

# KIC 007871438

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007871438-01	OBS	No	425.128191	151.639359	381.1	1.683	16.2	1.4	0.49	3756	1.12	0.06
007871438-02	OBS	No	531.504356	330.273324	2236.7	3.906	14.6	7.9	0.49	3756	2.90	0.04
007871438-03	OBS	No	479.390131	610.181072	2802.7	11.762	18.1	7.2	0.49	3756	3.27	0.05
007871438-04	OBS	No	244.181013	178.530891	1296.8	5.285	10.5	6.3	0.49	3756	1.79	0.12
007871438-05	OBS	No	565.591864	151.051491	1905.6	3.356	12.0	7.6	0.49	3756	2.25	0.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007871438-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_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_FEW_DIFFS
007871438-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007871438-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
007871438-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT— INCONSISTENT_TRANS—CENT_KIC_POS
007871438-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—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.

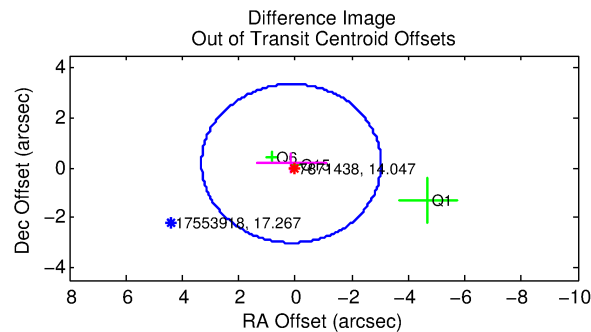
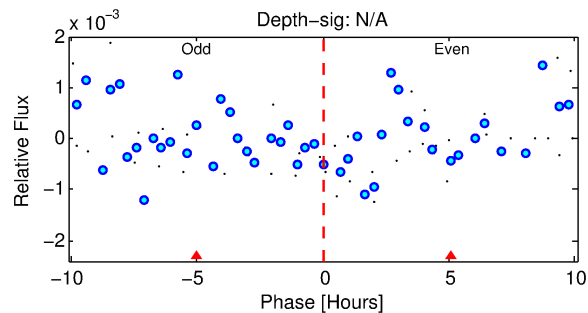
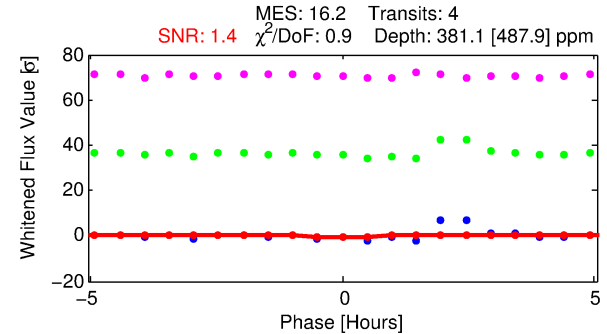
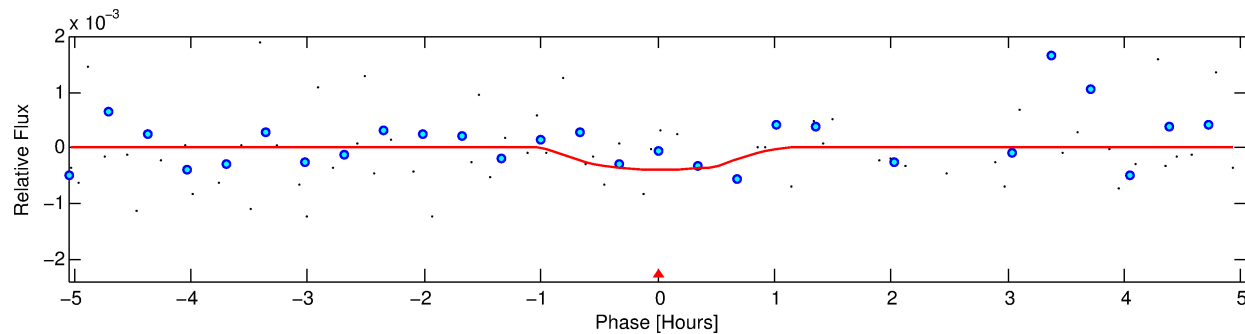
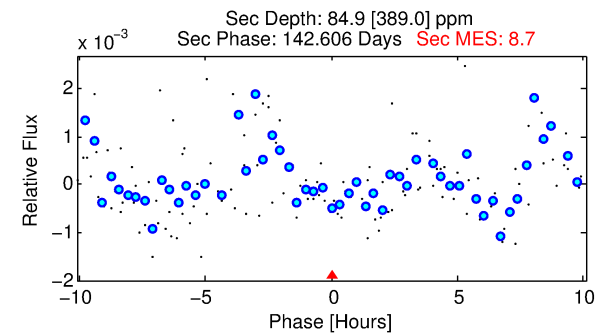
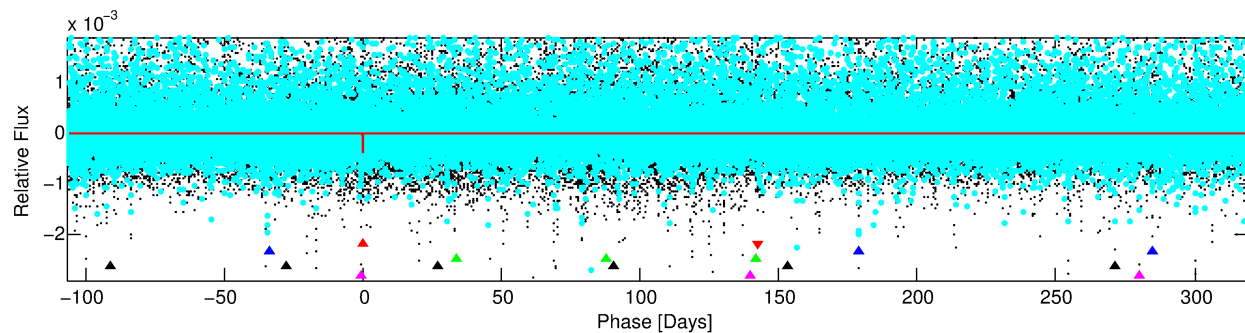
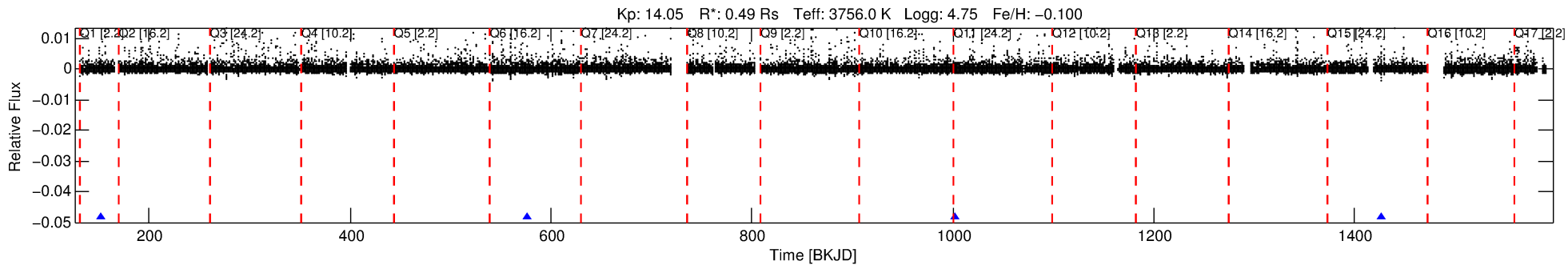
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007871438-01

No Significant Match Found

# DV One-Page Summary

KIC: 7871438 Candidate: 1 of 5 Period: 425.128 d



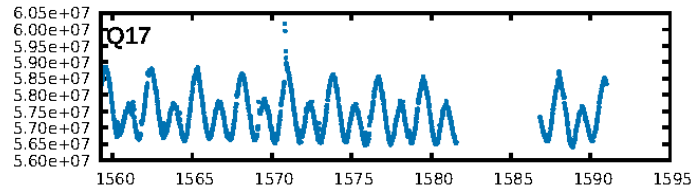
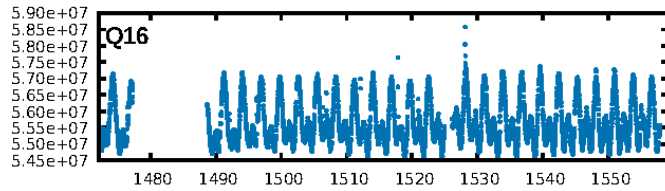
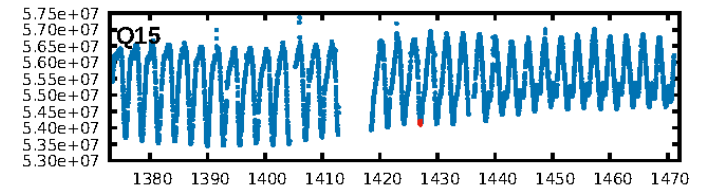
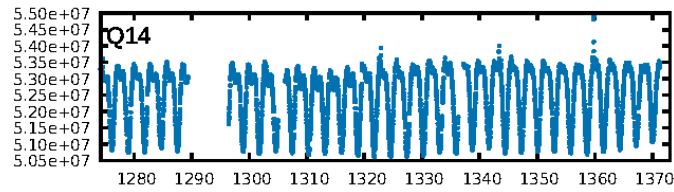
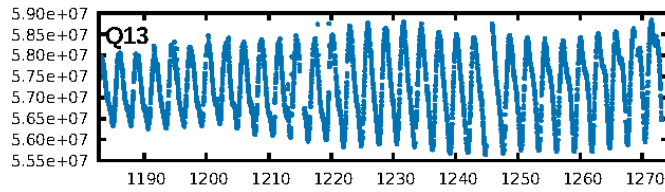
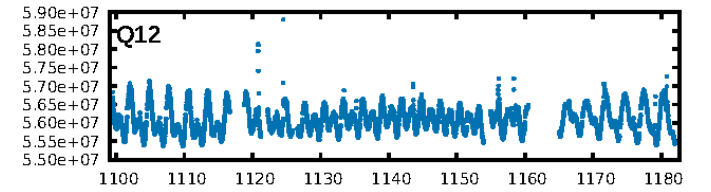
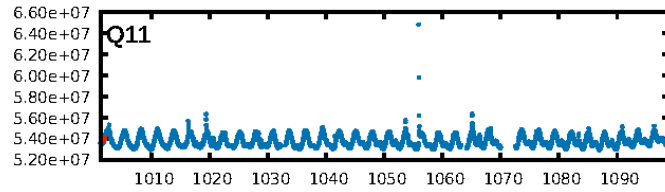
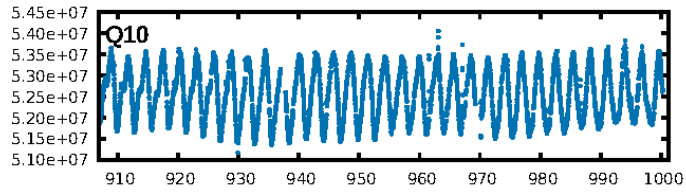
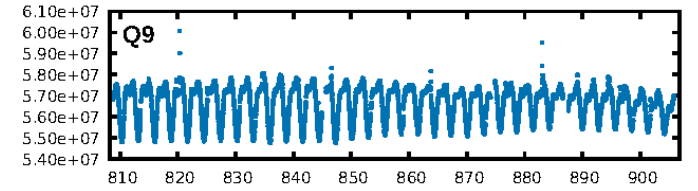
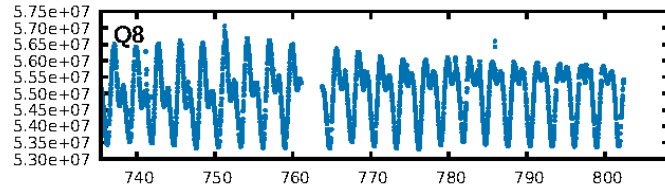
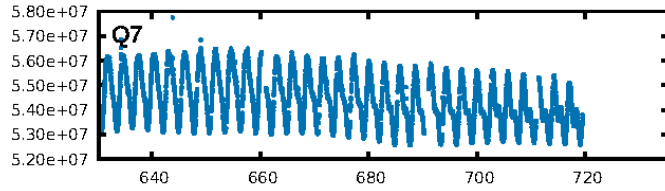
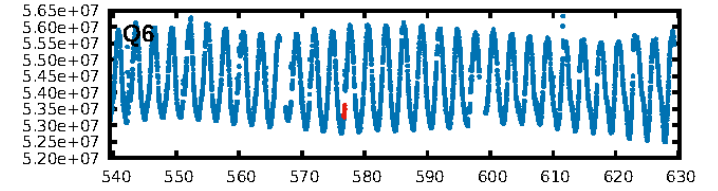
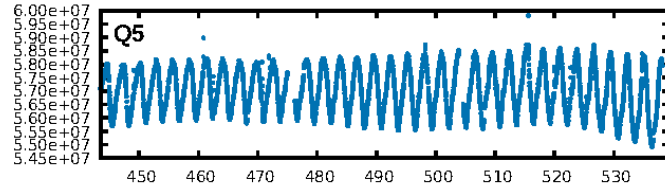
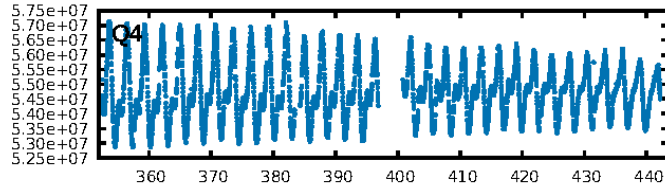
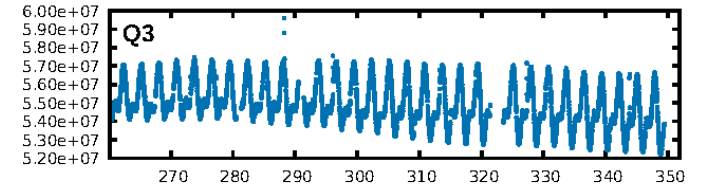
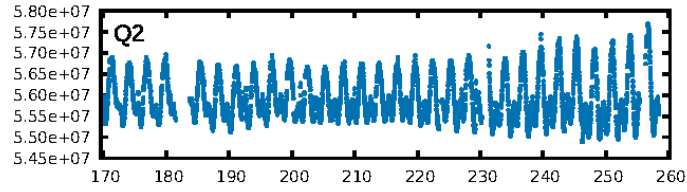
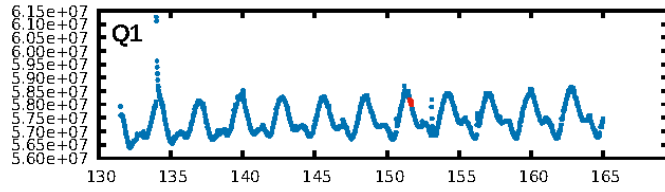
## DV Fit Results:

Period = 425.12819 [0.02048] d  
Epoch = 151.6394 [0.0416] BKJD  
Rp/R\* = 0.0207 [0.1098]  
a/R\* = 1033.36 [24516.89]  
b = 0.87 [6.77]  
Seff = 0.06 [0.00]  
Teq = 124 [3] K  
Rp = 1.12 [5.92] Re  
a = 0.8808 [0.0407] AU  
Ag = 29031.16 [335204.73] [0.09σ]  
Teffp = 2504 [7229] K [0.33σ]

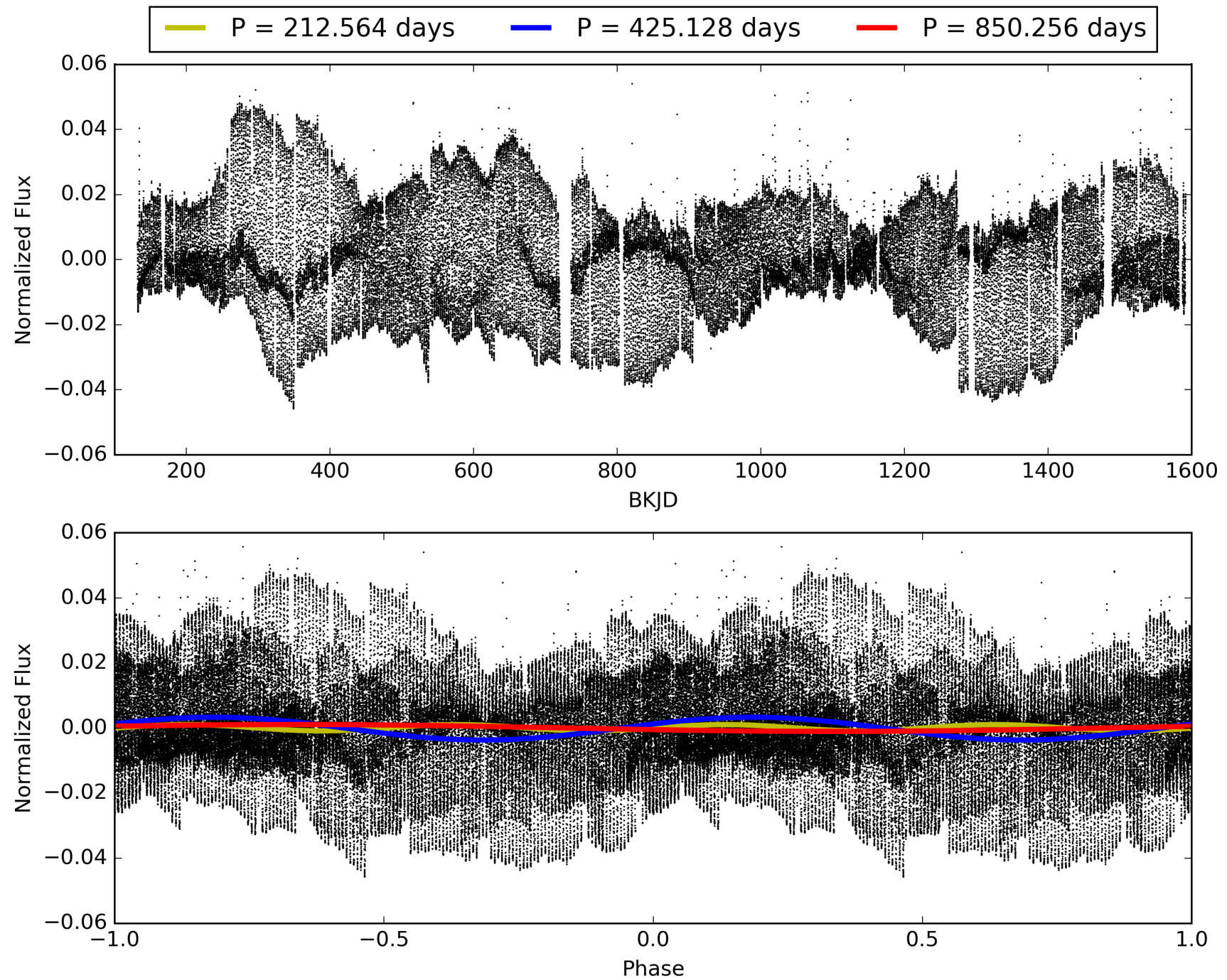
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [783.00σ]  
LongPeriod-sig: 100.0% [109.61σ]  
ModelChiSquare2-sig: 30.3%  
ModelChiSquareGof-sig: 99.1%  
Bootstrap-pfa: 1.08e-13  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -1.92  
Centroid-sig: 32.5%  
Centroid-so: 3.234 arcsec [1.17σ]  
OotOffset-rm: 0.216 arcsec [0.20σ]  
KicOffset-rm: 0.798 arcsec [1.54σ]  
OotOffset-st: 1/1/0/1 [3]  
KicOffset-st: 1/1/0/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 007871438-01, PDC Light Curves



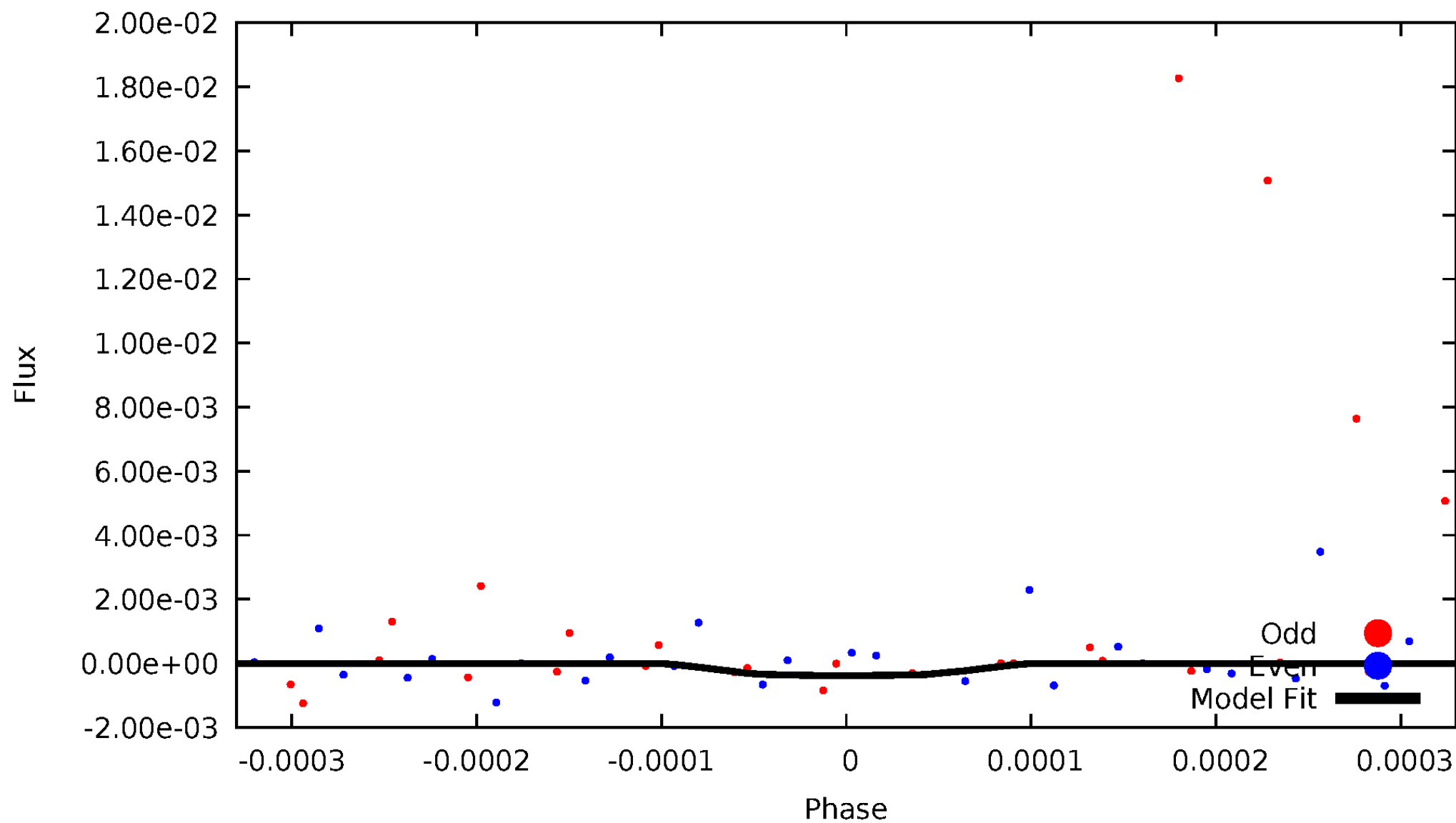
TCE 007871438-01





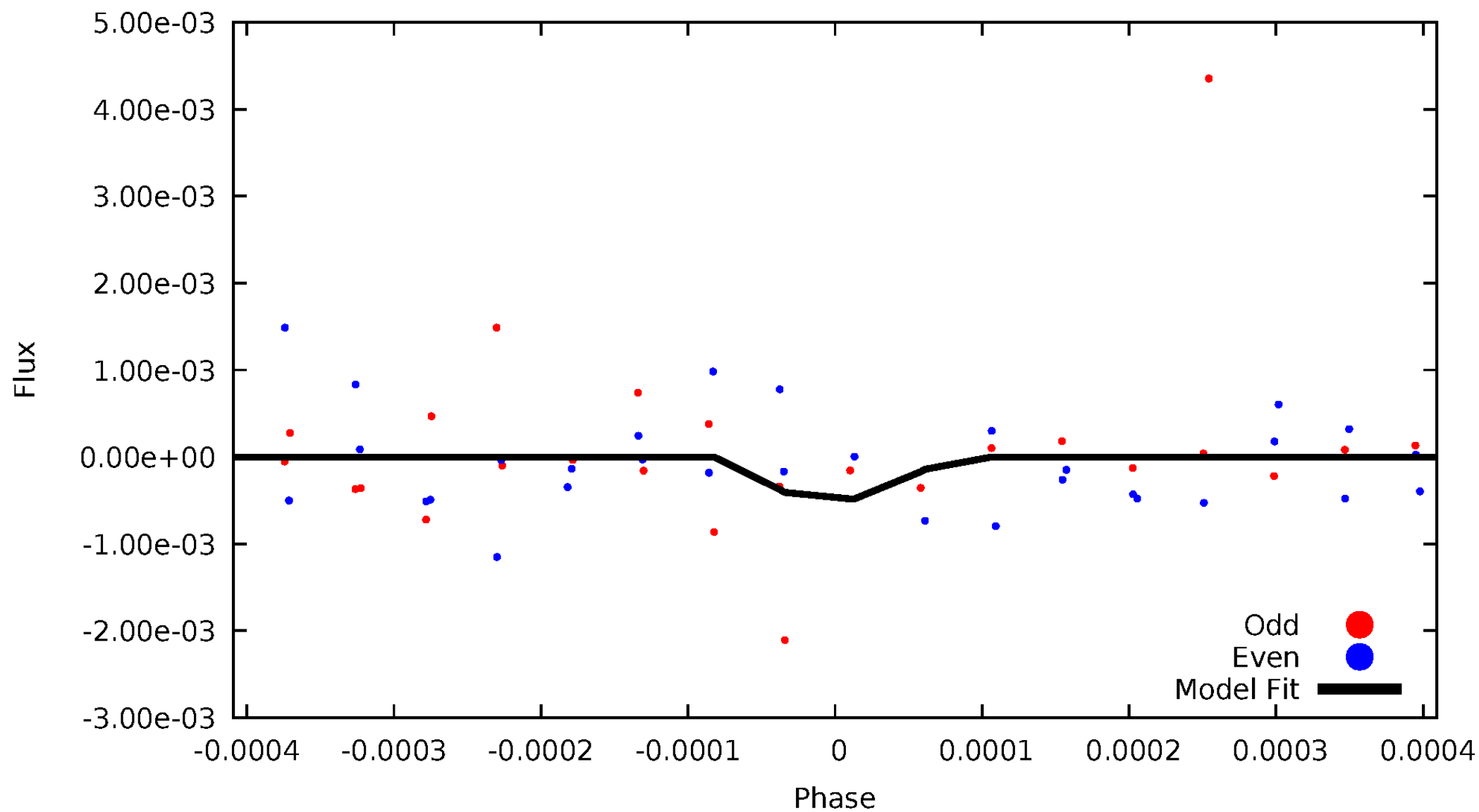
# DV Odd/Even

TCE 007871438-01



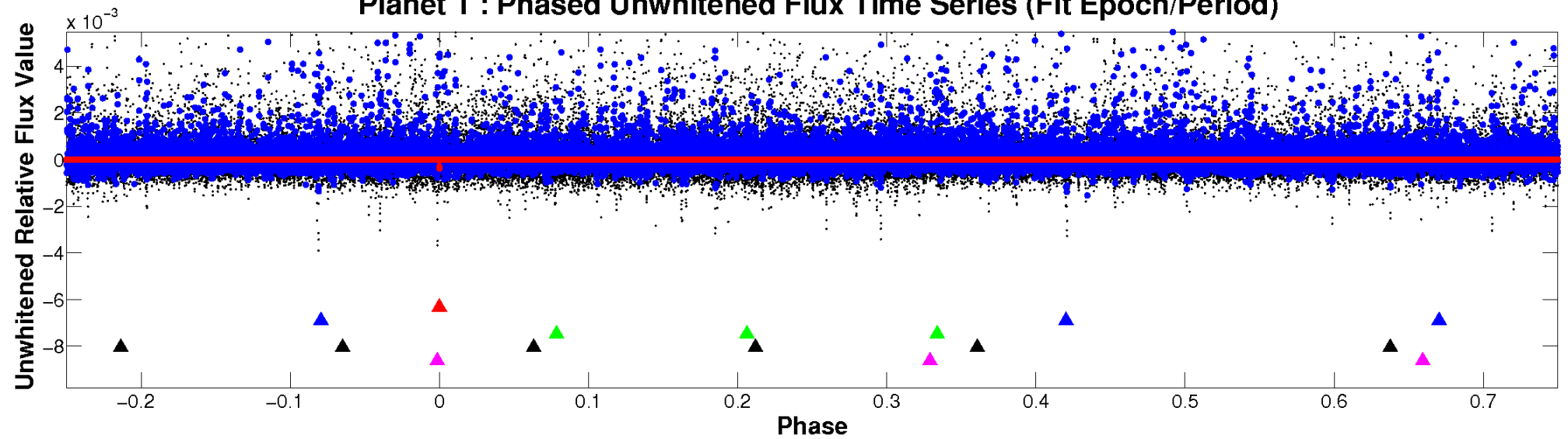
# ALT Odd/Even

TCE 007871438-01

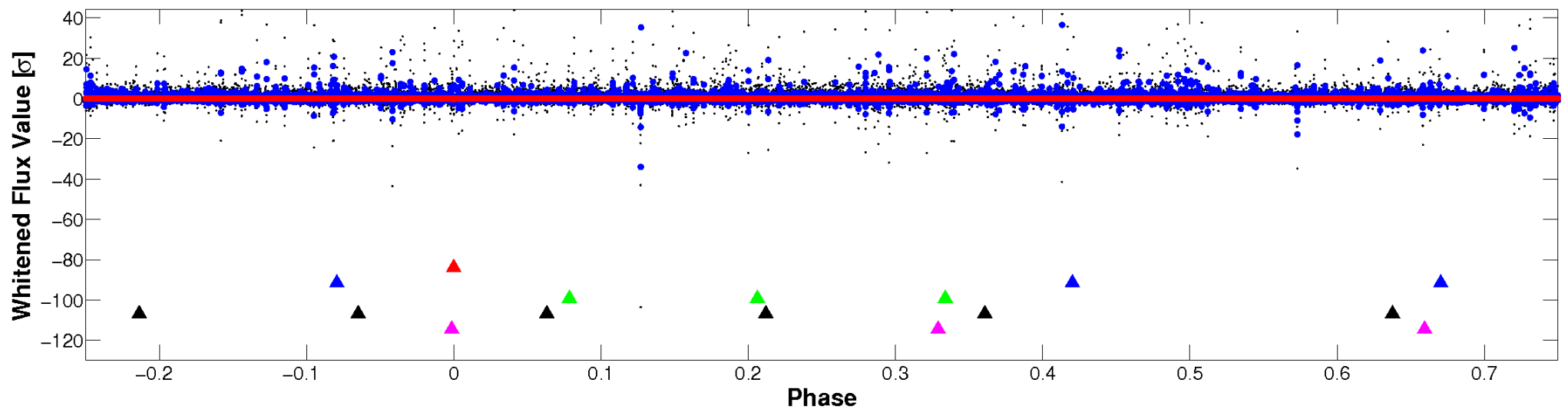


# Non-Whitened Vs. Whitened Light Curve

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

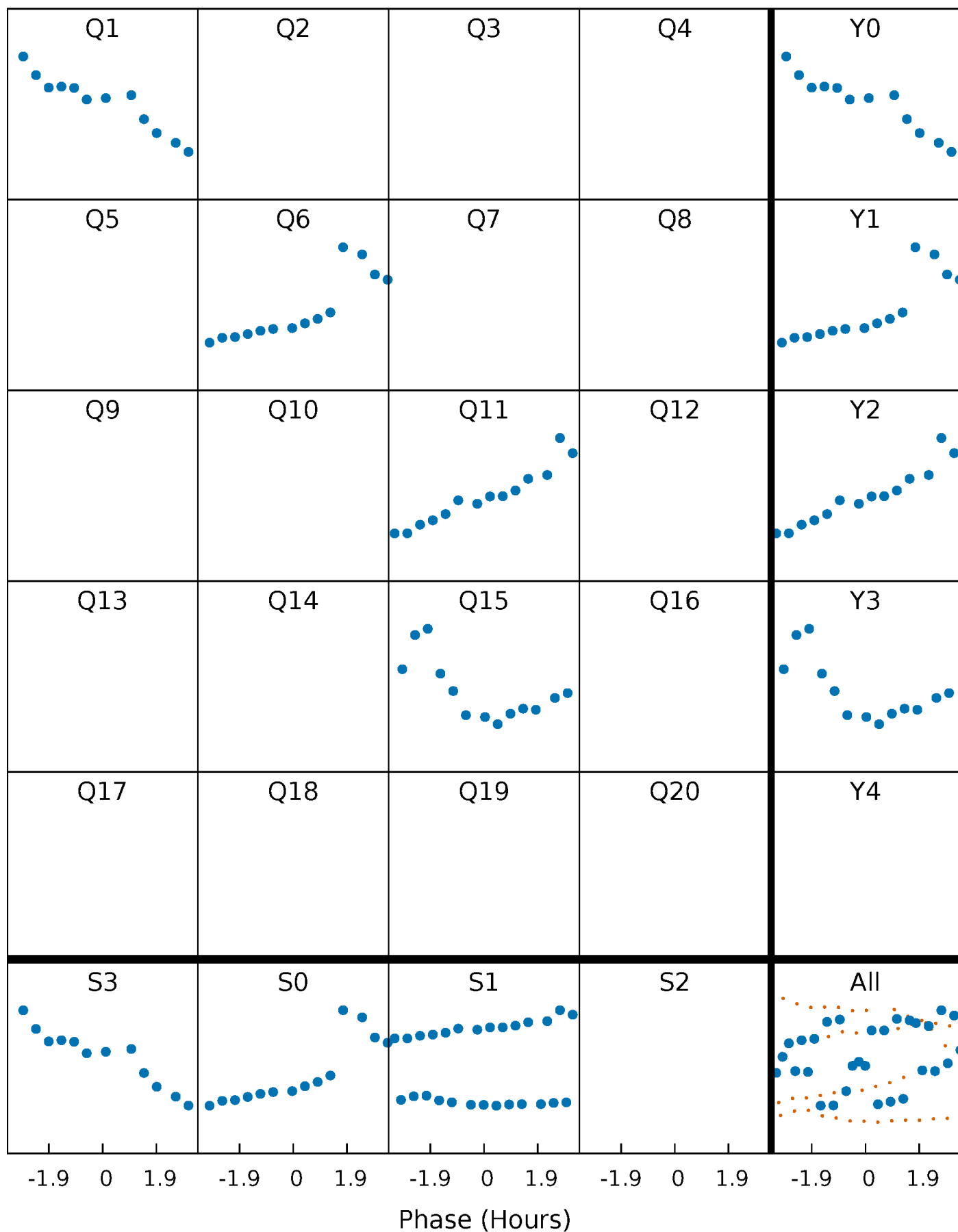


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

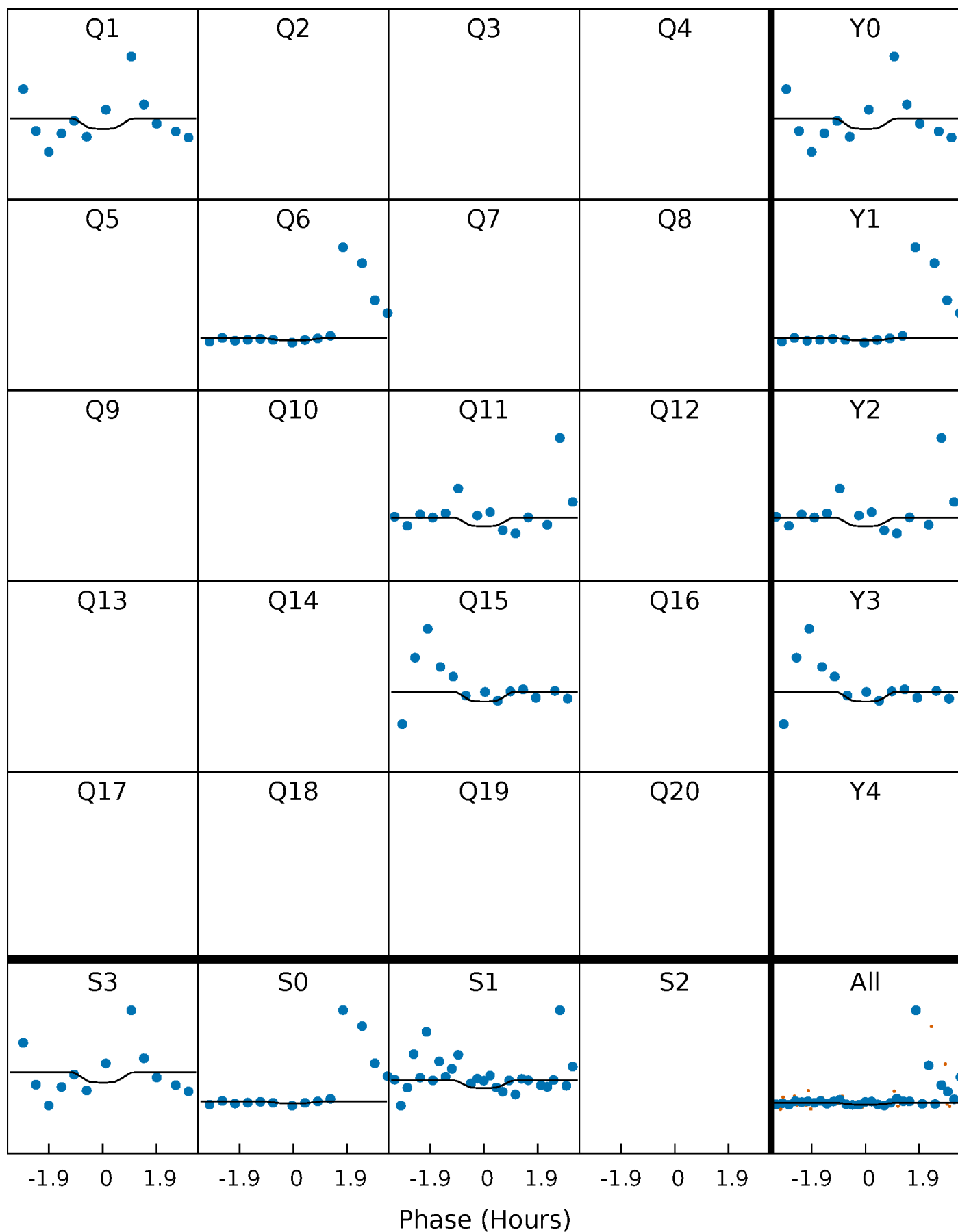
TCE 007871438-01 P=425.128191 Days  $T_0=151.639359$  (BKJD)





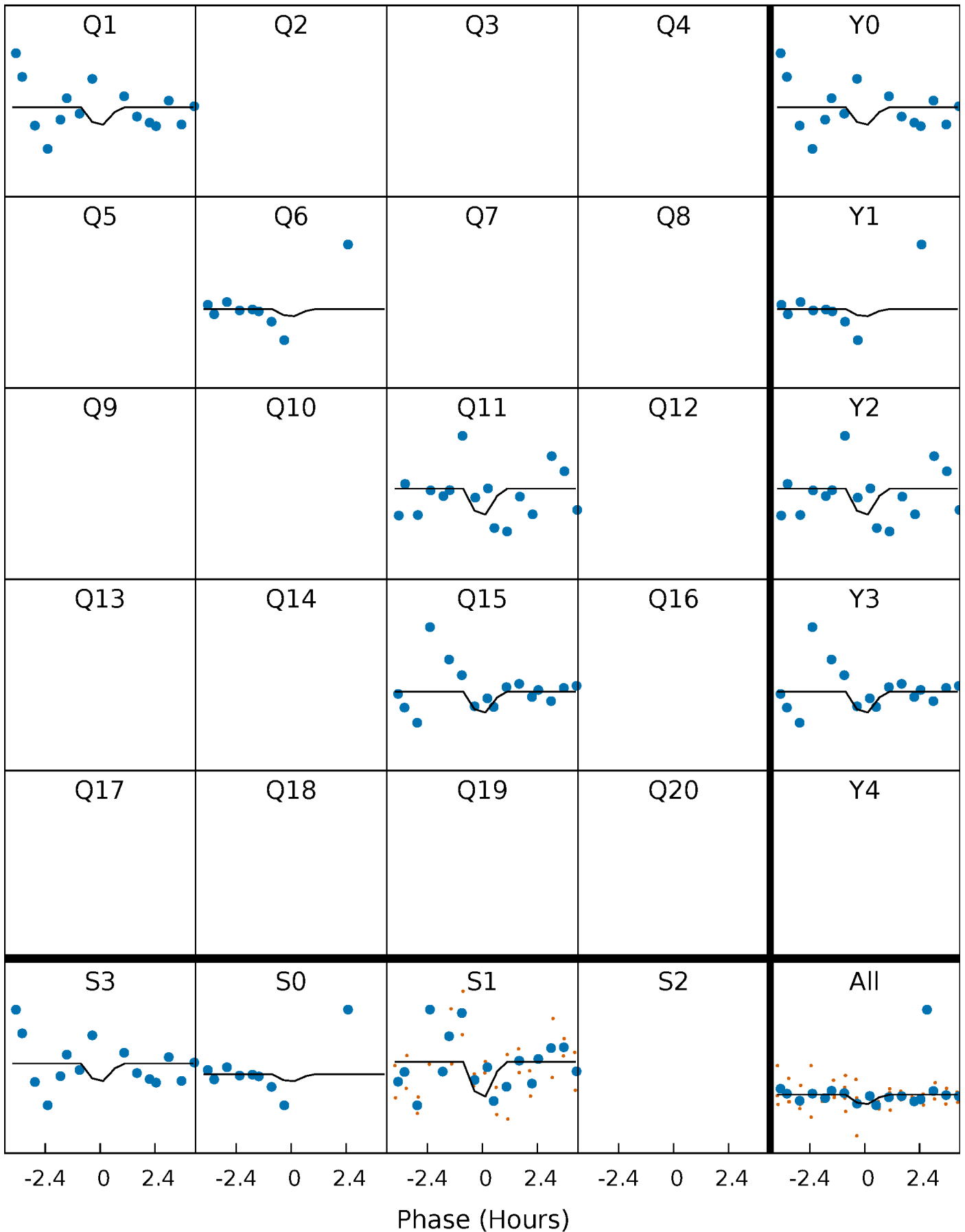
# DV Quarter-Phased Transit Curves

TCE 007871438-01 P=425.128191 Days  $T_0=151.639359$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

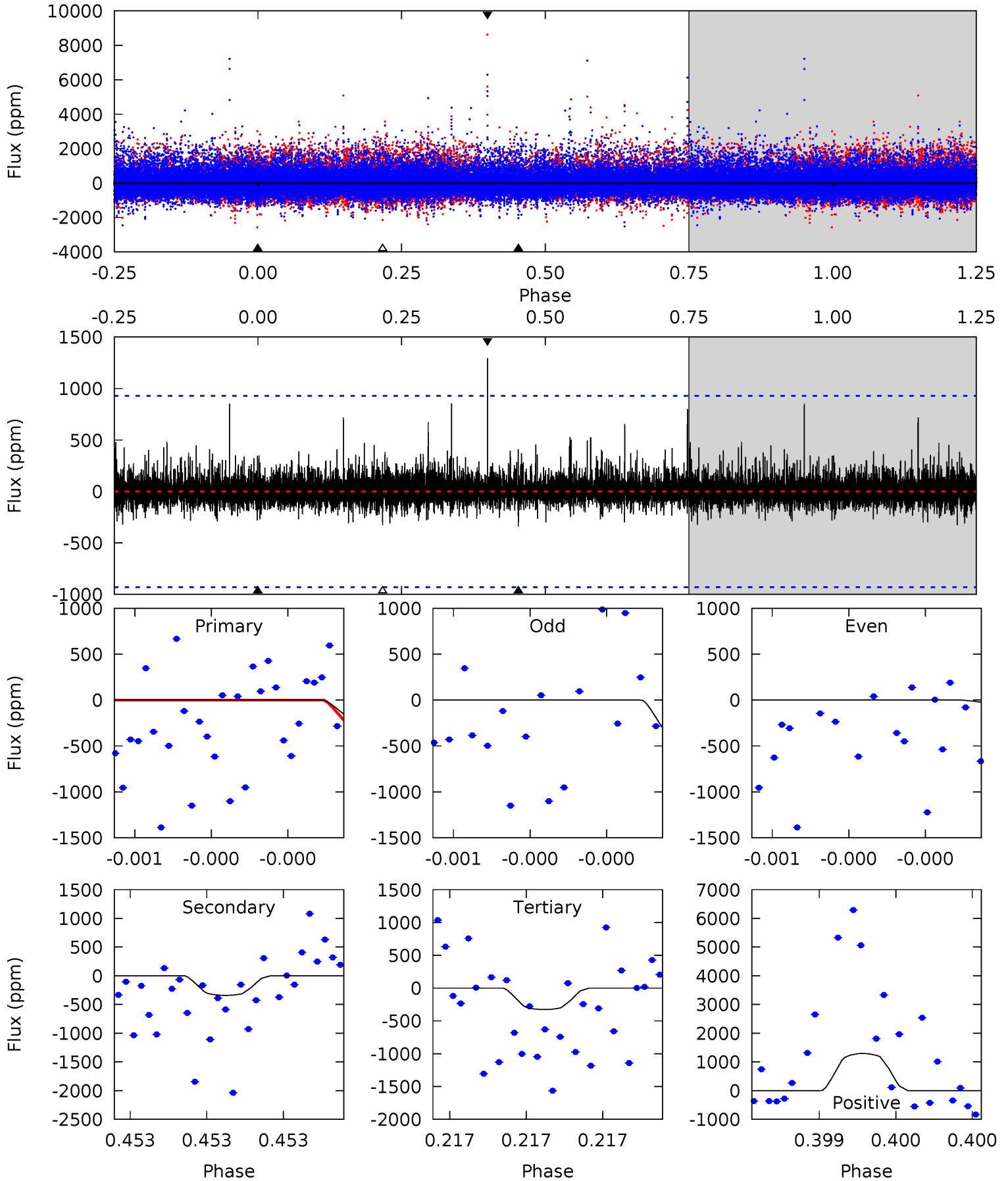
TCE 007871438-01 P=425.120216 Days  $T_0=151.656595$  (BKJD)



# DV Model-Shift Uniqueness Test

007871438-01, P = 425.128191 Days, E = 151.639359 Days

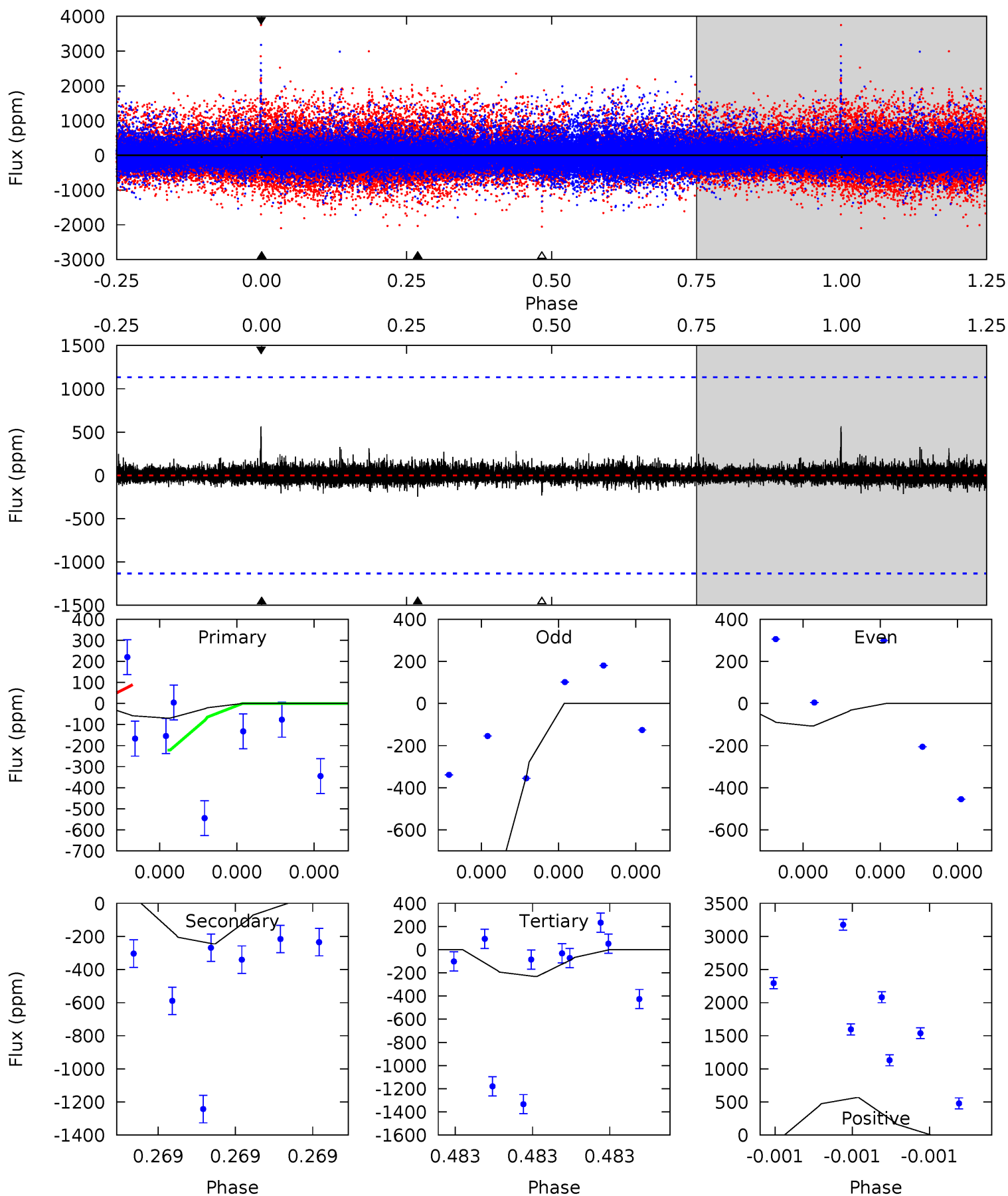
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.13	2.11	2.02	8.00	5.74	3.73	0.61	-0.89	-6.87	0.09	-5.89	0.76	1.14	0.79	0.54



# Alt Model-Shift Uniqueness Test

007871438-01, P = 425.120216 Days, E = 151.656595 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
0.36	1.26	1.20	2.92	5.85	3.89	0.25	-0.84	-2.56	0.07	-1.66	2.19	1.00	0.70	0





### Stellar Parameters For KIC 007871438

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3756^{+50}_{-45}$	$4.753^{+0.032}_{-0.017}$	$-0.100^{+0.100}_{-0.100}$	$0.494^{+0.022}_{-0.029}$	$0.503^{+0.025}_{-0.025}$	$5.896^{+0.797}_{-0.457}$
	+1%/-1%	+1%/-0%	+100%/-100%	+4%/-6%	+5%/-5%	+14%/-8%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 007871438-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-341 \pm 162$	$4.48^{+4.30}_{-3.15}$	$173^{+3}_{-2}$	$2422^{+990}_{-355}$	$6567^{+78095}_{-4968}$
Alt.	$-245 \pm 194$	$4.50^{+4.85}_{-3.05}$	$173^{+3}_{-2}$	$2291^{+788}_{-484}$	$4089^{+37664}_{-3683}$

$T_{max}$  = 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

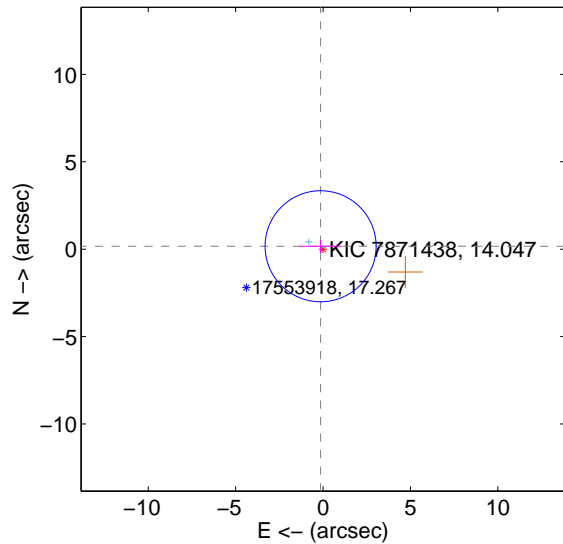
Supplemental centroid analysis for 007871438-01. Kepler magnitude: 14.05. Transit SNR 1.37

There are 2 quarters with good PRF difference image offsets

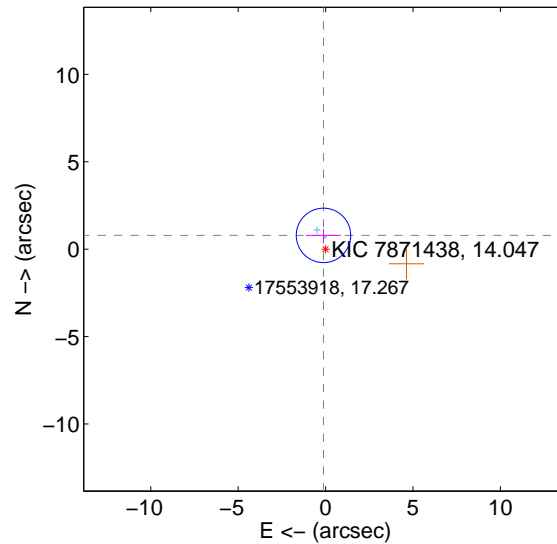
The direct PRF centroid is offset from the target star catalog position by about 0.61 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.216 \pm 1.059$	0.20	$0.139 \pm 1.207$	$0.166 \pm 0.376$
PRF-fit source offset from KIC position	$0.798 \pm 0.519$	1.54	$0.120 \pm 1.003$	$0.789 \pm 0.376$
photometric centroid source offset	$3.23 \pm 2.77$	1.17	$0.12 \pm 3.14$	$3.23 \pm 2.77$

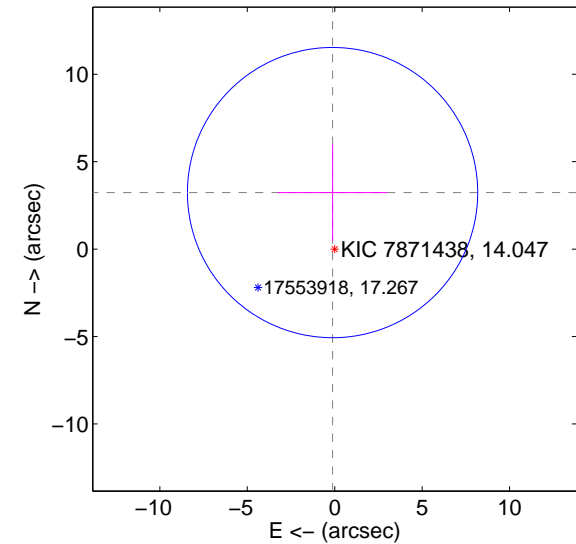
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

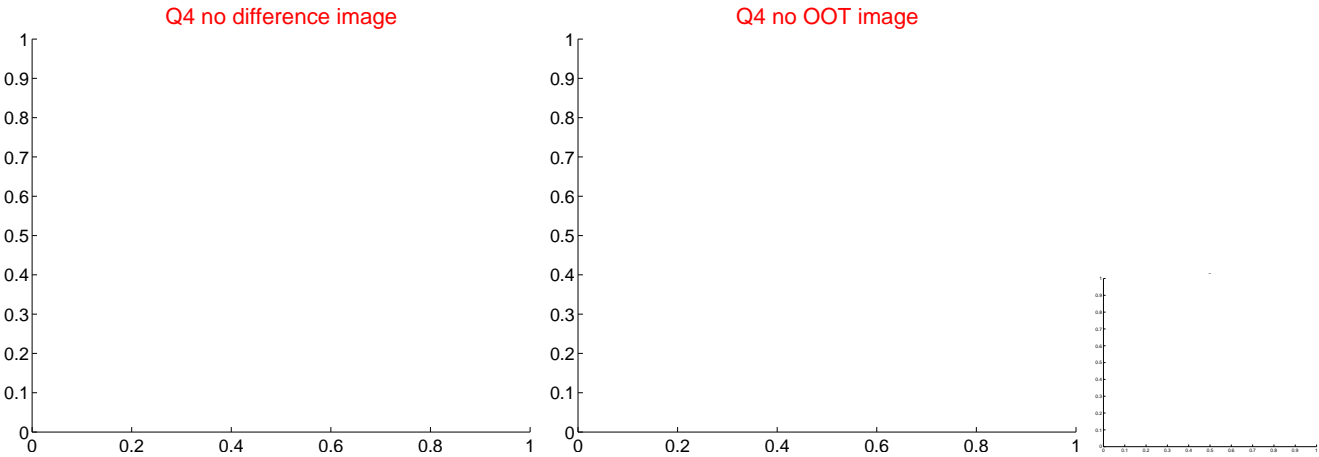
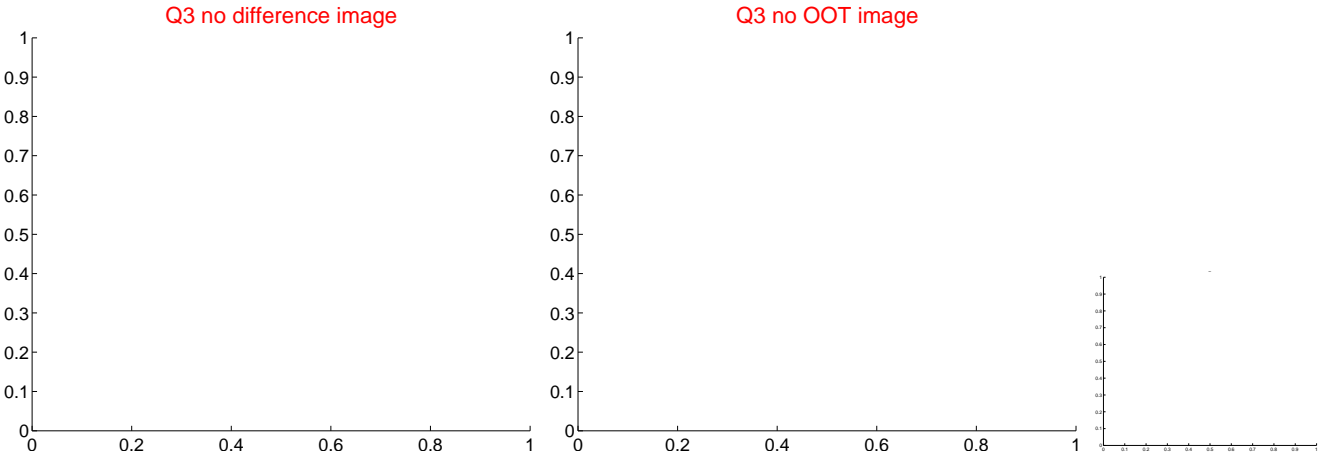
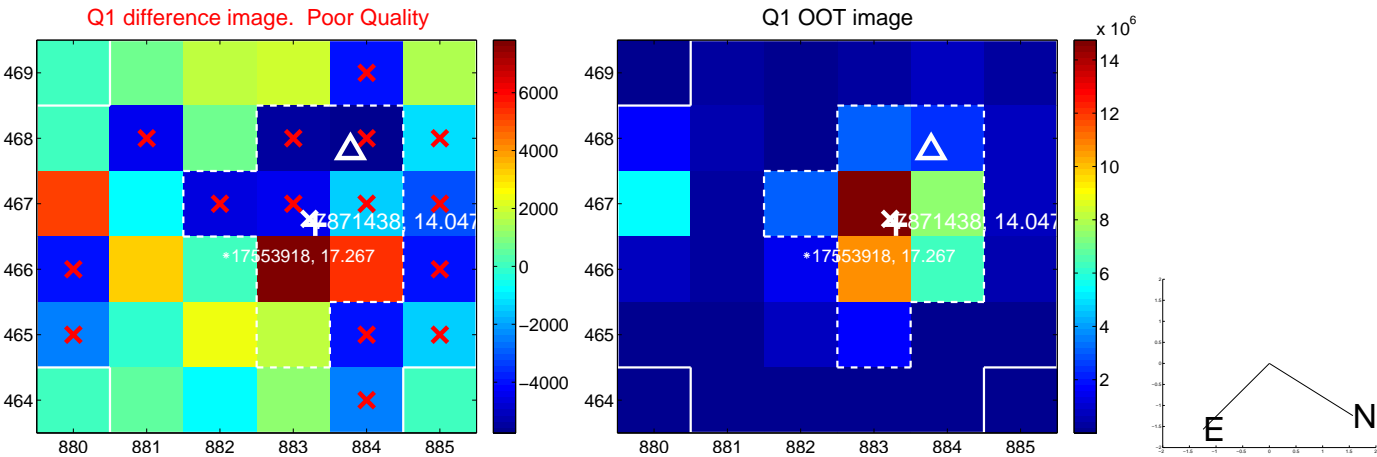


offset from photometric centroids



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

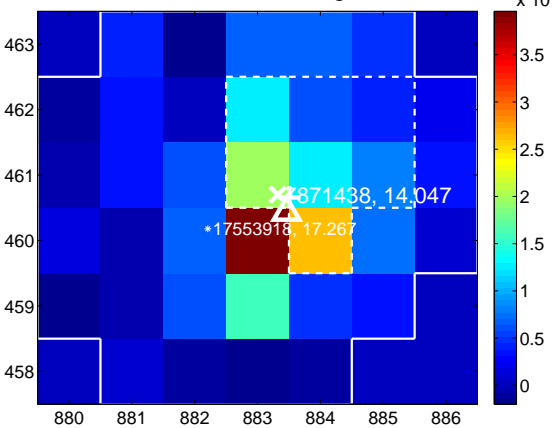
Q5 no difference image



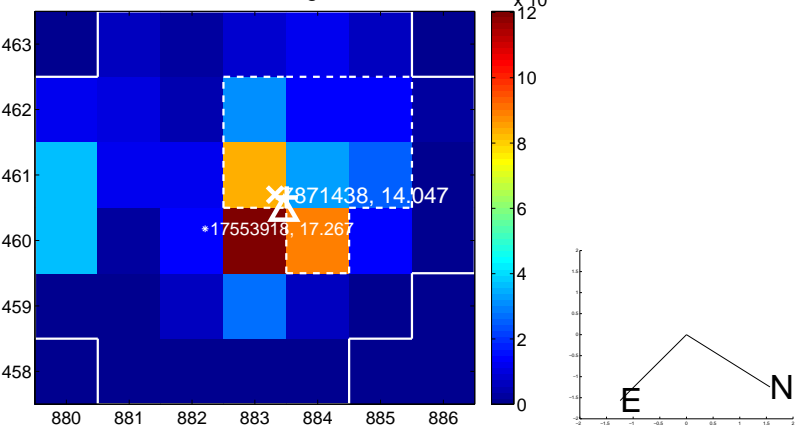
Q5 no OOT image



Q6 difference image



Q6 OOT image



Q7 no difference image



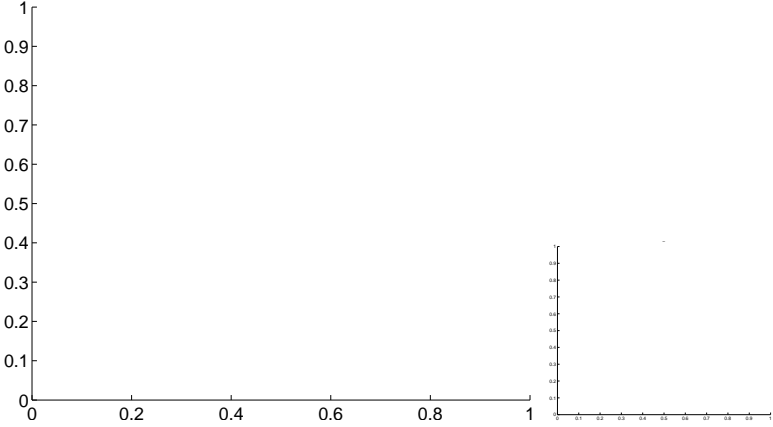
Q7 no OOT image



Q8 no difference image



Q8 no OOT image

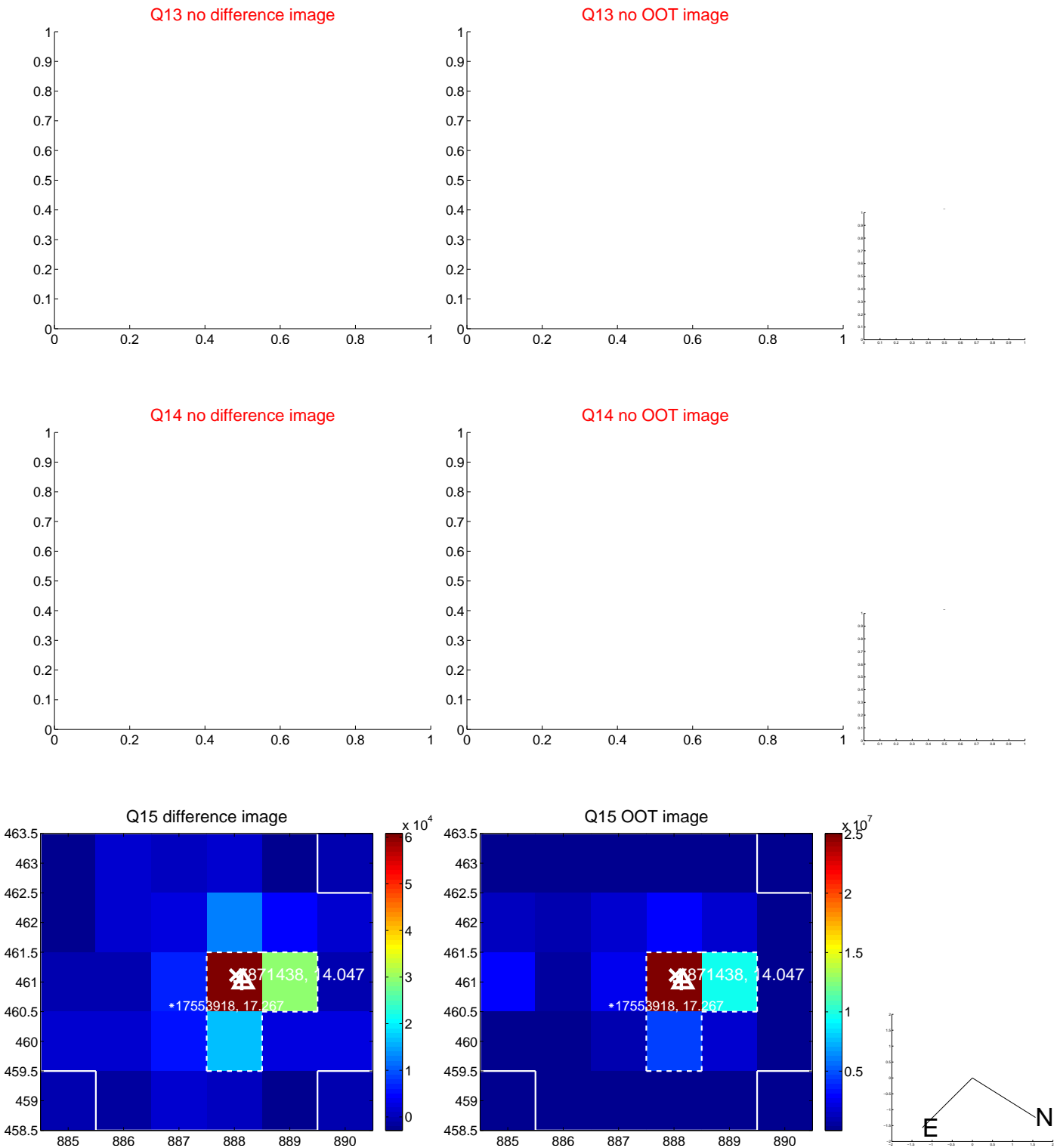




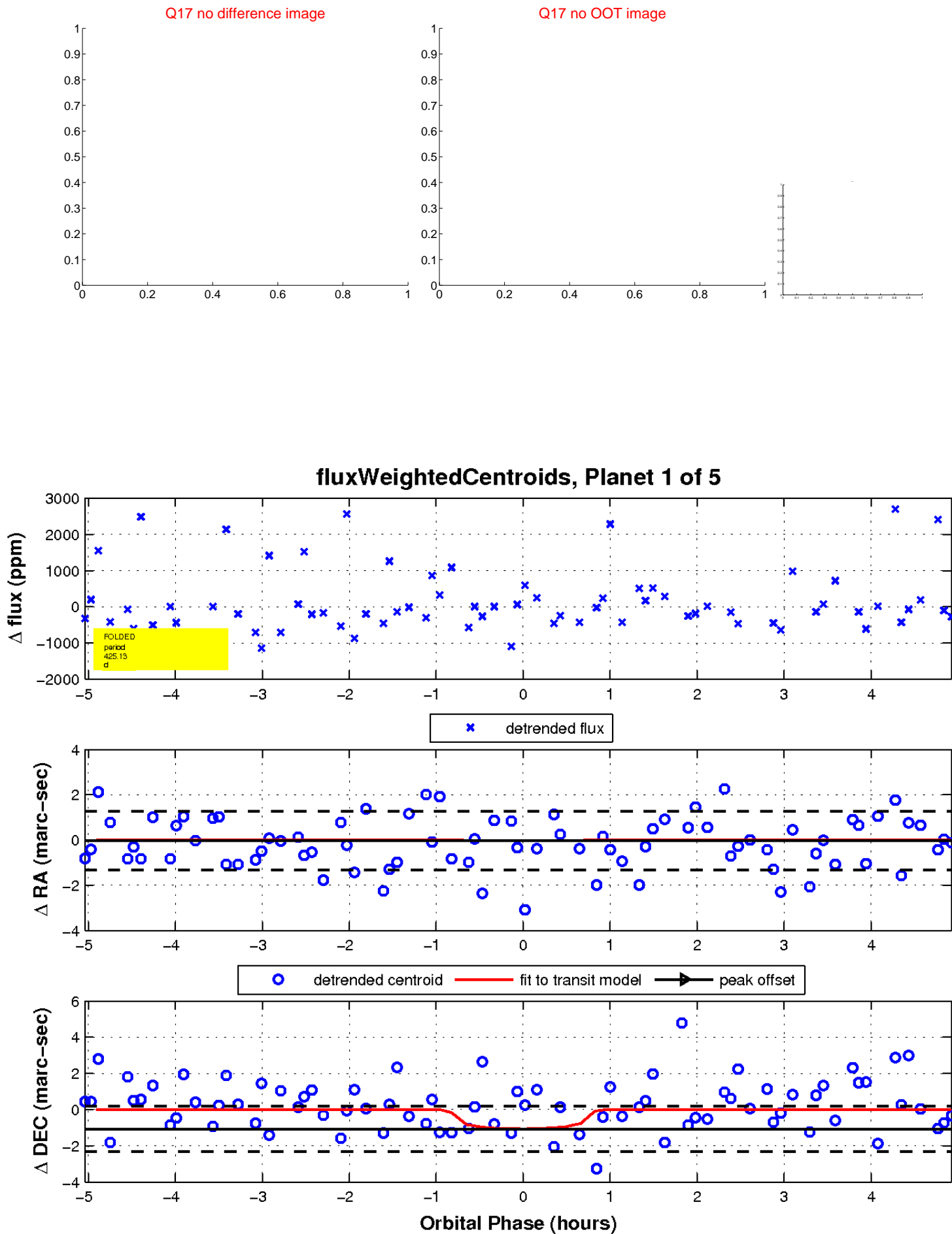
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white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



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UKIRT Image





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007871438-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
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007871438-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS
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N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

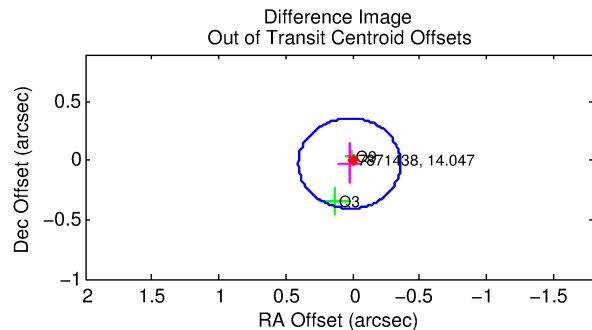
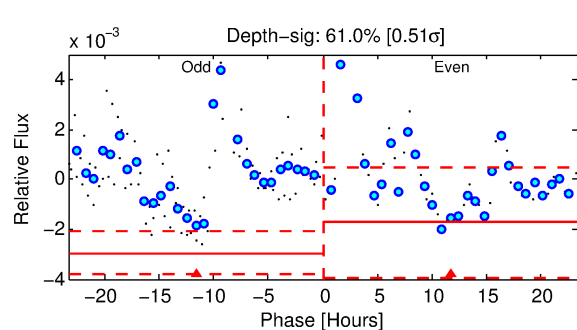
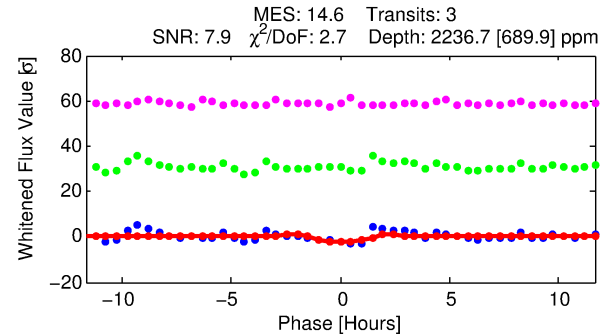
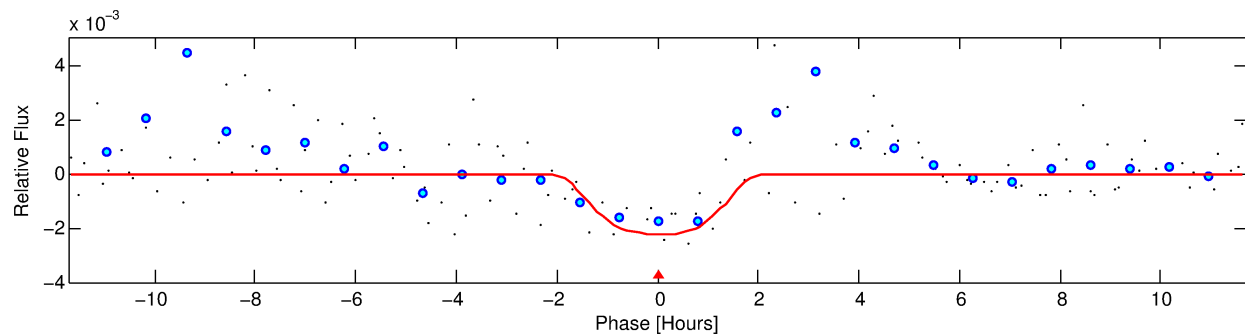
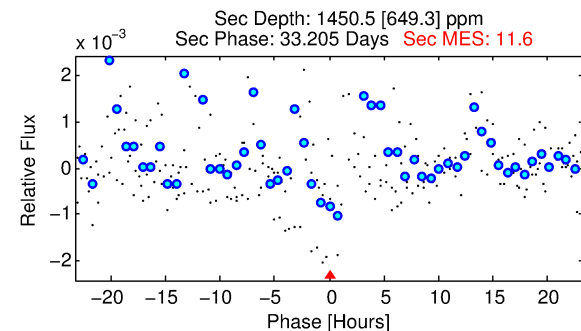
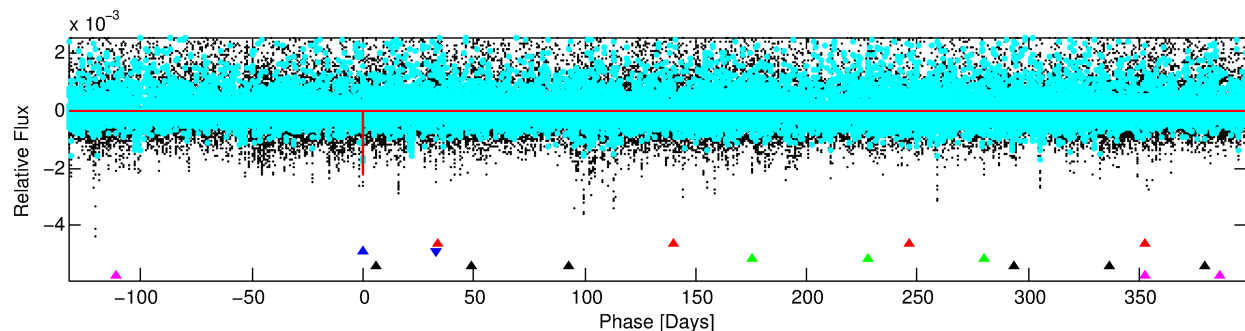
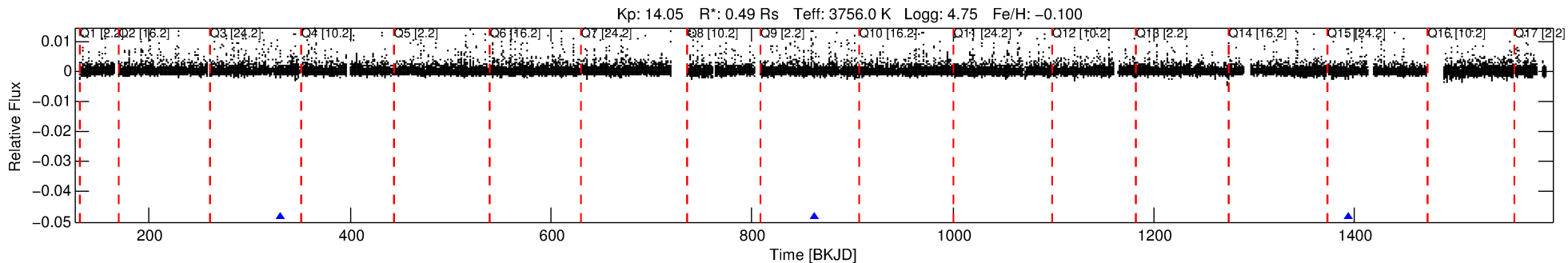
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007871438-02

No Significant Match Found

# DV One-Page Summary

KIC: 7871438 Candidate: 2 of 5 Period: 531.504 d



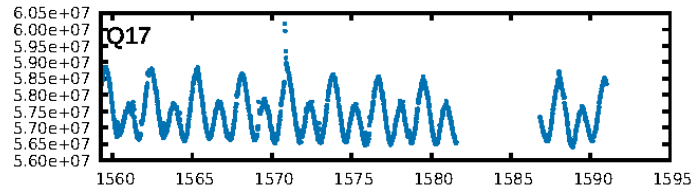
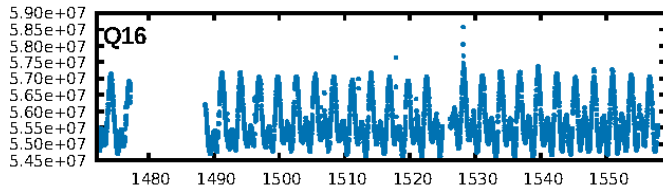
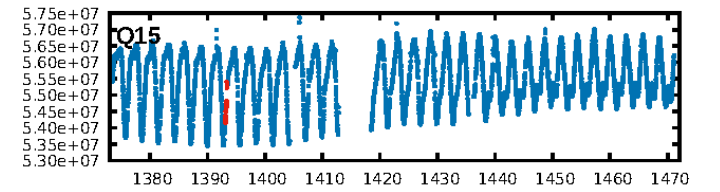
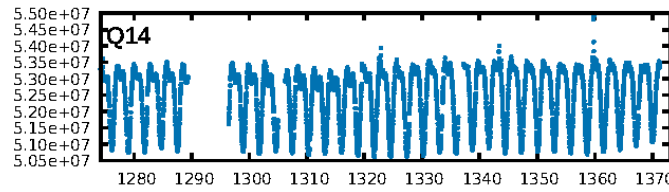
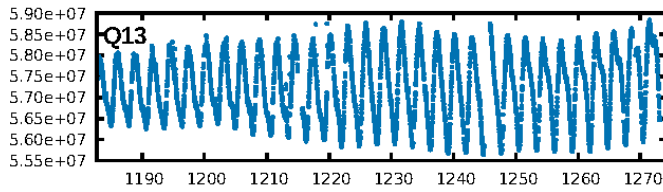
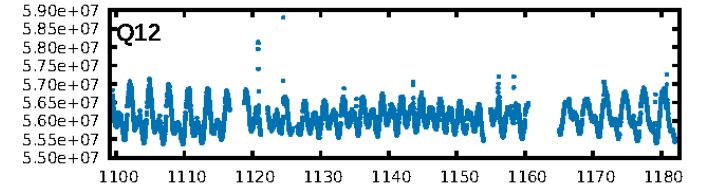
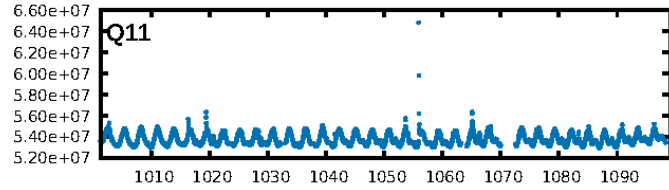
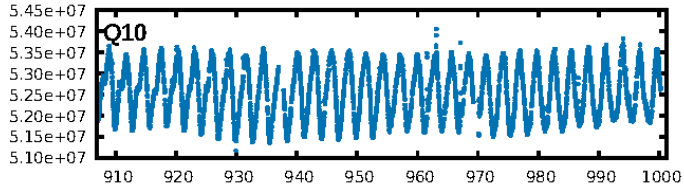
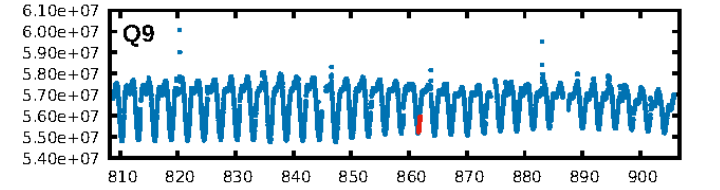
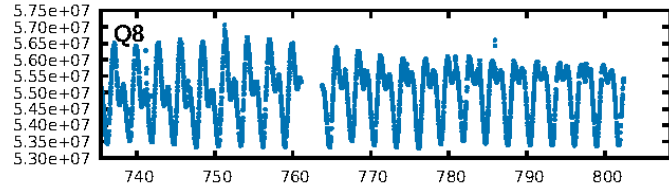
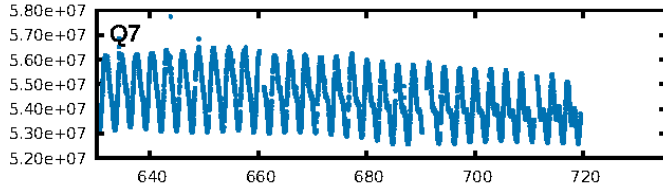
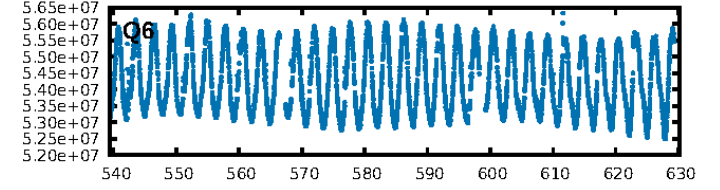
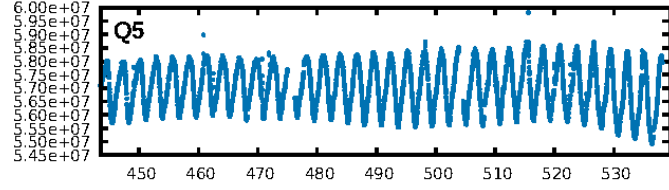
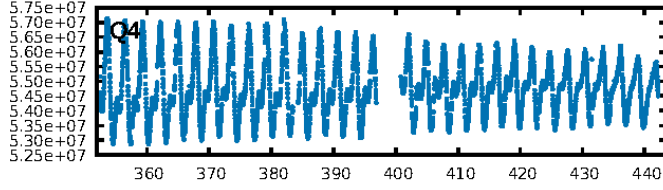
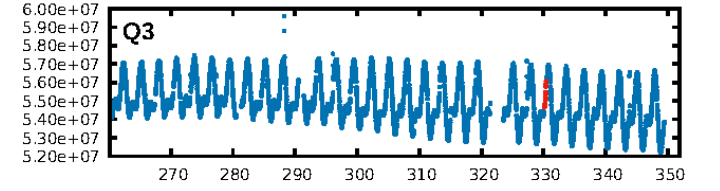
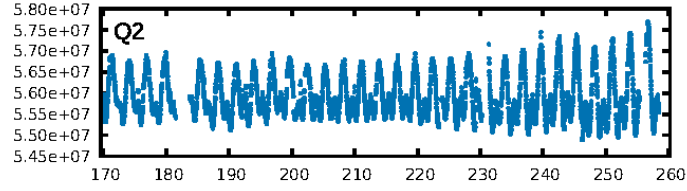
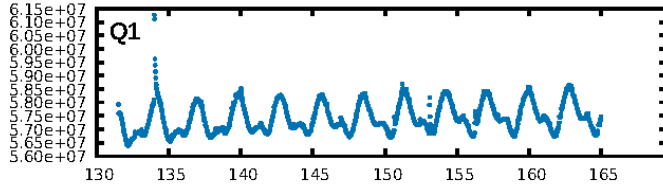
## DV Fit Results:

Period = 531.50436 [0.01029] d  
Epoch = 330.2733 [0.0130] BKJD  
Rp/R\* = 0.0537 [0.0116]  
a/R\* = 515.72 [202.79]  
b = 0.93 [0.06]  
Seff = 0.04 [0.00]  
Teq = 115 [2] K  
Rp = 2.89 [0.65] Re  
a = 1.0222 [0.0472] AU  
Ag = 99492.50 [62215.01] [1.60σ]  
Teffp = 3163 [494] K [6.17σ]

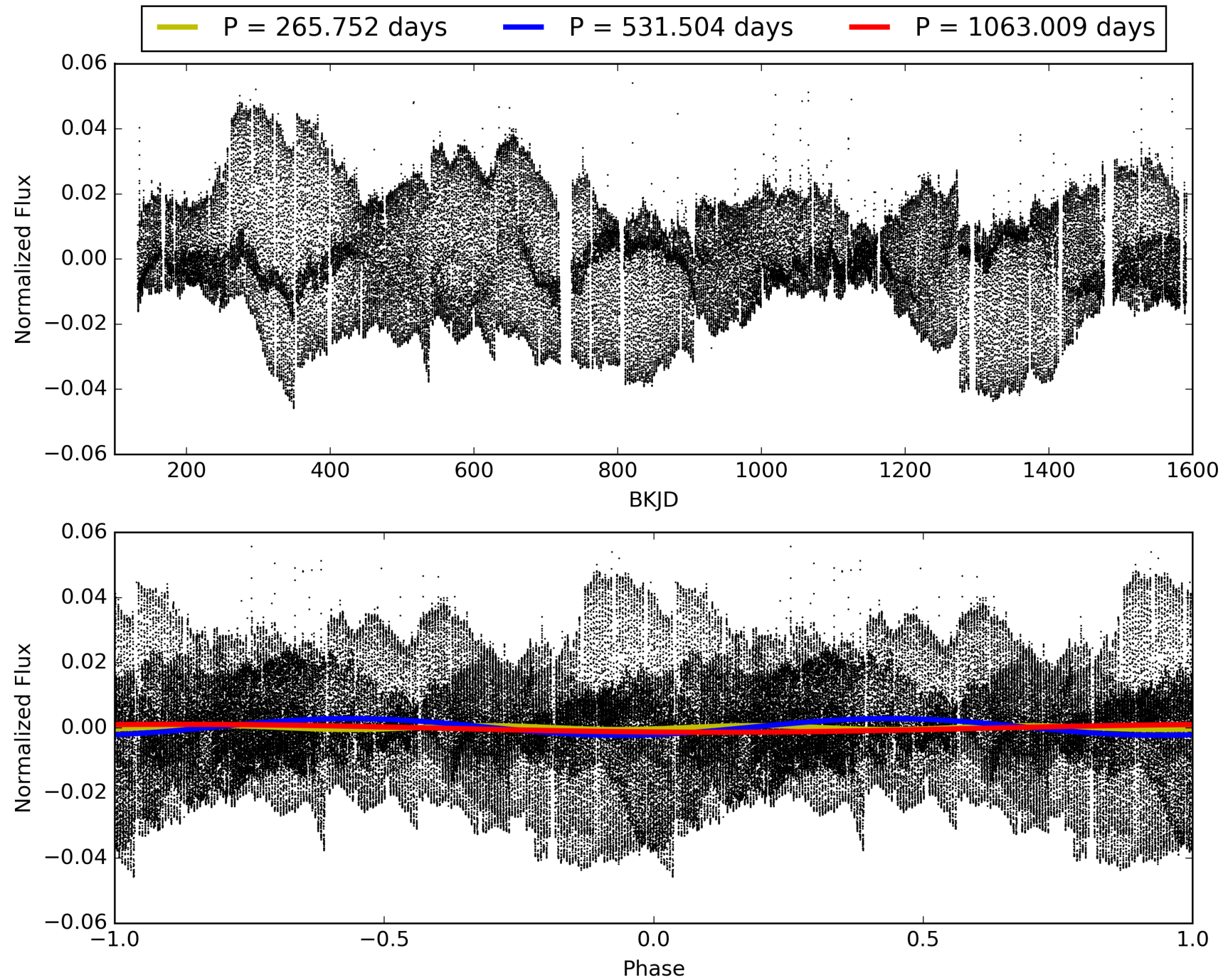
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [100.92σ]  
LongPeriod-sig: 100.0% [158.85σ]  
ModelChiSquare2-sig: 12.0%  
ModelChiSquareGof-sig: 91.8%  
Bootstrap-pfa: 3.64e-11  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.066  
Centroid-sig: 81.4%  
Centroid-so: 0.527 arcsec [1.28σ]  
OotOffset-rm: 0.035 arcsec [0.28σ]  
OotOffset-st: 0/1/0/1 [2]  
KicOffset-rm: 0.464 arcsec [2.32σ]  
KicOffset-st: 0/1/0/1 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [2/2]

# TCE 007871438-02, PDC Light Curves

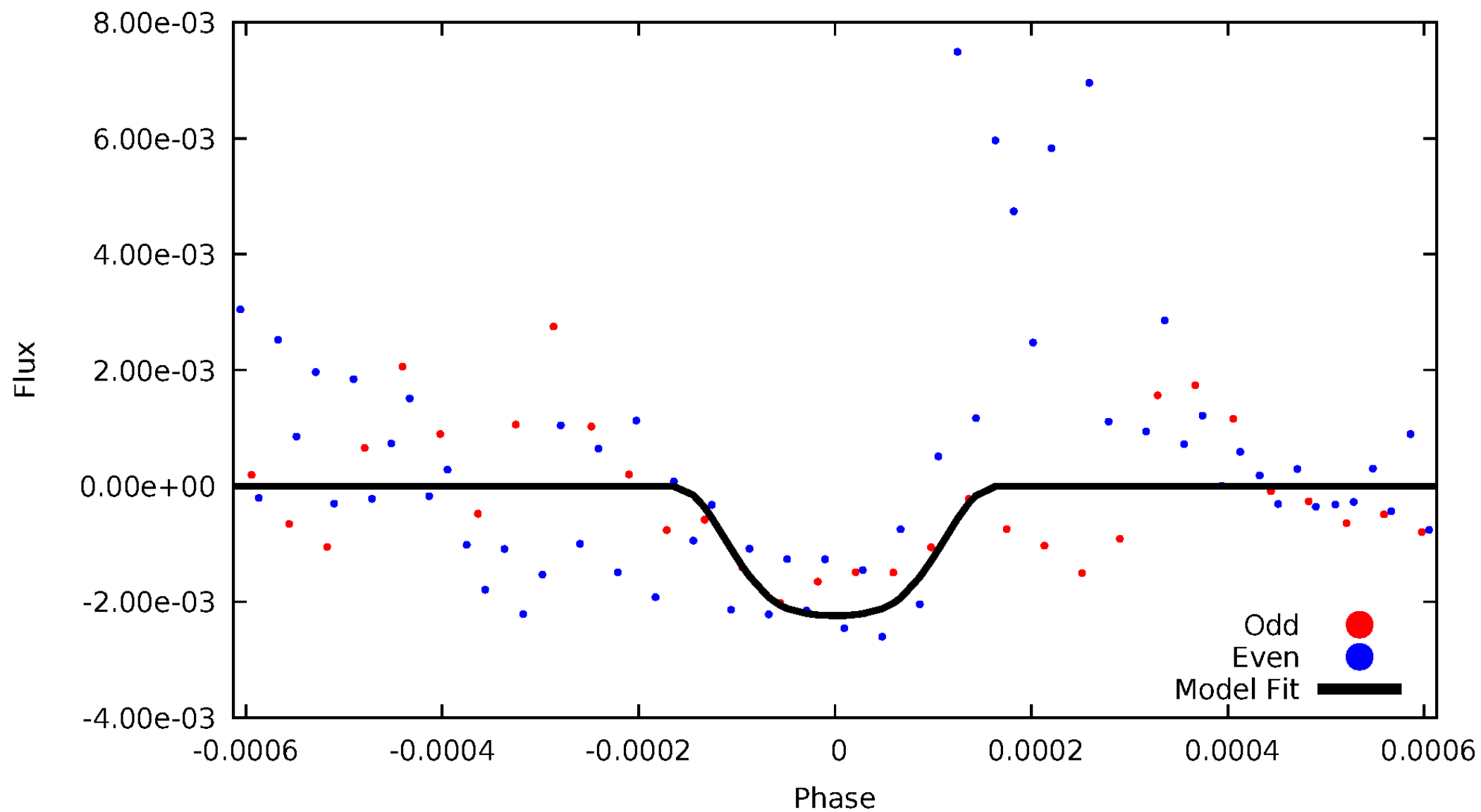


TCE 007871438-02



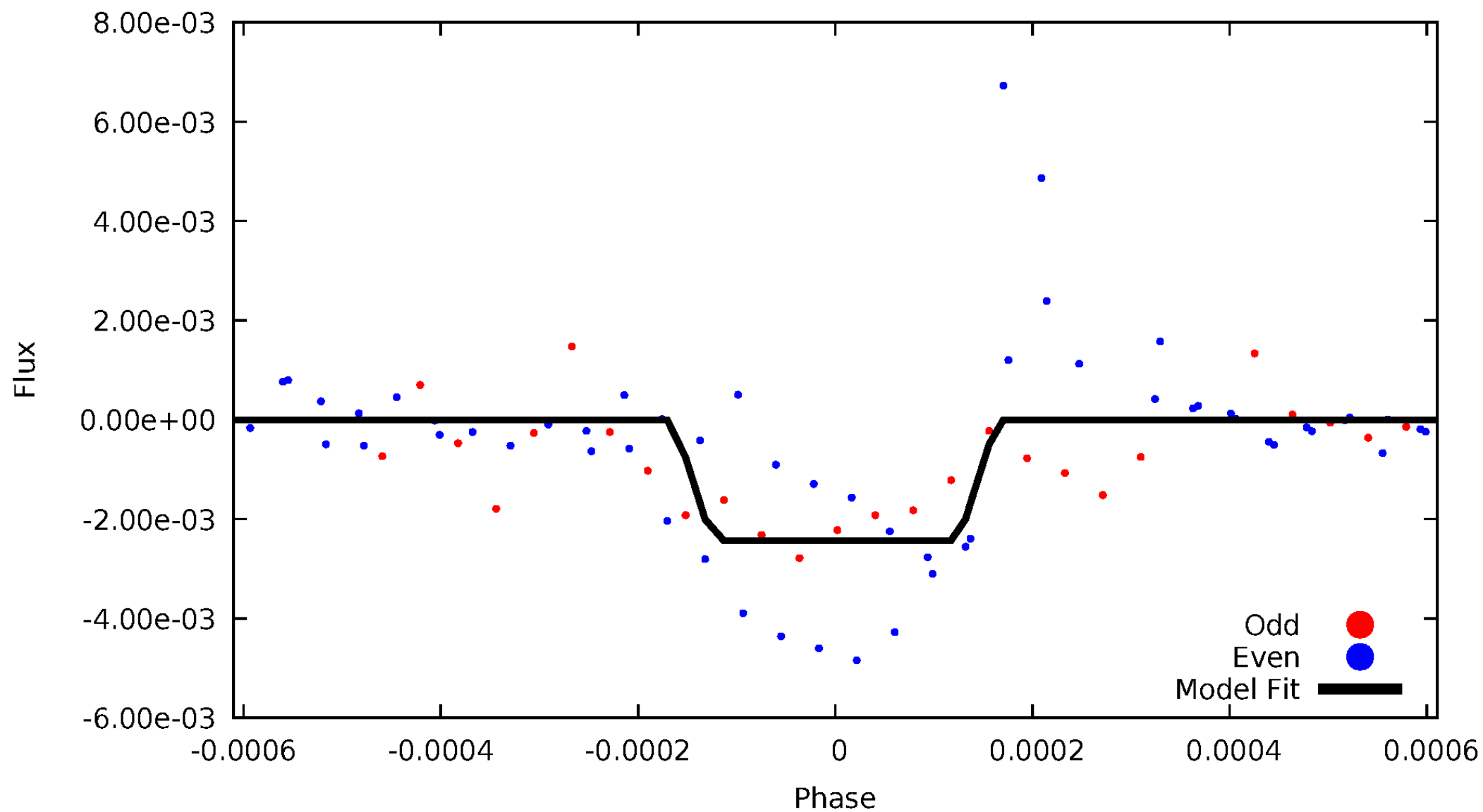
# DV Odd/Even

TCE 007871438-02



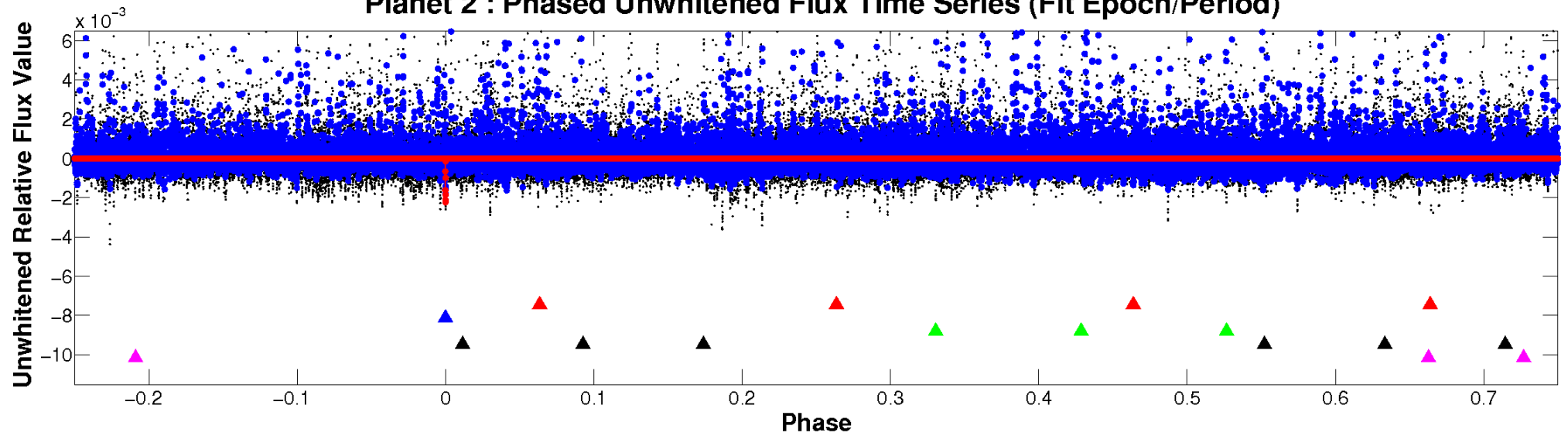
# ALT Odd/Even

TCE 007871438-02

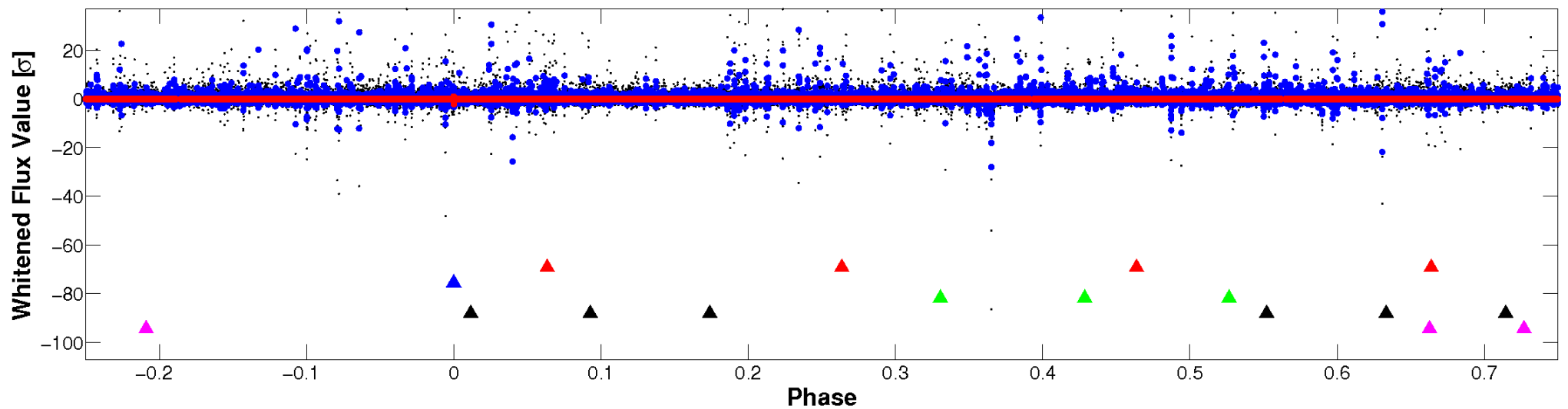


# Non-Whitened Vs. Whitened Light Curve

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



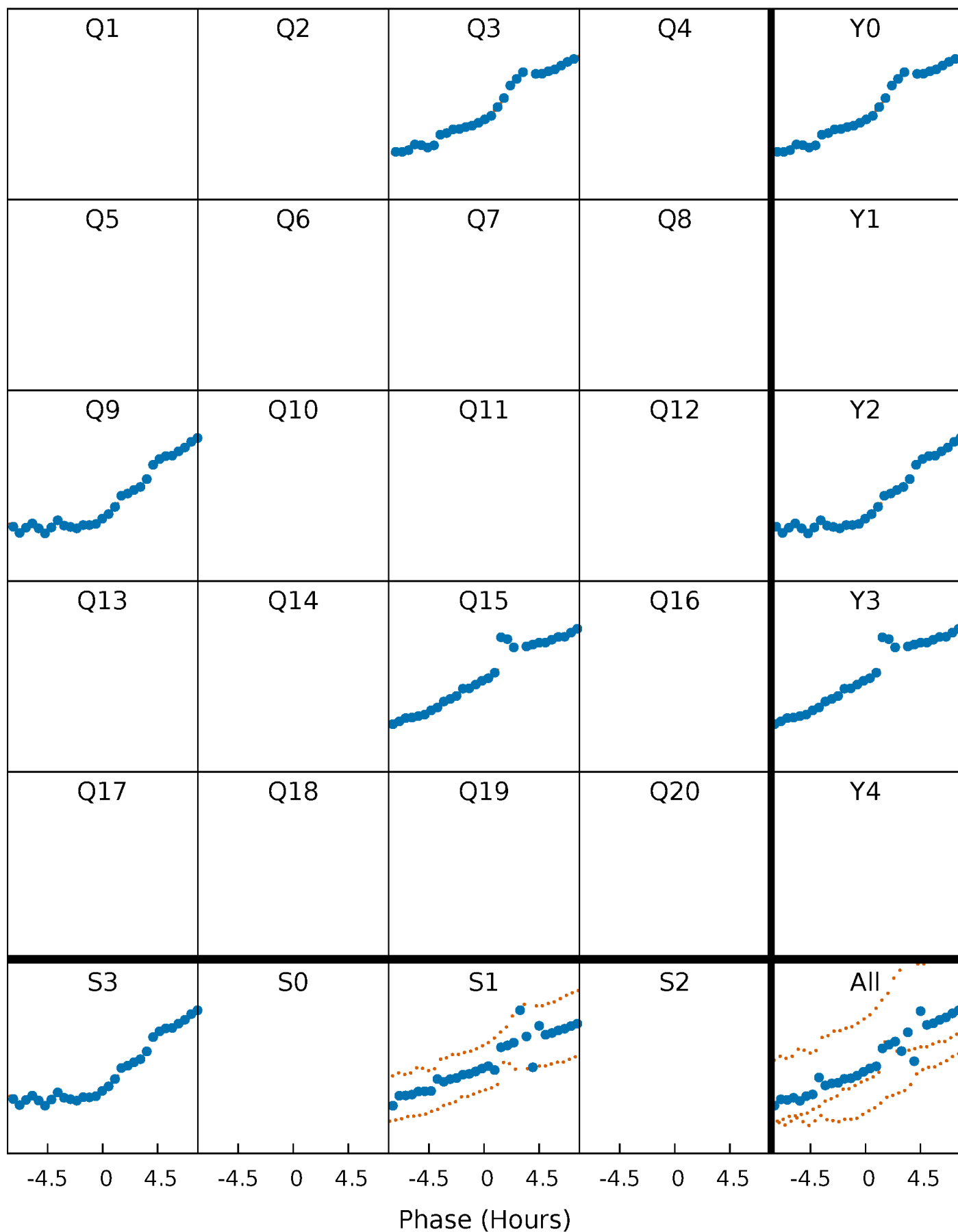
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

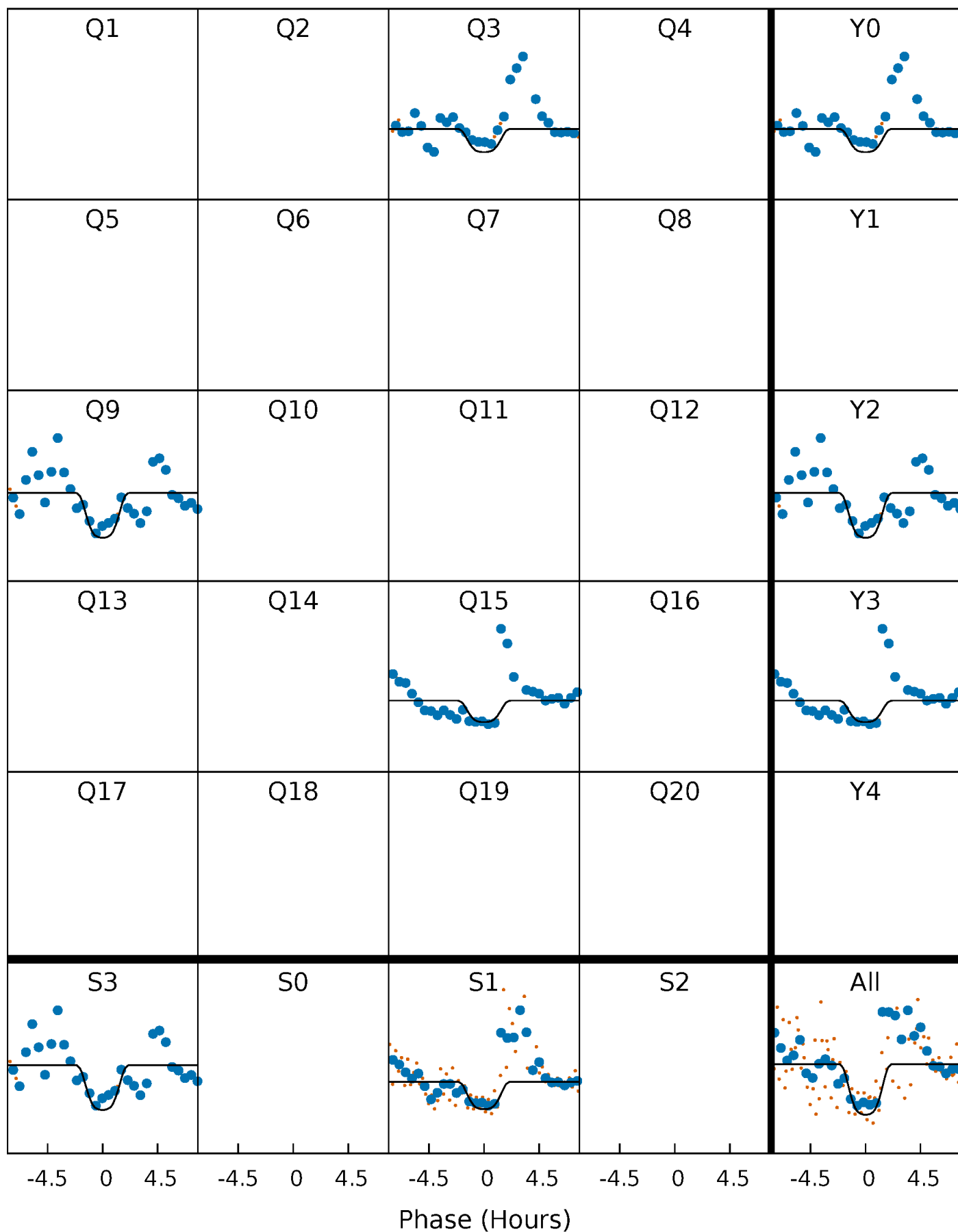
TCE 007871438-02     $P=531.504356$  Days     $T_0=330.273324$  (BKJD)





# DV Quarter-Phased Transit Curves

TCE 007871438-02     $P=531.504356$  Days     $T_0=330.273324$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

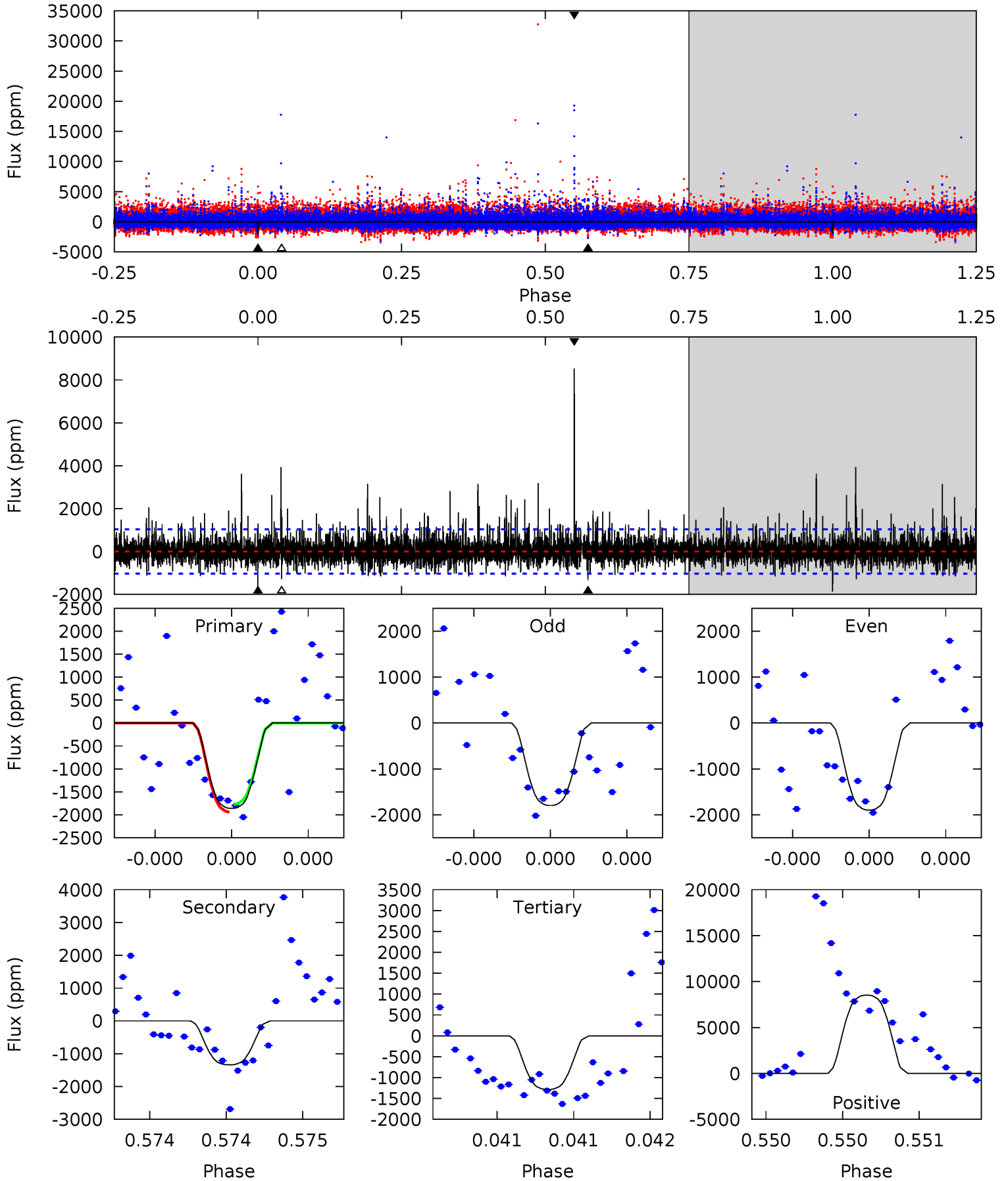
TCE 007871438-02 P=531.490518 Days  $T_0=330.276764$  (BKJD)



# DV Model-Shift Uniqueness Test

007871438-02, P = 531.504356 Days, E = 330.273324 Days

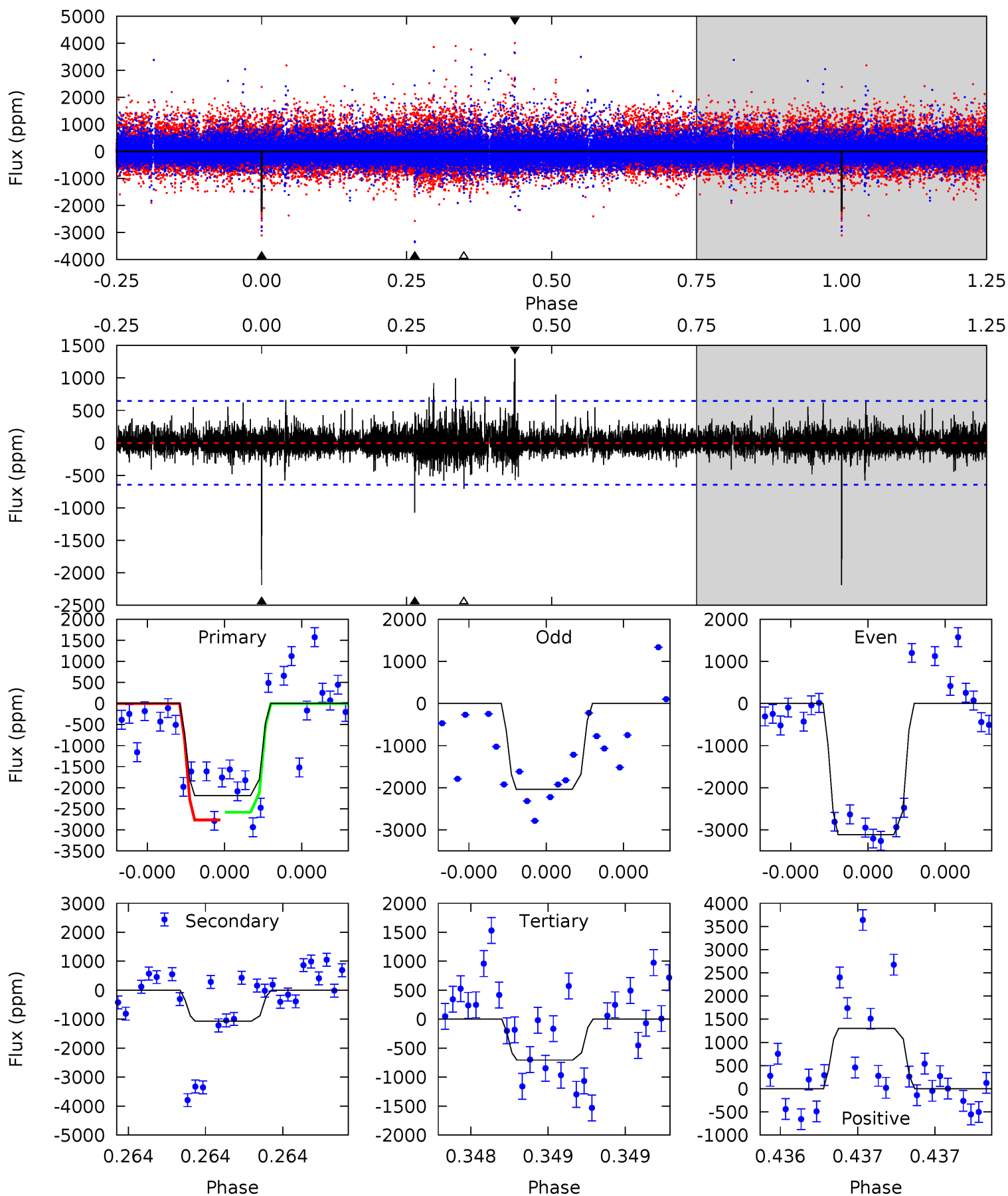
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.2	7.33	7.04	46.7	5.65	3.59	2.40	3.15	-36.5	0.30	-39.3	0.16	0.95	0.82	0.46



# Alt Model-Shift Uniqueness Test

007871438-02, P = 531.490518 Days, E = 330.276764 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
19.2	9.40	6.19	11.4	5.67	3.62	1.07	13.0	7.76	3.21	-2.02	4.41	1.24	0.37	0.78



### Stellar Parameters For KIC 007871438

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3756^{+50}_{-45}$	$4.753^{+0.032}_{-0.017}$	$-0.100^{+0.100}_{-0.100}$	$0.494^{+0.022}_{-0.029}$	$0.503^{+0.025}_{-0.025}$	$5.896^{+0.797}_{-0.457}$
	+1%/-1%	+1%/-0%	+100%/-100%	+4%/-6%	+5%/-5%	+14%/-8%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 007871438-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	-1339 $\pm$ 183	$2.87^{+0.61}_{-0.64}$	$161^{+2}_{-3}$	$3327^{+269}_{-209}$	$92886^{+59739}_{-31651}$
Alt.	-1071 $\pm$ 114	$2.66^{+0.66}_{-0.61}$	$161^{+2}_{-3}$	$3289^{+302}_{-212}$	$87765^{+61964}_{-31919}$

$T_{max}$  = 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

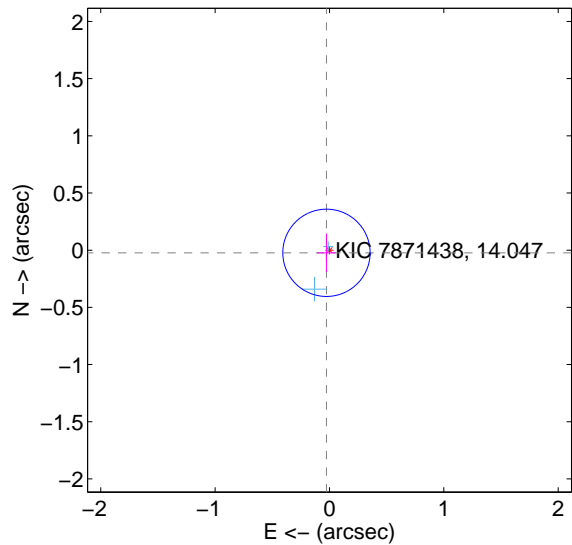
Supplemental centroid analysis for 007871438-02. Kepler magnitude: 14.05. Transit SNR 7.91

There are 2 quarters with good PRF difference image offsets

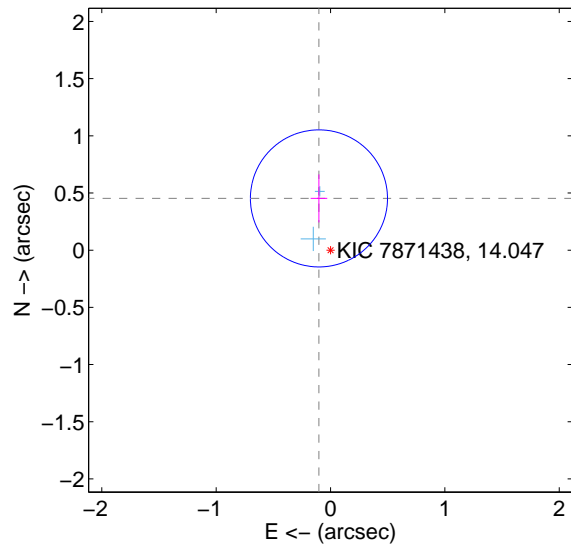
The direct PRF centroid is offset from the target star catalog position by about 0.49 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.035 \pm 0.127$	0.28	$0.026 \pm 0.082$	$-0.023 \pm 0.169$
PRF-fit source offset from KIC position	$0.464 \pm 0.200$	2.32	$0.101 \pm 0.072$	$0.453 \pm 0.210$
photometric centroid source offset	$0.53 \pm 0.41$	1.28	$-0.12 \pm 0.46$	$0.51 \pm 0.41$

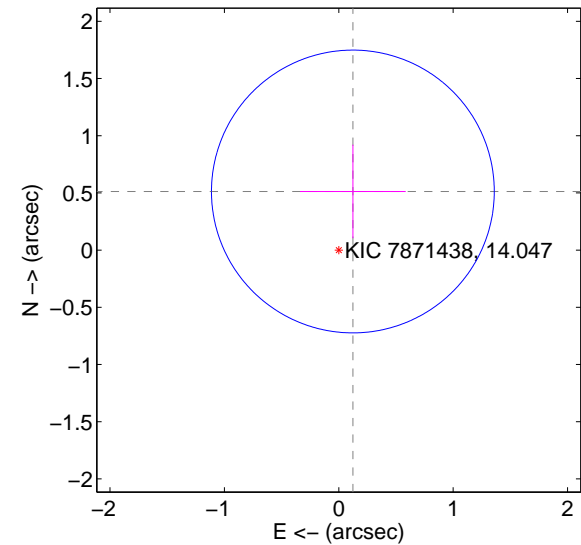
offset from difference PRF-fit to OOT PRF-fit



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.

Q1 no difference image



Q1 no OOT image



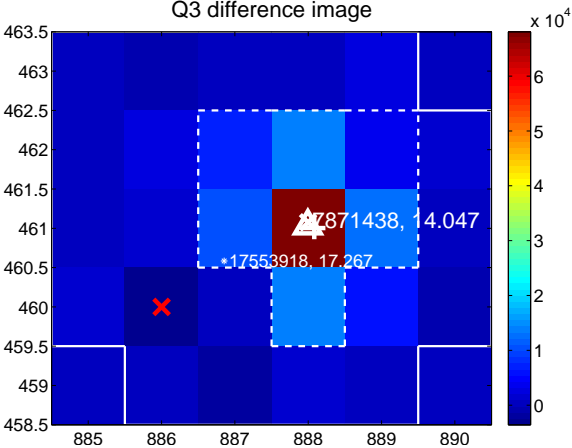
Q2 no difference image



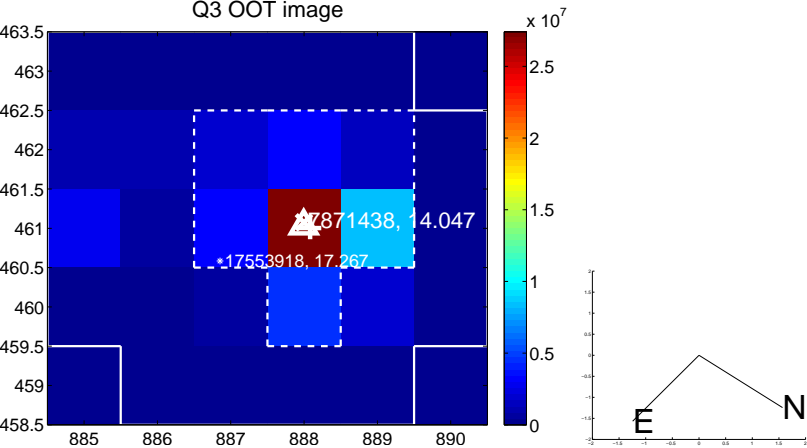
Q2 no OOT image



Q3 difference image



Q3 OOT image



Q4 no difference image



Q4 no OOT image

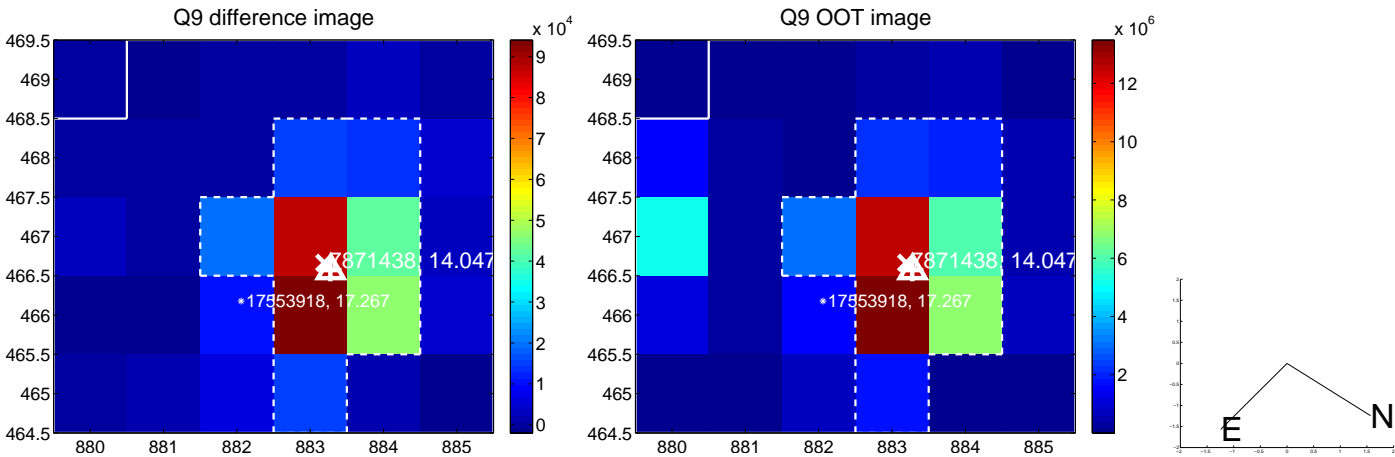


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





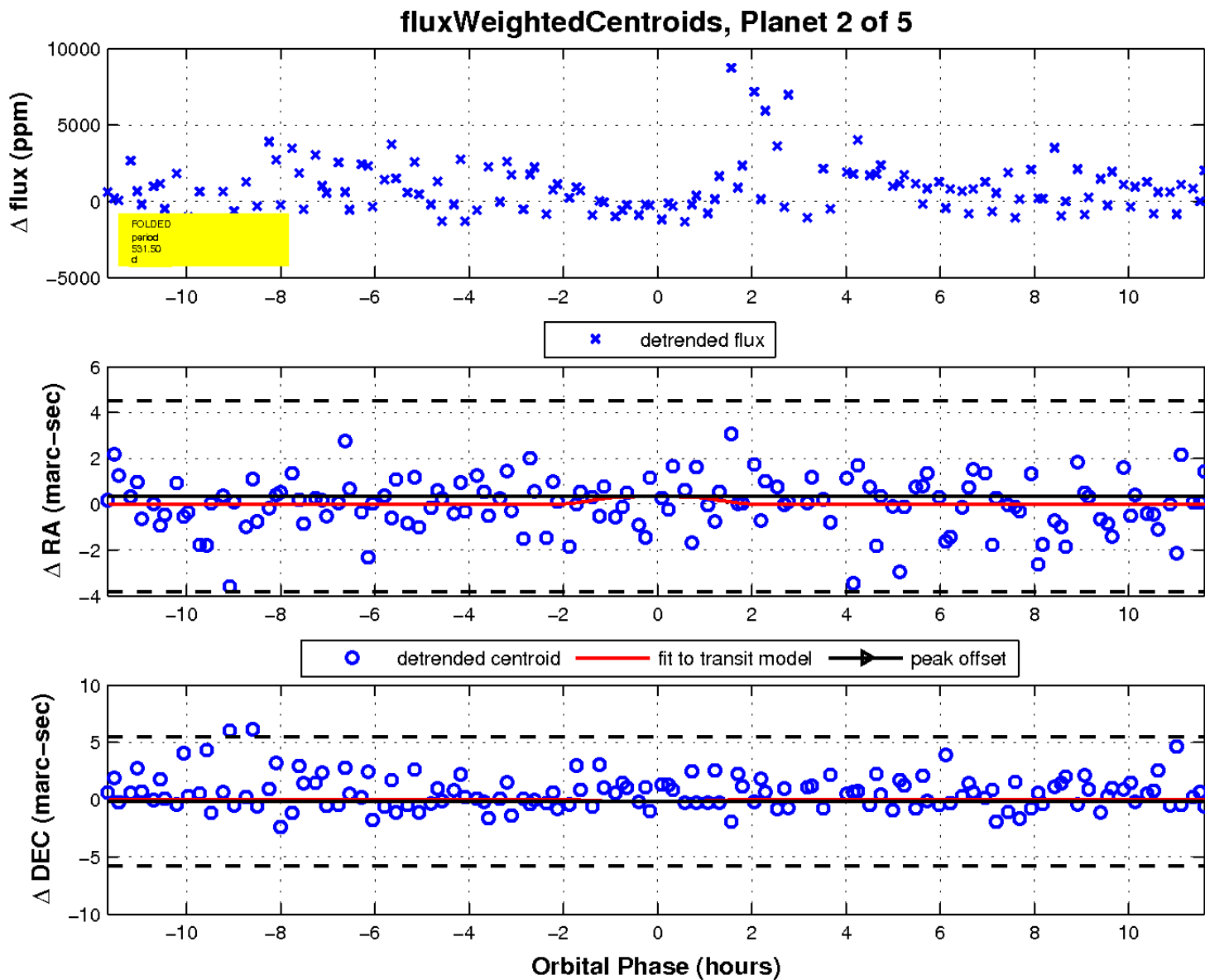
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



UKIRT Image



# KIC 007871438

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007871438-01	OBS	No	425.128191	151.639359	381.1	1.683	16.2	1.4	0.49	3756	1.12	0.06
007871438-02	OBS	No	531.504356	330.273324	2236.7	3.906	14.6	7.9	0.49	3756	2.90	0.04
007871438-03	OBS	No	479.390131	610.181072	2802.7	11.762	18.1	7.2	0.49	3756	3.27	0.05
007871438-04	OBS	No	244.181013	178.530891	1296.8	5.285	10.5	6.3	0.49	3756	1.79	0.12
007871438-05	OBS	No	565.591864	151.051491	1905.6	3.356	12.0	7.6	0.49	3756	2.25	0.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007871438-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_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_FEW_DIFFS
007871438-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007871438-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
007871438-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS
007871438-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—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.

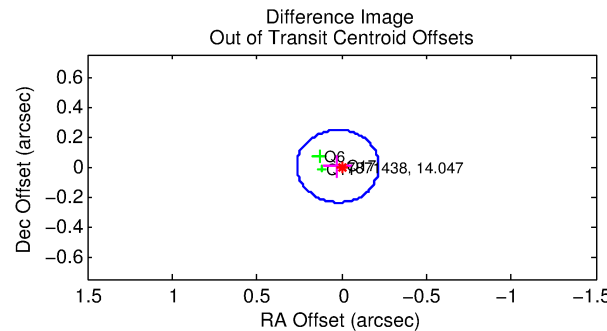
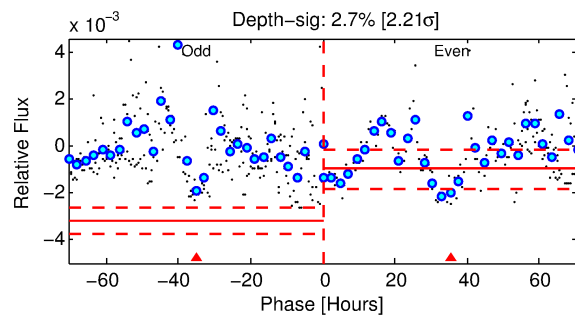
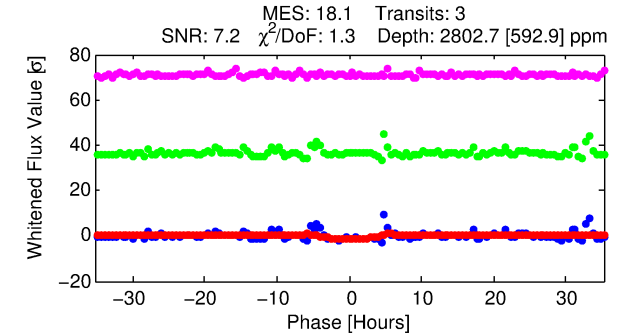
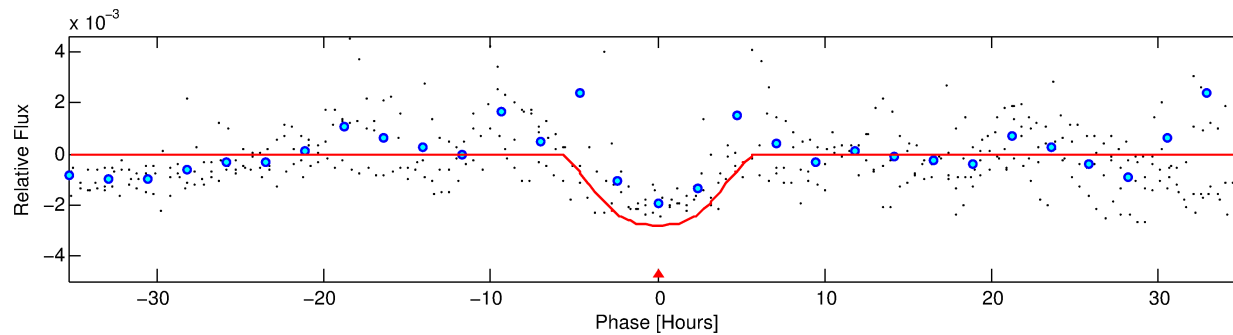
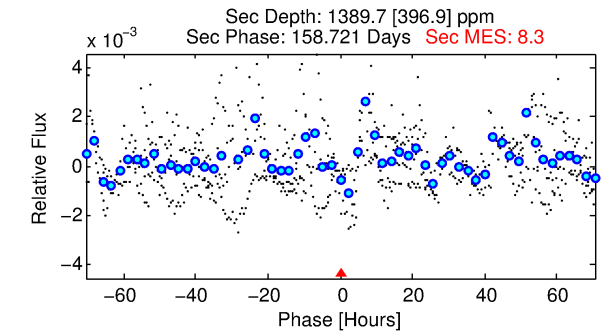
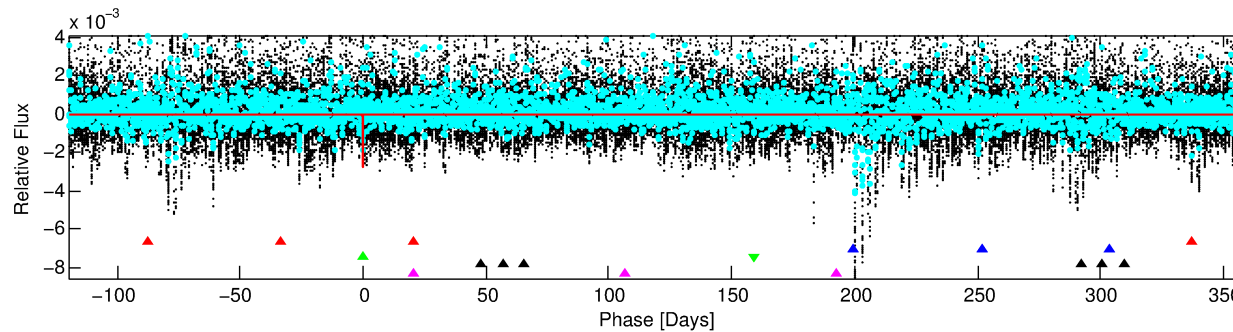
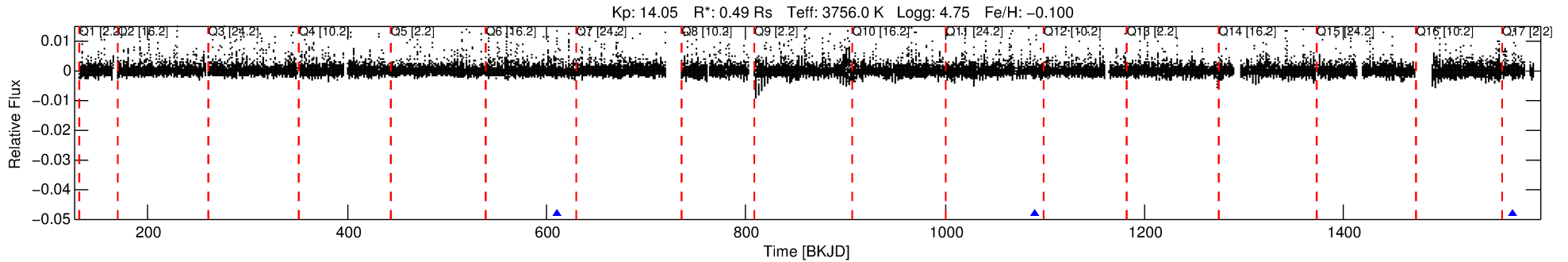
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007871438-03

No Significant Match Found

# DV One-Page Summary

KIC: 7871438 Candidate: 3 of 5 Period: 479.390 d



## DV Fit Results:

Period = 479.39013 [0.01844] d  
Epoch = 610.1811 [0.0228] BKJD  
Rp/R\* = 0.0607 [0.0080]  
a/R\* = 156.37 [22.00]  
b = 0.93 [0.03]  
Seff = 0.05 [0.00]  
Teq = 119 [2] K  
Rp = 3.27 [0.47] Re  
a = 0.9542 [0.0441] AU  
Ag = 65043.13 [25628.23] [2.54σ]  
**Teffp = 2944 [289] K [9.78σ]**

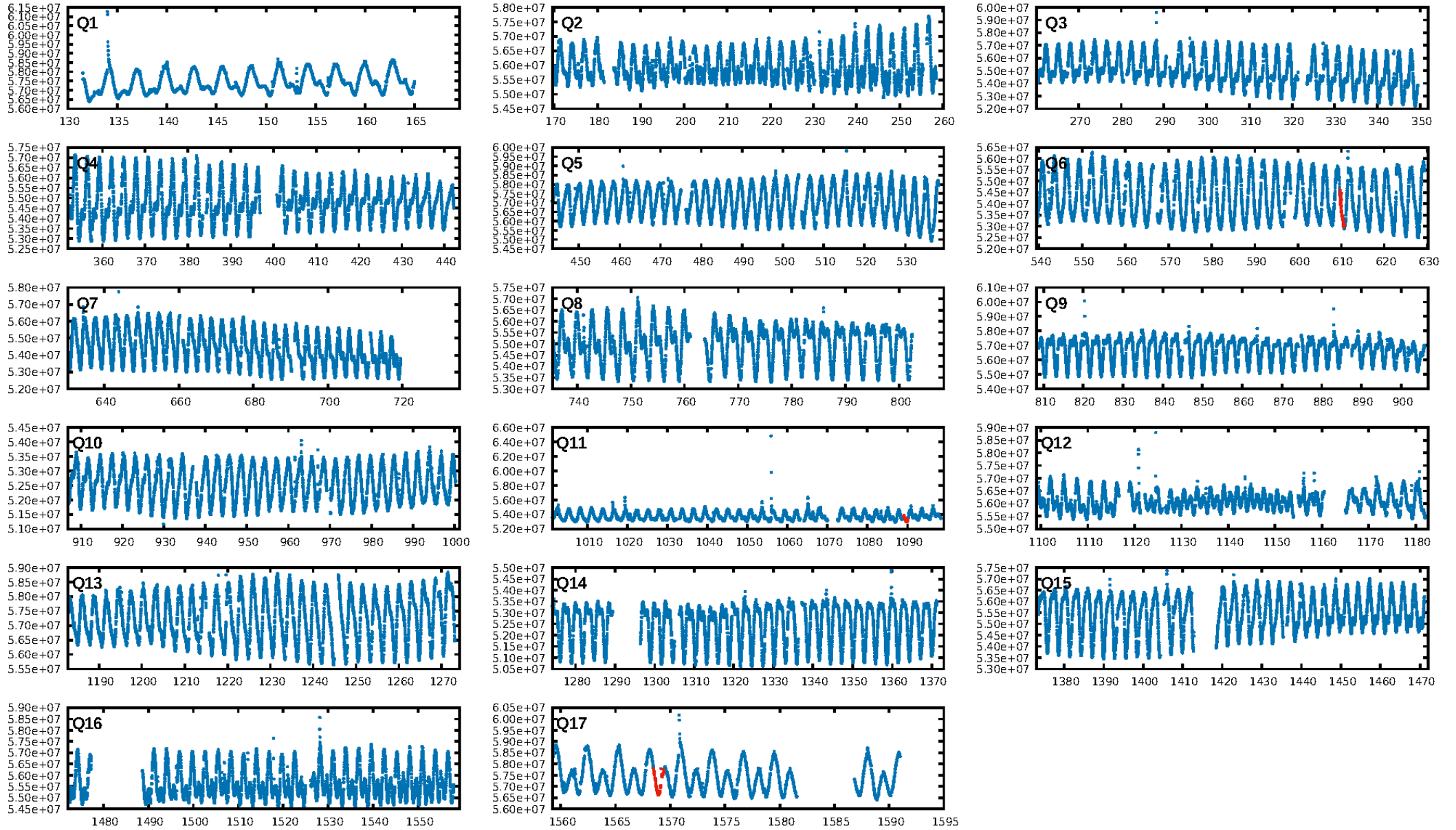
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [109.61σ]  
LongPeriod-sig: 100.0% [100.92σ]  
ModelChiSquare2-sig: 9.8%  
ModelChiSquareGof-sig: 80.0%  
Bootstrap-pfa: 2.62e-15  
RollingBand-fgt: 1.00 [2/2]  
**GhostDiagnostic-chr: 0.7058**  
Centroid-sig: 3.1%  
Centroid-so: 0.052 arcsec [0.18σ]  
OotOffset-rm: 0.022 arcsec [0.28σ]  
OotOffset-st: 1/1/0/1 [3]  
KicOffset-rm: 0.667 arcsec [8.28σ]  
KicOffset-st: 1/1/0/1 [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: 02-Feb-2016 09:01:12 Z

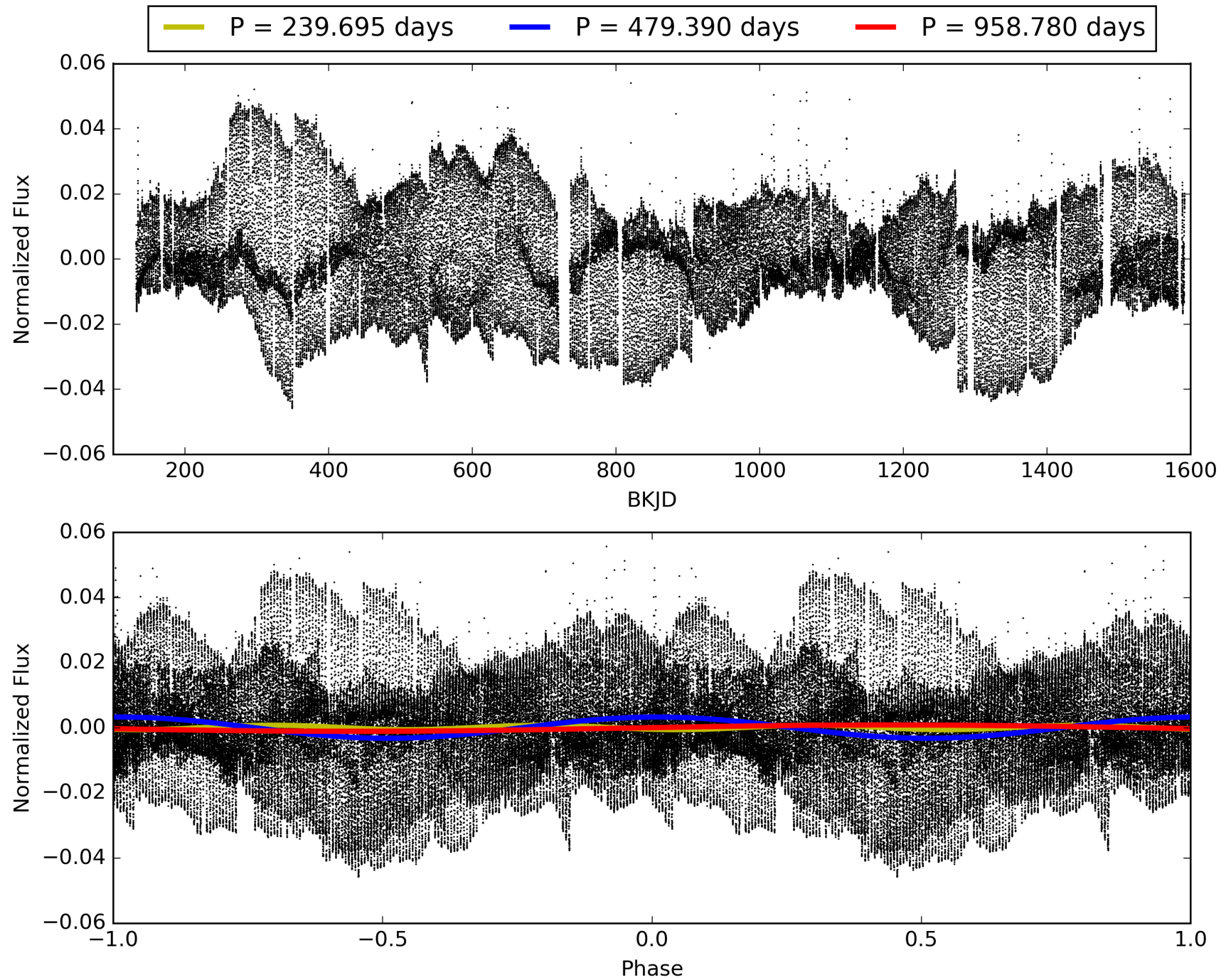
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 007871438-03, PDC Light Curves





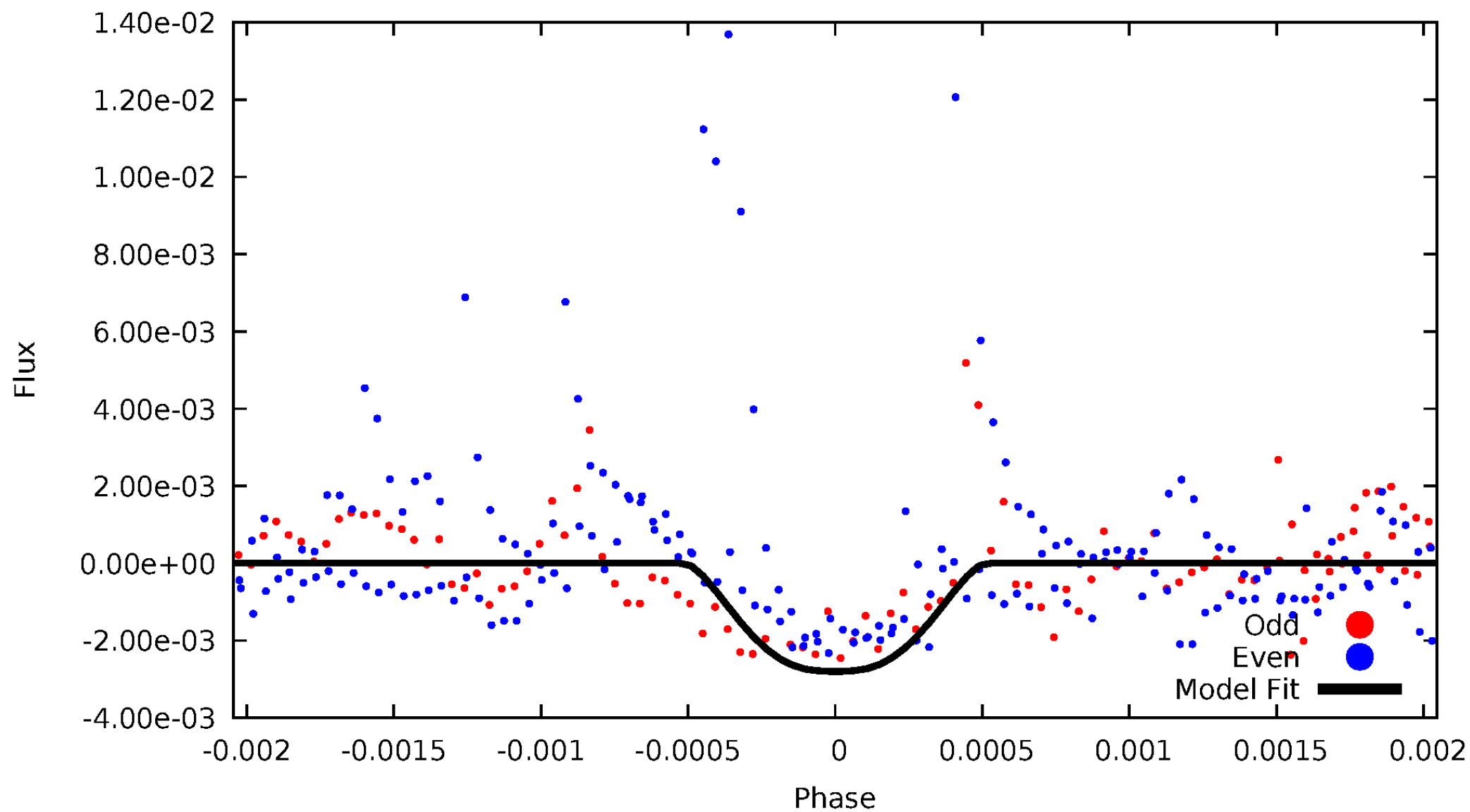
TCE 007871438-03





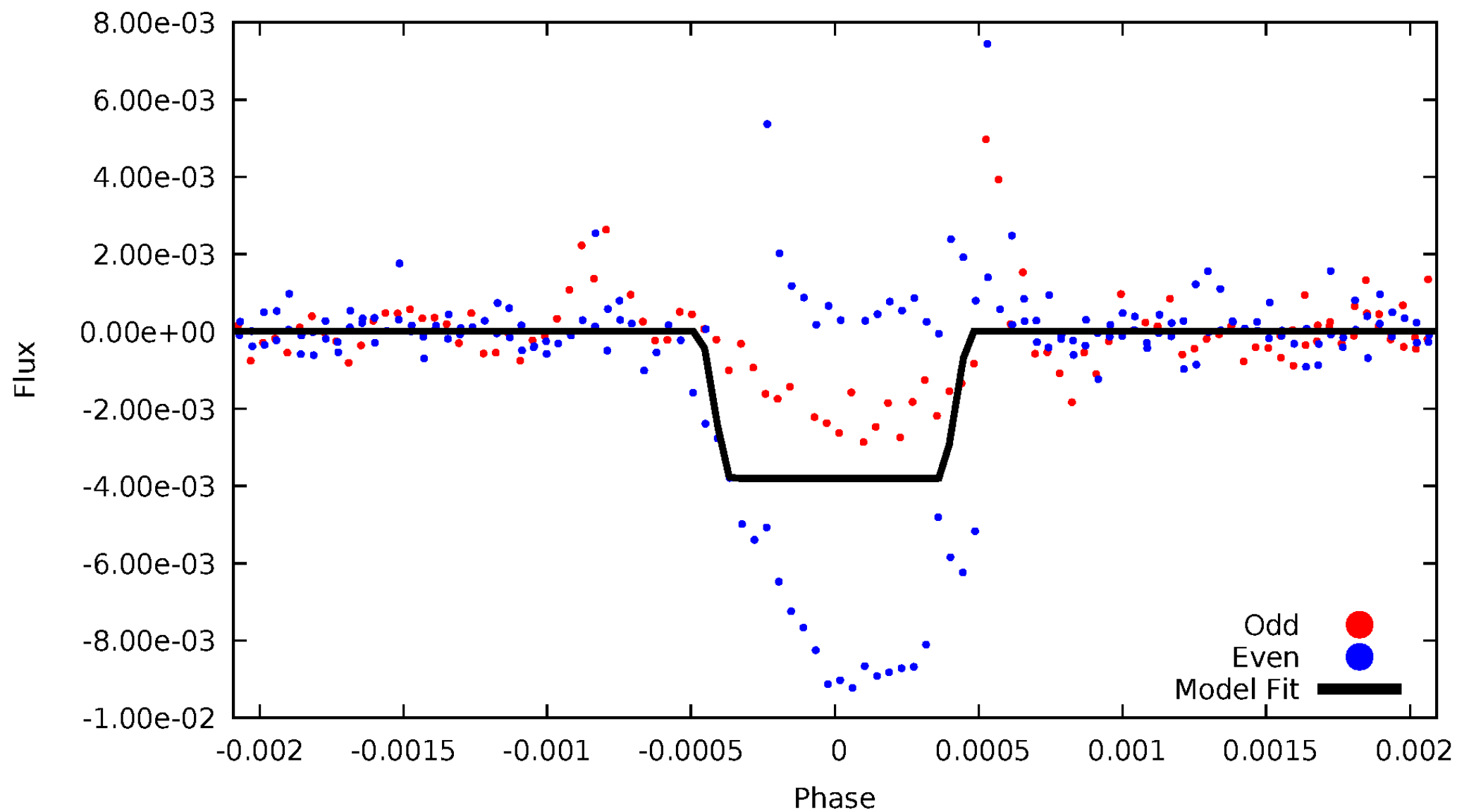
# DV Odd/Even

TCE 007871438-03



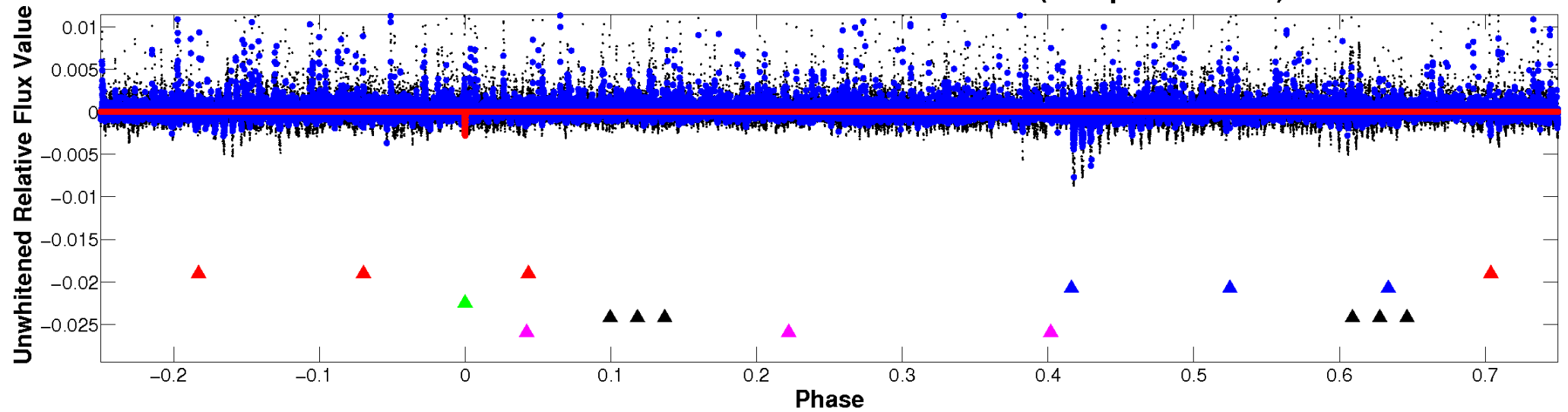
# ALT Odd/Even

TCE 007871438-03

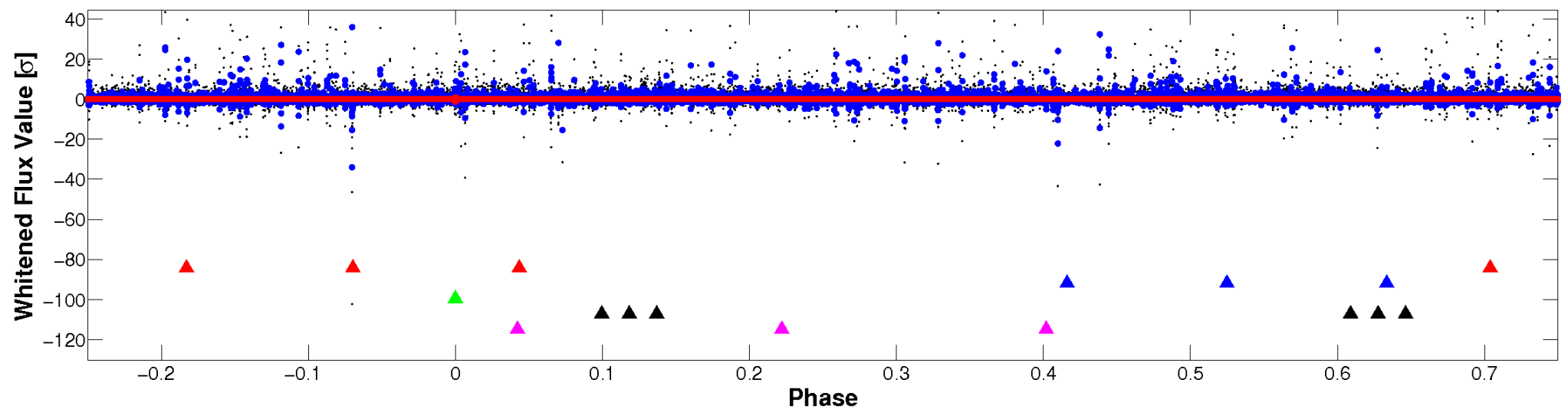


# Non-Whitened Vs. Whitened Light Curve

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

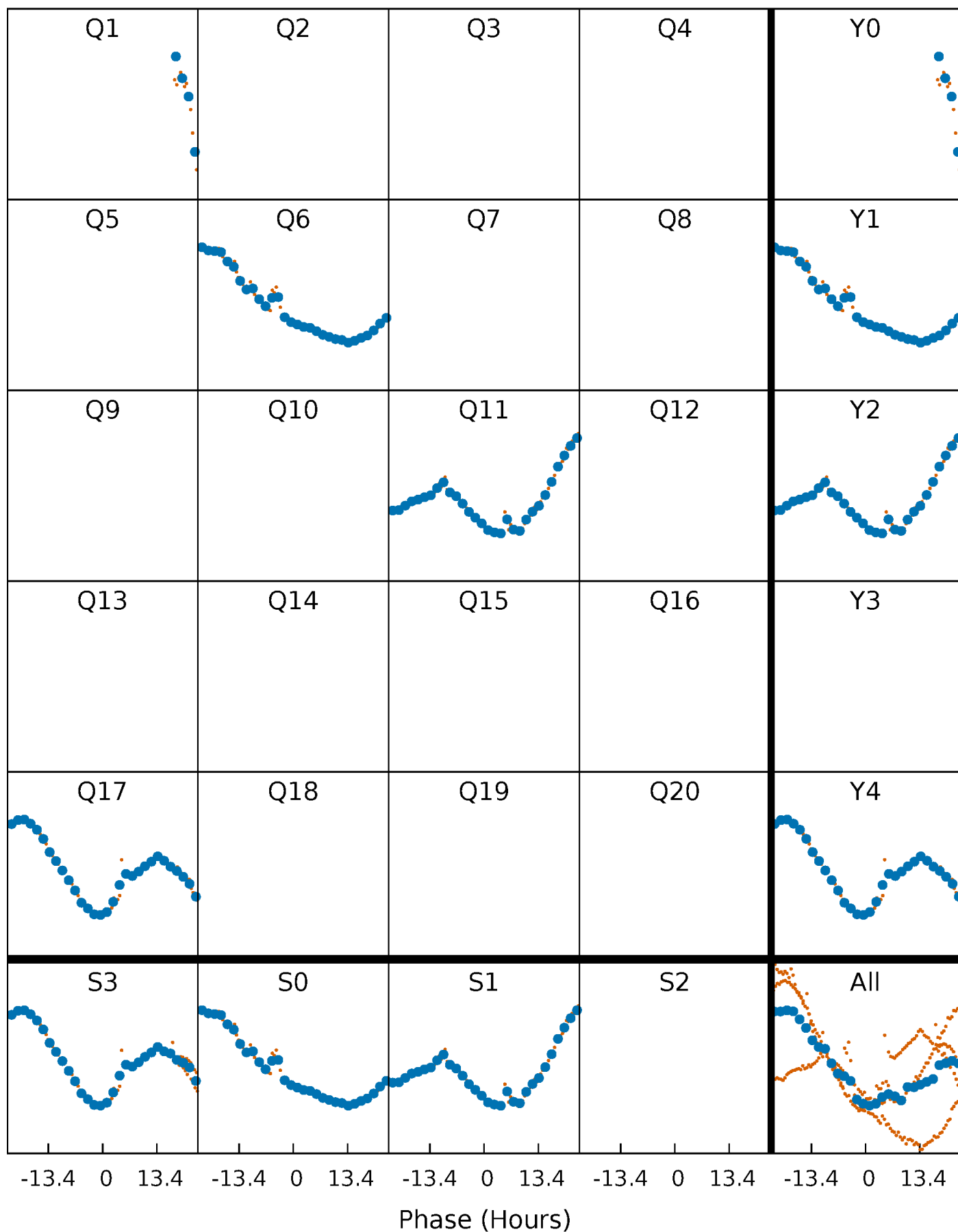


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



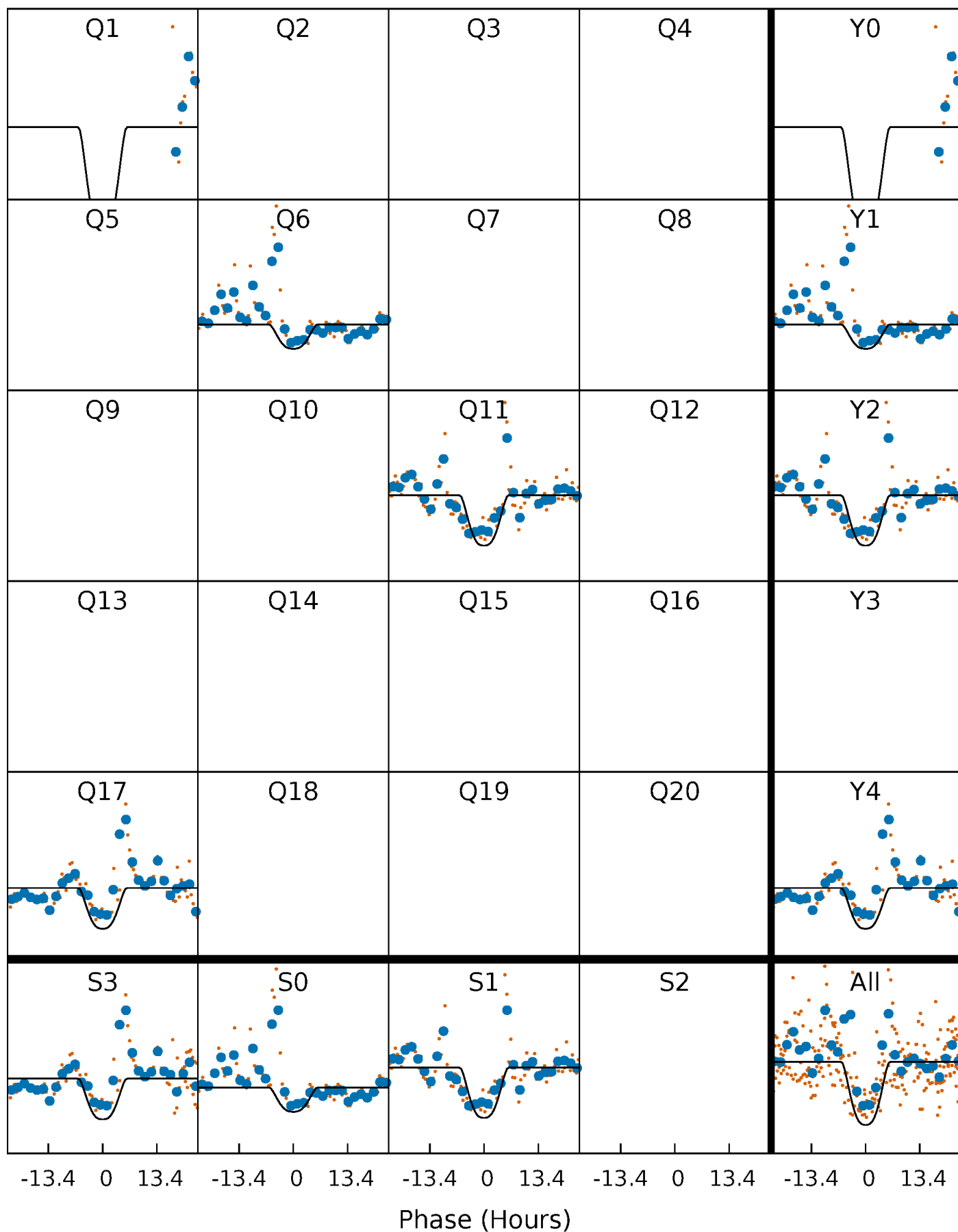
# PDC Quarter-Phased Transit Curves

TCE 007871438-03 P=479.390131 Days  $T_0=610.181072$  (BKJD)



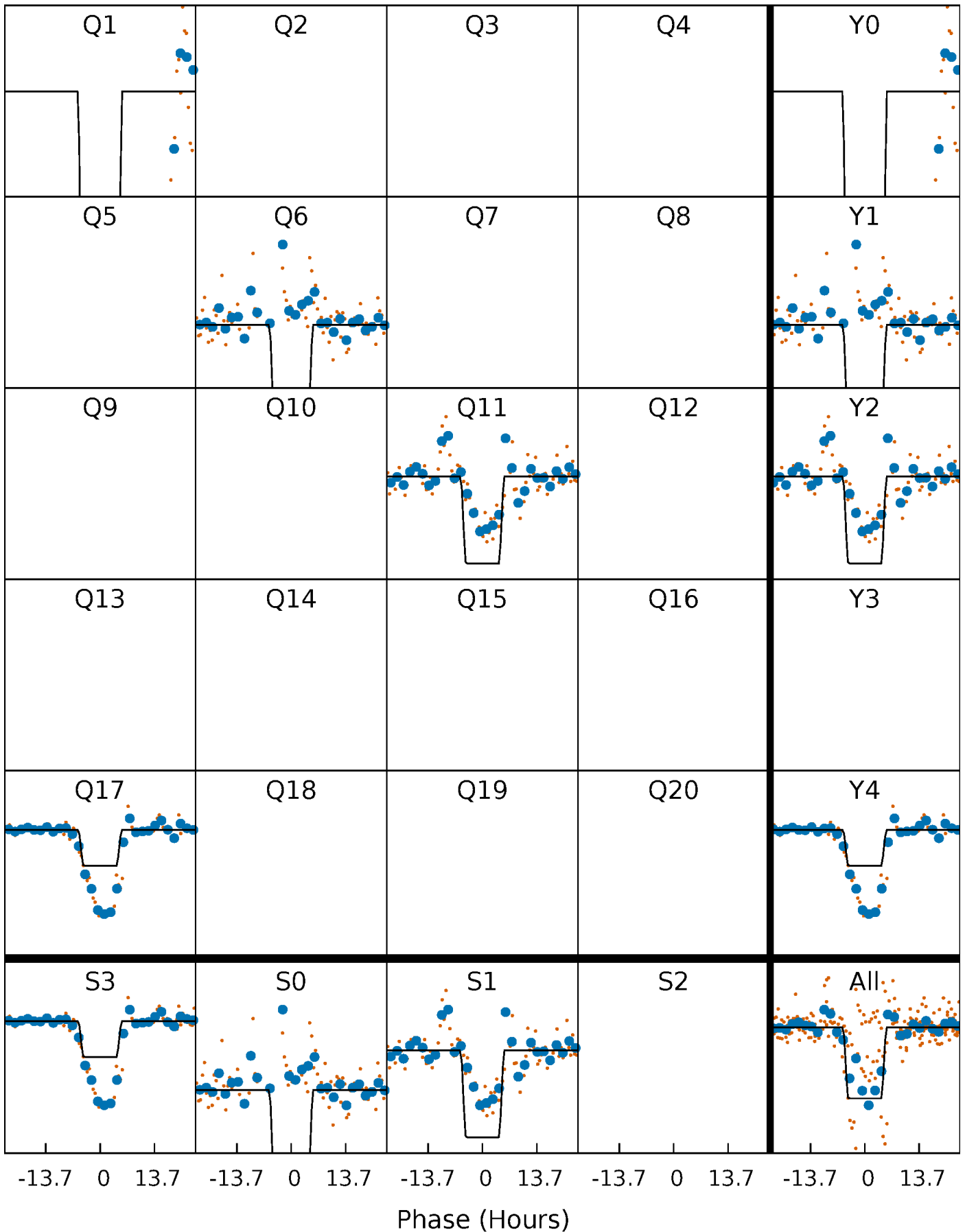
# DV Quarter-Phased Transit Curves

TCE 007871438-03 P=479.390131 Days  $T_0=610.181072$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

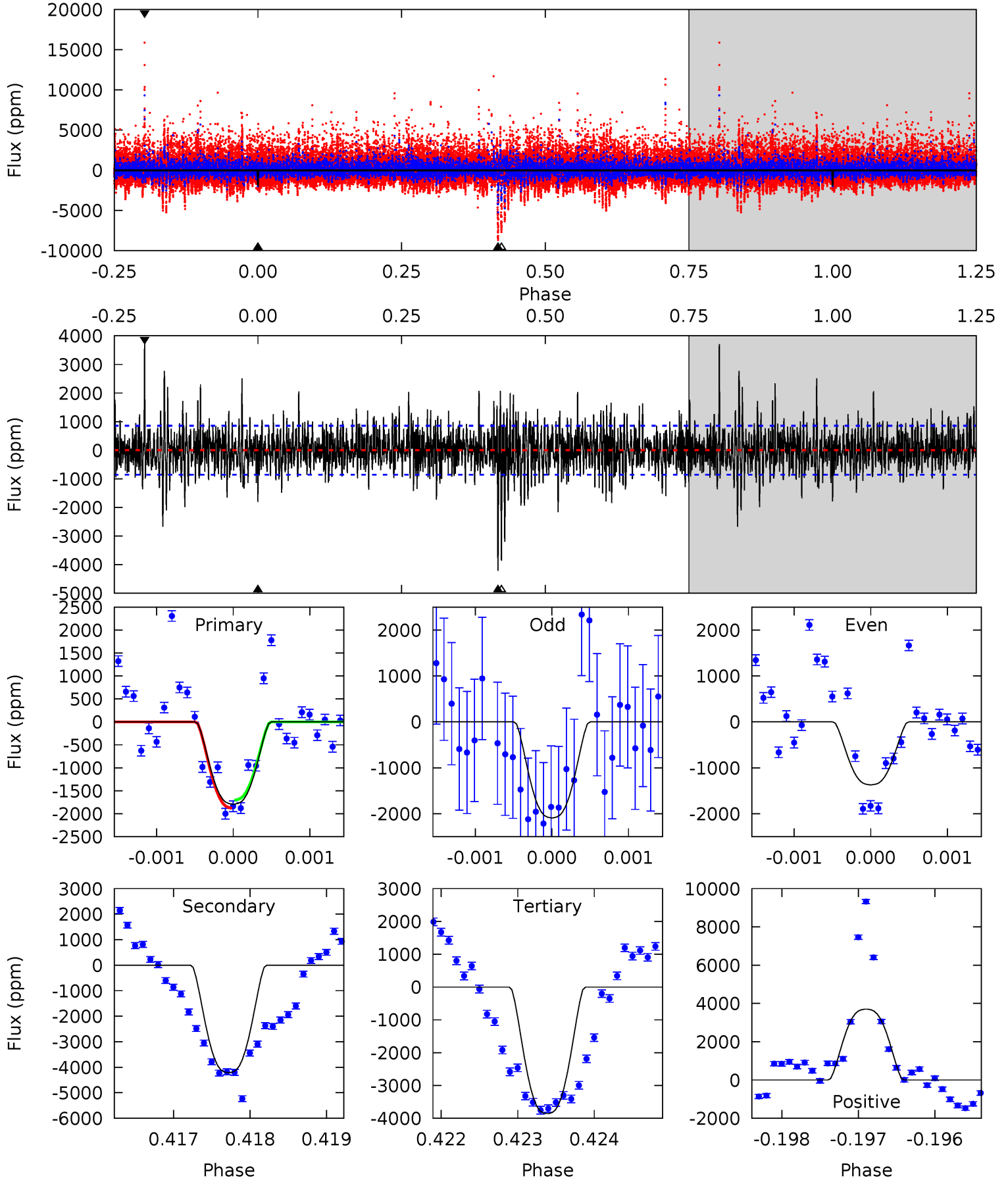
TCE 007871438-03 P=479.371318 Days  $T_0=610.161063$  (BKJD)



# DV Model-Shift Uniqueness Test

007871438-03, P = 479.390131 Days, E = 130.790941 Days

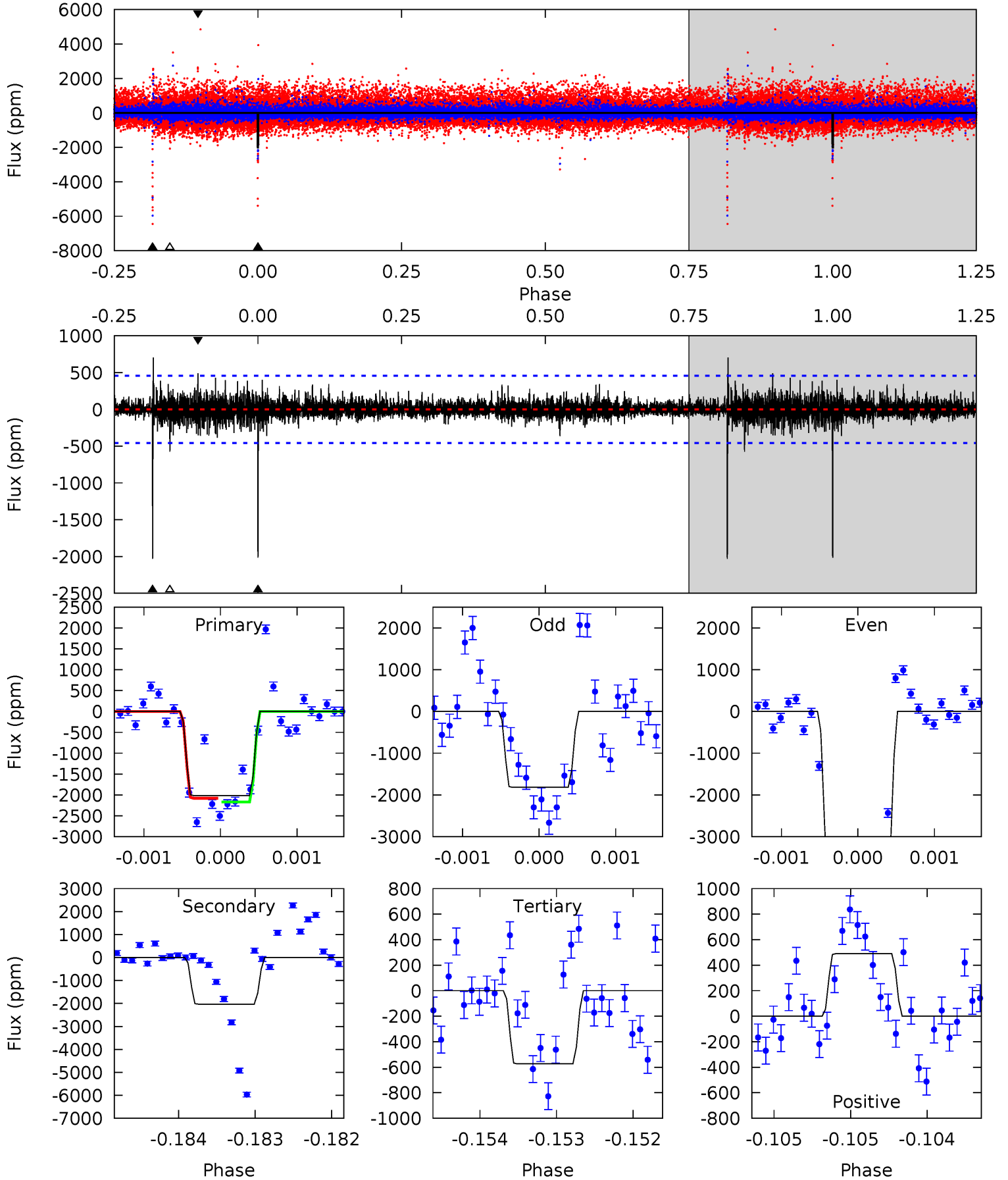
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.4	26.8	24.5	23.5	5.44	3.27	3.90	-13.1	-12.1	2.25	3.24	1.73	0.90	0.47	0.56



# Alt Model-Shift Uniqueness Test

007871438-03, P = 479.371318 Days, E = 130.789745 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
24.0	24.2	6.84	5.84	5.46	3.31	0.94	17.2	18.2	17.4	18.4	15.6	1.49	0.26	0





### Stellar Parameters For KIC 007871438

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3756^{+50}_{-45}$	$4.753^{+0.032}_{-0.017}$	$-0.100^{+0.100}_{-0.100}$	$0.494^{+0.022}_{-0.029}$	$0.503^{+0.025}_{-0.025}$	$5.896^{+0.797}_{-0.457}$
	+1%/-1%	+1%/-0%	+100%/-100%	+4%/-6%	+5%/-5%	+14%/-8%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 007871438-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-4211 \pm 157$	$3.25^{+0.44}_{-0.42}$	$166^{+3}_{-3}$	$3852^{+199}_{-167}$	$200319^{+62387}_{-44572}$
Alt.	$-2030 \pm 84$	$3.28^{+0.42}_{-0.43}$	$166^{+3}_{-3}$	$3403^{+165}_{-133}$	$93796^{+31656}_{-19417}$

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

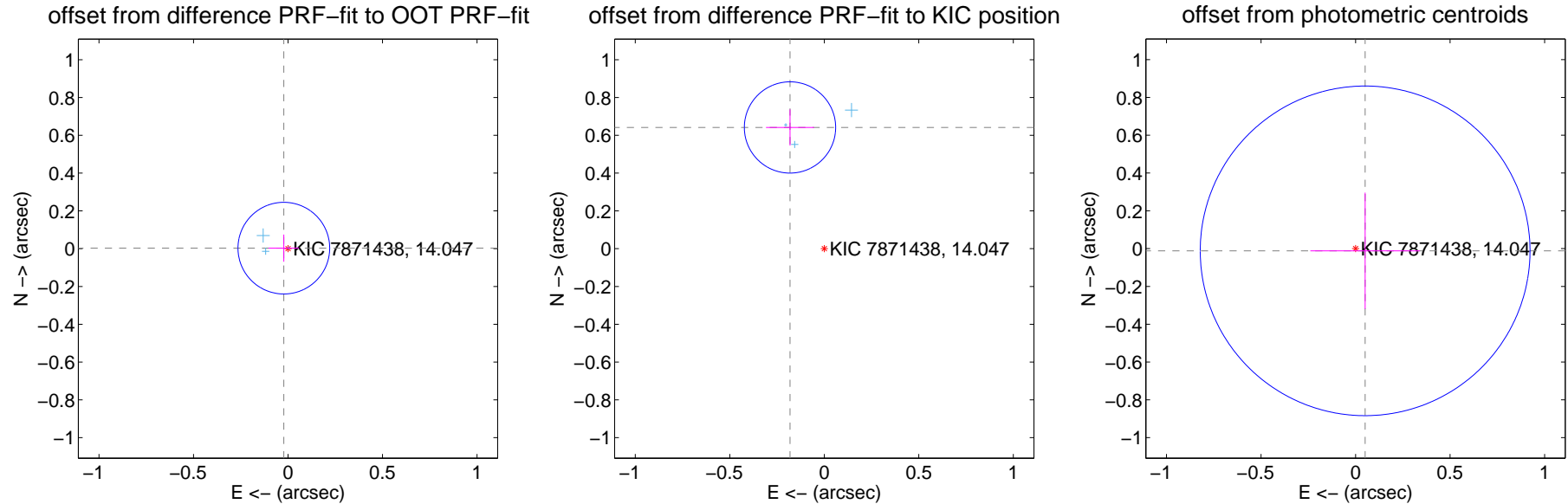
## DV Centroid Data

Supplemental centroid analysis for 007871438-03. Kepler magnitude: 14.05. Transit SNR 7.20

There are 3 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.68 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.022 \pm 0.081$	0.28	$0.022 \pm 0.080$	$0.003 \pm 0.072$
PRF-fit source offset from KIC position	<b><math>0.667 \pm 0.080</math></b>	<b>8.28</b>	$0.181 \pm 0.127$	$0.642 \pm 0.095$
photometric centroid source offset	$0.05 \pm 0.29$	0.18	$-0.05 \pm 0.29$	$-0.01 \pm 0.31$



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

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



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

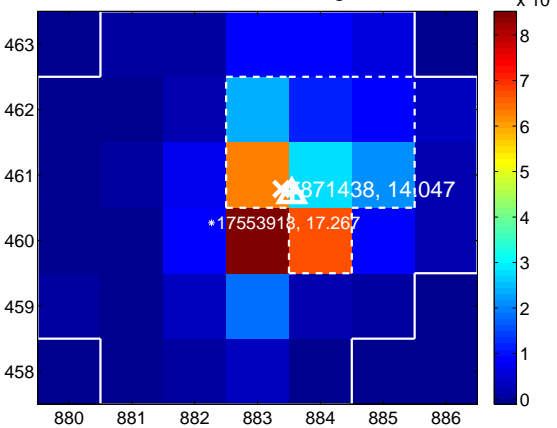
Q5 no difference image



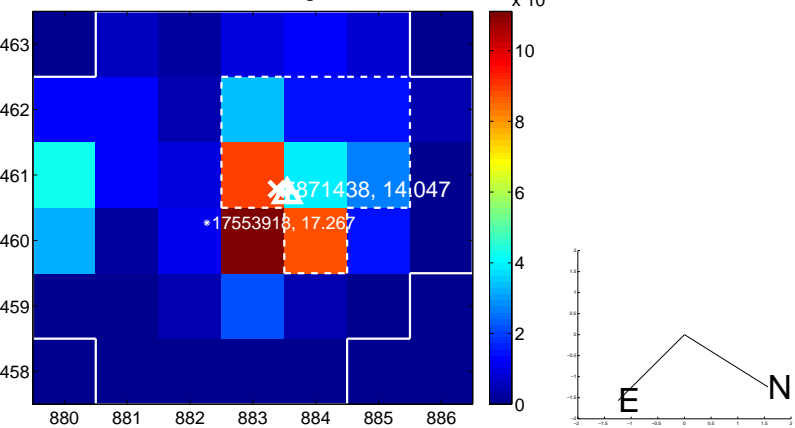
Q5 no OOT image



Q6 difference image



Q6 OOT image



Q7 no difference image



Q7 no OOT image



Q8 no difference image



Q8 no OOT image



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

Q9 no difference image



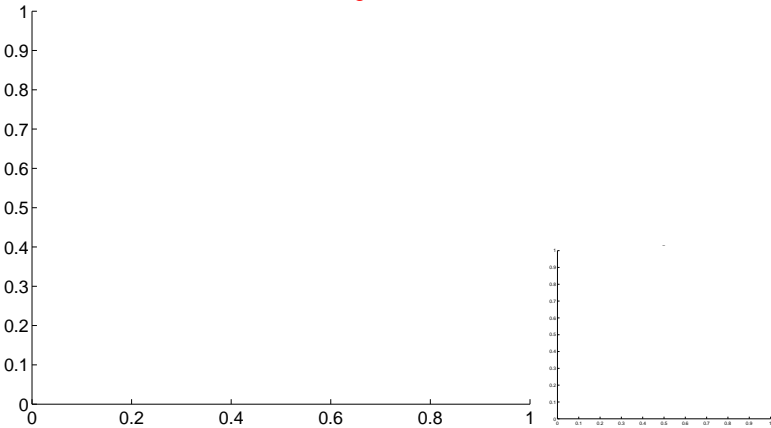
Q9 no OOT image



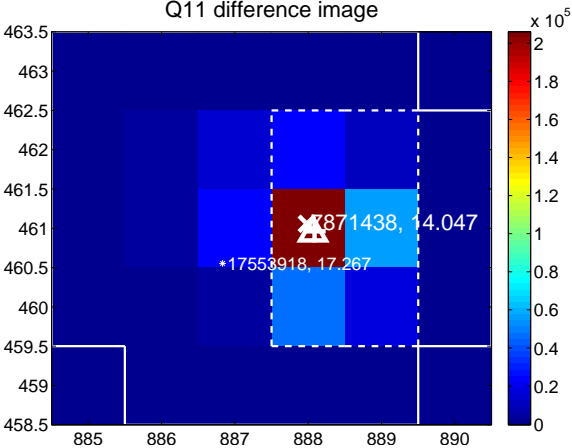
Q10 no difference image



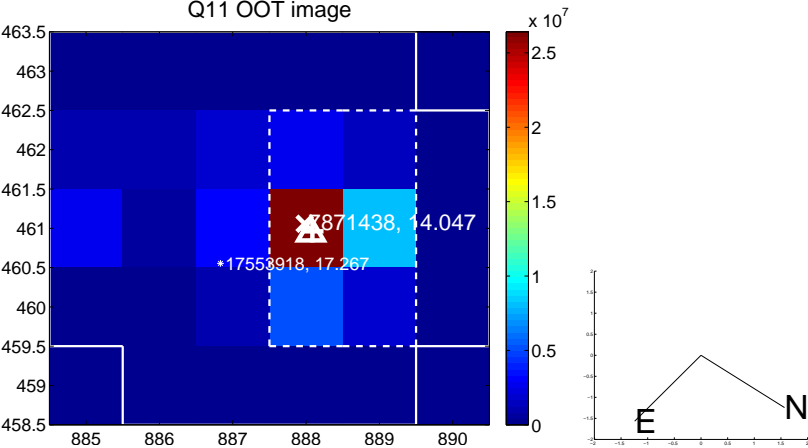
Q10 no OOT image



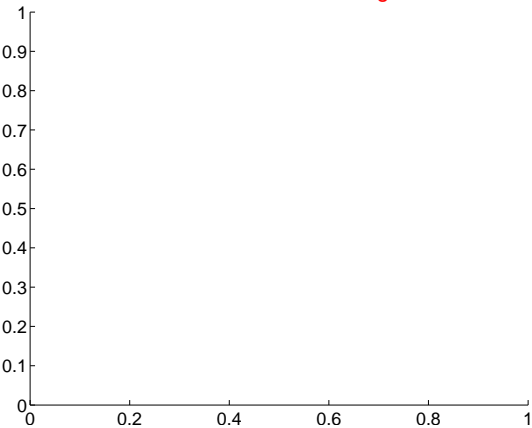
Q11 difference image



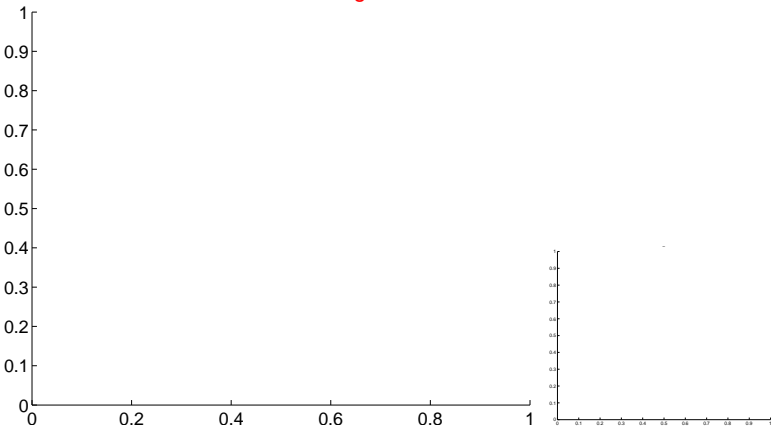
Q11 OOT image



Q12 no difference image



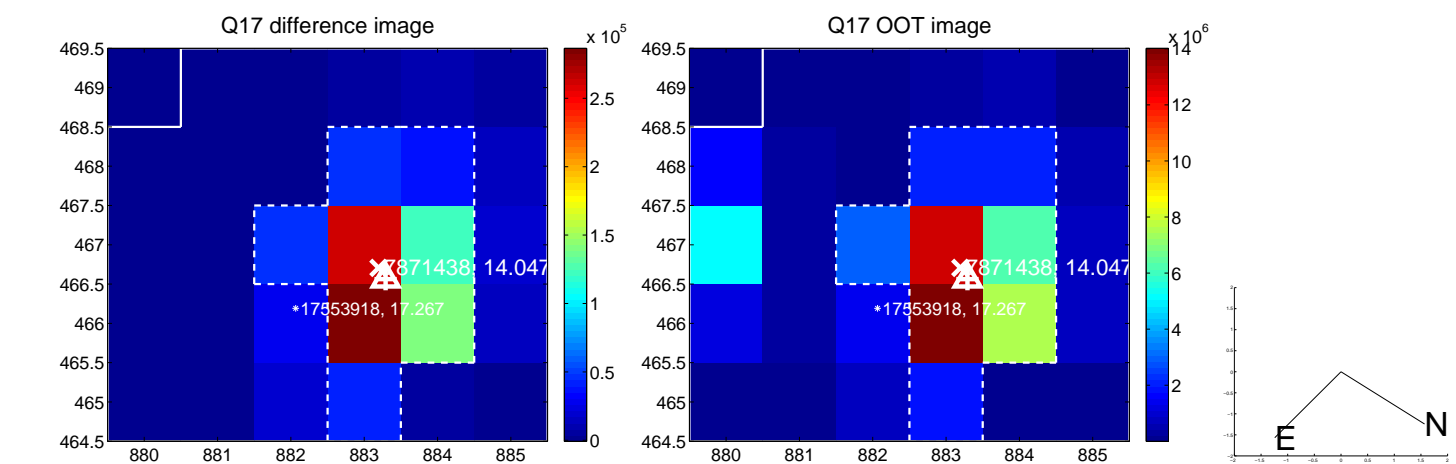
Q12 no OOT image



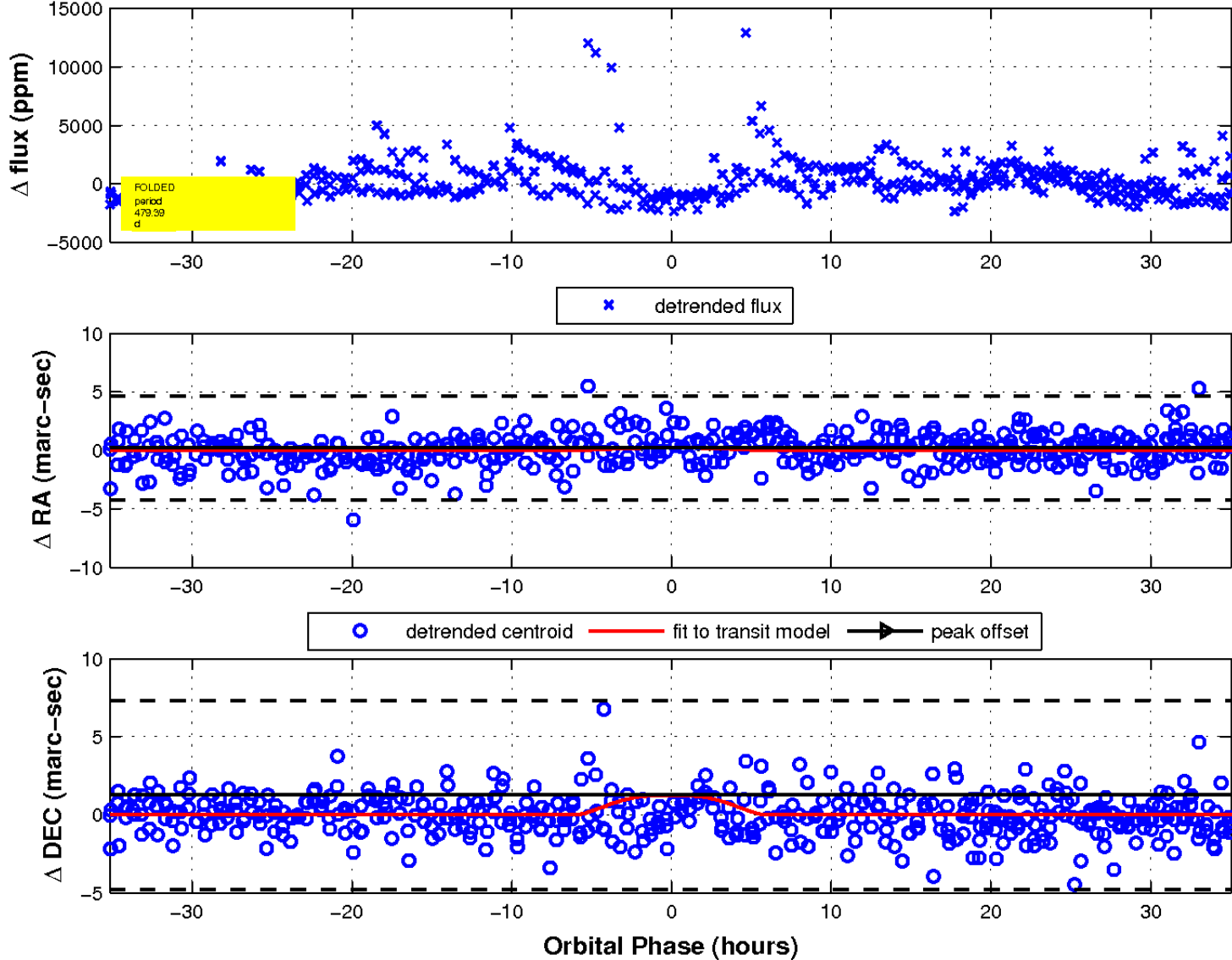
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 3 of 5



UKIRT Image





# KIC 007871438

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007871438-01	OBS	No	425.128191	151.639359	381.1	1.683	16.2	1.4	0.49	3756	1.12	0.06
007871438-02	OBS	No	531.504356	330.273324	2236.7	3.906	14.6	7.9	0.49	3756	2.90	0.04
007871438-03	OBS	No	479.390131	610.181072	2802.7	11.762	18.1	7.2	0.49	3756	3.27	0.05
007871438-04	OBS	No	244.181013	178.530891	1296.8	5.285	10.5	6.3	0.49	3756	1.79	0.12
007871438-05	OBS	No	565.591864	151.051491	1905.6	3.356	12.0	7.6	0.49	3756	2.25	0.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007871438-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_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_FEW_DIFFS
007871438-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007871438-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
007871438-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS
007871438-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—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.

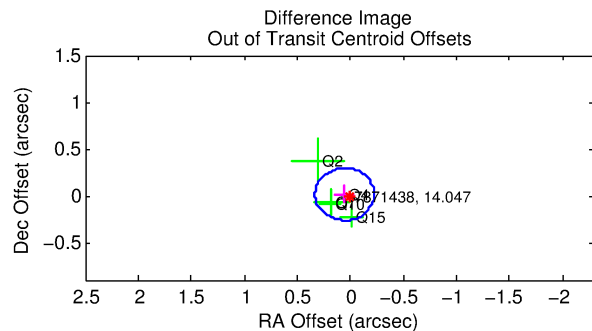
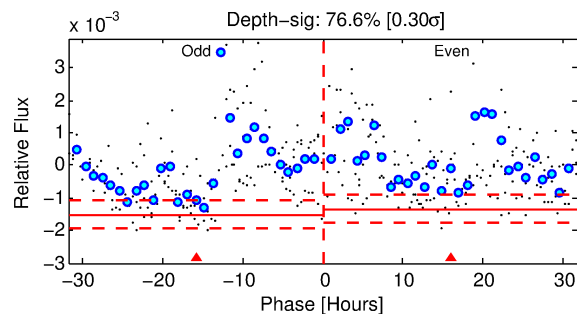
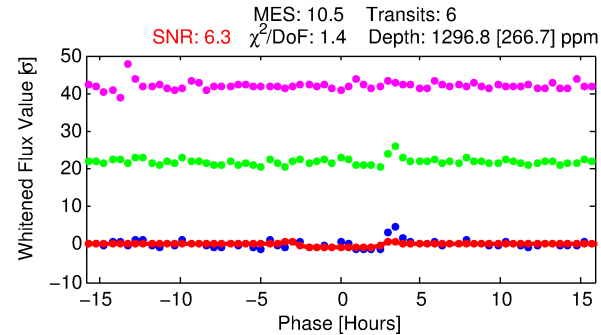
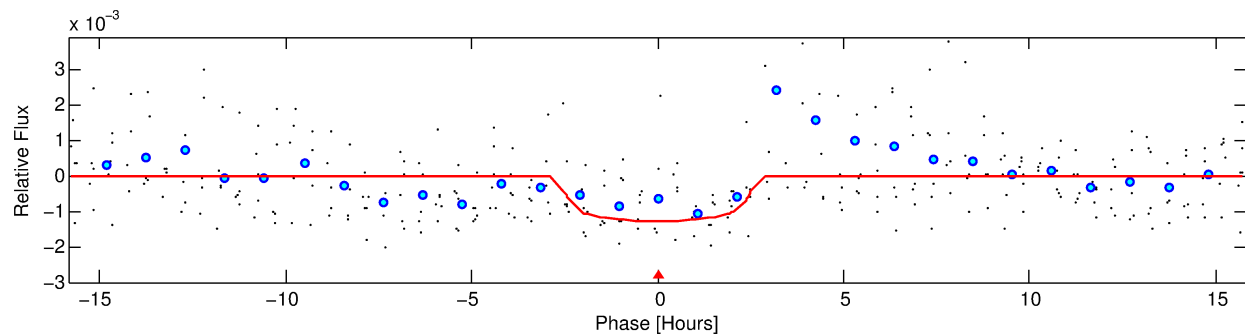
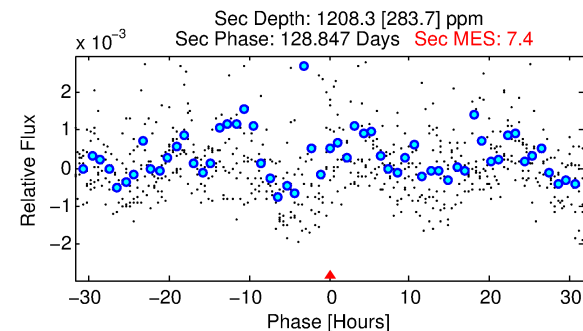
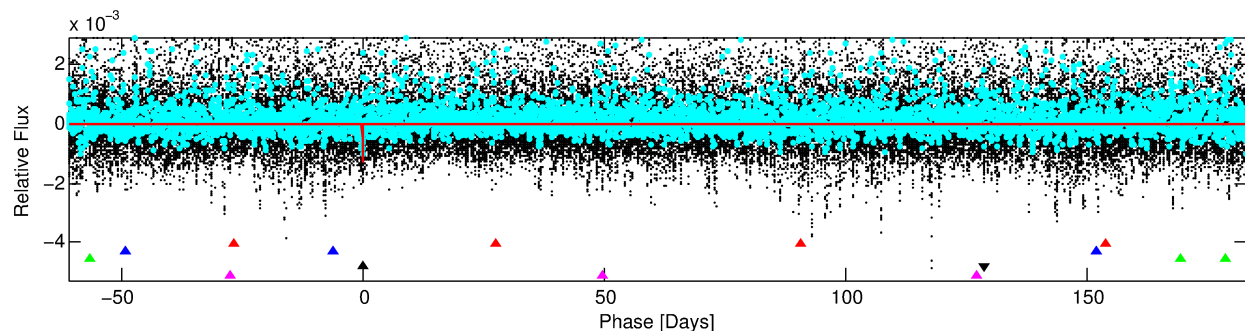
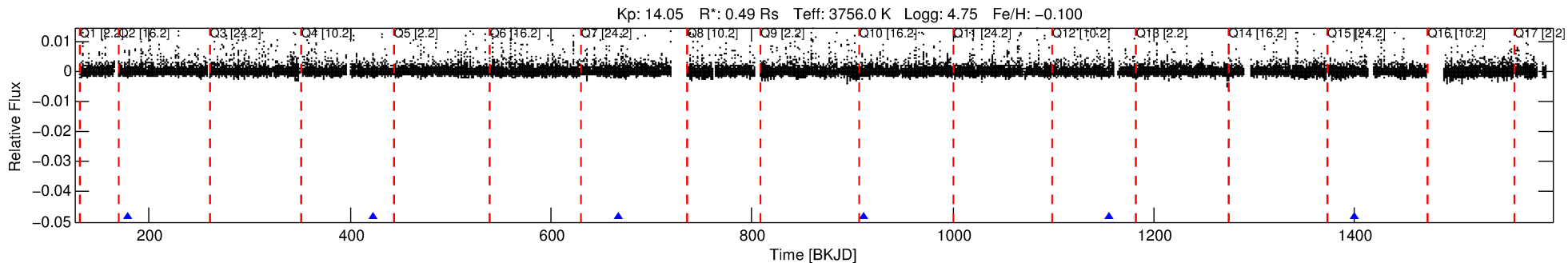
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007871438-04

No Significant Match Found

# DV One-Page Summary

KIC: 7871438 Candidate: 4 of 5 Period: 244.181 d



## DV Fit Results:

Period = 244.18101 [0.00237] d  
Epoch = 178.5309 [0.0072] BKJD  
Rp/R\* = 0.0331 [0.1507]  
a/R\* = 343.36 [7037.56]  
b = 0.35 [51.99]  
Seff = 0.12 [0.01]  
Teff = 149 [3] K  
Rp = 1.79 [8.12] Re  
a = 0.6086 [0.0281] AU  
Ag = 77164.25 [702002.14] [0.11σ]  
Teffp = 3847 [8749] K [0.42σ]

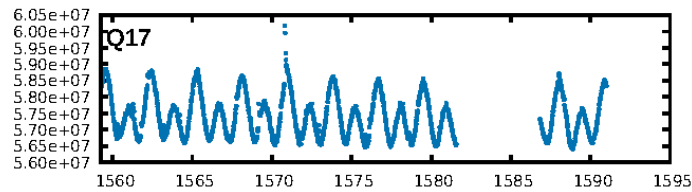
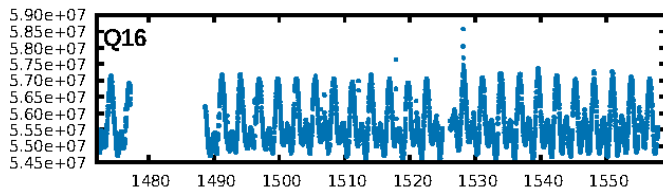
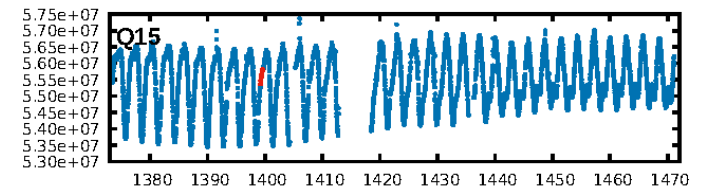
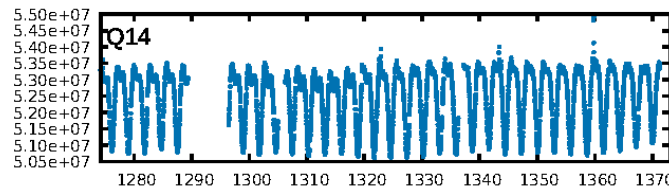
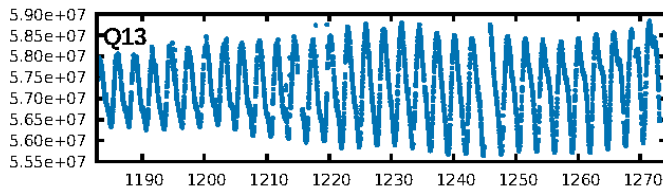
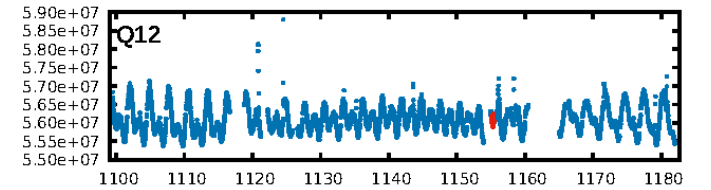
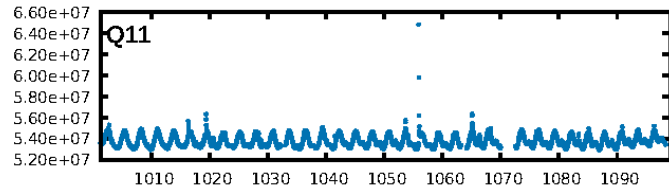
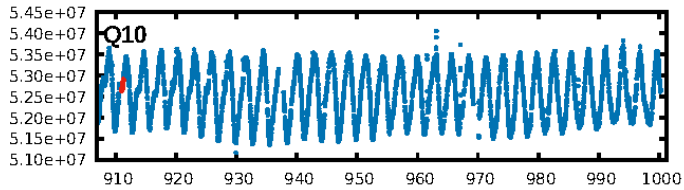
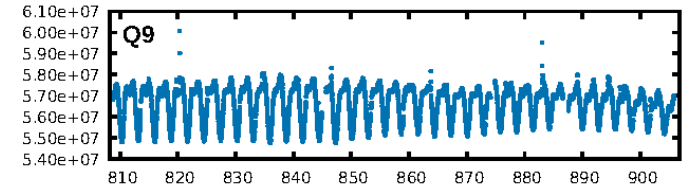
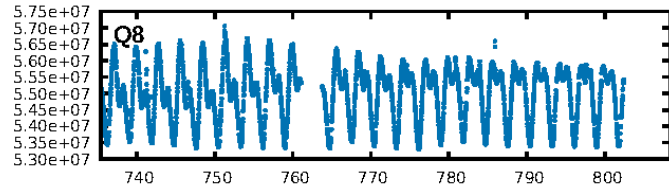
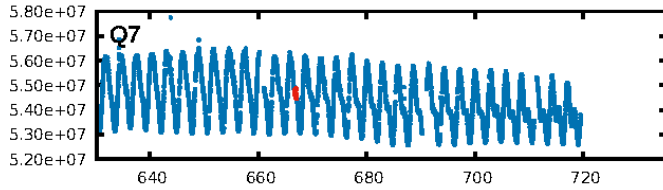
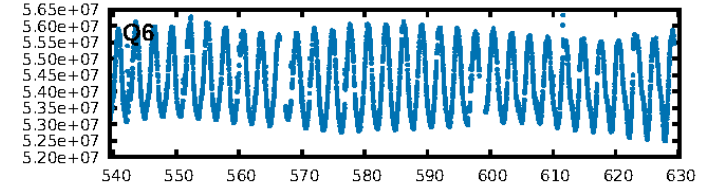
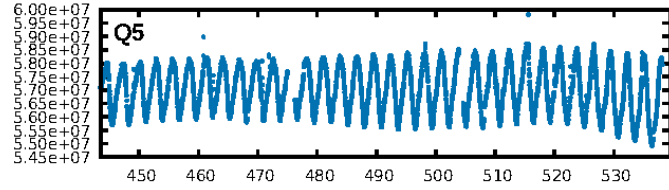
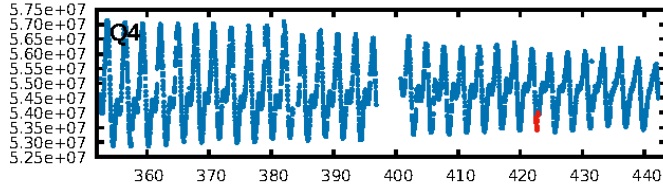
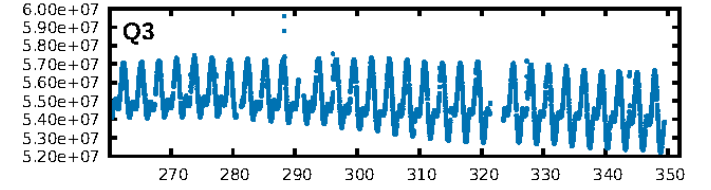
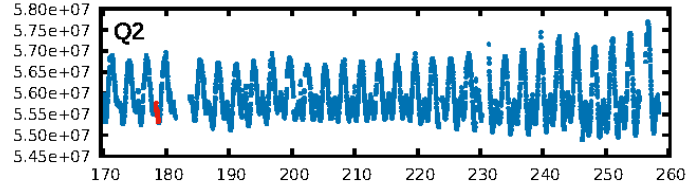
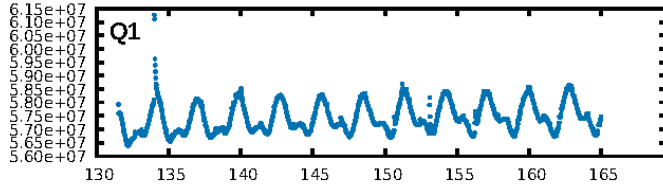
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [783.00σ]  
ModelChiSquare2-sig: 3.8%  
ModelChiSquareGof-sig: 60.5%  
**Bootstrap-pfa: 1.24e-08**  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: -3.71  
Centroid-sig: 38.7%  
Centroid-so: 0.483 arcsec [1.07σ]  
OotOffset-rm: 0.056 arcsec [0.60σ]  
**KicOffset-rm: 0.501 arcsec [5.51σ]**  
OotOffset-st: 2/2/1/0 [5]  
KicOffset-st: 2/2/1/0 [5]  
DiffImageQuality-fgm: 0.60 [3/5]  
DiffImageOverlap-fno: 1.00 [5/5]

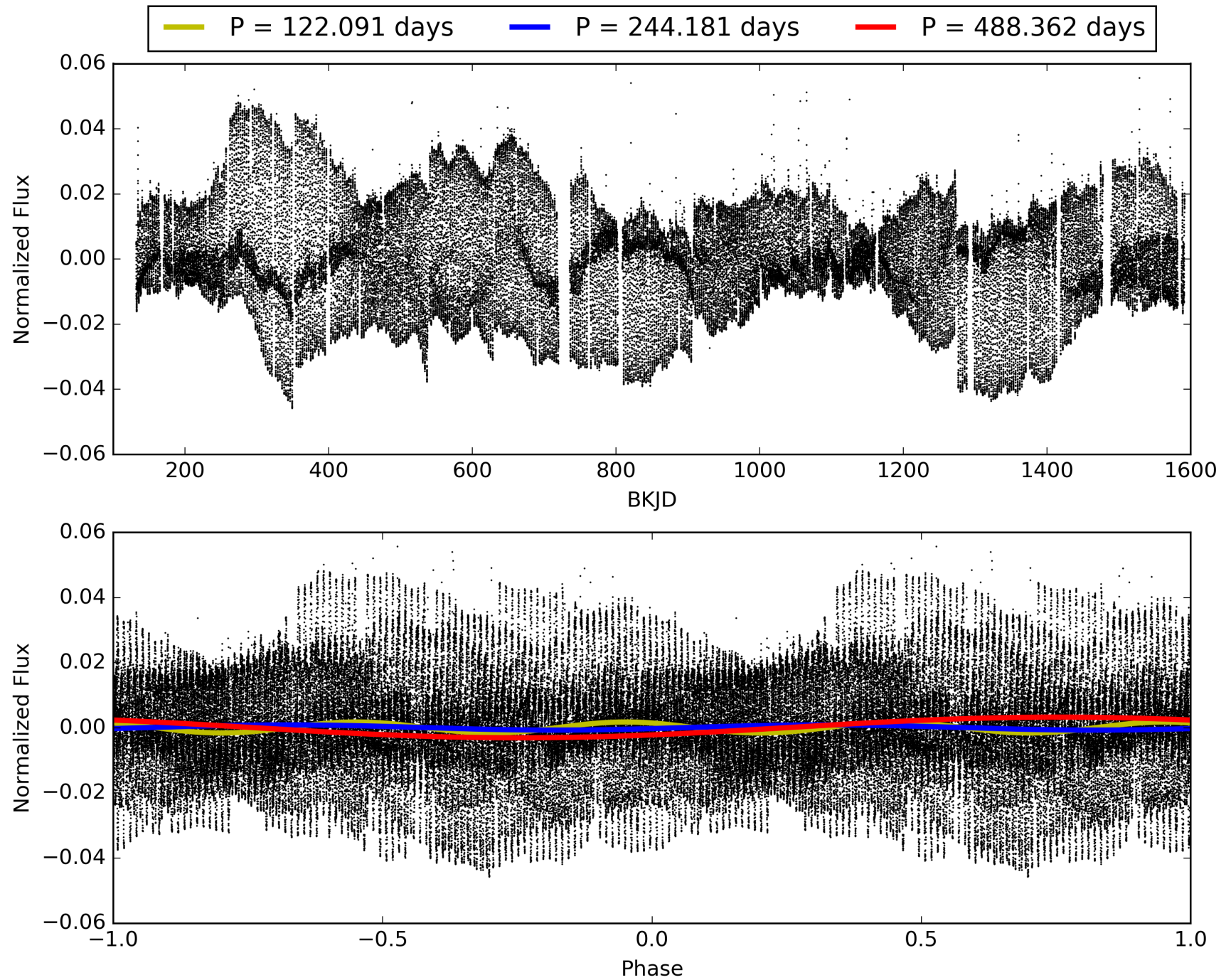
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 09:01:21 Z

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

# TCE 007871438-04, PDC Light Curves

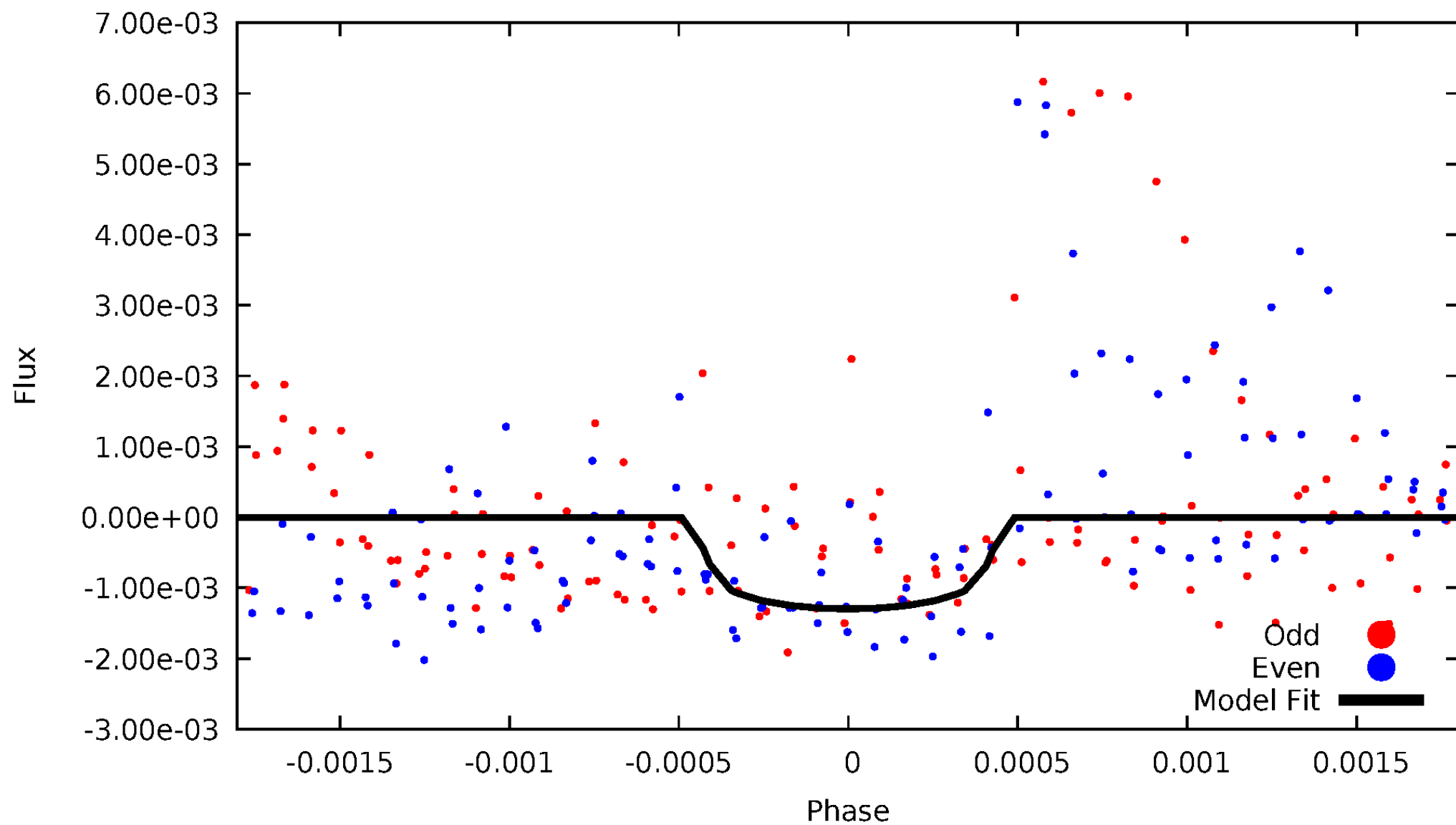


TCE 007871438-04



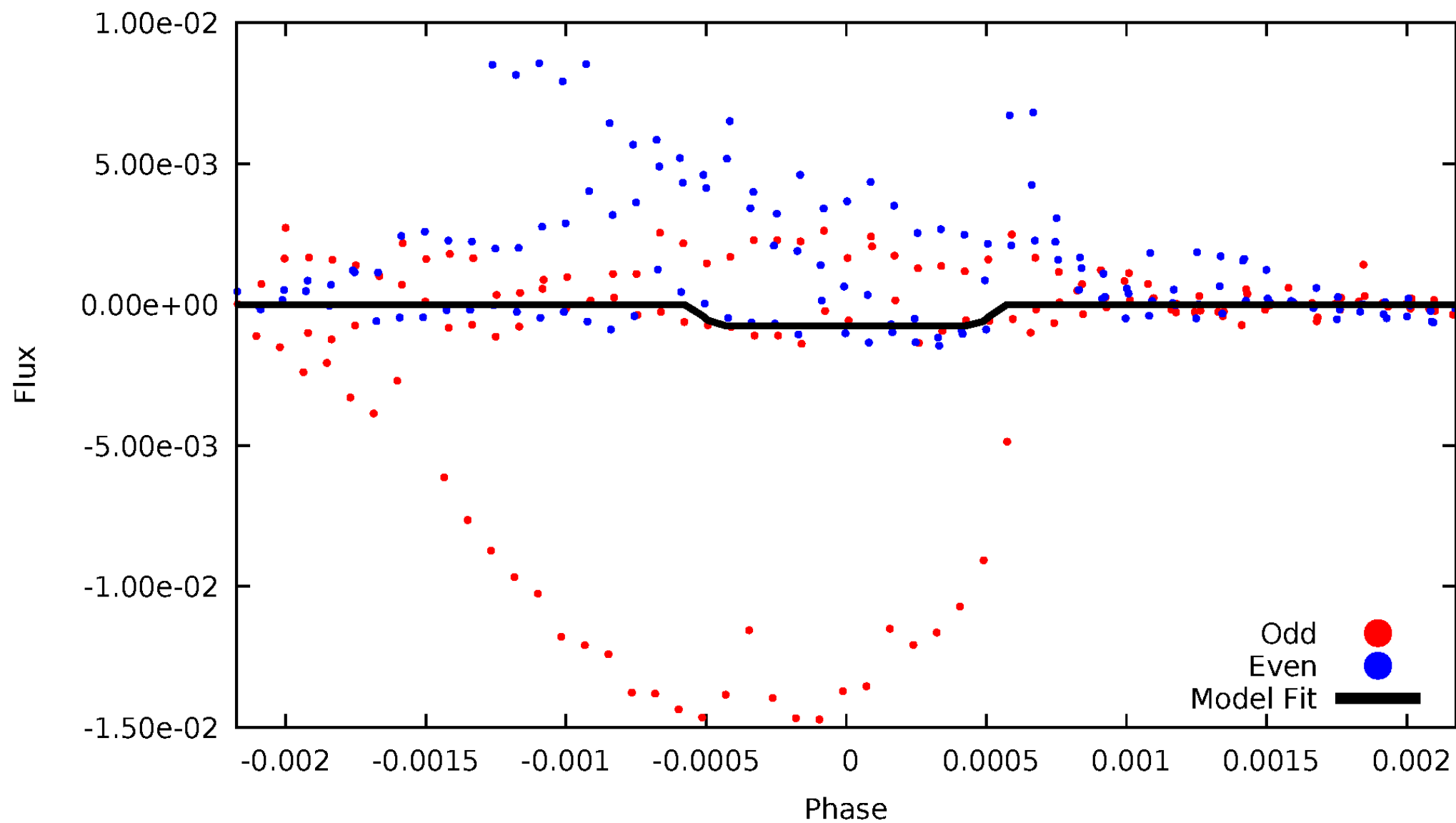
# DV Odd/Even

TCE 007871438-04



# ALT Odd/Even

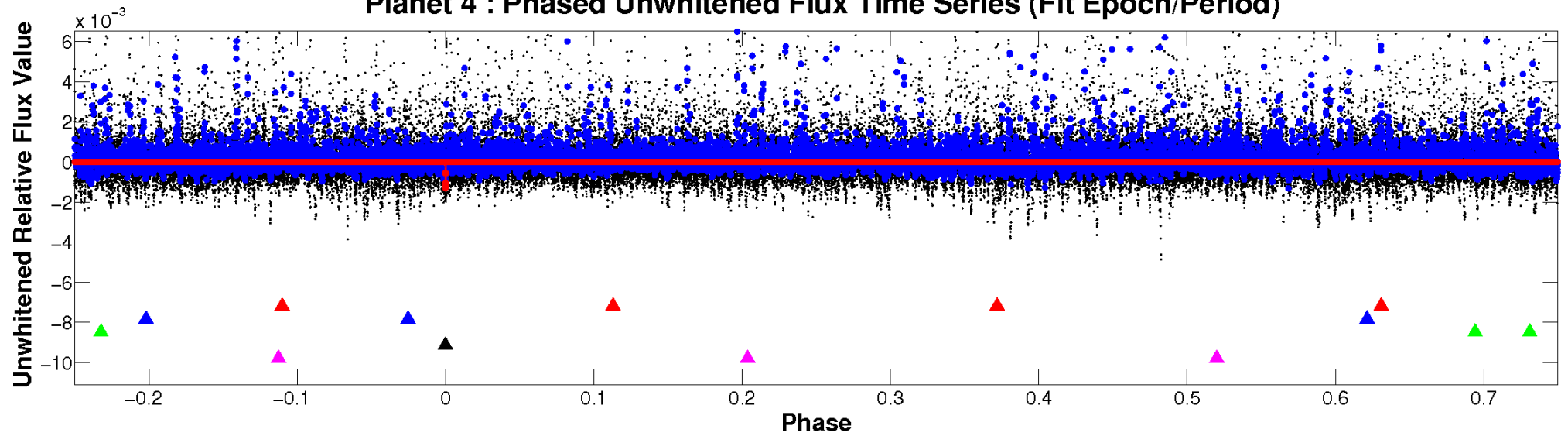
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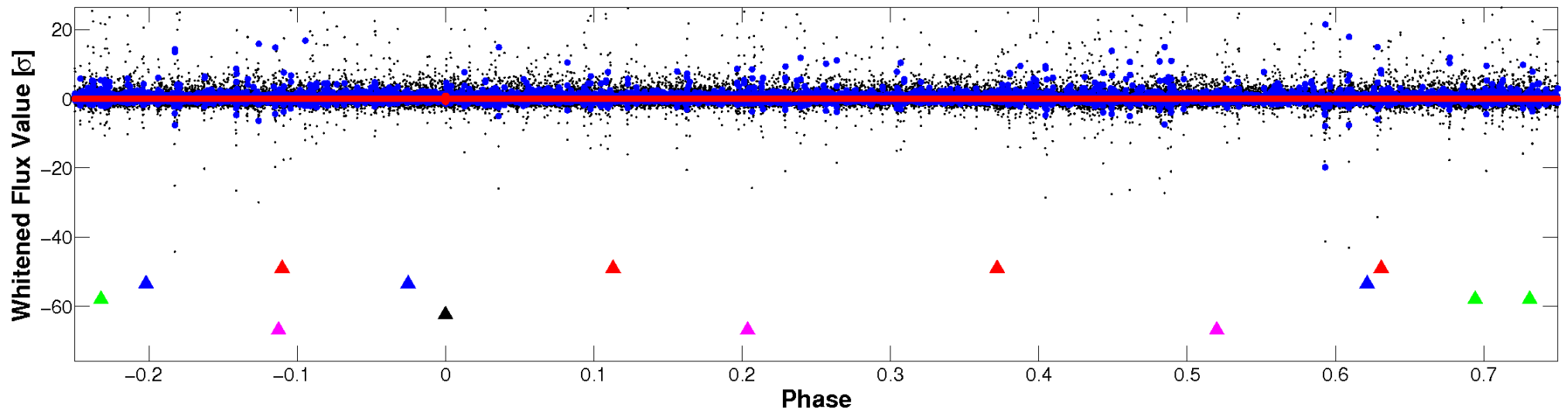


# Non-Whitened Vs. Whitened Light Curve

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

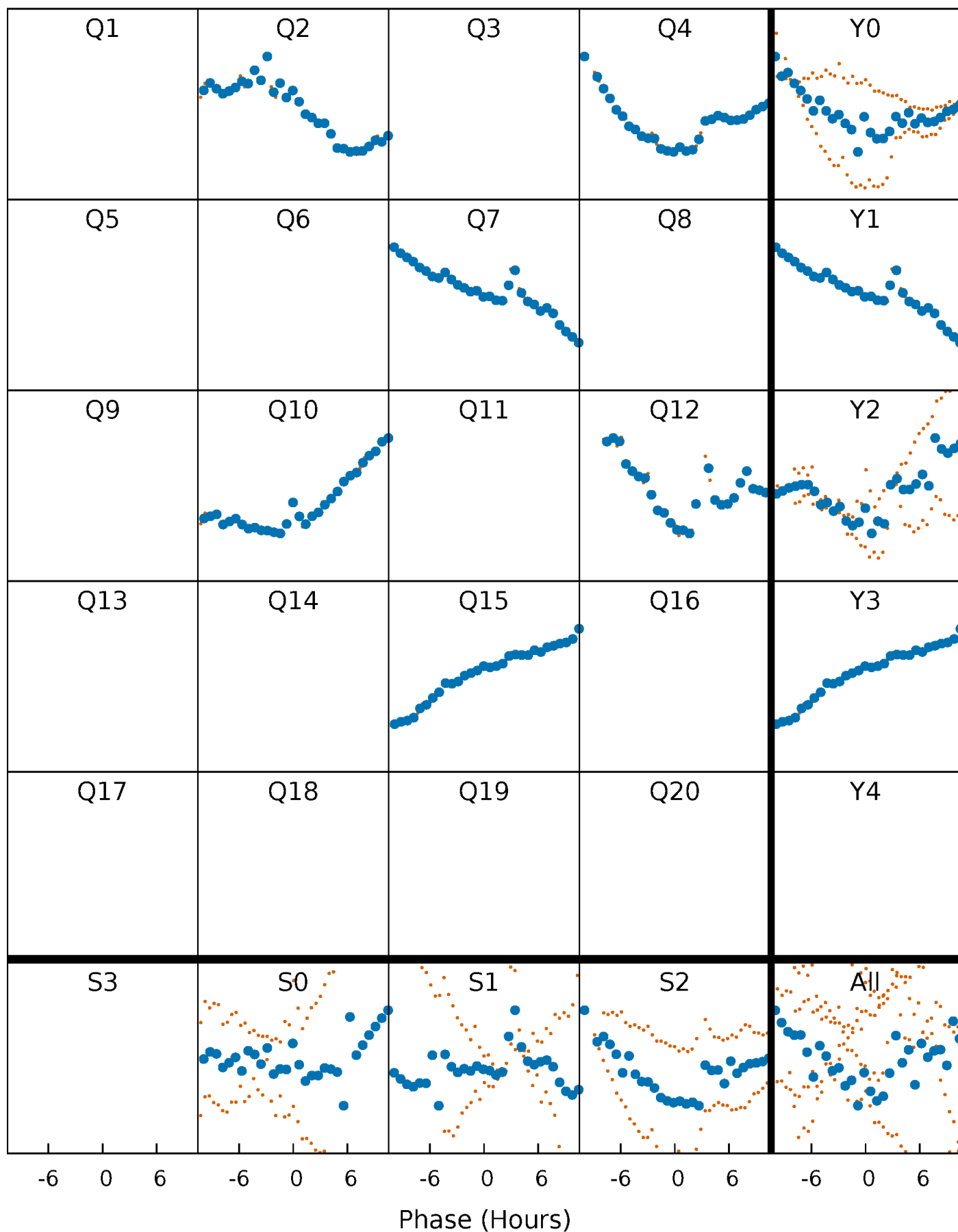


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

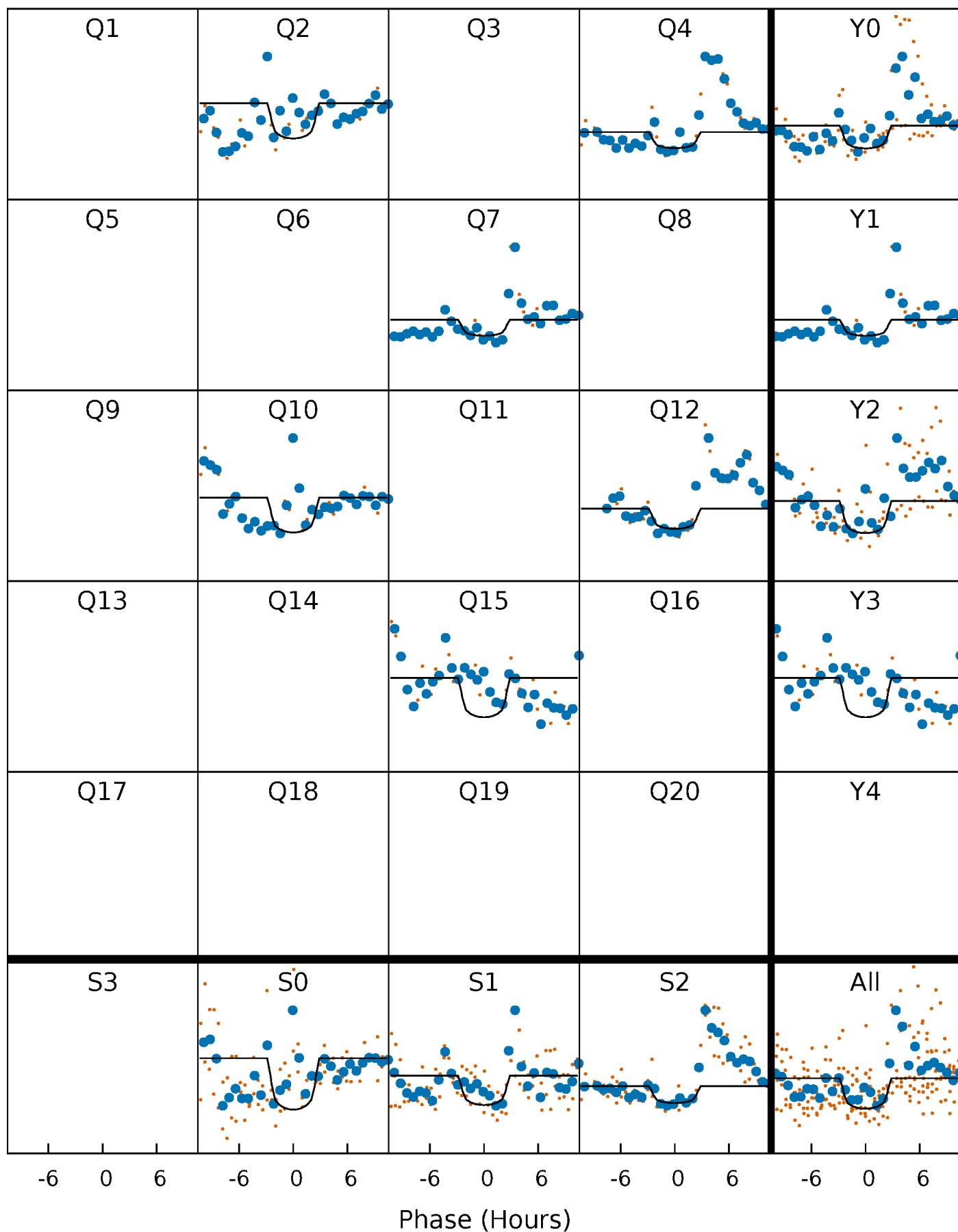
TCE 007871438-04 P=244.181013 Days  $T_0=178.530891$  (BKJD)





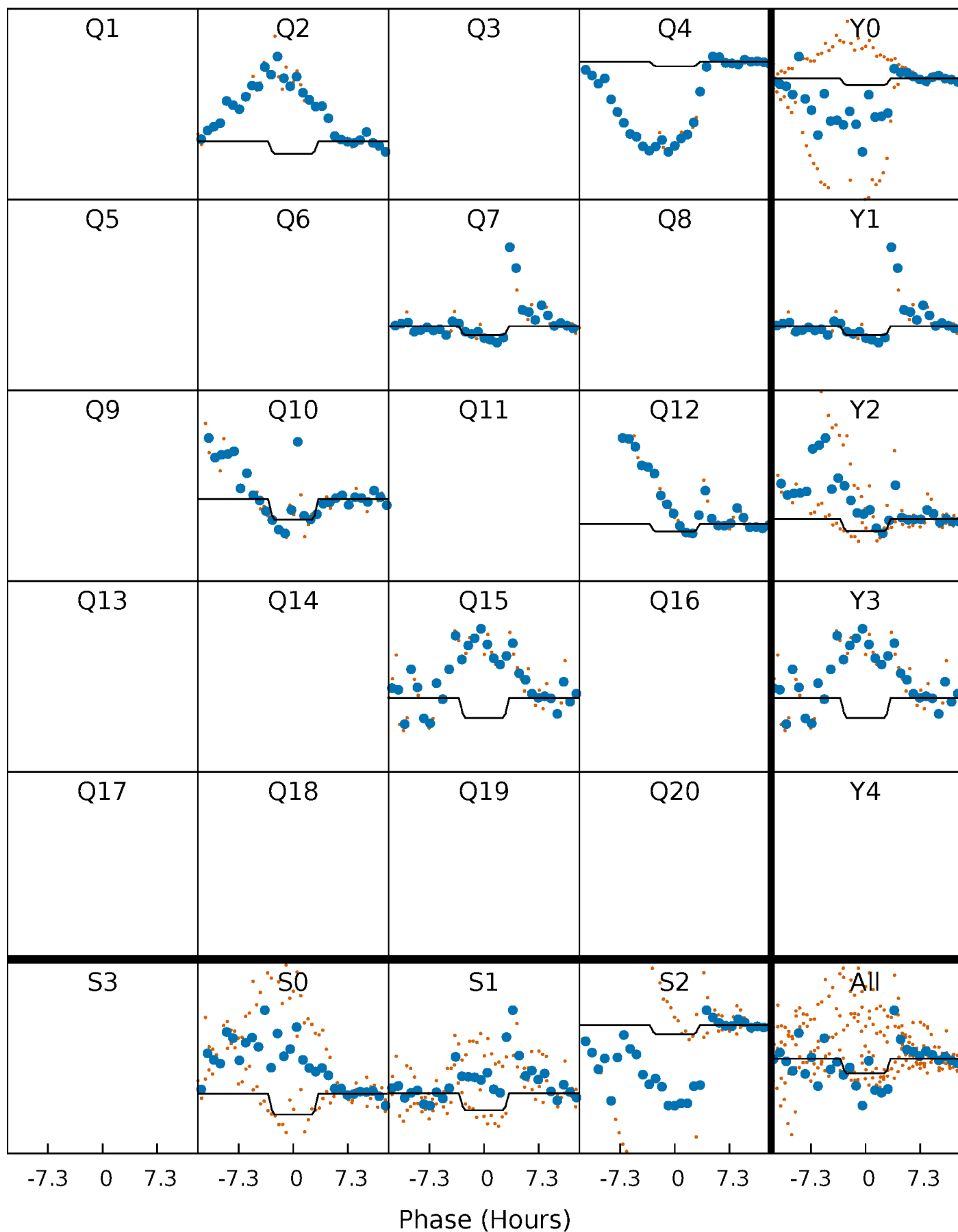
# DV Quarter-Phased Transit Curves

TCE 007871438-04   P=244.181013 Days    $T_0=178.530891$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

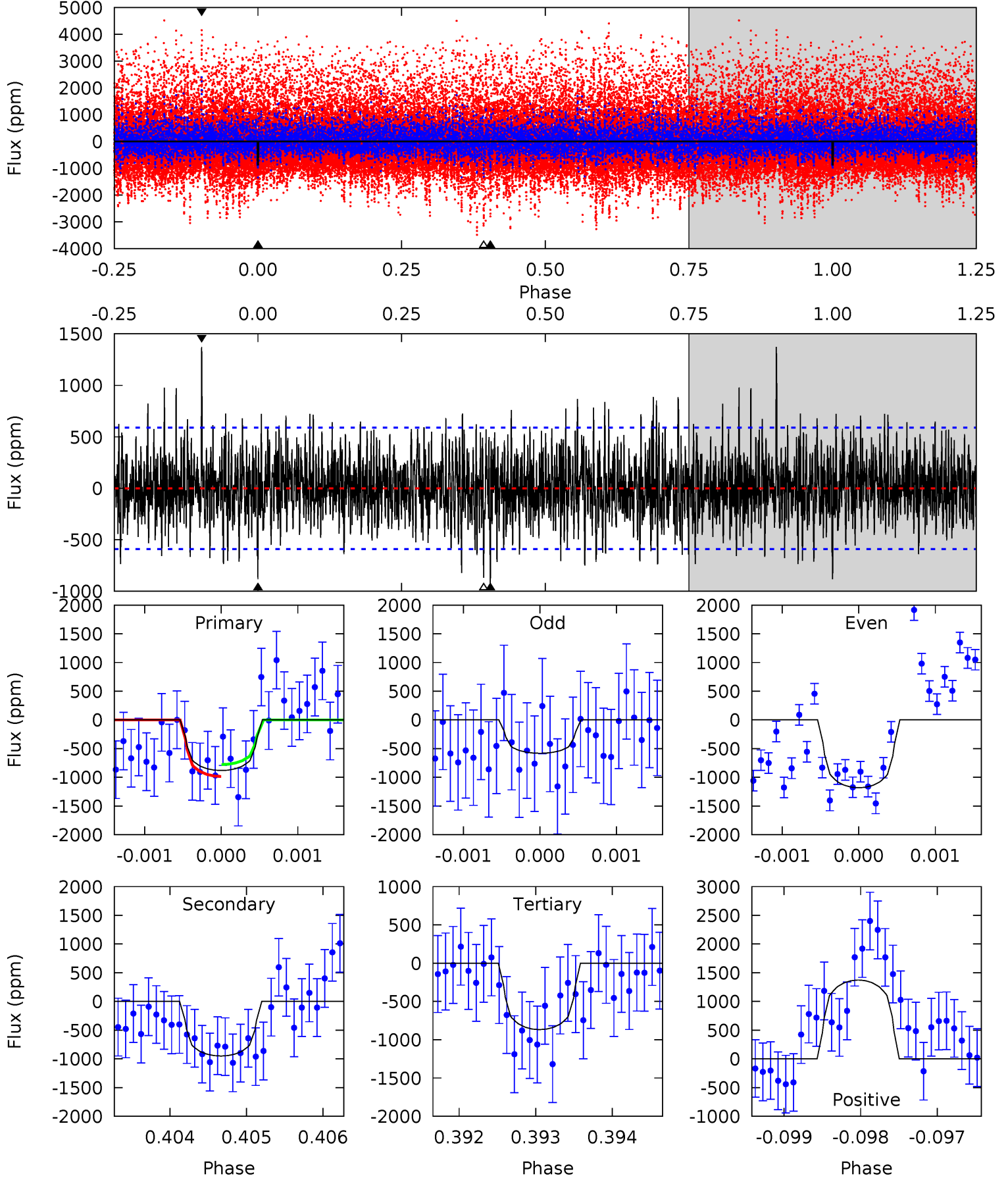
TCE 007871438-04 P=244.181042 Days  $T_0=178.510600$  (BKJD)



# DV Model-Shift Uniqueness Test

007871438-04, P = 244.181013 Days, E = 178.530891 Days

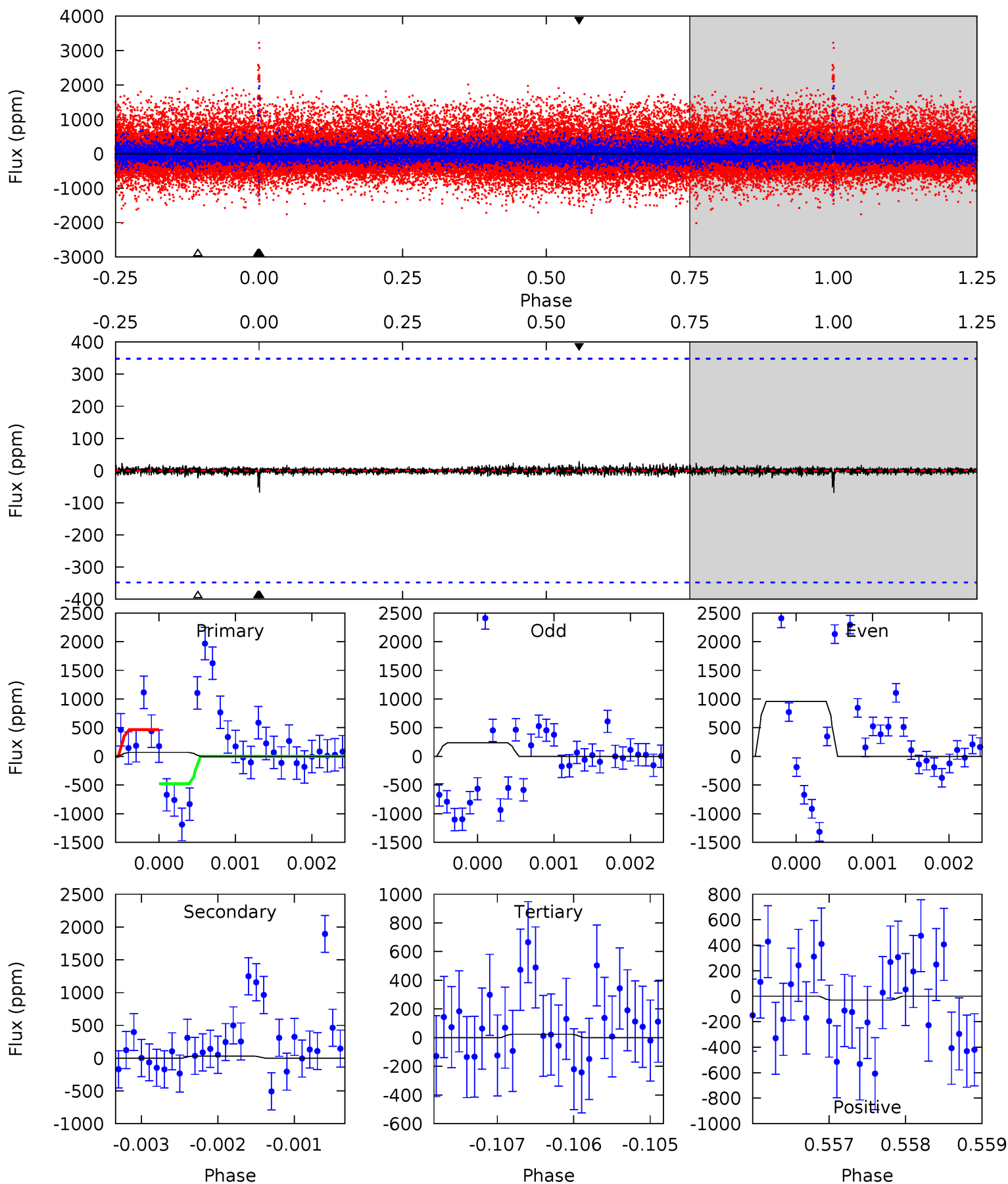
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.18	8.81	8.05	12.7	5.47	3.32	2.45	0.13	-4.56	0.76	-3.92	2.64	0.95	0.59	0.97



# Alt Model-Shift Uniqueness Test

007871438-04, P = 244.181042 Days, E = 178.510600 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
1.07	0.50	0.37	0.47	5.44	3.27	0.09	0.70	0.60	0.13	0.03	5.15	-3.65	0.31	0.10



### Stellar Parameters For KIC 007871438

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3756^{+50}_{-45}$	$4.753^{+0.032}_{-0.017}$	$-0.100^{+0.100}_{-0.100}$	$0.494^{+0.022}_{-0.029}$	$0.503^{+0.025}_{-0.025}$	$5.896^{+0.797}_{-0.457}$
	+1%/-1%	+1%/-0%	+100%/-100%	+4%/-6%	+5%/-5%	+14%/-8%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 007871438-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-950 \pm 108$	$6.37^{+5.72}_{-4.43}$	$208^{+3}_{-3}$	$2548^{+1050}_{-352}$	$4789^{+47949}_{-3471}$
Alt.	$-32 \pm 64$	$5.84^{+6.15}_{-3.72}$	$208^{+3}_{-3}$	$1681^{+479}_{-3519}$	$87^{+1024}_{-322}$

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

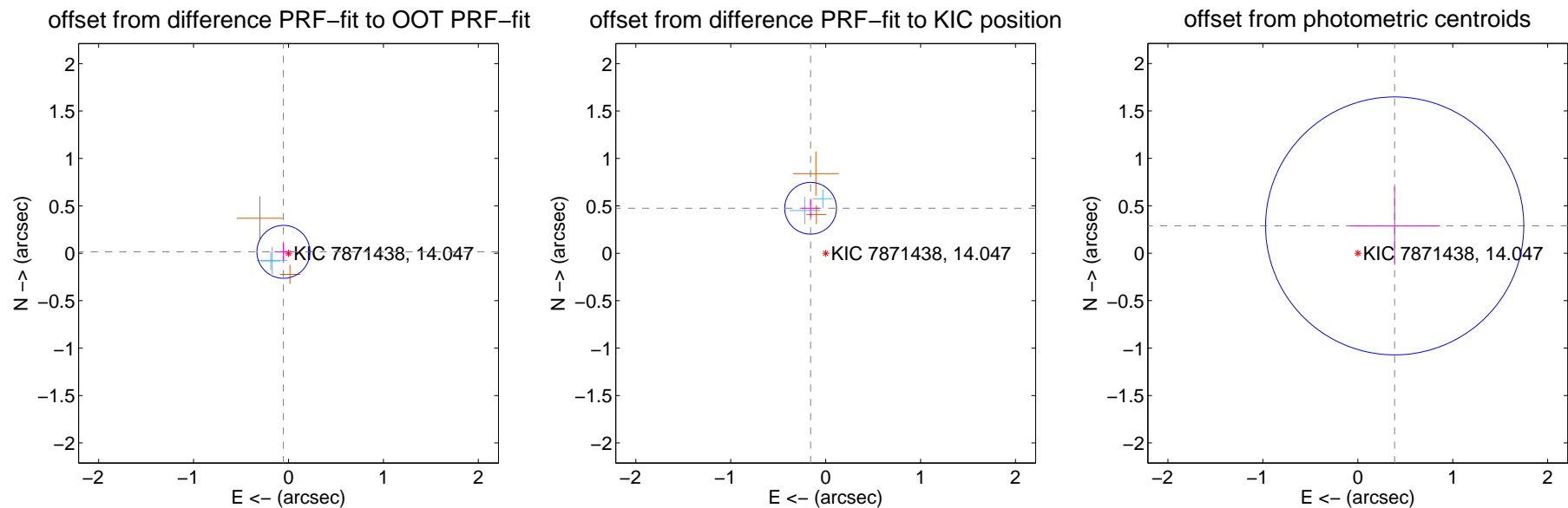
## DV Centroid Data

Supplemental centroid analysis for 007871438-04. Kepler magnitude: 14.05. Transit SNR 6.27

There are 3 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.64 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.056 \pm 0.093$	0.60	$0.053 \pm 0.093$	$0.015 \pm 0.091$
PRF-fit source offset from KIC position	$0.501 \pm 0.091$	5.51	$0.159 \pm 0.093$	$0.475 \pm 0.091$
photometric centroid source offset	$0.48 \pm 0.45$	1.07	$-0.39 \pm 0.47$	$0.29 \pm 0.41$



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

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

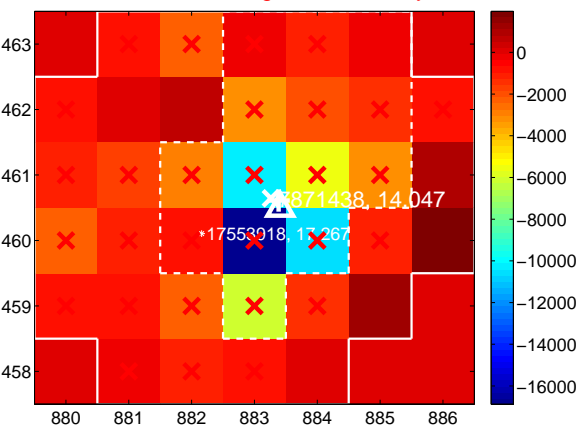
Q1 no difference image



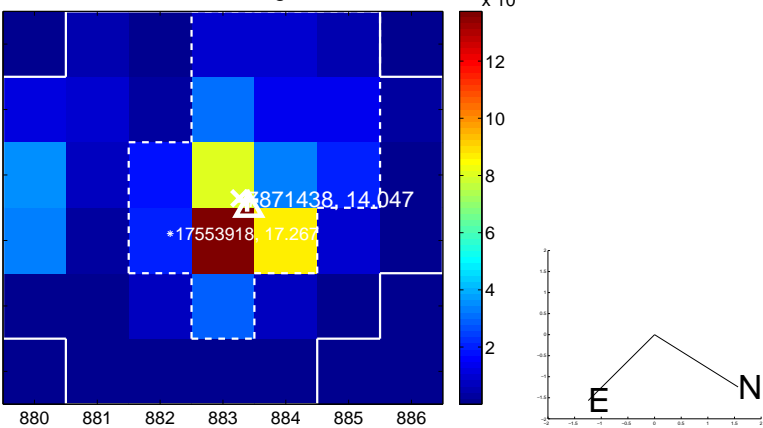
Q1 no OOT image



Q2 difference image. Poor Quality



Q2 OOT image



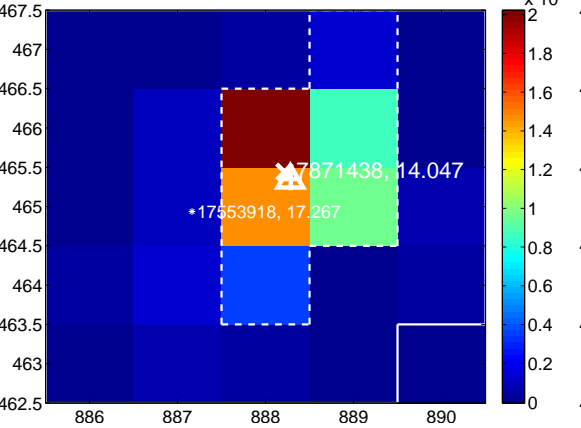
Q3 no difference image



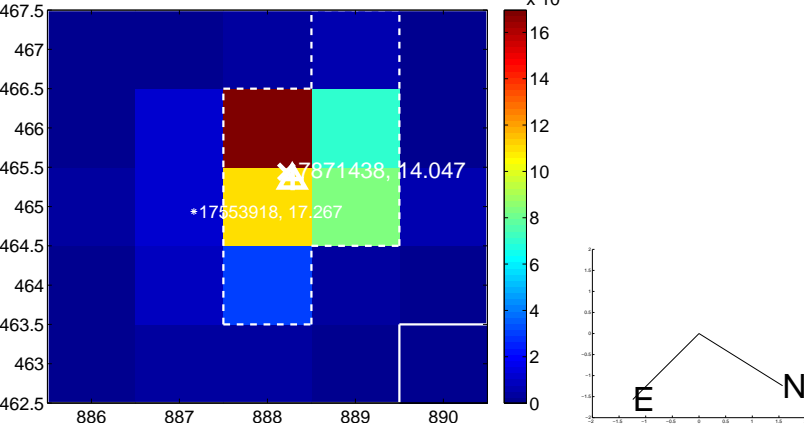
Q3 no OOT image



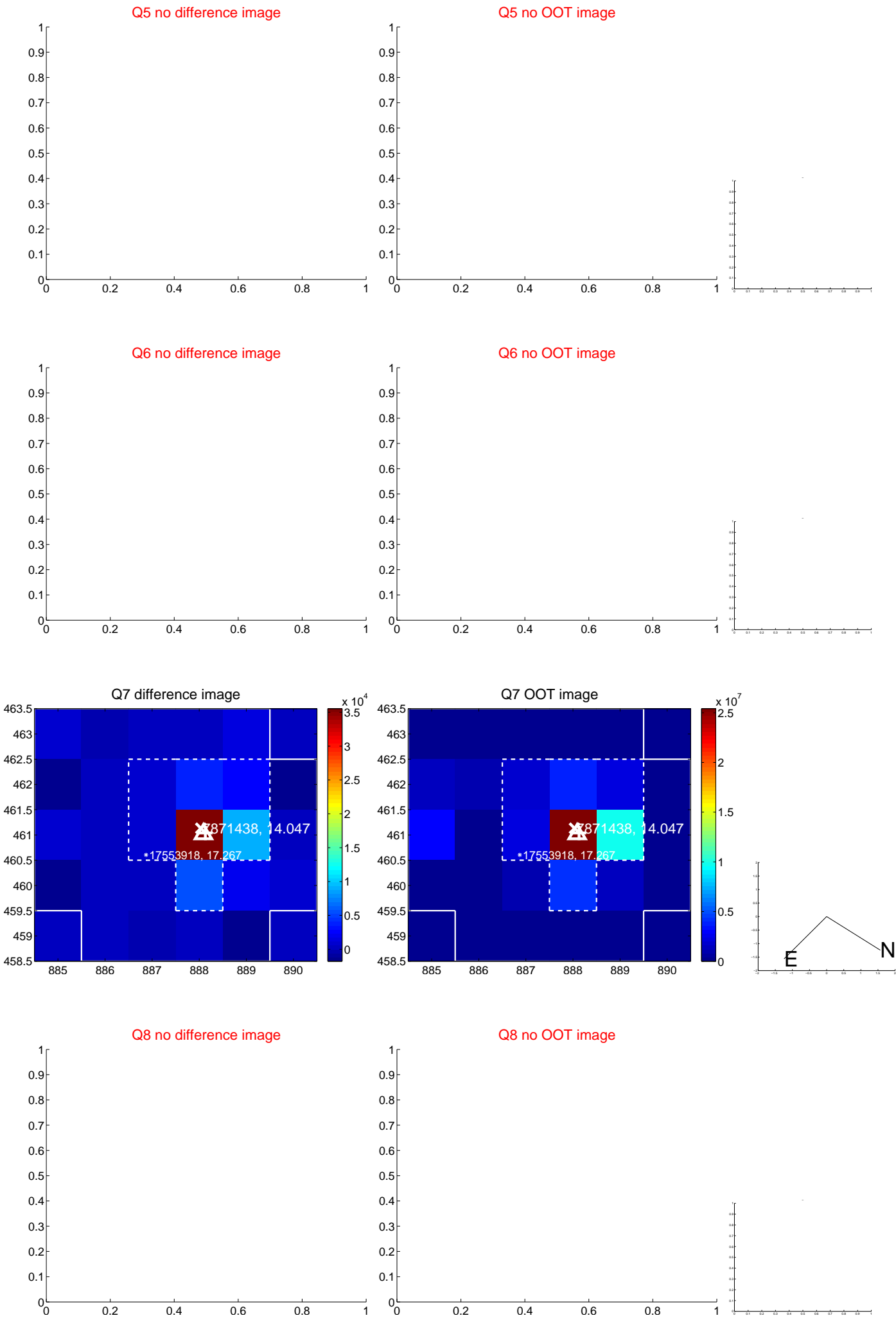
Q4 difference image



Q4 OOT image

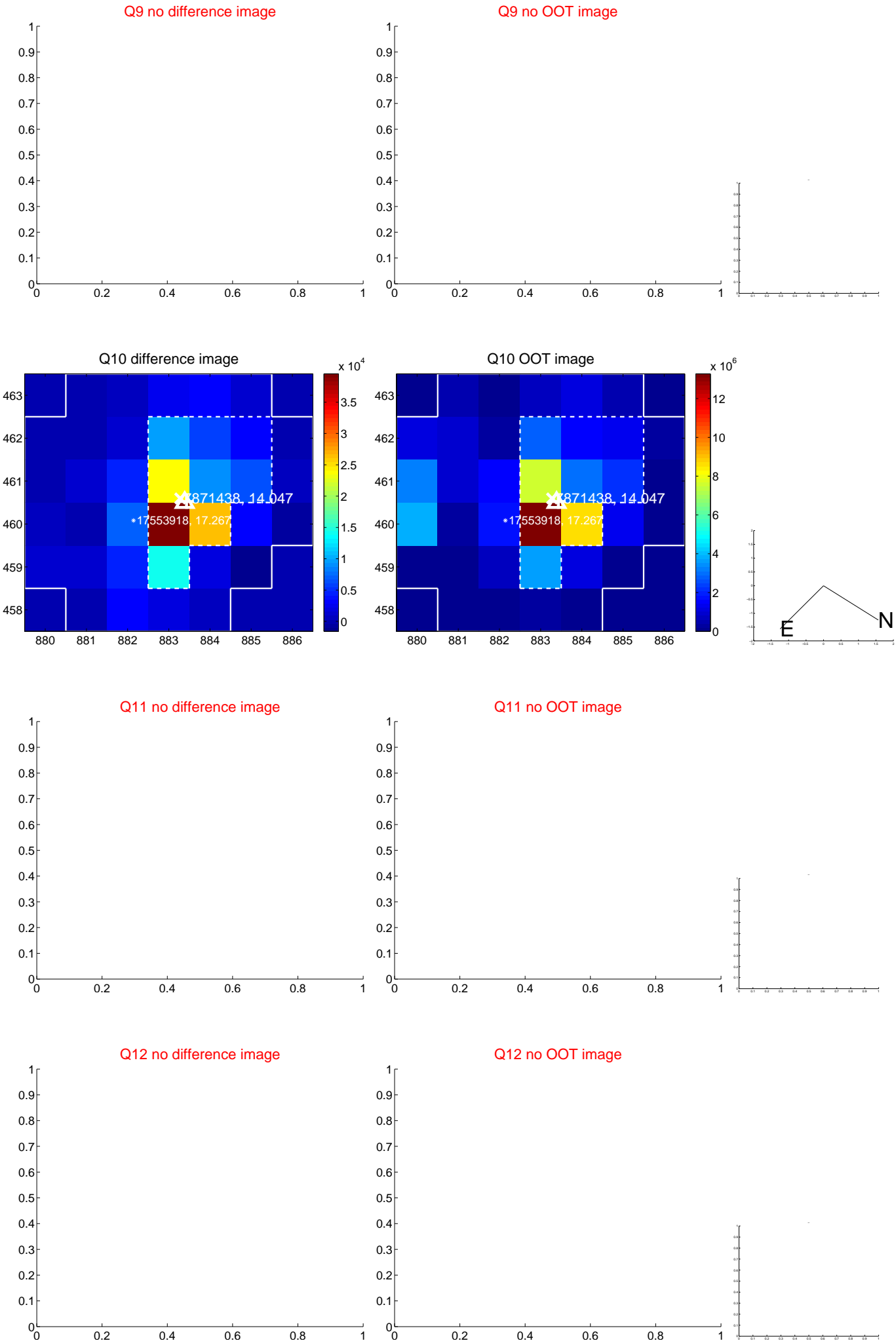


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

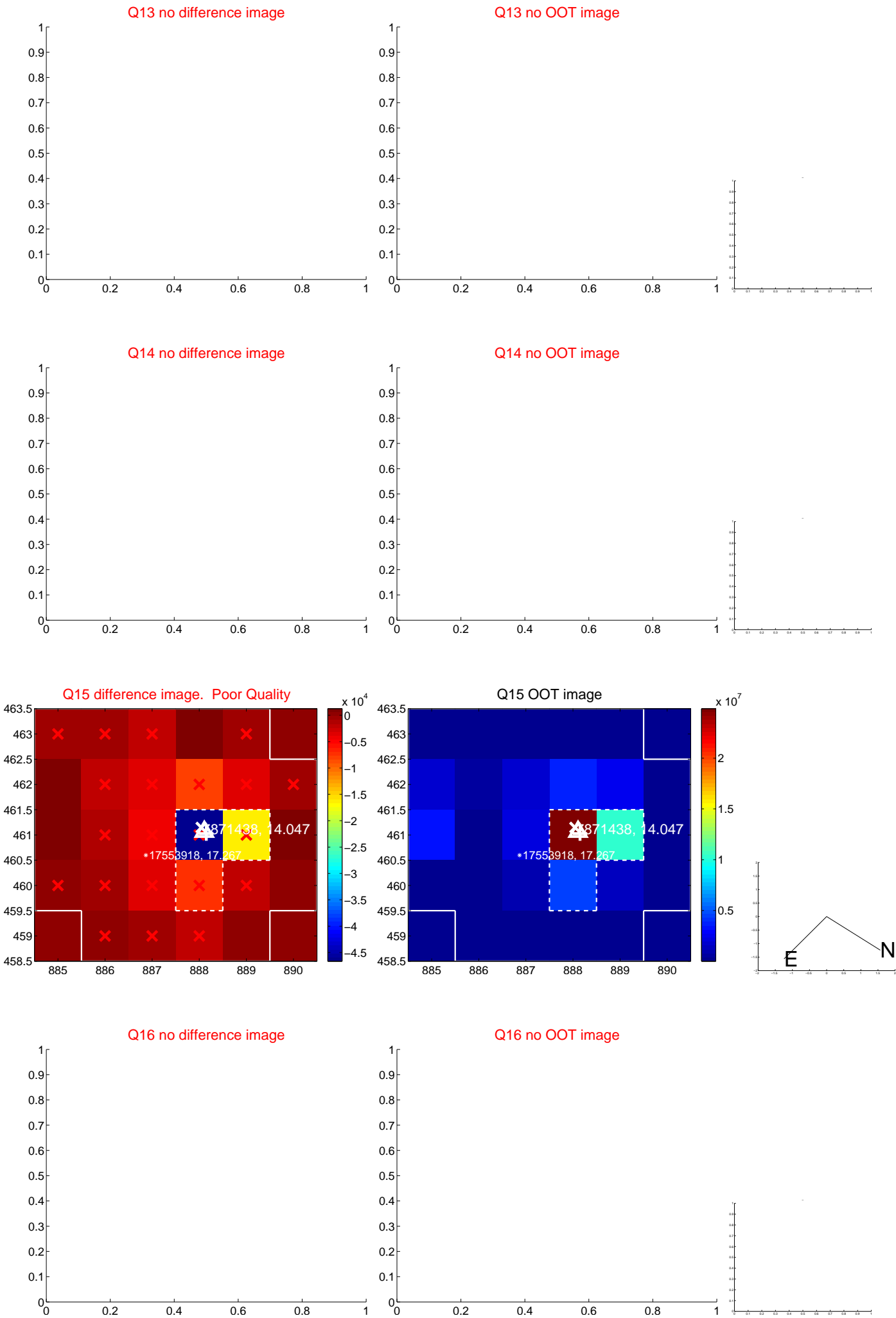




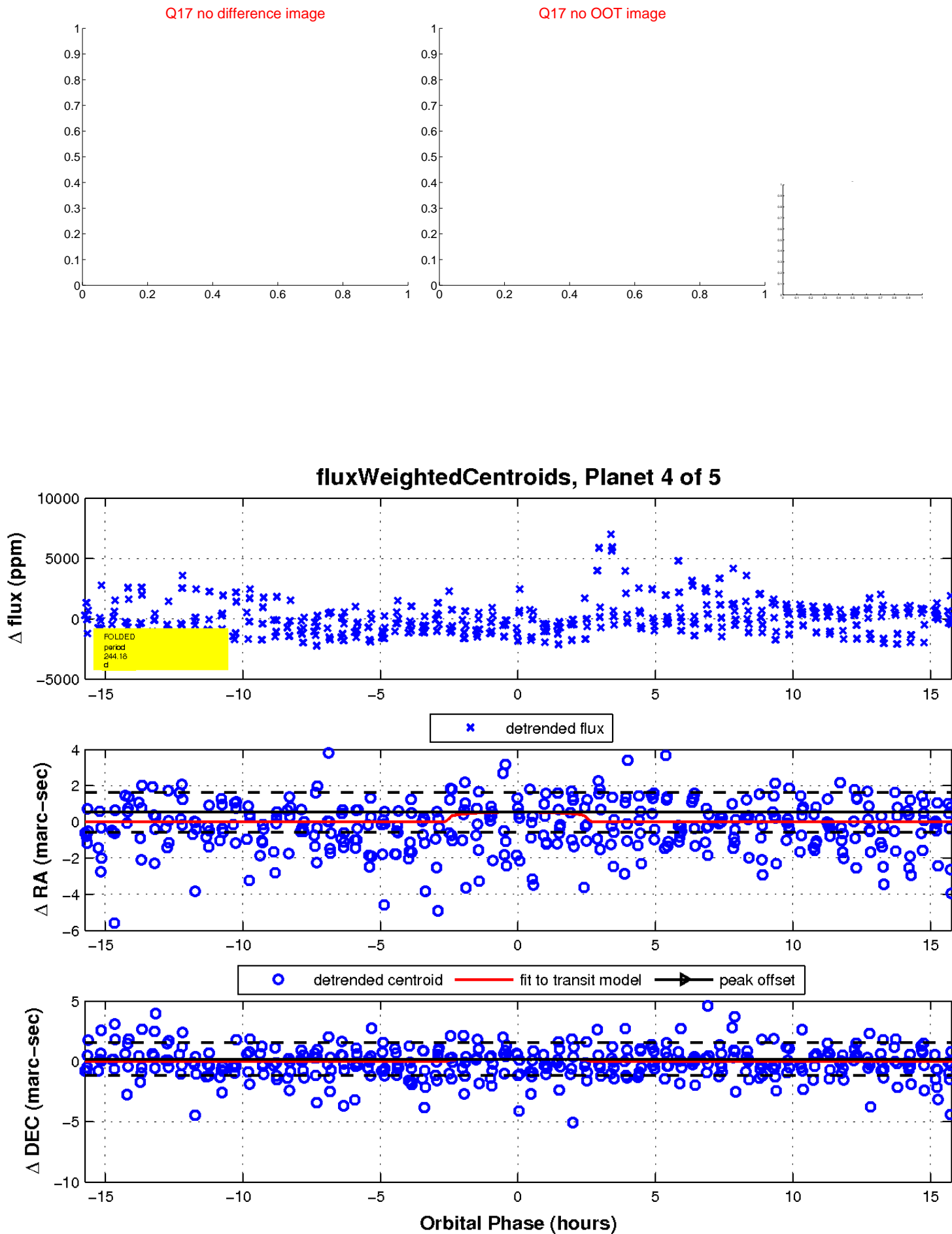
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white ×: 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



# KIC 007871438

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007871438-01	OBS	No	425.128191	151.639359	381.1	1.683	16.2	1.4	0.49	3756	1.12	0.06
007871438-02	OBS	No	531.504356	330.273324	2236.7	3.906	14.6	7.9	0.49	3756	2.90	0.04
007871438-03	OBS	No	479.390131	610.181072	2802.7	11.762	18.1	7.2	0.49	3756	3.27	0.05
007871438-04	OBS	No	244.181013	178.530891	1296.8	5.285	10.5	6.3	0.49	3756	1.79	0.12
007871438-05	OBS	No	565.591864	151.051491	1905.6	3.356	12.0	7.6	0.49	3756	2.25	0.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007871438-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_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_FEW_DIFFS
007871438-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007871438-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_KIC_POS
007871438-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_KIC_POS
007871438-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—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.

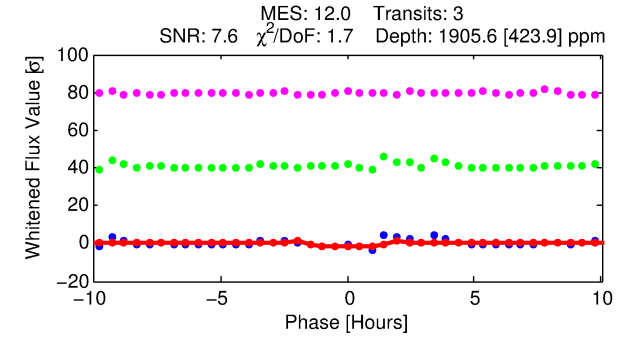
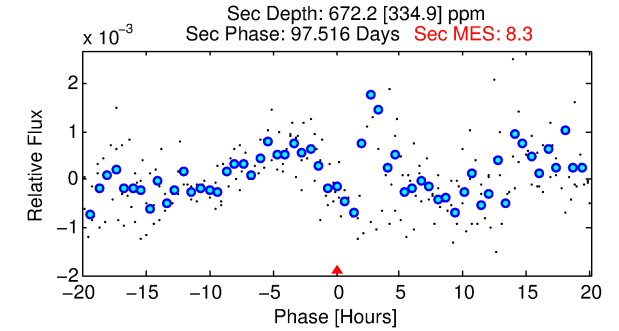
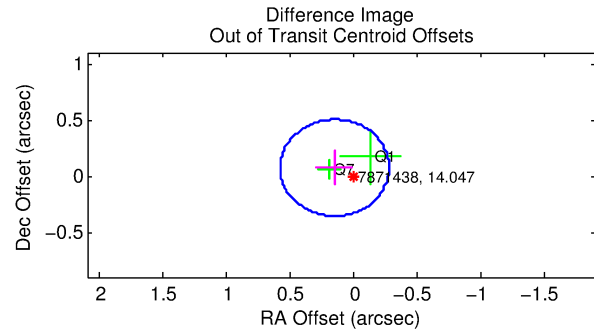
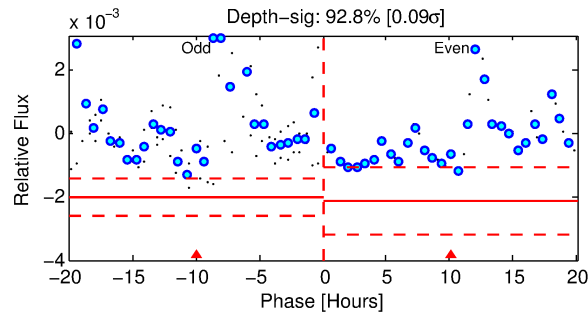
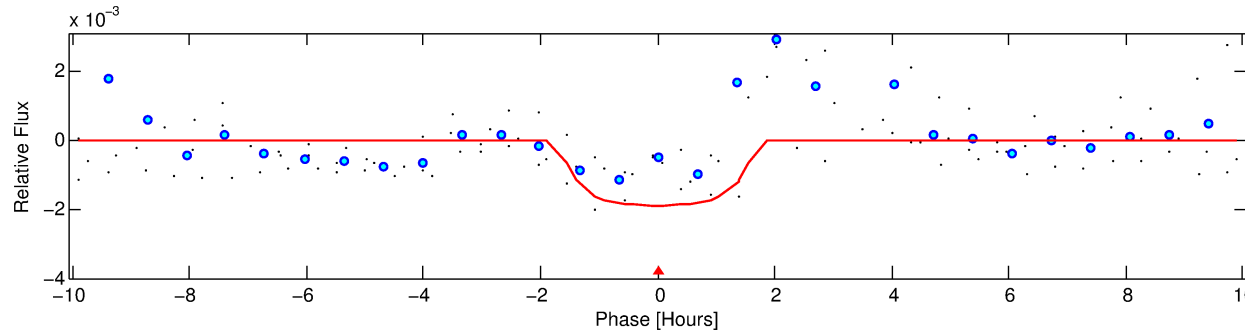
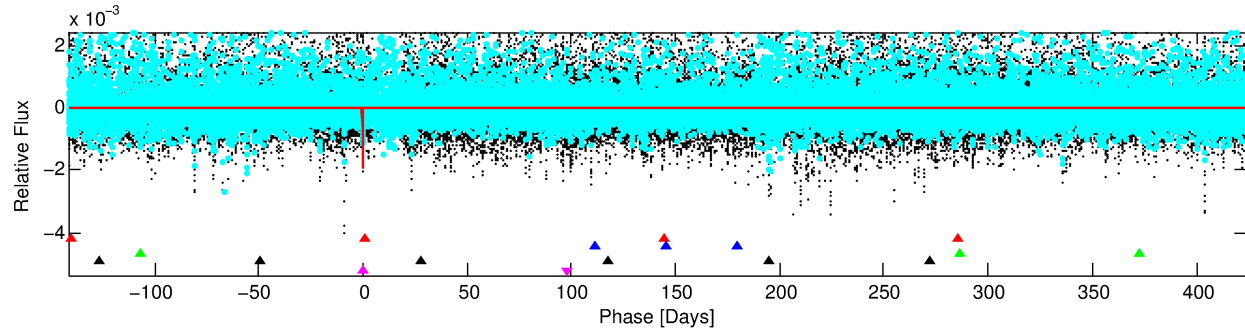
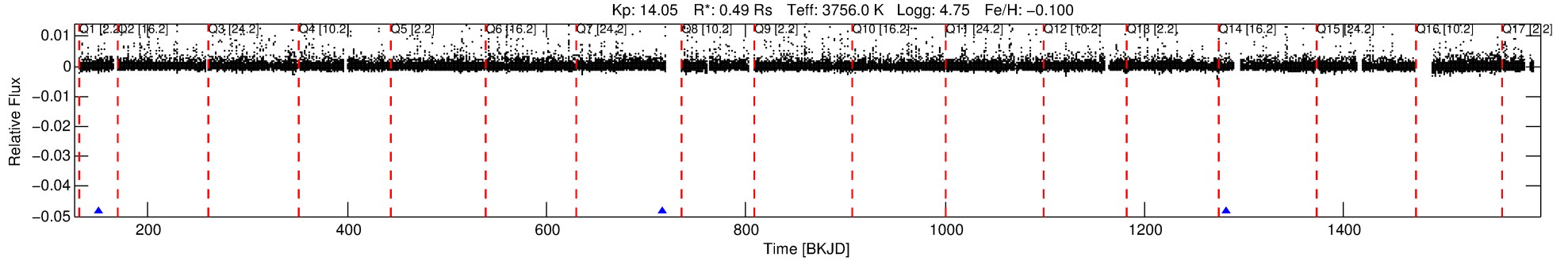
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 007871438-05

No Significant Match Found

# DV One-Page Summary

KIC: 7871438 Candidate: 5 of 5 Period: 565.592 d



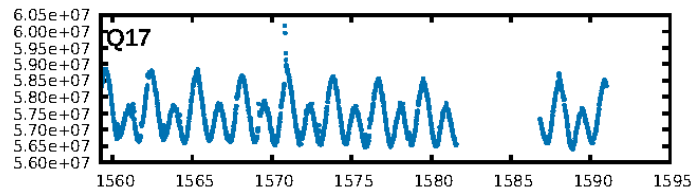
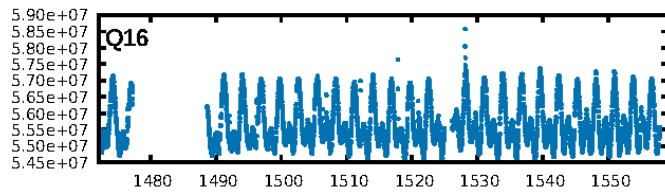
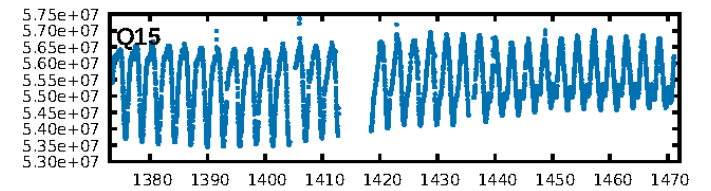
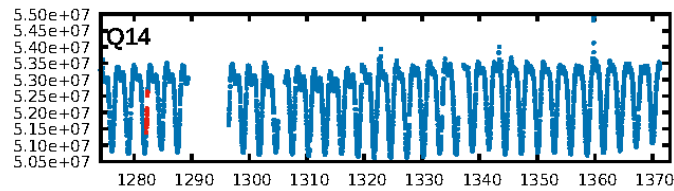
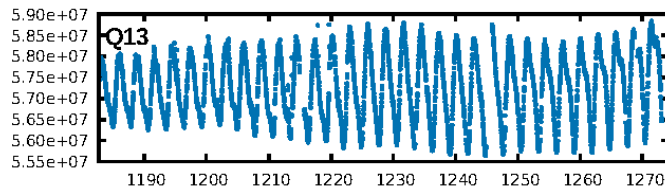
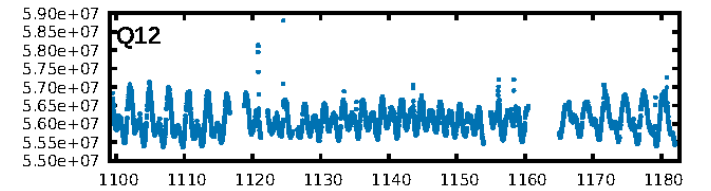
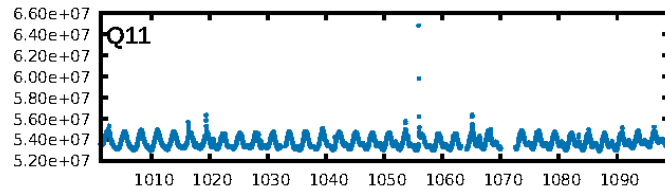
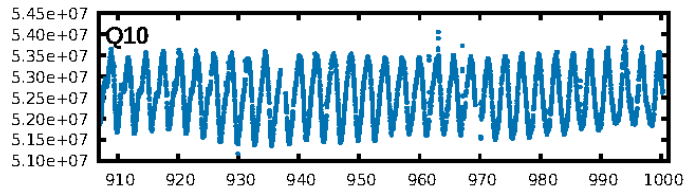
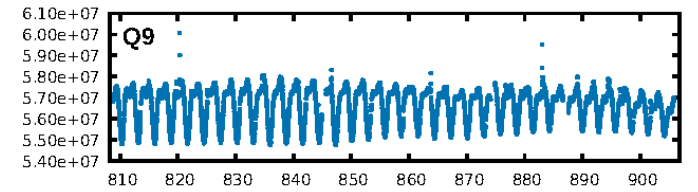
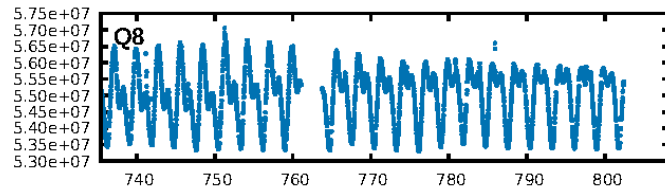
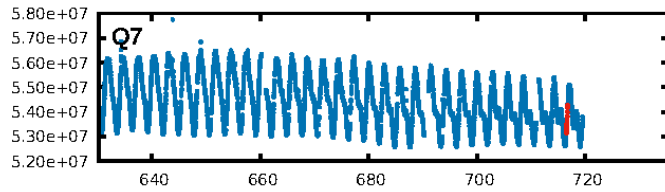
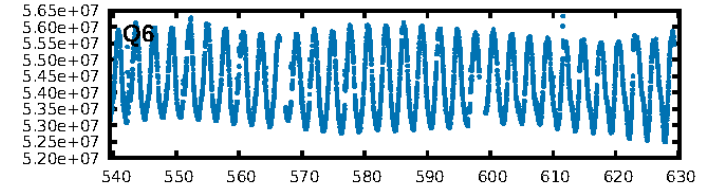
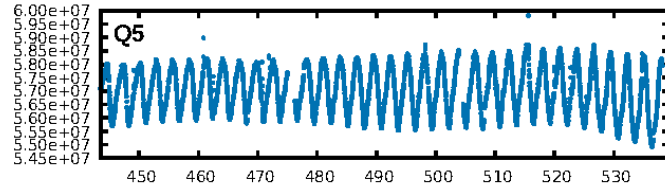
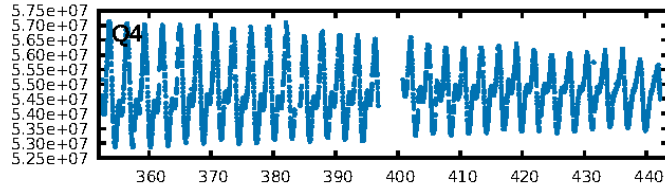
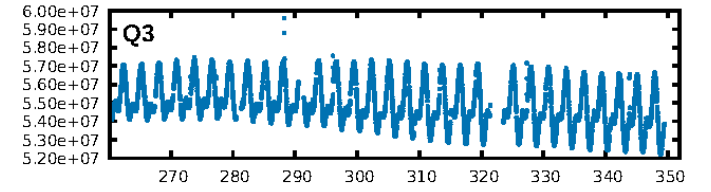
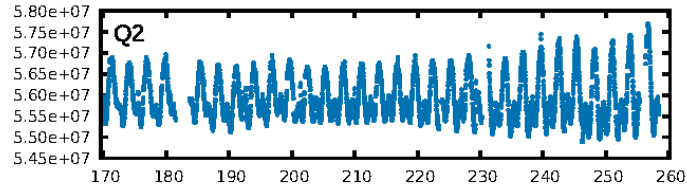
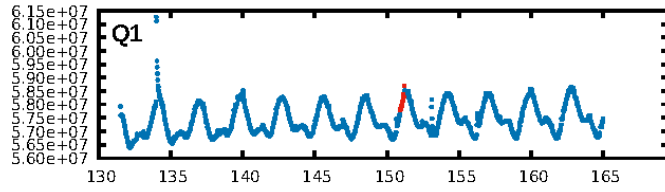
## DV Fit Results:

Period = 565.59186 [0.00583] d  
Epoch = 151.0515 [0.0077] BKJD  
Rp/R\* = 0.0418 [0.0692]  
a/R\* = 1078.61 [7916.27]  
b = 0.62 [7.31]  
Seff = 0.04 [0.00]  
Teq = 113 [2] K  
Rp = 2.25 [3.73] Re  
a = 1.0654 [0.0492] AU  
Ag = 82633.10 [276755.86] [0.30σ]  
Teffp = 2958 [2476] K [1.15σ]

## DV Diagnostic Results:

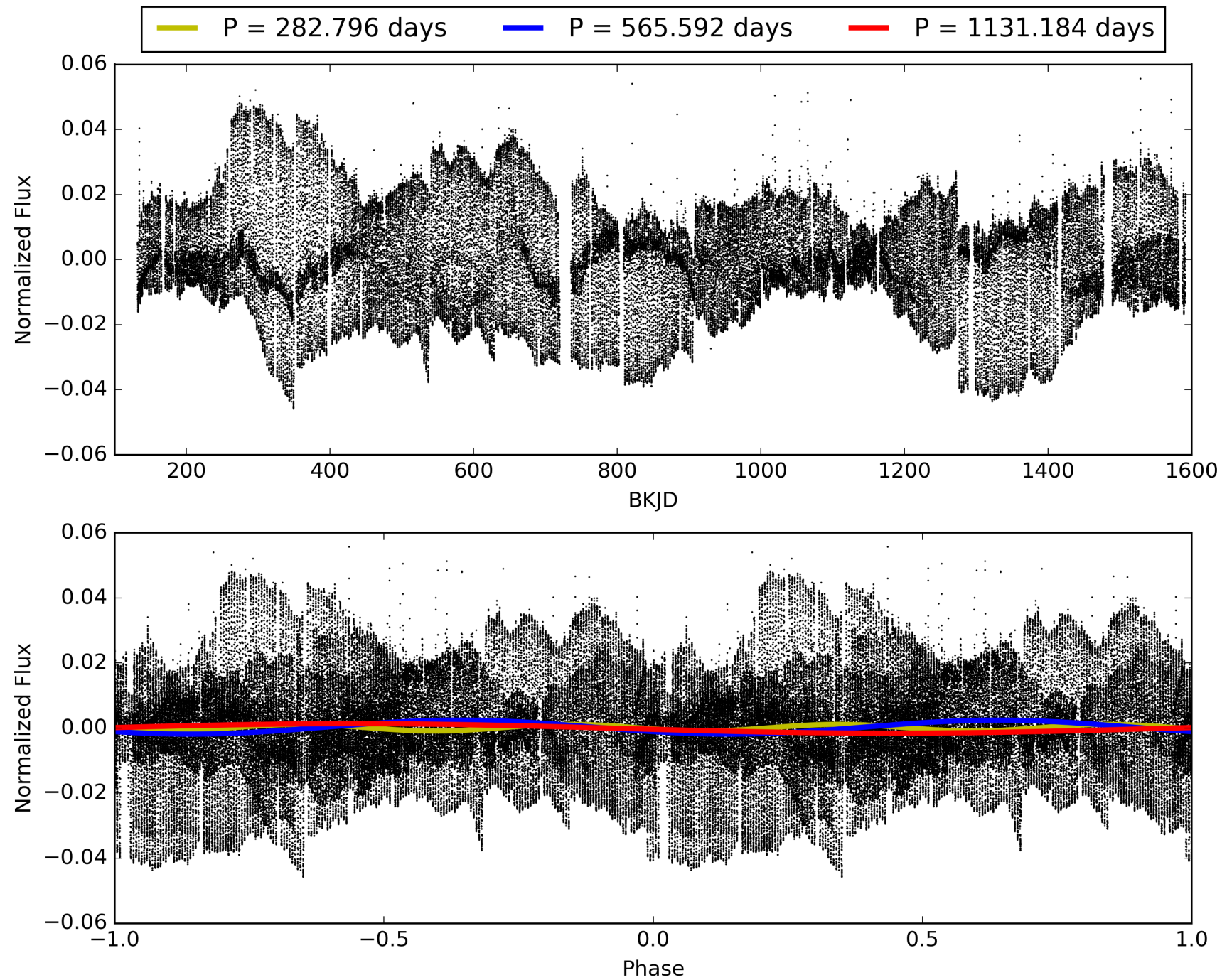
ShortPeriod-sig: 100.0% [158.85σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 42.1%  
ModelChiSquareGof-sig: 57.7%  
**Bootstrap-pfa: 1.44e-08**  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: 1.144  
Centroid-sig: 64.2%  
Centroid-so: 0.159 arcsec [0.27σ]  
OotOffset-rm: 0.172 arcsec [1.20σ]  
**KicOffset-rm: 0.576 arcsec [3.94σ]**  
OotOffset-st: 0/1/0/1 [2]  
KicOffset-st: 0/1/0/1 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [2/2]

# TCE 007871438-05, PDC Light Curves





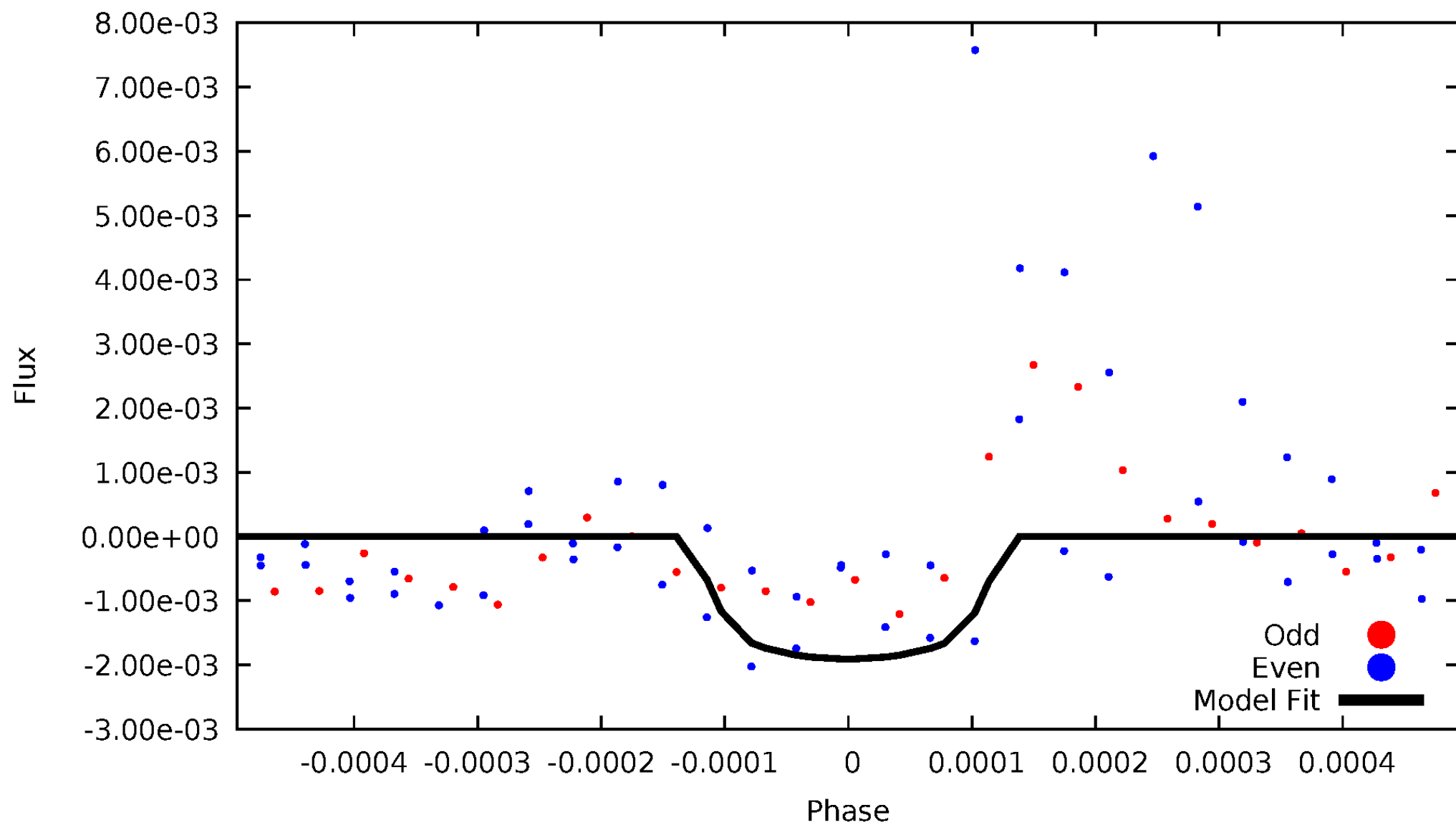
TCE 007871438-05





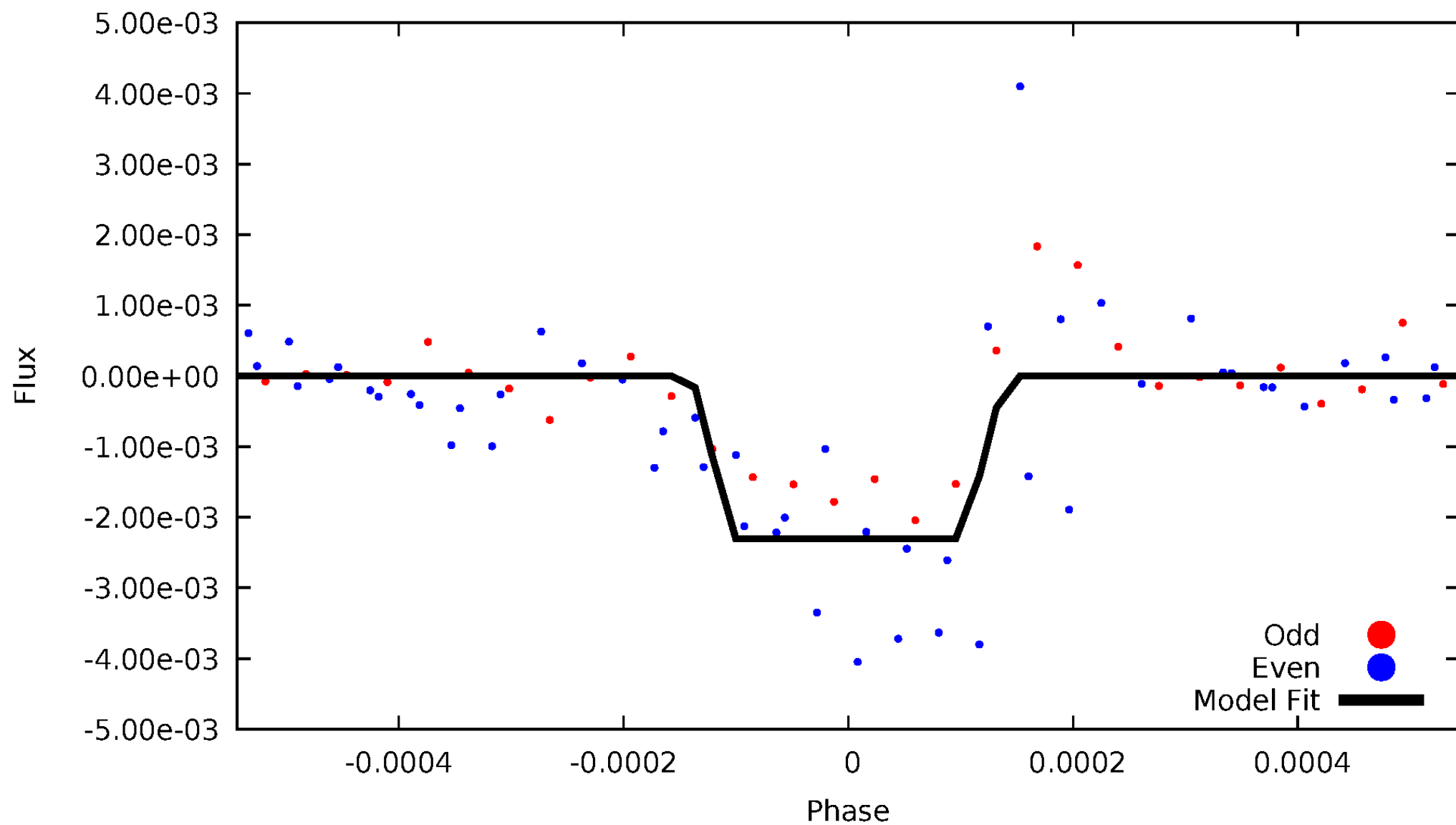
# DV Odd/Even

TCE 007871438-05



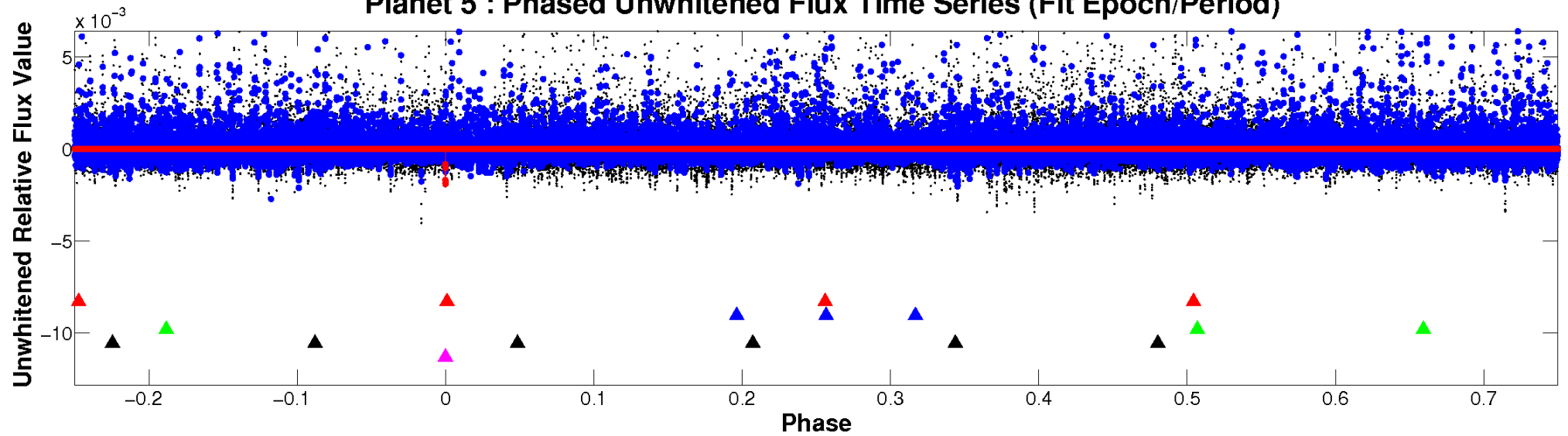
# ALT Odd/Even

TCE 007871438-05

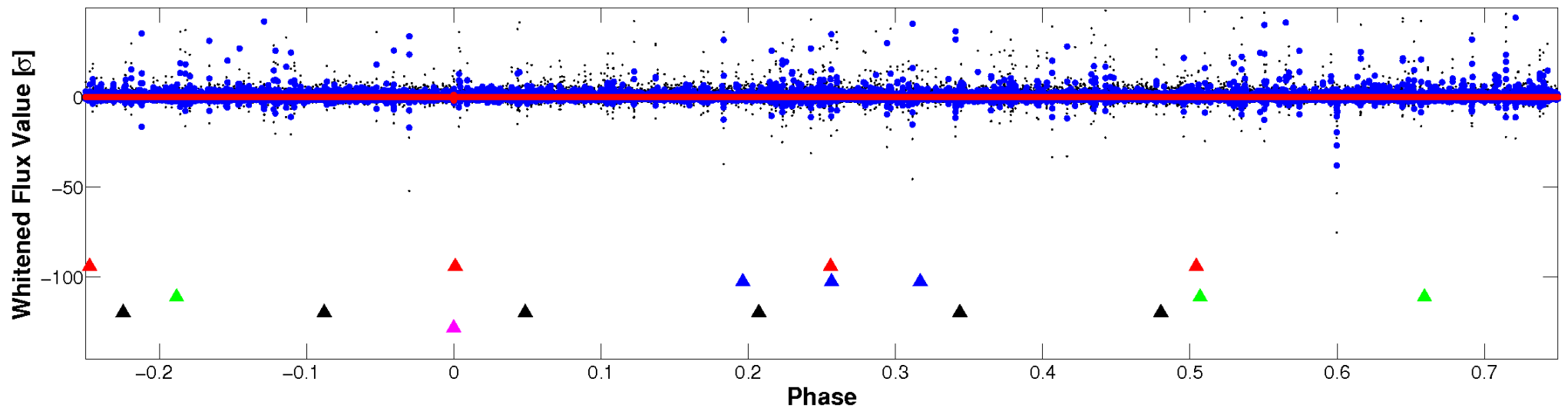


# Non-Whitened Vs. Whitened Light Curve

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

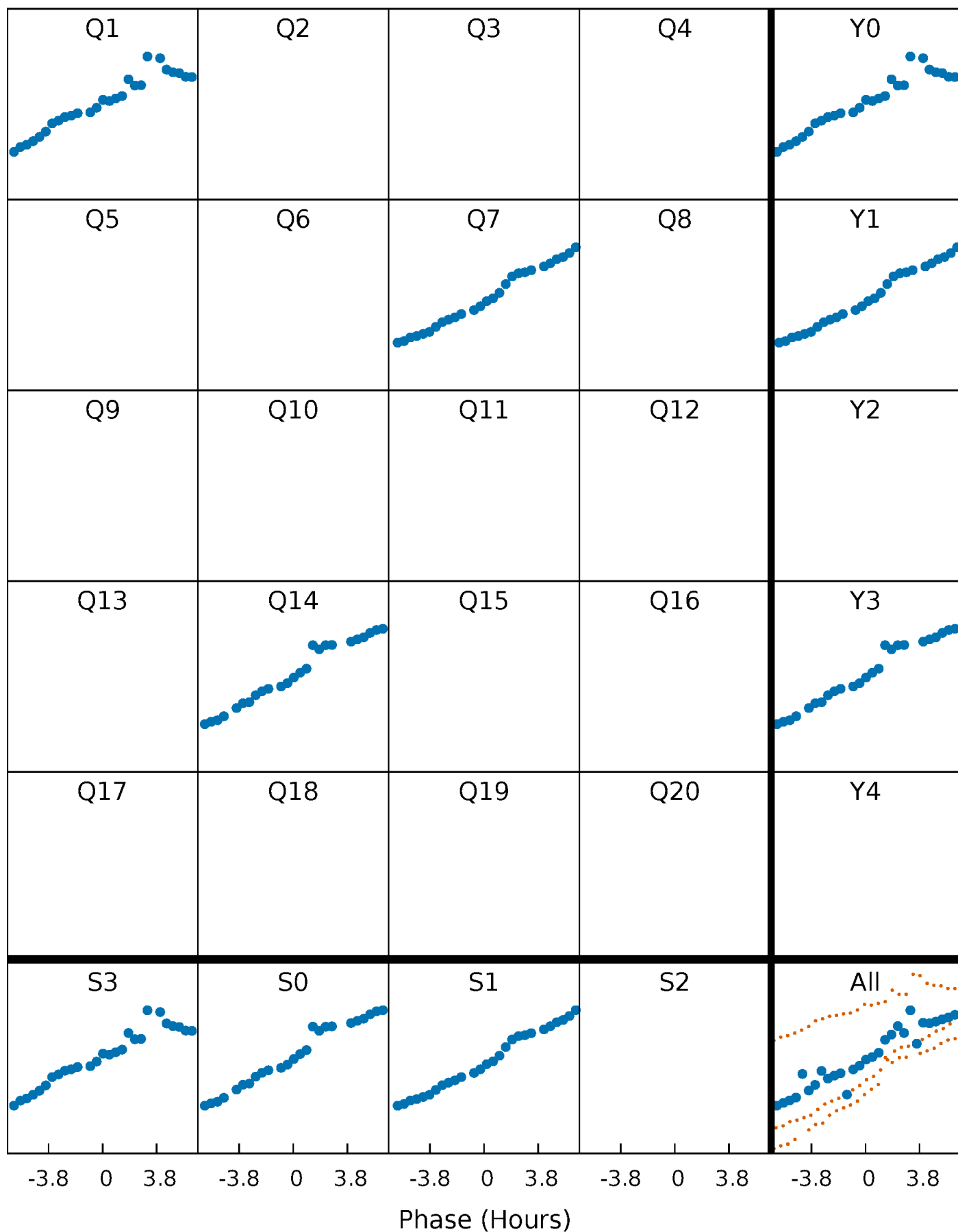


**Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



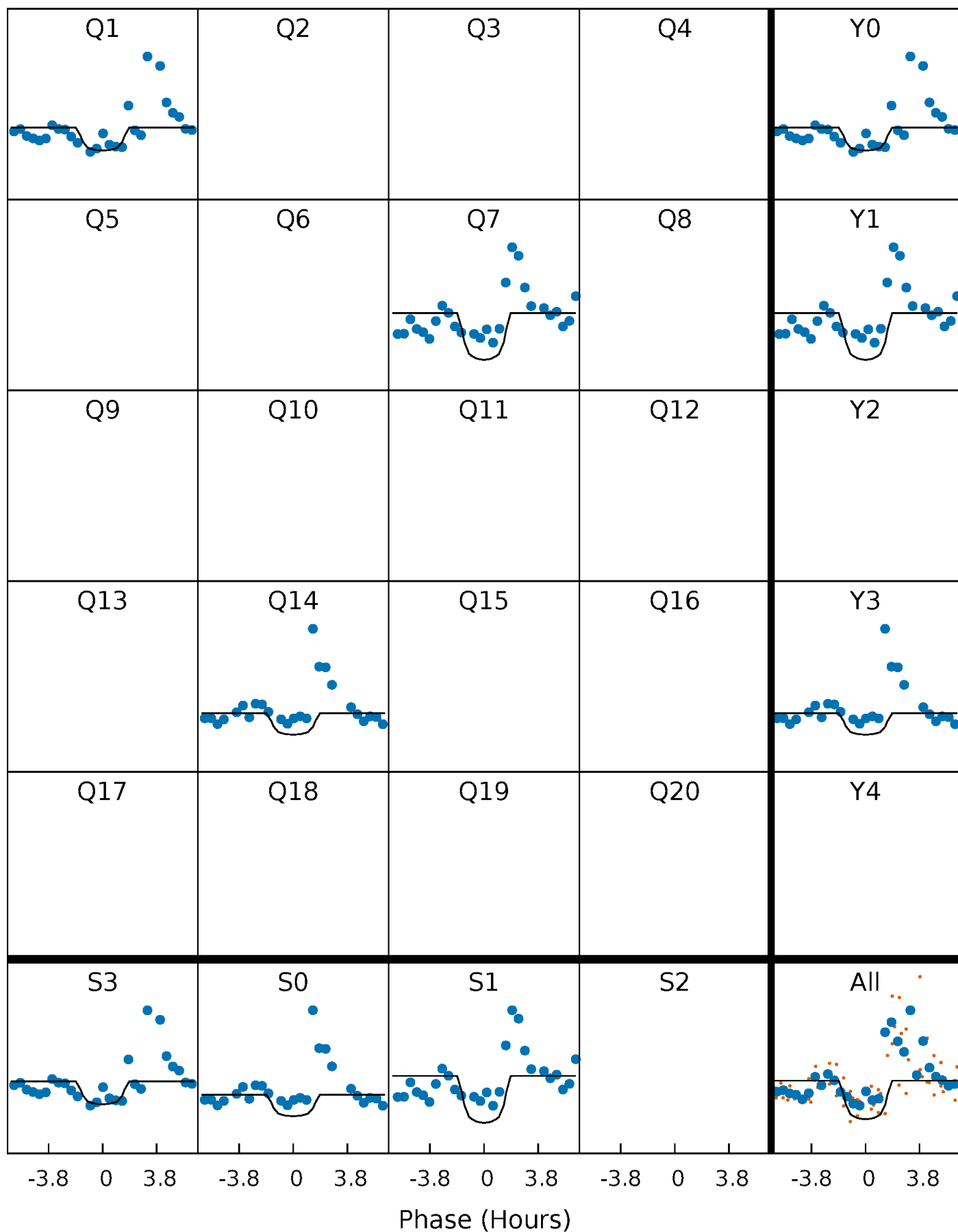
# PDC Quarter-Phased Transit Curves

TCE 007871438-05     $P=565.591864$  Days     $T_0=151.051491$  (BKJD)



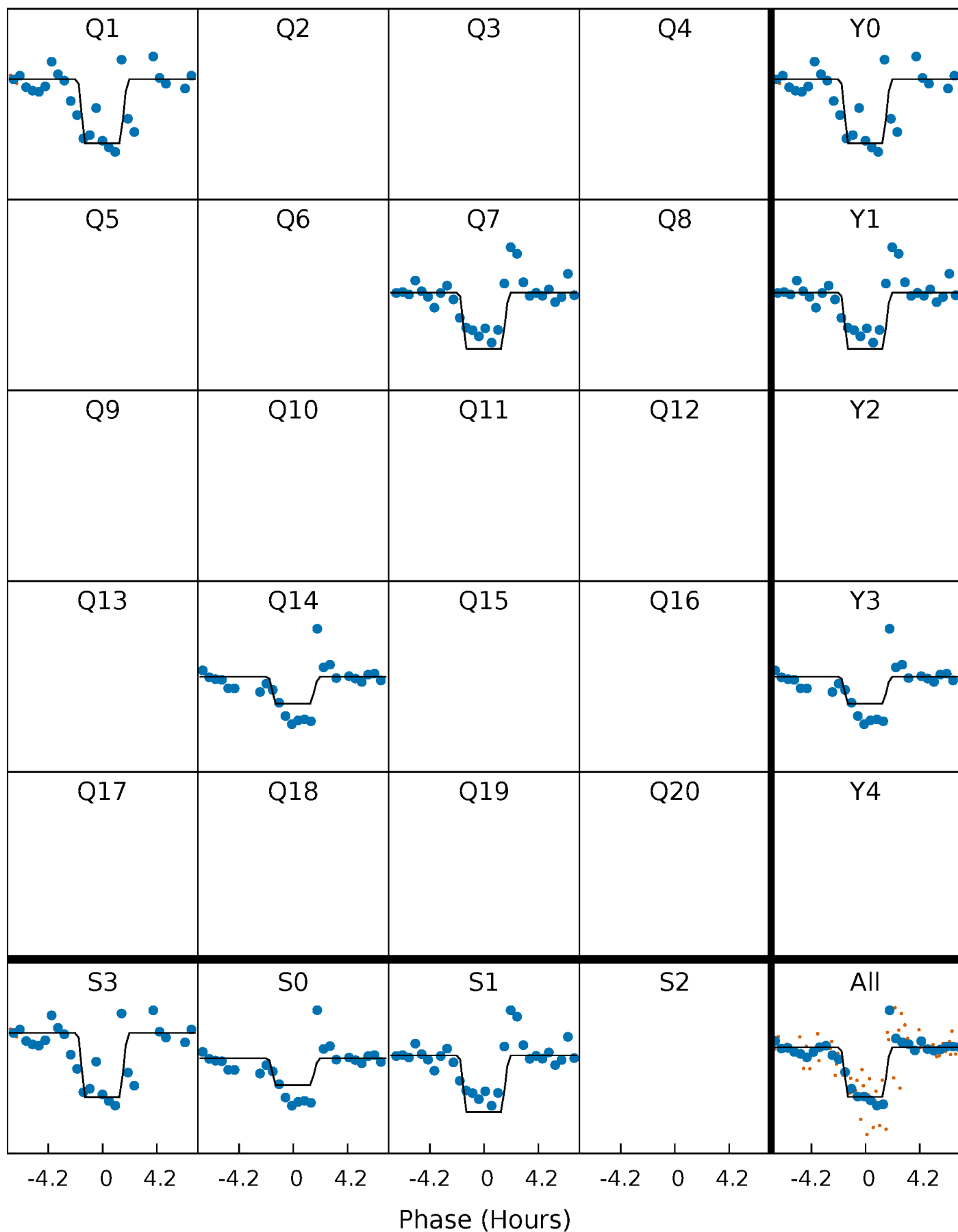
# DV Quarter-Phased Transit Curves

TCE 007871438-05     $P=565.591864$  Days     $T_0=151.051491$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

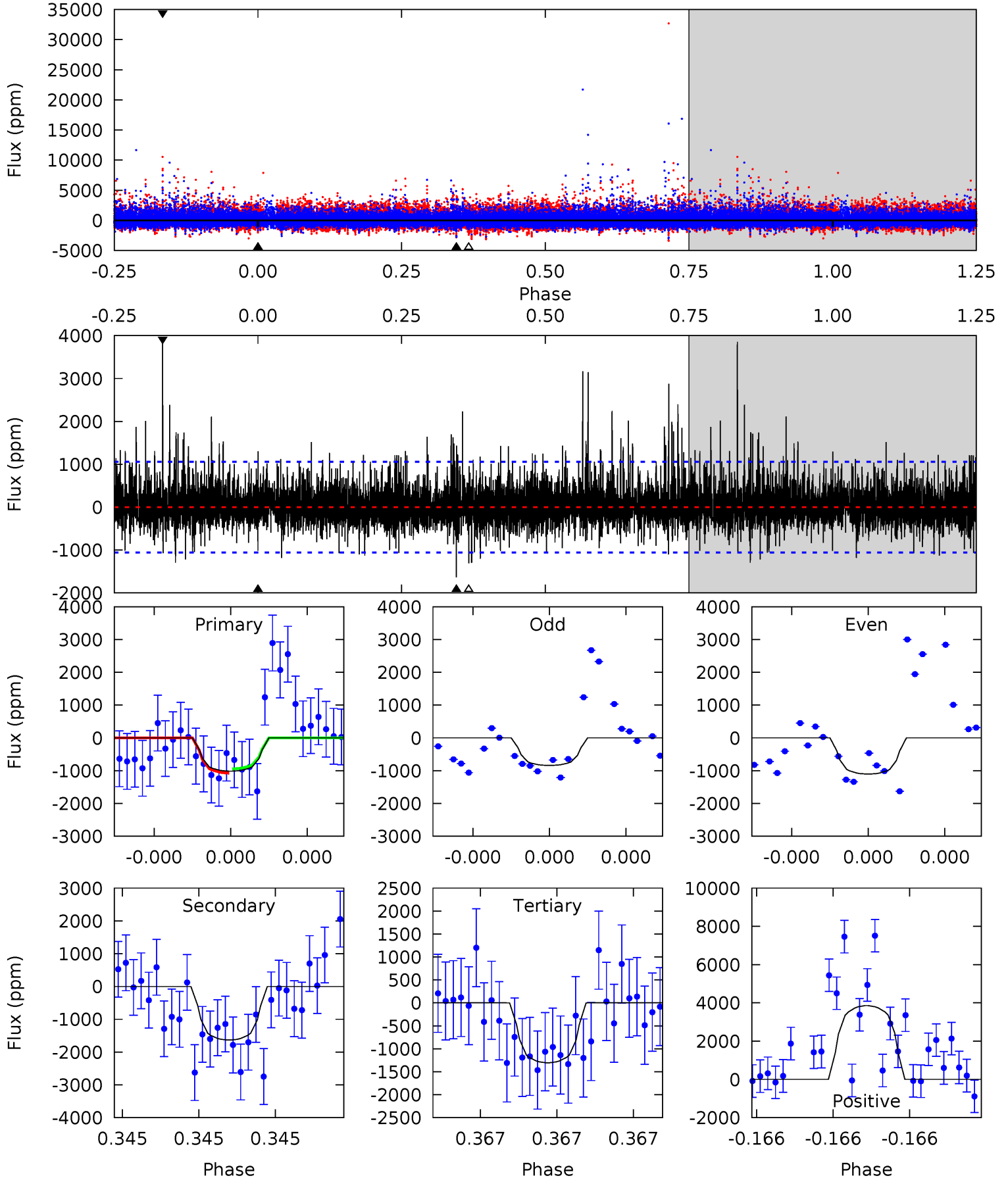
TCE 007871438-05 P=565.573696 Days  $T_0=151.059504$  (BKJD)



# DV Model-Shift Uniqueness Test

007871438-05, P = 565.591864 Days, E = 151.051491 Days

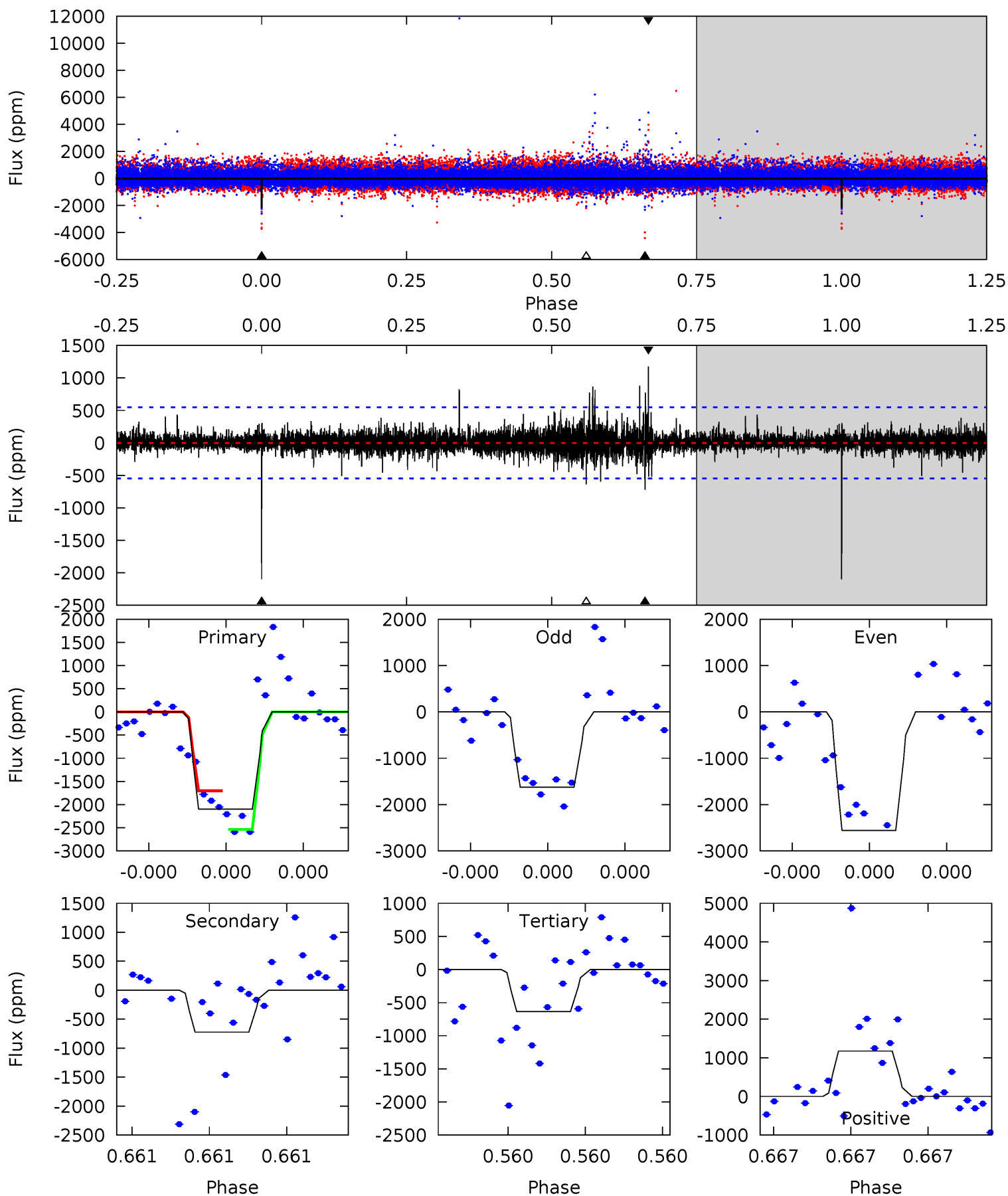
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.45	8.78	7.01	20.7	5.67	3.64	2.02	-1.55	-15.3	1.77	-11.9	0.44	0.81	0.70	0.35



# Alt Model-Shift Uniqueness Test

007871438-05, P = 565.573696 Days, E = 151.059504 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
21.7	7.49	6.58	12.2	5.67	3.63	1.07	15.2	9.56	0.91	-4.69	4.35	1.14	0.36	4.27





### Stellar Parameters For KIC 007871438

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3756^{+50}_{-45}$	$4.753^{+0.032}_{-0.017}$	$-0.100^{+0.100}_{-0.100}$	$0.494^{+0.022}_{-0.029}$	$0.503^{+0.025}_{-0.025}$	$5.896^{+0.797}_{-0.457}$
	+1%/-1%	+1%/-0%	+100%/-100%	+4%/-6%	+5%/-5%	+14%/-8%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 007871438-05 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1635 \pm 186$	$3.56^{+2.95}_{-2.42}$	$157^{+3}_{-2}$	$3203^{+1575}_{-504}$	$81464^{+719598}_{-57549}$
Alt.	$-723 \pm 97$	$3.67^{+3.16}_{-2.27}$	$157^{+3}_{-3}$	$2835^{+1002}_{-409}$	$32695^{+214477}_{-23119}$

$T_{max}$  = 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

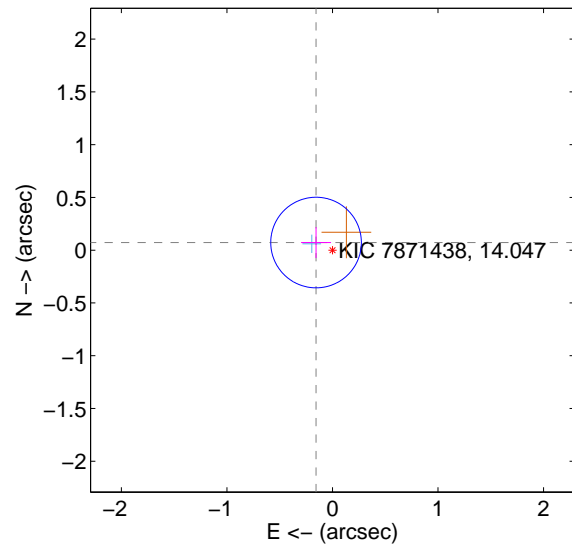
Supplemental centroid analysis for 007871438-05. Kepler magnitude: 14.05. Transit SNR 7.61

There are 1 quarters with good PRF difference image offsets

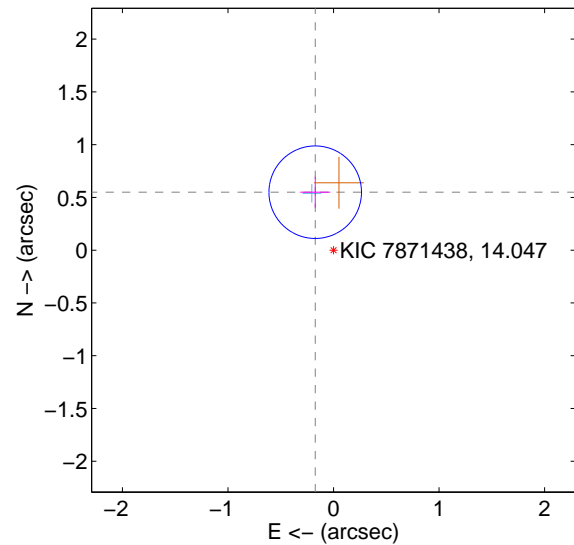
The direct PRF centroid is offset from the target star catalog position by about 0.48 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.172 \pm 0.143$	1.20	$0.156 \pm 0.142$	$0.072 \pm 0.146$
PRF-fit source offset from KIC position	<b><math>0.576 \pm 0.146</math></b>	<b>3.94</b>	$0.173 \pm 0.142$	$0.549 \pm 0.146$
photometric centroid source offset	$0.16 \pm 0.58$	0.27	$0.04 \pm 0.56$	$0.15 \pm 0.59$

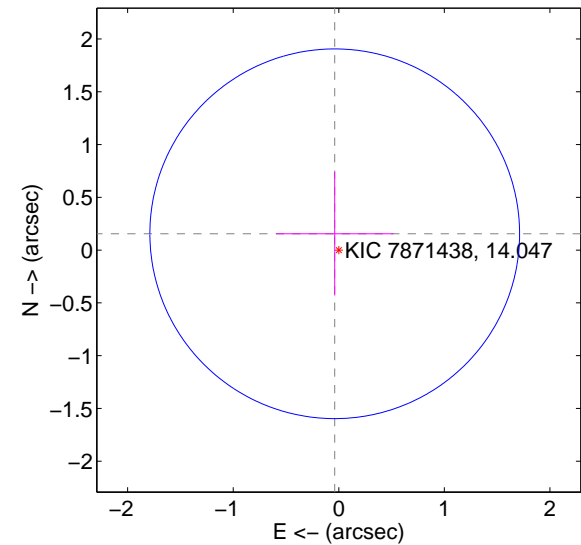
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

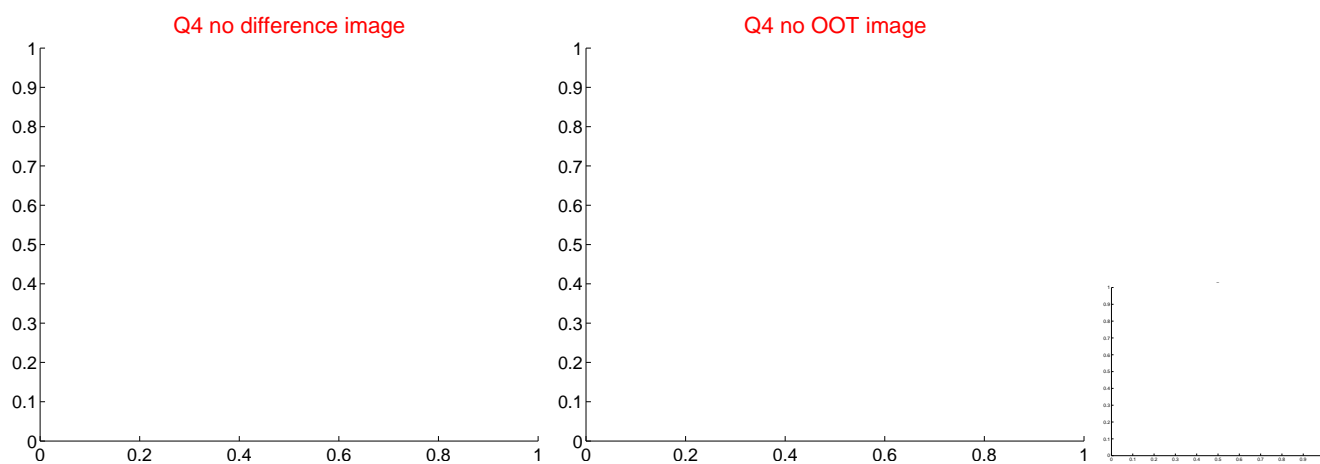
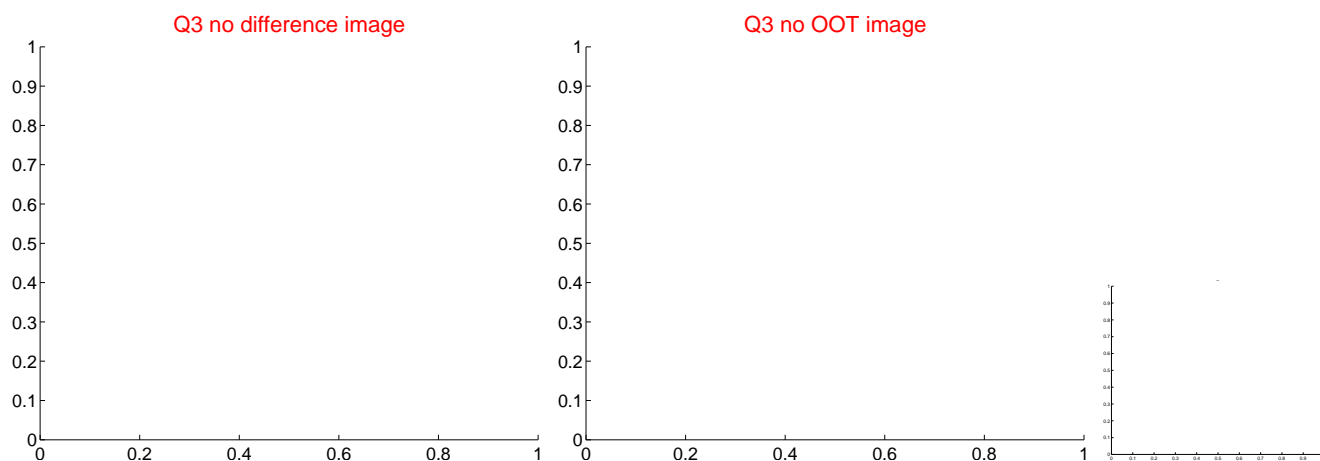
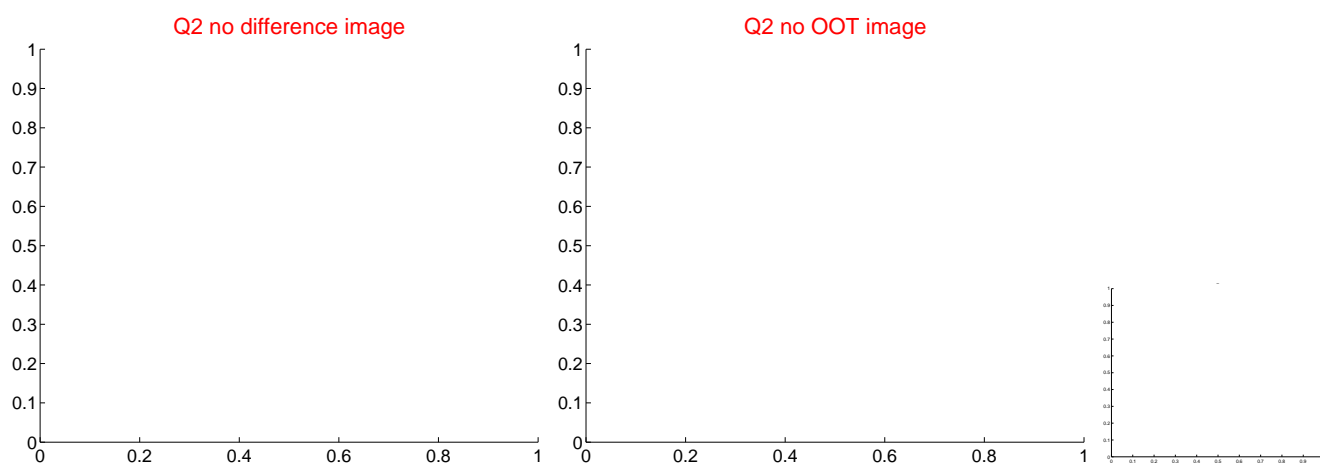
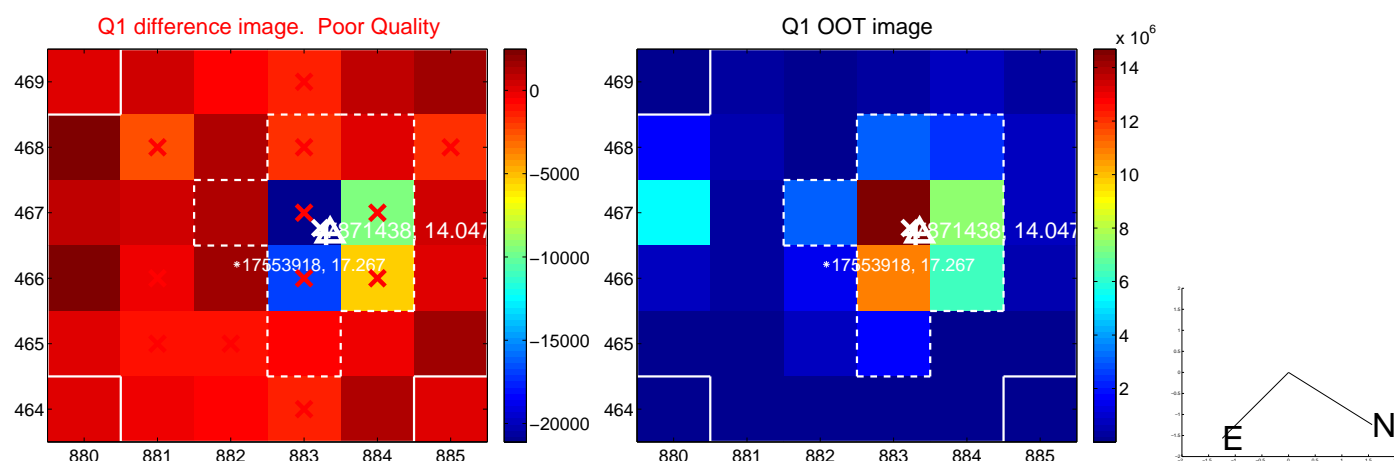


offset from photometric centroids



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

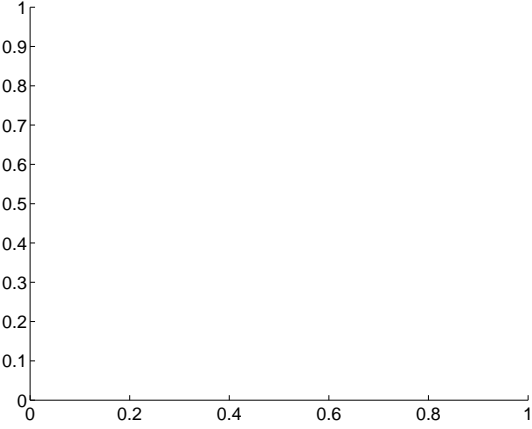
Q5 no difference image



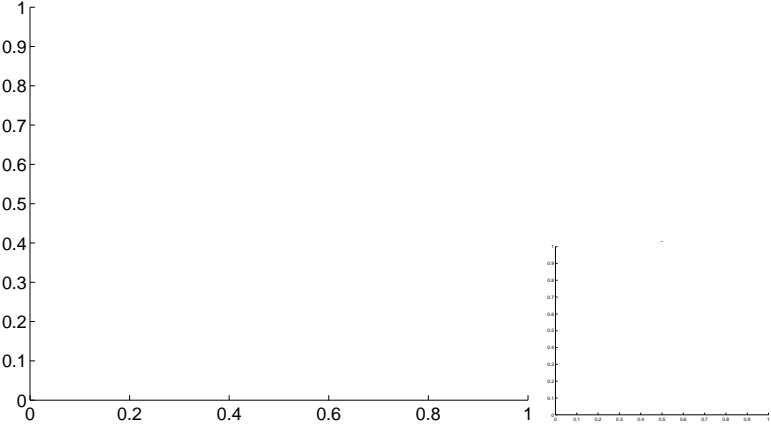
Q5 no OOT image



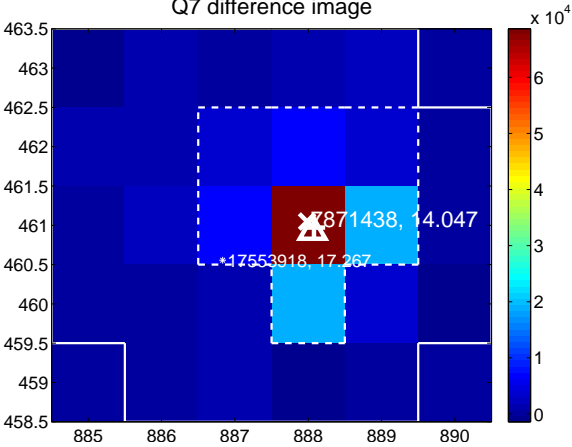
Q6 no difference image



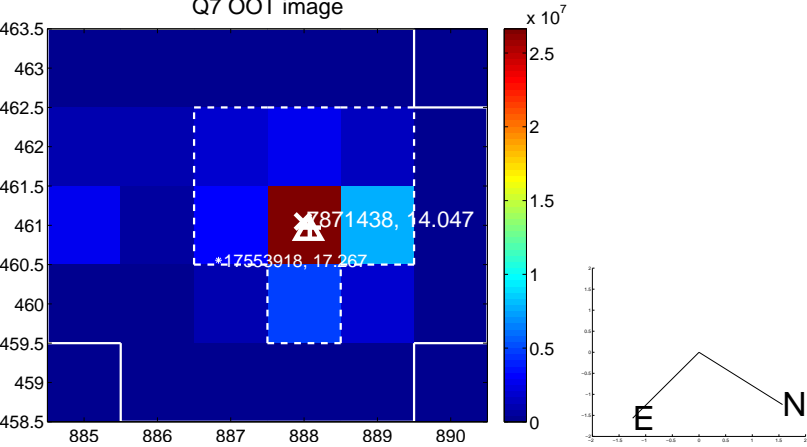
Q6 no OOT image



Q7 difference image



Q7 OOT image



Q8 no difference image



Q8 no OOT image



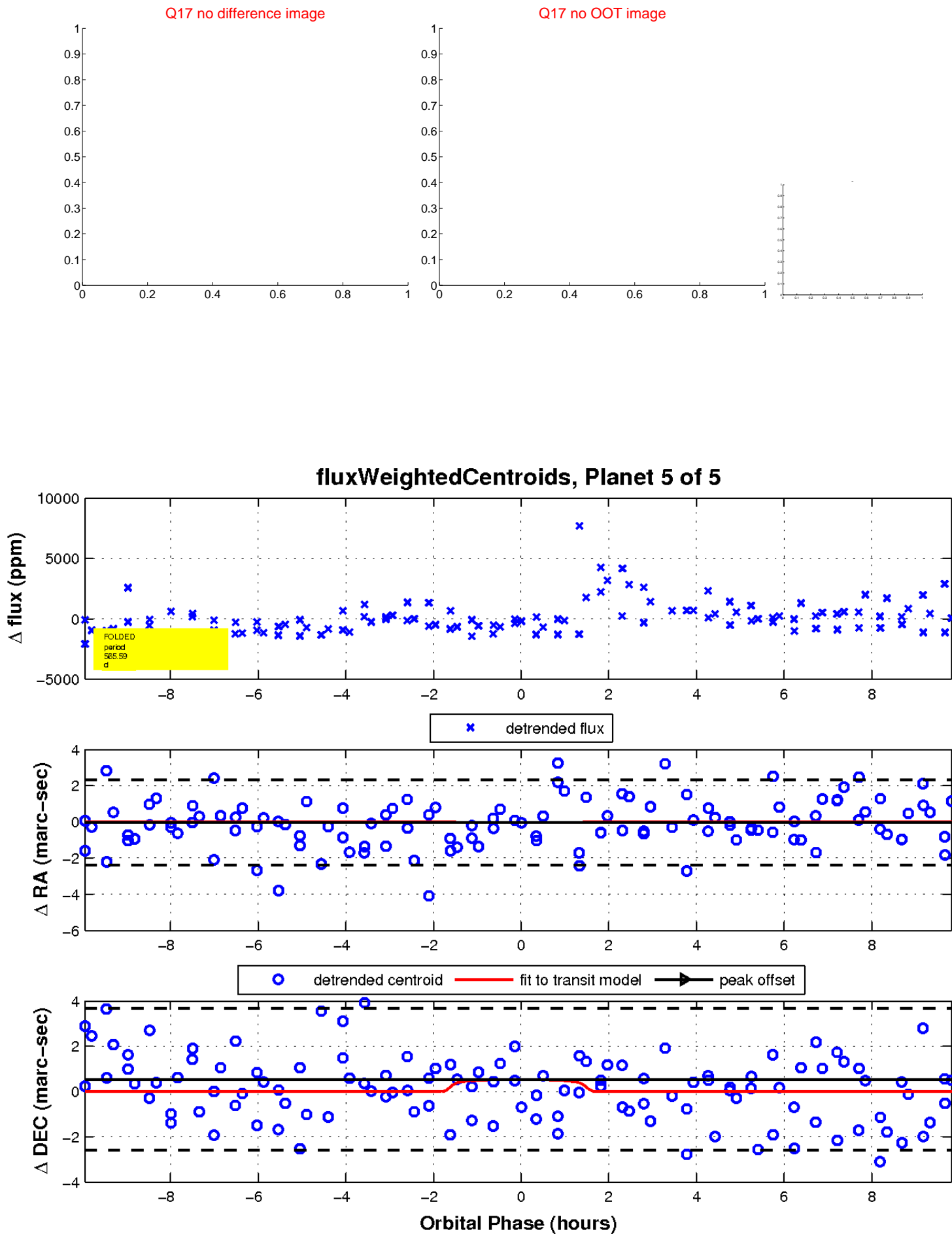
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



This astronomical image shows a field of stars against a dark, noisy background. A blue grid is overlaid on the image. Green text labels provide coordinates: '1:30.0' and '29.0' are on the left, '28.0' and '27.0' are in the center, and '26.0' and '25.0' are on the right. A vertical green label '20.0' is on the right side, and a horizontal green label '40.0' is at the bottom. A red dashed line is visible near the bottom center.

Declination