

# KIC 009643043

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009643043-01	OBS	3297.01	84.806171	192.374150	9673.5	9.280	190.6	149.4	0.85	5735	14.78	5.34
009643043-02	OBS	No	84.805751	215.647346	9740.6	8.282	179.7	137.1	0.85	5735	13.71	5.34

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009643043-01	OBS	FP	0.00	0	1	1	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_UNRESOLVED_OFFSET—HALO_GHOST
009643043-02	OBS	FP	0.00	1	1	1	0	IS_SEC_TCE—CENT_RESOLVED_OFFSET—HALO_GHOST

**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.

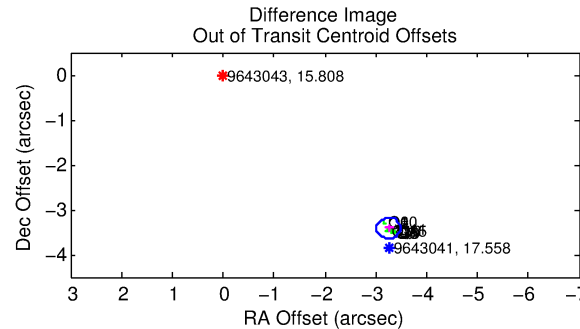
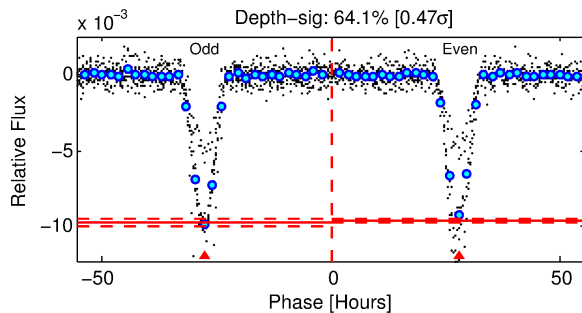
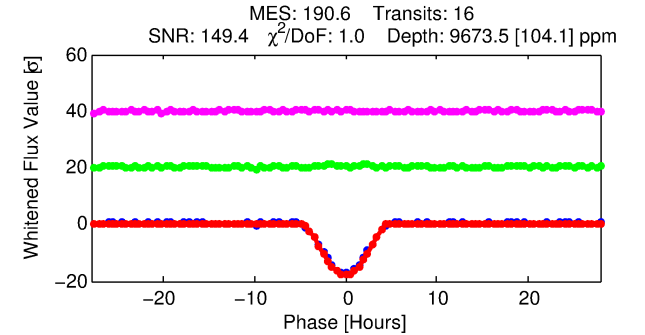
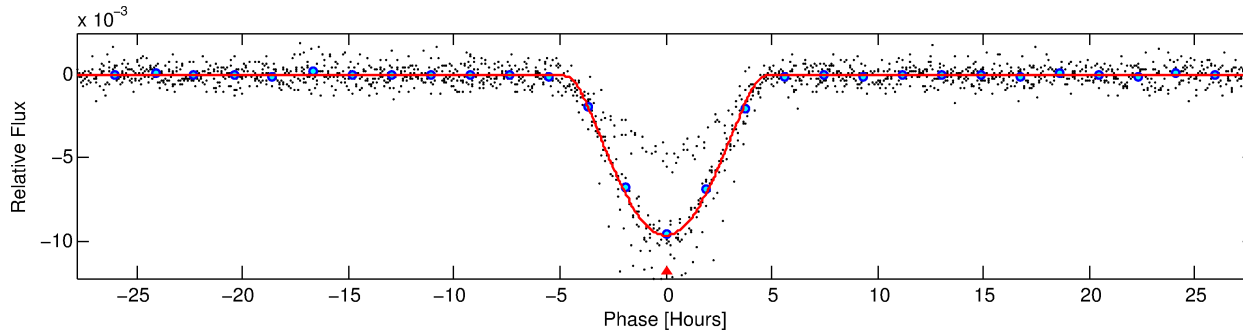
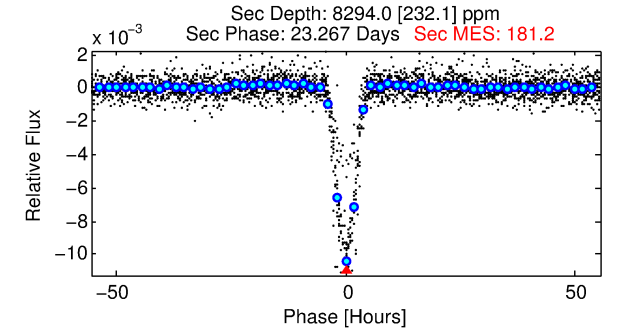
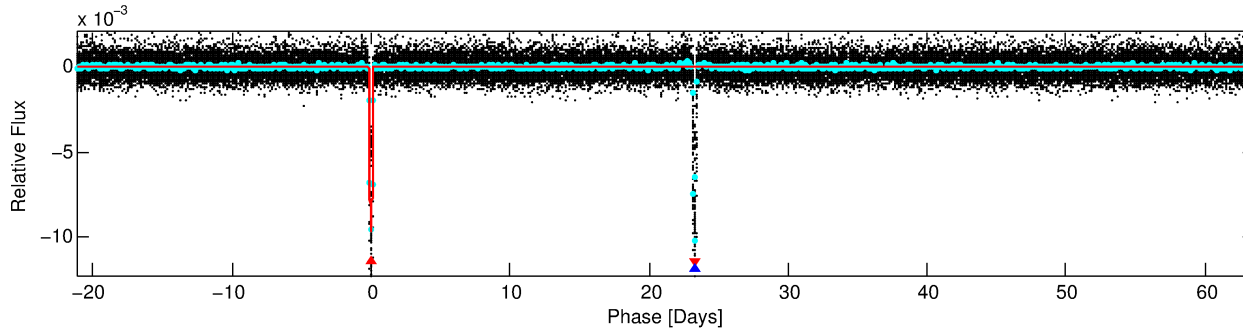
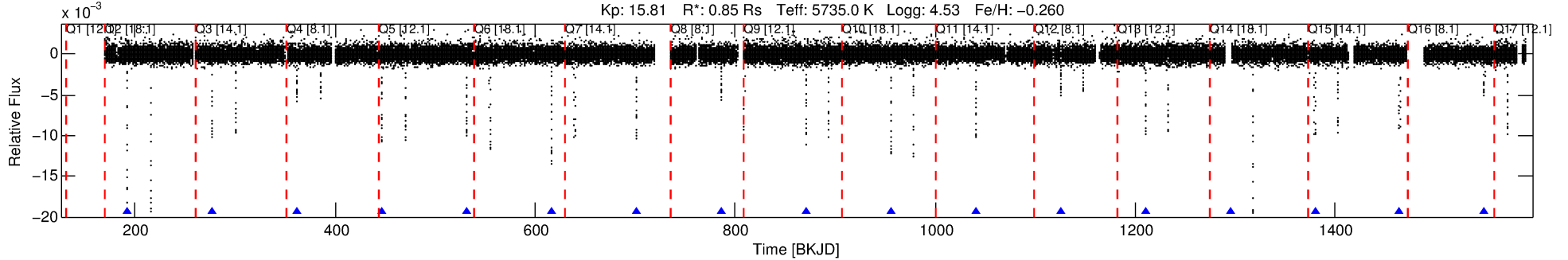
## Ephemeris Match Information For 009643043-01

No Significant Match Found

# DV One-Page Summary

KIC: 9643043 Candidate: 1 of 2 Period: 84.806 d  
KOI: K03297.01 Corr: 0.994

Kp: 15.81 R\*: 0.85 Rs Teff: 5735.0 K Logg: 4.53 Fe/H: -0.260



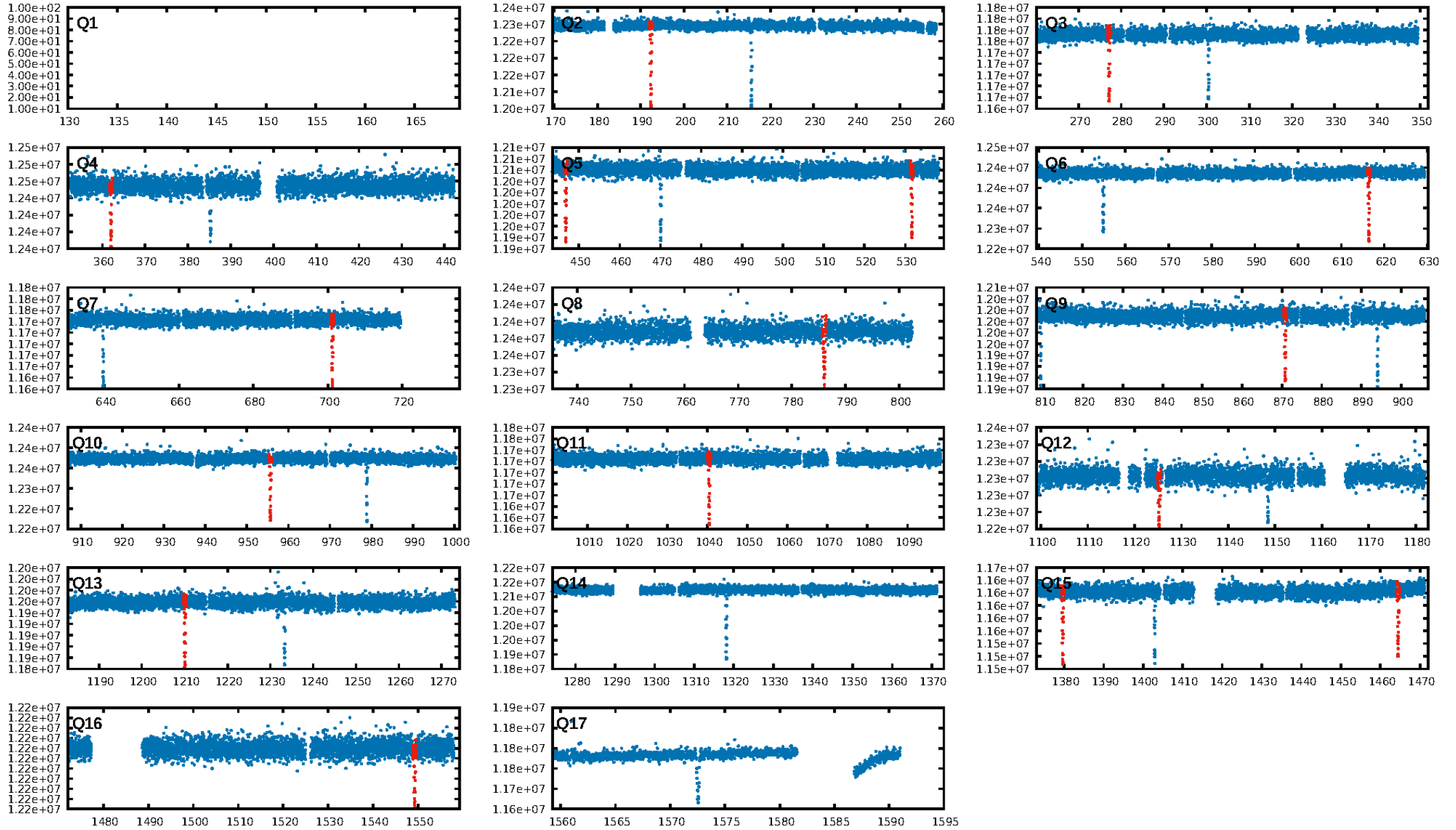
## DV Fit Results:

Period = 84.80617 [0.00013] d  
Epoch = 192.3742 [0.0013] BKJD  
Rp/R\* = 0.1588 [0.0474]  
a/R\* = 41.51 [1.90]  
b = 0.99 [0.07]  
Seff = 5.34 [1.87]  
Teq = 388 [34] K  
Rp = 14.78 [6.02] Re  
a = 0.3633 [0.0837] AU  
Ag = 2755.54 [1883.28] [1.46σ]  
Teff = 4343 [659] K [5.99σ]

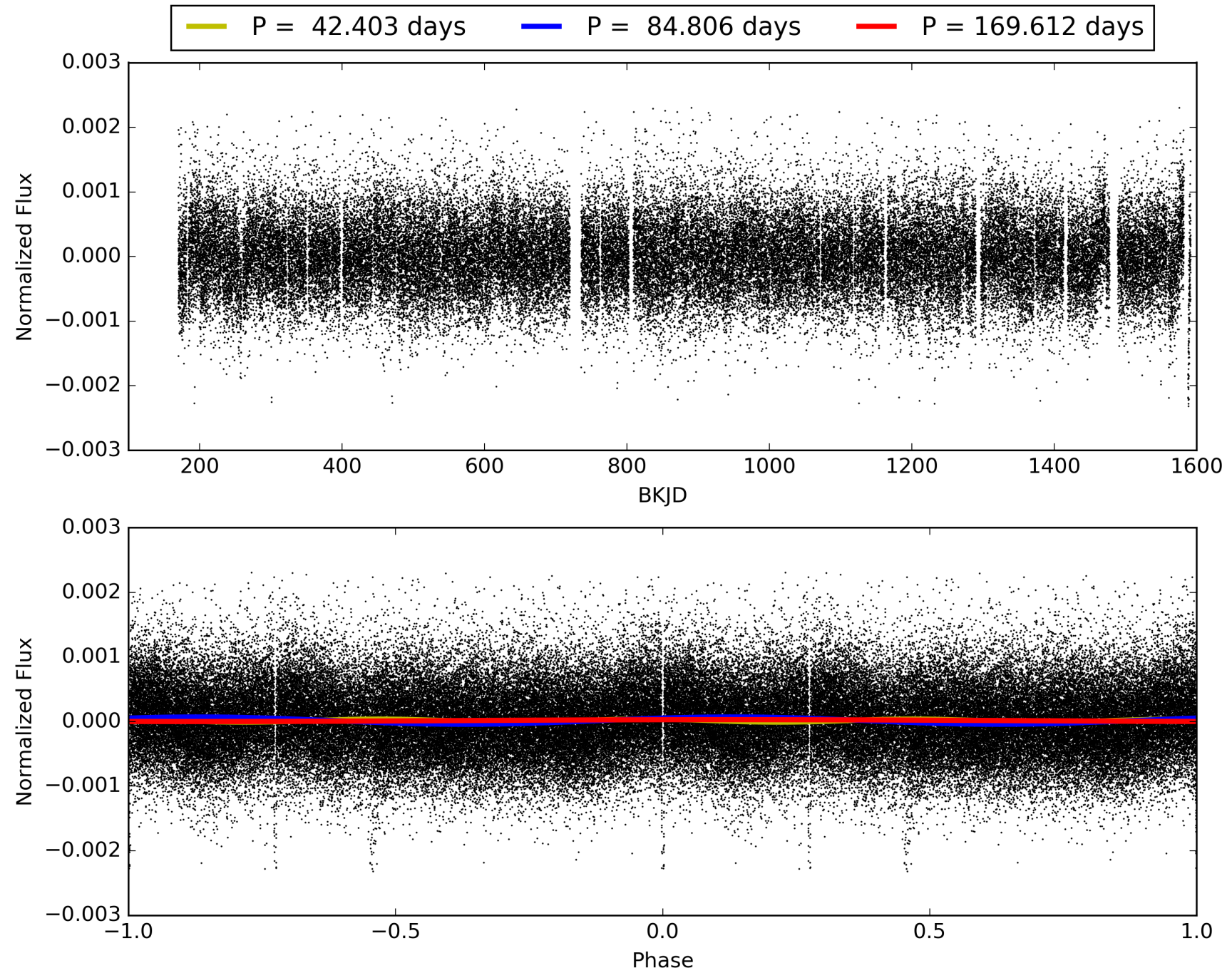
## DV Diagnostic Results:

ShortPeriod-sig: 0.1% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [16/16]  
GhostDiagnostic-chr: -9.101e-05  
Centroid-sig: 0.0%  
Centroid-so: 11.572 arcsec [178.44σ]  
OotOffset-rm: 4.716 arcsec [61.03σ]  
KicOffset-rm: 4.950 arcsec [72.35σ]  
OotOffset-st: 3/4/0/3 [10]  
KicOffset-st: 3/4/0/3 [10]  
DiffImageQuality-fgm: 1.00 [10/10]  
DiffImageOverlap-fno: 1.00 [13/13]

# TCE 009643043-01, PDC Light Curves

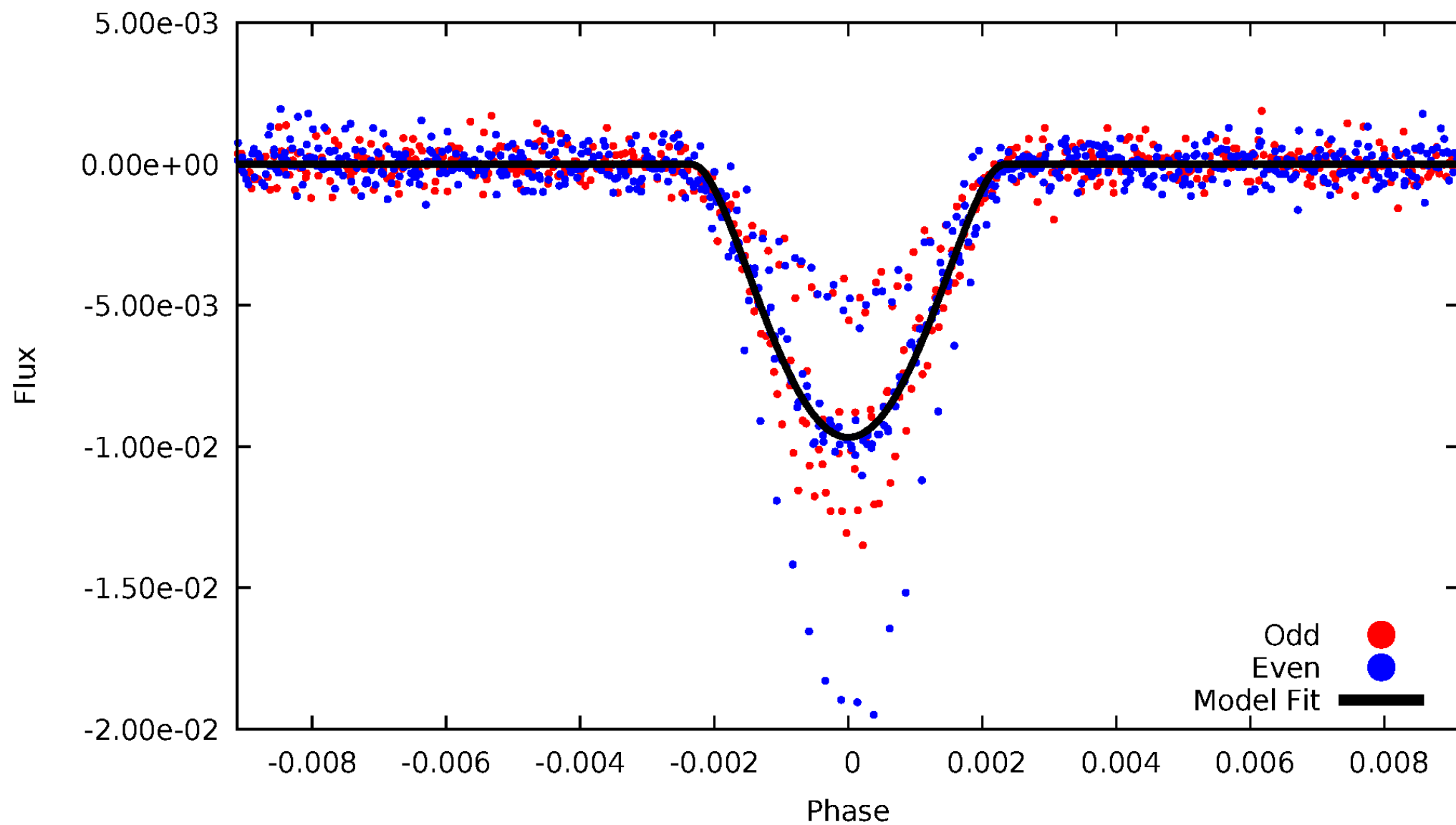


TCE 009643043-01



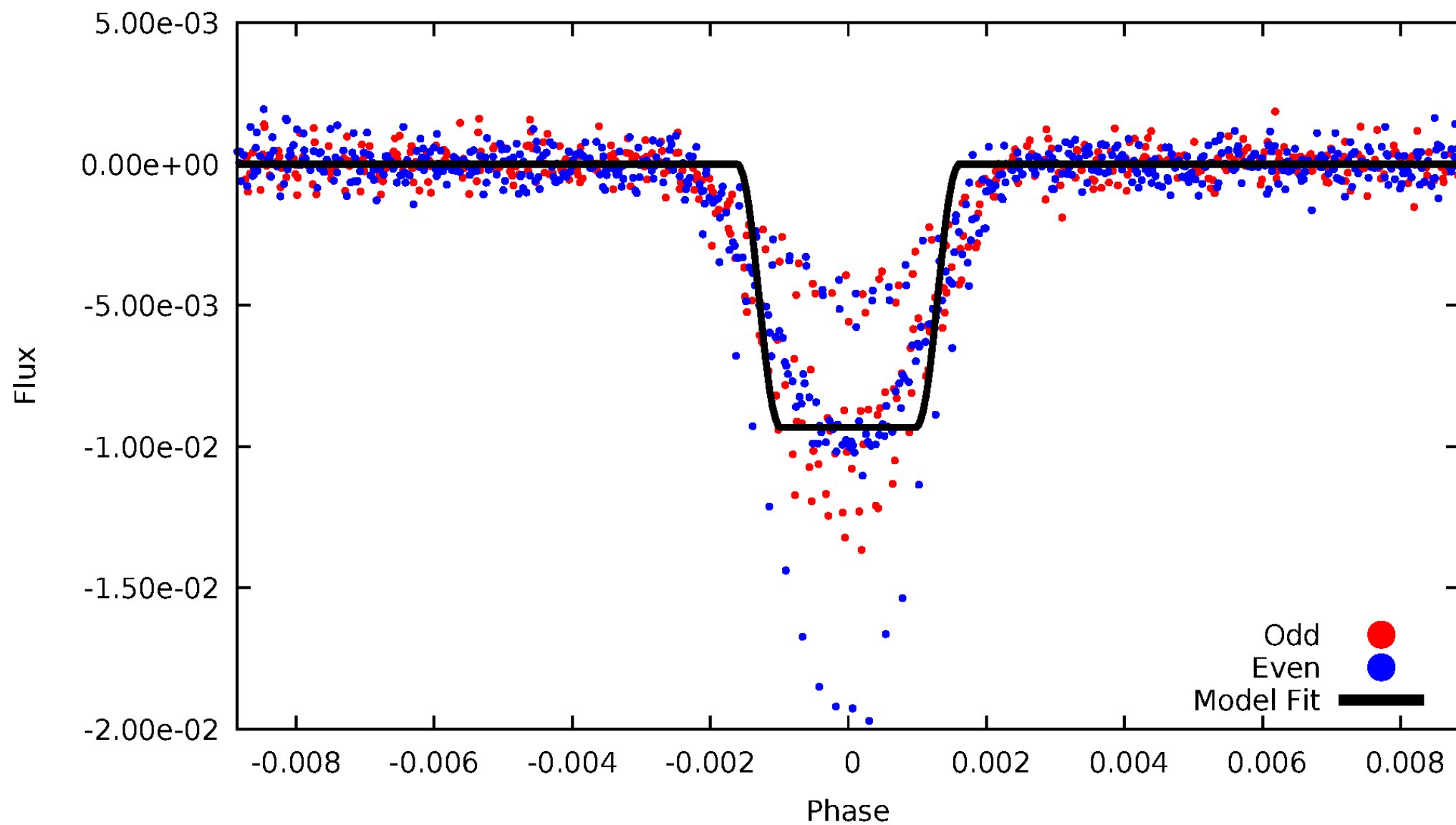
# DV Odd/Even

TCE 009643043-01



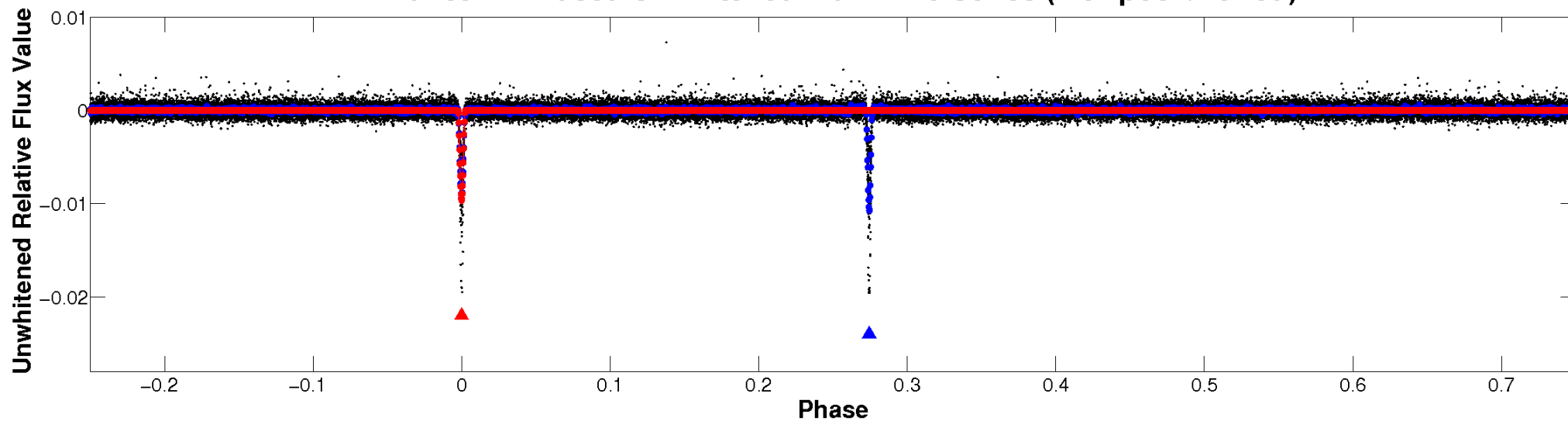
# ALT Odd/Even

TCE 009643043-01

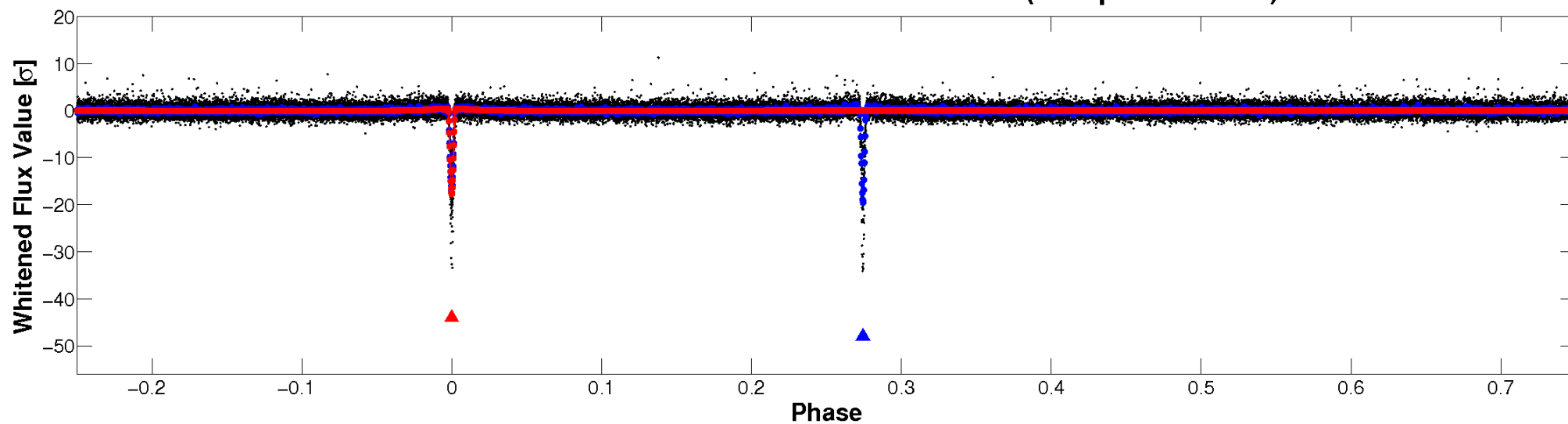


# Non-Whitened Vs. Whitened Light Curve

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

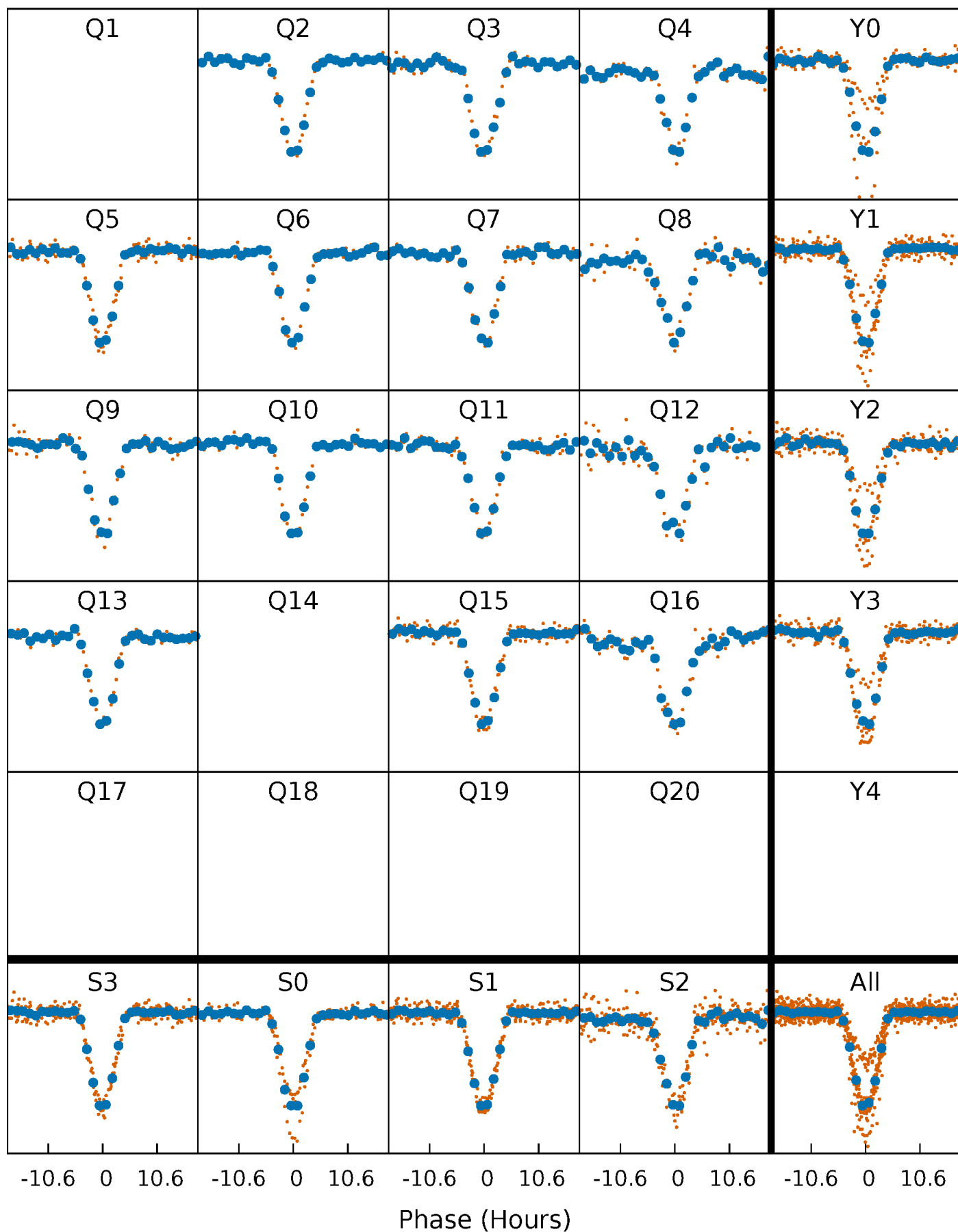


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

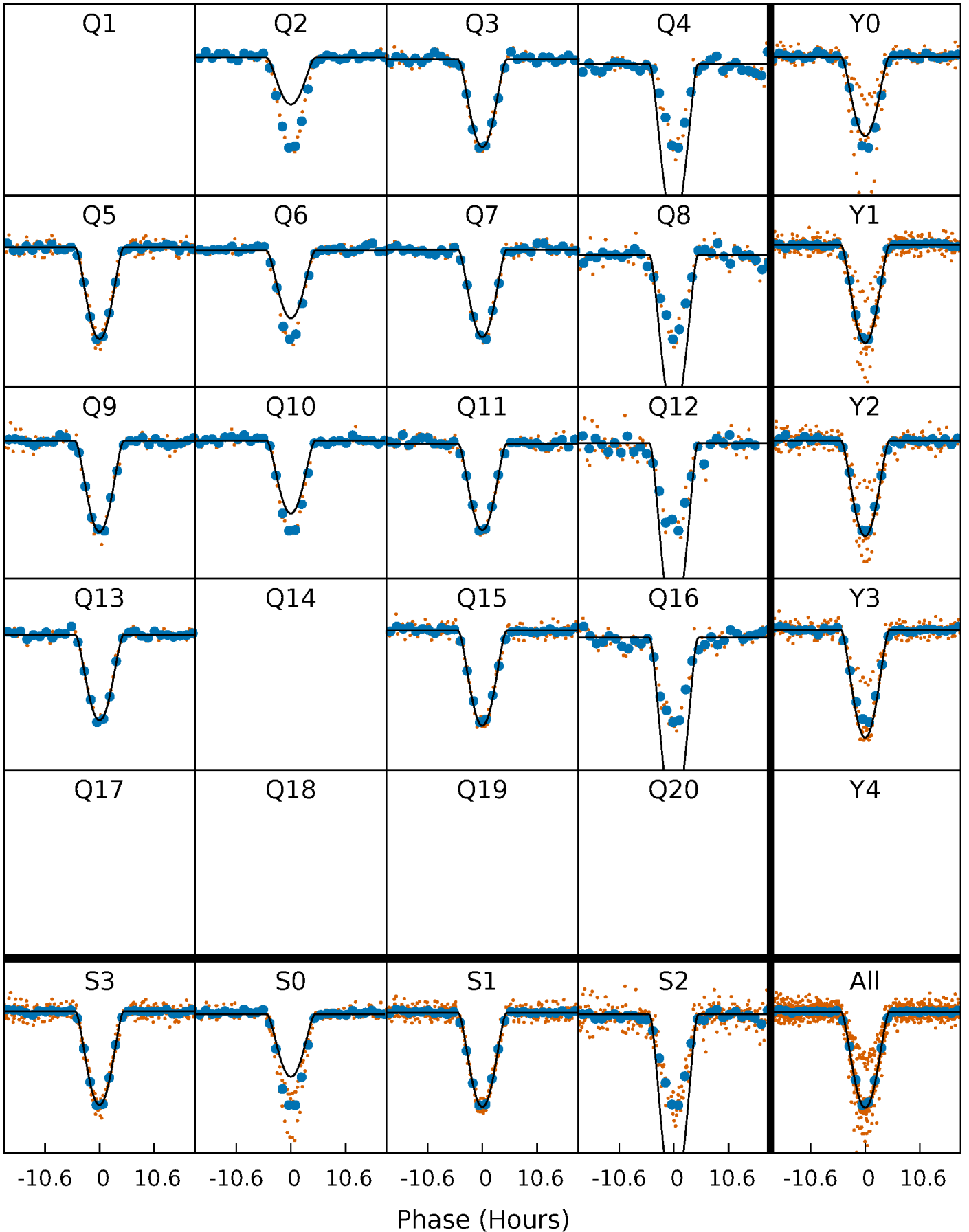
TCE 009643043-01 P= 84.806171 Days  $T_0=192.374150$  (BKJD)





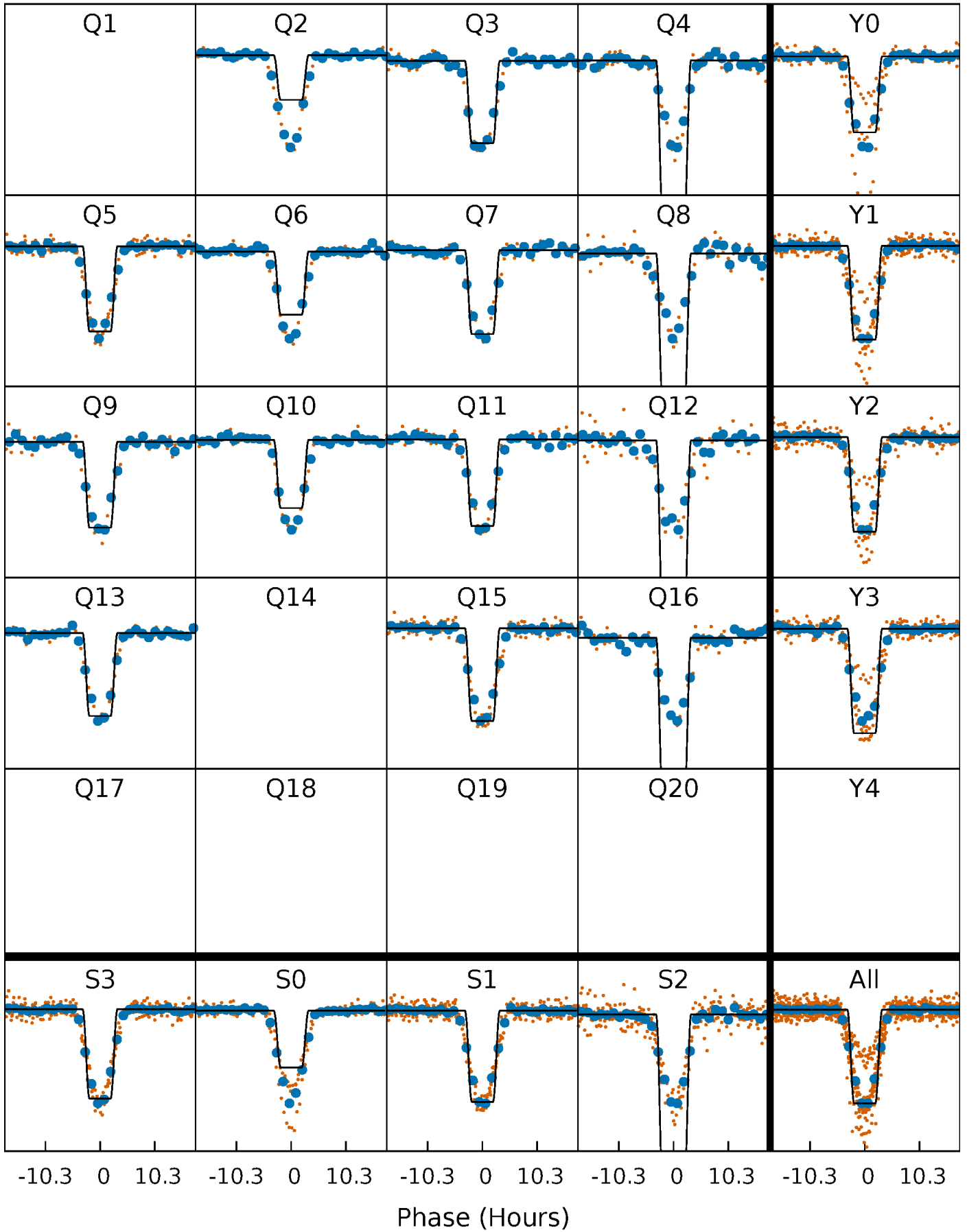
# DV Quarter-Phased Transit Curves

TCE 009643043-01 P= 84.806171 Days  $T_0=192.374150$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

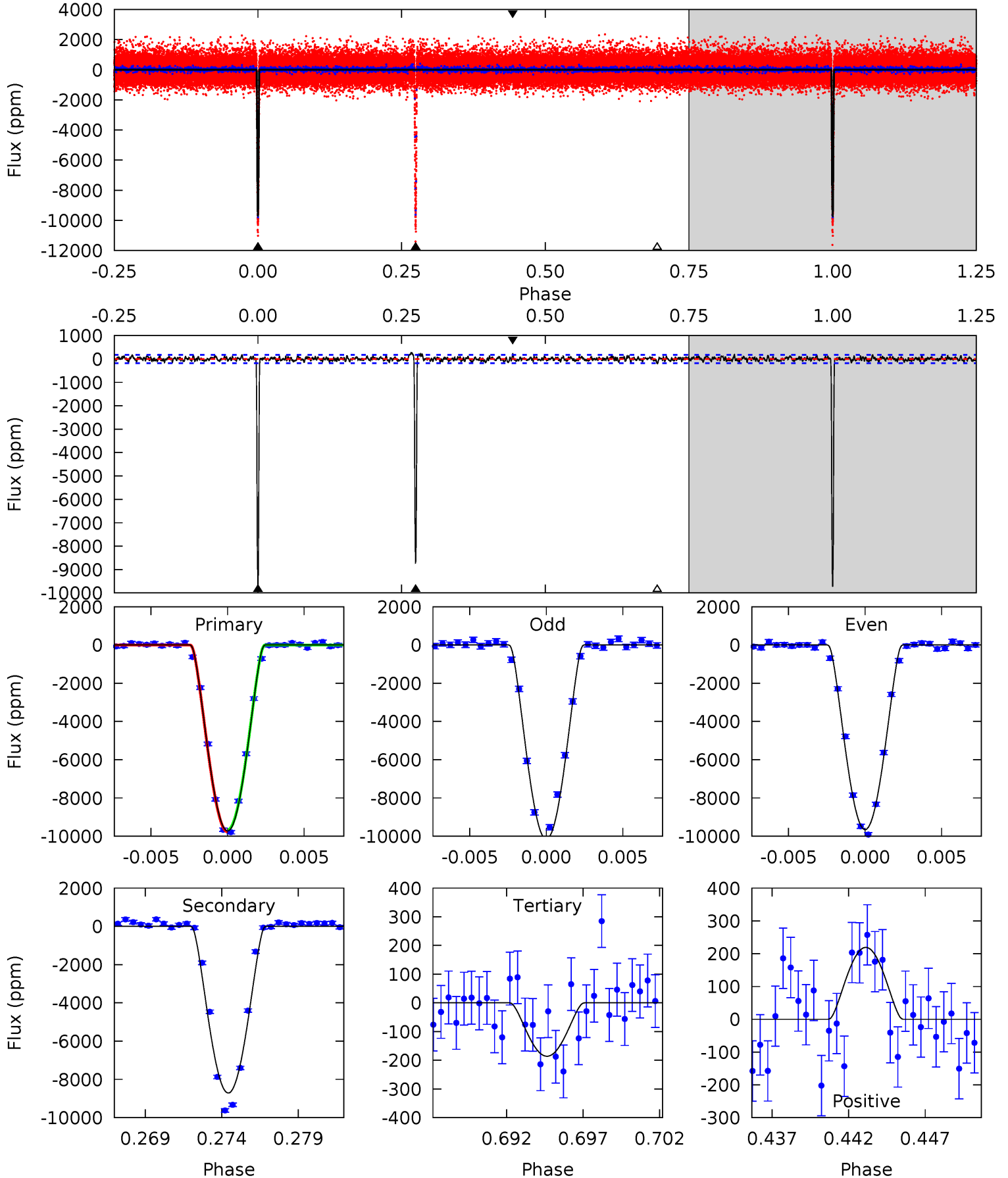
TCE 009643043-01 P= 84.805326 Days  $T_0=192.380546$  (BKJD)



# DV Model-Shift Uniqueness Test

009643043-01, P = 84.806171 Days, E = 107.567979 Days

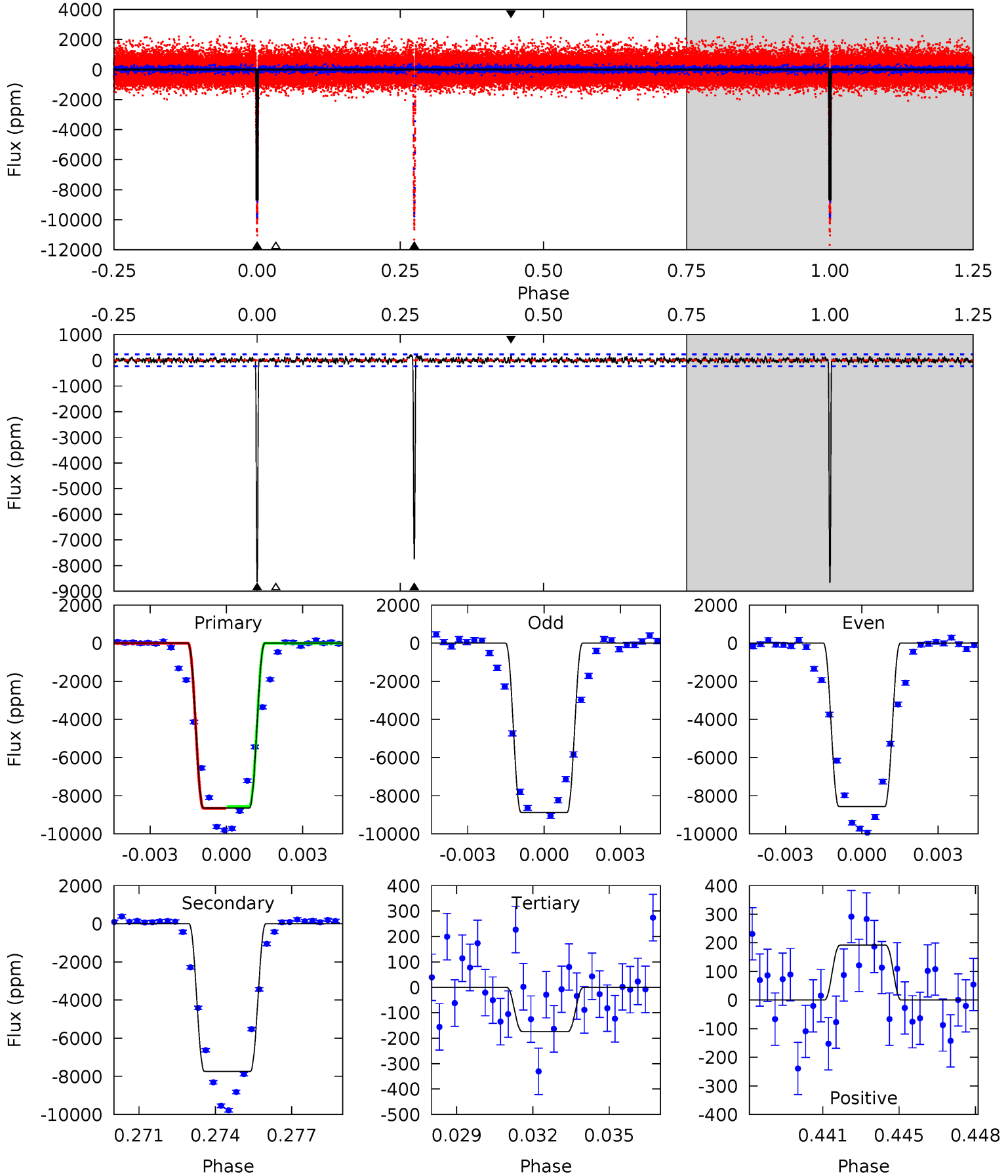
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
285.3	255.5	5.45	6.42	5.17	2.82	1.78	279.8	278.8	250.0	249.1	7.33	0.96	0.03	1.58



# Alt Model-Shift Uniqueness Test

009643043-01, P = 84.805326 Days, E = 107.575220 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
194.4	174.1	3.90	4.31	5.24	2.95	1.18	190.5	190.1	170.2	169.8	3.42	0.96	0.02	1.17



### Stellar Parameters For KIC 009643043

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5735^{+155}_{-155}$	$4.525^{+0.060}_{-0.180}$	$-0.260^{+0.300}_{-0.300}$	$0.853^{+0.236}_{-0.079}$	$0.889^{+0.100}_{-0.090}$	$2.021^{+0.599}_{-0.960}$
	+3%/-3%	+1%/-4%	+115%/-115%	+28%/-9%	+11%/-10%	+30%/-48%
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 009643043-01 / KOI 3297.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-8710 \pm 34$	$15.07^{+5.31}_{-4.37}$	$551^{+37}_{-24}$	$4599^{+691}_{-451}$	$2762^{+2675}_{-1225}$
Alt.	$-7743 \pm 44$	$9.57^{+4.55}_{-4.55}$	$549^{+38}_{-23}$	$5414^{+2261}_{-799}$	$6092^{+15734}_{-3284}$

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

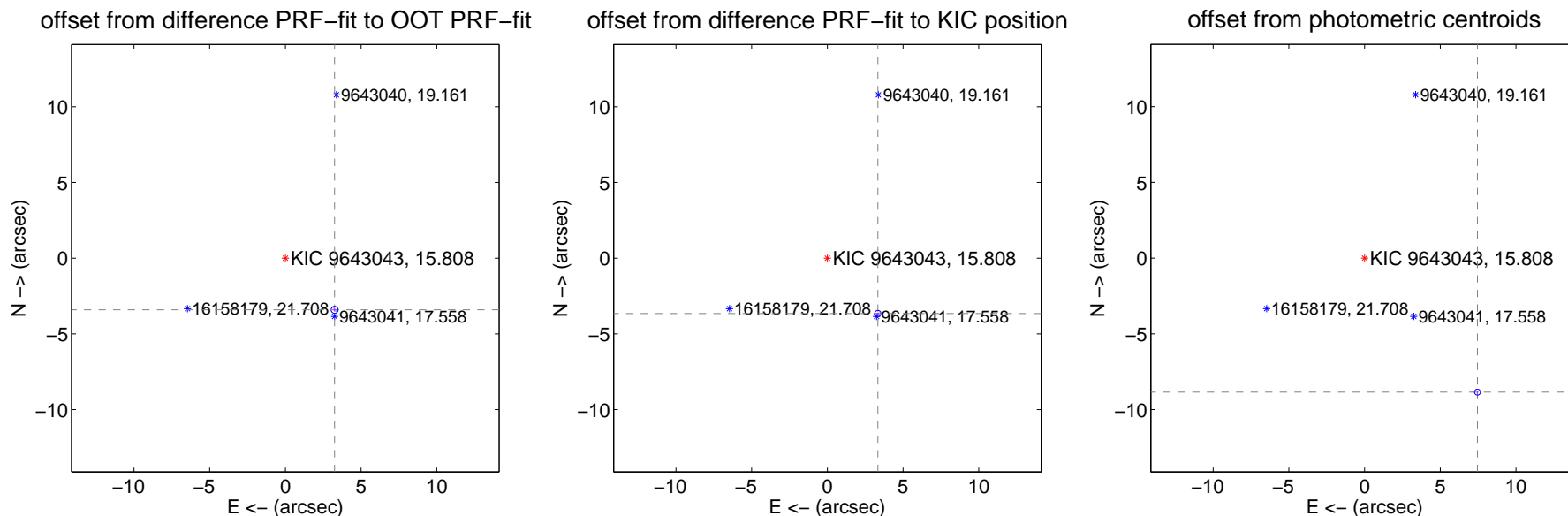
## DV Centroid Data

Supplemental centroid analysis for 009643043-01. Kepler magnitude: 15.81. Transit SNR 149.41

There are 10 quarters with good PRF difference image offsets

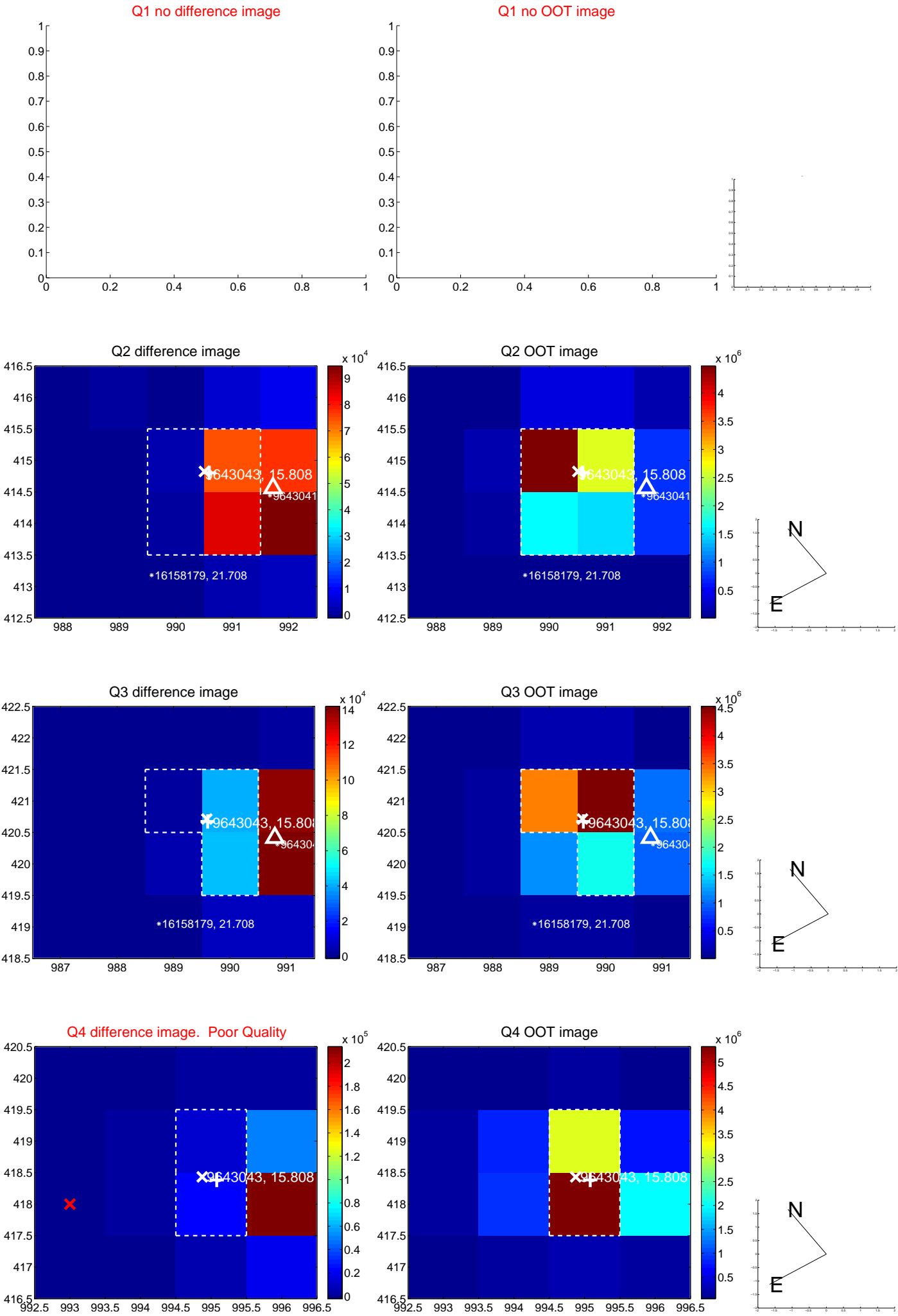
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.716 \pm 0.077$	61.03	$-3.253 \pm 0.072$	$-3.414 \pm 0.073$
PRF-fit source offset from KIC position	$4.950 \pm 0.068$	72.35	$-3.335 \pm 0.069$	$-3.657 \pm 0.068$
photometric centroid source offset	$11.57 \pm 0.06$	178.44	$-7.46 \pm 0.07$	$-8.85 \pm 0.06$

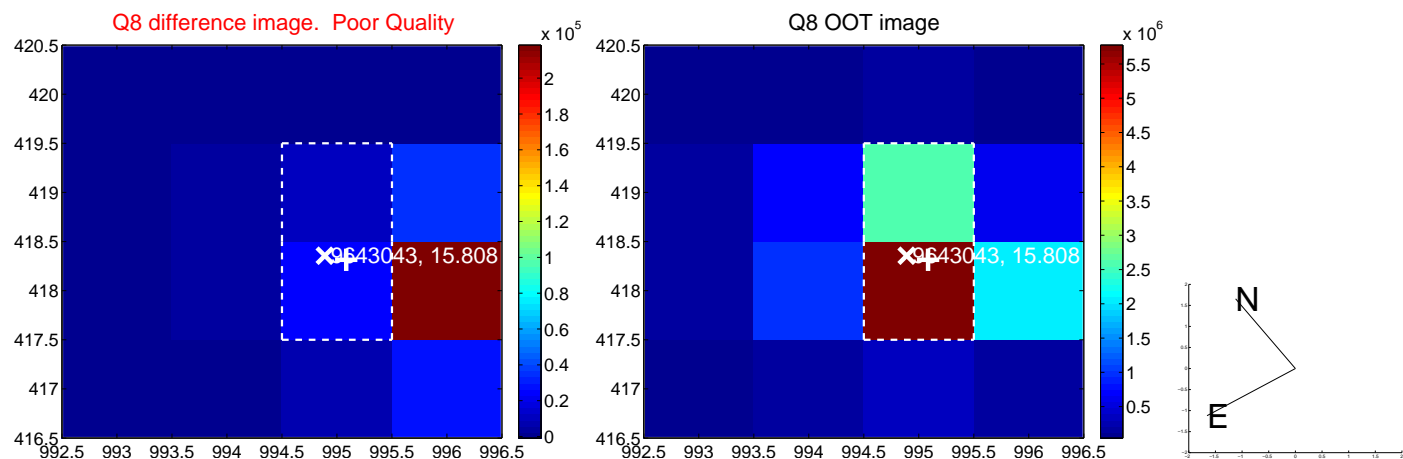
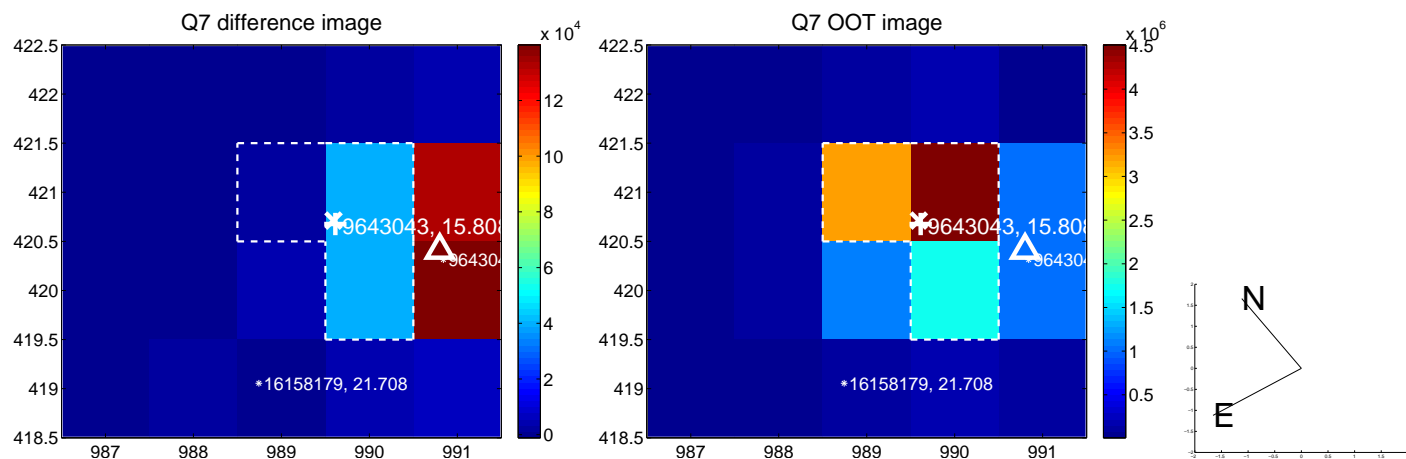
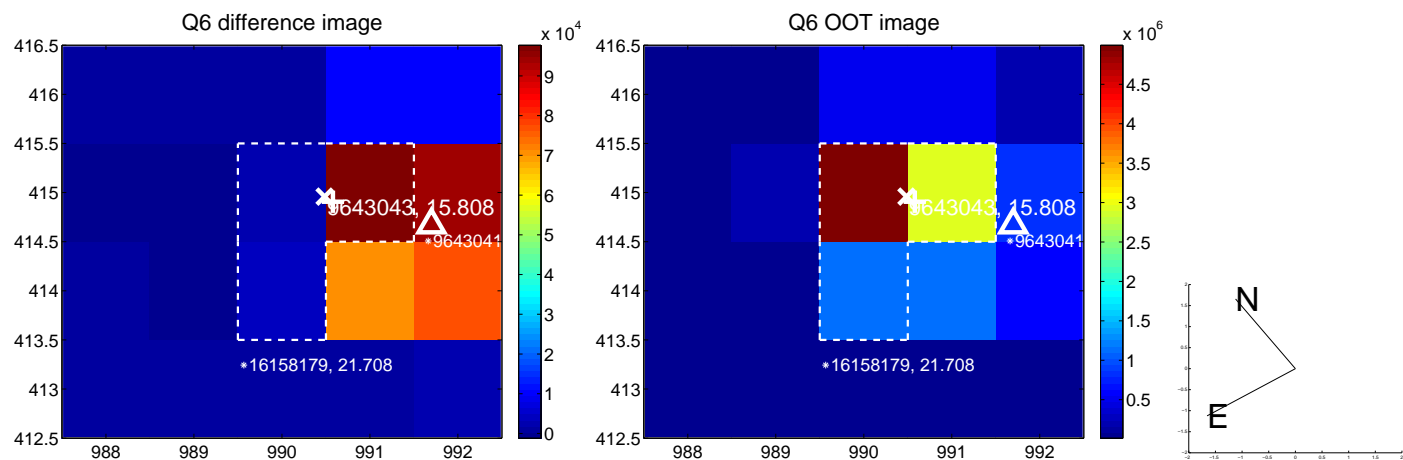
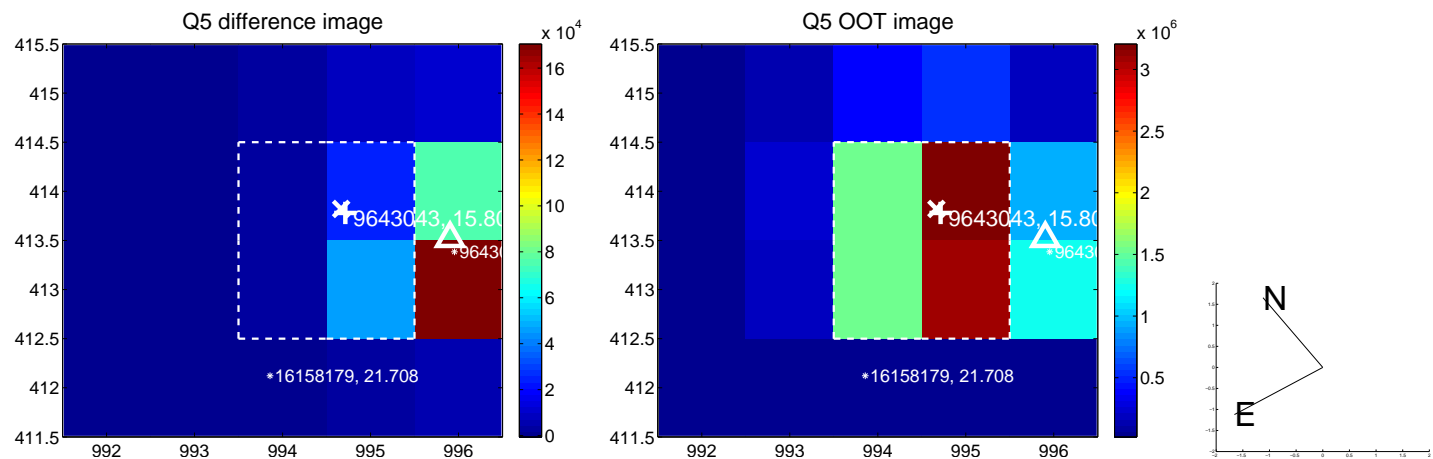


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

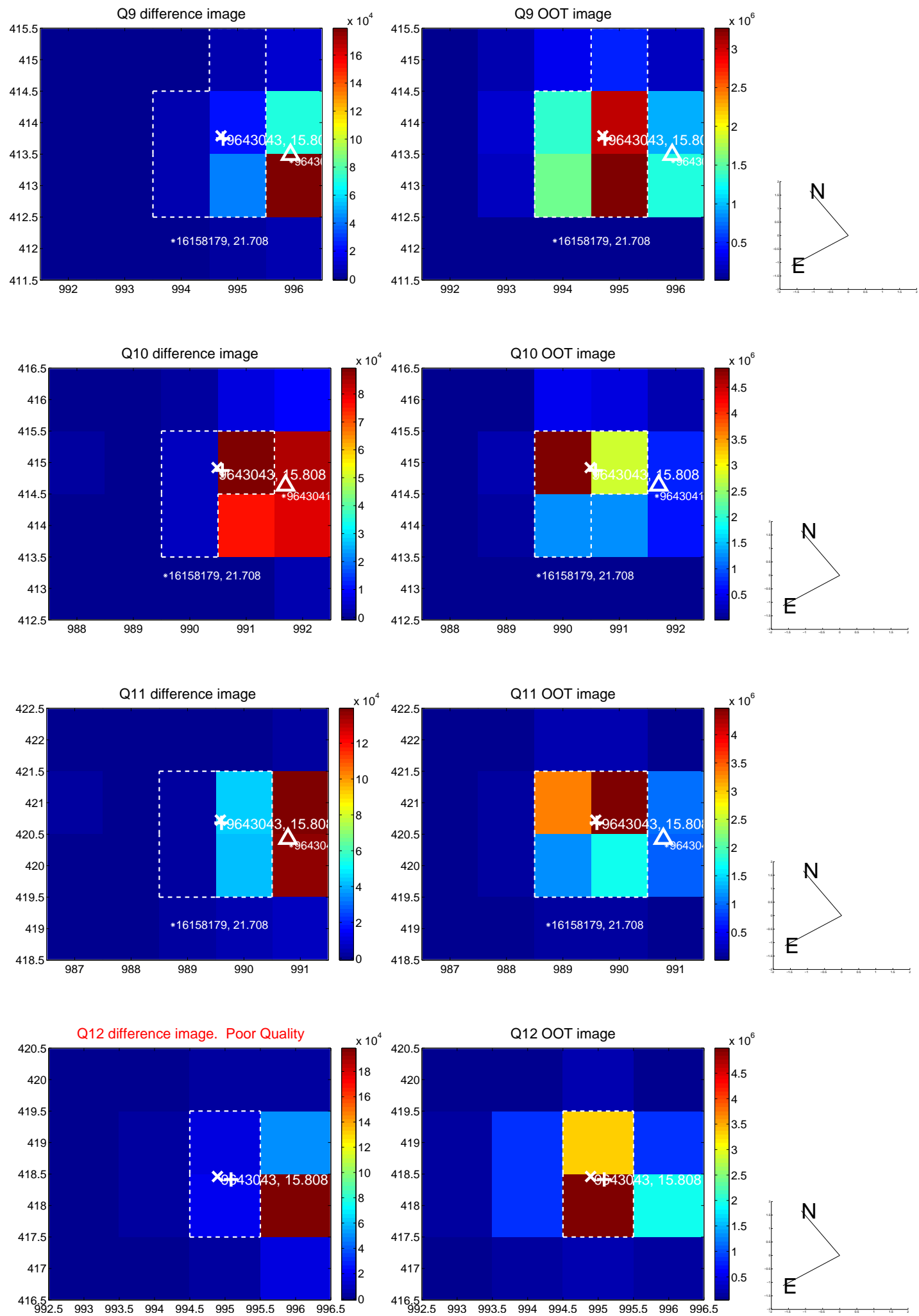


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

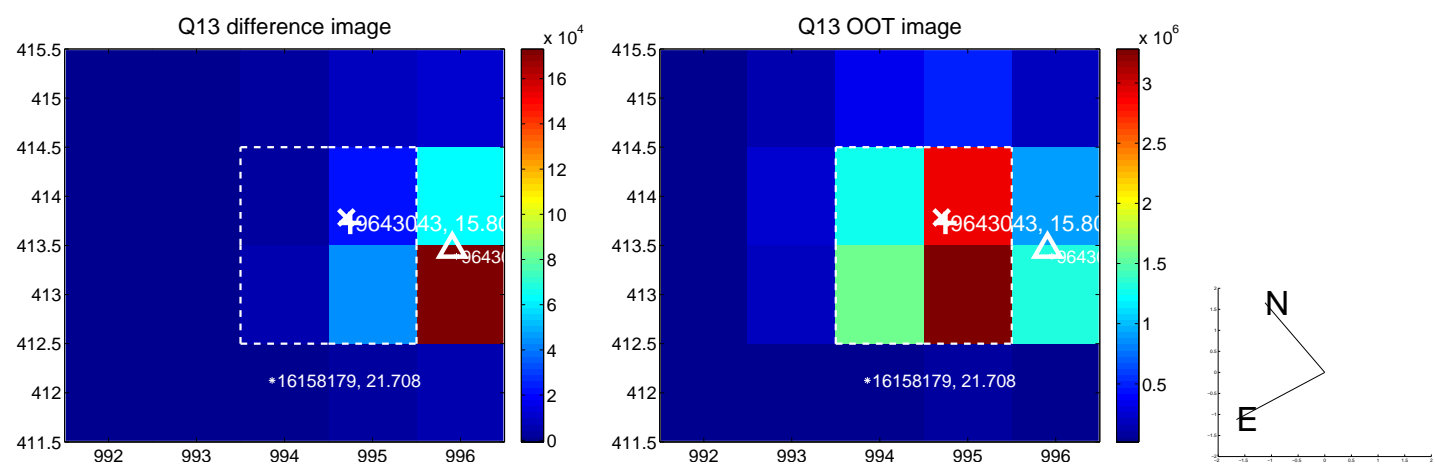




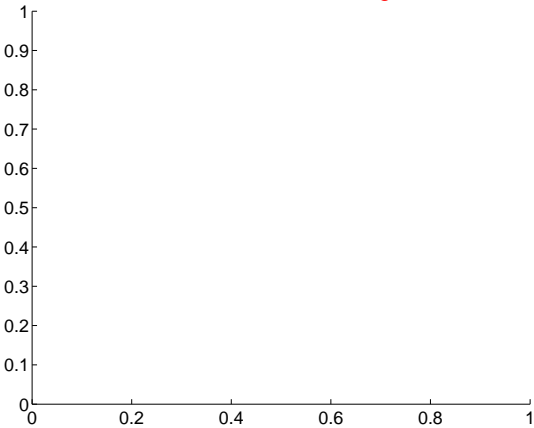
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



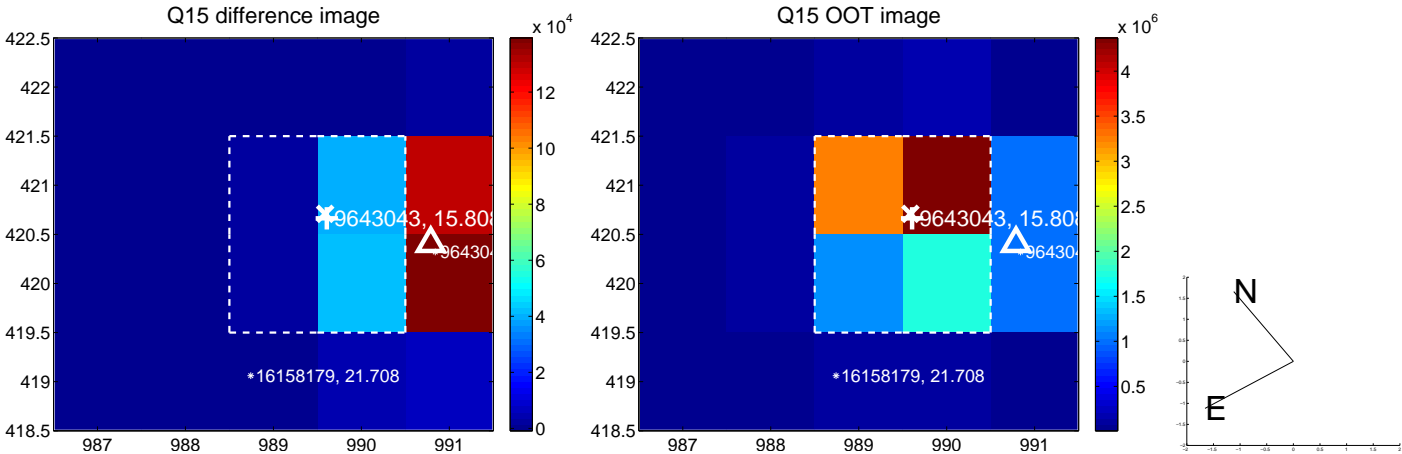
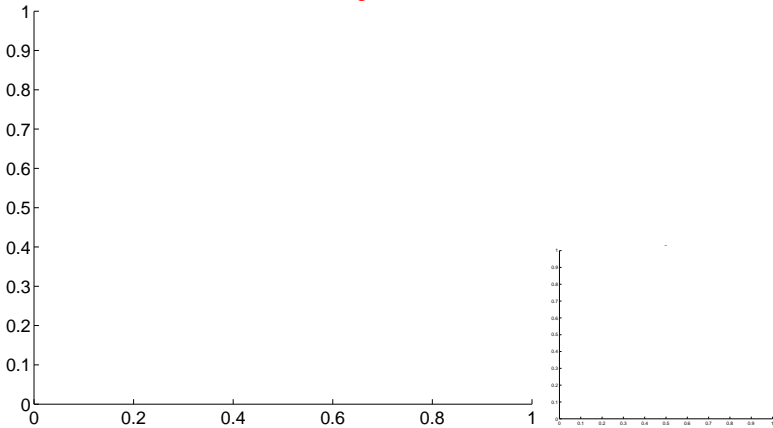
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



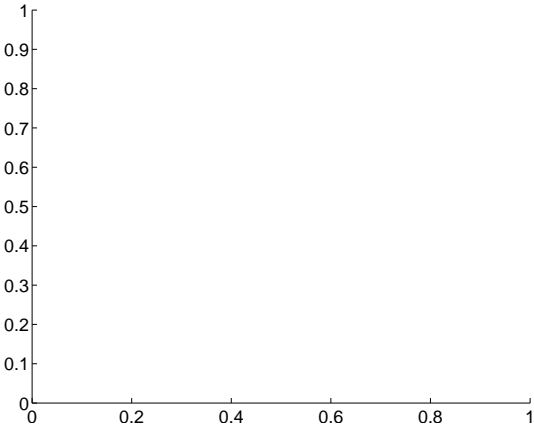
Q14 no difference image



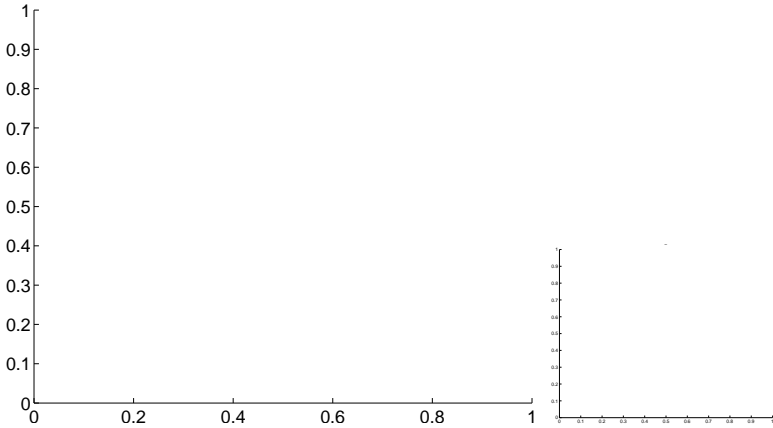
Q14 no OOT image



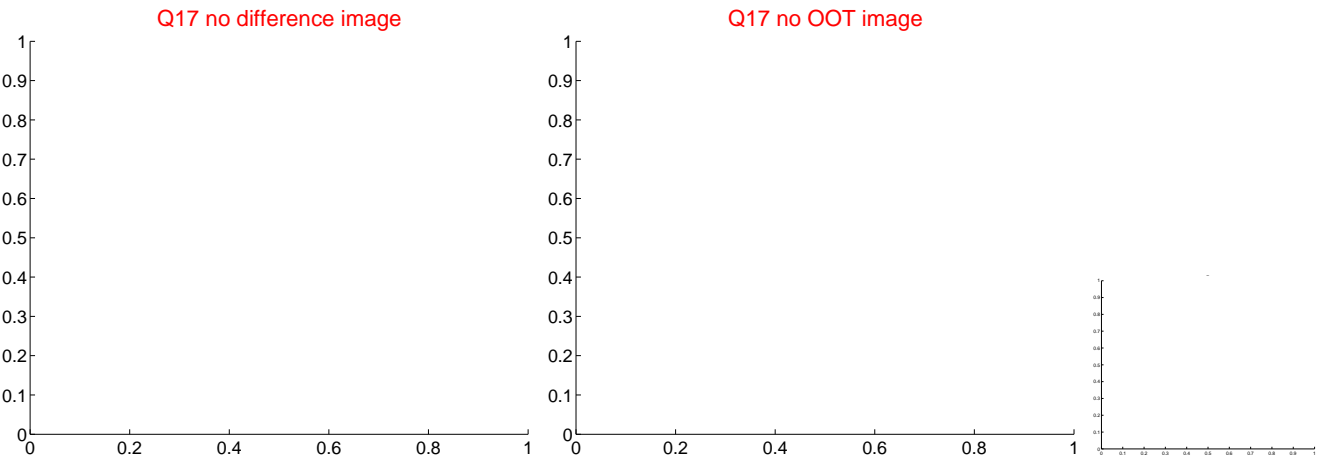
Q16 no difference image



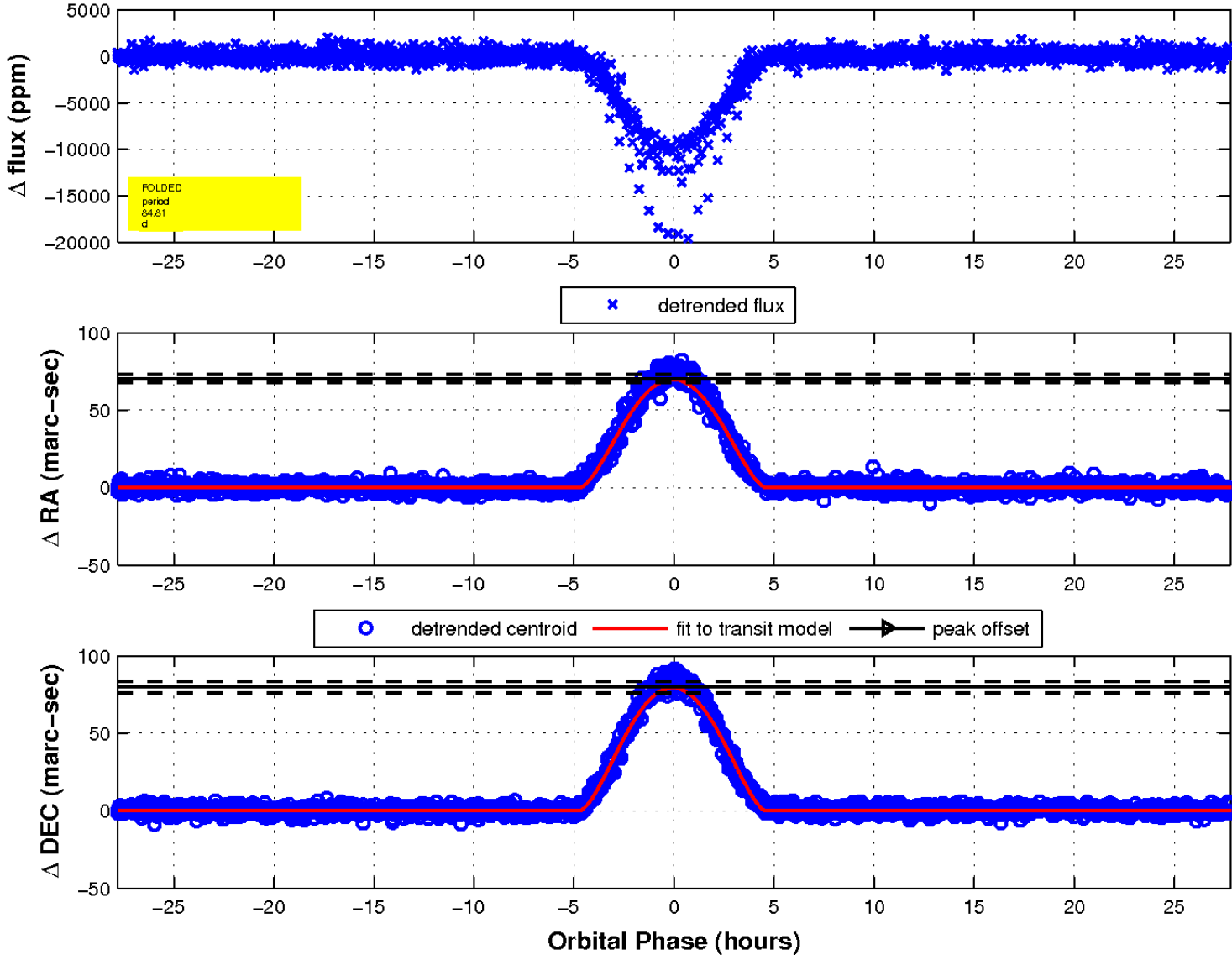
Q16 no OOT image



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

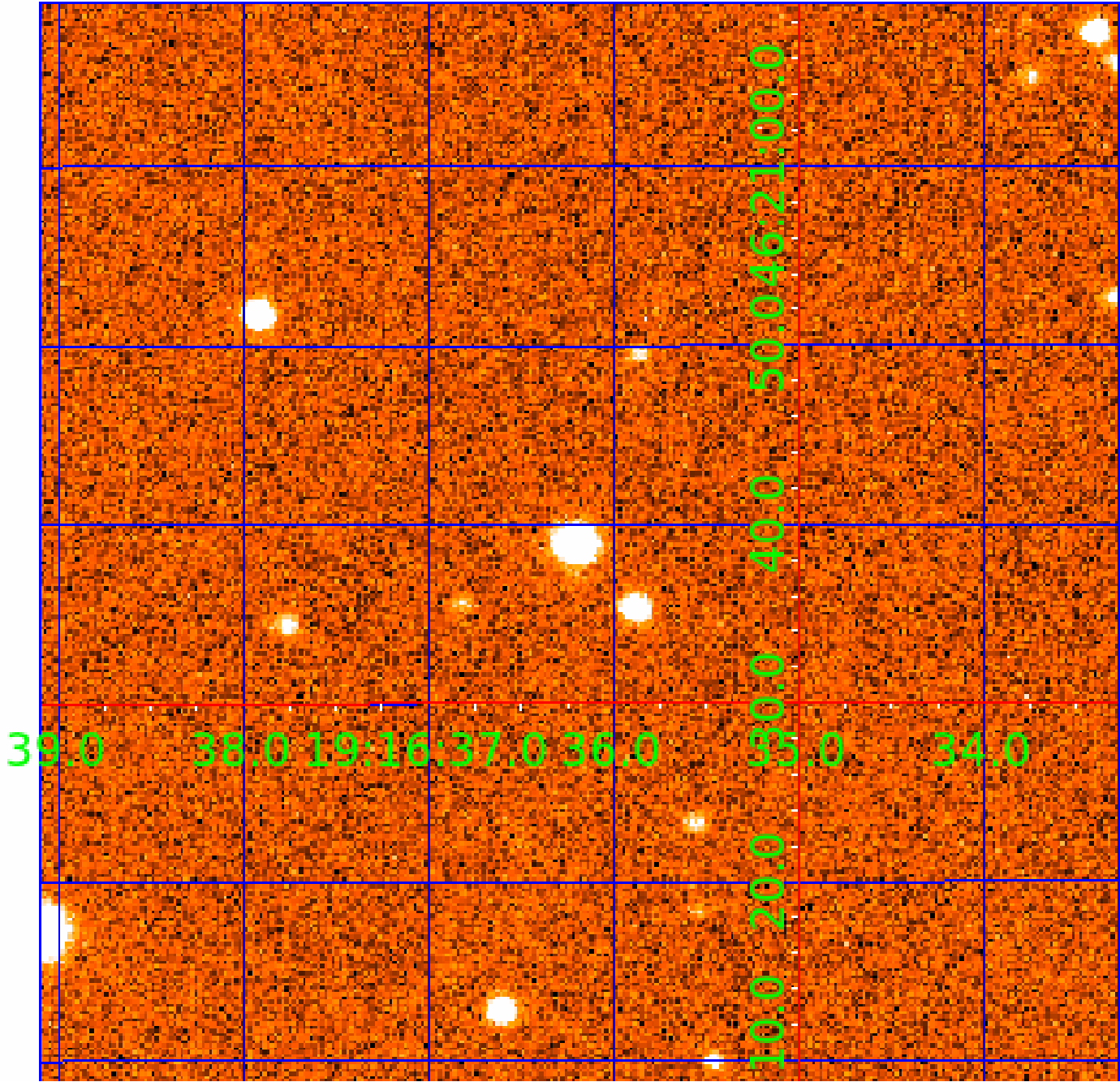


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



# KIC 009643043

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009643043-01	OBS	3297.01	84.806171	192.374150	9673.5	9.280	190.6	149.4	0.85	5735	14.78	5.34
009643043-02	OBS	No	84.805751	215.647346	9740.6	8.282	179.7	137.1	0.85	5735	13.71	5.34

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009643043-01	OBS	FP	0.00	0	1	1	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_UNRESOLVED_OFFSET—HALO_GHOST
009643043-02	OBS	FP	0.00	1	1	1	0	IS_SEC_TCE—CENT_RESOLVED_OFFSET—HALO_GHOST

**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.

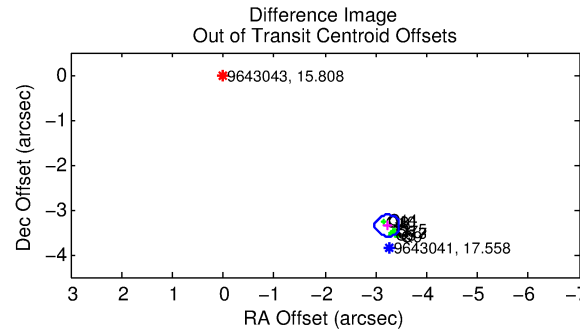
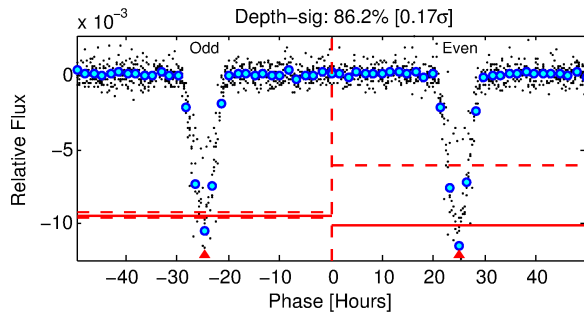
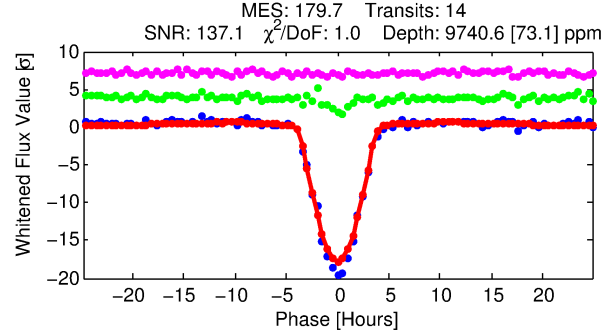
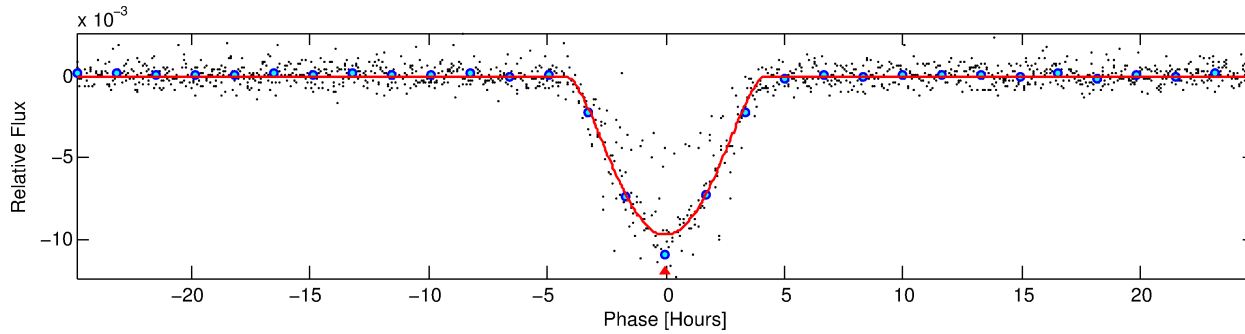
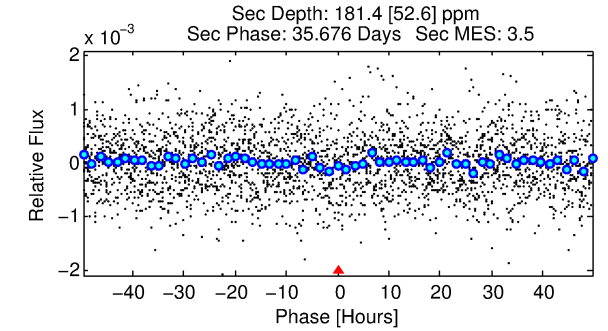
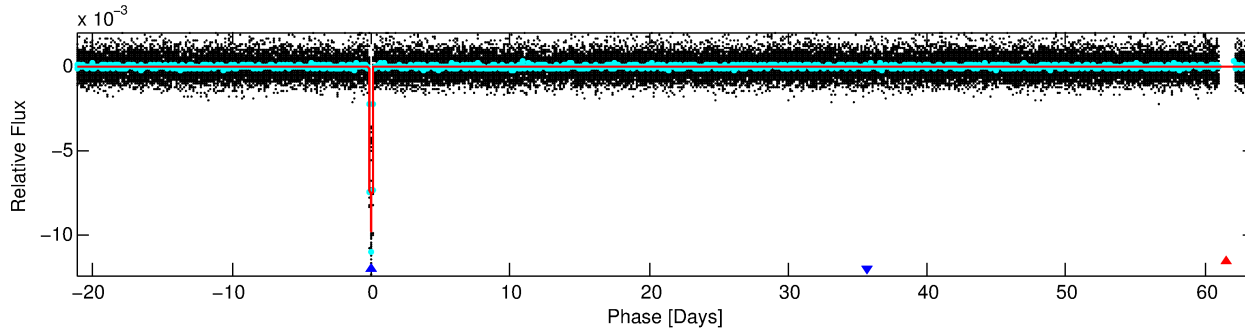
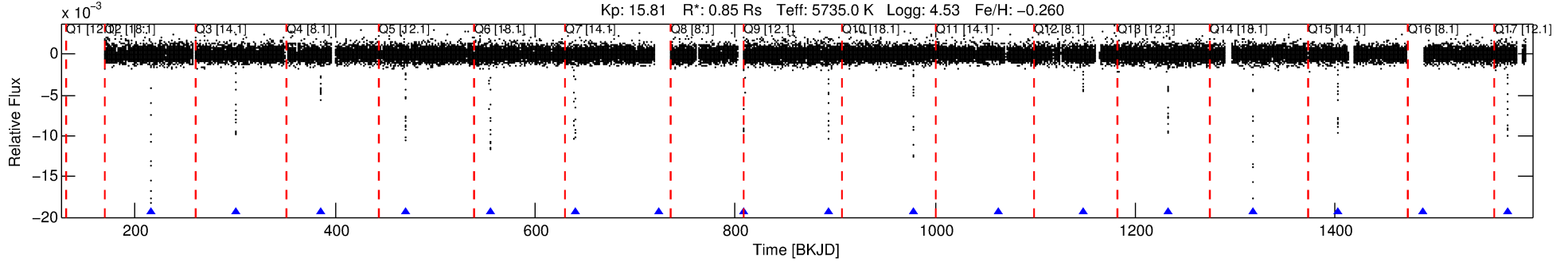
## Ephemeris Match Information For 009643043-02

No Significant Match Found

# DV One-Page Summary

KIC: 9643043 Candidate: 2 of 2 Period: 84.806 d  
KOI: K03297 Corr: No Ephemeris Match

Kp: 15.81 R\*: 0.85 Rs Teff: 5735.0 K Logg: 4.53 Fe/H: -0.260



## DV Fit Results:

Period = 84.80575 [0.00014] d  
Epoch = 215.6473 [0.0012] BKJD  
Rp/R\* = 0.1473 [0.0373]  
a/R\* = 47.09 [2.23]  
b = 0.98 [0.06]  
Seff = 5.34 [1.87]  
Teq = 388 [34] K  
Rp = 13.71 [5.14] Re  
a = 0.3633 [0.0837] AU  
Ag = 70.04 [46.99] [1.47σ]  
Teffp = 1734 [257] K [5.19σ]

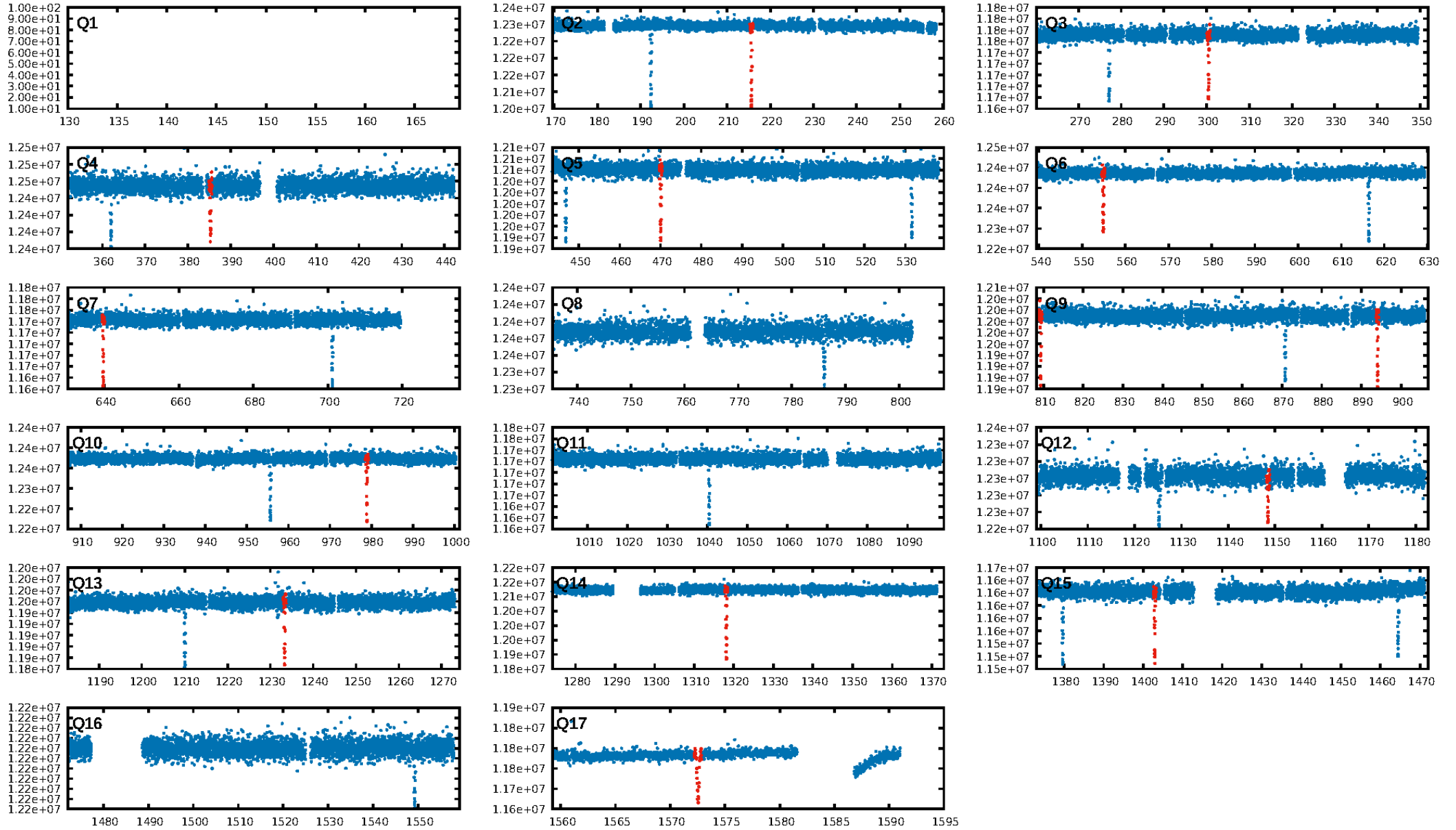
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.1% [0.00σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [13/13]  
GhostDiagnostic-chr: 0.0535  
Centroid-sig: 0.0%  
Centroid-so: 11.025 arcsec [152.02σ]  
OotOffset-rm: 4.659 arcsec [58.05σ]  
KicOffset-rm: 4.952 arcsec [70.07σ]  
OotOffset-st: 4/3/0/4 [11]  
KicOffset-st: 4/3/0/4 [11]  
DiffImageQuality-fgm: 1.00 [11/11]  
DiffImageOverlap-fno: 1.00 [12/12]

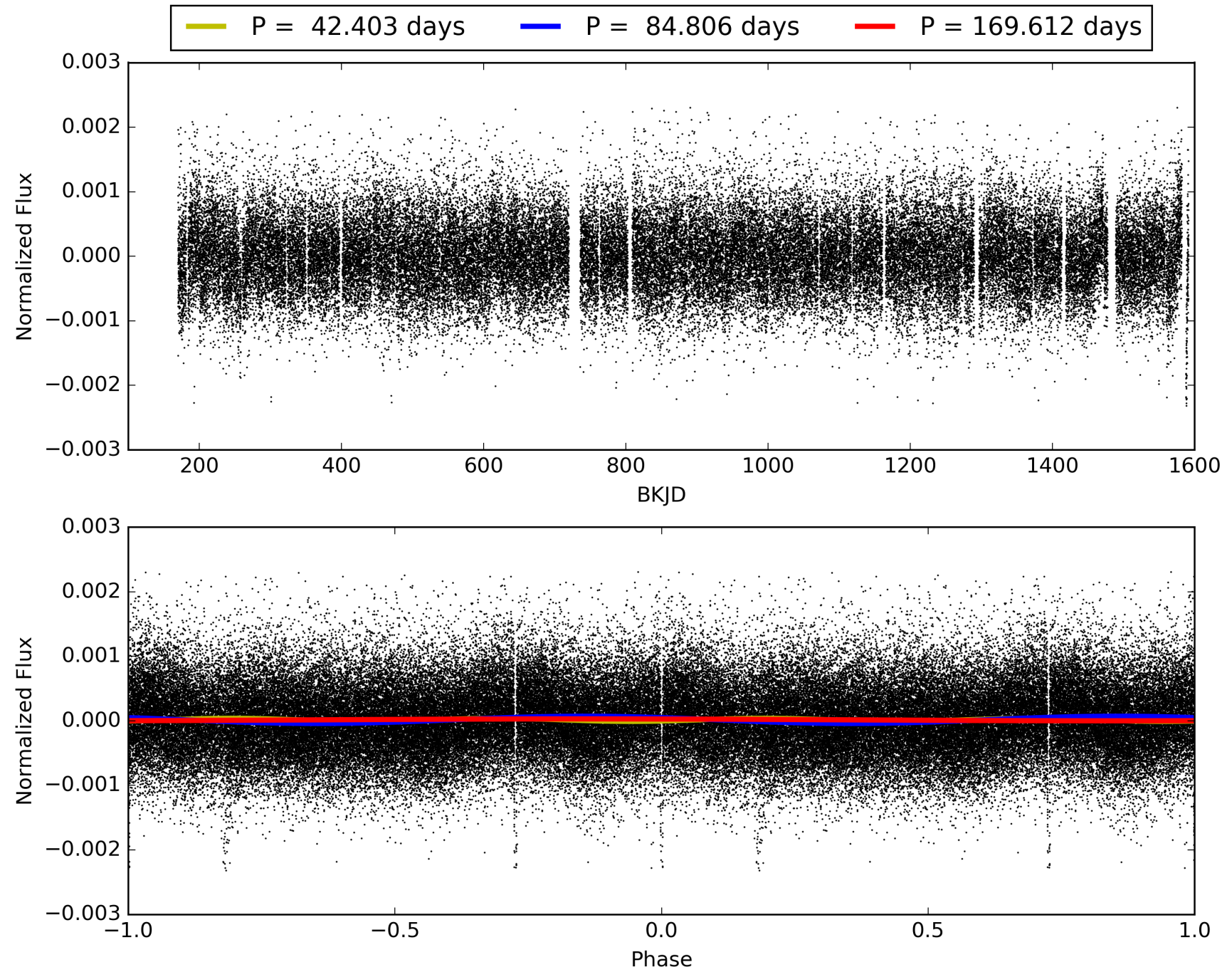
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 03:12:00 Z

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

# TCE 009643043-02, PDC Light Curves



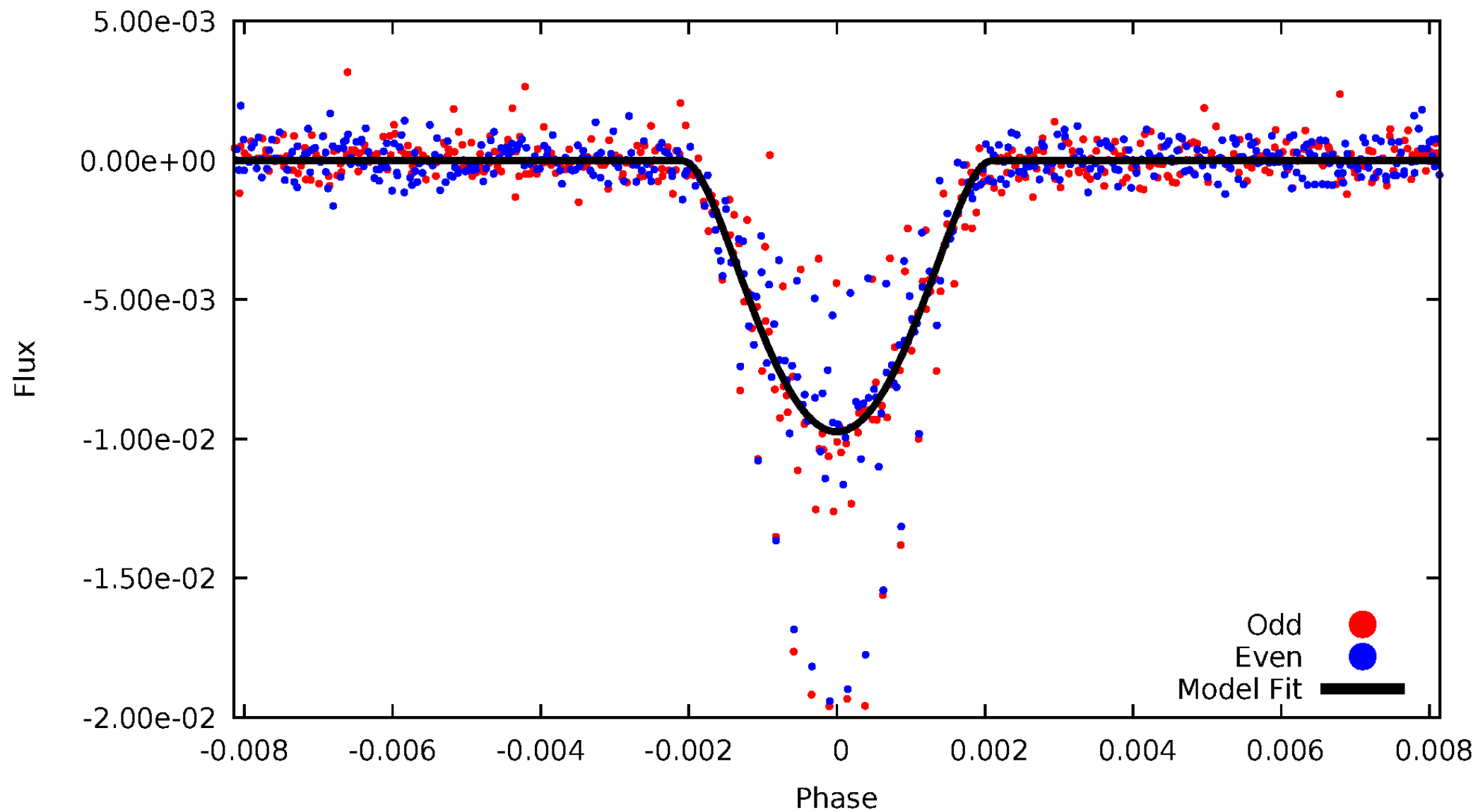
# TCE 009643043-02





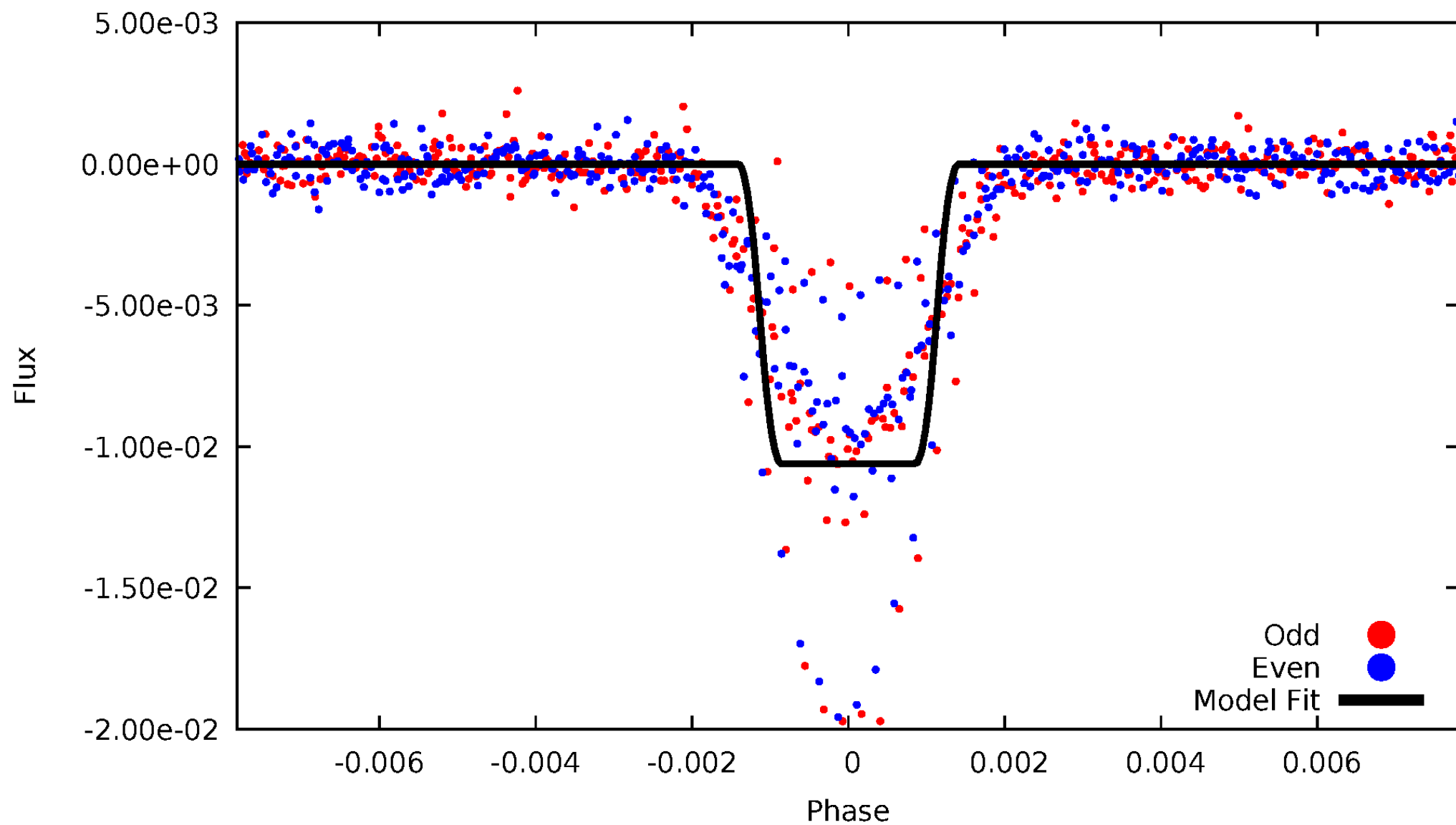
# DV Odd/Even

TCE 009643043-02



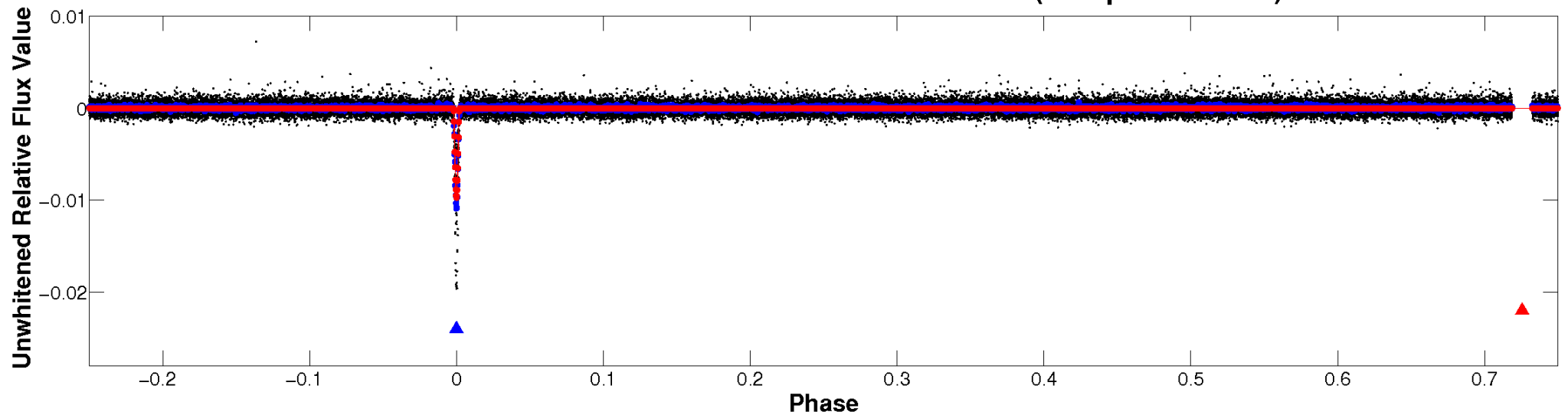
# ALT Odd/Even

TCE 009643043-02

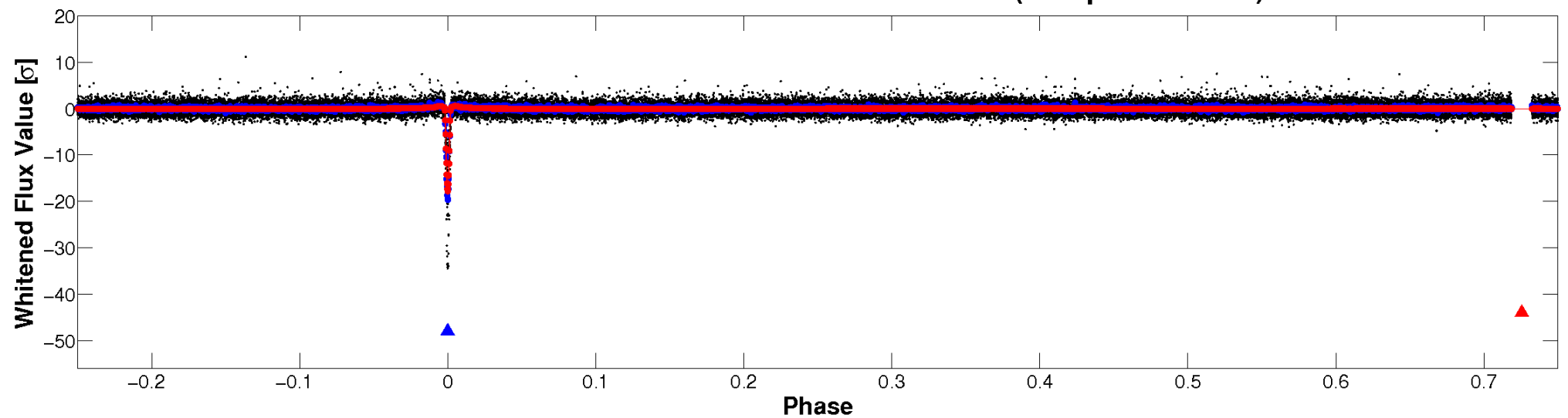


# Non-Whitened Vs. Whitened Light Curve

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

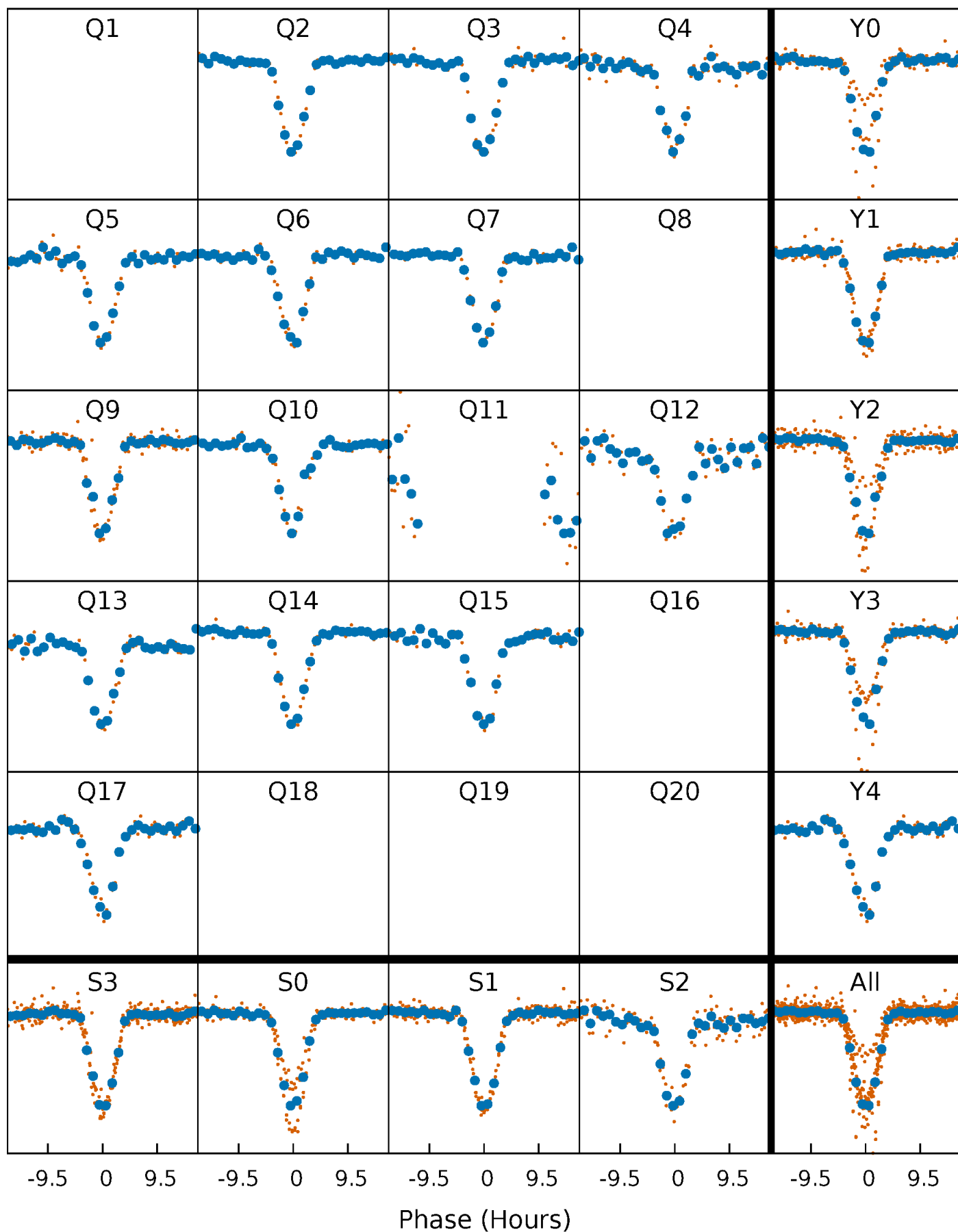


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



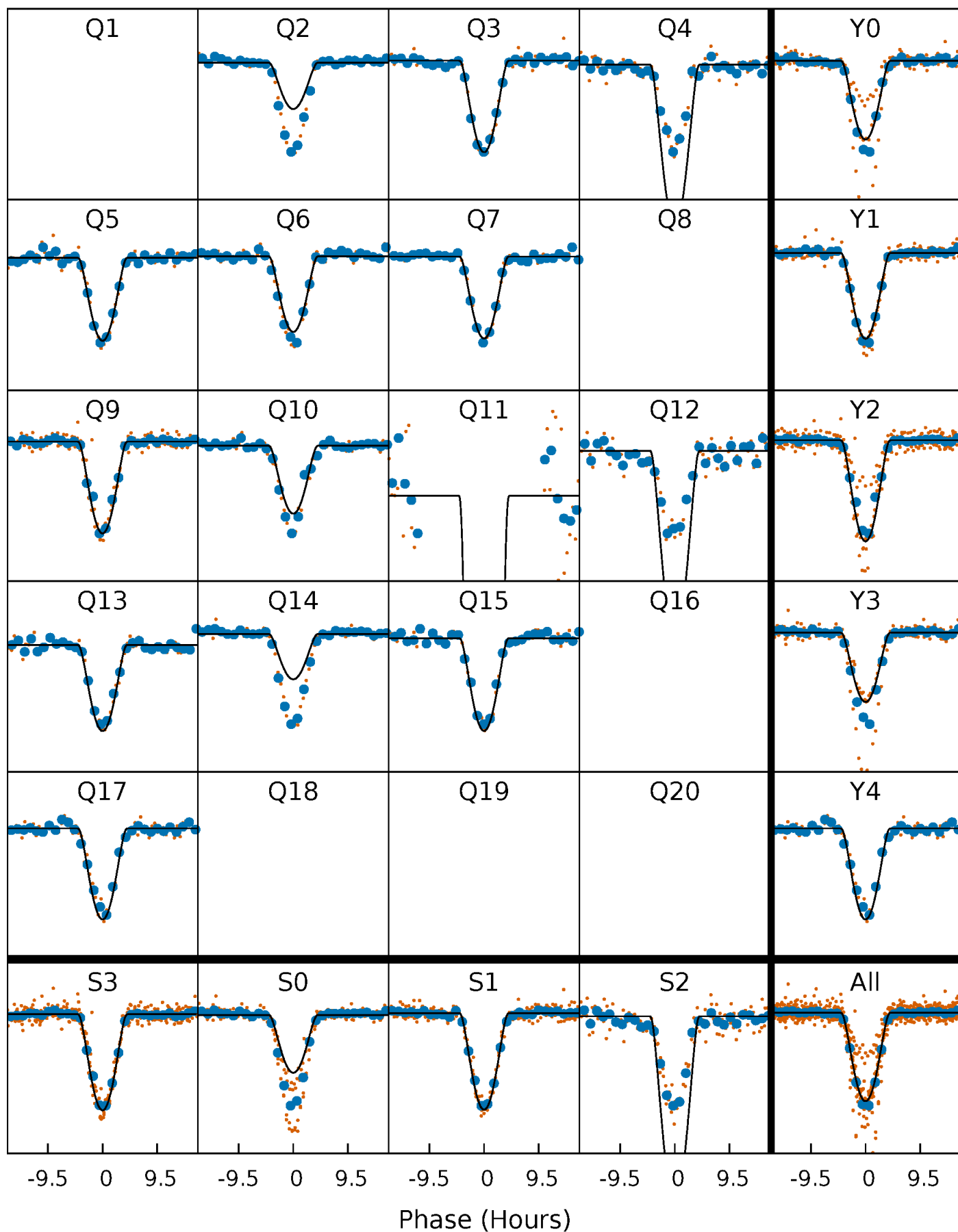
# PDC Quarter-Phased Transit Curves

TCE 009643043-02   P= 84.805751 Days    $T_0=215.647346$  (BKJD)



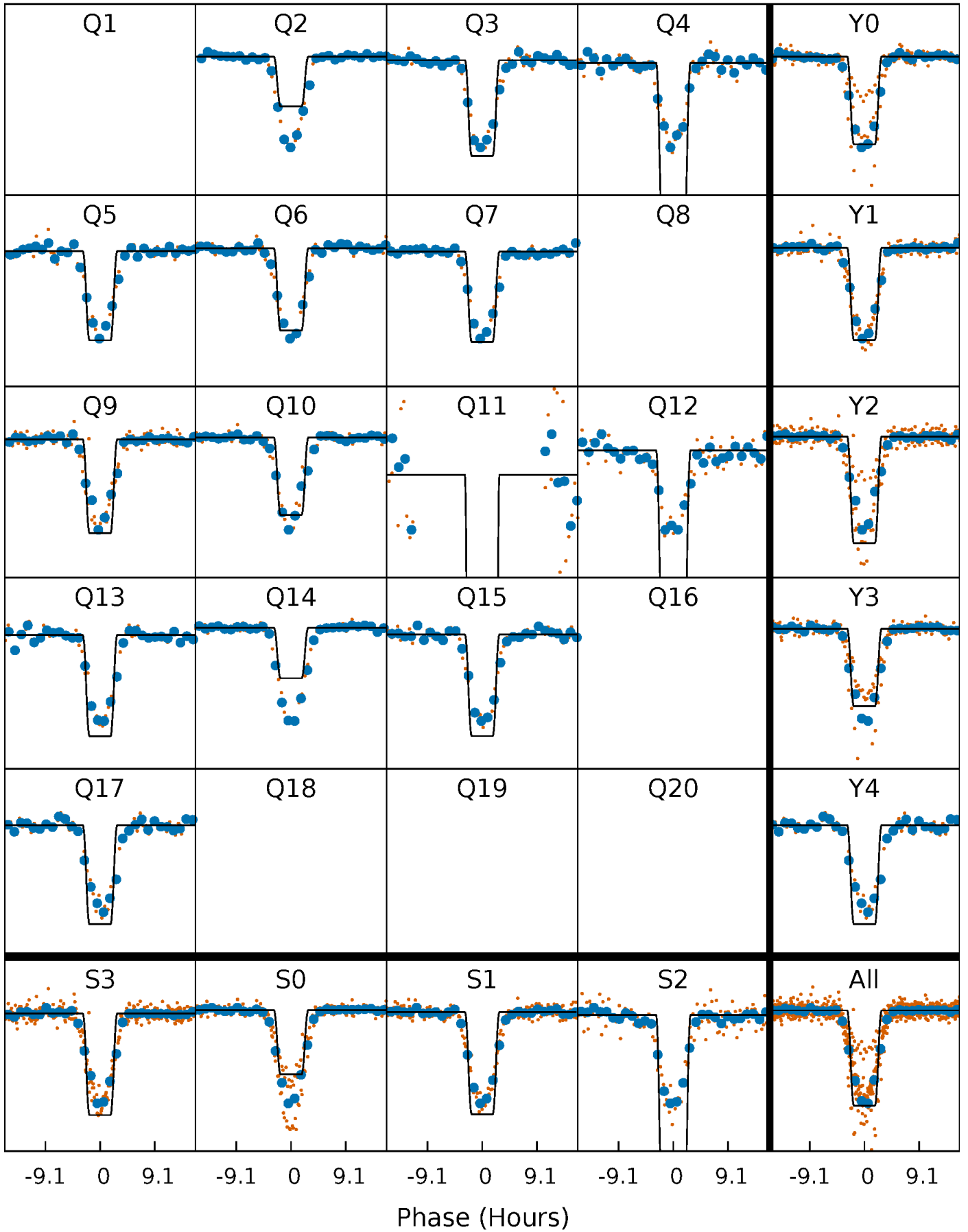
# DV Quarter-Phased Transit Curves

TCE 009643043-02 P= 84.805751 Days  $T_0=215.647346$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

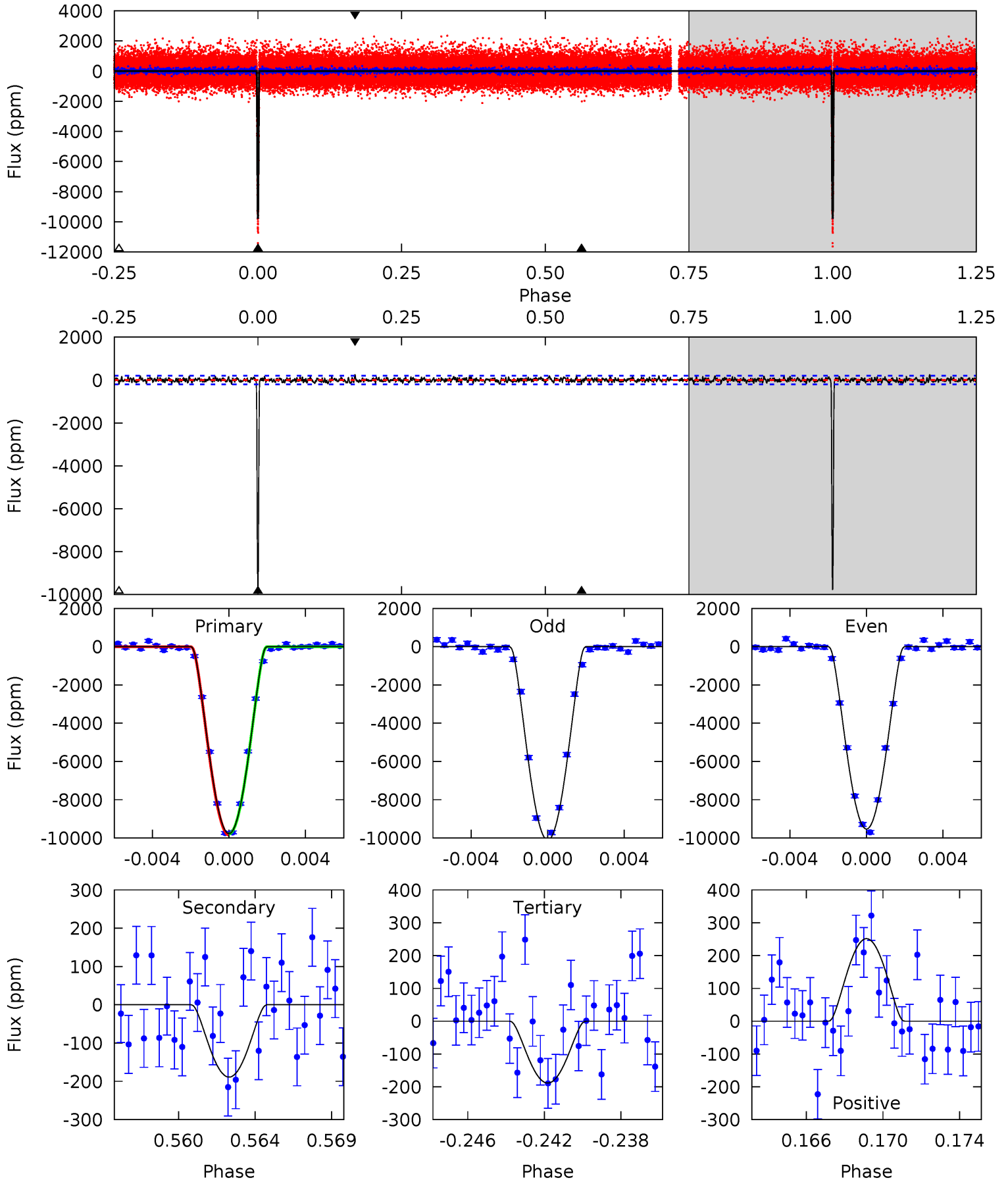
TCE 009643043-02 P= 84.805326 Days  $T_0=215.650446$  (BKJD)



# DV Model-Shift Uniqueness Test

009643043-02, P = 84.805751 Days, E = 130.841595 Days

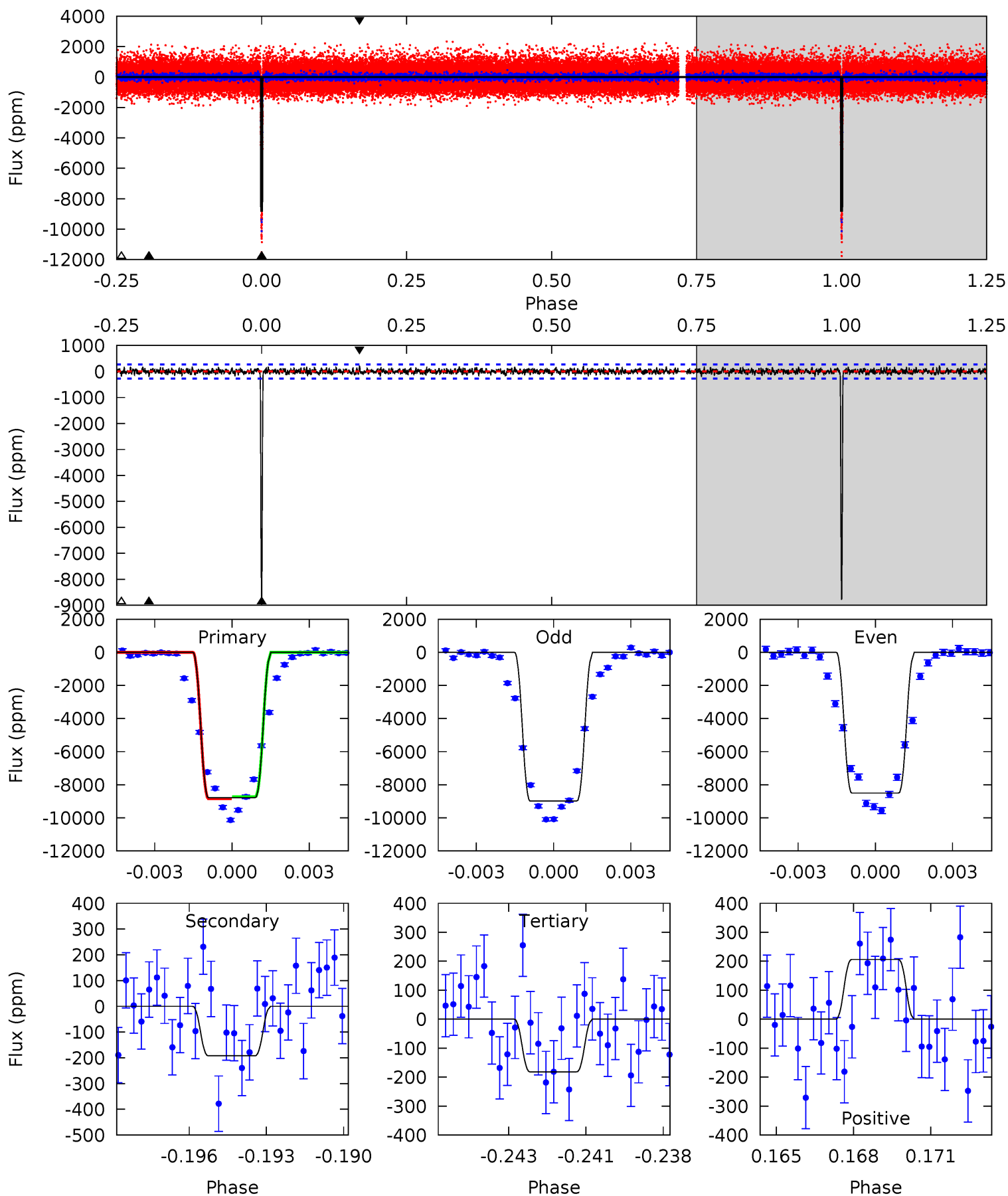
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
252.4	4.88	4.87	6.49	5.19	2.86	1.61	247.5	245.9	0.01	-1.61	7.50	1.08	0.03	0



# Alt Model-Shift Uniqueness Test

009643043-02, P = 84.805326 Days, E = 130.845120 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
169.8	3.72	3.51	3.98	5.27	2.99	1.10	166.2	165.8	0.20	-0.27	4.61	1.09	0.02	1.01





### Stellar Parameters For KIC 009643043

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5735^{+155}_{-155}$	$4.525^{+0.060}_{-0.180}$	$-0.260^{+0.300}_{-0.300}$	$0.853^{+0.236}_{-0.079}$	$0.889^{+0.100}_{-0.090}$	$2.021^{+0.599}_{-0.960}$
	+3%/-3%	+1%/-4%	+115%/-115%	+28%/-9%	+11%/-10%	+30%/-48%
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 009643043-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-189 \pm 39$	$14.10^{+4.03}_{-4.04}$	$549^{+36}_{-24}$	$2577^{+222}_{-159}$	$66^{+70}_{-27}$
Alt.	$-192 \pm 52$	$10.04^{+3.90}_{-3.62}$	$550^{+36}_{-27}$	$2828^{+391}_{-256}$	$137^{+205}_{-71}$

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

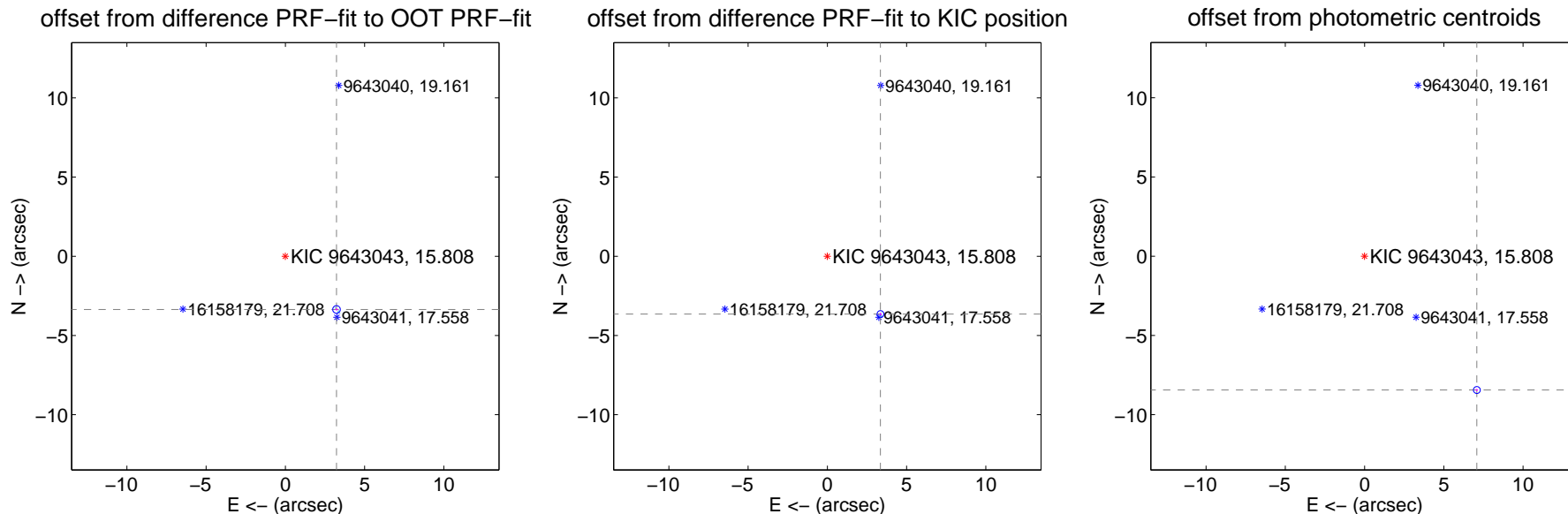
## DV Centroid Data

Supplemental centroid analysis for 009643043-02. Kepler magnitude: 15.81. Transit SNR 137.08

There are 11 quarters with good PRF difference image offsets

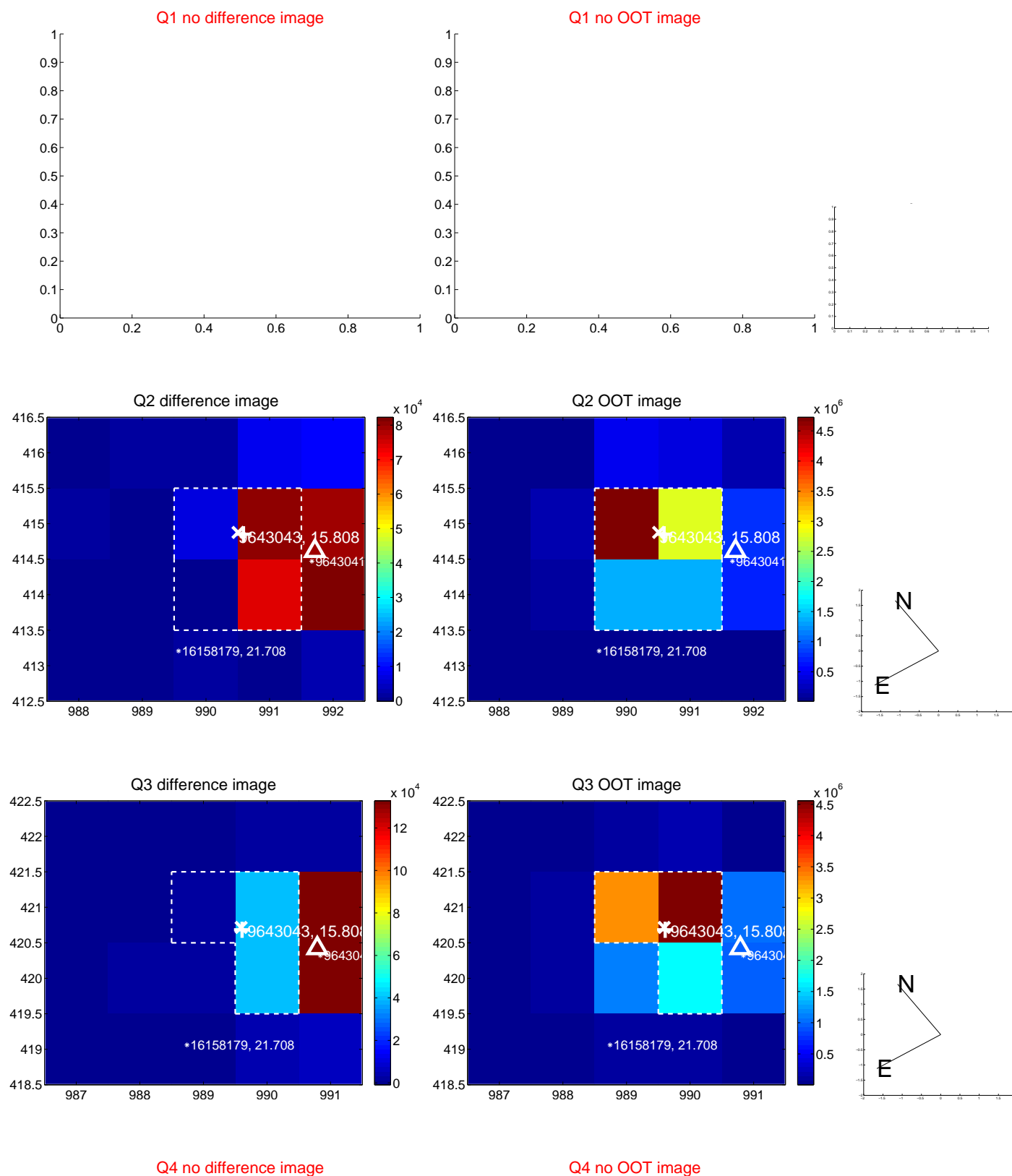
The direct PRF centroid is offset from the target star catalog position by about 0.26 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$4.659 \pm 0.080$	58.05	$-3.229 \pm 0.072$	$-3.359 \pm 0.076$
PRF-fit source offset from KIC position	$4.952 \pm 0.071$	70.07	$-3.352 \pm 0.068$	$-3.646 \pm 0.072$
photometric centroid source offset	$11.02 \pm 0.07$	152.02	$-7.09 \pm 0.08$	$-8.45 \pm 0.07$

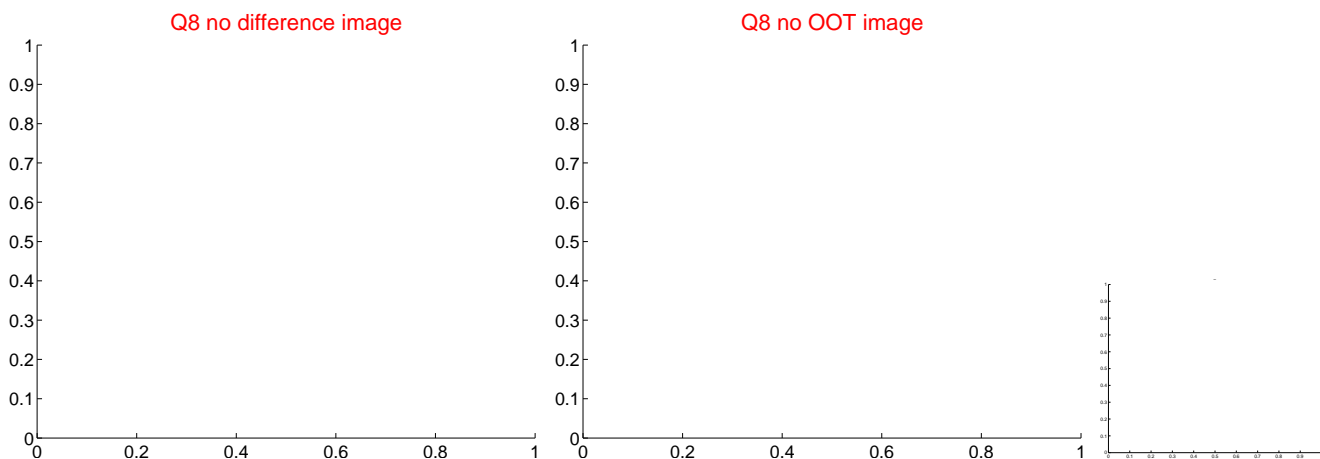
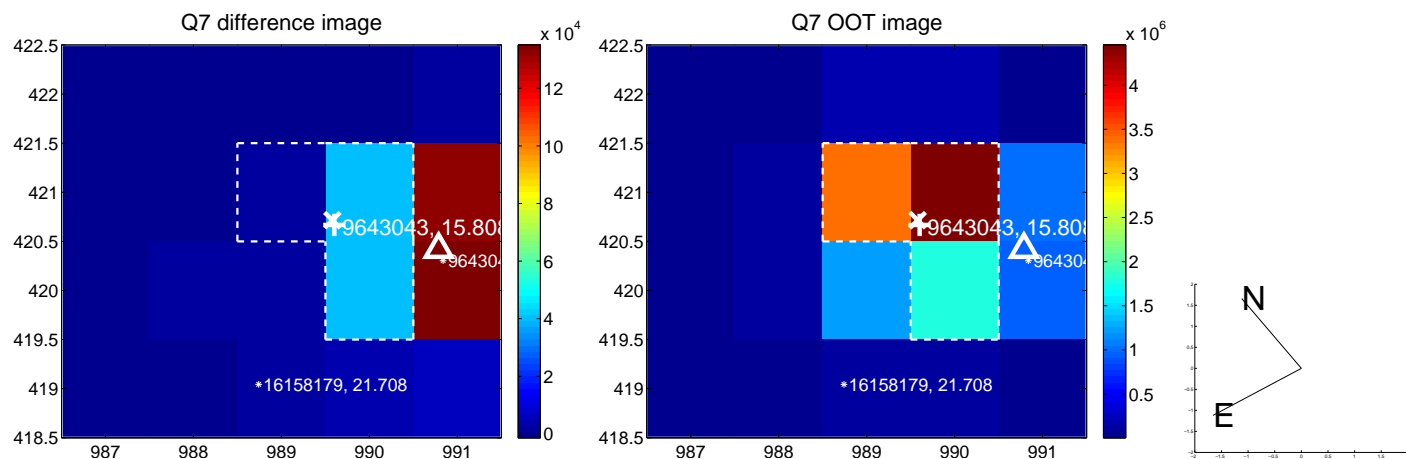
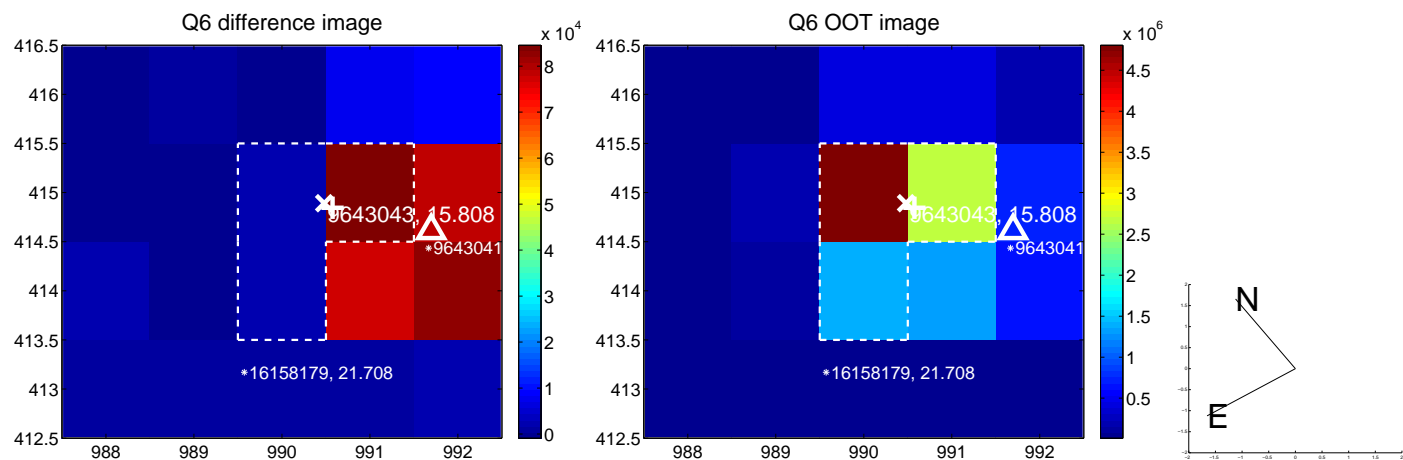
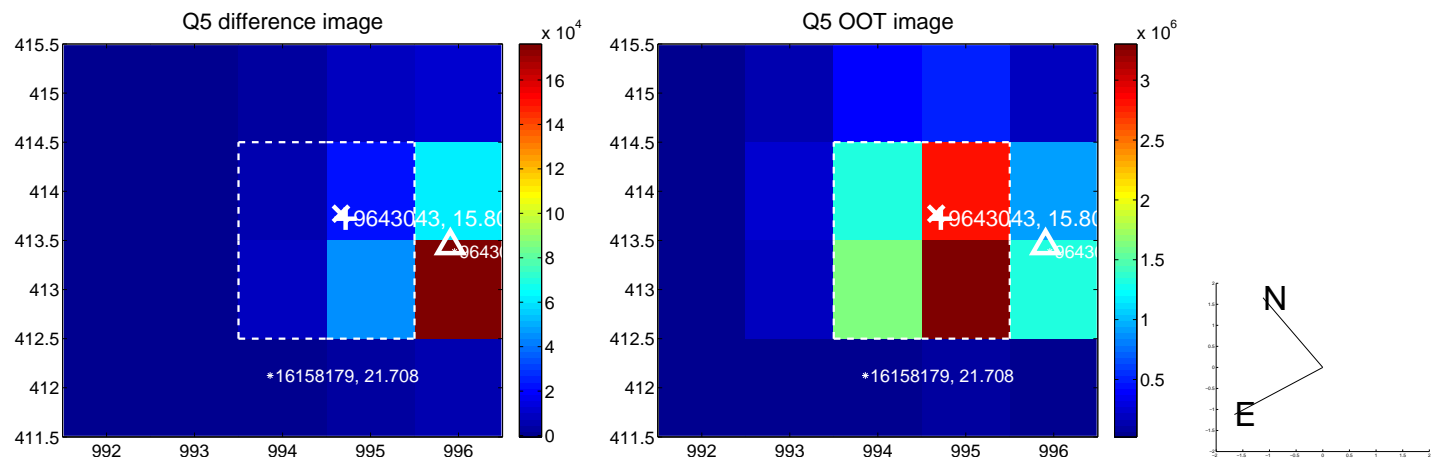


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

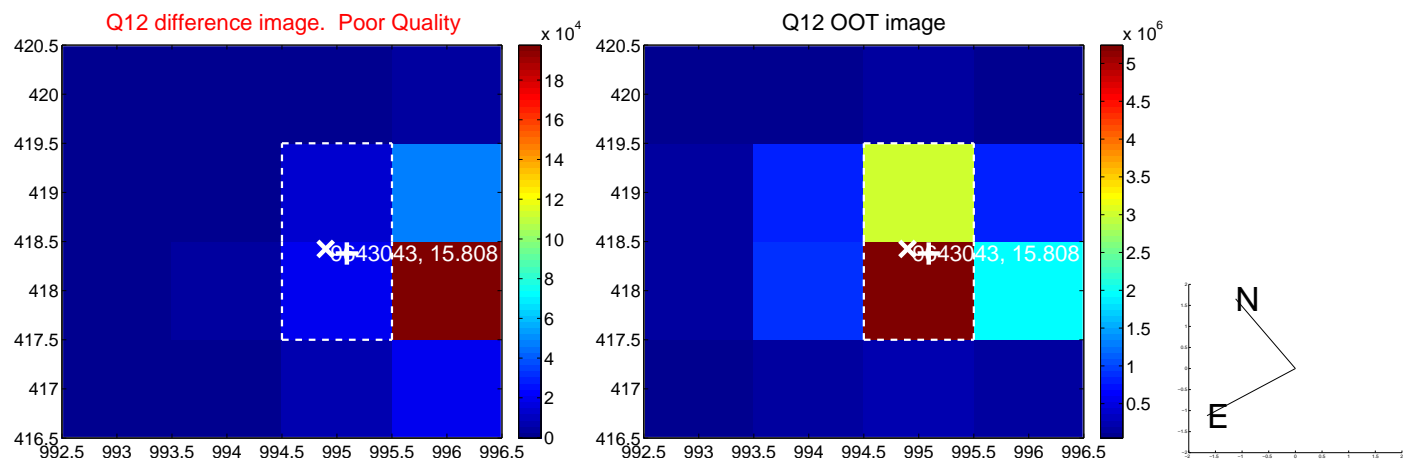
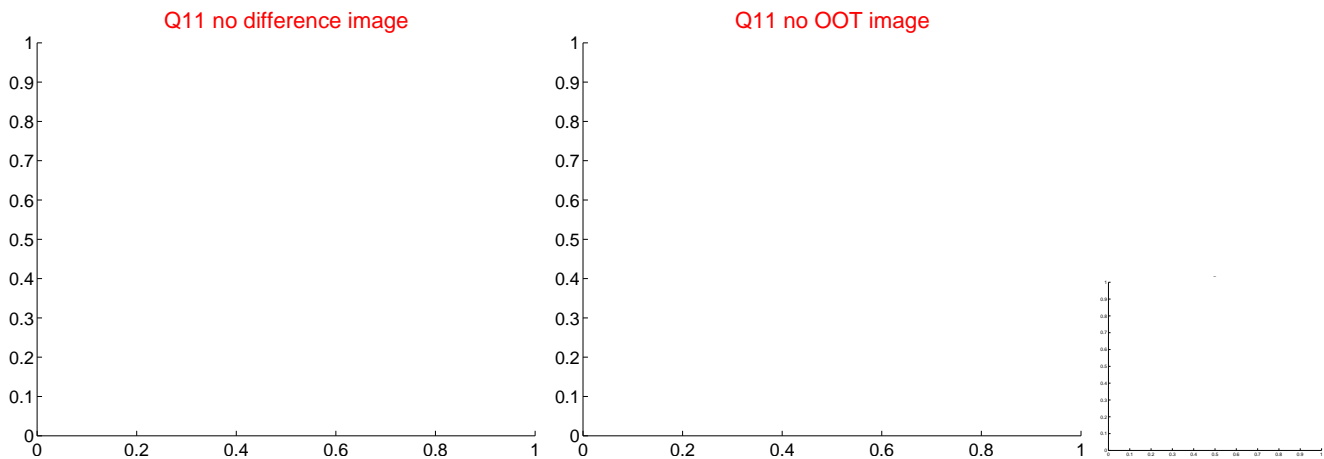
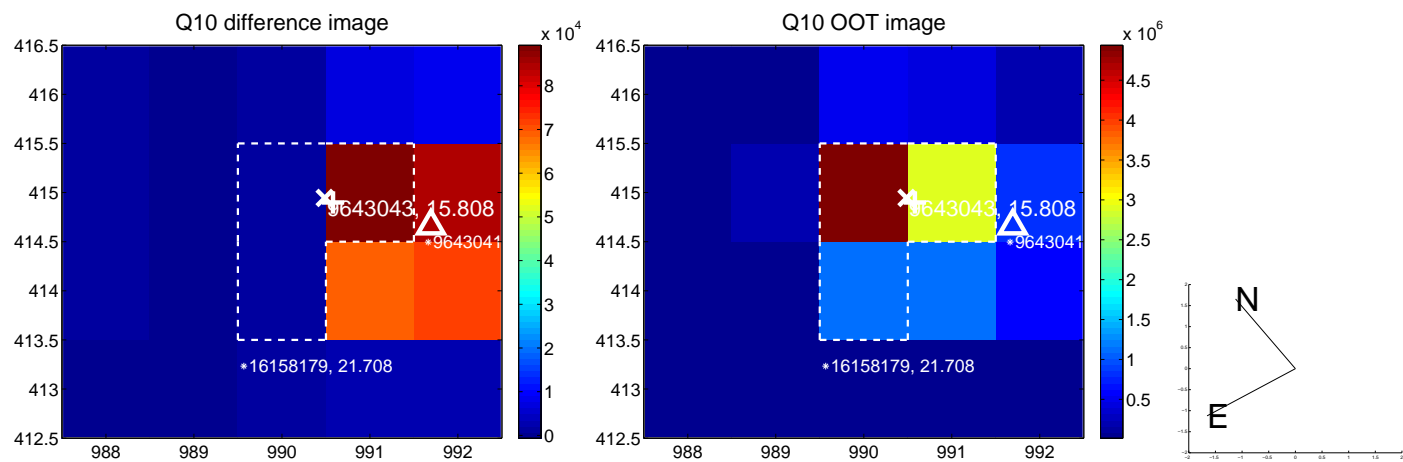
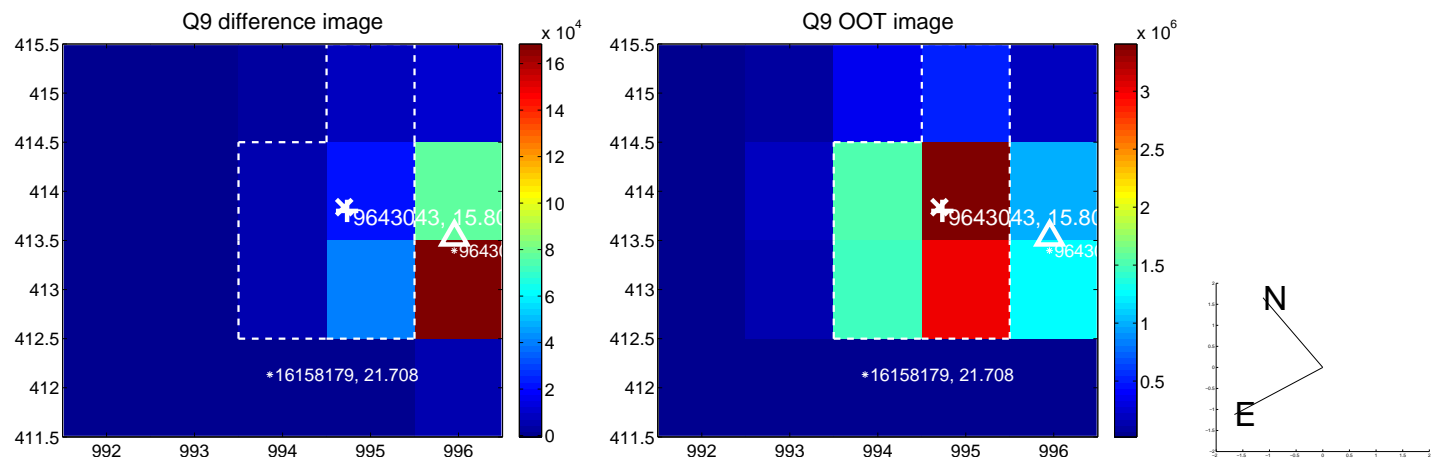
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



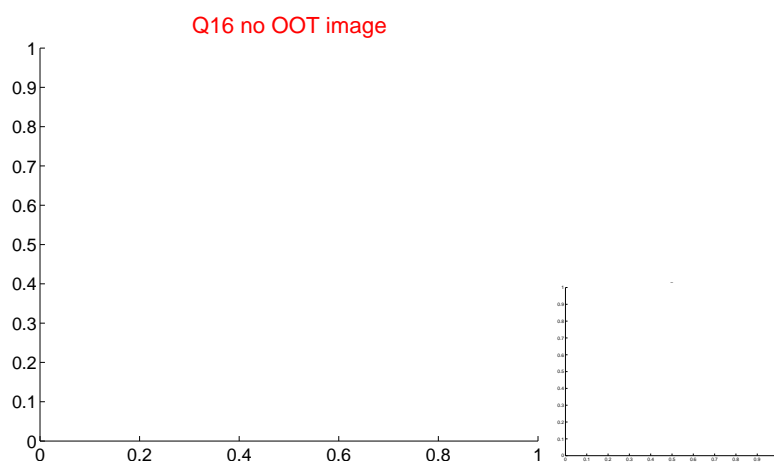
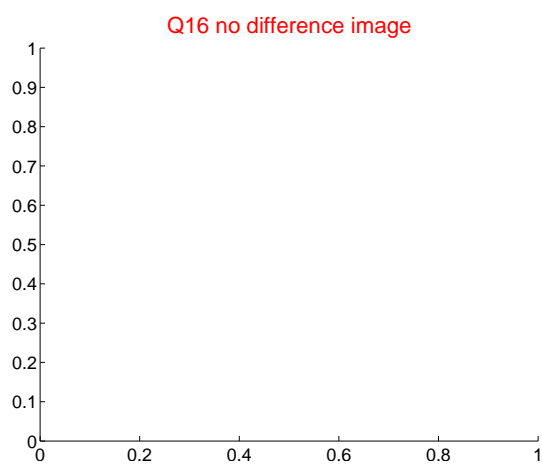
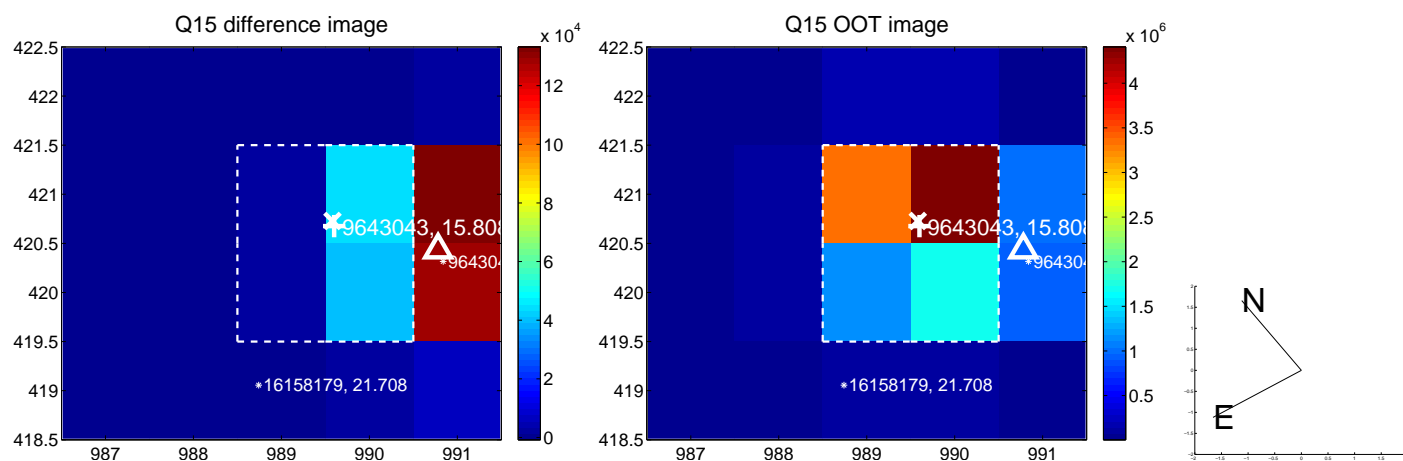
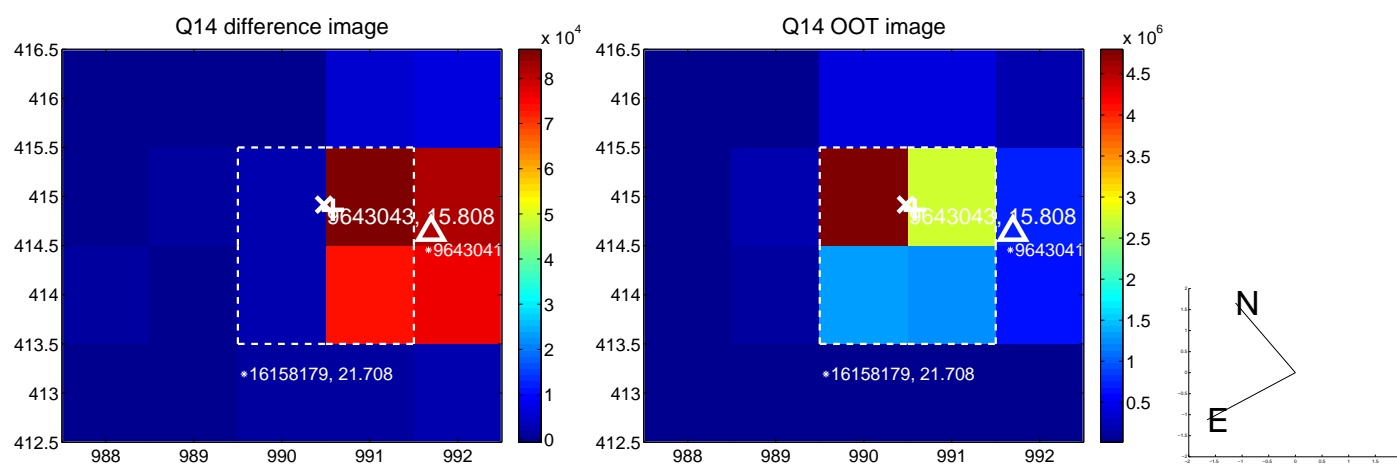
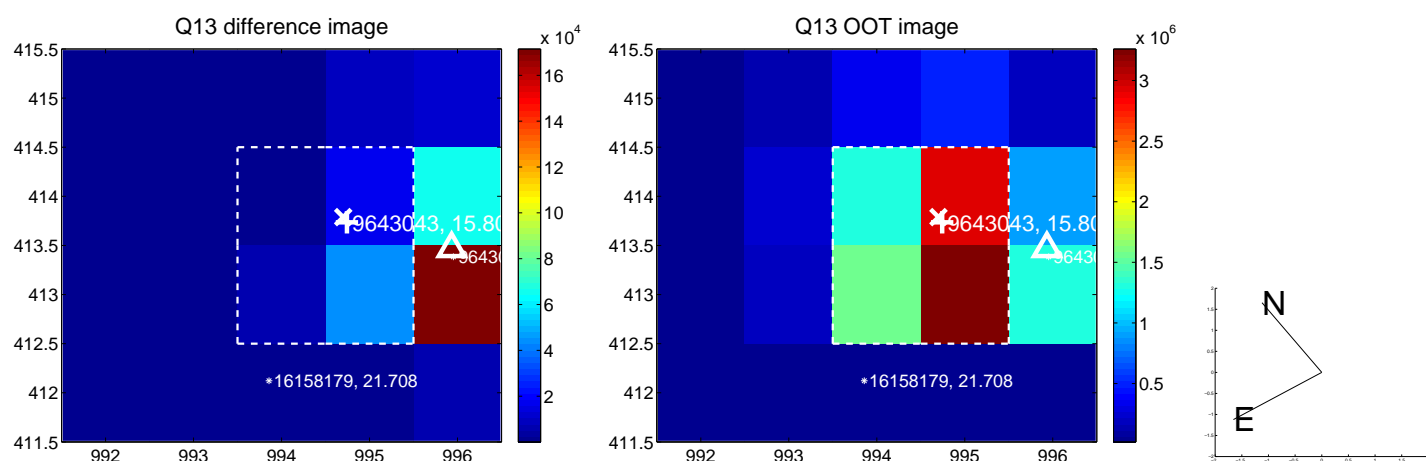
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



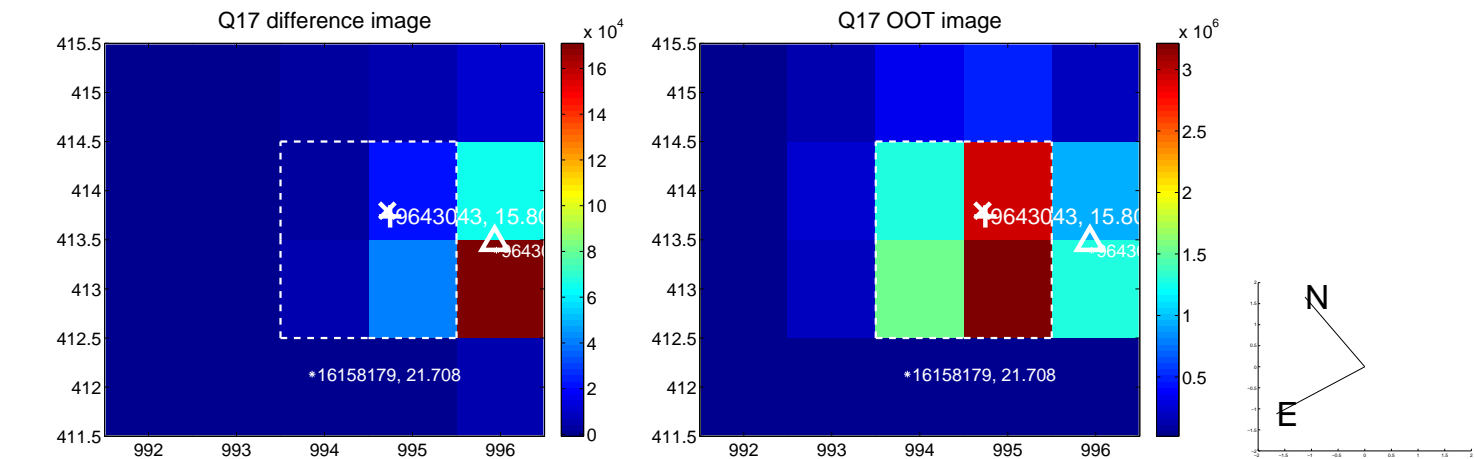
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



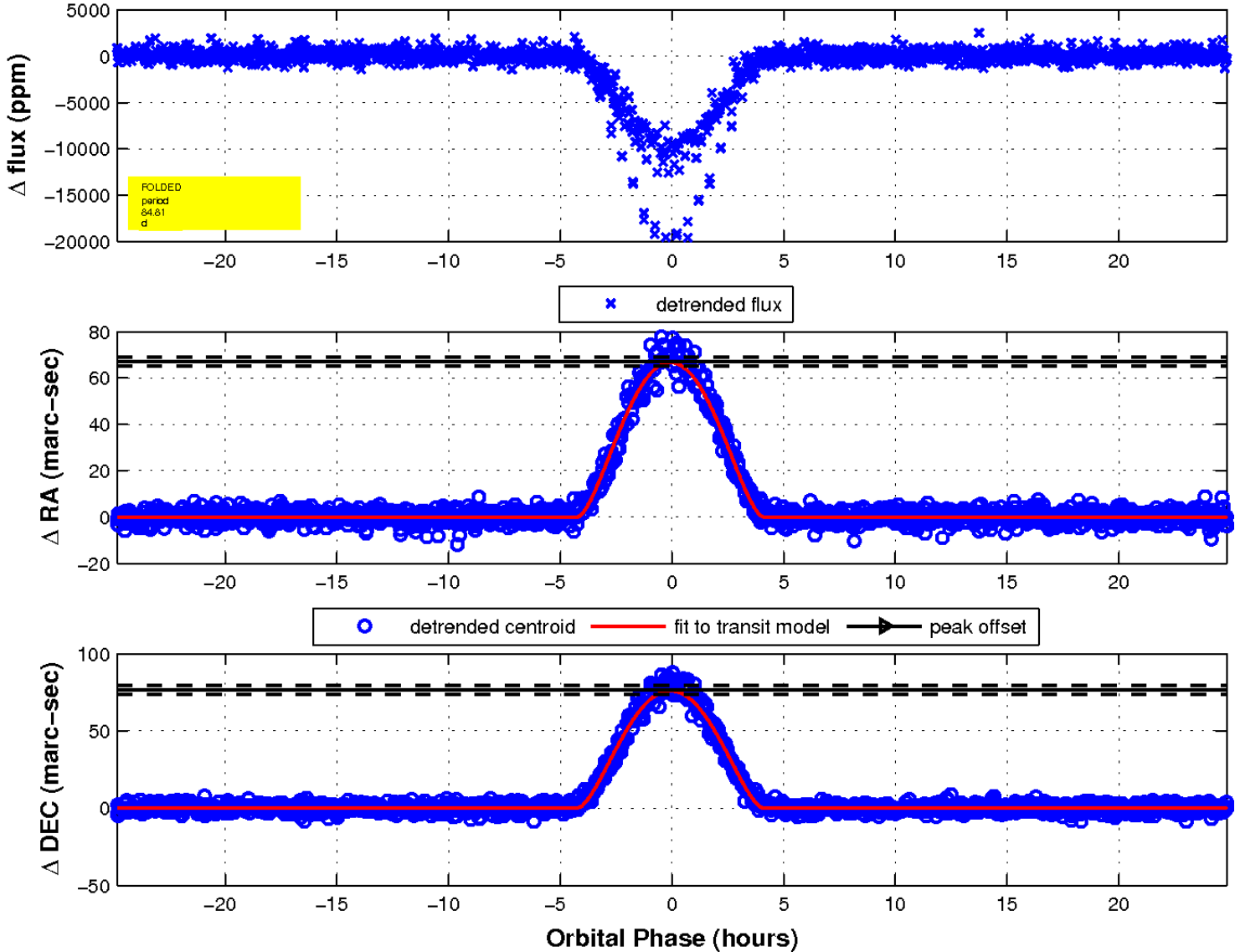
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

