

# KIC 010618078

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010618078-01	OBS	No	4.557500	135.635039	24.4	14.501	8.1	5.5	3.13	6529	1.80	3991.18
010618078-02	OBS	No	459.538935	426.316227	345.0	3.332	7.3	7.1	3.13	6529	6.58	8.50

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010618078-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
010618078-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

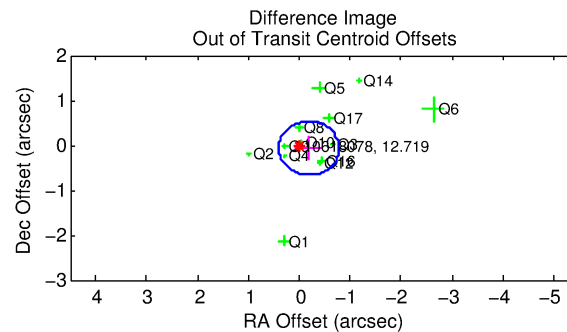
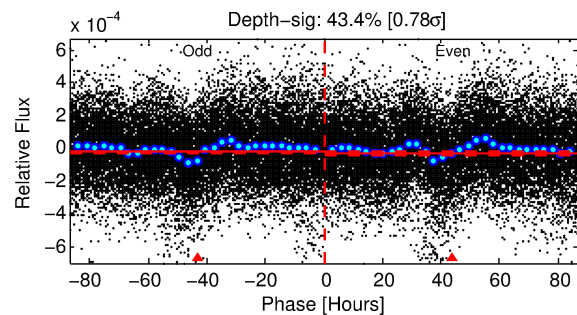
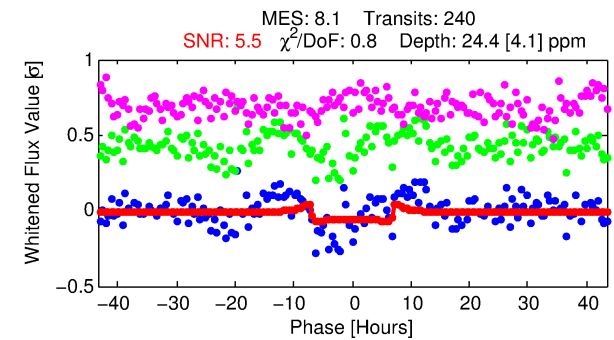
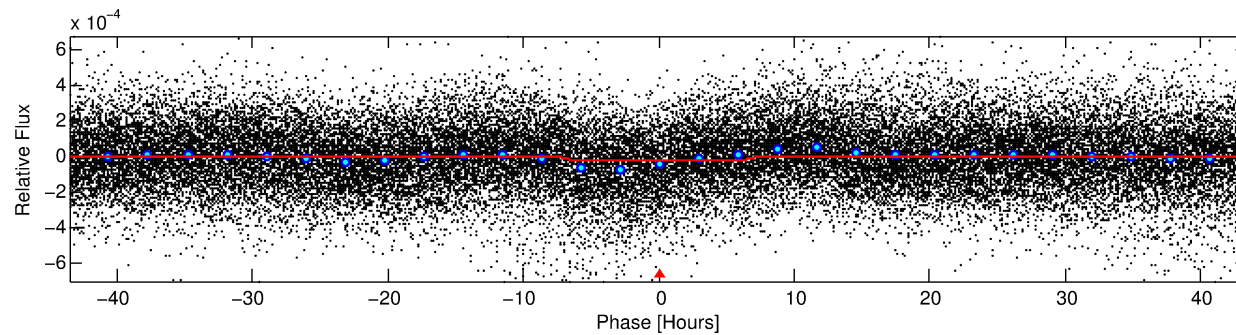
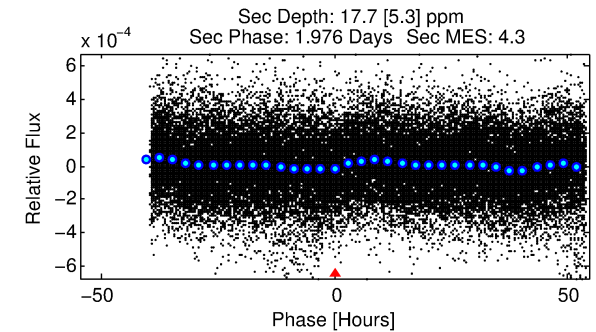
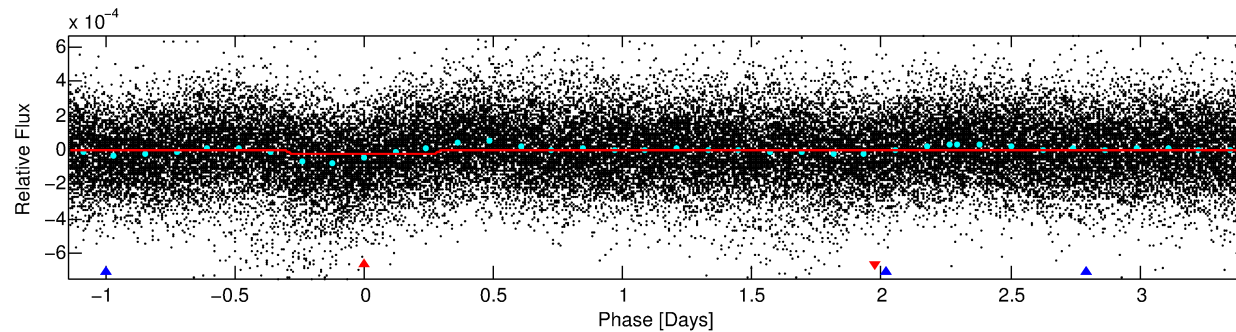
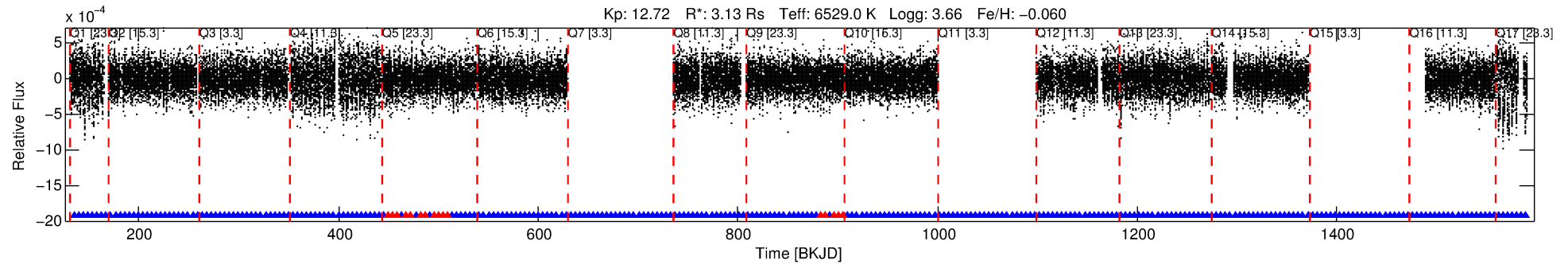
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010618078-01

No Significant Match Found

# DV One-Page Summary

KIC: 10618078 Candidate: 1 of 2 Period: 4.558 d



## DV Fit Results:

Period = 4.55750 [0.00009] d  
Epoch = 135.6350 [0.0127] BKJD  
Rp/R\* = 0.0053 [0.0010]  
a/R\* = 1.43 [0.67]  
b = 0.90 [0.20]  
Seff = 3991.18 [2094.37]  
Teq = 2027 [266] K  
Rp = 1.80 [0.72] Re  
a = 0.0632 [0.0209] AU  
Ag = 11.95 [8.31] [1.32σ]  
Teffp = 5826 [701] K [5.07σ]

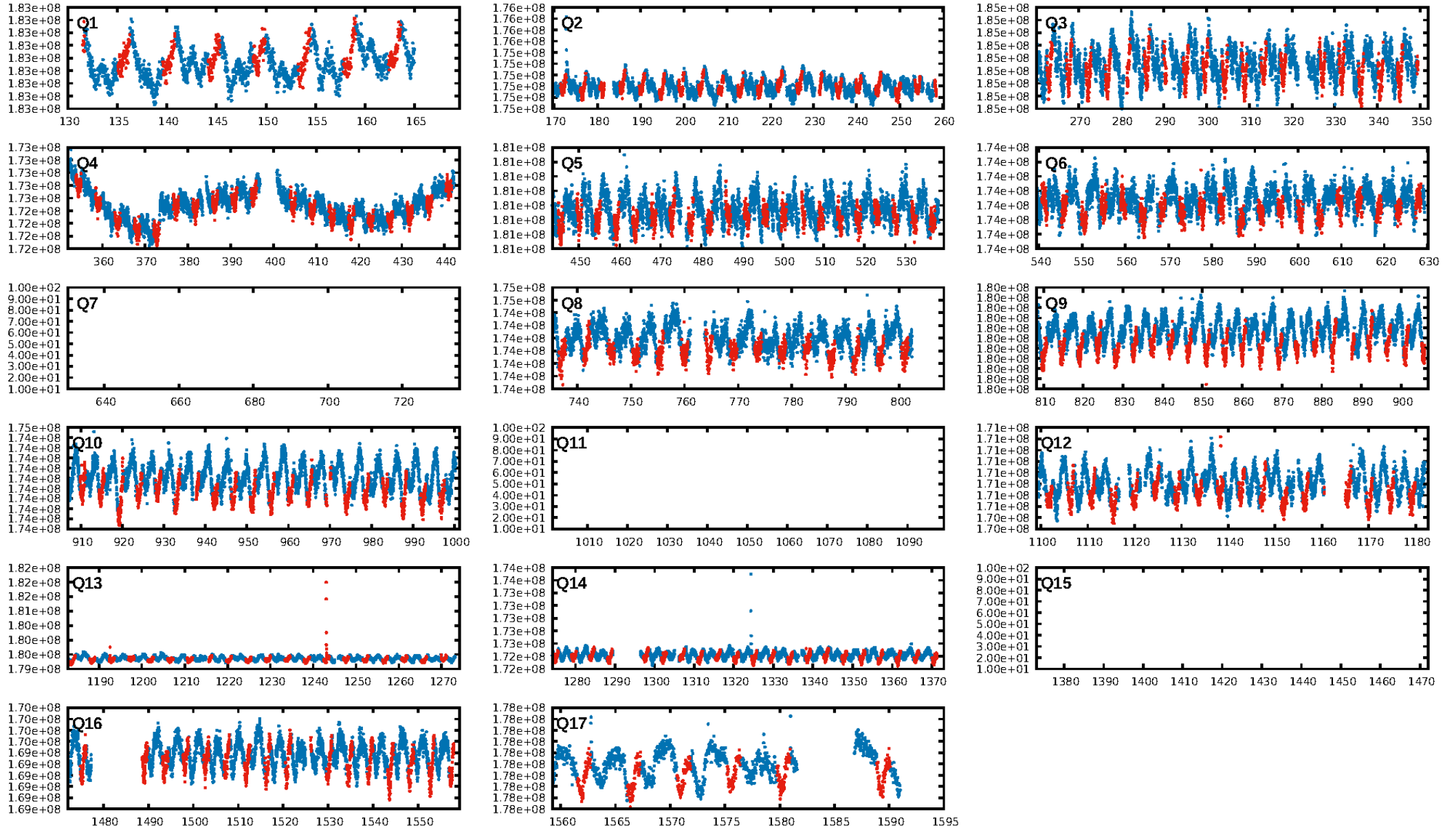
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [733.91σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
**Bootstrap-pfa: 7.15e-11**  
RollingBand-fgt: 0.93 [211/227]  
GhostDiagnostic-chr: 3.202  
Centroid-sig: N/A  
Centroid-so: 0.581 arcsec [0.45σ]  
OotOffset-rm: 0.199 arcsec [1.00σ]  
KicOffset-rm: 0.212 arcsec [0.86σ]  
OotOffset-st: 4/1/4/4 [13]  
KicOffset-st: 4/1/4/4 [13]  
DiffImageQuality-fgm: 1.00 [13/13]  
DiffImageOverlap-fno: 1.00 [14/14]

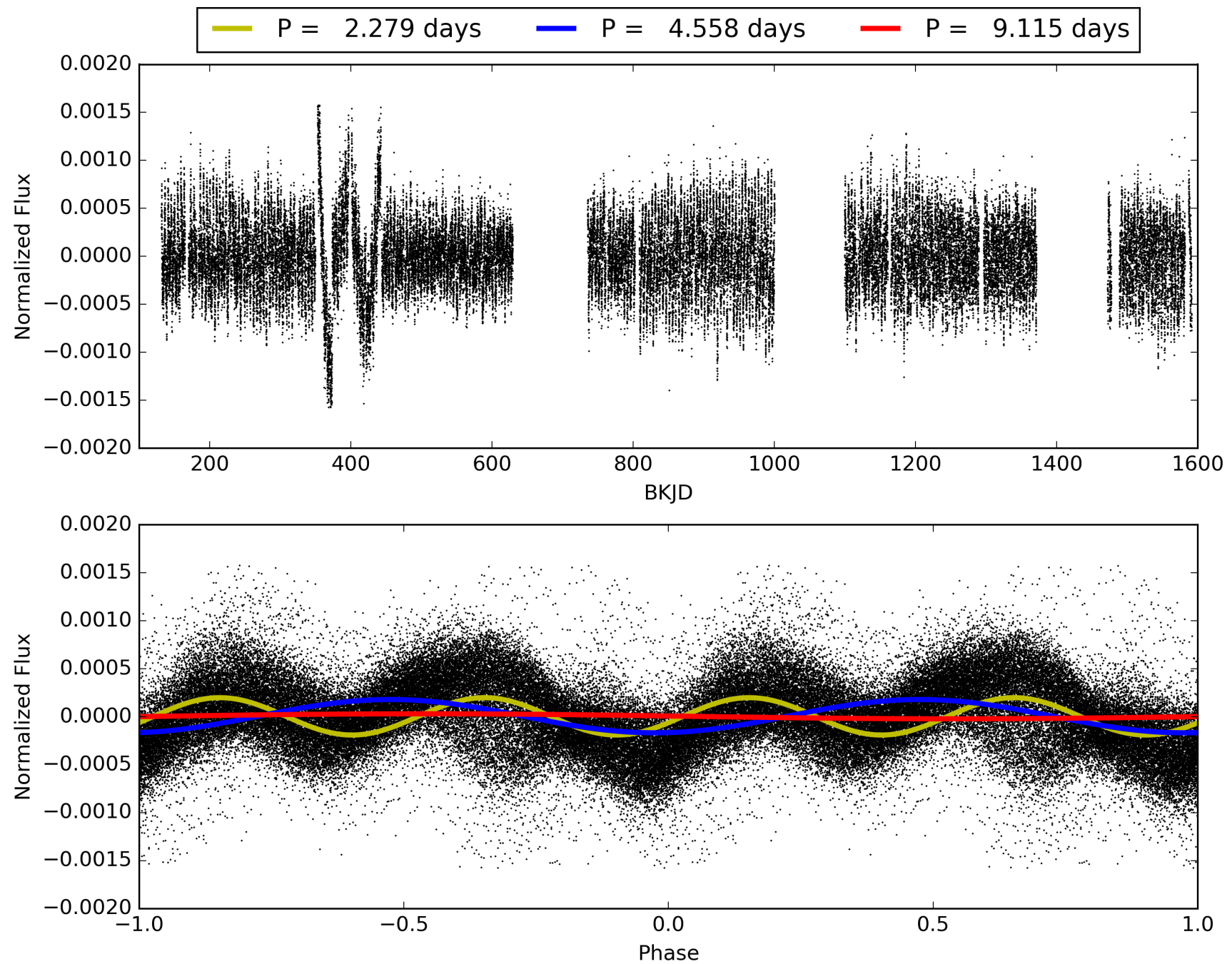
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:49:48 Z

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

# TCE 010618078-01, PDC Light Curves

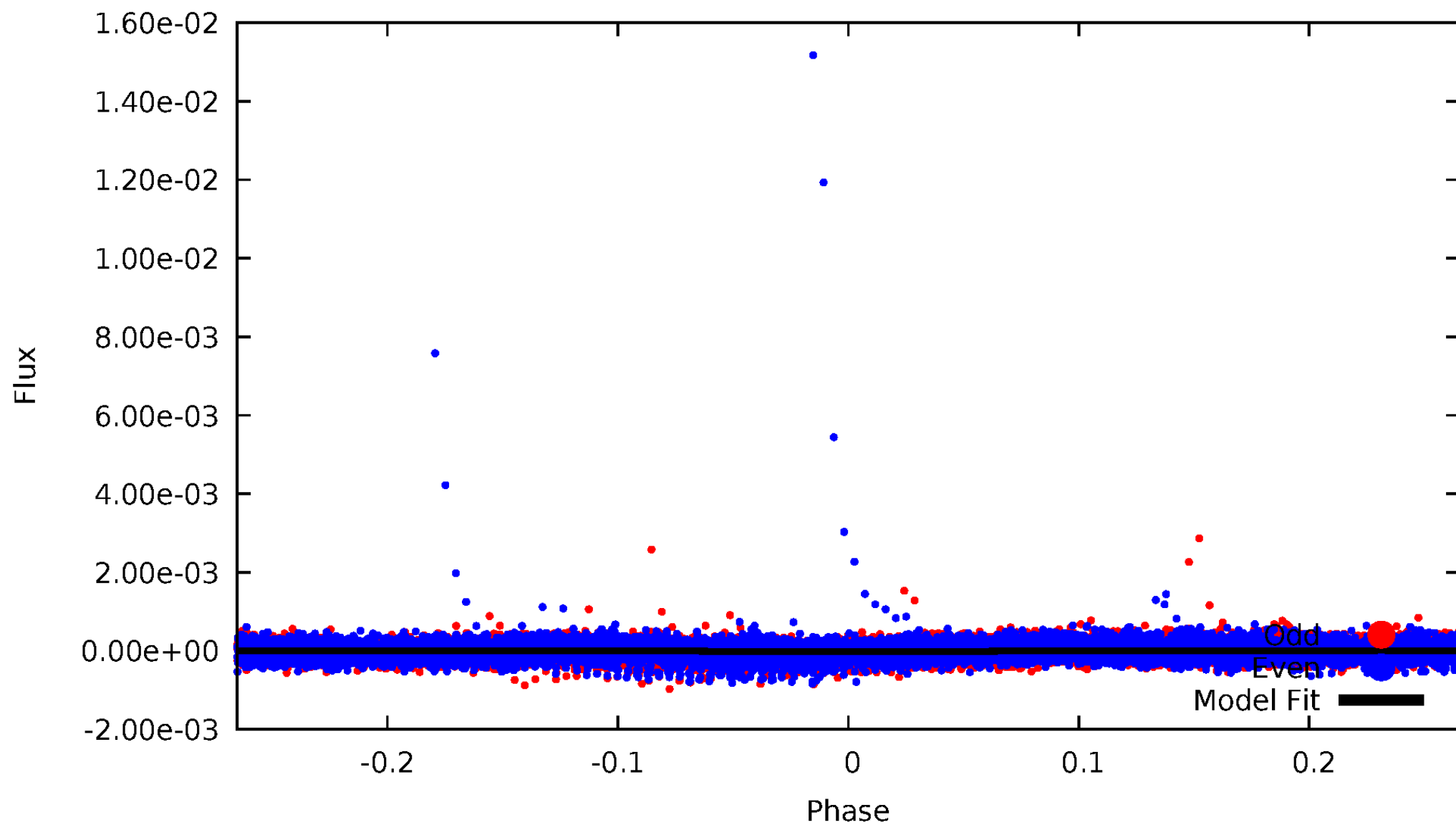


# TCE 010618078-01



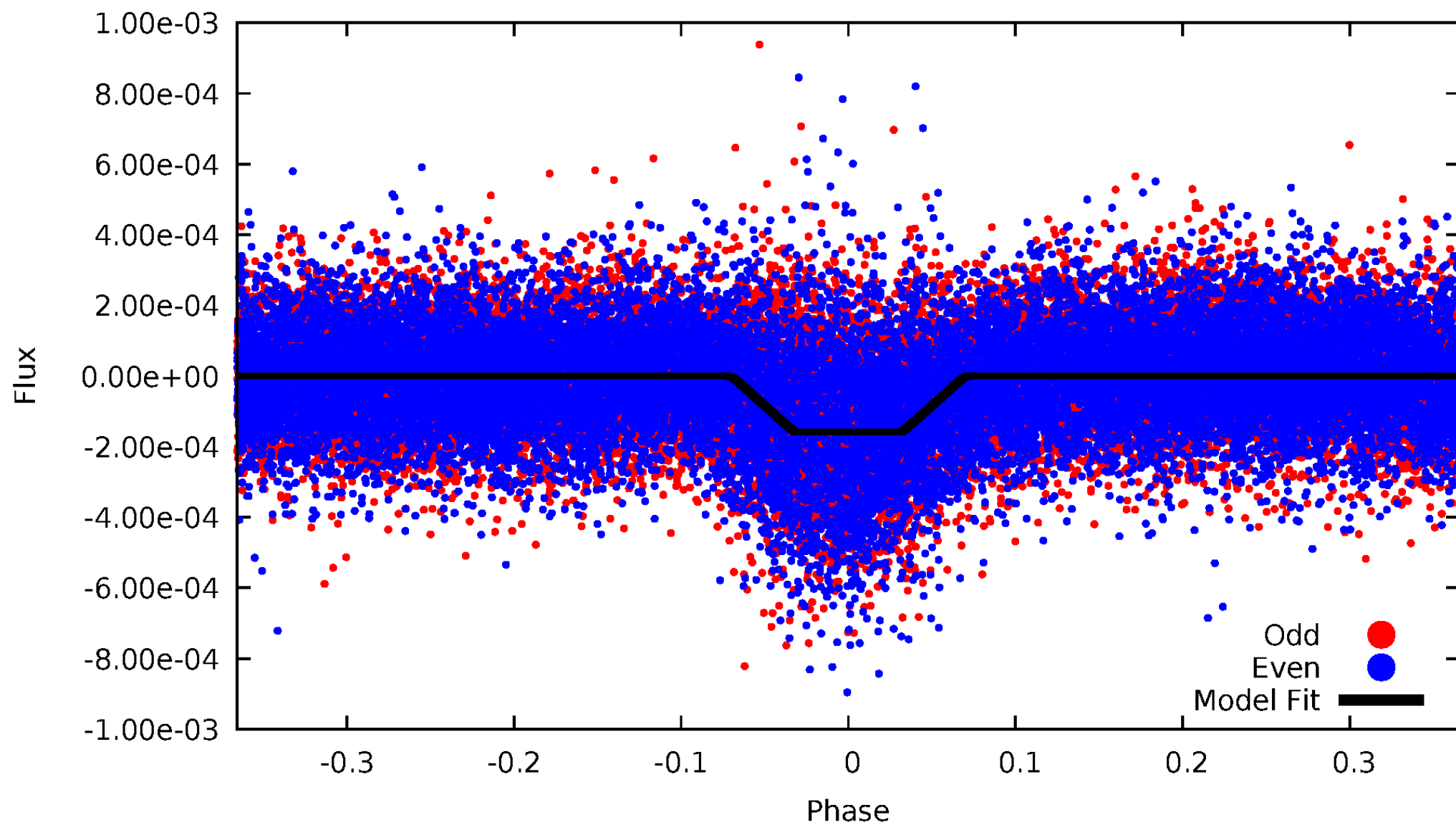
# DV Odd/Even

TCE 010618078-01



# ALT Odd/Even

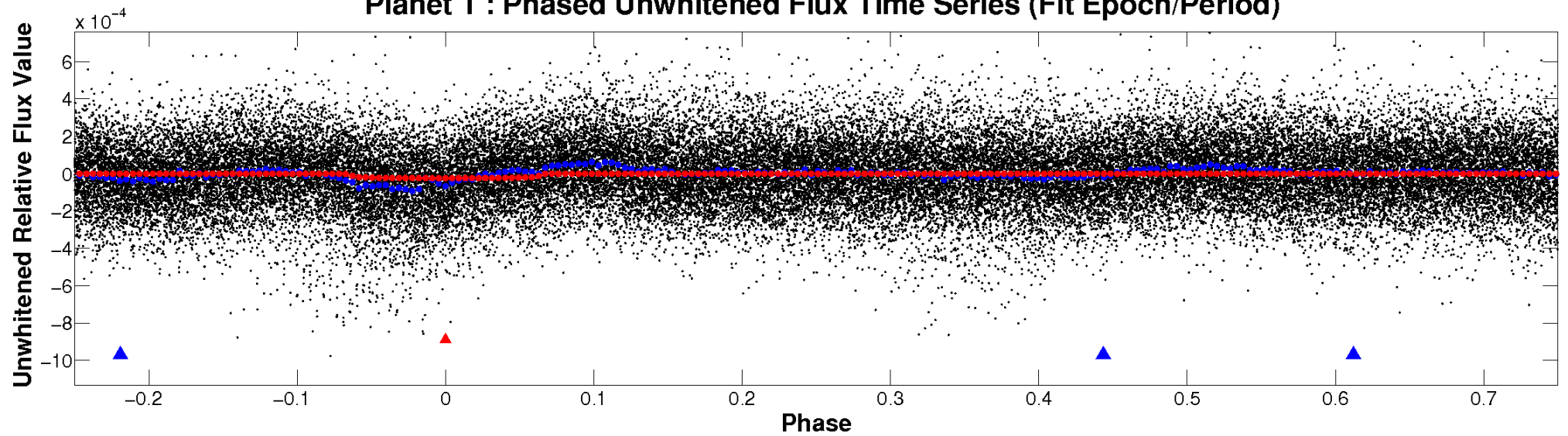
TCE 010618078-01



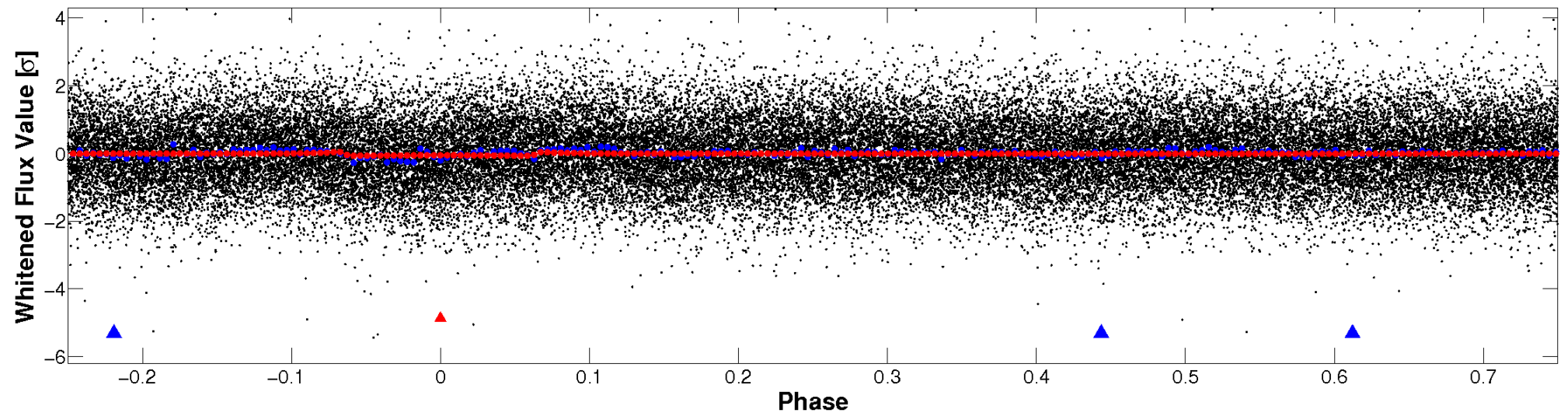


# Non-Whitened Vs. Whitened Light Curve

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

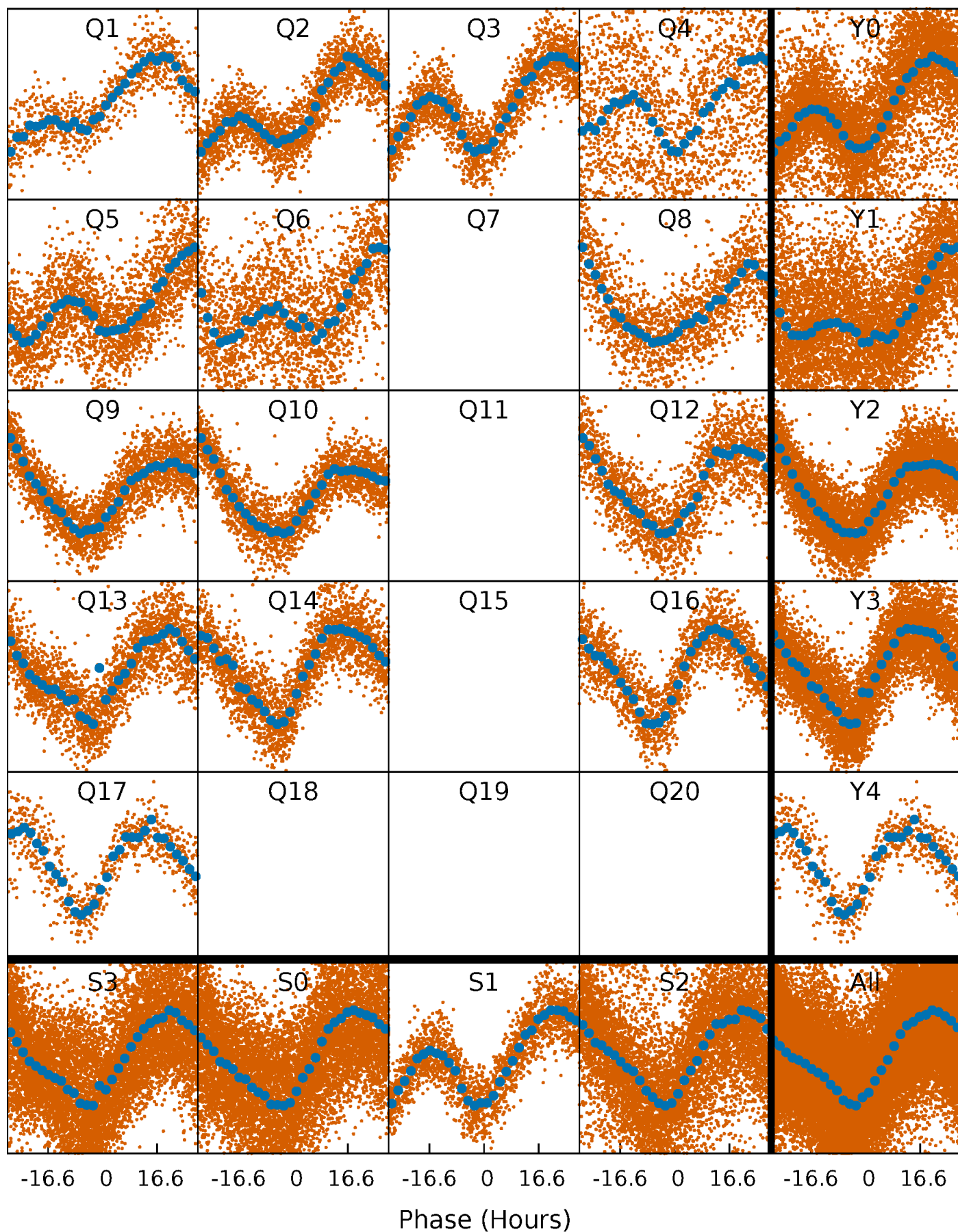


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

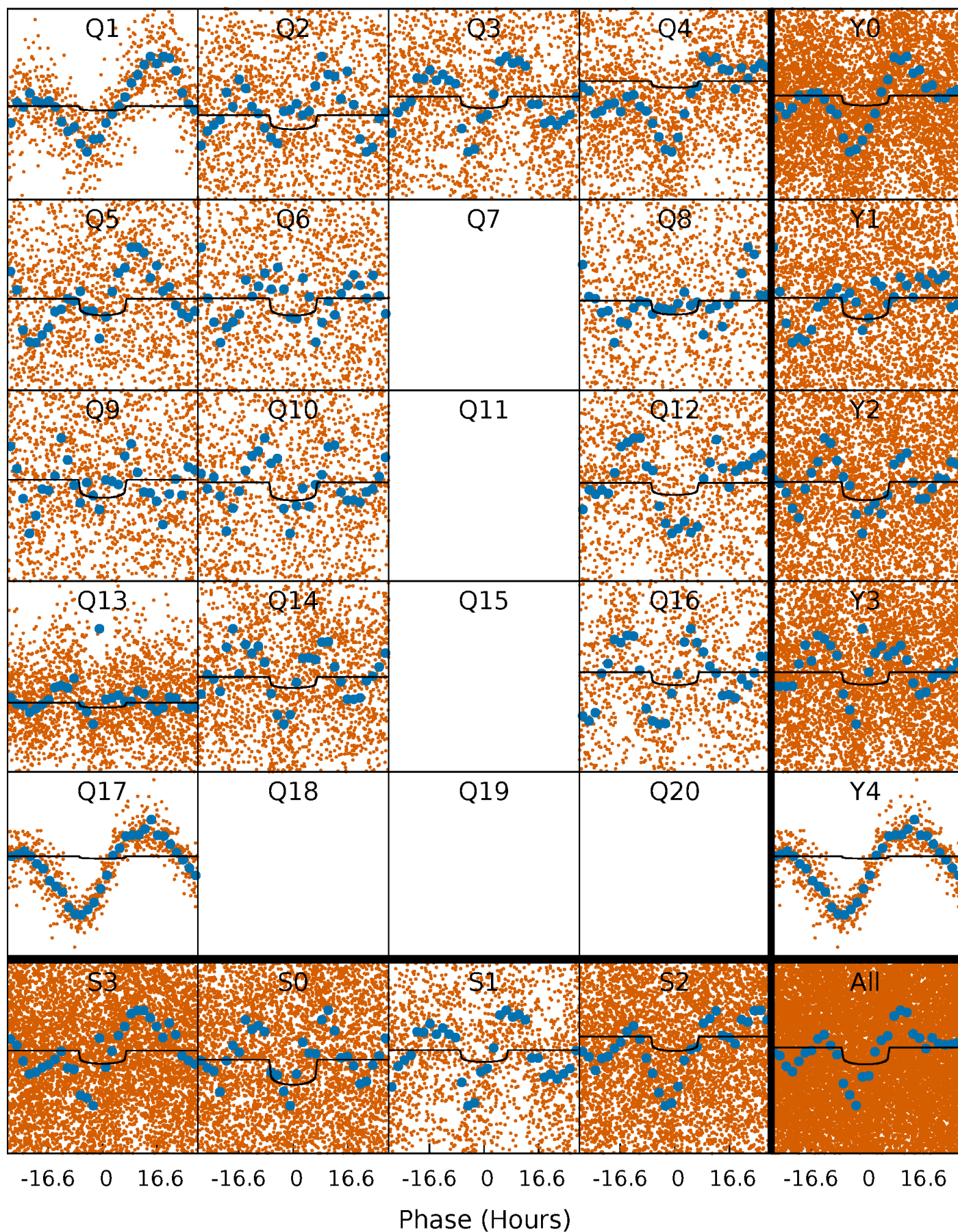
TCE 010618078-01 P= 4.557500 Days  $T_0=135.635039$  (BKJD)





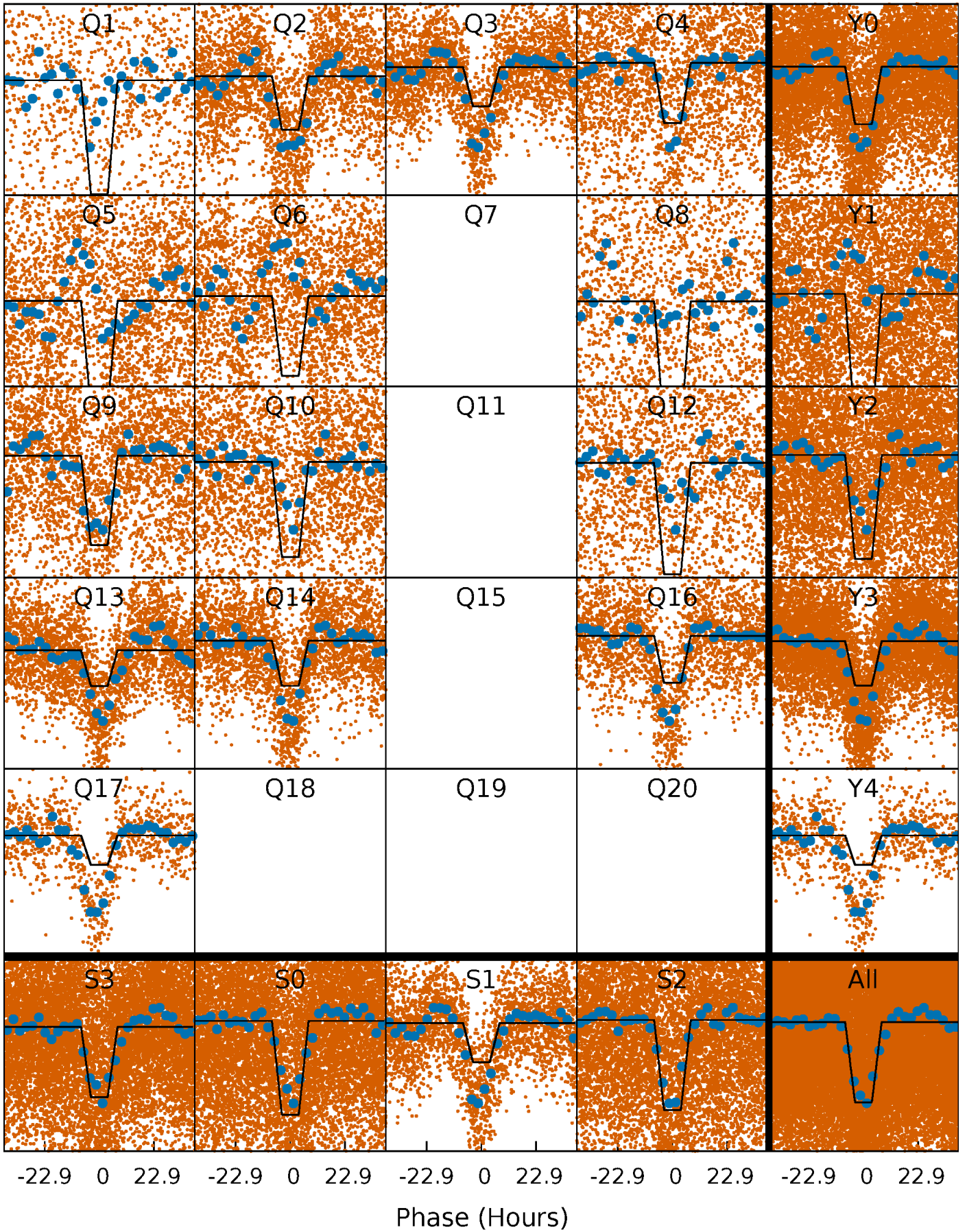
# DV Quarter-Phased Transit Curves

TCE 010618078-01 P= 4.557500 Days  $T_0=135.635039$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 010618078-01 P= 4.557151 Days  $T_0=135.589566$  (BKJD)

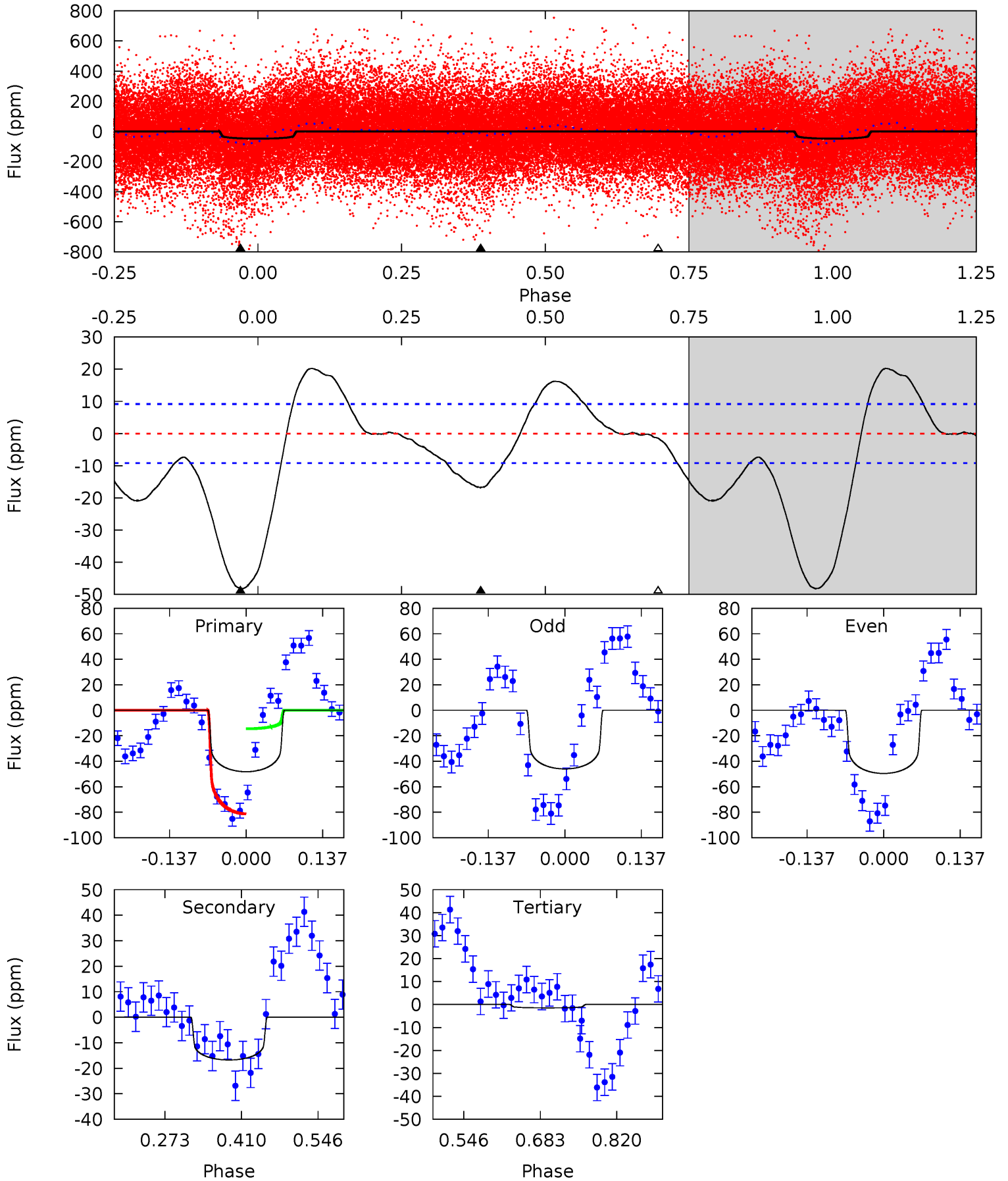




# DV Model-Shift Uniqueness Test

010618078-01, P = 4.557500 Days, E = 131.077539 Days

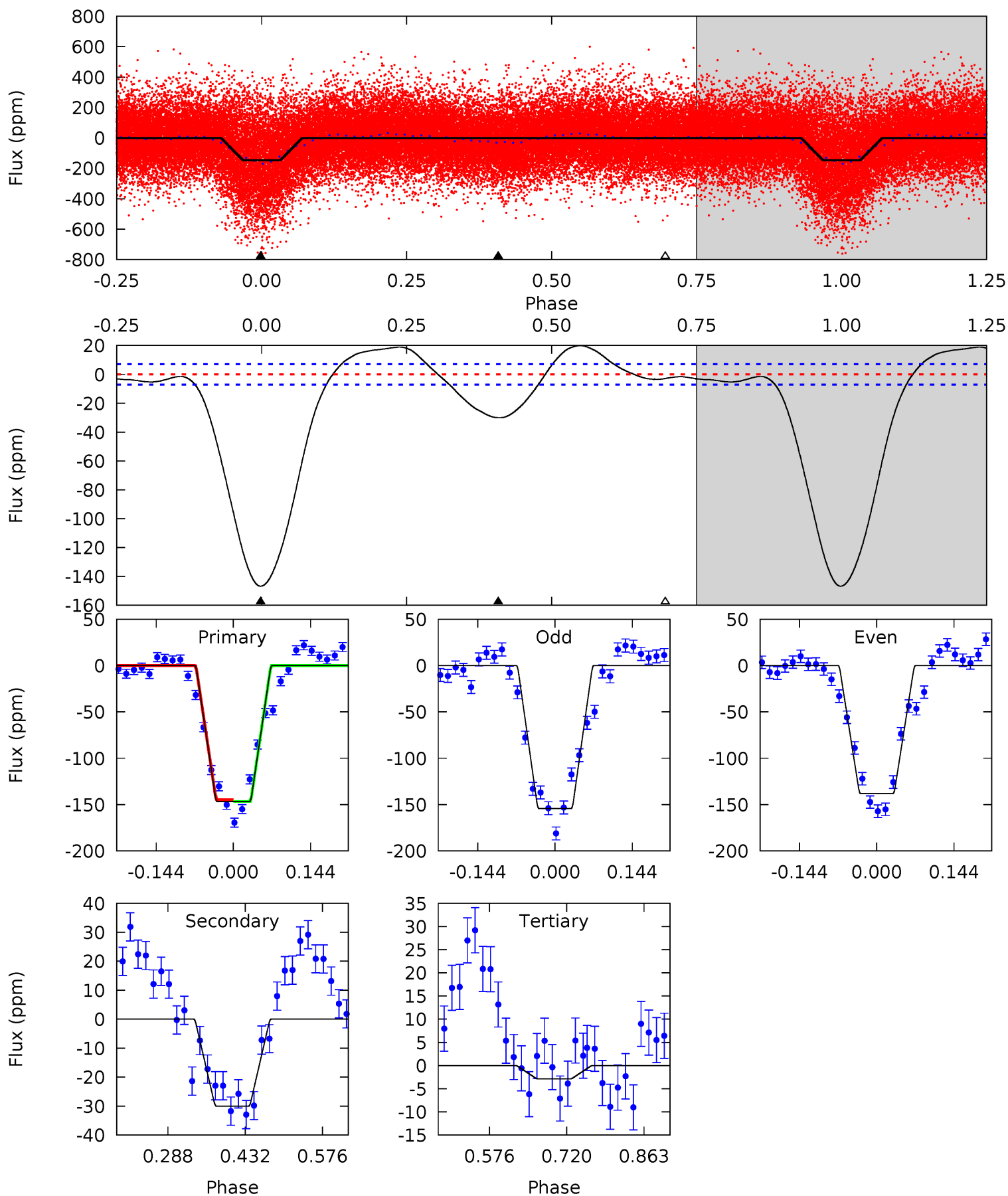
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
23.6	8.21	0.72	0	4.50	1.49	5.46	22.9	23.6	7.49	8.21	0.87	0.94	0.30	16.3



# Alt Model-Shift Uniqueness Test

010618078-01, P = 4.557151 Days, E = 131.032415 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
93.2	19.1	1.83	0	4.49	1.46	5.91	91.3	93.2	17.2	19.1	5.10	0.98	0.12	0.60



### Stellar Parameters For KIC 010618078

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6529^{+176}_{-176}$	$3.657^{+0.296}_{-0.074}$	$-0.060^{+0.300}_{-0.250}$	$3.131^{+0.482}_{-1.124}$	$1.623^{+0.218}_{-0.327}$	$0.075^{+0.154}_{-0.018}$
	+3%/-3%	+8%/-2%	+500%/-417%	+15%/-36%	+13%/-20%	+207%/-24%
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 010618078-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-17 \pm 2$	$1.66^{+0.43}_{-0.39}$	$2773^{+139}_{-259}$	$5741^{+622}_{-488}$	$14^{+9}_{-5}$
Alt.	$-30 \pm 2$	$4.15^{+0.61}_{-0.76}$	$2770^{+157}_{-234}$	$4418^{+169}_{-164}$	$3.894^{+1.596}_{-0.836}$

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



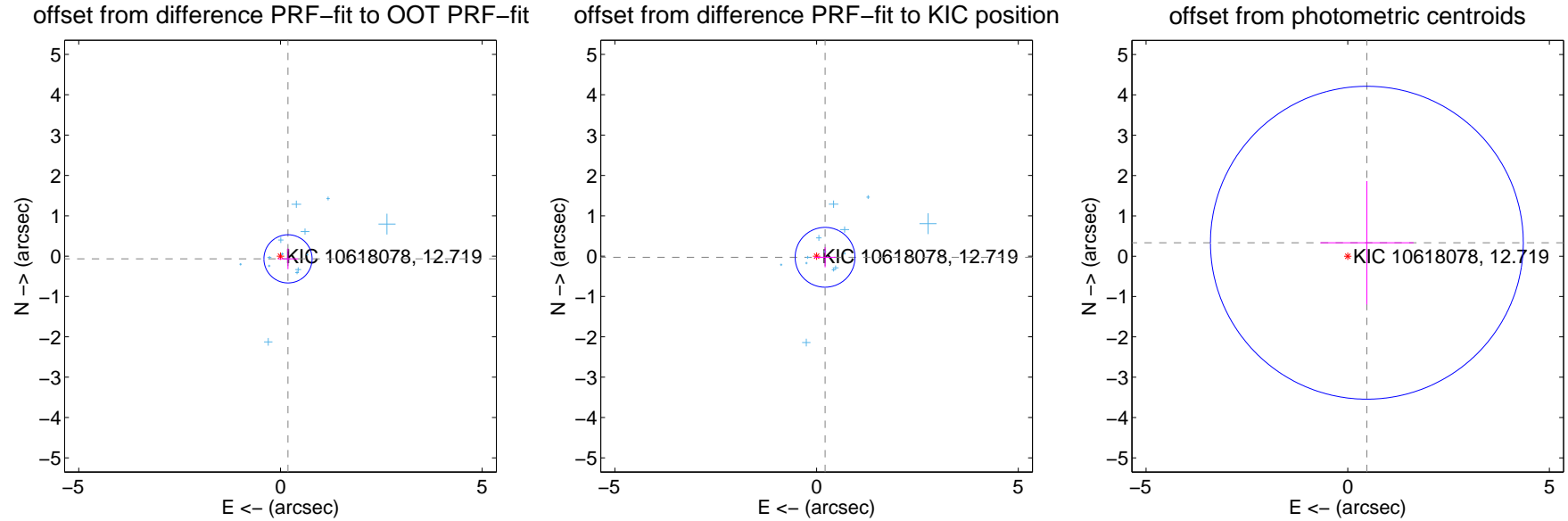
## DV Centroid Data

Supplemental centroid analysis for 010618078-01. Kepler magnitude: 12.72. Transit SNR 5.47

There are 13 quarters with good PRF difference image offsets

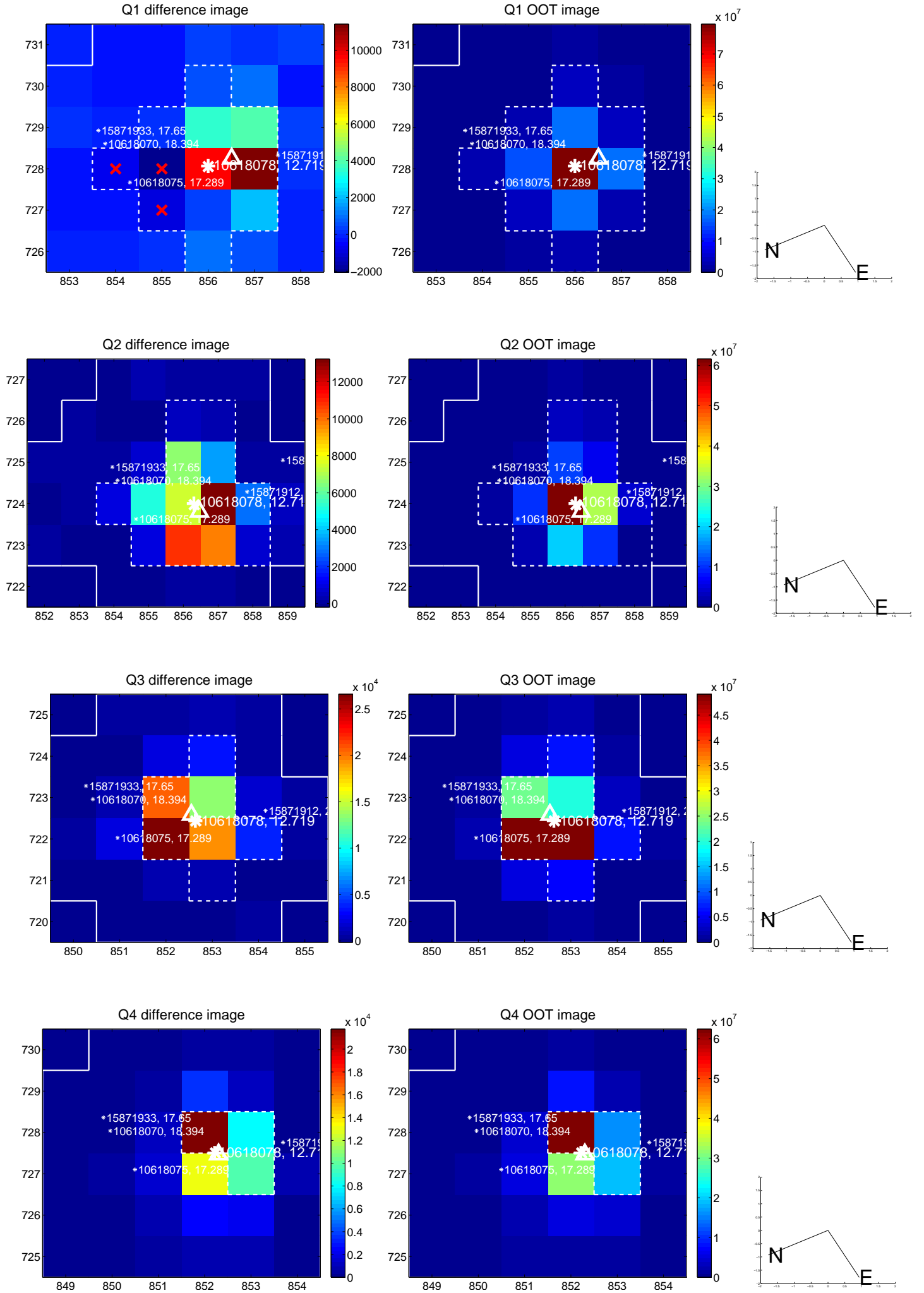
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.199 \pm 0.199$	1.00	$-0.187 \pm 0.249$	$-0.067 \pm 0.255$
PRF-fit source offset from KIC position	$0.212 \pm 0.247$	0.86	$-0.210 \pm 0.265$	$-0.029 \pm 0.248$
photometric centroid source offset	$0.58 \pm 1.29$	0.45	$-0.47 \pm 1.16$	$0.33 \pm 1.53$

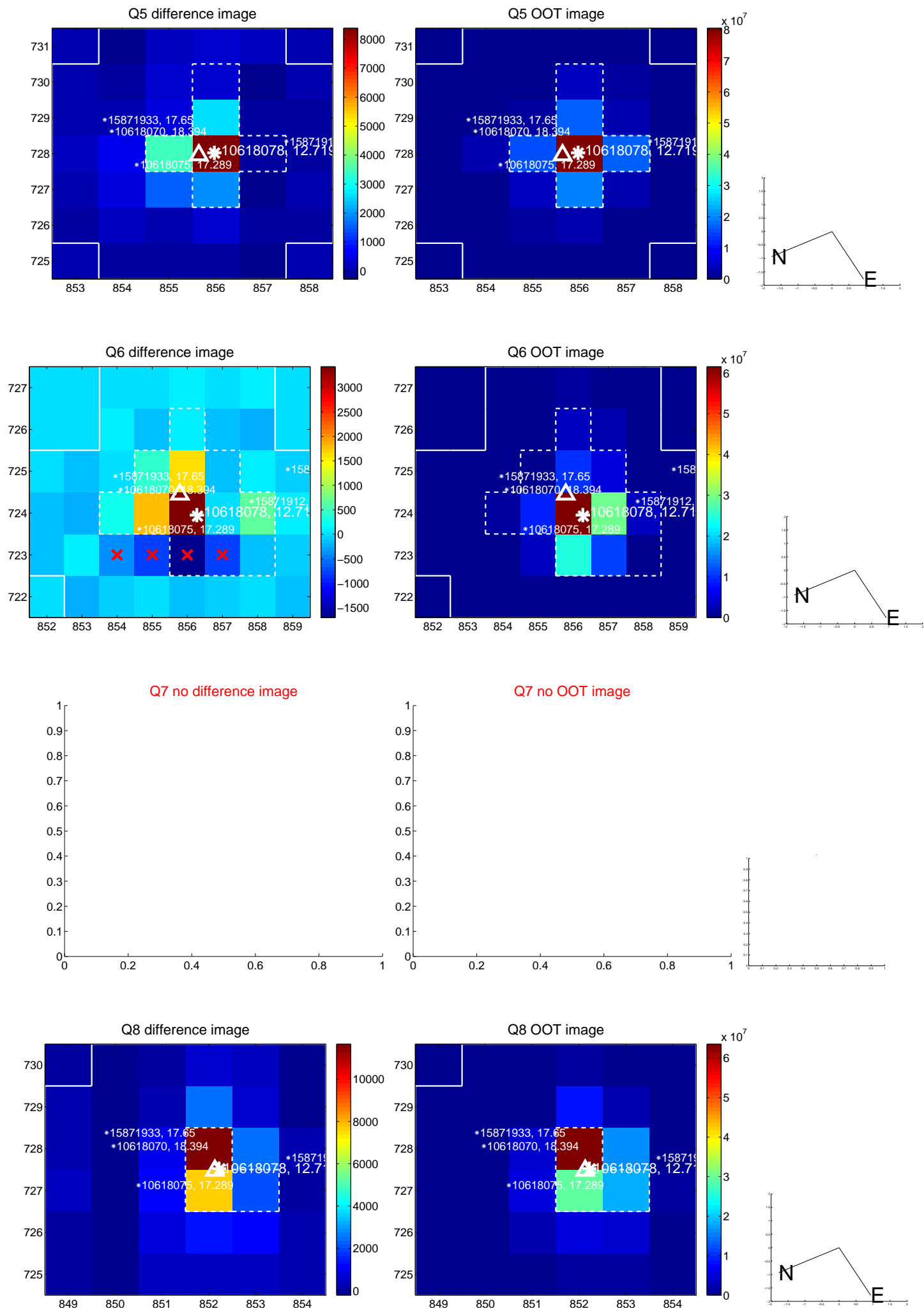


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

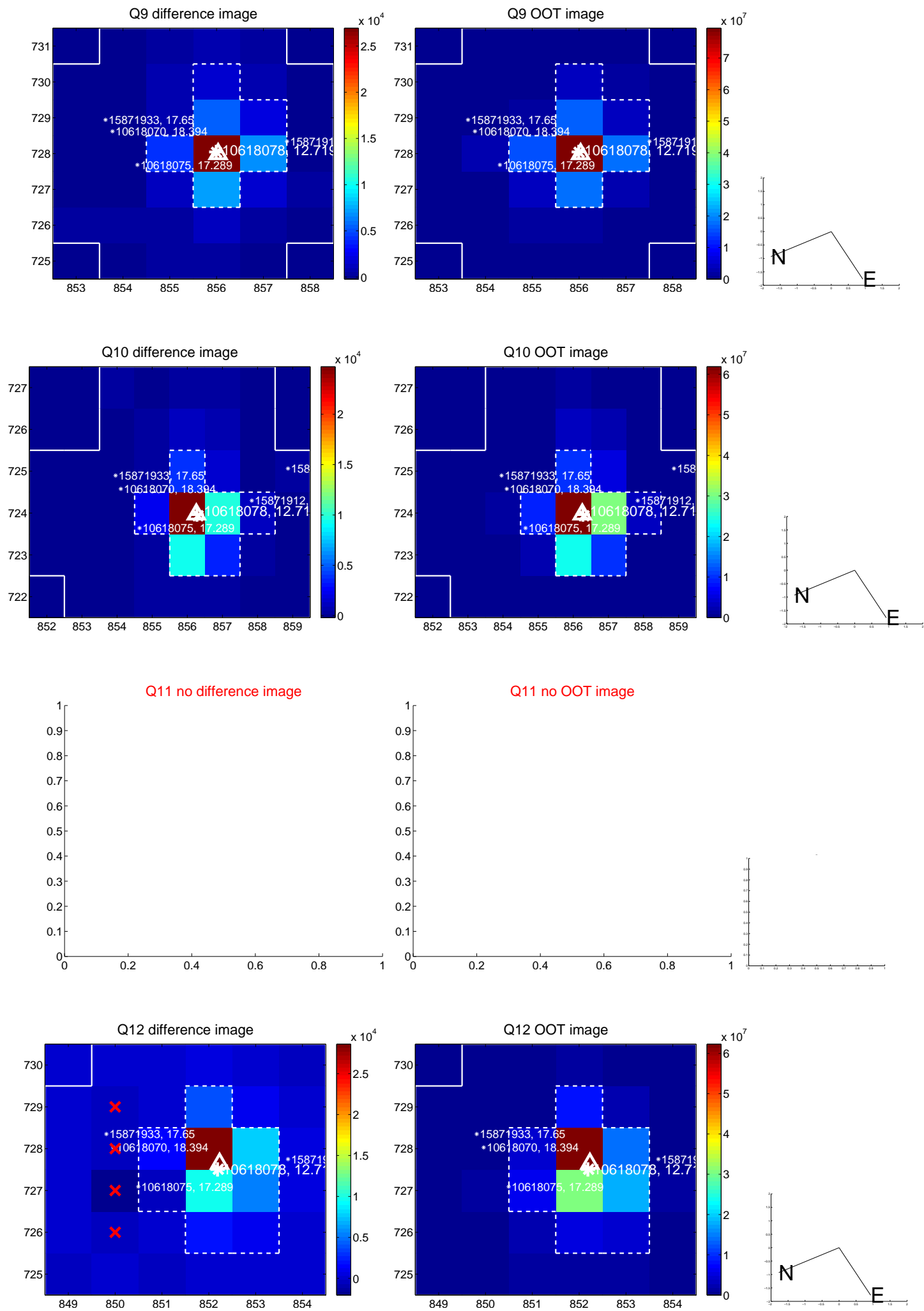
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



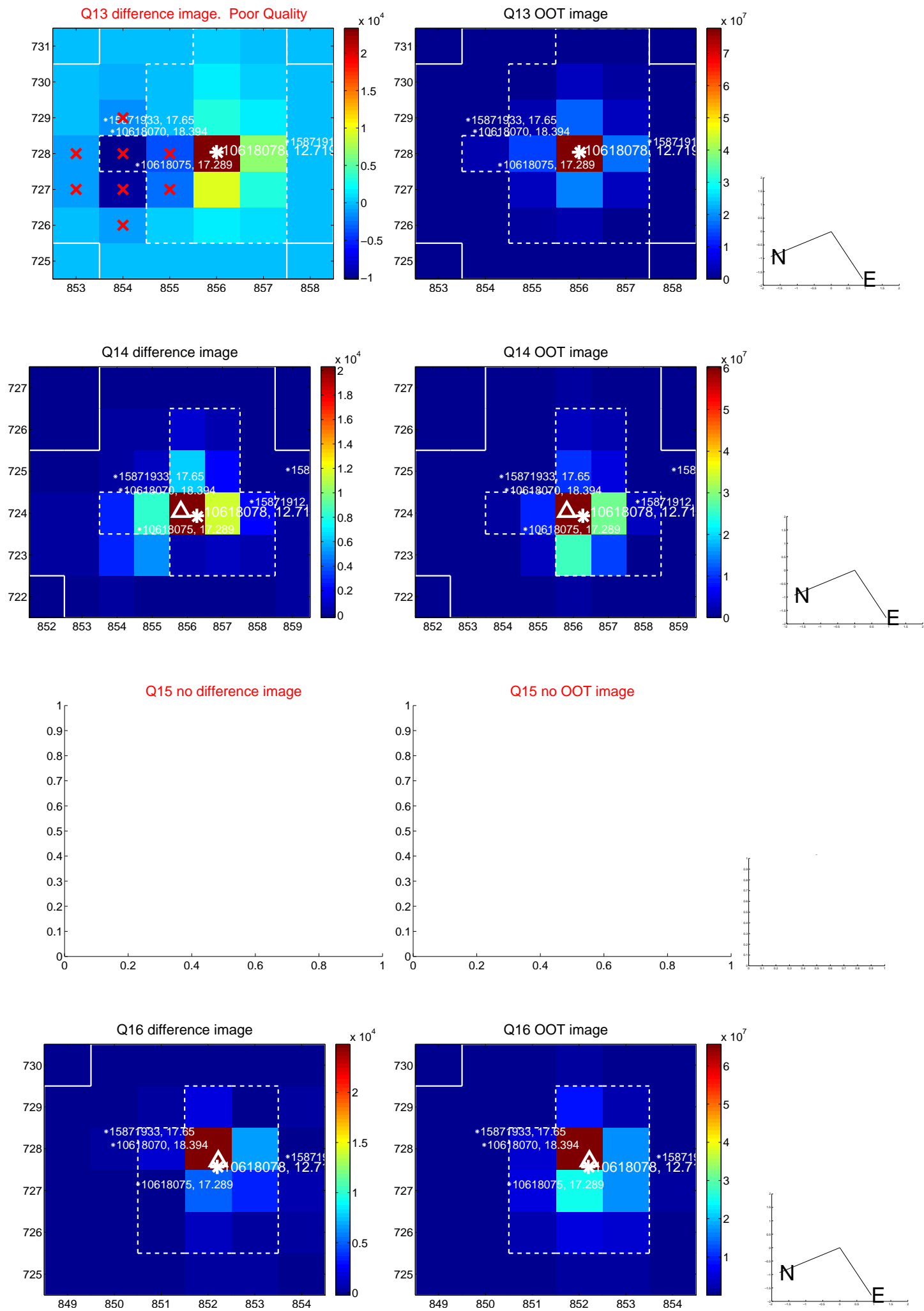
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

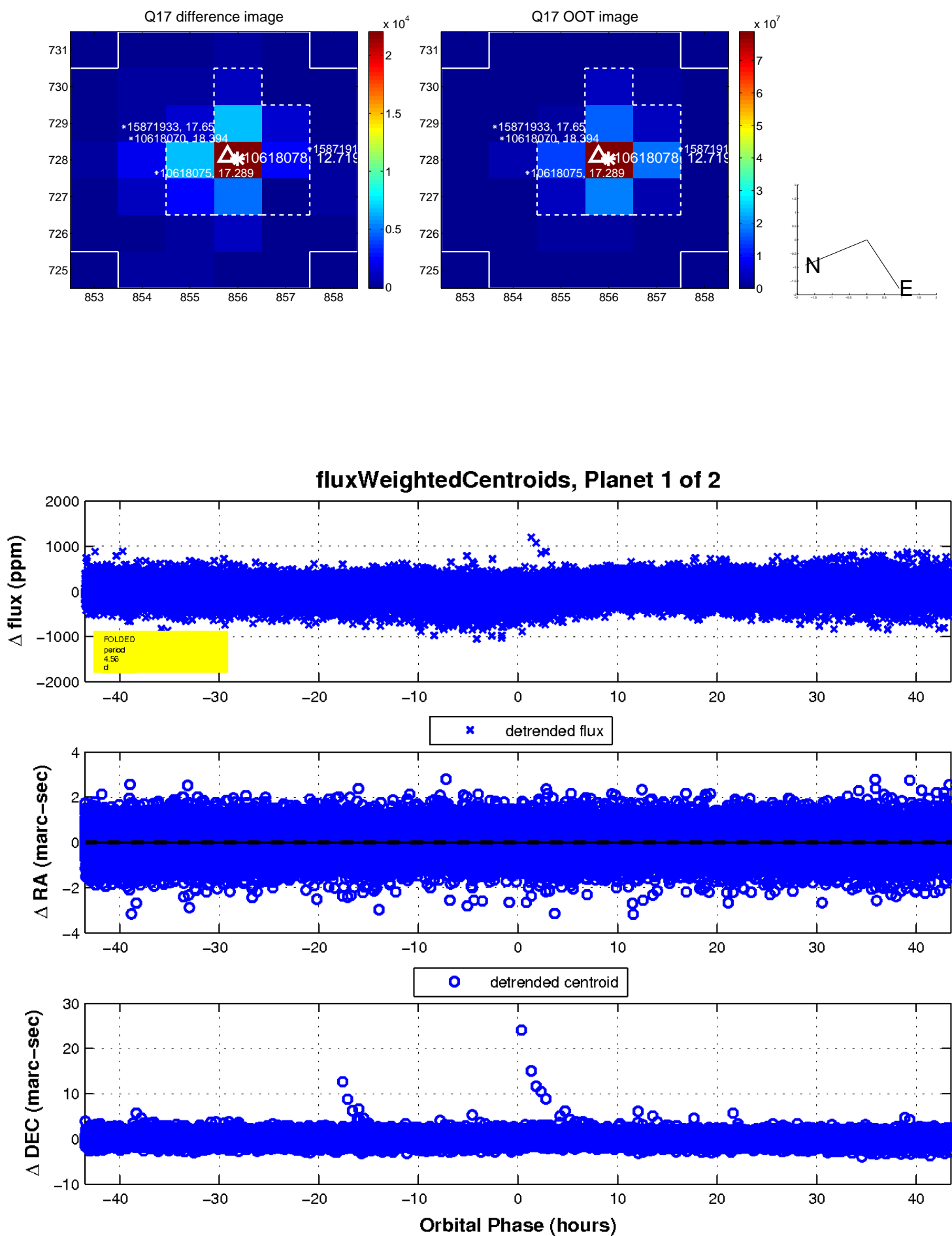


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



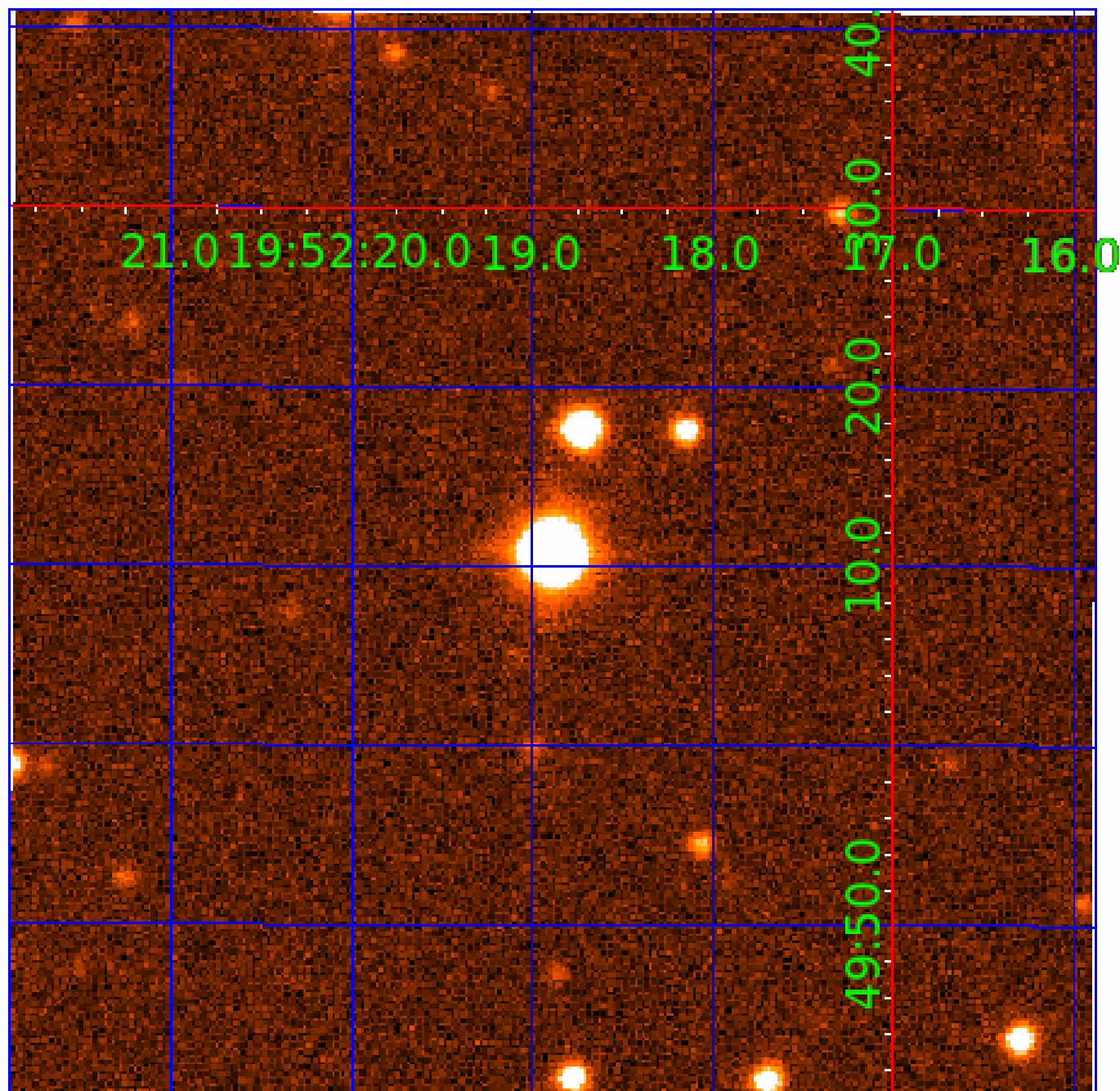


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010618078

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010618078-01	OBS	No	4.557500	135.635039	24.4	14.501	8.1	5.5	3.13	6529	1.80	3991.18
010618078-02	OBS	No	459.538935	426.316227	345.0	3.332	7.3	7.1	3.13	6529	6.58	8.50

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010618078-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV
010618078-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_SKYE—MOD_NONUNIQ_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

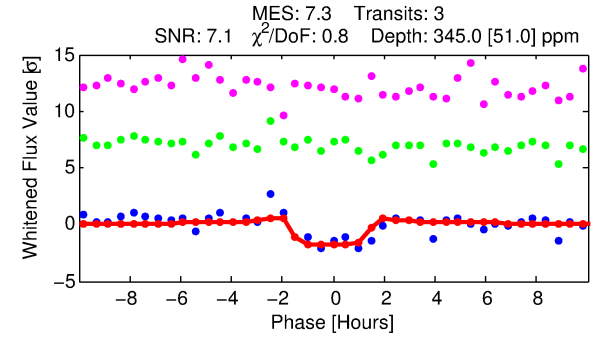
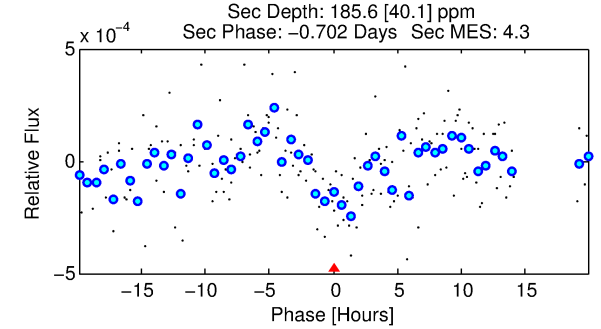
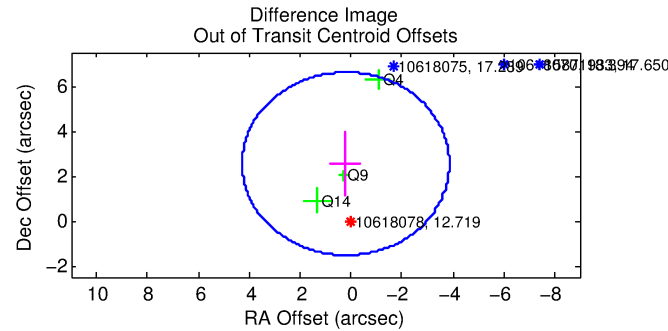
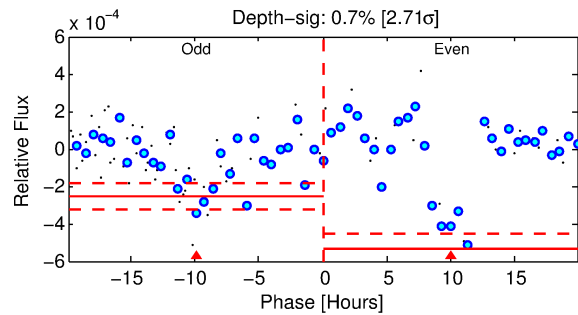
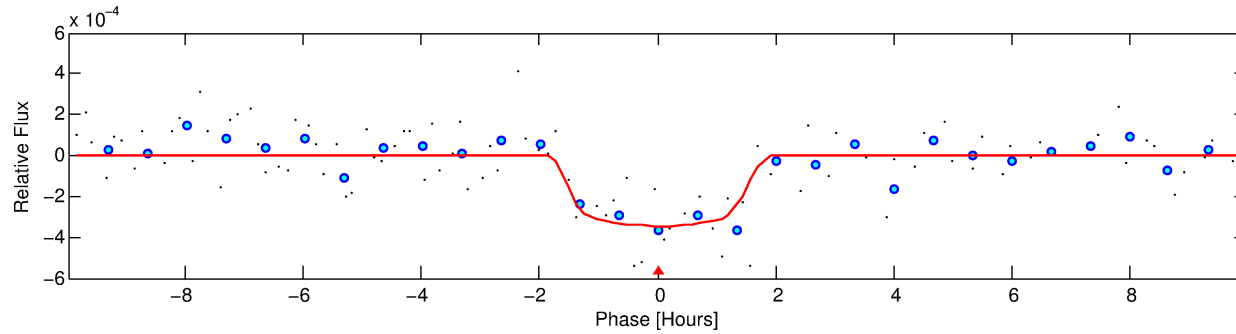
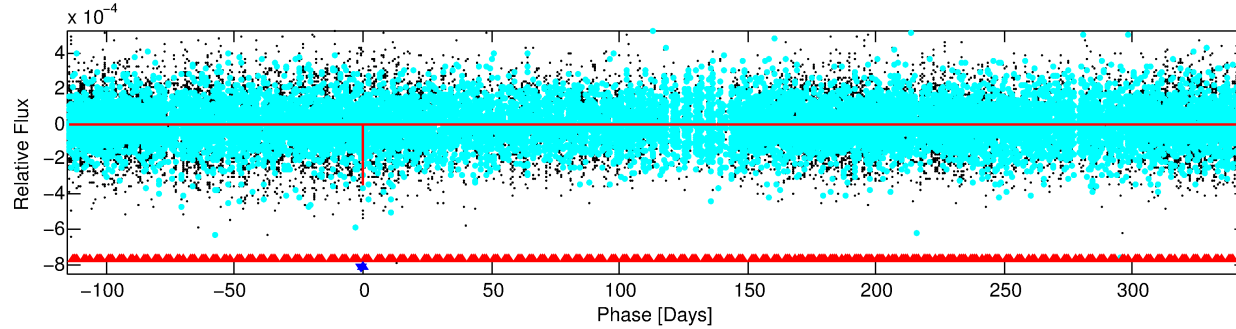
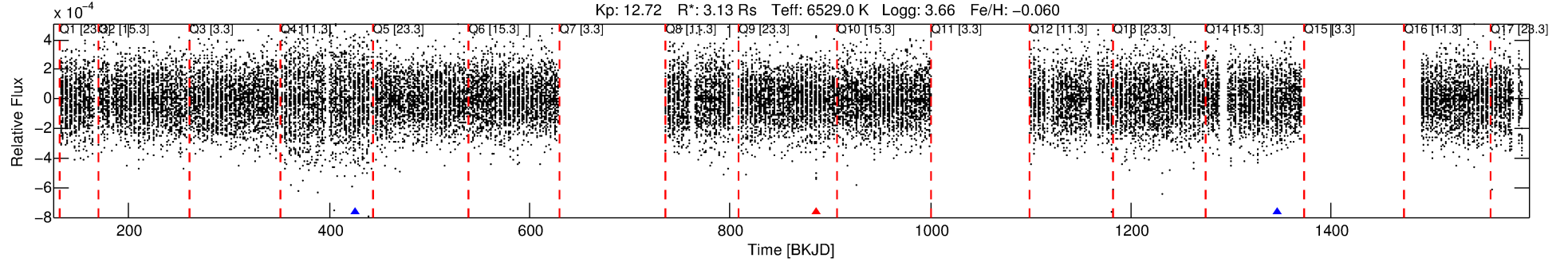
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010618078-02

No Significant Match Found

# DV One-Page Summary

KIC: 10618078 Candidate: 2 of 2 Period: 459.539 d



## DV Fit Results:

Period = 459.53893 [0.00503] d  
Epoch = 426.3162 [0.0075] BKJD  
Rp/R\* = 0.0193 [0.0135]  
a/R\* = 592.25 [2314.03]  
b = 0.85 [1.29]  
Seff = 8.50 [4.46]  
Teq = 435 [57] K  
Rp = 6.58 [5.18] Re  
a = 1.3699 [0.4521] AU  
Ag = 4430.56 [6677.94] [0.66 $\sigma$ ]  
Teffp = 5493 [1952] K [2.59 $\sigma$ ]

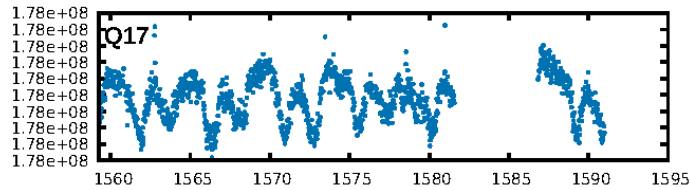
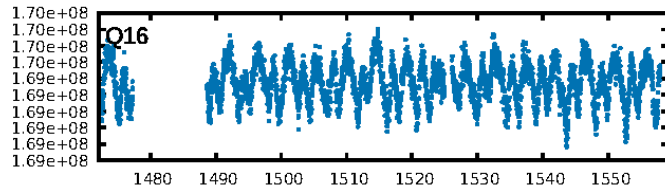
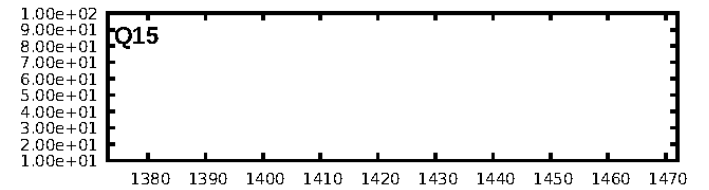
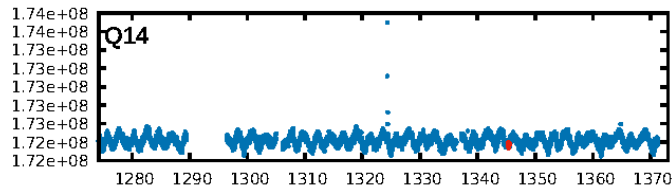
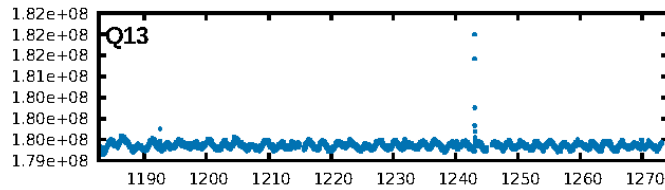
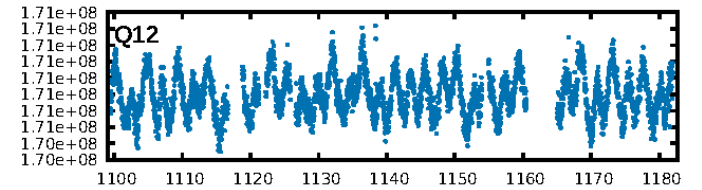
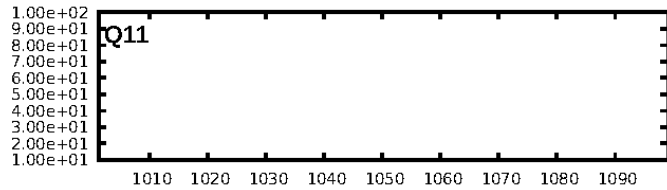
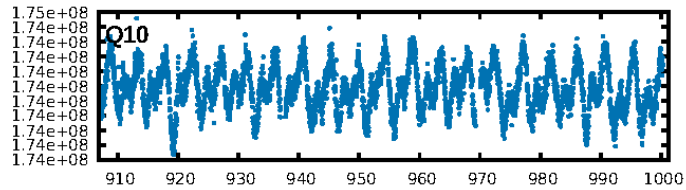
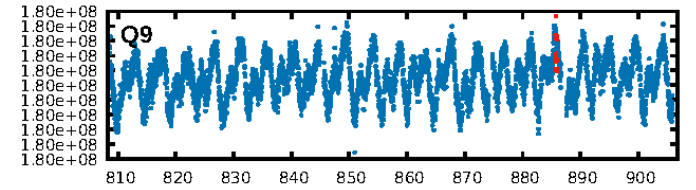
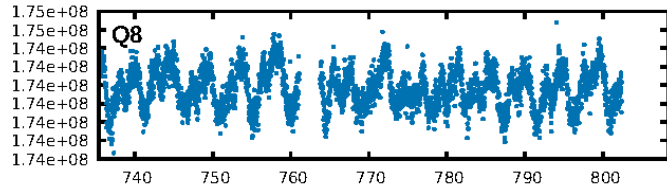
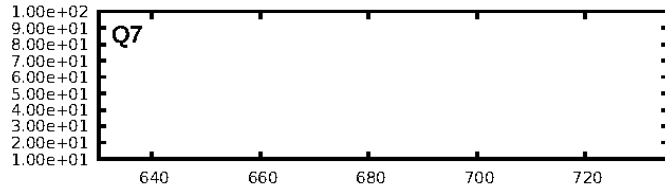
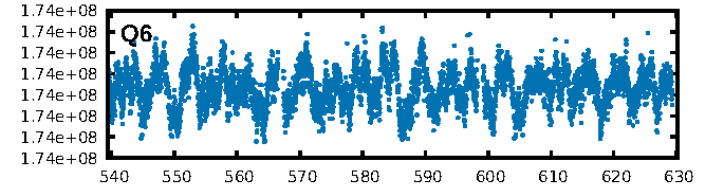
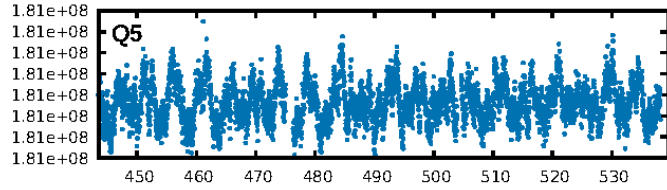
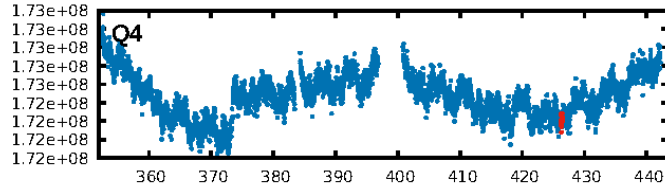
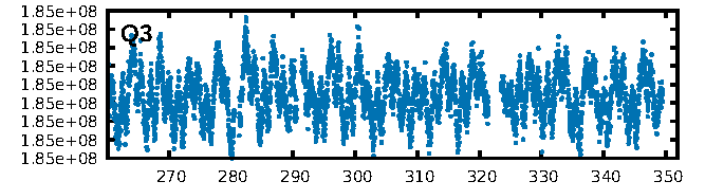
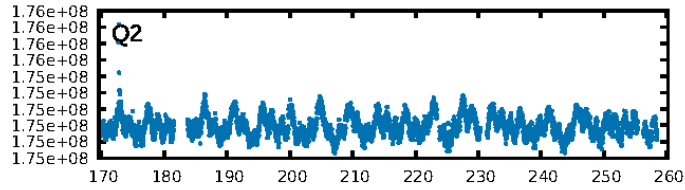
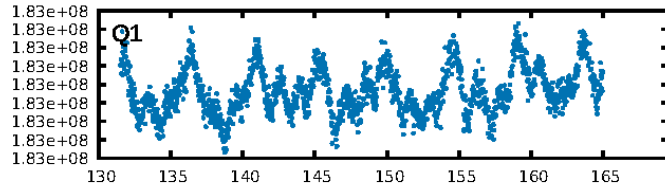
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [733.91 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 44.5%  
ModelChiSquareGof-sig: 98.5%  
Bootstrap-pfa: 1.48e-09  
RollingBand-fgt: 0.67 [2/3]  
GhostDiagnostic-chr: 5.742  
Centroid-sig: N/A  
Centroid-so: 2.514 arcsec [2.42 $\sigma$ ]  
OotOffset-rm: 2.548 arcsec [1.88 $\sigma$ ]  
KicOffset-rm: 2.546 arcsec [1.56 $\sigma$ ]  
OotOffset-st: 1/0/1/1 [3]  
KicOffset-st: 1/0/1/1 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:50:04 Z

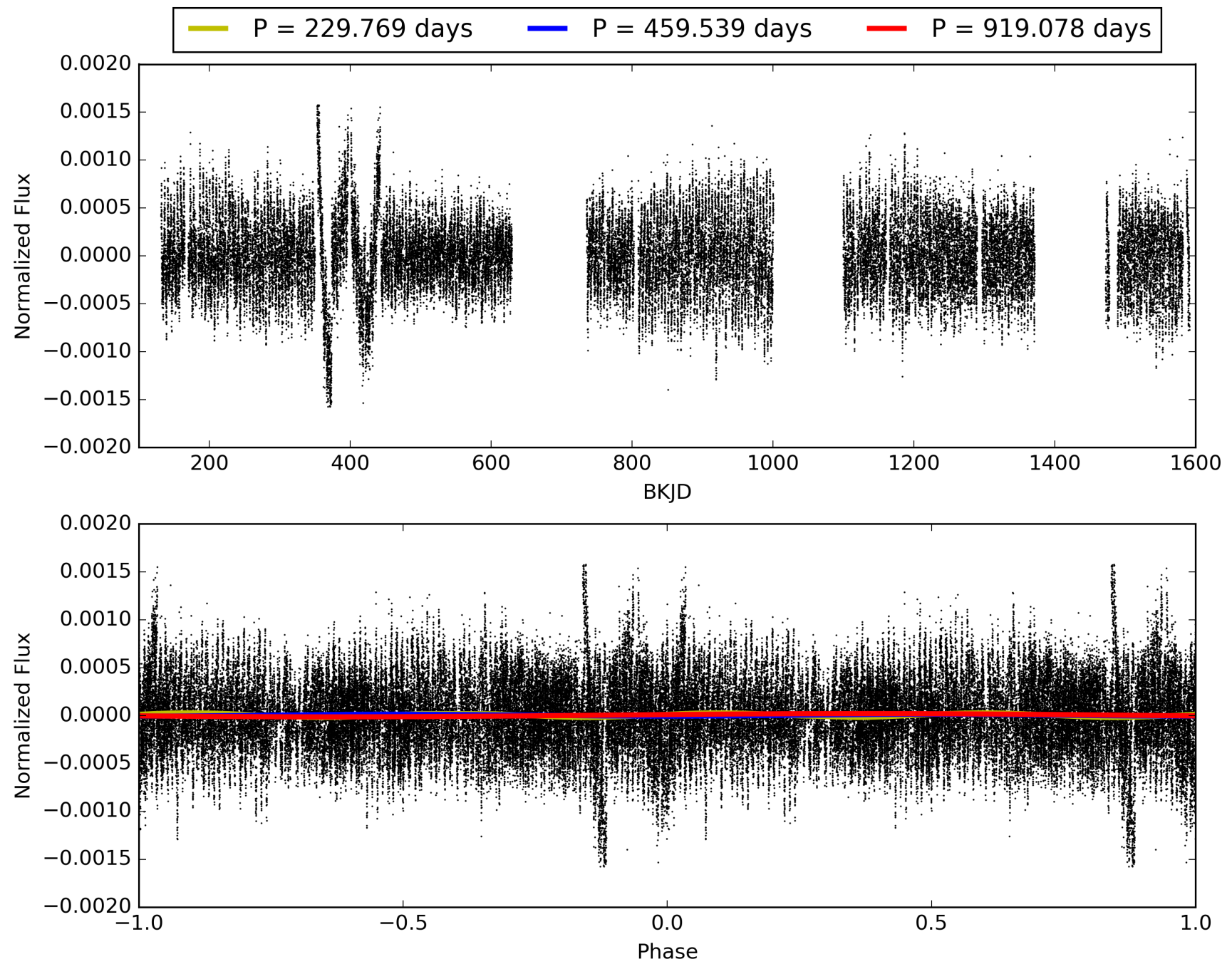
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

## TCE 010618078-02, PDC Light Curves



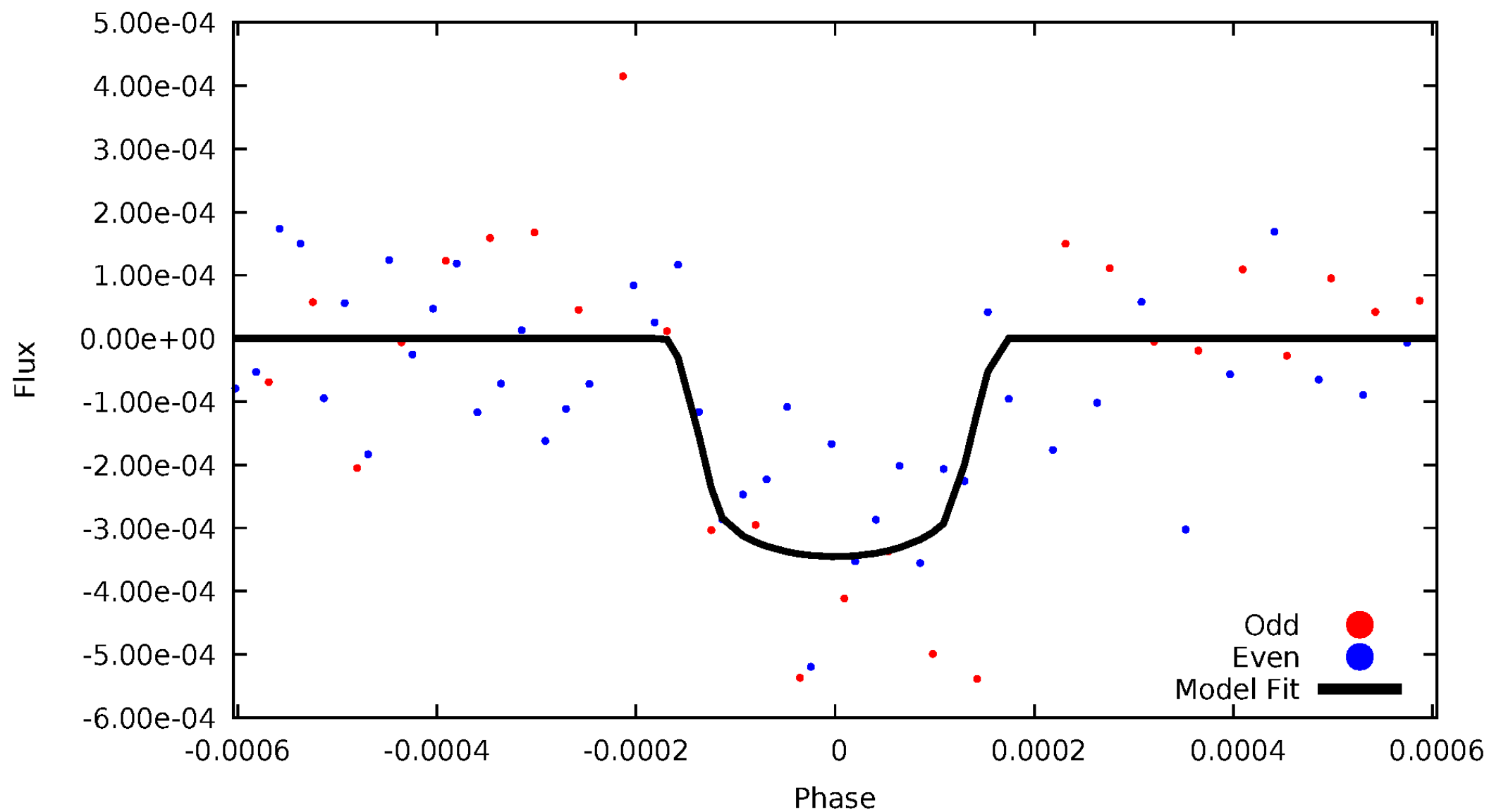


# TCE 010618078-02



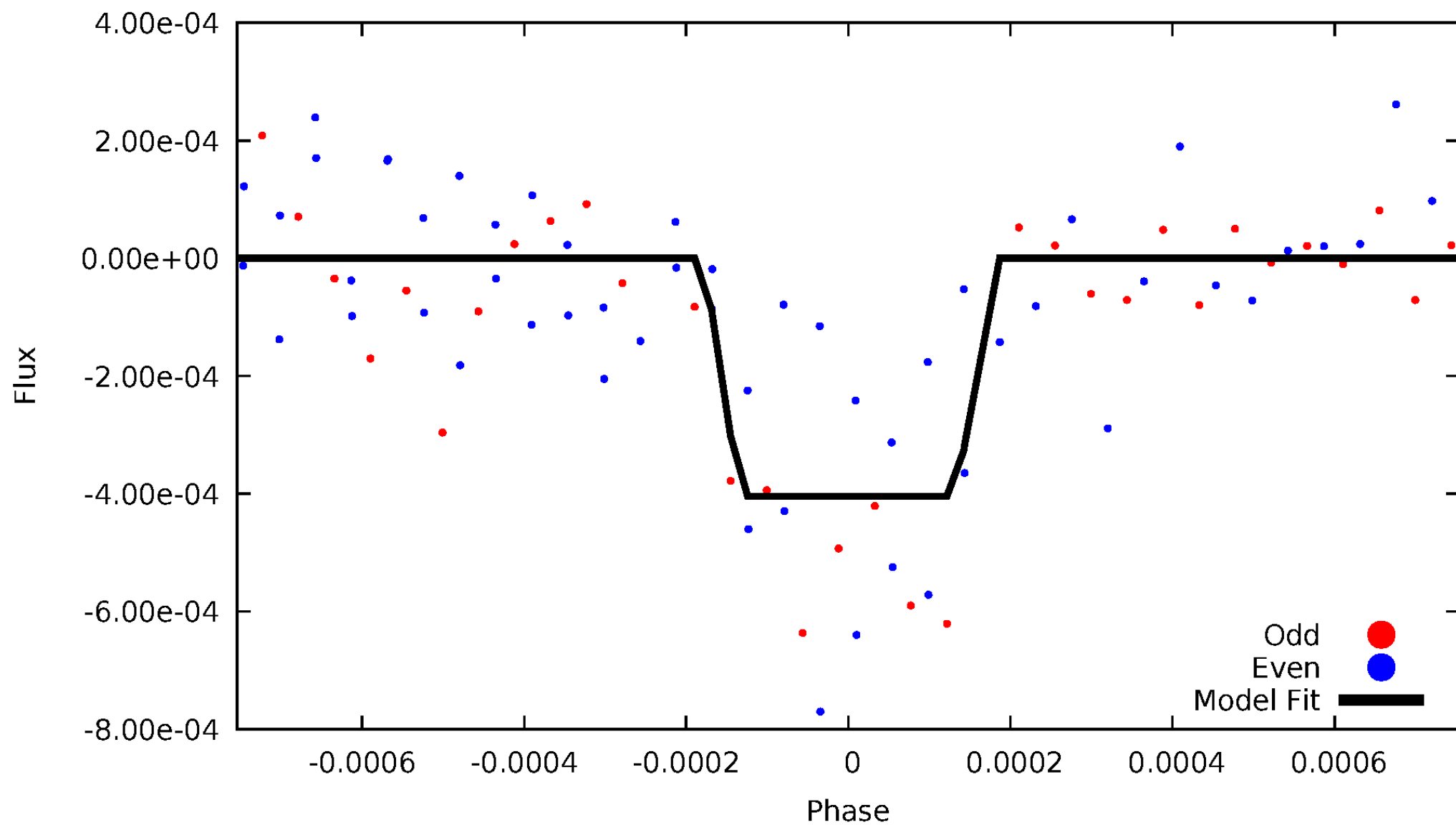
# DV Odd/Even

TCE 010618078-02



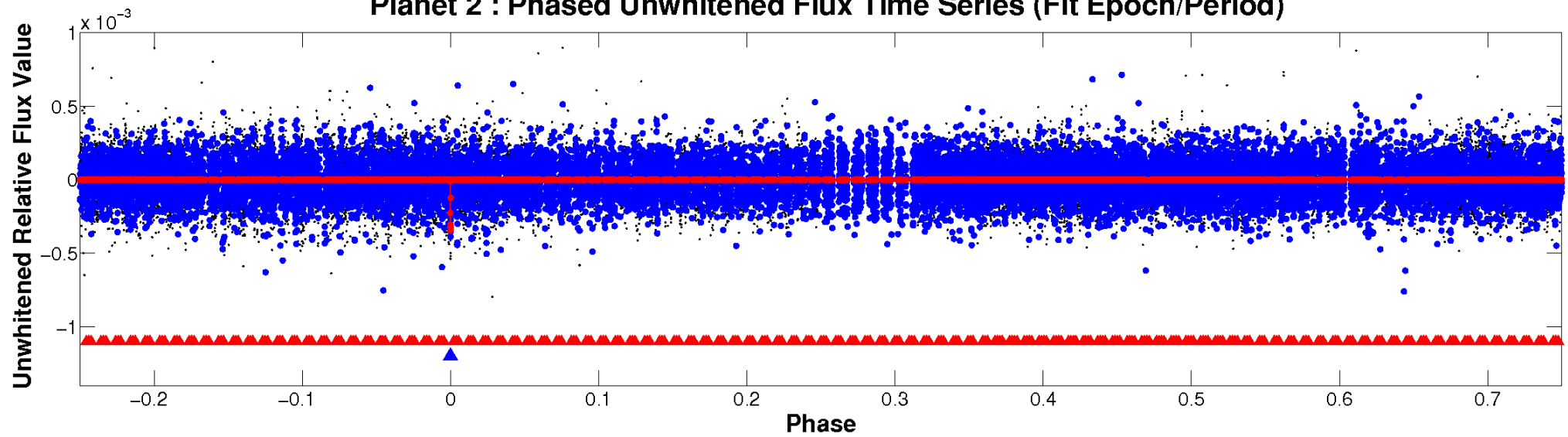
# ALT Odd/Even

TCE 010618078-02

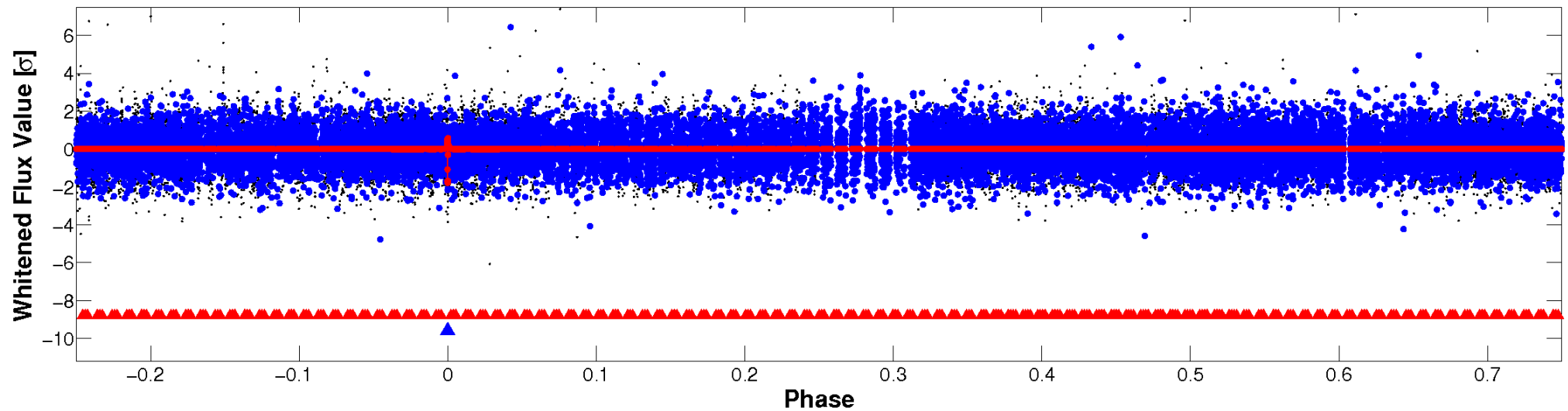


# Non-Whitened Vs. Whitened Light Curve

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

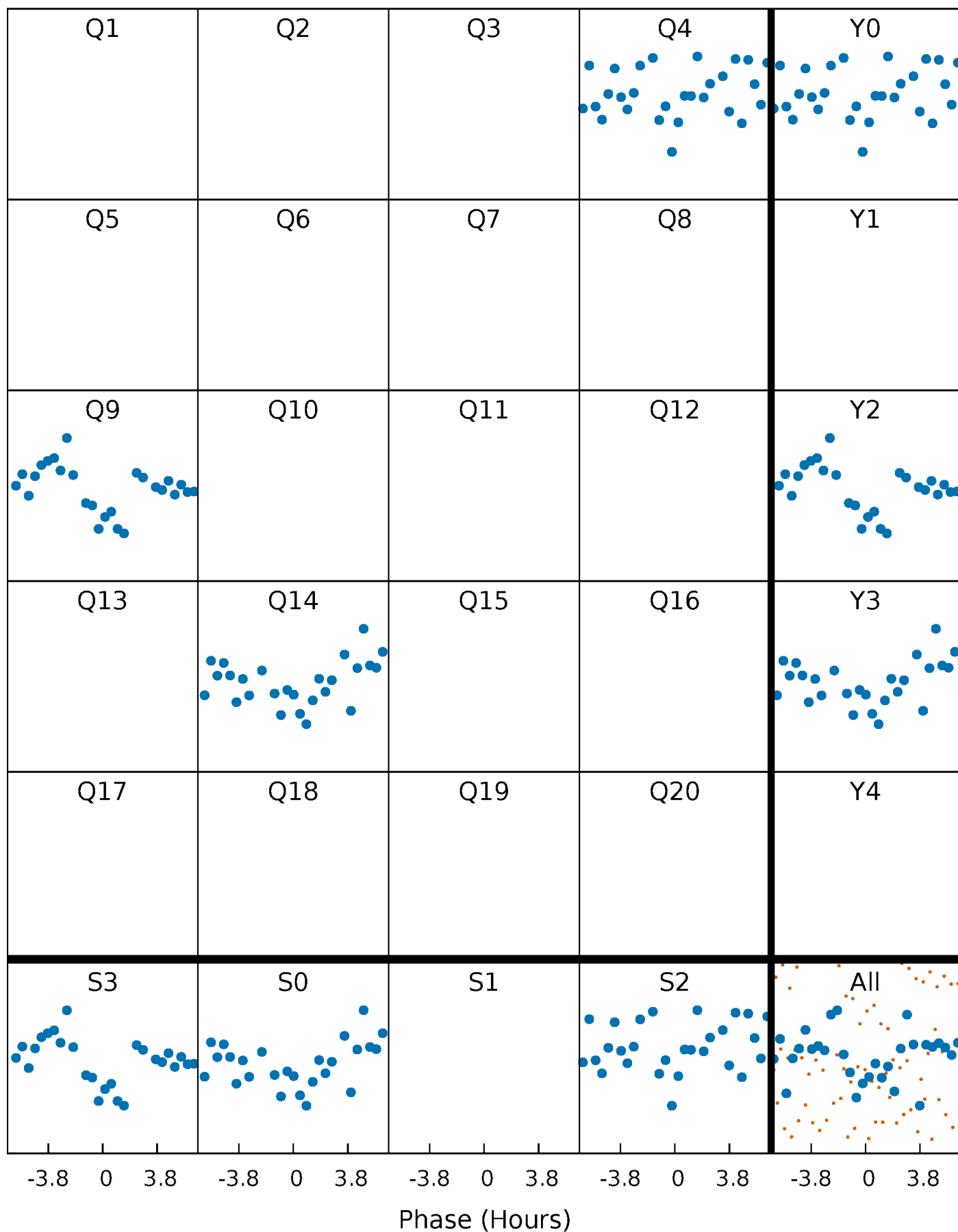


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

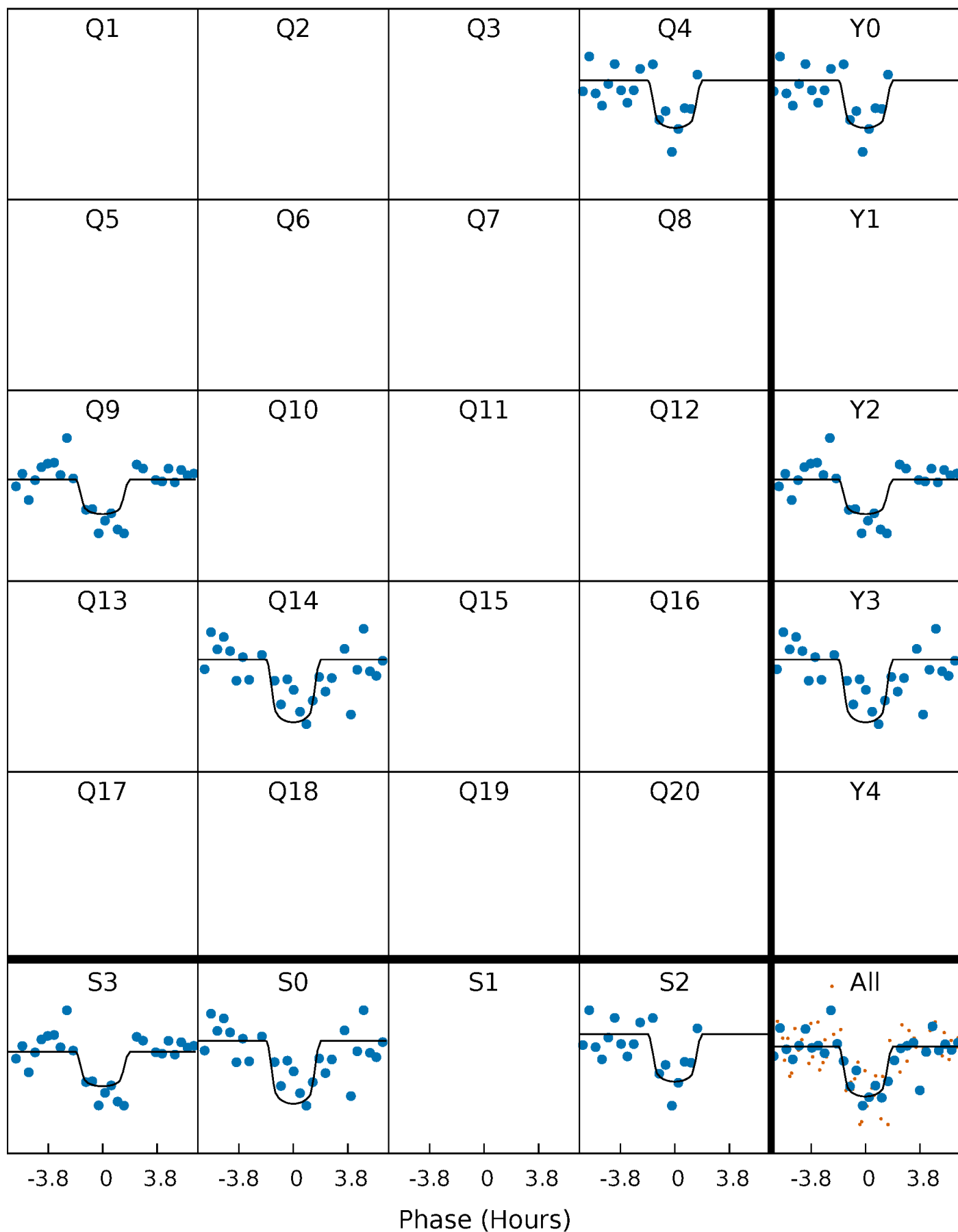
TCE 010618078-02 P=459.538935 Days  $T_0=426.316227$  (BKJD)





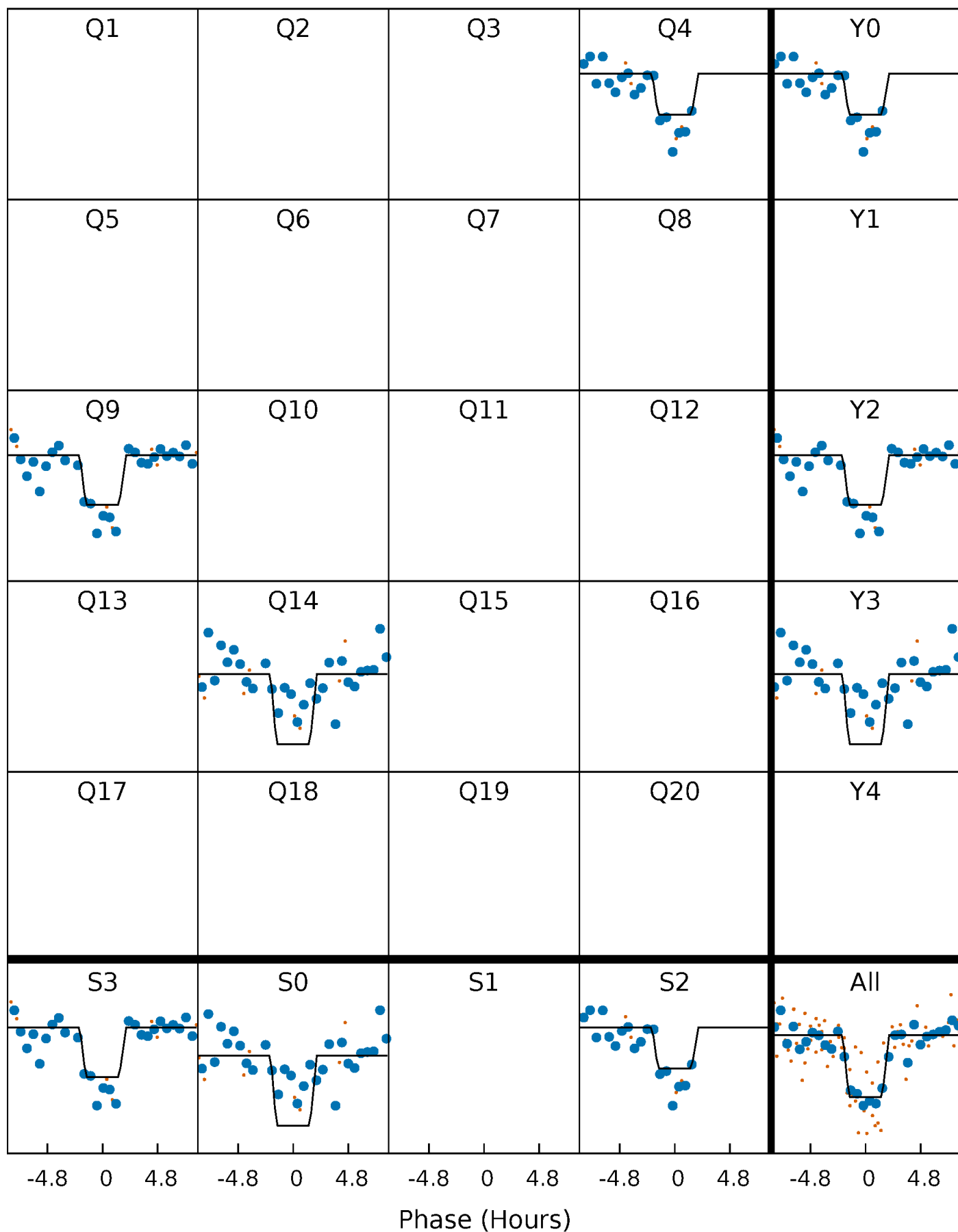
# DV Quarter-Phased Transit Curves

TCE 010618078-02     $P=459.538935$  Days     $T_0=426.316227$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

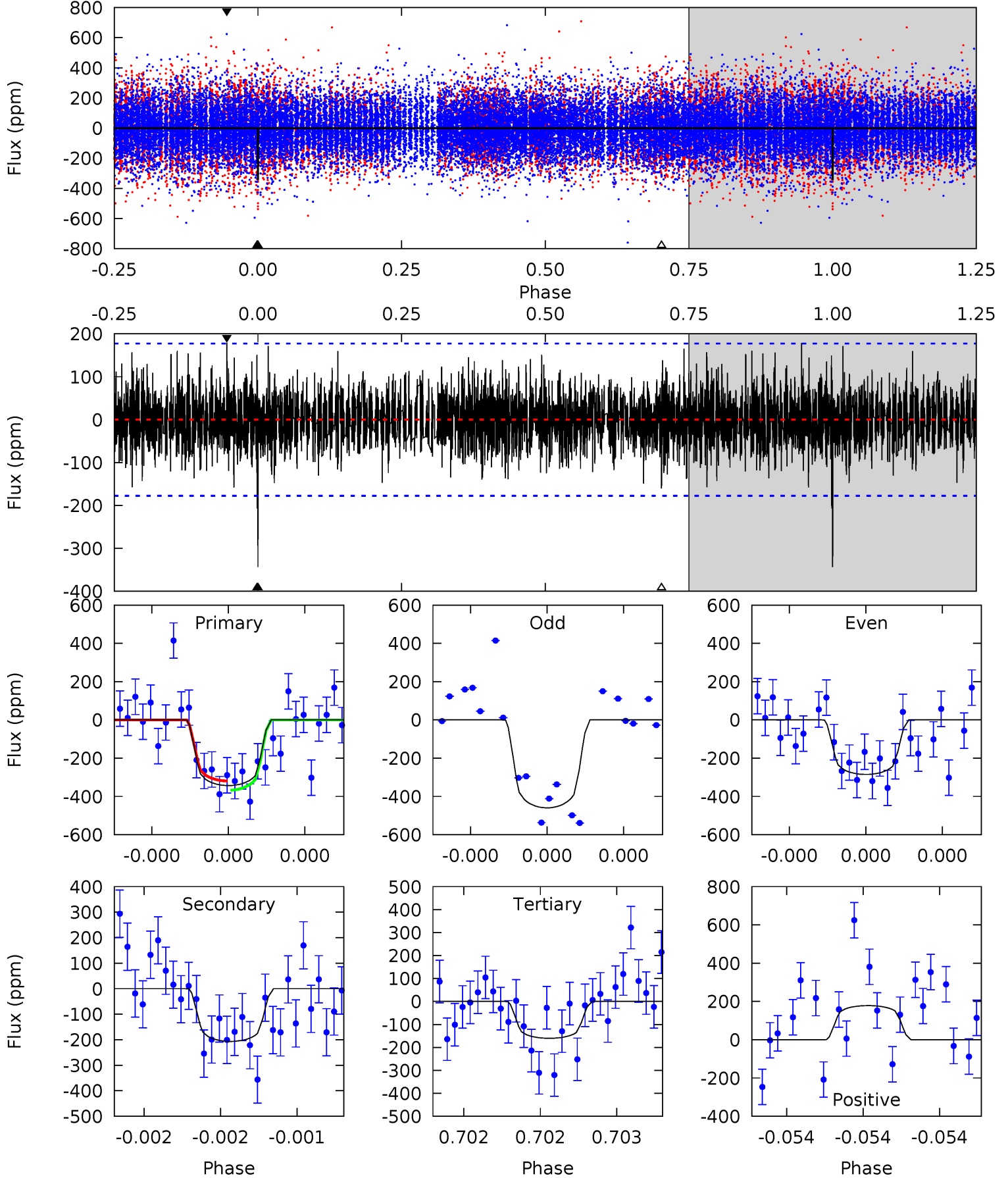
TCE 010618078-02 P=459.543953 Days  $T_0=426.320831$  (BKJD)



# DV Model-Shift Uniqueness Test

010618078-02, P = 459.538935 Days, E = 426.316227 Days

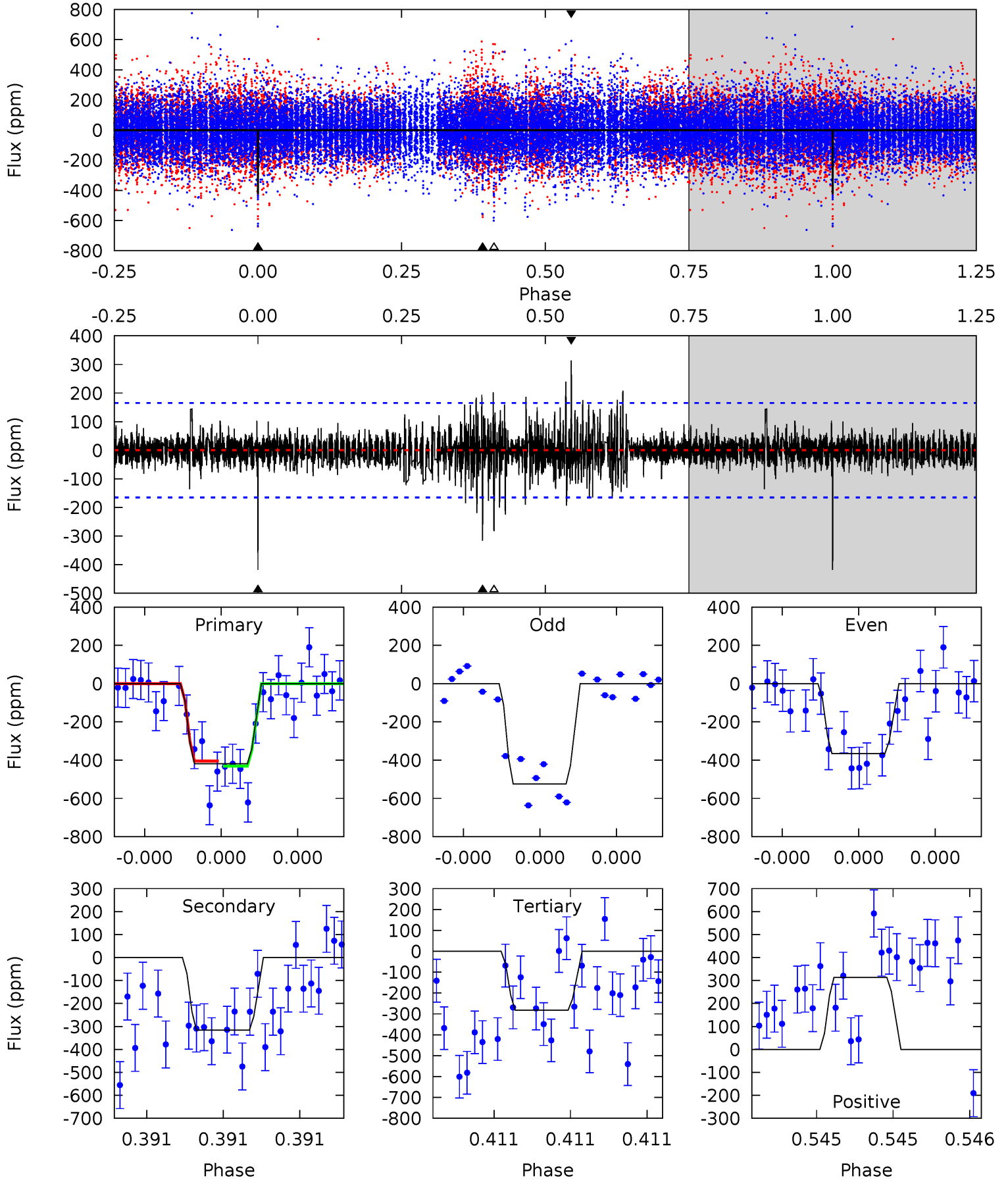
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.0	6.60	5.12	5.69	5.66	3.61	1.51	5.84	5.27	1.48	0.90	2.70	1.08	0.34	0.77



# Alt Model-Shift Uniqueness Test

010618078-02, P = 459.543953 Days, E = 426.320831 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
14.3	10.8	9.63	10.7	5.63	3.57	1.48	4.63	3.58	1.16	0.11	2.53	0.80	0.43	0.45



### Stellar Parameters For KIC 010618078

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6529^{+176}_{-176}$	$3.657^{+0.296}_{-0.074}$	$-0.060^{+0.300}_{-0.250}$	$3.131^{+0.482}_{-1.124}$	$1.623^{+0.218}_{-0.327}$	$0.075^{+0.154}_{-0.018}$
	+3%/-3%	+8%/-2%	+500%/-417%	+15%/-36%	+13%/-20%	+207%/-24%
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 010618078-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-207 \pm 31$	$6.68^{+4.57}_{-3.93}$	$595^{+31}_{-51}$	$5413^{+3119}_{-995}$	$4784^{+21834}_{-3062}$
Alt.	$-316 \pm 29$	$6.63^{+4.66}_{-3.78}$	$595^{+33}_{-52}$	$5943^{+3935}_{-1154}$	$7457^{+32482}_{-4905}$

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

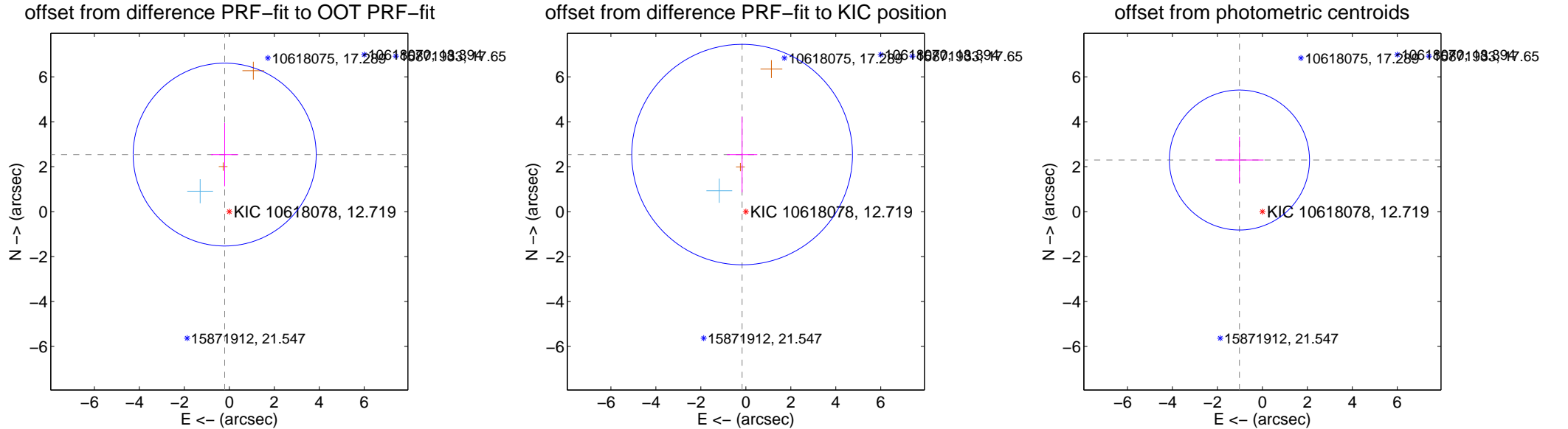
## DV Centroid Data

Supplemental centroid analysis for 010618078-02. Kepler magnitude: 12.72. Transit SNR 7.12

There are 1 quarters with good PRF difference image offsets

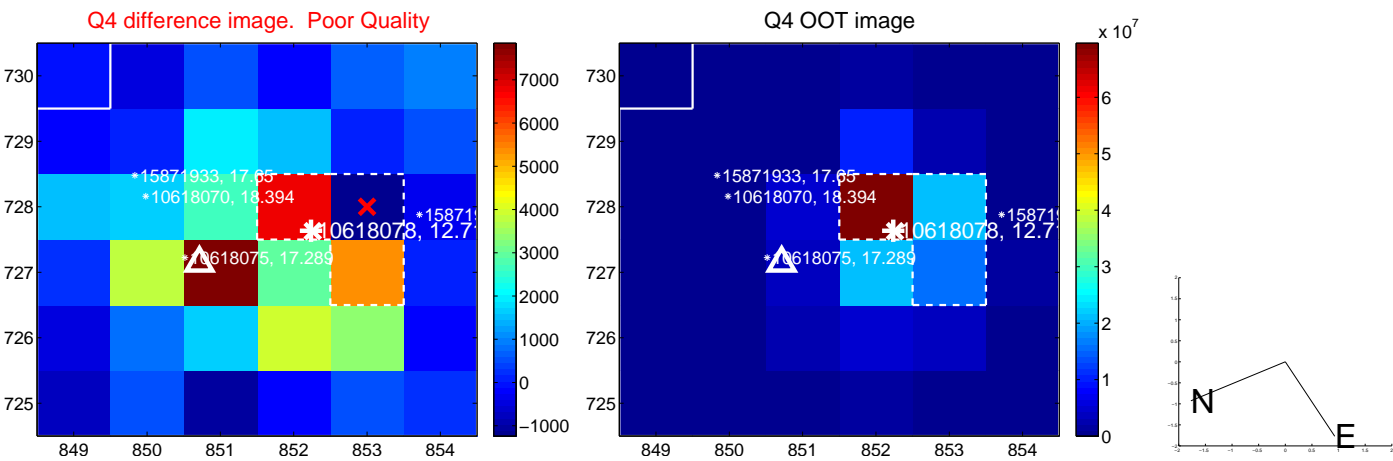
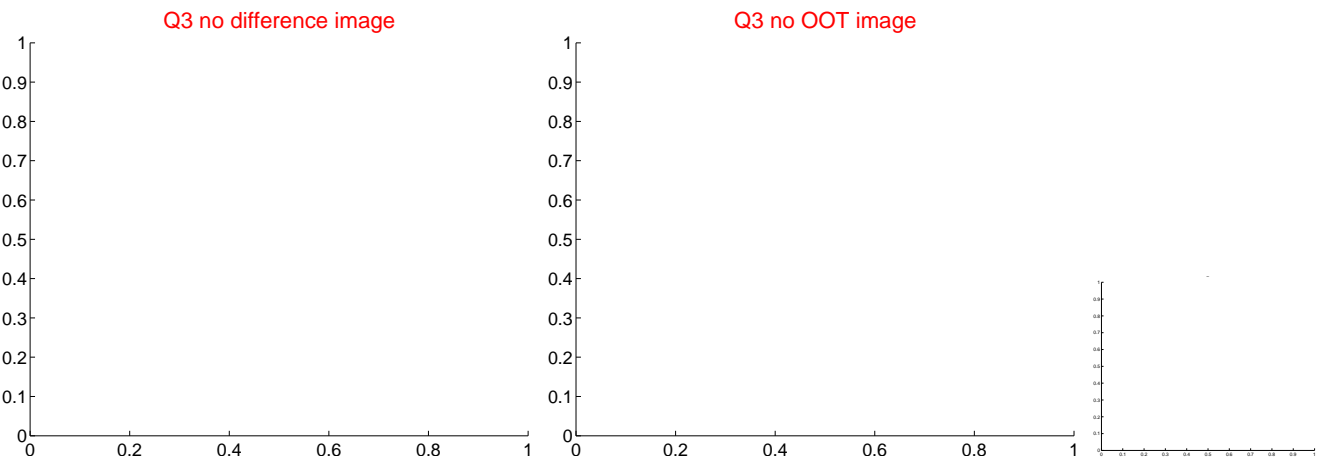
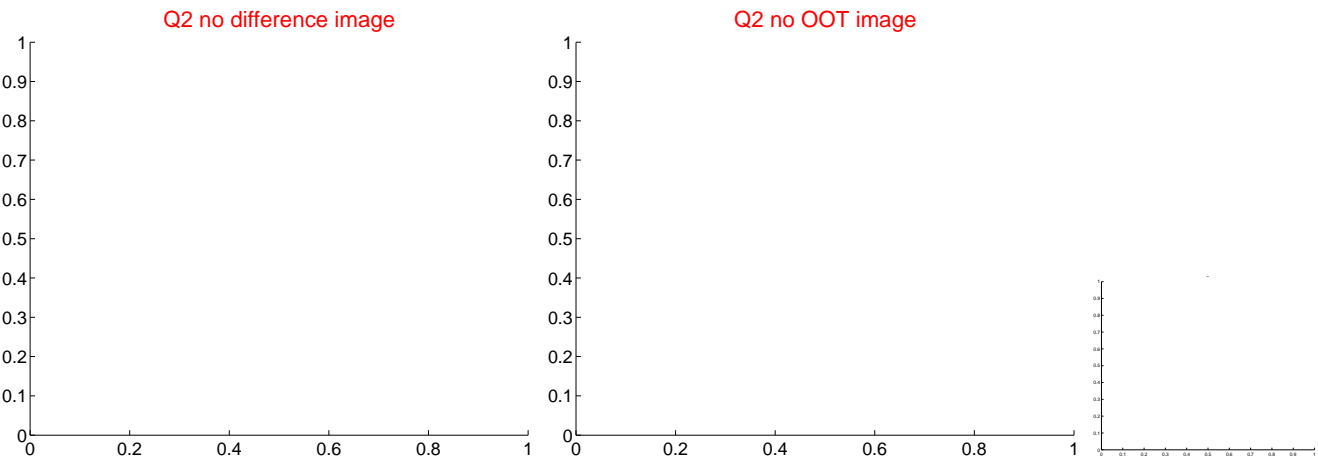
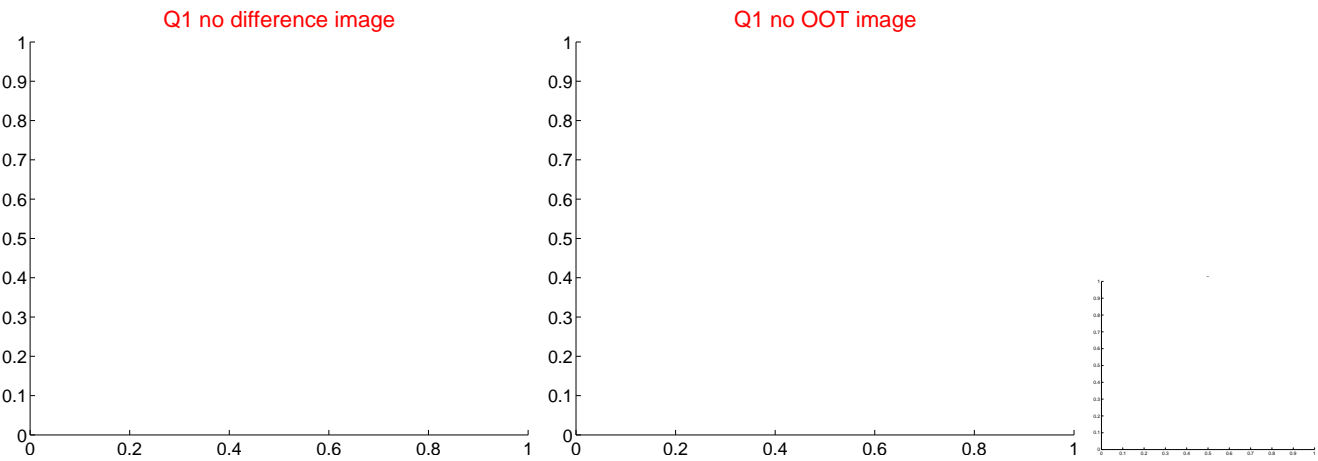
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.548 \pm 1.357$	1.88	$0.205 \pm 0.599$	$2.540 \pm 1.409$
PRF-fit source offset from KIC position	$2.546 \pm 1.636$	1.56	$0.166 \pm 0.675$	$2.541 \pm 1.683$
photometric centroid source offset	$2.51 \pm 1.04$	2.42	$1.02 \pm 1.07$	$2.30 \pm 1.03$



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.

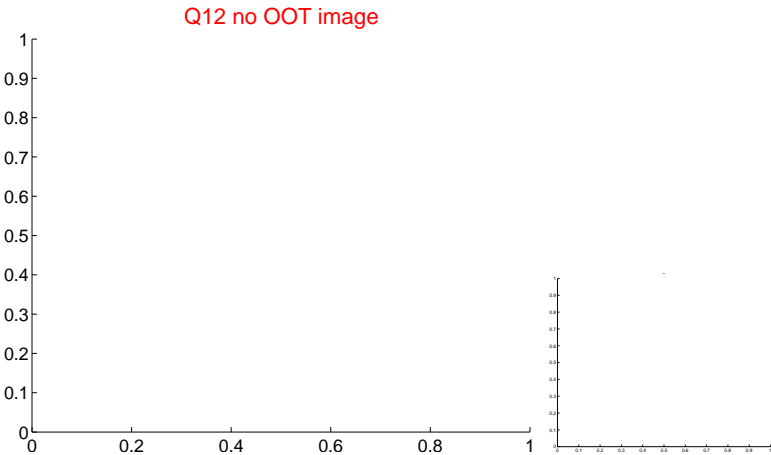
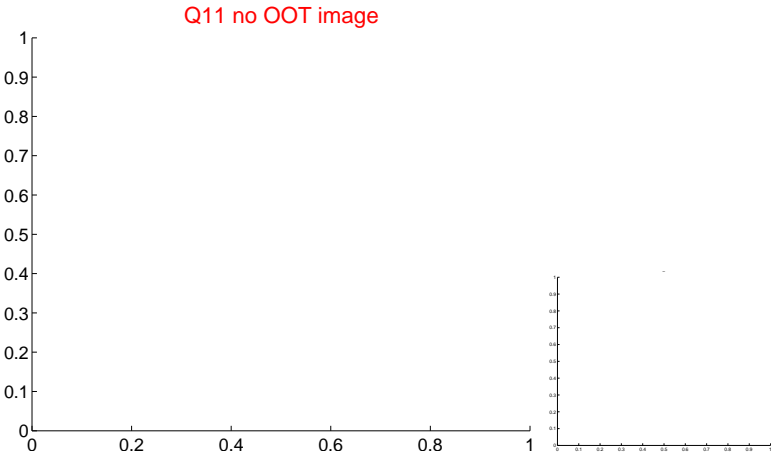
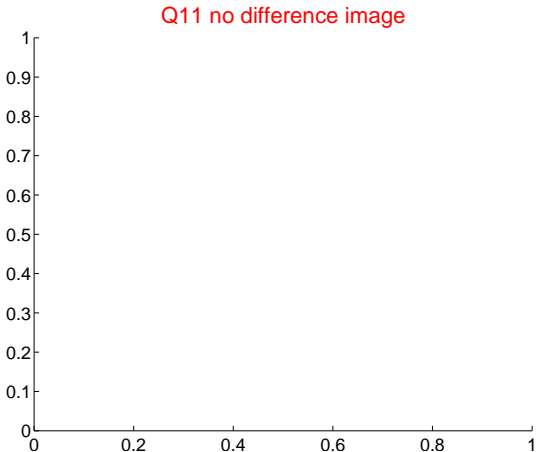
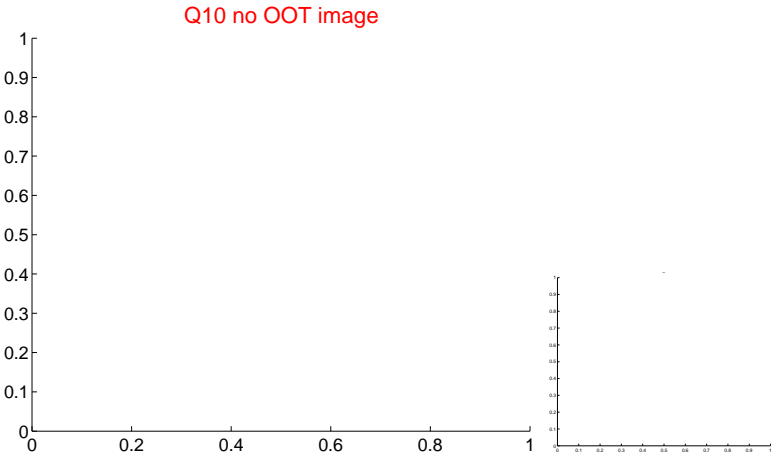
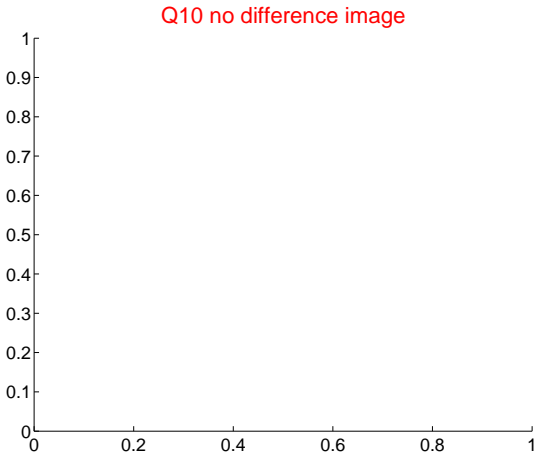
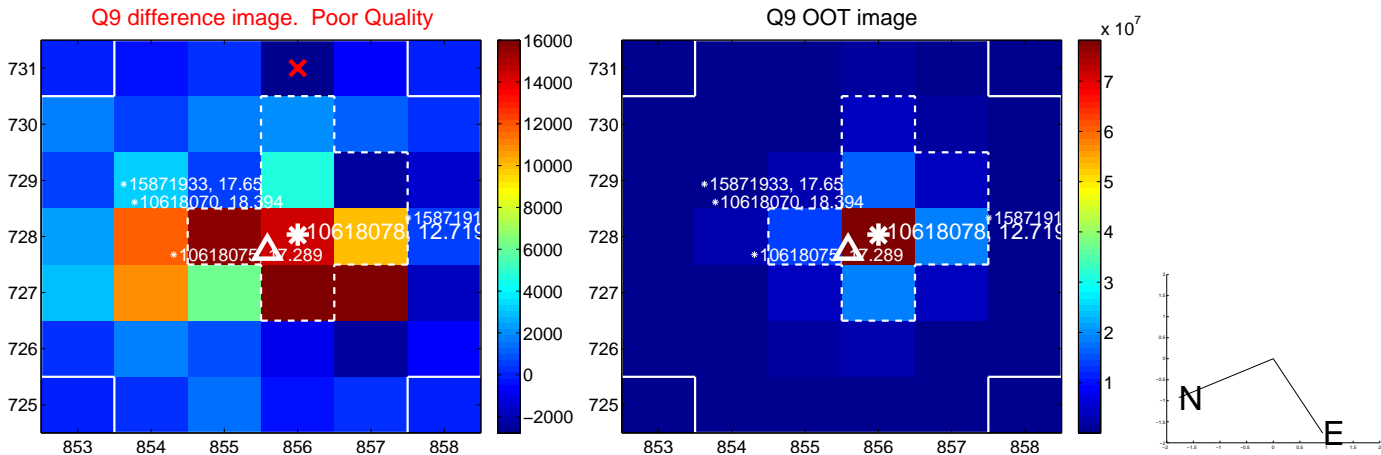




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

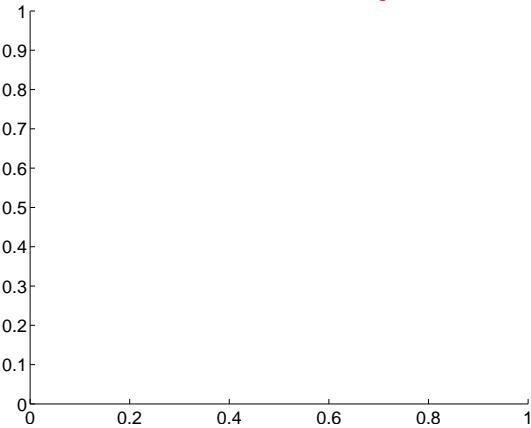


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value

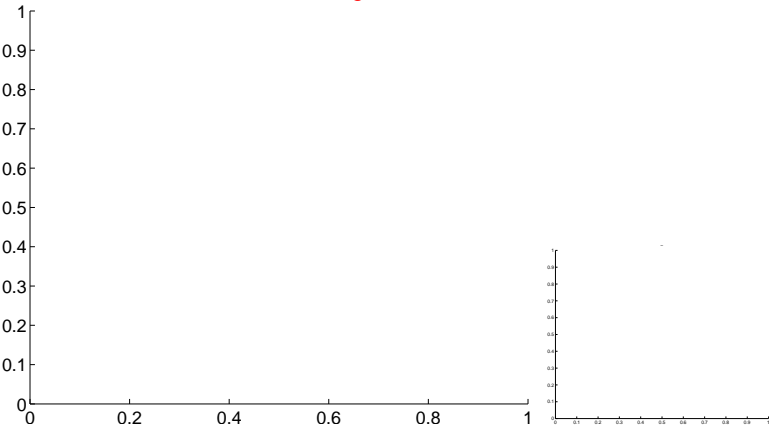


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

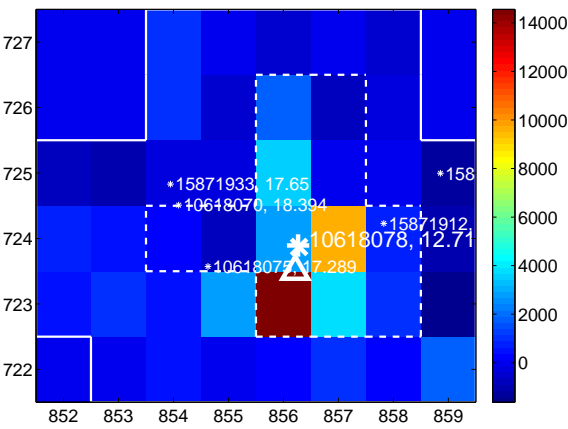
Q13 no difference image



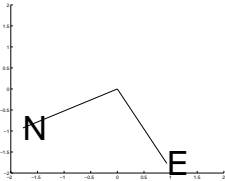
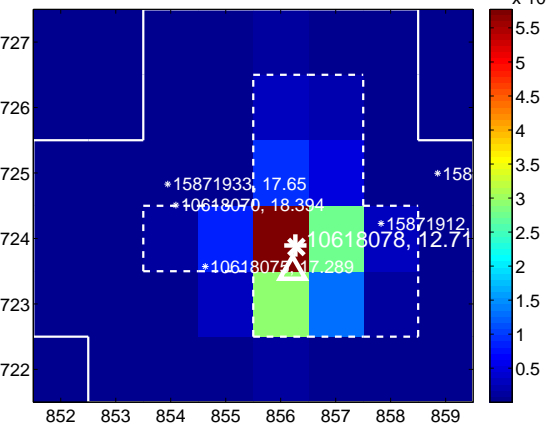
Q13 no OOT image



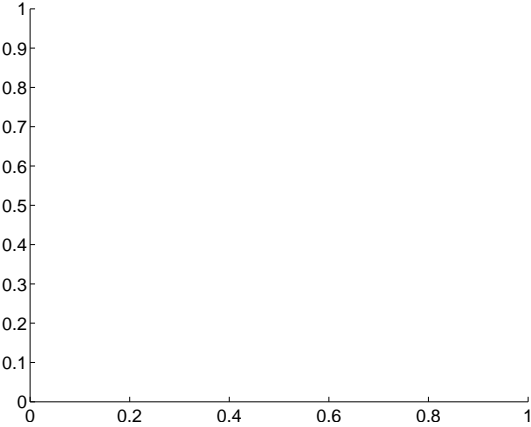
Q14 difference image



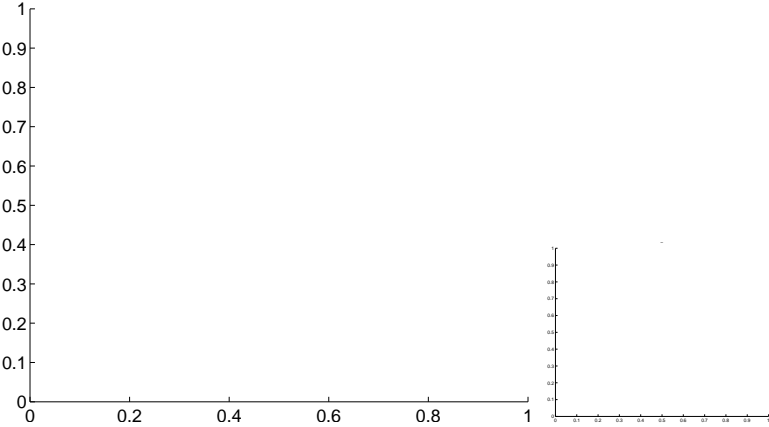
Q14 OOT image



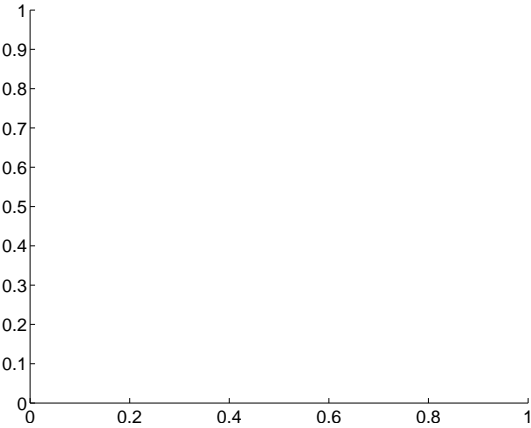
Q15 no difference image



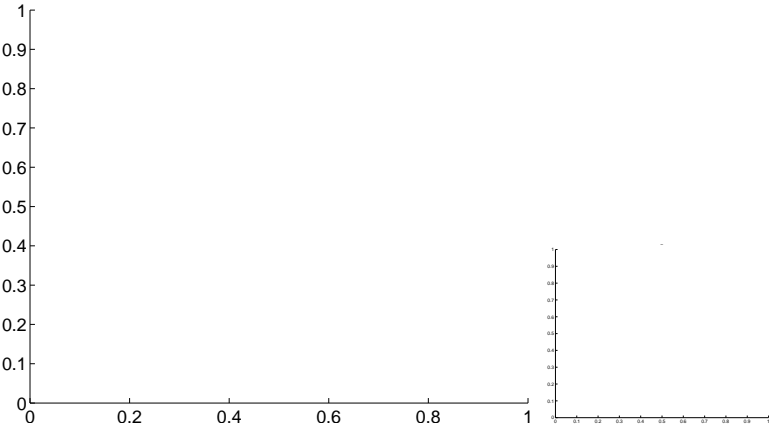
Q15 no OOT image



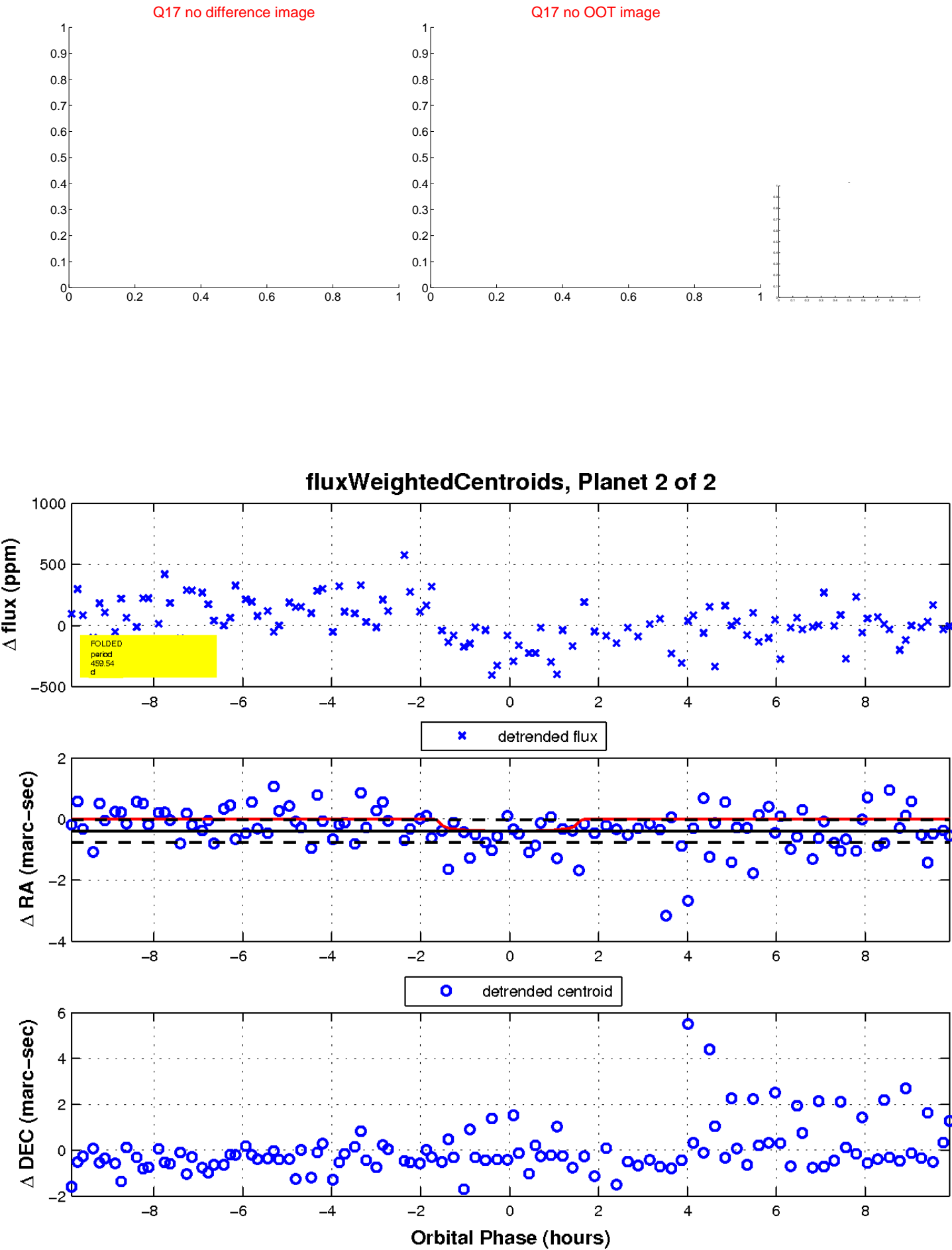
Q16 no difference image



Q16 no OOT image



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



UKIRT Image

Declination

