

# KIC 010030778

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010030778-01	OBS	3265.01	29.473189	154.891649	12598.6	6.397	165.8	173.8	0.90	5838	17.88	24.13
010030778-02	OBS	No	29.473139	140.375543	9345.2	6.284	134.7	128.8	0.90	5838	15.16	24.13

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010030778-01	OBS	FP	0.00	0	1	1	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_UNRESOLVED_OFFSET
010030778-02	OBS	FP	0.00	1	1	1	0	IS_SEC_TCE—CENT_UNRESOLVED_OFFSET

**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 010030778-01

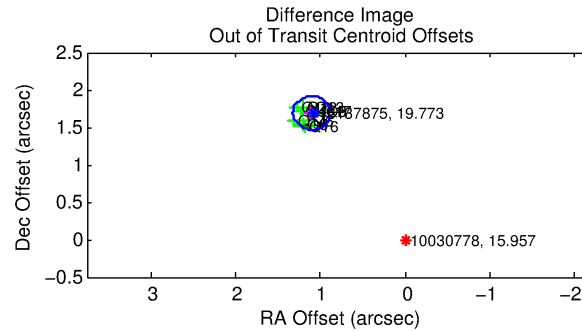
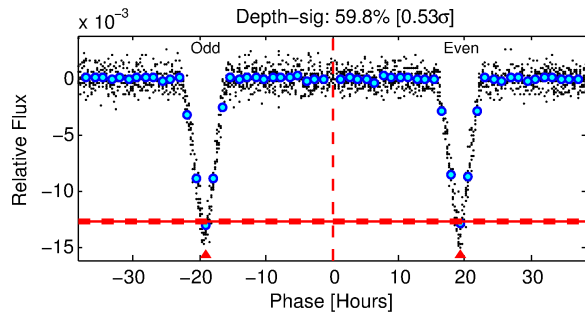
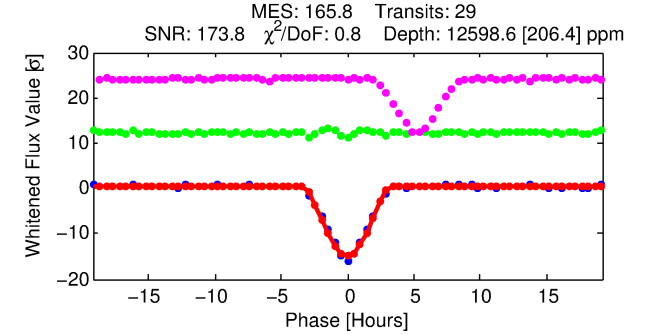
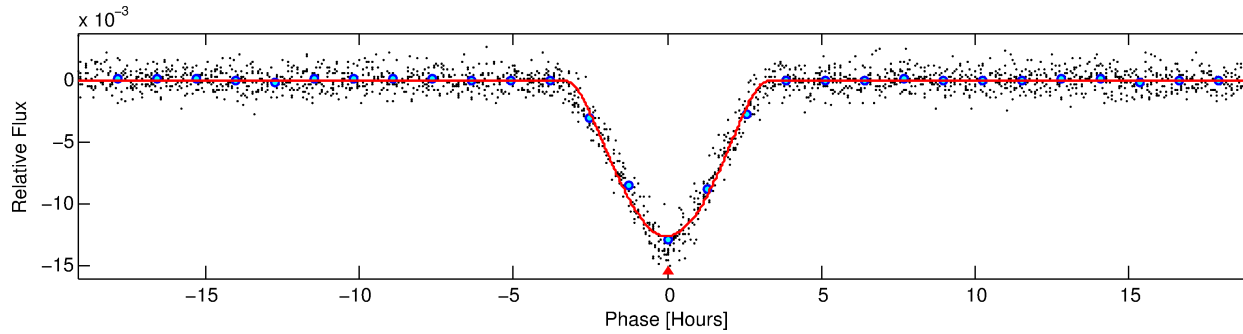
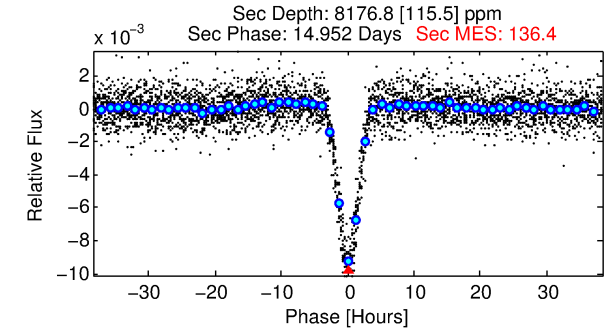
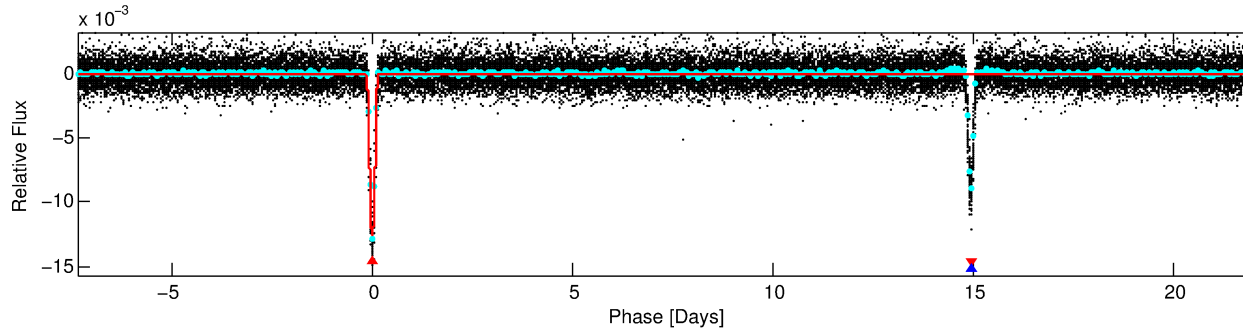
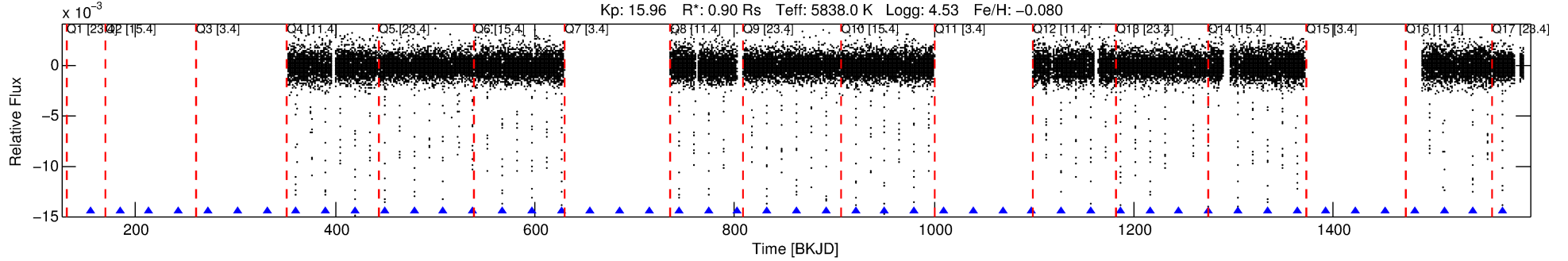
No Significant Match Found

# DV One-Page Summary

KIC: 10030778 Candidate: 1 of 2 Period: 29.473 d

KOI: K03265.01 Corr: 0.995

Kp: 15.96 R\*: 0.90 Rs Teff: 5838.0 K Logg: 4.53 Fe/H: -0.080



## DV Fit Results:

Period = 29.47319 [0.00003] d  
Epoch = 154.8916 [0.0010] BKJD  
Rp/R\* = 0.1827 [0.0631]  
a/R\* = 22.35 [1.01]  
b = 1.00 [0.09]  
Seff = 24.13 [9.55]  
Teq = 565 [56] K  
Rp = 17.88 [8.30] Re  
a = 0.1863 [0.0479] AU  
Ag = 488.08 [382.56] [1.27σ]  
Teffp = 4107 [724] K [4.88σ]

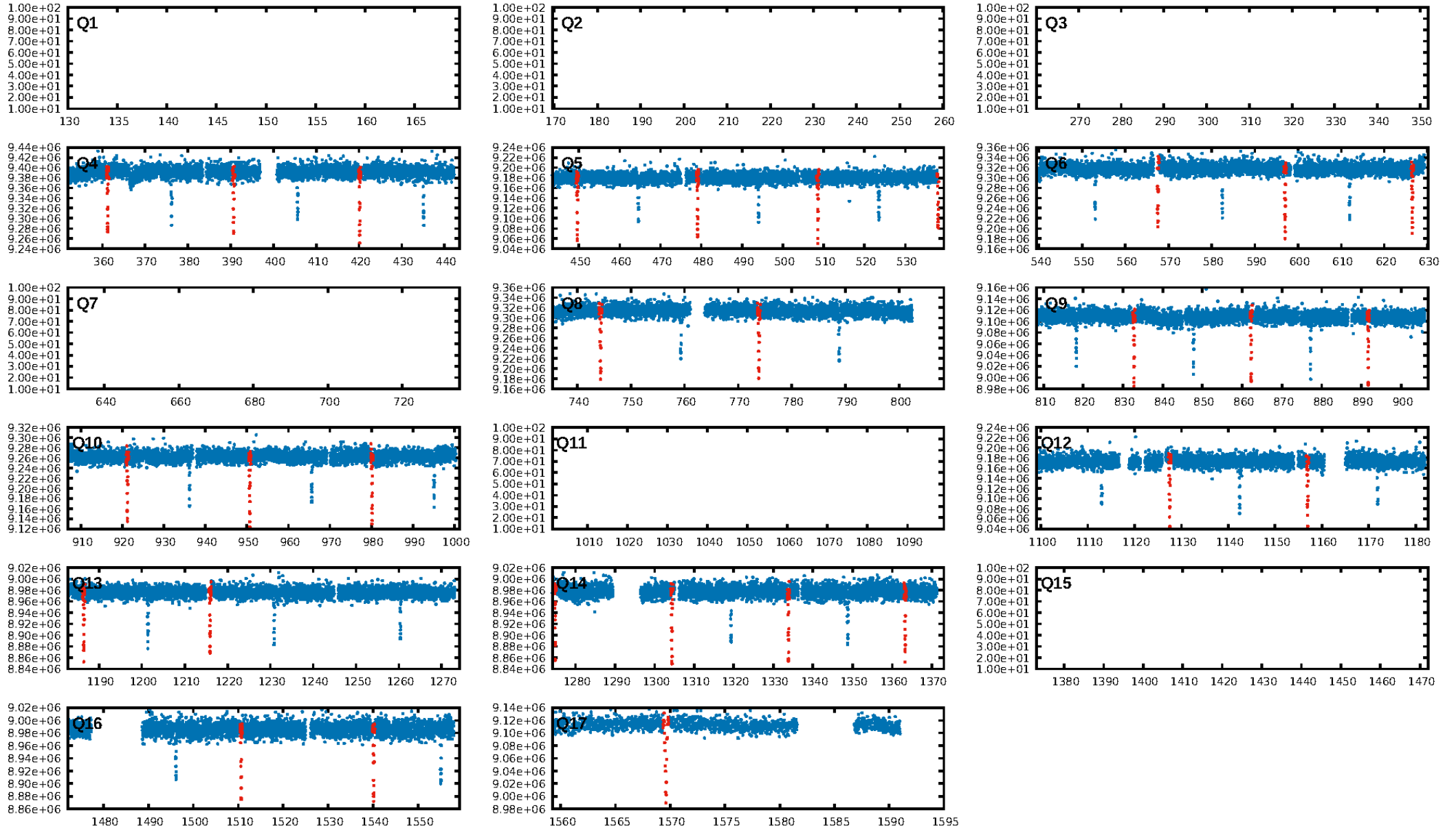
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [28/28]  
GhostDiagnostic-chr: 2.539  
Centroid-sig: 0.0%  
Centroid-so: 2.025 arcsec [26.33σ]  
OotOffset-rm: 2.018 arcsec [27.26σ]  
KicOffset-rm: 2.138 arcsec [29.11σ]  
OotOffset-st: 3/0/4/4 [11]  
KicOffset-st: 3/0/4/4 [11]  
DiffImageQuality-fgm: 1.00 [11/11]  
DiffImageOverlap-fno: 1.00 [11/11]

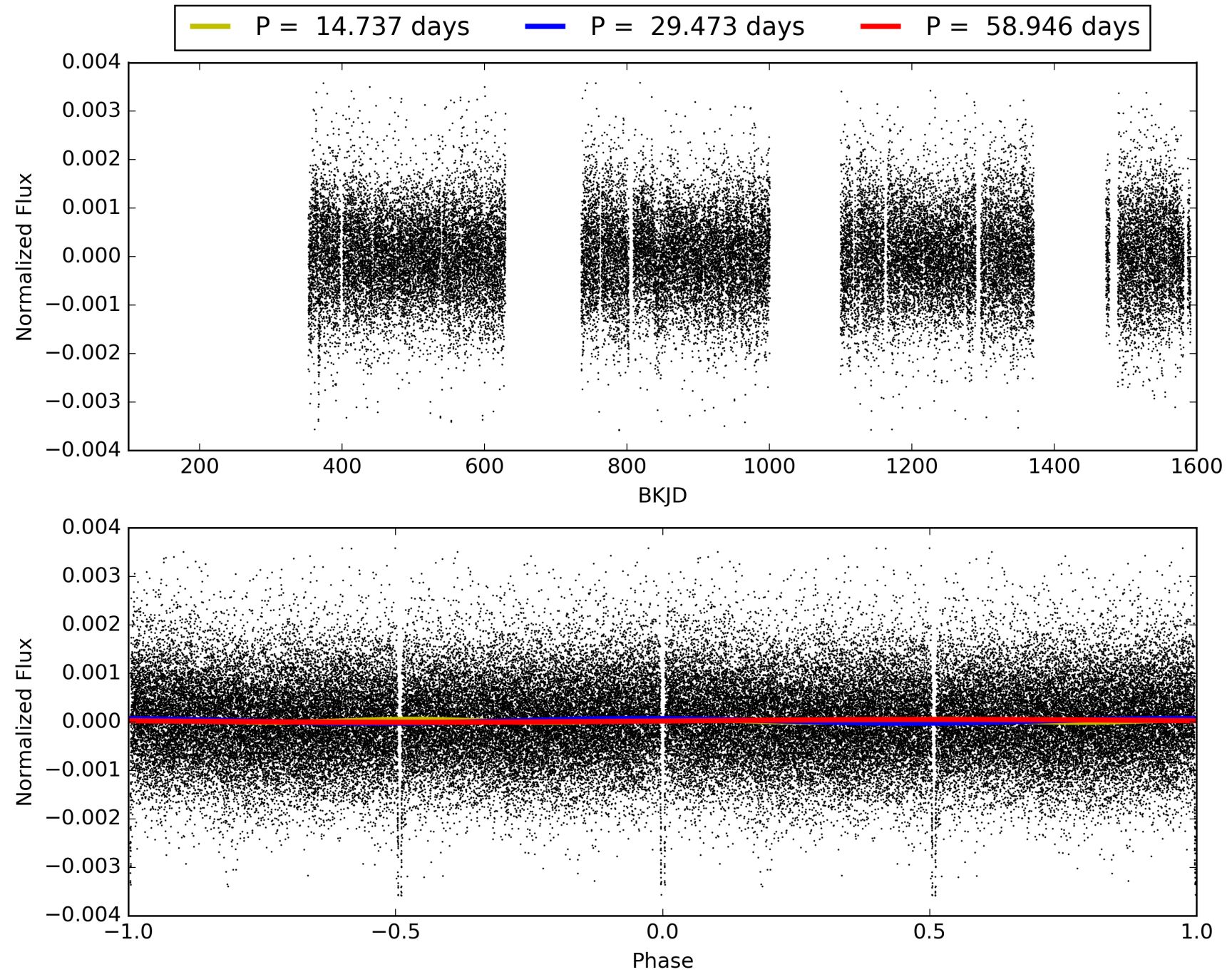
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 12:36:15 Z

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

# TCE 010030778-01, PDC Light Curves

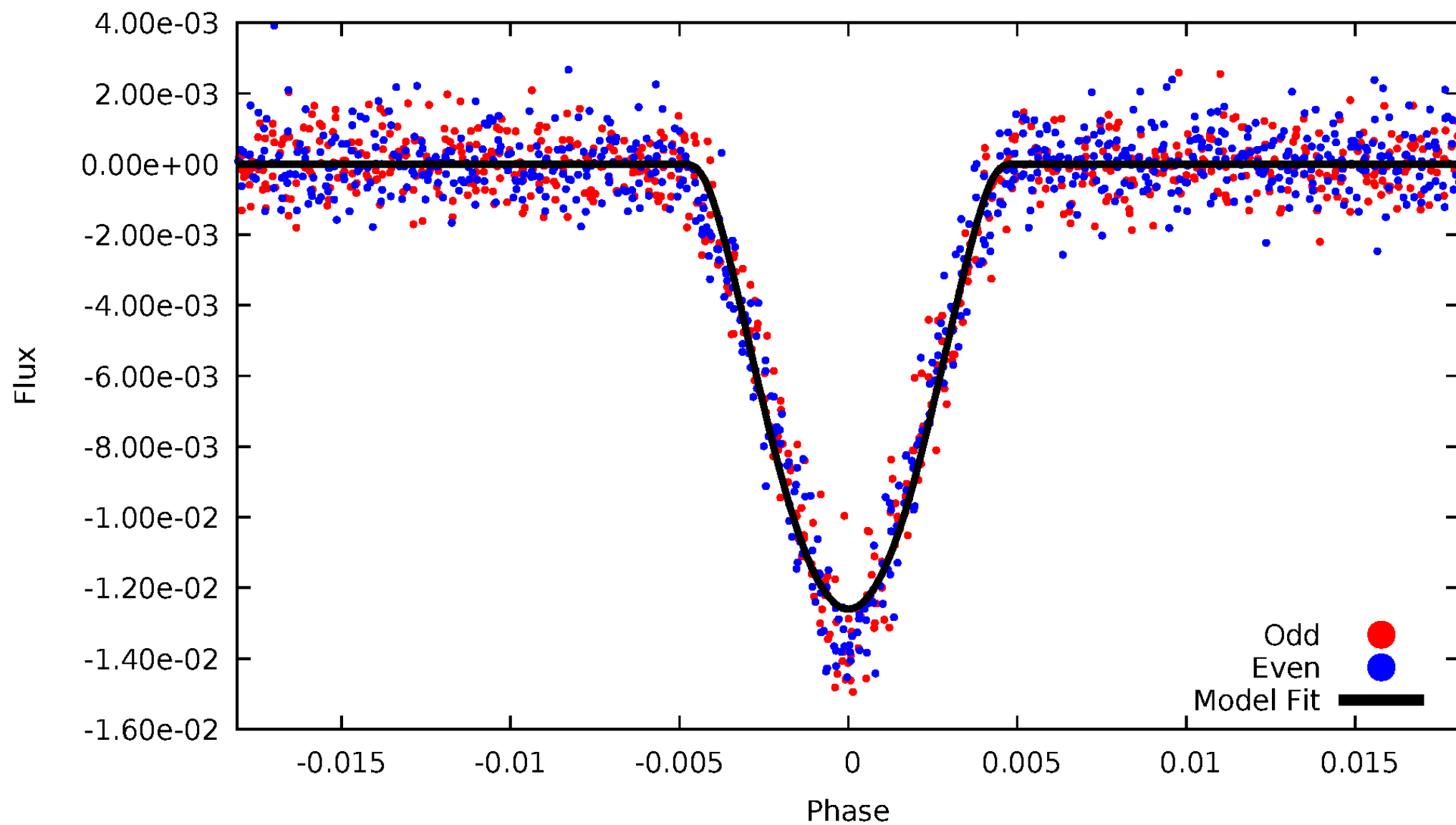


TCE 010030778-01



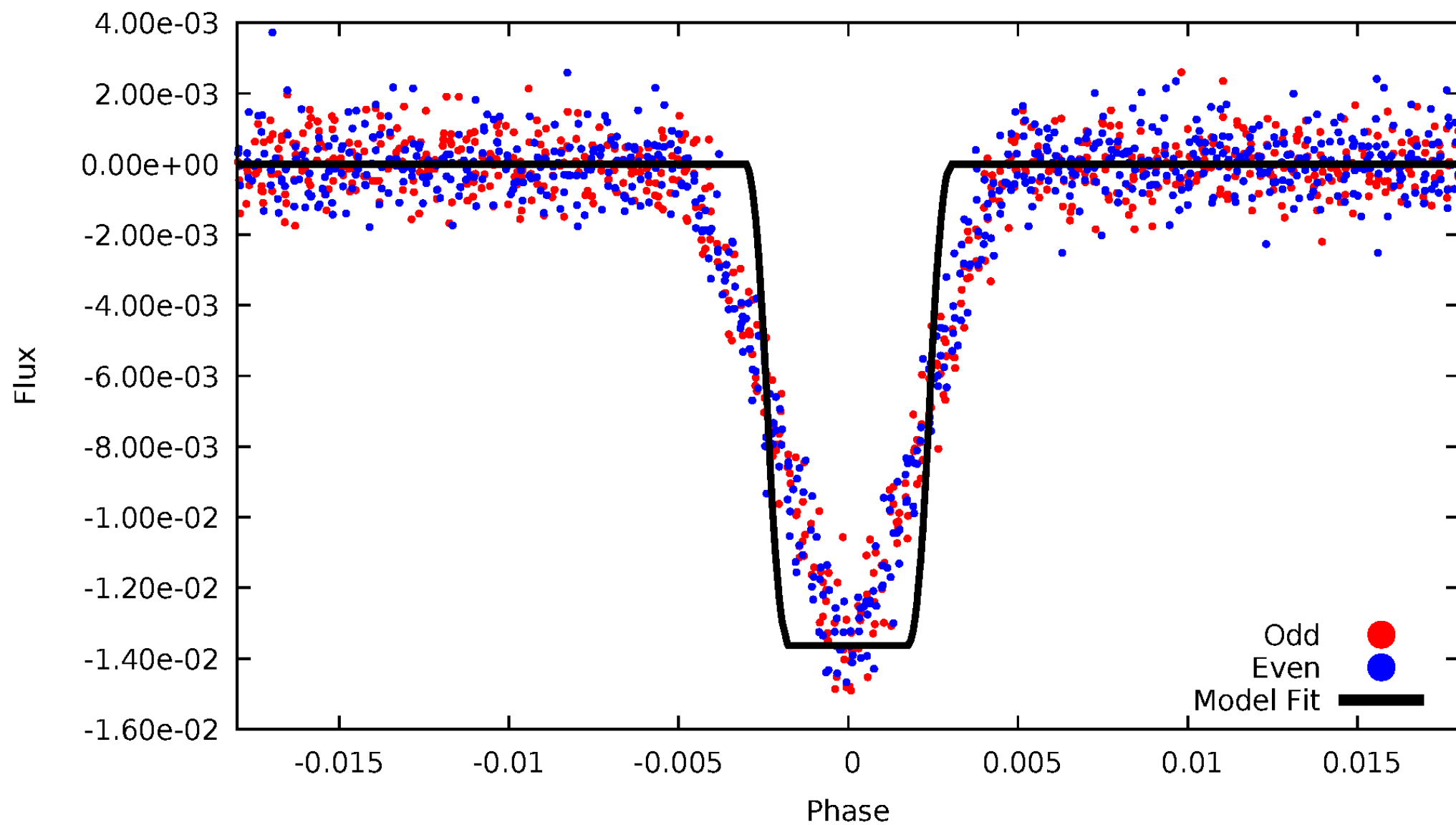
# DV Odd/Even

TCE 010030778-01



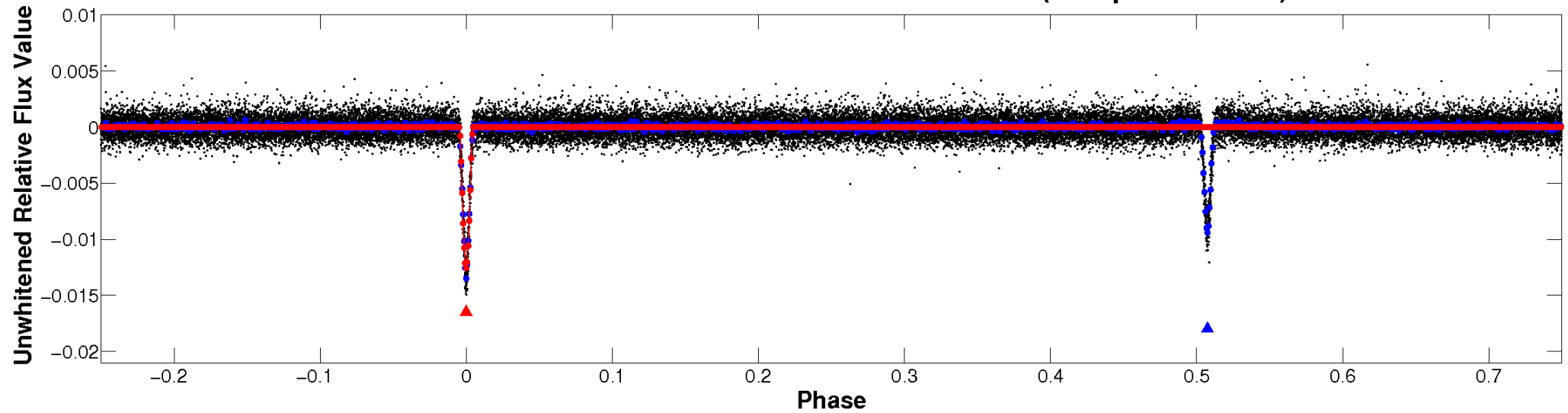
# ALT Odd/Even

TCE 010030778-01

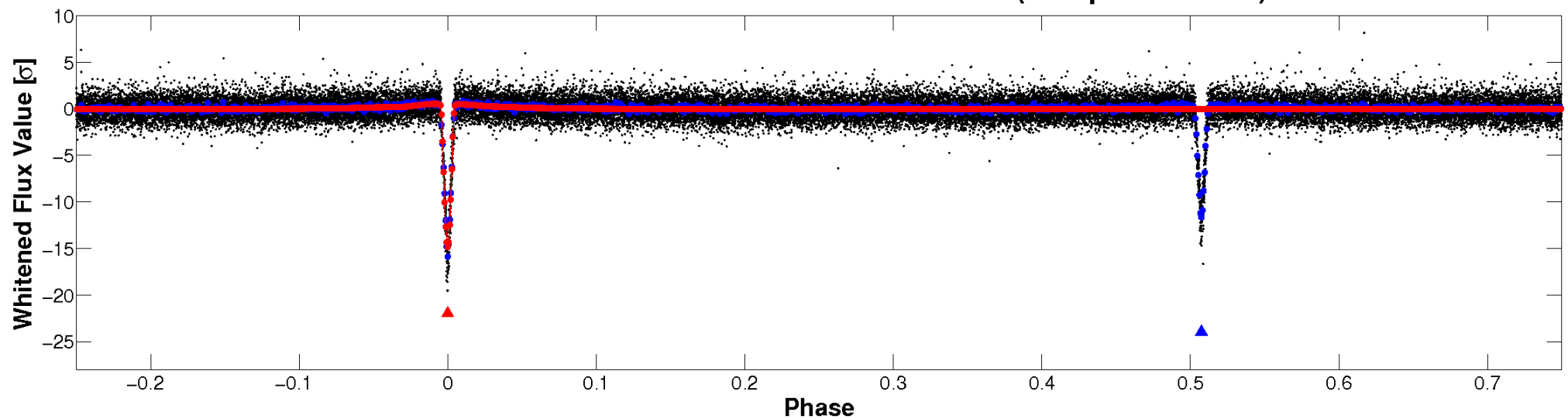


# Non-Whitened Vs. Whitened Light Curve

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

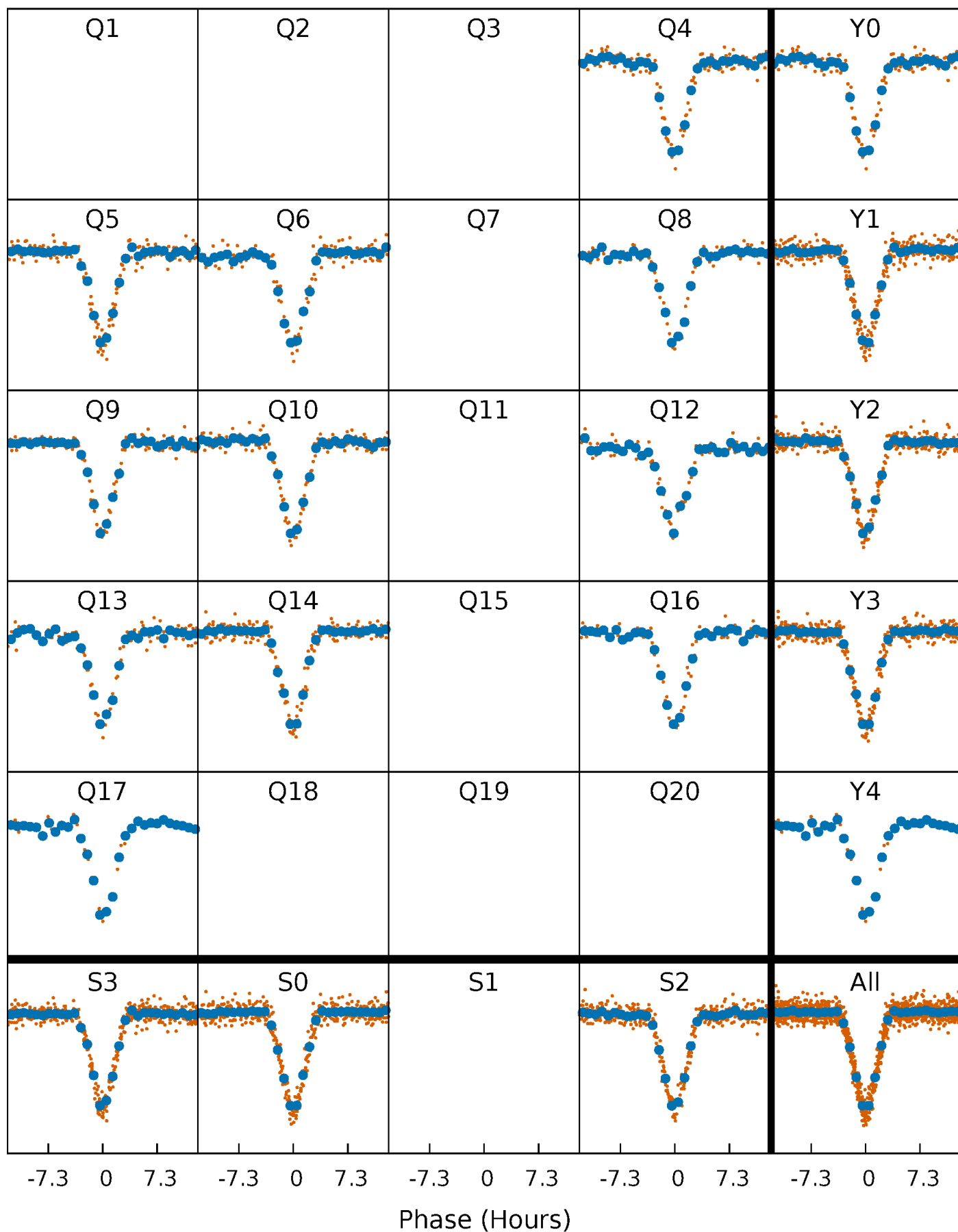


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

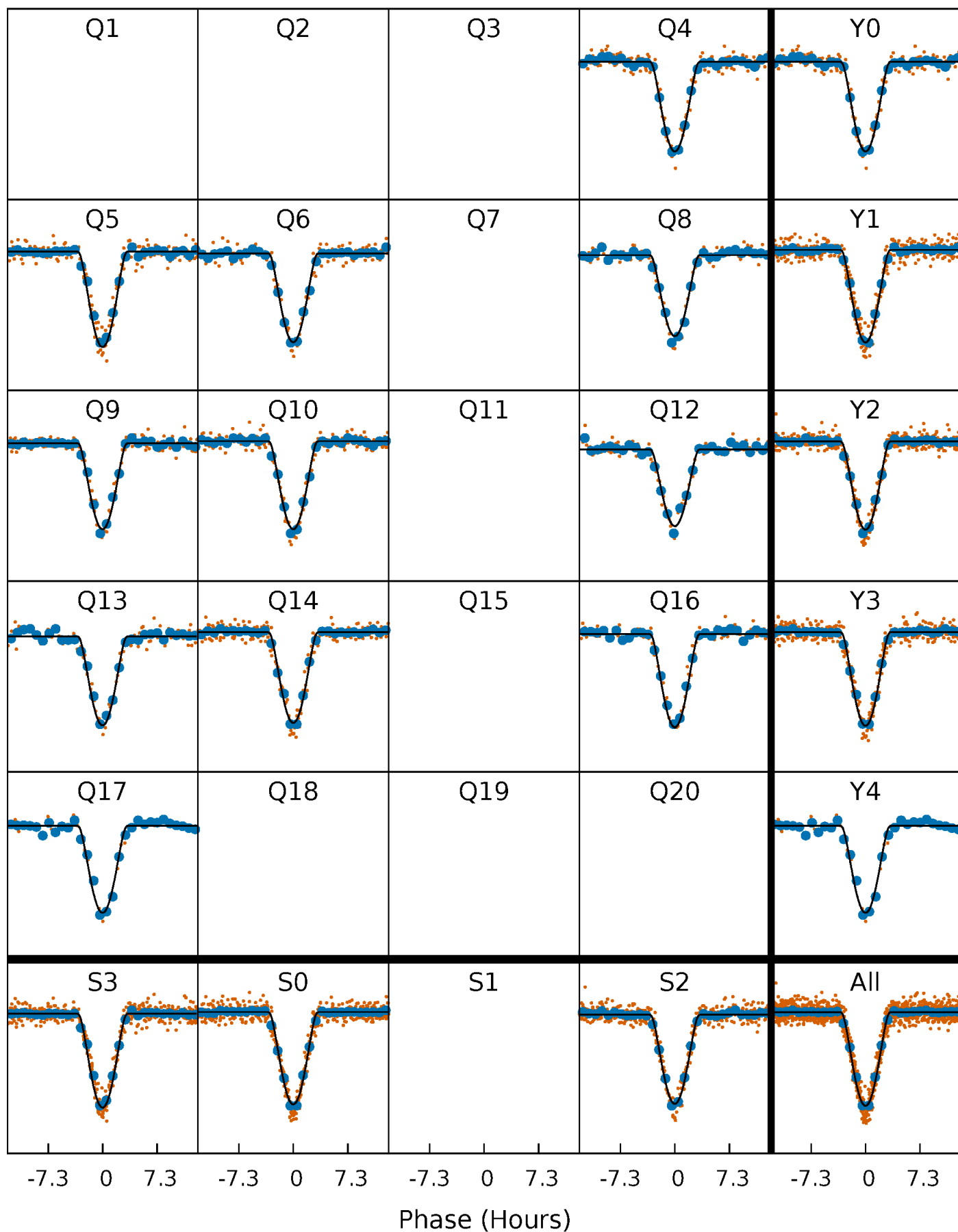
TCE 010030778-01 P= 29.473189 Days  $T_0=154.891649$  (BKJD)





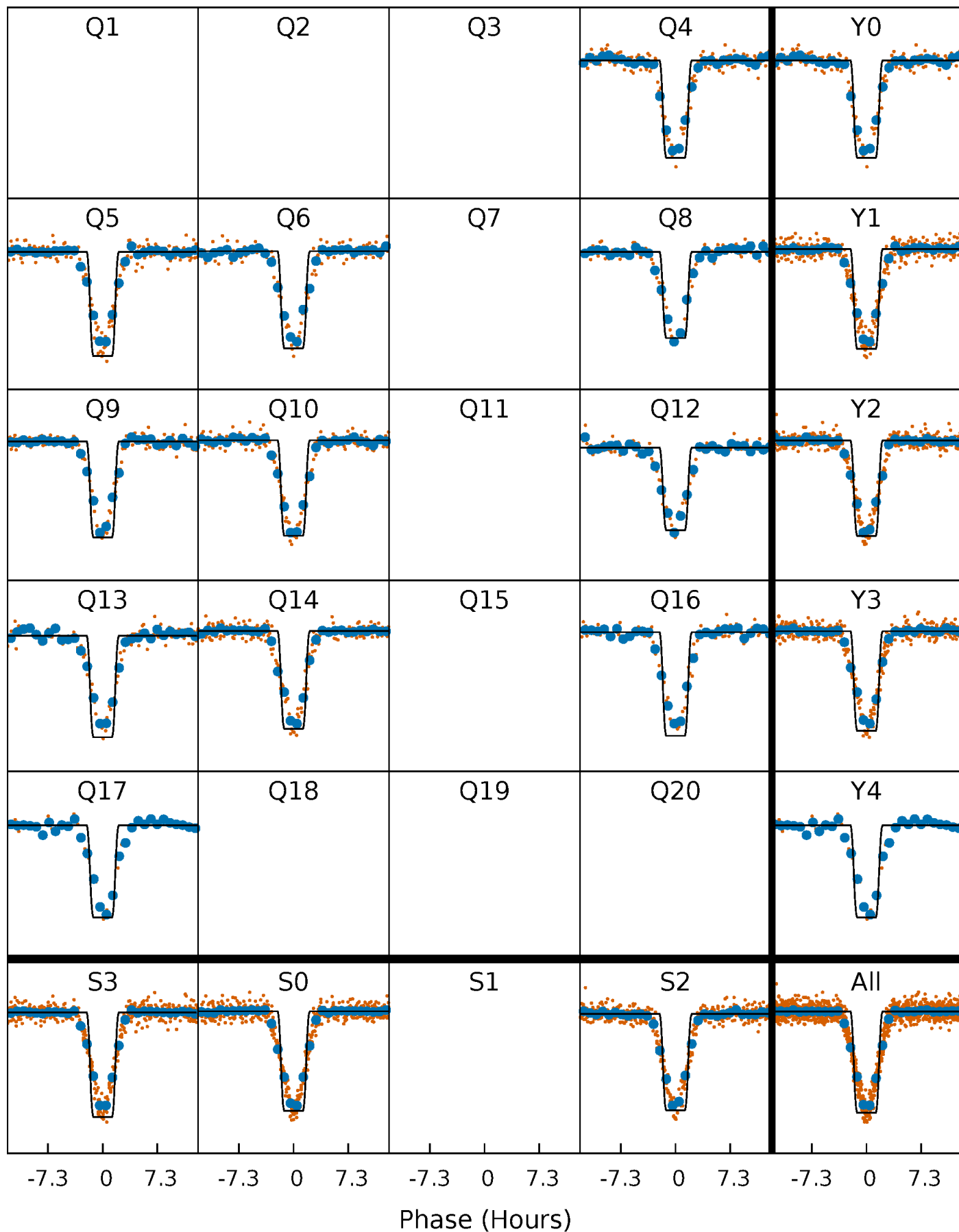
# DV Quarter-Phased Transit Curves

TCE 010030778-01 P= 29.473189 Days  $T_0=154.891649$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

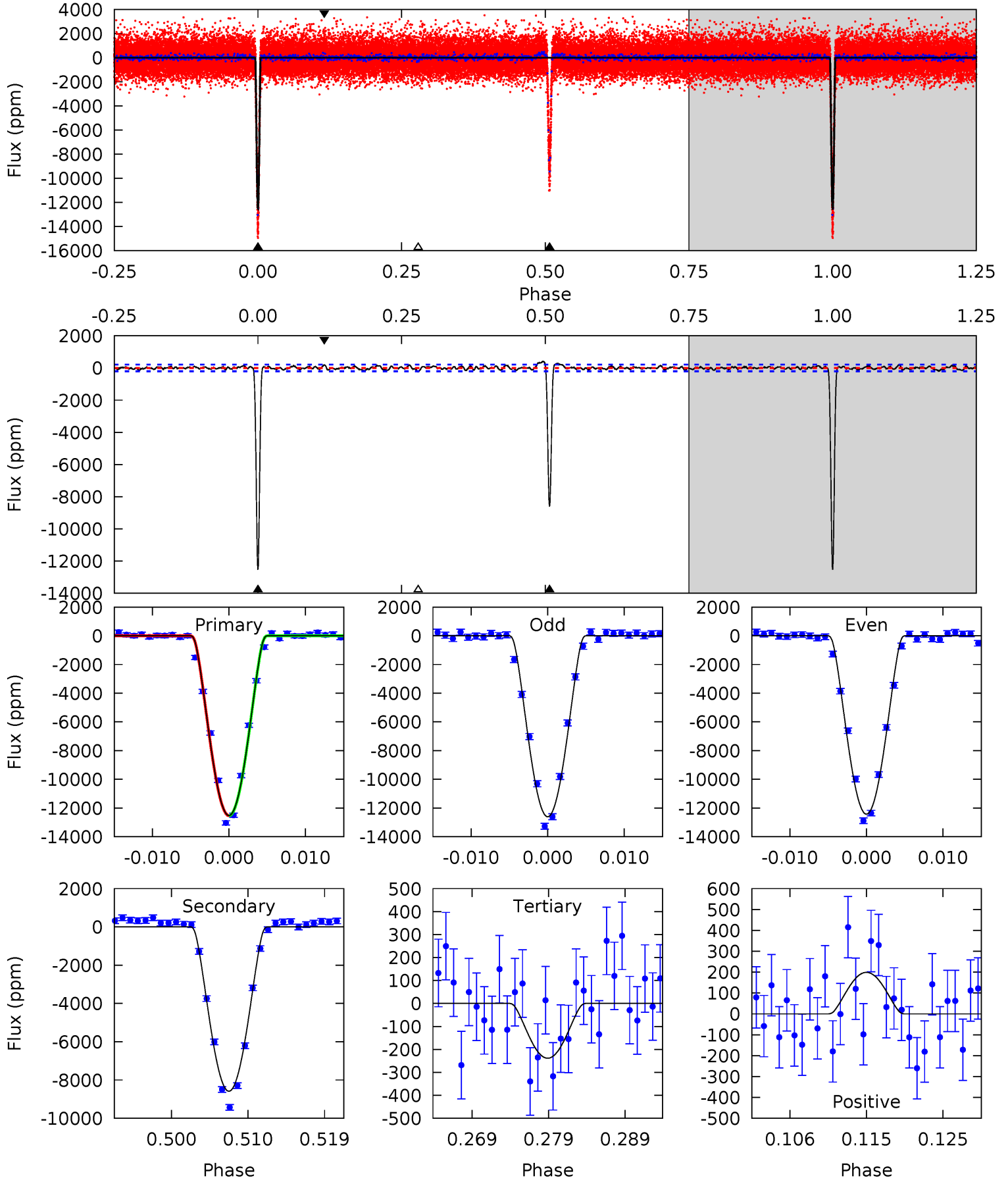
TCE 010030778-01   P= 29.473088 Days    $T_0=154.894216$  (BKJD)



# DV Model-Shift Uniqueness Test

010030778-01, P = 29.473189 Days, E = 154.891649 Days

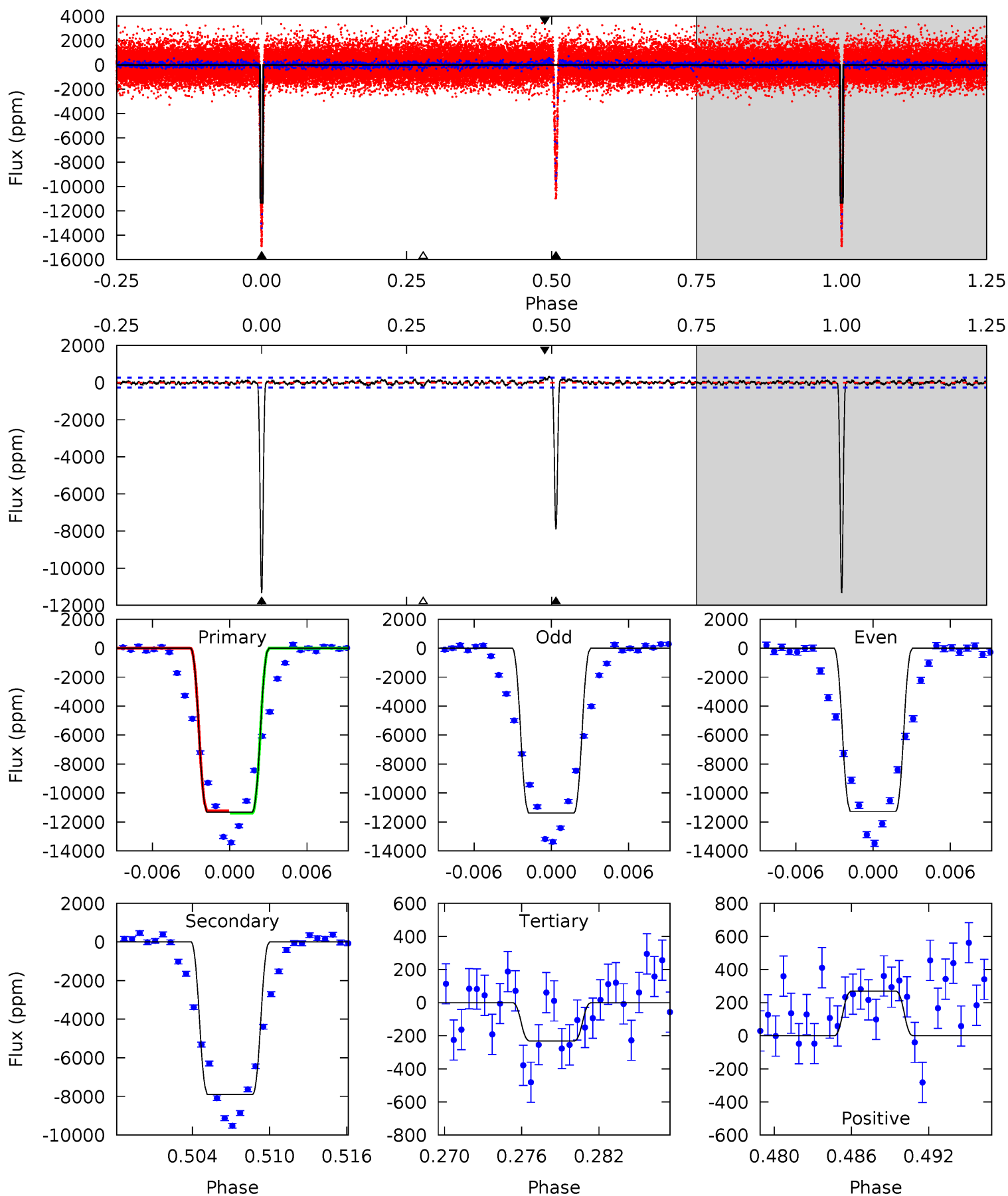
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
298.3	204.5	5.68	4.74	5.03	2.59	1.90	292.7	293.6	198.9	199.8	2.15	1.00	0.03	0.16



# Alt Model-Shift Uniqueness Test

010030778-01, P = 29.473088 Days, E = 154.894216 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
214.3	149.5	4.39	5.10	5.12	2.75	1.35	209.9	209.2	145.1	144.4	1.04	1.00	0.03	1.23



### Stellar Parameters For KIC 010030778

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5838^{+184}_{-204}$	$4.529^{+0.037}_{-0.200}$	$-0.080^{+0.300}_{-0.300}$	$0.897^{+0.278}_{-0.087}$	$0.992^{+0.113}_{-0.113}$	$1.938^{+0.375}_{-0.977}$
	+3%/-3%	+1%/-4%	+375%/-375%	+31%/-10%	+11%/-11%	+19%/-50%
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 010030778-01 / KOI 3265.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-8586 \pm 42$	$19.00^{+7.55}_{-6.82}$	$808^{+53}_{-37}$	$4361^{+846}_{-467}$	$451^{+654}_{-221}$
Alt.	$-7892 \pm 53$	$12.16^{+6.94}_{-6.09}$	$809^{+61}_{-36}$	$5154^{+2113}_{-831}$	$1005^{+3083}_{-599}$

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

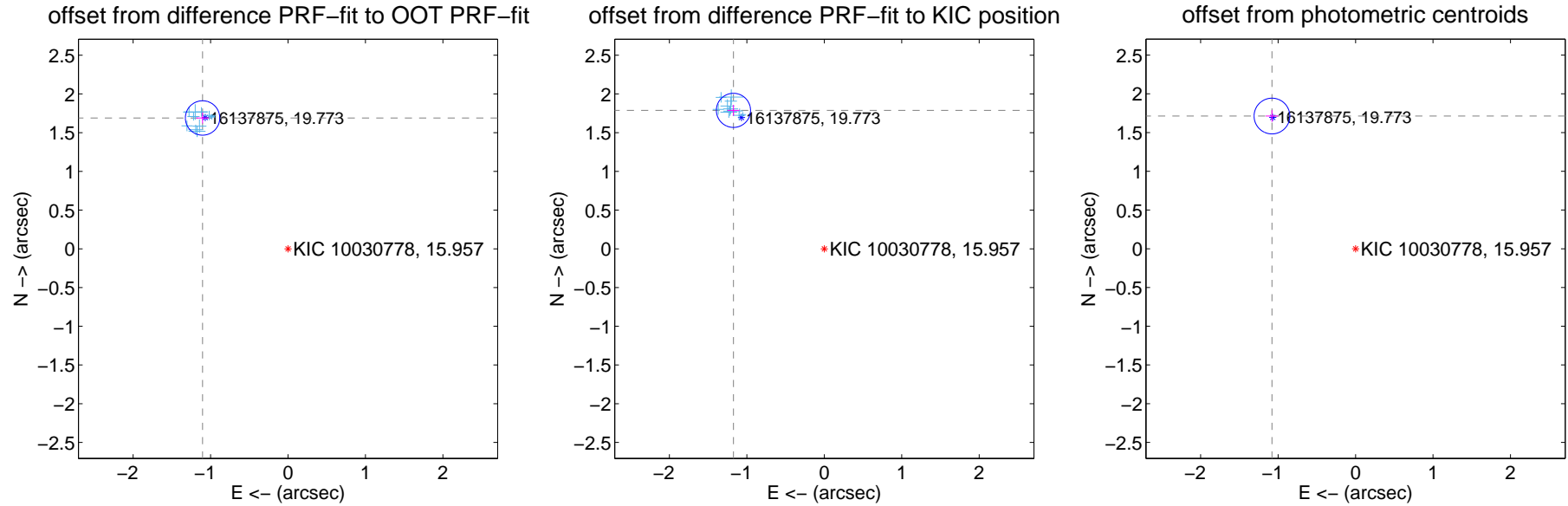
## DV Centroid Data

Supplemental centroid analysis for 010030778-01. Kepler magnitude: 15.96. Transit SNR 173.79

There are 11 quarters with good PRF difference image offsets

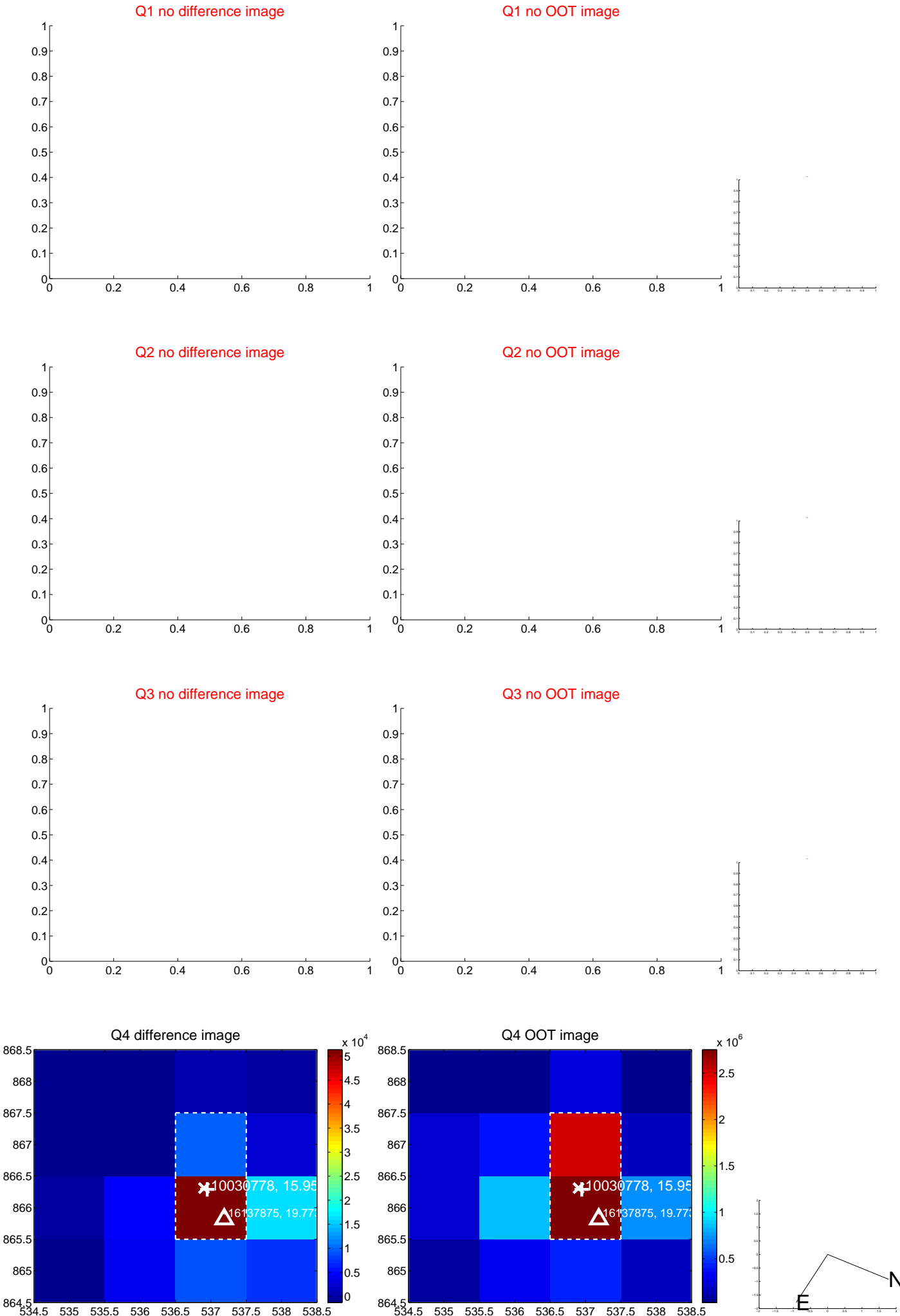
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.018 \pm 0.074$	<b>27.26</b>	$1.103 \pm 0.081$	$1.690 \pm 0.071$
PRF-fit source offset from KIC position	$2.138 \pm 0.073$	<b>29.11</b>	$1.173 \pm 0.077$	$1.788 \pm 0.072$
photometric centroid source offset	$2.03 \pm 0.08$	<b>26.33</b>	$1.08 \pm 0.08$	$1.71 \pm 0.08$

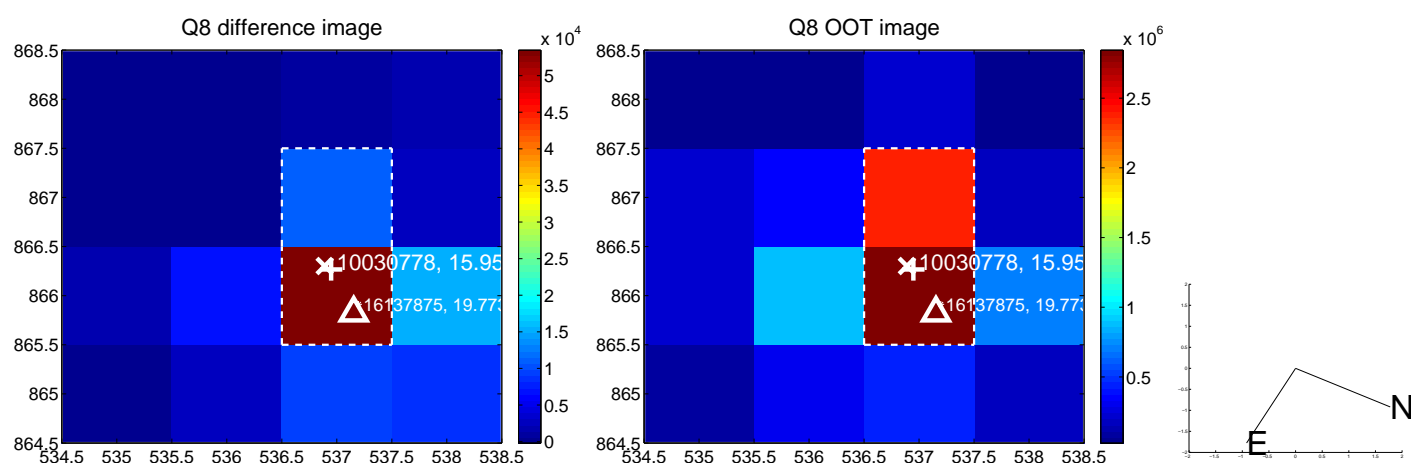
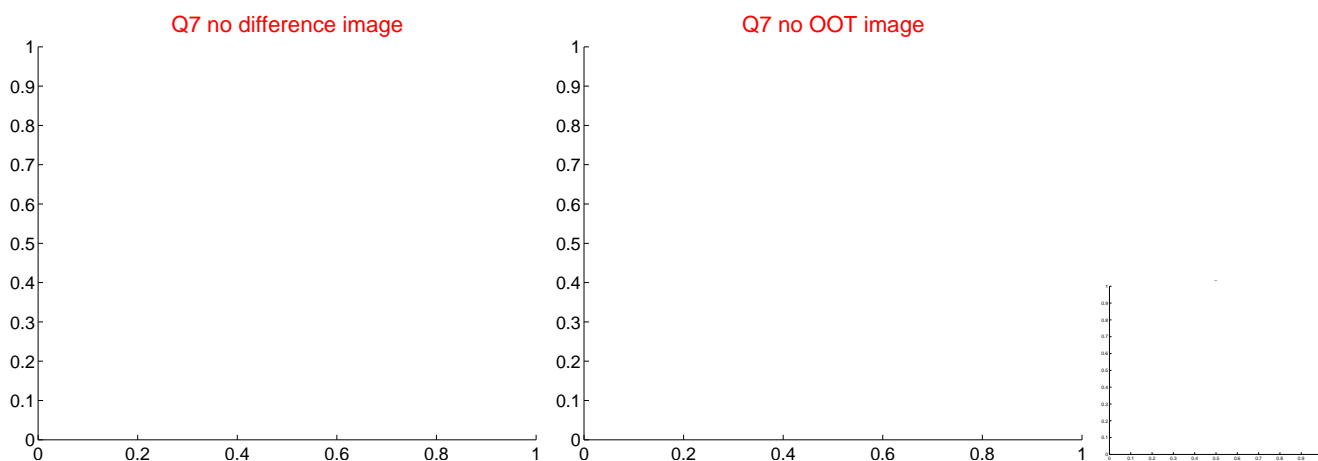
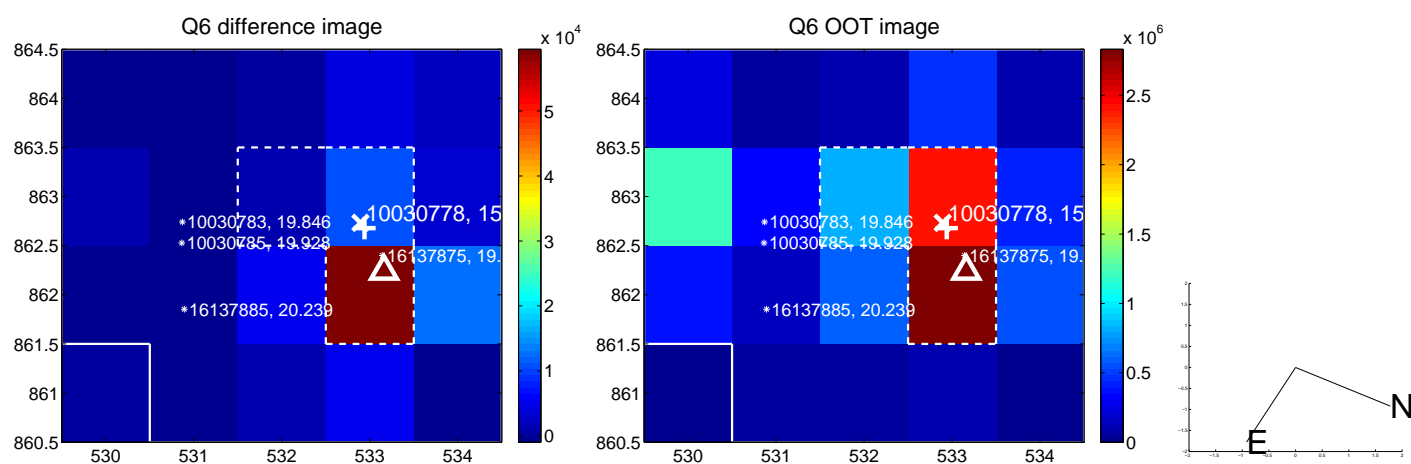
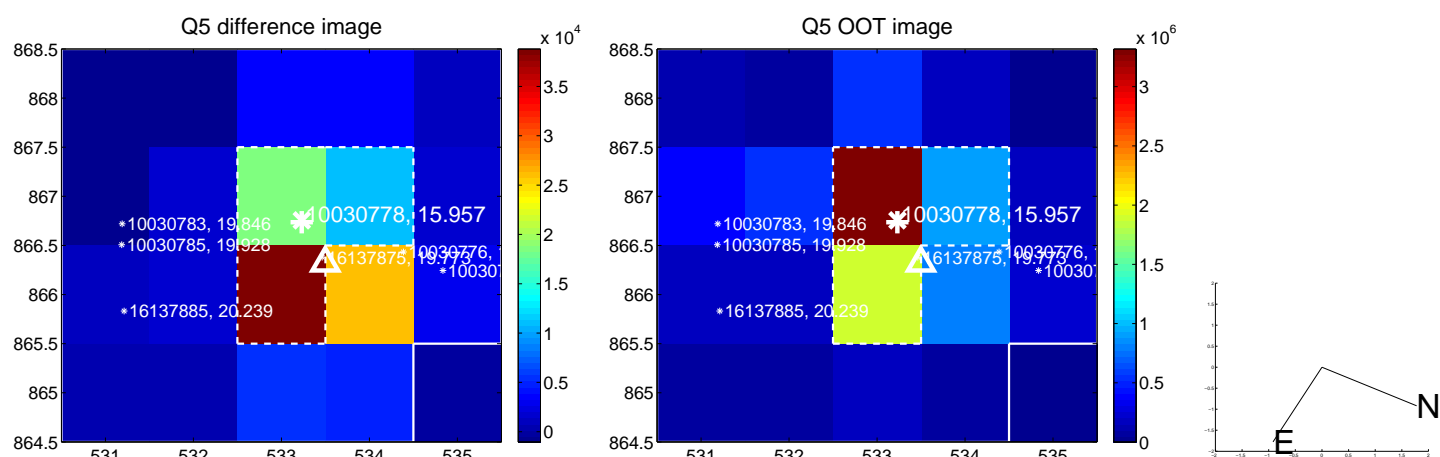


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

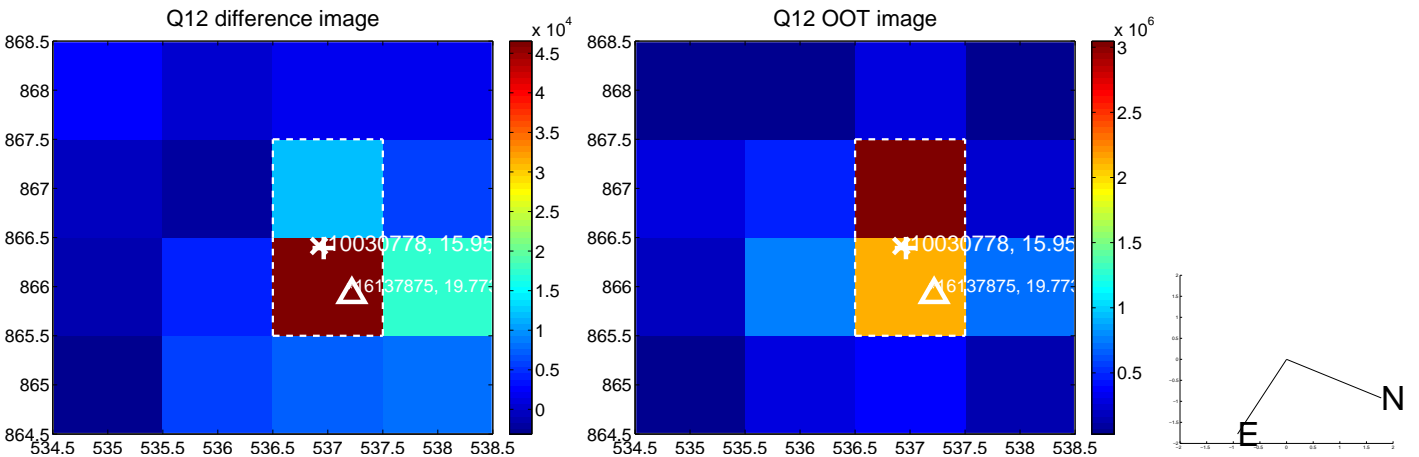
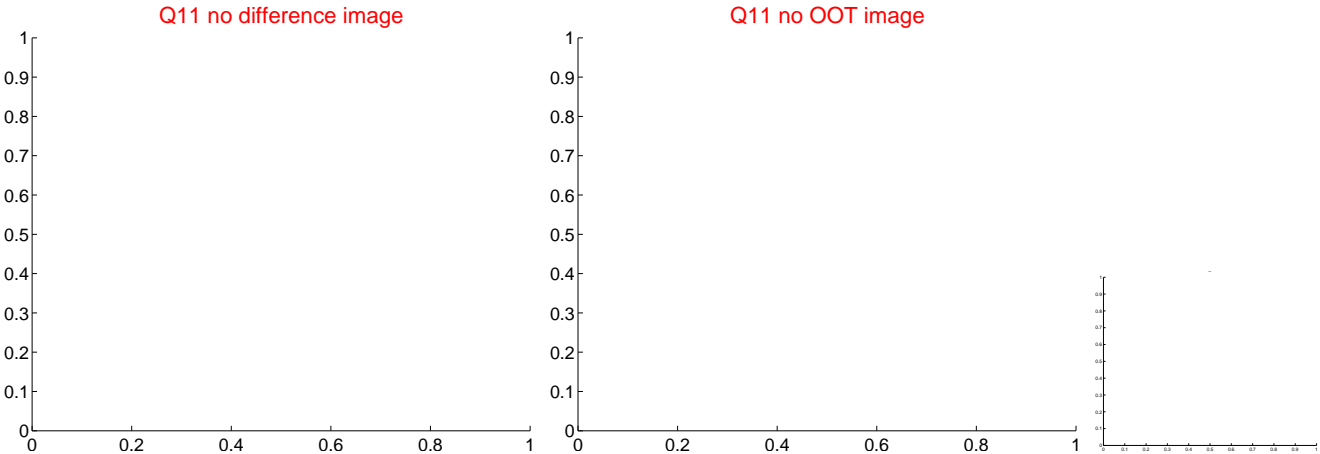
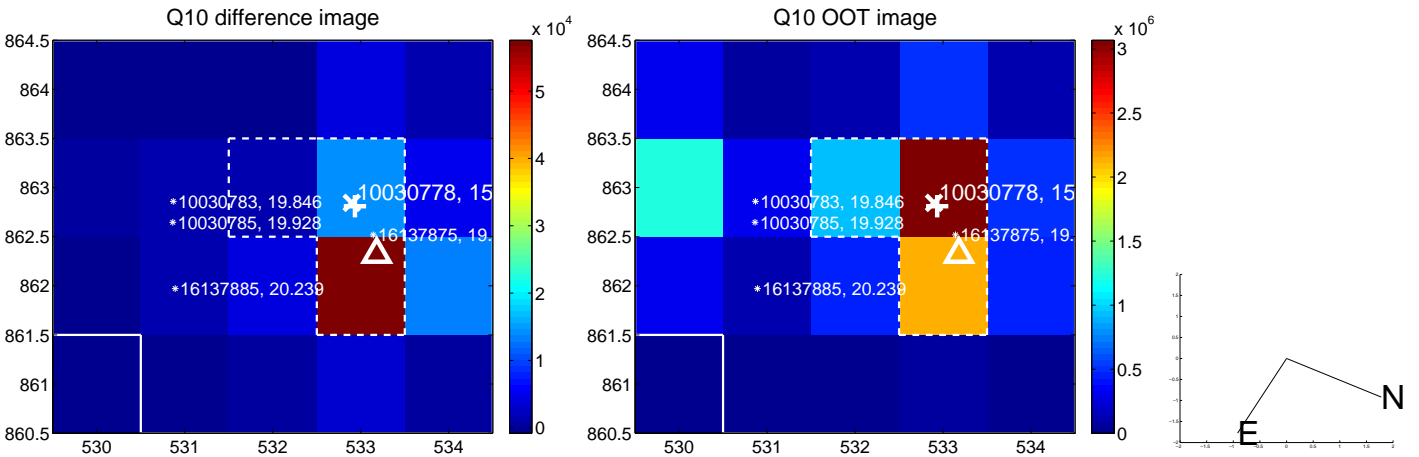
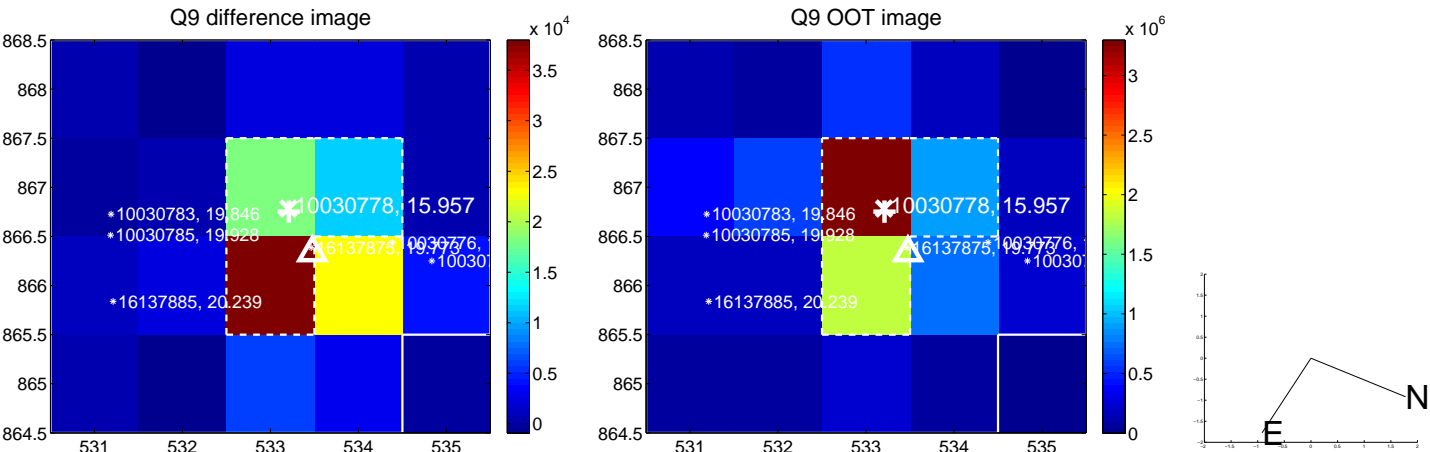


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

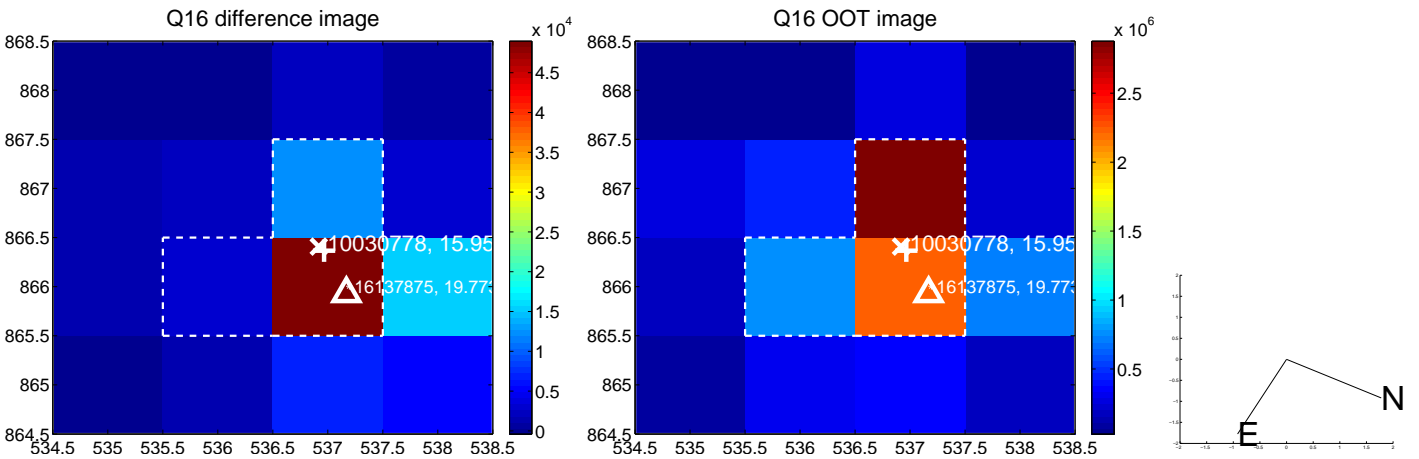
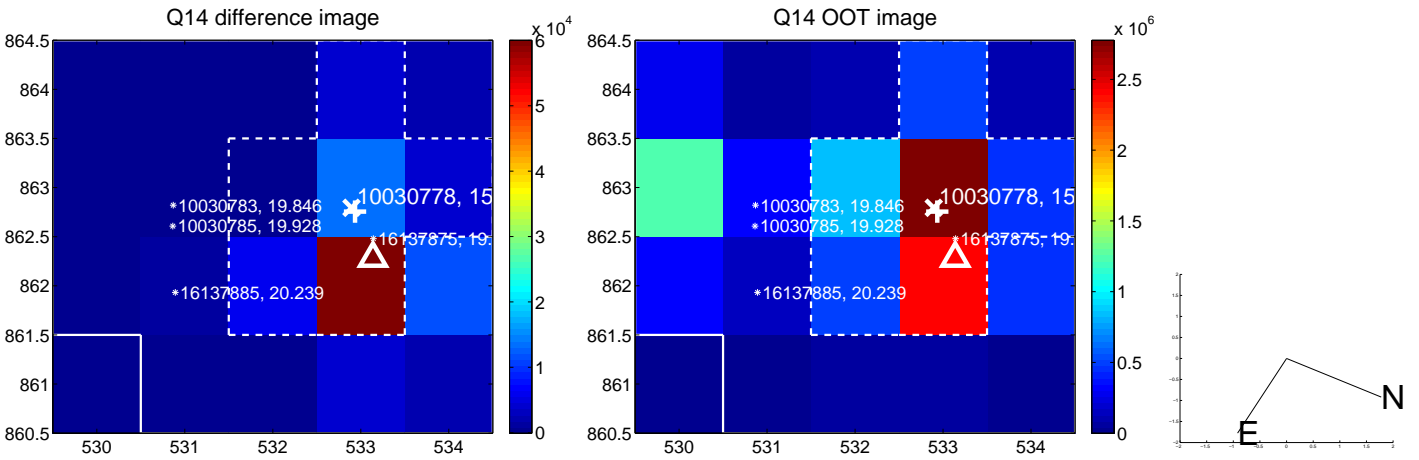
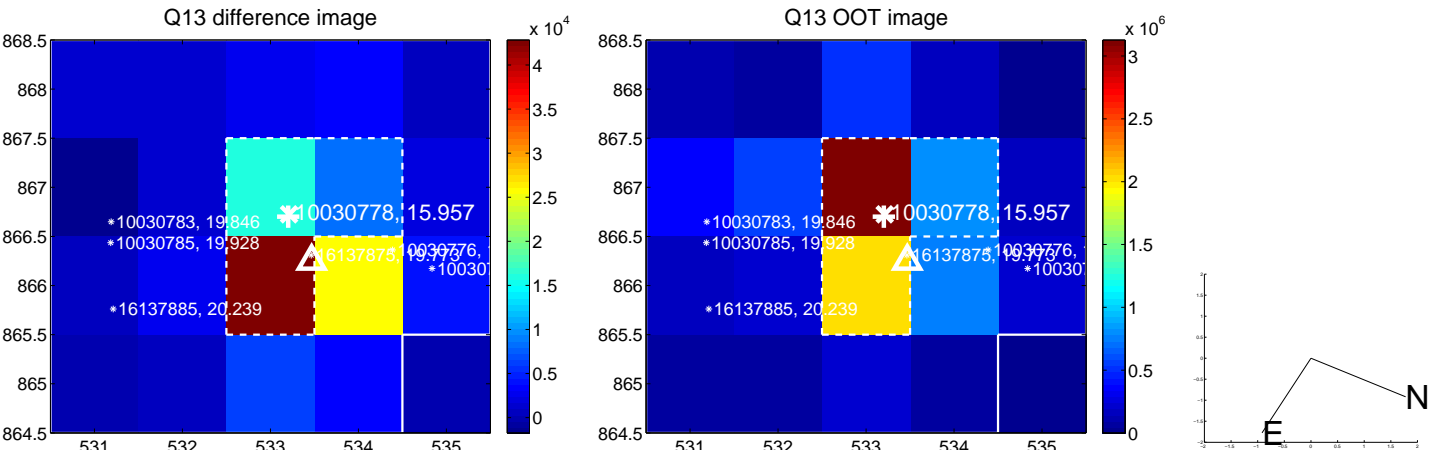




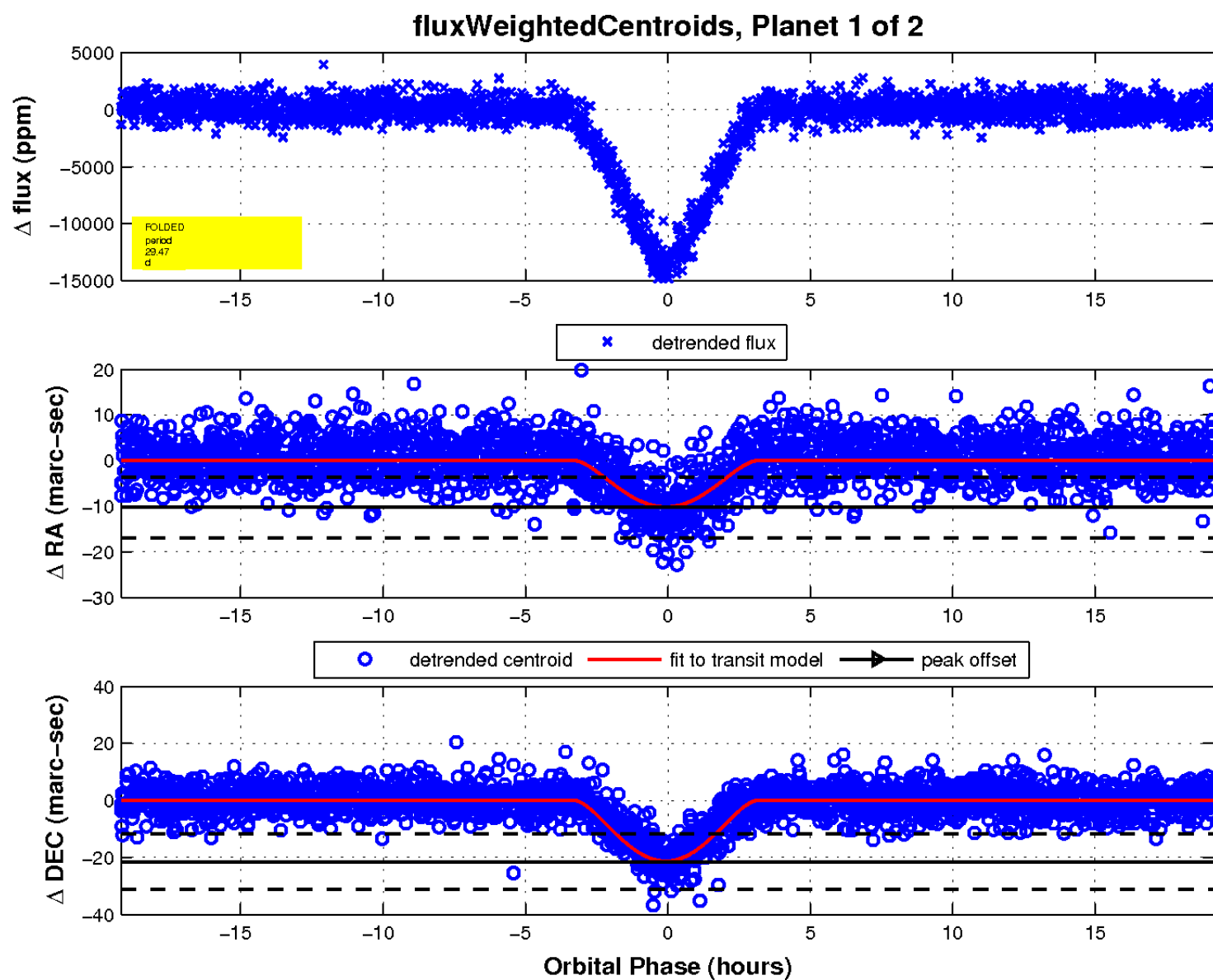
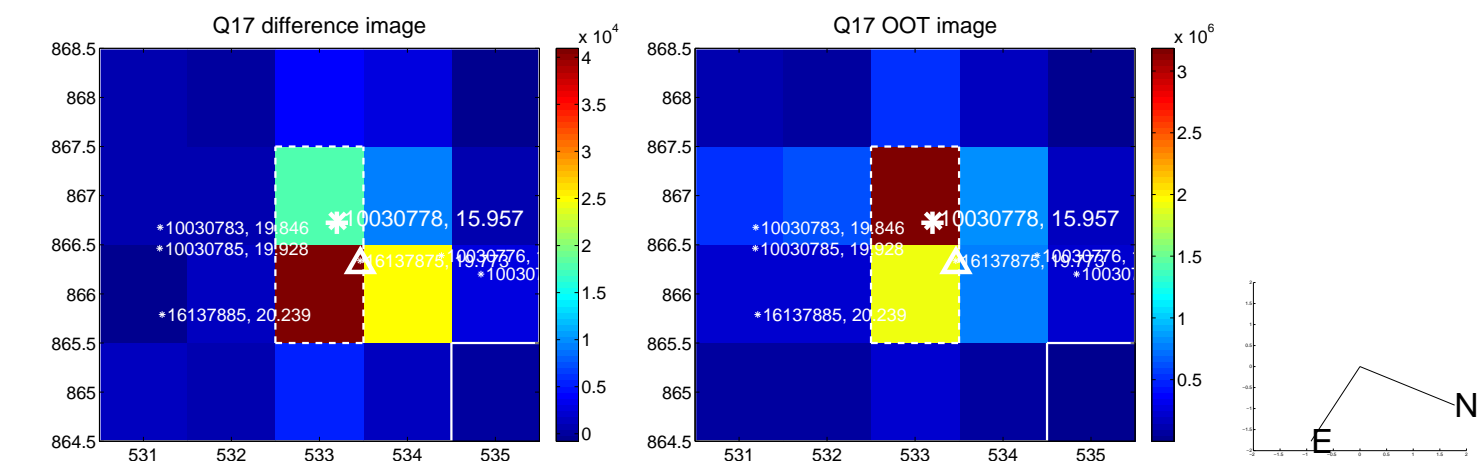
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

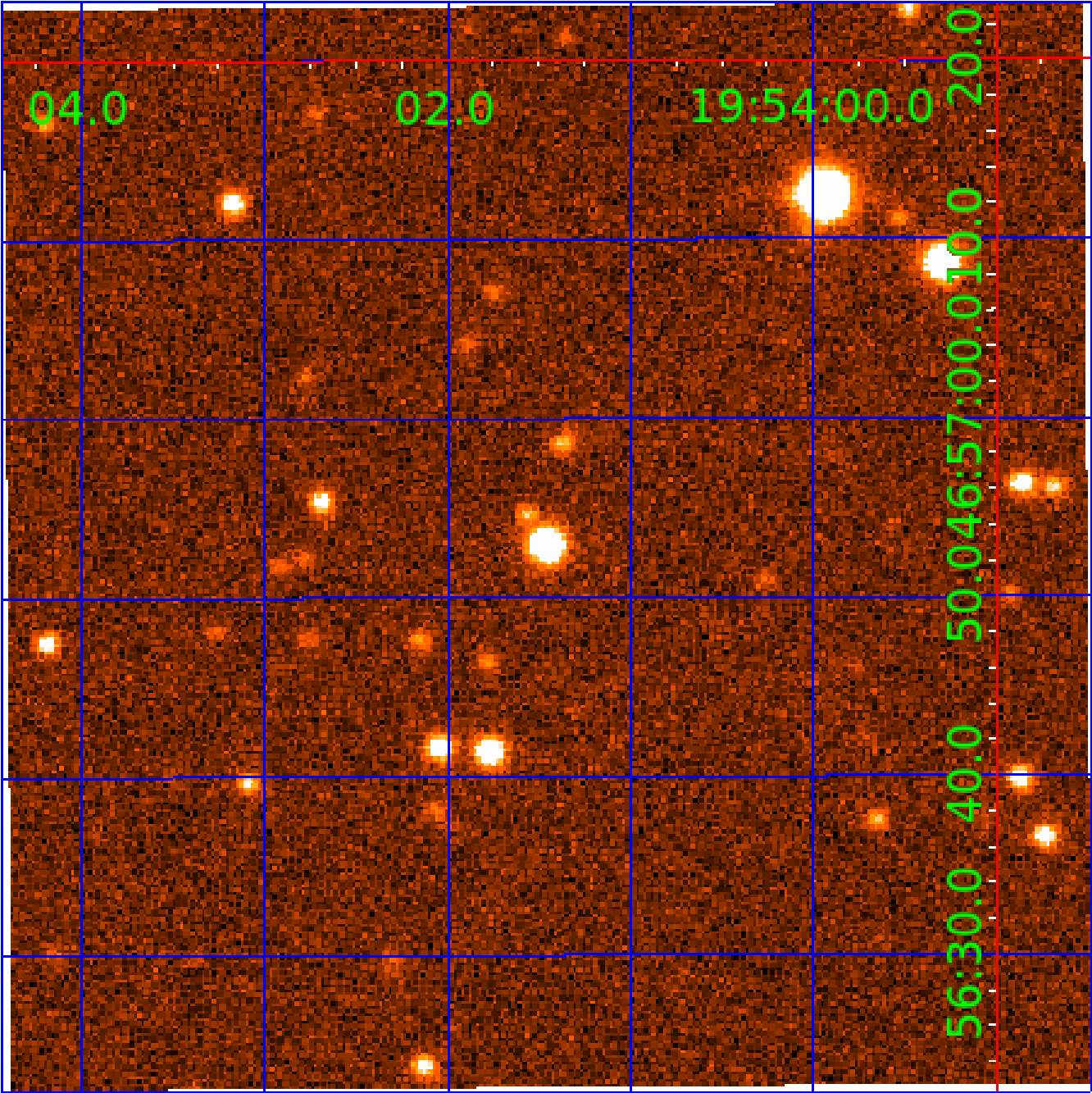


5



UKIRT Image

Declination



# KIC 010030778

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010030778-01	OBS	3265.01	29.473189	154.891649	12598.6	6.397	165.8	173.8	0.90	5838	17.88	24.13
010030778-02	OBS	No	29.473139	140.375543	9345.2	6.284	134.7	128.8	0.90	5838	15.16	24.13

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010030778-01	OBS	FP	0.00	0	1	1	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_UNRESOLVED_OFFSET
010030778-02	OBS	FP	0.00	1	1	1	0	IS_SEC_TCE—CENT_UNRESOLVED_OFFSET

**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 010030778-02

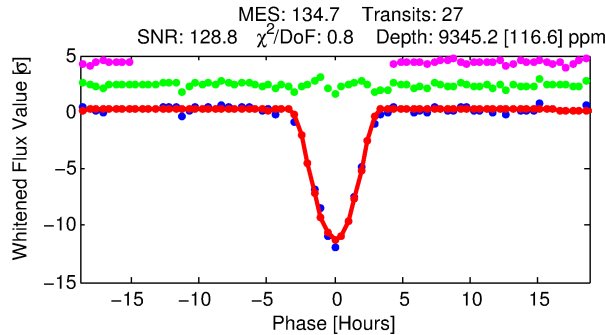
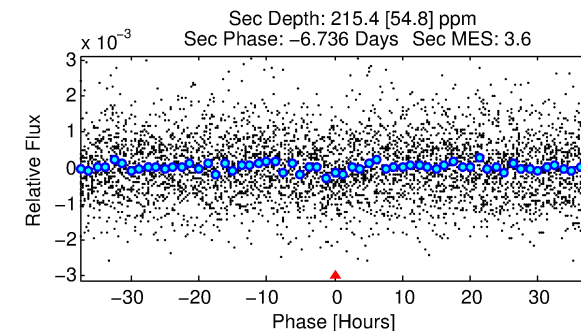
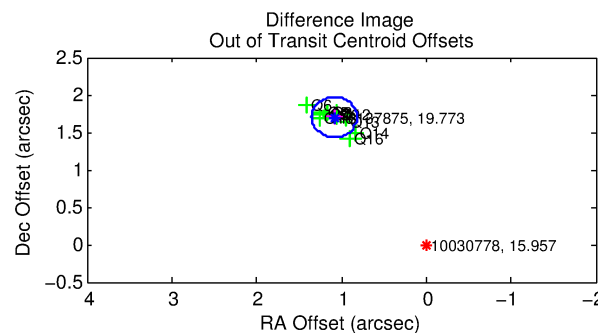
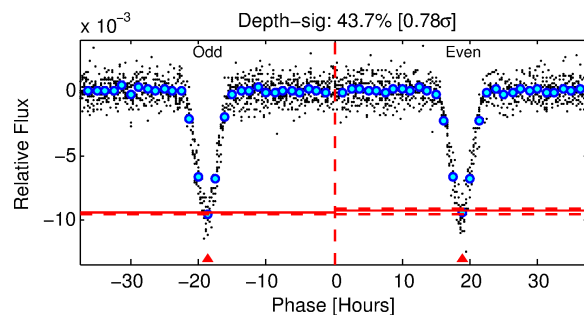
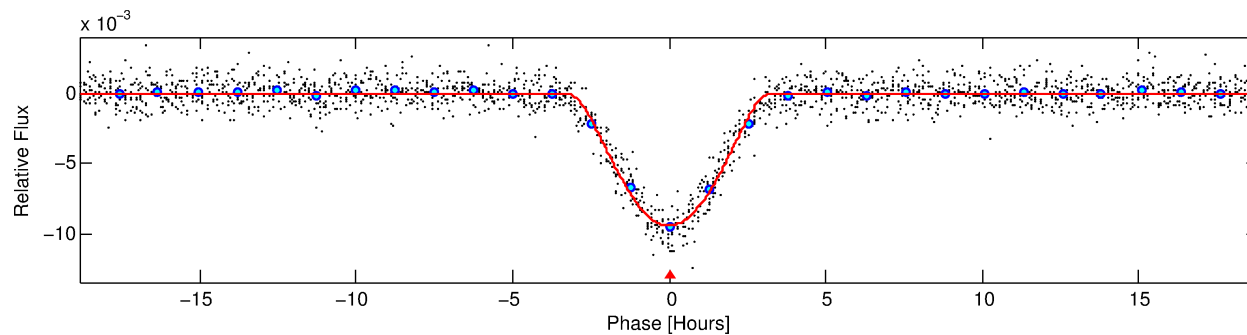
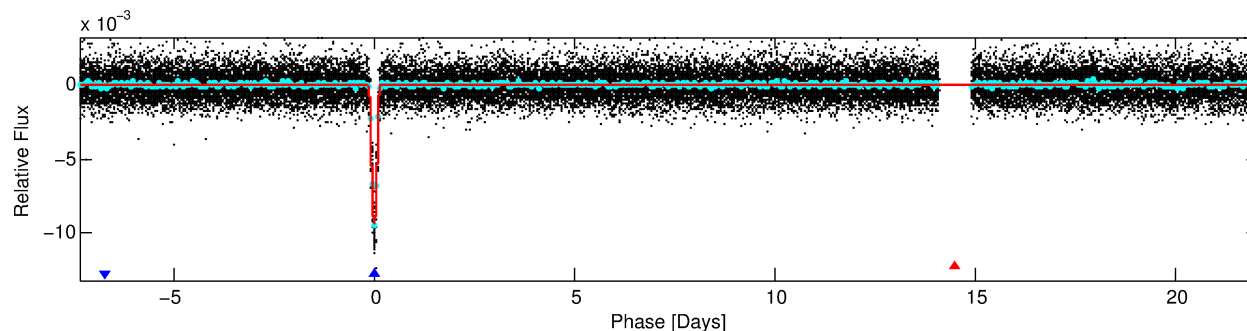
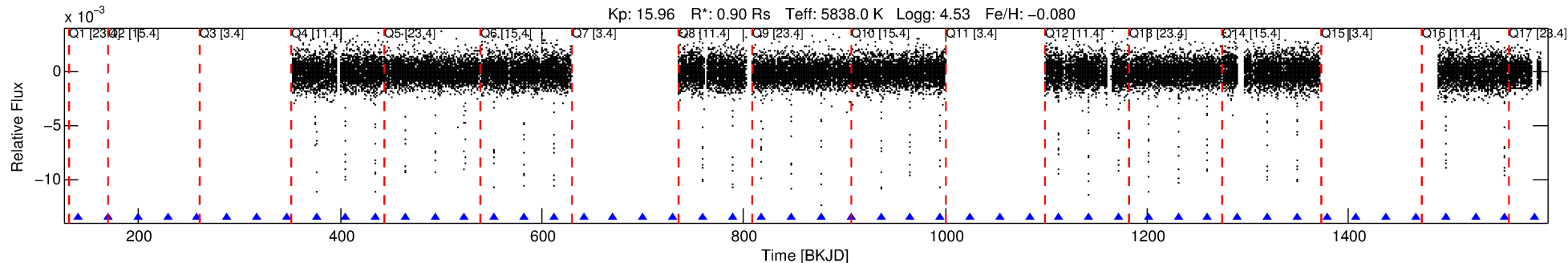
No Significant Match Found

# DV One-Page Summary

KIC: 10030778 Candidate: 2 of 2 Period: 29.473 d

KOI: K03265 Corr: No Ephemeris Match

Kp: 15.96 R\*: 0.90 Rs Teff: 5838.0 K Logg: 4.53 Fe/H: -0.080



## DV Fit Results:

Period = 29.47314 [0.00005] d  
Epoch = 140.3755 [0.0014] BKJD  
Rp/R\* = 0.1549 [0.0573]  
a/R\* = 21.17 [1.25]  
b = 0.99 [0.08]  
Seff = 24.13 [9.55]  
Teq = 565 [56] K  
Rp = 15.16 [7.31] Re  
a = 0.1863 [0.0479] AU  
Ag = 17.90 [15.49] [1.09σ]  
Teffp = 1797 [357] K [3.41σ]

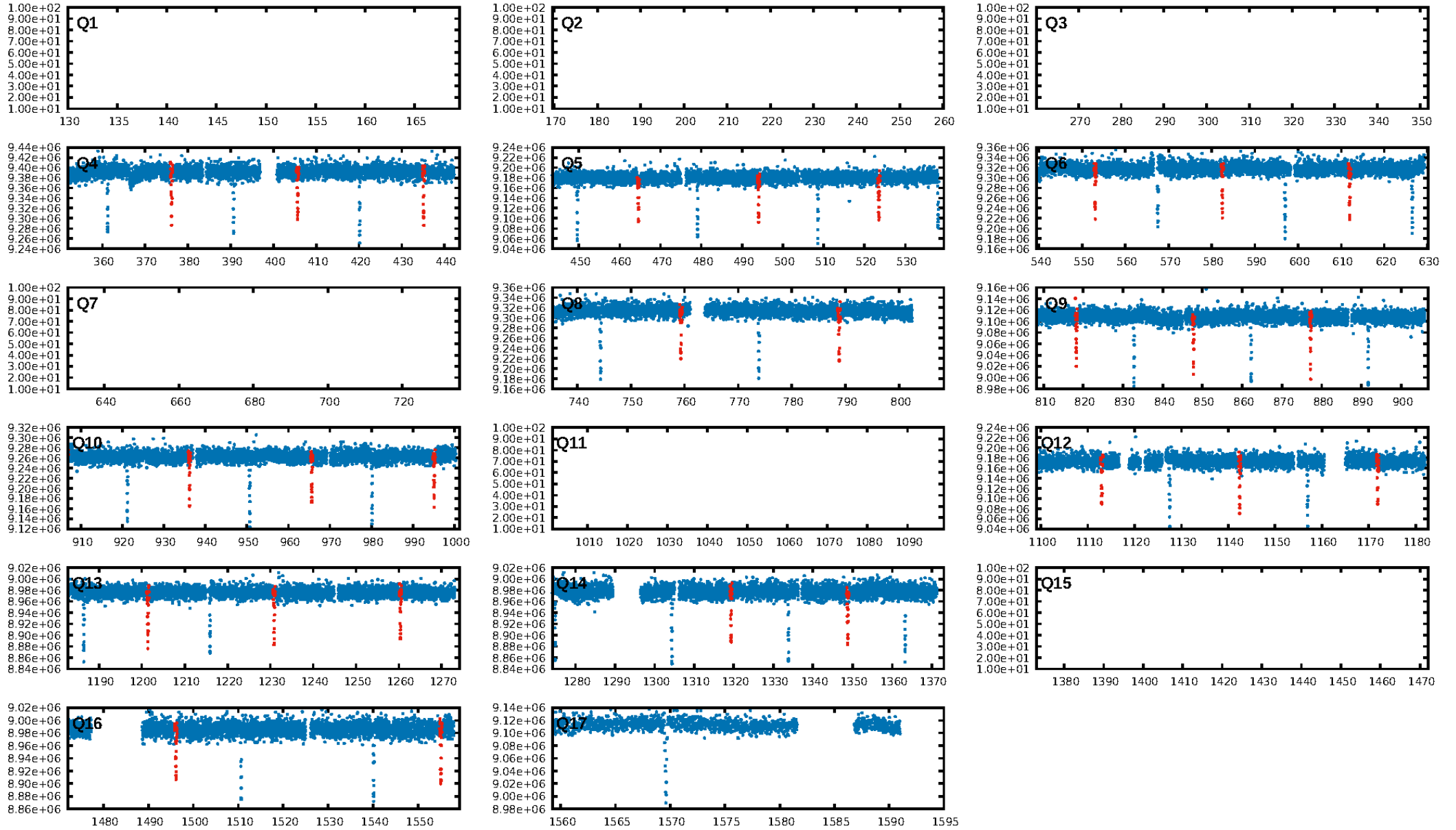
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 14.4%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [27/27]  
GhostDiagnostic-chr: 2.08  
Centroid-sig: 0.0%  
Centroid-so: 1.817 arcsec [16.87σ]  
OotOffset-rm: 2.017 arcsec [22.48σ]  
KicOffset-rm: 2.140 arcsec [23.47σ]  
OotOffset-st: 3/0/4/3 [10]  
KicOffset-st: 3/0/4/3 [10]  
DiffImageQuality-fgm: 1.00 [10/10]  
DiffImageOverlap-fno: 1.00 [10/10]

Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 12:36:20 Z

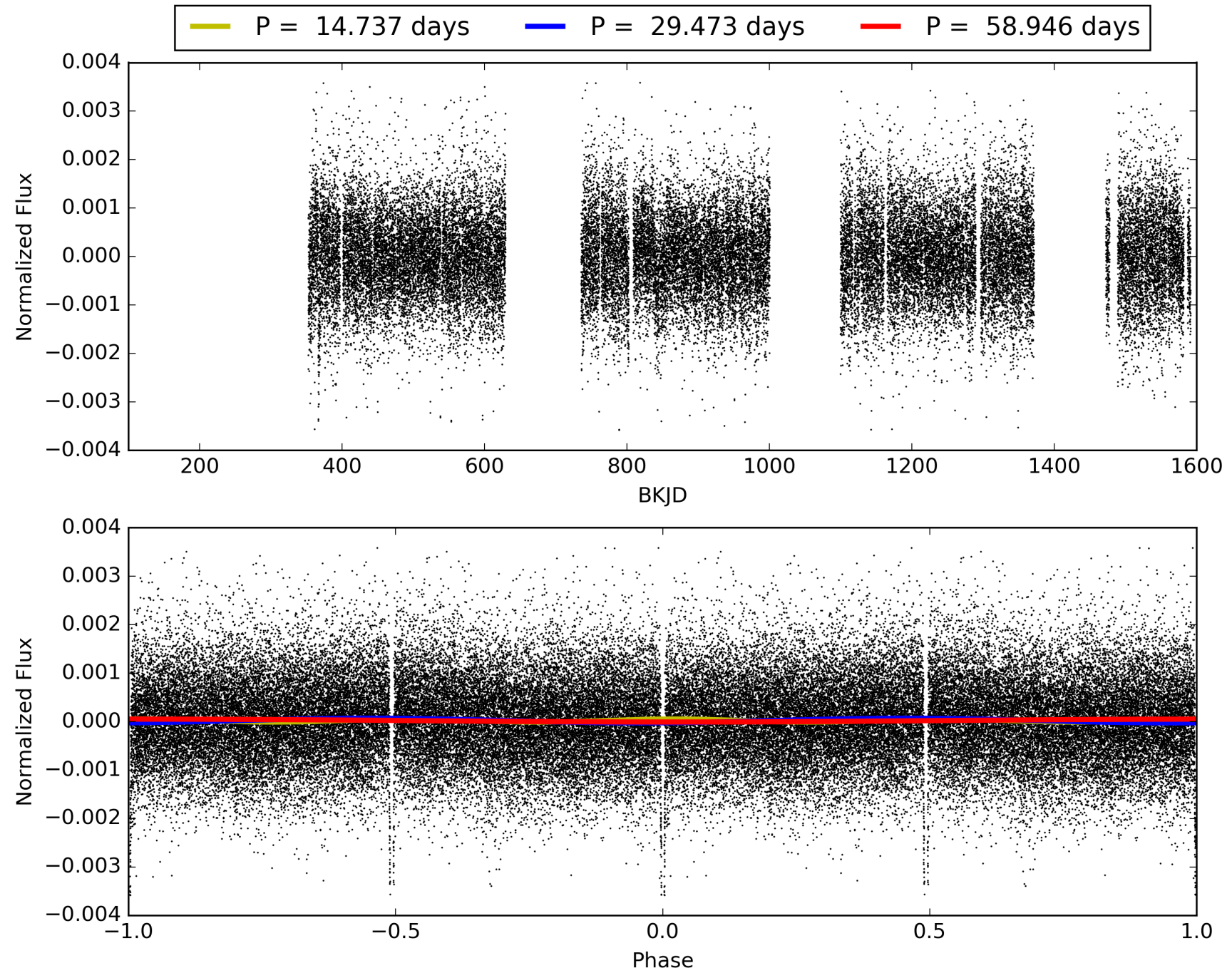
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010030778-02, PDC Light Curves





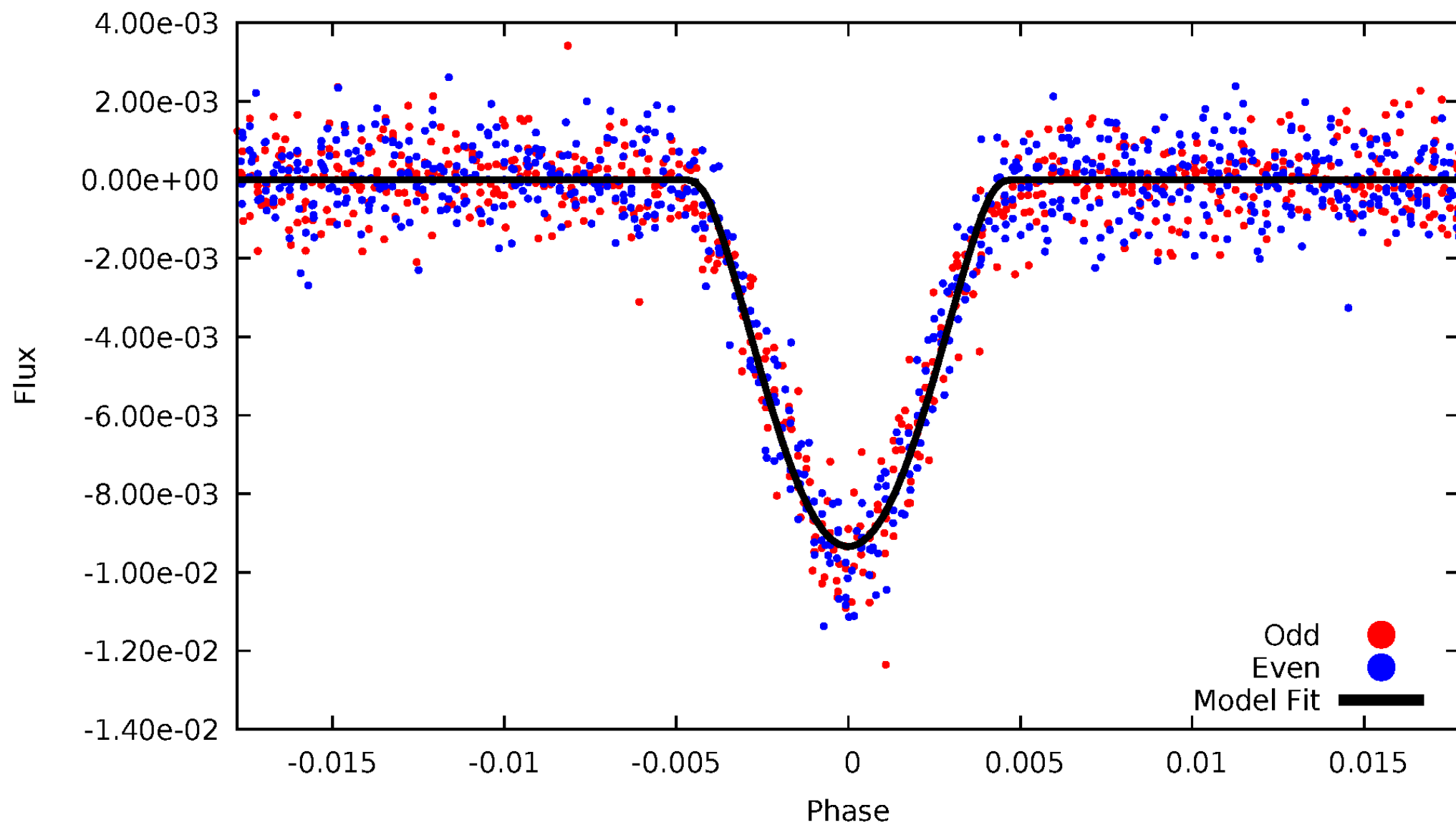
TCE 010030778-02





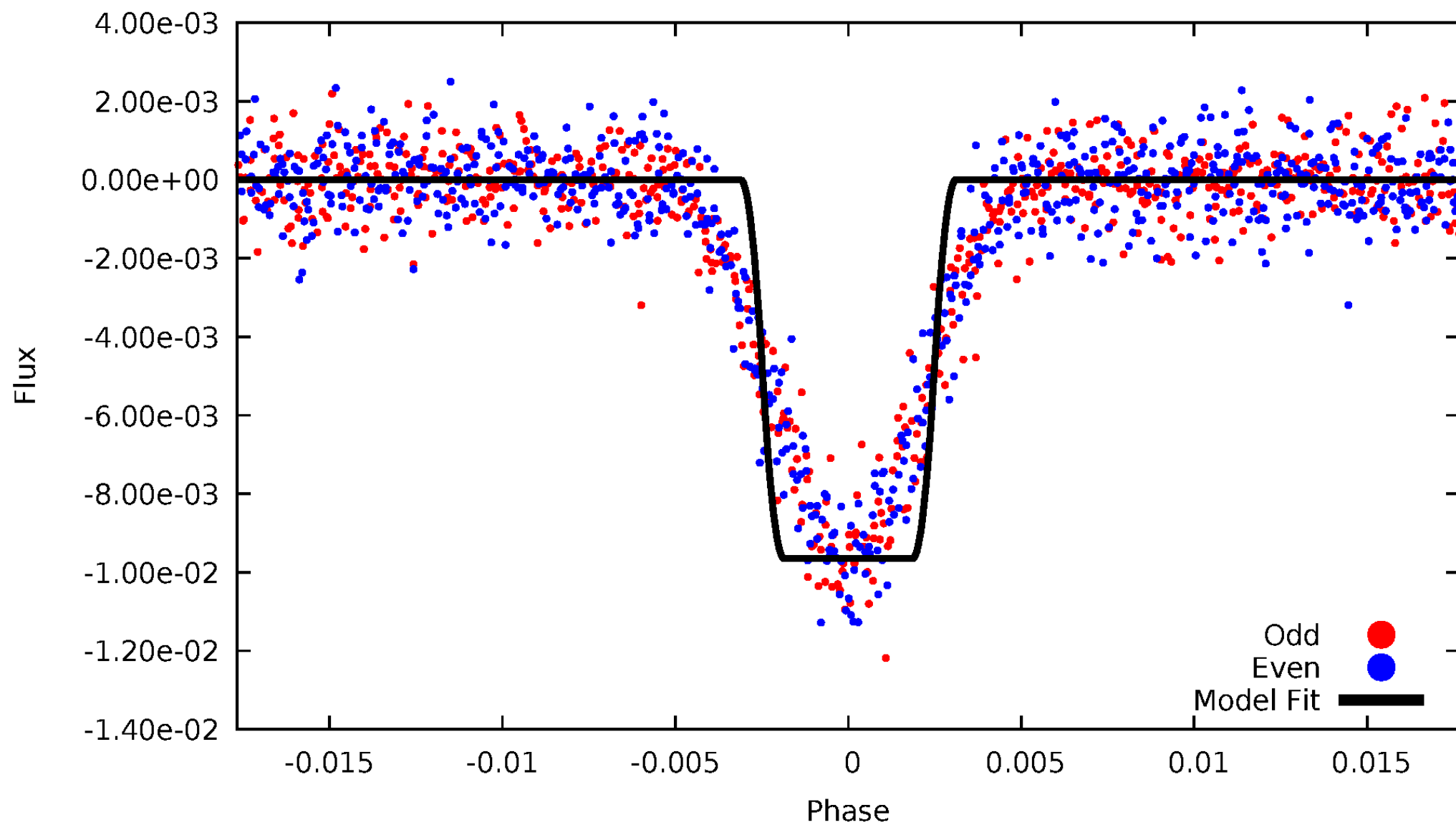
DV Odd/Even

TCE 010030778-02



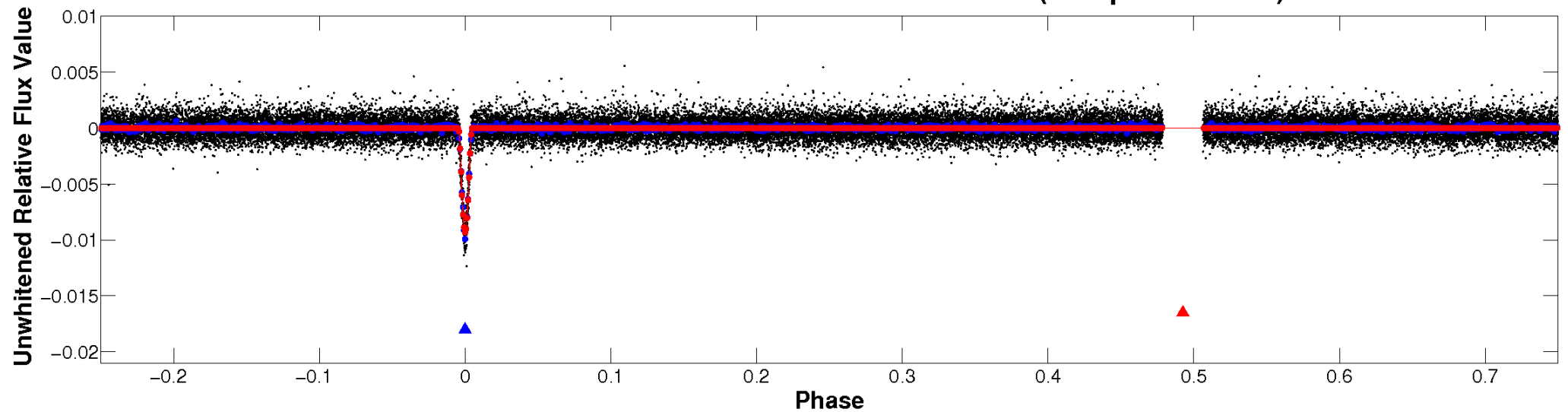
# ALT Odd/Even

TCE 010030778-02

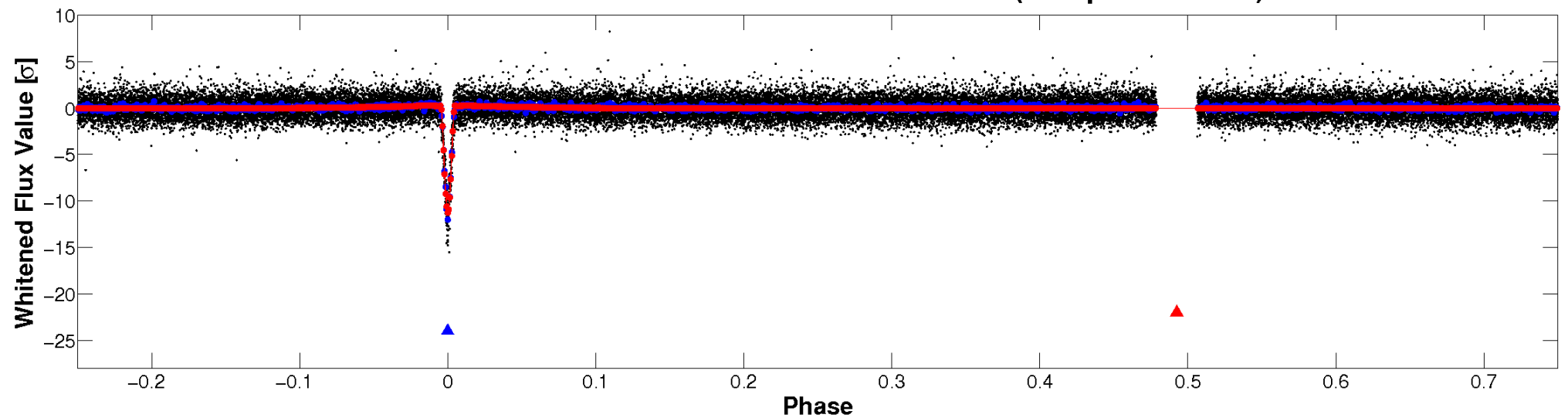


# Non-Whitened Vs. Whitened Light Curve

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

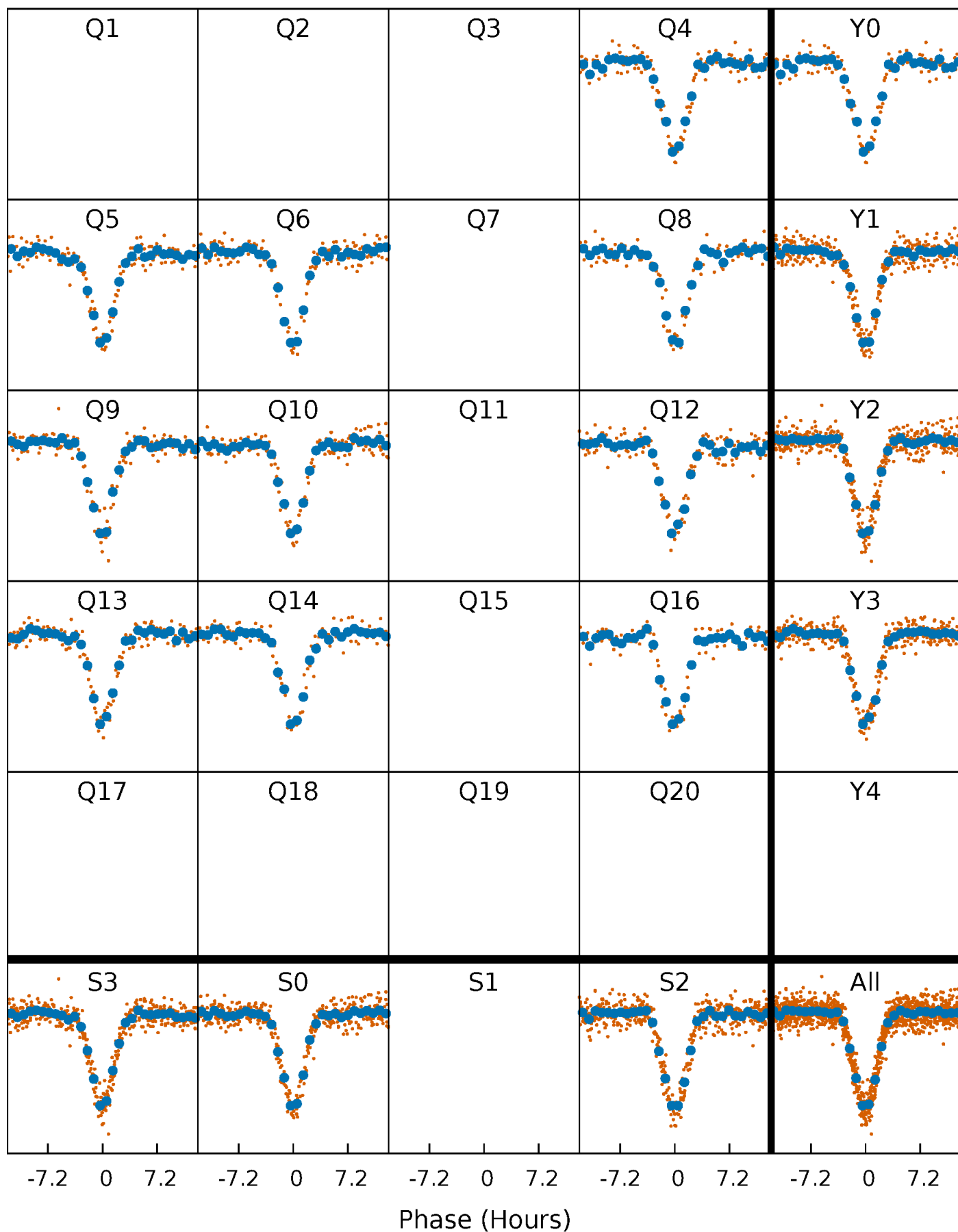


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



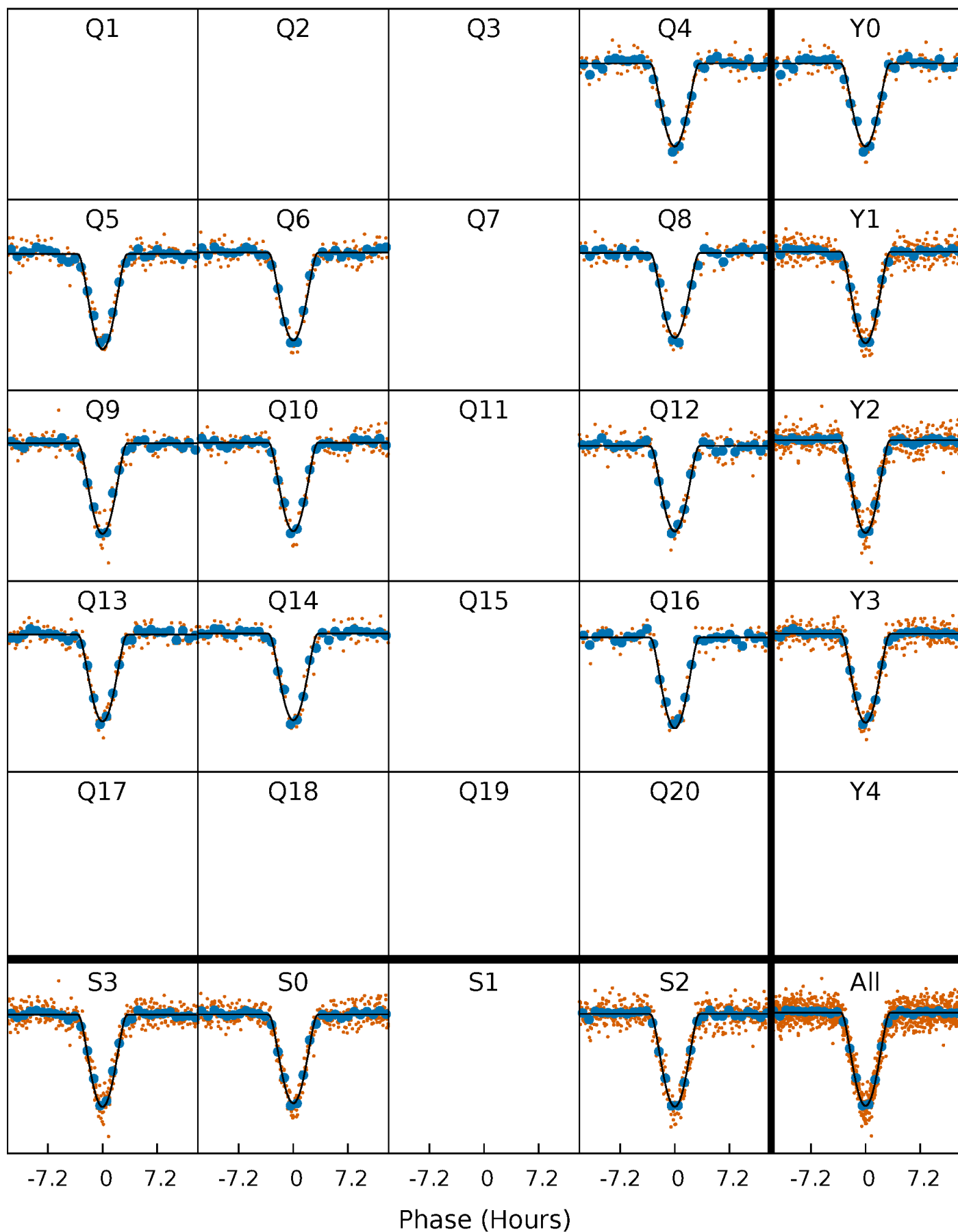
# PDC Quarter-Phased Transit Curves

TCE 010030778-02     $P = 29.473139$  Days     $T_0 = 140.375543$  (BKJD)



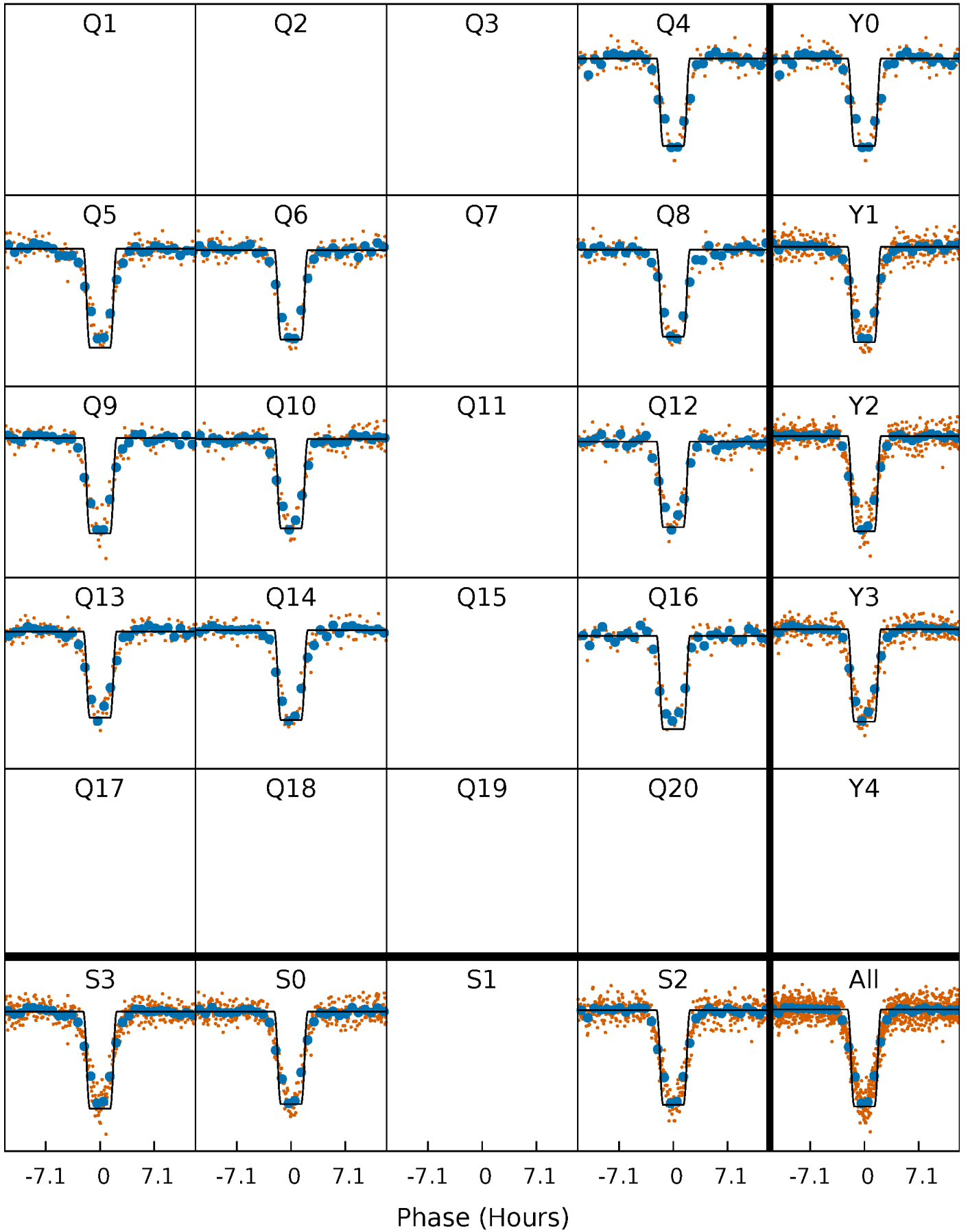
# DV Quarter-Phased Transit Curves

TCE 010030778-02   P= 29.473139 Days    $T_0=140.375543$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

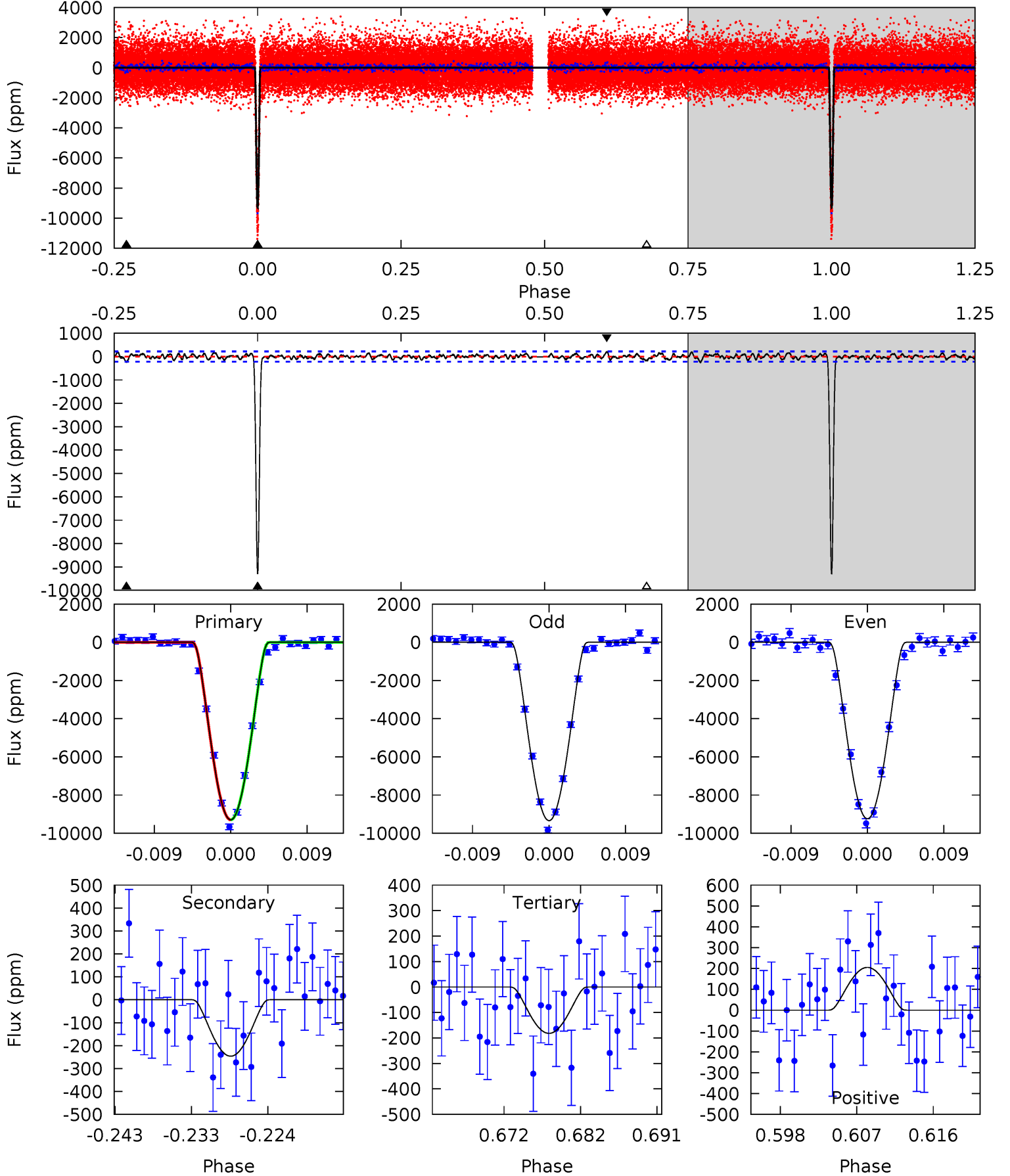
TCE 010030778-02   P= 29.473370 Days    $T_0=140.369896$  (BKJD)



# DV Model-Shift Uniqueness Test

010030778-02, P = 29.473139 Days, E = 140.375543 Days

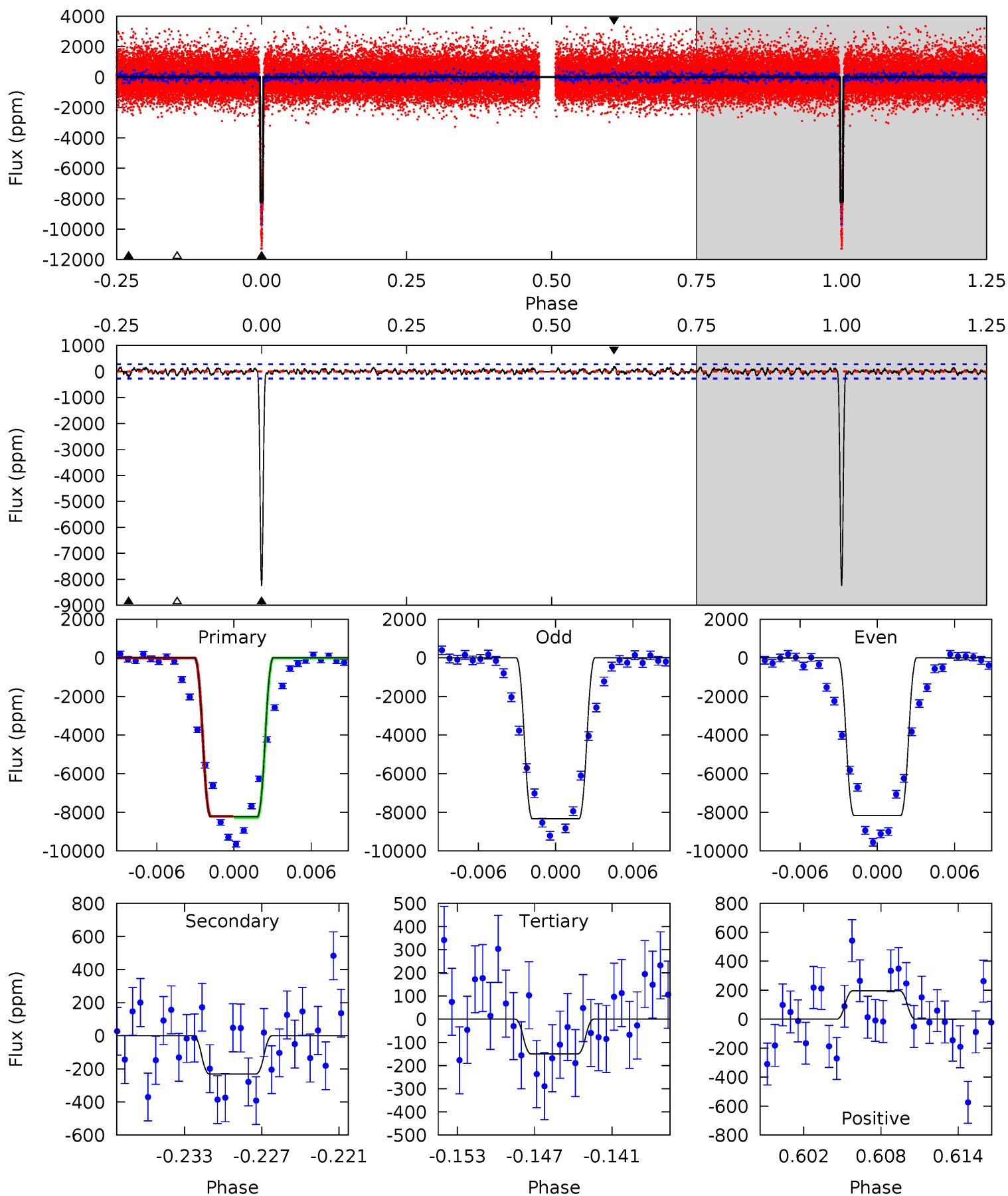
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
212.7	5.63	4.16	4.70	5.04	2.60	1.51	208.5	208.0	1.47	0.94	1.11	0.99	0.02	0.06



# Alt Model-Shift Uniqueness Test

010030778-02, P = 29.473370 Days, E = 140.369896 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
152.6	4.29	2.78	3.65	5.12	2.74	1.14	149.9	149.0	1.51	0.64	1.54	0.98	0.02	0.53





### Stellar Parameters For KIC 010030778

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5838^{+184}_{-204}$	$4.529^{+0.037}_{-0.200}$	$-0.080^{+0.300}_{-0.300}$	$0.897^{+0.278}_{-0.087}$	$0.992^{+0.113}_{-0.113}$	$1.938^{+0.375}_{-0.977}$
	+3%/-3%	+1%/-4%	+375%/-375%	+31%/-10%	+11%/-11%	+19%/-50%
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 010030778-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-246 \pm 44$	$16.05^{+6.15}_{-5.71}$	$808^{+53}_{-36}$	$2629^{+361}_{-187}$	$17^{+27}_{-8}$
Alt.	$-231 \pm 54$	$10.25^{+6.15}_{-5.57}$	$812^{+57}_{-41}$	$2958^{+814}_{-365}$	$41^{+159}_{-26}$

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

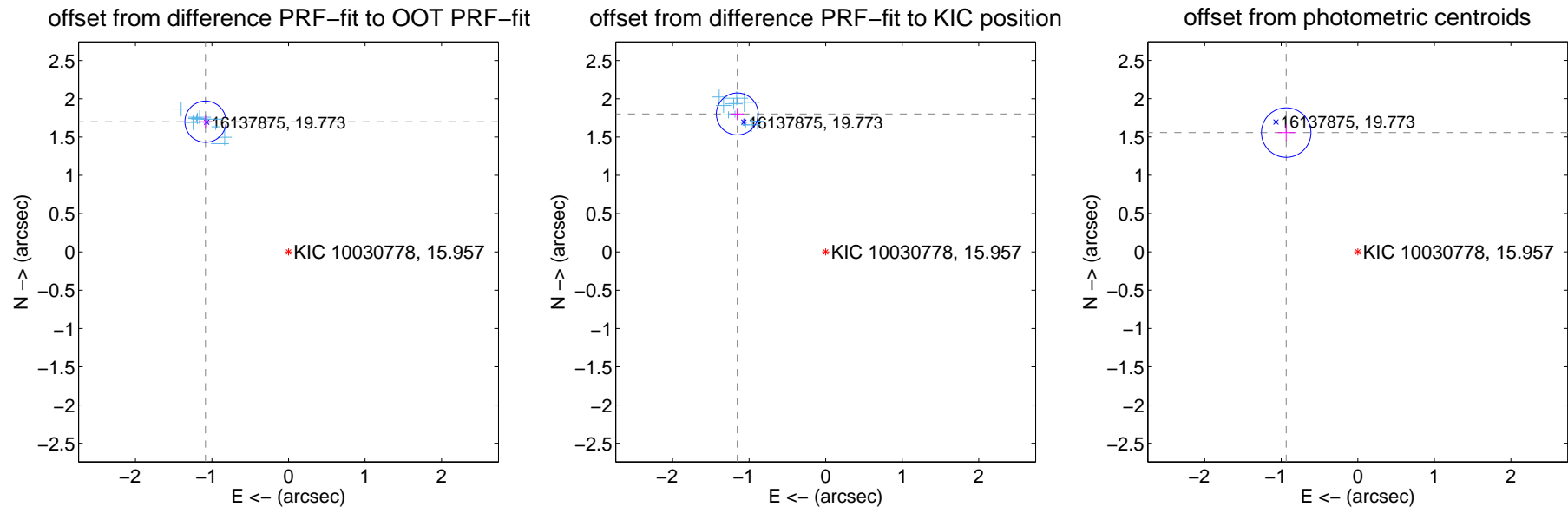
## DV Centroid Data

Supplemental centroid analysis for 010030778-02. Kepler magnitude: 15.96. Transit SNR 128.81

There are 10 quarters with good PRF difference image offsets

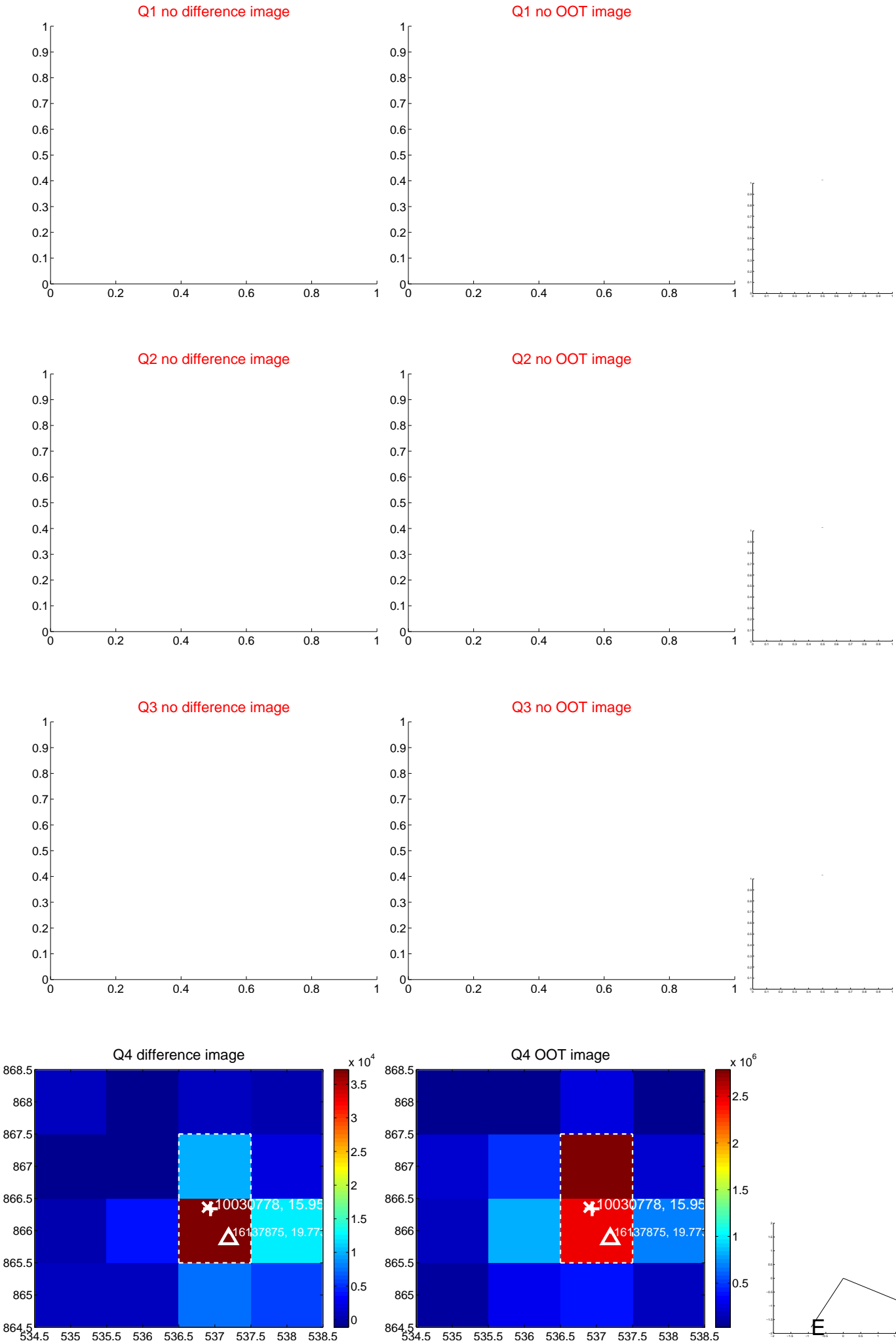
The direct PRF centroid is offset from the target star catalog position by about 0.26 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.017 \pm 0.090$	22.48	$1.084 \pm 0.087$	$1.701 \pm 0.077$
PRF-fit source offset from KIC position	$2.140 \pm 0.091$	23.47	$1.155 \pm 0.085$	$1.802 \pm 0.081$
photometric centroid source offset	$1.82 \pm 0.11$	16.87	$0.94 \pm 0.11$	$1.56 \pm 0.11$

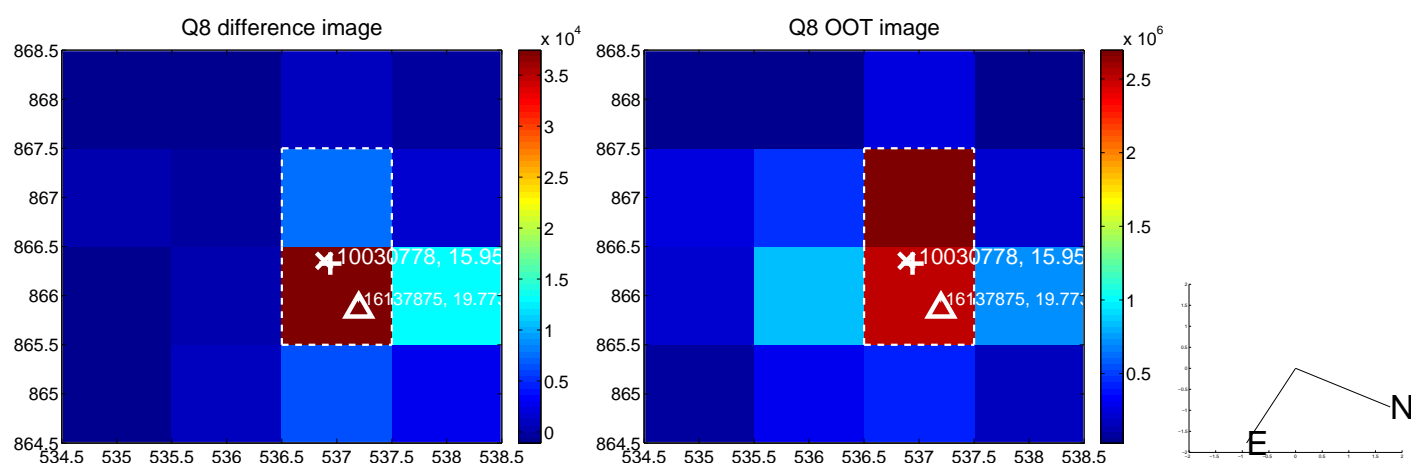
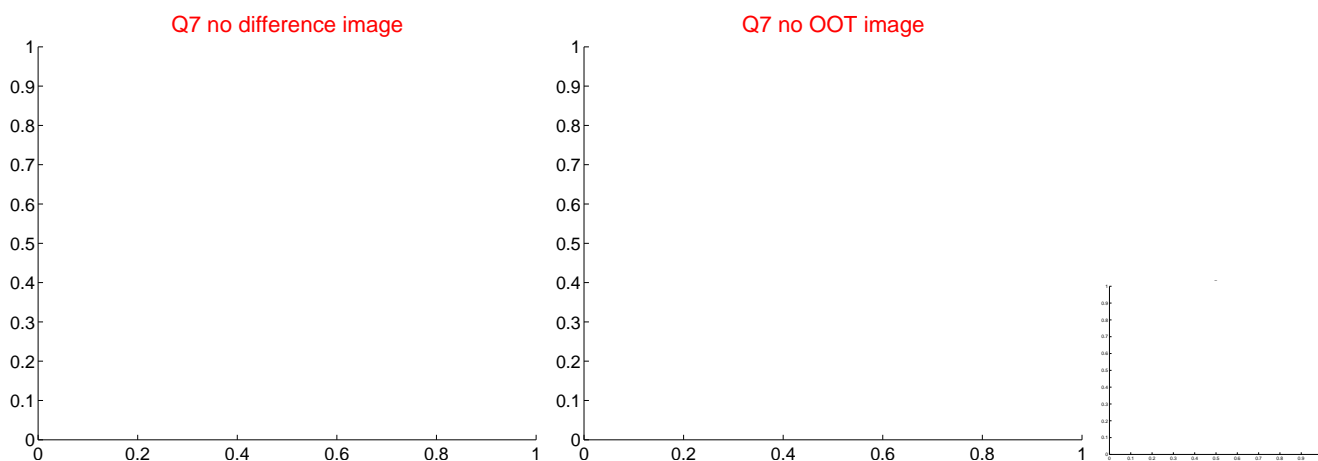
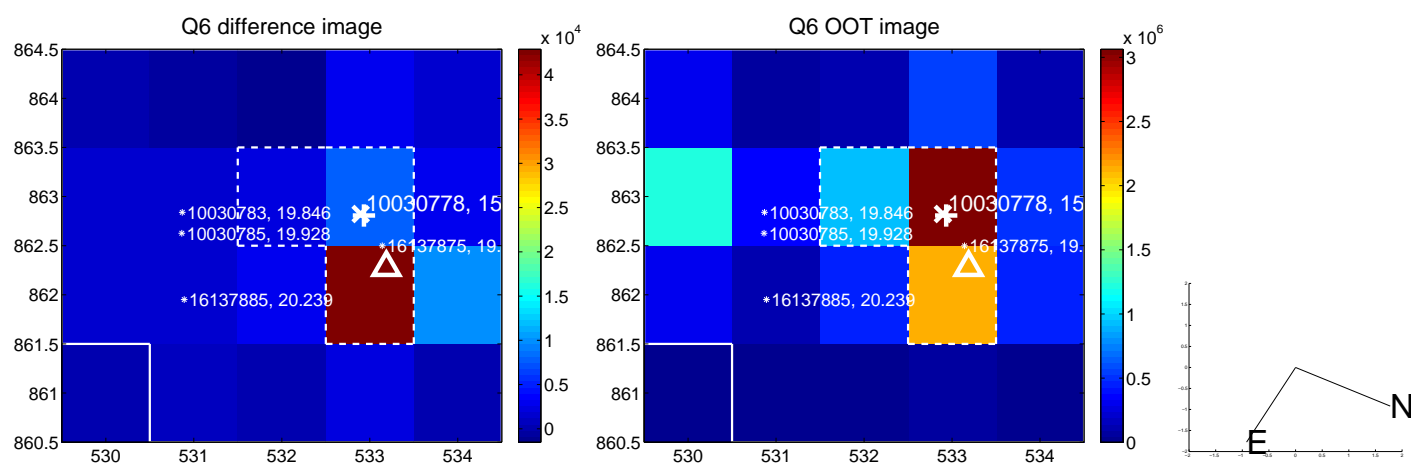
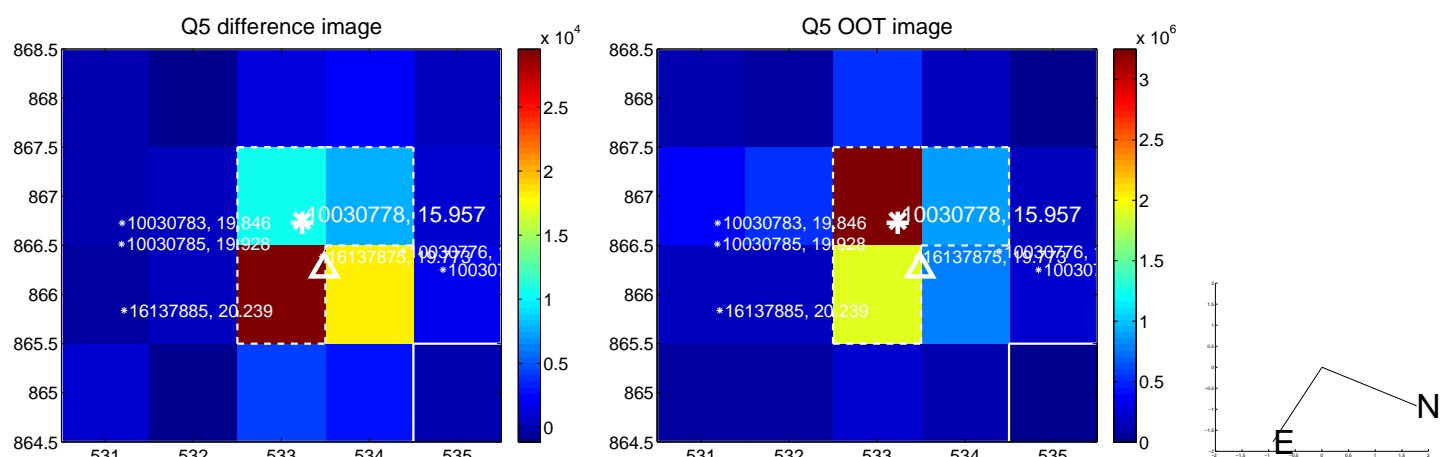


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

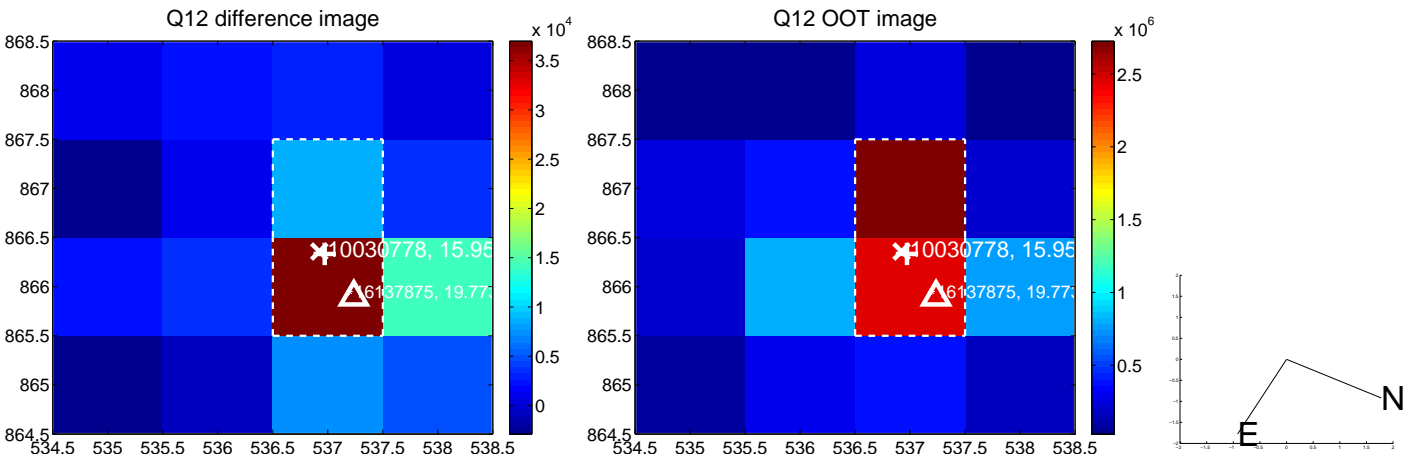
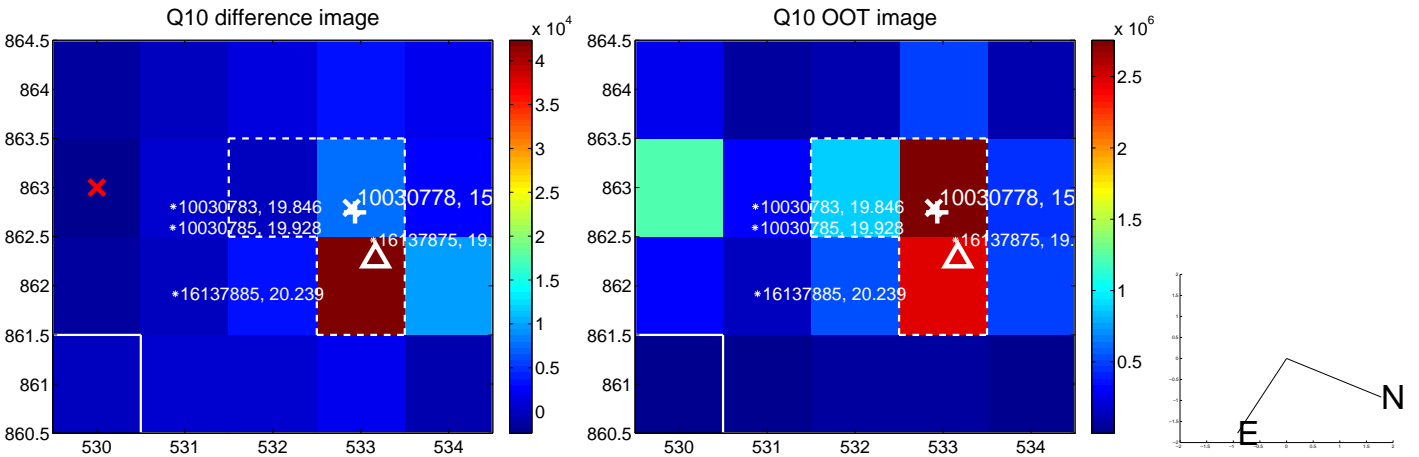
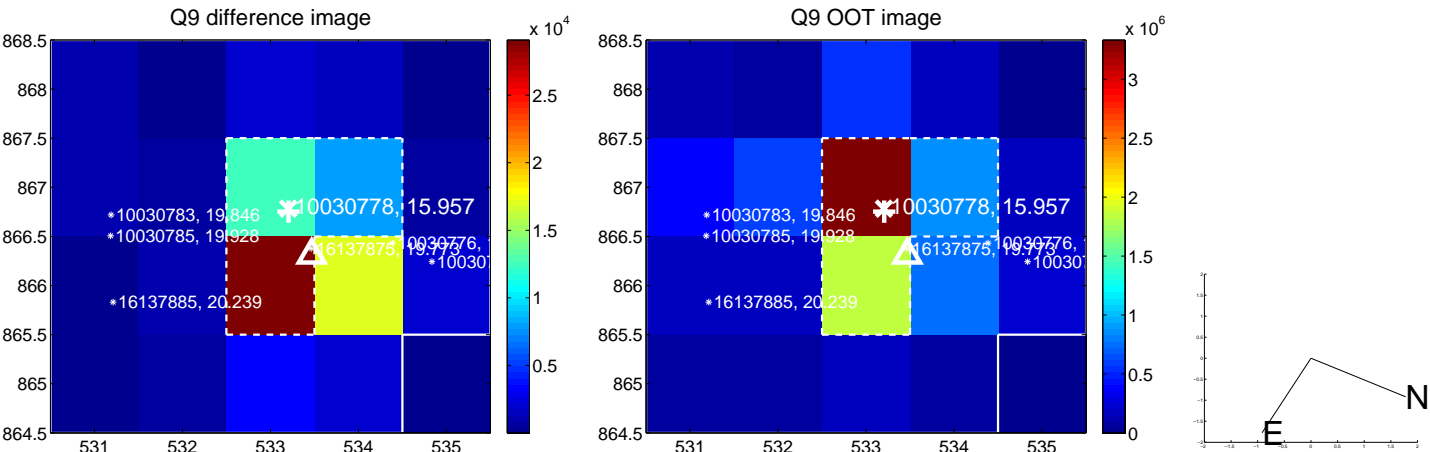
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



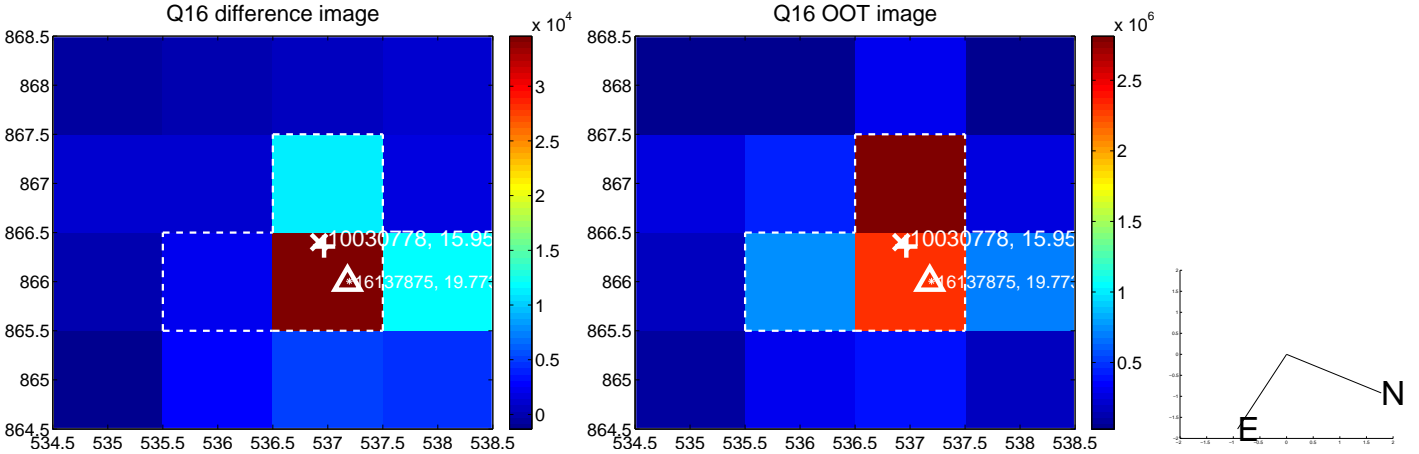
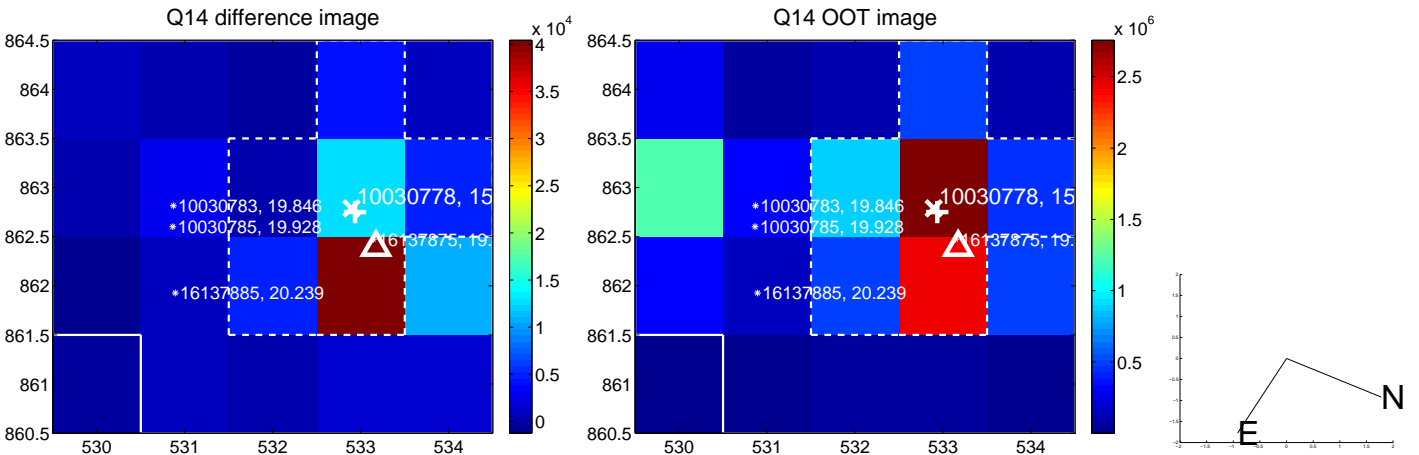
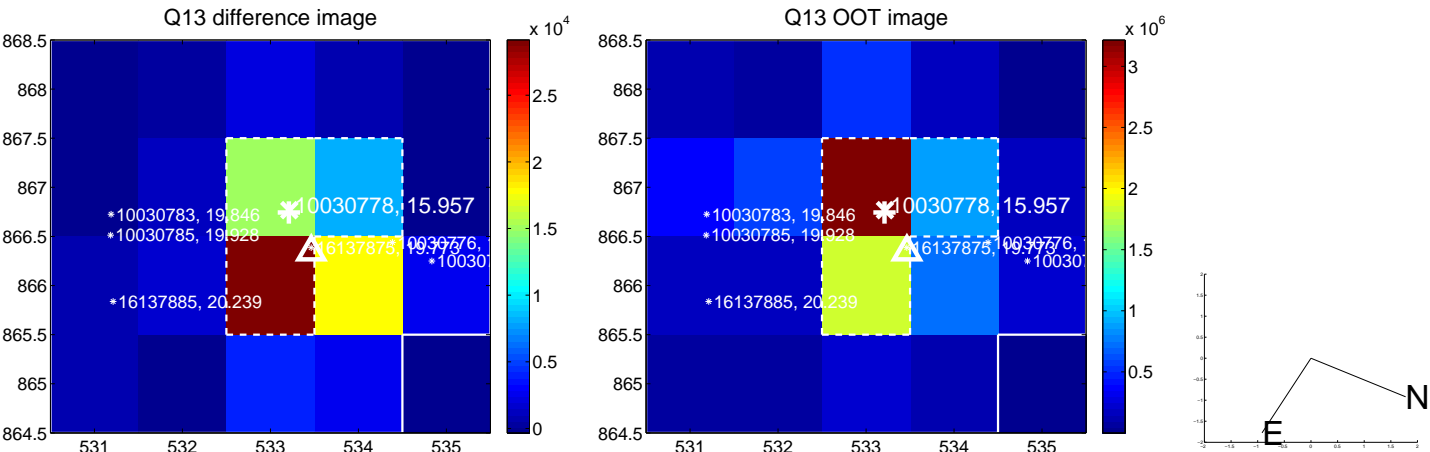
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



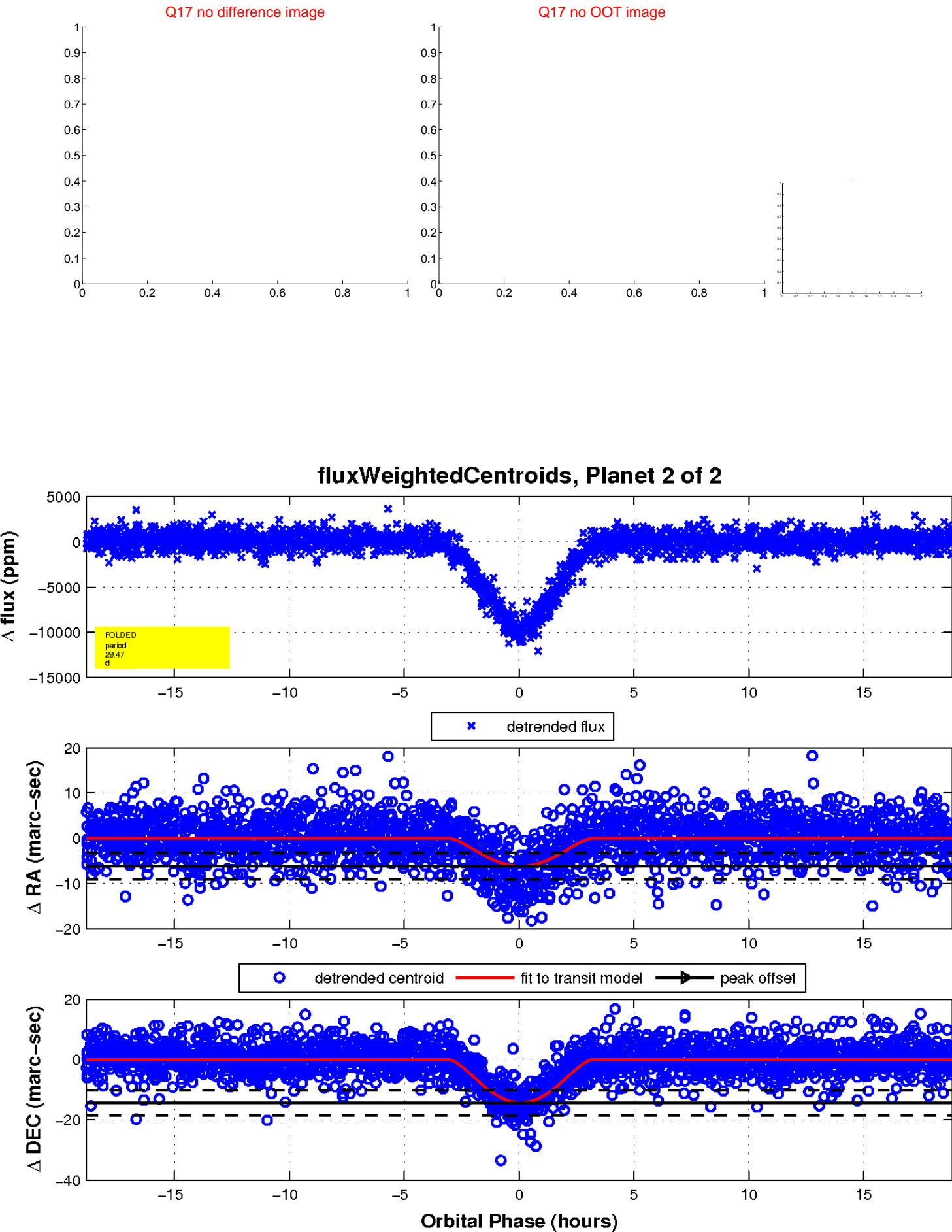
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

