

# KIC 009240664

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009240664-01	OBS	4338.01	10.784318	141.411548	215.9	1.478	12.2	14.7	3.52	5575	8.73	902.47
009240664-02	OBS	No	10.784238	136.750473	122.6	1.963	10.5	11.8	3.52	5575	4.67	902.48

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009240664-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
009240664-02	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.

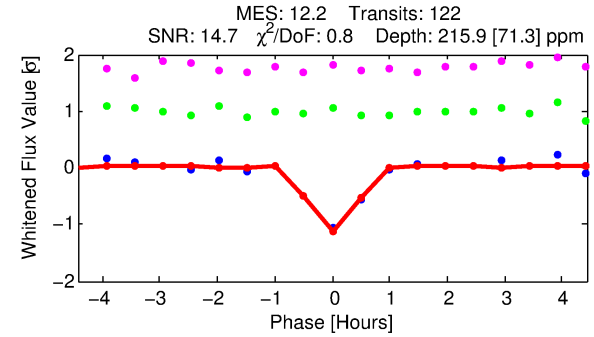
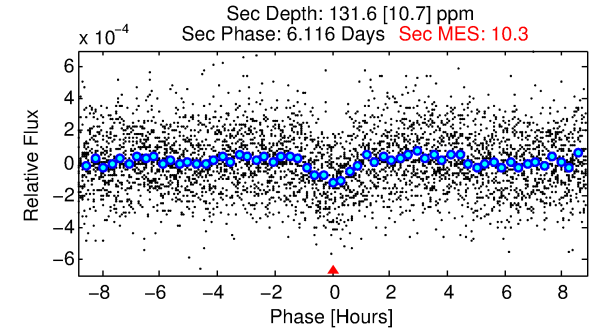
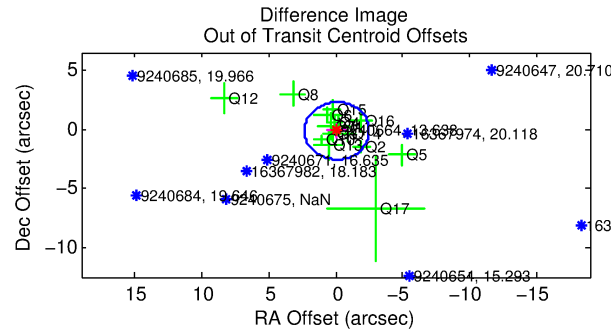
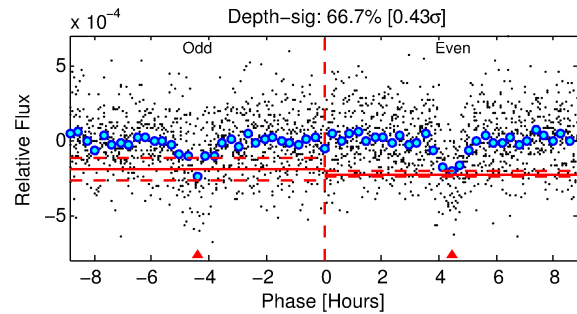
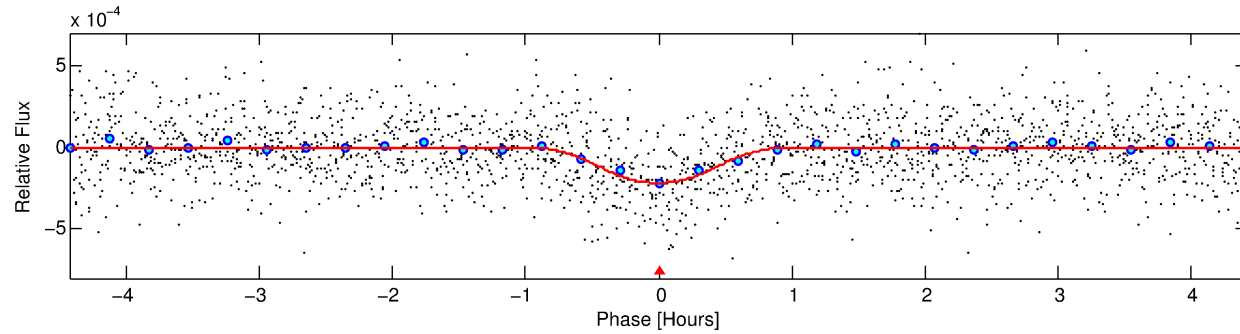
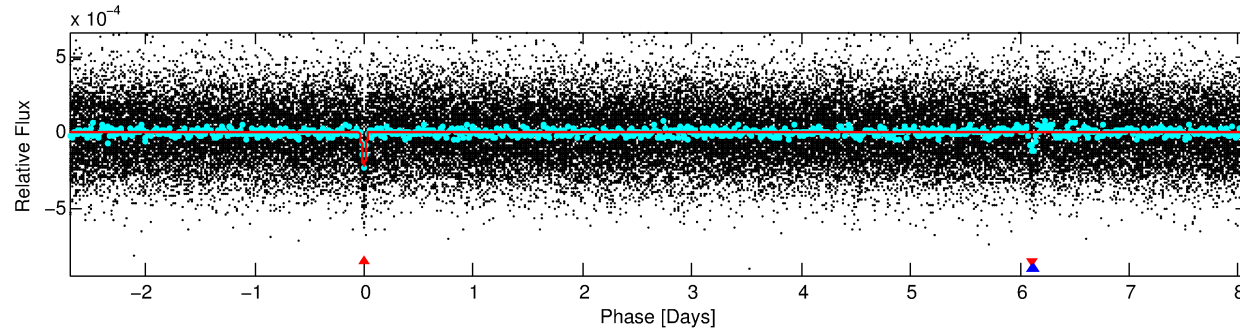
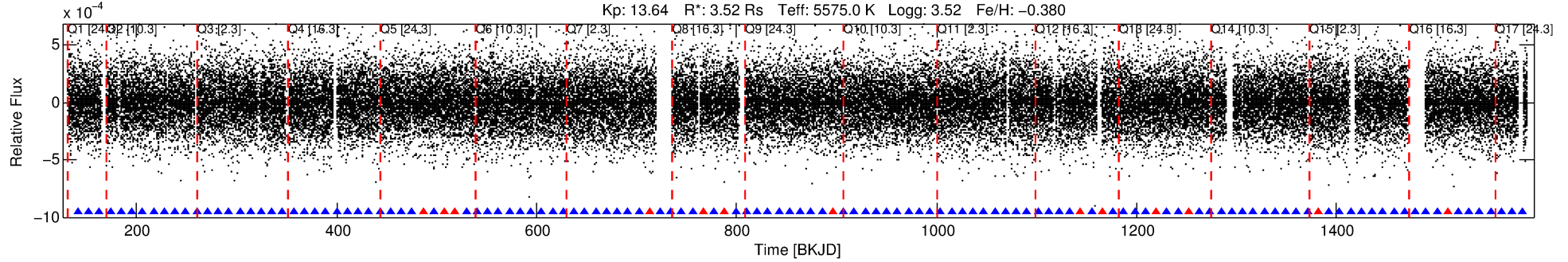
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009240664-01

No Significant Match Found

# DV One-Page Summary

KIC: 9240664 Candidate: 1 of 2 Period: 10.784 d  
KOI: K04338.01 Corr: 0.959



## DV Fit Results:

Period = 10.78432 [0.00003] d  
Epoch = 141.4115 [0.0024] BKJD  
Rp/R\* = 0.0228 [0.0539]  
a/R\* = 14.14 [13.27]  
b = 0.99 [0.10]  
Seff = 902.47 [1231.18]  
Teq = 1398 [477] K  
Rp = 8.73 [21.54] Re  
a = 0.1089 [0.0855] AU  
Ag = 11.25 [55.47] [0.18 $\sigma$ ]  
Teffp = 3958 [4692] K [0.54 $\sigma$ ]

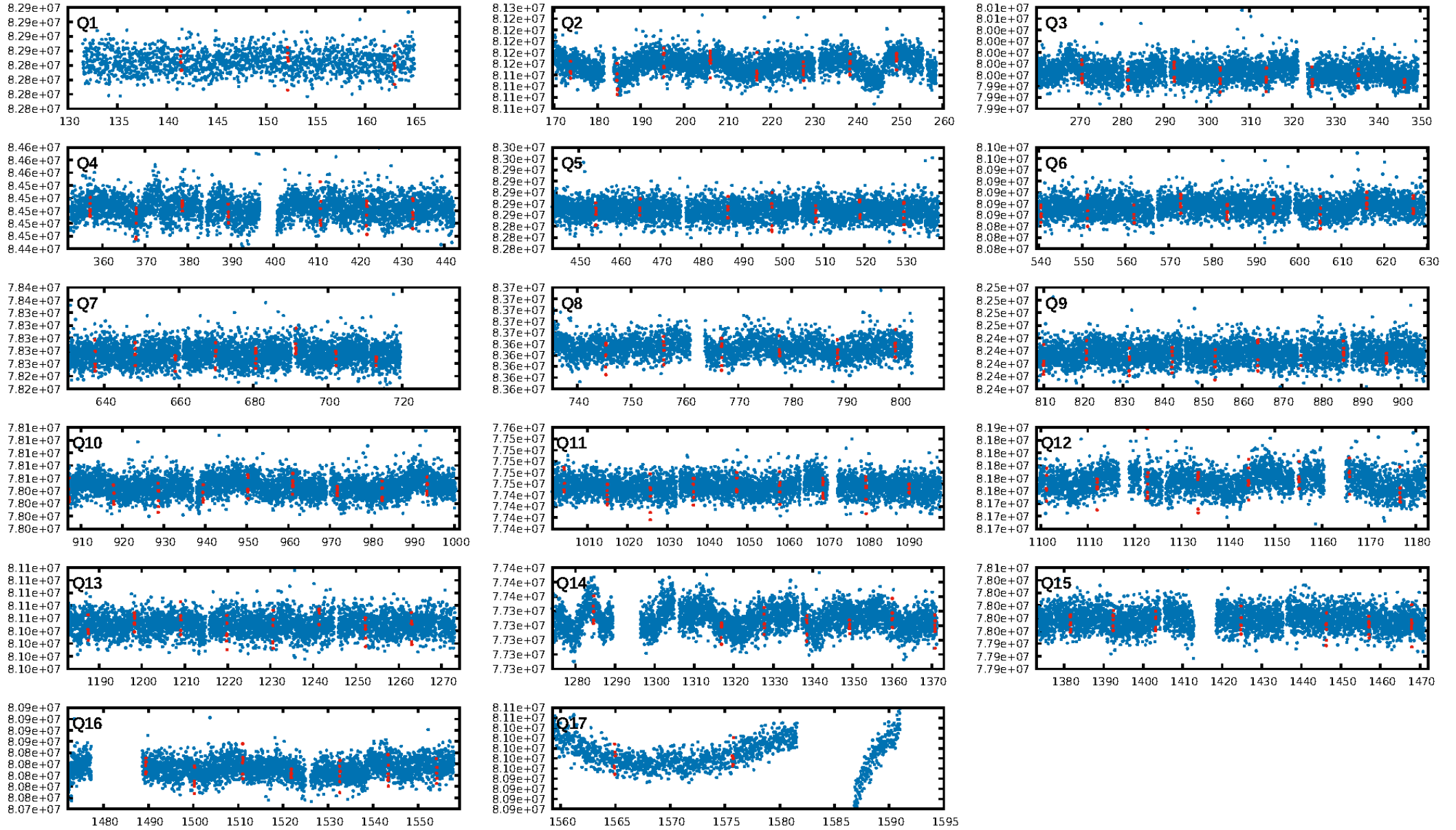
## DV Diagnostic Results:

ShortPeriod-sig: 0.1% [0.00 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 99.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.40e-33  
RollingBand-fgt: 0.89 [104/117]  
GhostDiagnostic-chr: 3.869  
Centroid-sig: 7.9%  
Centroid-so: 0.692 arcsec [0.76 $\sigma$ ]  
OotOffset-rm: 0.160 arcsec [0.20 $\sigma$ ]  
KicOffset-rm: 0.089 arcsec [0.15 $\sigma$ ]  
OotOffset-st: 4/4/4/3 [15]  
KicOffset-st: 4/4/4/3 [15]  
DiffImageQuality-fgm: 0.67 [10/15]  
DiffImageOverlap-fno: 1.00 [17/17]

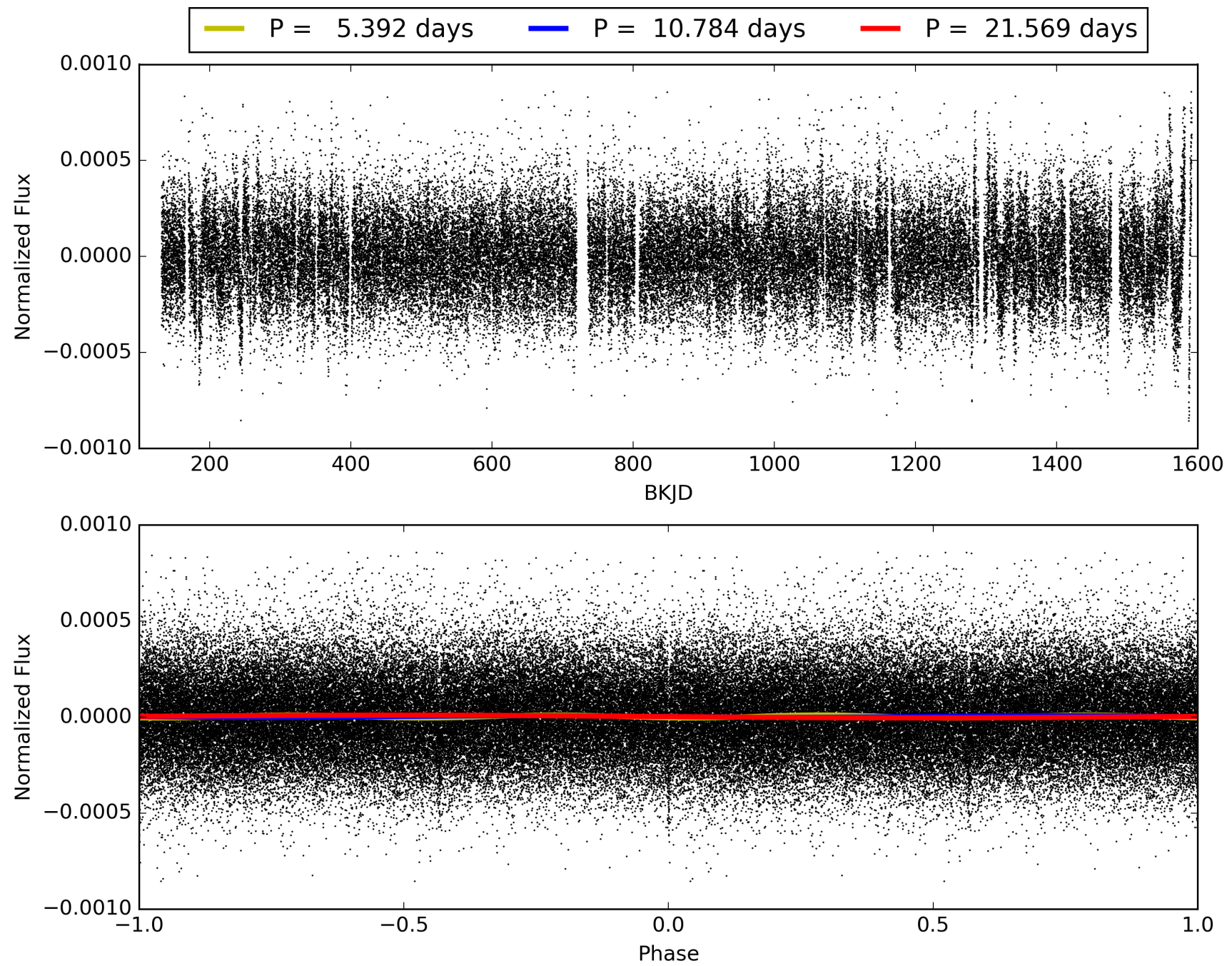
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 08:50:04 Z

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

# TCE 009240664-01, PDC Light Curves

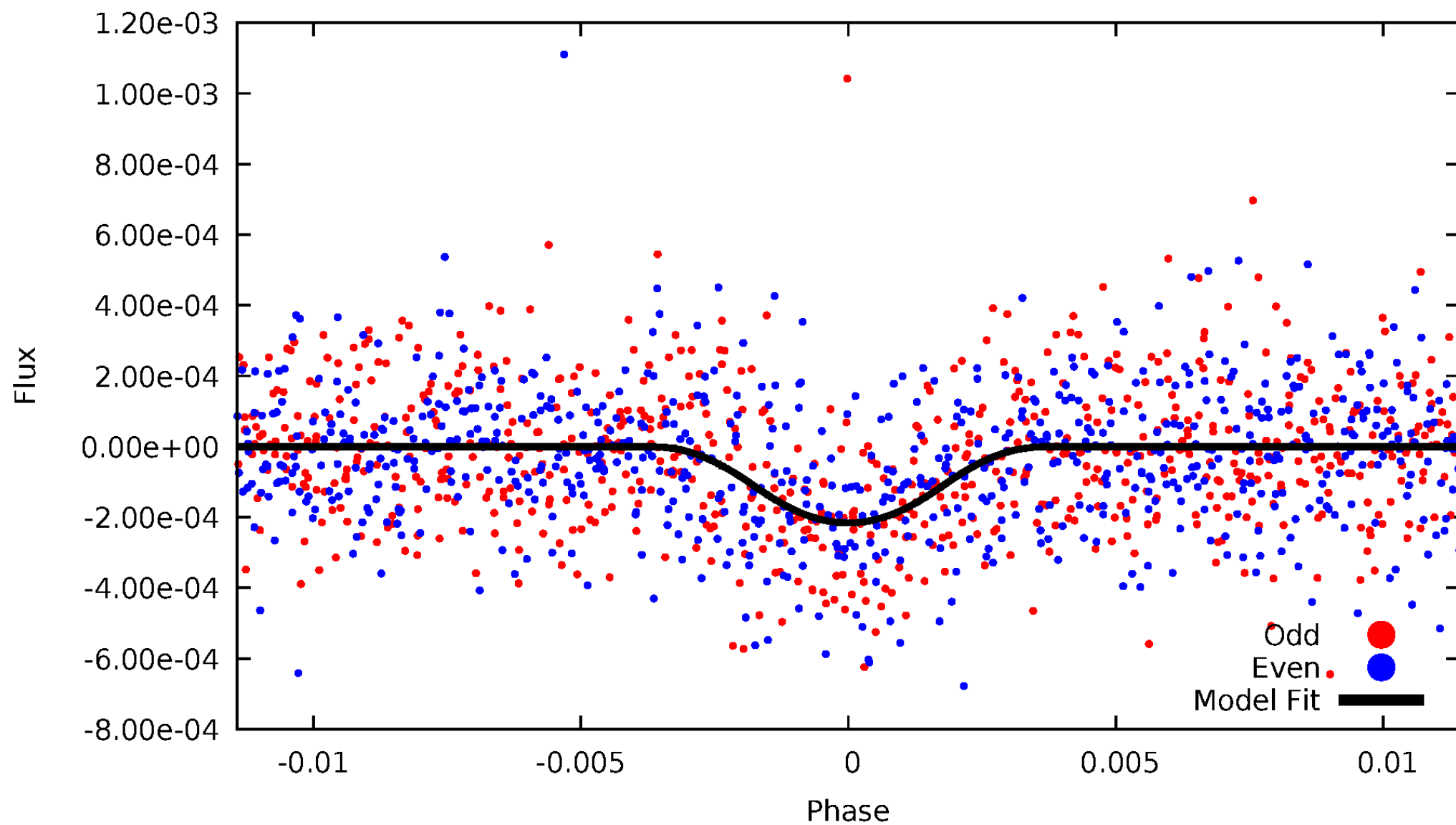


TCE 009240664-01



# DV Odd/Even

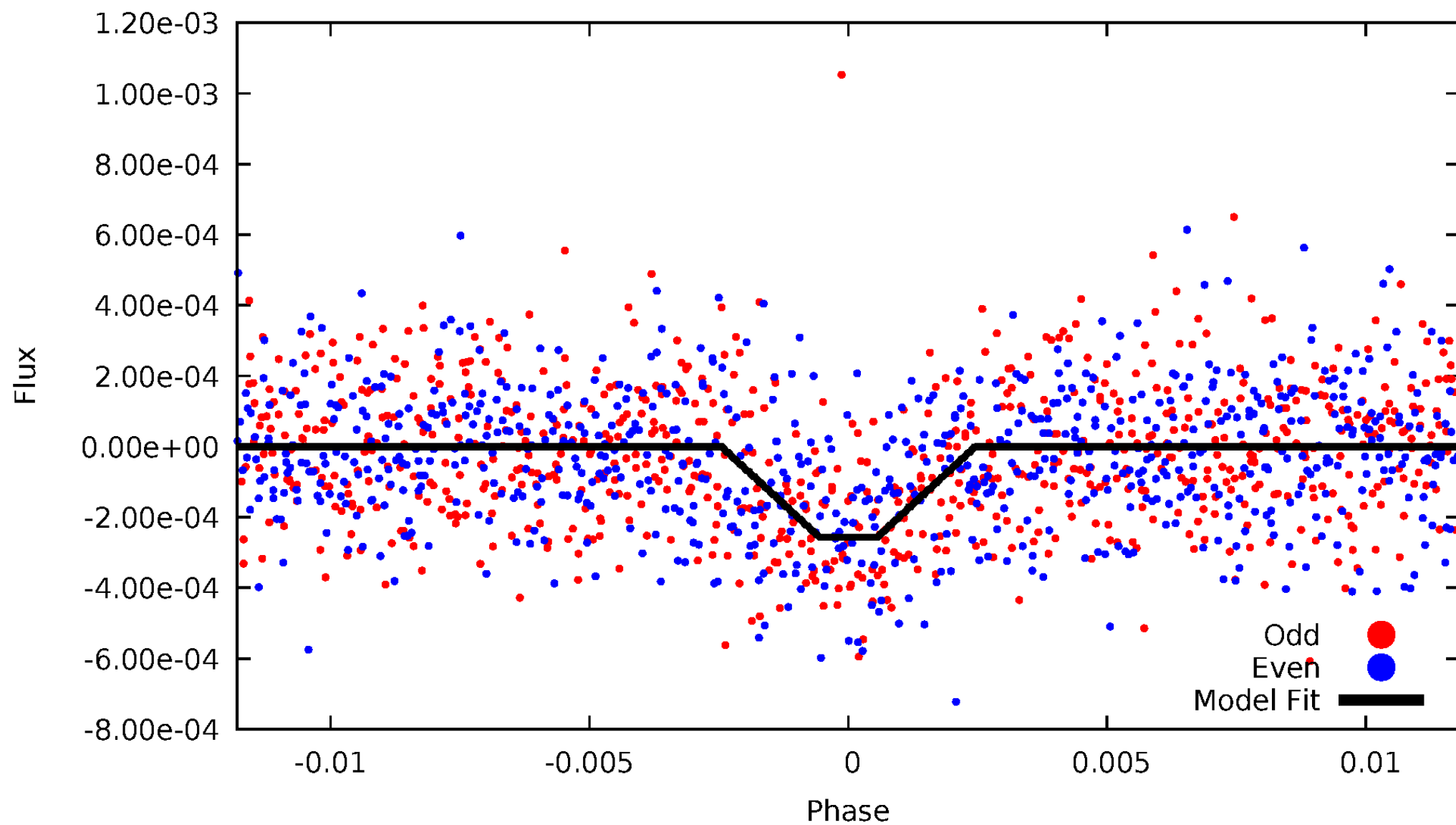
TCE 009240664-01



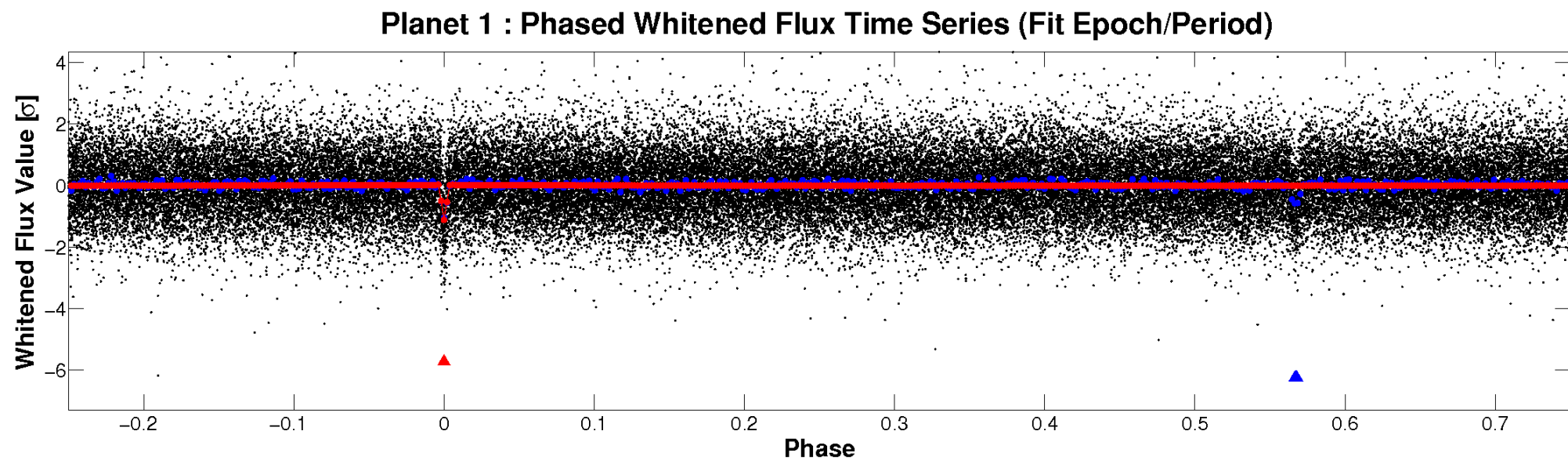
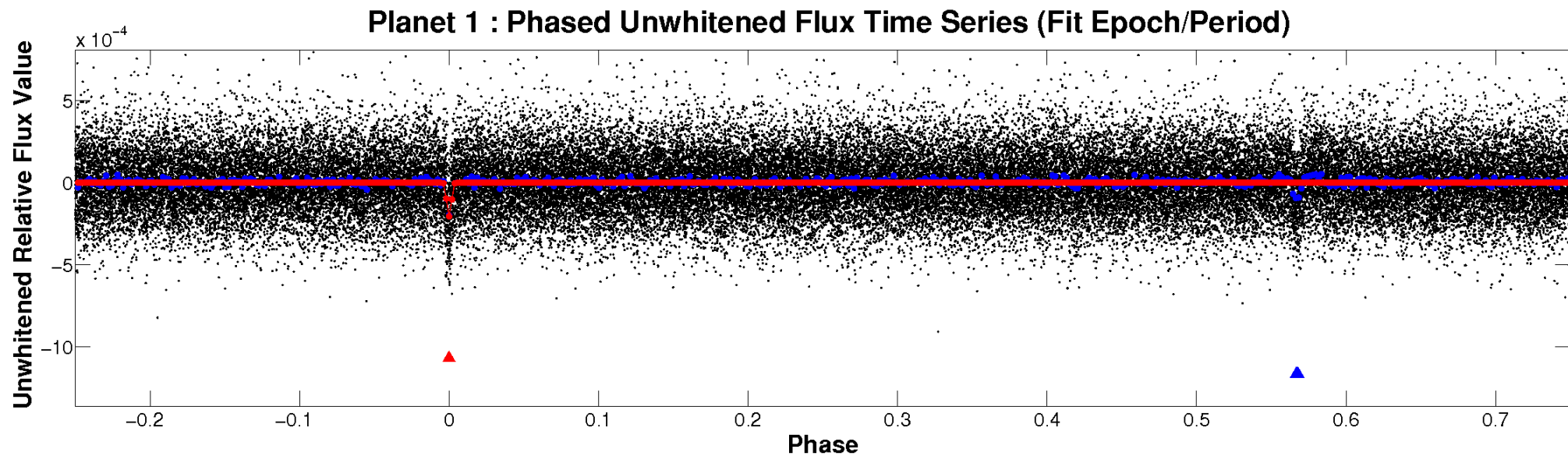


# ALT Odd/Even

TCE 009240664-01

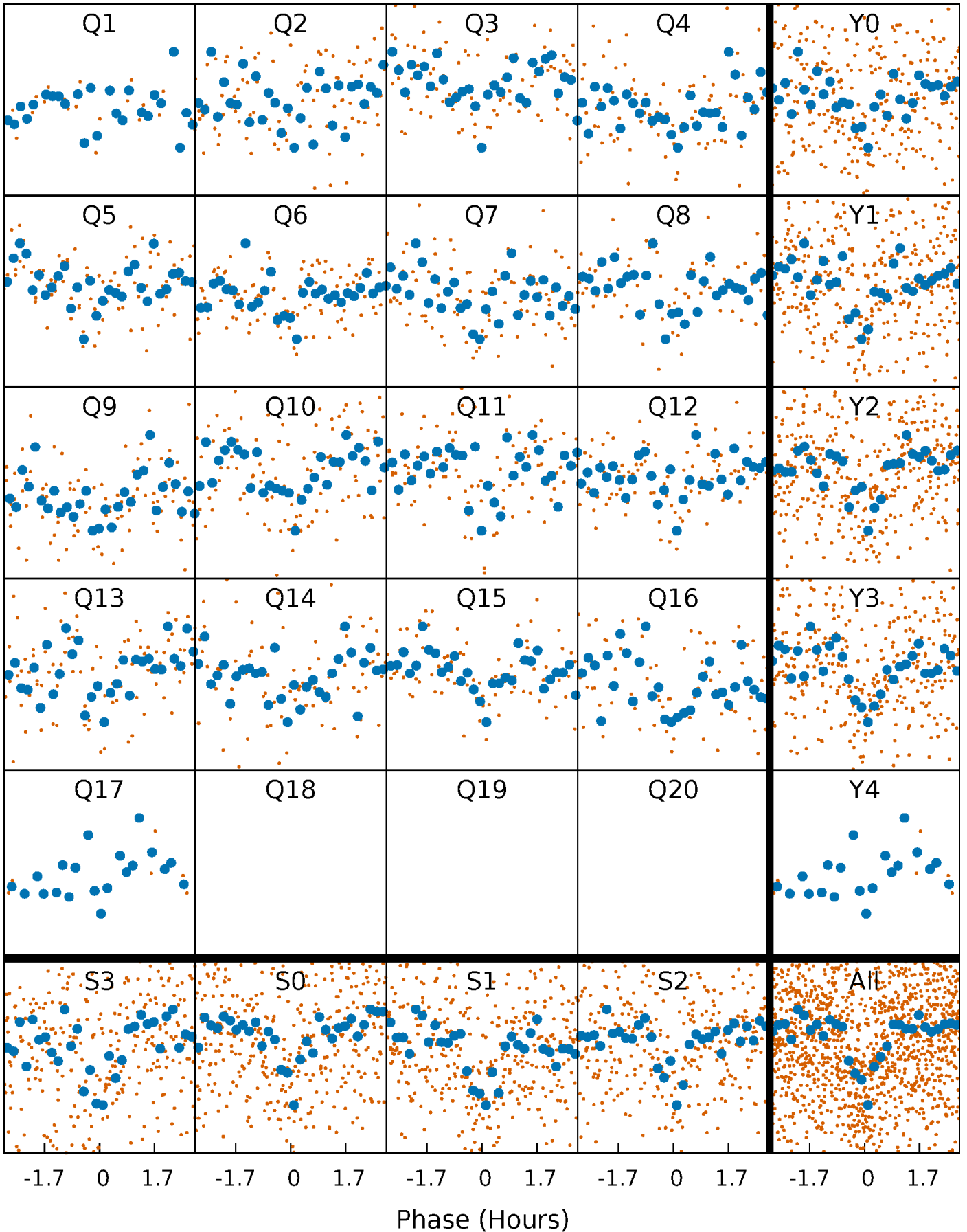


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

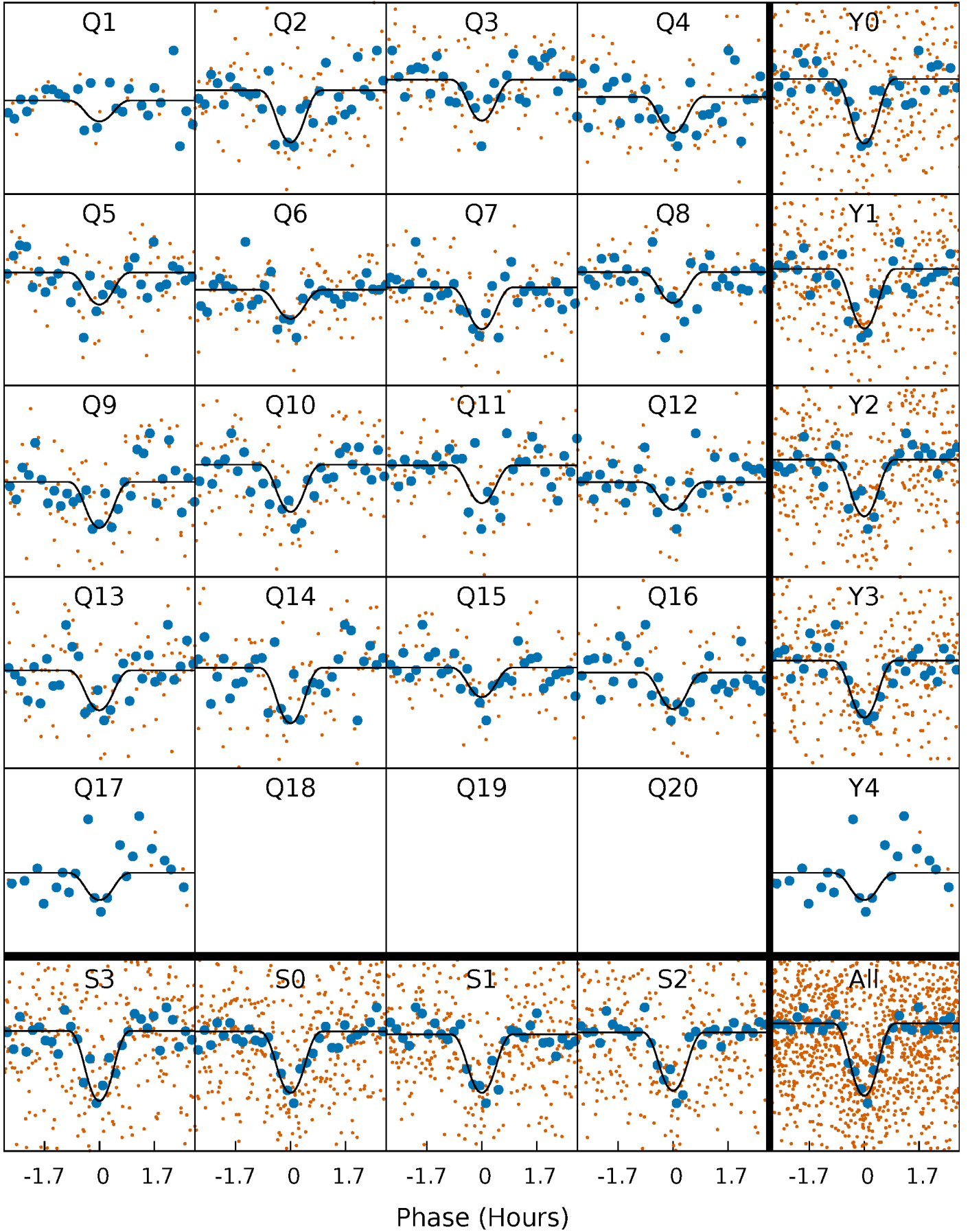
TCE 009240664-01 P= 10.784318 Days  $T_0=141.411548$  (BKJD)





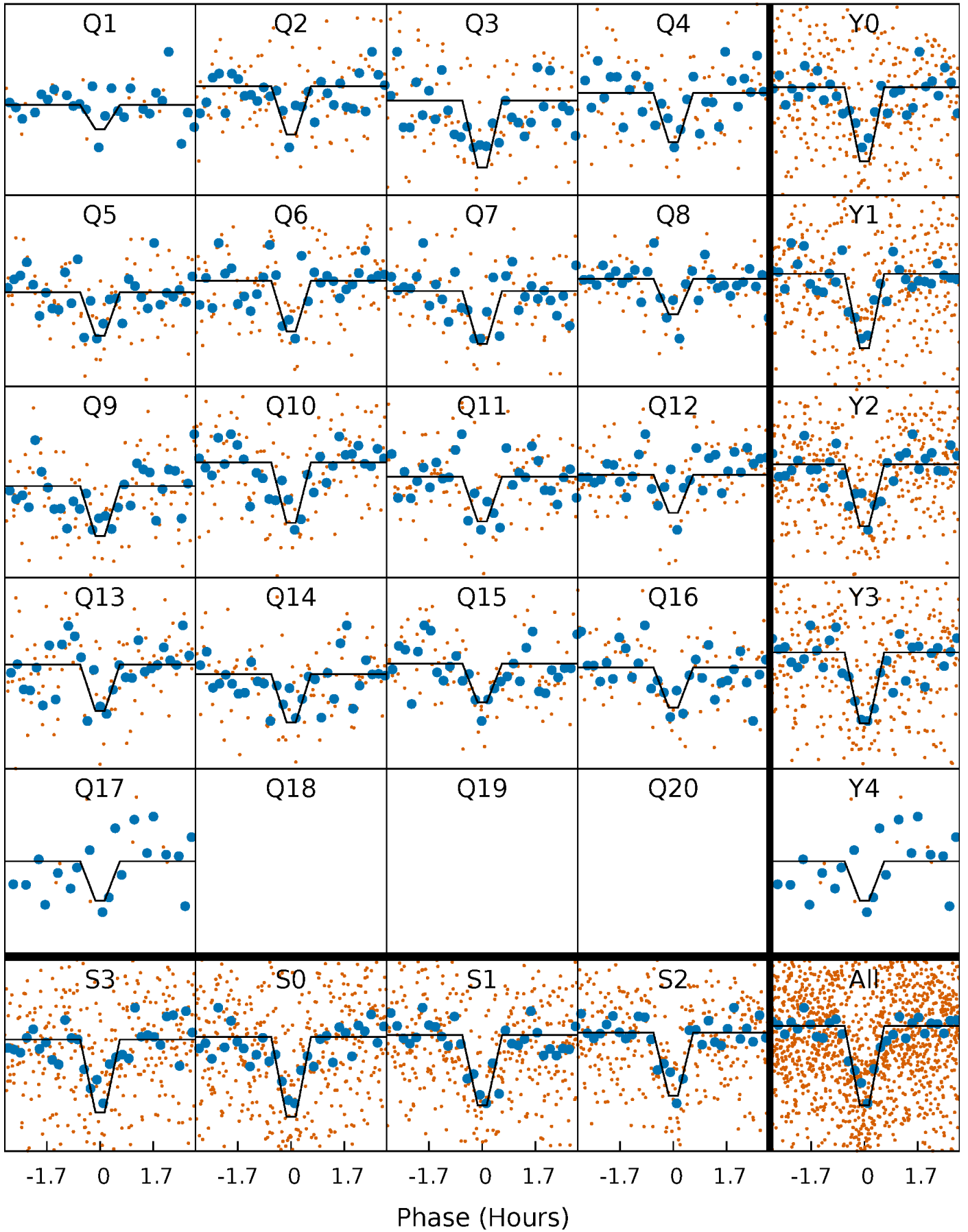
# DV Quarter-Phased Transit Curves

TCE 009240664-01 P= 10.784318 Days  $T_0=141.411548$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

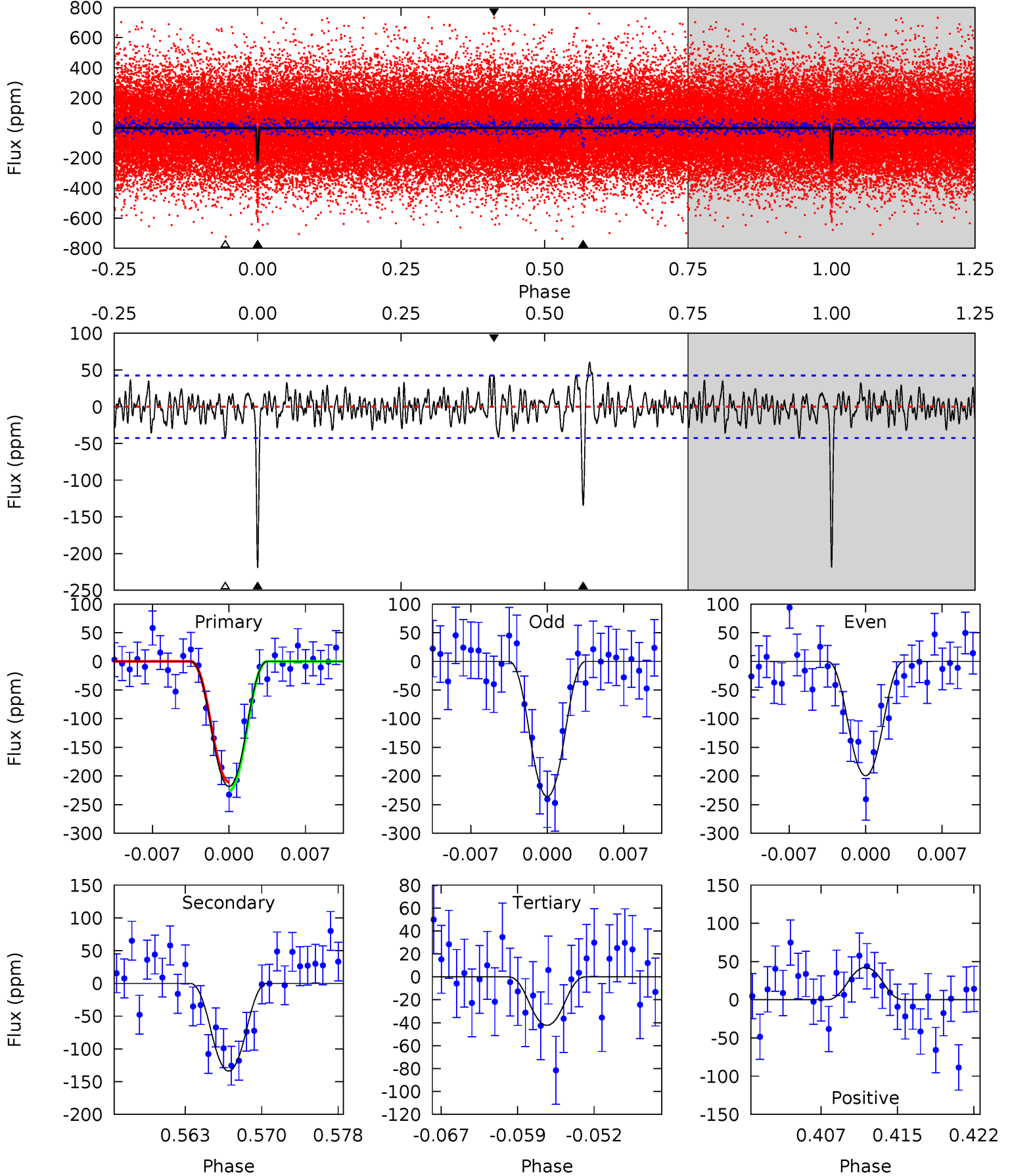
TCE 009240664-01 P= 10.784357 Days  $T_0=141.409244$  (BKJD)



# DV Model-Shift Uniqueness Test

009240664-01, P = 10.784318 Days, E = 130.627230 Days

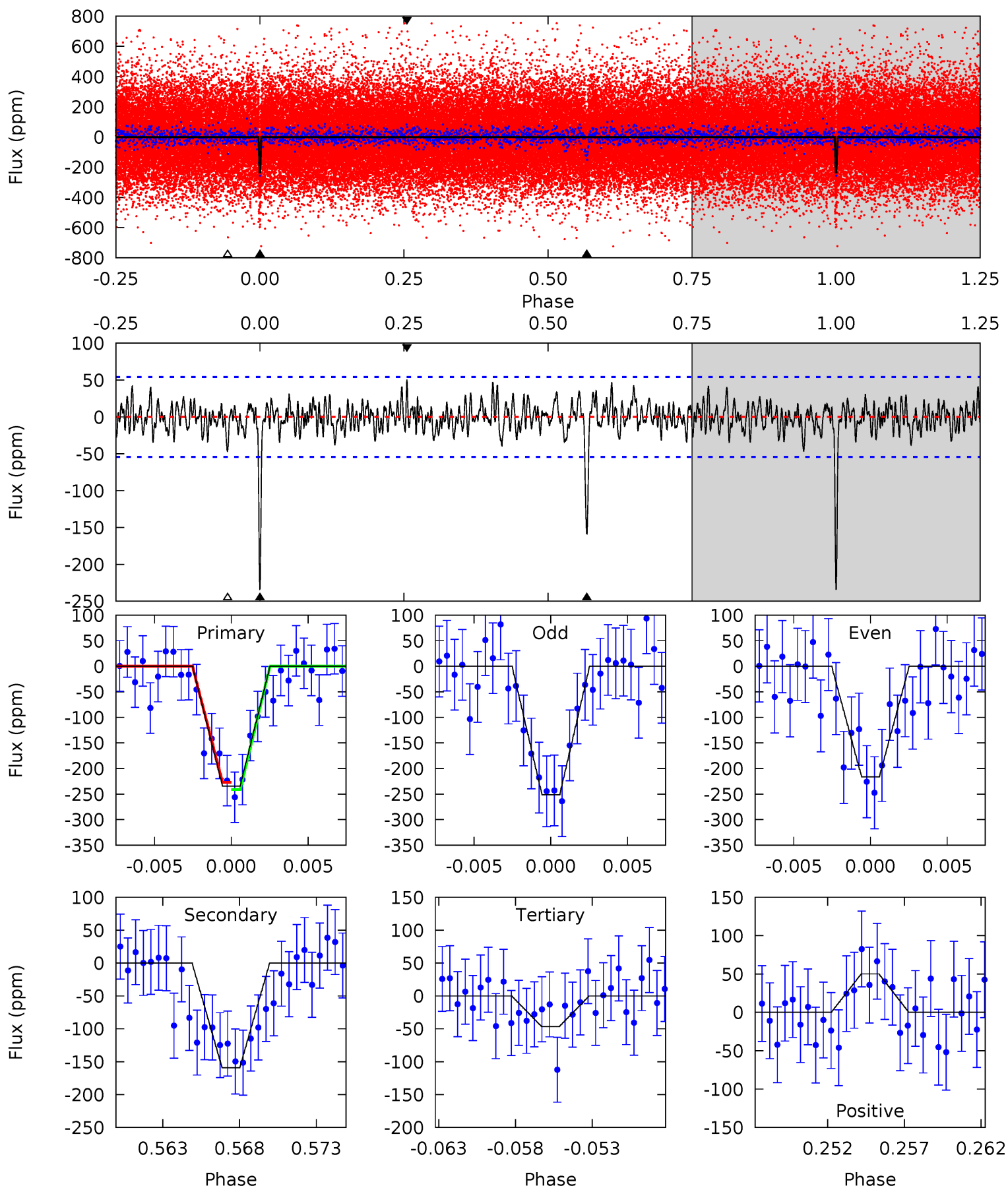
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
26.1	16.0	5.05	5.05	5.08	2.68	1.77	21.0	21.0	10.9	10.9	2.18	1.01	0.22	0



# Alt Model-Shift Uniqueness Test

009240664-01, P = 10.784357 Days, E = 130.624887 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
22.3	15.1	4.43	4.77	5.16	2.82	1.46	17.9	17.5	10.7	10.4	1.68	0.94	0.18	0.68



### Stellar Parameters For KIC 009240664

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5575^{+198}_{-198}$	$3.516^{+0.832}_{-0.208}$	$-0.380^{+0.350}_{-0.300}$	$3.515^{+1.035}_{-2.415}$	$1.480^{+0.206}_{-0.617}$	$0.048^{+0.984}_{-0.026}$
	+4%/-4%	+24%/-6%	+92%/-79%	+29%/-69%	+14%/-42%	+2051%/-53%
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 009240664-01 / KOI 4338.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-134 \pm 8$	$14.80^{+18.96}_{-9.87}$	$1900^{+199}_{-363}$	$3278^{+1499}_{-724}$	$3.865^{+30.691}_{-3.132}$
Alt.	$-159 \pm 11$	$13.89^{+15.95}_{-9.88}$	$1904^{+210}_{-352}$	$3487^{+2005}_{-754}$	$5.065^{+61.503}_{-3.966}$

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



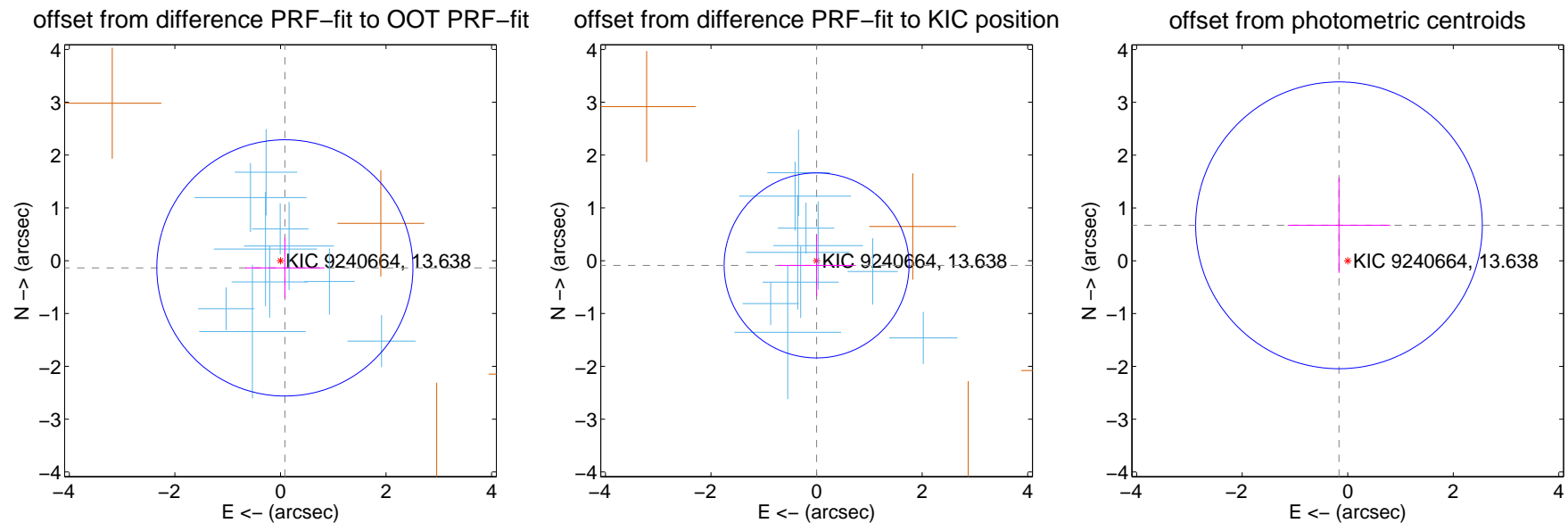
## DV Centroid Data

Supplemental centroid analysis for 009240664-01. Kepler magnitude: 13.64. Transit SNR 14.73

There are 10 quarters with good PRF difference image offsets

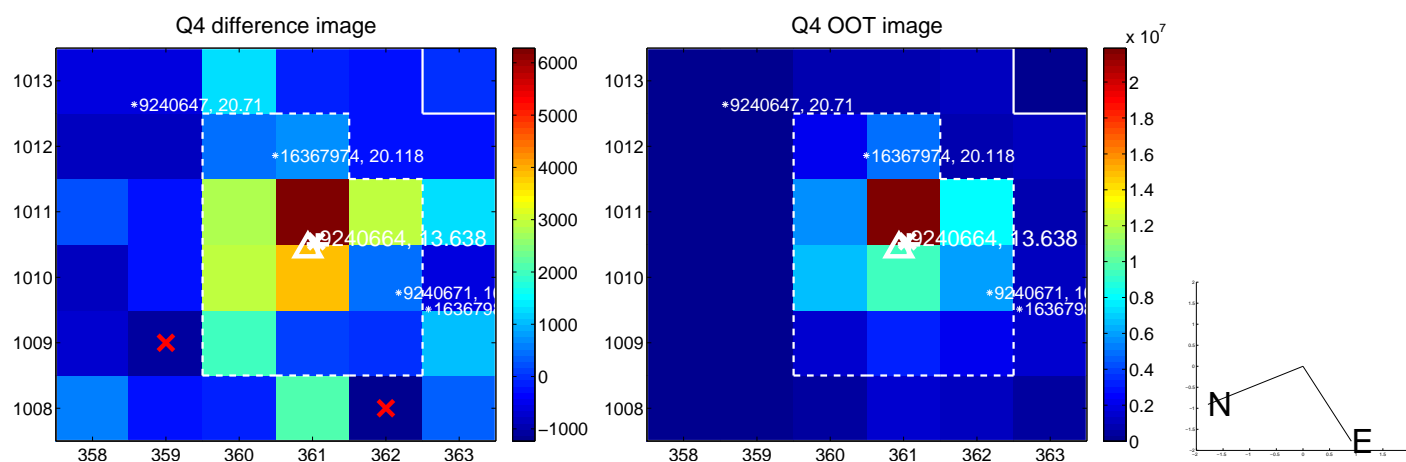
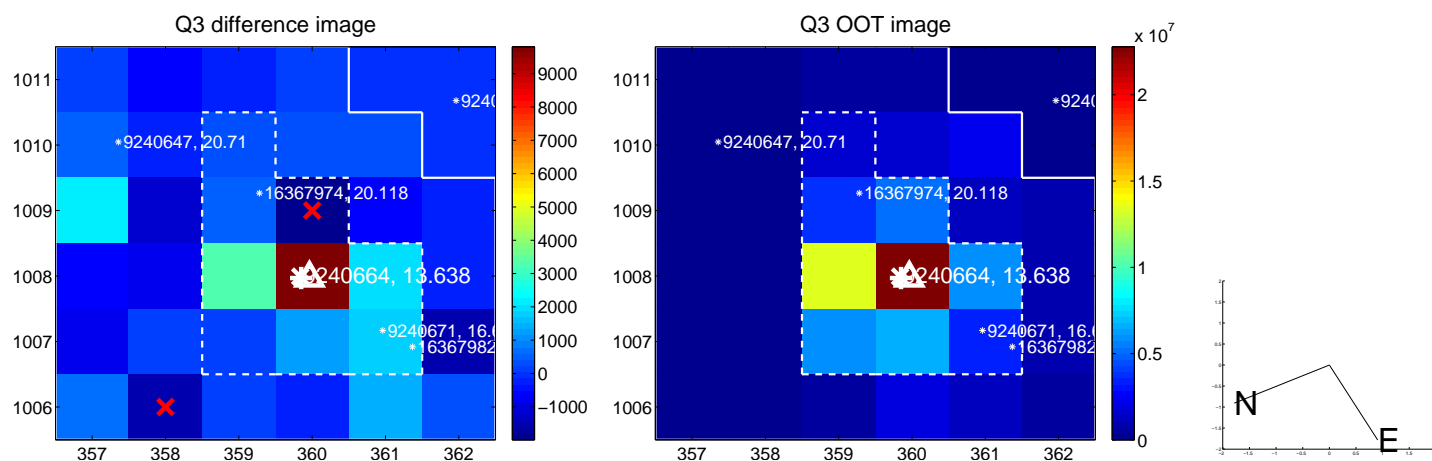
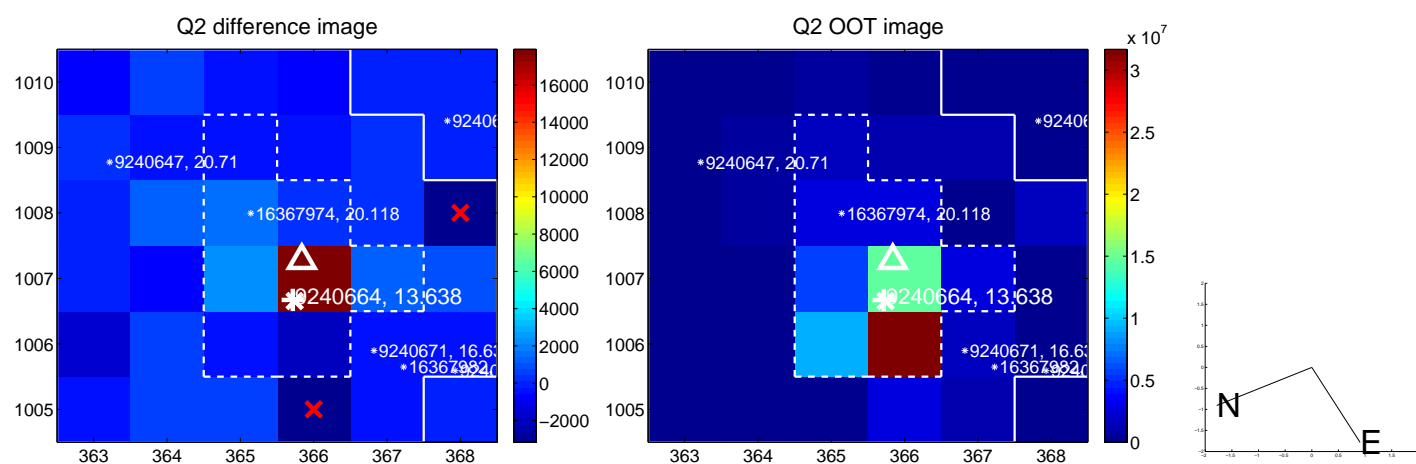
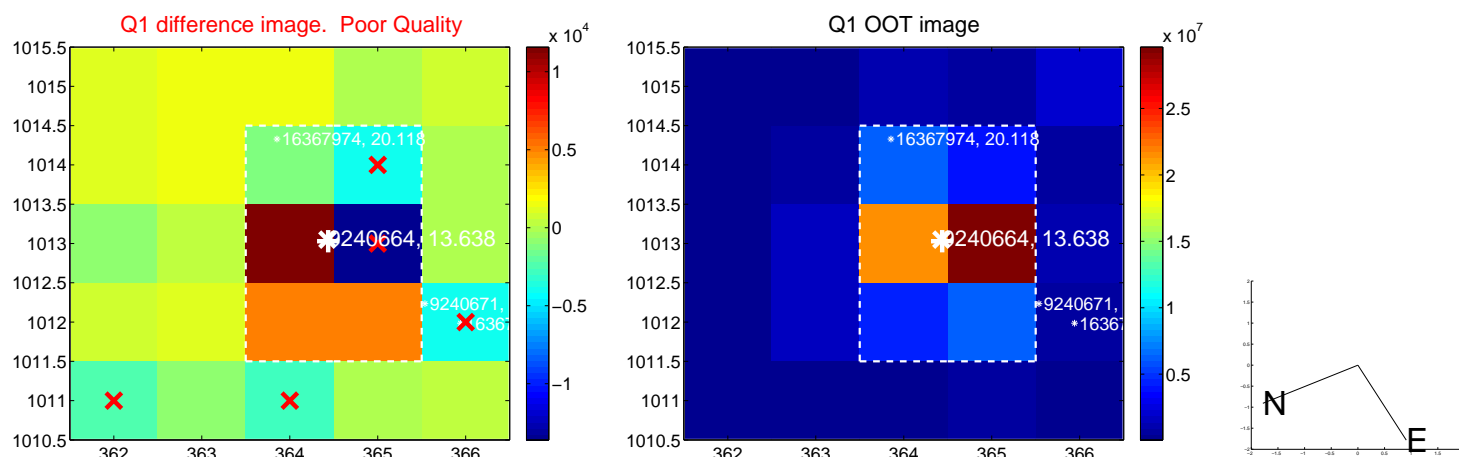
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.160 \pm 0.809$	0.20	$-0.084 \pm 0.748$	$-0.136 \pm 0.573$
PRF-fit source offset from KIC position	$0.089 \pm 0.584$	0.15	$-0.000 \pm 0.725$	$-0.089 \pm 0.581$
photometric centroid source offset	$0.69 \pm 0.91$	0.76	$0.17 \pm 0.97$	$0.67 \pm 0.90$

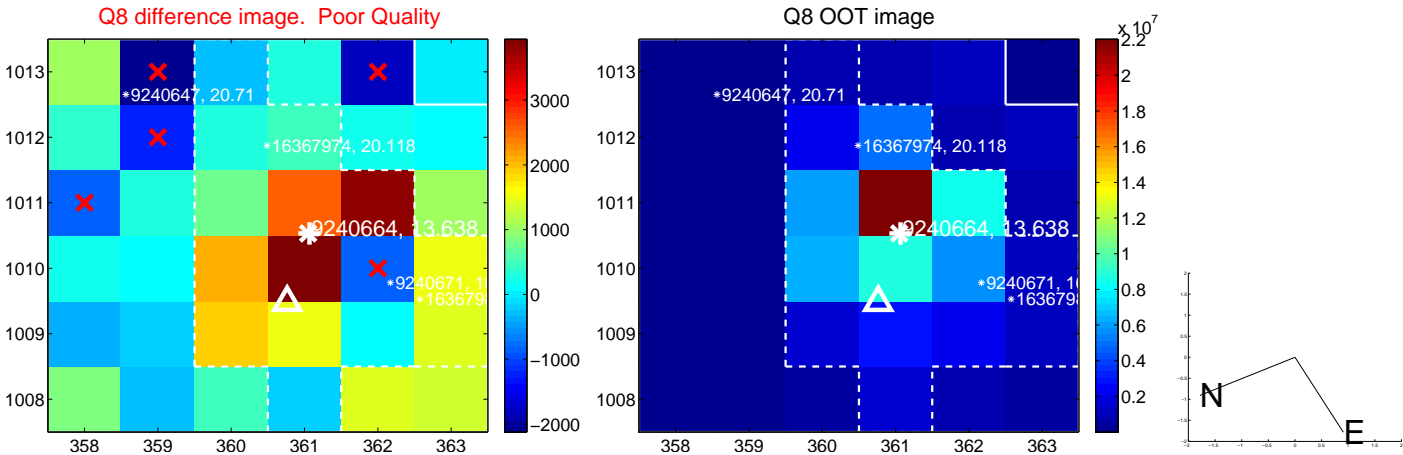
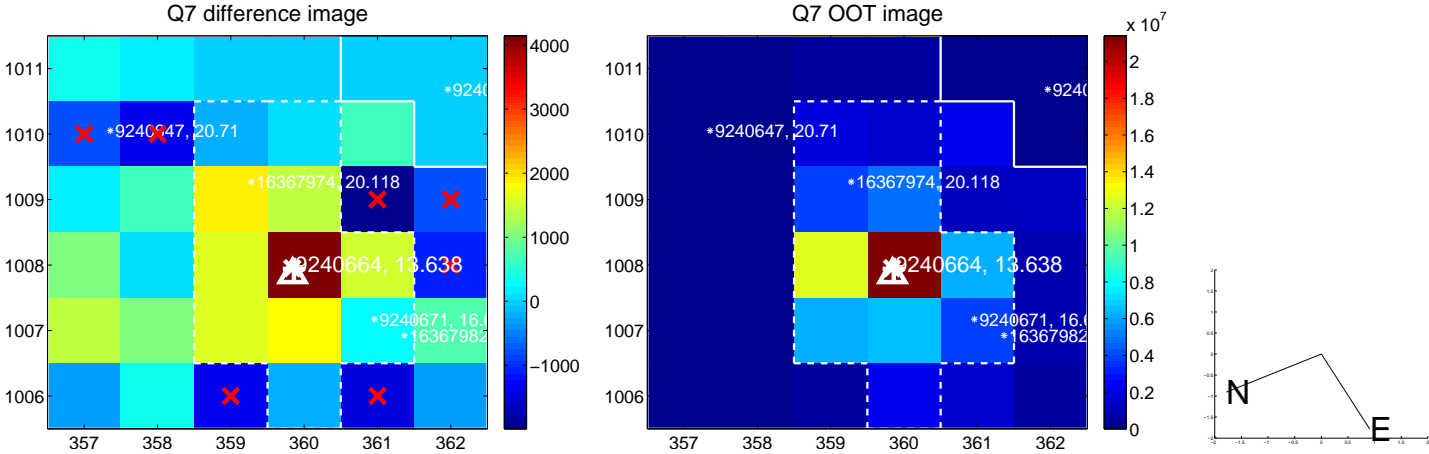
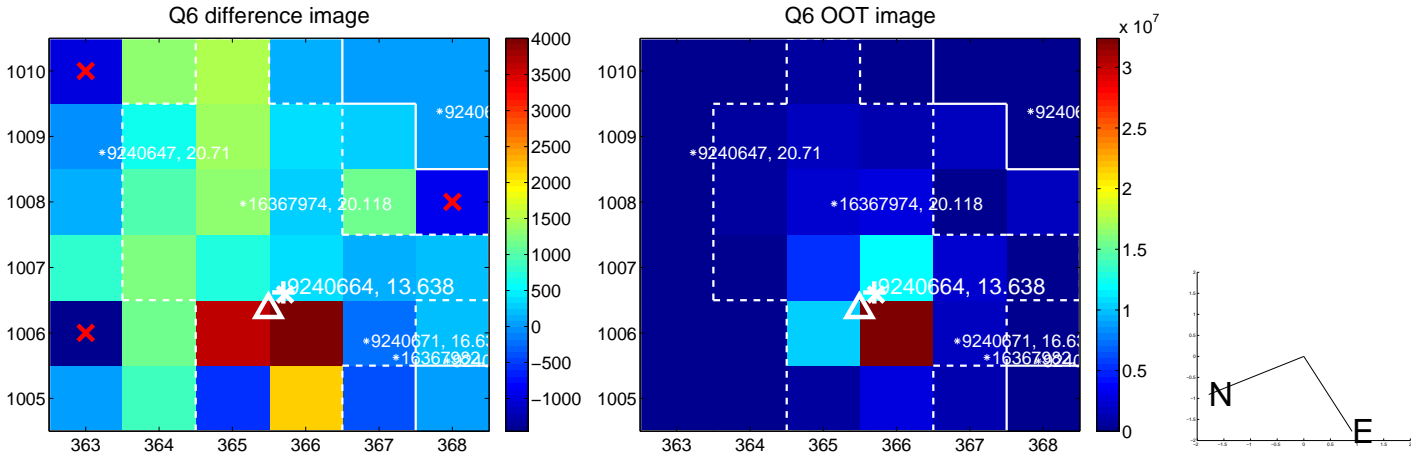
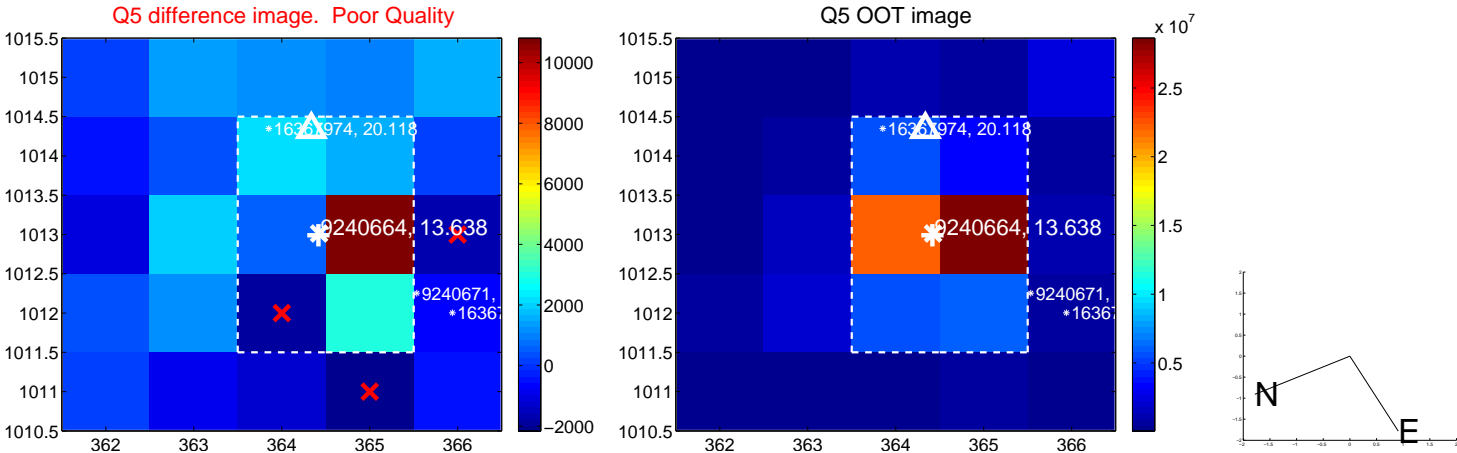


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

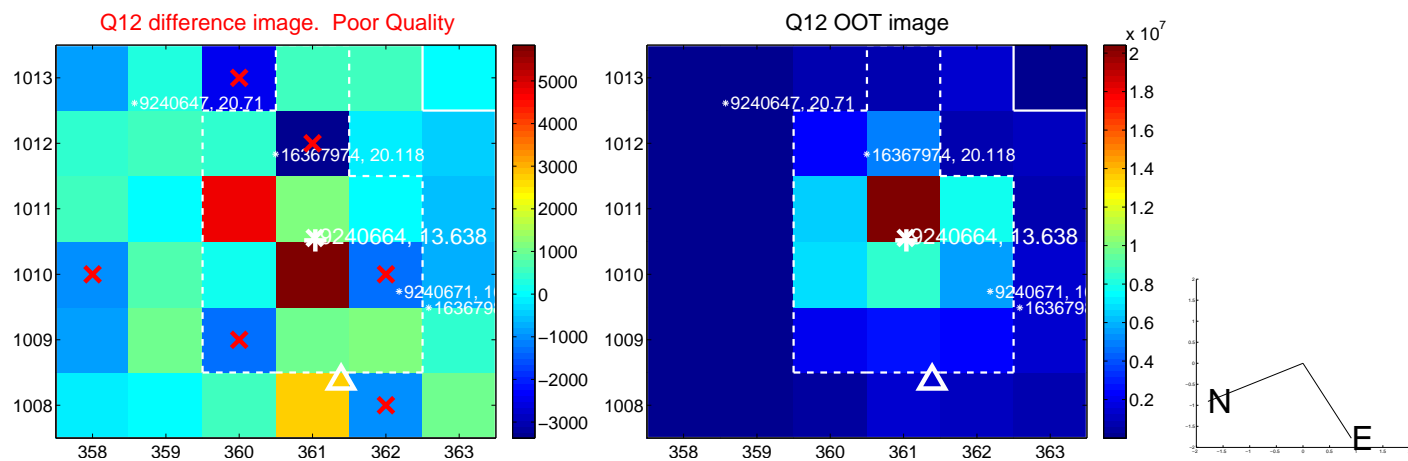
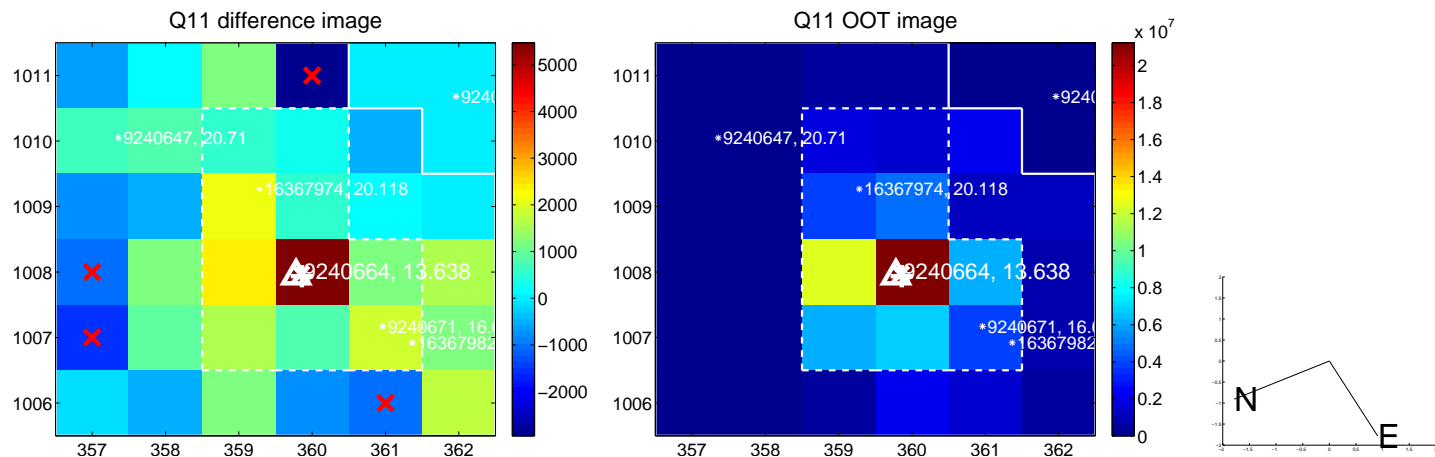
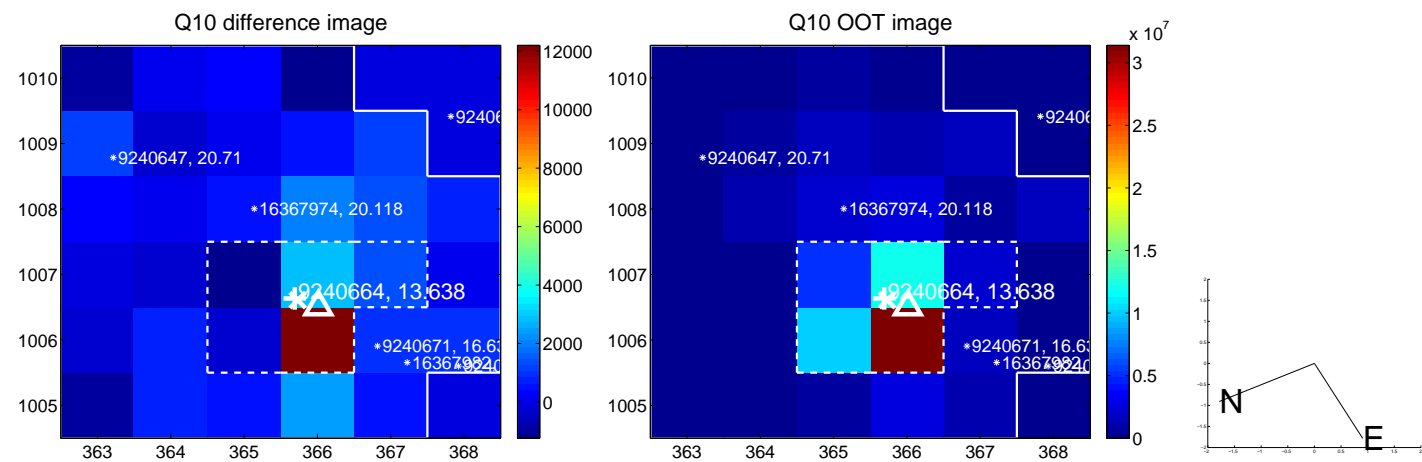
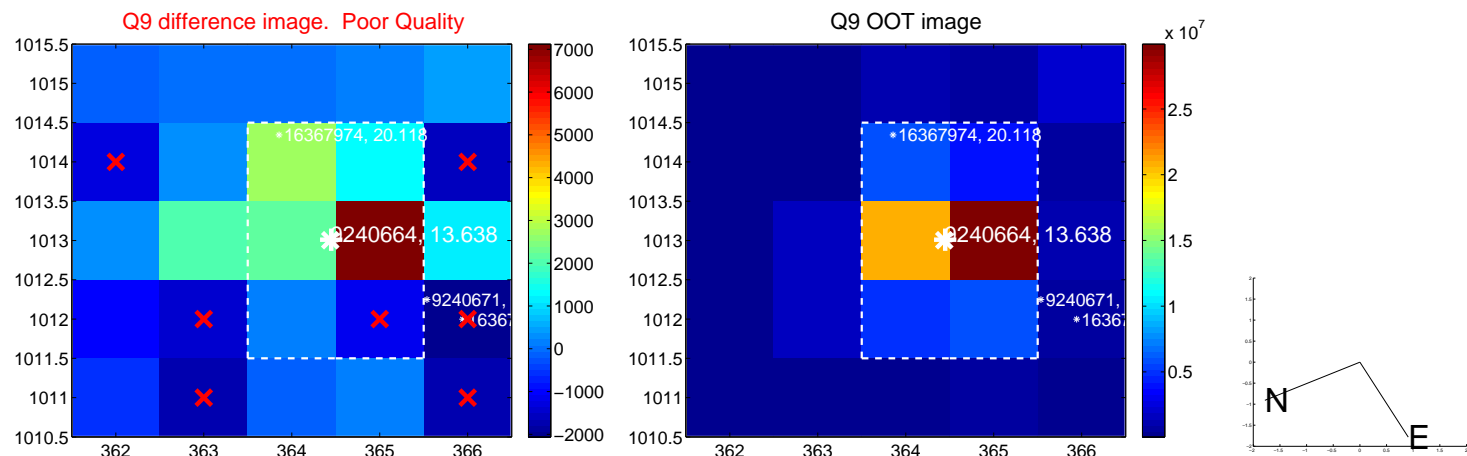
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



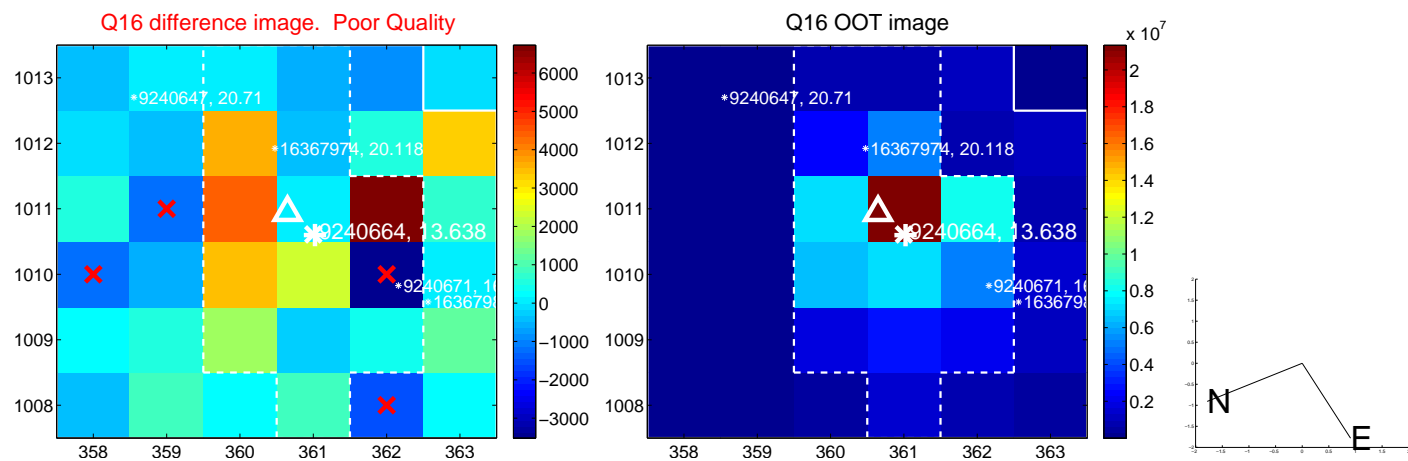
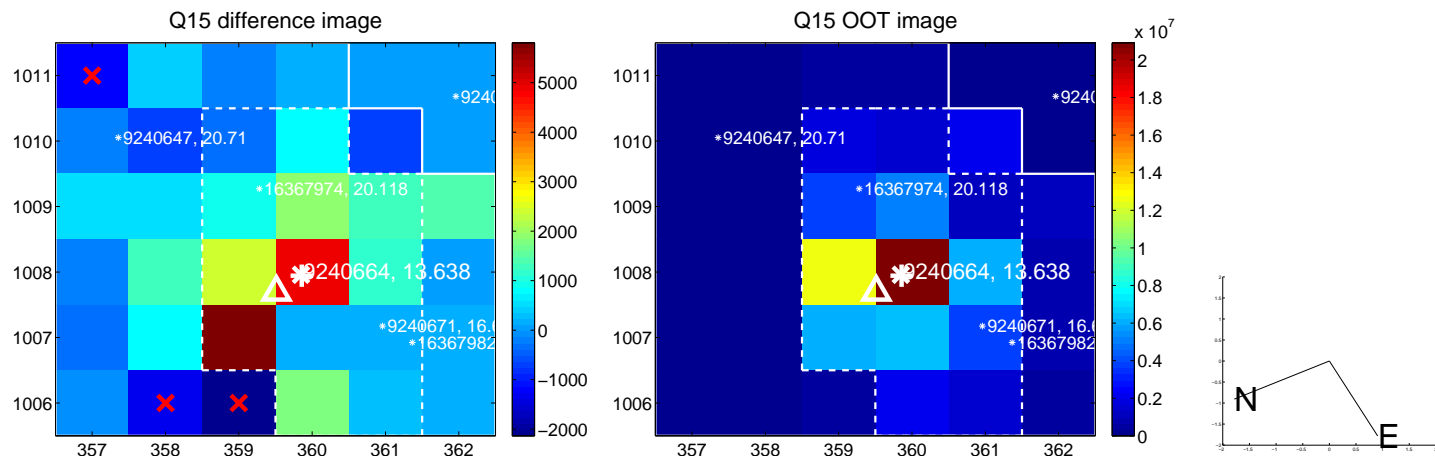
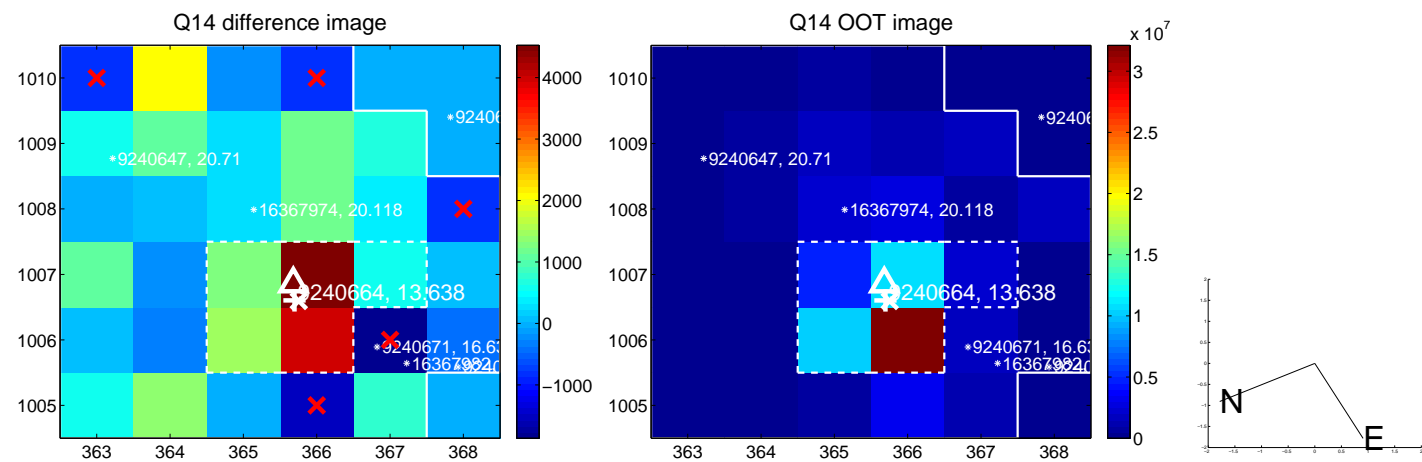
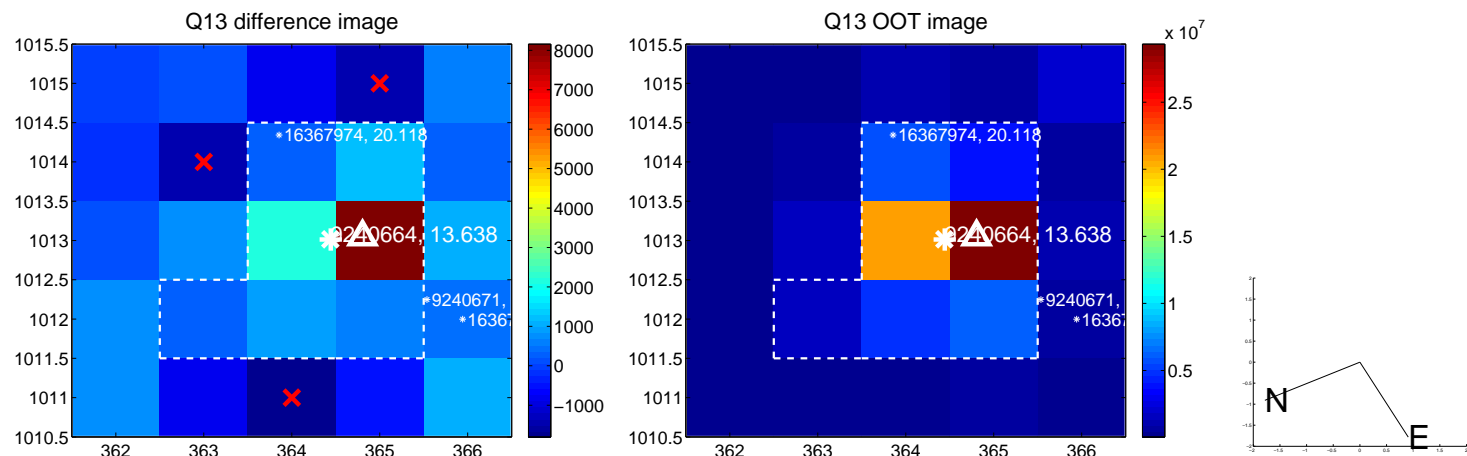
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

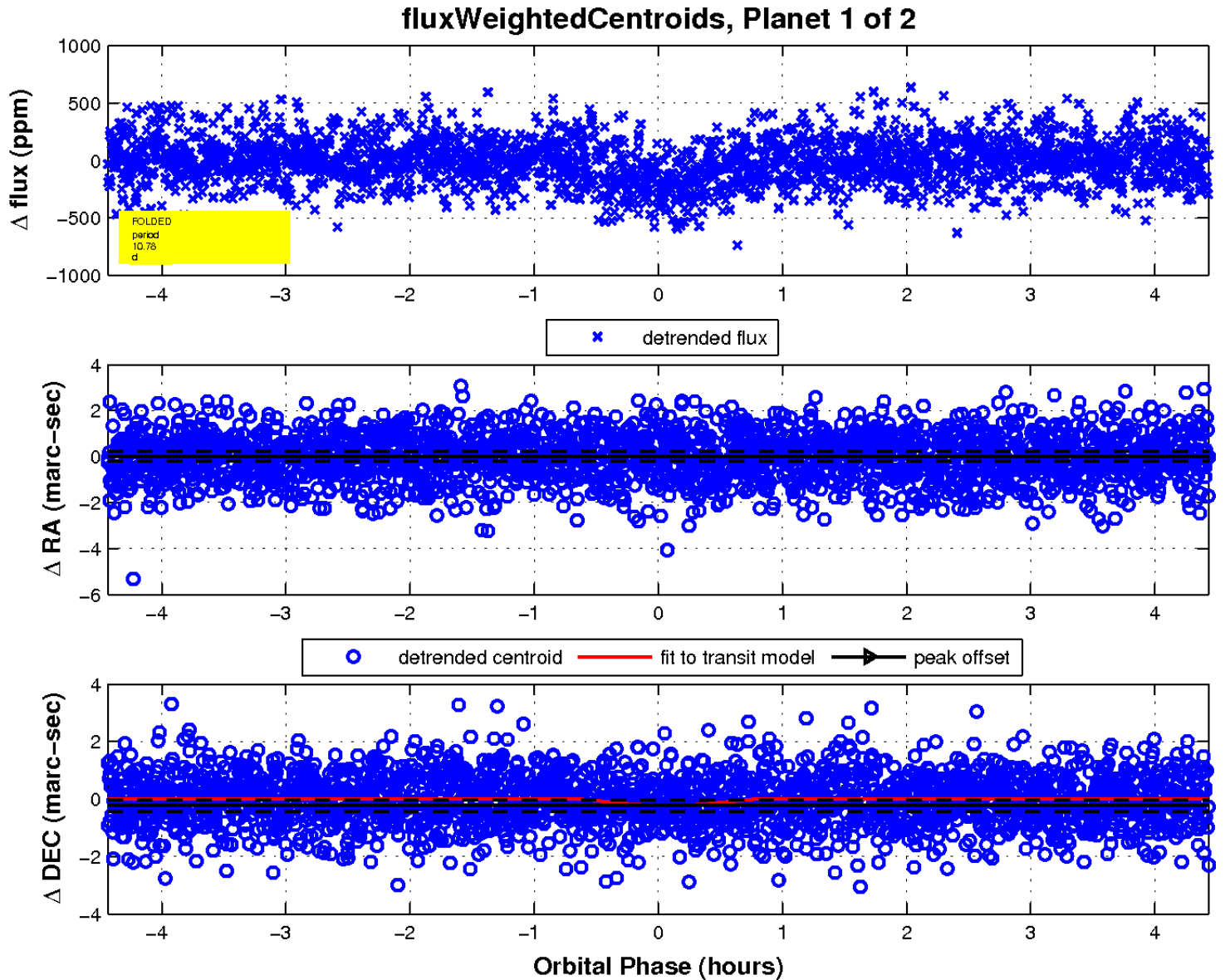
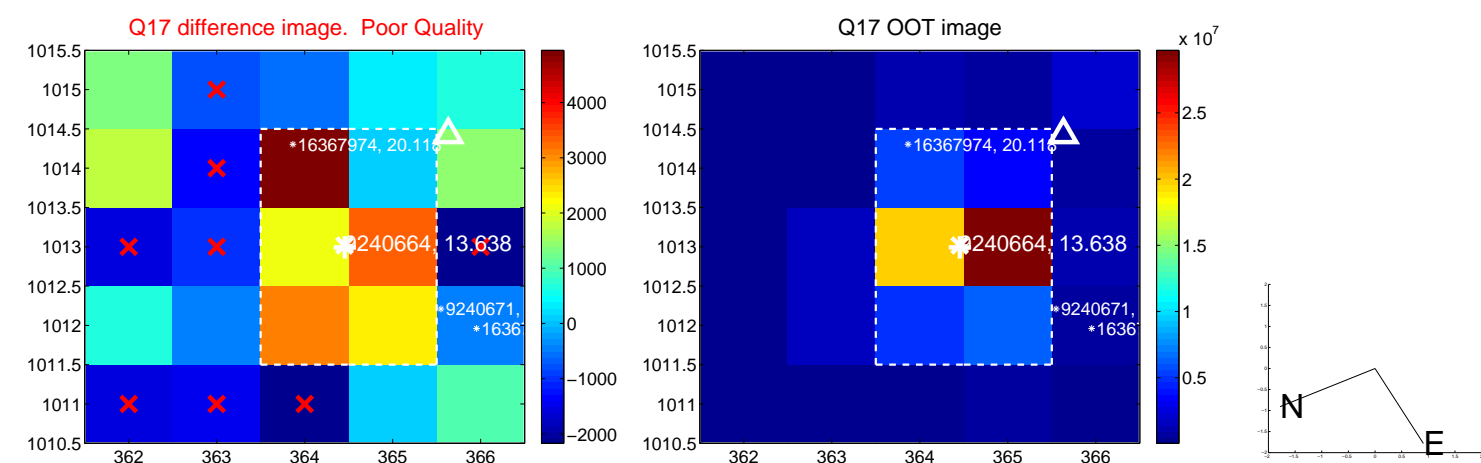


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



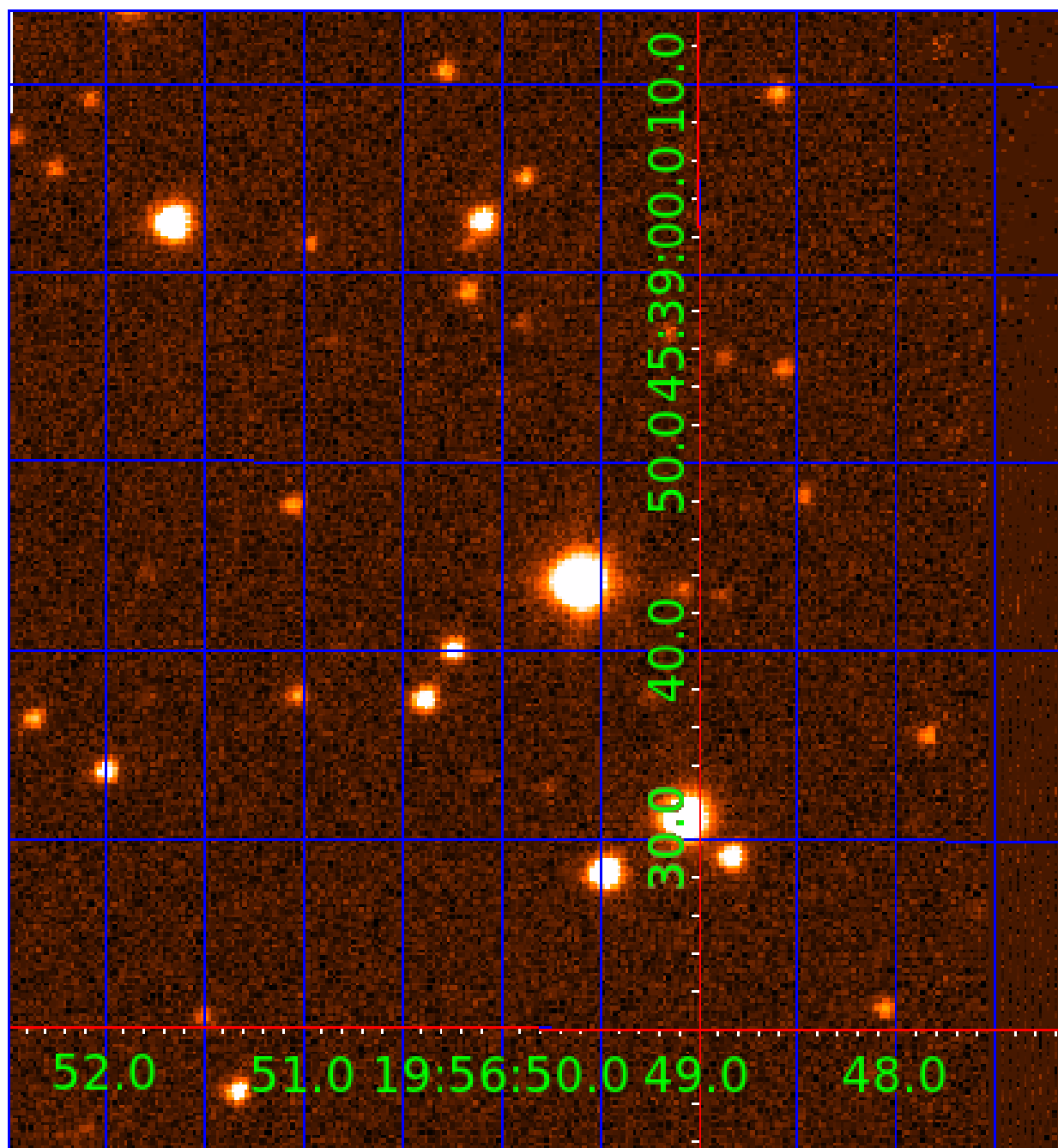


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009240664

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009240664-01	OBS	4338.01	10.784318	141.411548	215.9	1.478	12.2	14.7	3.52	5575	8.73	902.47
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009240664-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
009240664-02	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.

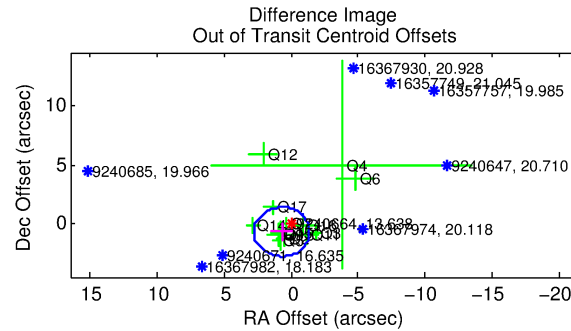
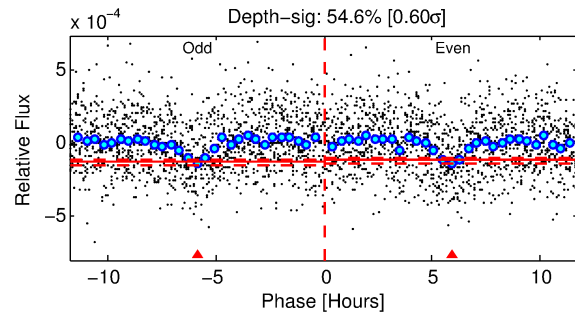
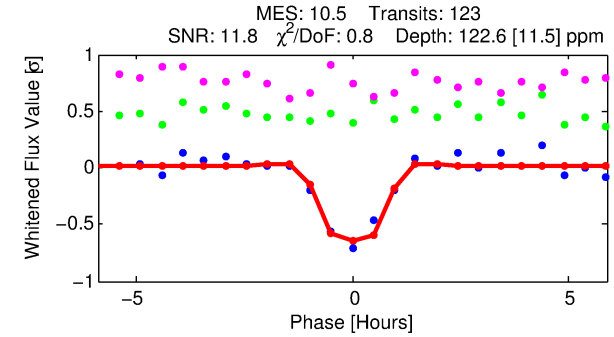
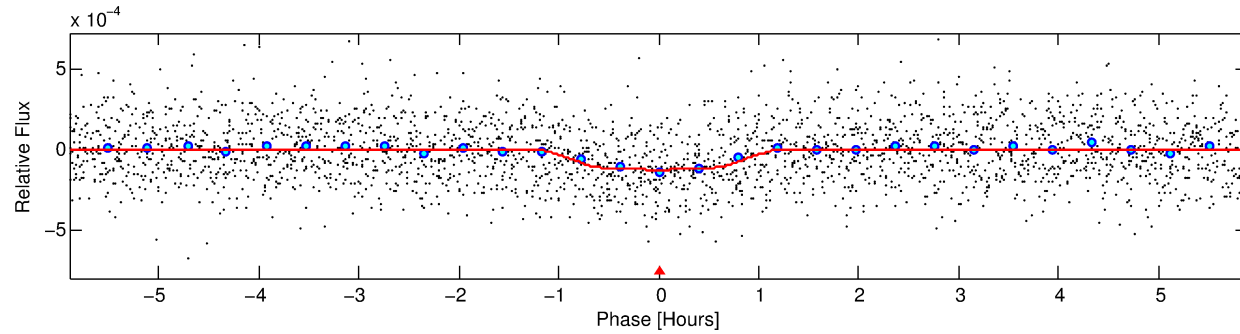
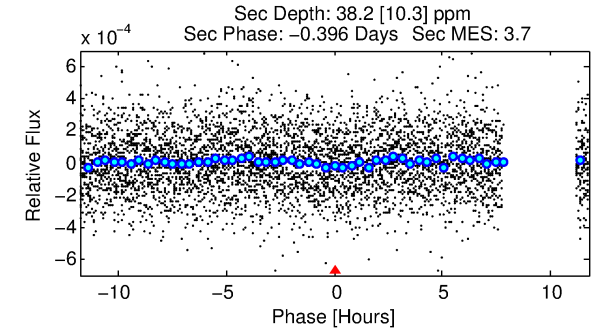
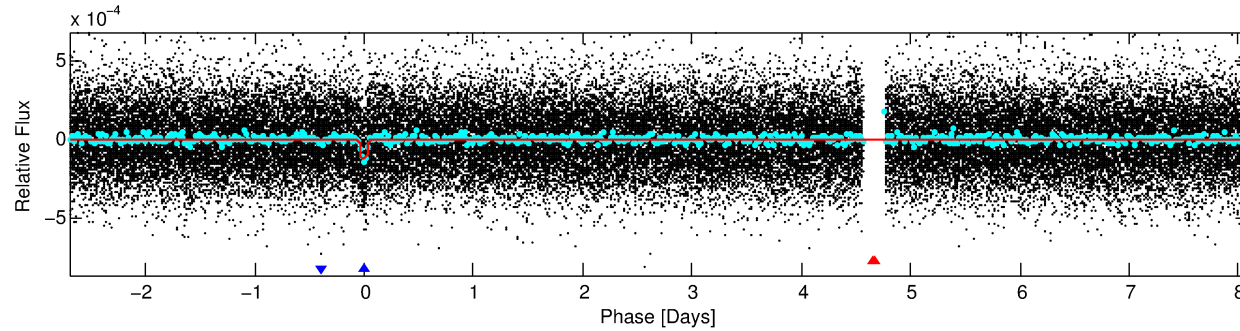
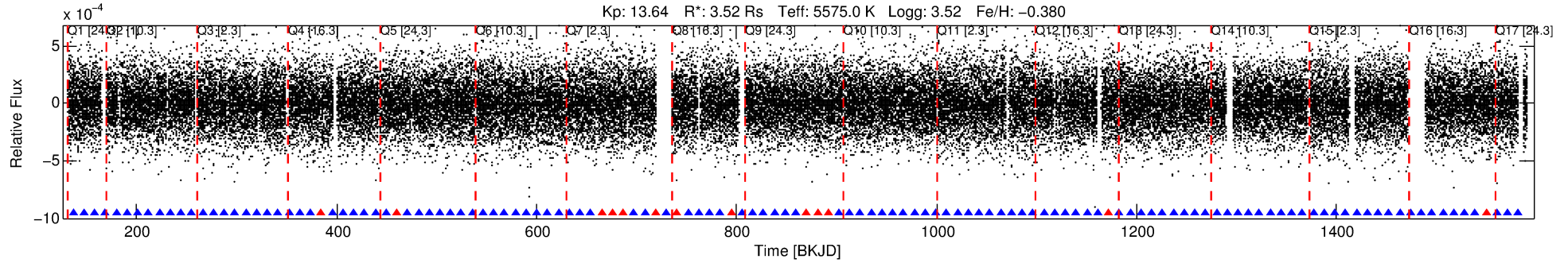
## Ephemeris Match Information For 009240664-02

No Significant Match Found

# DV One-Page Summary

KIC: 9240664 Candidate: 2 of 2 Period: 10.784 d

KOI: K04338 Corr: No Ephemeris Match



## DV Fit Results:

Period = 10.78424 [0.00006] d  
Epoch = 136.7505 [0.0041] BKJD  
Rp/R\* = 0.0122 [0.0073]  
a/R\* = 18.65 [54.70]  
b = 0.91 [0.57]  
Seff = 902.48 [1231.20]  
Teq = 1398 [477] K  
Rp = 4.67 [4.27] Re  
a = 0.1089 [0.0855] AU  
Ag = 11.39 [20.88] [0.50σ]  
Teffp = 3970 [1231] K [1.95σ]

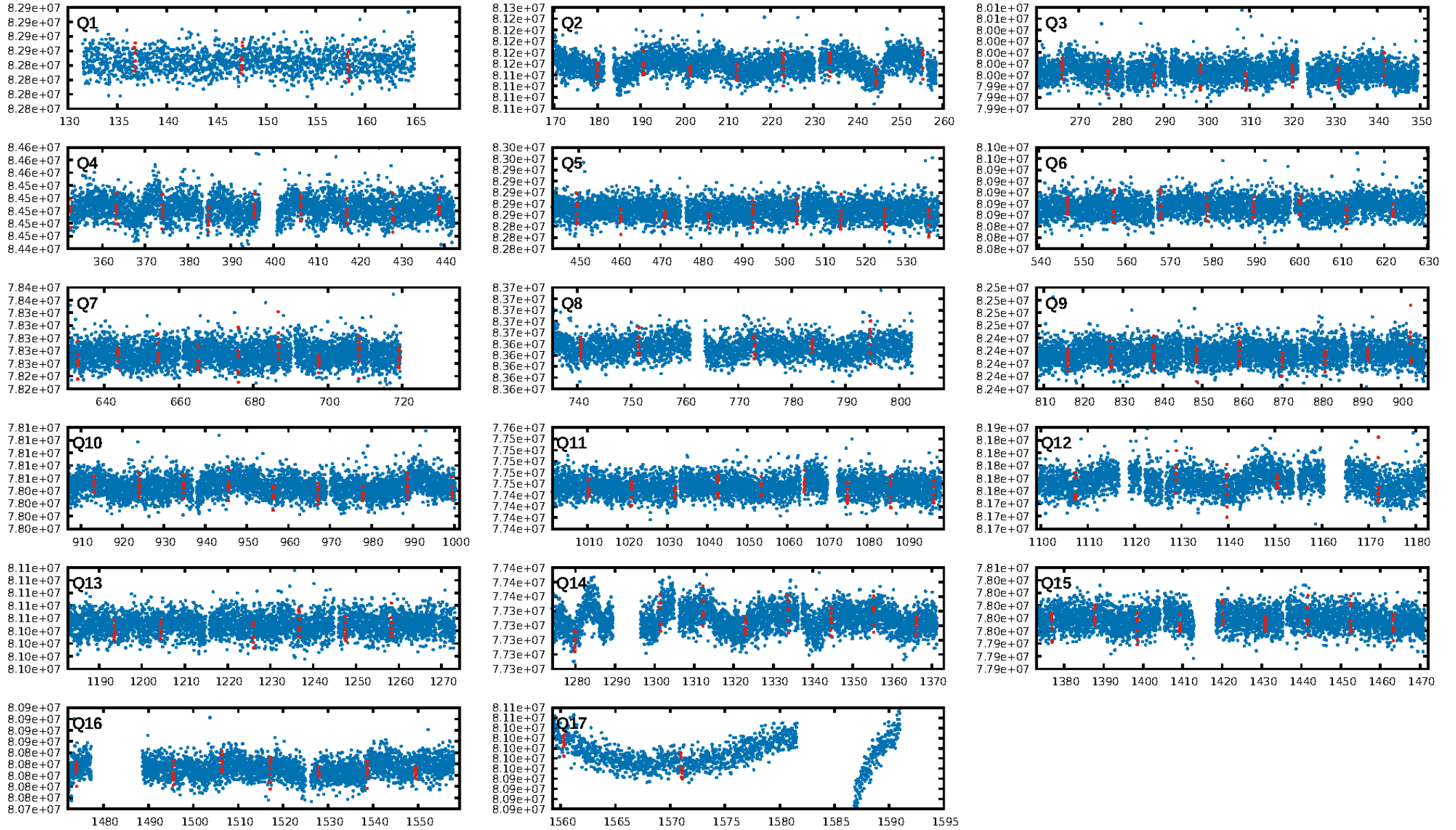
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.1% [0.00σ]  
ModelChiSquare2-sig: 99.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 3.64e-25  
RollingBand-fgt: 0.89 [105/118]  
GhostDiagnostic-chr: -7.955  
Centroid-sig: 59.8%  
Centroid-so: 0.862 arcsec [0.73σ]  
OotOffset-rm: 0.982 arcsec [1.41σ]  
OotOffset-st: 3/4/3/4 [14]  
KicOffset-rm: 1.047 arcsec [1.43σ]  
KicOffset-st: 3/4/3/4 [14]  
DiffImageQuality-fgm: 0.79 [11/14]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 08:50:15 Z

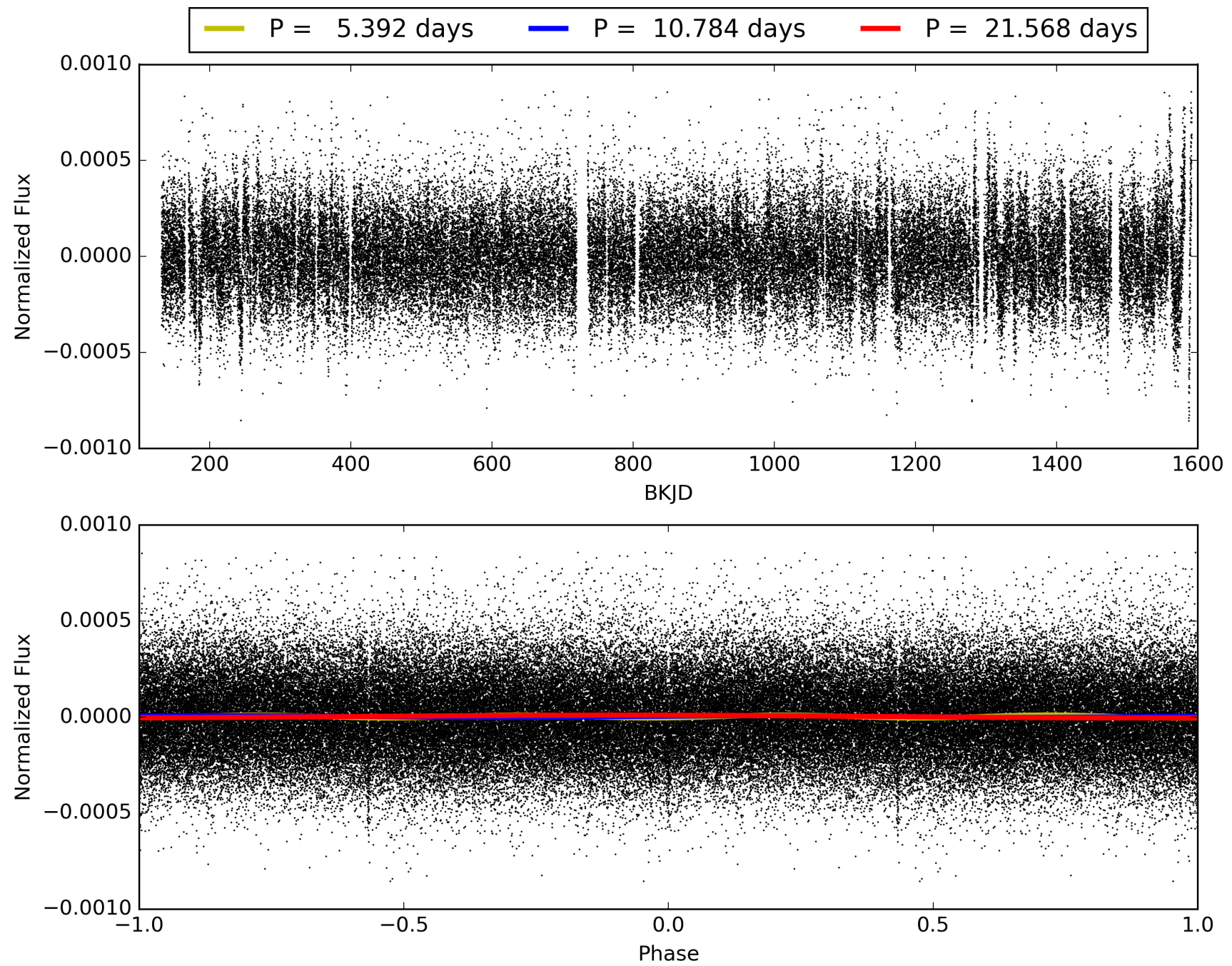
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 009240664-02, PDC Light Curves



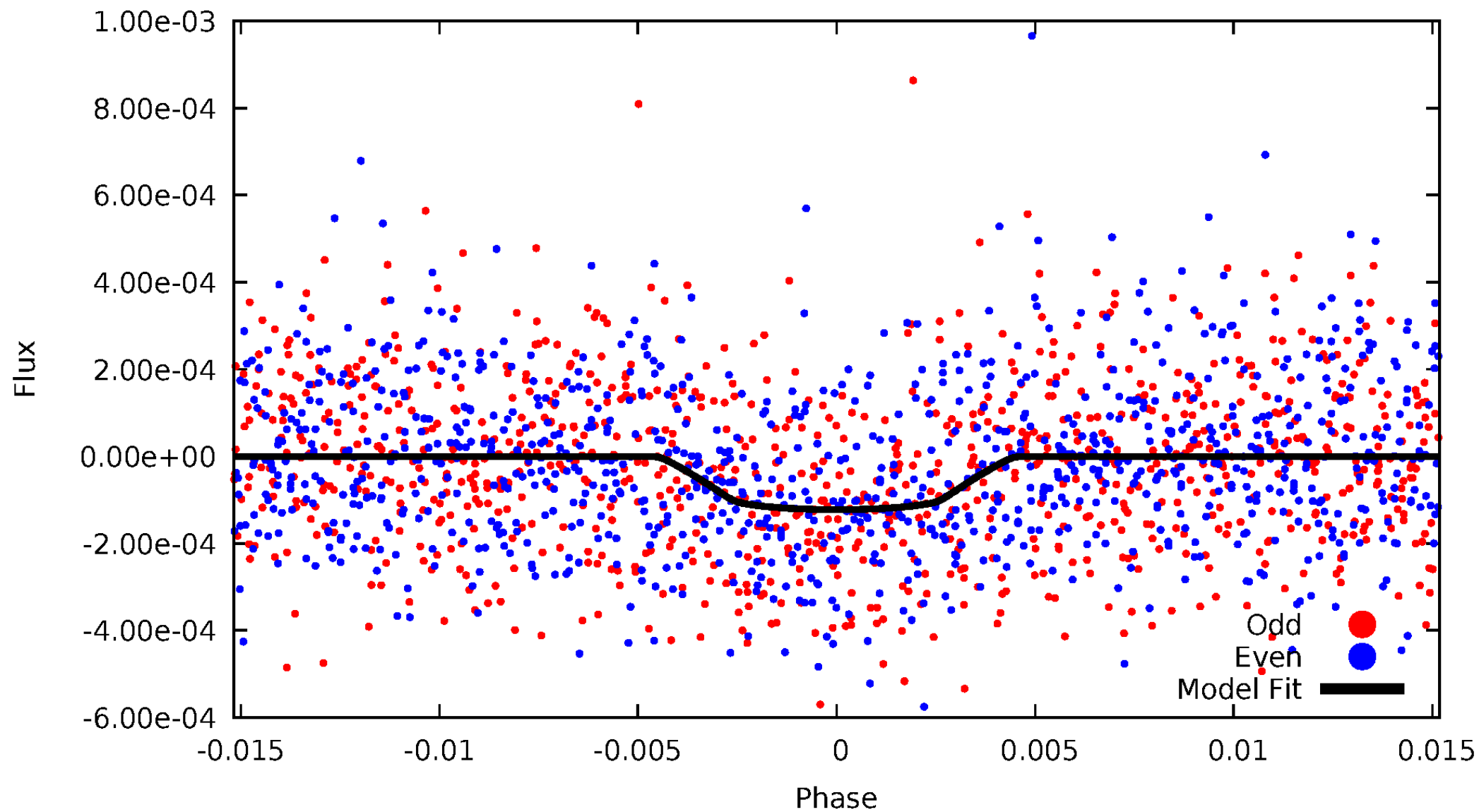


TCE 009240664-02



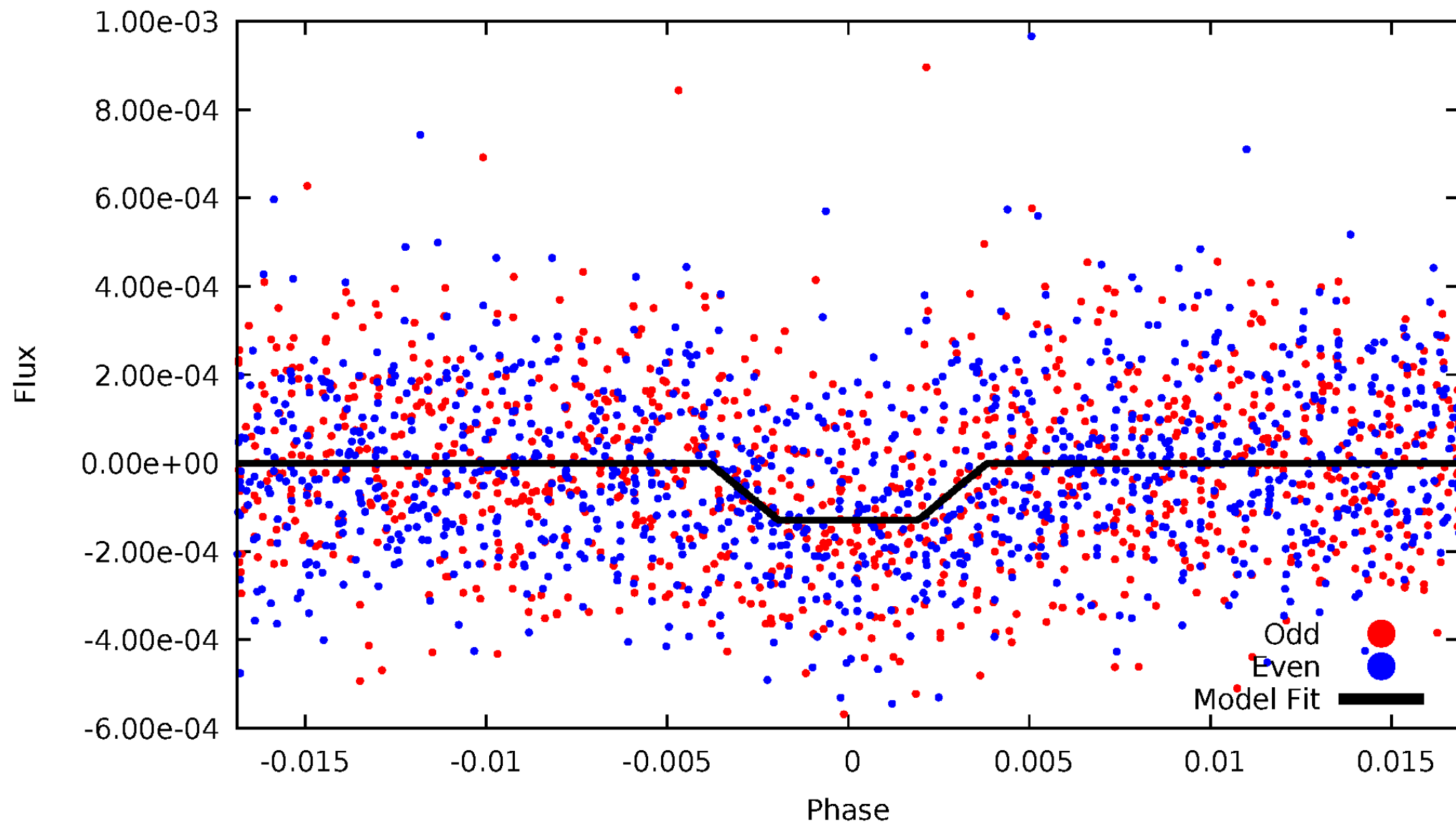
# DV Odd/Even

TCE 009240664-02



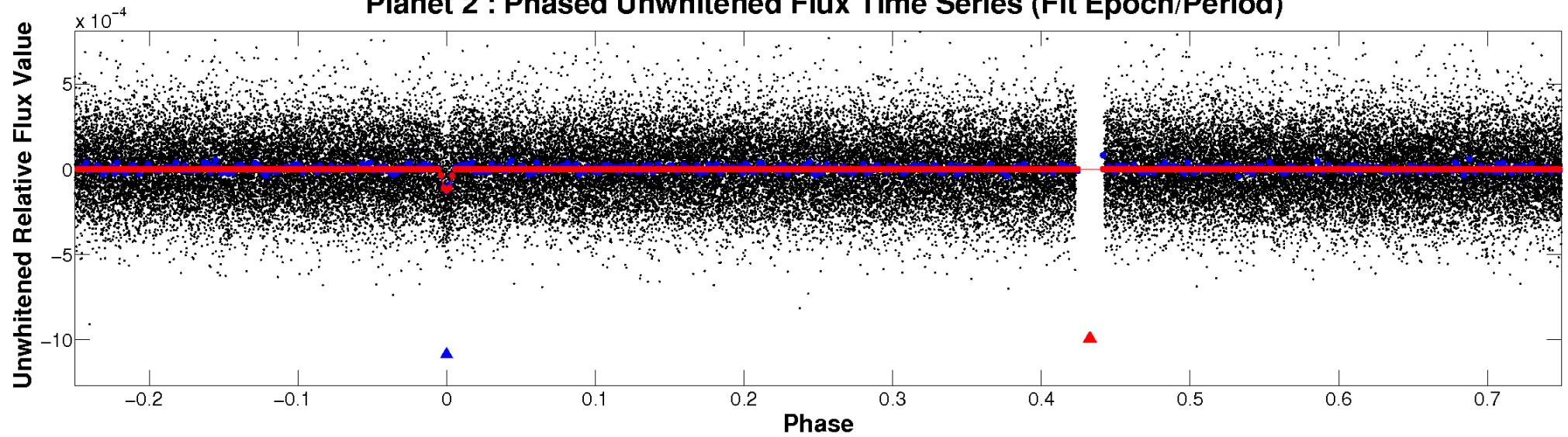
# ALT Odd/Even

TCE 009240664-02

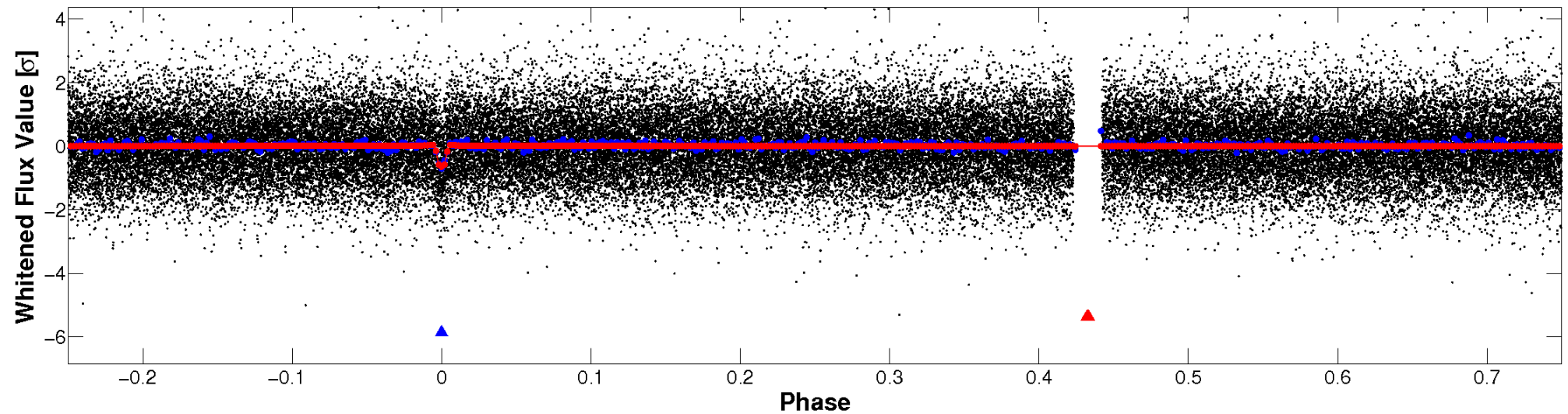


# Non-Whitened Vs. Whitened Light Curve

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

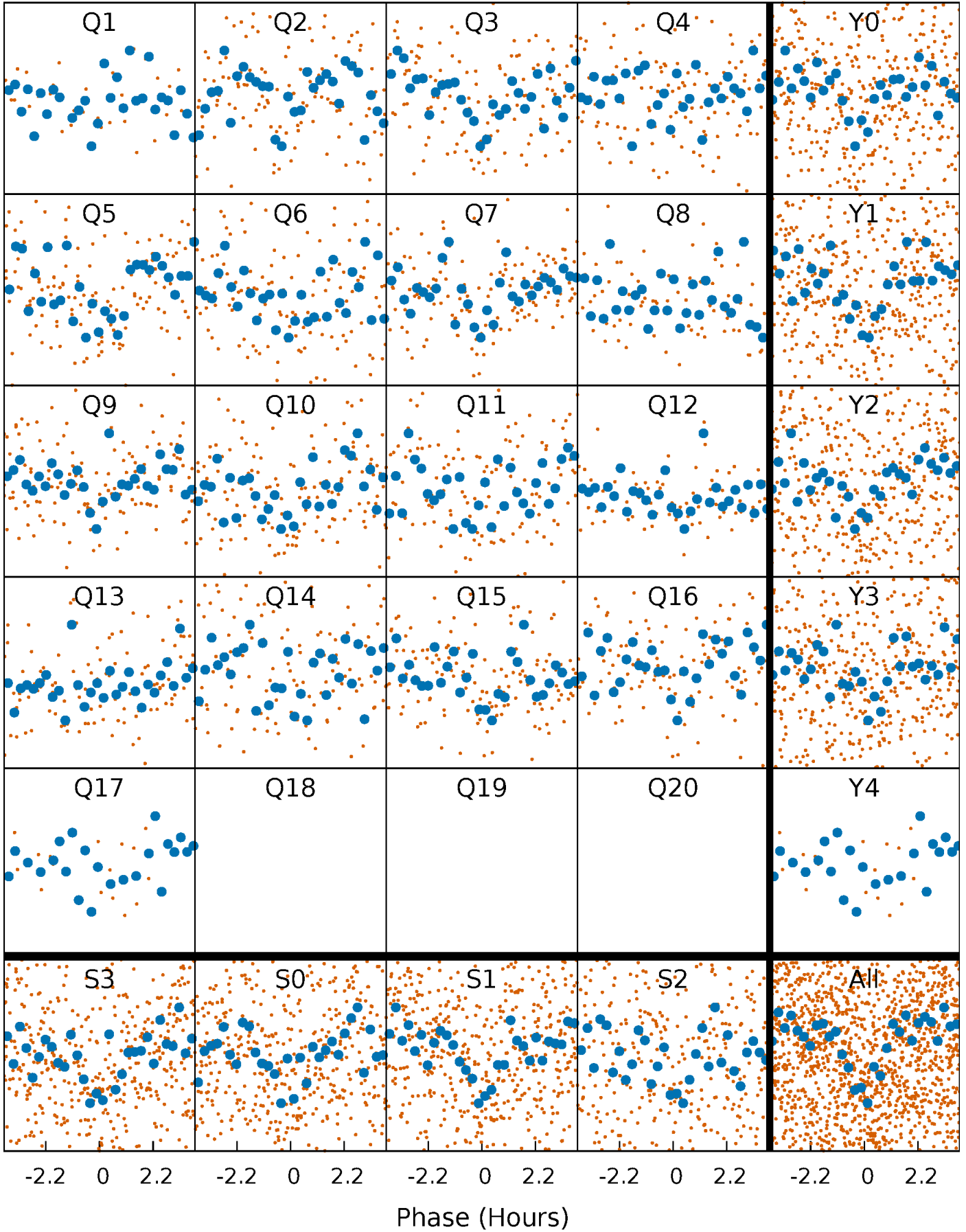


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

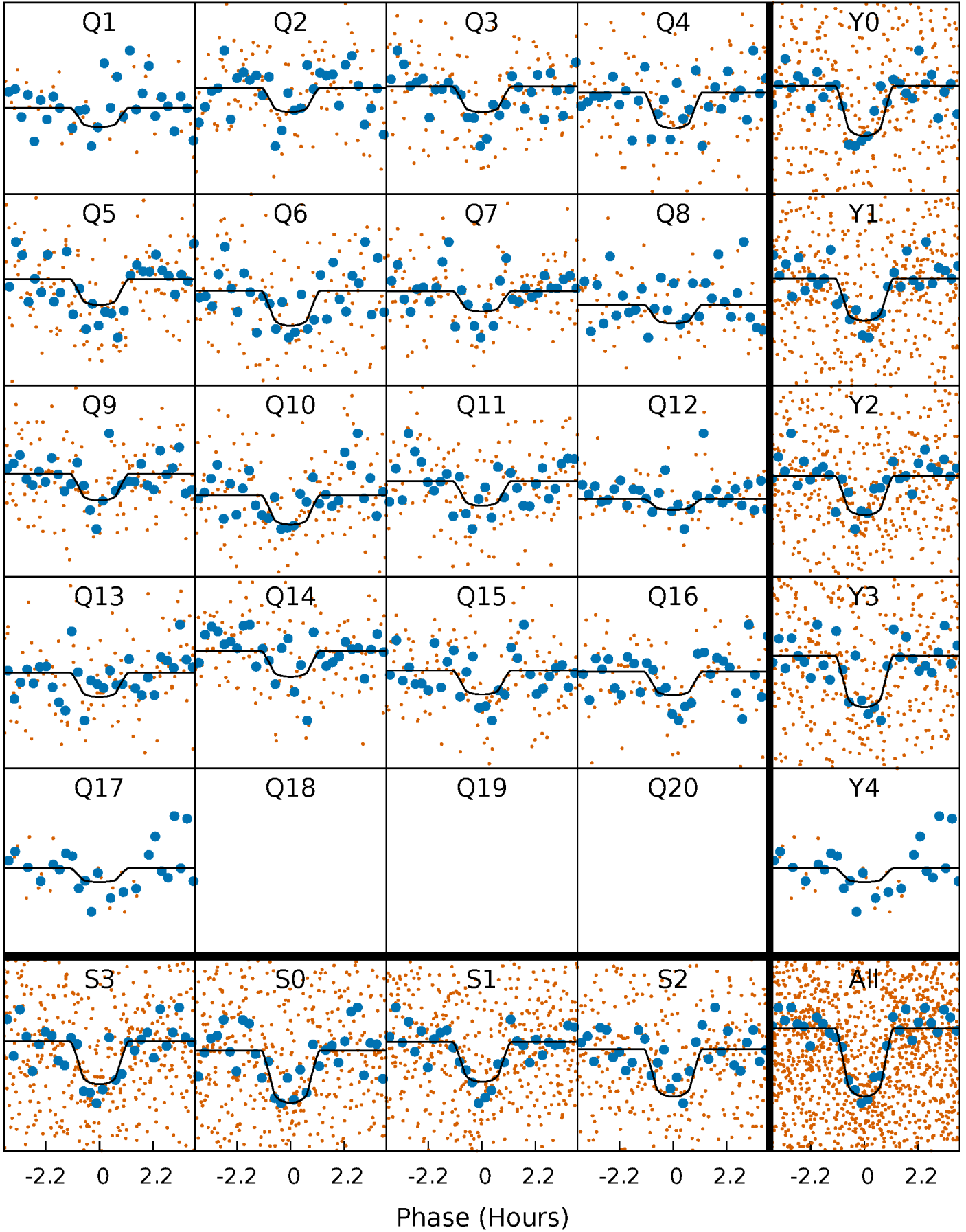
TCE 009240664-02 P= 10.784238 Days  $T_0=136.750473$  (BKJD)





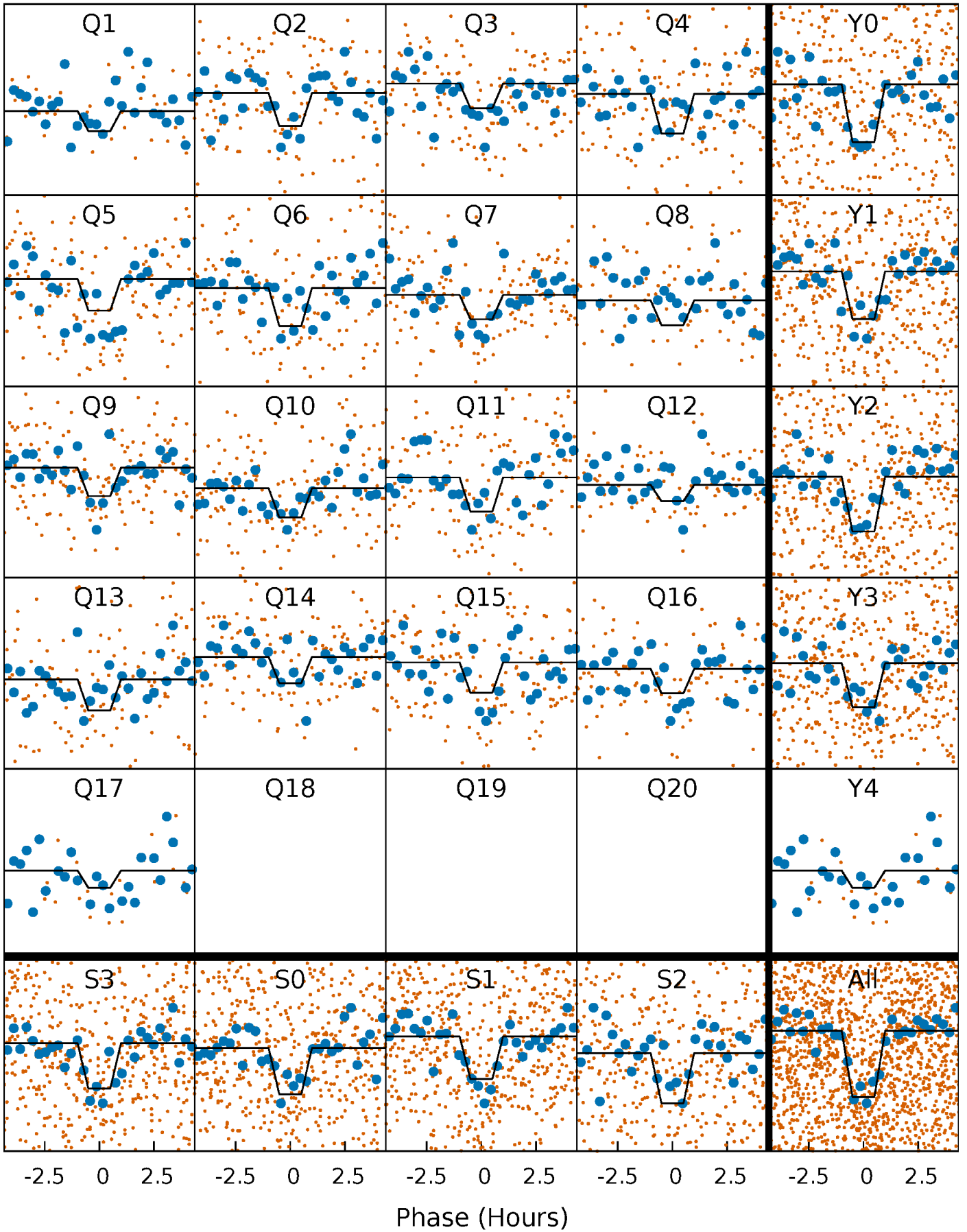
# DV Quarter-Phased Transit Curves

TCE 009240664-02 P= 10.784238 Days  $T_0=136.750473$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

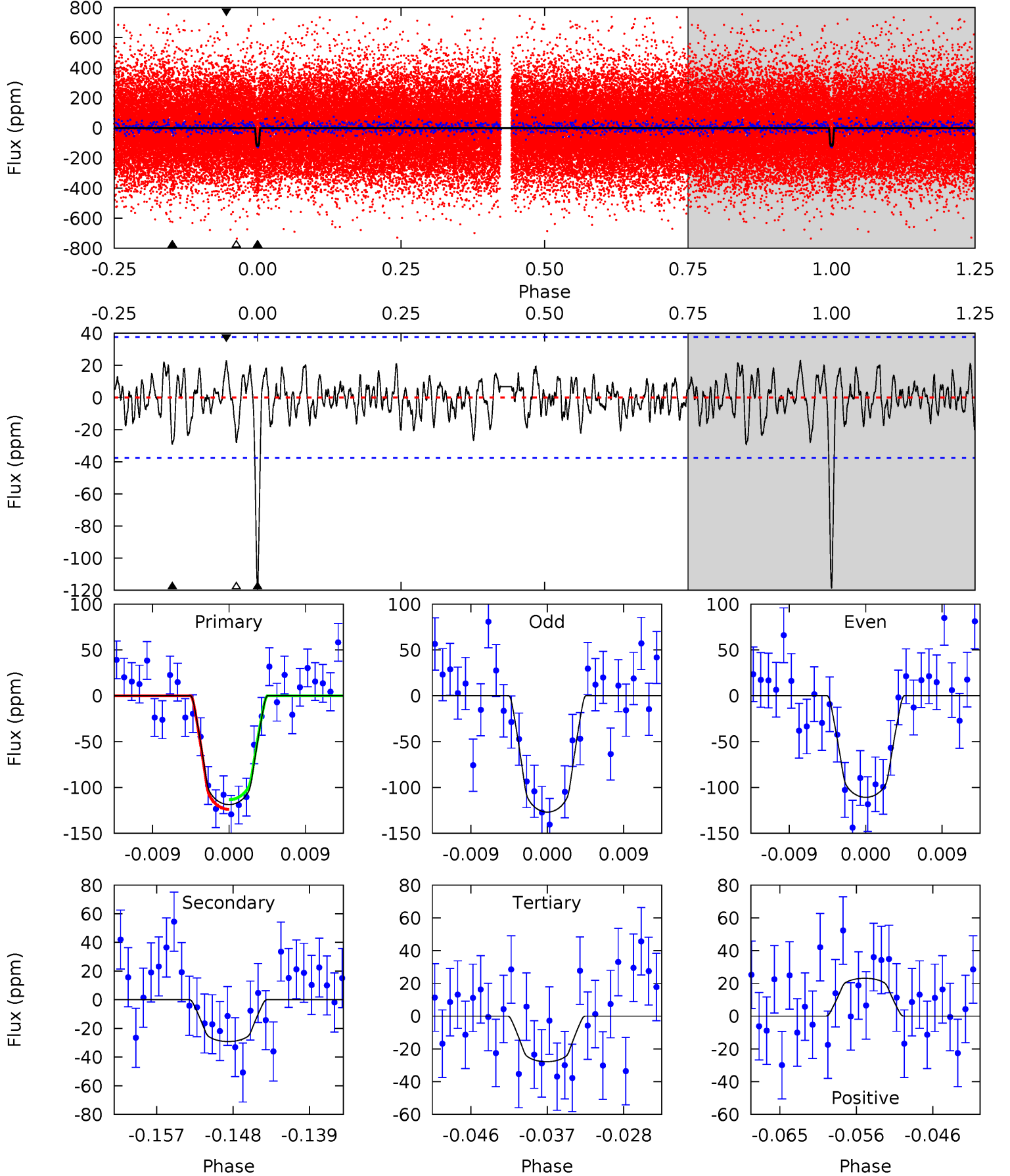
TCE 009240664-02 P= 10.784274 Days  $T_0=136.745462$  (BKJD)



# DV Model-Shift Uniqueness Test

009240664-02, P = 10.784238 Days, E = 125.966235 Days

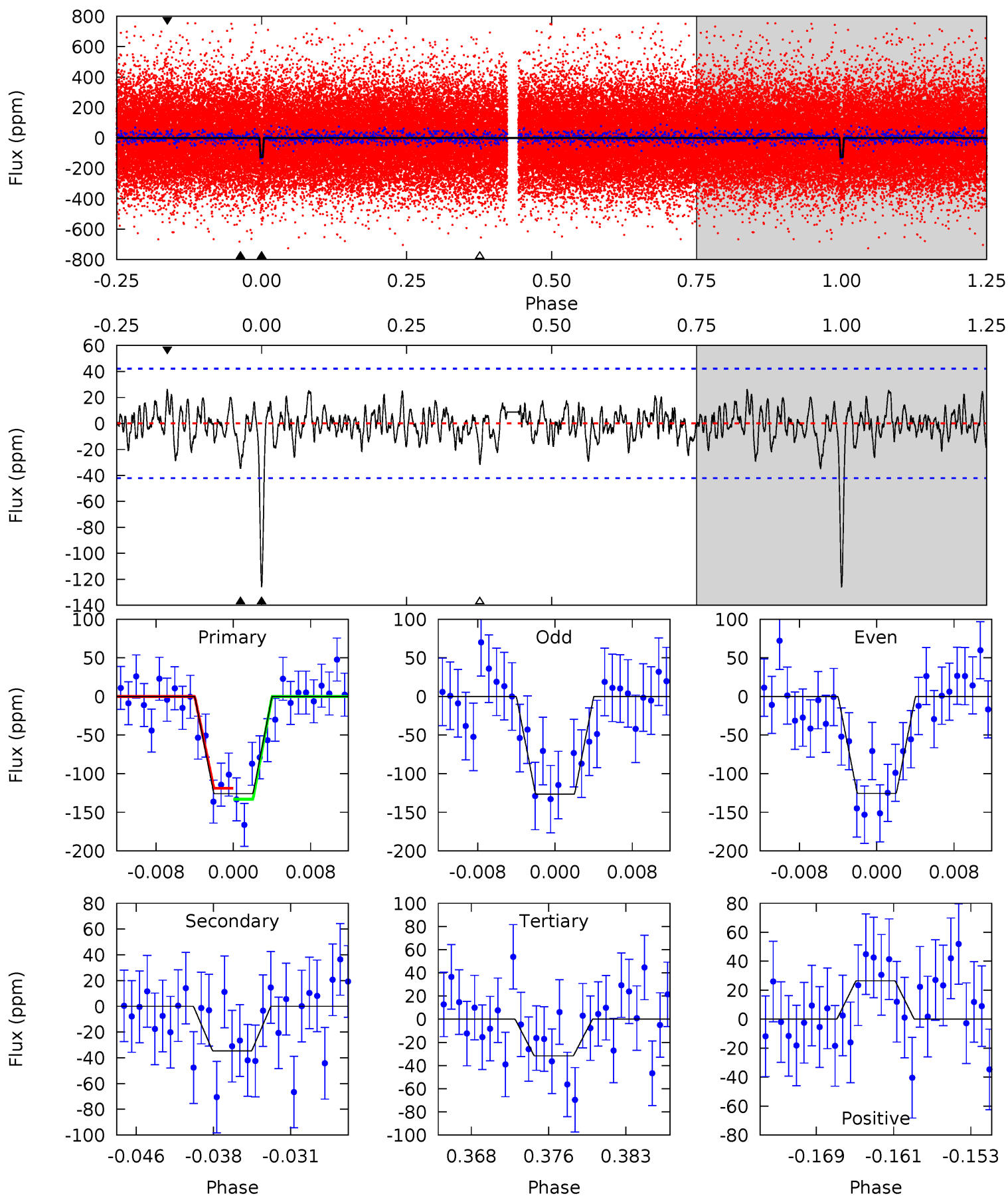
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.9	3.90	3.73	3.10	5.04	2.60	1.21	12.2	12.8	0.18	0.81	1.08	1.03	0.16	0.71



# Alt Model-Shift Uniqueness Test

009240664-02, P = 10.784274 Days, E = 125.961188 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
15.2	4.17	3.82	3.19	5.08	2.67	1.17	11.3	12.0	0.35	0.98	0.05	1.02	0.17	0.87



### Stellar Parameters For KIC 009240664

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5575^{+198}_{-198}$	$3.516^{+0.832}_{-0.208}$	$-0.380^{+0.350}_{-0.300}$	$3.515^{+1.035}_{-2.415}$	$1.480^{+0.206}_{-0.617}$	$0.048^{+0.984}_{-0.026}$
	+4%/-4%	+24%/-6%	+92%/-79%	+29%/-69%	+14%/-42%	+2051%/-53%
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 009240664-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-29 \pm 7$	$4.15^{+3.44}_{-2.41}$	$1927^{+193}_{-341}$	$3946^{+1288}_{-618}$	$10^{+48}_{-7}$
Alt.	$-35 \pm 8$	$3.95^{+3.08}_{-2.36}$	$1905^{+205}_{-351}$	$4121^{+1694}_{-634}$	$14^{+71}_{-10}$

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

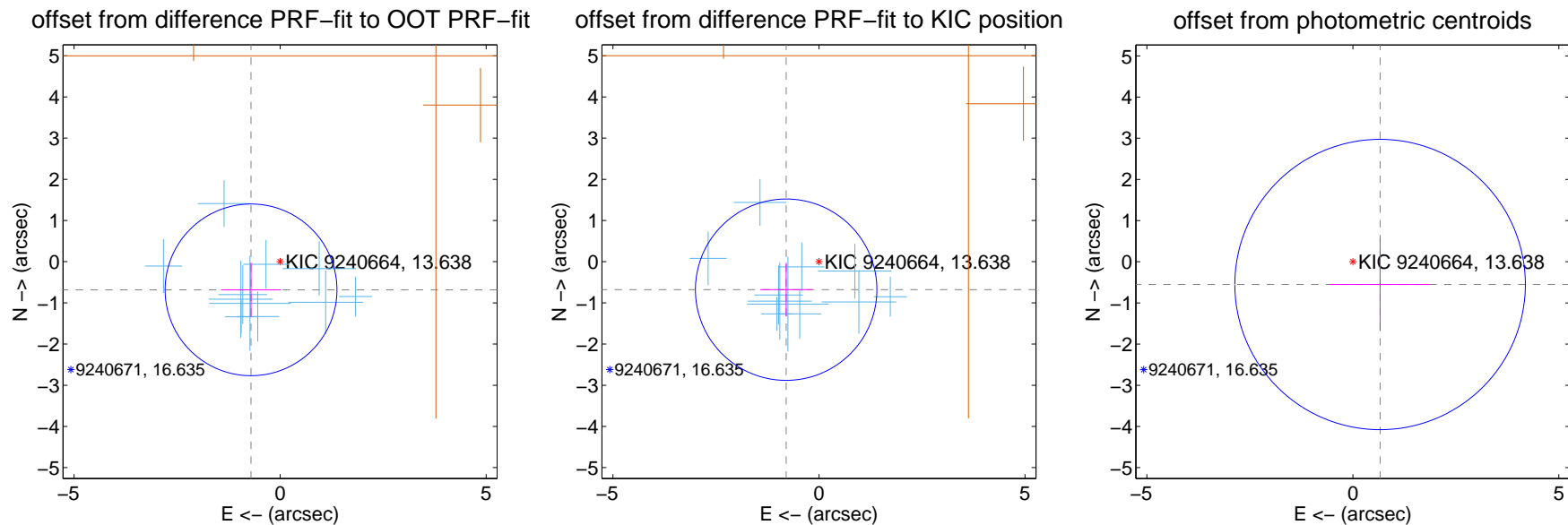
## DV Centroid Data

Supplemental centroid analysis for 009240664-02. Kepler magnitude: 13.64. Transit SNR 11.76

There are 11 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

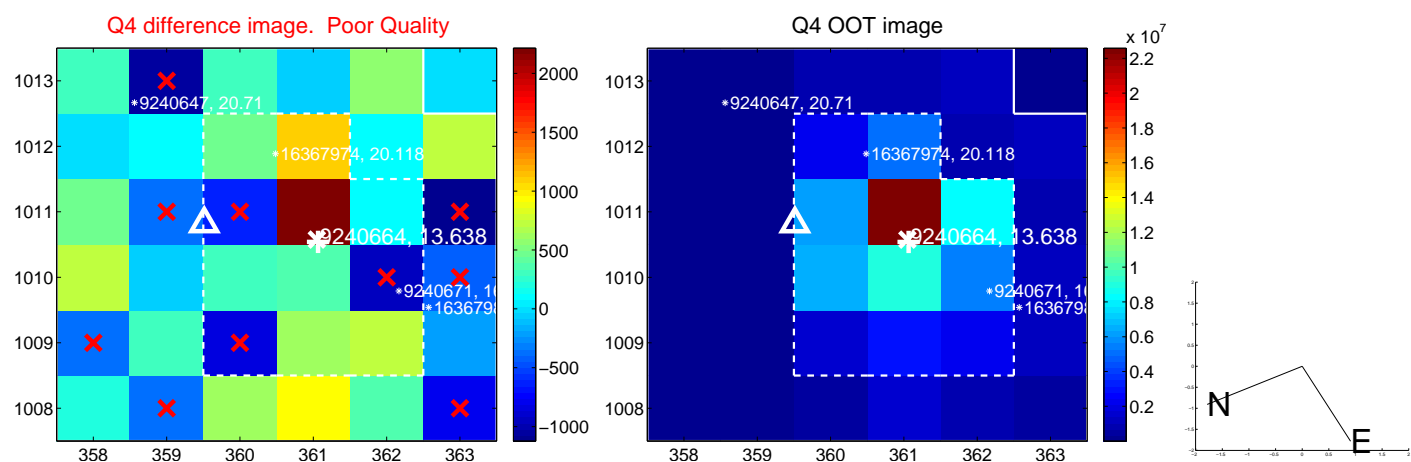
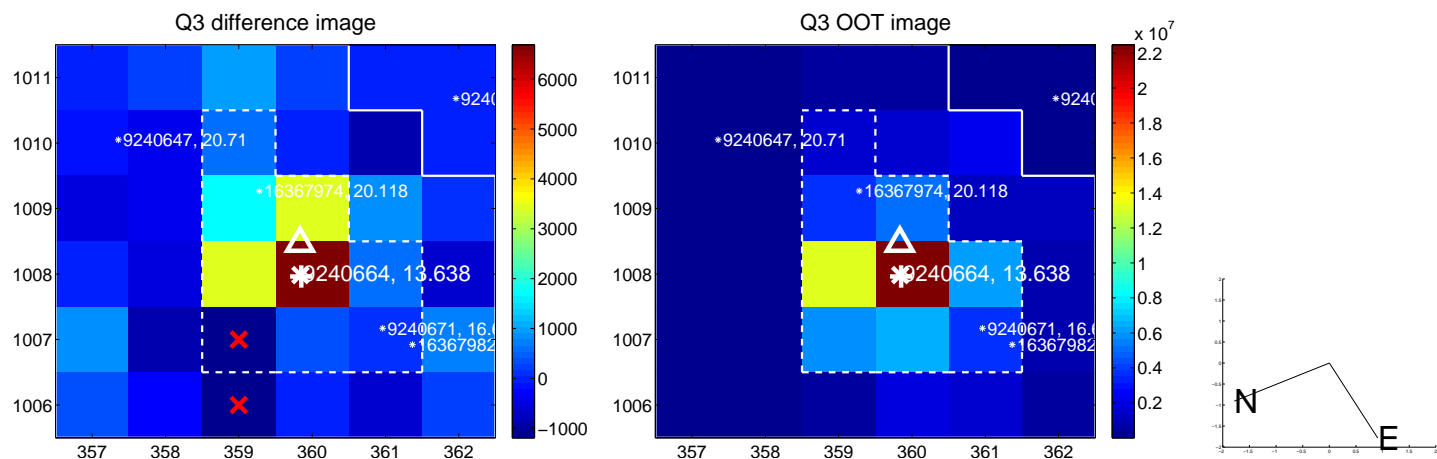
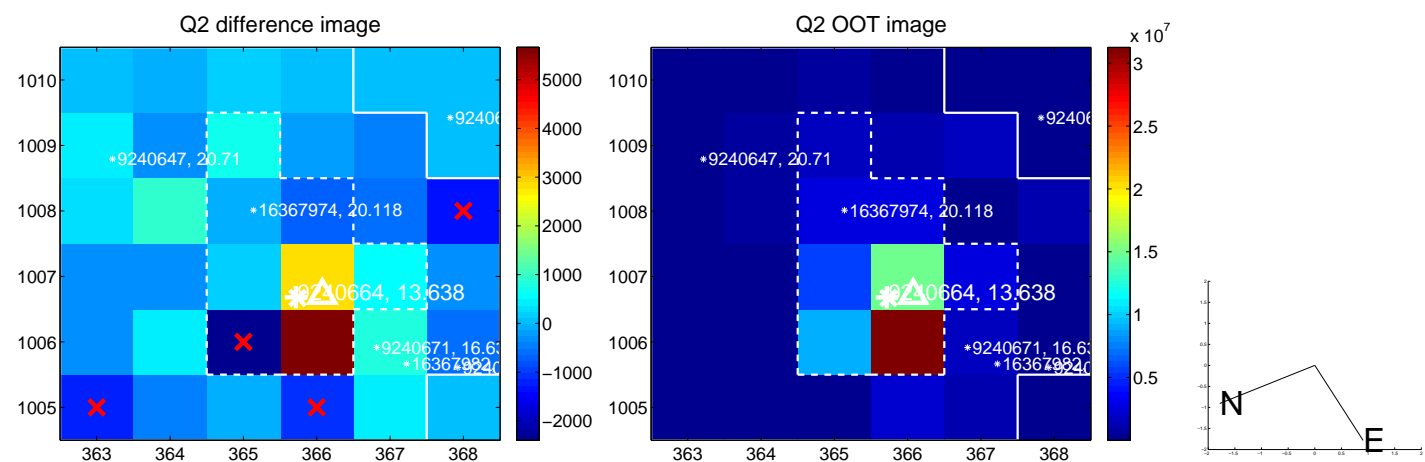
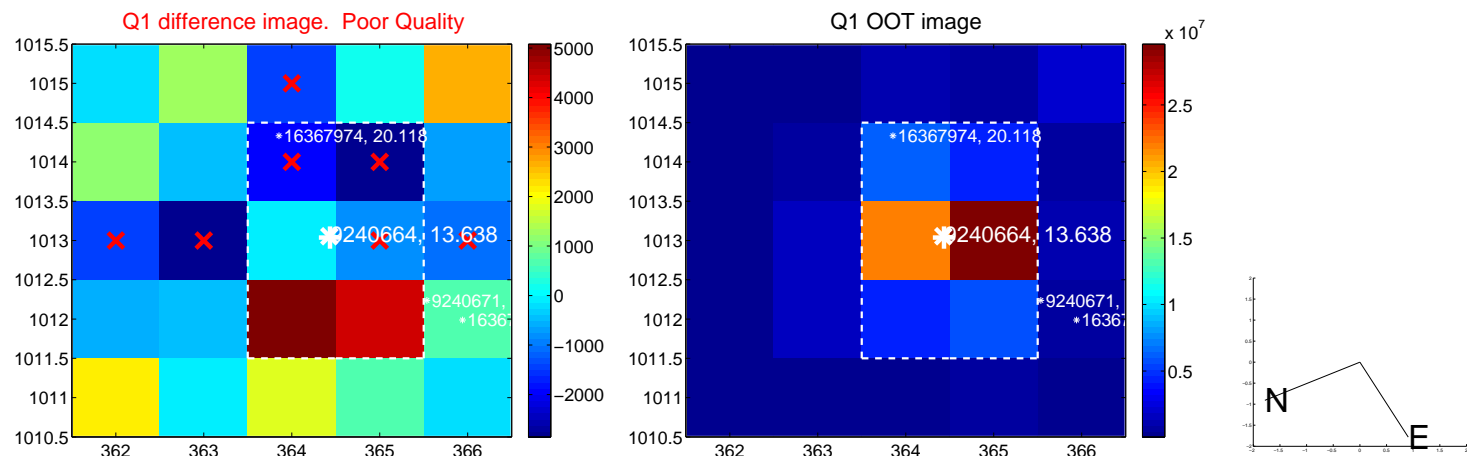
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.982 \pm 0.695$	1.41	$0.705 \pm 0.725$	$-0.684 \pm 0.661$
PRF-fit source offset from KIC position	$1.047 \pm 0.734$	1.43	$0.796 \pm 0.628$	$-0.680 \pm 0.650$
photometric centroid source offset	$0.86 \pm 1.18$	0.73	$-0.66 \pm 1.21$	$-0.55 \pm 1.13$



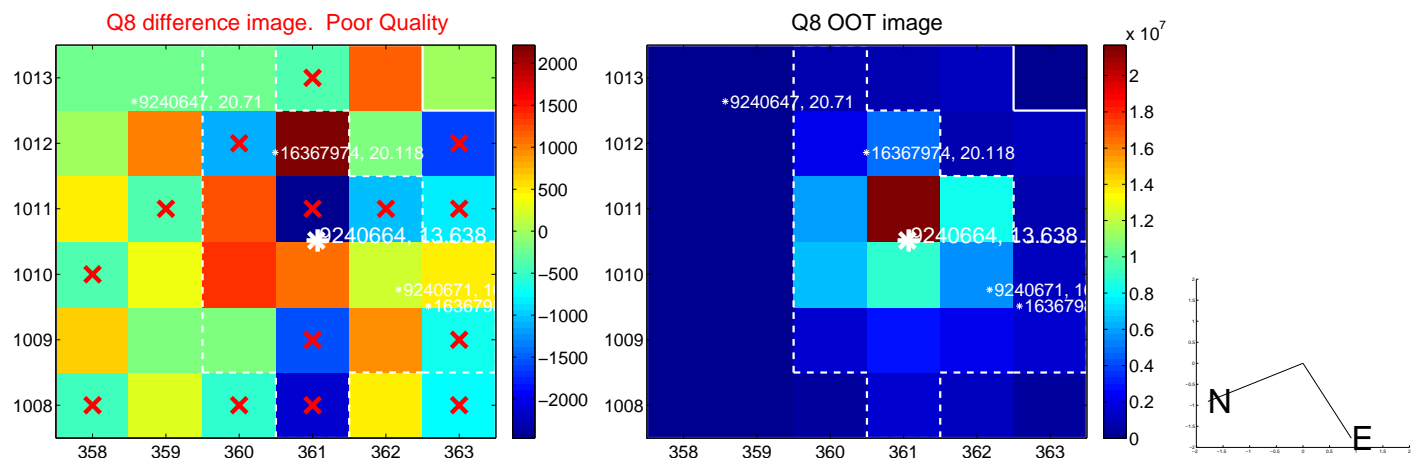
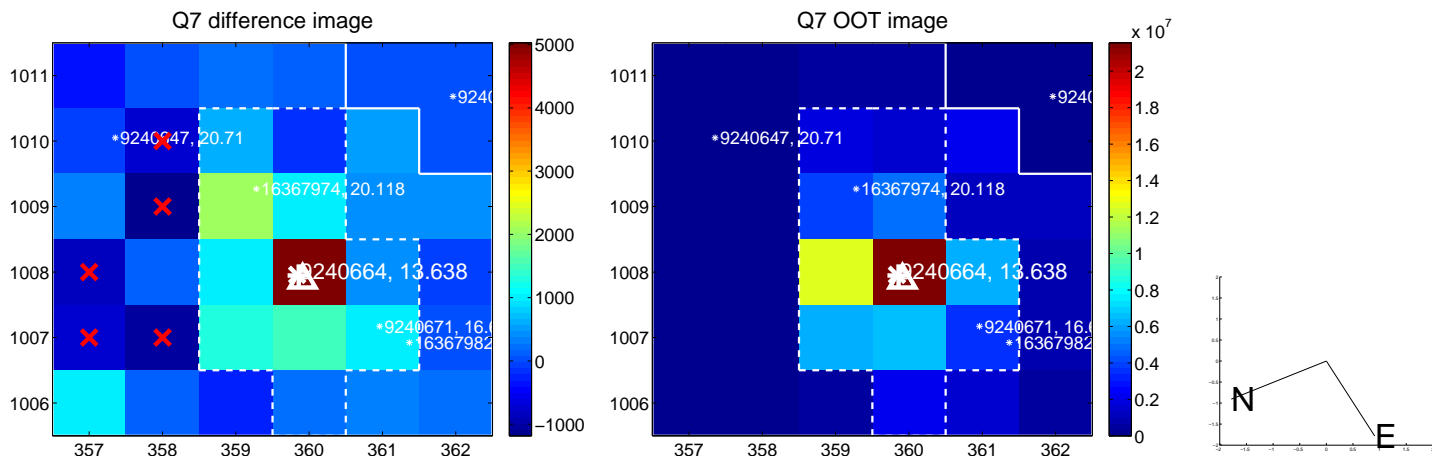
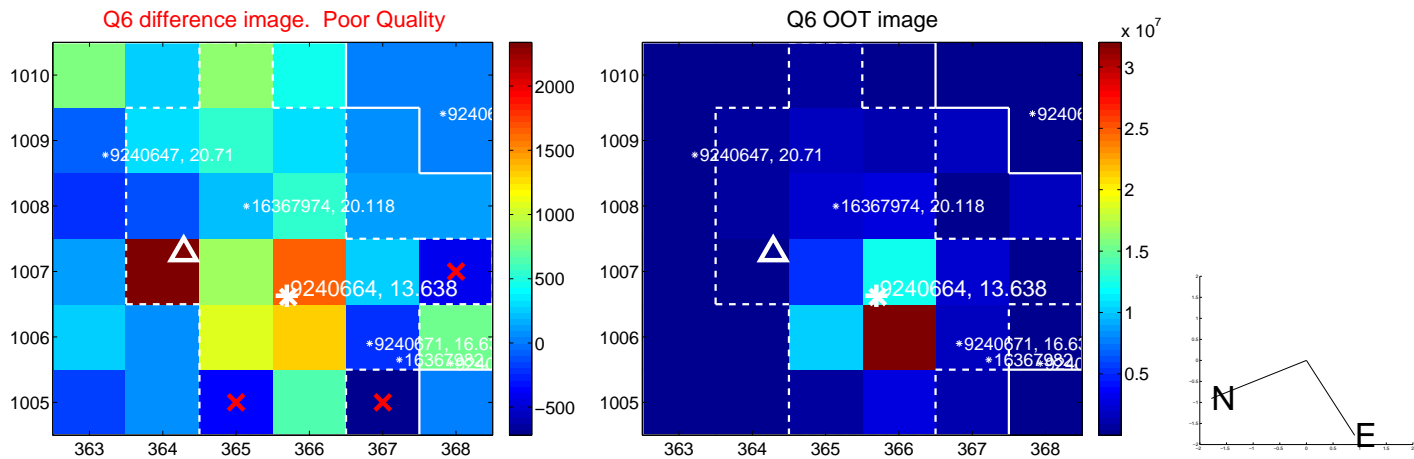
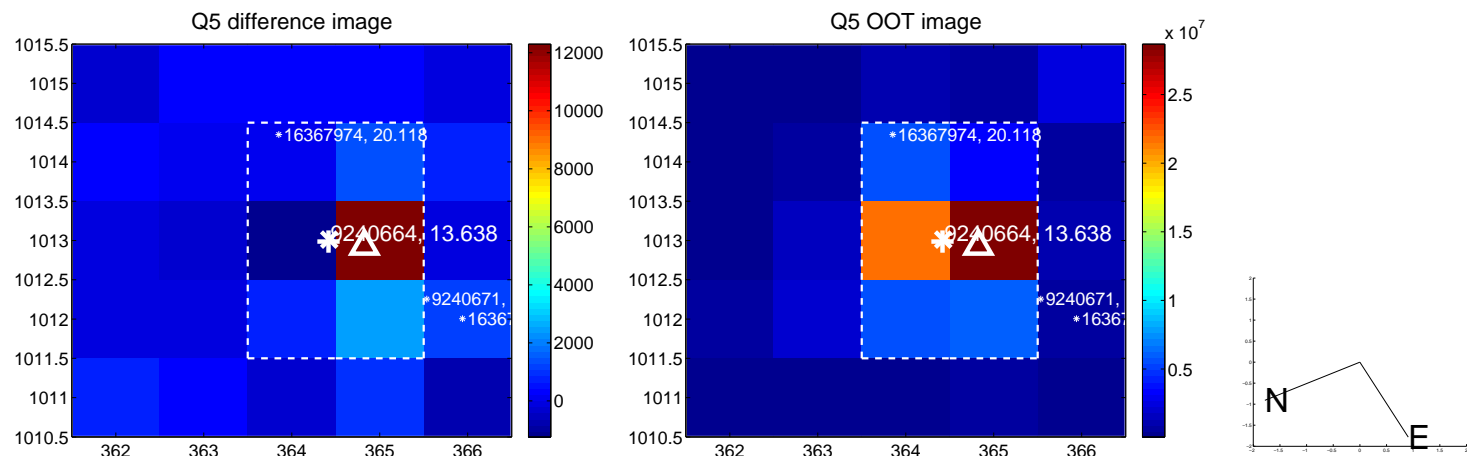
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



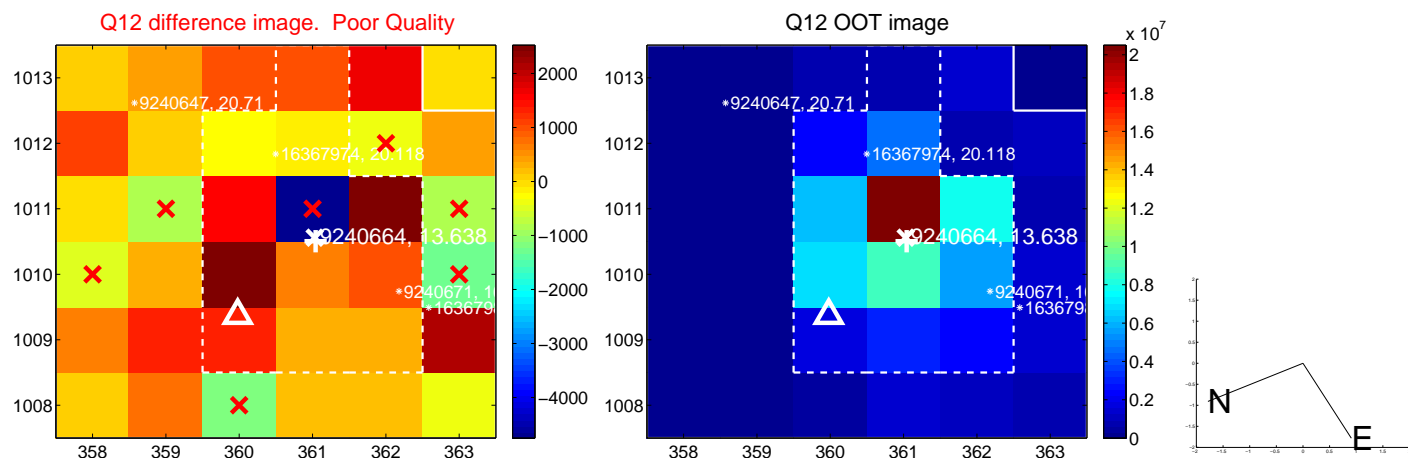
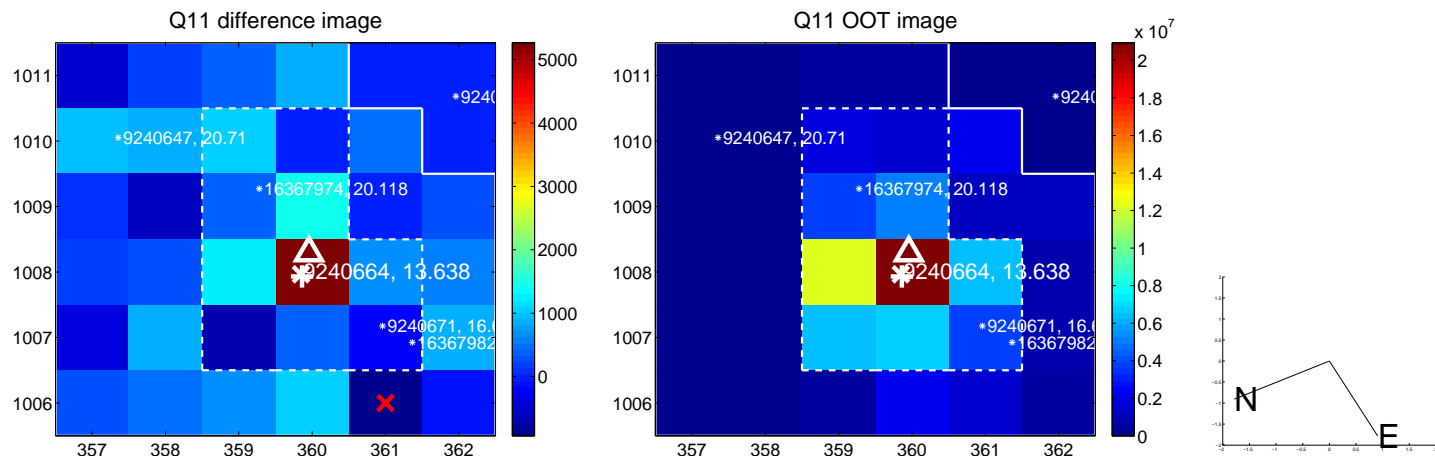
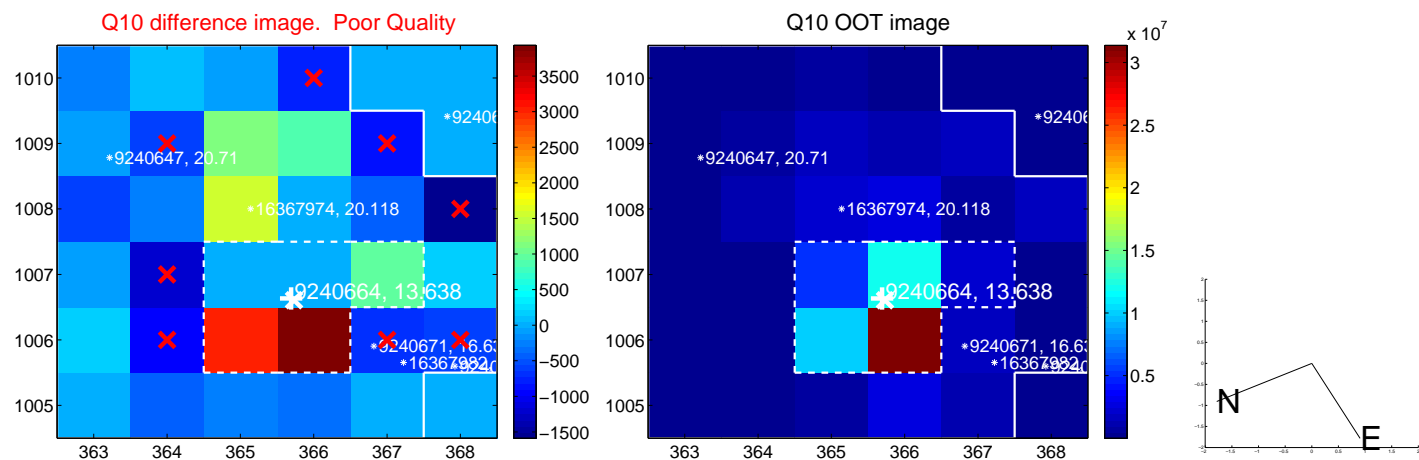
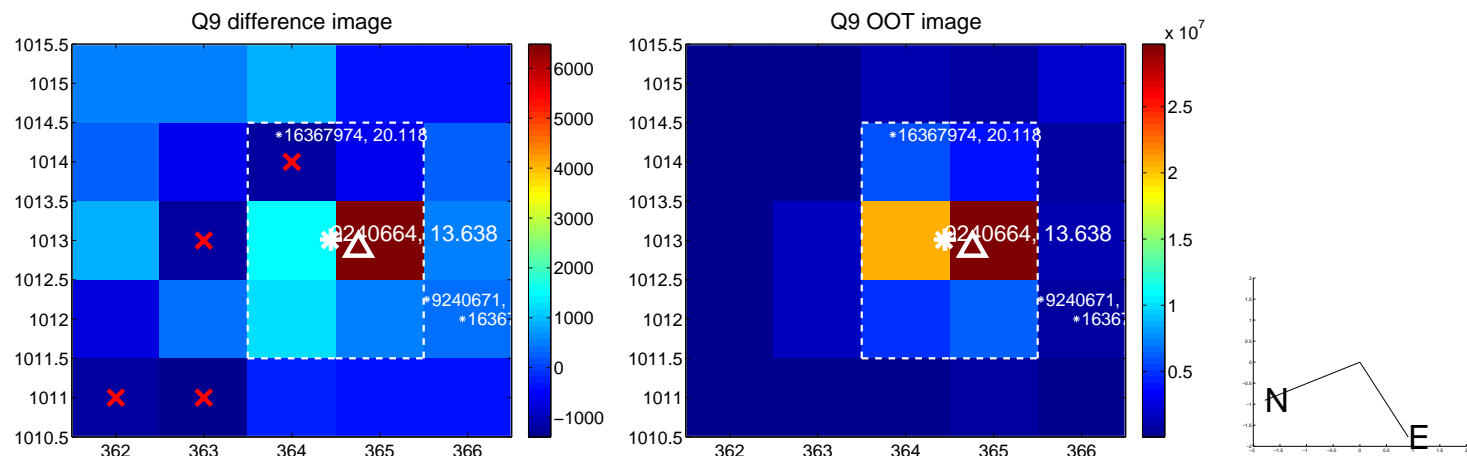
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



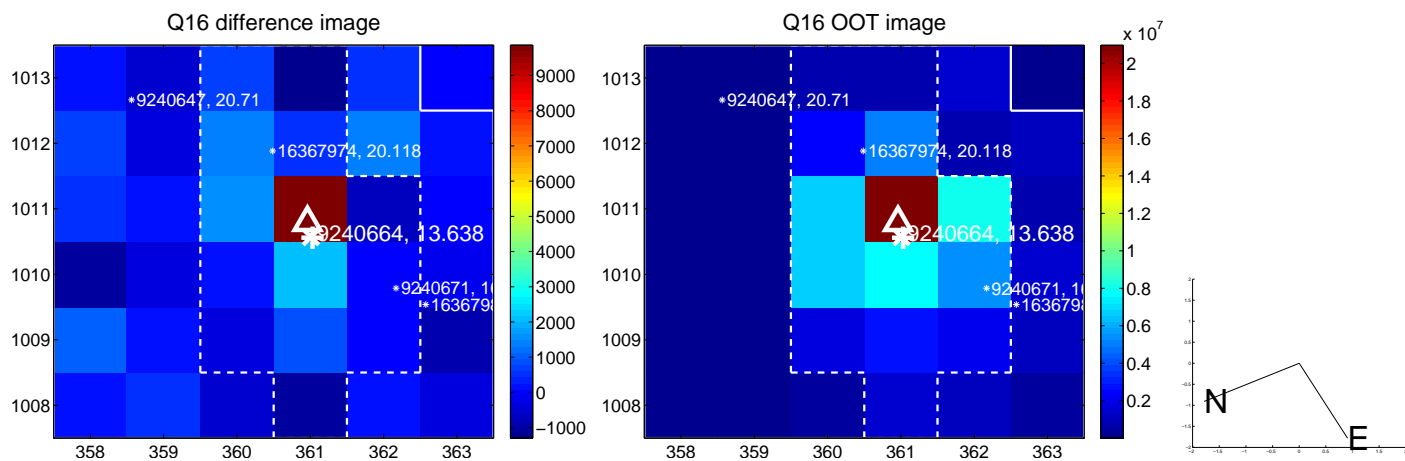
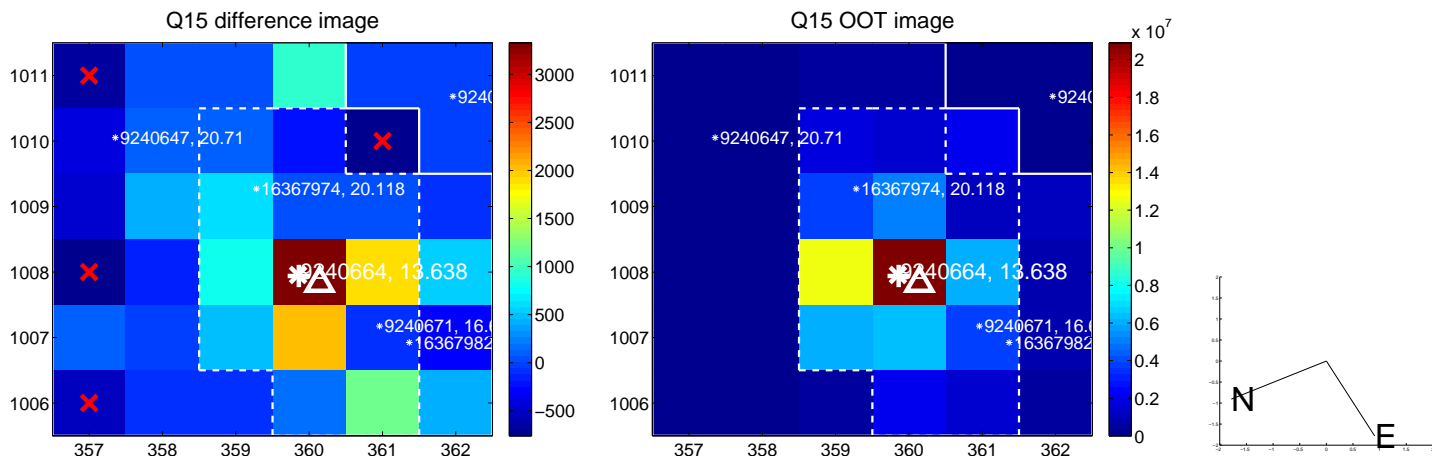
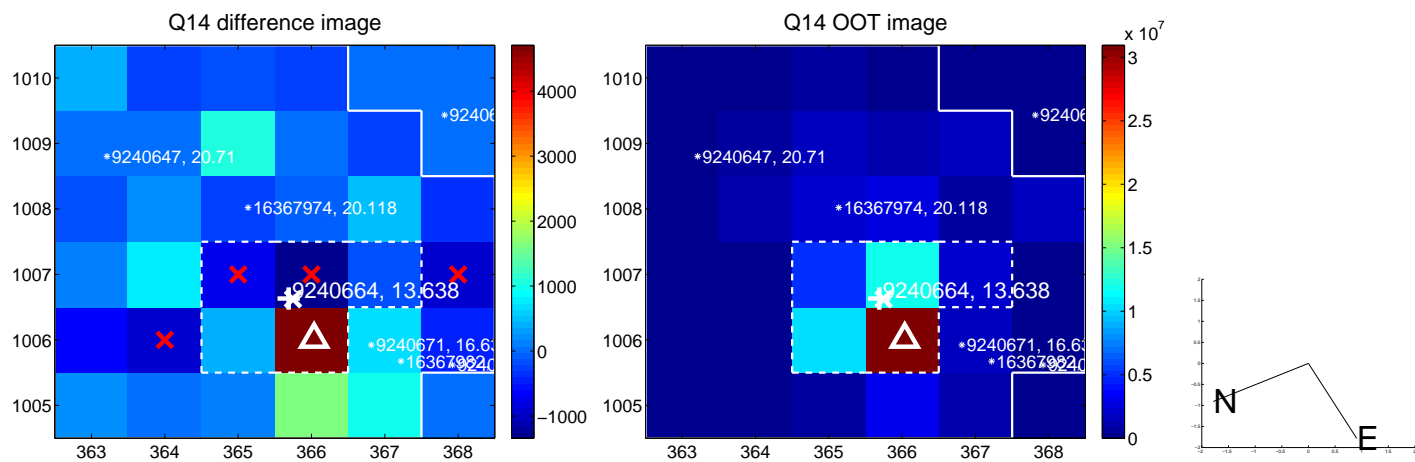
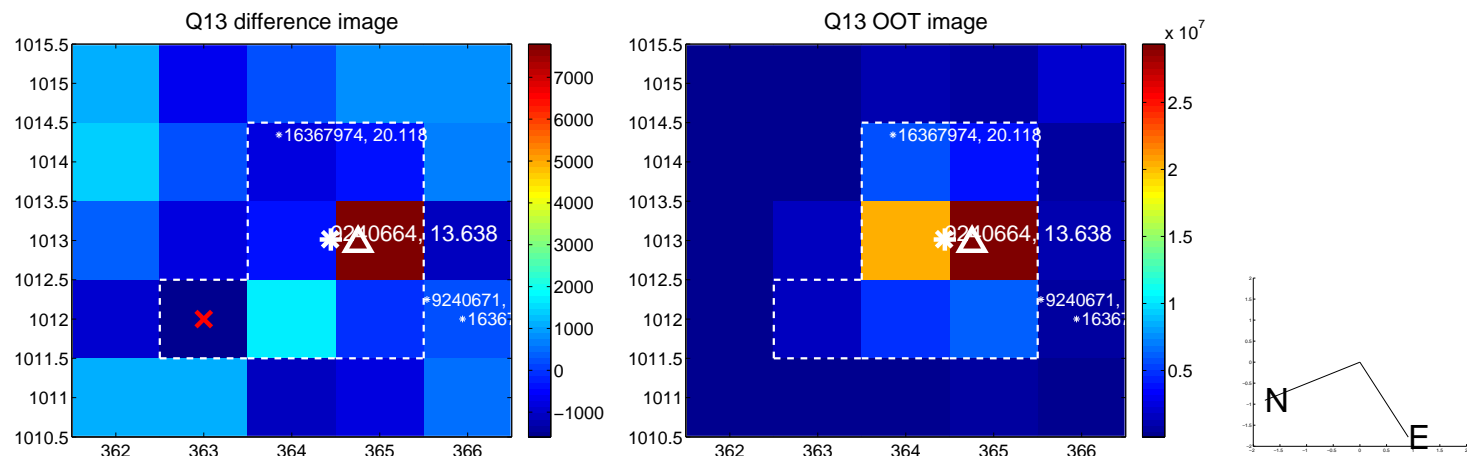
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



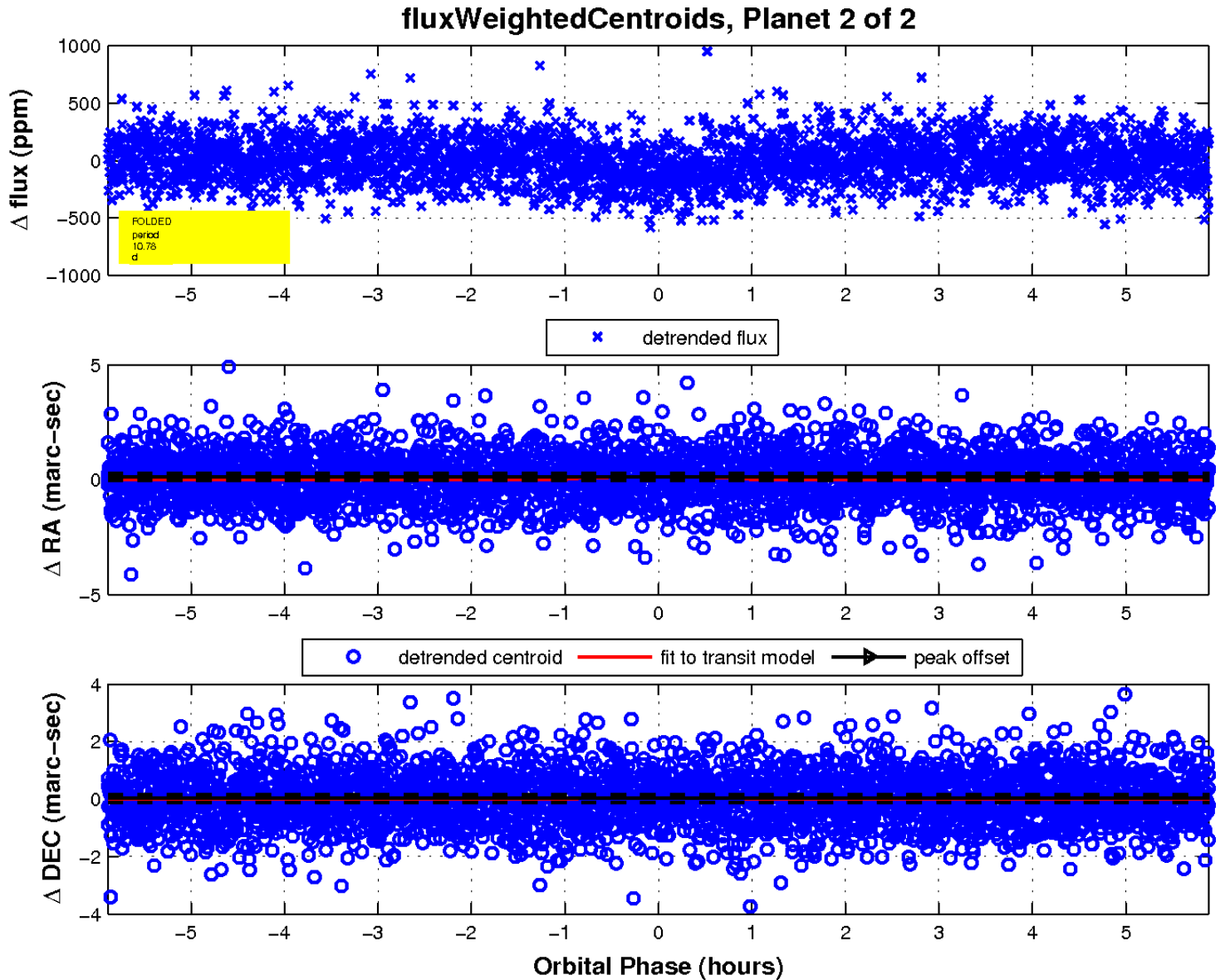
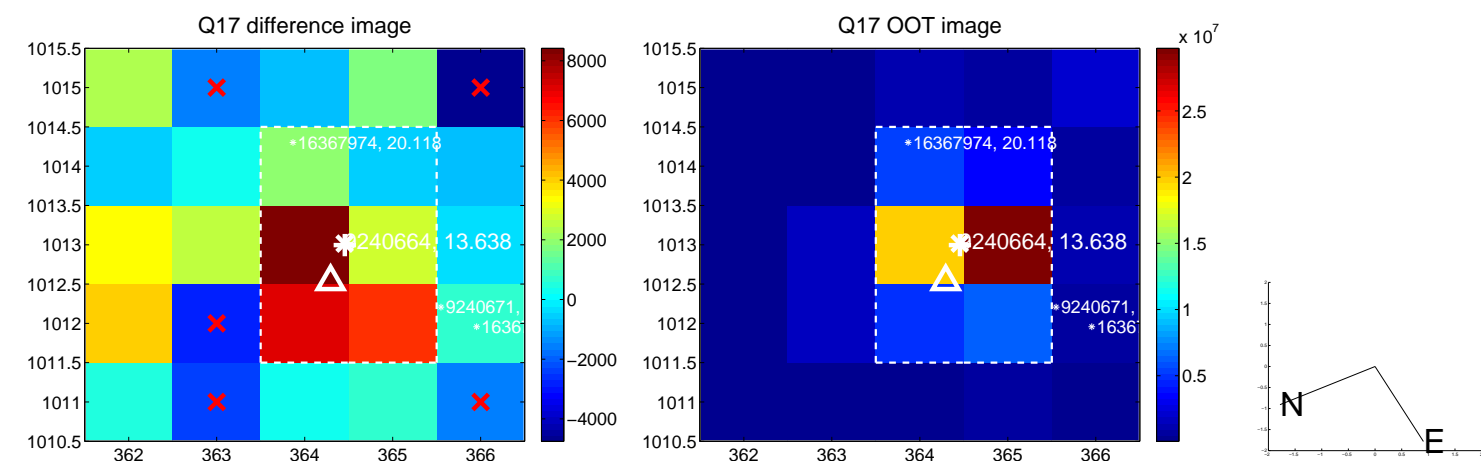
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UKIRT Image

Declination

