

# KIC 009944421

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009944421-01	OBS	7260.01	7.095206	135.371494	231282.7	3.688	9368.6	5750.9	0.78	5481	56.99	103.36
009944421-02	OBS	No	7.095207	132.261415	30302.6	4.094	1265.4	1078.7	0.78	5481	23.84	103.36

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009944421-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
009944421-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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.

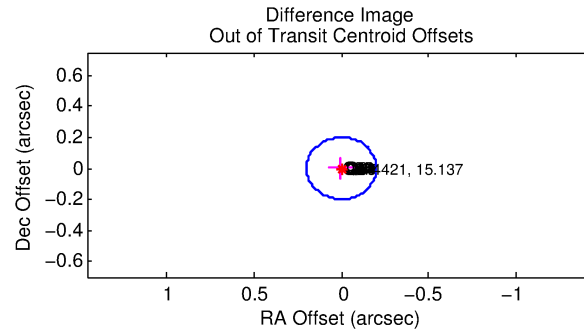
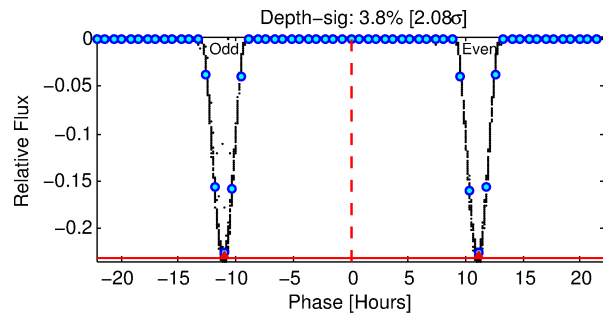
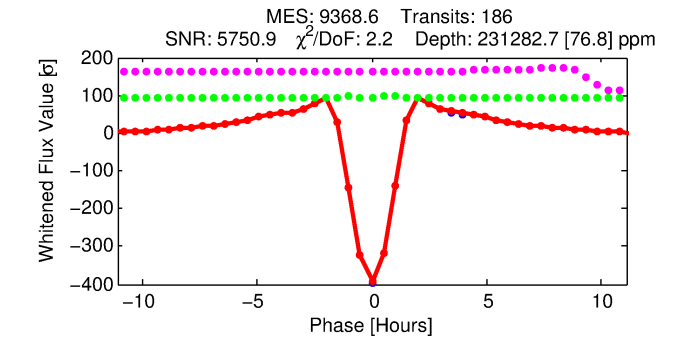
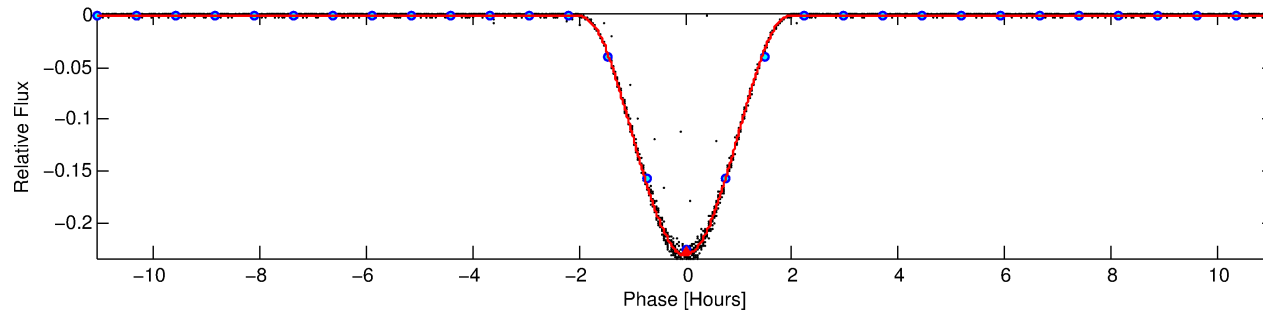
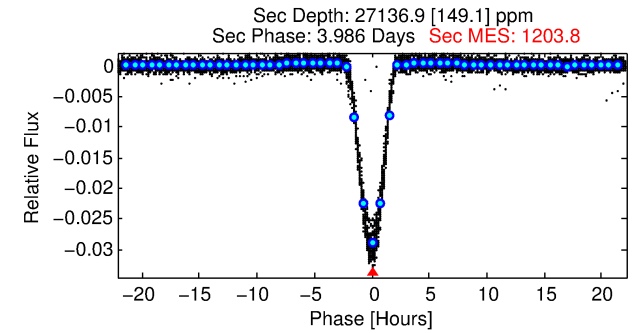
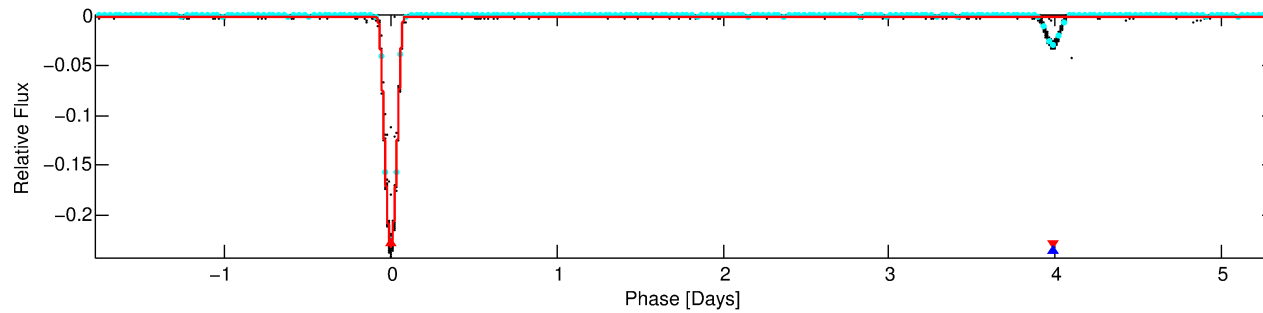
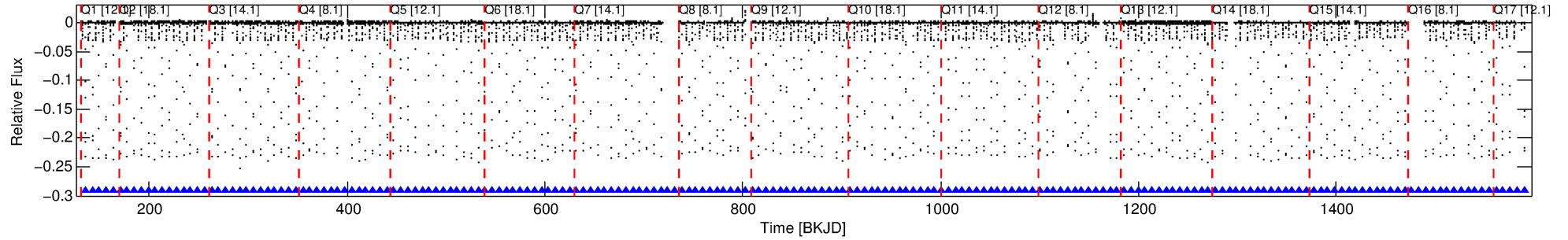
## Ephemeris Match Information For 009944421-01

No Significant Match Found

# DV One-Page Summary

KIC: 9944421 Candidate: 1 of 2 Period: 7.095 d  
KOI: K07260.01 Corr: 0.999

Kp: 15.14 R\*: 0.78 Rs Teff: 5481.0 K Logg: 4.59 Fe/H: -0.220



## DV Fit Results:

Period = 7.09521 [0.00000] d  
Epoch = 135.3715 [0.0000] BKJD  
Rp/R\* = 0.6712 [0.0077]  
a/R\* = 20.80 [0.05]  
b = 0.89 [0.01]  
Seff = 103.36 [28.87]  
Teff = 813 [57] K  
Rp = 56.99 [12.03] Re  
a = 0.0688 [0.0120] AU  
Ag = 21.77 [5.50] [3.77σ]  
Teffp = 2715 [84] K [18.79σ]

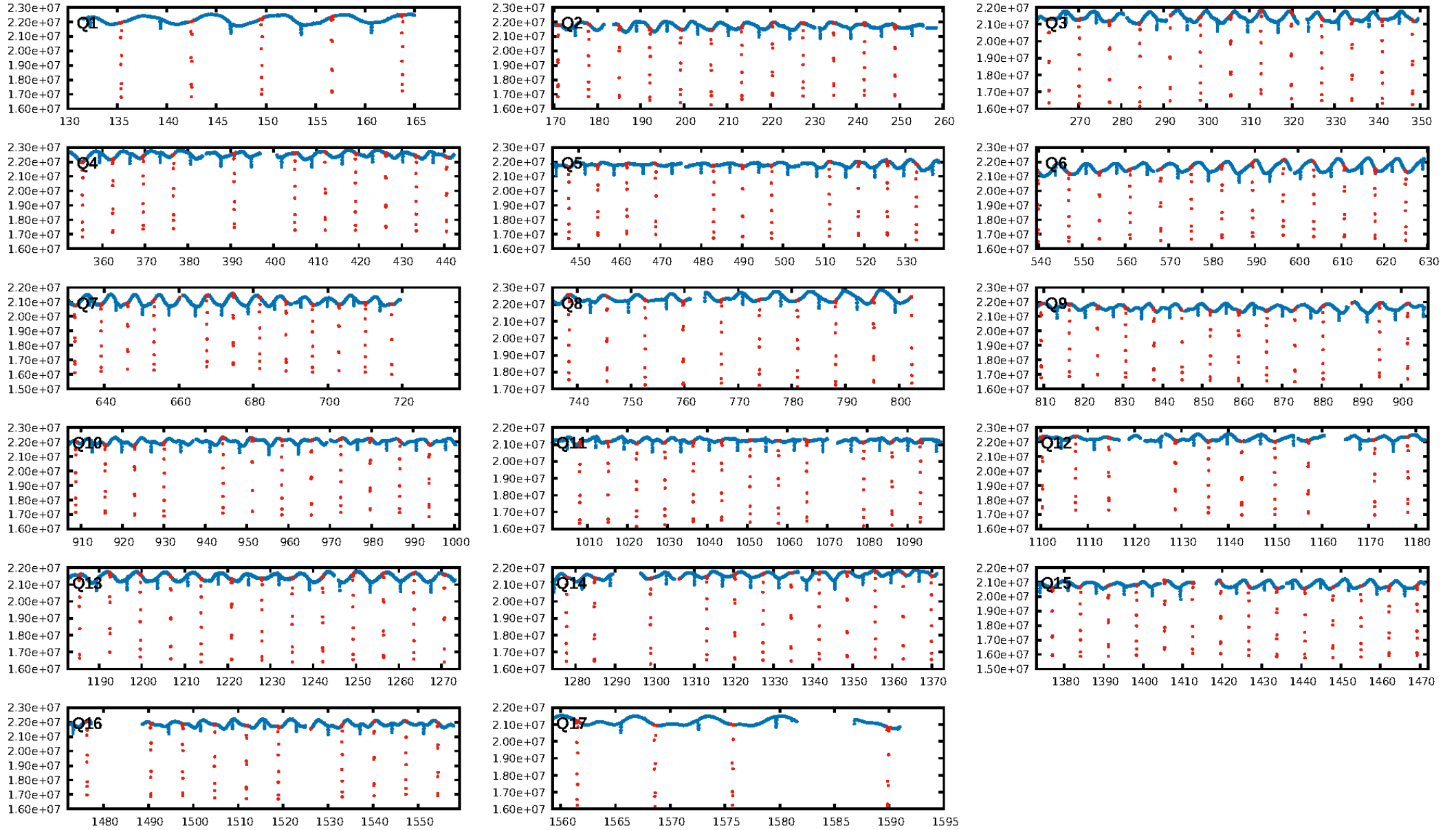
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [177/177]  
GhostDiagnostic-chr: 2.32  
Centroid-sig: 0.0%  
Centroid-so: 0.104 arcsec [105.06σ]  
OotOffset-rm: 0.001 arcsec [0.02σ]  
KicOffset-rm: 0.061 arcsec [0.90σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

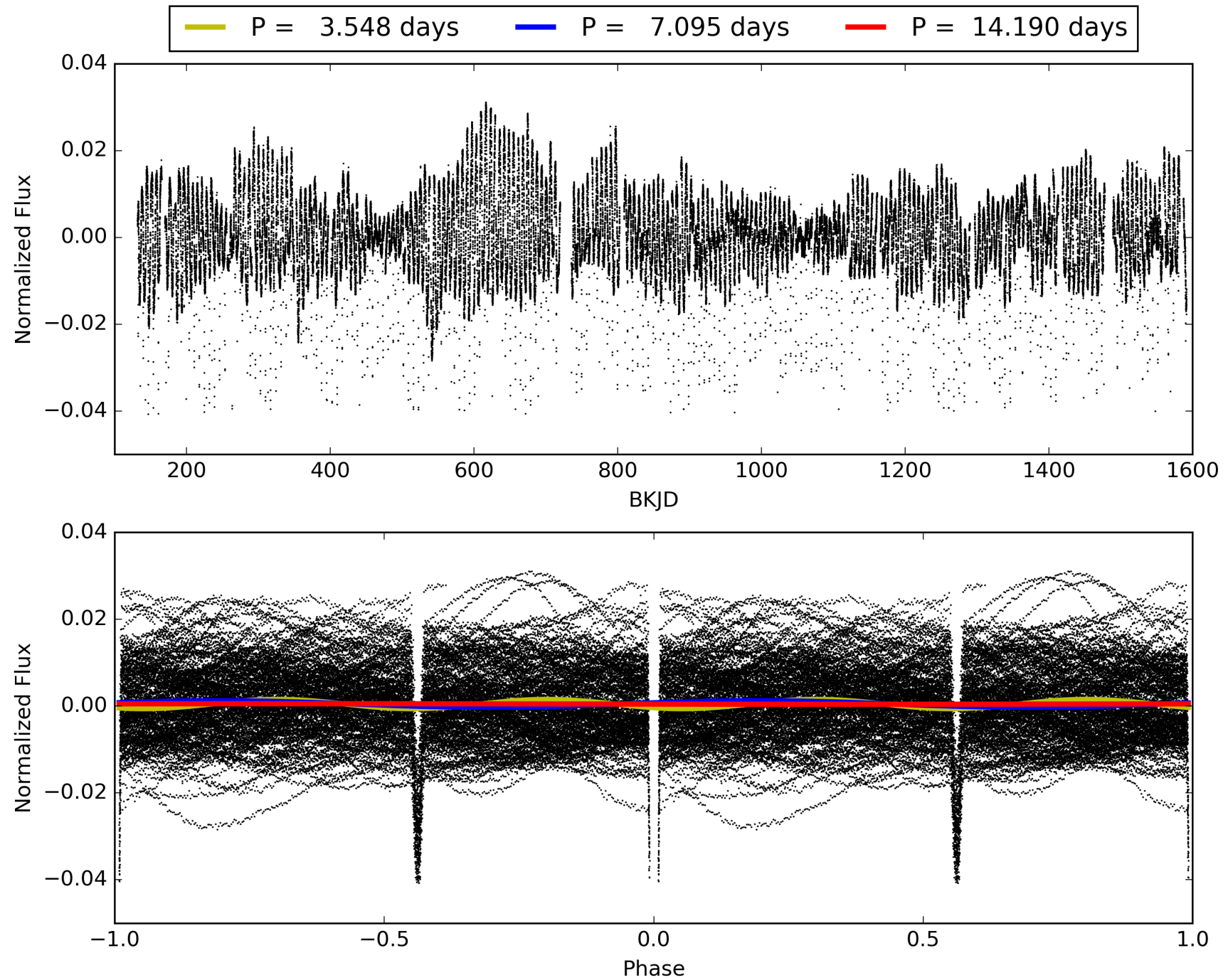
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 05:43:19 Z

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

# TCE 009944421-01, PDC Light Curves

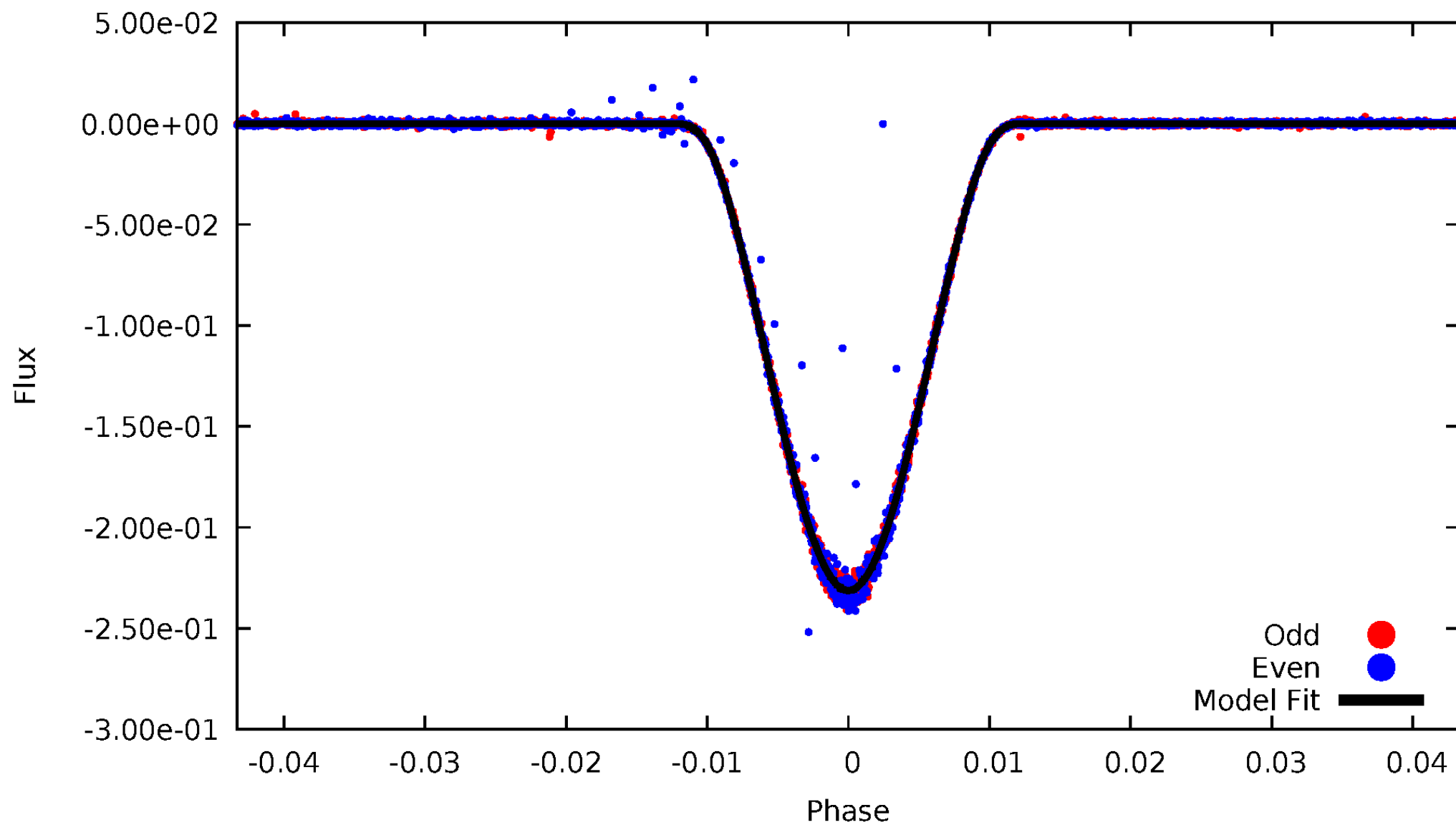


TCE 009944421-01



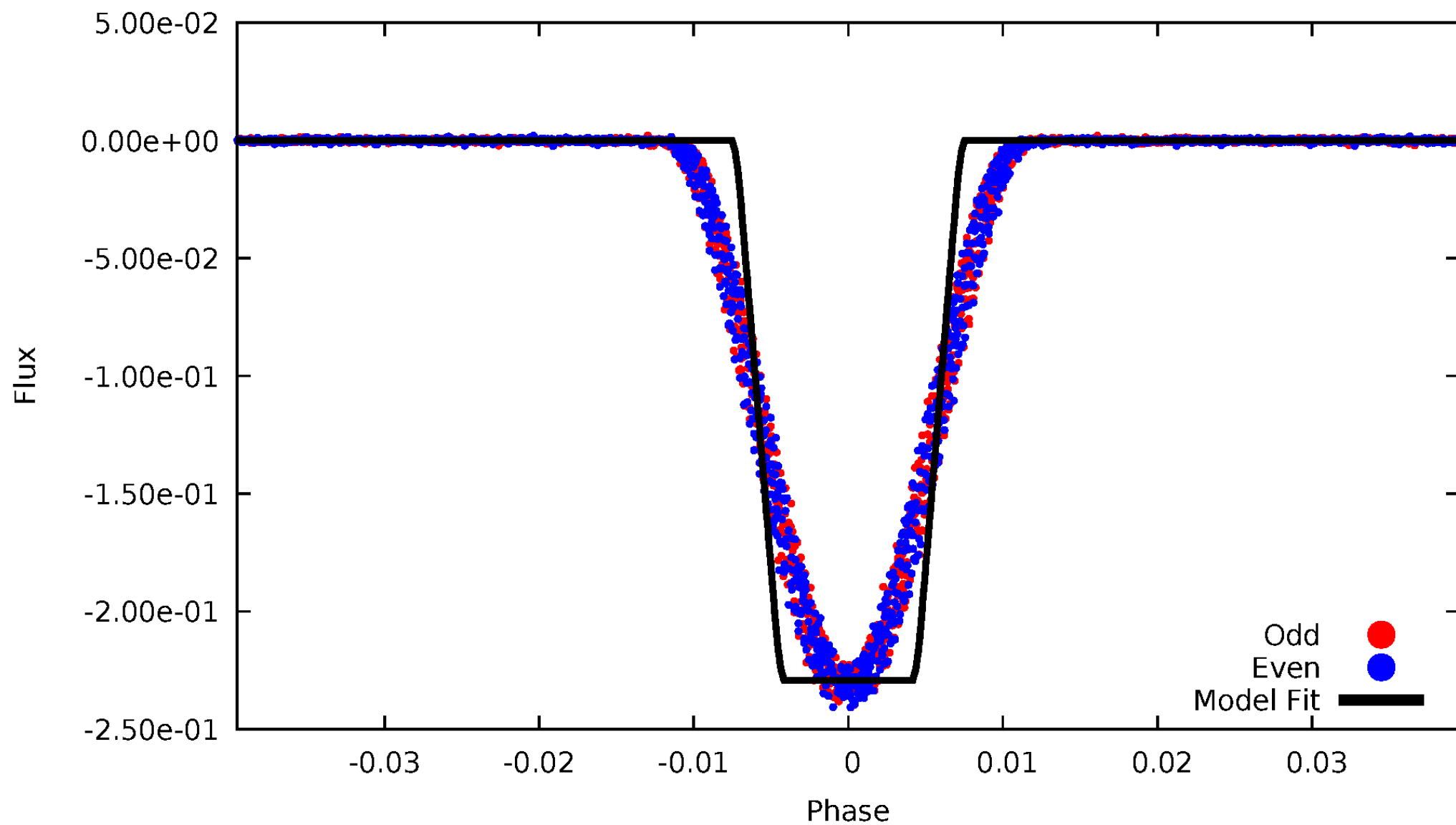
# DV Odd/Even

TCE 009944421-01



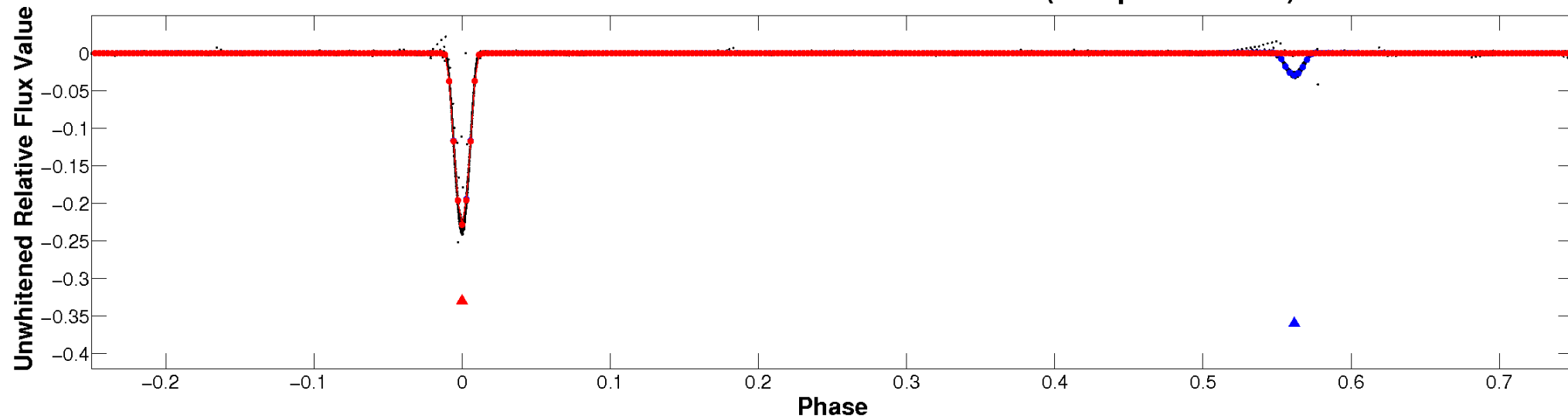
# ALT Odd/Even

TCE 009944421-01

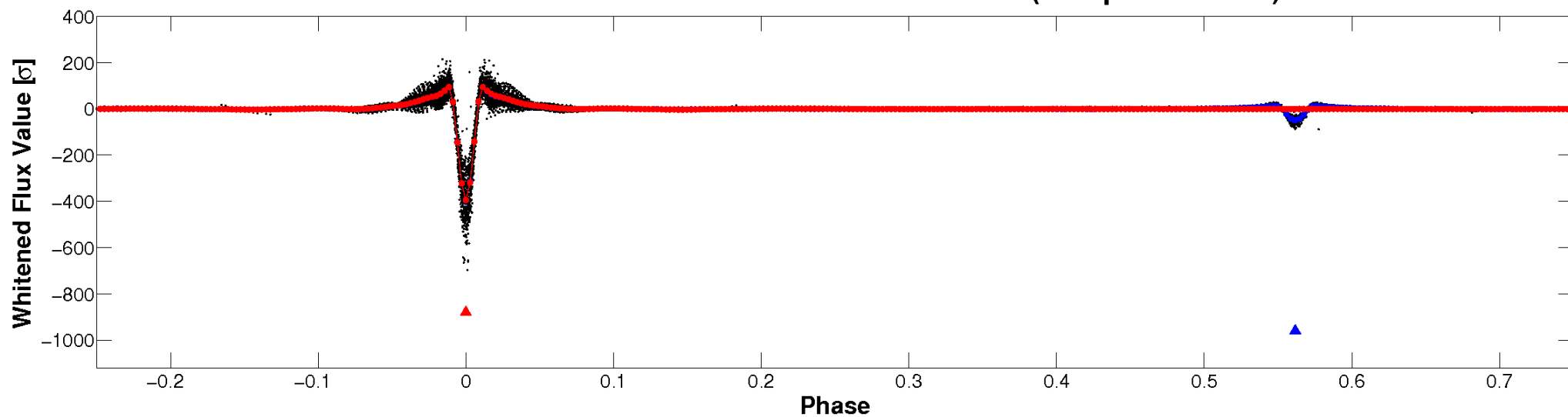


# Non-Whitened Vs. Whitened Light Curve

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

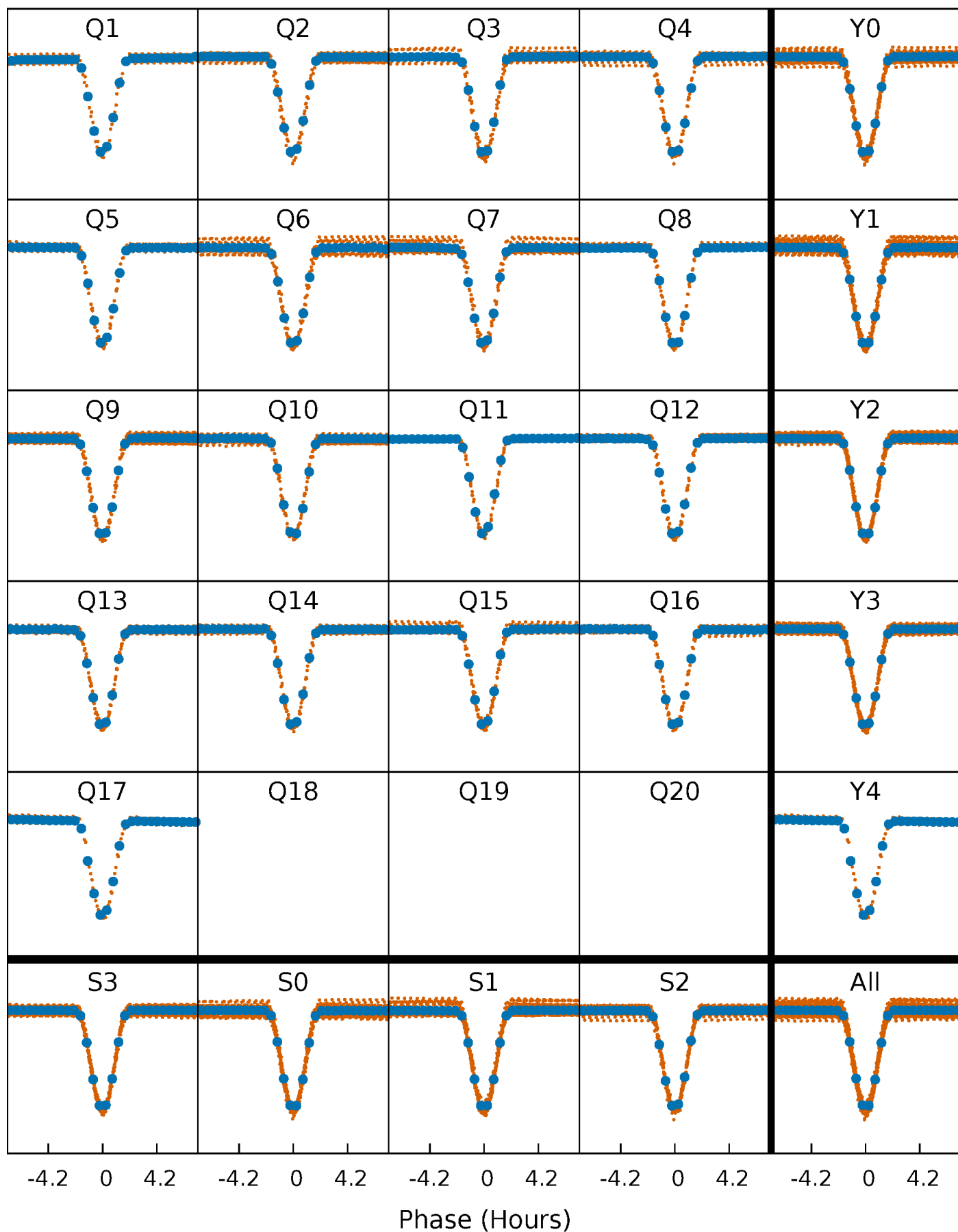


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

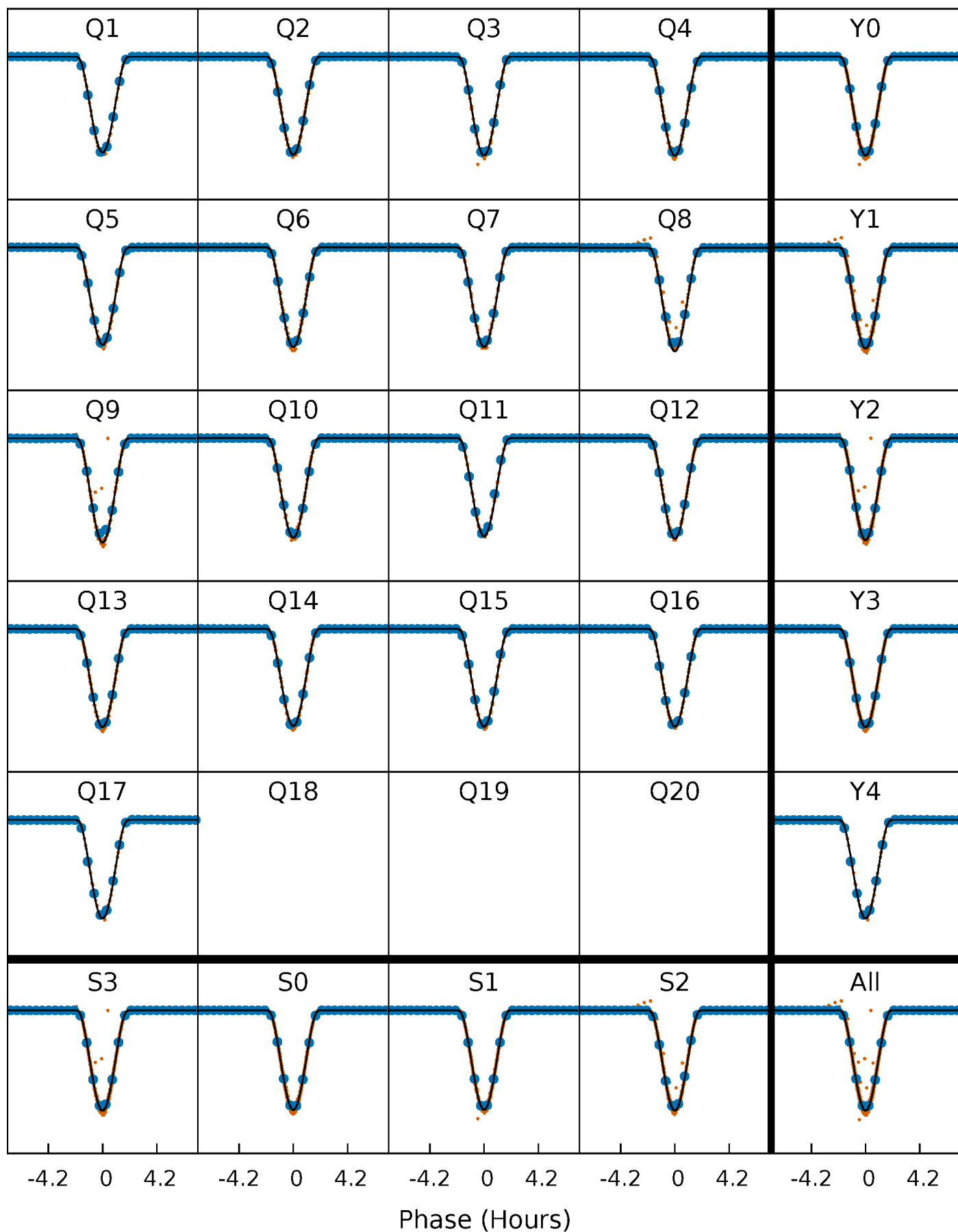
TCE 009944421-01 P= 7.095206 Days  $T_0=135.371495$  (BKJD)





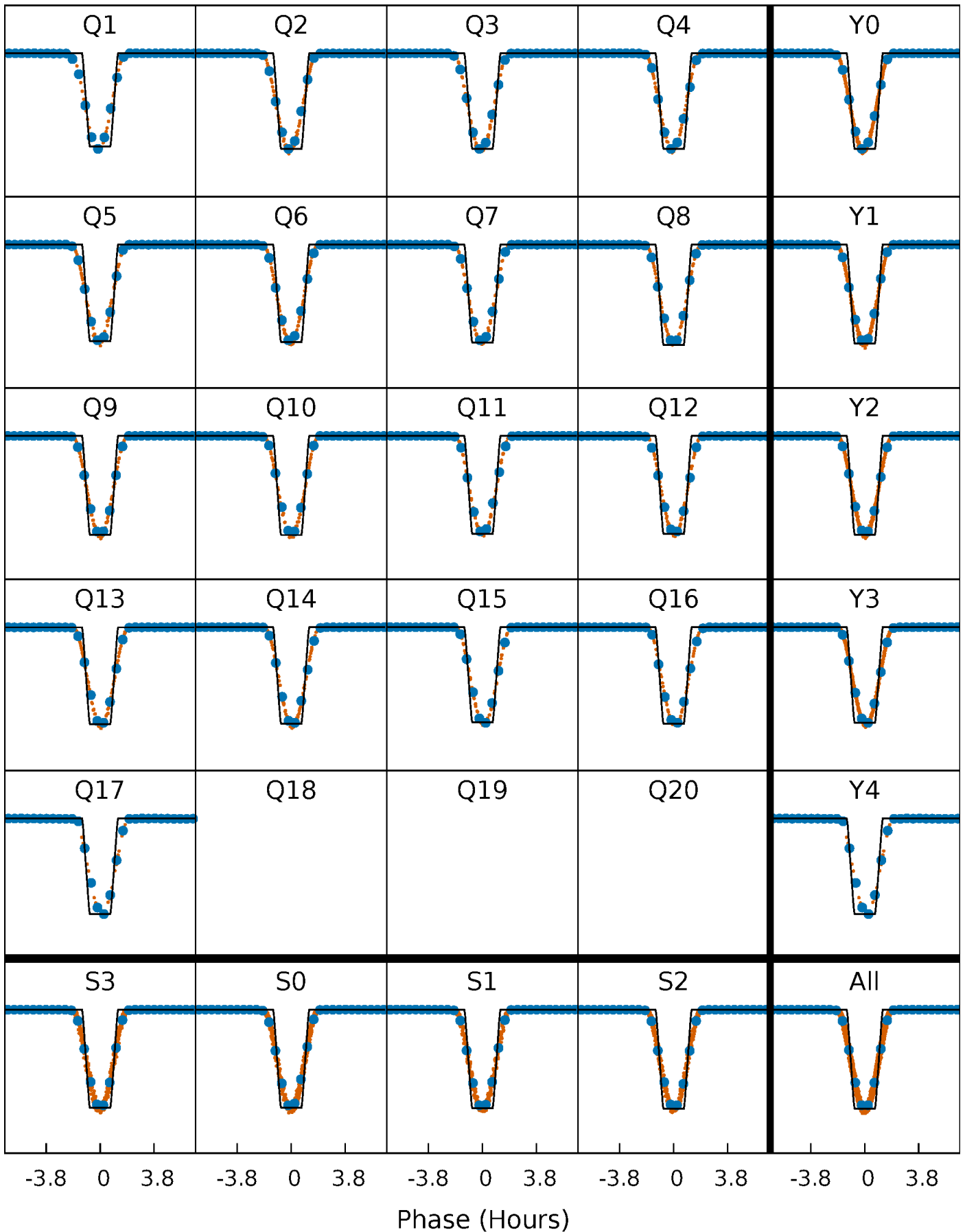
# DV Quarter-Phased Transit Curves

TCE 009944421-01 P= 7.095206 Days  $T_0=135.371495$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

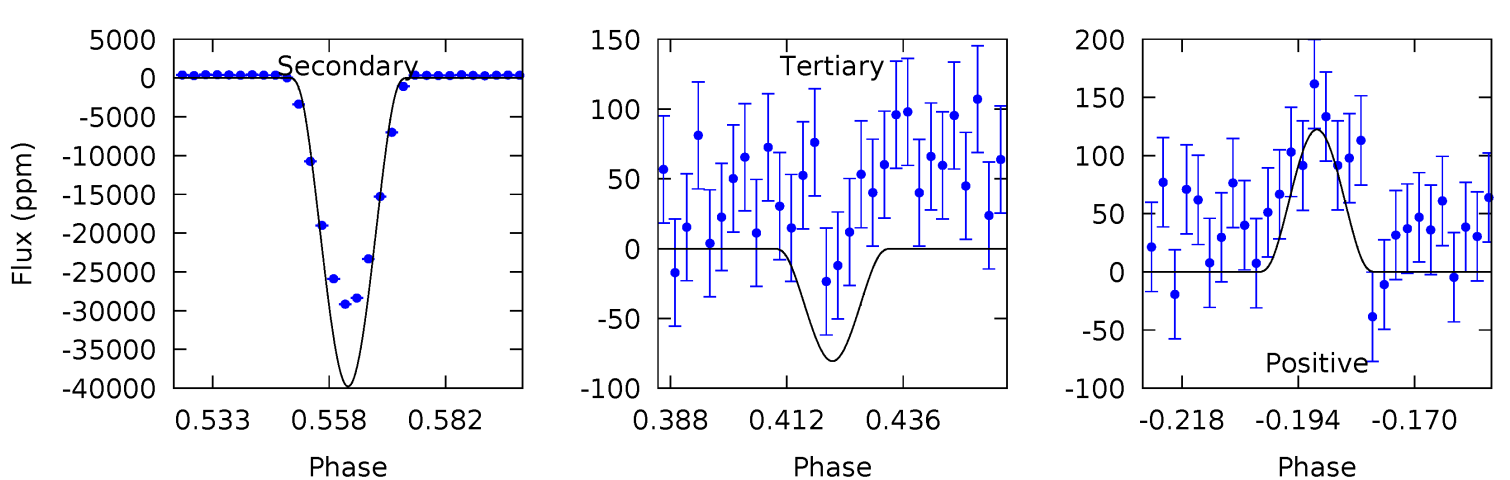
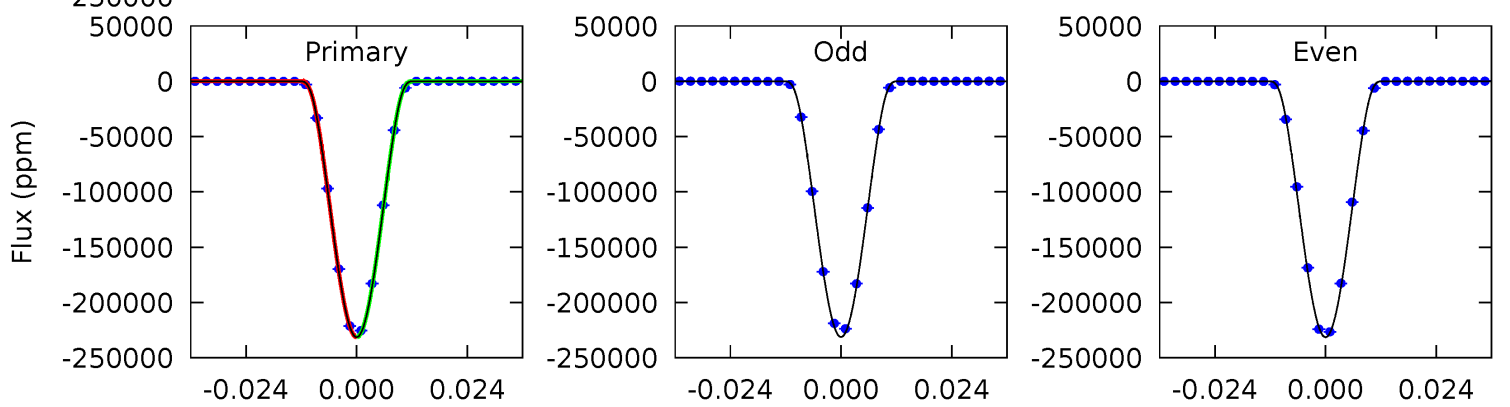
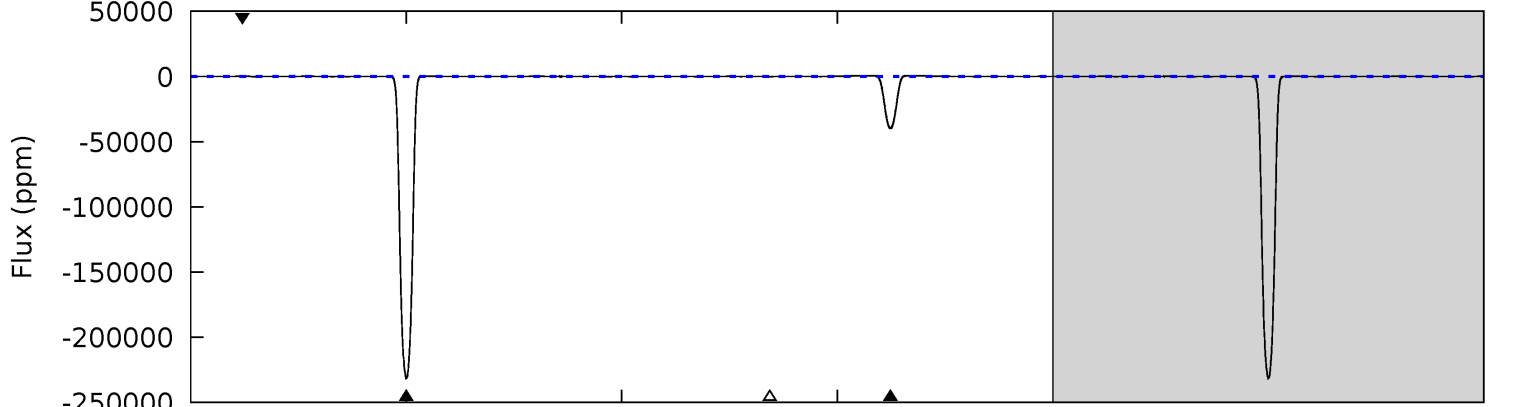
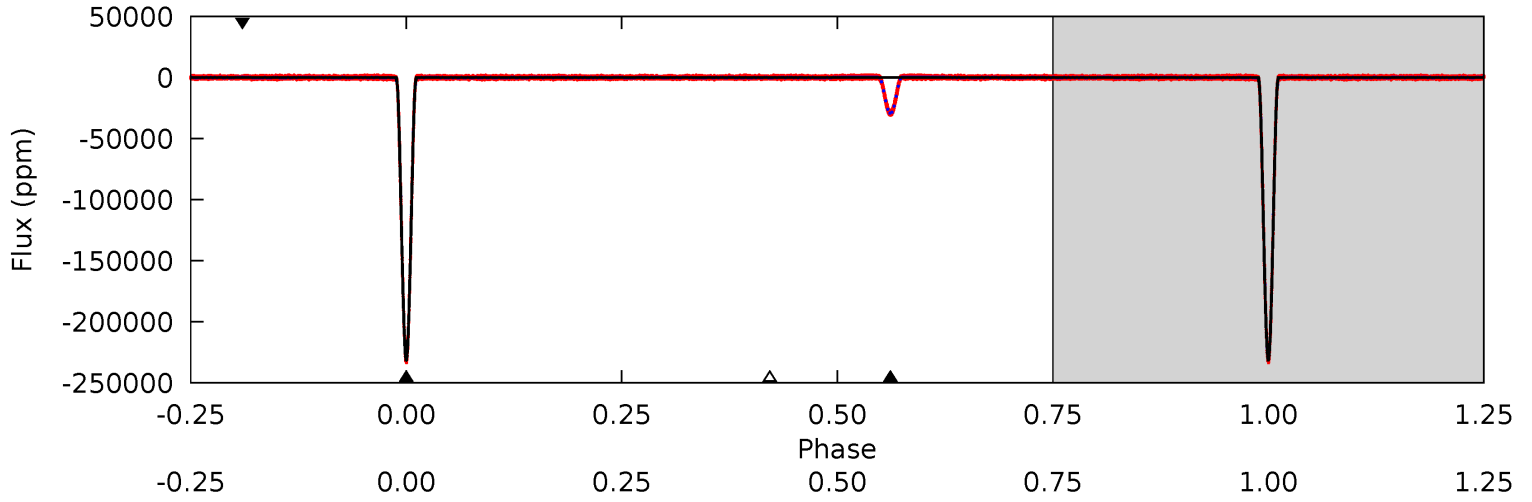
TCE 009944421-01 P= 7.095154 Days  $T_0=135.376833$  (BKJD)



# DV Model-Shift Uniqueness Test

009944421-01, P = 7.095206 Days, E = 128.276289 Days

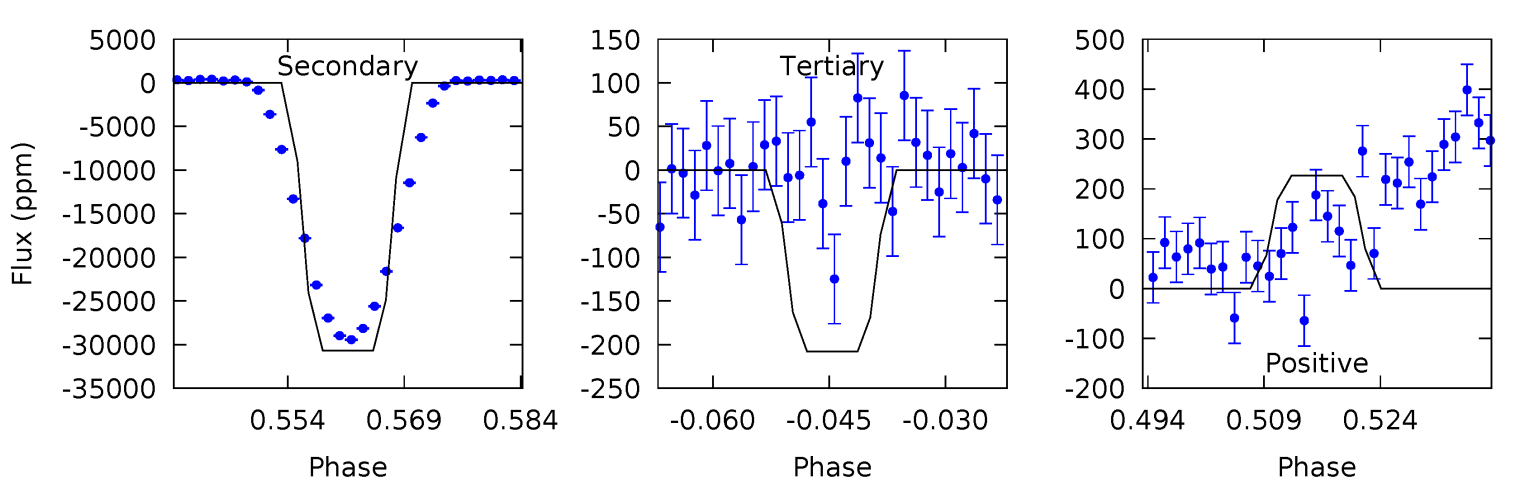
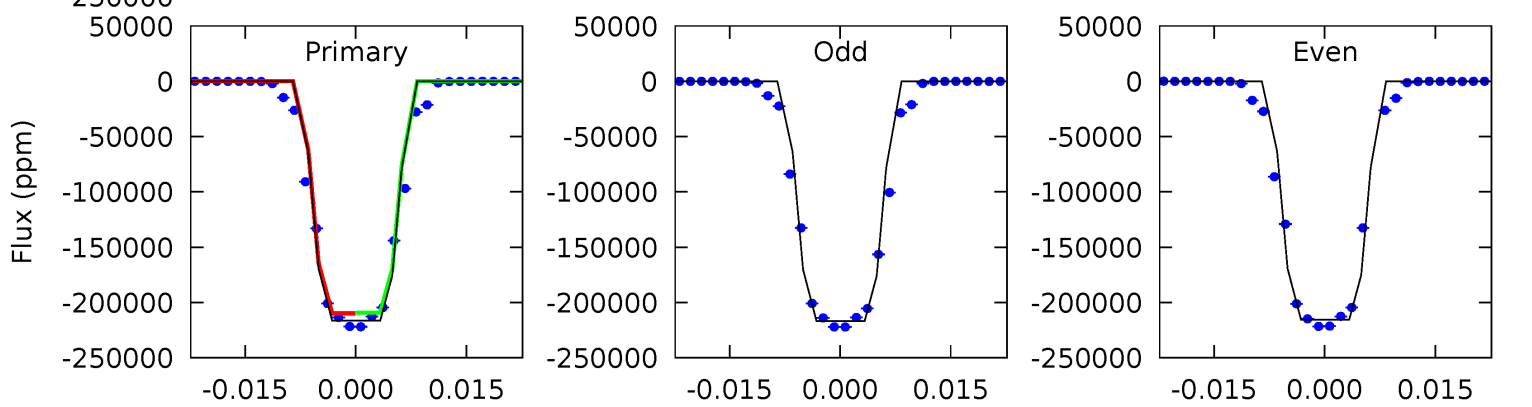
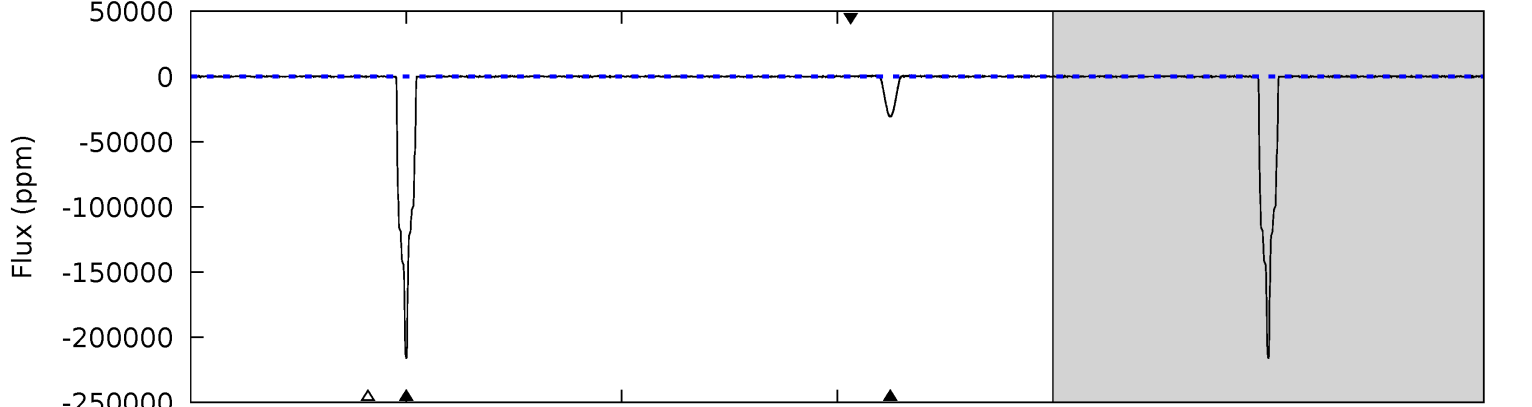
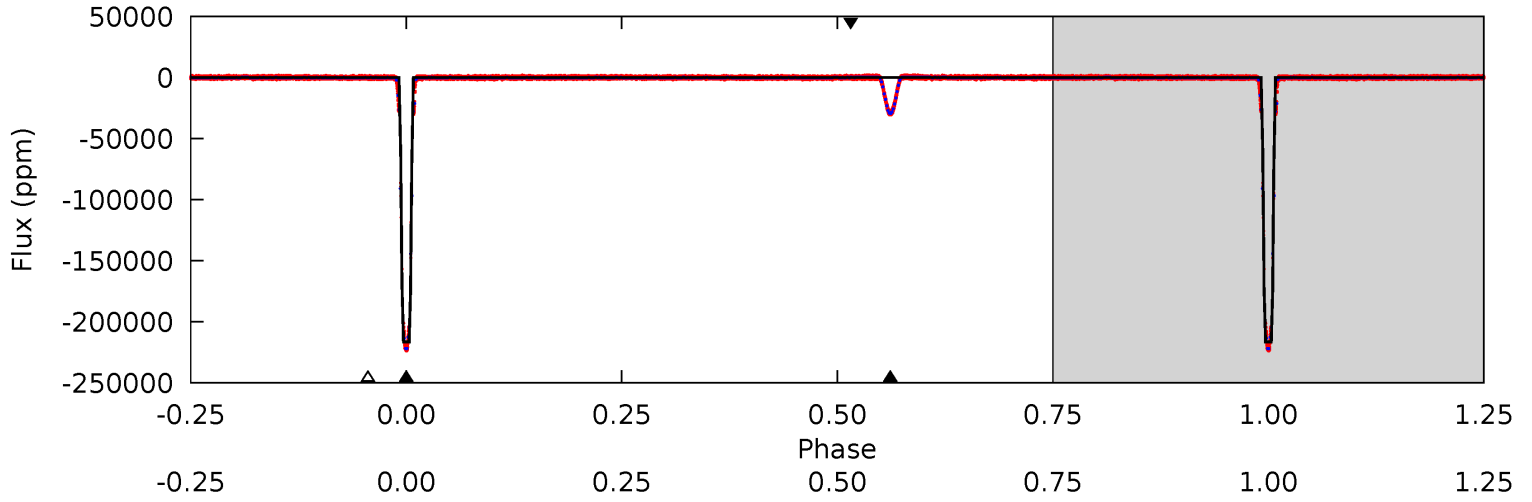
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
14592	2508	5.09	7.72	4.85	2.25	6.82	14587	14585	2503	2500	5.79	1.00	0.00	0.31



# Alt Model-Shift Uniqueness Test

009944421-01, P = 7.095154 Days, E = 128.281679 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
4077	577.8	3.92	4.27	4.95	2.43	1.59	4073	4072	573.9	573.6	11.2	1.00	0.00	0



### Stellar Parameters For KIC 009944421

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5481^{+166}_{-149}$	$4.592^{+0.034}_{-0.136}$	$-0.220^{+0.300}_{-0.300}$	$0.778^{+0.164}_{-0.059}$	$0.871^{+0.083}_{-0.102}$	$2.607^{+0.476}_{-1.084}$
	+3%/-3%	+1%/-3%	+136%/-136%	+21%/-8%	+10%/-12%	+18%/-42%
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 009944421-01 / KOI 7260.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-39767 \pm 16$	$58.41^{+5.99}_{-3.66}$	$1157^{+59}_{-44}$	$3487^{+73}_{-70}$	$31^{+3}_{-5}$
Alt.	$-30671 \pm 53$	$41.50^{+4.76}_{-2.51}$	$1162^{+51}_{-47}$	$3727^{+91}_{-75}$	$47^{+5}_{-8}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$

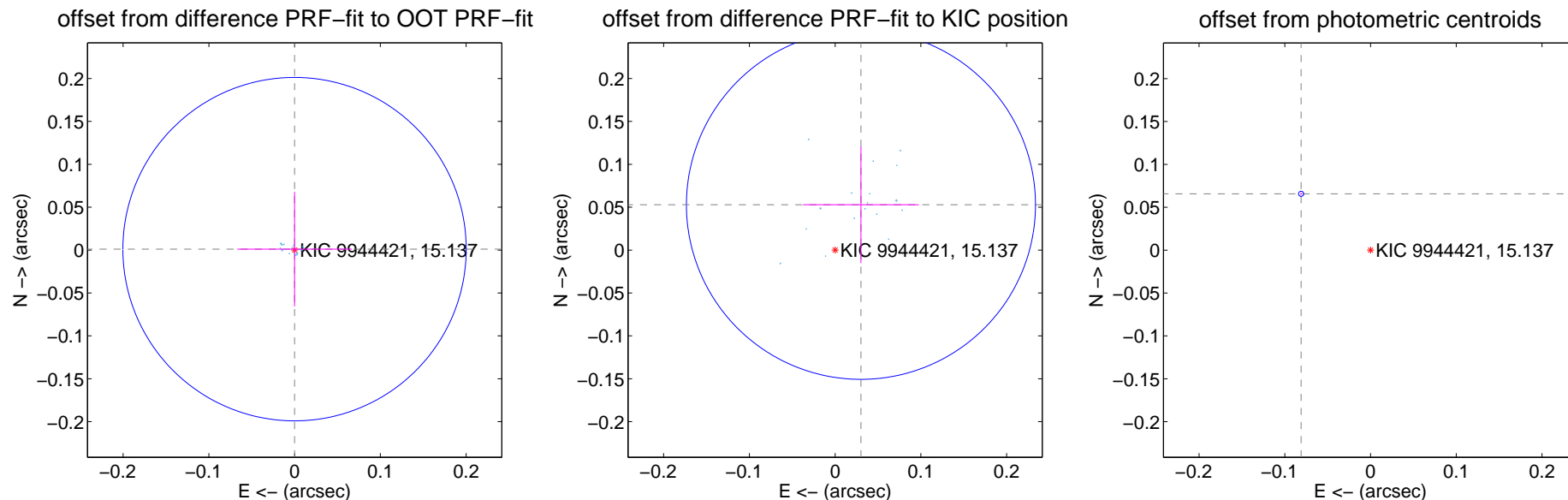
## DV Centroid Data

Supplemental centroid analysis for 009944421-01. Kepler magnitude: 15.14. Transit SNR 5750.86

There are 17 quarters with good PRF difference image offsets

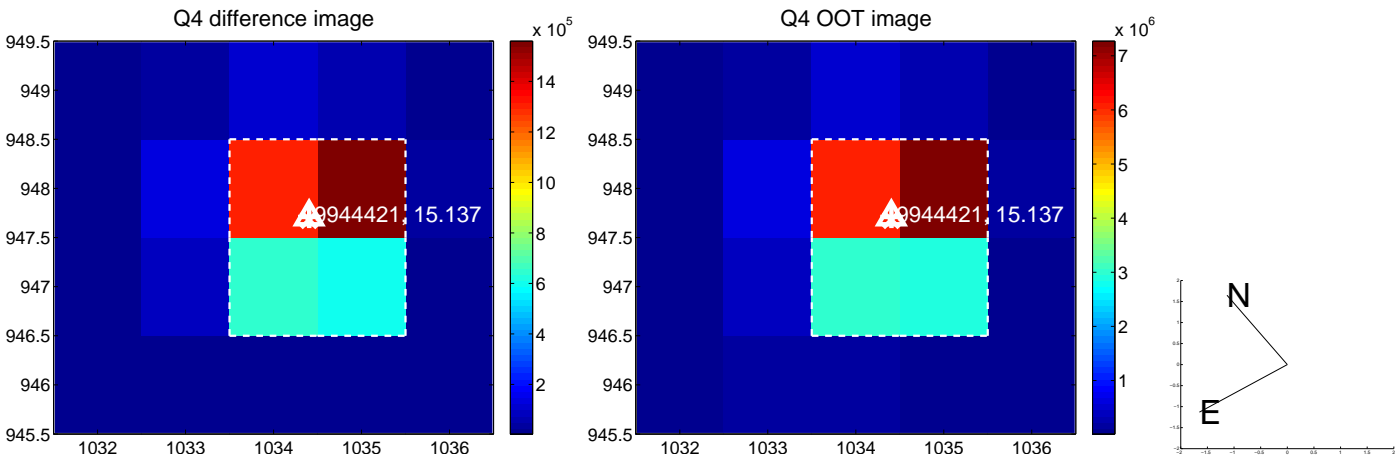
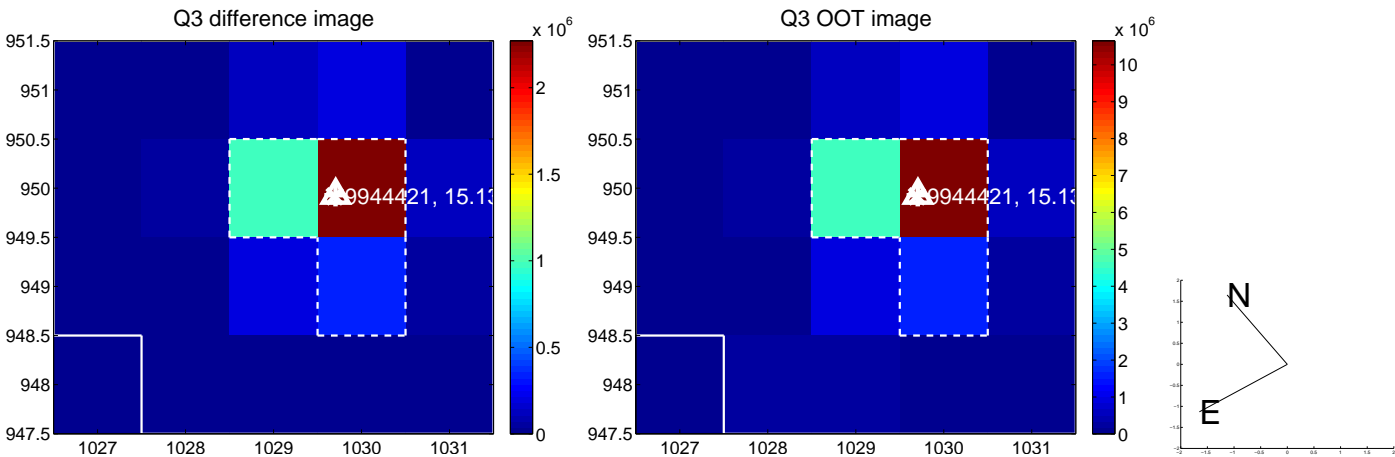
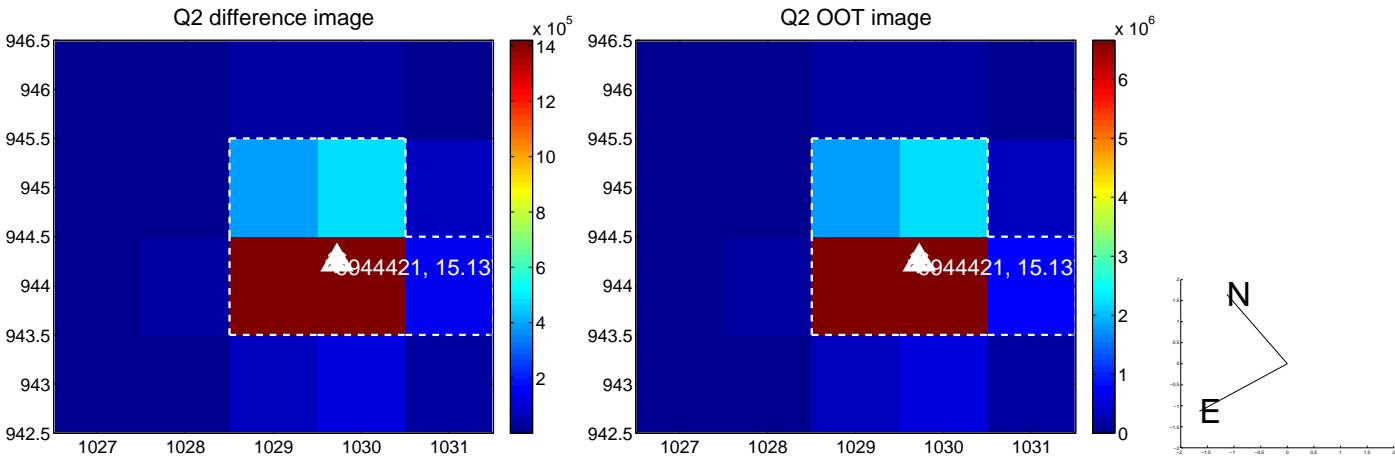
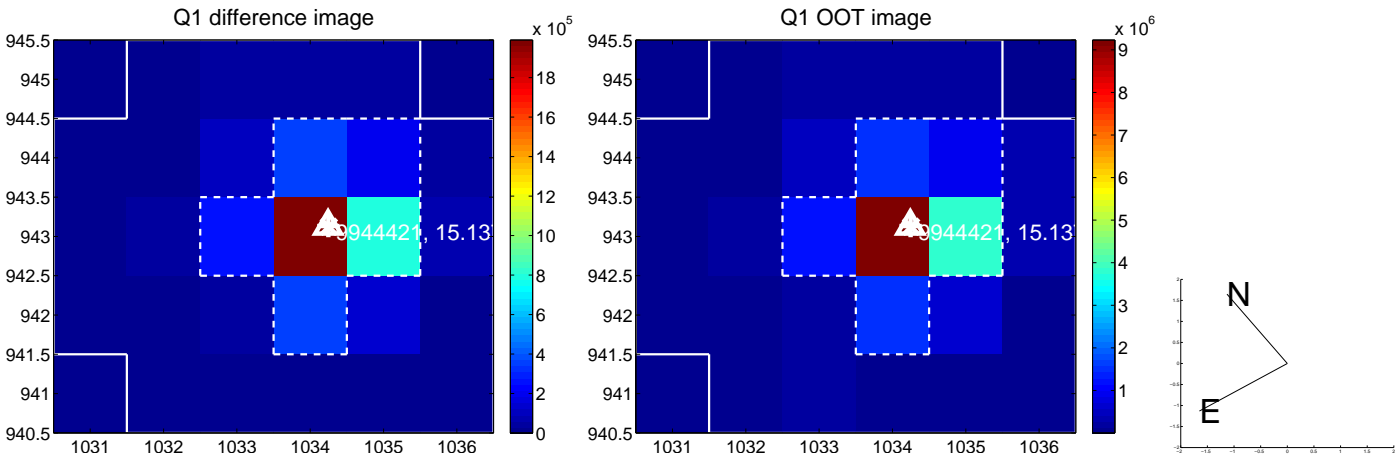
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.001 \pm 0.067$	0.02	$0.000 \pm 0.067$	$0.001 \pm 0.067$
PRF-fit source offset from KIC position	$0.061 \pm 0.068$	0.90	$-0.030 \pm 0.068$	$0.053 \pm 0.068$
photometric centroid source offset	$0.10 \pm 0.00$	105.06	$0.08 \pm 0.00$	$0.07 \pm 0.00$

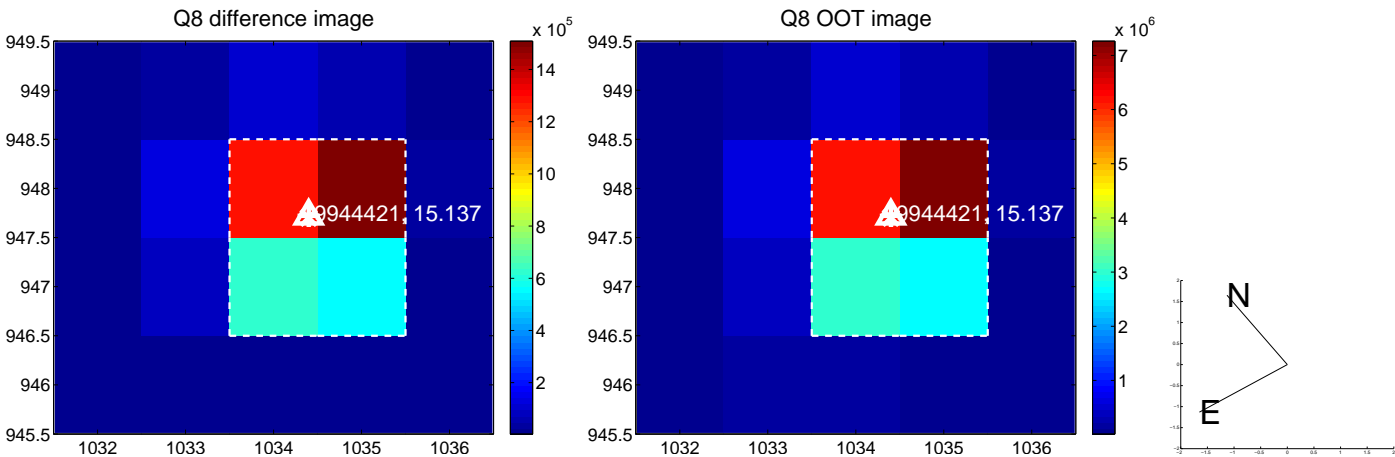
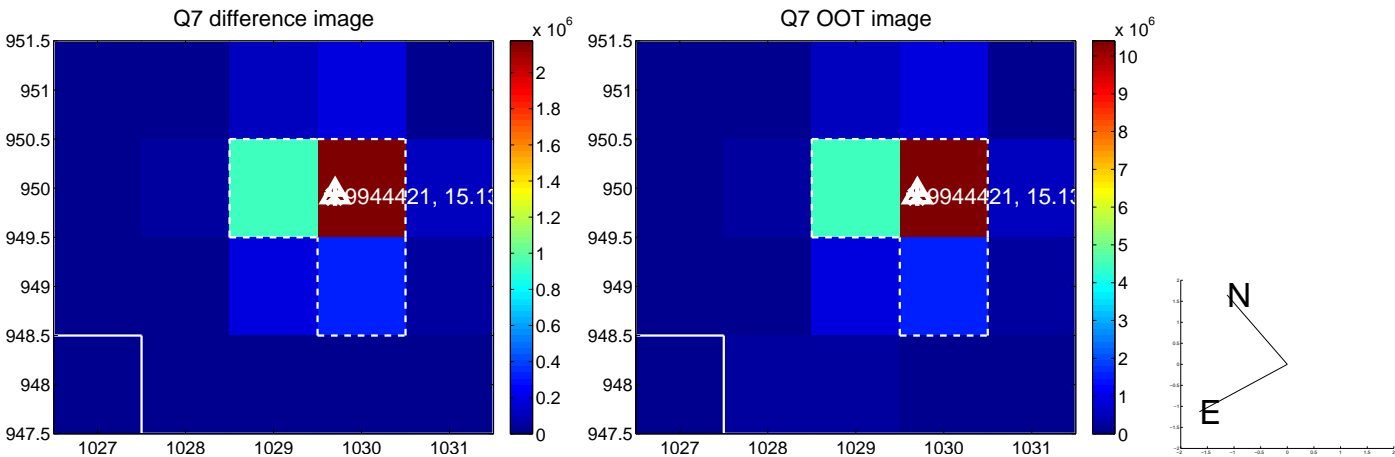
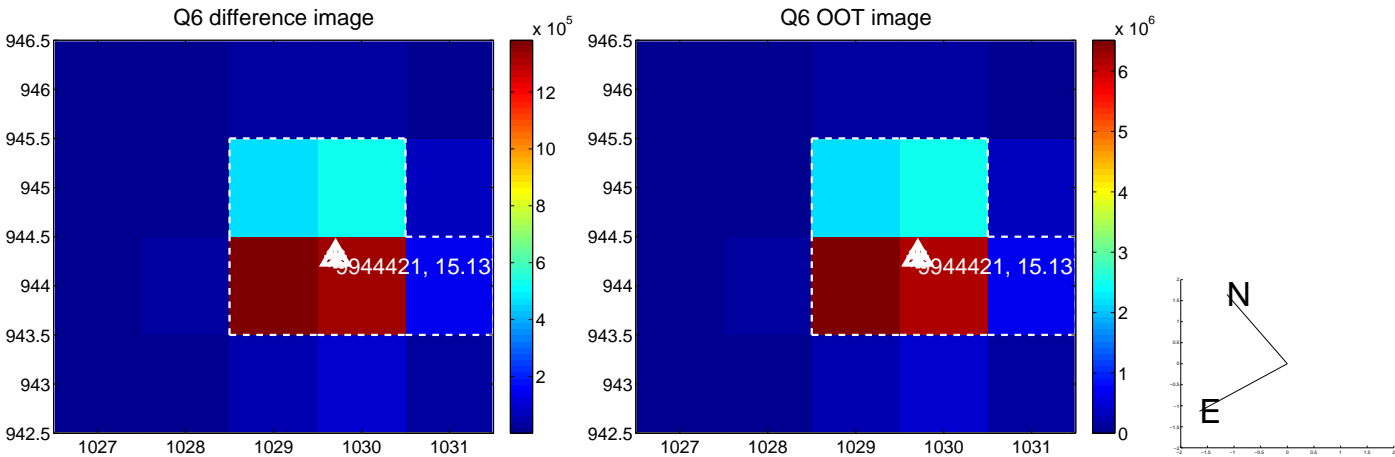
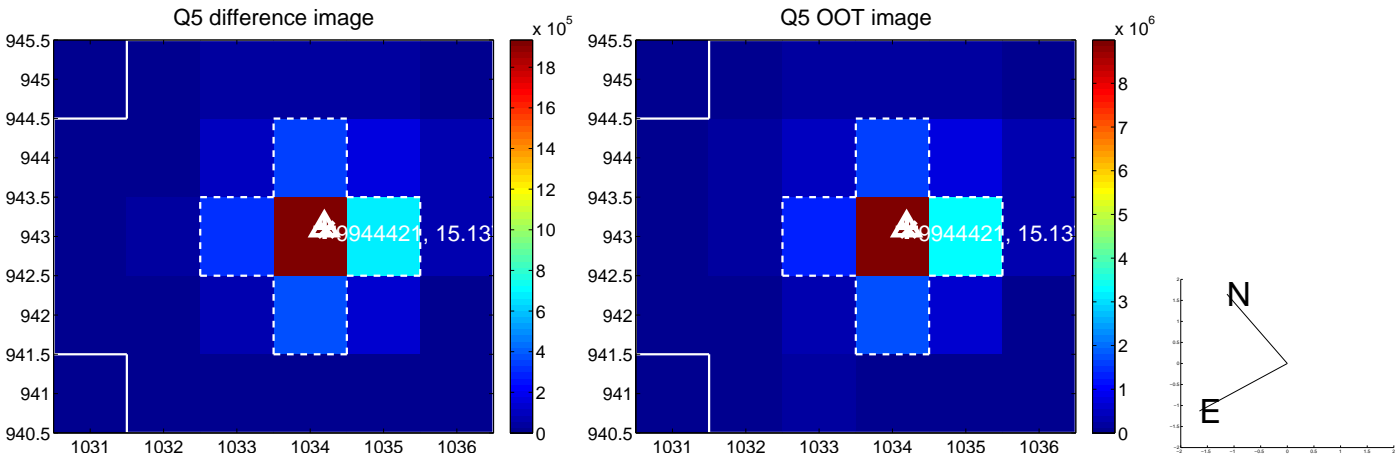


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

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

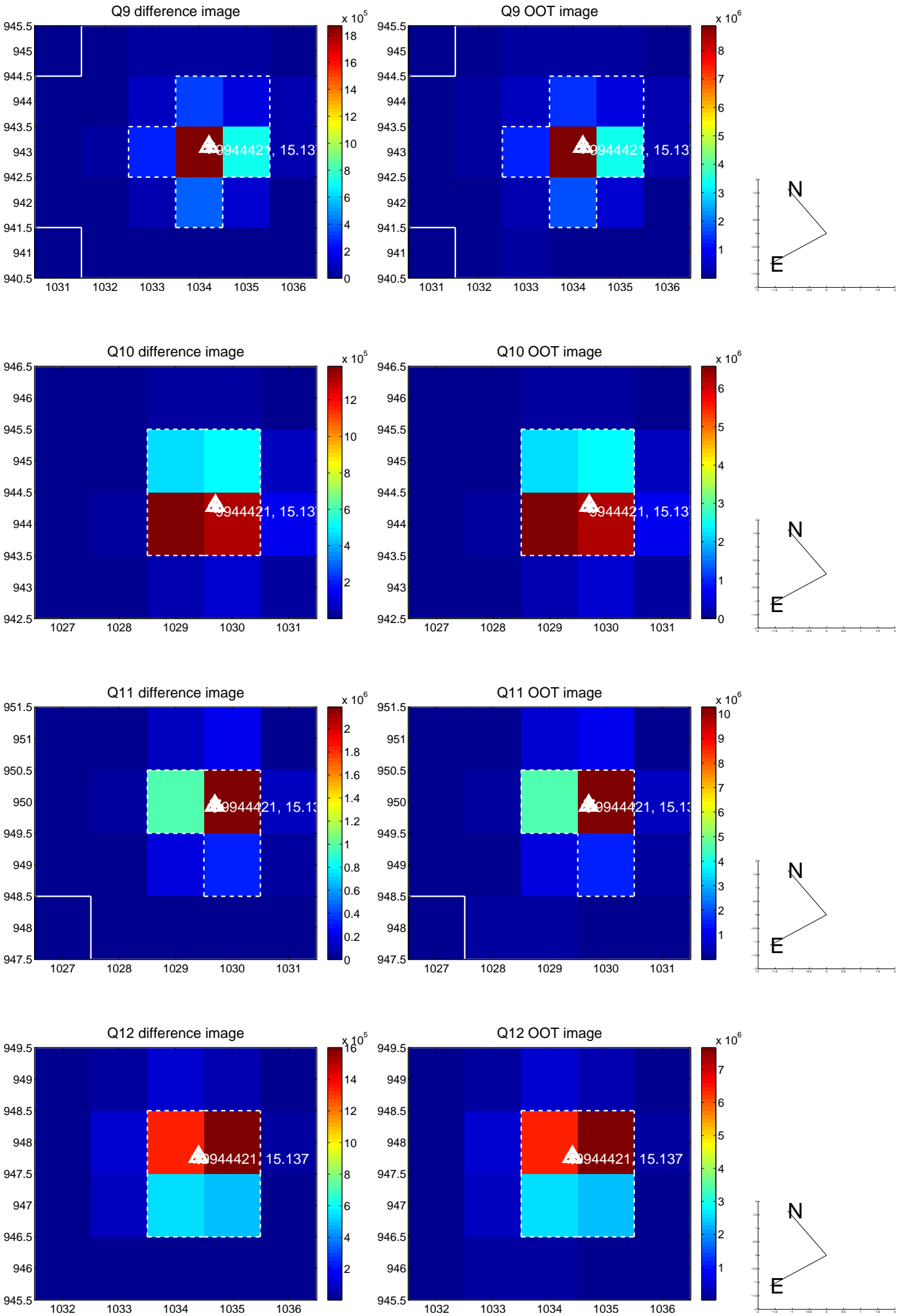


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

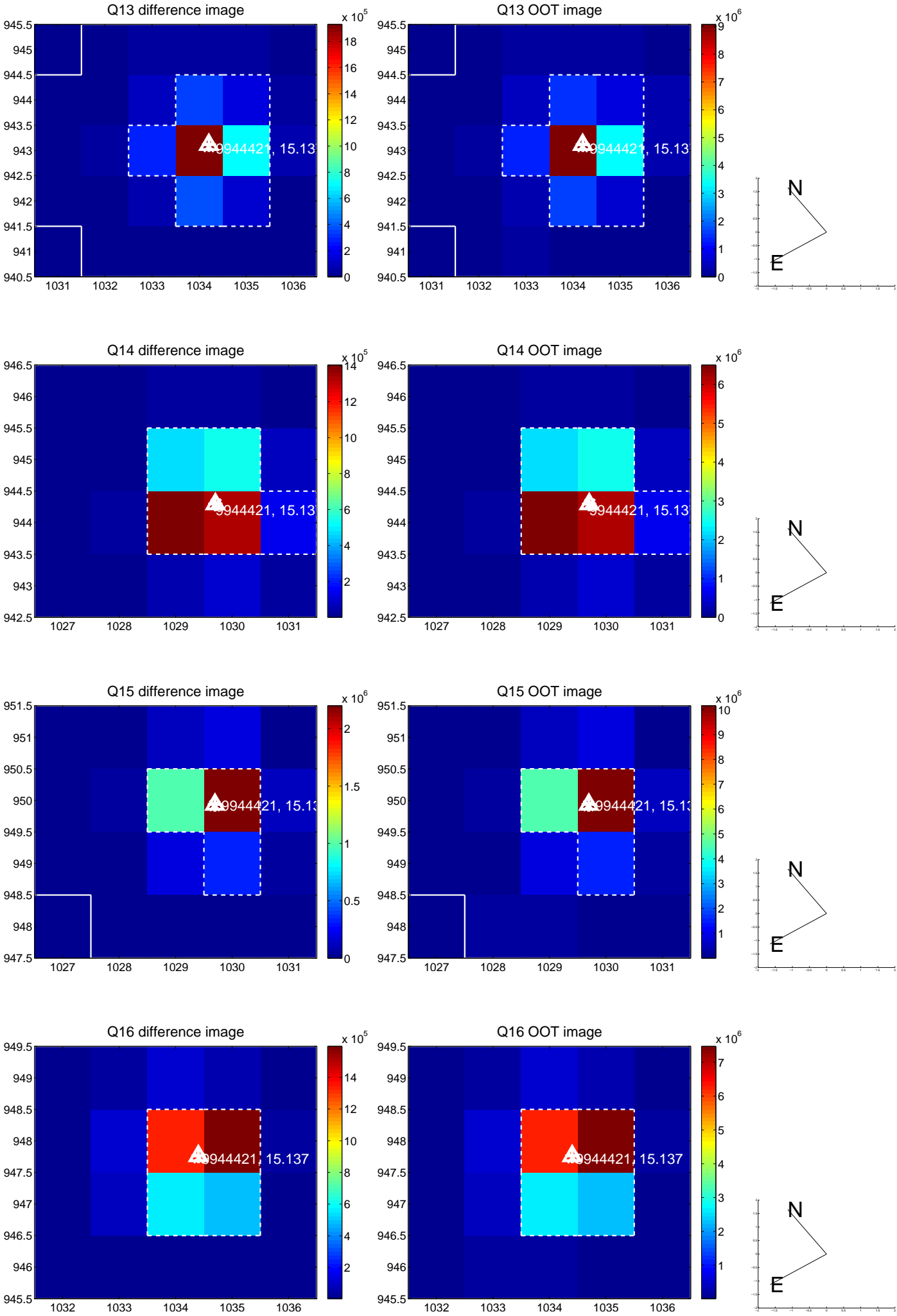




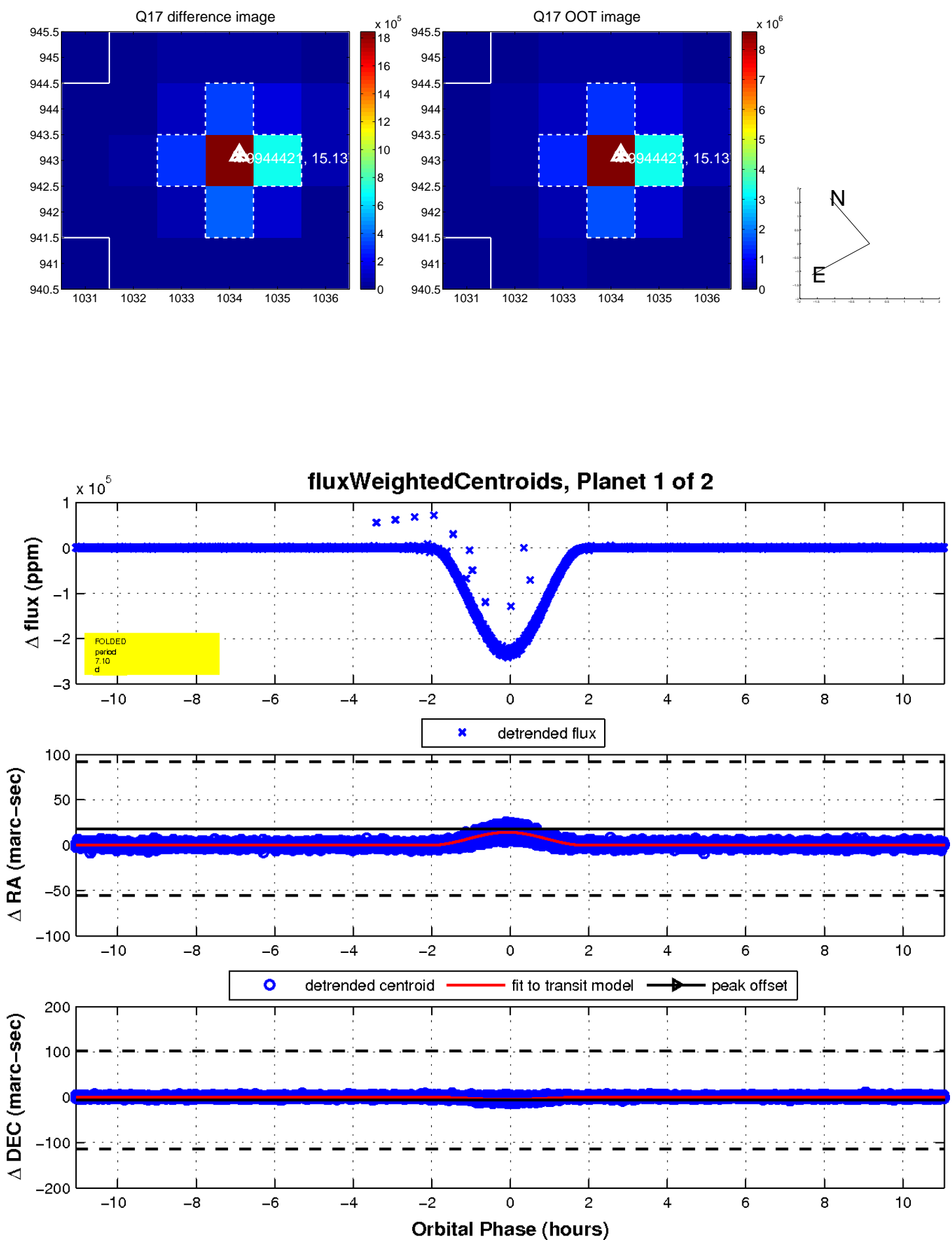
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

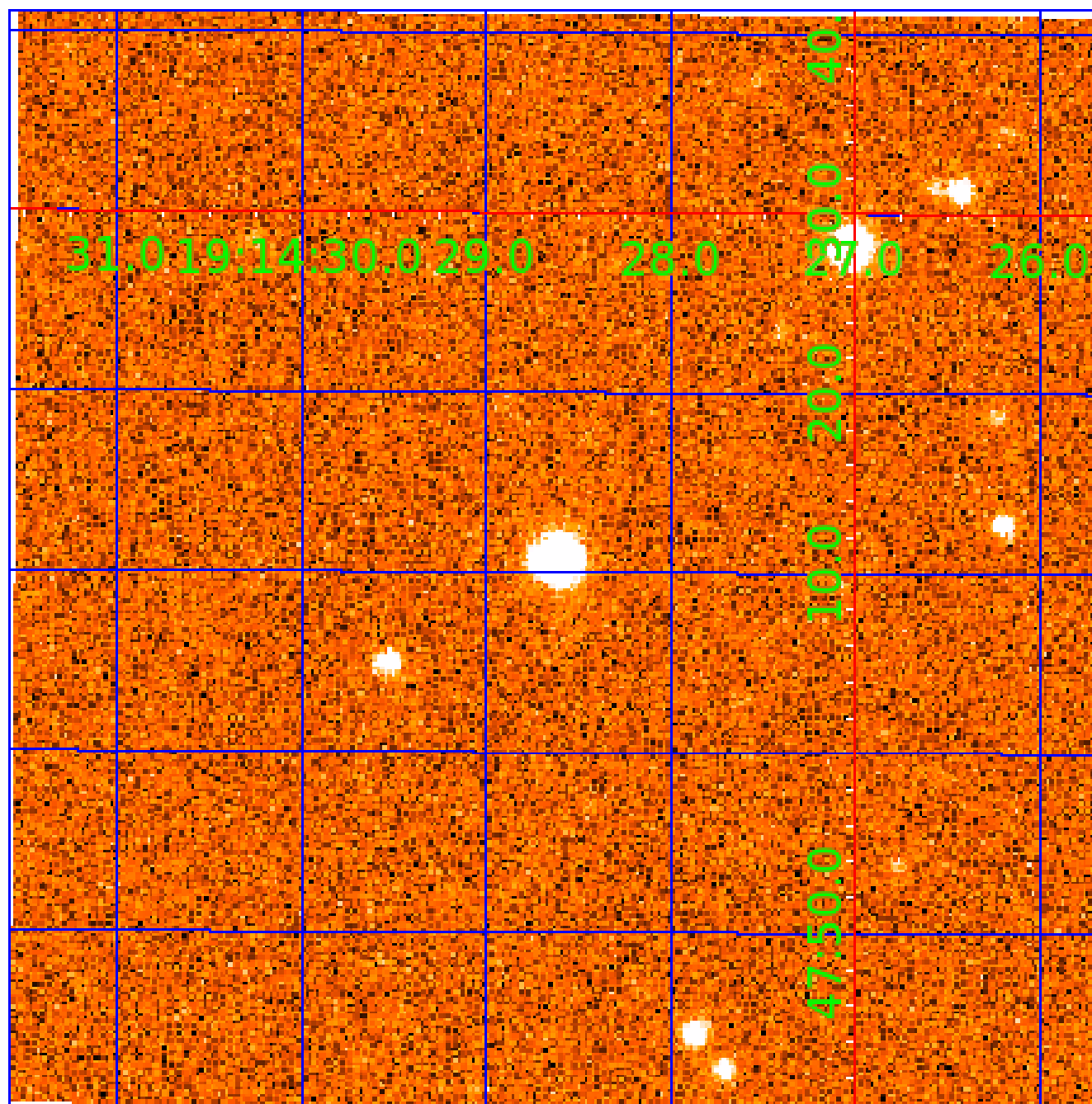


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009944421

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009944421-01	OBS	7260.01	7.095206	135.371494	231282.7	3.688	9368.6	5750.9	0.78	5481	56.99	103.36
009944421-02	OBS	No	7.095207	132.261415	30302.6	4.094	1265.4	1078.7	0.78	5481	23.84	103.36

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009944421-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
009944421-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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 009944421-02

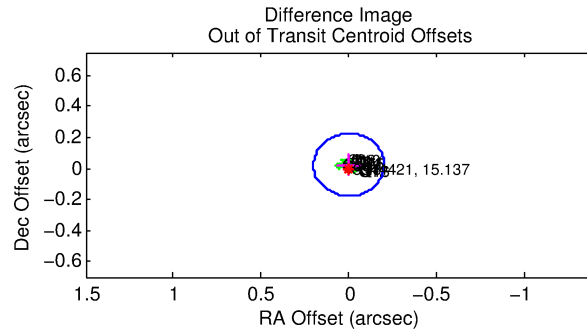
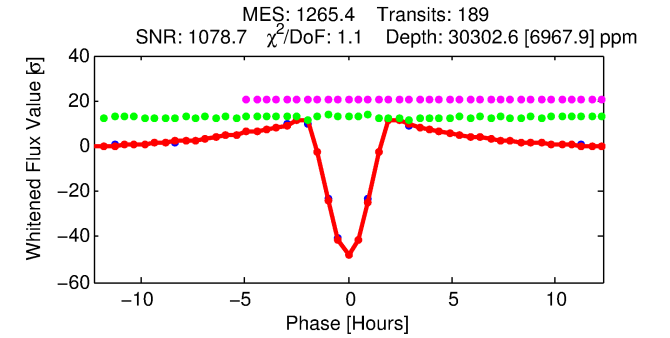
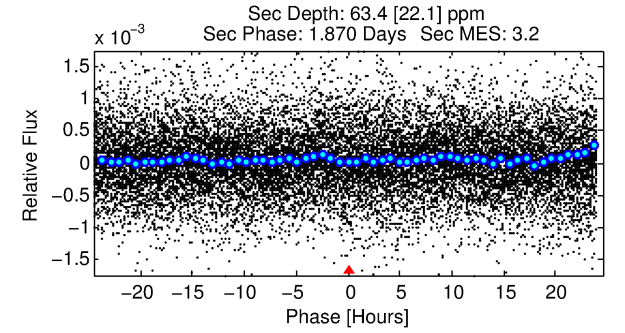
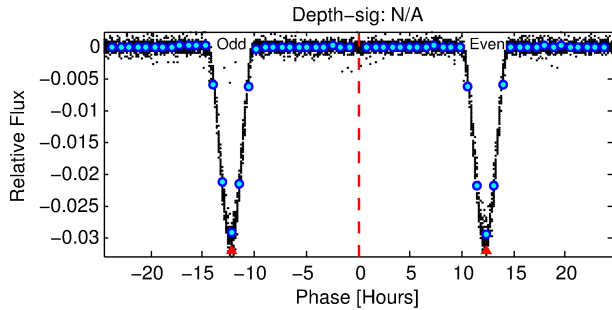
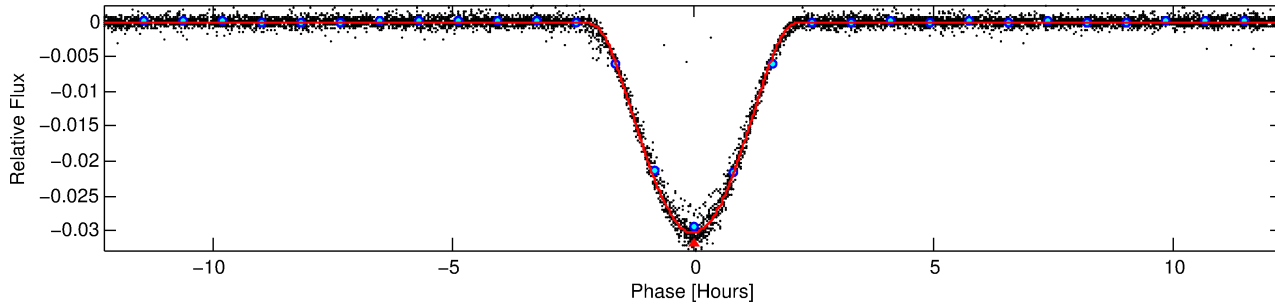
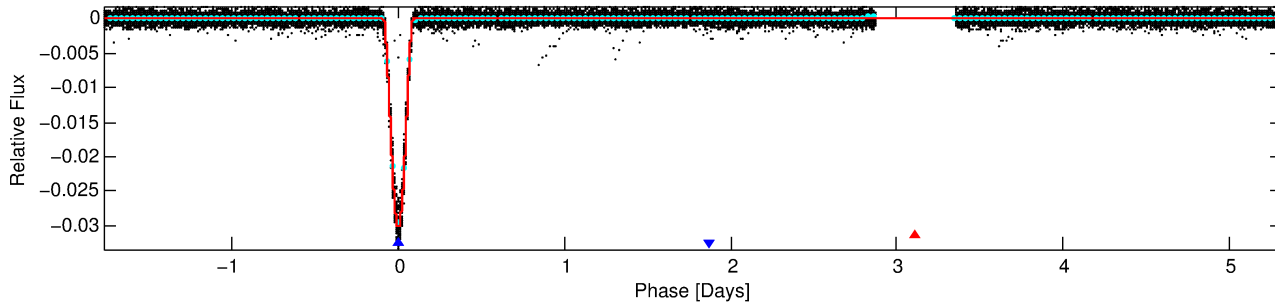
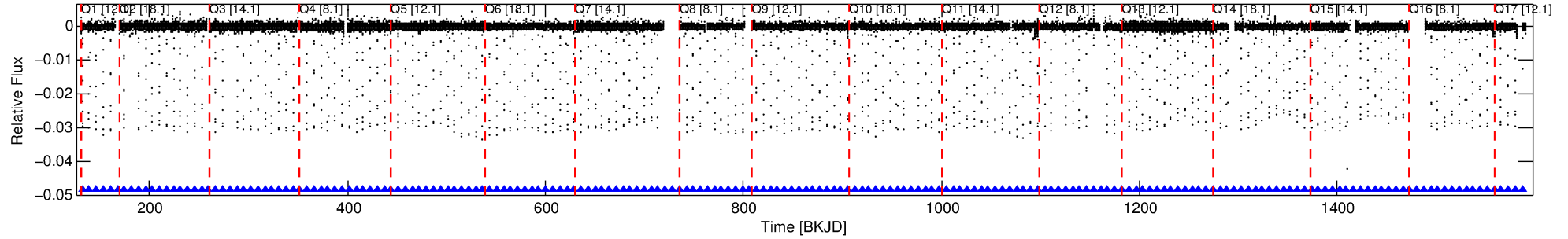
No Significant Match Found

# DV One-Page Summary

KIC: 9944421 Candidate: 2 of 2 Period: 7.095 d

KOI: K07260 Corr: No Ephemeris Match

Kp: 15.14 R\*: 0.78 Rs Teff: 5481.0 K Logg: 4.59 Fe/H: -0.220



## DV Fit Results:

Period = 7.09521 [0.00000] d  
Epoch = 132.2614 [0.0001] BKJD  
Rp/R\* = 0.2808 [0.0181]  
a/R\* = 10.65 [0.04]  
b = 1.00 [0.02]  
Seff = 103.36 [28.87]  
Teq = 813 [57] K  
Rp = 23.84 [5.25] Re  
a = 0.0688 [0.0120] AU  
Ag = 0.29 [0.13] [-5.44σ]  
Teffp = 923 [90] K [1.03σ]

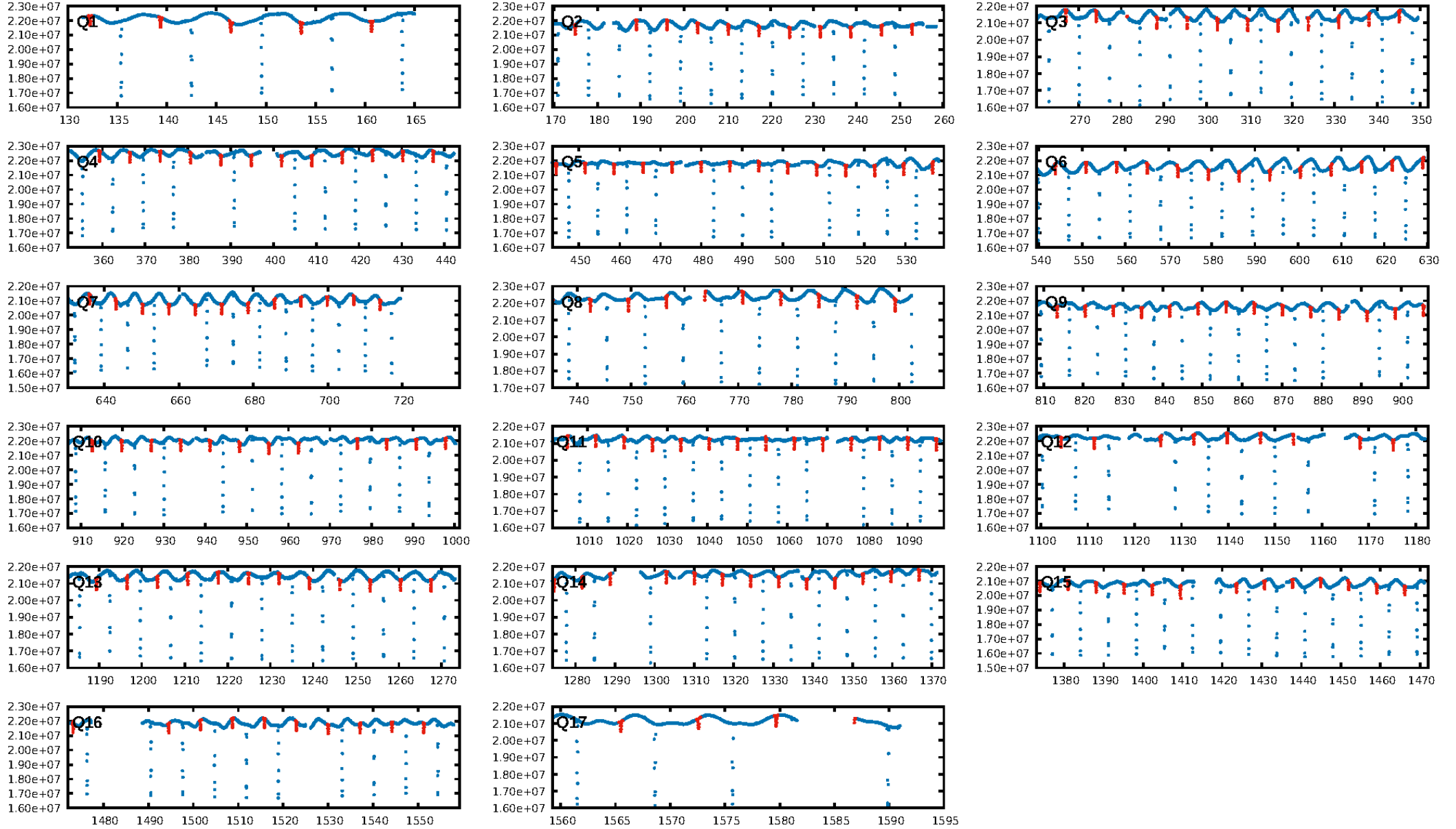
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.3%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [180/180]  
GhostDiagnostic-chr: 2.209  
Centroid-sig: 0.0%  
Centroid-so: 0.120 arcsec [18.32σ]  
OotOffset-rm: 0.023 arcsec [0.35σ]  
KicOffset-rm: 0.076 arcsec [1.12σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

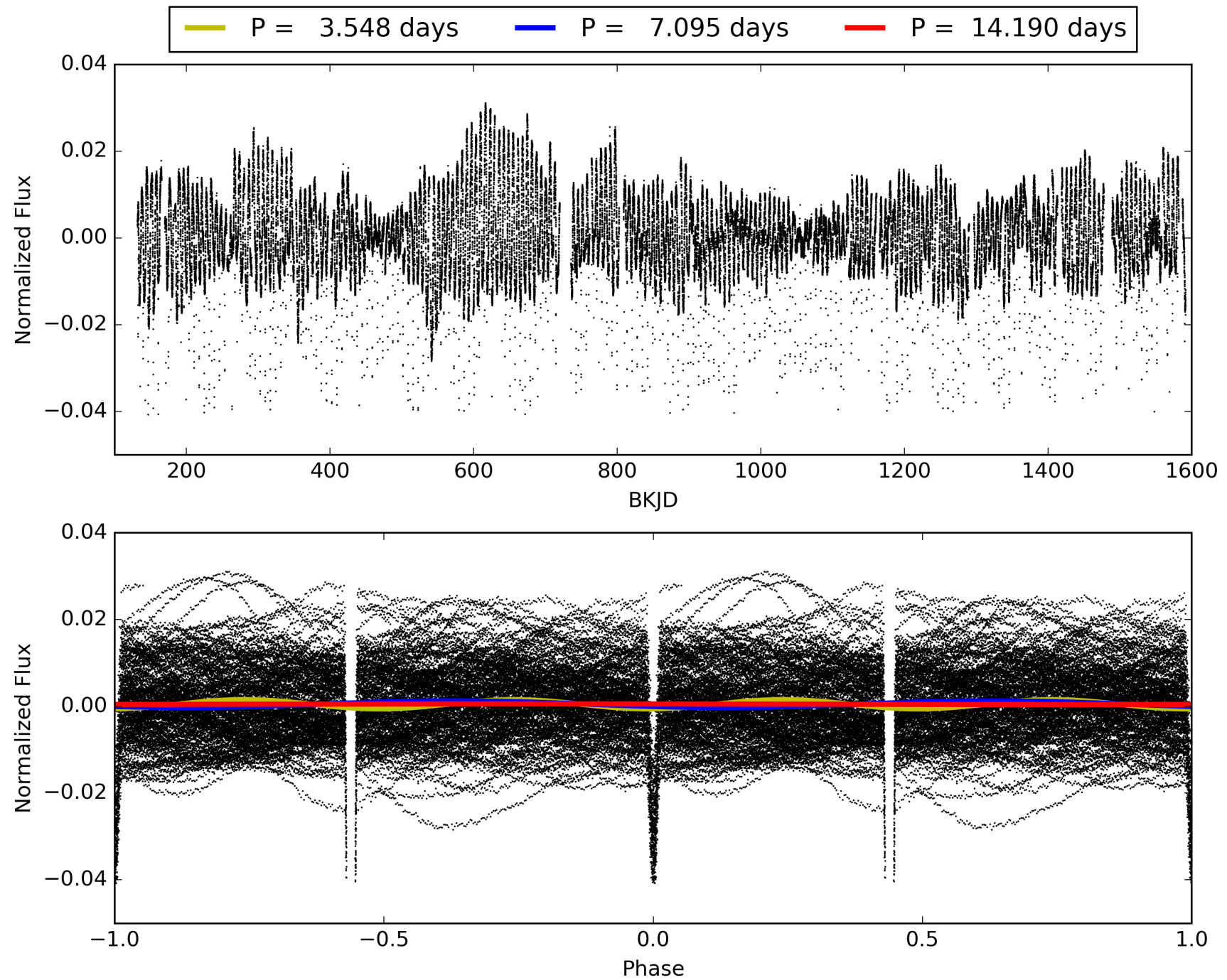
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 05:43:24 Z

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

# TCE 009944421-02, PDC Light Curves



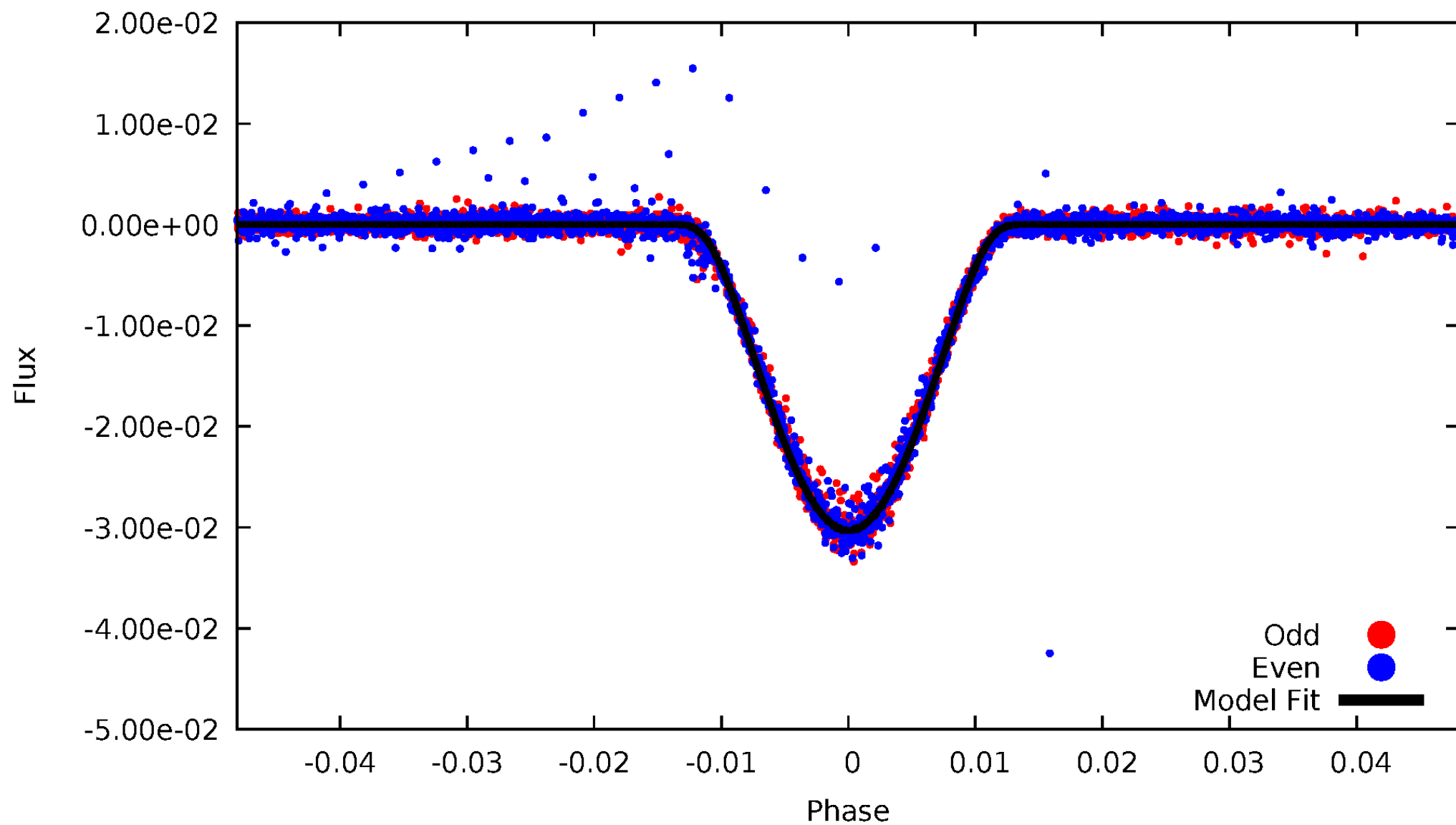
TCE 009944421-02





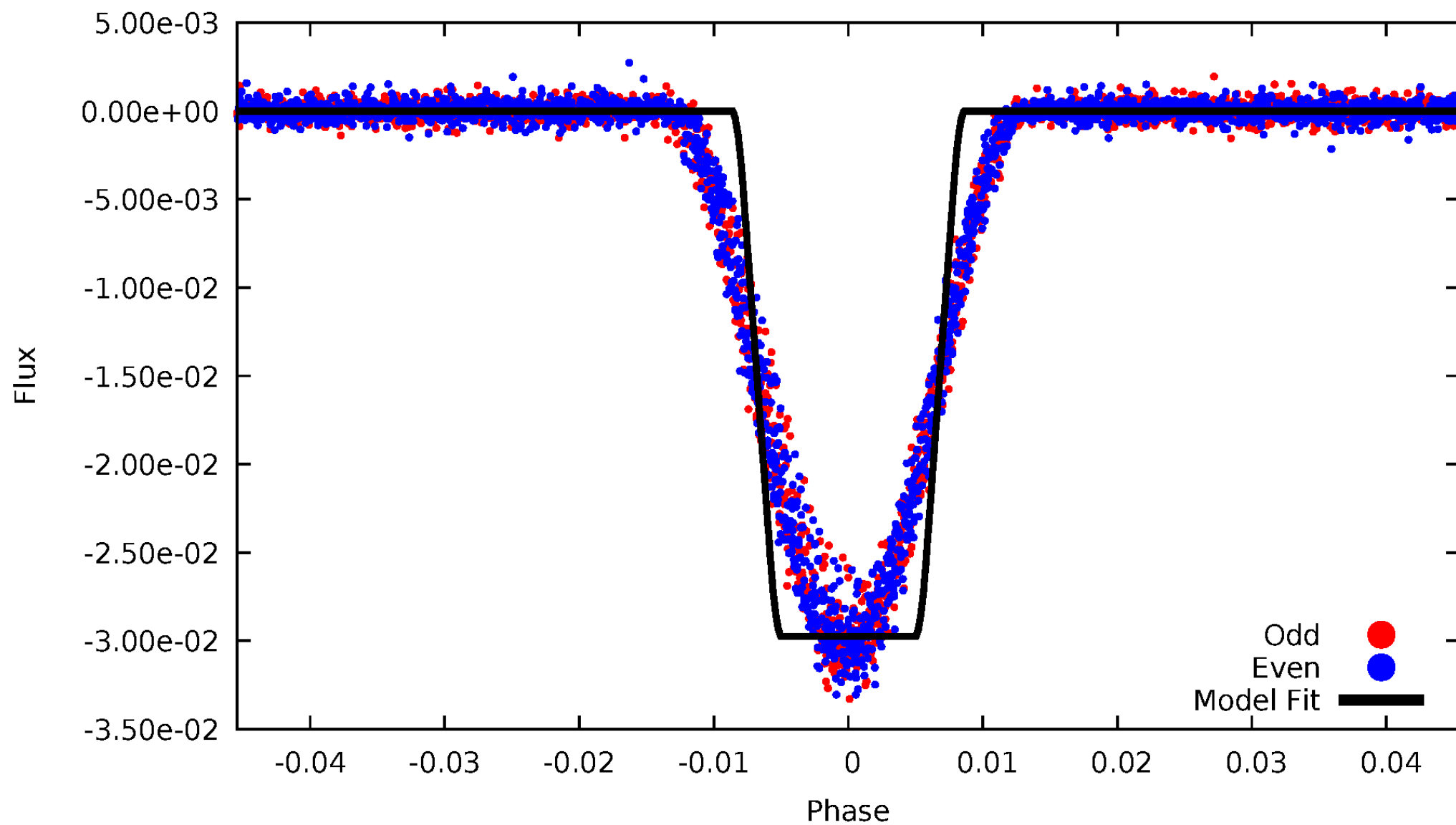
# DV Odd/Even

TCE 009944421-02



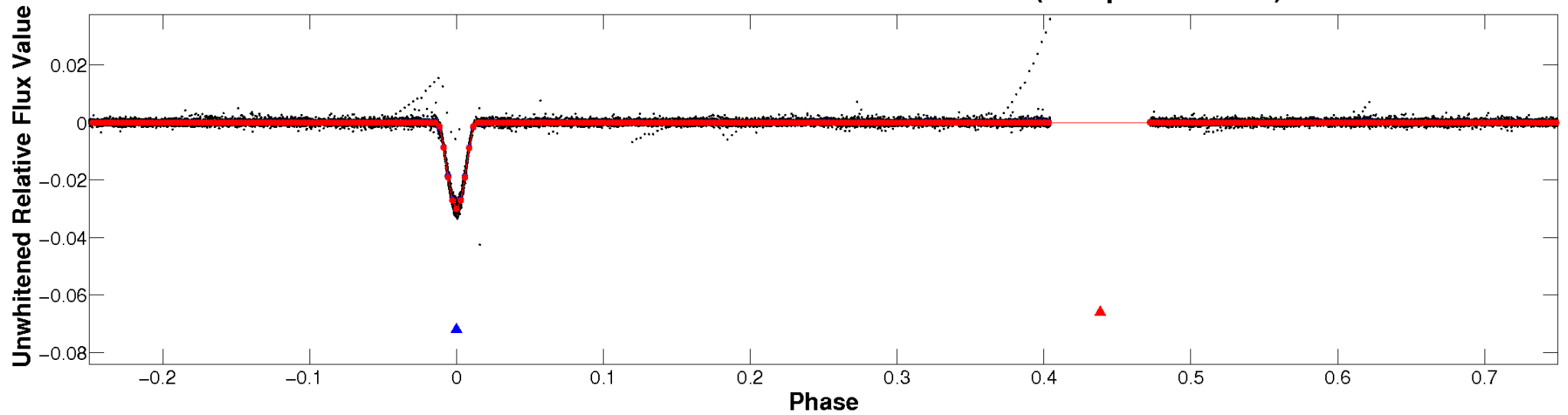
# ALT Odd/Even

TCE 009944421-02

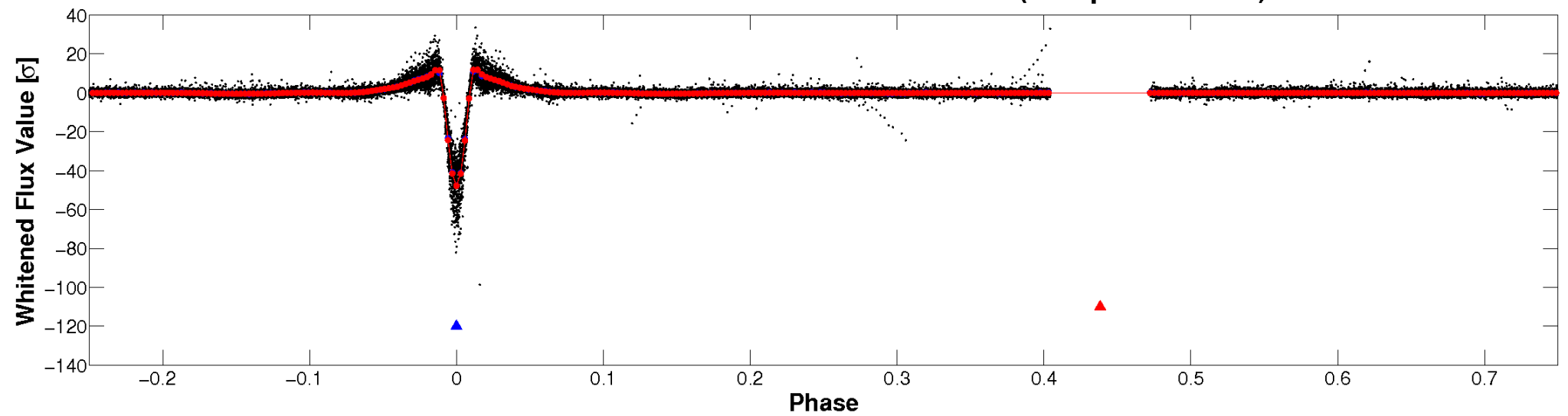


# Non-Whitened Vs. Whitened Light Curve

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

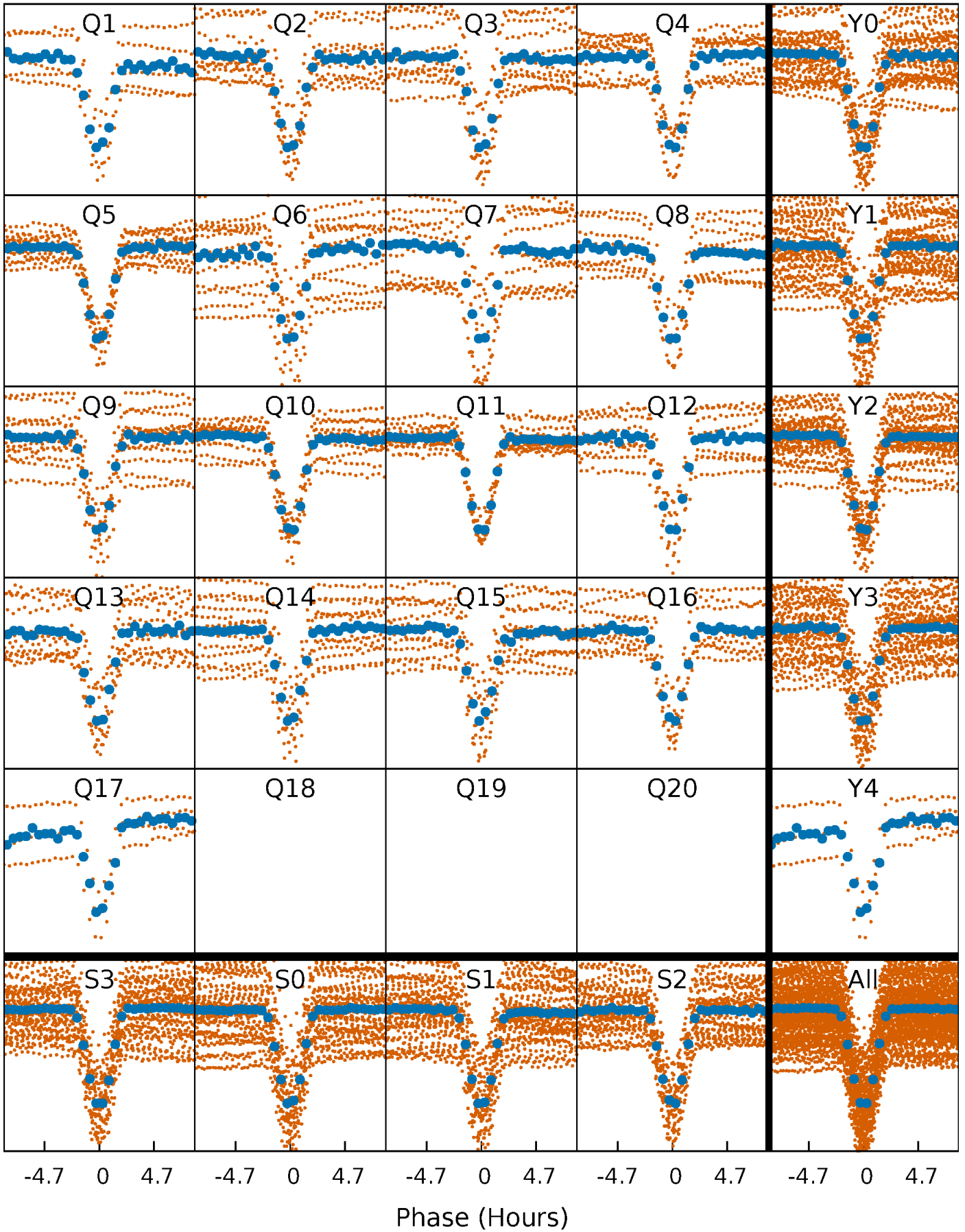


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



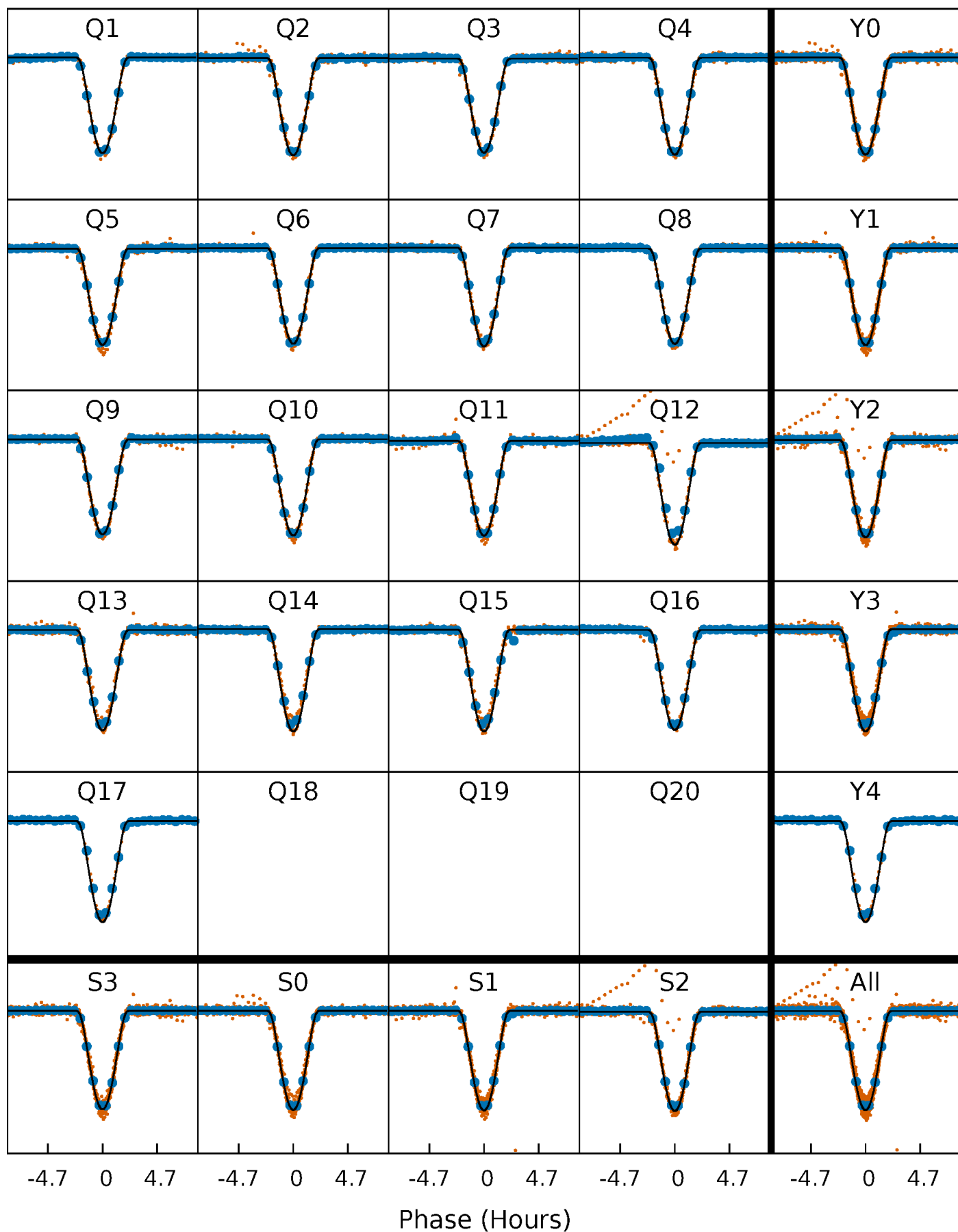
# PDC Quarter-Phased Transit Curves

TCE 009944421-02 P= 7.095207 Days  $T_0=132.261415$  (BKJD)



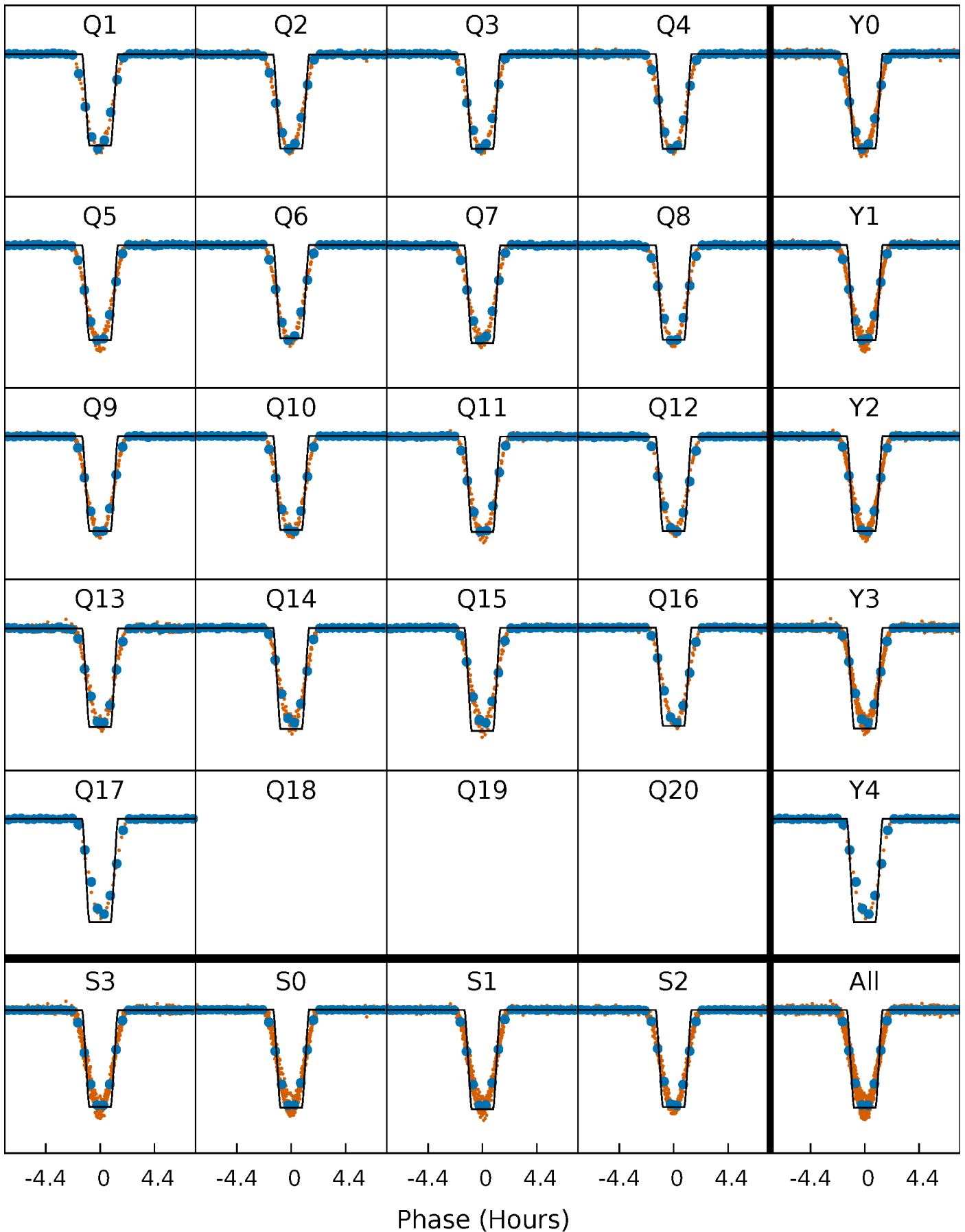
# DV Quarter-Phased Transit Curves

TCE 009944421-02 P= 7.095207 Days  $T_0=132.261415$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

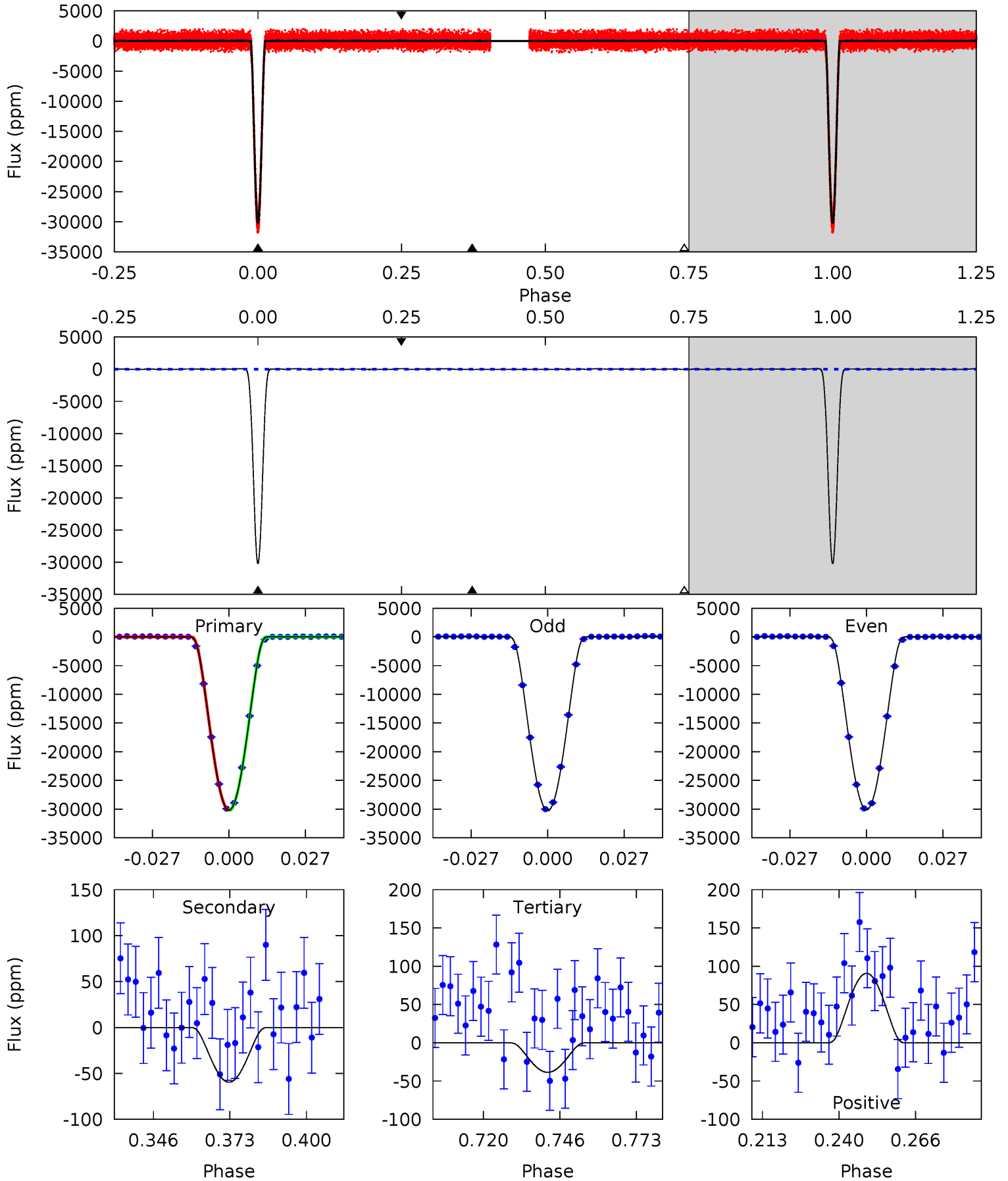
TCE 009944421-02 P= 7.095154 Days  $T_0=132.266798$  (BKJD)



# DV Model-Shift Uniqueness Test

009944421-02, P = 7.095207 Days, E = 125.166208 Days

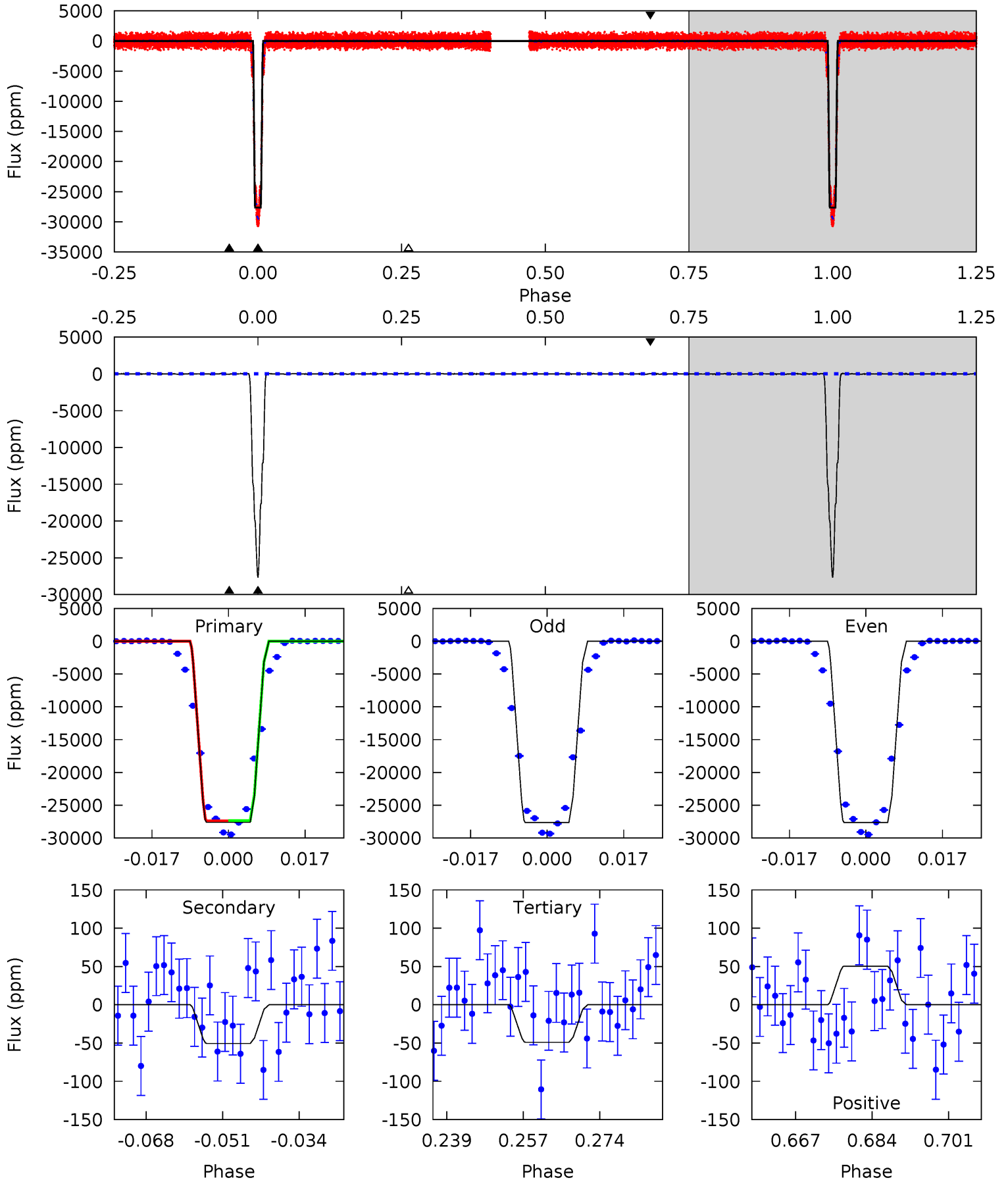
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2418	4.77	3.09	7.27	4.83	2.22	2.11	2415	2411	1.68	-2.49	6.89	0.99	0.00	3.65



# Alt Model-Shift Uniqueness Test

009944421-02, P = 7.095154 Days, E = 125.171644 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
1513	2.77	2.68	2.76	4.92	2.38	0.97	1511	1511	0.08	0.00	0.14	0.99	0.00	1.35





### Stellar Parameters For KIC 009944421

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5481^{+166}_{-149}$	$4.592^{+0.034}_{-0.136}$	$-0.220^{+0.300}_{-0.300}$	$0.778^{+0.164}_{-0.059}$	$0.871^{+0.083}_{-0.102}$	$2.607^{+0.476}_{-1.084}$
	+3%/-3%	+1%/-3%	+136%/-136%	+21%/-8%	+10%/-12%	+18%/-42%
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 009944421-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-60 \pm 12$	$24.43^{+2.99}_{-2.09}$	$1156^{+56}_{-45}$	$-1644^{+3196}_{-161}$	$0.250^{+0.076}_{-0.065}$
Alt.	$-51 \pm 18$	$15.18^{+2.15}_{-1.91}$	$1158^{+63}_{-45}$	$1920^{+164}_{-346}$	$0.543^{+0.328}_{-0.218}$

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

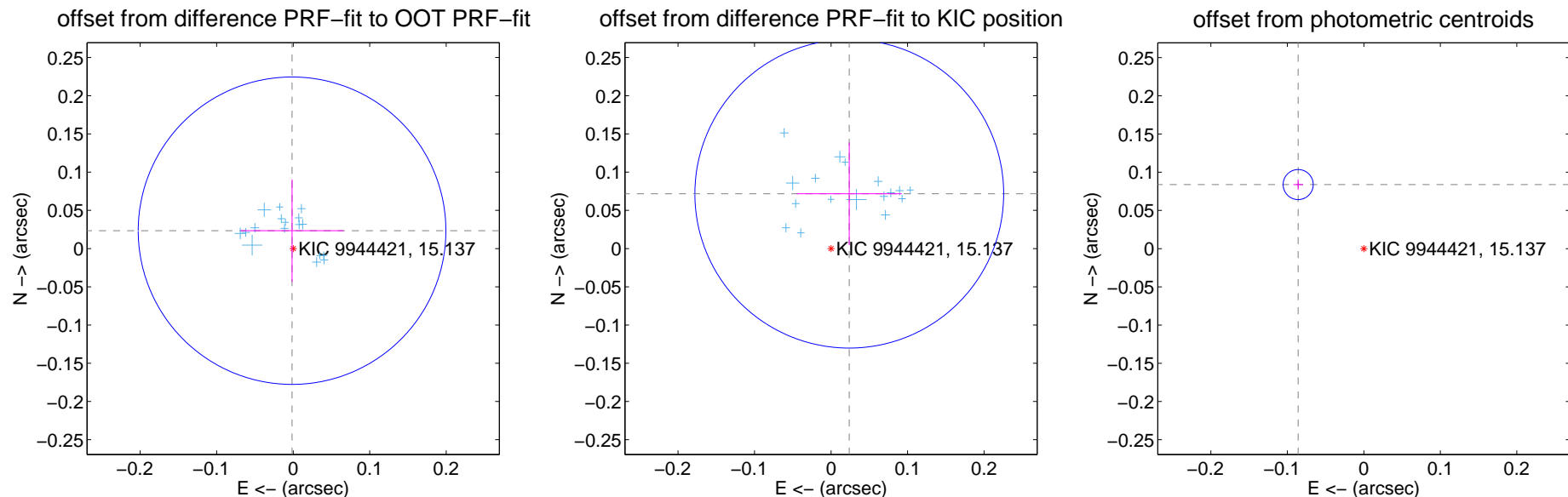
## DV Centroid Data

Supplemental centroid analysis for 009944421-02. Kepler magnitude: 15.14. Transit SNR 1078.71

There are 17 quarters with good PRF difference image offsets

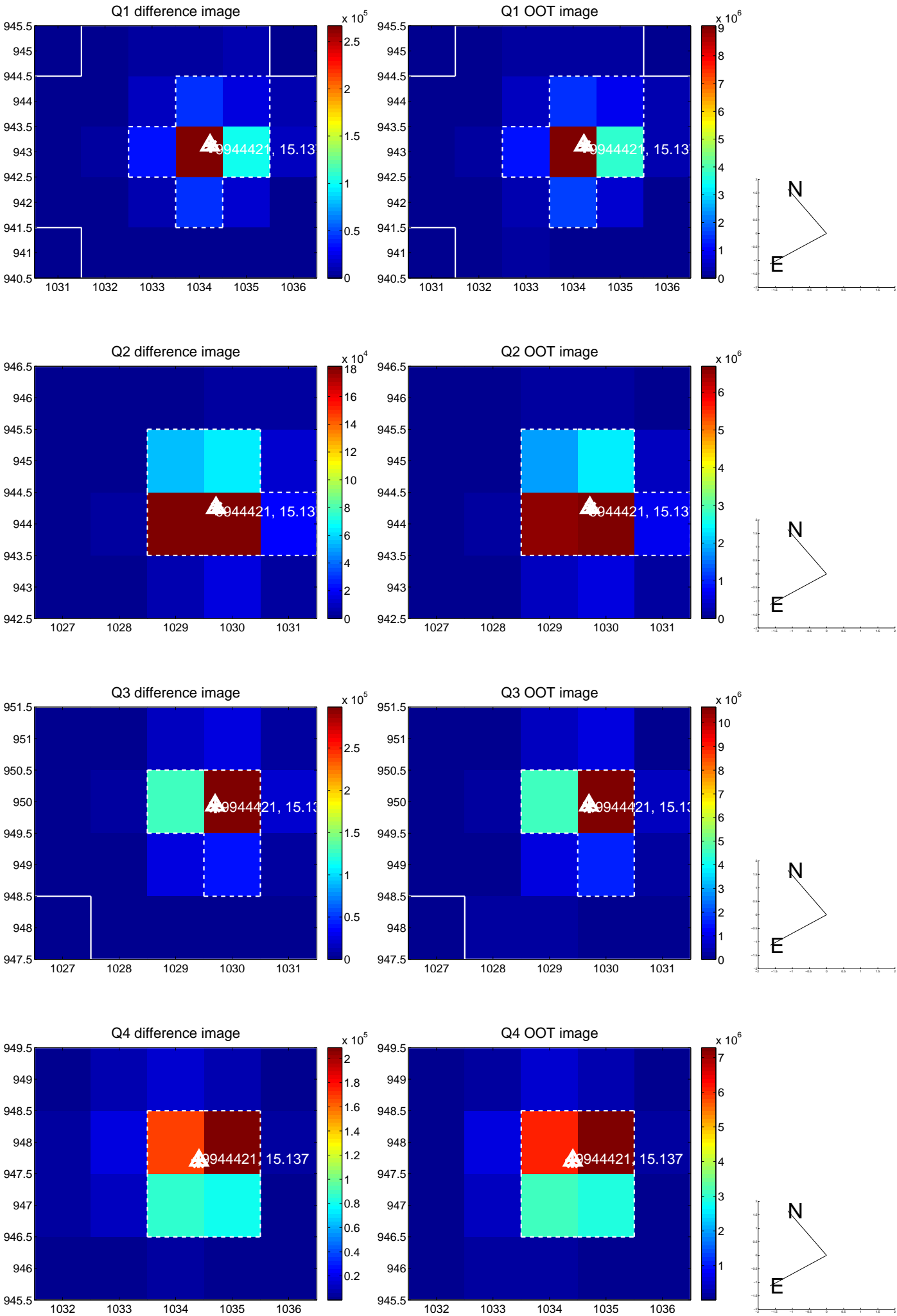
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.023 \pm 0.067$	0.35	$0.001 \pm 0.067$	$0.023 \pm 0.067$
PRF-fit source offset from KIC position	$0.076 \pm 0.067$	1.12	$-0.024 \pm 0.069$	$0.072 \pm 0.067$
photometric centroid source offset	$0.12 \pm 0.01$	18.32	$0.09 \pm 0.01$	$0.08 \pm 0.01$

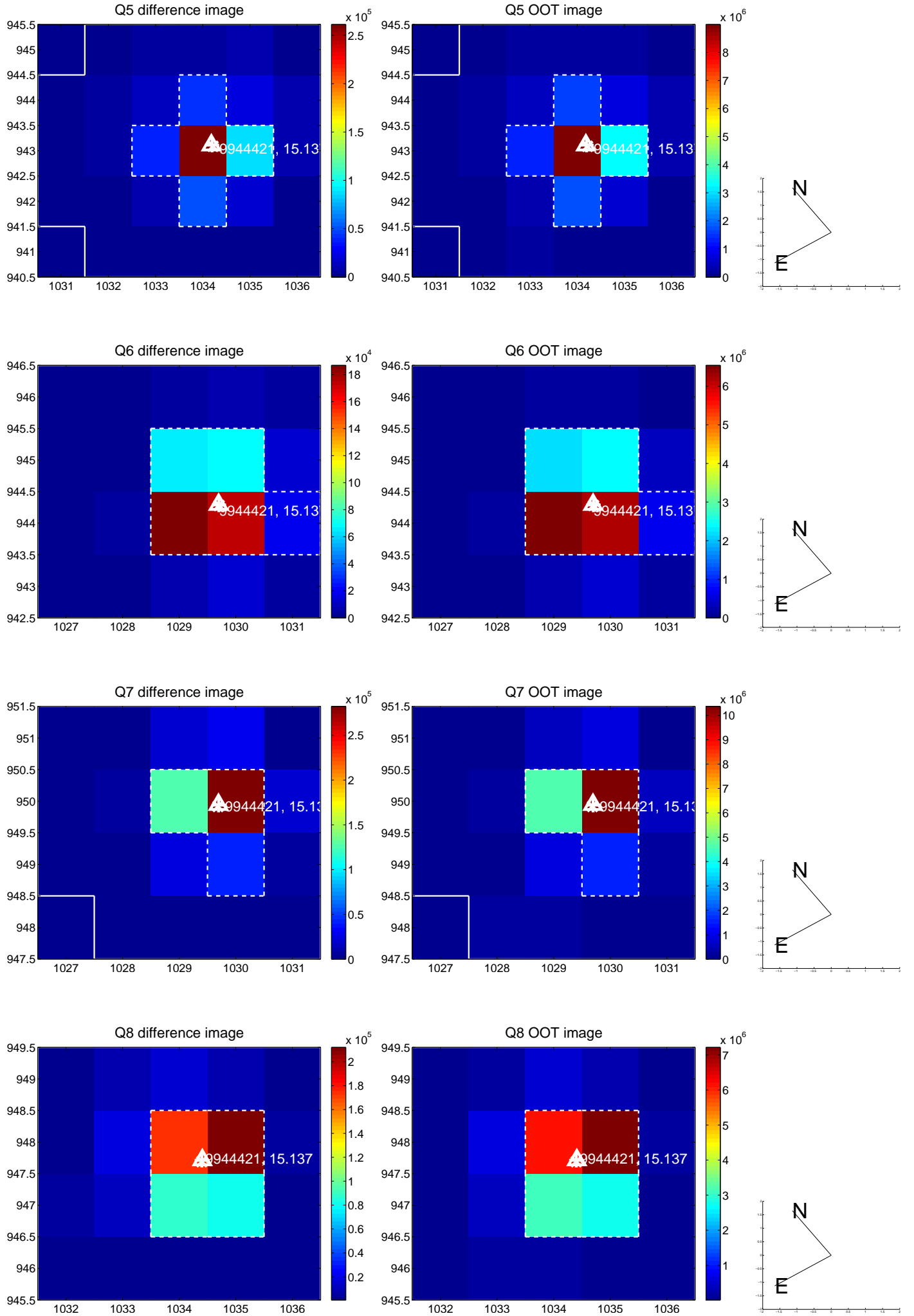


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

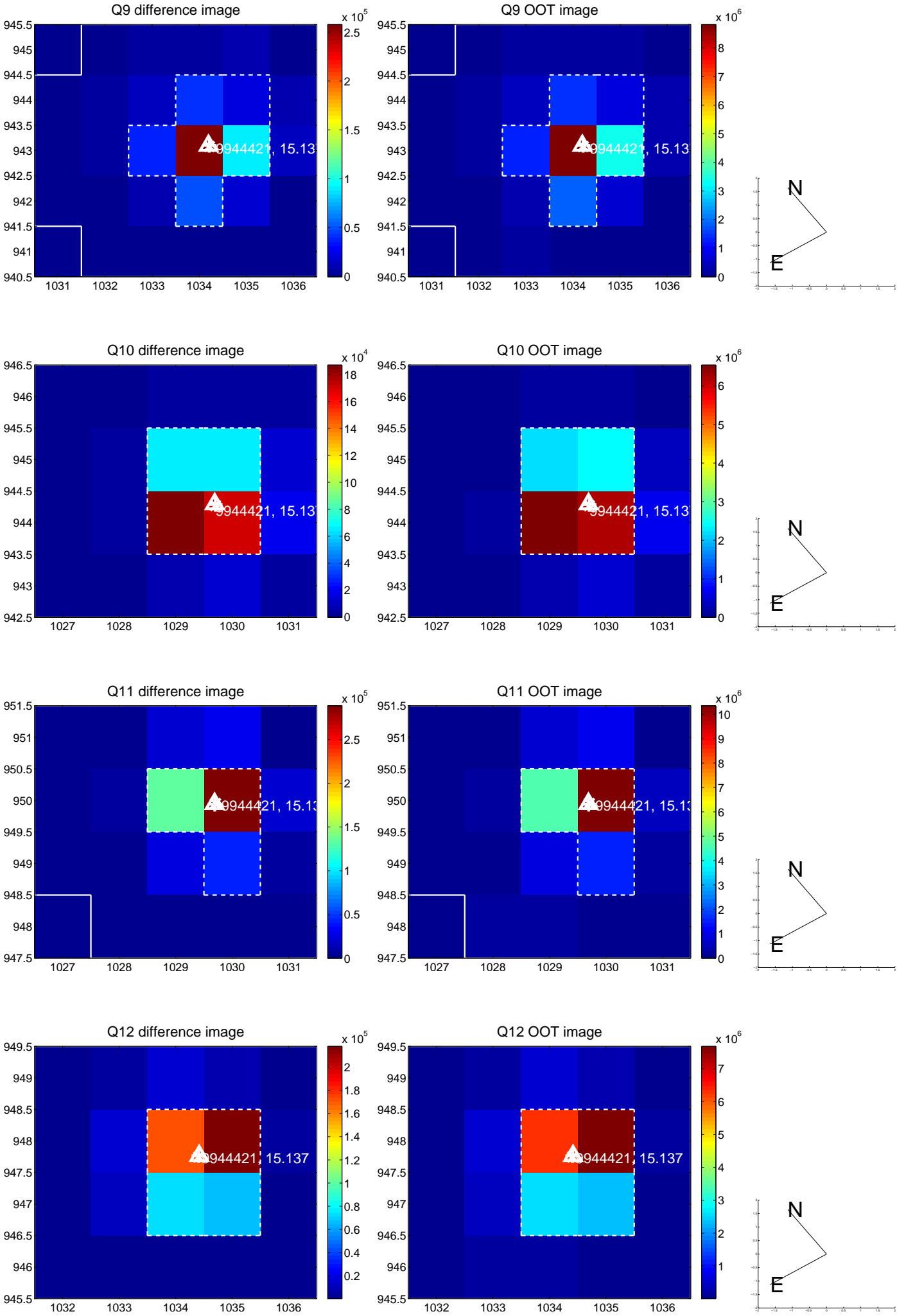
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



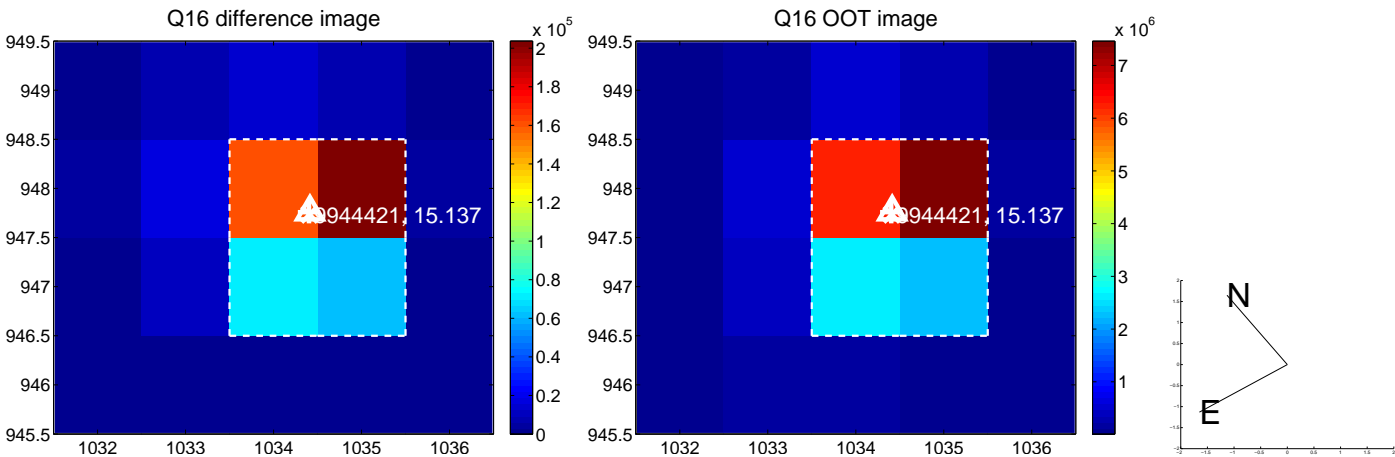
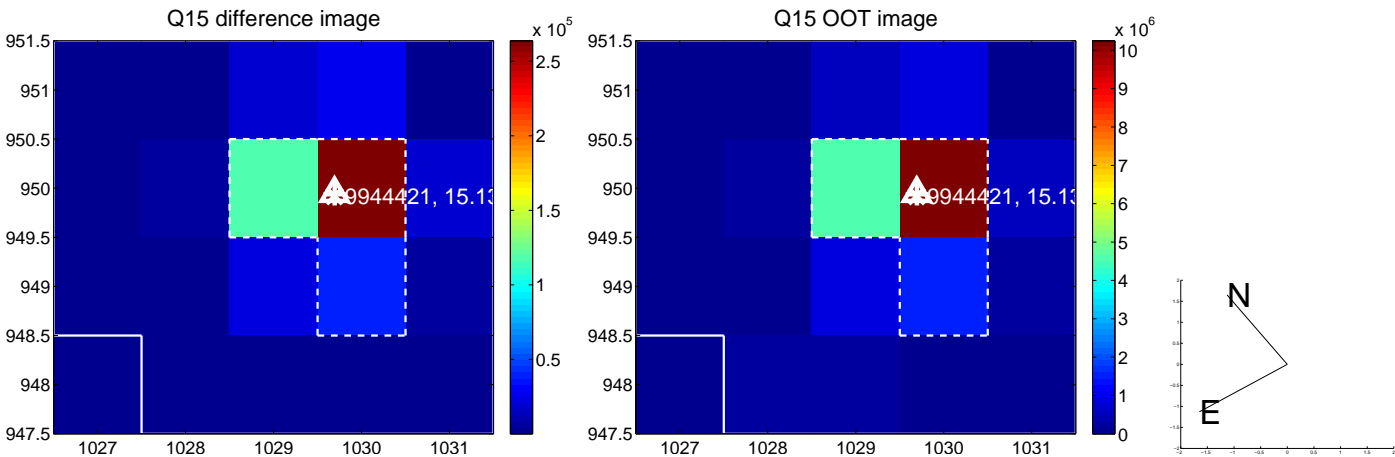
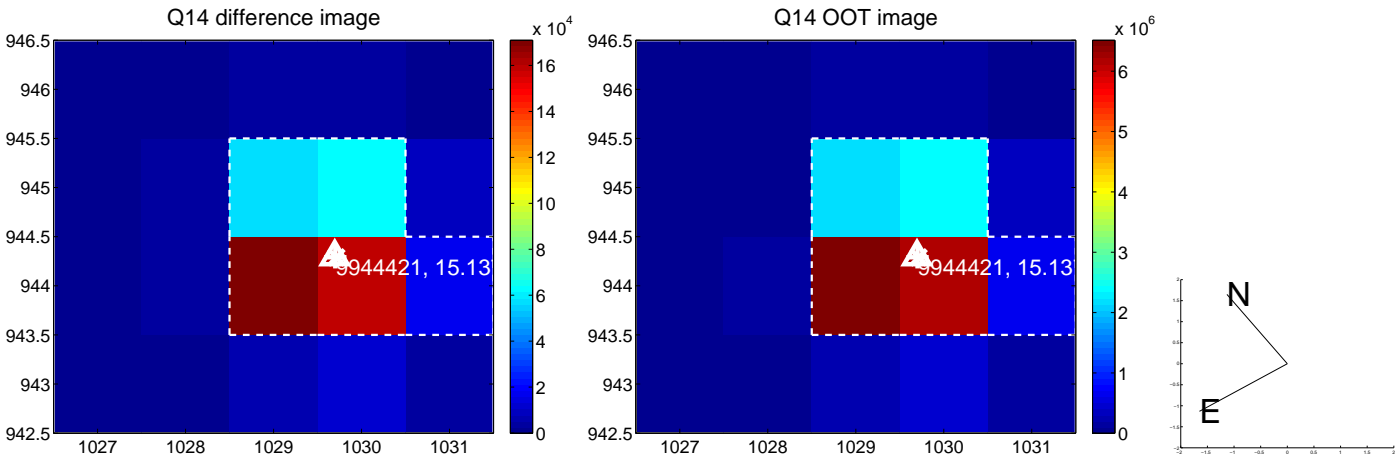
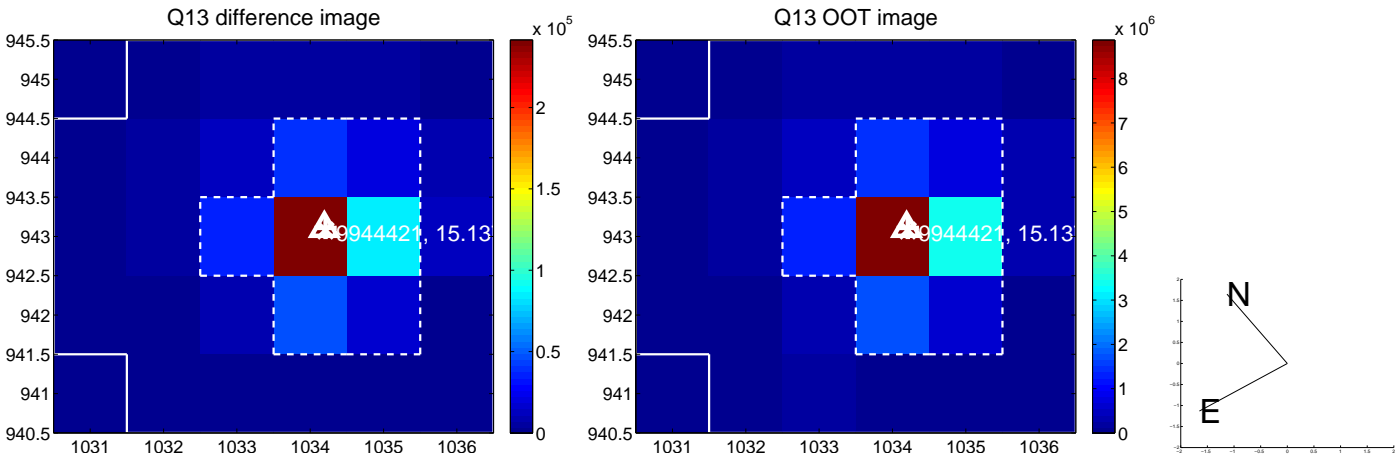
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



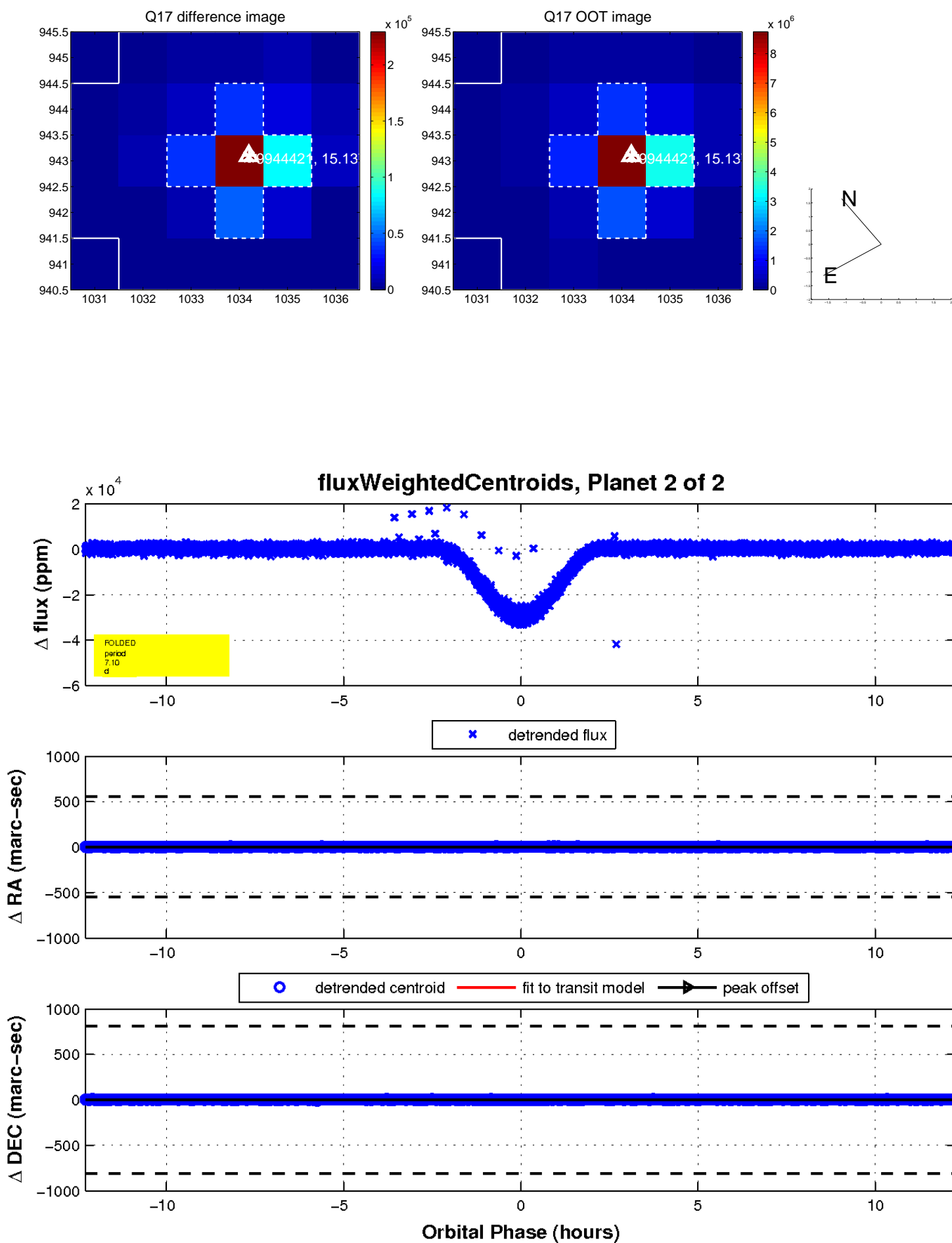
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

