

# KIC 002165002

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002165002-01	OBS	0999.01	16.568109	146.151395	1258.2	4.354	31.1	35.1	0.72	4987	2.75	21.31
002165002-02	OBS	0999.02	47.333078	151.411920	964.4	3.057	13.3	14.0	0.72	4987	2.73	5.26

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002165002-01	OBS	PC	1.00	0	0	0	0	CENT_KIC_POS
002165002-02	OBS	PC	1.00	0	0	0	0	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.

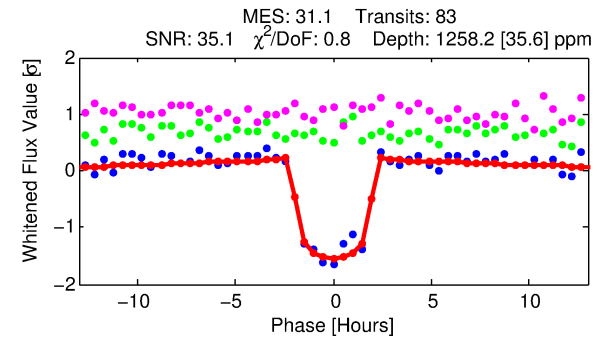
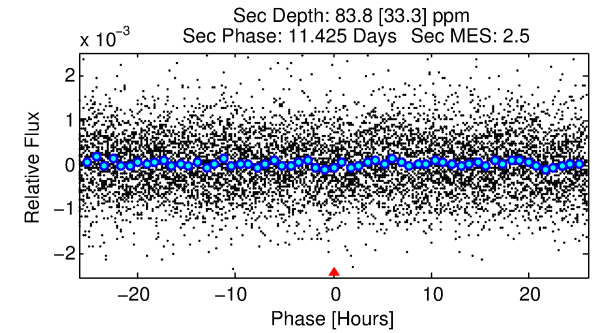
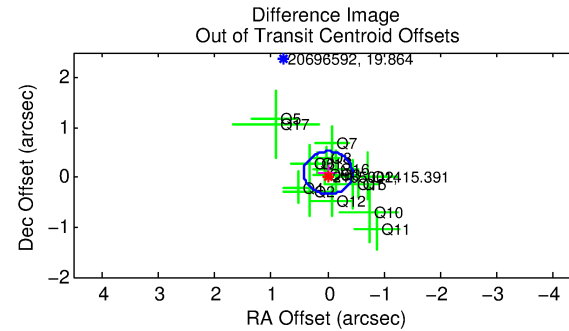
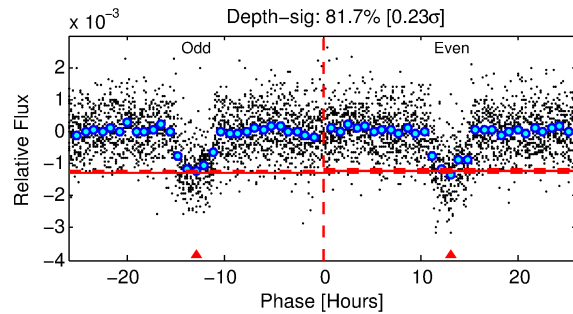
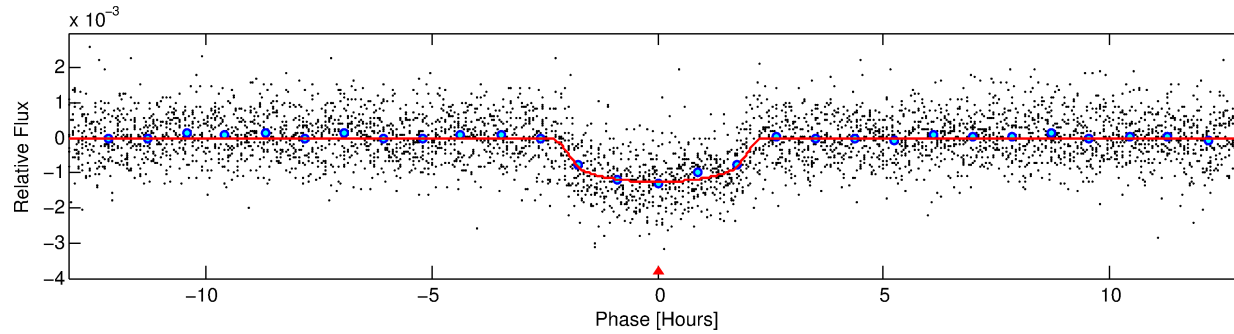
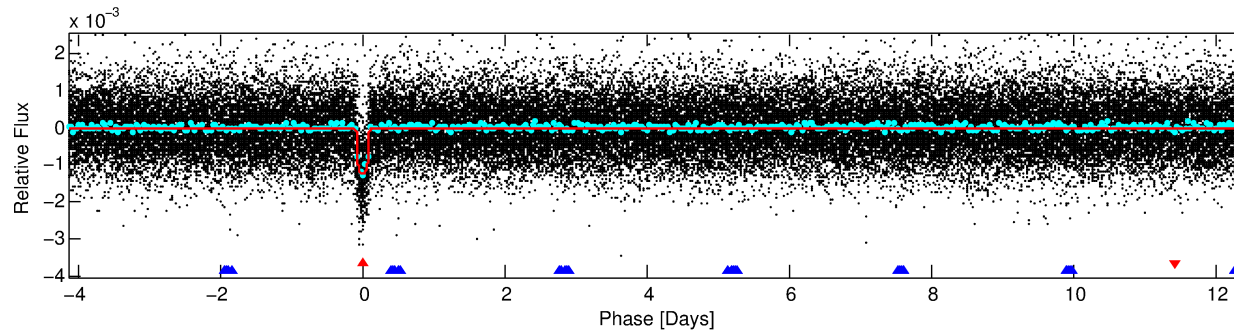
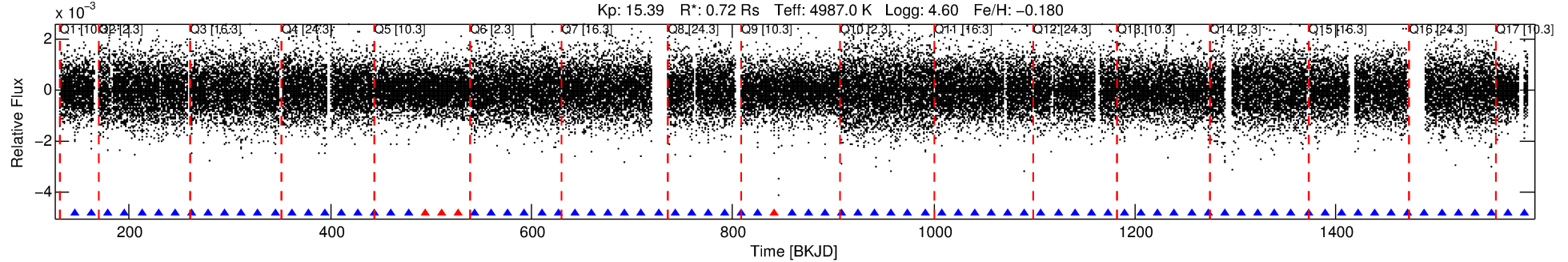
## Ephemeris Match Information For 002165002-01

No Significant Match Found

# DV One-Page Summary

KIC: 2165002 Candidate: 1 of 2 Period: 16.568 d  
KOI: K00999.01 Name: Kepler-263b Corr: 0.987

Kp: 15.39 R\*: 0.72 Rs Teff: 4987.0 K Logg: 4.60 Fe/H: -0.180



## DV Fit Results:

Period = 16.56811 [0.00005] d  
Epoch = 146.1514 [0.0024] BKJD  
Rp/R\* = 0.0351 [0.0071]  
a/R\* = 21.31 [15.10]  
b = 0.73 [0.46]  
Seff = 21.31 [2.01]  
Teq = 548 [13] K  
Rp = 2.74 [0.58] Re  
a = 0.1155 [0.0055] AU  
Ag = 81.63 [46.60] [1.73σ]  
Teffp = 2546 [363] K [5.50σ]

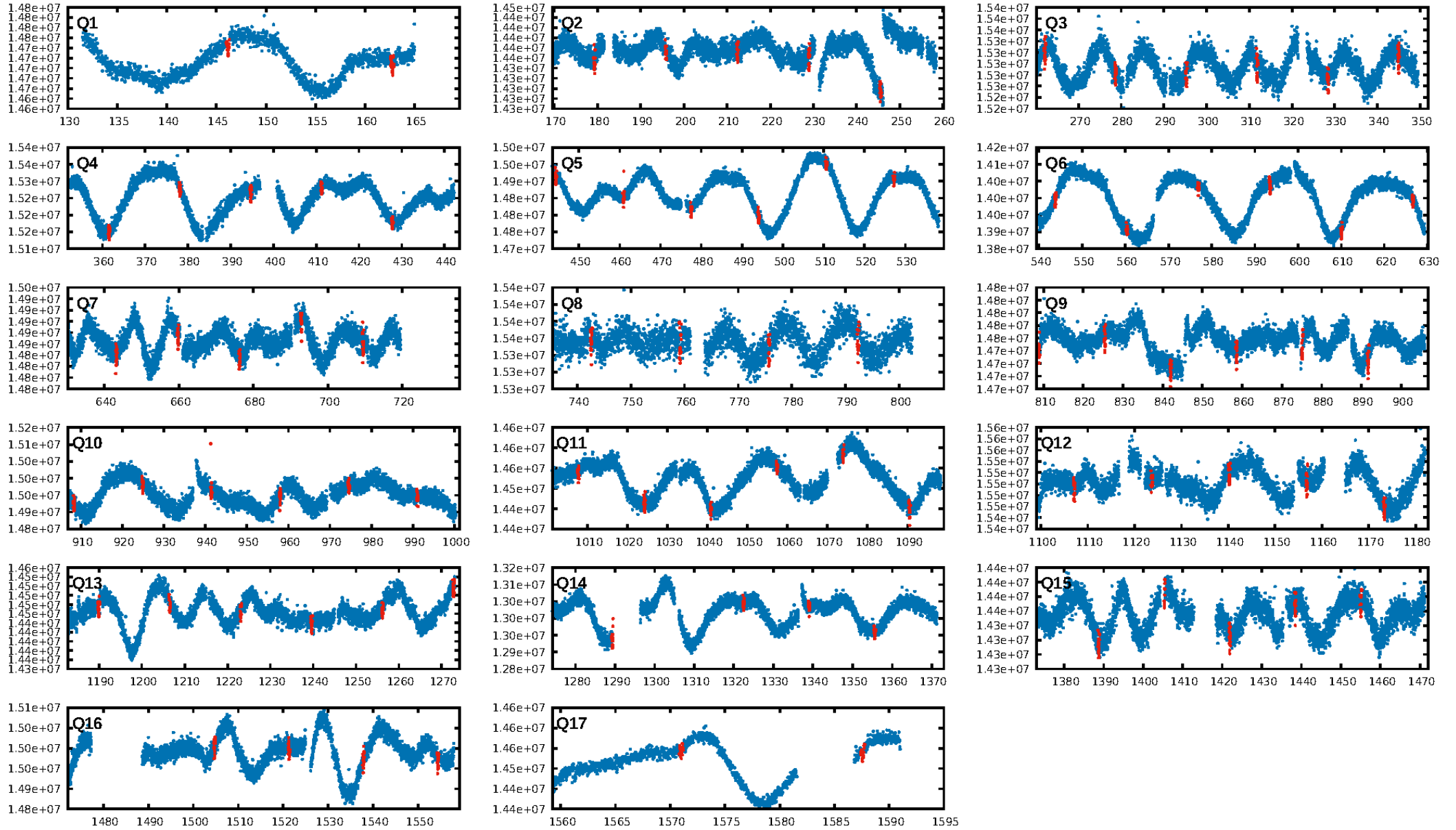
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [138.77σ]  
ModelChiSquare2-sig: 97.5%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 4.11e-196  
RollingBand-fgt: 0.95 [75/79]  
GhostDiagnostic-chr: 5.1  
Centroid-sig: 5.4%  
Centroid-so: 0.774 arcsec [2.67σ]  
OotOffset-rm: 0.088 arcsec [0.62σ]  
KicOffset-rm: 0.292 arcsec [1.97σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.94 [16/17]

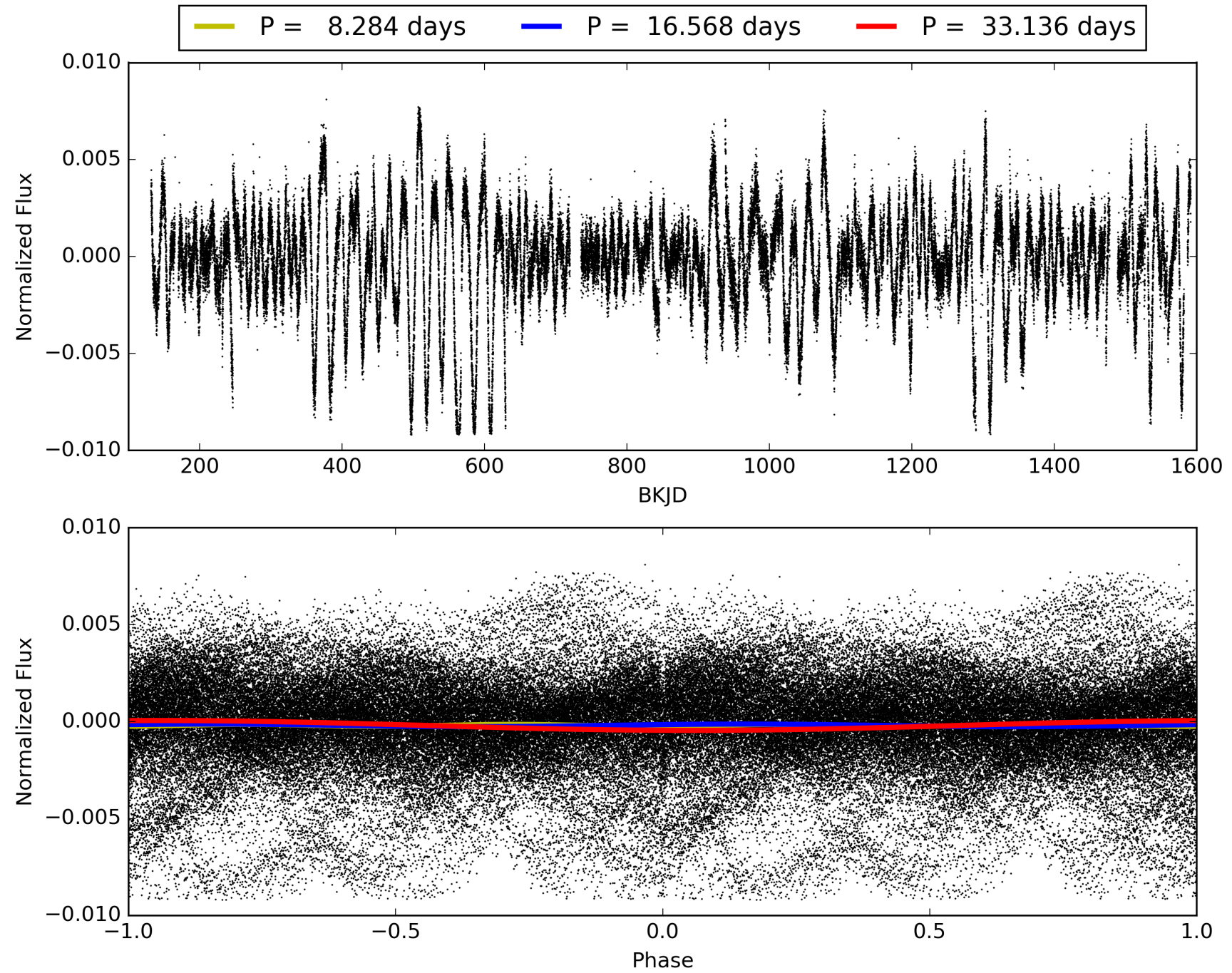
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:20:35 Z

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

# TCE 002165002-01, PDC Light Curves

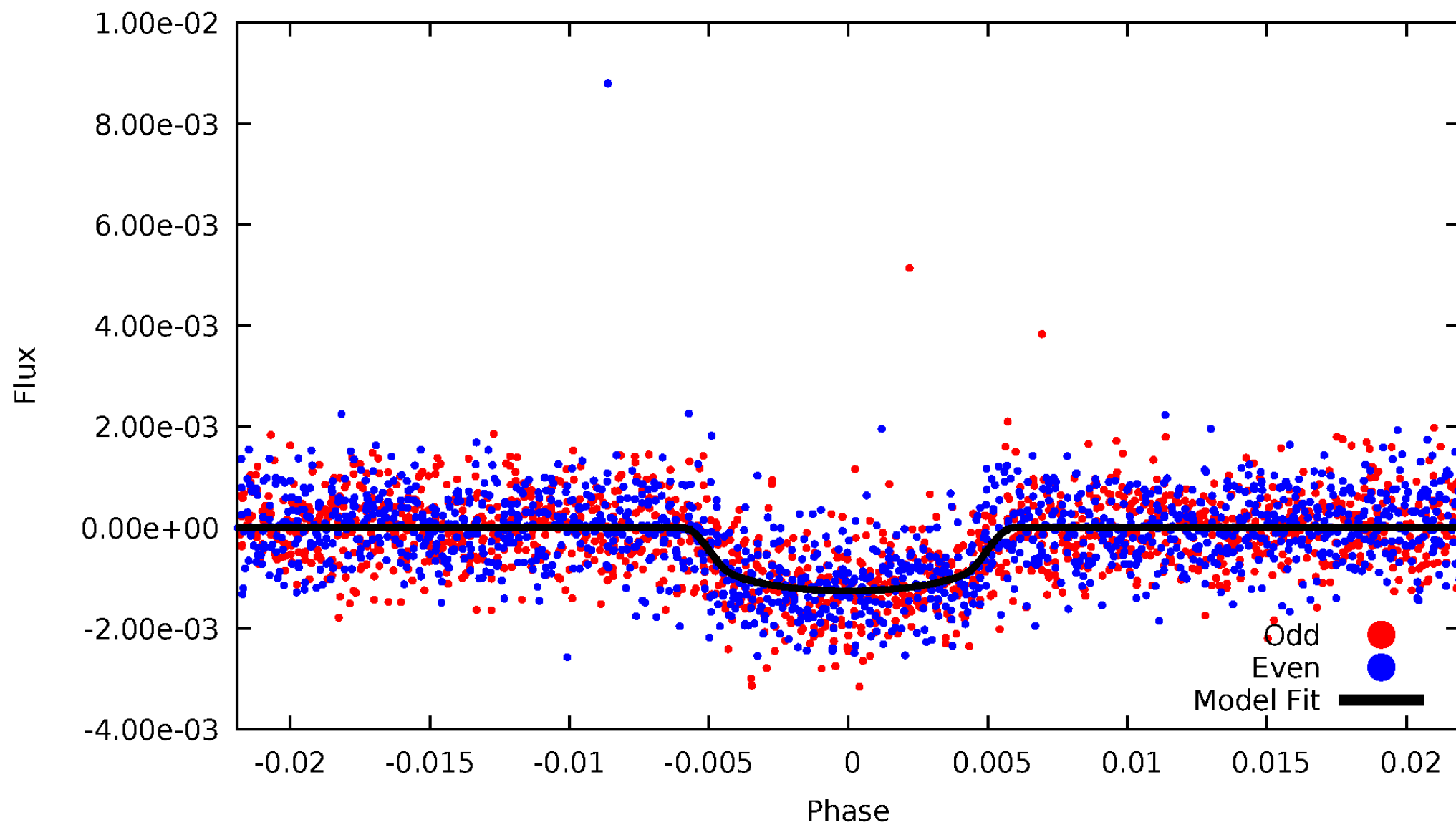


TCE 002165002-01



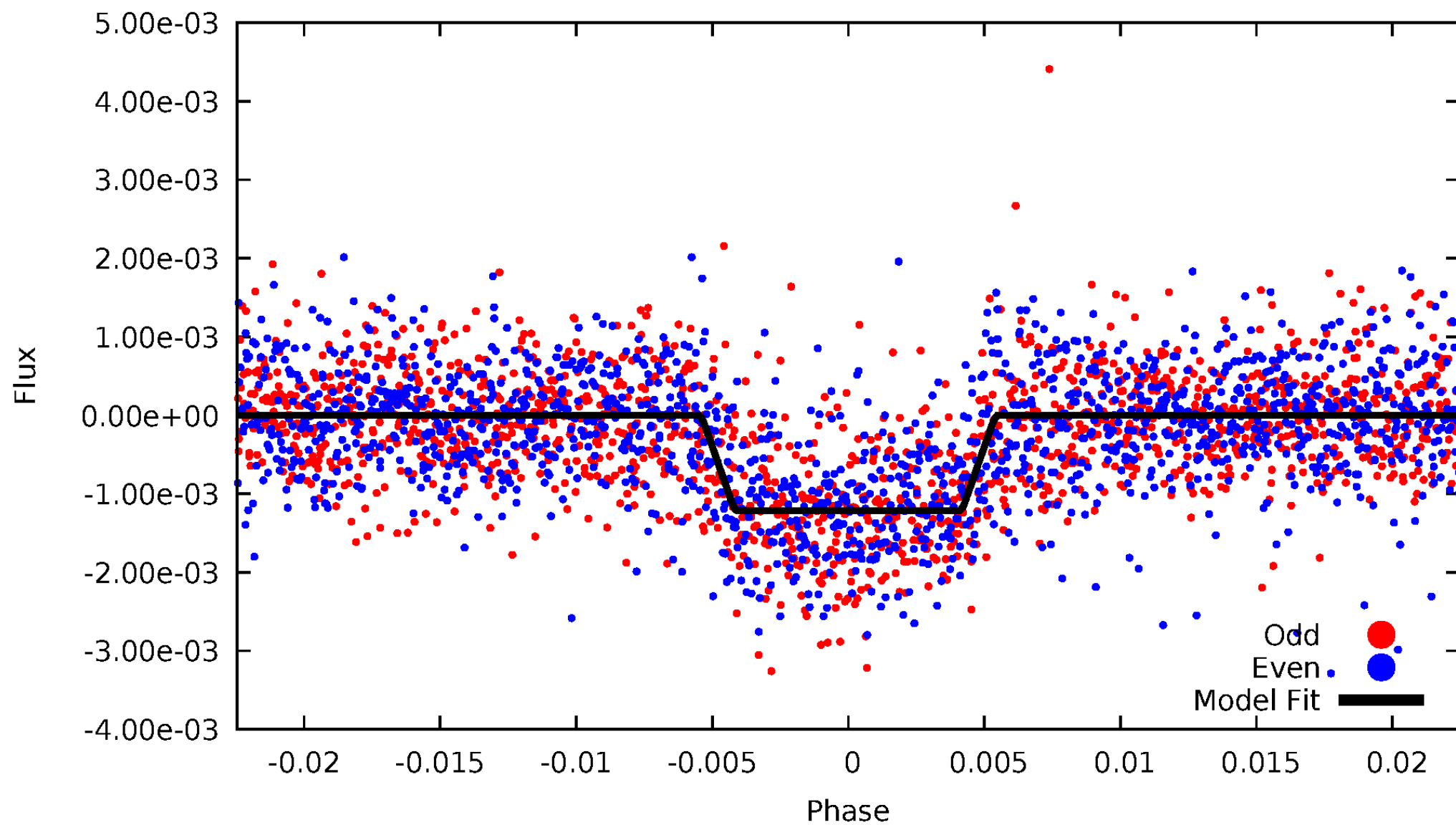
# DV Odd/Even

TCE 002165002-01



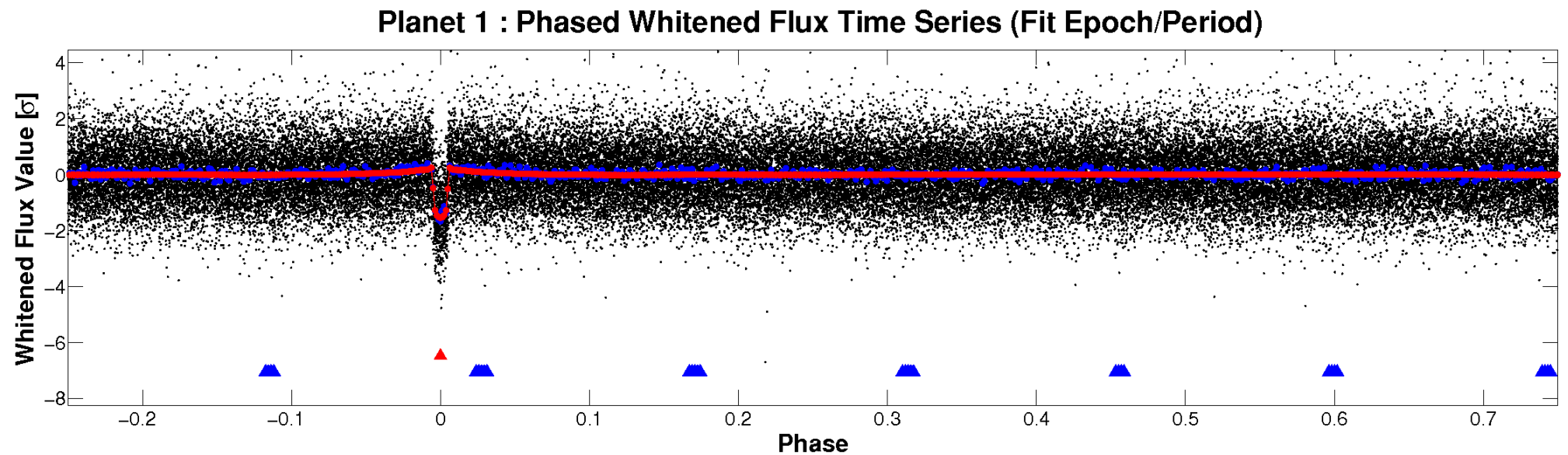
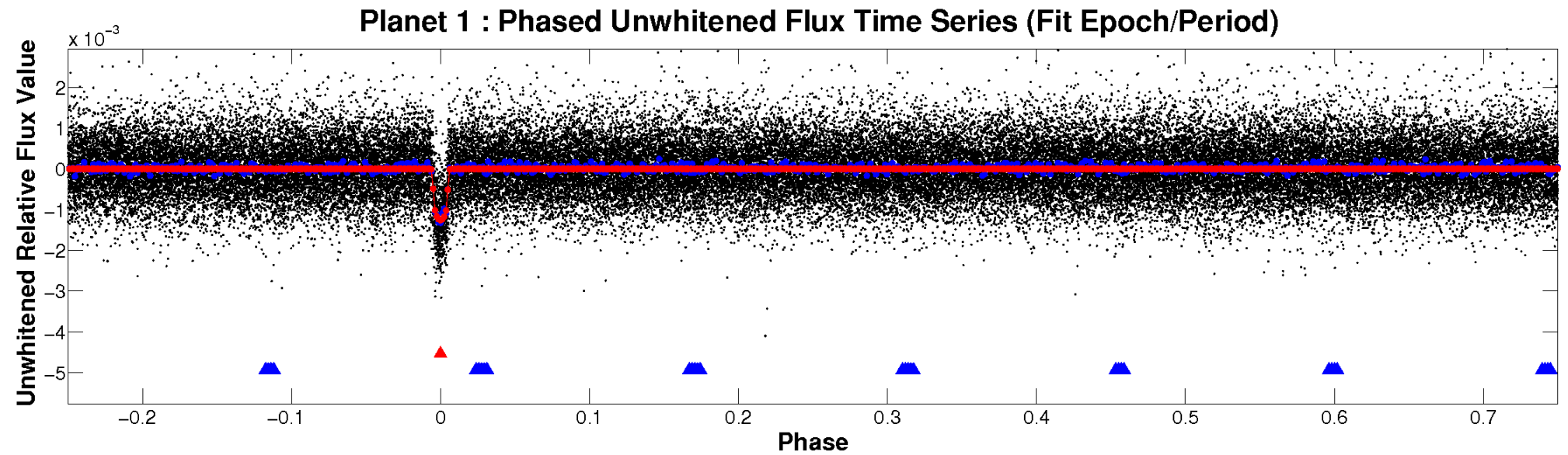
# ALT Odd/Even

TCE 002165002-01



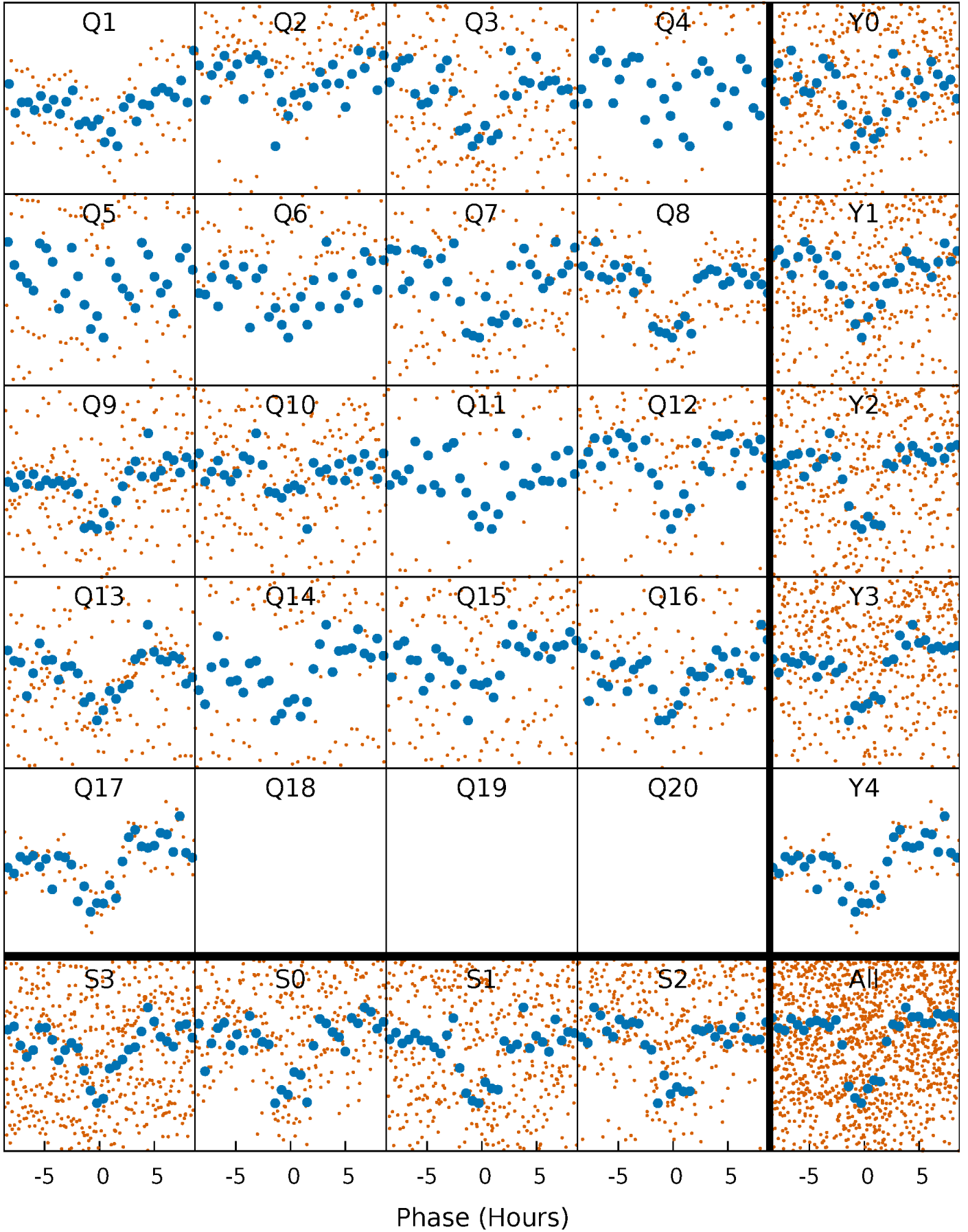


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

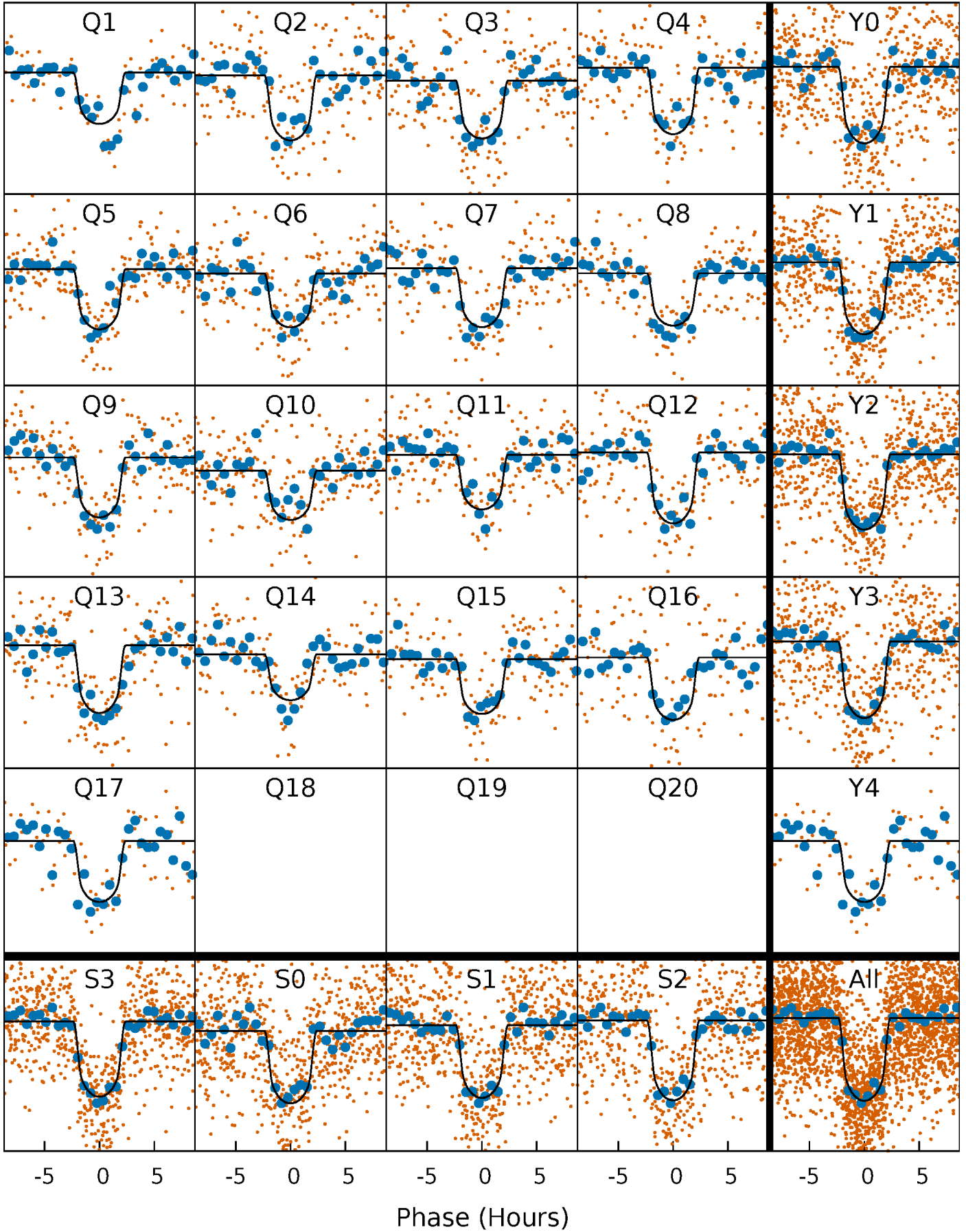
TCE 002165002-01 P= 16.568109 Days  $T_0=146.151395$  (BKJD)





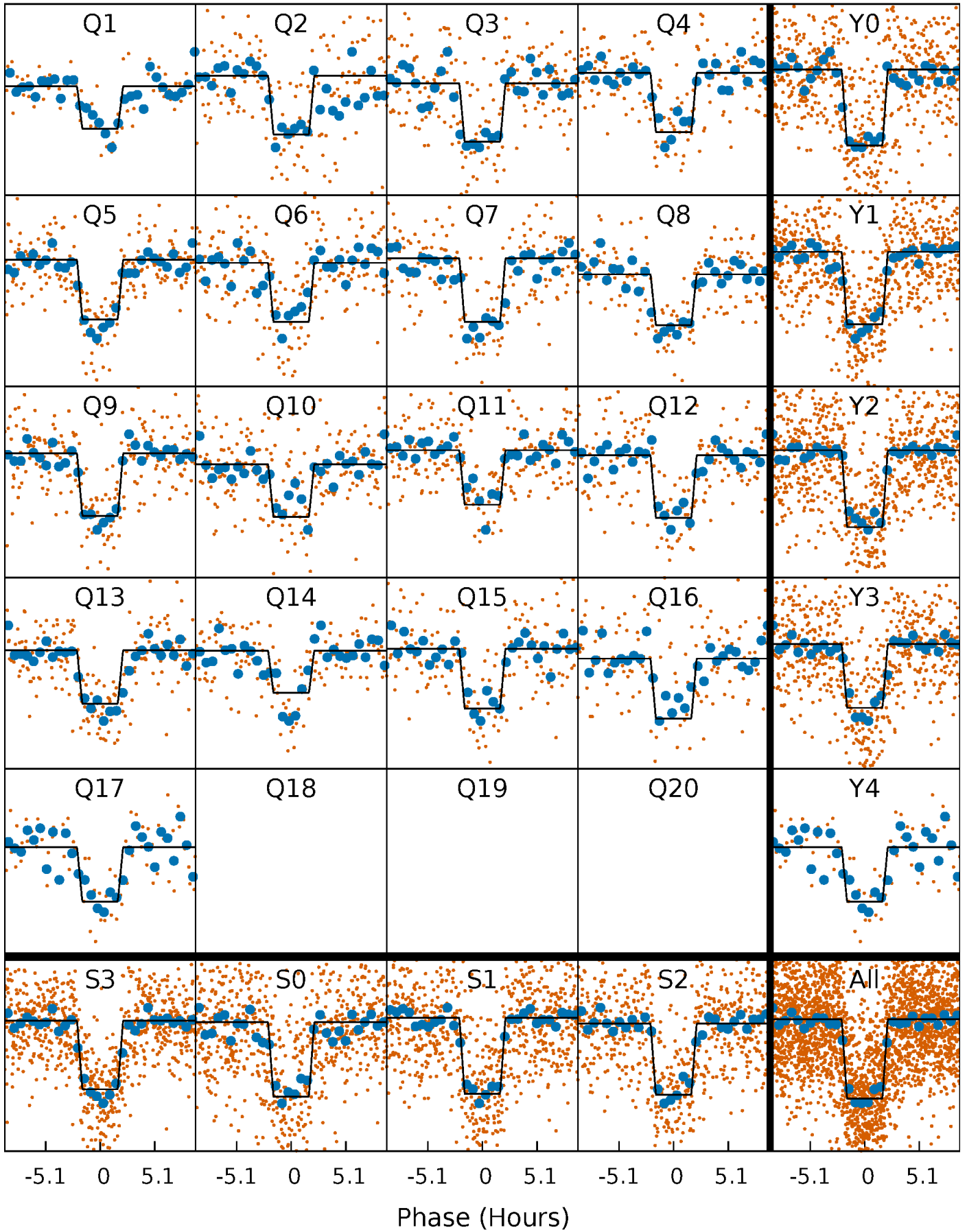
# DV Quarter-Phased Transit Curves

TCE 002165002-01 P= 16.568109 Days  $T_0=146.151395$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

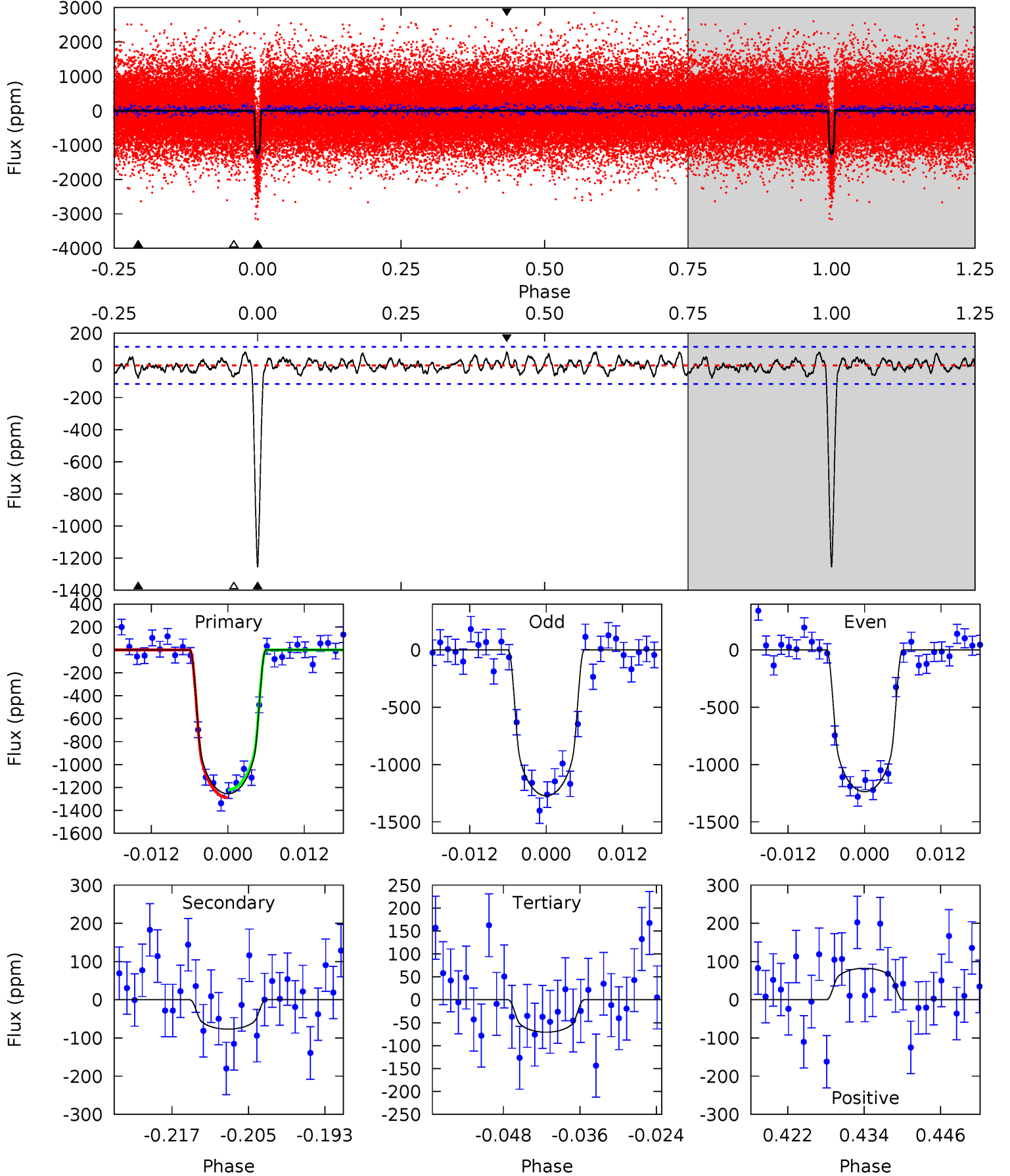
TCE 002165002-01 P= 16.567882 Days  $T_0=146.159731$  (BKJD)



# DV Model-Shift Uniqueness Test

002165002-01,  $P = 16.568109$  Days,  $E = 129.583286$  Days

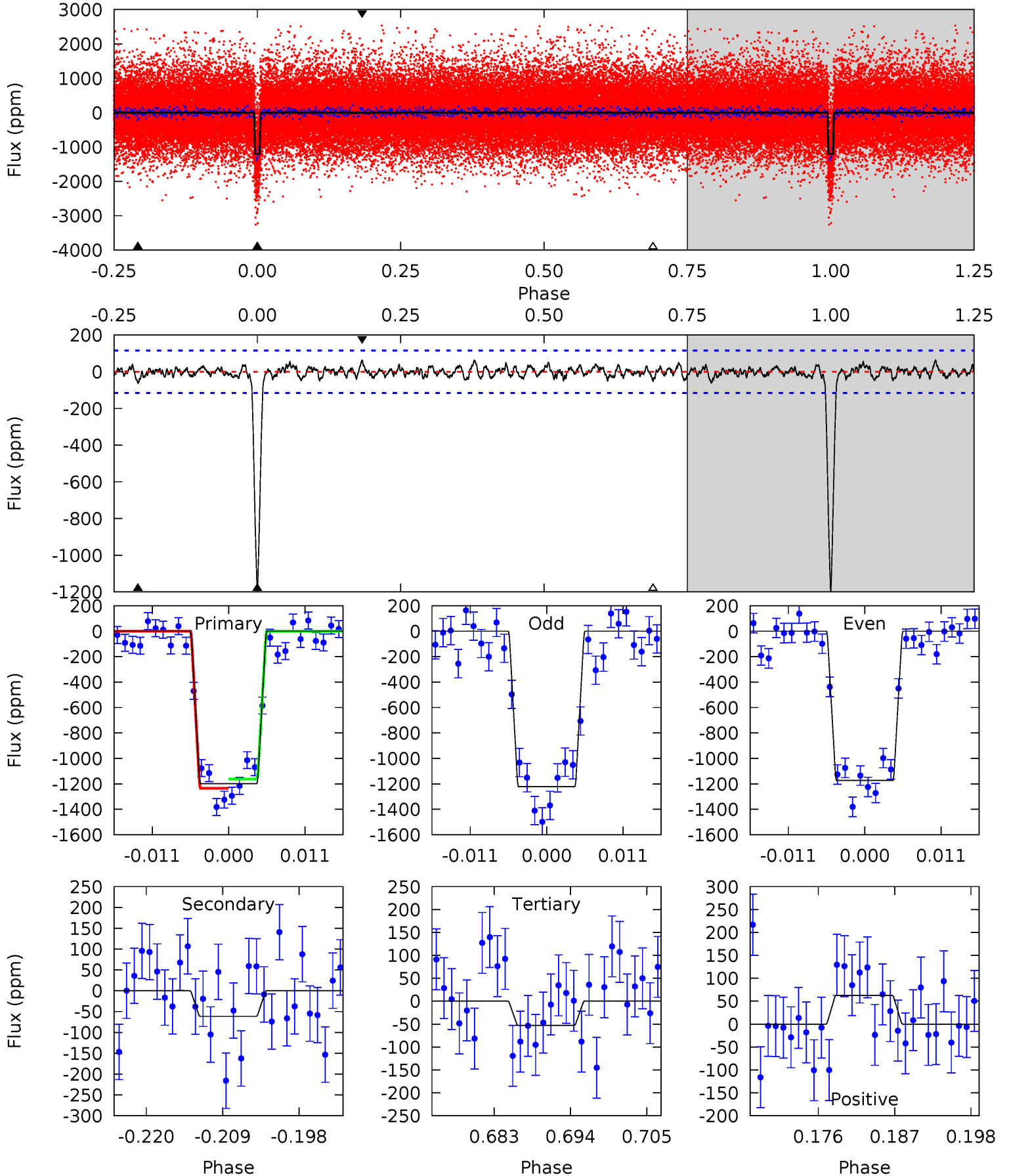
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
54.1	3.31	3.05	3.55	4.99	2.51	1.32	51.0	50.5	0.27	-0.24	0.76	1.00	0.06	1.47



# Alt Model-Shift Uniqueness Test

002165002-01,  $P = 16.567882$  Days,  $E = 129.591849$  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
52.0	2.66	2.29	2.71	5.01	2.54	0.90	49.7	49.3	0.37	-0.05	1.06	0.97	0.05	1.59



### Stellar Parameters For KIC 002165002

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4987^{+80}_{-80}$	$4.602^{+0.024}_{-0.038}$	$-0.180^{+0.150}_{-0.150}$	$0.716^{+0.040}_{-0.032}$	$0.749^{+0.043}_{-0.043}$	$2.876^{+0.313}_{-0.370}$
	+2%/-2%	+1%/-1%	+83%/-83%	+6%/-4%	+6%/-6%	+11%/-13%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 002165002-01 / KOI 0999.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-77 \pm 23$	$2.74^{+0.59}_{-0.55}$	$767^{+17}_{-16}$	$3081^{+261}_{-227}$	$74^{+48}_{-31}$
Alt.	$-61 \pm 23$	$2.73^{+0.55}_{-0.53}$	$767^{+16}_{-15}$	$2973^{+232}_{-230}$	$58^{+37}_{-25}$

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



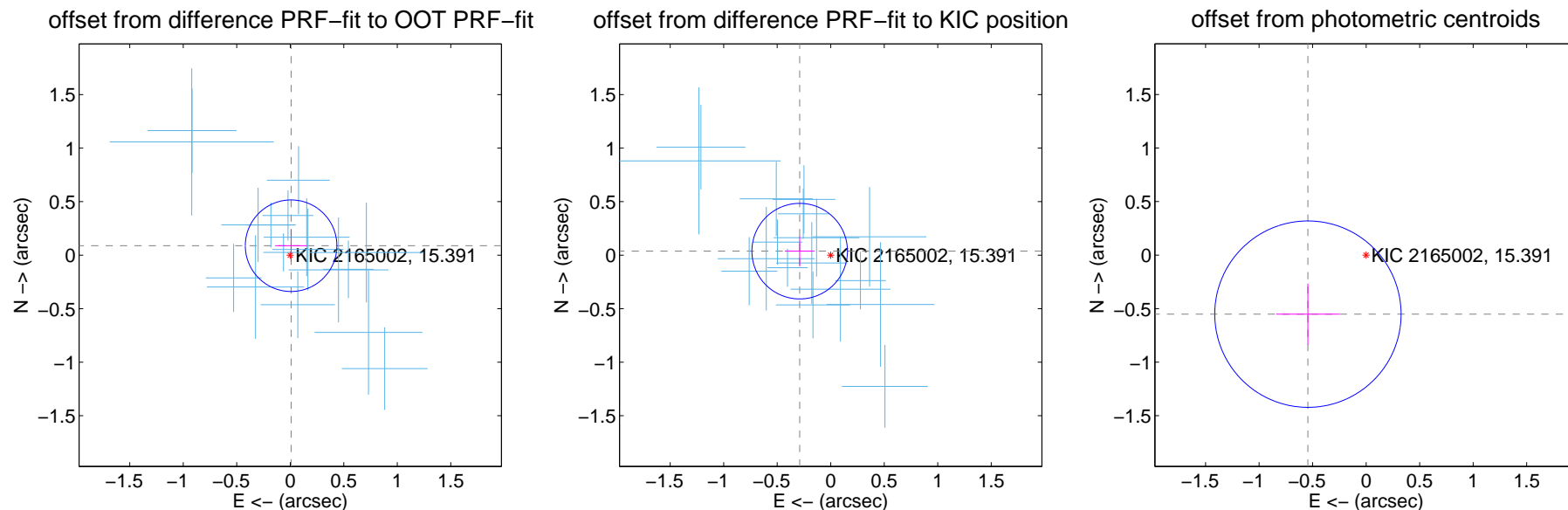
## DV Centroid Data

Supplemental centroid analysis for 002165002-01. Kepler magnitude: 15.39. Transit SNR 35.13

There are 17 quarters with good PRF difference image offsets

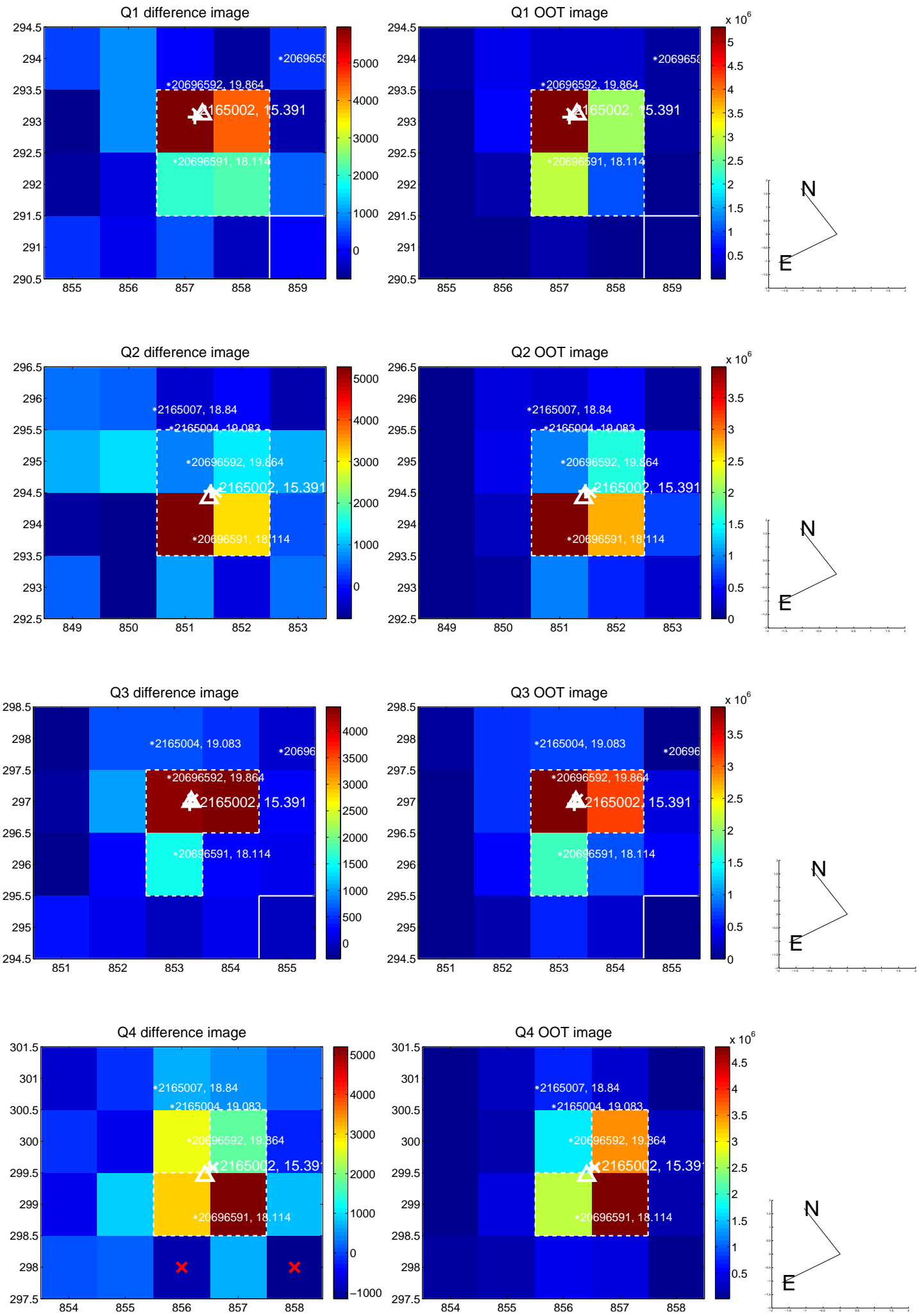
The direct PRF centroid is offset from the target star catalog position by about 0.36 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.088 \pm 0.143$	0.62	$-0.008 \pm 0.149$	$0.088 \pm 0.150$
PRF-fit source offset from KIC position	$0.292 \pm 0.149$	1.97	$0.290 \pm 0.139$	$0.037 \pm 0.143$
photometric centroid source offset	$0.77 \pm 0.29$	2.67	$0.54 \pm 0.30$	$-0.55 \pm 0.28$

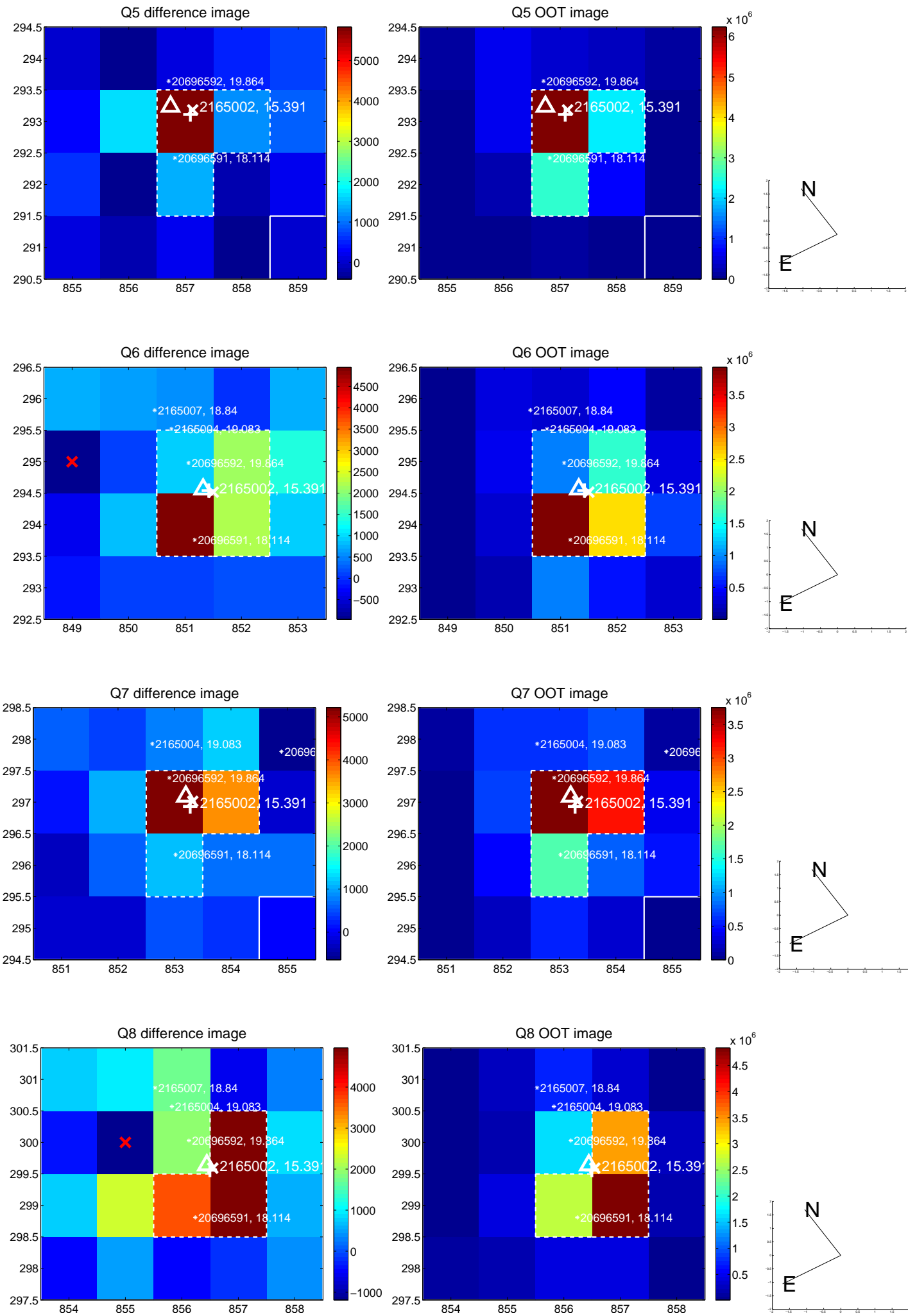


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

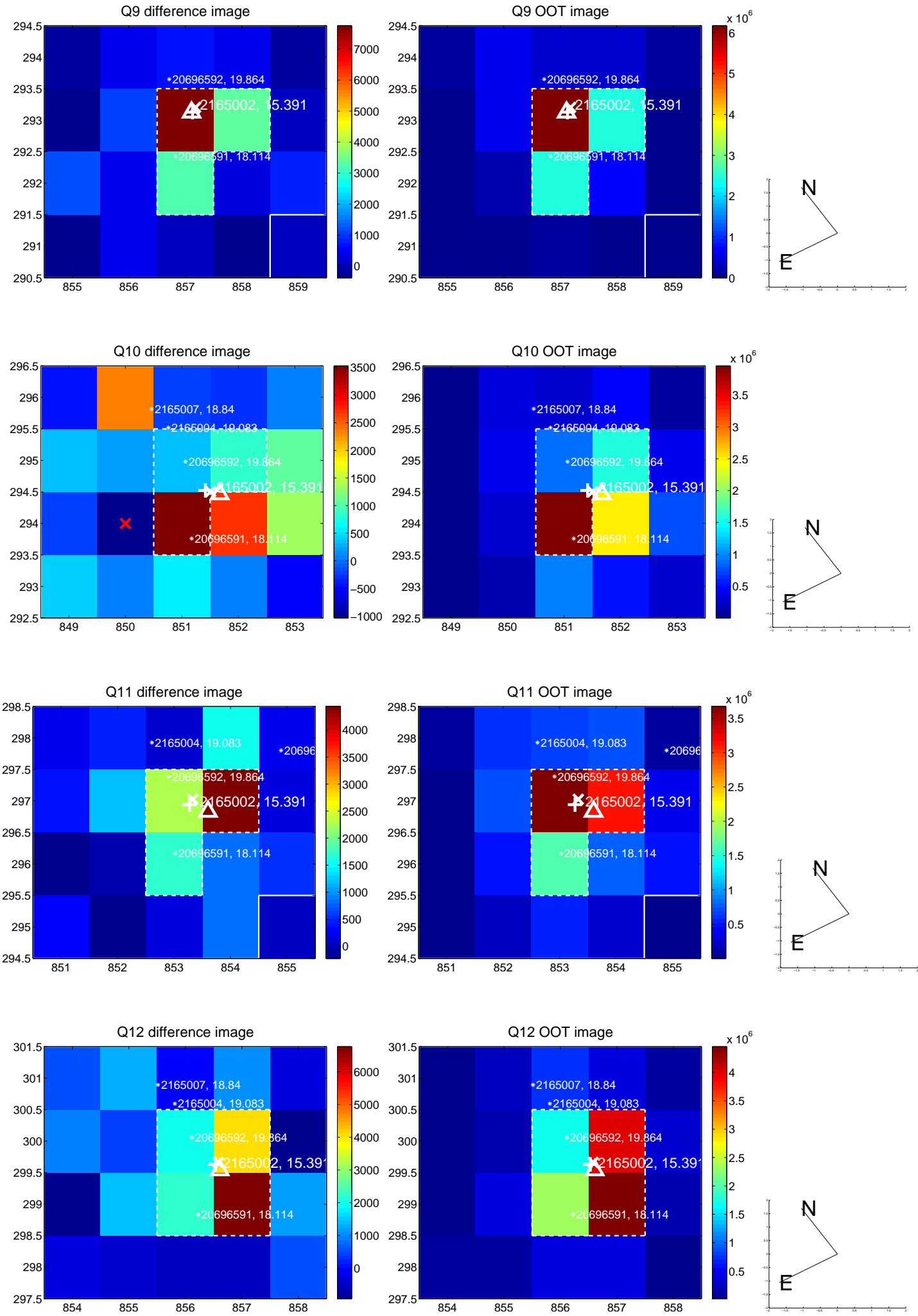
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



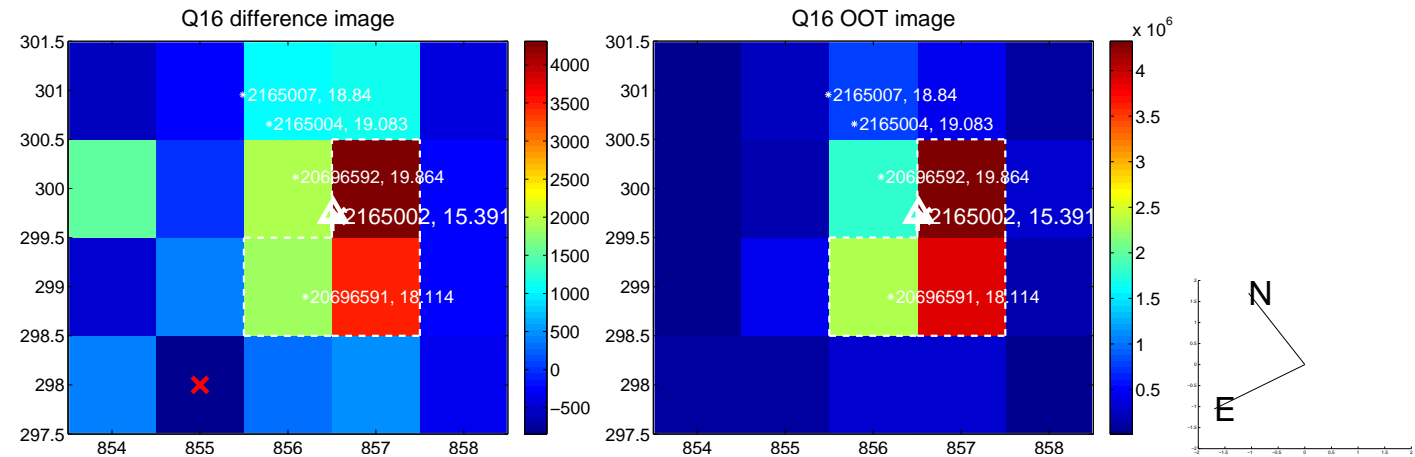
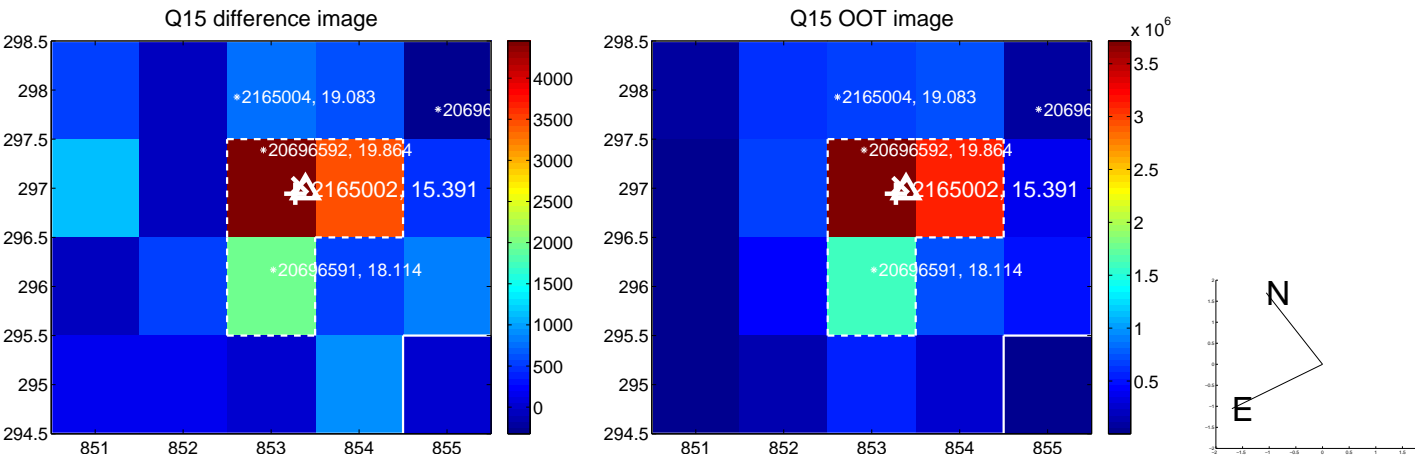
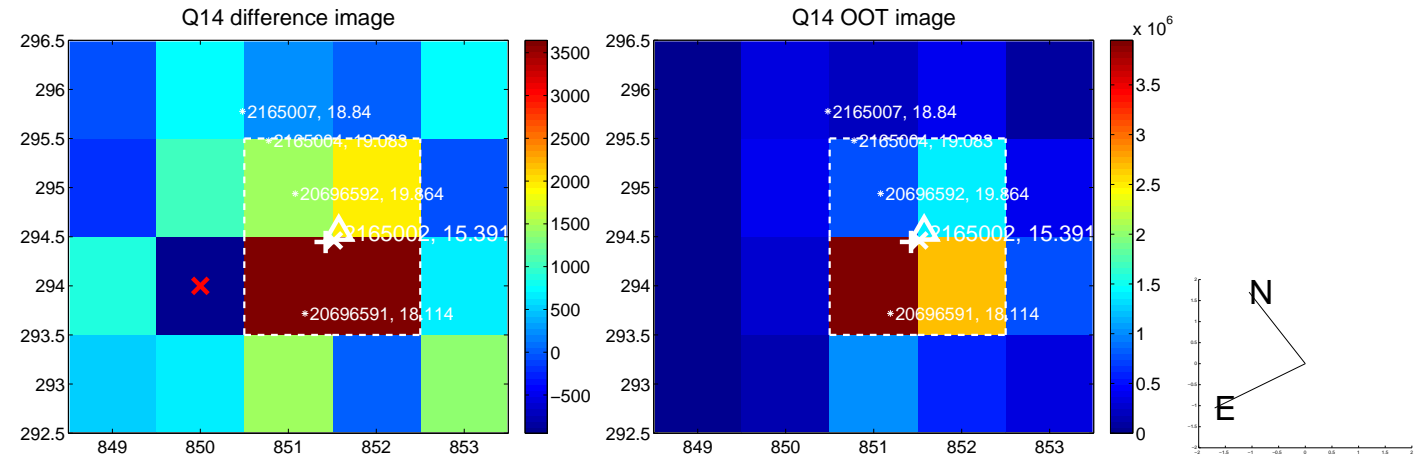
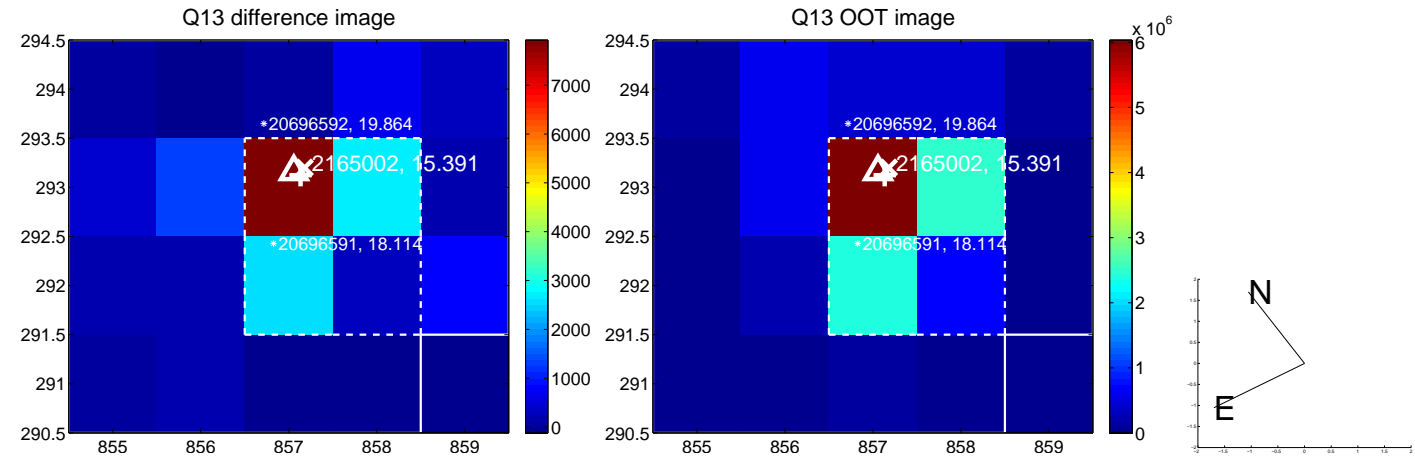
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

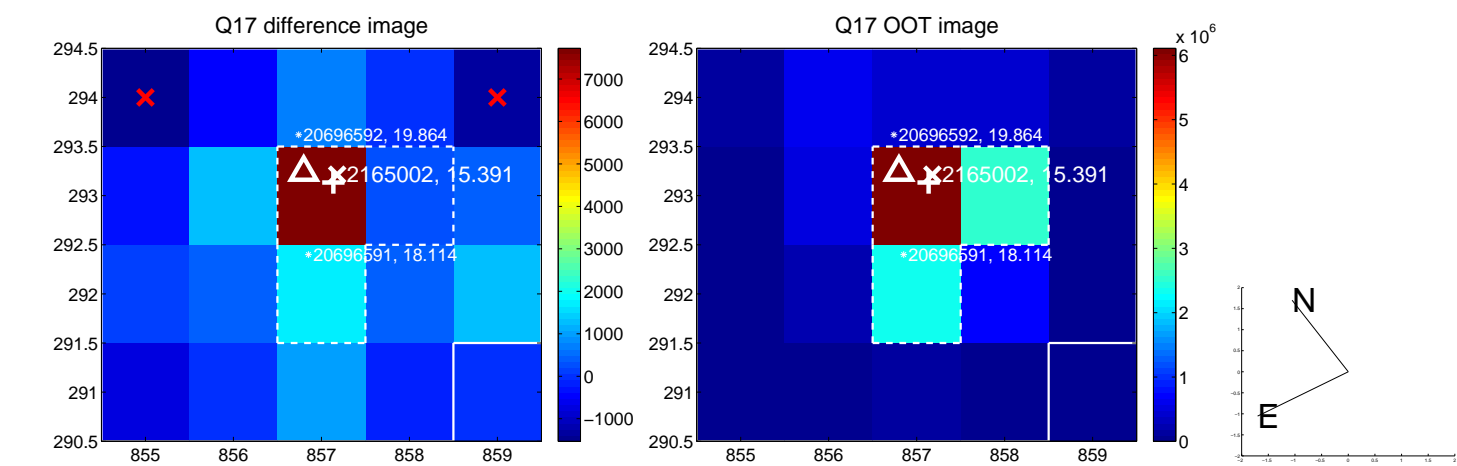


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

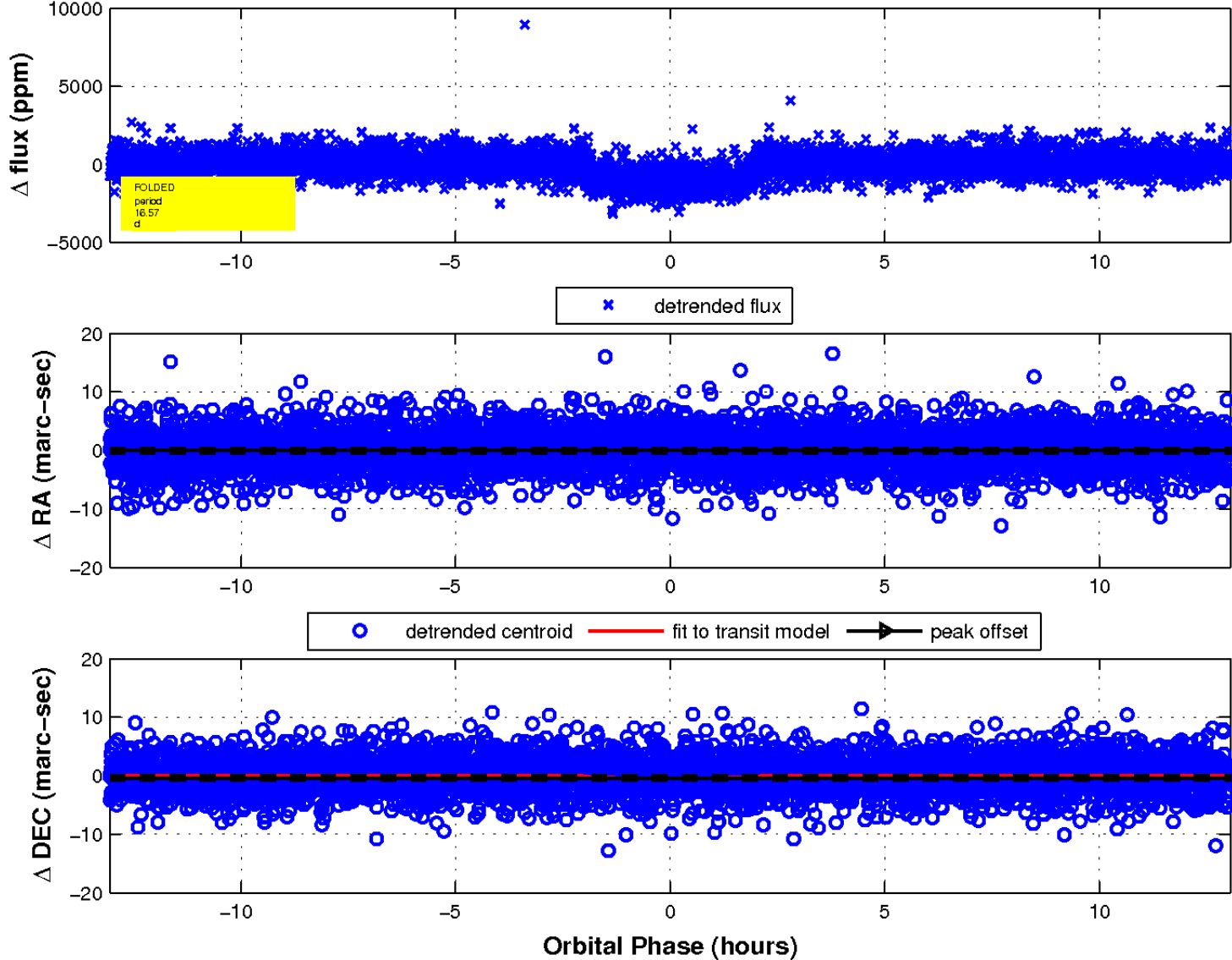




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\Delta$ : difference centroid. red  $\times$ : large negative pixel value.

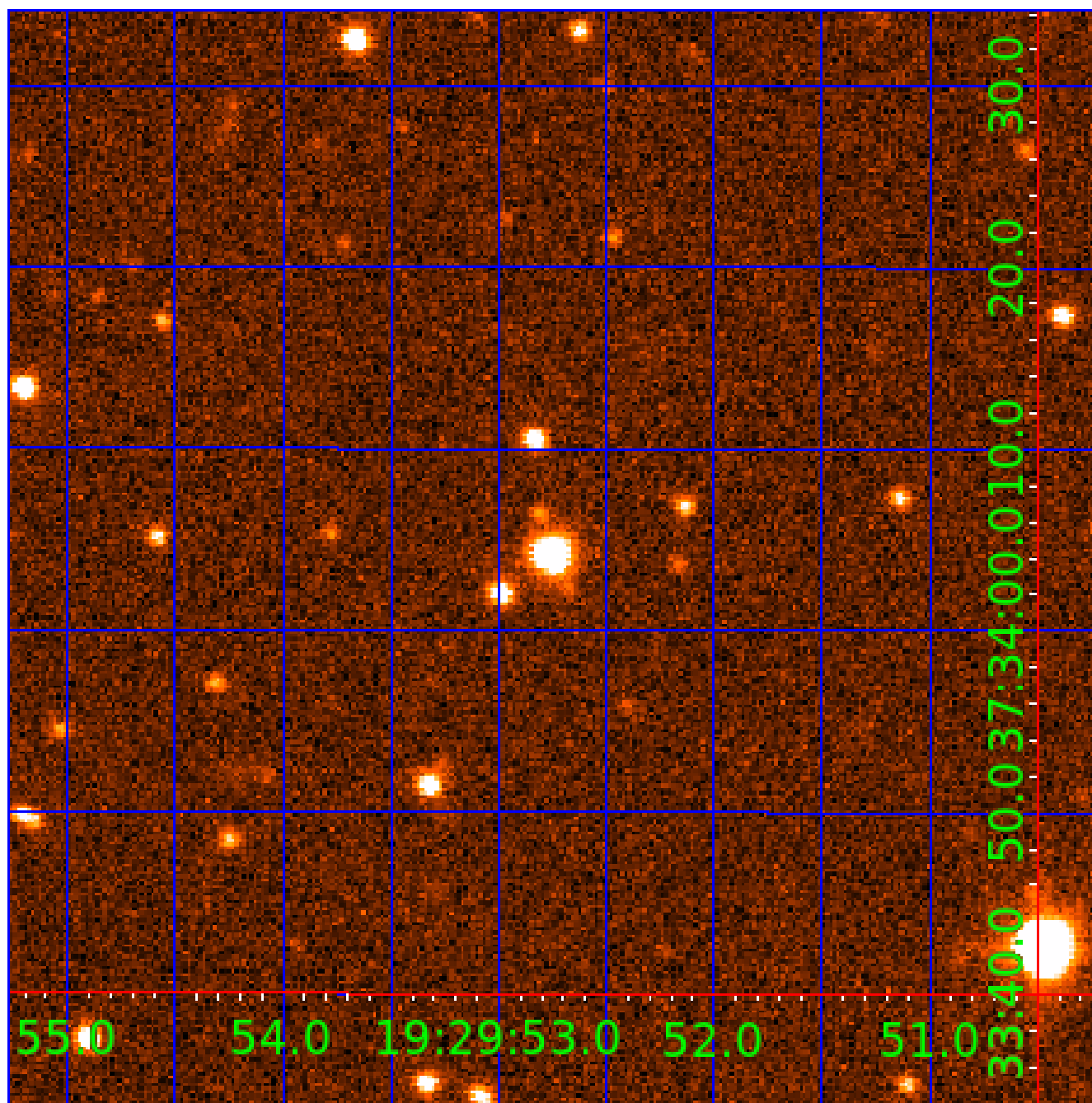


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



# KIC 002165002

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002165002-01	OBS	0999.01	16.568109	146.151395	1258.2	4.354	31.1	35.1	0.72	4987	2.75	21.31
002165002-02	OBS	0999.02	47.333078	151.411920	964.4	3.057	13.3	14.0	0.72	4987	2.73	5.26

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002165002-01	OBS	PC	1.00	0	0	0	0	CENT_KIC_POS
002165002-02	OBS	PC	1.00	0	0	0	0	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.

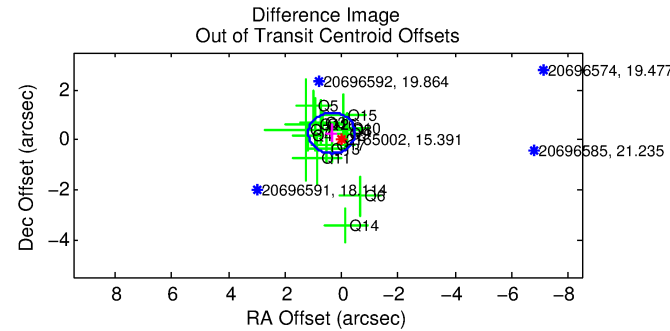
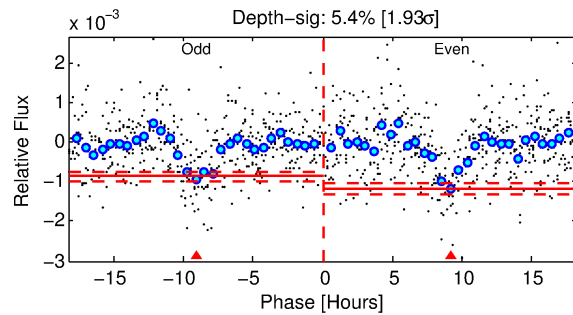
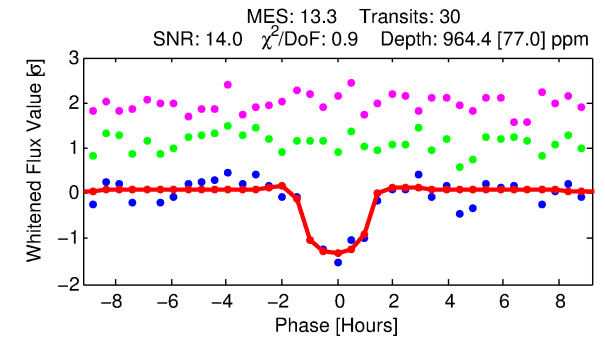
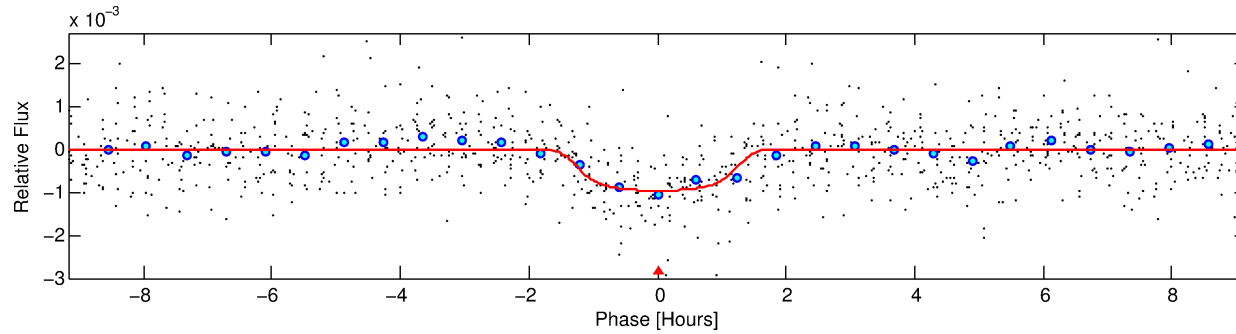
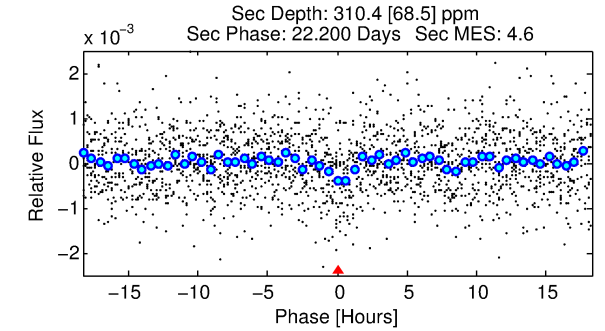
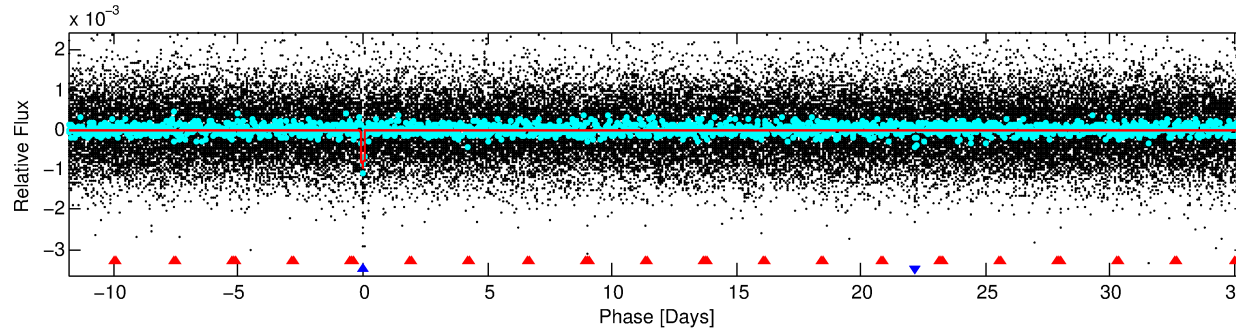
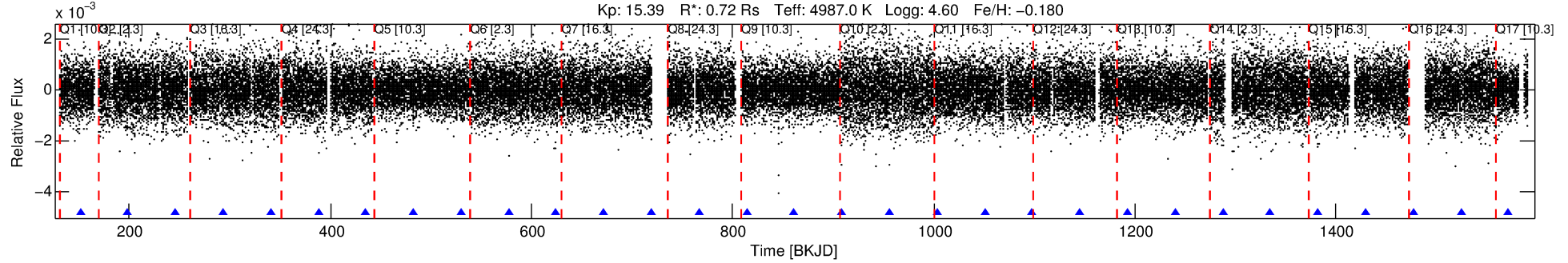
## Ephemeris Match Information For 002165002-02

No Significant Match Found

# DV One-Page Summary

KIC: 2165002 Candidate: 2 of 2 Period: 47.333 d  
KOI: K00999.02 Name: Kepler-263c Corr: 0.960

Kp: 15.39 R\*: 0.72 Rs Teff: 4987.0 K Logg: 4.60 Fe/H: -0.180



## DV Fit Results:

Period = 47.33308 [0.00029] d  
Epoch = 151.4119 [0.0048] BKJD  
Rp/R\* = 0.0350 [0.0053]  
a/R\* = 58.99 [31.36]  
b = 0.91 [0.11]  
Seff = 5.26 [0.50]  
Teq = 386 [9] K  
Rp = 2.73 [0.44] Re  
a = 0.2325 [0.0110] AU  
Ag = 1237.18 [470.17] [2.63σ]  
Teffp = 3540 [336] K [9.40σ]

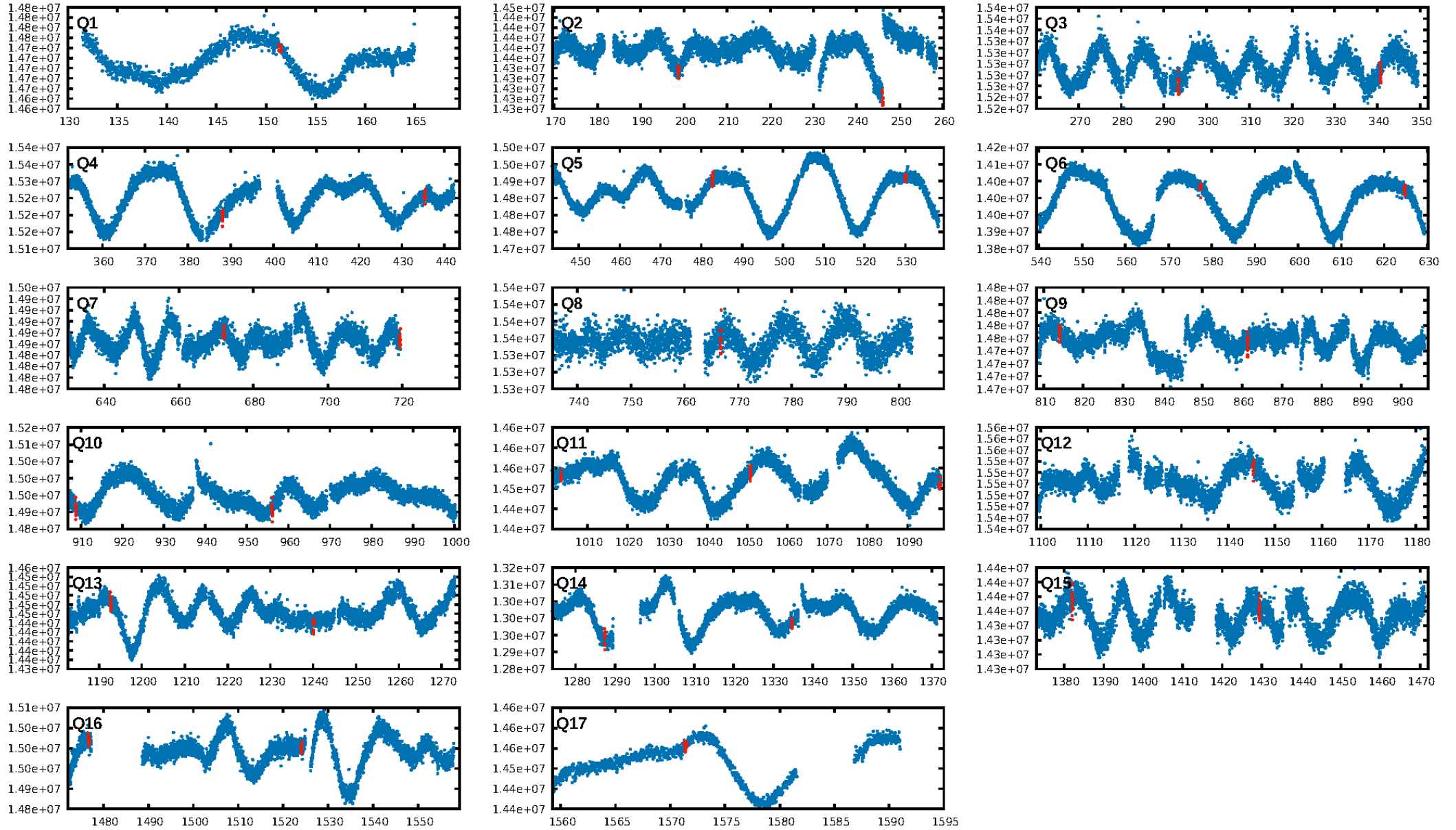
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [138.77σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 83.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.53e-37  
RollingBand-fgt: 1.00 [28/28]  
GhostDiagnostic-chr: 2.138  
Centroid-sig: 5.7%  
Centroid-so: 1.392 arcsec [1.80σ]  
OotOffset-rm: 0.448 arcsec [1.65σ]  
KicOffset-rm: 0.690 arcsec [3.07σ]  
OotOffset-st: 3/4/4/4 [15]  
KicOffset-st: 3/4/4/4 [15]  
DiffImageQuality-fgm: 0.53 [8/15]  
DiffImageOverlap-fno: 0.94 [16/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 00:20:52 Z

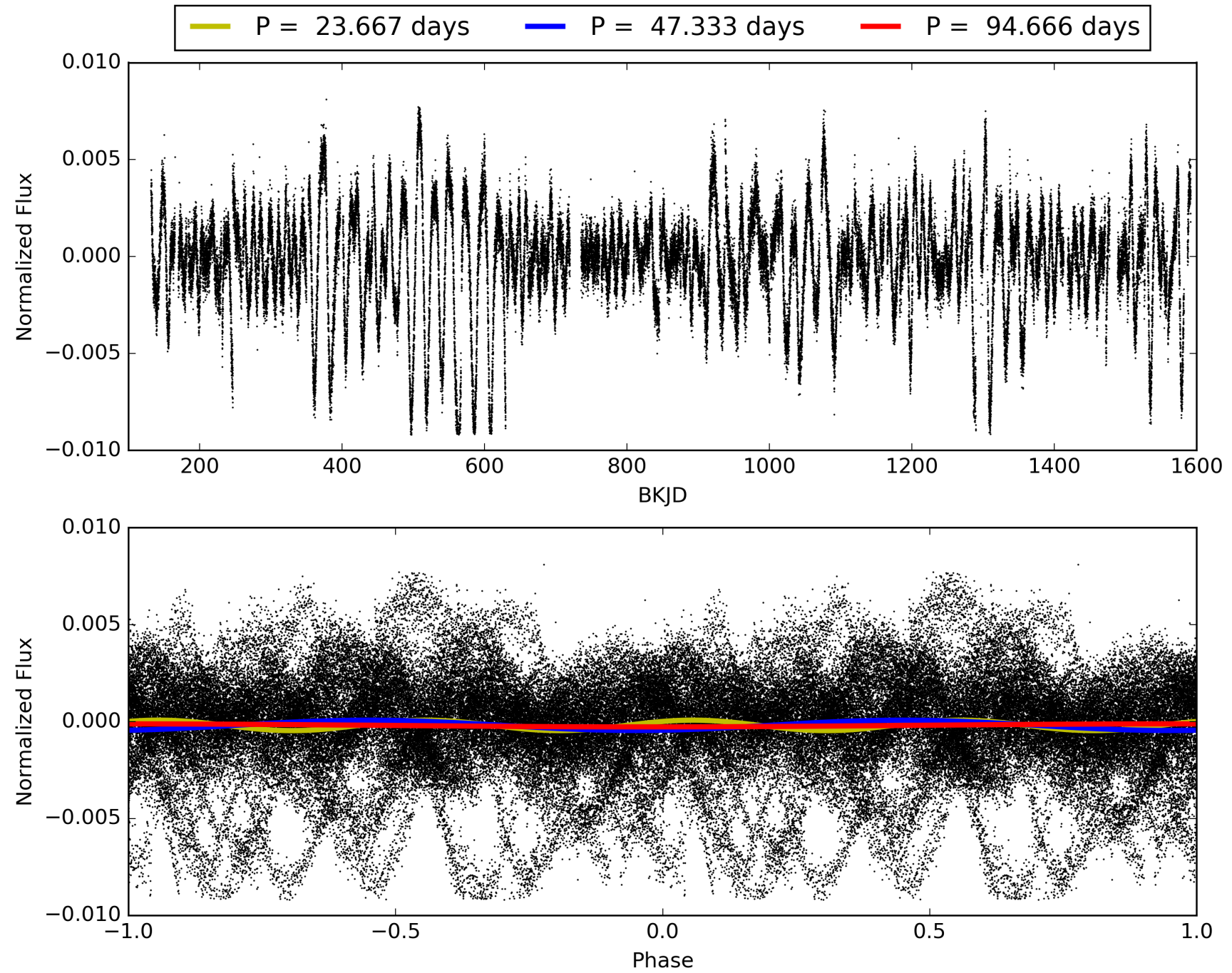
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 002165002-02, PDC Light Curves



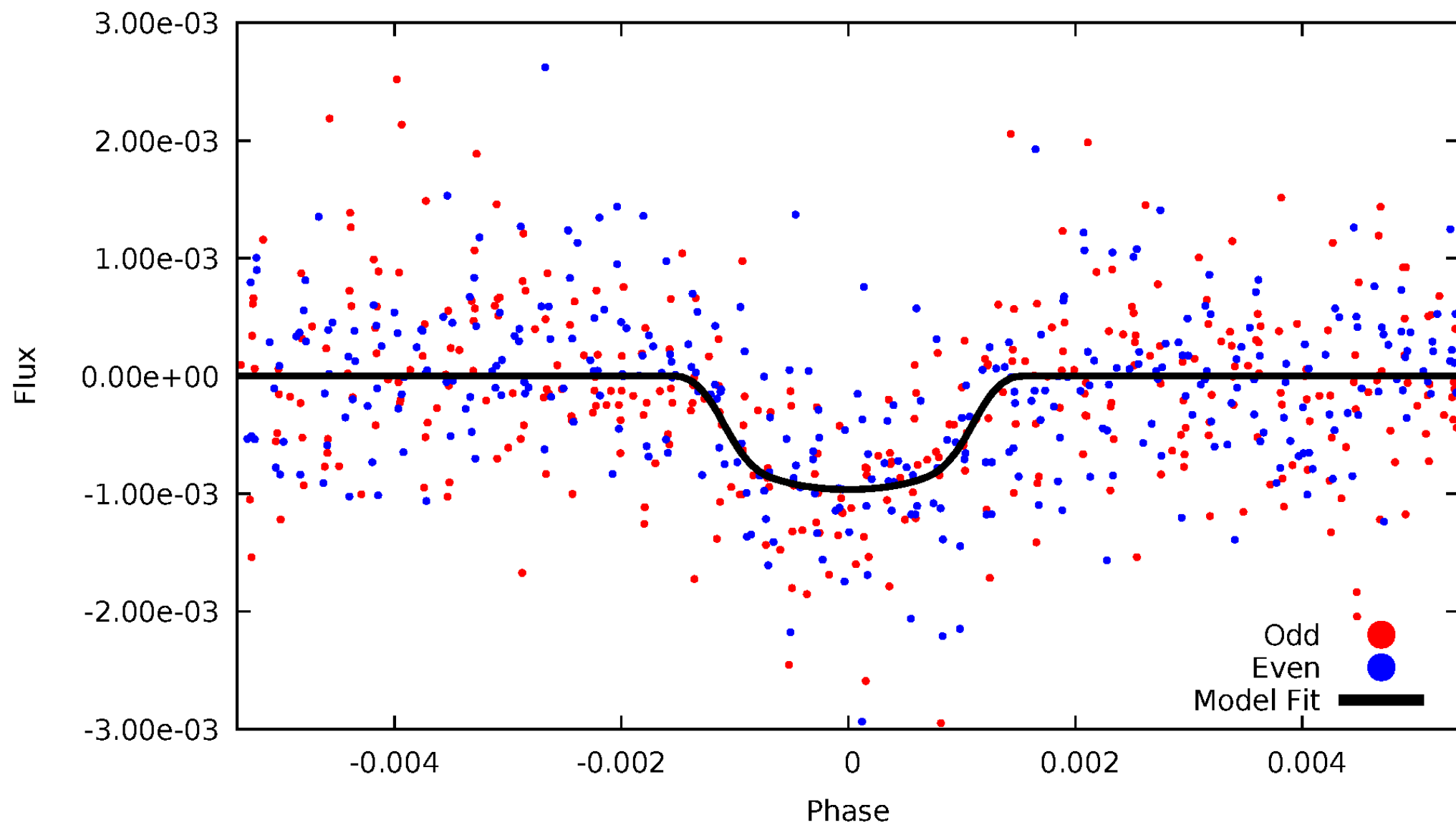


# TCE 002165002-02



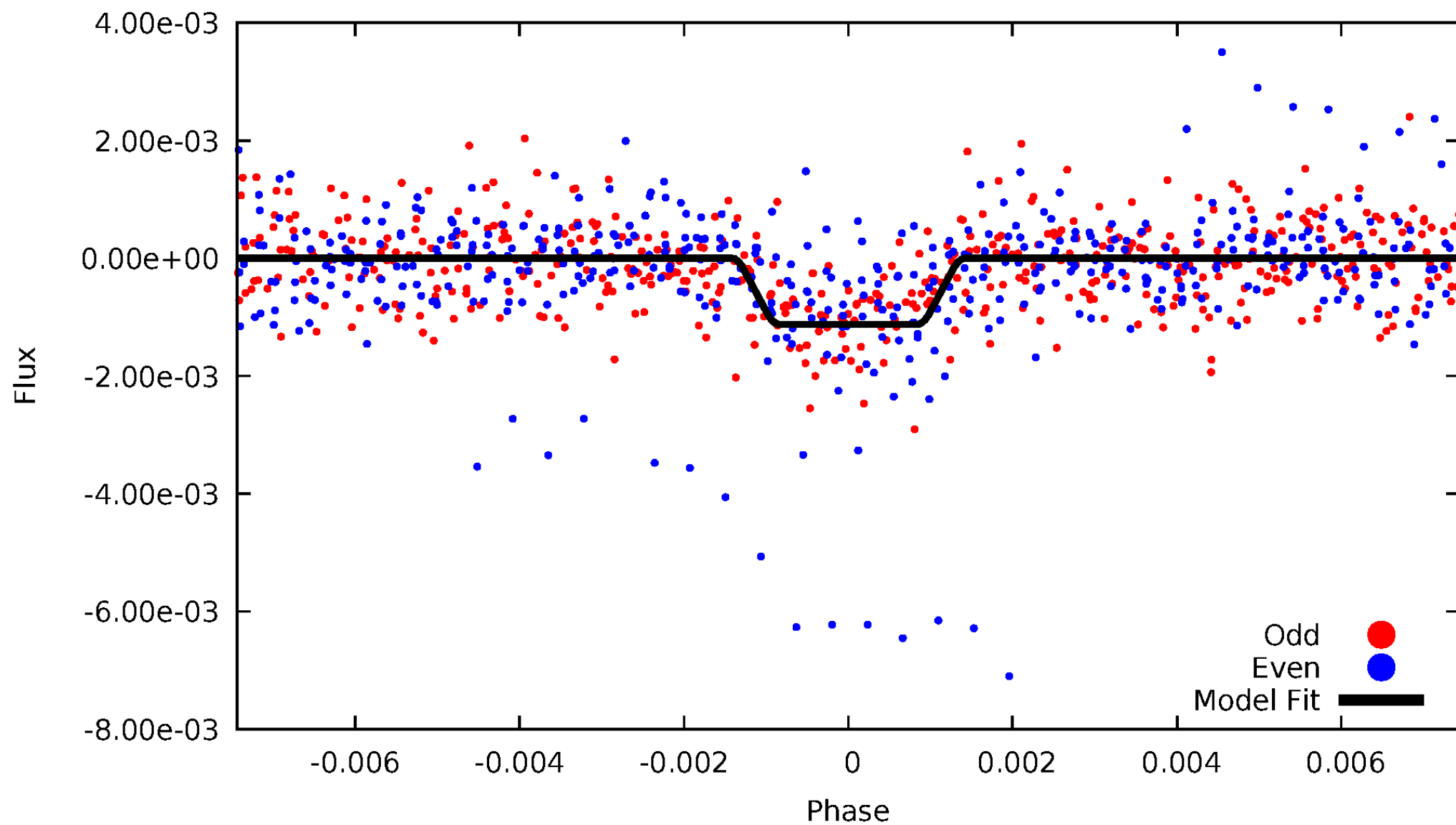
# DV Odd/Even

TCE 002165002-02



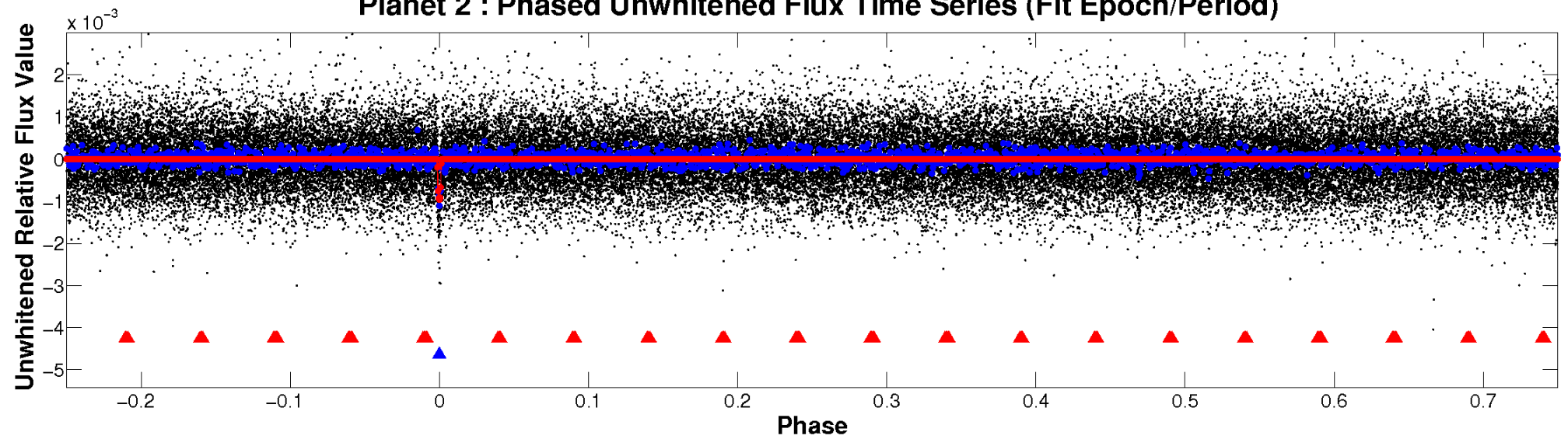
# ALT Odd/Even

TCE 002165002-02

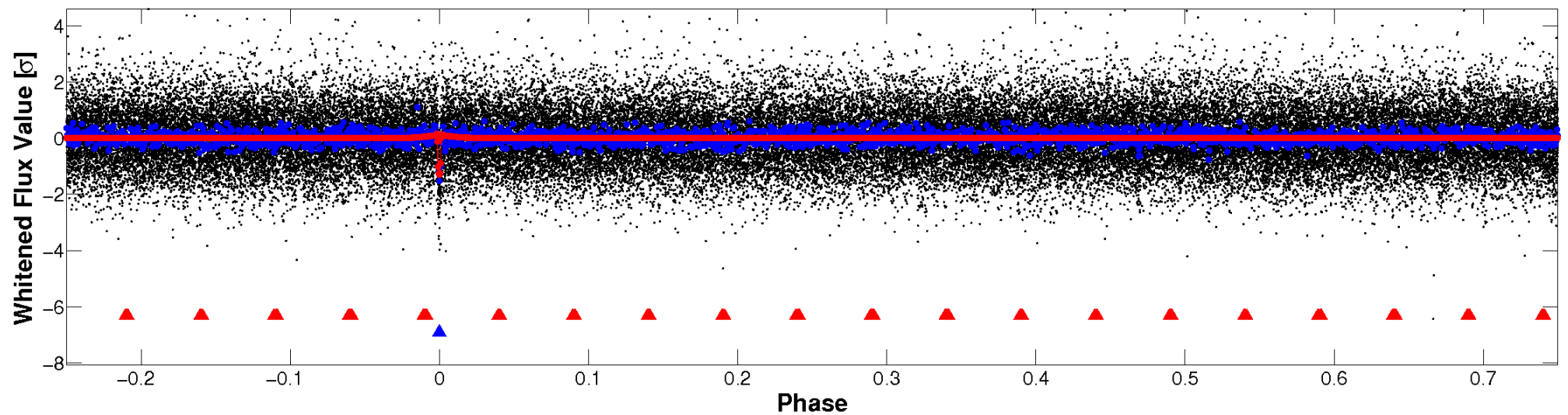


# Non-Whitened Vs. Whitened Light Curve

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

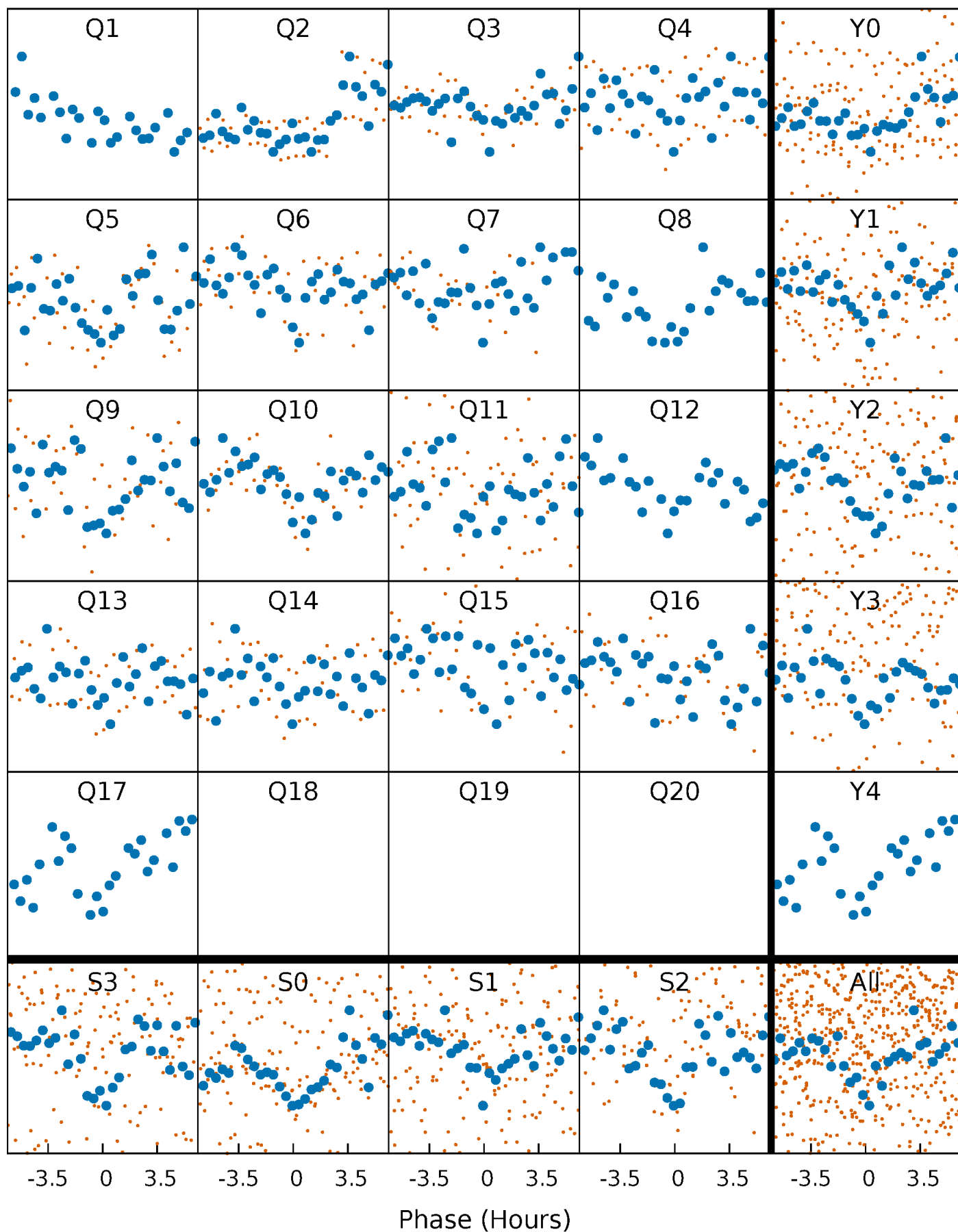


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

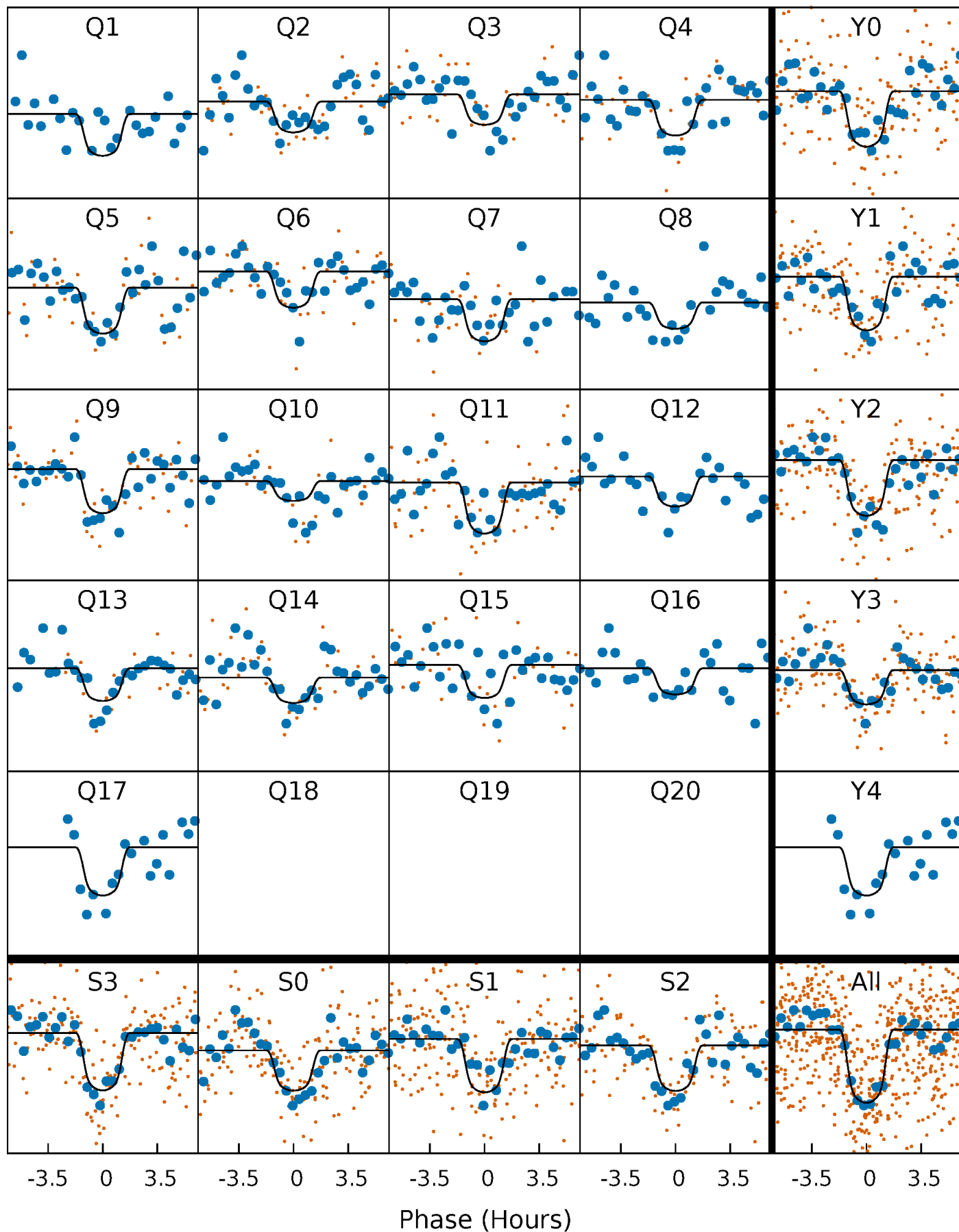
TCE 002165002-02   P= 47.333078 Days    $T_0=151.411920$  (BKJD)





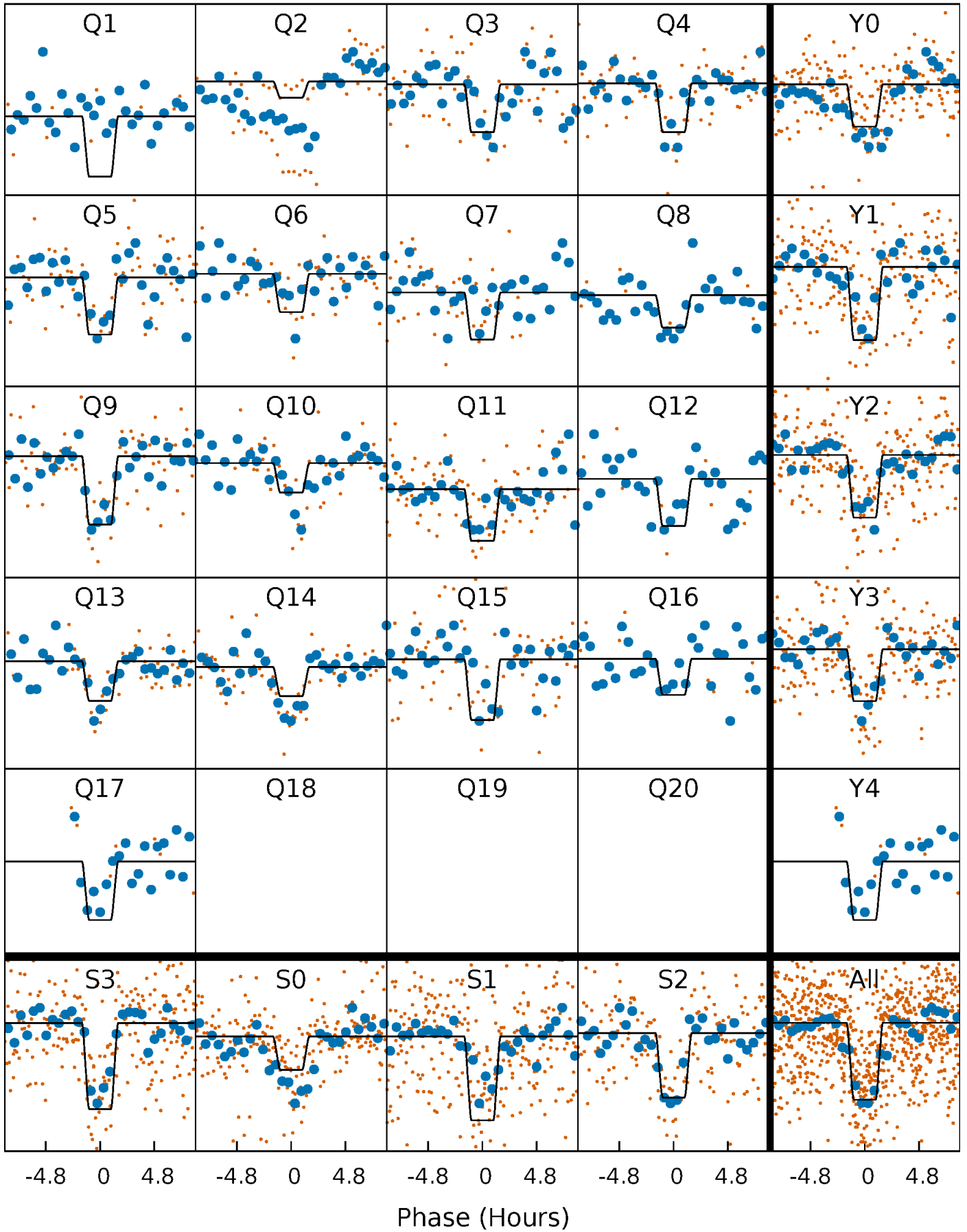
# DV Quarter-Phased Transit Curves

TCE 002165002-02   P= 47.333078 Days    $T_0=151.411920$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

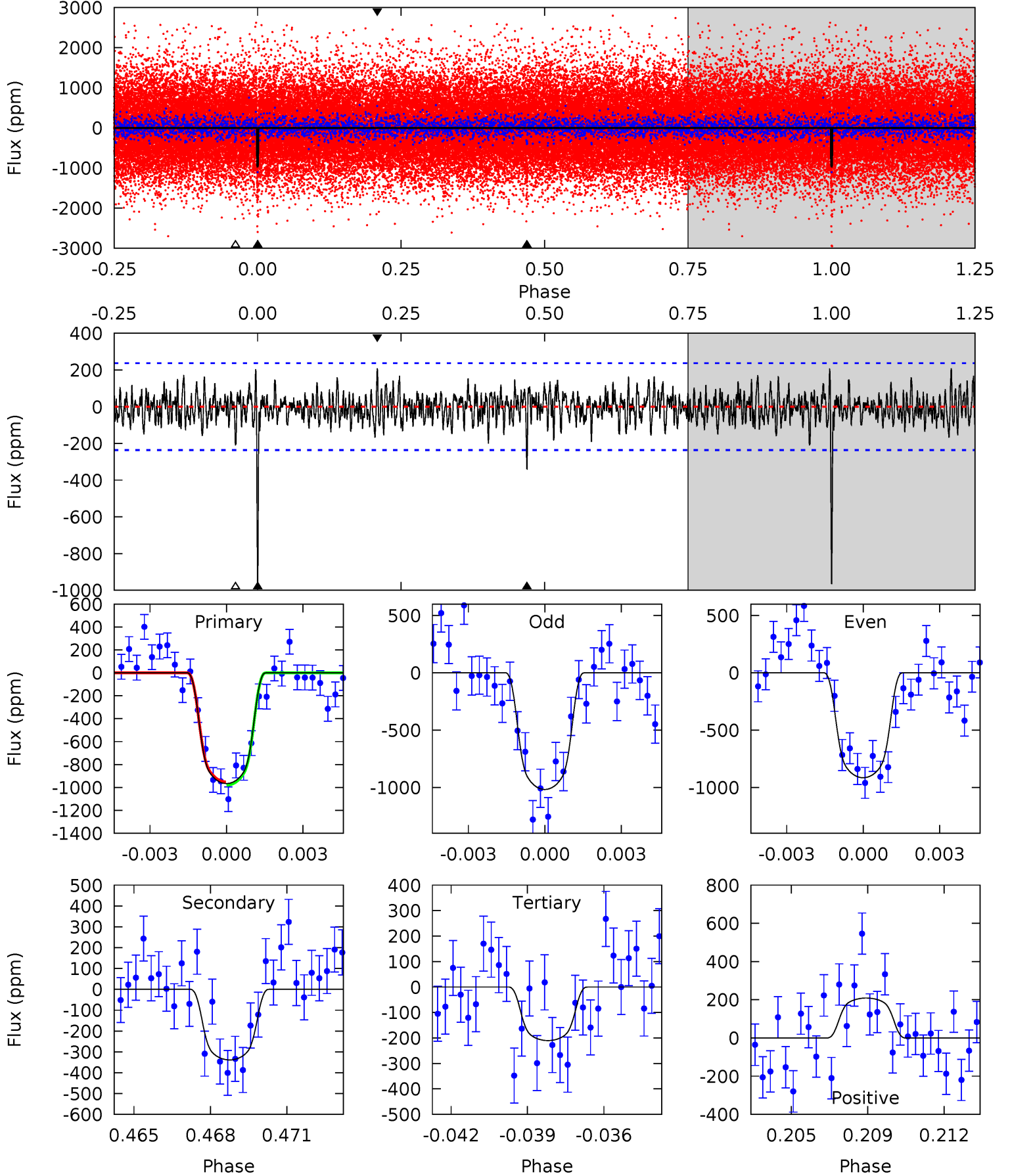
TCE 002165002-02 P= 47.333325 Days  $T_0=151.407939$  (BKJD)



# DV Model-Shift Uniqueness Test

002165002-02, P = 47.333078 Days, E = 104.078842 Days

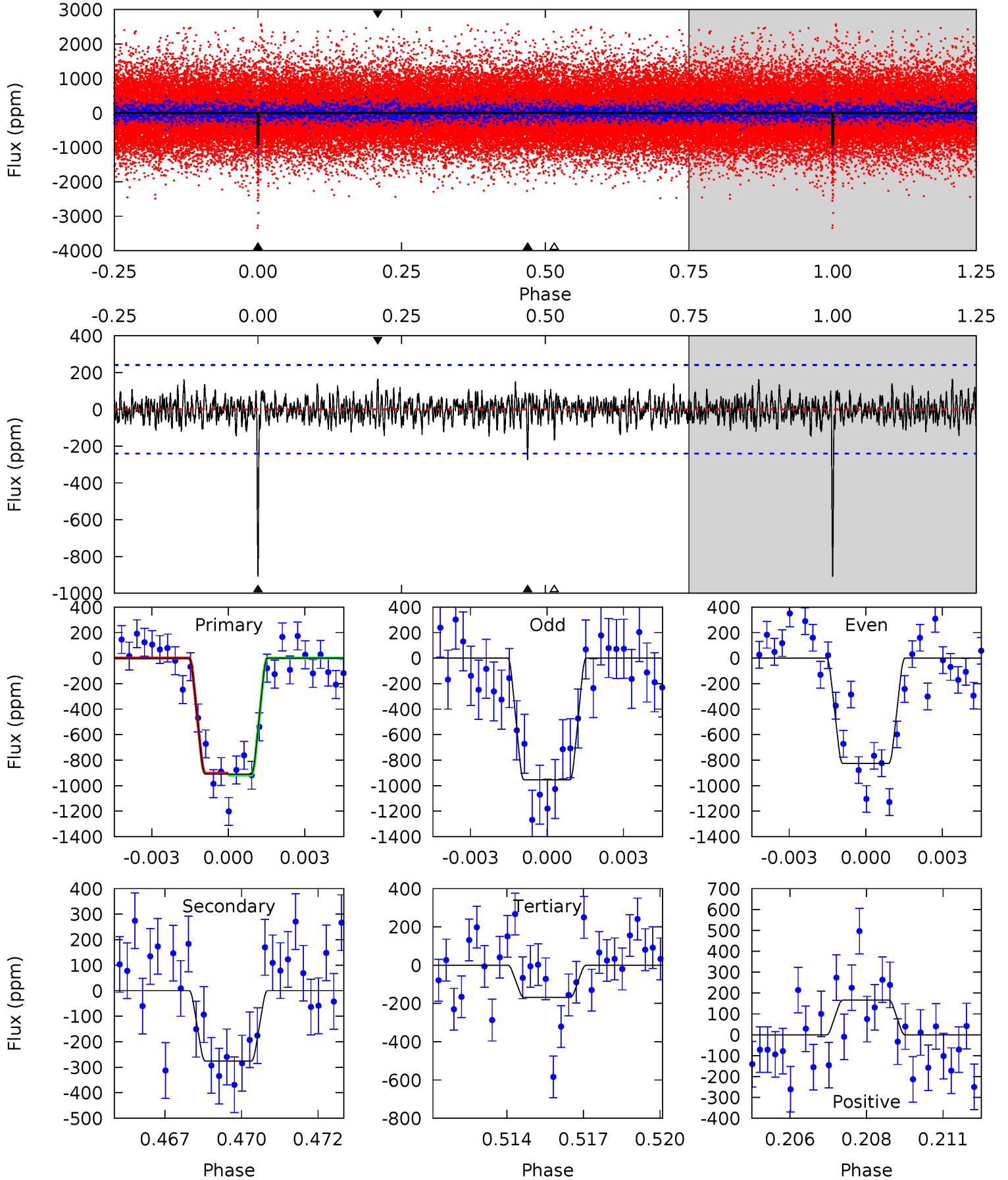
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
21.4	7.51	4.66	4.64	5.25	2.97	1.40	16.8	16.8	2.85	2.88	1.14	0.98	0.18	0.31



# Alt Model-Shift Uniqueness Test

002165002-02, P = 47.333325 Days, E = 104.074614 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
19.9	6.02	3.68	3.62	5.27	2.99	1.07	16.2	16.3	2.34	2.40	1.40	1.23	0.15	0.19



### Stellar Parameters For KIC 002165002

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4987^{+80}_{-80}$	$4.602^{+0.024}_{-0.038}$	$-0.180^{+0.150}_{-0.150}$	$0.716^{+0.040}_{-0.032}$	$0.749^{+0.043}_{-0.043}$	$2.876^{+0.313}_{-0.370}$
	+2%/-2%	+1%/-1%	+83%/-83%	+6%/-4%	+6%/-6%	+11%/-13%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 002165002-02 / KOI 0999.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-339 \pm 45$	$2.77^{+0.45}_{-0.40}$	$542^{+11}_{-11}$	$3893^{+250}_{-202}$	$1309^{+537}_{-354}$
Alt.	$-275 \pm 46$	$2.61^{+0.44}_{-0.41}$	$541^{+11}_{-10}$	$3835^{+268}_{-233}$	$1196^{+527}_{-359}$

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

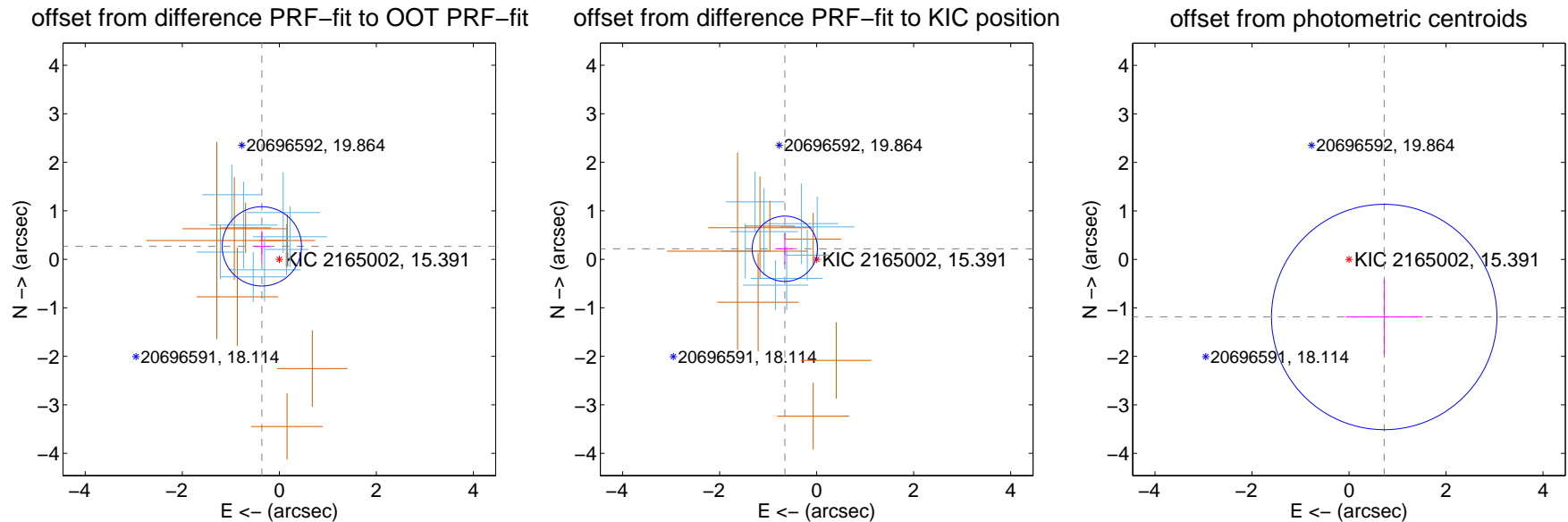
## DV Centroid Data

Supplemental centroid analysis for 002165002-02. Kepler magnitude: 15.39. Transit SNR 14.02

There are 8 quarters with good PRF difference image offsets

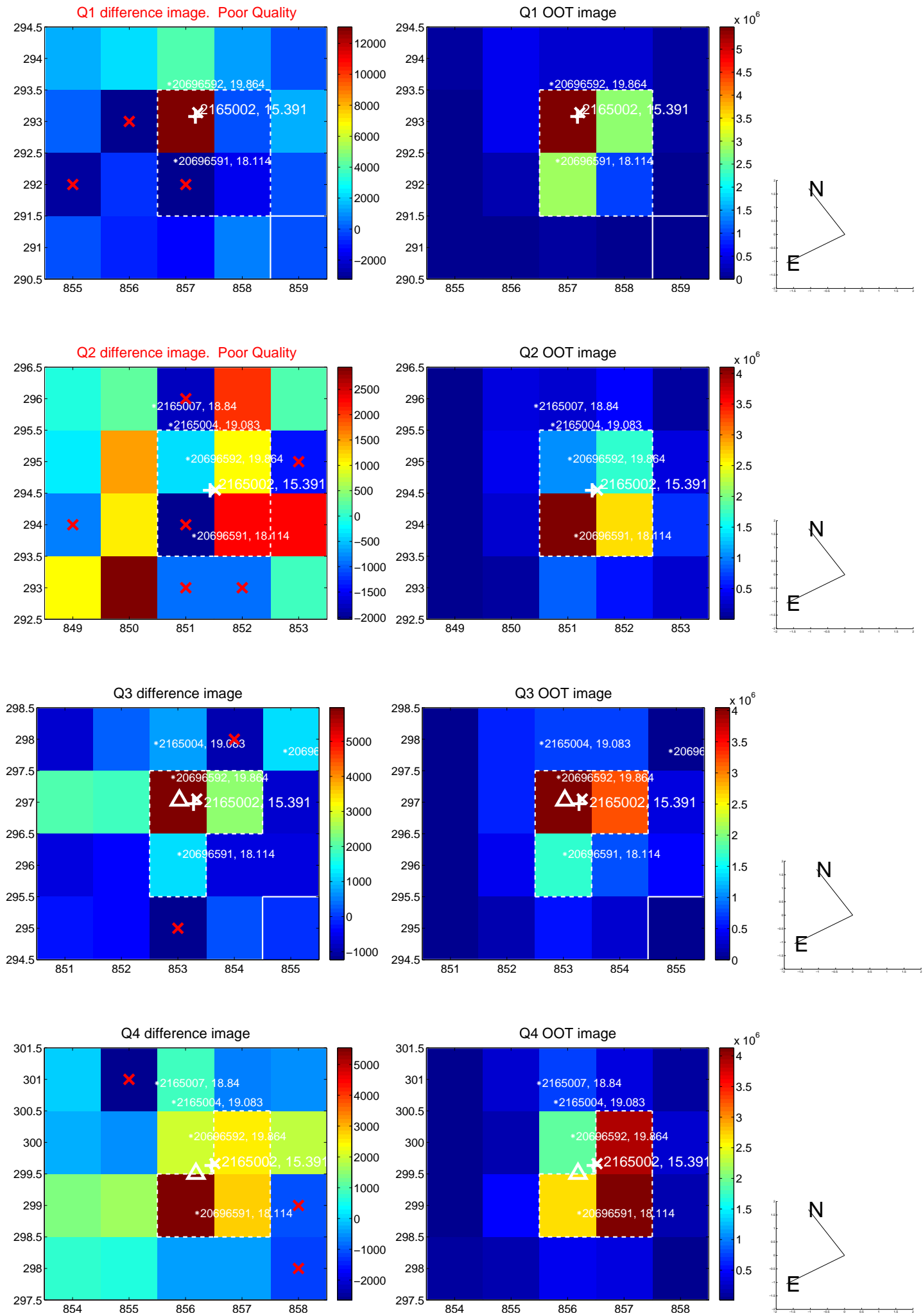
The direct PRF centroid is offset from the target star catalog position by about 0.36 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.448 \pm 0.272$	1.65	$0.360 \pm 0.166$	$0.267 \pm 0.320$
PRF-fit source offset from KIC position	<b><math>0.690 \pm 0.224</math></b>	<b>3.07</b>	$0.655 \pm 0.171$	$0.217 \pm 0.317$
photometric centroid source offset	$1.39 \pm 0.77$	1.80	$-0.73 \pm 0.79$	$-1.19 \pm 0.77$



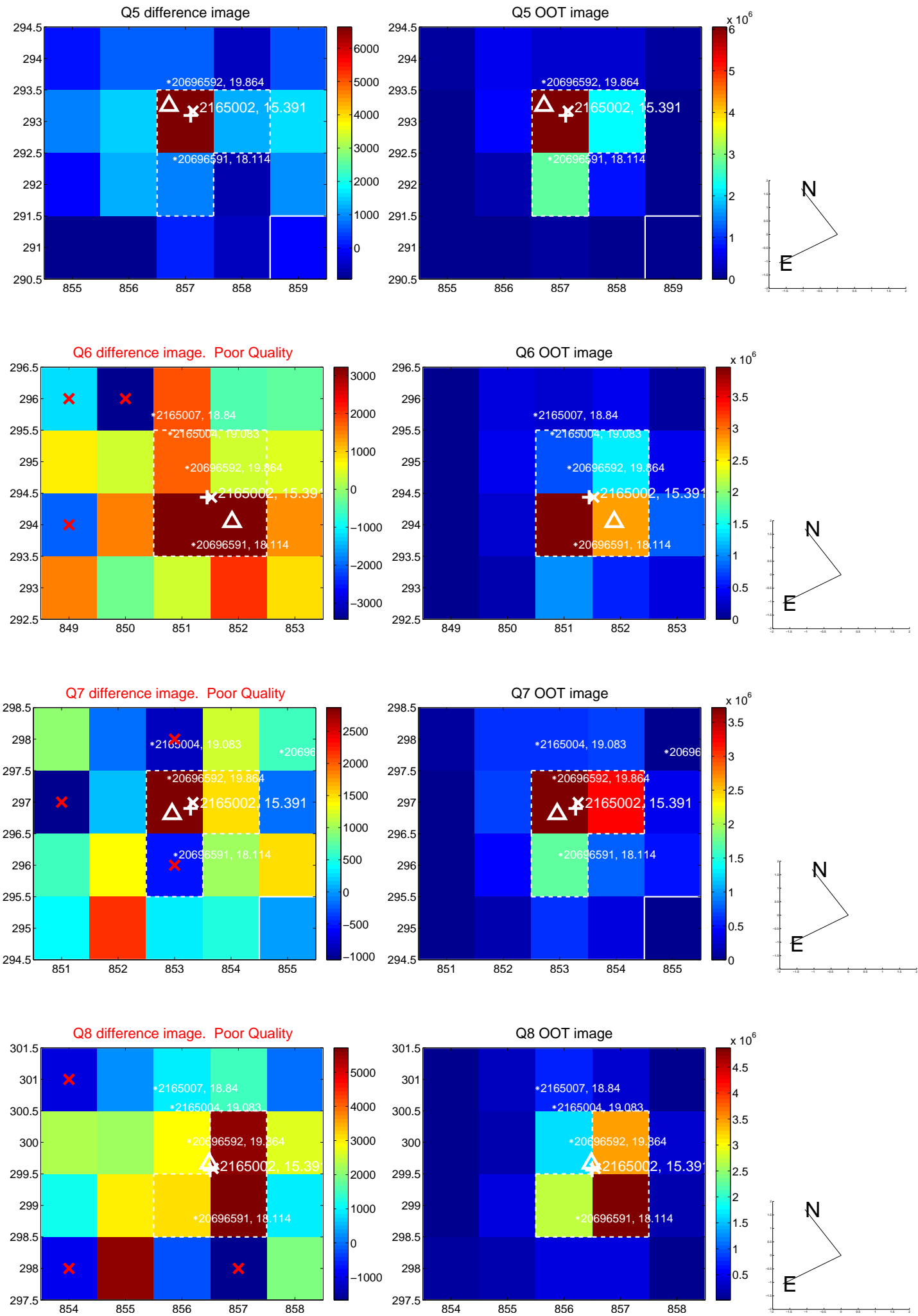
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

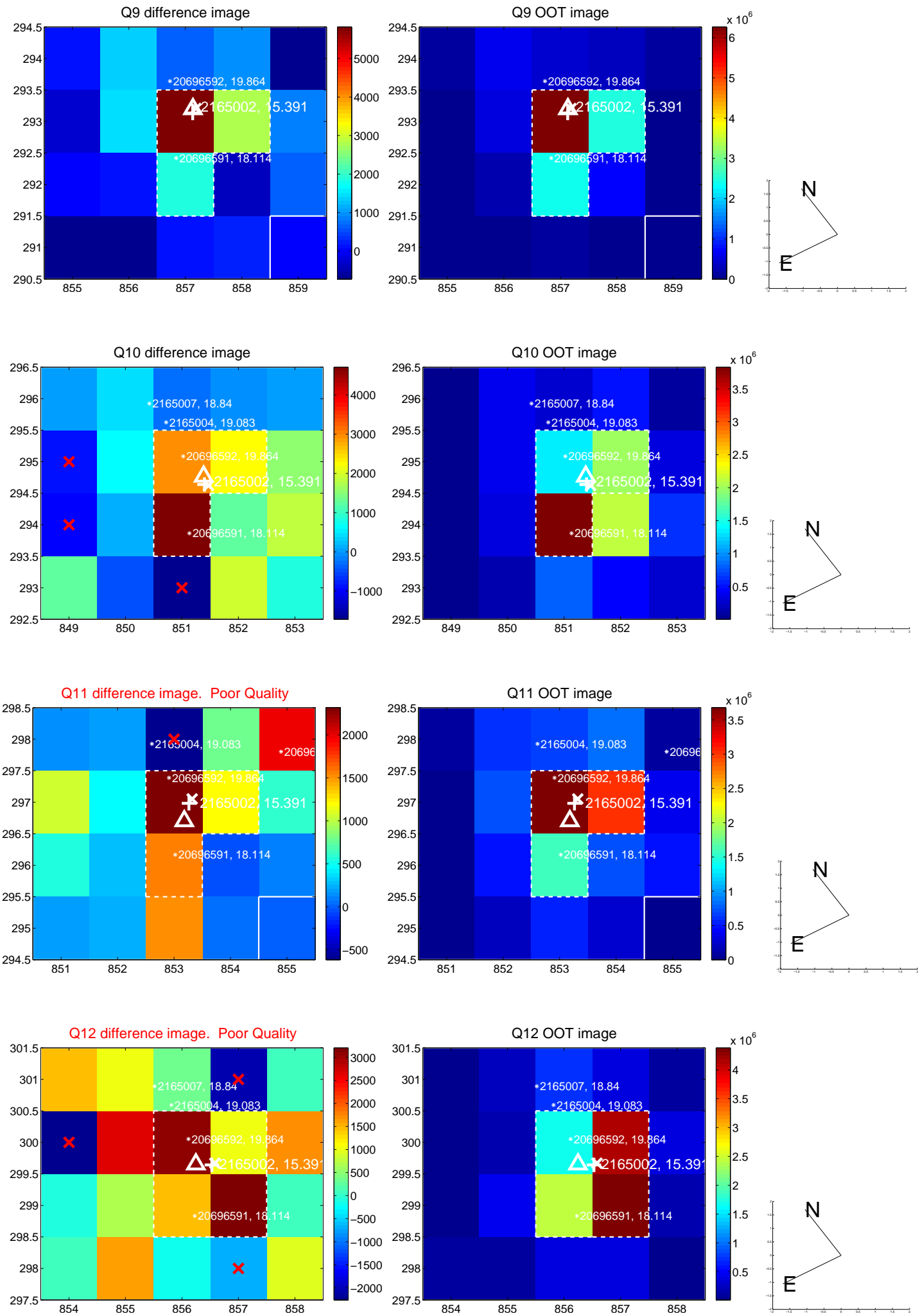




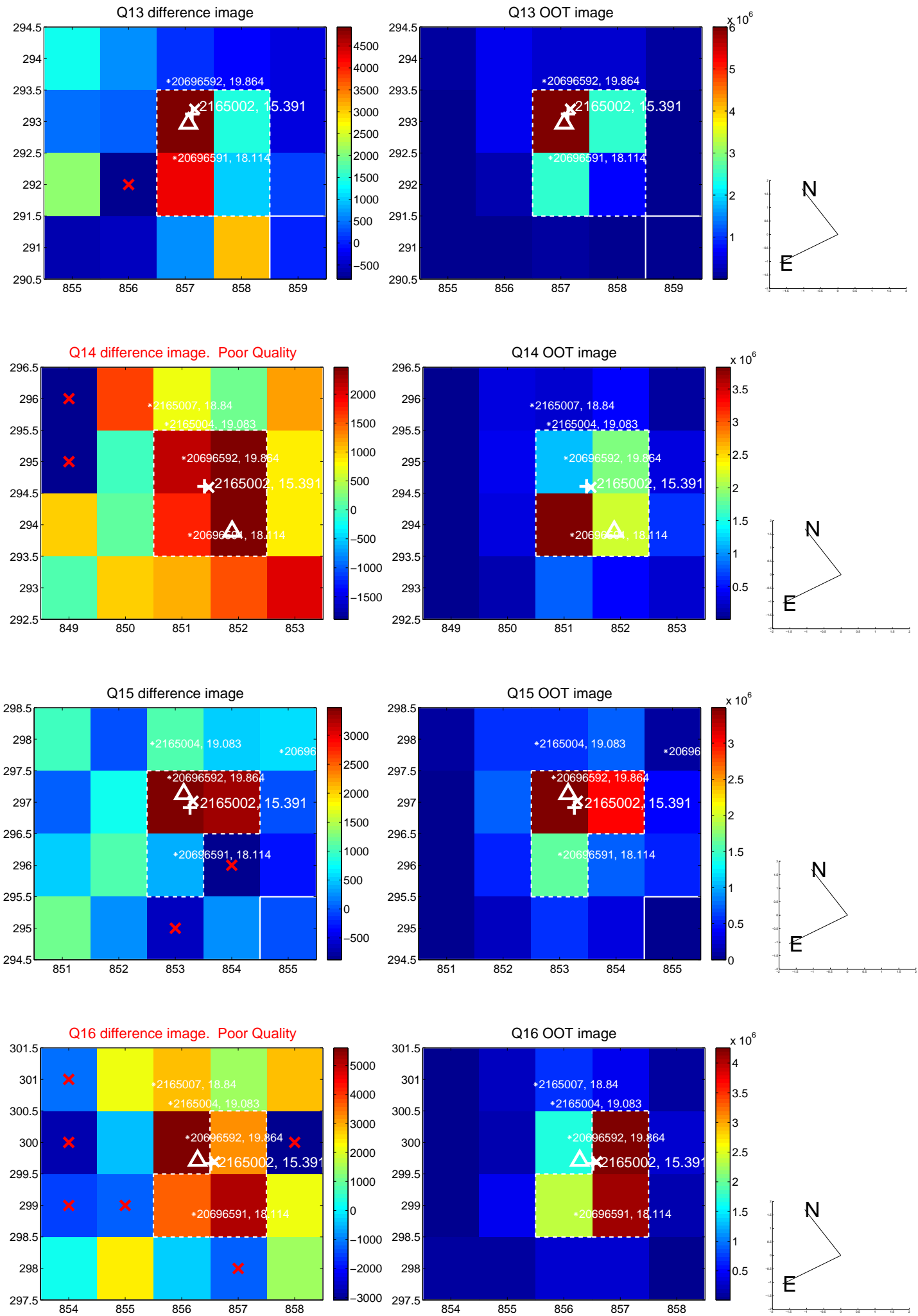
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



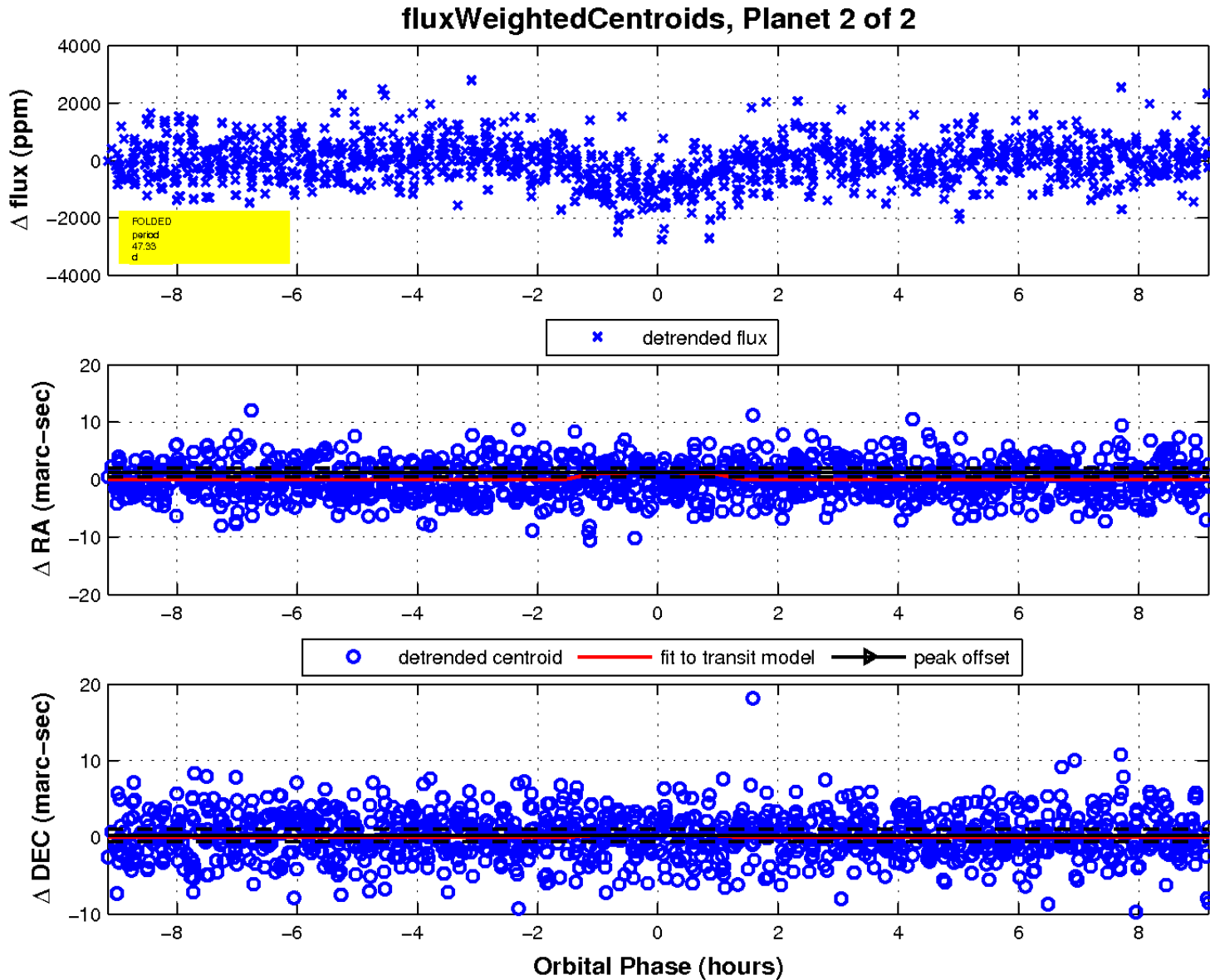
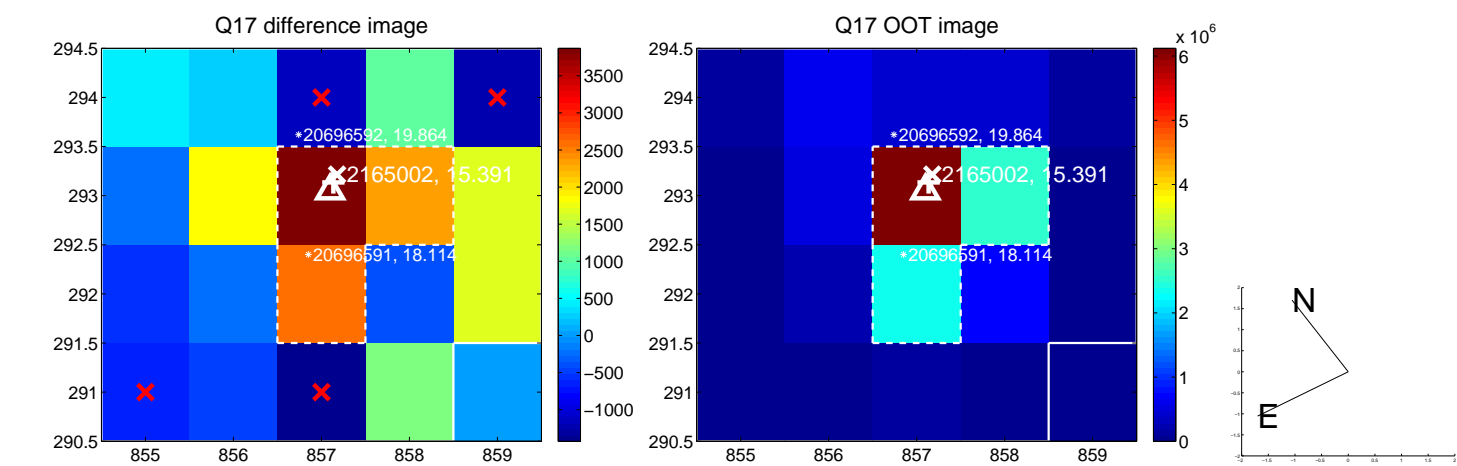
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

