

# KIC 003340313

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003340313-01	OBS	3677.01	30.552860	143.348724	63060.2	5.323	555.6	558.9	1.17	6441	41.39	52.02
003340313-02	OBS	No	30.552880	158.870224	2171.1	4.523	19.2	21.5	1.17	6441	7.74	52.02

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003340313-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_KIC_POS
003340313-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_KIC_POS

**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.

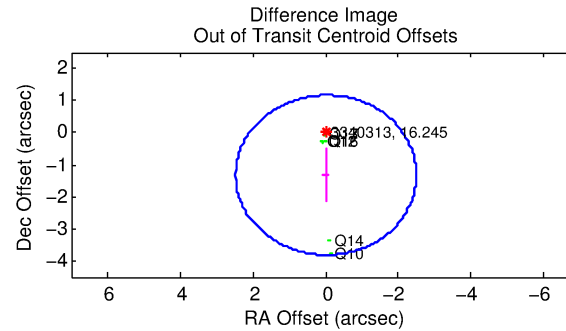
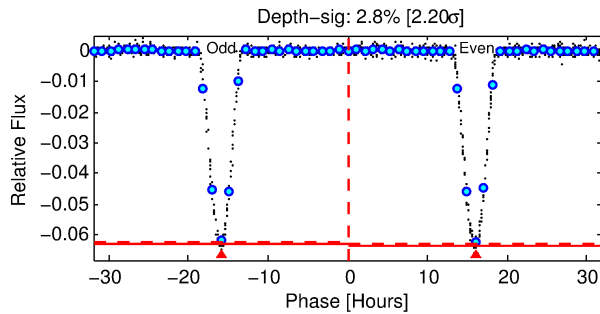
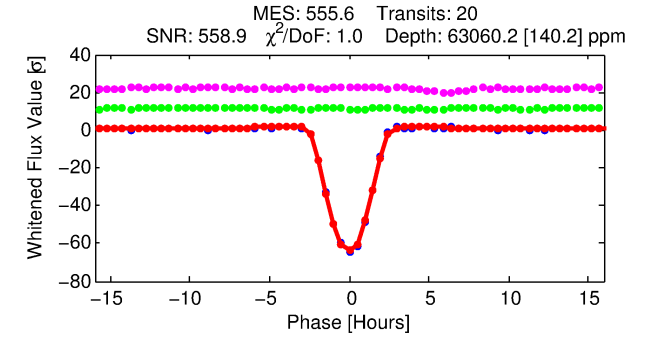
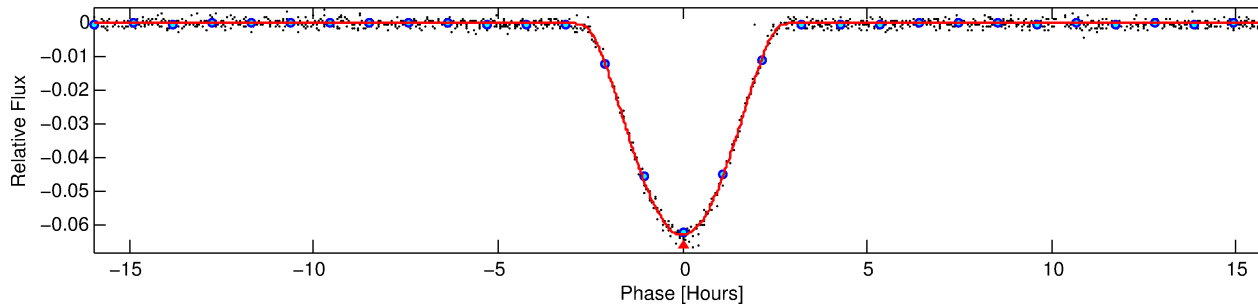
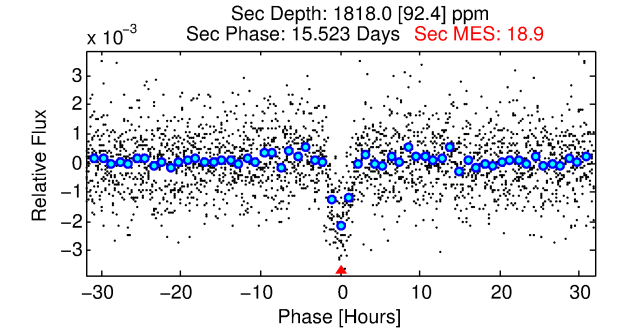
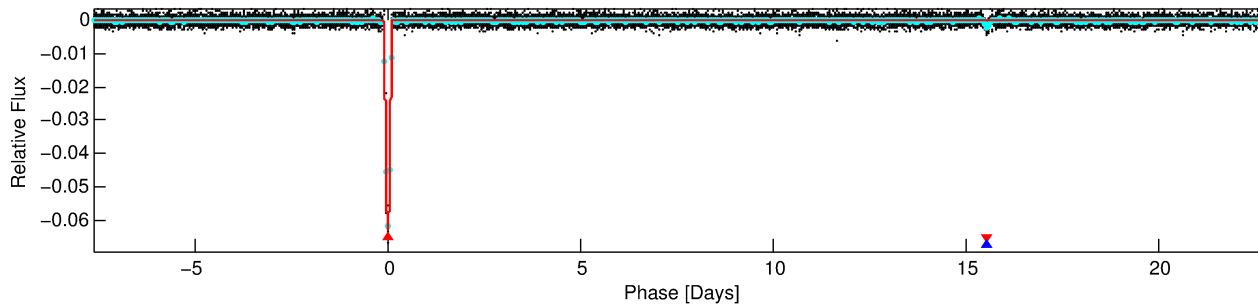
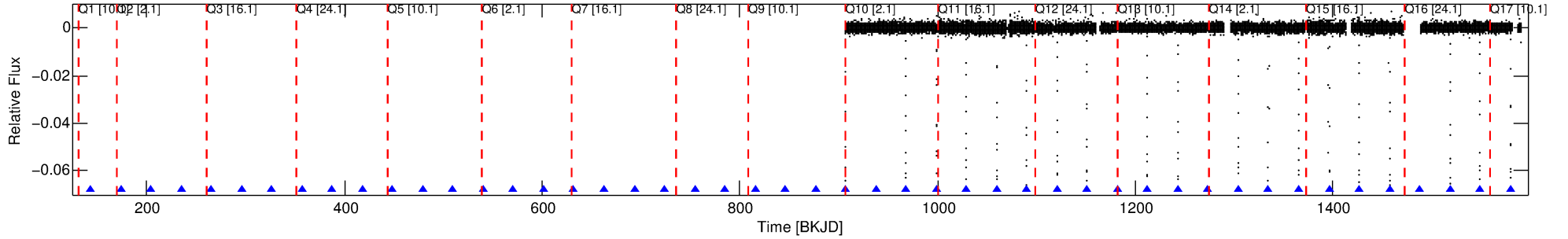
## Ephemeris Match Information For 003340313-01

No Significant Match Found

# DV One-Page Summary

KIC: 3340313 Candidate: 1 of 2 Period: 30.553 d  
KOI: K03677.01 Corr: 1.000

Kp: 16.25 R\*: 1.17 Rs Teff: 6441.0 K Logg: 4.37 Fe/H: -0.120



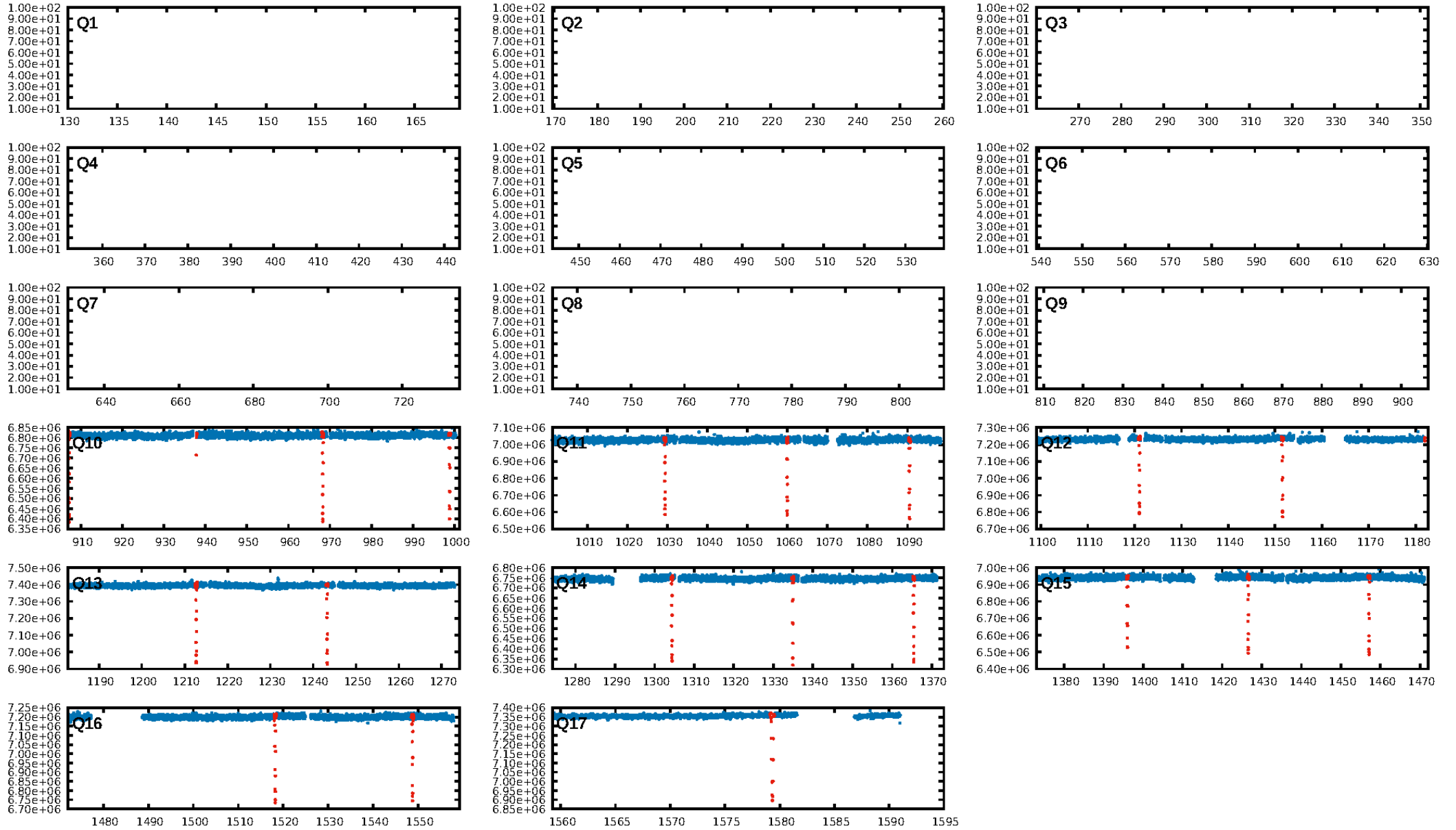
## DV Fit Results:

Period = 30.55286 [0.00002] d  
Epoch = 143.3487 [0.0006] BKJD  
Rp/R\* = 0.3256 [0.0270]  
a/R\* = 42.51 [0.26]  
b = 0.90 [0.04]  
Seff = 52.02 [21.32]  
Teq = 685 [70] K  
Rp = 41.39 [13.96] Re  
a = 0.2006 [0.0538] AU  
Ag = 23.49 [9.82] [2.29σ]  
Teffp = 2331 [135] K [10.84σ]

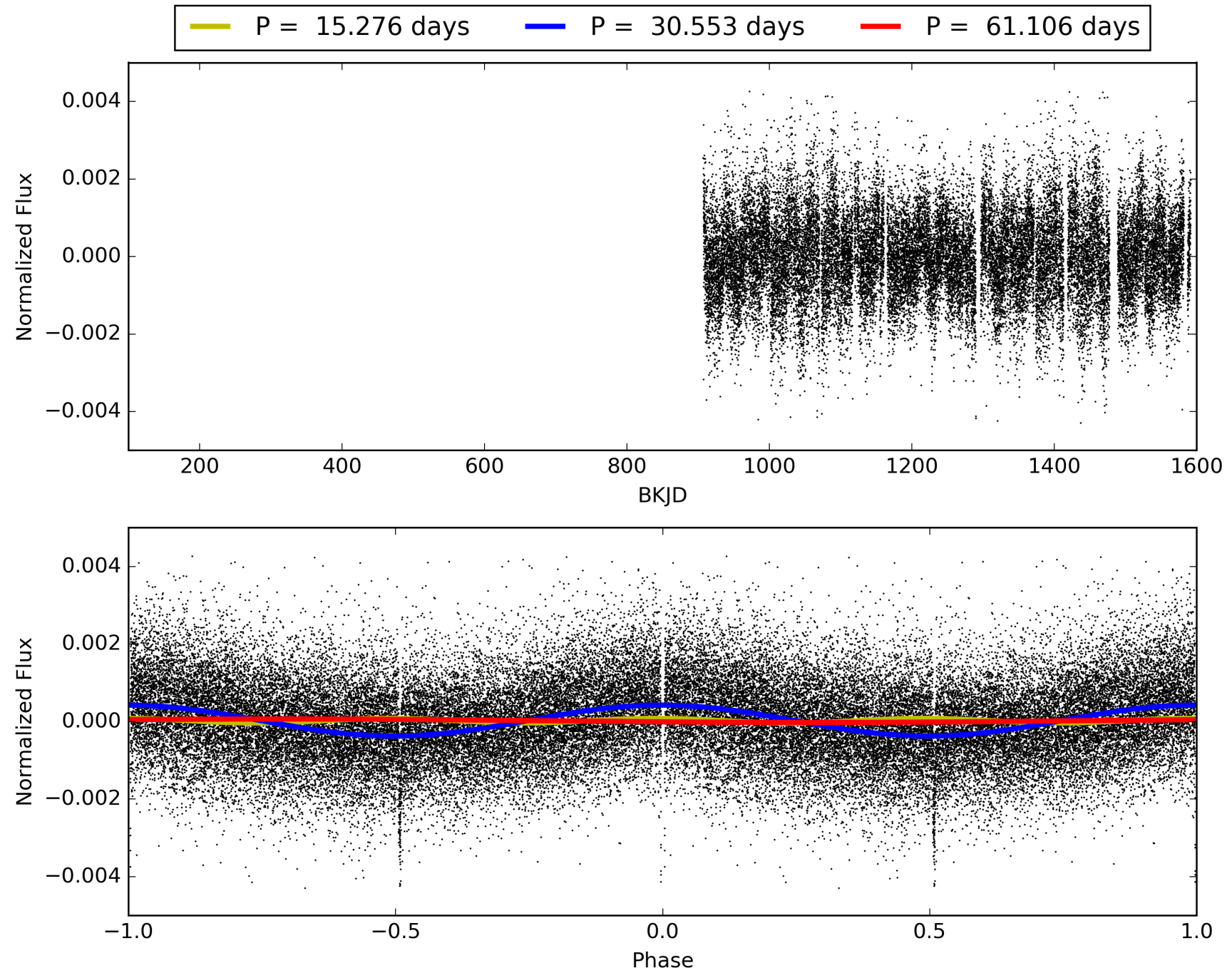
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 99.6%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [19/19]  
GhostDiagnostic-chr: 12.4  
Centroid-sig: 0.0%  
Centroid-so: 0.625 arcsec [32.04σ]  
OotOffset-rm: 1.325 arcsec [1.60σ]  
OotOffset-st: 2/0/2/2 [6]  
KicOffset-rm: 0.115 arcsec [1.30σ]  
KicOffset-st: 2/2/2/2 [8]  
DiffImageQuality-fgm: 1.00 [8/8]  
DiffImageOverlap-fno: 1.00 [8/8]

# TCE 003340313-01, PDC Light Curves

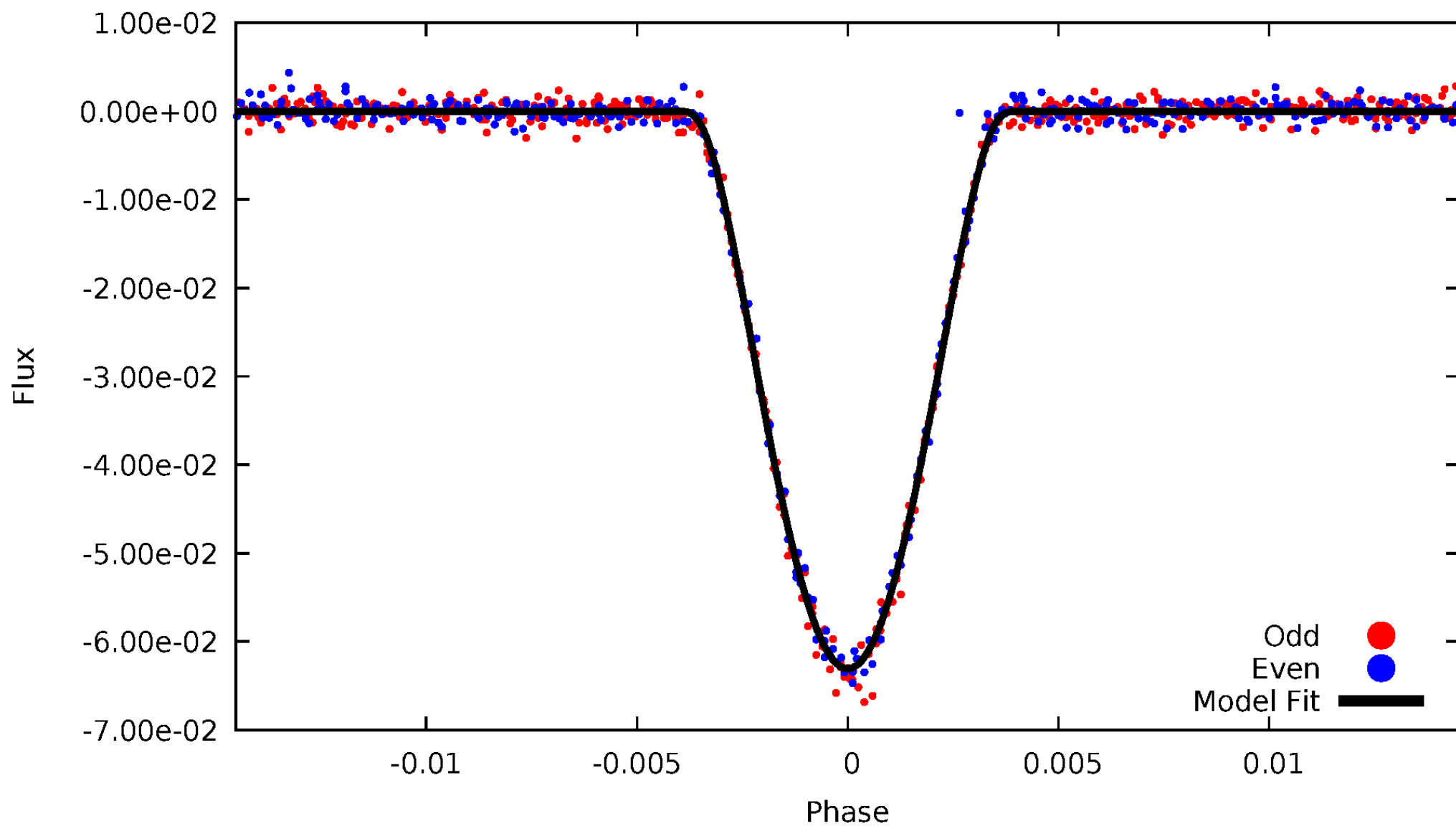


TCE 003340313-01



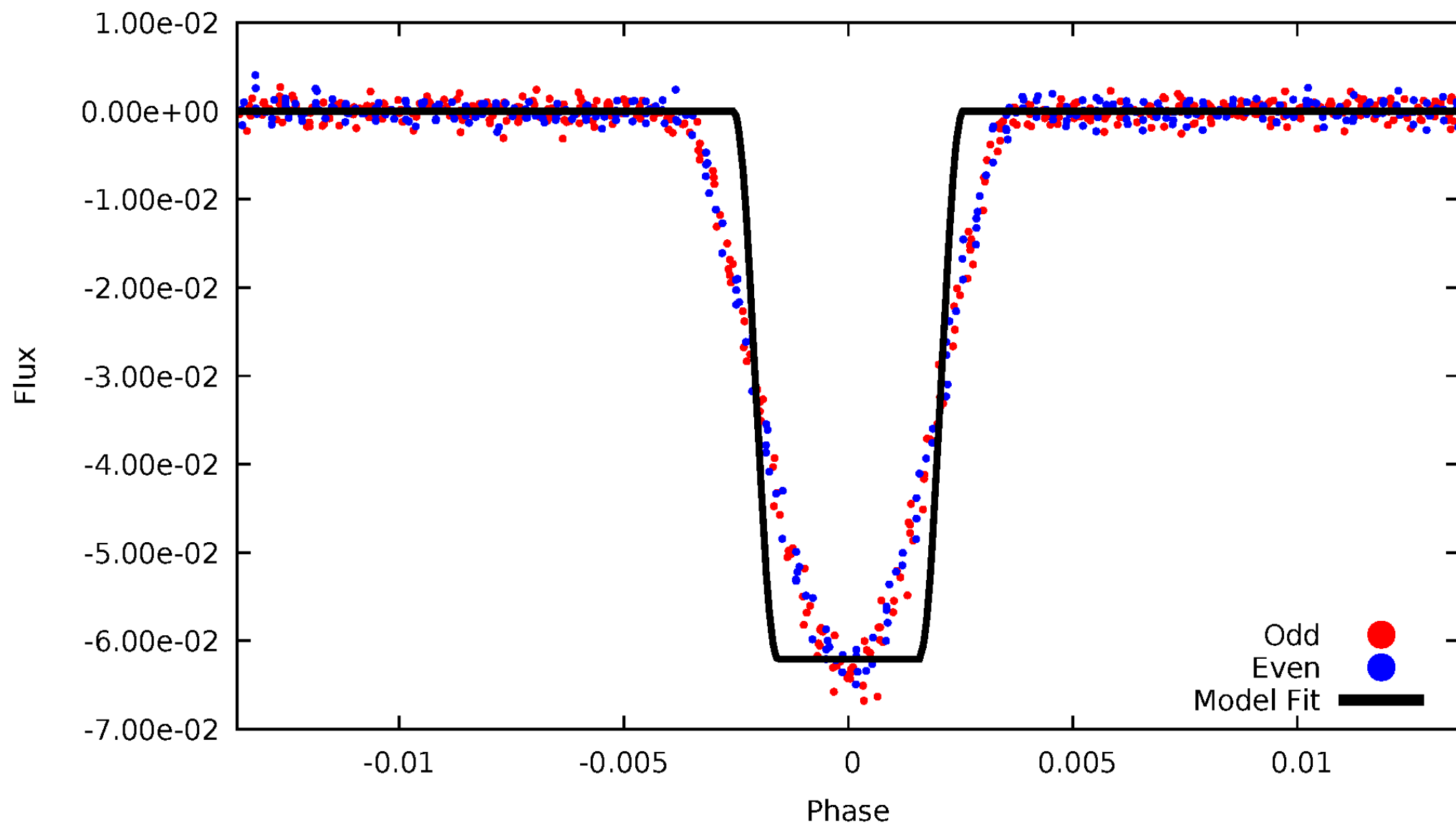
# DV Odd/Even

TCE 003340313-01



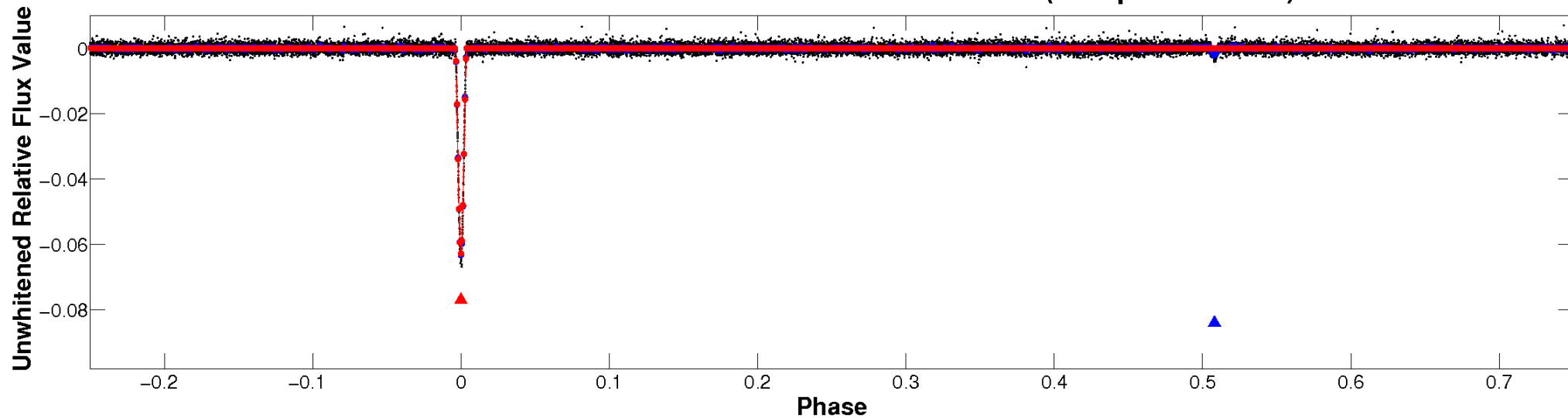
# ALT Odd/Even

TCE 003340313-01

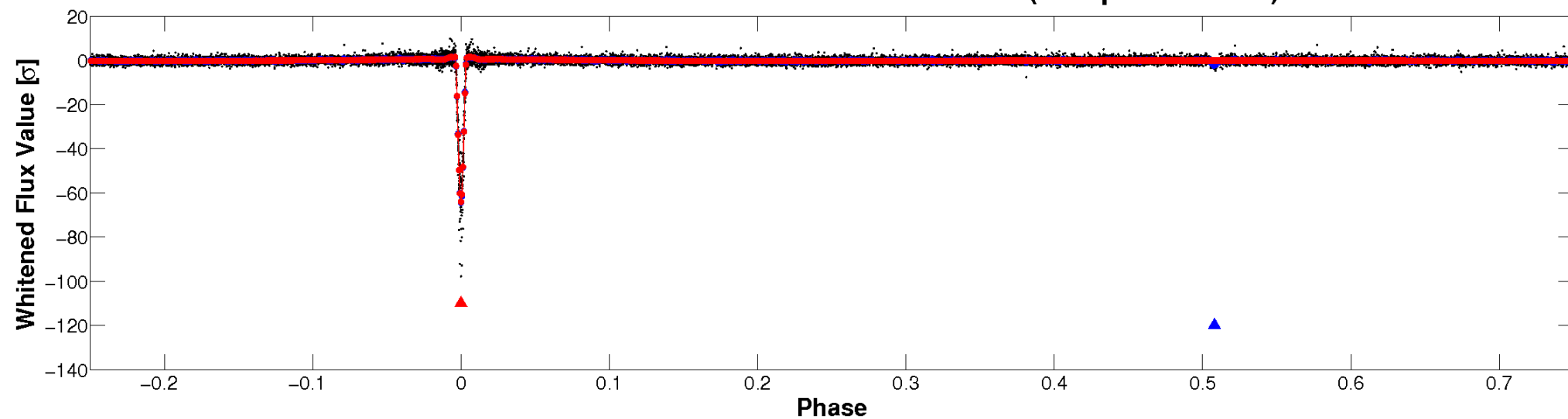


# Non-Whitened Vs. Whitened Light Curve

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

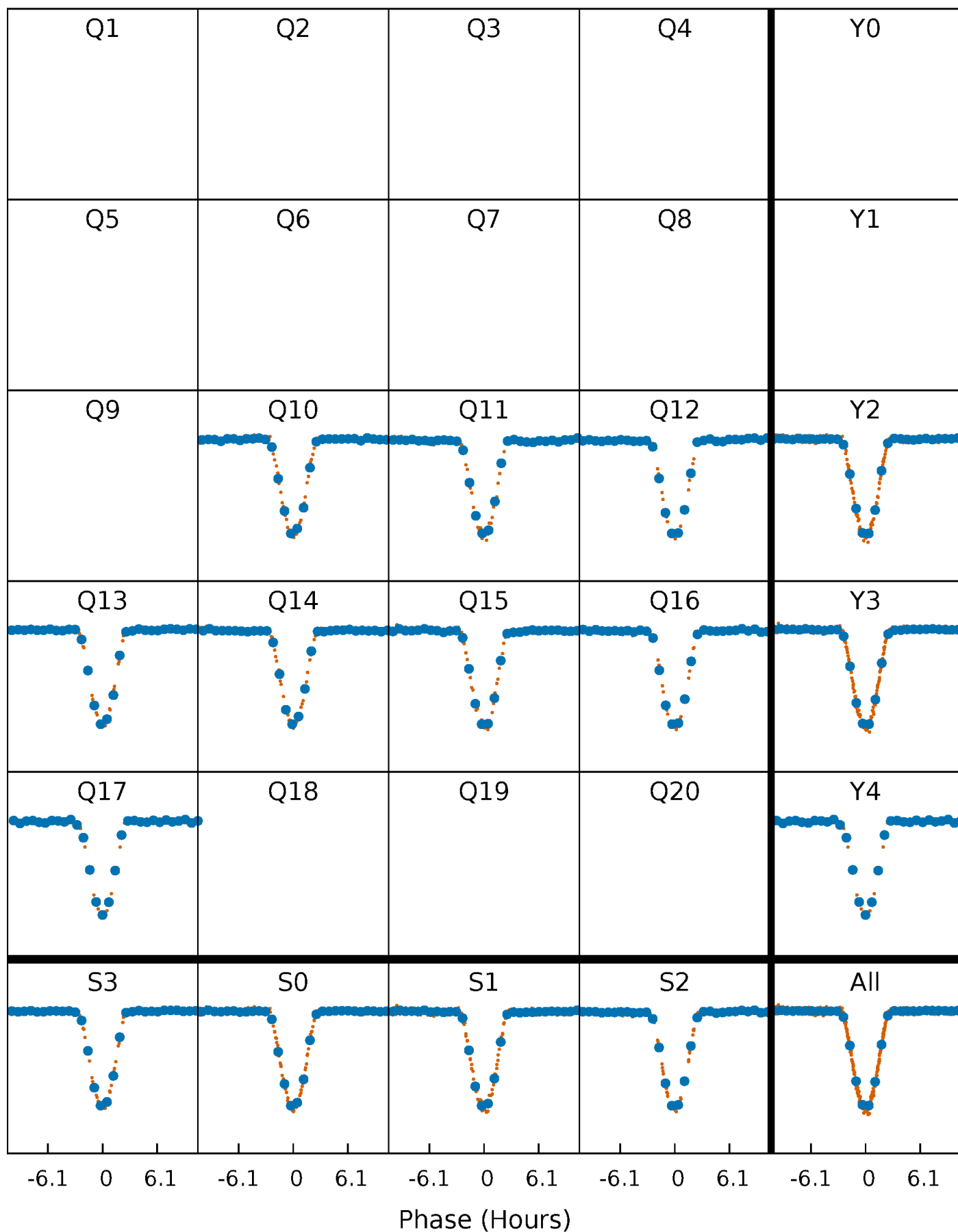


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

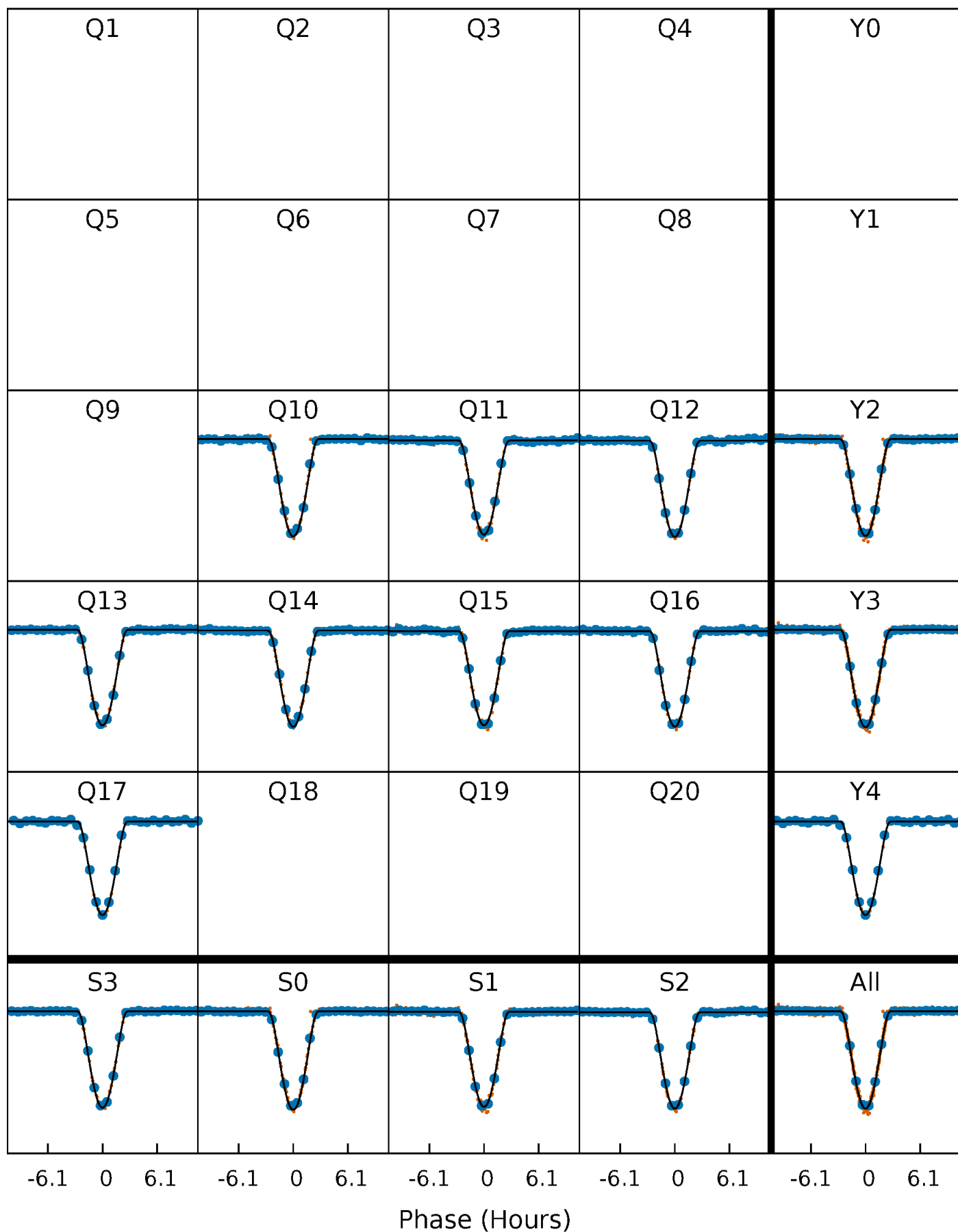
TCE 003340313-01 P= 30.552860 Days  $T_0=143.348724$  (BKJD)





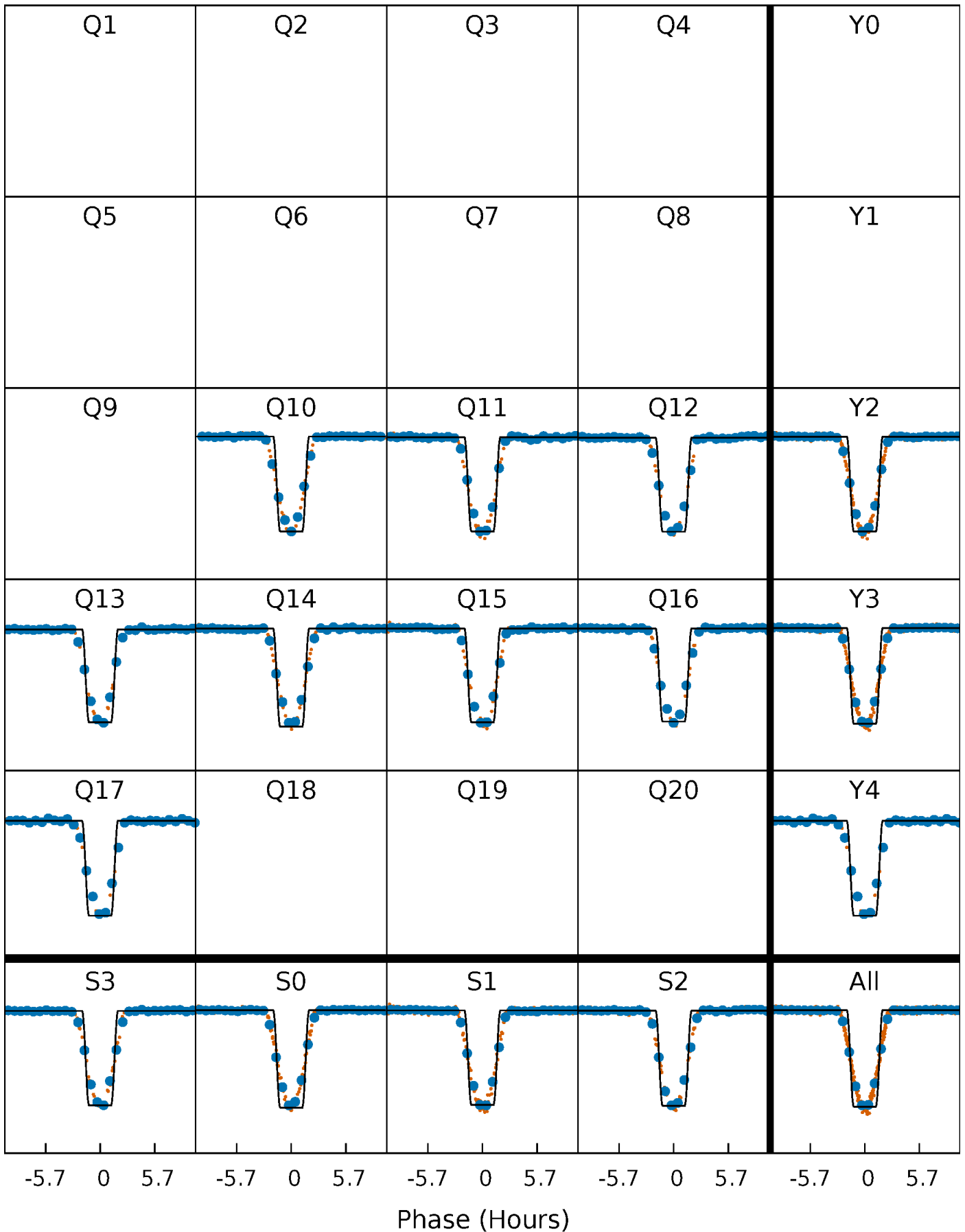
# DV Quarter-Phased Transit Curves

TCE 003340313-01 P= 30.552860 Days  $T_0=143.348724$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

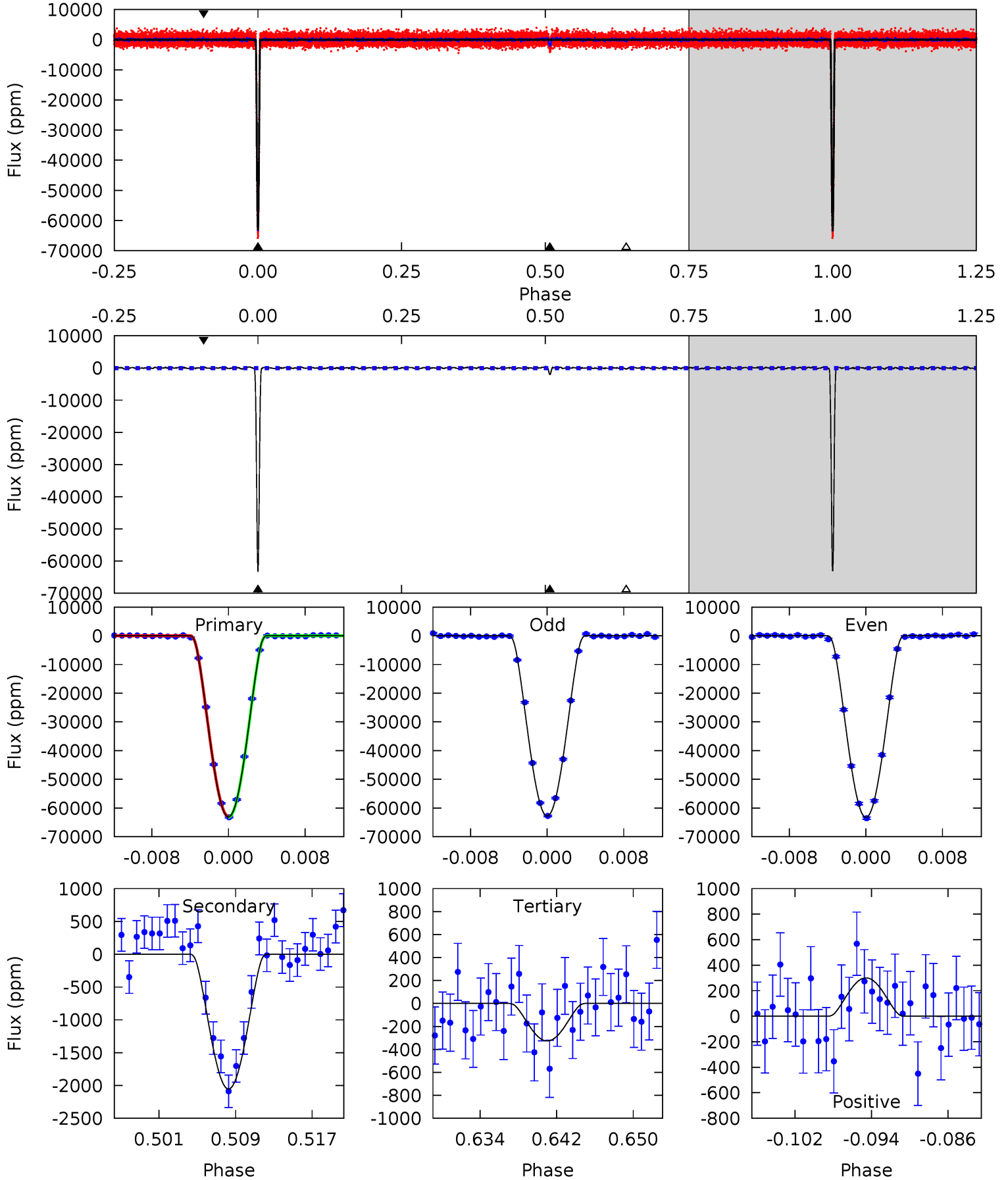
TCE 003340313-01 P= 30.552589 Days  $T_0=143.358519$  (BKJD)



# DV Model-Shift Uniqueness Test

003340313-01, P = 30.552860 Days, E = 143.348724 Days

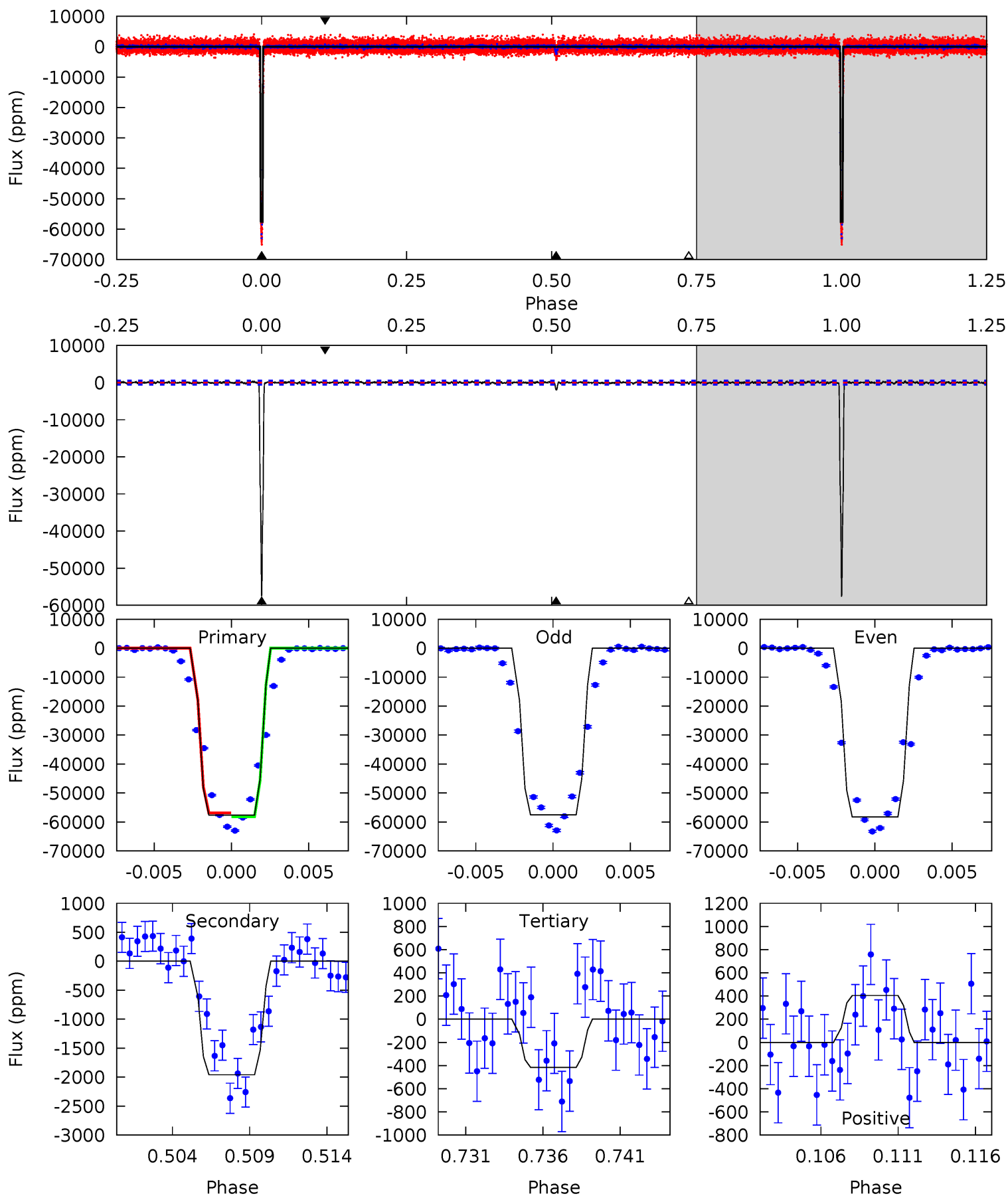
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
933.8	30.4	4.83	4.45	5.07	2.66	1.58	929.0	929.4	25.6	25.9	3.50	0.95	0.01	2.57



# Alt Model-Shift Uniqueness Test

003340313-01, P = 30.552589 Days, E = 143.358519 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
567.7	19.3	4.10	3.98	5.16	2.80	1.06	563.6	563.7	15.2	15.3	3.58	0.99	0.01	6.50



### Stellar Parameters For KIC 003340313

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6441^{+179}_{-246}$	$4.367^{+0.072}_{-0.203}$	$-0.120^{+0.250}_{-0.300}$	$1.165^{+0.381}_{-0.136}$	$1.152^{+0.185}_{-0.152}$	$1.026^{+0.399}_{-0.552}$
	+3%/-4%	+2%/-5%	+208%/-250%	+33%/-12%	+16%/-13%	+39%/-54%
Source	KIC0	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 003340313-01 / KOI 3677.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-2053 \pm 68$	$42.71^{+7.51}_{-5.43}$	$970^{+73}_{-53}$	$3045^{+93}_{-94}$	$24^{+7}_{-6}$
Alt.	$-1959 \pm 102$	$32.63^{+5.67}_{-4.45}$	$969^{+64}_{-46}$	$3277^{+128}_{-124}$	$41^{+12}_{-11}$

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

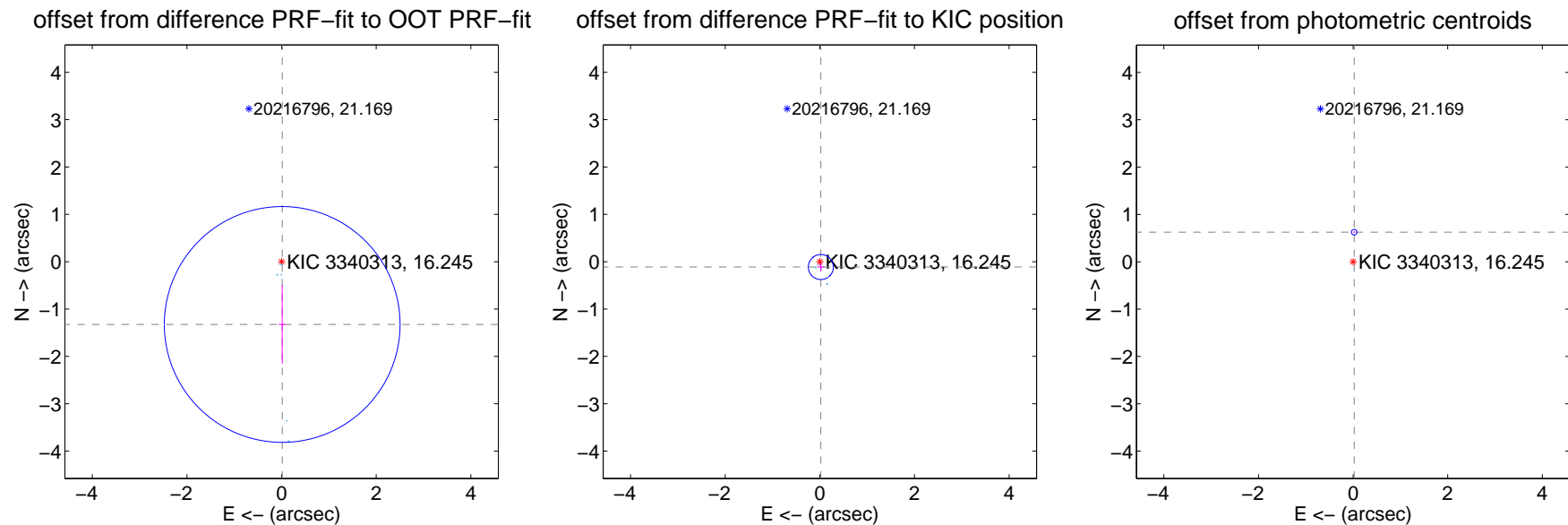
## DV Centroid Data

Supplemental centroid analysis for 003340313-01. Kepler magnitude: 16.25. Transit SNR 558.88

There are 8 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.325 \pm 0.830$	1.60	$-0.013 \pm 0.076$	$-1.325 \pm 0.830$
PRF-fit source offset from KIC position	$0.115 \pm 0.088$	1.30	$-0.022 \pm 0.073$	$-0.113 \pm 0.085$
photometric centroid source offset	$0.63 \pm 0.02$	32.04	$-0.02 \pm 0.01$	$0.62 \pm 0.02$



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.

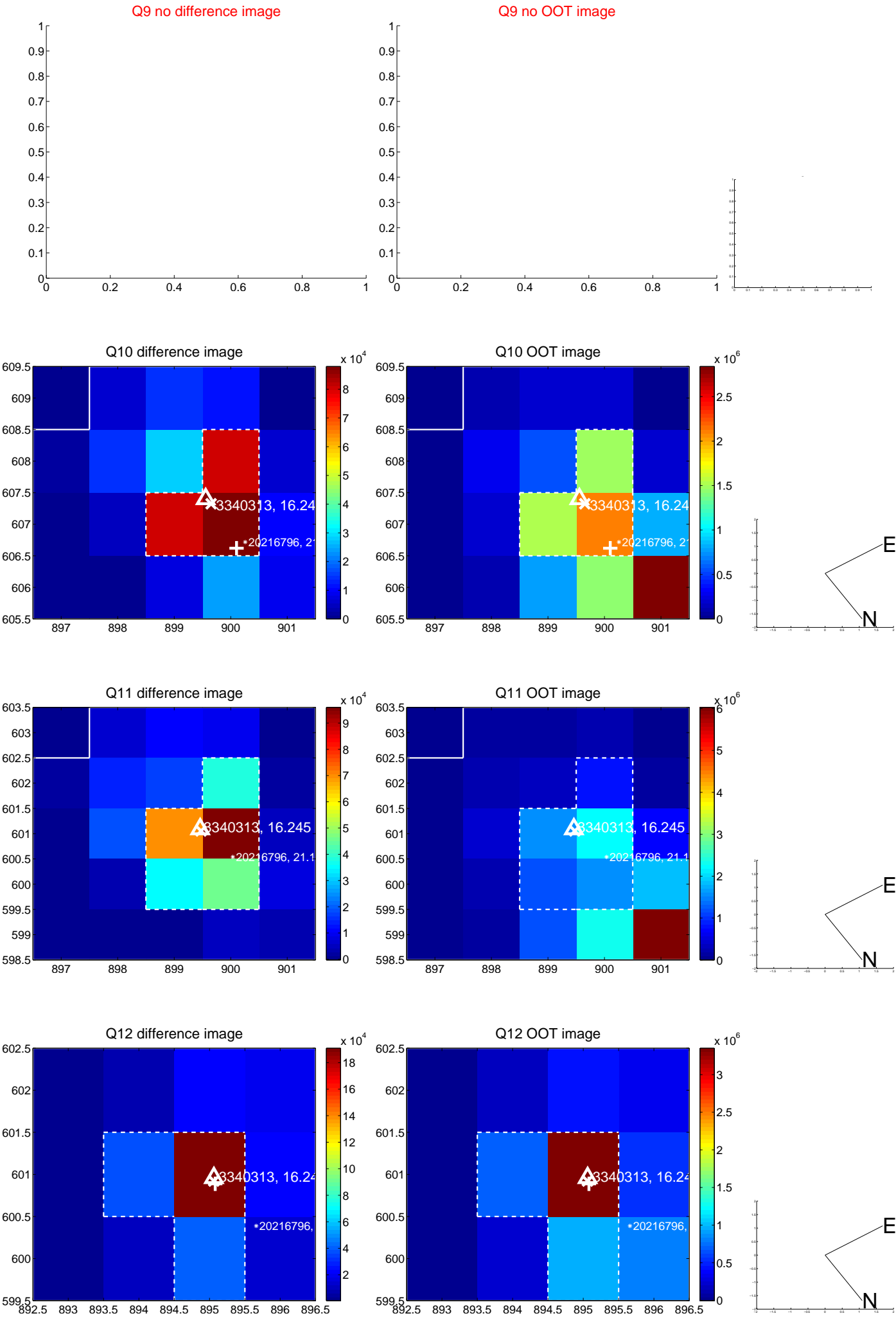


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

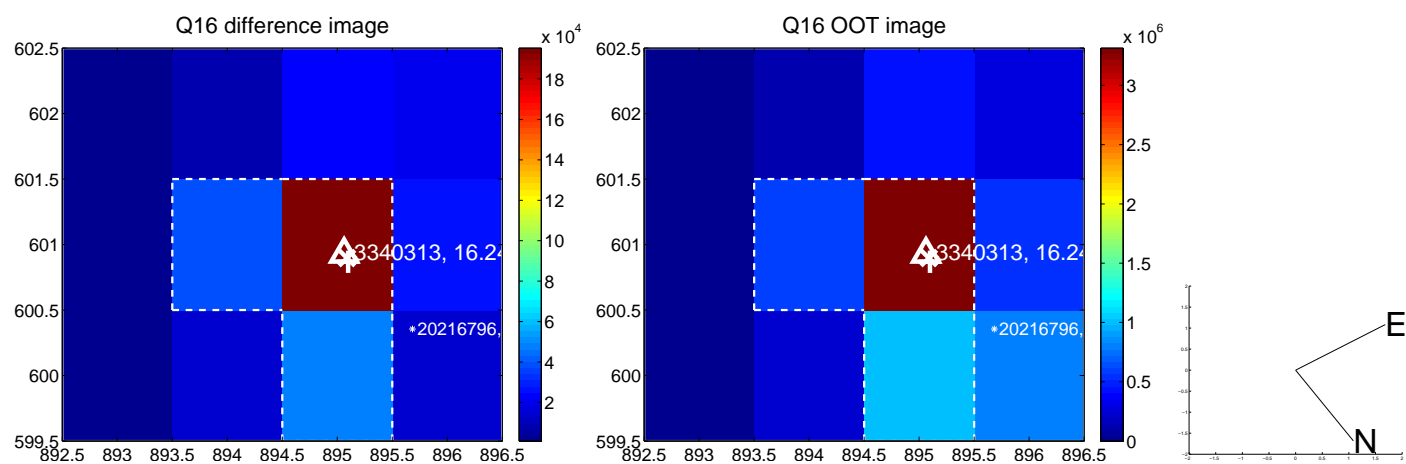
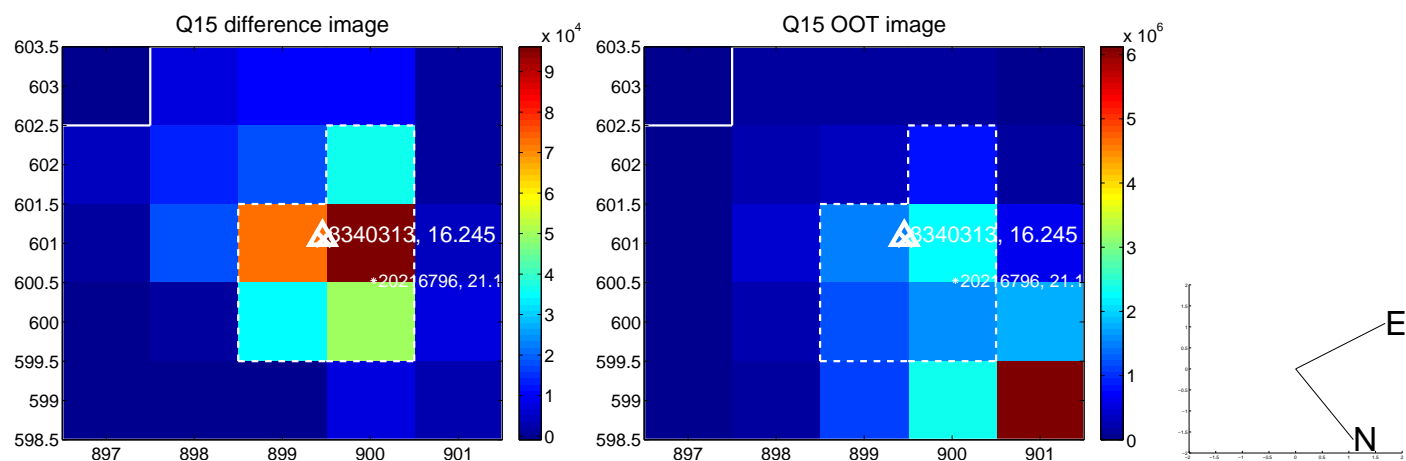
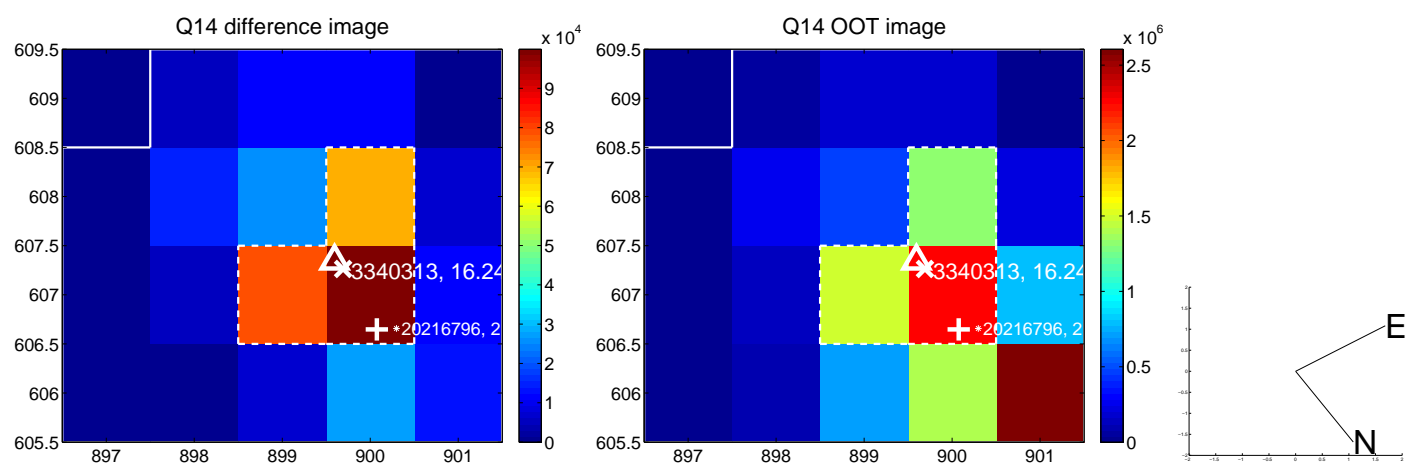
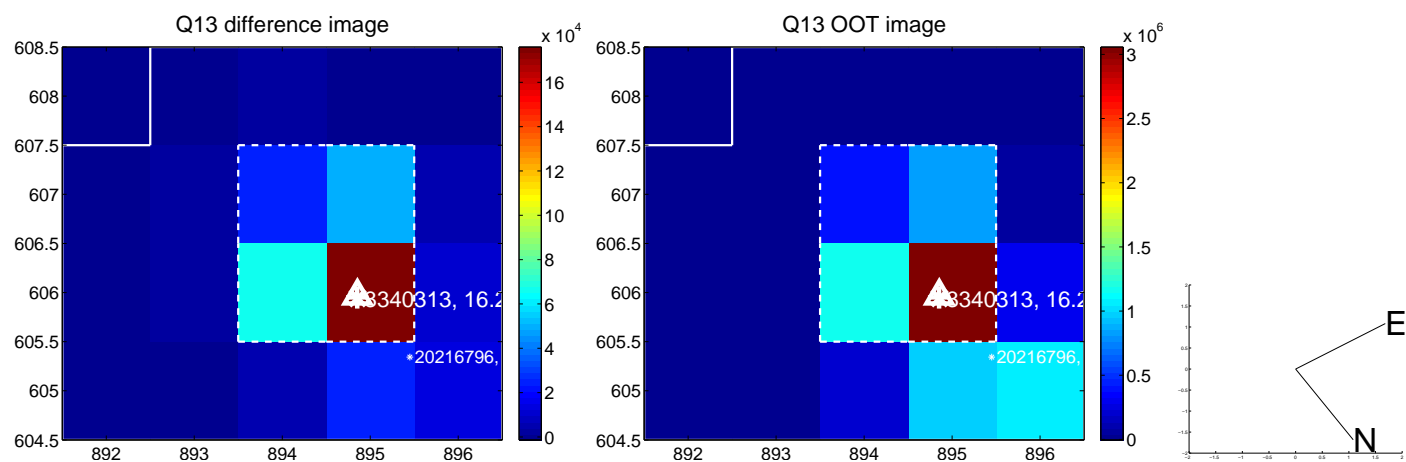




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

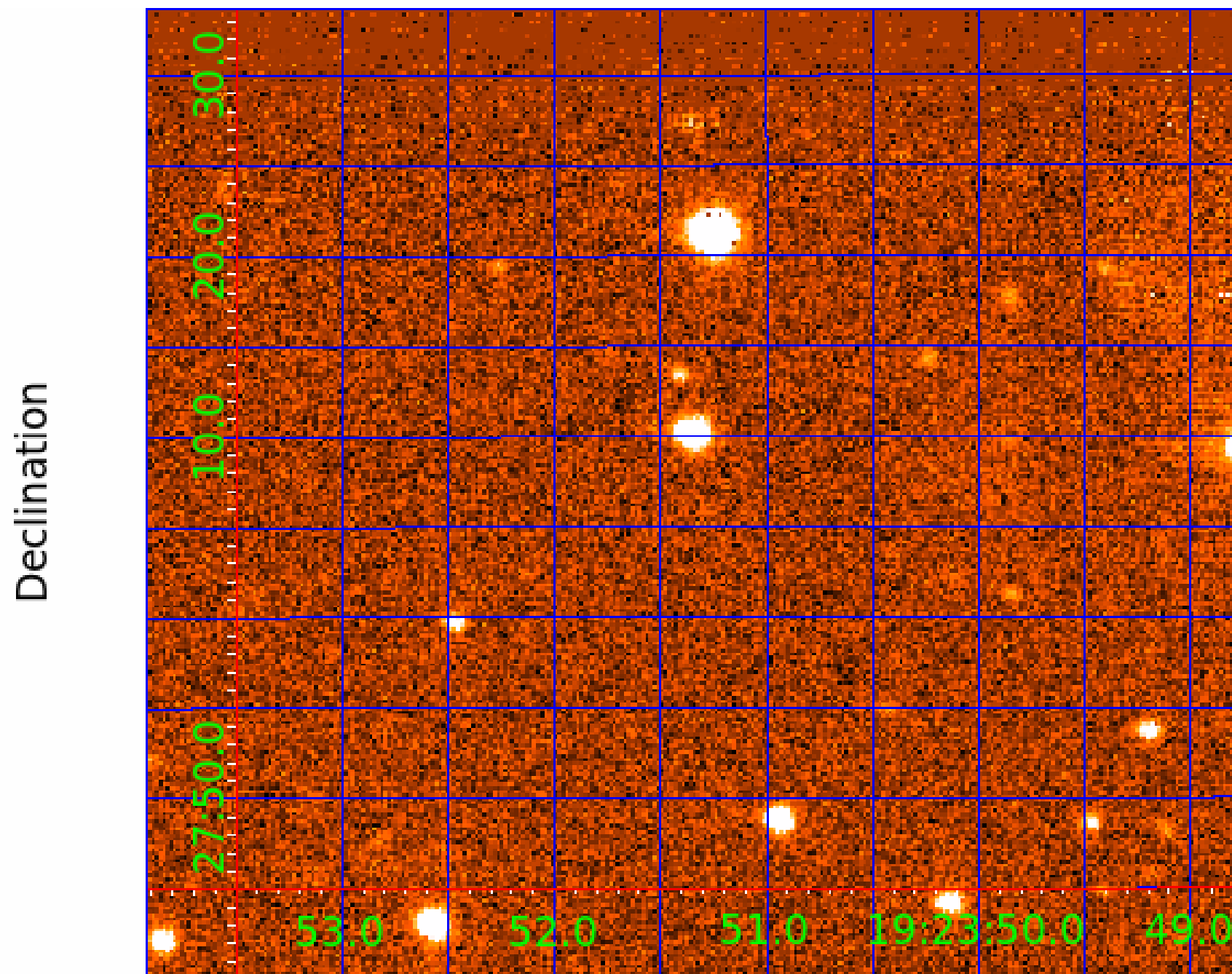


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value





UKIRT Image



# KIC 003340313

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003340313-01	OBS	3677.01	30.552860	143.348724	63060.2	5.323	555.6	558.9	1.17	6441	41.39	52.02
003340313-02	OBS	No	30.552880	158.870224	2171.1	4.523	19.2	21.5	1.17	6441	7.74	52.02

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003340313-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_KIC_POS
003340313-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_KIC_POS

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

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

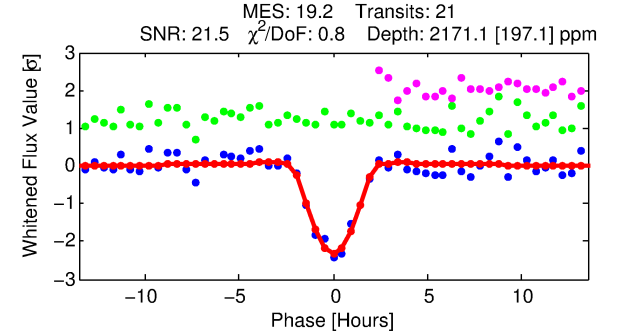
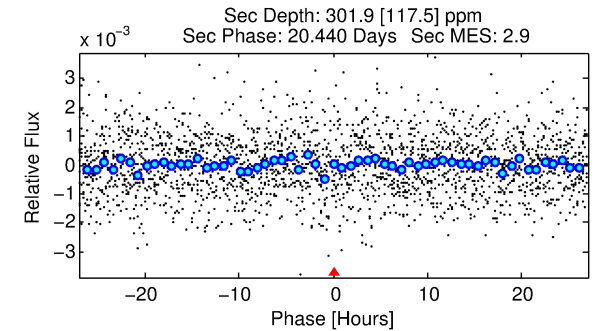
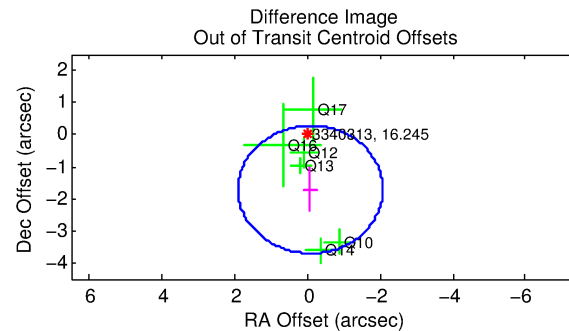
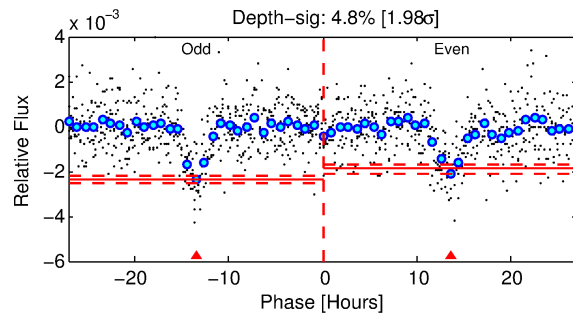
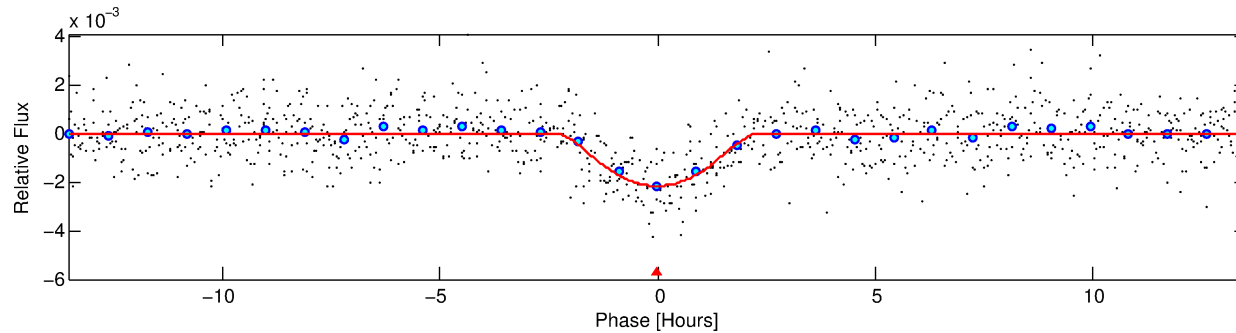
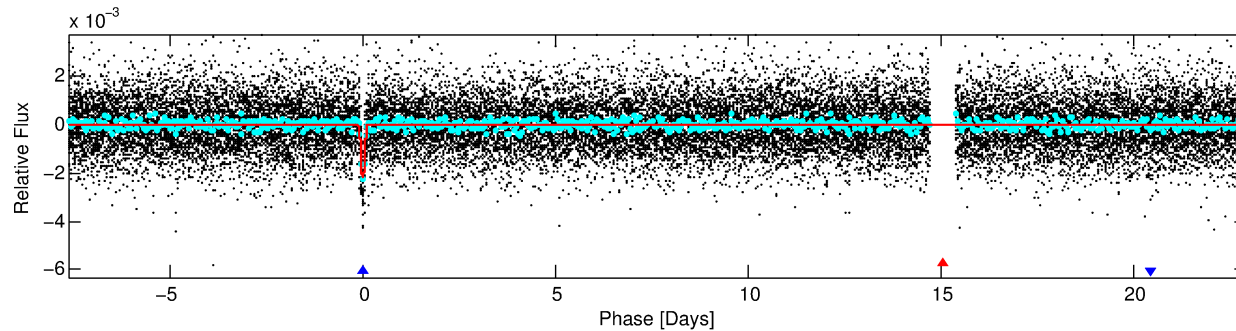
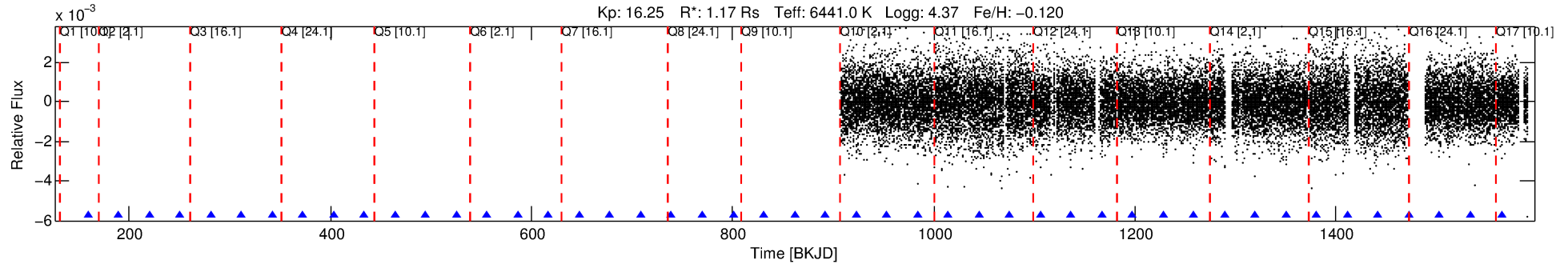
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 003340313-02

No Significant Match Found

# DV One-Page Summary

KIC: 3340313 Candidate: 2 of 2 Period: 30.553 d  
KOI: K03677 Corr: No Ephemeris Match



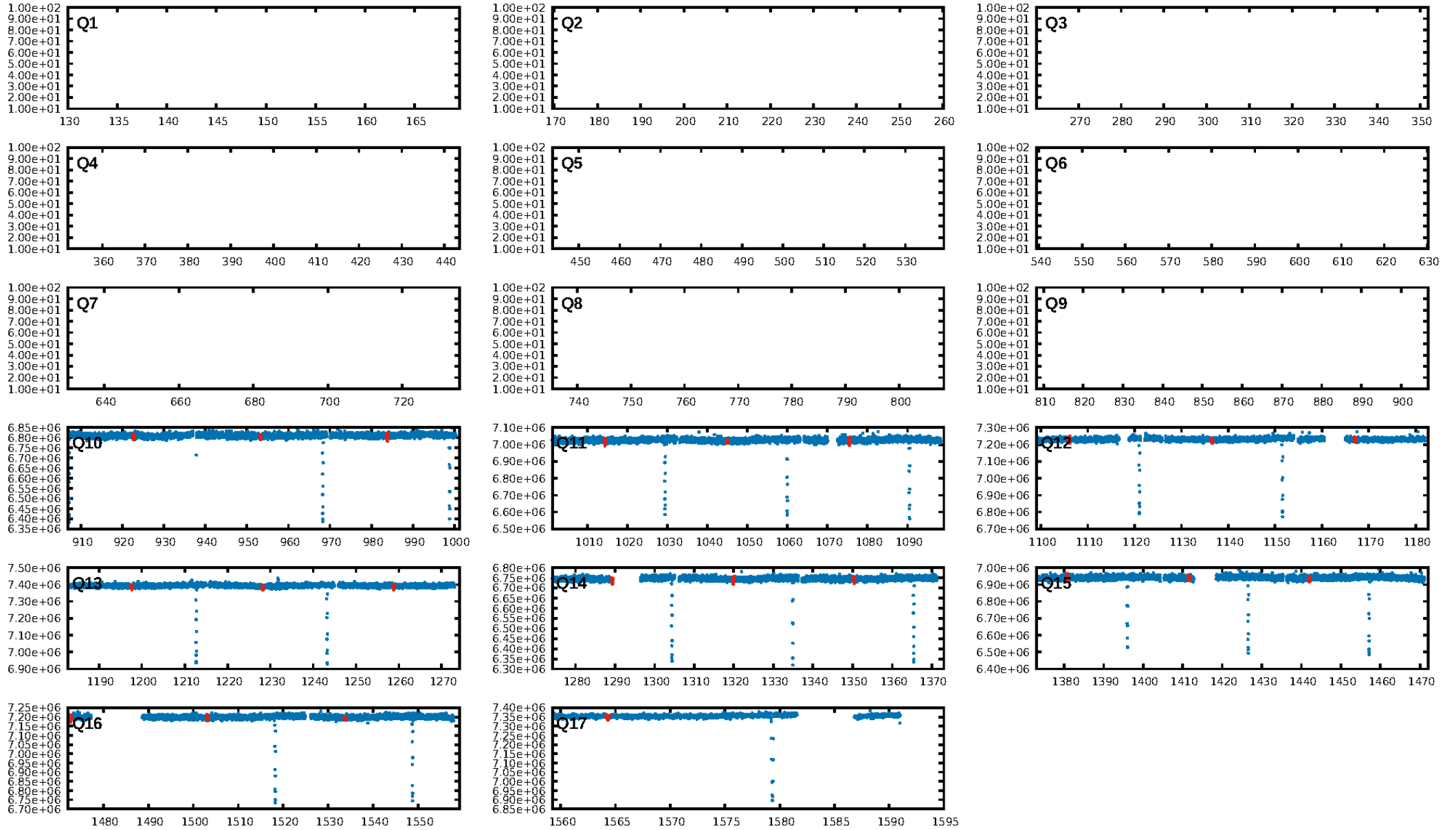
## DV Fit Results:

Period = 30.55288 [0.00042] d  
Epoch = 158.8702 [0.0152] BKJD  
Rp/R\* = 0.0608 [0.0405]  
a/R\* = 22.29 [6.07]  
b = 0.97 [0.08]  
Seff = 52.02 [21.32]  
Teq = 685 [70] K  
Rp = 7.74 [5.73] Re  
a = 0.2006 [0.0538] AU  
Ag = 111.68 [160.52] [0.69 $\sigma$ ]  
Teffp = 3442 [1200] K [2.29 $\sigma$ ]

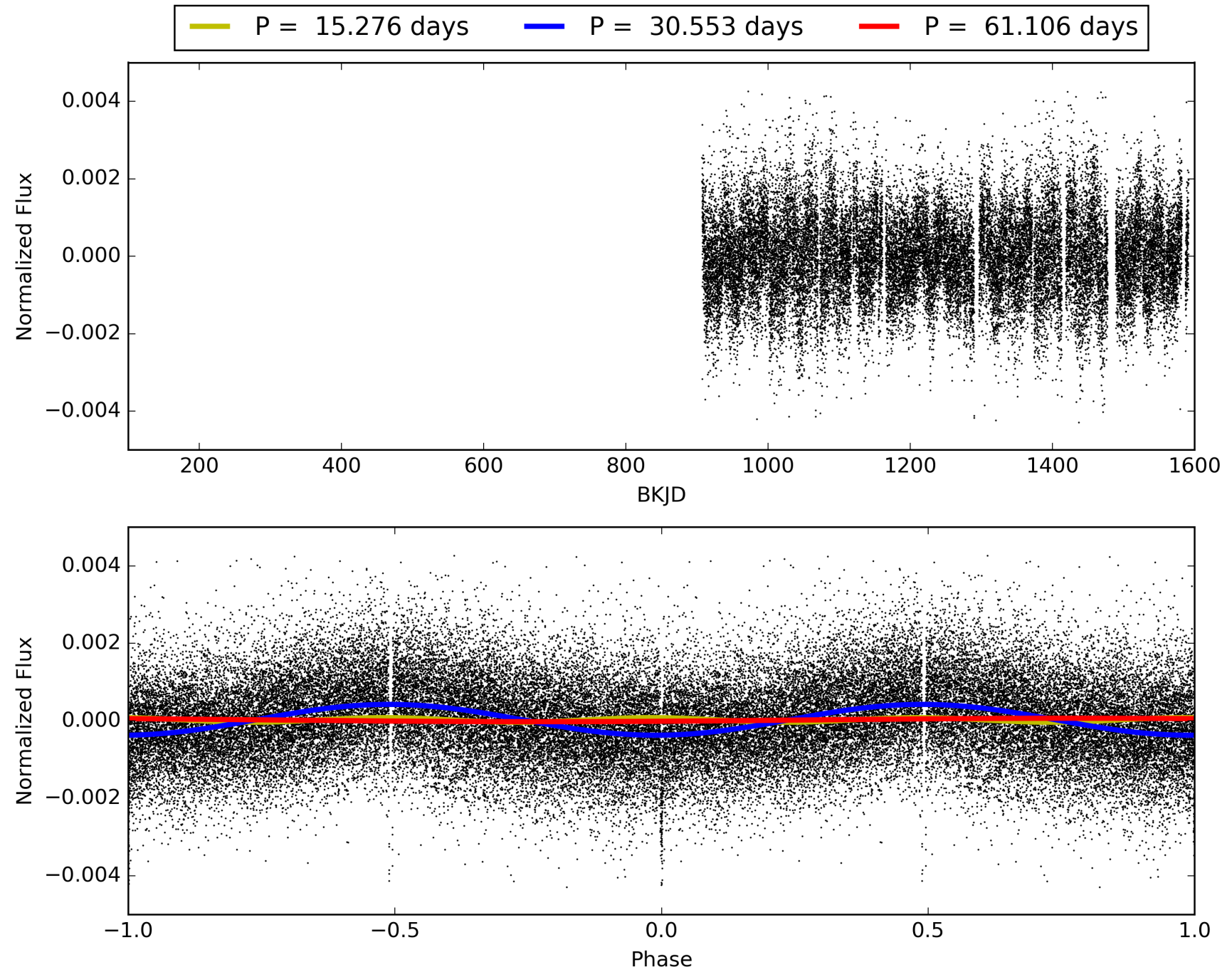
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 84.1%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 4.52e-80  
RollingBand-fgt: 1.00 [20/20]  
GhostDiagnostic-chr: 4.601  
Centroid-sig: 0.0%  
Centroid-so: 0.488 arcsec [0.99 $\sigma$ ]  
OotOffset-rm: 1.716 arcsec [2.58 $\sigma$ ]  
KicOffset-rm: 0.558 arcsec [2.02 $\sigma$ ]  
OotOffset-st: 2/0/2/2 [6]  
KicOffset-st: 2/2/2/2 [8]  
DiffImageQuality-fgm: 0.88 [7/8]  
DiffImageOverlap-fno: 1.00 [8/8]

# TCE 003340313-02, PDC Light Curves



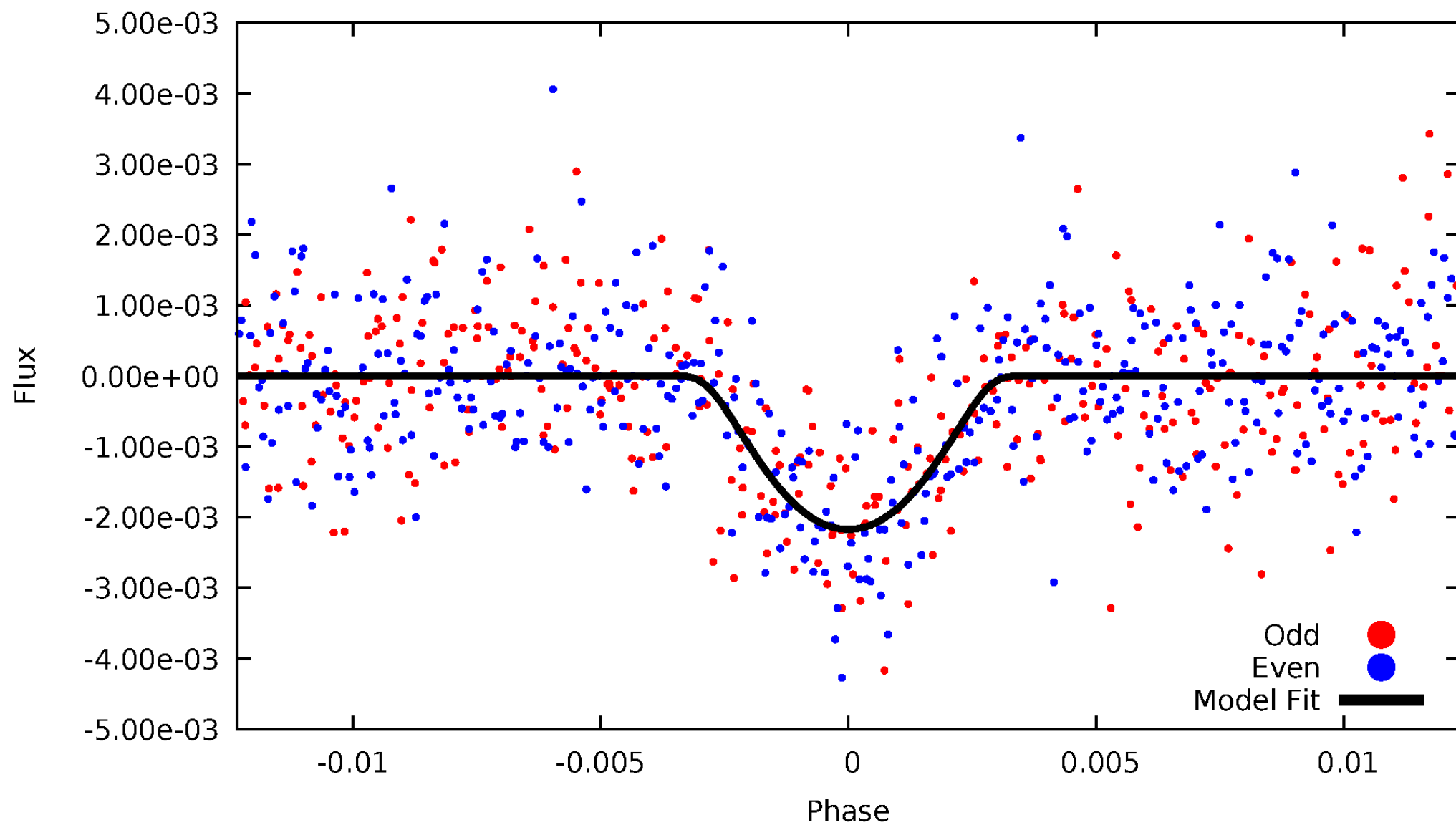
# TCE 003340313-02





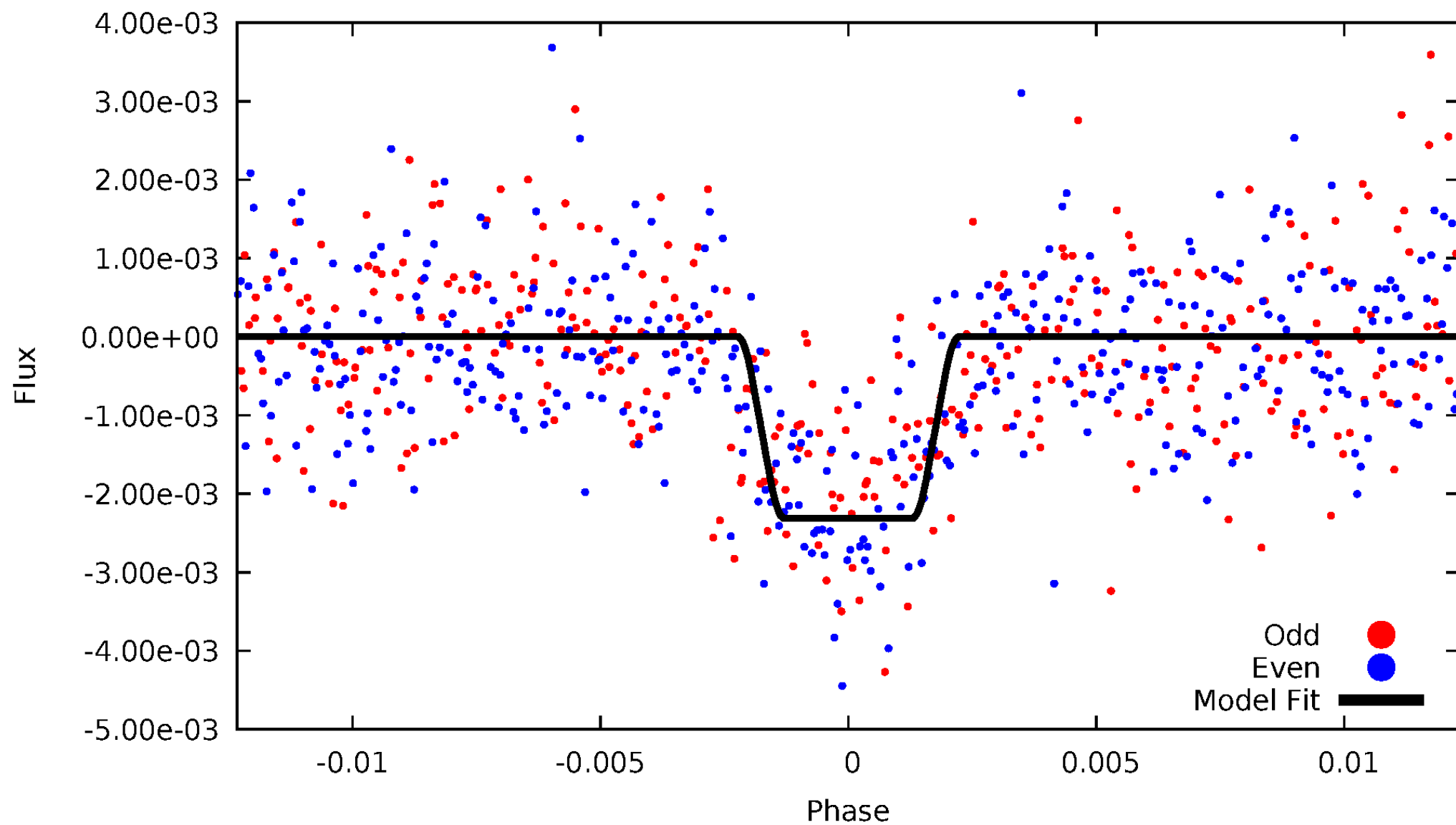
DV Odd/Even

TCE 003340313-02



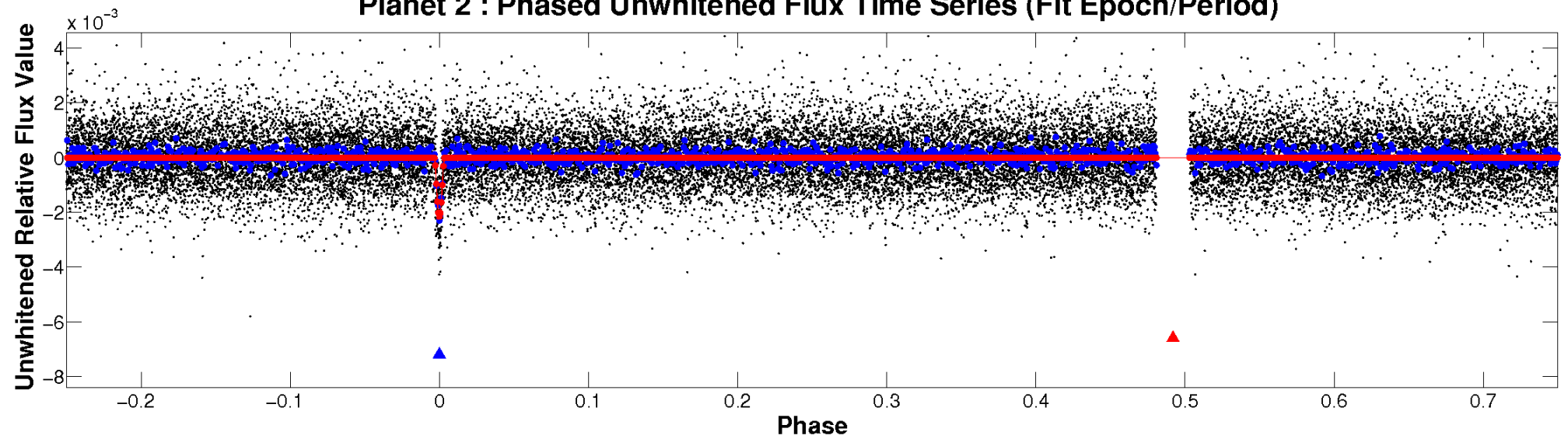
# ALT Odd/Even

TCE 003340313-02

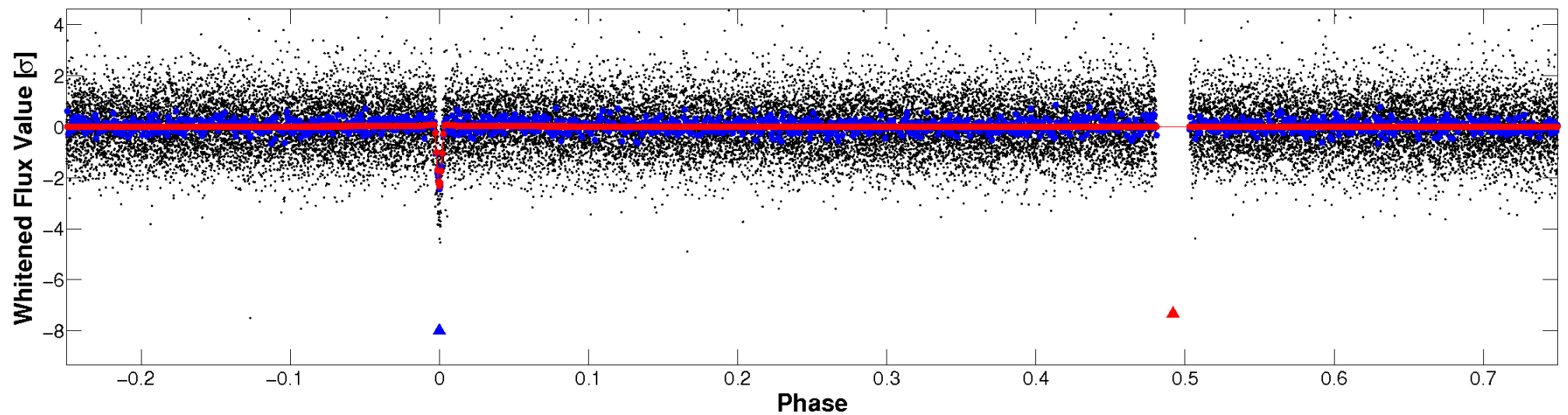


# Non-Whitened Vs. Whitened Light Curve

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

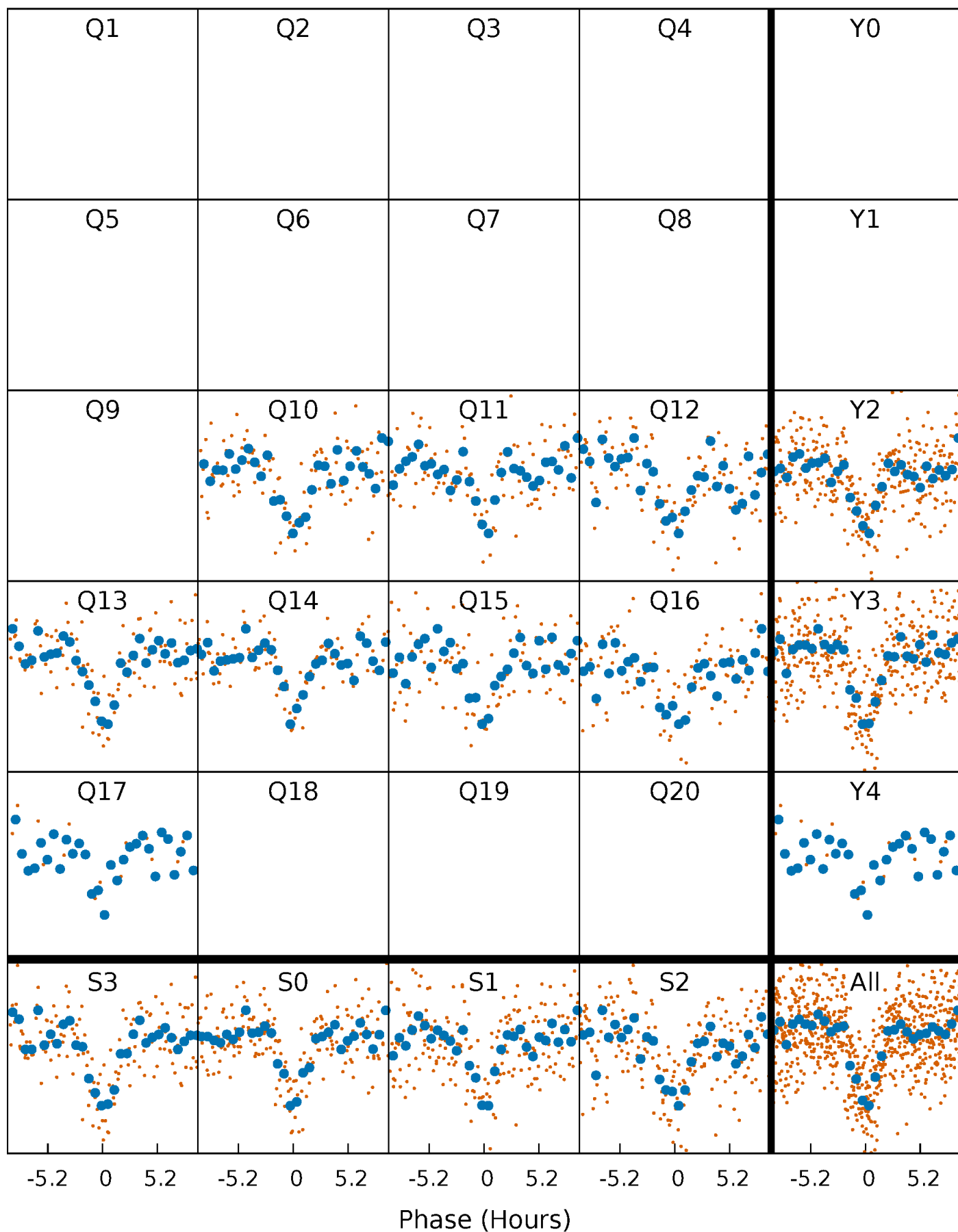


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



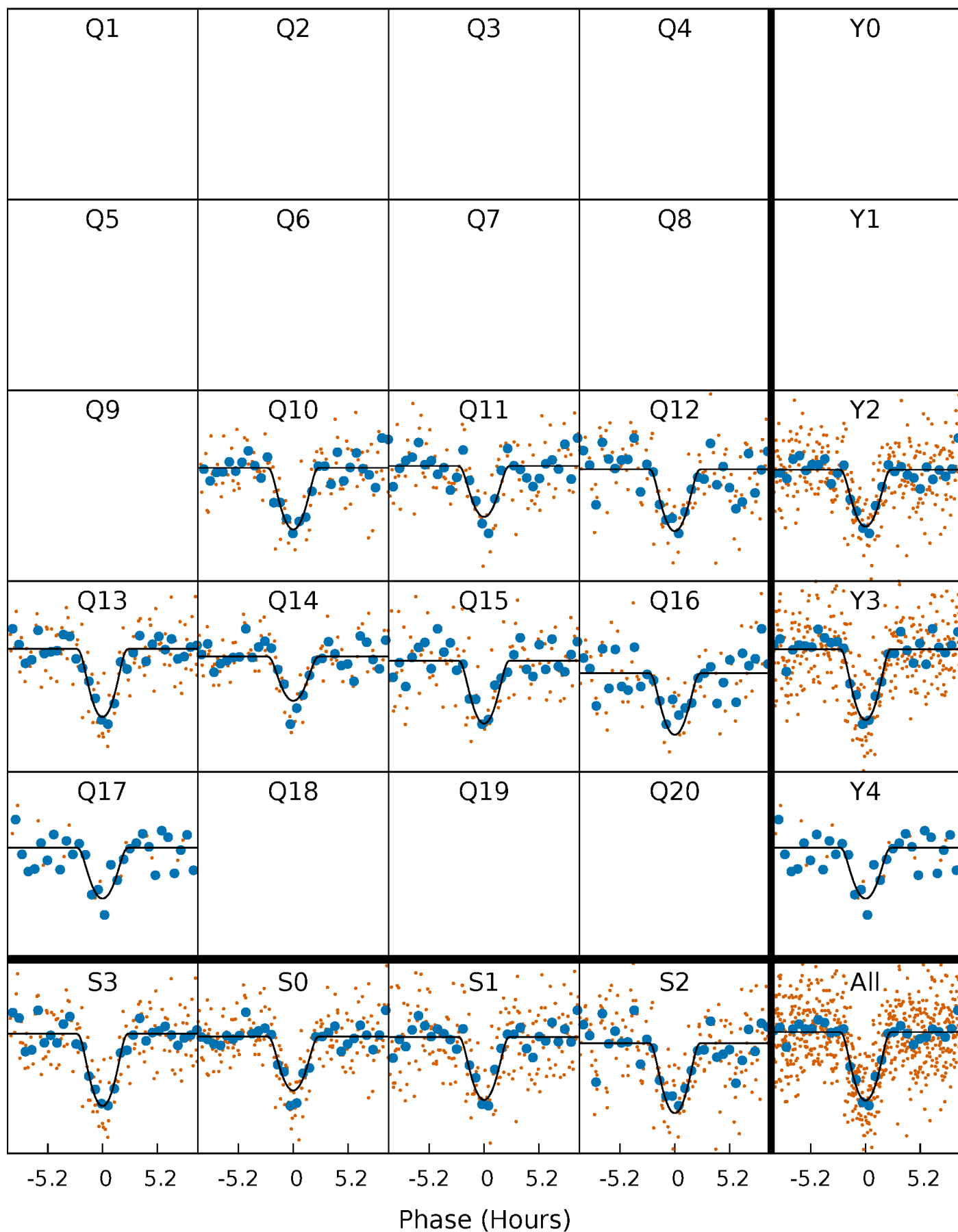
# PDC Quarter-Phased Transit Curves

TCE 003340313-02 P= 30.552880 Days  $T_0=158.870224$  (BKJD)



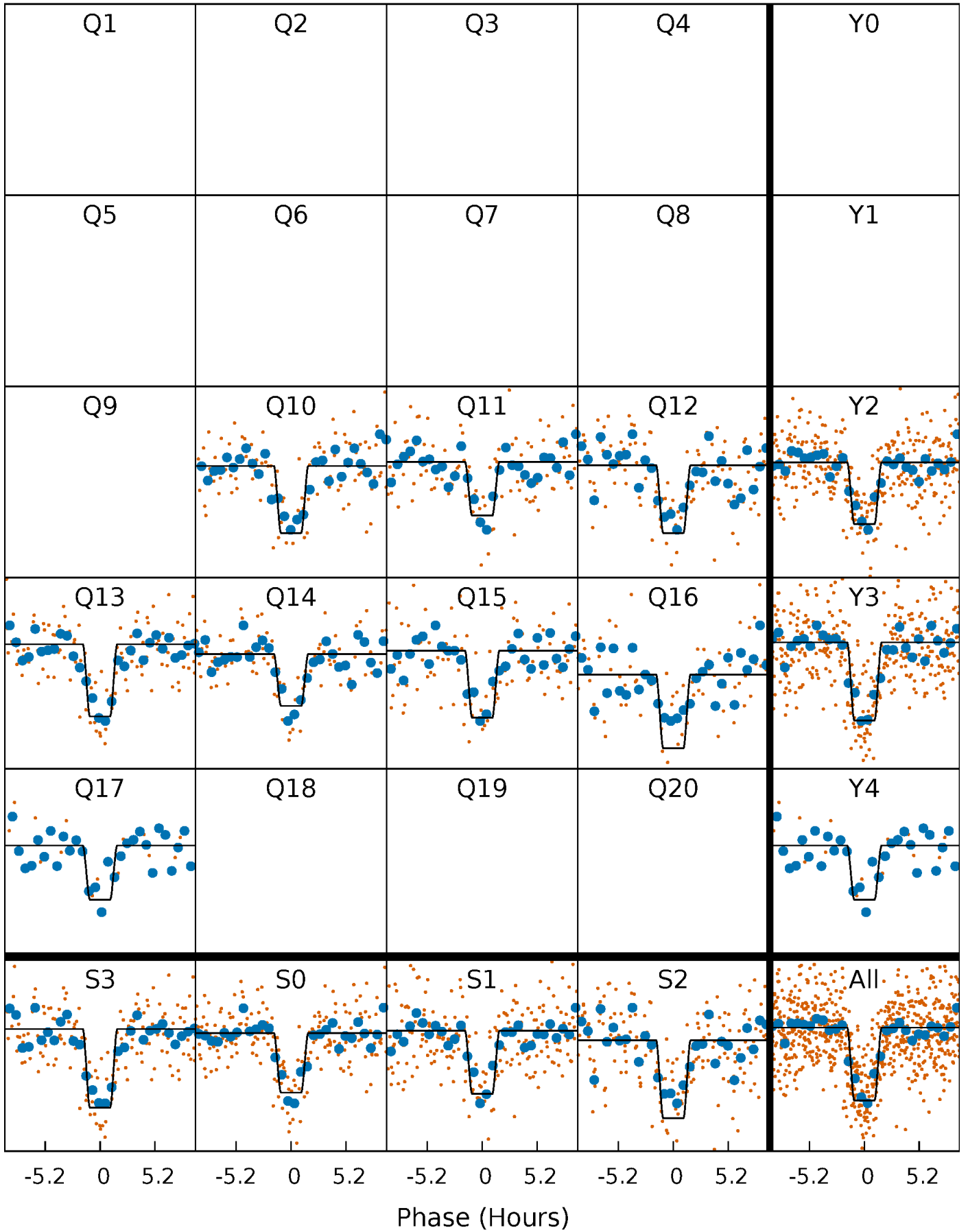
# DV Quarter-Phased Transit Curves

TCE 003340313-02 P= 30.552880 Days  $T_0=158.870224$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

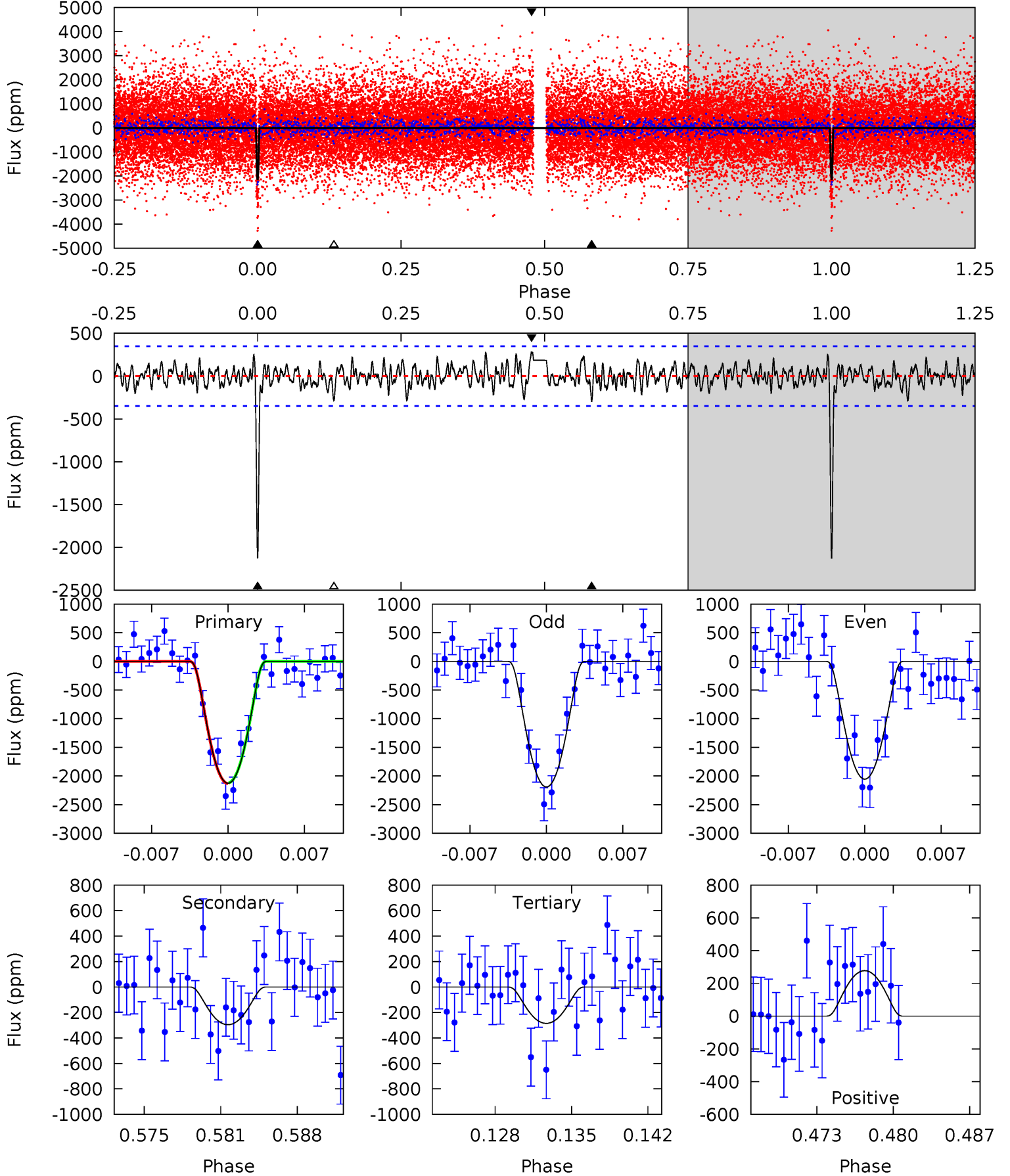
TCE 003340313-02   P= 30.552945 Days    $T_0=158.868218$  (BKJD)



# DV Model-Shift Uniqueness Test

003340313-02, P = 30.552880 Days, E = 158.870224 Days

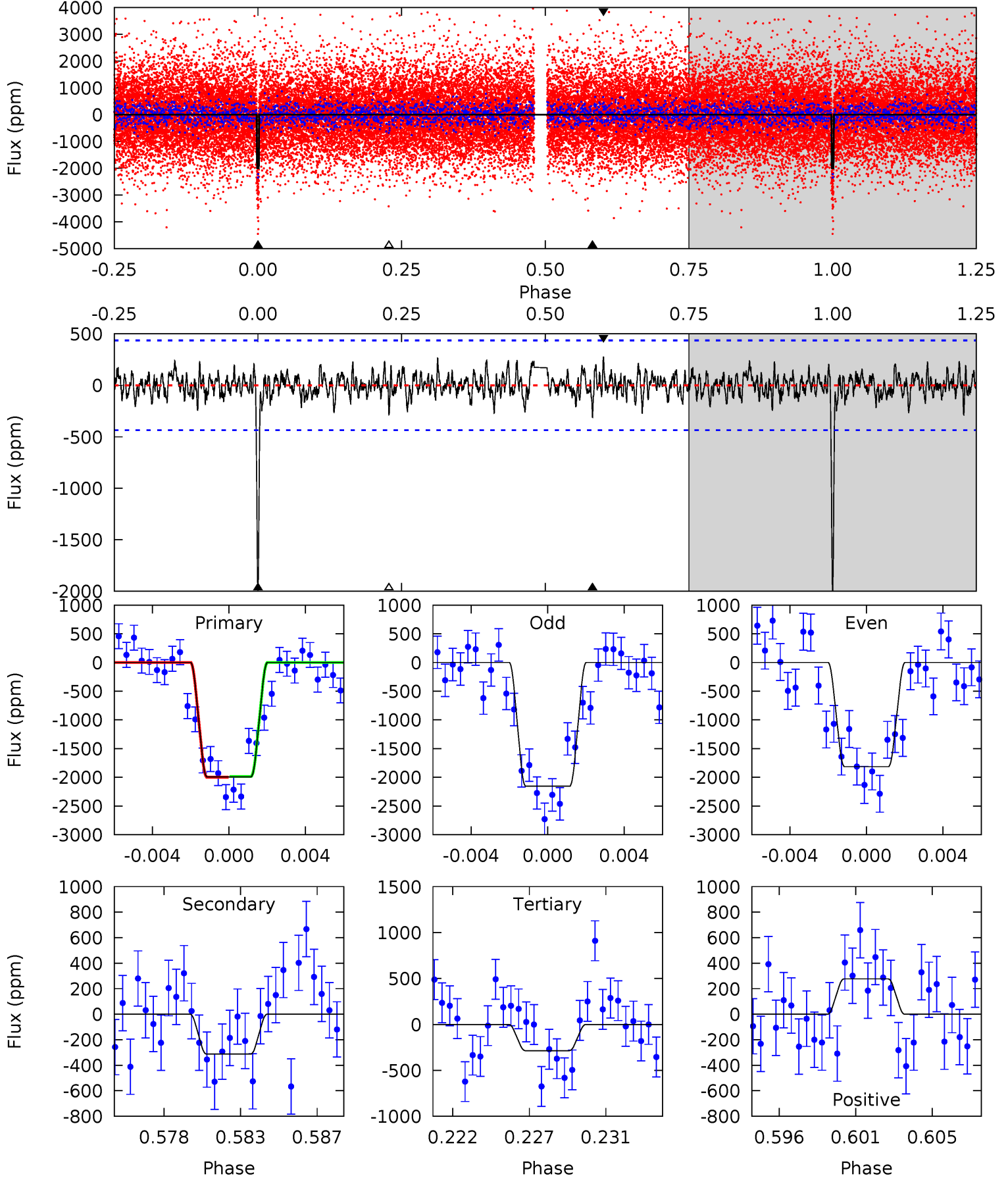
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
31.1	4.32	4.17	4.06	5.10	2.71	1.38	26.9	27.0	0.15	0.27	1.00	1.01	0.12	0.09



# Alt Model-Shift Uniqueness Test

003340313-02,  $P = 30.552945$  Days,  $E = 158.868218$  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
23.6	3.72	3.39	3.29	5.18	2.84	1.07	20.3	20.4	0.33	0.43	2.04	0.99	0.12	0.09





### Stellar Parameters For KIC 003340313

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6441^{+179}_{-246}$	$4.367^{+0.072}_{-0.203}$	$-0.120^{+0.250}_{-0.300}$	$1.165^{+0.381}_{-0.136}$	$1.152^{+0.185}_{-0.152}$	$1.026^{+0.399}_{-0.552}$
	+3%/-4%	+2%/-5%	+208%/-250%	+33%/-12%	+16%/-13%	+39%/-54%
Source	KIC0	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 003340313-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-296 \pm 68$	$8.34^{+5.24}_{-4.47}$	$971^{+65}_{-51}$	$3764^{+1139}_{-573}$	$92^{+303}_{-58}$
Alt.	$-313 \pm 84$	$7.14^{+5.34}_{-4.34}$	$967^{+78}_{-49}$	$3980^{+1867}_{-682}$	$132^{+735}_{-90}$

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

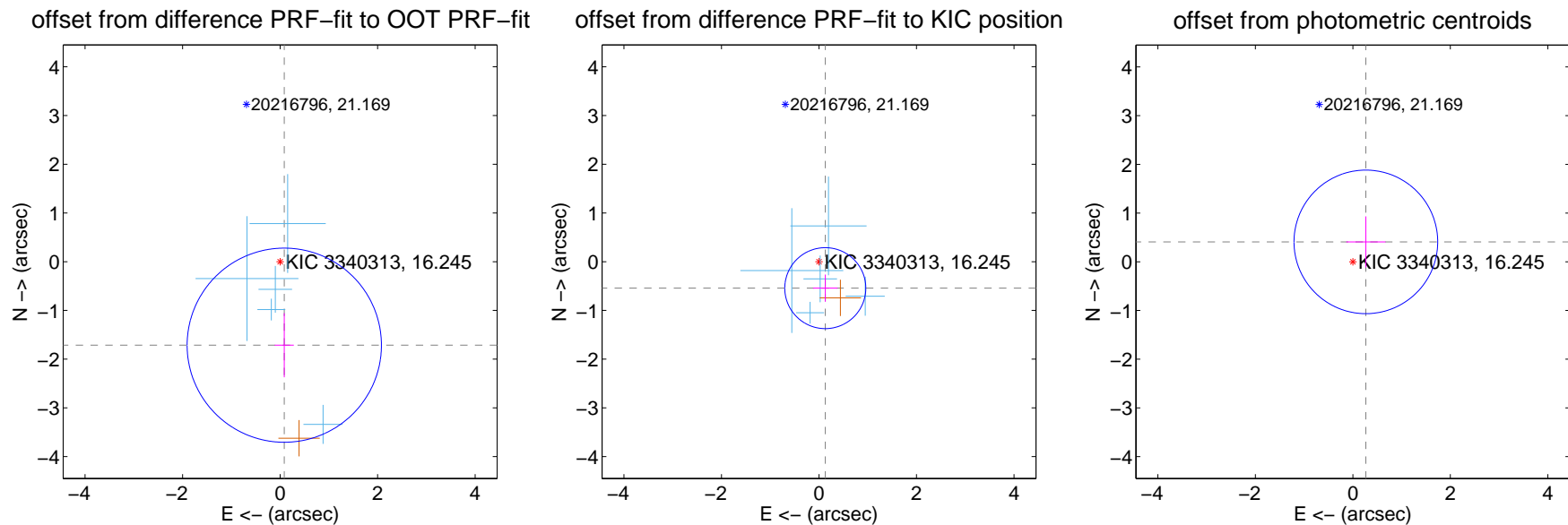
## DV Centroid Data

Supplemental centroid analysis for 003340313-02. Kepler magnitude: 16.25. Transit SNR 21.47

There are 7 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.716 \pm 0.664$	2.58	$-0.086 \pm 0.196$	$-1.714 \pm 0.658$
PRF-fit source offset from KIC position	$0.558 \pm 0.277$	2.02	$-0.129 \pm 0.251$	$-0.543 \pm 0.278$
photometric centroid source offset	$0.49 \pm 0.49$	0.99	$-0.27 \pm 0.40$	$0.41 \pm 0.52$



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.

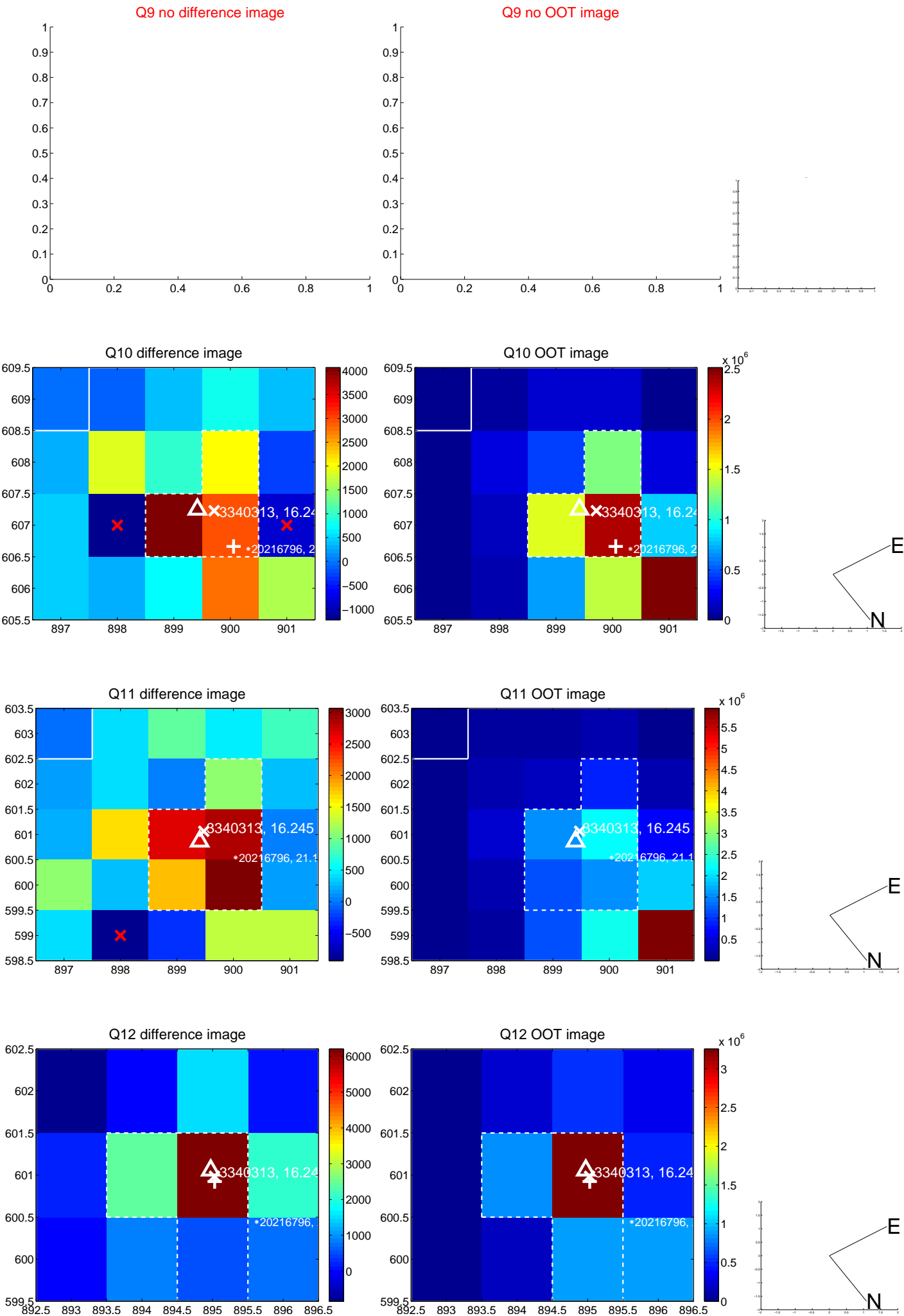
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



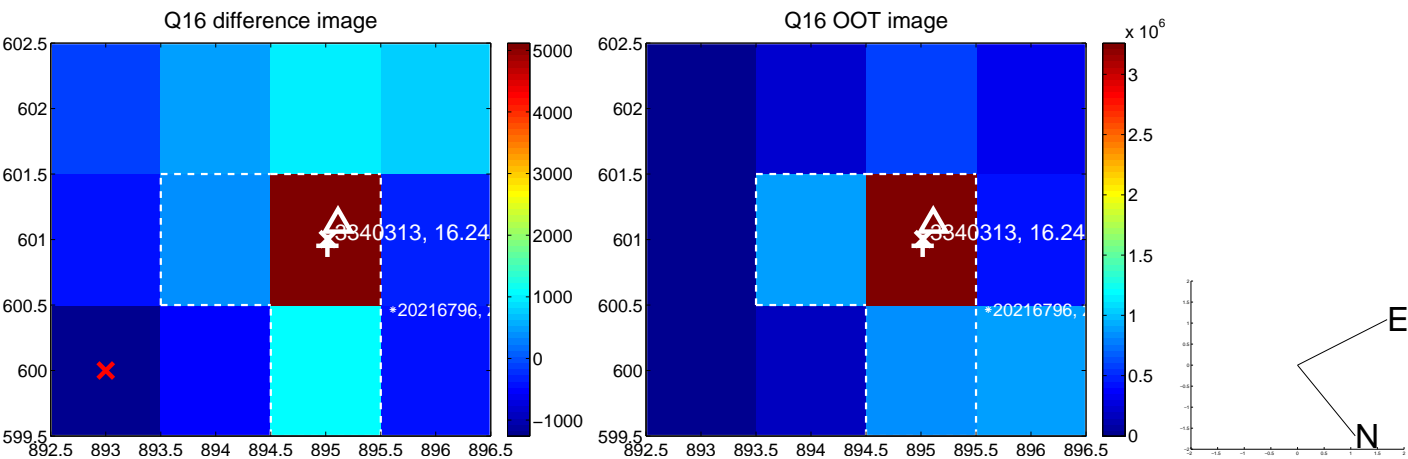
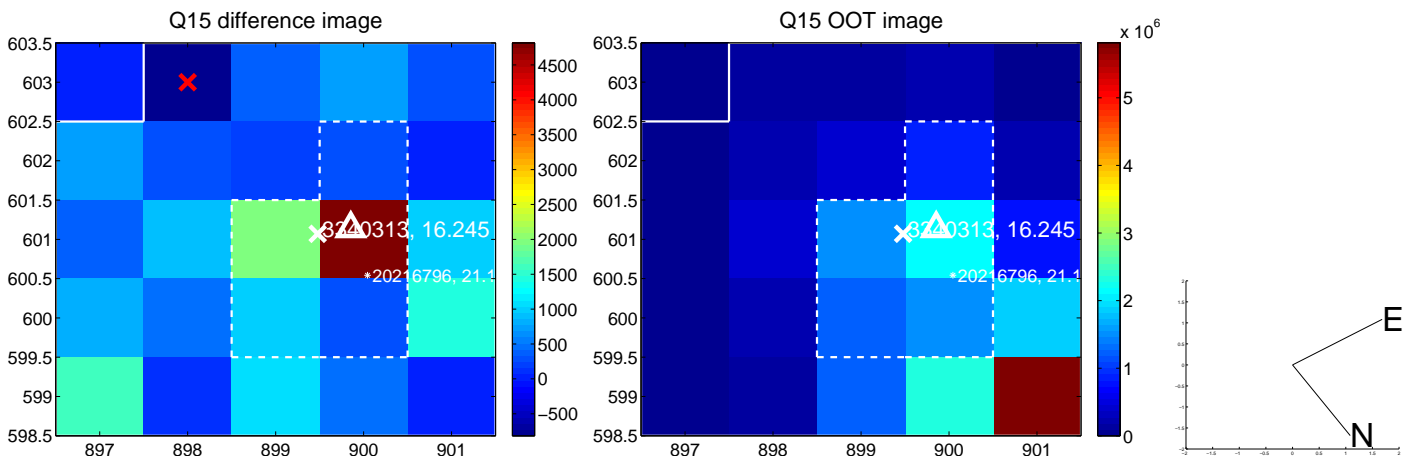
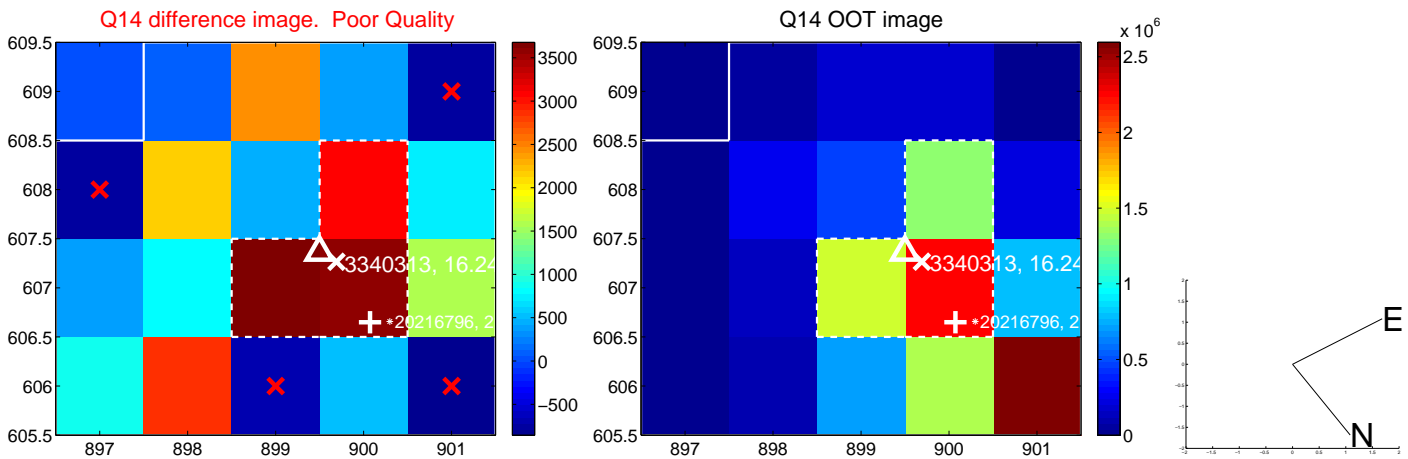
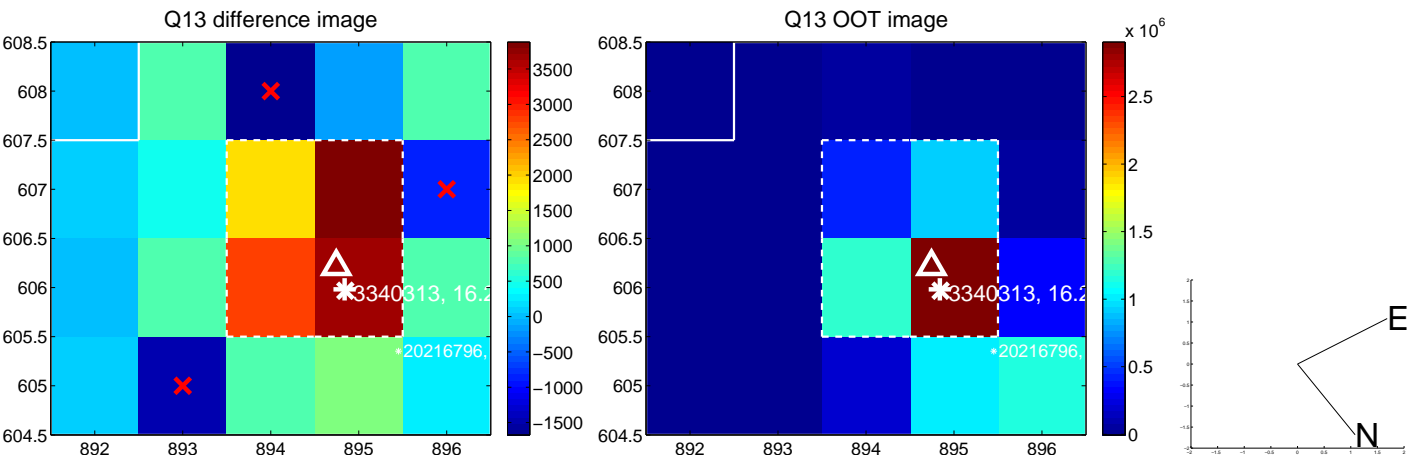
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



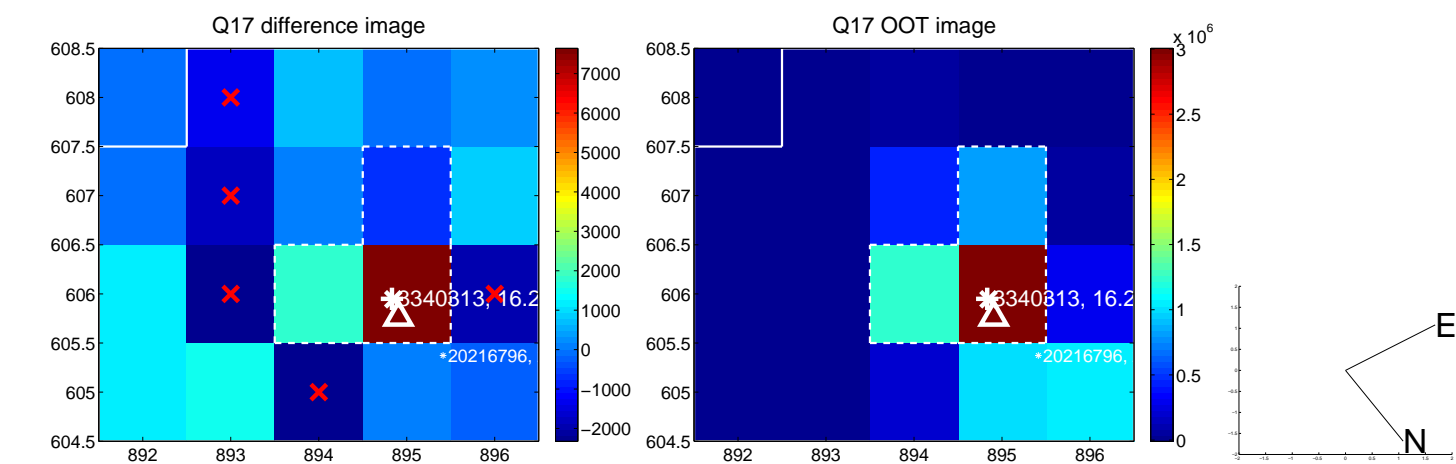
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



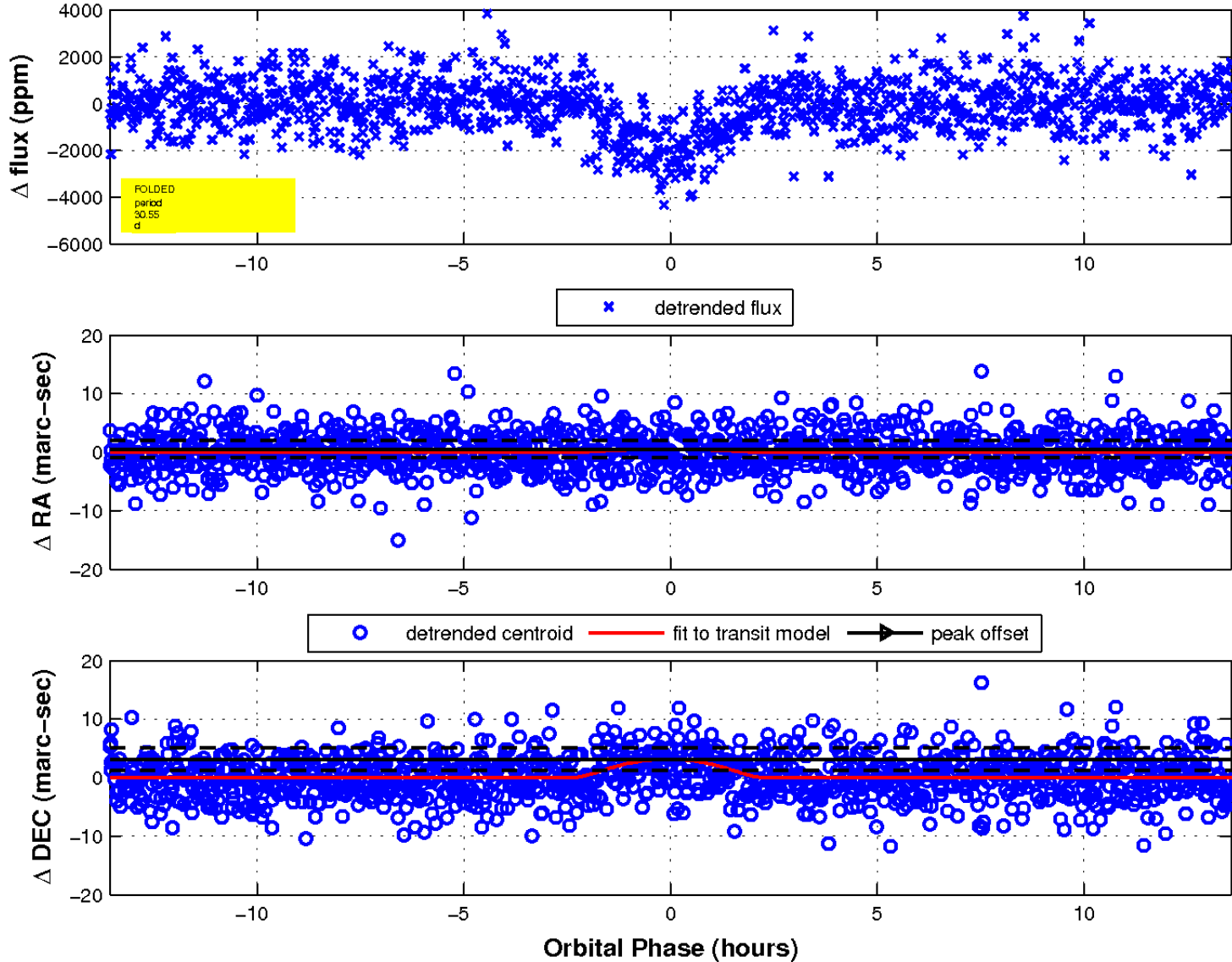
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

