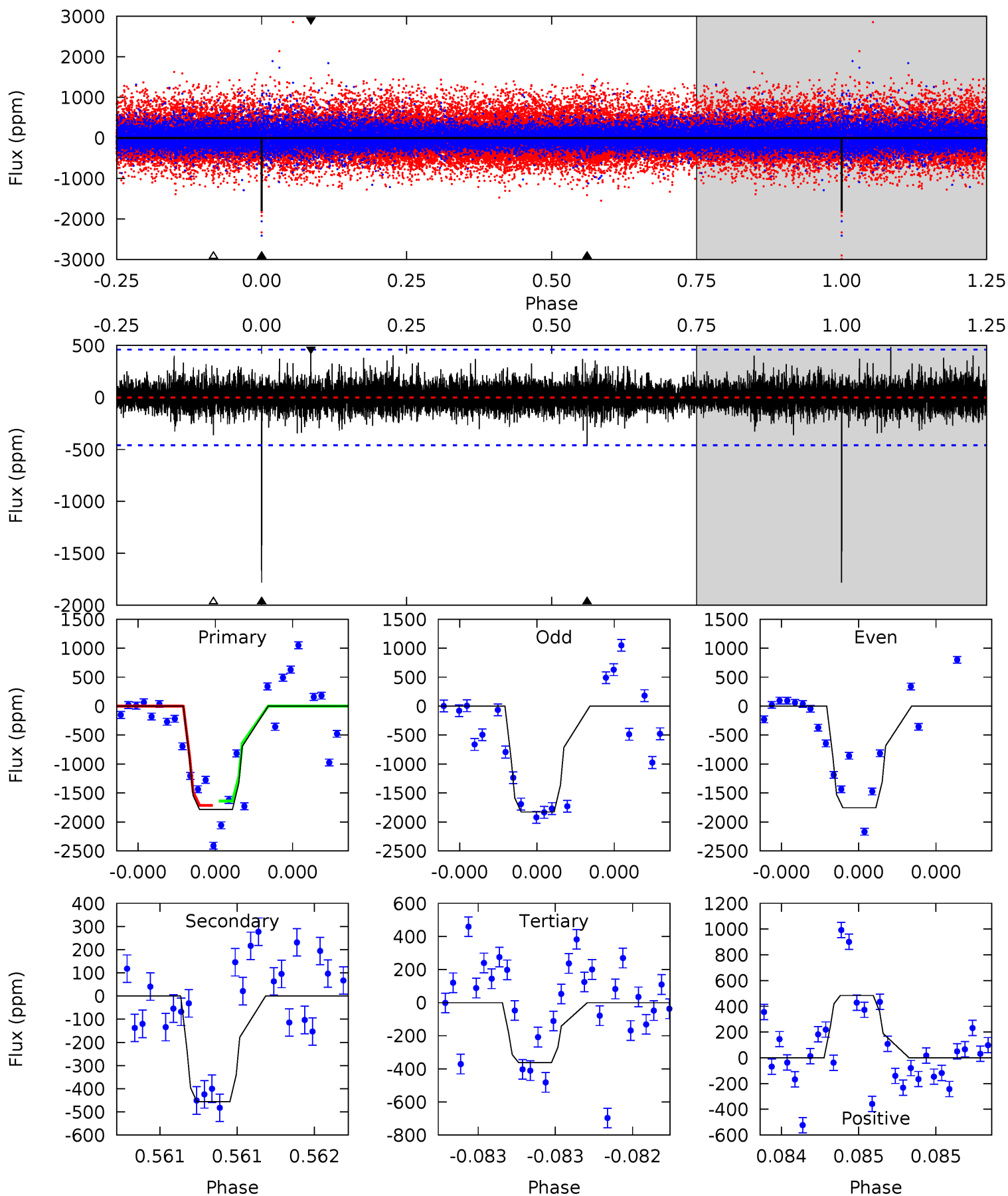
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.80	9.53	9.33	11.6	5.48	3.33	2.70	-3.53	-5.84	0.20	-2.11	3.05	0.40	0.60	0.49



# Alt Model-Shift Uniqueness Test

008873450-01, P = 329.143178 Days, E = 65.338854 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
21.6	5.54	4.39	5.87	5.58	3.49	1.04	17.2	15.8	1.15	-0.33	0.40	1.02	0.21	0.42



### Stellar Parameters For KIC 008873450

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4450^{+132}_{-132}$	$4.583^{+0.056}_{-0.020}$	$0.140^{+0.250}_{-0.300}$	$0.707^{+0.029}_{-0.059}$	$0.698^{+0.054}_{-0.054}$	$2.780^{+0.684}_{-0.220}$
	+3%/-3%	+1%/-0%	+179%/-214%	+4%/-8%	+8%/-8%	+25%/-8%
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 008873450-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1742 \pm 183$	$6.61^{+5.97}_{-4.52}$	$252^{+8}_{-8}$	$3503^{+1792}_{-652}$	$15724^{+129663}_{-11635}$
Alt.	$-456 \pm 82$	$6.53^{+6.06}_{-4.79}$	$252^{+8}_{-9}$	$2845^{+1509}_{-440}$	$4023^{+48584}_{-2954}$

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

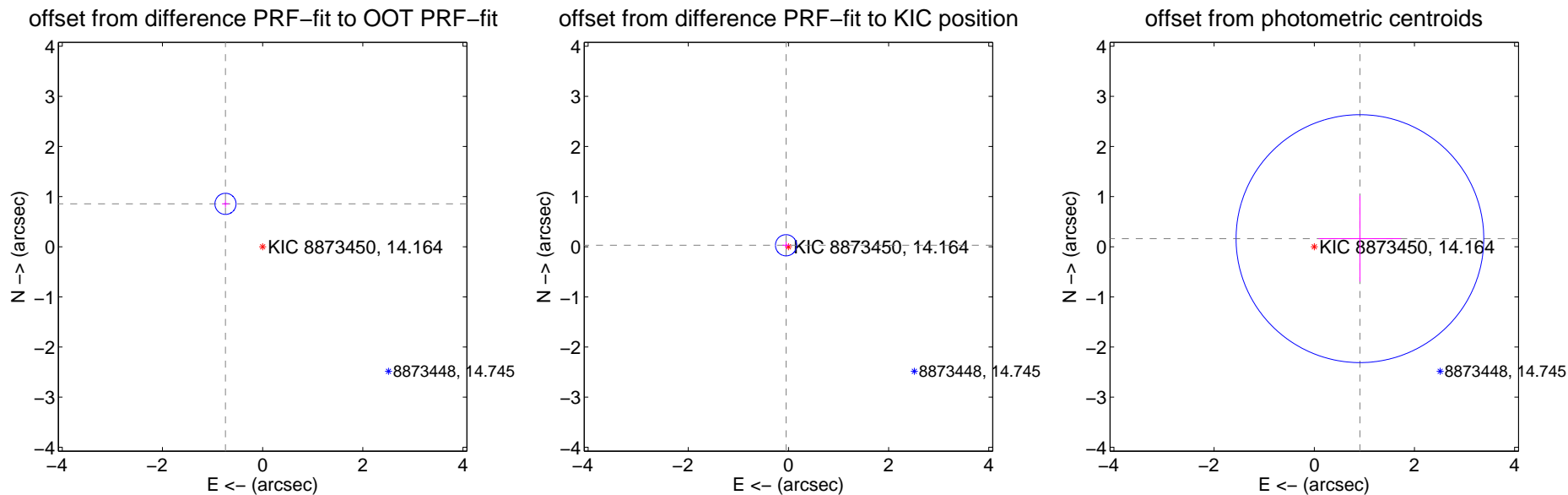
## DV Centroid Data

Supplemental centroid analysis for 008873450-01. Kepler magnitude: 14.16. Transit SNR 6.07

There are 1 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 1.08 arcsec

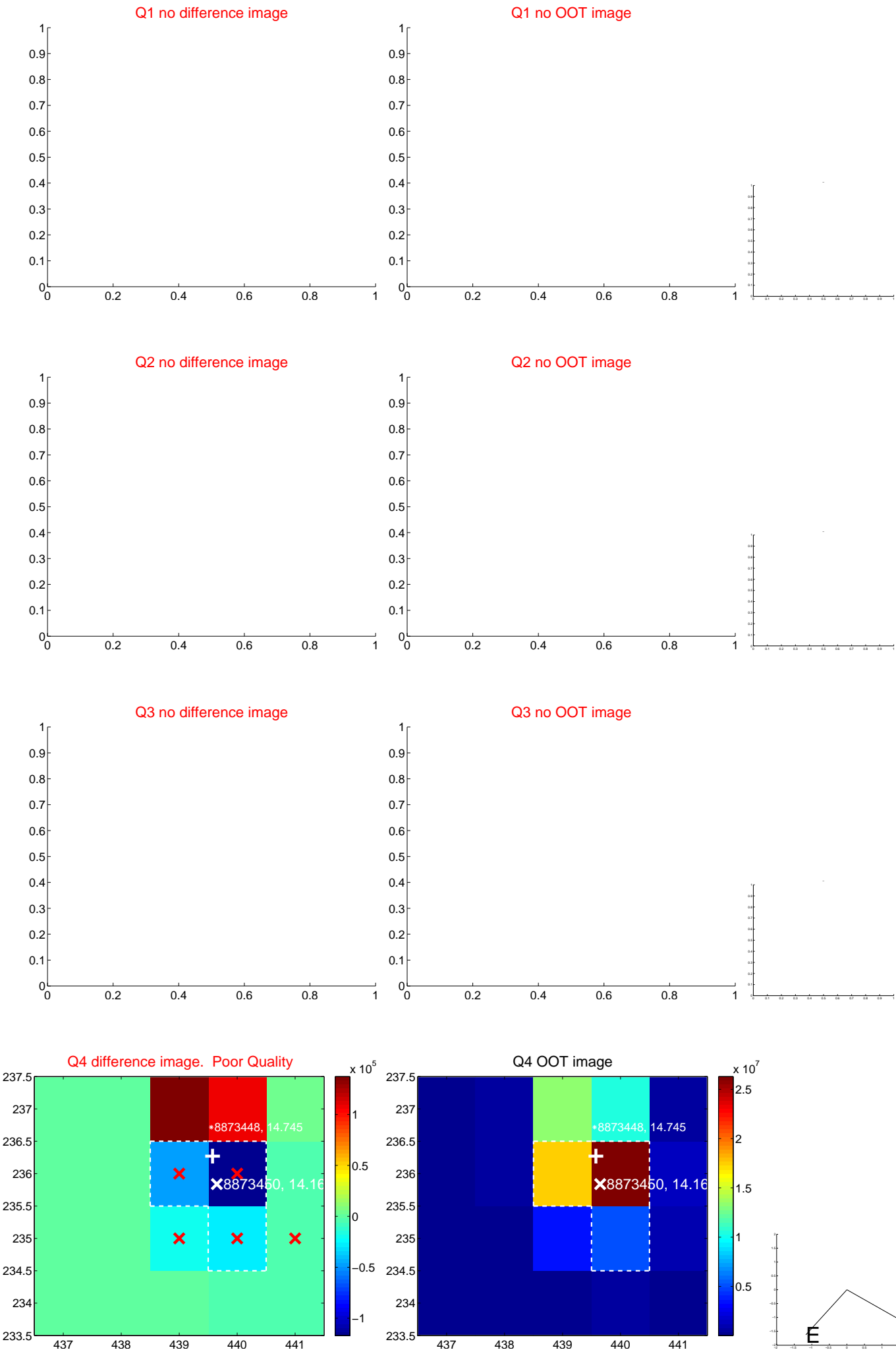
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.132 \pm 0.070$	16.10	$0.742 \pm 0.071$	$0.856 \pm 0.070$
PRF-fit source offset from KIC position	$0.056 \pm 0.070$	0.80	$0.048 \pm 0.071$	$0.030 \pm 0.070$
photometric centroid source offset	$0.93 \pm 0.82$	1.12	$-0.91 \pm 0.82$	$0.16 \pm 0.86$



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.



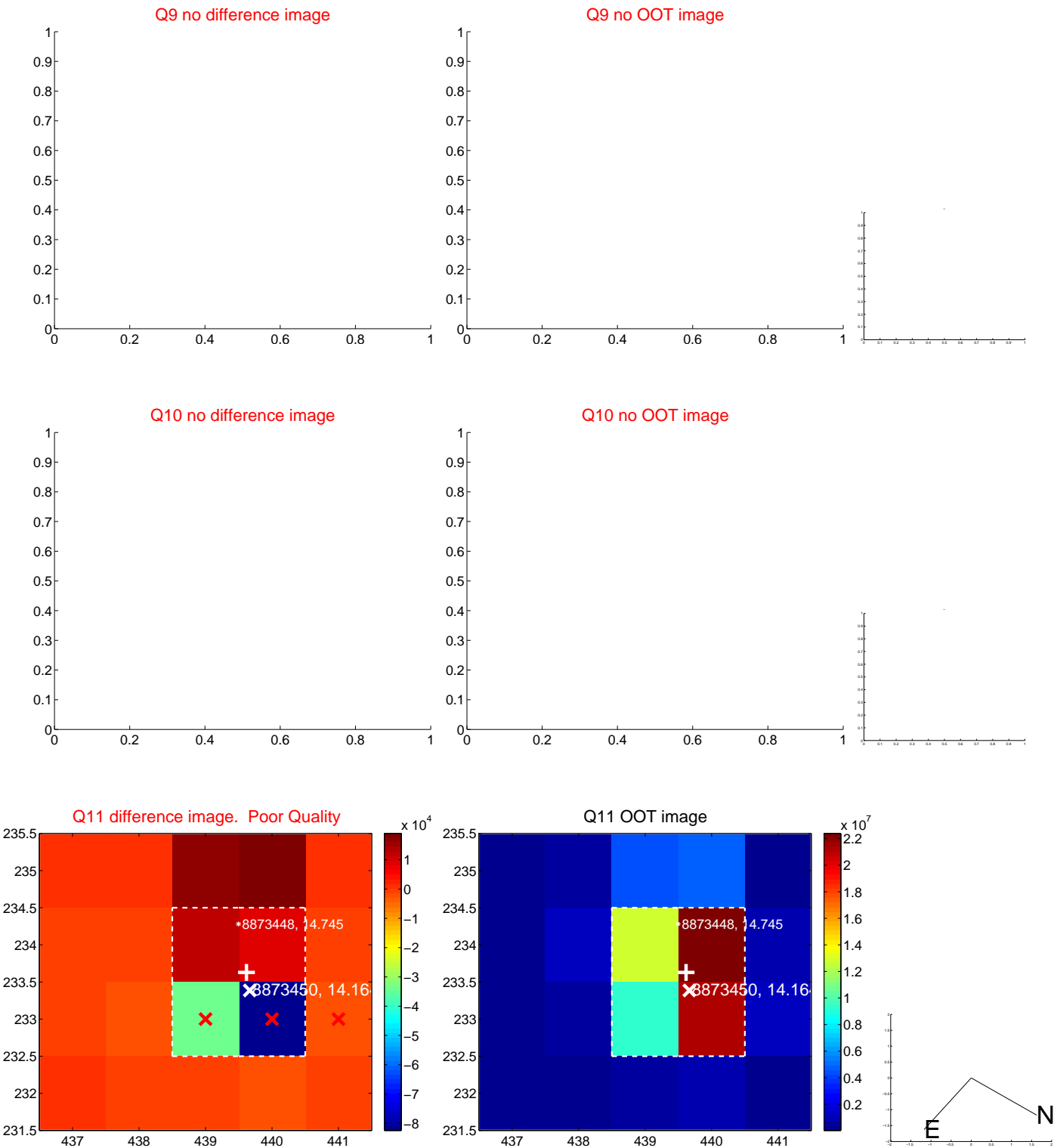
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



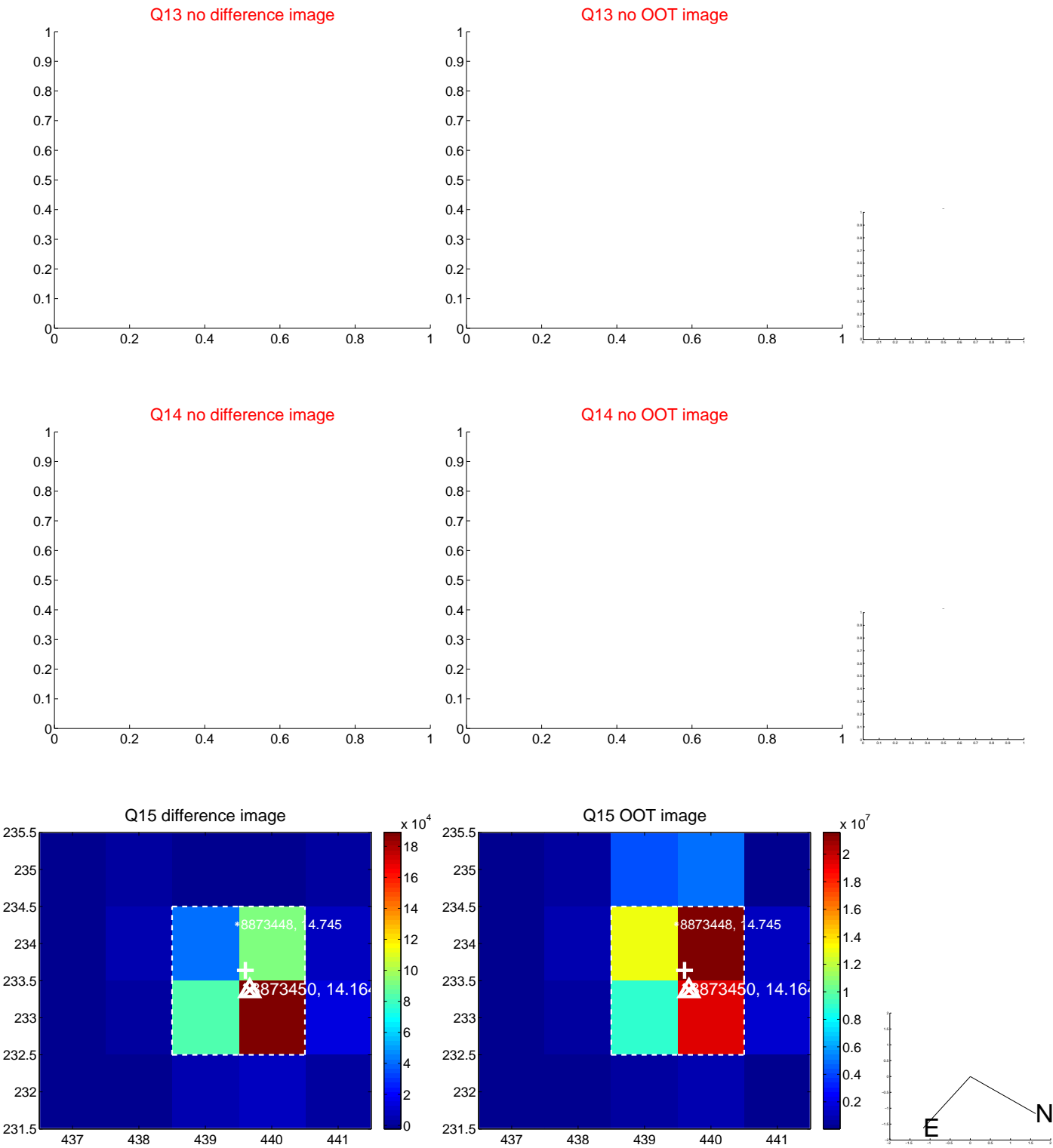
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



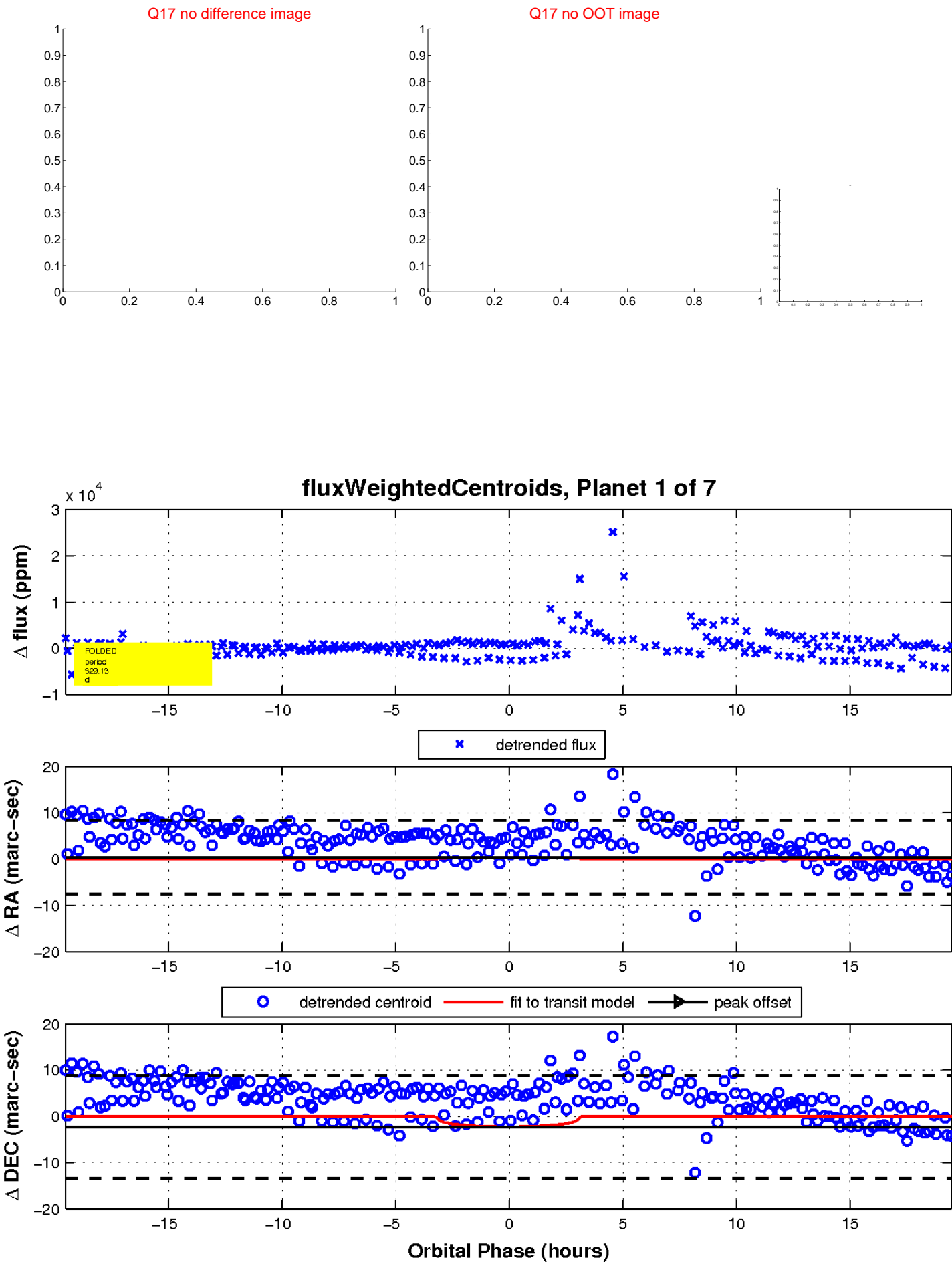
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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



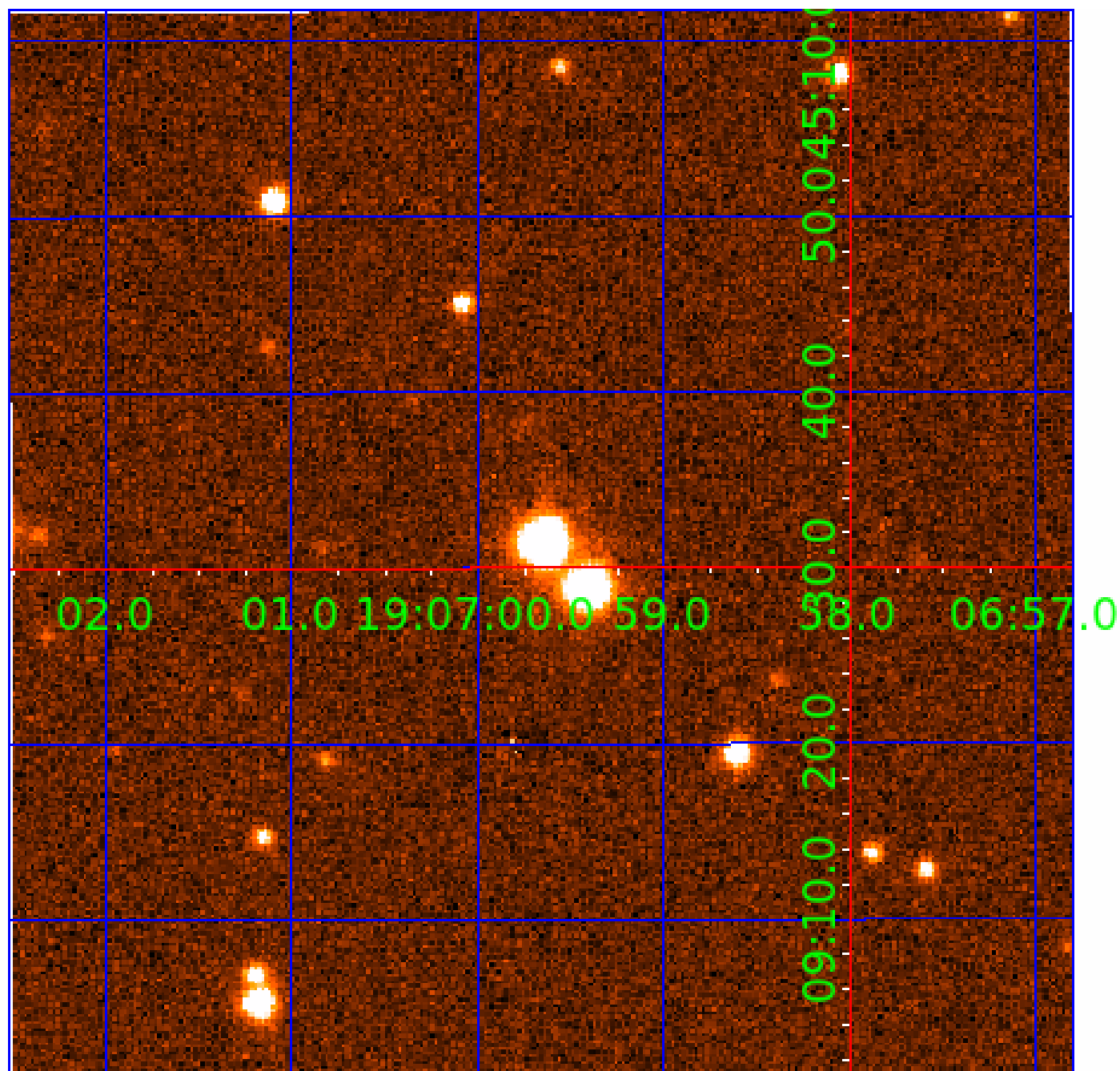
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 008873450

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008873450-01	OBS	No	329.128908	394.473473	2360.5	6.518	14.2	6.1	0.71	4450	3.27	0.26
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008873450-04	OBS	No	270.967374	207.131607	649.6	1.722	16.5	3.5	0.71	4450	2.02	0.33
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008873450-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008873450-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008873450-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE_ZUMA—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008873450-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS
008873450-05	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008873450-06	OBS	FP	0.00	0	0	1	0	CENT_KIC_POS—HALO_GHOST
008873450-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—CENT_NOFITS

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

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

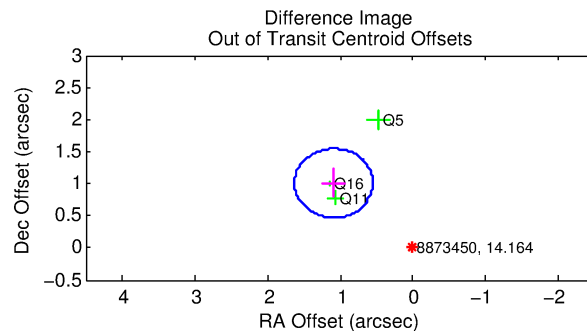
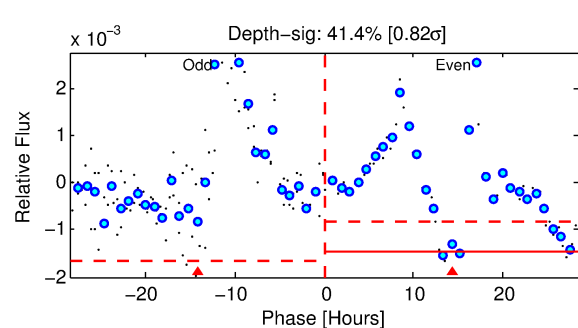
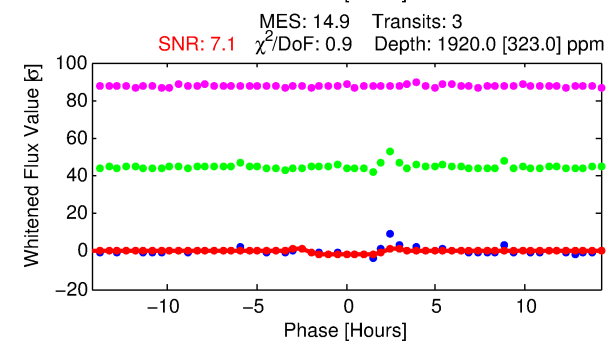
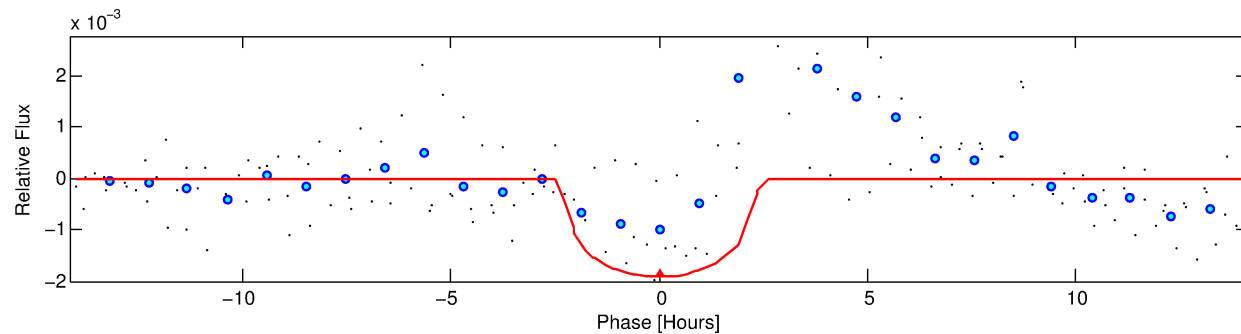
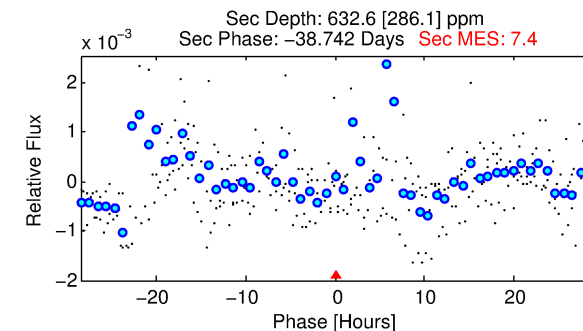
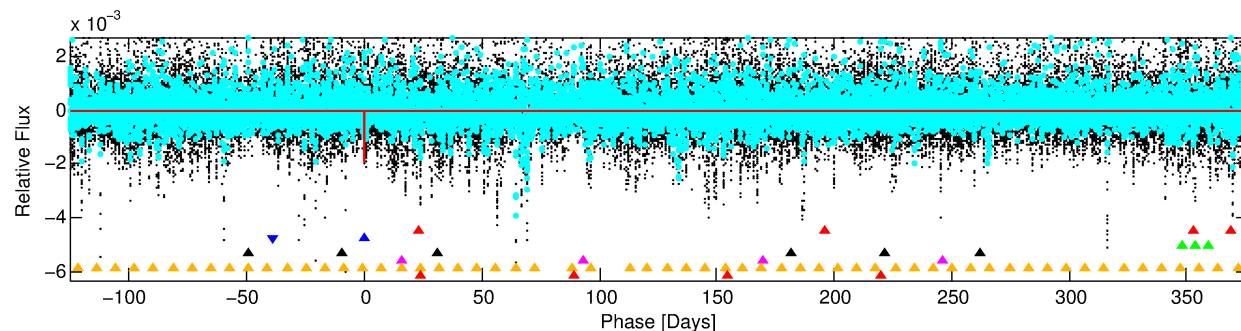
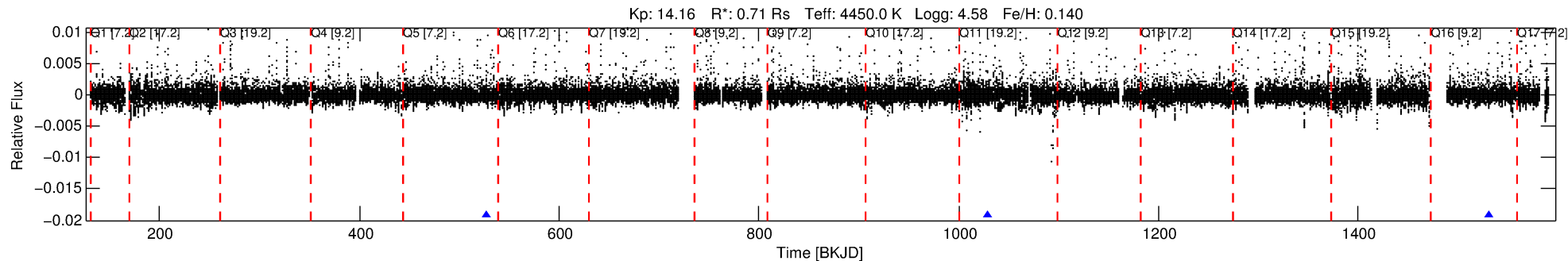
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008873450-02

No Significant Match Found

# DV One-Page Summary

KIC: 8873450 Candidate: 2 of 7 Period: 501.920 d



## DV Fit Results:

Period = 501.91968 [0.00485] d  
Epoch = 527.3355 [0.0064] BKJD  
Rp/R\* = 0.0393 [0.0323]  
a/R\* = 784.16 [1866.92]  
b = 0.38 [5.46]  
Seff = 0.15 [0.02]  
Teq = 158 [6] K  
Rp = 3.03 [2.51] Re  
a = 1.0966 [0.0771] AU  
Ag = 45594.84 [78035.79] [0.58σ]  
Teff = 3561 [1525] K [2.23σ]

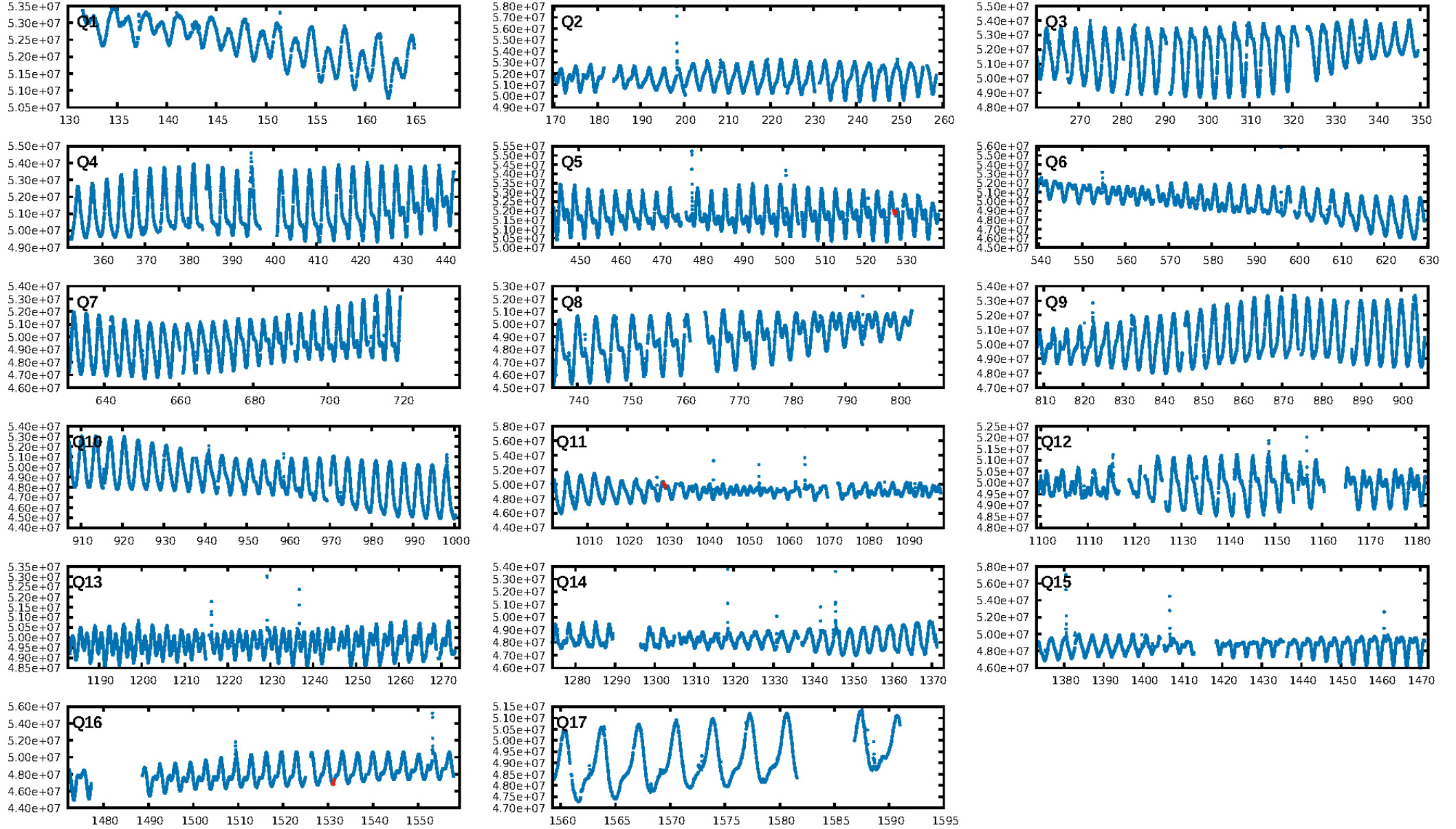
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [227.56σ]  
LongPeriod-sig: 100.0% [19.69σ]  
ModelChiSquare2-sig: 7.6%  
ModelChiSquareGof-sig: 88.6%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -3.486  
Centroid-sig: 78.6%  
Centroid-so: 1.521 arcsec [1.71σ]  
OotOffset-rm: 1.485 arcsec [8.29σ]  
KicOffset-rm: 0.258 arcsec [1.15σ]  
OotOffset-st: 0/1/1/1 [3]  
KicOffset-st: 0/1/1/1 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

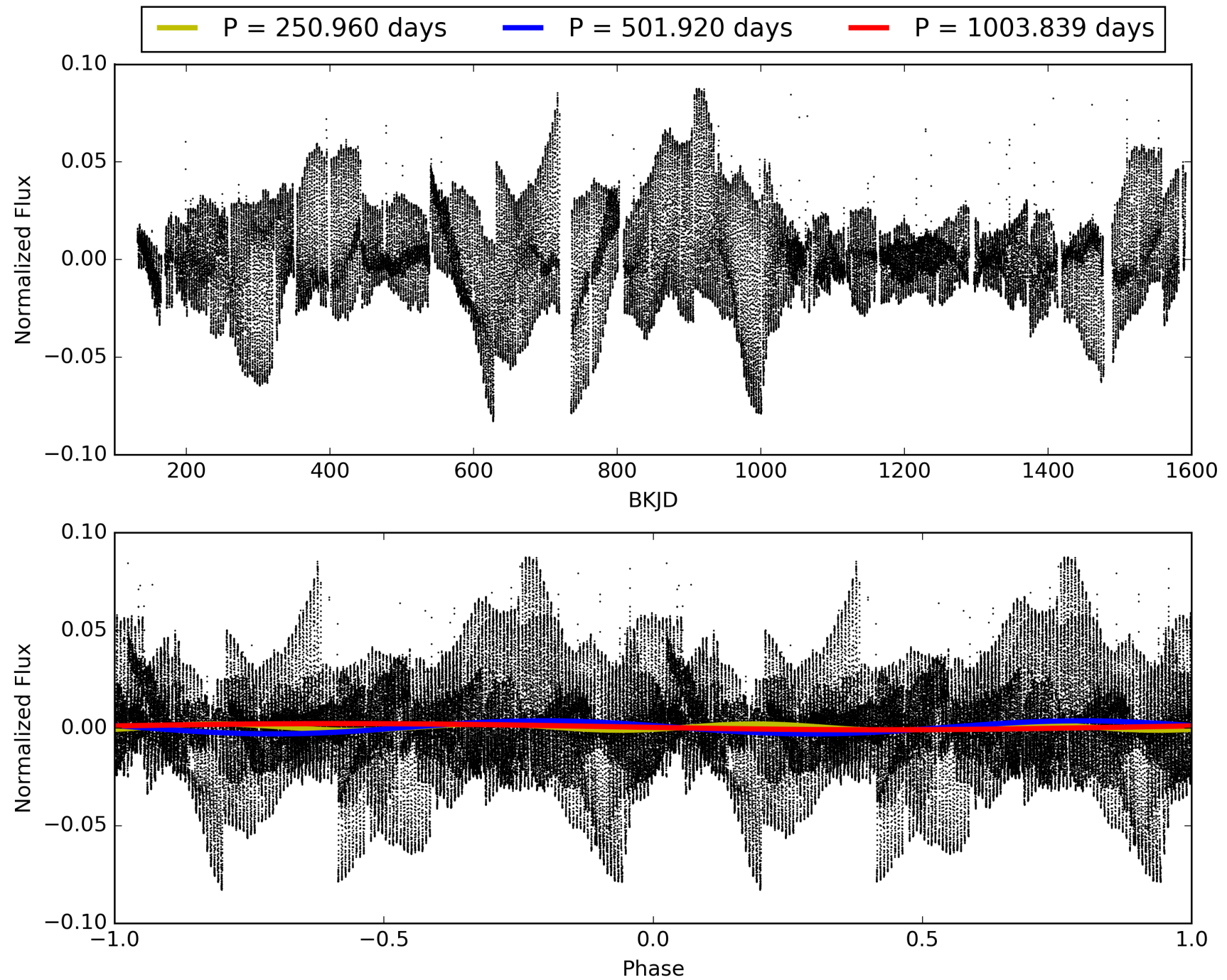
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:13:10 Z

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

# TCE 008873450-02, PDC Light Curves



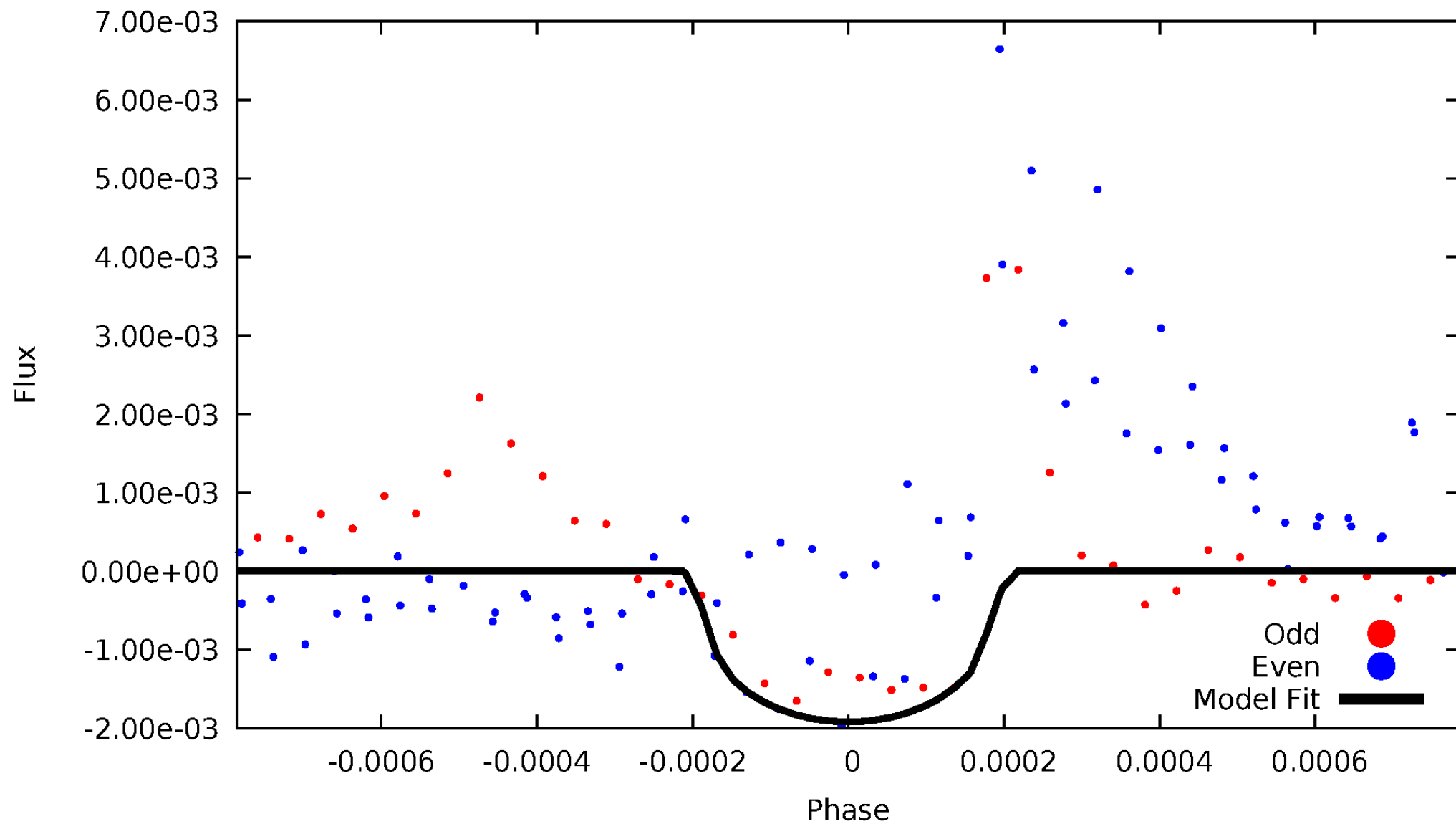
TCE 008873450-02





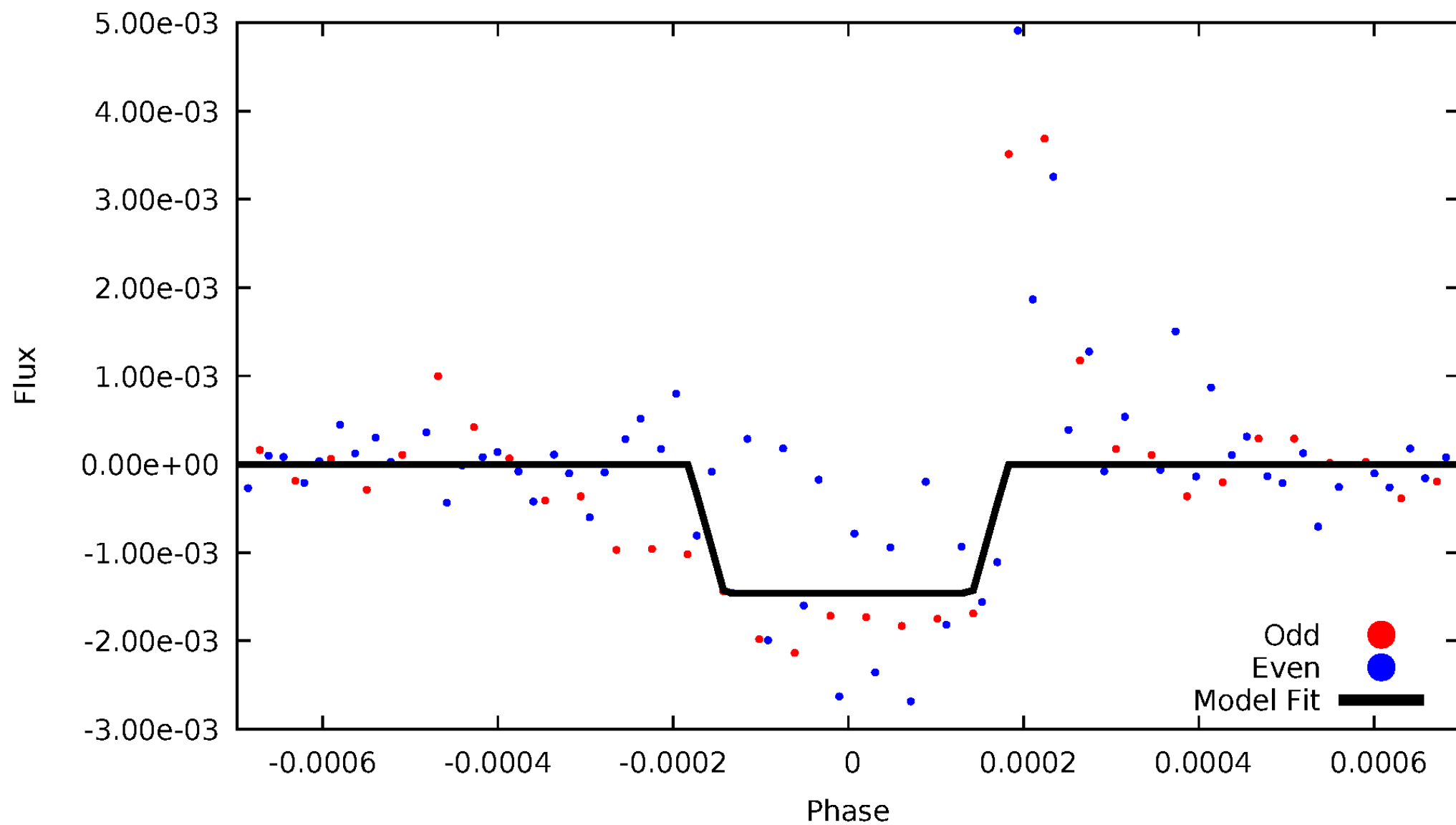
# DV Odd/Even

TCE 008873450-02



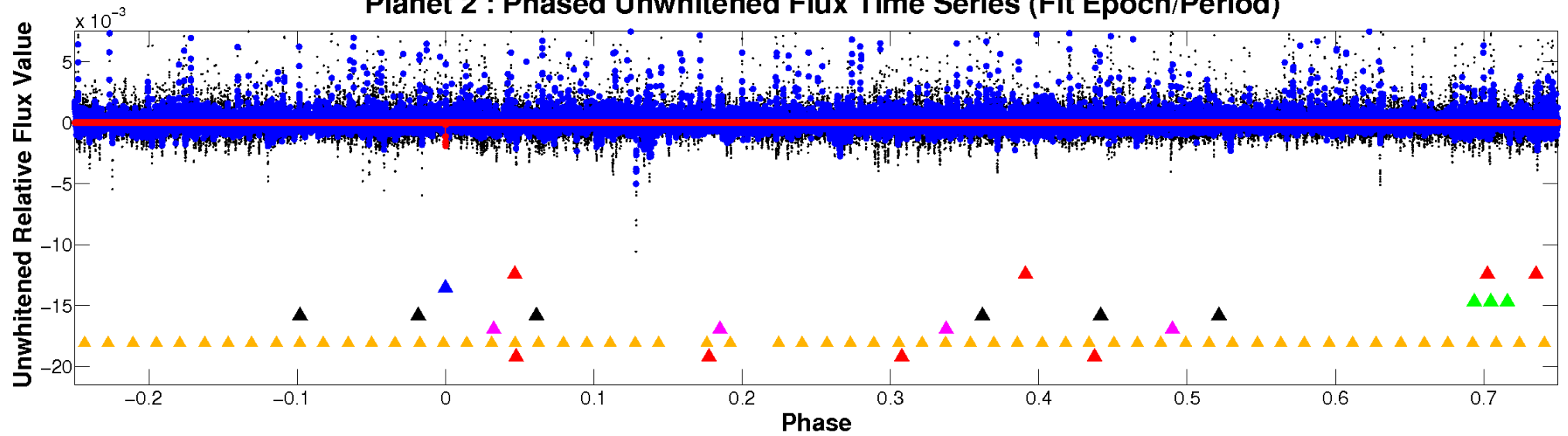
# ALT Odd/Even

TCE 008873450-02

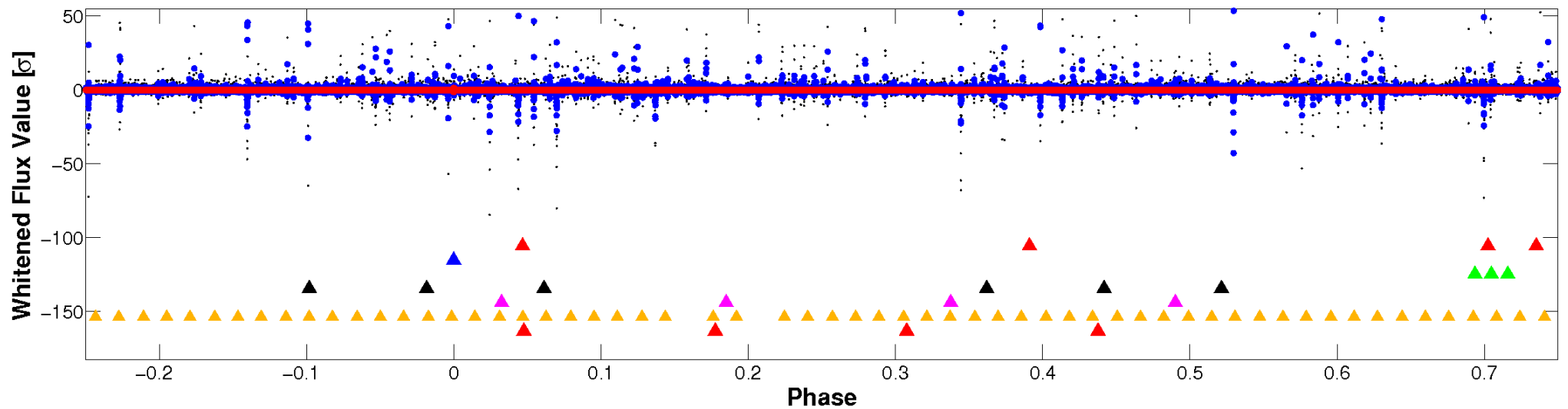


# Non-Whitened Vs. Whitened Light Curve

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

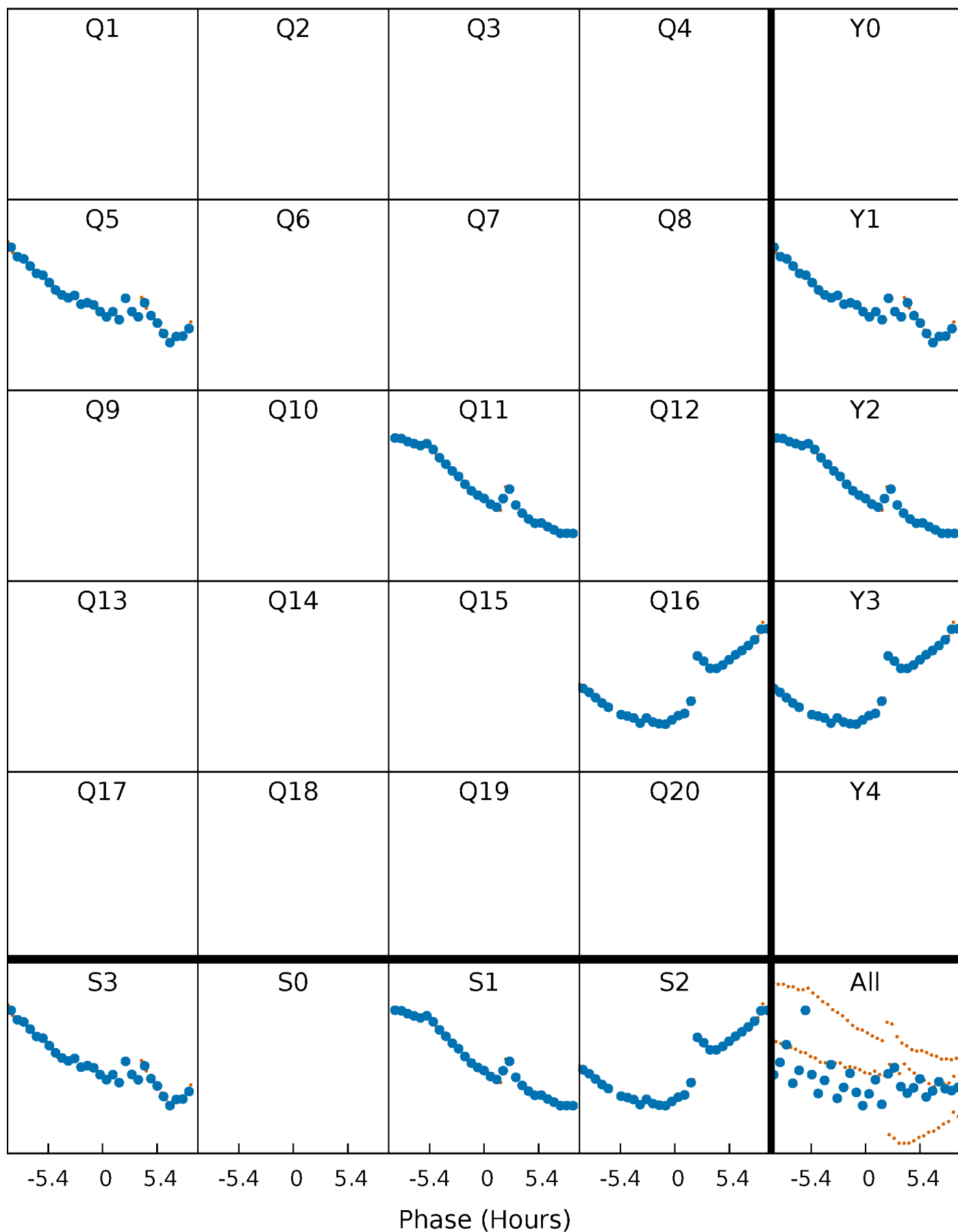


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



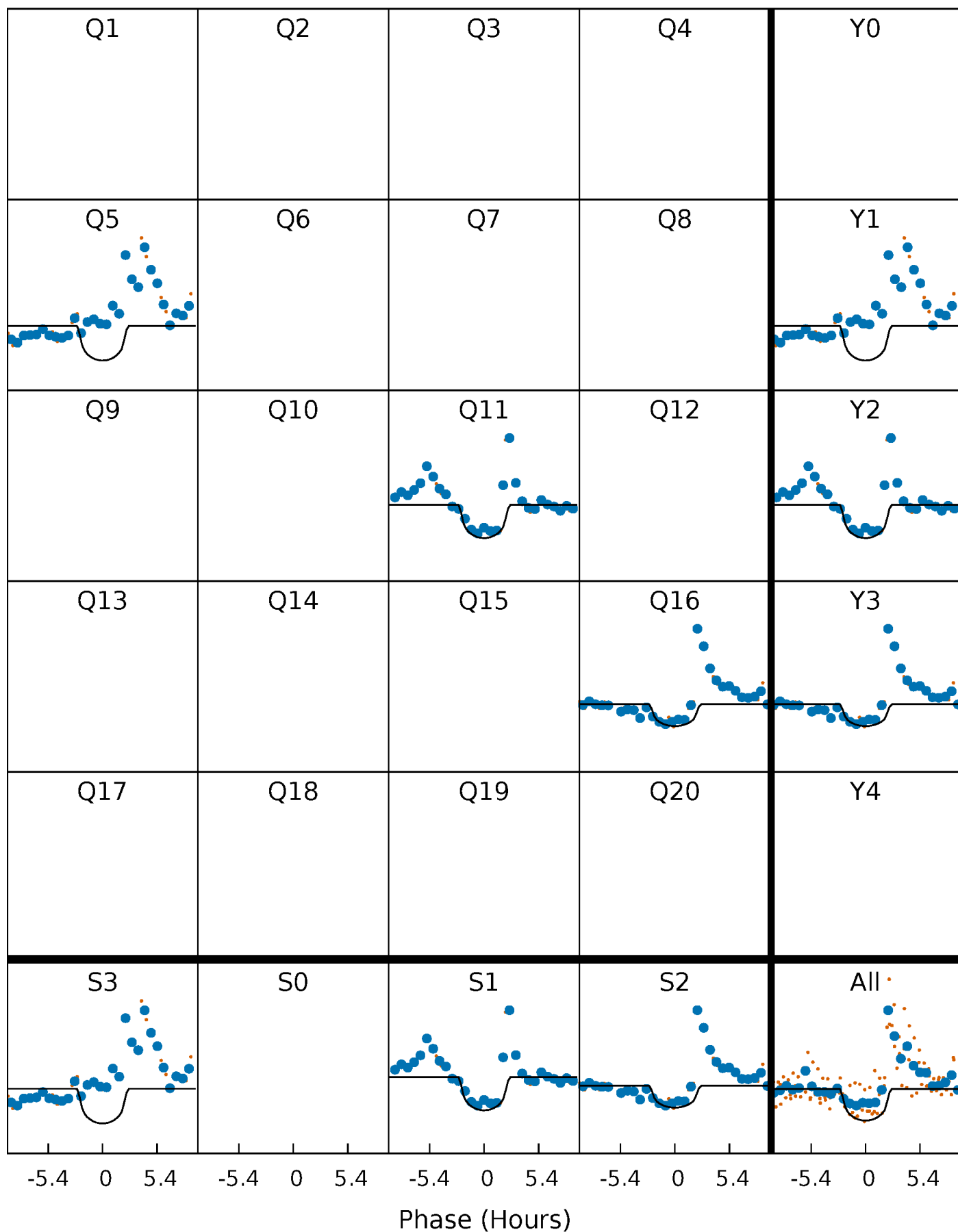
# PDC Quarter-Phased Transit Curves

TCE 008873450-02     $P=501.919677$  Days     $T_0=527.335460$  (BKJD)



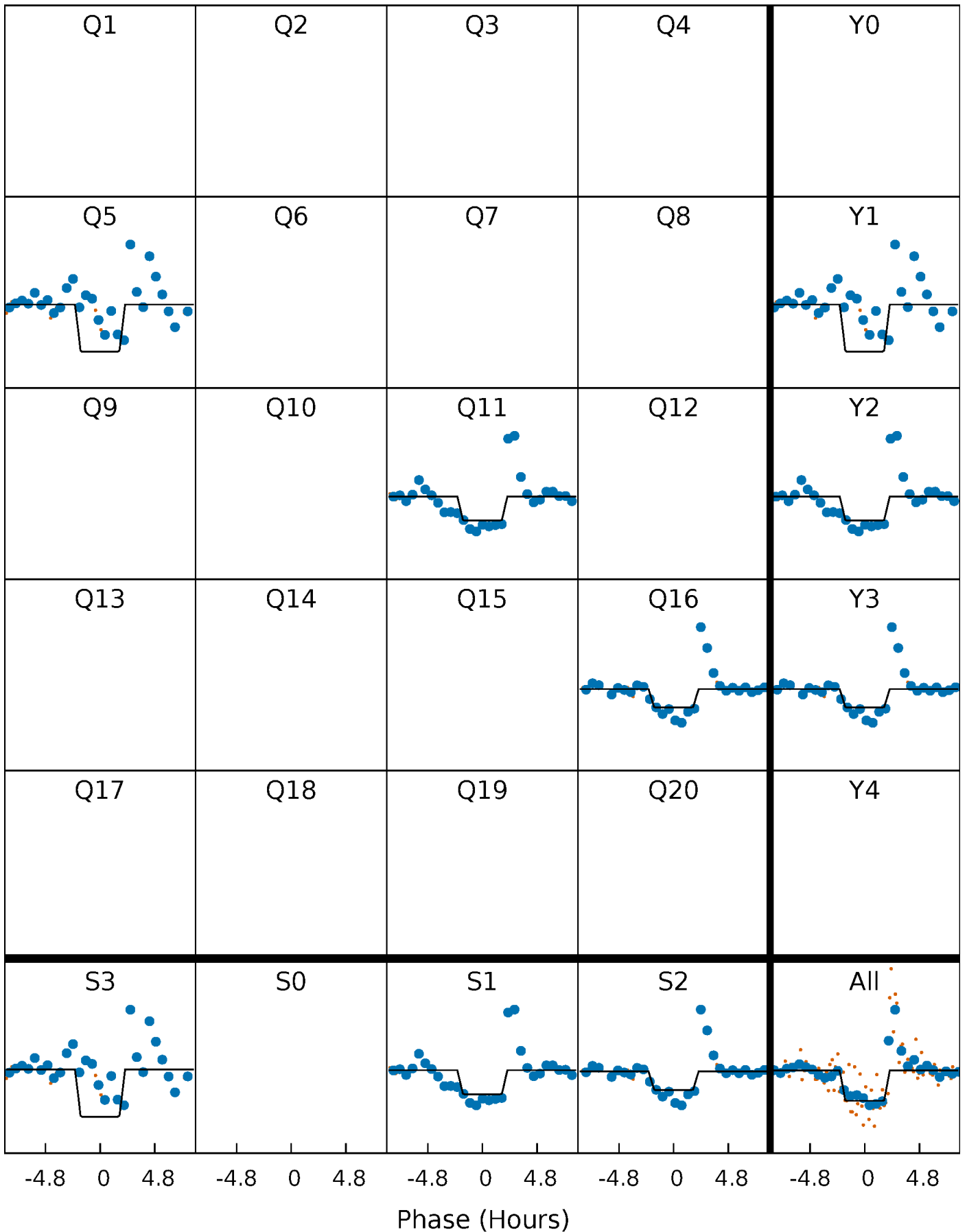
# DV Quarter-Phased Transit Curves

TCE 008873450-02     $P=501.919677$  Days     $T_0=527.335460$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

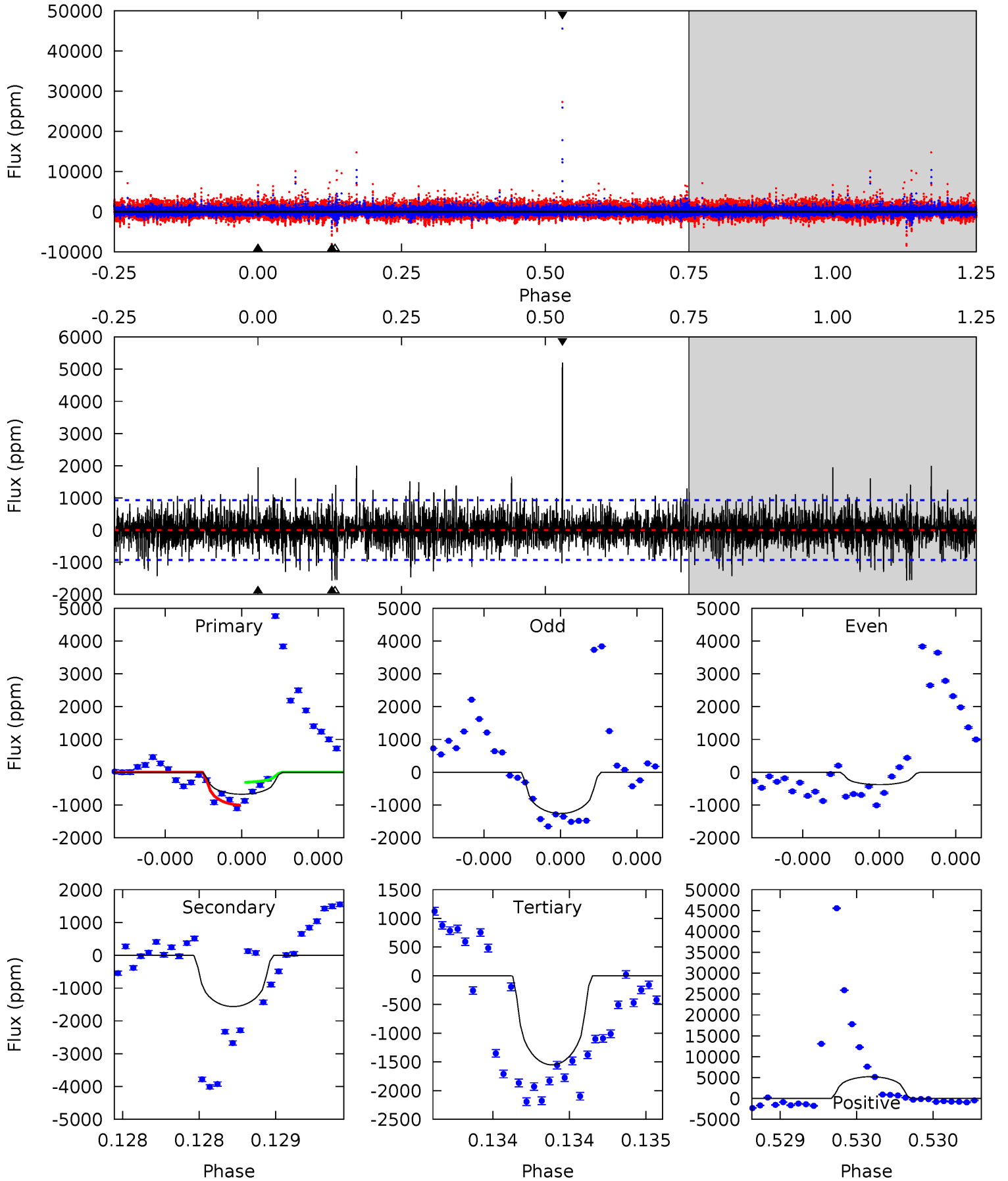
TCE 008873450-02 P=501.923157 Days  $T_0=527.329142$  (BKJD)



# DV Model-Shift Uniqueness Test

008873450-02, P = 501.919677 Days, E = 25.415783 Days

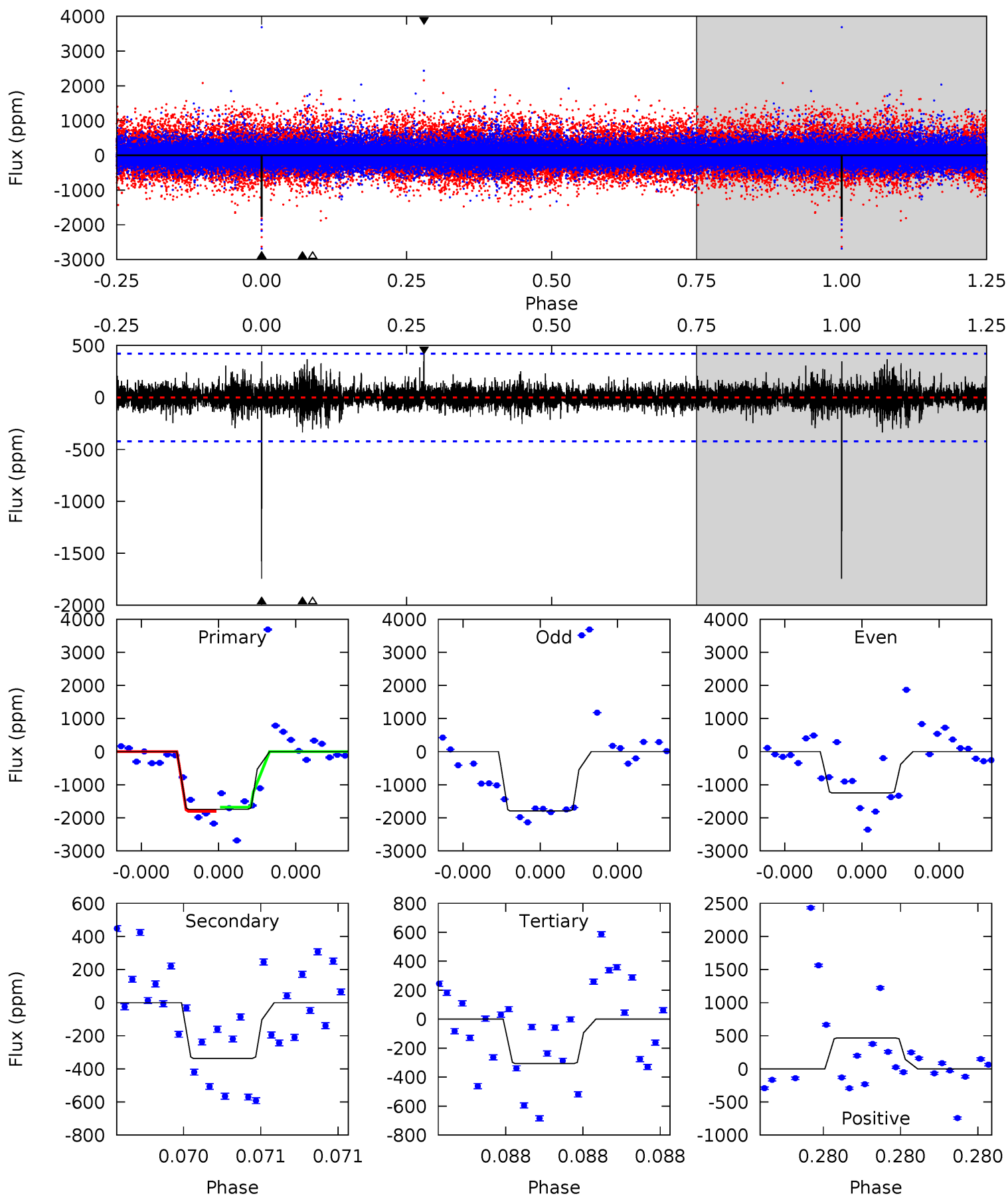
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.06	9.44	9.37	31.4	5.61	3.53	2.23	-5.31	-27.4	0.07	-22.0	1.59	0.56	0.77	2.11



# Alt Model-Shift Uniqueness Test

008873450-02, P = 501.923157 Days, E = 25.405985 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
23.3	4.49	4.09	6.22	5.64	3.58	0.79	19.2	17.1	0.41	-1.72	3.41	0.79	0.21	0.78





### Stellar Parameters For KIC 008873450

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4450^{+132}_{-132}$	$4.583^{+0.056}_{-0.020}$	$0.140^{+0.250}_{-0.300}$	$0.707^{+0.029}_{-0.059}$	$0.698^{+0.054}_{-0.054}$	$2.780^{+0.684}_{-0.220}$
	+3%/-3%	+1%/-0%	+179%/-214%	+4%/-8%	+8%/-8%	+25%/-8%
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 008873450-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1564 \pm 166$	$3.29^{+2.28}_{-1.92}$	$219^{+7}_{-8}$	$4304^{+2022}_{-745}$	$97613^{+469271}_{-65303}$
Alt.	$-336 \pm 75$	$3.26^{+2.32}_{-1.99}$	$219^{+7}_{-7}$	$3317^{+1305}_{-454}$	$20665^{+110343}_{-13509}$

$T_{max}$  = 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

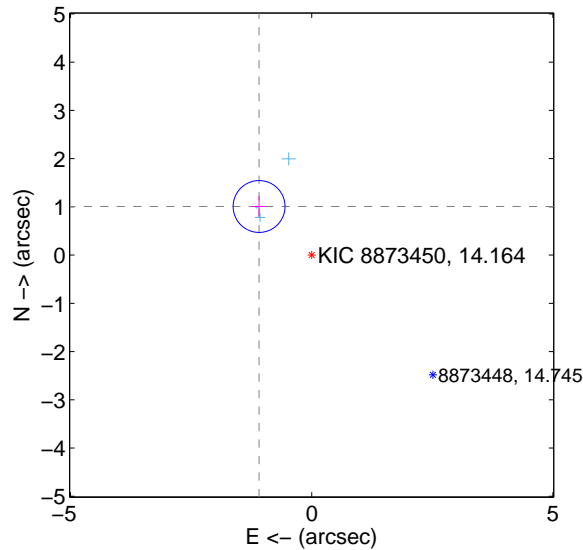
Supplemental centroid analysis for 008873450-02. Kepler magnitude: 14.16. Transit SNR 7.06

There are 3 quarters with good PRF difference image offsets

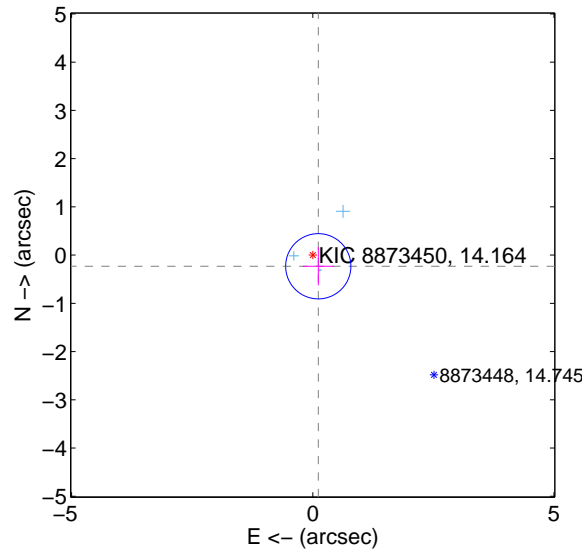
The direct PRF centroid is offset from the target star catalog position by about 1.83 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.485 \pm 0.179$	8.29	$1.091 \pm 0.142$	$1.008 \pm 0.215$
PRF-fit source offset from KIC position	$0.258 \pm 0.225$	1.15	$-0.114 \pm 0.323$	$-0.232 \pm 0.394$
photometric centroid source offset	$1.52 \pm 0.89$	1.71	$-1.31 \pm 0.88$	$-0.77 \pm 0.90$

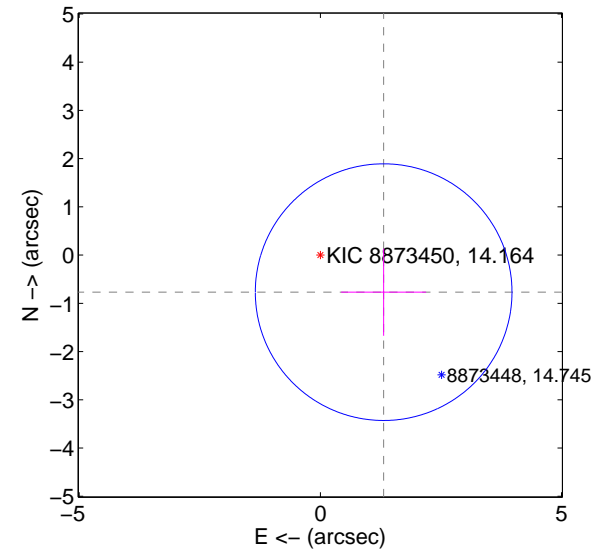
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids

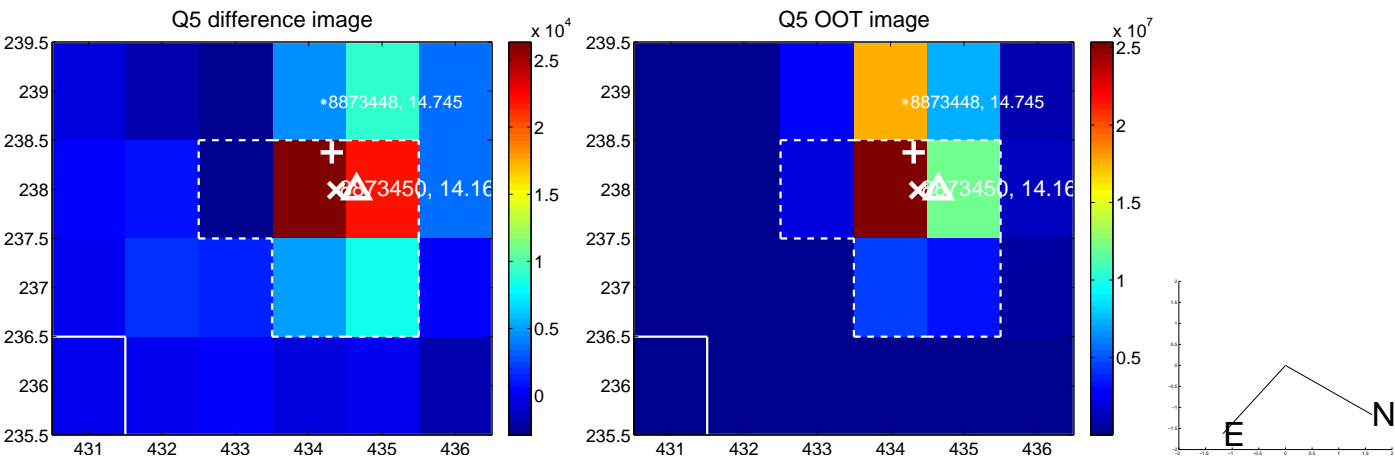


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

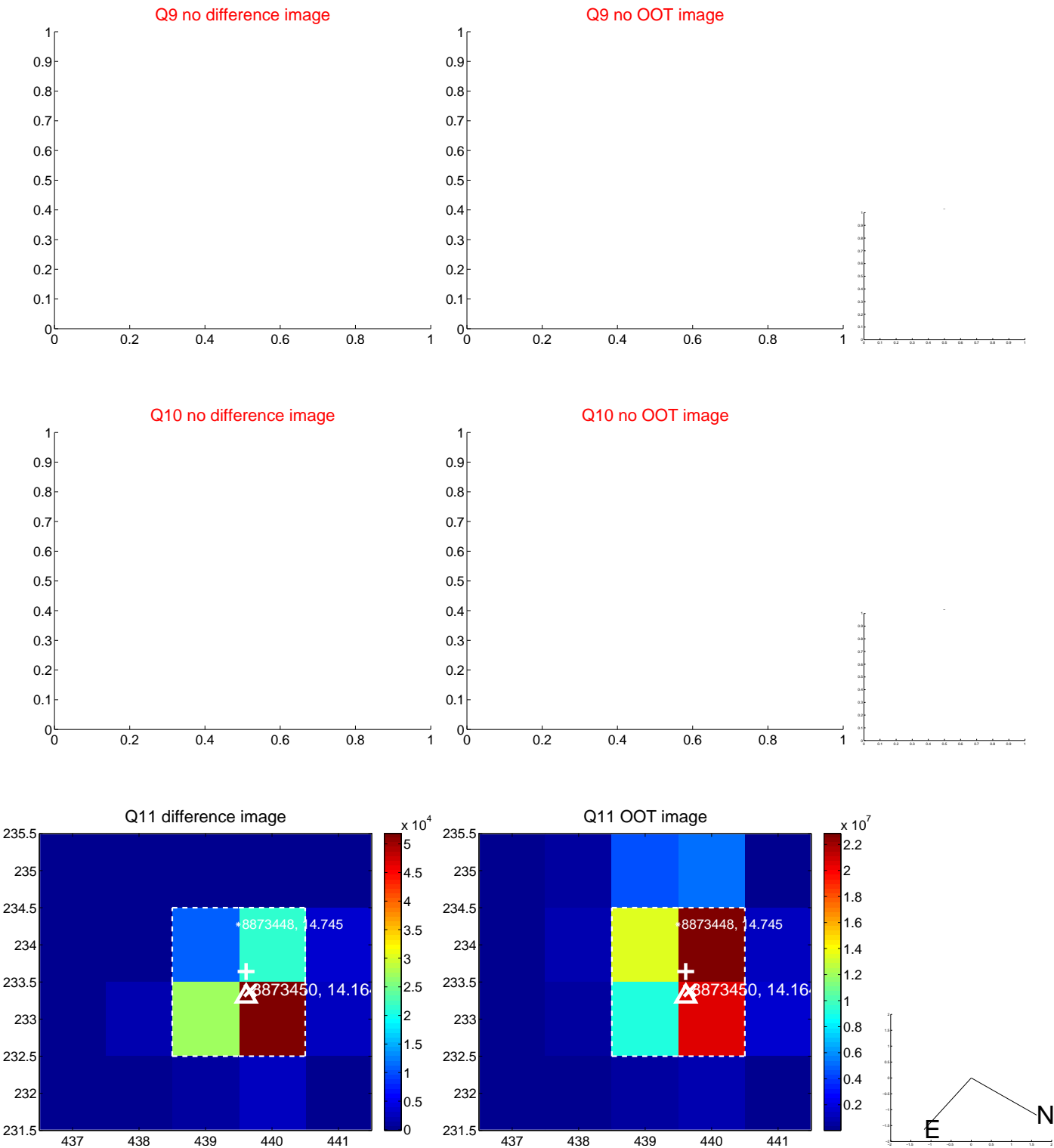
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



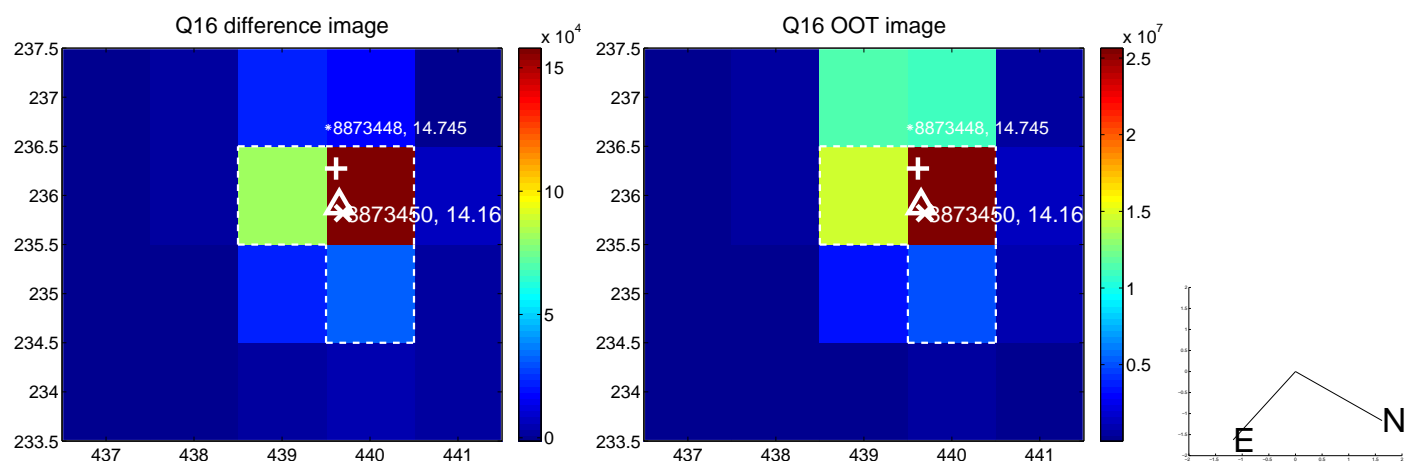
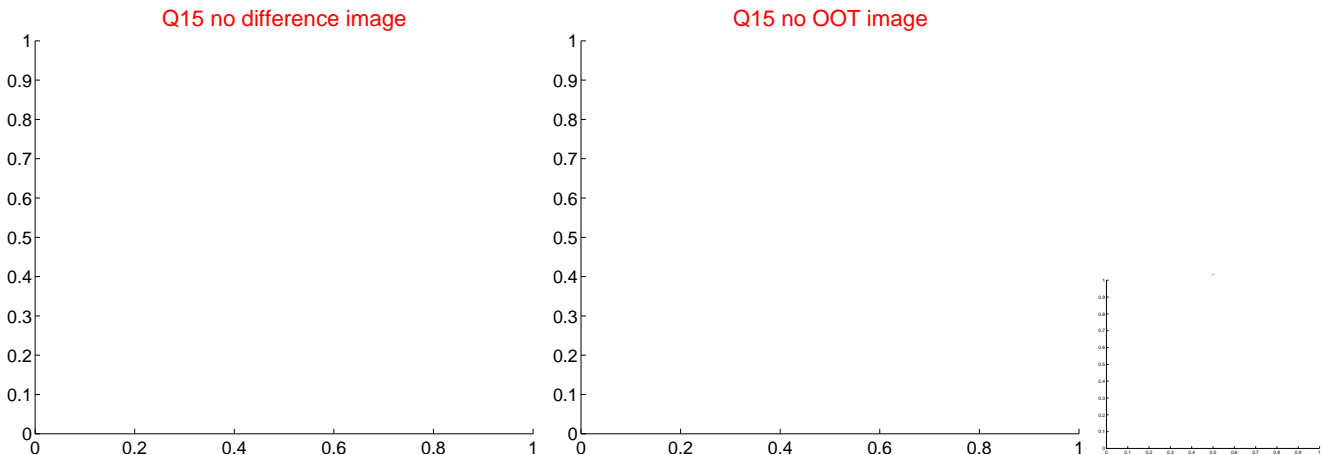
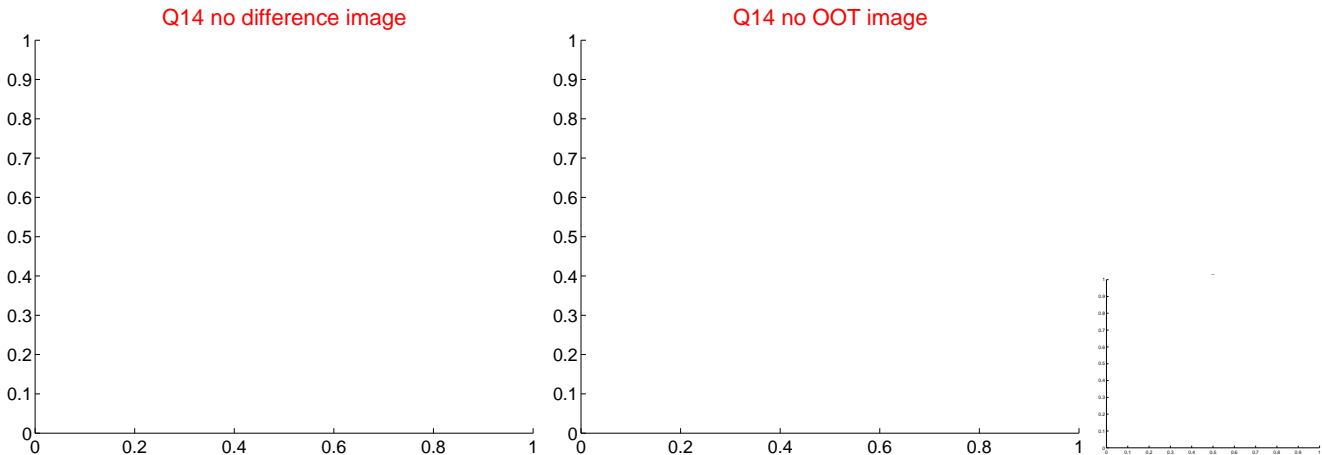
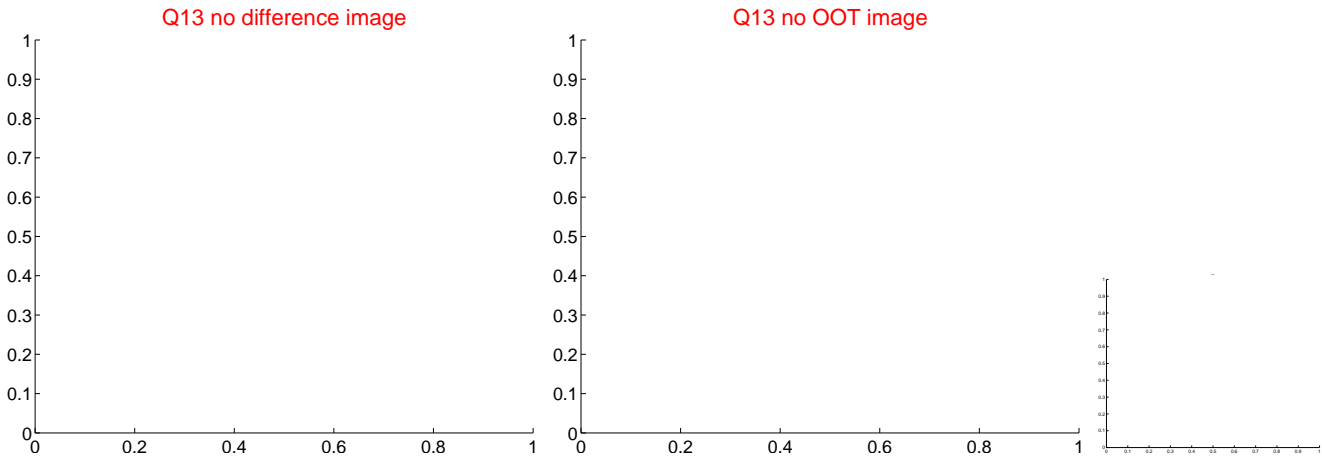
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



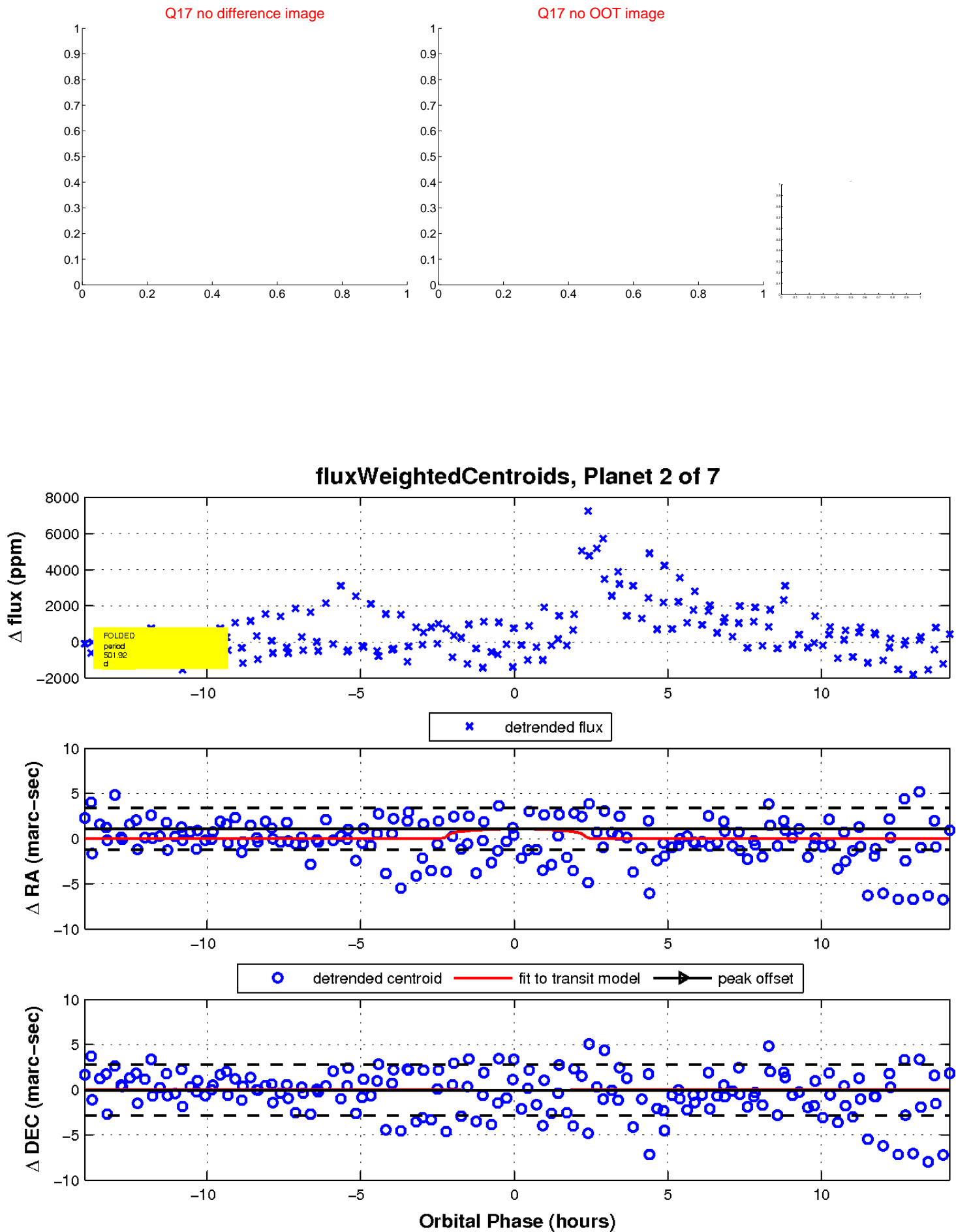
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

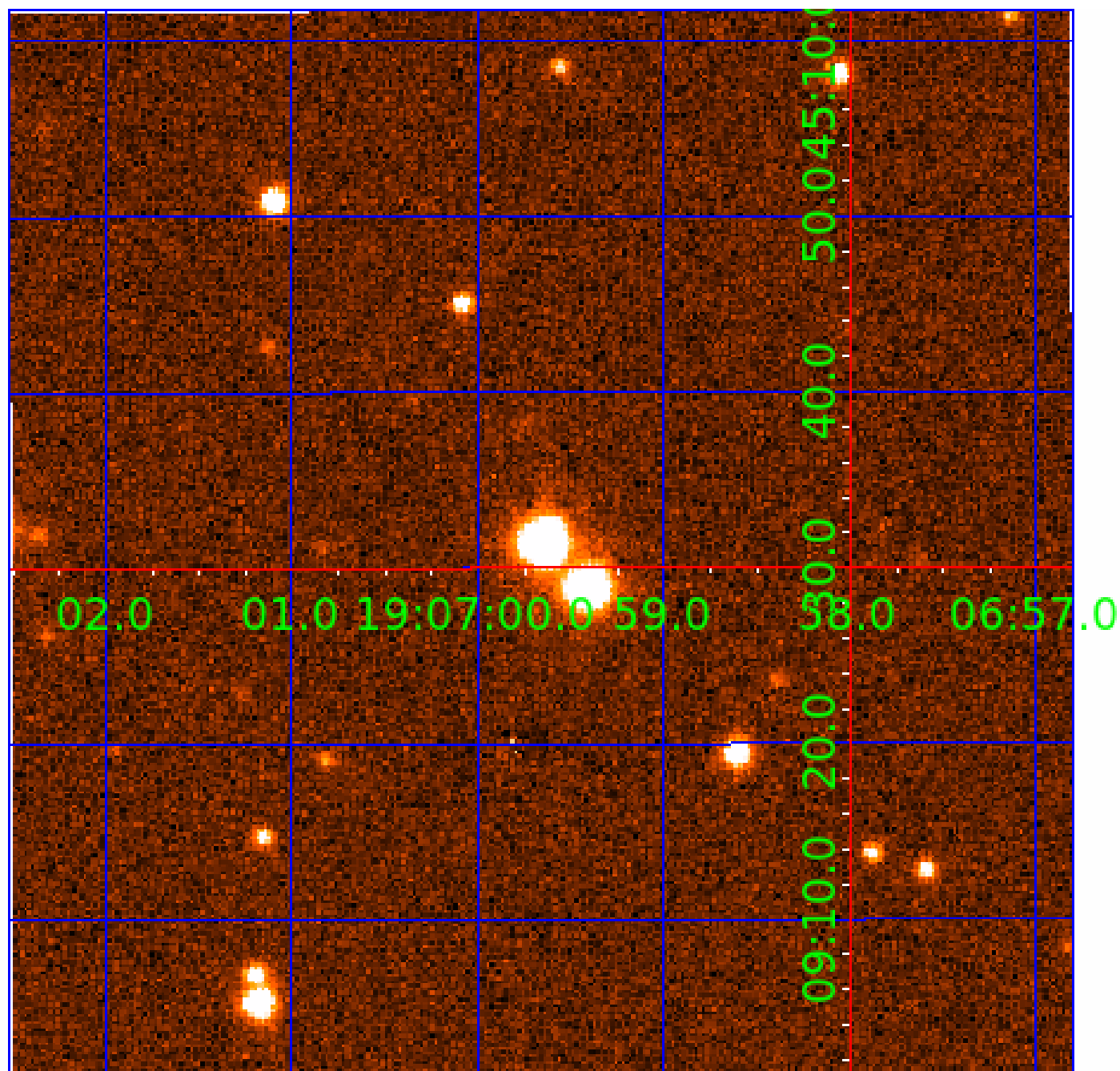


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 008873450

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008873450-01	OBS	No	329.128908	394.473473	2360.5	6.518	14.2	6.1	0.71	4450	3.27	0.26
008873450-02	OBS	No	501.919677	527.335460	1920.0	4.728	14.9	7.1	0.71	4450	3.03	0.15
008873450-03	OBS	No	507.529446	373.557613	1979.8	4.941	14.4	6.6	0.71	4450	4.27	0.14
008873450-04	OBS	No	270.967374	207.131607	649.6	1.722	16.5	3.5	0.71	4450	2.02	0.33
008873450-05	OBS	No	425.362386	271.409345	2246.5	15.491	11.1	6.0	0.71	4450	3.19	0.18
008873450-06	OBS	7913.01	24.278231	154.518614	840.8	4.450	12.5	13.7	0.71	4450	2.39	8.29
008873450-07	OBS	No	436.671988	245.084126	792.3	5.000	11.7	-1.0	0.71	4450	1.90	0.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008873450-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008873450-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008873450-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE_ZUMA—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008873450-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS
008873450-05	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008873450-06	OBS	FP	0.00	0	0	1	0	CENT_KIC_POS—HALO_GHOST
008873450-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—CENT_NOFITS

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

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

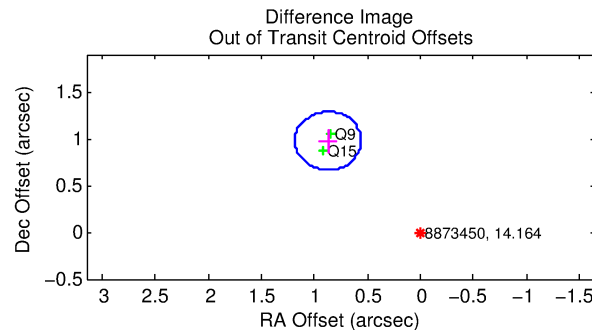
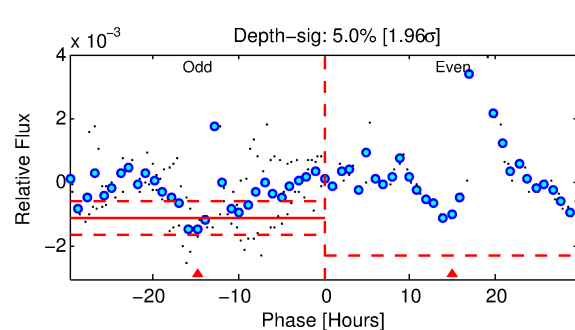
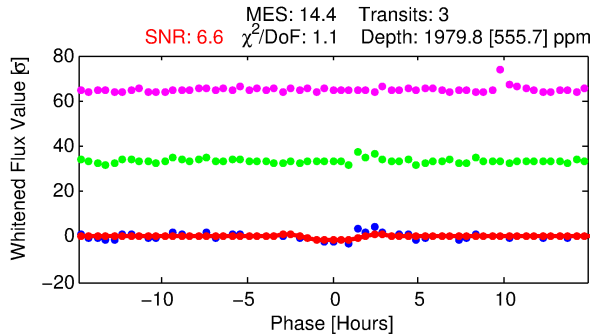
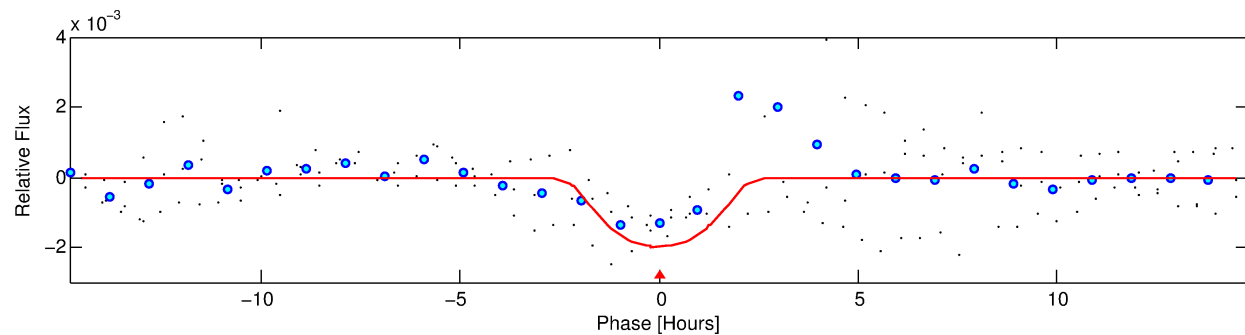
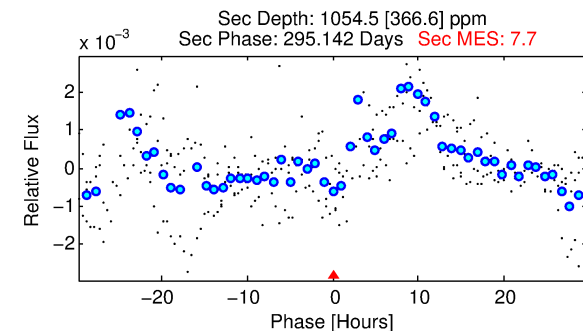
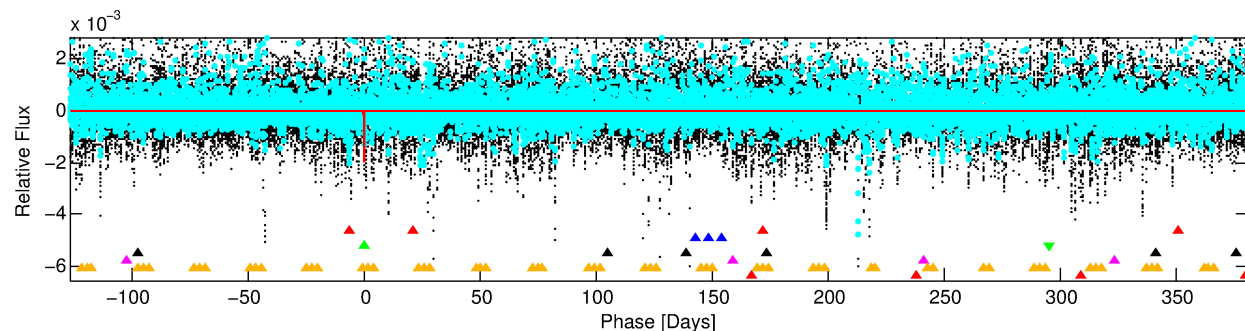
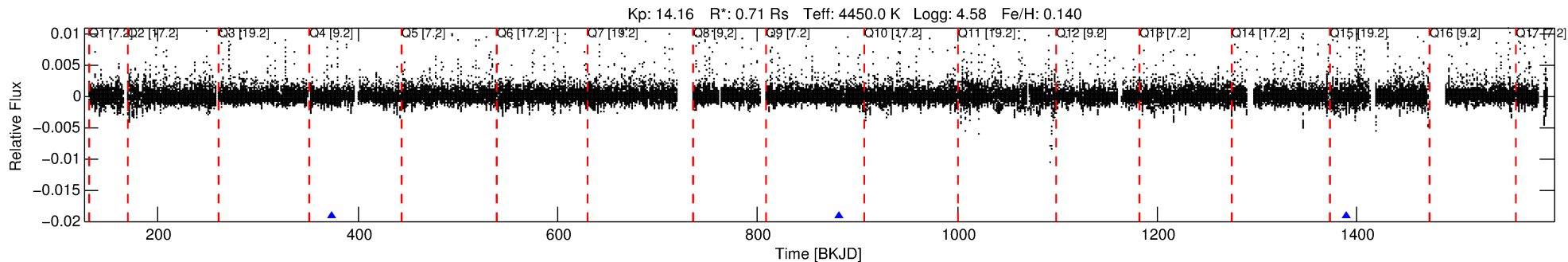
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008873450-03

No Significant Match Found

# DV One-Page Summary

KIC: 8873450 Candidate: 3 of 7 Period: 507.529 d



## DV Fit Results:

Period = 507.52945 [0.00976] d  
Epoch = 373.5576 [0.0102] BKJD  
Rp/R\* = 0.0553 [0.0138]  
a/R\* = 366.84 [78.54]  
b = 0.95 [0.04]  
Seff = 0.14 [0.02]  
Teq = 157 [6] K  
Rp = 4.27 [1.12] Re  
a = 1.1048 [0.0777] AU  
Ag = 38915.34 [23984.05] [1.62 $\sigma$ ]  
**Teffp = 3410 [528] K [6.16 $\sigma$ ]**

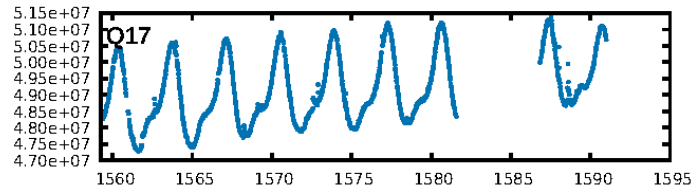
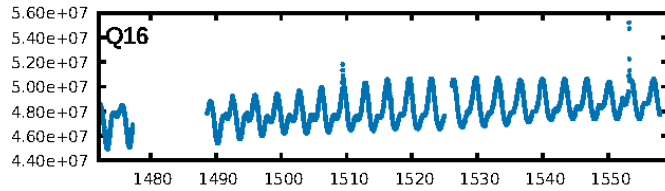
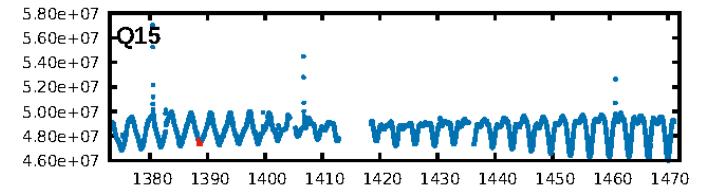
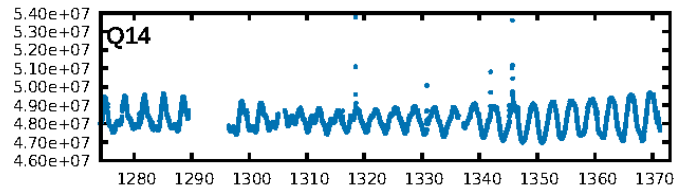
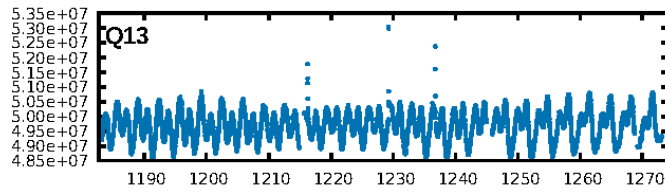
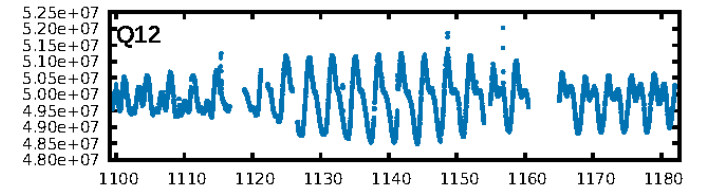
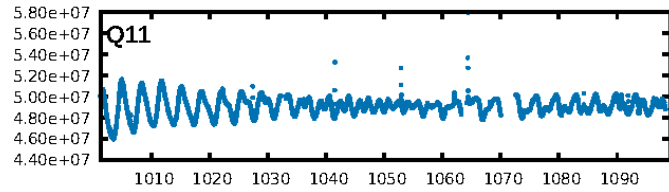
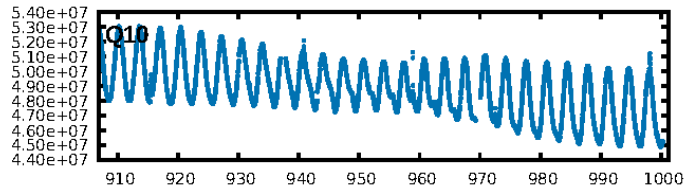
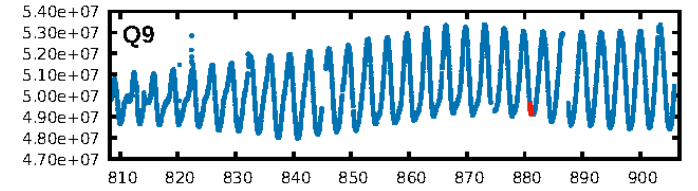
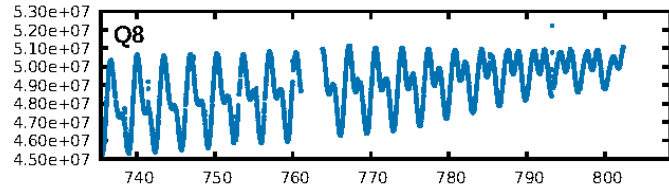
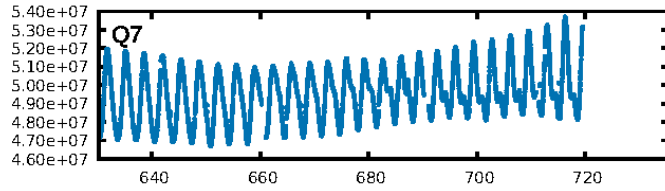
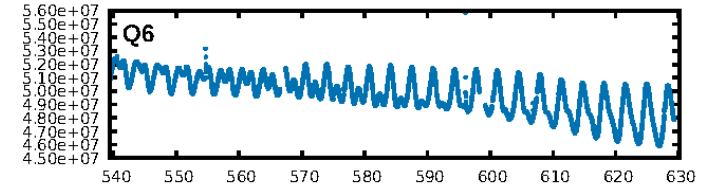
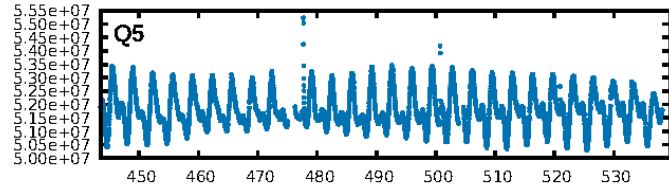
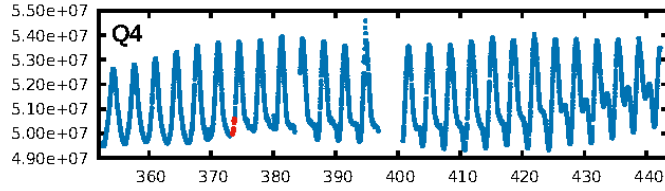
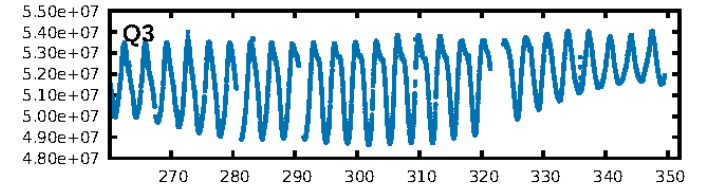
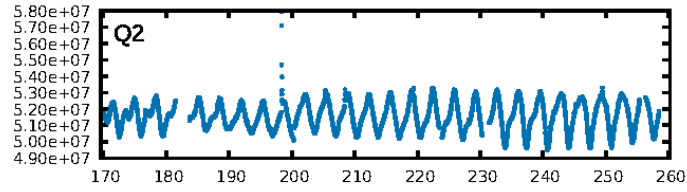
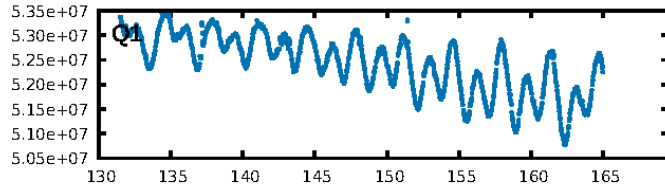
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [19.69 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 3.3%  
ModelChiSquareGof-sig: 99.4%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.534  
Centroid-sig: 93.7%  
Centroid-so: 1.176 arcsec [1.30 $\sigma$ ]  
**OotOffset-rm: 1.308 arcsec [12.55 $\sigma$ ]**  
KicOffset-rm: 0.053 arcsec [0.20 $\sigma$ ]  
OotOffset-st: 0/1/0/1 [2]  
KicOffset-st: 0/1/0/1 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [2/2]

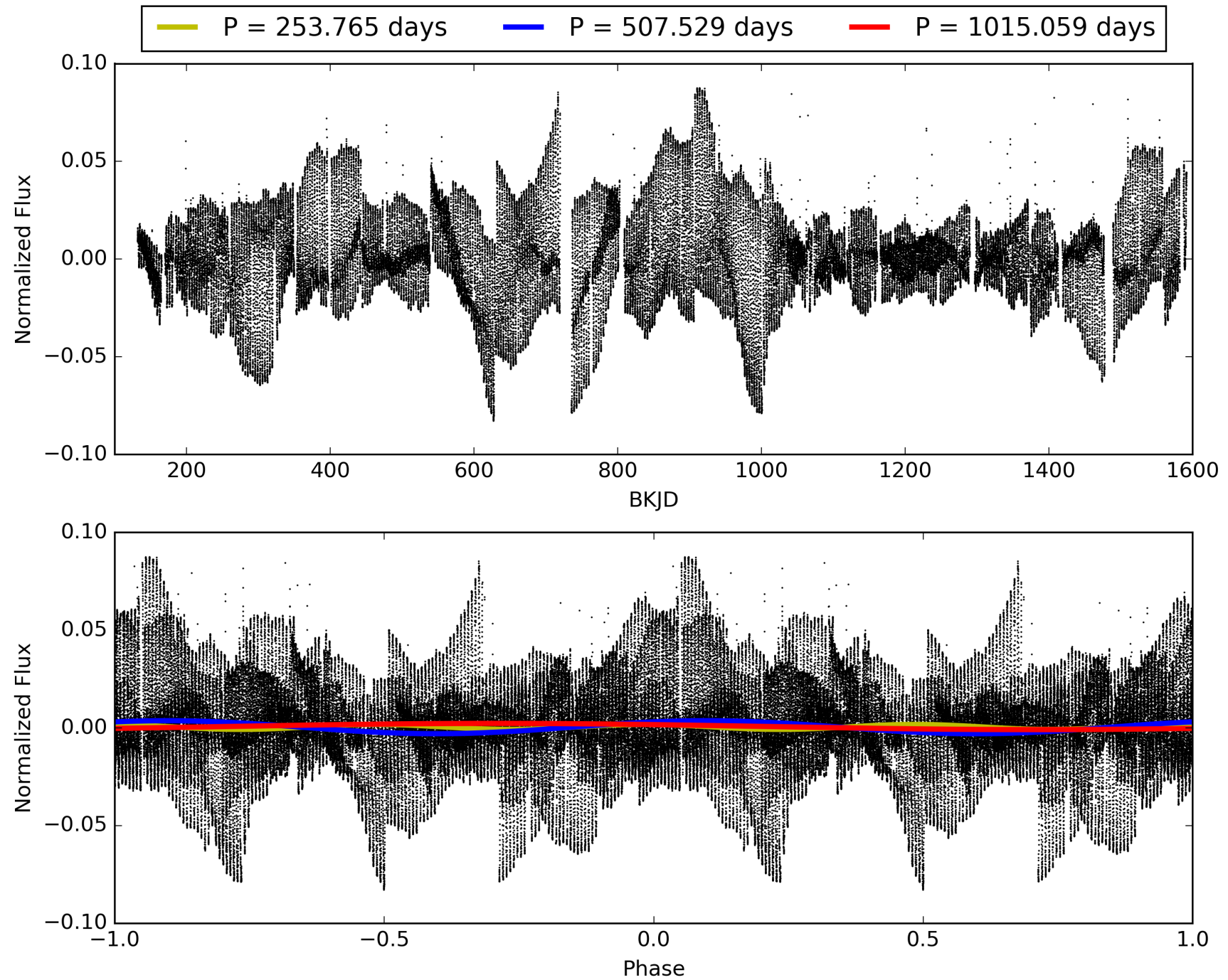
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:13:26 Z

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

# TCE 008873450-03, PDC Light Curves

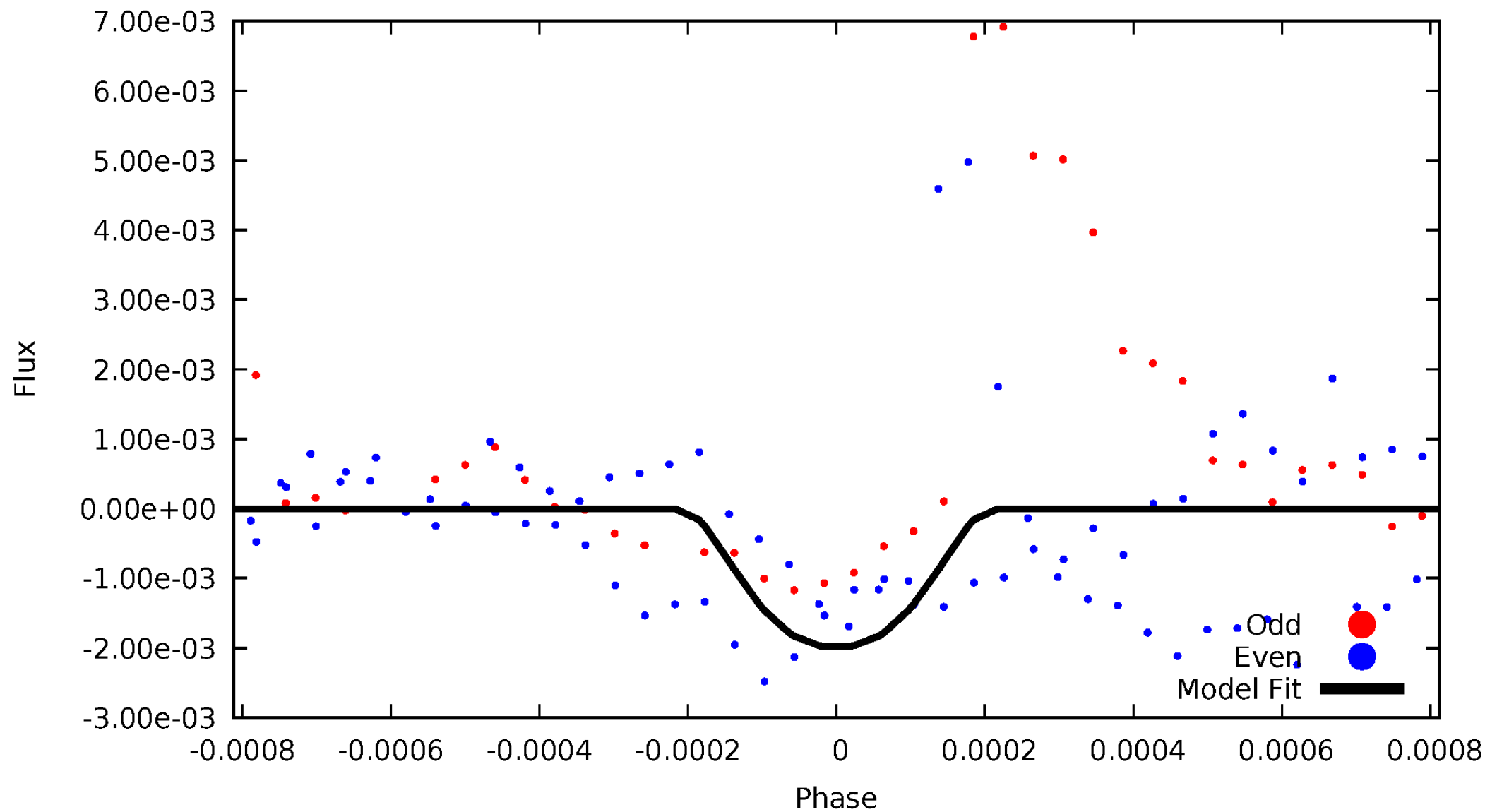


TCE 008873450-03



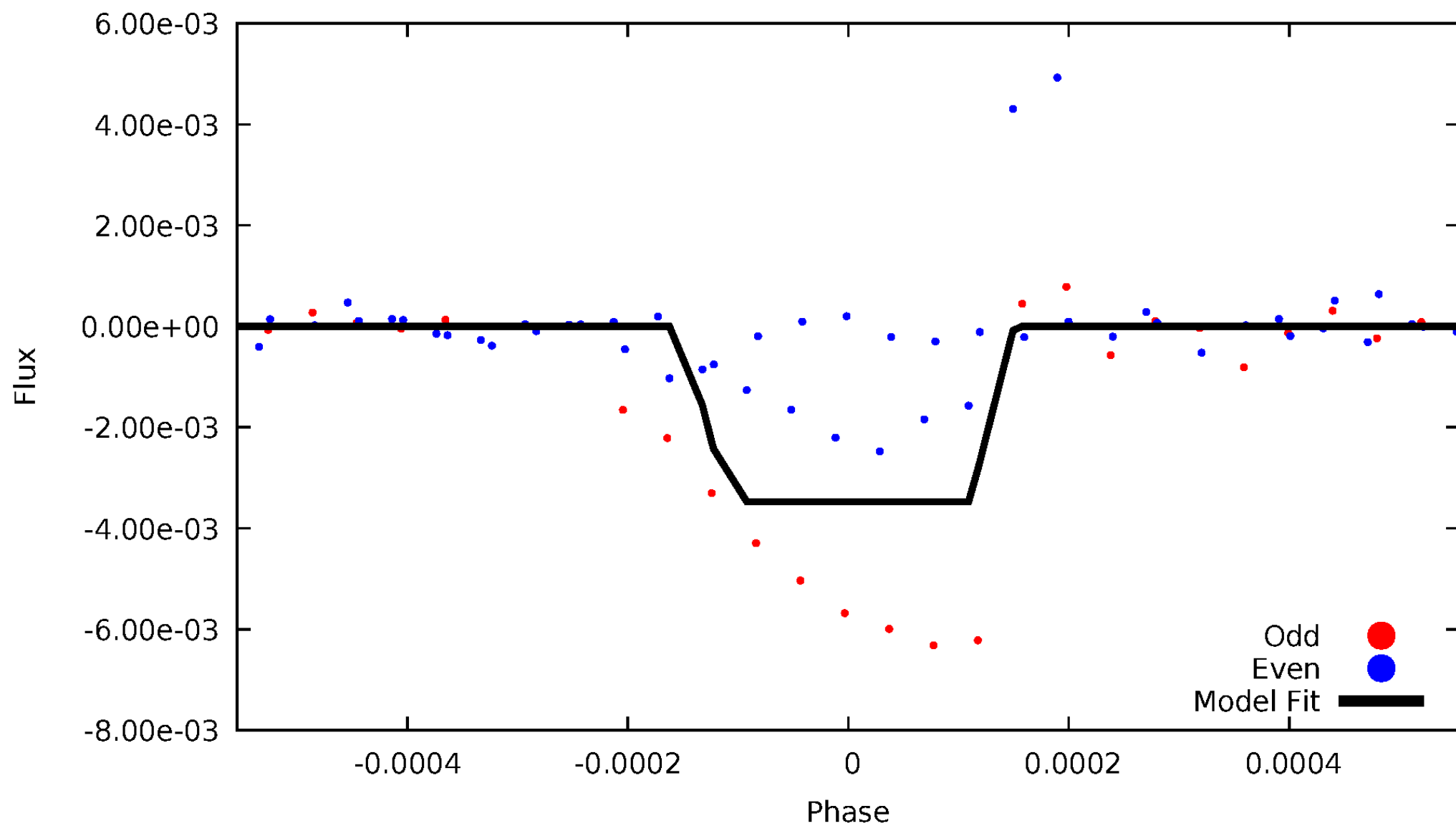
# DV Odd/Even

TCE 008873450-03



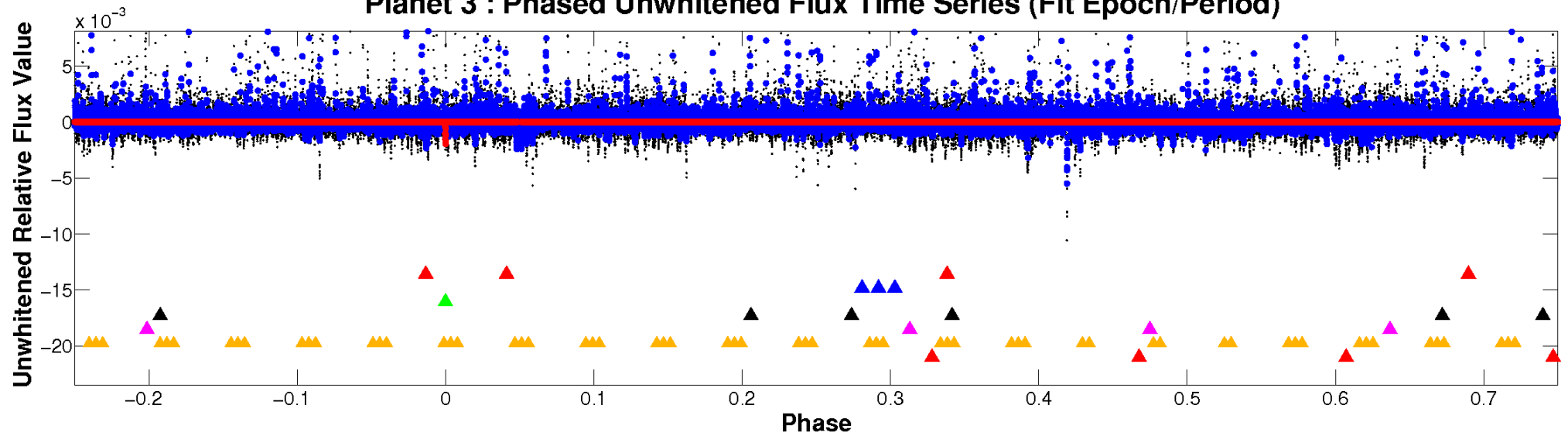
# ALT Odd/Even

TCE 008873450-03

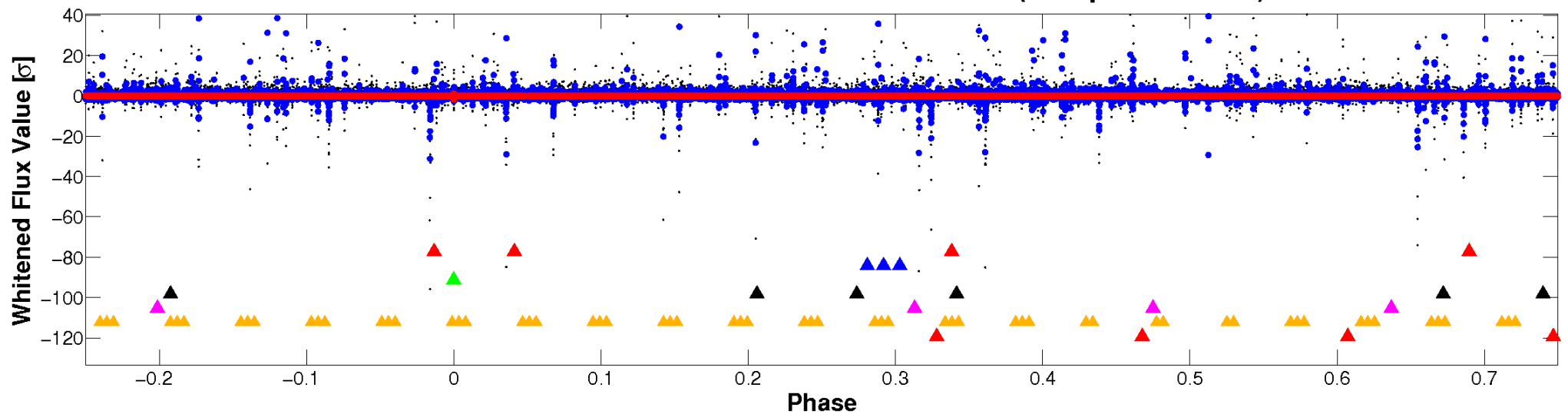


# Non-Whitened Vs. Whitened Light Curve

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

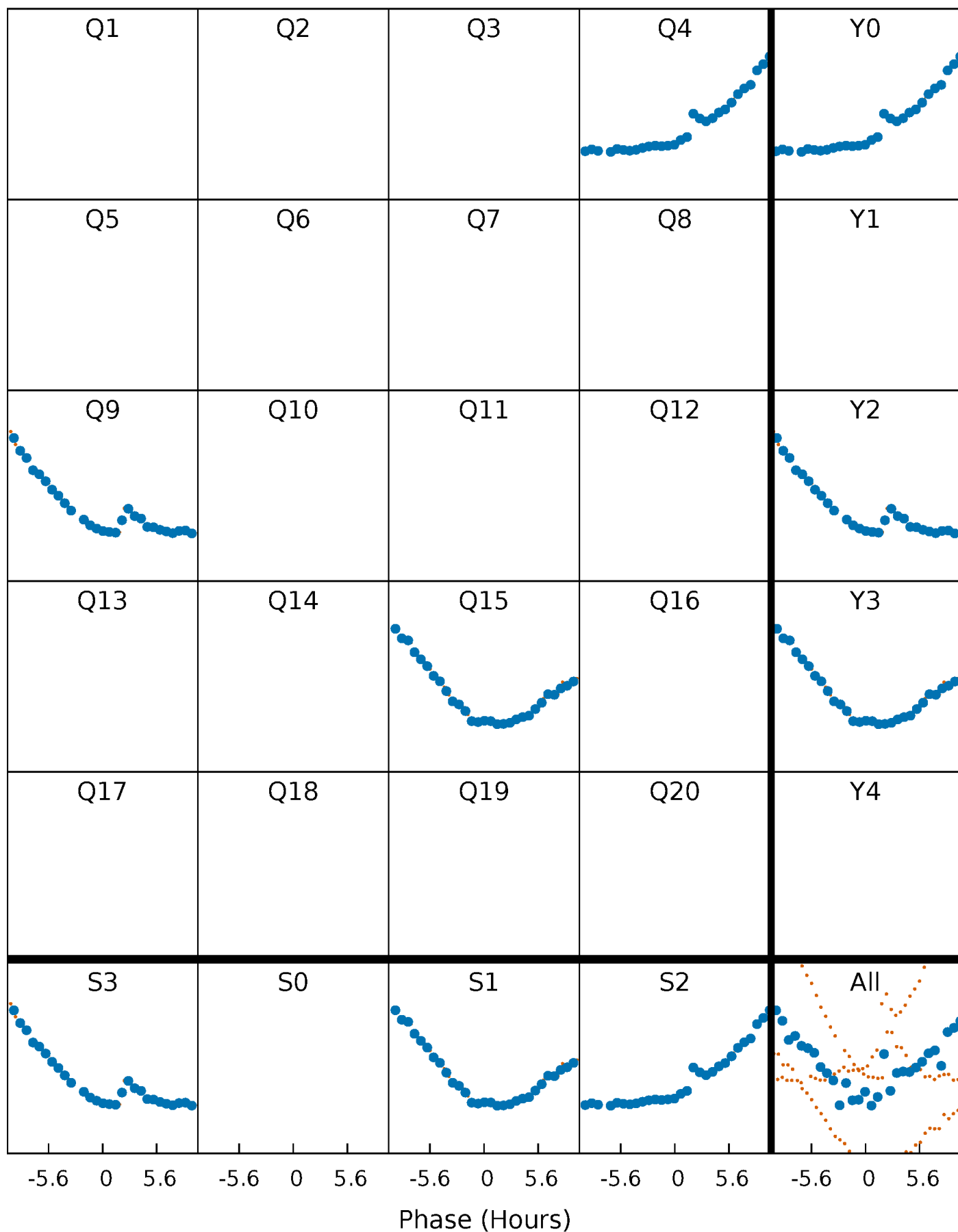


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

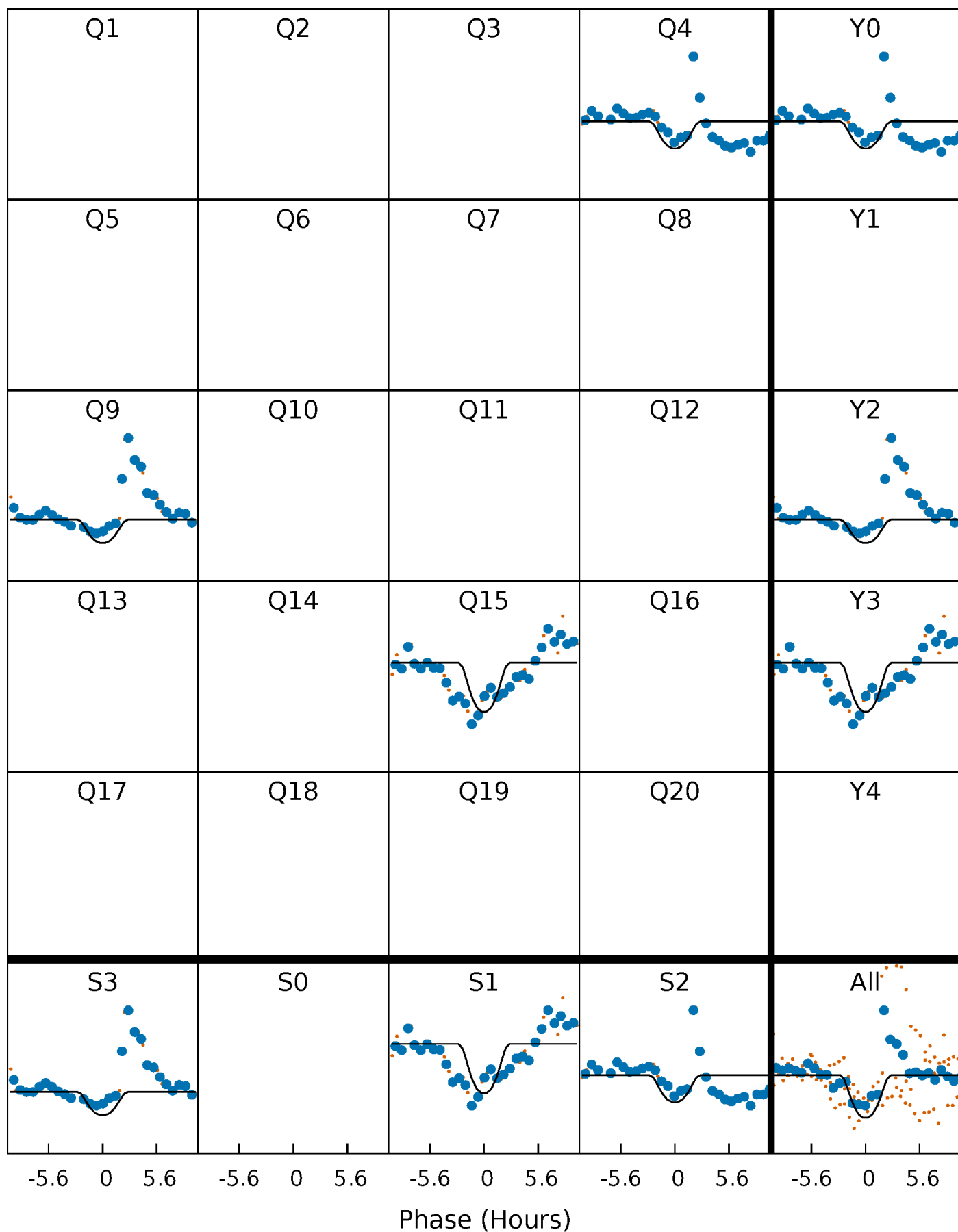
TCE 008873450-03 P=507.529446 Days  $T_0=373.557613$  (BKJD)





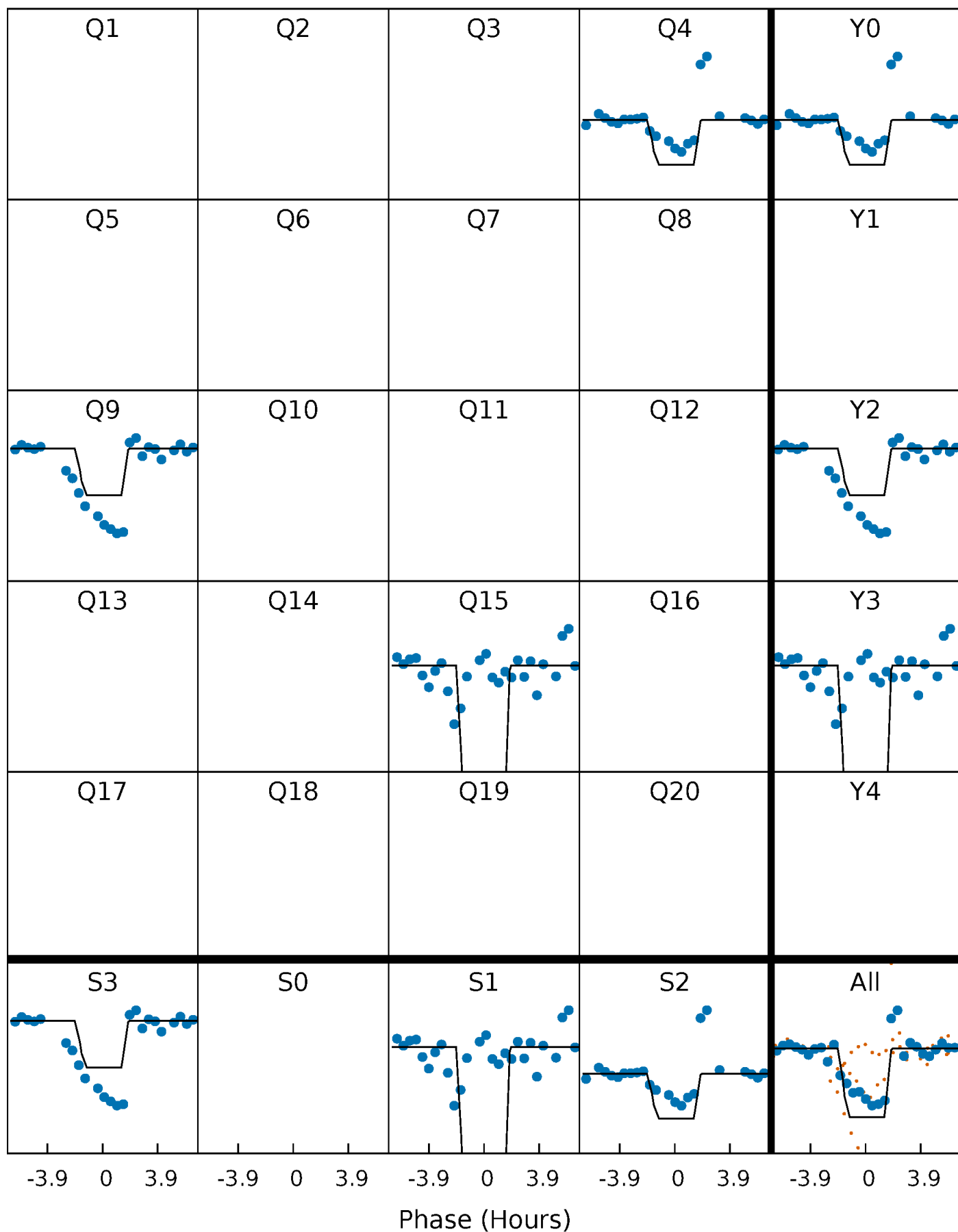
# DV Quarter-Phased Transit Curves

TCE 008873450-03     $P=507.529446$  Days     $T_0=373.557613$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

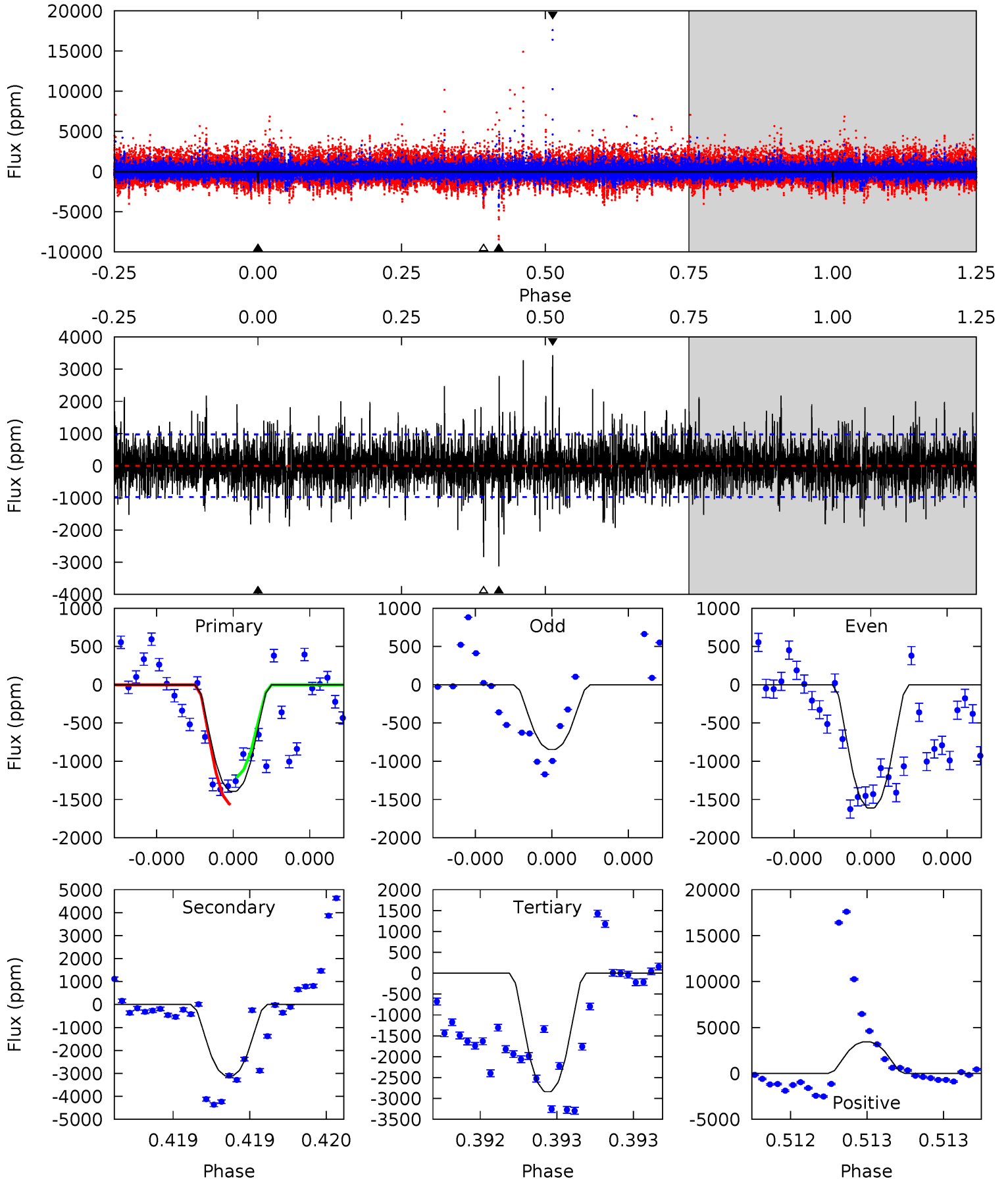
TCE 008873450-03 P=507.549197 Days  $T_0=373.551437$  (BKJD)



# DV Model-Shift Uniqueness Test

008873450-03, P = 507.529446 Days, E = 373.557613 Days

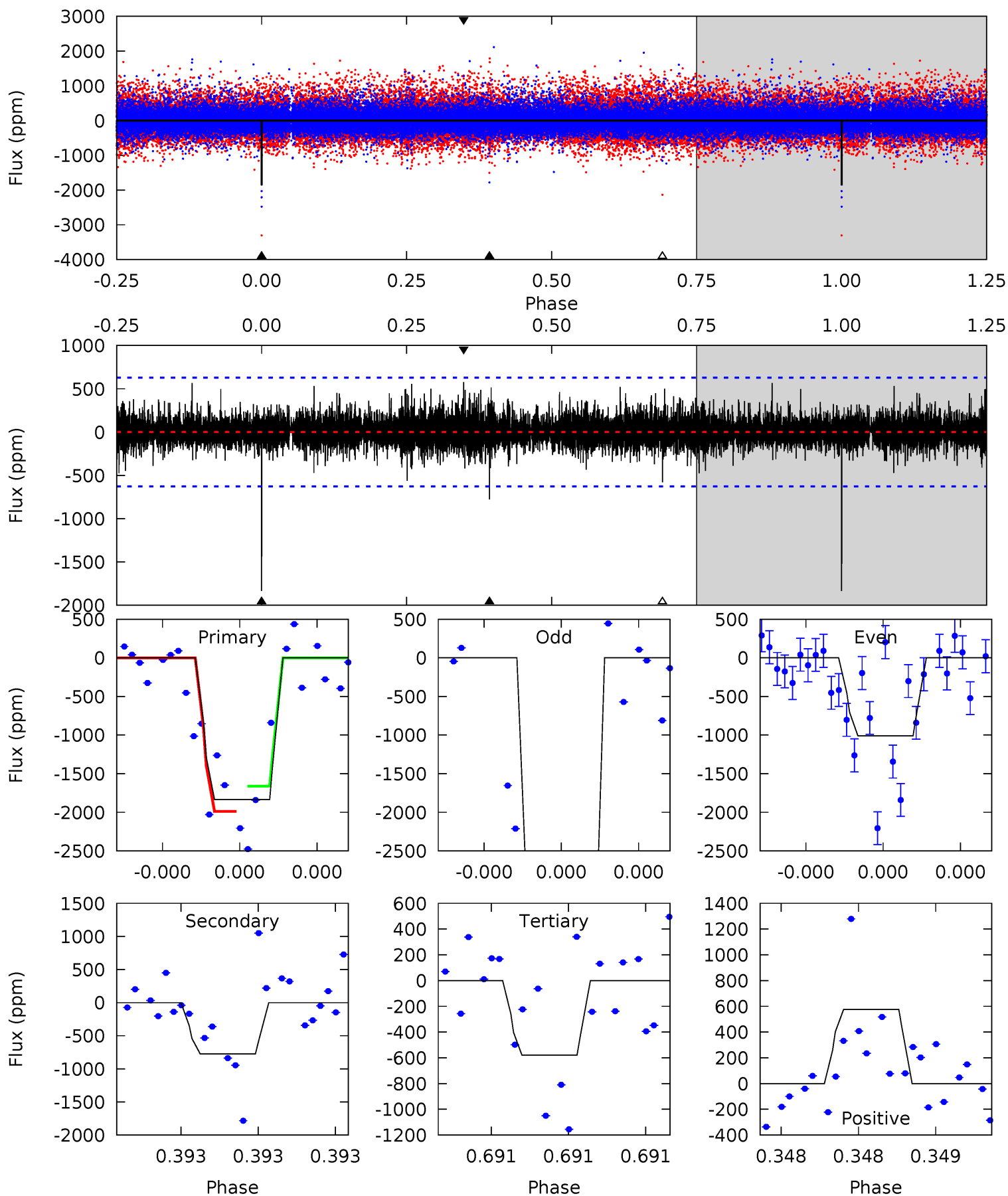
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.00	17.9	16.3	19.8	5.60	3.52	2.99	-8.31	-11.8	1.62	-1.82	1.26	1.37	0.52	1.03



# Alt Model-Shift Uniqueness Test

008873450-03, P = 507.549197 Days, E = 373.551437 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
16.6	7.01	5.23	5.21	5.67	3.63	0.96	11.4	11.4	1.78	1.80	28.5	1.40	0.24	0



### Stellar Parameters For KIC 008873450

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4450^{+132}_{-132}$	$4.583^{+0.056}_{-0.020}$	$0.140^{+0.250}_{-0.300}$	$0.707^{+0.029}_{-0.059}$	$0.698^{+0.054}_{-0.054}$	$2.780^{+0.684}_{-0.220}$
	+3%/-3%	+1%/-0%	+179%/-214%	+4%/-8%	+8%/-8%	+25%/-8%
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 008873450-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	-3119±174	$4.25^{+1.04}_{-1.13}$	$218^{+7}_{-7}$	$4461^{+623}_{-366}$	$118849^{+96677}_{-44122}$
Alt.	-776±111	$4.48^{+1.12}_{-1.01}$	$218^{+7}_{-7}$	$3440^{+303}_{-256}$	$26267^{+16344}_{-10059}$

$T_{\text{max}}$  = 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

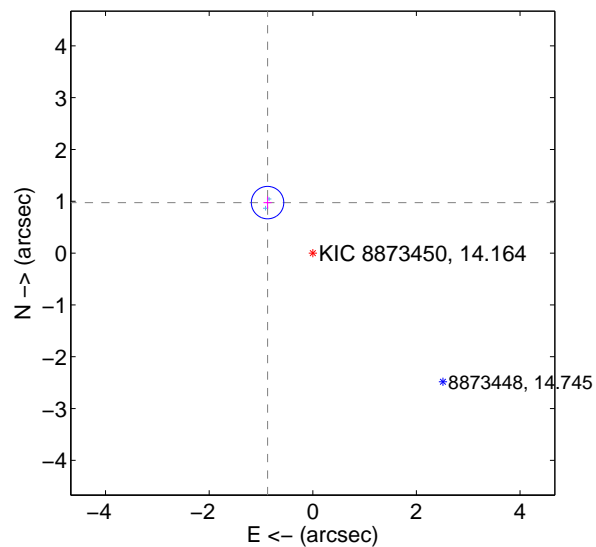
Supplemental centroid analysis for 008873450-03. Kepler magnitude: 14.16. Transit SNR 6.55

There are 2 quarters with good PRF difference image offsets

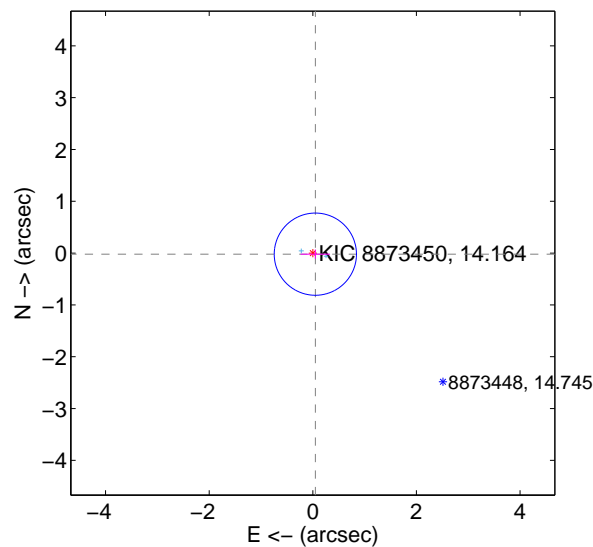
The direct PRF centroid is offset from the target star catalog position by about 1.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.308 \pm 0.104$	12.55	$0.873 \pm 0.078$	$0.975 \pm 0.121$
PRF-fit source offset from KIC position	$0.053 \pm 0.264$	0.20	$-0.049 \pm 0.284$	$-0.021 \pm 0.089$
photometric centroid source offset	$1.18 \pm 0.91$	1.30	$-0.96 \pm 0.88$	$-0.68 \pm 0.95$

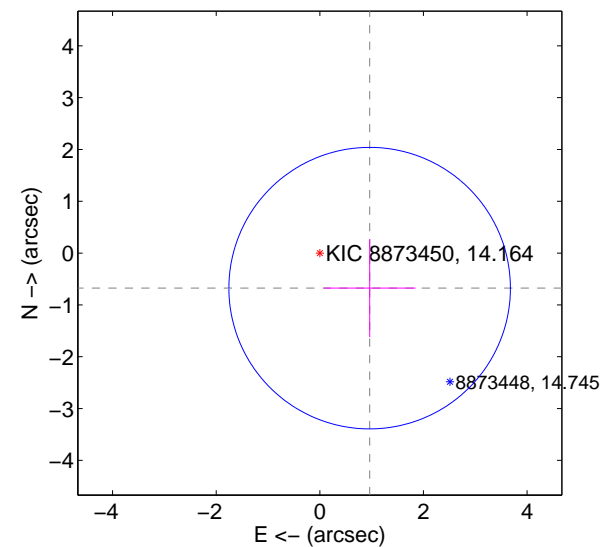
offset from difference PRF-fit to OOT PRF-fit



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.

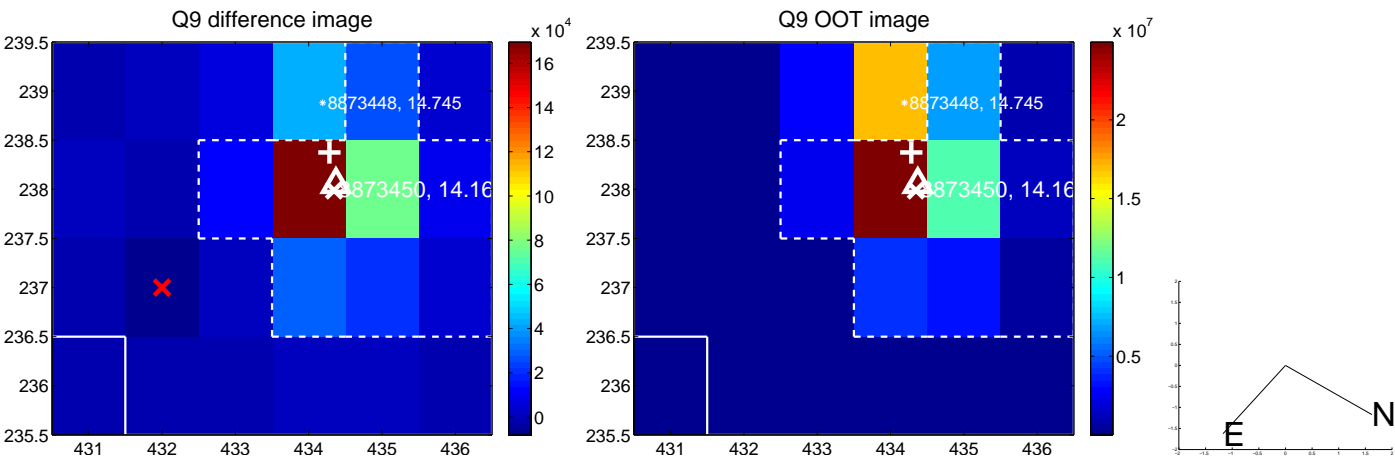


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

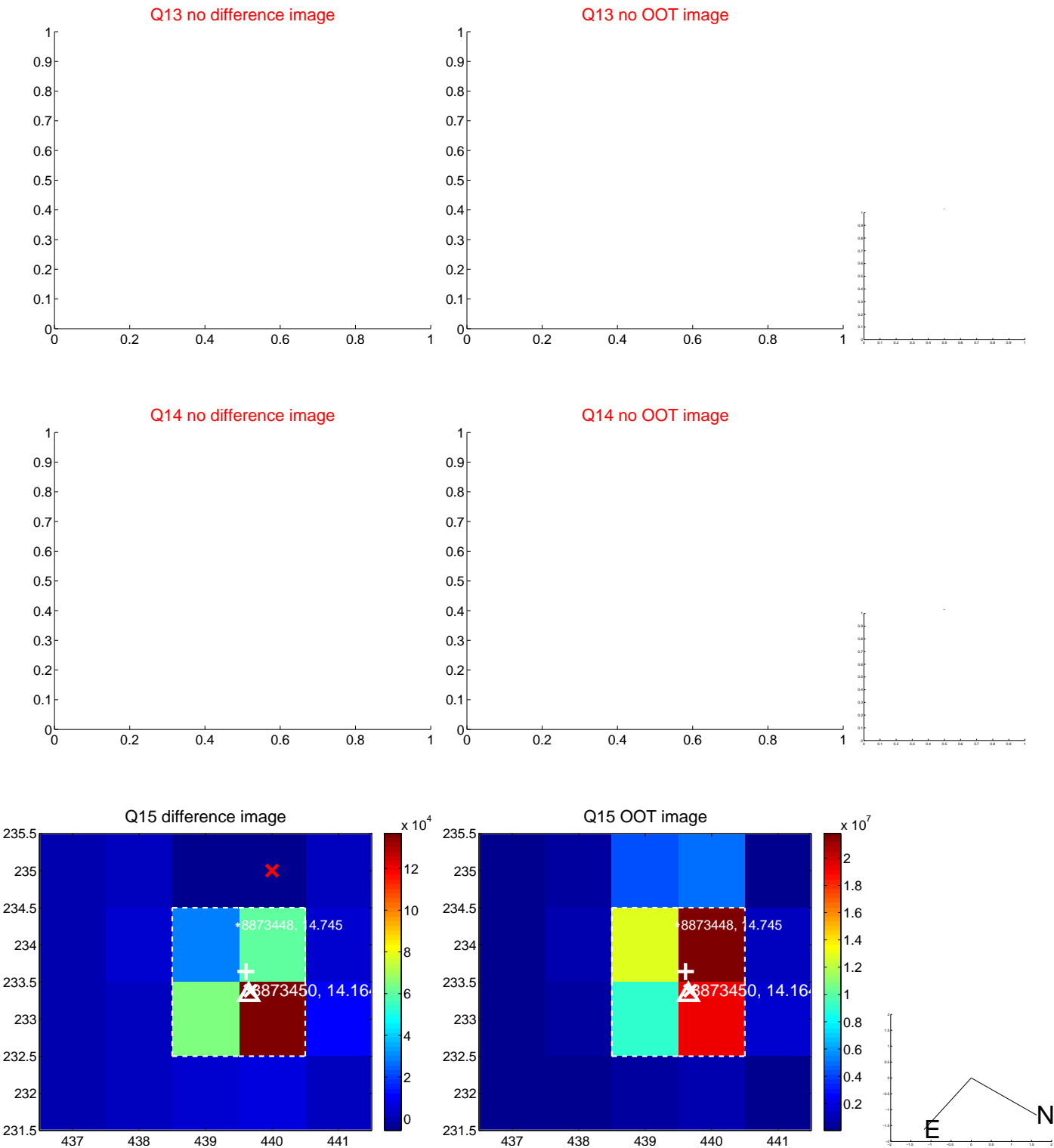




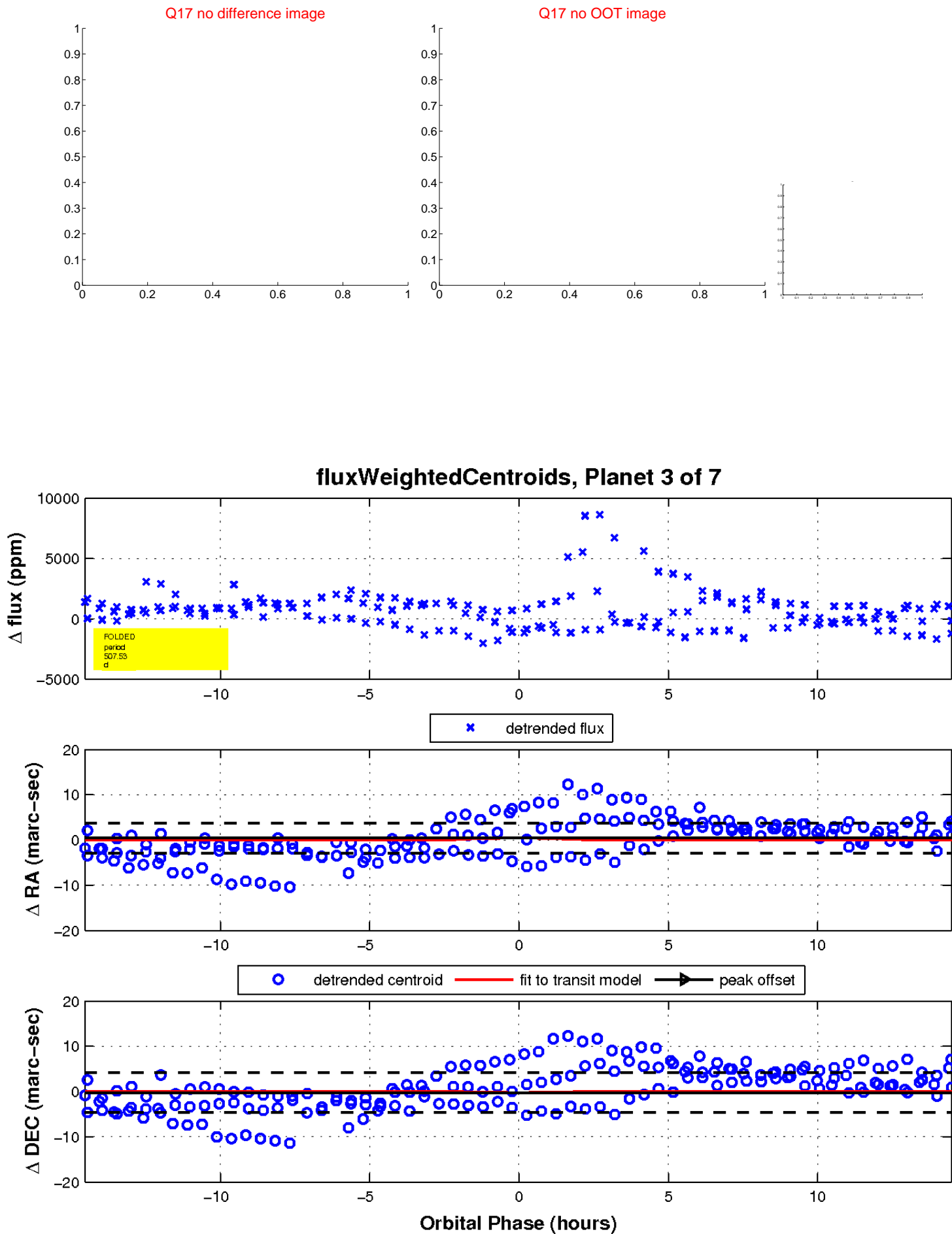
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

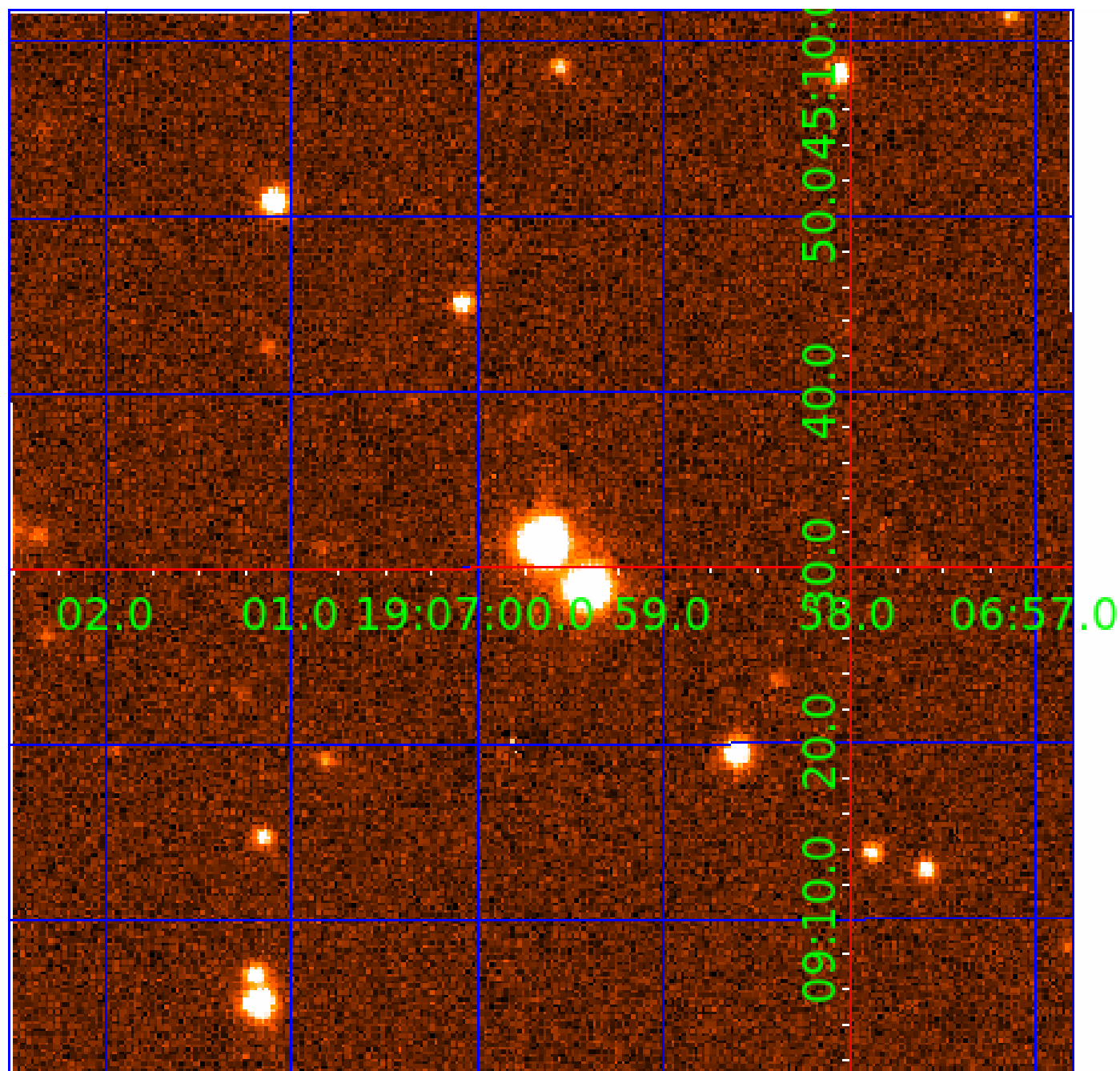


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008873450

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008873450-01	OBS	No	329.128908	394.473473	2360.5	6.518	14.2	6.1	0.71	4450	3.27	0.26
008873450-02	OBS	No	501.919677	527.335460	1920.0	4.728	14.9	7.1	0.71	4450	3.03	0.15
008873450-03	OBS	No	507.529446	373.557613	1979.8	4.941	14.4	6.6	0.71	4450	4.27	0.14
008873450-04	OBS	No	270.967374	207.131607	649.6	1.722	16.5	3.5	0.71	4450	2.02	0.33
008873450-05	OBS	No	425.362386	271.409345	2246.5	15.491	11.1	6.0	0.71	4450	3.19	0.18
008873450-06	OBS	7913.01	24.278231	154.518614	840.8	4.450	12.5	13.7	0.71	4450	2.39	8.29
008873450-07	OBS	No	436.671988	245.084126	792.3	5.000	11.7	-1.0	0.71	4450	1.90	0.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008873450-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008873450-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008873450-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE_ZUMA—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008873450-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS
008873450-05	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008873450-06	OBS	FP	0.00	0	0	1	0	CENT_KIC_POS—HALO_GHOST
008873450-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—CENT_NOFITS

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

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

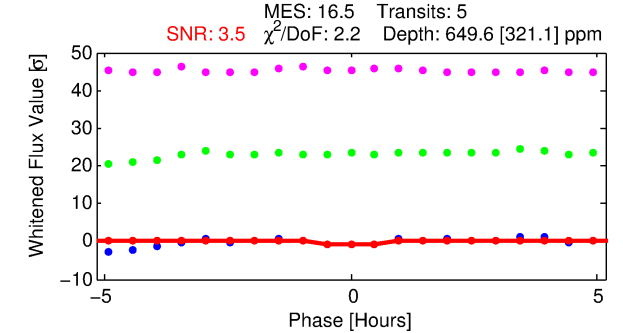
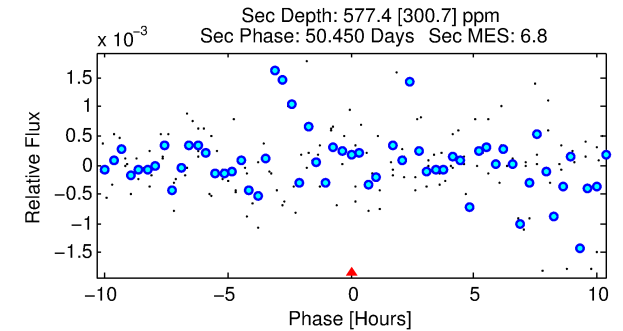
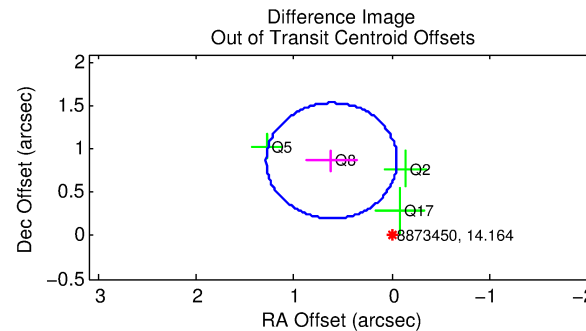
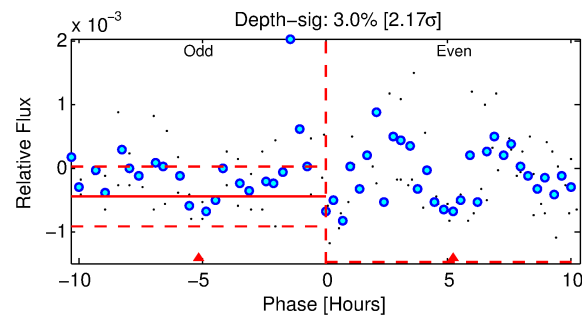
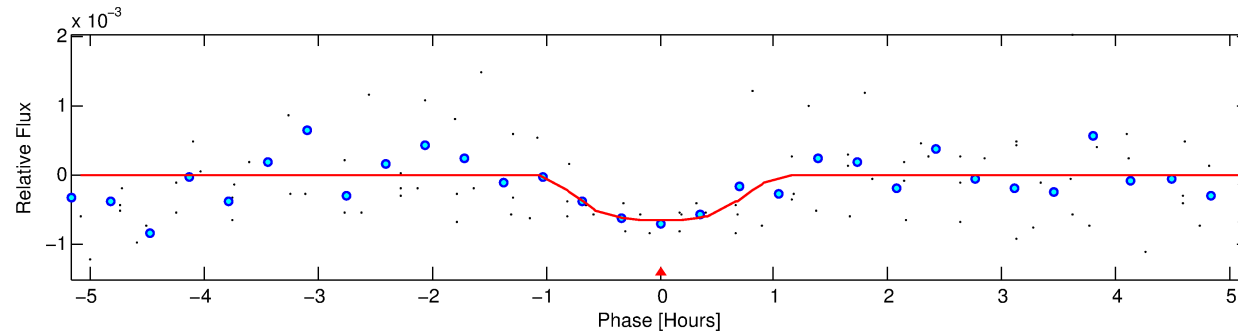
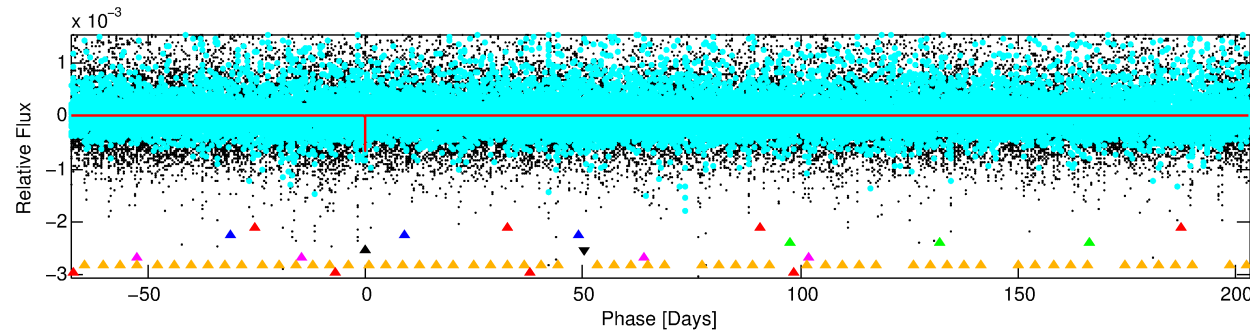
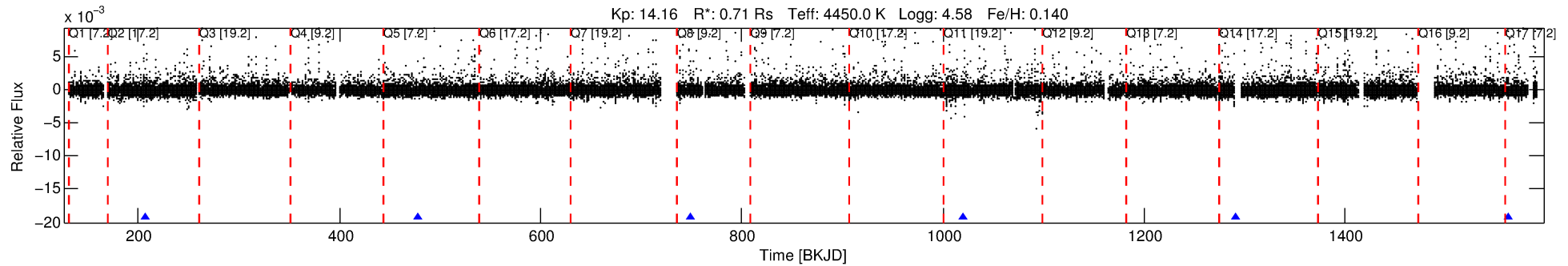
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 008873450-04

No Significant Match Found

# DV One-Page Summary

KIC: 8873450 Candidate: 4 of 7 Period: 270.967 d



## DV Fit Results:

Period = 270.96737 [0.00527] d  
Epoch = 207.1316 [0.0141] BKJD  
Rp/R\* = 0.0262 [0.1584]  
a/R\* = 800.80 [14987.41]  
b = 0.78 [9.80]  
Seff = 0.33 [0.05]  
Teq = 194 [8] K  
Rp = 2.02 [12.22] Re  
a = 0.7271 [0.0511] AU  
Ag = 41206.67 [499376.10] [0.08 $\sigma$ ]  
Teffp = 4264 [12920] K [0.32 $\sigma$ ]

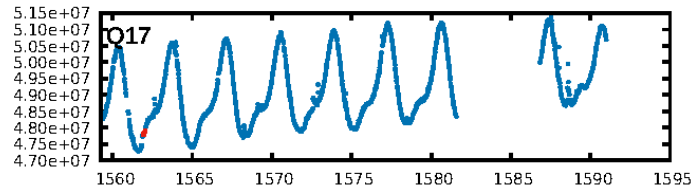
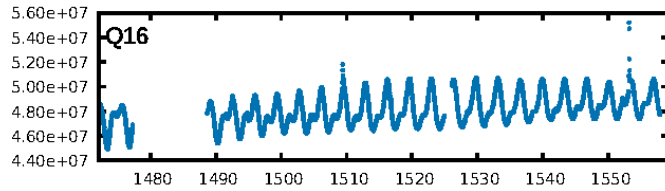
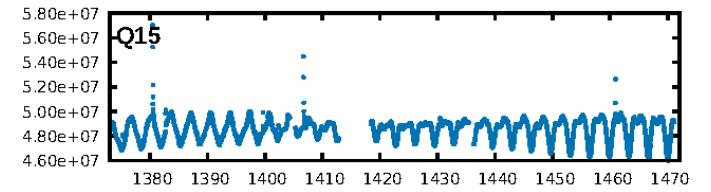
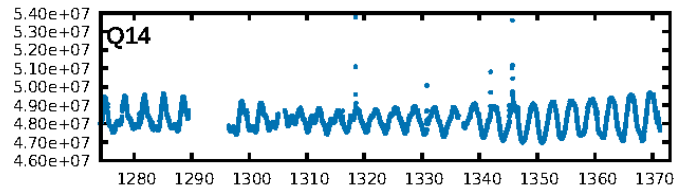
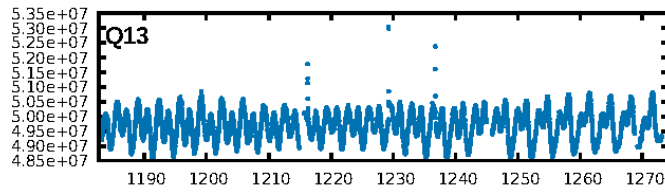
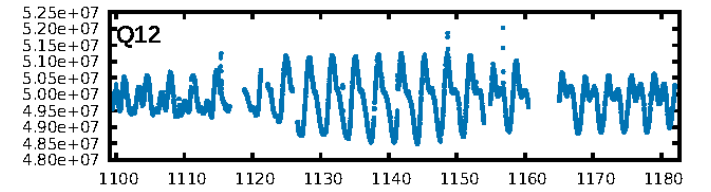
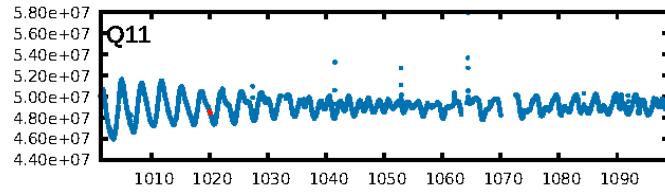
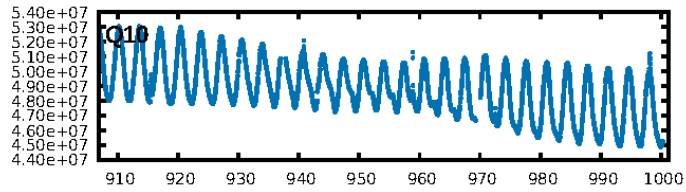
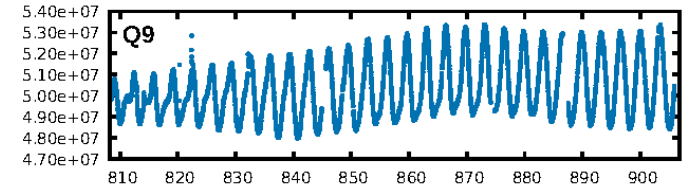
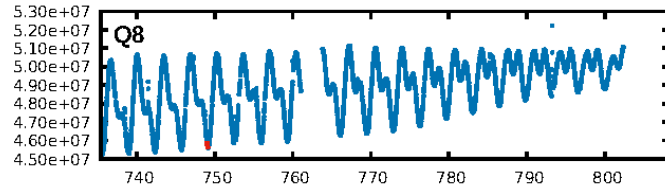
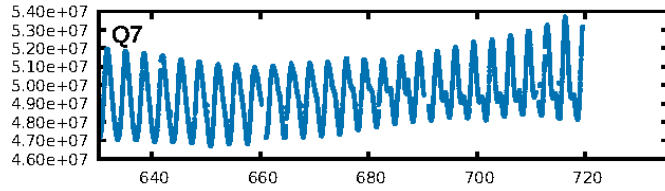
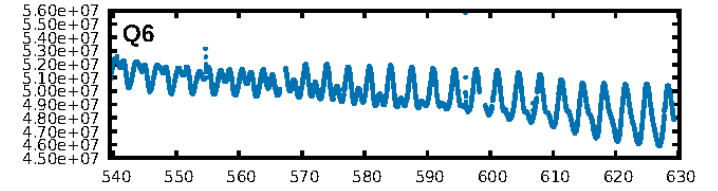
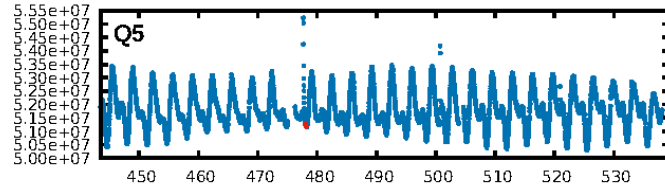
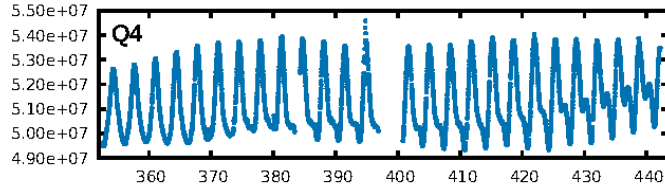
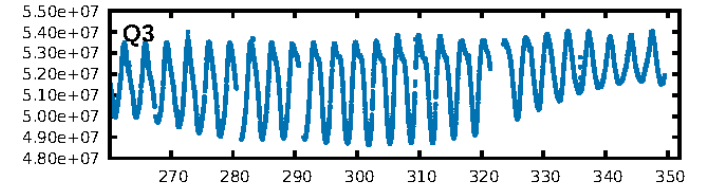
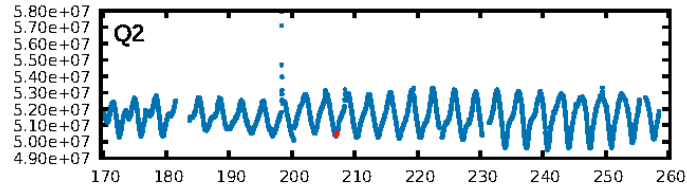
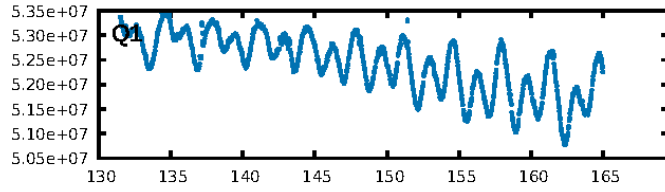
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [1240.73 $\sigma$ ]  
LongPeriod-sig: 100.0% [207.05 $\sigma$ ]  
ModelChiSquare2-sig: 67.7%  
ModelChiSquareGof-sig: 80.7%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -0.4766  
Centroid-sig: 12.8%  
Centroid-so: 1.550 arcsec [0.69 $\sigma$ ]  
OotOffset-rm: 1.065 arcsec [4.78 $\sigma$ ]  
KicOffset-rm: 0.595 arcsec [2.29 $\sigma$ ]  
OotOffset-st: 1/0/1/2 [4]  
KicOffset-st: 1/0/1/2 [4]  
DiffImageQuality-fgm: 1.00 [4/4]  
DiffImageOverlap-fno: 1.00 [5/5]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:13:48 Z

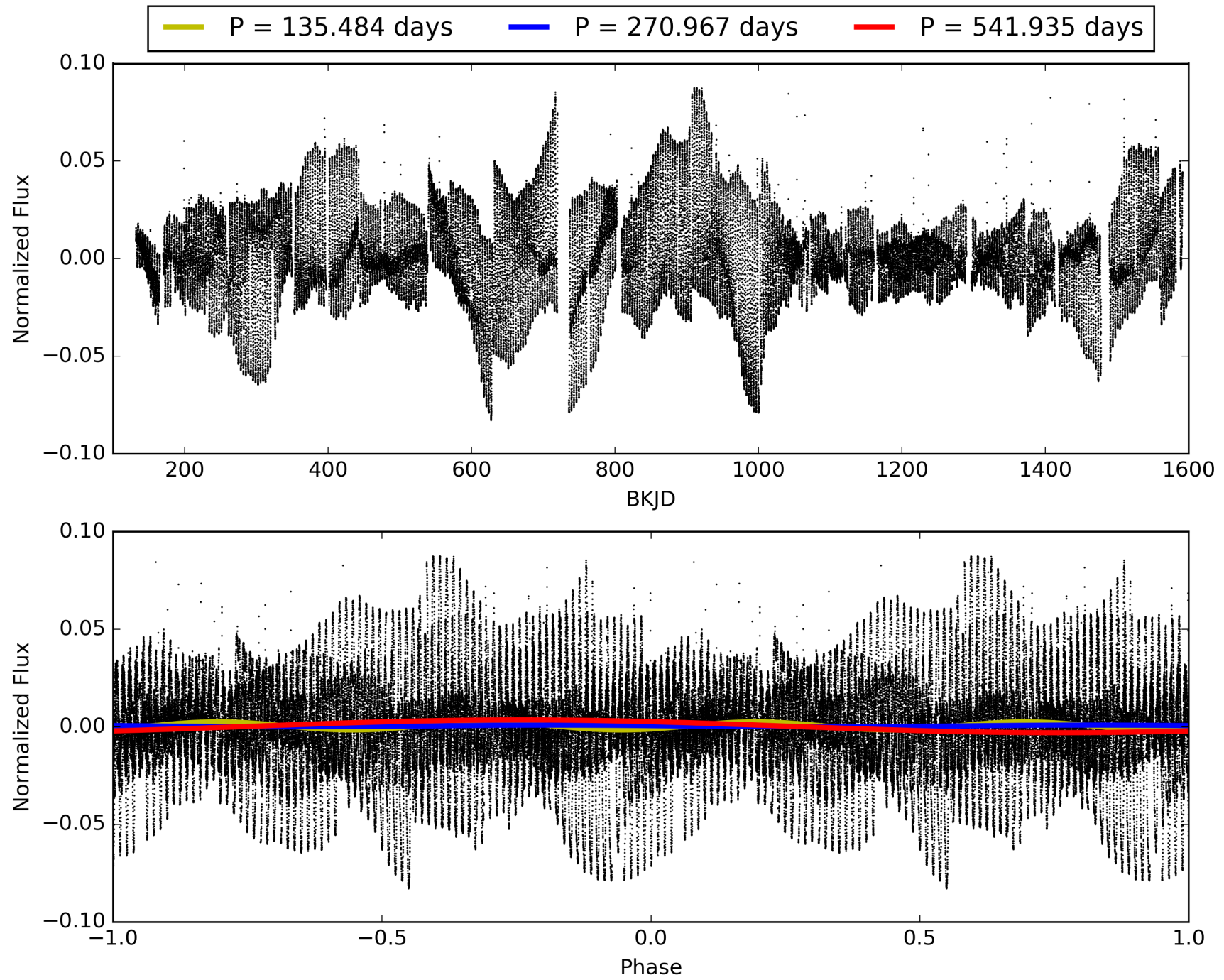
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008873450-04, PDC Light Curves





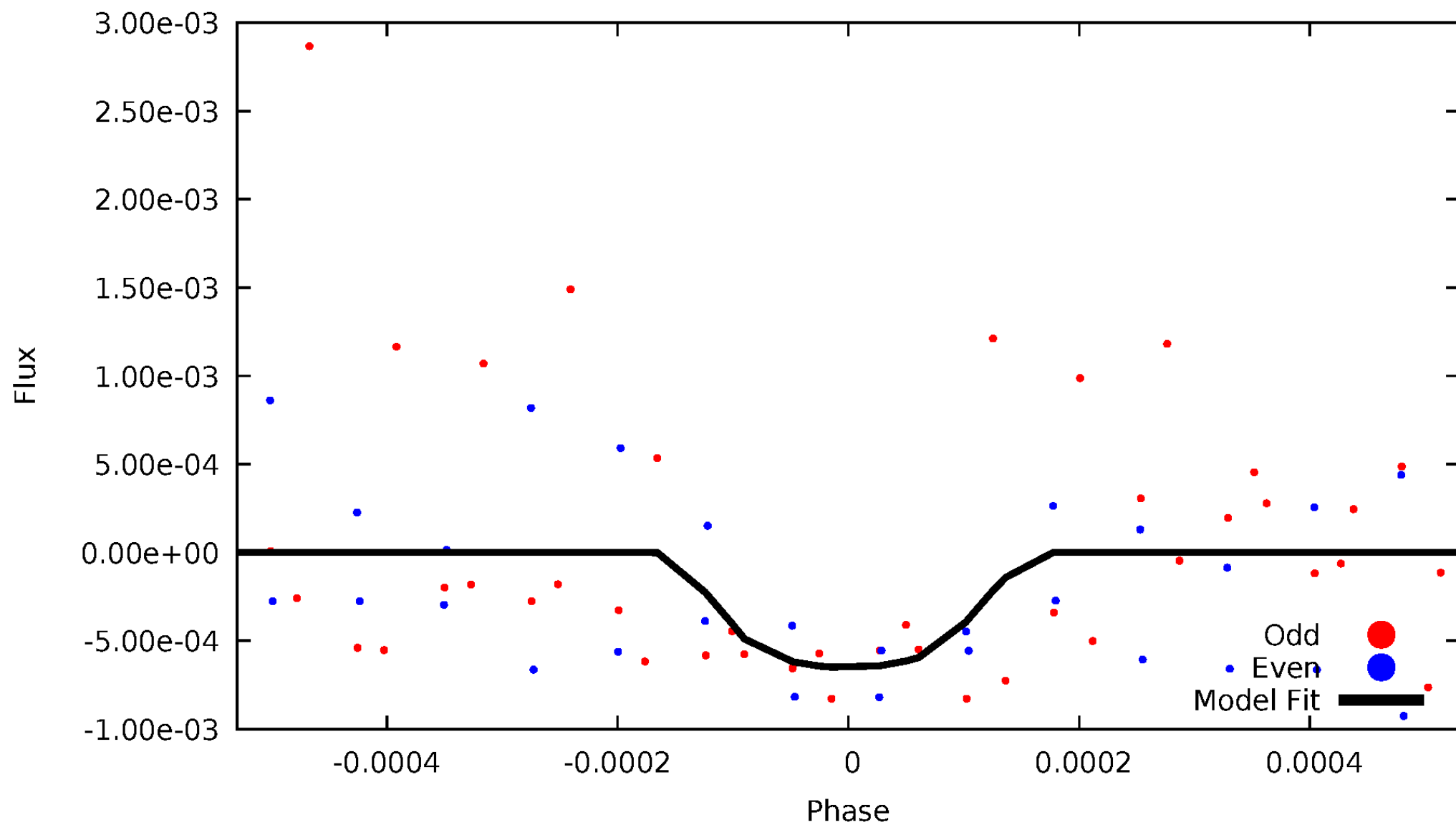
TCE 008873450-04





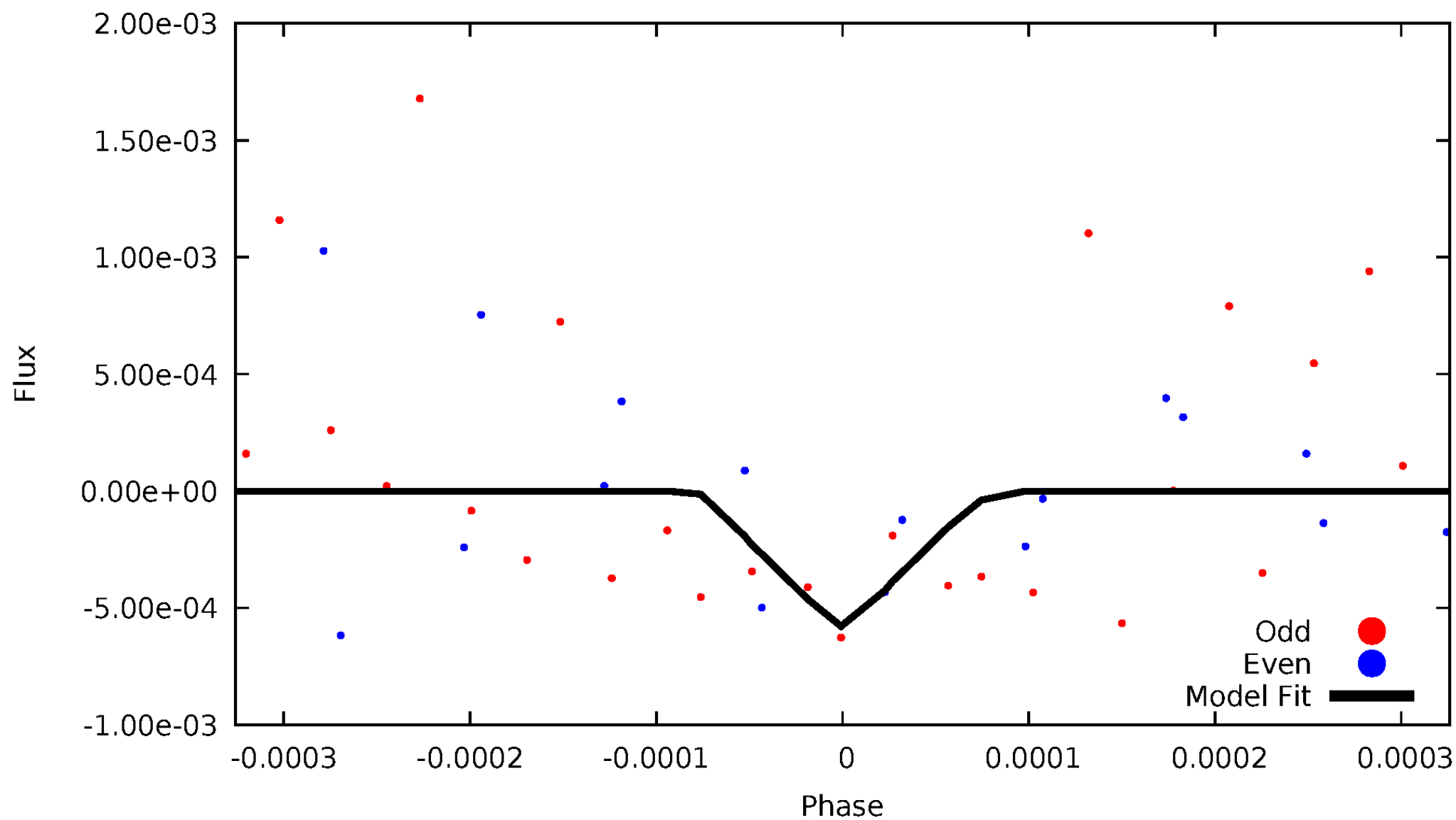
# DV Odd/Even

TCE 008873450-04



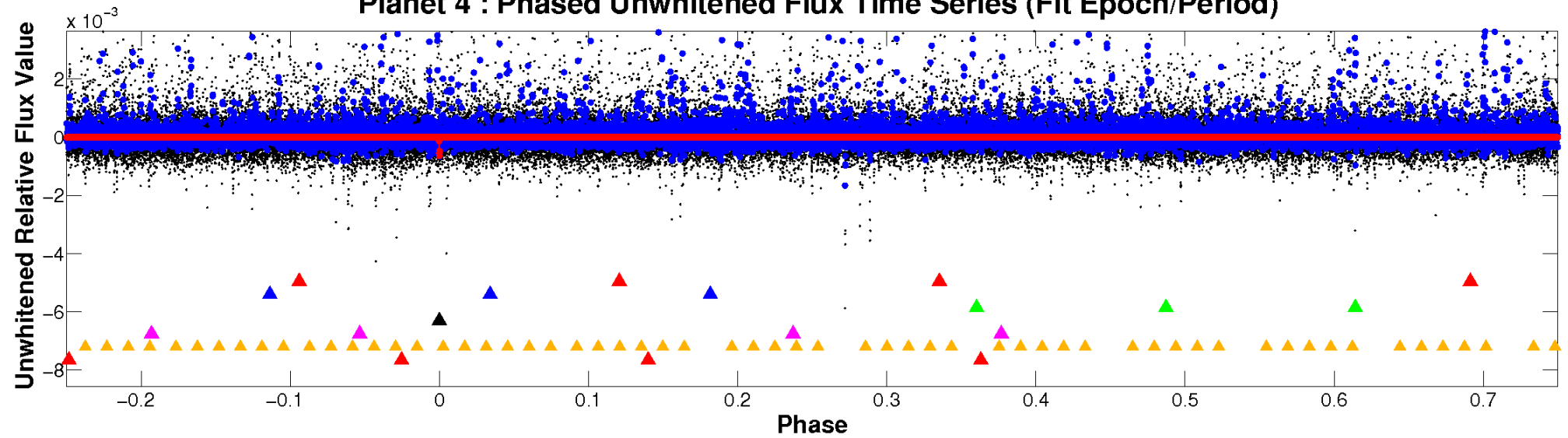
# ALT Odd/Even

TCE 008873450-04

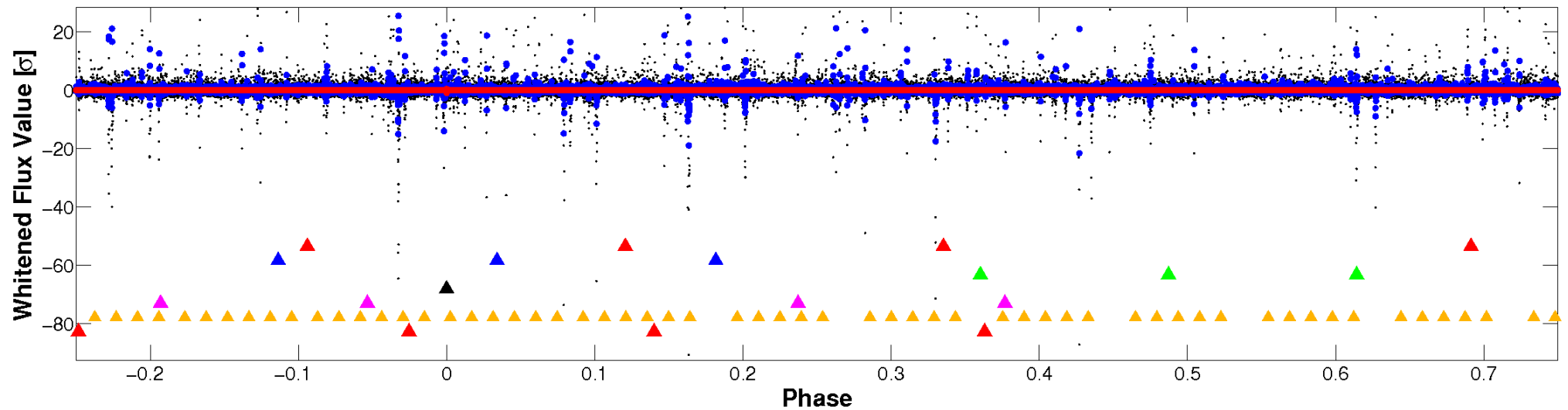


# Non-Whitened Vs. Whitened Light Curve

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

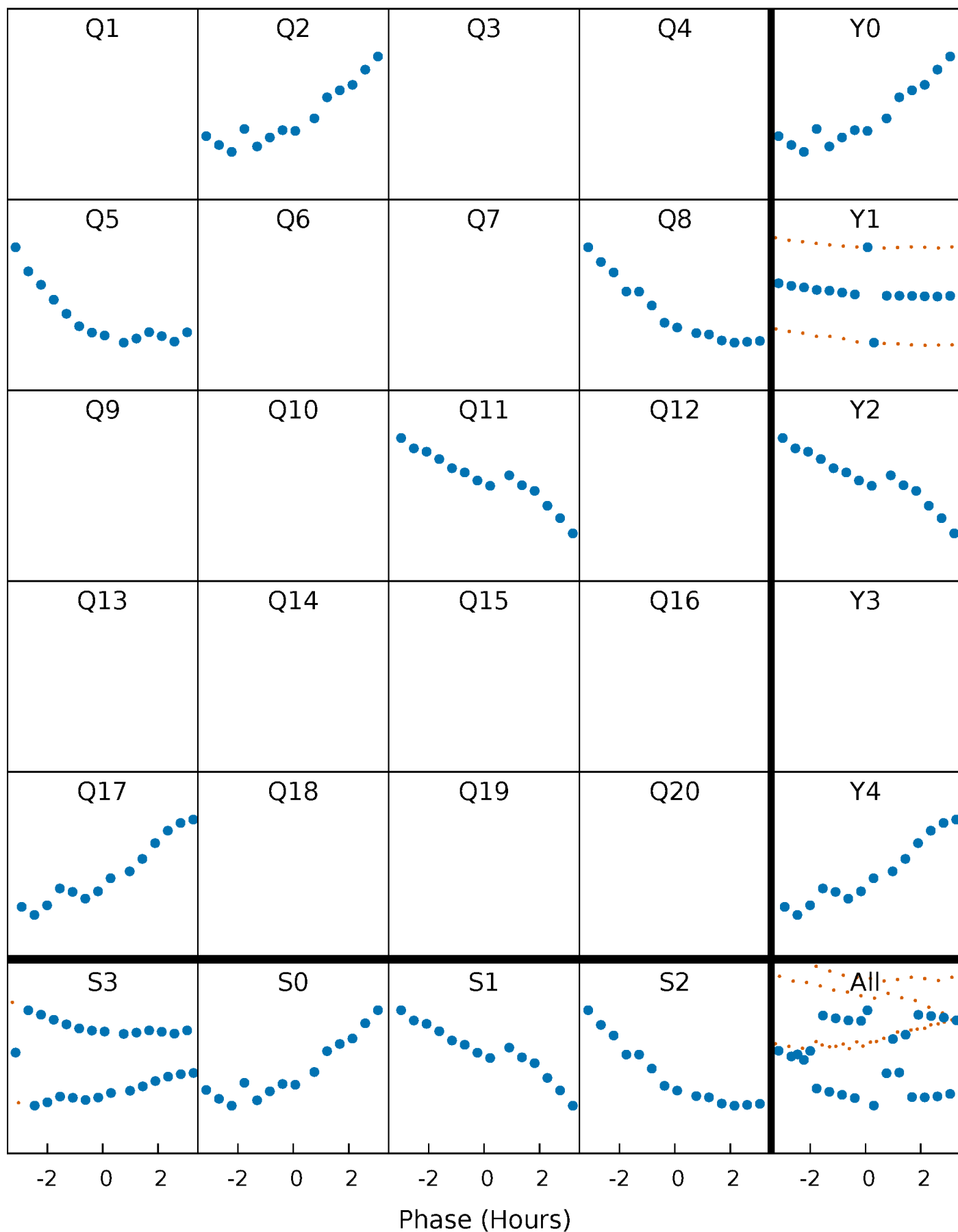


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



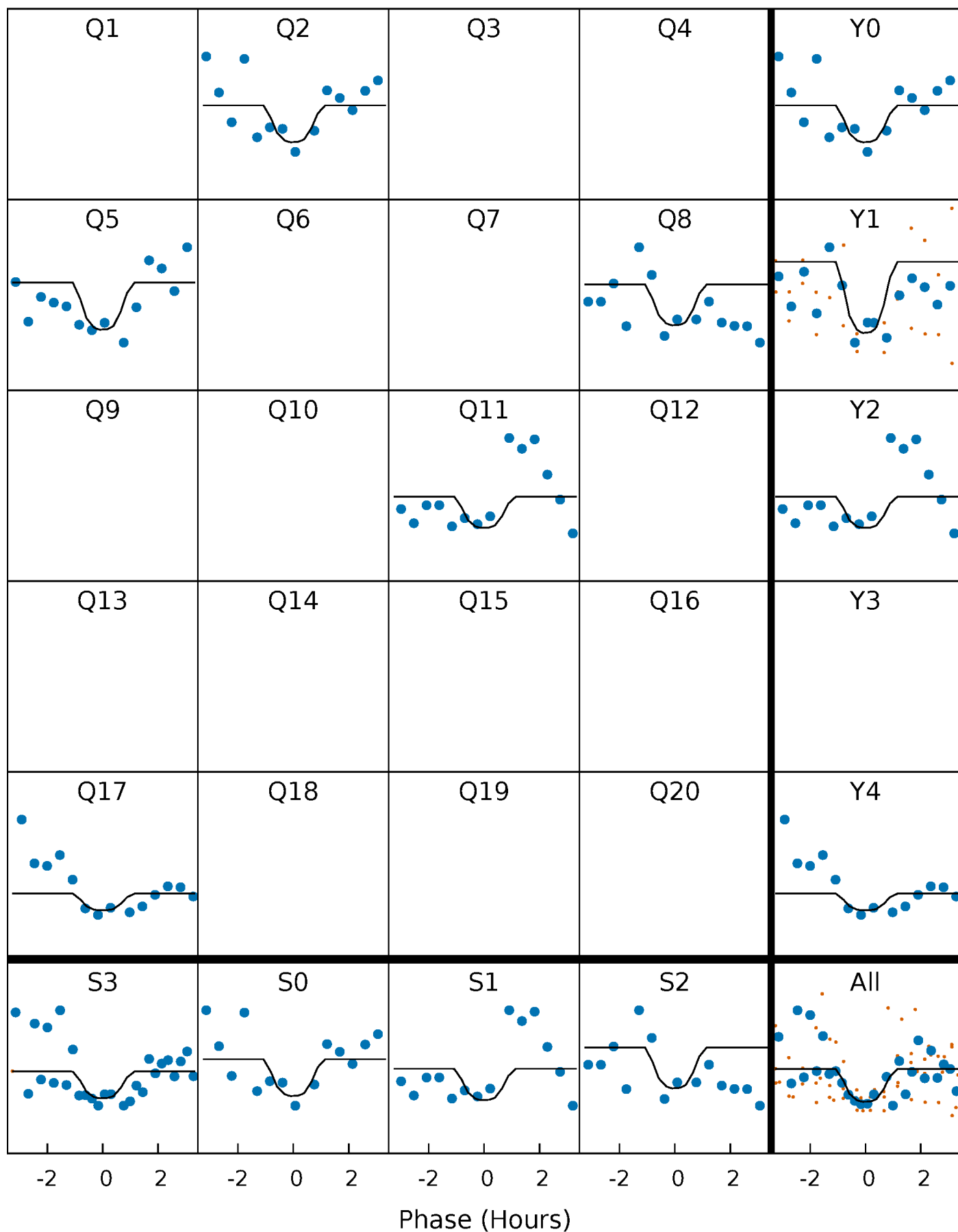
# PDC Quarter-Phased Transit Curves

TCE 008873450-04     $P=270.967374$  Days     $T_0=207.131607$  (BKJD)



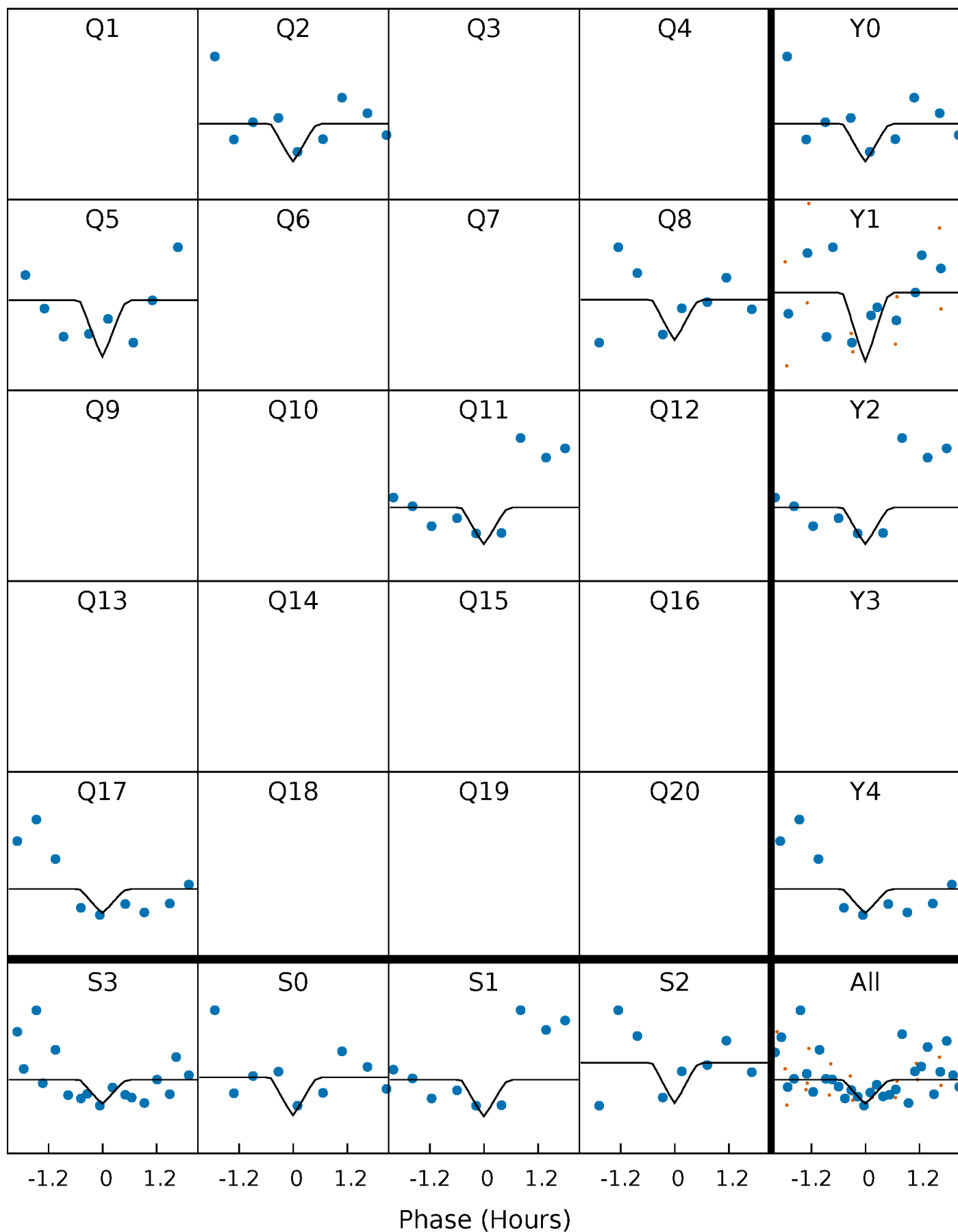
# DV Quarter-Phased Transit Curves

TCE 008873450-04 P=270.967374 Days  $T_0=207.131607$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

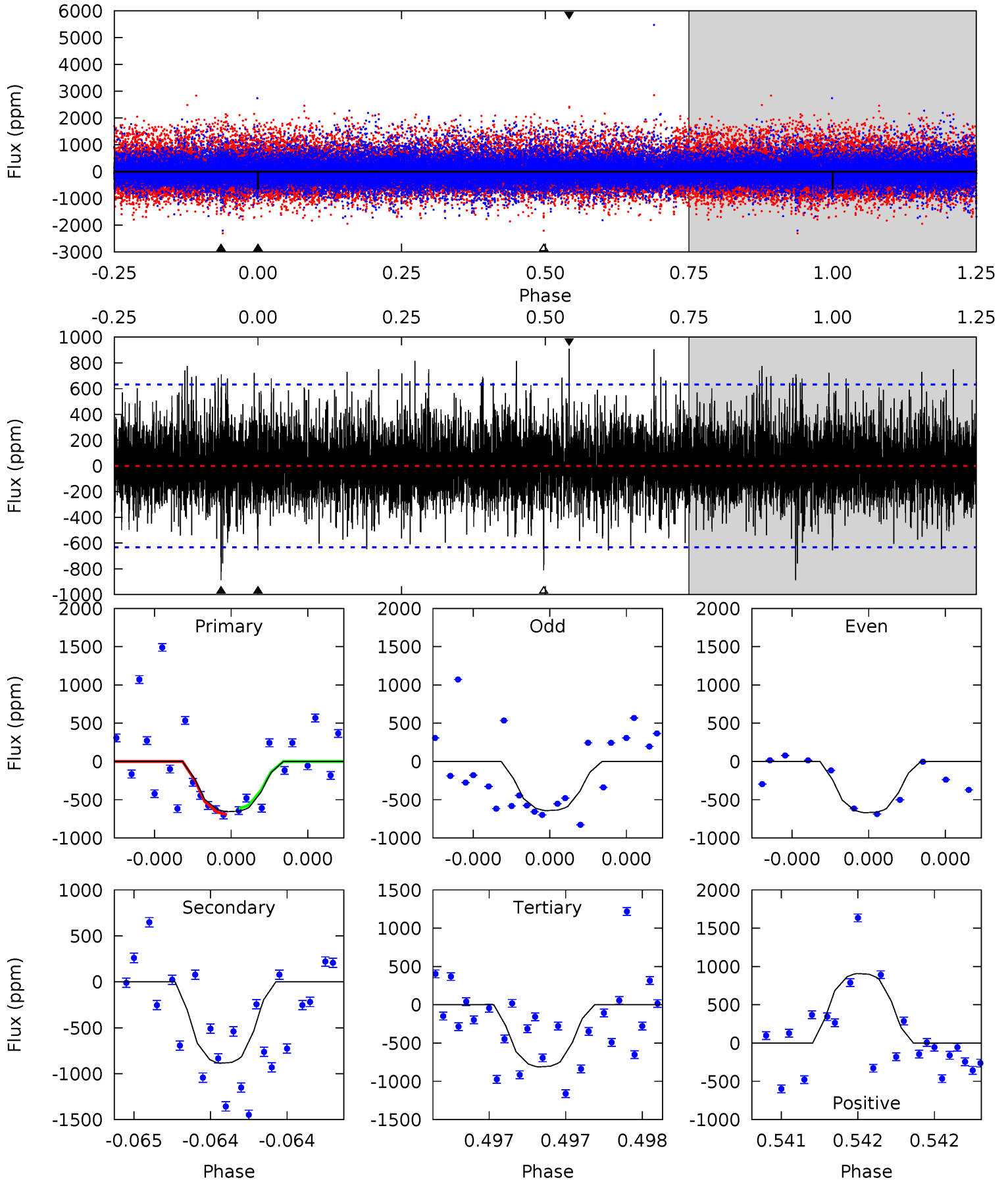
TCE 008873450-04 P=270.966419 Days  $T_0=207.132643$  (BKJD)



# DV Model-Shift Uniqueness Test

008873450-04, P = 270.967374 Days, E = 207.131607 Days

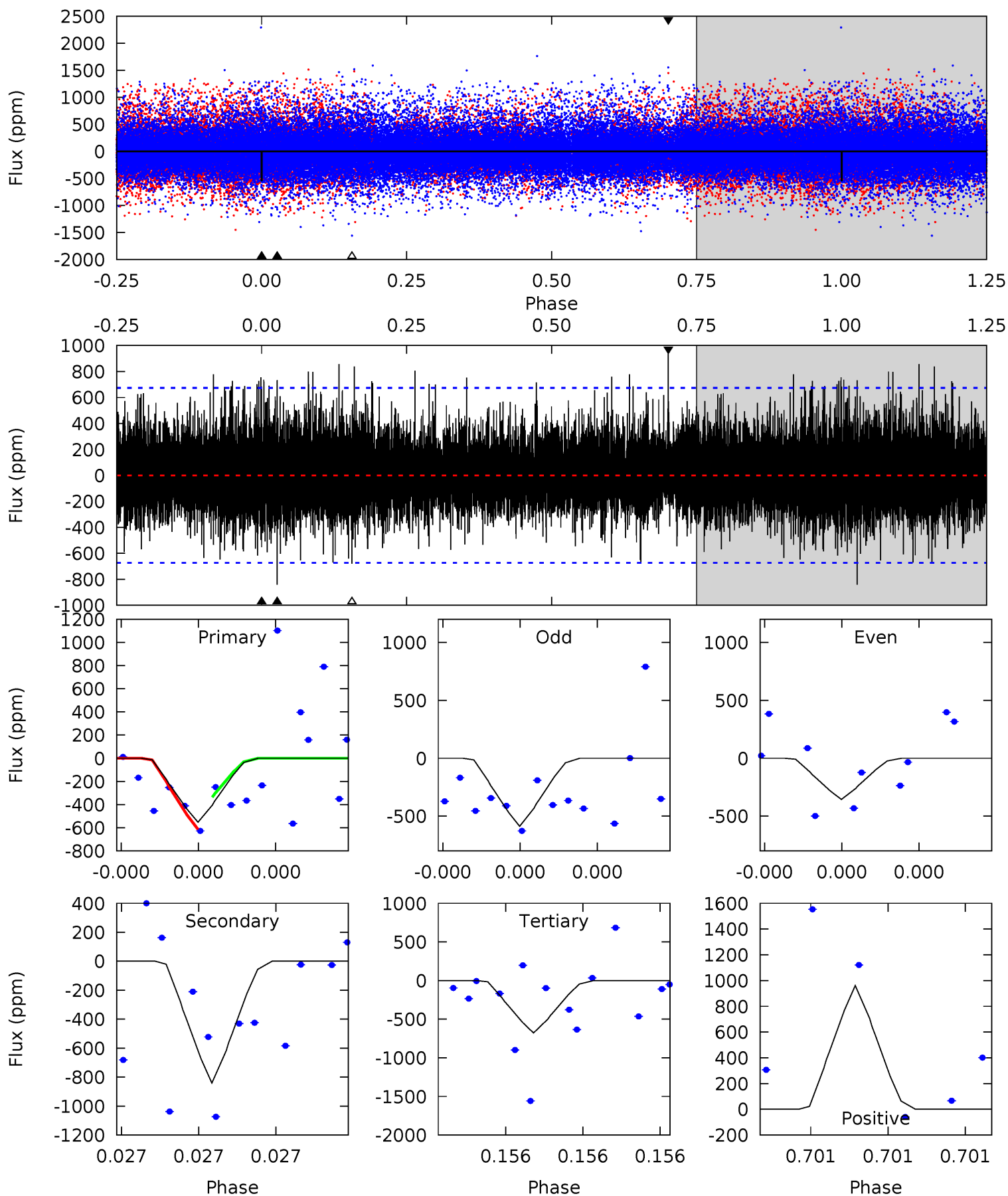
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.90	7.98	7.30	8.17	5.69	3.65	1.67	-1.40	-2.27	0.68	-0.19	0.11	0.97	0.51	0.37



# Alt Model-Shift Uniqueness Test

008873450-04, P = 270.966419 Days, E = 207.132643 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
4.76	7.25	5.85	8.29	5.81	3.83	1.49	-1.09	-3.53	1.40	-1.04	0.94	1.01	0.53	1.21





### Stellar Parameters For KIC 008873450

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4450^{+132}_{-132}$	$4.583^{+0.056}_{-0.020}$	$0.140^{+0.250}_{-0.300}$	$0.707^{+0.029}_{-0.059}$	$0.698^{+0.054}_{-0.054}$	$2.780^{+0.684}_{-0.220}$
	+3%/-3%	+1%/-0%	+179%/-214%	+4%/-8%	+8%/-8%	+25%/-8%
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 008873450-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-887 \pm 111$	$9.18^{+8.62}_{-6.48}$	$269^{+9}_{-9}$	$2870^{+1355}_{-472}$	$3140^{+32106}_{-2311}$
Alt.	$-841 \pm 116$	$8.97^{+8.78}_{-6.31}$	$268^{+9}_{-9}$	$2839^{+1265}_{-456}$	$3057^{+31766}_{-2298}$

$T_{max}$  = 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

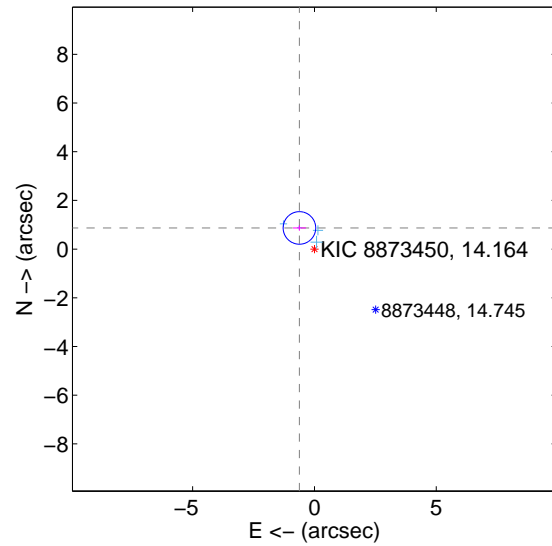
Supplemental centroid analysis for 008873450-04. Kepler magnitude: 14.16. Transit SNR 3.50

There are 4 quarters with good PRF difference image offsets

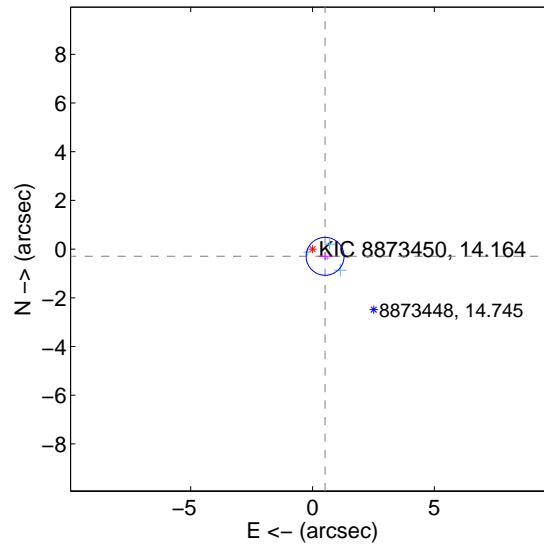
The direct PRF centroid is offset from the target star catalog position by about 1.56 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>1.065 \pm 0.223</math></b>	<b>4.78</b>	$0.616 \pm 0.265$	$0.869 \pm 0.114$
PRF-fit source offset from KIC position	$0.595 \pm 0.259$	2.29	$-0.516 \pm 0.284$	$-0.296 \pm 0.164$
photometric centroid source offset	$1.55 \pm 2.24$	0.69	$1.03 \pm 2.22$	$1.16 \pm 2.26$

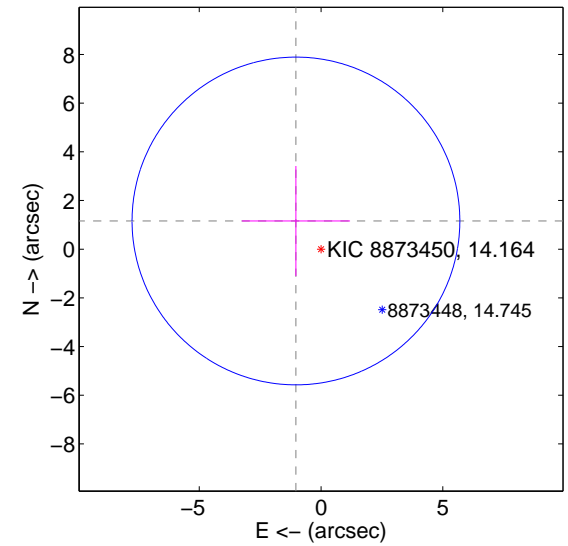
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

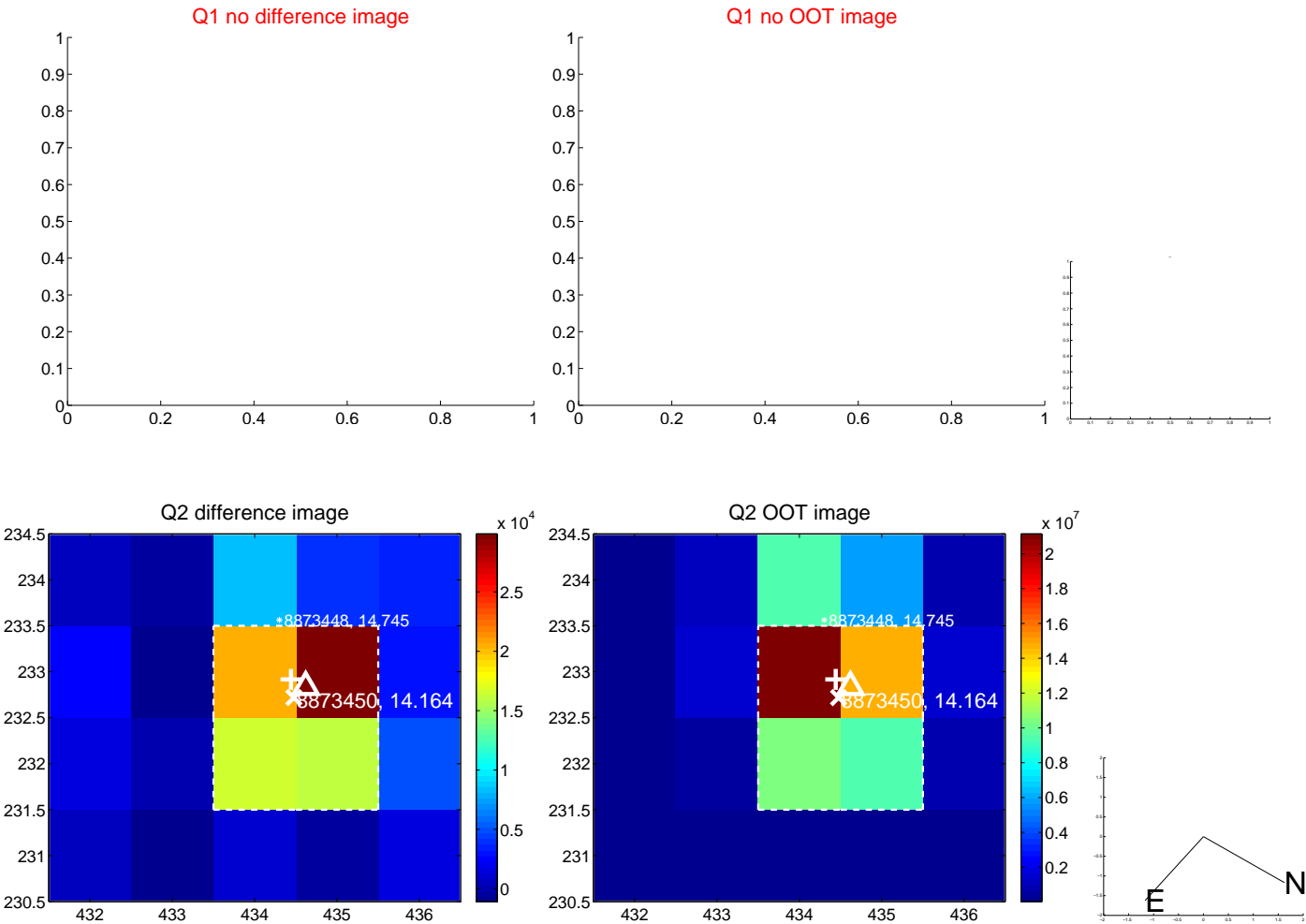


offset from photometric centroids

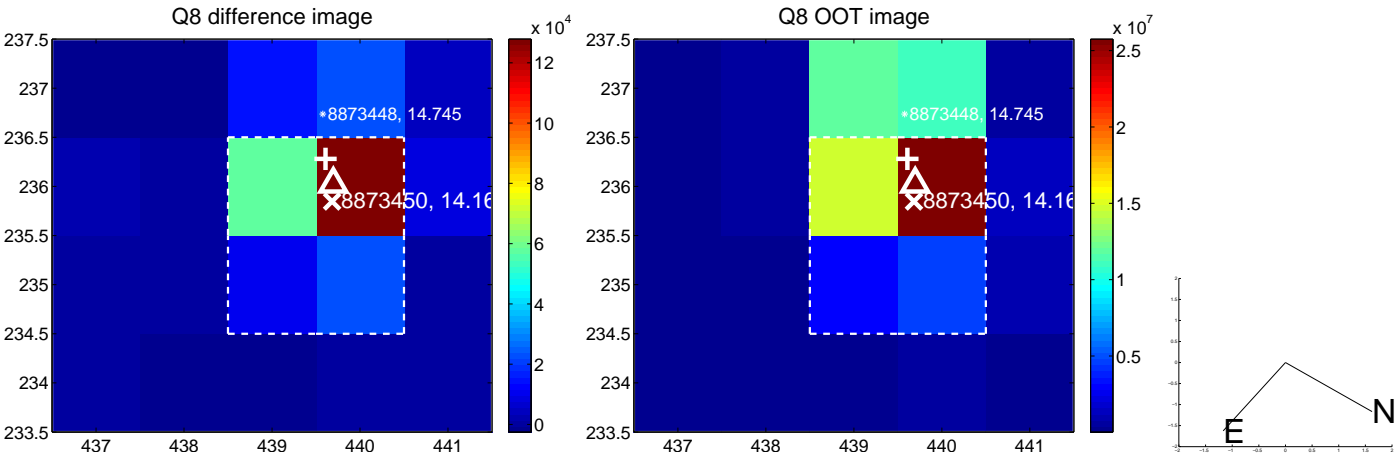
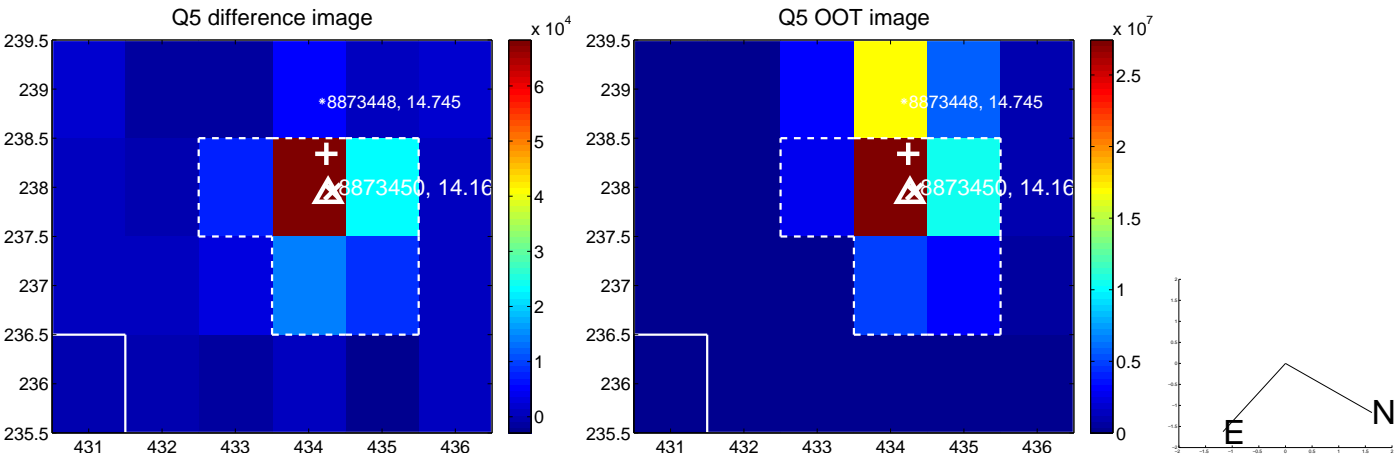


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

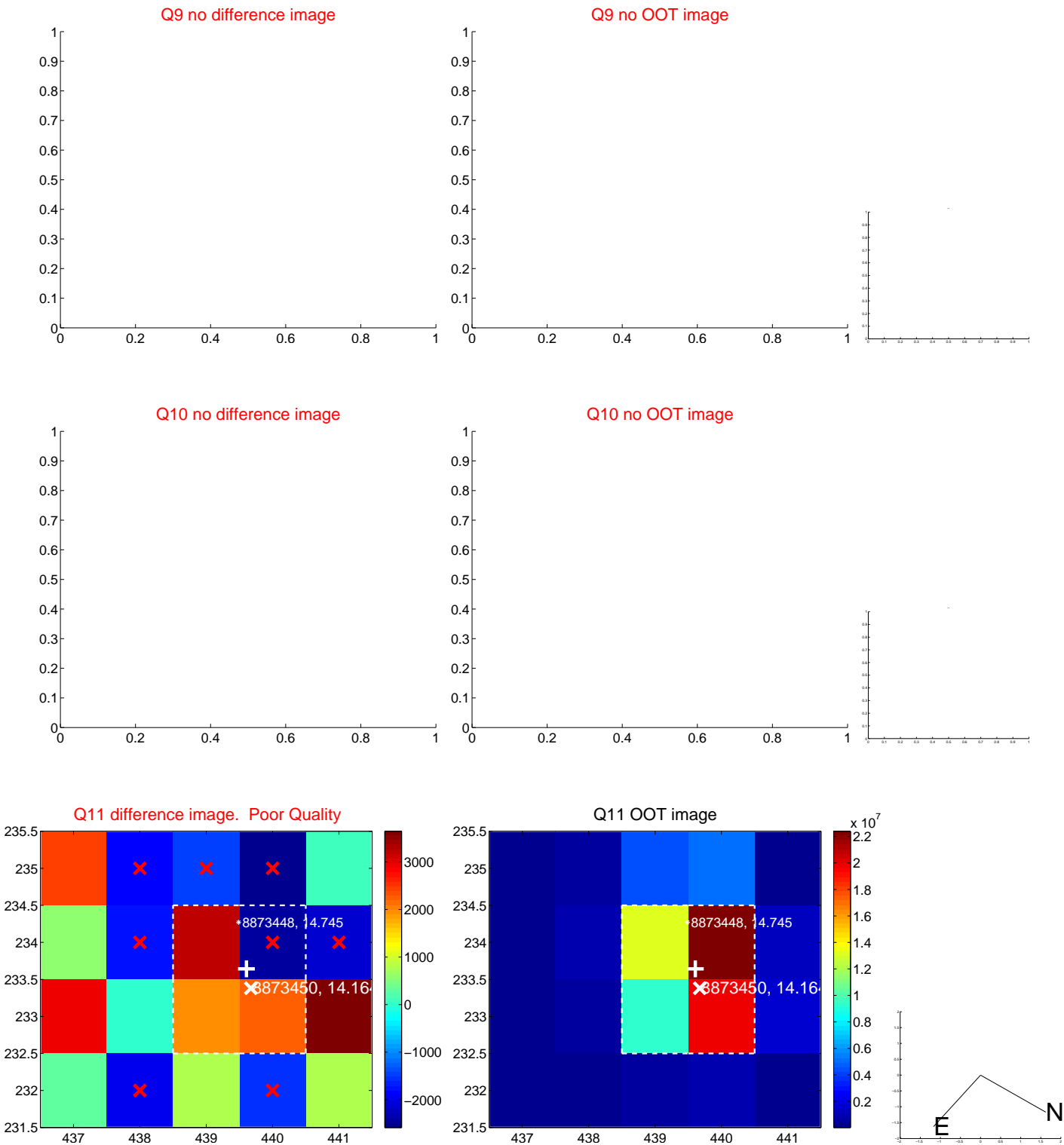
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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



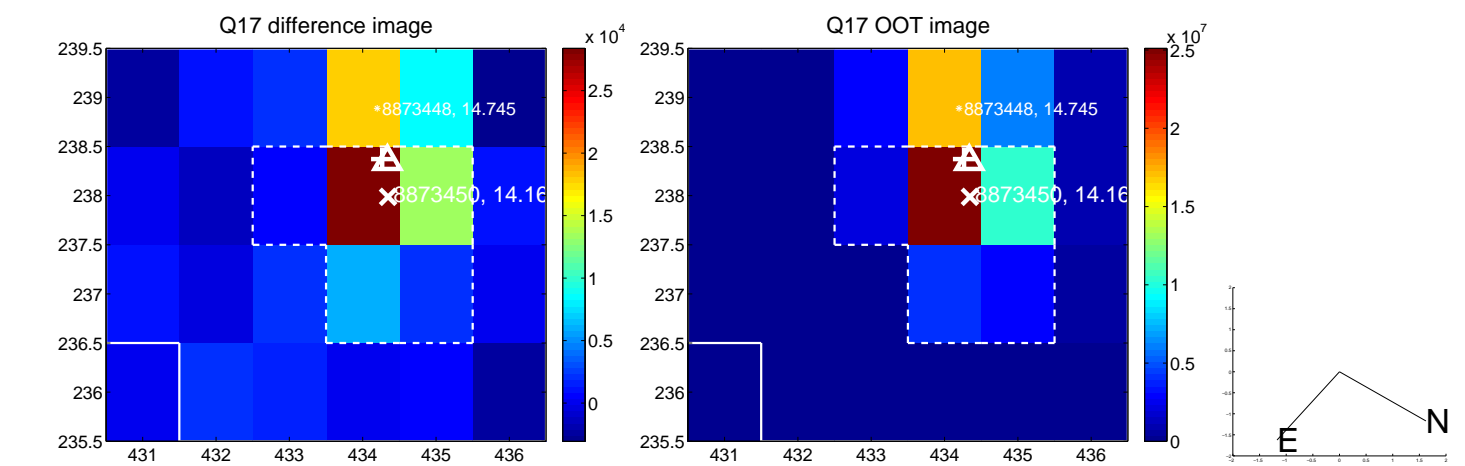
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



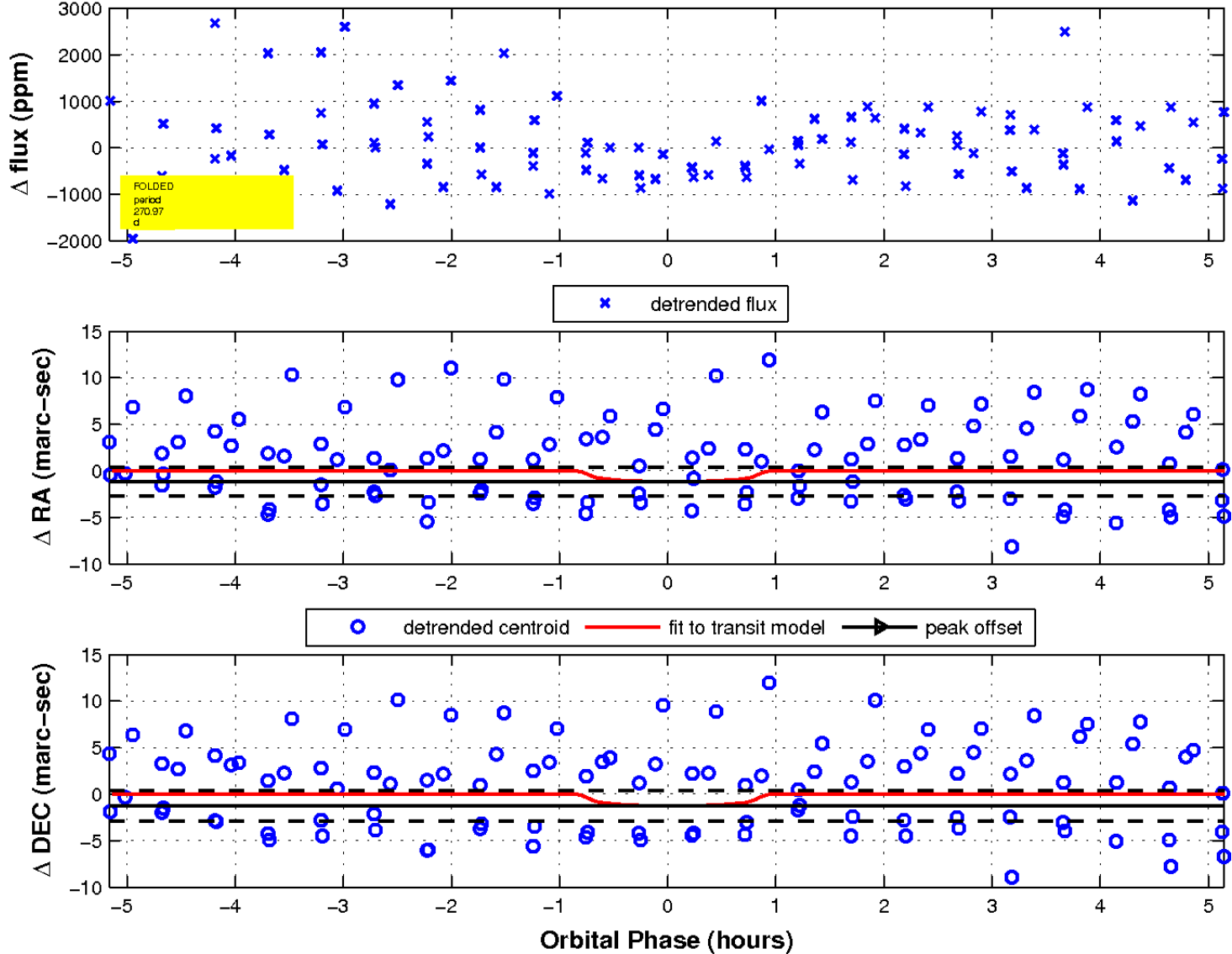
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

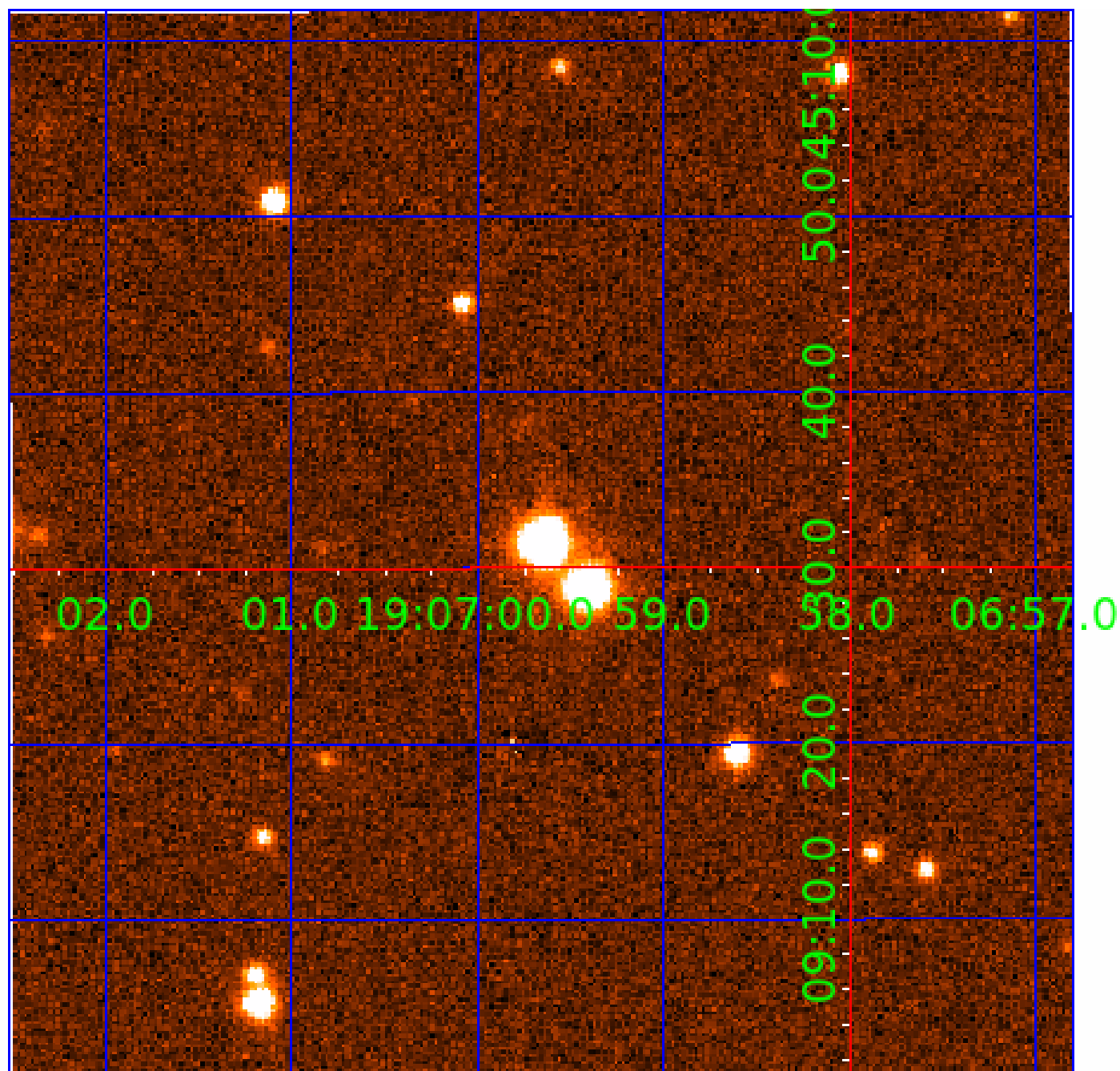


fluxWeightedCentroids, Planet 4 of 7



UKIRT Image

Declination





# KIC 008873450

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008873450-01	OBS	No	329.128908	394.473473	2360.5	6.518	14.2	6.1	0.71	4450	3.27	0.26
008873450-02	OBS	No	501.919677	527.335460	1920.0	4.728	14.9	7.1	0.71	4450	3.03	0.15
008873450-03	OBS	No	507.529446	373.557613	1979.8	4.941	14.4	6.6	0.71	4450	4.27	0.14
008873450-04	OBS	No	270.967374	207.131607	649.6	1.722	16.5	3.5	0.71	4450	2.02	0.33
008873450-05	OBS	No	425.362386	271.409345	2246.5	15.491	11.1	6.0	0.71	4450	3.19	0.18
008873450-06	OBS	7913.01	24.278231	154.518614	840.8	4.450	12.5	13.7	0.71	4450	2.39	8.29
008873450-07	OBS	No	436.671988	245.084126	792.3	5.000	11.7	-1.0	0.71	4450	1.90	0.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008873450-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008873450-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008873450-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE_ZUMA—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008873450-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS
008873450-05	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008873450-06	OBS	FP	0.00	0	0	1	0	CENT_KIC_POS—HALO_GHOST
008873450-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—CENT_NOFITS

**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.

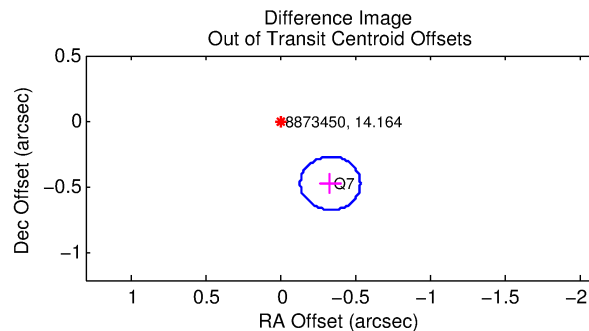
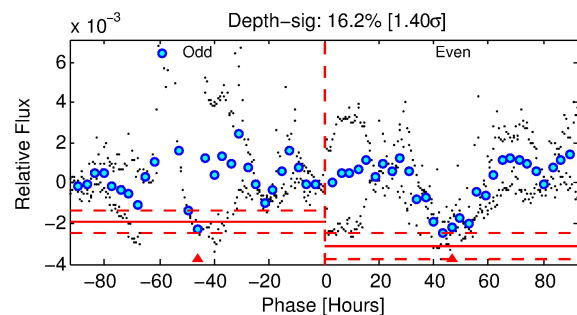
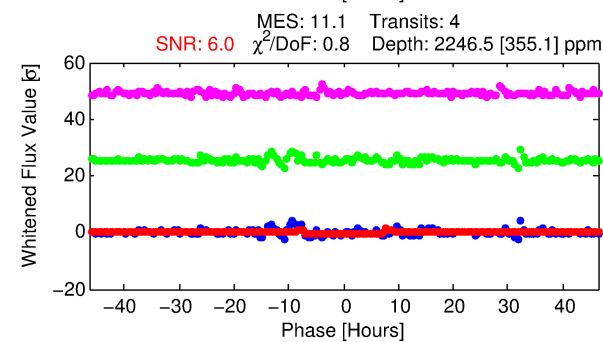
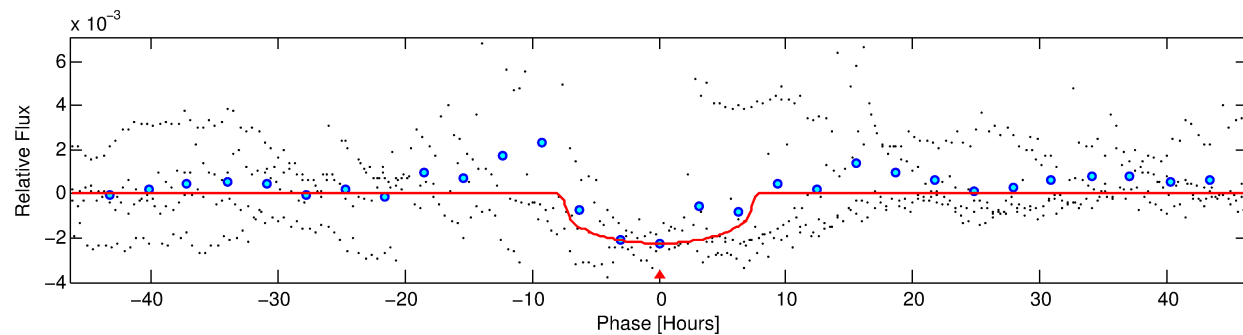
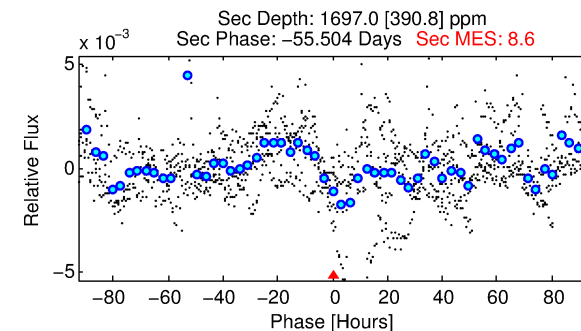
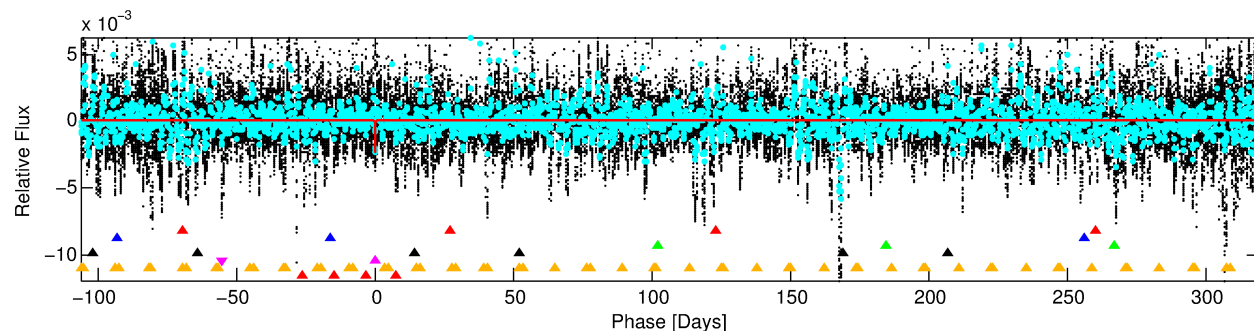
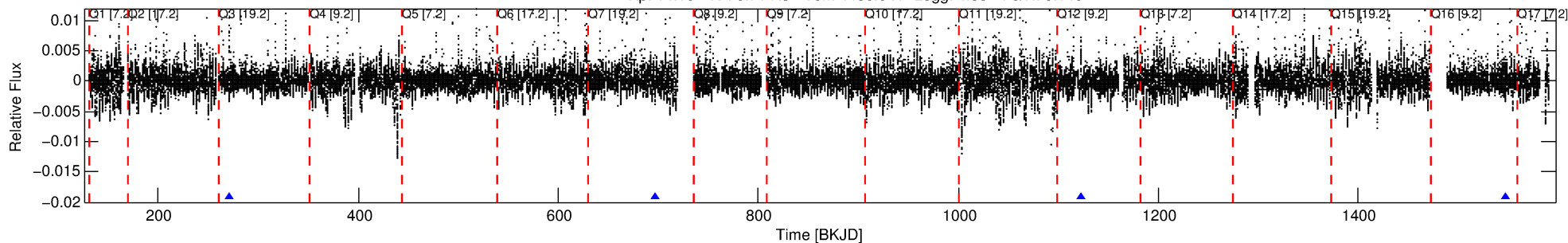
Ephemeris Match Information For 008873450-05

No Significant Match Found

# DV One-Page Summary

KIC: 8873450 Candidate: 5 of 7 Period: 425.362 d

Kp: 14.16 R\*: 0.71 Rs Teff: 4450.0 K Logg: 4.58 Fe/H: 0.140



## DV Fit Results:

Period = 425.36239 [0.00353] d  
Epoch = 271.4093 [0.0077] BKJD  
Rp/R\* = 0.0414 [0.0085]  
a/R\* = 217.44 [114.30]  
b = 0.10 [5.25]  
Seff = 0.18 [0.03]  
Teq = 167 [7] K  
Rp = 3.19 [0.70] Re  
a = 0.9821 [0.0690] AU  
Ag = 88413.50 [42480.41] [2.08σ]  
Teffp = 4441 [538] K [7.95σ]

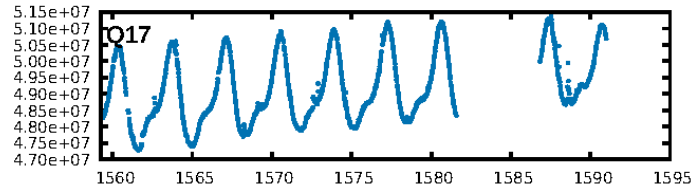
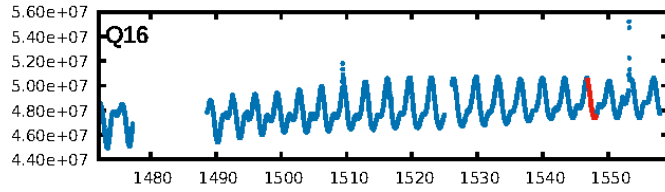
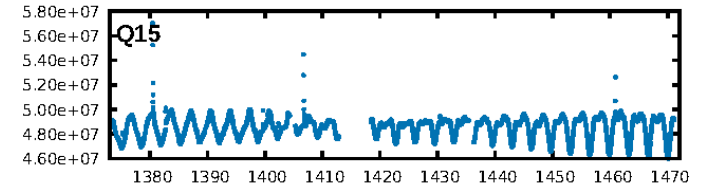
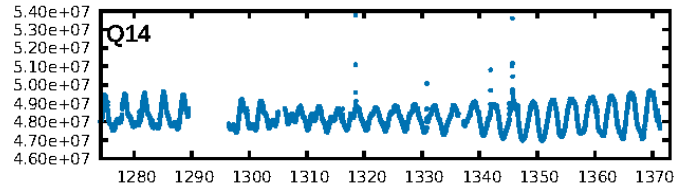
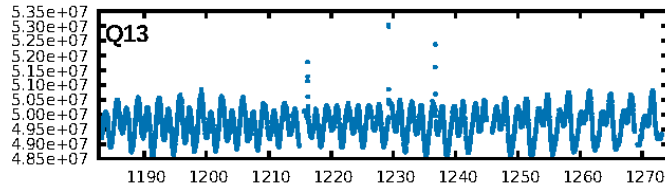
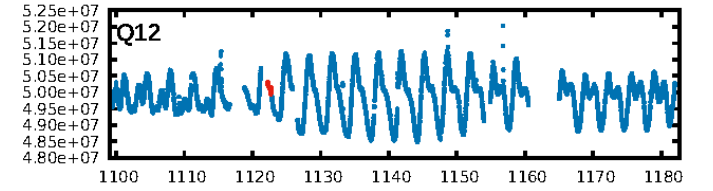
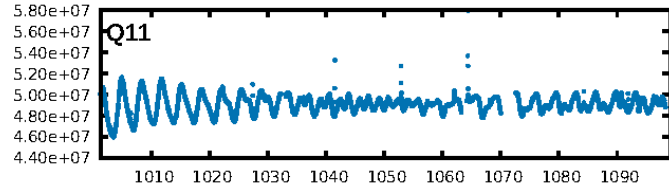
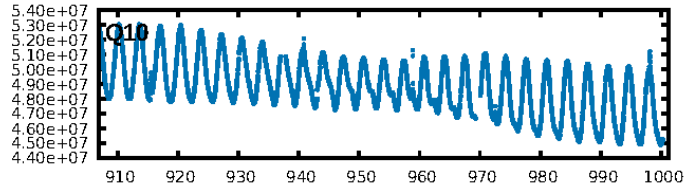
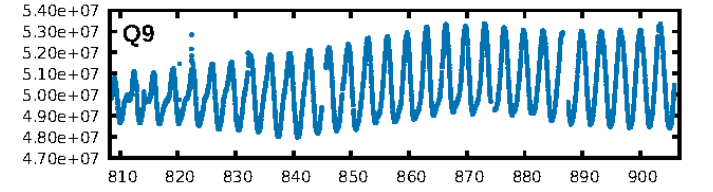
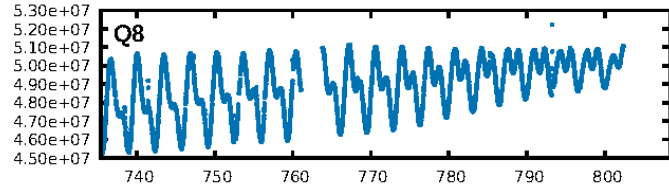
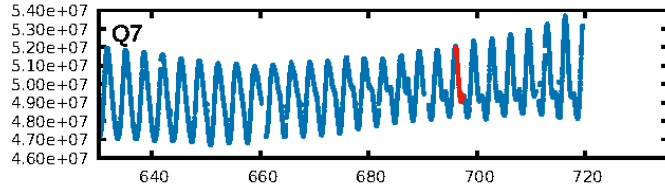
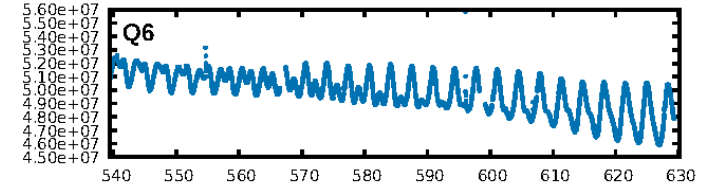
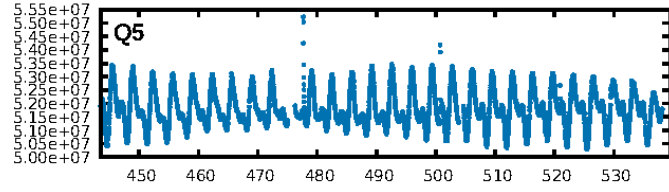
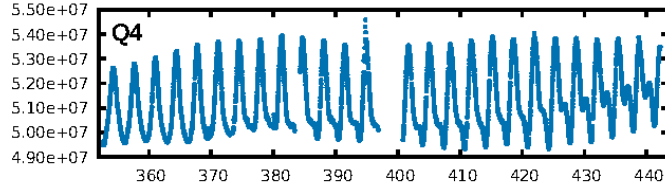
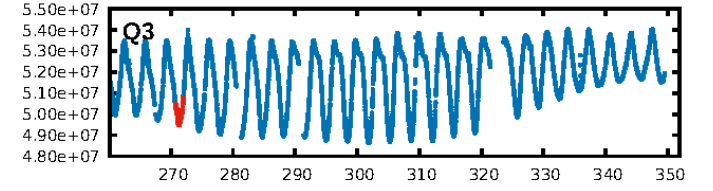
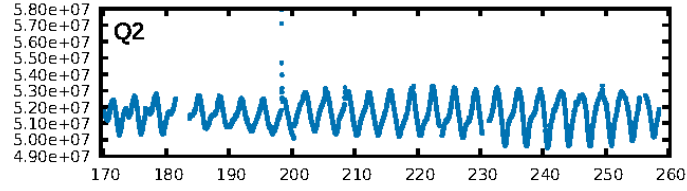
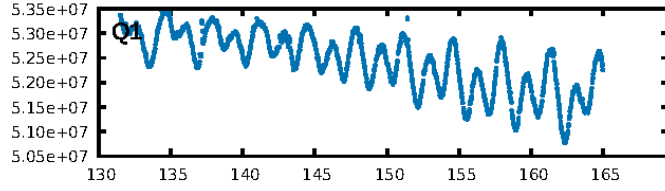
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [137.42σ]  
LongPeriod-sig: 100.0% [16.67σ]  
ModelChiSquare2-sig: 5.3%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -0.4282  
Centroid-sig: 0.8%  
Centroid-so: 3.124 arcsec [2.65σ]  
OotOffset-rm: 0.577 arcsec [8.59σ]  
KicOffset-rm: 1.529 arcsec [22.78σ]  
OotOffset-st: 0/1/0/0 [1]  
KicOffset-st: 0/1/0/0 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 1.00 [1/1]

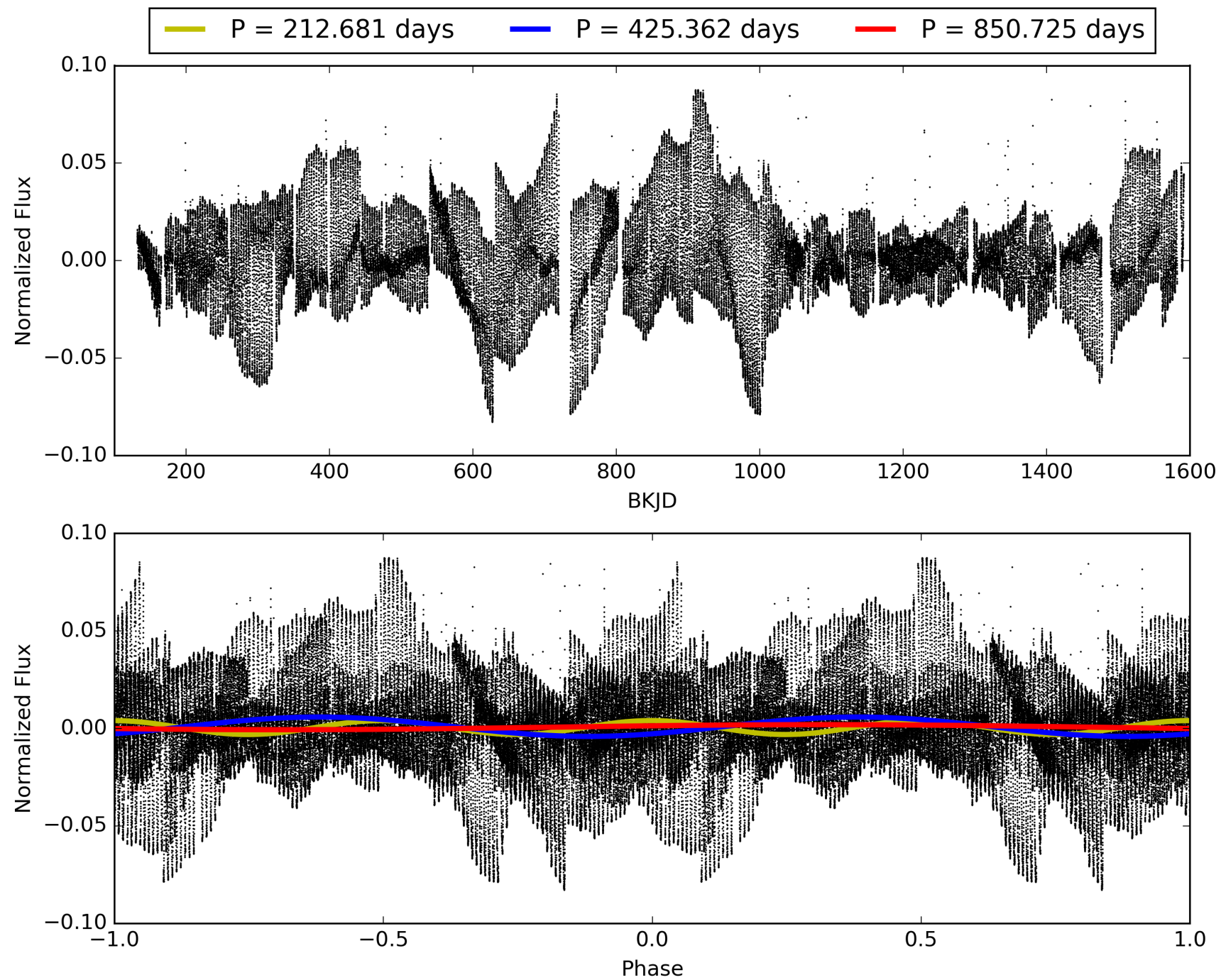
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:13:57 Z

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

# TCE 008873450-05, PDC Light Curves

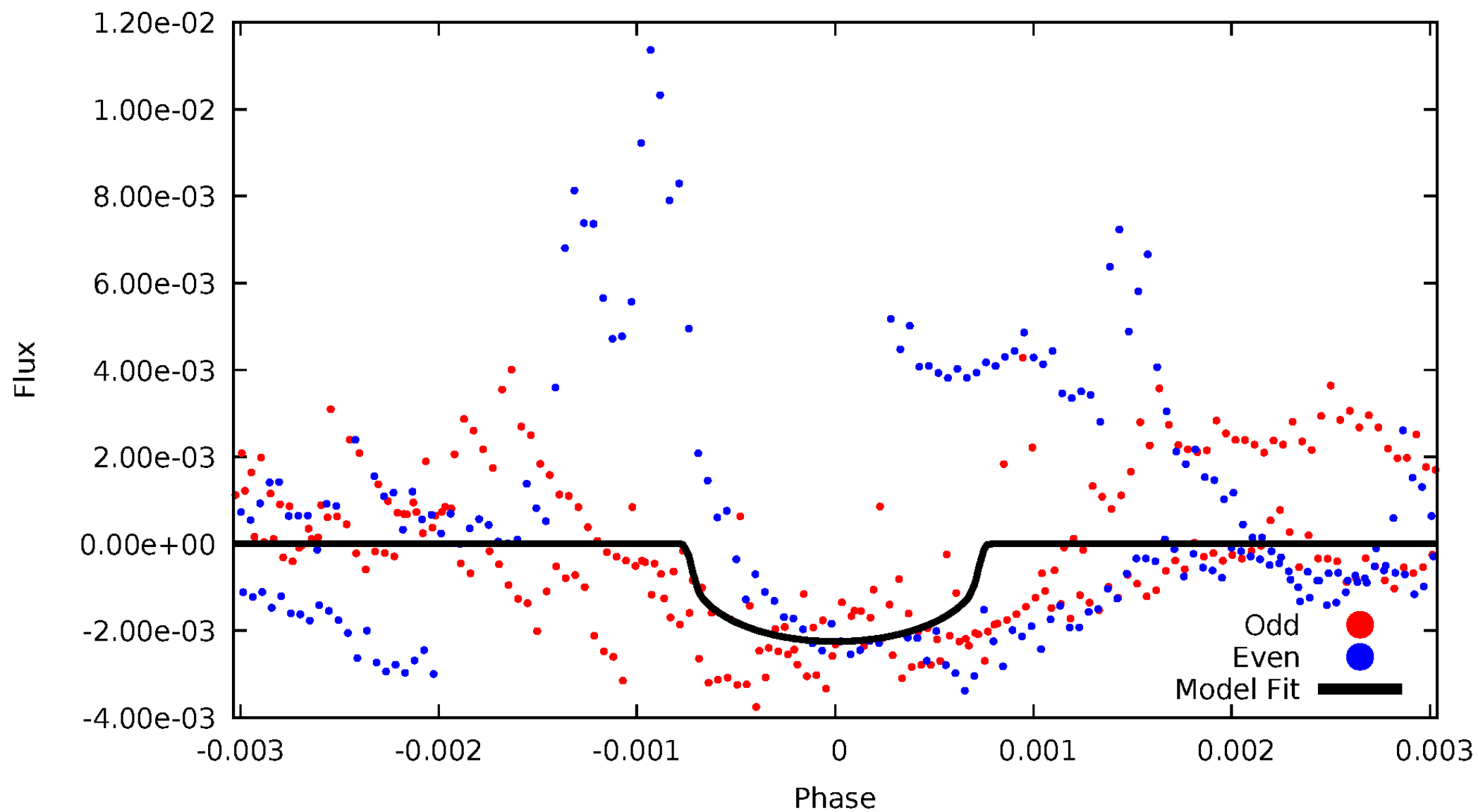


TCE 008873450-05



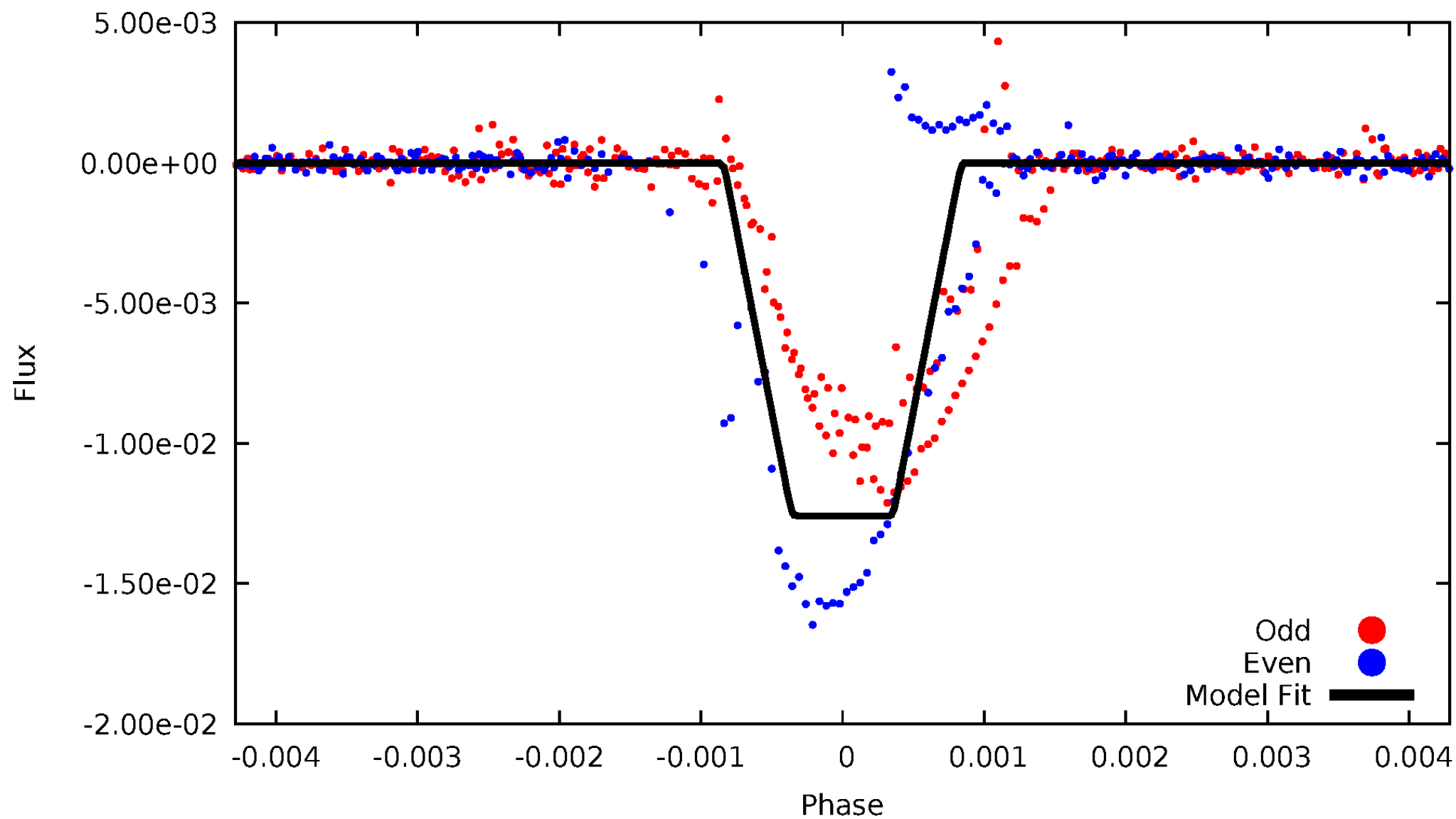
# DV Odd/Even

TCE 008873450-05



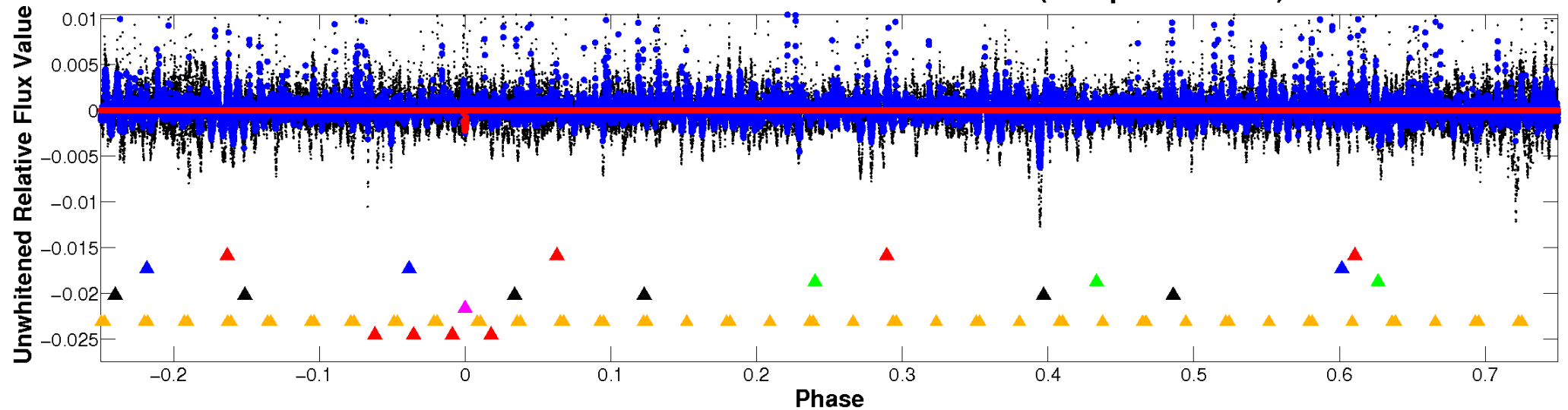
# ALT Odd/Even

TCE 008873450-05

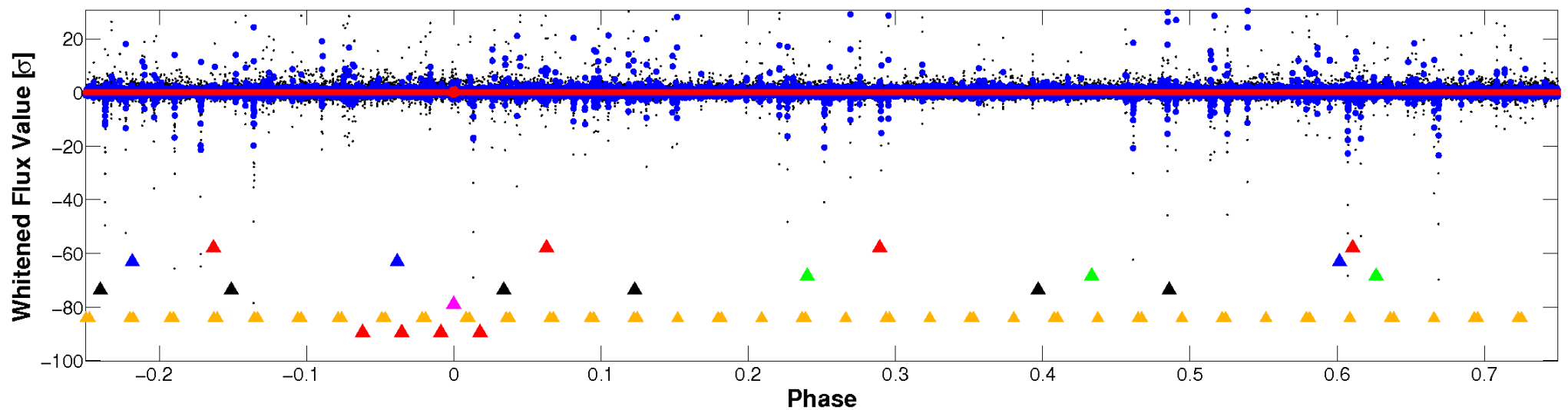


# Non-Whitened Vs. Whitened Light Curve

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



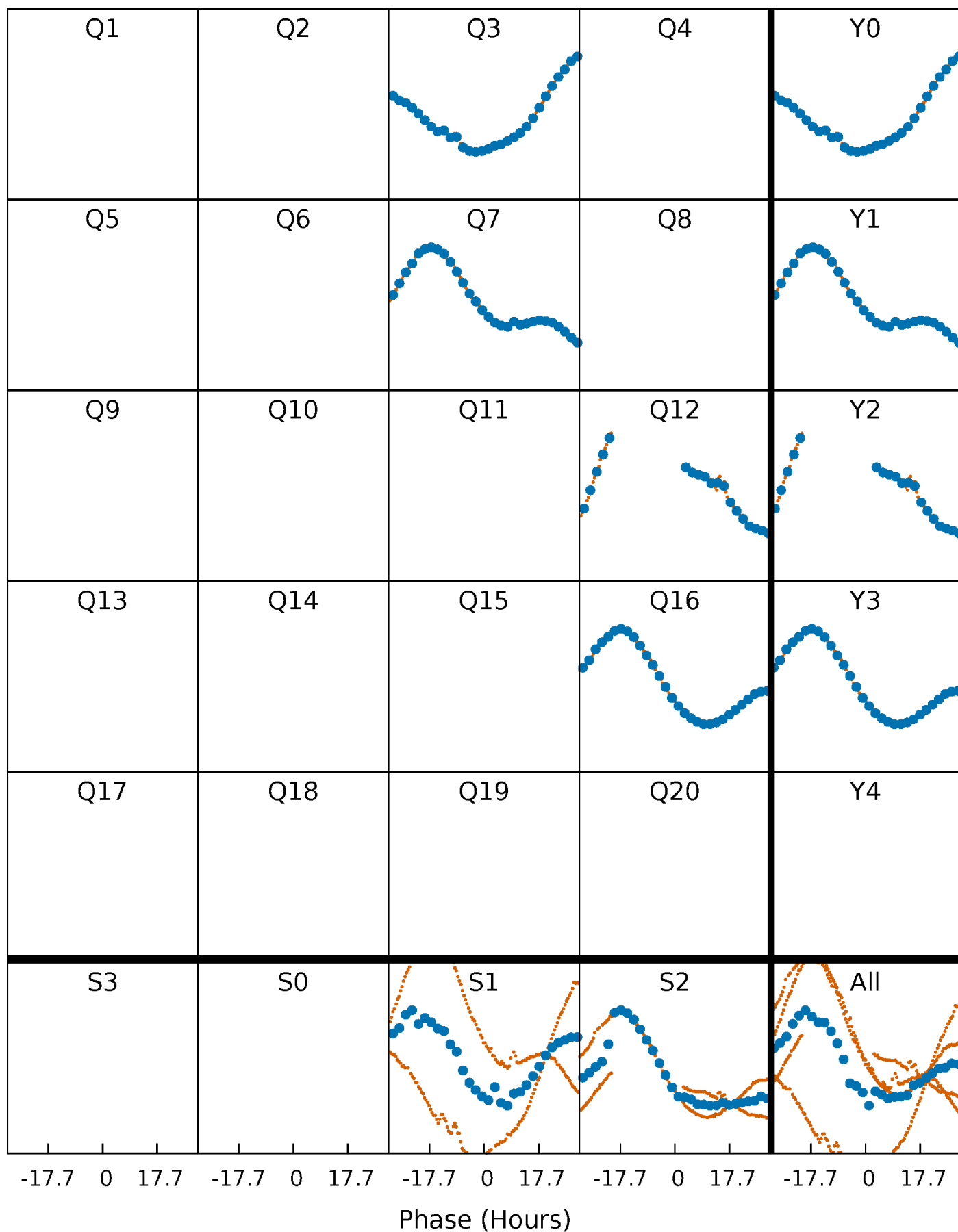
Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

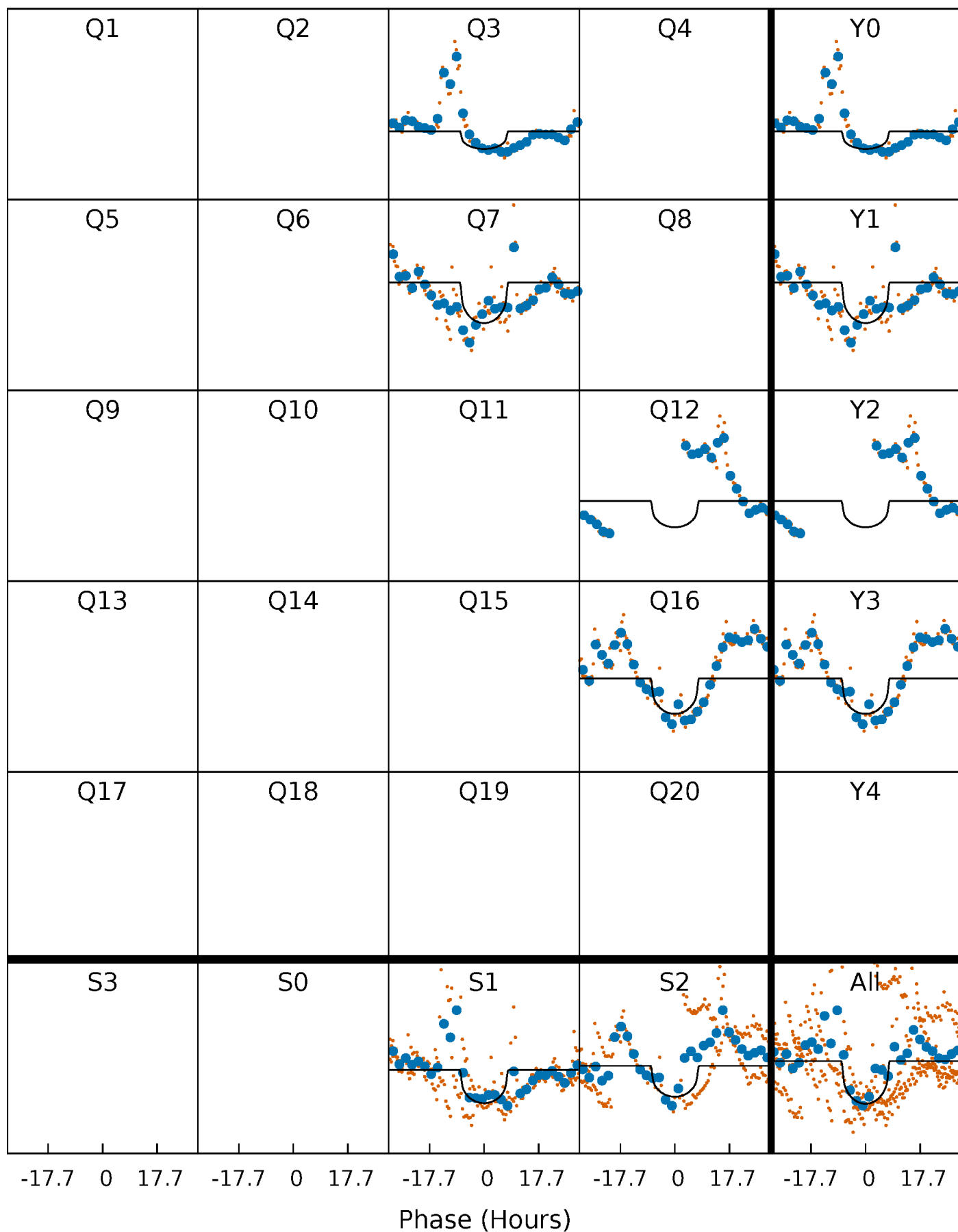
TCE 008873450-05     $P=425.362386$  Days     $T_0=271.409345$  (BKJD)





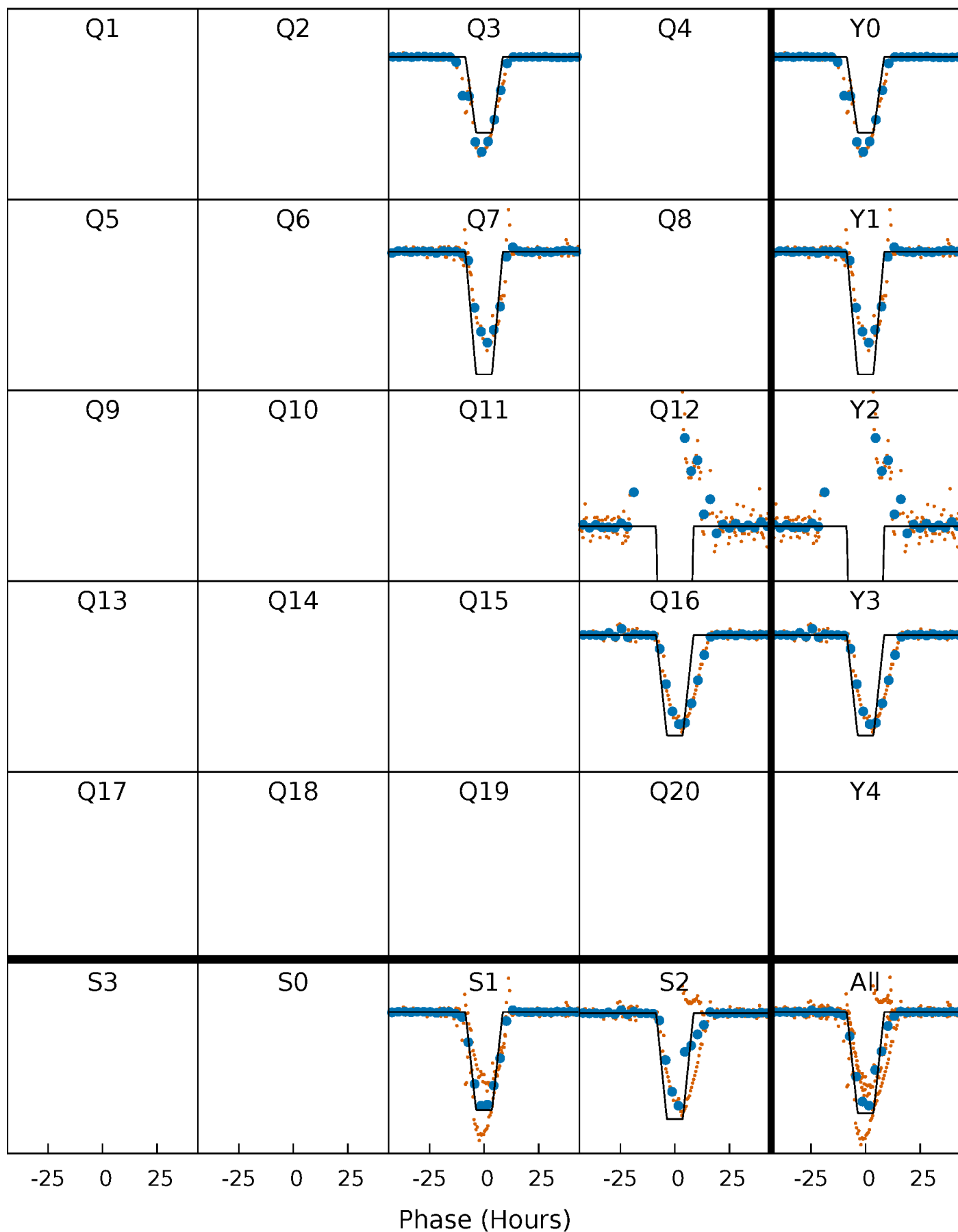
# DV Quarter-Phased Transit Curves

TCE 008873450-05     $P=425.362386$  Days     $T_0=271.409345$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

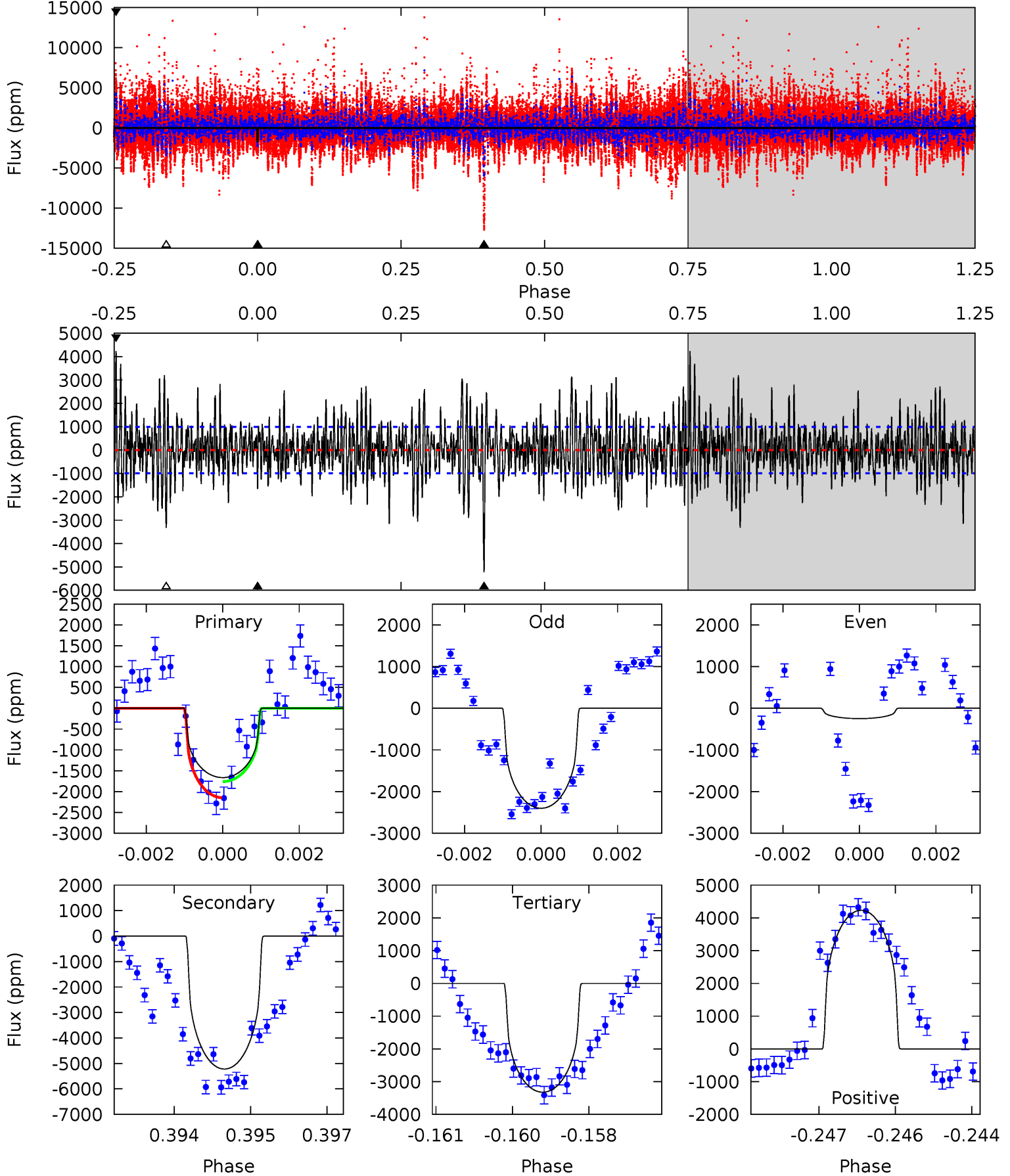
TCE 008873450-05     $P=425.399474$  Days     $T_0=271.307281$  (BKJD)



# DV Model-Shift Uniqueness Test

008873450-05, P = 425.362386 Days, E = 271.409345 Days

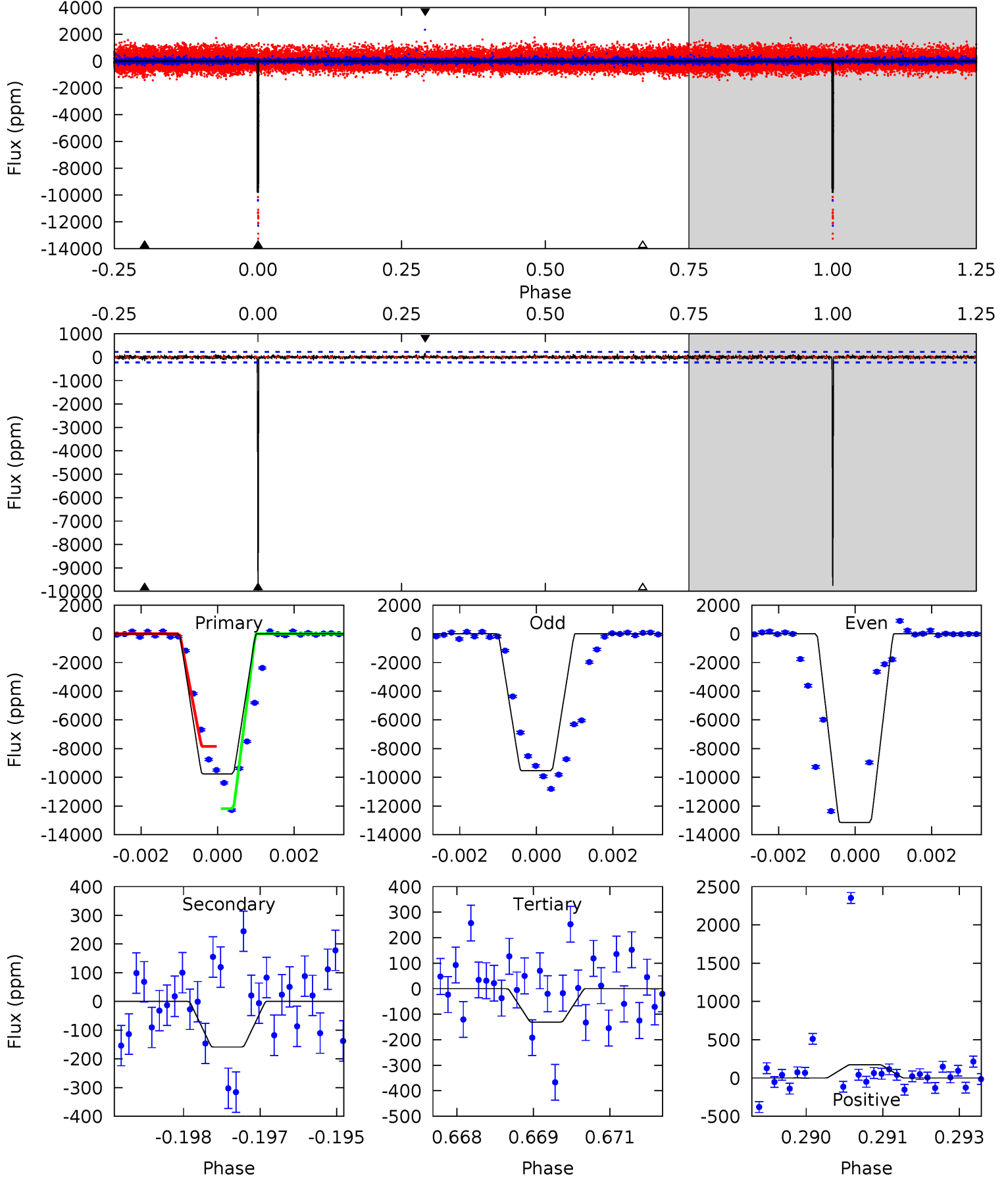
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.03	28.3	18.0	23.0	5.37	3.17	5.34	-9.00	-13.9	10.3	5.37	5.26	0.16	0.45	1.03



# Alt Model-Shift Uniqueness Test

008873450-05, P = 425.399474 Days, E = 271.307281 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
230.0	3.74	3.08	4.09	5.36	3.14	0.63	226.9	225.9	0.65	-0.35	50.8	0.82	0.02	0



### Stellar Parameters For KIC 008873450

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4450^{+132}_{-132}$	$4.583^{+0.056}_{-0.020}$	$0.140^{+0.250}_{-0.300}$	$0.707^{+0.029}_{-0.059}$	$0.698^{+0.054}_{-0.054}$	$2.780^{+0.684}_{-0.220}$
	+3%/-3%	+1%/-0%	+179%/-214%	+4%/-8%	+8%/-8%	+25%/-8%
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 008873450-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-5220 \pm 184$	$3.14^{+0.70}_{-0.62}$	$231^{+8}_{-7}$	$5648^{+667}_{-505}$	$283374^{+162714}_{-92154}$
Alt.	$-159 \pm 42$	$8.54^{+0.72}_{-0.79}$	$231^{+8}_{-7}$	$2329^{+99}_{-96}$	$1168^{+398}_{-366}$

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

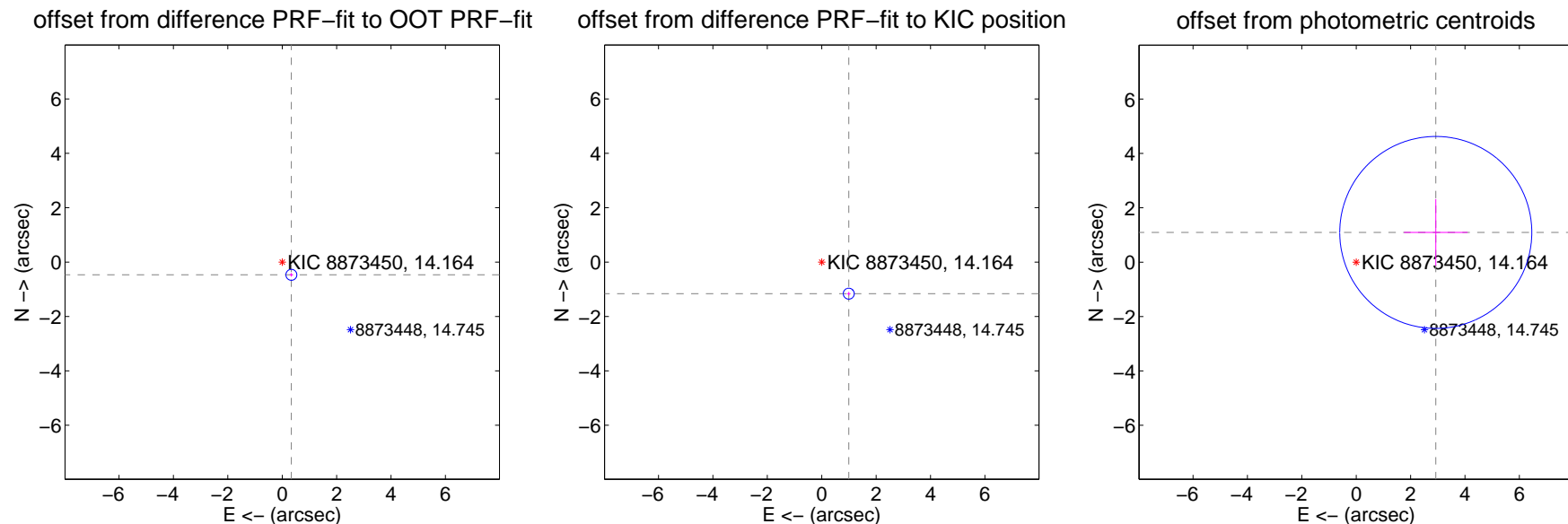
## DV Centroid Data

Supplemental centroid analysis for 008873450-05. Kepler magnitude: 14.16. Transit SNR 6.03

There are 1 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.96 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.577 \pm 0.067$	8.59	$-0.336 \pm 0.067$	$-0.468 \pm 0.067$
PRF-fit source offset from KIC position	$1.529 \pm 0.067$	22.78	$-0.994 \pm 0.067$	$-1.161 \pm 0.067$
photometric centroid source offset	$3.12 \pm 1.18$	2.65	$-2.93 \pm 1.17$	$1.09 \pm 1.23$

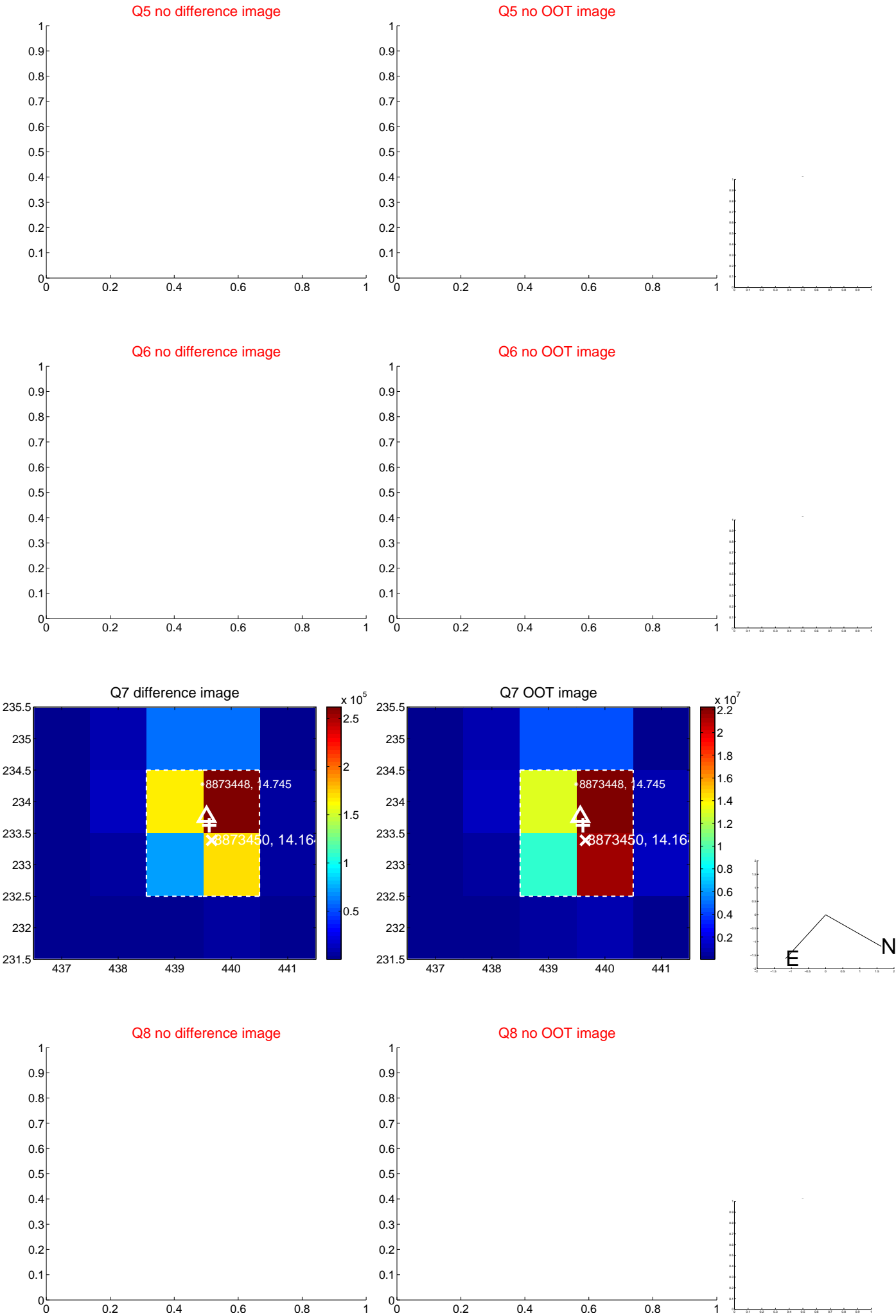


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

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



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





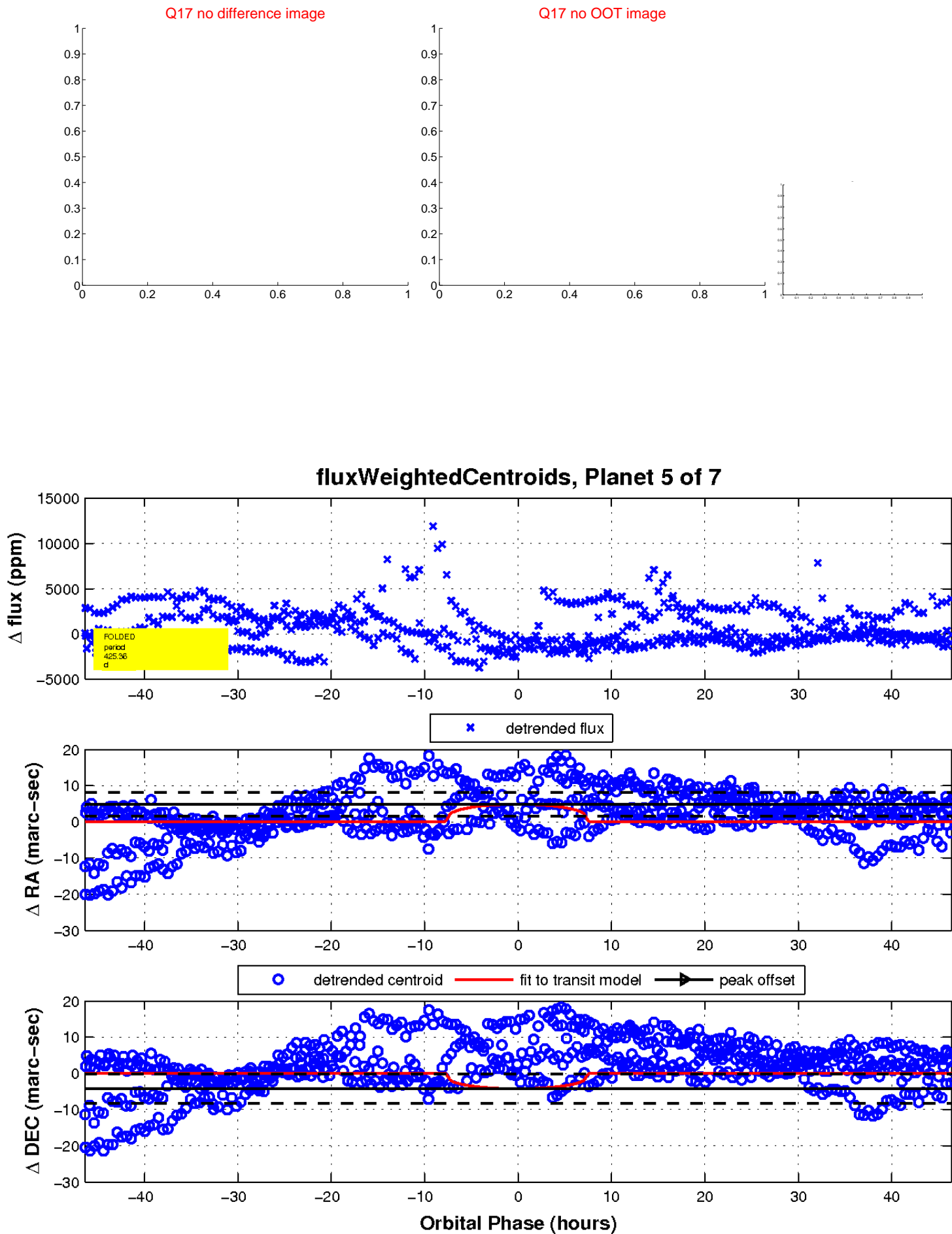
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

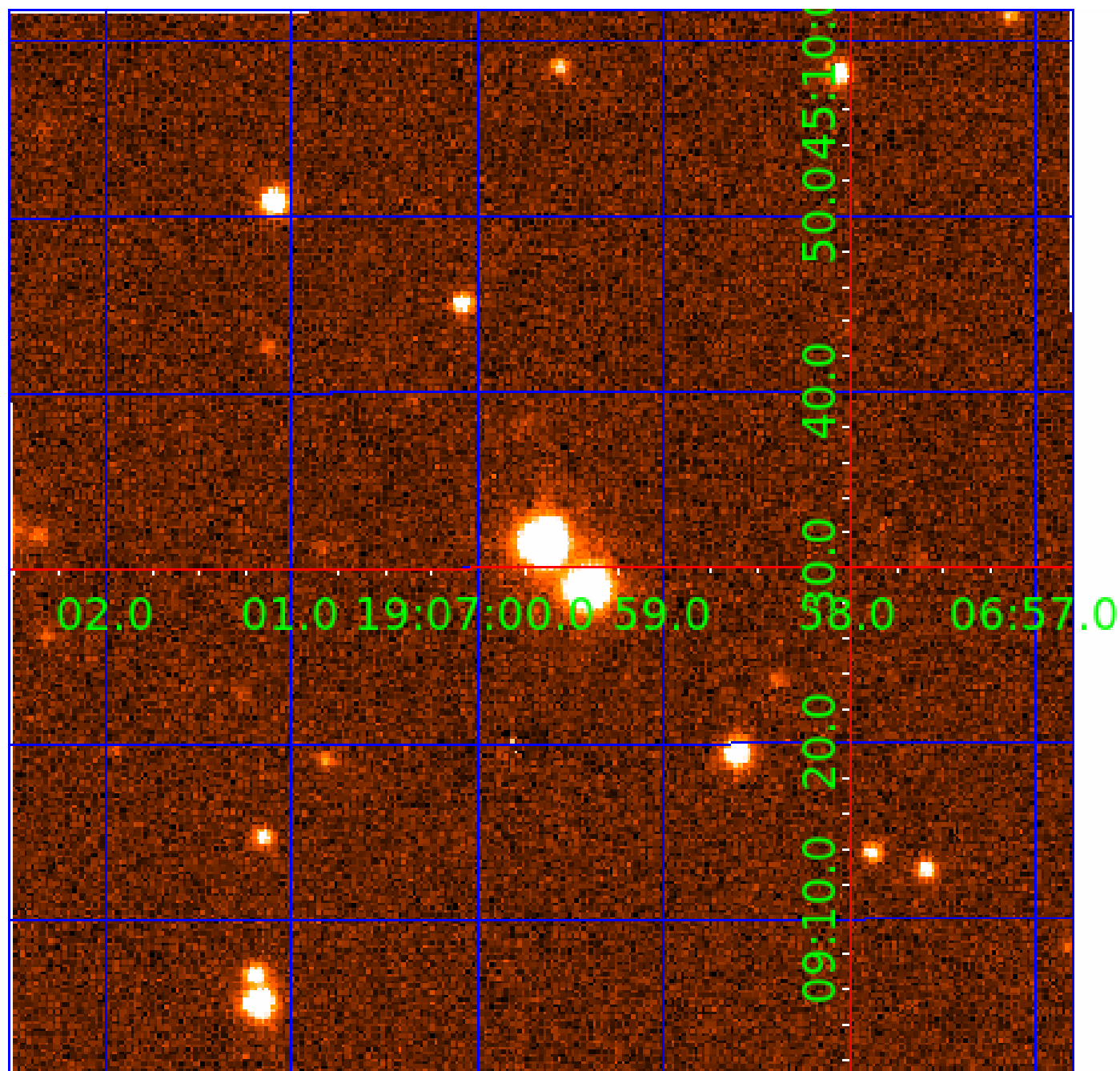


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008873450

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008873450-01	OBS	No	329.128908	394.473473	2360.5	6.518	14.2	6.1	0.71	4450	3.27	0.26
008873450-02	OBS	No	501.919677	527.335460	1920.0	4.728	14.9	7.1	0.71	4450	3.03	0.15
008873450-03	OBS	No	507.529446	373.557613	1979.8	4.941	14.4	6.6	0.71	4450	4.27	0.14
008873450-04	OBS	No	270.967374	207.131607	649.6	1.722	16.5	3.5	0.71	4450	2.02	0.33
008873450-05	OBS	No	425.362386	271.409345	2246.5	15.491	11.1	6.0	0.71	4450	3.19	0.18
008873450-06	OBS	7913.01	24.278231	154.518614	840.8	4.450	12.5	13.7	0.71	4450	2.39	8.29
008873450-07	OBS	No	436.671988	245.084126	792.3	5.000	11.7	-1.0	0.71	4450	1.90	0.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008873450-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008873450-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008873450-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE_ZUMA—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008873450-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS
008873450-05	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008873450-06	OBS	FP	0.00	0	0	1	0	CENT_KIC_POS—HALO_GHOST
008873450-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—CENT_NOFITS

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

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

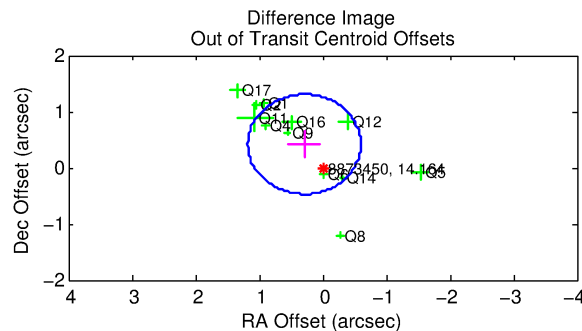
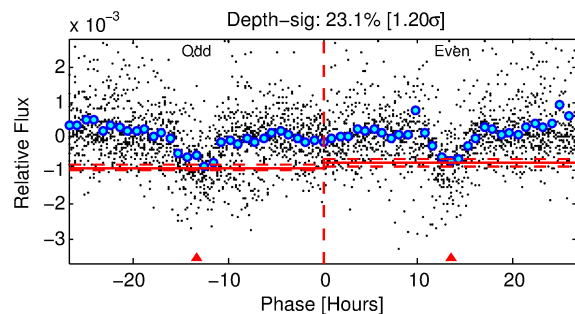
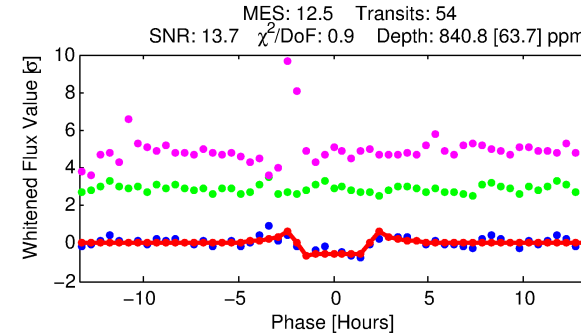
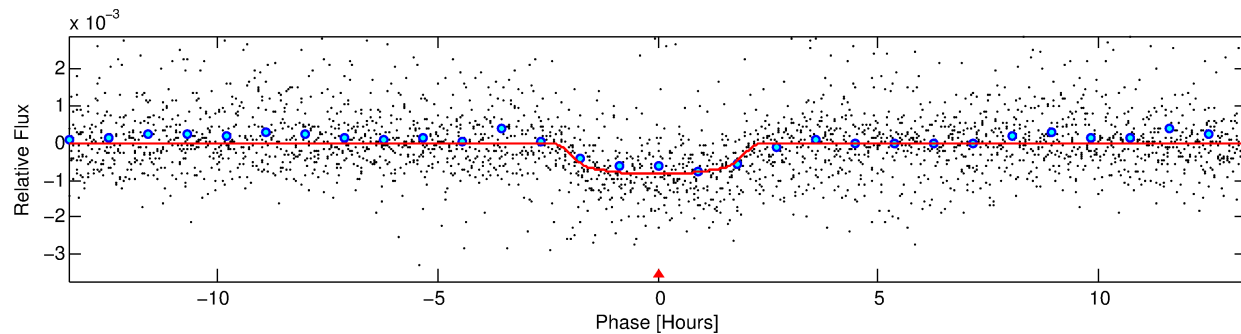
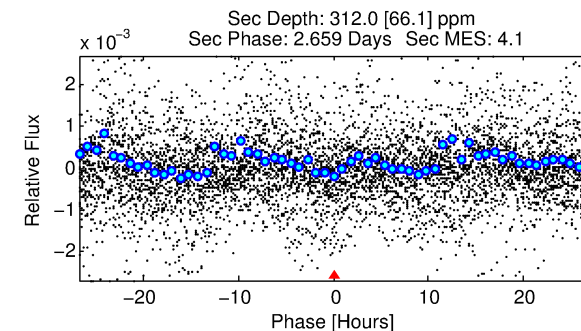
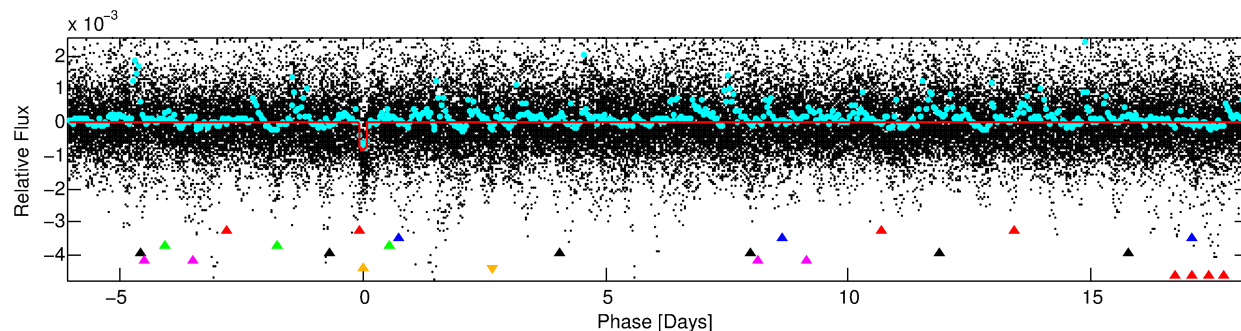
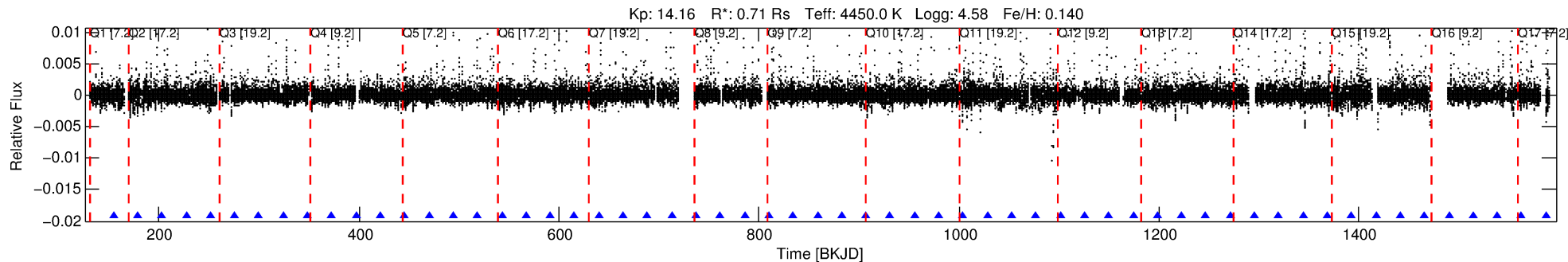
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008873450-06

No Significant Match Found

# DV One-Page Summary

KIC: 8873450 Candidate: 6 of 7 Period: 24.278 d



## DV Fit Results:

Period = 24.27823 [0.00010] d  
Epoch = 154.5186 [0.0034] BKJD  
Rp/R\* = 0.0310 [0.0044]  
a/R\* = 24.78 [10.71]  
b = 0.84 [0.15]  
Seff = 8.29 [1.30]  
Teq = 433 [17] K  
Rp = 2.39 [0.40] Re  
a = 0.1456 [0.0102] AU  
Ag = 636.52 [235.46] [2.70σ]  
Teffp = 3360 [315] K [9.29σ]

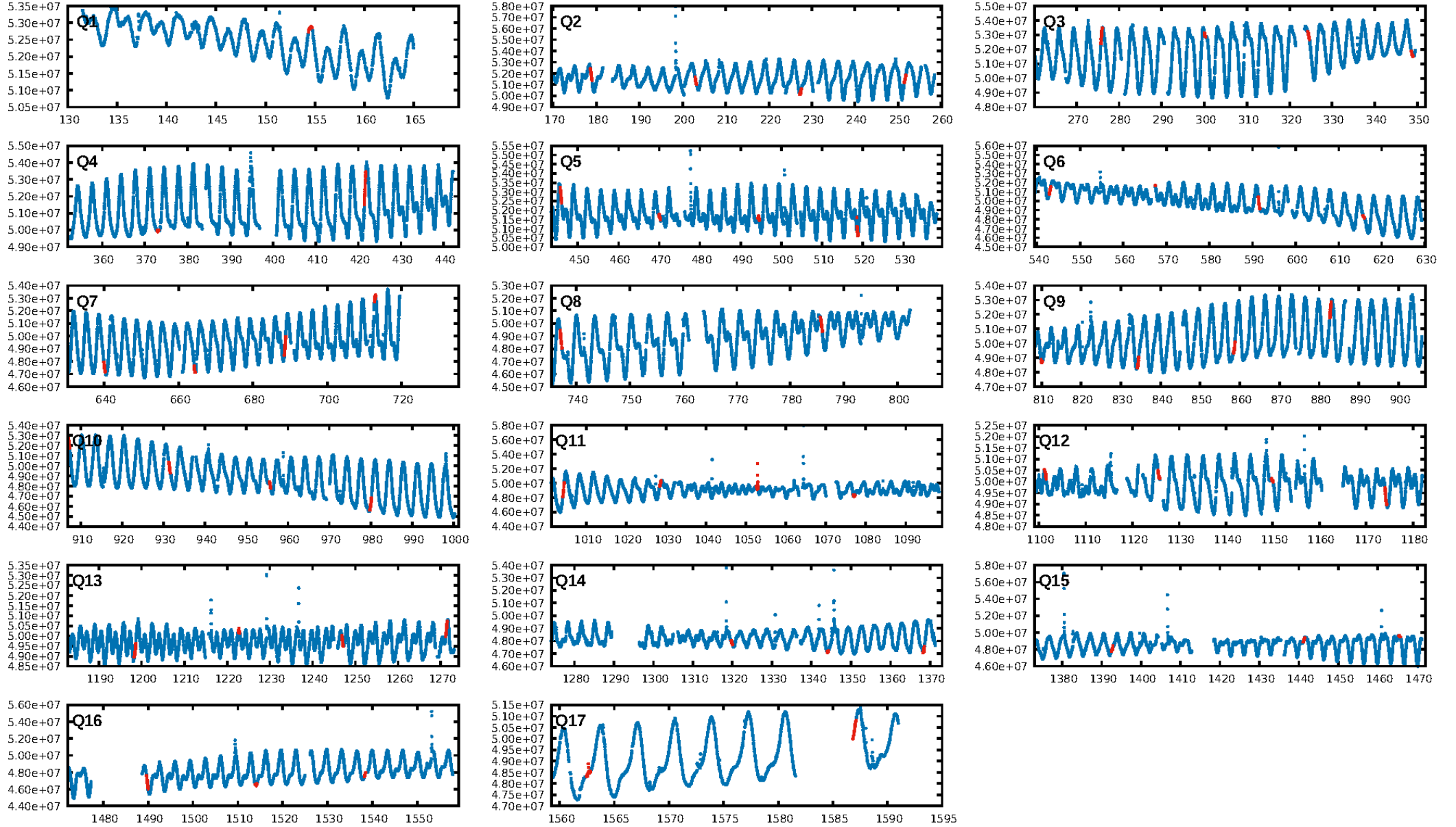
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [1240.73σ]  
ModelChiSquare2-sig: 68.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [51/51]  
**GhostDiagnostic-chr: -0.01322**  
Centroid-sig: 0.0%  
Centroid-so: 0.634 arcsec [1.33σ]  
OotOffset-rm: 0.508 arcsec [1.71σ]  
KicOffset-rm: 0.776 arcsec [2.39σ]  
OotOffset-st: 3/1/4/4 [12]  
KicOffset-st: 3/1/4/4 [12]  
DiffImageQuality-fgm: 0.58 [7/12]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:14:03 Z

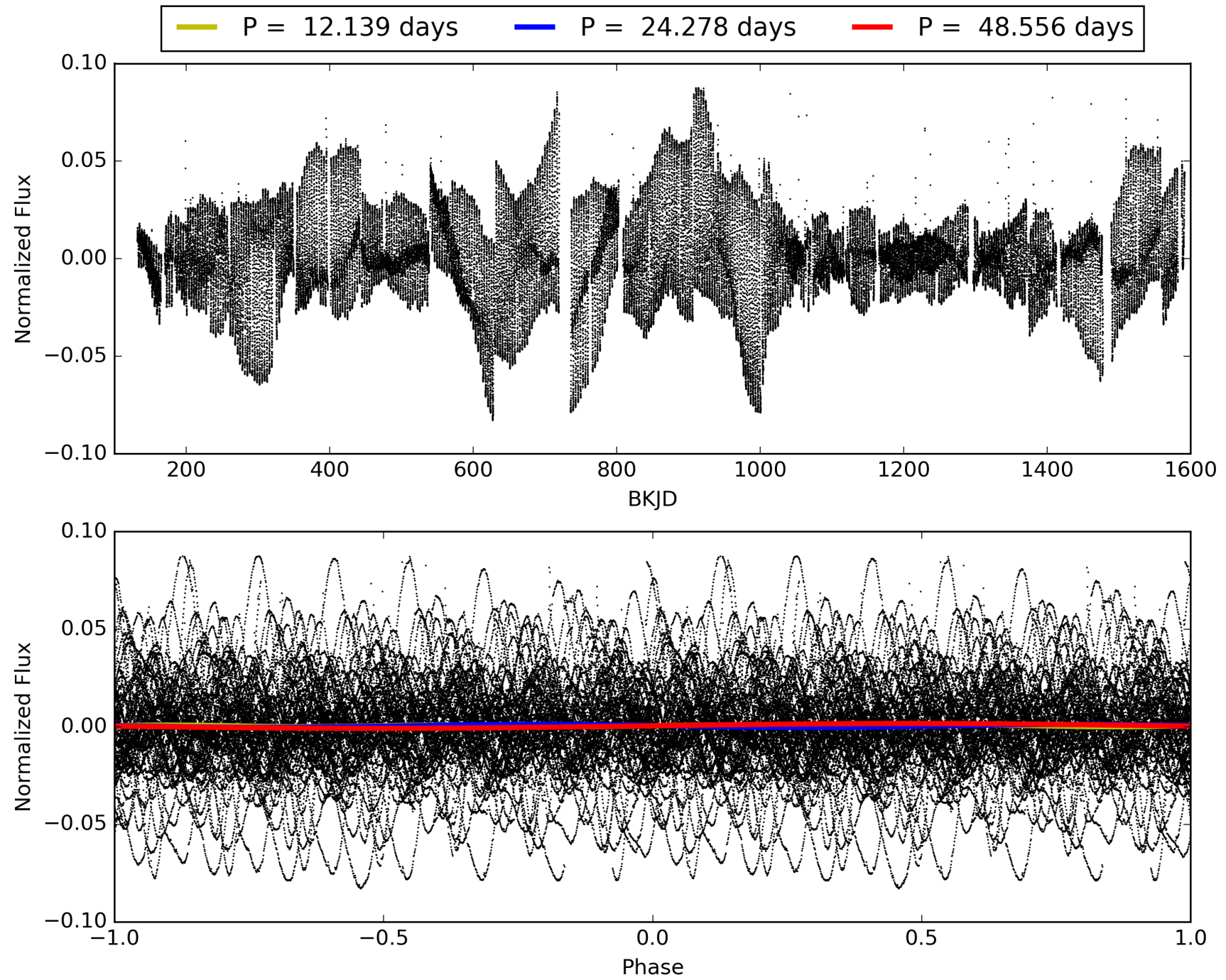
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 008873450-06, PDC Light Curves





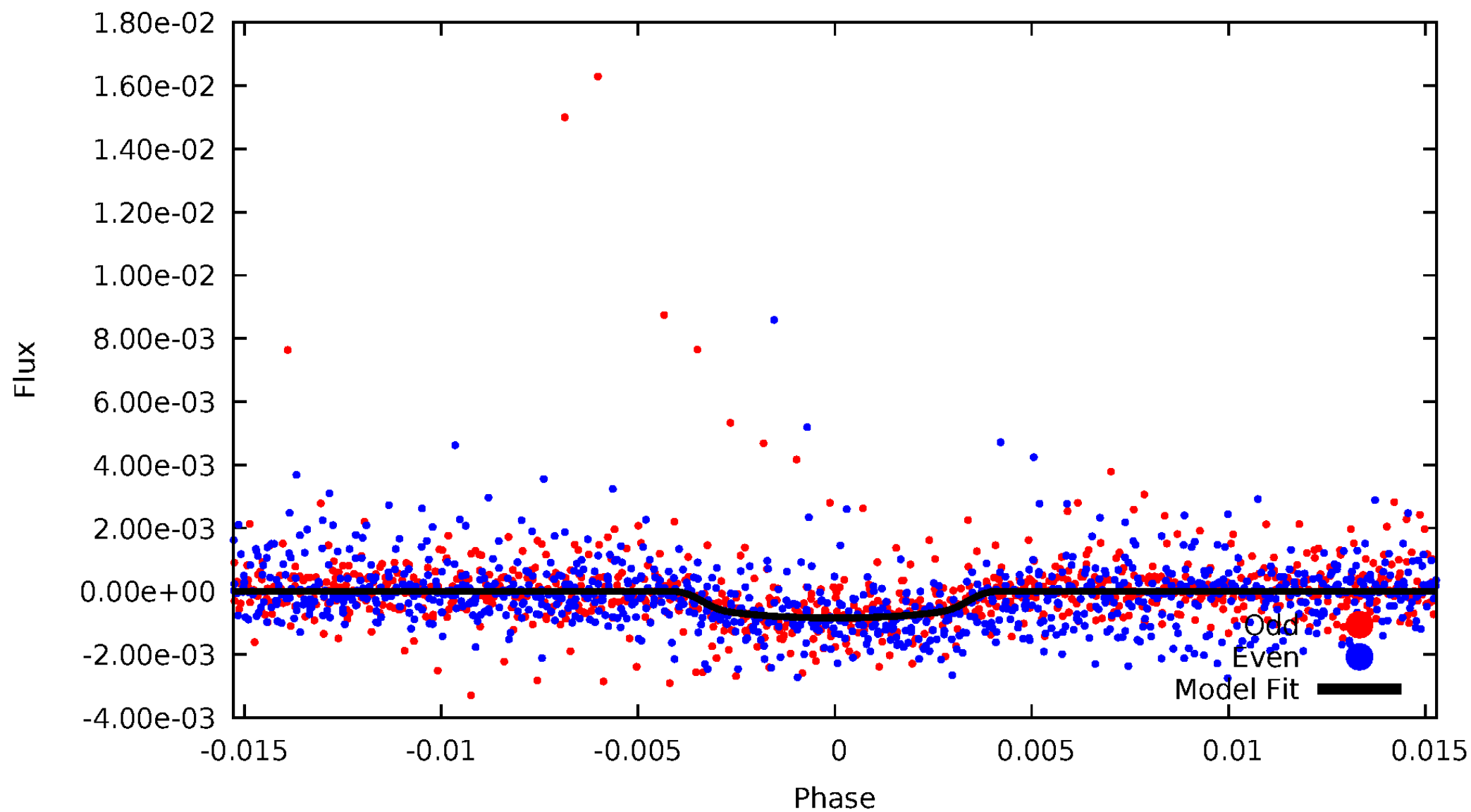
TCE 008873450-06





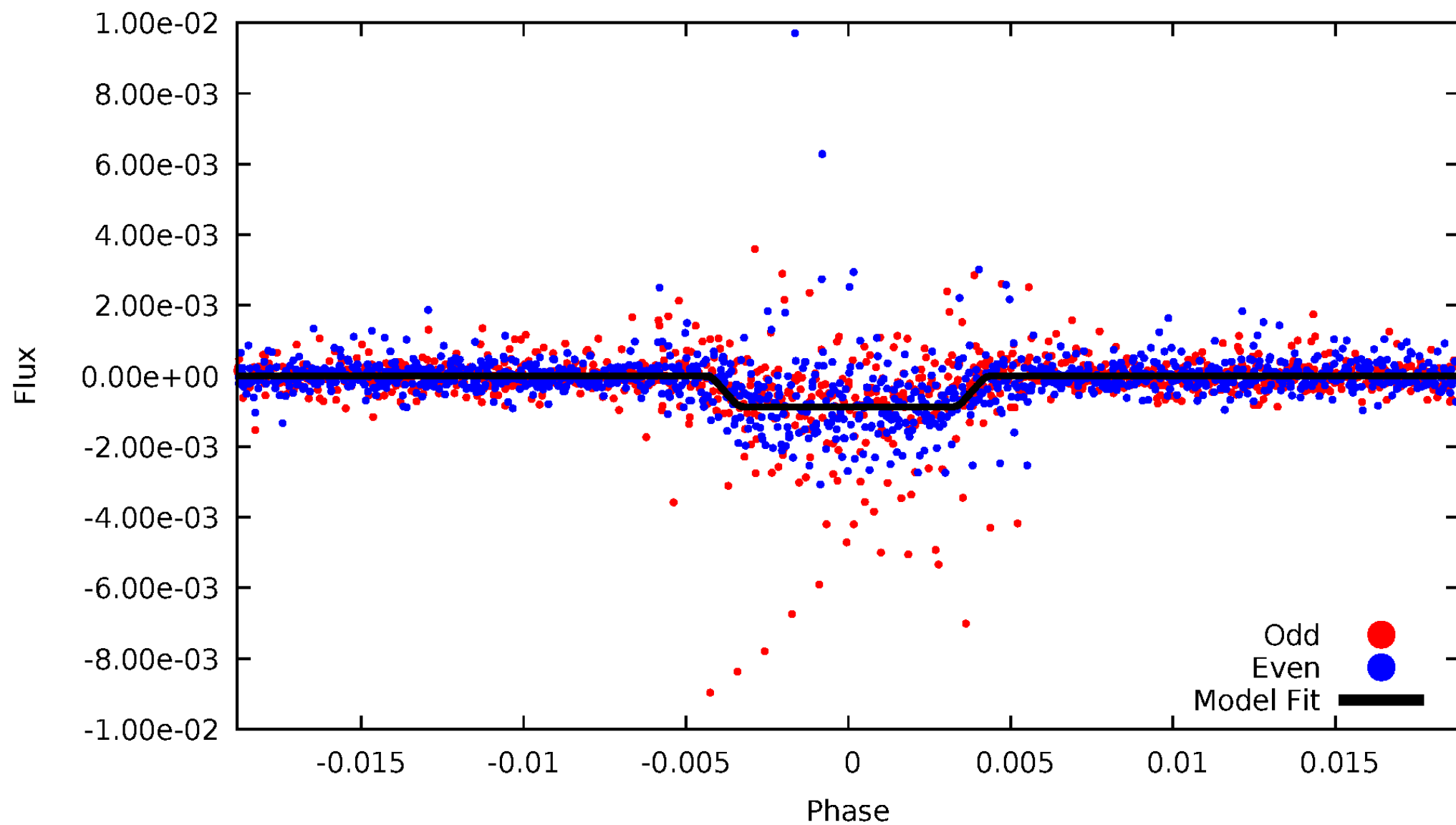
# DV Odd/Even

TCE 008873450-06



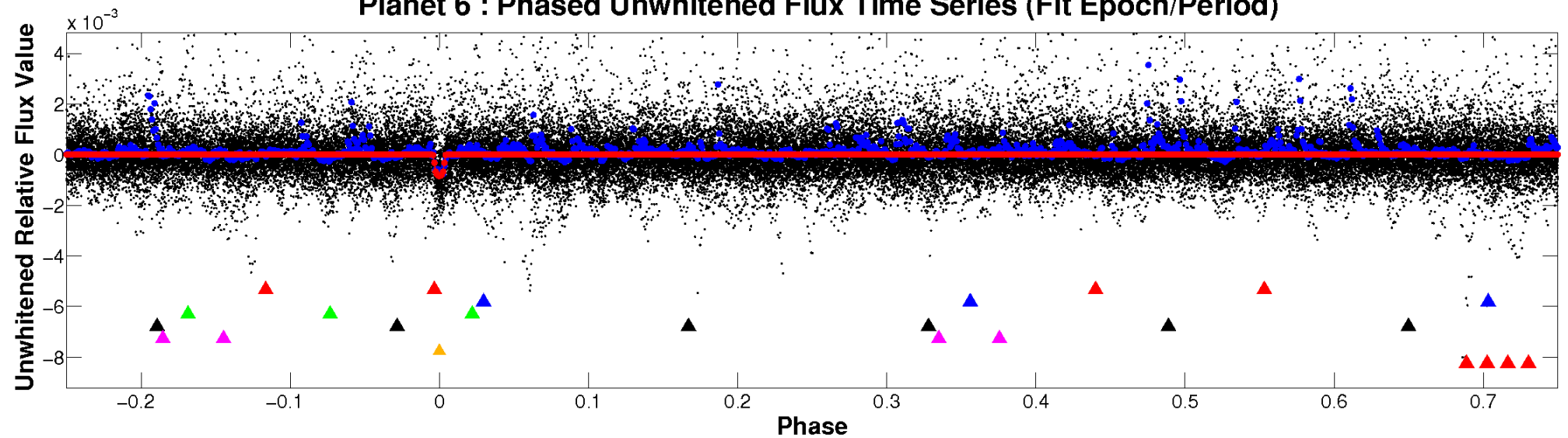
# ALT Odd/Even

TCE 008873450-06

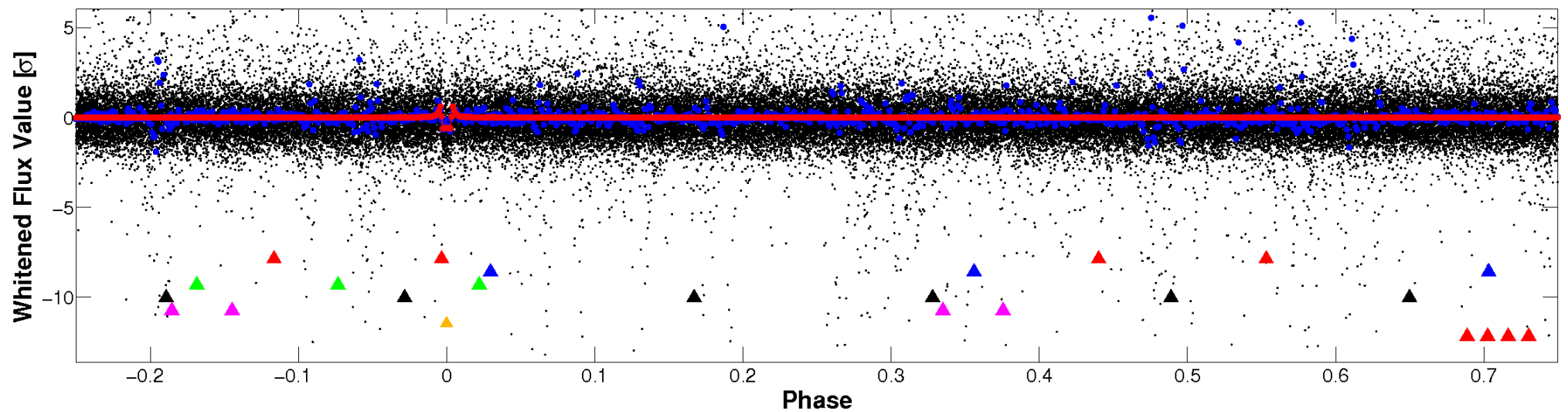


# Non-Whitened Vs. Whitened Light Curve

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

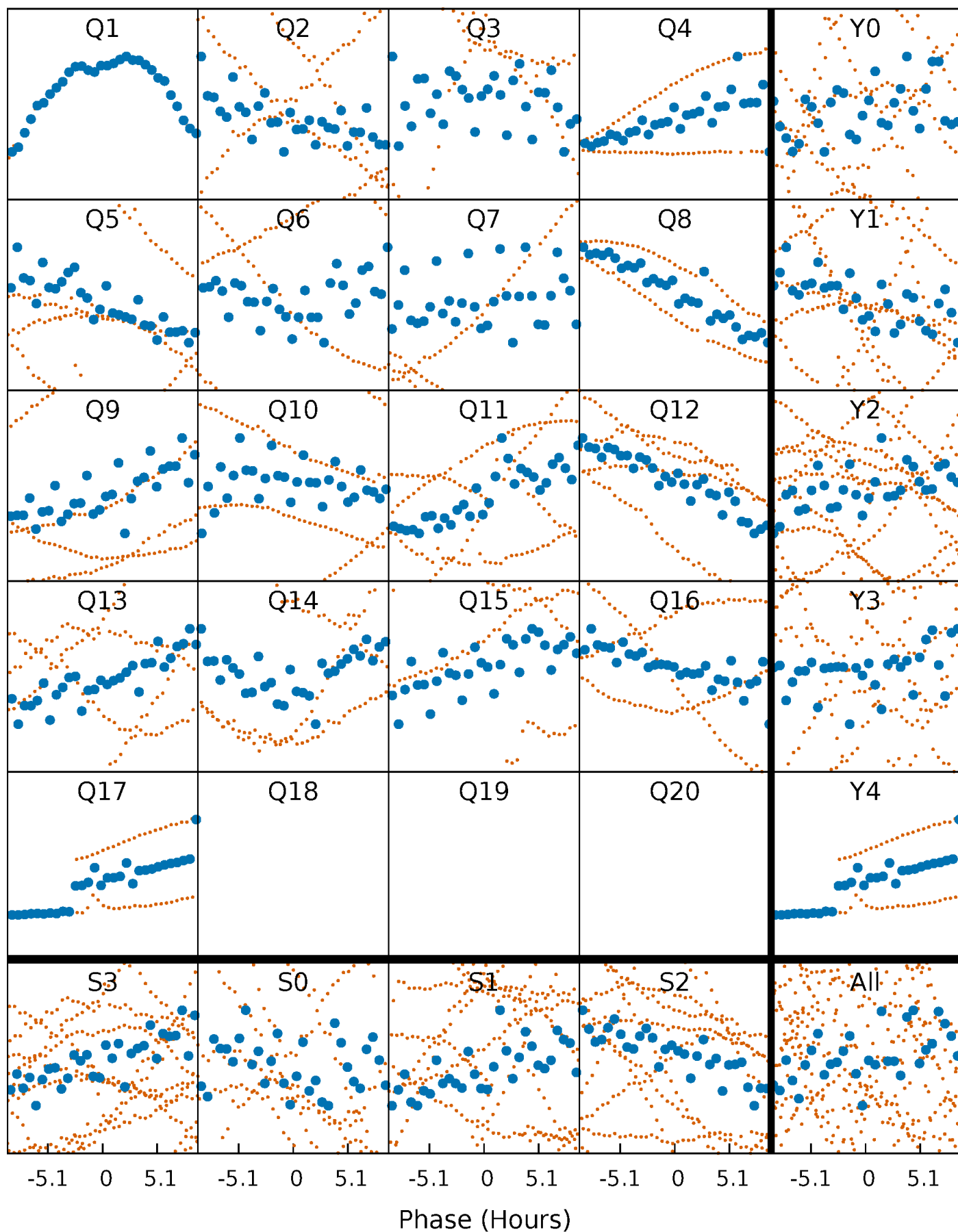


## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



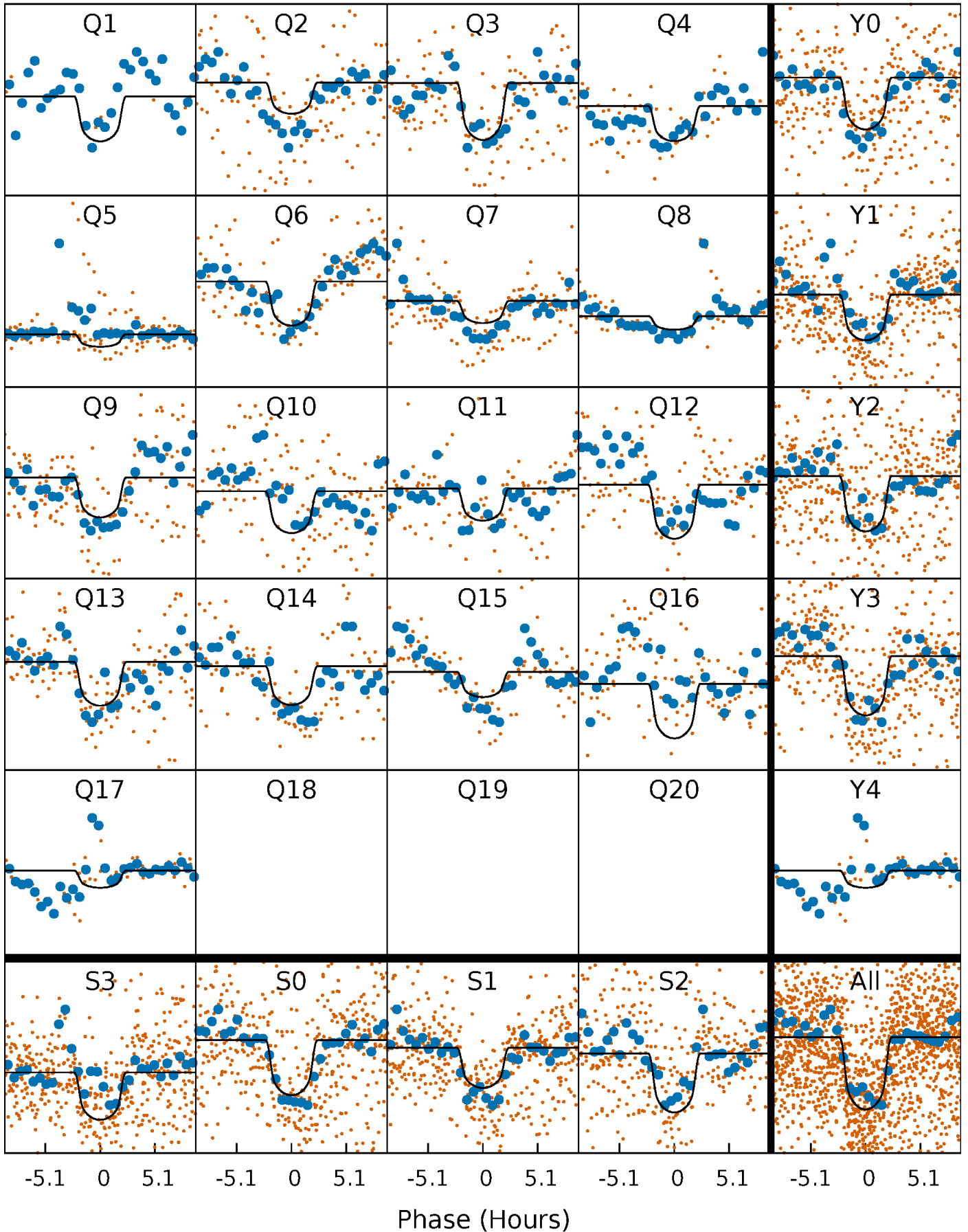
# PDC Quarter-Phased Transit Curves

TCE 008873450-06 P= 24.278231 Days  $T_0=154.518614$  (BKJD)



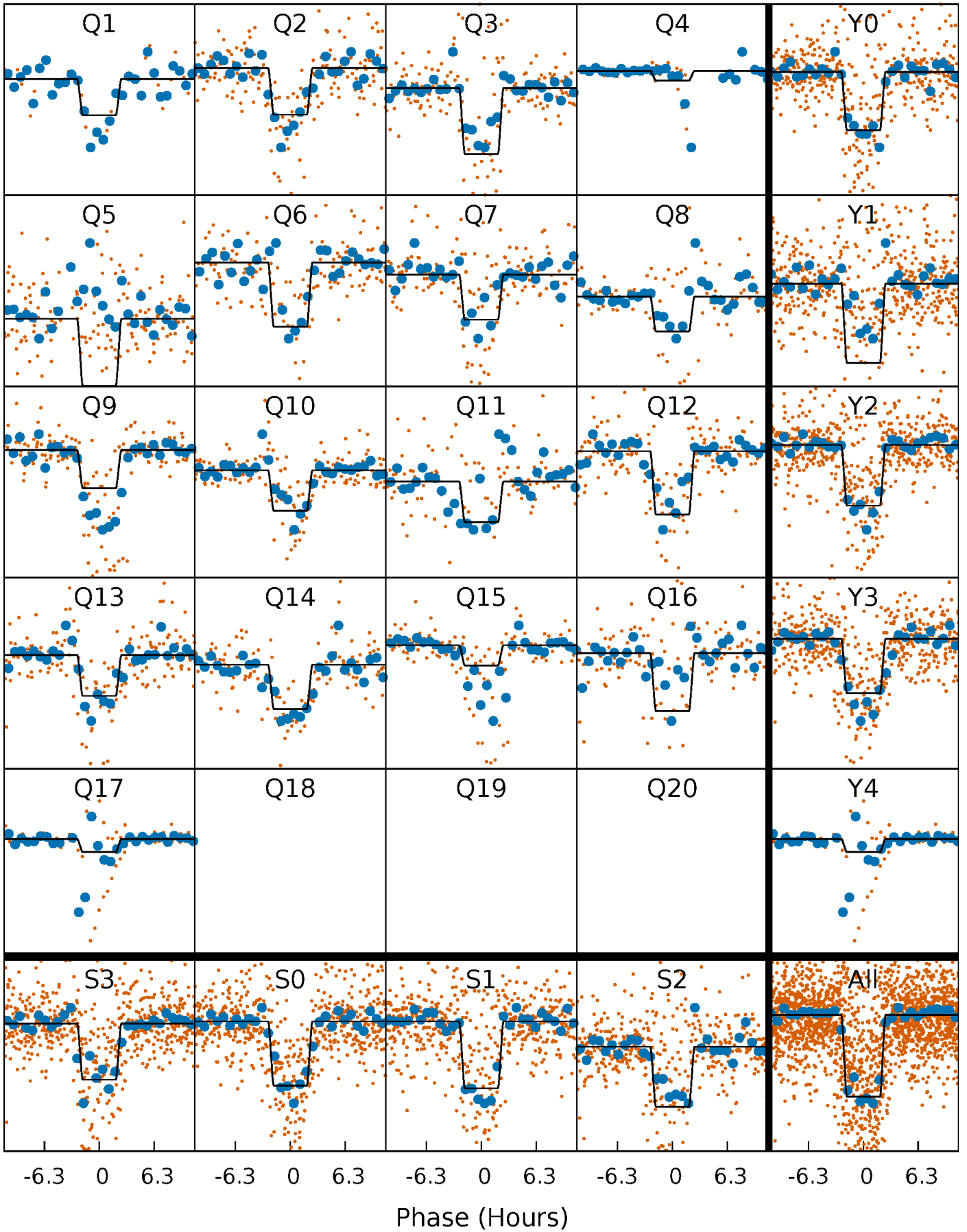
# DV Quarter-Phased Transit Curves

TCE 008873450-06 P= 24.278231 Days  $T_0=154.518614$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

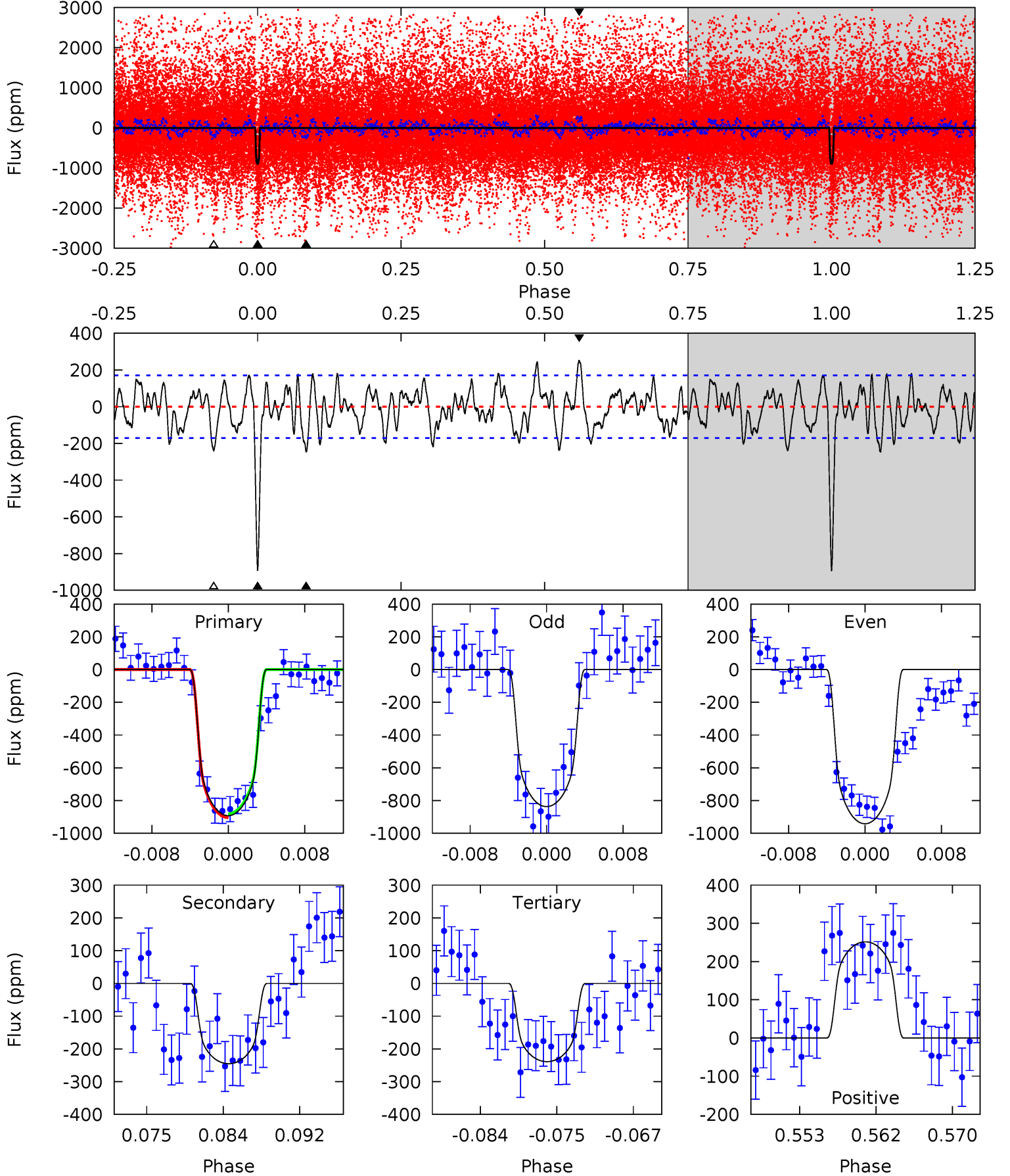
TCE 008873450-06 P= 24.278160 Days  $T_0=154.525056$  (BKJD)



# DV Model-Shift Uniqueness Test

008873450-06,  $P = 24.278231$  Days,  $E = 130.240383$  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
26.5	7.27	7.09	7.46	5.06	2.64	2.69	19.4	19.0	0.19	-0.19	1.56	0.84	0.22	0.35

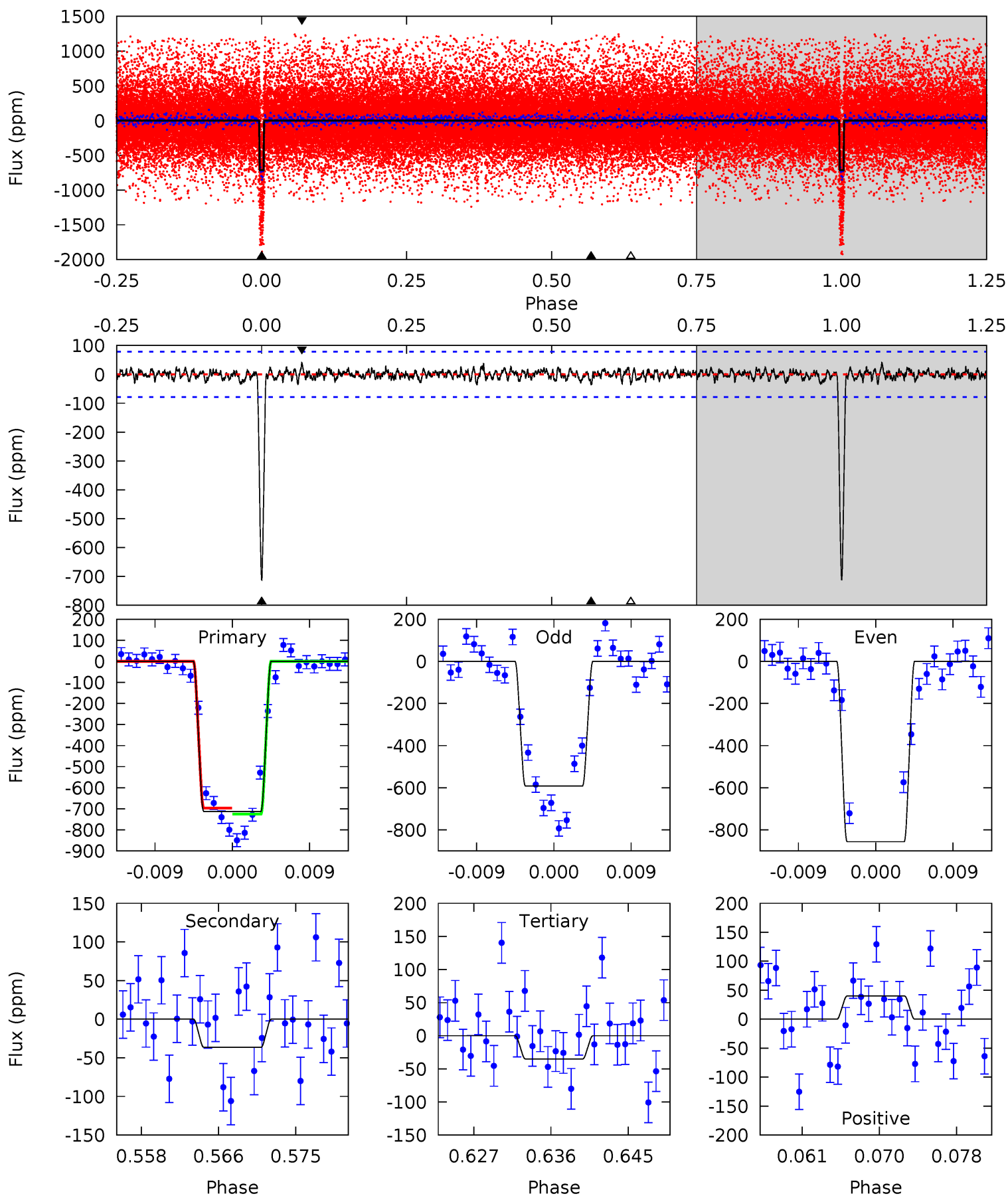




# Alt Model-Shift Uniqueness Test

008873450-06,  $P = 24.278160$  Days,  $E = 130.246896$  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
45.8	2.34	2.26	2.58	5.05	2.62	0.76	43.6	43.3	0.08	-0.24	8.50	1.09	0.05	0





### Stellar Parameters For KIC 008873450

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4450^{+132}_{-132}$	$4.583^{+0.056}_{-0.020}$	$0.140^{+0.250}_{-0.300}$	$0.707^{+0.029}_{-0.059}$	$0.698^{+0.054}_{-0.054}$	$2.780^{+0.684}_{-0.220}$
	+3%/-3%	+1%/-0%	+179%/-214%	+4%/-8%	+8%/-8%	+25%/-8%
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 008873450-06 / KOI 7913.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-245 \pm 34$	$2.40^{+0.34}_{-0.37}$	$600^{+20}_{-21}$	$3498^{+210}_{-185}$	$507^{+206}_{-129}$
Alt.	$-36 \pm 16$	$2.25^{+0.35}_{-0.32}$	$601^{+19}_{-23}$	$2683^{+208}_{-207}$	$81^{+55}_{-38}$

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

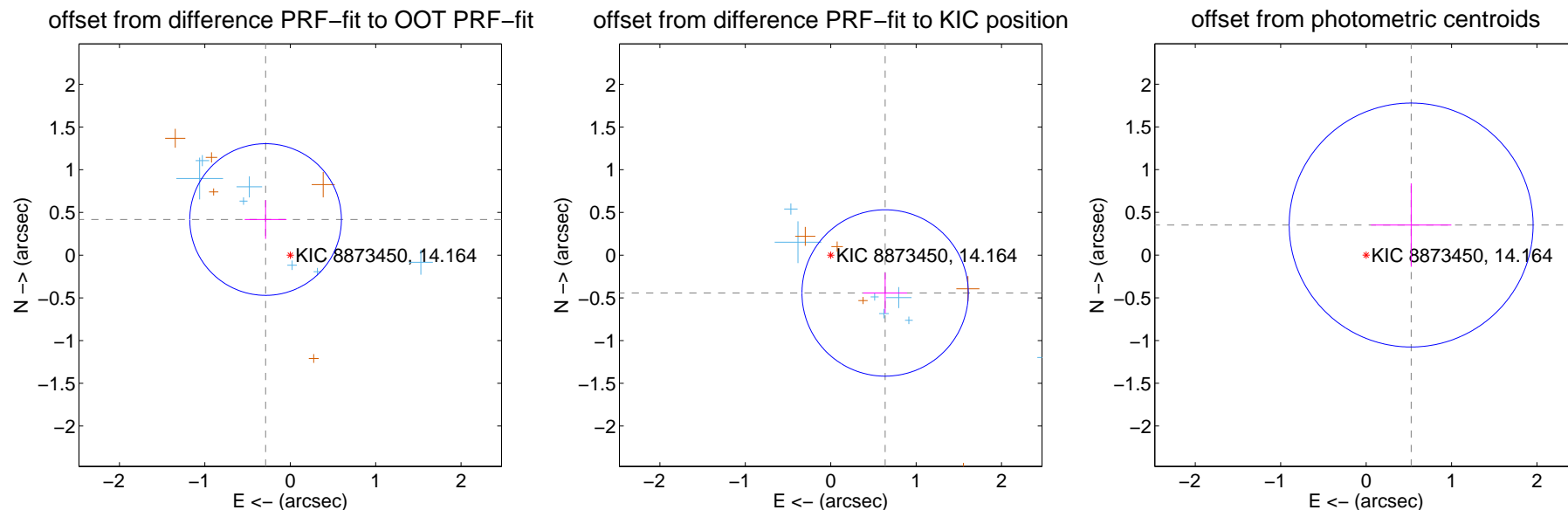
## DV Centroid Data

Supplemental centroid analysis for 008873450-06. Kepler magnitude: 14.16. Transit SNR 13.72

There are 7 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 1.56 arcsec

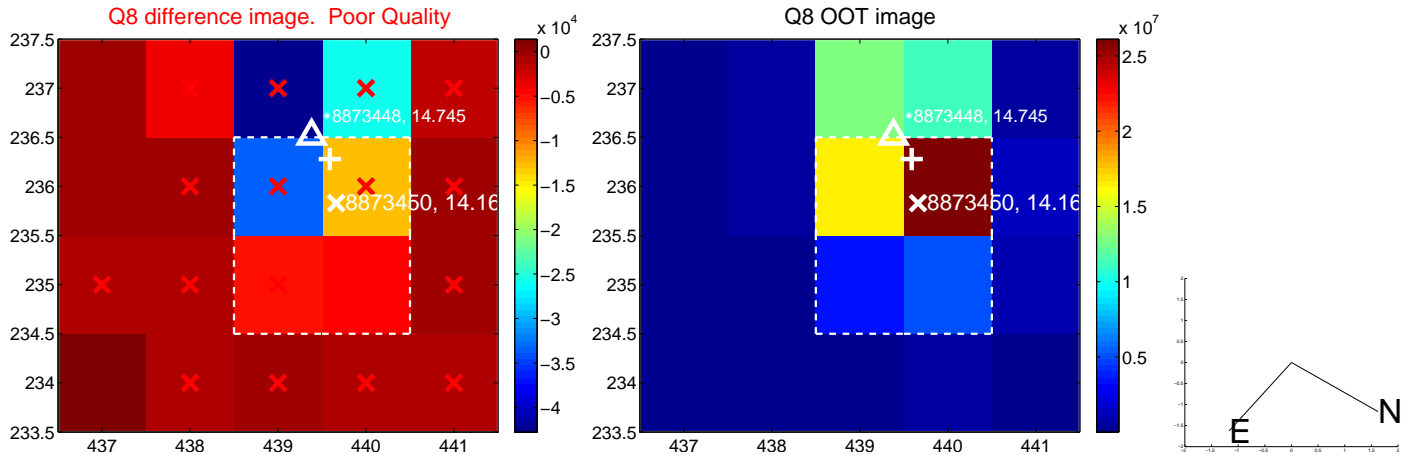
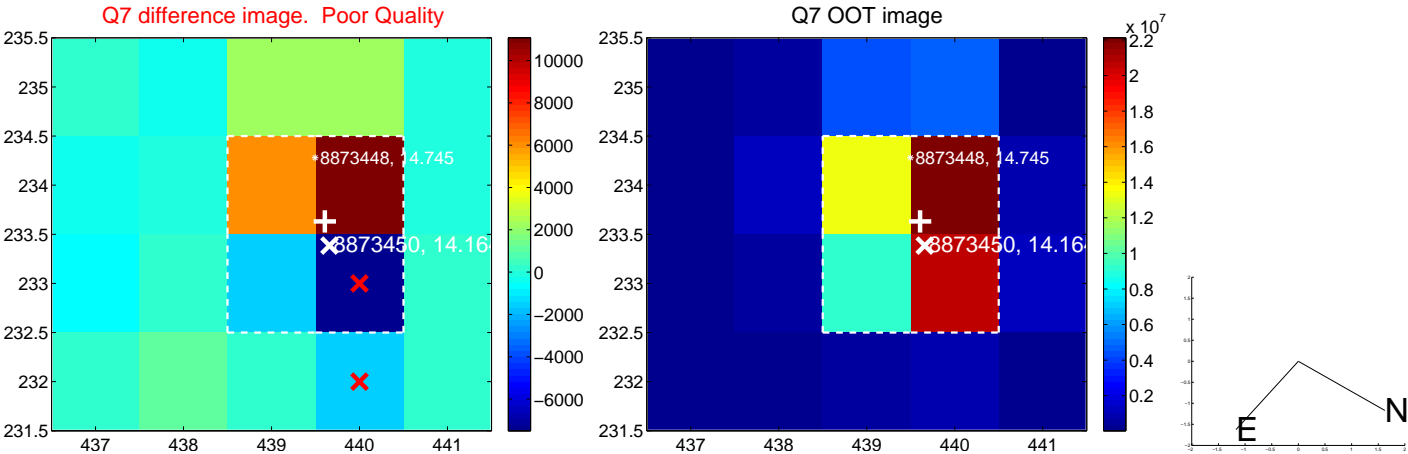
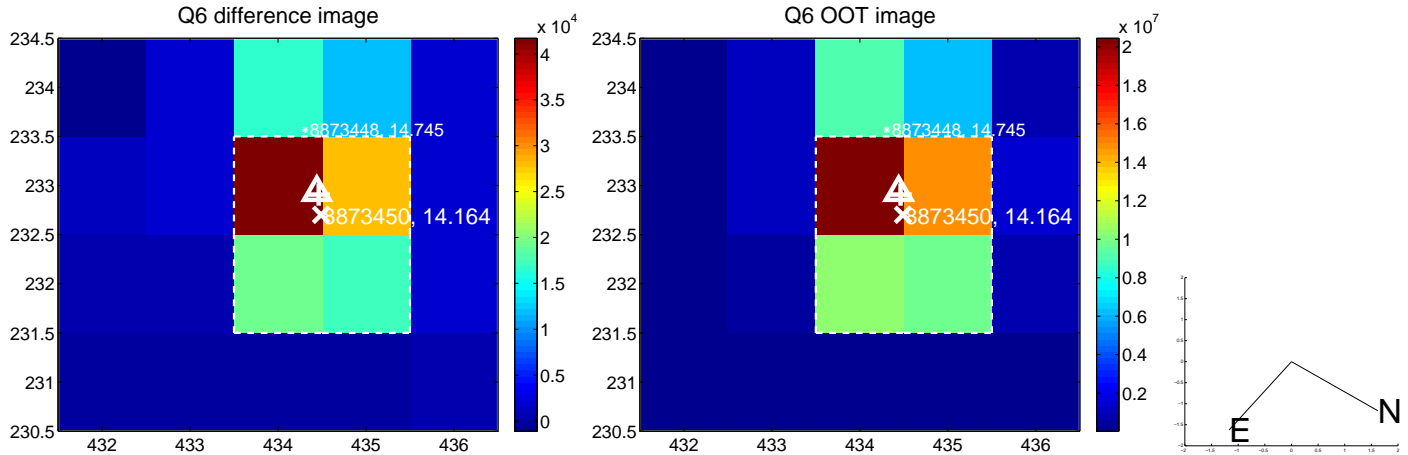
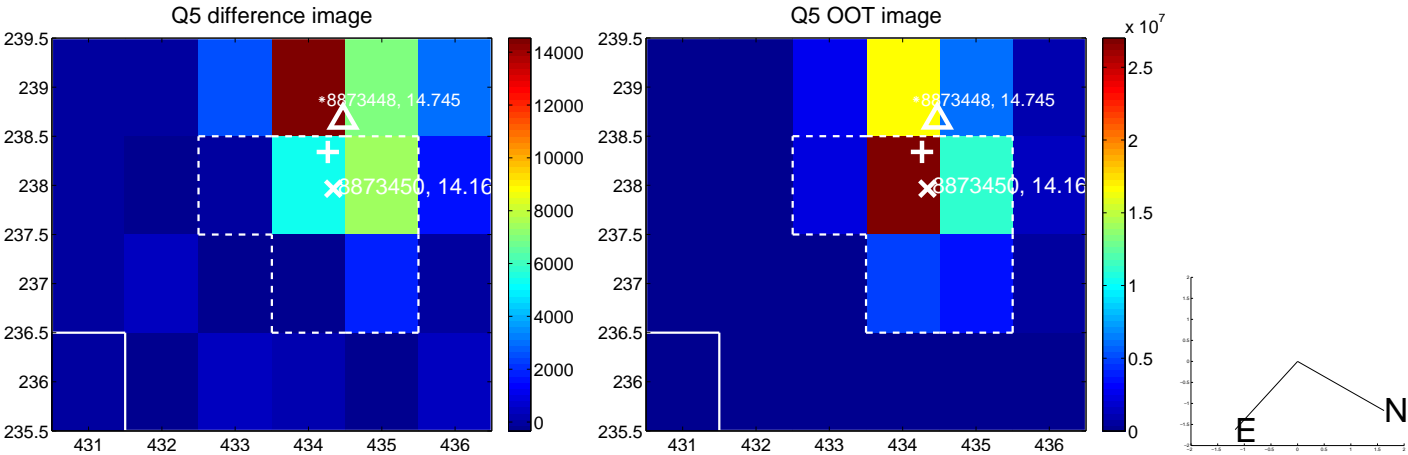
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.508 \pm 0.296$	1.71	$0.289 \pm 0.245$	$0.417 \pm 0.226$
PRF-fit source offset from KIC position	$0.776 \pm 0.325$	2.39	$-0.637 \pm 0.258$	$-0.443 \pm 0.238$
photometric centroid source offset	$0.63 \pm 0.48$	1.33	$-0.53 \pm 0.47$	$0.35 \pm 0.49$



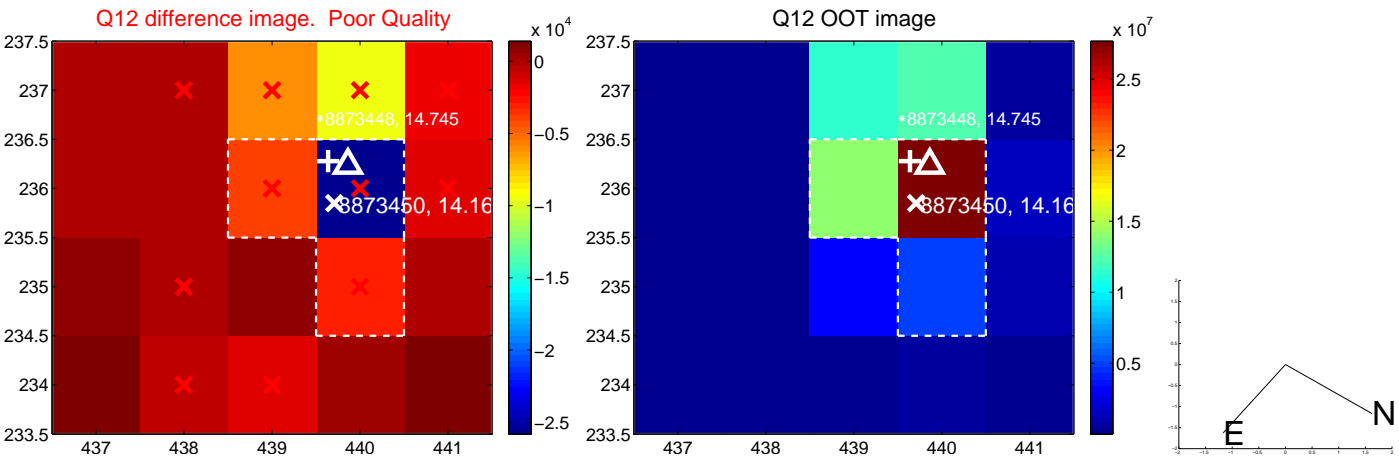
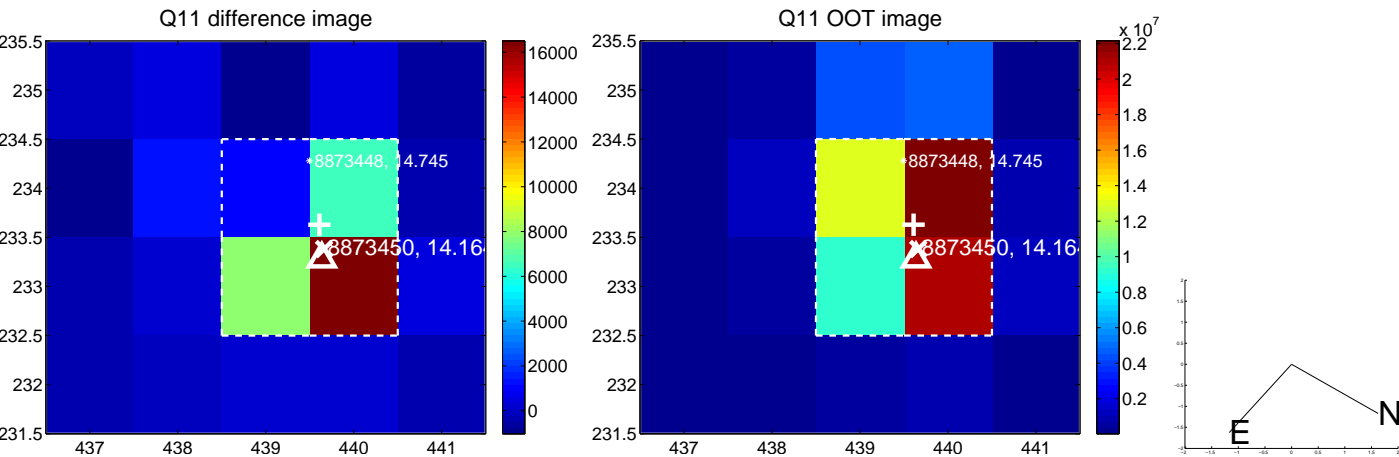
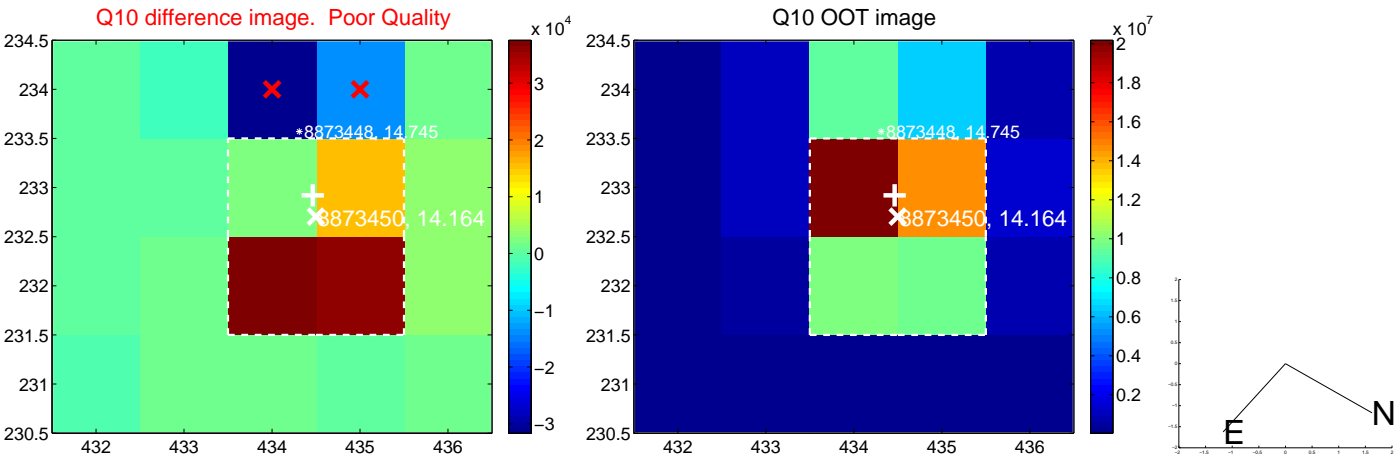
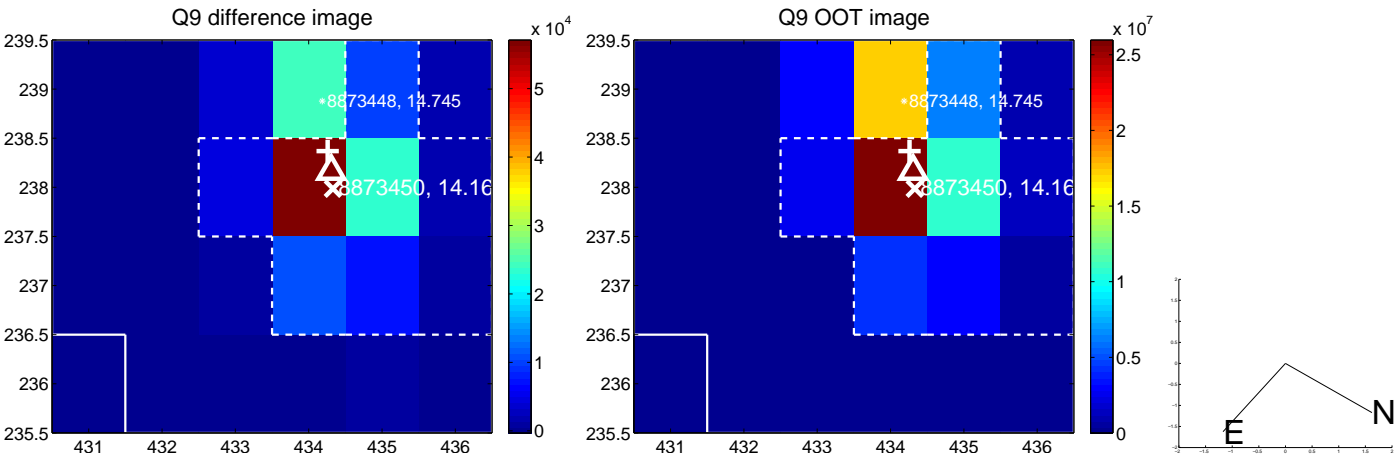
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



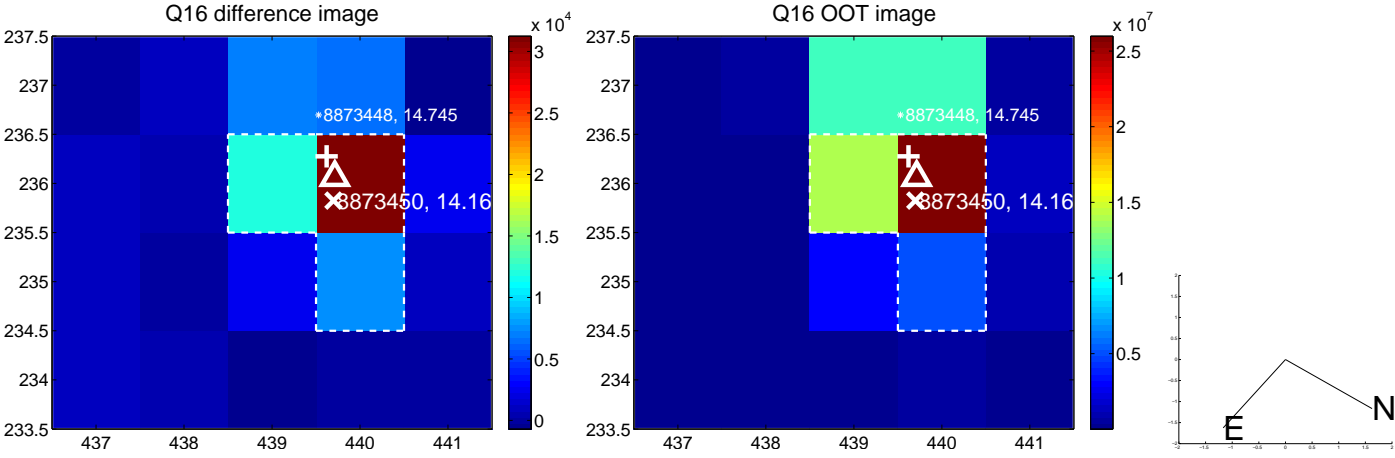
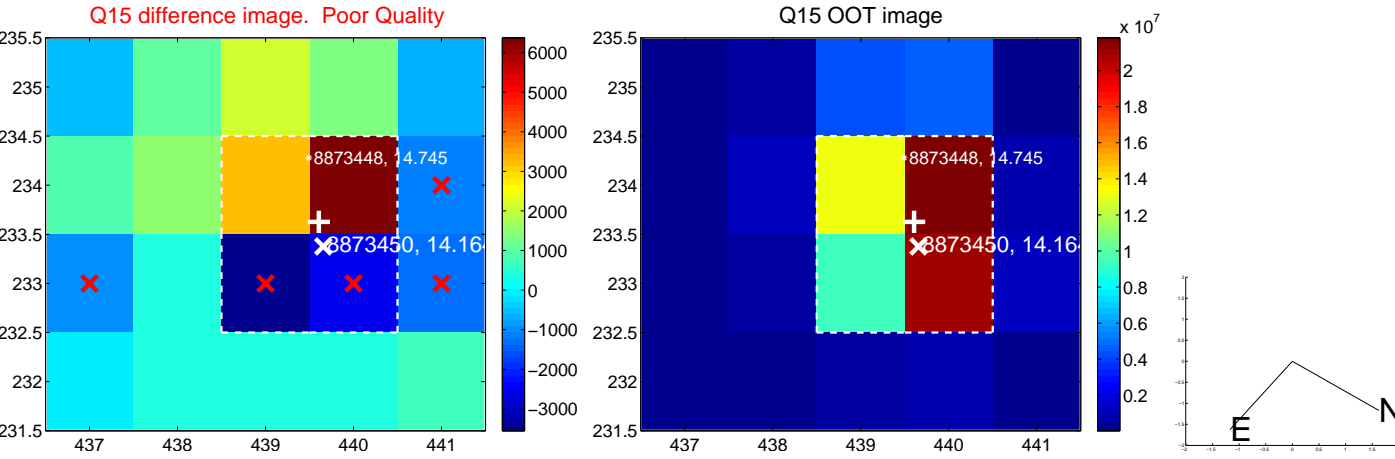
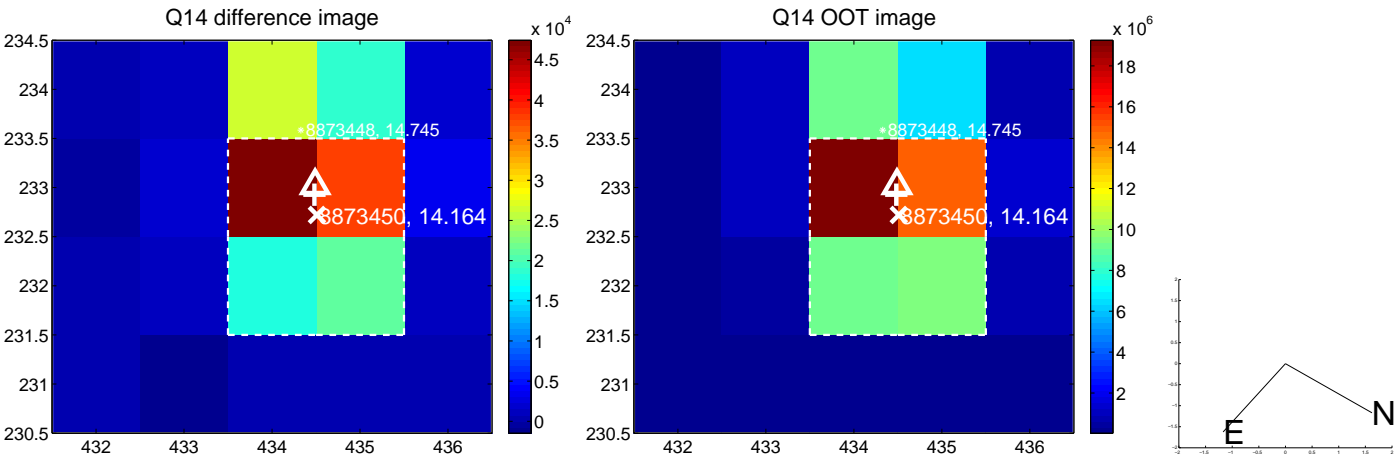
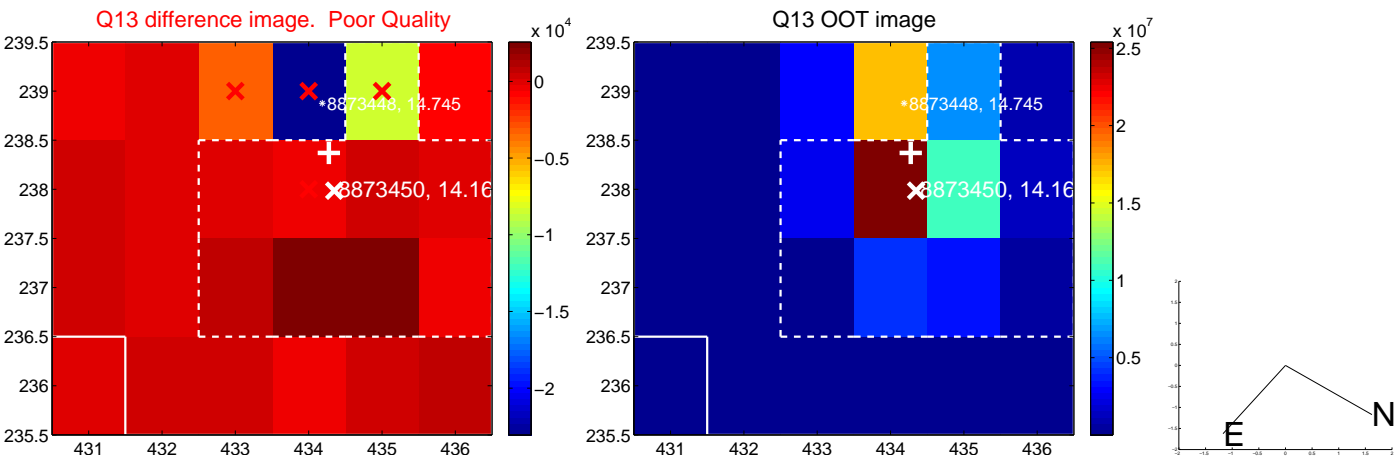
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



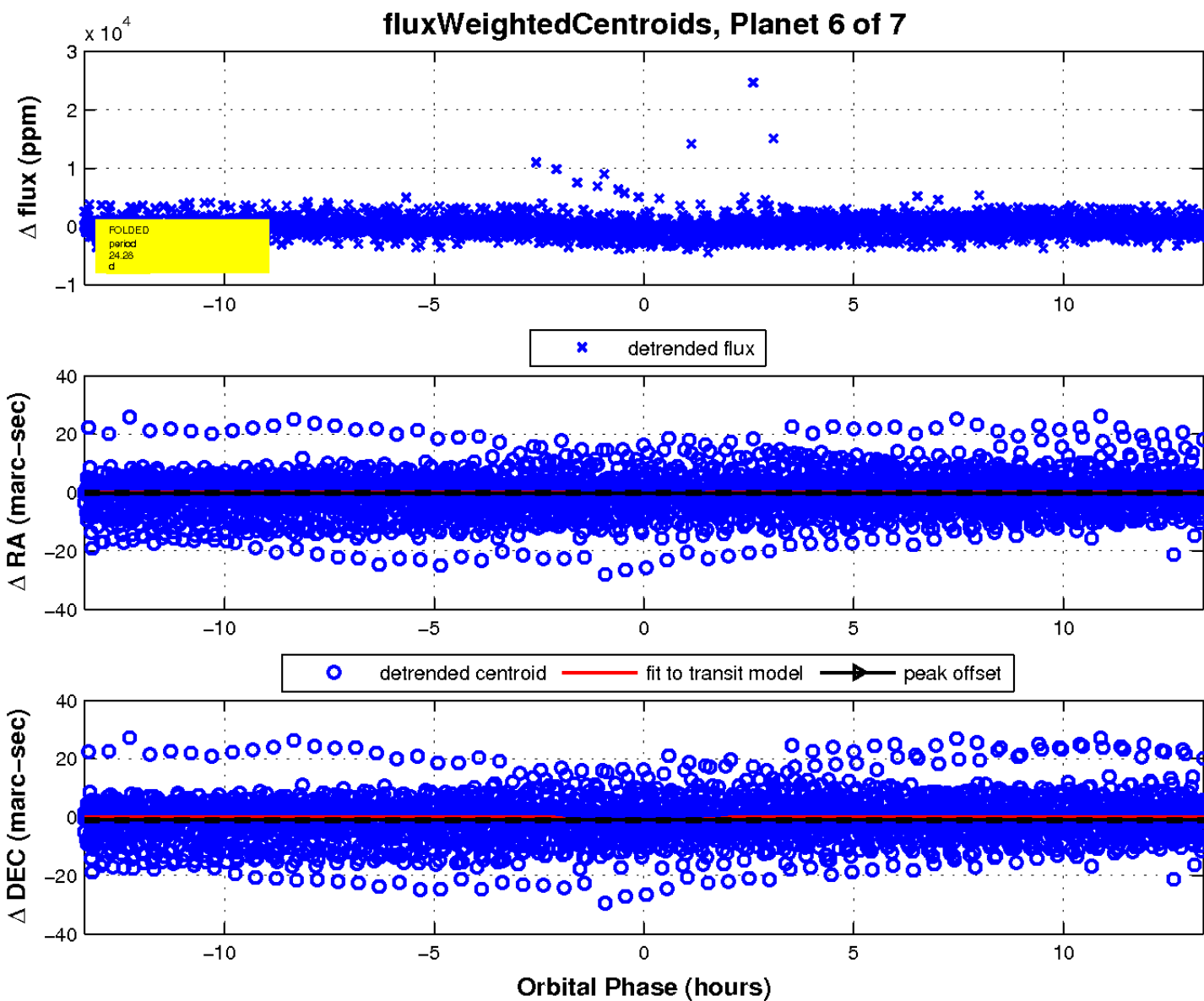
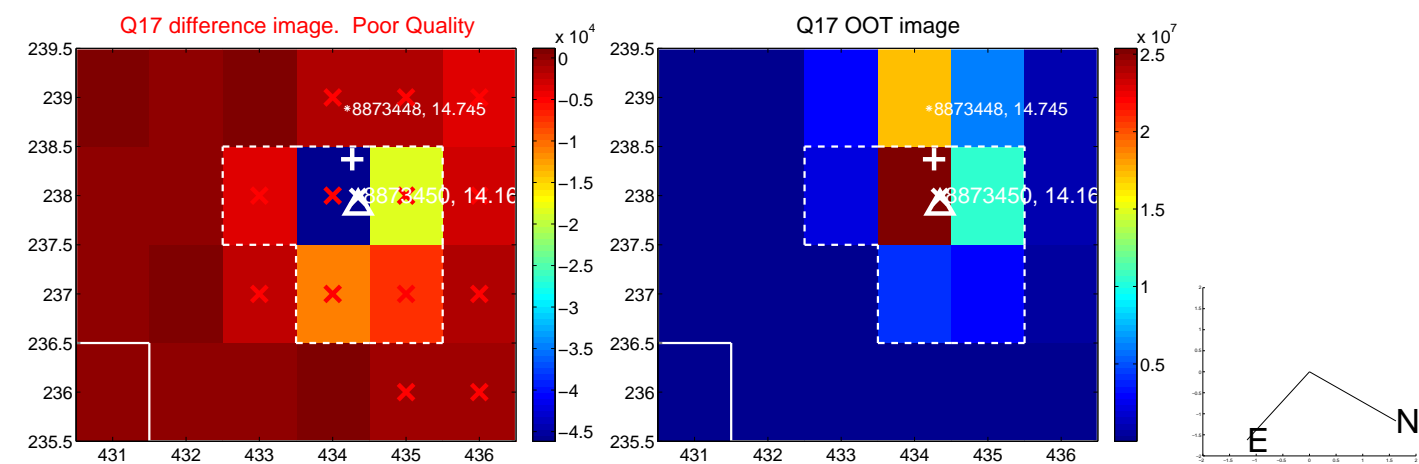
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

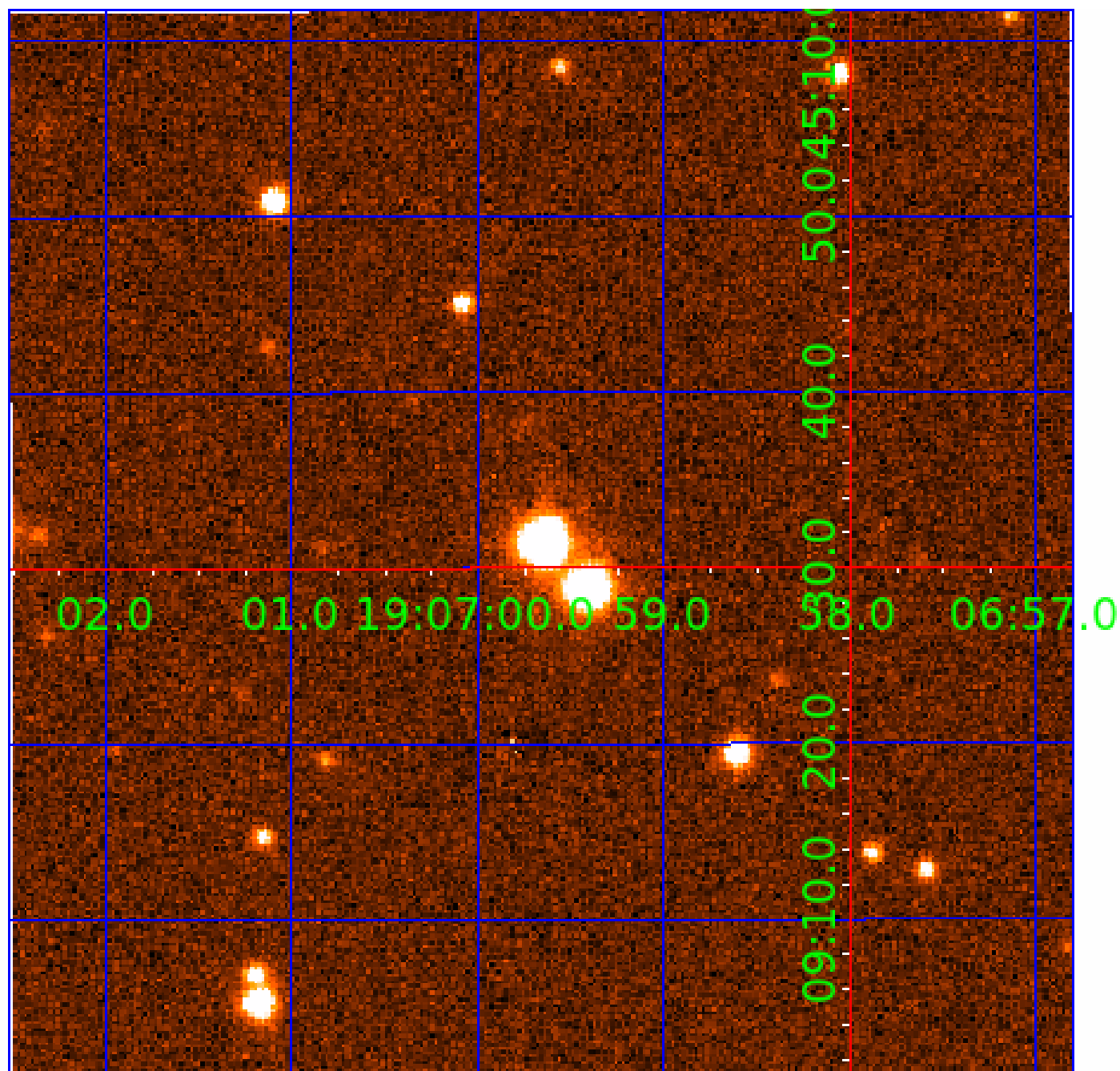


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\Delta$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 008873450

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008873450-01	OBS	No	329.128908	394.473473	2360.5	6.518	14.2	6.1	0.71	4450	3.27	0.26
008873450-02	OBS	No	501.919677	527.335460	1920.0	4.728	14.9	7.1	0.71	4450	3.03	0.15
008873450-03	OBS	No	507.529446	373.557613	1979.8	4.941	14.4	6.6	0.71	4450	4.27	0.14
008873450-04	OBS	No	270.967374	207.131607	649.6	1.722	16.5	3.5	0.71	4450	2.02	0.33
008873450-05	OBS	No	425.362386	271.409345	2246.5	15.491	11.1	6.0	0.71	4450	3.19	0.18
008873450-06	OBS	7913.01	24.278231	154.518614	840.8	4.450	12.5	13.7	0.71	4450	2.39	8.29
008873450-07	OBS	No	436.671988	245.084126	792.3	5.000	11.7	-1.0	0.71	4450	1.90	0.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008873450-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
008873450-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
008873450-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE_ZUMA—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008873450-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS
008873450-05	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008873450-06	OBS	FP	0.00	0	0	1	0	CENT_KIC_POS—HALO_GHOST
008873450-07	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—CENT_NOFITS

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

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

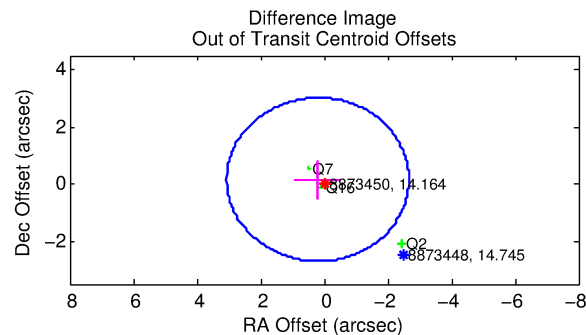
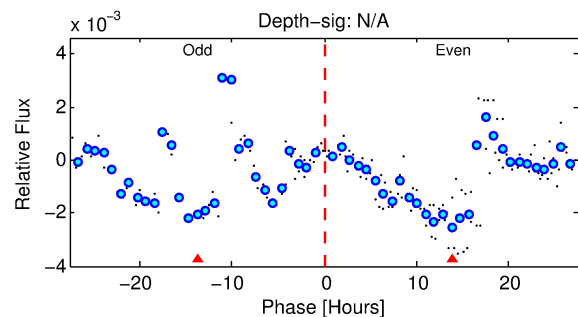
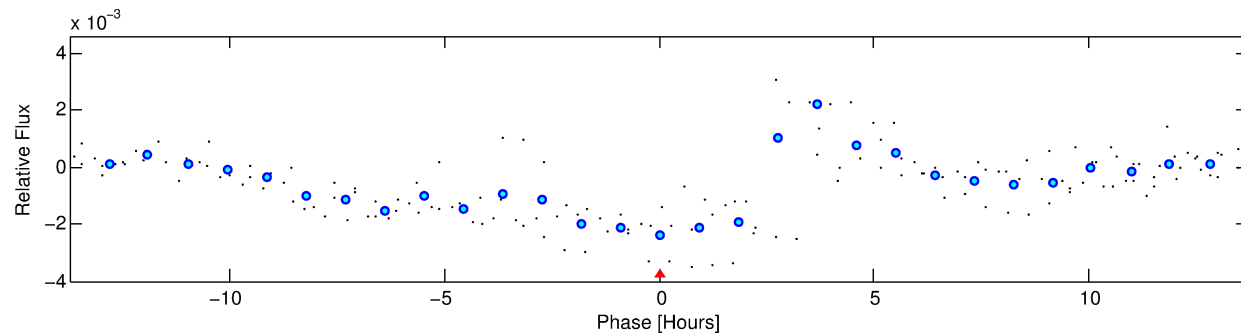
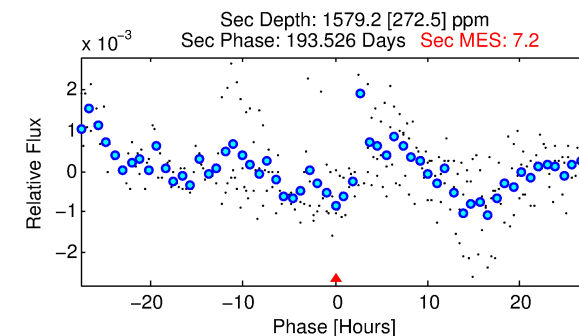
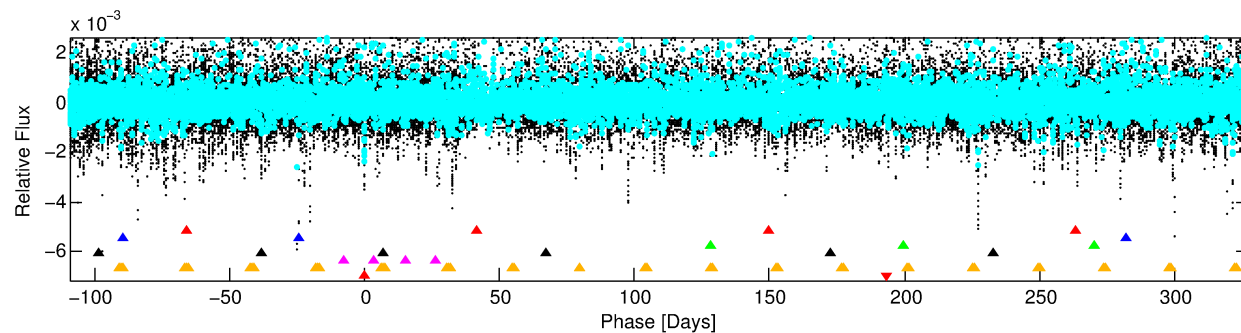
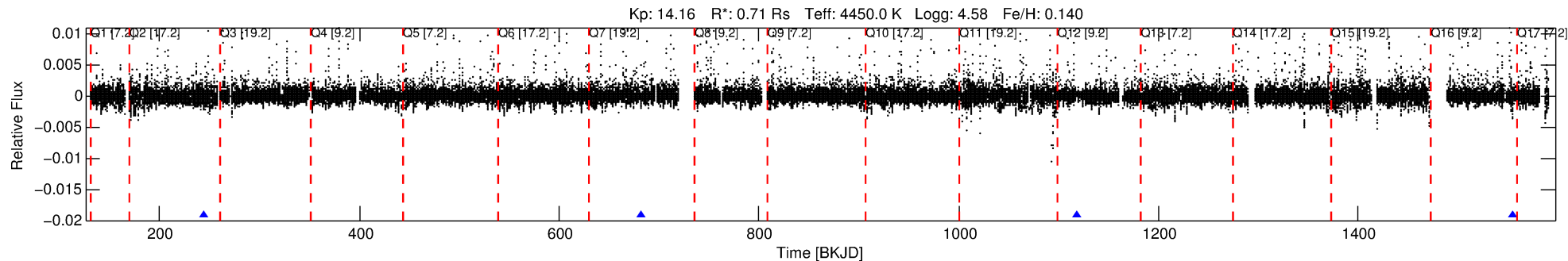
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008873450-07

No Significant Match Found

# DV One-Page Summary

KIC: 8873450 Candidate: 7 of 7 Period: 436.672 d



## TPS TCE Results:

Period = 436.67199 d  
Epoch = 245.0841 BKJD

**DV fit results are unavailable**

## DV Diagnostic Results:

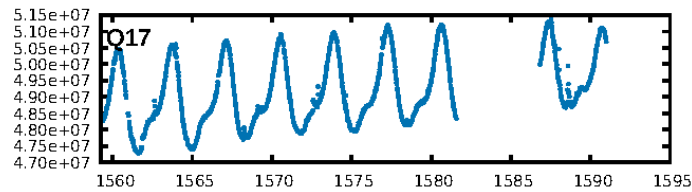
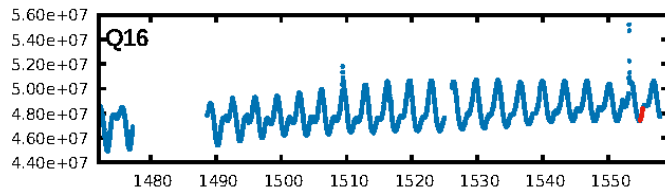
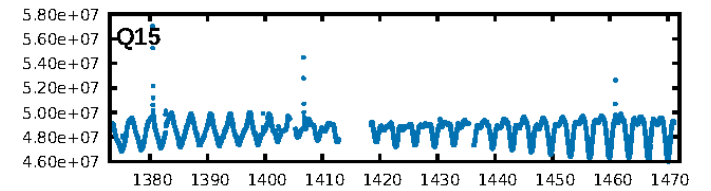
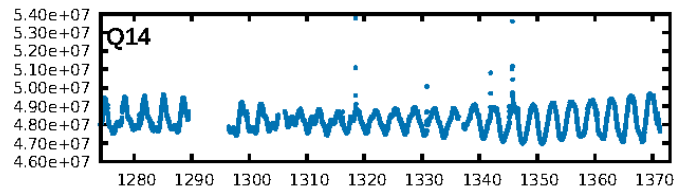
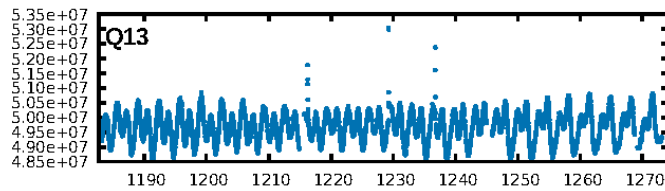
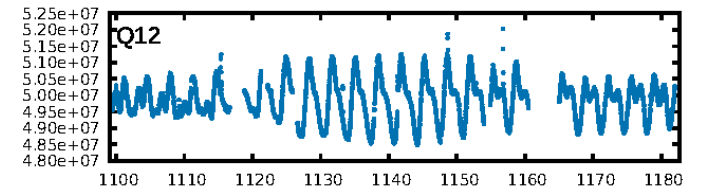
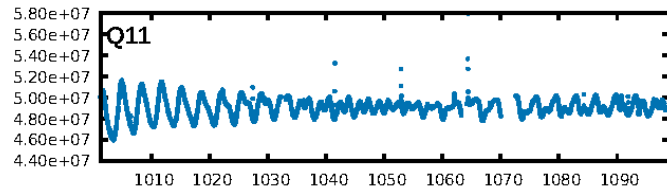
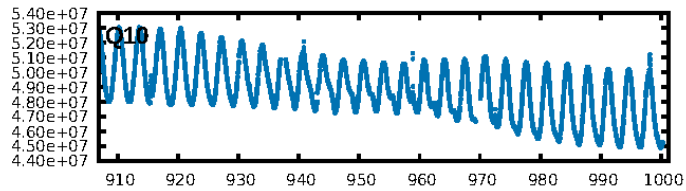
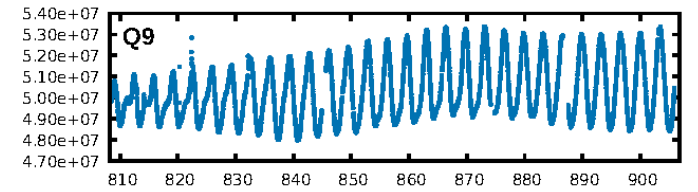
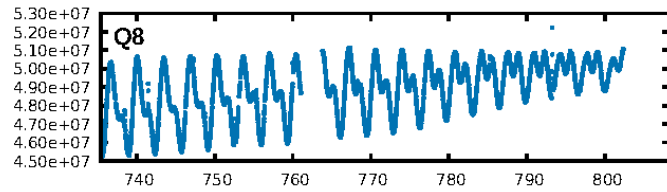
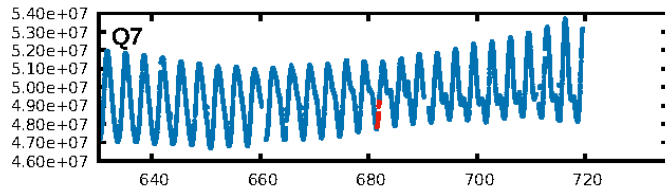
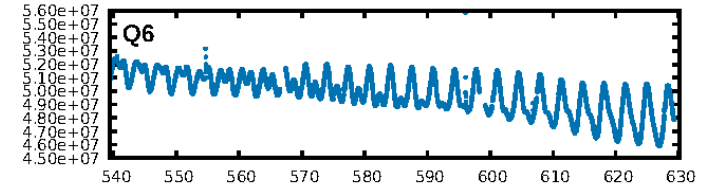
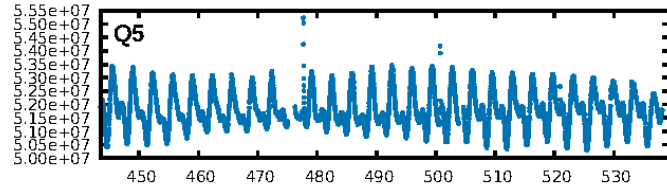
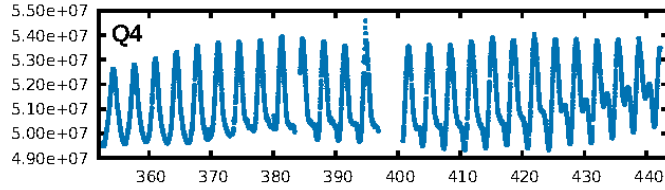
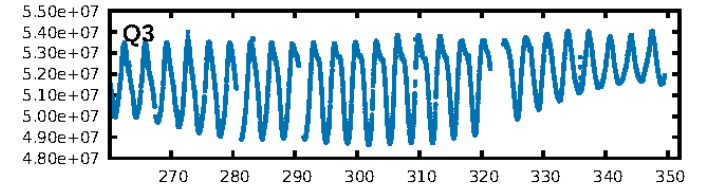
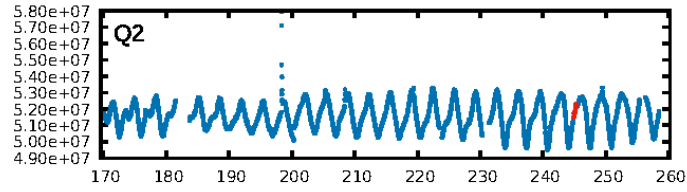
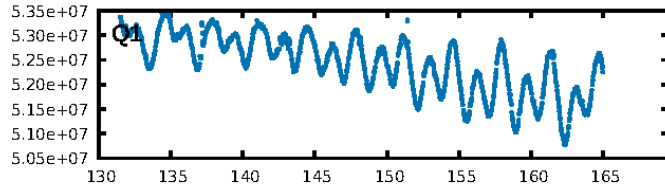
ShortPeriod-sig: 100.0% [16.67 $\sigma$ ]  
LongPeriod-sig: 100.0% [227.56 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.553

Centroid-sig: 20.5%  
Centroid-so: 0.707 arcsec [1.12 $\sigma$ ]  
OotOffset-rm: 0.255 arcsec [0.27 $\sigma$ ]  
KicOffset-rm: 1.105 arcsec [1.60 $\sigma$ ]  
OotOffset-st: 1/1/1/0 [3]  
KicOffset-st: 1/1/1/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

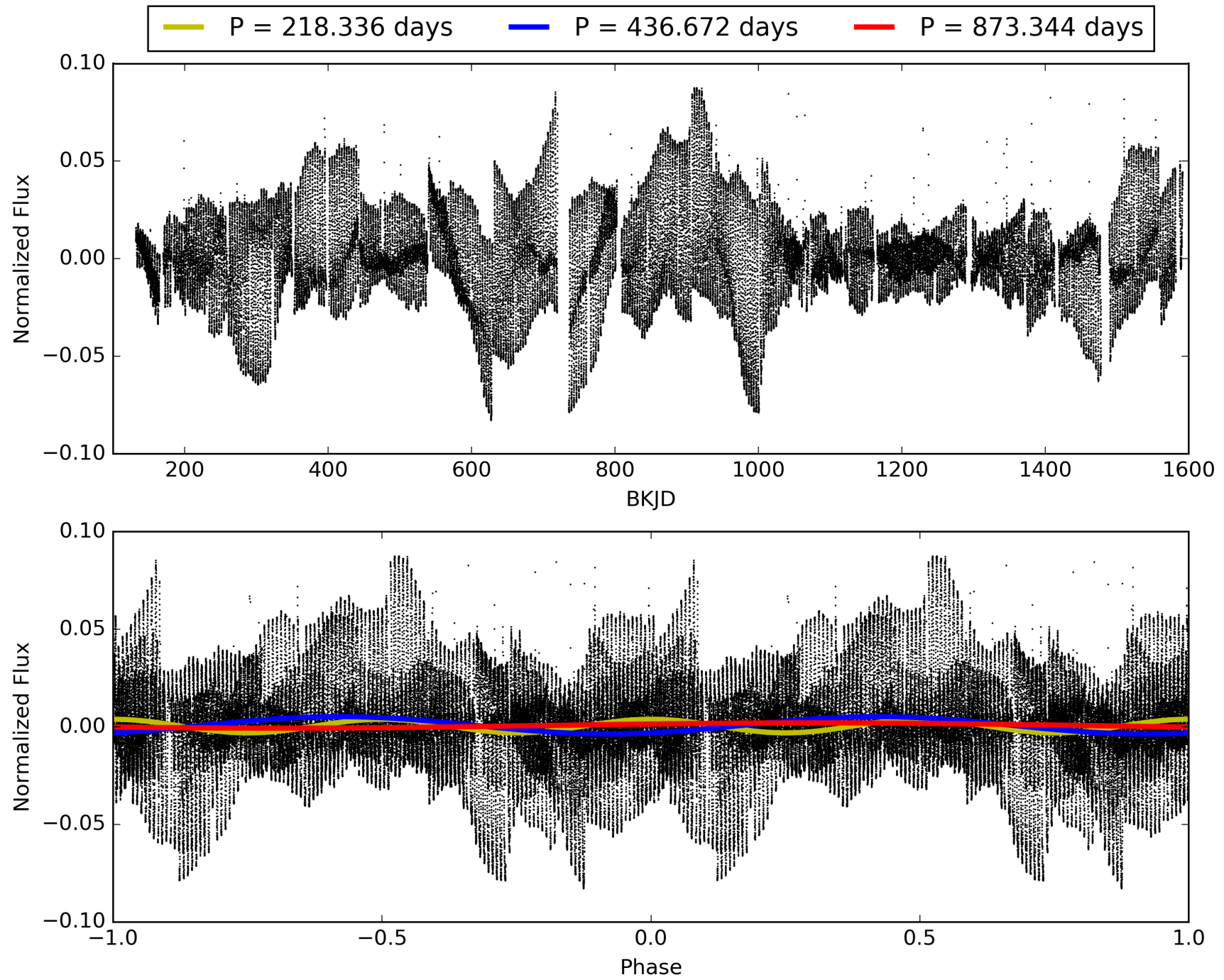
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:14:18 Z

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

# TCE 008873450-07, PDC Light Curves

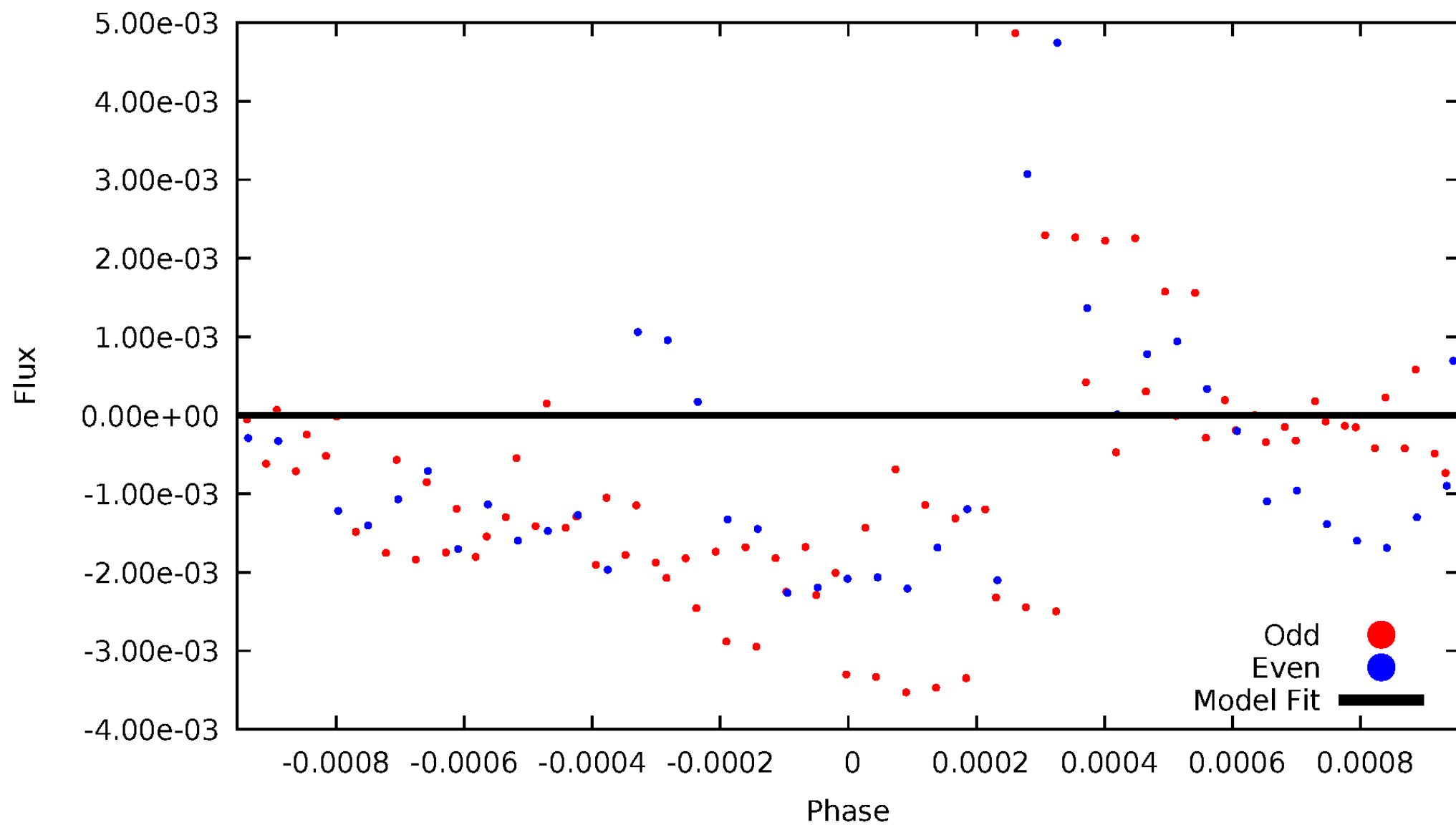


TCE 008873450-07



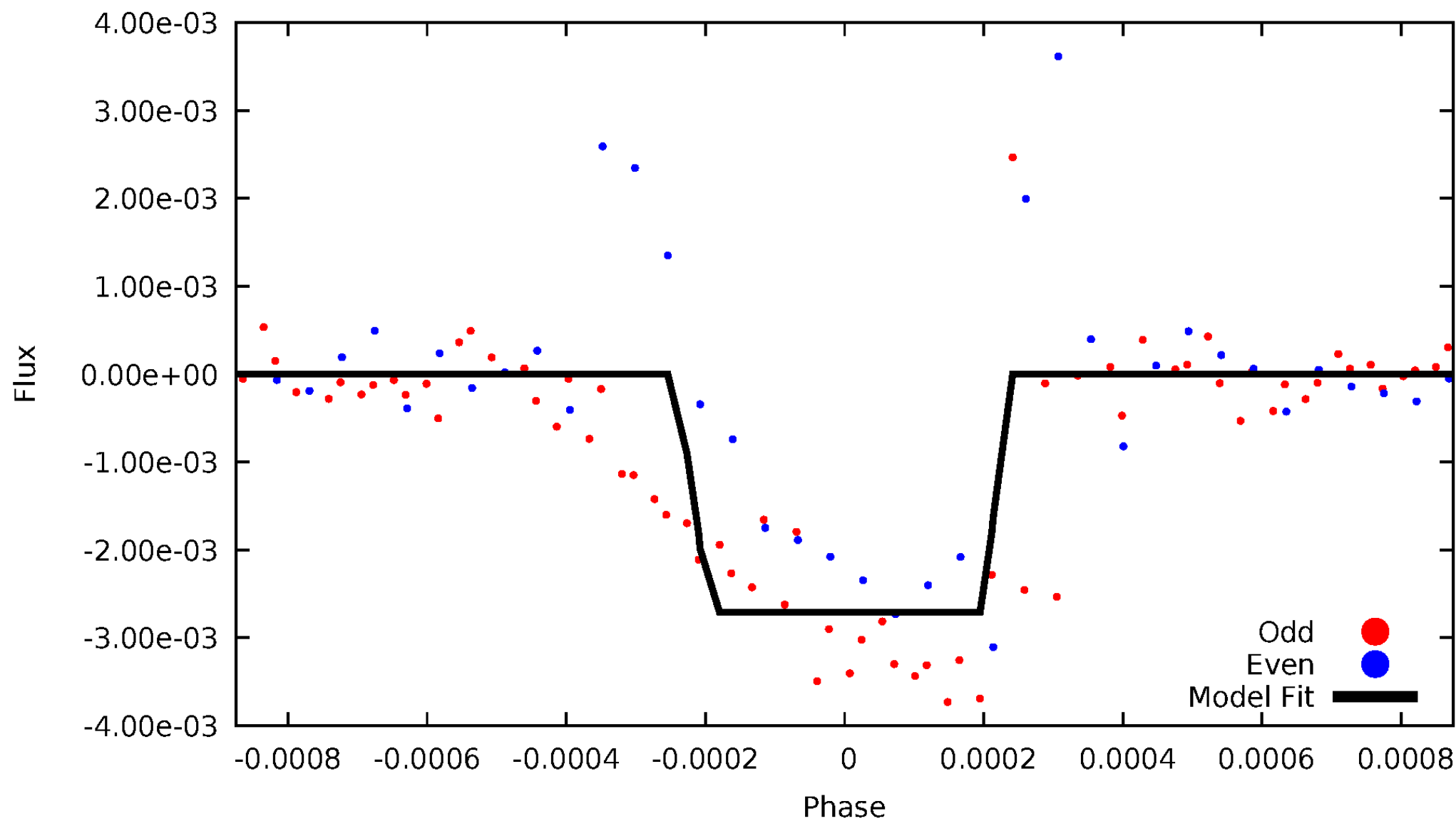
# DV Odd/Even

TCE 008873450-07

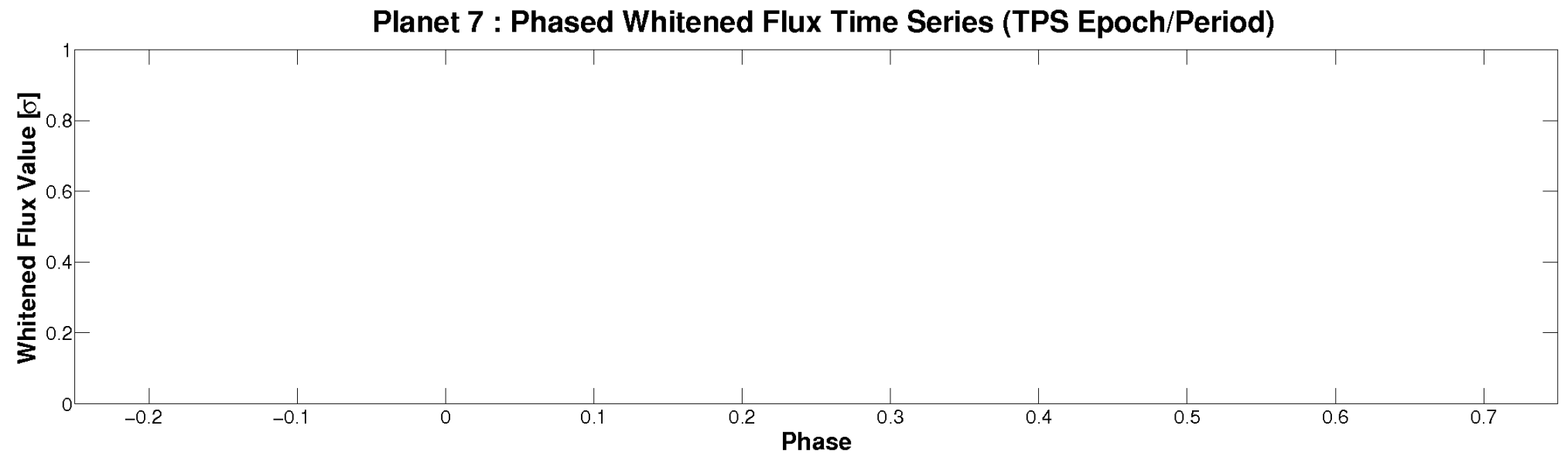
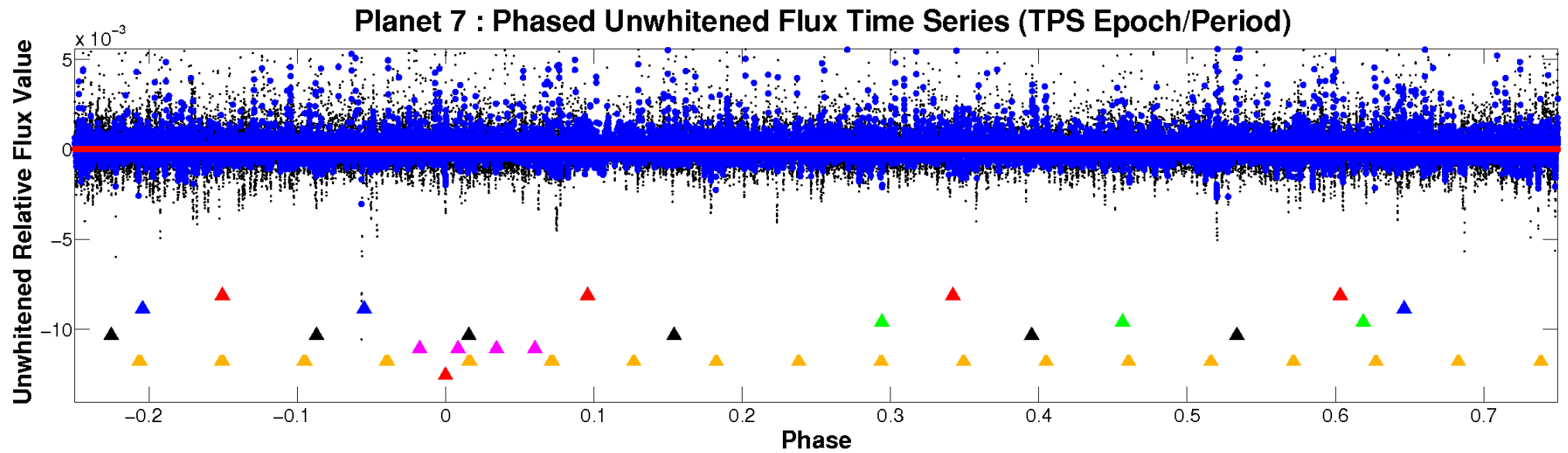


# ALT Odd/Even

TCE 008873450-07

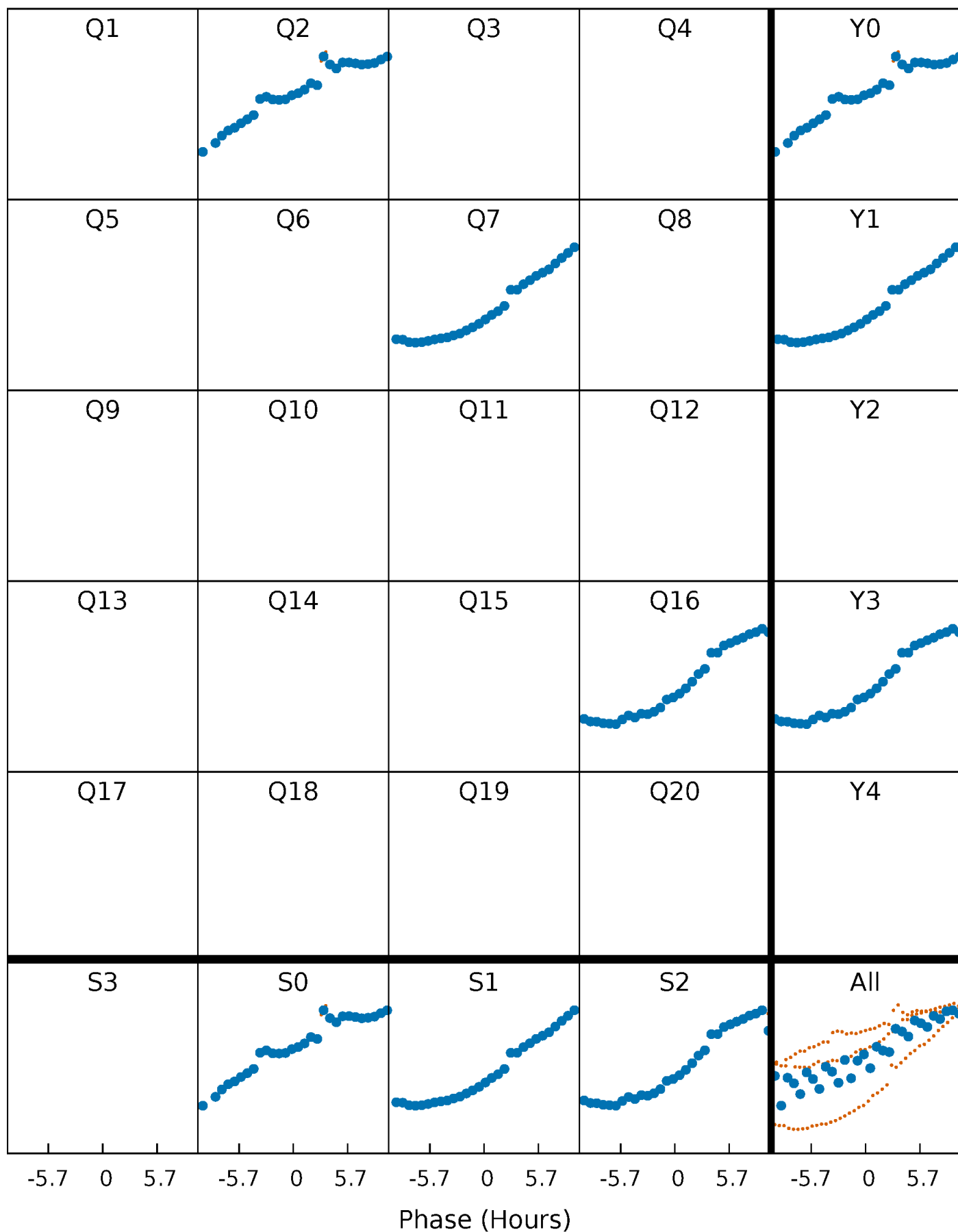


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

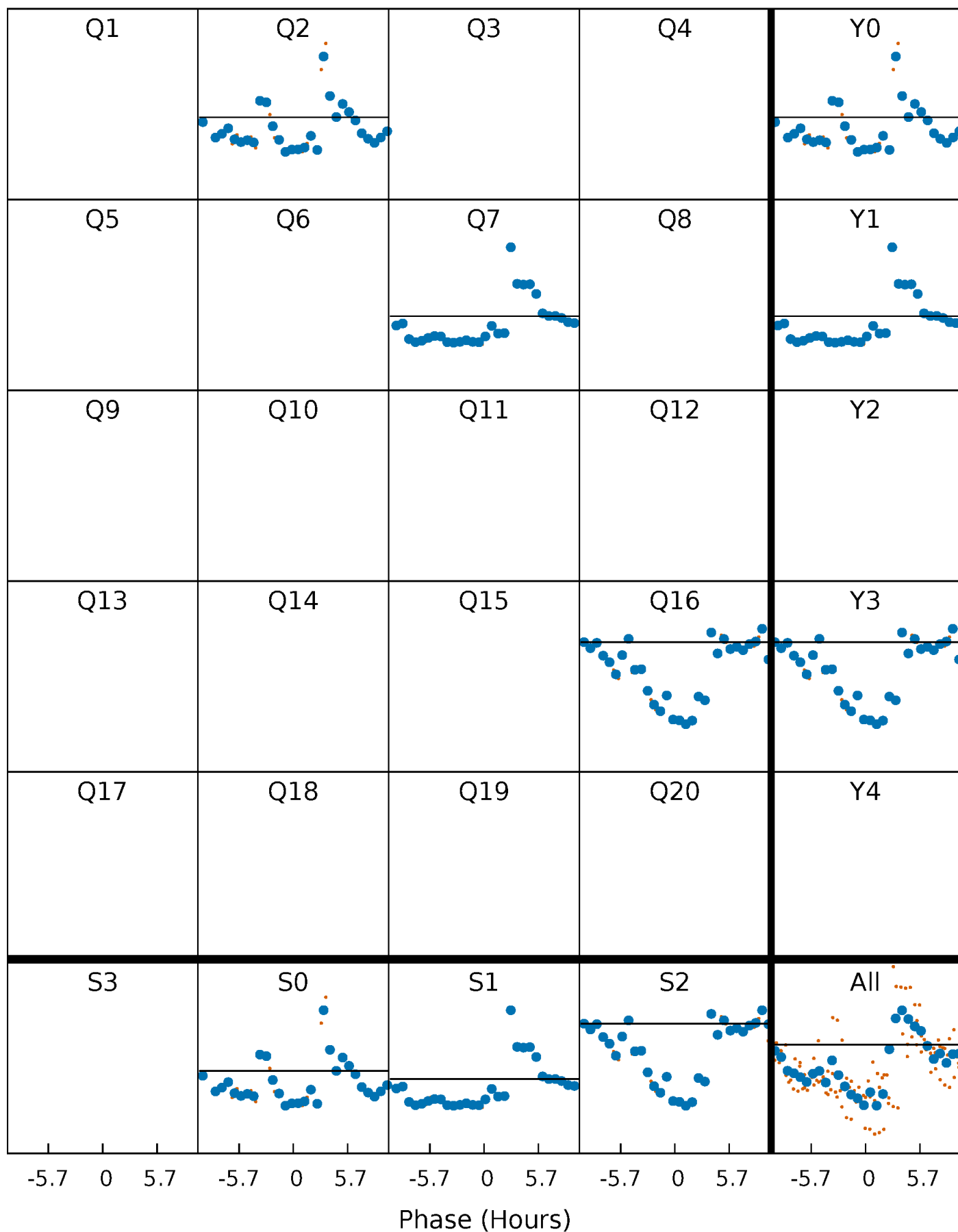
TCE 008873450-07     $P=436.671988$  Days     $T_0=245.084126$  (BKJD)





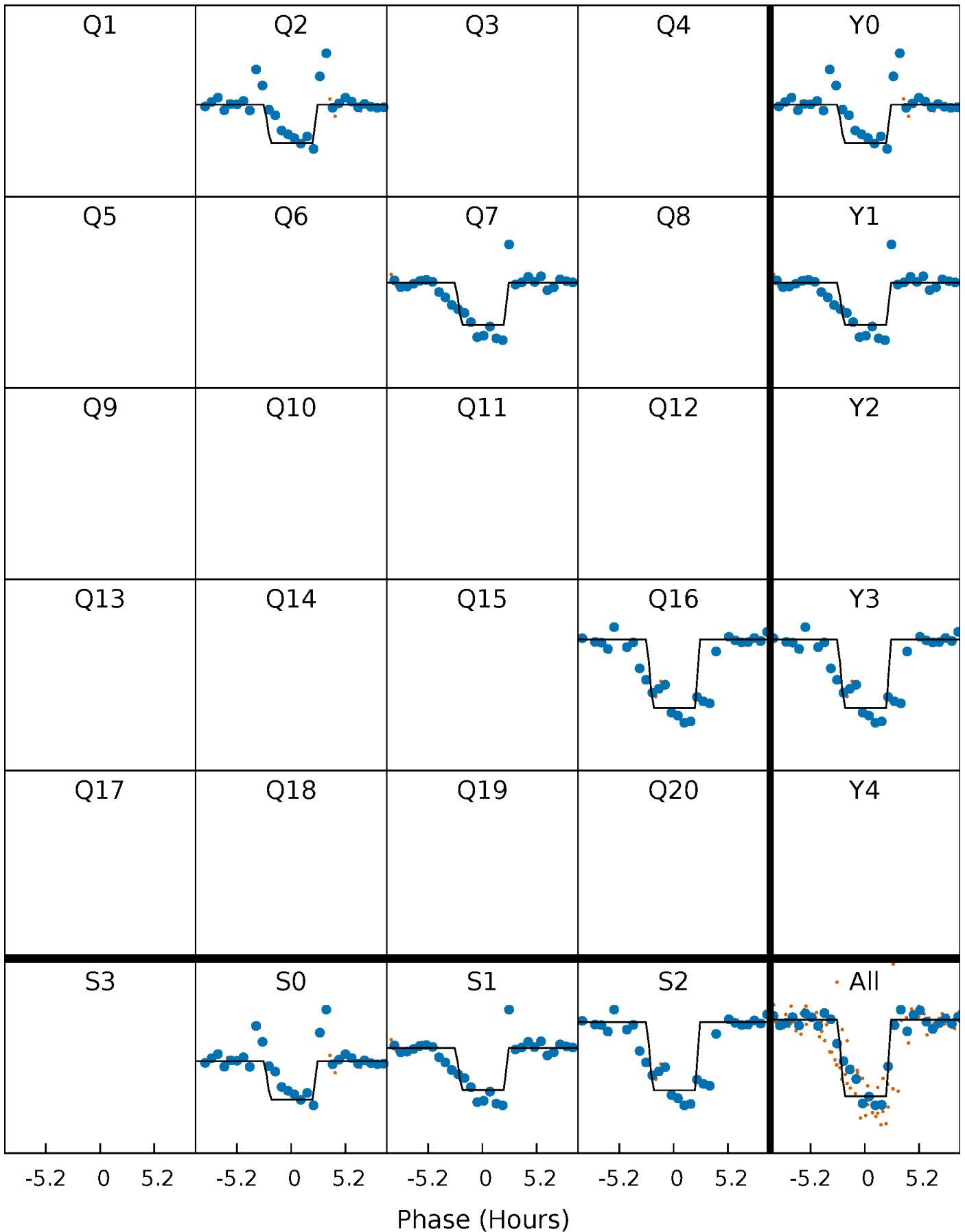
# DV Quarter-Phased Transit Curves

TCE 008873450-07     $P=436.671988$  Days     $T_0=245.084126$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

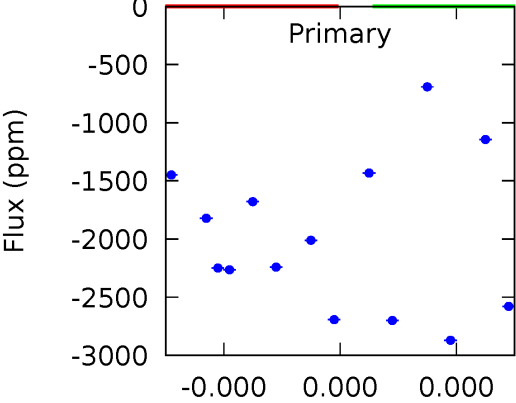
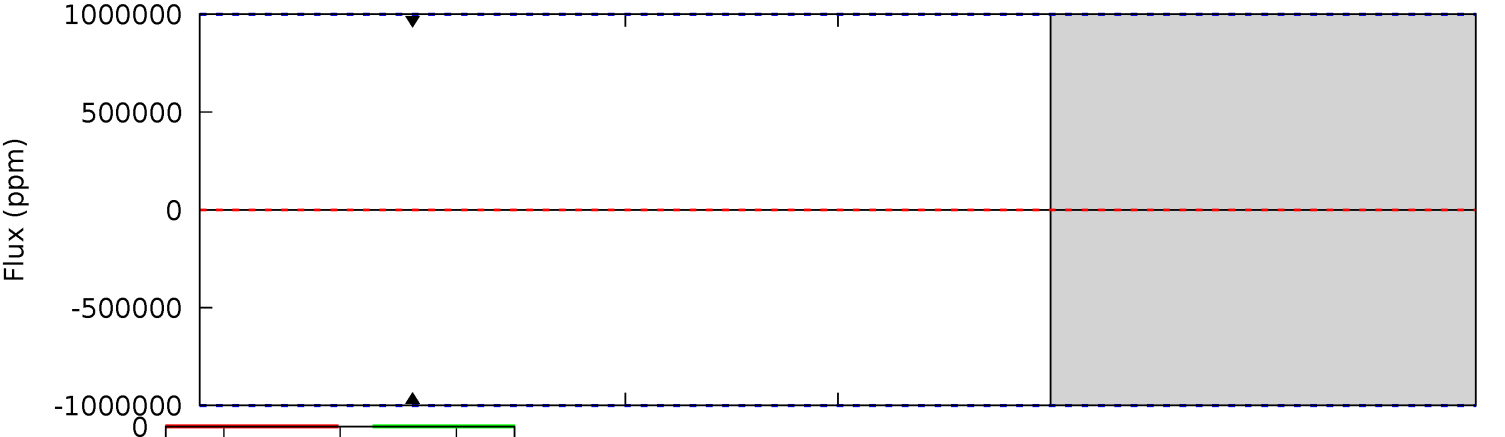
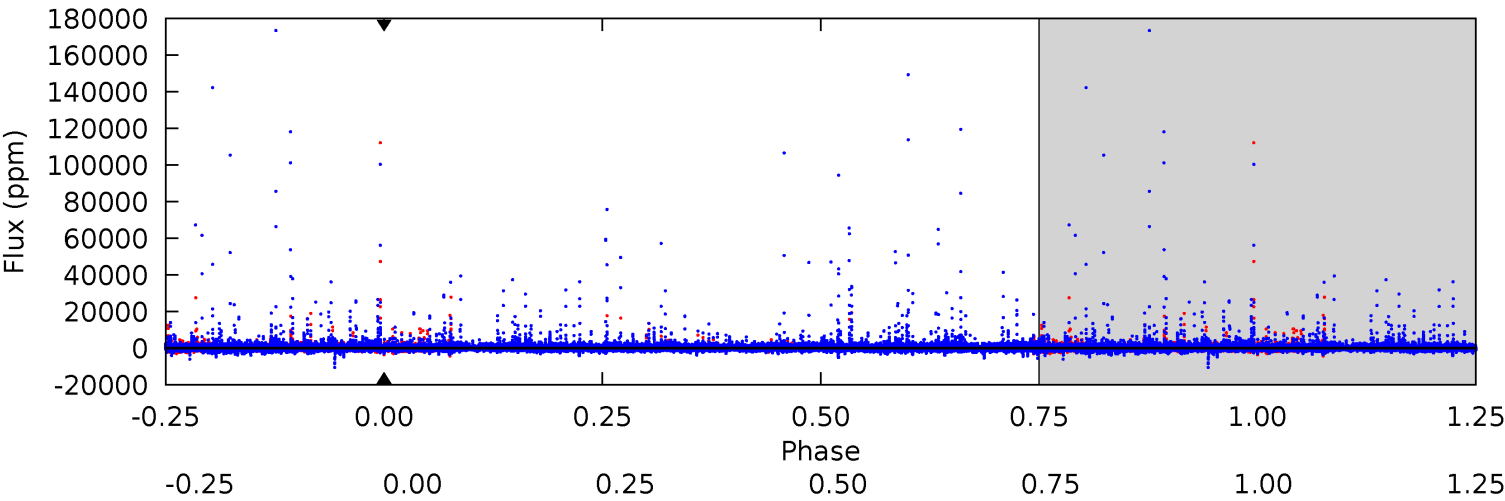
TCE 008873450-07 P=436.671988 Days  $T_0=245.092474$  (BKJD)



DV Model-Shift Uniqueness Test

008873450-07, P = 436.671988 Days, E = 245.084126 Days

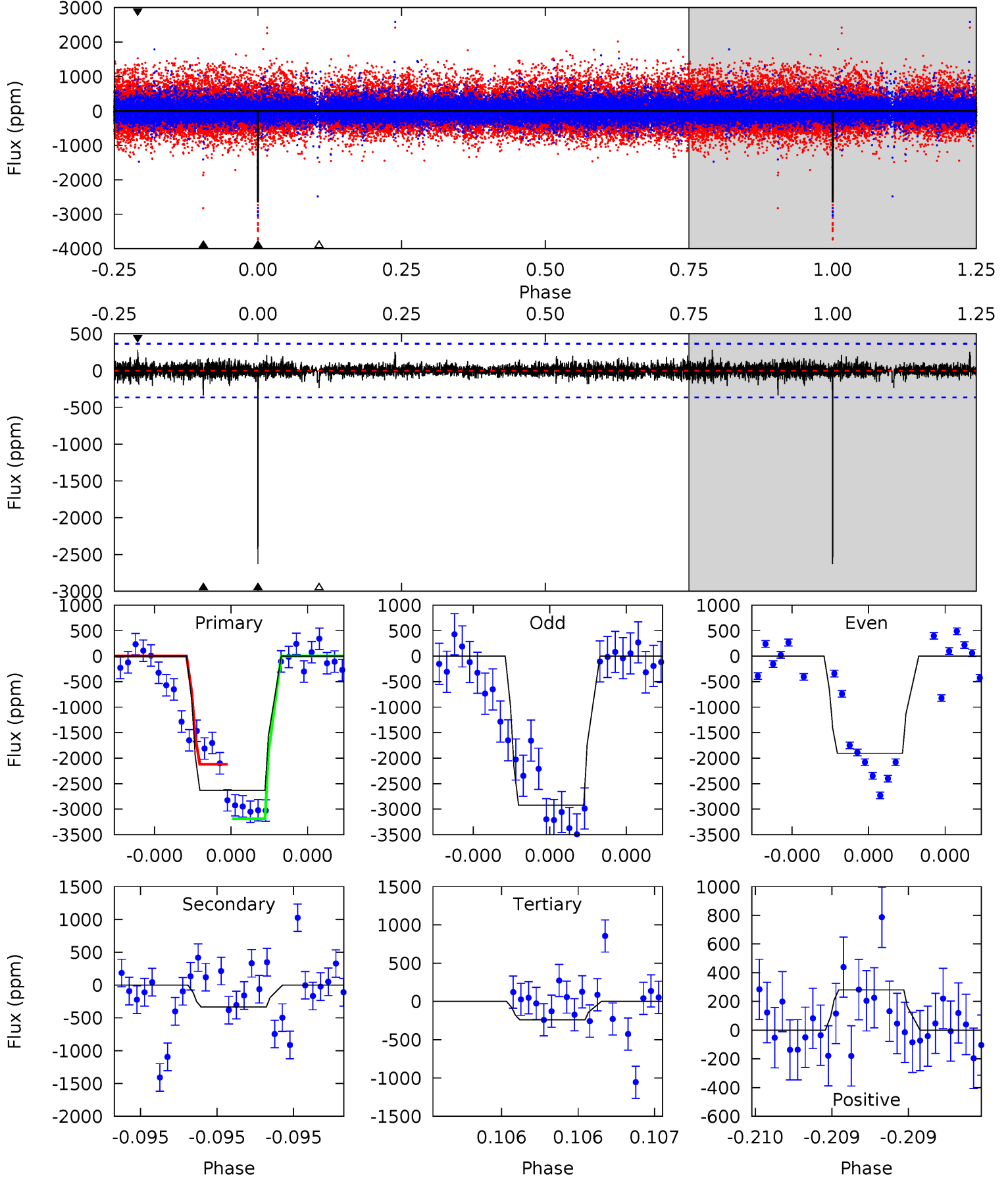
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

008873450-07, P = 436.671988 Days, E = 245.092474 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
40.3	5.14	3.66	4.30	5.60	3.51	0.71	36.6	36.0	1.48	0.84	6.70	0.95	0.10	8.09



### Stellar Parameters For KIC 008873450

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4450^{+132}_{-132}$	$4.583^{+0.056}_{-0.020}$	$0.140^{+0.250}_{-0.300}$	$0.707^{+0.029}_{-0.059}$	$0.698^{+0.054}_{-0.054}$	$2.780^{+0.684}_{-0.220}$
	+3%/-3%	+1%/-0%	+179%/-214%	+4%/-8%	+8%/-8%	+25%/-8%
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 008873450-07 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$5.90^{+5.70}_{-4.13}$	$230^{+7}_{-8}$	$3458^{+8165}_{-14459}$	$20283^{+2840486}_{-2739567}$
Alt.	$-335 \pm 65$	$7.11^{+6.77}_{-4.60}$	$229^{+8}_{-8}$	$2669^{+883}_{-404}$	$3553^{+23869}_{-2599}$

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

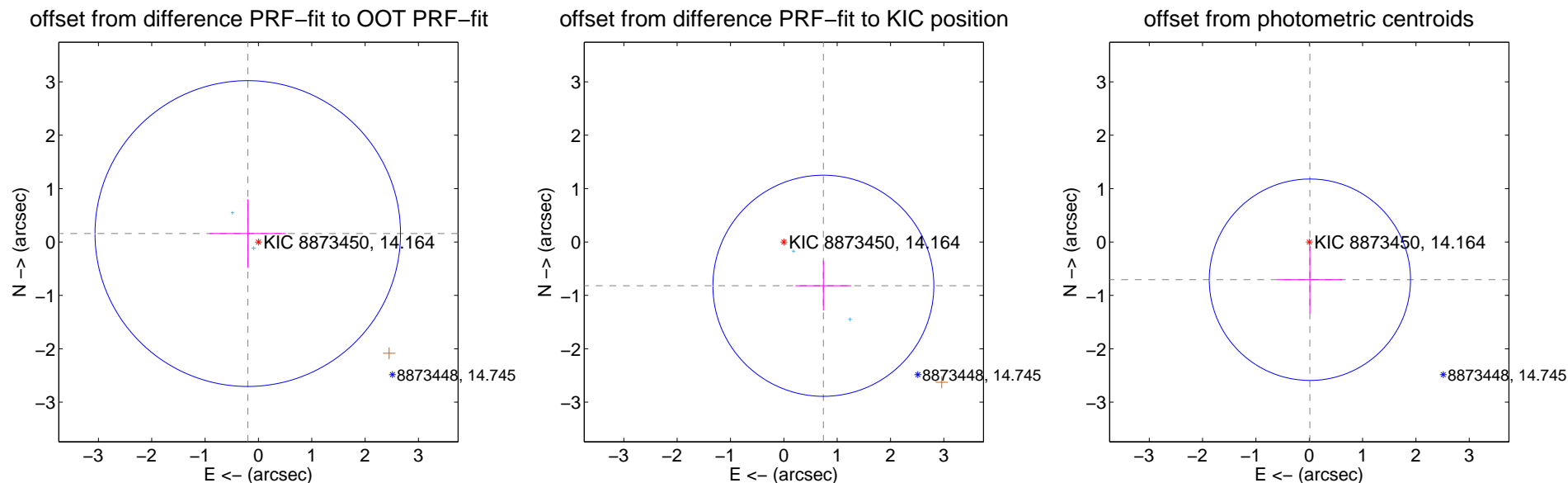
## DV Centroid Data

Supplemental centroid analysis for 008873450-07. Kepler magnitude: 14.16. Transit SNR -1.00

There are 2 quarters with good PRF difference image offsets

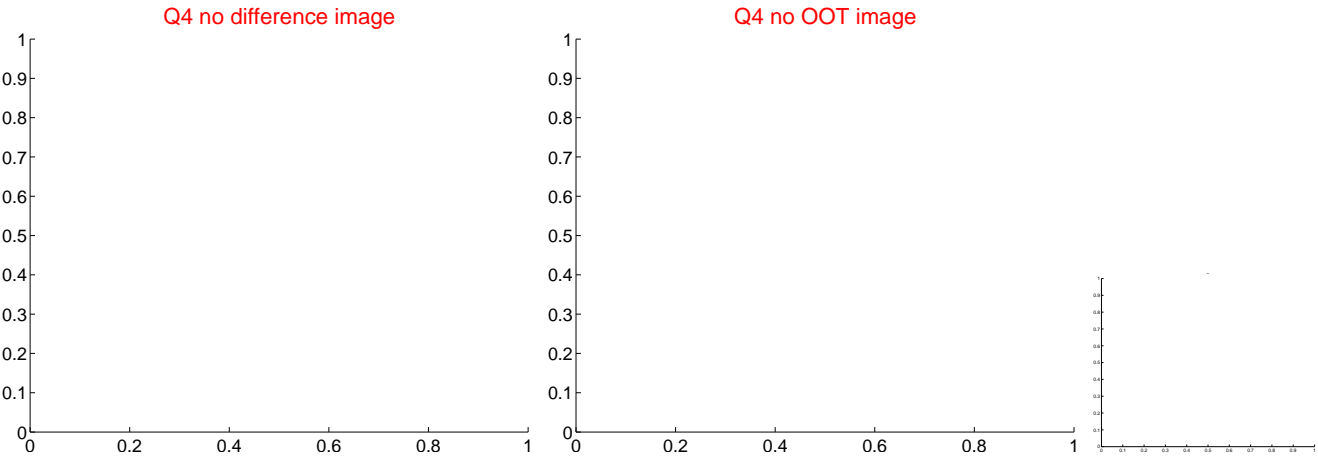
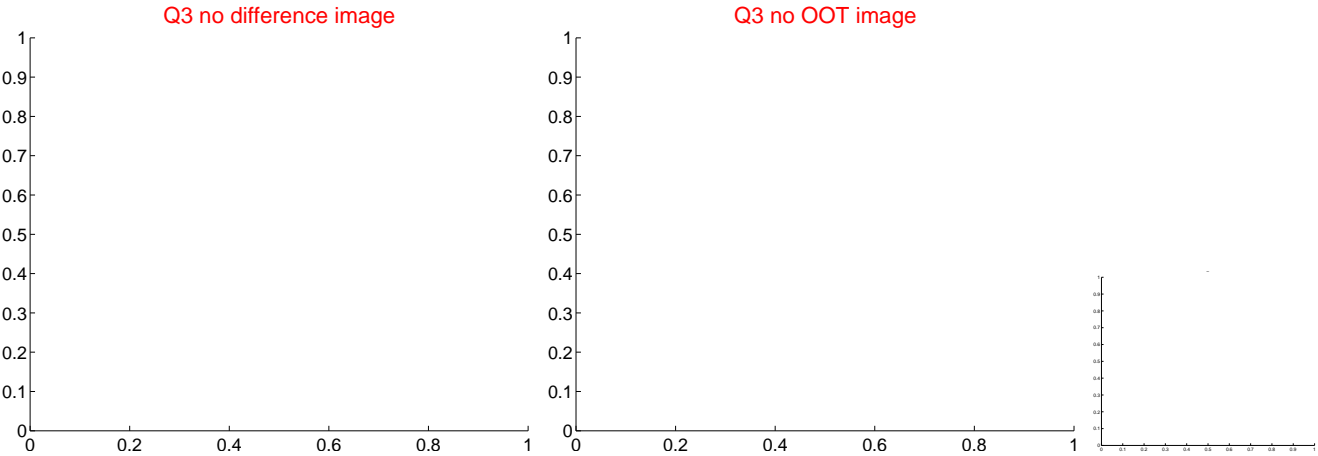
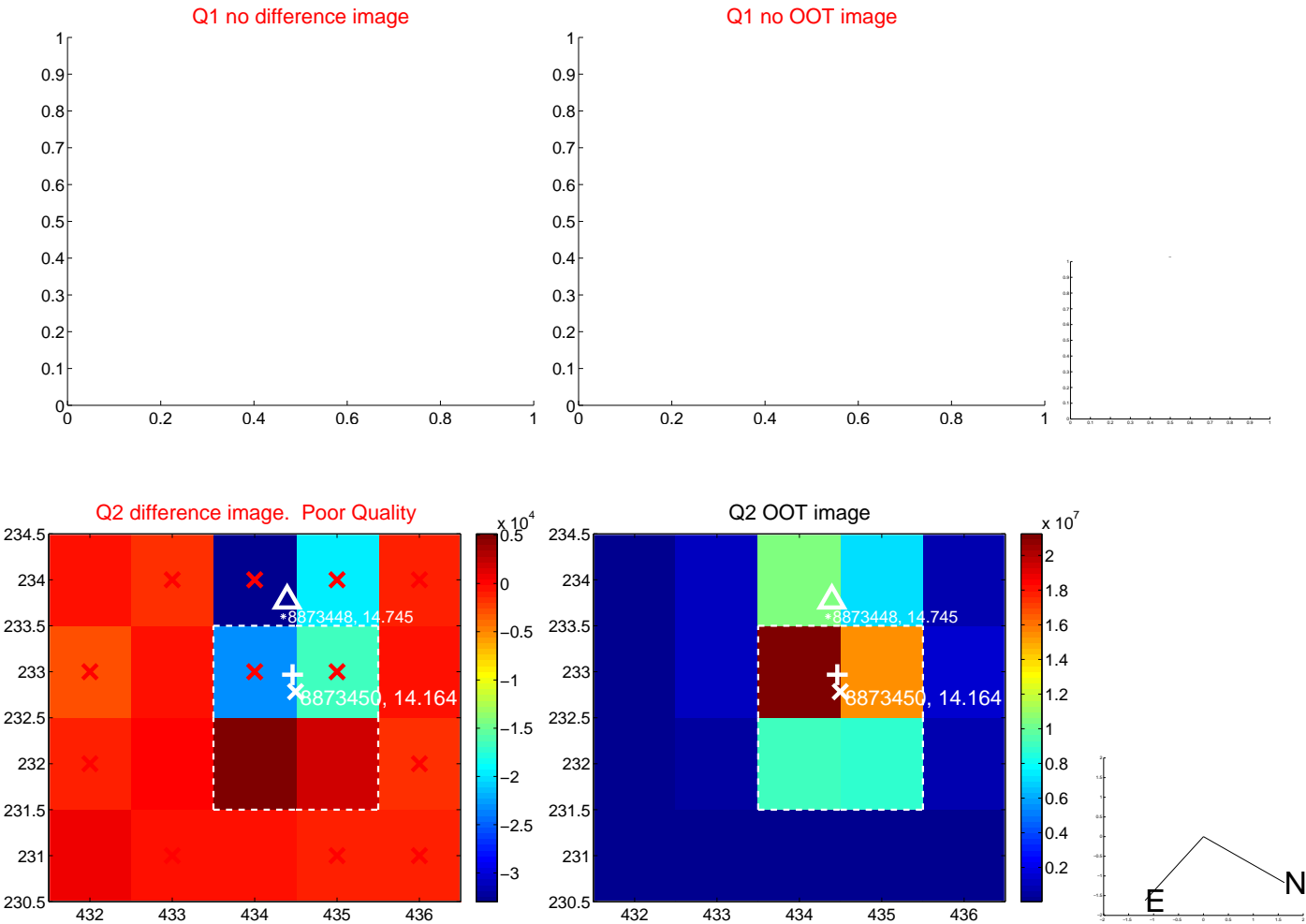
The direct PRF centroid is offset from the target star catalog position by about 1.88 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.255 \pm 0.955$	0.27	$0.200 \pm 0.713$	$0.158 \pm 0.643$
PRF-fit source offset from KIC position	$1.105 \pm 0.690$	1.60	$-0.741 \pm 0.524$	$-0.820 \pm 0.462$
photometric centroid source offset	$0.71 \pm 0.63$	1.12	$-0.01 \pm 0.61$	$-0.71 \pm 0.63$

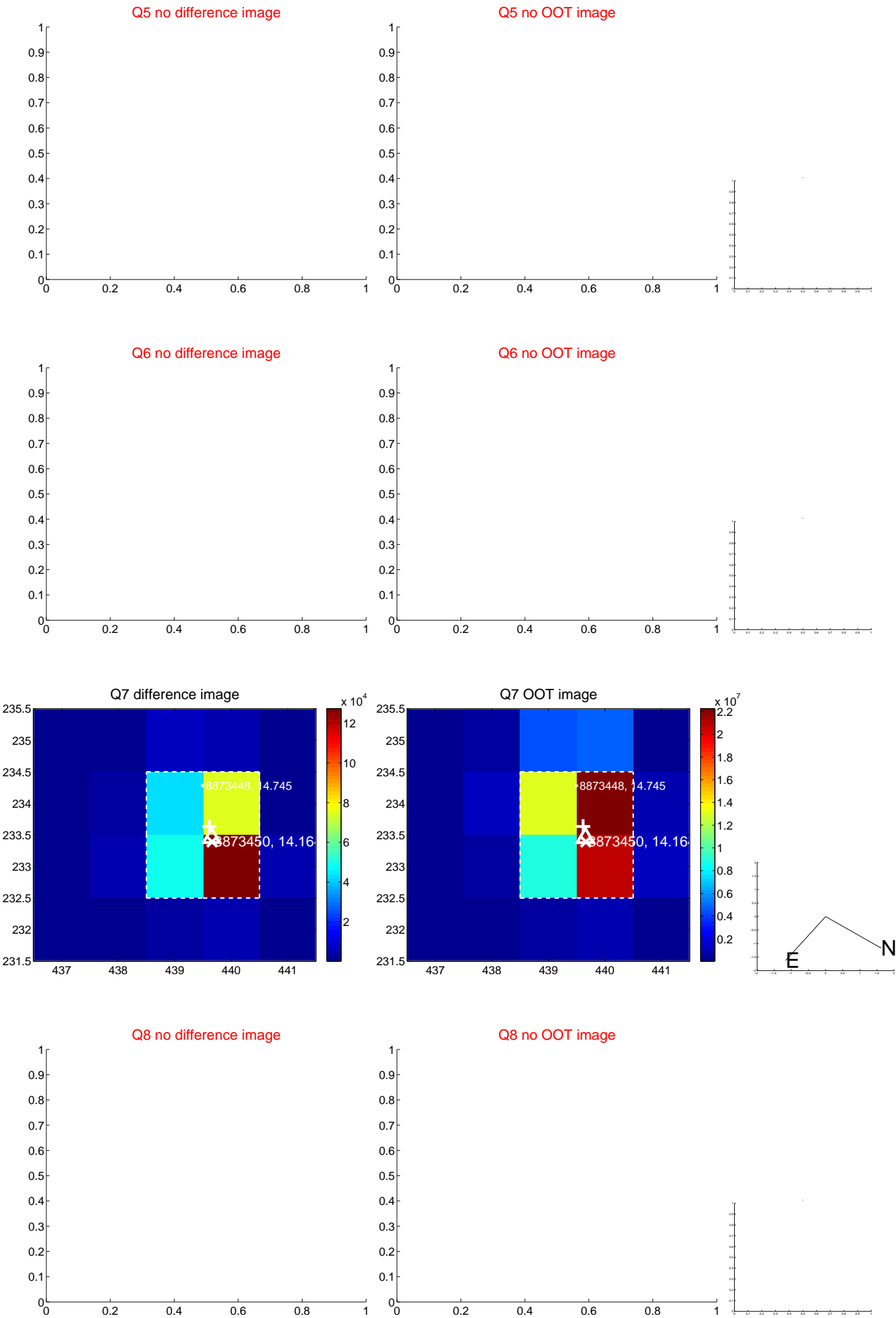


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

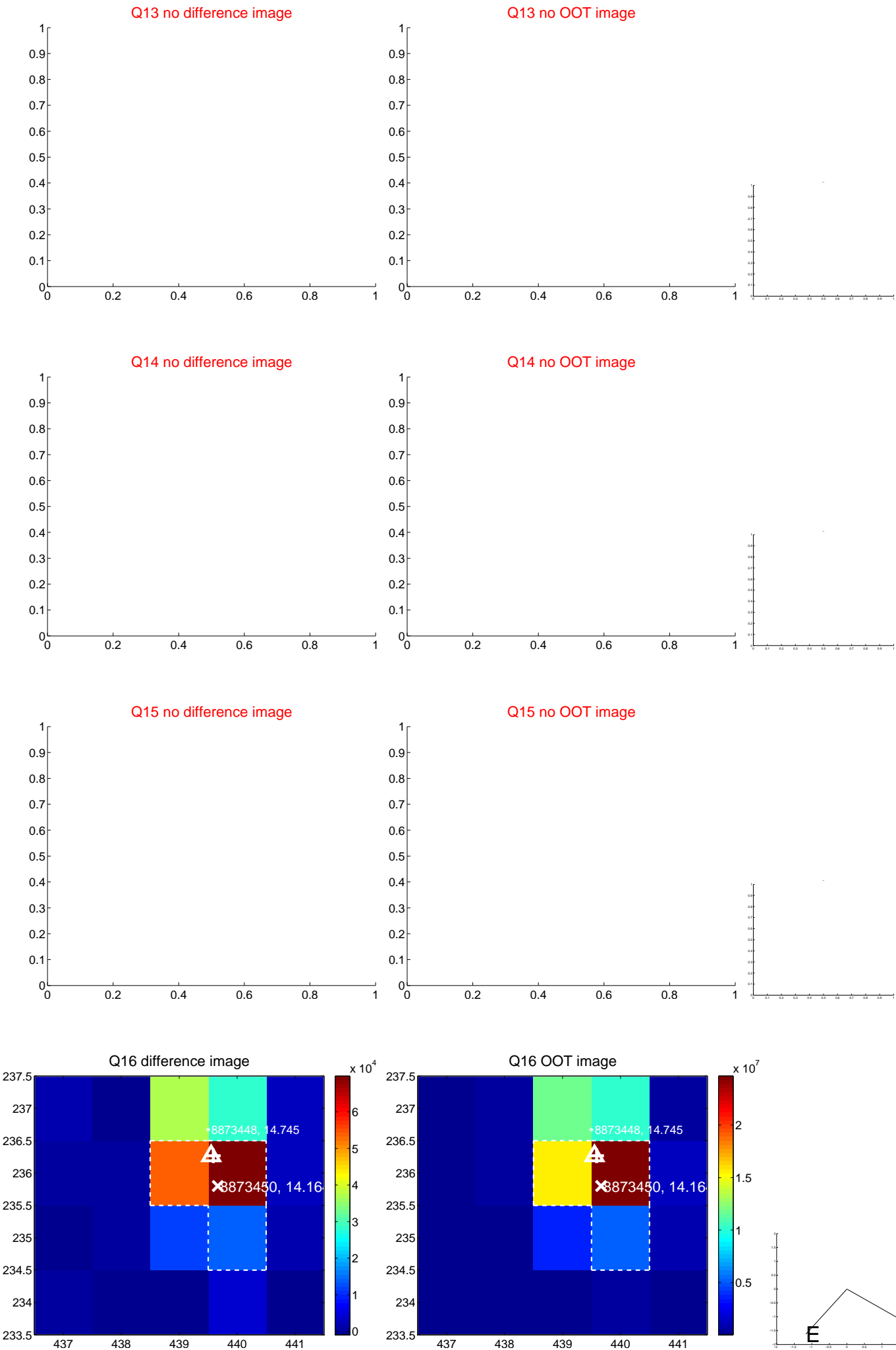




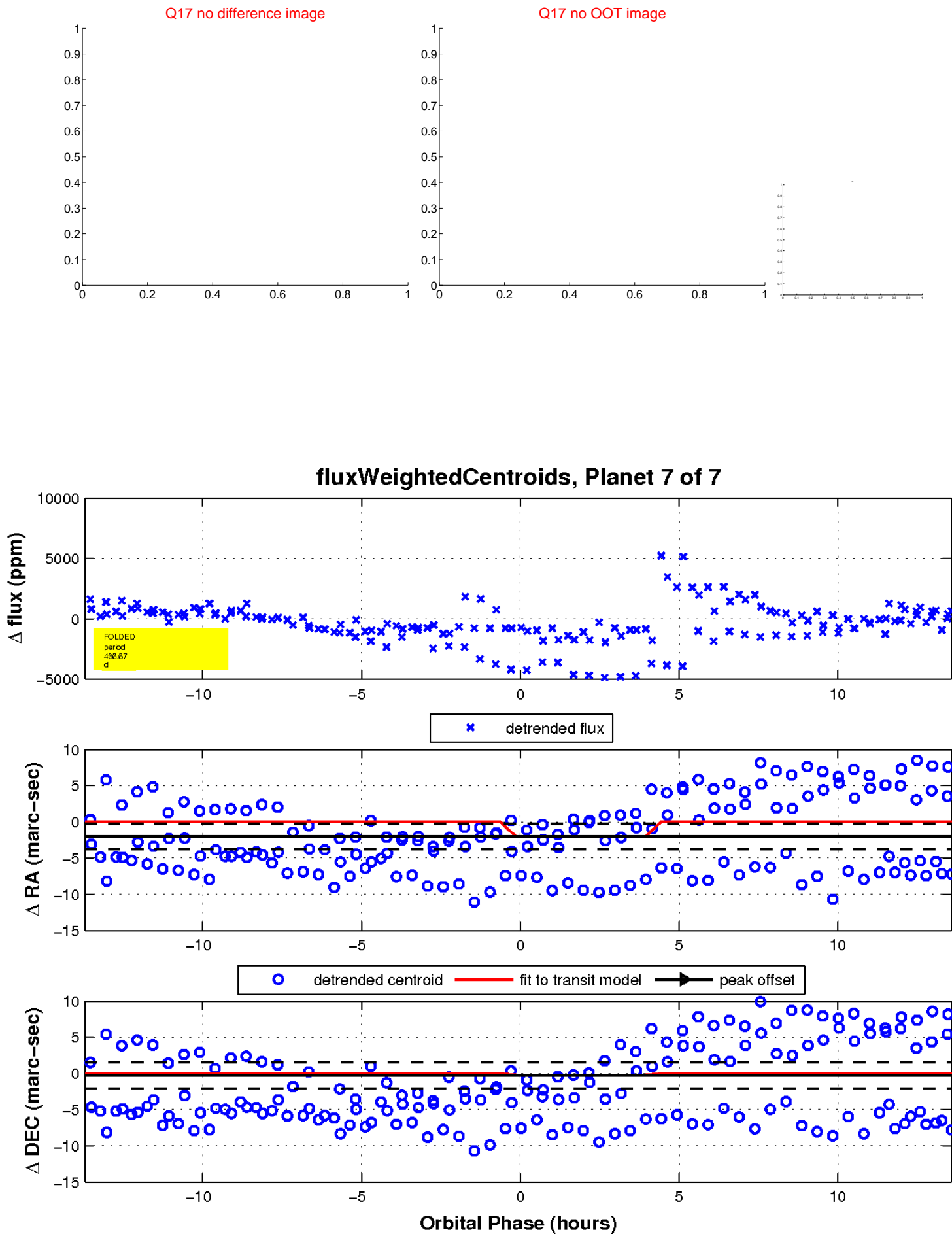
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white ×: 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.



UKIRT Image

Declination

