

# KIC 009578833

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009578833-01	OBS	No	0.527541	131.741525	1.0	0.530	184.7	0.0	1.80	7211	0.19	36298.55
009578833-02	OBS	No	0.527028	131.589119	5566.7	1.500	63.4	-1.0	1.80	7211	13.65	36345.64

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009578833-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009578833-02	OBS	FP	0.00	1	0	1	0	SWEET_NTL—LPP_DV—LPP_ALT—CENT_NOFITS—HALO_GHOST

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

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

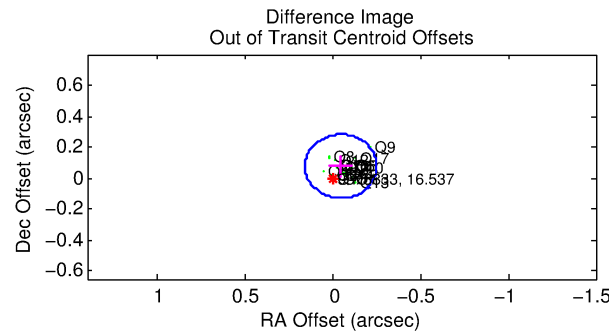
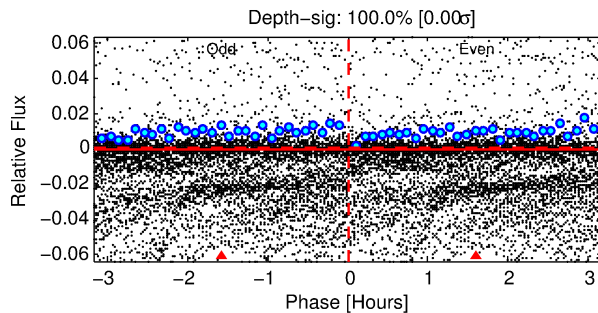
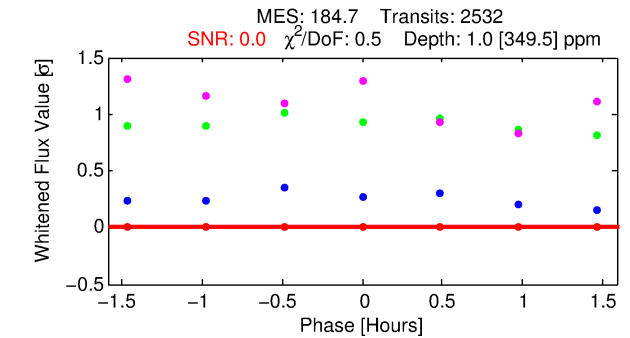
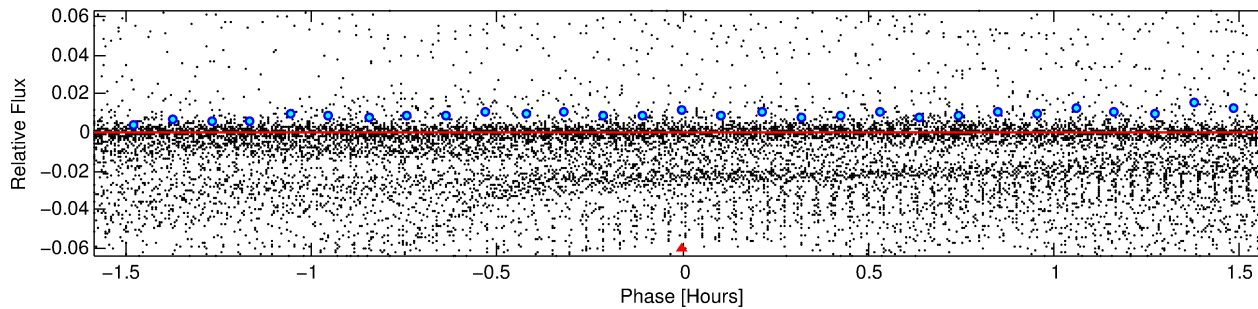
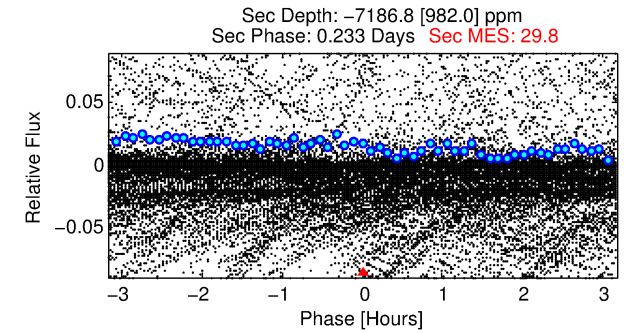
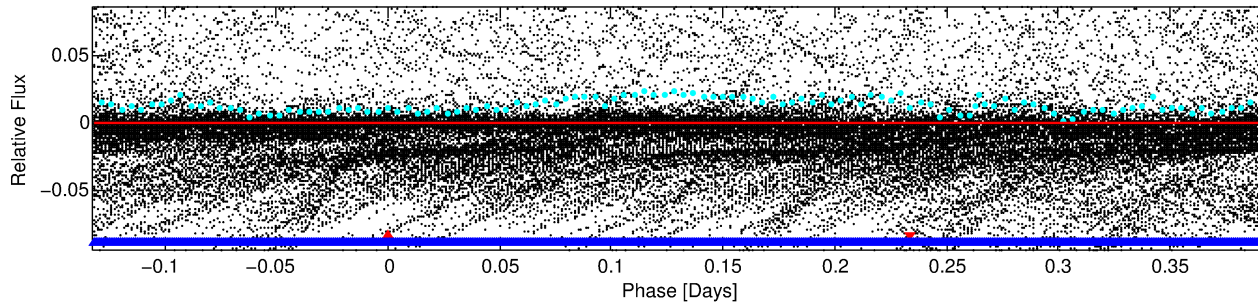
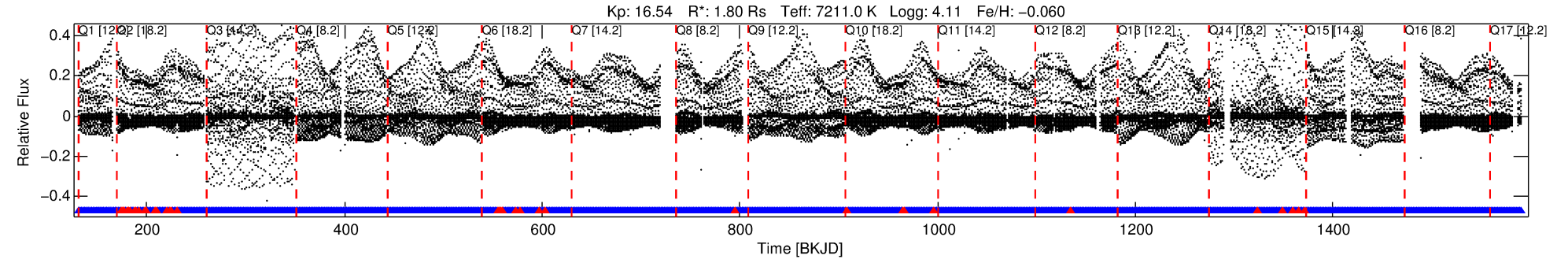
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009578833-01

No Significant Match Found

# DV One-Page Summary

KIC: 9578833 Candidate: 1 of 2 Period: 0.528 d



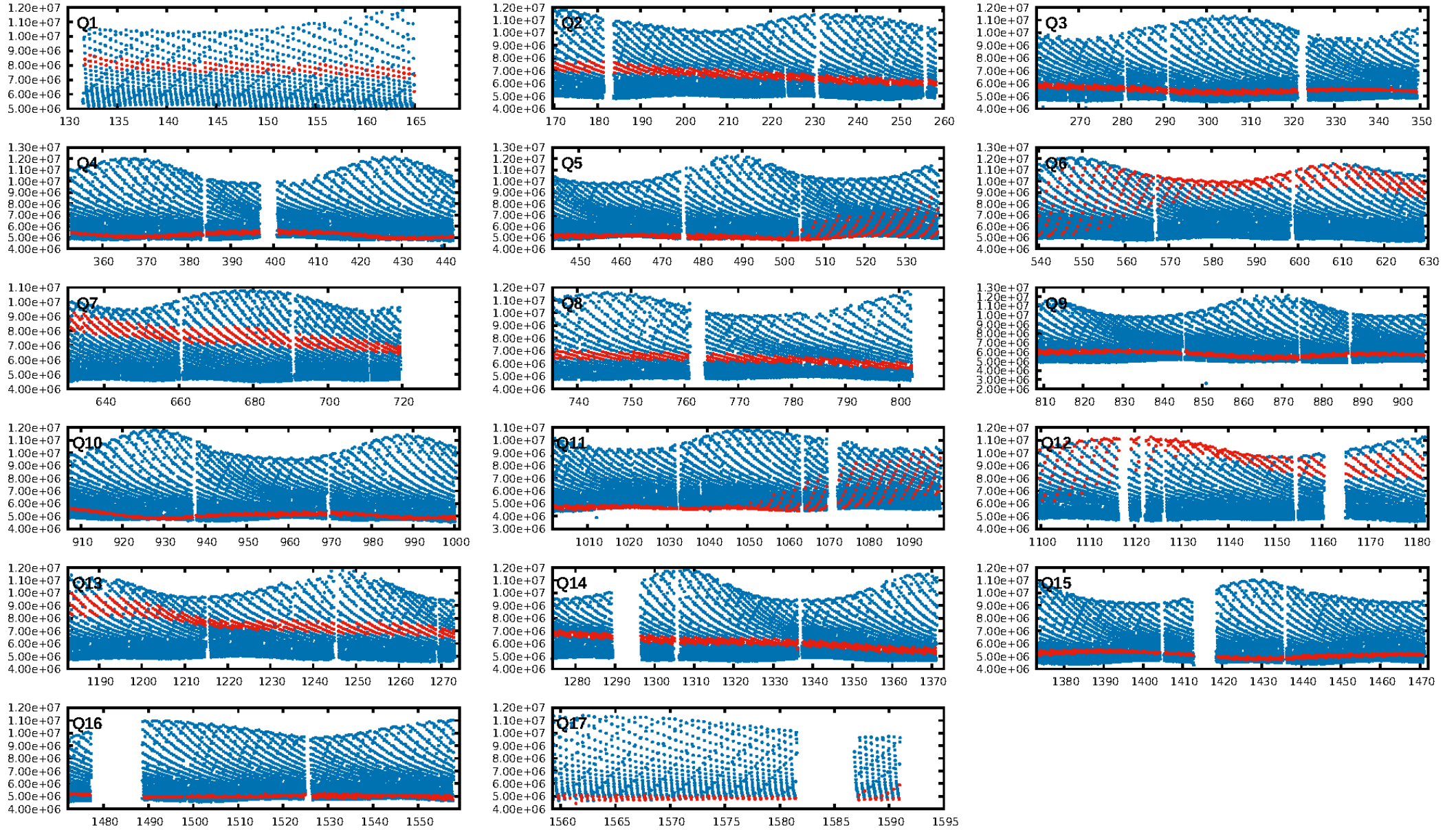
## DV Fit Results:

Period = 0.52754 [0.02988] d  
Epoch = 131.7415 [1.6260] BKJD  
Rp/R\* = 0.0010 [0.1841]  
a/R\* = 6.85 [2360.19]  
b = 0.45 [637.14]  
Seff = 36298.55 [14443.81]  
Teq = 3520 [350] K  
Rp = 0.19 [36.14] Re  
a = 0.0147 [0.0037] AU  
Ag = N/A  
Teffp = N/A

## DV Diagnostic Results:

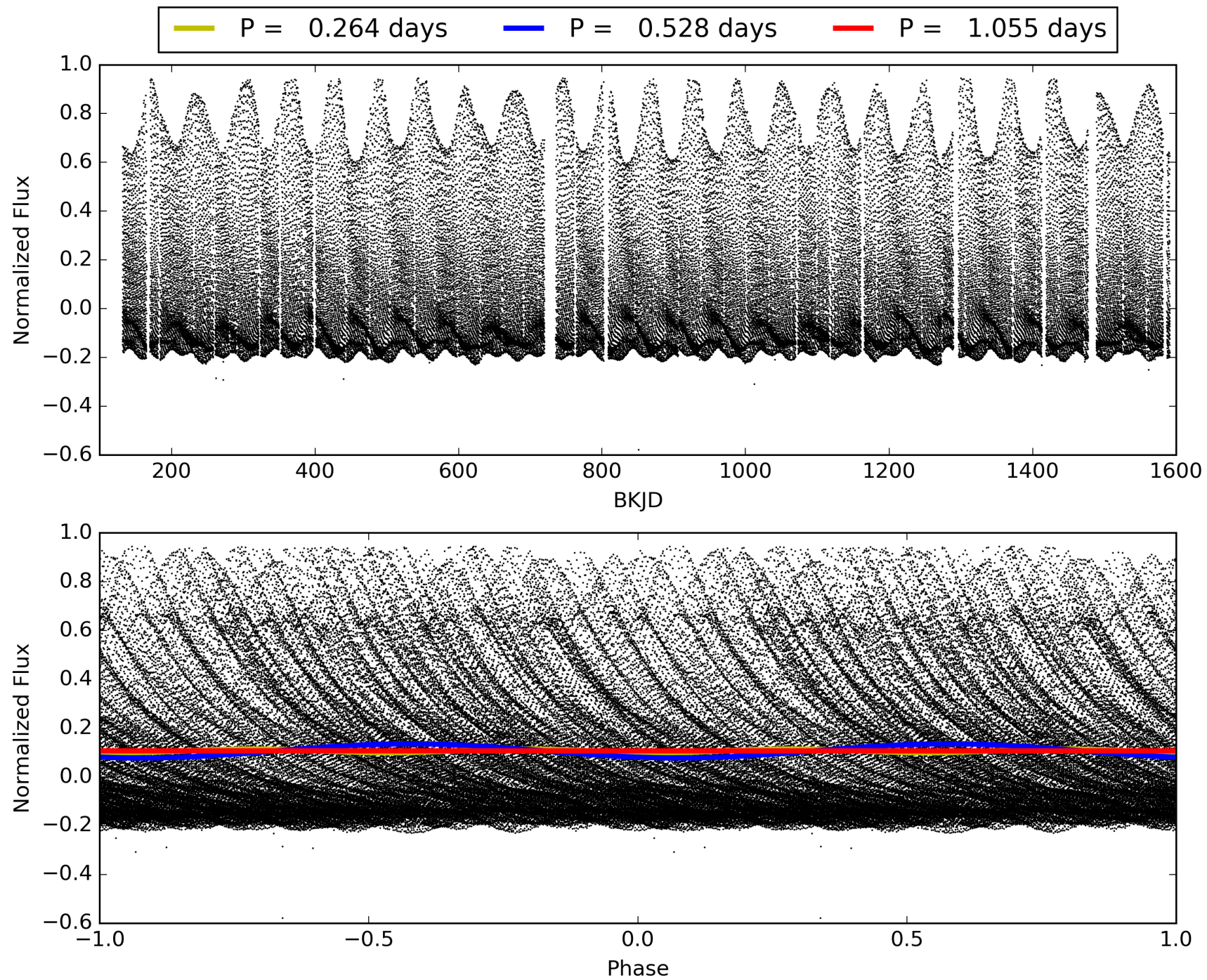
ShortPeriod-sig: 0.6% [0.01σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.98 [2378/2417]  
GhostDiagnostic-chr: N/A  
Centroid-sig: N/A  
Centroid-so: N/A  
OotOffset-rm: 0.089 arcsec [1.30σ]  
KicOffset-rm: 0.060 arcsec [0.87σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.71 [12/17]  
DiffImageOverlap-fno: 0.00 [0/17]

# TCE 009578833-01, PDC Light Curves



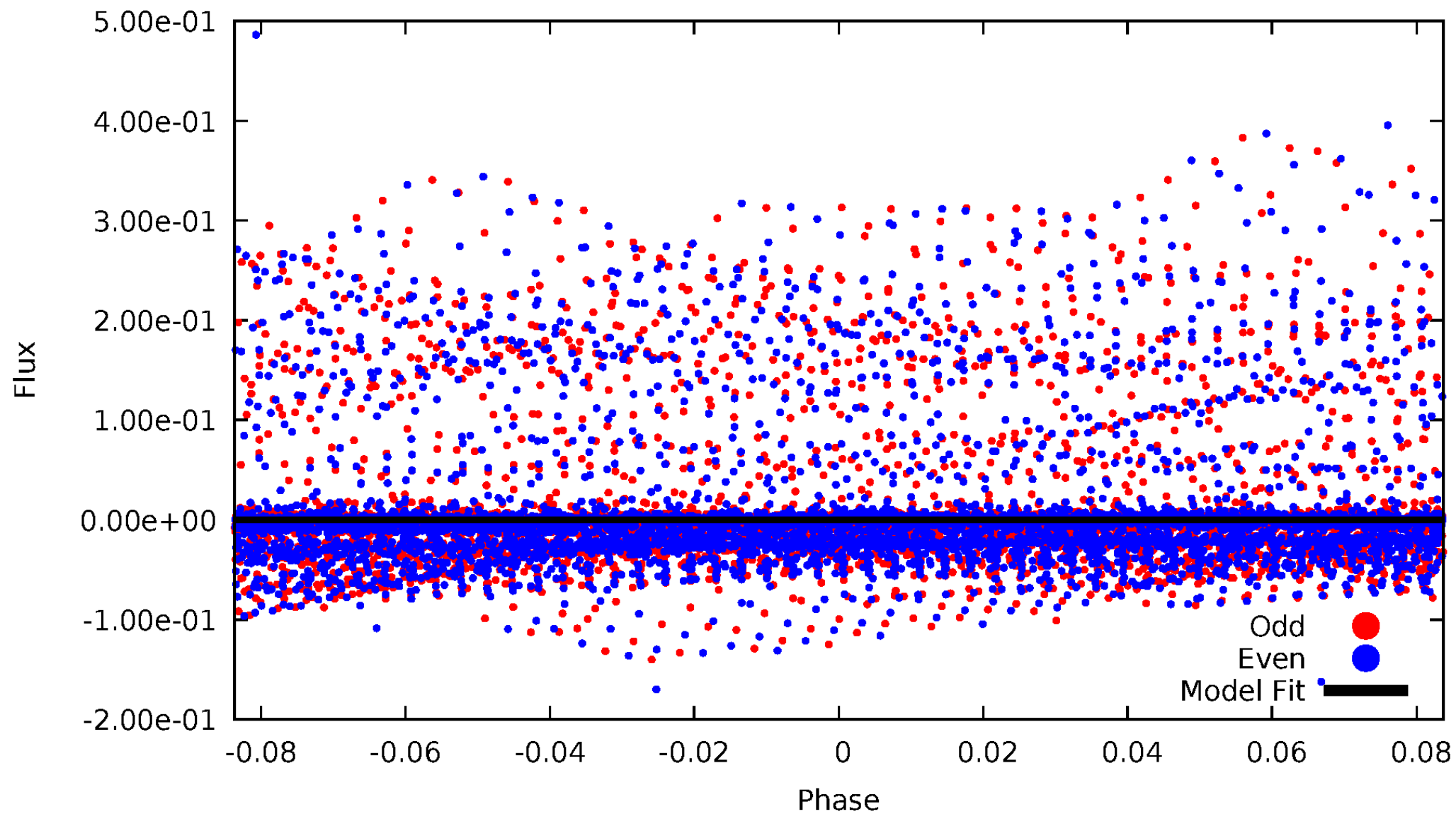


TCE 009578833-01



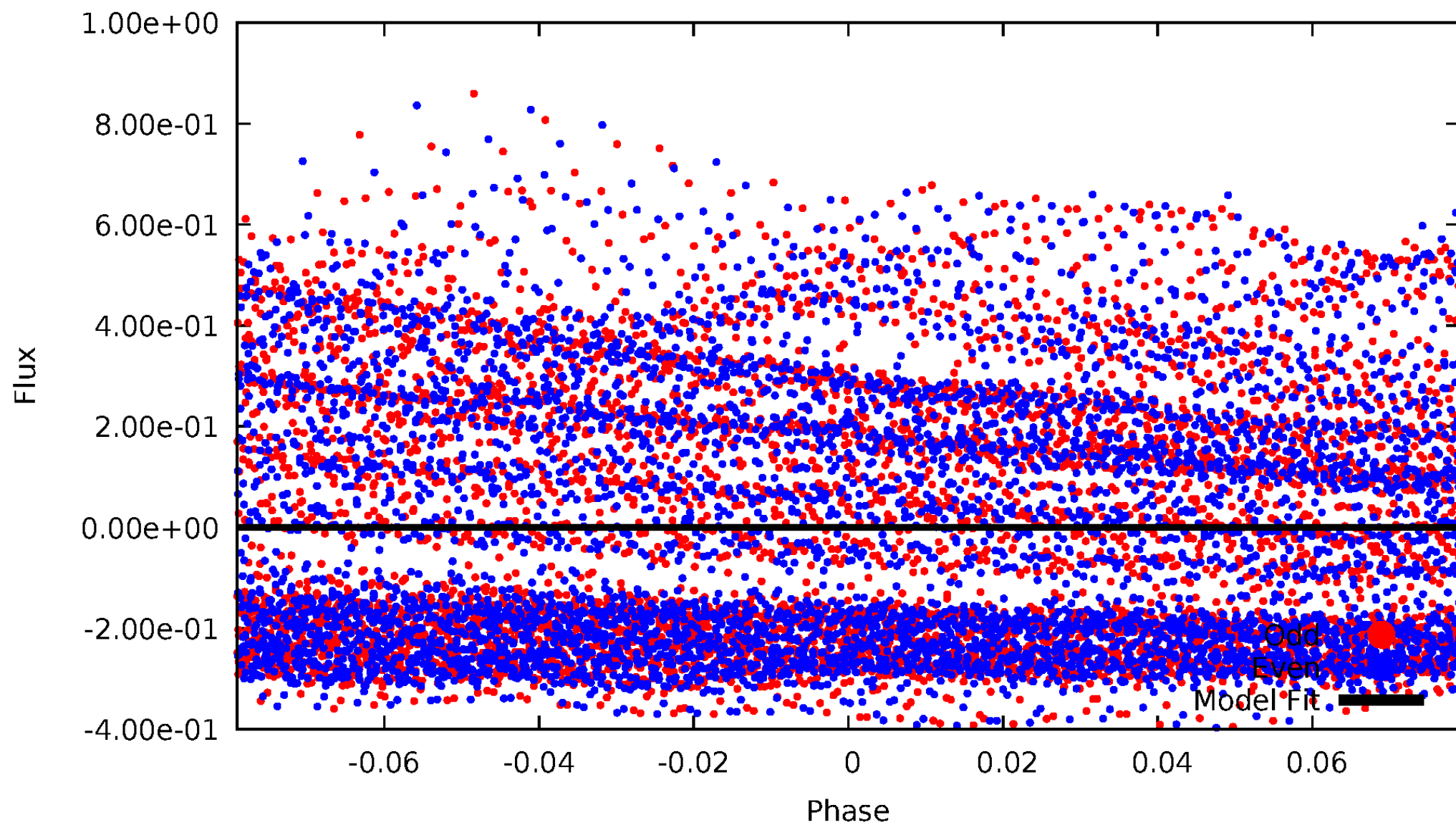
# DV Odd/Even

TCE 009578833-01



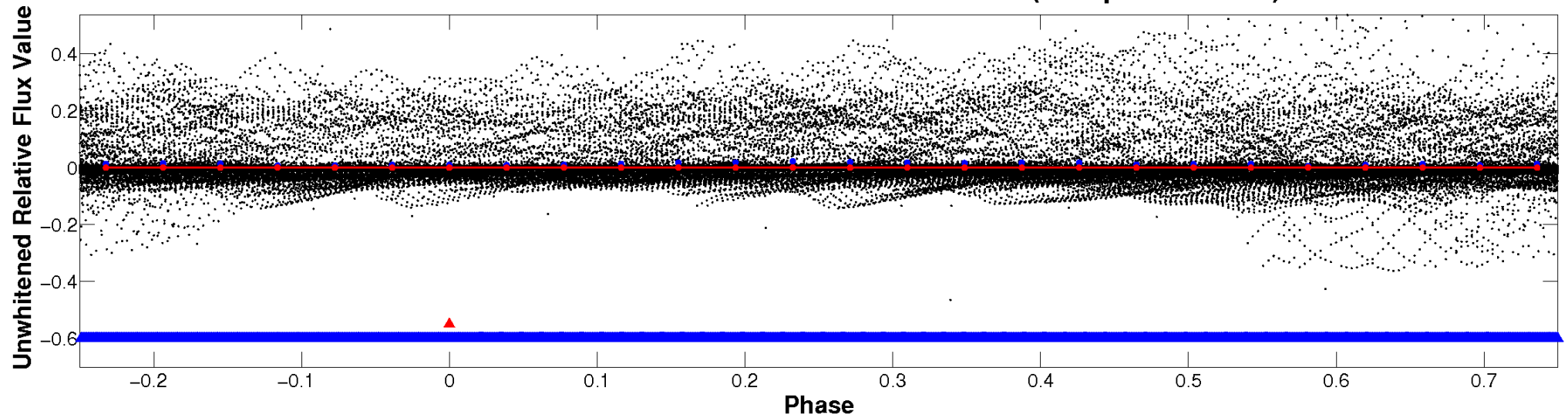
# ALT Odd/Even

TCE 009578833-01

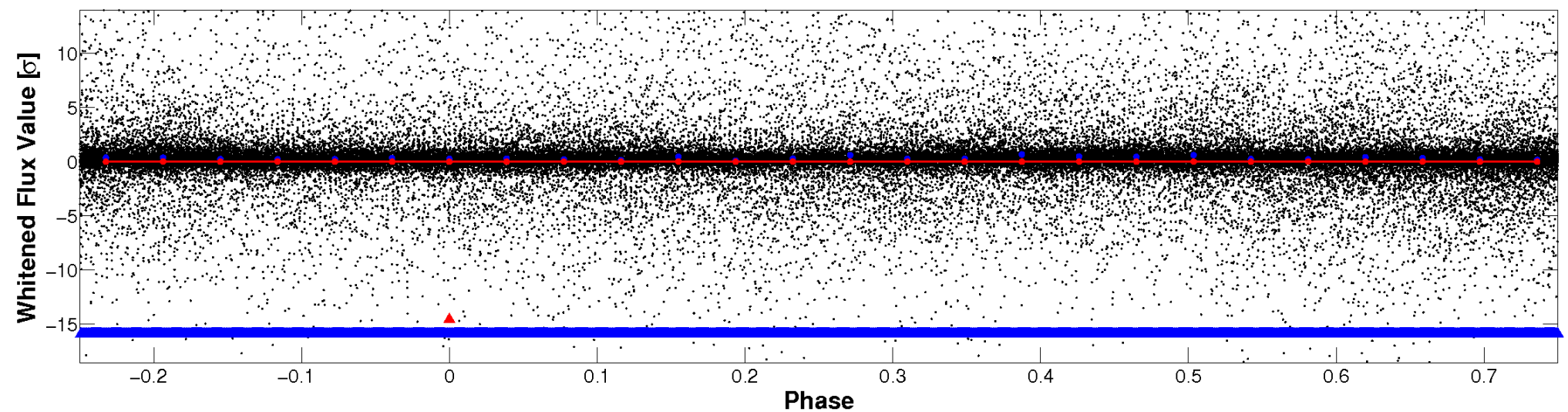


# Non-Whitened Vs. Whitened Light Curve

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



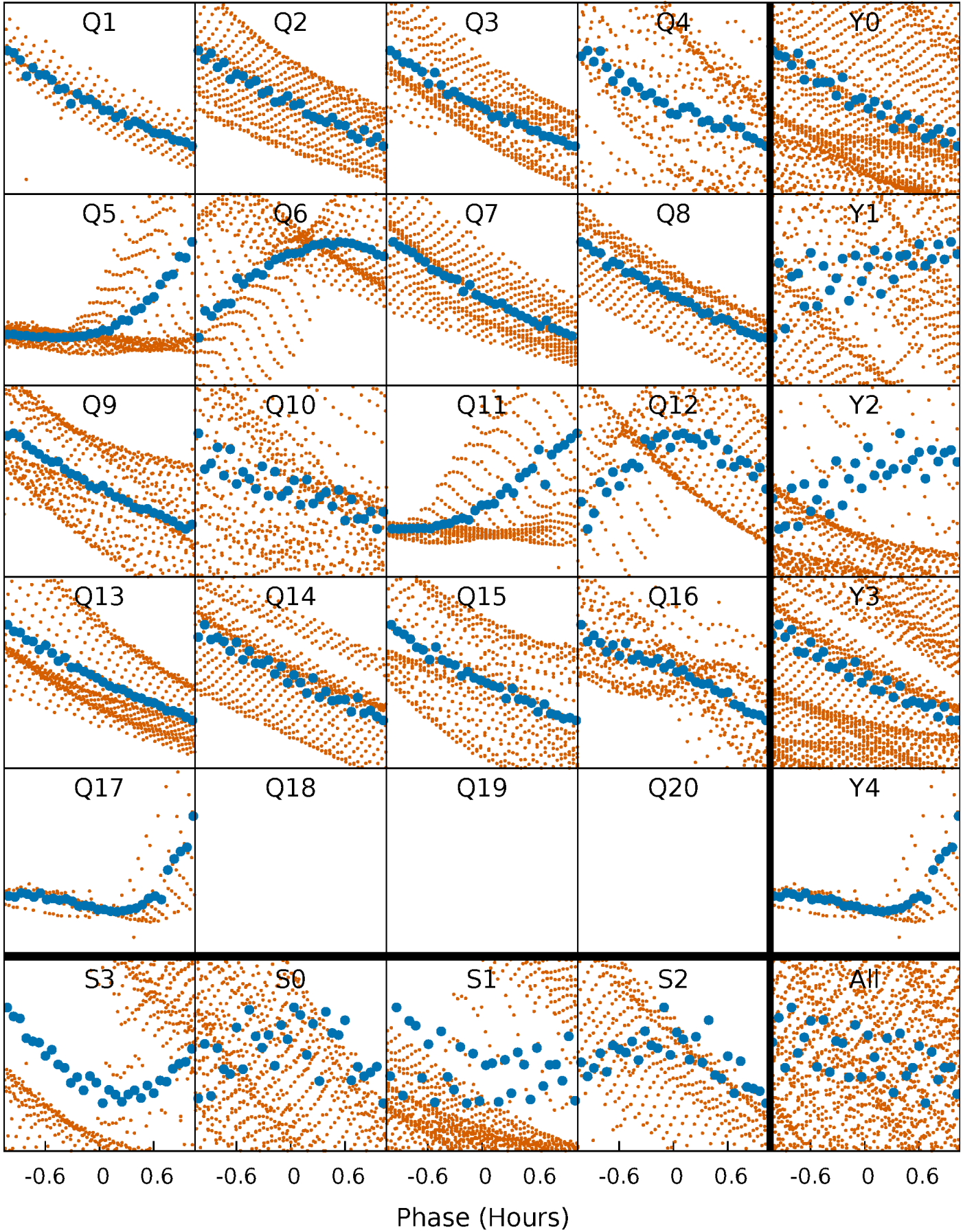
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

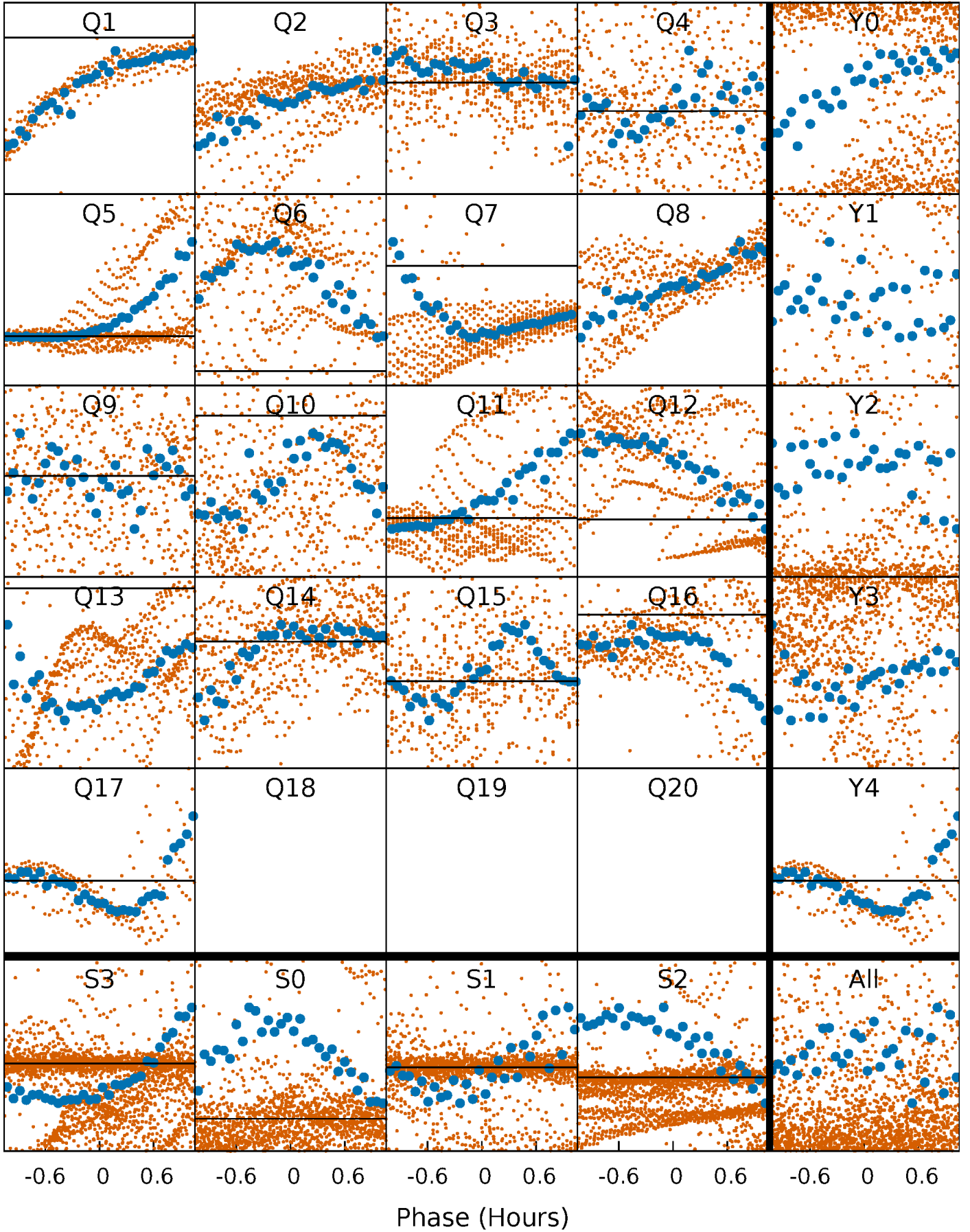
TCE 009578833-01   P= 0.527541 Days    $T_0=131.741525$  (BKJD)





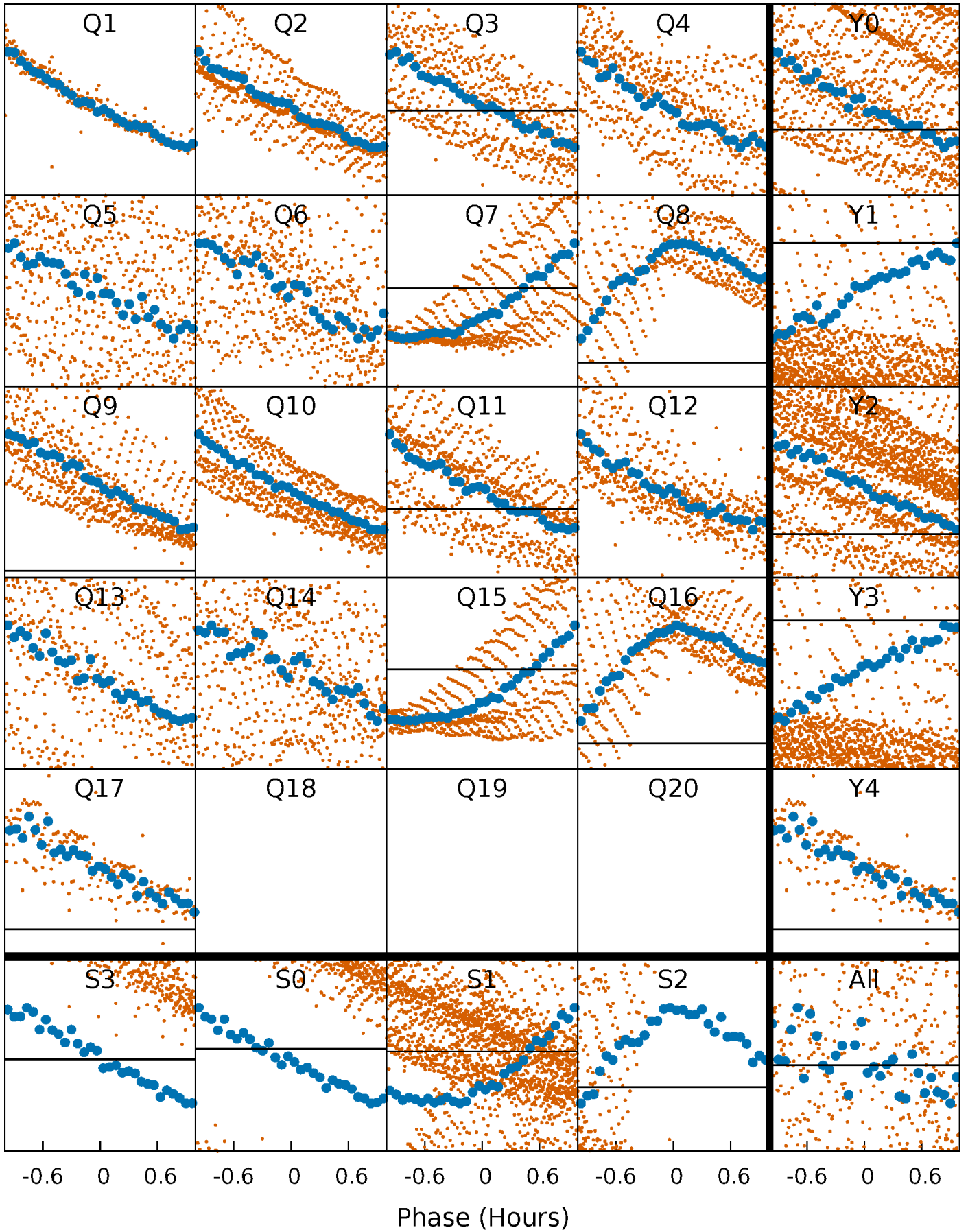
# DV Quarter-Phased Transit Curves

TCE 009578833-01   P= 0.527541 Days    $T_0=131.741525$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

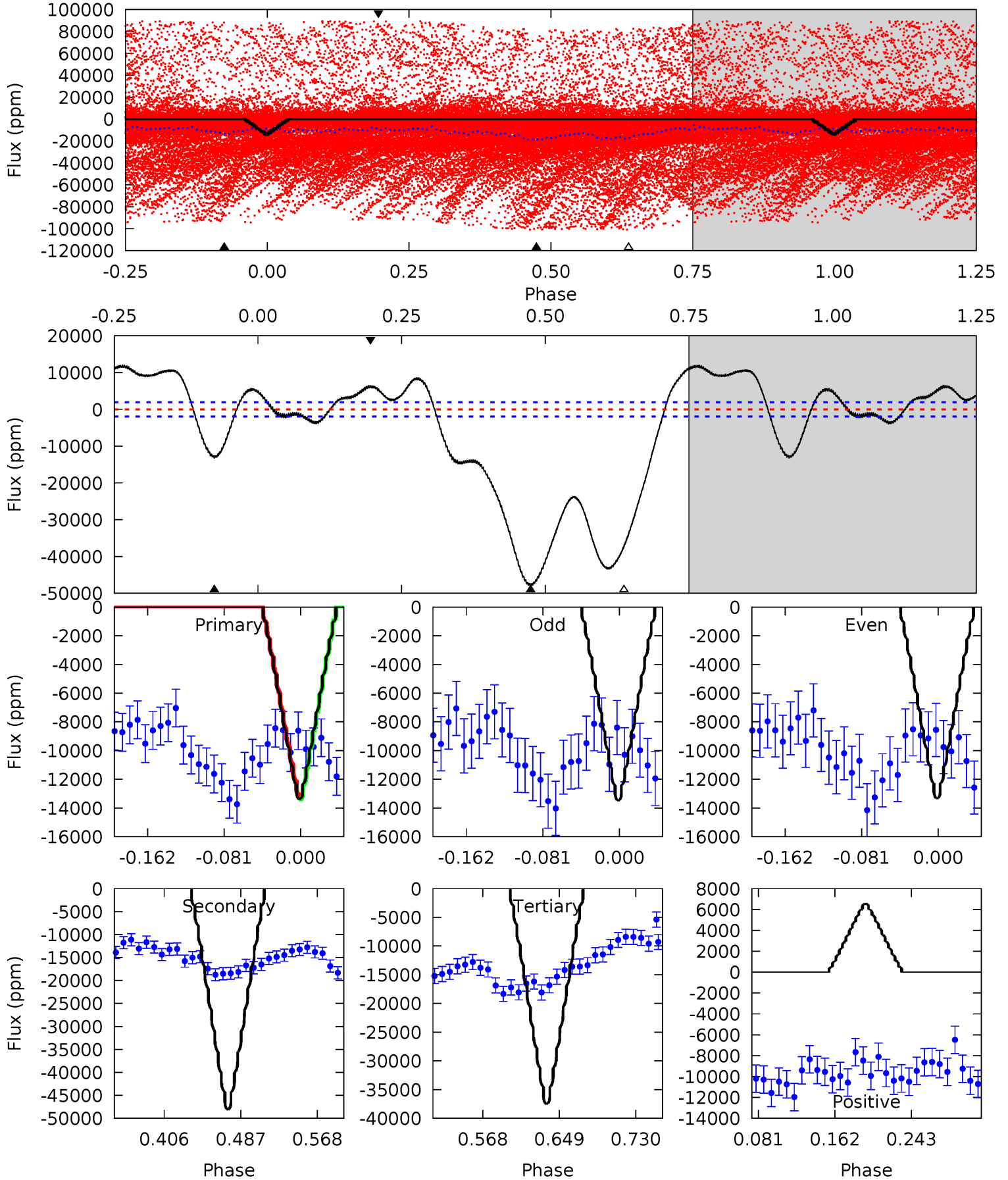
TCE 009578833-01 P= 0.527398 Days  $T_0=131.737779$  (BKJD)



# DV Model-Shift Uniqueness Test

009578833-01, P = 0.527541 Days, E = 131.213984 Days

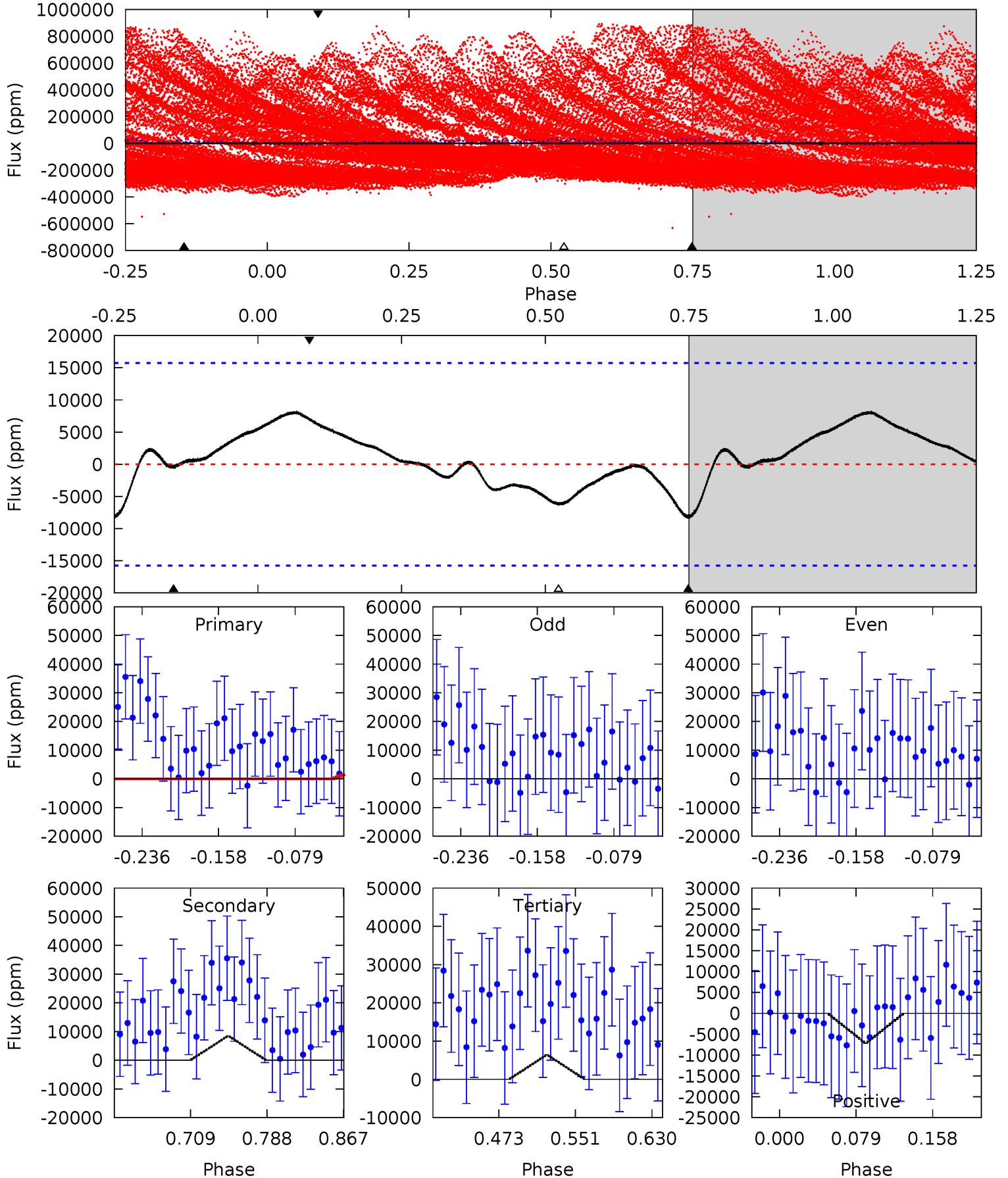
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
31.8	114.1	89.0	15.5	4.61	1.74	36.4	-57.3	16.2	25.1	98.6	0.17	-7.11	0.20	0.46



# Alt Model-Shift Uniqueness Test

009578833-01, P = 0.527398 Days, E = 131.210381 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
0.20	2.48	1.87	2.10	4.61	1.76	1.19	-1.67	-1.90	0.60	0.38	0.10	0.03	0.50	0.08





### Stellar Parameters For KIC 009578833

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7211^{+200}_{-314}$	$4.110^{+0.153}_{-0.187}$	$-0.060^{+0.250}_{-0.350}$	$1.799^{+0.539}_{-0.392}$	$1.519^{+0.209}_{-0.255}$	$0.367^{+0.295}_{-0.191}$
	+3%/-4%	+4%/-5%	+417%/-583%	+30%/-22%	+14%/-17%	+80%/-52%
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 009578833-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-47999 \pm 421$	$23.09^{+27.56}_{-16.04}$	$4930^{+386}_{-350}$	$11031^{+28161}_{-4581}$	$11^{+107}_{-9}$
Alt.	$-8445 \pm 3412$	$23.66^{+27.27}_{-16.75}$	$4912^{+381}_{-331}$	$5730^{+8517}_{-2833}$	$1.628^{+18.383}_{-1.298}$

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

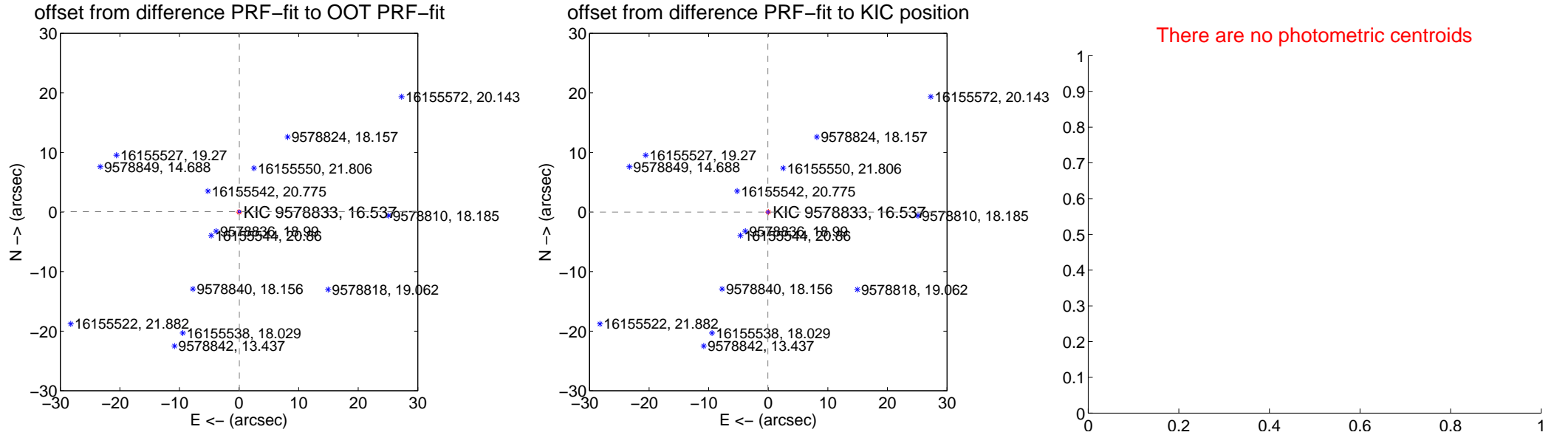
## DV Centroid Data

Supplemental centroid analysis for 009578833-01. Kepler magnitude: 16.54. Transit SNR 0.00

There are 12 quarters with good PRF difference image offsets

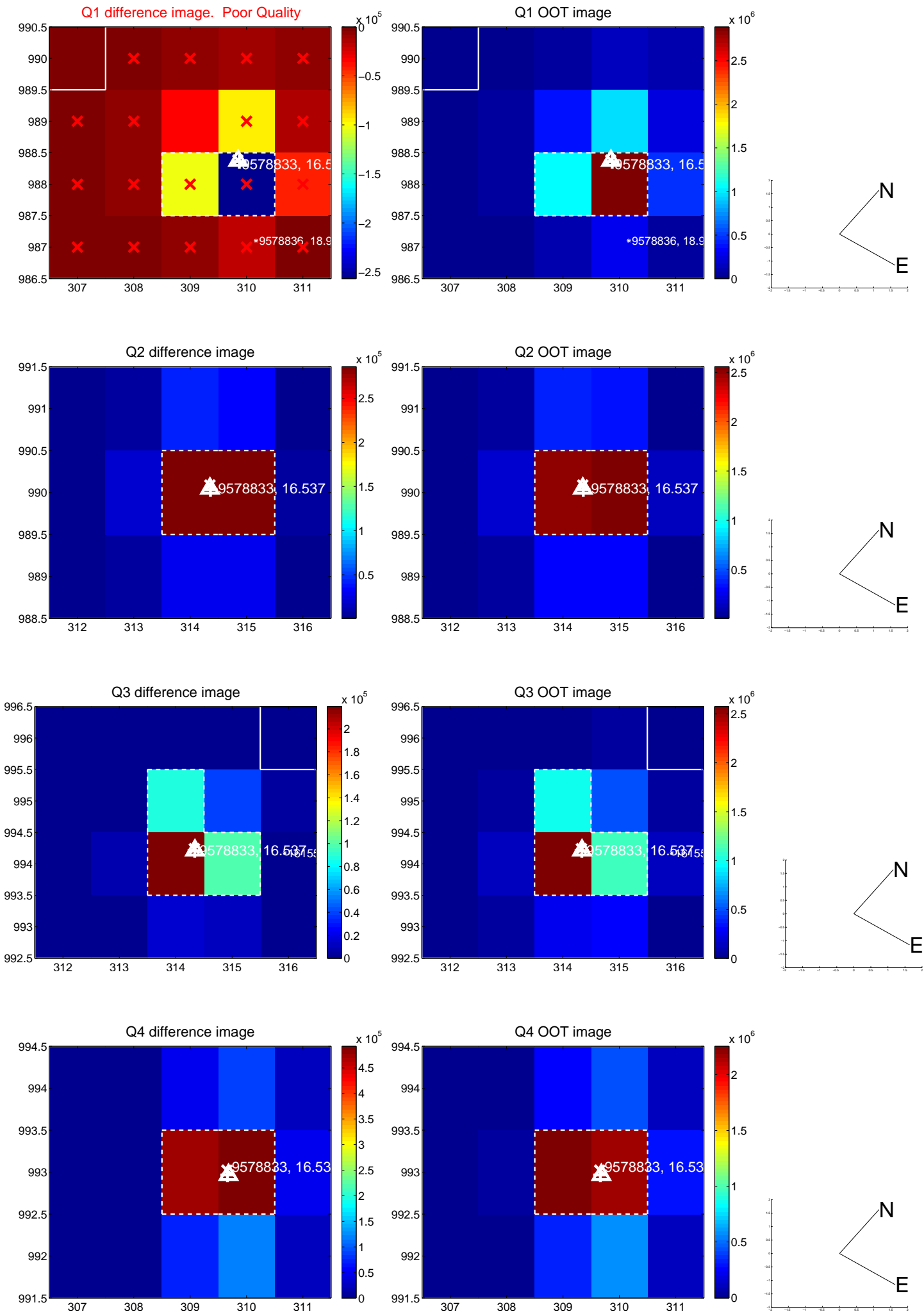
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.089 \pm 0.068$	1.30	$-0.045 \pm 0.069$	$0.077 \pm 0.068$
PRF-fit source offset from KIC position	$0.060 \pm 0.069$	0.87	$0.059 \pm 0.068$	$-0.010 \pm 0.071$
photometric centroid source offset	—	—	—	—

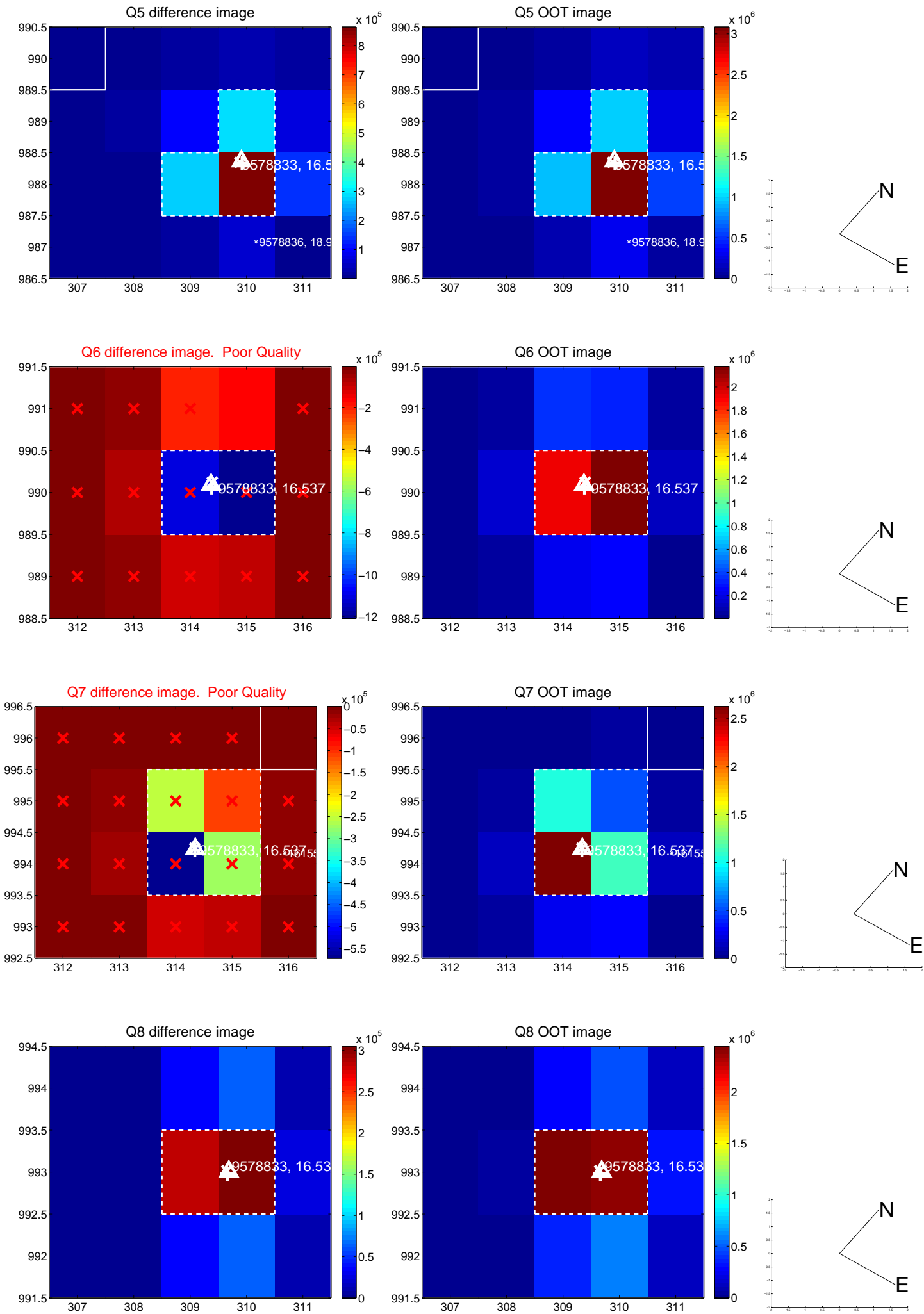


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

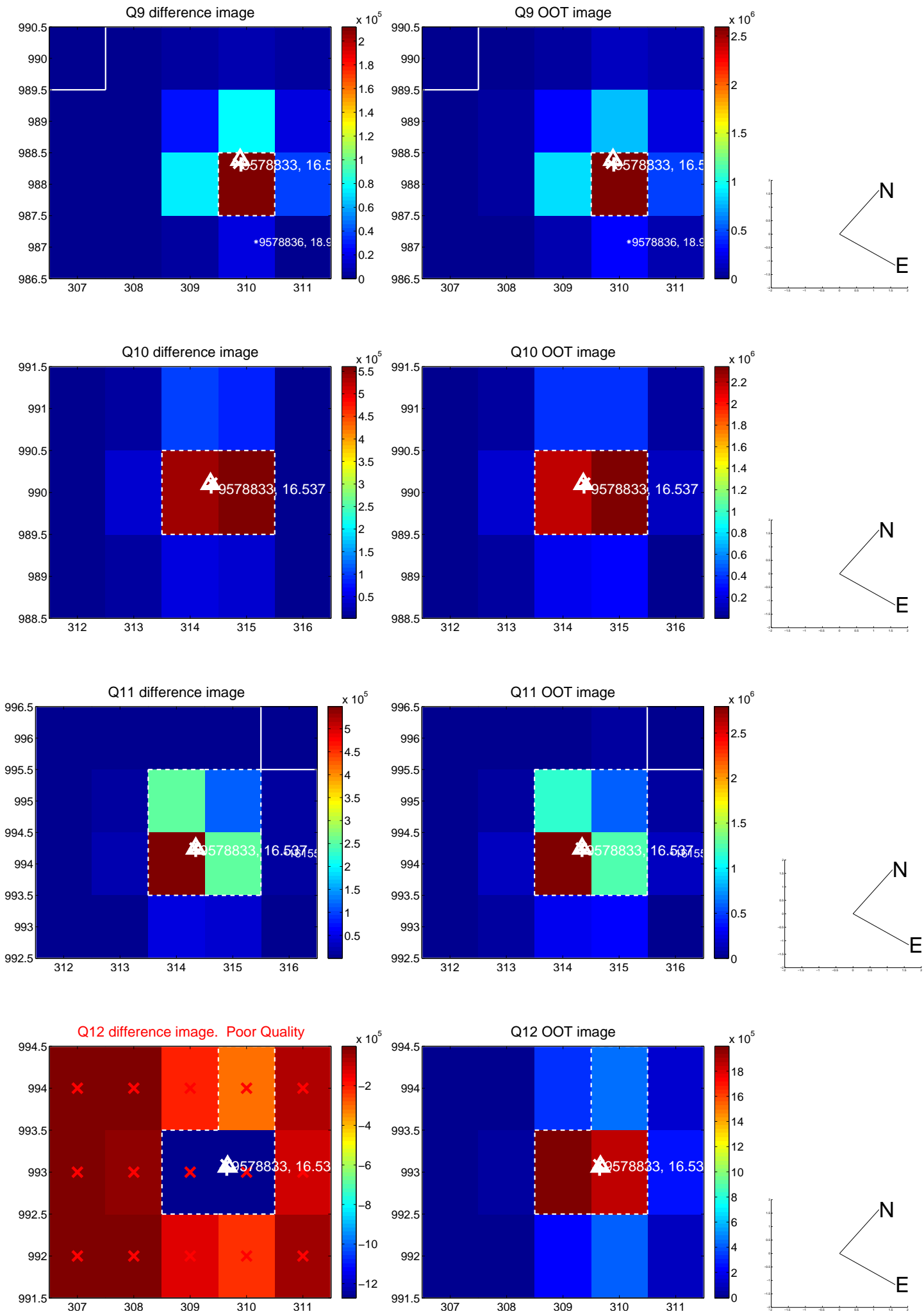


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

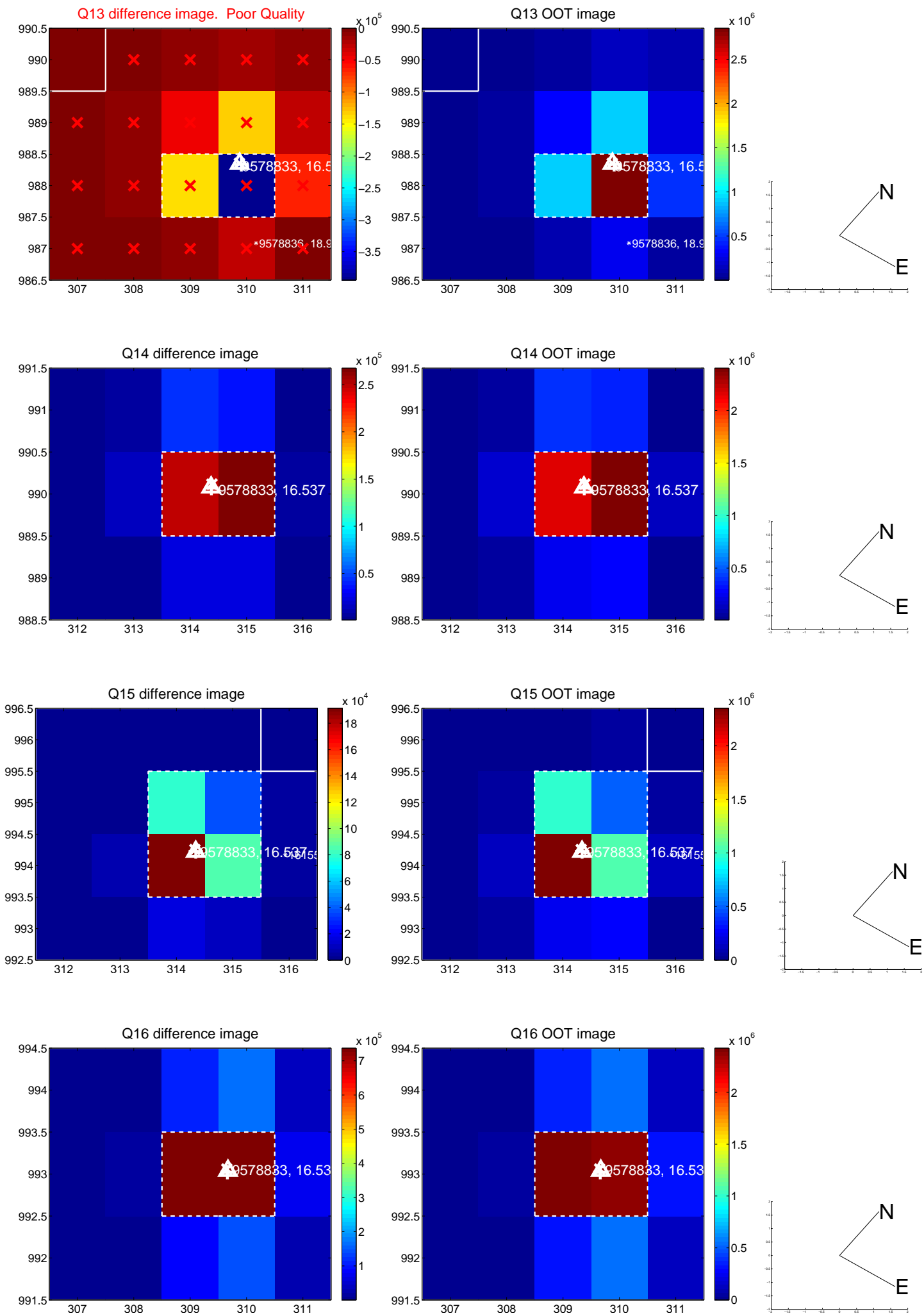




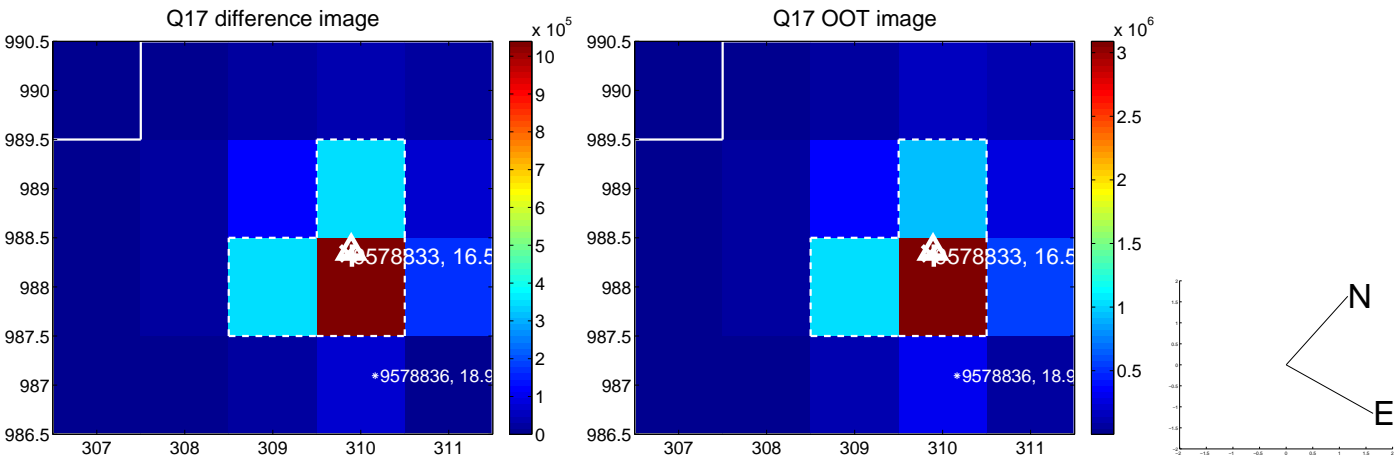
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



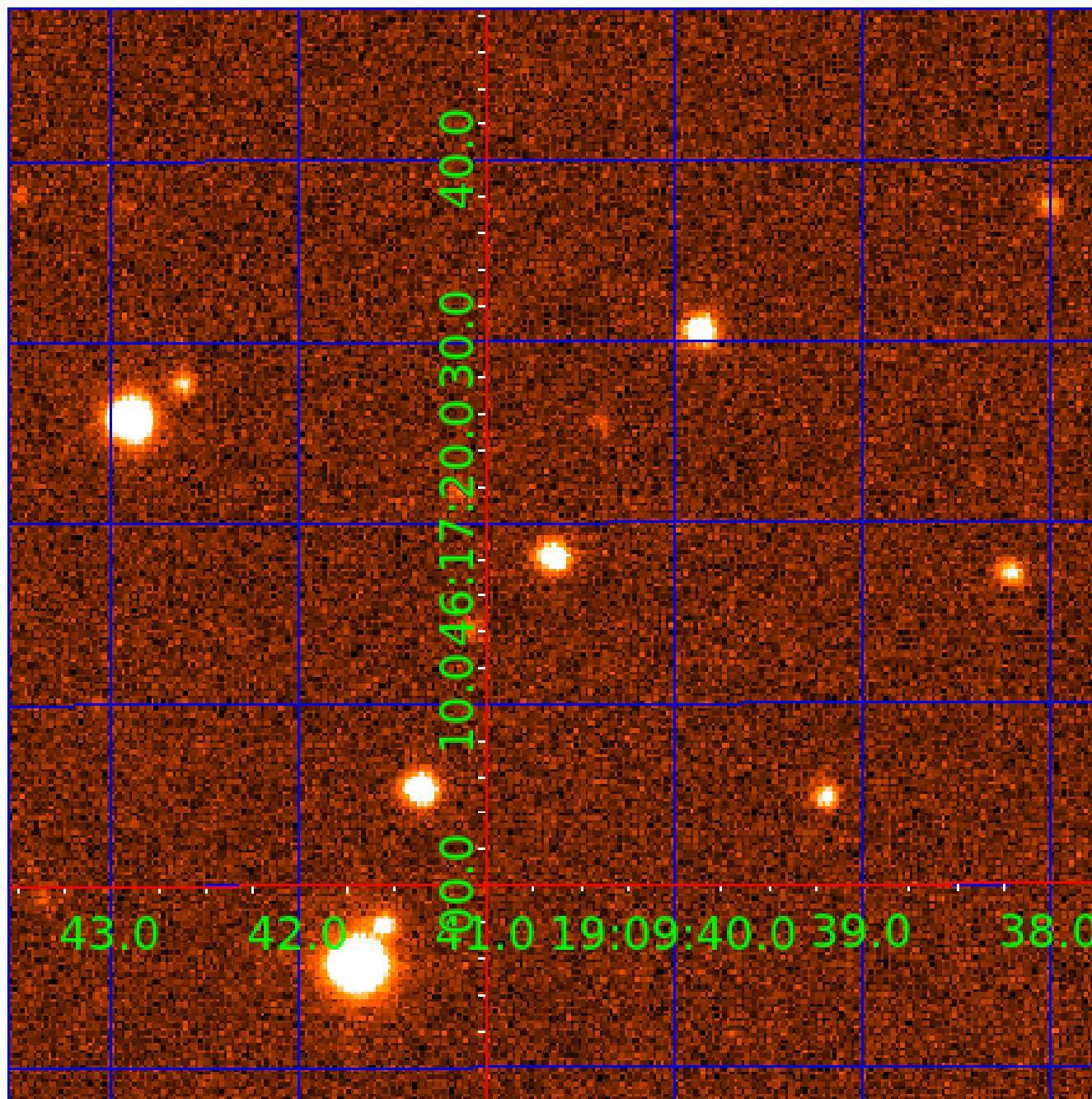
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image

Declination





# KIC 009578833

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009578833-01	OBS	No	0.527541	131.741525	1.0	0.530	184.7	0.0	1.80	7211	0.19	36298.55
009578833-02	OBS	No	0.527028	131.589119	5566.7	1.500	63.4	-1.0	1.80	7211	13.65	36345.64

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009578833-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT
009578833-02	OBS	FP	0.00	1	0	1	0	SWEET_NTL—LPP_DV—LPP_ALT—CENT_NOFITS—HALO_GHOST

**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.

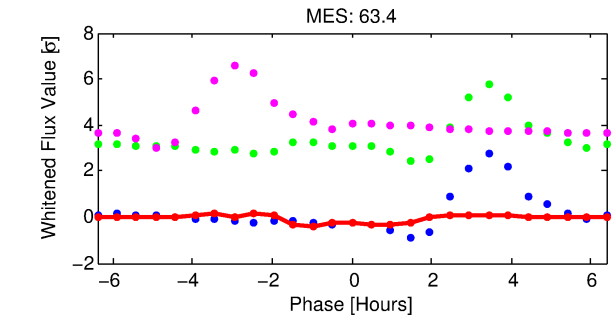
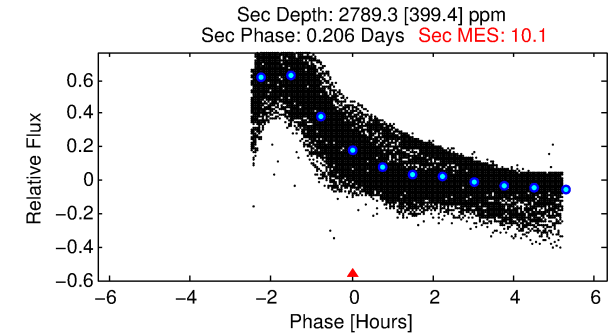
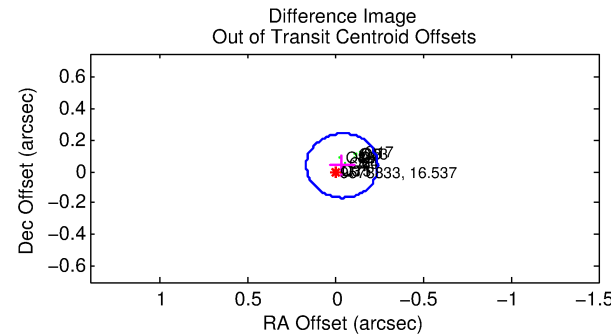
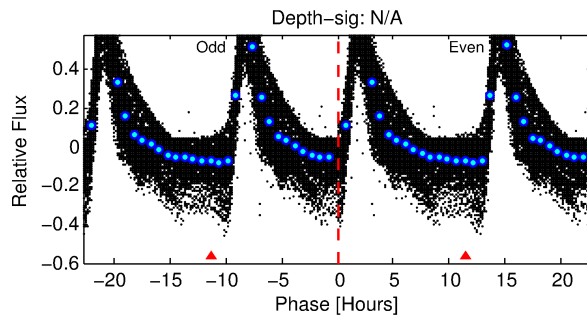
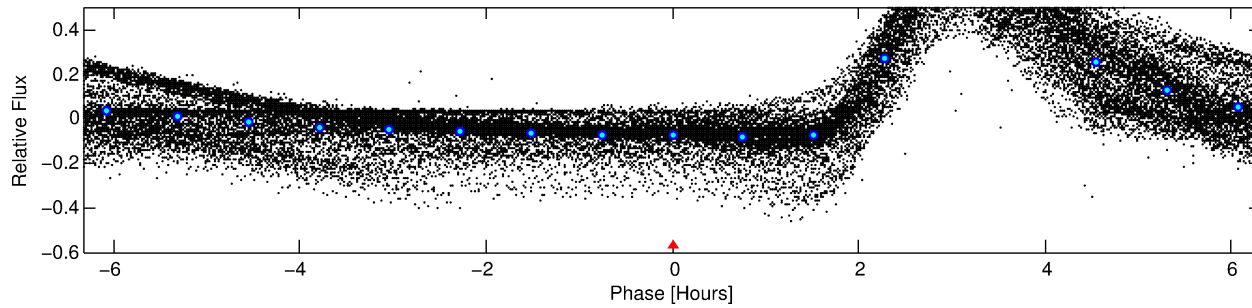
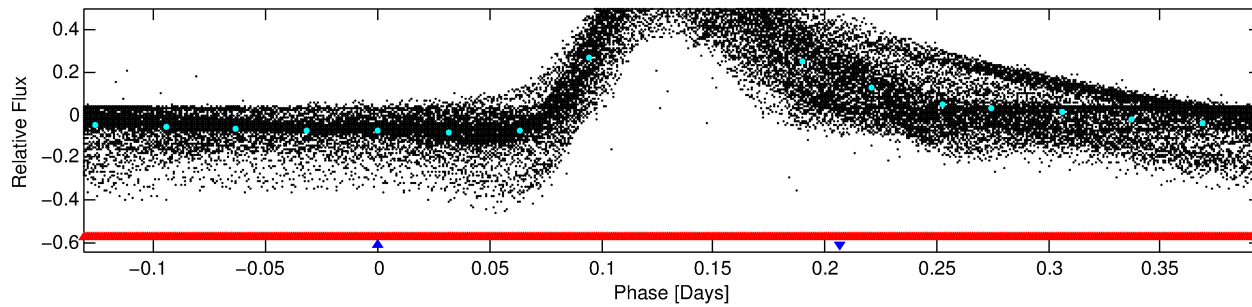
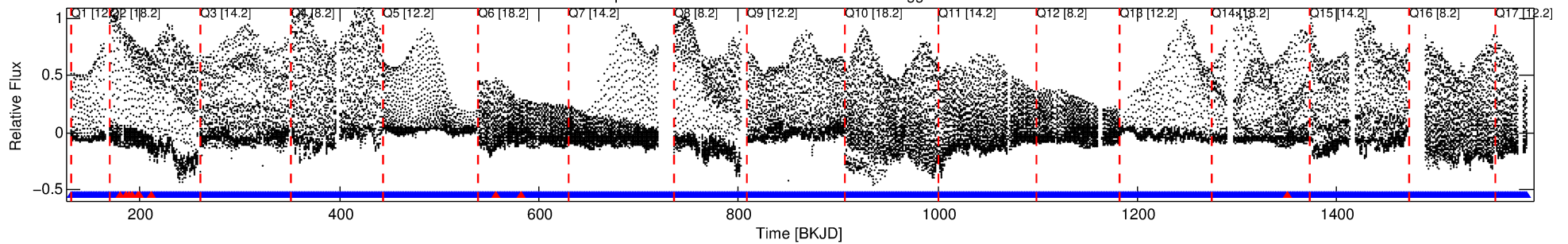
## Ephemeris Match Information For 009578833-02

No Significant Match Found

# DV One-Page Summary

KIC: 9578833 Candidate: 2 of 2 Period: 0.527 d

Kp: 16.54 R\*: 1.80 Rs Teff: 7211.0 K Logg: 4.11 Fe/H: -0.060



## TPS TCE Results:

Period = 0.52703 d  
Epoch = 131.5891 BKJD

DV fit results are unavailable

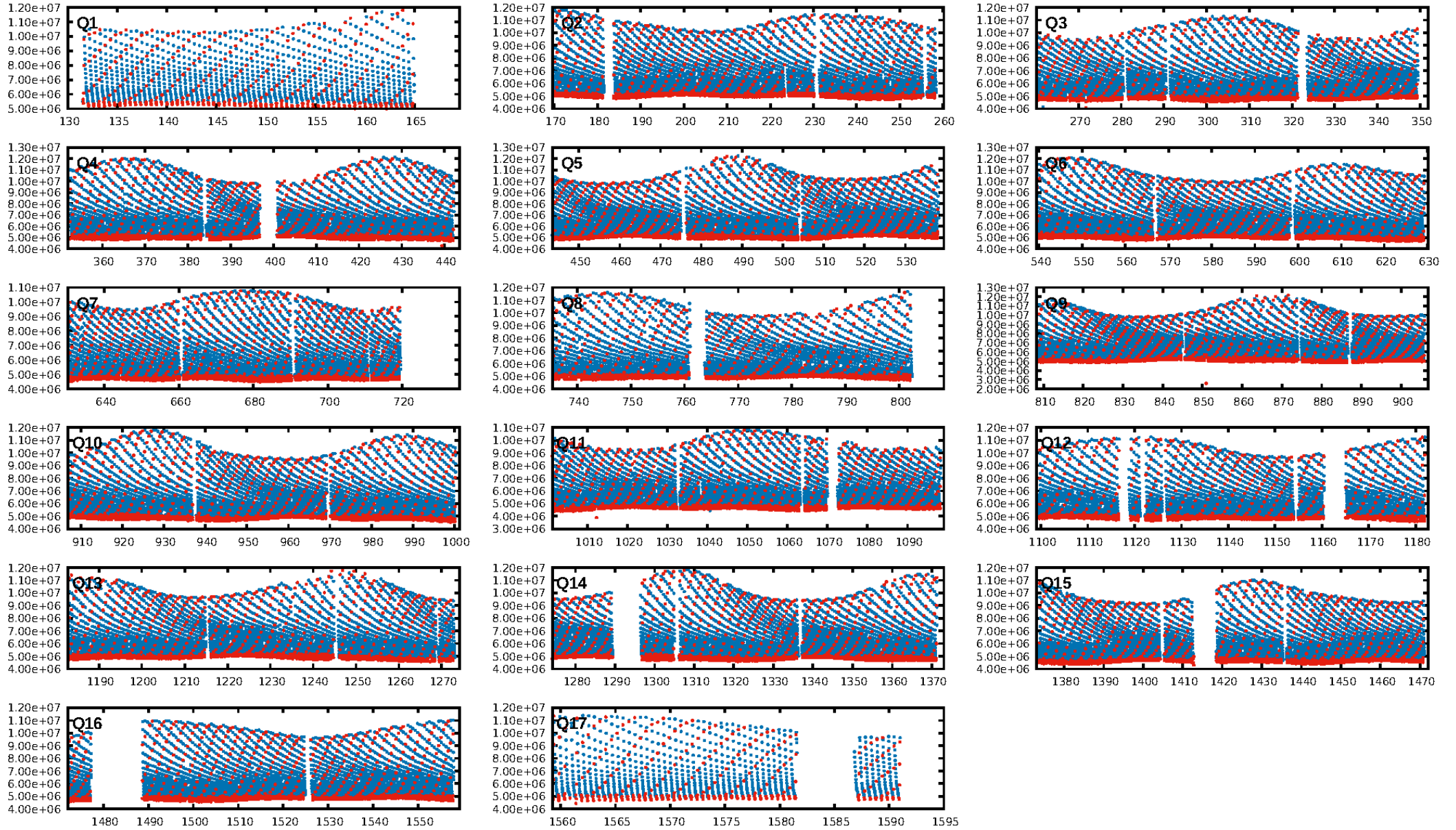
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.6% [0.01σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [2136/2146]  
GhostDiagnostic-chr: 0.1934  
Centroid-sig: N/A  
Centroid-so: 0.384 arcsec [244.83σ]  
OotOffset-rm: 0.054 arcsec [0.80σ]  
KicOffset-rm: 0.090 arcsec [1.30σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 08:38:59 Z

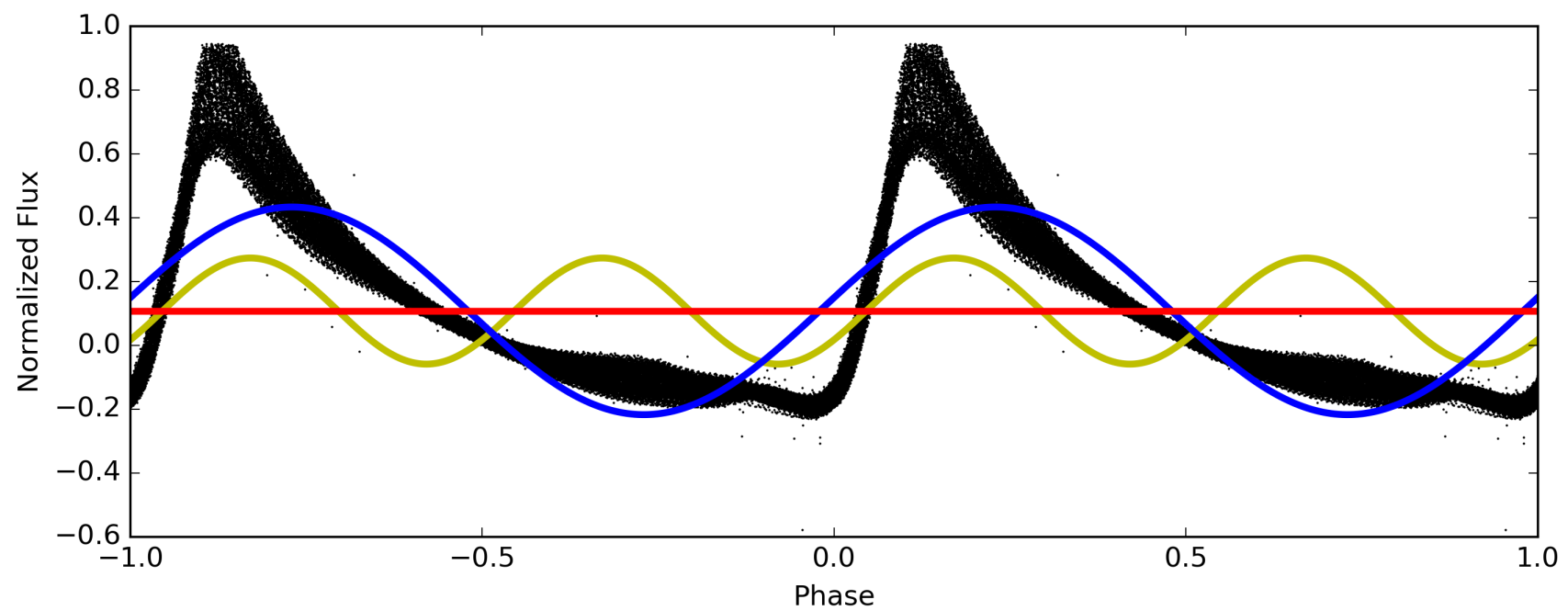
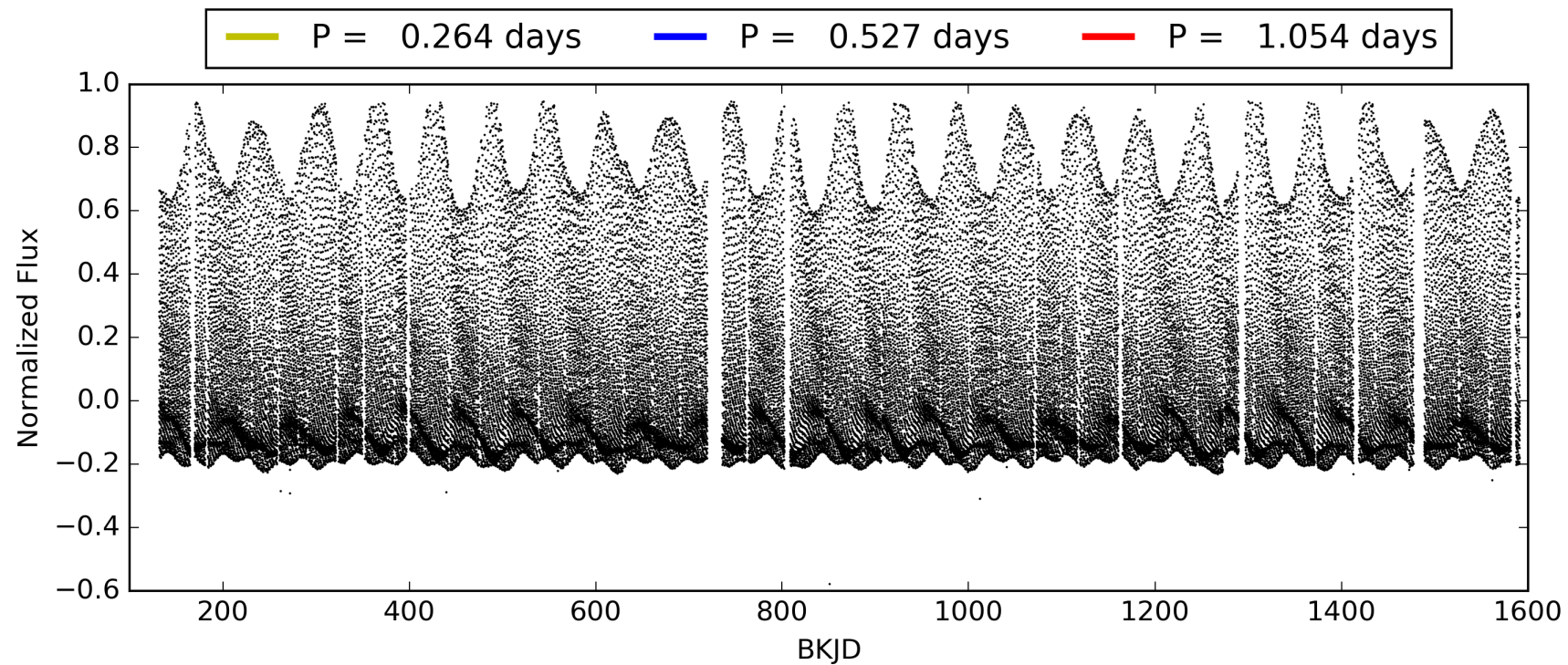
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009578833-02, PDC Light Curves



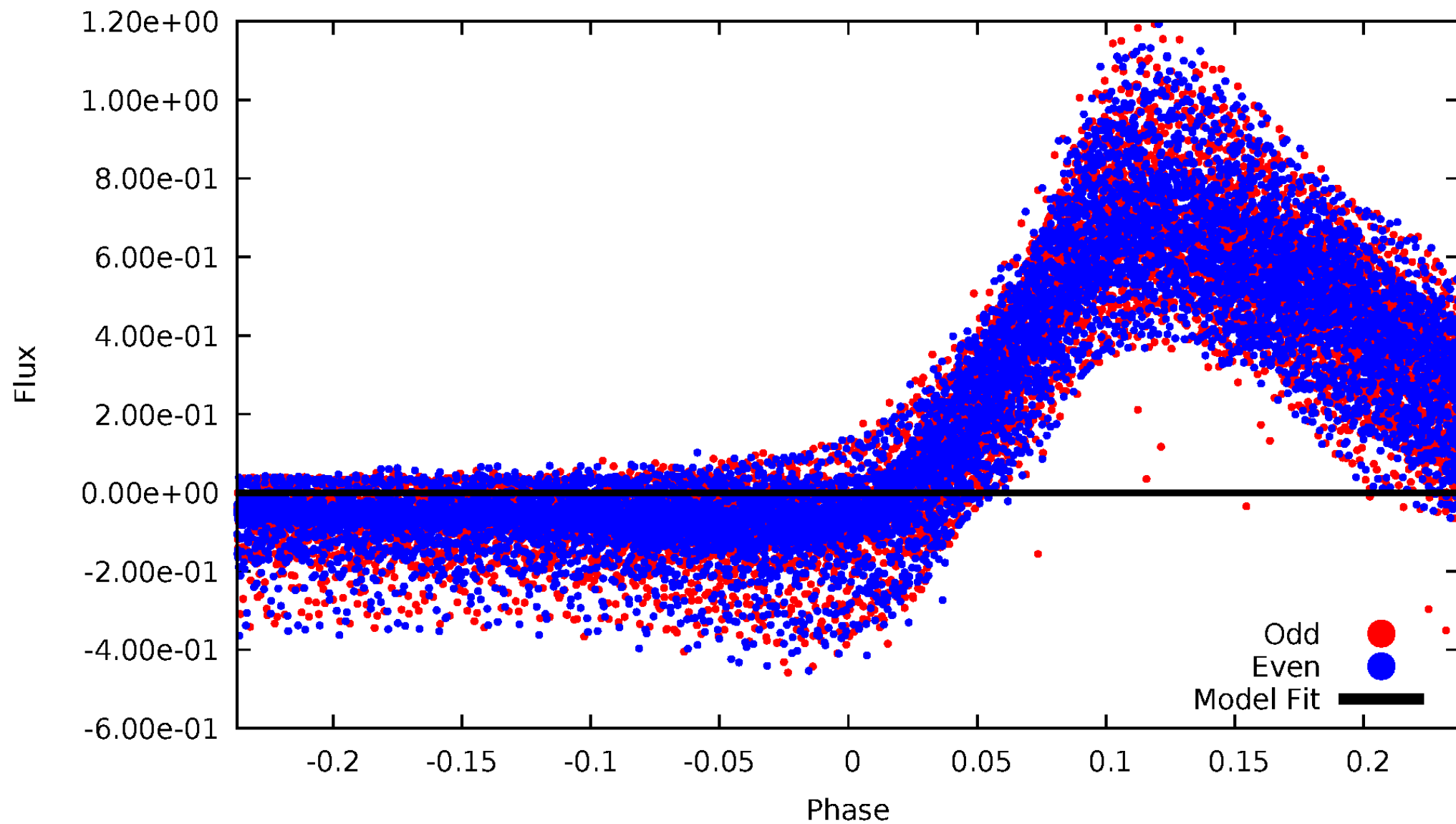


TCE 009578833-02



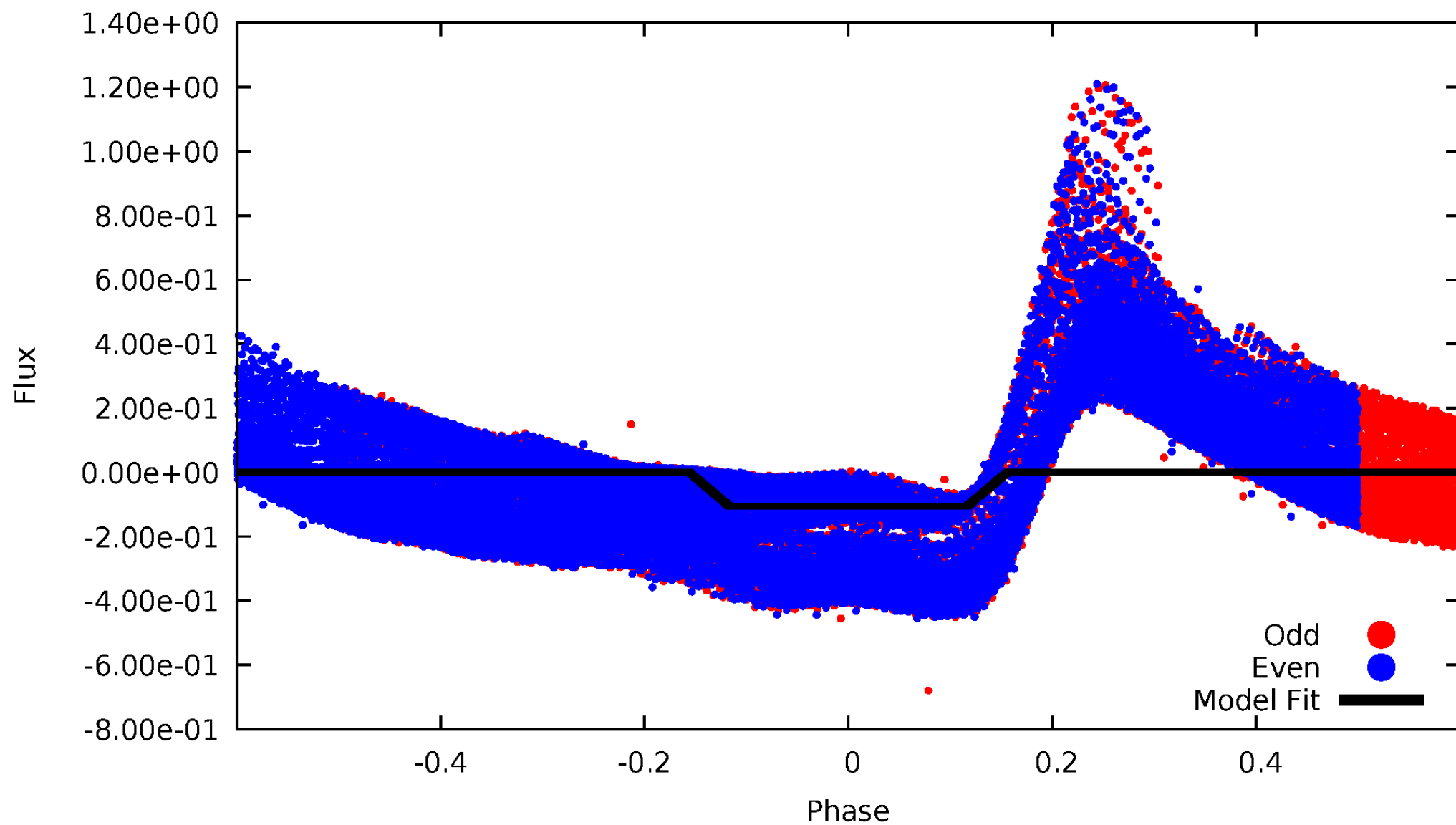
# DV Odd/Even

TCE 009578833-02



# ALT Odd/Even

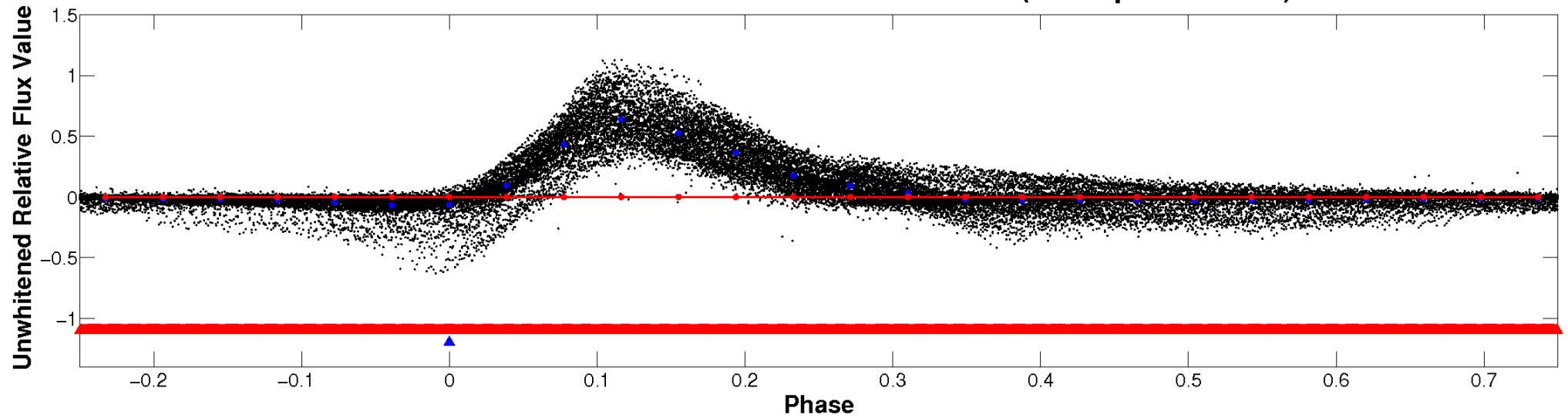
TCE 009578833-02



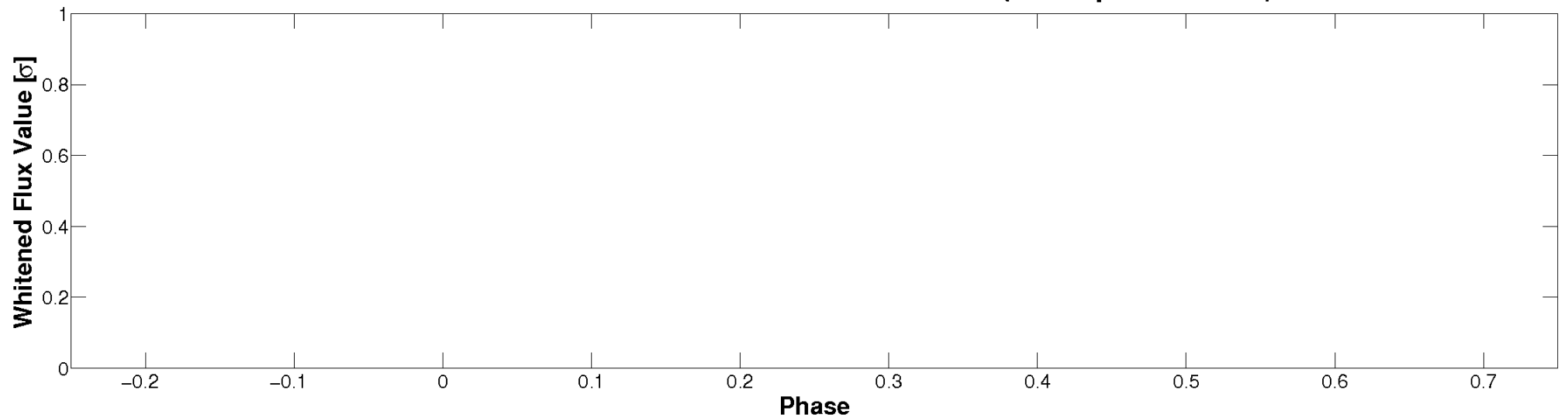


# Non-Whitened Vs. Whitened Light Curve

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

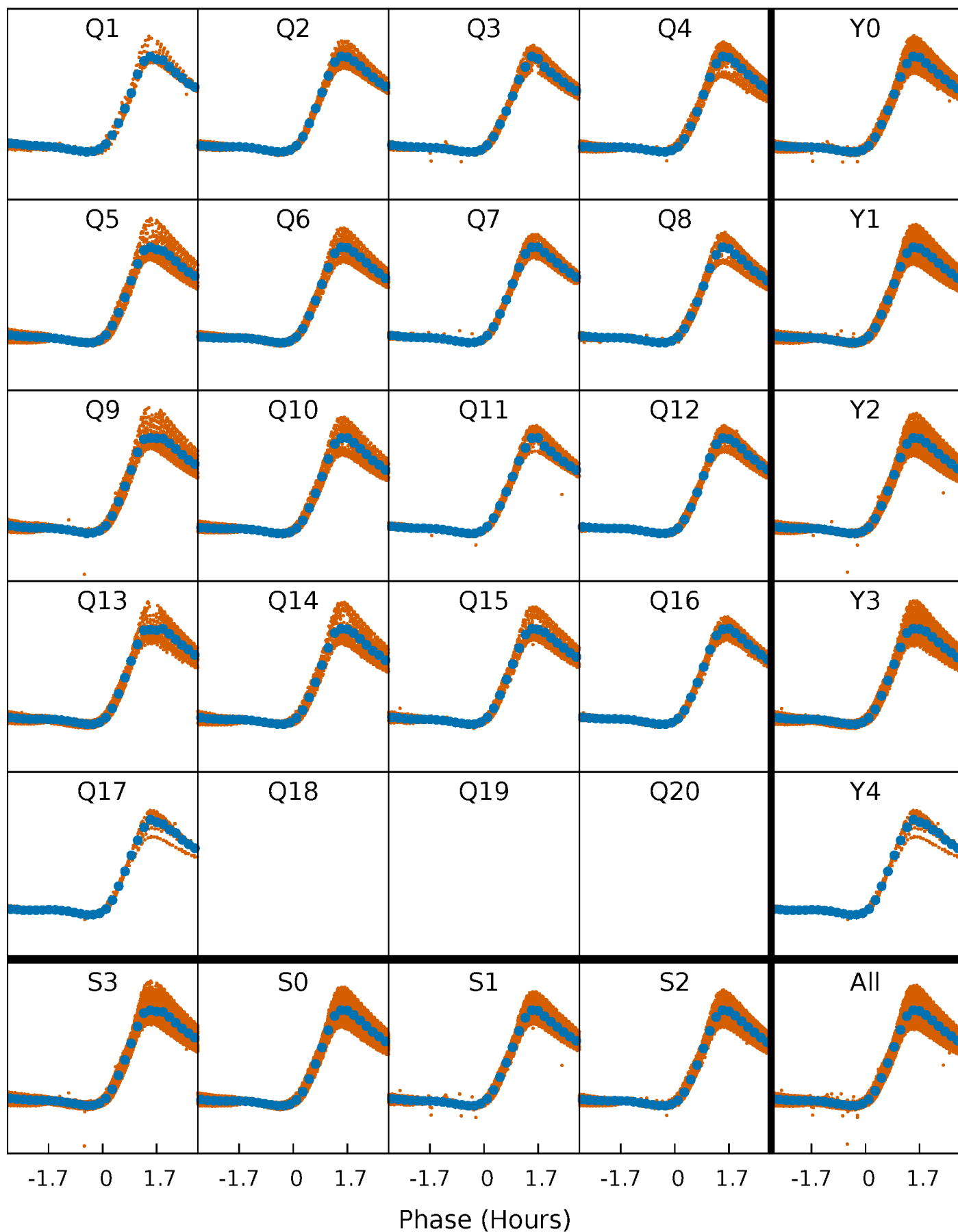


**Planet 2 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



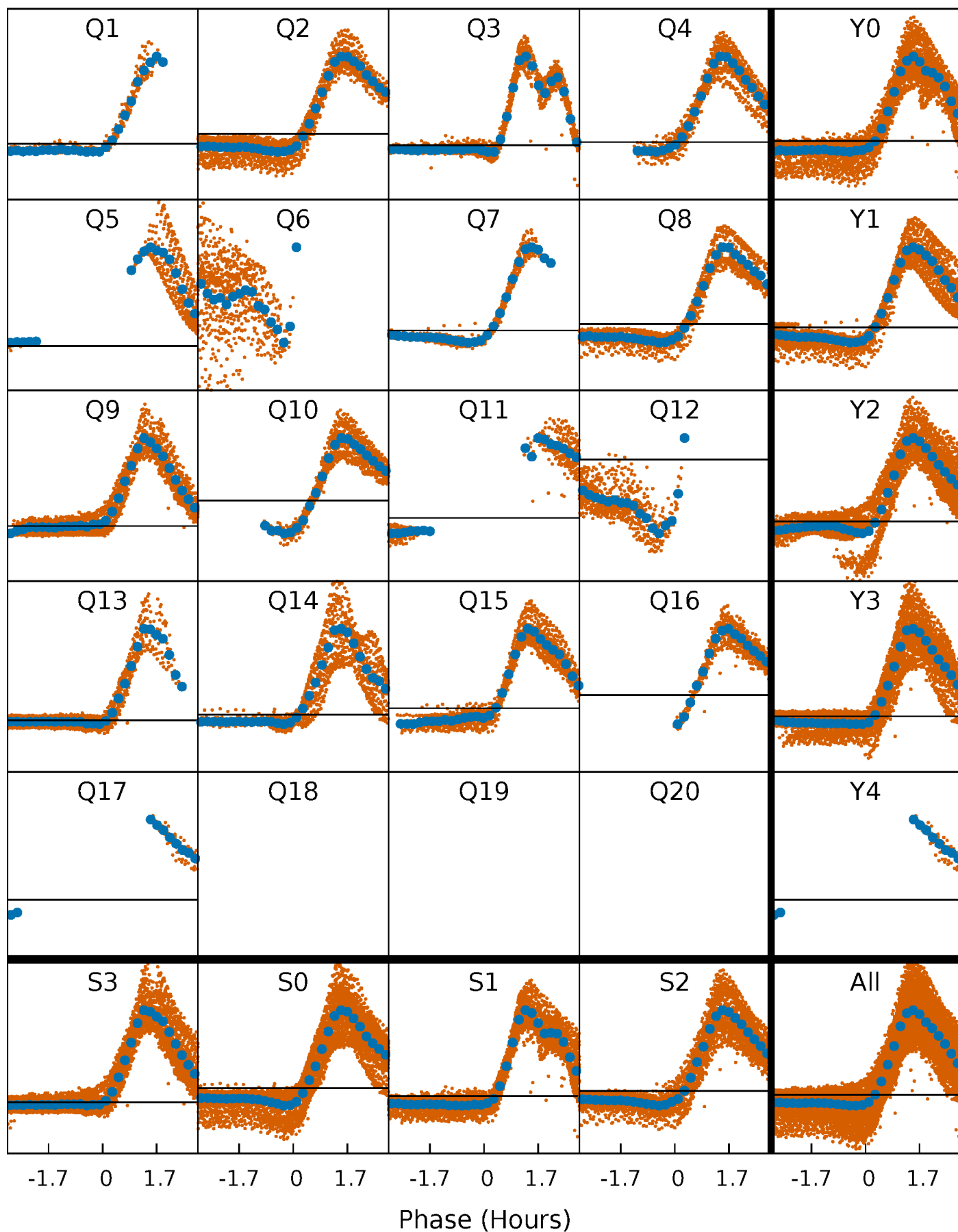
# PDC Quarter-Phased Transit Curves

TCE 009578833-02   P= 0.527028 Days    $T_0=131.589119$  (BKJD)



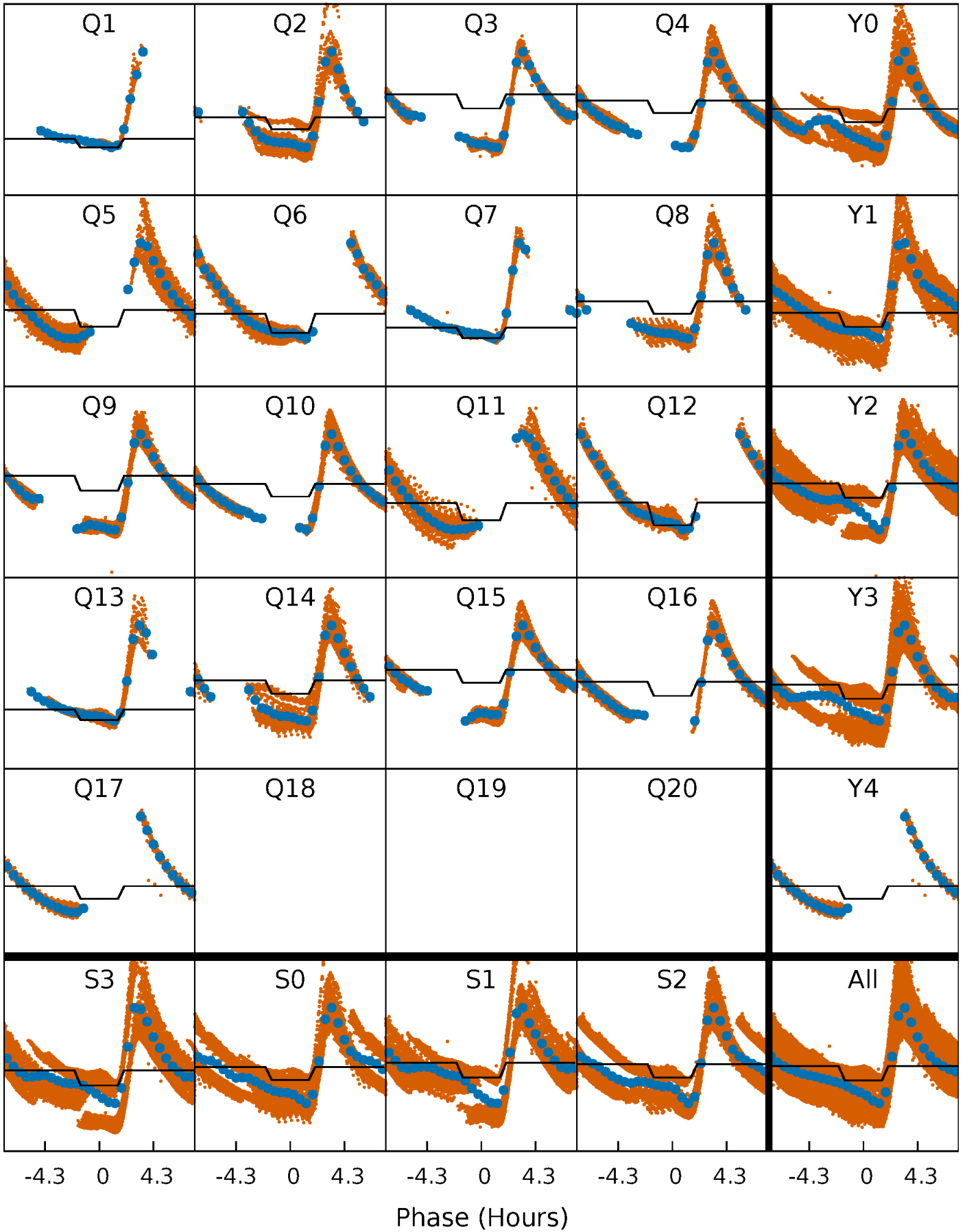
# DV Quarter-Phased Transit Curves

TCE 009578833-02   P= 0.527028 Days    $T_0=131.589119$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

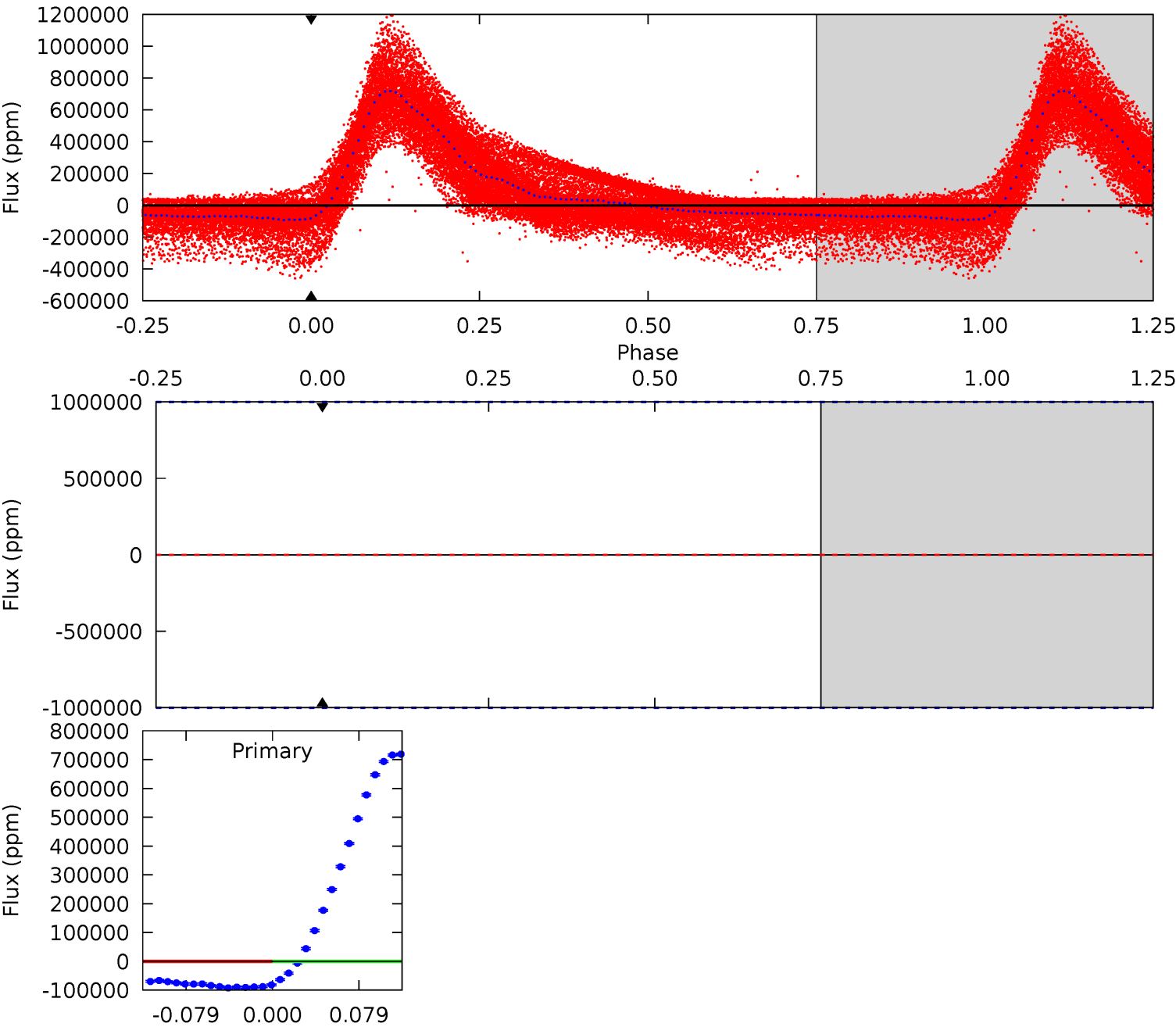
TCE 009578833-02     $P = 0.527028$  Days     $T_0 = 131.523745$  (BKJD)



# DV Model-Shift Uniqueness Test

009578833-02, P = 0.527028 Days, E = 131.062091 Days

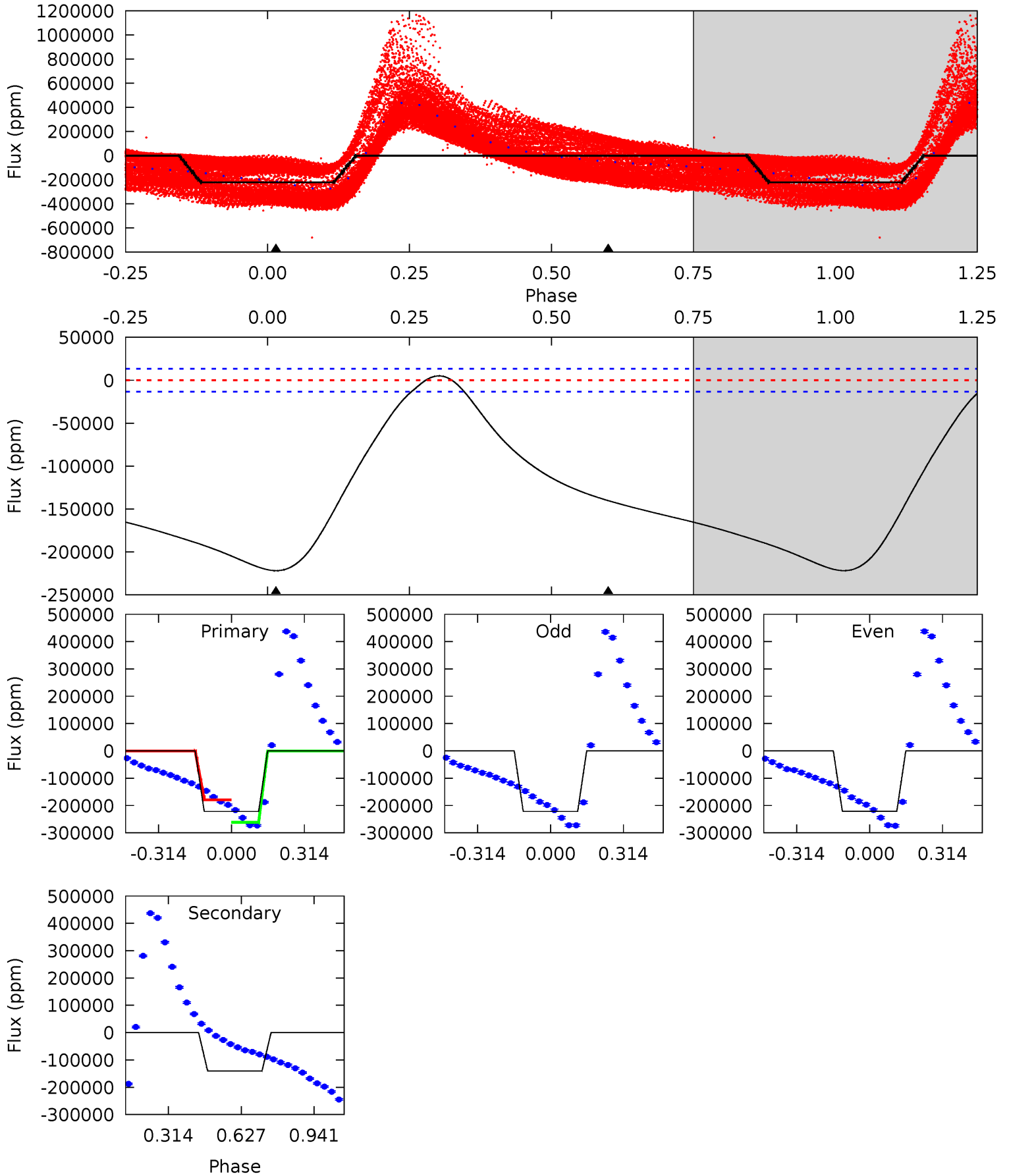
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

009578833-02, P = 0.527028 Days, E = 130.996717 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
71.4	45.2	0	0	4.32	1.01	2.08	71.4	71.4	45.2	45.2	0.05	0.93	0.02	13.2





### Stellar Parameters For KIC 009578833

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7211^{+200}_{-314}$	$4.110^{+0.153}_{-0.187}$	$-0.060^{+0.250}_{-0.350}$	$1.799^{+0.539}_{-0.392}$	$1.519^{+0.209}_{-0.255}$	$0.367^{+0.295}_{-0.191}$
	+3%/-4%	+4%/-5%	+417%/-583%	+30%/-22%	+14%/-17%	+80%/-52%
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 009578833-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$0 \pm 1000000$	$18.21^{+17.27}_{-12.52}$	$4930^{+388}_{-335}$	$-4150^{+36433}_{-17019}$	$0.059^{+75.648}_{-45.891}$
Alt.	$-140233 \pm 3104$	$64.06^{+21.81}_{-20.99}$	$4932^{+367}_{-332}$	$8035^{+2354}_{-1335}$	$4.694^{+5.411}_{-2.095}$

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

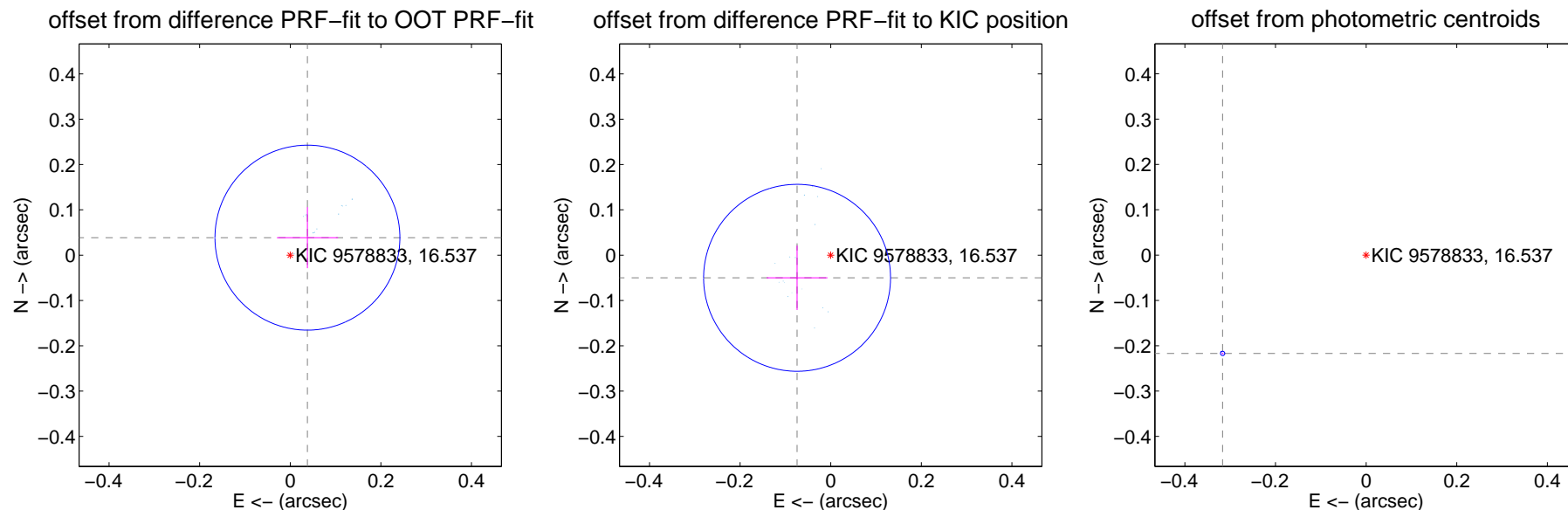
## DV Centroid Data

Supplemental centroid analysis for 009578833-02. Kepler magnitude: 16.54. Transit SNR -1.00

There are 17 quarters with good PRF difference image offsets

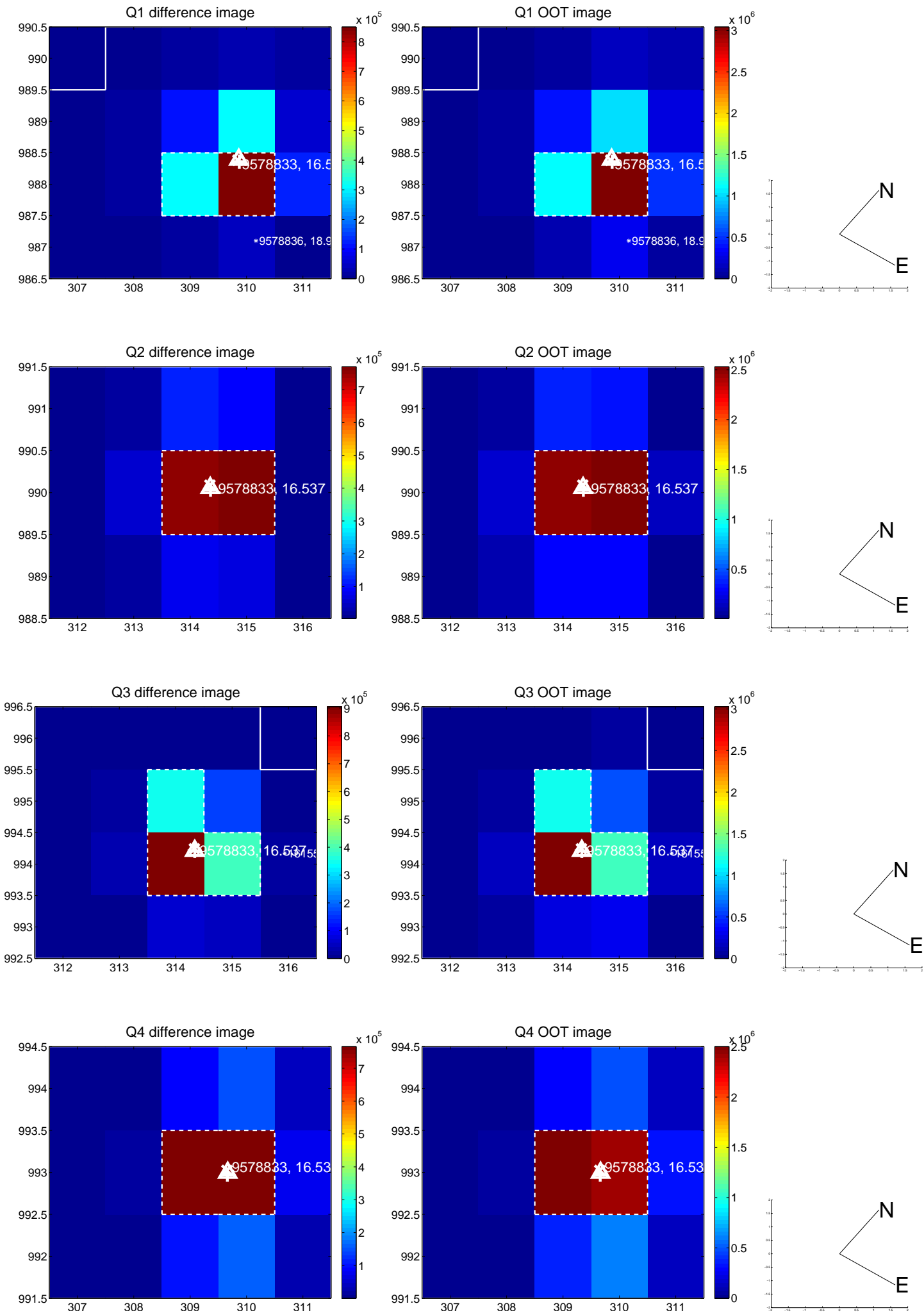
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.054 \pm 0.068$	0.80	$-0.038 \pm 0.067$	$0.039 \pm 0.067$
PRF-fit source offset from KIC position	$0.090 \pm 0.069$	1.30	$0.074 \pm 0.067$	$-0.050 \pm 0.071$
photometric centroid source offset	$0.38 \pm 0.00$	244.83	$0.32 \pm 0.00$	$-0.22 \pm 0.00$

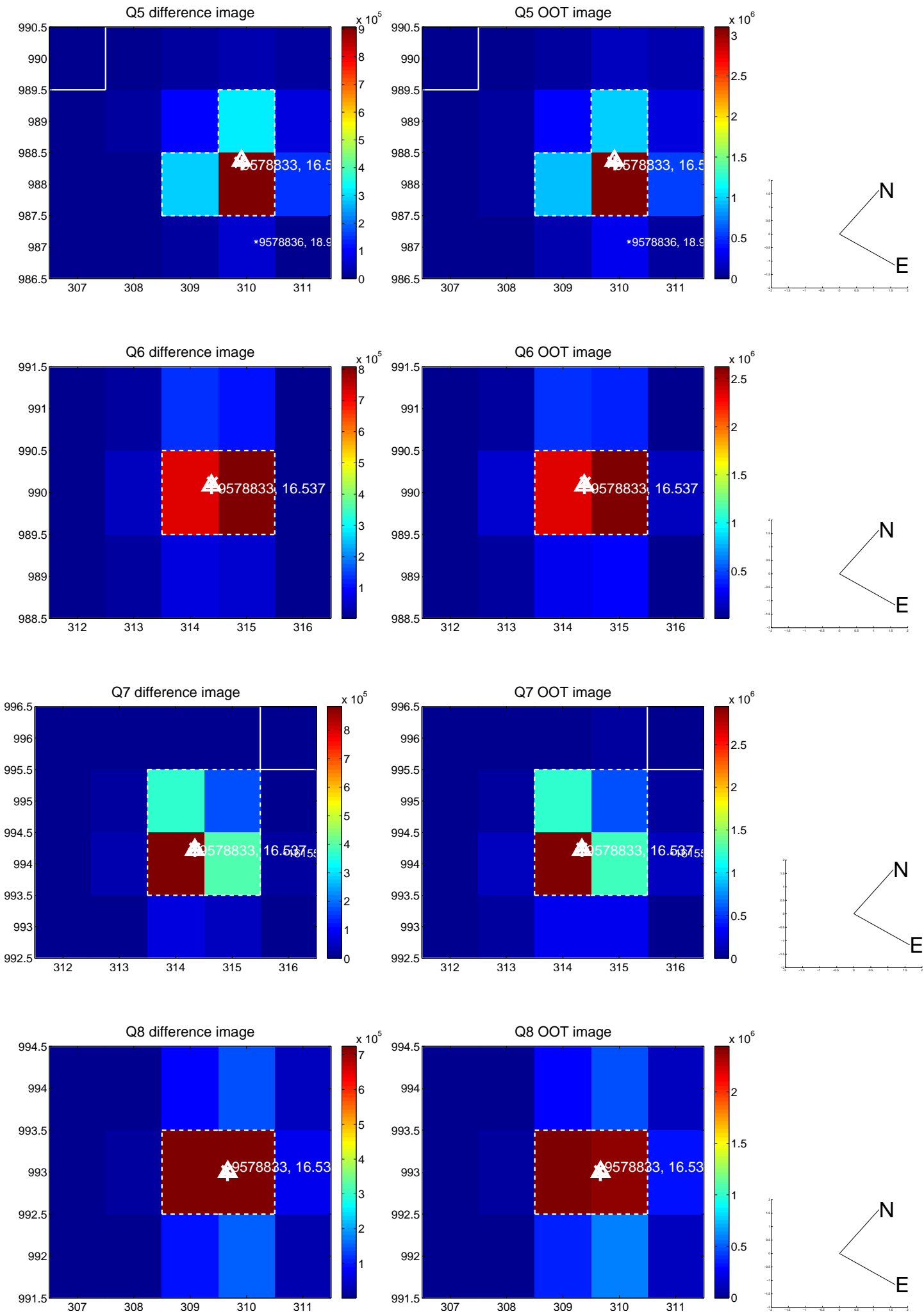


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

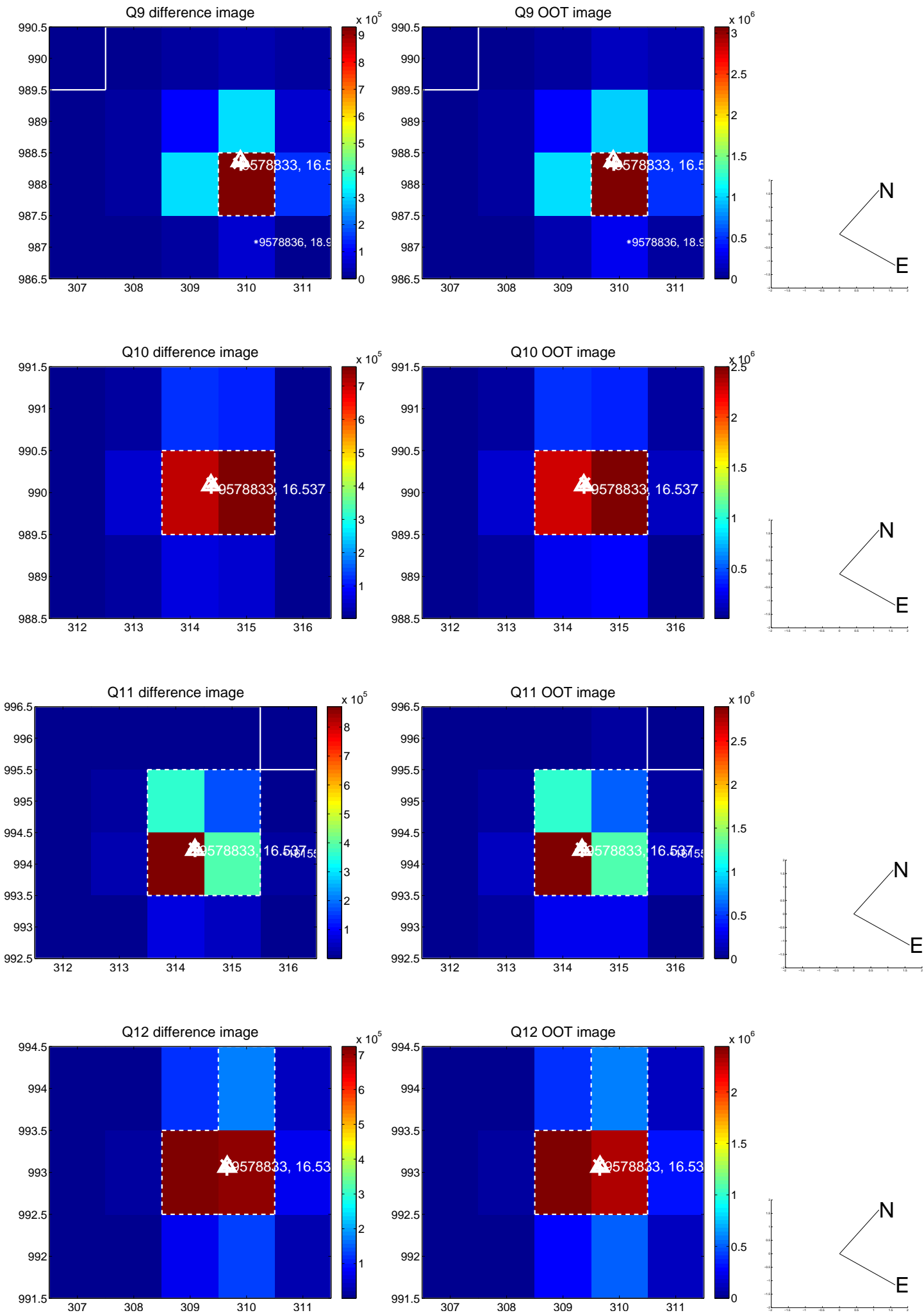
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



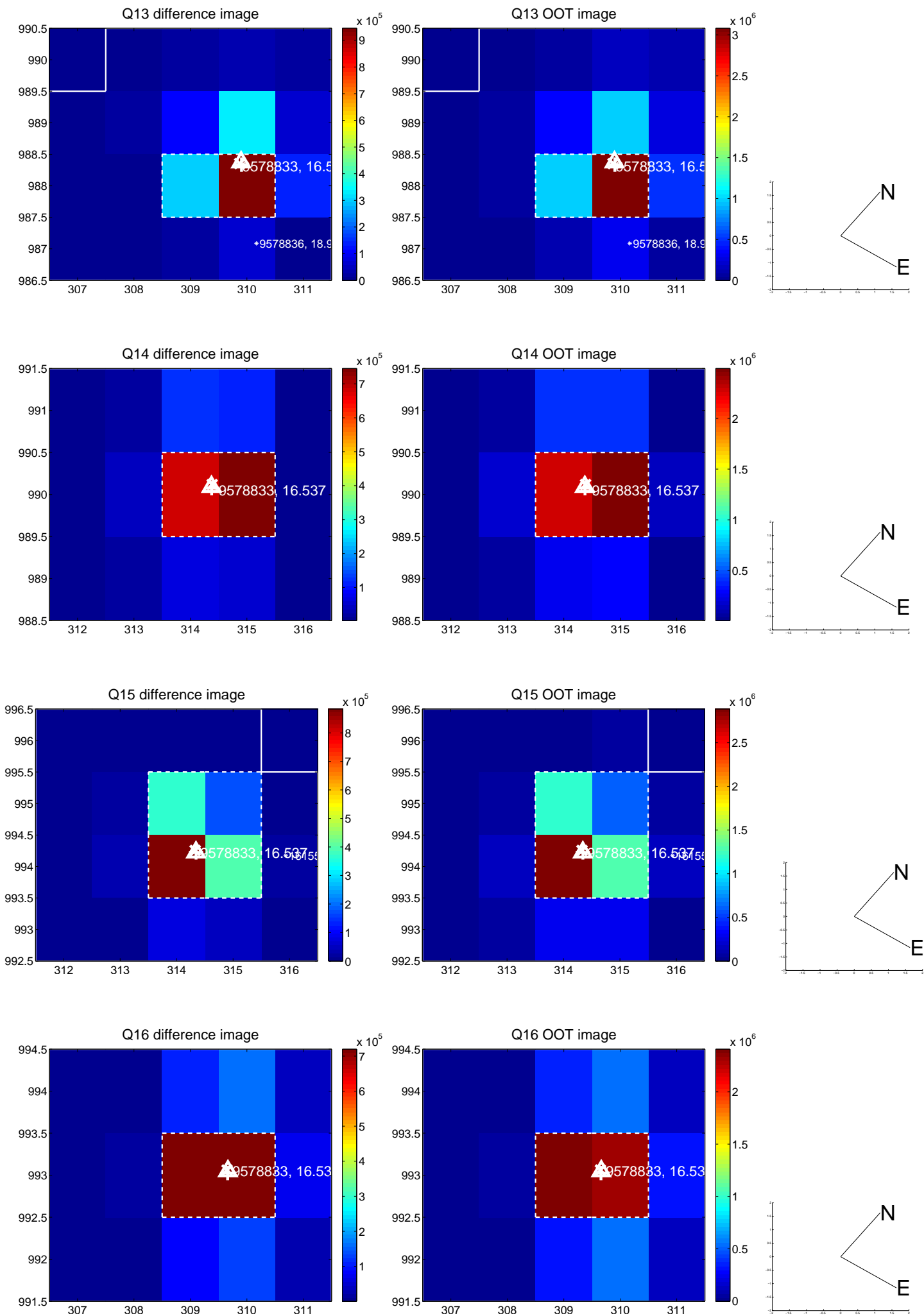
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

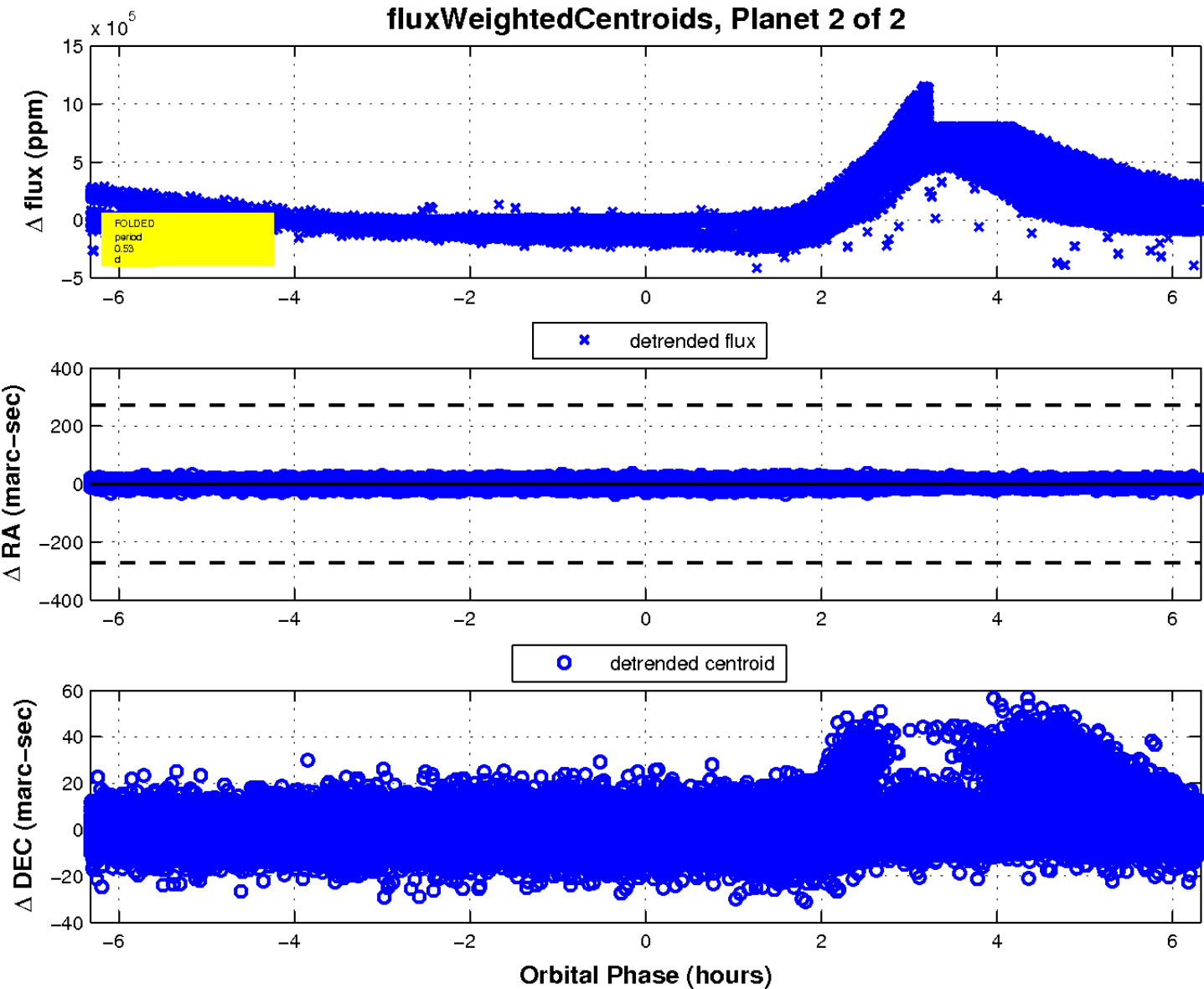
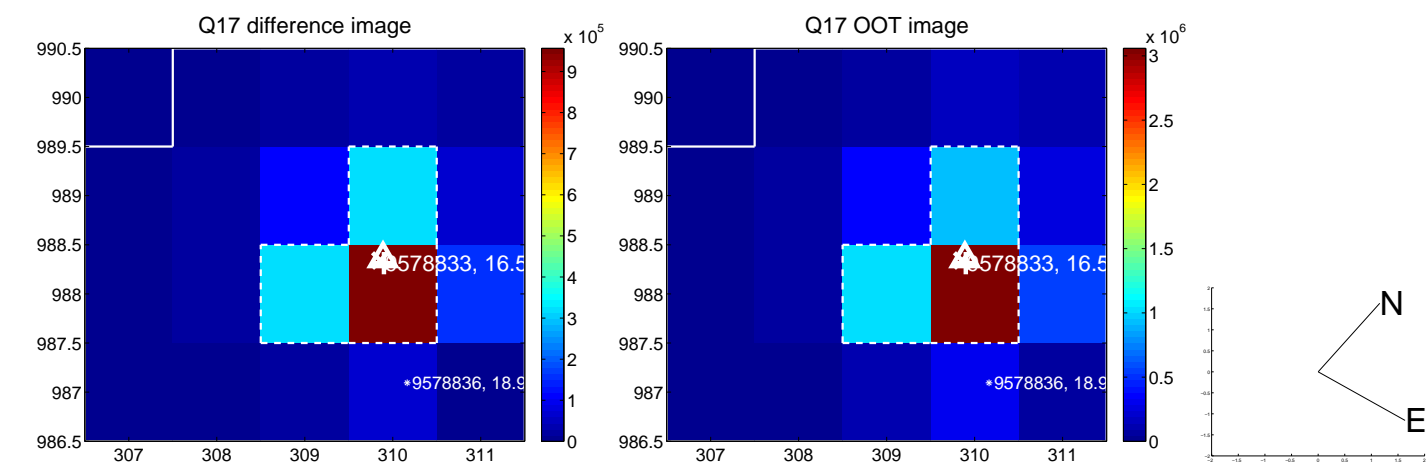


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



UKIRT Image

Declination

