

# KIC 005438845

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005438845-01	OBS	No	282.880082	137.417322	641.5	17.903	41.9	9.3	0.63	5237	3.14	0.51
005438845-02	OBS	No	387.032099	318.836850	3988.1	55.320	16.4	20.7	0.63	5237	7.38	0.34

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005438845-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV— INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
005438845-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

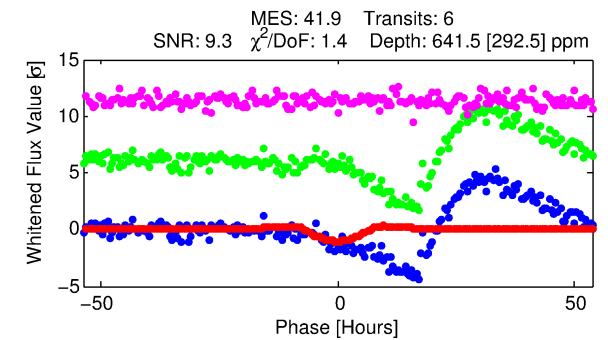
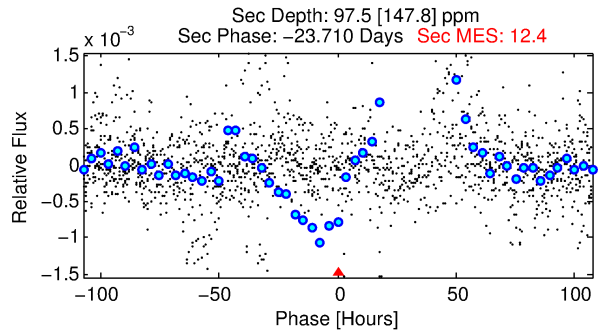
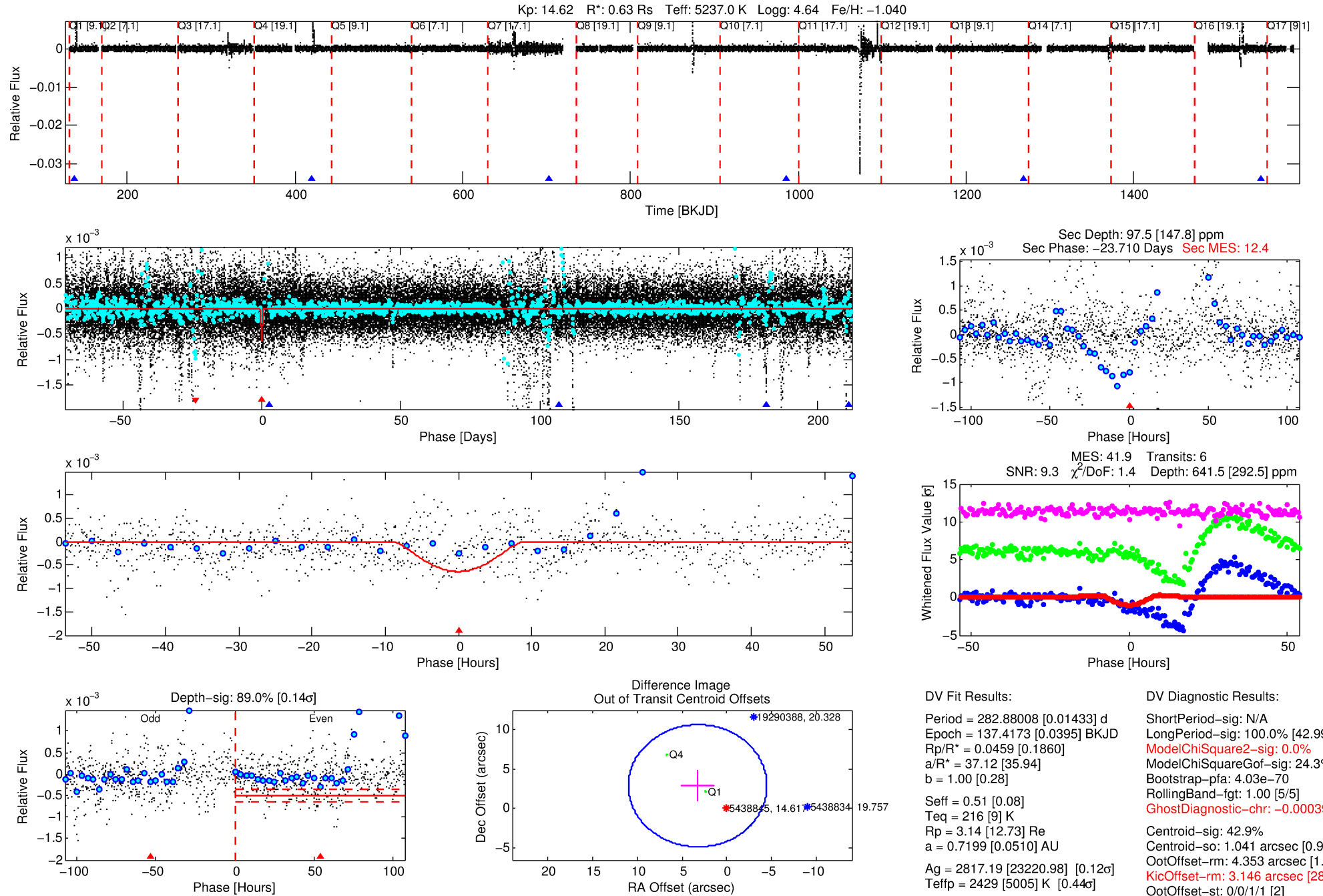
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005438845-01

No Significant Match Found

# DV One-Page Summary

KIC: 5438845 Candidate: 1 of 2 Period: 282.880 d



## DV Fit Results:

Period = 282.88008 [0.01433] d  
 Epoch = 137.4173 [0.0395] BKJD  
 Rp/R\* = 0.0459 [0.1860]  
 a/R\* = 37.12 [35.94]  
 b = 1.00 [0.28]  
 Seff = 0.51 [0.08]  
 Teq = 216 [9] K  
 Rp = 3.14 [12.73] Re  
 a = 0.7199 [0.0510] AU  
 Ag = 2817.19 [23220.98] [0.12σ]  
 Teffp = 2429 [5005] K [0.44σ]

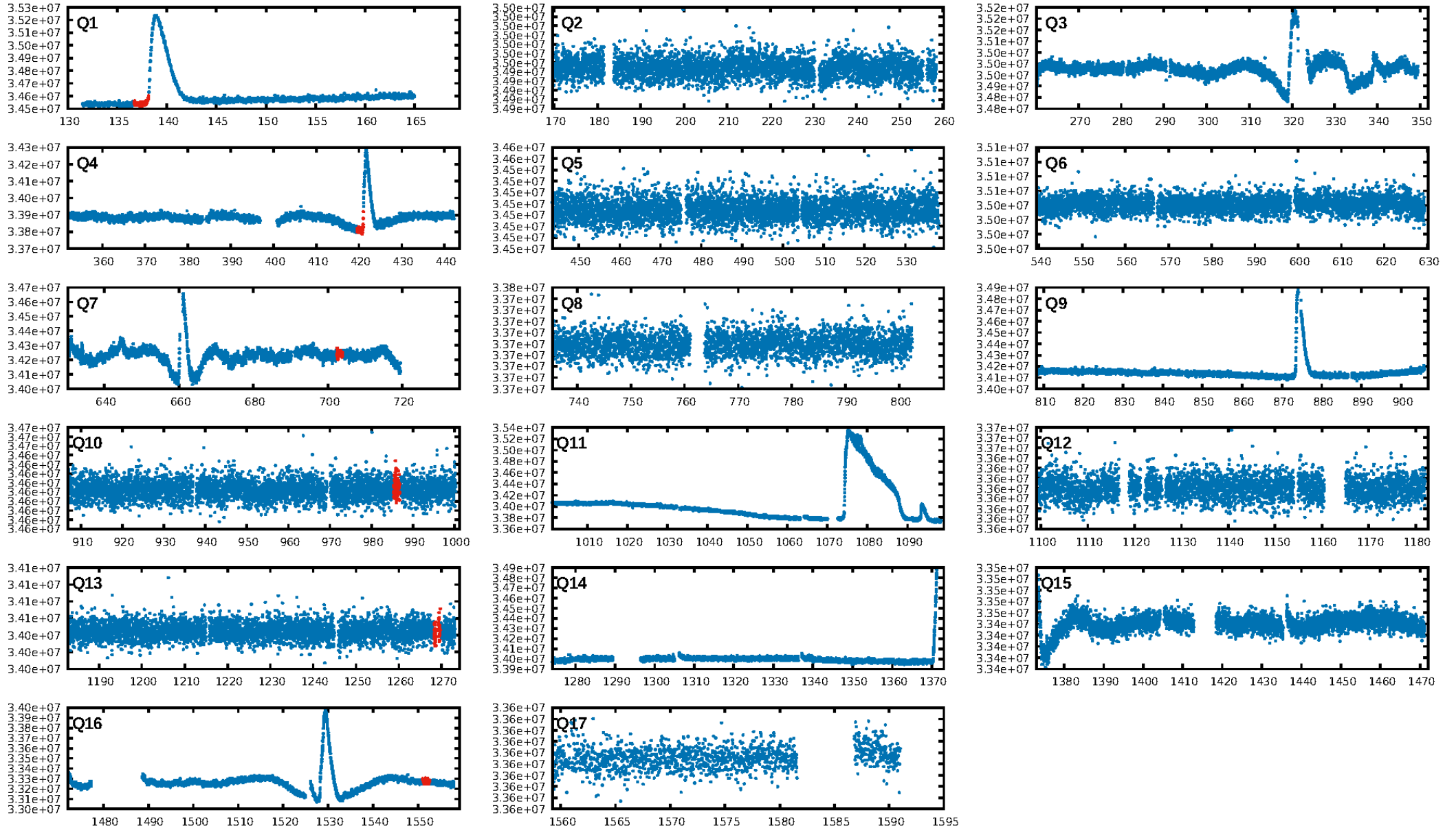
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
 LongPeriod-sig: 100.0% [42.99σ]  
 ModelChiSquare2-sig: 0.0%  
 ModelChiSquareGoF-sig: 24.3%  
 Bootstrap-pfa: 4.03e-70  
 RollingBand-fgt: 1.00 [5/5]  
 GhostDiagnostic-chr: -0.0003918  
 Centroid-sig: 42.9%  
 Centroid-so: 1.041 arcsec [0.91σ]  
 OotOffset-rm: 4.353 arcsec [1.69σ]  
 OotOffset-st: 0/0/1/1 [2]  
 KicOffset-rm: 3.146 arcsec [28.84σ]  
 KicOffset-st: 0/0/1/1 [2]  
 DiffImageQuality-fgm: 1.00 [2/2]  
 DiffImageOverlap-fno: 1.00 [5/5]

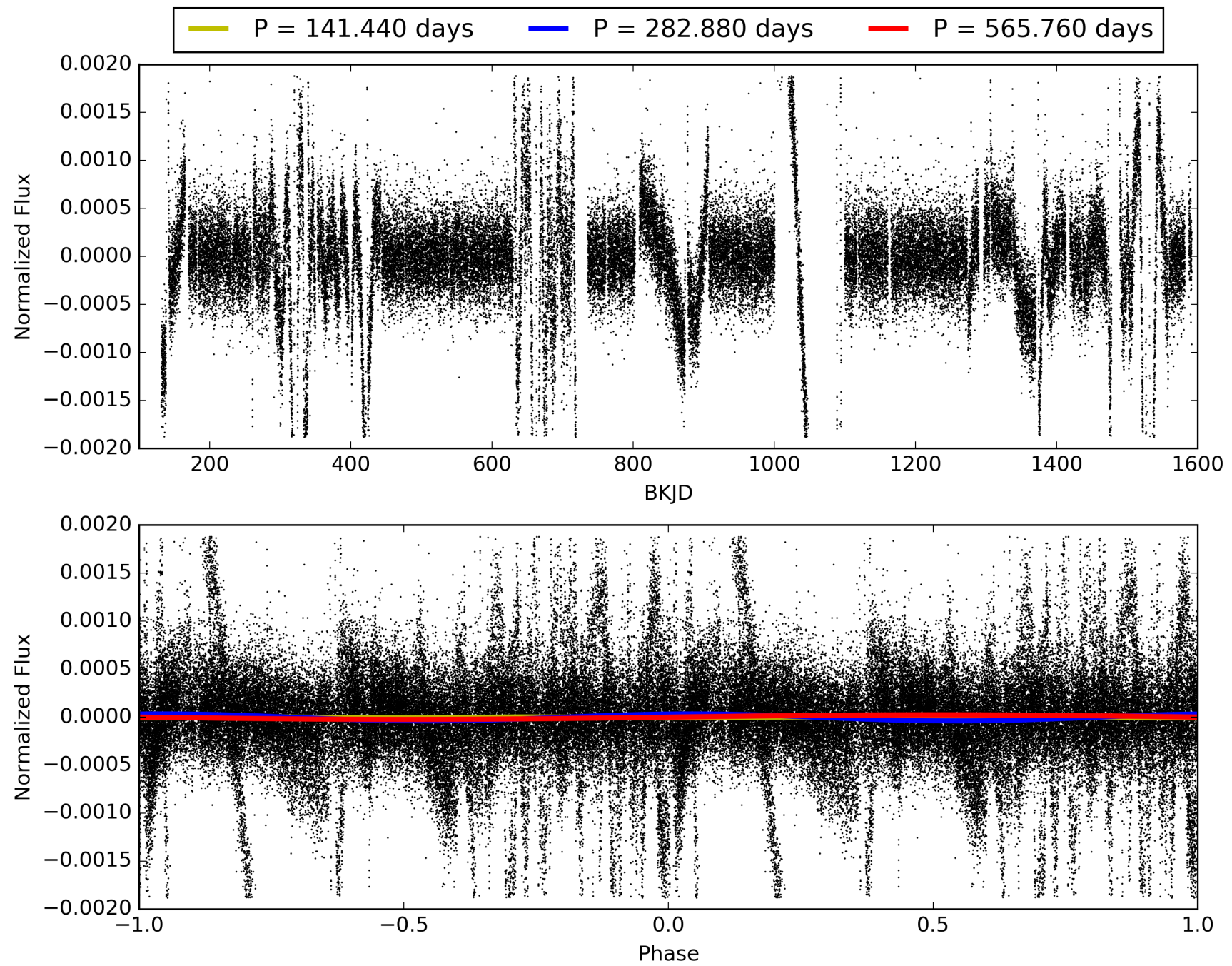
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 09:58:49 Z

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

# TCE 005438845-01, PDC Light Curves

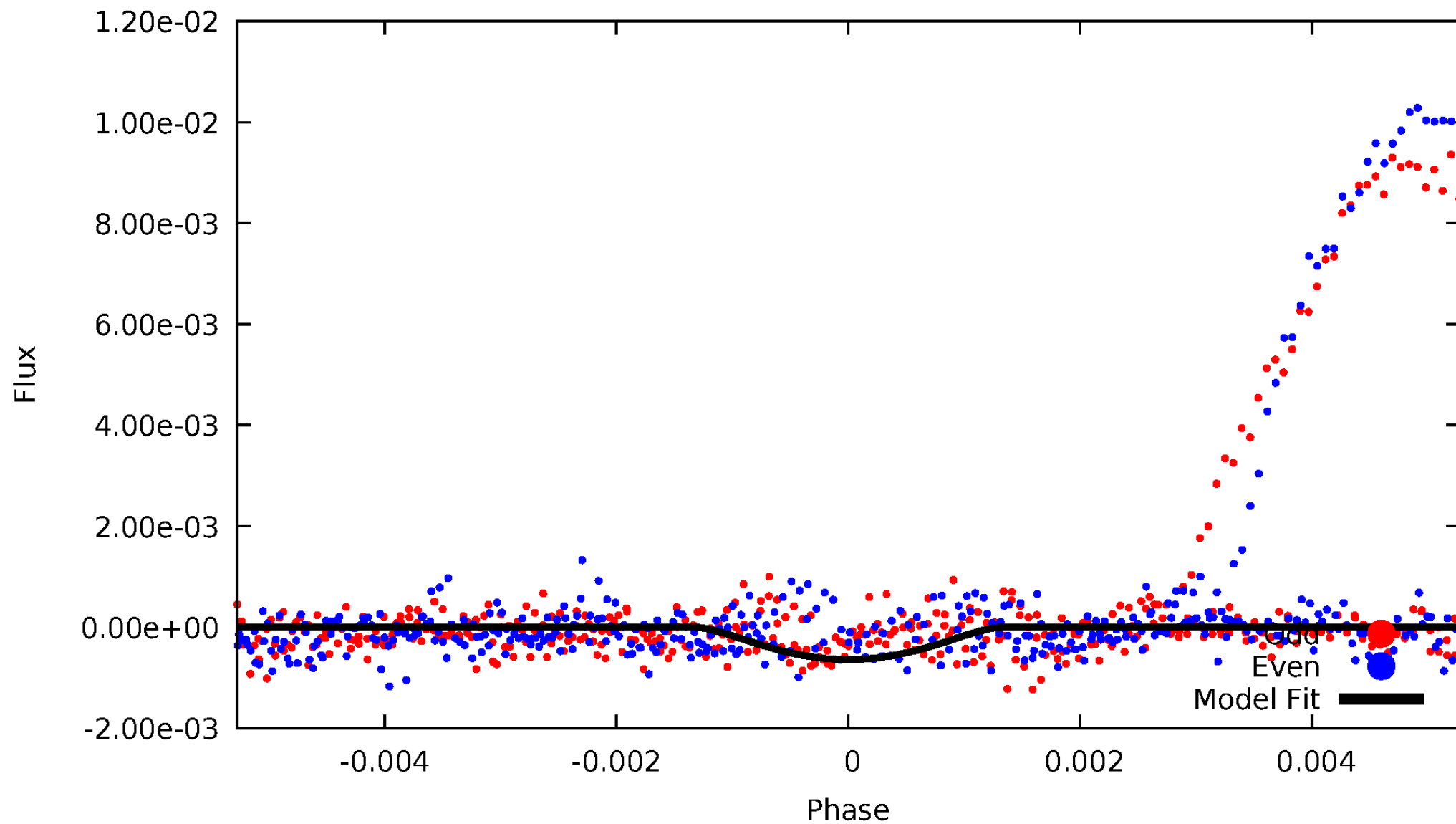


TCE 005438845-01



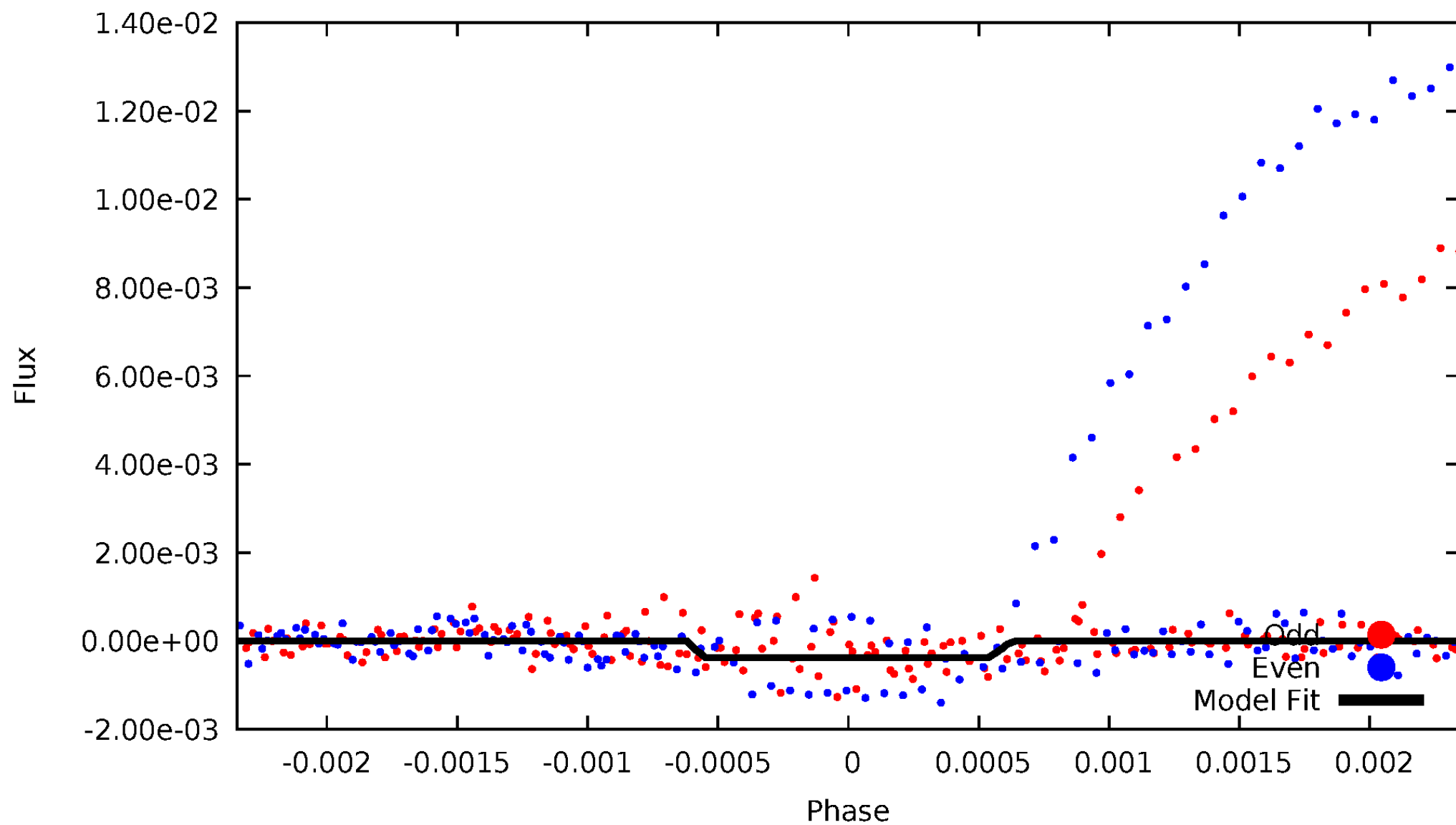
# DV Odd/Even

TCE 005438845-01

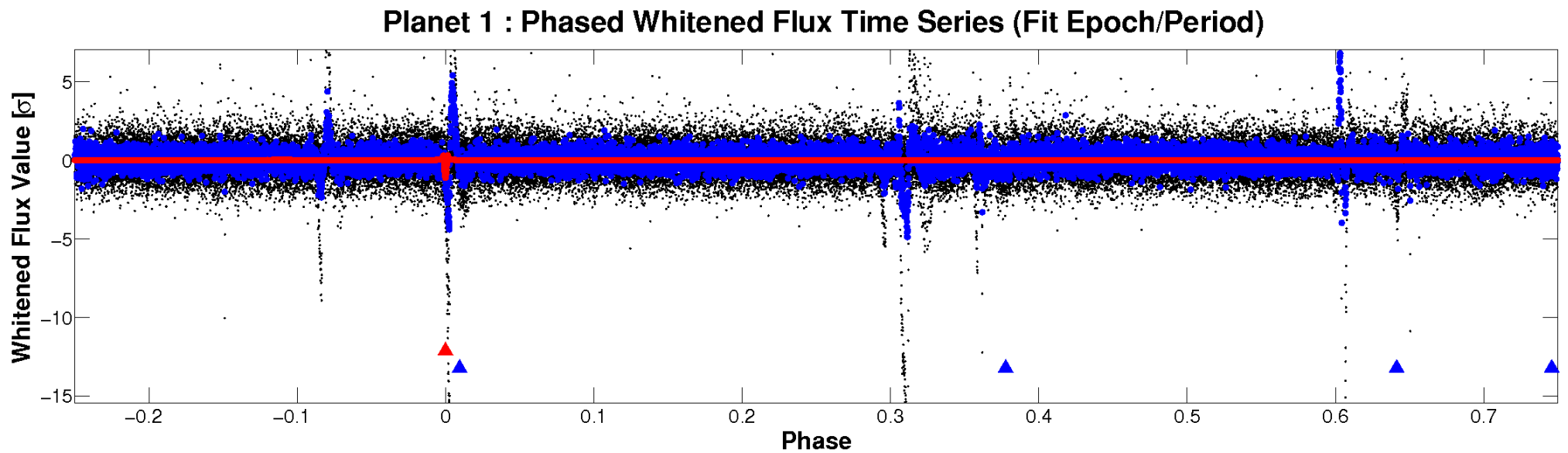
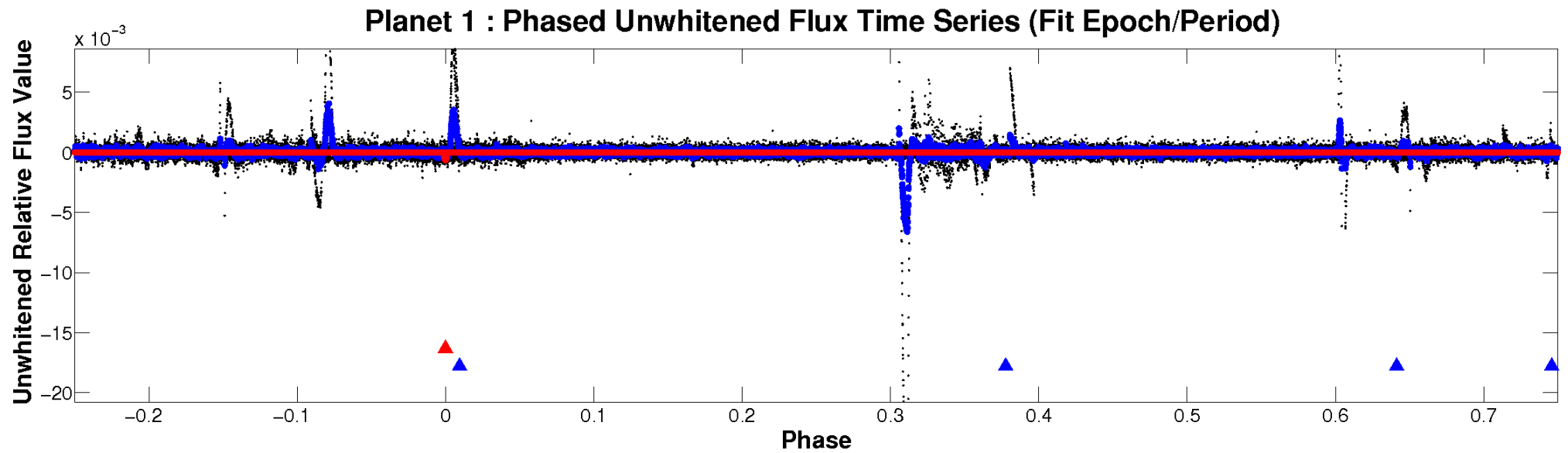


# ALT Odd/Even

TCE 005438845-01



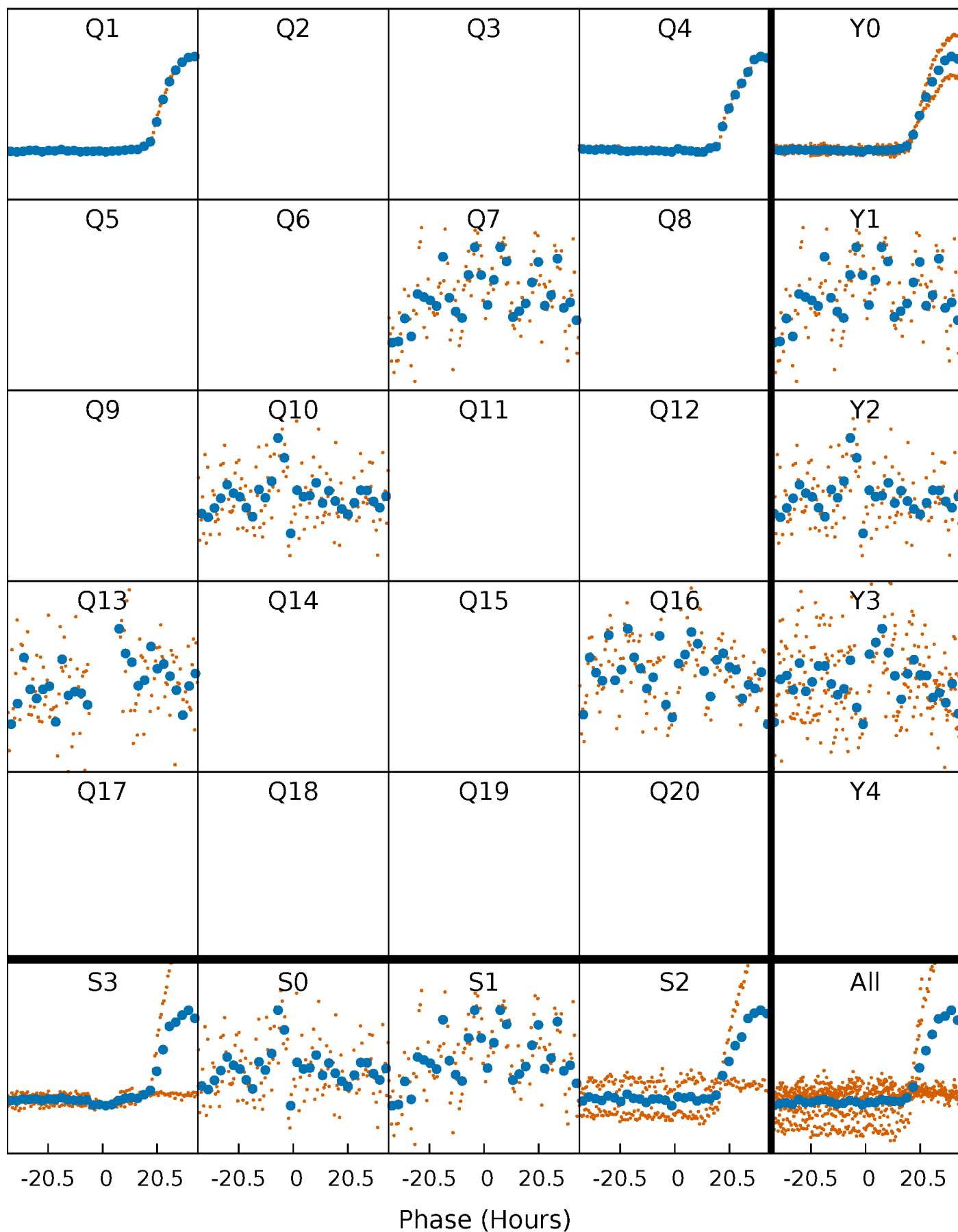
# Non-Whitened Vs. Whitened Light Curve





# PDC Quarter-Phased Transit Curves

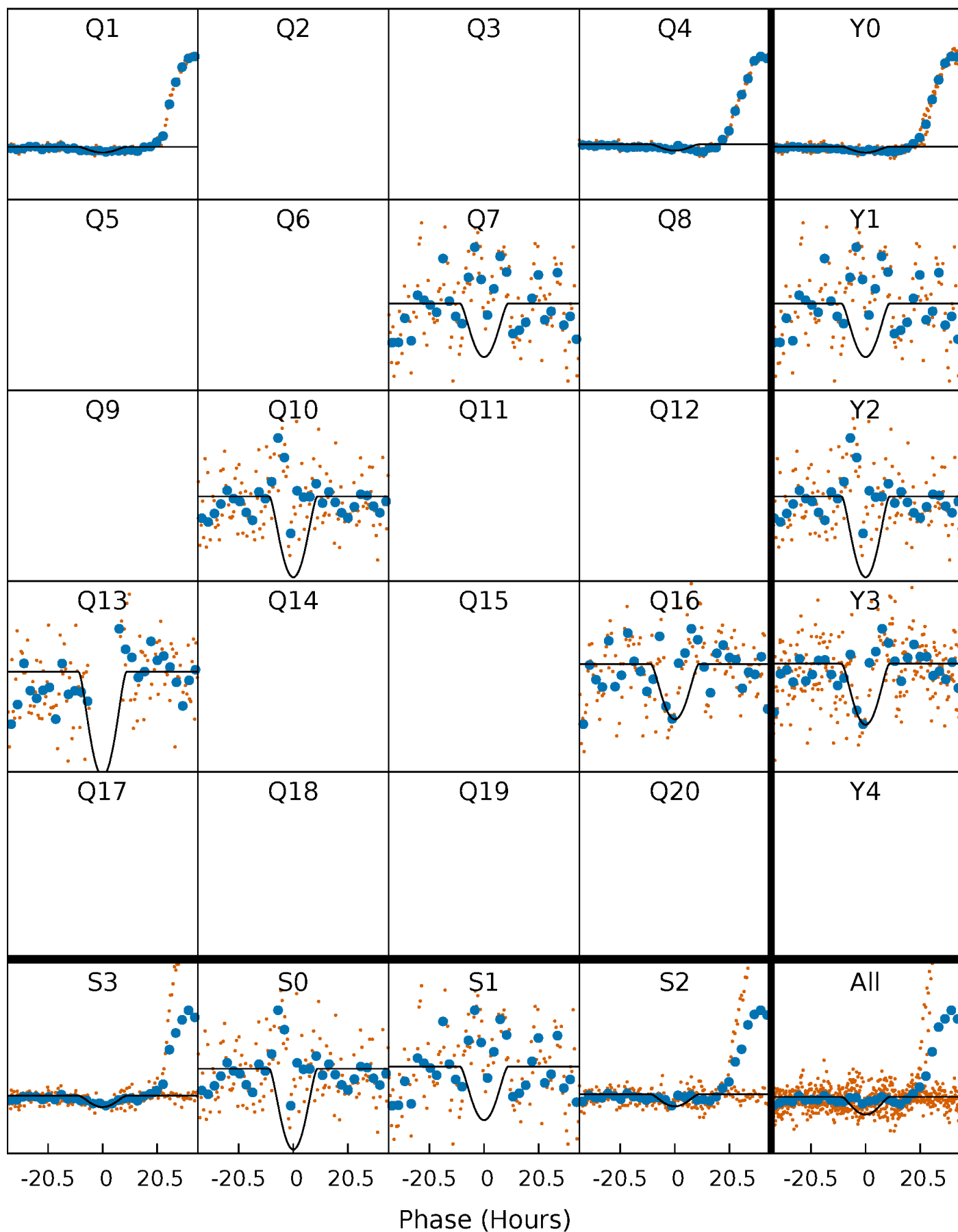
TCE 005438845-01 P=282.880082 Days  $T_0=137.417322$  (BKJD)





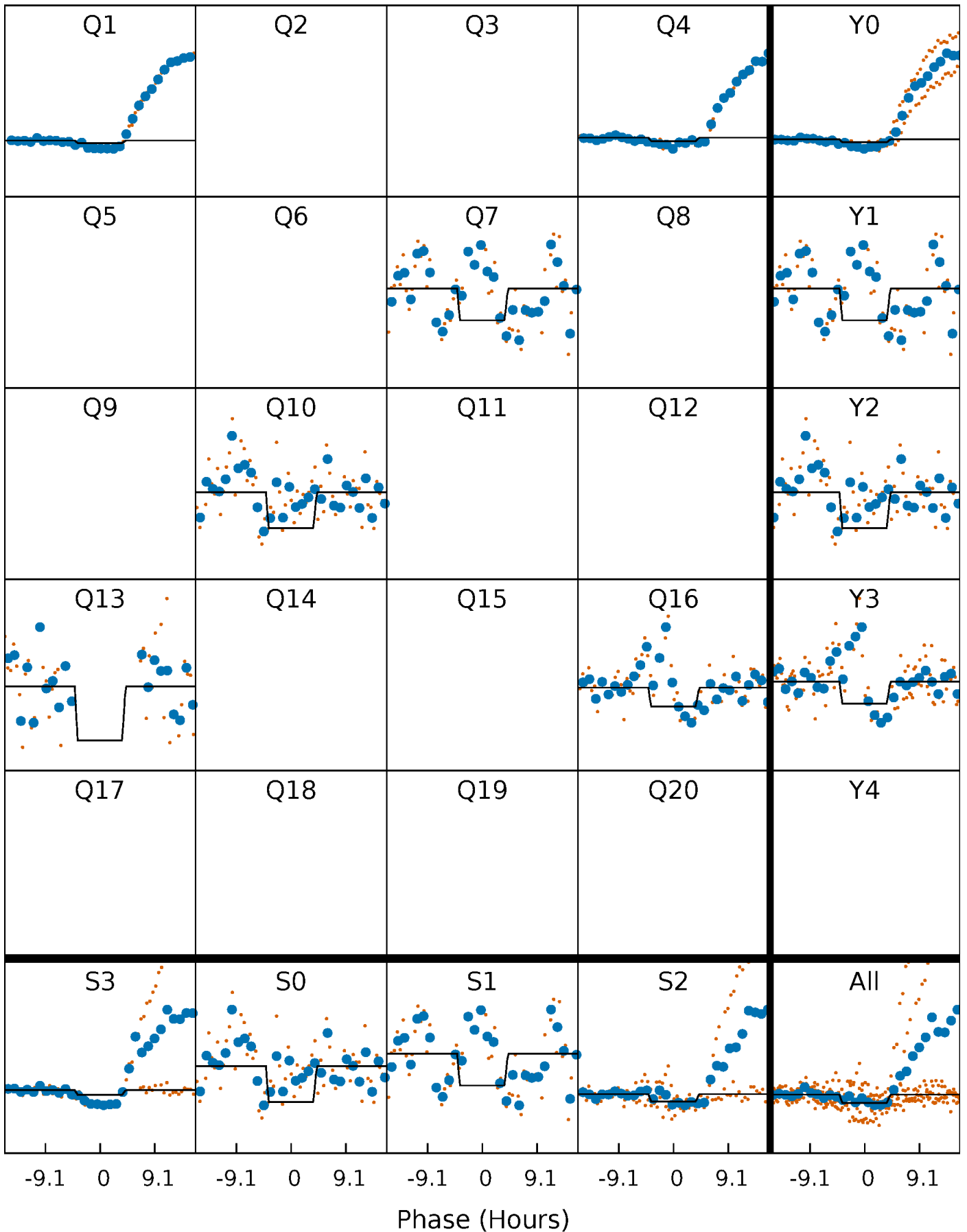
# DV Quarter-Phased Transit Curves

TCE 005438845-01 P=282.880082 Days  $T_0=137.417322$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

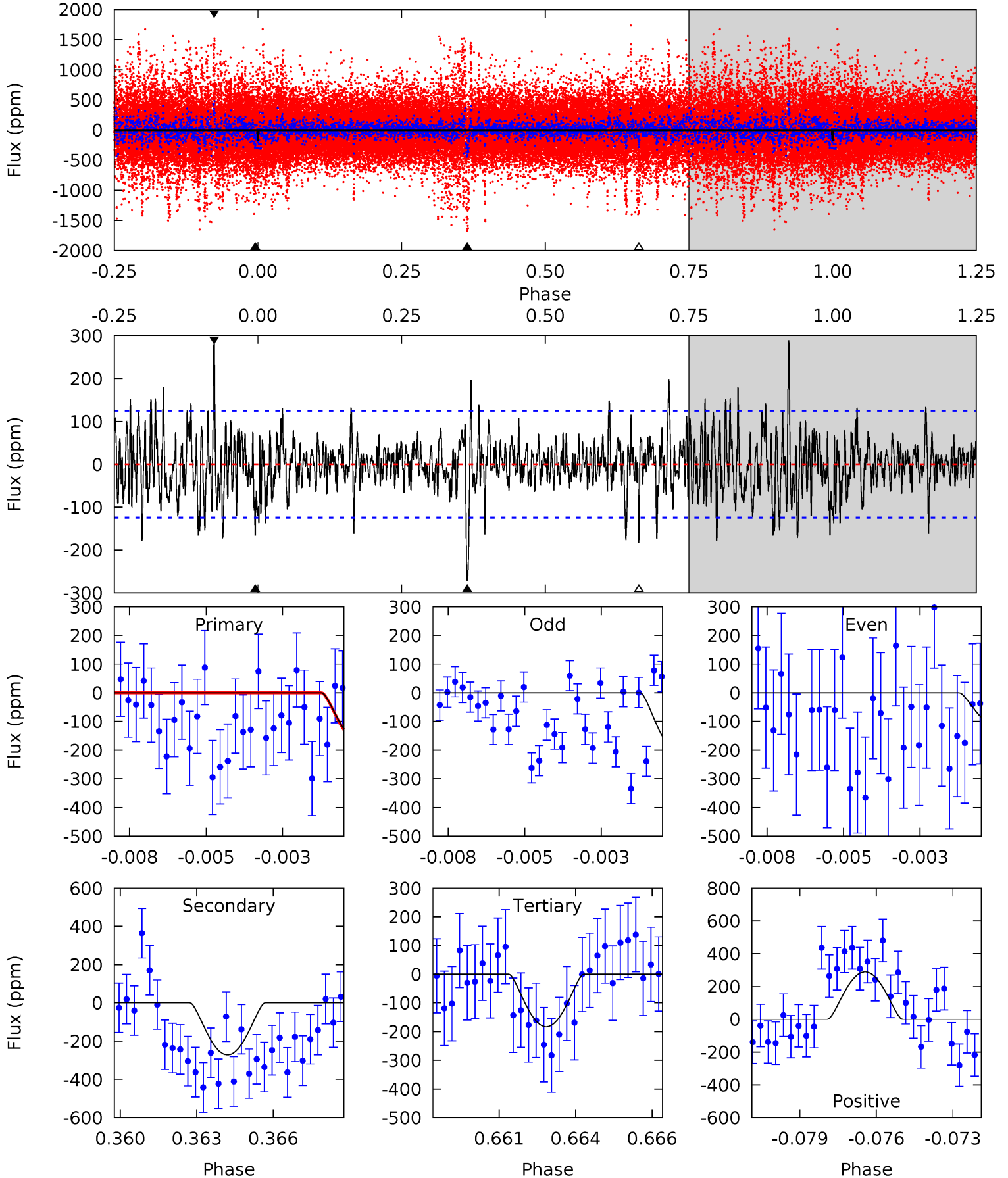
TCE 005438845-01 P=282.725547 Days  $T_0=138.033225$  (BKJD)



# DV Model-Shift Uniqueness Test

005438845-01, P = 282.880082 Days, E = 137.417322 Days

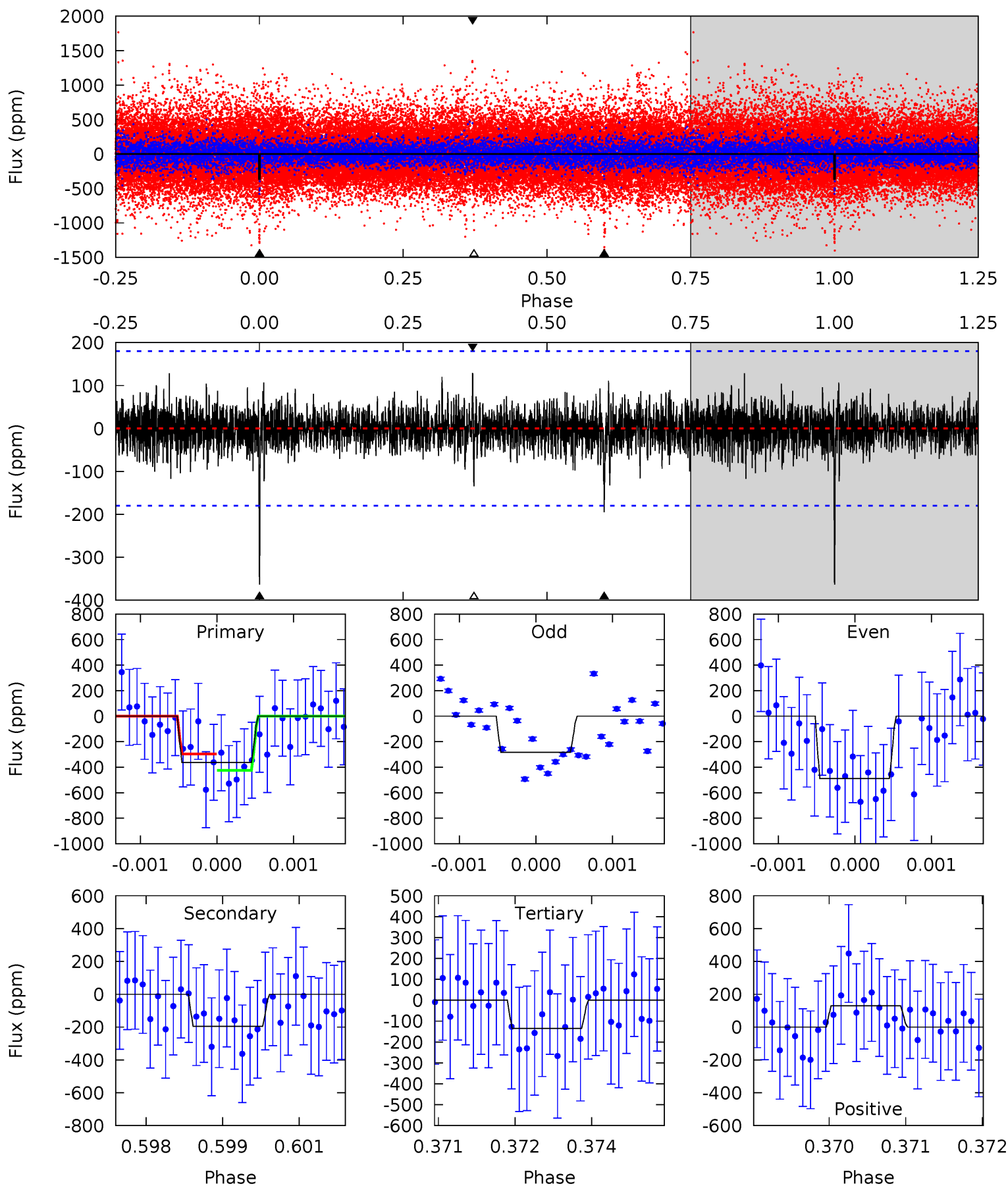
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.02	11.5	7.74	12.2	5.27	3.00	2.26	-0.72	-5.17	3.75	-0.71	1.25	1.06	0.51	0.15



# Alt Model-Shift Uniqueness Test

005438845-01, P = 282.725547 Days, E = 138.033225 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.9	5.88	4.06	3.90	5.42	3.24	0.96	6.89	7.05	1.82	1.98	2.14	5.39	0.26	1.92



### Stellar Parameters For KIC 005438845

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5237^{+157}_{-157}$	$4.637^{+0.061}_{-0.039}$	$-1.040^{+0.300}_{-0.300}$	$0.627^{+0.050}_{-0.045}$	$0.621^{+0.055}_{-0.024}$	$3.556^{+0.846}_{-0.511}$
	+3%/-3%	+1%/-1%	+29%/-29%	+8%/-7%	+9%/-4%	+24%/-14%
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 005438845-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-272 \pm 24$	$10.08^{+9.99}_{-6.82}$	$300^{+10}_{-11}$	$2566^{+955}_{-389}$	$777^{+6867}_{-584}$
Alt.	$-195 \pm 33$	$9.02^{+10.94}_{-6.20}$	$300^{+11}_{-11}$	$2520^{+960}_{-405}$	$682^{+6187}_{-539}$

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

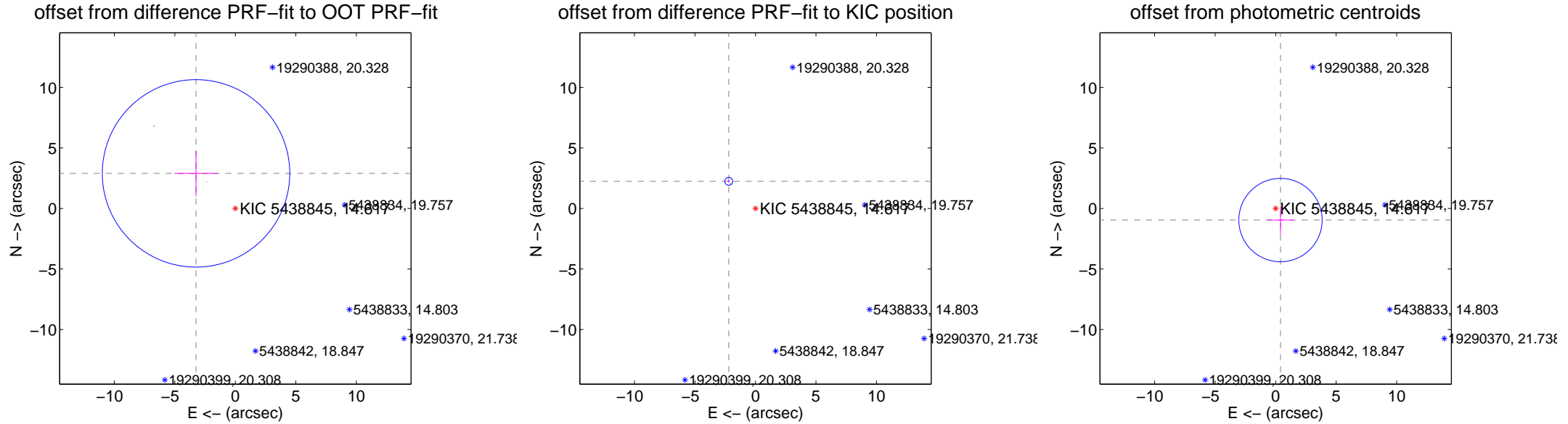
## DV Centroid Data

Supplemental centroid analysis for 005438845-01. Kepler magnitude: 14.62. Transit SNR 9.27

There are 2 quarters with good PRF difference image offsets

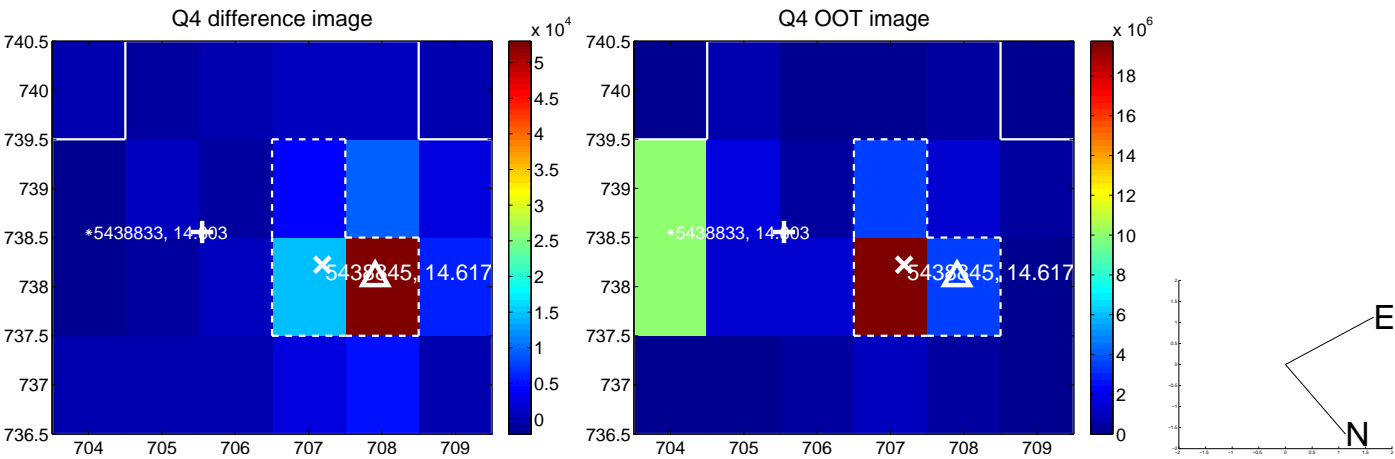
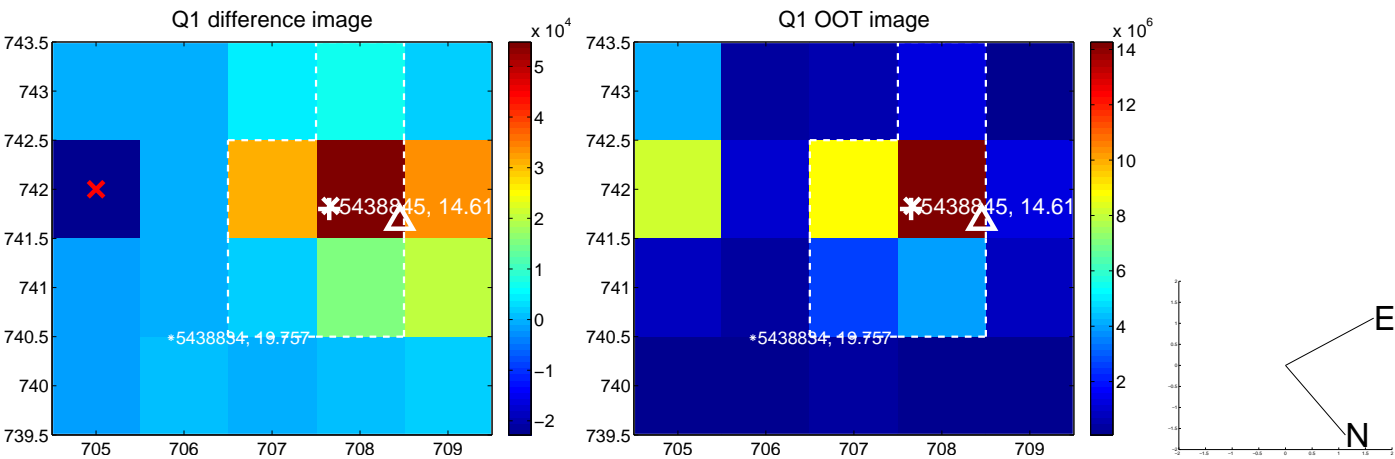
The OOT PRF centroid is offset from the target star catalog position by about 6.65 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.353 \pm 2.581$	1.69	$3.248 \pm 1.782$	$2.898 \pm 1.882$
PRF-fit source offset from KIC position	<b><math>3.146 \pm 0.109</math></b>	<b>28.84</b>	$2.209 \pm 0.102$	$2.240 \pm 0.116$
photometric centroid source offset	$1.04 \pm 1.15$	0.91	$-0.40 \pm 1.07$	$-0.96 \pm 1.16$



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

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





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

Q5 no difference image



Q5 no OOT image



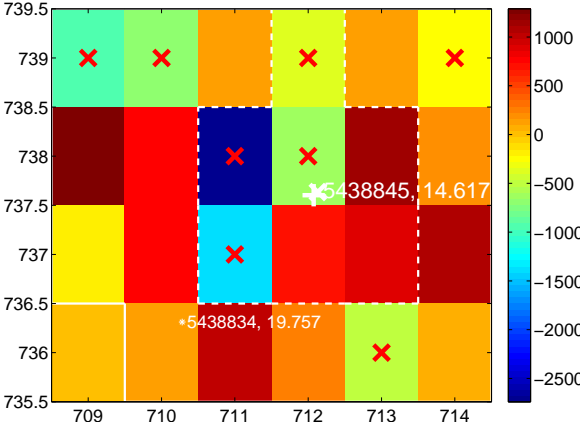
Q6 no difference image



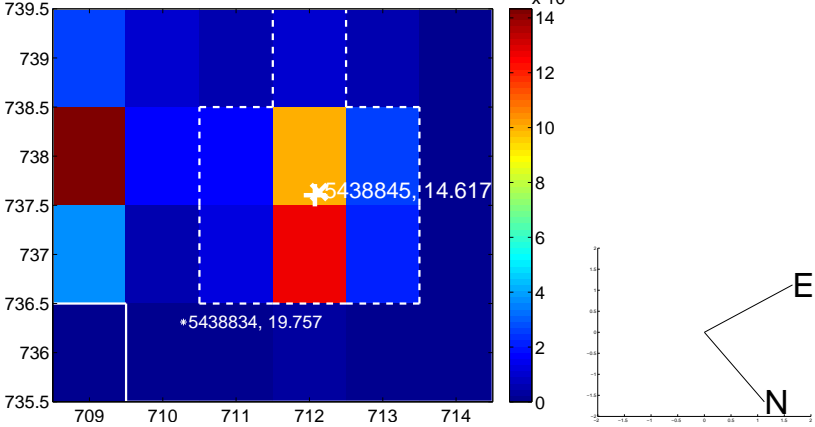
Q6 no OOT image



Q7 difference image. Poor Quality



Q7 OOT image



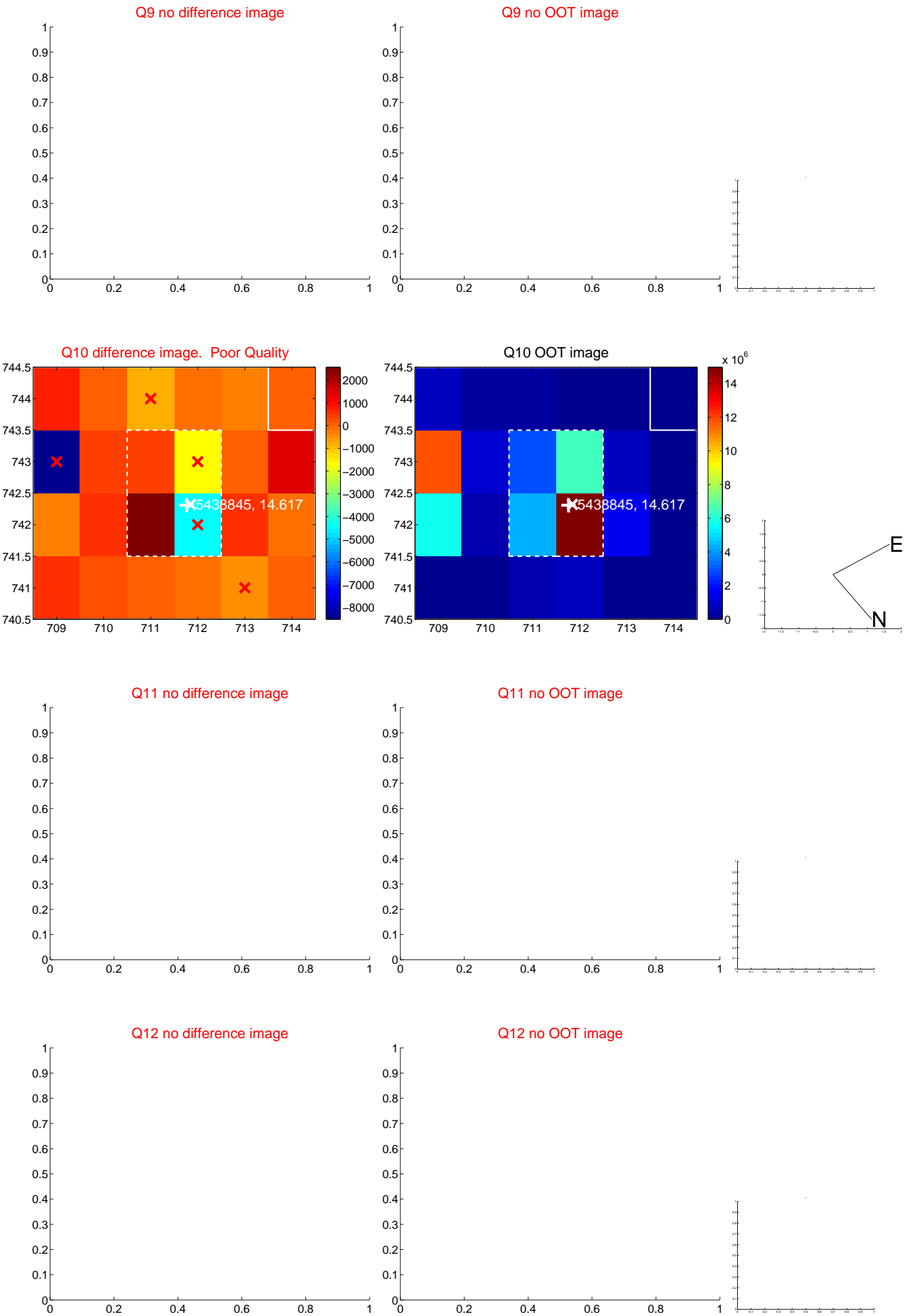
Q8 no difference image



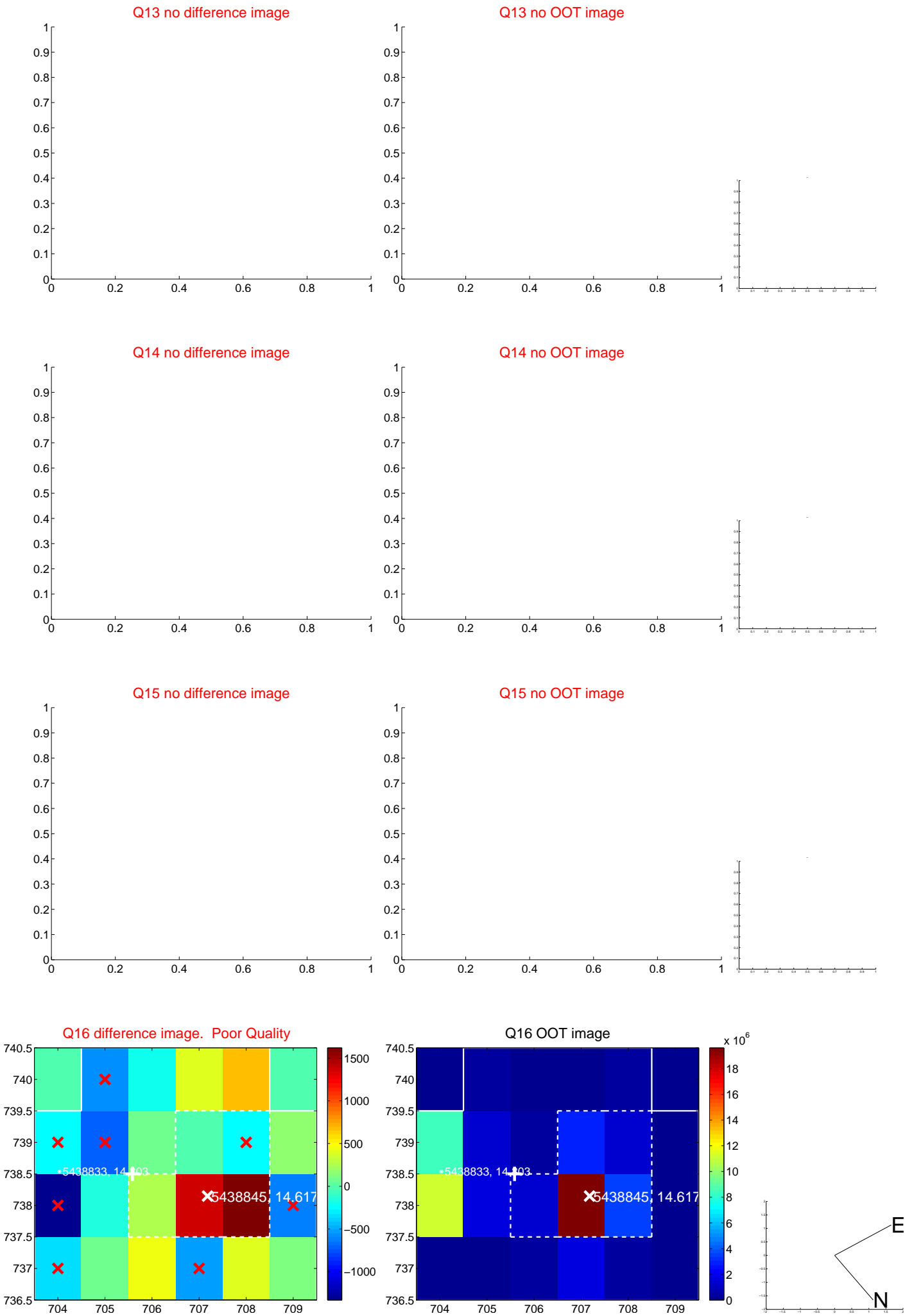
Q8 no OOT image



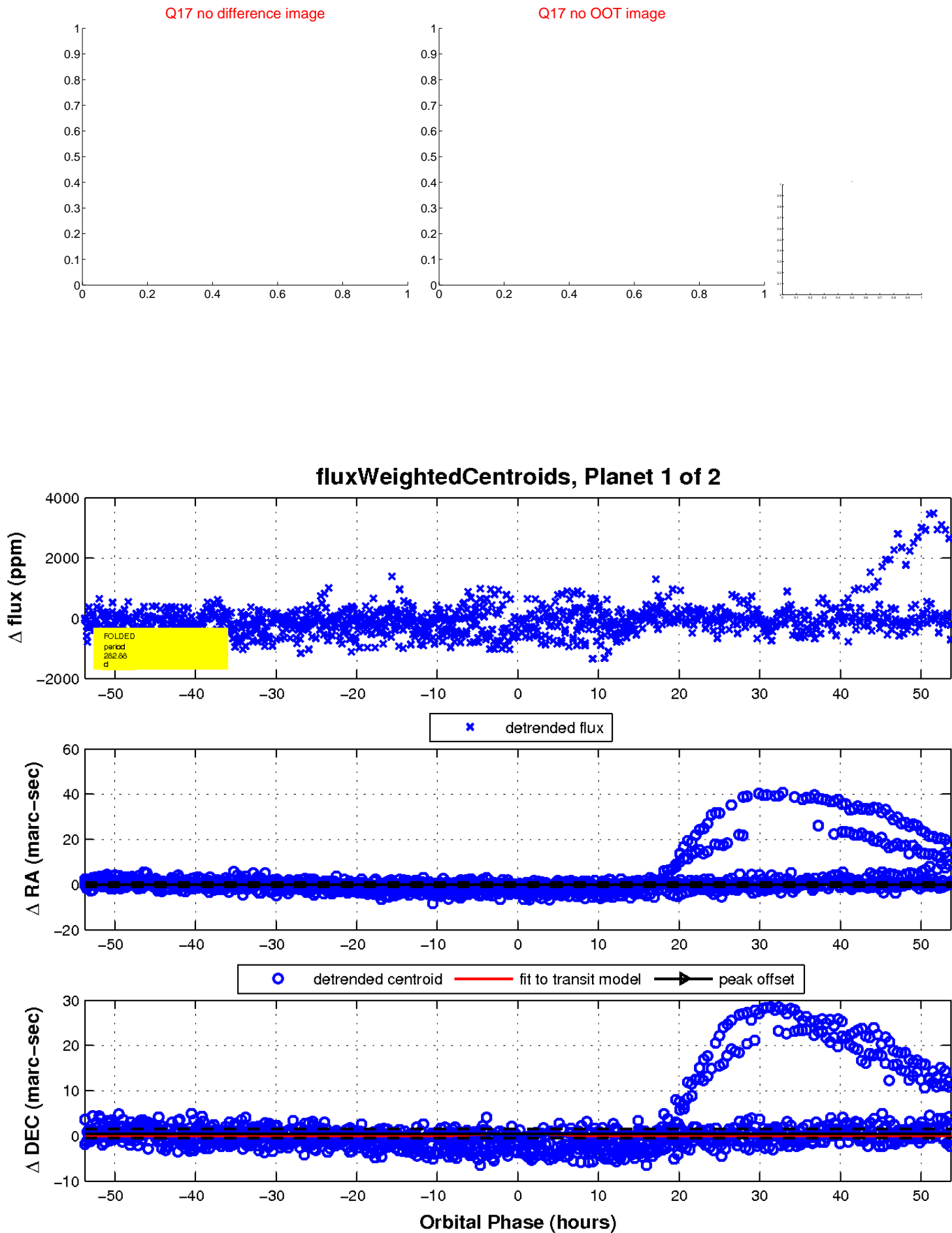
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

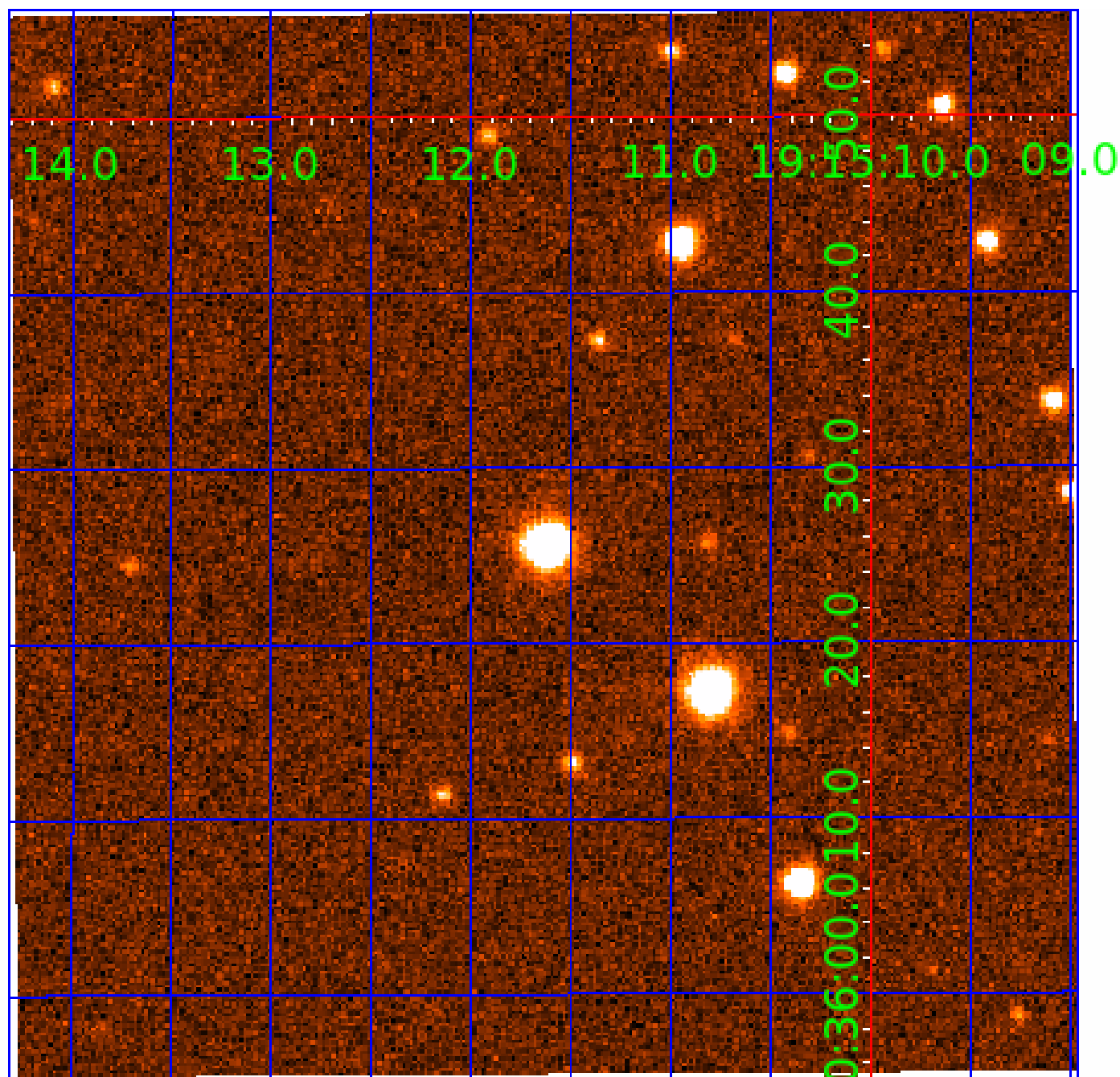


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 005438845

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005438845-01	OBS	No	282.880082	137.417322	641.5	17.903	41.9	9.3	0.63	5237	3.14	0.51
005438845-02	OBS	No	387.032099	318.836850	3988.1	55.320	16.4	20.7	0.63	5237	7.38	0.34

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005438845-01	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_MARSHALL_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV— INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
005438845-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

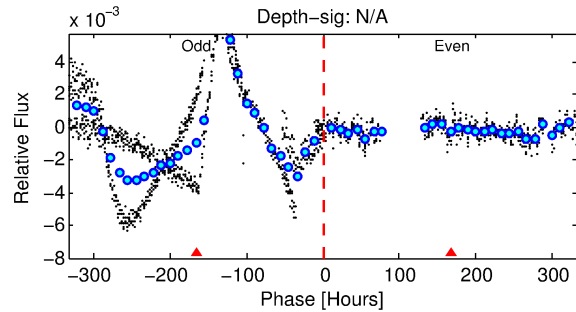
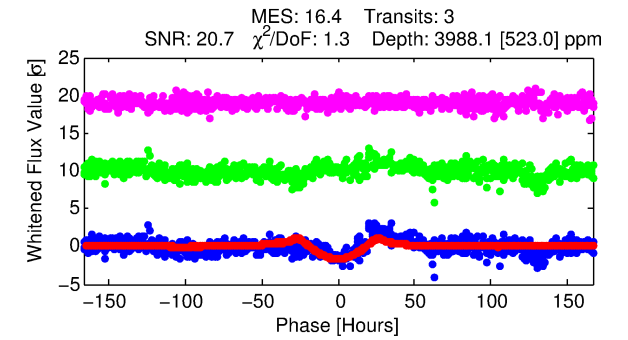
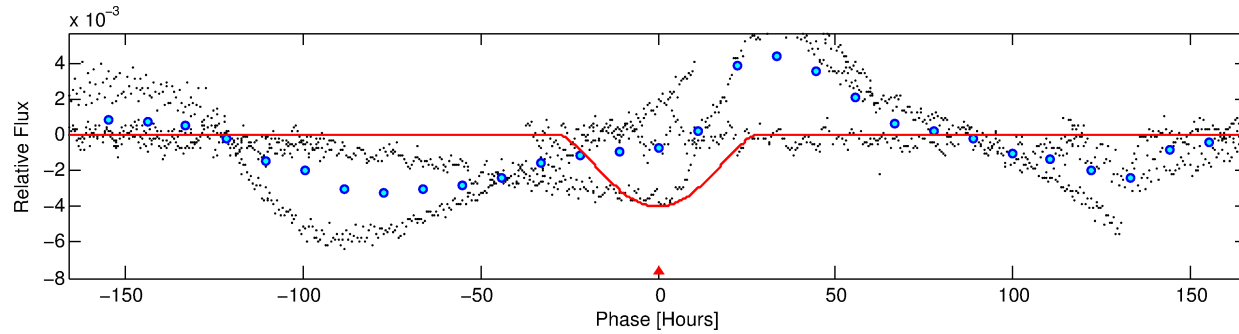
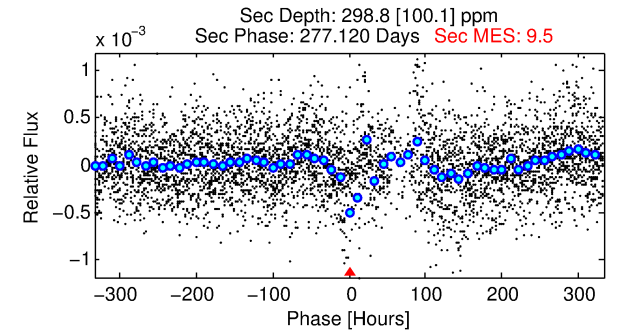
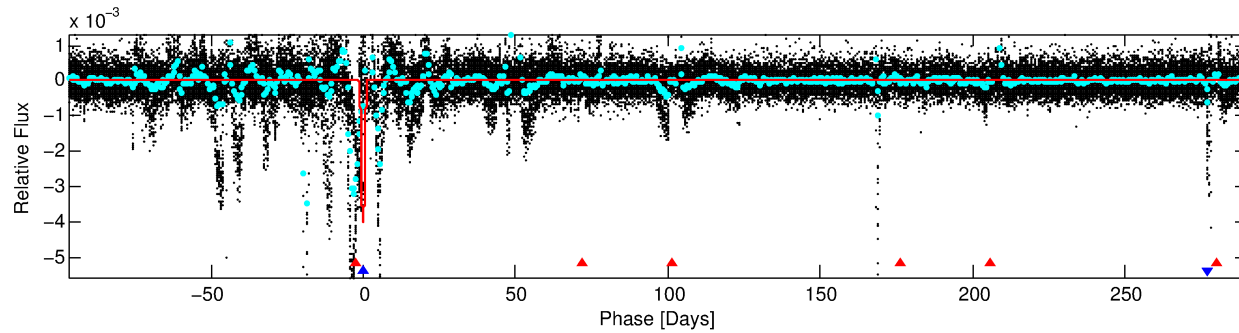
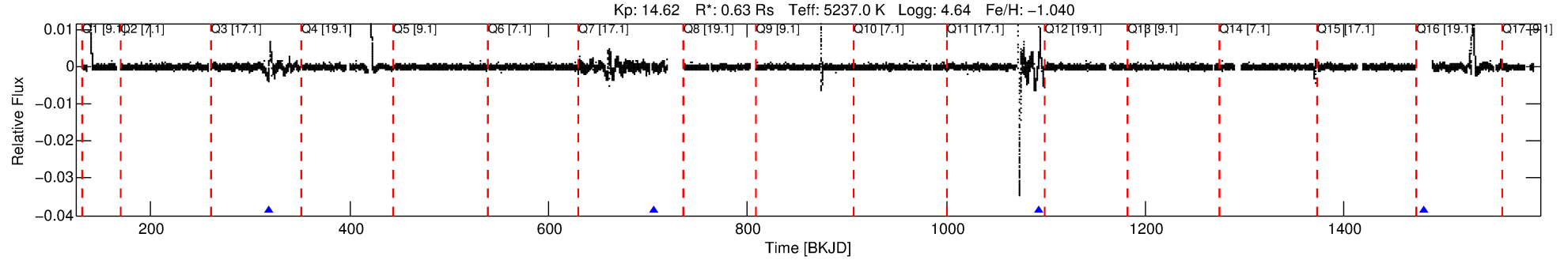
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005438845-02

No Significant Match Found

# DV One-Page Summary

KIC: 5438845 Candidate: 2 of 2 Period: 387.032 d



## DV Fit Results:

Period = 387.03210 [0.02824] d  
Epoch = 318.8369 [0.0322] BKJD  
Rp/R\* = 0.1078 [0.1094]  
a/R\* = 25.51 [4.75]  
b = 1.00 [0.15]  
Seff = 0.34 [0.05]  
Teq = 194 [8] K  
Rp = 7.38 [7.51] Re  
a = 0.8872 [0.0629] AU  
Ag = 2377.69 [4896.20] [0.49σ]  
Teffp = 2097 [1080] K [1.76σ]

## DV Diagnostic Results:

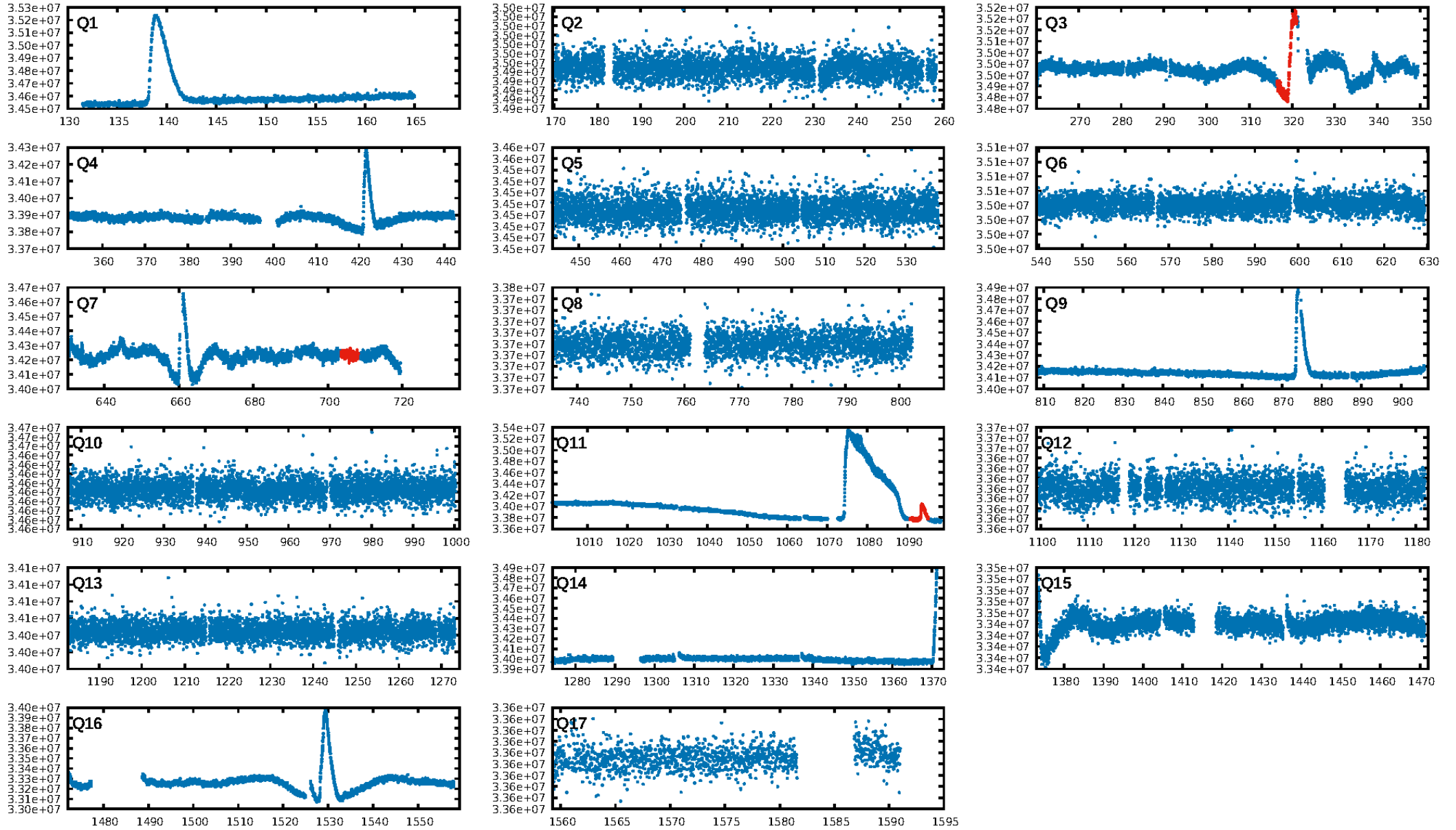
ShortPeriod-sig: 100.0% [42.99σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 82.1%  
Bootstrap-pfa: 3.33e-10  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -5.197  
Centroid-sig: 1.7%  
Centroid-so: 1.592 arcsec [1.40σ]  
OotOffset-rm: N/A  
KicOffset-rm: N/A  
OotOffset-st: 0/0/0 [0]  
KicOffset-st: 0/0/0 [0]  
DiffImageQuality-fgm: N/A  
DiffImageOverlap-fno: 0.00 [0/1]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 09:58:56 Z

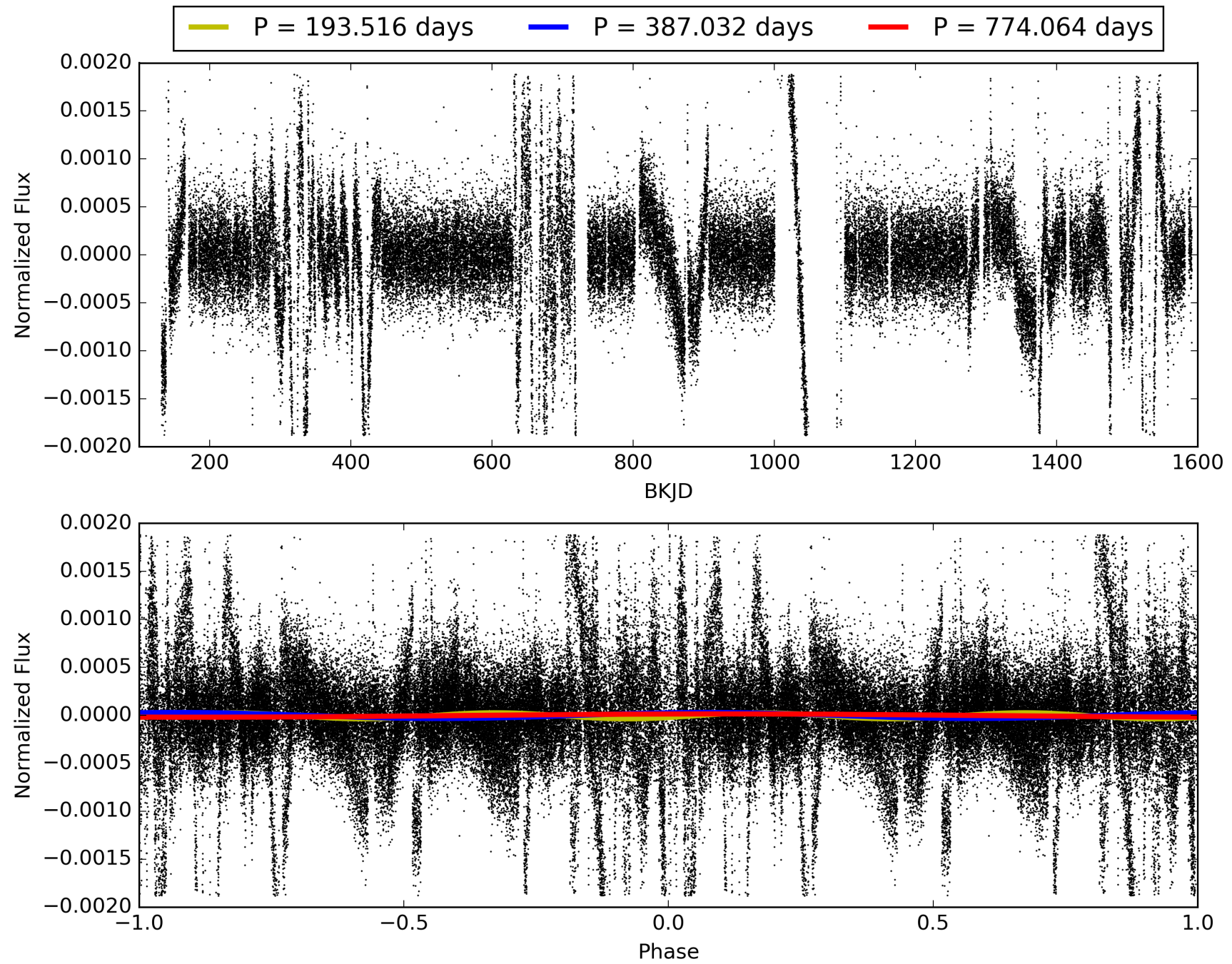
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 005438845-02, PDC Light Curves

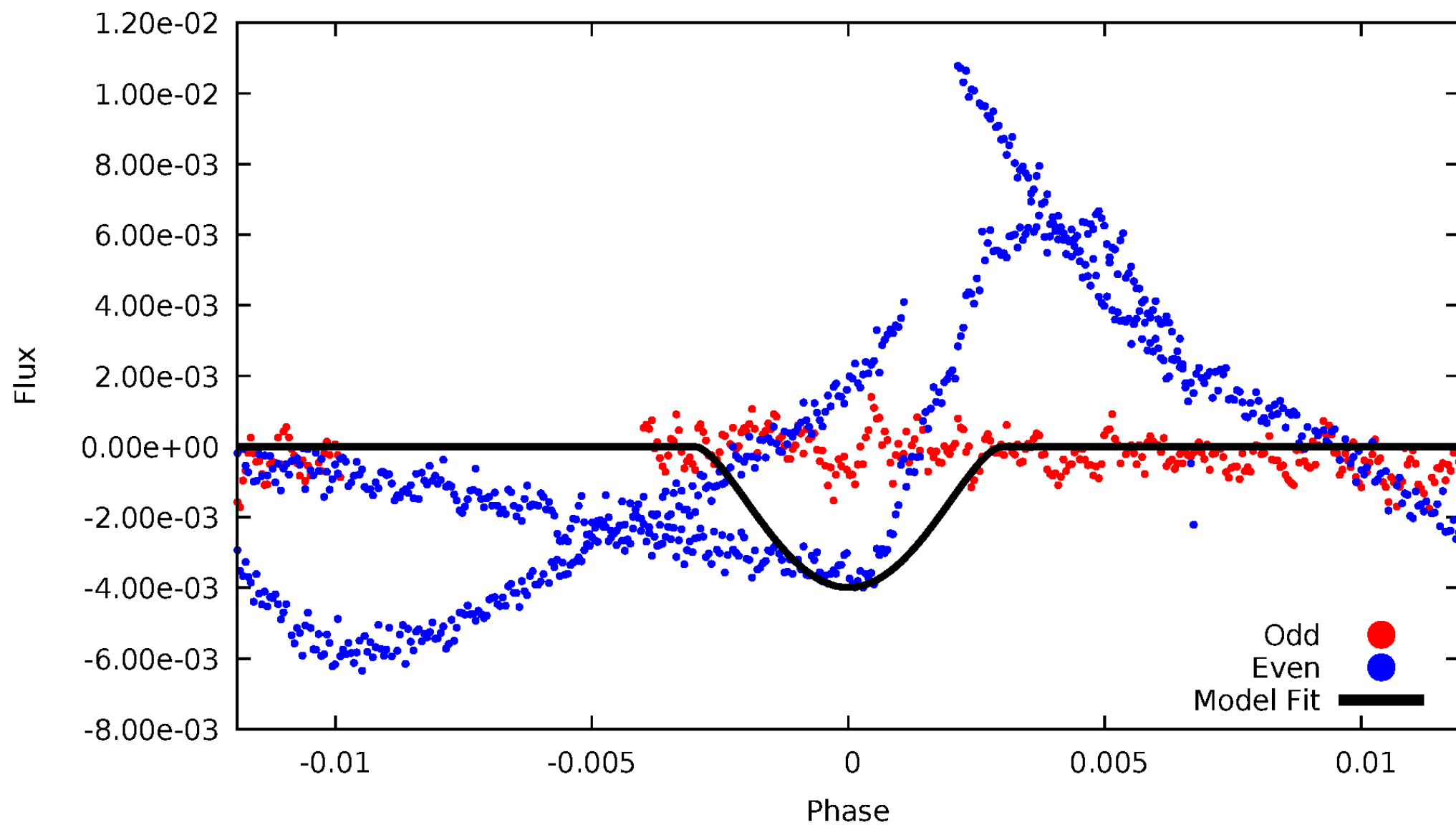


TCE 005438845-02



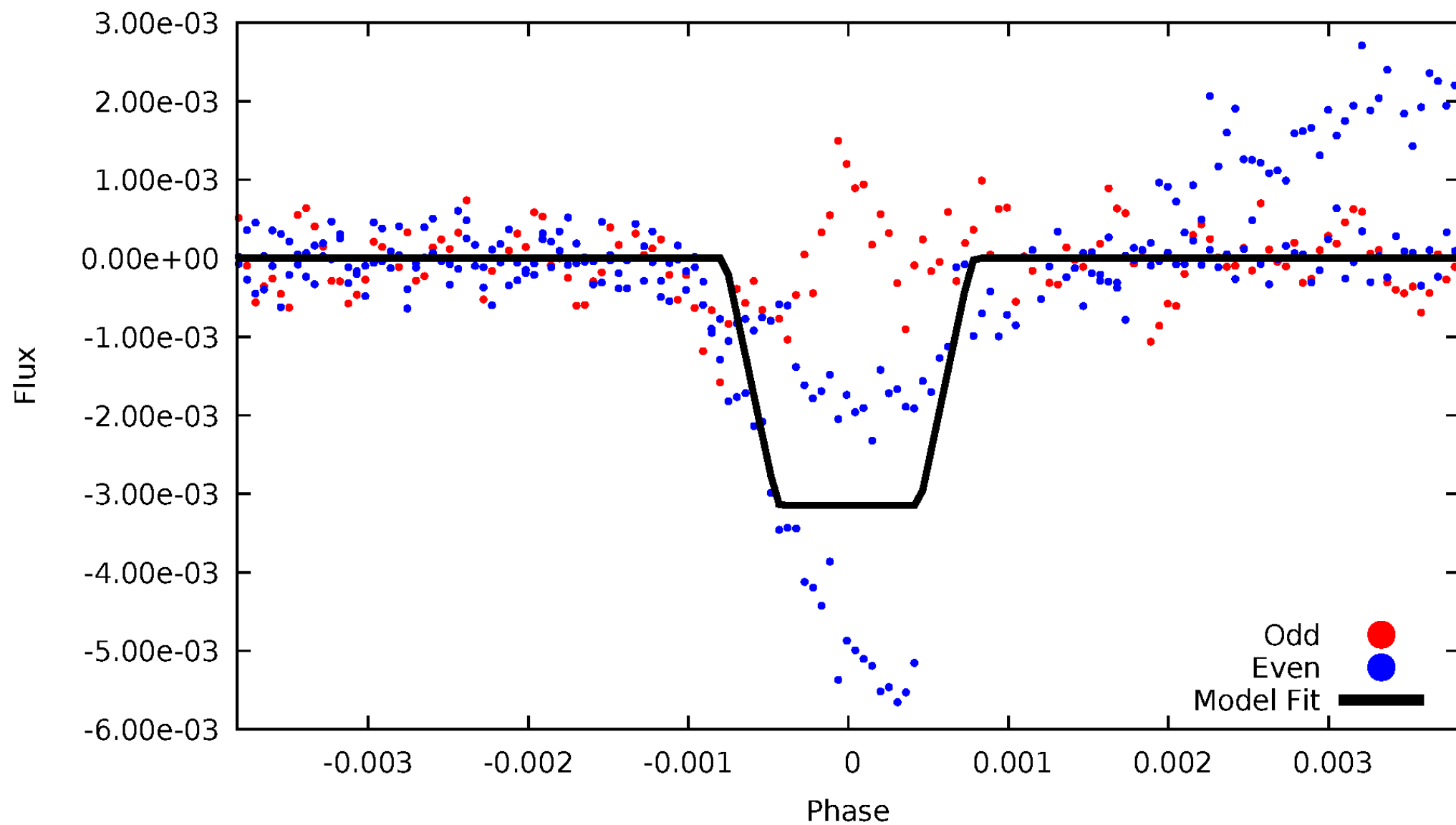
# DV Odd/Even

TCE 005438845-02



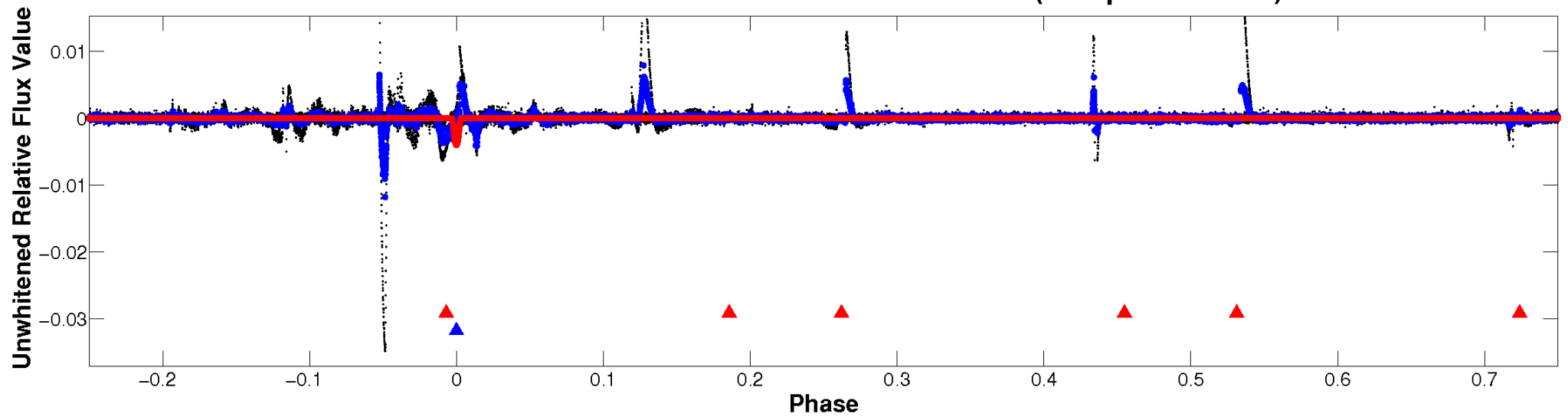
# ALT Odd/Even

TCE 005438845-02

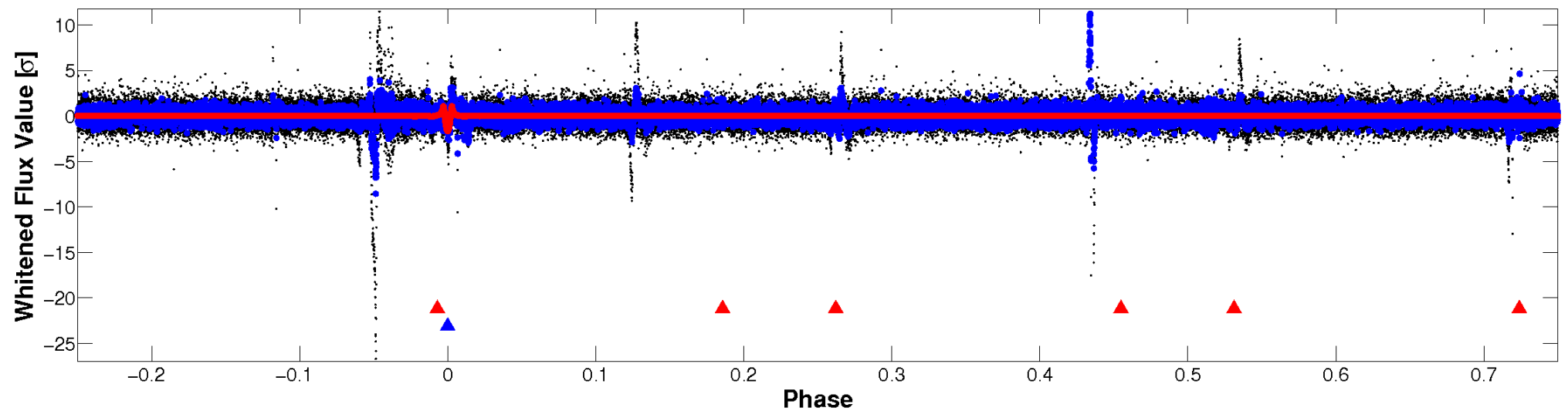


# Non-Whitened Vs. Whitened Light Curve

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

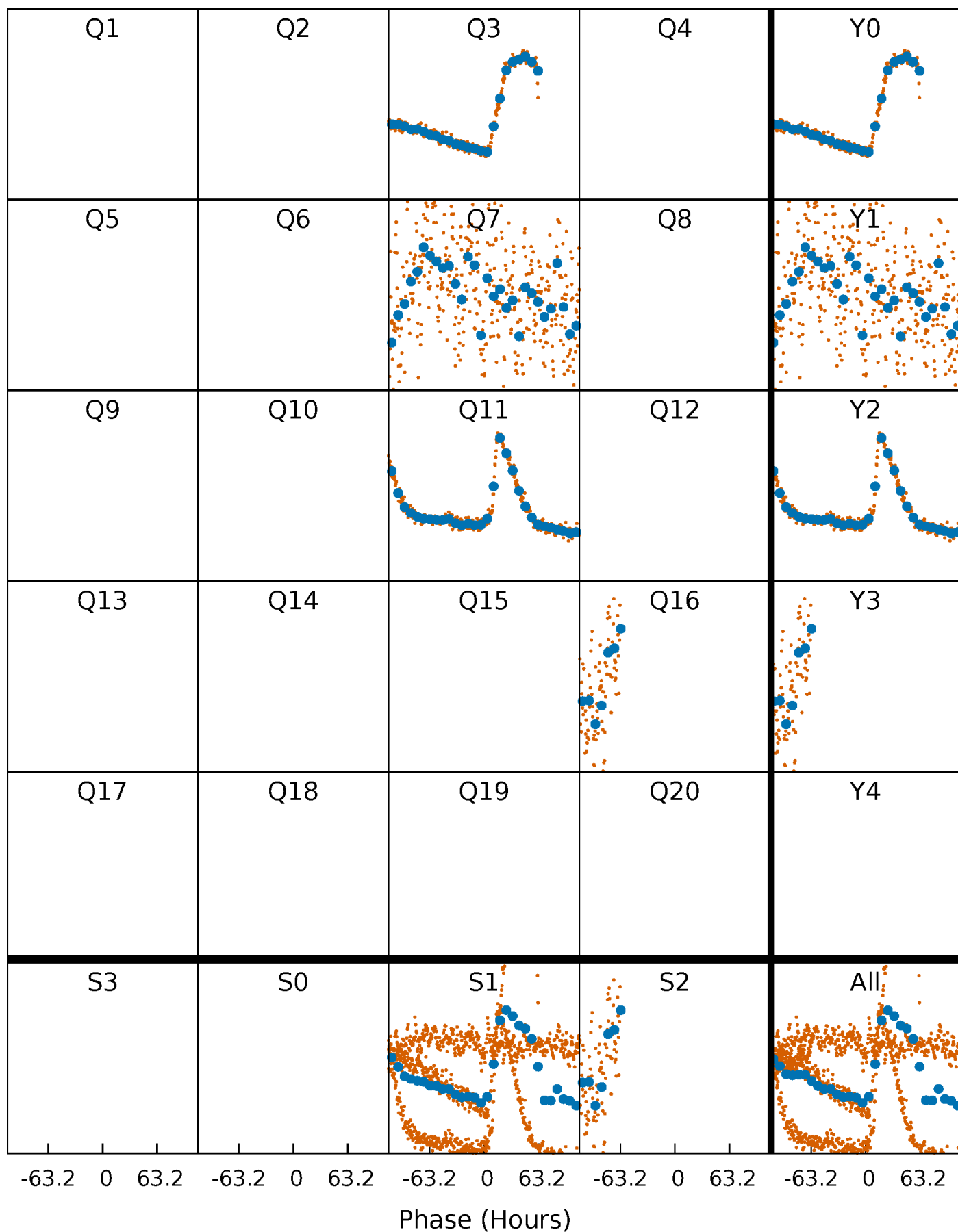


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



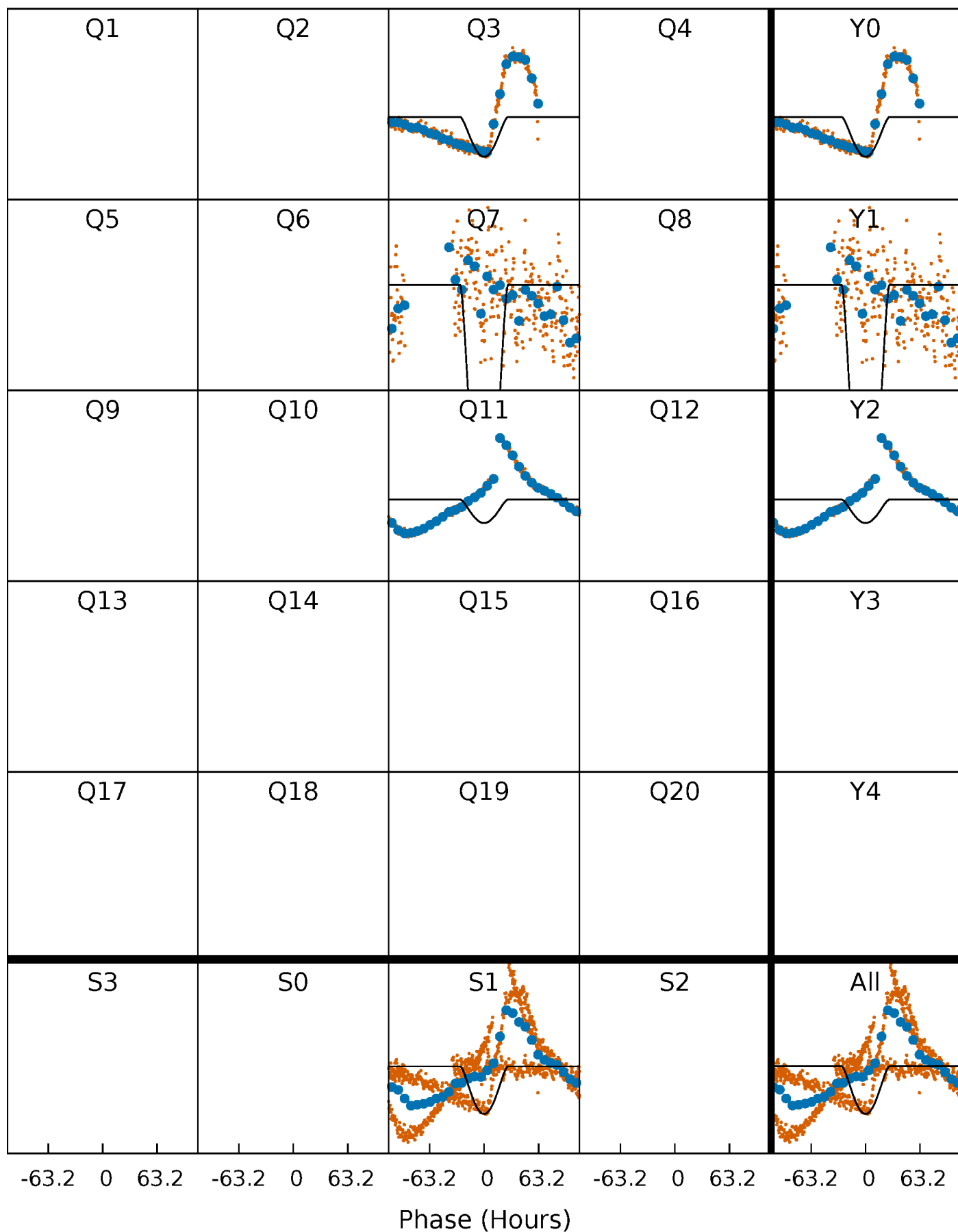
# PDC Quarter-Phased Transit Curves

TCE 005438845-02     $P=387.032100$  Days     $T_0=318.836850$  (BKJD)



# DV Quarter-Phased Transit Curves

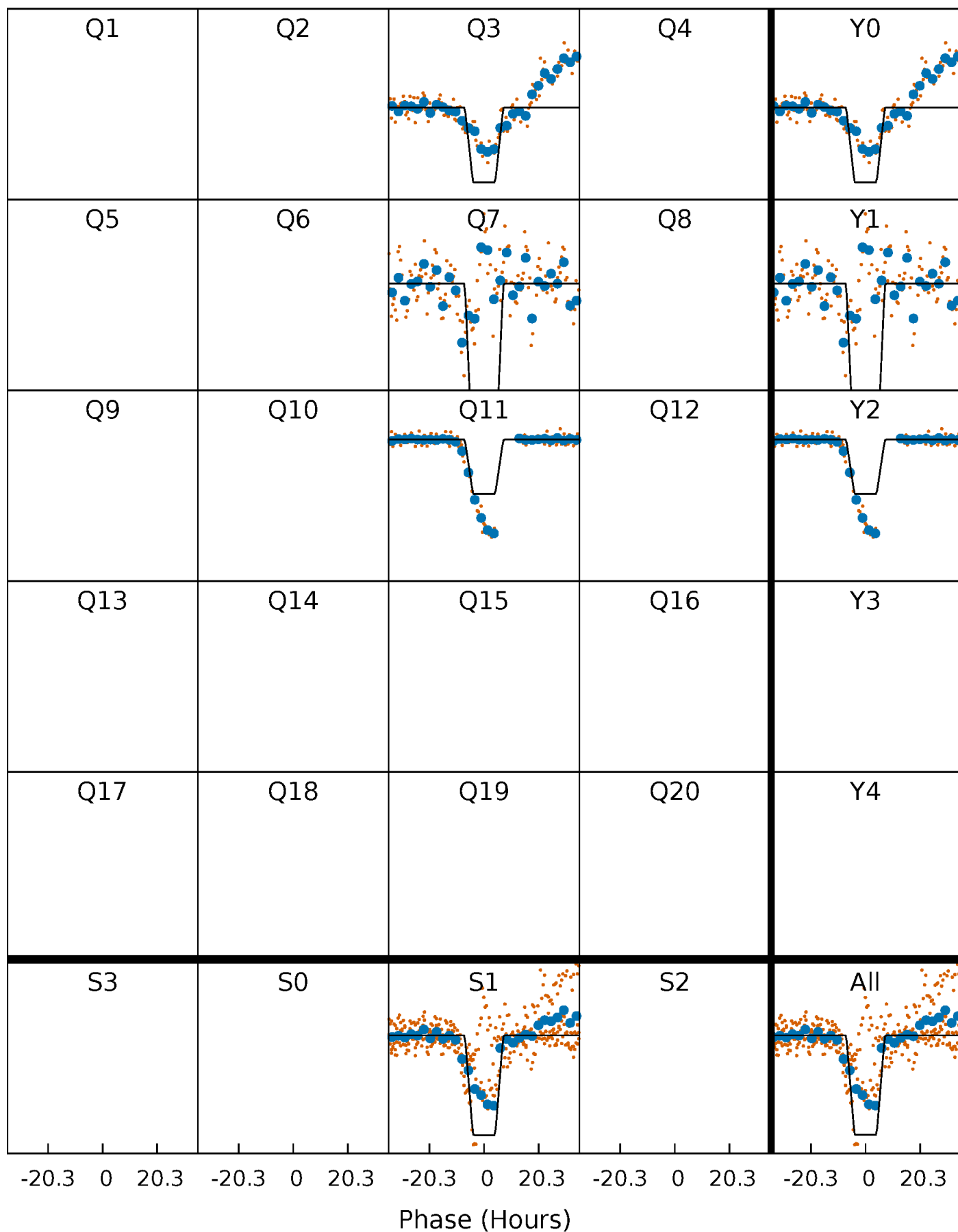
TCE 005438845-02     $P=387.032100$  Days     $T_0=318.836850$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

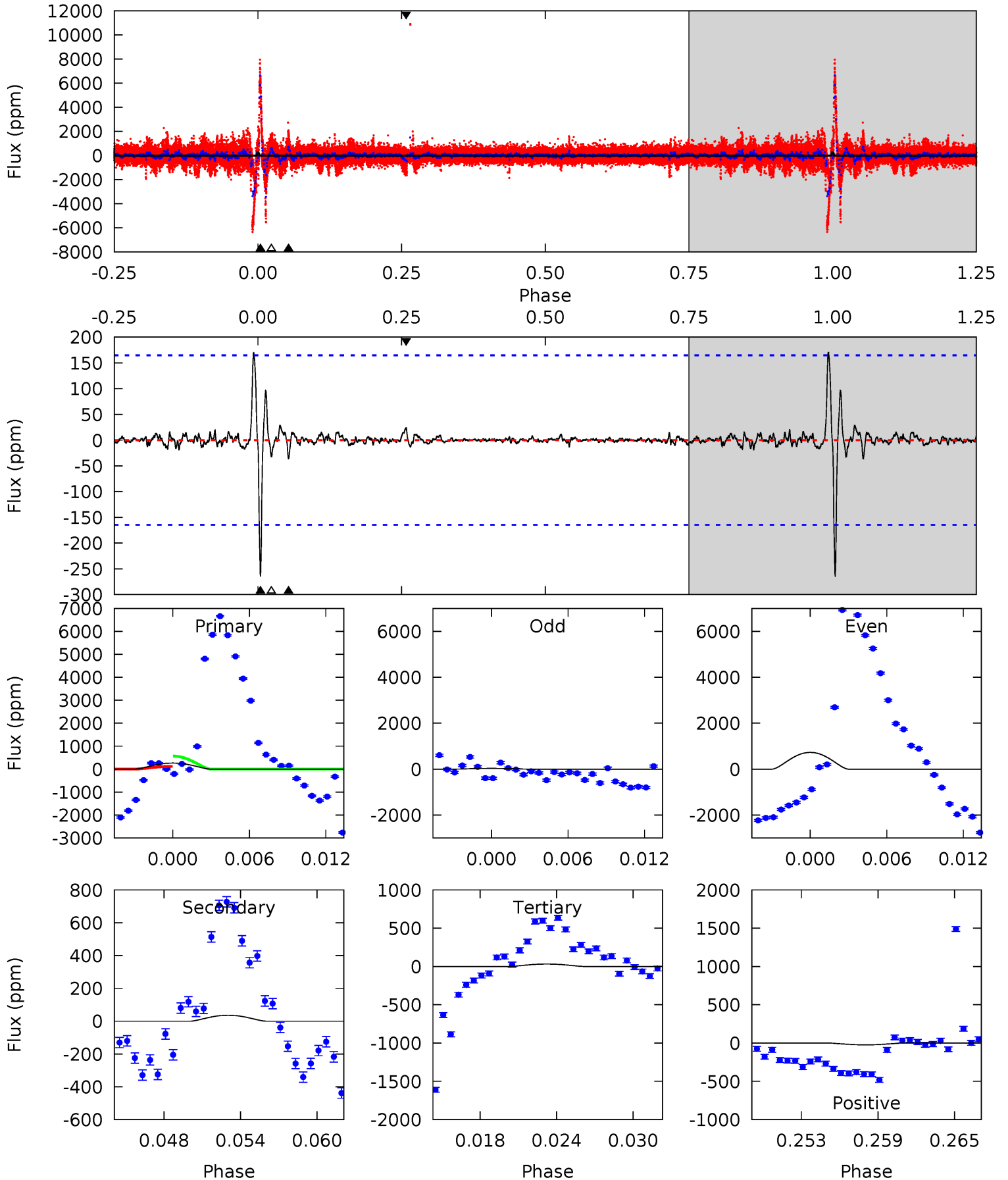
TCE 005438845-02 P=387.093361 Days  $T_0=318.972734$  (BKJD)



# DV Model-Shift Uniqueness Test

005438845-02, P = 387.032100 Days, E = 318.836850 Days

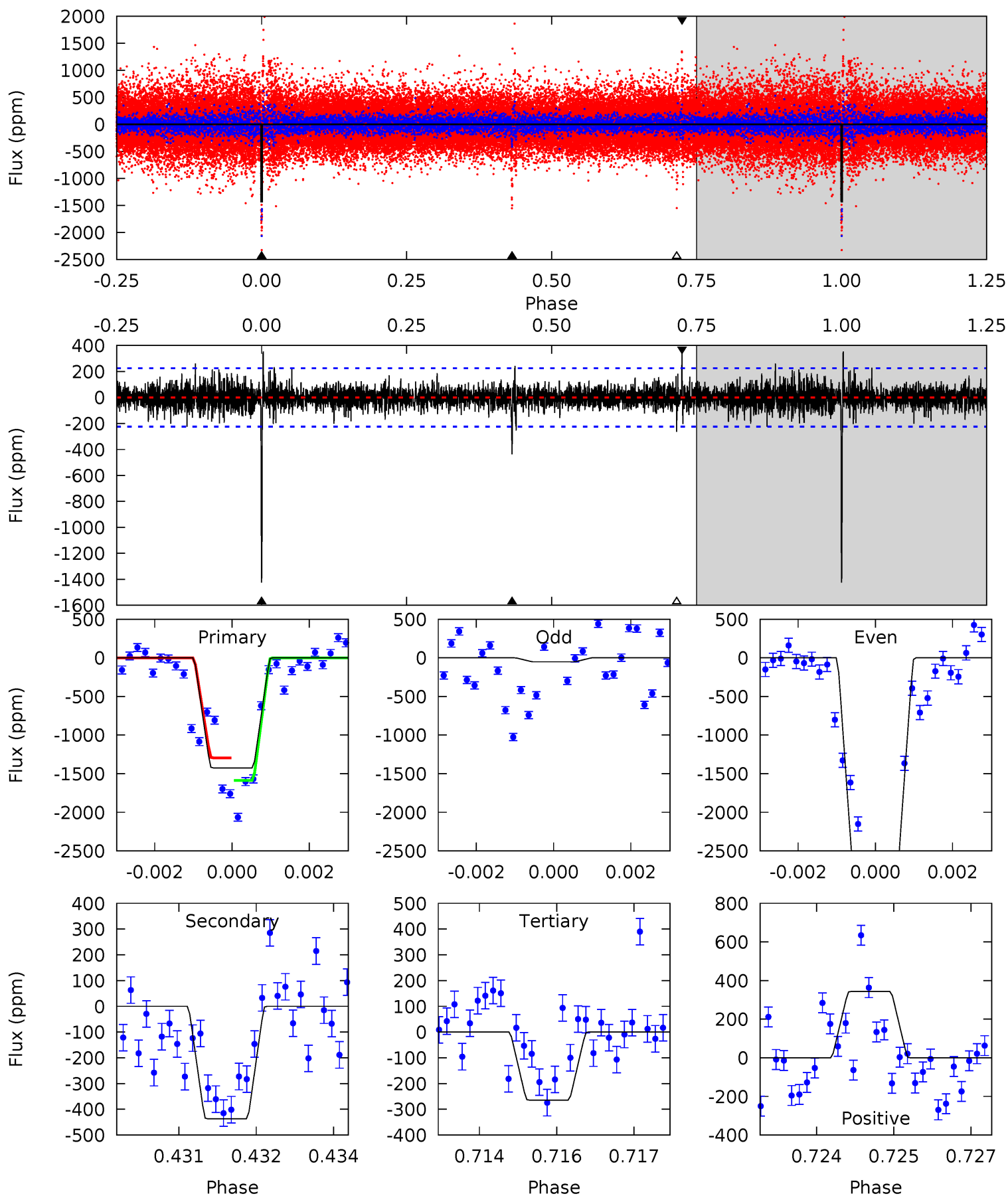
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.23	1.13	1.00	0.75	5.12	2.75	0.38	7.23	7.49	0.12	0.38	4.96	9.93	0.39	7.26



# Alt Model-Shift Uniqueness Test

005438845-02, P = 387.093361 Days, E = 318.972734 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
34.0	10.4	6.31	8.19	5.37	3.16	1.36	27.7	25.8	4.12	2.23	34.6	1.26	0.20	0



### Stellar Parameters For KIC 005438845

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5237^{+157}_{-157}$	$4.637^{+0.061}_{-0.039}$	$-1.040^{+0.300}_{-0.300}$	$0.627^{+0.050}_{-0.045}$	$0.621^{+0.055}_{-0.024}$	$3.556^{+0.846}_{-0.511}$
	+3%/-3%	+1%/-1%	+29%/-29%	+8%/-7%	+9%/-4%	+24%/-14%
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 005438845-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-36 \pm 32$	$8.95^{+6.80}_{-5.32}$	$270^{+10}_{-10}$	$2038^{+546}_{-380}$	$153^{+1060}_{-136}$
Alt.	$-437 \pm 42$	$6.78^{+5.98}_{-4.52}$	$270^{+10}_{-9}$	$3042^{+1358}_{-475}$	$4372^{+34127}_{-3177}$

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

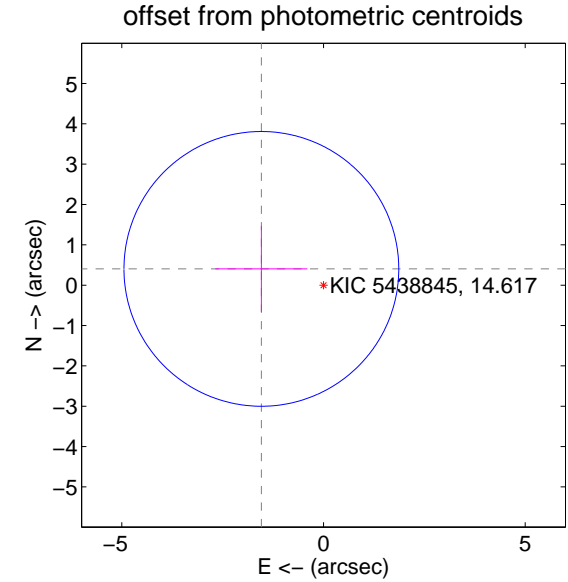
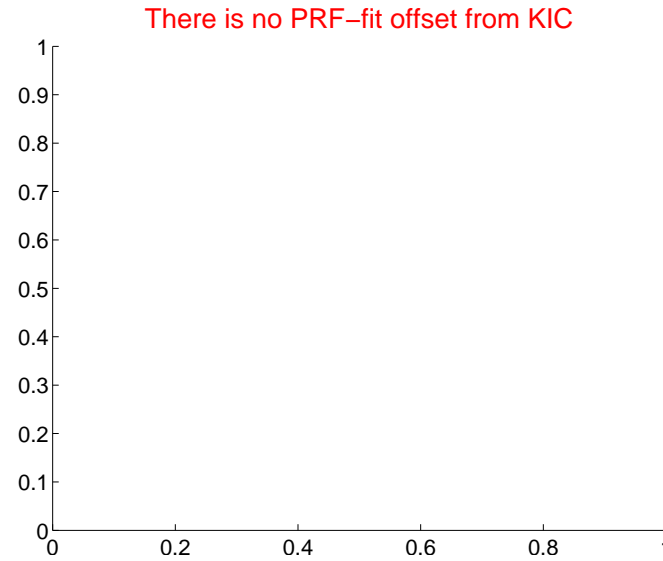
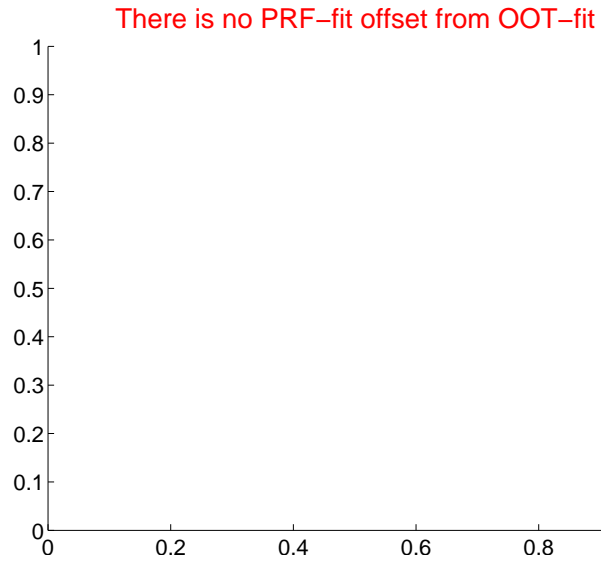
## DV Centroid Data

Supplemental centroid analysis for 005438845-02. Kepler magnitude: 14.62. Transit SNR 20.65

There are 0 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	—	—	—	—
photometric centroid source offset	$1.59 \pm 1.14$	1.40	$1.54 \pm 1.14$	$0.40 \pm 1.06$

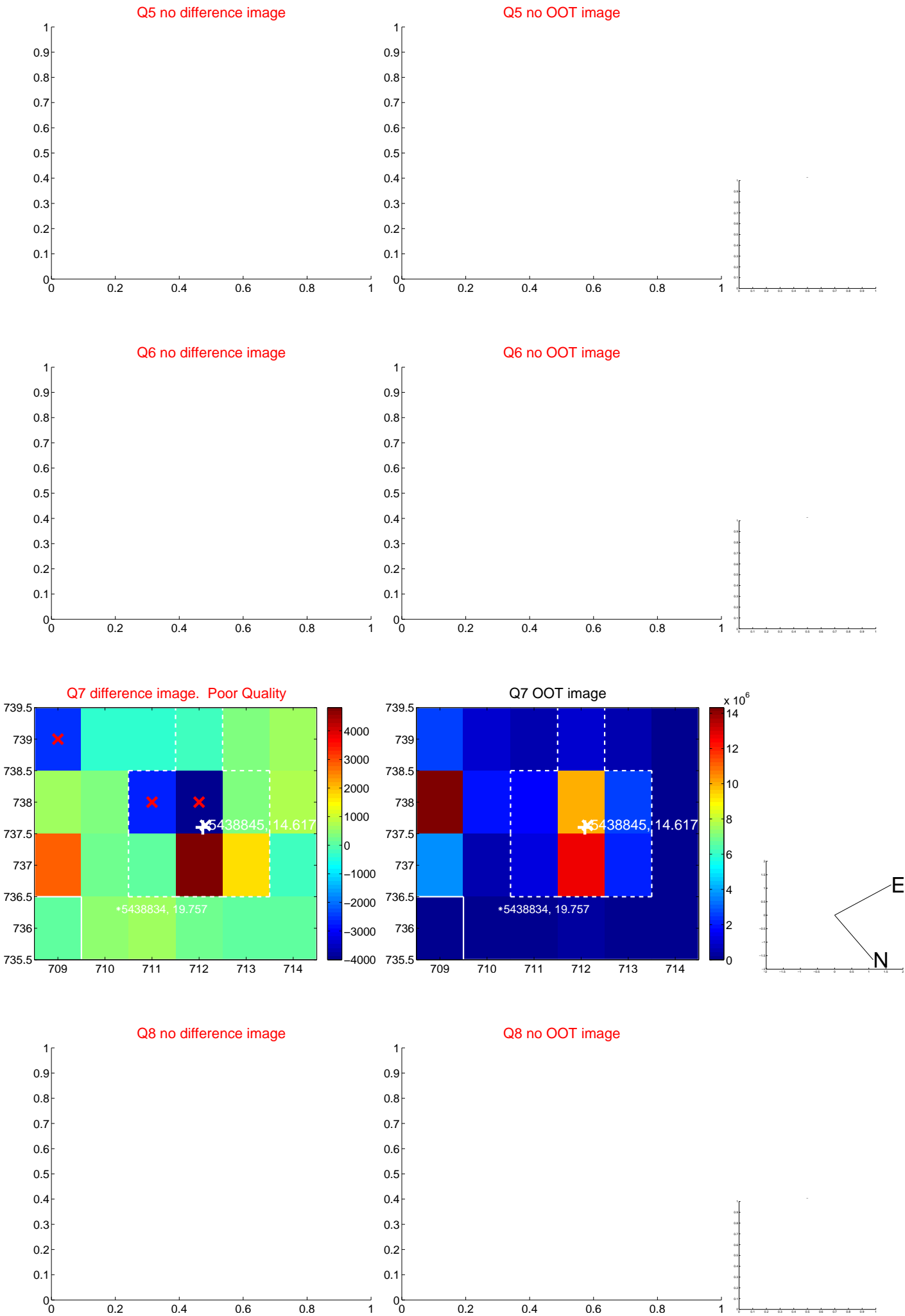


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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





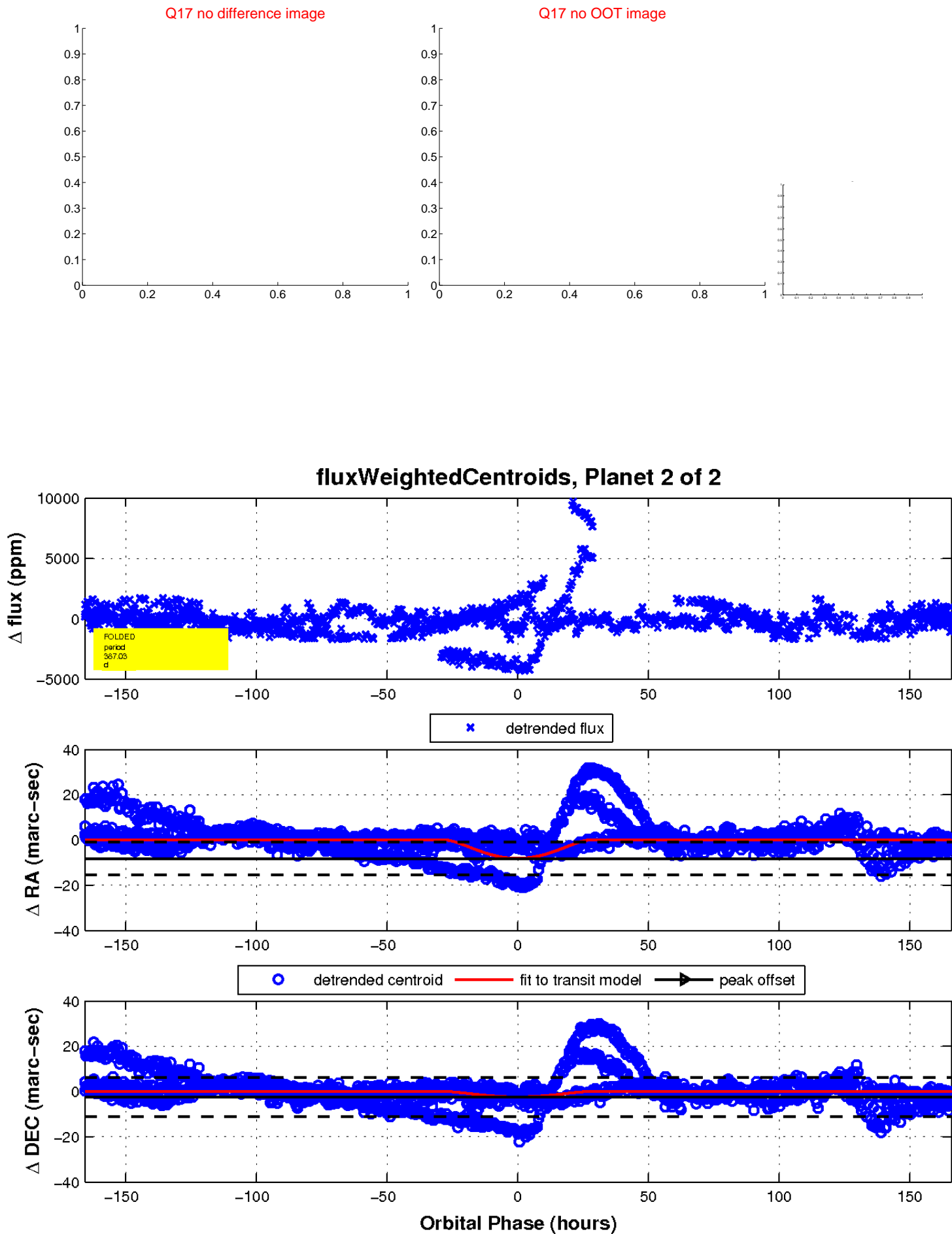
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

