

# KIC 006685403

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006685403-01	OBS	No	451.028008	557.685959	780.8	16.189	8.8	8.0	0.88	5587	2.73	0.55
006685403-02	OBS	8126.01	429.619681	269.485014	977.0	19.320	7.8	8.3	0.88	5587	3.04	0.58

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006685403-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006685403-02	OBS	FP	0.00	1	0	0	0	MOD_NONUNIQ_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

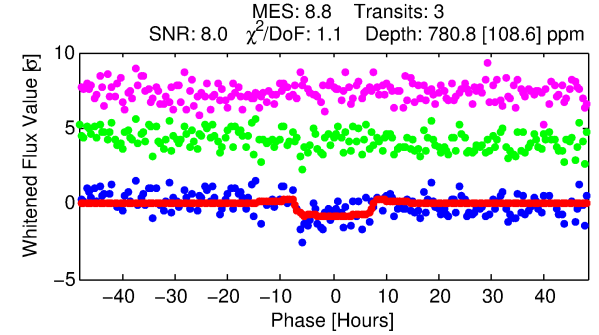
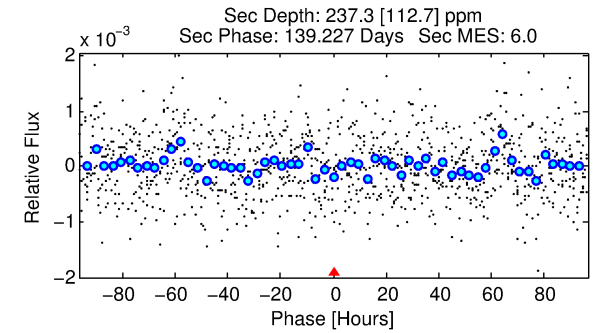
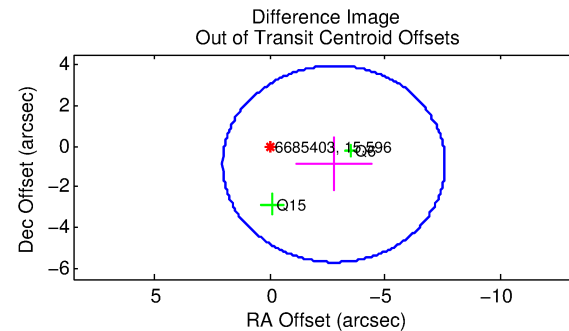
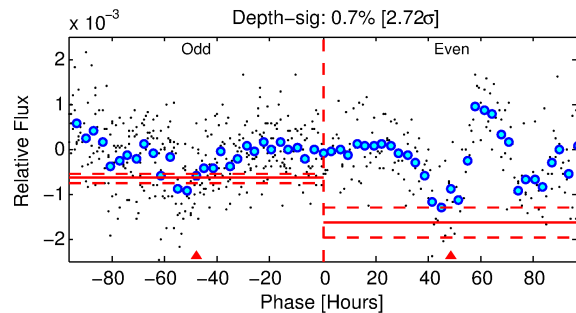
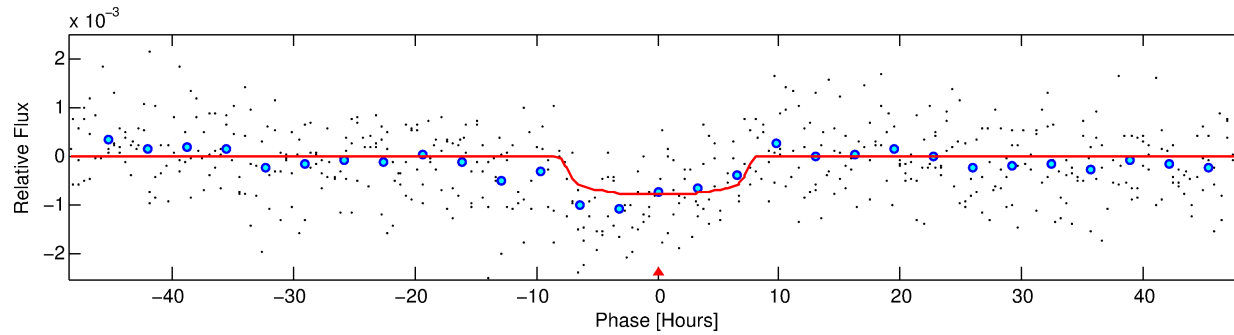
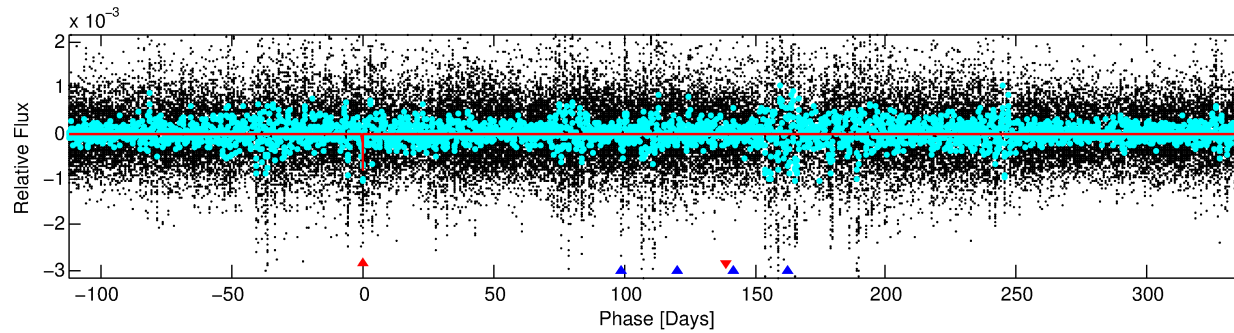
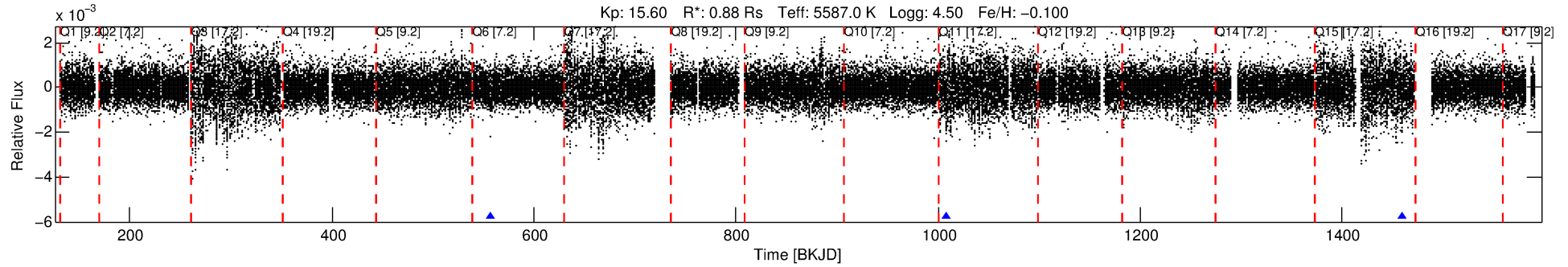
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006685403-01

No Significant Match Found

# DV One-Page Summary

KIC: 6685403 Candidate: 1 of 2 Period: 451.028 d



## DV Fit Results:

Period = 451.02801 [0.02044] d  
Epoch = 557.6860 [0.0200] BKJD  
Rp/R\* = 0.0285 [0.0056]  
a/R\* = 135.99 [105.34]  
b = 0.81 [0.34]  
Seff = 0.55 [0.18]  
Teq = 219 [18] K  
Rp = 2.73 [0.87] Re  
a = 1.1079 [0.2379] AU  
Ag = 21468.13 [14827.10] [1.45 $\sigma$ ]  
Teff = 4104 [642] K [6.04 $\sigma$ ]

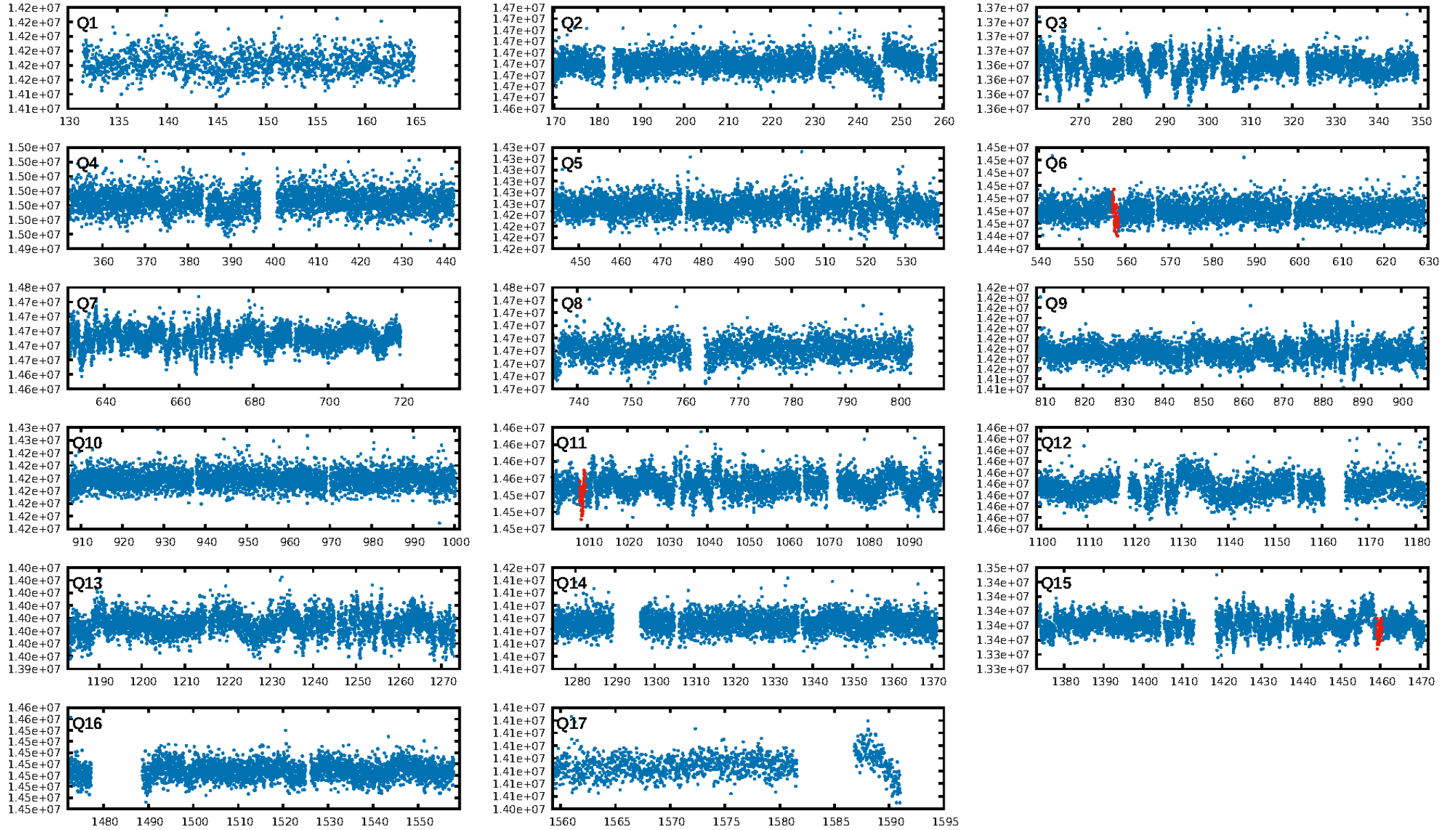
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [20.38 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 6.5%  
ModelChiSquareGof-sig: 99.5%  
**Bootstrap-pfa: 6.36e-11**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -3.609  
Centroid-sig: 1.9%  
Centroid-so: 4.426 arcsec [2.00 $\sigma$ ]  
OotOffset-rm: 2.906 arcsec [1.81 $\sigma$ ]  
OotOffset-st: 1/1/0/0 [2]  
KicOffset-rm: 3.025 arcsec [1.79 $\sigma$ ]  
KicOffset-st: 1/1/0/0 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [2/2]

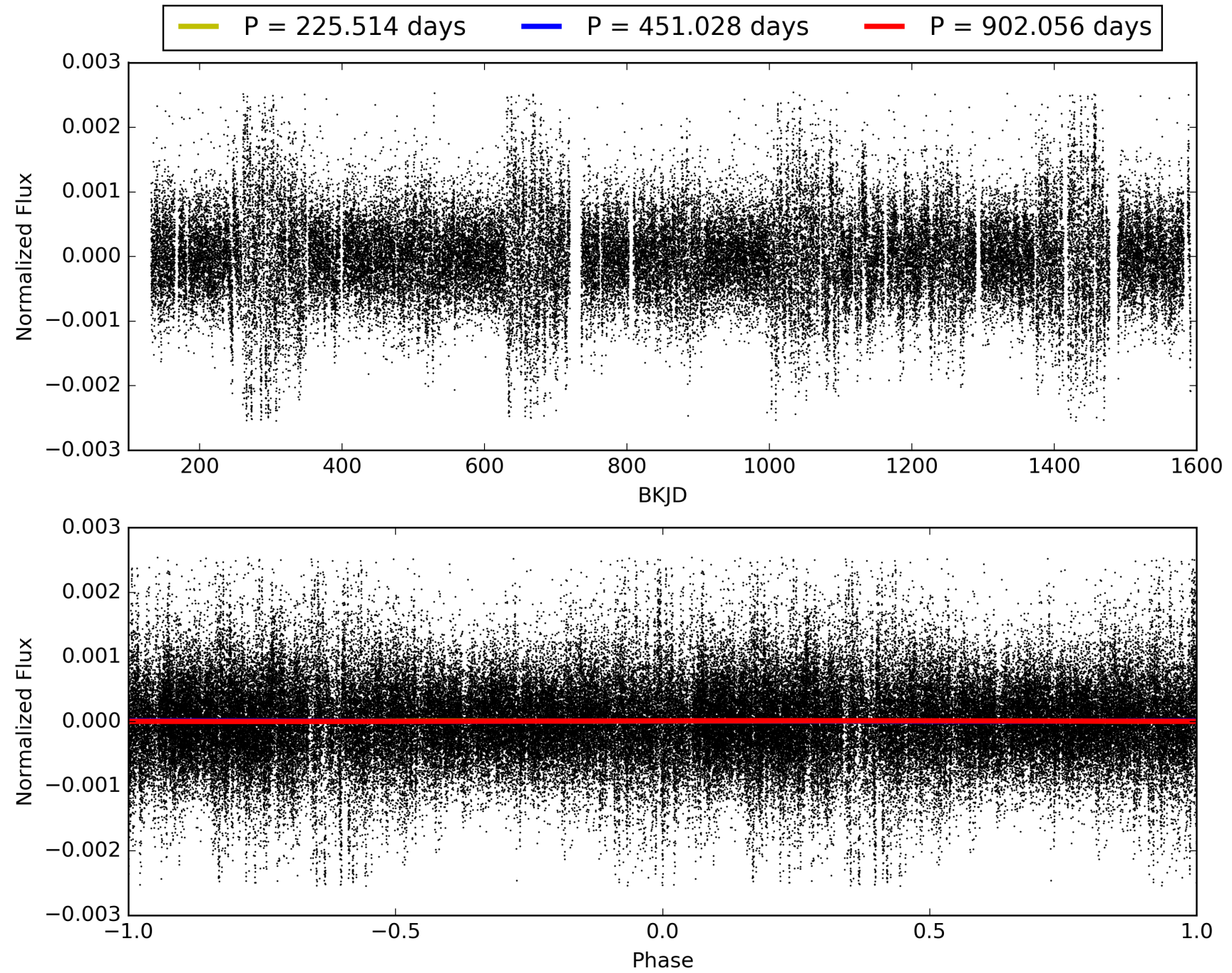
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 19:51:54 Z

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

# TCE 006685403-01, PDC Light Curves

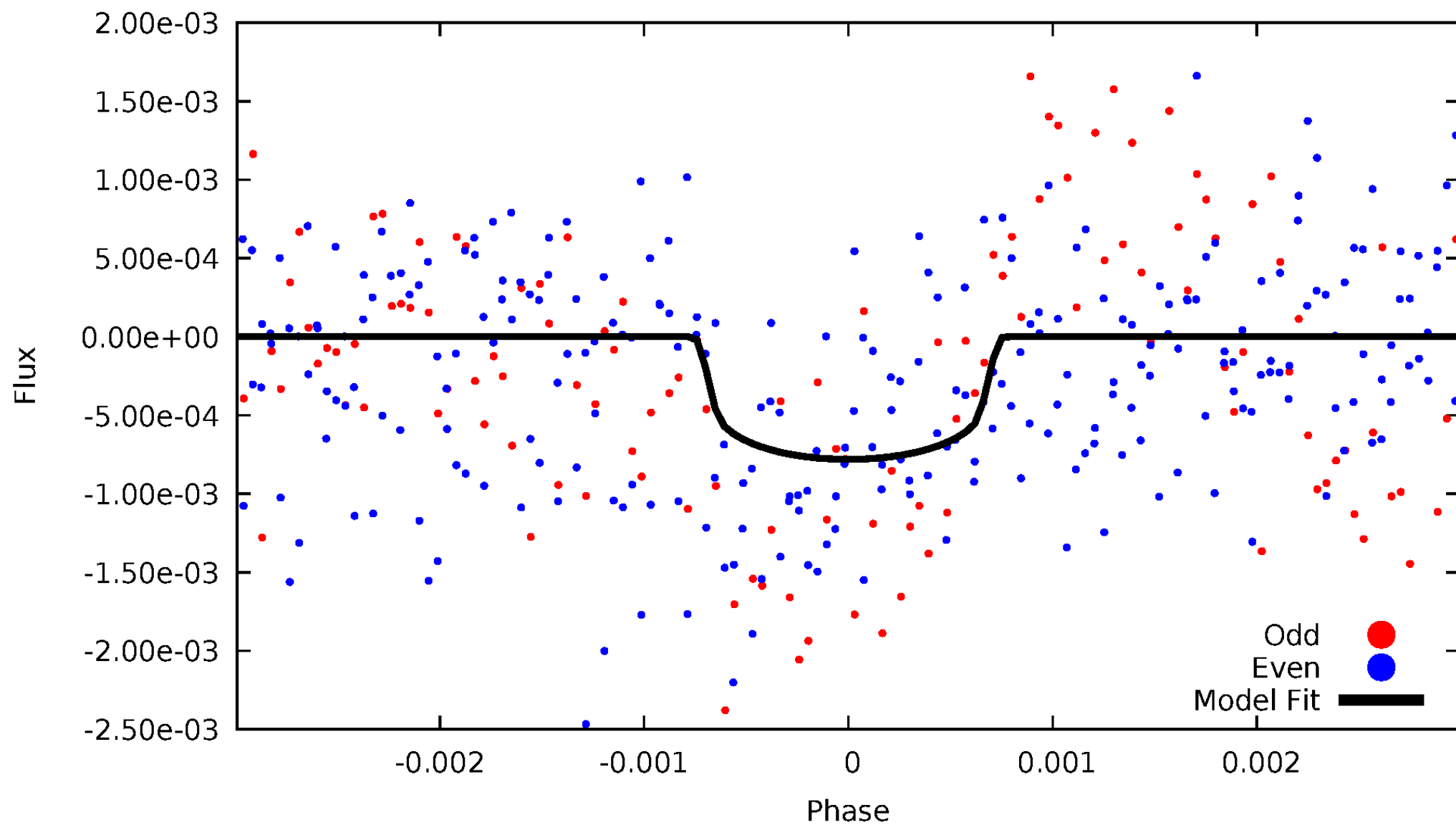


# TCE 006685403-01



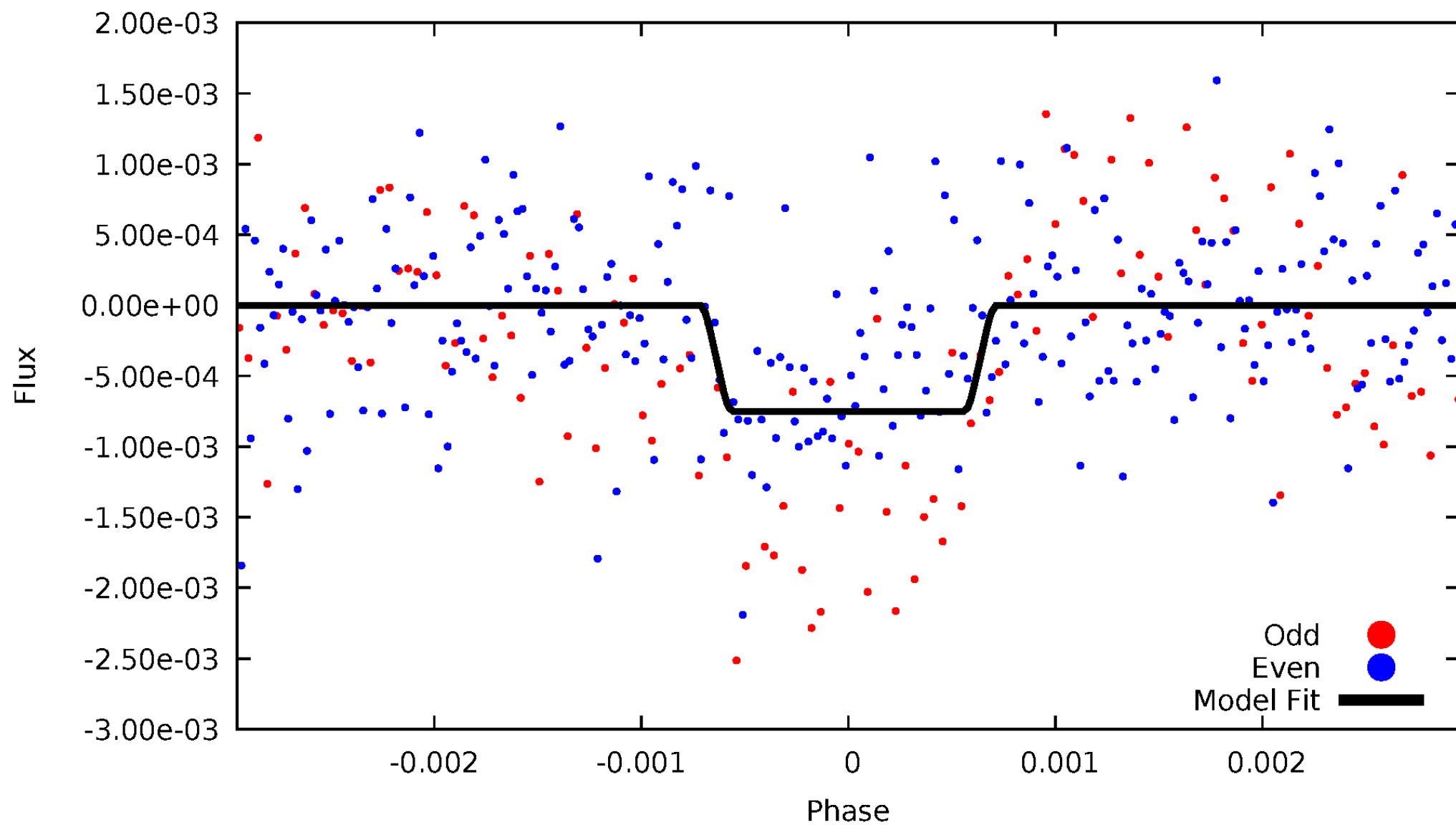
# DV Odd/Even

TCE 006685403-01



# ALT Odd/Even

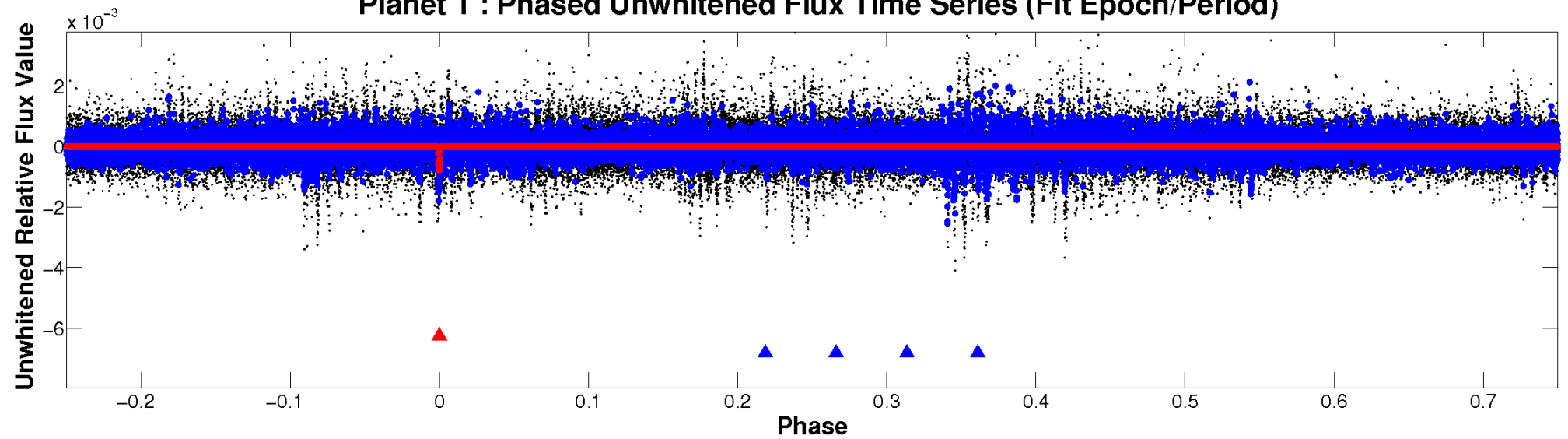
TCE 006685403-01



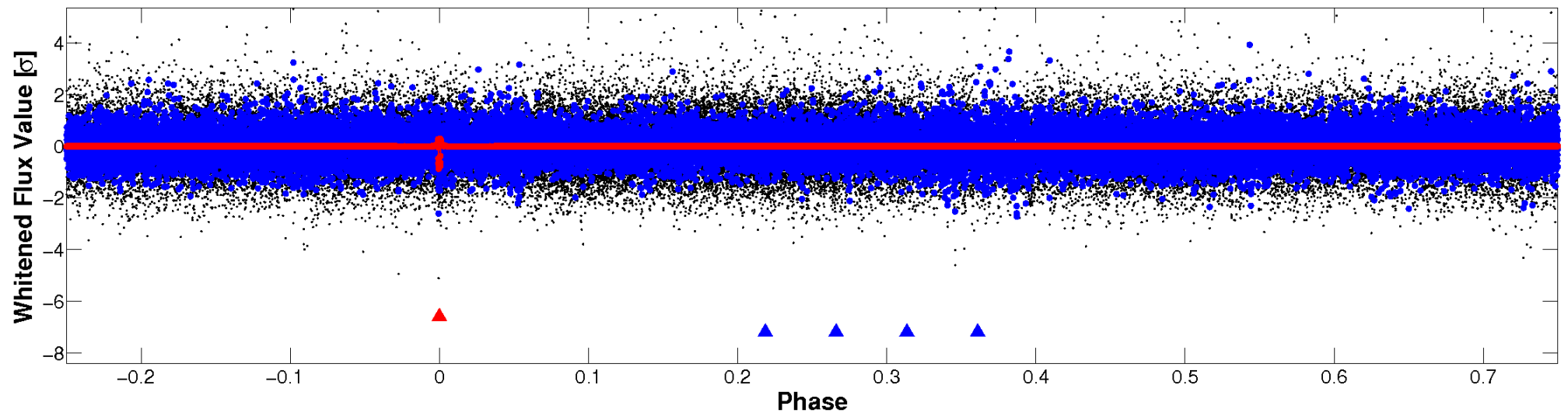


# Non-Whitened Vs. Whitened Light Curve

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

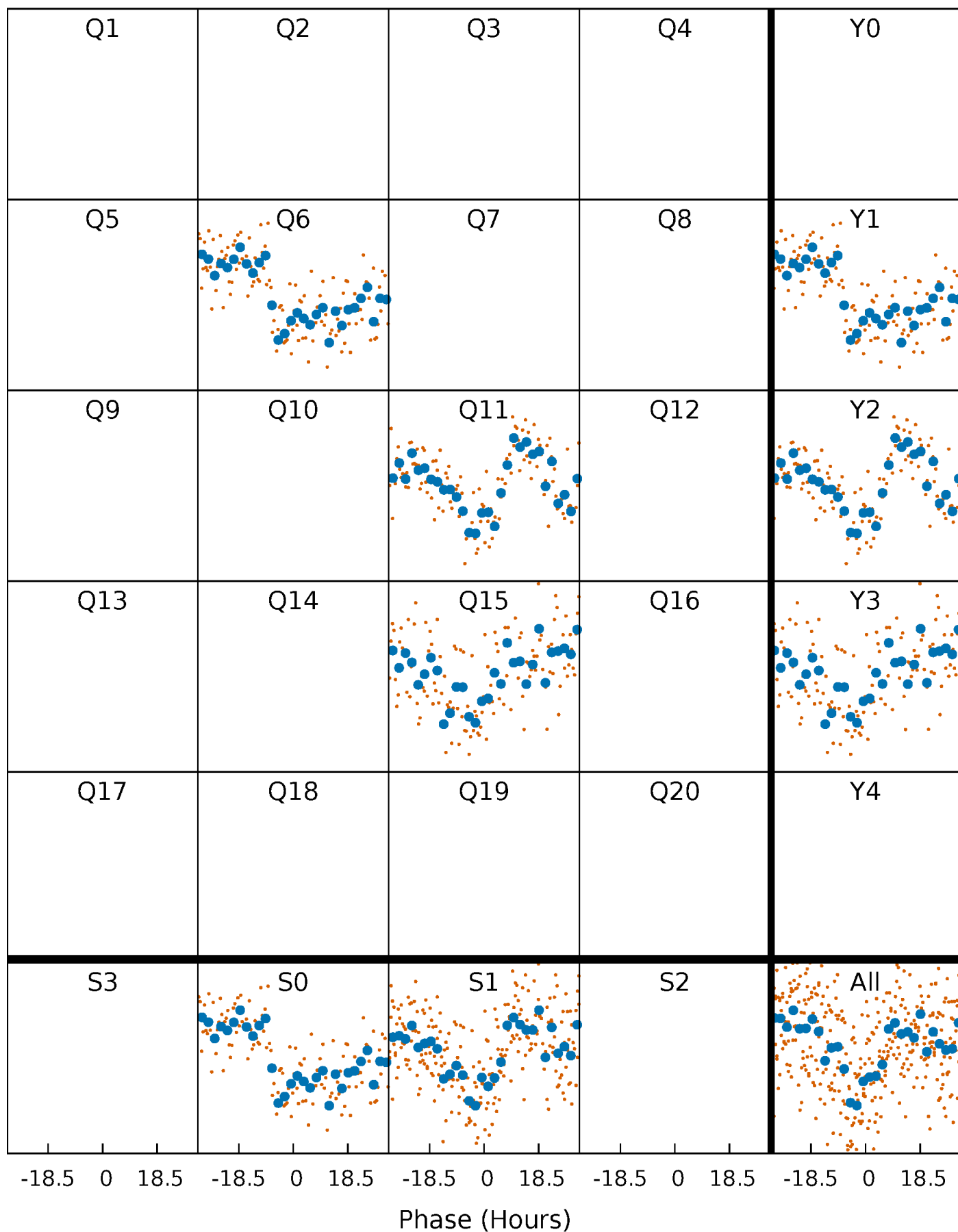


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

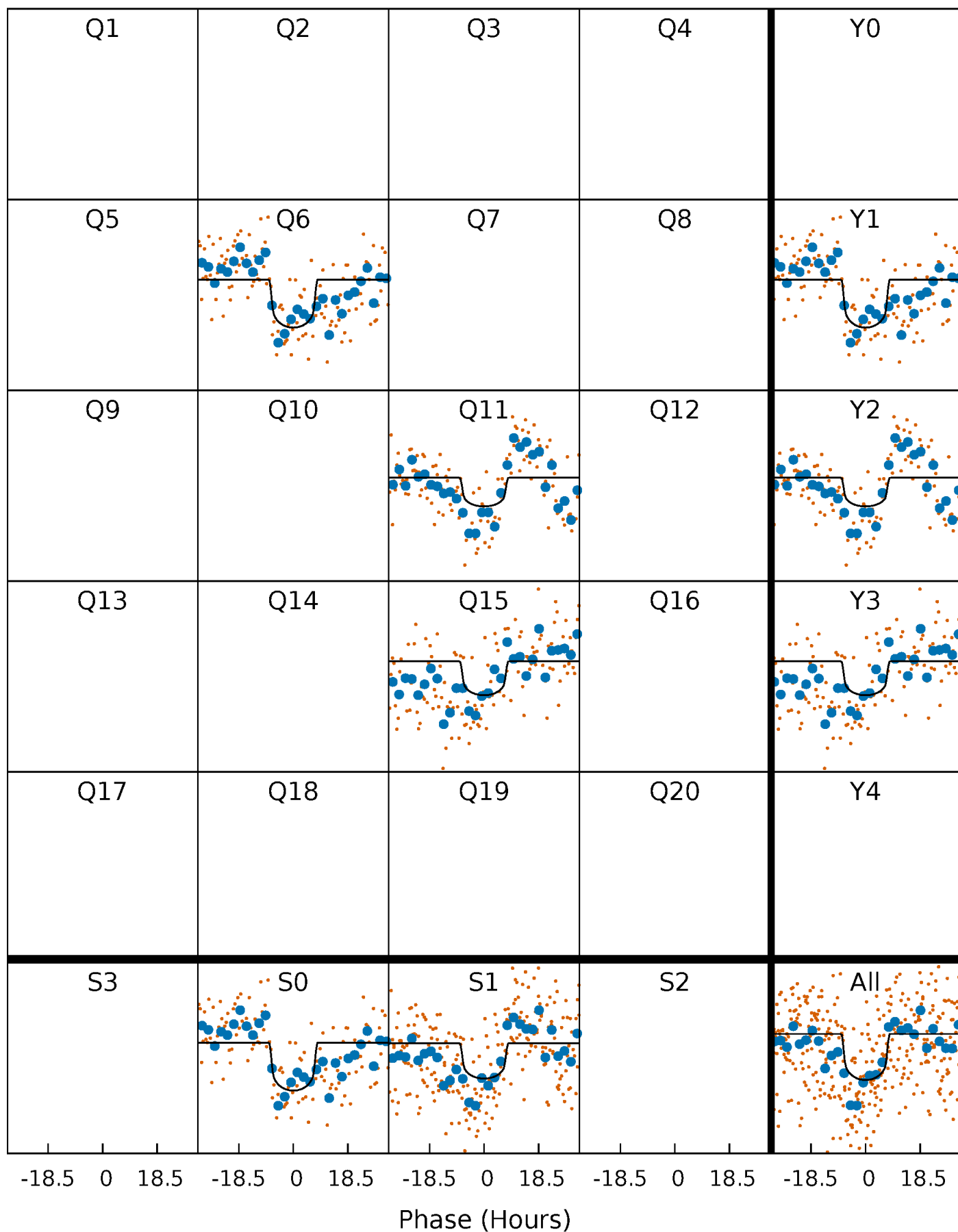
TCE 006685403-01 P=451.028008 Days  $T_0=557.685959$  (BKJD)





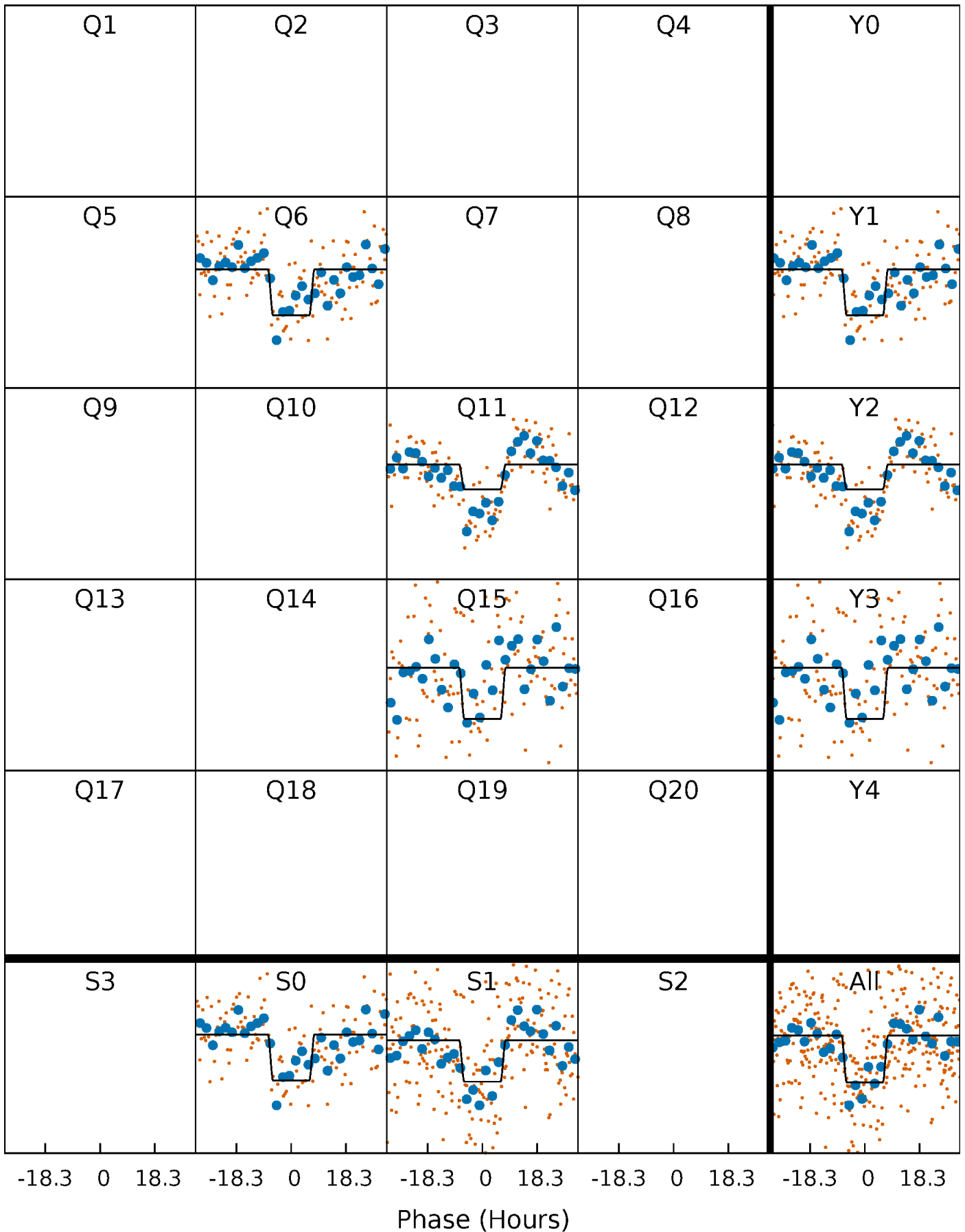
# DV Quarter-Phased Transit Curves

TCE 006685403-01 P=451.028008 Days  $T_0=557.685959$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

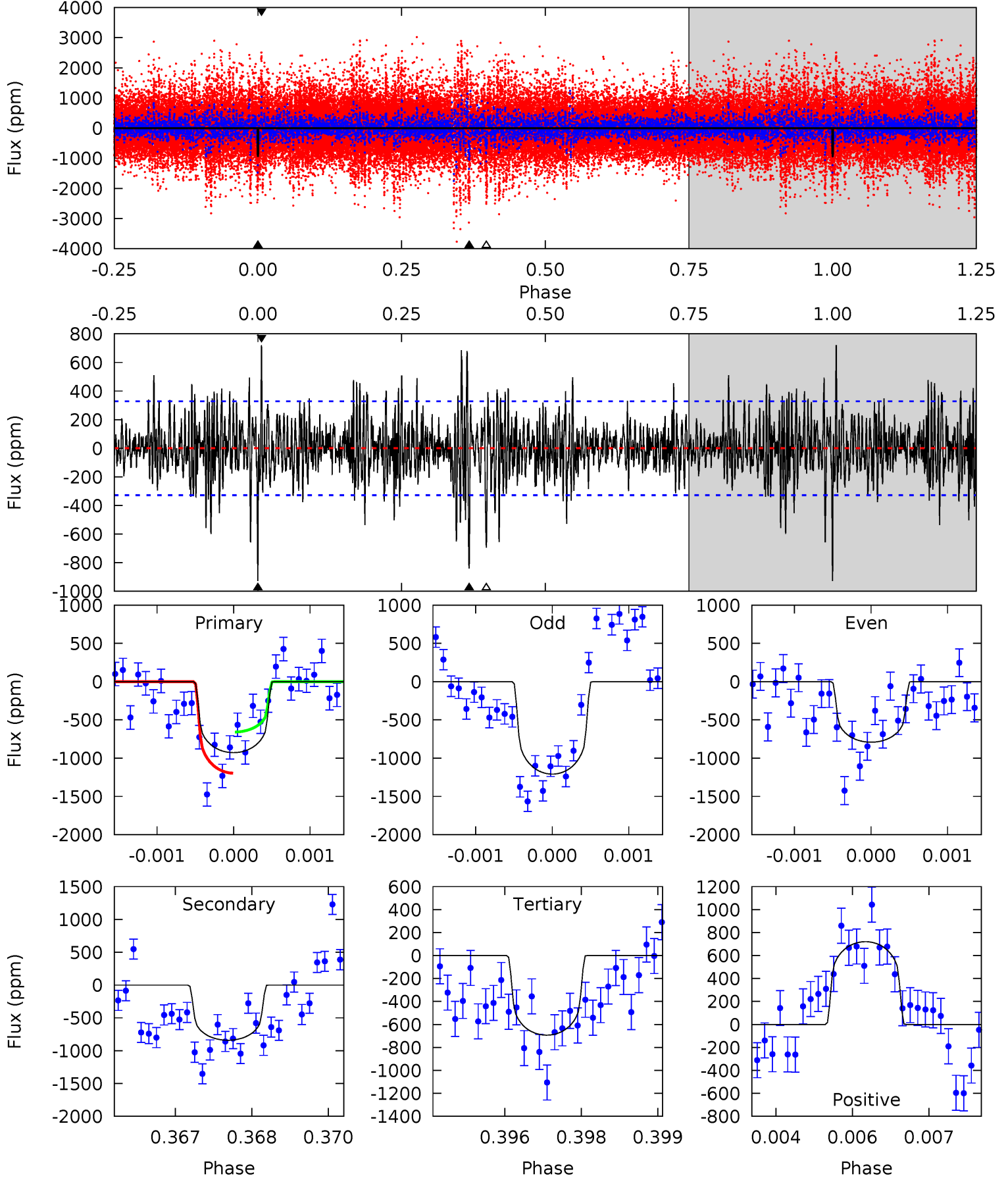
TCE 006685403-01 P=451.023159 Days  $T_0=557.662302$  (BKJD)



# DV Model-Shift Uniqueness Test

006685403-01, P = 451.028008 Days, E = 106.657951 Days

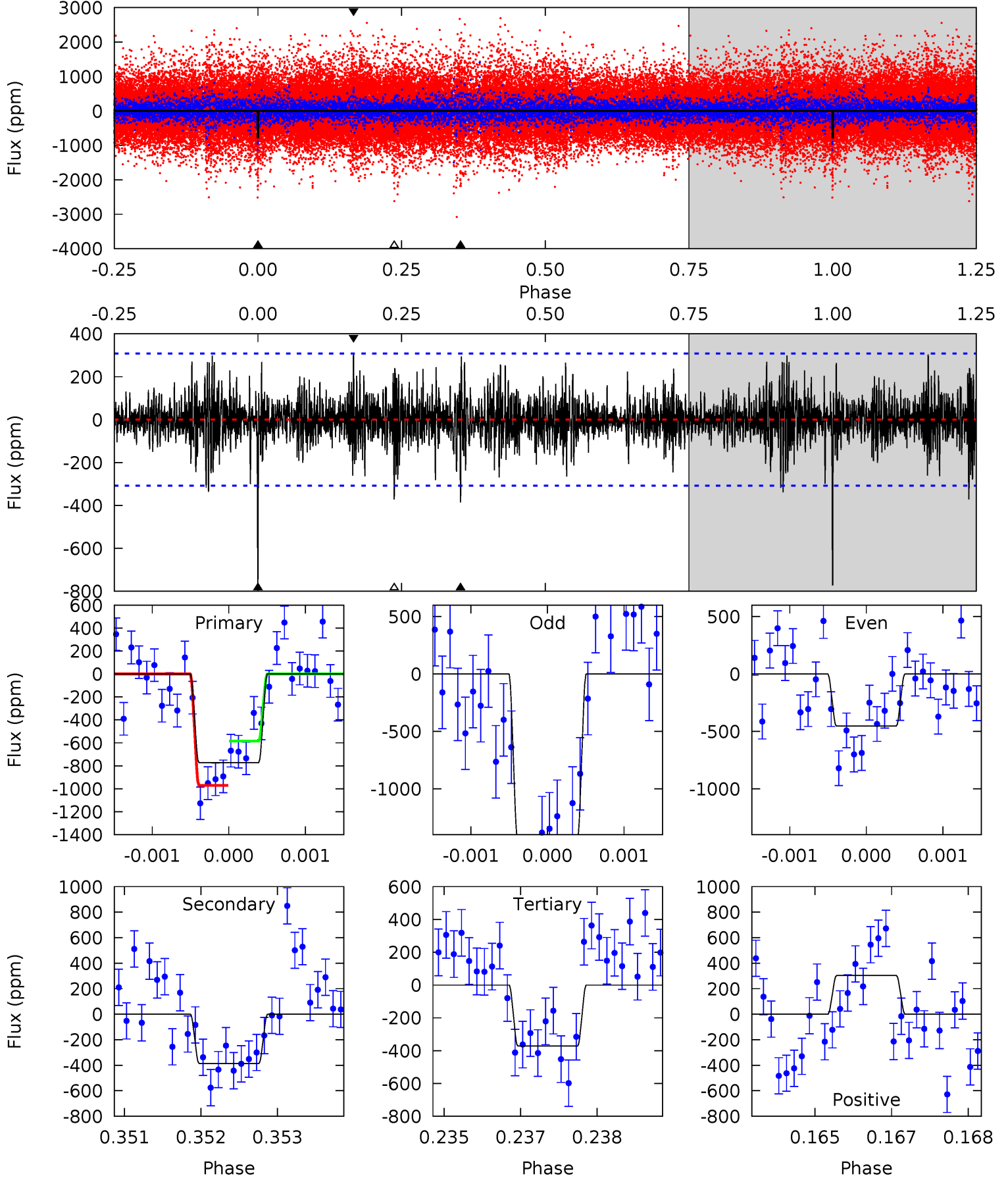
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.2	13.8	11.4	11.8	5.38	3.18	2.68	3.84	3.40	2.42	1.97	3.16	1.15	0.44	4.42



# Alt Model-Shift Uniqueness Test

006685403-01, P = 451.023159 Days, E = 106.639143 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
13.5	6.75	6.51	5.32	5.39	3.19	1.39	7.01	8.21	0.24	1.43	8.05	1.20	0.28	3.39



### Stellar Parameters For KIC 006685403

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5587^{+166}_{-166}$	$4.502^{+0.069}_{-0.173}$	$-0.100^{+0.300}_{-0.300}$	$0.877^{+0.222}_{-0.095}$	$0.891^{+0.102}_{-0.081}$	$1.862^{+0.547}_{-0.844}$
	+3%/-3%	+2%/-4%	+300%/-300%	+25%/-11%	+11%/-9%	+29%/-45%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006685403-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-841 \pm 61$	$2.78^{+0.69}_{-0.53}$	$309^{+20}_{-15}$	$5633^{+618}_{-477}$	$74021^{+36020}_{-27224}$
Alt.	$-386 \pm 57$	$2.71^{+0.64}_{-0.60}$	$311^{+19}_{-15}$	$4841^{+506}_{-387}$	$35296^{+22472}_{-12840}$

$T_{max}$  = 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

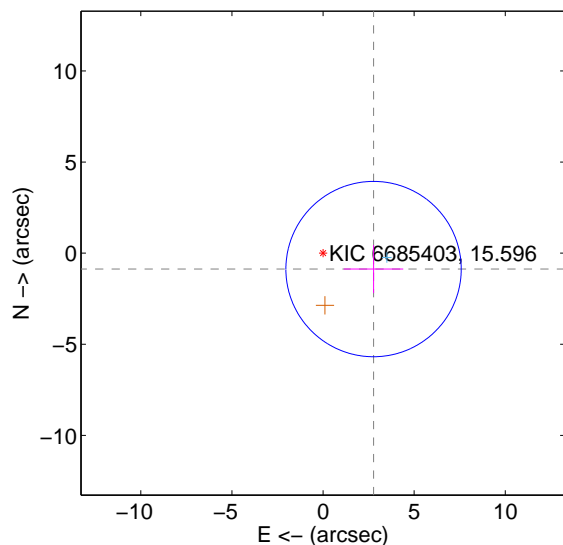
Supplemental centroid analysis for 006685403-01. Kepler magnitude: 15.60. Transit SNR 8.03

There are 1 quarters with good PRF difference image offsets

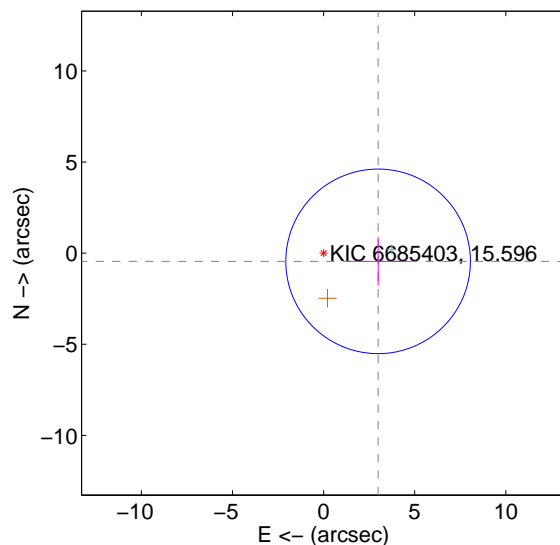
The direct PRF centroid is offset from the target star catalog position by about 0.40 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.906 \pm 1.604$	1.81	$-2.772 \pm 1.629$	$-0.872 \pm 1.316$
PRF-fit source offset from KIC position	$3.025 \pm 1.688$	1.79	$-2.992 \pm 1.695$	$-0.449 \pm 1.339$
photometric centroid source offset	$4.43 \pm 2.21$	2.00	$-4.39 \pm 2.22$	$0.54 \pm 1.65$

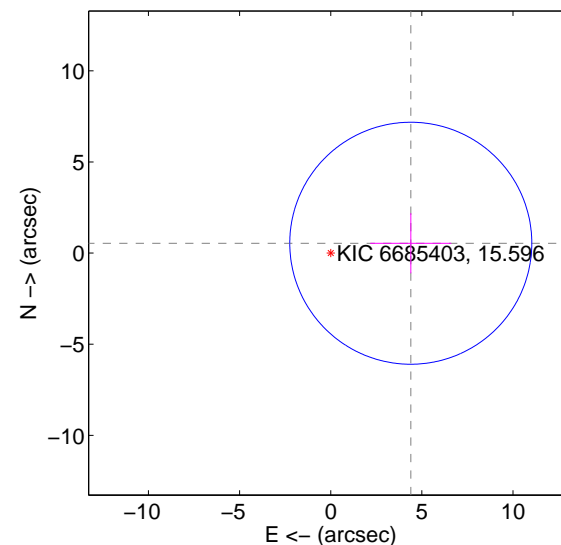
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids



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

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



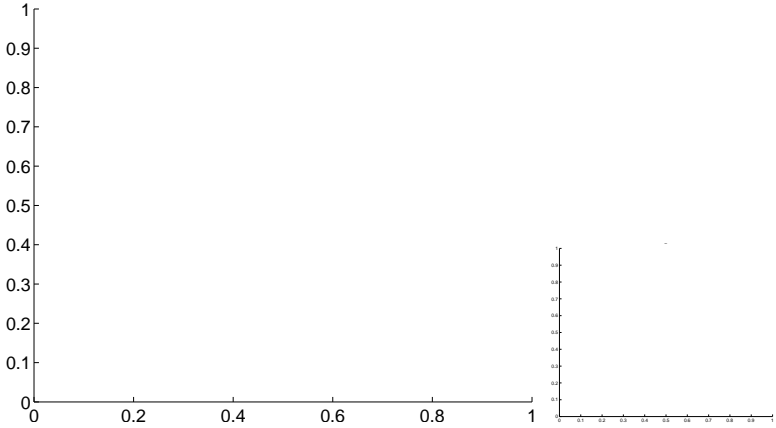


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

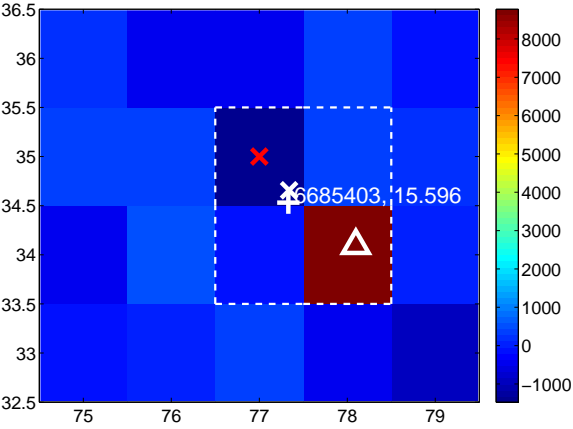
Q5 no difference image



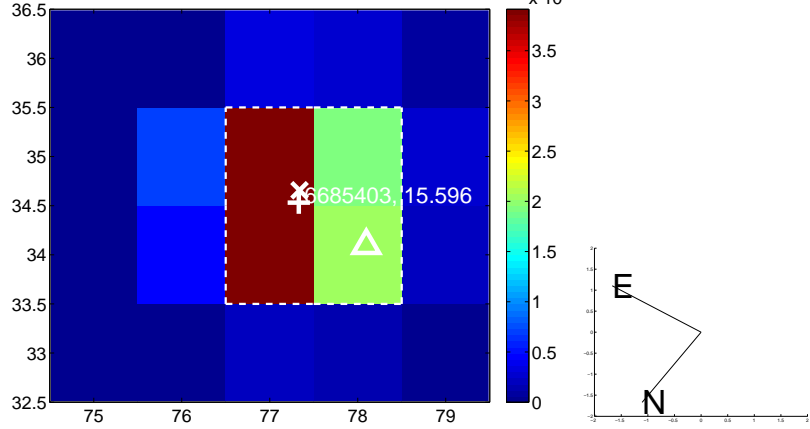
Q5 no OOT image



Q6 difference image



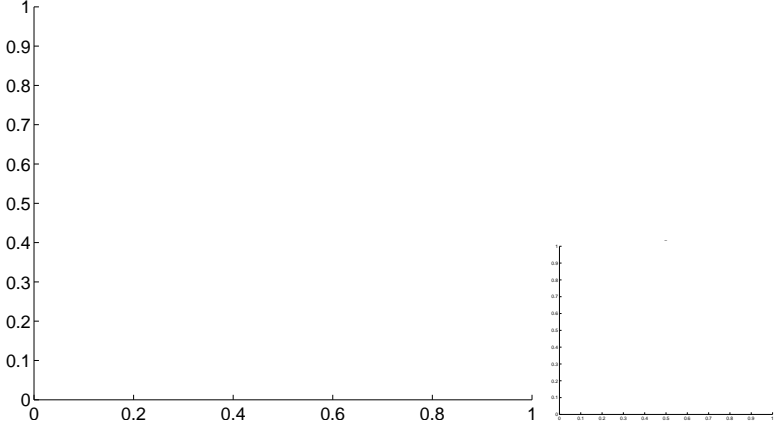
Q6 OOT image



Q7 no difference image



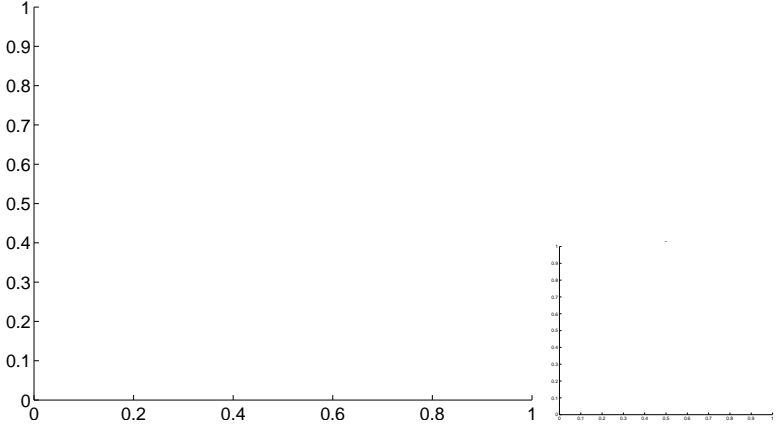
Q7 no OOT image



Q8 no difference image



Q8 no OOT image



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



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

Q13 no difference image



Q13 no OOT image



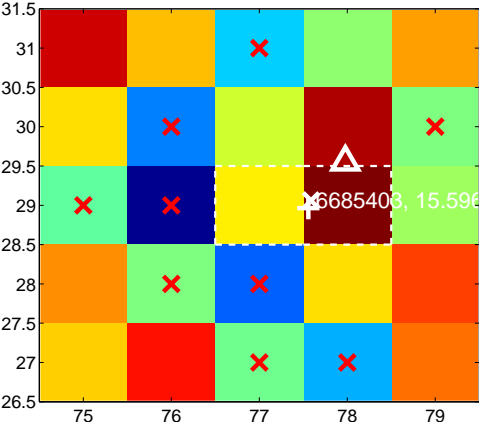
Q14 no difference image



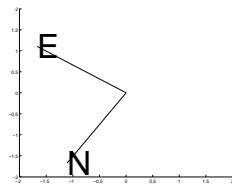
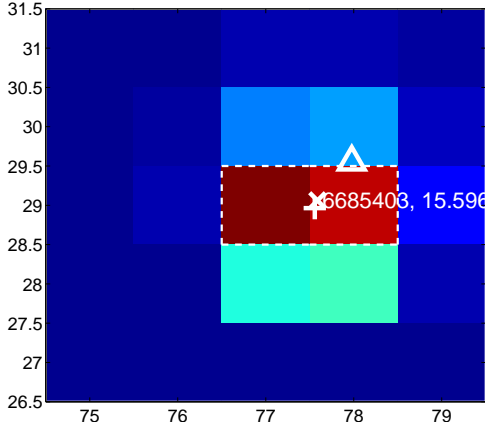
Q14 no OOT image



Q15 difference image. Poor Quality



Q15 OOT image



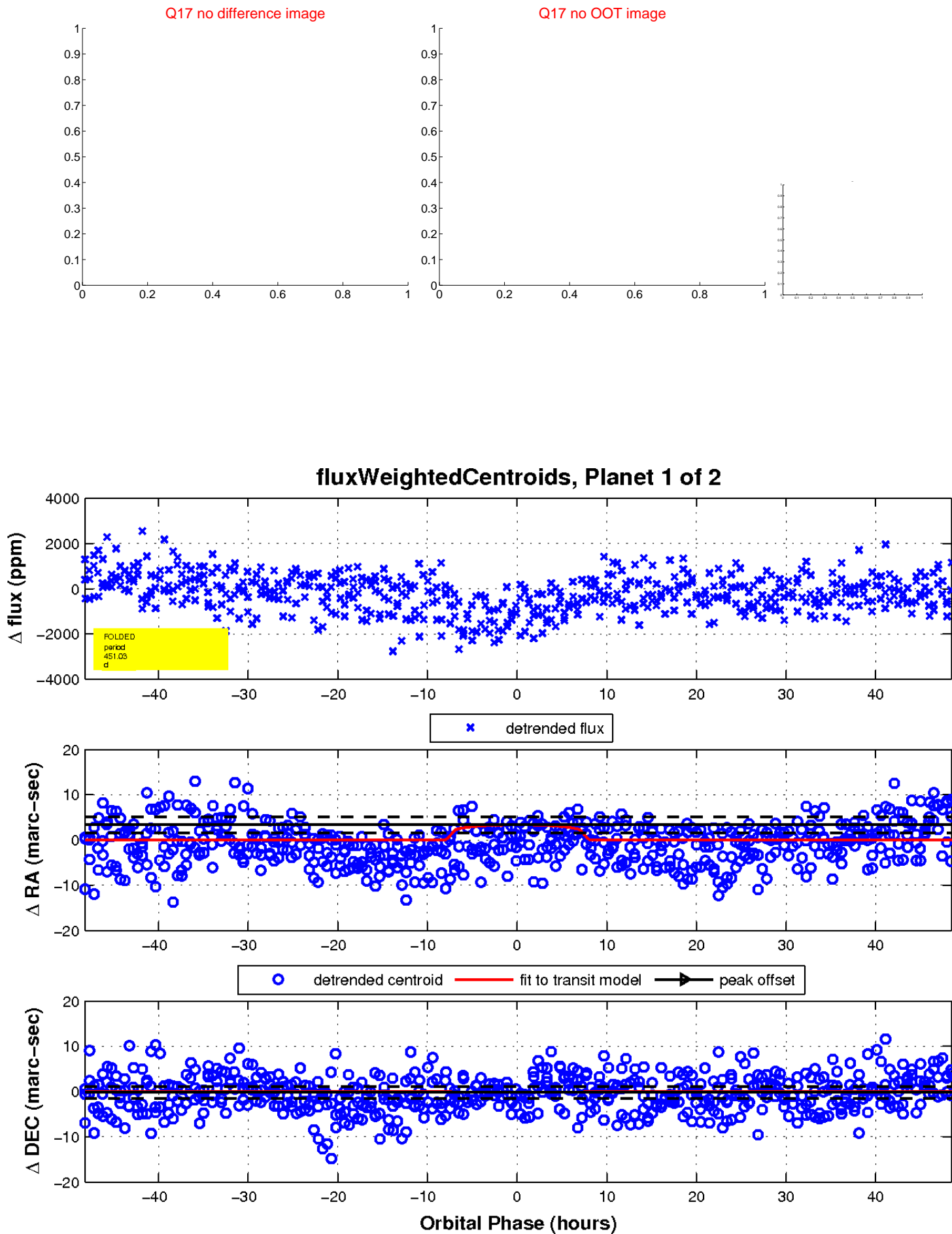
Q16 no difference image



Q16 no OOT image

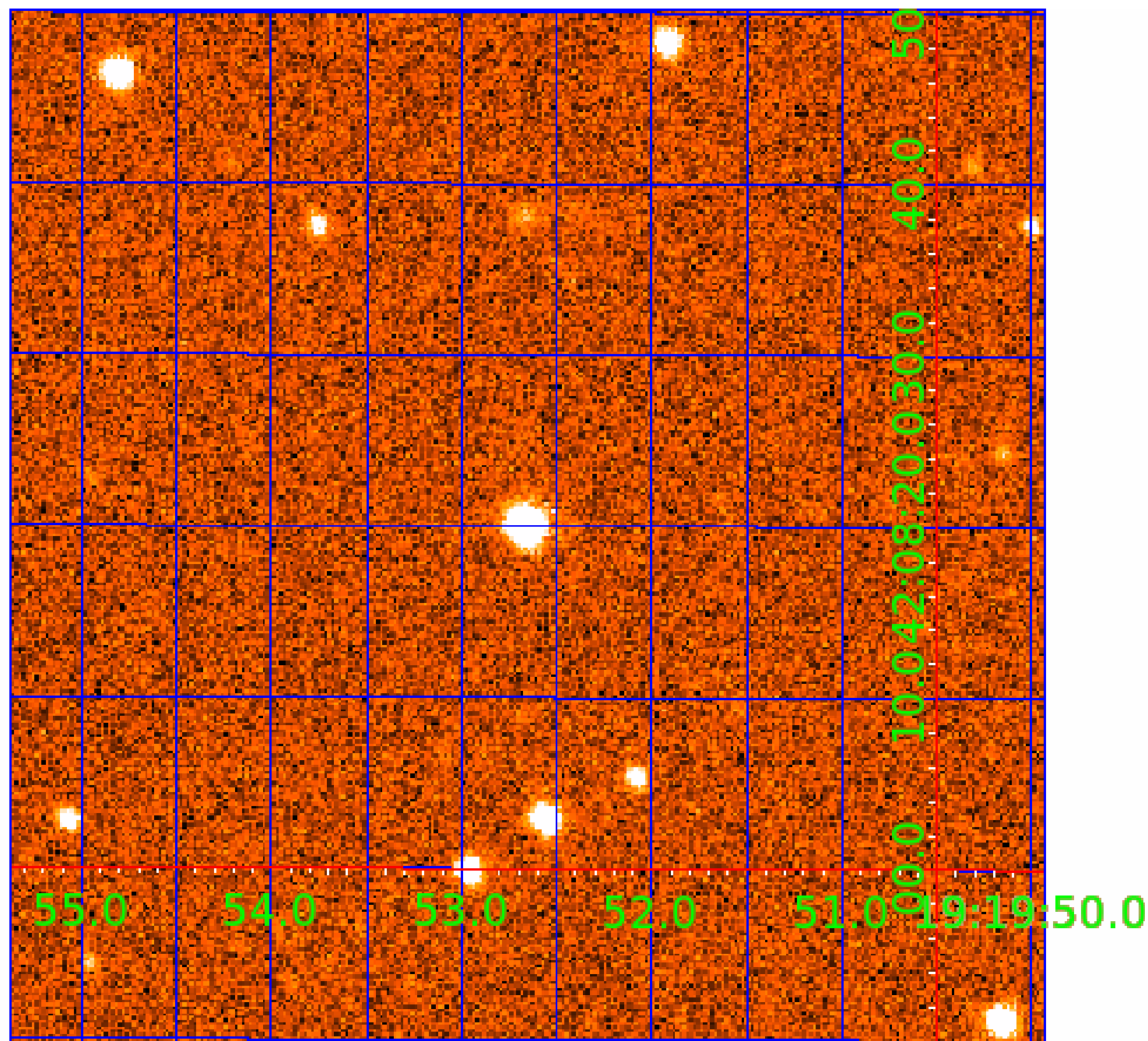


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination



# KIC 006685403

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006685403-01	OBS	No	451.028008	557.685959	780.8	16.189	8.8	8.0	0.88	5587	2.73	0.55
006685403-02	OBS	8126.01	429.619681	269.485014	977.0	19.320	7.8	8.3	0.88	5587	3.04	0.58

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006685403-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
006685403-02	OBS	FP	0.00	1	0	0	0	MOD_NONUNIQ_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

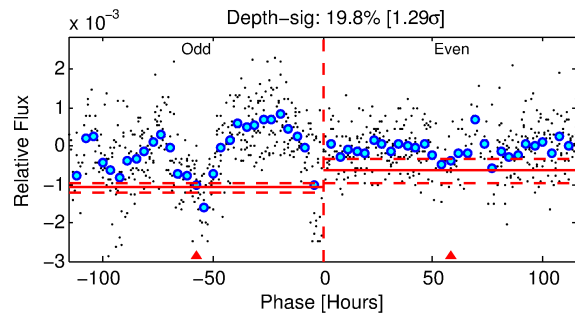
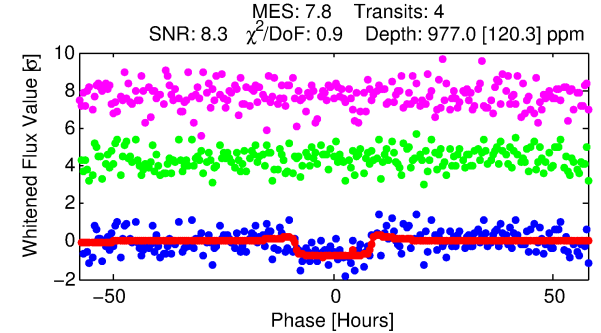
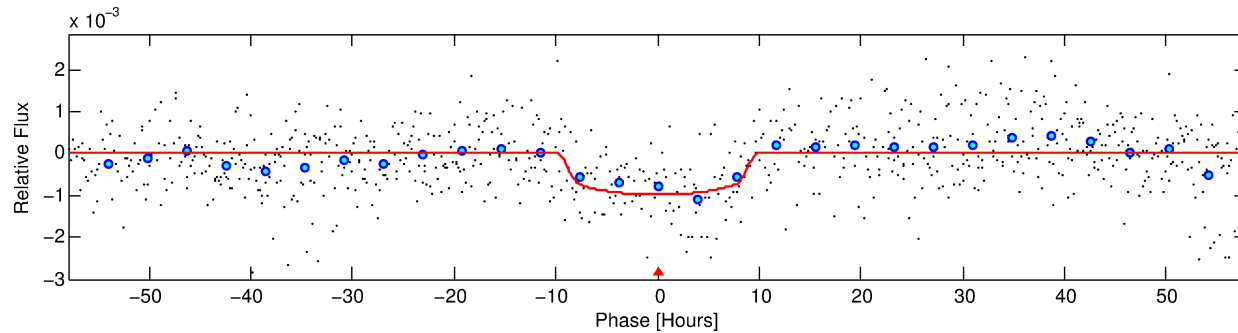
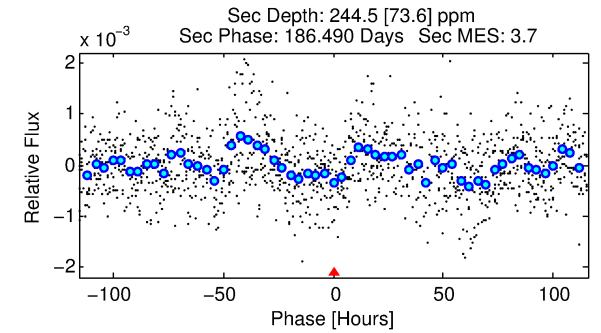
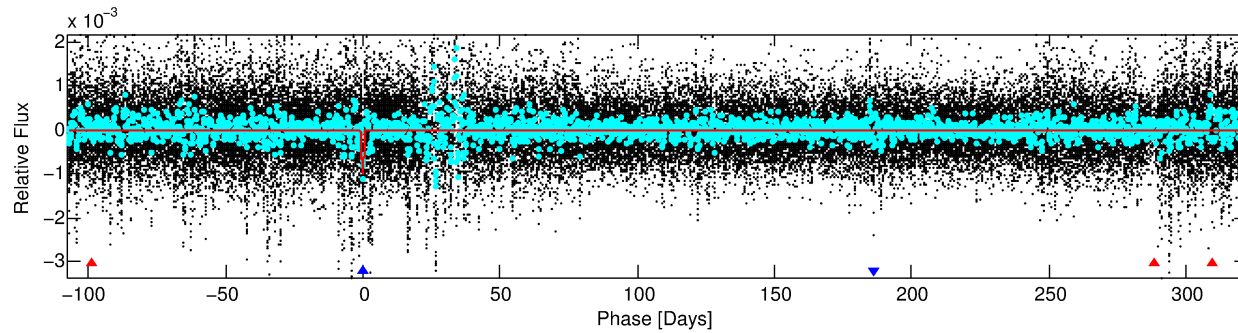
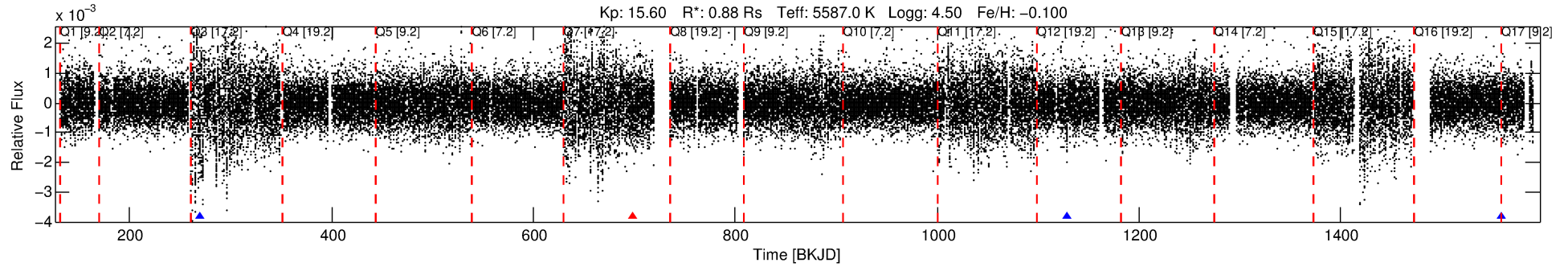
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006685403-02

No Significant Match Found

# DV One-Page Summary

KIC: 6685403 Candidate: 2 of 2 Period: 429.620 d



## DV Fit Results:

Period = 429.61968 [0.01600] d  
Epoch = 269.4850 [0.0269] BKJD  
Rp/R\* = 0.0317 [0.0047]  
a/R\* = 112.17 [61.78]  
b = 0.79 [0.26]  
Seff = 0.58 [0.20]  
Teq = 223 [19] K  
Rp = 3.04 [0.89] Re  
a = 1.0726 [0.2303] AU  
Ag = 16795.65 [8829.39] [1.90σ]  
Teffp = 3923 [429] K [8.61σ]

## DV Diagnostic Results:

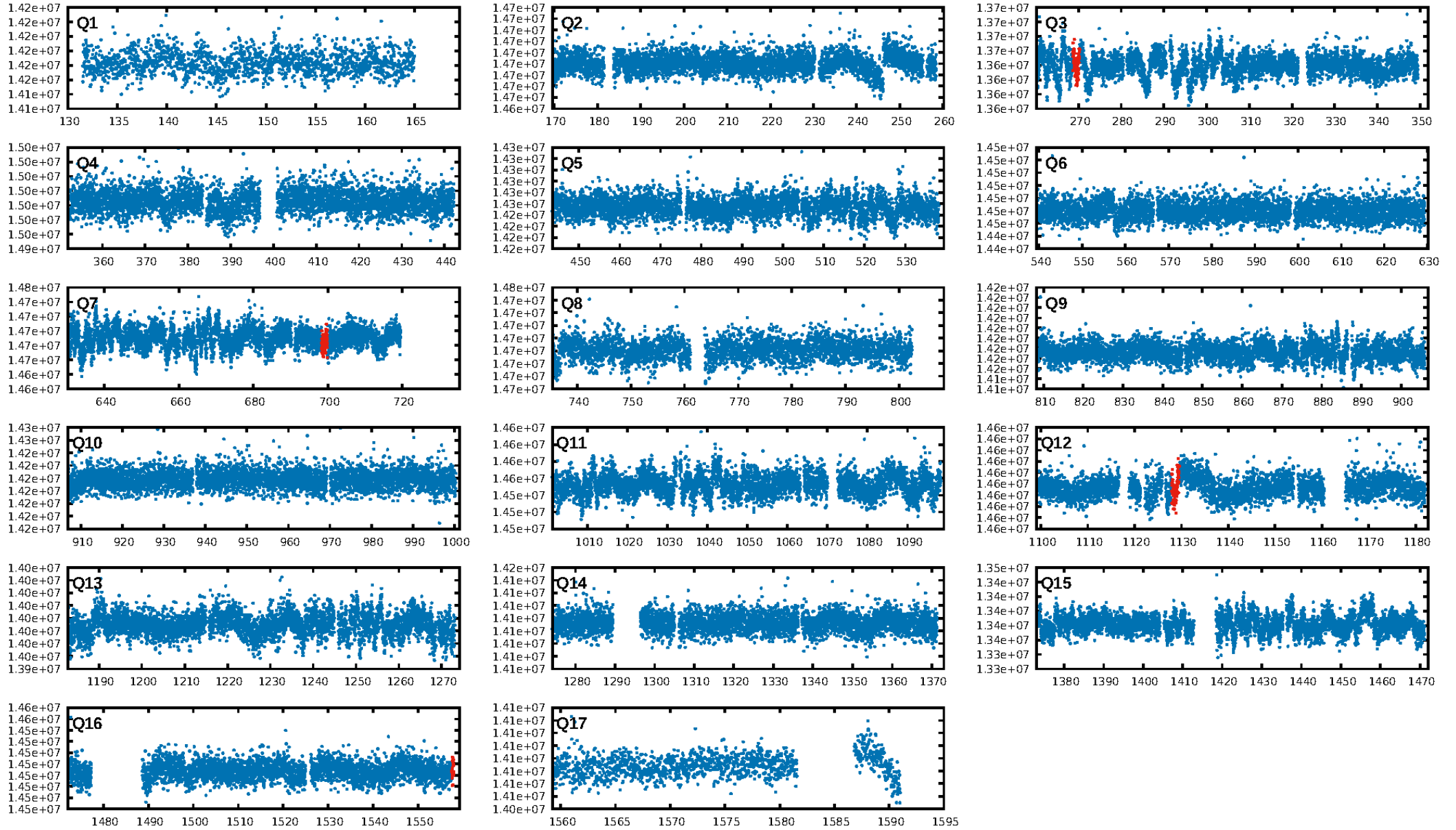
ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [20.38σ]  
ModelChiSquare2-sig: 64.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.34e-09  
RollingBand-fgt: 0.75 [3/4]  
GhostDiagnostic-chr: 7.177  
Centroid-sig: 19.1%  
Centroid-so: 2.280 arcsec [1.04σ]  
OotOffset-rm: N/A  
KicOffset-rm: N/A  
OotOffset-st: 0/0/0/0 [0]  
KicOffset-st: 0/0/0/0 [0]  
DiffImageQuality-fgm: N/A  
DiffImageOverlap-fno: 1.00 [2/2]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 19:52:03 Z

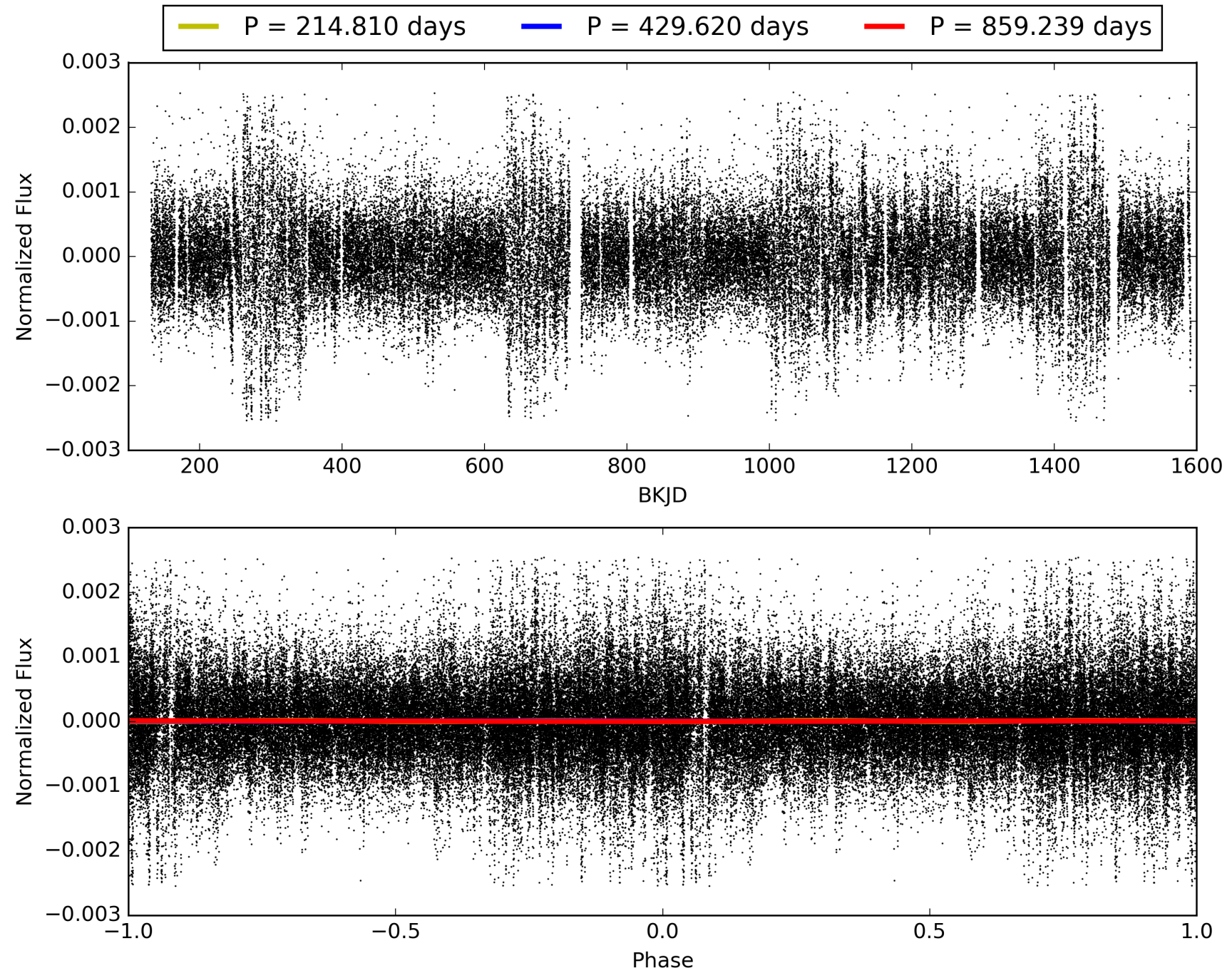
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 006685403-02, PDC Light Curves

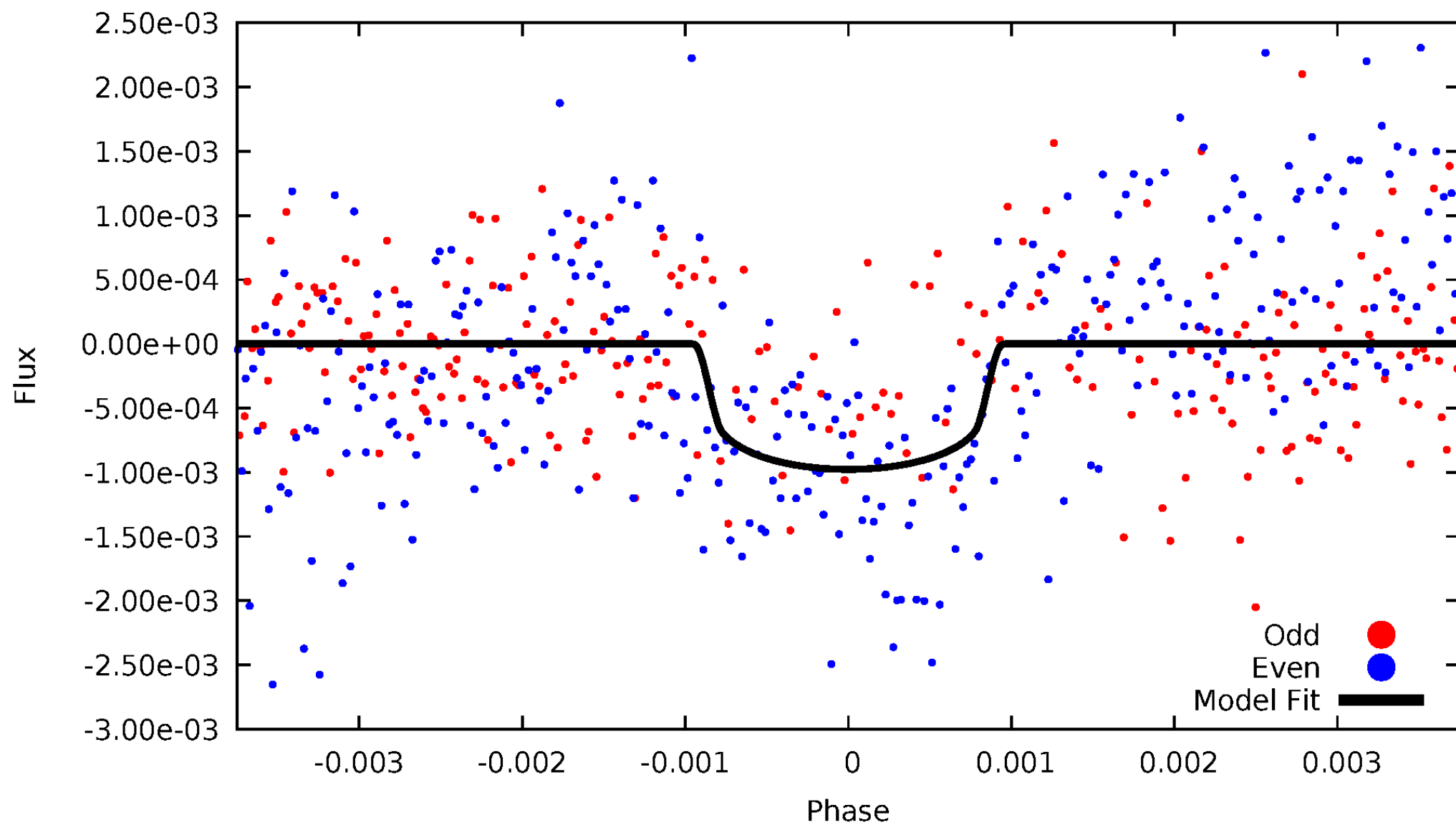


# TCE 006685403-02



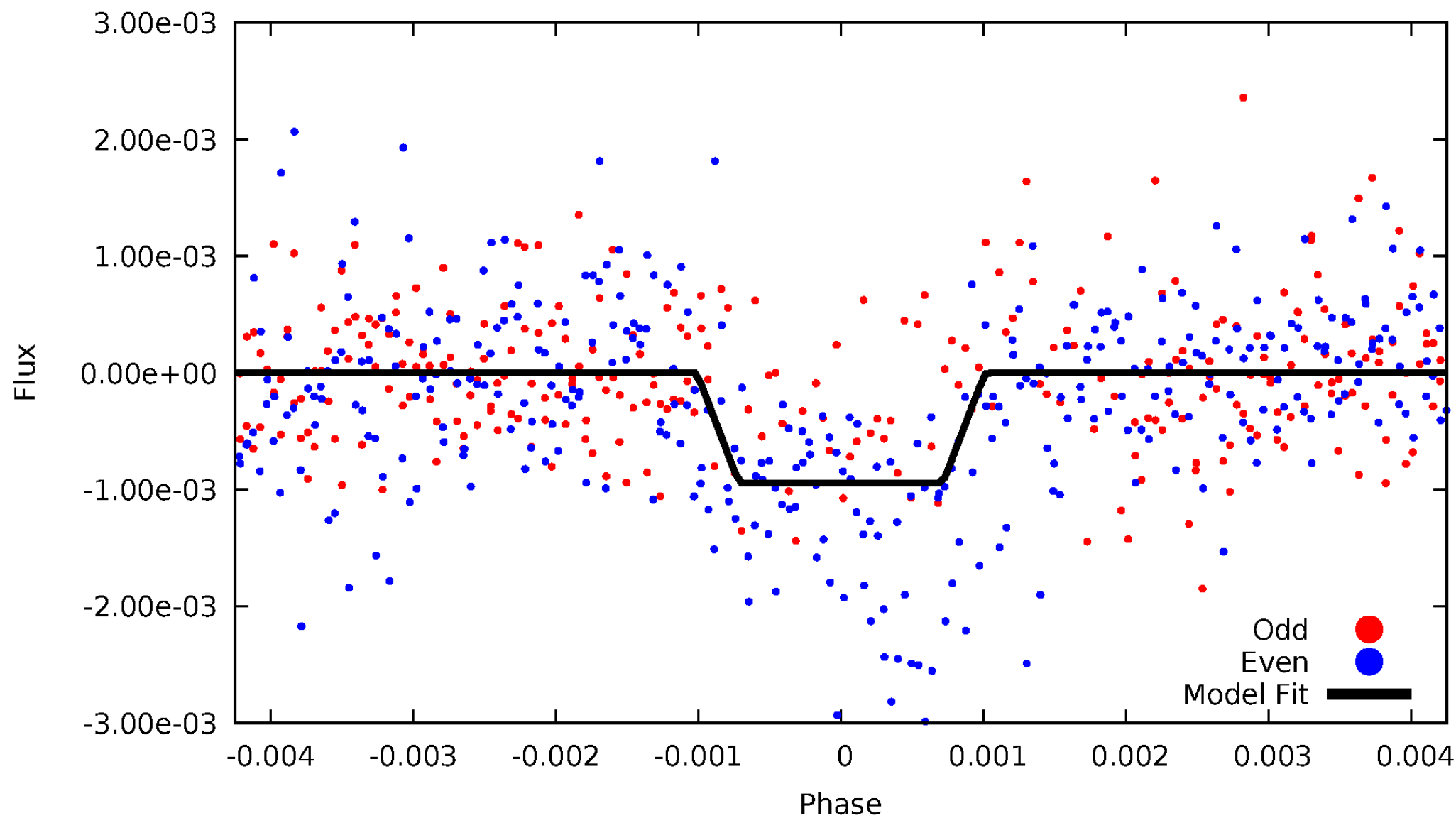
# DV Odd/Even

TCE 006685403-02



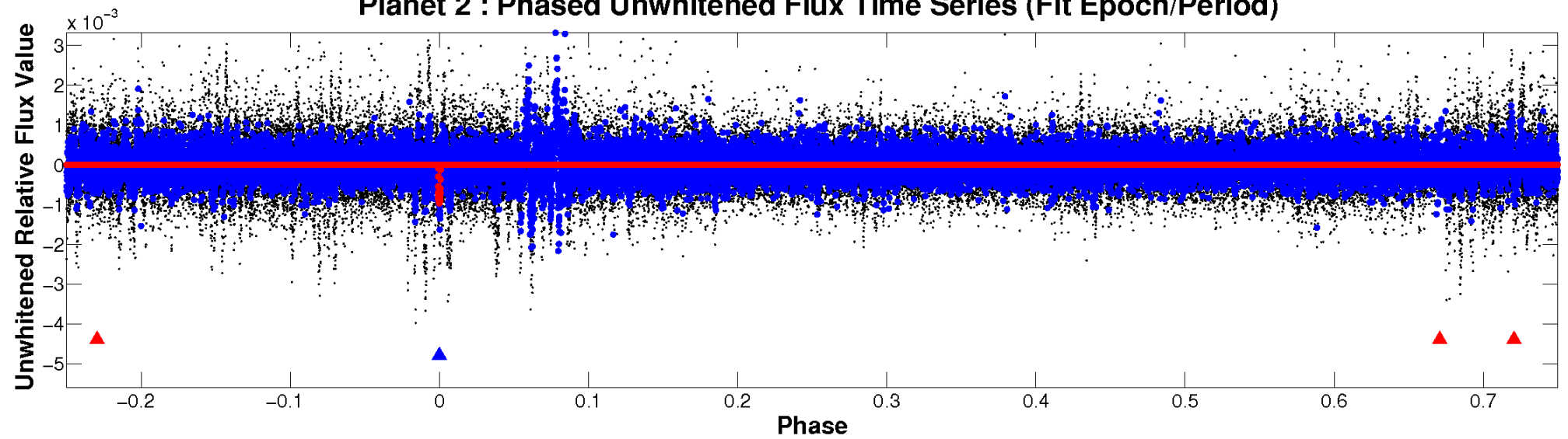
# ALT Odd/Even

TCE 006685403-02

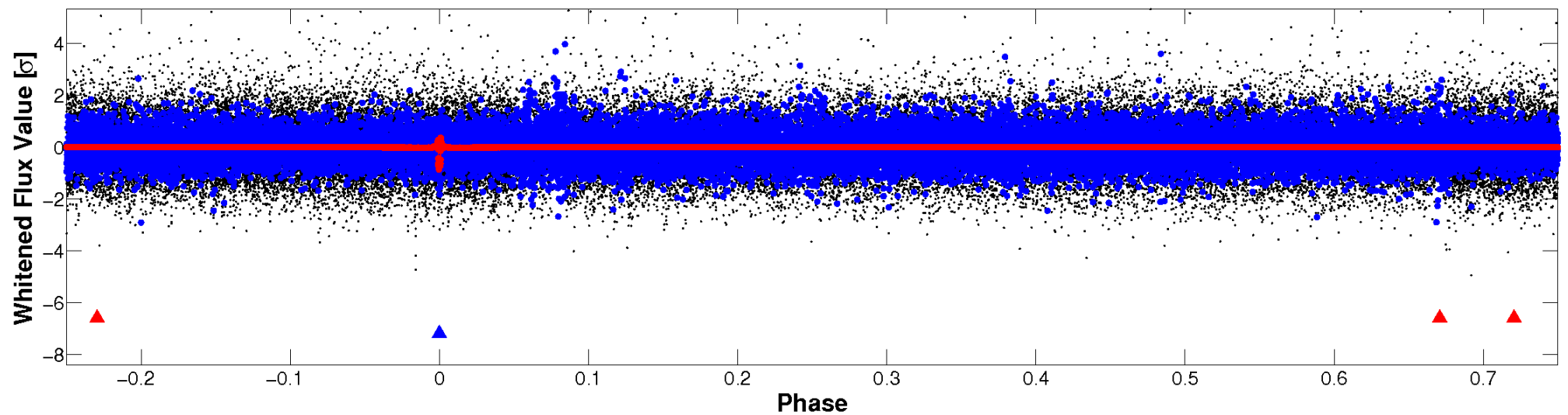


# Non-Whitened Vs. Whitened Light Curve

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



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



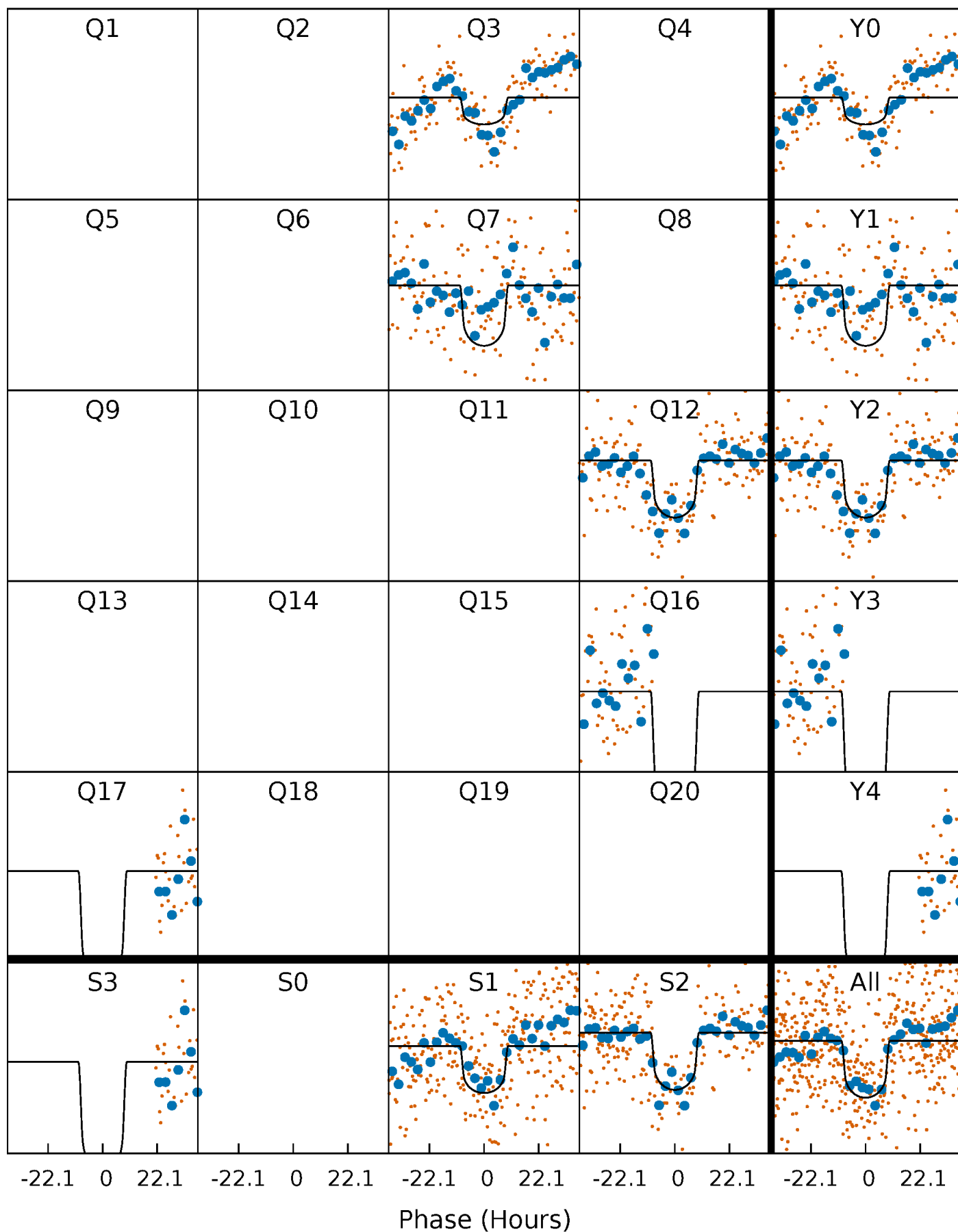
# PDC Quarter-Phased Transit Curves

TCE 006685403-02 P=429.619681 Days  $T_0=269.485014$  (BKJD)



# DV Quarter-Phased Transit Curves

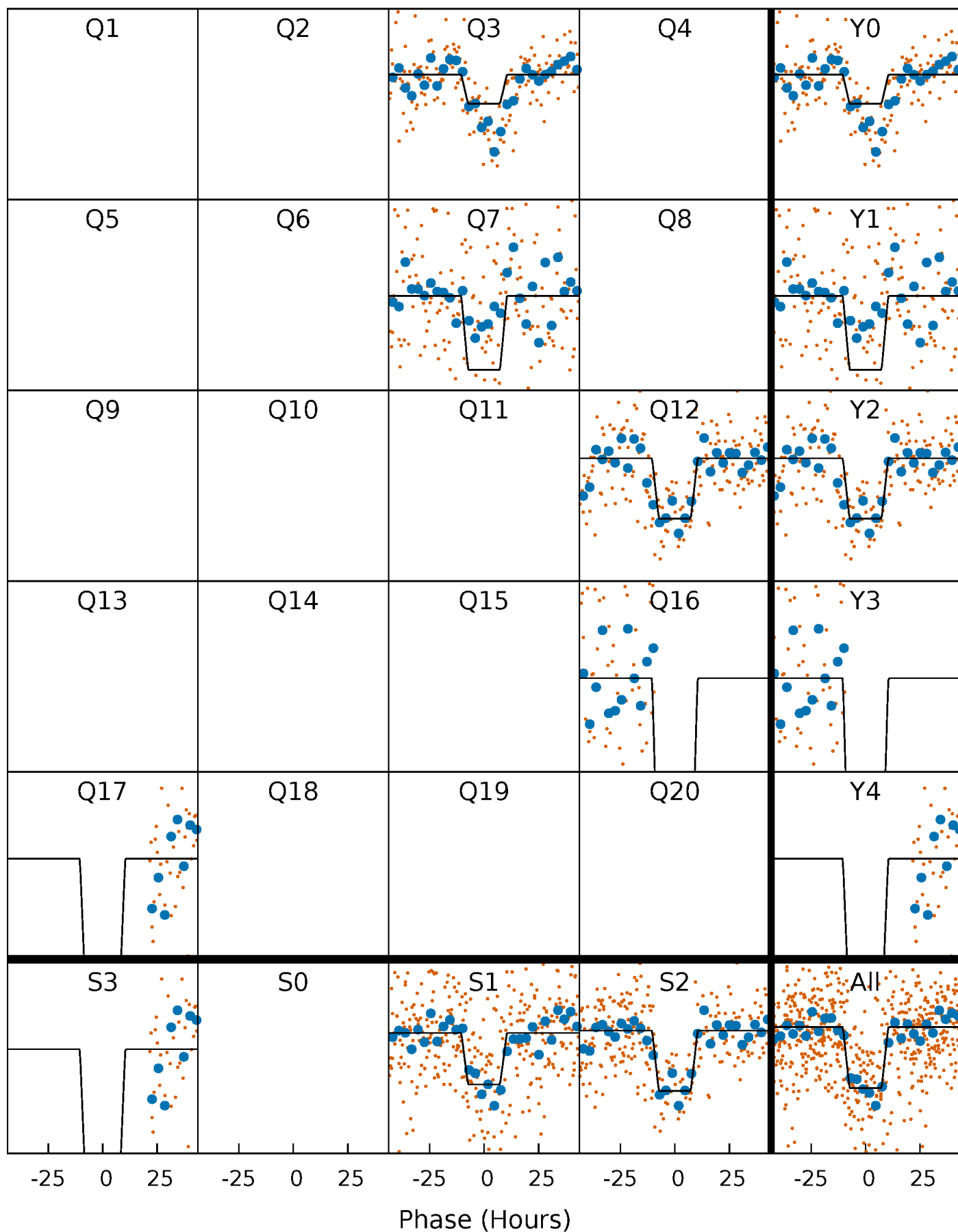
TCE 006685403-02     $P=429.619681$  Days     $T_0=269.485014$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

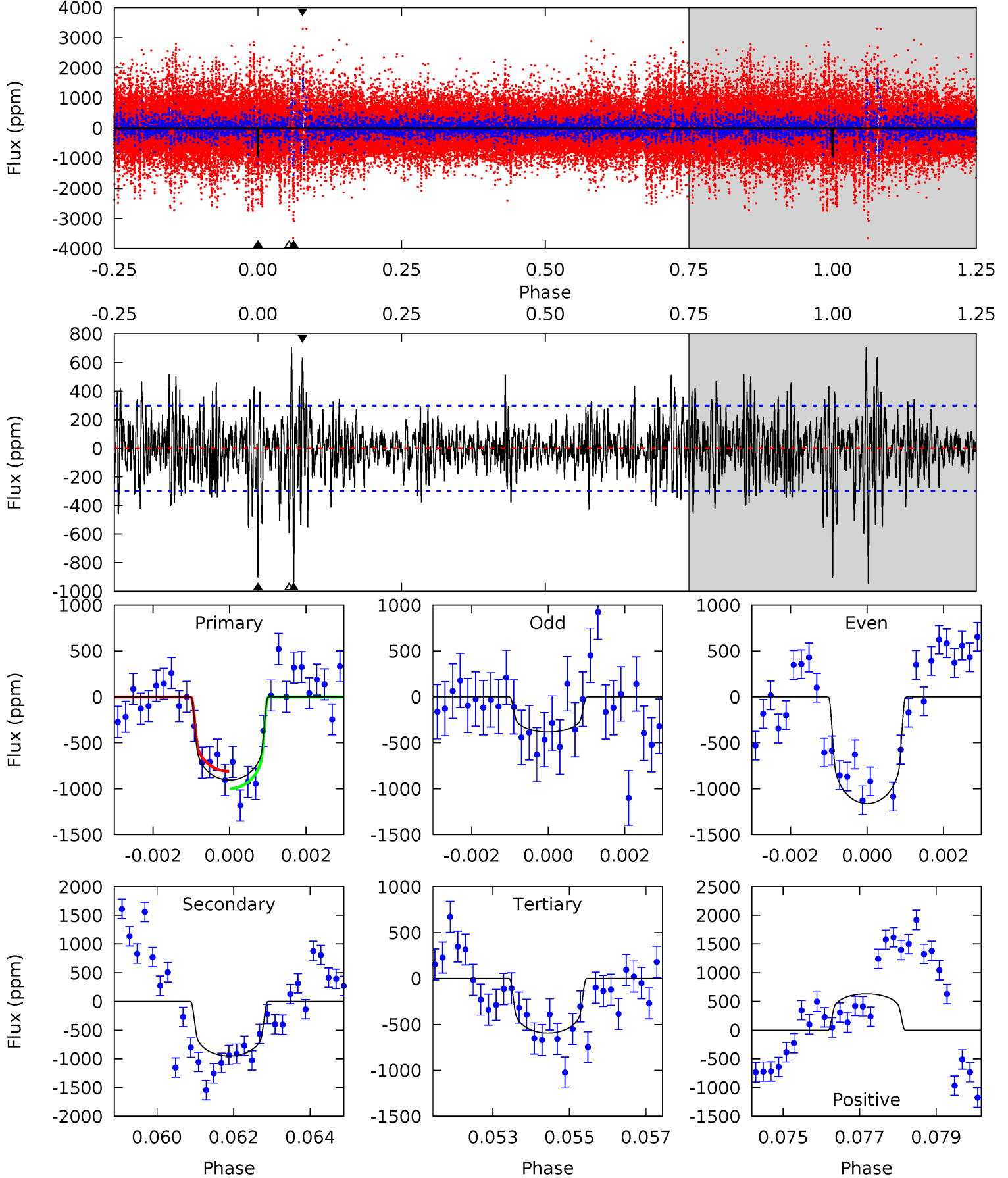
TCE 006685403-02     $P=429.636032$  Days     $T_0=269.451562$  (BKJD)



# DV Model-Shift Uniqueness Test

006685403-02, P = 429.619681 Days, E = 269.485014 Days

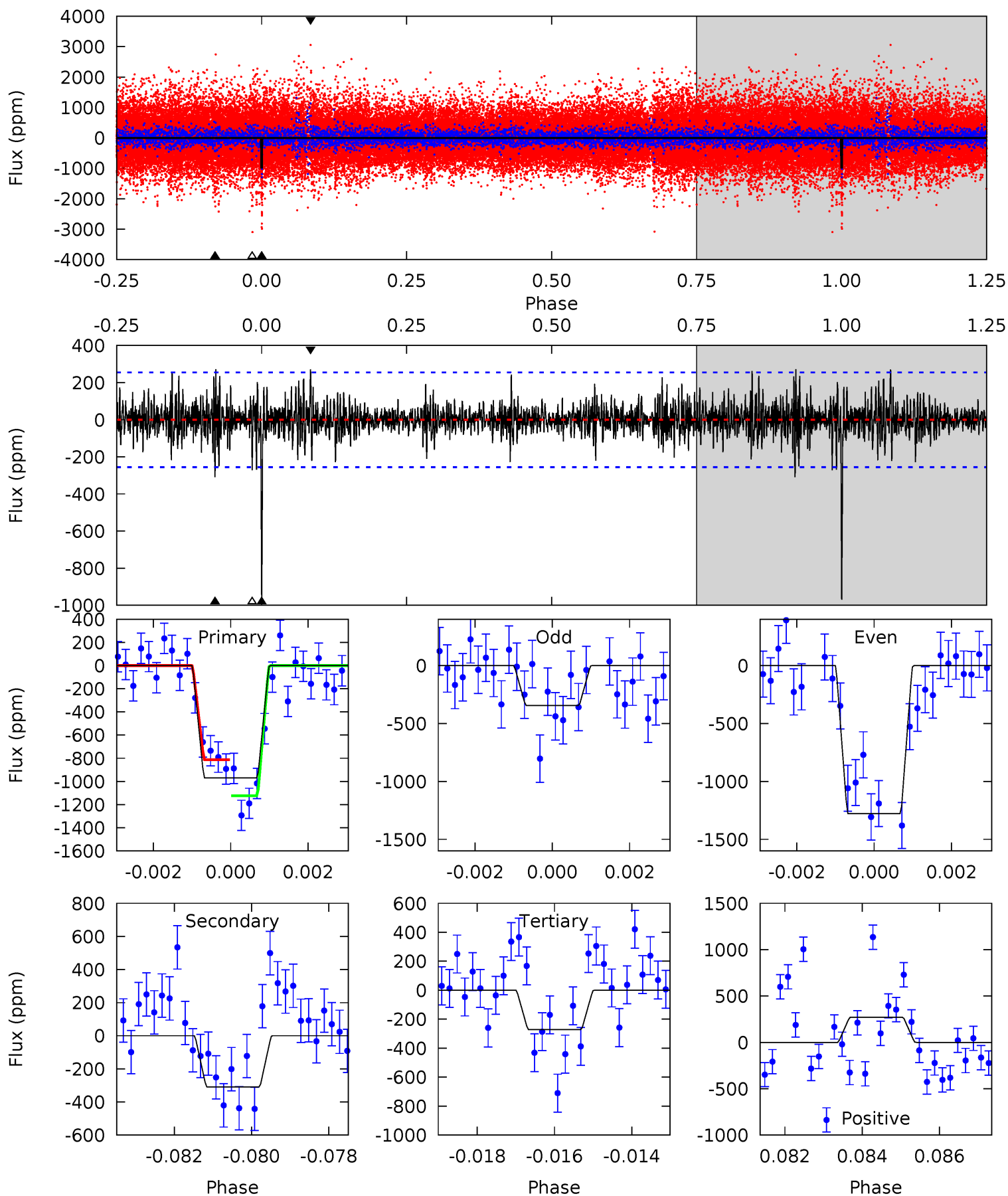
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.2	17.0	10.6	11.3	5.34	3.11	2.81	5.57	4.87	6.40	5.70	6.51	0.69	0.43	1.71



# Alt Model-Shift Uniqueness Test

006685403-02, P = 429.636032 Days, E = 269.451562 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
20.2	6.43	5.67	5.63	5.32	3.08	1.35	14.5	14.6	0.77	0.80	9.26	1.01	0.22	3.25



### Stellar Parameters For KIC 006685403

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5587^{+166}_{-166}$	$4.502^{+0.069}_{-0.173}$	$-0.100^{+0.300}_{-0.300}$	$0.877^{+0.222}_{-0.095}$	$0.891^{+0.102}_{-0.081}$	$1.862^{+0.547}_{-0.844}$
	+3%/-3%	+2%/-4%	+300%/-300%	+25%/-11%	+11%/-9%	+29%/-45%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 006685403-02 / KOI 8126.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-950 \pm 56$	$3.10^{+0.63}_{-0.54}$	$316^{+21}_{-15}$	$5547^{+462}_{-382}$	$60850^{+29387}_{-18132}$
Alt.	$-309 \pm 48$	$3.05^{+0.66}_{-0.49}$	$316^{+21}_{-15}$	$4423^{+328}_{-295}$	$20980^{+9117}_{-7031}$

$T_{max}$  = 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

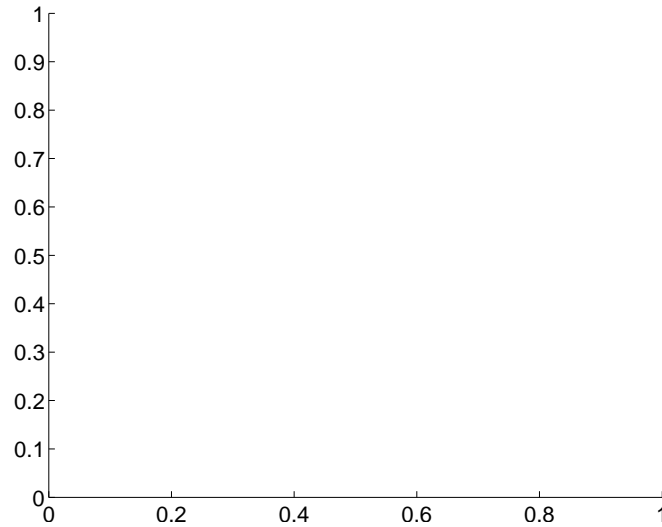
Supplemental centroid analysis for 006685403-02. Kepler magnitude: 15.60. Transit SNR 8.26

There are 0 quarters with good PRF difference image offsets

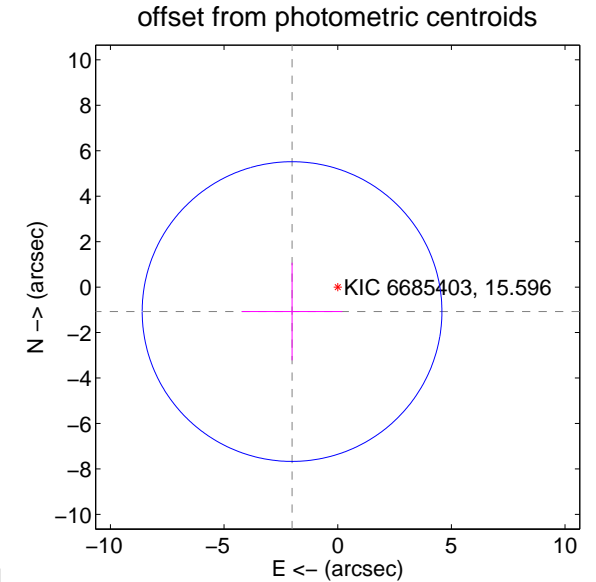
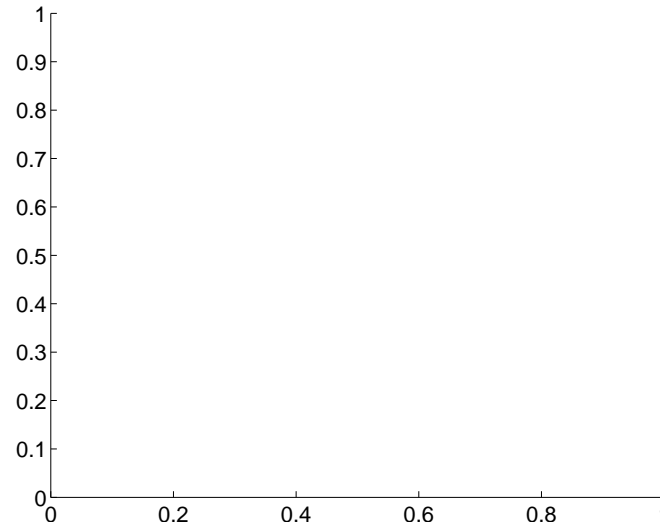
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	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	$2.28 \pm 2.20$	1.04	$2.01 \pm 2.21$	$-1.08 \pm 2.15$

There is no PRF-fit offset from OOT-fit



There is no PRF-fit offset from KIC



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

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

Q1 no difference image



Q1 no OOT image



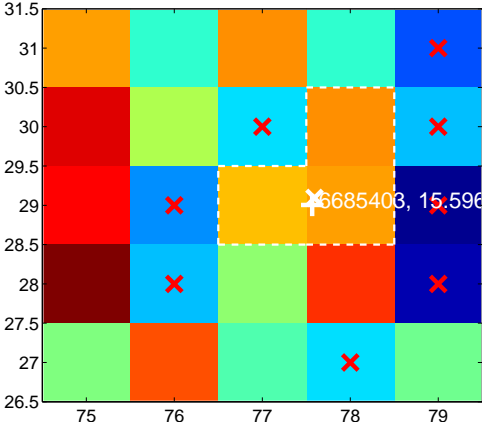
Q2 no difference image



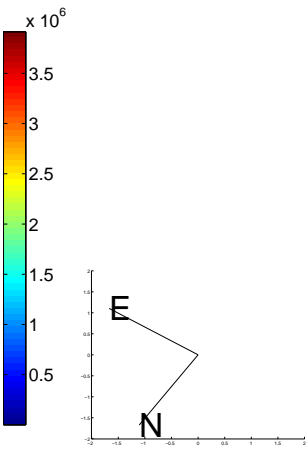
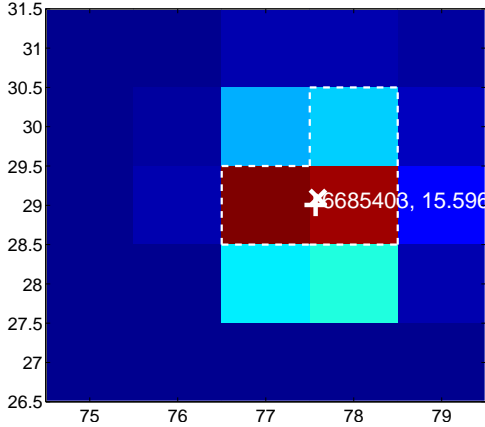
Q2 no OOT image



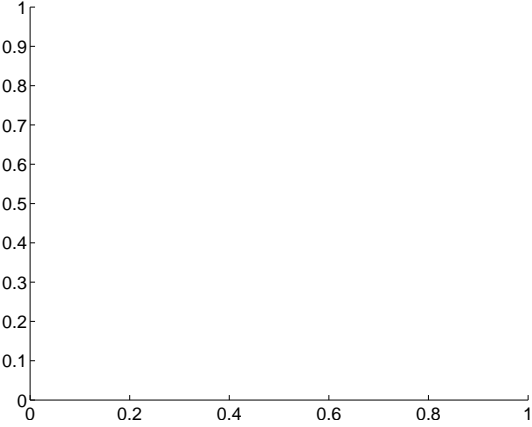
Q3 difference image. Poor Quality



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.

Q5 no difference image



Q5 no OOT image



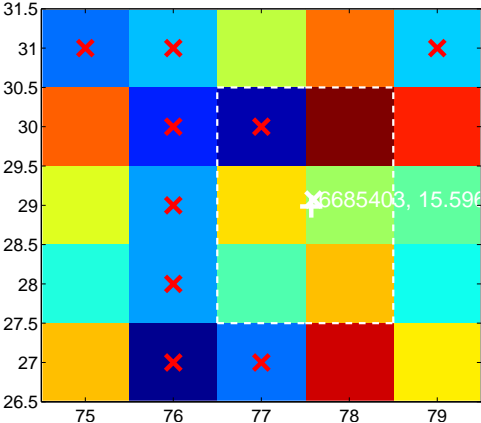
Q6 no difference image



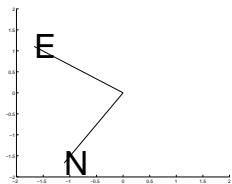
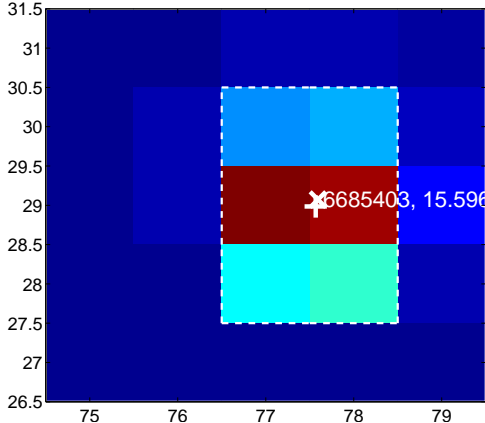
Q6 no OOT image



Q7 difference image. Poor Quality



Q7 OOT image



Q8 no difference image

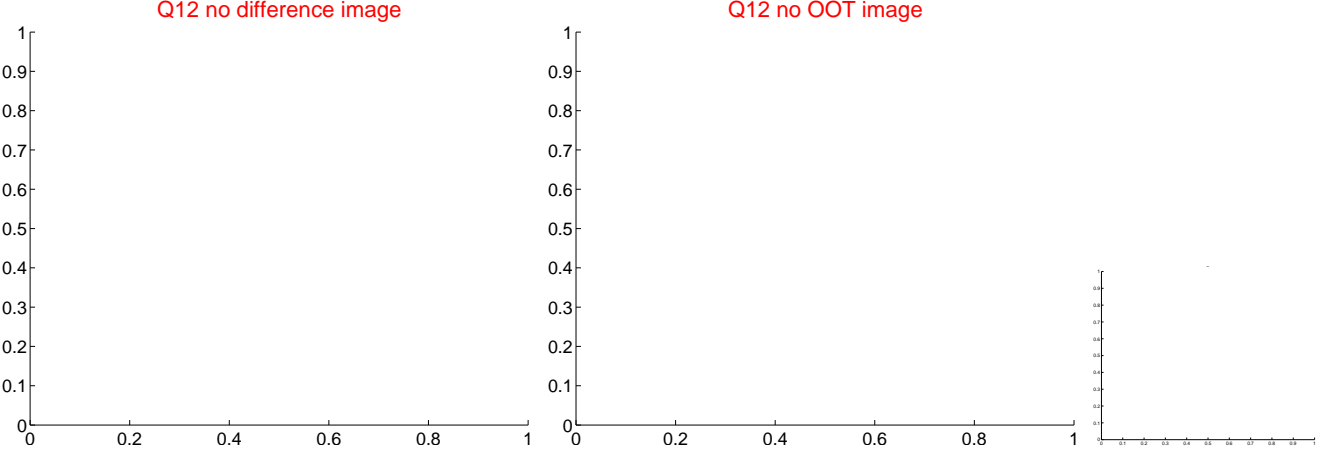
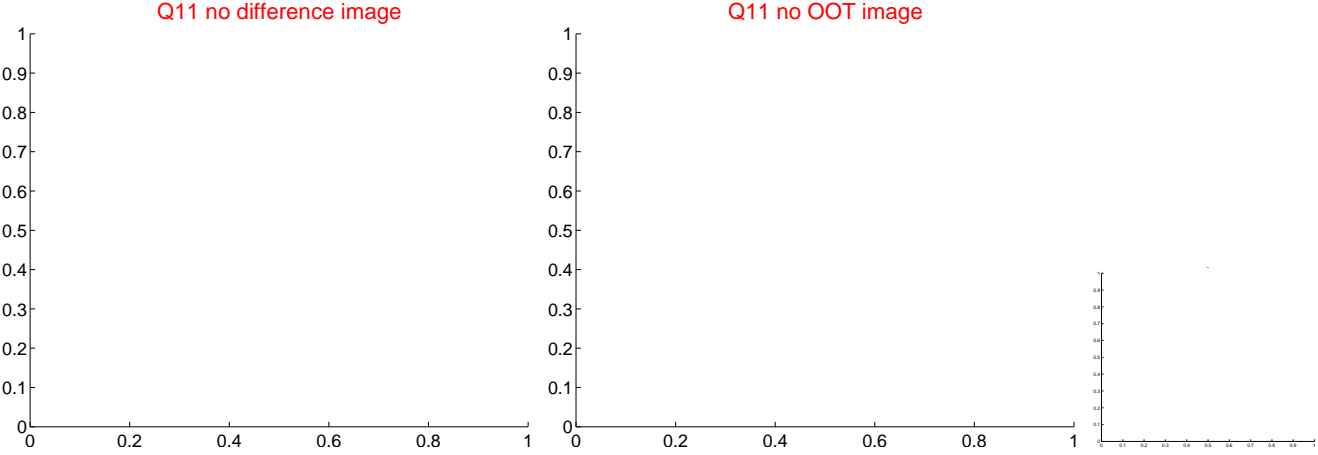
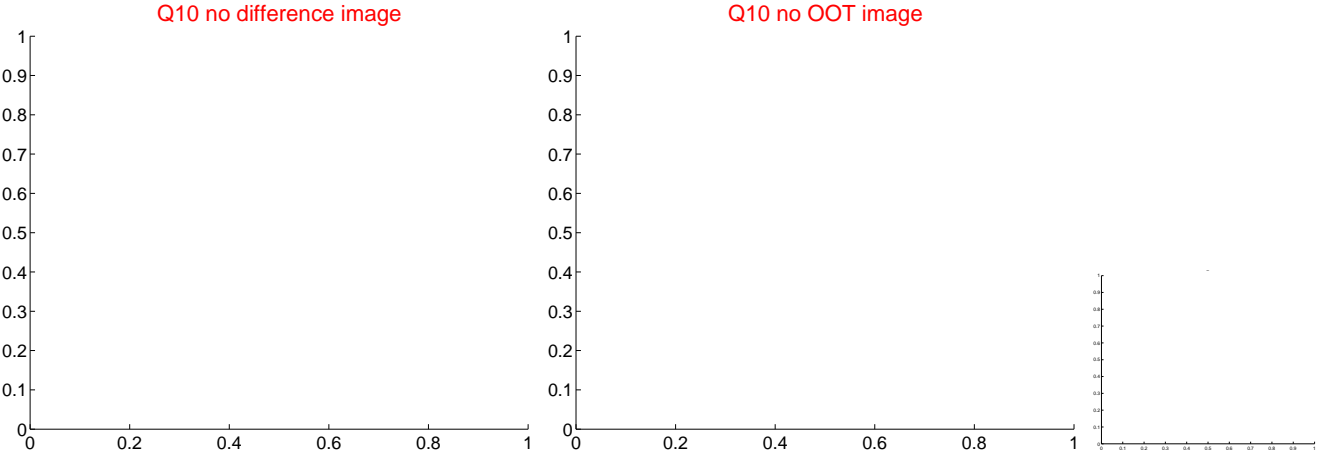


Q8 no OOT image





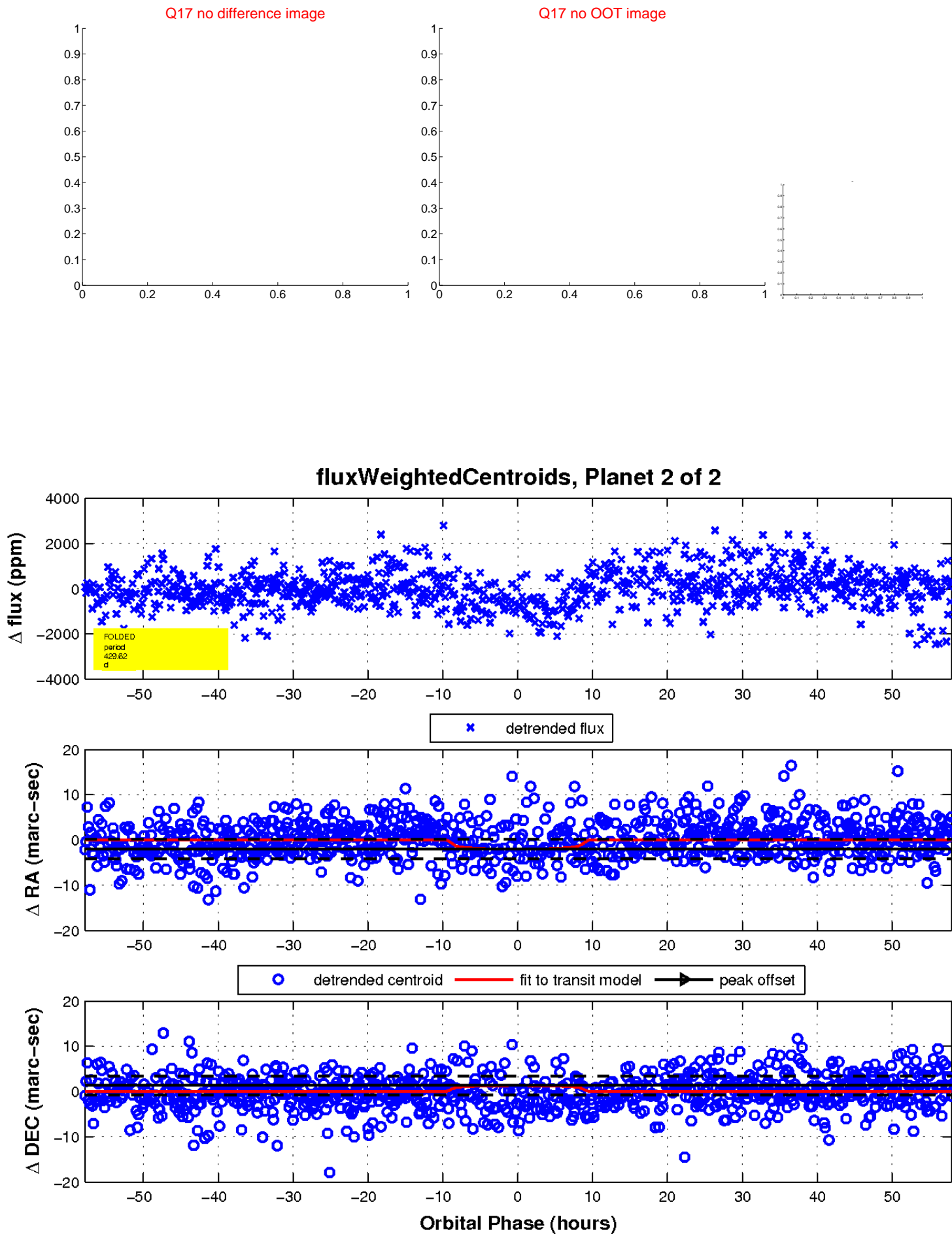
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

