

# KIC 008644365

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008644365-01	OBS	3384.02	19.916031	139.362945	134.7	6.317	22.3	22.9	1.09	6047	1.49	66.42
008644365-02	OBS	3384.01	10.548433	139.063689	99.2	1.226	9.9	11.0	1.09	6047	1.30	154.98

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008644365-01	OBS	PC	0.98	0	0	0	0	NO_COMMENT
008644365-02	OBS	PC	1.00	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.

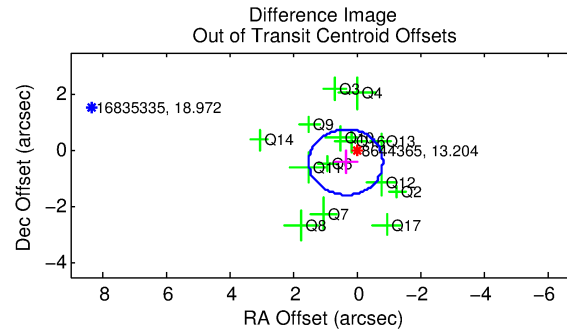
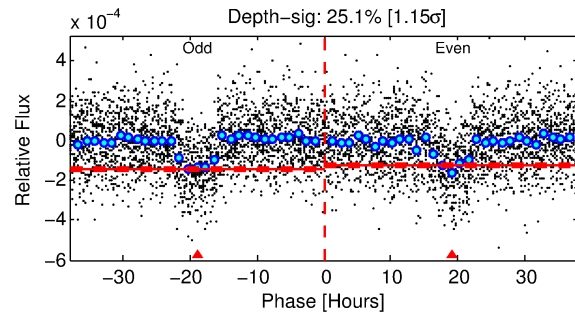
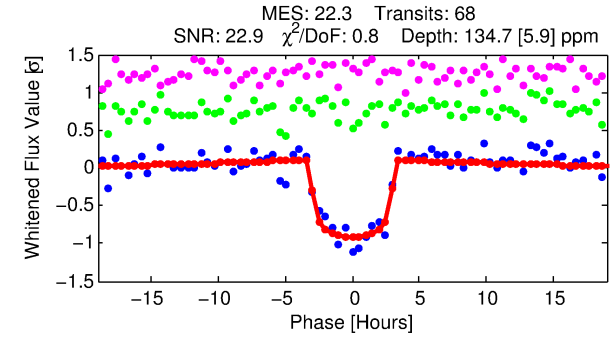
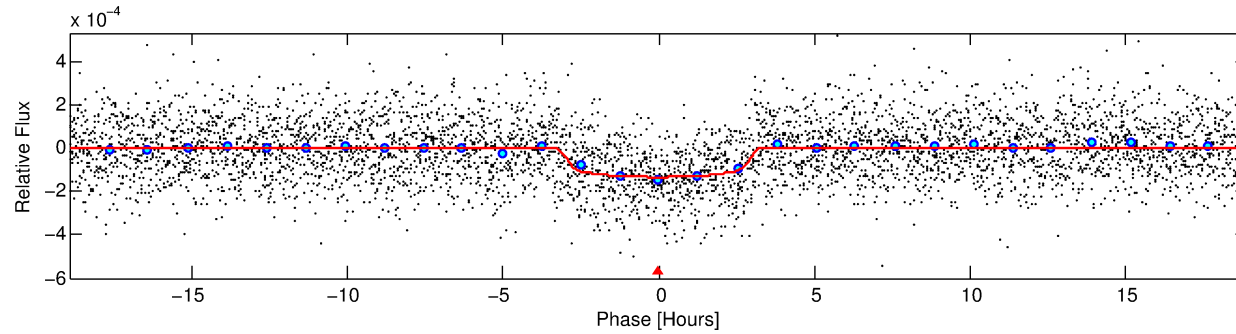
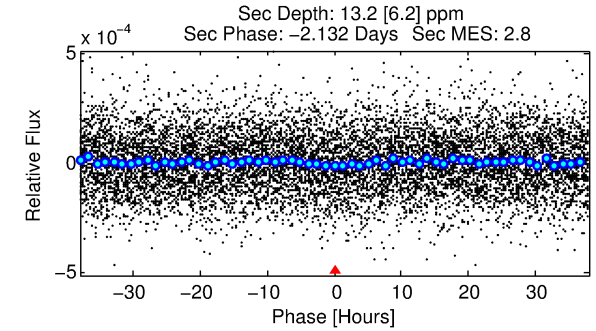
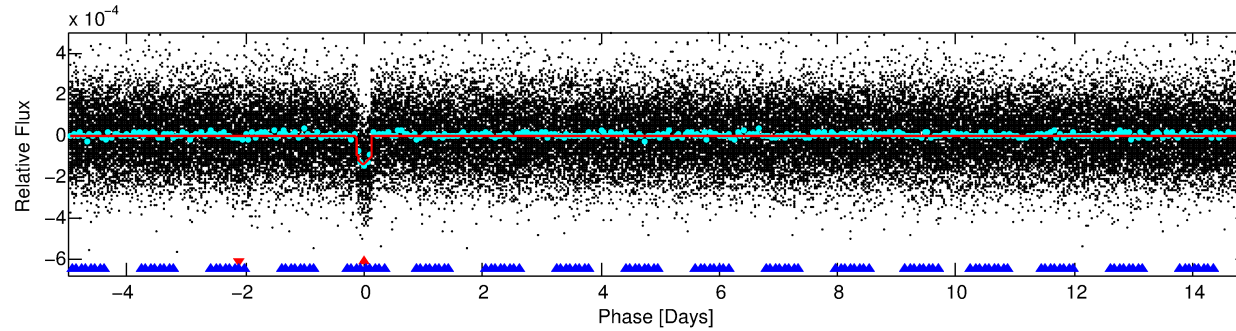
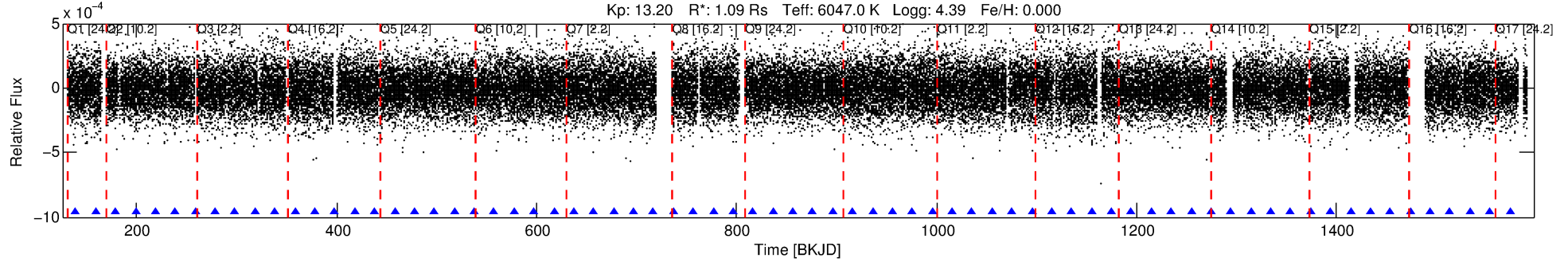
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008644365-01

No Significant Match Found

# DV One-Page Summary

KIC: 8644365 Candidate: 1 of 2 Period: 19.916 d  
KOI: K03384.02 Corr: 0.980



## DV Fit Results:

Period = 19.91603 [0.00012] d  
Epoch = 139.3629 [0.0050] BKJD  
Rp/R\* = 0.0125 [0.0017]  
a/R\* = 11.58 [7.76]  
b = 0.89 [0.16]  
Seff = 66.41 [15.66]  
Teq = 728 [43] K  
Rp = 1.48 [0.32] Re  
a = 0.1467 [0.0213] AU  
Ag = 70.99 [41.51] [1.69σ]  
Teffp = 3267 [449] K [5.63σ]

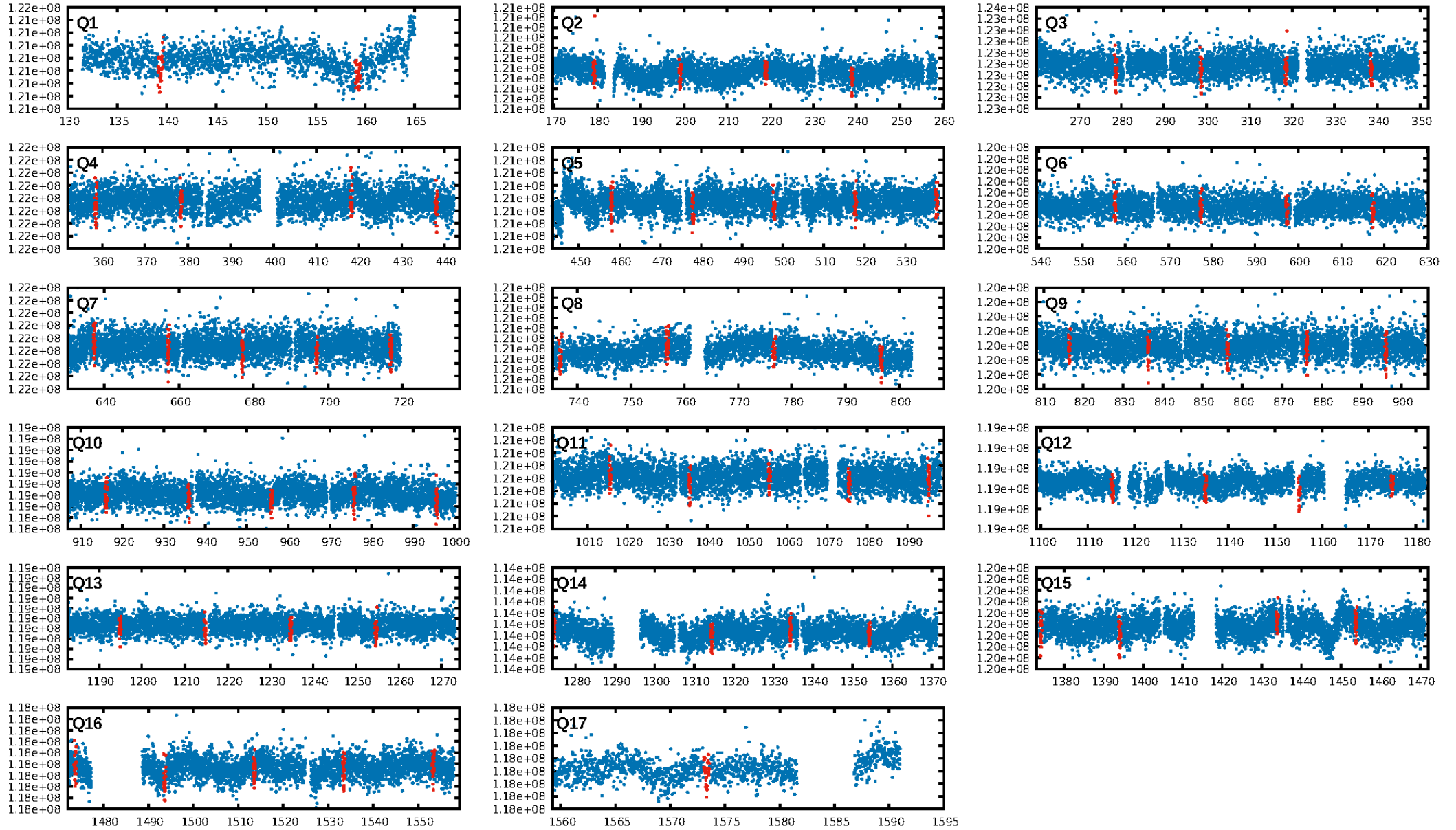
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [34.94σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 99.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.05e-106  
RollingBand-fgt: 1.00 [65/65]  
GhostDiagnostic-chr: 5.762  
Centroid-sig: 54.5%  
Centroid-so: 0.437 arcsec [0.70σ]  
OotOffset-rm: 0.532 arcsec [1.37σ]  
KicOffset-rm: 0.563 arcsec [1.45σ]  
OotOffset-st: 4/3/4/3 [14]  
KicOffset-st: 4/3/4/3 [14]  
DiffImageQuality-fgm: 0.93 [13/14]  
DiffImageOverlap-fno: 0.94 [16/17]

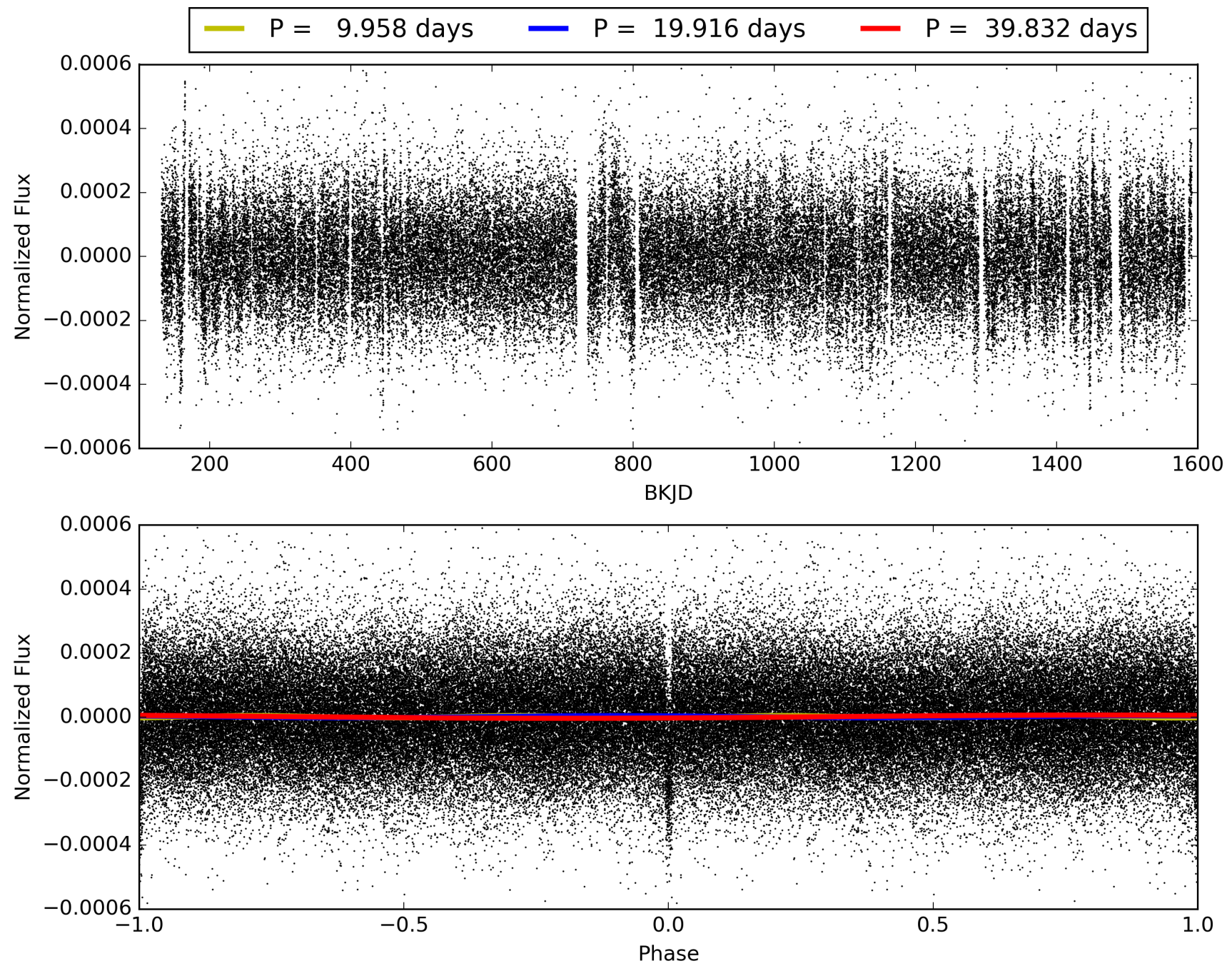
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 17:35:03 Z

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

# TCE 008644365-01, PDC Light Curves



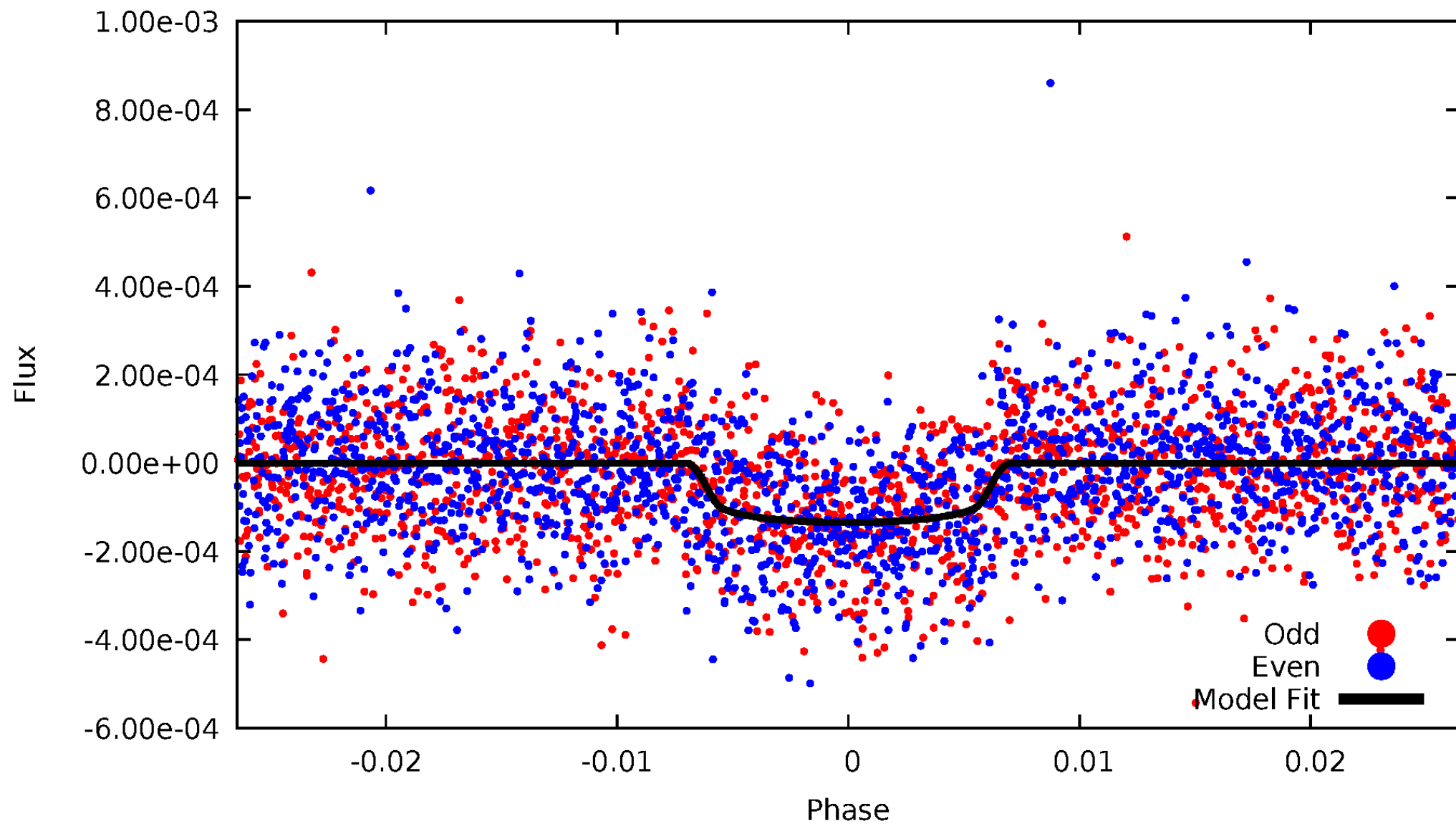
TCE 008644365-01





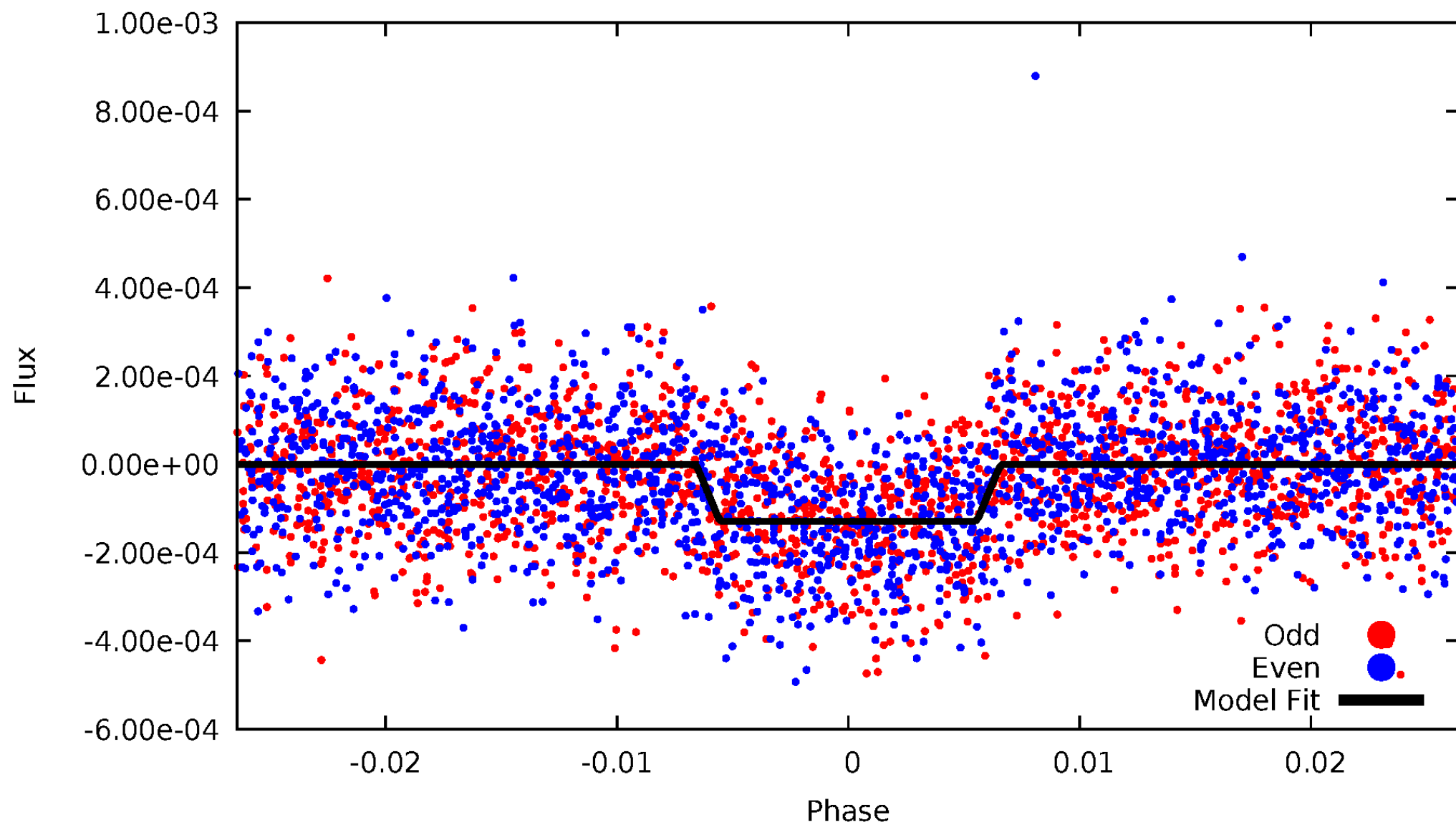
# DV Odd/Even

TCE 008644365-01



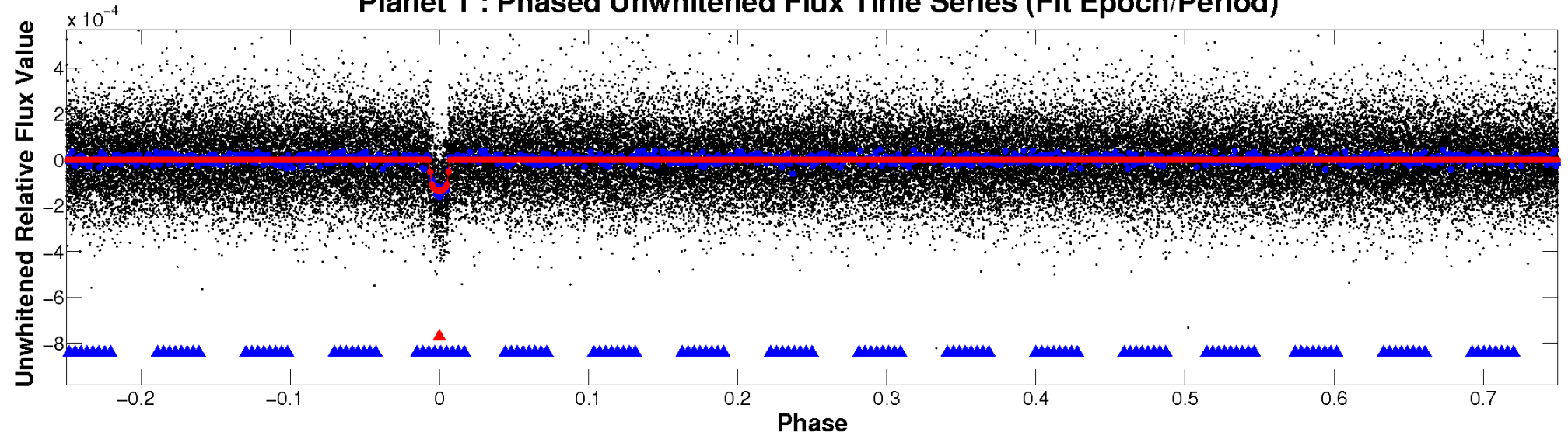
# ALT Odd/Even

TCE 008644365-01

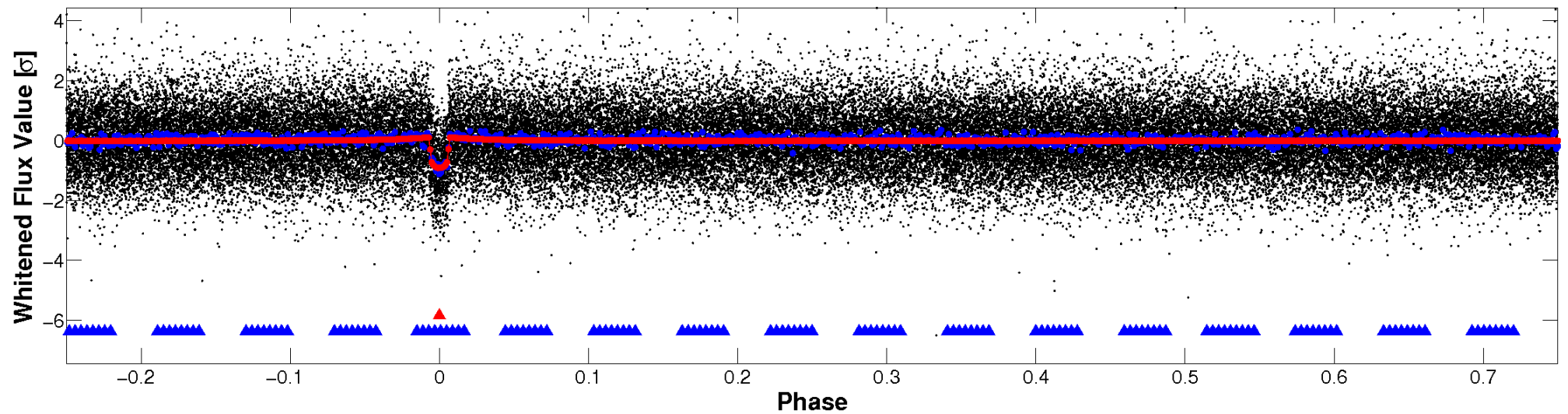


# Non-Whitened Vs. Whitened Light Curve

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

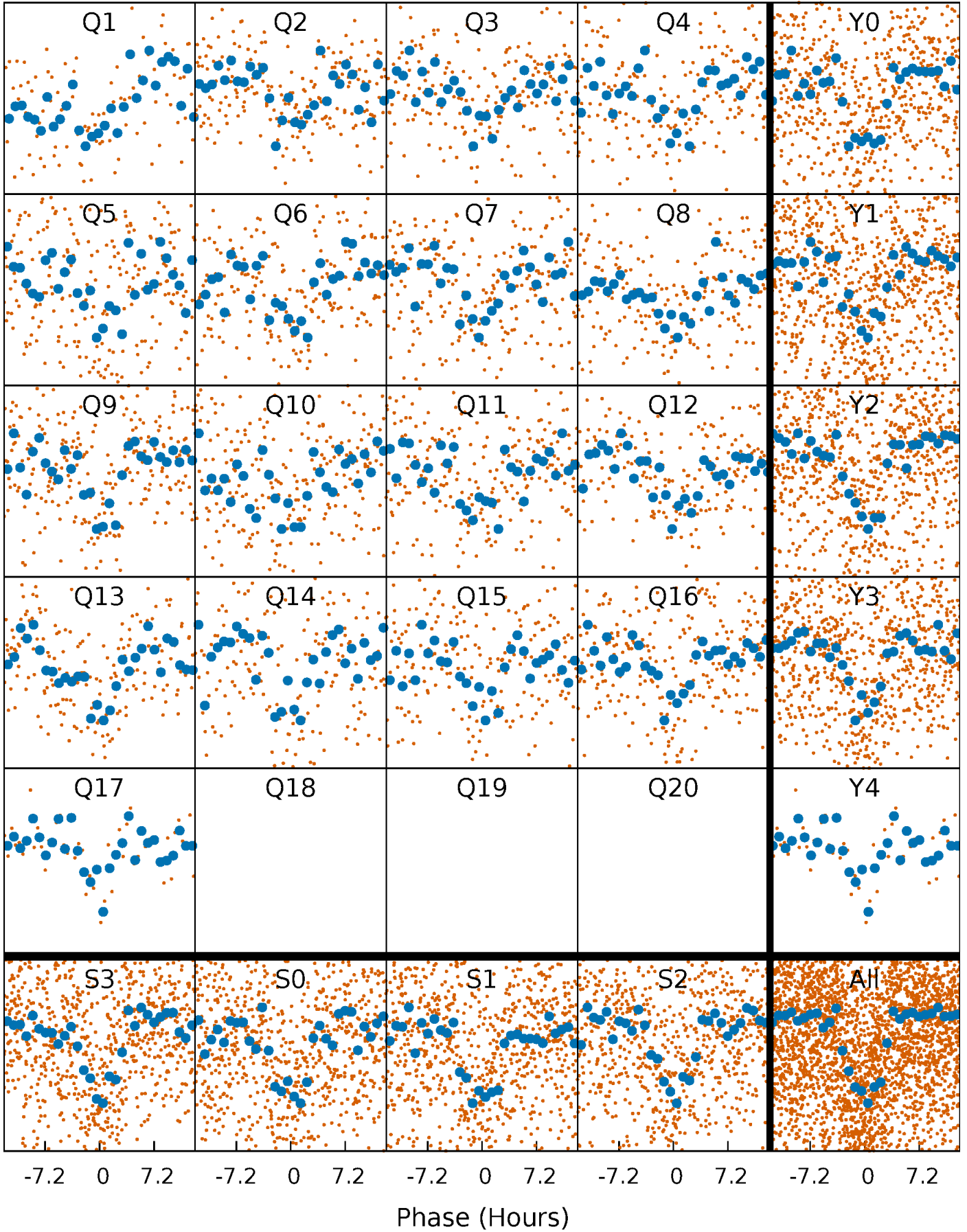


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

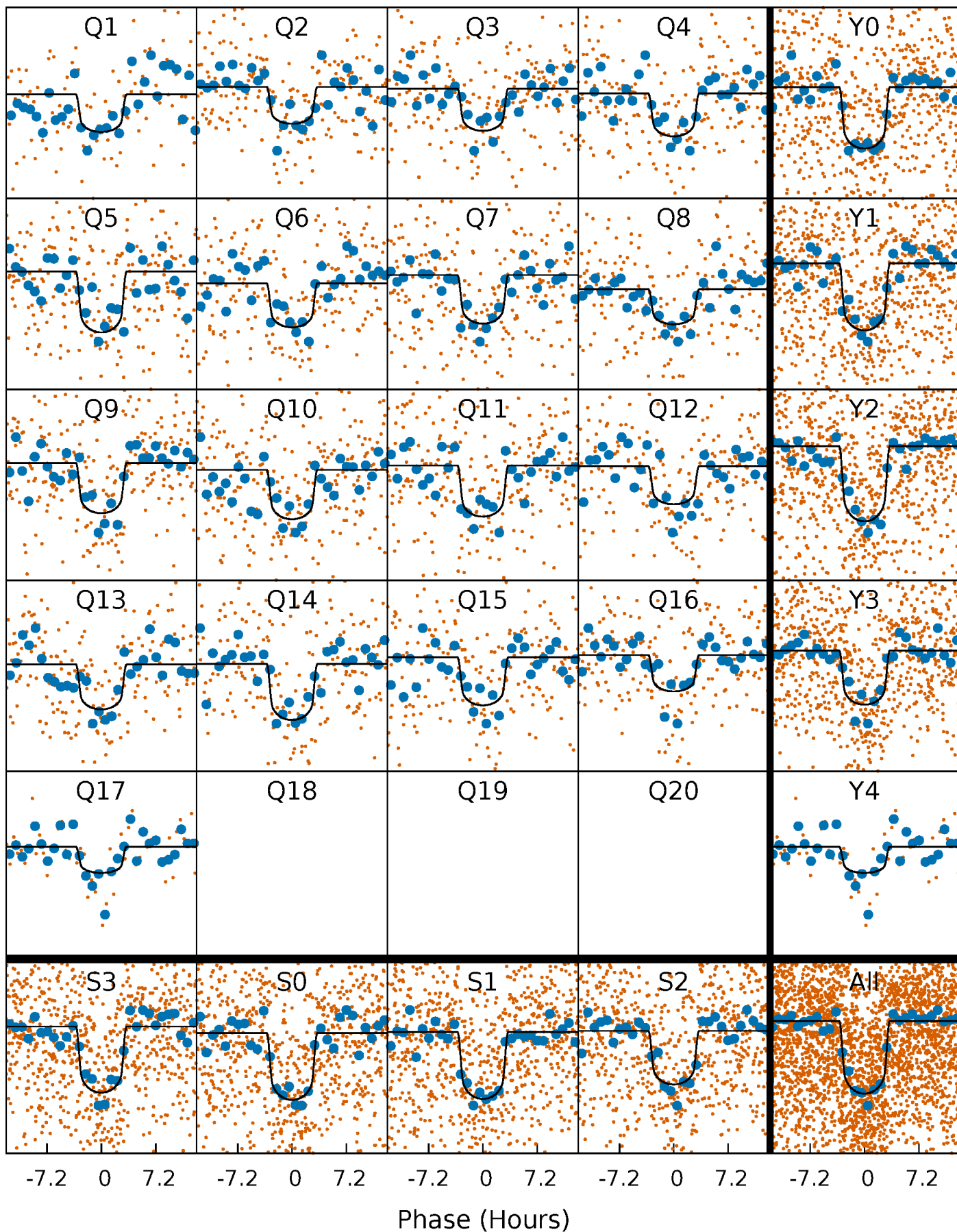
TCE 008644365-01 P= 19.916031 Days  $T_0=139.362945$  (BKJD)





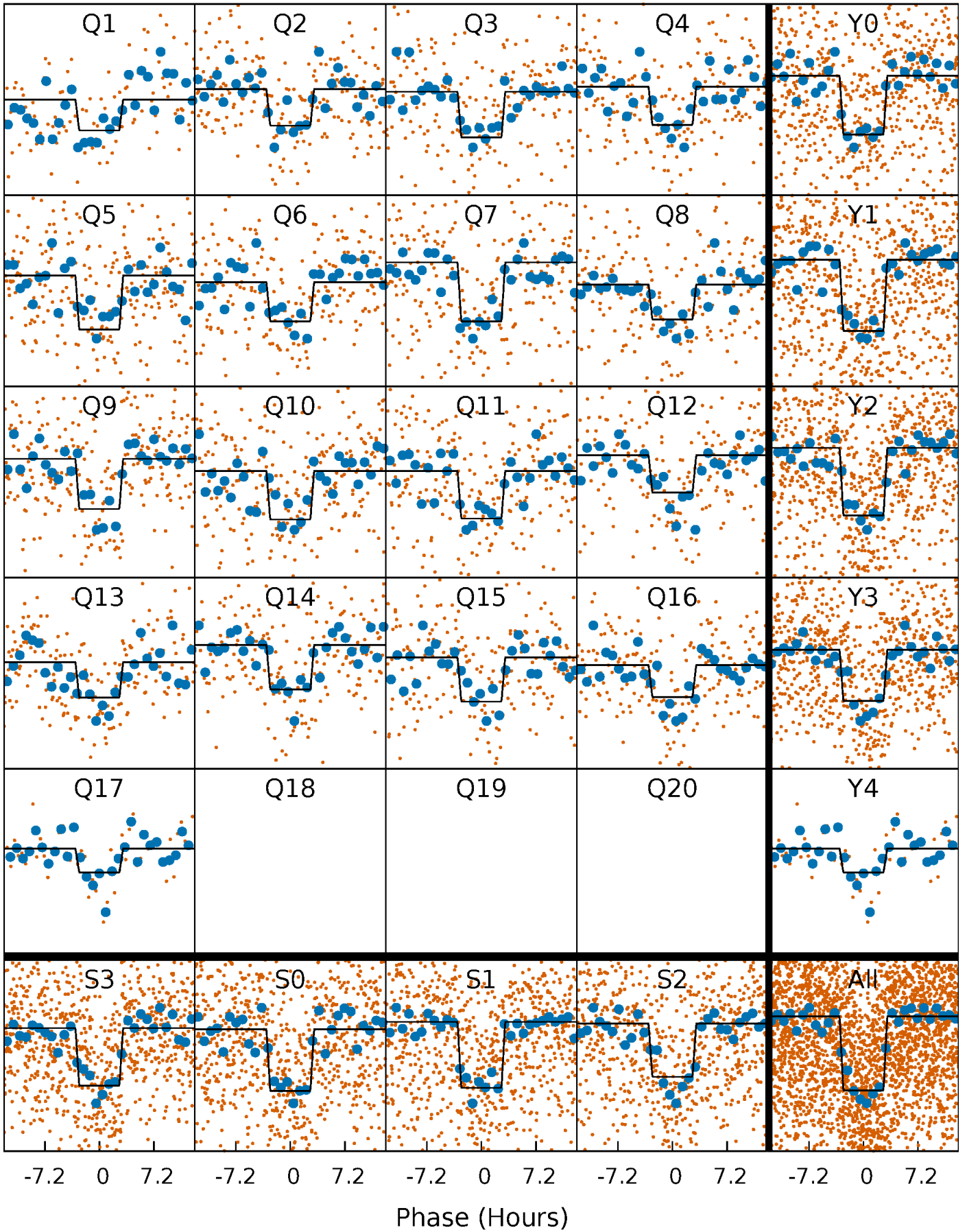
# DV Quarter-Phased Transit Curves

TCE 008644365-01 P= 19.916031 Days  $T_0=139.362945$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

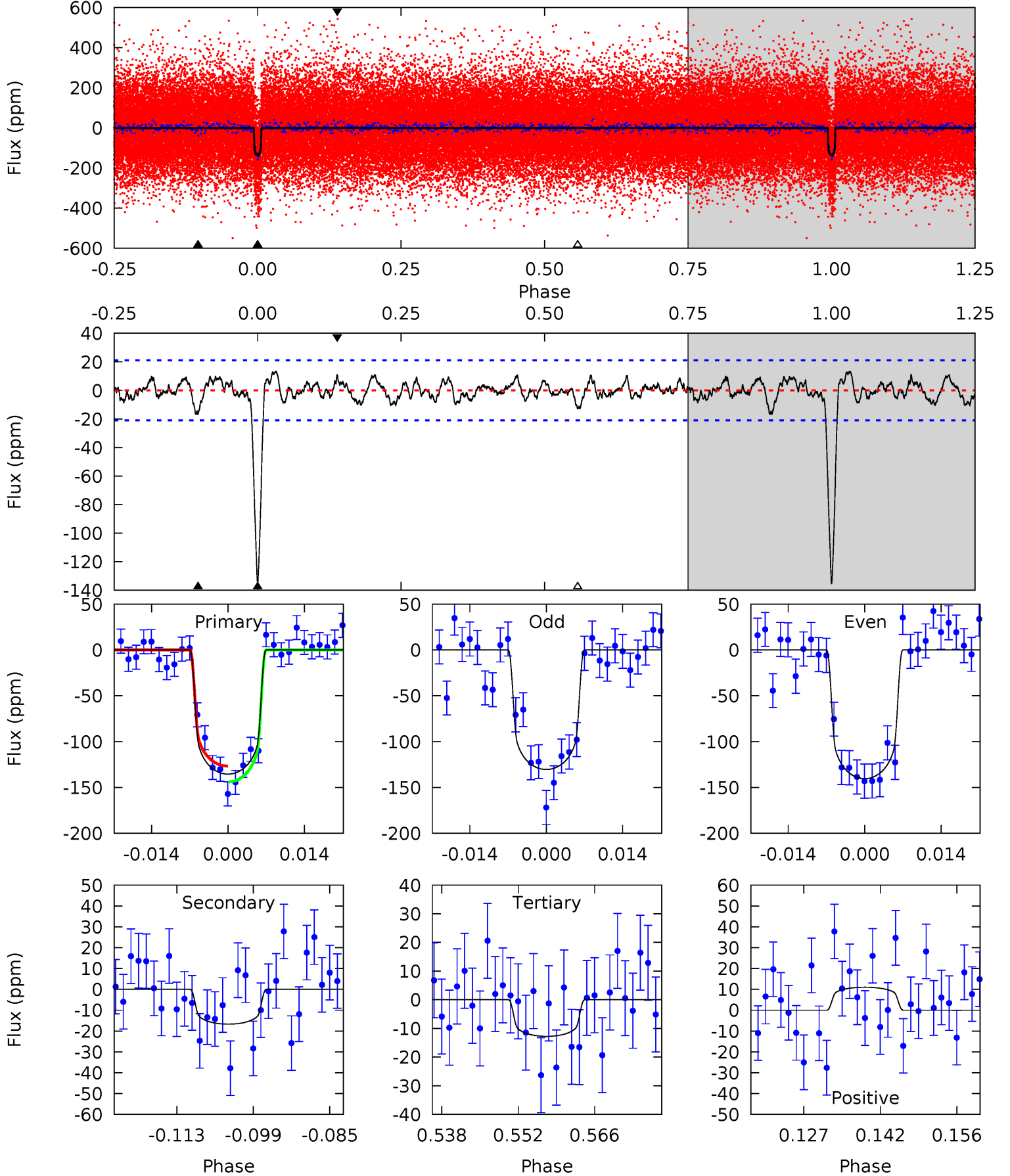
TCE 008644365-01 P= 19.915627 Days  $T_0=139.376701$  (BKJD)



# DV Model-Shift Uniqueness Test

008644365-01,  $P = 19.916031$  Days,  $E = 119.446914$  Days

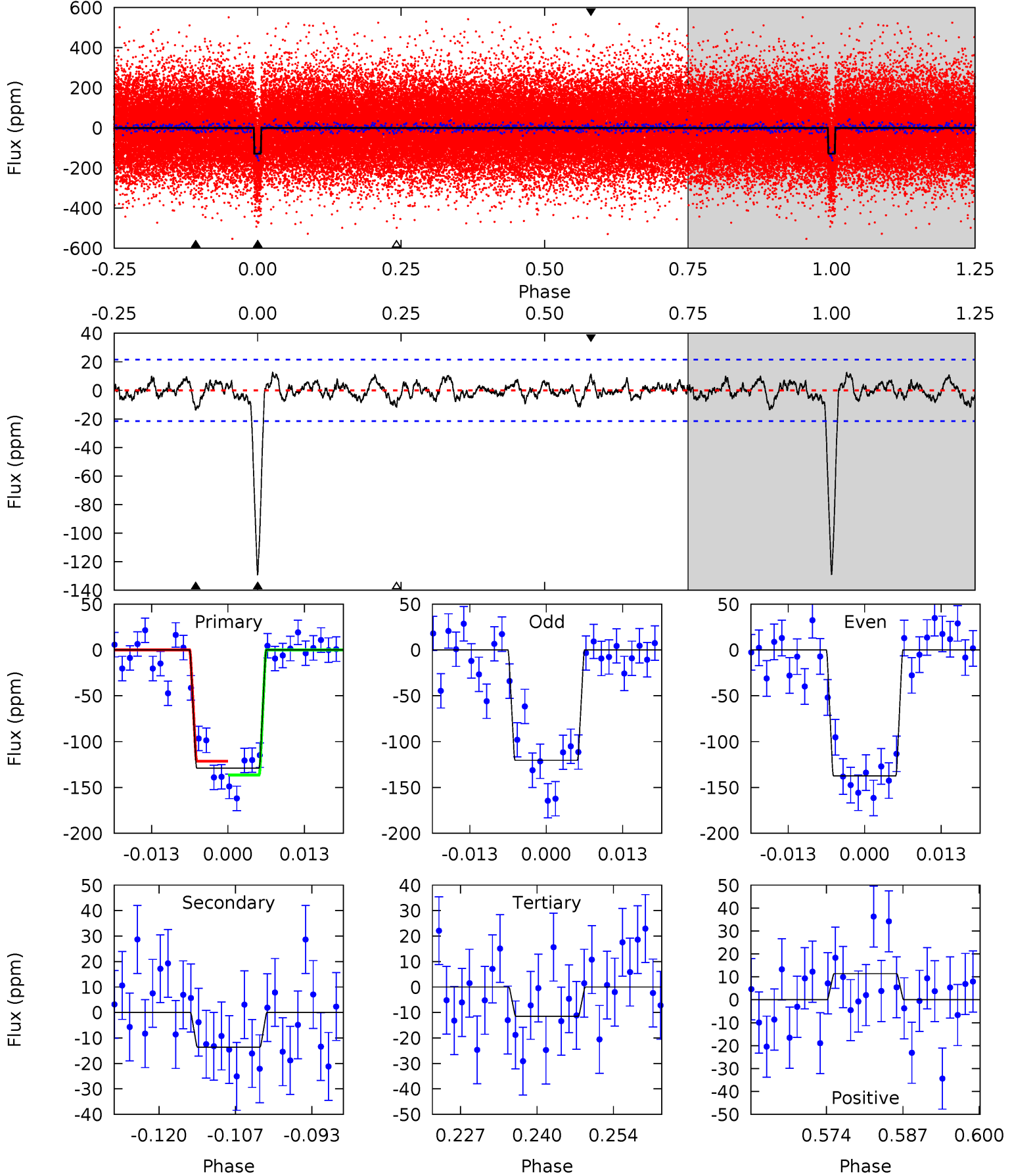
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
31.9	3.94	3.01	2.59	4.96	2.45	1.14	28.9	29.3	0.93	1.35	1.18	1.03	0.09	2.04



# Alt Model-Shift Uniqueness Test

008644365-01, P = 19.915627 Days, E = 119.461074 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
29.7	3.13	2.65	2.62	4.97	2.47	0.98	27.1	27.1	0.49	0.51	1.97	1.04	0.09	1.73





### Stellar Parameters For KIC 008644365

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6047^{+120}_{-133}$	$4.387^{+0.066}_{-0.123}$	$0.000^{+0.150}_{-0.150}$	$1.092^{+0.181}_{-0.097}$	$1.059^{+0.086}_{-0.070}$	$1.146^{+0.302}_{-0.404}$
	+2%/-2%	+2%/-3%	+inf%/-inf%	+17%/-9%	+8%/-7%	+26%/-35%
Source	SPE57	SPE57	SPE57	DSEP		

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

### Secondary Eclipse Parameters for KIC 008644365-01 / KOI 3384.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-17 \pm 4$	$1.51^{+0.24}_{-0.21}$	$1025^{+47}_{-38}$	$3836^{+259}_{-249}$	$86^{+42}_{-29}$
Alt.	$-14 \pm 4$	$1.37^{+0.22}_{-0.23}$	$1025^{+46}_{-36}$	$3805^{+310}_{-284}$	$82^{+48}_{-31}$

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

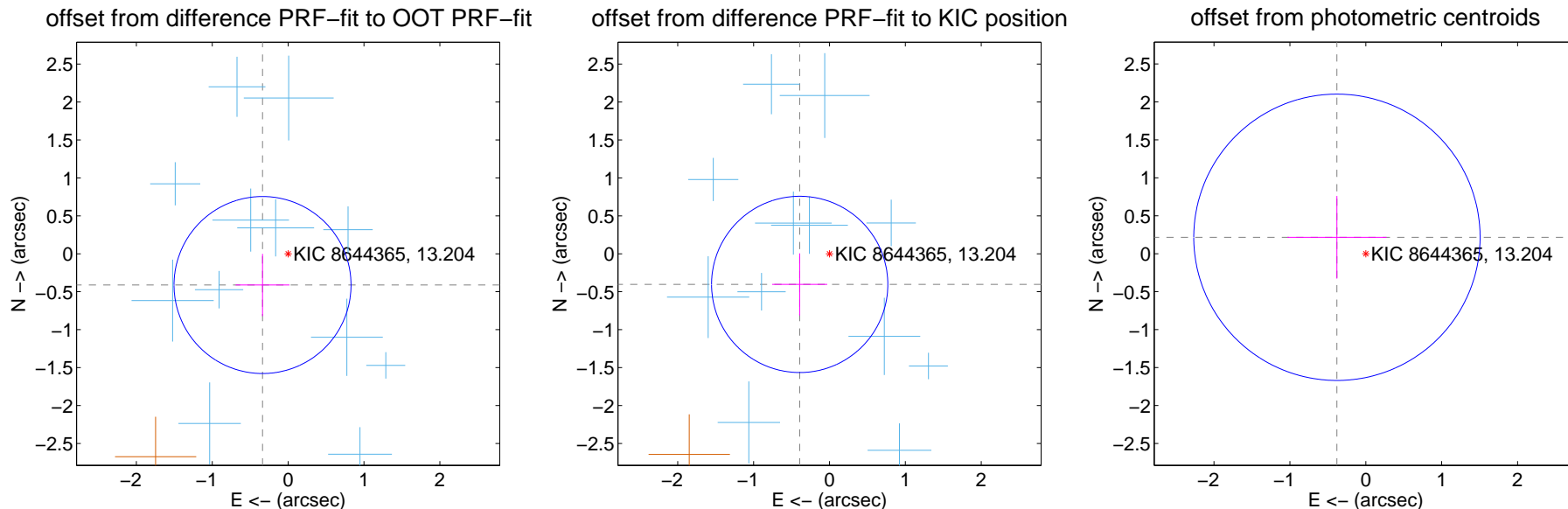
## DV Centroid Data

Supplemental centroid analysis for 008644365-01. Kepler magnitude: 13.20. Transit SNR 22.94

There are 13 quarters with good PRF difference image offsets

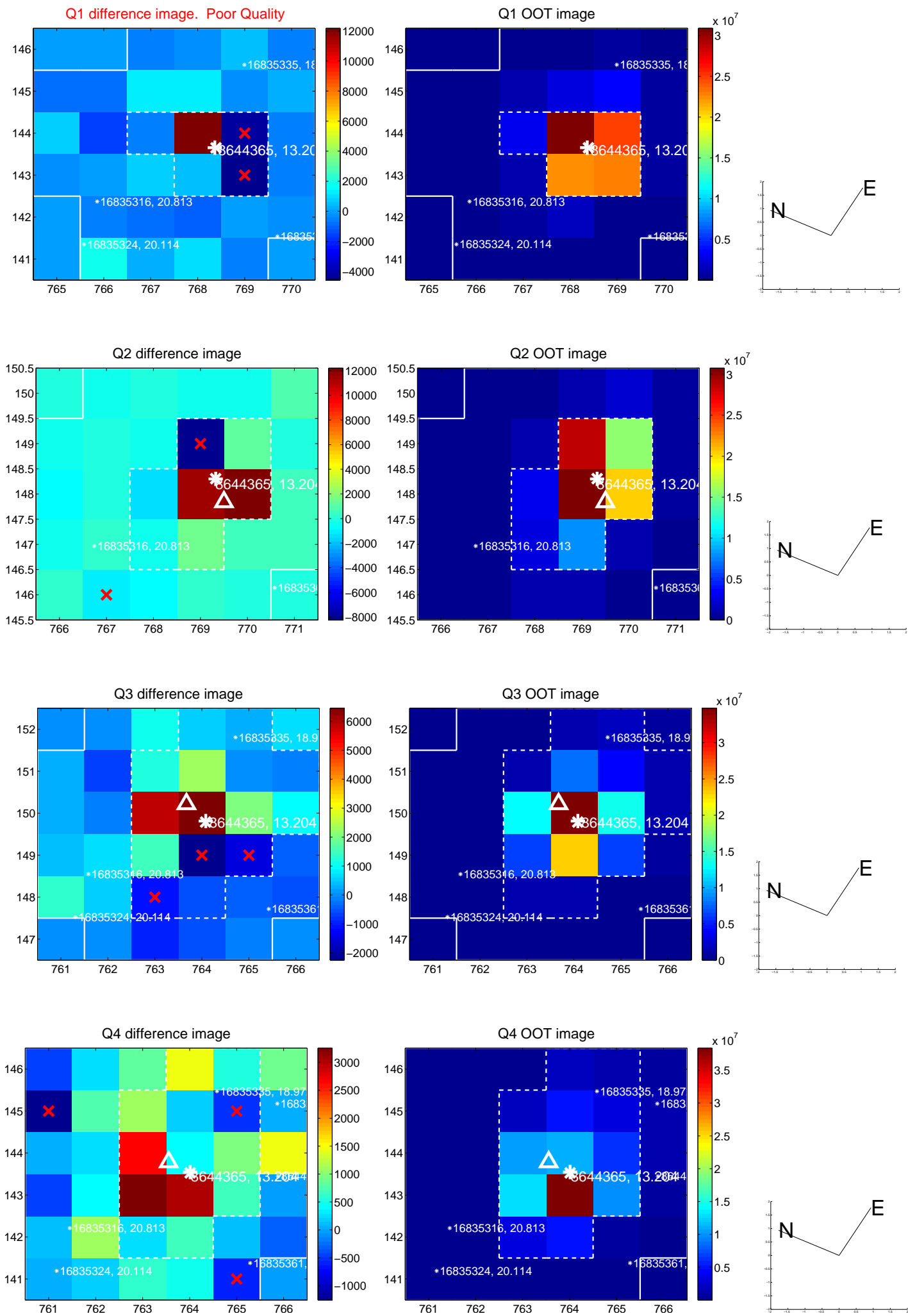
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.532 \pm 0.389$	1.37	$0.337 \pm 0.355$	$-0.412 \pm 0.410$
PRF-fit source offset from KIC position	$0.563 \pm 0.387$	1.45	$0.393 \pm 0.363$	$-0.404 \pm 0.409$
photometric centroid source offset	$0.44 \pm 0.63$	0.70	$0.38 \pm 0.65$	$0.22 \pm 0.54$

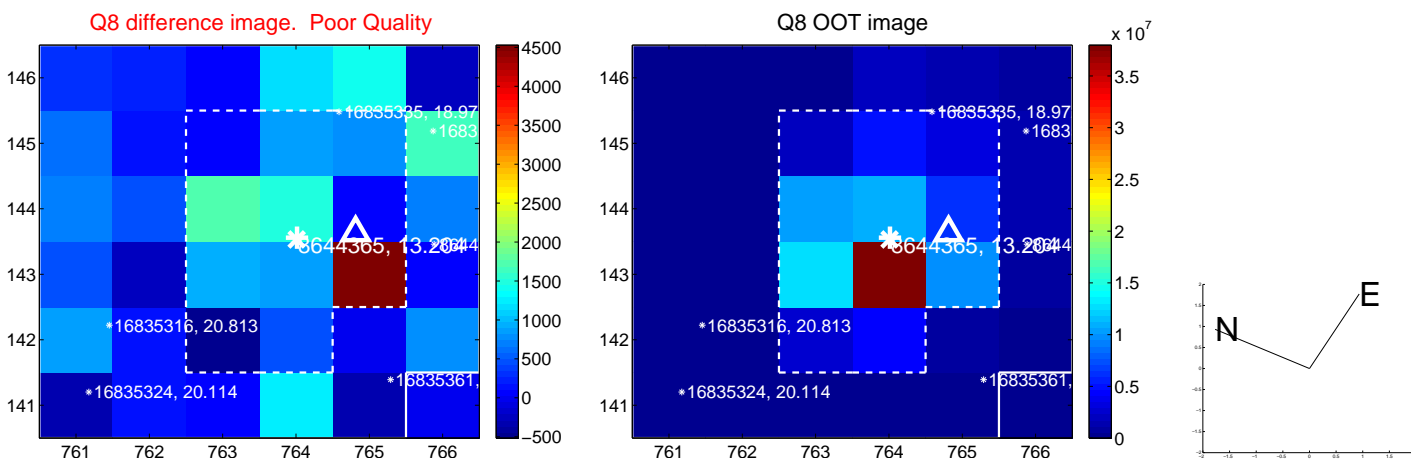
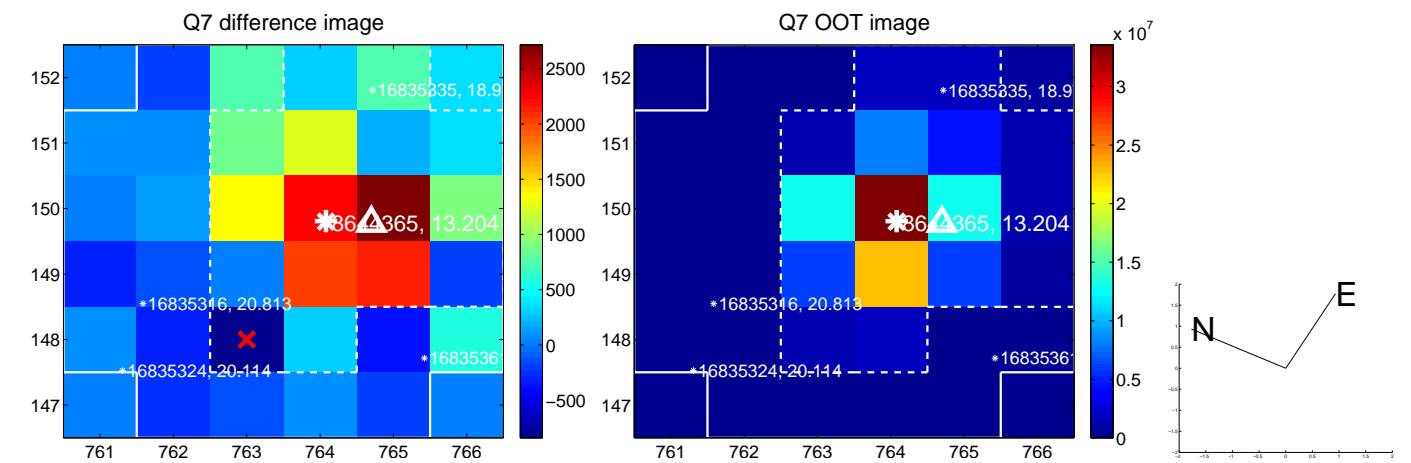
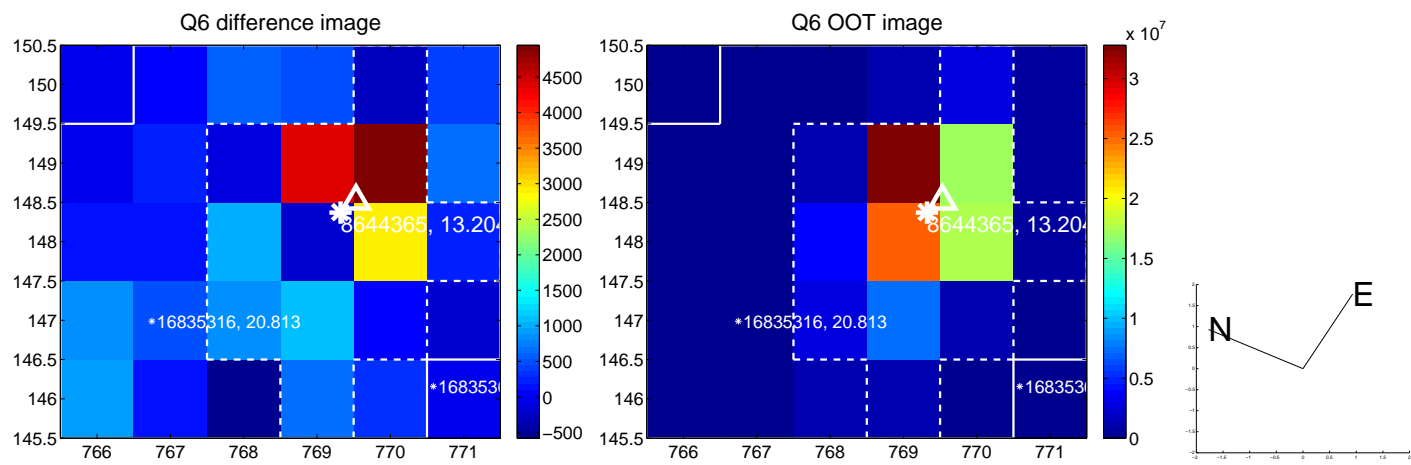
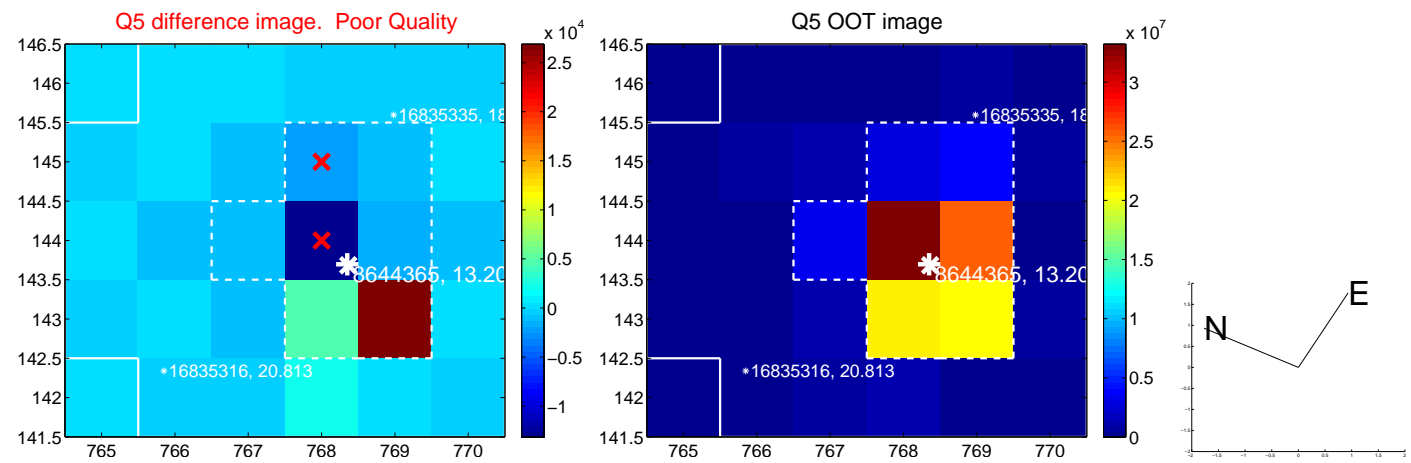


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



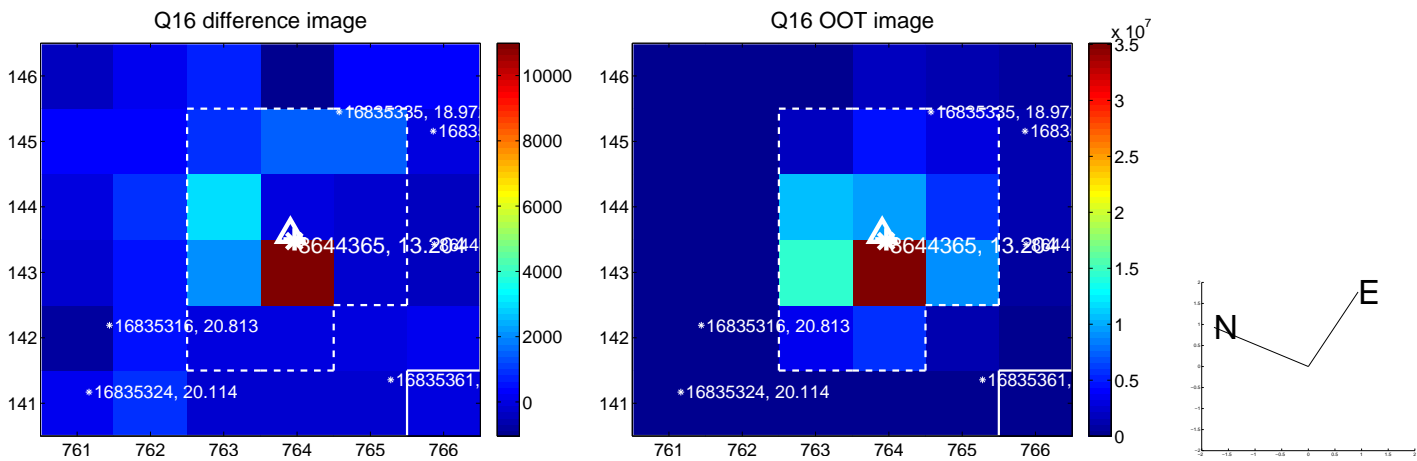
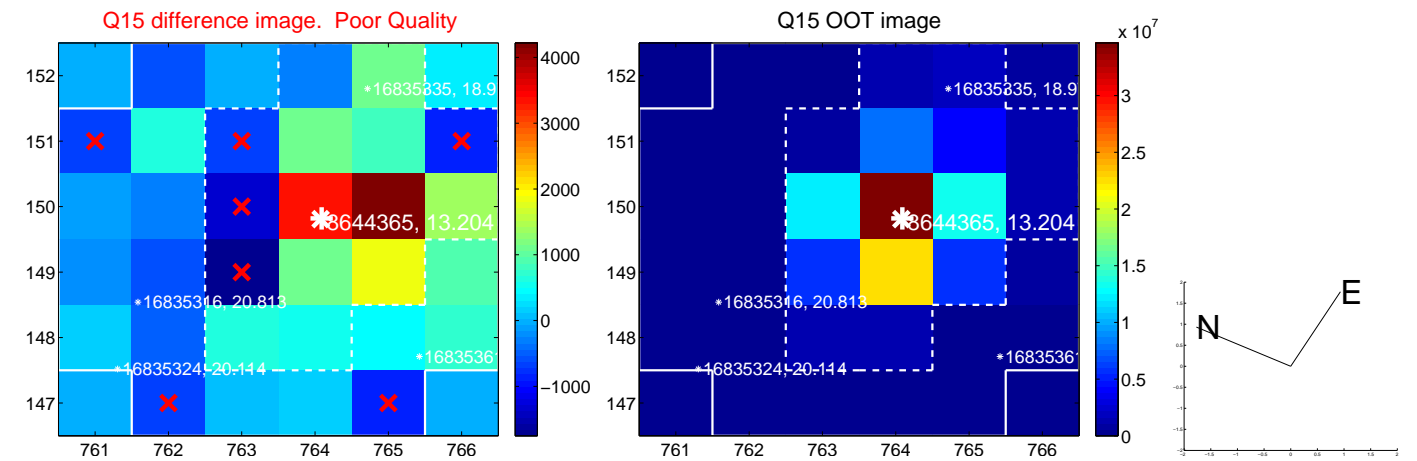
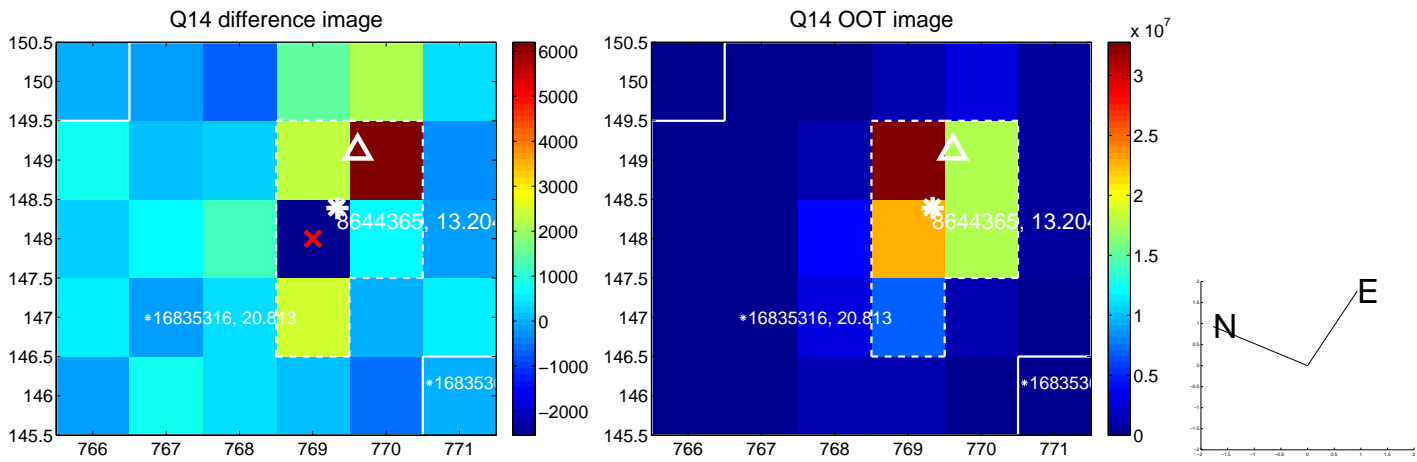
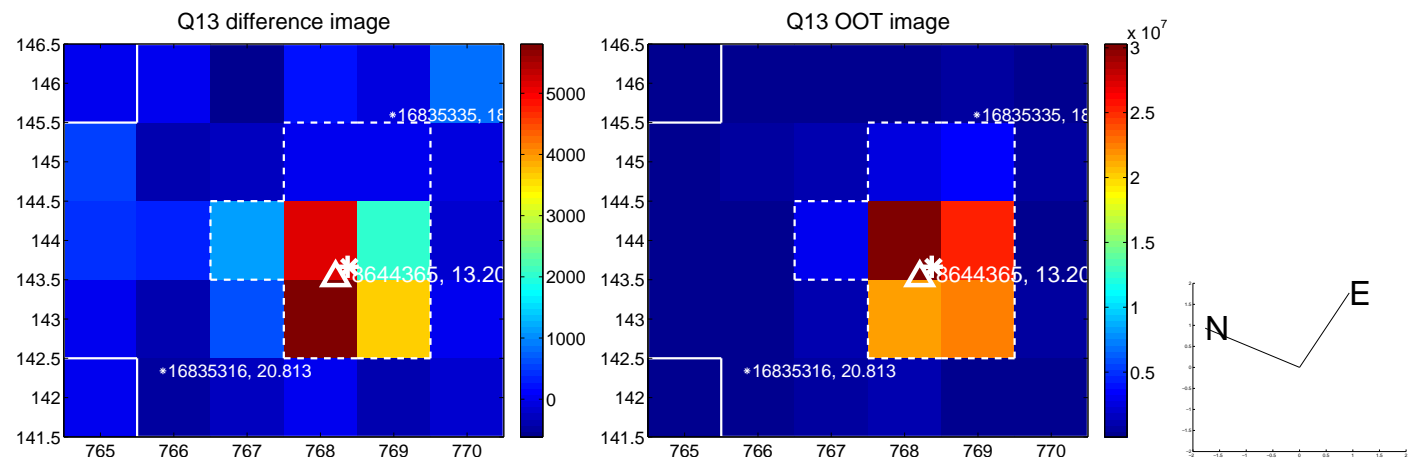
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



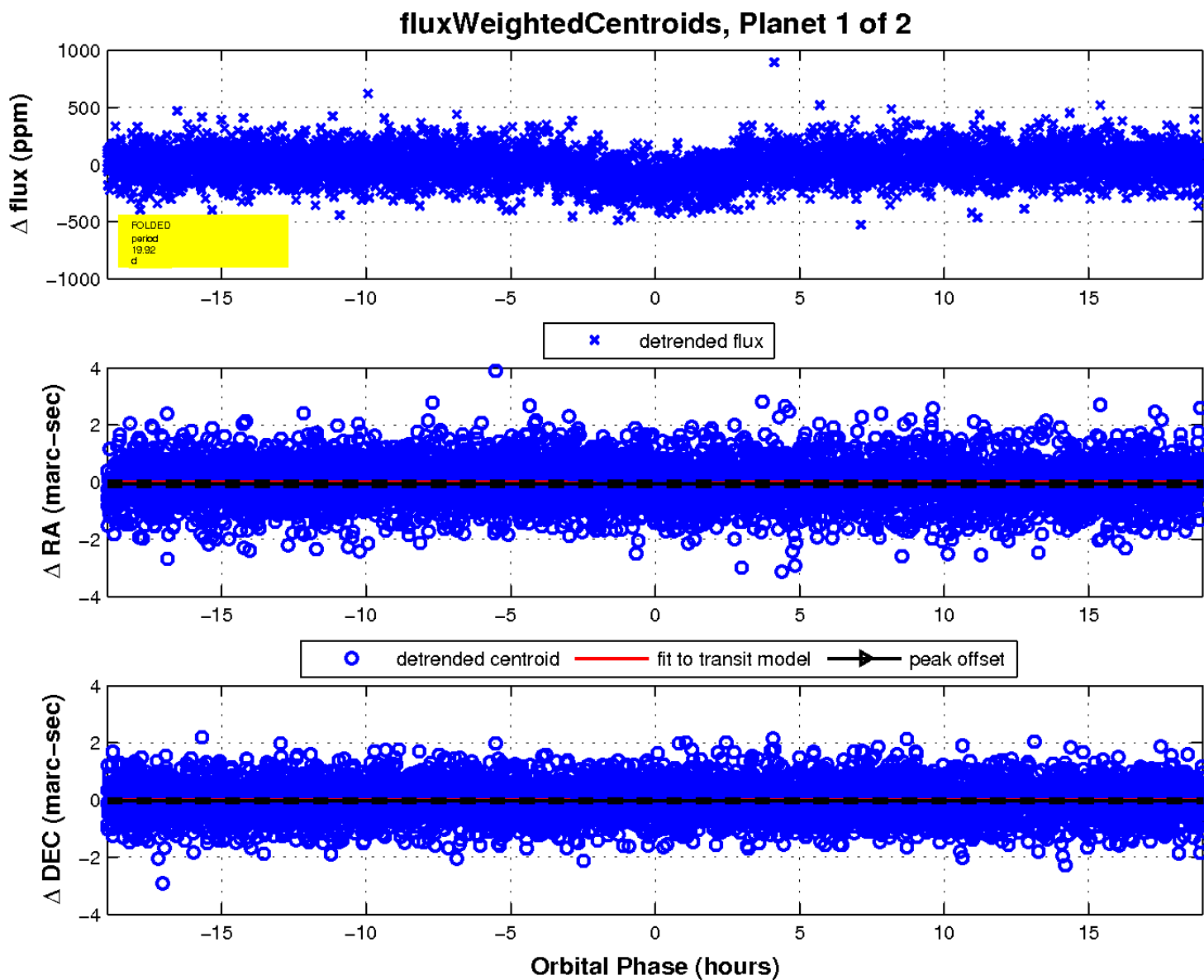
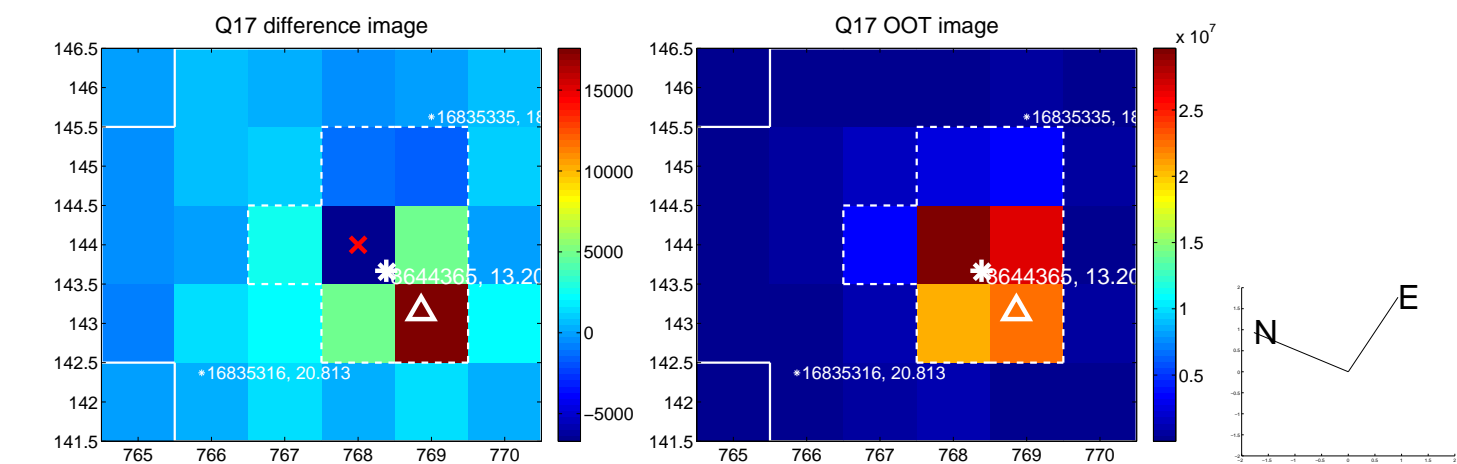




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

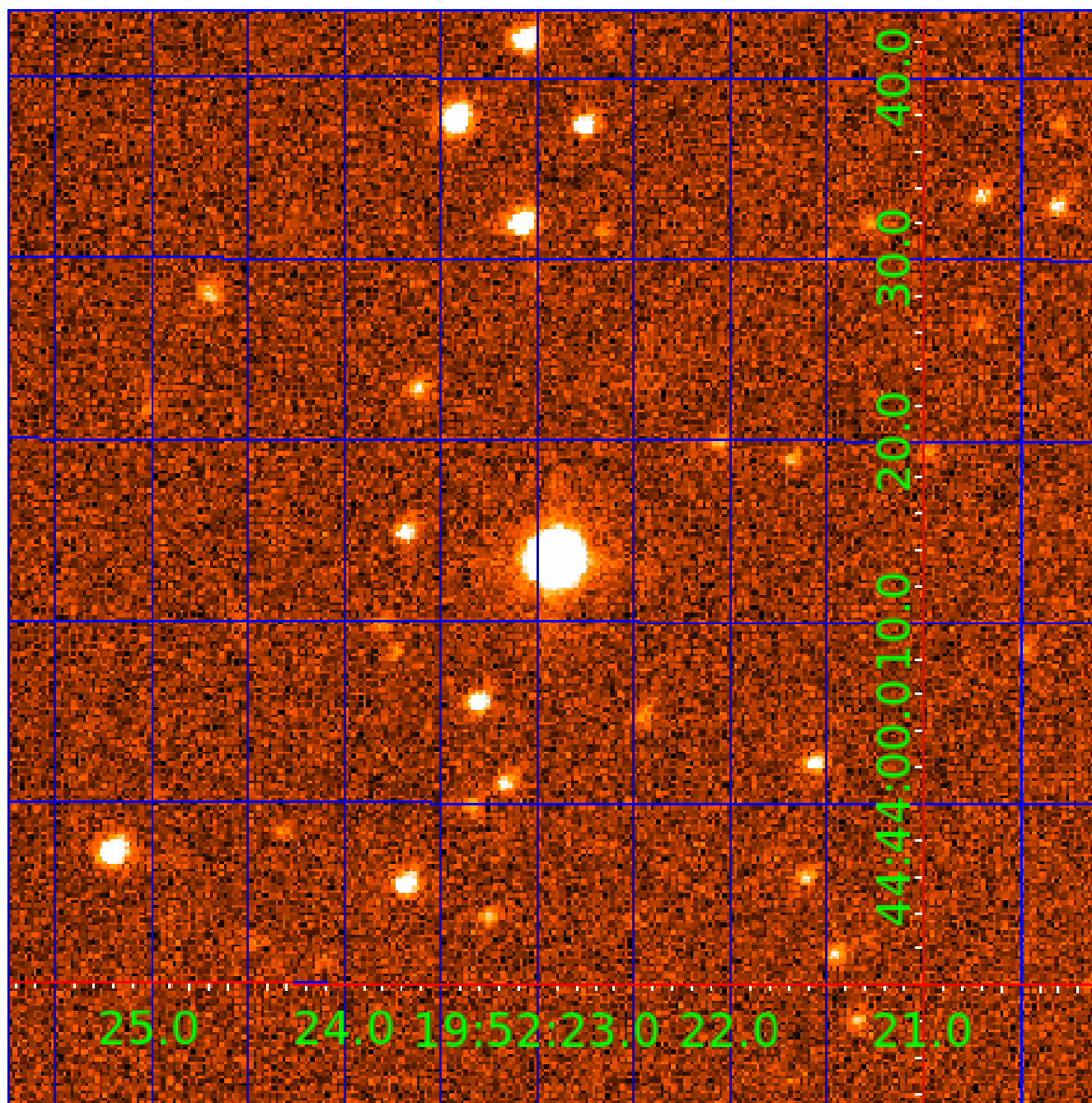


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\Delta$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 008644365

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008644365-01	OBS	3384.02	19.916031	139.362945	134.7	6.317	22.3	22.9	1.09	6047	1.49	66.42
008644365-02	OBS	3384.01	10.548433	139.063689	99.2	1.226	9.9	11.0	1.09	6047	1.30	154.98

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008644365-01	OBS	PC	0.98	0	0	0	0	NO_COMMENT
008644365-02	OBS	PC	1.00	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.

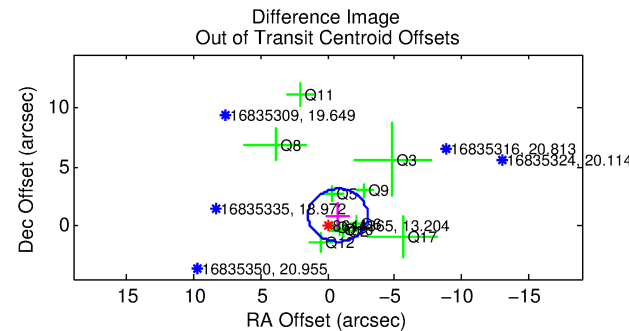
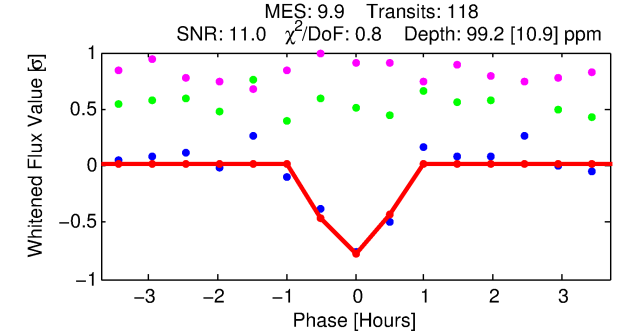
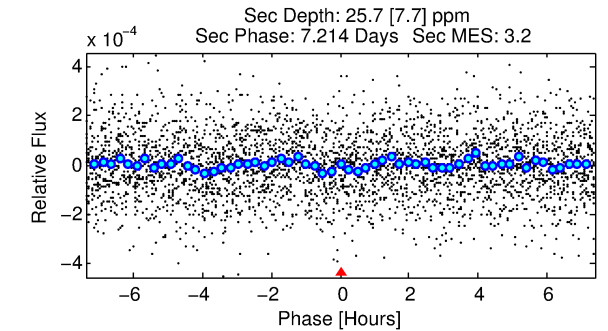
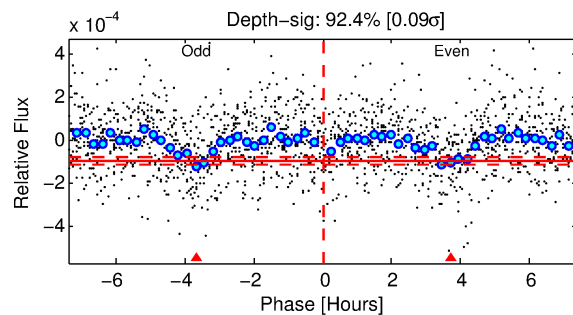
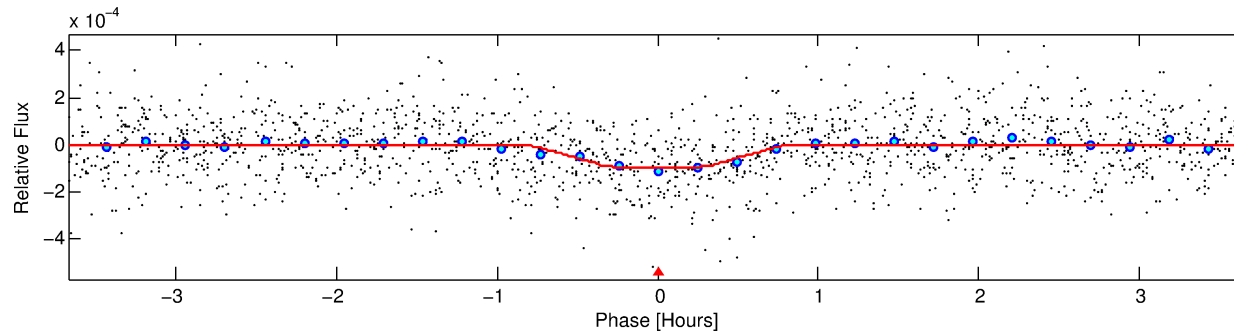
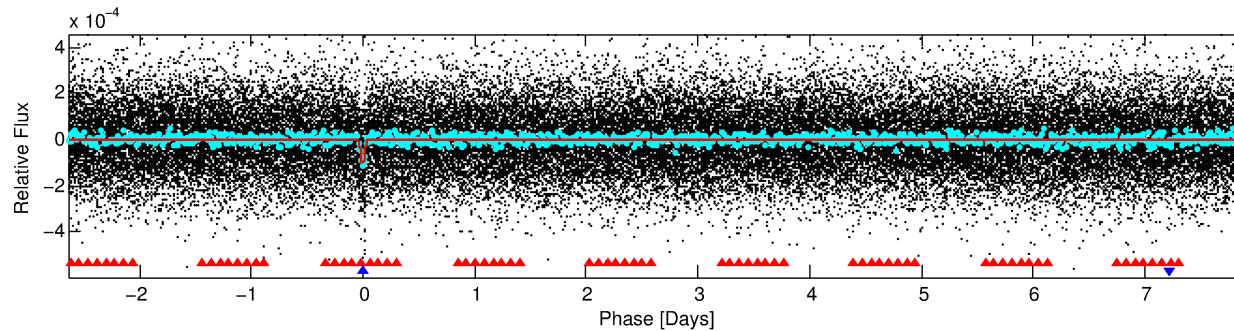
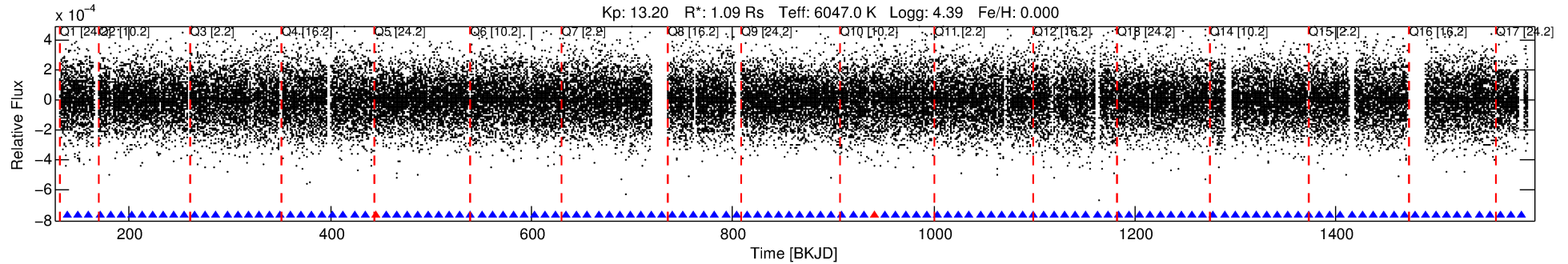
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008644365-02

No Significant Match Found

# DV One-Page Summary

KIC: 8644365 Candidate: 2 of 2 Period: 10.548 d  
KOI: K03384.01 Corr: 0.934



## DV Fit Results:

Period = 10.54843 [0.00004] d  
Epoch = 139.0637 [0.0032] BKJD  
Rp/R\* = 0.0109 [0.0073]  
a/R\* = 29.01 [100.34]  
b = 0.91 [0.67]  
Seff = 154.98 [36.54]  
Teq = 900 [53] K  
Rp = 1.30 [0.90] Re  
a = 0.0960 [0.0140] AU  
Ag = 76.84 [106.80] [0.71 $\sigma$ ]  
Teff = 4118 [1416] K [2.27 $\sigma$ ]

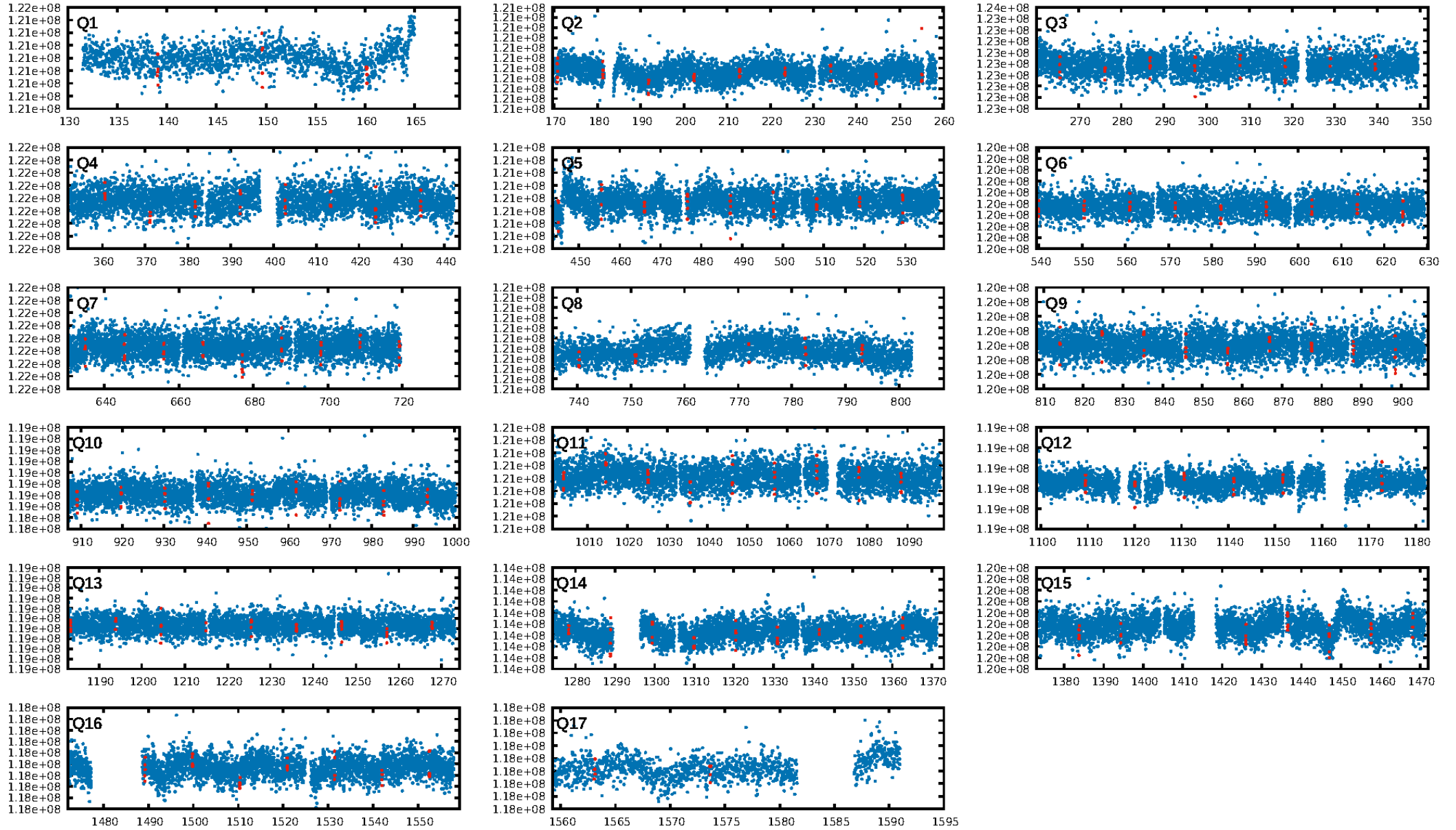
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [34.94 $\sigma$ ]  
ModelChiSquare2-sig: 99.4%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 4.78e-22  
RollingBand-fgt: 0.98 [113/115]  
GhostDiagnostic-chr: 3.081  
Centroid-sig: 17.9%  
Centroid-so: 1.844 arcsec [1.35 $\sigma$ ]  
OotOffset-rm: 1.162 arcsec [1.56 $\sigma$ ]  
KicOffset-rm: 1.143 arcsec [1.43 $\sigma$ ]  
OotOffset-st: 4/2/2/3 [11]  
KicOffset-st: 4/2/2/3 [11]  
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DiffImageOverlap-fno: 1.00 [17/17]

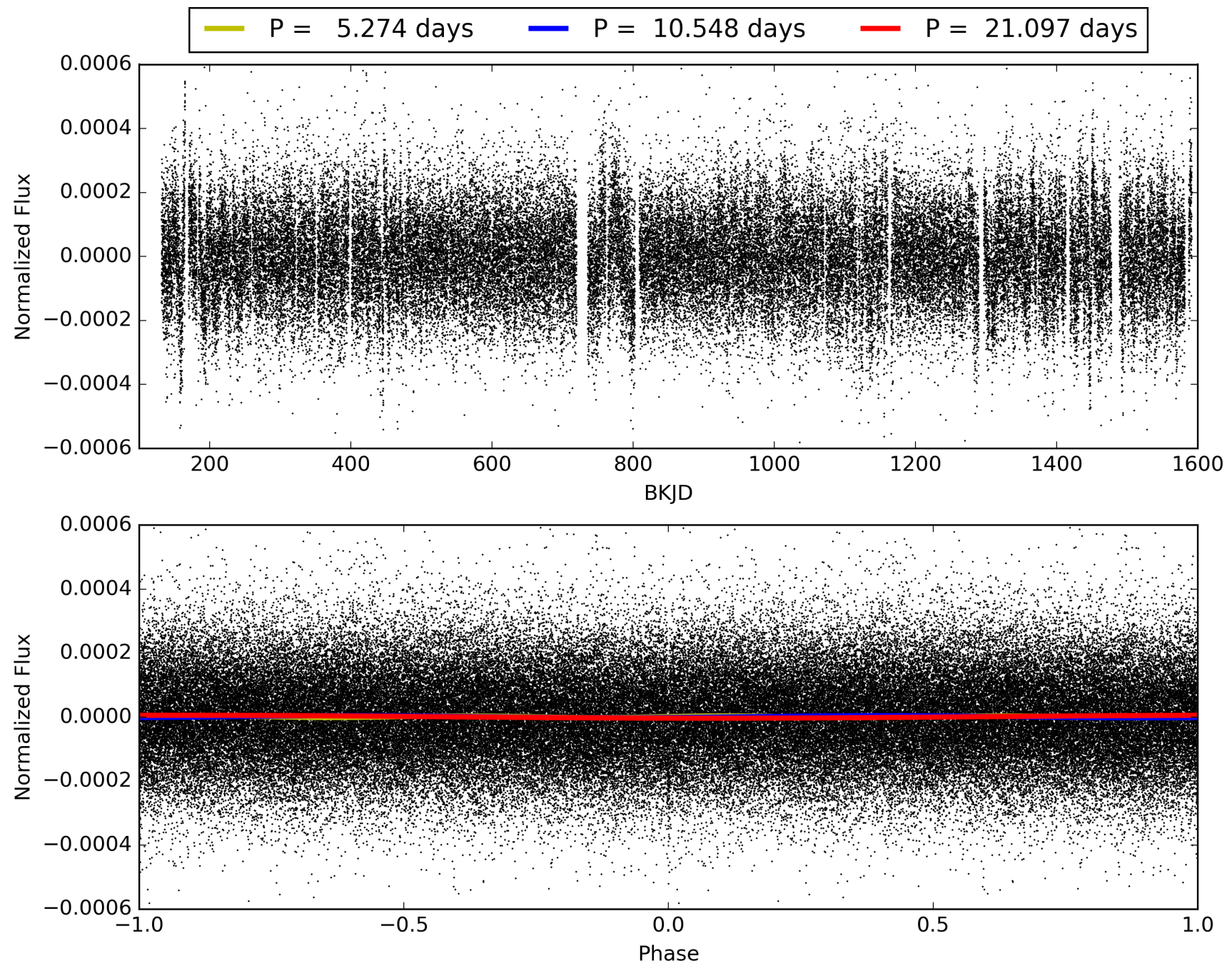
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 17:35:11 Z

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

# TCE 008644365-02, PDC Light Curves



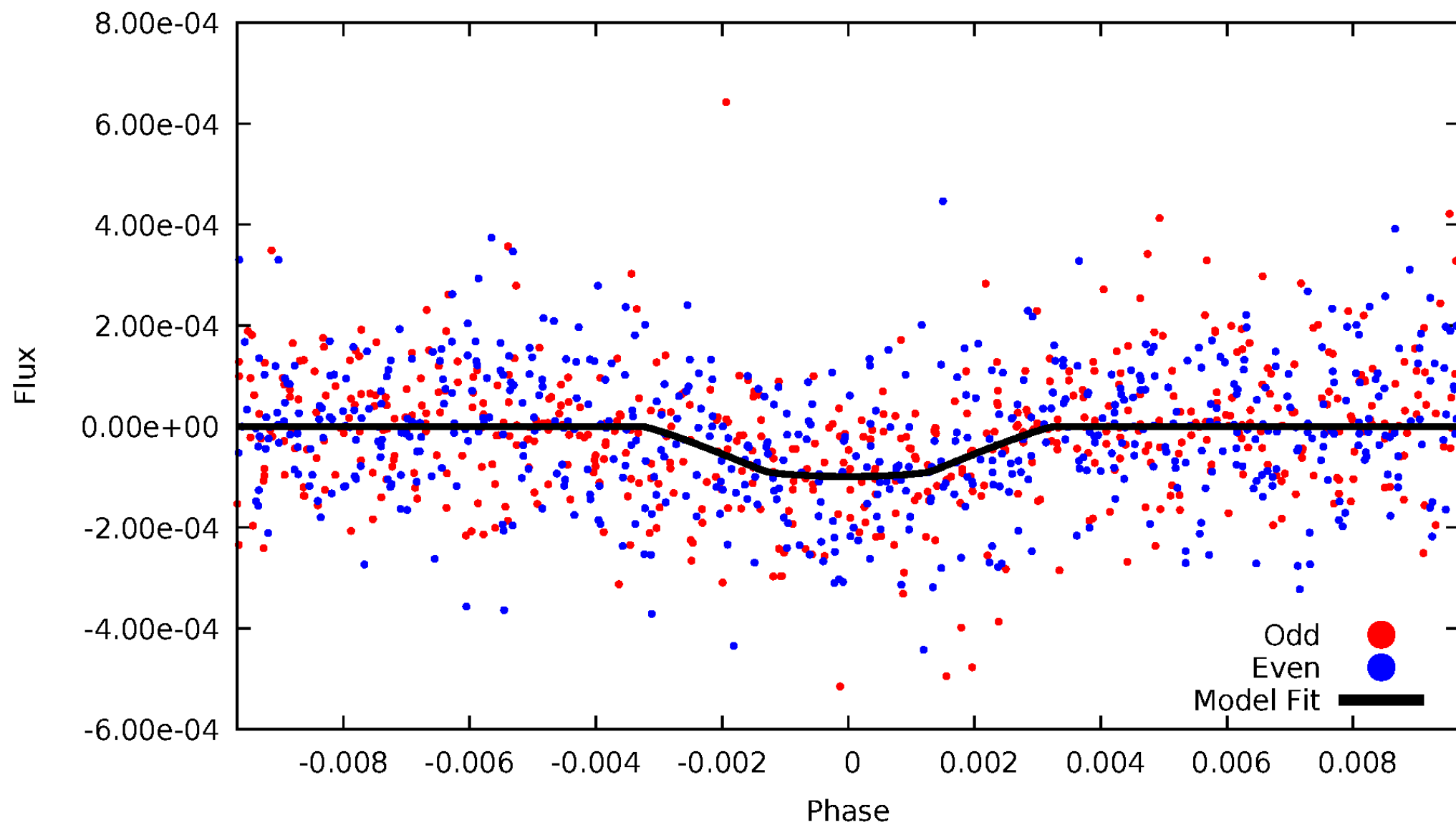
TCE 008644365-02





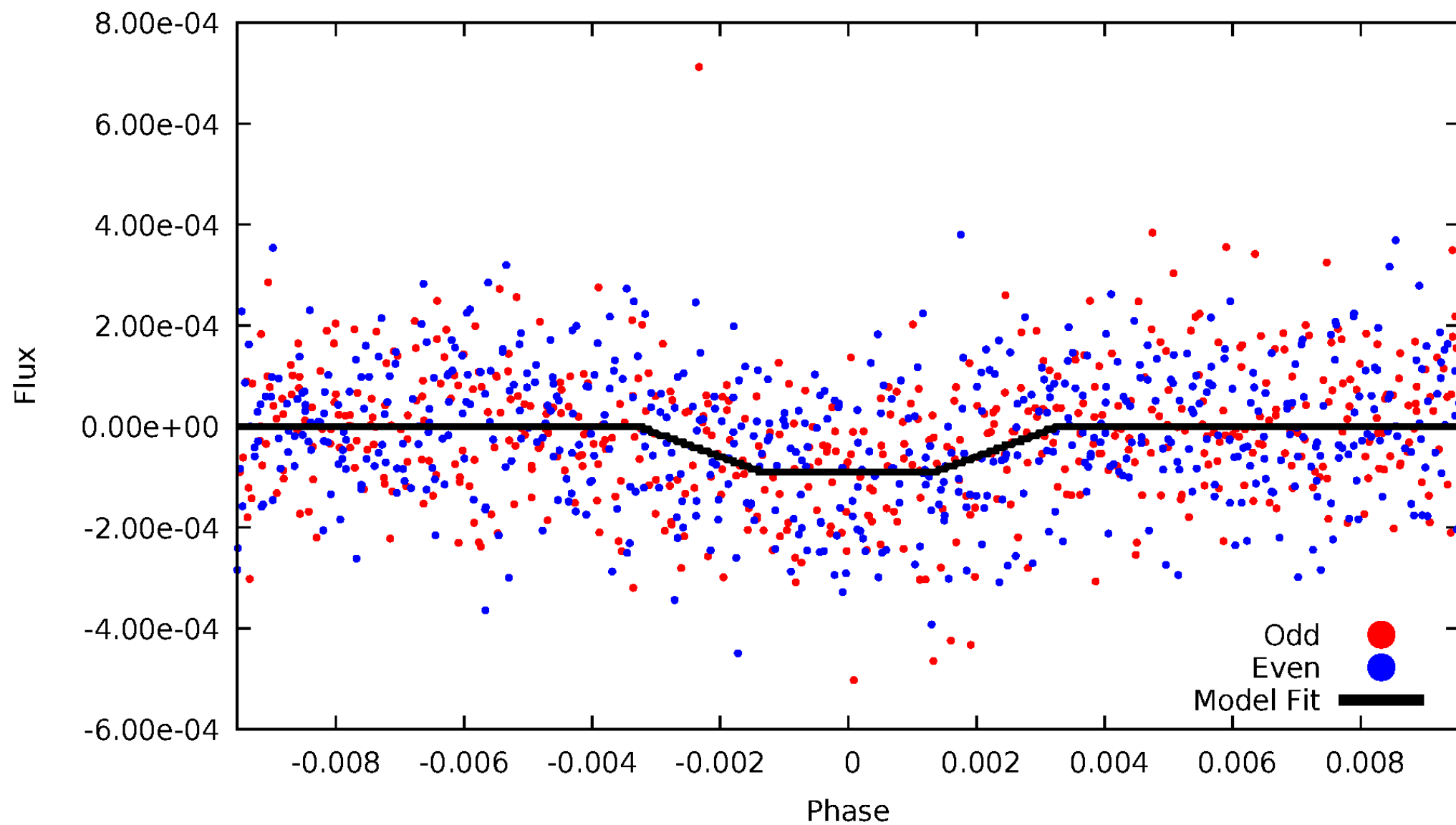
# DV Odd/Even

TCE 008644365-02



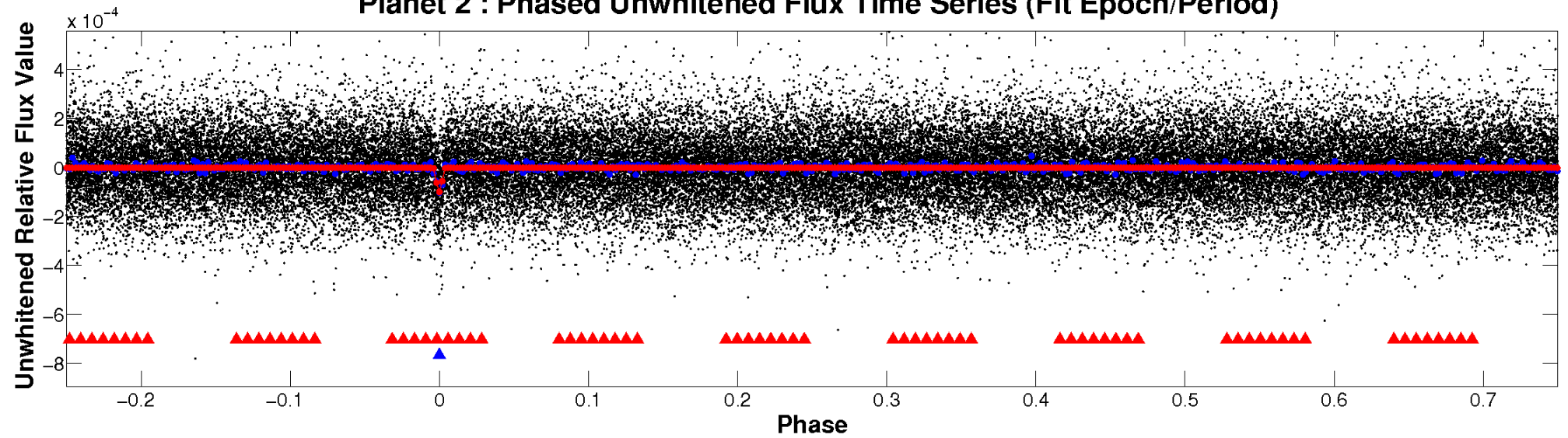
# ALT Odd/Even

TCE 008644365-02

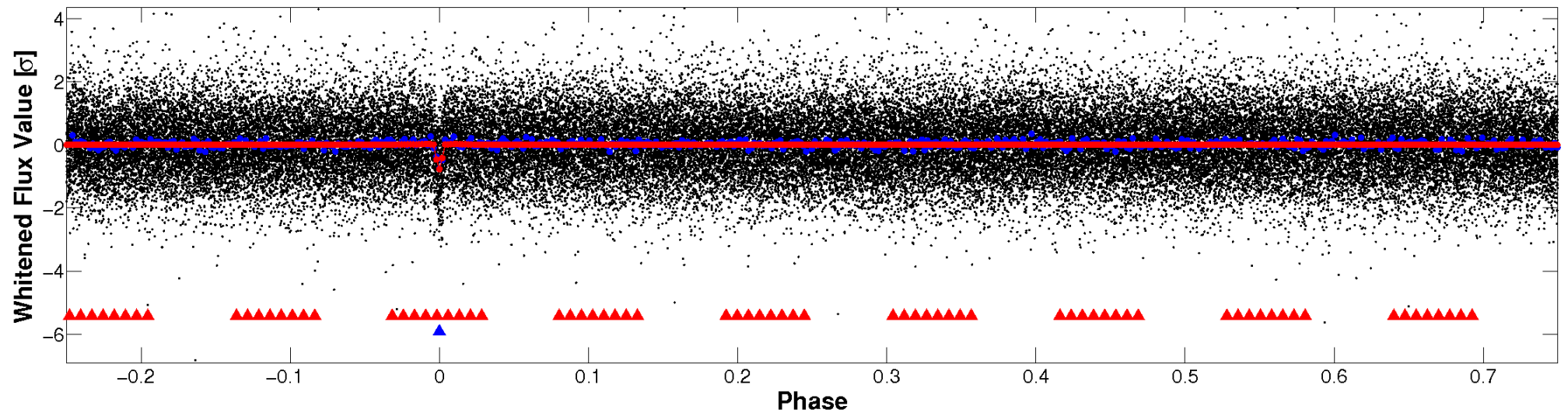


# Non-Whitened Vs. Whitened Light Curve

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

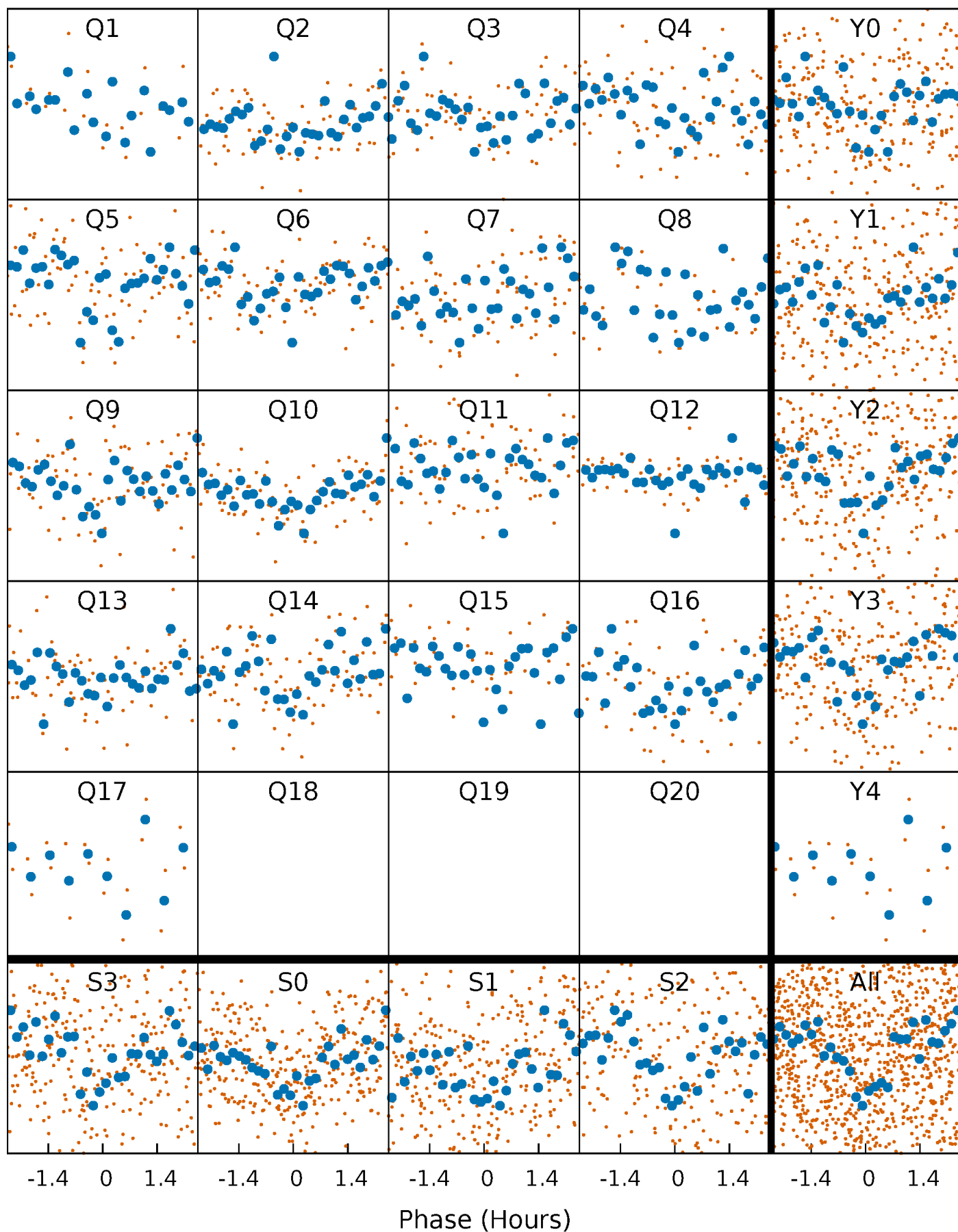


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



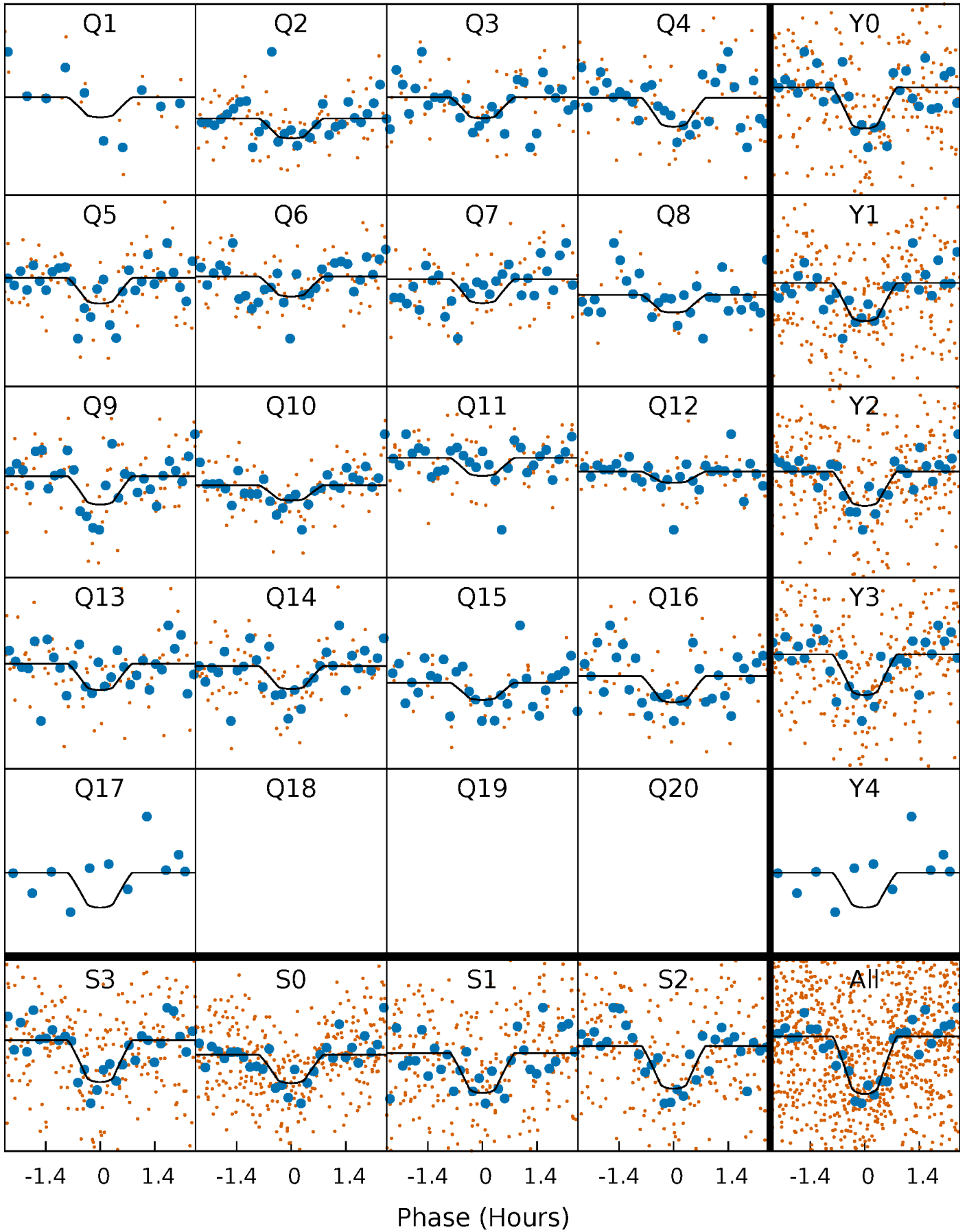
# PDC Quarter-Phased Transit Curves

TCE 008644365-02   P= 10.548433 Days    $T_0=139.063689$  (BKJD)



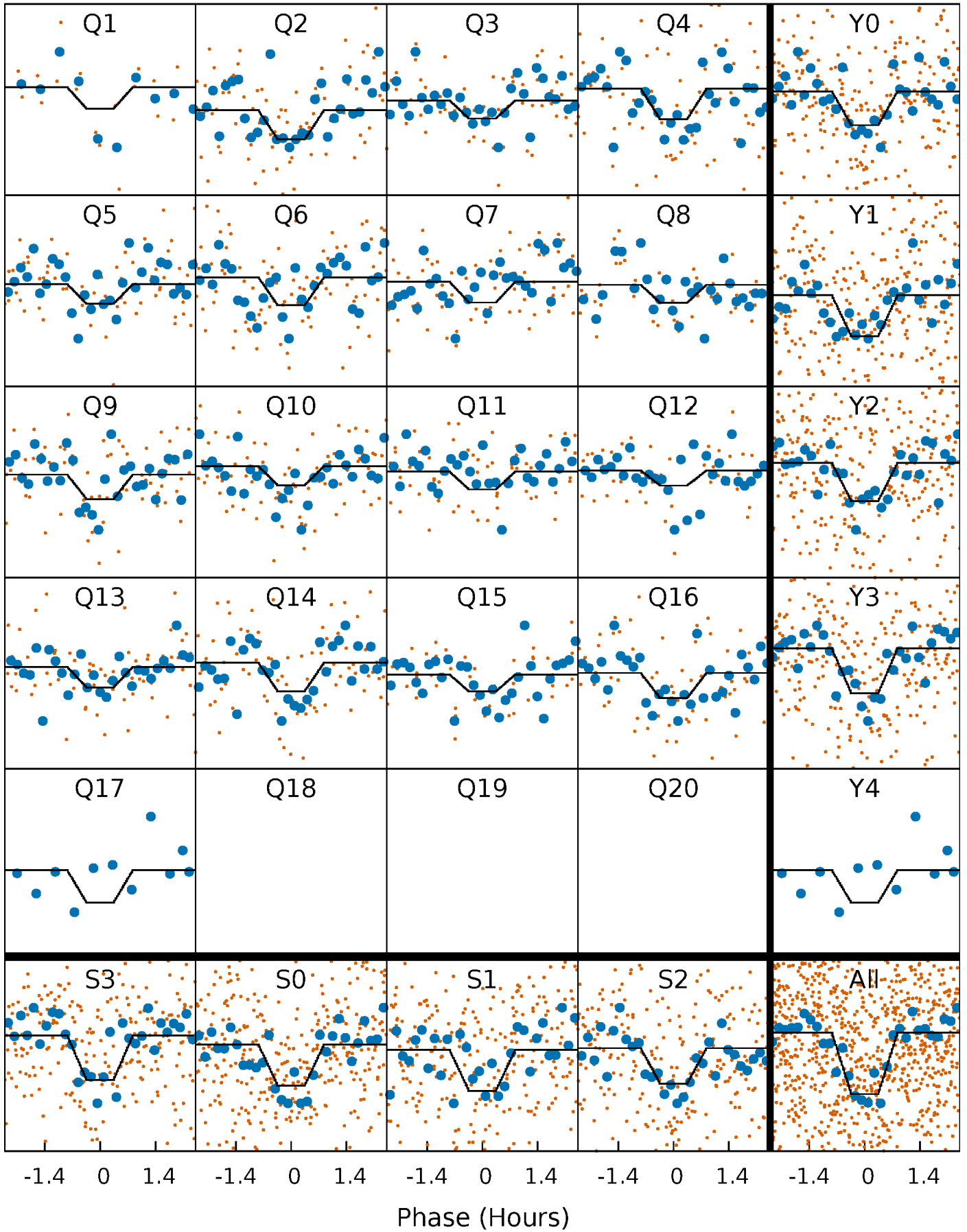
# DV Quarter-Phased Transit Curves

TCE 008644365-02 P= 10.548433 Days  $T_0=139.063689$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

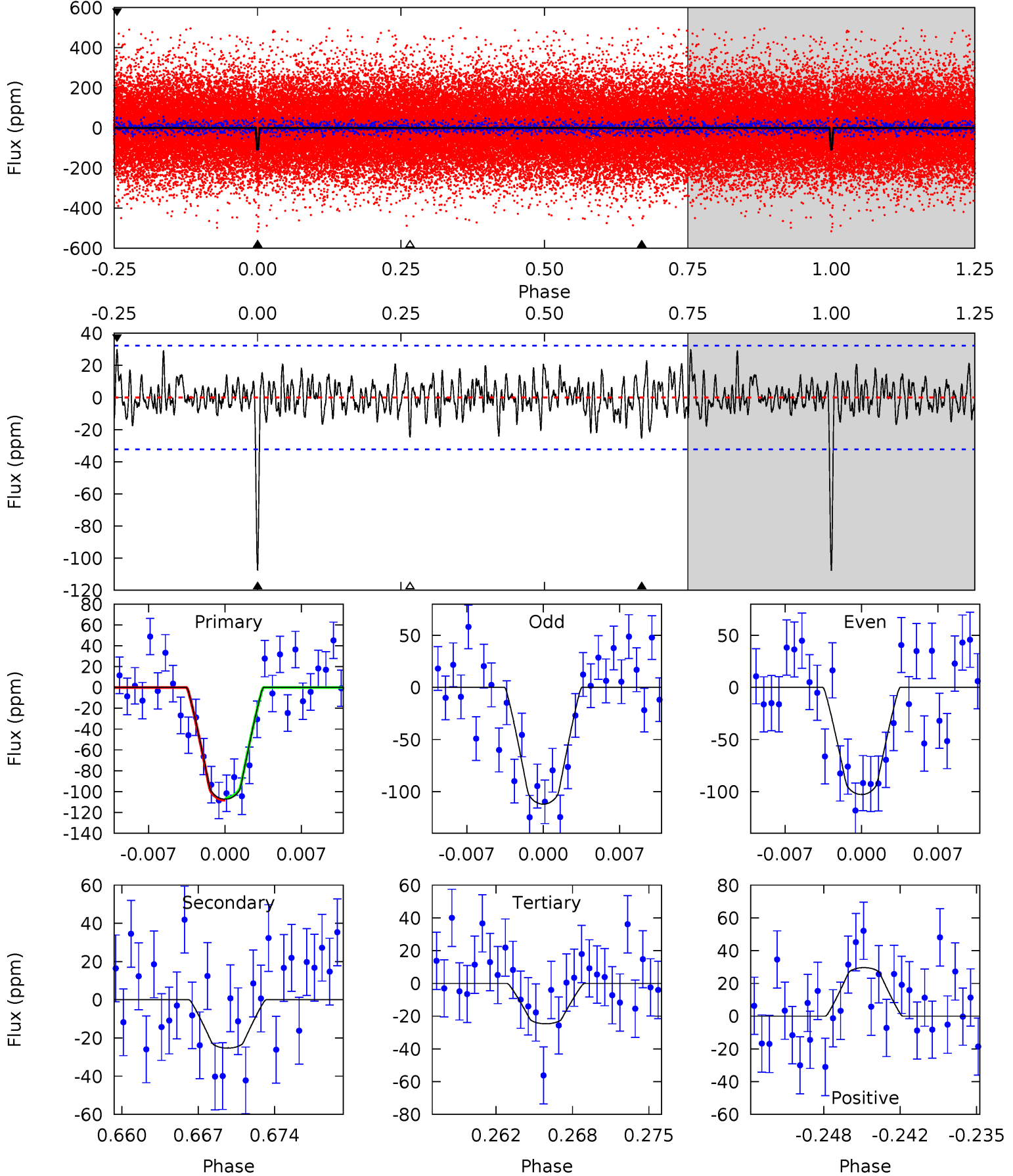
TCE 008644365-02 P= 10.548355 Days  $T_0=139.068698$  (BKJD)



# DV Model-Shift Uniqueness Test

008644365-02,  $P = 10.548433$  Days,  $E = 128.515256$  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
17.0	4.01	3.90	4.69	5.11	2.72	1.33	13.1	12.3	0.11	-0.68	0.73	0.99	0.22	0.14

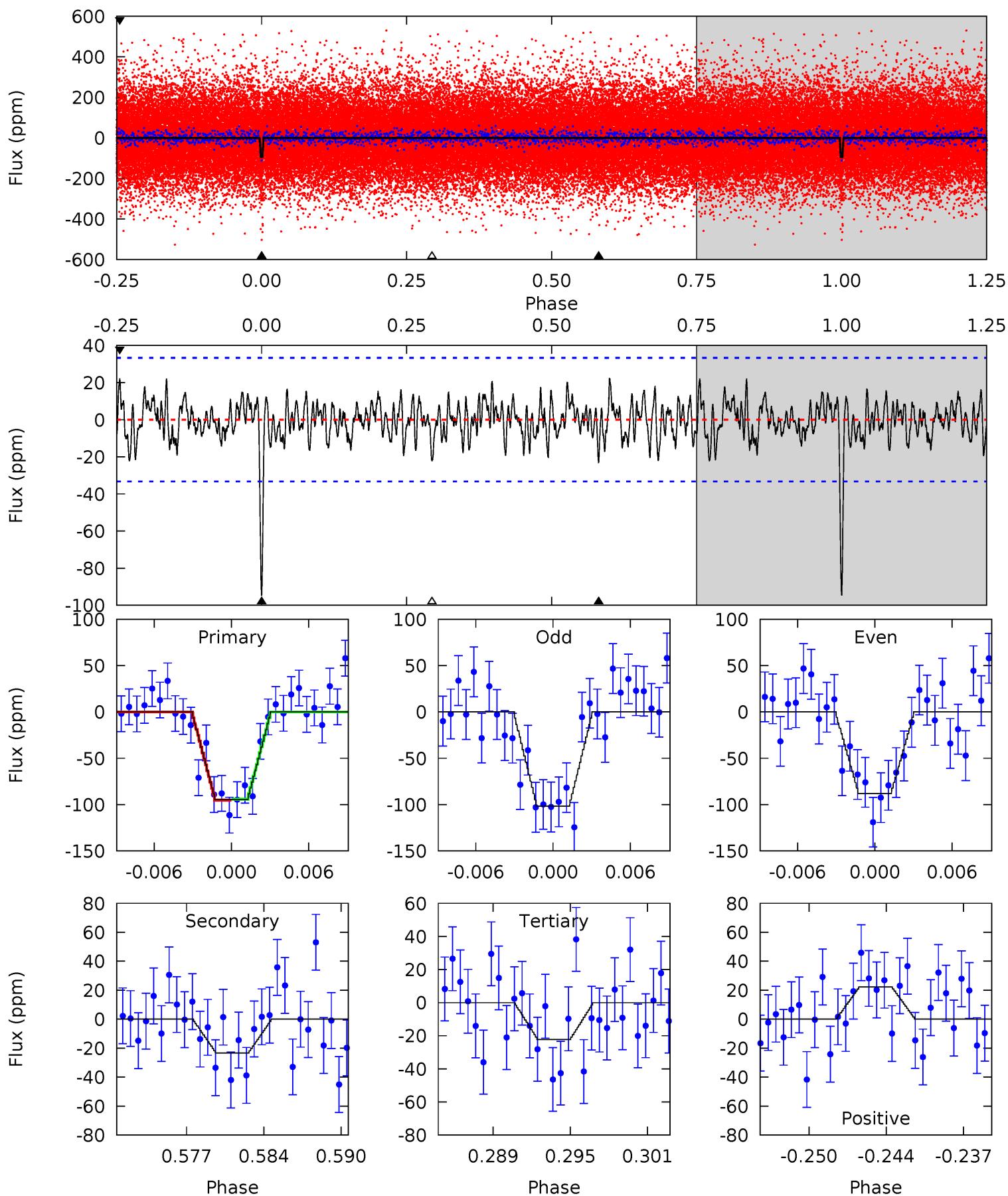




# Alt Model-Shift Uniqueness Test

008644365-02, P = 10.548355 Days, E = 128.520343 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
14.5	3.58	3.42	3.42	5.11	2.73	1.28	11.1	11.1	0.16	0.17	1.05	1.10	0.19	0.08



### Stellar Parameters For KIC 008644365

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6047^{+120}_{-133}$	$4.387^{+0.066}_{-0.123}$	$0.000^{+0.150}_{-0.150}$	$1.092^{+0.181}_{-0.097}$	$1.059^{+0.086}_{-0.070}$	$1.146^{+0.302}_{-0.404}$
	+2%/-2%	+2%/-3%	+inf%/-inf%	+17%/-9%	+8%/-7%	+26%/-35%
Source	SPE57	SPE57	SPE57	DSEP		

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

### Secondary Eclipse Parameters for KIC 008644365-02 / KOI 3384.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-25 \pm 6$	$1.38^{+0.92}_{-0.77}$	$1266^{+57}_{-43}$	$4245^{+1824}_{-682}$	$66^{+293}_{-42}$
Alt.	$-23 \pm 7$	$1.29^{+0.87}_{-0.75}$	$1264^{+55}_{-43}$	$4251^{+1944}_{-680}$	$66^{+321}_{-42}$

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

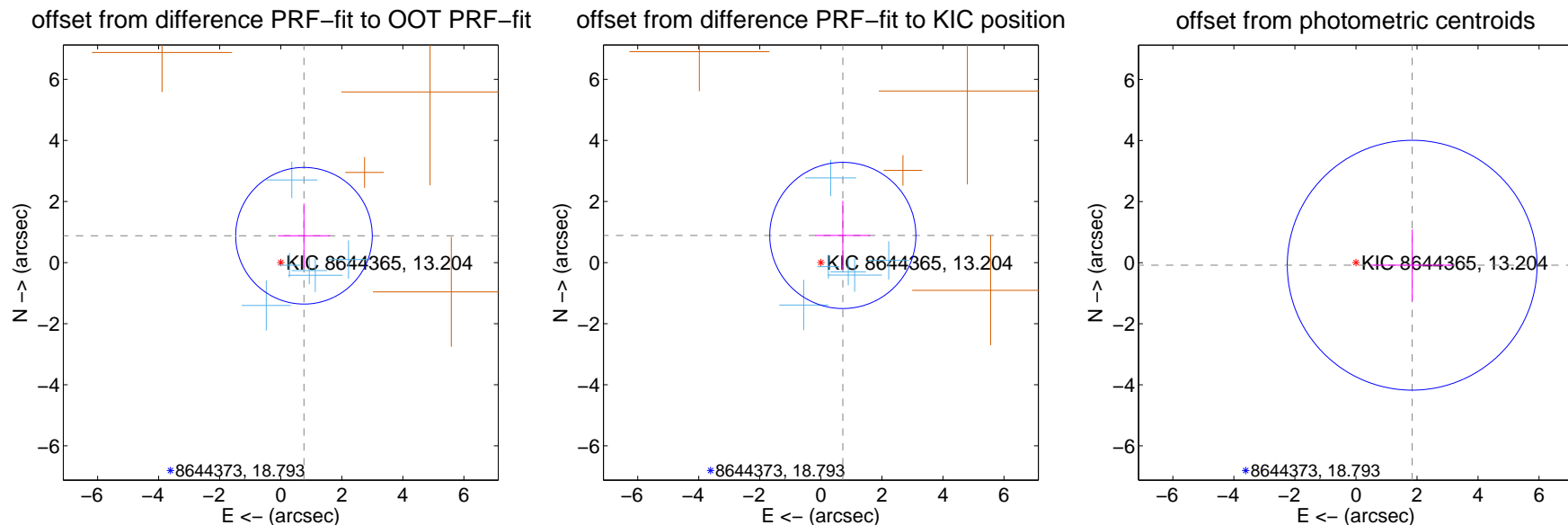
## DV Centroid Data

Supplemental centroid analysis for 008644365-02. Kepler magnitude: 13.20. Transit SNR 10.96

There are 6 quarters with good PRF difference image offsets

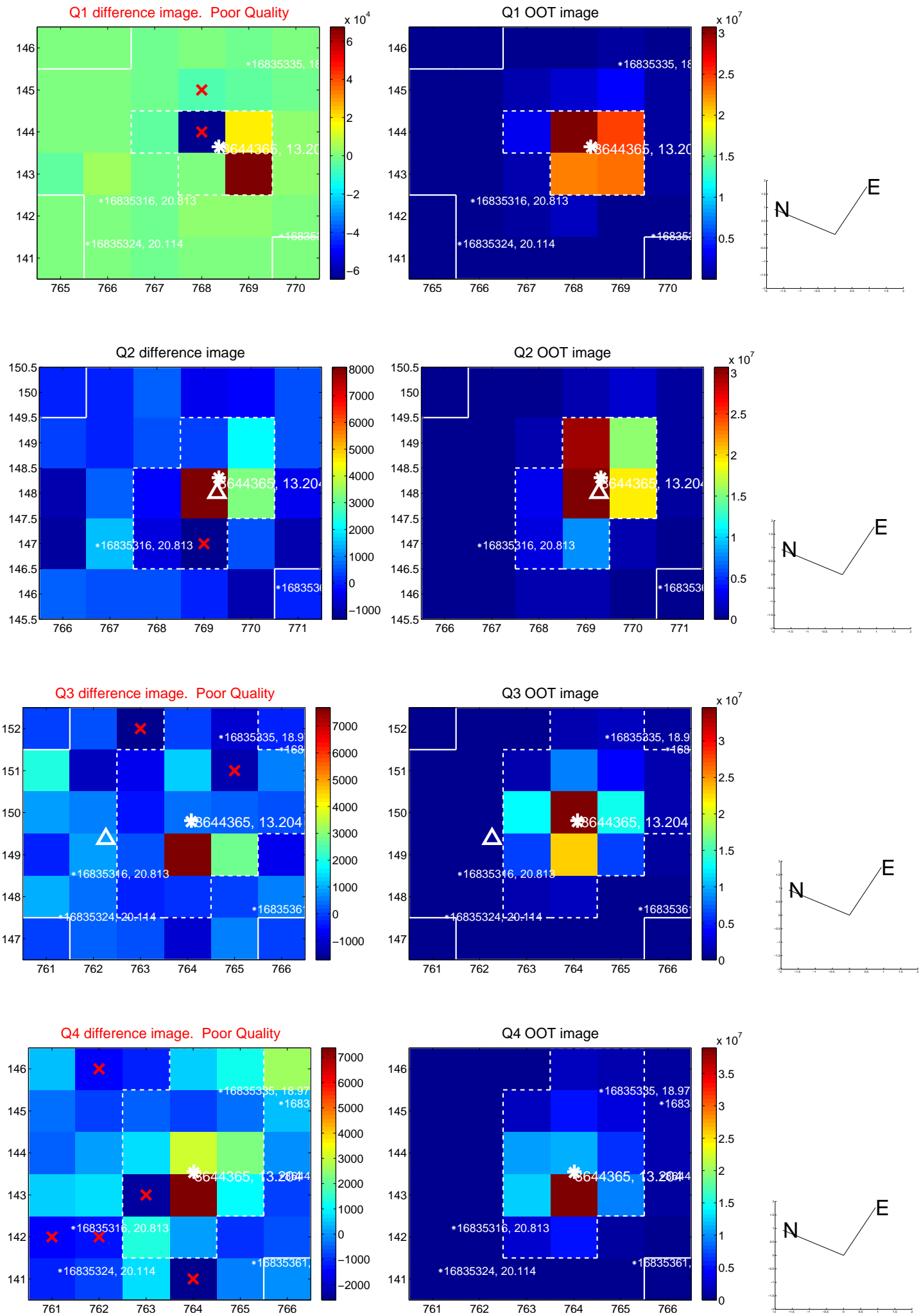
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.162 \pm 0.746$	1.56	$-0.761 \pm 0.856$	$0.878 \pm 1.054$
PRF-fit source offset from KIC position	$1.143 \pm 0.798$	1.43	$-0.719 \pm 0.898$	$0.889 \pm 1.129$
photometric centroid source offset	$1.84 \pm 1.36$	1.35	$-1.84 \pm 1.36$	$-0.08 \pm 1.17$

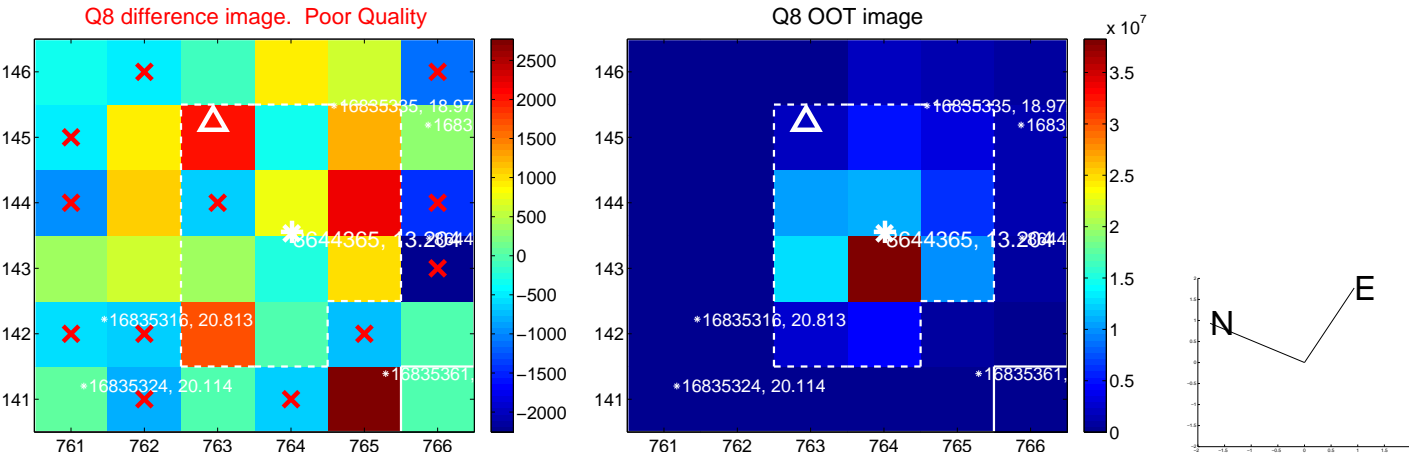
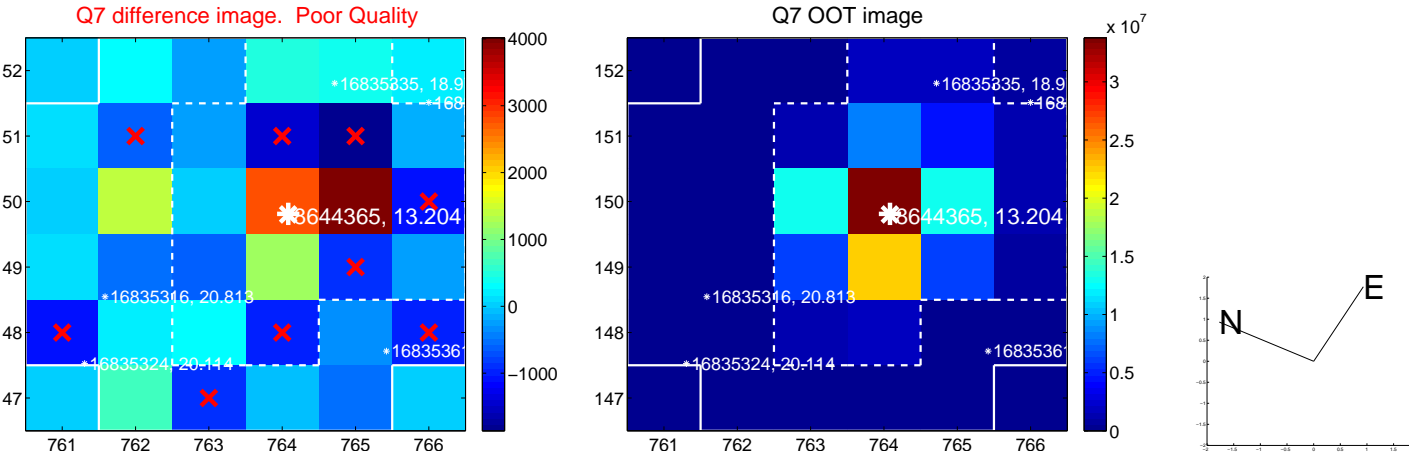
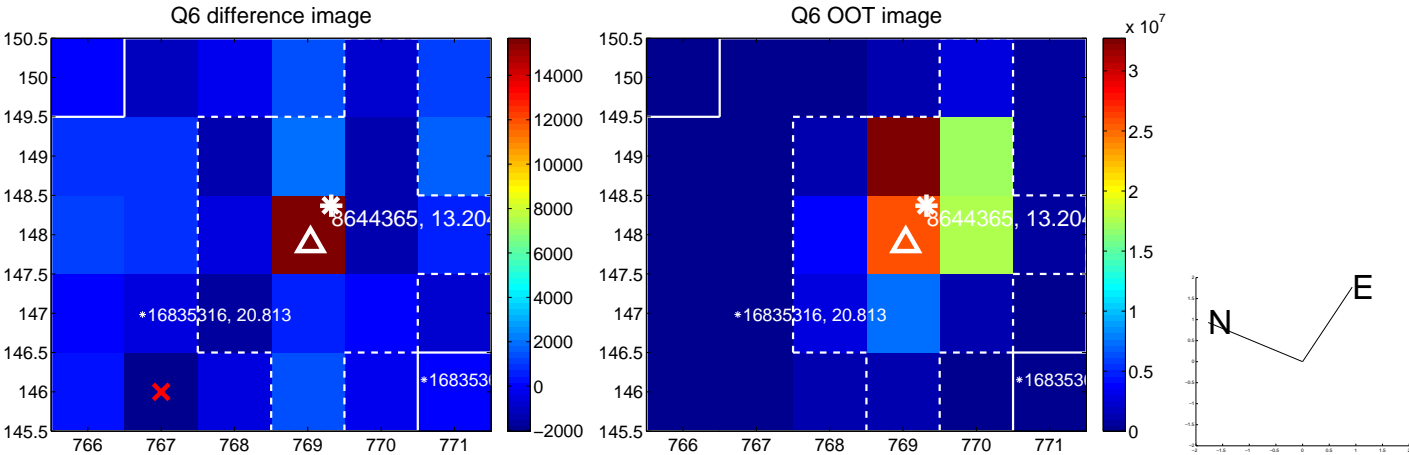
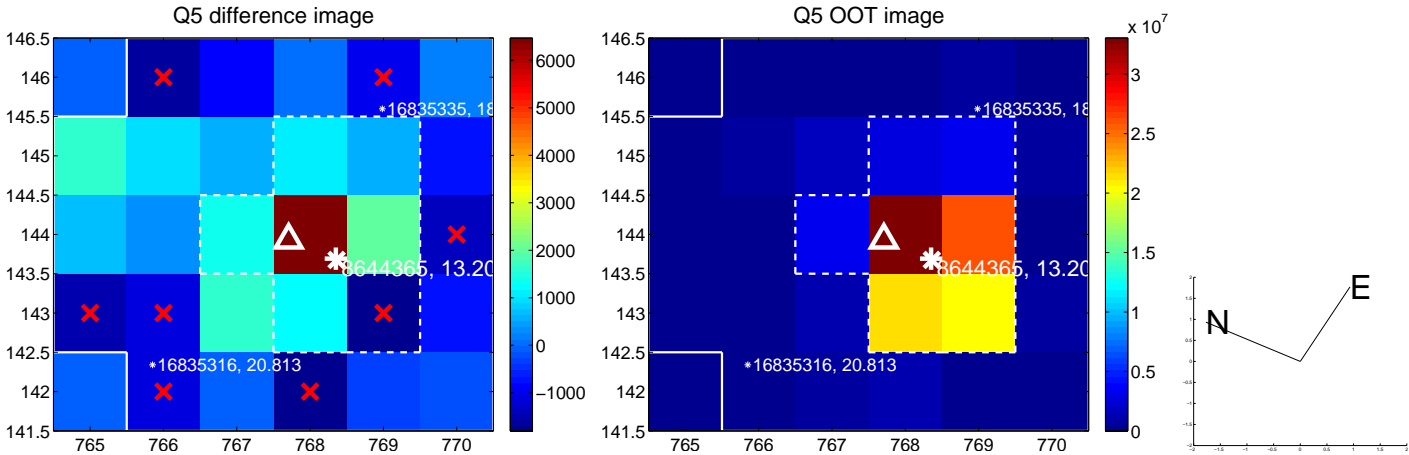


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

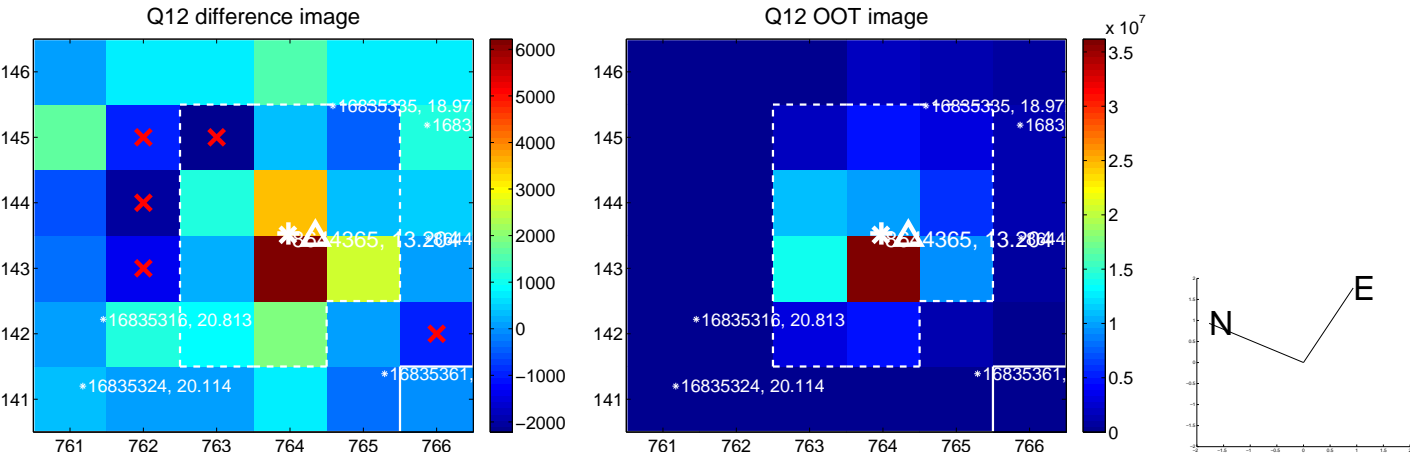
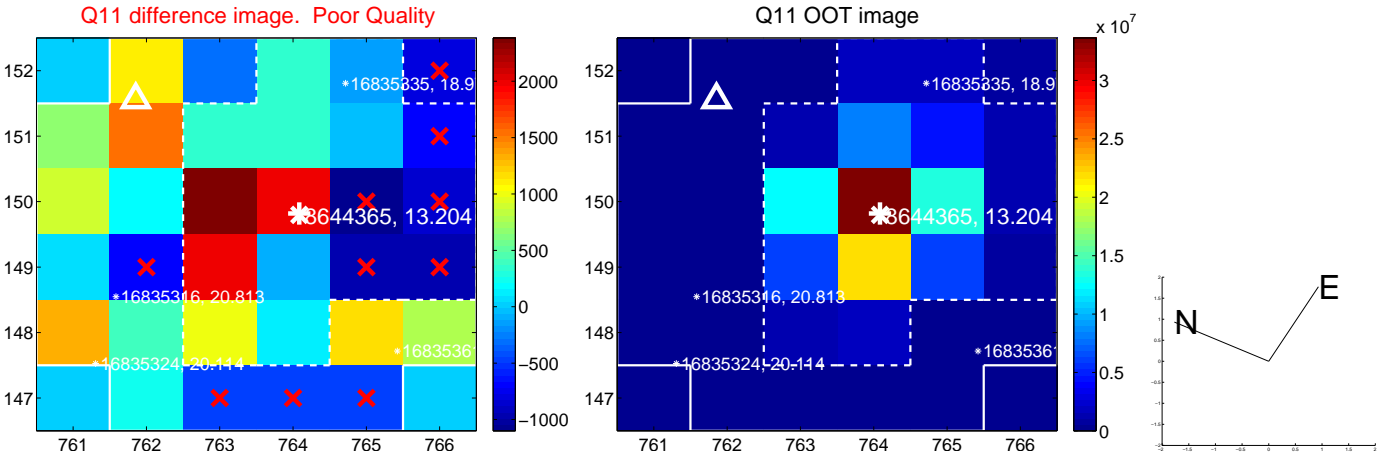
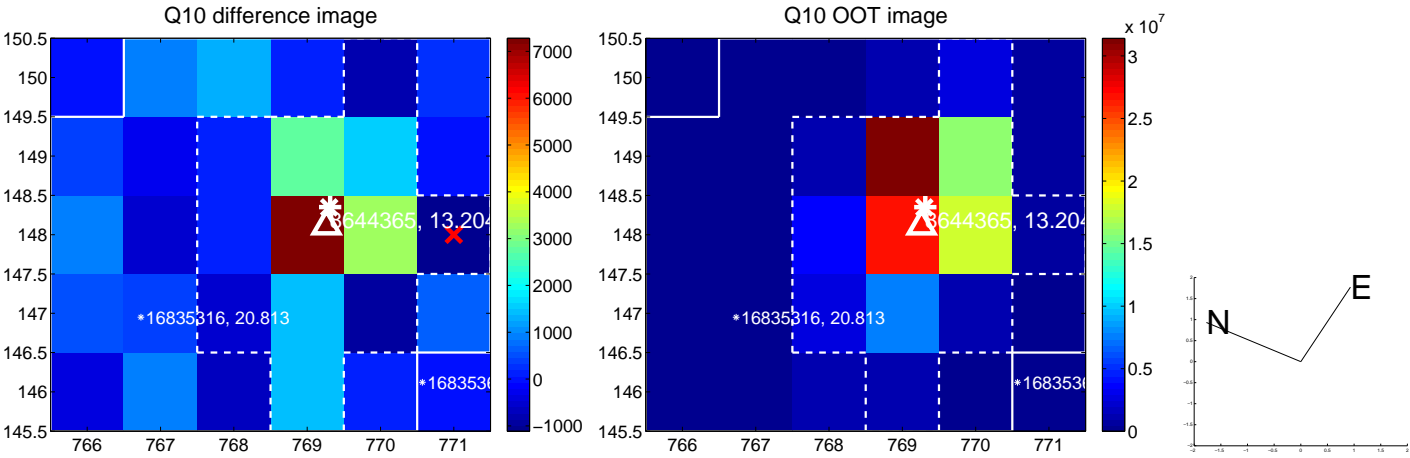
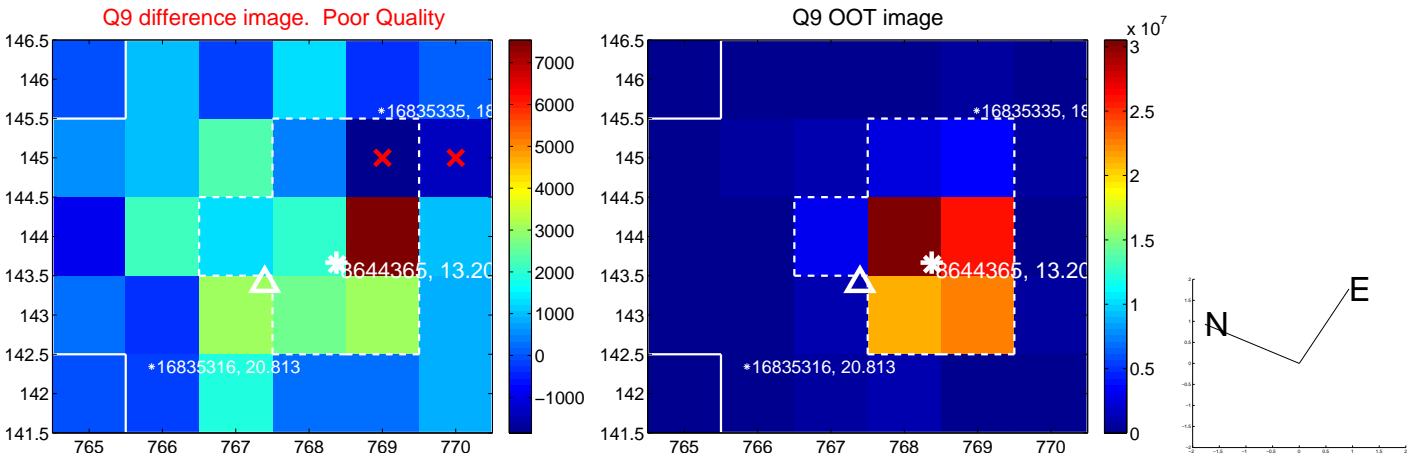
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



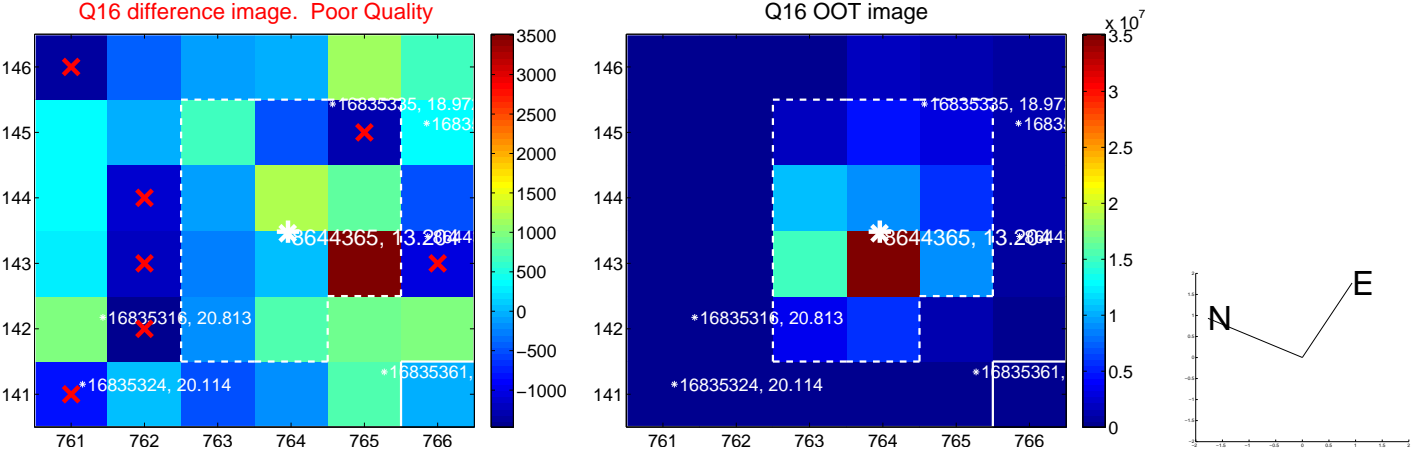
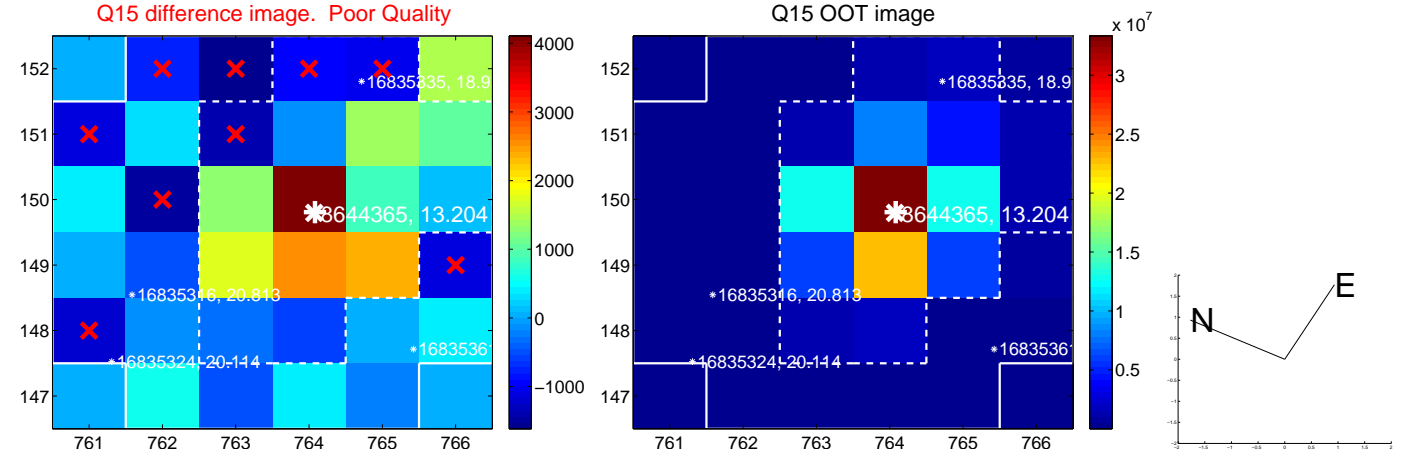
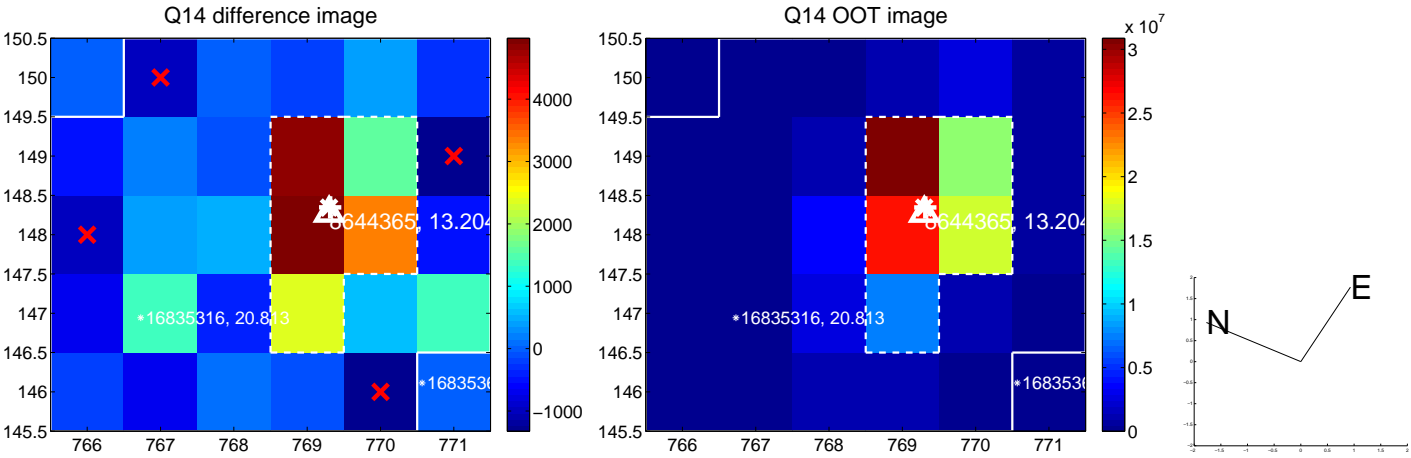
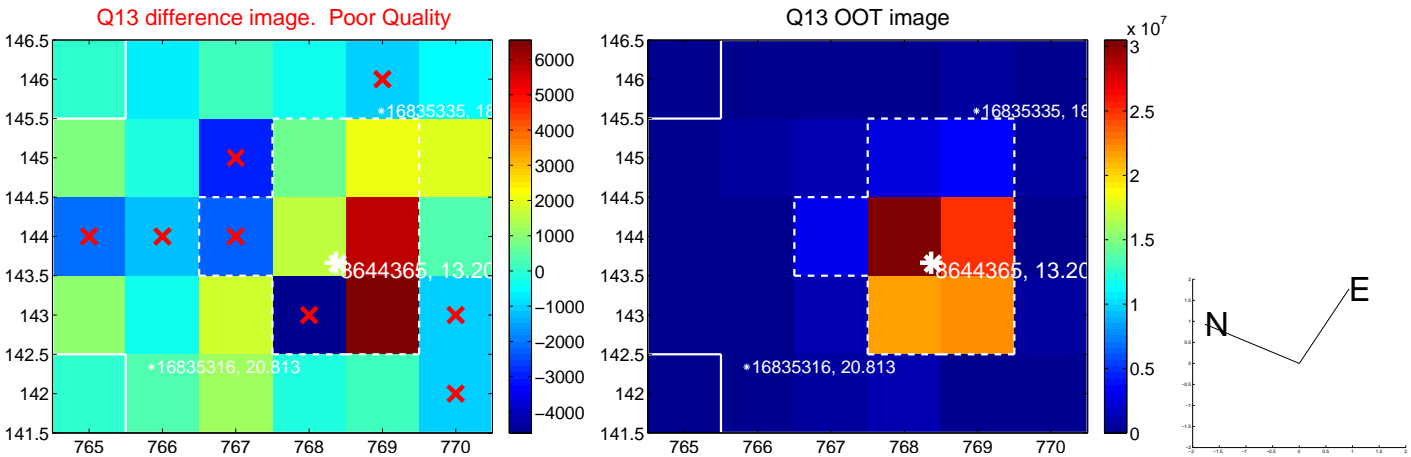
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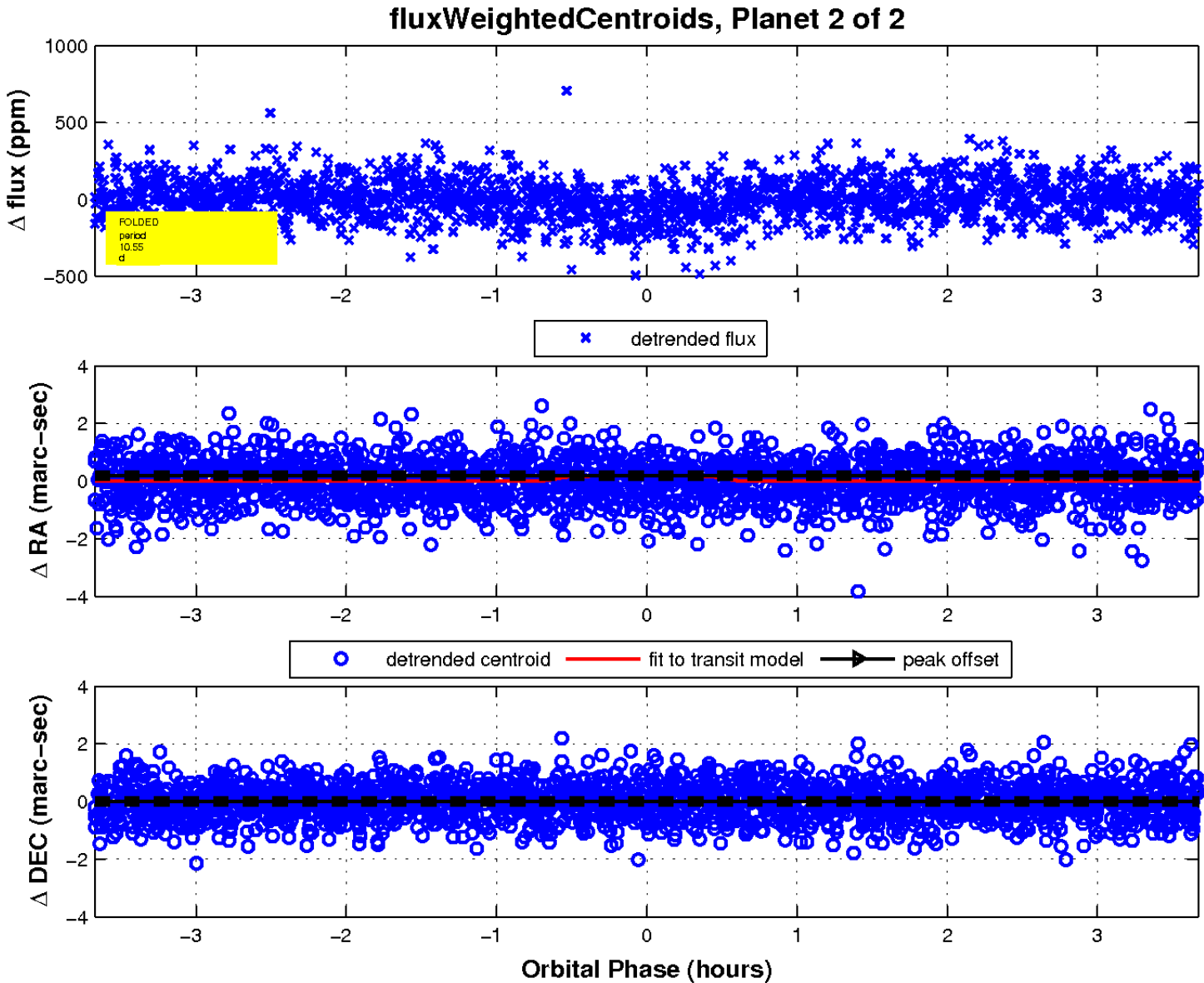
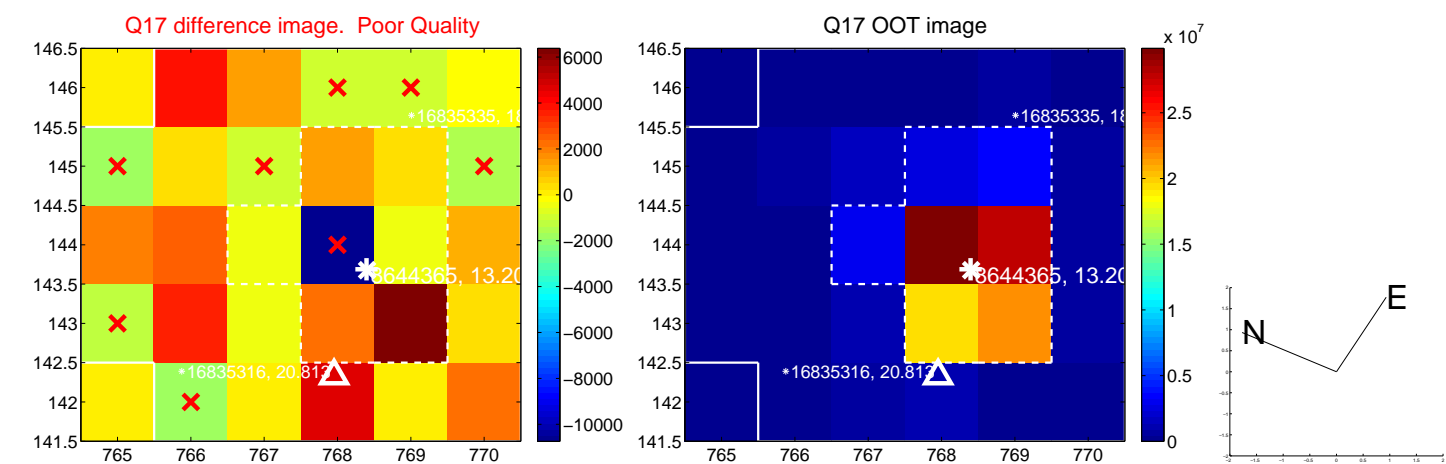


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UKIRT Image

Declination

