

# KIC 012365015

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012365015-01	OBS	7528.01	0.595842	131.976619	1051.9	1.500	14.1	-1.0	0.66	4315	2.06	938.25
012365015-02	OBS	No	0.595595	131.656715	549.0	2.994	11.5	15.6	0.66	4315	1.52	938.77

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012365015-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_NOFITS
012365015-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_KIC_POS

**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.

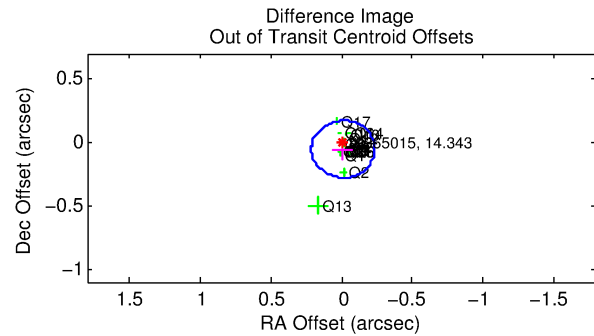
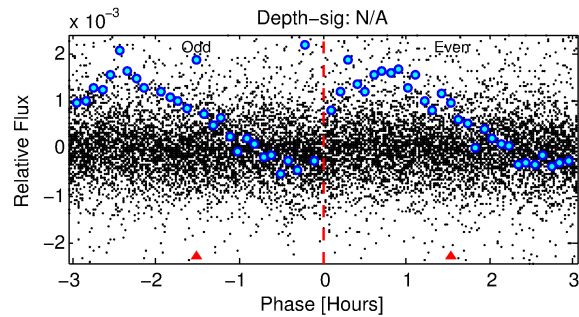
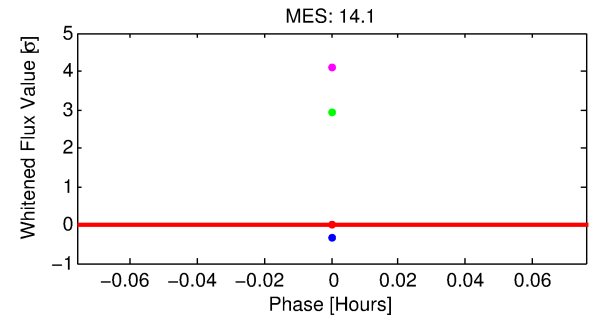
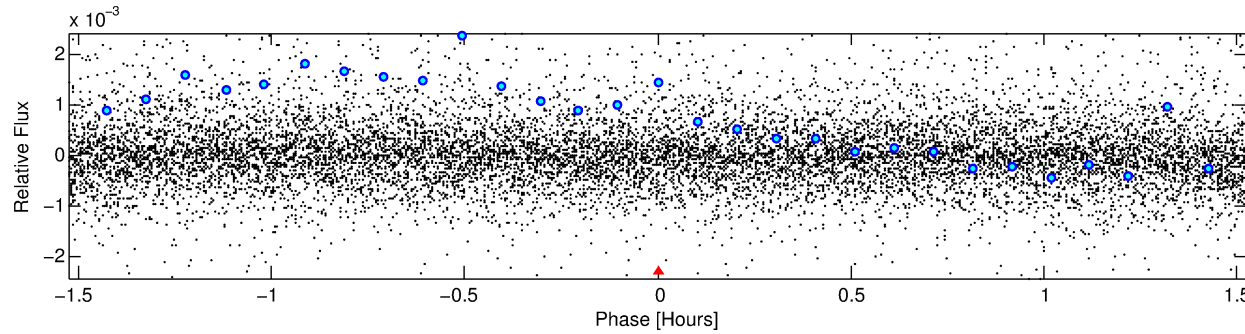
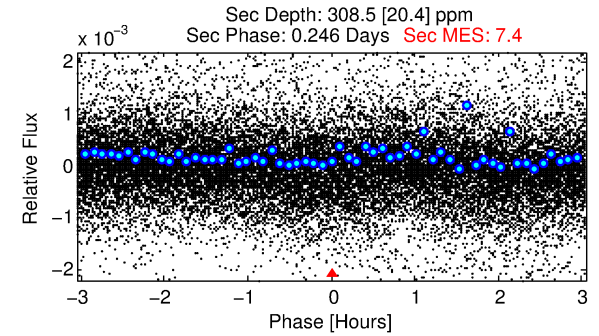
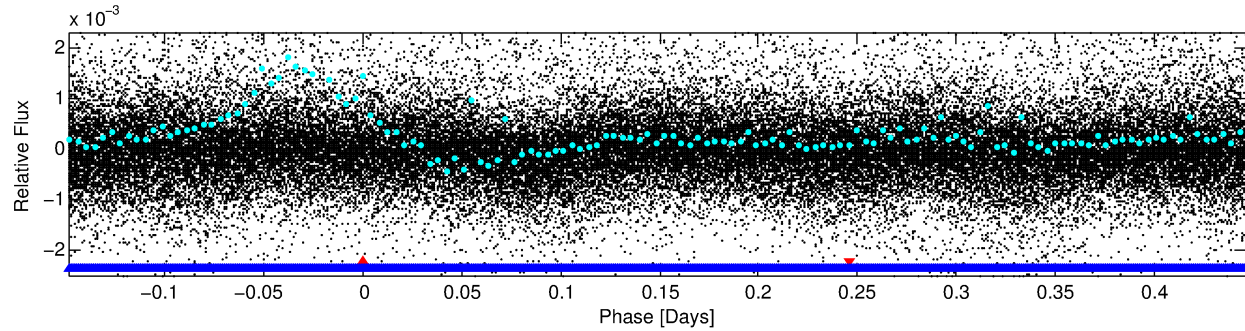
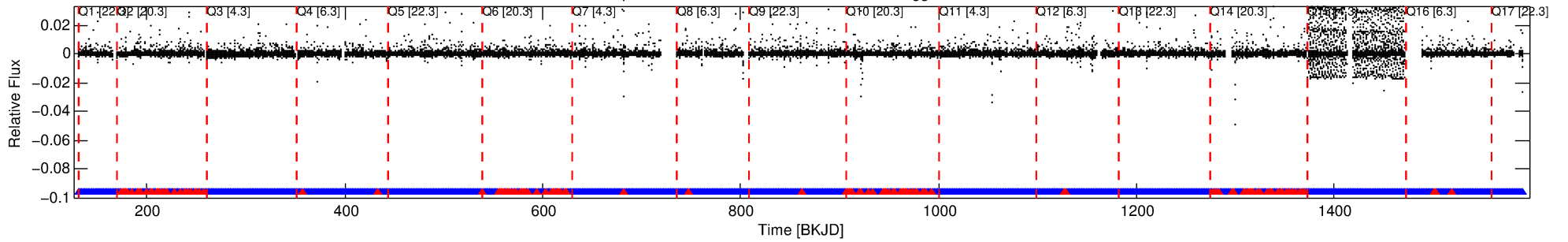
## Ephemeris Match Information For 012365015-01

No Significant Match Found

# DV One-Page Summary

KIC: 12365015 Candidate: 1 of 2 Period: 0.596 d  
KOI: K07528 Corr: No Ephemeris Match

Kp: 14.34 R\*: 0.66 Rs Teff: 4315.0 K Logg: 4.61 Fe/H: 0.020



TPS TCE Results:

Period = 0.59584 d  
Epoch = 131.9766 BKJD

DV fit results are unavailable

DV Diagnostic Results:

ShortPeriod-sig: 0.1% [0.00σ]

LongPeriod-sig: N/A

ModelChiSquare2-sig: N/A

ModelChiSquareGof-sig: N/A

Bootstrap-pfa: 7.47e-42

RollingBand-fgt: 0.94 [2006/2145]

GhostDiagnostic-chr: -9.126

Centroid-sig: 99.9%

Centroid-so: 0.370 arcsec [0.03σ]

OotOffset-rm: 0.054 arcsec [0.73σ]

KicOffset-rm: 0.672 arcsec [9.58σ]

OotOffset-st: 4/4/4/5 [17]

KicOffset-st: 4/4/4/5 [17]

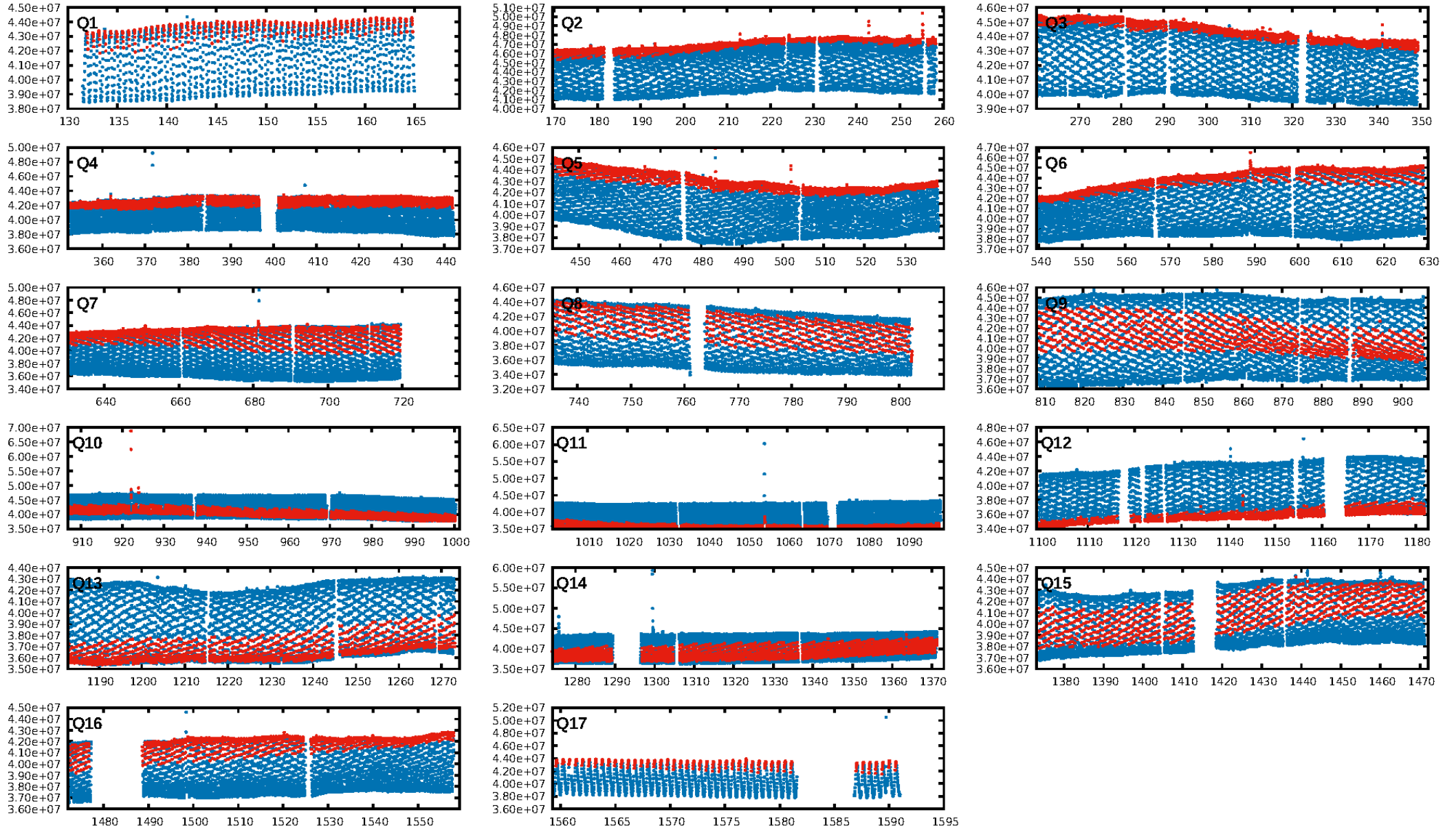
DiffImageQuality-fgm: 0.35 [6/17]

DiffImageOverlap-fno: 0.12 [2/17]

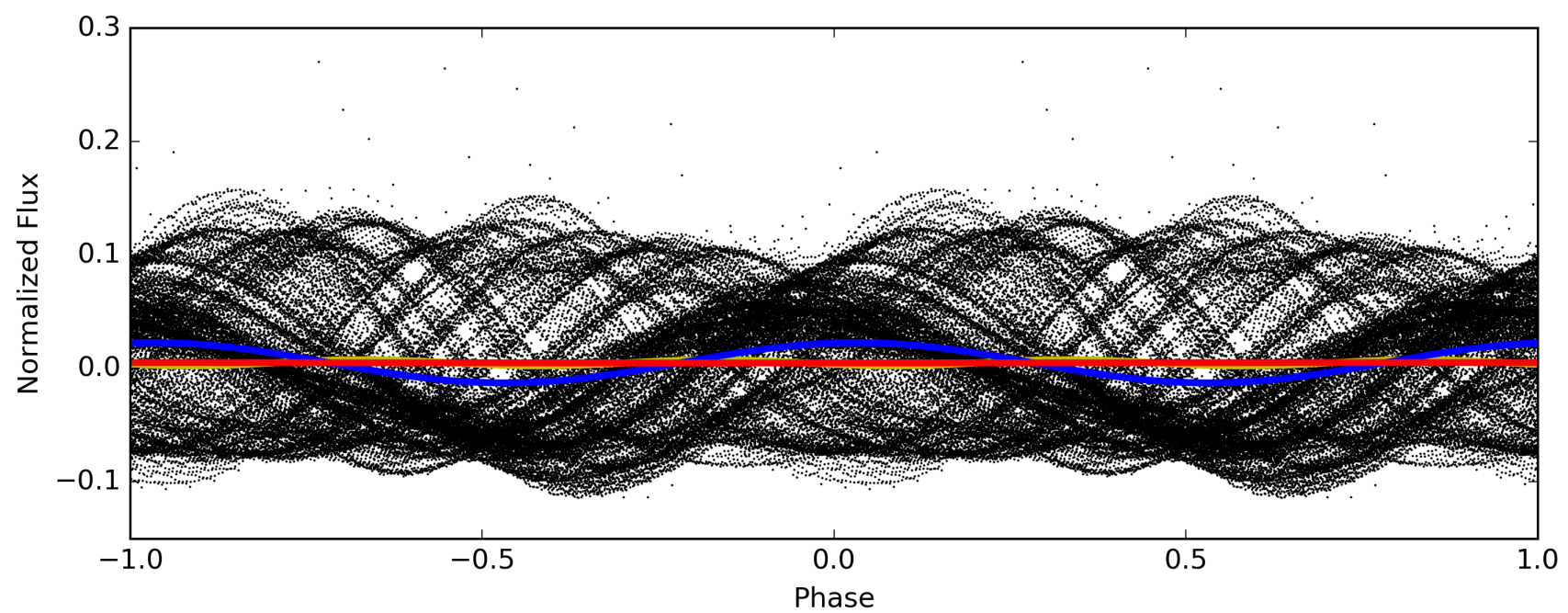
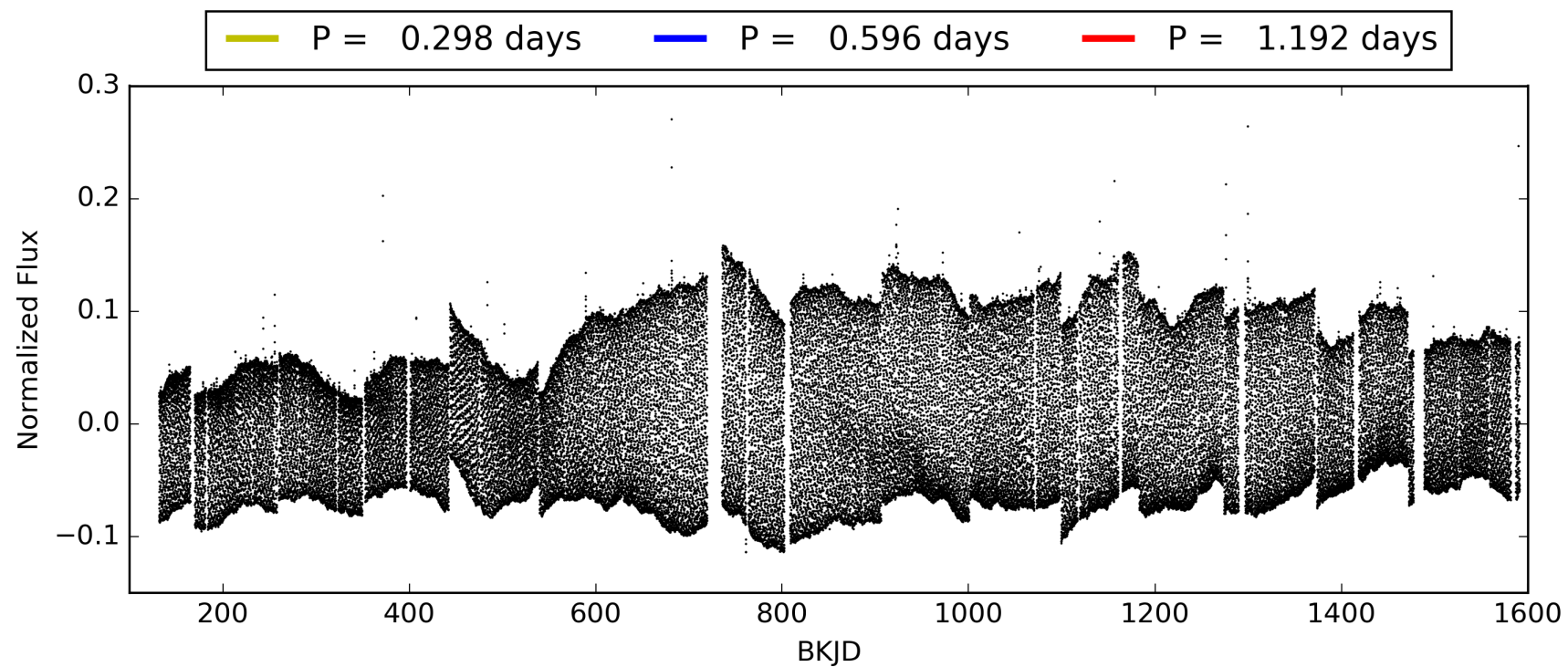
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 02:40:22 Z

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

# TCE 012365015-01, PDC Light Curves

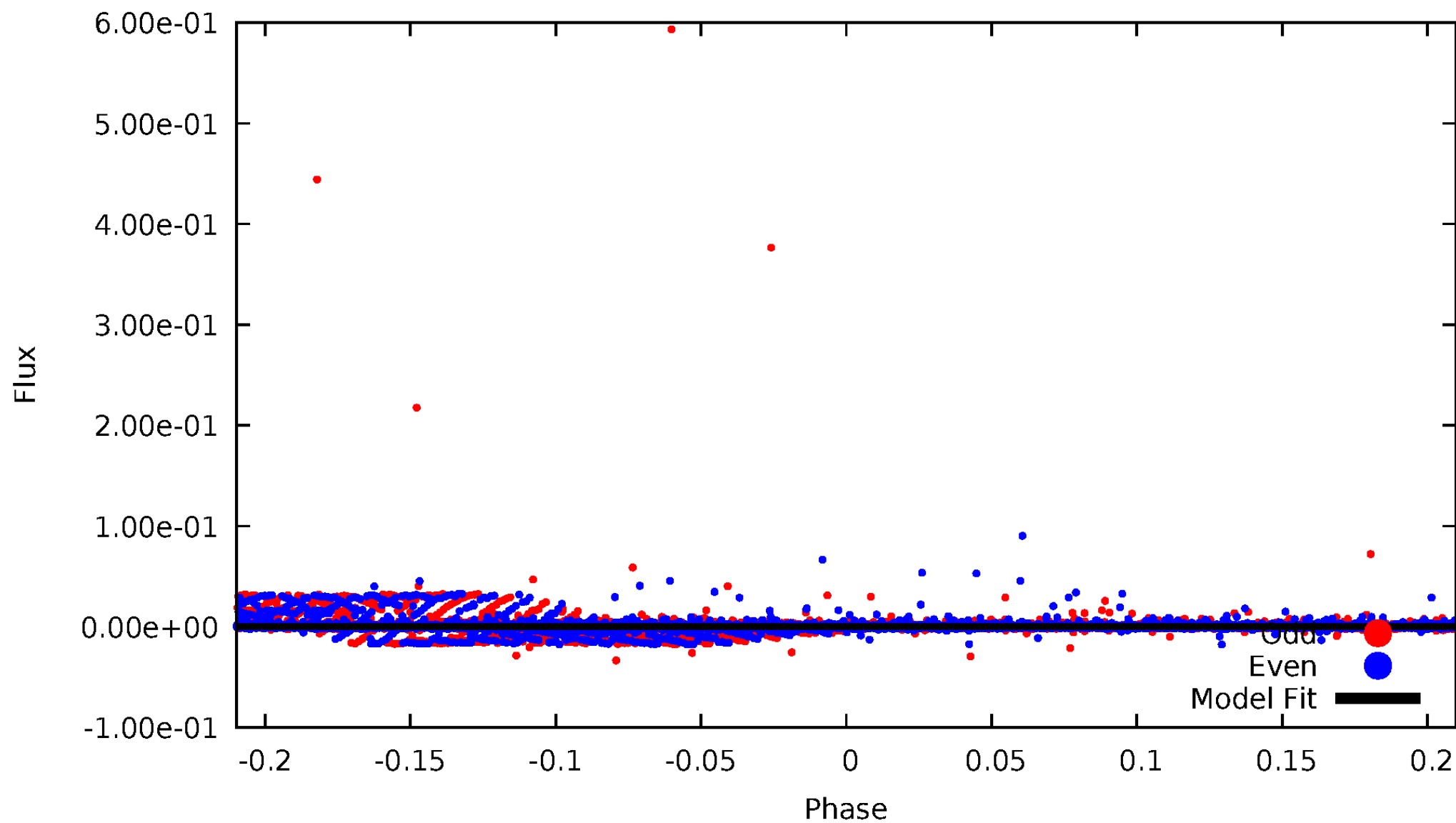


TCE 012365015-01



# DV Odd/Even

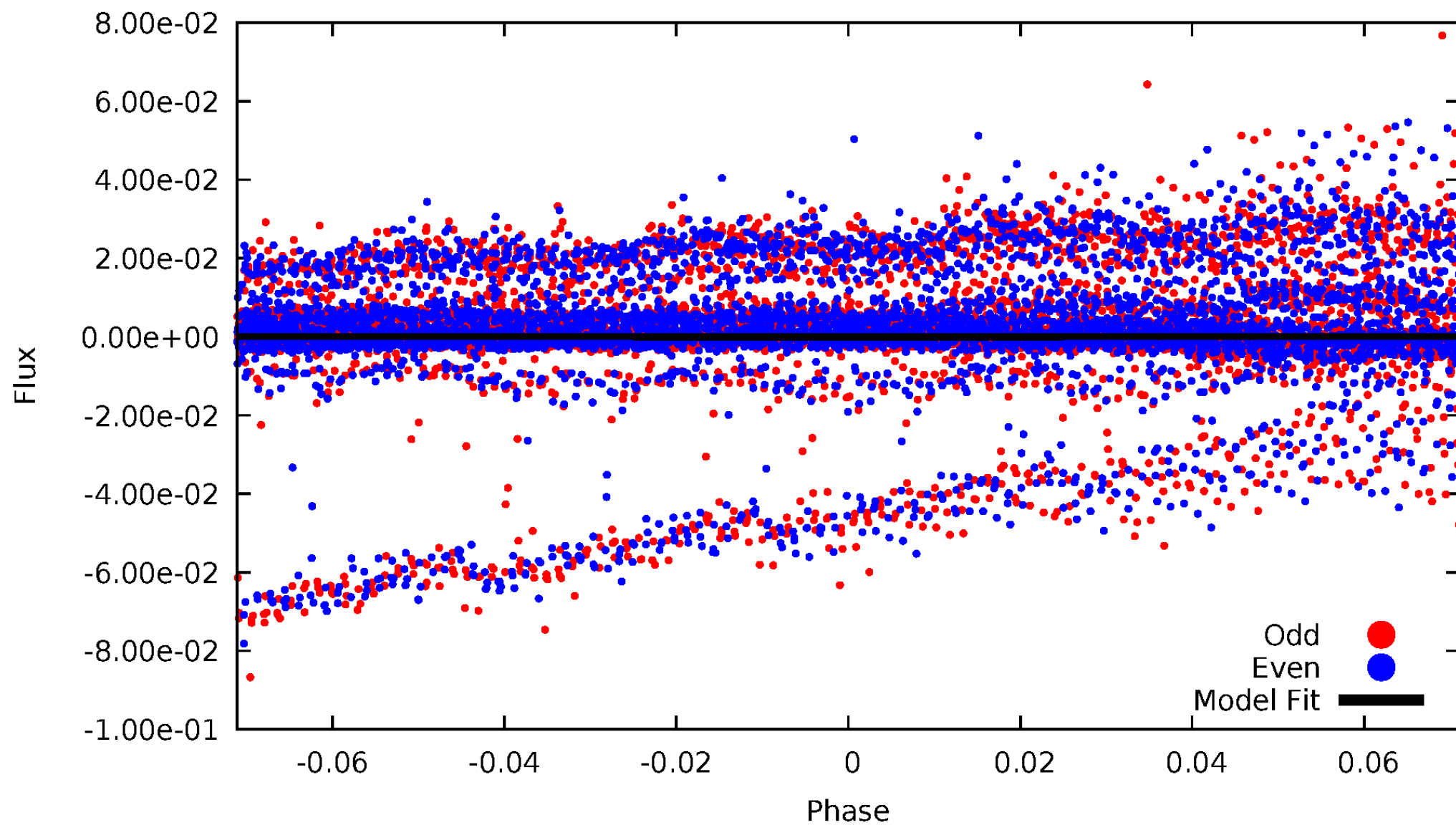
TCE 012365015-01





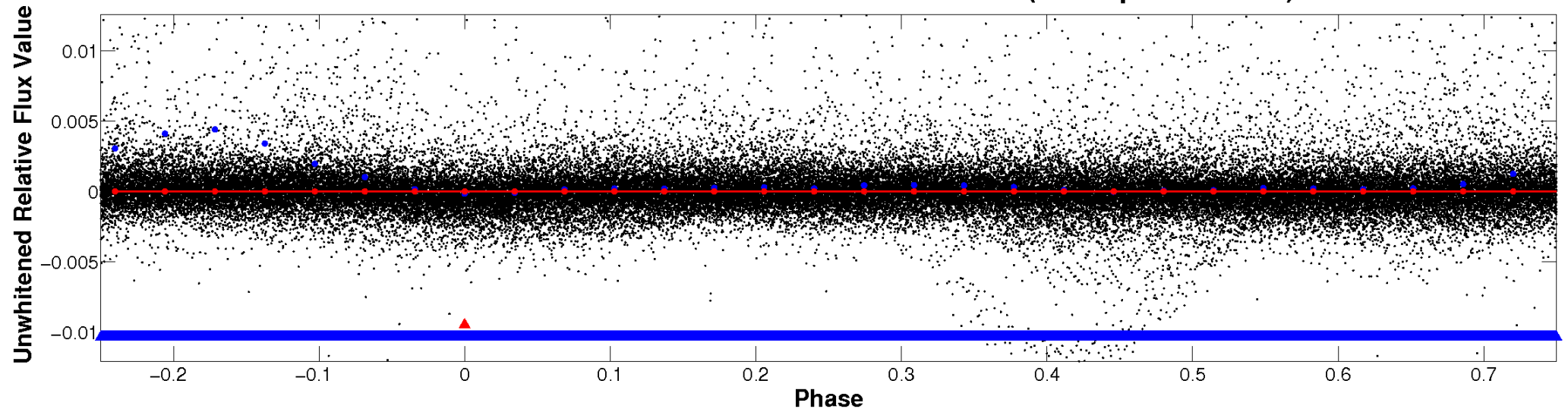
# ALT Odd/Even

TCE 012365015-01

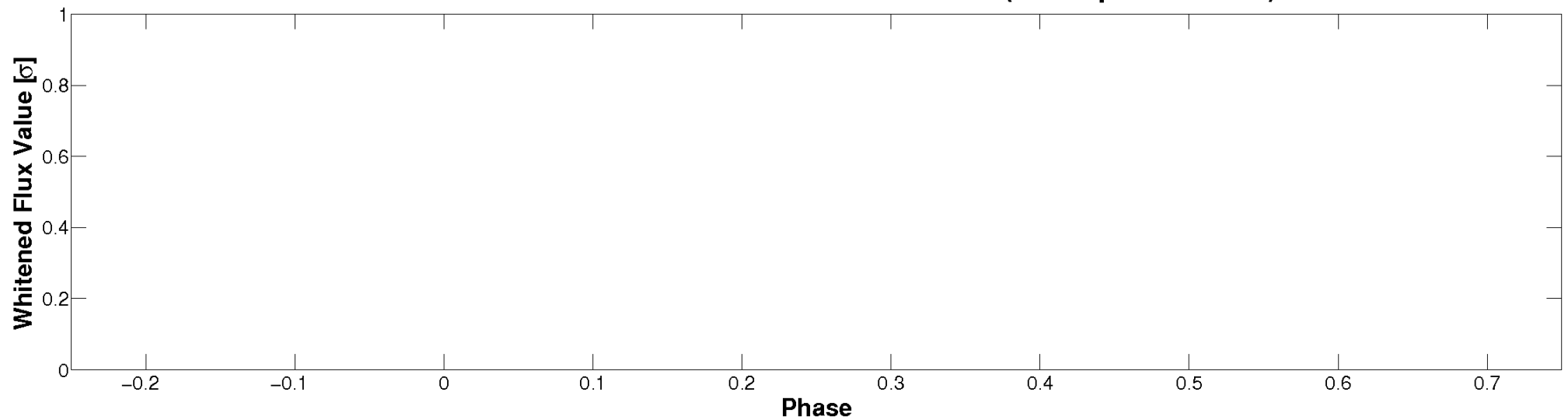


# Non-Whitened Vs. Whitened Light Curve

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

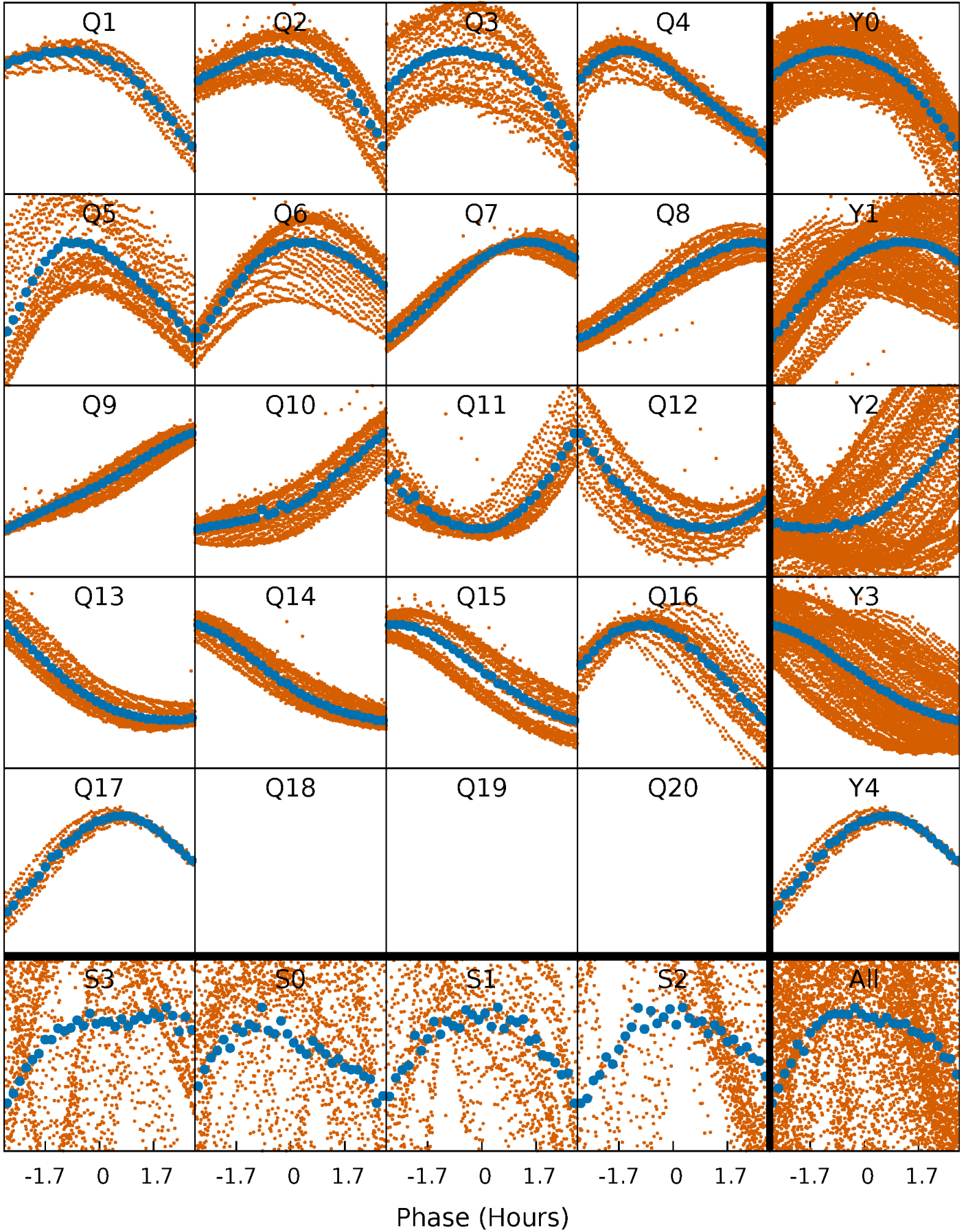


**Planet 1 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



# PDC Quarter-Phased Transit Curves

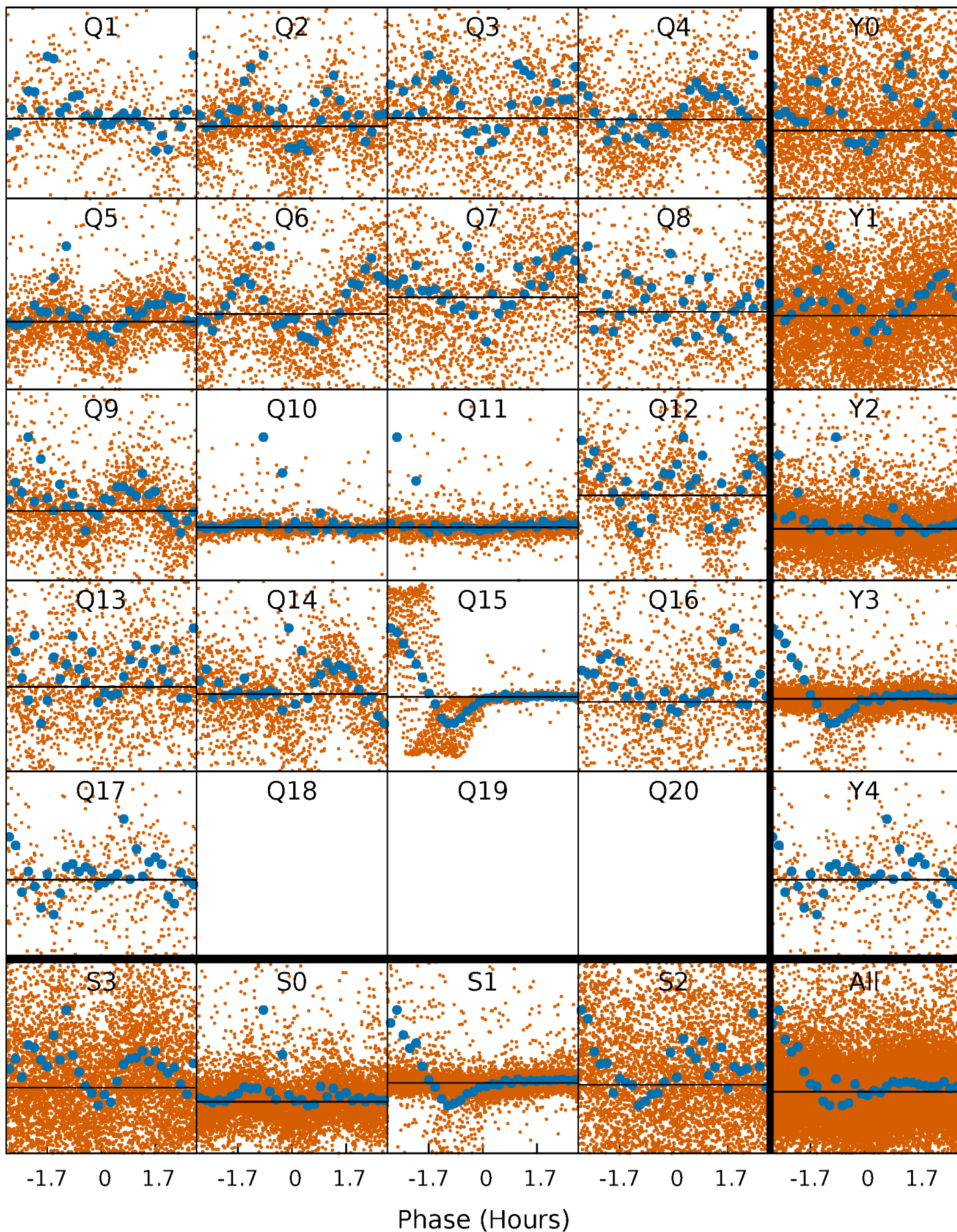
TCE 012365015-01 P= 0.595842 Days  $T_0=131.976619$  (BKJD)





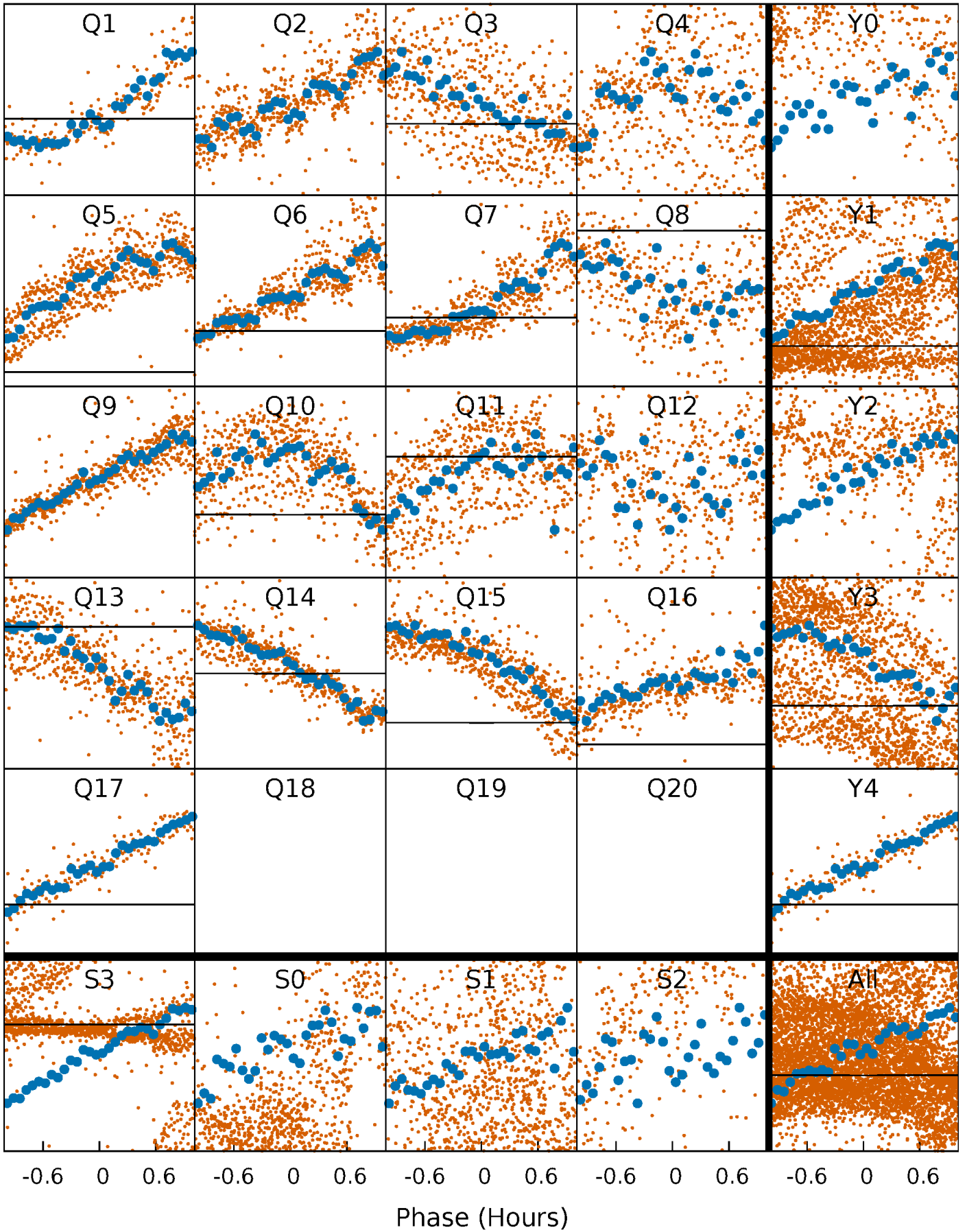
# DV Quarter-Phased Transit Curves

TCE 012365015-01 P= 0.595842 Days  $T_0=131.976619$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

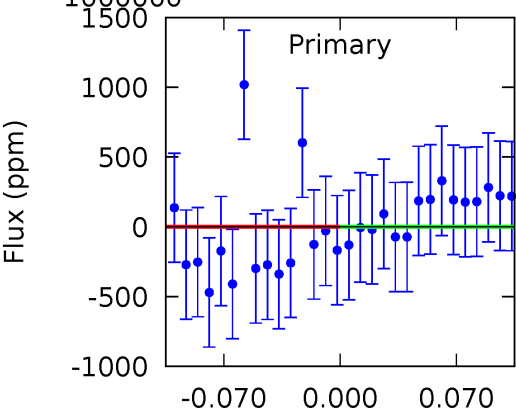
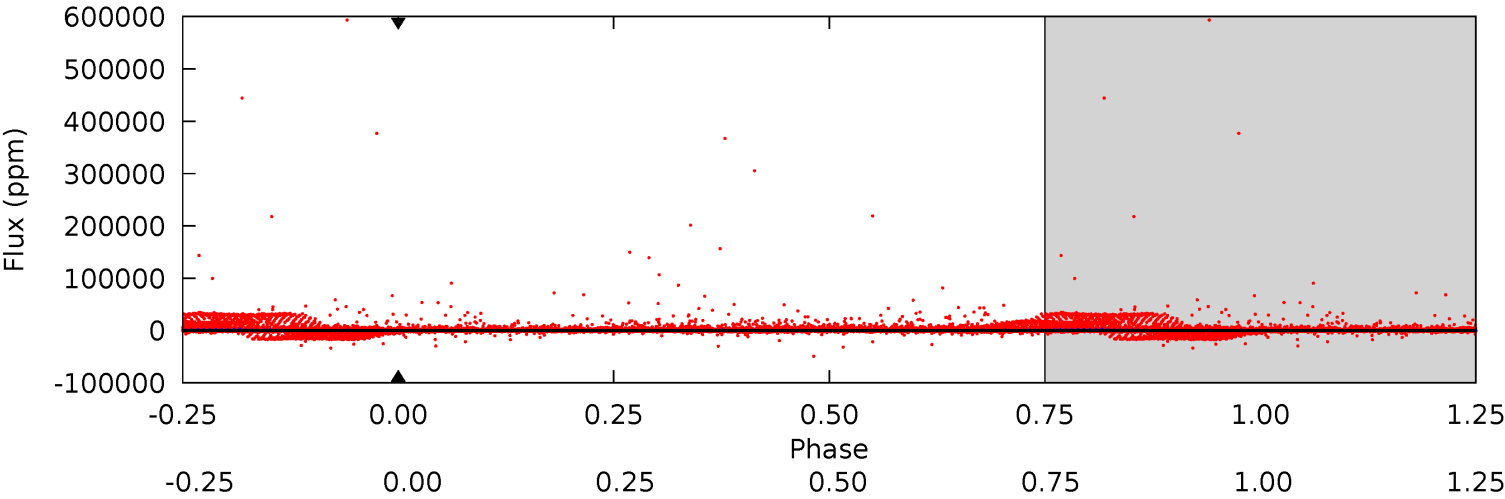
TCE 012365015-01   P= 0.595842 Days    $T_0=131.887364$  (BKJD)



DV Model-Shift Uniqueness Test

012365015-01, P = 0.595842 Days, E = 131.380777 Days

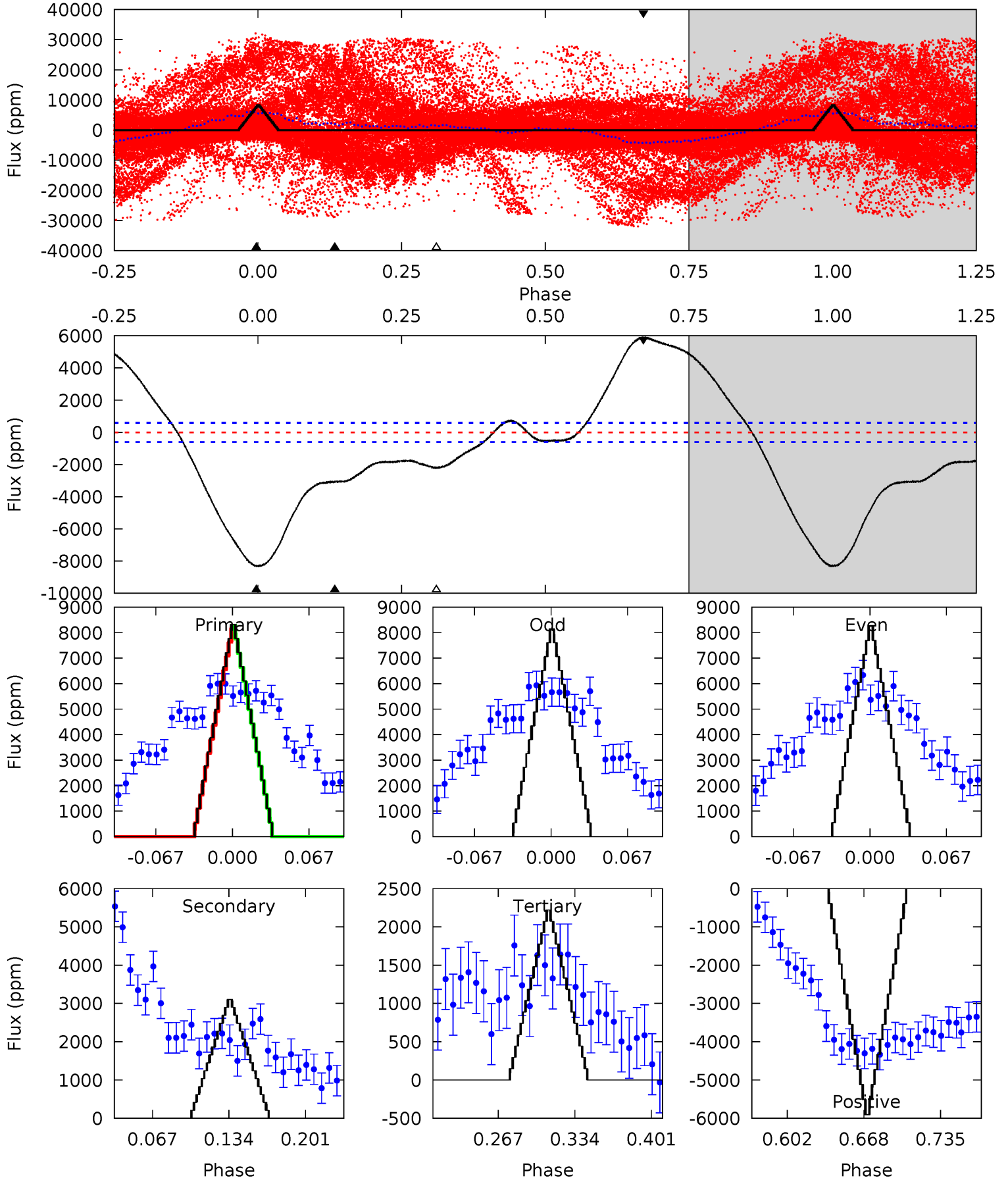
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

012365015-01, P = 0.595842 Days, E = 131.291522 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
64.7	24.1	17.3	45.9	4.65	1.83	21.9	47.5	18.8	6.87	-21.8	0.39	1.30	0.42	0.41



### Stellar Parameters For KIC 012365015

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4315^{+129}_{-129}$	$4.614^{+0.049}_{-0.021}$	$0.020^{+0.250}_{-0.300}$	$0.663^{+0.036}_{-0.057}$	$0.657^{+0.057}_{-0.057}$	$3.183^{+0.681}_{-0.272}$
	+3%/-3%	+1%/-0%	+1250%/-1500%	+5%/-9%	+9%/-9%	+21%/-9%
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 012365015-01 / KOI 7528.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$0 \pm 1000000$	$5.50^{+6.05}_{-3.91}$	$1958^{+64}_{-65}$	$2979^{+8067}_{-13027}$	$2.094^{+523.787}_{-411.278}$
Alt.	$-3105 \pm 129$	$4.99^{+4.90}_{-3.47}$	$1958^{+70}_{-66}$	$3995^{+2790}_{-870}$	$10^{+97}_{-8}$

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



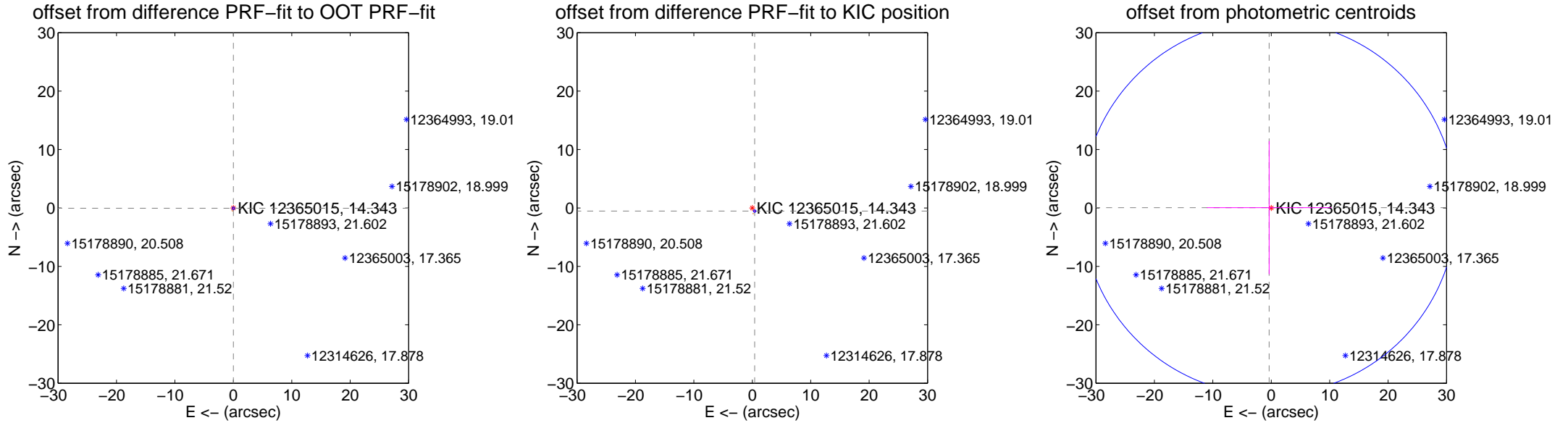
## DV Centroid Data

Supplemental centroid analysis for 012365015-01. Kepler magnitude: 14.34. Transit SNR -1.00

There are 6 quarters with good PRF difference image offsets

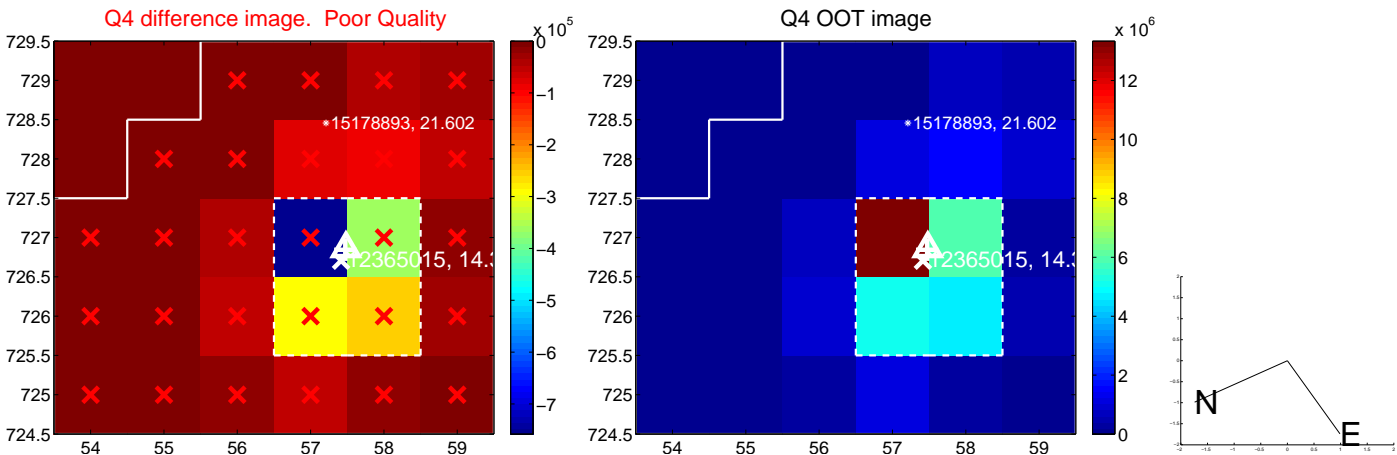
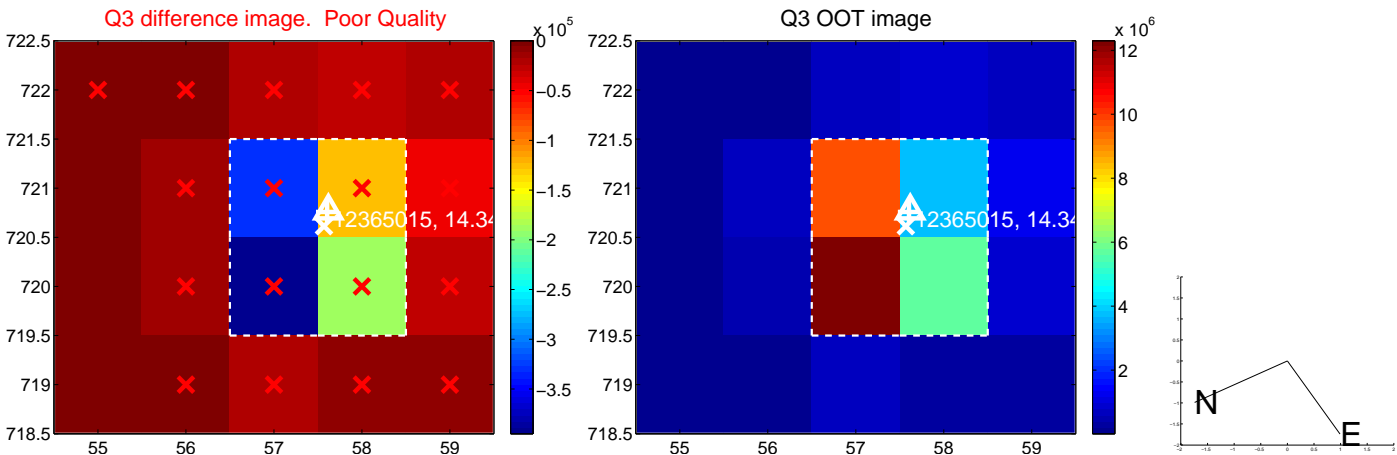
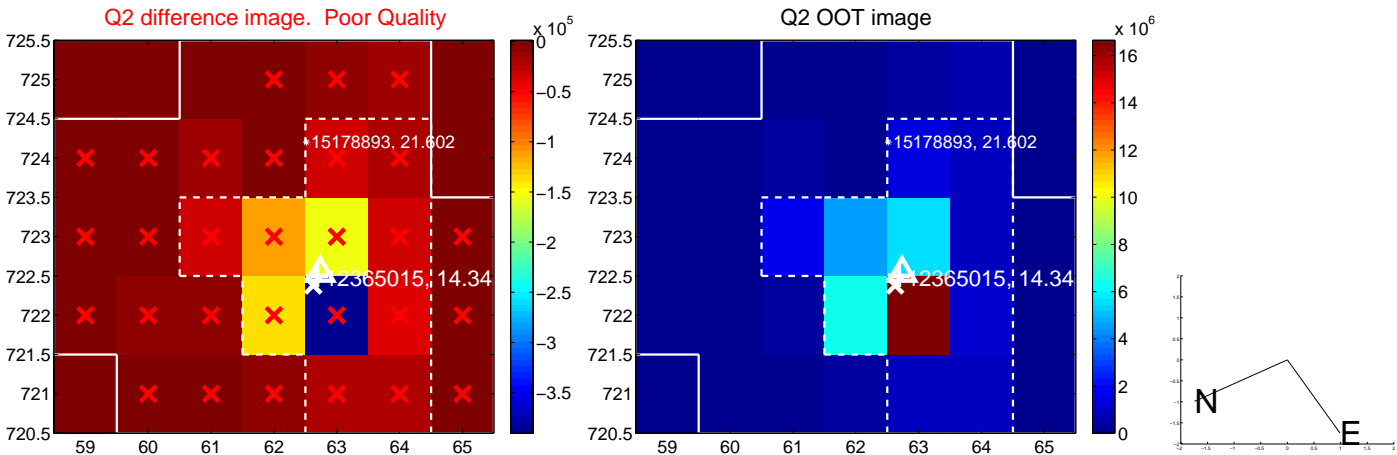
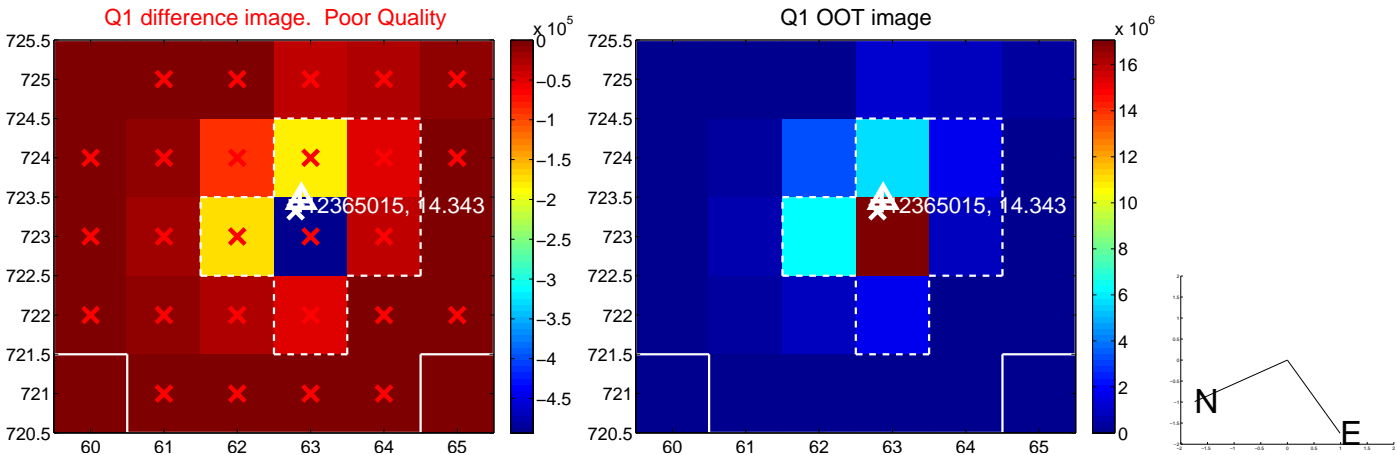
The direct PRF centroid is offset from the target star catalog position by about 0.68 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.054 \pm 0.075$	0.73	$-0.011 \pm 0.068$	$-0.053 \pm 0.076$
PRF-fit source offset from KIC position	<b><math>0.672 \pm 0.070</math></b>	<b>9.58</b>	$-0.407 \pm 0.071$	$-0.534 \pm 0.073$
photometric centroid source offset	$0.37 \pm 10.68$	0.03	$0.37 \pm 10.66$	$0.06 \pm 11.38$

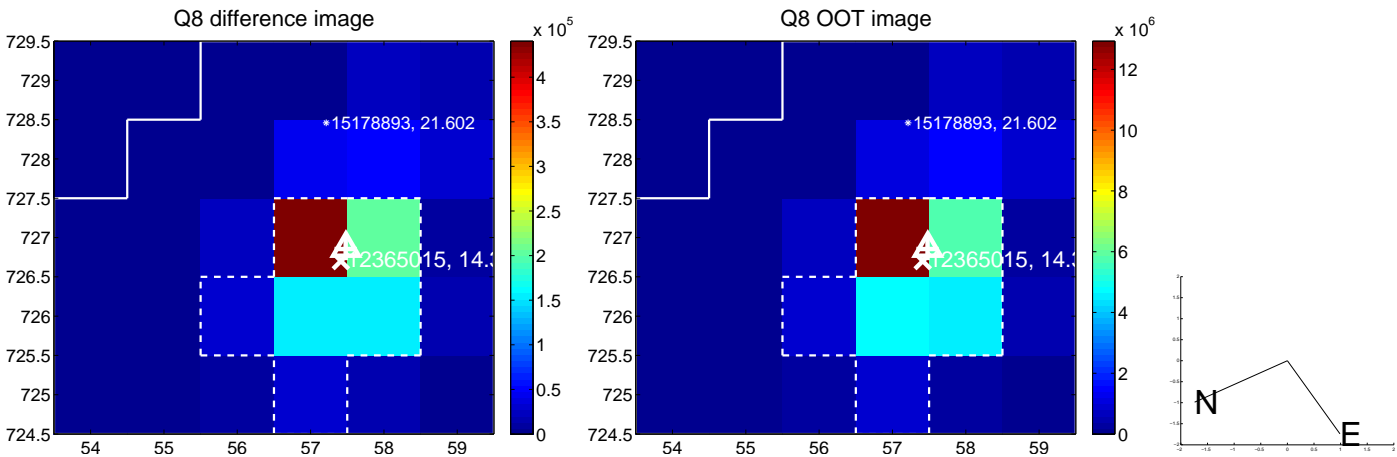
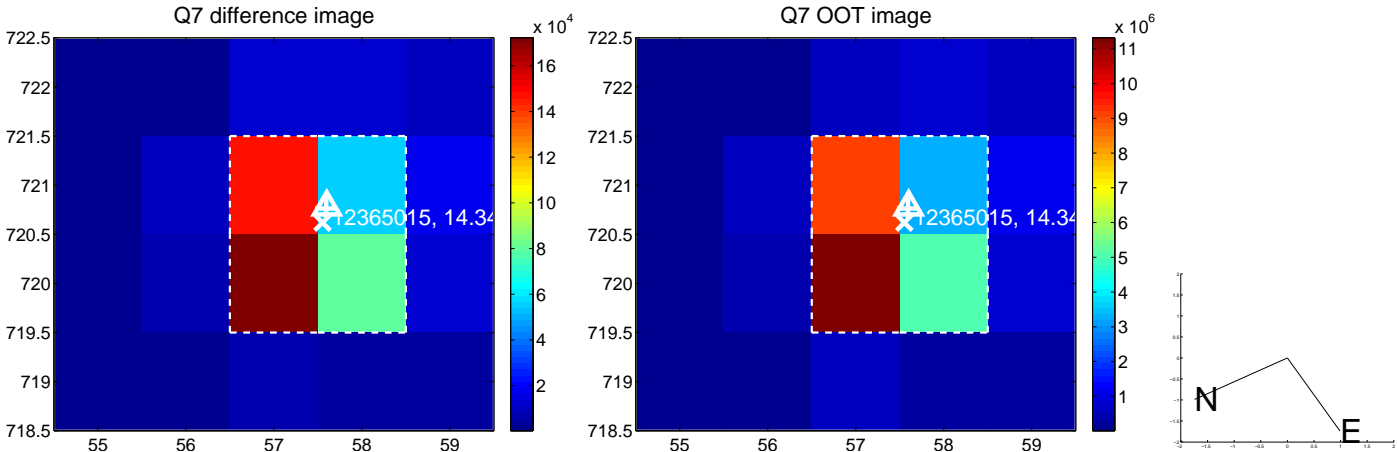
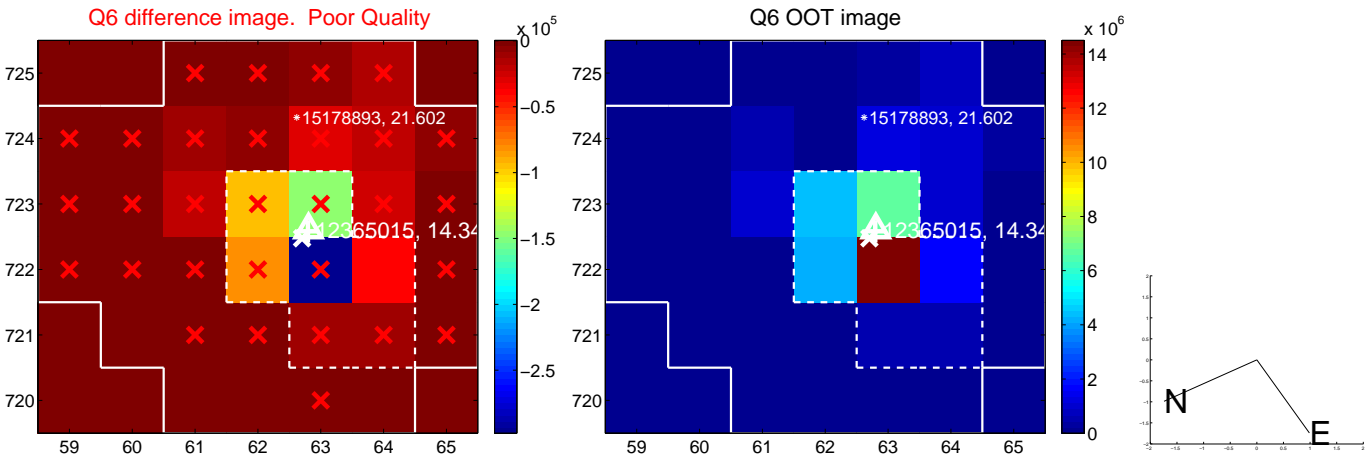
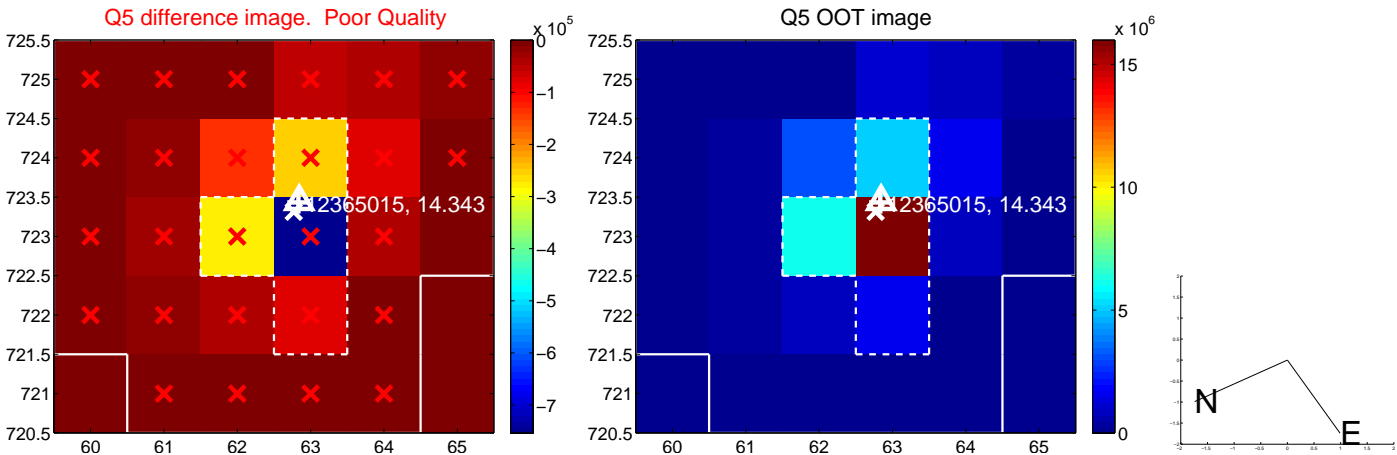


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

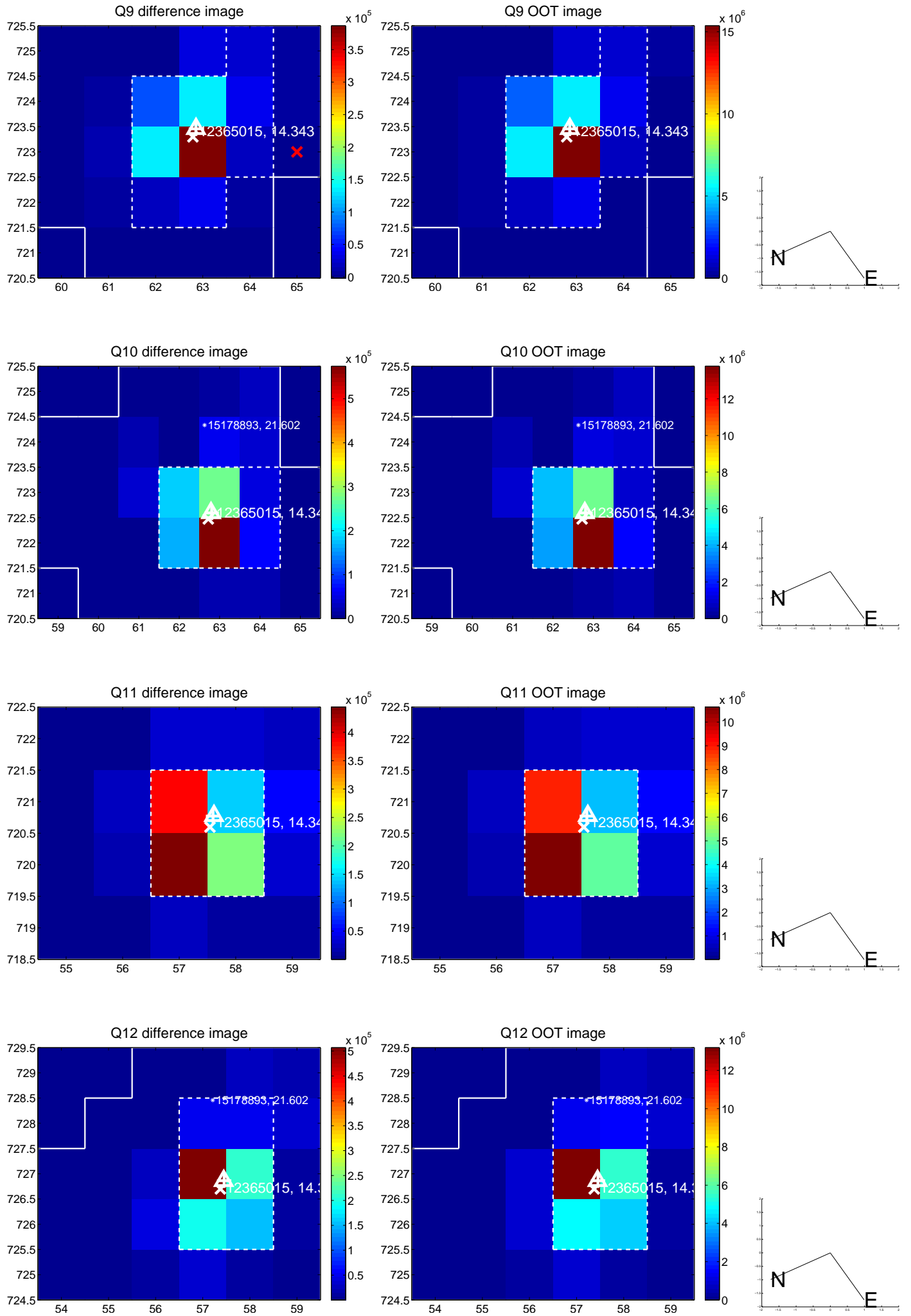
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



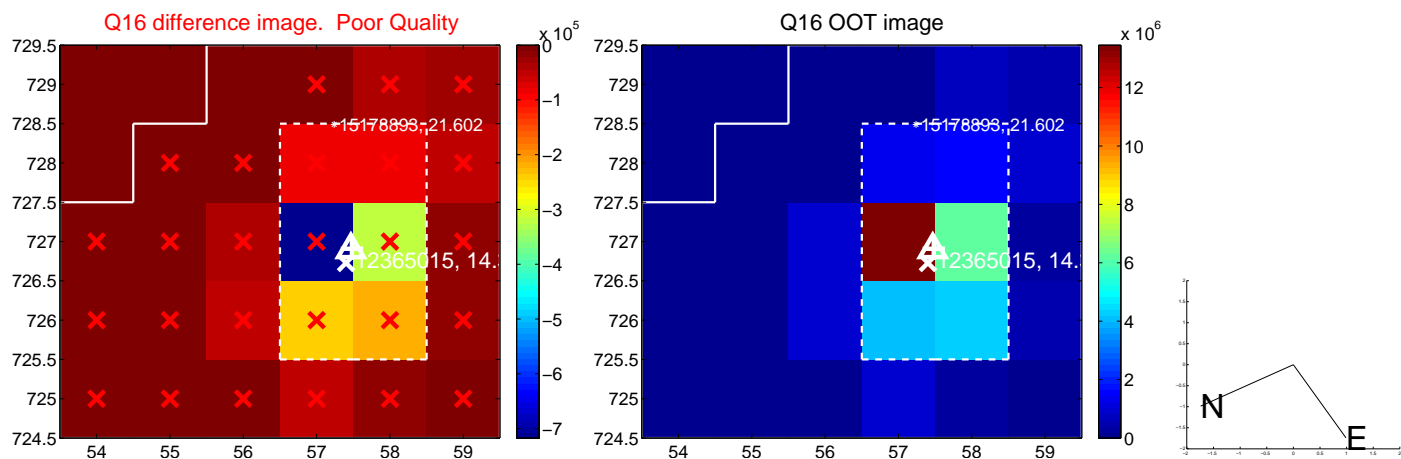
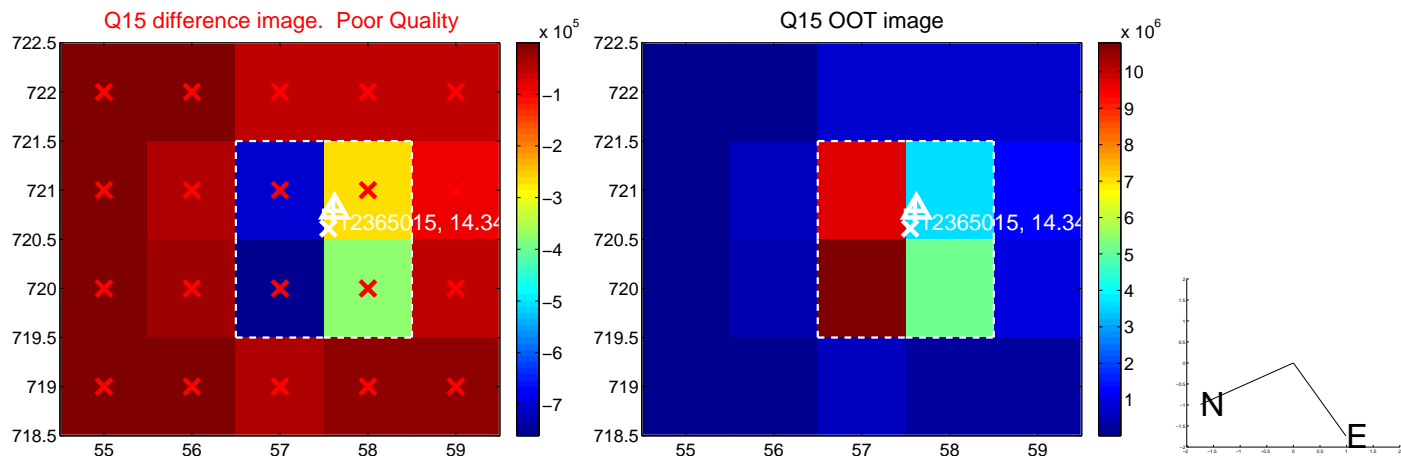
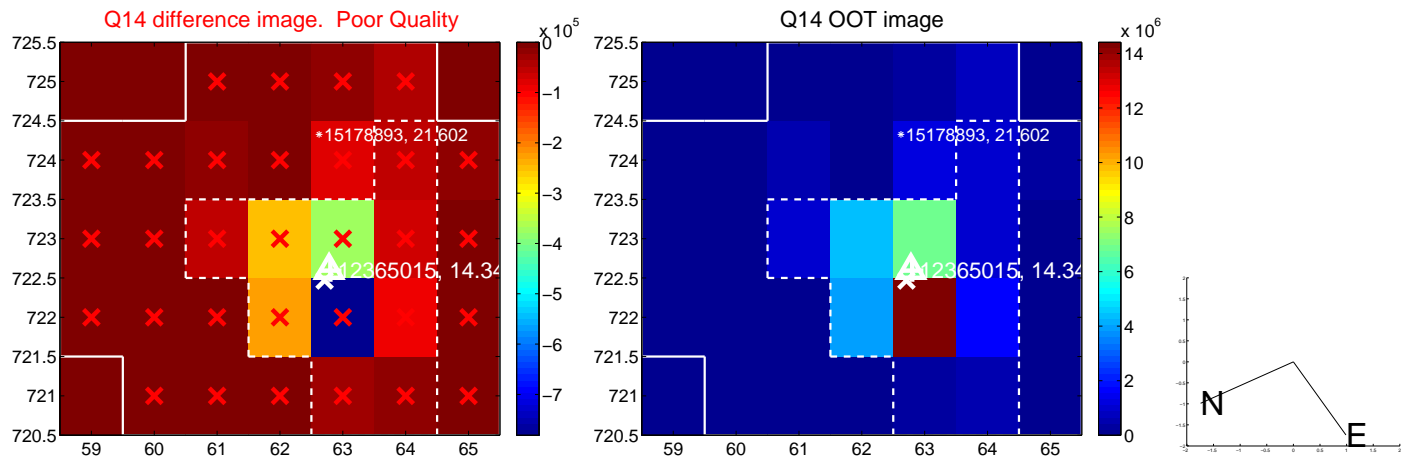
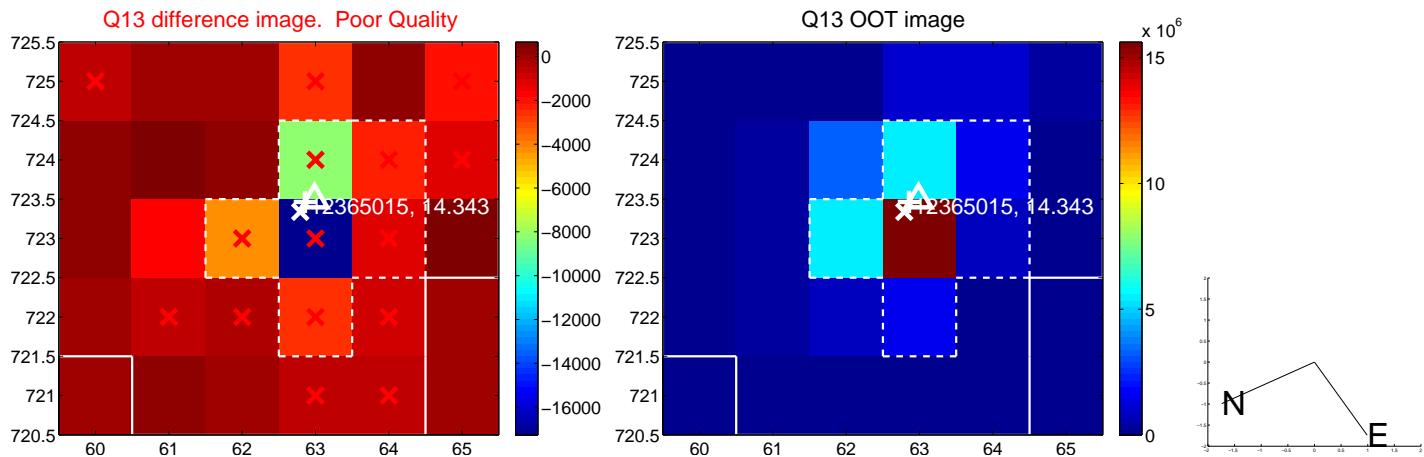
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

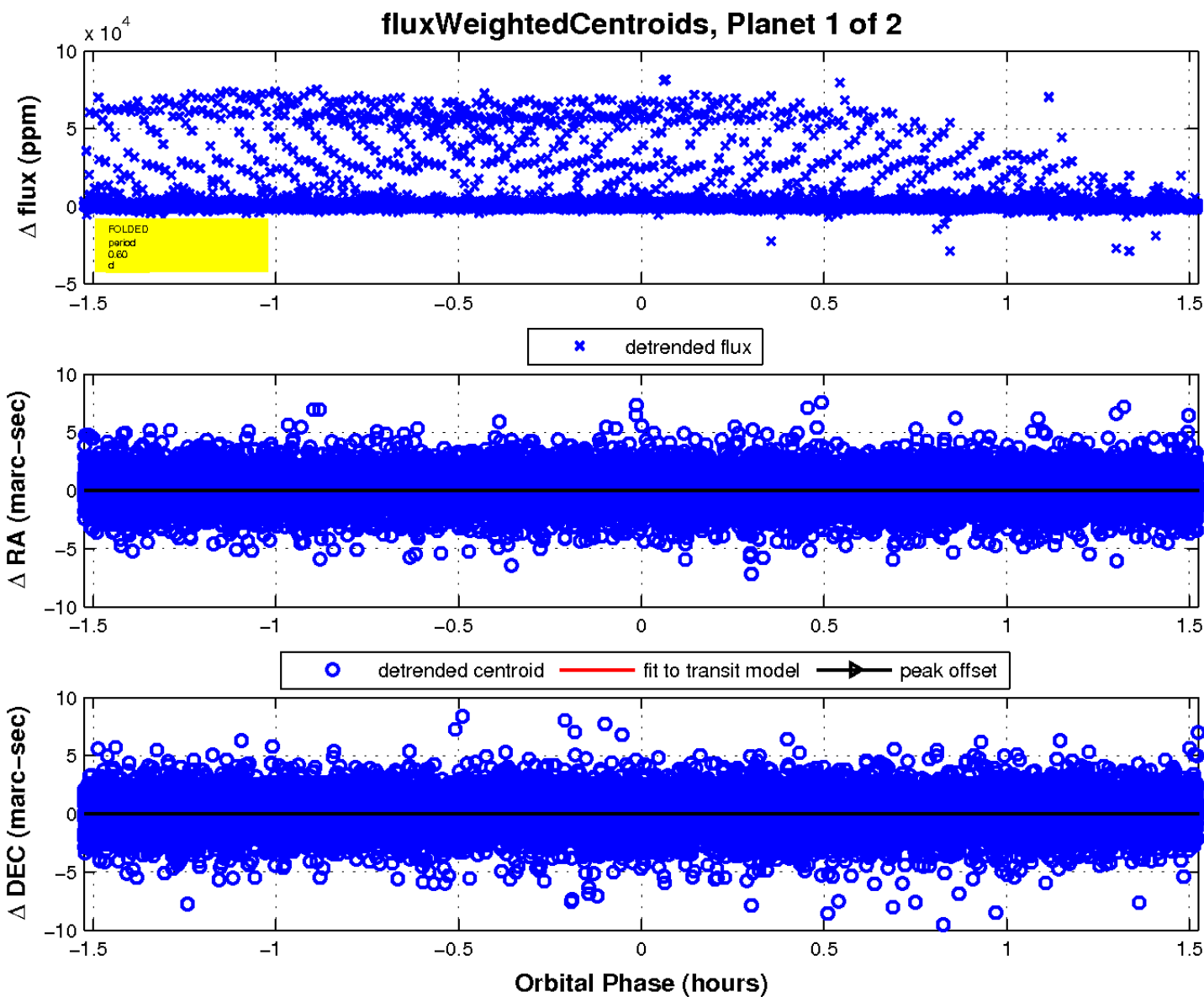
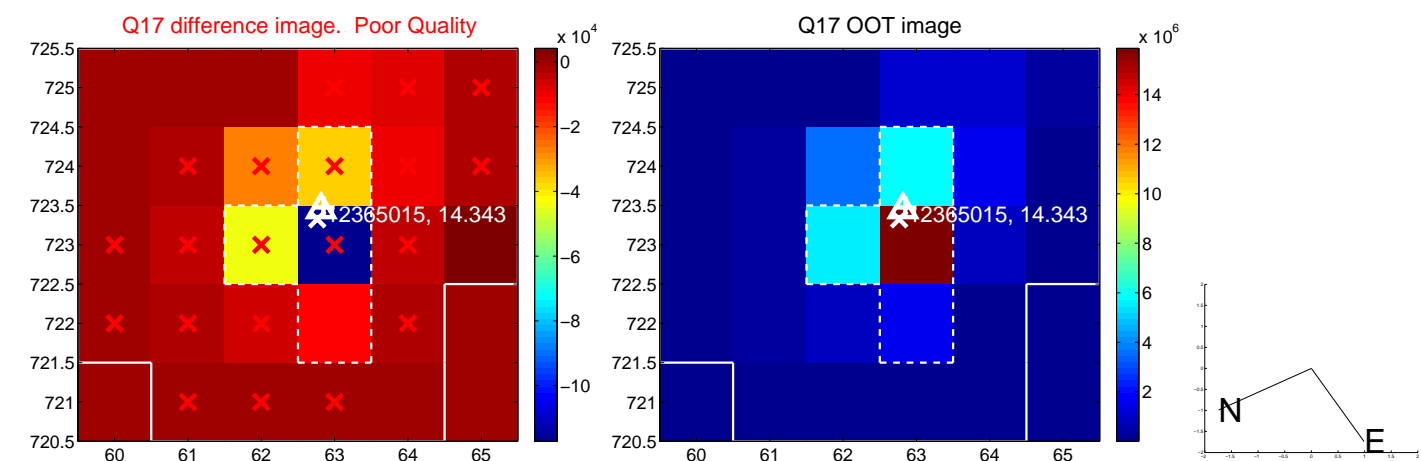


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



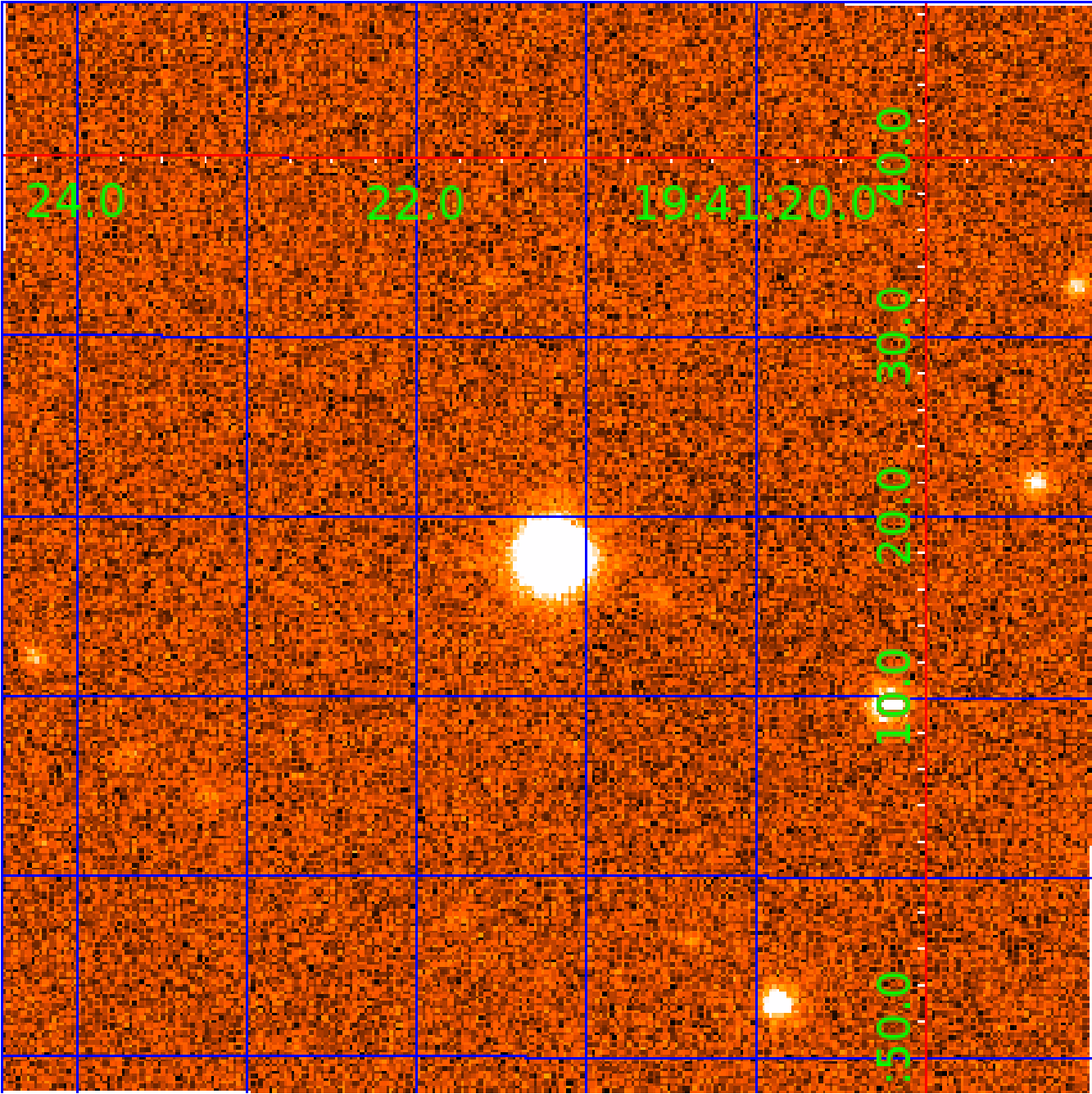


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 012365015

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012365015-01	OBS	7528.01	0.595842	131.976619	1051.9	1.500	14.1	-1.0	0.66	4315	2.06	938.25
012365015-02	OBS	No	0.595595	131.656715	549.0	2.994	11.5	15.6	0.66	4315	1.52	938.77

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012365015-01	OBS	FP	0.00	1	0	0	0	SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_NOFITS
012365015-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_KIC_POS

**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.

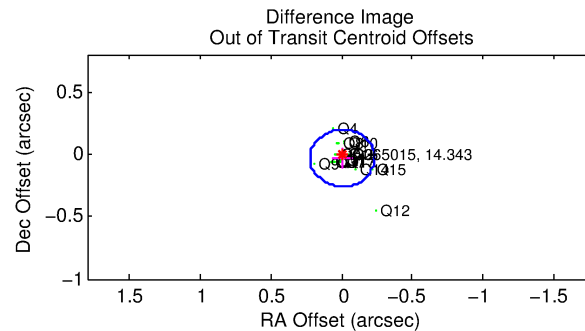
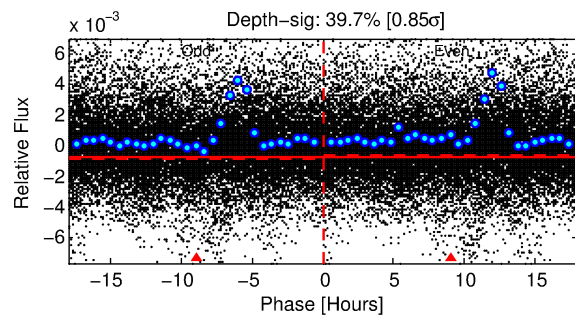
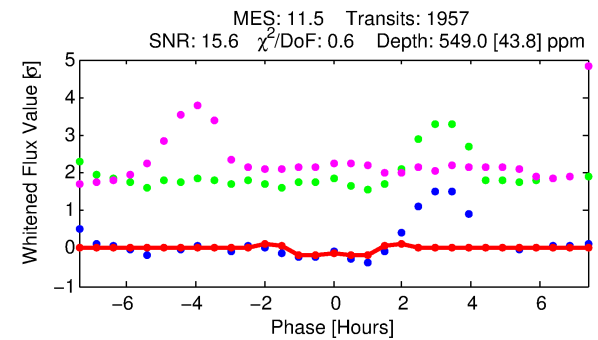
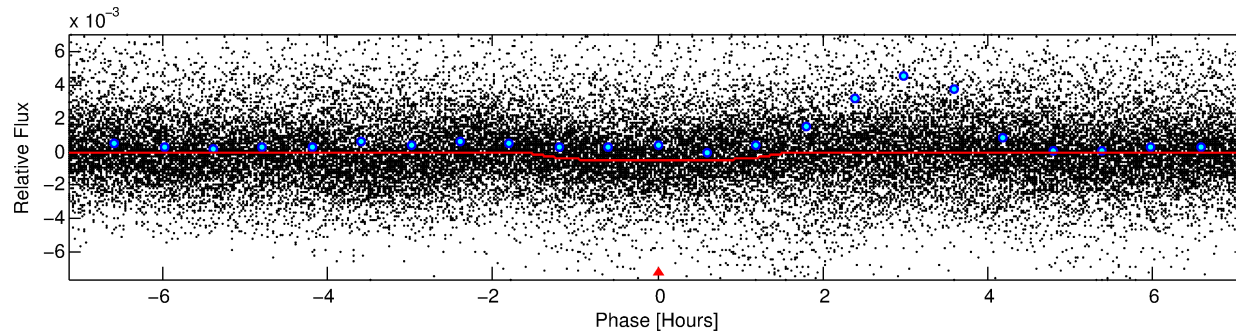
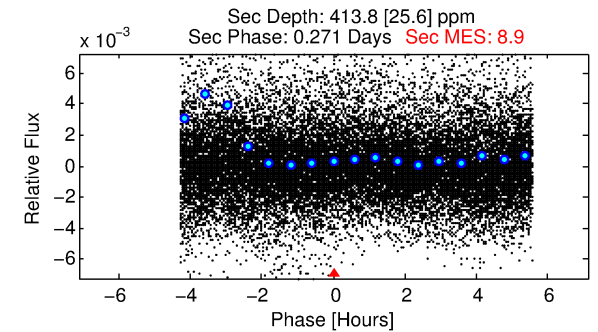
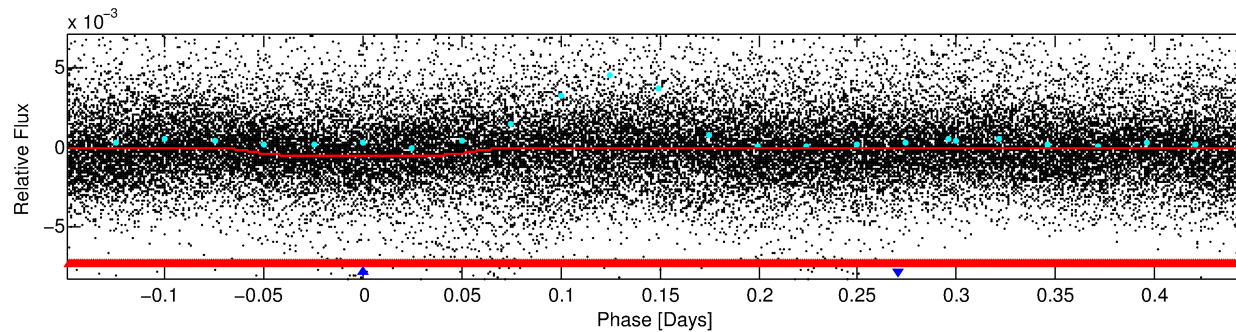
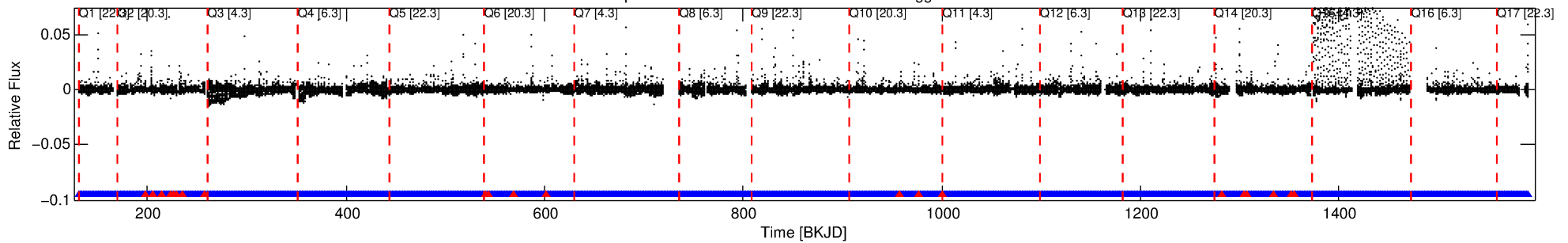
## Ephemeris Match Information For 012365015-02

No Significant Match Found

# DV One-Page Summary

KIC: 12365015 Candidate: 2 of 2 Period: 0.596 d  
KOI: K07528 Corr: No Ephemeris Match

Kp: 14.34 R\*: 0.66 Rs Teff: 4315.0 K Logg: 4.61 Fe/H: 0.020



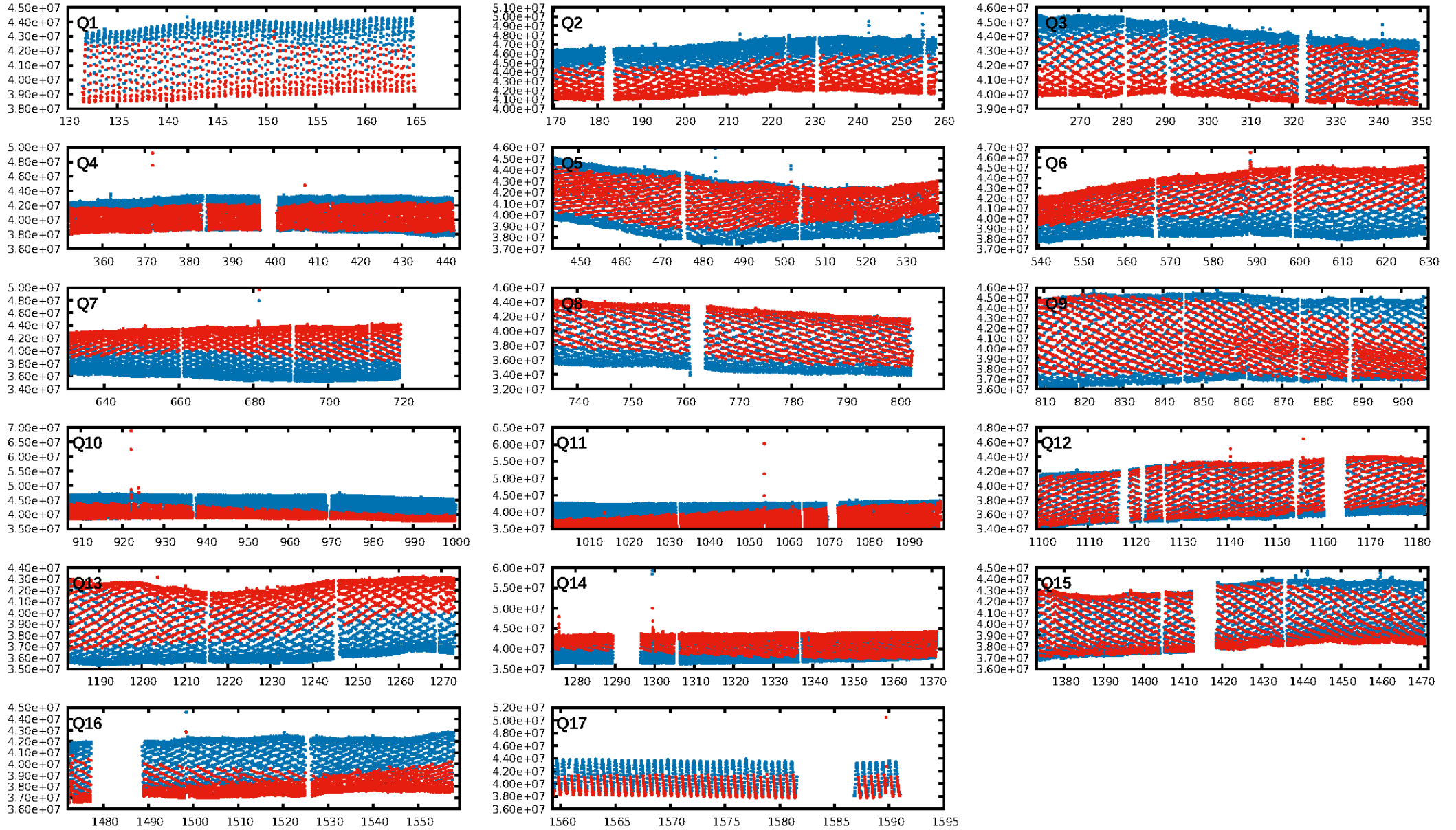
## DV Fit Results:

Period = 0.59559 [0.00001] d  
Epoch = 131.6567 [0.0010] BKJD  
Rp/R\* = 0.0210 [0.0057]  
a/R\* = 1.60 [0.76]  
b = 0.37 [1.91]  
Seff = 938.77 [143.12]  
Teff = 1411 [54] K  
Rp = 1.52 [0.43] Re  
a = 0.0121 [0.0008] AU  
Ag = 14.35 [7.91] [1.69σ]  
Teffp = 4247 [591] K [4.78σ]

## DV Diagnostic Results:

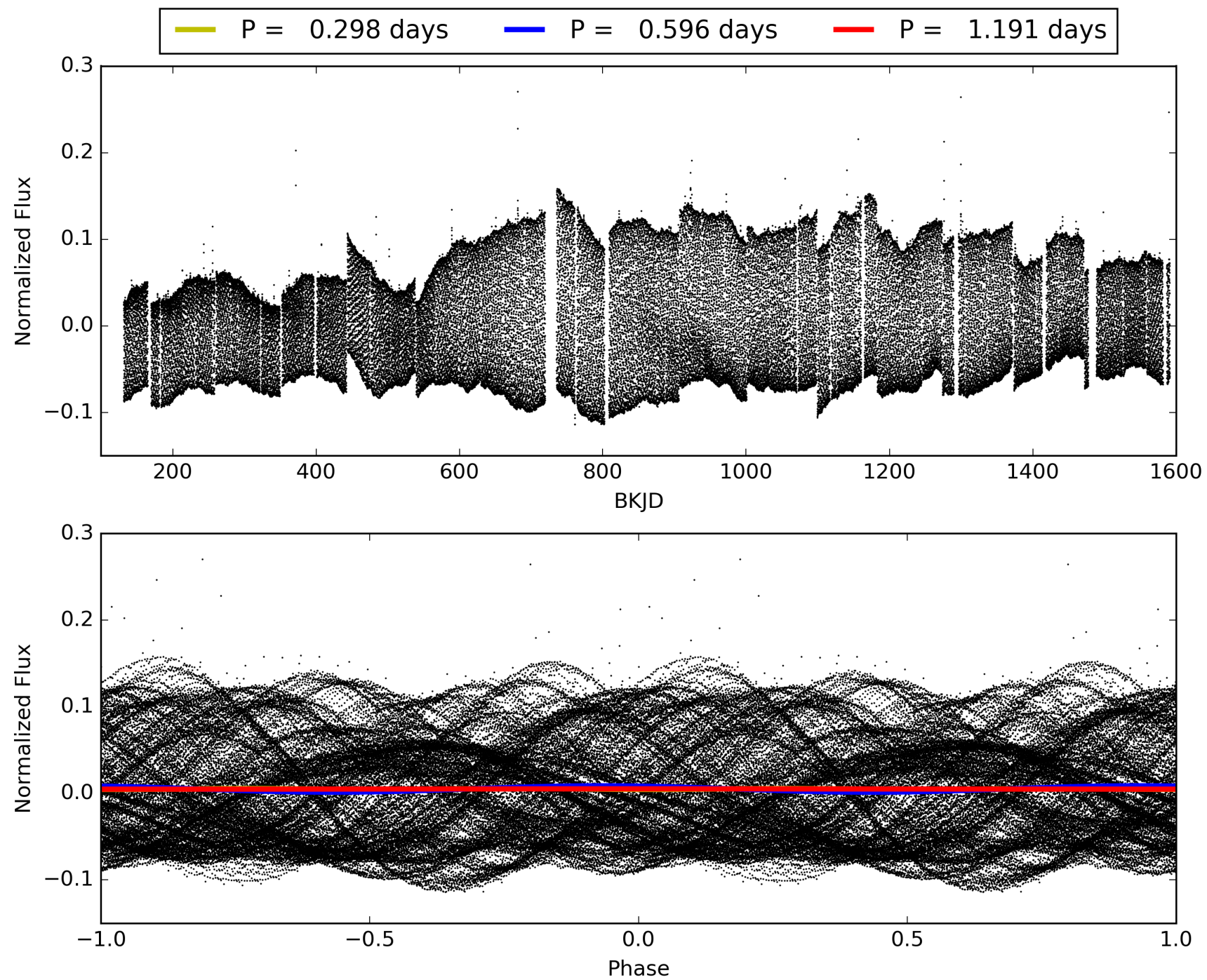
ShortPeriod-sig: N/A  
LongPeriod-sig: 0.1% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.71e-29  
RollingBand-fgt: 0.99 [1832/1855]  
GhostDiagnostic-chr: 1.13  
Centroid-sig: 10.5%  
Centroid-so: 0.165 arcsec [2.03σ]  
OotOffset-rm: 0.032 arcsec [0.42σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-rm: 0.618 arcsec [7.69σ]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.59 [10/17]  
DiffImageOverlap-fno: 0.00 [0/17]

# TCE 012365015-02, PDC Light Curves



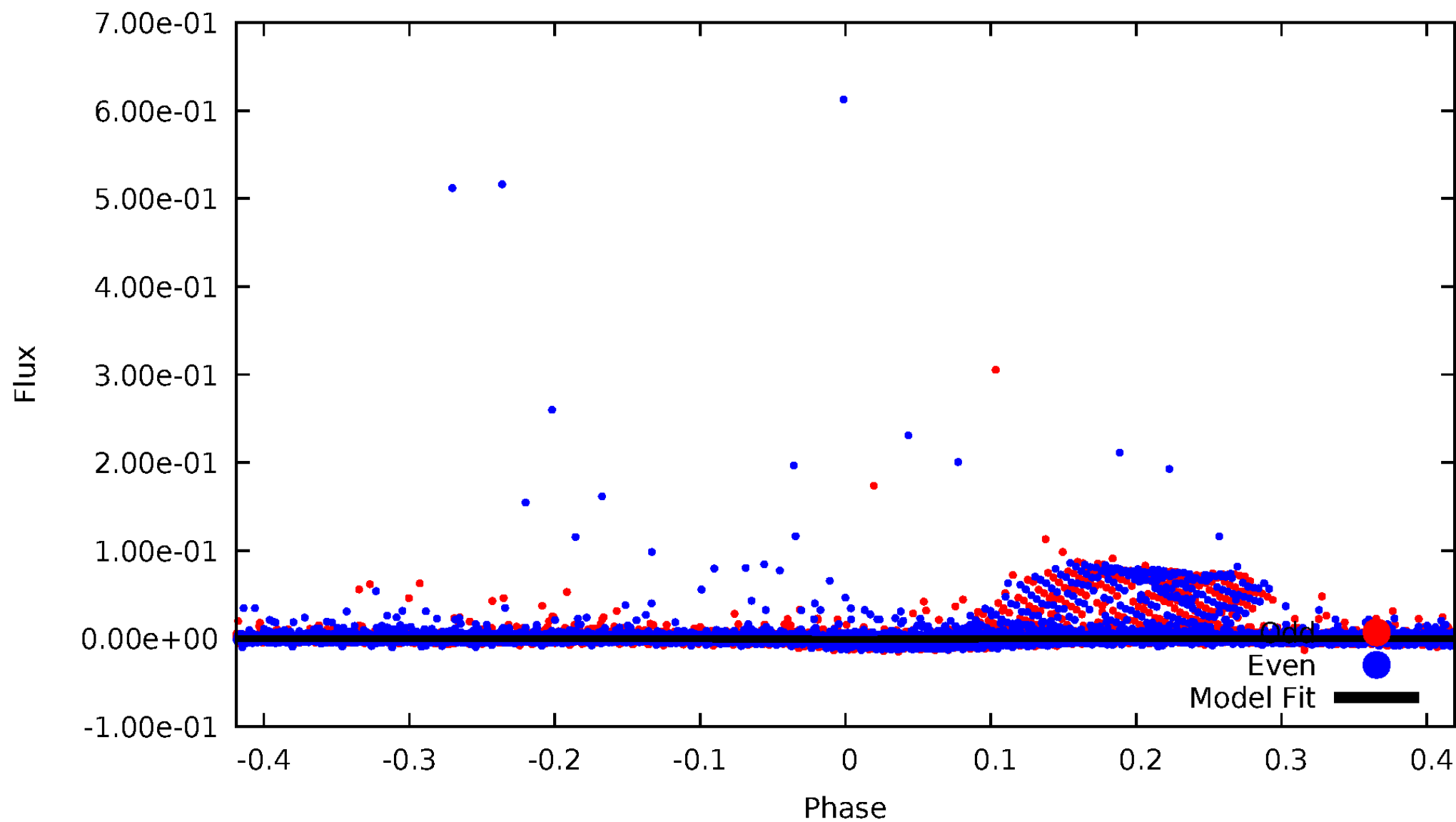


# TCE 012365015-02



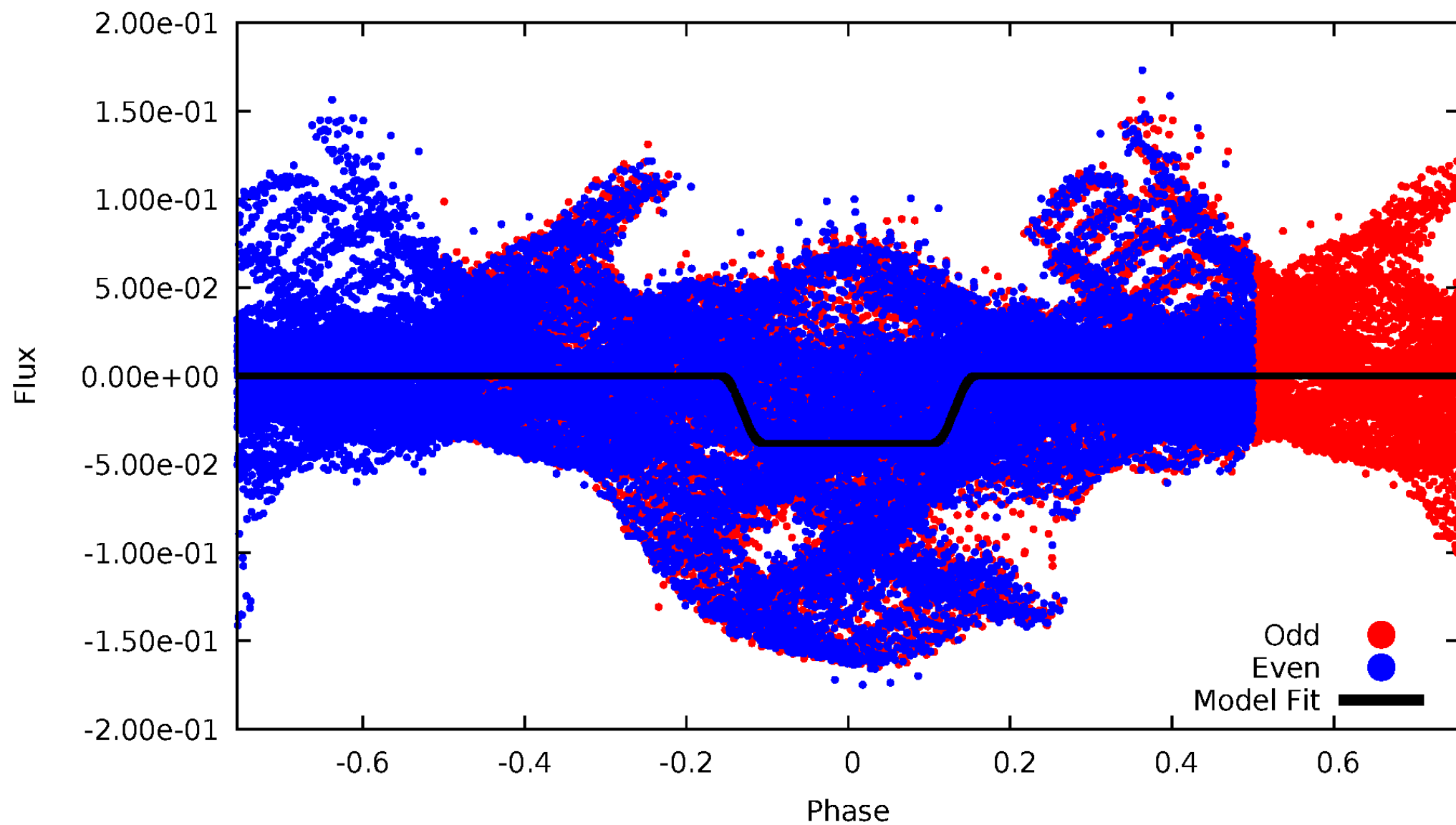
# DV Odd/Even

TCE 012365015-02



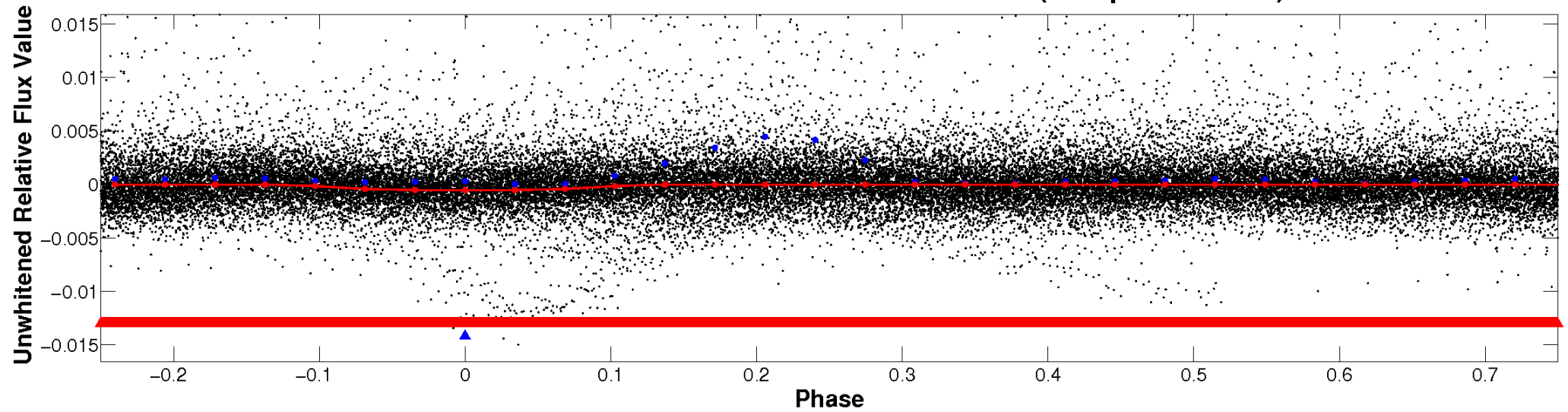
# ALT Odd/Even

TCE 012365015-02

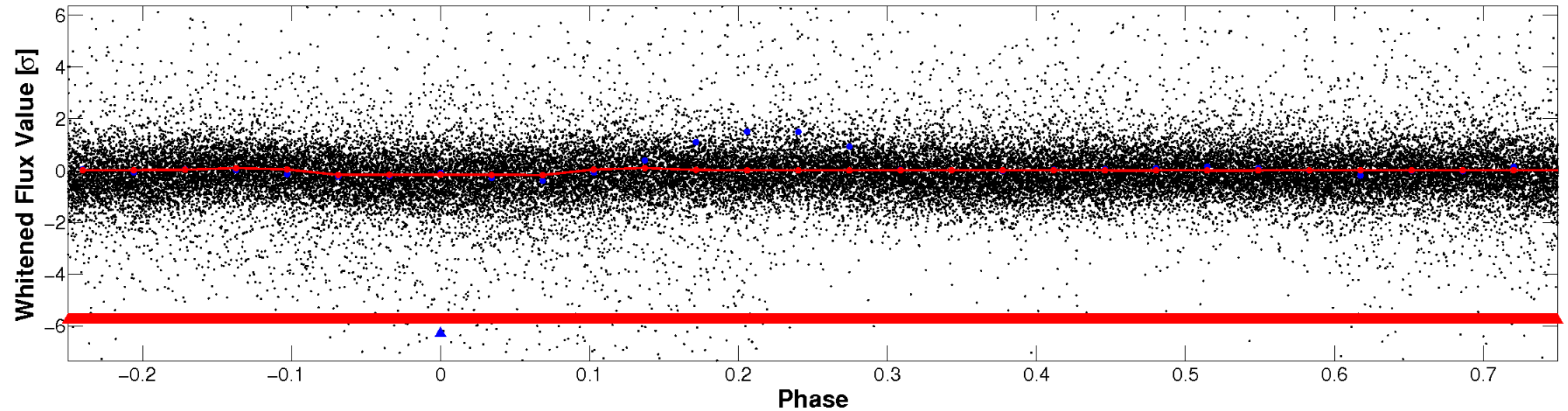


# Non-Whitened Vs. Whitened Light Curve

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

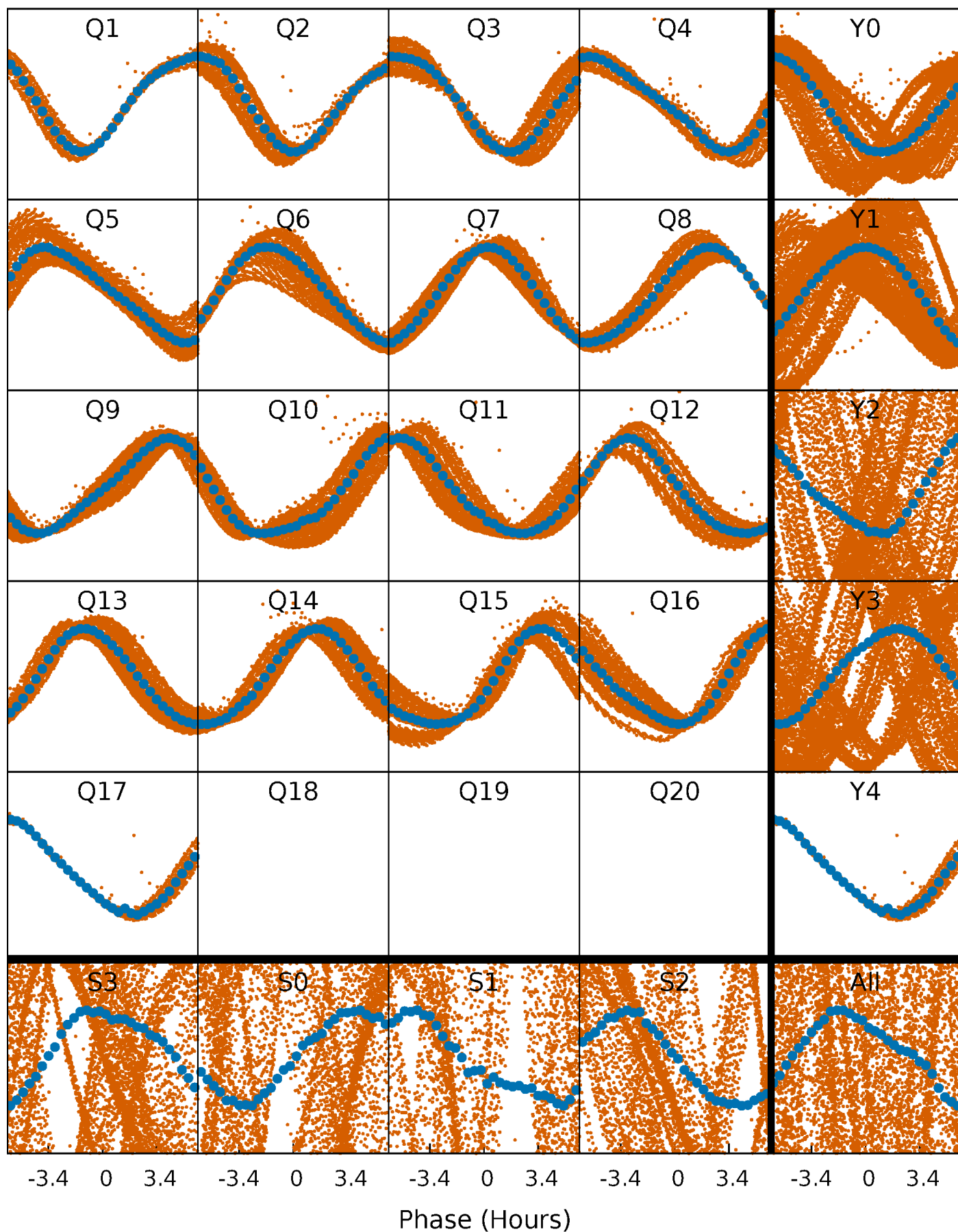


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

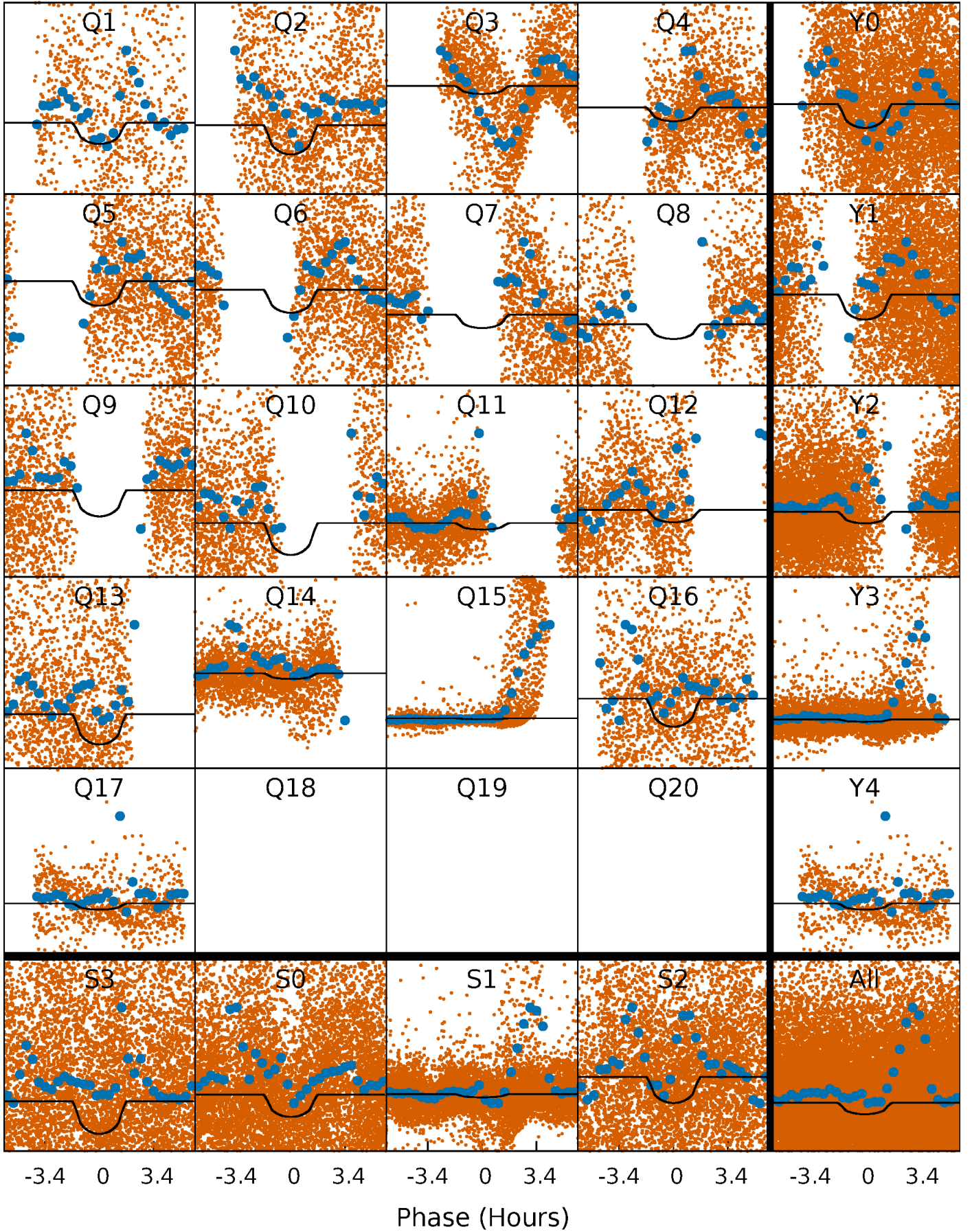
TCE 012365015-02   P= 0.595595 Days    $T_0=131.656715$  (BKJD)





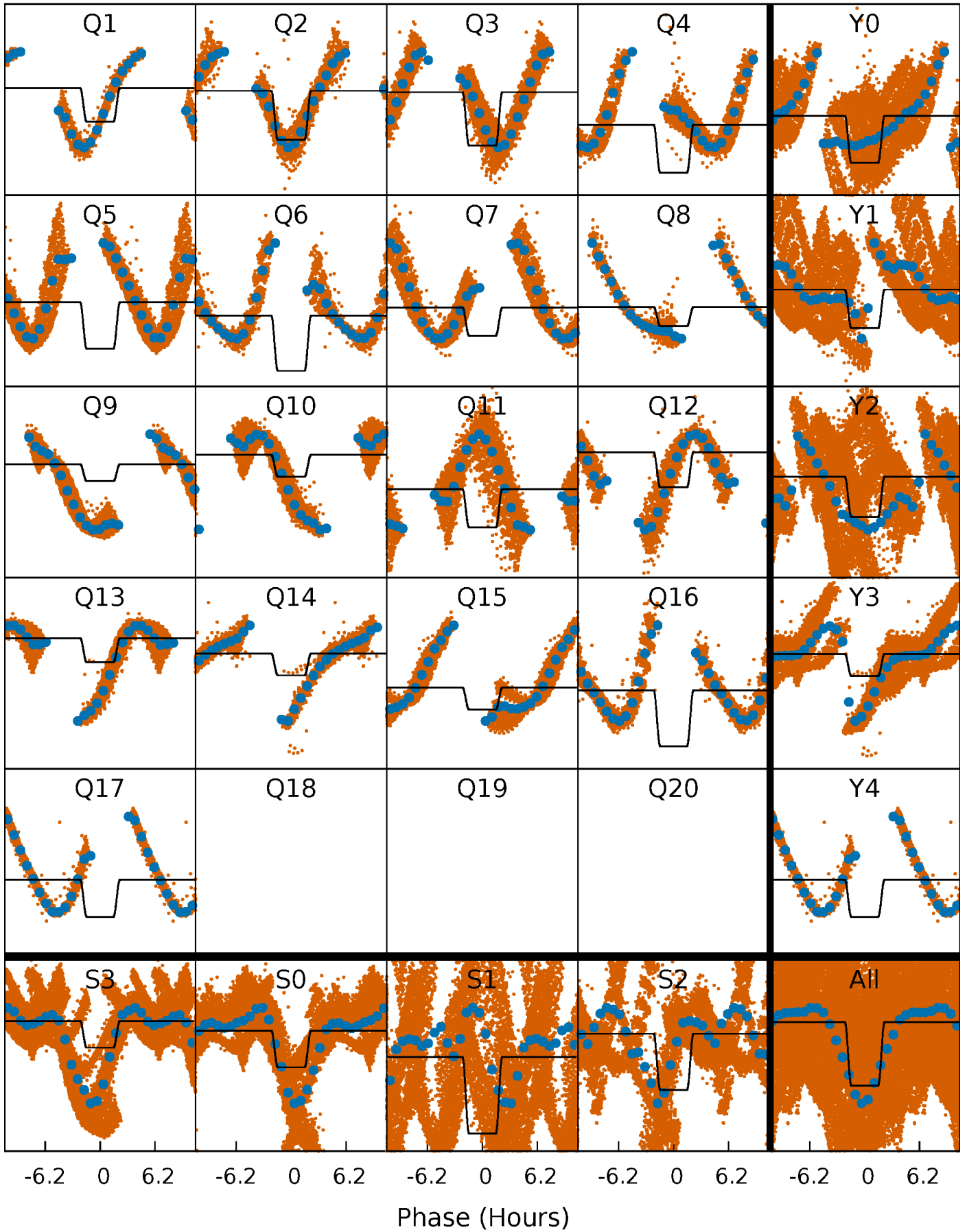
# DV Quarter-Phased Transit Curves

TCE 012365015-02   P= 0.595595 Days    $T_0=131.656715$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

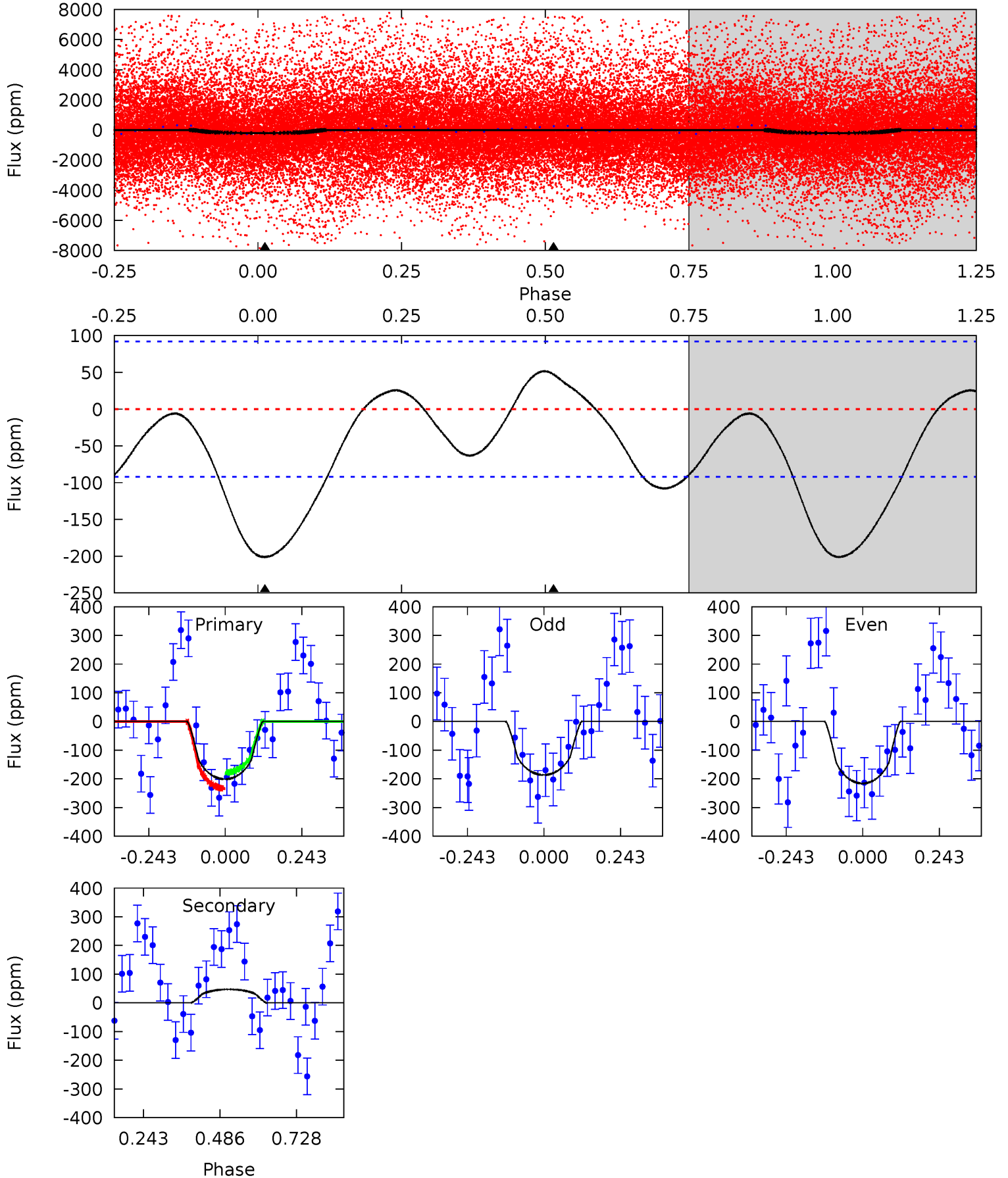
TCE 012365015-02   P= 0.595451 Days    $T_0=131.685533$  (BKJD)



# DV Model-Shift Uniqueness Test

012365015-02, P = 0.595595 Days, E = 131.061120 Days

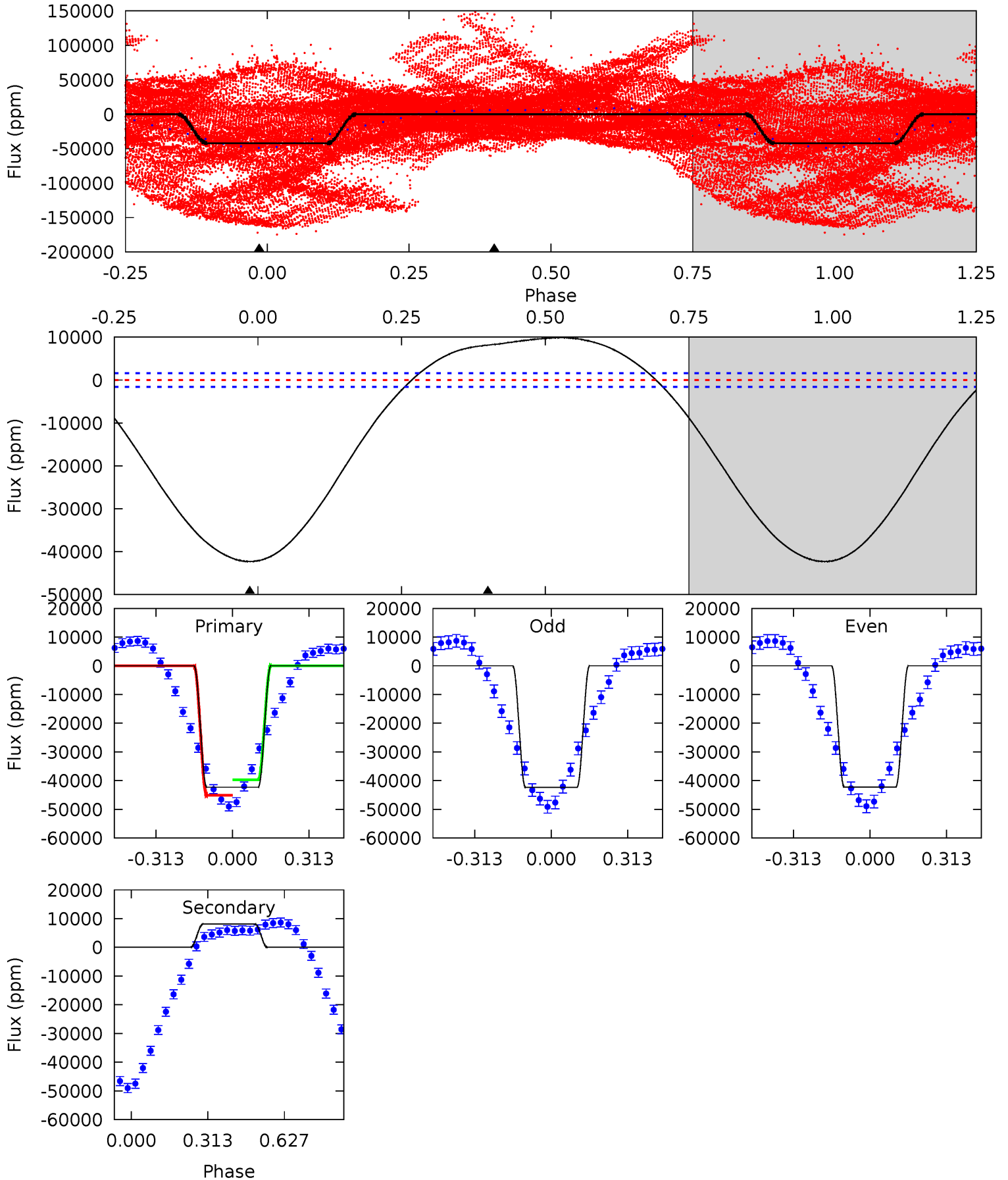
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.57	-2.24	0	0	4.38	1.17	2.27	9.57	9.57	-2.24	-2.24	0.70	-1.99	0.20	1.34



# Alt Model-Shift Uniqueness Test

012365015-02, P = 0.595451 Days, E = 131.090082 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
115.5	-22.2	0	0	4.32	1.01	11.8	115.5	115.5	-22.2	-22.2	0.14	0.98	0.19	7.78



### Stellar Parameters For KIC 012365015

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4315^{+129}_{-129}$	$4.614^{+0.049}_{-0.021}$	$0.020^{+0.250}_{-0.300}$	$0.663^{+0.036}_{-0.057}$	$0.657^{+0.057}_{-0.057}$	$3.183^{+0.681}_{-0.272}$
	+3%/-3%	+1%/-0%	+1250%/-1500%	+5%/-9%	+9%/-9%	+21%/-9%
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 012365015-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$47 \pm 21$	$1.50^{+0.39}_{-0.39}$	$1963^{+65}_{-70}$	$-3075^{+259}_{-299}$	$-1.693^{+0.912}_{-1.651}$
Alt.	$8138 \pm 366$	$14.04^{+0.70}_{-0.74}$	$1959^{+65}_{-66}$	$-3366^{+90}_{-87}$	$-3.302^{+0.269}_{-0.364}$

$T_{\text{max}}$  = 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

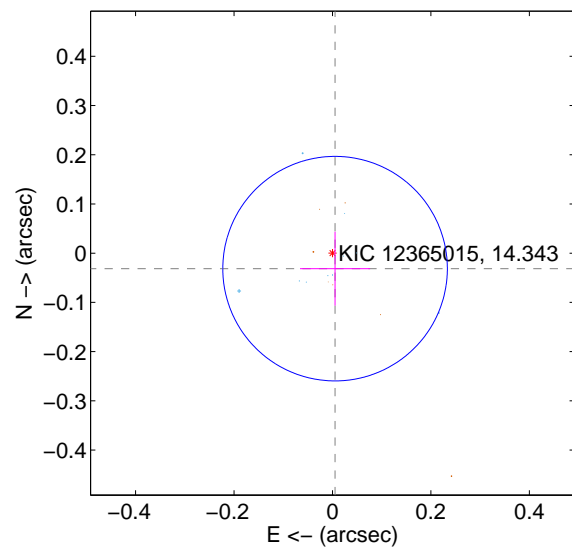
Supplemental centroid analysis for 012365015-02. Kepler magnitude: 14.34. Transit SNR 15.59

There are 10 quarters with good PRF difference image offsets

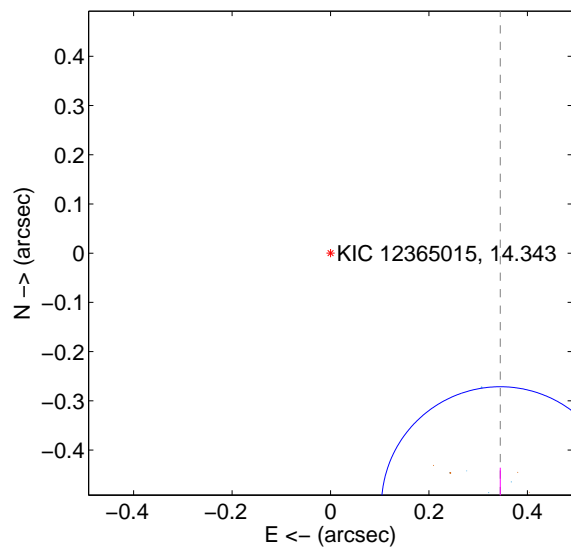
The direct PRF centroid is offset from the target star catalog position by about 0.68 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.032 \pm 0.076$	0.42	$-0.005 \pm 0.071$	$-0.031 \pm 0.075$
PRF-fit source offset from KIC position	<b><math>0.618 \pm 0.080</math></b>	<b>7.69</b>	$-0.345 \pm 0.074$	$-0.512 \pm 0.077$
photometric centroid source offset	$0.17 \pm 0.08$	2.03	$0.13 \pm 0.08$	$0.10 \pm 0.09$

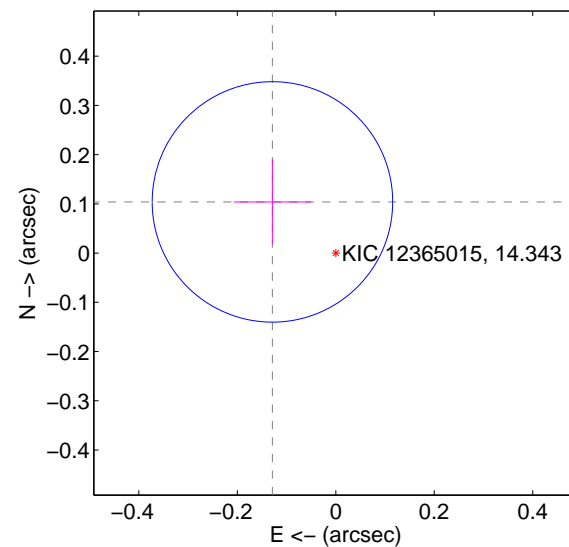
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



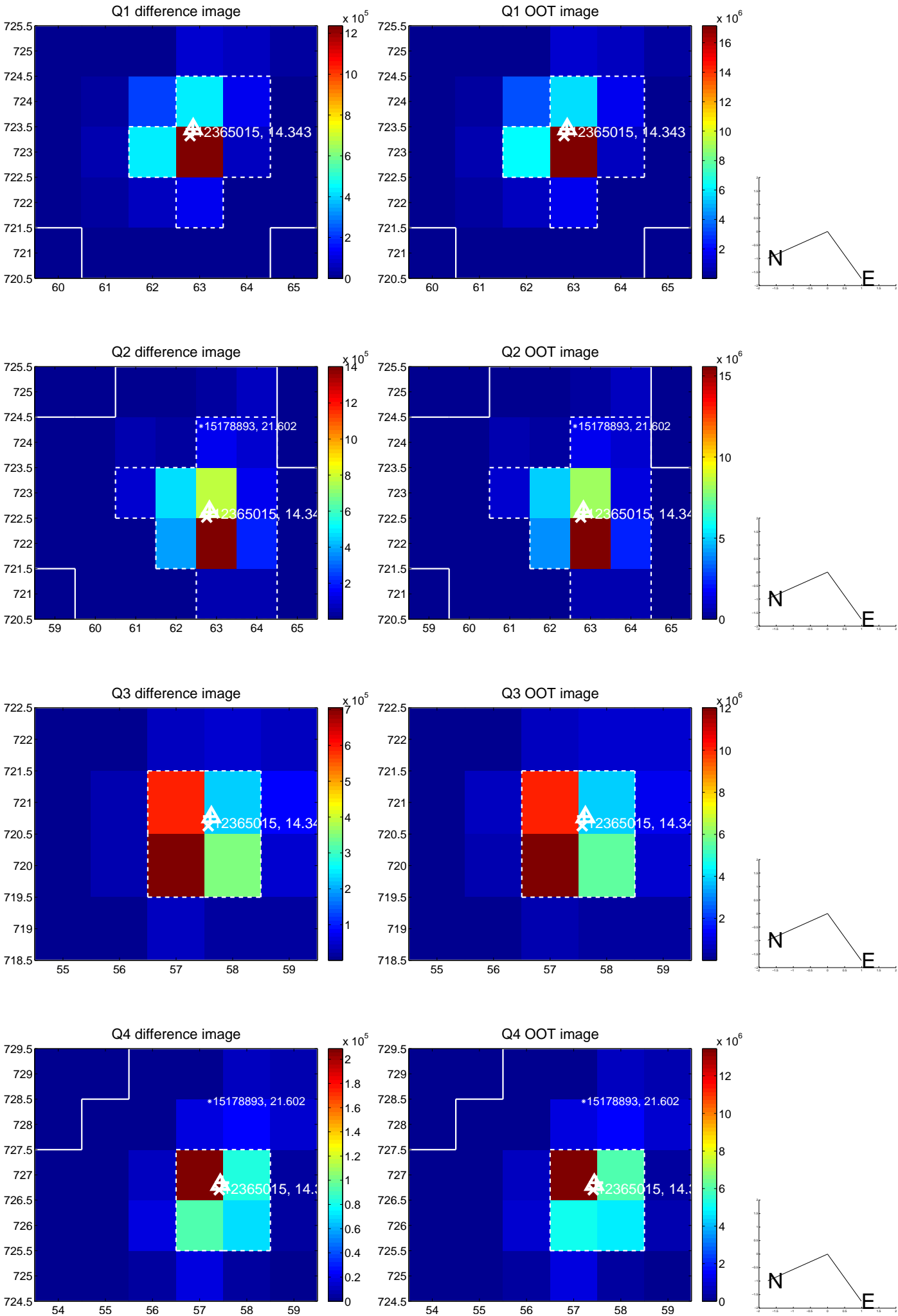
offset from photometric centroids



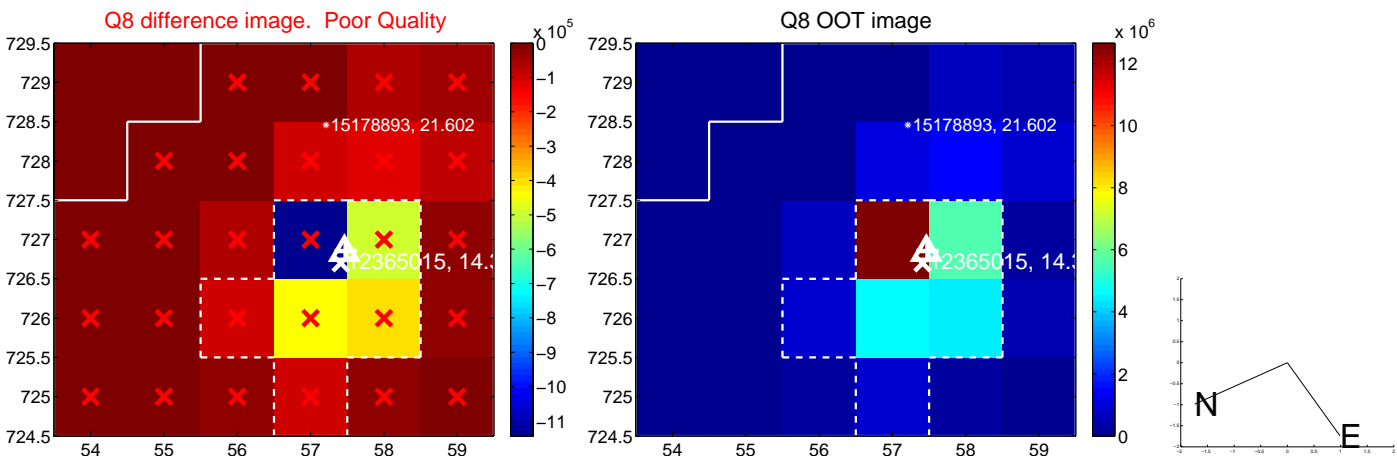
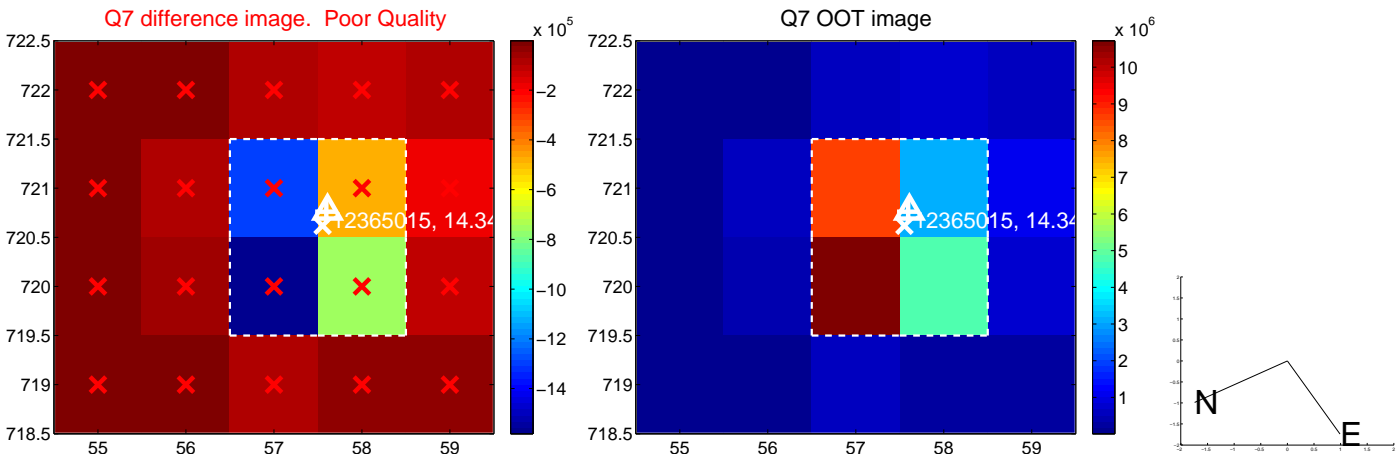
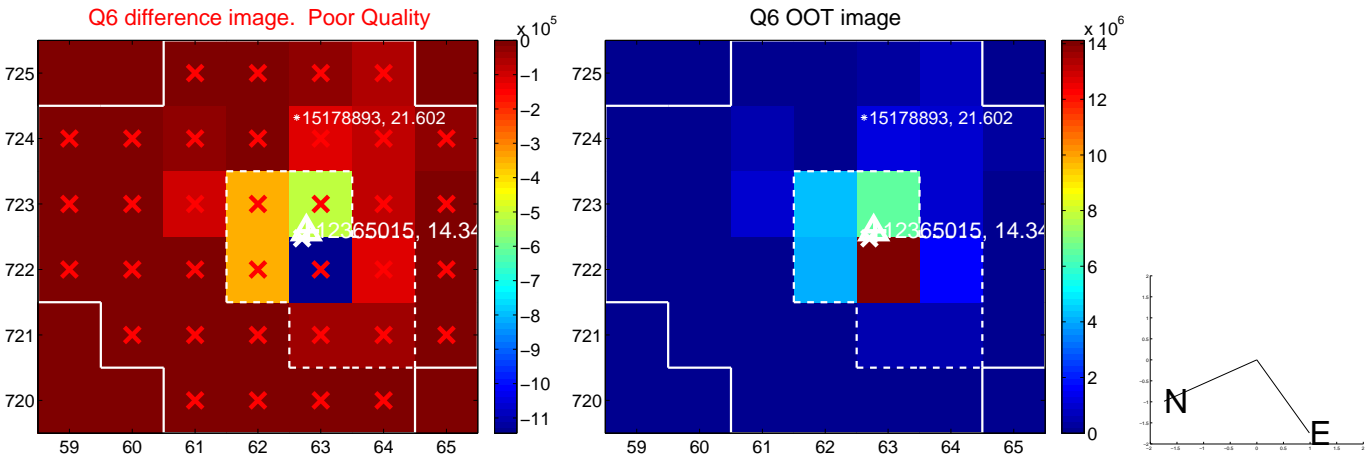
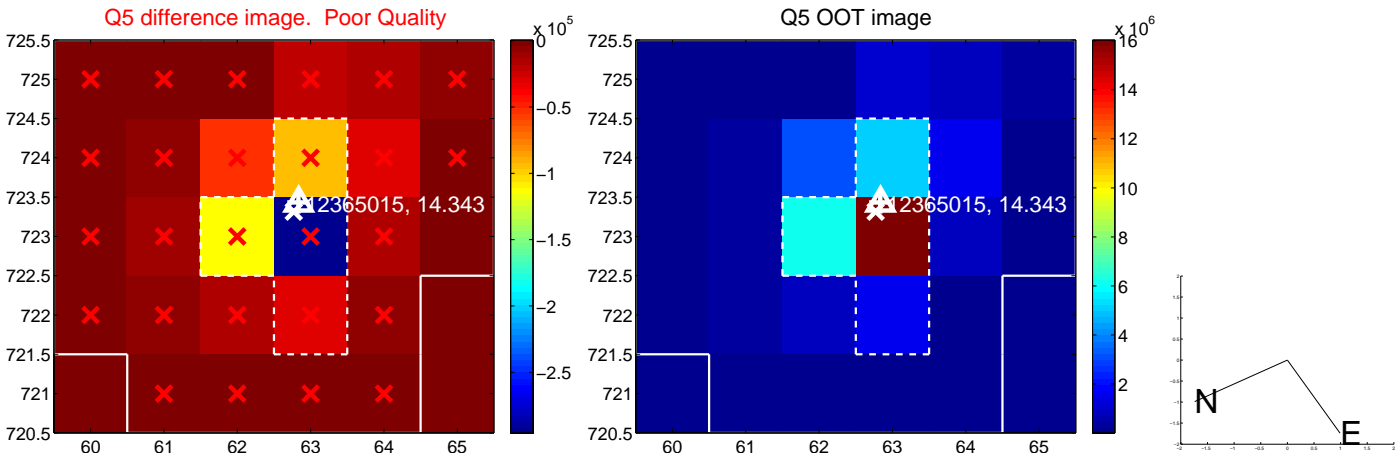
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



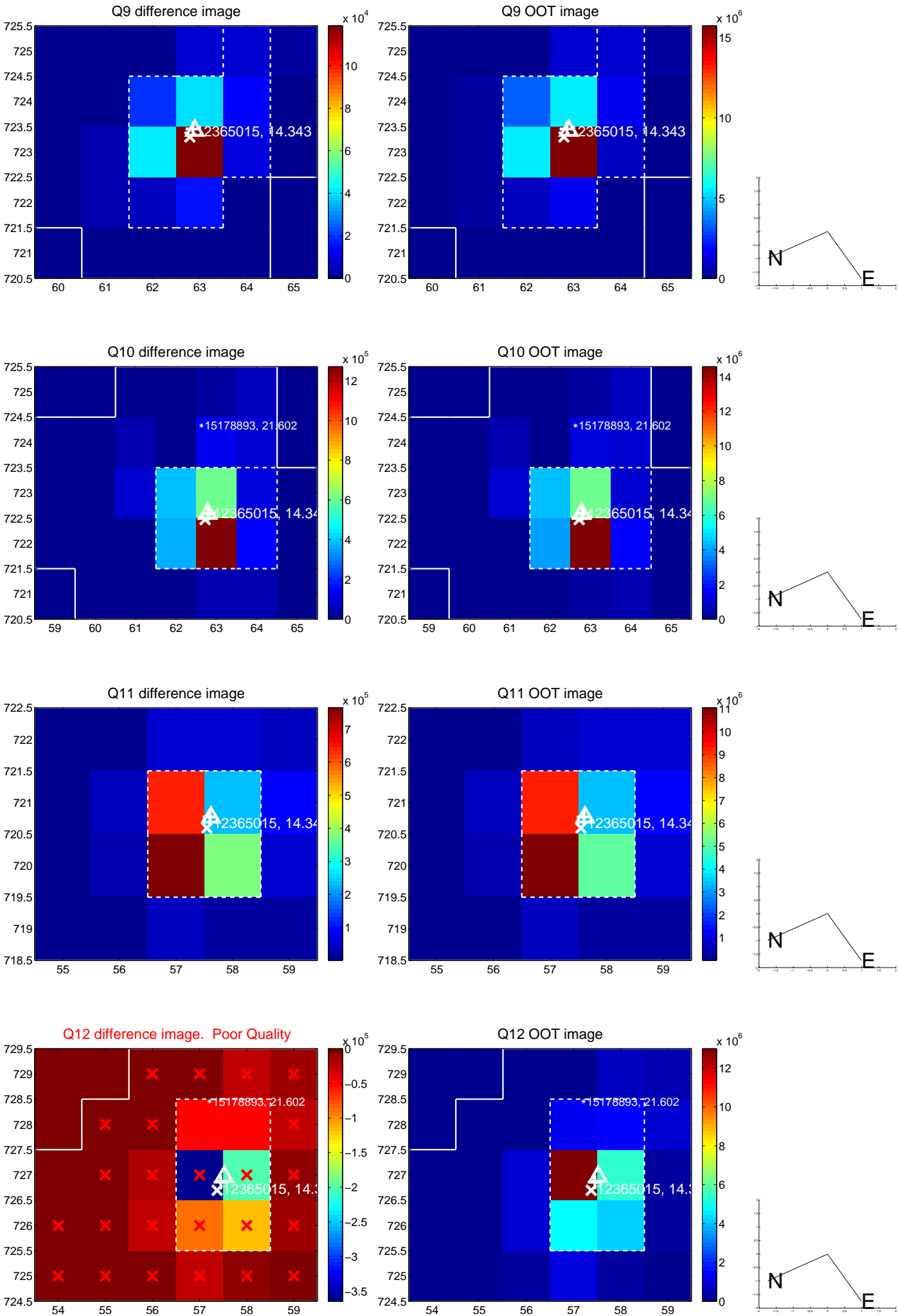
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



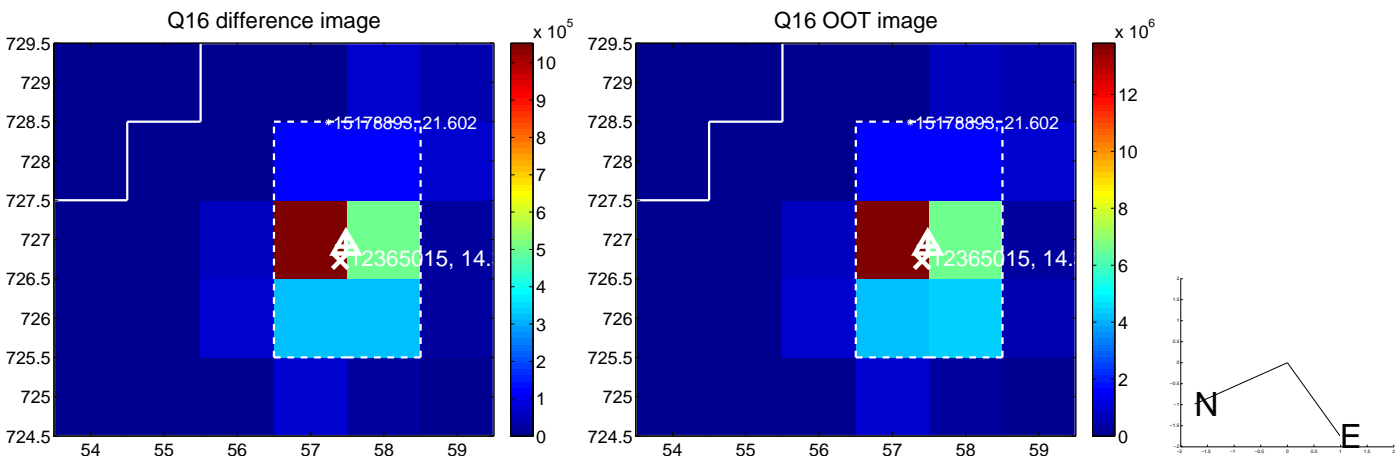
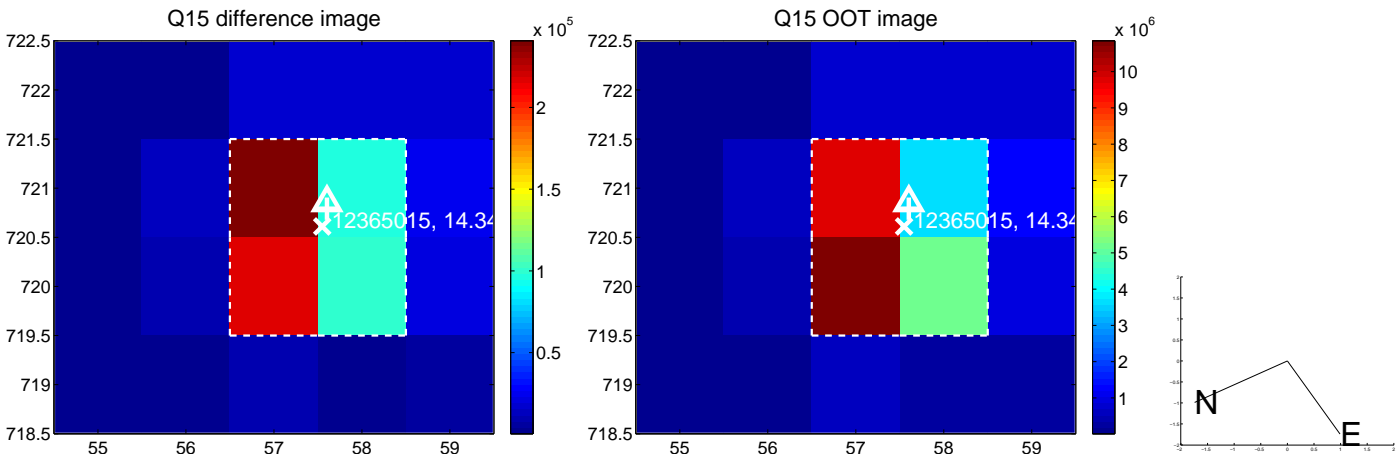
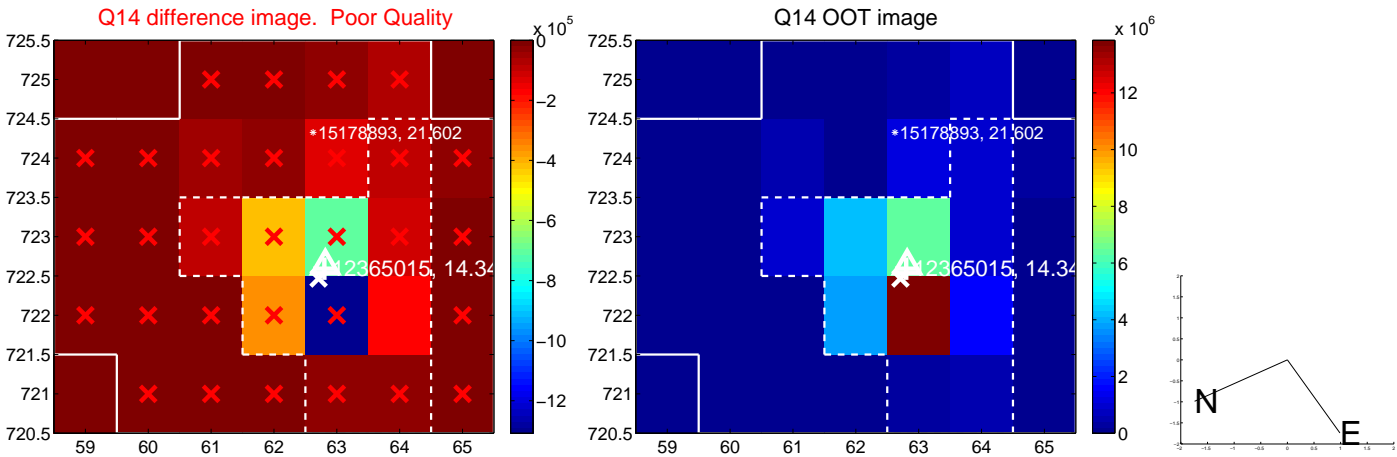
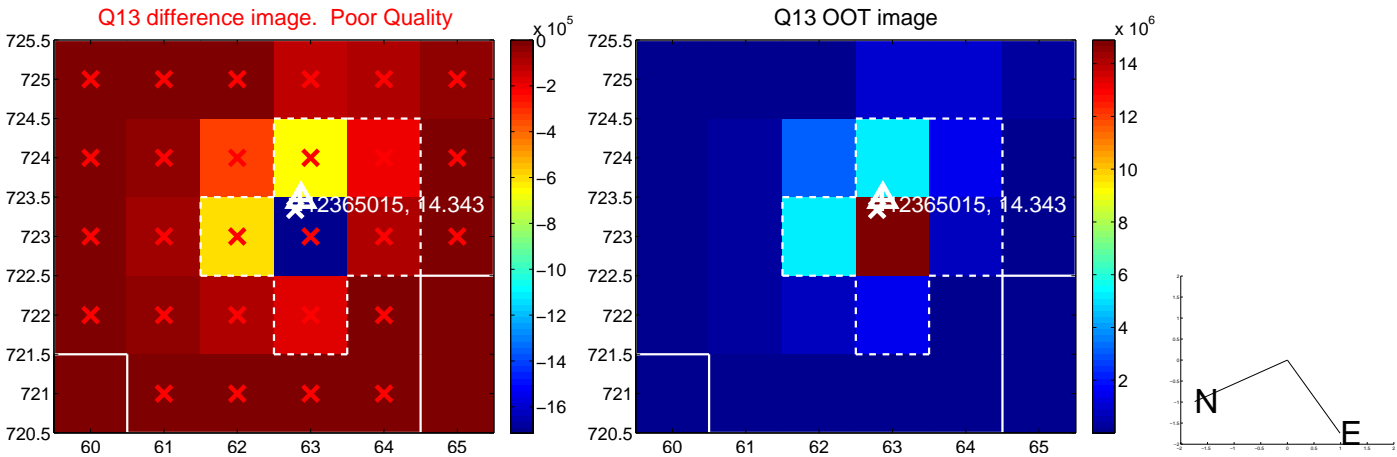
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



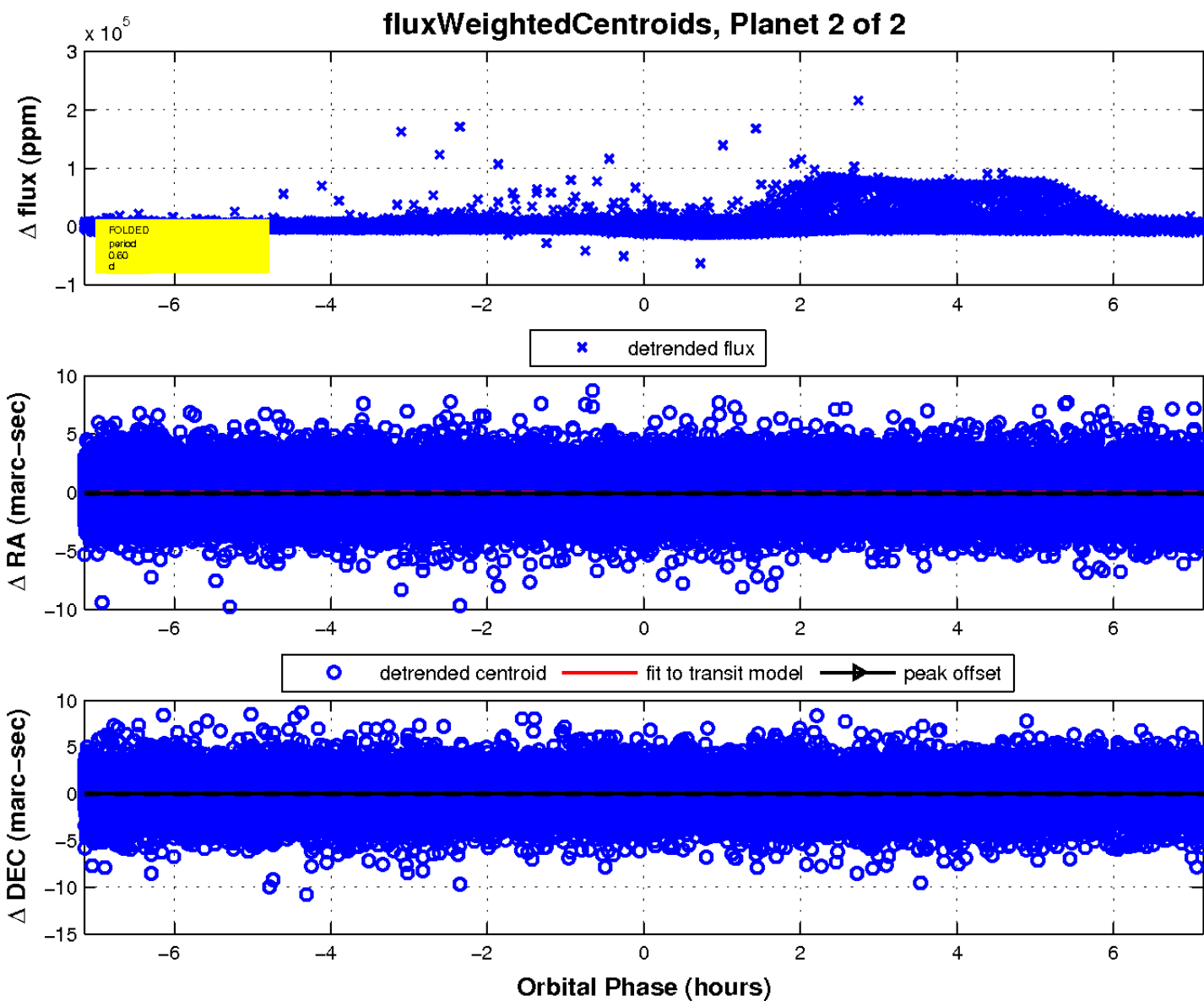
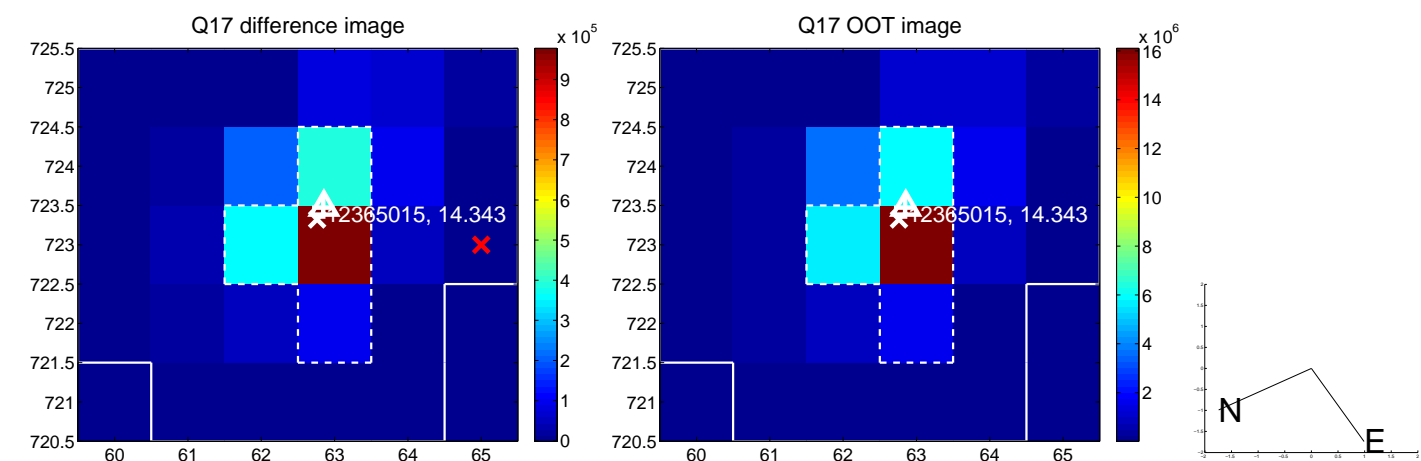
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

