

# KIC 004845665

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004845665-01	OBS	No	512.559967	510.445597	165.2	4.632	7.6	4.7	2.20	6343	3.23	3.83
004845665-02	OBS	No	27.288096	145.837029	70.0	62.980	7.3	12.0	2.20	6343	2.56	191.25

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004845665-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004845665-02	OBS	FP	0.00	1	0	0	0	LPP_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.

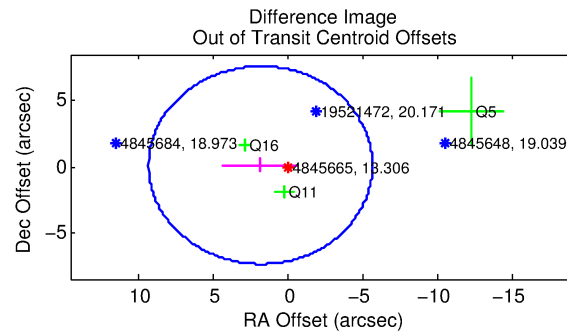
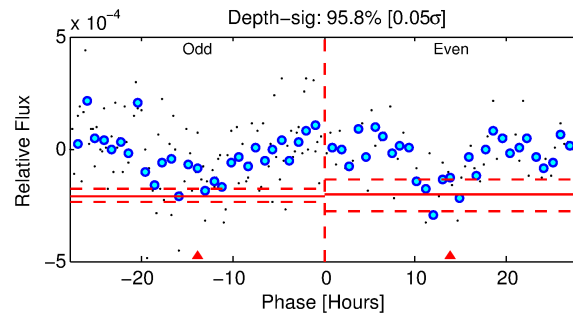
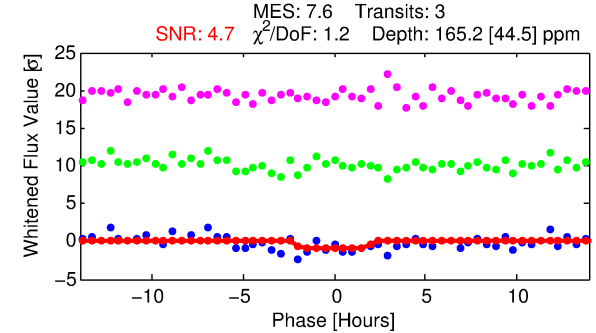
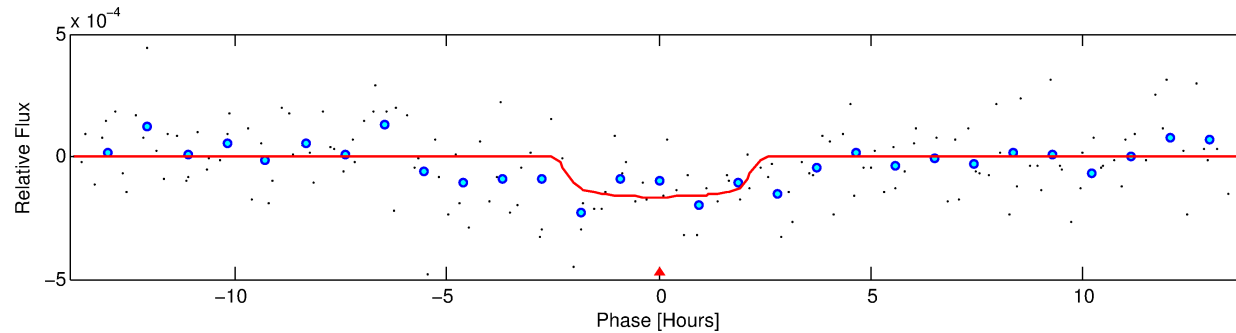
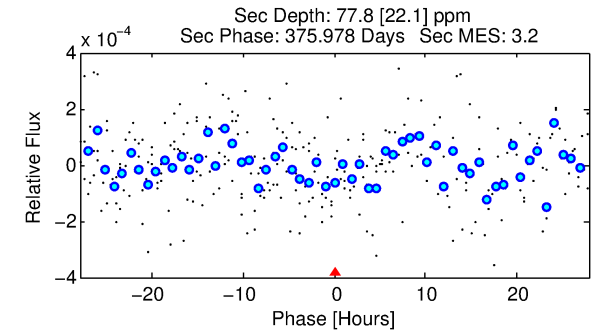
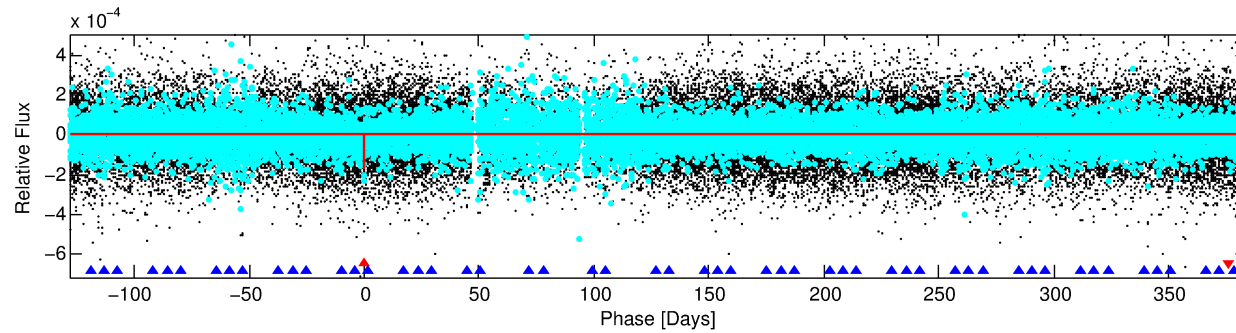
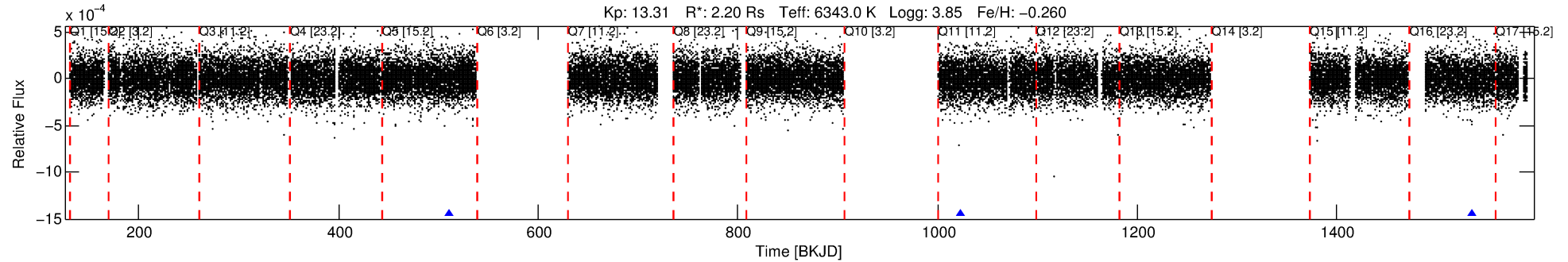
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004845665-01

No Significant Match Found

# DV One-Page Summary

KIC: 4845665 Candidate: 1 of 2 Period: 512.560 d



## DV Fit Results:

Period = 512.55997 [0.01478] d  
Epoch = 510.4456 [0.0176] BKJD  
Rp/R\* = 0.0134 [0.0232]  
a/R\* = 446.61 [4264.36]  
b = 0.86 [2.82]  
Seff = 3.83 [2.03]  
Teff = 357 [47] K  
Rp = 3.23 [5.68] Re  
a = 1.3531 [0.4475] AU  
Ag = 7535.59 [26365.55] [0.29 $\sigma$ ]  
Teffp = 5139 [4447] K [1.08 $\sigma$ ]

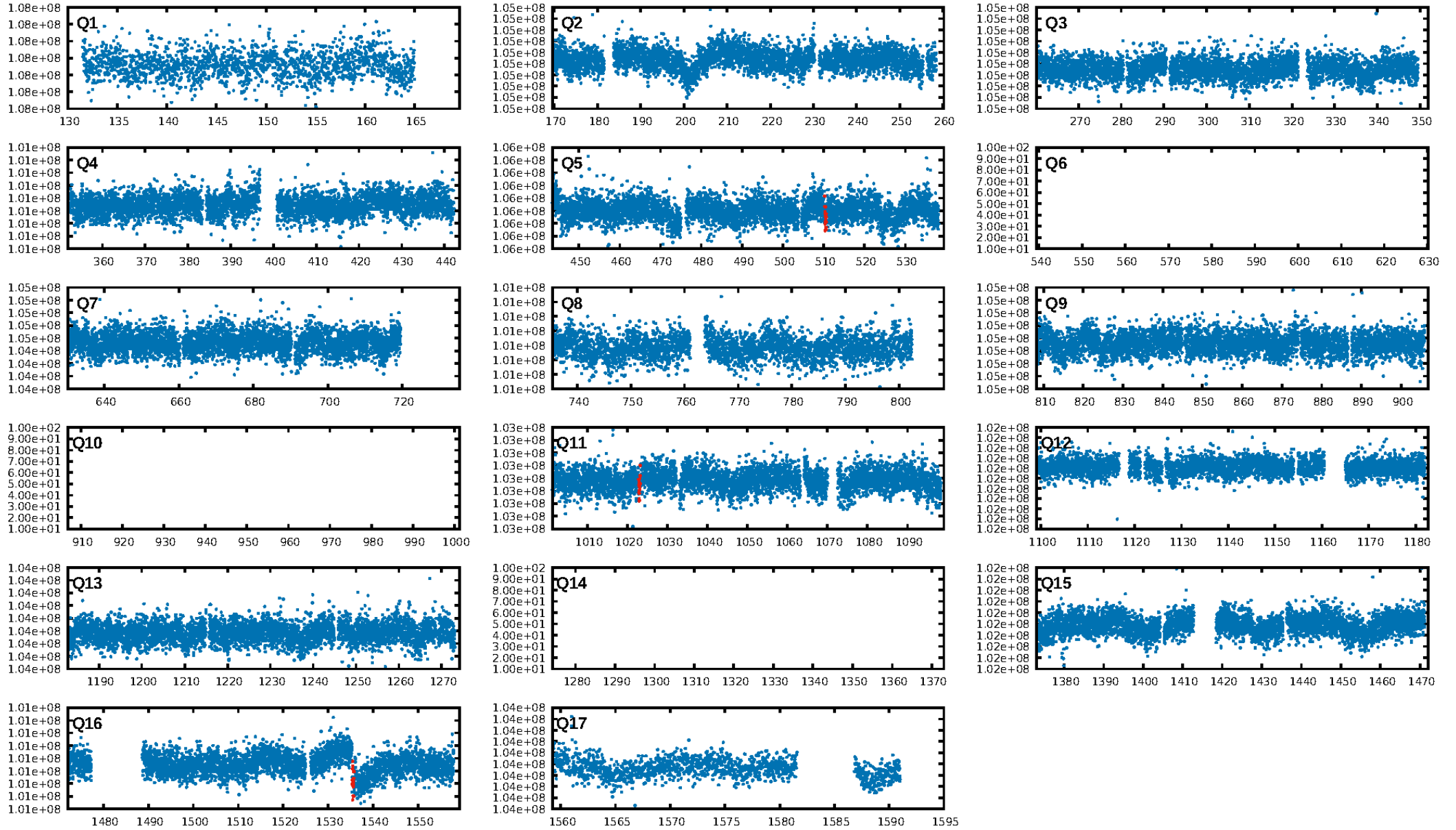
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [184.43 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 34.5%  
ModelChiSquareGof-sig: 98.9%  
**Bootstrap-pfa: 9.14e-11**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.781  
**Centroid-sig: 0.2%**  
Centroid-so: 6.192 arcsec [2.12 $\sigma$ ]  
OotOffset-rm: 1.785 arcsec [0.72 $\sigma$ ]  
KicOffset-rm: 1.966 arcsec [0.54 $\sigma$ ]  
OotOffset-st: 0/1/1/1 [3]  
KicOffset-st: 0/1/1/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

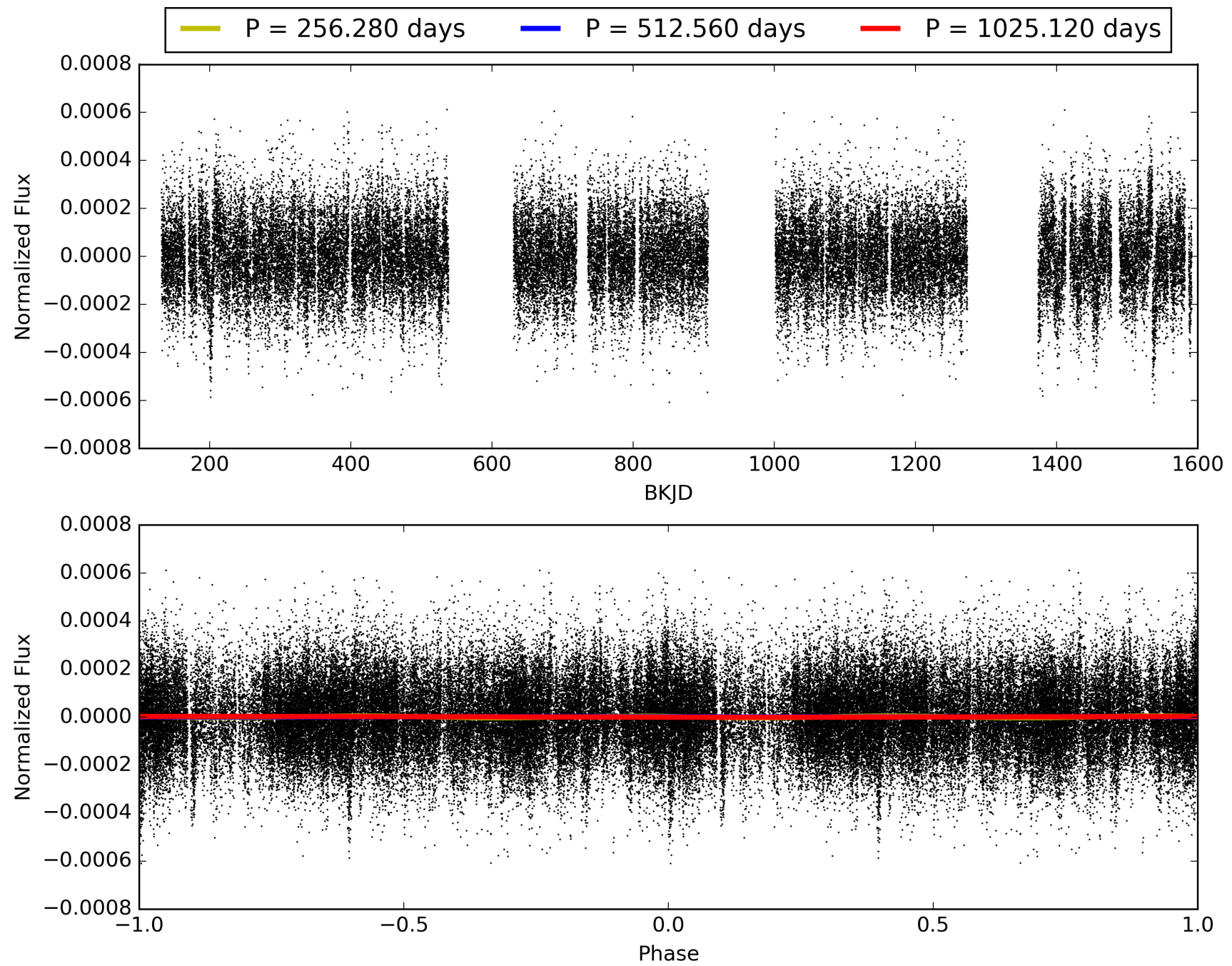
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:10:45 Z

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

# TCE 004845665-01, PDC Light Curves

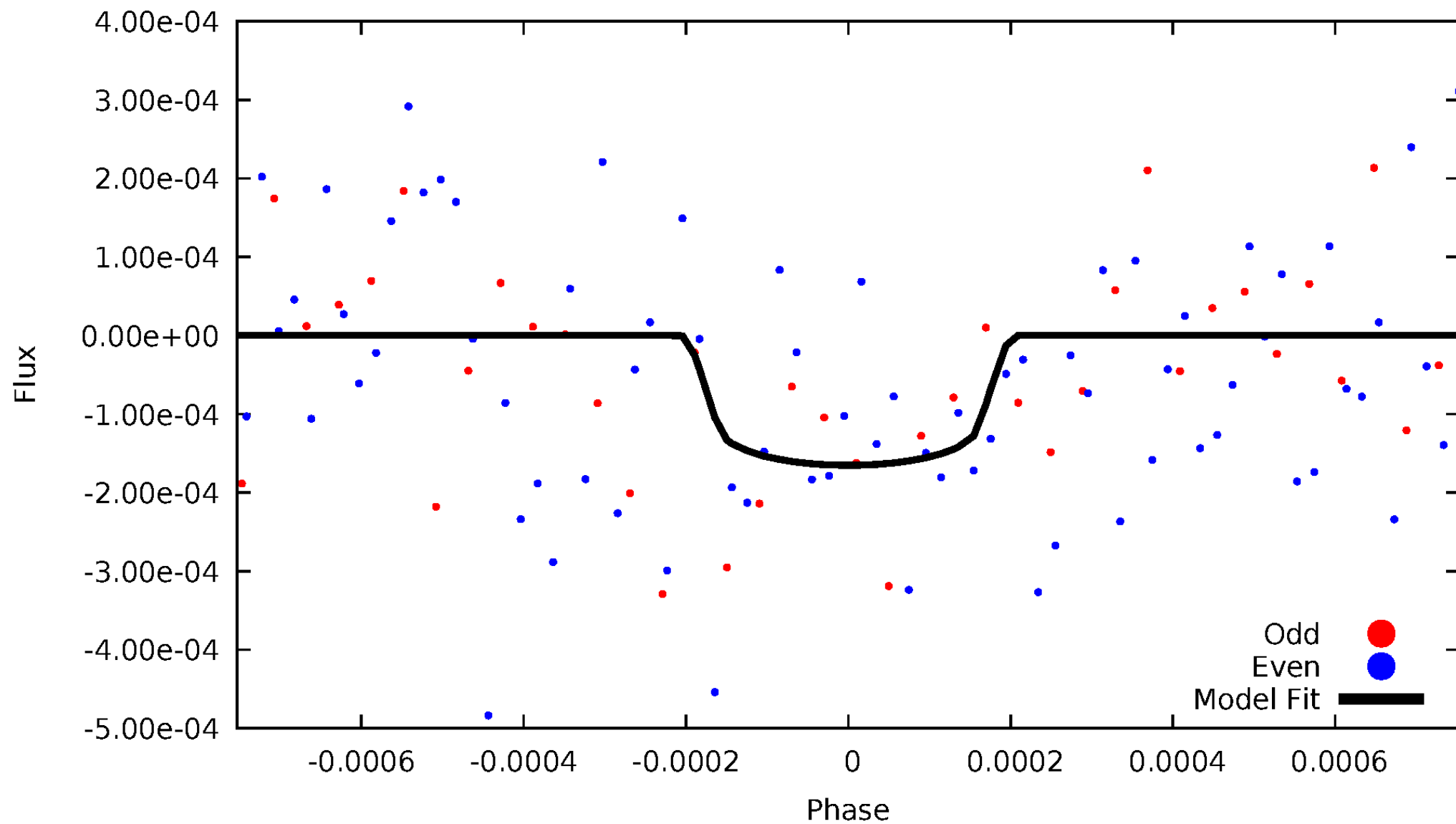


TCE 004845665-01



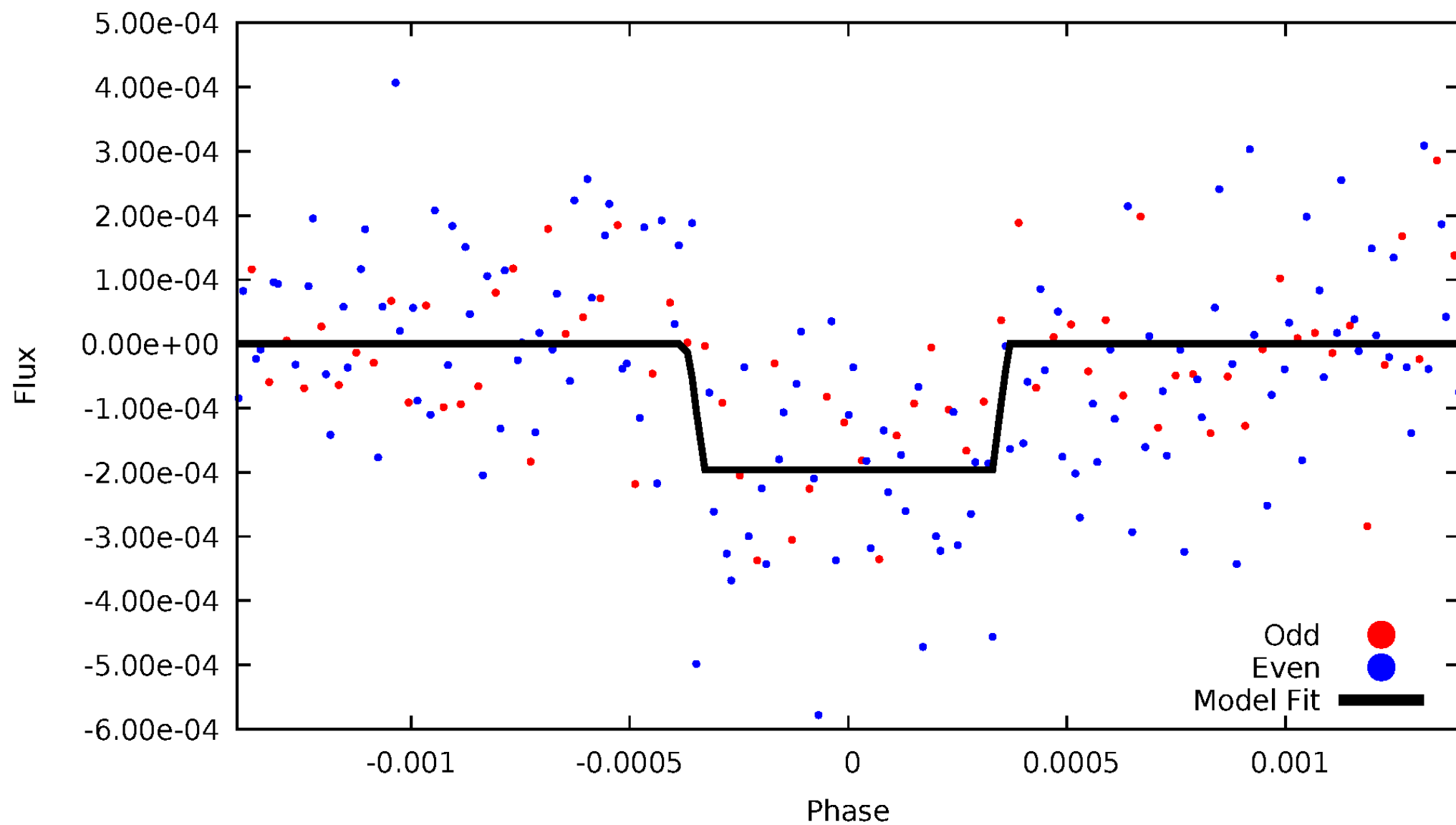
# DV Odd/Even

TCE 004845665-01



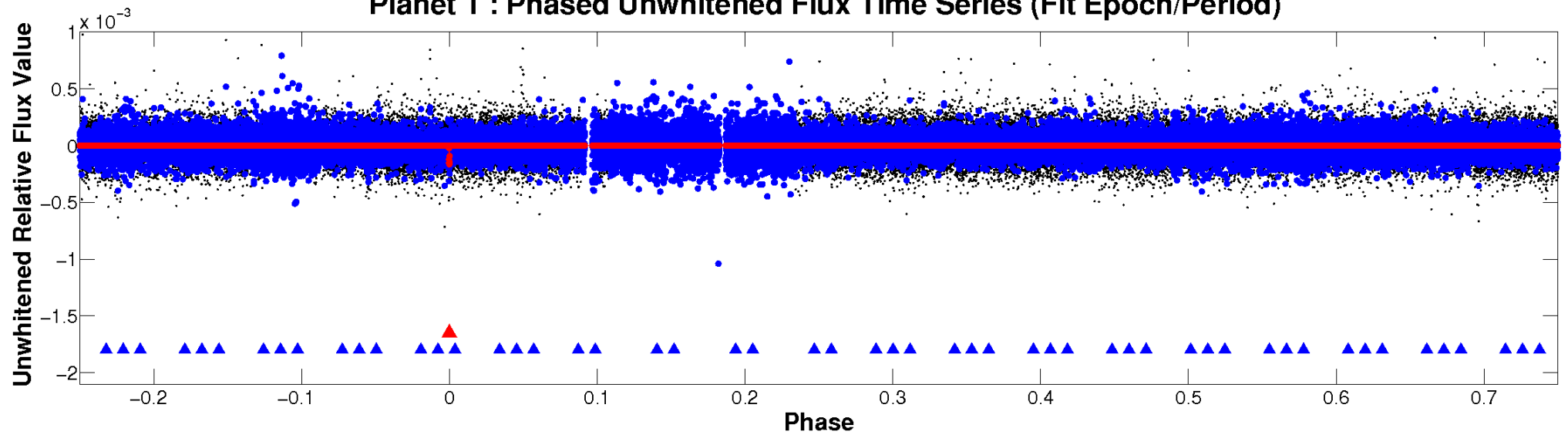
# ALT Odd/Even

TCE 004845665-01

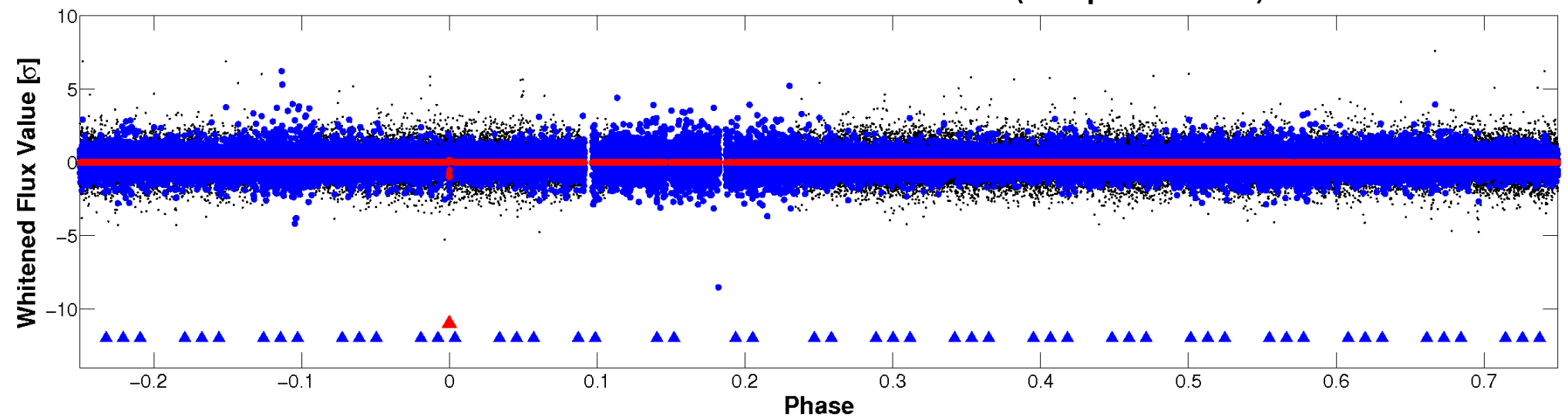


# Non-Whitened Vs. Whitened Light Curve

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

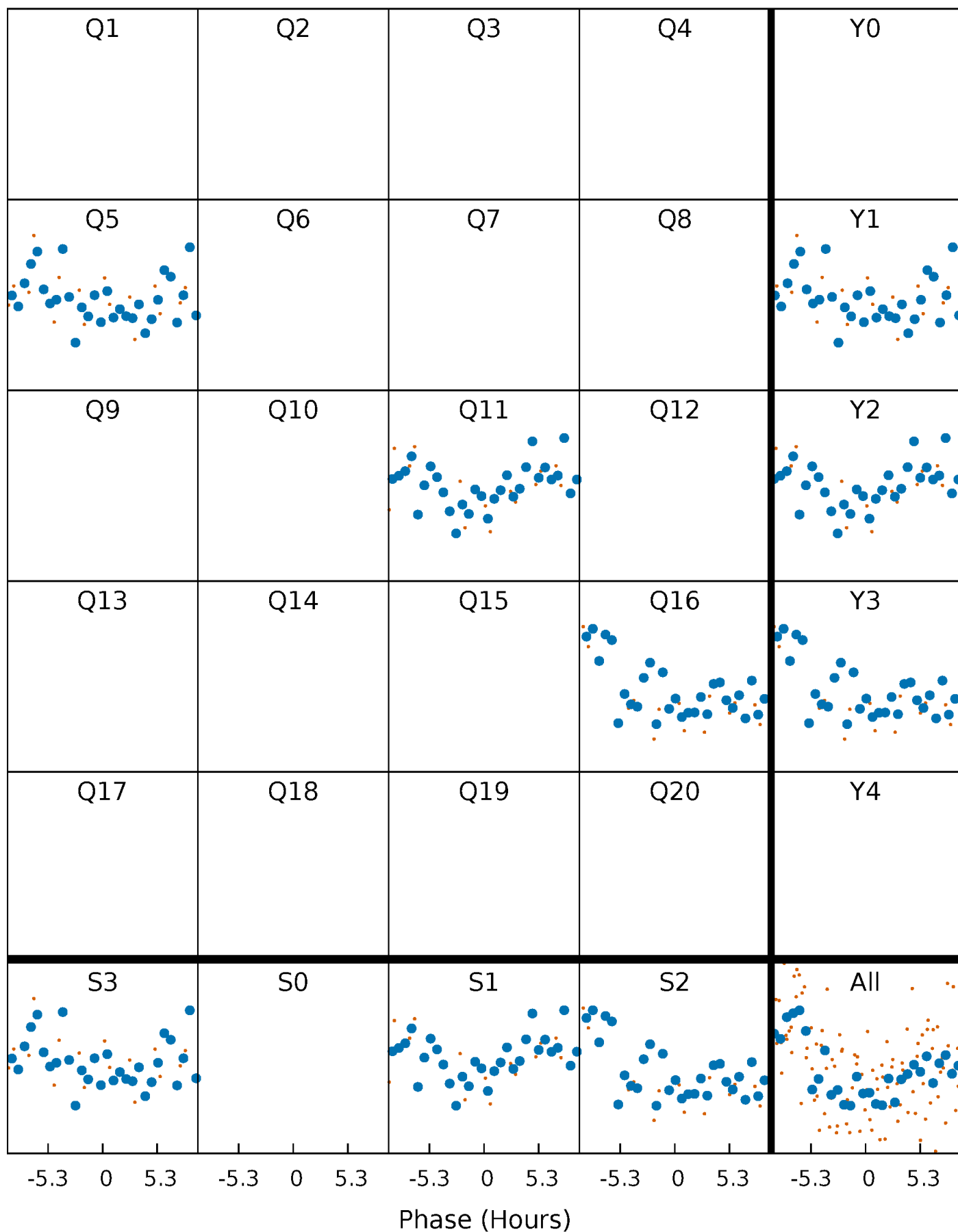


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

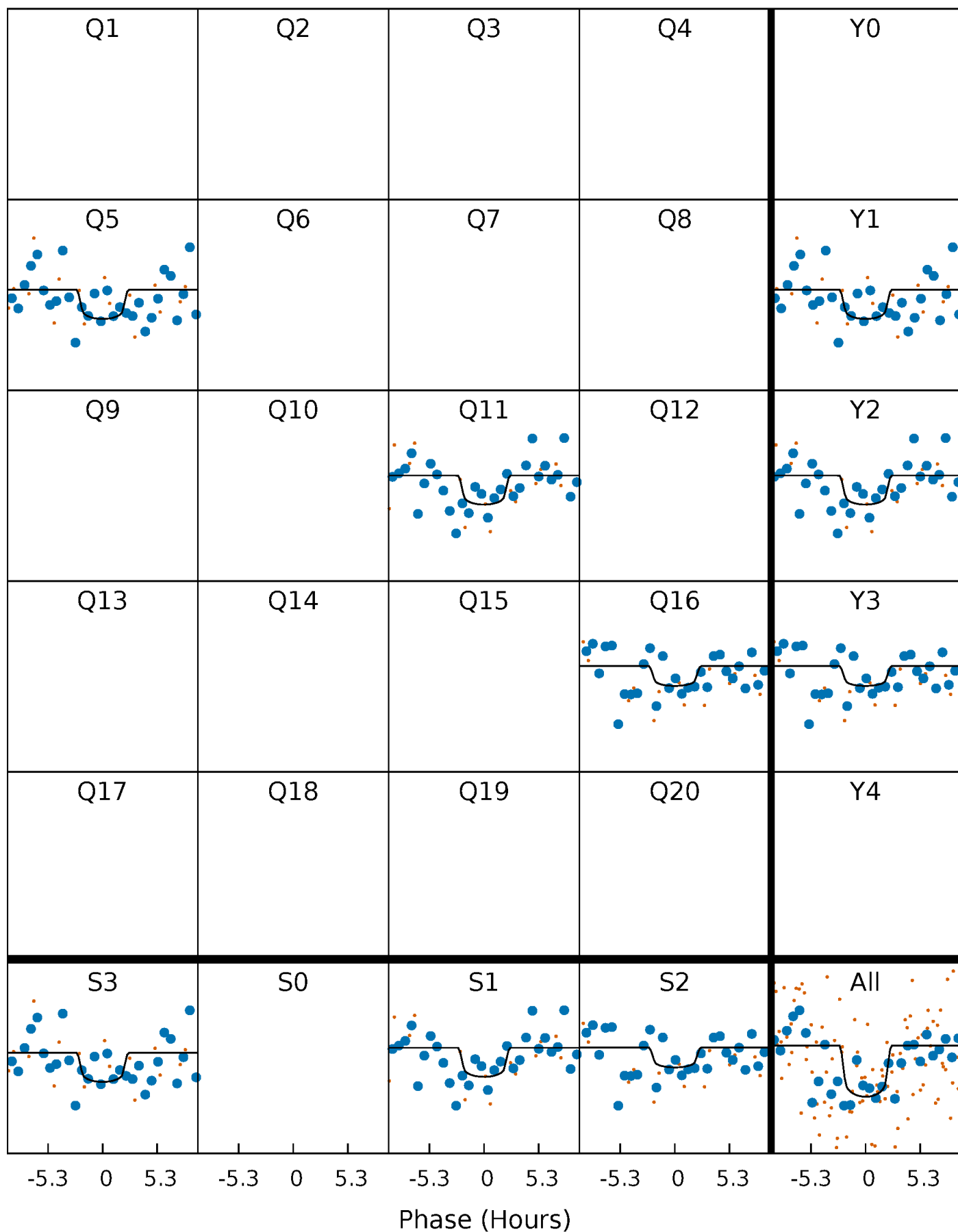
TCE 004845665-01 P=512.559967 Days  $T_0=510.445597$  (BKJD)





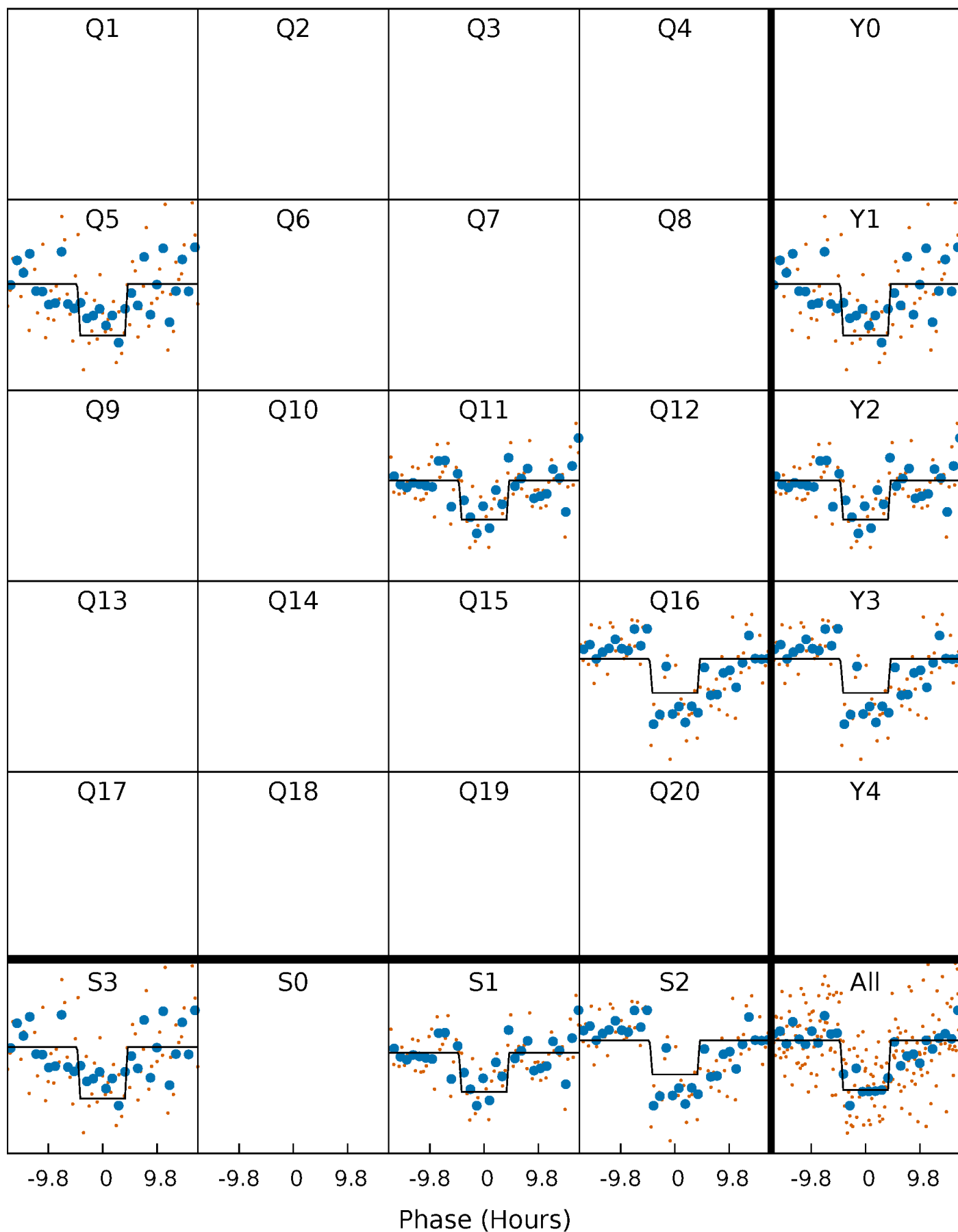
# DV Quarter-Phased Transit Curves

TCE 004845665-01 P=512.559967 Days  $T_0=510.445597$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

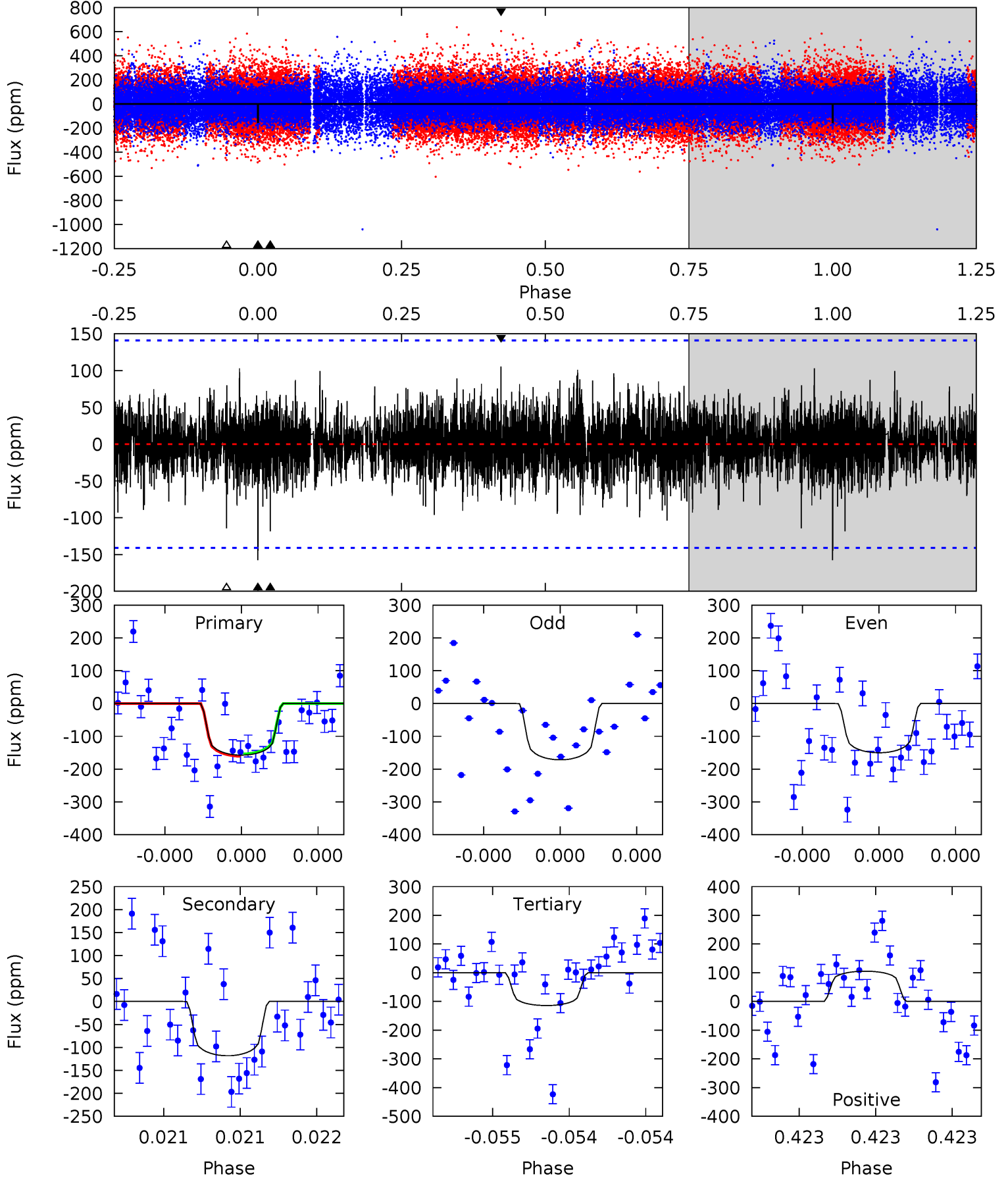
TCE 004845665-01 P=512.521363 Days  $T_0=510.473579$  (BKJD)



# DV Model-Shift Uniqueness Test

004845665-01, P = 512.559967 Days, E = 510.445597 Days

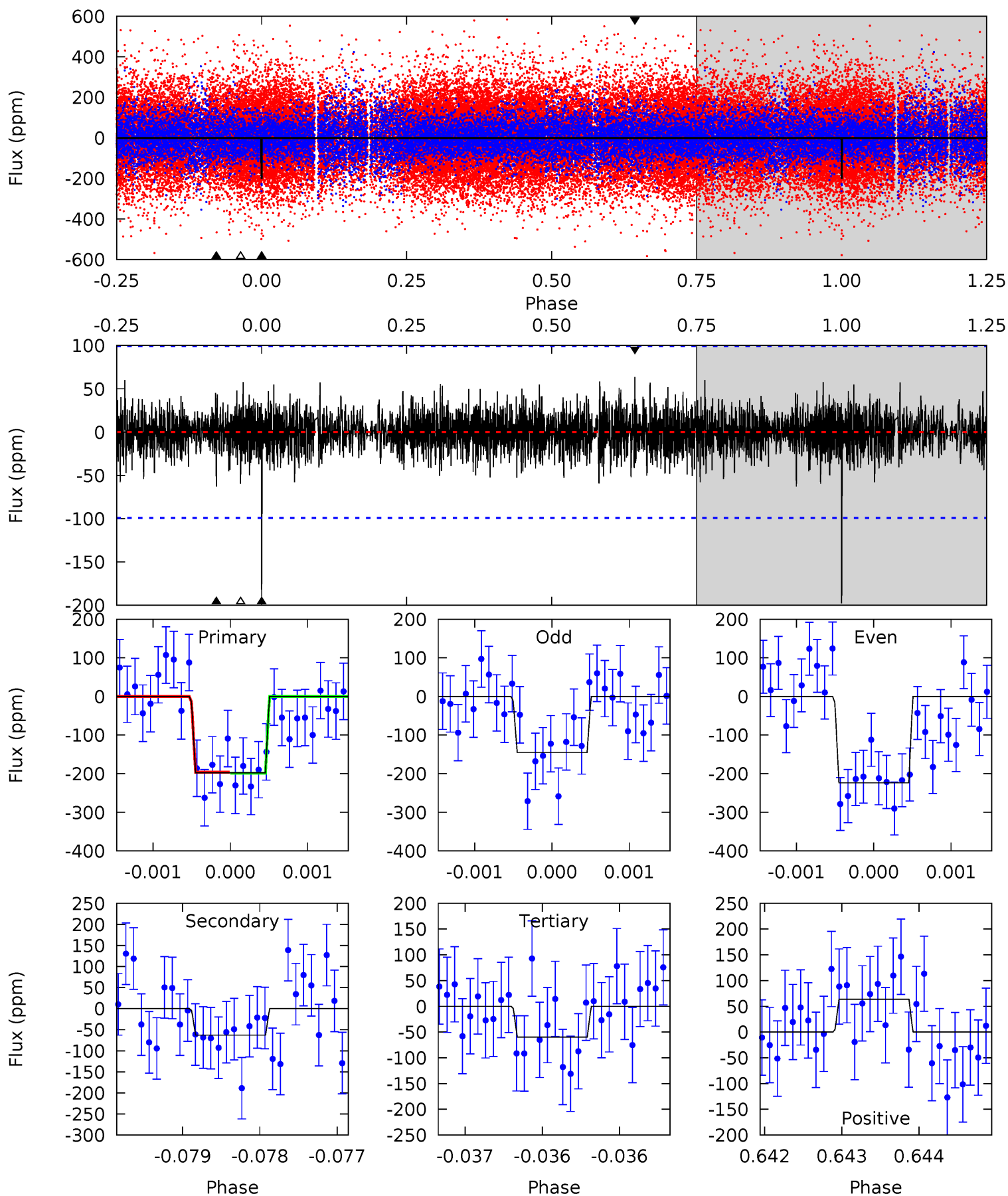
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.27	4.70	4.55	4.20	5.62	3.55	1.09	1.72	2.07	0.16	0.51	0.40	0.92	0.40	0.13



# Alt Model-Shift Uniqueness Test

004845665-01, P = 512.521363 Days, E = 510.473579 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
11.0	3.49	3.32	3.54	5.51	3.38	0.93	7.66	7.44	0.17	-0.05	2.06	1.32	0.24	0.07



### Stellar Parameters For KIC 004845665

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6343^{+174}_{-174}$	$3.853^{+0.300}_{-0.100}$	$-0.260^{+0.300}_{-0.250}$	$2.199^{+0.422}_{-0.783}$	$1.258^{+0.223}_{-0.223}$	$0.167^{+0.322}_{-0.054}$
	+3%/-3%	+8%/-3%	+115%/-96%	+19%/-36%	+18%/-18%	+193%/-32%
Source	PHO1	FLK73	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 004845665-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-118 \pm 25$	$5.37^{+4.53}_{-3.68}$	$489^{+31}_{-48}$	$4503^{+3126}_{-919}$	$4169^{+39383}_{-2961}$
Alt.	$-63 \pm 18$	$4.94^{+4.88}_{-3.35}$	$490^{+32}_{-45}$	$4059^{+2474}_{-775}$	$2500^{+21844}_{-1860}$

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

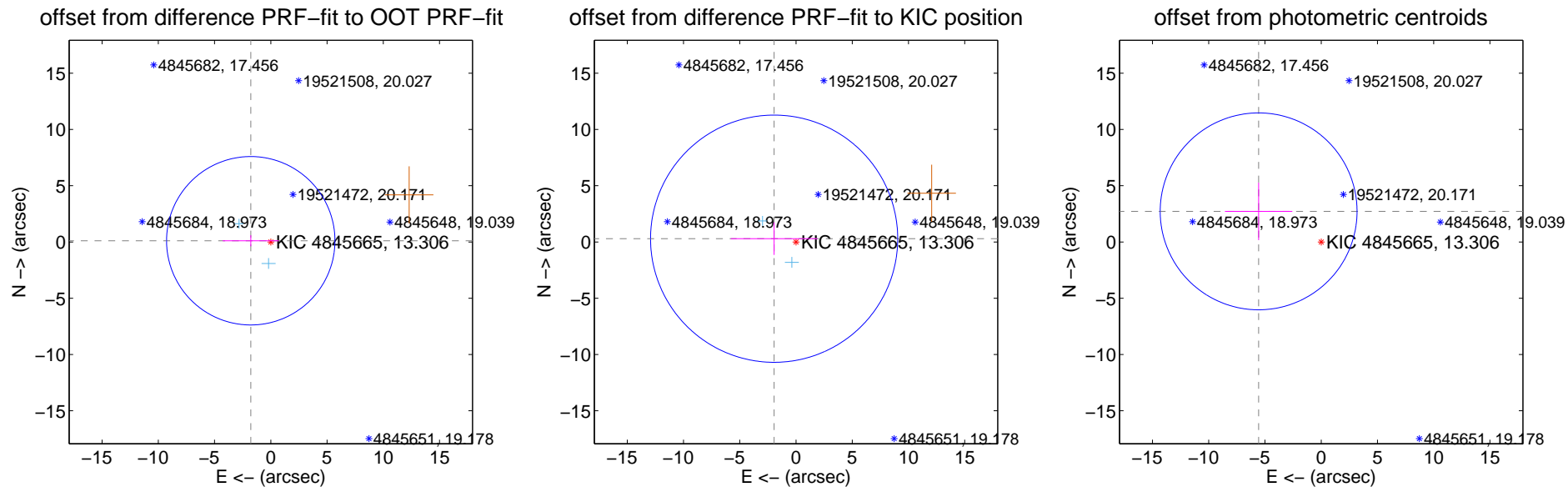
## DV Centroid Data

Supplemental centroid analysis for 004845665-01. Kepler magnitude: 13.31. Transit SNR 4.71

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.30 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.785 \pm 2.494$	0.72	$1.782 \pm 2.497$	$0.108 \pm 0.492$
PRF-fit source offset from KIC position	$1.966 \pm 3.661$	0.54	$1.944 \pm 3.858$	$0.292 \pm 1.446$
photometric centroid source offset	$6.19 \pm 2.92$	2.12	$5.56 \pm 3.00$	$2.72 \pm 2.56$

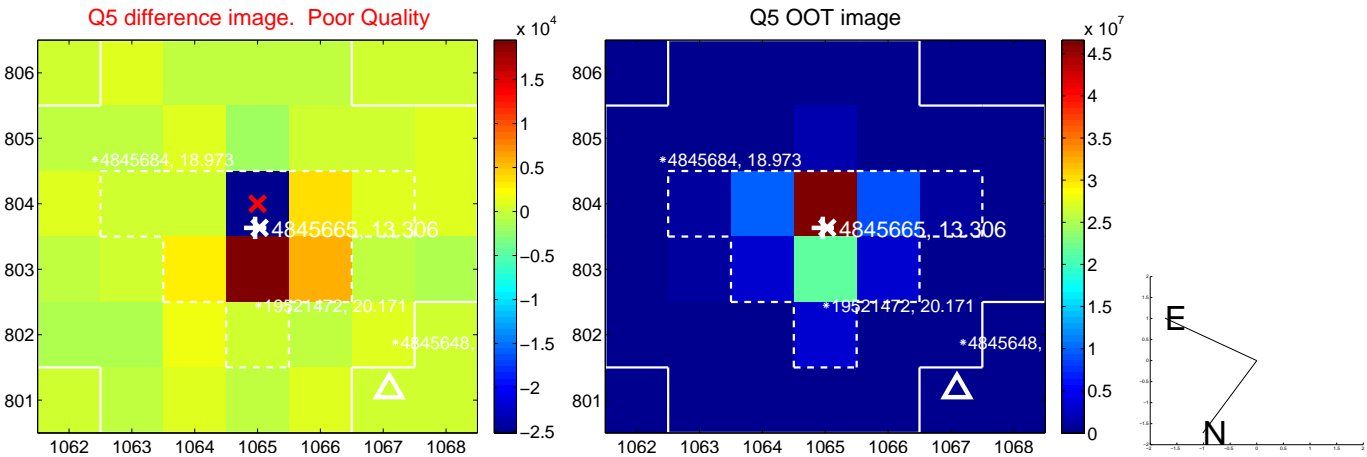


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

Q9 no difference image



Q9 no OOT image



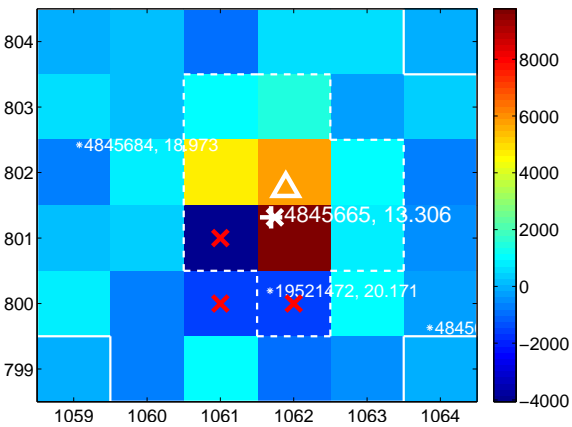
Q10 no difference image



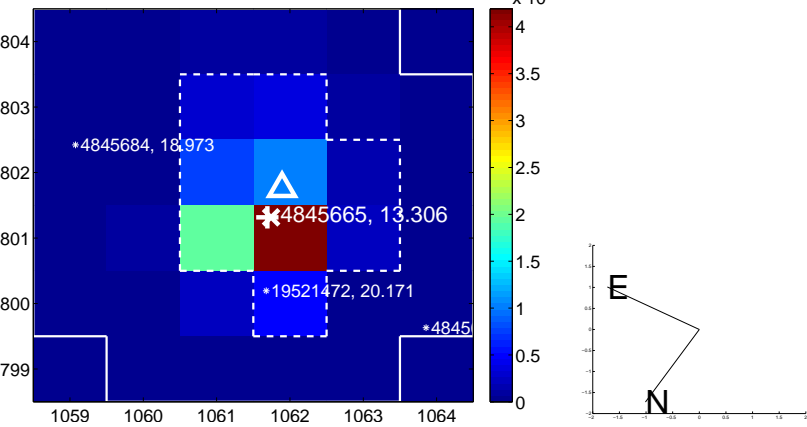
Q10 no OOT image



Q11 difference image



Q11 OOT image



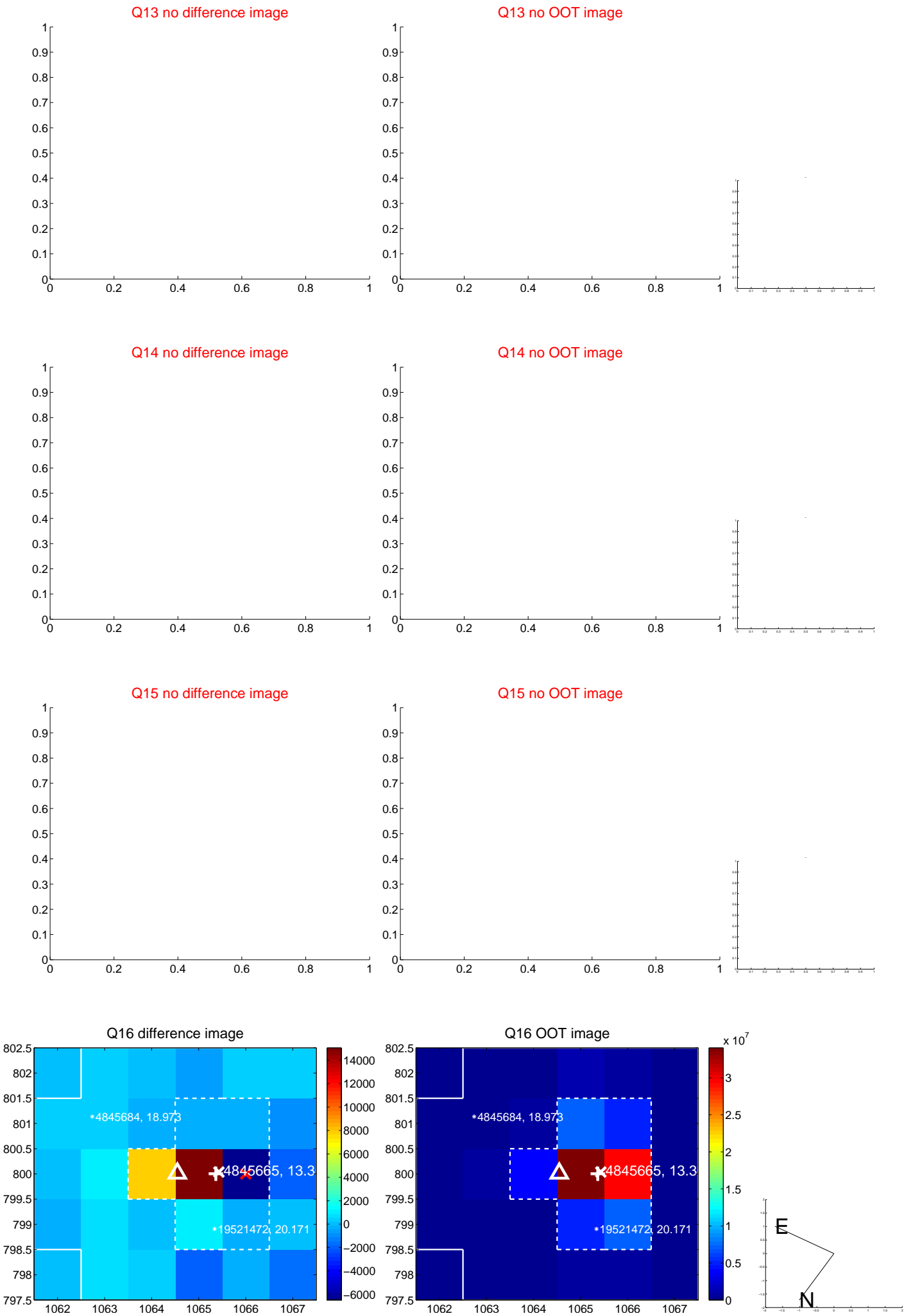
Q12 no difference image



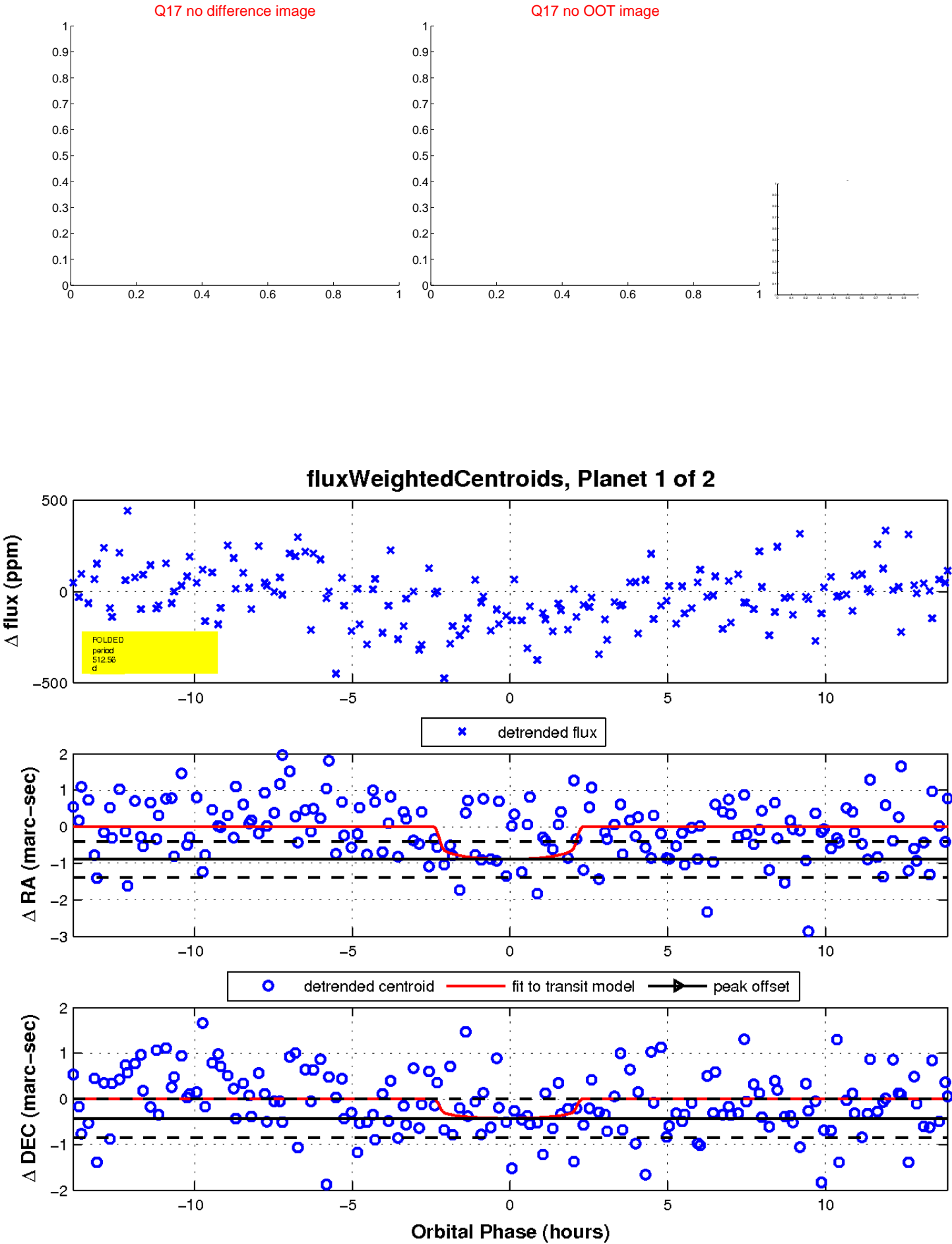
Q12 no OOT image



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

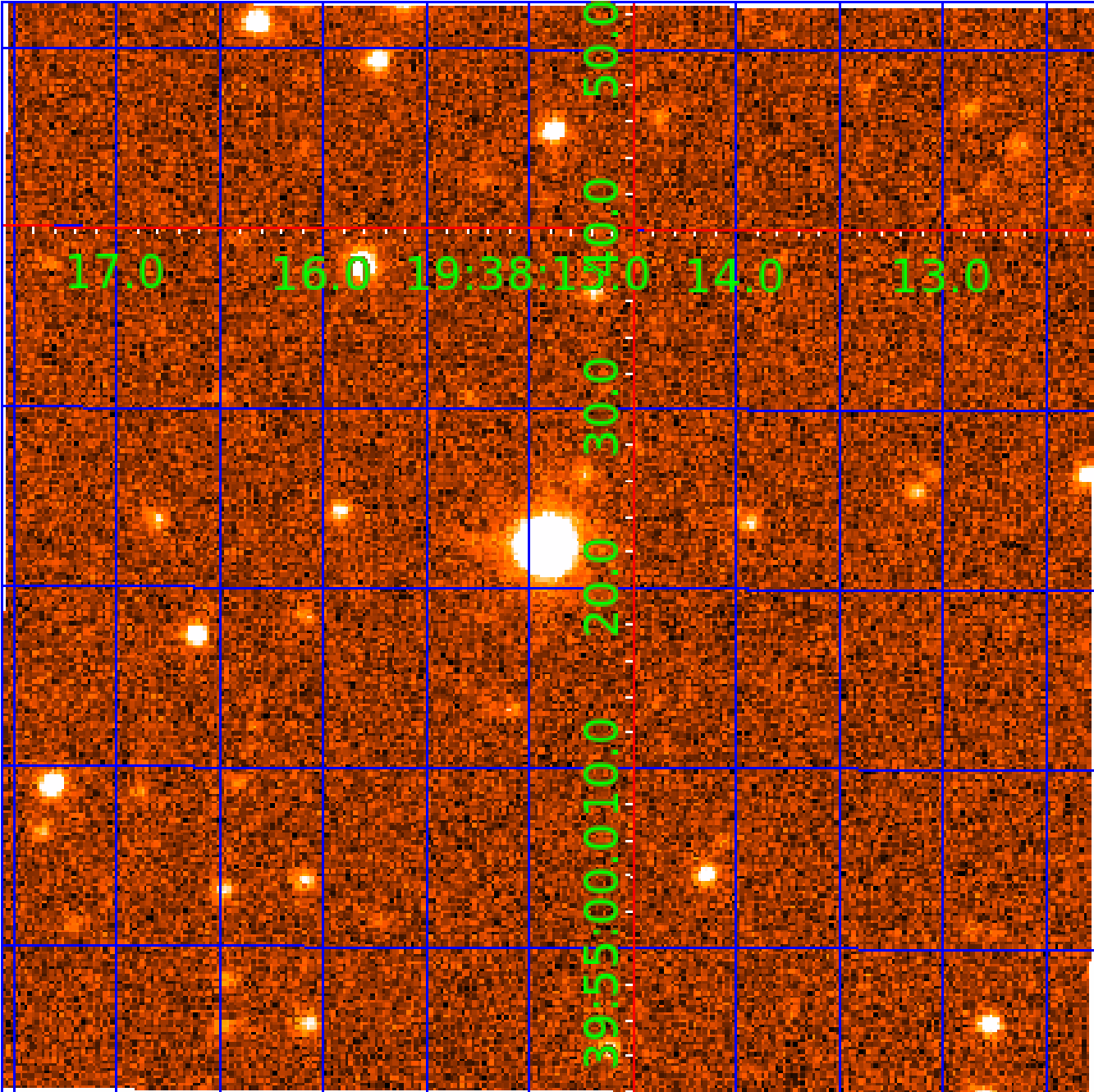


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004845665

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004845665-01	OBS	No	512.559967	510.445597	165.2	4.632	7.6	4.7	2.20	6343	3.23	3.83
004845665-02	OBS	No	27.288096	145.837029	70.0	62.980	7.3	12.0	2.20	6343	2.56	191.25

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004845665-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
004845665-02	OBS	FP	0.00	1	0	0	0	LPP_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.

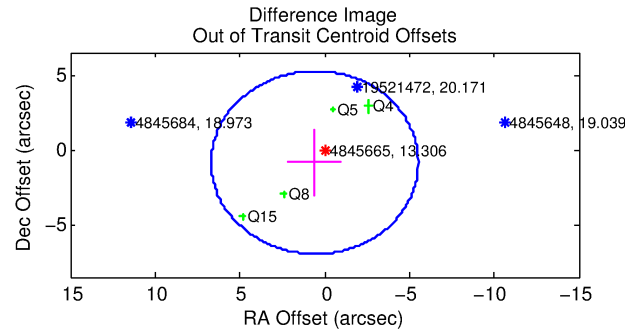
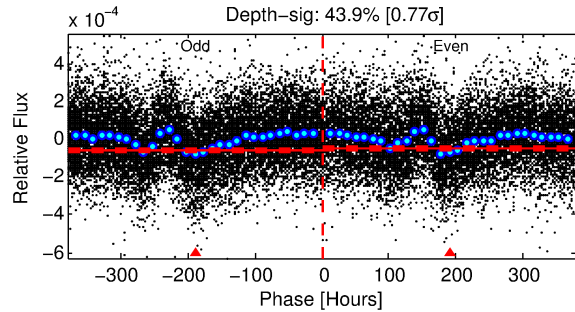
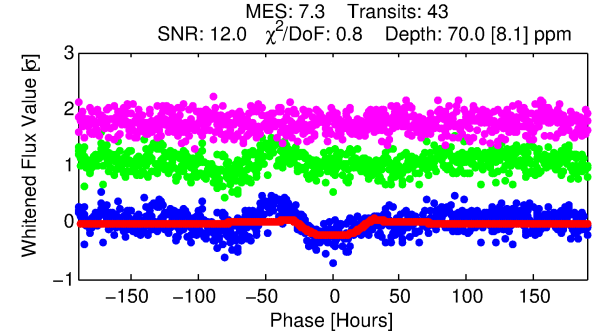
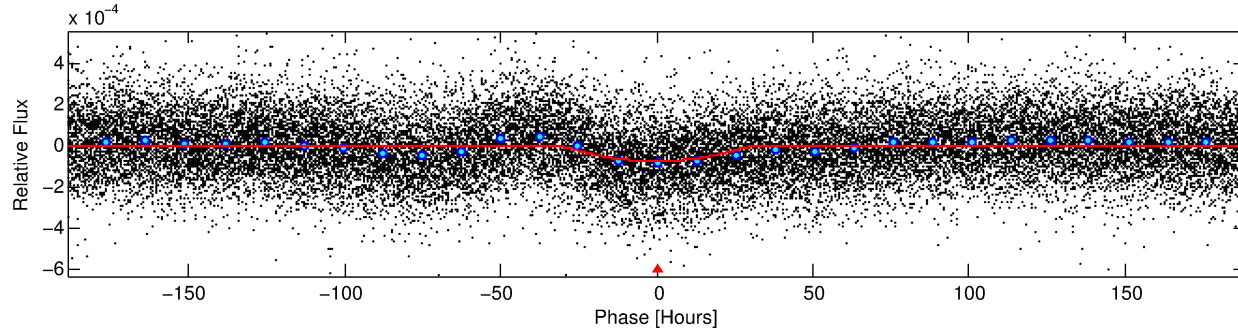
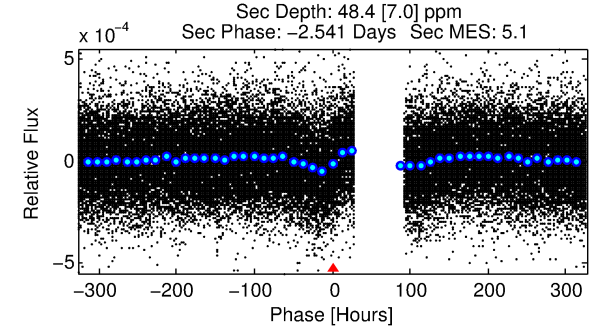
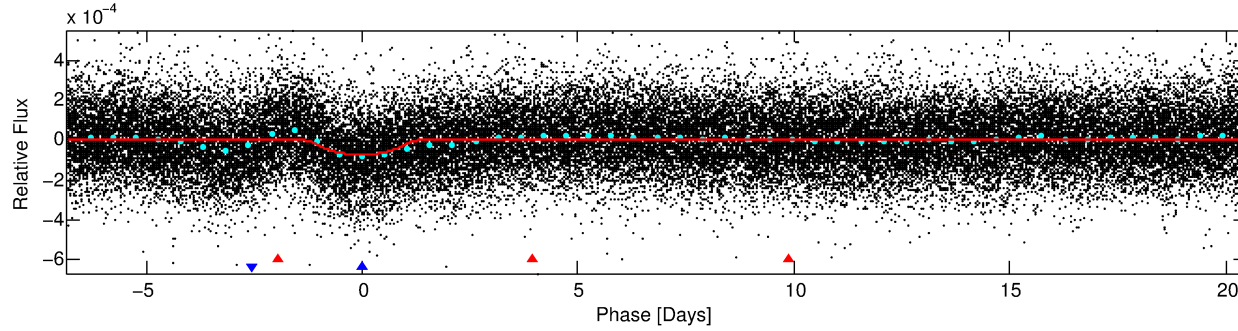
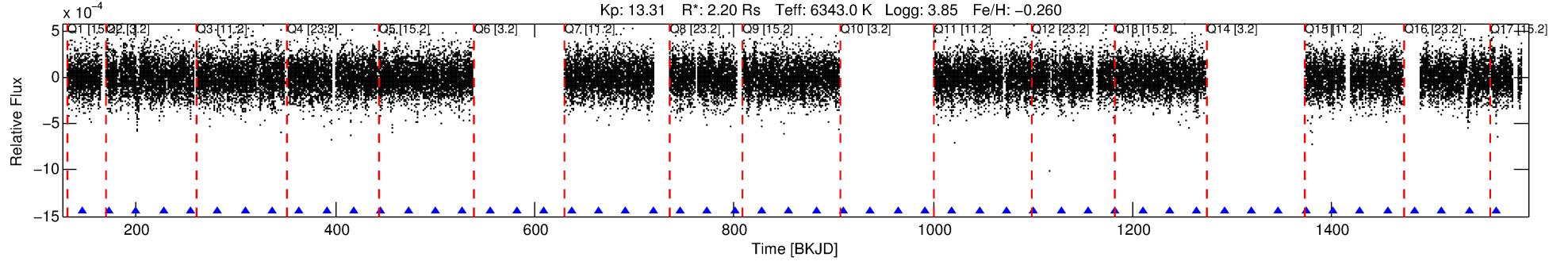
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004845665-02

No Significant Match Found

# DV One-Page Summary

KIC: 4845665 Candidate: 2 of 2 Period: 27.288 d



## DV Fit Results:

Period = 27.28810 [0.00320] d  
Epoch = 145.8370 [0.0940] BKJD  
Rp/R\* = 0.0107 [0.0007]  
a/R\* = 1.21 [0.04]  
b = 0.99 [0.00]  
Seff = 191.25 [101.28]  
Teq = 948 [126] K  
Rp = 2.56 [0.93] Re  
a = 0.1915 [0.0633] AU  
Ag = 149.11 [82.90] [1.79σ]  
Teffp = 5123 [294] K [13.06σ]

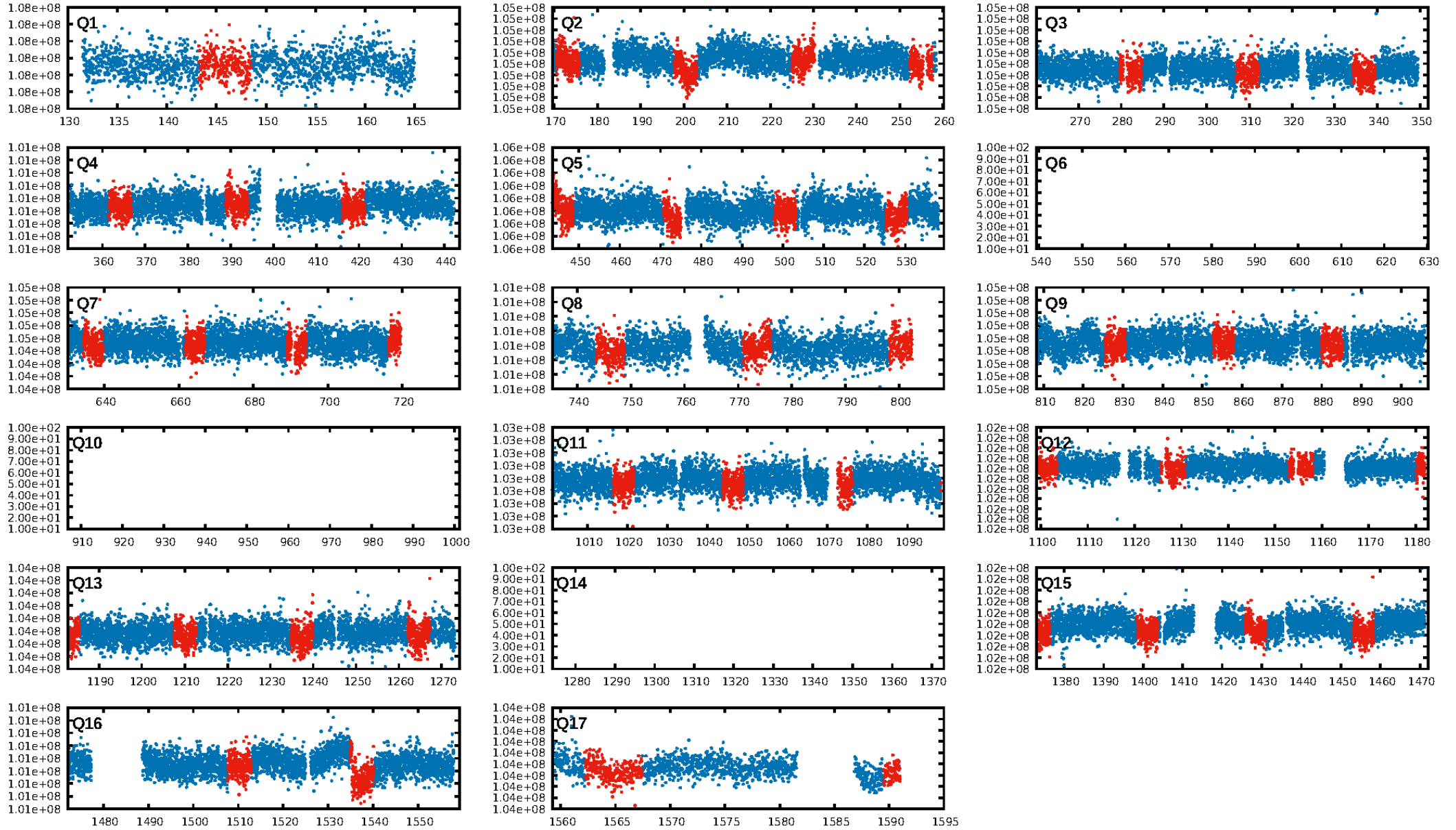
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [184.43σ]  
ModelChiSquare2-sig: 71.5%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 6.29e-13  
RollingBand-fgt: 1.00 [40/40]  
**GhostDiagnostic-chr: 0.7604**  
Centroid-sig: 92.1%  
Centroid-so: 0.377 arcsec [0.56σ]  
OotOffset-rm: 1.037 arcsec [0.51σ]  
OotOffset-st: 0/1/2/1 [4]  
KicOffset-rm: 1.040 arcsec [0.46σ]  
KicOffset-st: 0/1/2/1 [4]  
DiffImageQuality-fgm: 0.00 [0/4]  
DiffImageOverlap-fno: 1.00 [9/9]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:10:55 Z

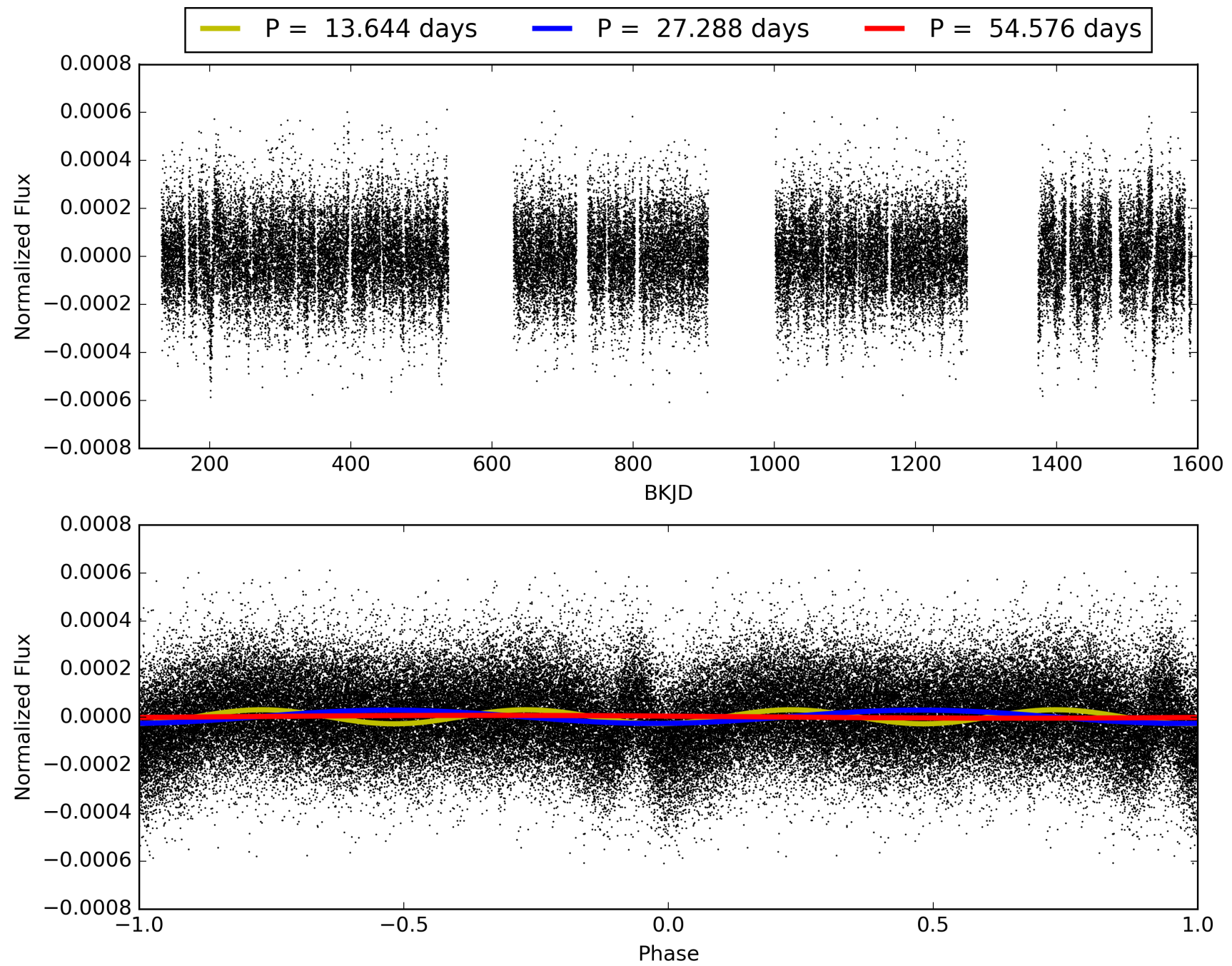
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004845665-02, PDC Light Curves





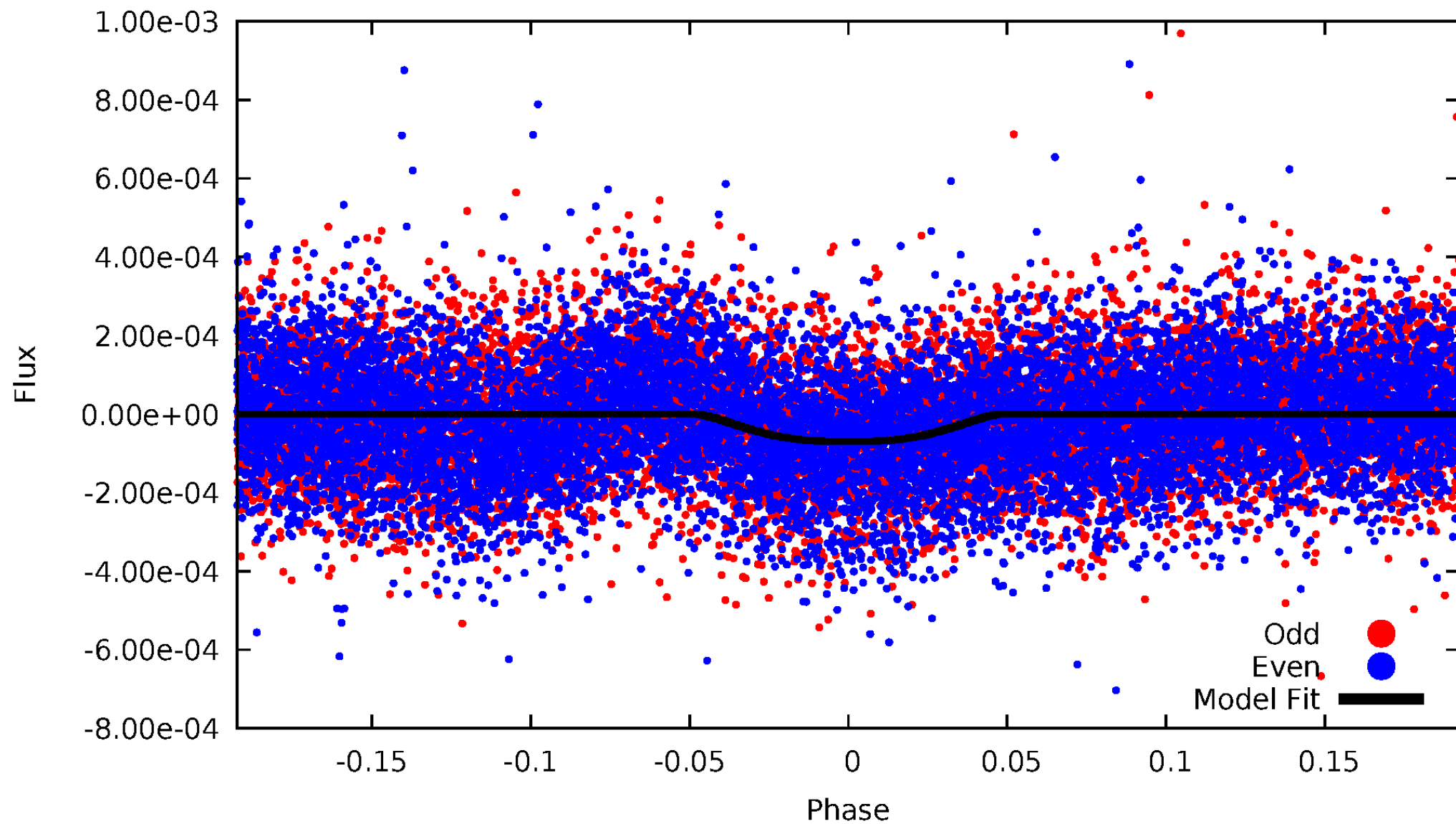
TCE 004845665-02





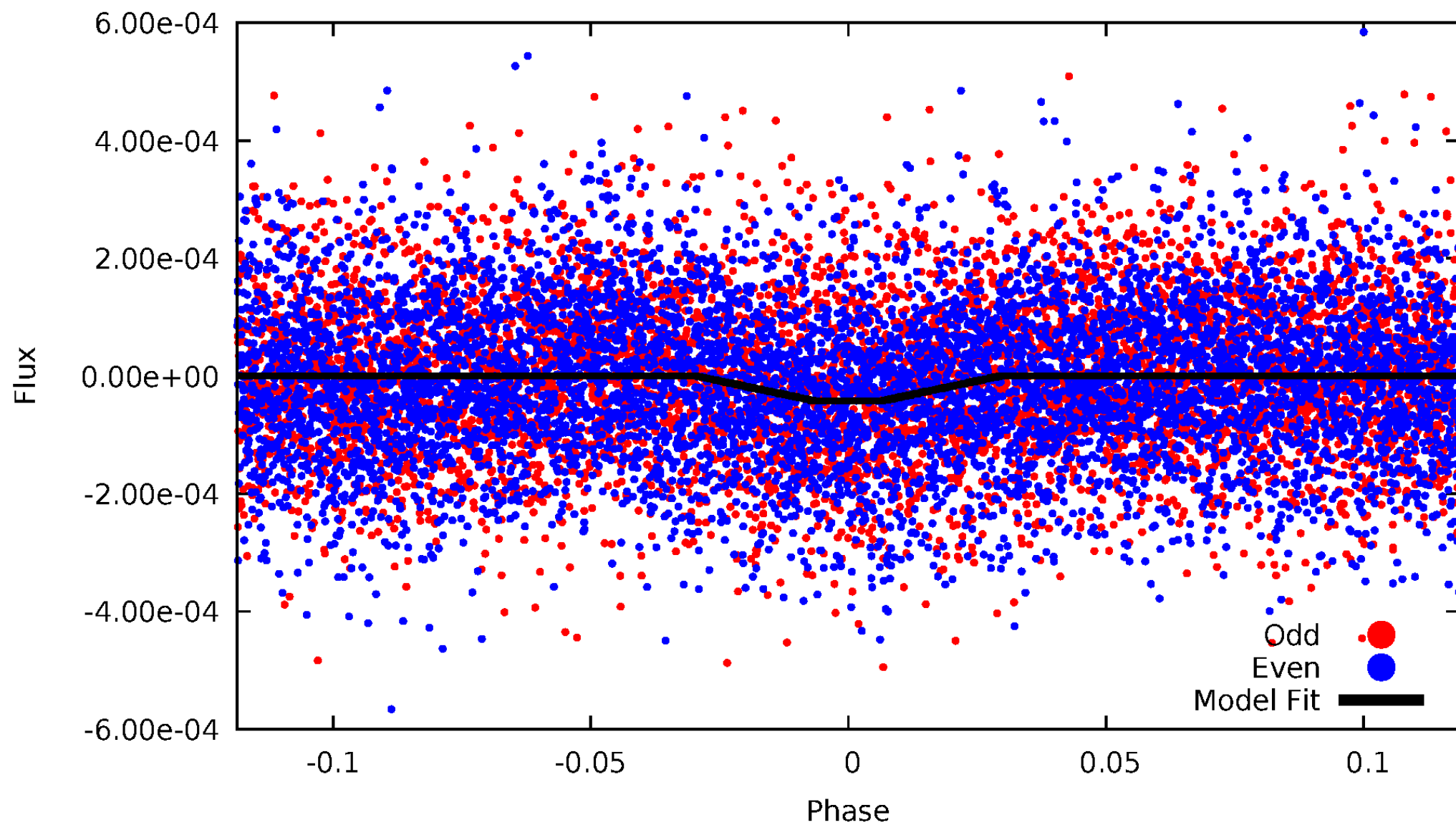
# DV Odd/Even

TCE 004845665-02



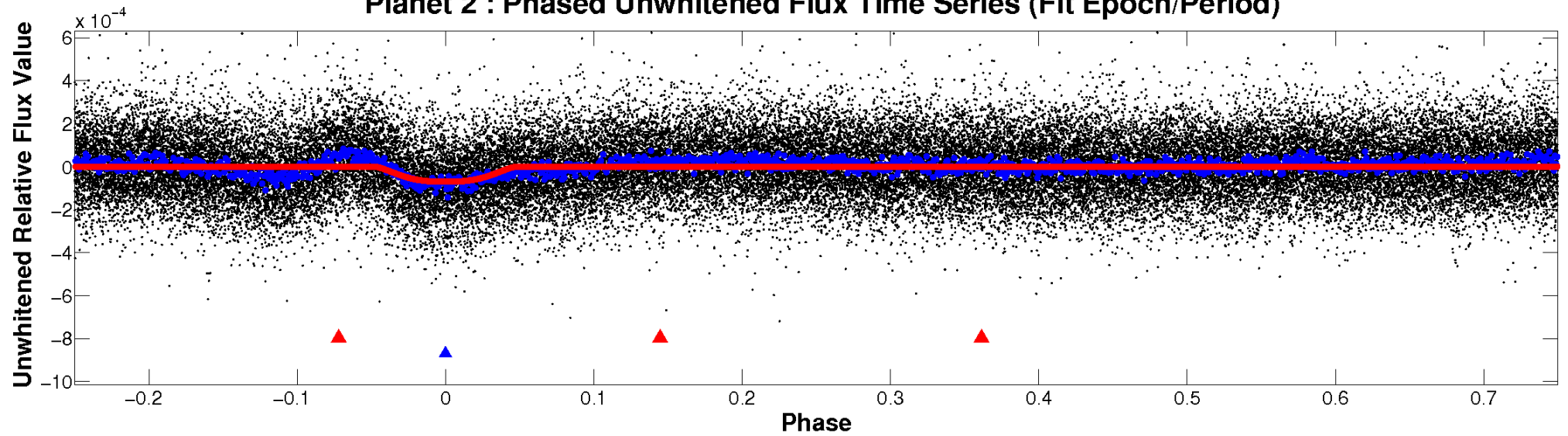
# ALT Odd/Even

TCE 004845665-02

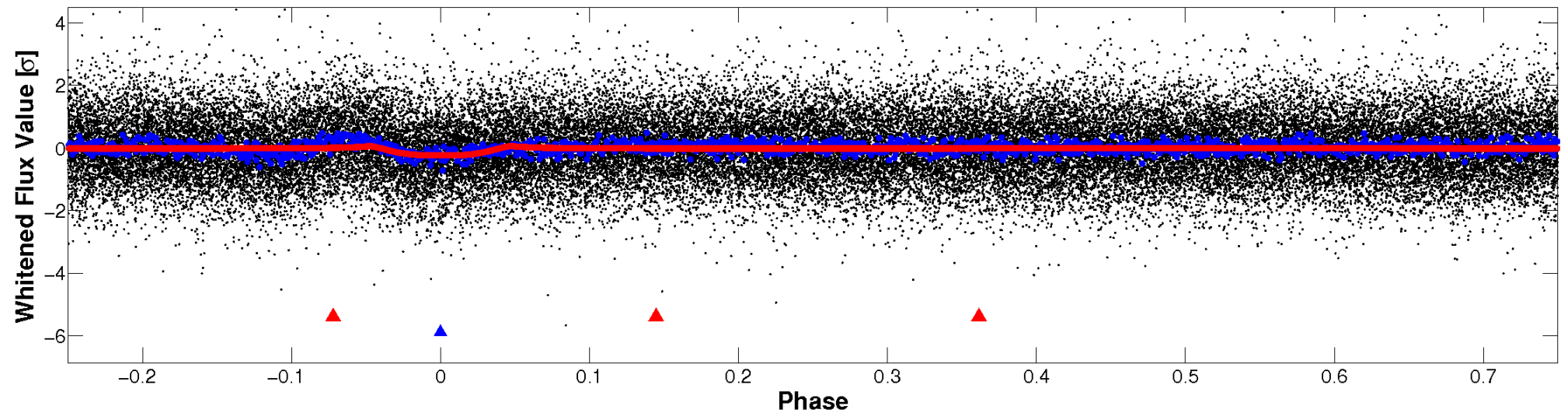


# Non-Whitened Vs. Whitened Light Curve

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

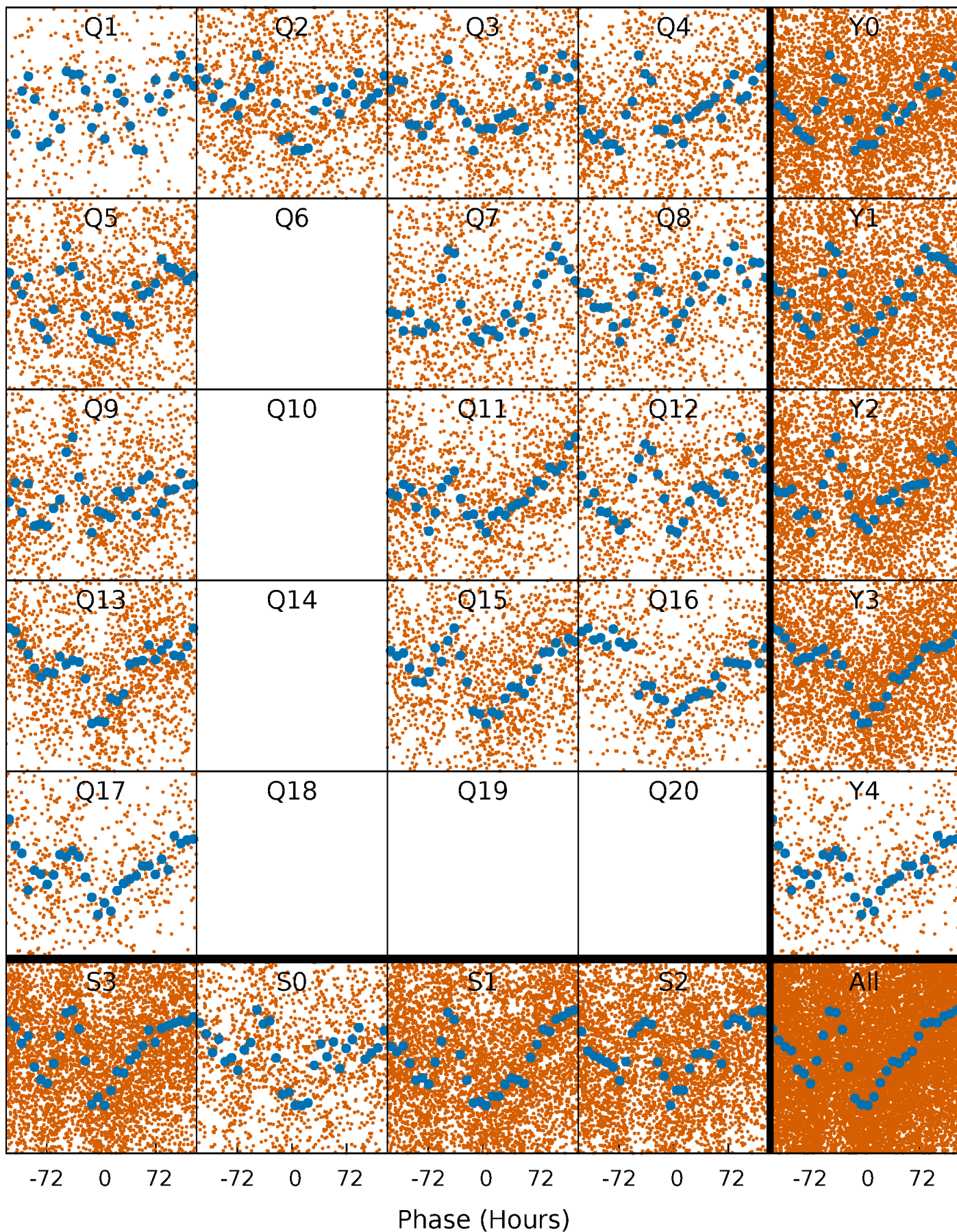


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

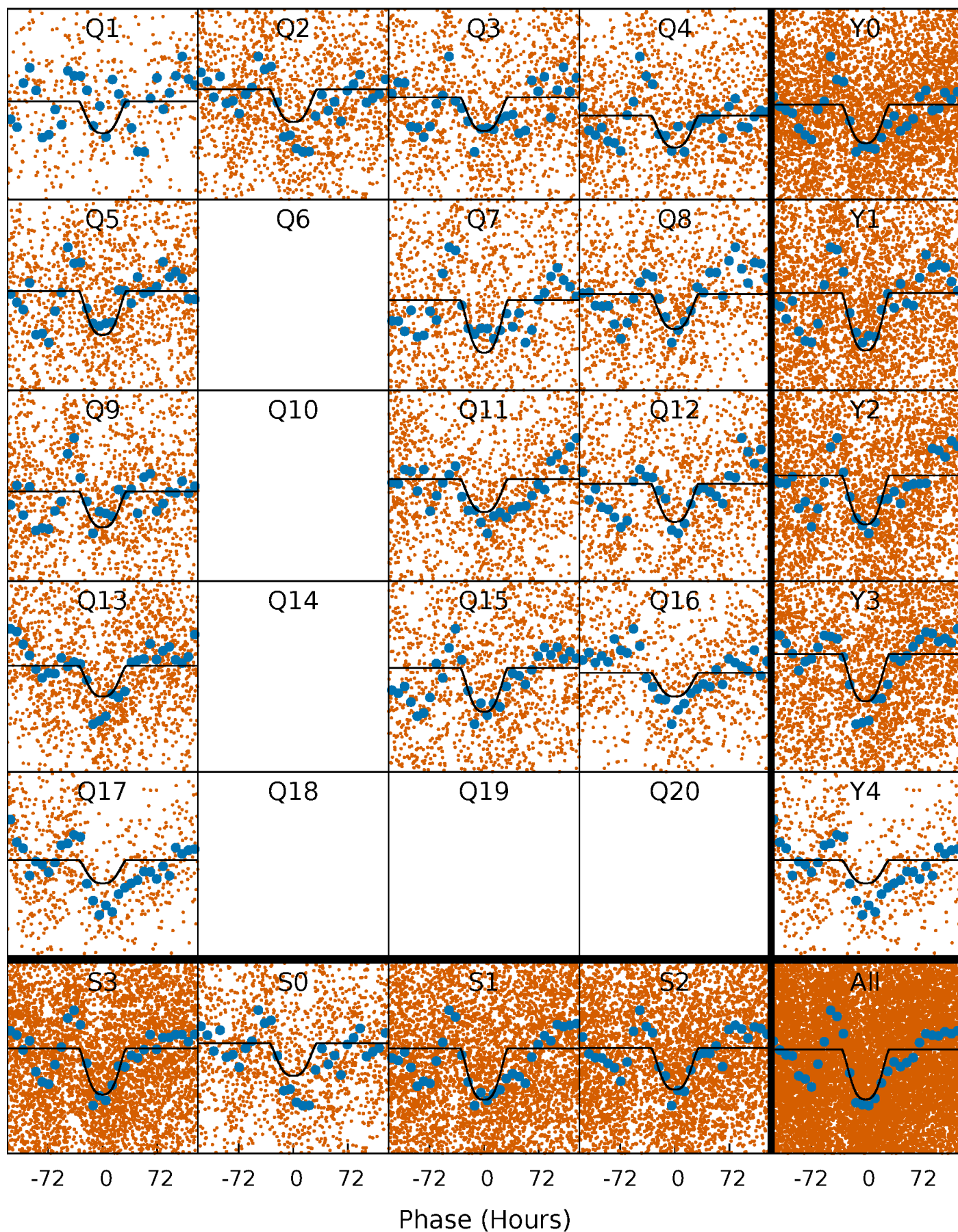
TCE 004845665-02 P= 27.288096 Days  $T_0=145.837029$  (BKJD)





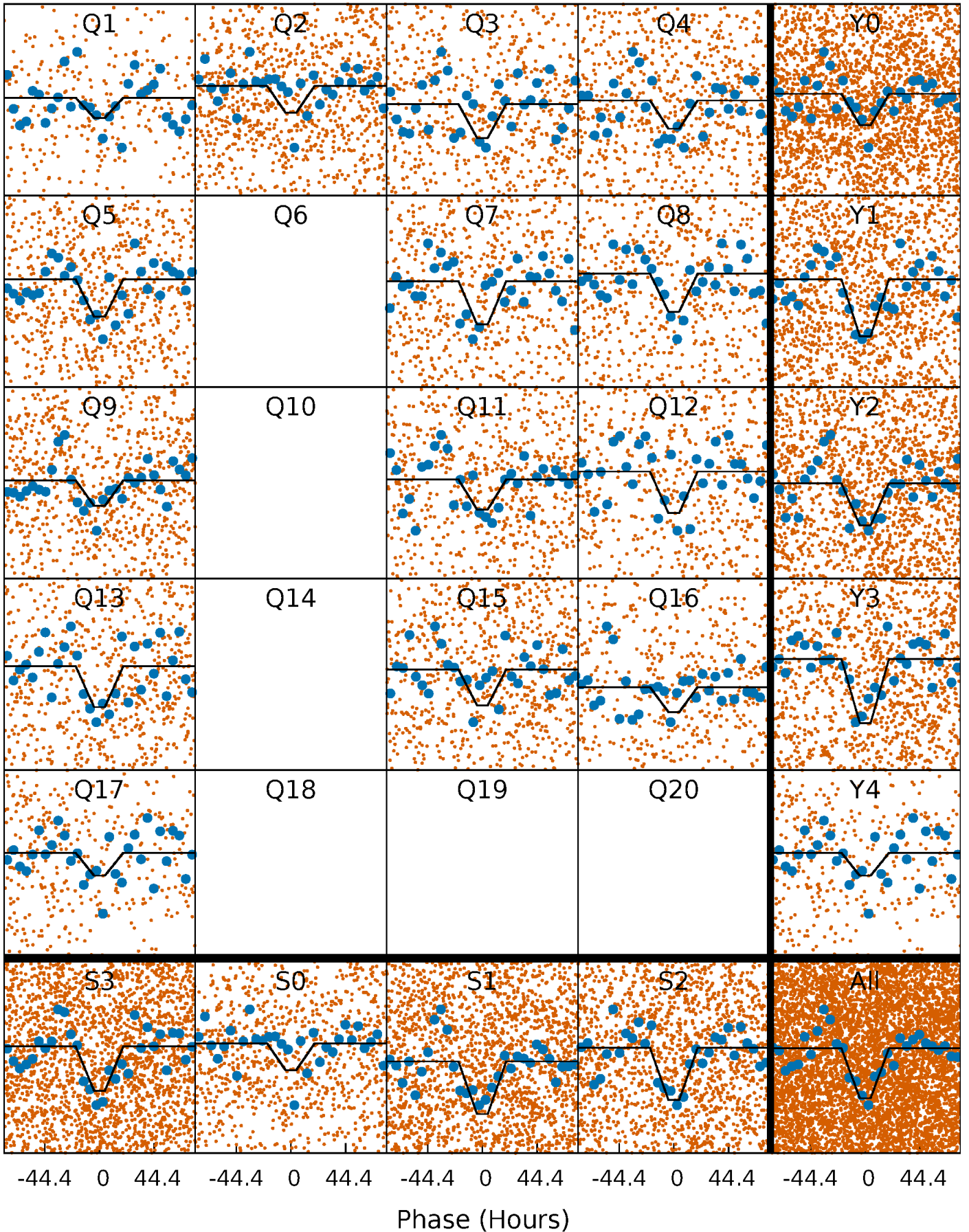
# DV Quarter-Phased Transit Curves

TCE 004845665-02 P= 27.288096 Days  $T_0=145.837029$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

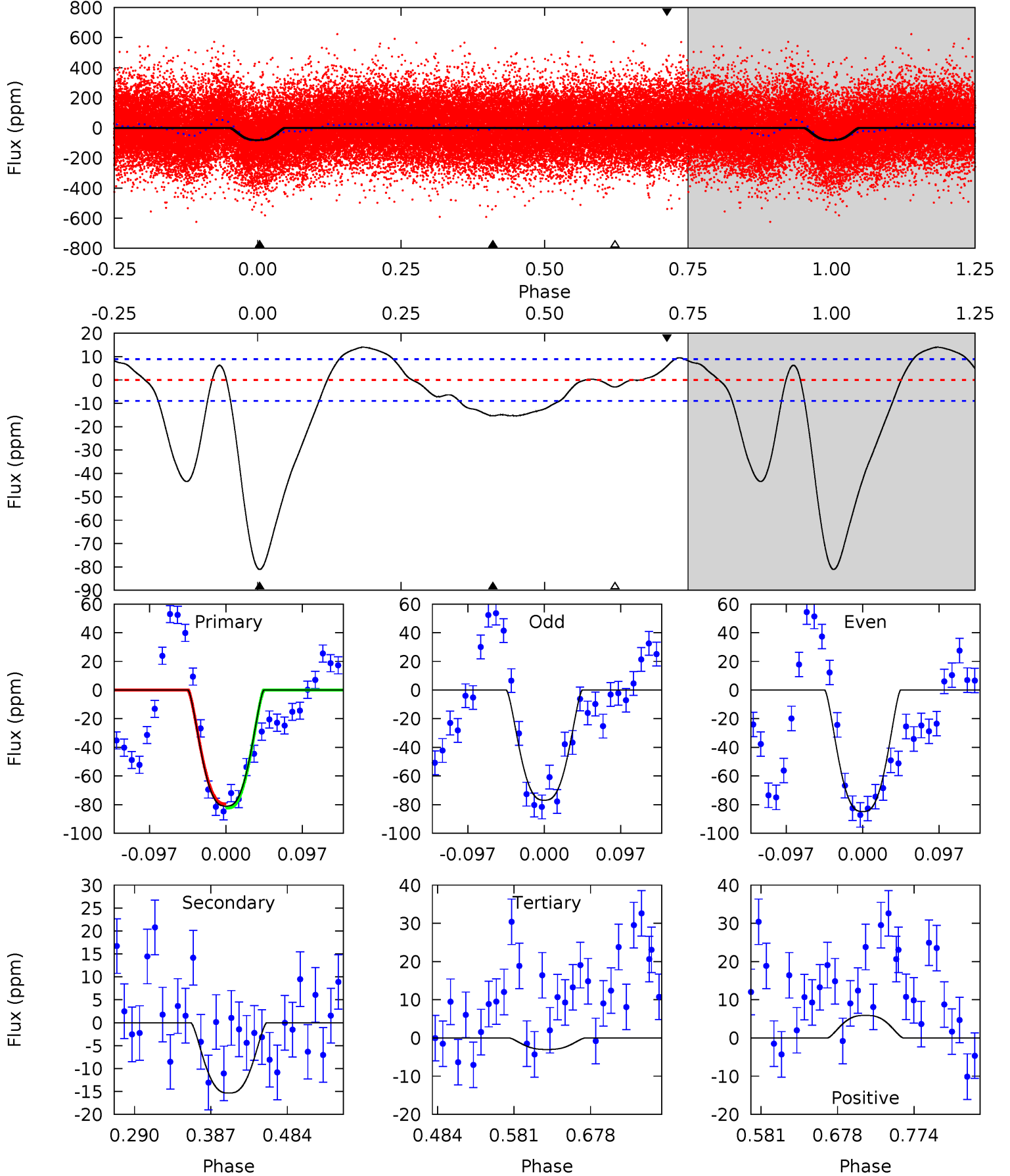
TCE 004845665-02 P= 27.297235 Days  $T_0=145.250799$  (BKJD)



# DV Model-Shift Uniqueness Test

004845665-02, P = 27.288096 Days, E = 118.548933 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
41.5	7.85	1.54	3.02	4.57	1.66	6.87	39.9	38.4	6.31	4.83	2.02	1.11	0.15	0.72

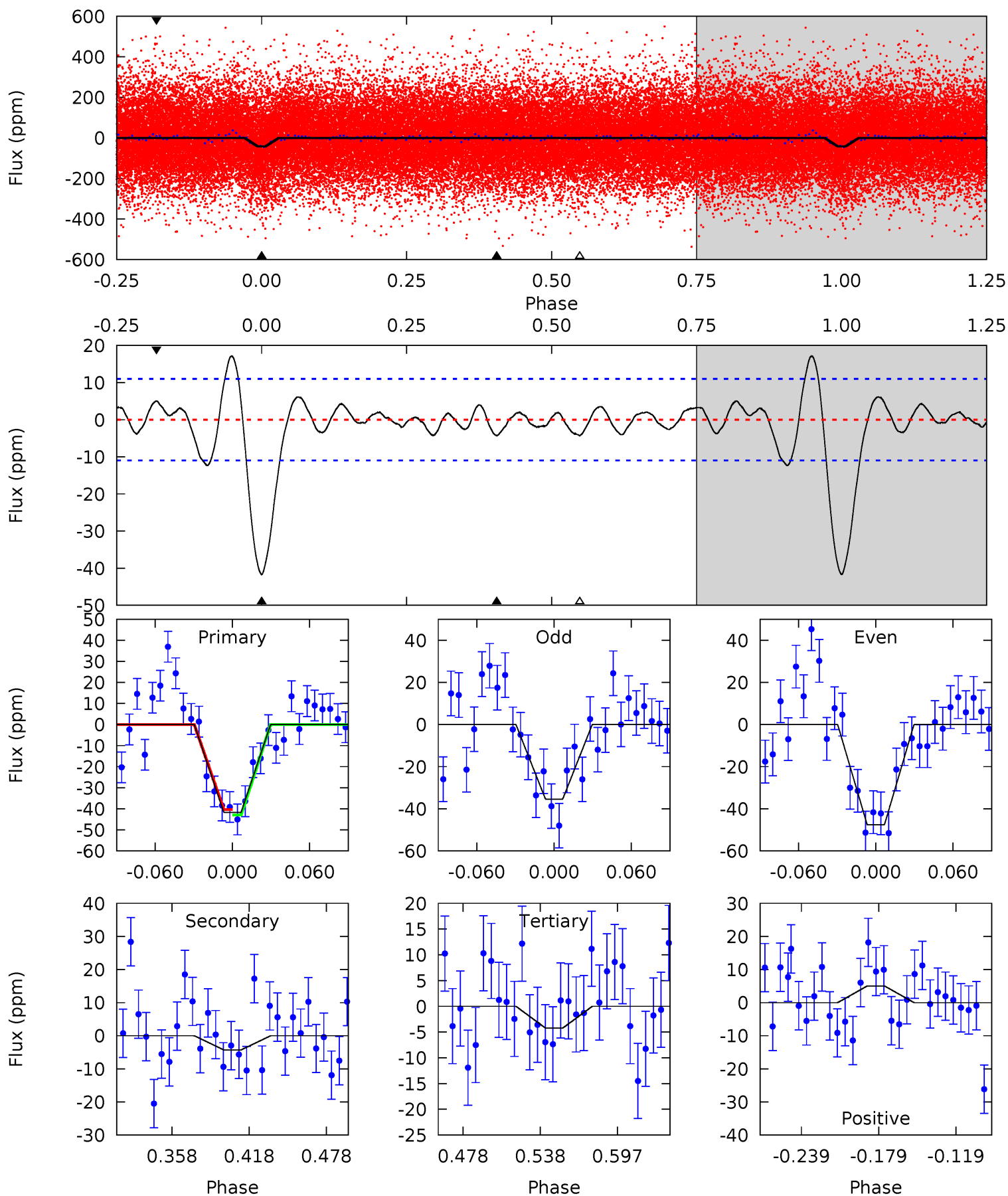




# Alt Model-Shift Uniqueness Test

004845665-02, P = 27.297235 Days, E = 117.953564 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
17.8	1.83	1.80	2.14	4.67	1.88	1.45	16.0	15.6	0.03	-0.32	2.58	0.75	0.29	0.55





### Stellar Parameters For KIC 004845665

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6343^{+174}_{-174}$	$3.853^{+0.300}_{-0.100}$	$-0.260^{+0.300}_{-0.250}$	$2.199^{+0.422}_{-0.783}$	$1.258^{+0.223}_{-0.223}$	$0.167^{+0.322}_{-0.054}$
	+3%/-3%	+8%/-3%	+115%/-96%	+19%/-36%	+18%/-18%	+193%/-32%
Source	PHO1	FLK73	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 004845665-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-15 \pm 2$	$2.47^{+0.38}_{-0.44}$	$1304^{+78}_{-115}$	$4122^{+182}_{-159}$	$52^{+23}_{-14}$
Alt.	$-4 \pm 2$	$1.51^{+0.28}_{-0.30}$	$1299^{+77}_{-107}$	$3891^{+395}_{-487}$	$38^{+30}_{-22}$

$T_{max}$  = 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

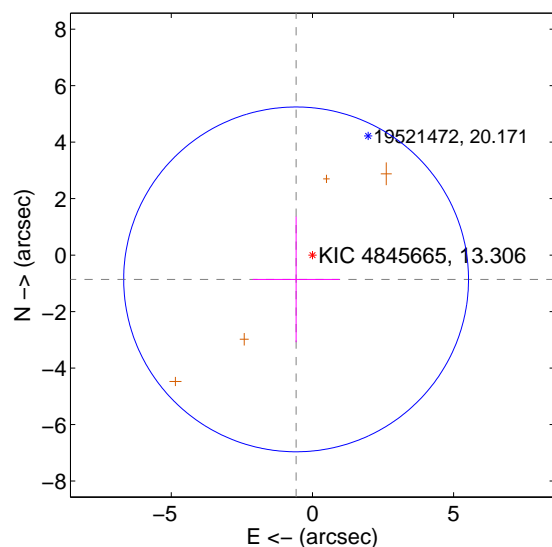
Supplemental centroid analysis for 004845665-02. Kepler magnitude: 13.31. Transit SNR 11.98

There are 0 quarters with good PRF difference image offsets

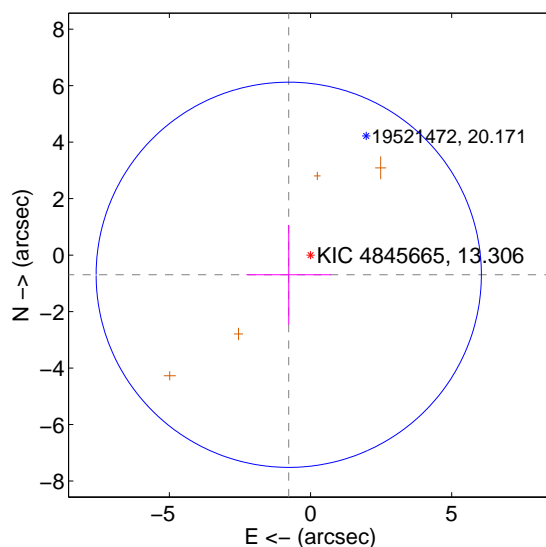
The direct PRF centroid is offset from the target star catalog position by about 0.24 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.037 \pm 2.035$	0.51	$0.579 \pm 1.538$	$-0.860 \pm 2.224$
PRF-fit source offset from KIC position	$1.040 \pm 2.274$	0.46	$0.771 \pm 1.502$	$-0.697 \pm 1.762$
photometric centroid source offset	$0.38 \pm 0.68$	0.56	$0.28 \pm 0.67$	$0.25 \pm 0.69$

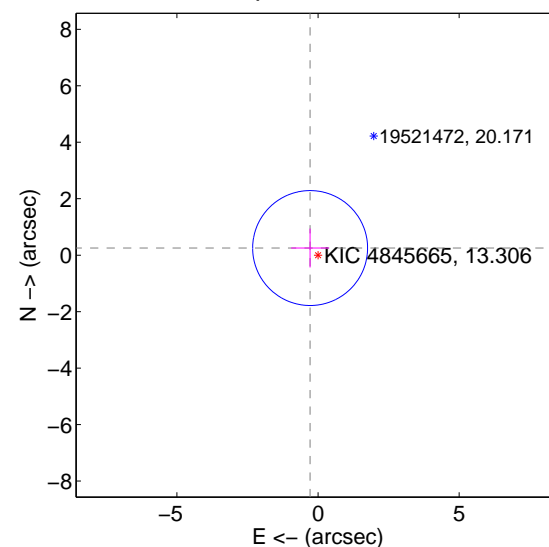
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

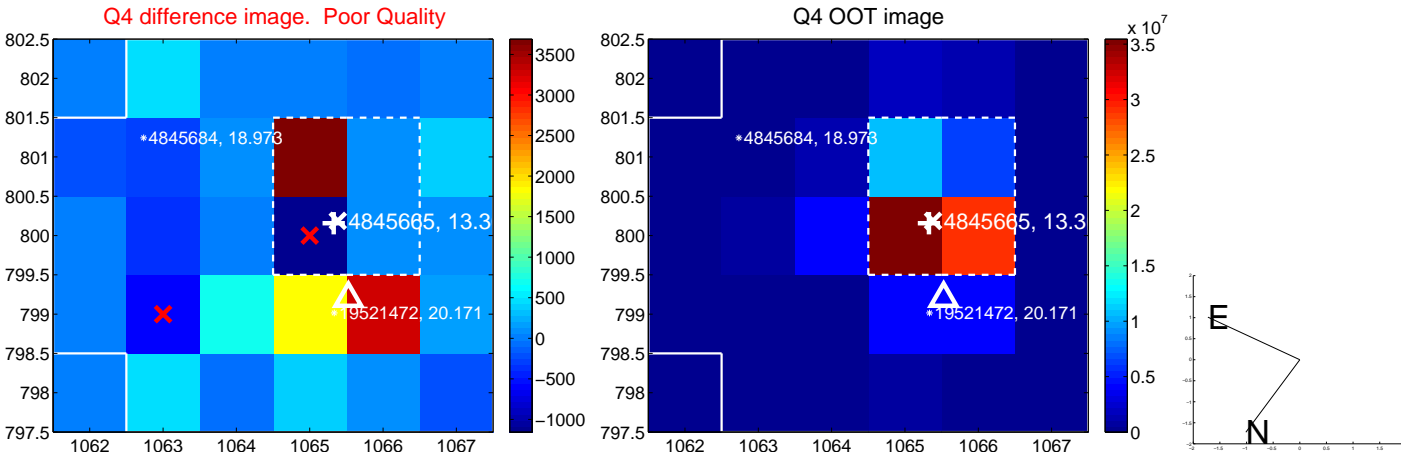
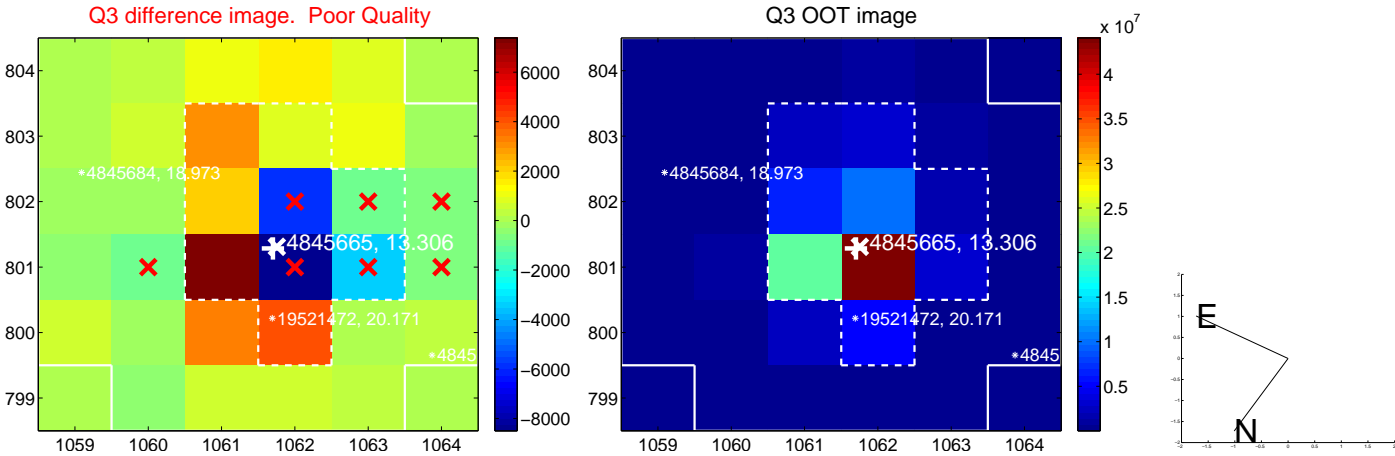
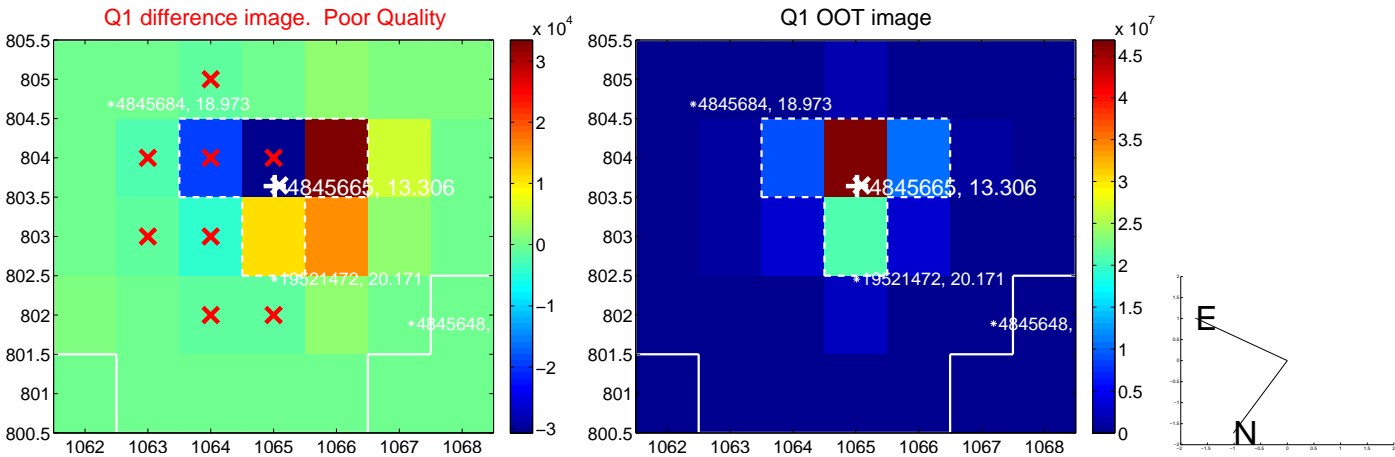


offset from photometric centroids

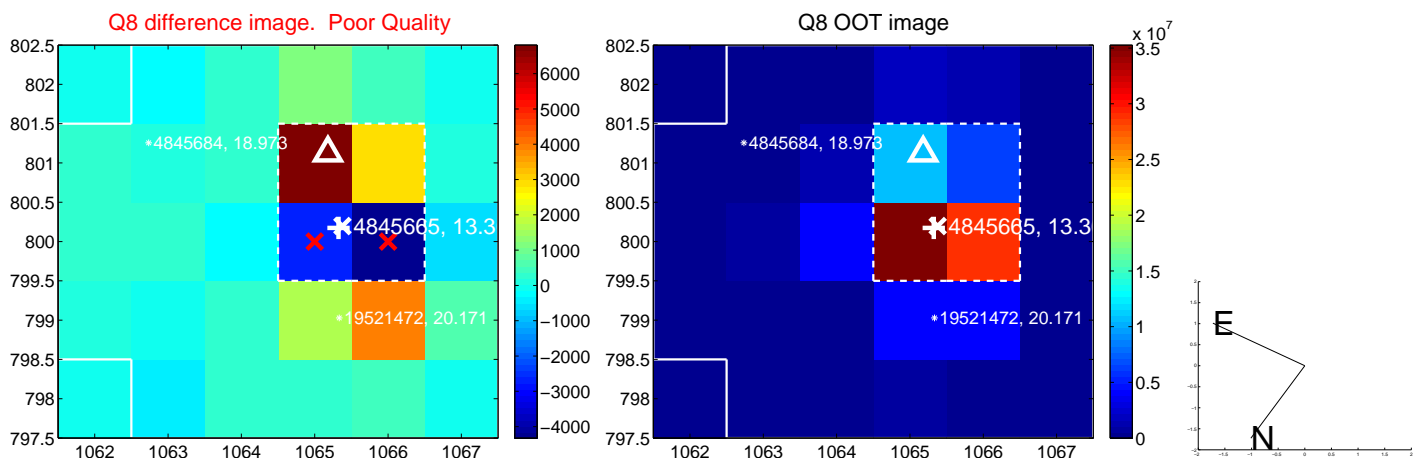
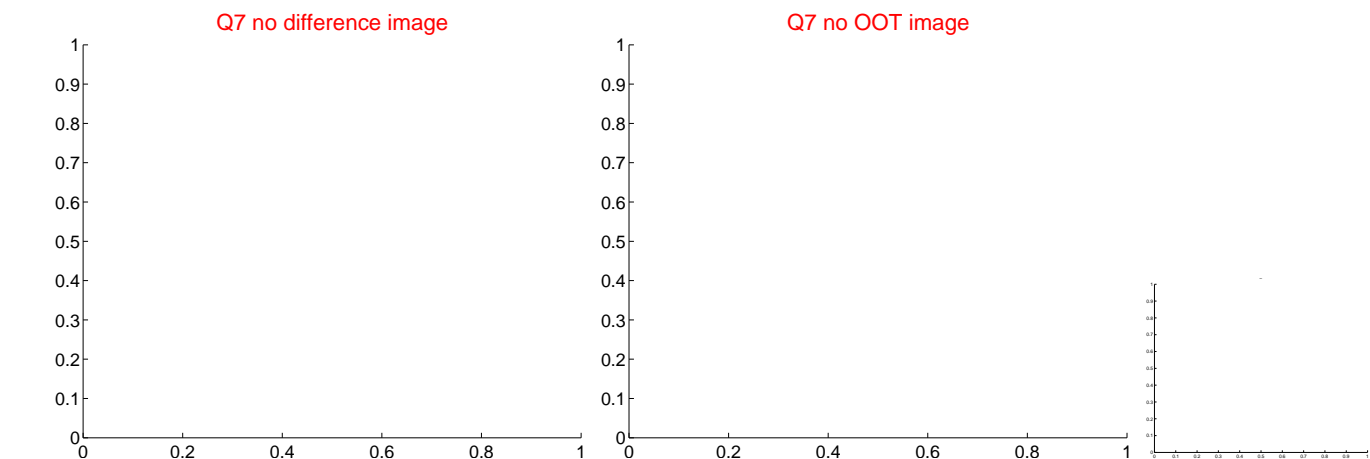
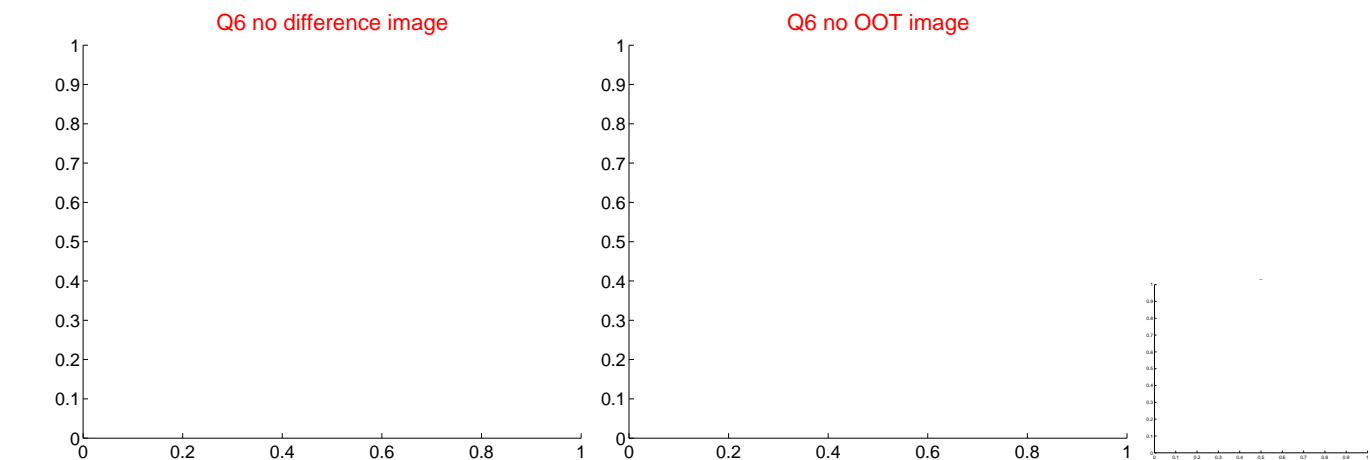
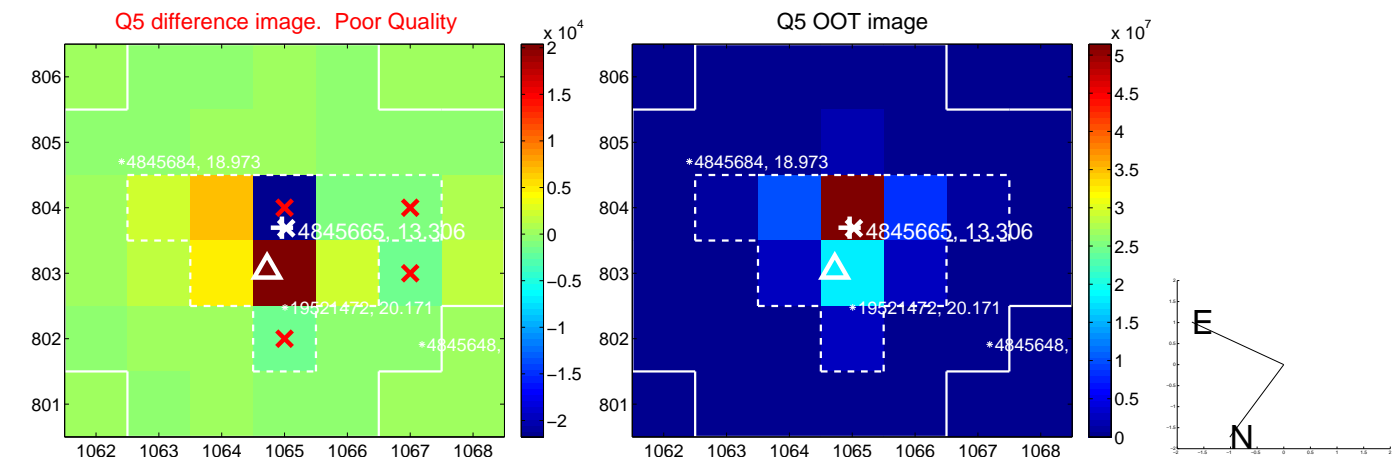


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

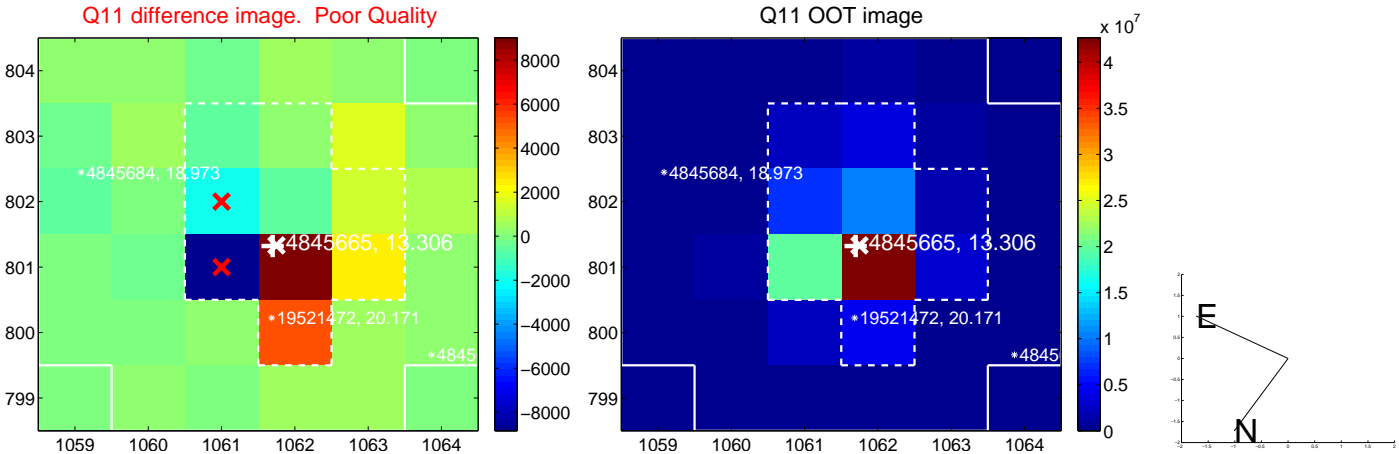
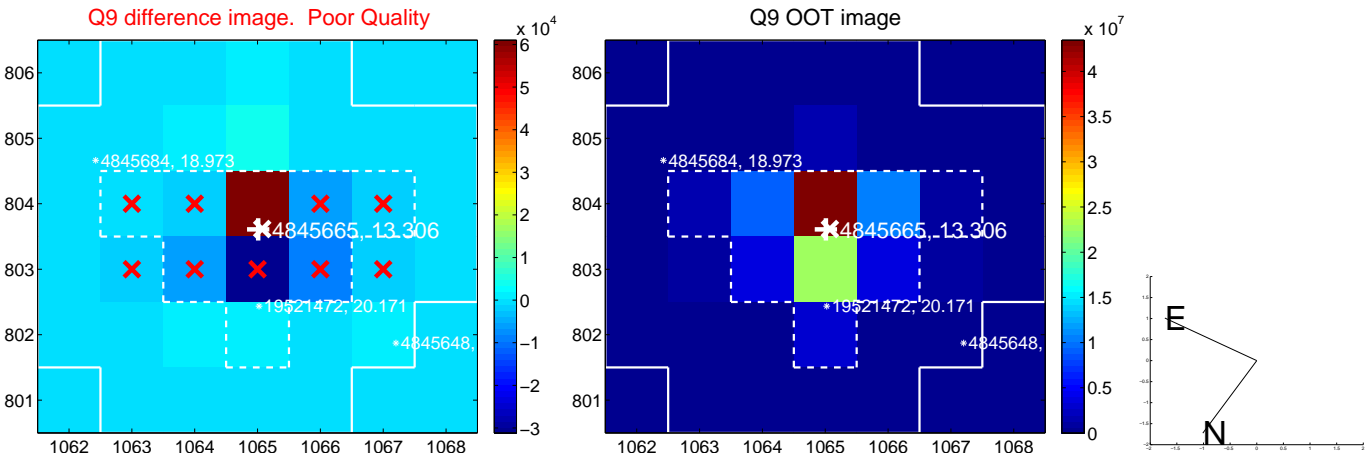
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



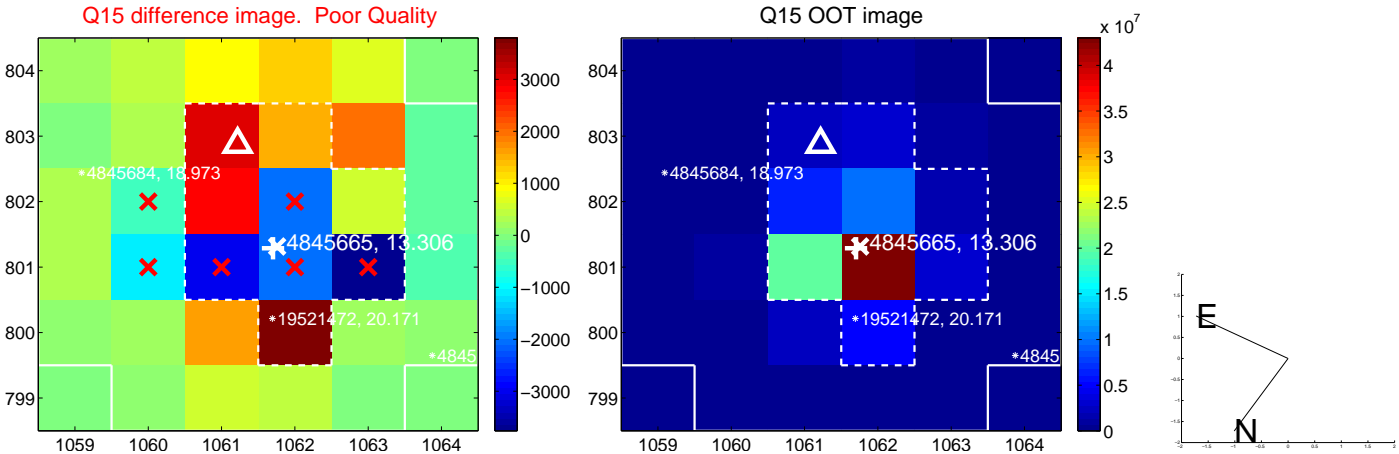
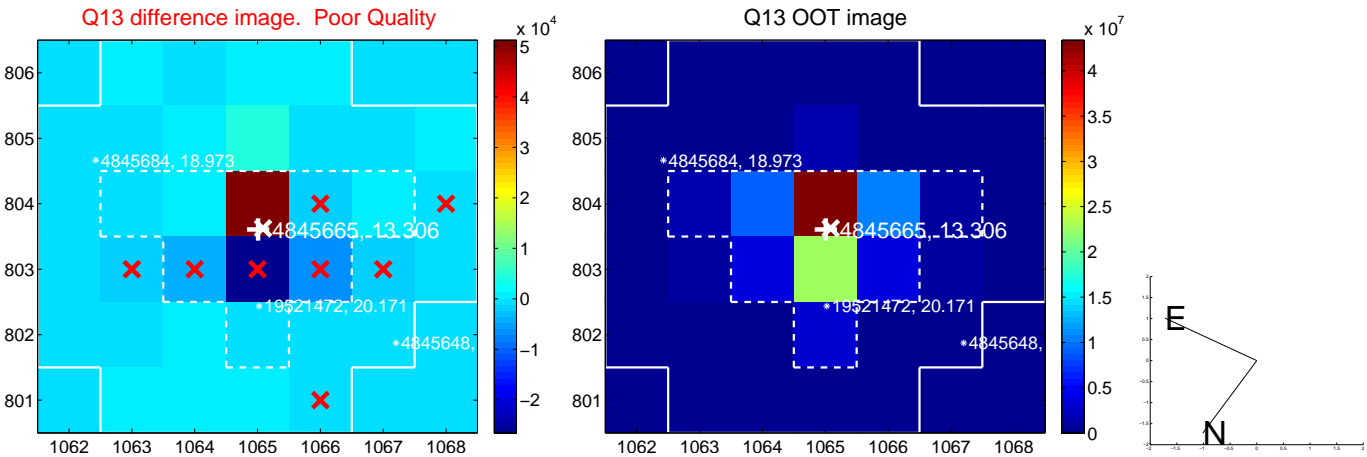
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



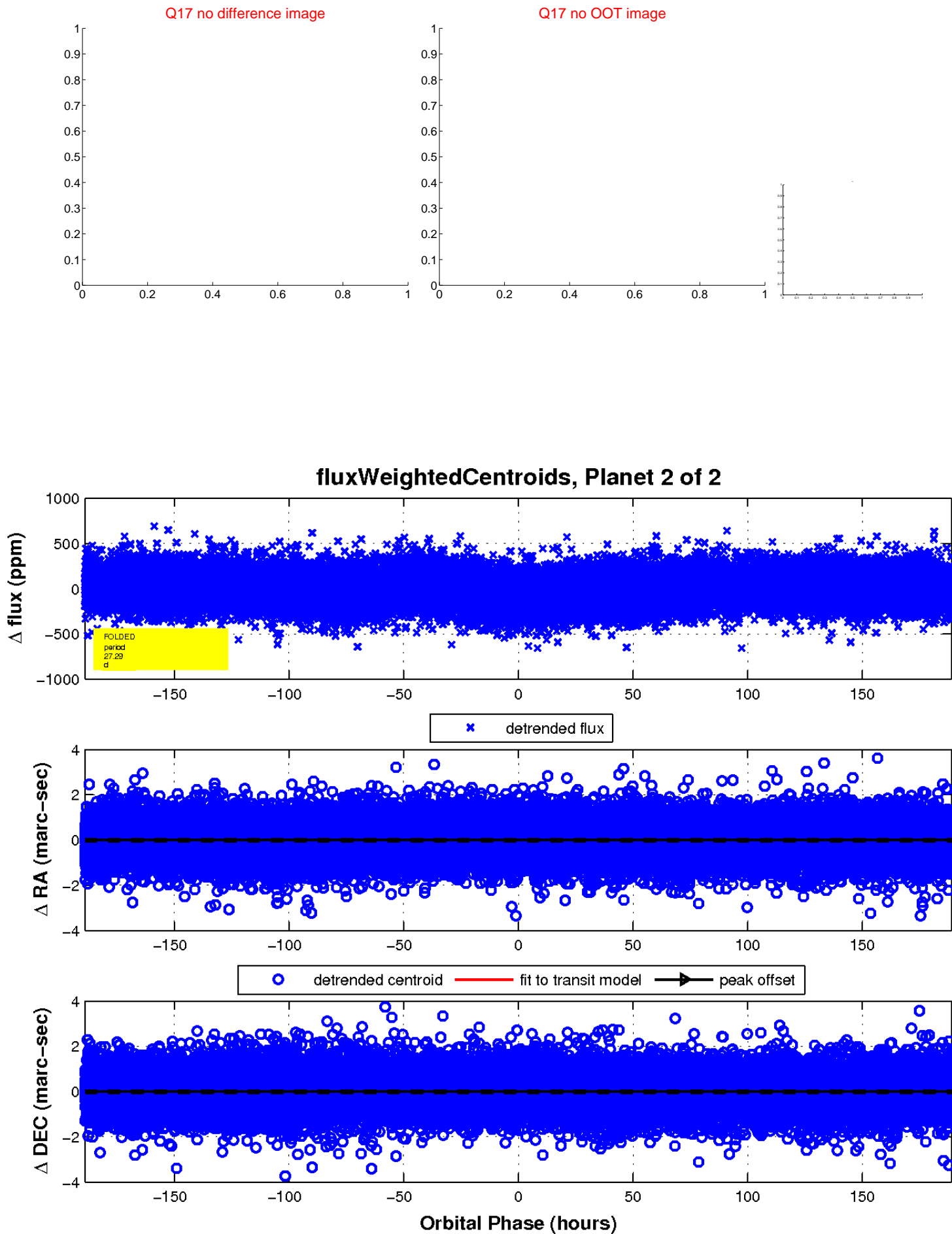
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : 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

