

# KIC 008613615

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008613615-01	OBS	No	500.255849	176.495108	898.3	20.190	7.5	8.3	5.66	4893	16.37	8.39
008613615-02	OBS	No	241.264386	213.467395	1051.5	18.122	9.7	9.0	5.66	4893	28.70	22.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008613615-01	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008613615-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—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.

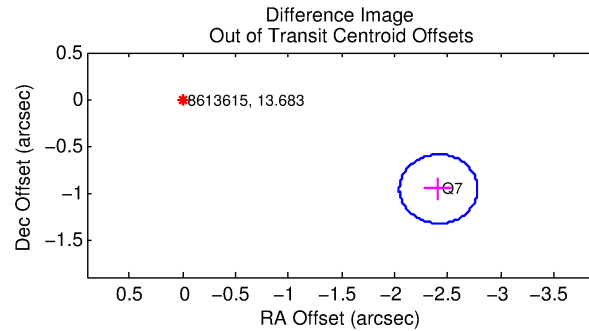
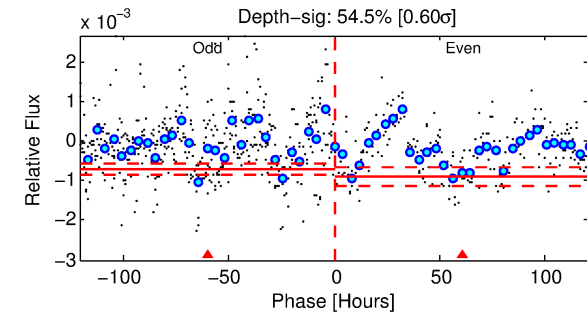
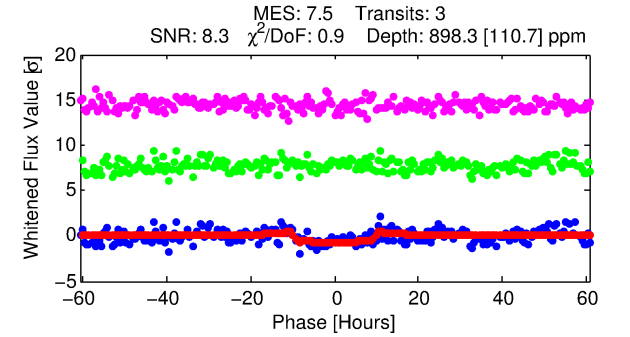
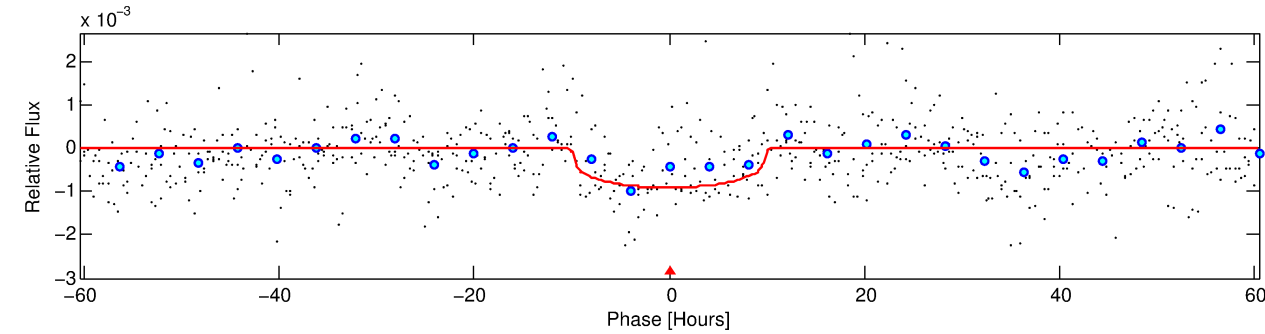
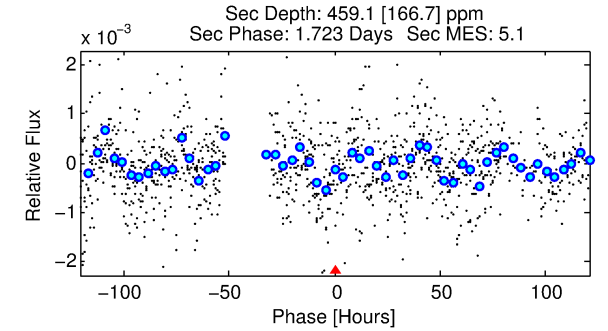
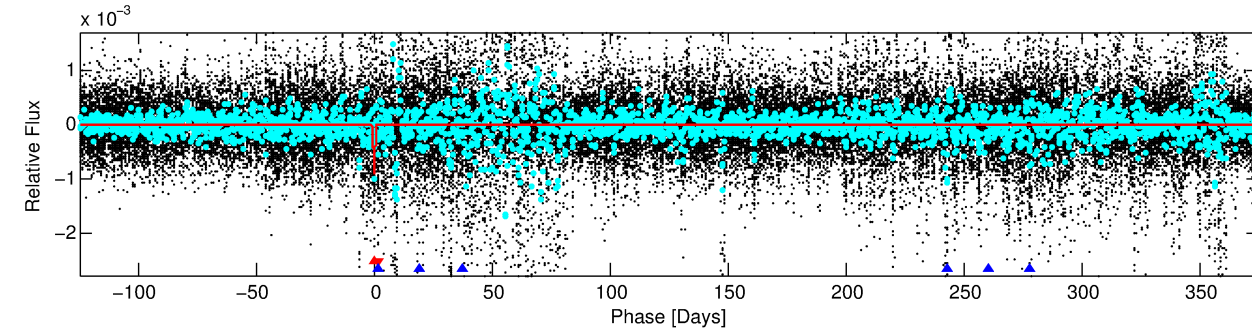
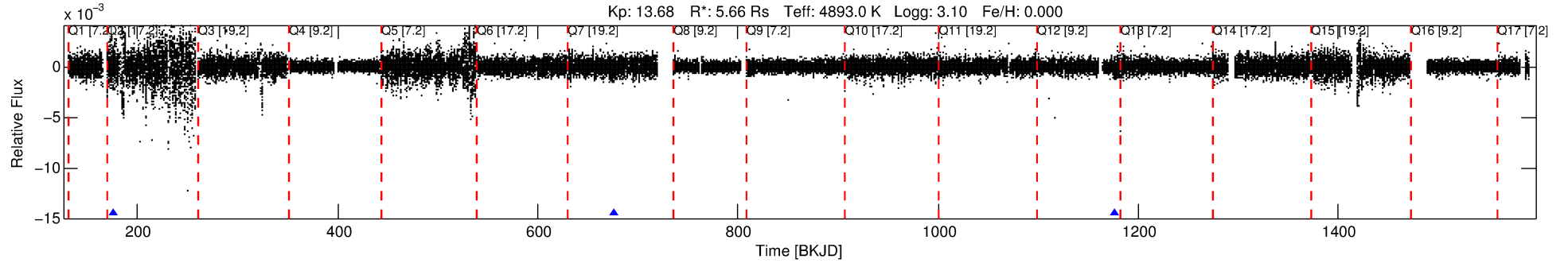
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008613615-01

No Significant Match Found

# DV One-Page Summary

KIC: 8613615 Candidate: 1 of 2 Period: 500.256 d



## DV Fit Results:

Period = 500.25585 [0.01695] d  
Epoch = 176.4951 [0.0276] BKJD  
Rp/R\* = 0.0265 [0.0144]  
a/R\* = 194.29 [348.69]  
b = 0.01 [186.55]  
Seff = 8.39 [2.76]  
Teq = 434 [36] K  
Rp = 16.37 [9.96] Re  
a = 1.4014 [0.3142] AU  
Ag = 1850.80 [2207.50] [0.84σ]  
Teffp = 4401 [1266] K [3.13σ]

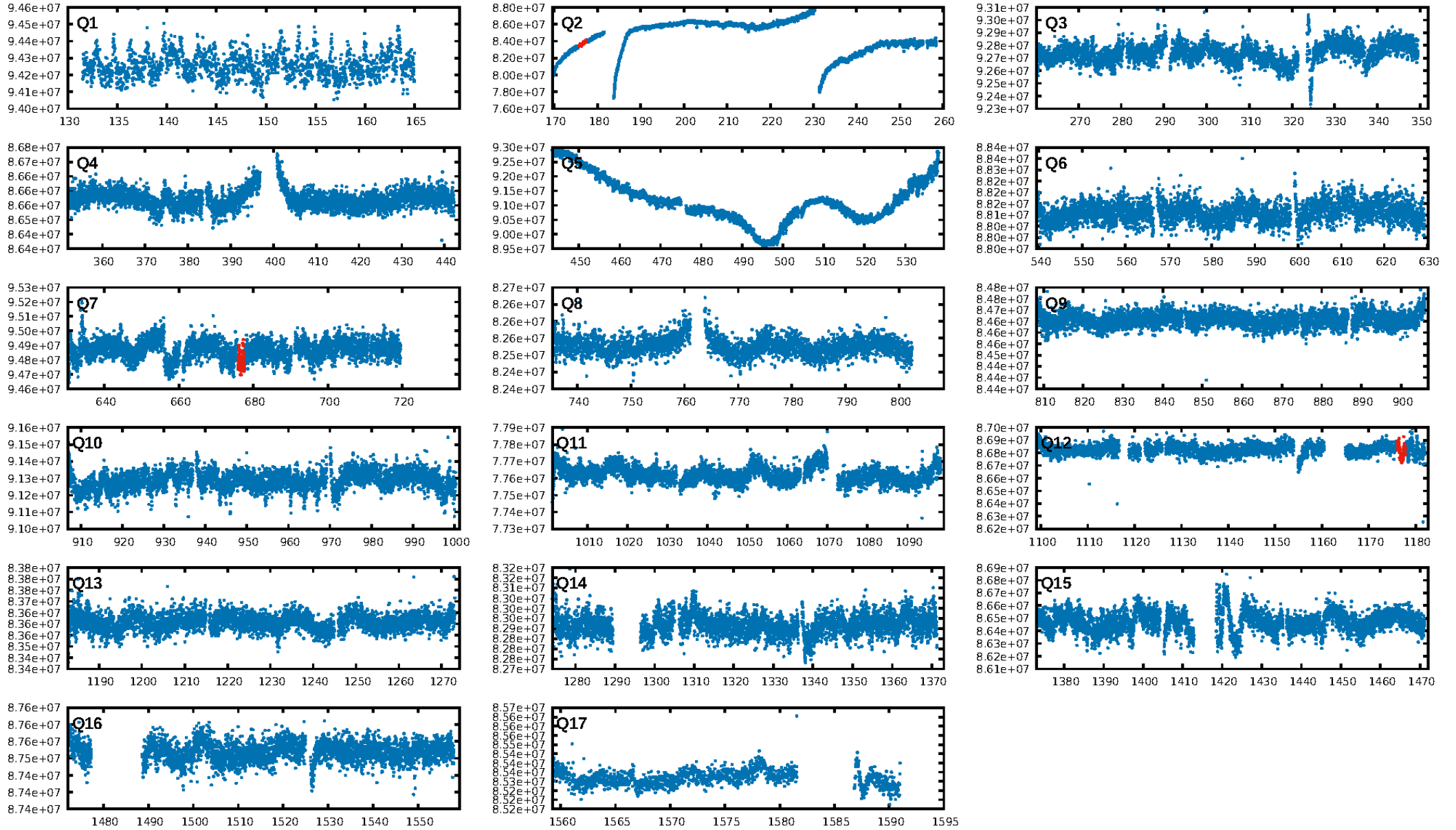
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [229.11σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 98.3%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 3.45e-08**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.777  
**Centroid-sig: 0.0%**  
**Centroid-so: 3.101 arcsec [15.16σ]**  
**OotOffset-rm: 2.598 arcsec [21.16σ]**  
**KicOffset-rm: 3.283 arcsec [29.02σ]**  
OotOffset-st: 0/1/0/0 [1]  
KicOffset-st: 0/1/0/0 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 1.00 [2/2]

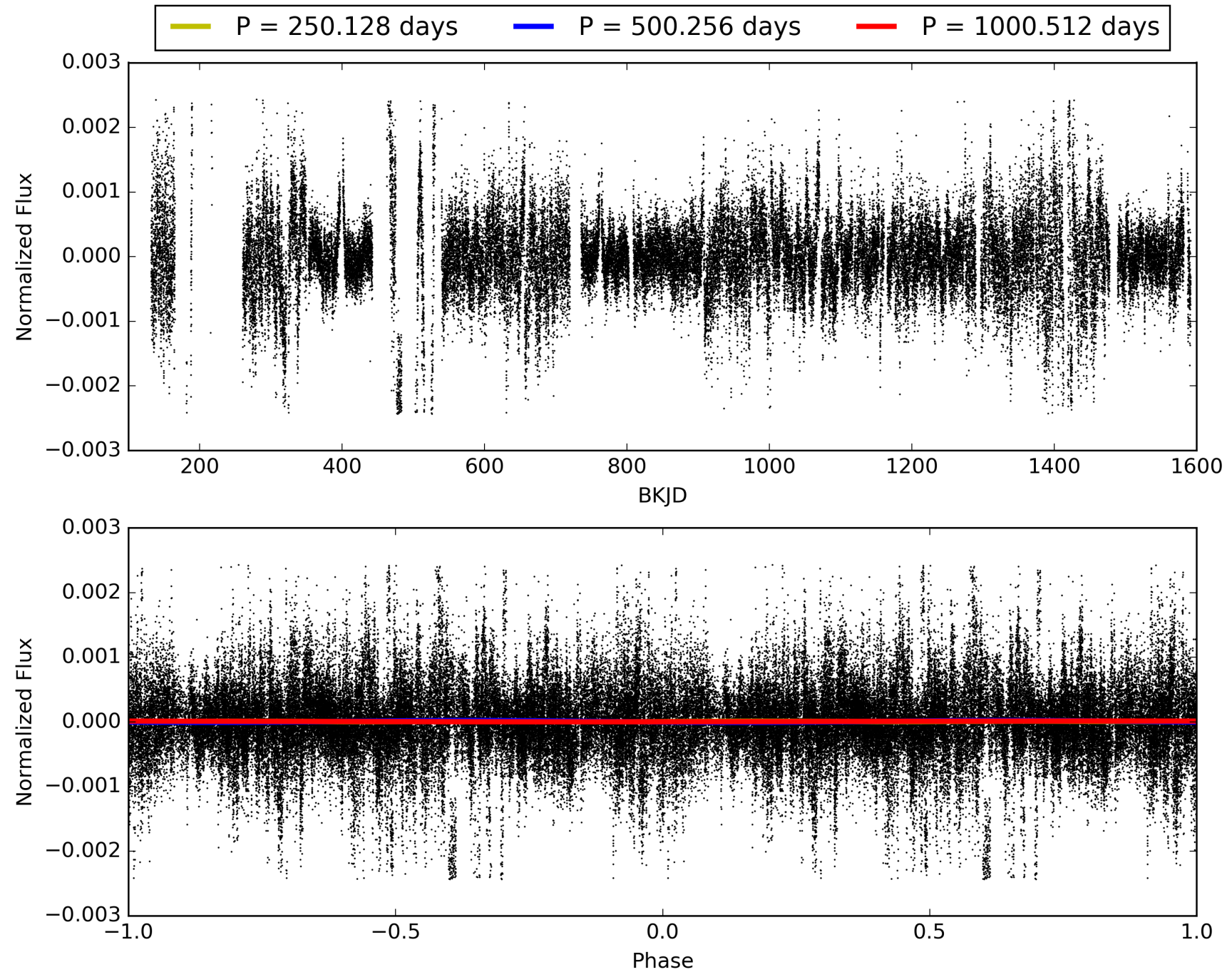
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 04:26:14 Z

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

# TCE 008613615-01, PDC Light Curves

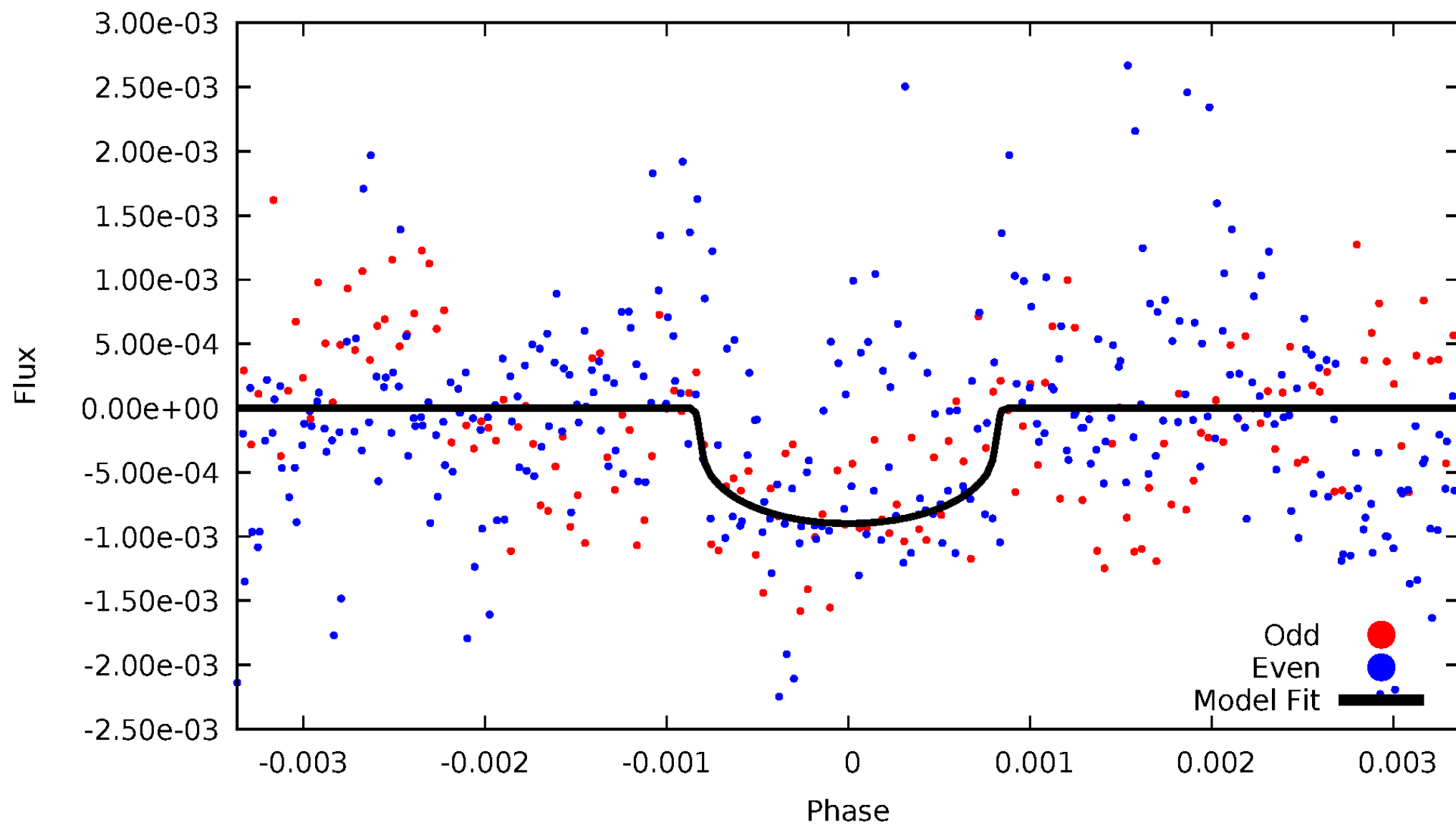


TCE 008613615-01



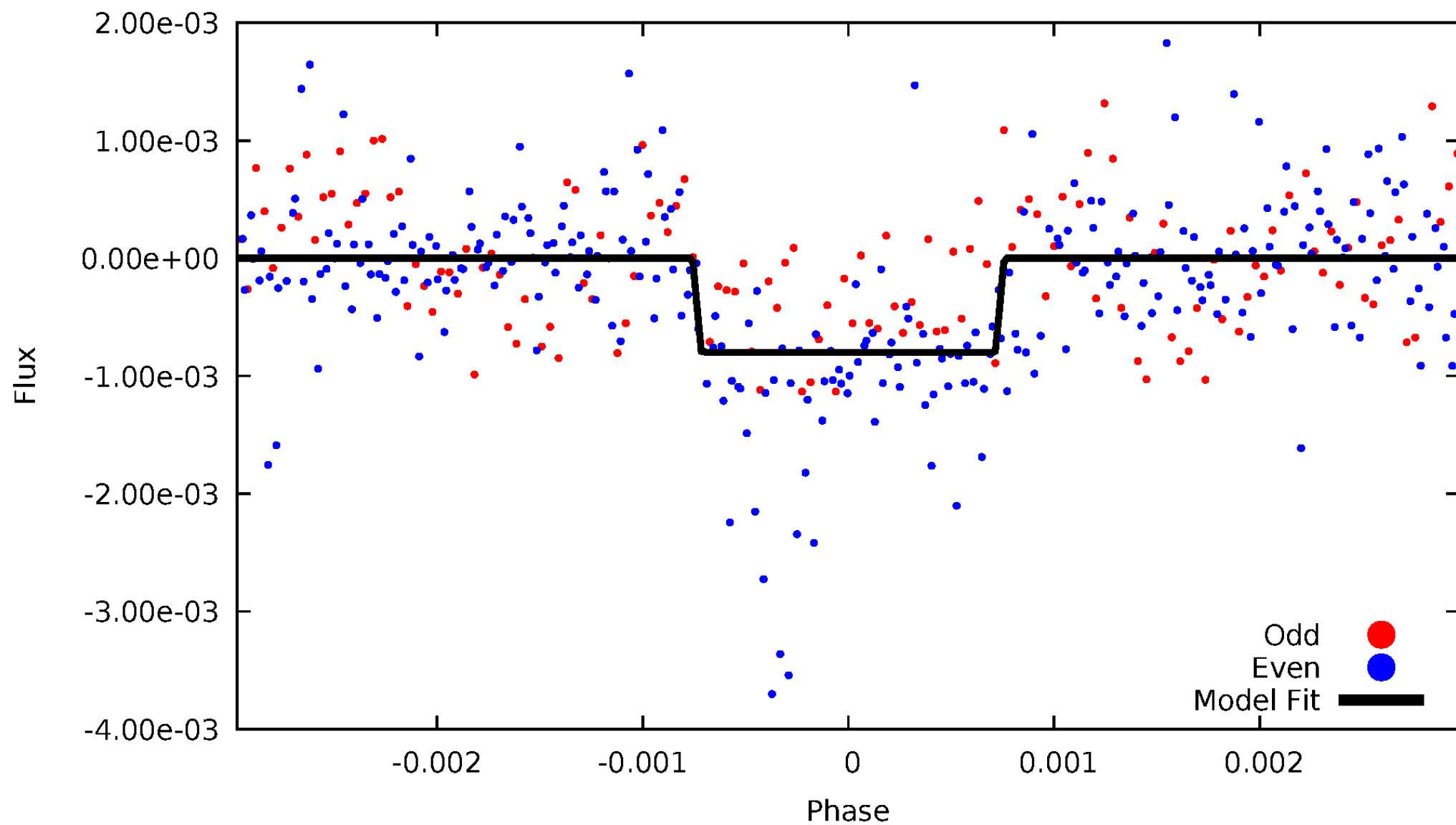
# DV Odd/Even

TCE 008613615-01

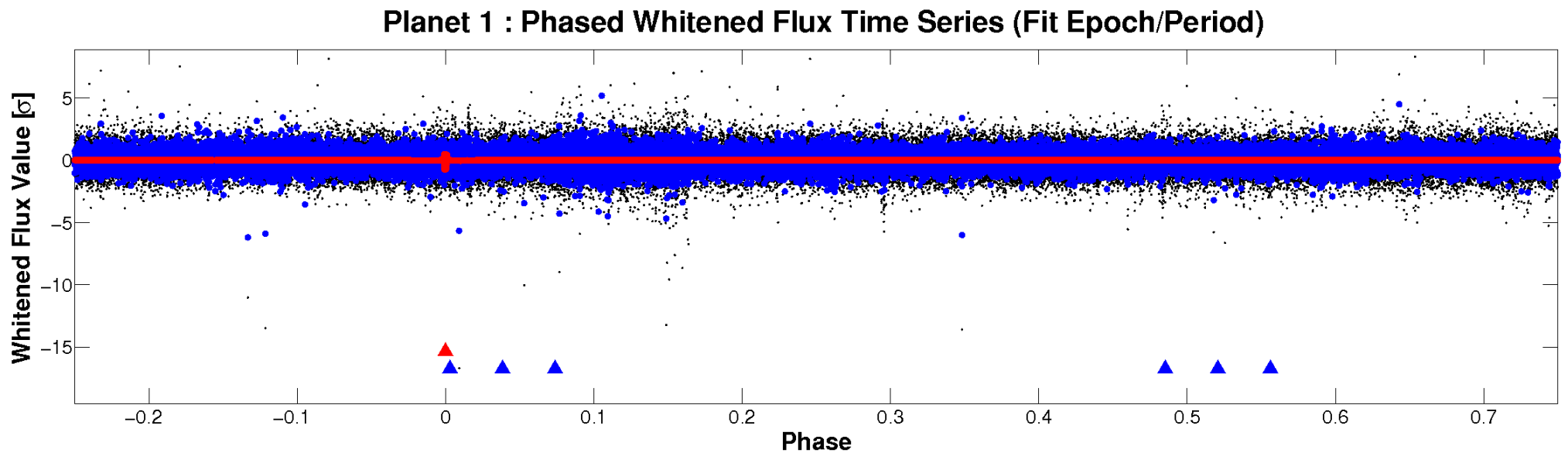
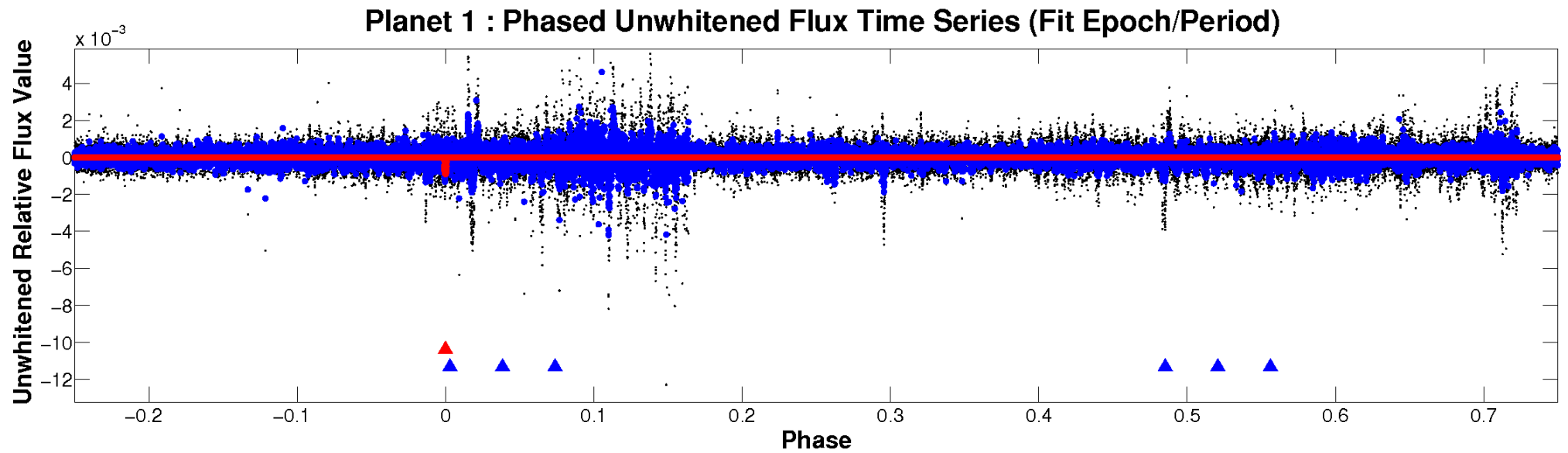


# ALT Odd/Even

TCE 008613615-01

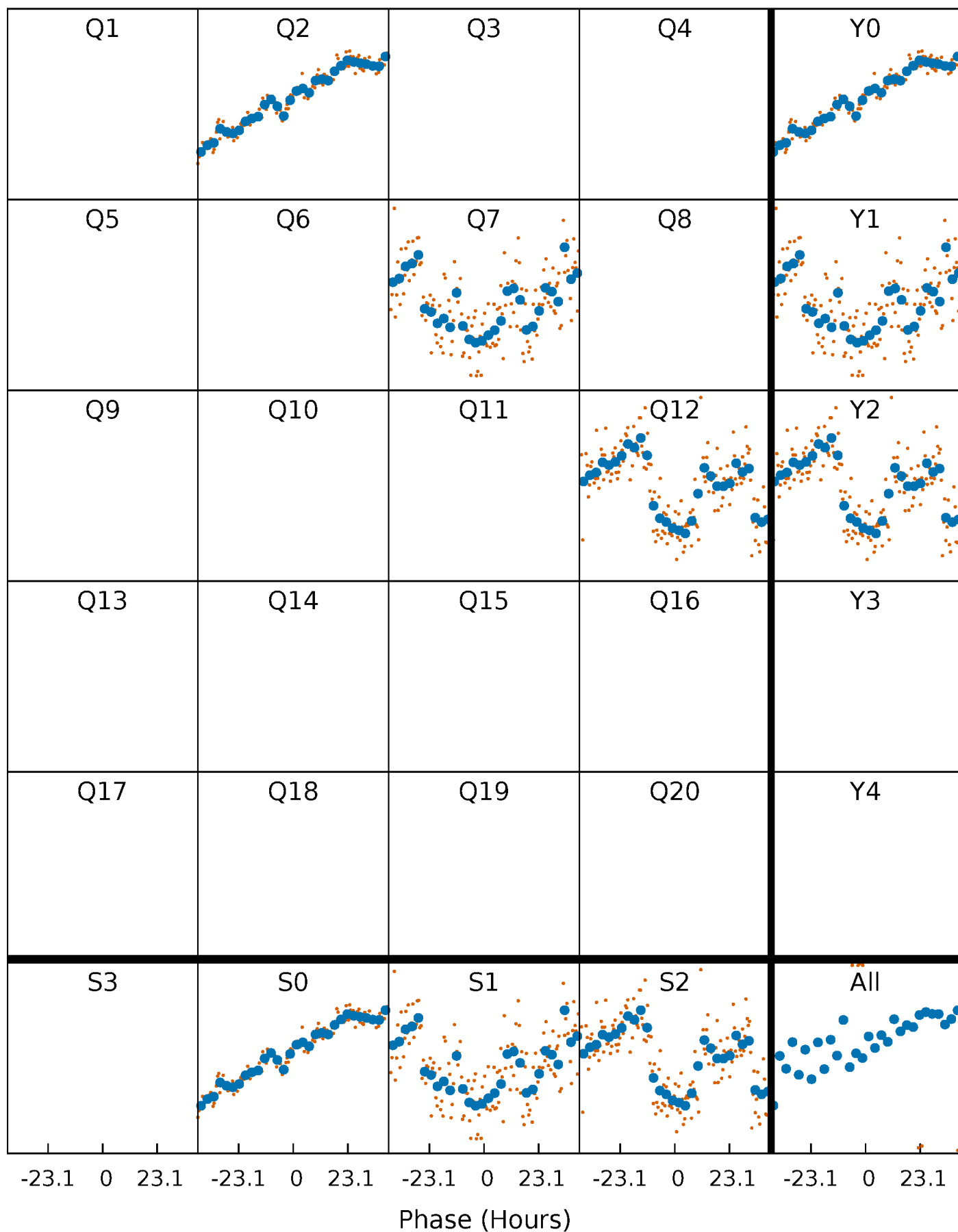


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

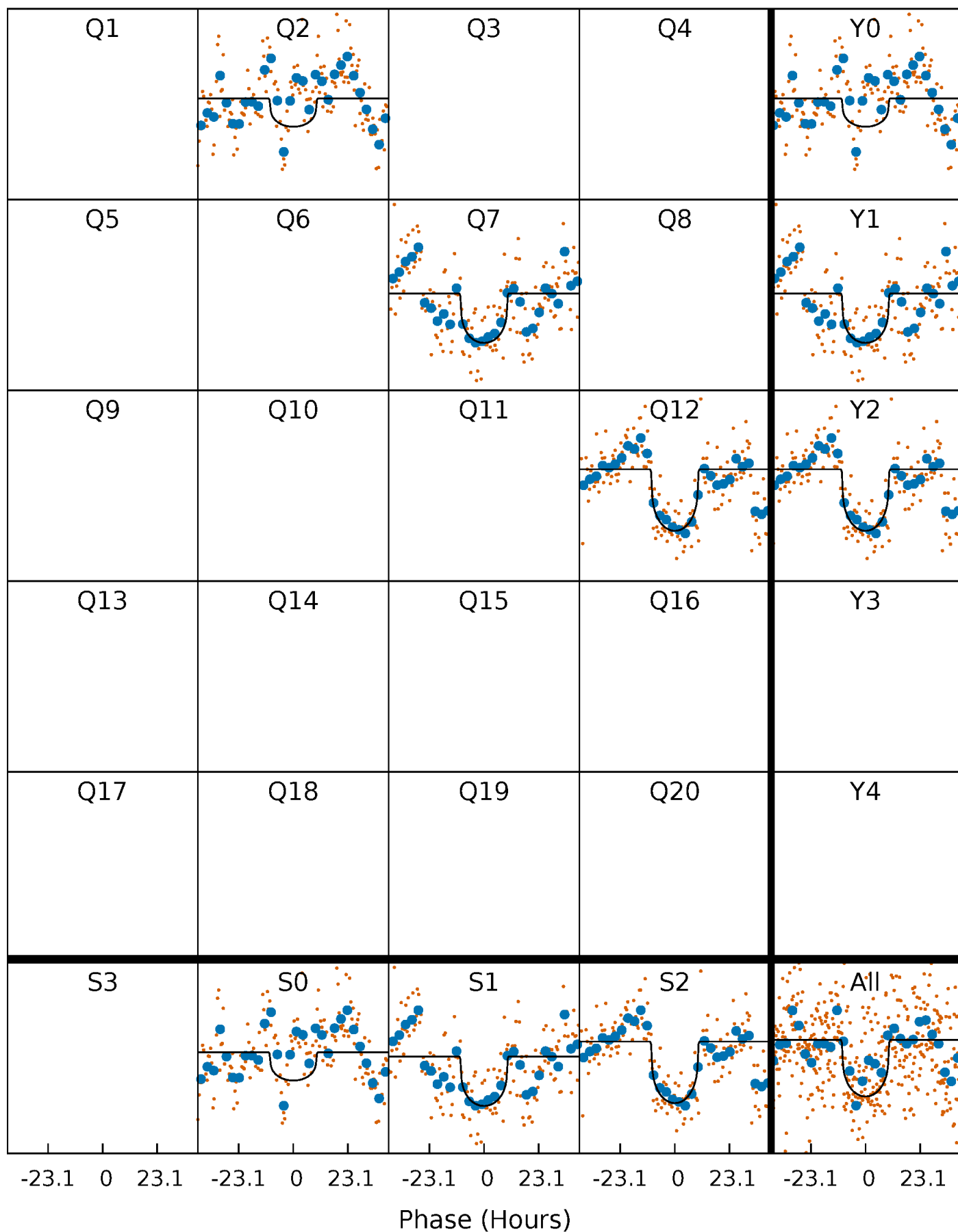
TCE 008613615-01 P=500.255849 Days  $T_0=176.495108$  (BKJD)





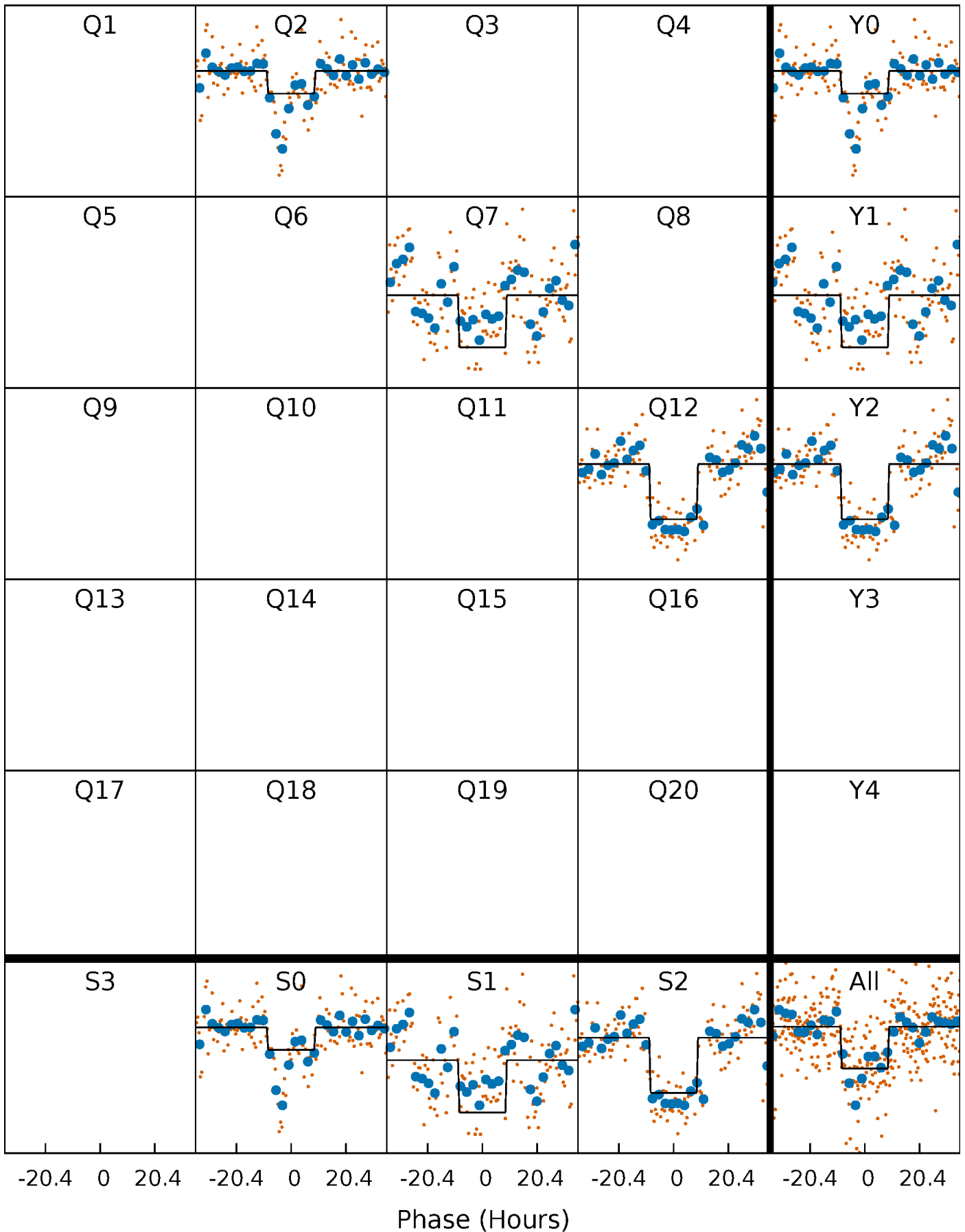
# DV Quarter-Phased Transit Curves

TCE 008613615-01 P=500.255849 Days  $T_0=176.495108$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

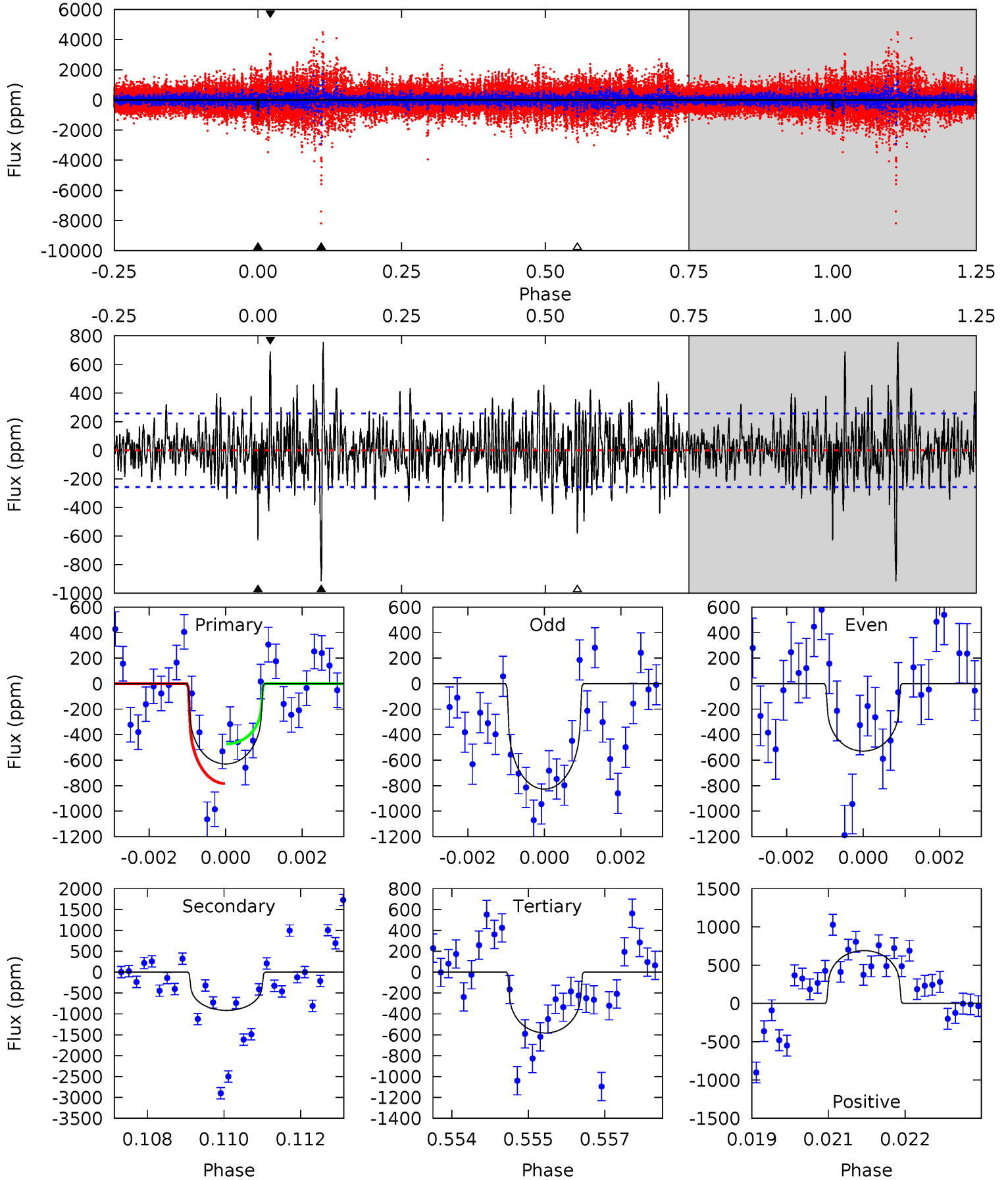
TCE 008613615-01 P=500.240793 Days  $T_0=176.490222$  (BKJD)



# DV Model-Shift Uniqueness Test

008613615-01, P = 500.255849 Days, E = 176.495108 Days

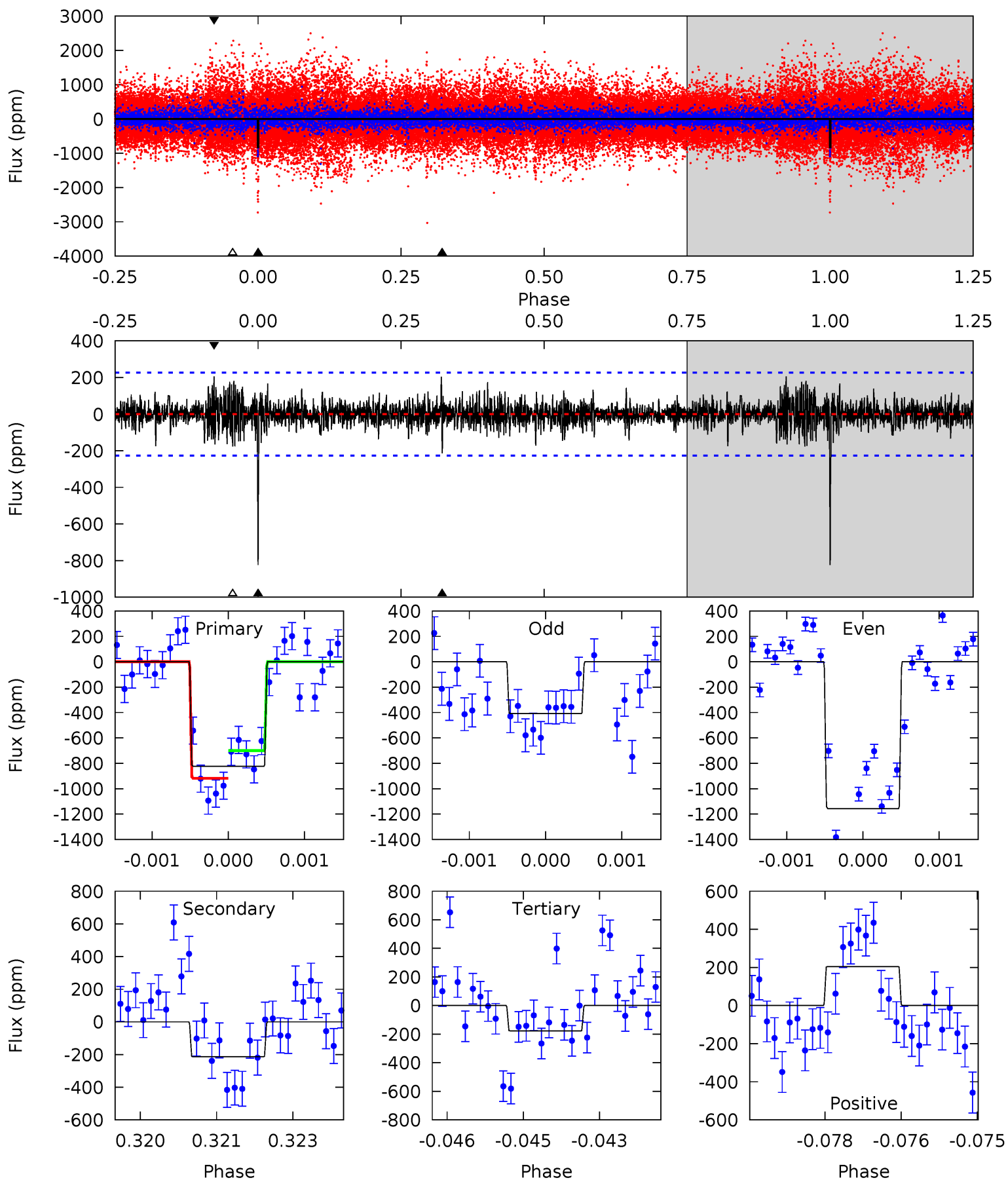
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.1	19.0	12.1	14.3	5.35	3.13	3.13	0.98	-1.25	6.91	4.68	2.79	0.72	0.45	3.27



# Alt Model-Shift Uniqueness Test

008613615-01, P = 500.240793 Days, E = 176.490222 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
19.5	5.07	4.20	4.86	5.38	3.18	1.09	15.3	14.7	0.86	0.21	8.88	0.97	0.20	2.59



### Stellar Parameters For KIC 008613615

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4893^{+51}_{-80}$	$3.098^{+0.174}_{-0.116}$	$0.000^{+0.100}_{-0.150}$	$5.664^{+0.941}_{-1.530}$	$1.466^{+0.203}_{-0.377}$	$0.011^{+0.011}_{-0.004}$
	+1%/-2%	+6%/-4%	+inf%/-inf%	+17%/-27%	+14%/-26%	+100%/-31%
Source	SPE74	SPE74	SPE74	DSEP		

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

### Secondary Eclipse Parameters for KIC 008613615-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-916 \pm 48$	$16.31^{+8.75}_{-8.30}$	$605^{+28}_{-35}$	$5131^{+2186}_{-782}$	$3706^{+11532}_{-2124}$
Alt.	$-214 \pm 42$	$17.64^{+8.95}_{-8.64}$	$604^{+29}_{-36}$	$3774^{+1030}_{-496}$	$742^{+2081}_{-438}$

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

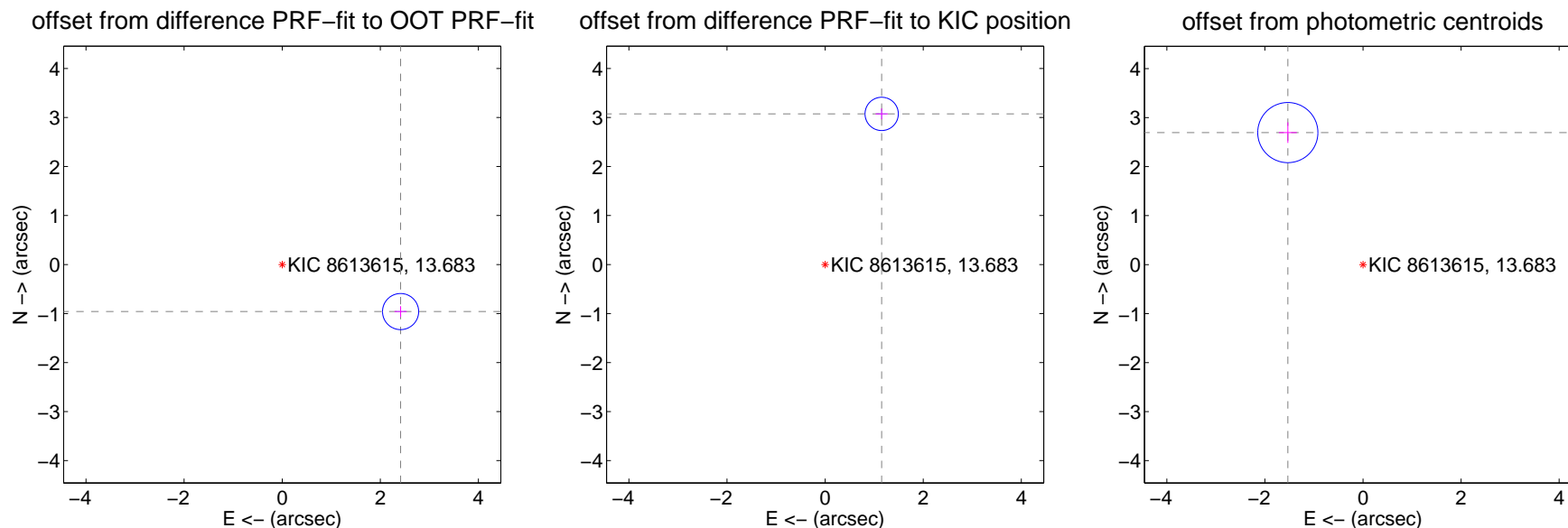
## DV Centroid Data

Supplemental centroid analysis for 008613615-01. Kepler magnitude: 13.68. Transit SNR 8.33

There are 1 quarters with good PRF difference image offsets

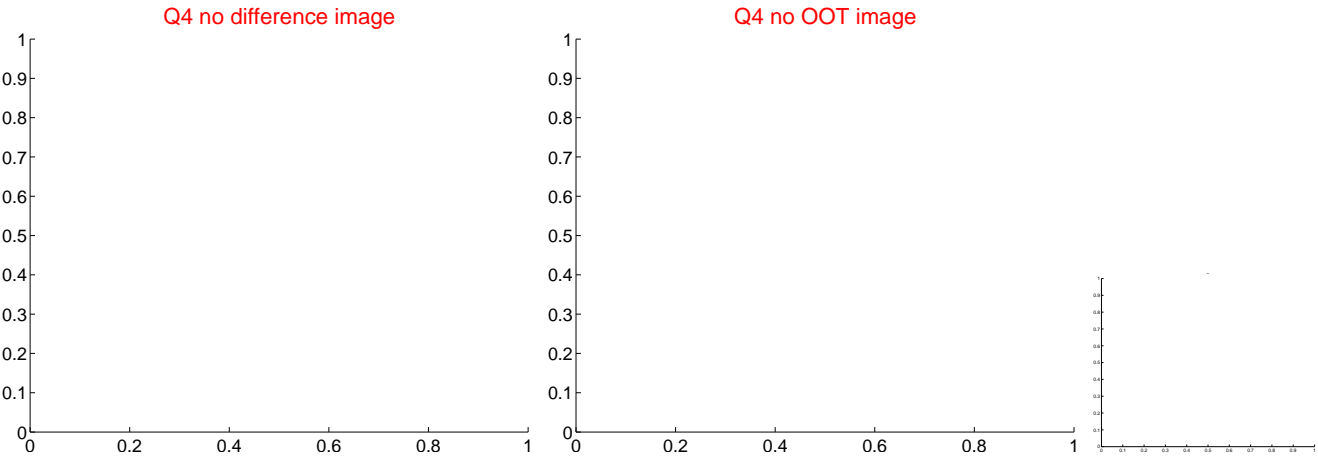
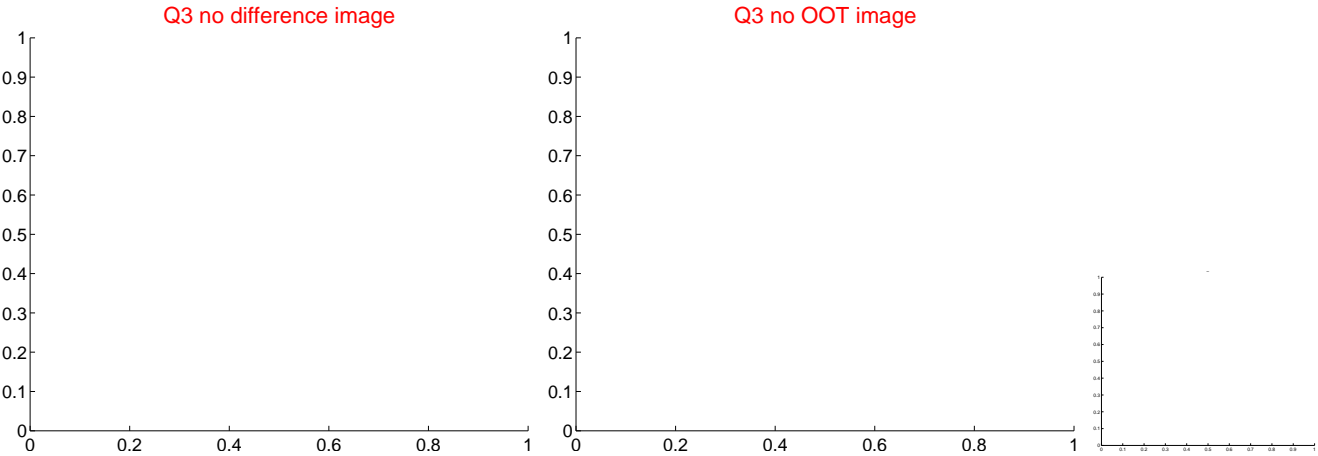
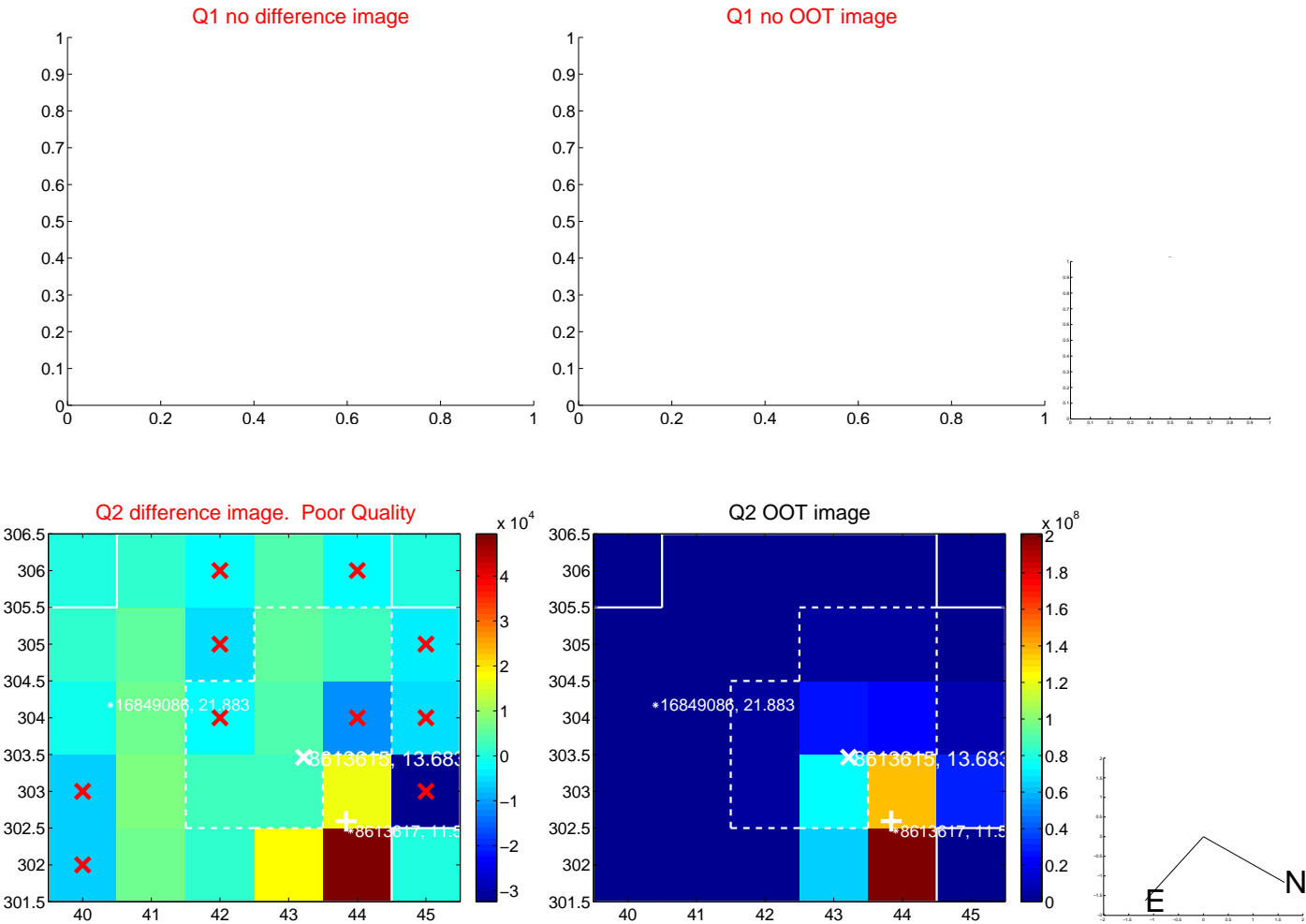
The OOT PRF centroid is offset from the target star catalog position by about 4.23 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.598 \pm 0.123$	21.16	$-2.414 \pm 0.124$	$-0.960 \pm 0.111$
PRF-fit source offset from KIC position	$3.283 \pm 0.113$	29.02	$-1.153 \pm 0.124$	$3.074 \pm 0.111$
photometric centroid source offset	$3.10 \pm 0.20$	15.16	$1.53 \pm 0.18$	$2.69 \pm 0.21$



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

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



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

Q5 no difference image



Q5 no OOT image



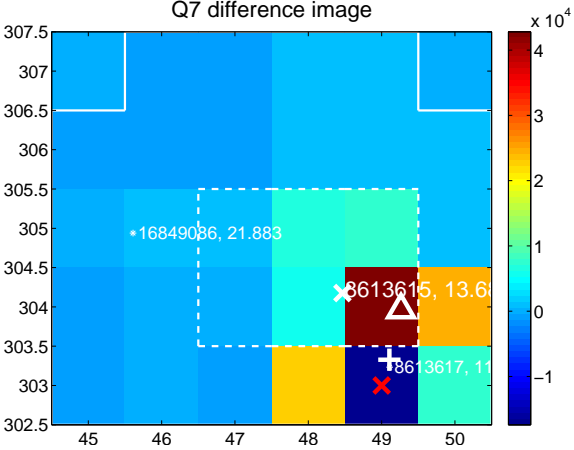
Q6 no difference image



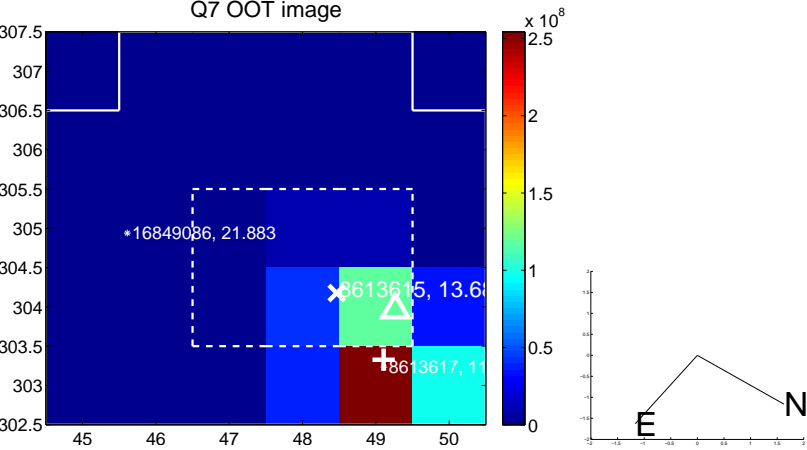
Q6 no OOT image



Q7 difference image



Q7 OOT image



Q8 no difference image



Q8 no OOT image





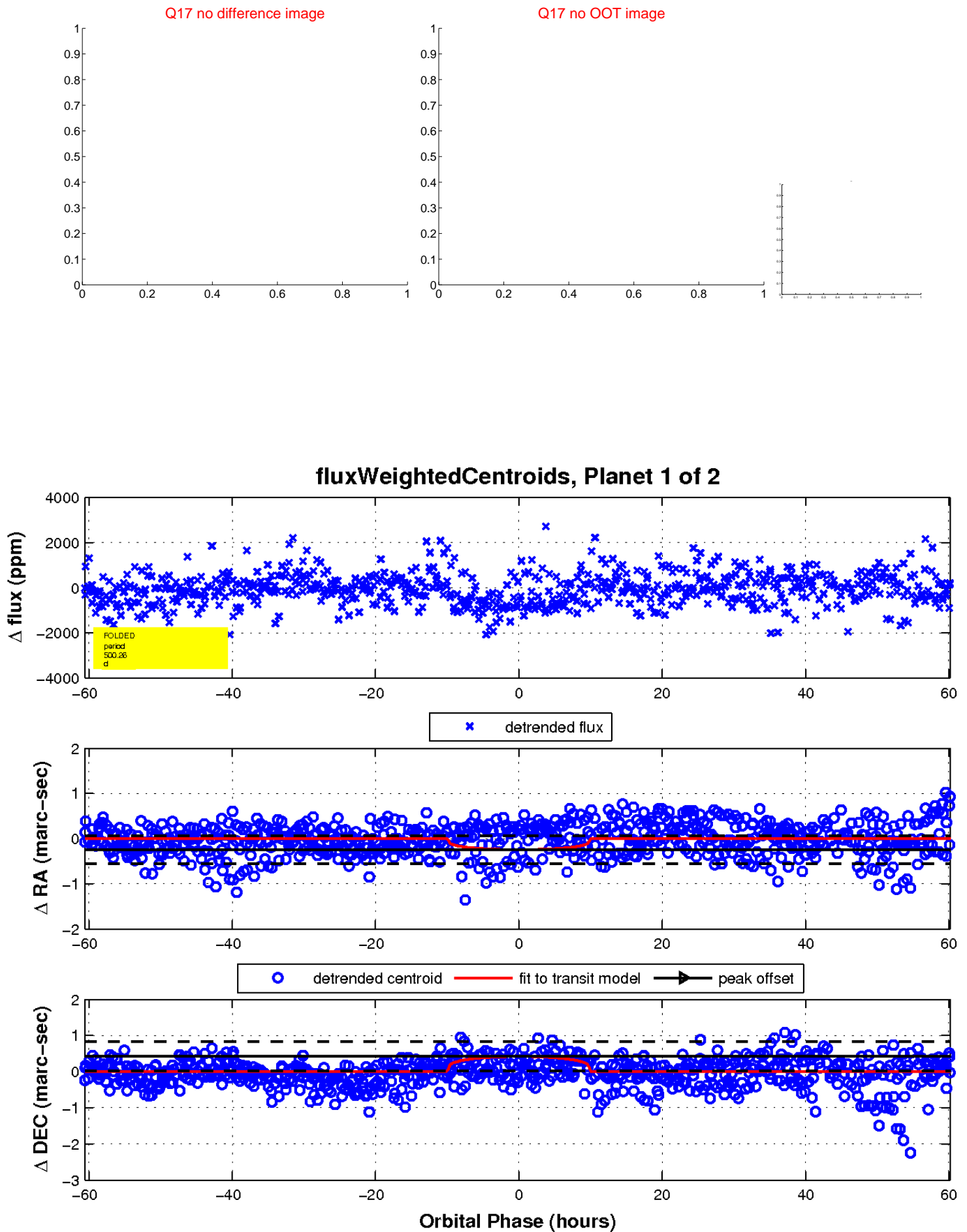
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

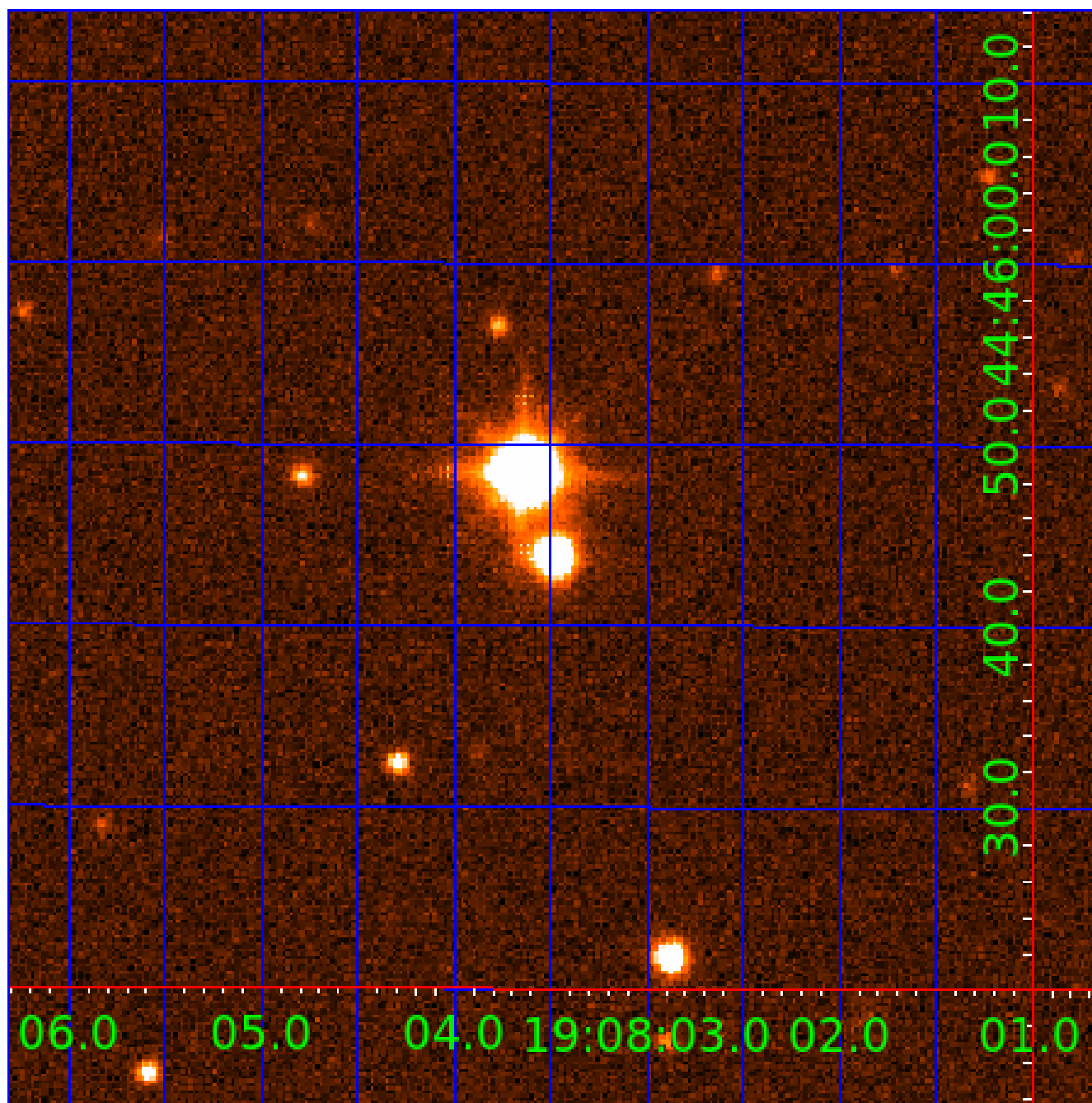


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008613615

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008613615-01	OBS	No	500.255849	176.495108	898.3	20.190	7.5	8.3	5.66	4893	16.37	8.39
008613615-02	OBS	No	241.264386	213.467395	1051.5	18.122	9.7	9.0	5.66	4893	28.70	22.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008613615-01	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008613615-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—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.

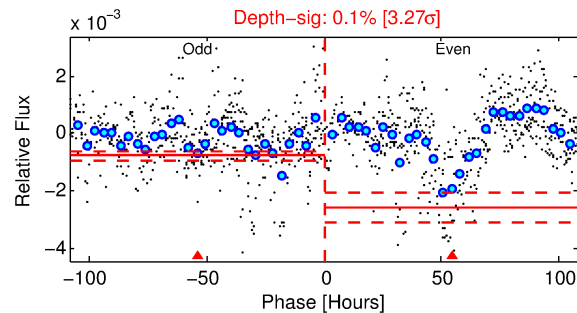
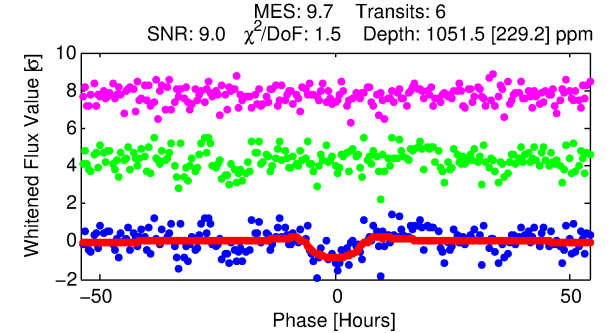
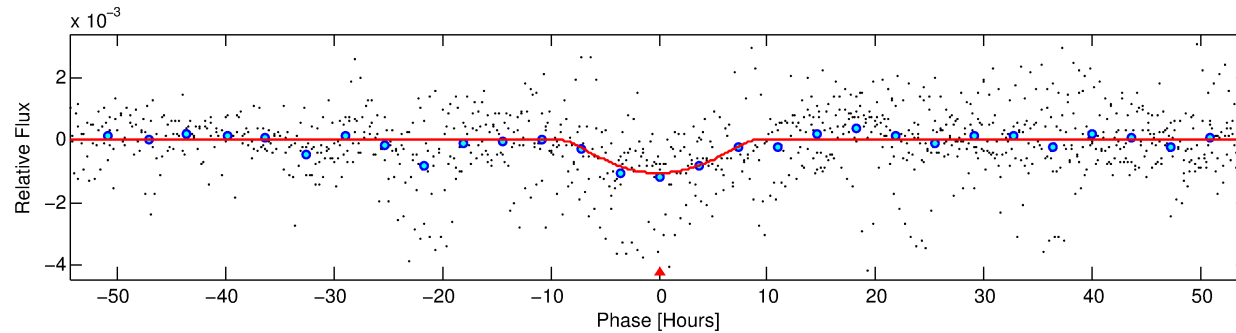
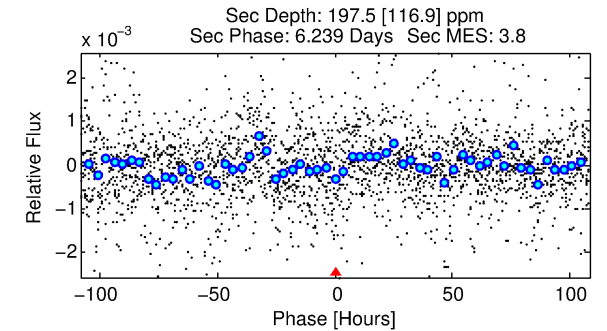
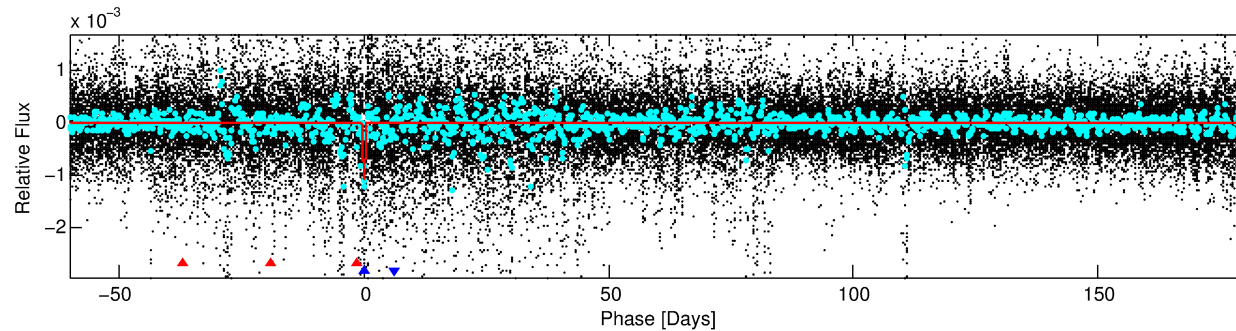
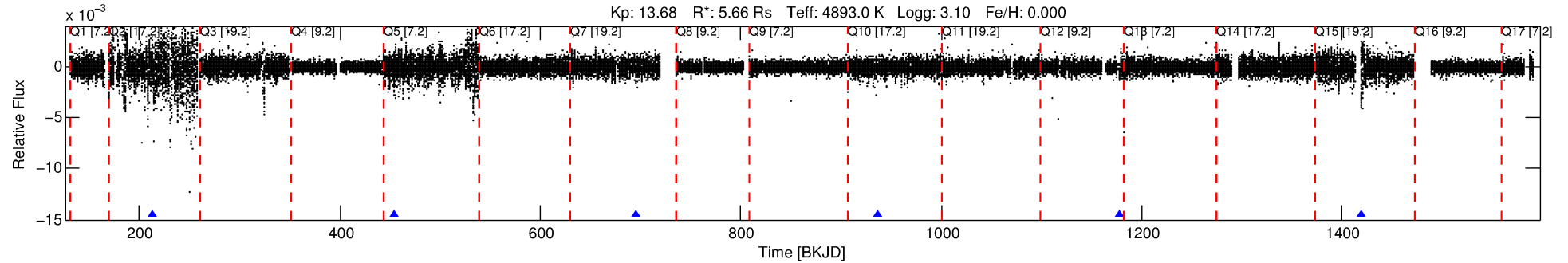
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008613615-02

No Significant Match Found

# DV One-Page Summary

KIC: 8613615 Candidate: 2 of 2 Period: 241.264 d



## DV Fit Results:

Period = 241.26439 [0.01905] d  
Epoch = 213.4674 [0.0654] BKJD  
Rp/R\* = 0.0464 [0.0578]  
a/R\* = 38.31 [19.34]  
b = 0.98 [0.11]  
Seff = 22.18 [7.29]  
Teff = 553 [45] K  
Rp = 28.70 [36.56] Re  
a = 0.8619 [0.1932] AU  
Ag = 97.94 [252.61] [0.38σ]  
Teffp = 2691 [1722] K [1.24σ]

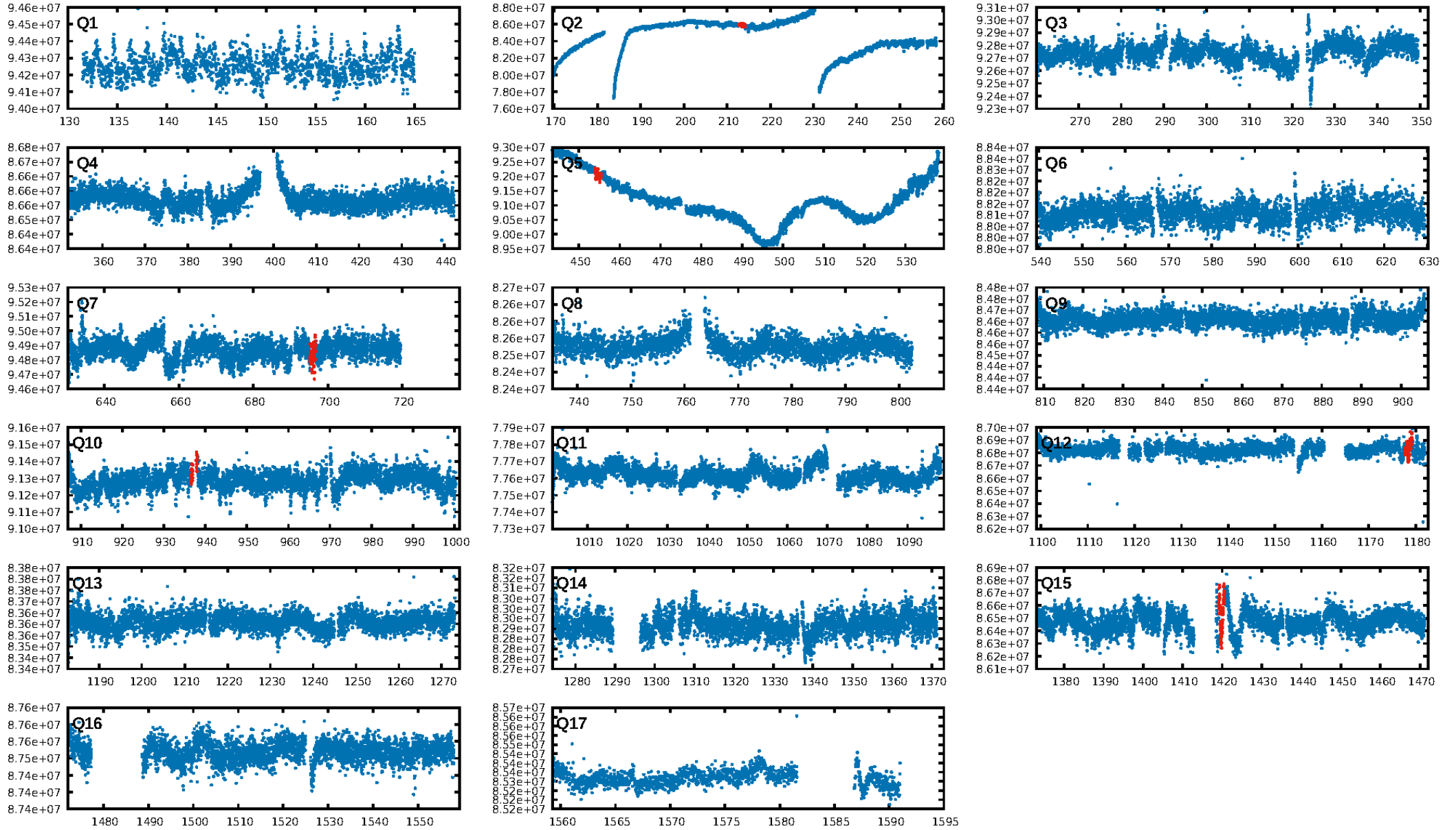
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [229.11σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 98.7%  
Bootstrap-pfa: 2.34e-13  
RollingBand-fgt: 1.00 [6/6]  
GhostDiagnostic-chr: 0.3272  
Centroid-sig: 11.4%  
Centroid-so: 3.384 arcsec [22.75σ]  
OotOffset-rm: N/A  
KicOffset-rm: N/A  
OotOffset-st: 0/0/0/0 [0]  
KicOffset-st: 0/0/0/0 [0]  
DiffImageQuality-fgm: N/A  
DiffImageOverlap-fno: 1.00 [3/3]

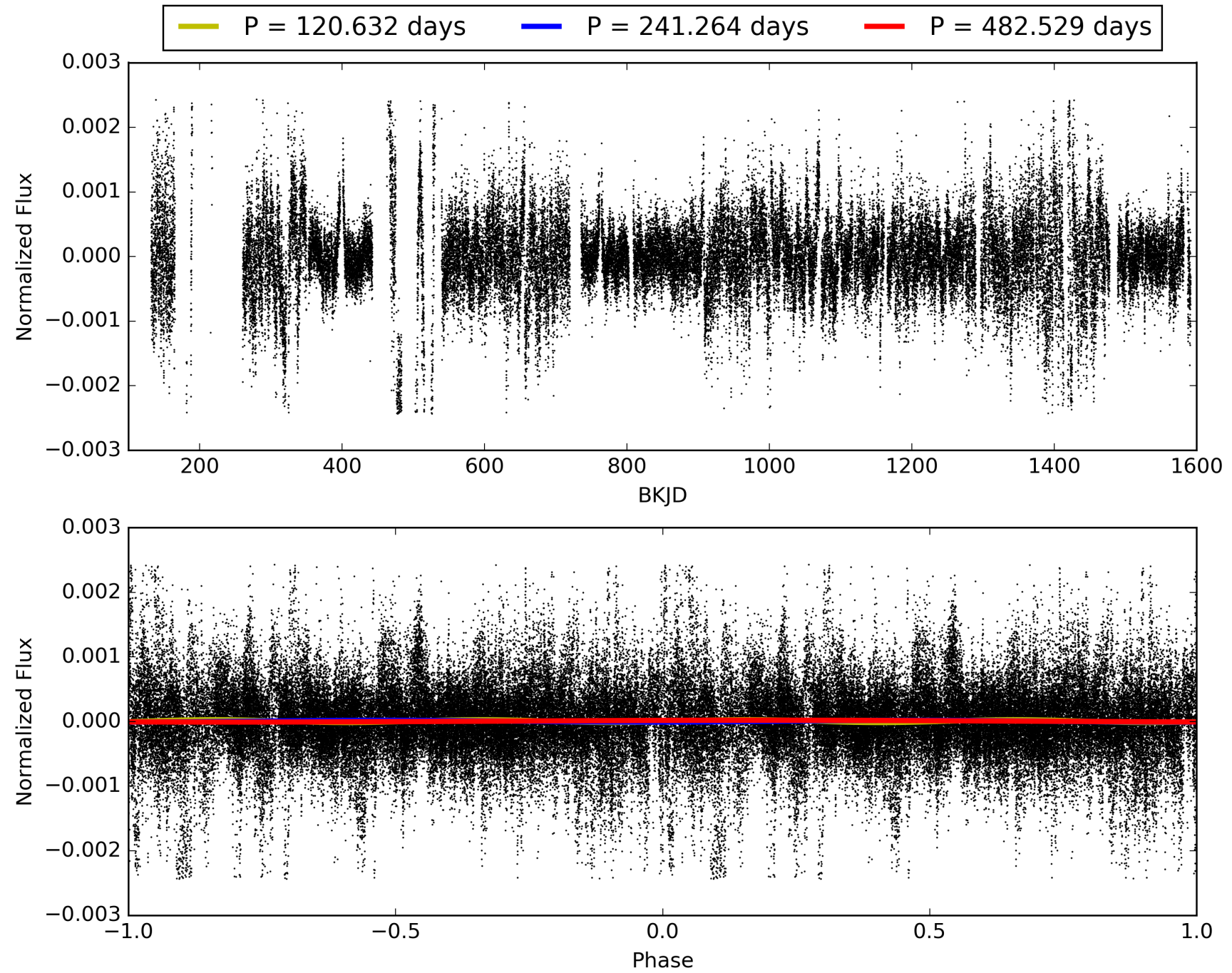
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 04:26:21 Z

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

# TCE 008613615-02, PDC Light Curves



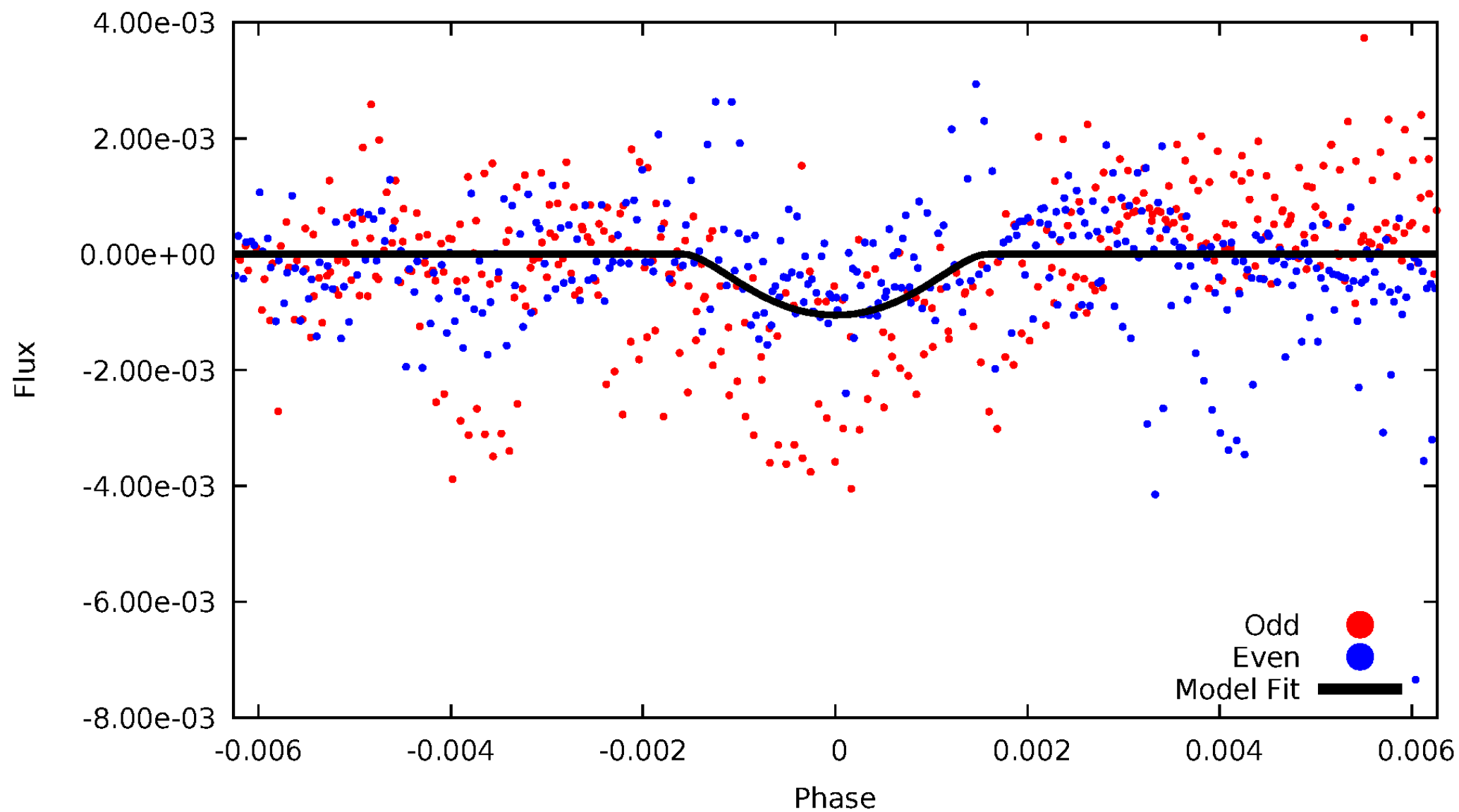
TCE 008613615-02





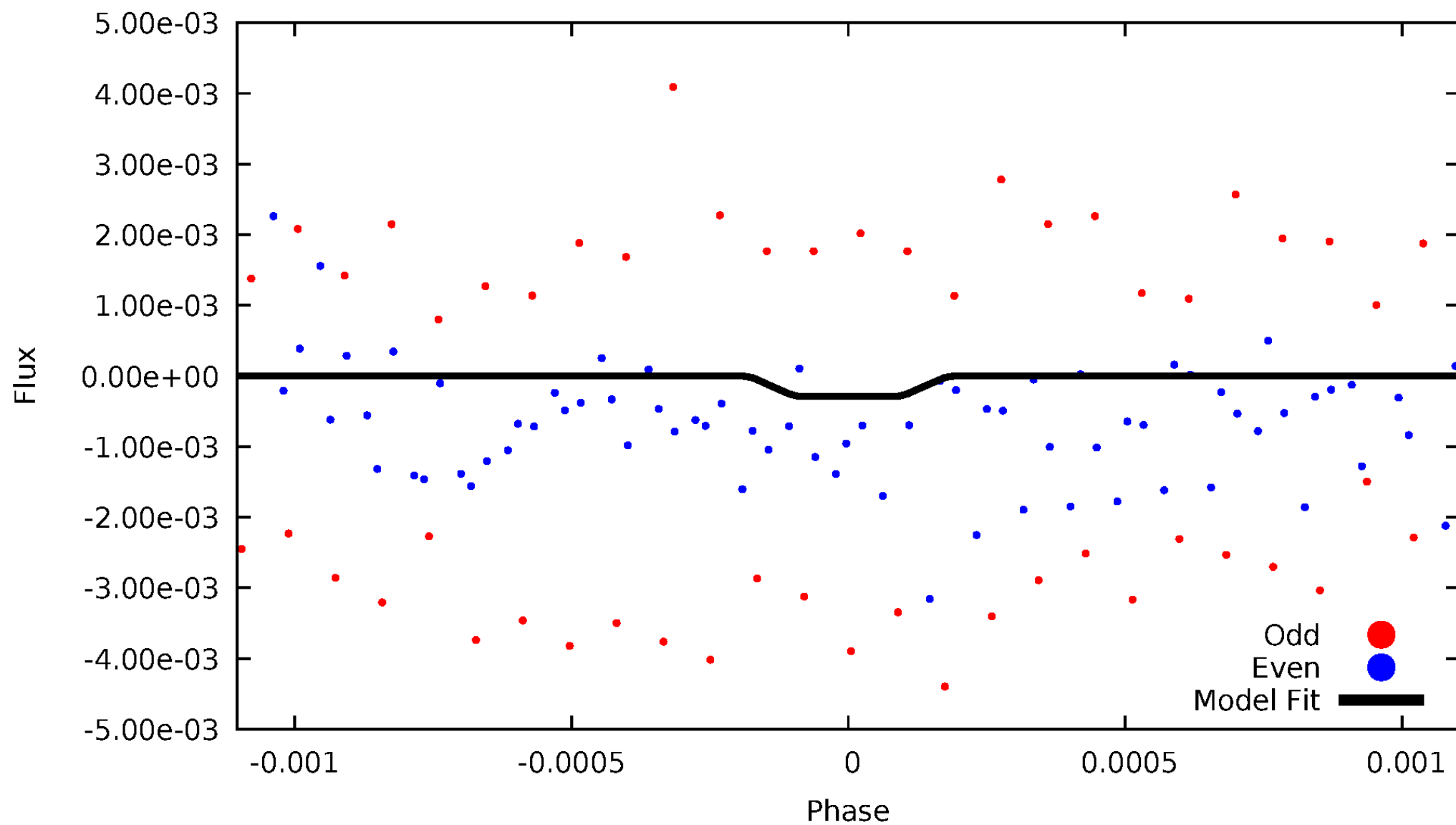
# DV Odd/Even

TCE 008613615-02



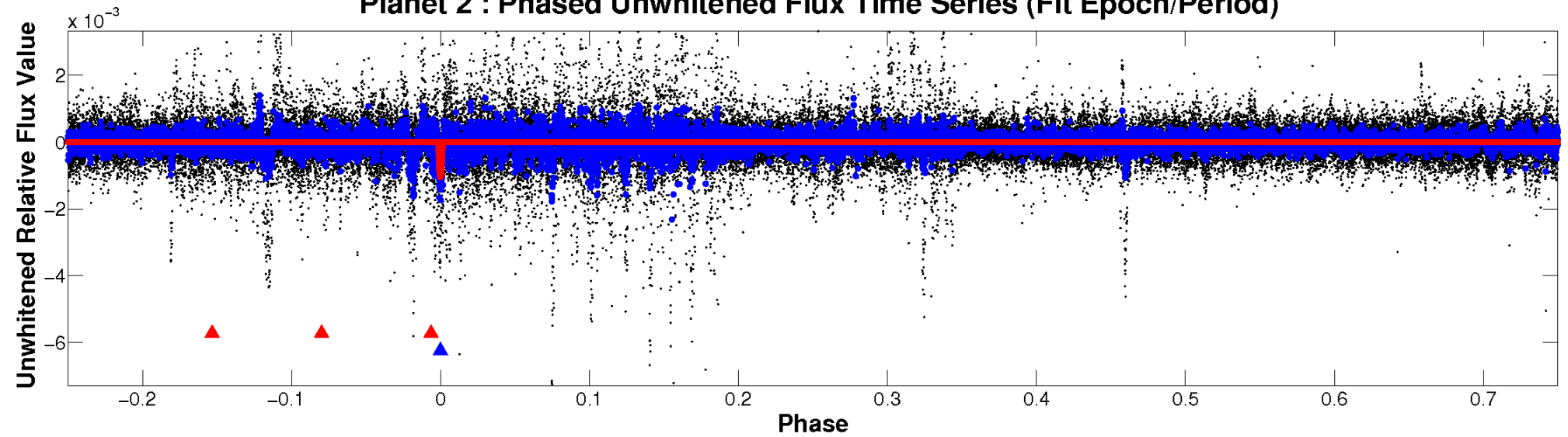
# ALT Odd/Even

TCE 008613615-02

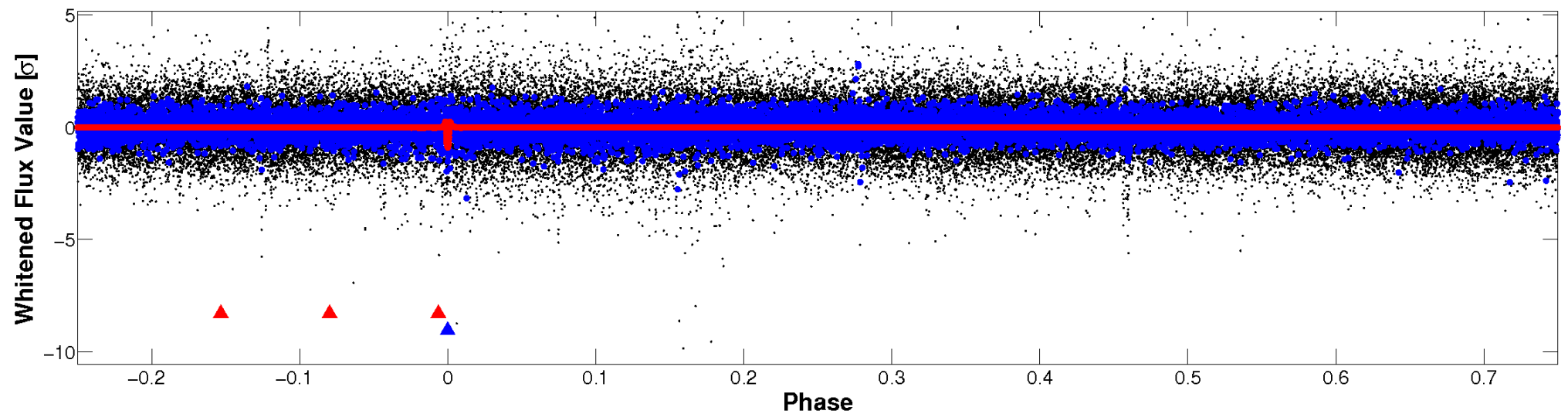


# Non-Whitened Vs. Whitened Light Curve

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

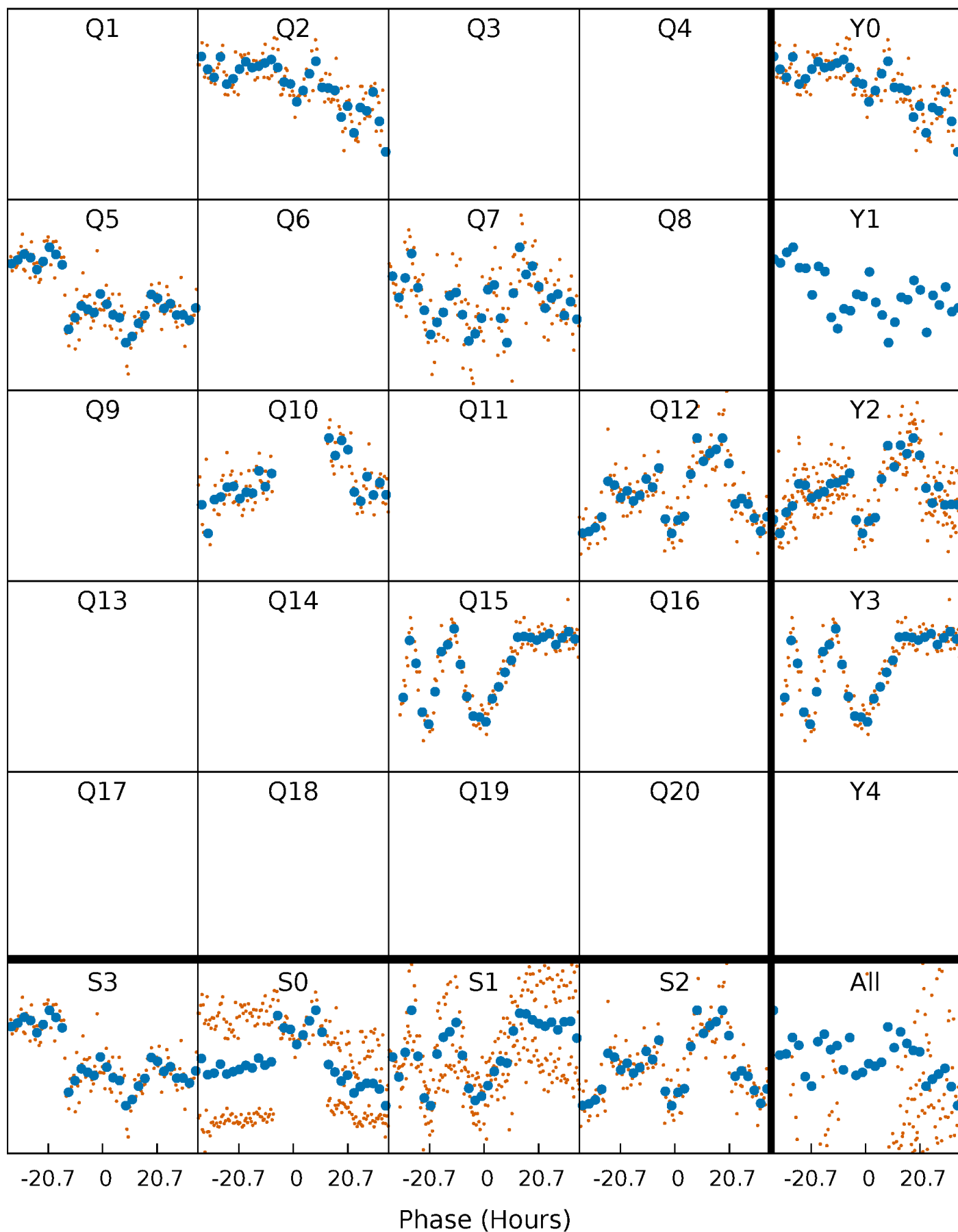


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



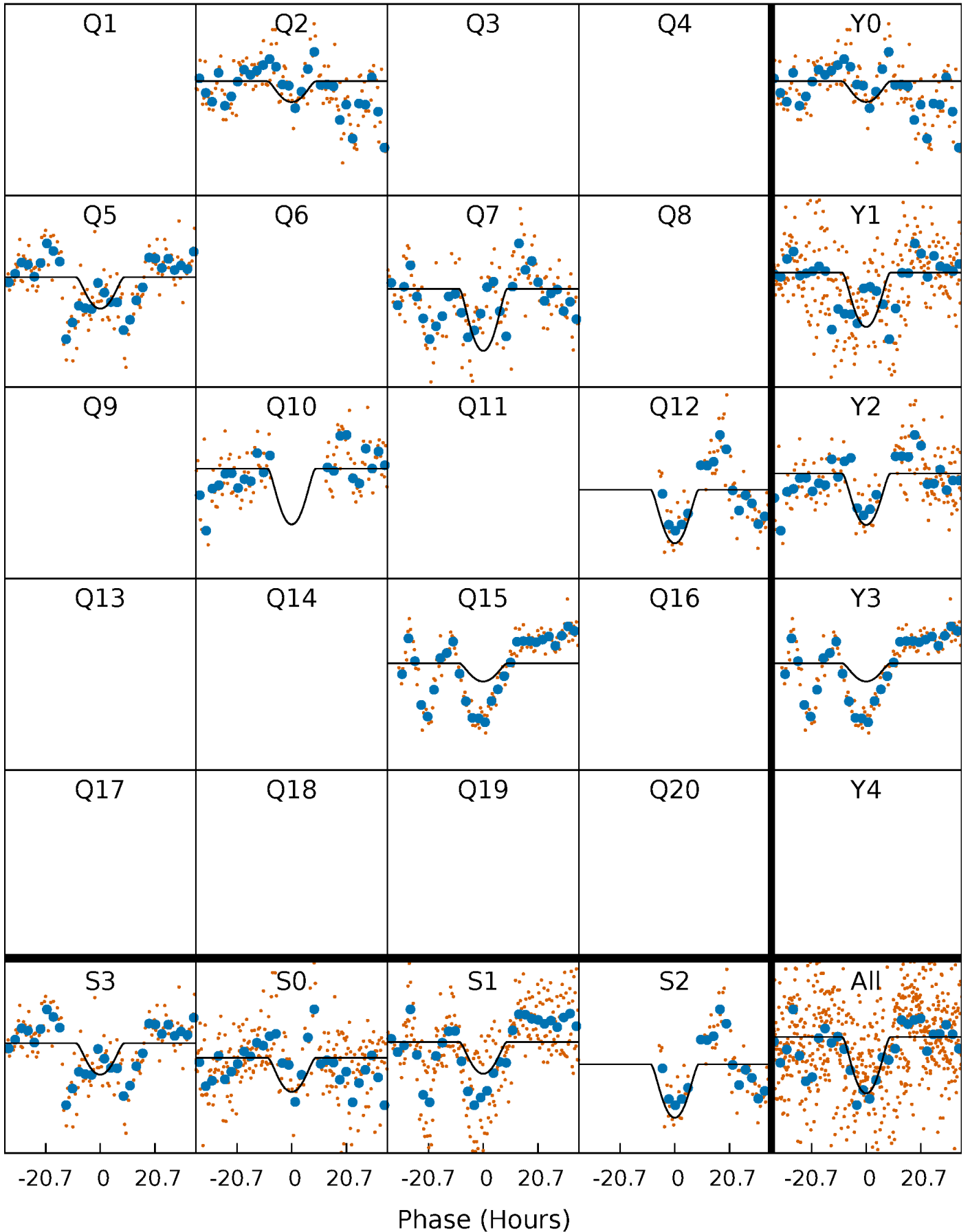
# PDC Quarter-Phased Transit Curves

TCE 008613615-02 P=241.264386 Days  $T_0=213.467395$  (BKJD)



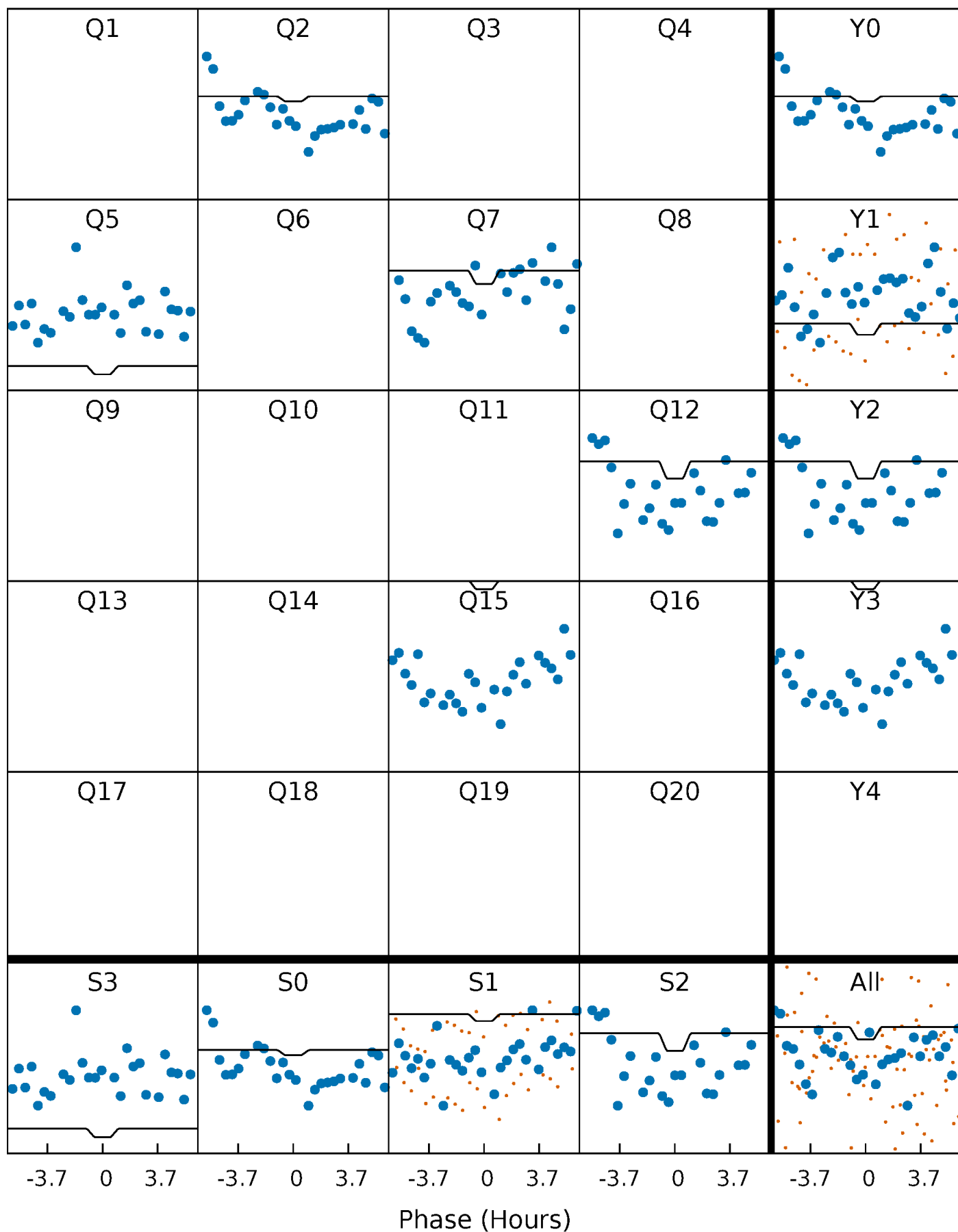
# DV Quarter-Phased Transit Curves

TCE 008613615-02   P=241.264386 Days    $T_0=213.467395$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

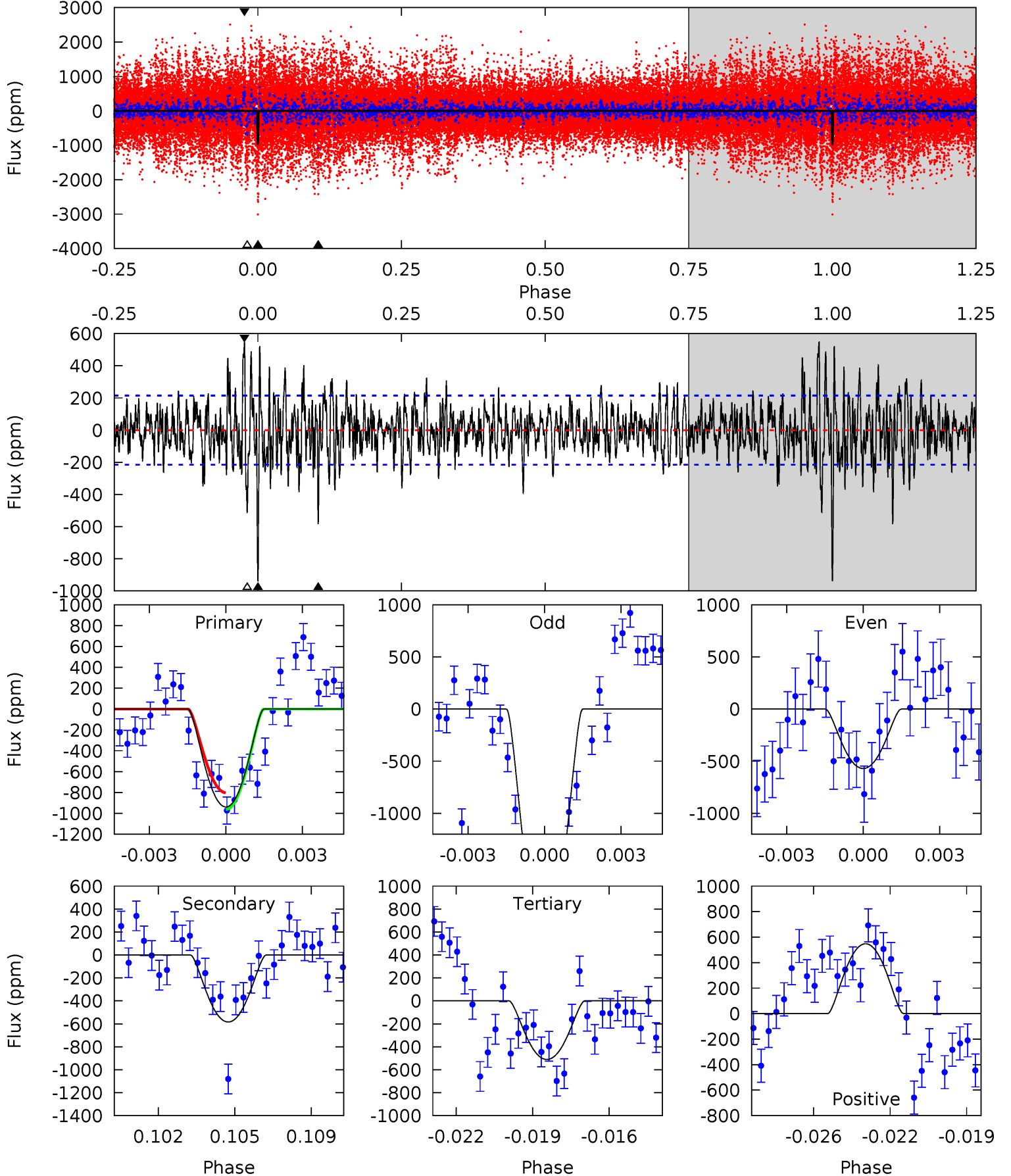
TCE 008613615-02 P=241.265854 Days  $T_0=213.458216$  (BKJD)



# DV Model-Shift Uniqueness Test

008613615-02, P = 241.264386 Days, E = 213.467395 Days

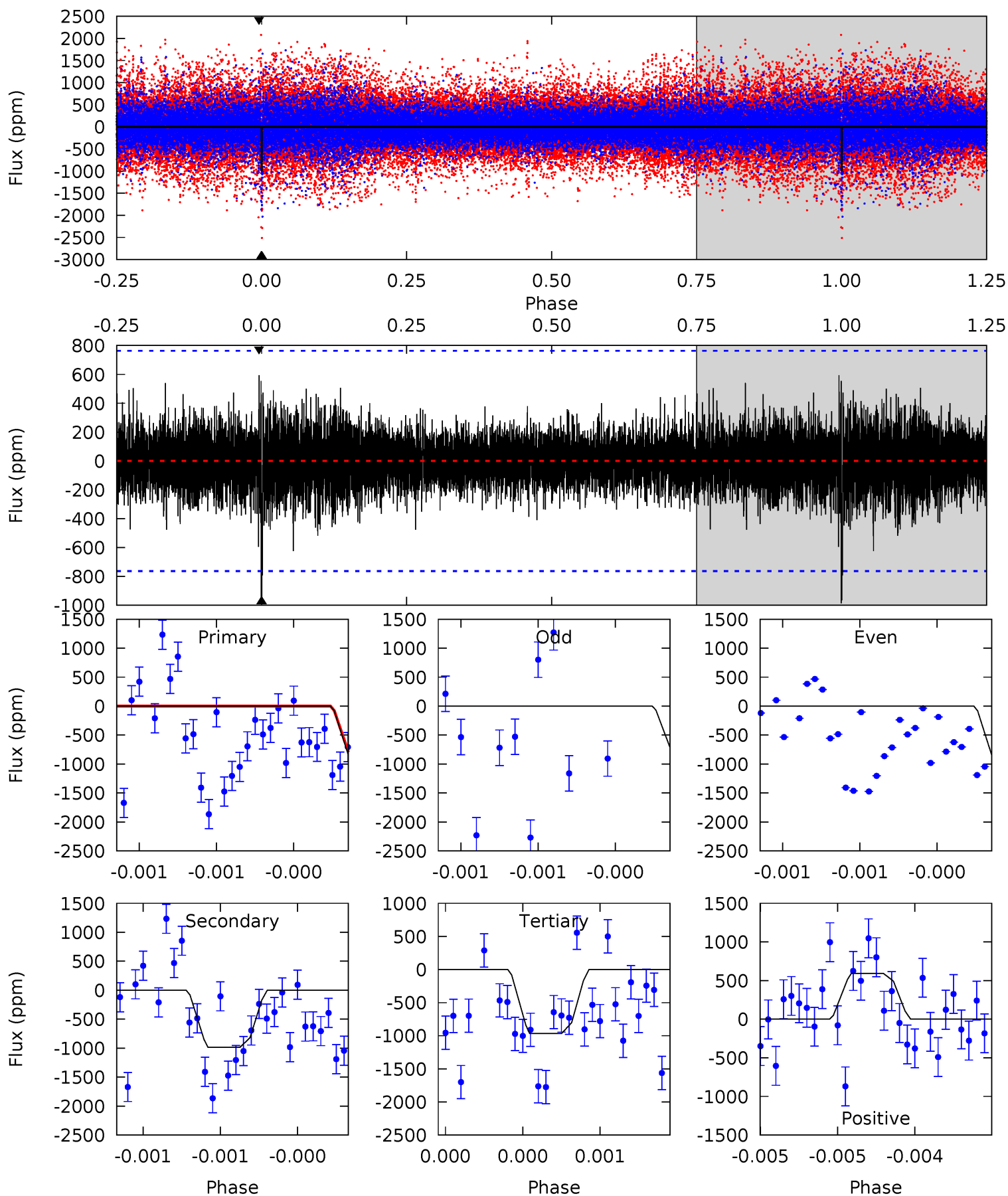
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
22.9	14.2	12.5	13.4	5.24	2.95	3.16	10.4	9.53	1.78	0.88	20.4	1.26	0.37	0



# Alt Model-Shift Uniqueness Test

008613615-02, P = 241.265854 Days, E = 213.458216 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
7.22	7.26	7.12	4.37	5.63	3.56	0.92	0.10	2.85	0.14	2.89	0.75	0.96	0.38	0.68





### Stellar Parameters For KIC 008613615

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4893^{+51}_{-80}$	$3.098^{+0.174}_{-0.116}$	$0.000^{+0.100}_{-0.150}$	$5.664^{+0.941}_{-1.530}$	$1.466^{+0.203}_{-0.377}$	$0.011^{+0.011}_{-0.004}$
	+1%/-2%	+6%/-4%	+inf%/-inf%	+17%/-27%	+14%/-26%	+100%/-31%
Source	SPE74	SPE74	SPE74	DSEP		

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

### Secondary Eclipse Parameters for KIC 008613615-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-584 \pm 41$	$38.47^{+31.67}_{-24.11}$	$773^{+35}_{-47}$	$3461^{+1453}_{-567}$	$160^{+975}_{-113}$
Alt.	$-985 \pm 136$	$27.30^{+24.57}_{-17.30}$	$770^{+36}_{-43}$	$4226^{+2346}_{-826}$	$535^{+3369}_{-393}$

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

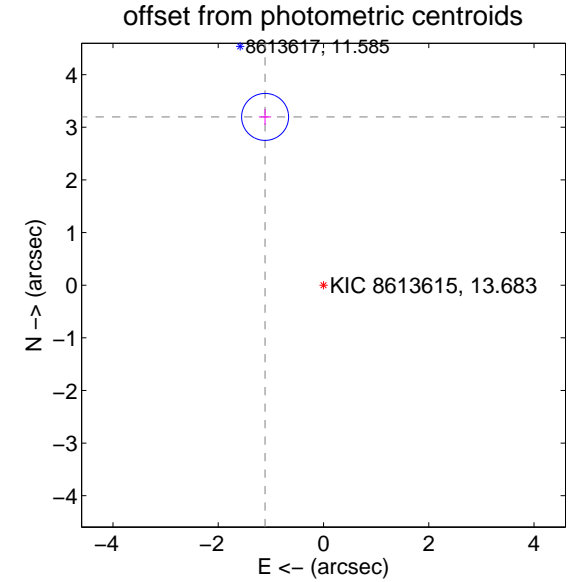
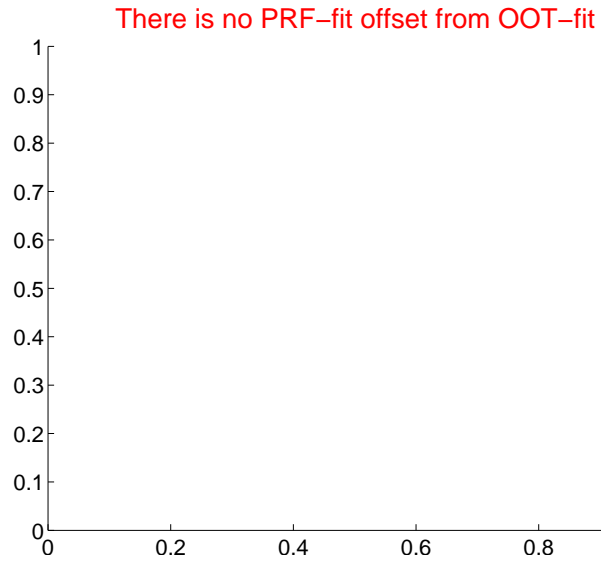
## DV Centroid Data

Supplemental centroid analysis for 008613615-02. Kepler magnitude: 13.68. Transit SNR 8.97

There are 0 quarters with good PRF difference image offsets

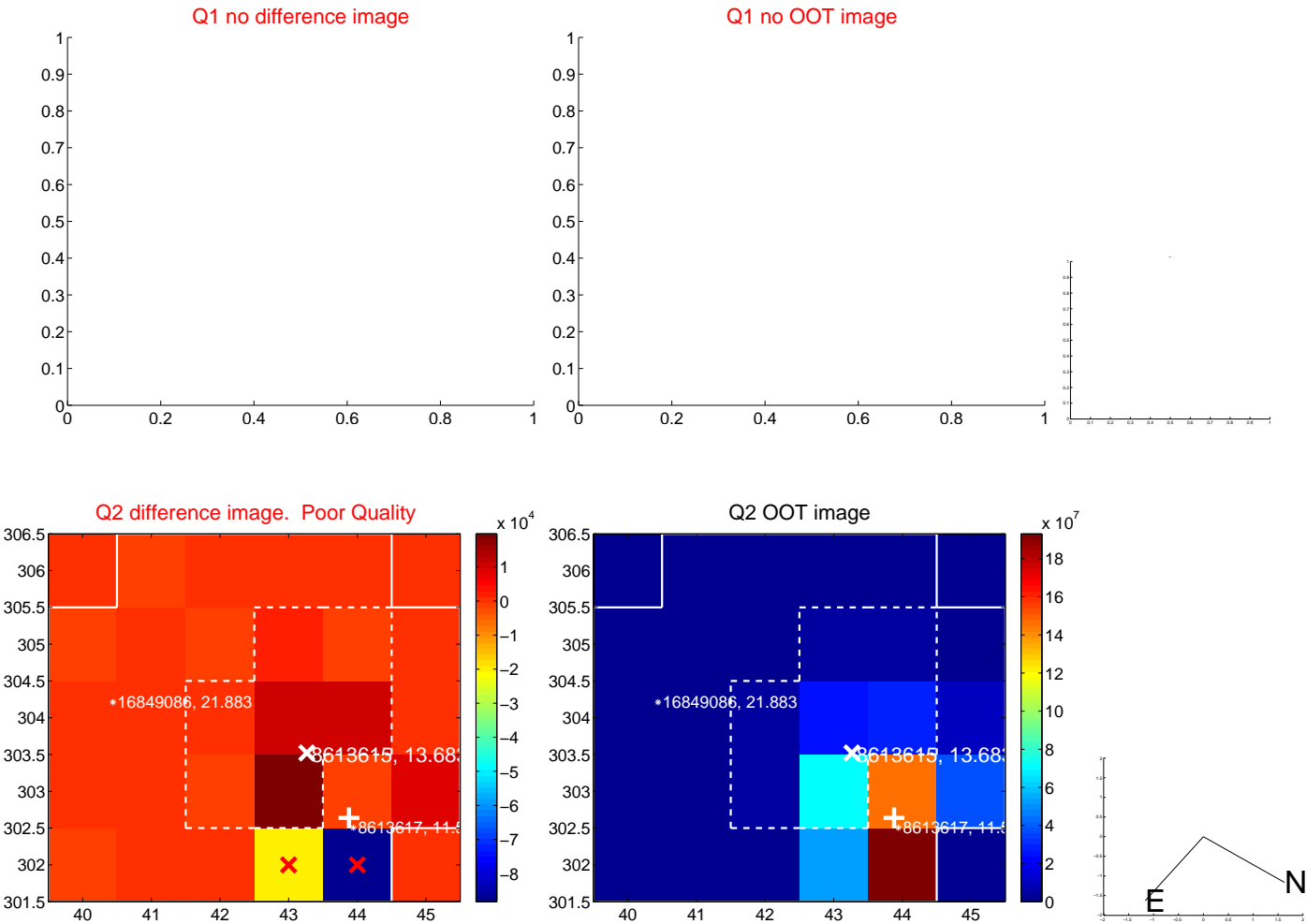
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	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	$3.38 \pm 0.15$	$22.75$	$1.11 \pm 0.12$	$3.20 \pm 0.15$

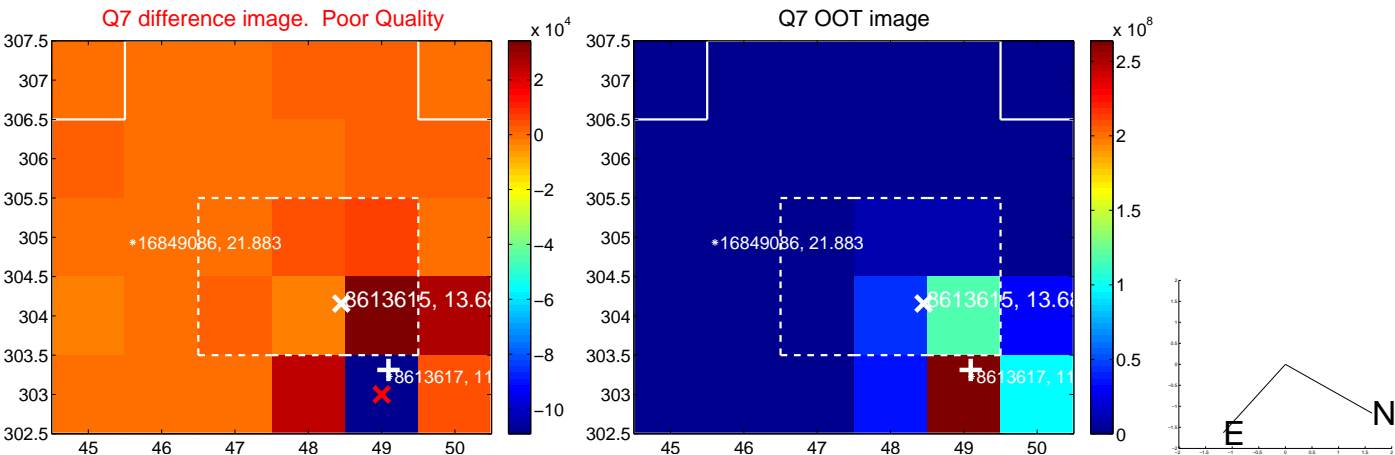
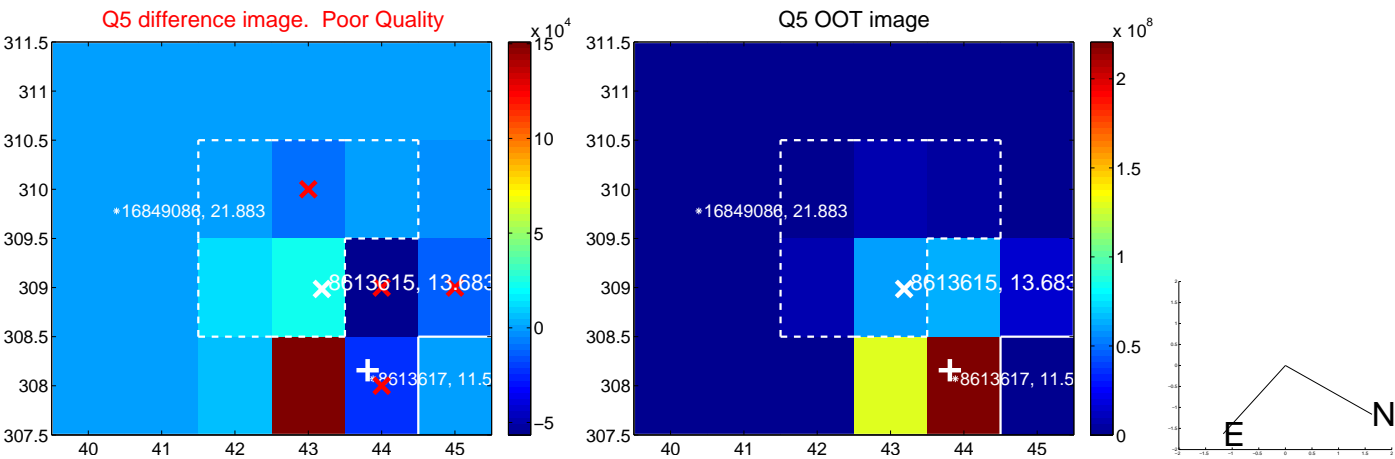


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



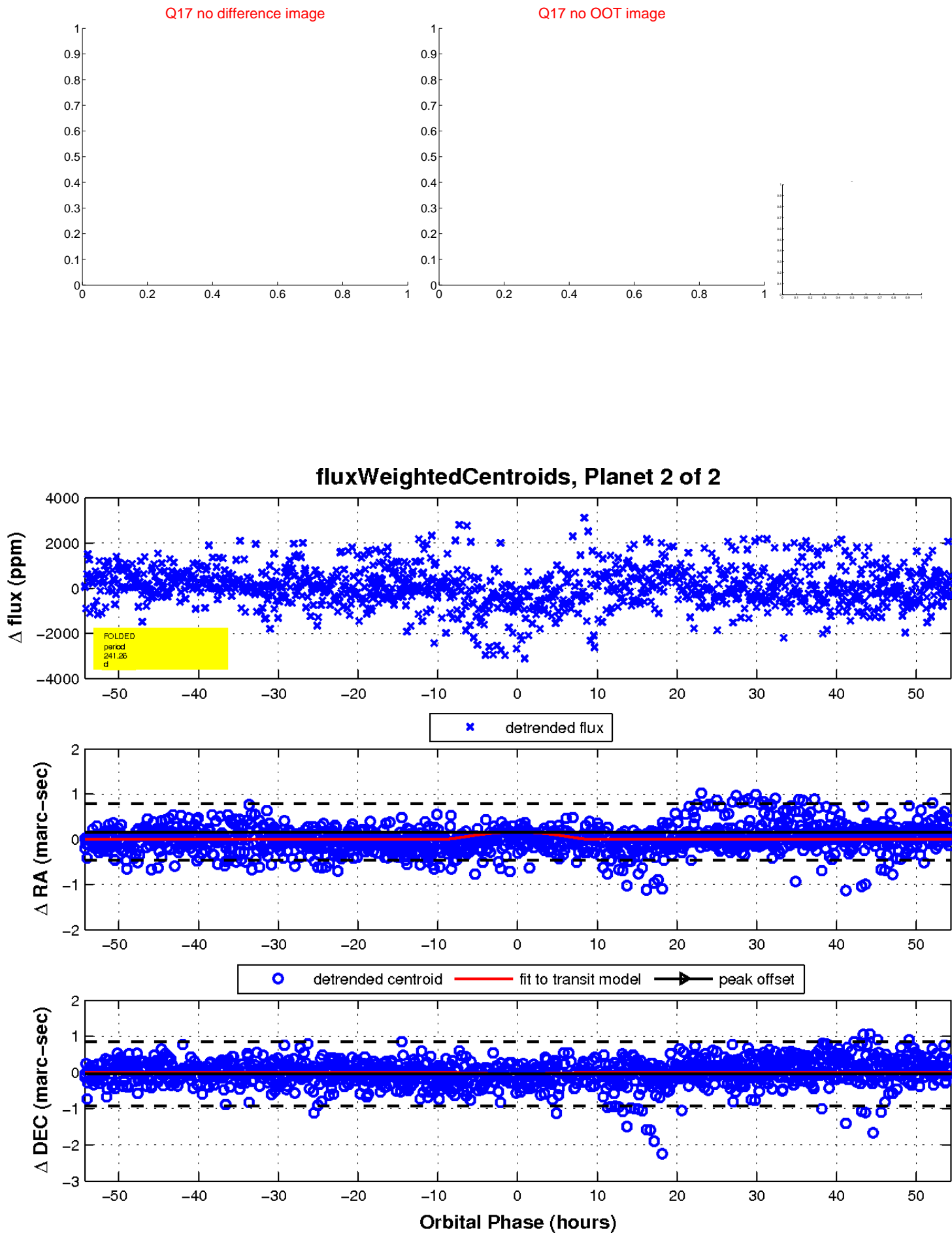
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

