

# KIC 002303365

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002303365-01	OBS	No	0.520693	131.700622	82.2	0.507	13.9	9.1	3.60	7517	3.44	0.00
002303365-02	OBS	No	0.520697	132.003032	123.6	1.035	14.1	18.9	3.60	7517	4.69	0.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002303365-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
002303365-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—SAME_NTL_PERIOD—CENT_SATURATED

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

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

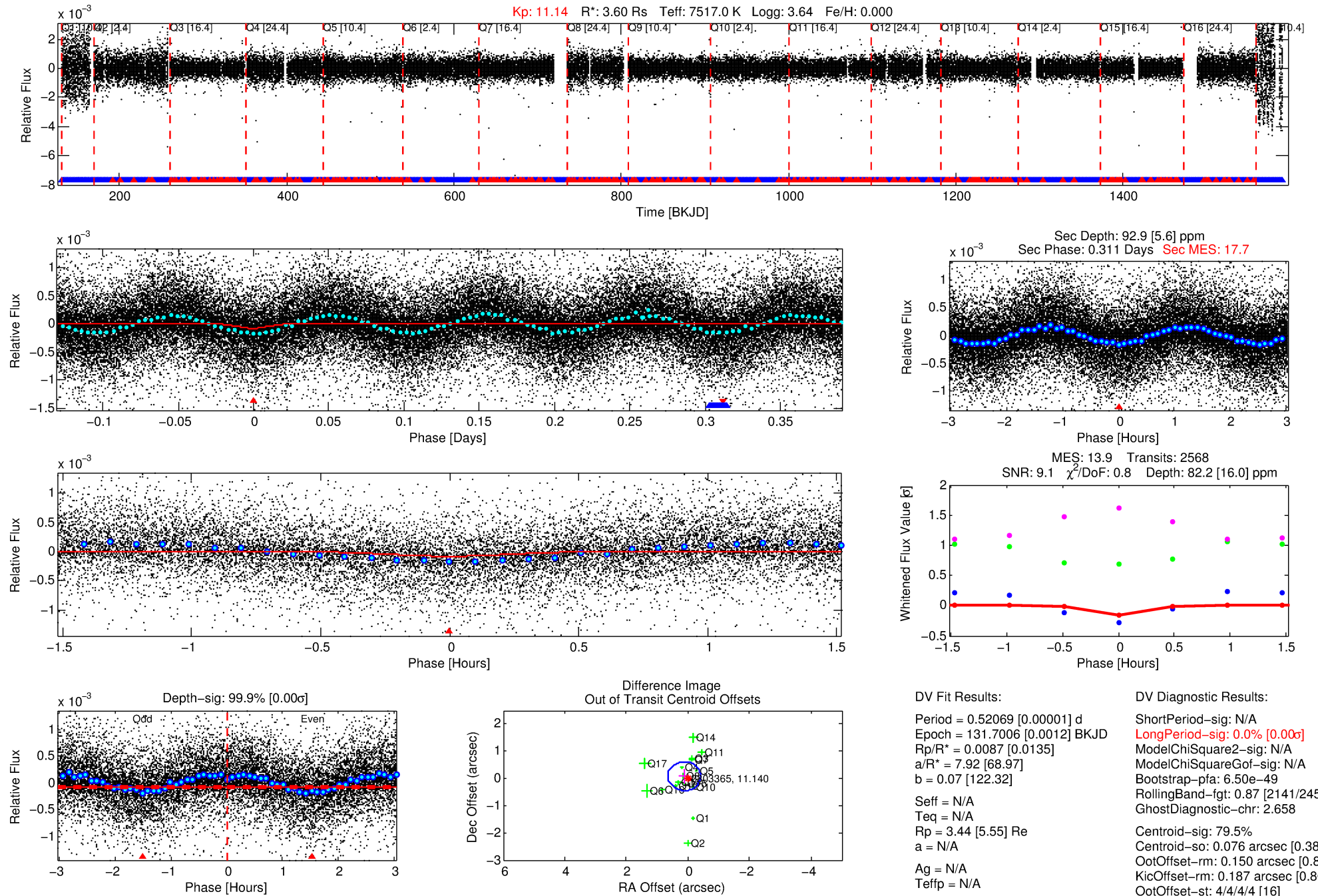
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 002303365-01

No Significant Match Found

# DV One-Page Summary

KIC: 2303365 Candidate: 1 of 2 Period: 0.521 d



## DV Fit Results:

Period = 0.52069 [0.00001] d  
Epoch = 131.7006 [0.0012] BKJD  
Rp/R\* = 0.0087 [0.0135]  
a/R\* = 7.92 [68.97]  
b = 0.07 [122.32]  
Seff = N/A  
Teq = N/A  
Rp = 3.44 [5.55] Re  
a = N/A  
Ag = N/A  
Teffp = N/A

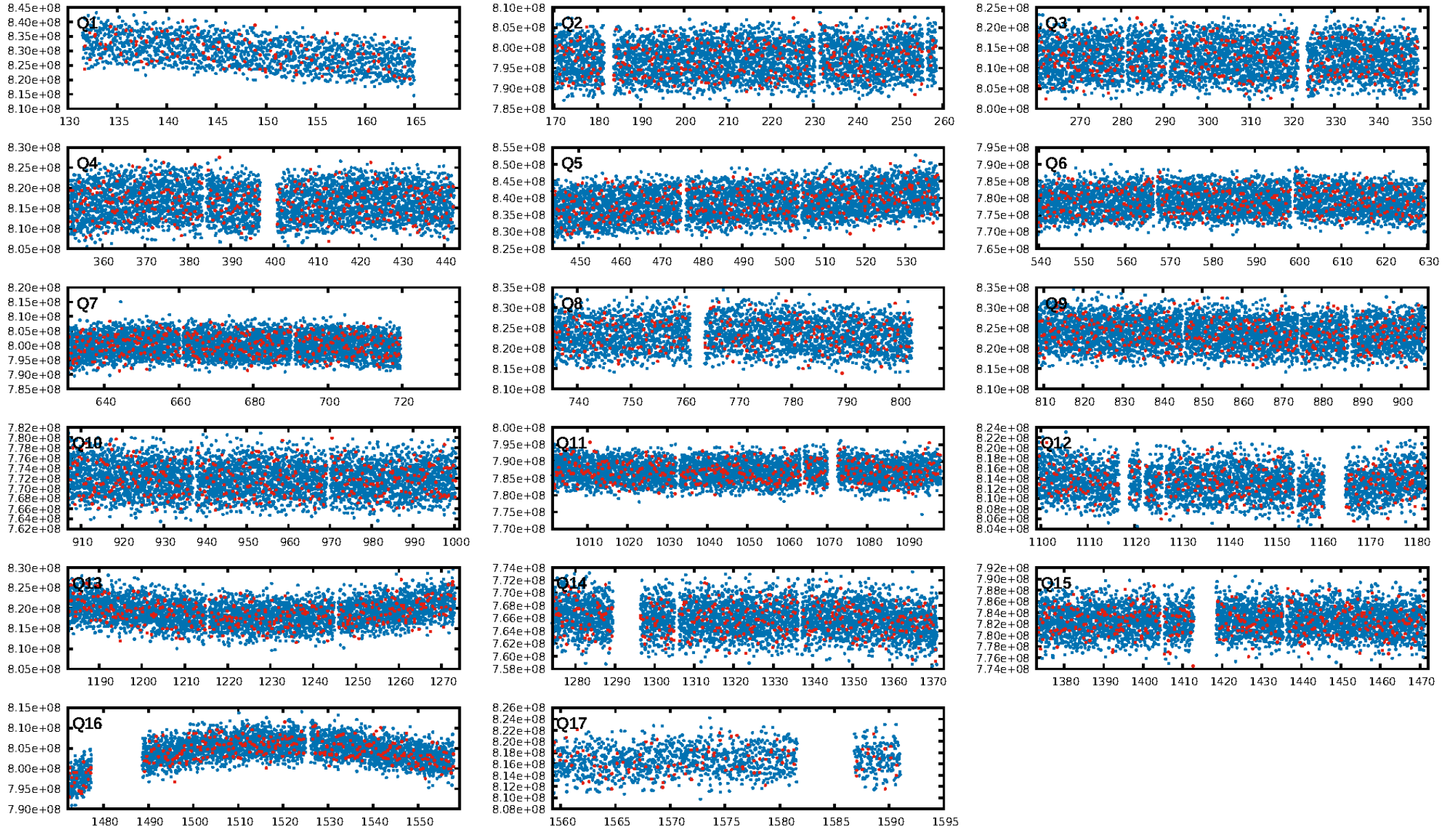
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 6.50e-49  
RollingBand-fgt: 0.87 [2141/2452]  
GhostDiagnostic-chr: 2.658  
Centroid-sig: 79.5%  
Centroid-so: 0.076 arcsec [0.38 $\sigma$ ]  
OotOffset-rm: 0.150 arcsec [0.85 $\sigma$ ]  
KicOffset-rm: 0.187 arcsec [0.80 $\sigma$ ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.81 [13/16]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 11:10:09 Z

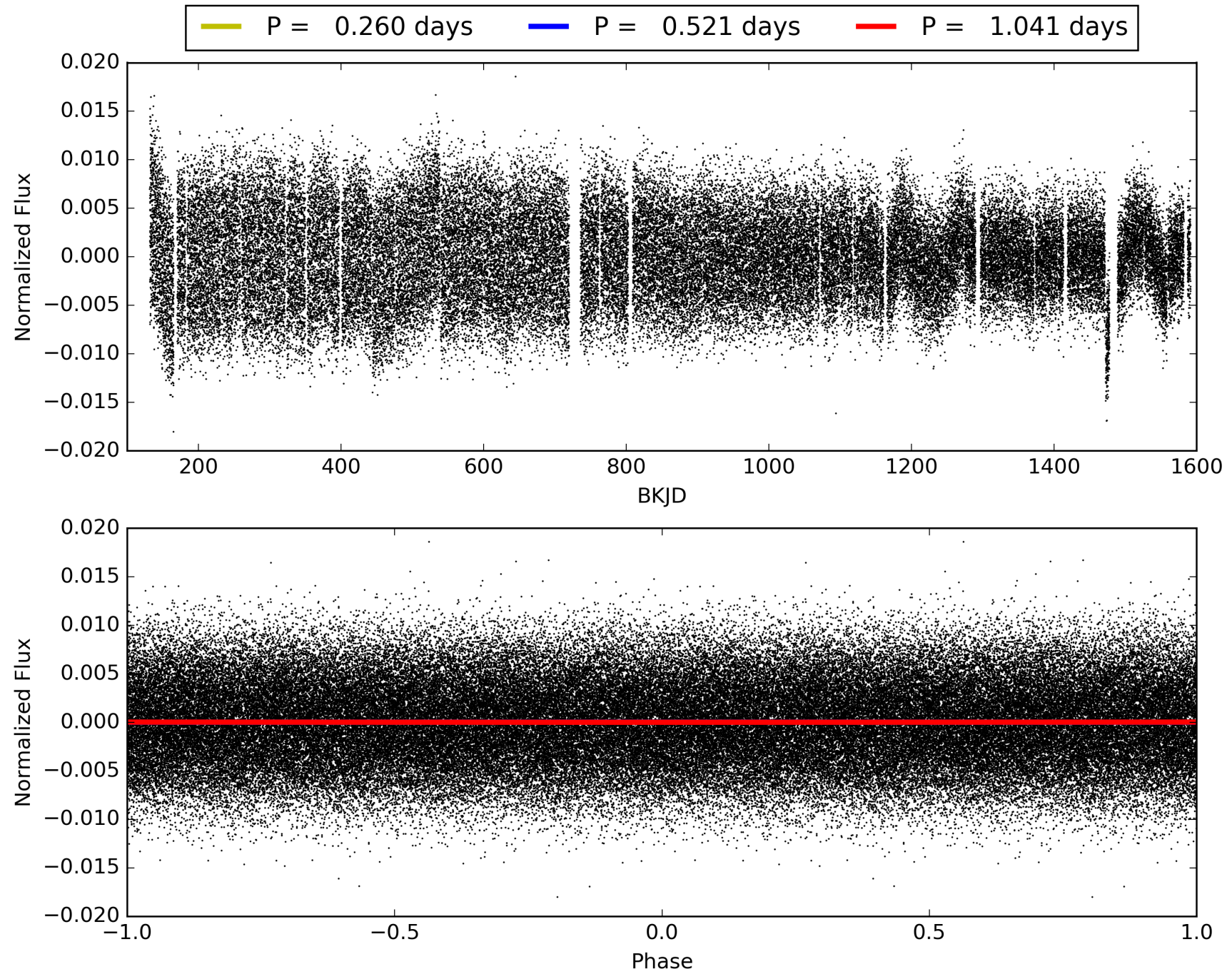
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 002303365-01, PDC Light Curves



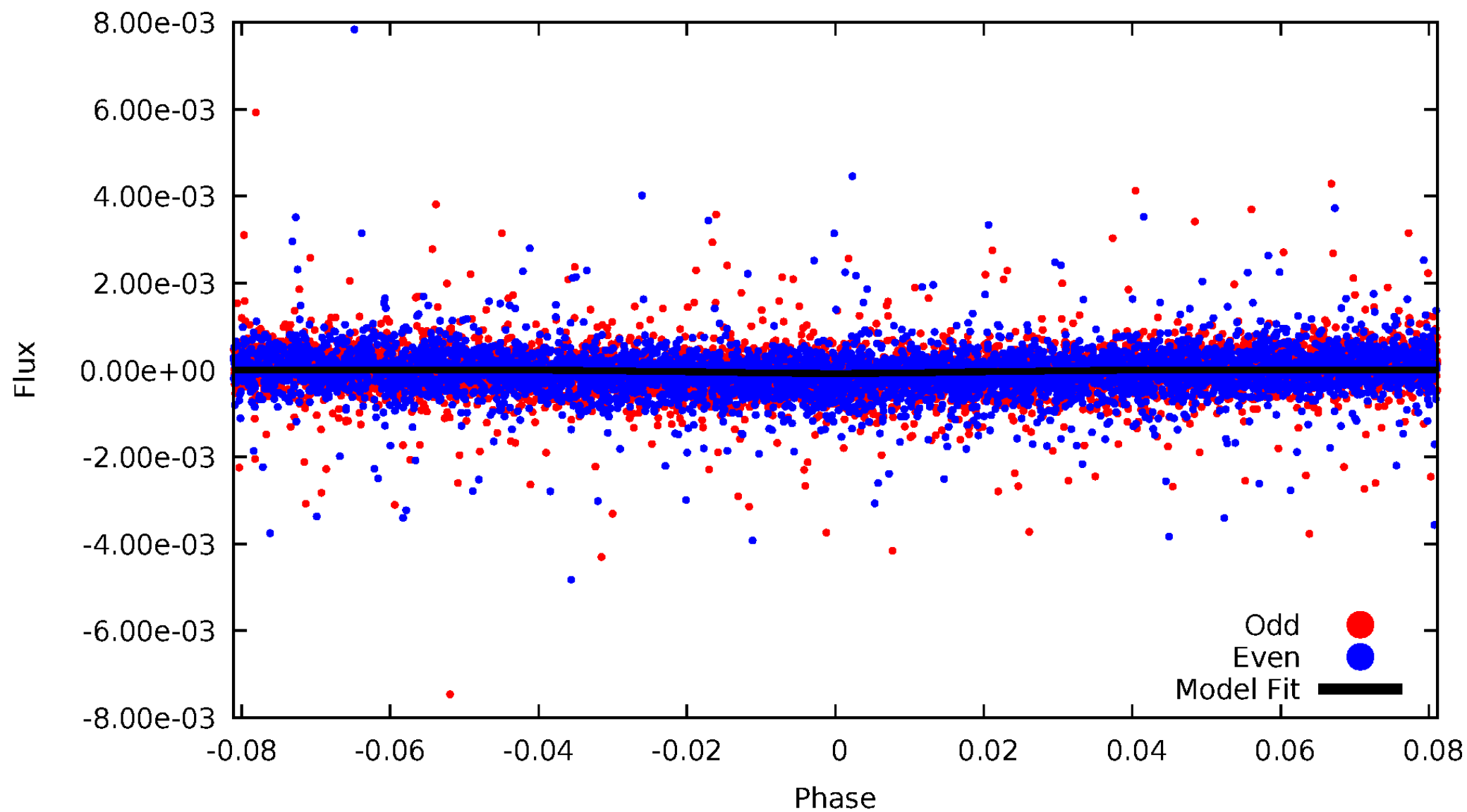


TCE 002303365-01



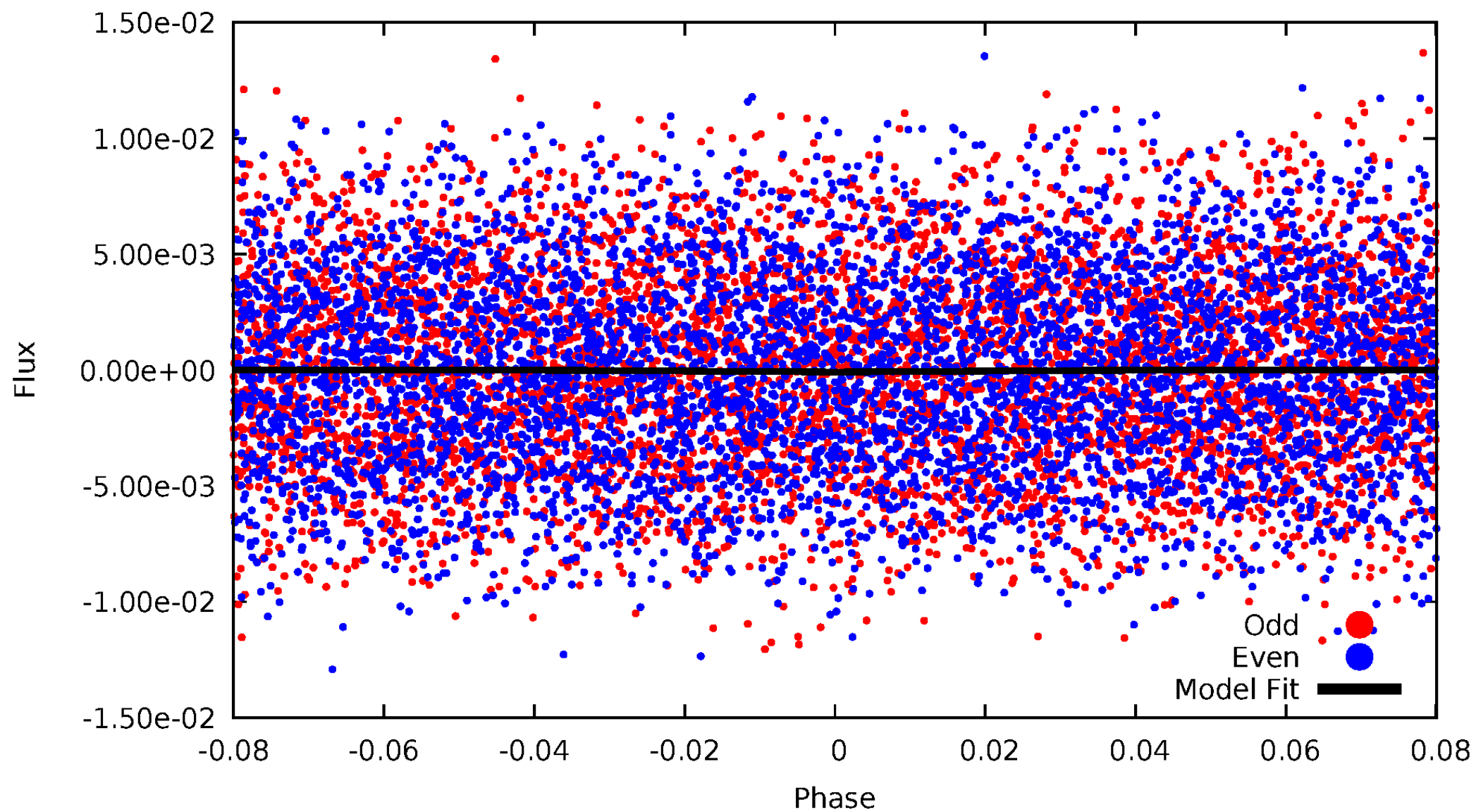
DV Odd/Even

TCE 002303365-01



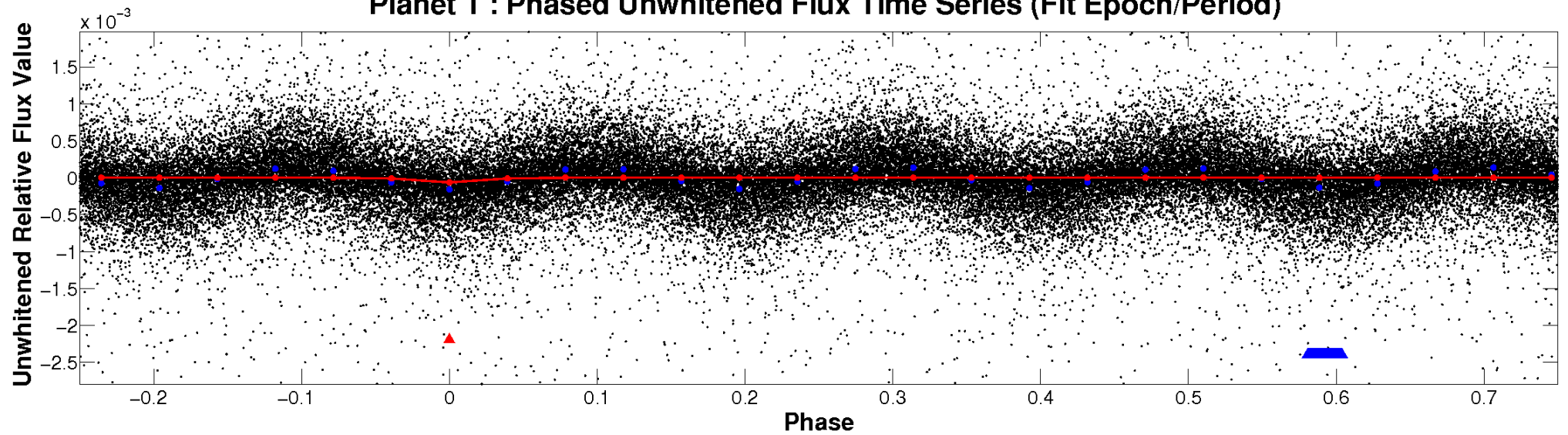
ALT Odd/Even

TCE 002303365-01

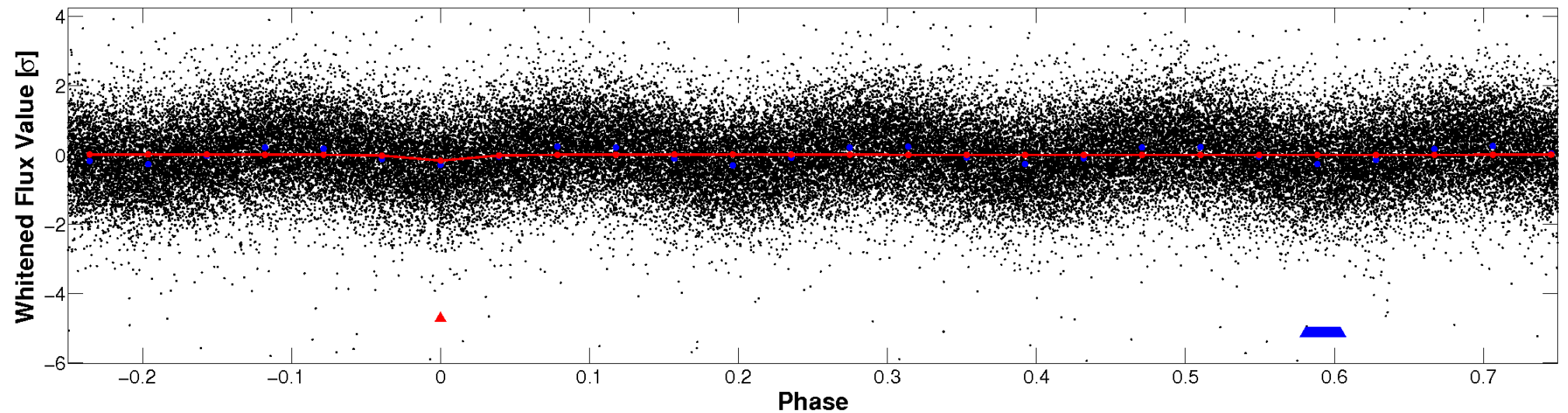


# Non-Whitened Vs. Whitened Light Curve

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



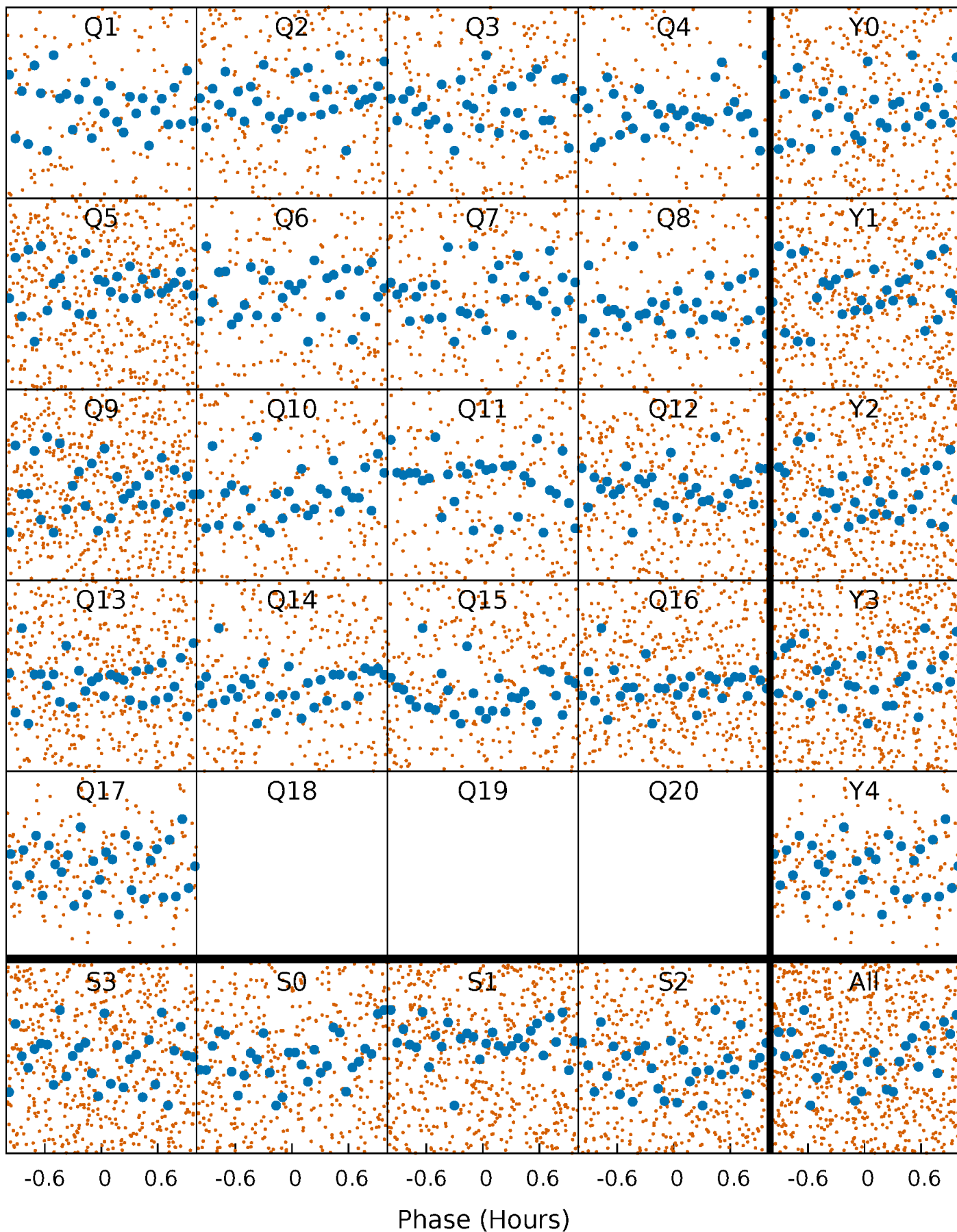
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

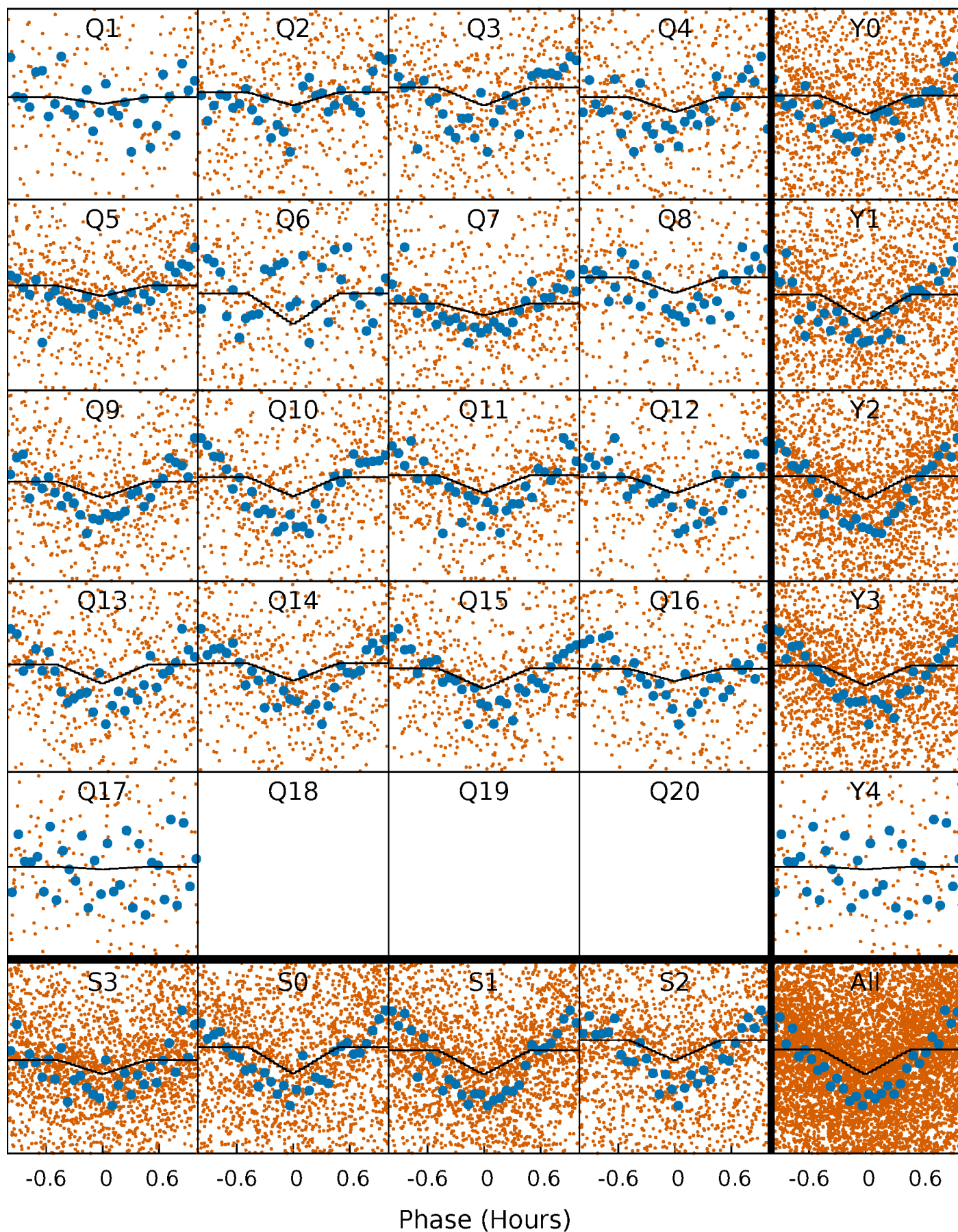
TCE 002303365-01 P= 0.520693 Days  $T_0=131.700622$  (BKJD)





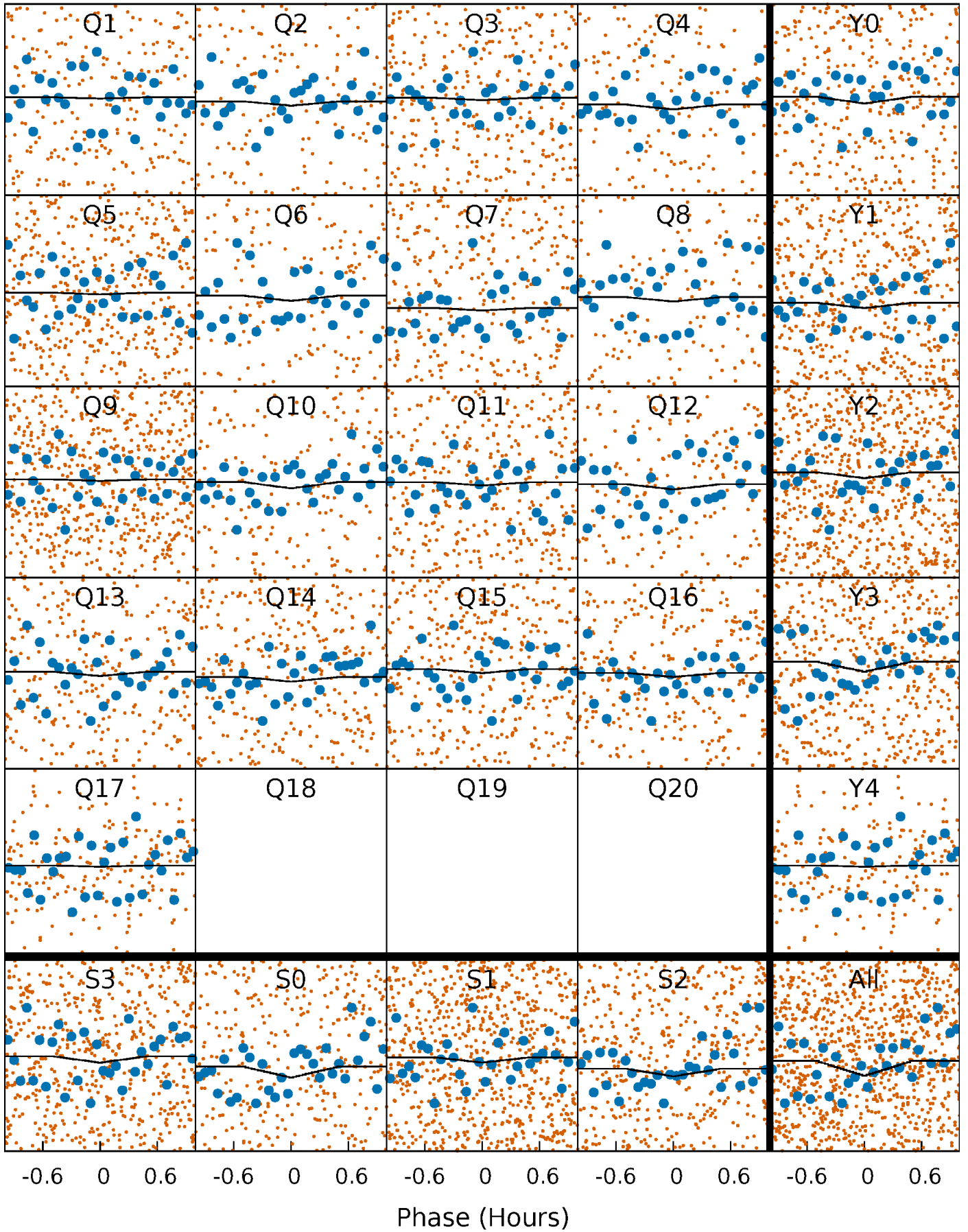
# DV Quarter-Phased Transit Curves

TCE 002303365-01   P= 0.520693 Days    $T_0=131.700622$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

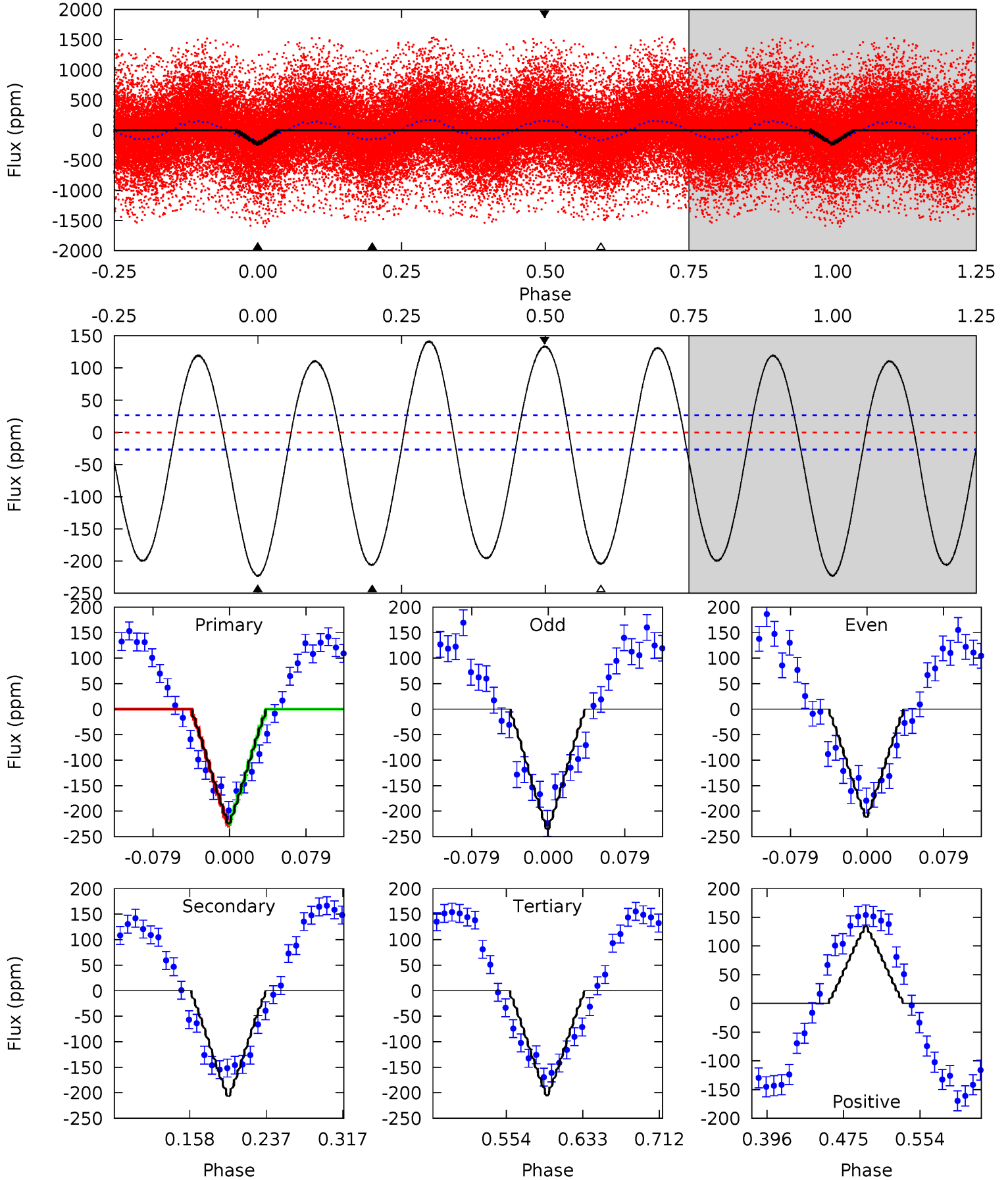
TCE 002303365-01 P= 0.520698 Days  $T_0=131.704965$  (BKJD)



# DV Model-Shift Uniqueness Test

002303365-01, P = 0.520693 Days, E = 131.179929 Days

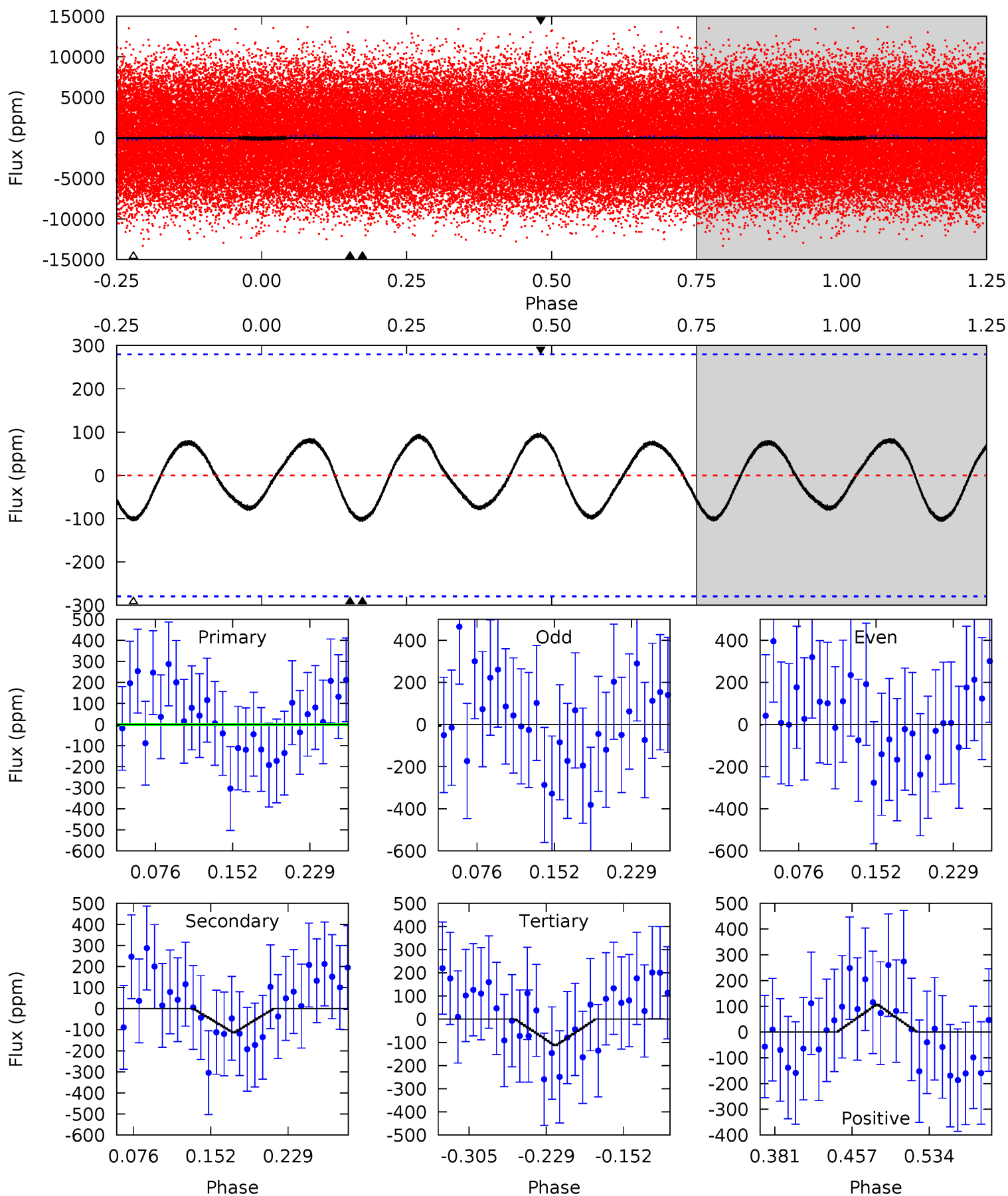
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
38.7	35.7	35.3	23.1	4.61	1.76	20.7	3.32	15.5	0.34	12.5	2.07	1.21	0.39	0.23



# Alt Model-Shift Uniqueness Test

002303365-01, P = 0.520698 Days, E = 131.184267 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
1.43	1.77	1.76	1.66	4.62	1.77	0.98	-0.33	-0.22	0.01	0.11	0.79	0.50	0.48	0.05





### Stellar Parameters For KIC 002303365

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7517^{+209}_{-339}$	$3.643^{+0.459}_{-0.081}$	$0.000^{+0.200}_{-0.350}$	$3.603^{+0.470}_{-1.762}$	$2.080^{+0.242}_{-0.564}$	$0.063^{+0.305}_{-0.017}$
	+3%/-5%	+13%/-2%	+inf%/-inf%	+13%/-49%	+12%/-27%	+487%/-27%
Source	KIC0	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 002303365-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-206 \pm 6$	$4.59^{+4.67}_{-3.06}$	$6677^{+476}_{-793}$	$7295^{+11950}_{-3427}$	$1.413^{+11.602}_{-1.055}$
Alt.	$-107 \pm 60$	$4.73^{+4.27}_{-3.25}$	$6642^{+490}_{-828}$	$5150^{+6975}_{-9938}$	$0.602^{+5.142}_{-0.468}$

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

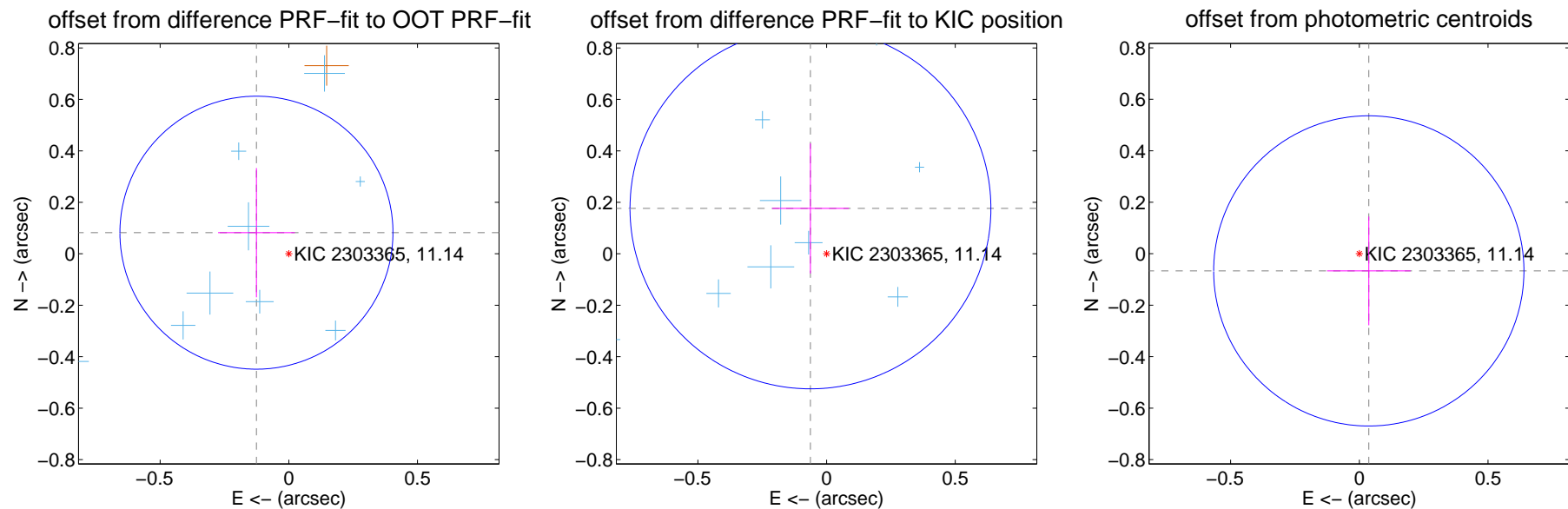
## DV Centroid Data

Supplemental centroid analysis for 002303365-01. **Kepler magnitude: 11.14.** Transit SNR 9.12

There are 13 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

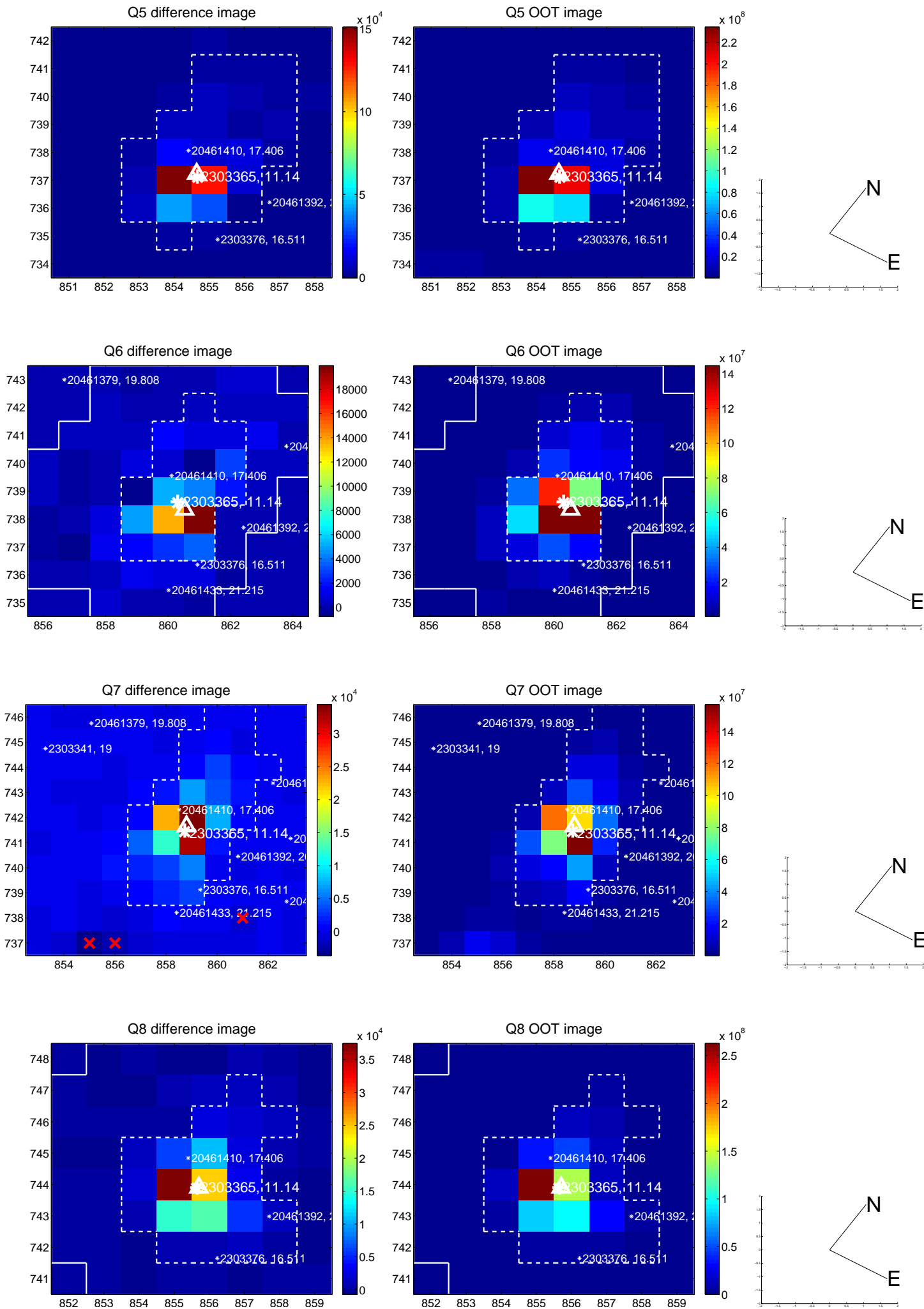
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.150 \pm 0.177$	0.85	$0.126 \pm 0.149$	$0.082 \pm 0.251$
PRF-fit source offset from KIC position	$0.187 \pm 0.234$	0.80	$0.063 \pm 0.149$	$0.176 \pm 0.253$
photometric centroid source offset	$0.08 \pm 0.20$	0.38	$-0.04 \pm 0.16$	$-0.07 \pm 0.21$



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.

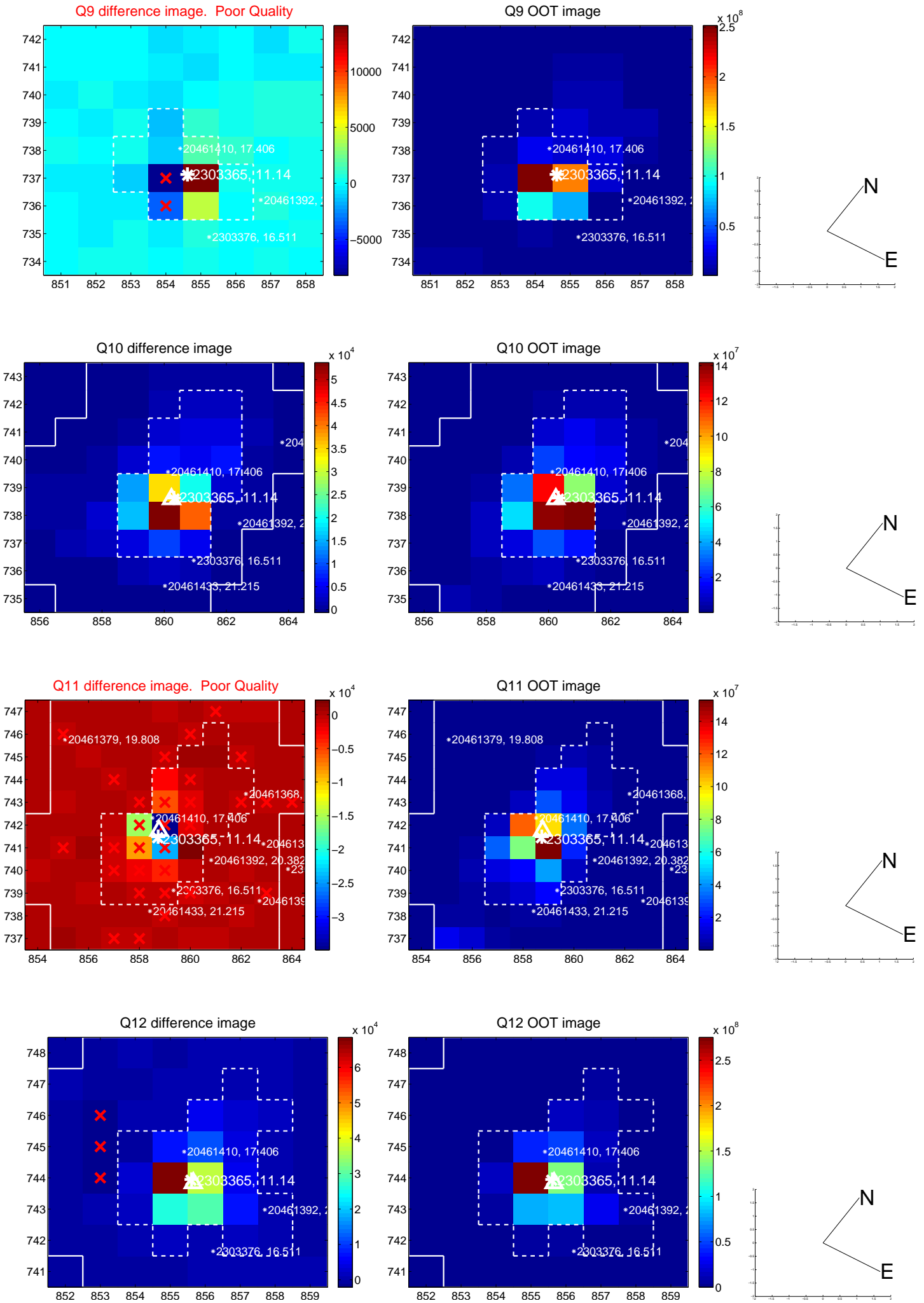


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

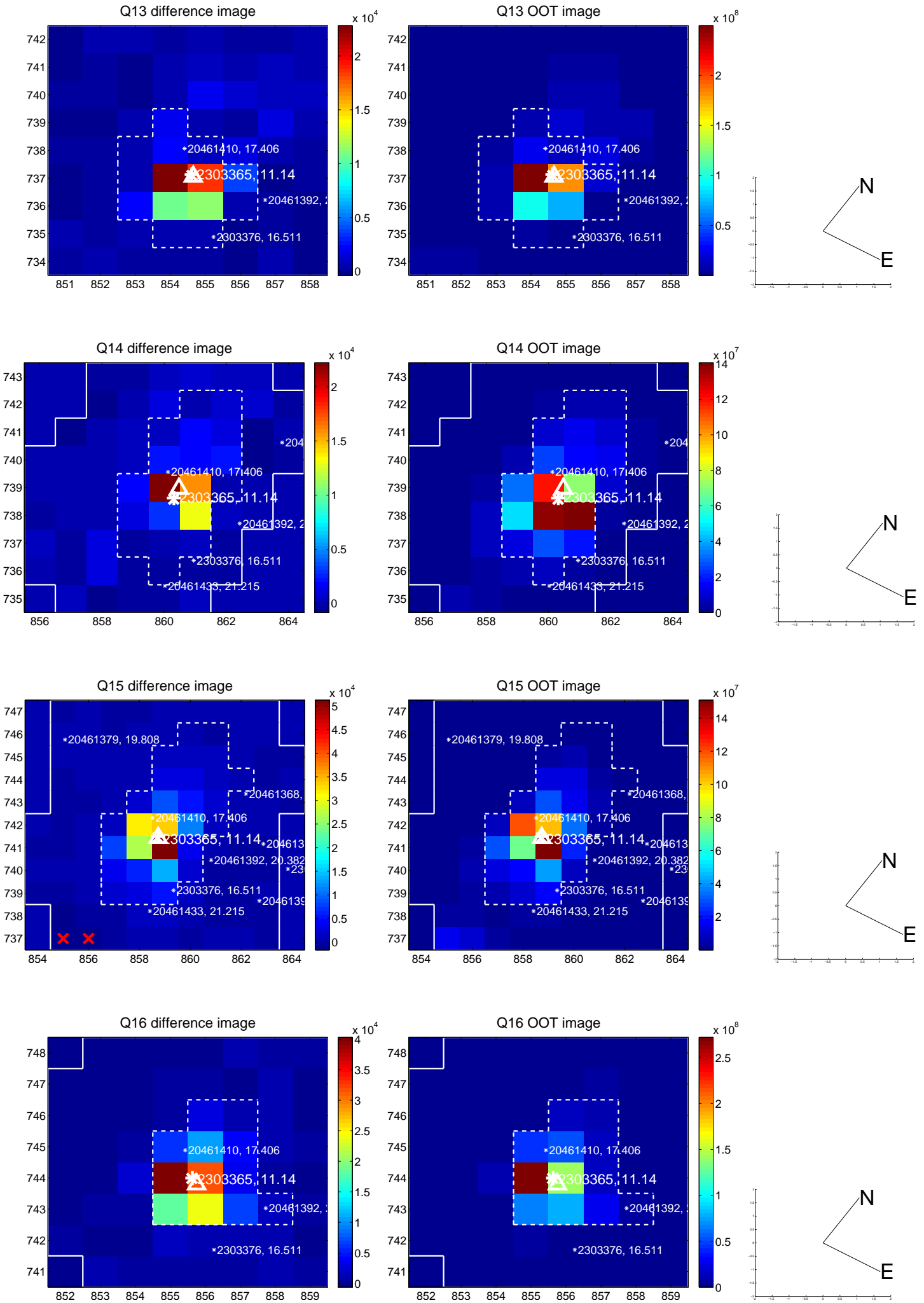




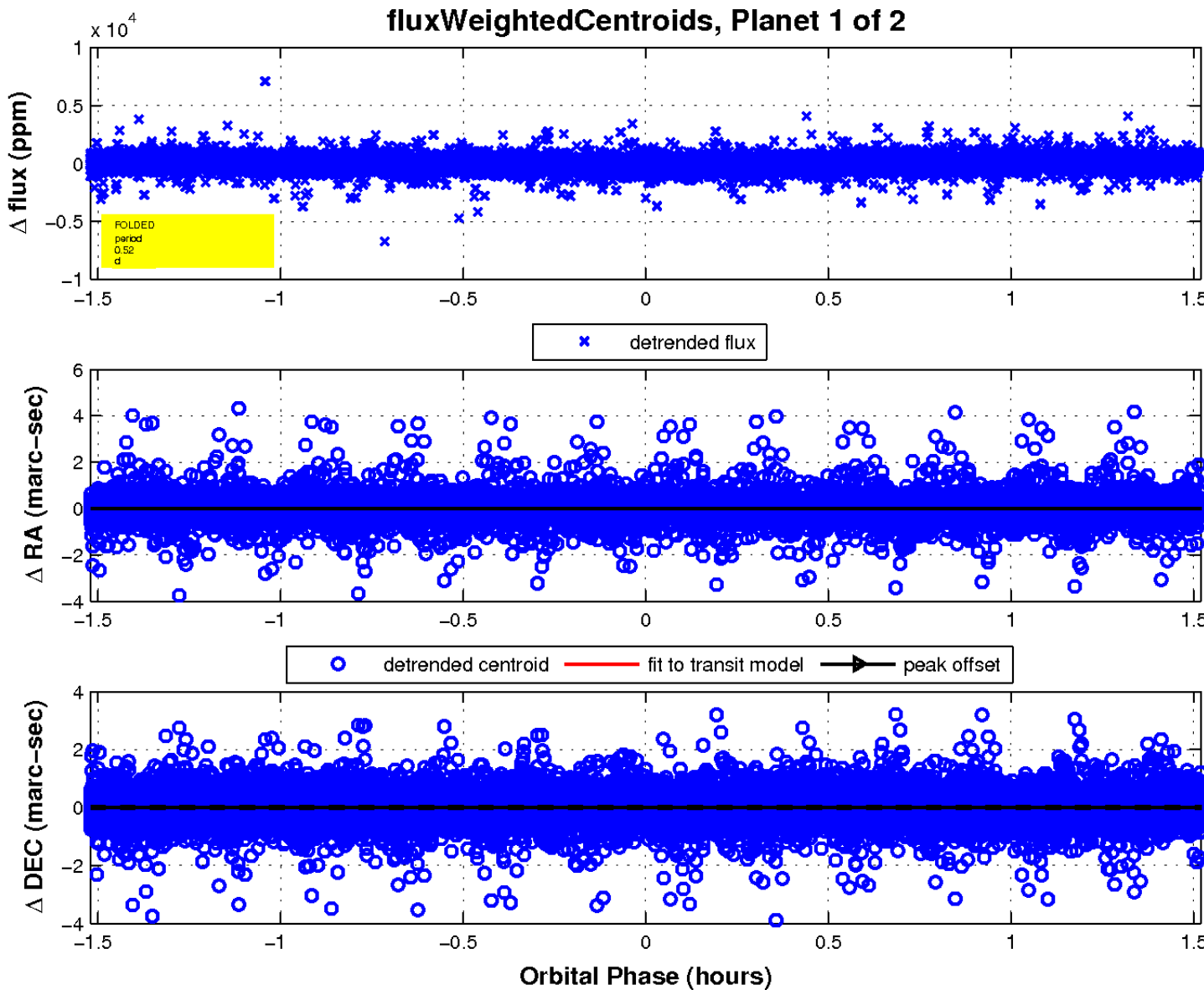
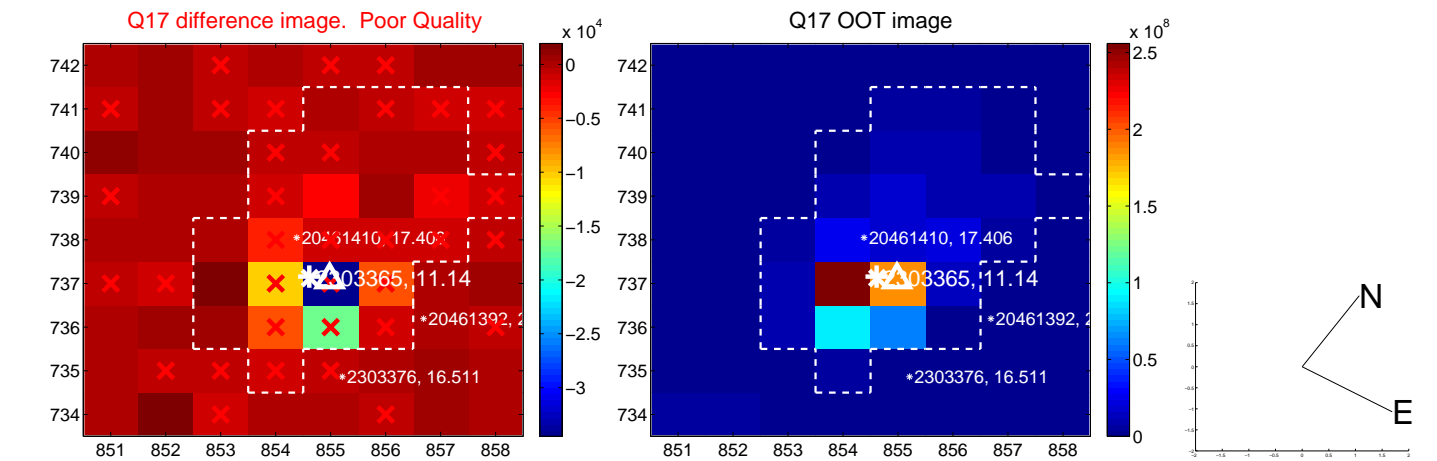
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

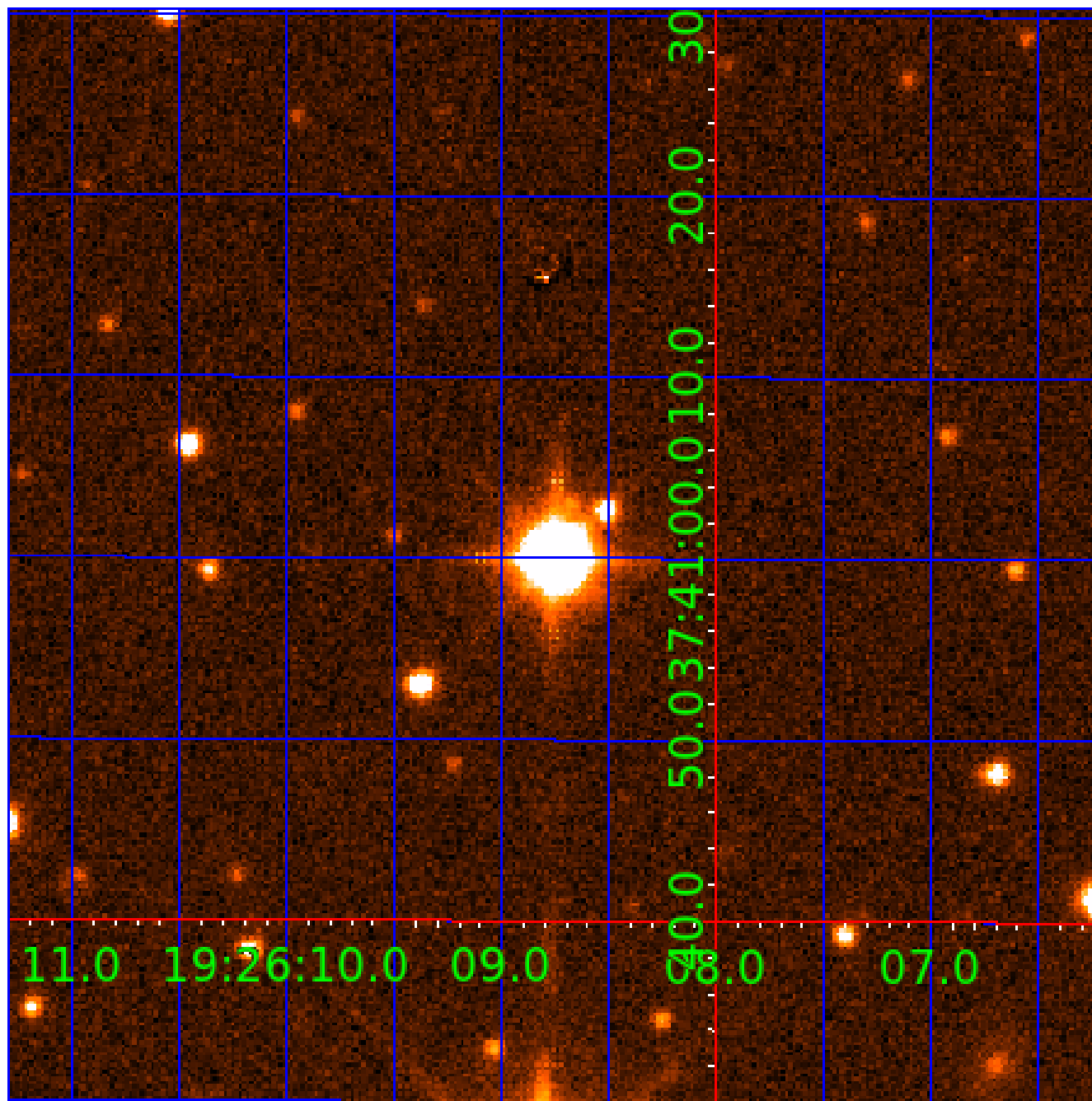


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 002303365

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
002303365-01	OBS	No	0.520693	131.700622	82.2	0.507	13.9	9.1	3.60	7517	3.44	0.00
002303365-02	OBS	No	0.520697	132.003032	123.6	1.035	14.1	18.9	3.60	7517	4.69	0.00

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
002303365-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_SATURATED
002303365-02	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—SAME_NTL_PERIOD—CENT_SATURATED

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

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

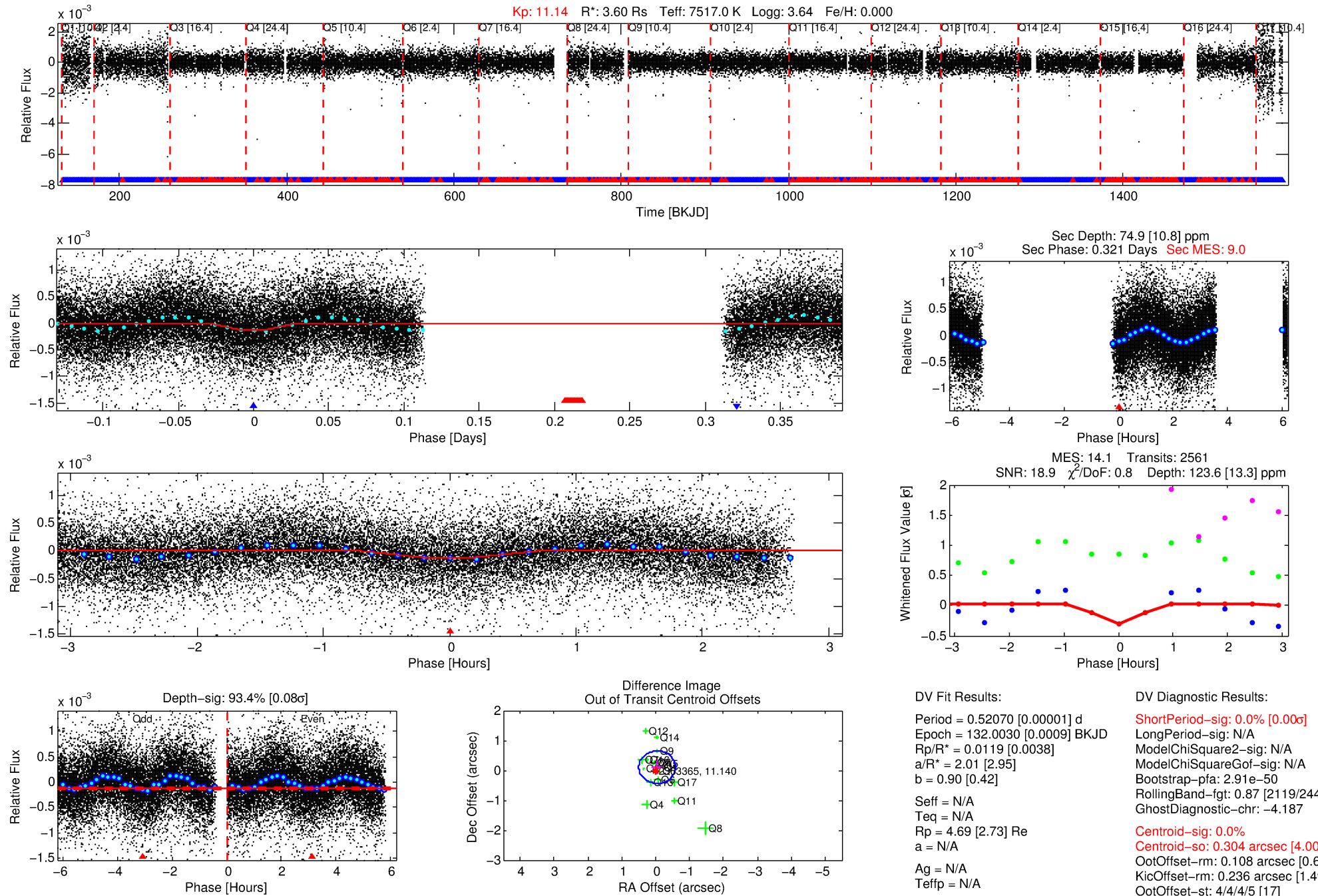
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 002303365-02

No Significant Match Found

# DV One-Page Summary

KIC: 2303365 Candidate: 2 of 2 Period: 0.521 d



## DV Fit Results:

Period = 0.52070 [0.00001] d  
 Epoch = 132.0030 [0.0009] BKJD  
 Rp/R\* = 0.0119 [0.0038]  
 a/R\* = 2.01 [2.95]  
 b = 0.90 [0.42]  
 Seff = N/A  
 Teq = N/A  
 Rp = 4.69 [2.73] Re  
 a = N/A  
 Ag = N/A  
 Tefp = N/A

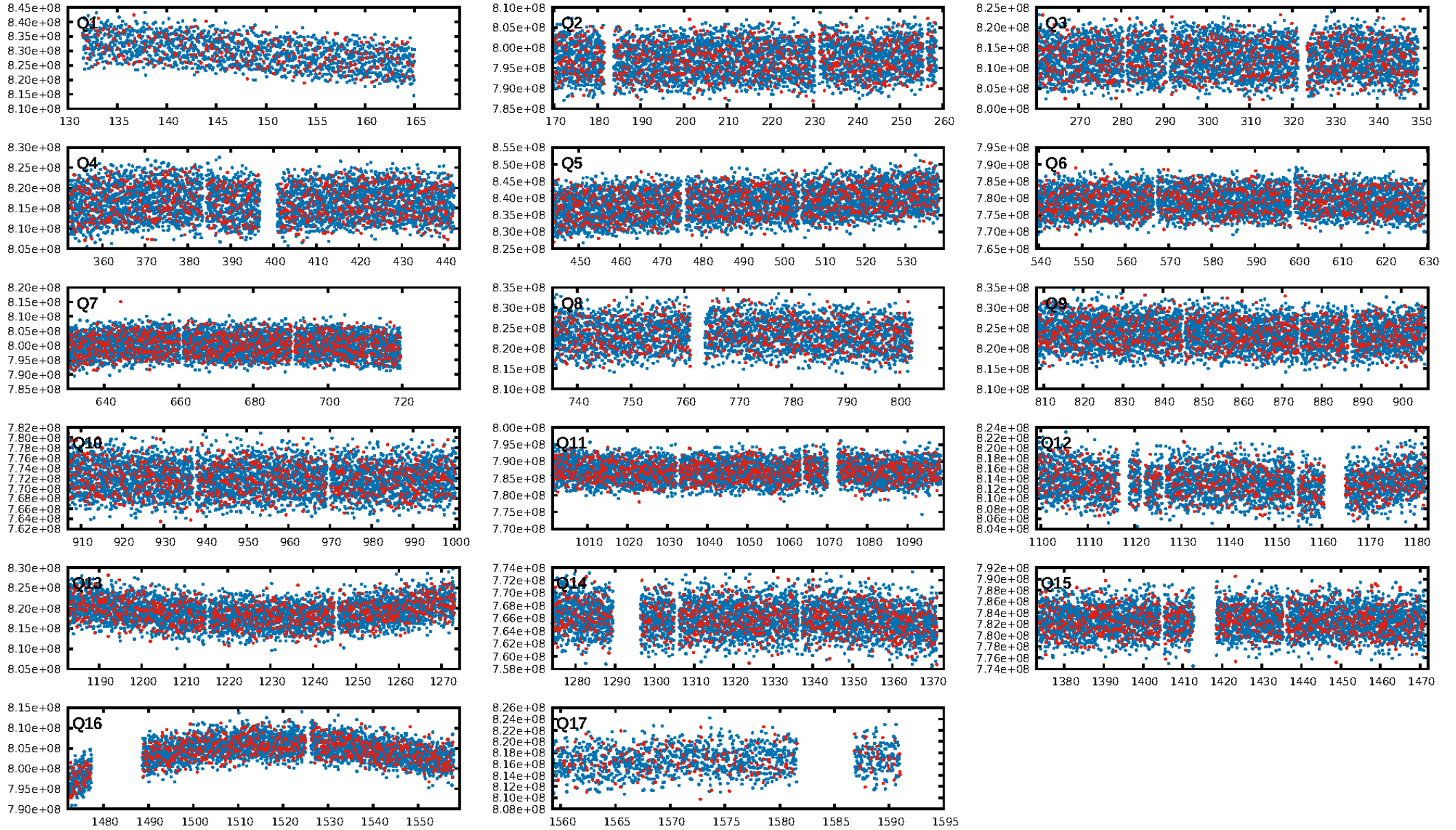
## DV Diagnostic Results:

**ShortPeriod-sig: 0.0% [0.00σ]**  
 LongPeriod-sig: N/A  
 ModelChiSquare2-sig: N/A  
 ModelChiSquareGof-sig: N/A  
 Bootstrap-pfa: 2.91e-50  
 RollingBand-fgt: 0.87 [2119/2444]  
 GhostDiagnostic-chr: -4.187  
**Centroid-sig: 0.0%**  
**Centroid-so: 0.304 arcsec [4.00σ]**  
 OotOffset-rm: 0.108 arcsec [0.60σ]  
 KicOffset-rm: 0.236 arcsec [1.49σ]  
 OotOffset-st: 4/4/4/5 [17]  
 KicOffset-st: 4/4/4/5 [17]  
 DiffImageQuality-fgm: 0.82 [14/17]  
 DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 11:10:18 Z

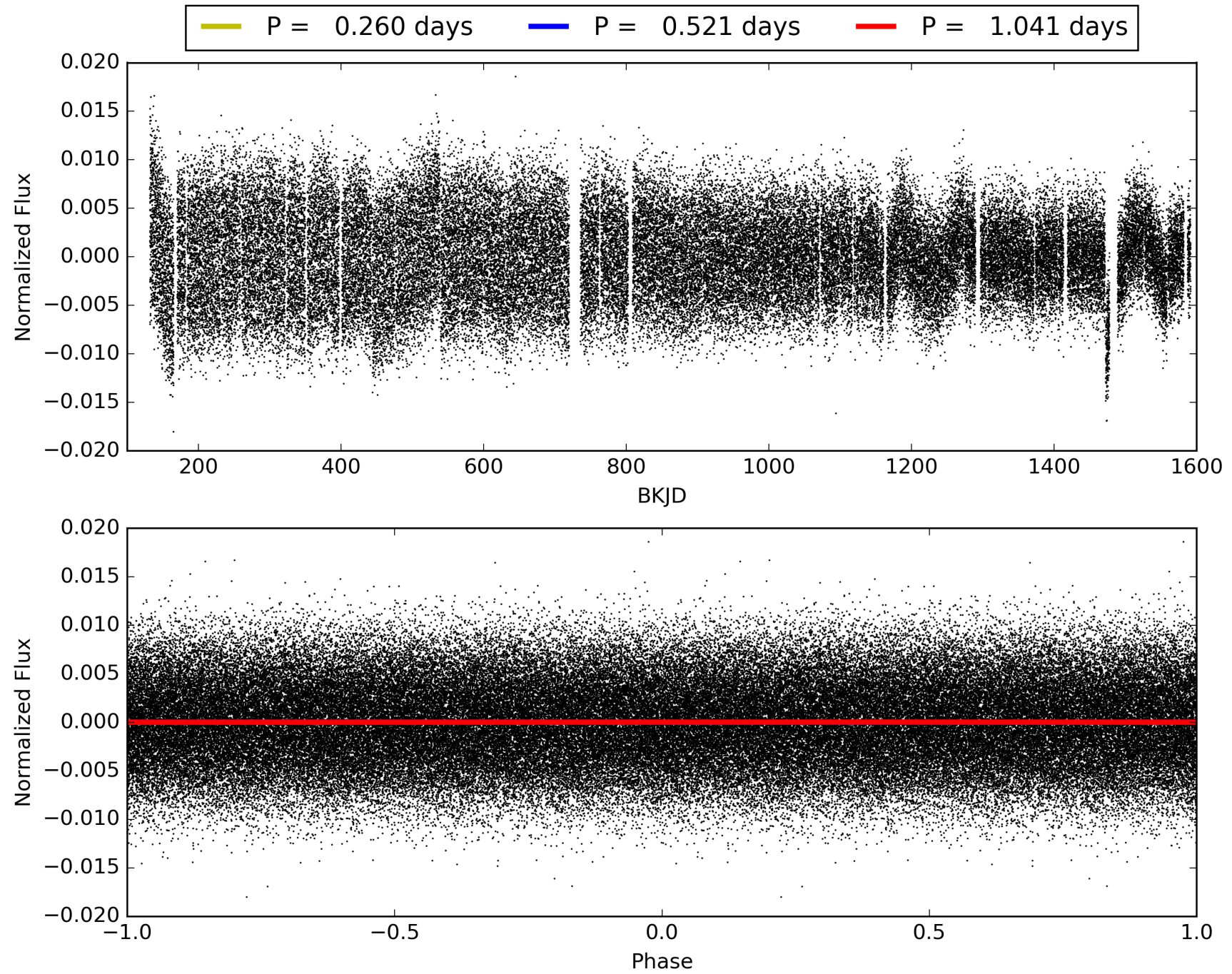
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 002303365-02, PDC Light Curves





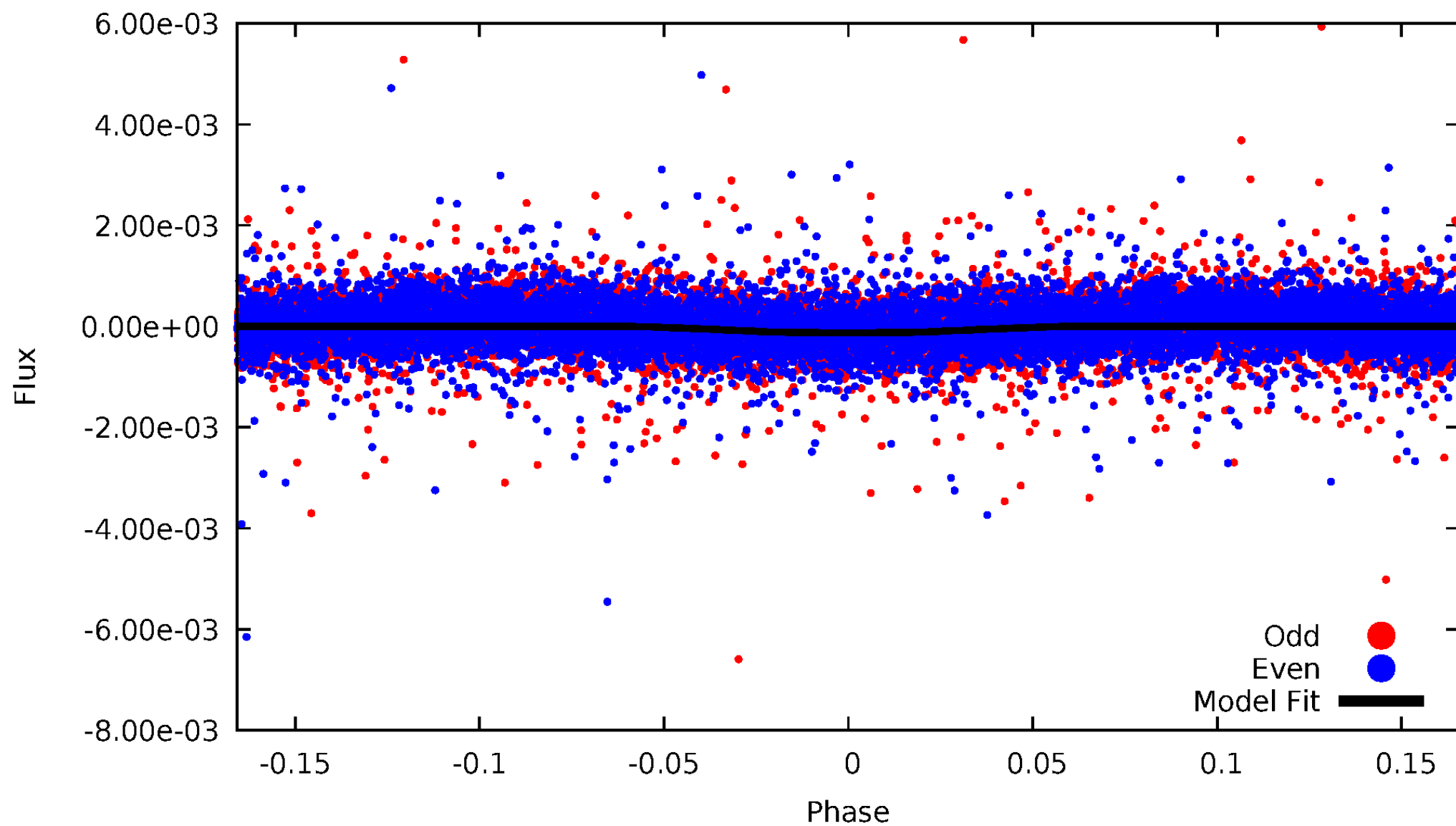
TCE 002303365-02





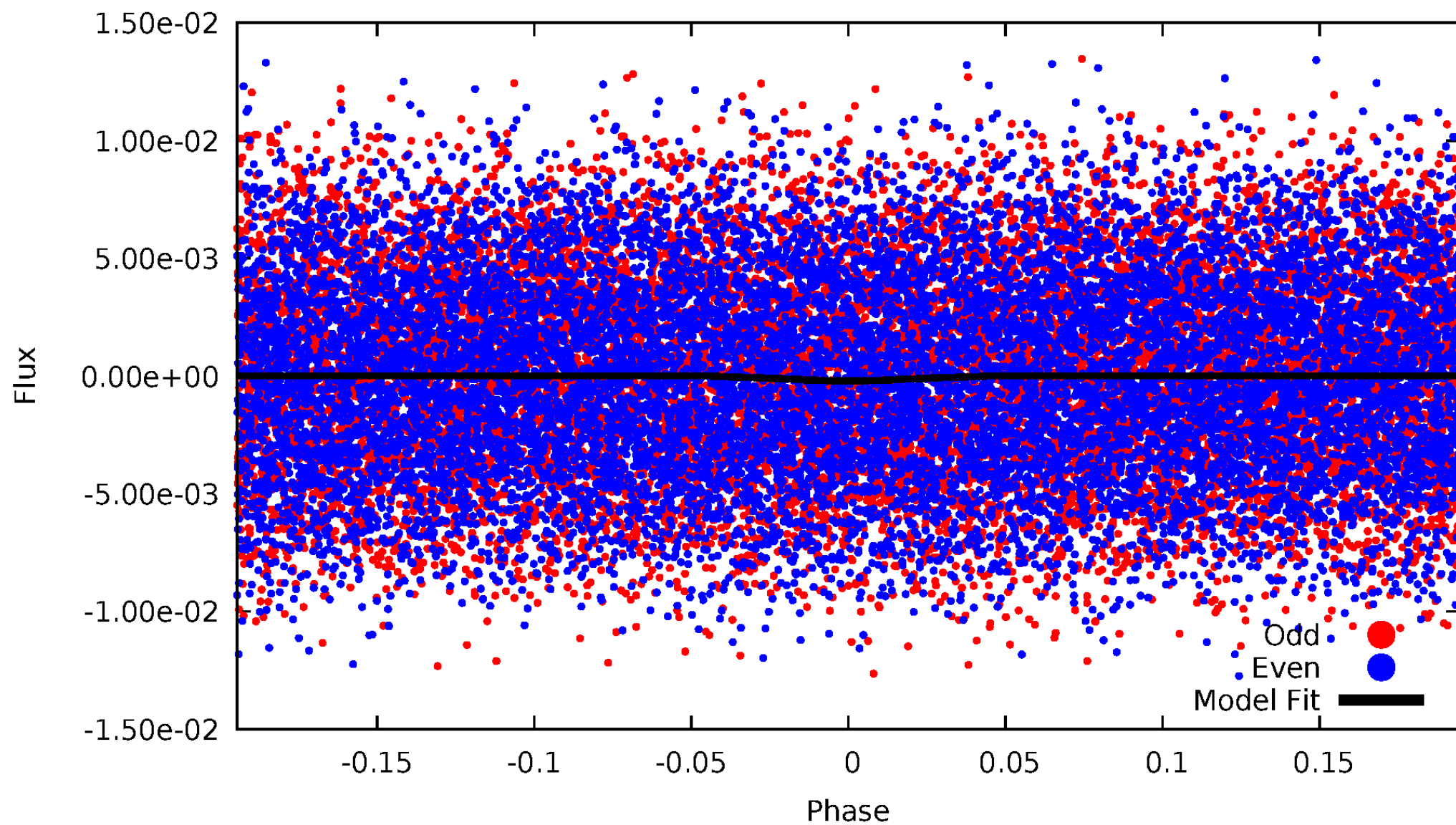
# DV Odd/Even

TCE 002303365-02



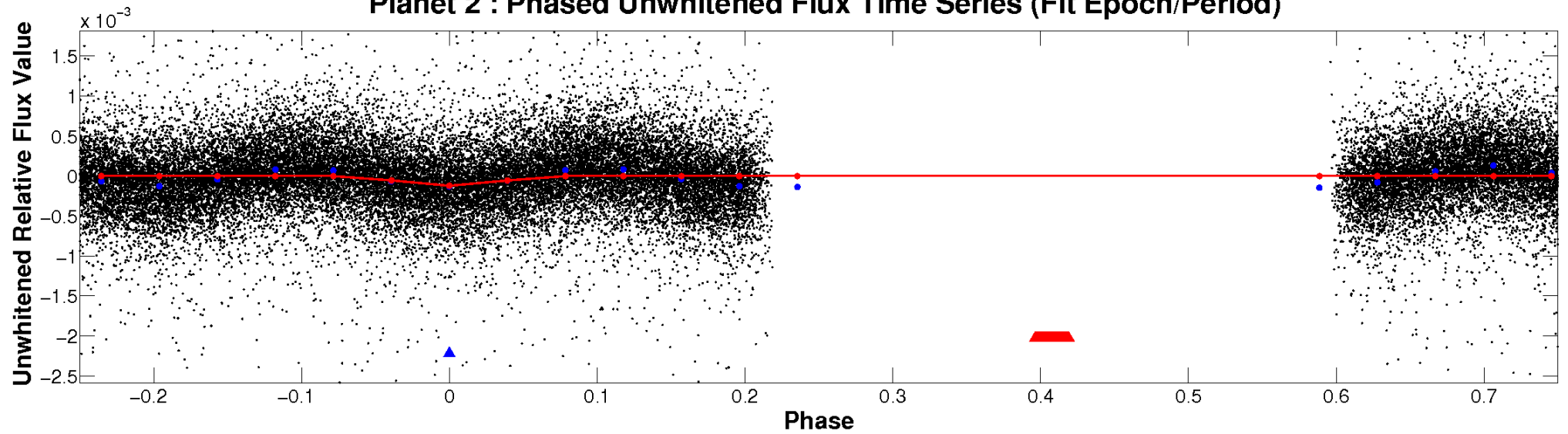
# ALT Odd/Even

TCE 002303365-02

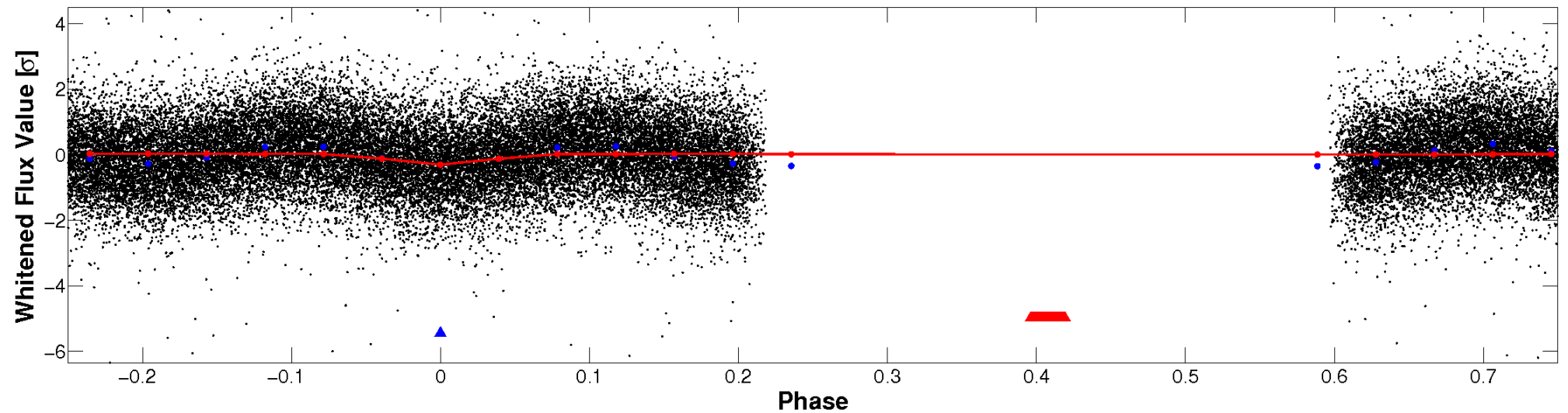


# Non-Whitened Vs. Whitened Light Curve

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

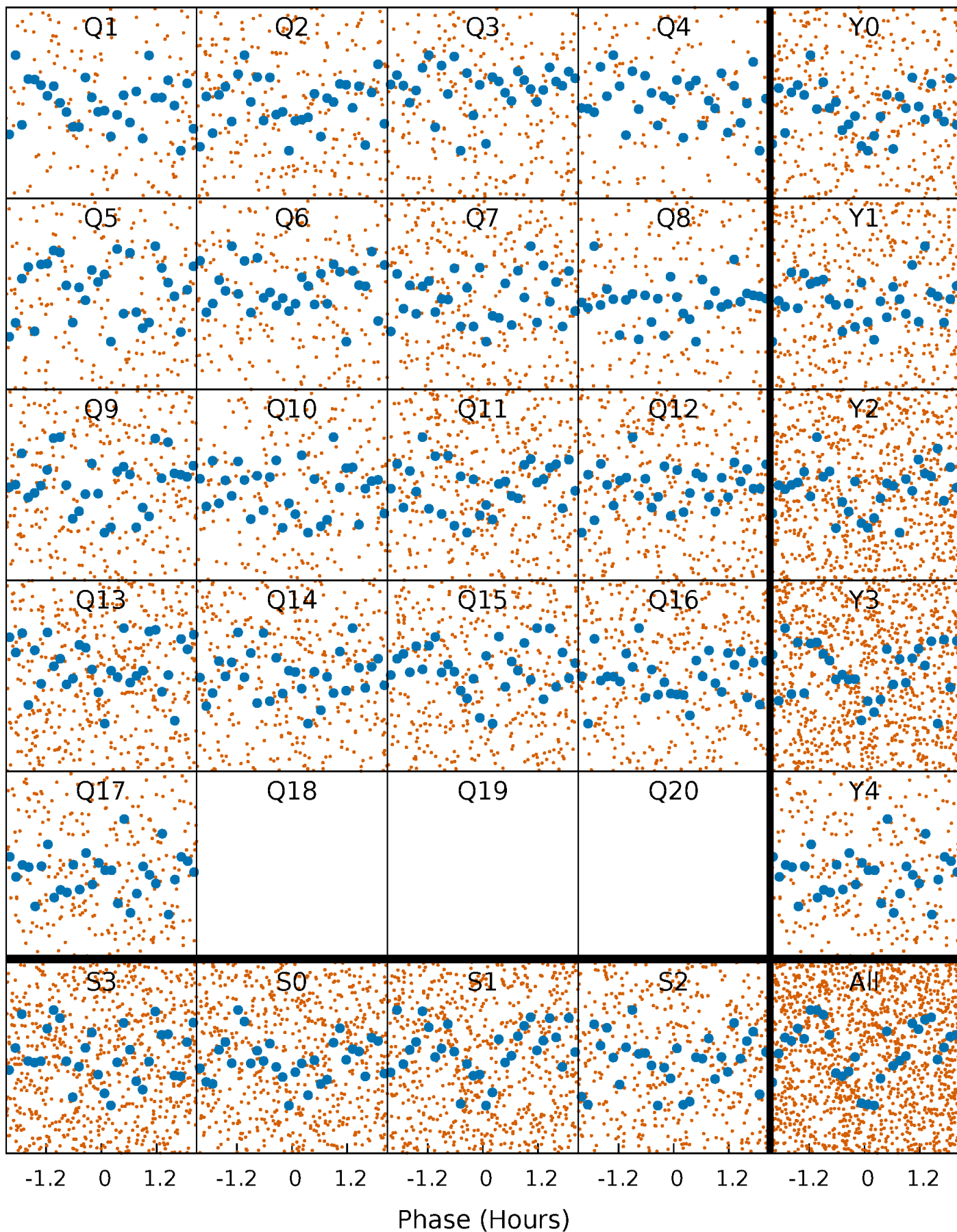


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

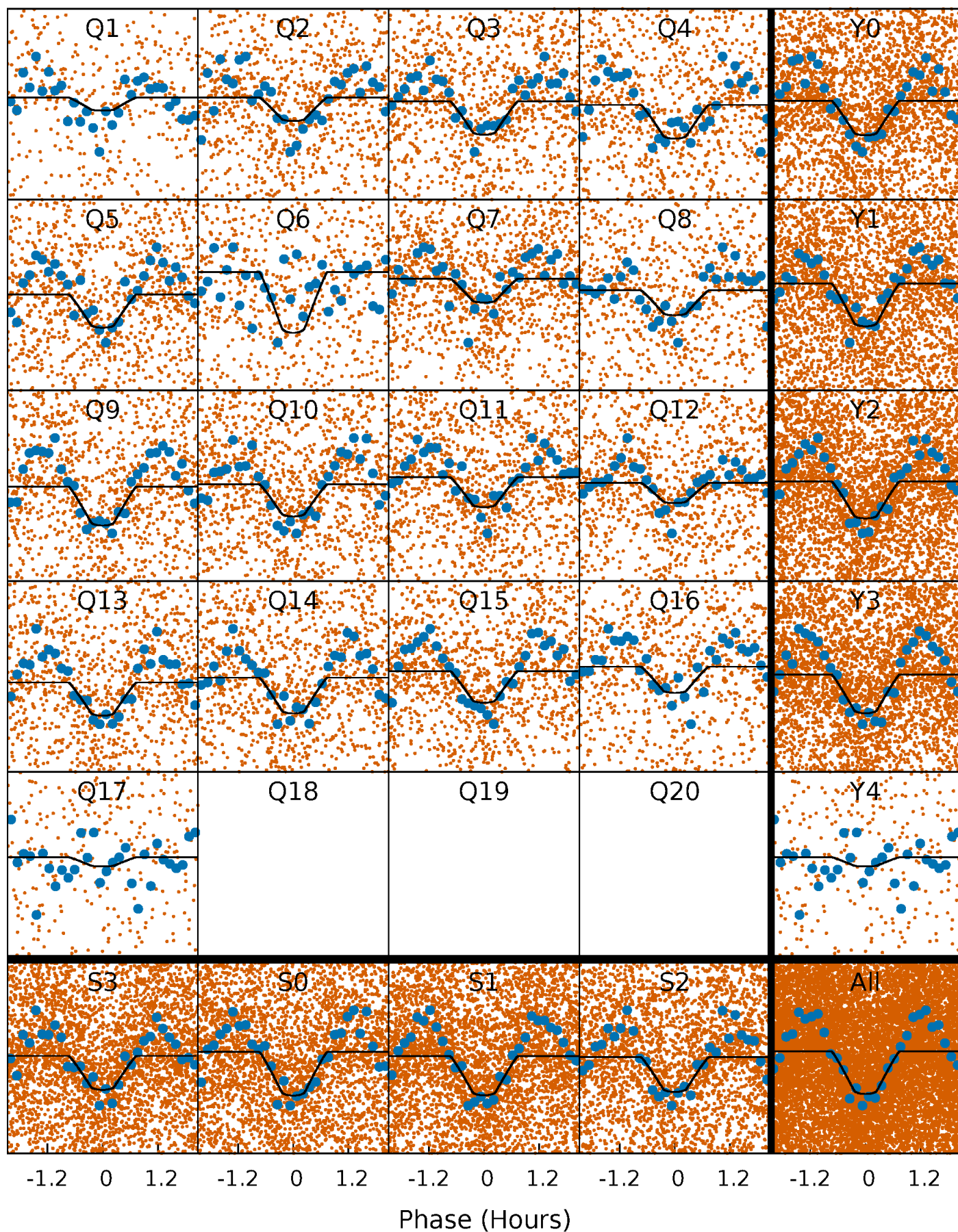
TCE 002303365-02   P= 0.520697 Days    $T_0=132.003032$  (BKJD)





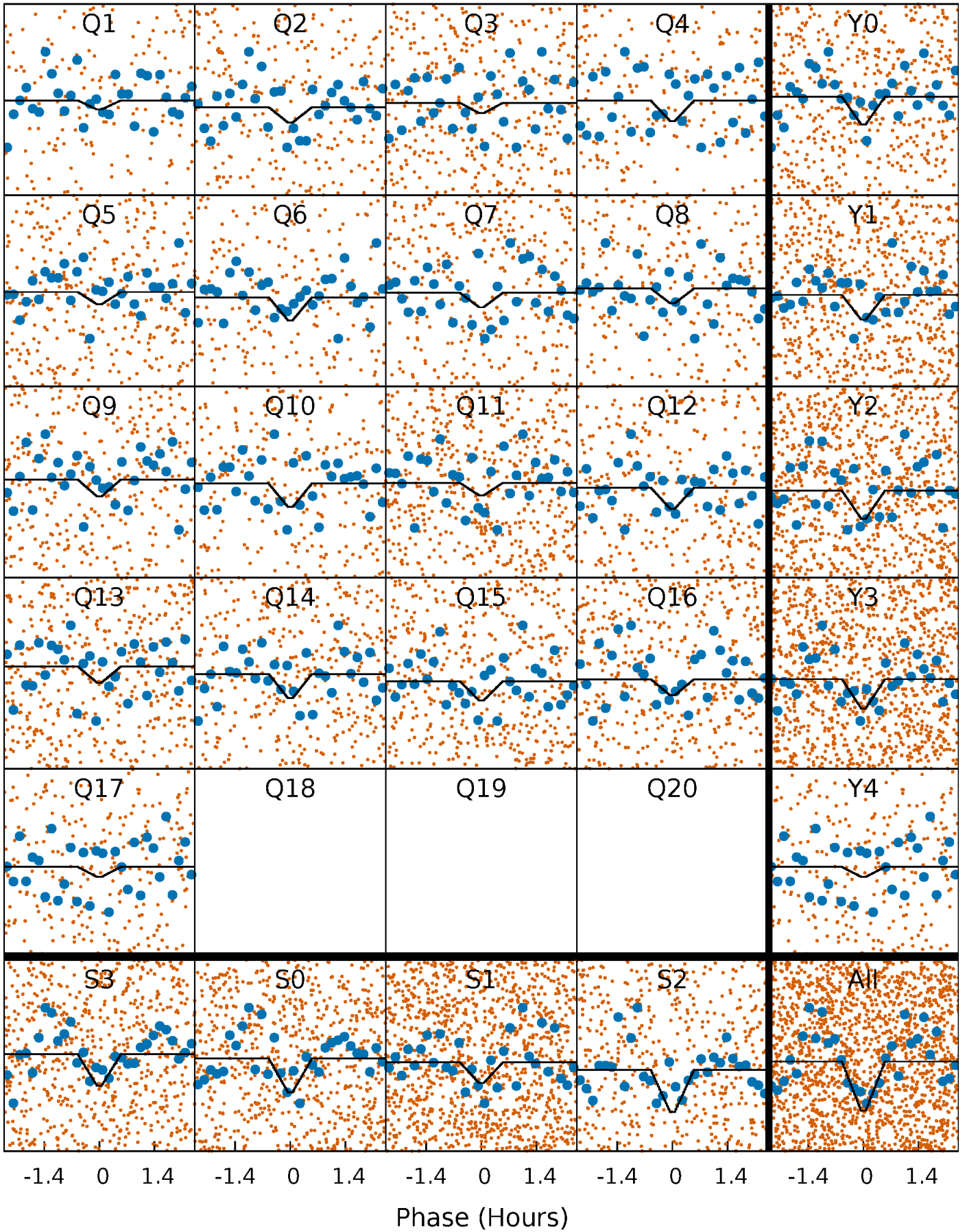
# DV Quarter-Phased Transit Curves

TCE 002303365-02   P= 0.520697 Days    $T_0=132.003032$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 002303365-02 P= 0.520698 Days  $T_0=132.001257$  (BKJD)

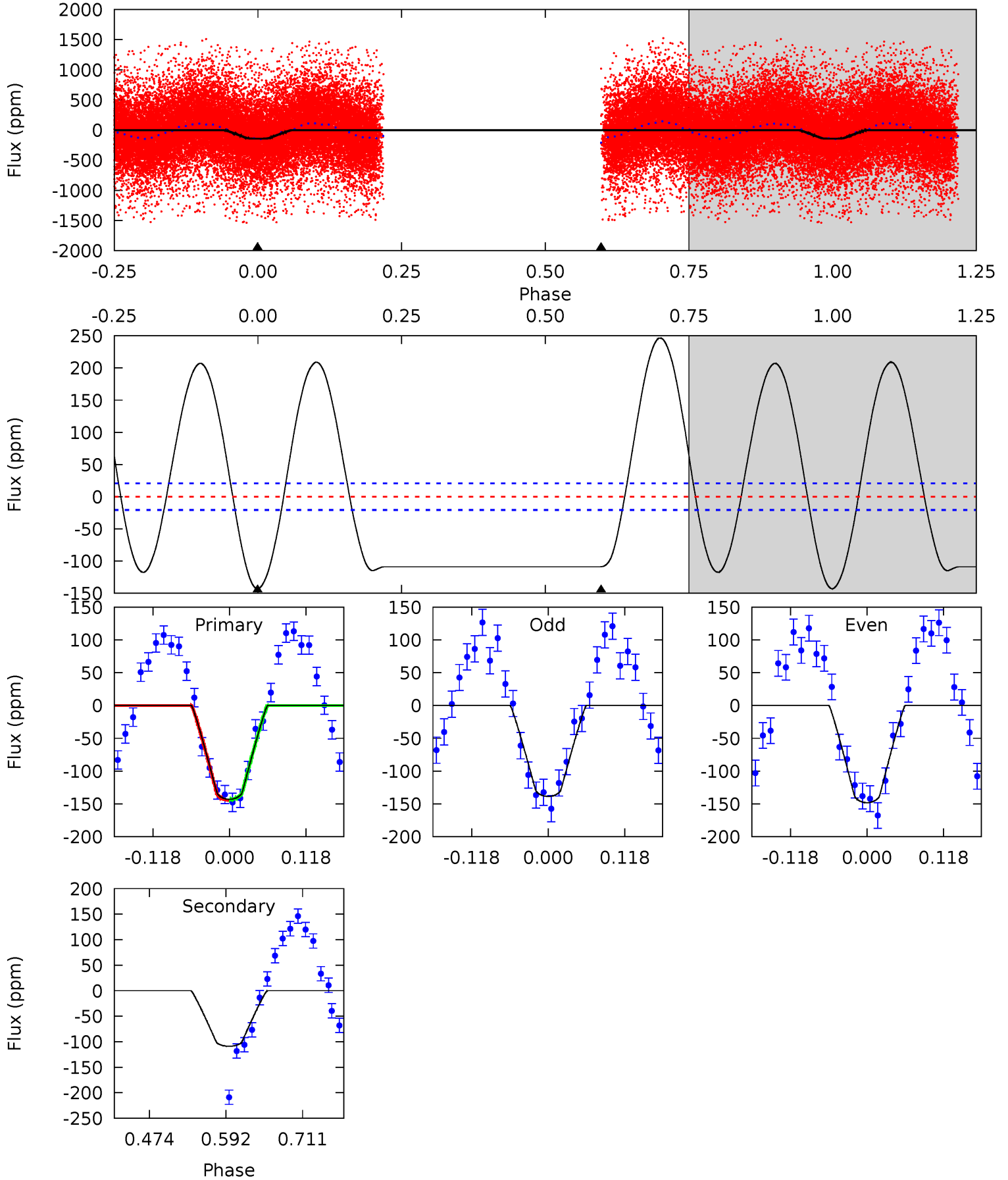




# DV Model-Shift Uniqueness Test

002303365-02, P = 0.520697 Days, E = 131.482335 Days

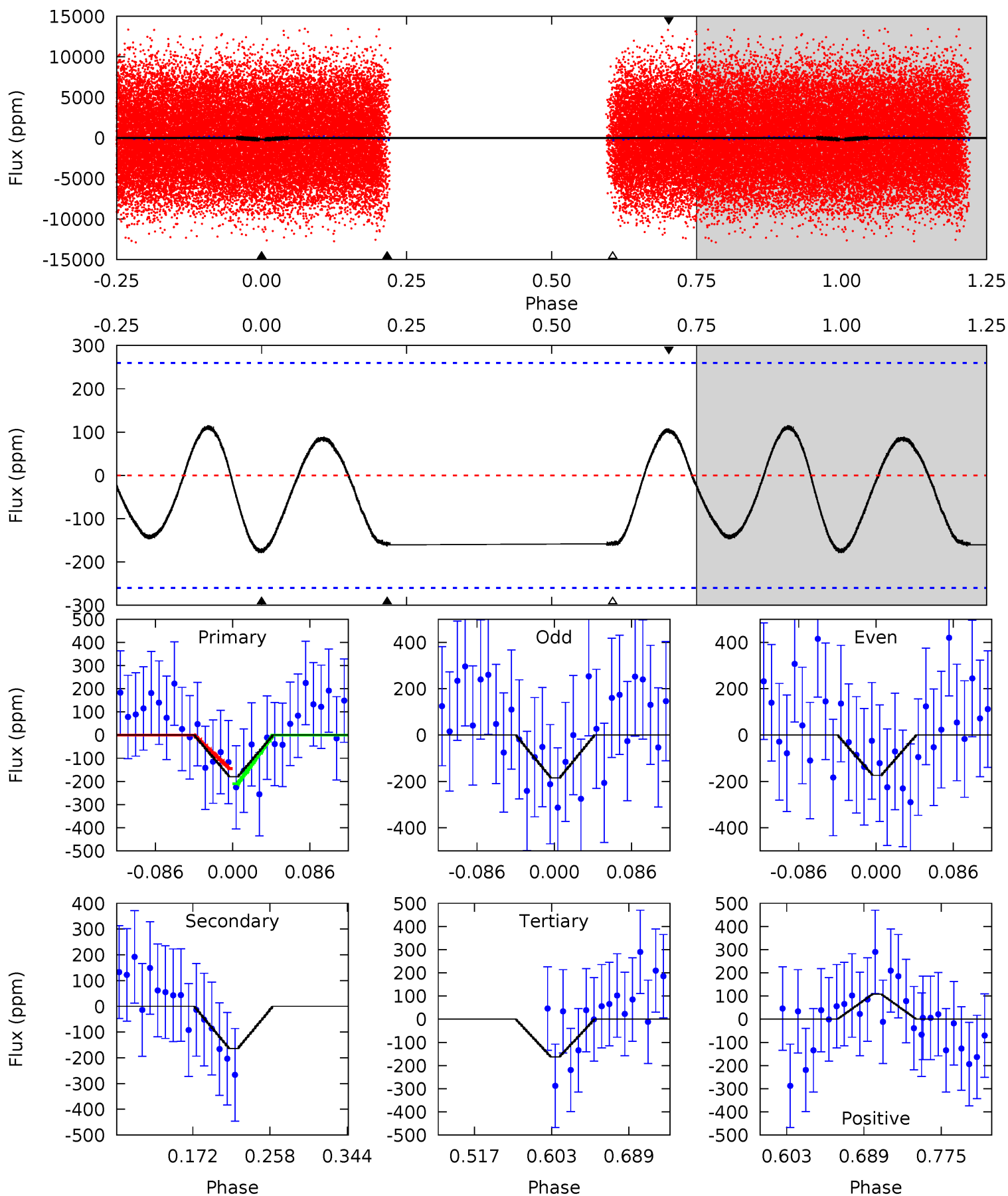
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
31.3	23.8	0	0	4.53	1.56	23.0	31.3	31.3	23.8	23.8	1.04	0.99	0.63	0.16



# Alt Model-Shift Uniqueness Test

002303365-02, P = 0.520698 Days, E = 131.480559 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
3.18	2.91	2.88	1.92	4.60	1.72	1.59	0.30	1.26	0.03	0.99	0.10	1.12	0.39	0.58



### Stellar Parameters For KIC 002303365

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$7517^{+209}_{-339}$	$3.643^{+0.459}_{-0.081}$	$0.000^{+0.200}_{-0.350}$	$3.603^{+0.470}_{-1.762}$	$2.080^{+0.242}_{-0.564}$	$0.063^{+0.305}_{-0.017}$
	+3%/-5%	+13%/-2%	+inf%/-inf%	+13%/-49%	+12%/-27%	+487%/-27%
Source	KIC0	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 002303365-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-109 \pm 5$	$4.33^{+1.67}_{-1.52}$	$6691^{+466}_{-738}$	$6091^{+1886}_{-1361}$	$0.835^{+1.142}_{-0.385}$
Alt.	$-164 \pm 56$	$5.18^{+1.82}_{-1.75}$	$6655^{+498}_{-785}$	$6216^{+1699}_{-1687}$	$0.864^{+1.076}_{-0.445}$

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

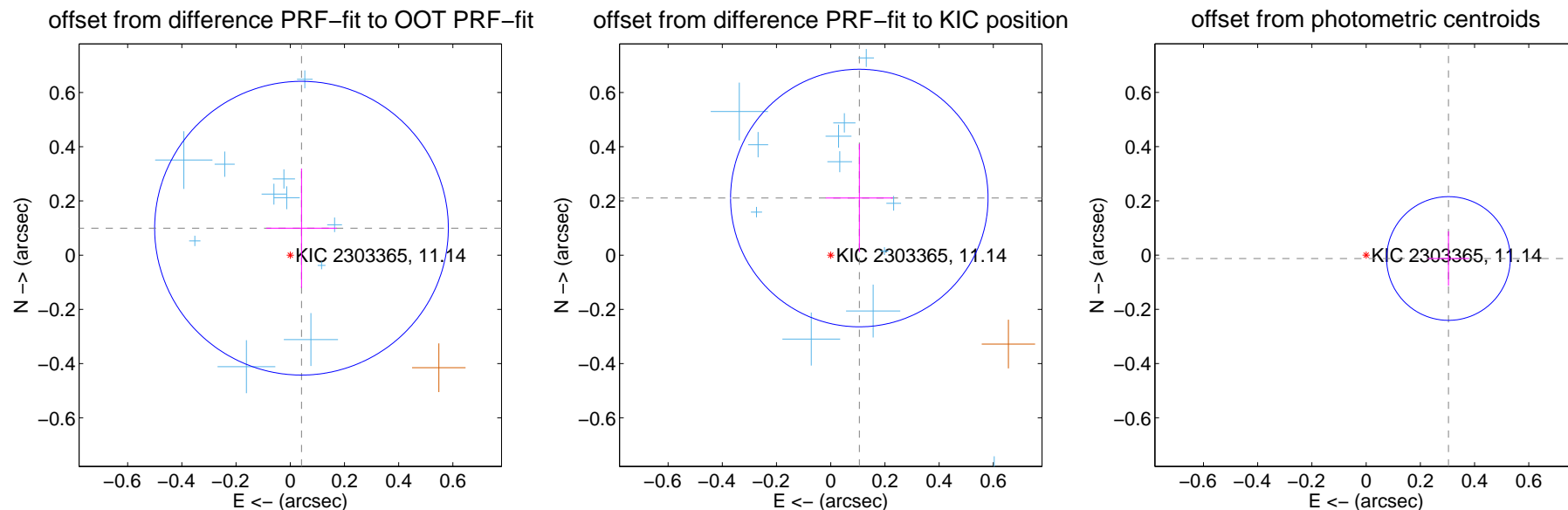
## DV Centroid Data

Supplemental centroid analysis for 002303365-02. **Kepler magnitude: 11.14.** Transit SNR 18.95

There are 14 quarters with good PRF difference image offsets

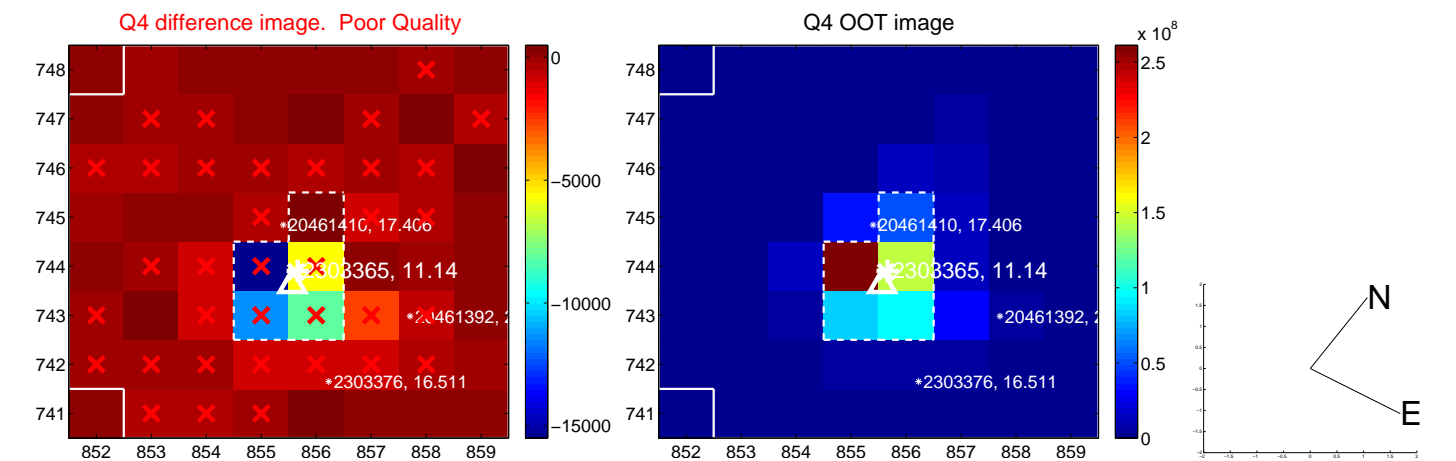
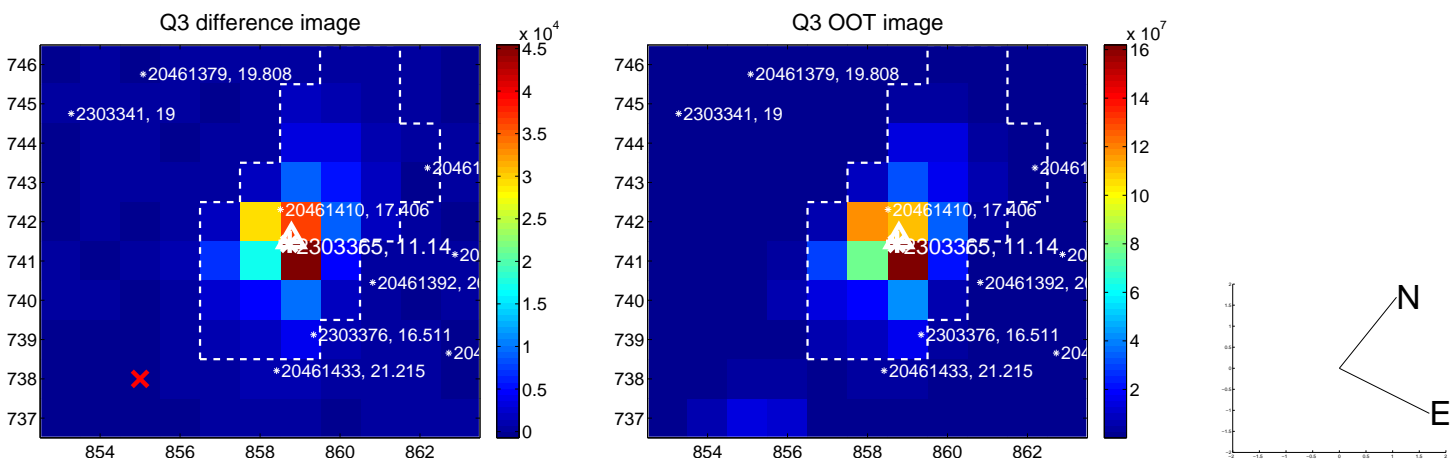
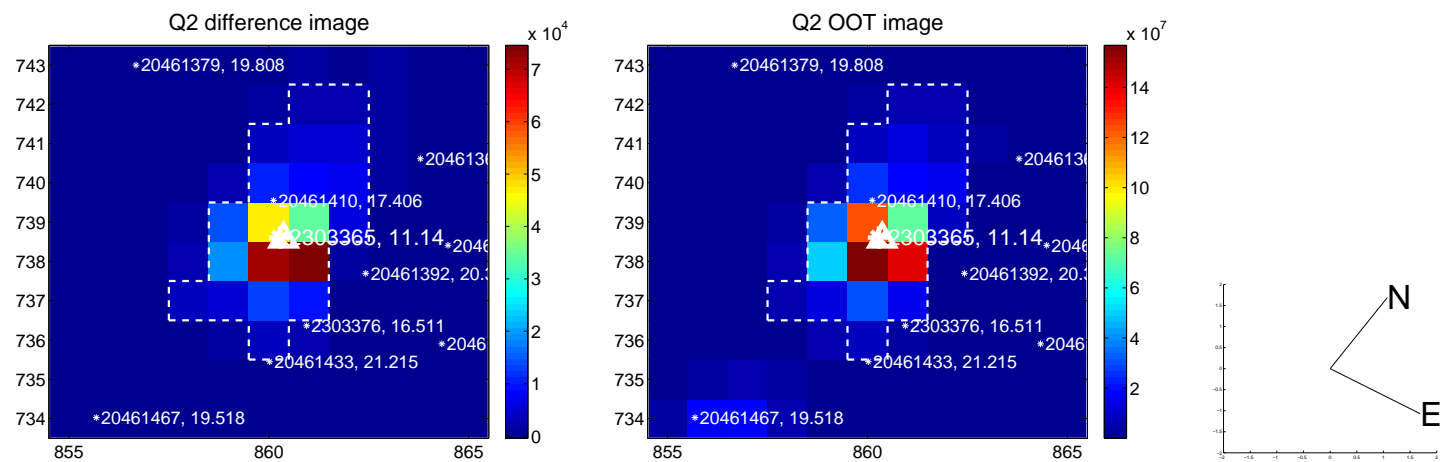
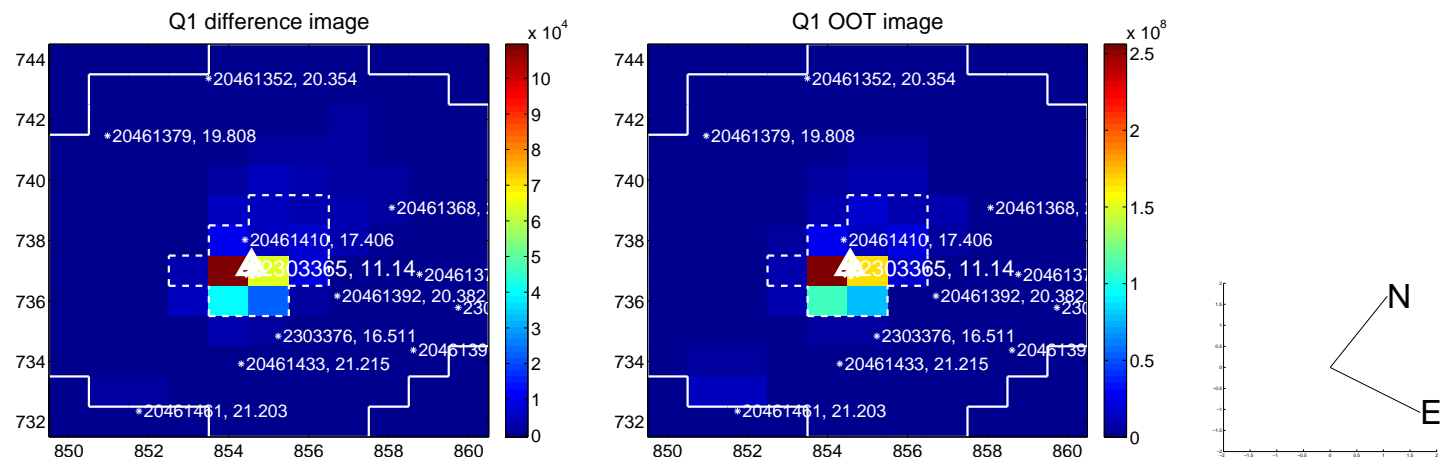
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.108 \pm 0.181$	0.60	$-0.041 \pm 0.130$	$0.099 \pm 0.220$
PRF-fit source offset from KIC position	$0.236 \pm 0.158$	1.49	$-0.106 \pm 0.124$	$0.211 \pm 0.199$
photometric centroid source offset	<b><math>0.30 \pm 0.08</math></b>	<b>4.00</b>	$-0.30 \pm 0.08$	$-0.01 \pm 0.10$



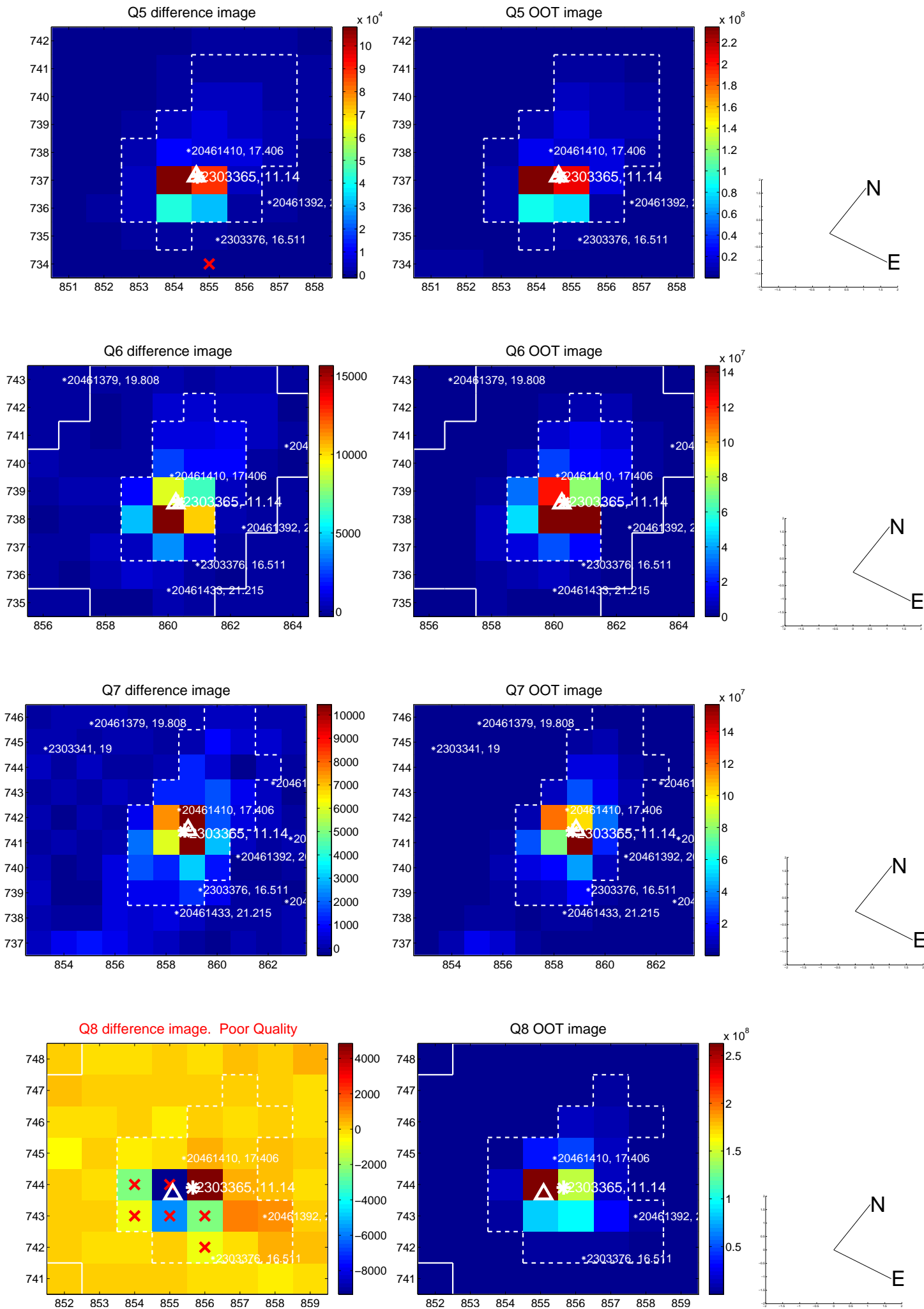
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

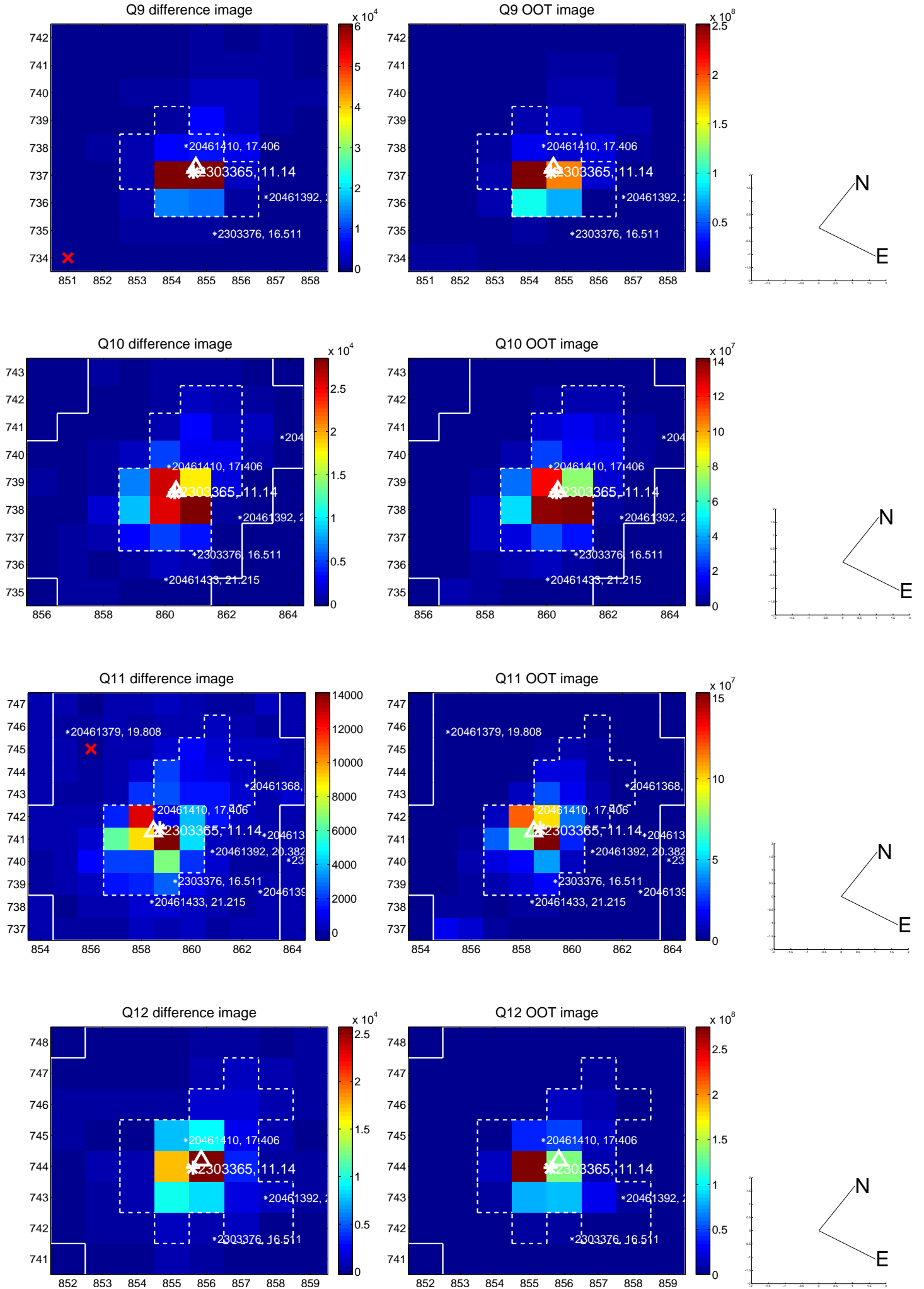




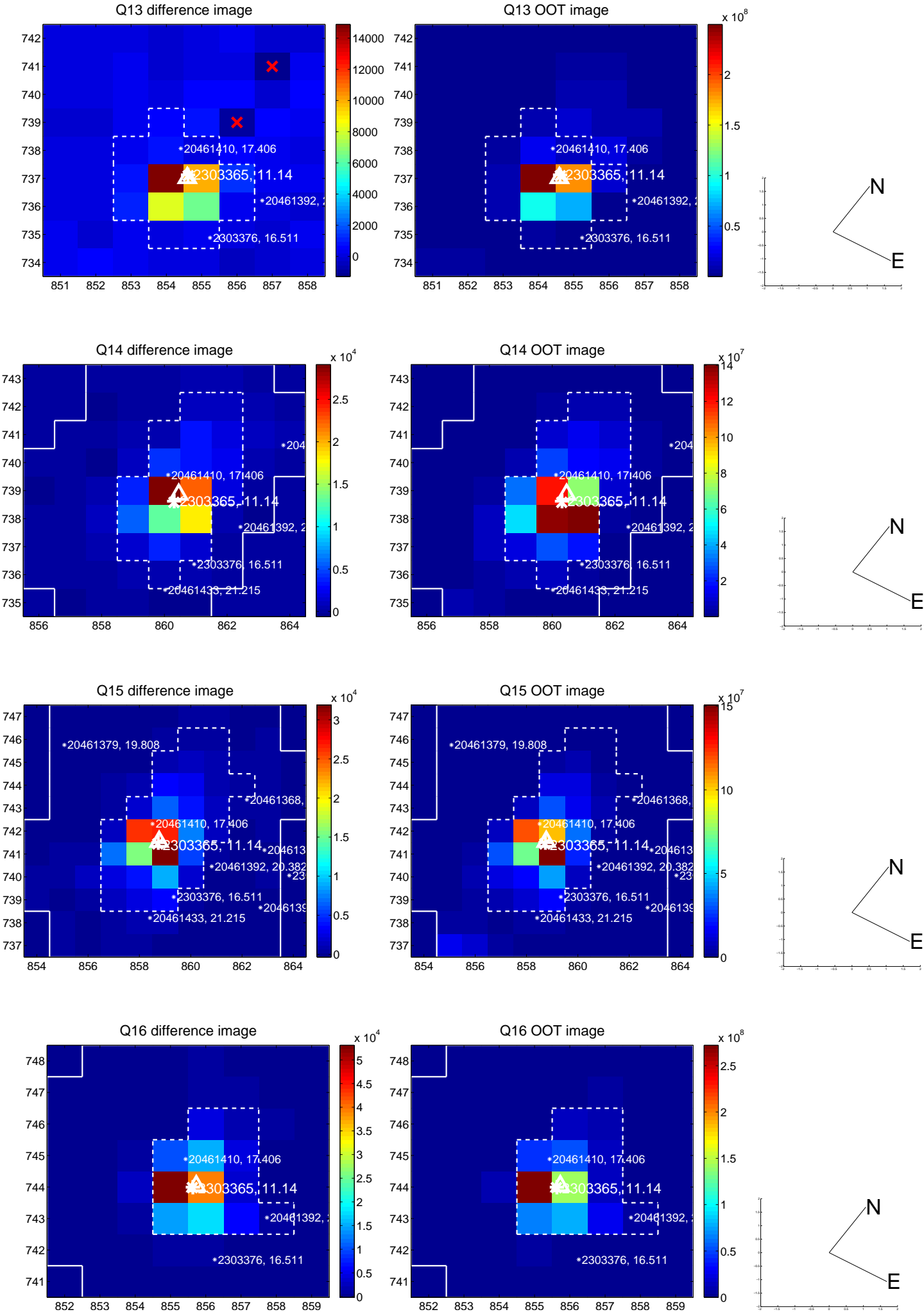
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



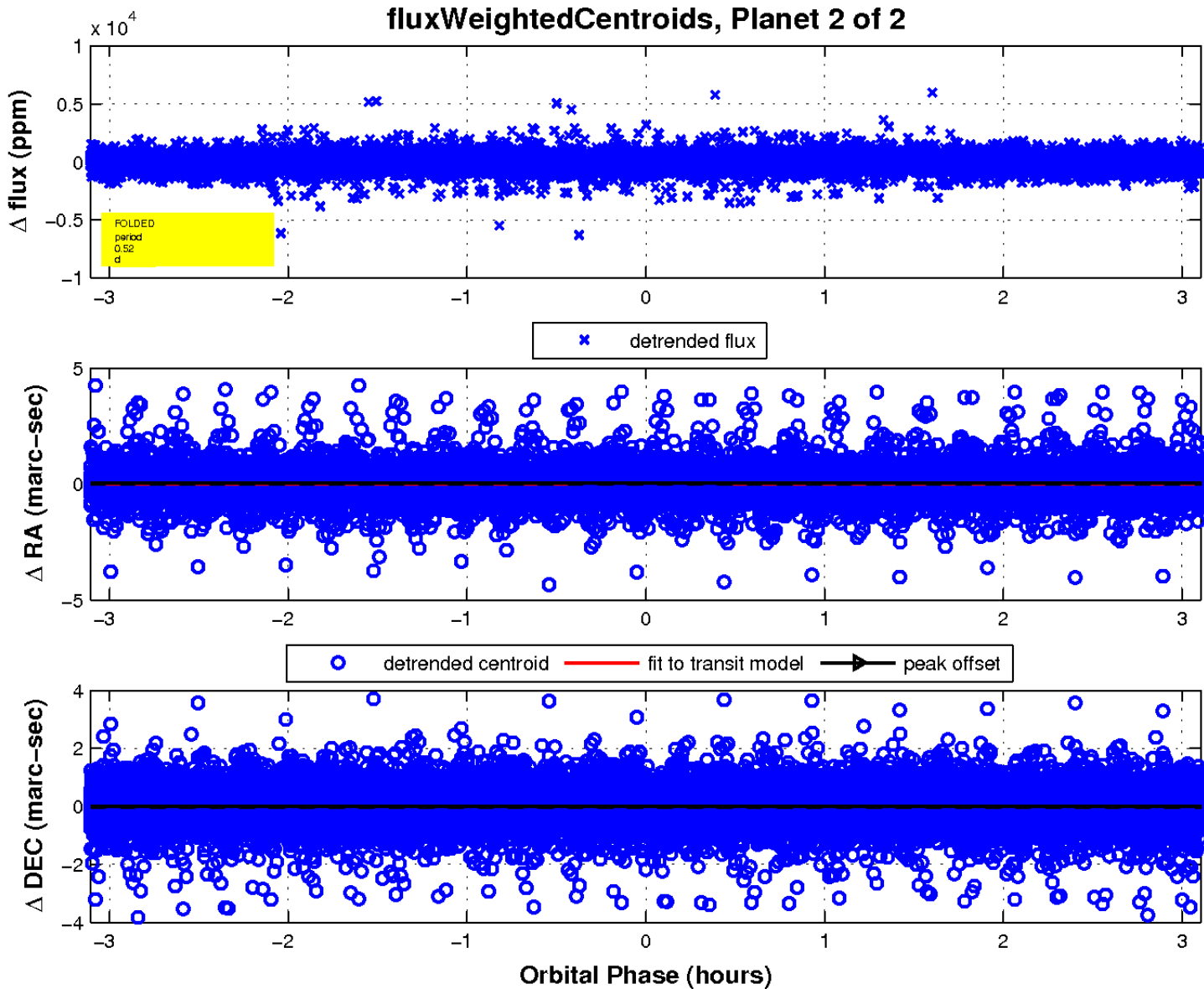
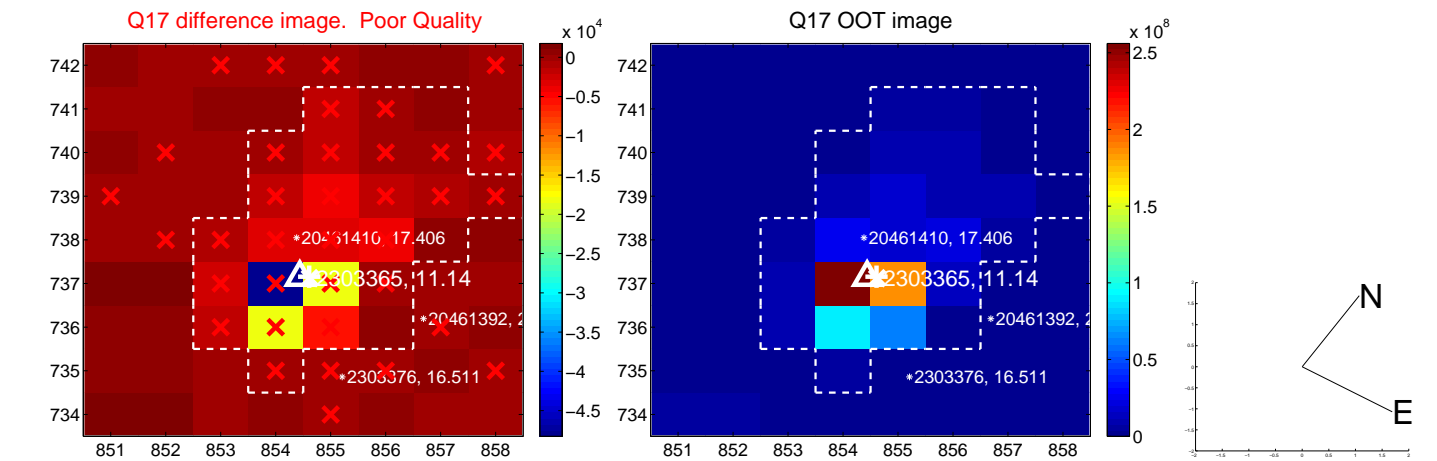
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

