

# KIC 012022517

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012022517-01	OBS	7507.01	3.442717	132.390769	58109.6	3.429	2268.3	1583.2	0.86	5819	35.04	423.73
012022517-02	OBS	No	1.721366	132.393741	20852.2	3.353	833.4	768.0	0.86	5819	16.52	1067.72

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012022517-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
012022517-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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.

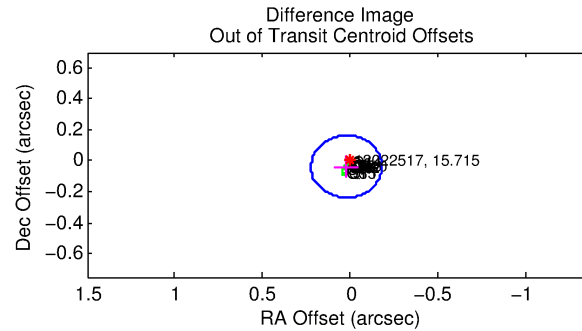
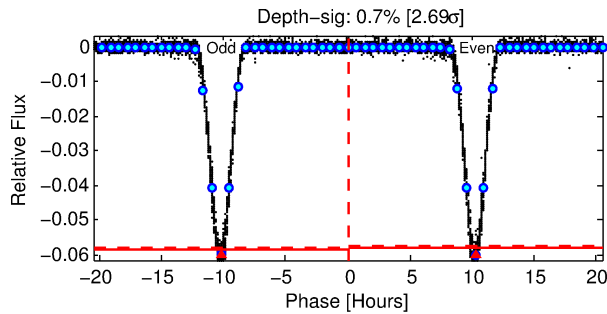
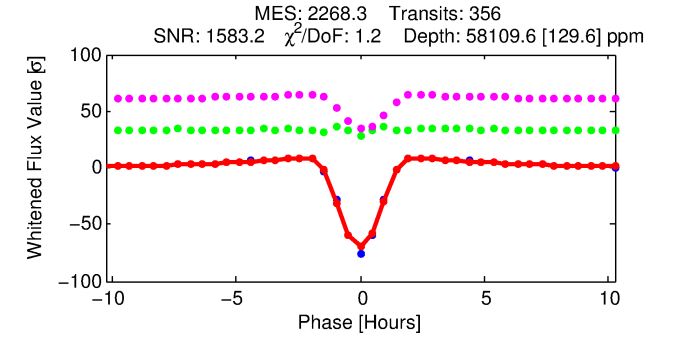
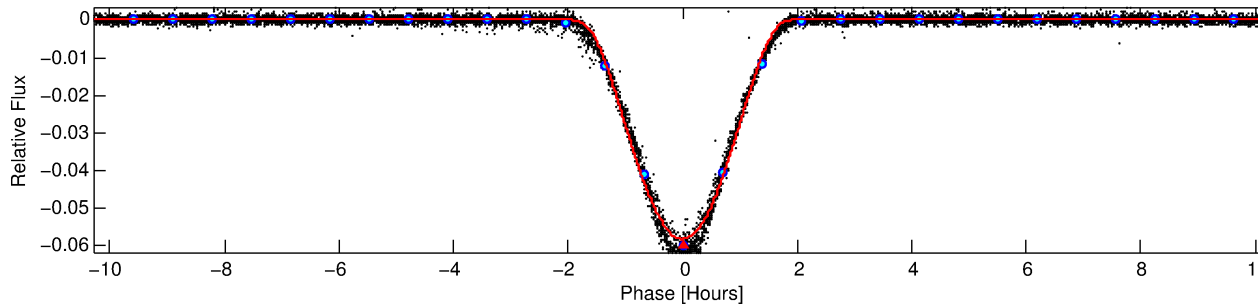
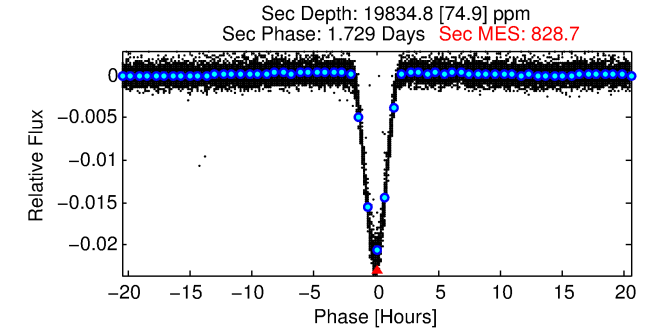
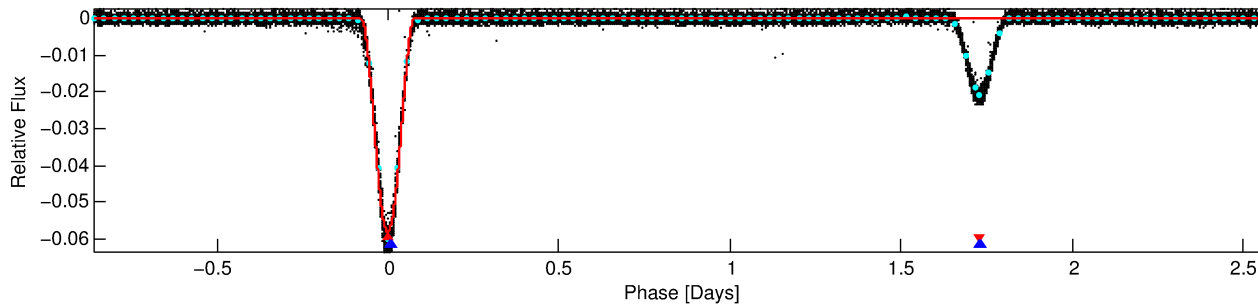
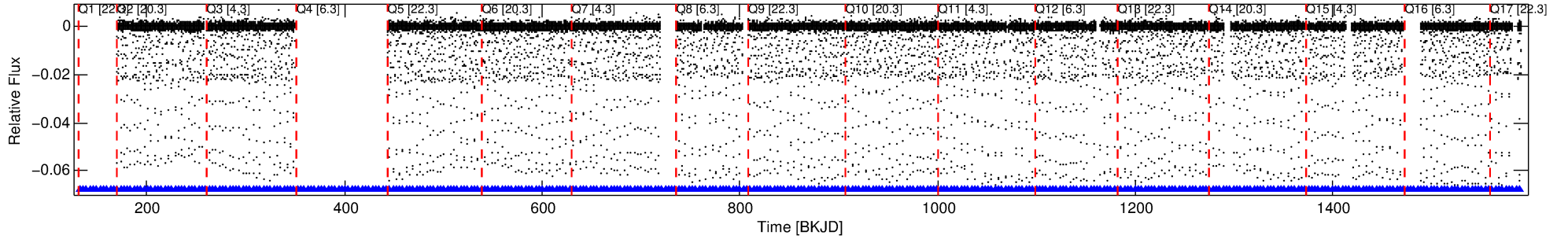
## Ephemeris Match Information For 012022517-01

No Significant Match Found

# DV One-Page Summary

KIC: 12022517 Candidate: 1 of 2 Period: 3.443 d  
KOI: K07507.01 Corr: 0.988

Kp: 15.72 R\*: 0.86 Rs Teff: 5819.0 K Logg: 4.50 Fe/H: -0.400



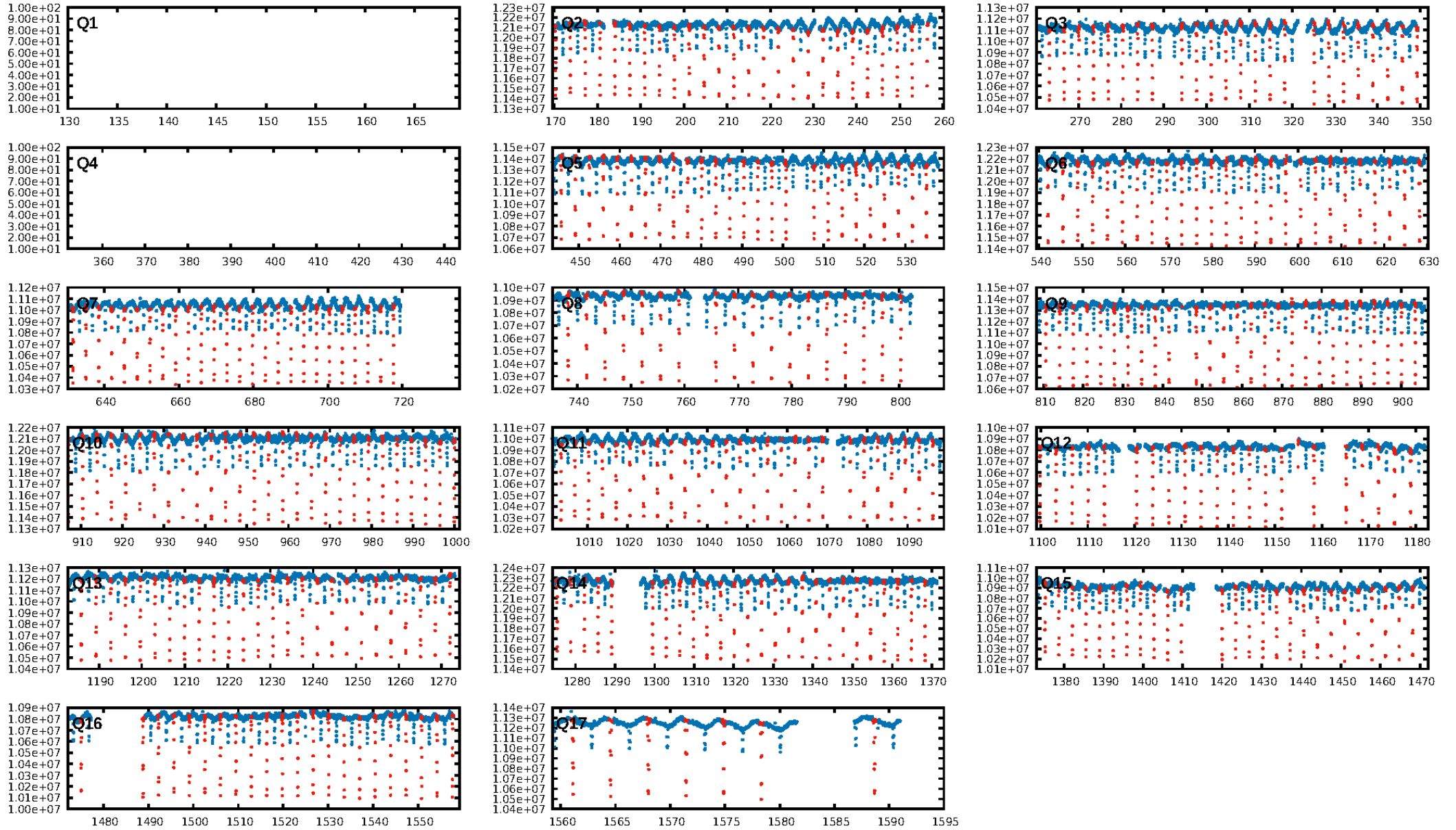
## DV Fit Results:

Period = 3.44272 [0.00000] d  
Epoch = 132.3908 [0.0000] BKJD  
Rp/R\* = 0.3730 [0.0302]  
a/R\* = 7.38 [0.01]  
b = 0.99 [0.04]  
Seff = 423.73 [148.49]  
Teff = 1157 [101] K  
Rp = 35.04 [9.82] Re  
a = 0.0424 [0.0096] AU  
Ag = 15.97 [5.86] [2.55σ]  
Teffp = 3576 [181] K [11.68σ]

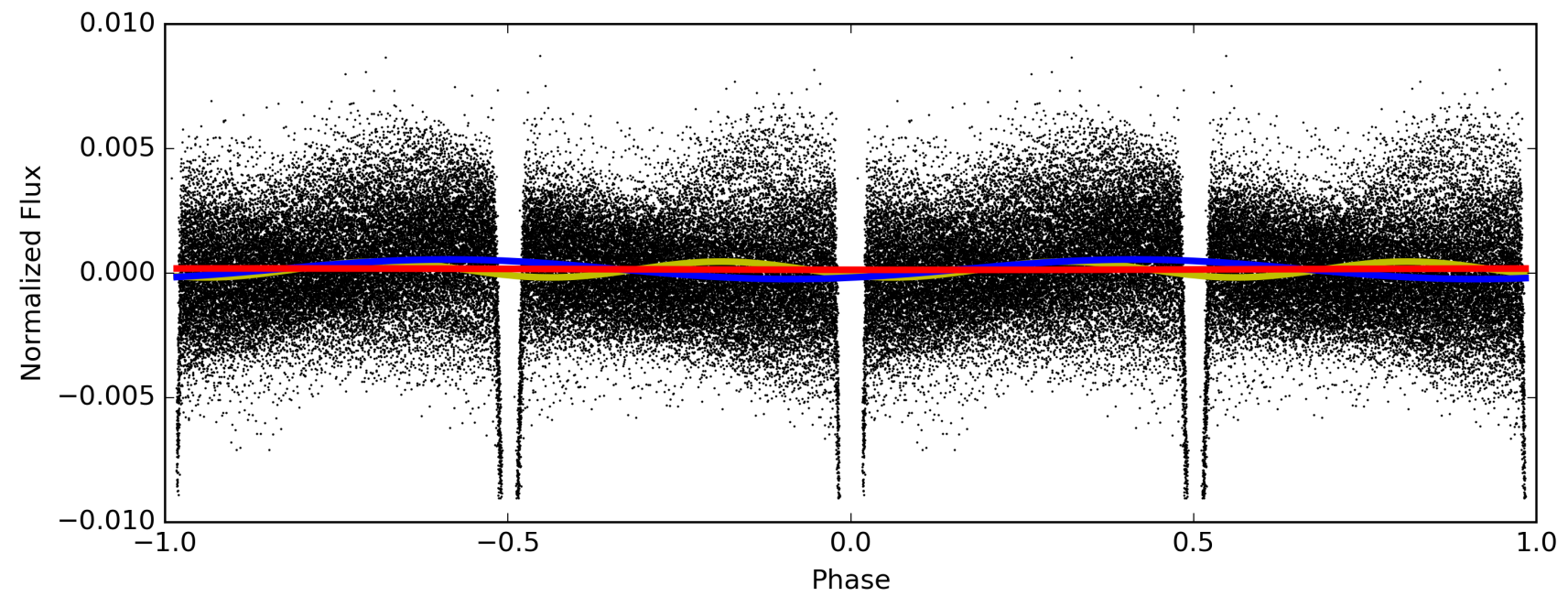
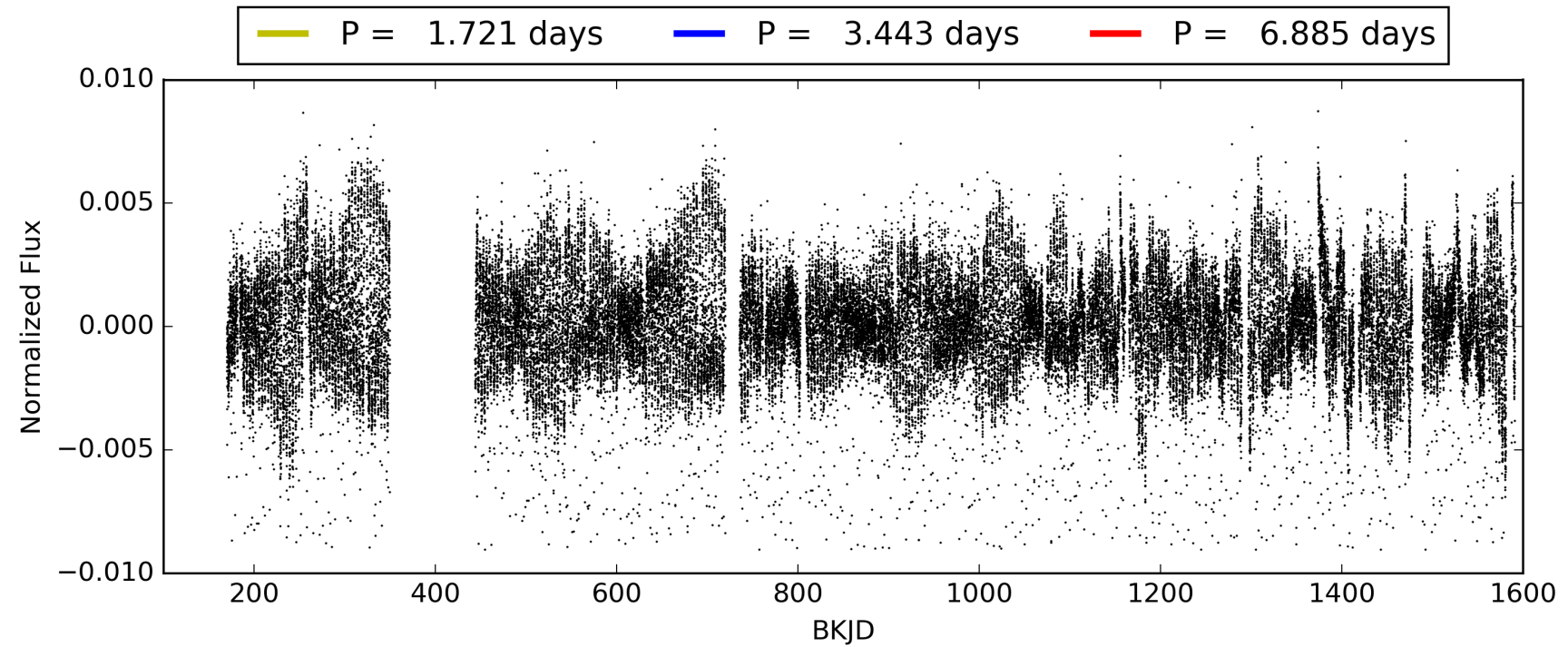
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [8.61σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [349/349]  
GhostDiagnostic-chr: 3.59  
Centroid-sig: 0.0%  
Centroid-so: 0.745 arcsec [86.78σ]  
OotOffset-rm: 0.044 arcsec [0.66σ]  
KicOffset-rm: 0.093 arcsec [1.38σ]  
OotOffset-st: 4/4/3/4 [15]  
KicOffset-st: 4/4/3/4 [15]  
DiffImageQuality-fgm: 1.00 [15/15]  
DiffImageOverlap-fno: 0.00 [0/15]

# TCE 012022517-01, PDC Light Curves

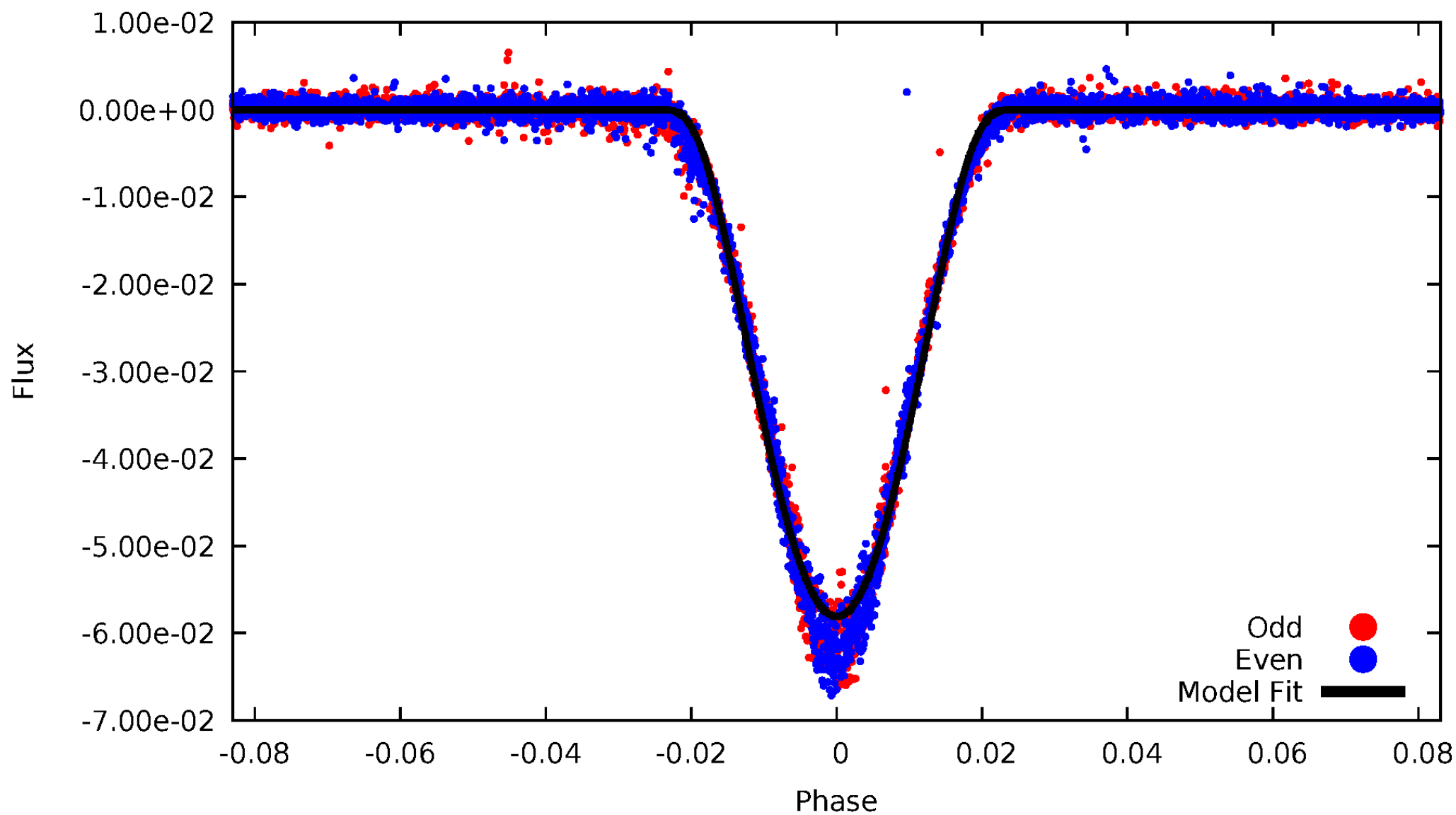


TCE 012022517-01



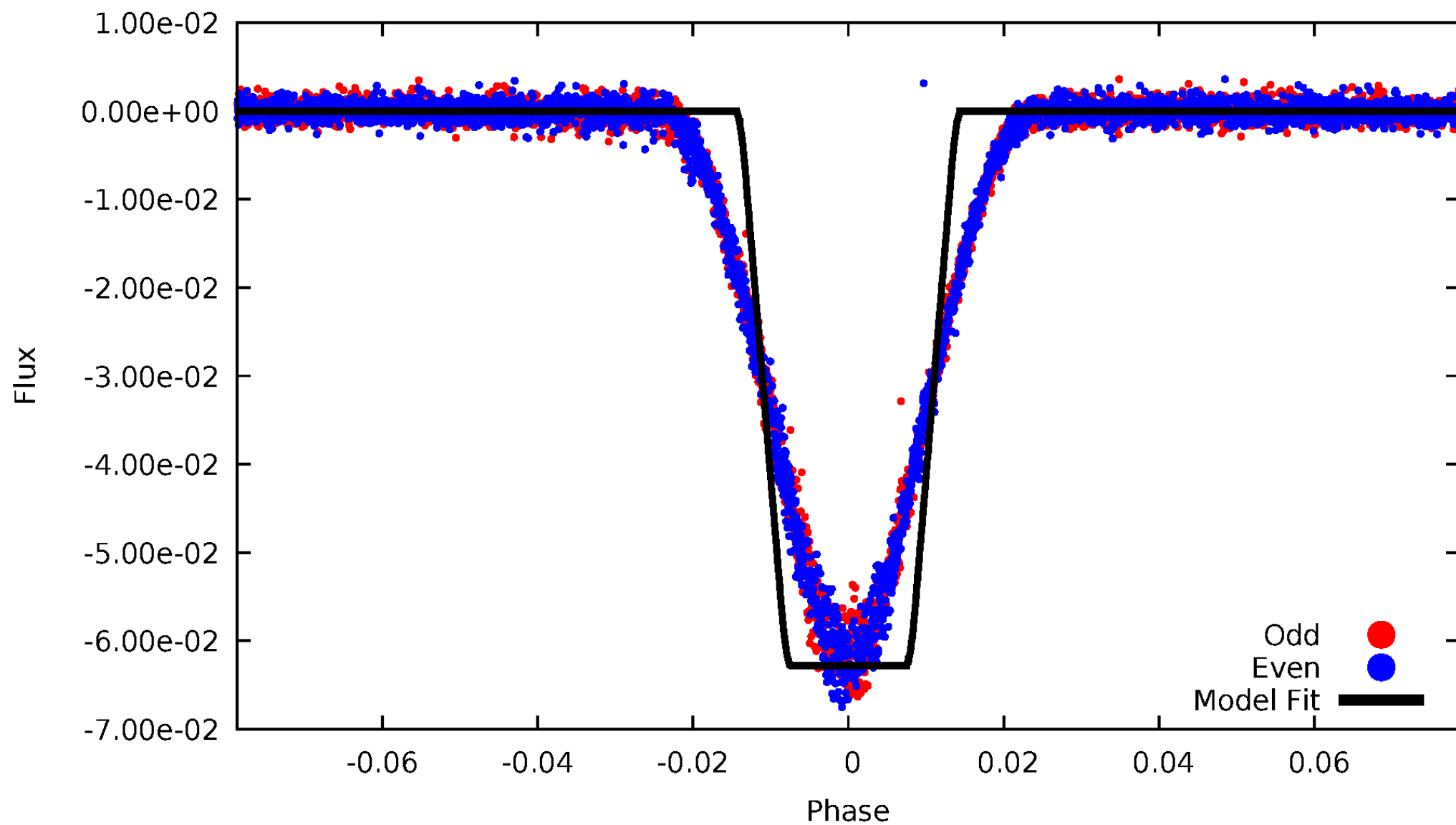
# DV Odd/Even

TCE 012022517-01



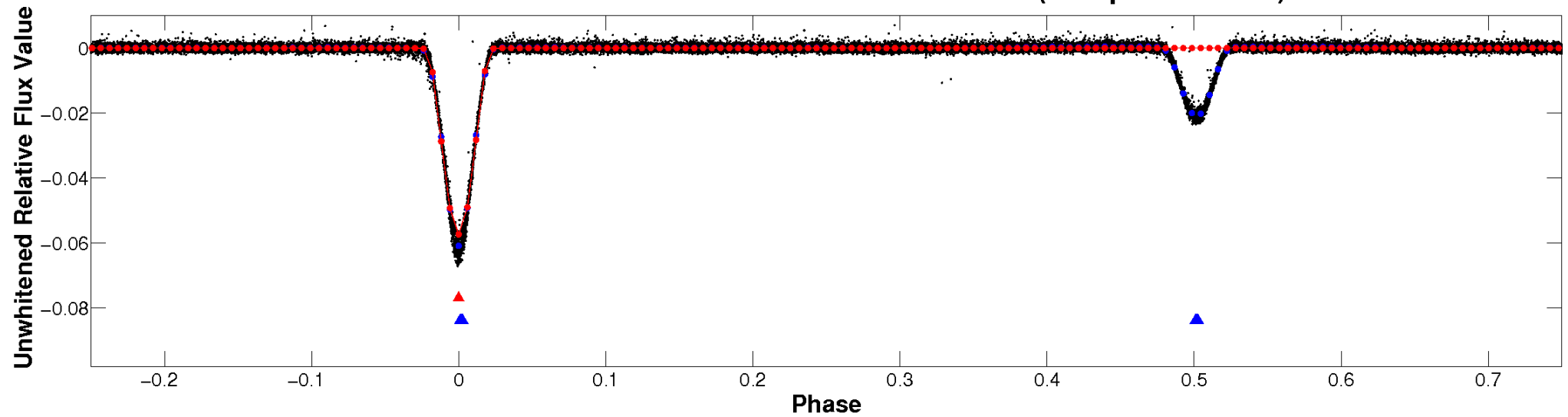
# ALT Odd/Even

TCE 012022517-01

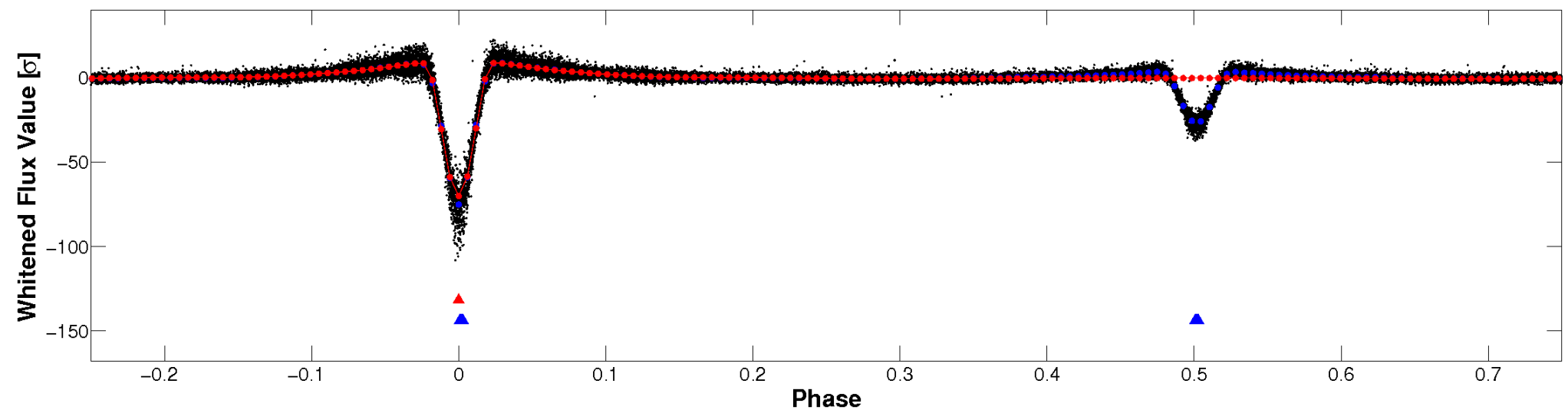


# Non-Whitened Vs. Whitened Light Curve

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

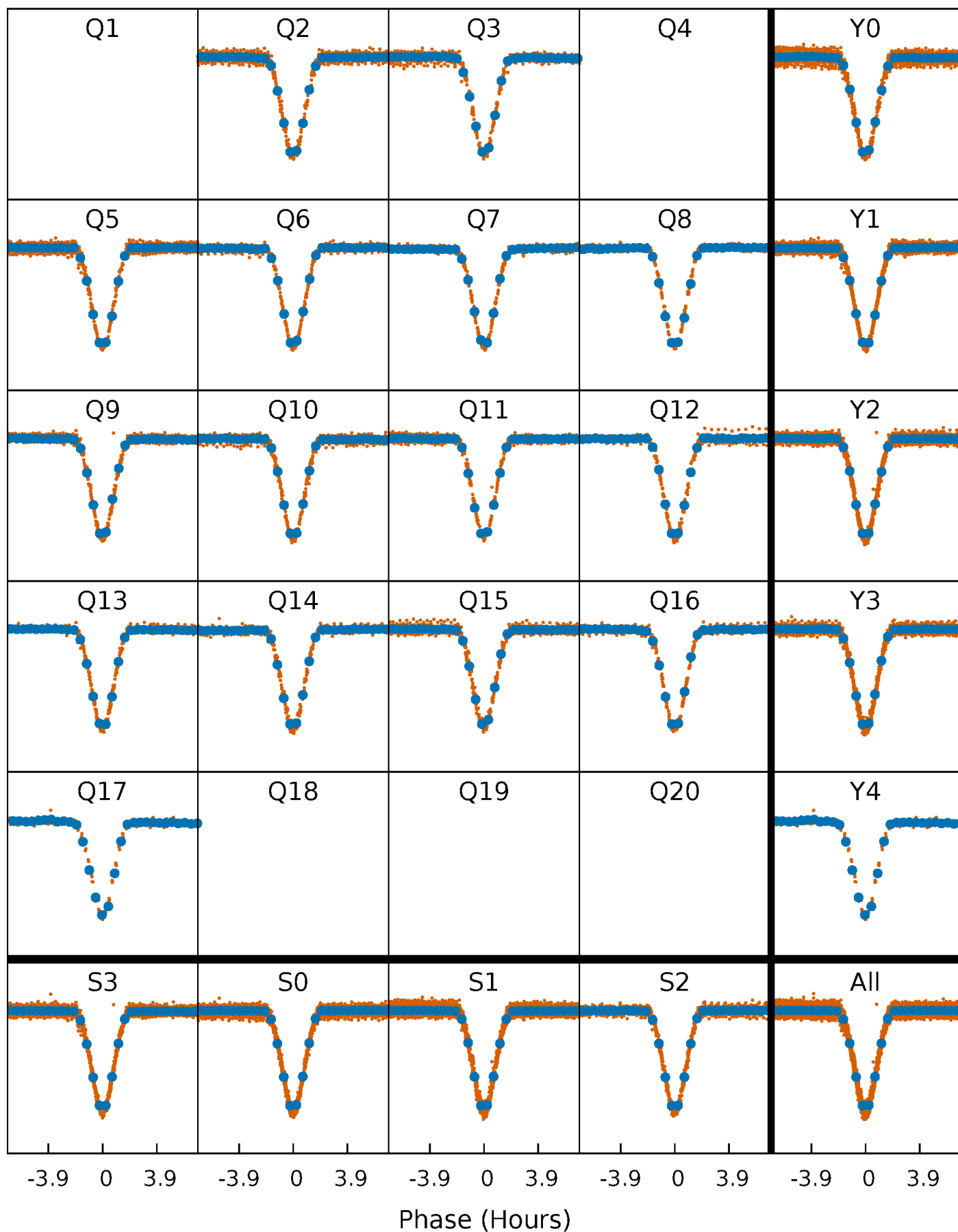


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

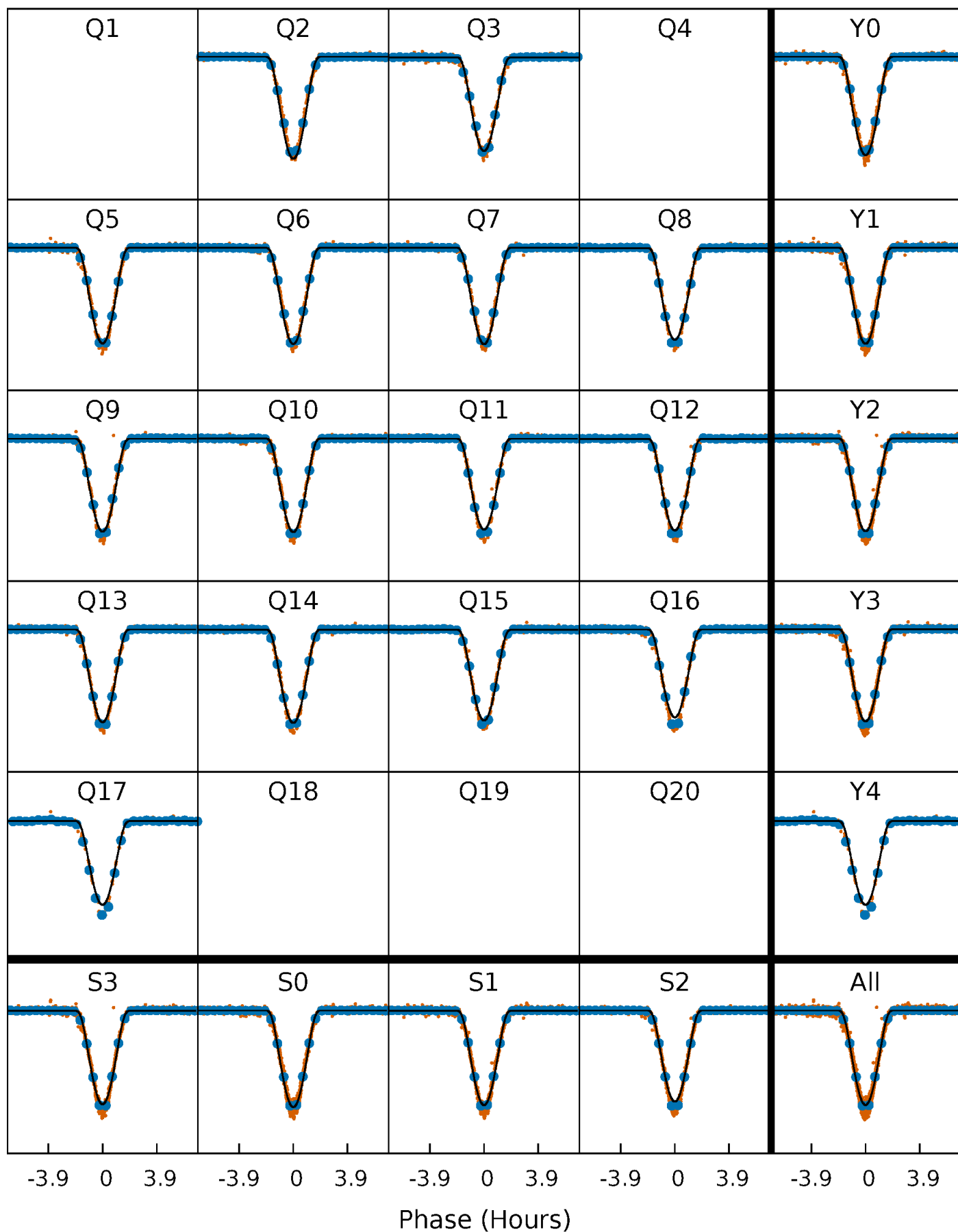
TCE 012022517-01 P= 3.442717 Days  $T_0=132.390770$  (BKJD)





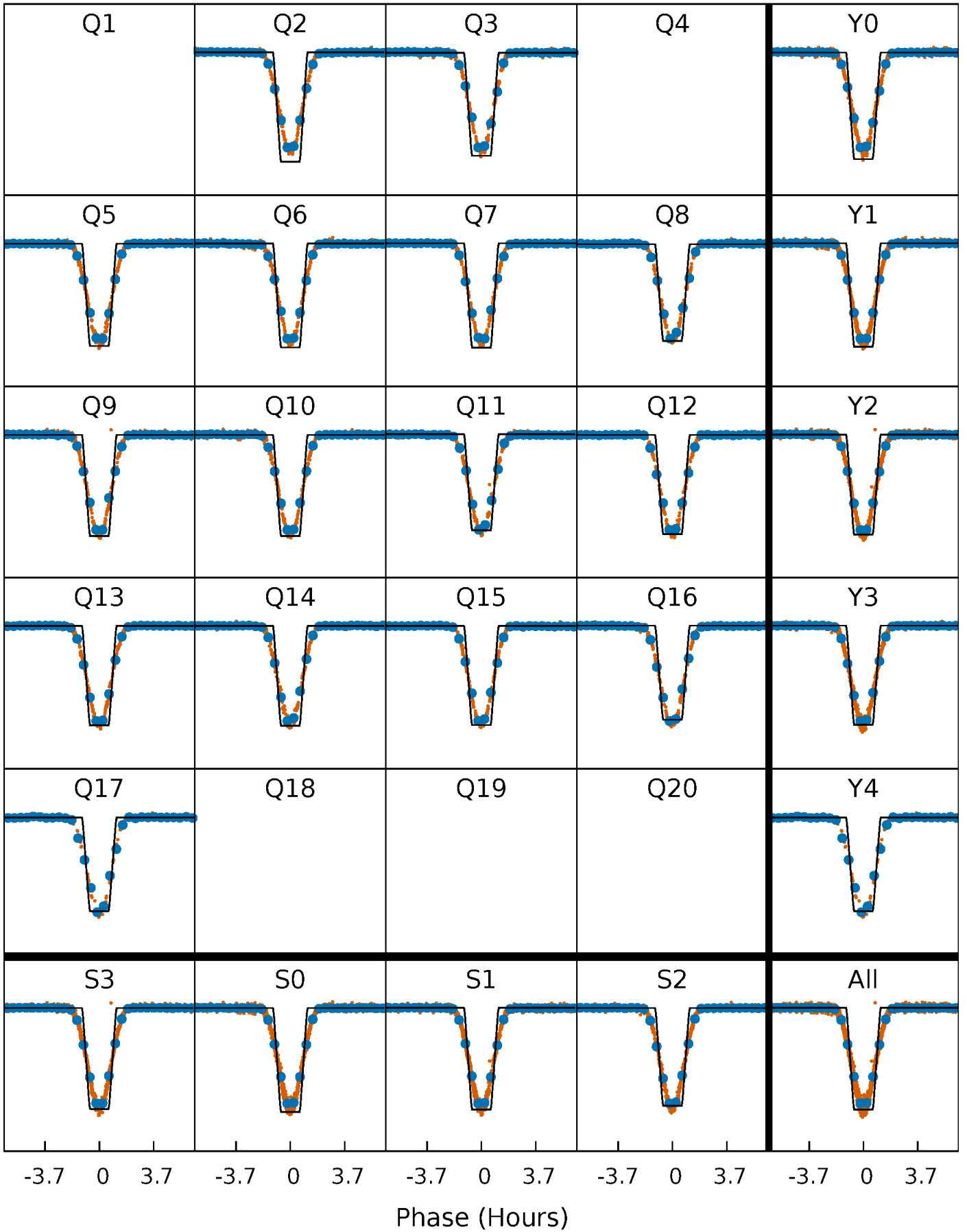
# DV Quarter-Phased Transit Curves

TCE 012022517-01 P= 3.442717 Days  $T_0=132.390770$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

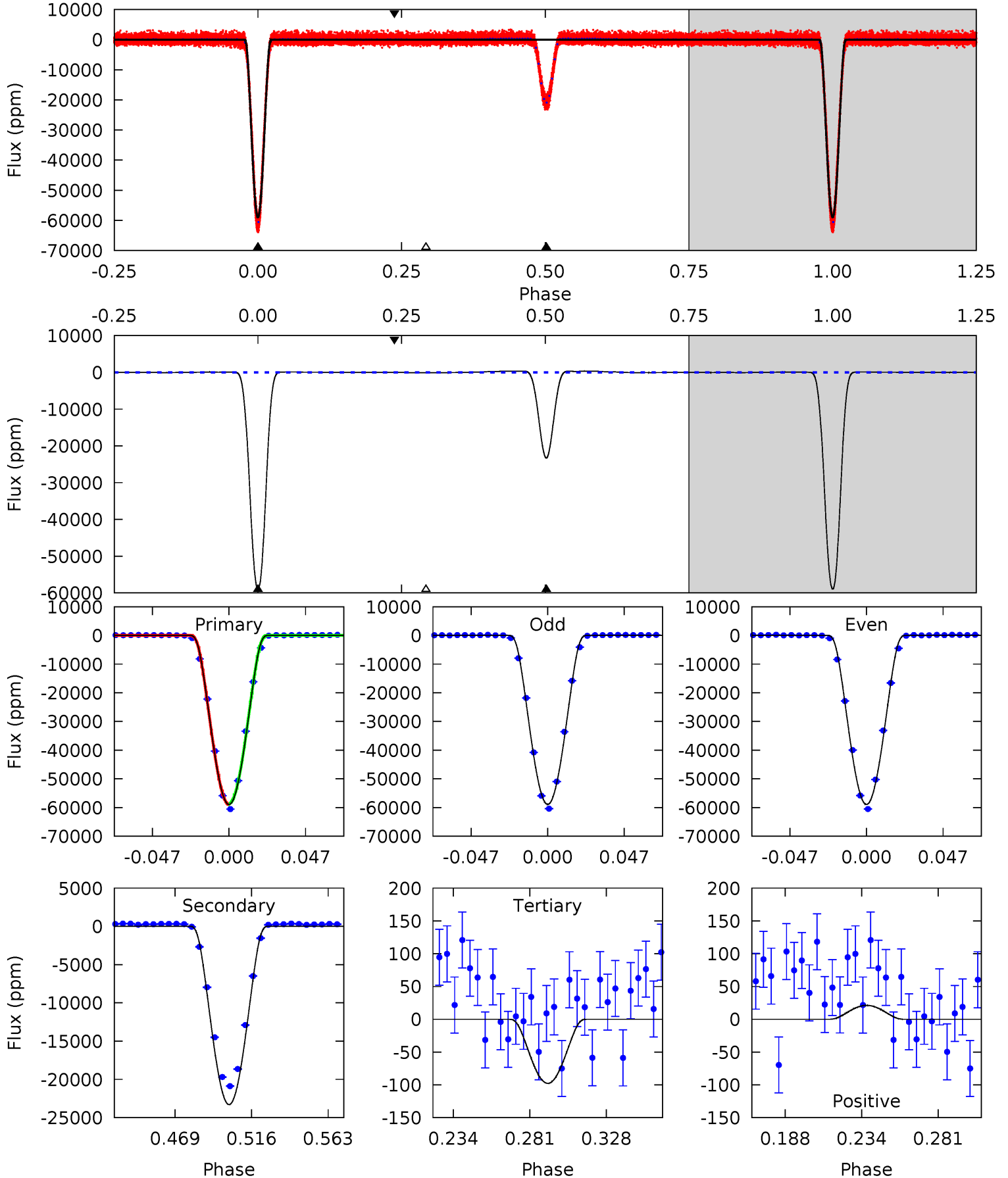
TCE 012022517-01 P= 3.442718 Days  $T_0=132.390303$  (BKJD)



# DV Model-Shift Uniqueness Test

012022517-01, P = 3.442717 Days, E = 132.390770 Days

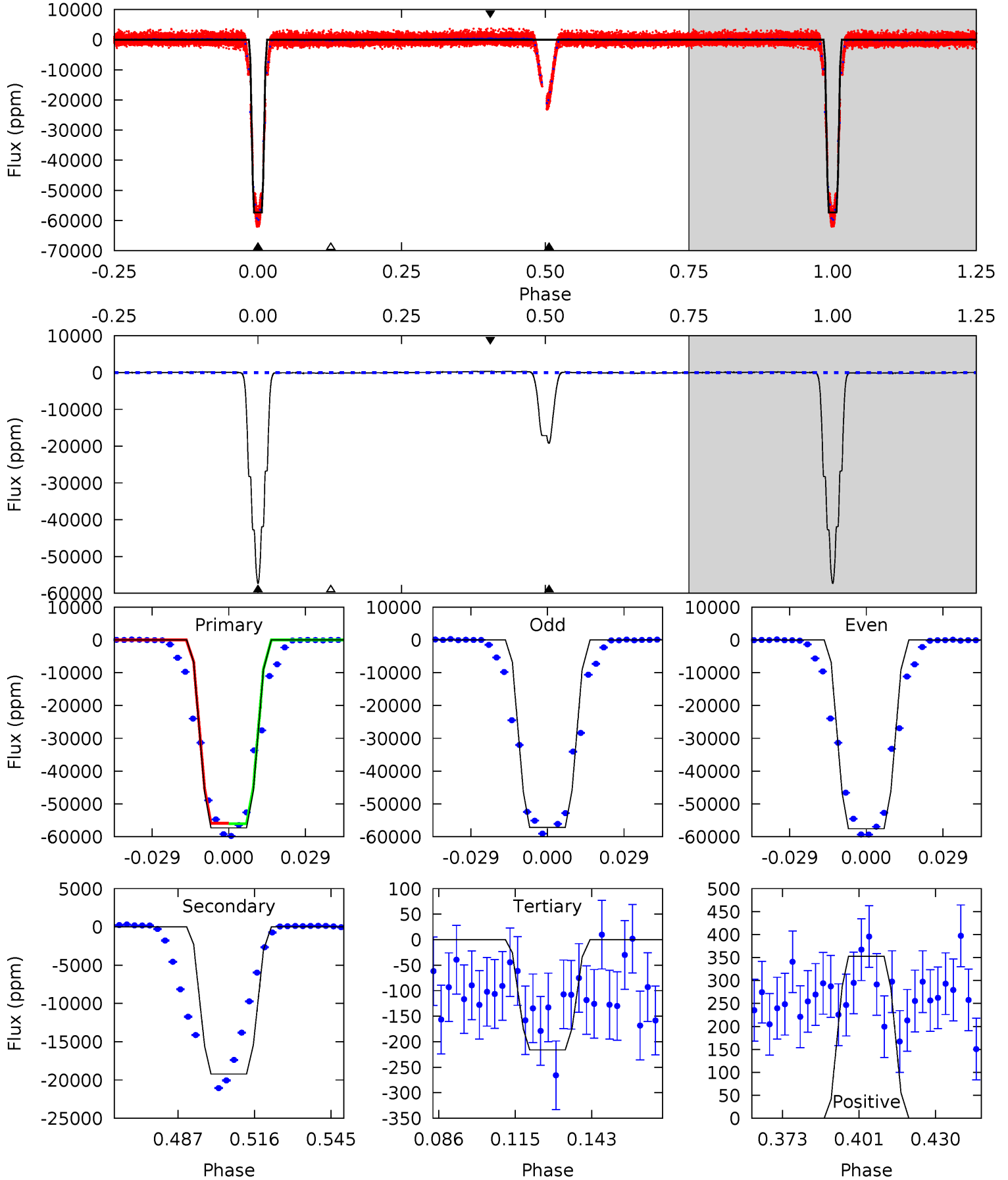
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4126	1631	6.84	1.48	4.72	1.99	7.95	4119	4125	1624	1630	1.13	1.00	0.01	0



# Alt Model-Shift Uniqueness Test

012022517-01, P = 3.442718 Days, E = 132.390303 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
2099	703.8	7.91	12.9	4.82	2.19	4.92	2091	2086	695.9	690.9	7.37	1.00	0.01	0



### Stellar Parameters For KIC 012022517

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5819^{+158}_{-175}$	$4.501^{+0.072}_{-0.180}$	$-0.400^{+0.300}_{-0.300}$	$0.861^{+0.231}_{-0.099}$	$0.858^{+0.109}_{-0.079}$	$1.890^{+0.704}_{-0.879}$
	+3%/-3%	+2%/-4%	+75%/-75%	+27%/-11%	+13%/-9%	+37%/-47%
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 012022517-01 / KOI 7507.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-23298 \pm 14$	$36.09^{+5.13}_{-4.36}$	$1629^{+106}_{-72}$	$4029^{+156}_{-140}$	$18^{+5}_{-4}$
Alt.	$-19218 \pm 27$	$24.24^{+4.93}_{-3.66}$	$1639^{+107}_{-83}$	$4521^{+270}_{-224}$	$33^{+12}_{-10}$

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

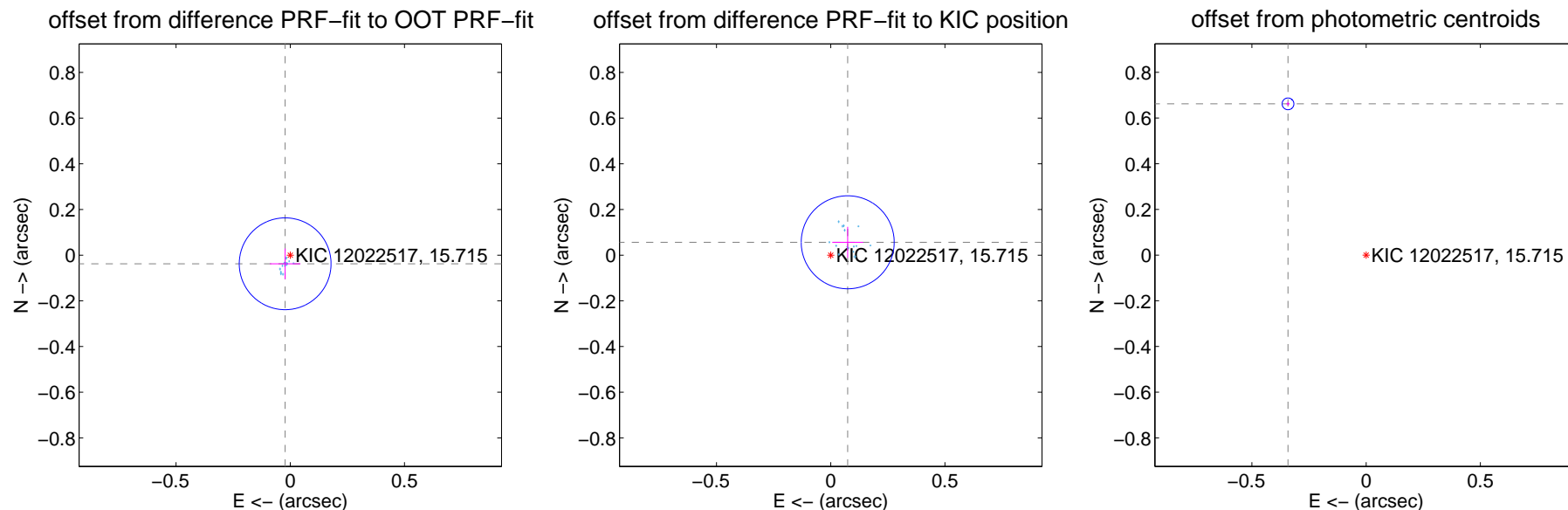
## DV Centroid Data

Supplemental centroid analysis for 012022517-01. Kepler magnitude: 15.71. Transit SNR 1583.16

There are 15 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.044 \pm 0.067$	0.66	$0.022 \pm 0.067$	$-0.038 \pm 0.067$
PRF-fit source offset from KIC position	$0.093 \pm 0.068$	1.38	$-0.074 \pm 0.068$	$0.056 \pm 0.068$
photometric centroid source offset	$0.75 \pm 0.01$	86.78	$0.34 \pm 0.01$	$0.66 \pm 0.01$



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.

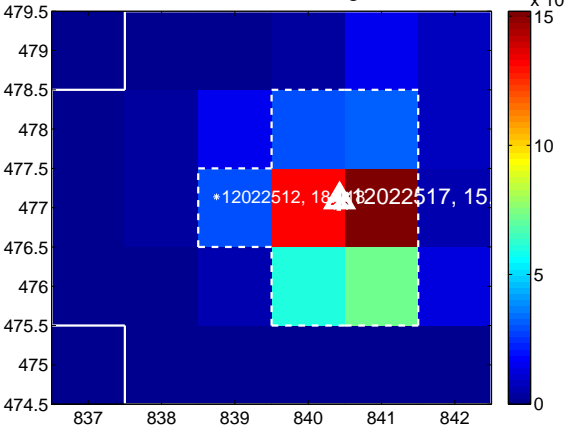
Q1 no difference image



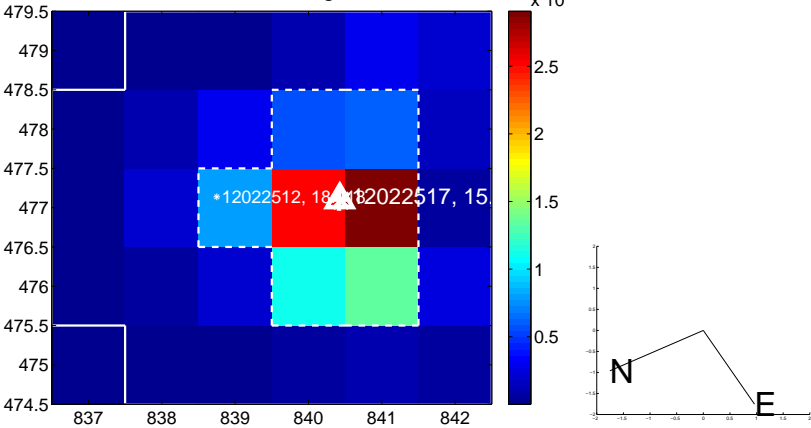
Q1 no OOT image



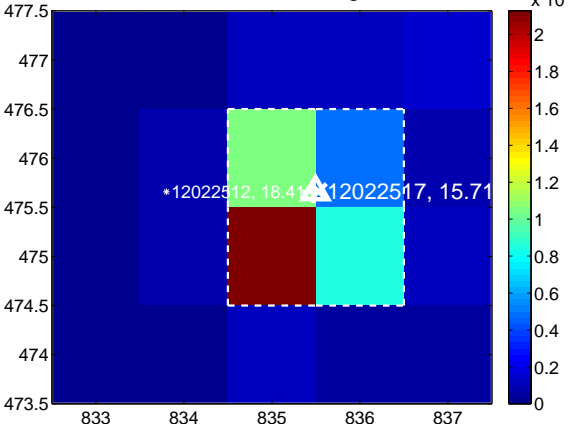
Q2 difference image



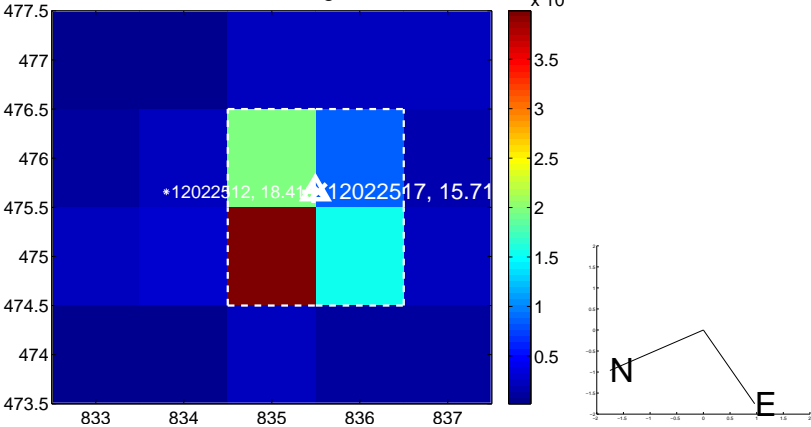
Q2 OOT image



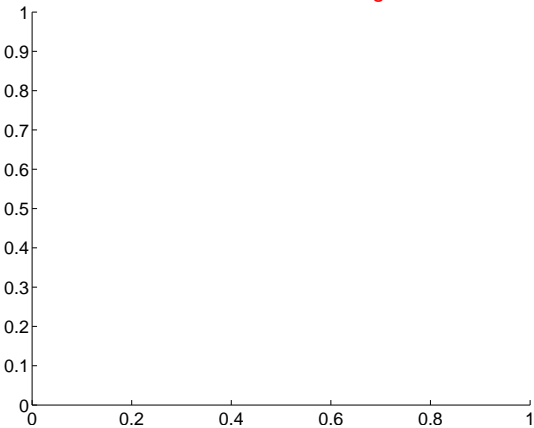
Q3 difference image



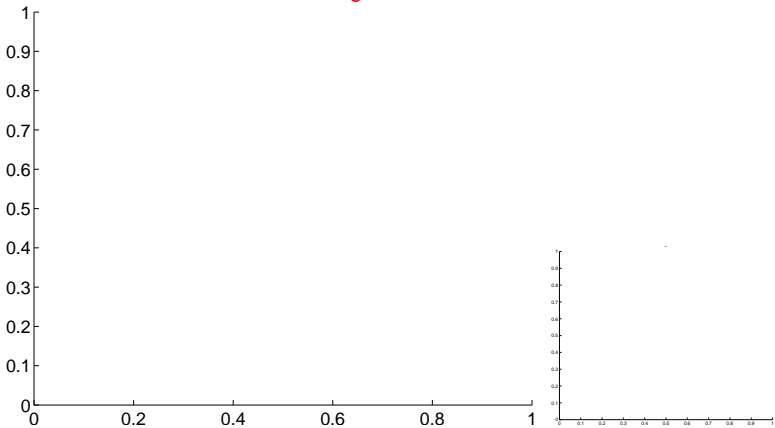
Q3 OOT image



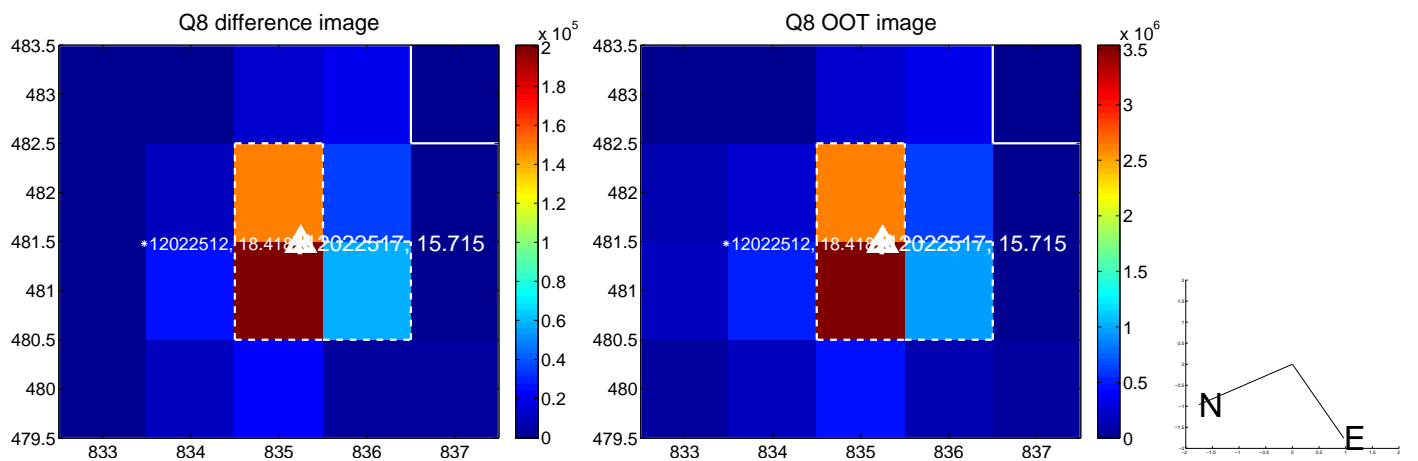
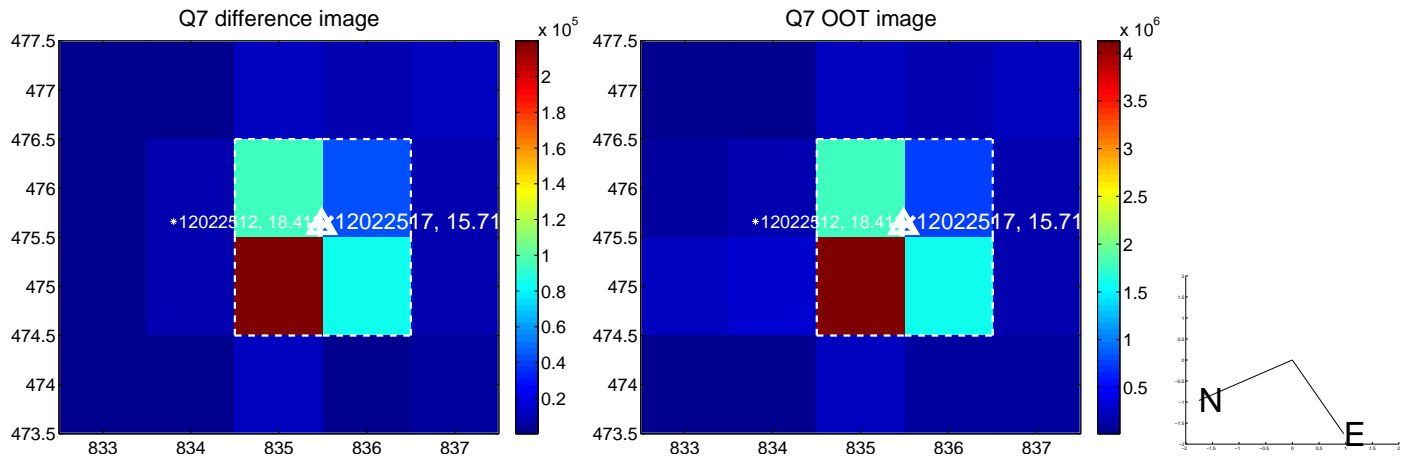
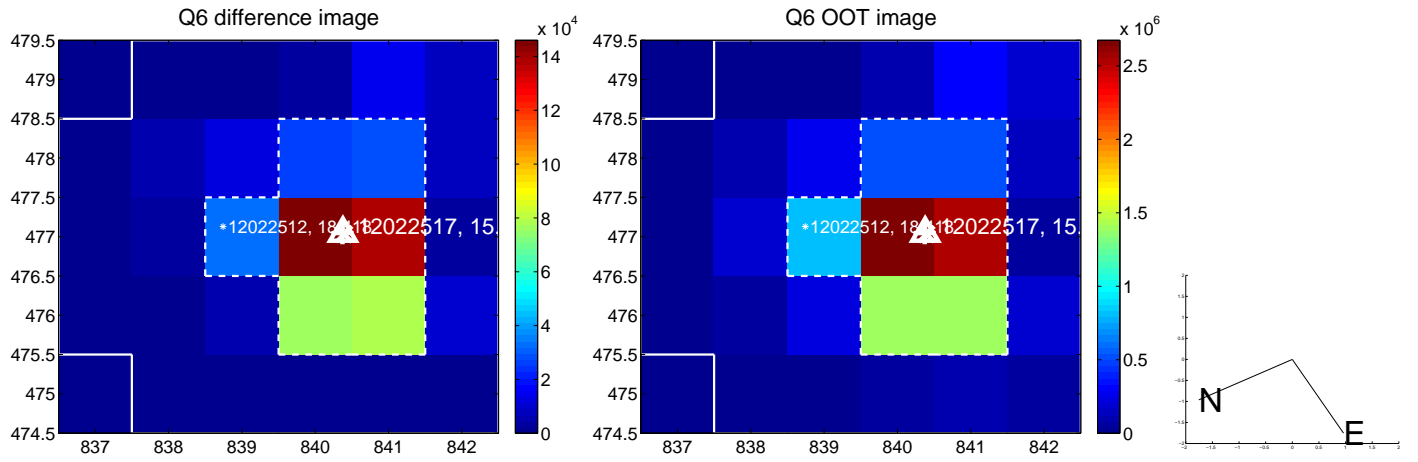
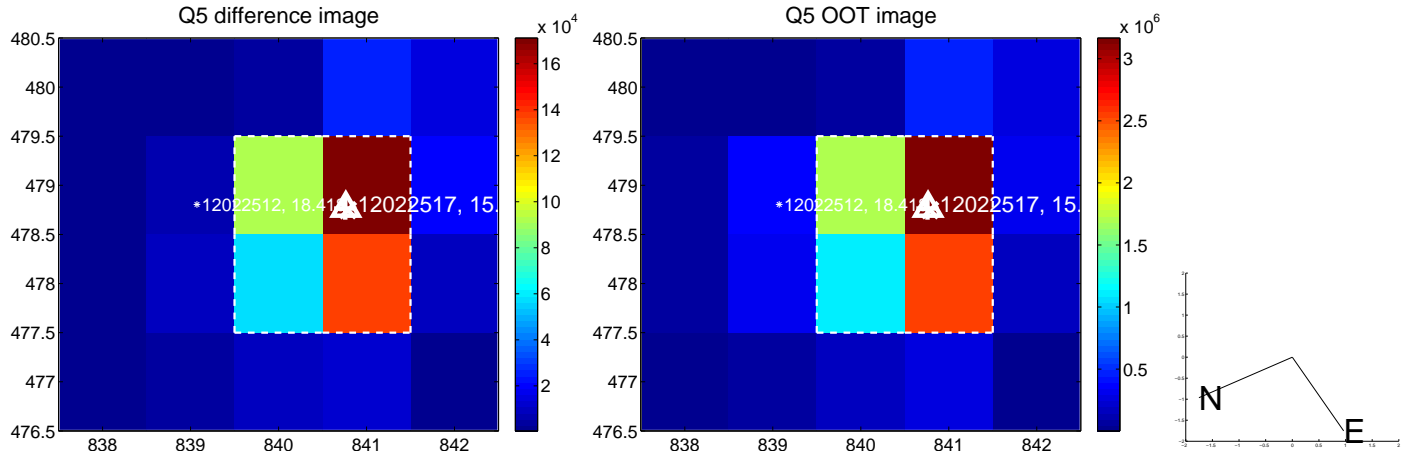
Q4 no difference image



Q4 no OOT image

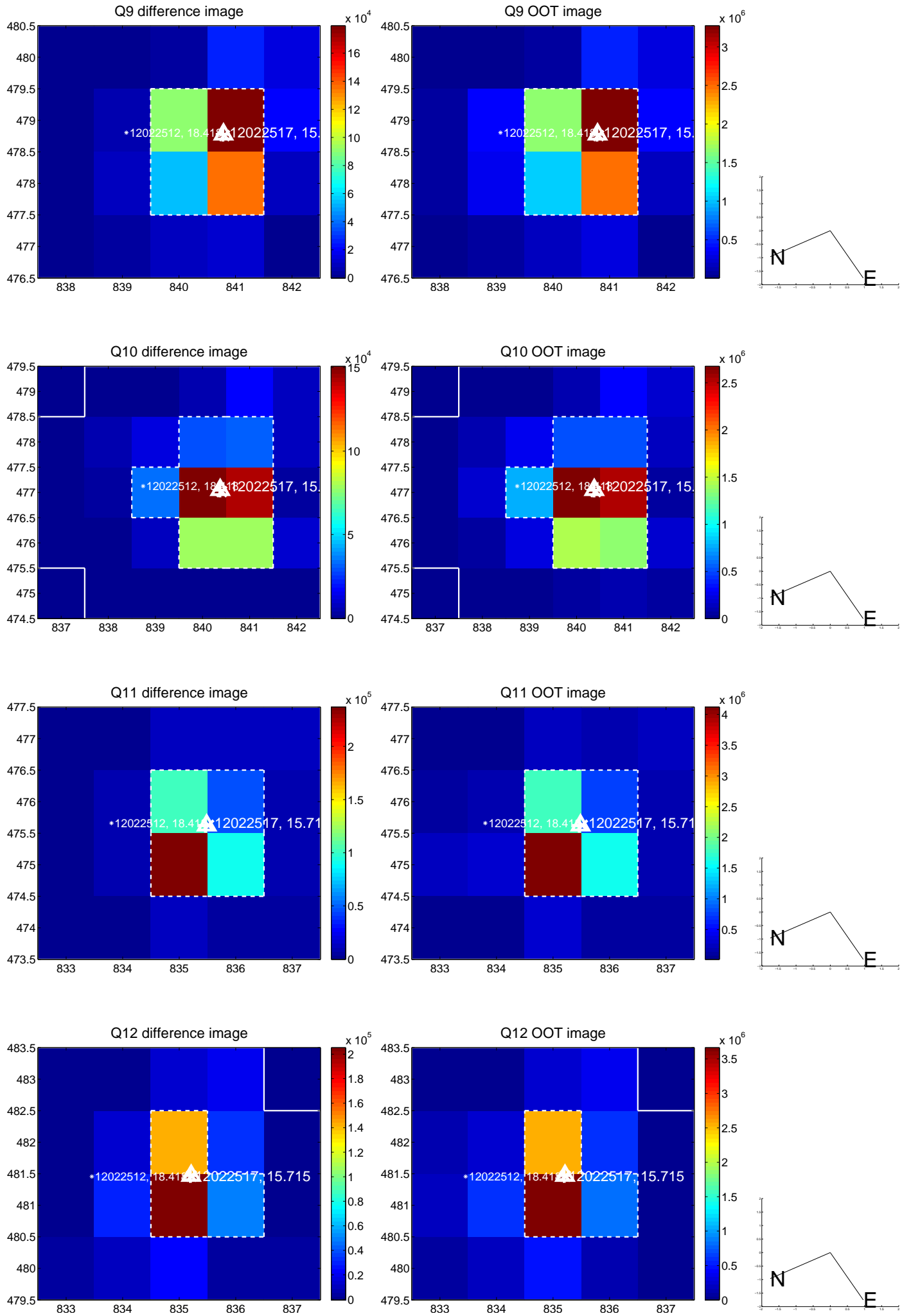


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

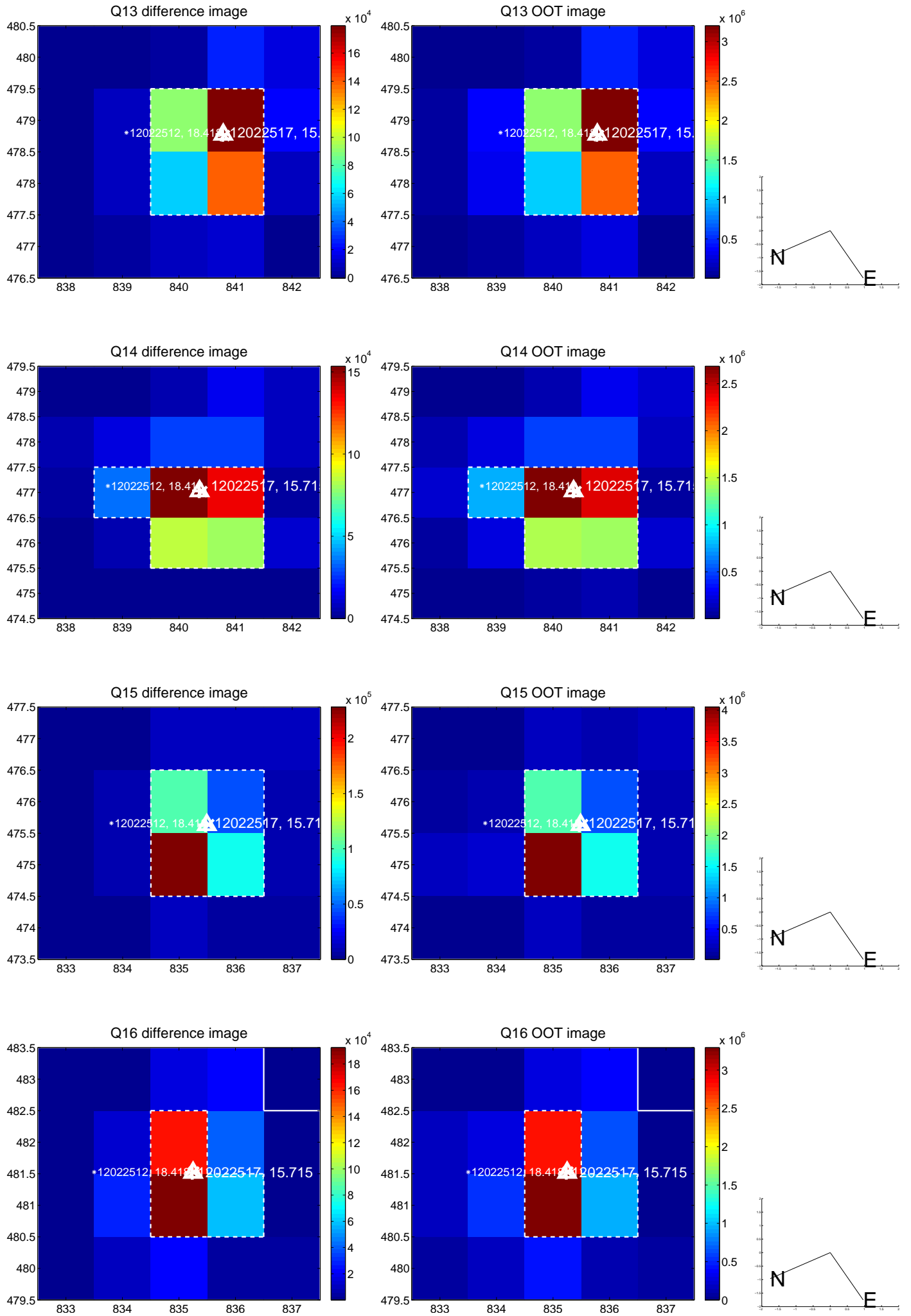




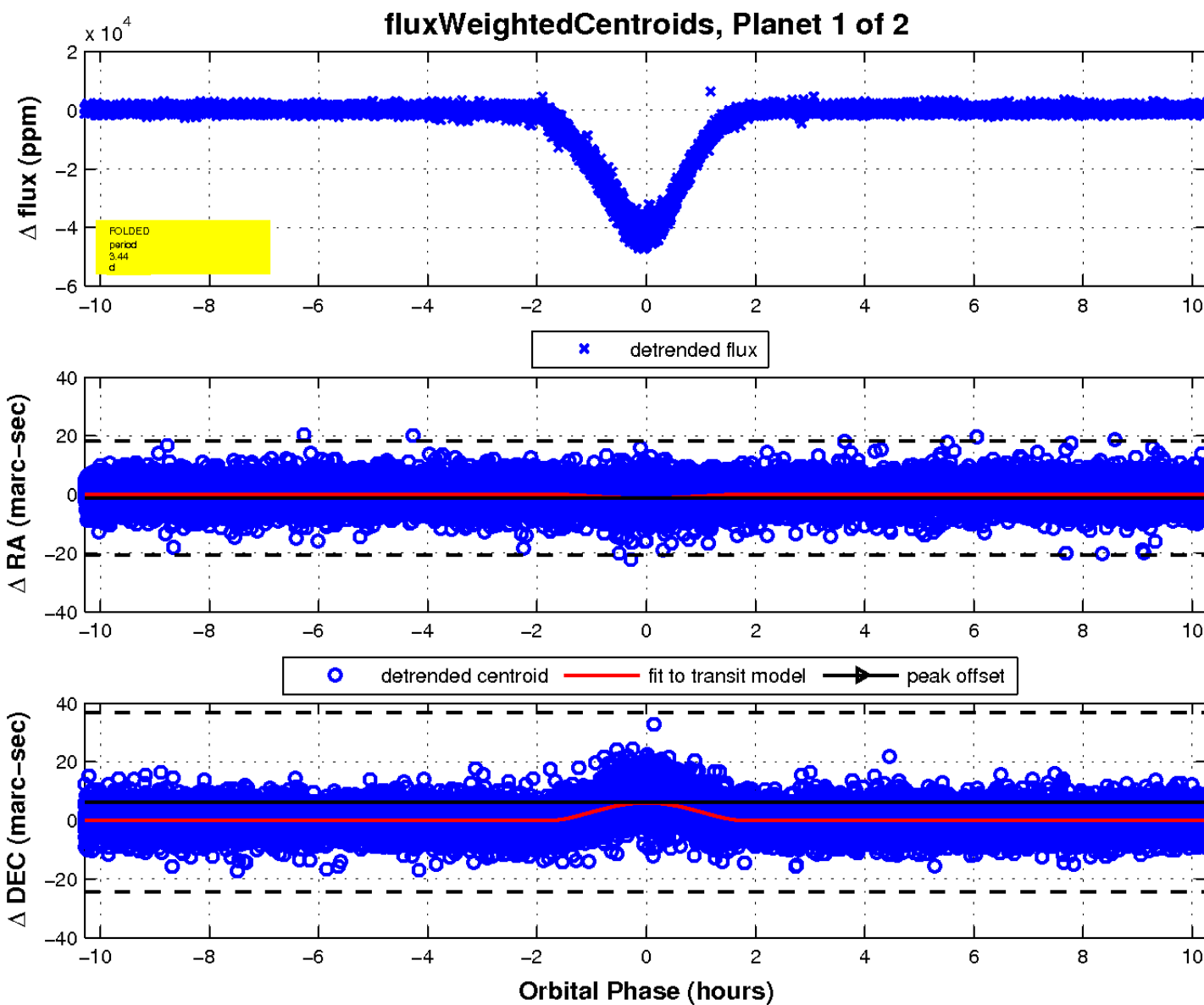
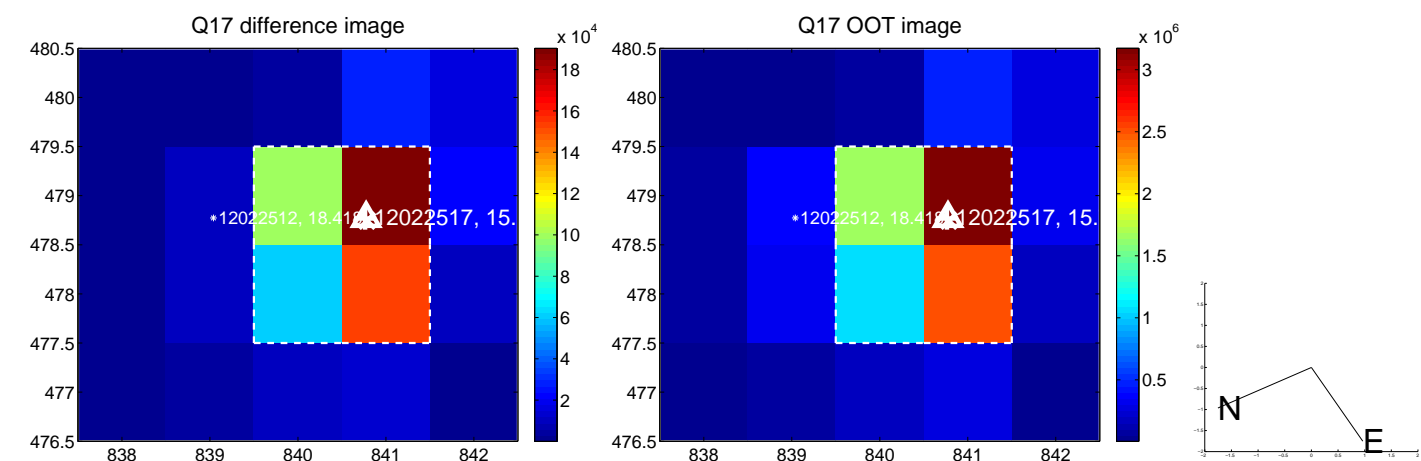
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

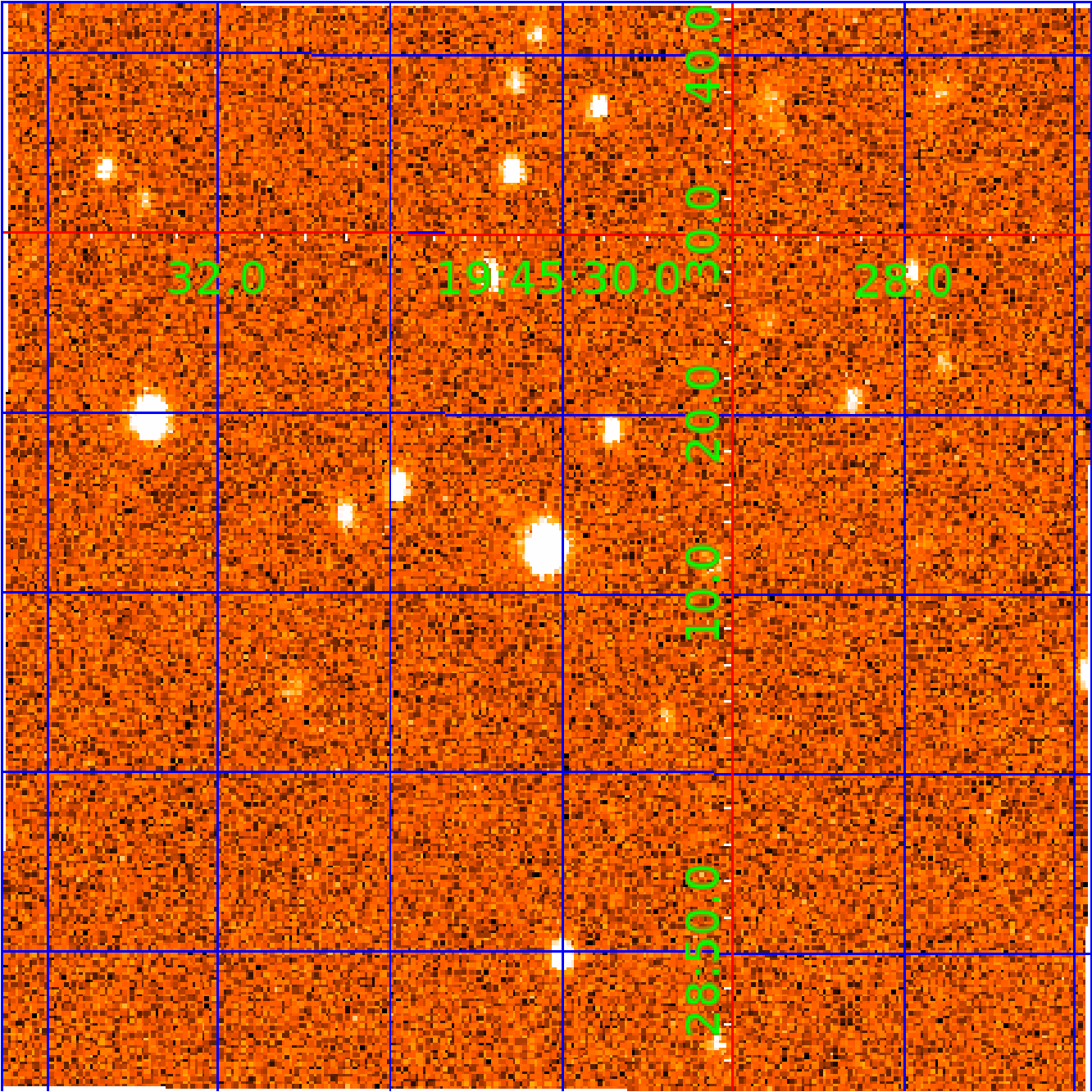


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 012022517

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012022517-01	OBS	7507.01	3.442717	132.390769	58109.6	3.429	2268.3	1583.2	0.86	5819	35.04	423.73
012022517-02	OBS	No	1.721366	132.393741	20852.2	3.353	833.4	768.0	0.86	5819	16.52	1067.72

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012022517-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
012022517-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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.

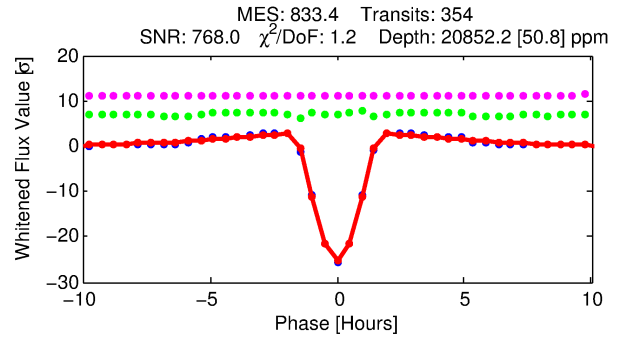
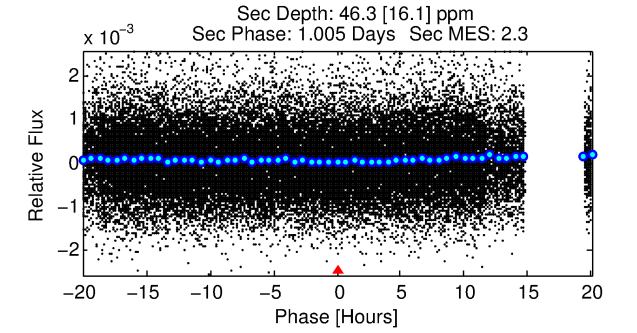
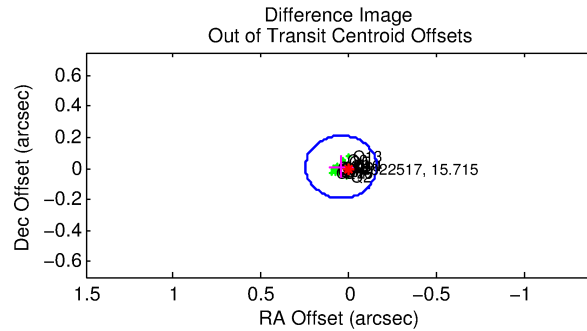
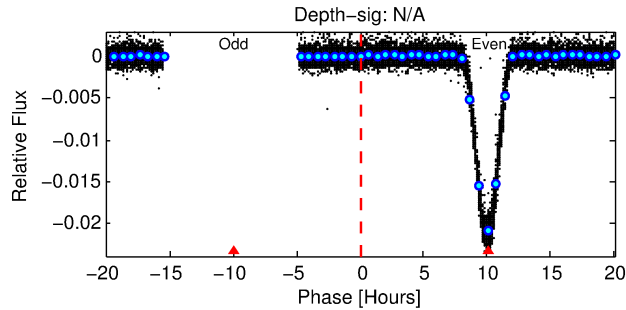
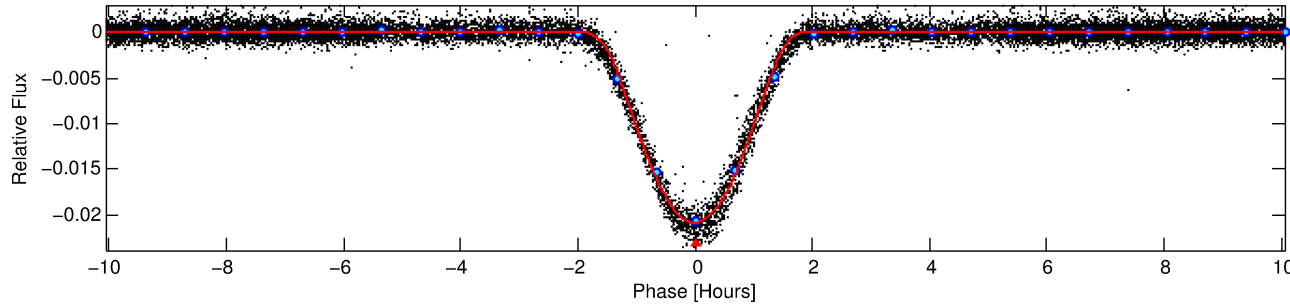
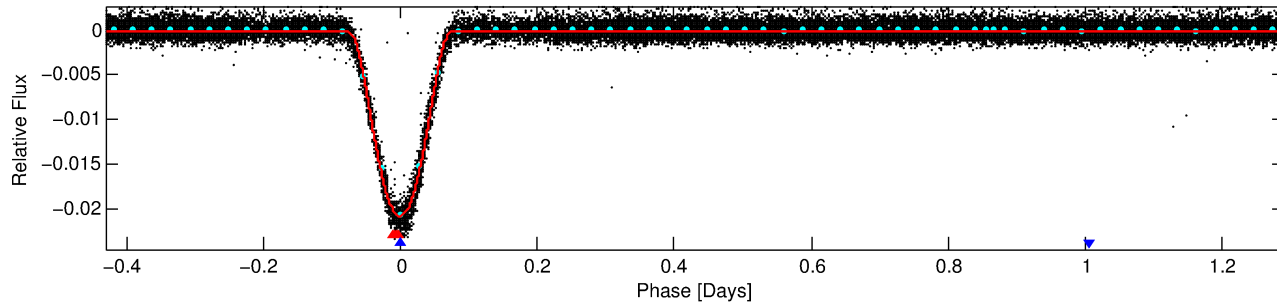
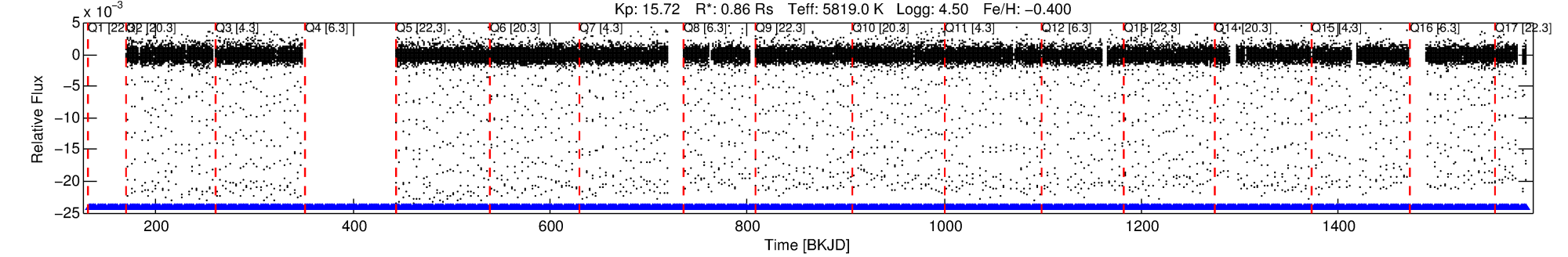
## Ephemeris Match Information For 012022517-02

No Significant Match Found

# DV One-Page Summary

KIC: 12022517 Candidate: 2 of 2 Period: 1.721 d  
KOI: K07507 Corr: No Ephemeris Match

Kp: 15.72 R\*: 0.86 Rs Teff: 5819.0 K Logg: 4.50 Fe/H: -0.400



## DV Fit Results:

Period = 1.72137 [0.00000] d  
Epoch = 132.3937 [0.0001] BKJD  
Rp/R\* = 0.1758 [0.0040]  
a/R\* = 3.10 [0.02]  
b = 0.91 [0.01]  
Seff = 1067.72 [374.18]  
Teq = 1458 [128] K  
Rp = 16.52 [4.45] Re  
a = 0.0267 [0.0060] AU  
Ag = 0.07 [0.03] [-29.14σ]  
Teffp = 1144 [106] K [-1.88σ]

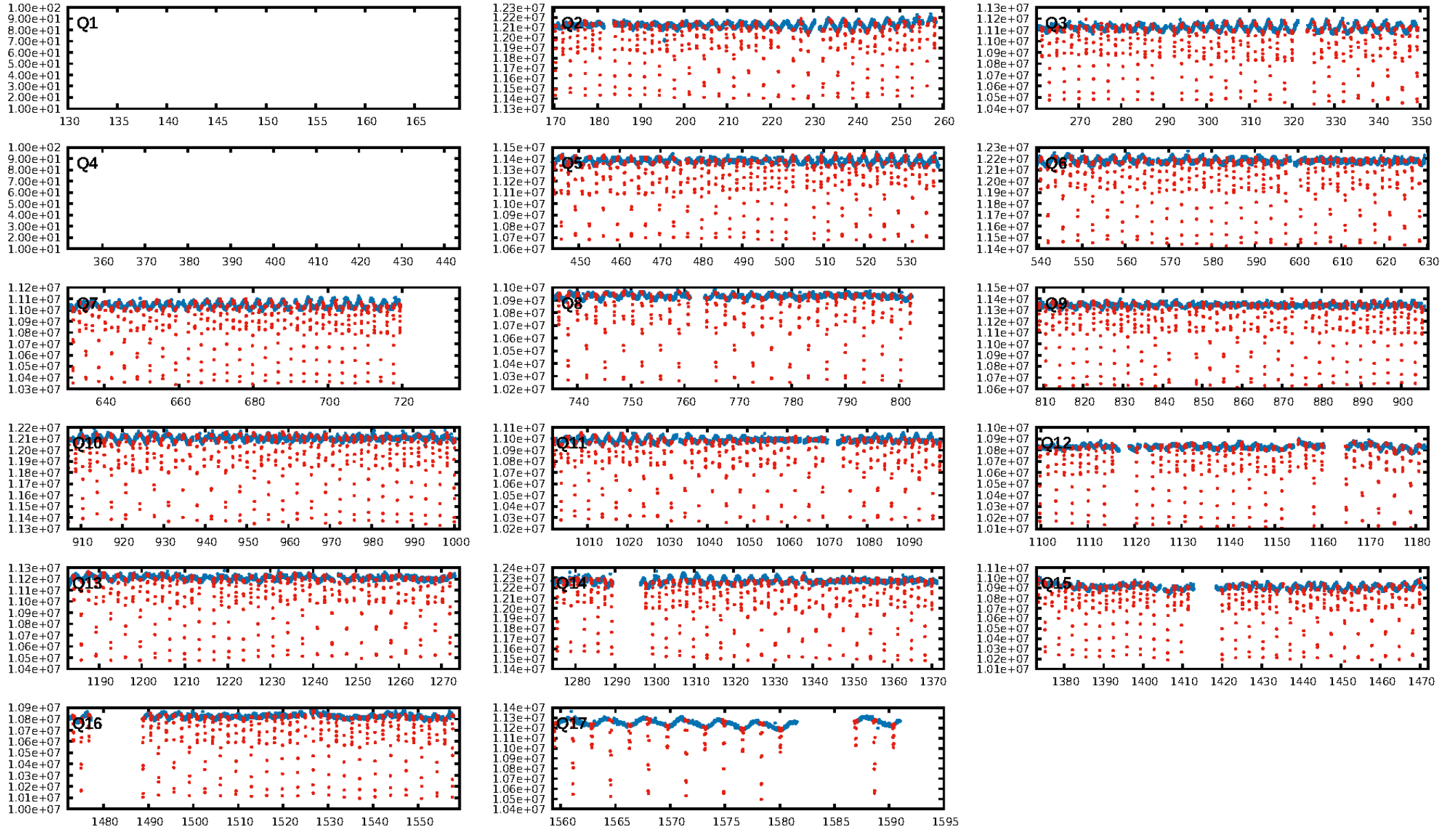
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [8.61σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [345/345]  
GhostDiagnostic-chr: 3.78  
Centroid-sig: 0.0%  
Centroid-so: 0.736 arcsec [44.69σ]  
OotOffset-rm: 0.046 arcsec [0.68σ]  
KicOffset-rm: 0.123 arcsec [1.78σ]  
OotOffset-st: 4/4/3/4 [15]  
KicOffset-st: 4/4/3/4 [15]  
DiffImageQuality-fgm: 1.00 [15/15]  
DiffImageOverlap-fno: 1.00 [15/15]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 23:04:14 Z

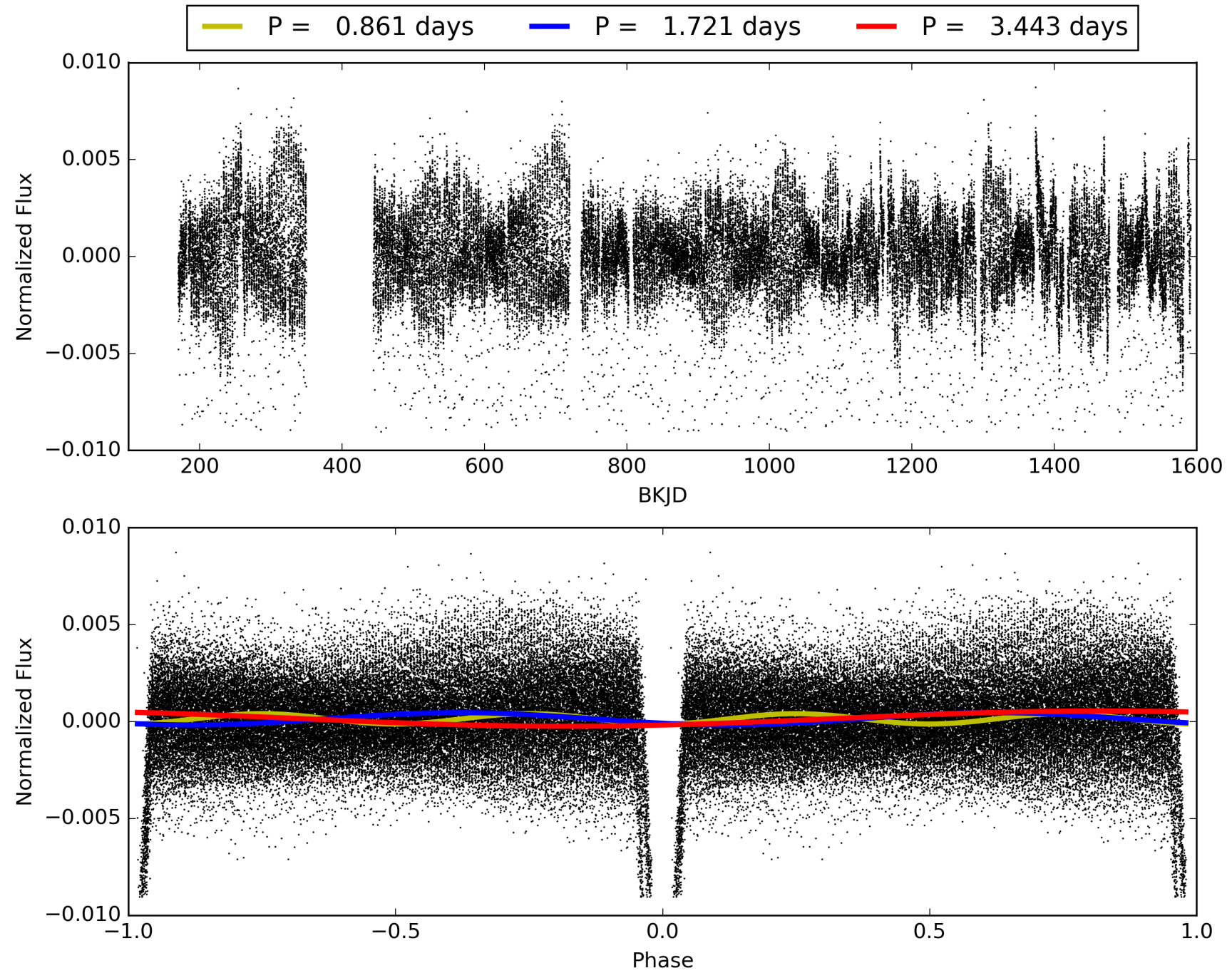
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 012022517-02, PDC Light Curves





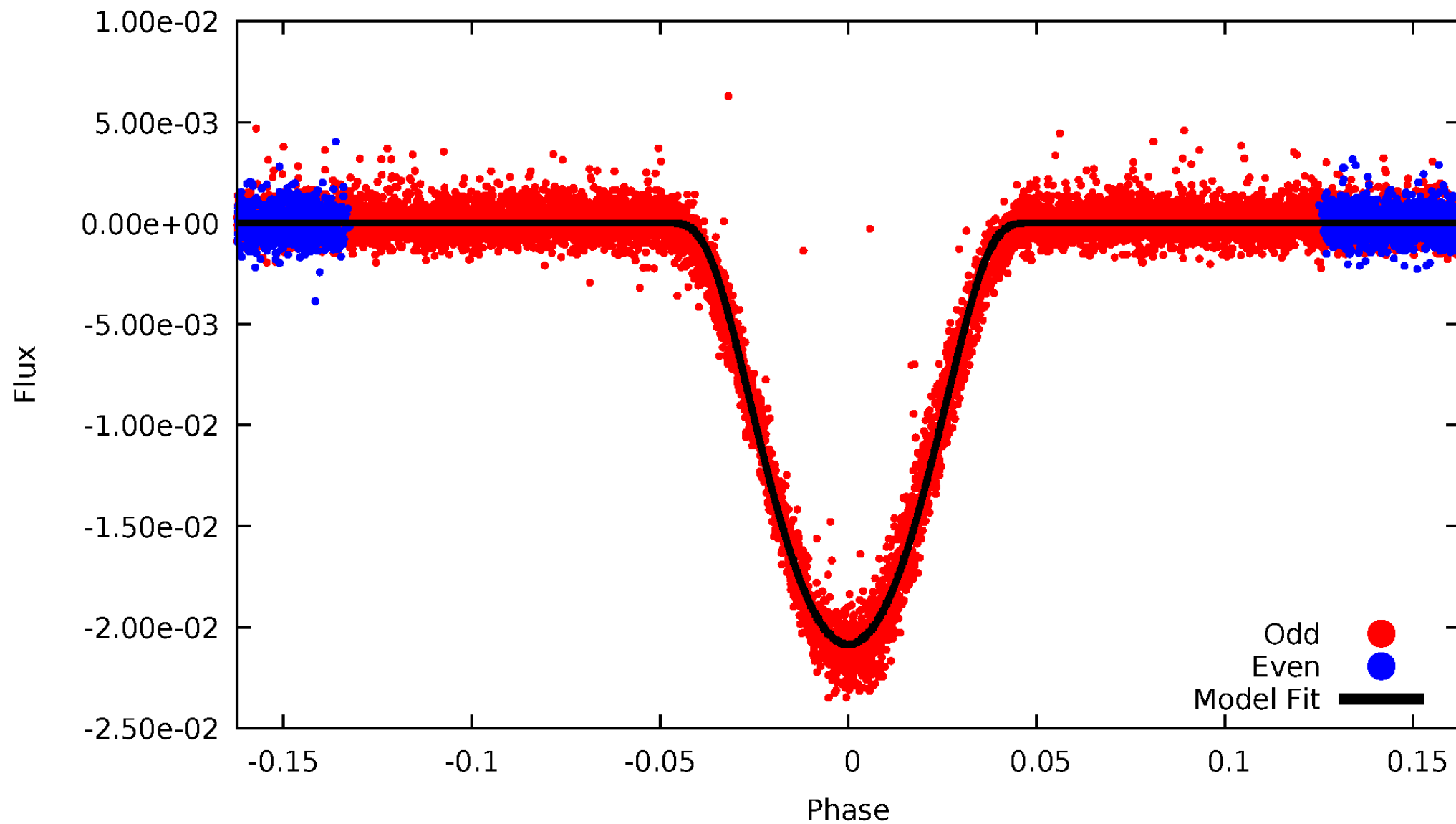
TCE 012022517-02





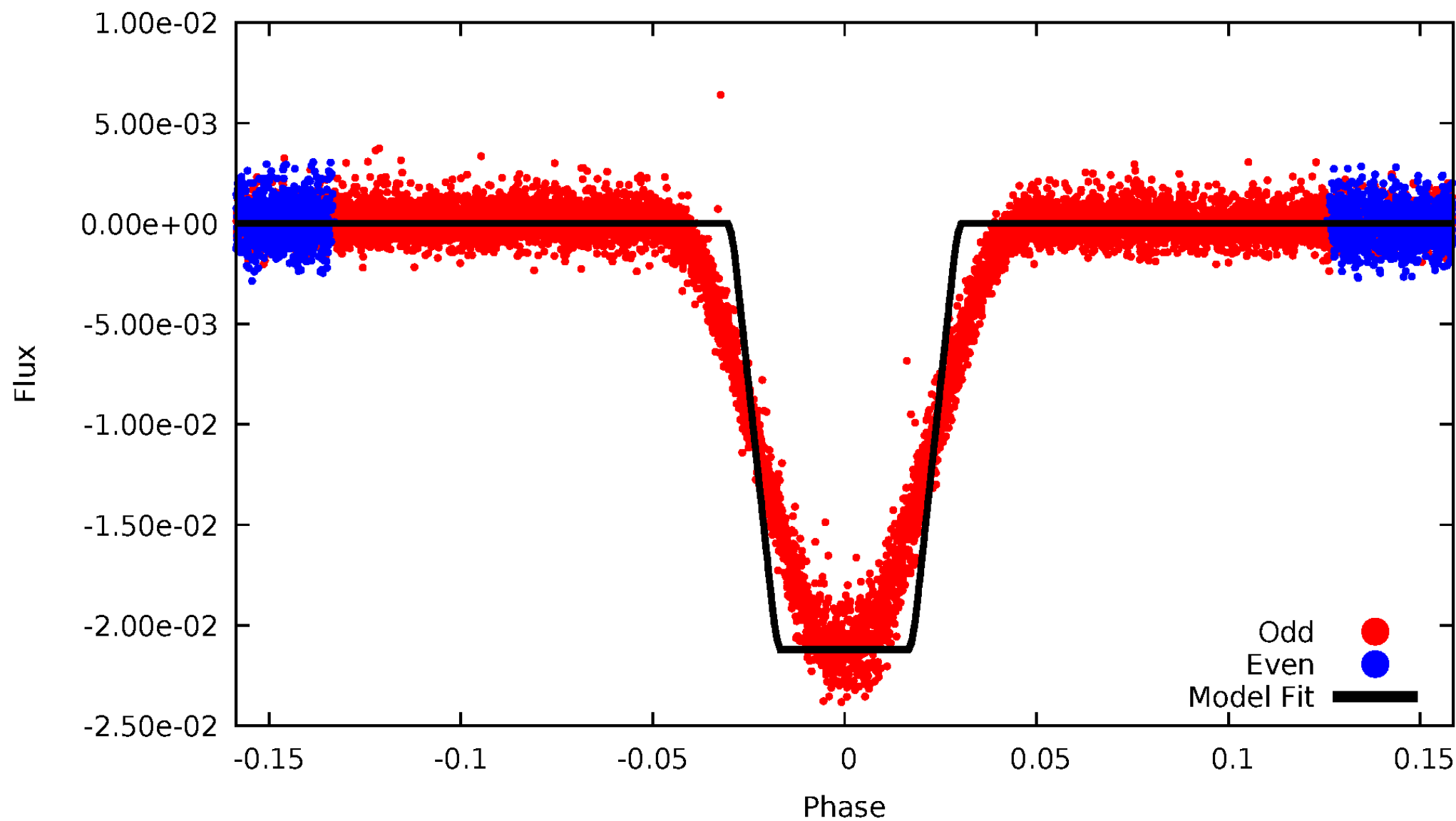
# DV Odd/Even

TCE 012022517-02



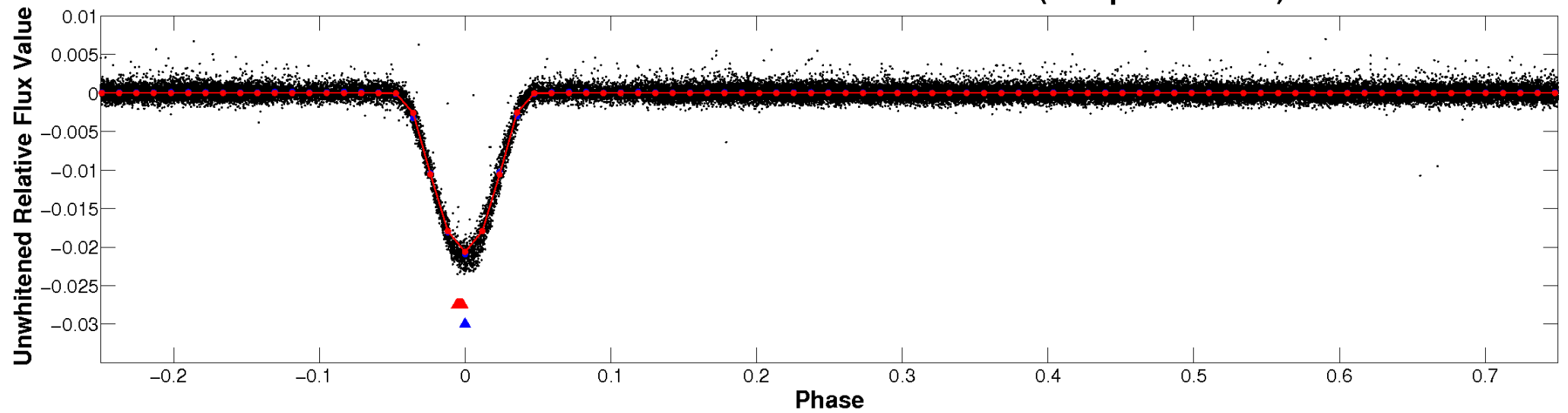
# ALT Odd/Even

TCE 012022517-02

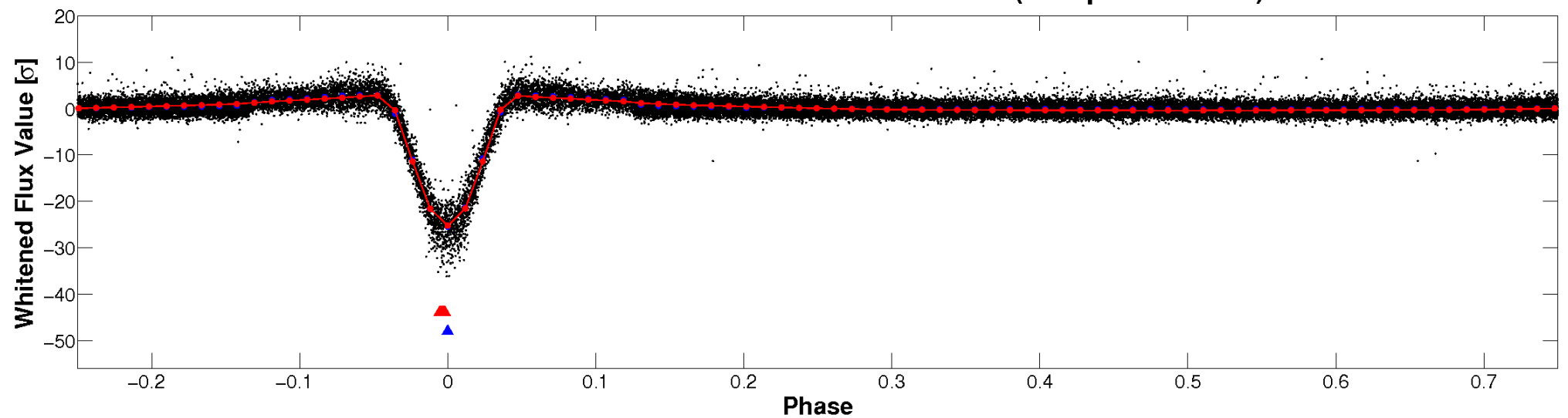


# Non-Whitened Vs. Whitened Light Curve

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

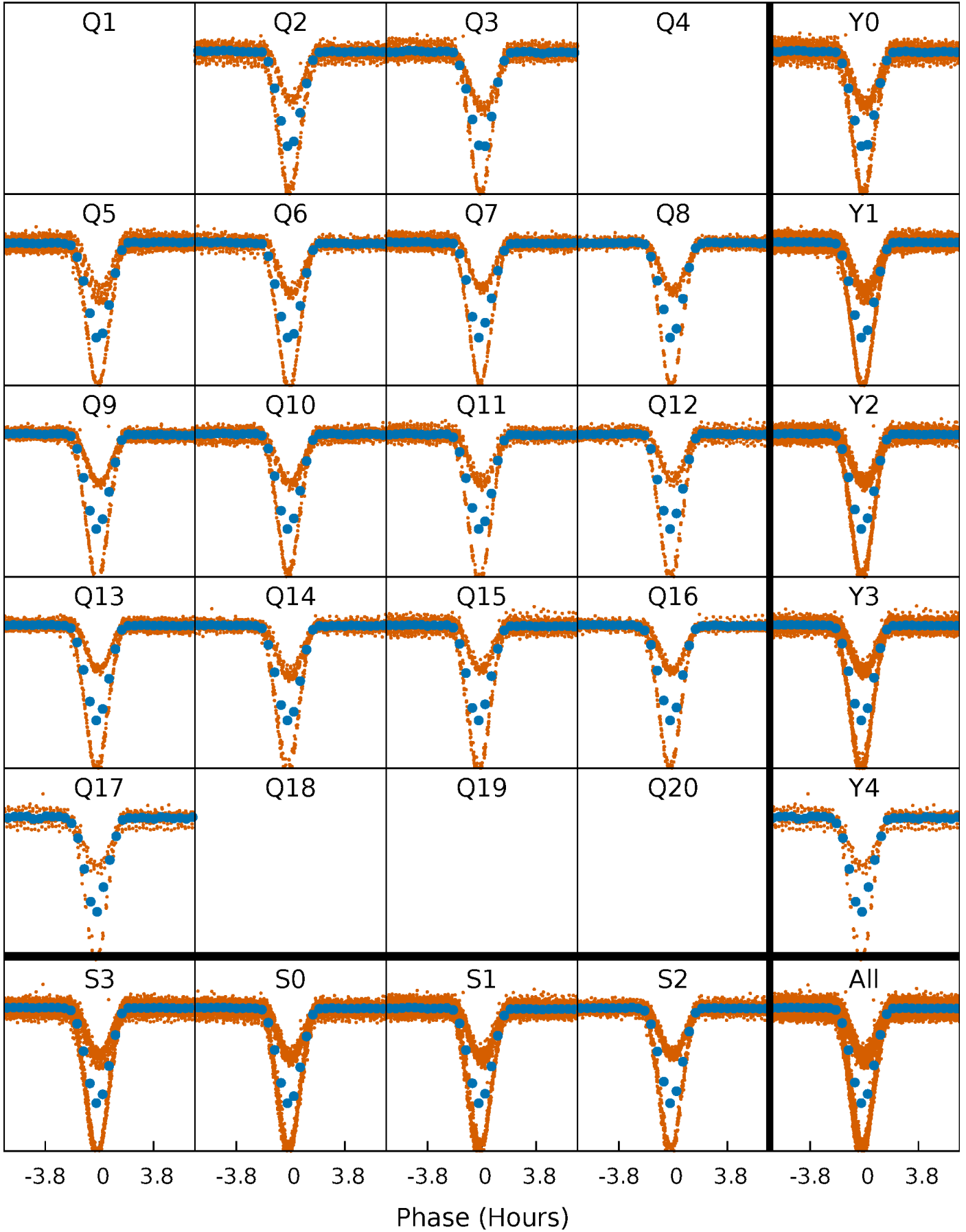


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



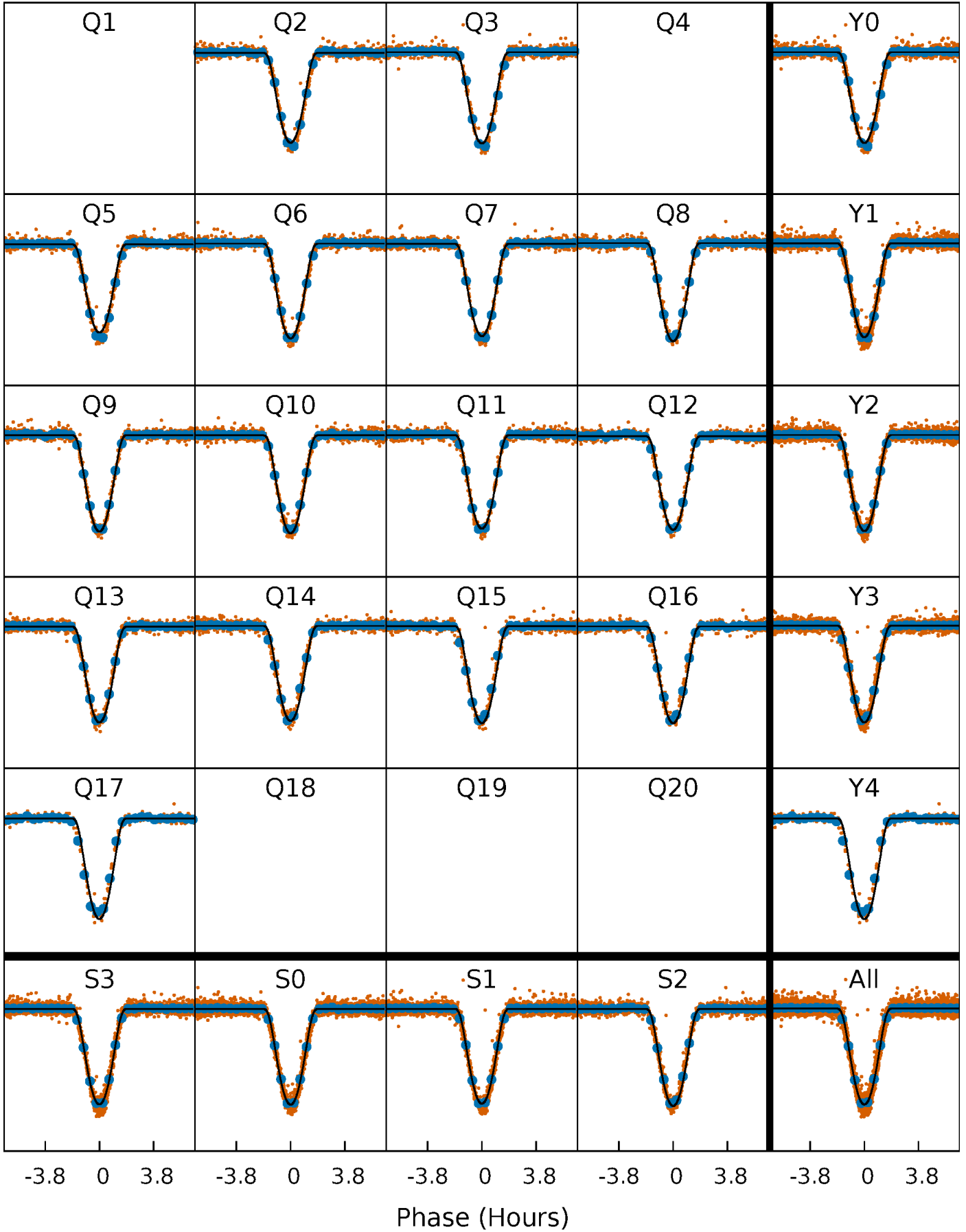
# PDC Quarter-Phased Transit Curves

TCE 012022517-02   P= 1.721366 Days    $T_0=132.393741$  (BKJD)



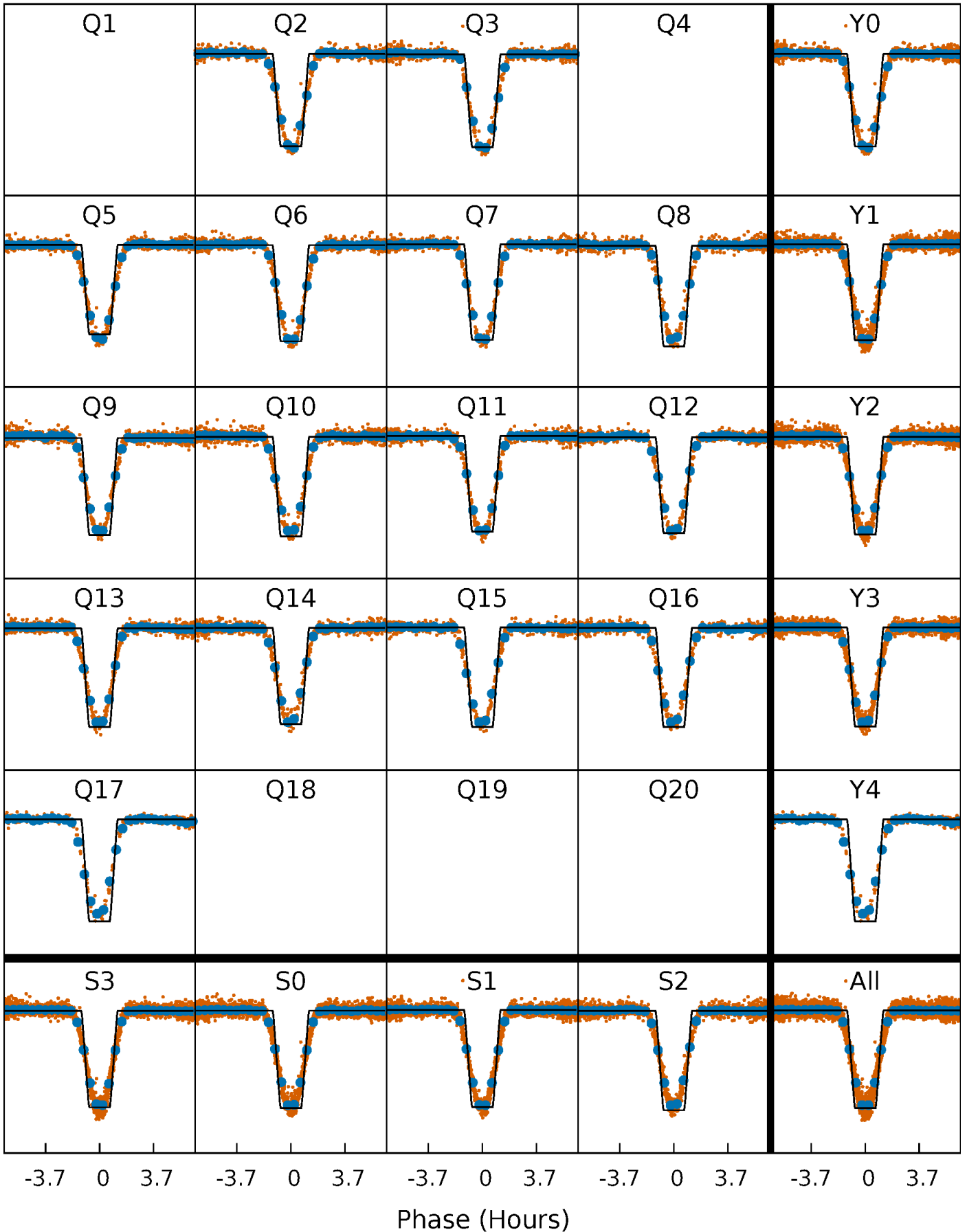
# DV Quarter-Phased Transit Curves

TCE 012022517-02   P= 1.721366 Days    $T_0=132.393741$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

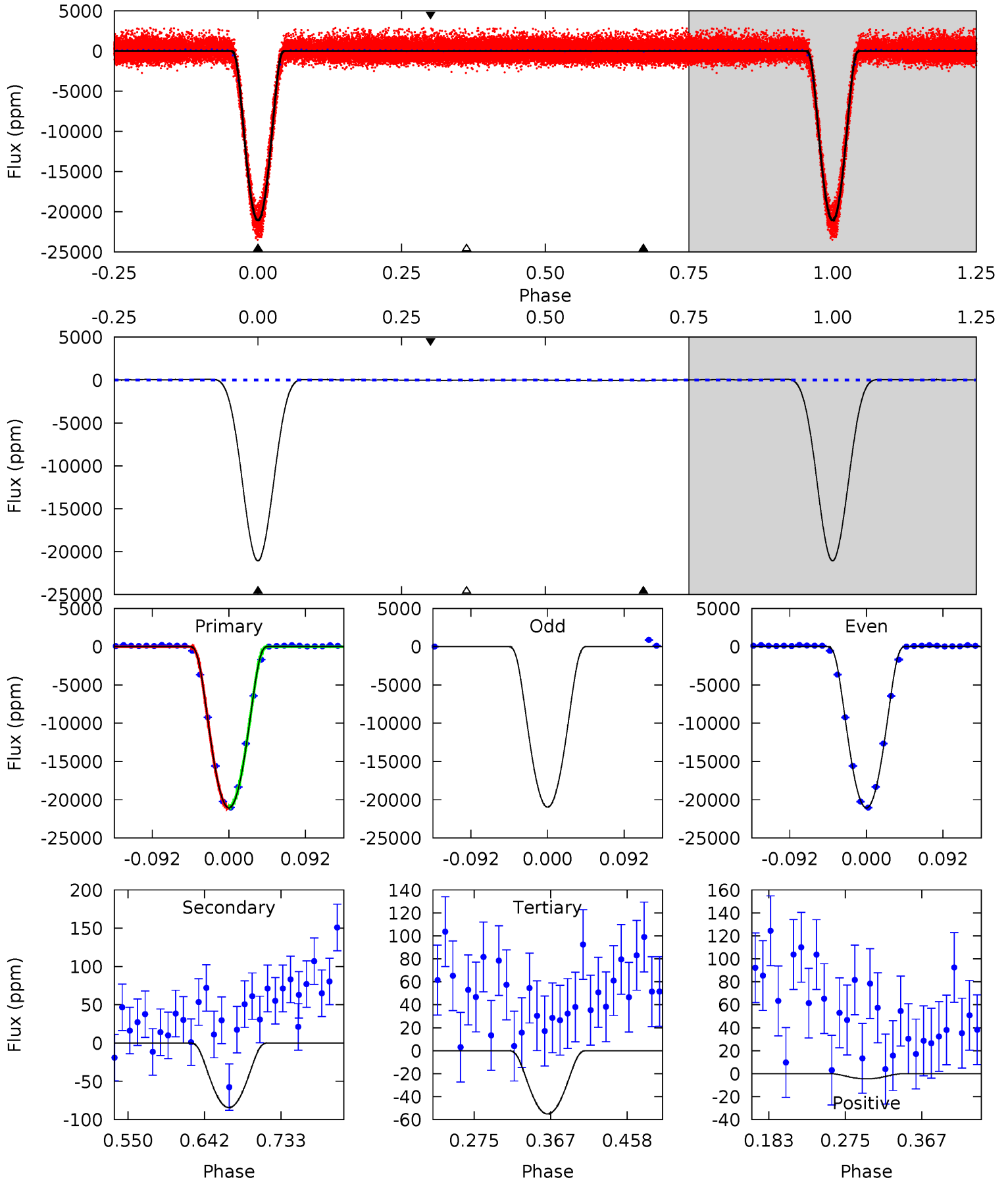
TCE 012022517-02     $P = 1.721363$  Days     $T_0 = 132.394731$  (BKJD)



# DV Model-Shift Uniqueness Test

012022517-02, P = 1.721366 Days, E = 132.393741 Days

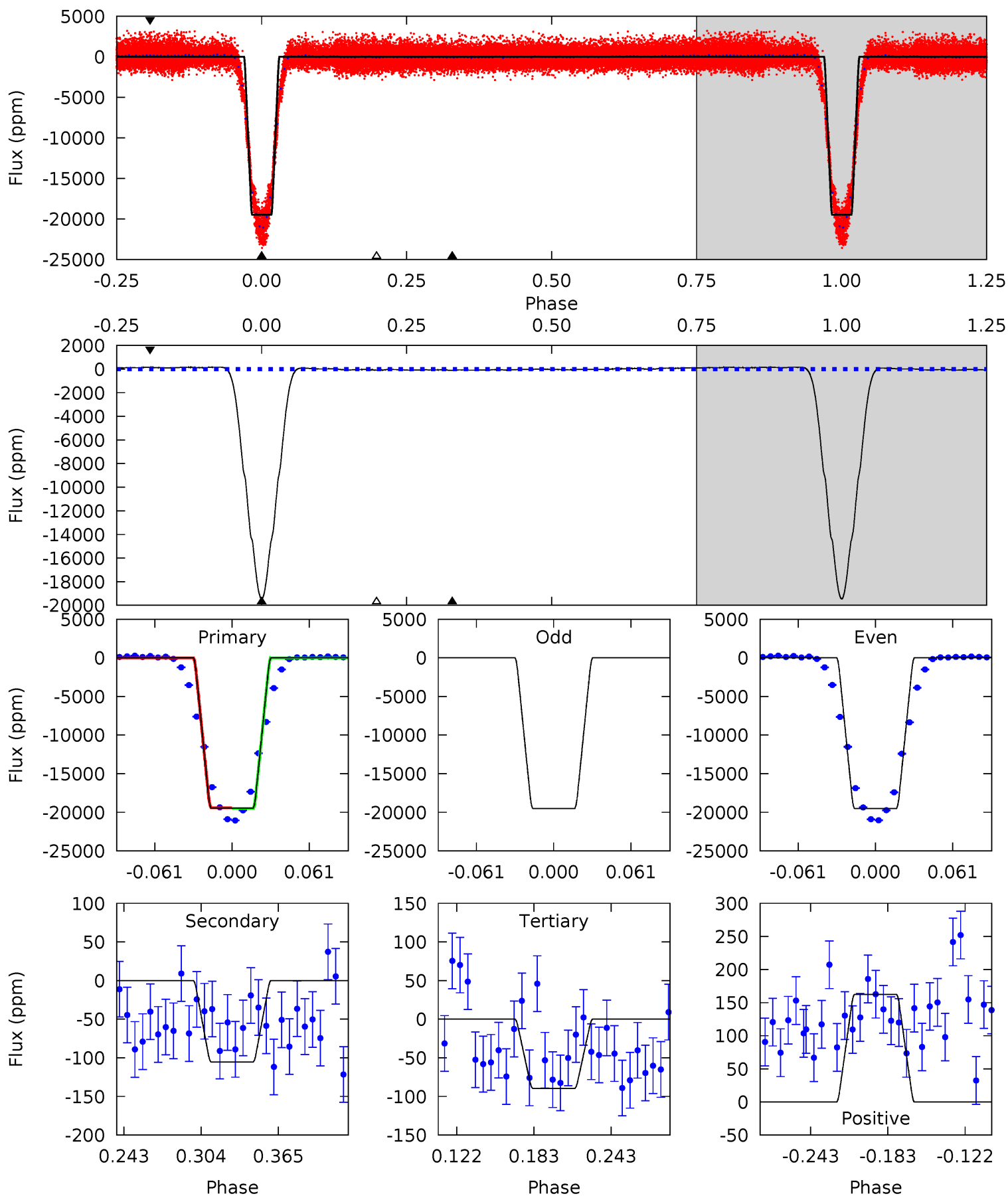
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1562	6.26	4.09	-0.33	4.58	1.69	2.78	1558	1563	2.17	6.59	3.99	0.99	0.00	6.09



# Alt Model-Shift Uniqueness Test

012022517-02, P = 1.721363 Days, E = 132.394731 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
995.4	5.40	4.58	8.31	4.67	1.87	3.86	990.8	987.1	0.81	-2.92	0.33	1.00	0.01	1.74





### Stellar Parameters For KIC 012022517

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5819^{+158}_{-175}$	$4.501^{+0.072}_{-0.180}$	$-0.400^{+0.300}_{-0.300}$	$0.861^{+0.231}_{-0.099}$	$0.858^{+0.109}_{-0.079}$	$1.890^{+0.704}_{-0.879}$
	+3%/-3%	+2%/-4%	+75%/-75%	+27%/-11%	+13%/-9%	+37%/-47%
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 012022517-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-84 \pm 13$	$16.81^{+2.64}_{-1.27}$	$2068^{+142}_{-97}$	$-2395^{+86}_{-112}$	$0.113^{+0.028}_{-0.029}$
Alt.	$-106 \pm 20$	$14.08^{+1.96}_{-1.26}$	$2062^{+138}_{-93}$	$-2213^{+224}_{-170}$	$0.204^{+0.057}_{-0.054}$

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

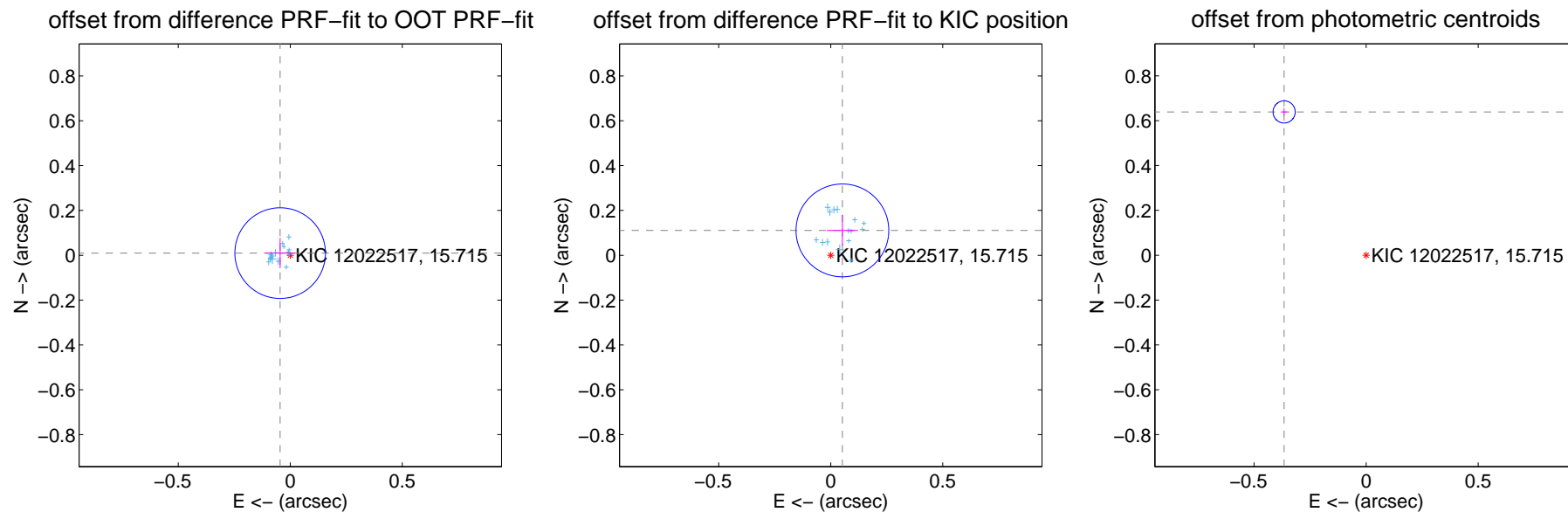
## DV Centroid Data

Supplemental centroid analysis for 012022517-02. Kepler magnitude: 15.71. Transit SNR 768.04

There are 15 quarters with good PRF difference image offsets

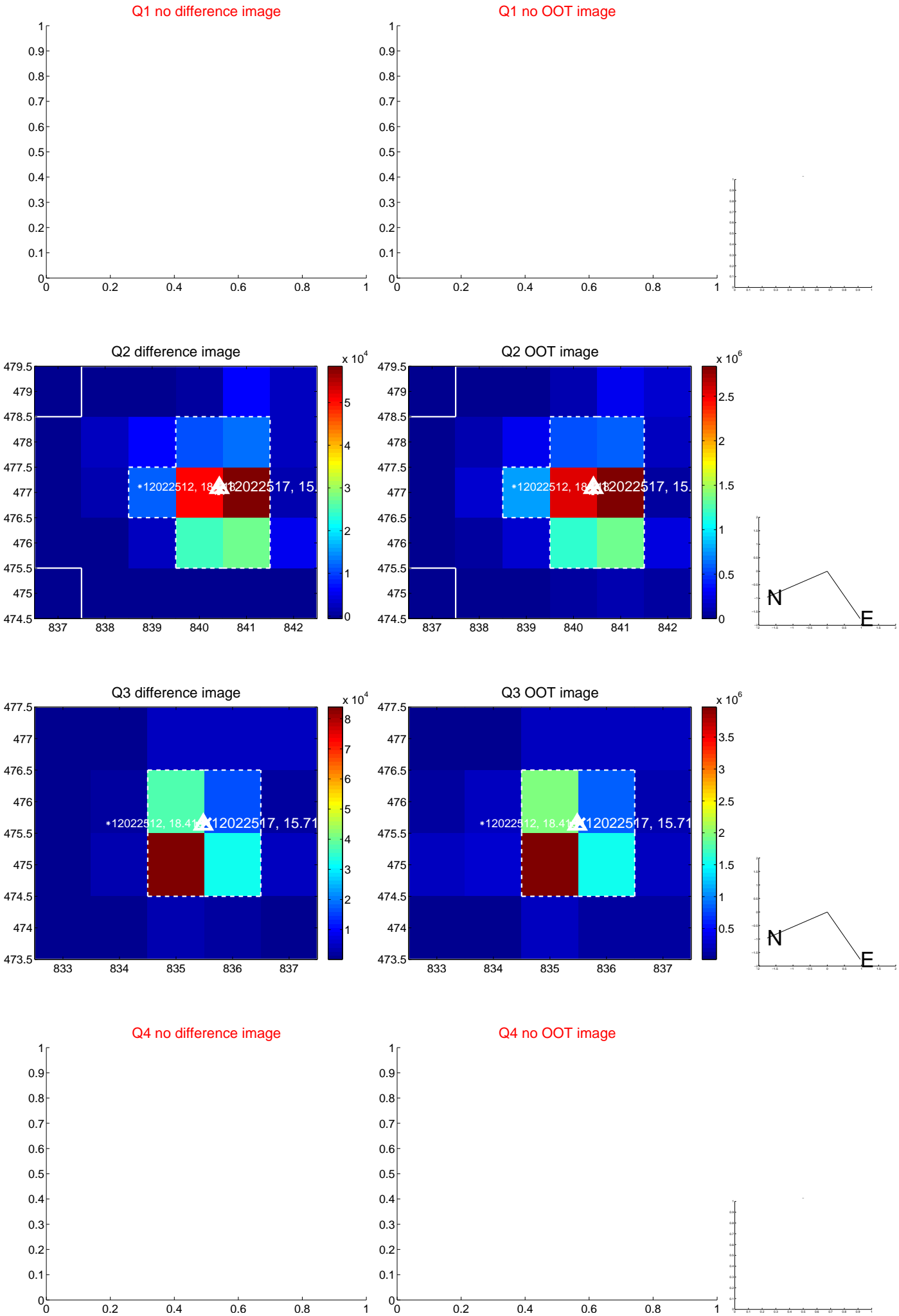
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.046 \pm 0.067$	0.68	$0.045 \pm 0.067$	$0.010 \pm 0.067$
PRF-fit source offset from KIC position	$0.123 \pm 0.069$	1.78	$-0.052 \pm 0.069$	$0.111 \pm 0.069$
photometric centroid source offset	$0.74 \pm 0.02$	44.69	$0.37 \pm 0.01$	$0.64 \pm 0.02$

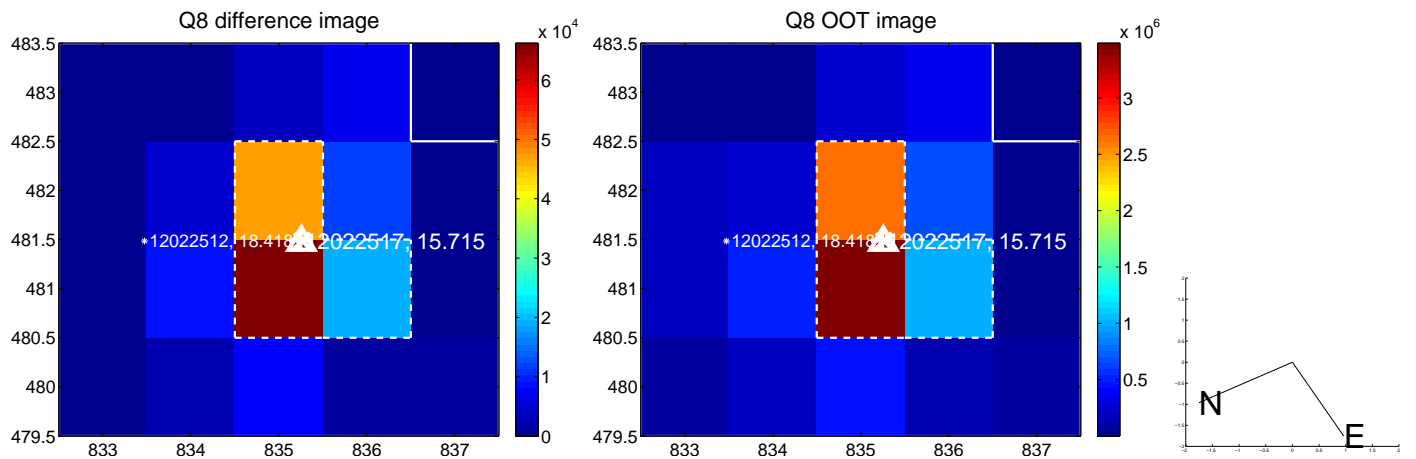
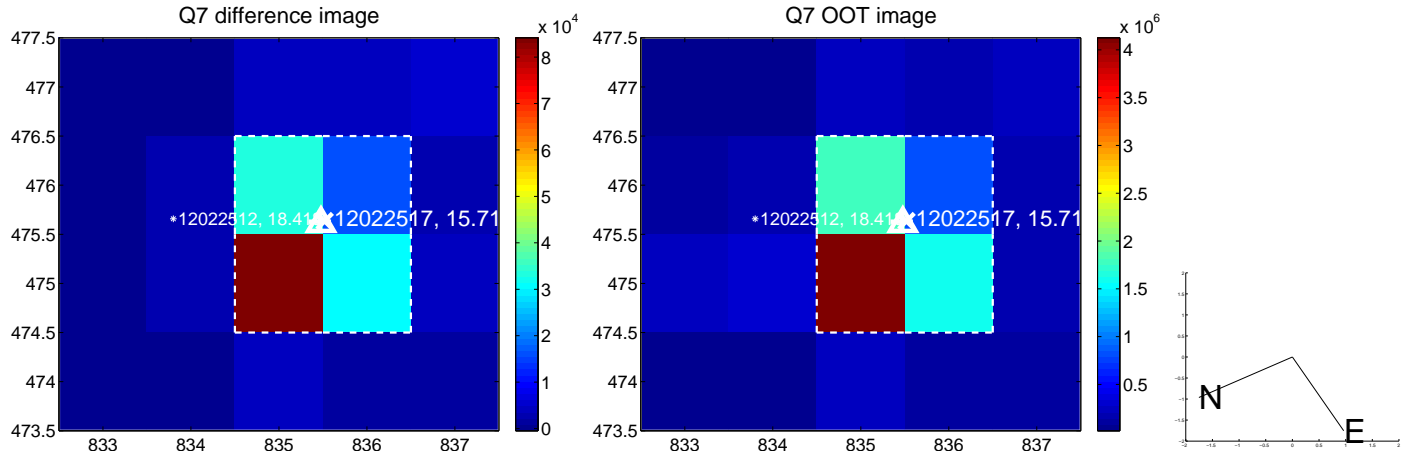
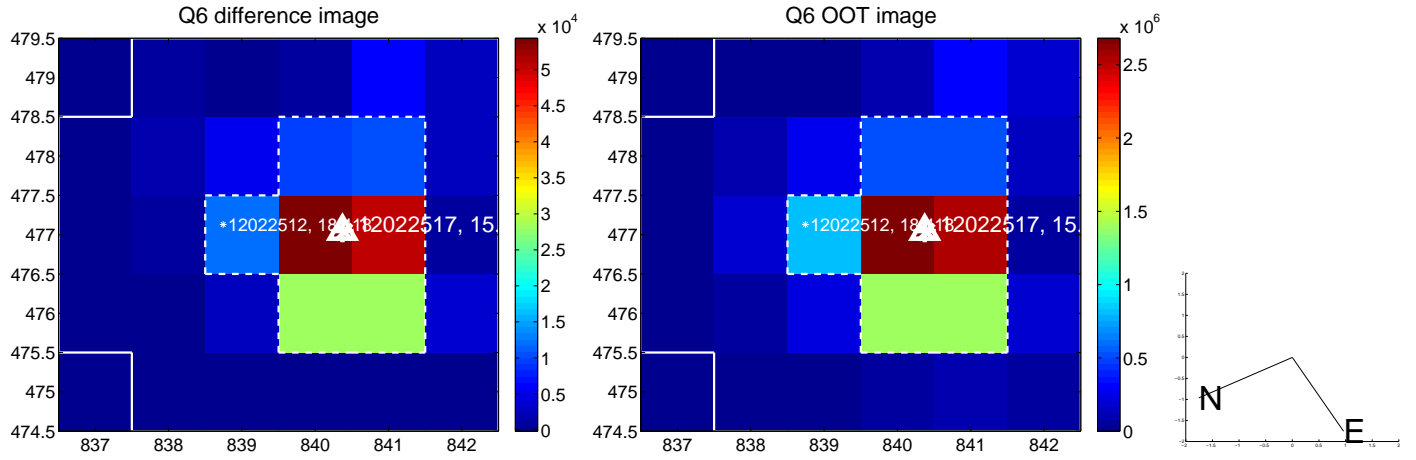
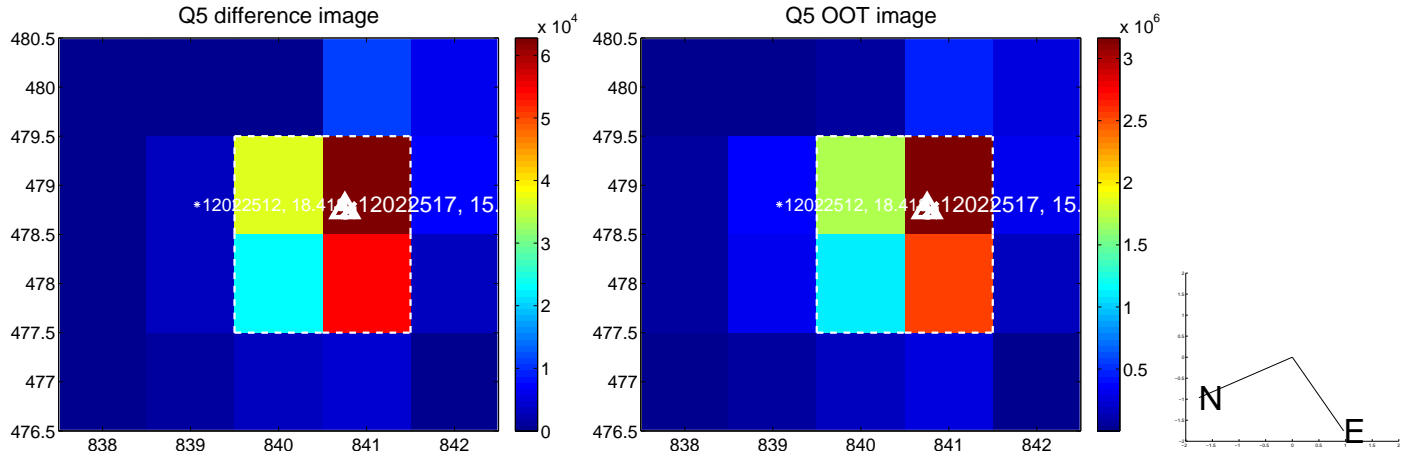


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

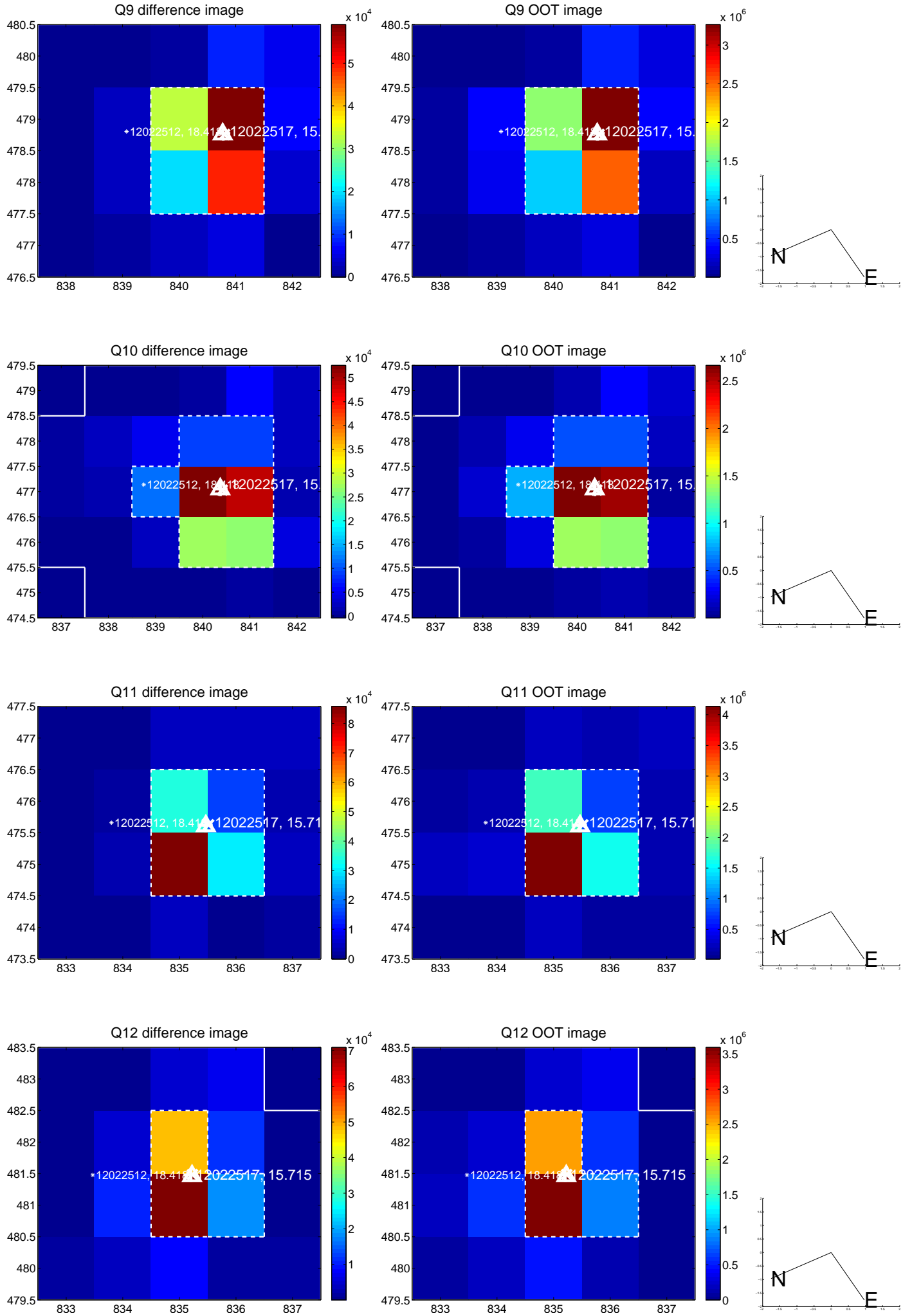
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



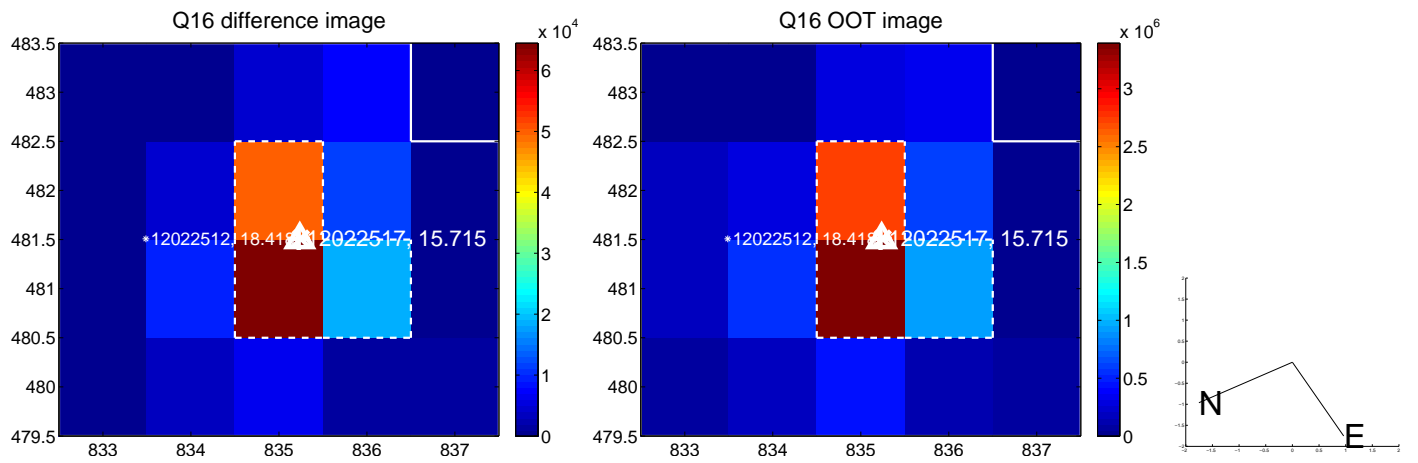
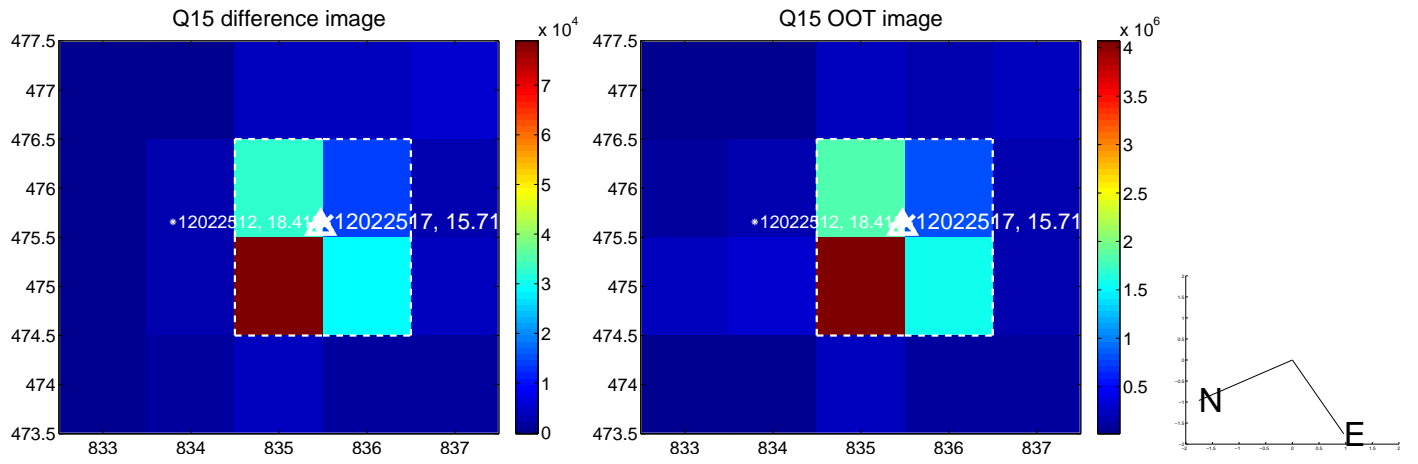
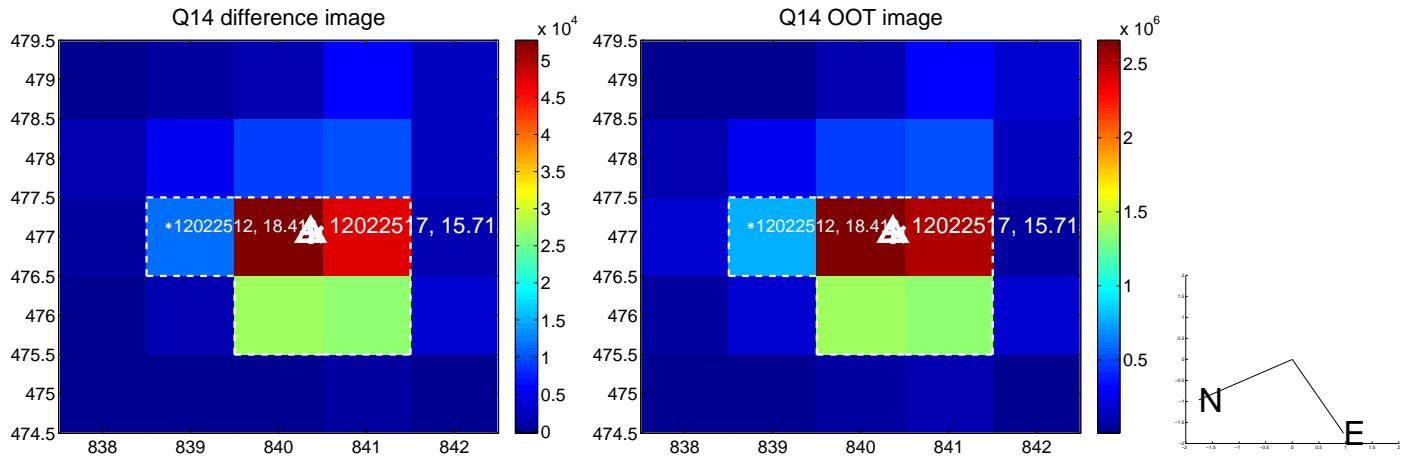
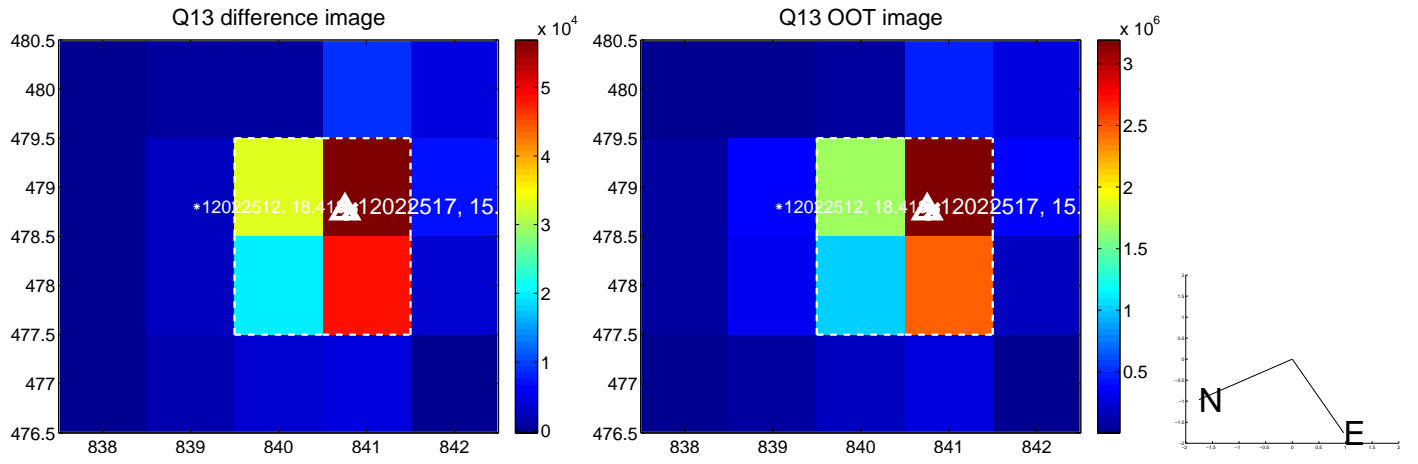
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



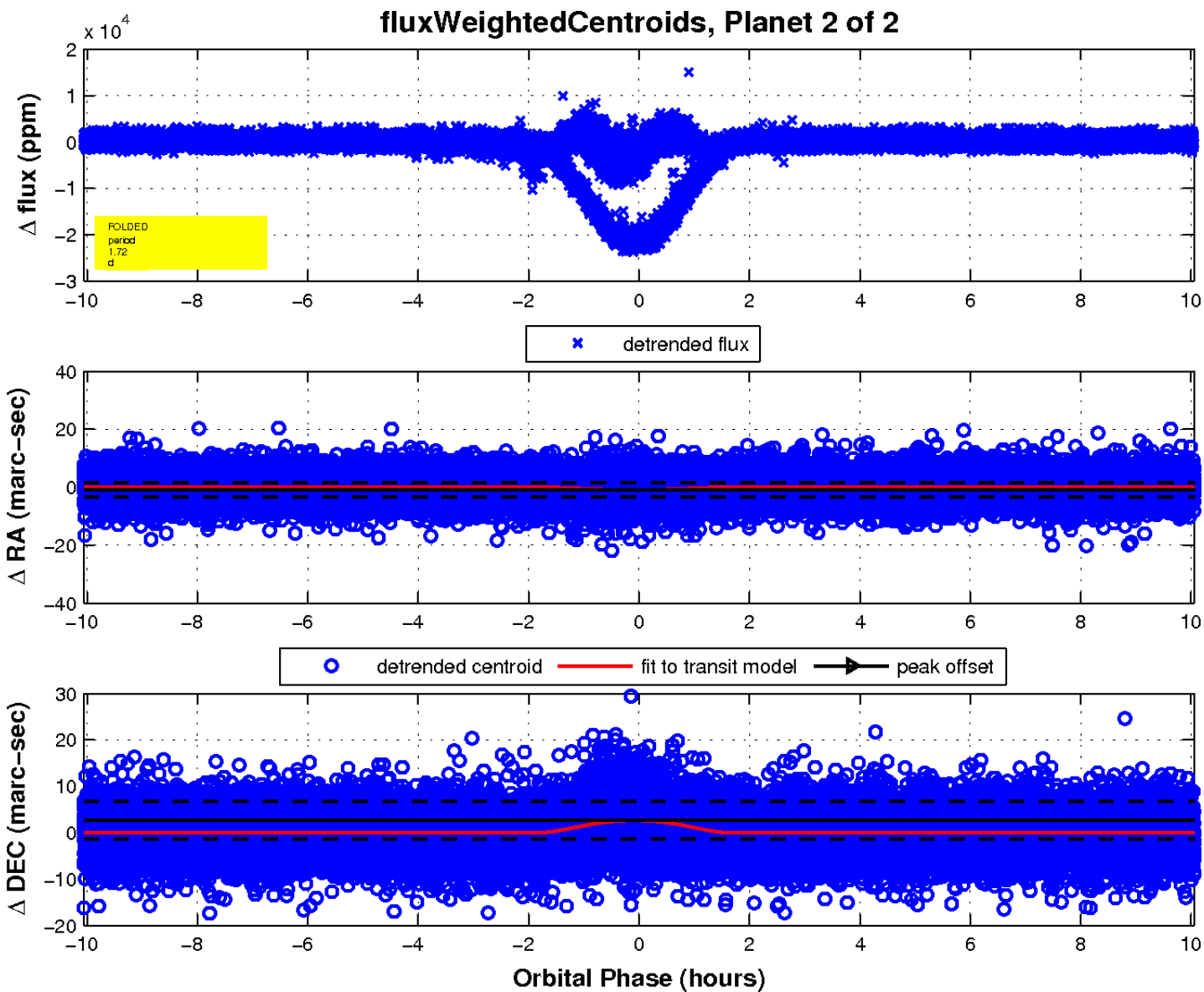
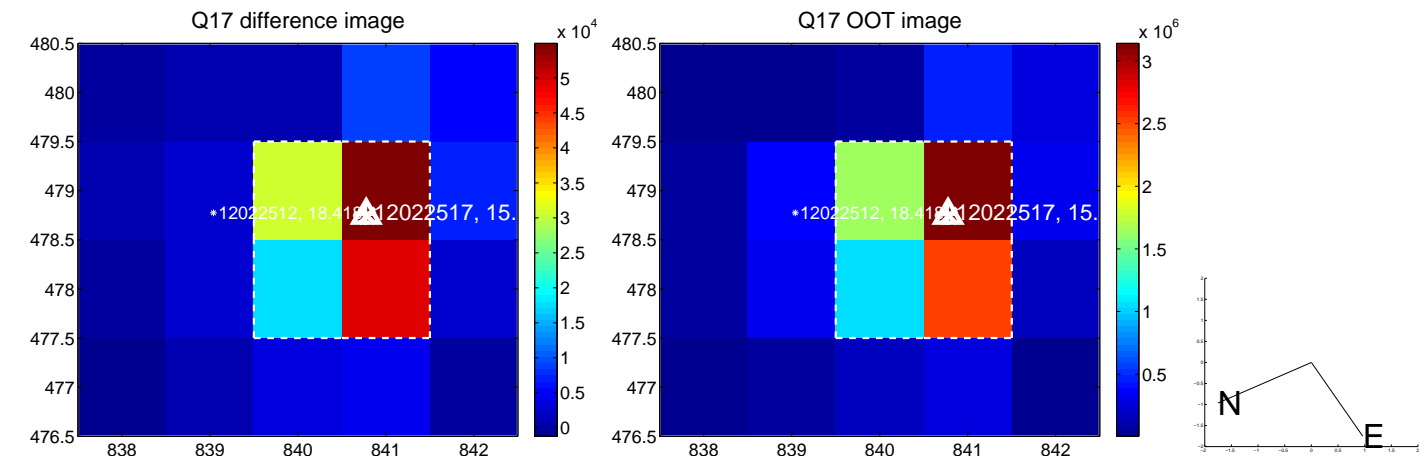
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



## UKIRT Image

Declination

