

# KIC 003967760

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003967760-01	OBS	1760.01	5.524194	135.622056	473.4	2.955	17.3	18.8	1.00	5334	2.61	215.06
003967760-02	OBS	1760.02	8.775105	133.706628	371.5	3.390	10.8	12.2	1.00	5334	2.29	116.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003967760-01	OBS	PC	0.68	0	0	0	0	NO_COMMENT
003967760-02	OBS	PC	0.97	0	0	0	0	NO_COMMENT

**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.

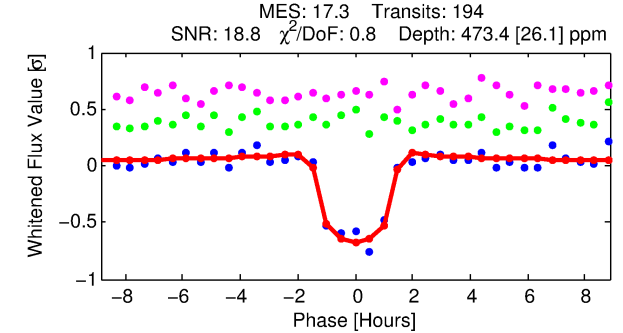
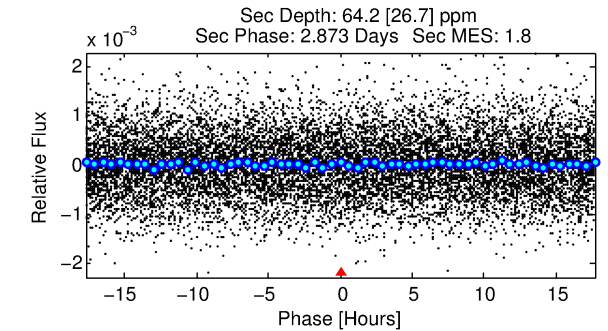
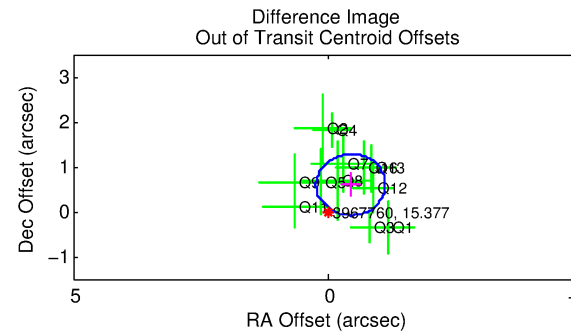
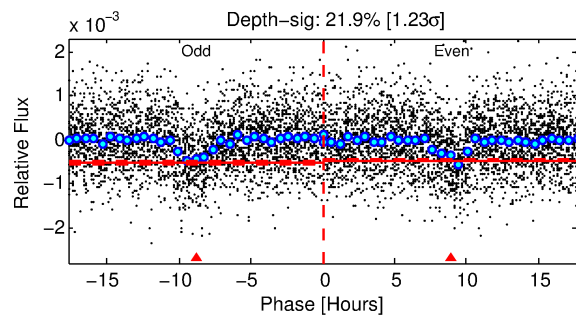
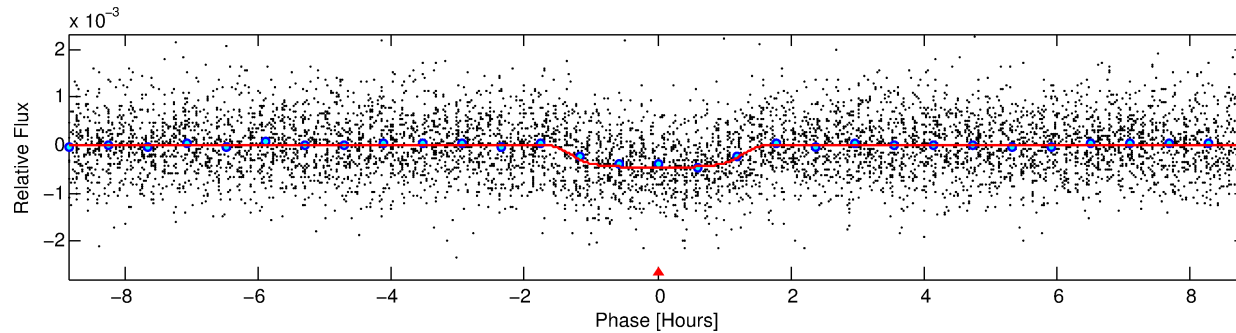
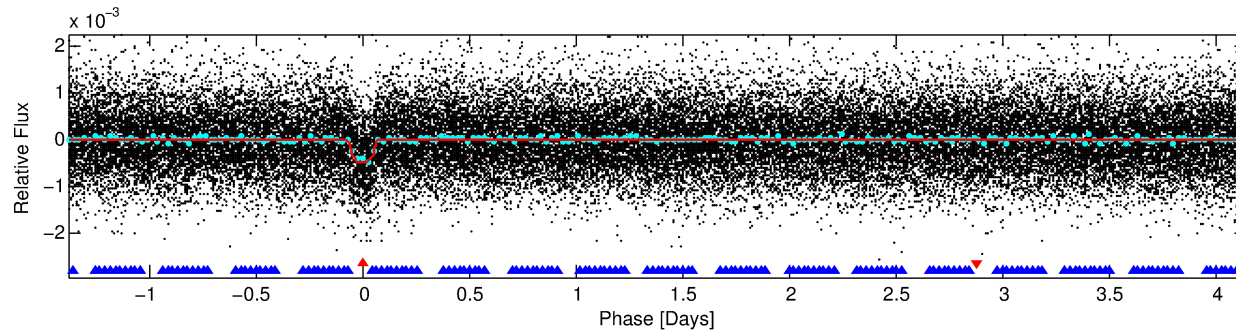
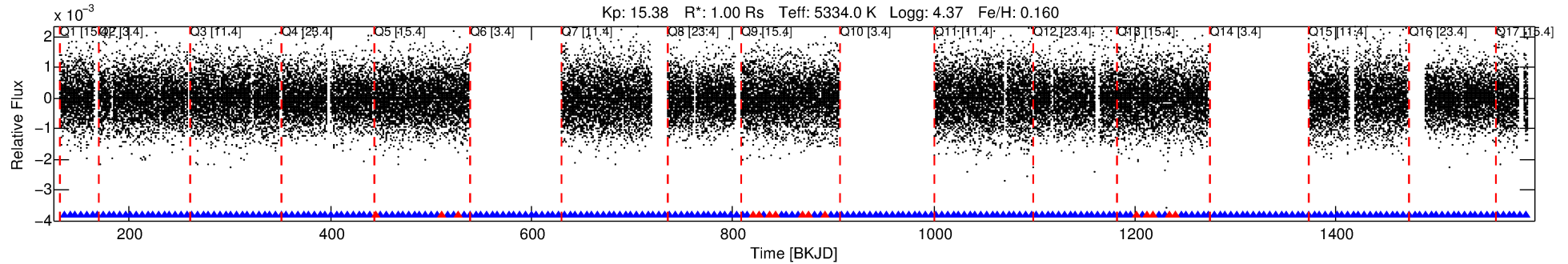
## Ephemeris Match Information For 003967760-01

No Significant Match Found

# DV One-Page Summary

KIC: 3967760 Candidate: 1 of 2 Period: 5.524 d  
KOI: K01760.01 Name: Kepler-317b Corr: 0.964

Kp: 15.38 R\*: 1.00 Rs Teff: 5334.0 K Logg: 4.37 Fe/H: 0.160



## DV Fit Results:

Period = 5.52419 [0.00002] d  
Epoch = 135.6221 [0.0025] BKJD  
Rp/R\* = 0.0238 [0.0053]  
a/R\* = 7.29 [6.49]  
b = 0.89 [0.22]  
Seff = 215.07 [49.11]  
Teff = 976 [56] K  
Rp = 2.61 [0.67] Re  
a = 0.0583 [0.0078] AU  
Ag = 17.62 [11.41] [1.46σ]  
Teffp = 3093 [473] K [4.44σ]

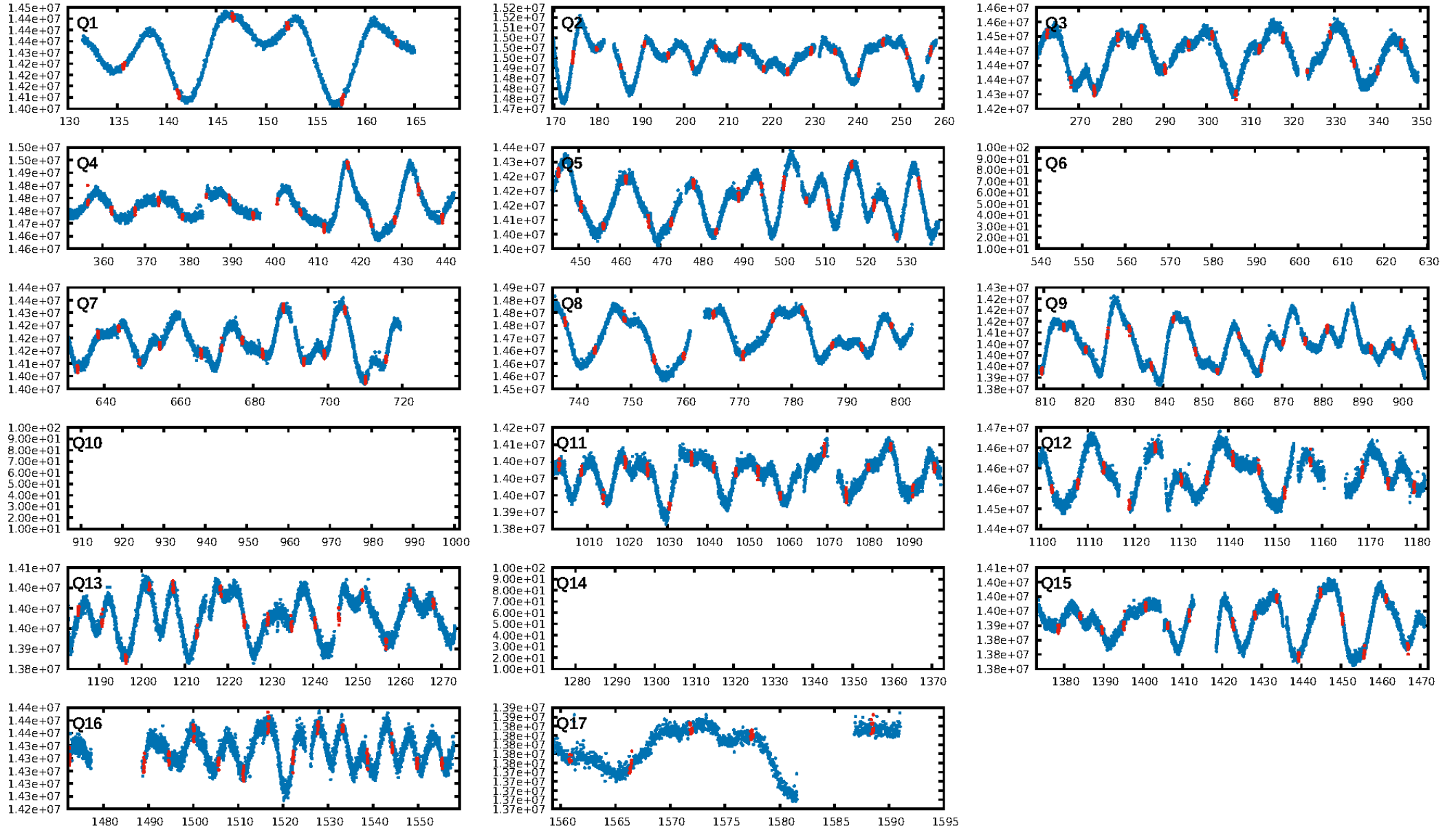
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [17.35σ]  
ModelChiSquare2-sig: 100.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 5.78e-65  
RollingBand-fgt: 0.92 [168/183]  
GhostDiagnostic-chr: 2.052  
Centroid-sig: 0.0%  
Centroid-so: 1.749 arcsec [2.36σ]  
OotOffset-rm: 0.752 arcsec [3.31σ]  
KicOffset-rm: 0.684 arcsec [2.92σ]  
OotOffset-st: 1/3/4/4 [12]  
KicOffset-st: 1/3/4/4 [12]  
DiffImageQuality-fgm: 1.00 [12/12]  
DiffImageOverlap-fno: 1.00 [14/14]

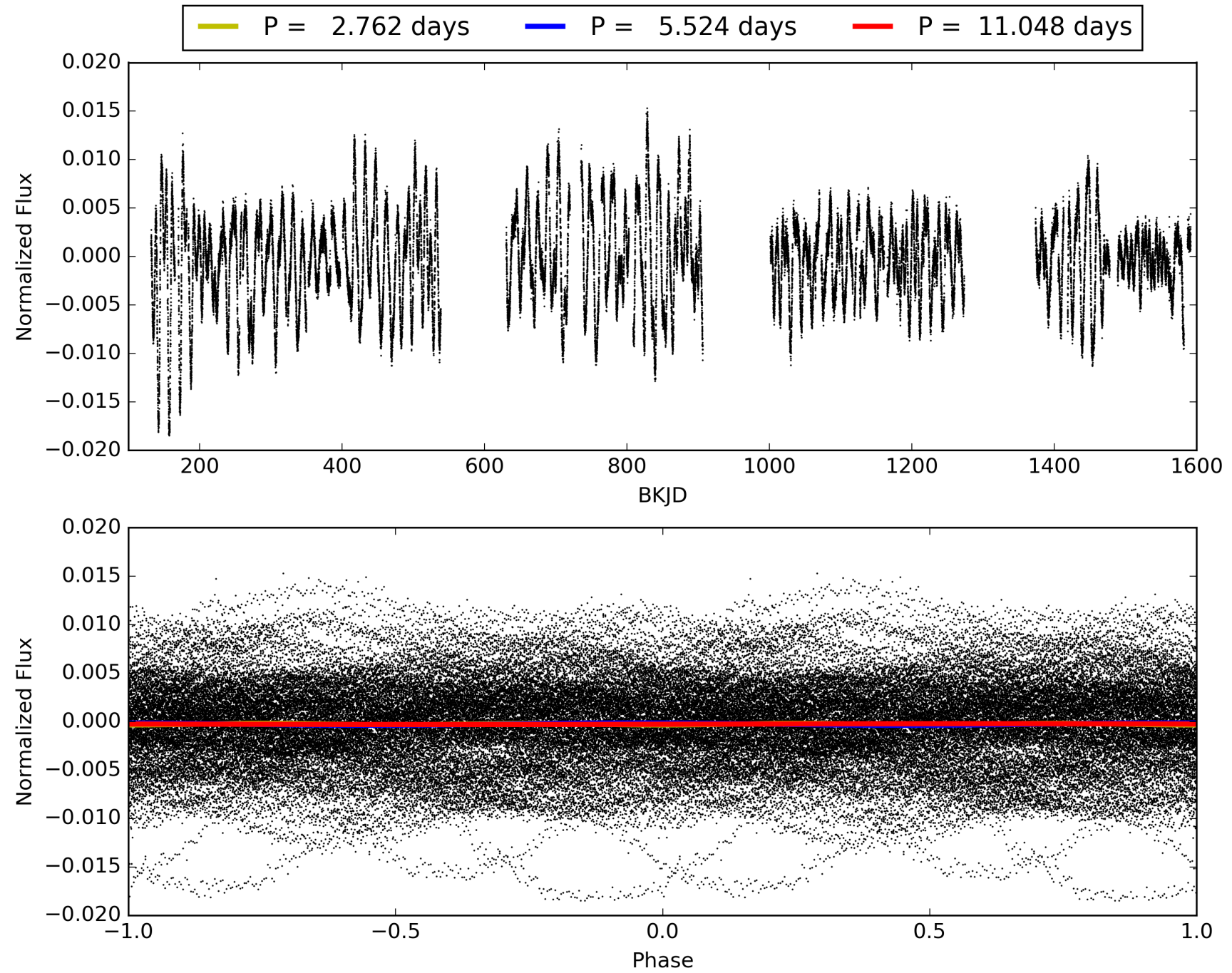
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 16:49:58 Z

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

# TCE 003967760-01, PDC Light Curves

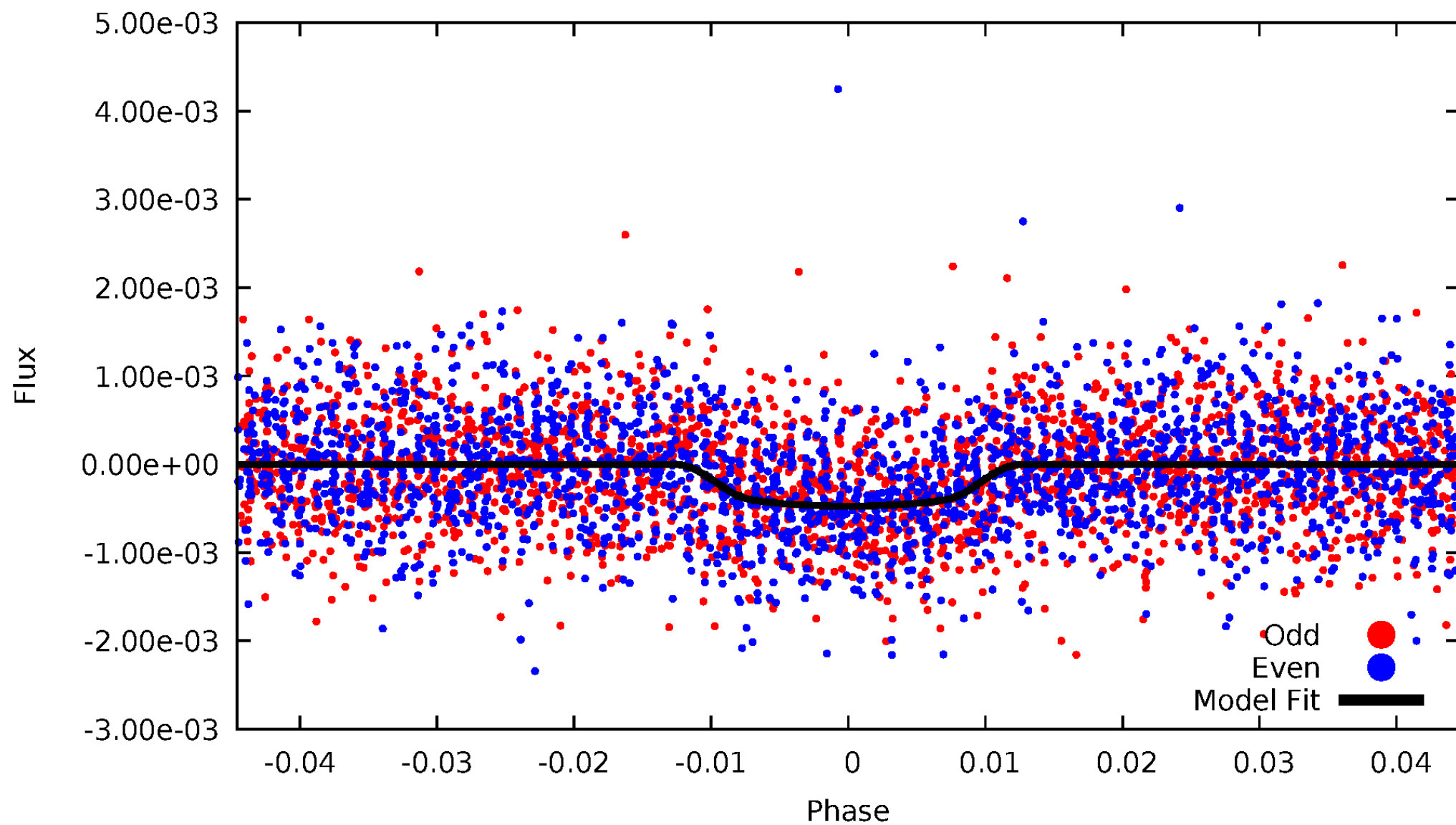


TCE 003967760-01



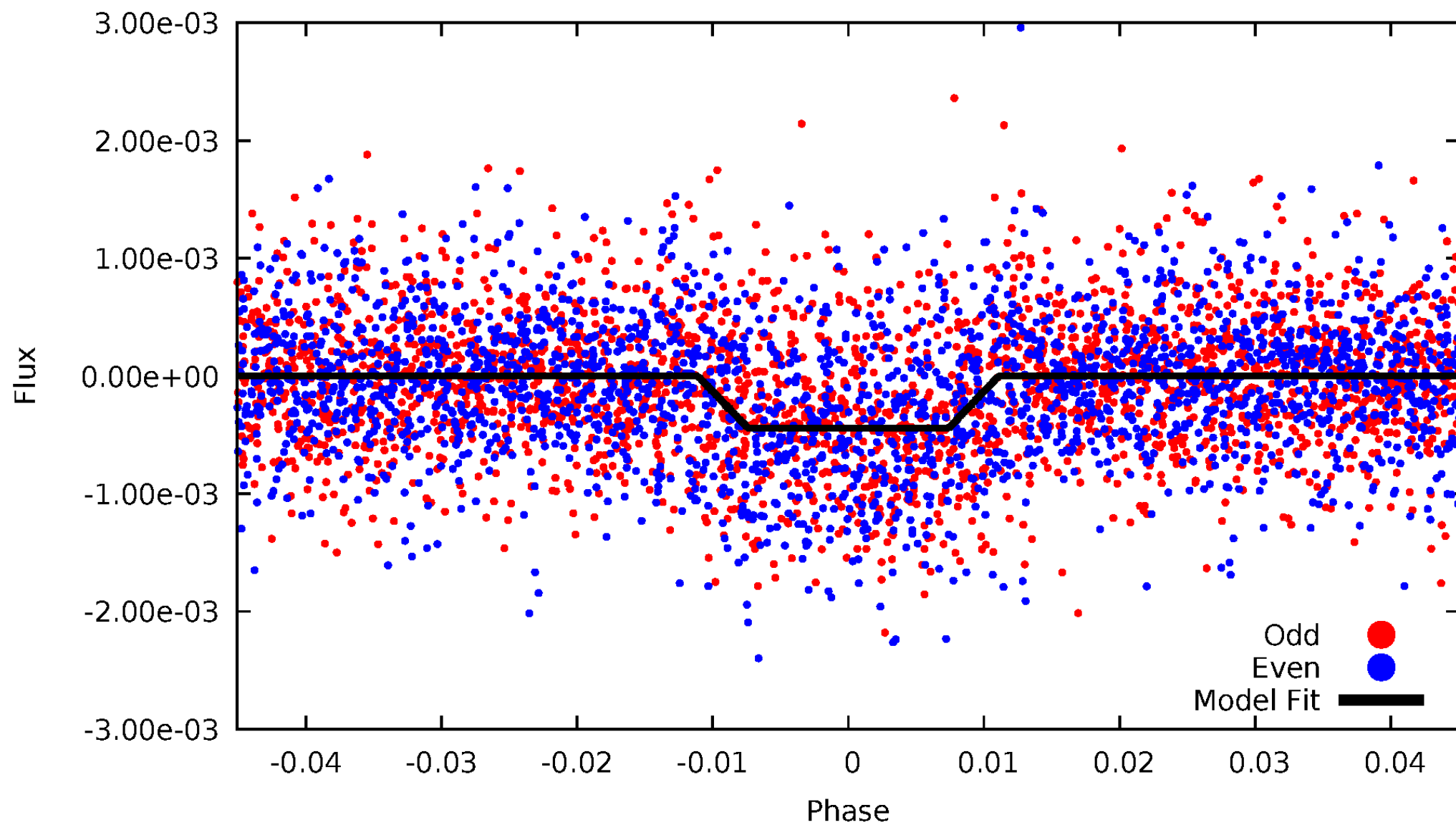
# DV Odd/Even

TCE 003967760-01



# ALT Odd/Even

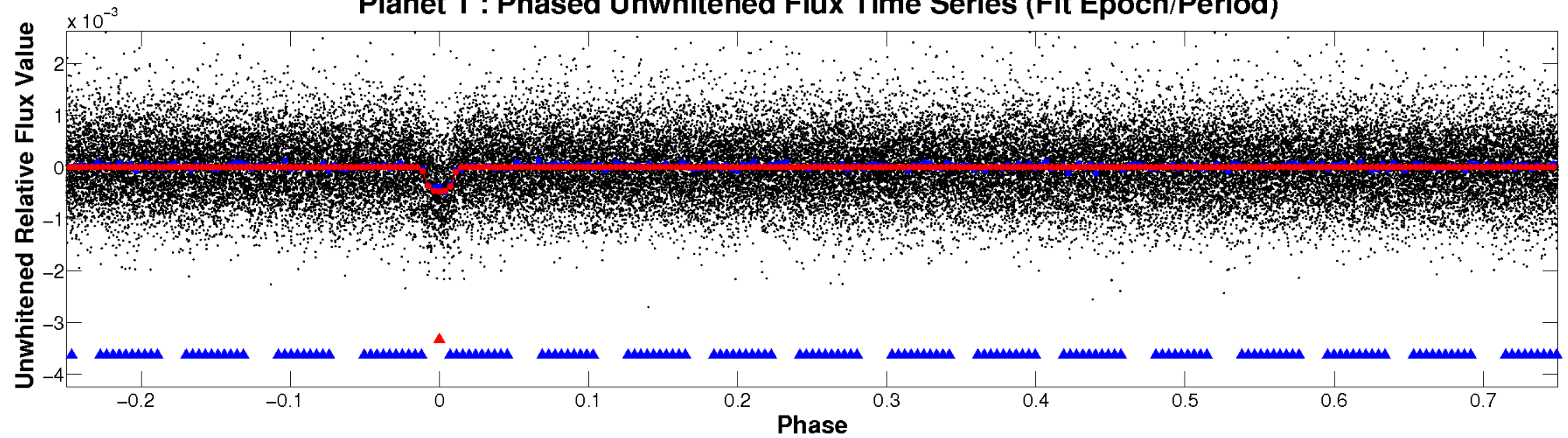
TCE 003967760-01



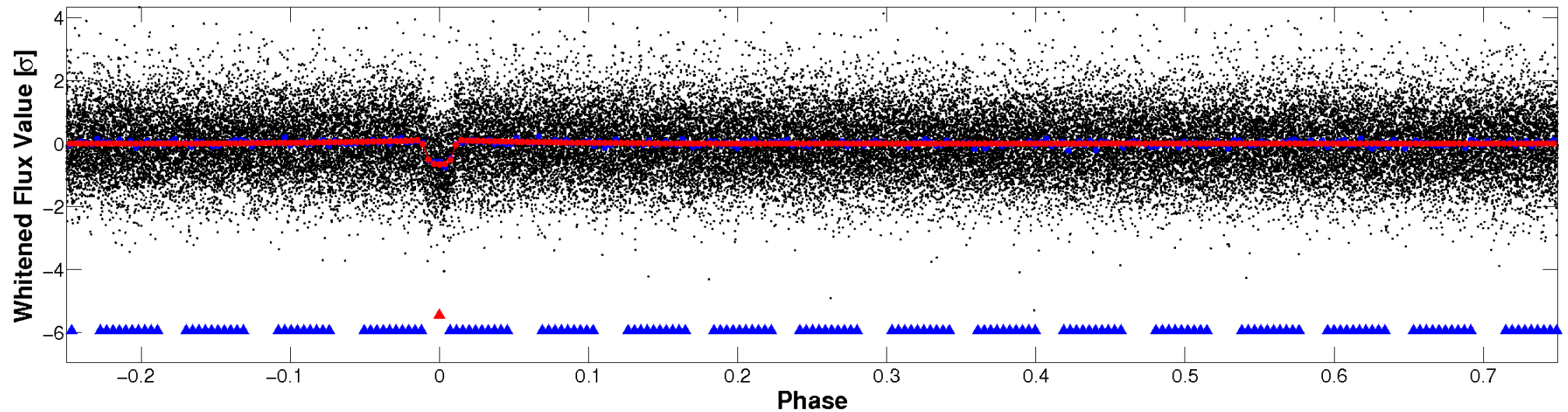


# Non-Whitened Vs. Whitened Light Curve

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

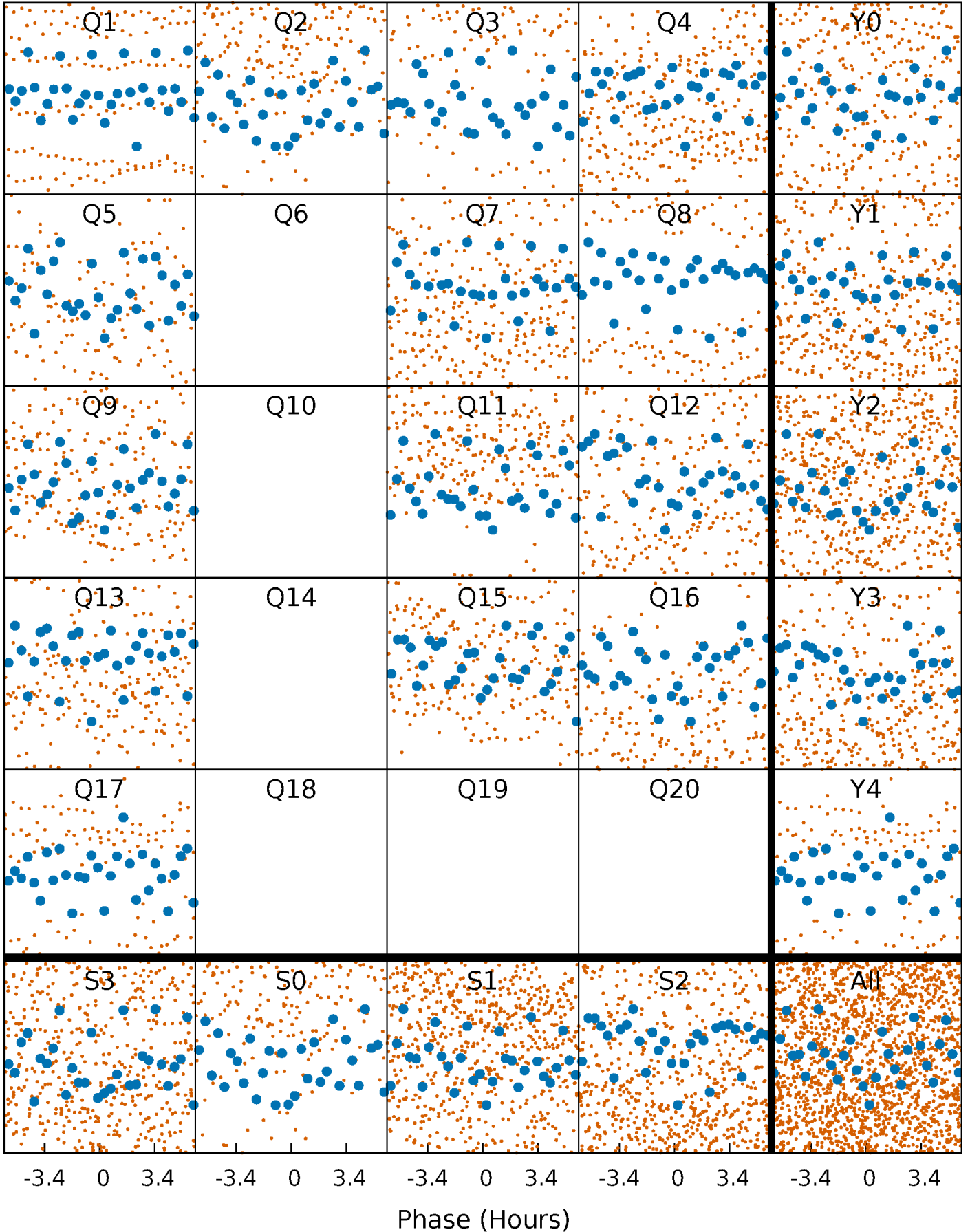


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

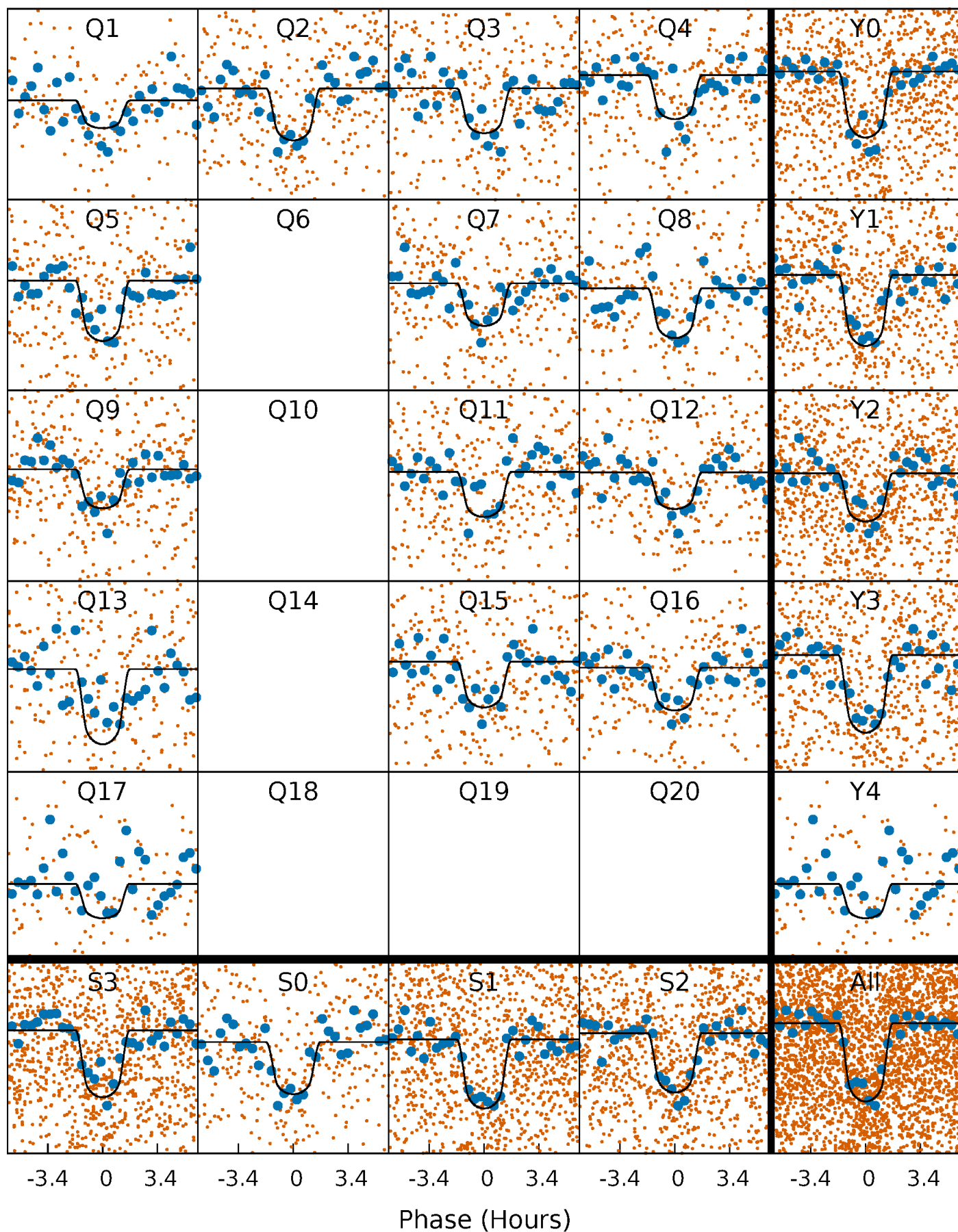
TCE 003967760-01 P= 5.524194 Days  $T_0=135.622056$  (BKJD)





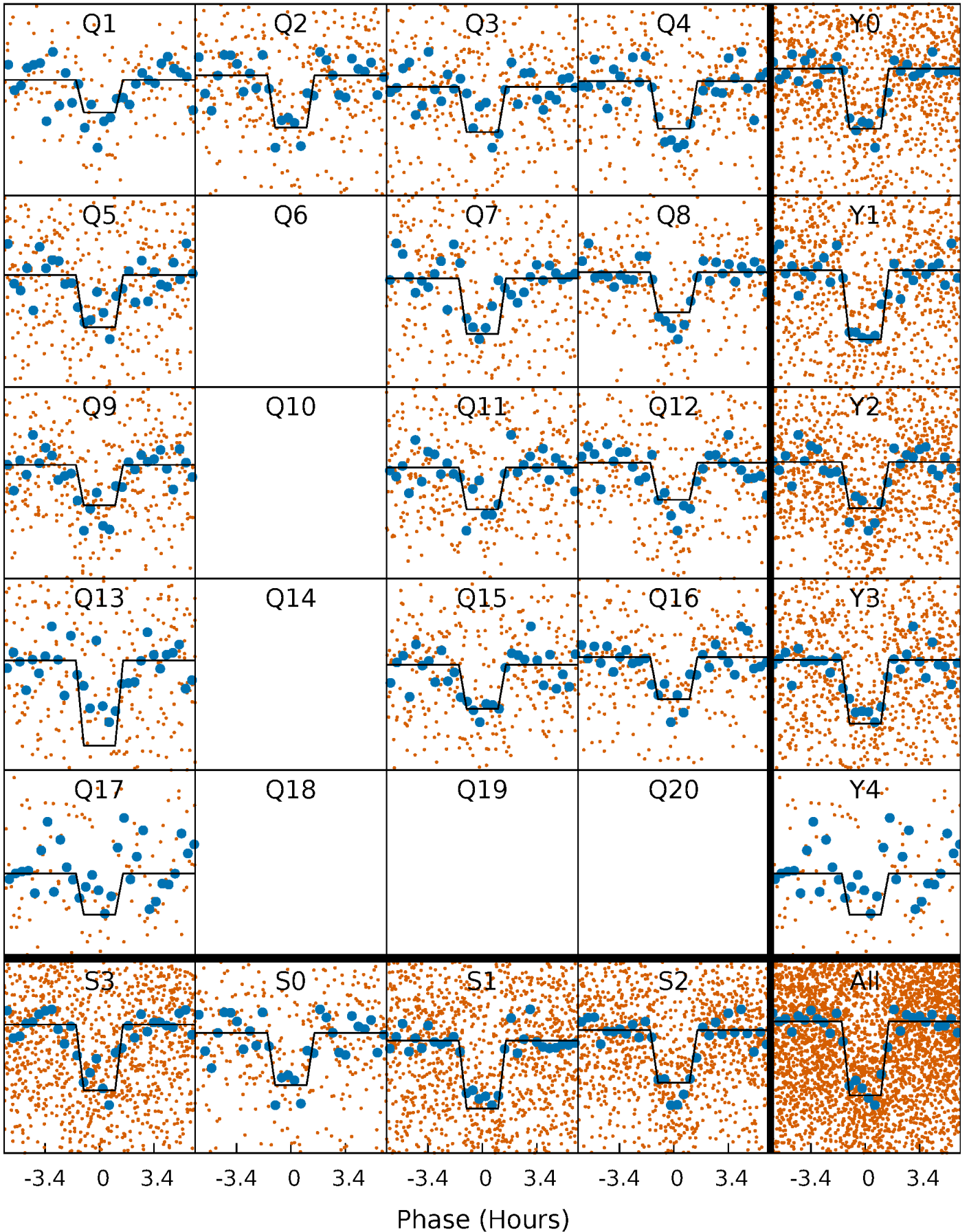
# DV Quarter-Phased Transit Curves

TCE 003967760-01 P= 5.524194 Days  $T_0=135.622056$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

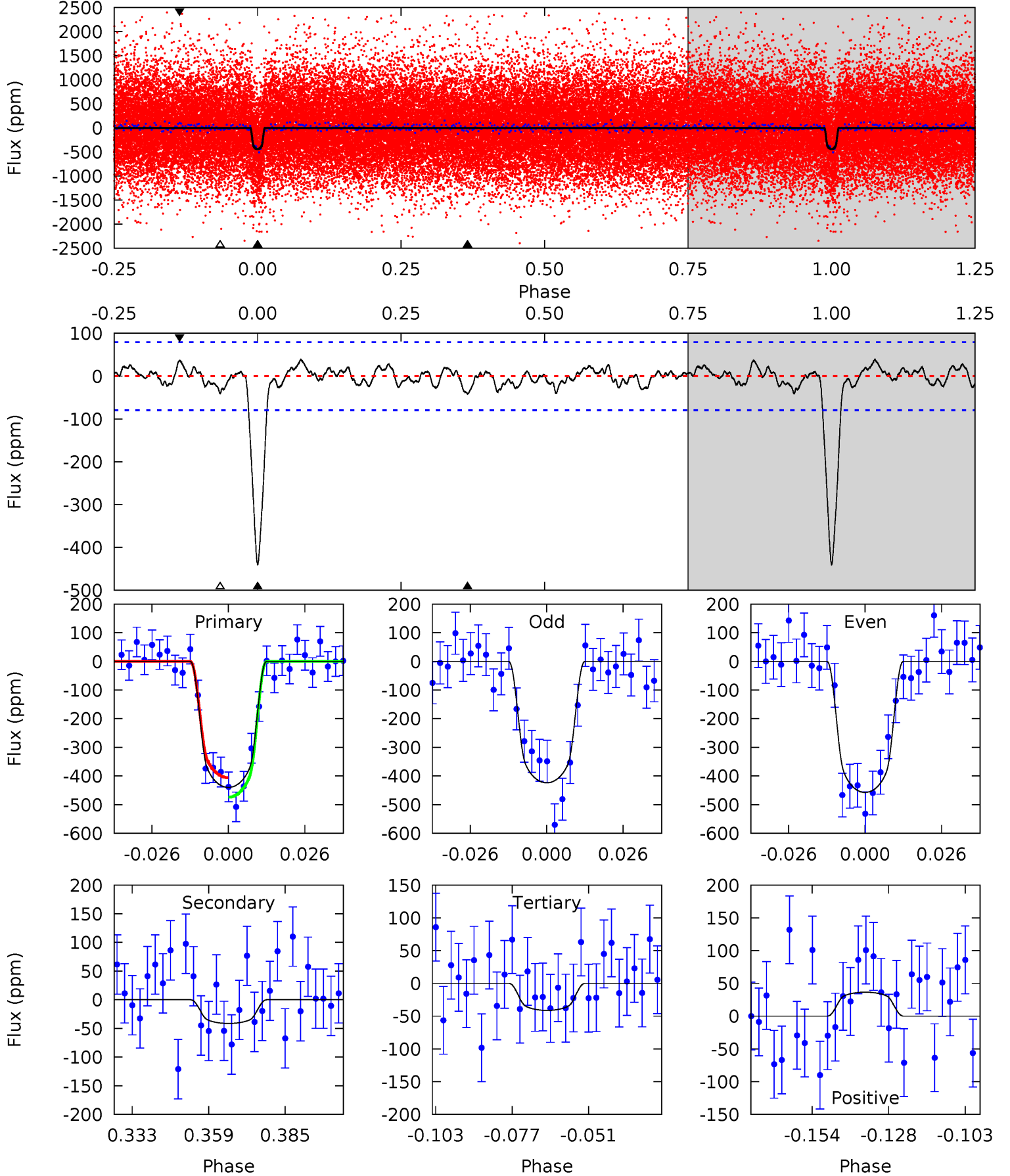
TCE 003967760-01 P= 5.524204 Days  $T_0=135.619984$  (BKJD)



# DV Model-Shift Uniqueness Test

003967760-01, P = 5.524194 Days, E = 130.097862 Days

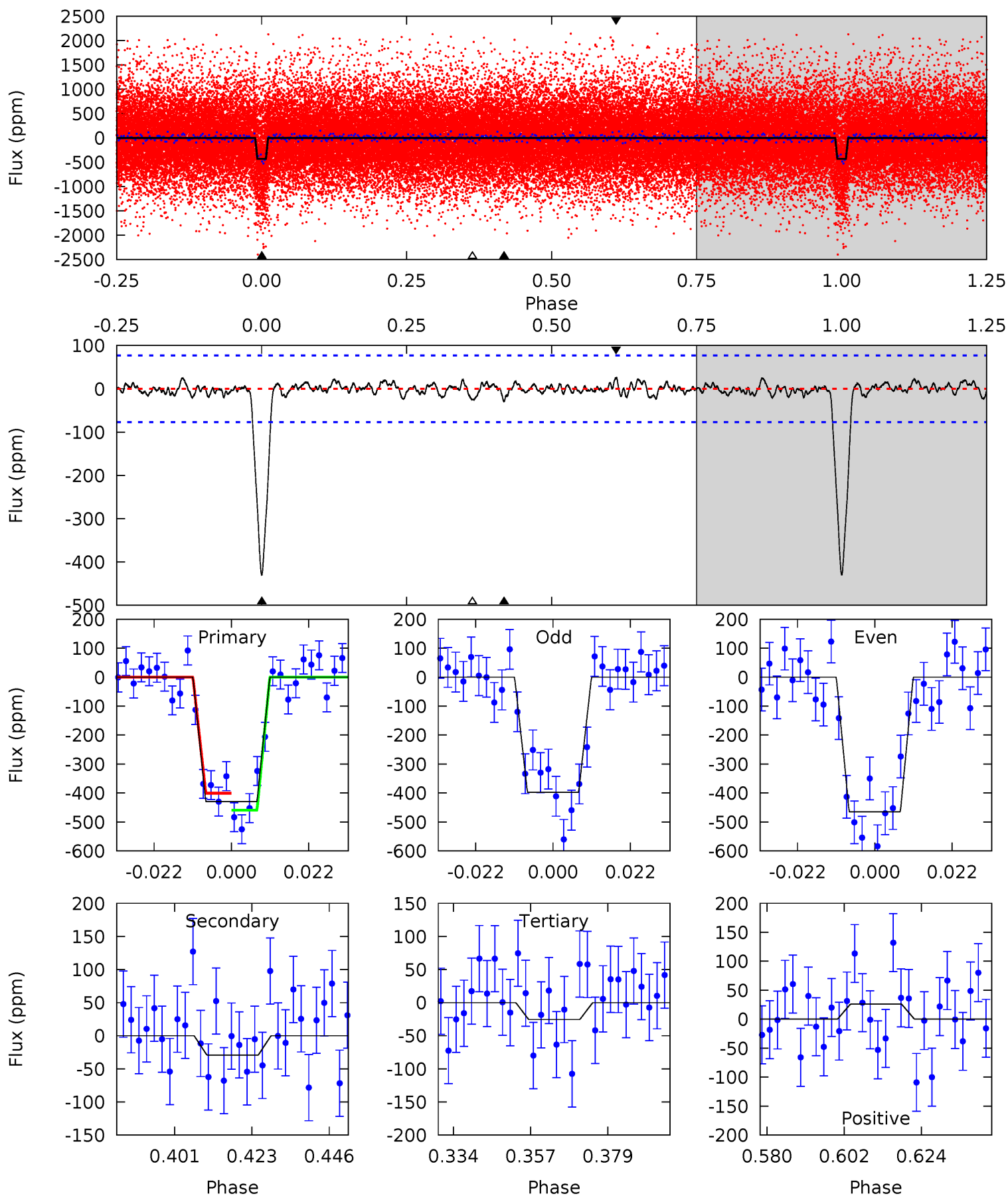
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
26.8	2.52	2.51	2.22	4.84	2.23	0.96	24.3	24.6	0.01	0.29	1.03	0.98	0.08	2.09



# Alt Model-Shift Uniqueness Test

003967760-01, P = 5.524204 Days, E = 130.095780 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
27.1	1.85	1.61	1.64	4.87	2.29	0.61	25.5	25.5	0.25	0.22	2.13	0.99	0.06	1.86



### Stellar Parameters For KIC 003967760

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5334^{+79}_{-79}$	$4.372^{+0.132}_{-0.099}$	$0.160^{+0.150}_{-0.150}$	$1.004^{+0.118}_{-0.131}$	$0.865^{+0.064}_{-0.032}$	$1.204^{+0.649}_{-0.358}$
	+1%/-1%	+3%/-2%	+94%/-94%	+12%/-13%	+7%/-4%	+54%/-30%
Source	SPE90	SPE90	SPE90	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 003967760-01 / KOI 1760.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-41 \pm 16$	$2.58^{+0.64}_{-0.57}$	$1362^{+53}_{-59}$	$3288^{+333}_{-296}$	$11^{+9}_{-5}$
Alt.	$-29 \pm 16$	$2.30^{+0.65}_{-0.59}$	$1366^{+51}_{-56}$	$3240^{+408}_{-406}$	$10^{+11}_{-6}$

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



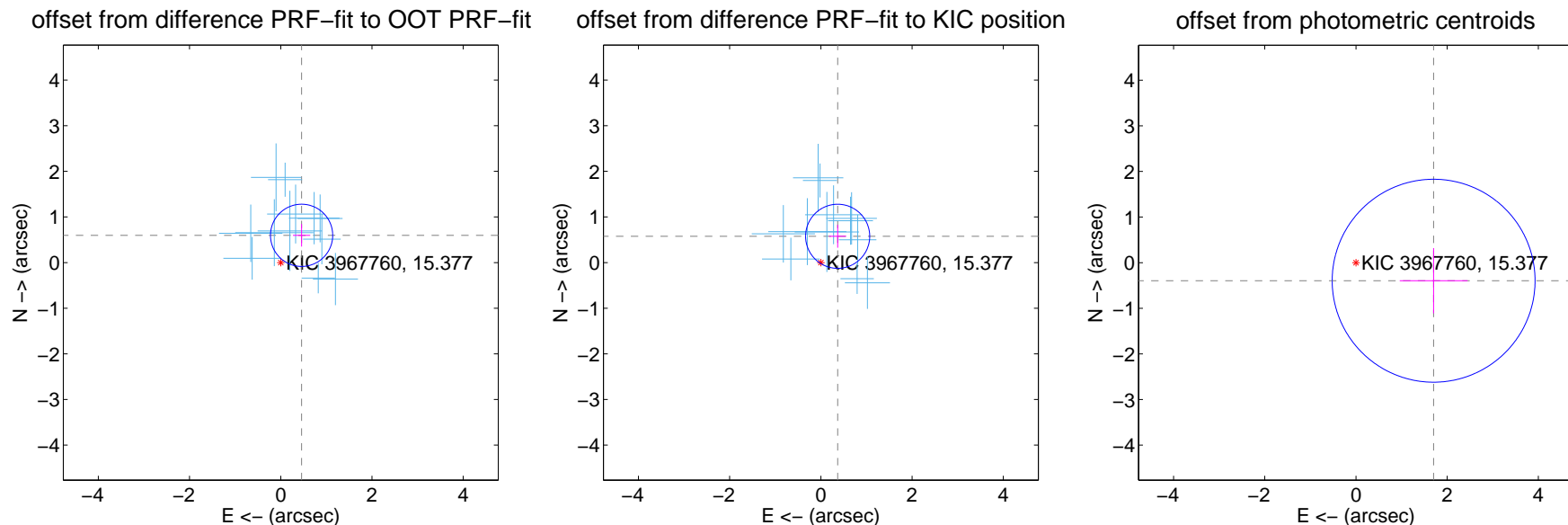
## DV Centroid Data

Supplemental centroid analysis for 003967760-01. Kepler magnitude: 15.38. Transit SNR 18.78

There are 12 quarters with good PRF difference image offsets

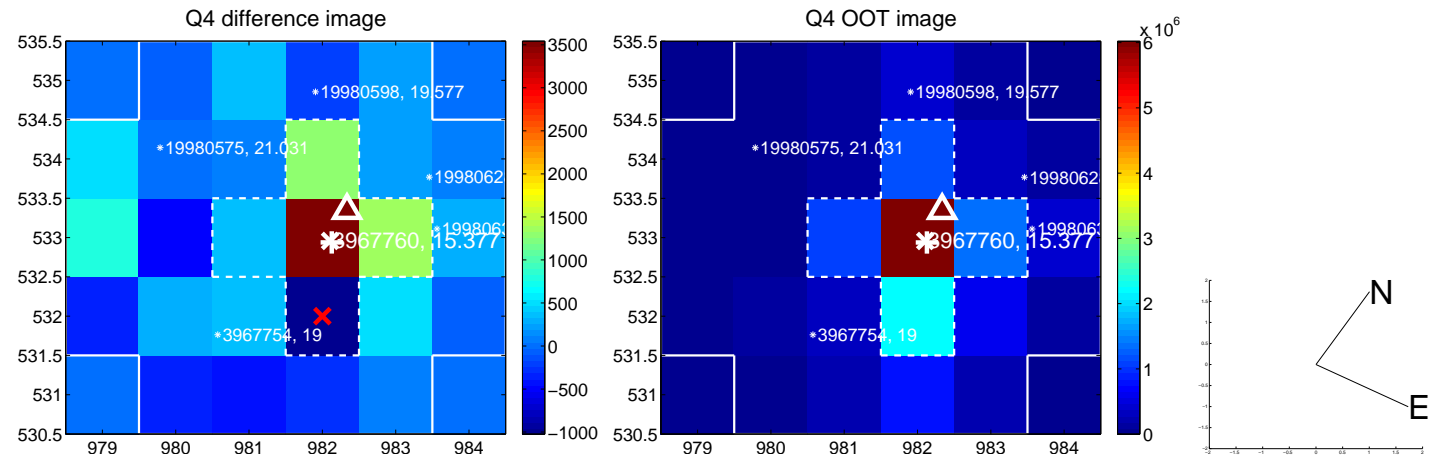
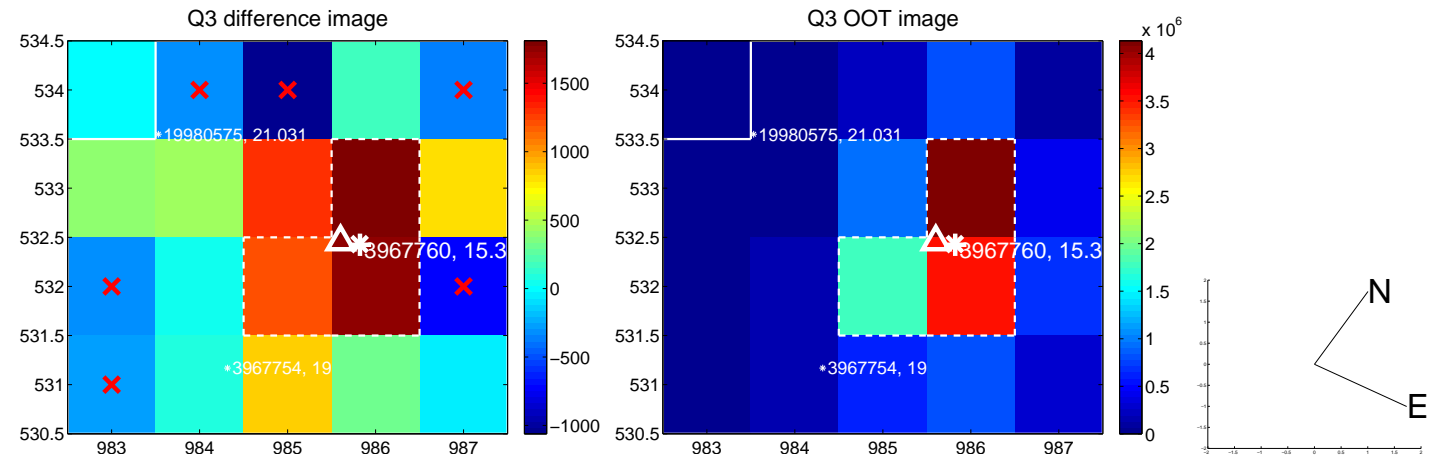
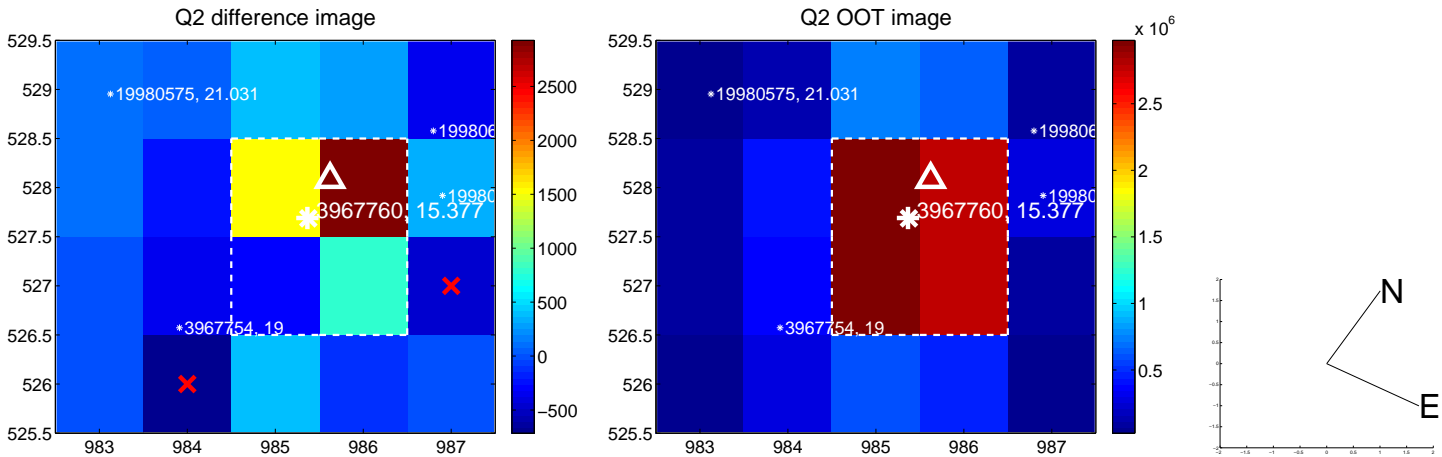
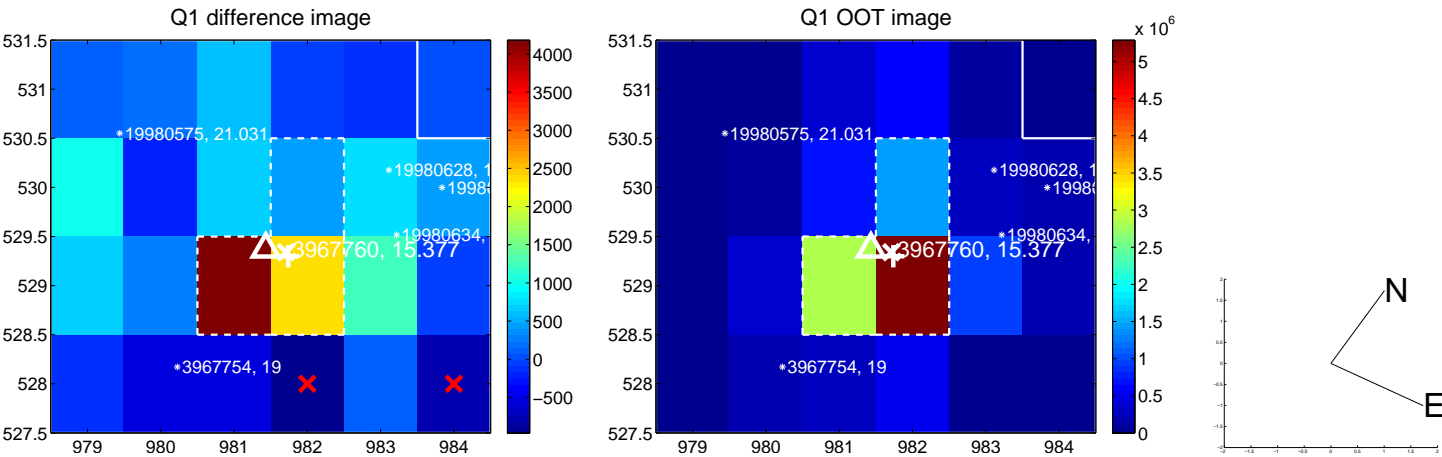
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>0.752 \pm 0.227</math></b>	<b>3.31</b>	$-0.457 \pm 0.189$	$0.598 \pm 0.247$
PRF-fit source offset from KIC position	$0.684 \pm 0.234$	2.92	$-0.368 \pm 0.187$	$0.576 \pm 0.251$
photometric centroid source offset	$1.75 \pm 0.74$	2.36	$-1.70 \pm 0.74$	$-0.40 \pm 0.72$

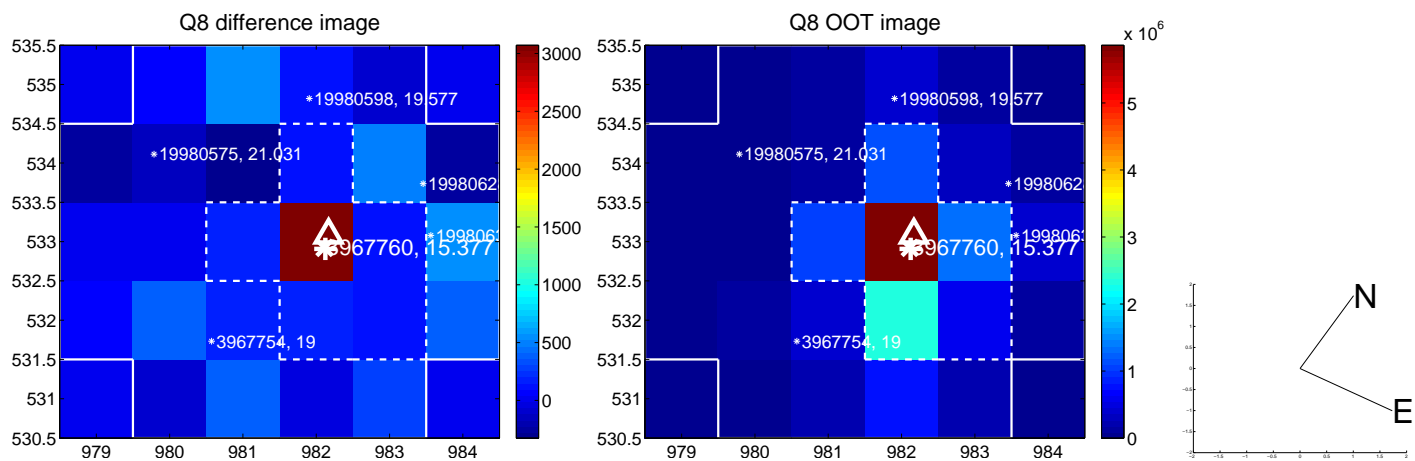
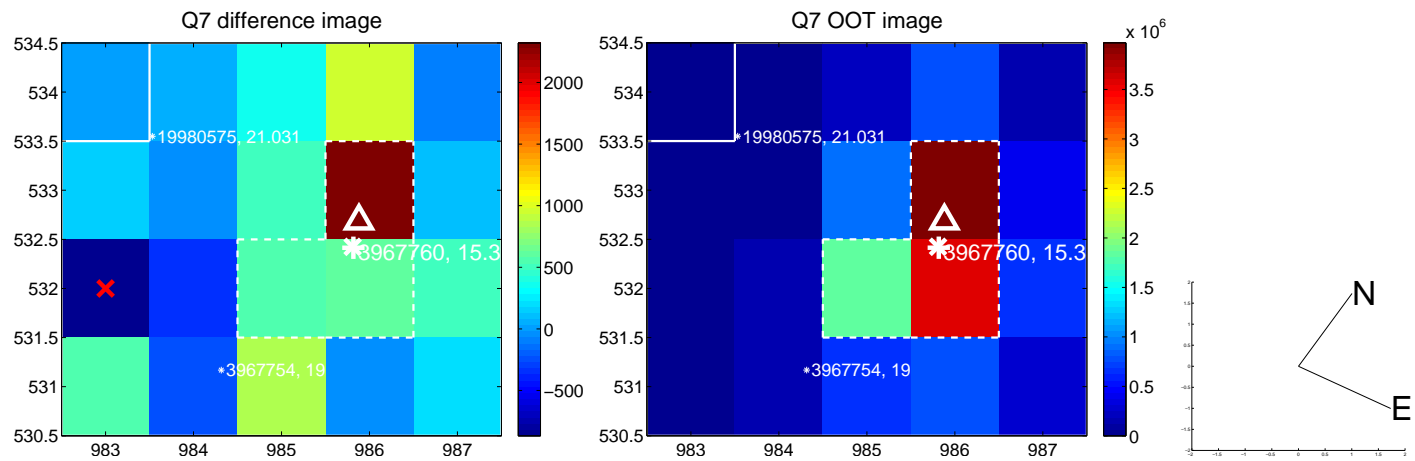
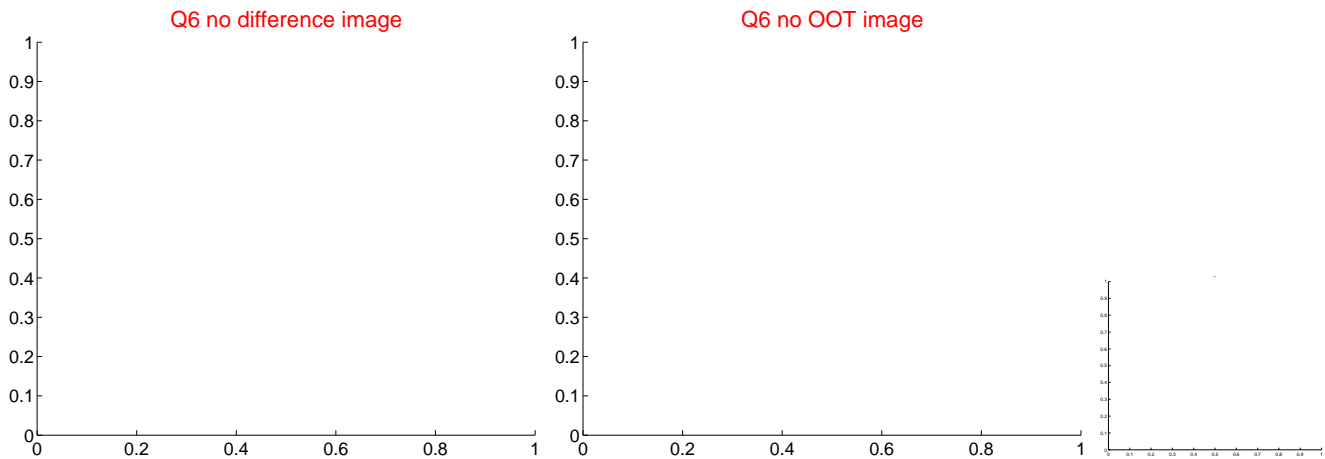
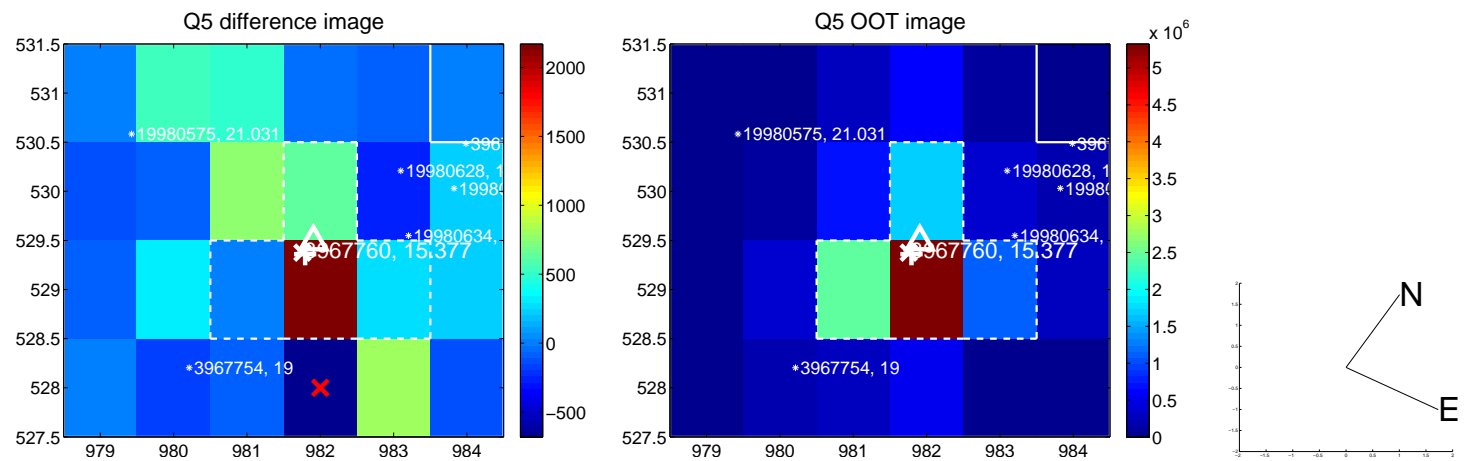


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

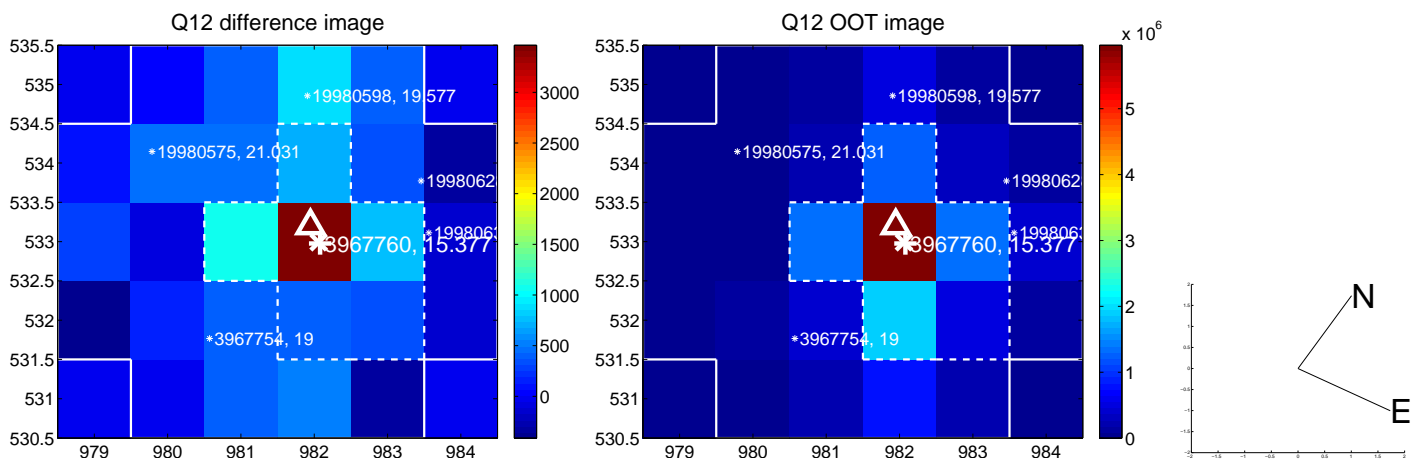
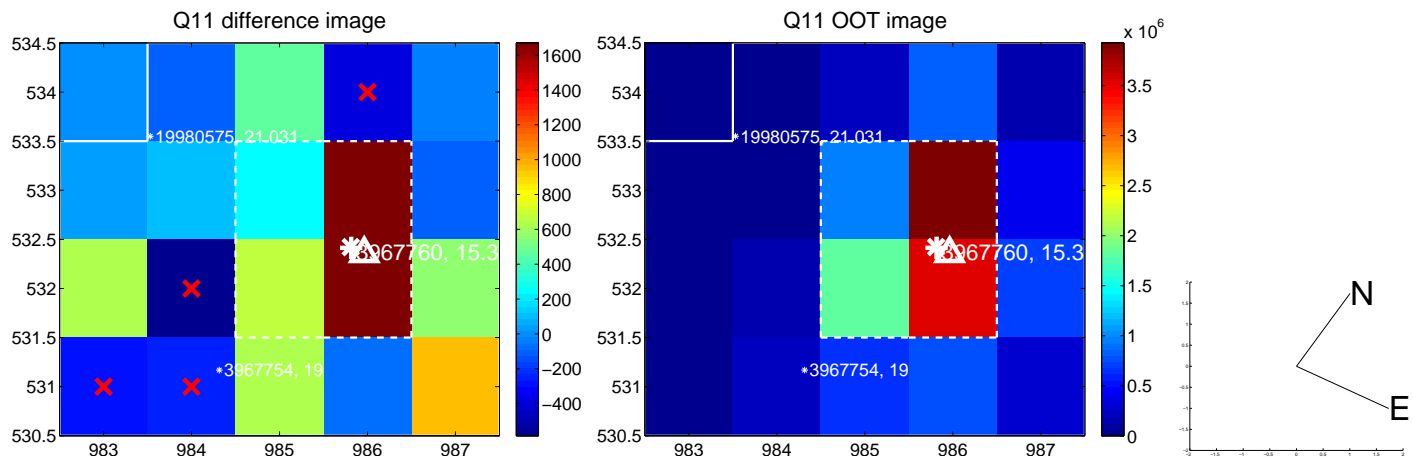
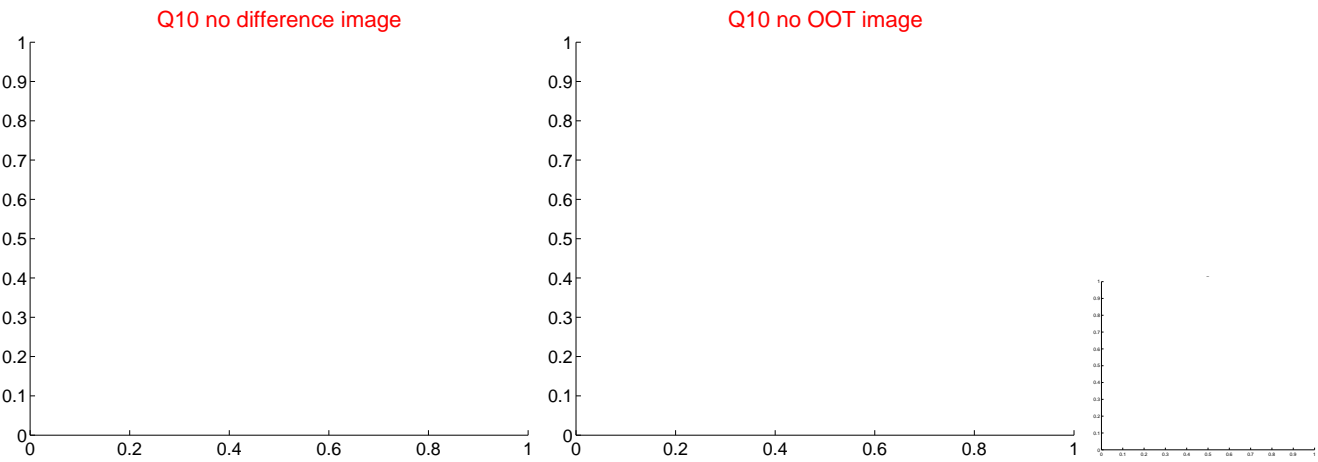
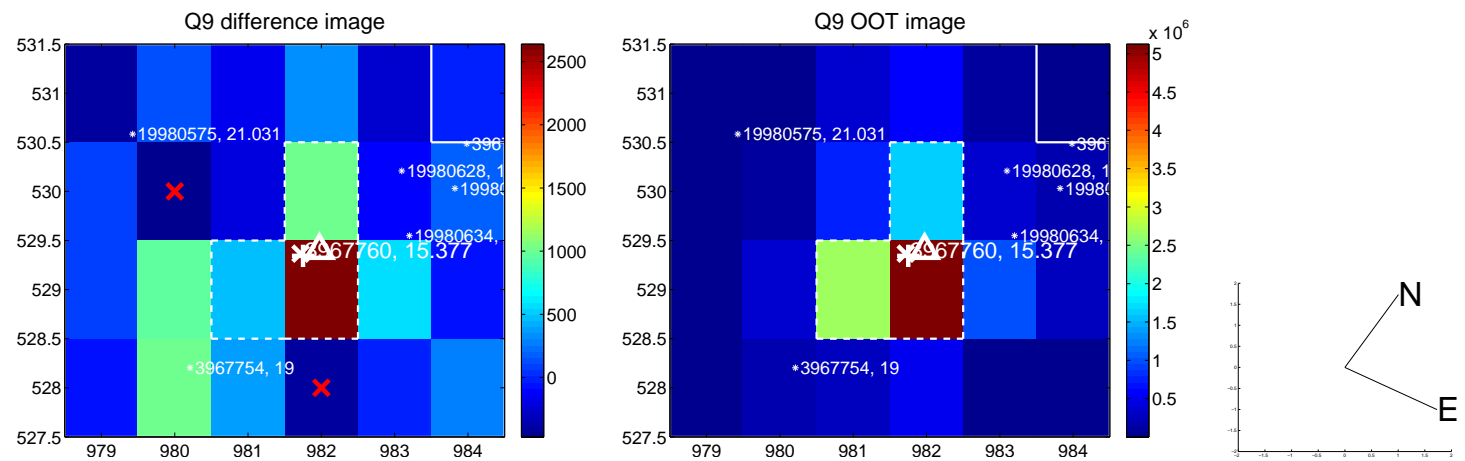
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



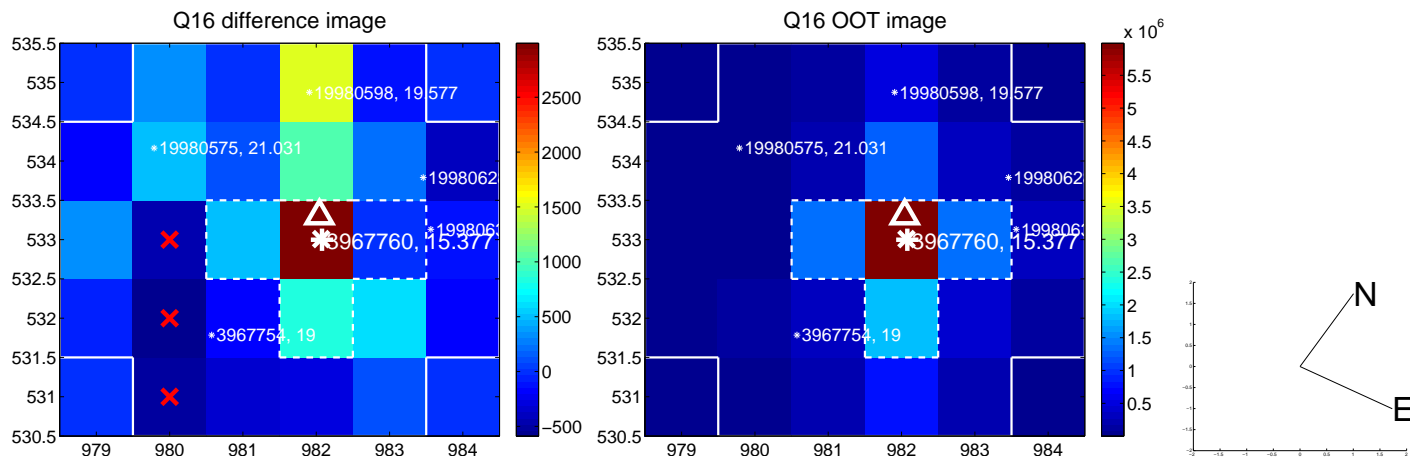
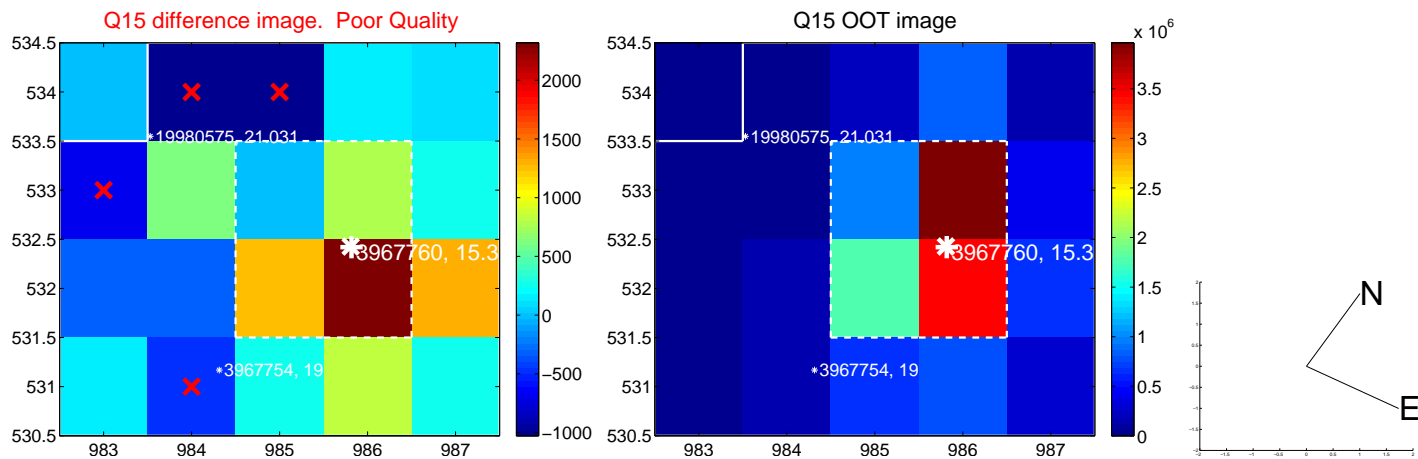
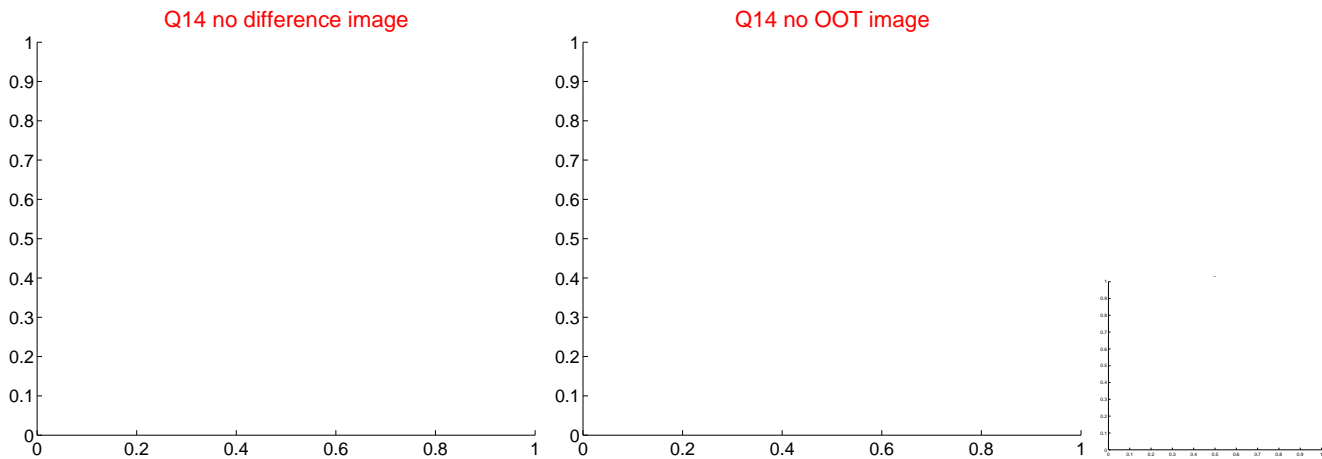
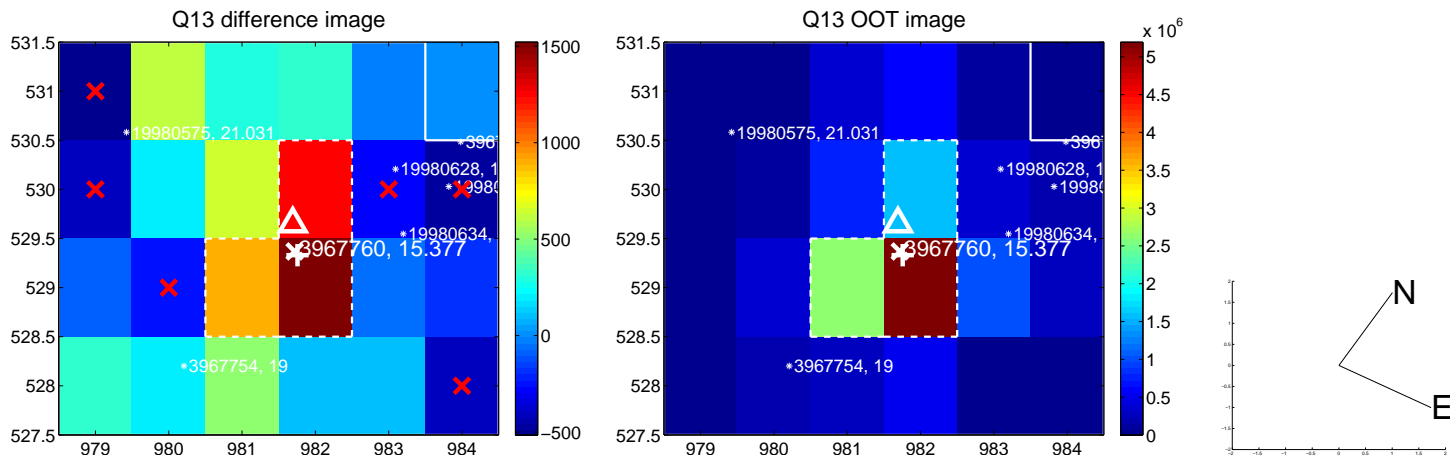
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

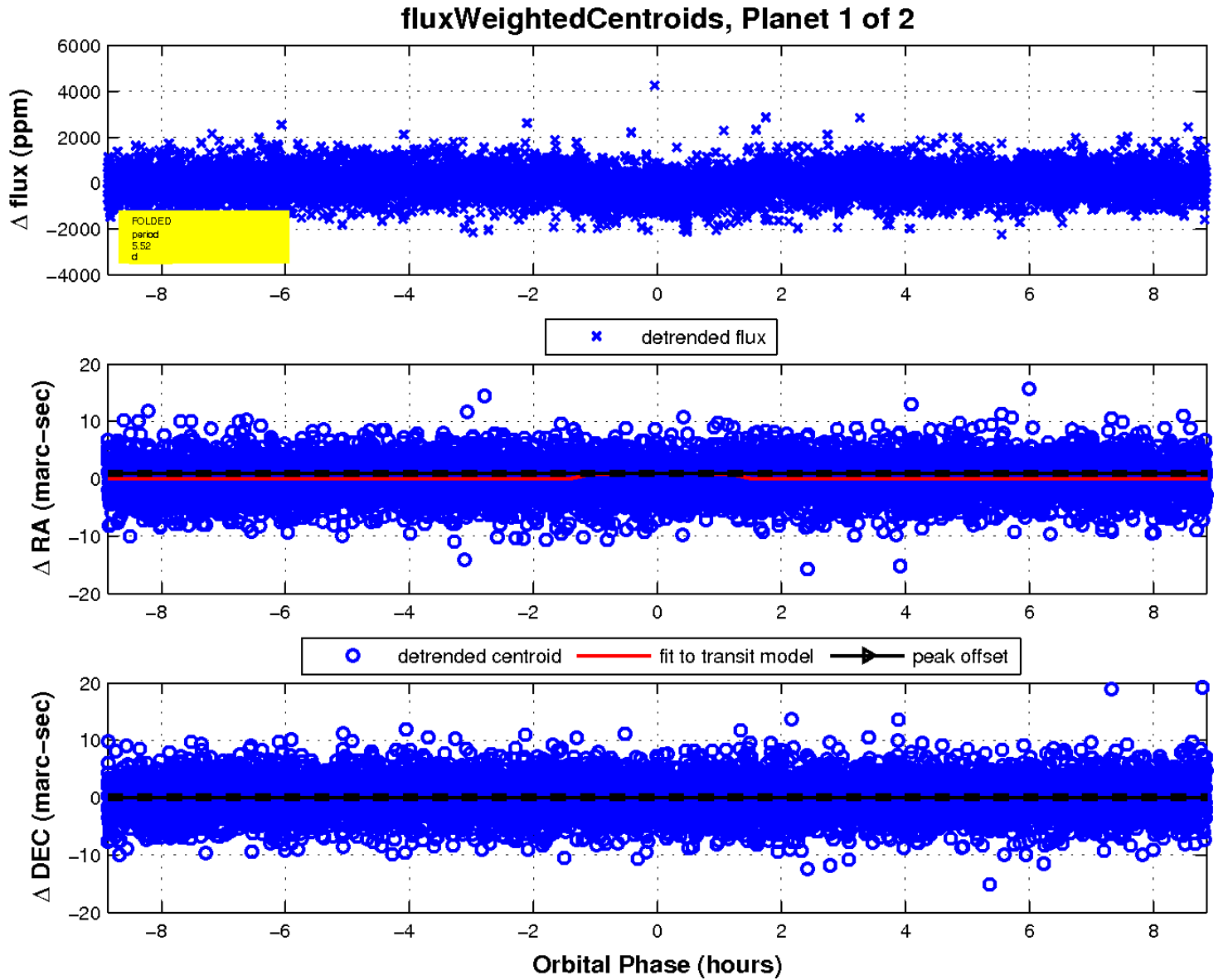
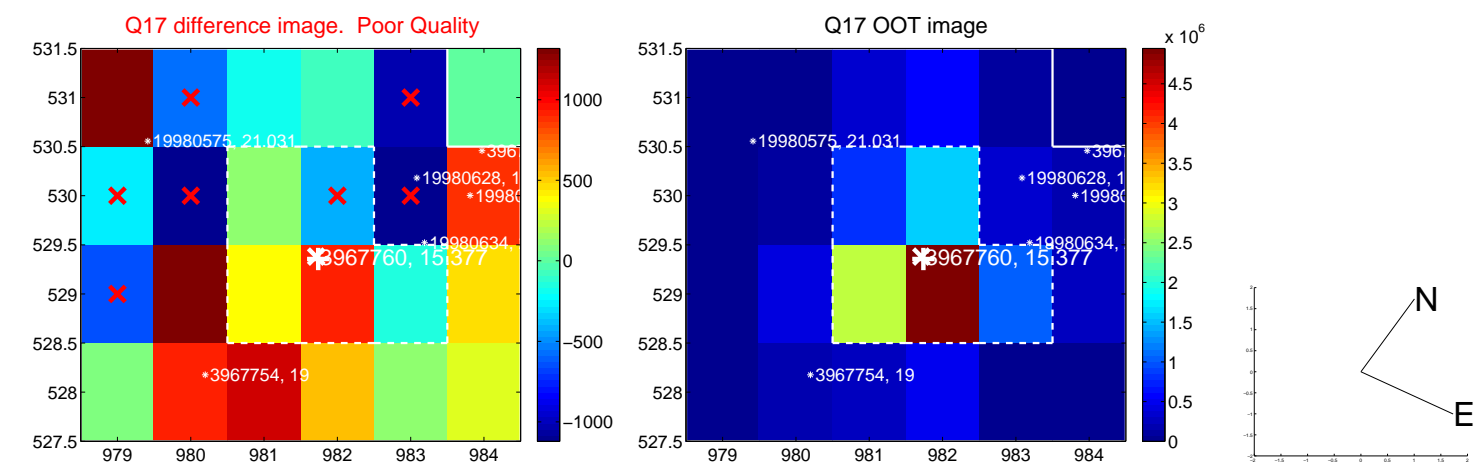


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



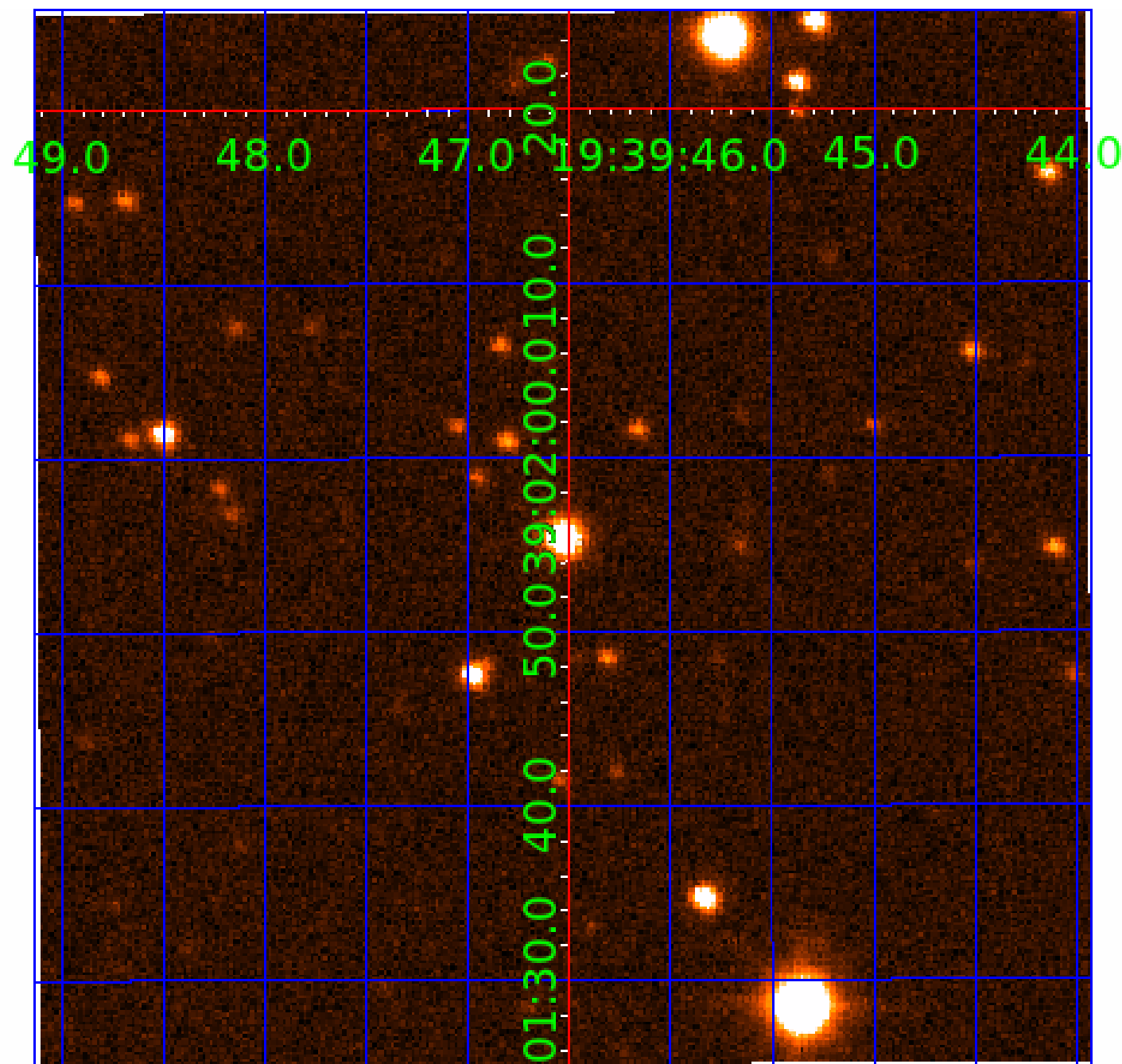


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 003967760

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
003967760-01	OBS	1760.01	5.524194	135.622056	473.4	2.955	17.3	18.8	1.00	5334	2.61	215.06
003967760-02	OBS	1760.02	8.775105	133.706628	371.5	3.390	10.8	12.2	1.00	5334	2.29	116.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
003967760-01	OBS	PC	0.68	0	0	0	0	NO_COMMENT
003967760-02	OBS	PC	0.97	0	0	0	0	NO_COMMENT

**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.

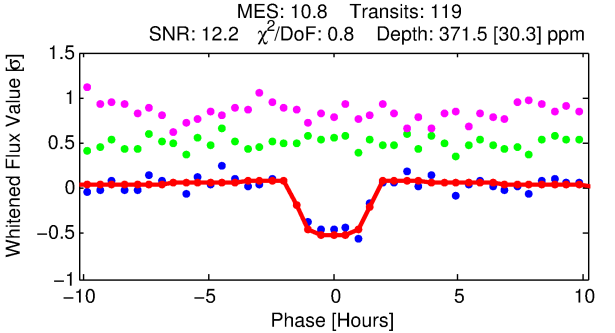
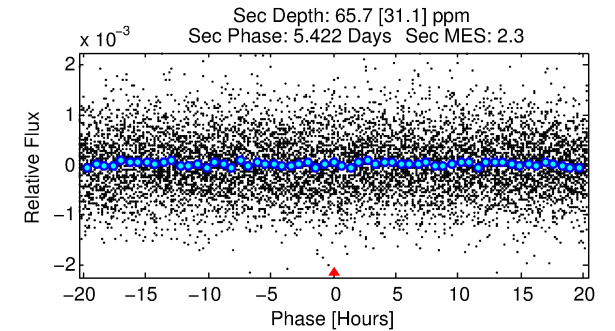
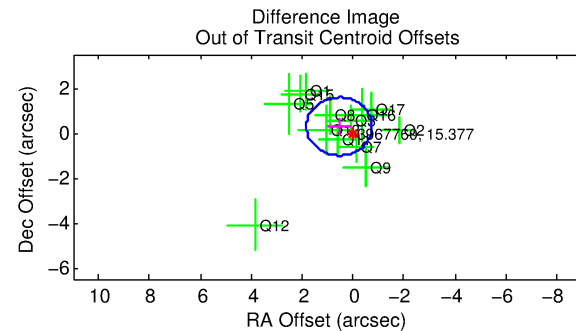
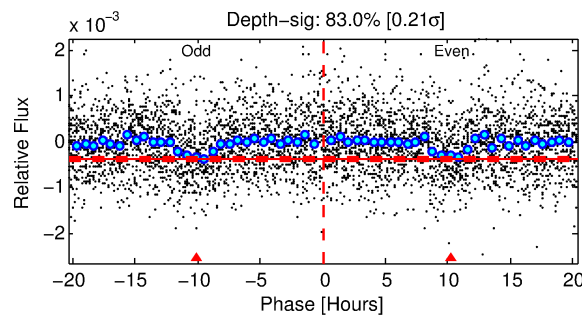
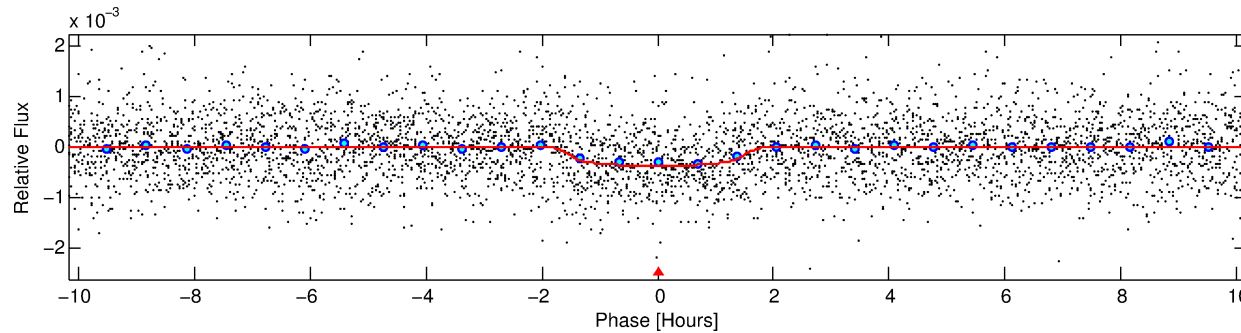
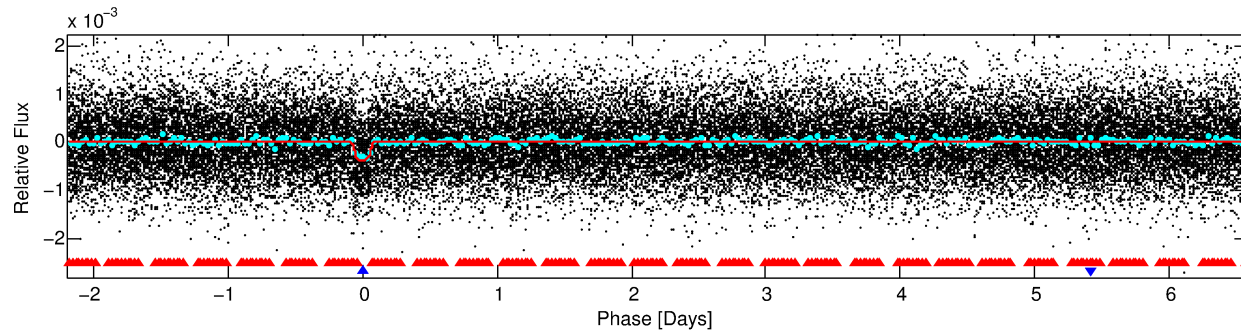
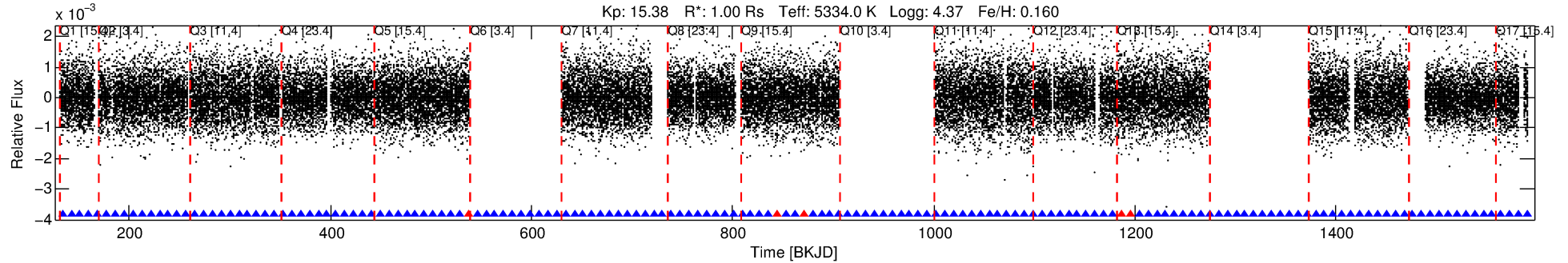
## Ephemeris Match Information For 003967760-02

No Significant Match Found

# DV One-Page Summary

KIC: 3967760 Candidate: 2 of 2 Period: 8.775 d  
KOI: K01760.02 Name: Kepler-317c Corr: 0.986

Kp: 15.38 R\*: 1.00 Rs Teff: 5334.0 K Logg: 4.37 Fe/H: 0.160



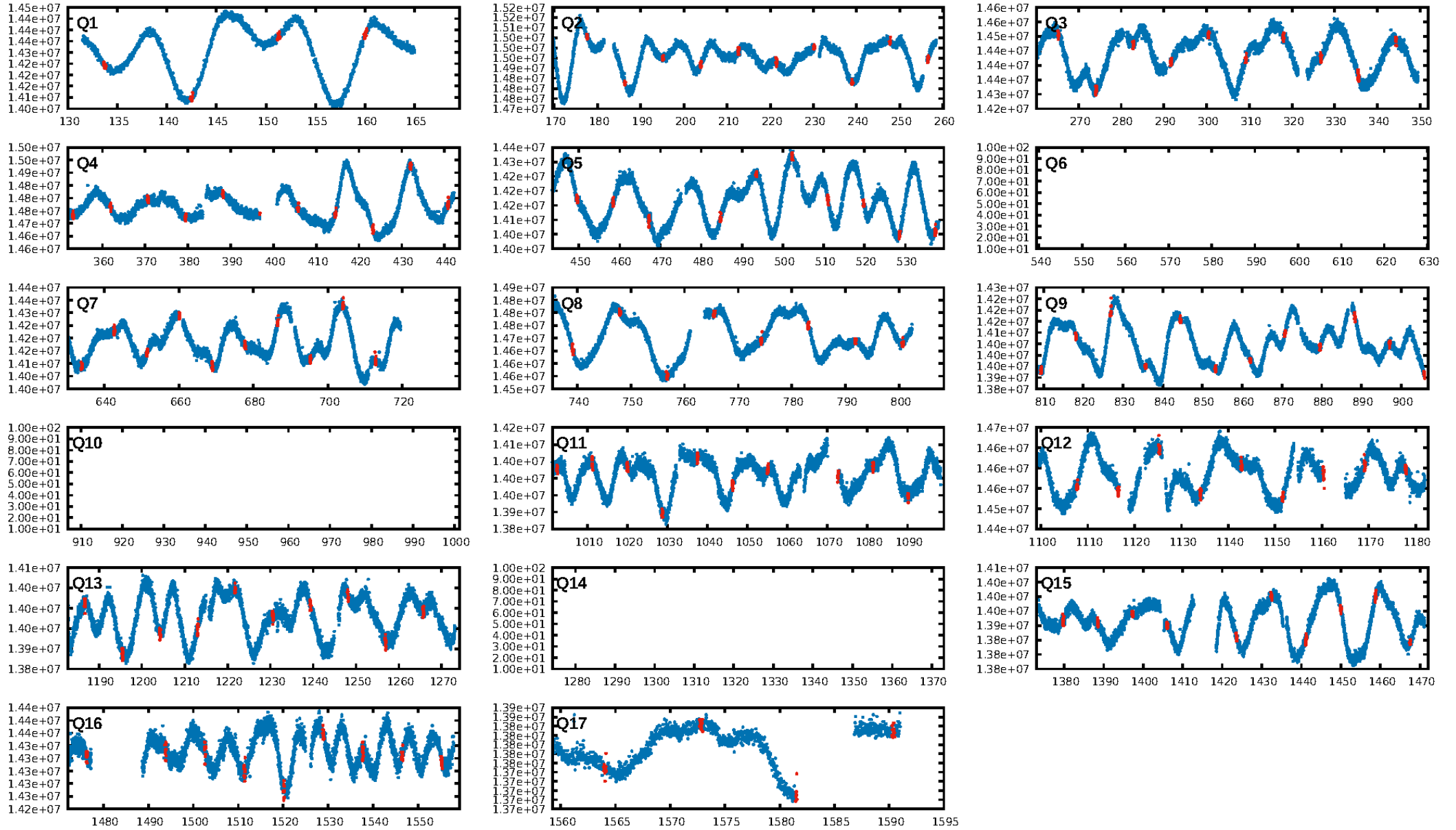
## DV Fit Results:

Period = 8.77510 [0.00006] d  
Epoch = 133.7066 [0.0048] BKJD  
Rp/R\* = 0.0209 [0.0086]  
a/R\* = 10.28 [17.09]  
b = 0.88 [0.44]  
Seff = 116.04 [26.49]  
Teff = 837 [48] K  
Rp = 2.29 [0.99] Re  
a = 0.0794 [0.0106] AU  
Ag = 43.45 [42.30] [1.00σ]  
Teffp = 3322 [789] K [3.14σ]

## DV Diagnostic Results:

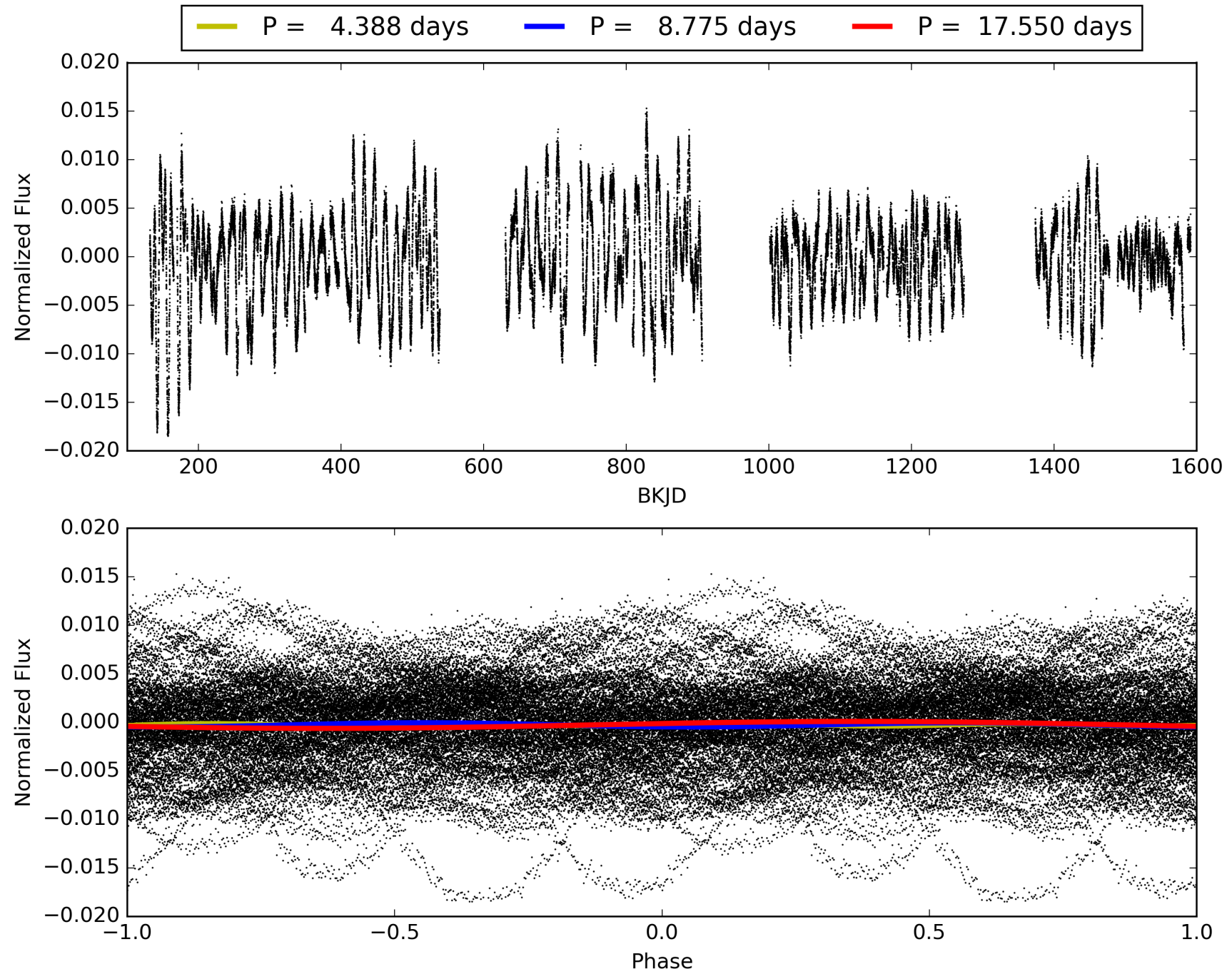
ShortPeriod-sig: 100.0% [17.35σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 100.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.13e-26  
RollingBand-fgt: 0.95 [106/111]  
GhostDiagnostic-chr: 3.031  
Centroid-sig: 19.9%  
Centroid-so: 1.300 arcsec [1.18σ]  
OotOffset-rm: 0.616 arcsec [1.43σ]  
KicOffset-rm: 0.699 arcsec [1.56σ]  
OotOffset-st: 1/4/3/5 [13]  
KicOffset-st: 1/4/3/5 [13]  
DiffImageQuality-fgm: 0.69 [9/13]  
DiffImageOverlap-fno: 1.00 [14/14]

# TCE 003967760-02, PDC Light Curves



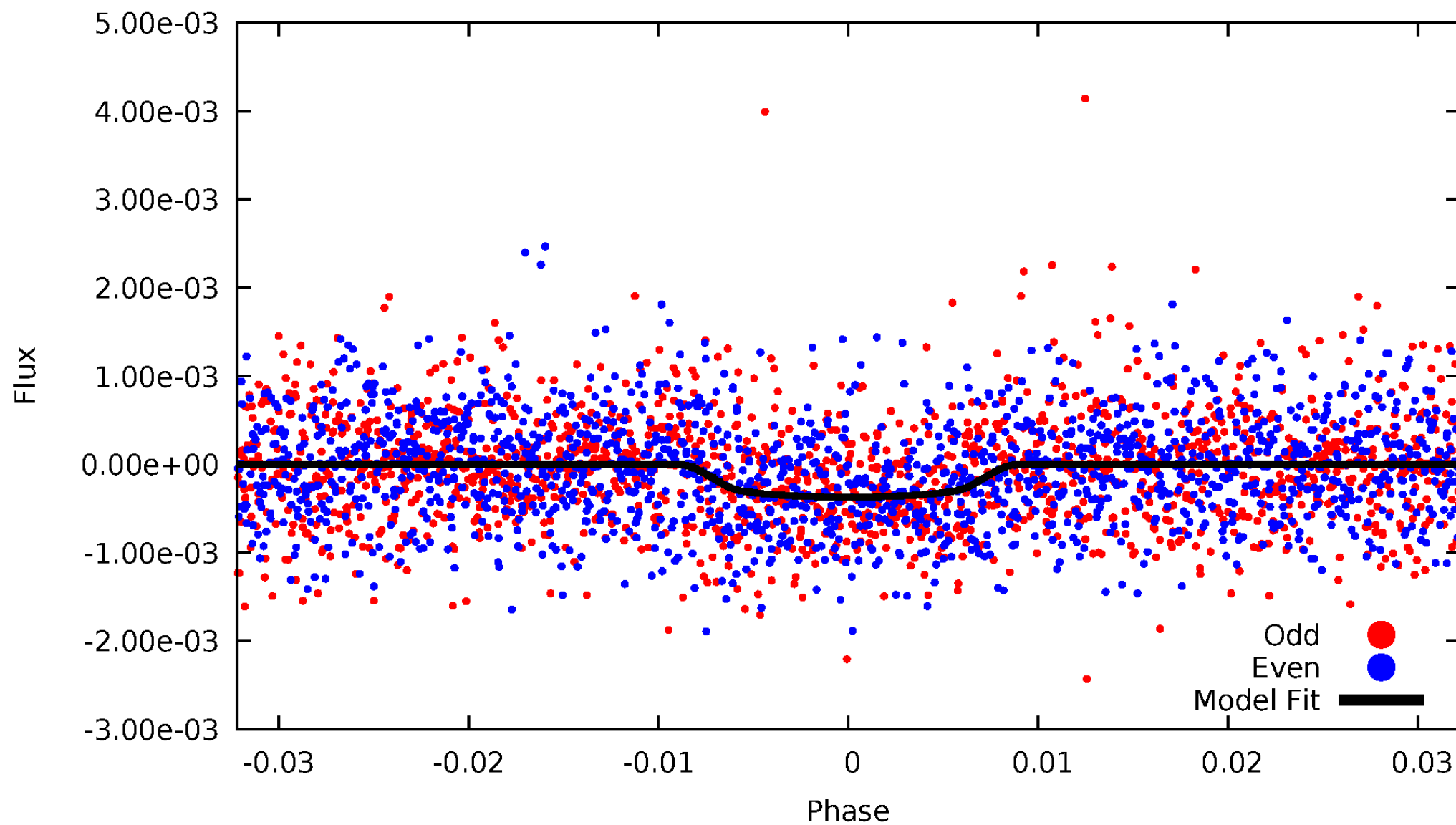


TCE 003967760-02



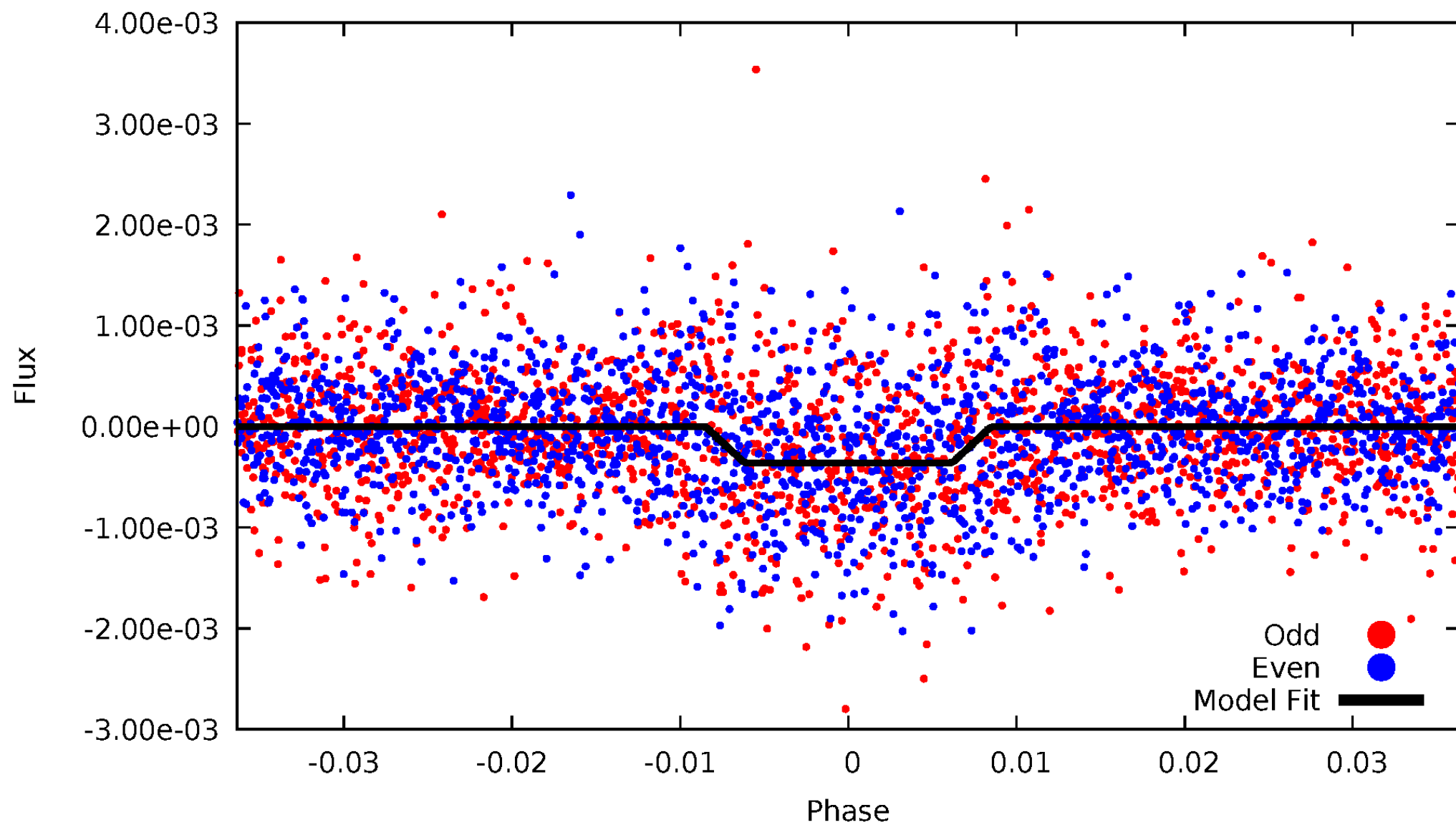
DV Odd/Even

TCE 003967760-02



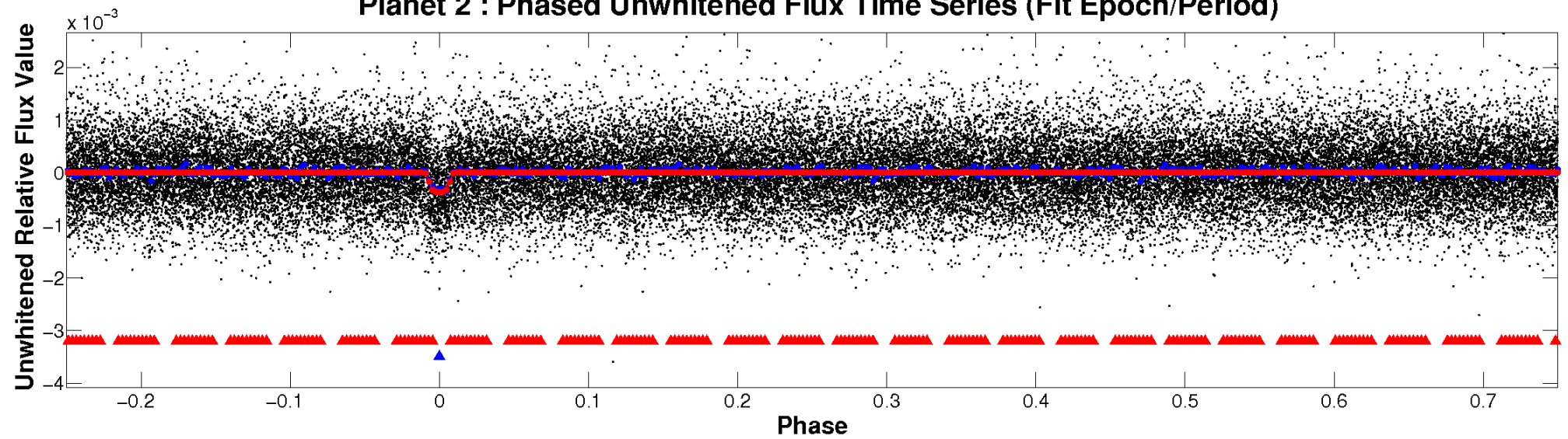
# ALT Odd/Even

TCE 003967760-02

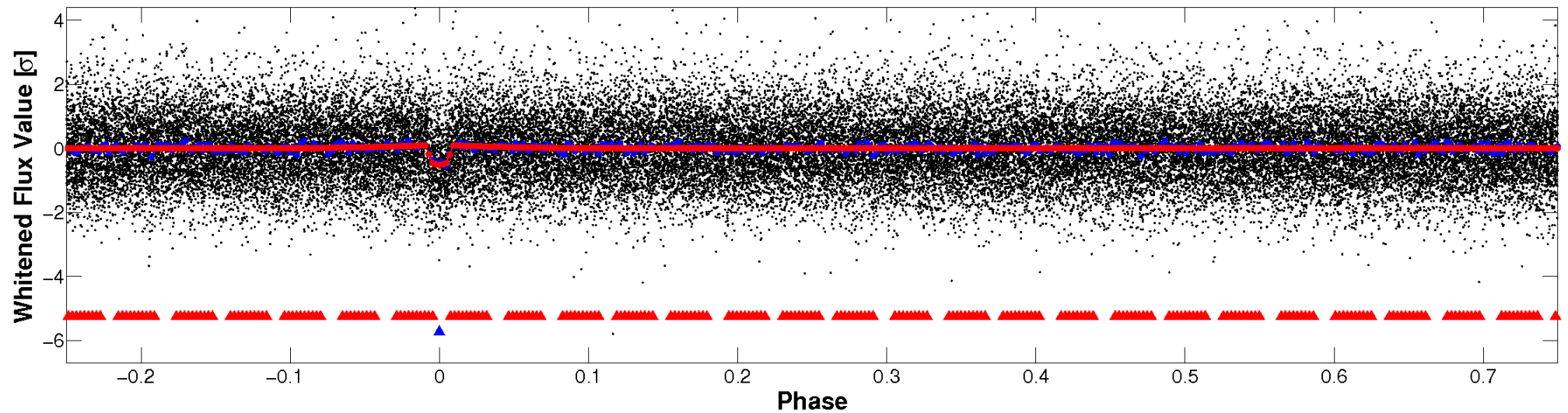


# Non-Whitened Vs. Whitened Light Curve

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

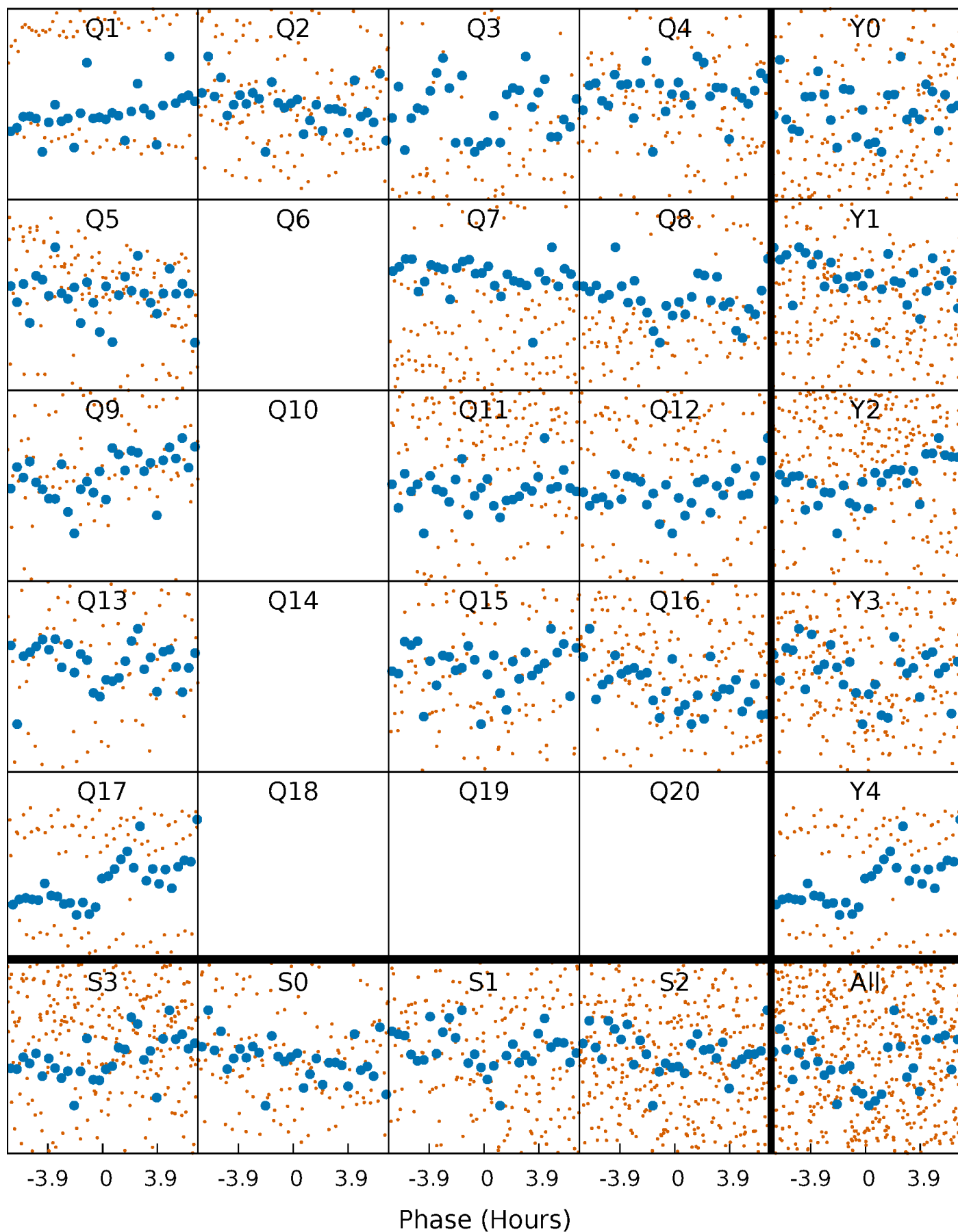


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

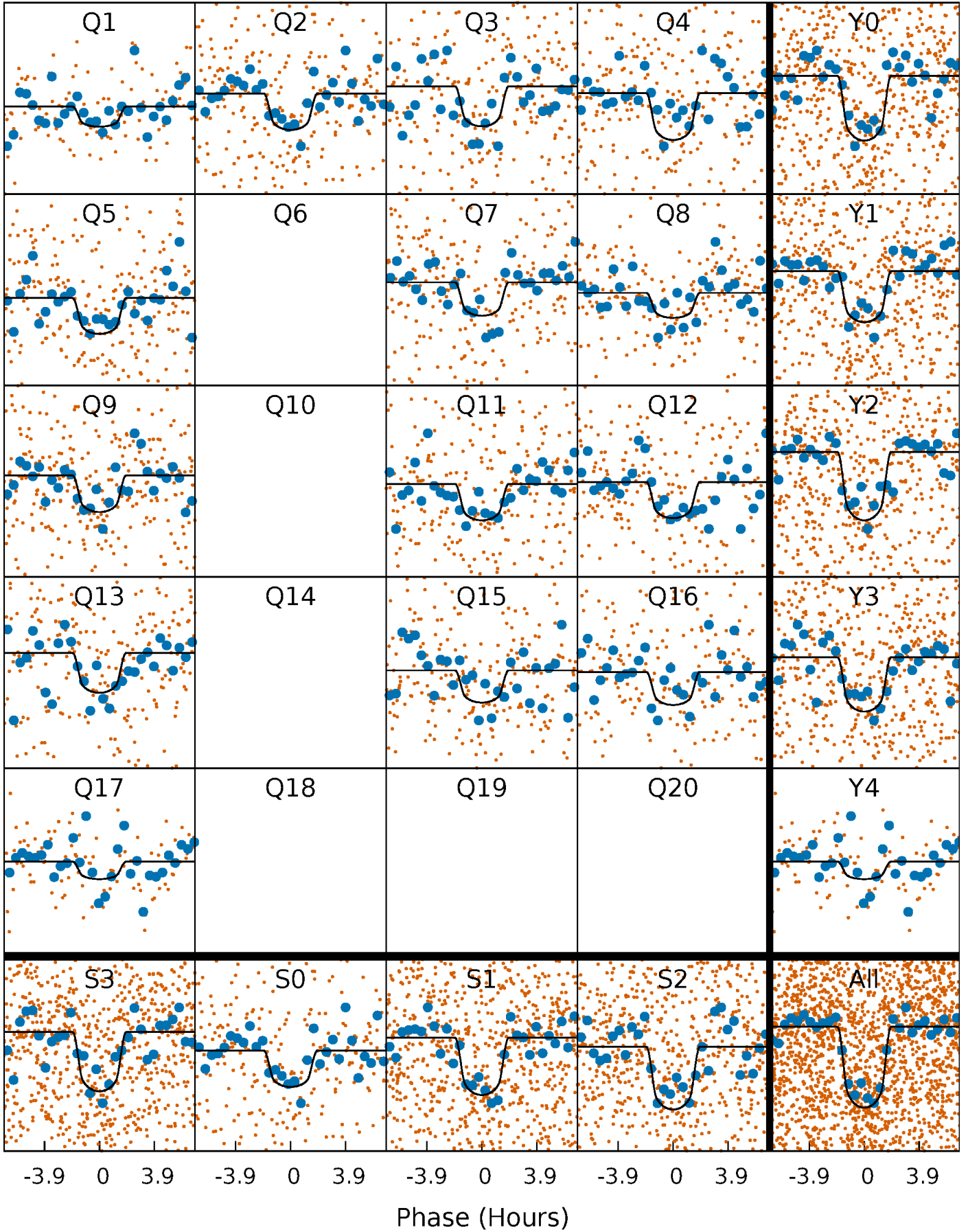
TCE 003967760-02   P= 8.775105 Days    $T_0=133.706628$  (BKJD)





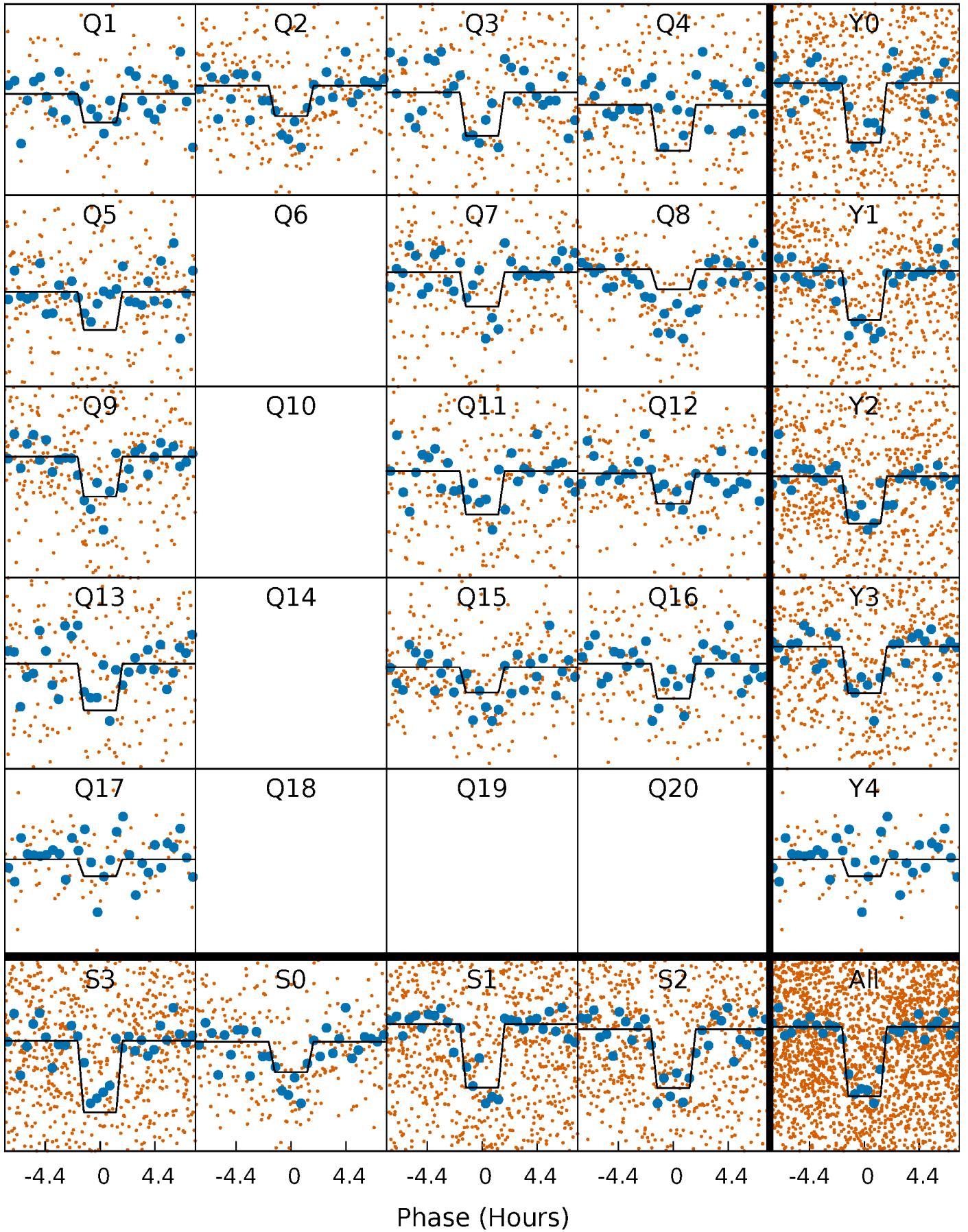
# DV Quarter-Phased Transit Curves

TCE 003967760-02    P= 8.775105 Days     $T_0=133.706628$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

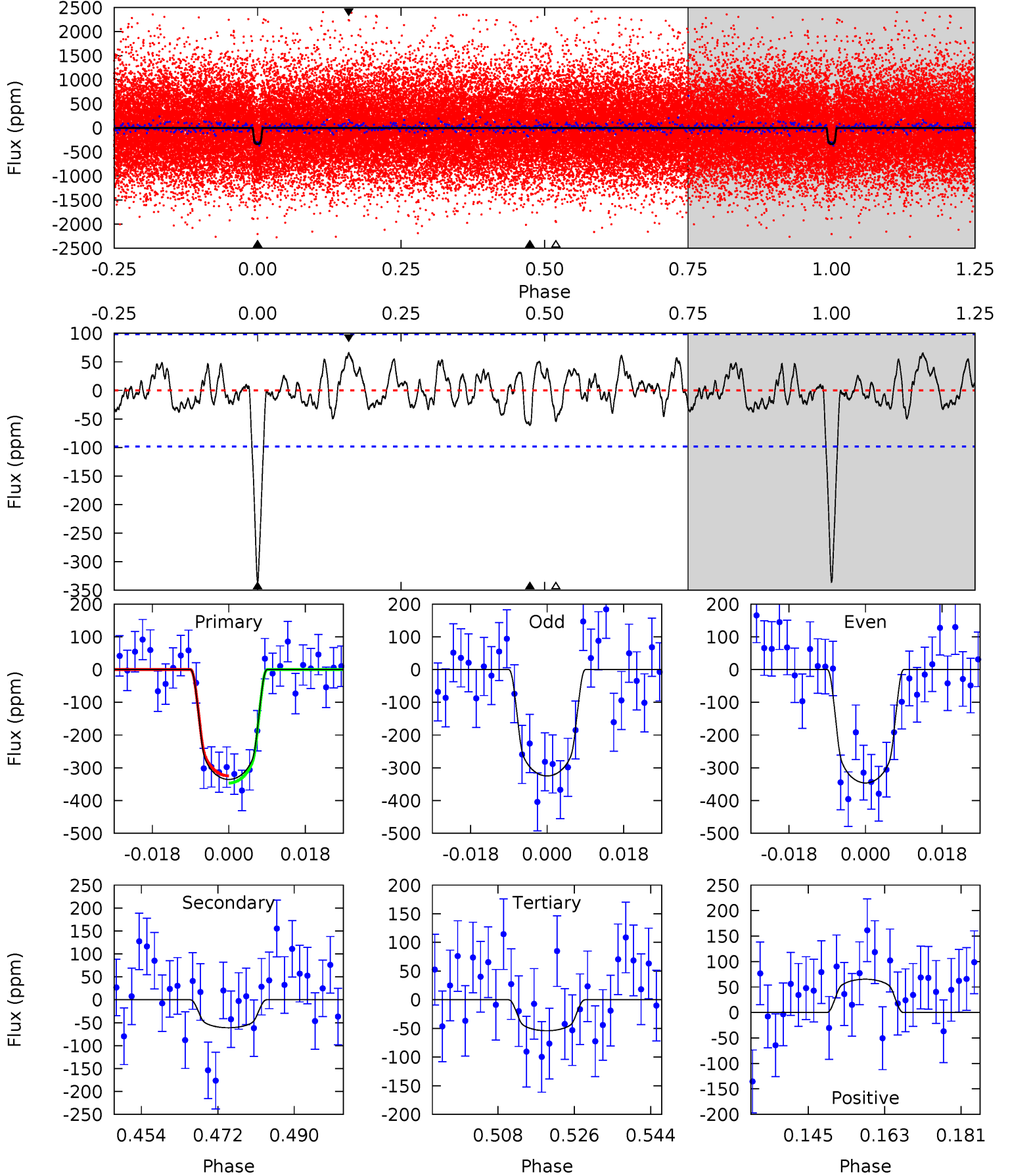
TCE 003967760-02   P= 8.775202 Days    $T_0=133.700211$  (BKJD)



# DV Model-Shift Uniqueness Test

003967760-02, P = 8.775105 Days, E = 124.931523 Days

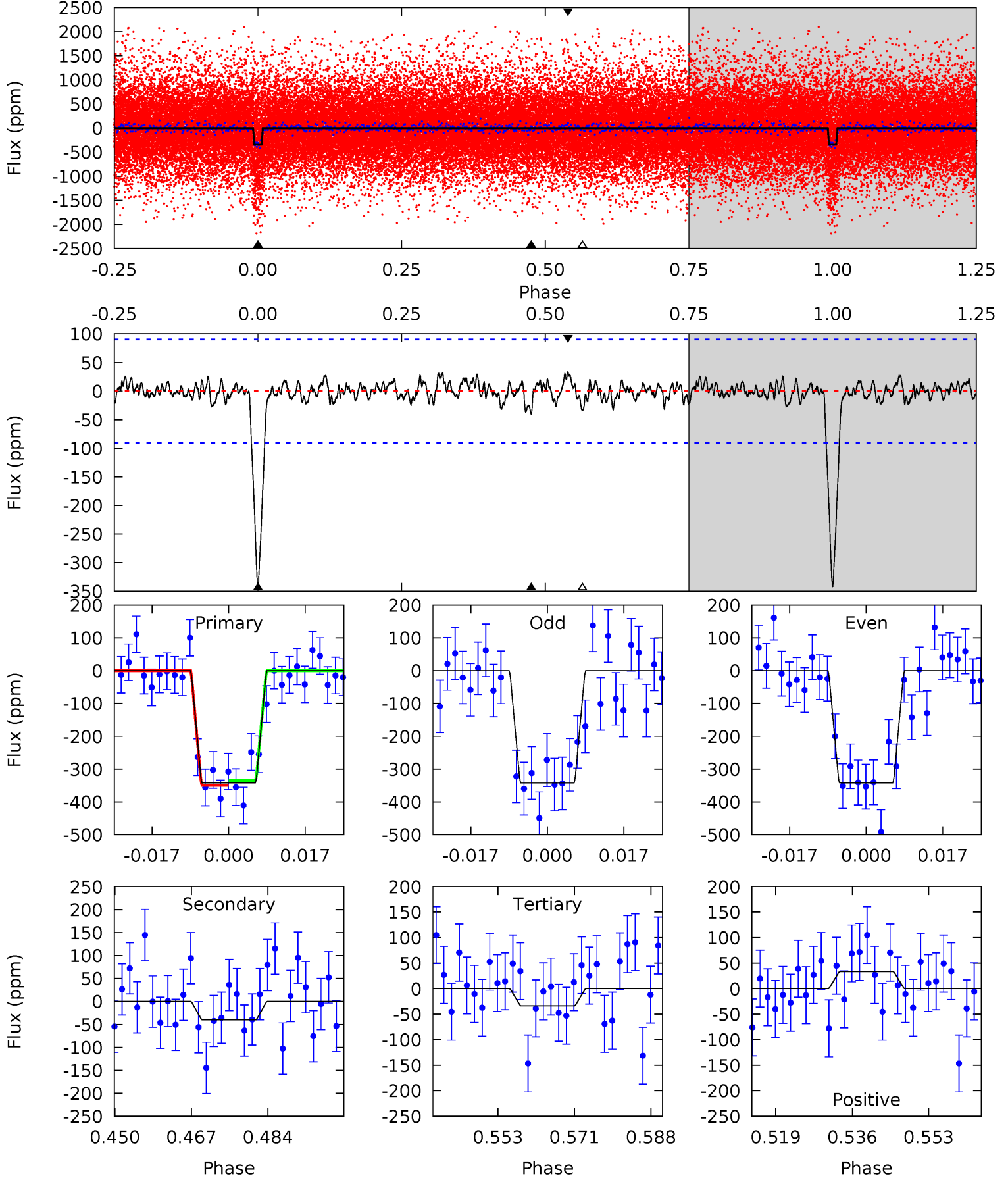
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
16.8	3.05	2.70	3.26	4.91	2.36	1.23	14.1	13.5	0.35	-0.21	0.54	0.91	0.16	0.55



# Alt Model-Shift Uniqueness Test

003967760-02, P = 8.775202 Days, E = 124.925009 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
18.6	2.19	1.83	1.82	4.92	2.38	0.67	16.8	16.8	0.36	0.37	0.01	0.98	0.09	0.41



### Stellar Parameters For KIC 003967760

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5334^{+79}_{-79}$	$4.372^{+0.132}_{-0.099}$	$0.160^{+0.150}_{-0.150}$	$1.004^{+0.118}_{-0.131}$	$0.865^{+0.064}_{-0.032}$	$1.204^{+0.649}_{-0.358}$
	+1%/-1%	+3%/-2%	+94%/-94%	+12%/-13%	+7%/-4%	+54%/-30%
Source	SPE90	SPE90	SPE90	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 003967760-02 / KOI 1760.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-61 \pm 20$	$2.29^{+0.99}_{-0.96}$	$1167^{+46}_{-49}$	$3644^{+769}_{-422}$	$41^{+81}_{-23}$
Alt.	$-40 \pm 18$	$2.09^{+0.93}_{-0.96}$	$1168^{+45}_{-52}$	$3466^{+852}_{-438}$	$30^{+76}_{-18}$

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

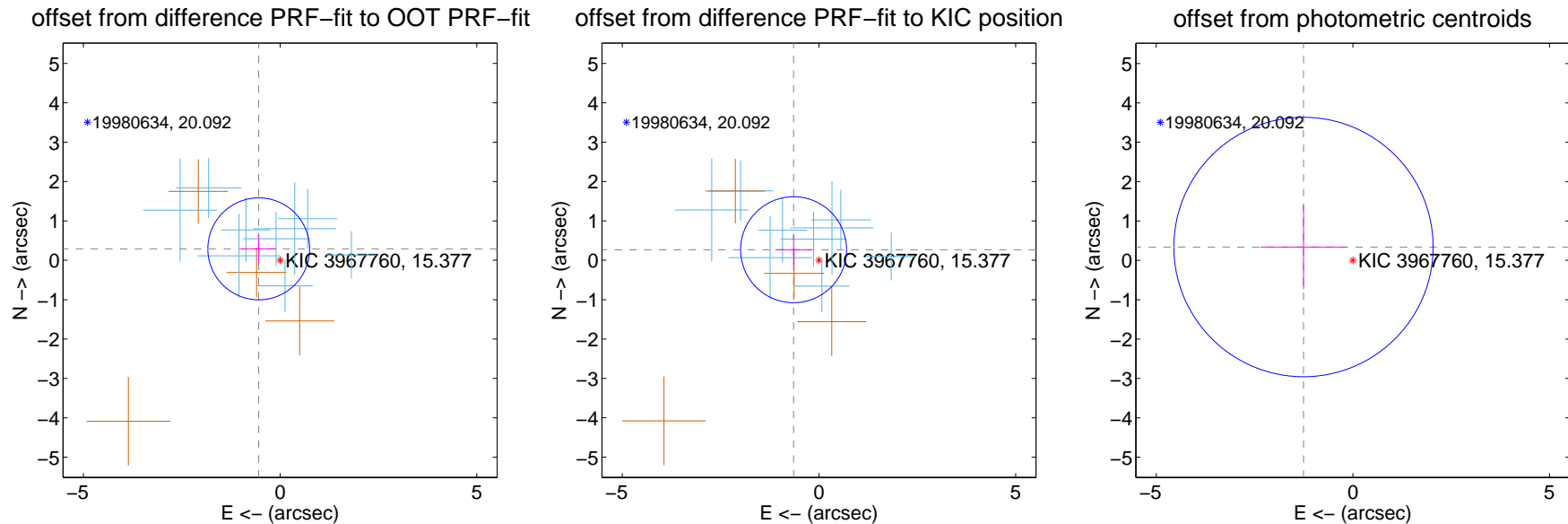
## DV Centroid Data

Supplemental centroid analysis for 003967760-02. Kepler magnitude: 15.38. Transit SNR 12.18

There are 9 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

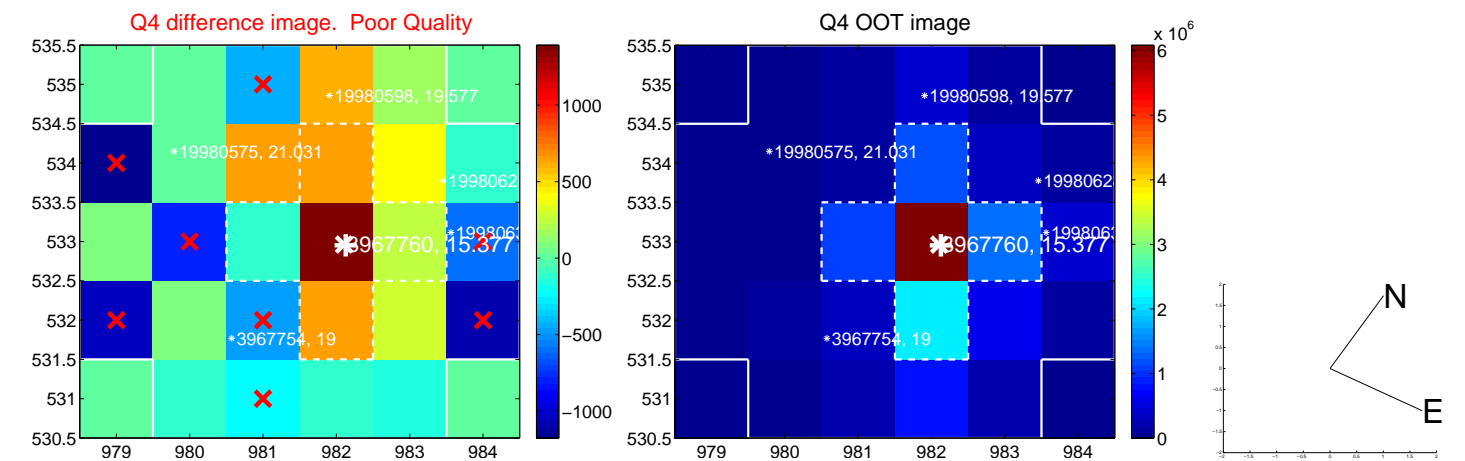
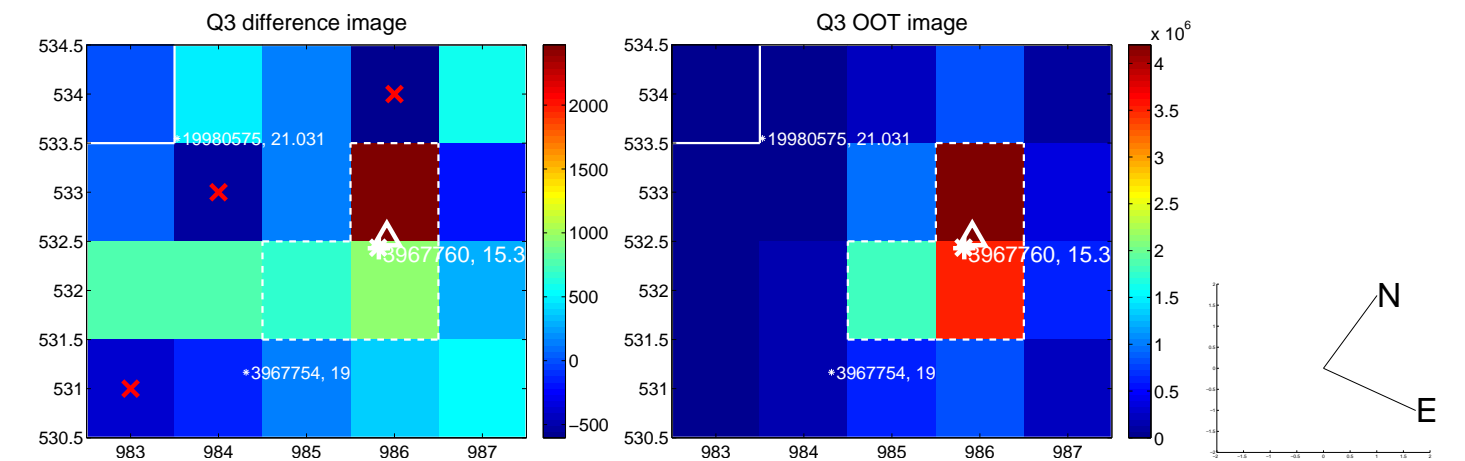
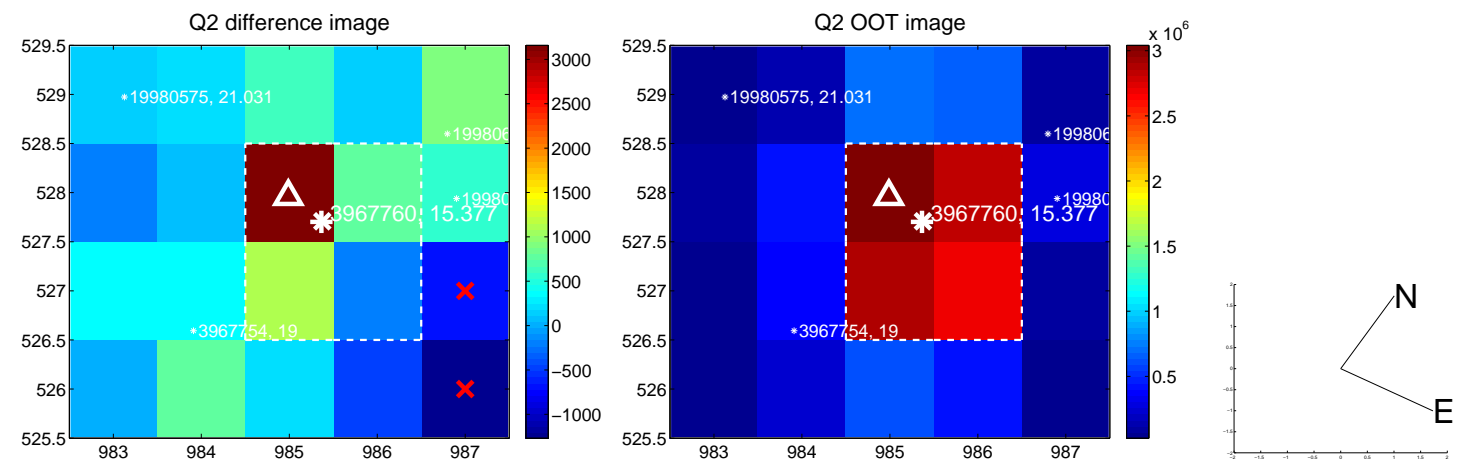
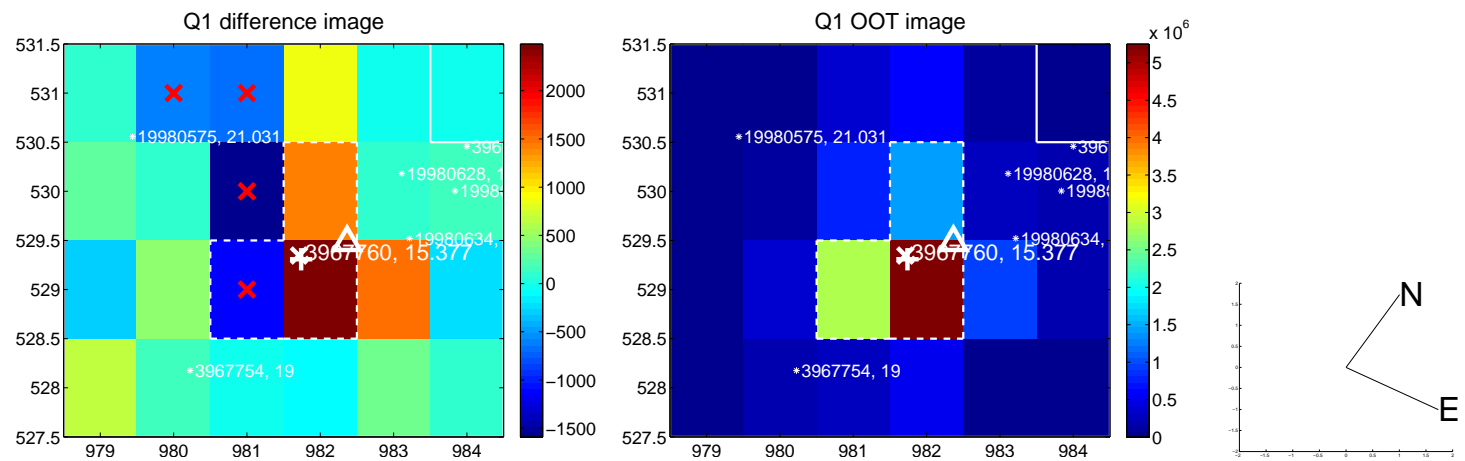
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.616 \pm 0.431$	1.43	$0.543 \pm 0.448$	$0.291 \pm 0.368$
PRF-fit source offset from KIC position	$0.699 \pm 0.449$	1.56	$0.646 \pm 0.461$	$0.269 \pm 0.368$
photometric centroid source offset	$1.30 \pm 1.10$	1.18	$1.26 \pm 1.10$	$0.34 \pm 1.07$



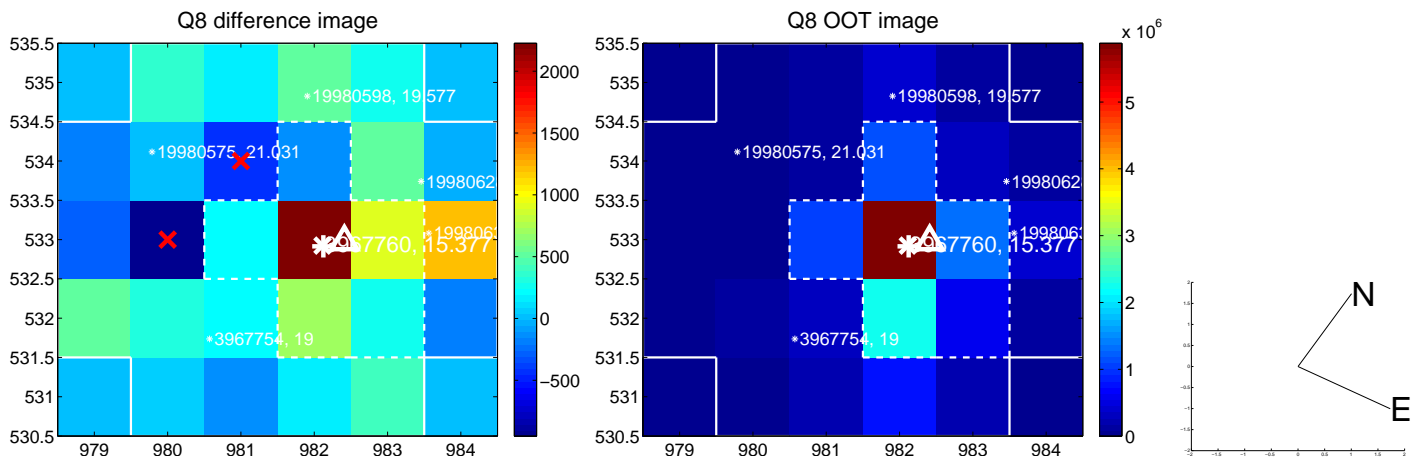
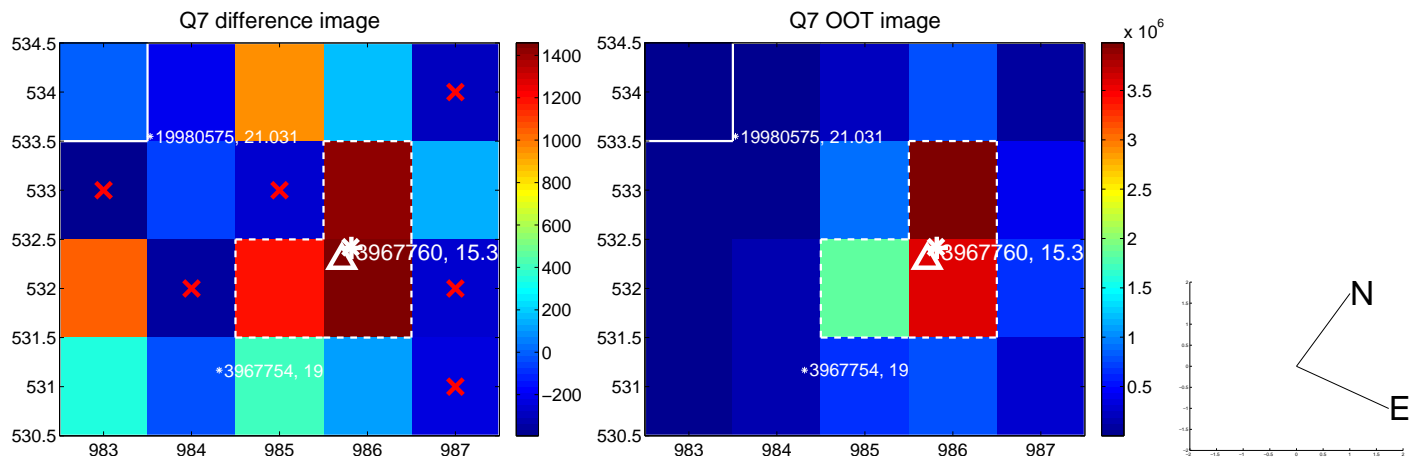
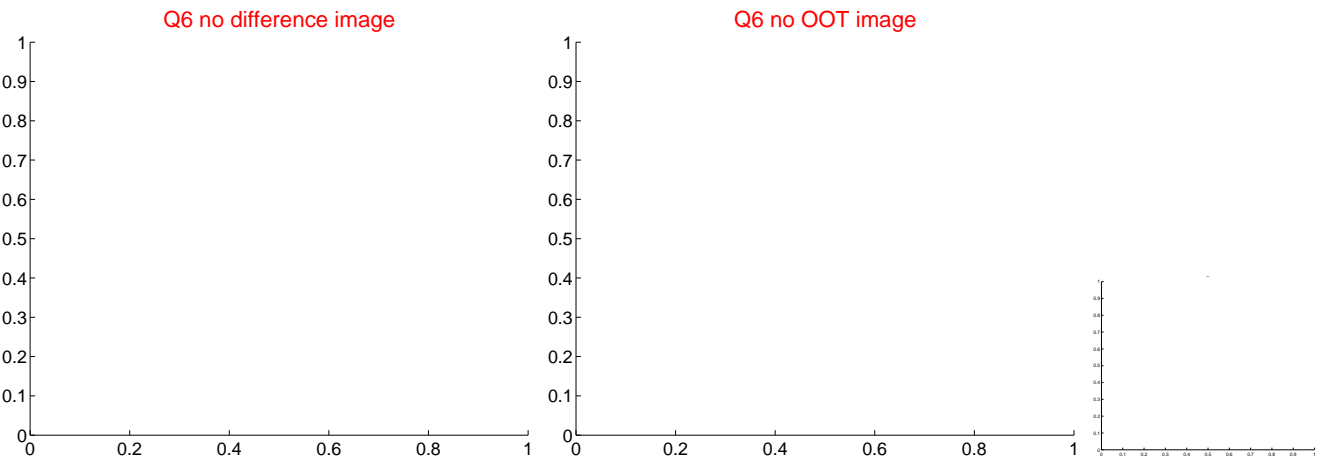
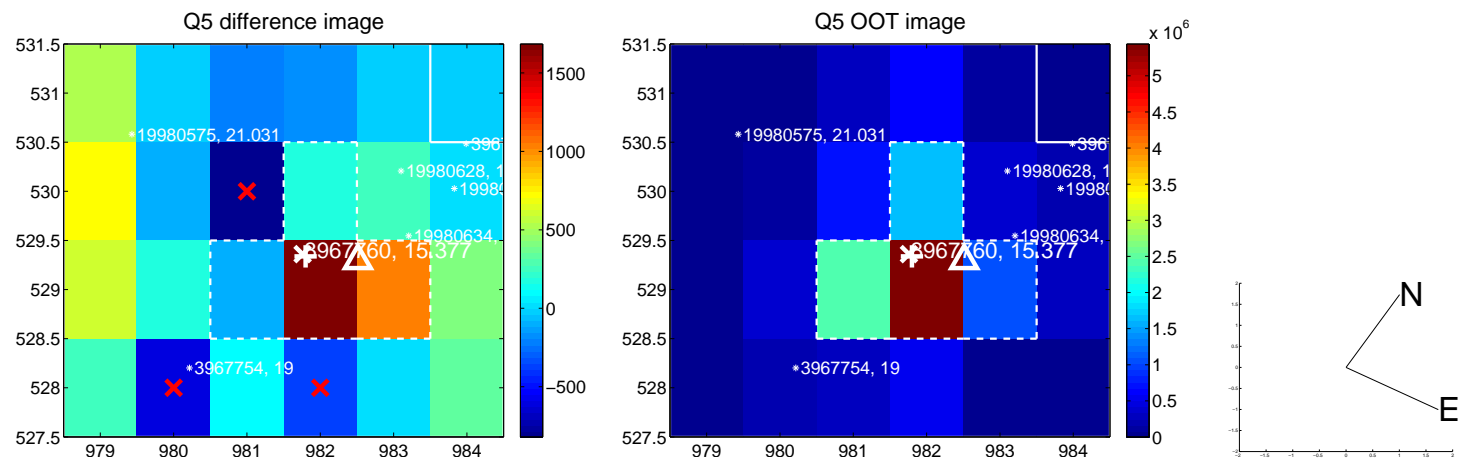
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



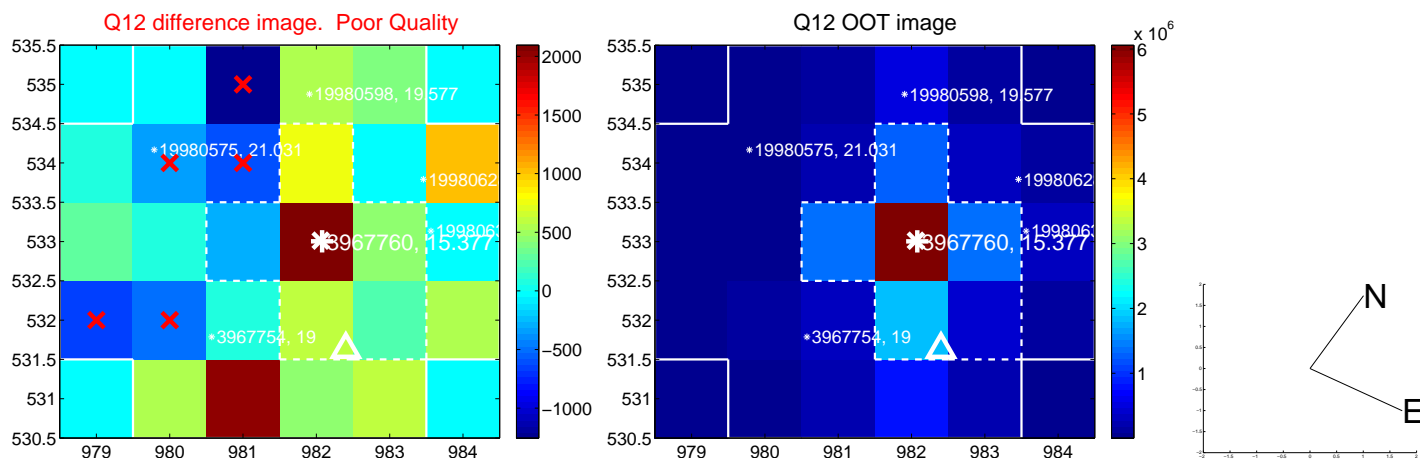
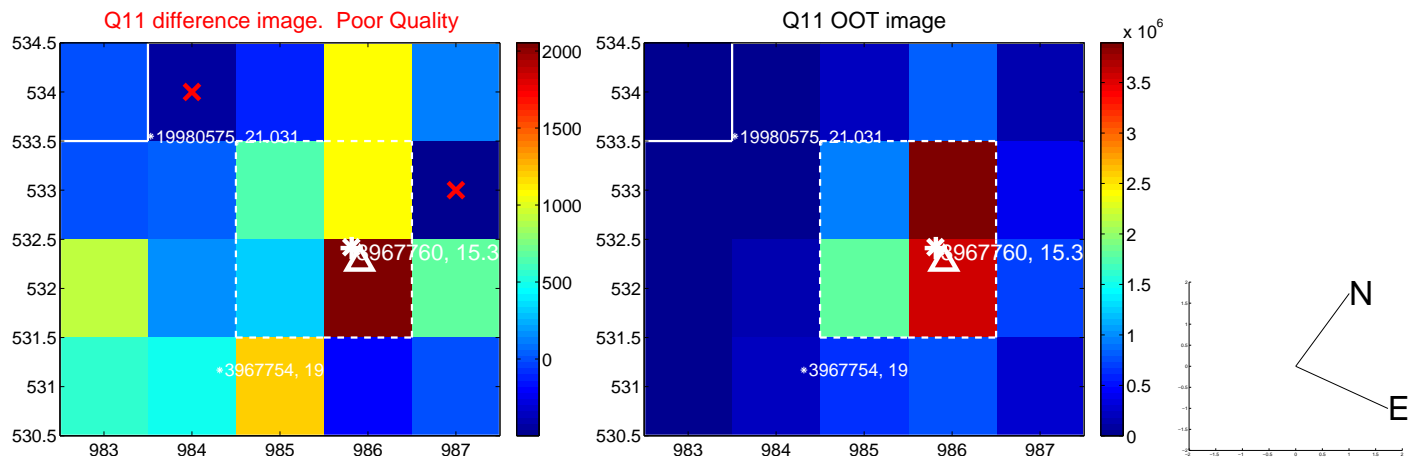
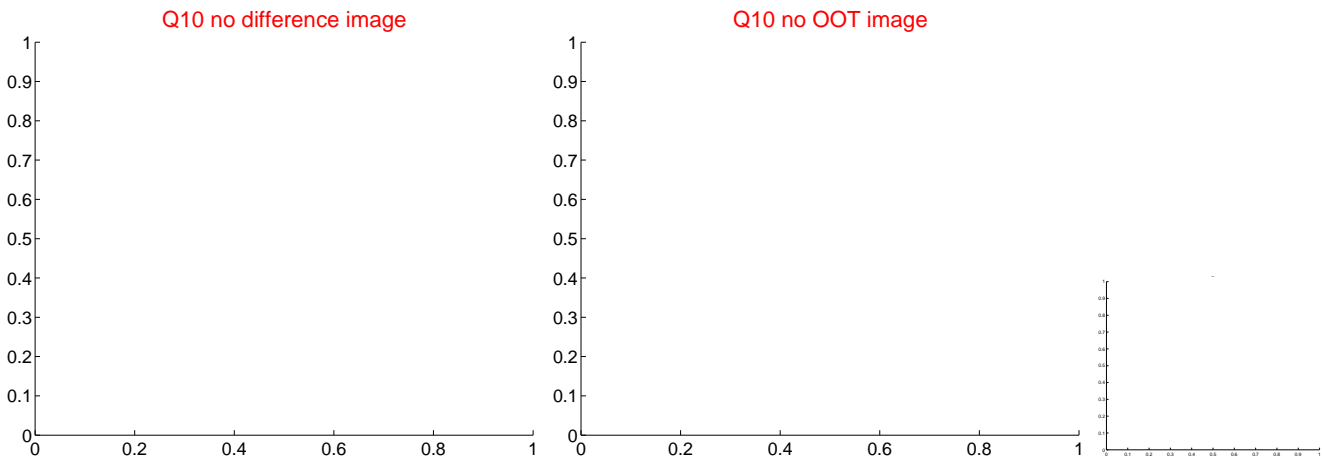
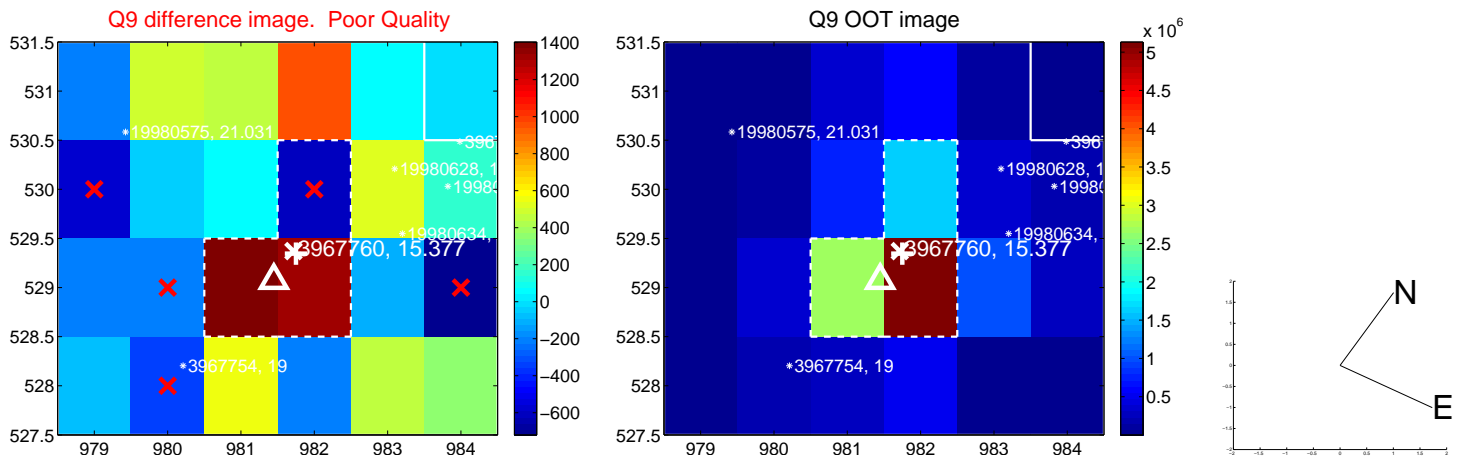
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



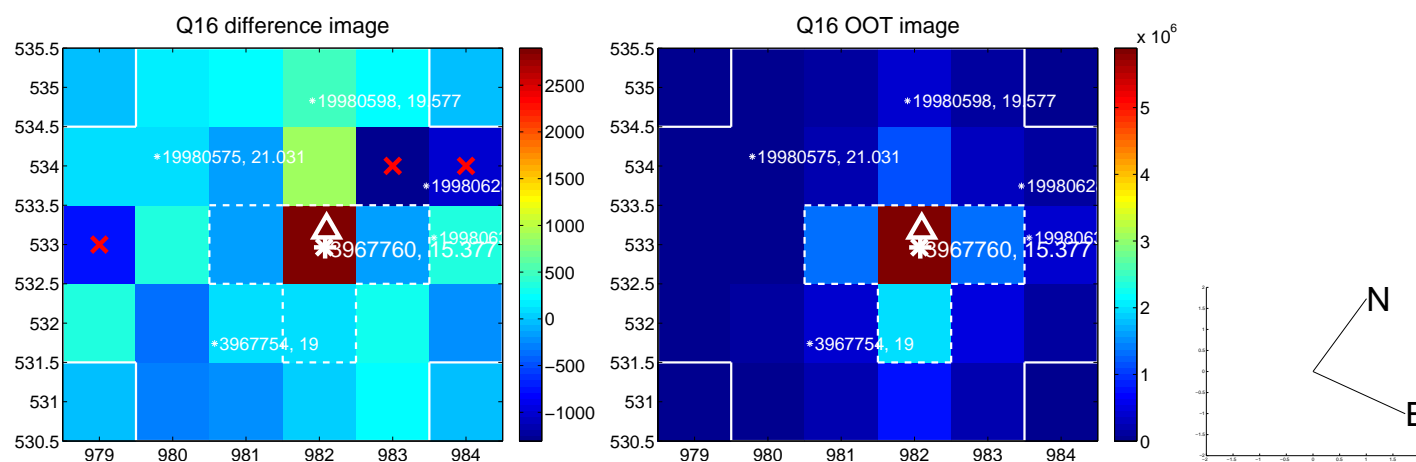
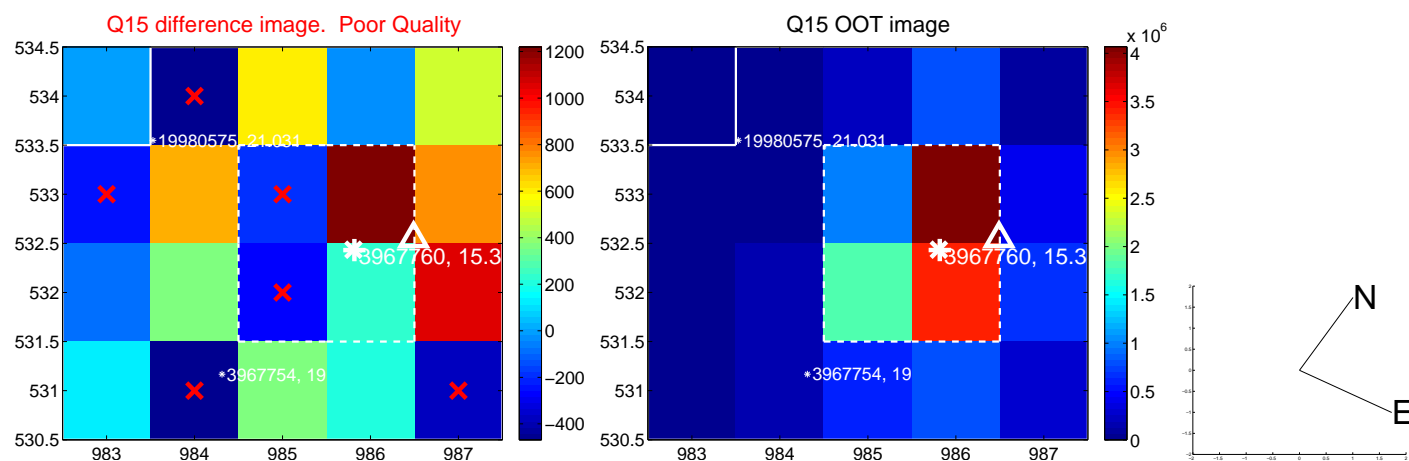
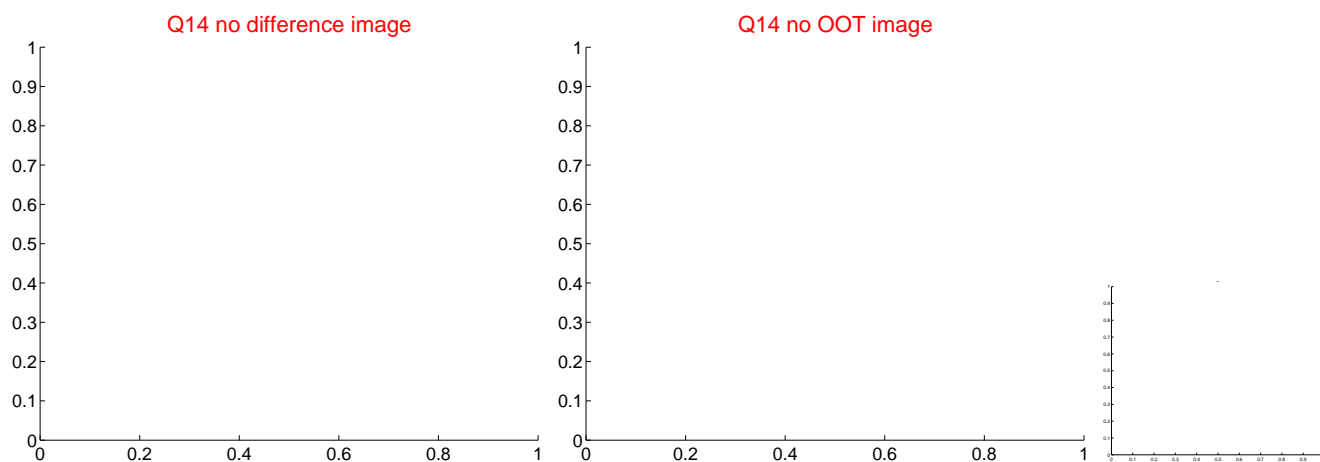
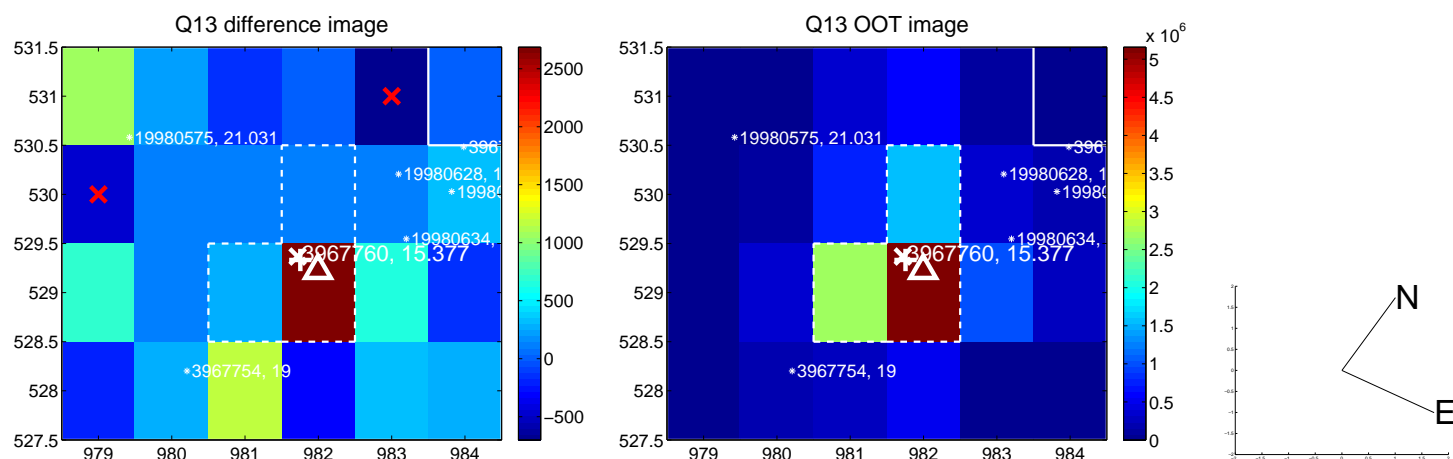
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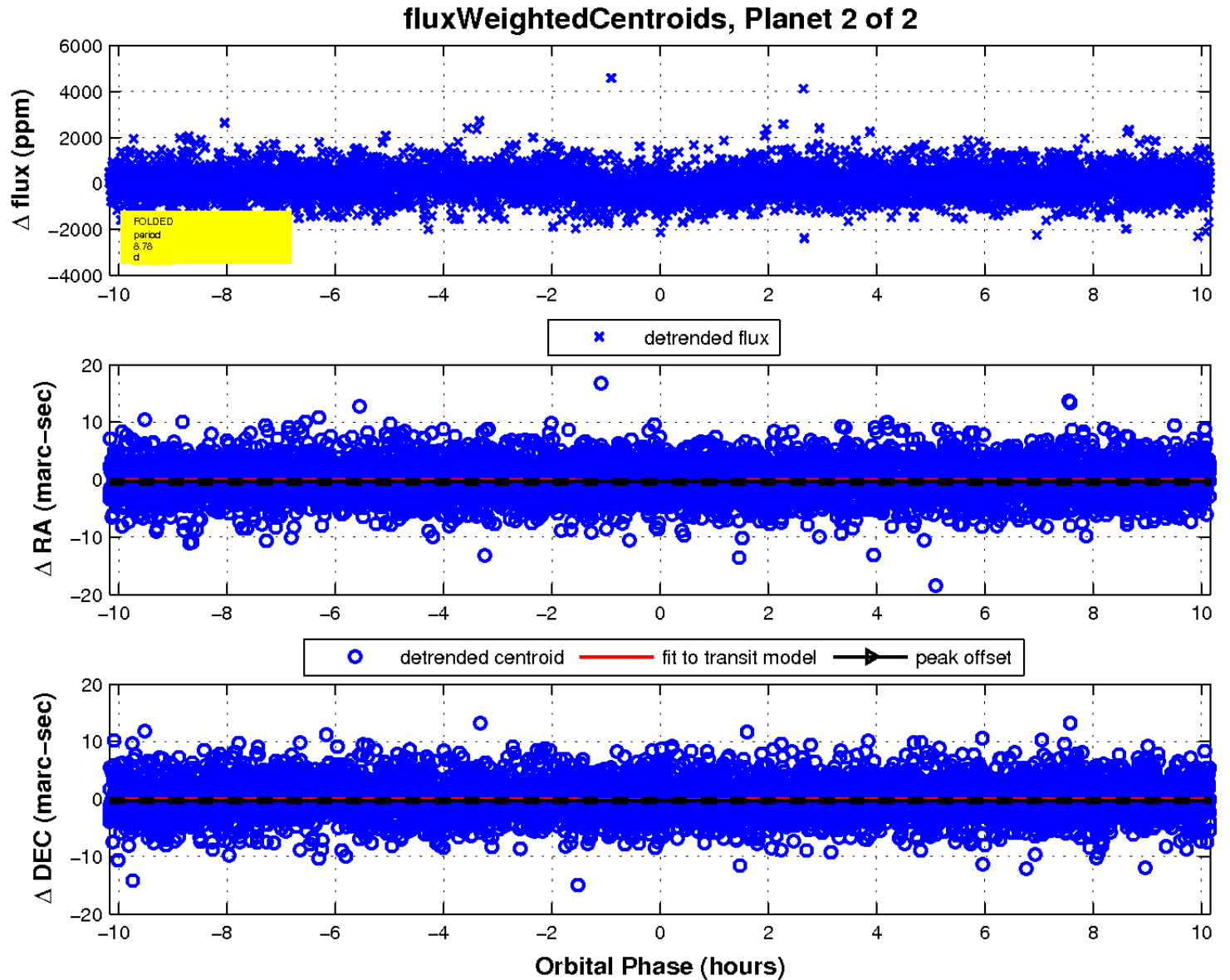
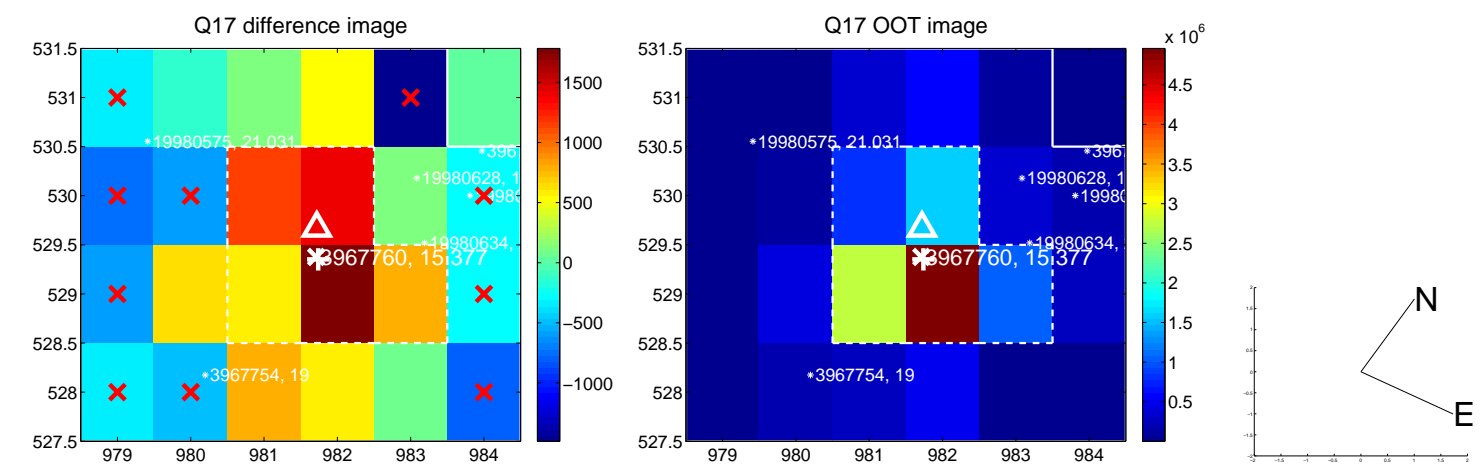
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image

Declination

