

# KIC 006231401

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006231401-01	OBS	6679.01	6.091955	137.587733	36605.7	3.603	2145.6	2087.0	0.91	6063	26.84	273.08
006231401-02	OBS	No	6.091955	134.631322	19406.3	3.546	1160.9	1104.5	0.91	6063	21.05	273.08

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006231401-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_KIC_POS
006231401-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_KIC_POS

**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.

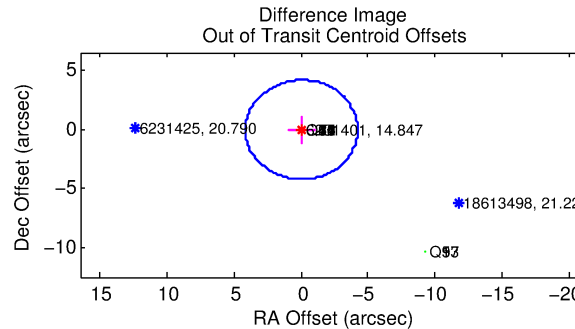
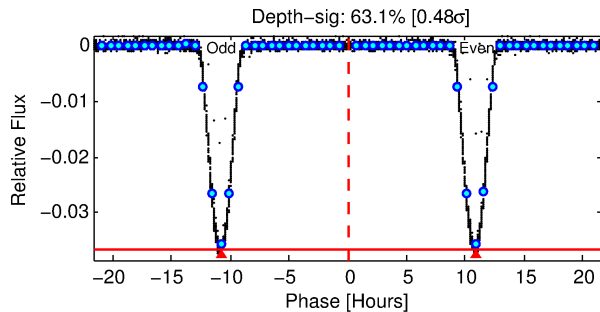
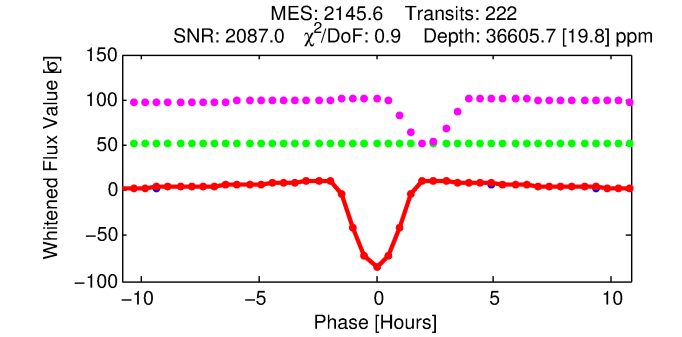
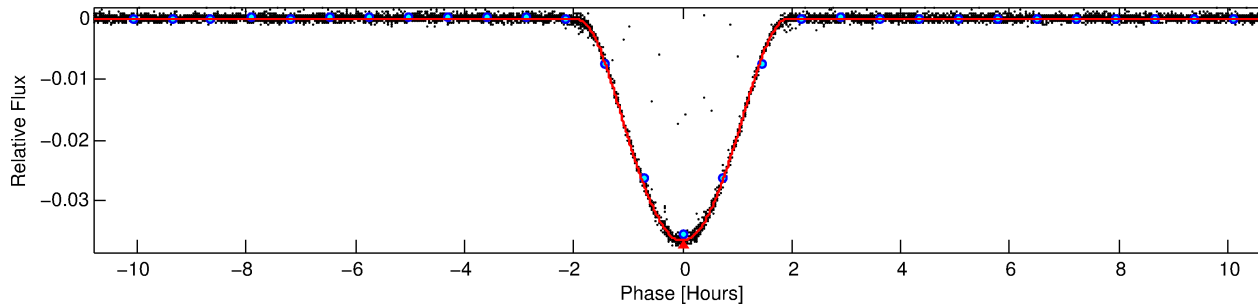
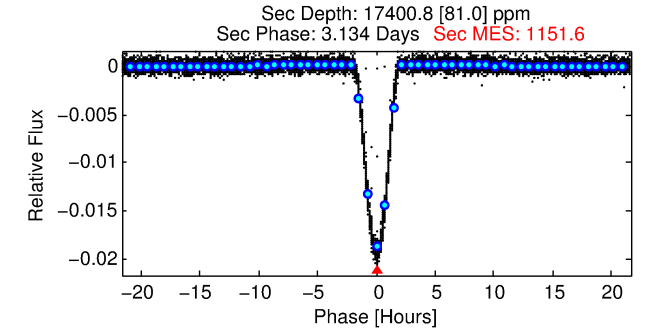
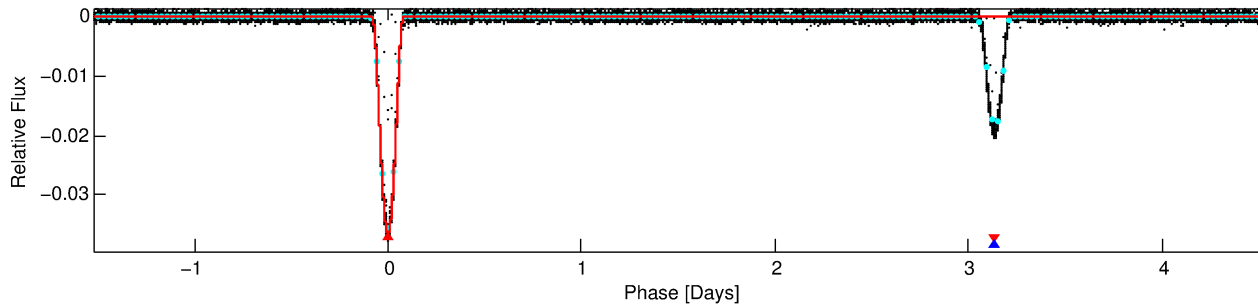
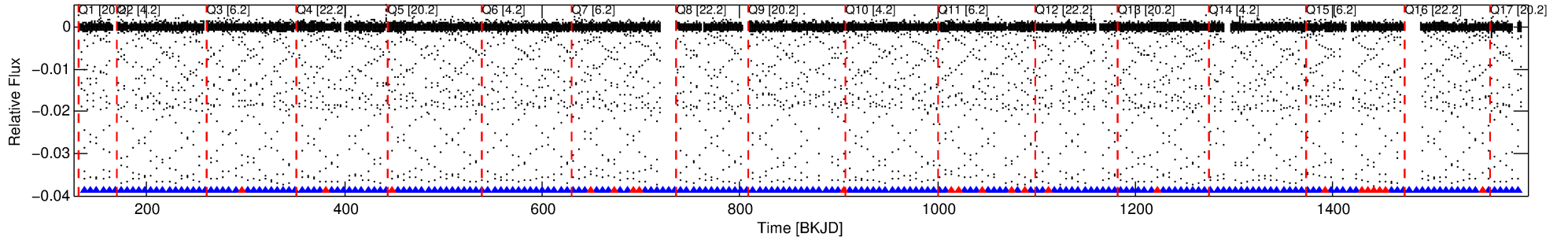
## Ephemeris Match Information For 006231401-01

No Significant Match Found

# DV One-Page Summary

KIC: 6231401 Candidate: 1 of 2 Period: 6.092 d  
KOI: K06679.01 Corr: 1.000

Kp: 14.85 R\*: 0.91 Rs Teff: 6063.0 K Logg: 4.42 Fe/H: -0.780



## DV Fit Results:

Period = 6.09196 [0.00000] d  
Epoch = 137.5877 [0.0000] BKJD  
Rp/R\* = 0.2694 [0.0063]  
a/R\* = 10.89 [0.02]  
b = 0.95 [0.01]  
Seff = 273.08 [88.93]  
Teq = 1037 [84] K  
Rp = 26.84 [6.70] Re  
a = 0.0608 [0.0127] AU  
Ag = 49.11 [15.04] [3.20σ]  
Teffp = 4243 [137] K [19.96σ]

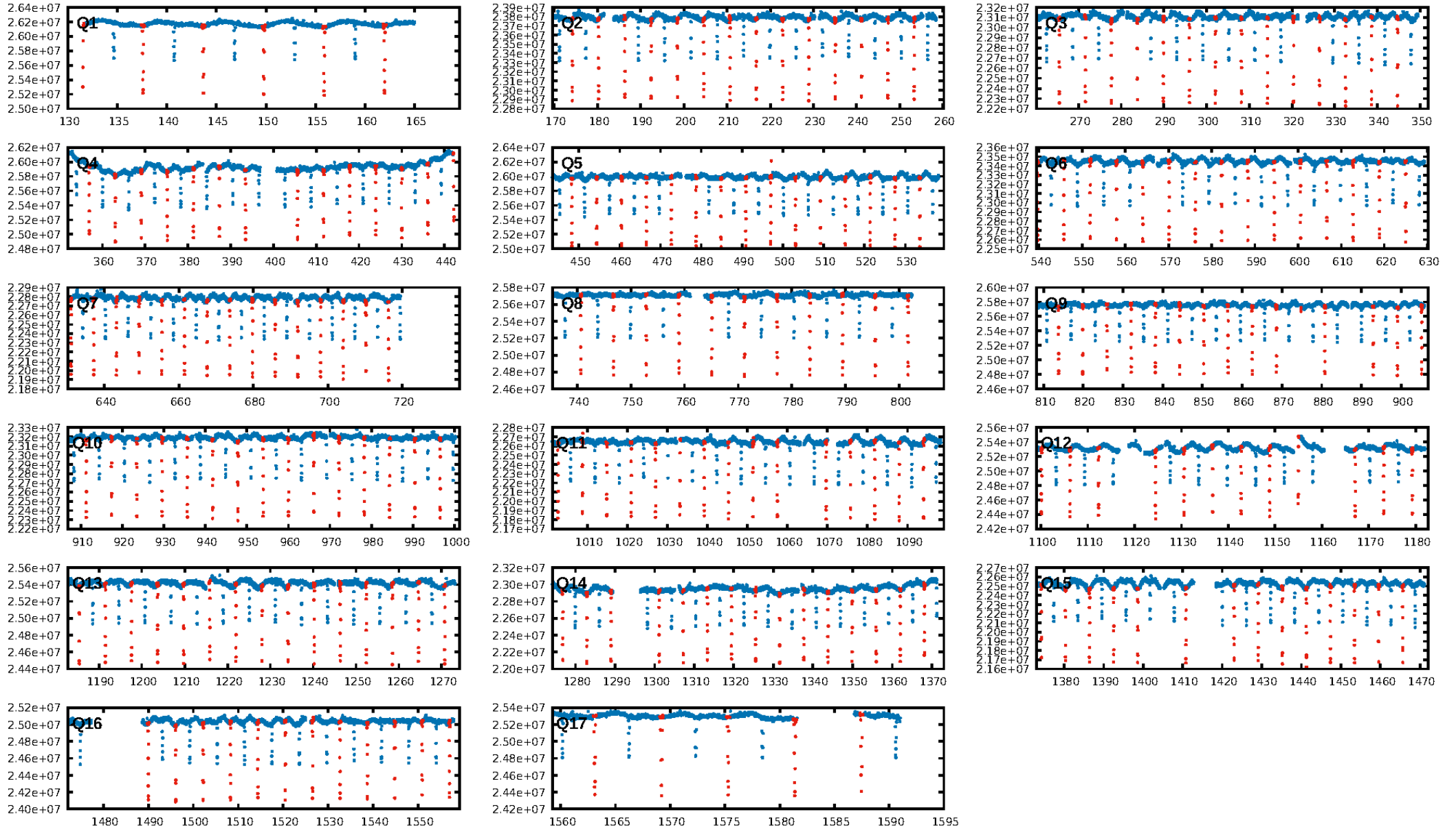
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.90 [189/211]  
GhostDiagnostic-chr: 6.108  
Centroid-sig: 0.0%  
Centroid-so: 0.167 arcsec [25.60σ]  
OotOffset-rm: 0.057 arcsec [0.04σ]  
KicOffset-rm: 0.092 arcsec [1.35σ]  
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]

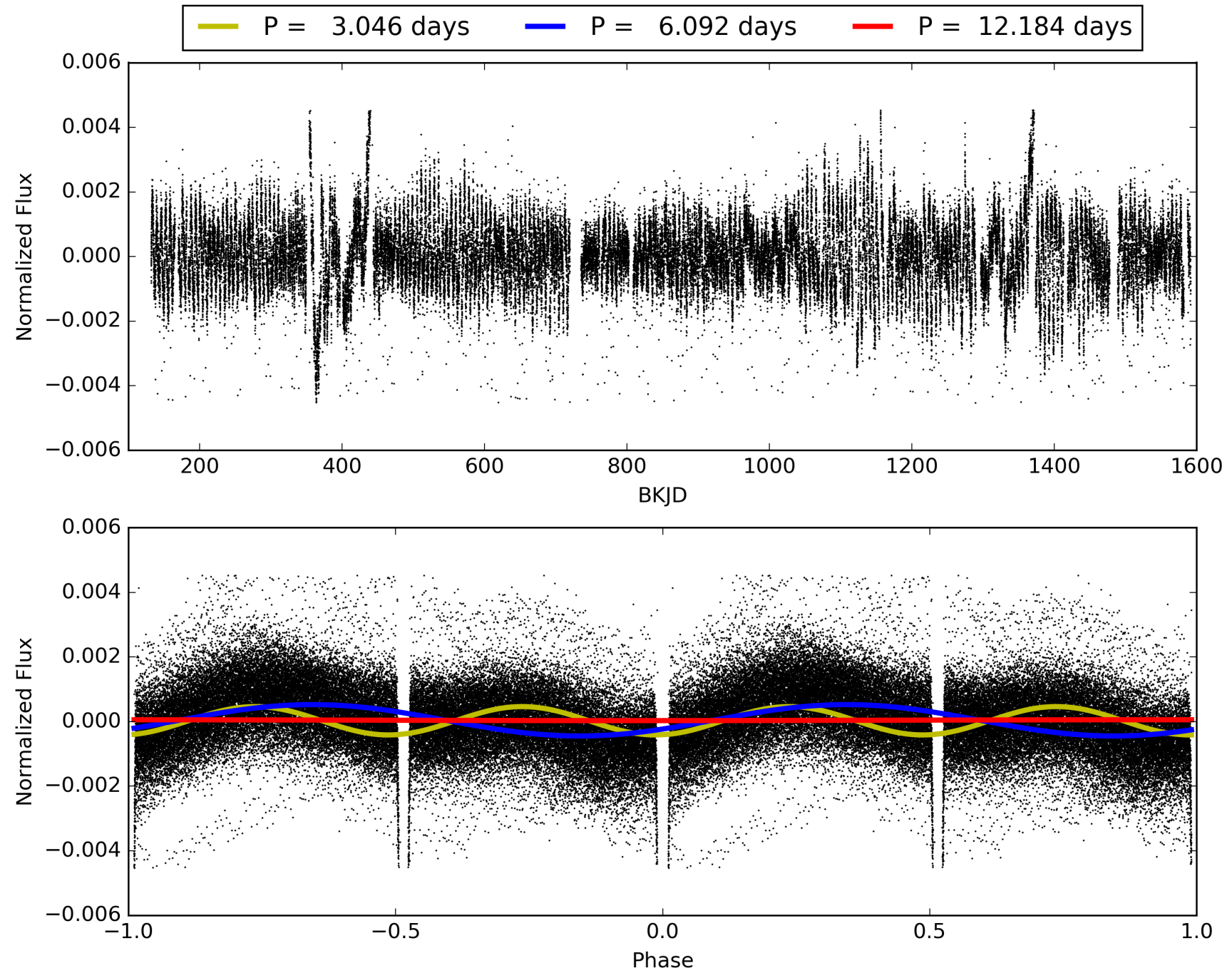
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:06:44 Z

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

# TCE 006231401-01, PDC Light Curves

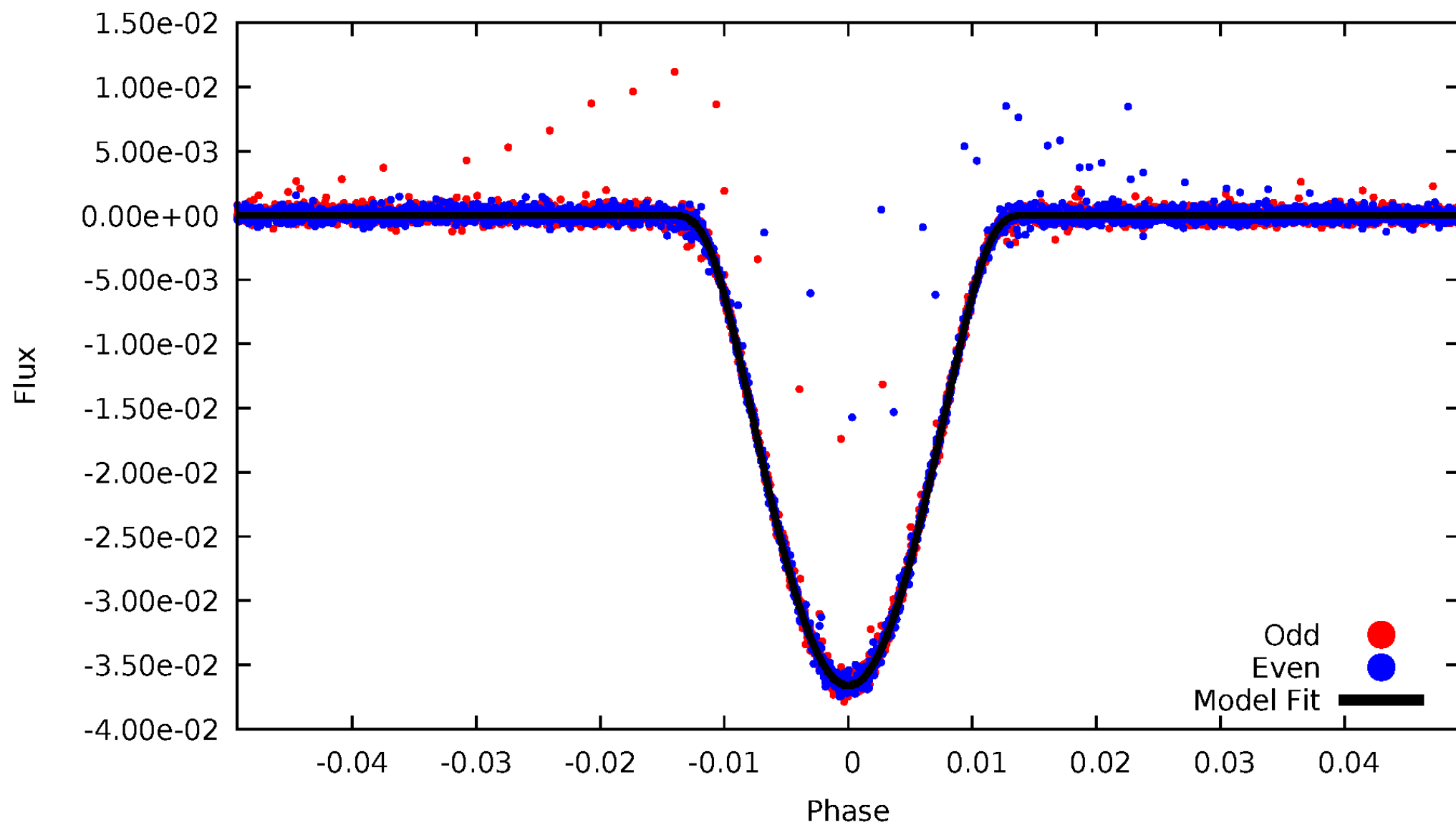


TCE 006231401-01



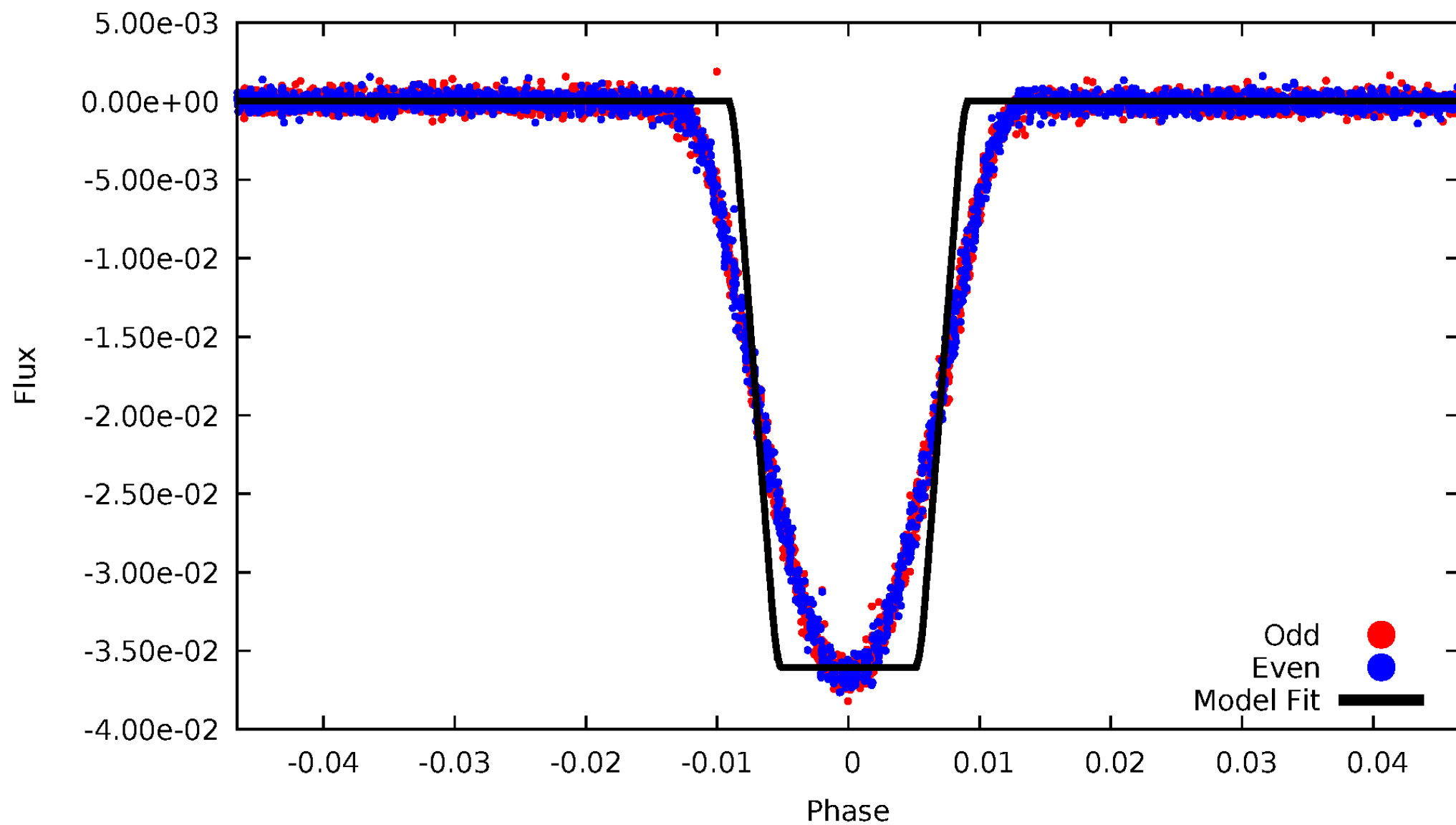
# DV Odd/Even

TCE 006231401-01



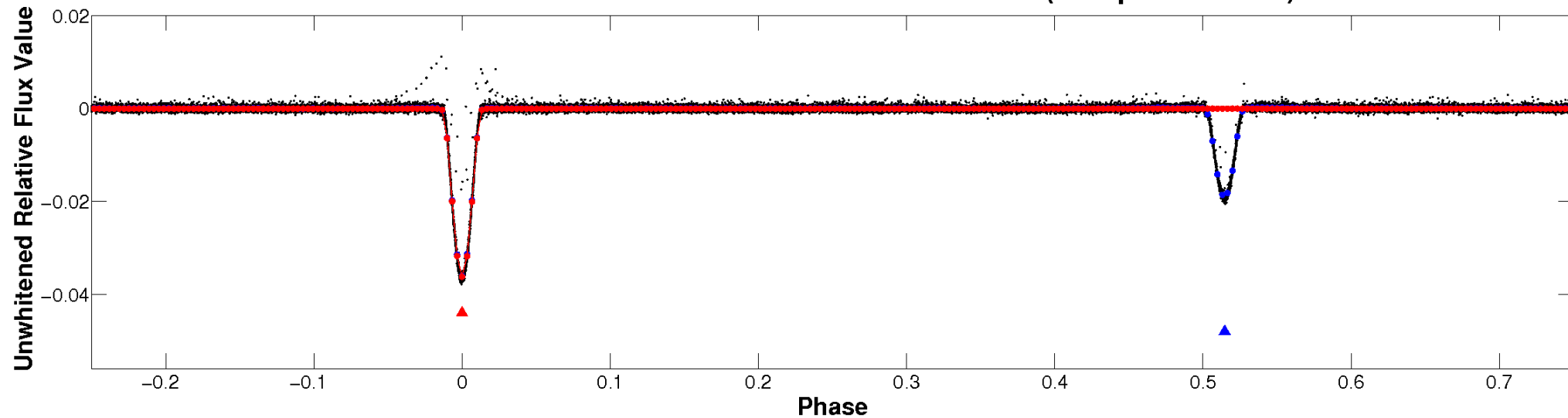
# ALT Odd/Even

TCE 006231401-01

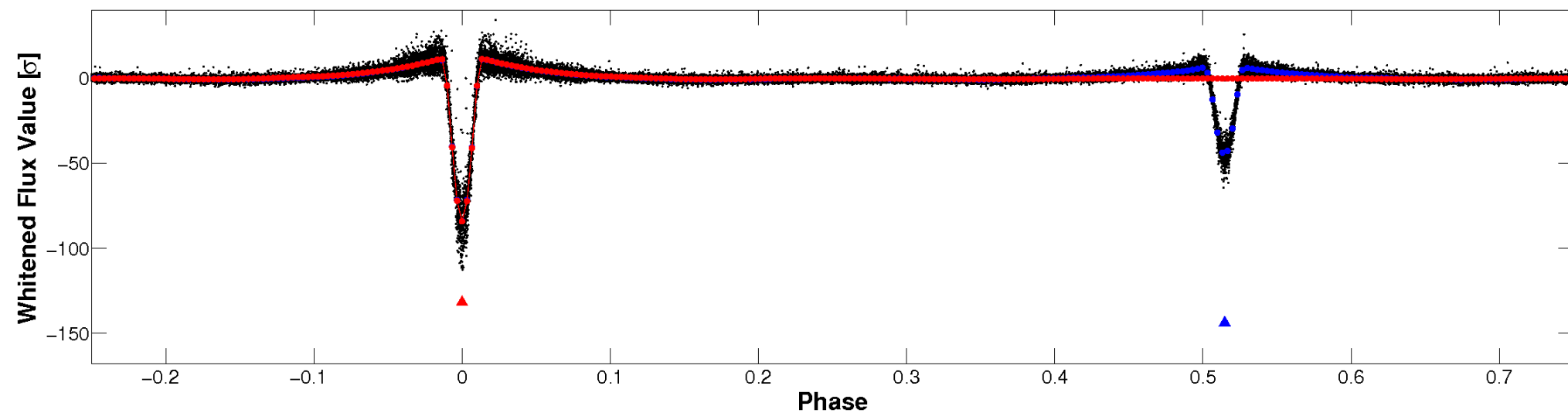


# Non-Whitened Vs. Whitened Light Curve

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

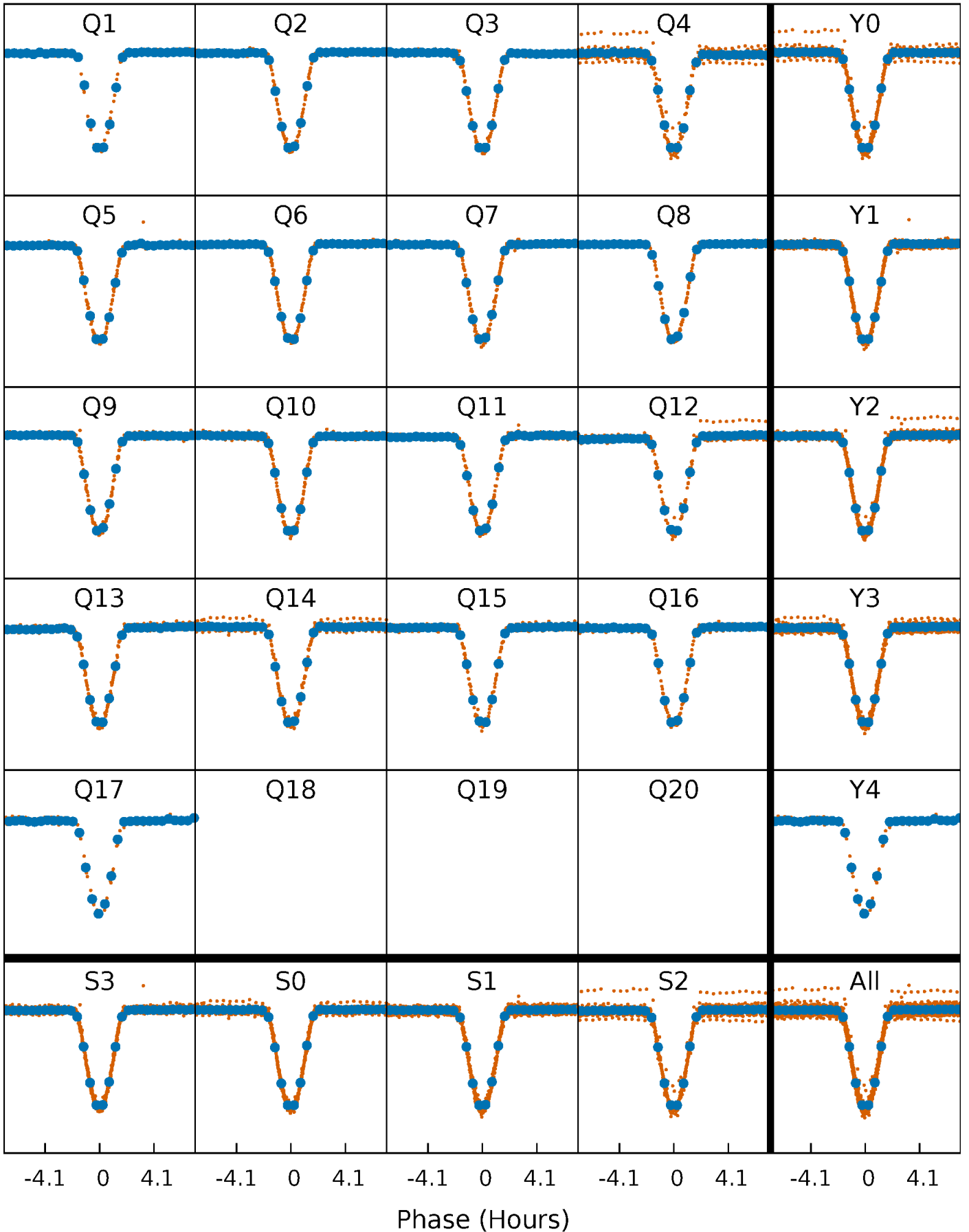


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

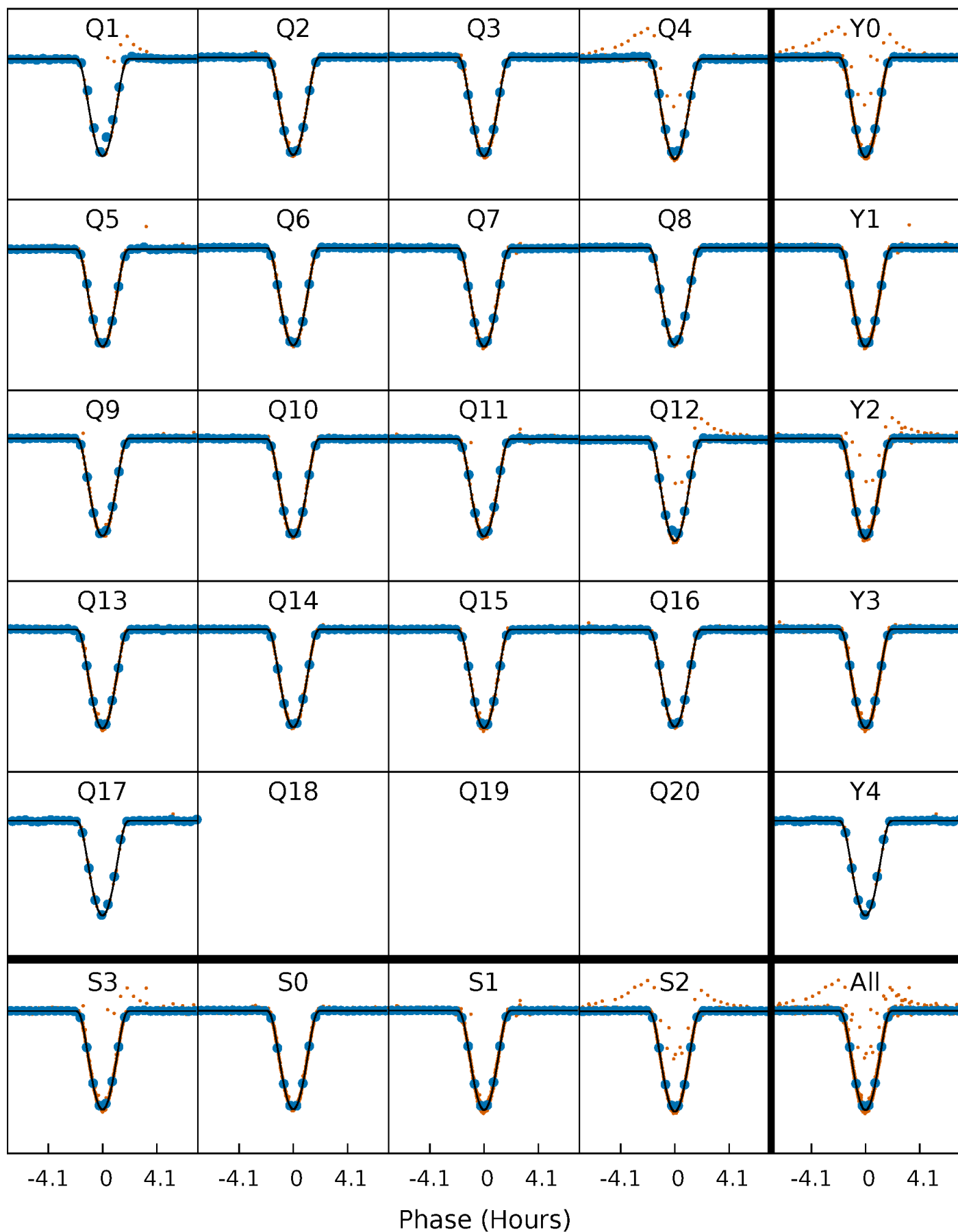
TCE 006231401-01 P= 6.091955 Days  $T_0=137.587733$  (BKJD)





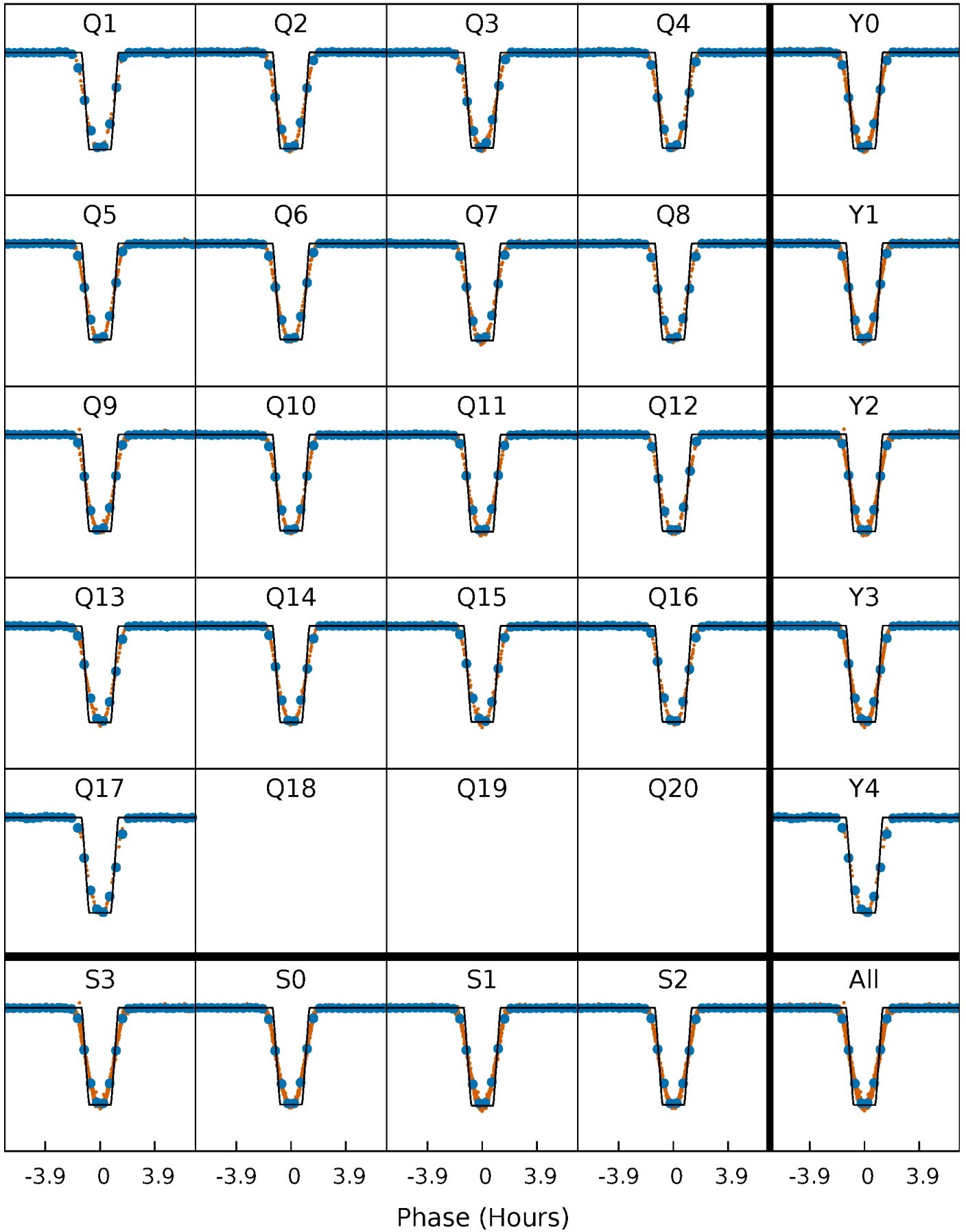
# DV Quarter-Phased Transit Curves

TCE 006231401-01 P= 6.091955 Days  $T_0=137.587733$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

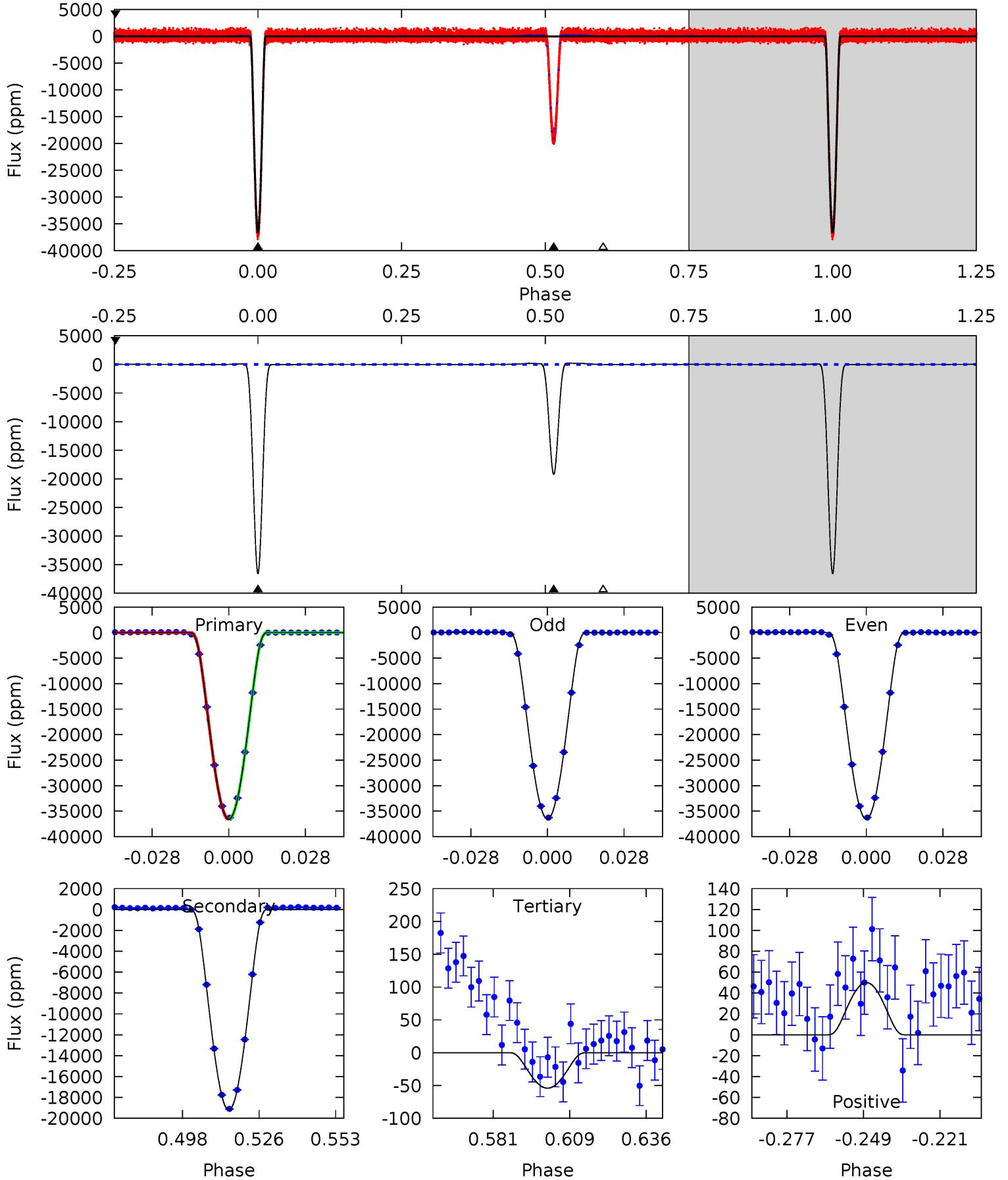
TCE 006231401-01 P= 6.091935 Days  $T_0=137.590185$  (BKJD)



# DV Model-Shift Uniqueness Test

006231401-01, P = 6.091955 Days, E = 131.495778 Days

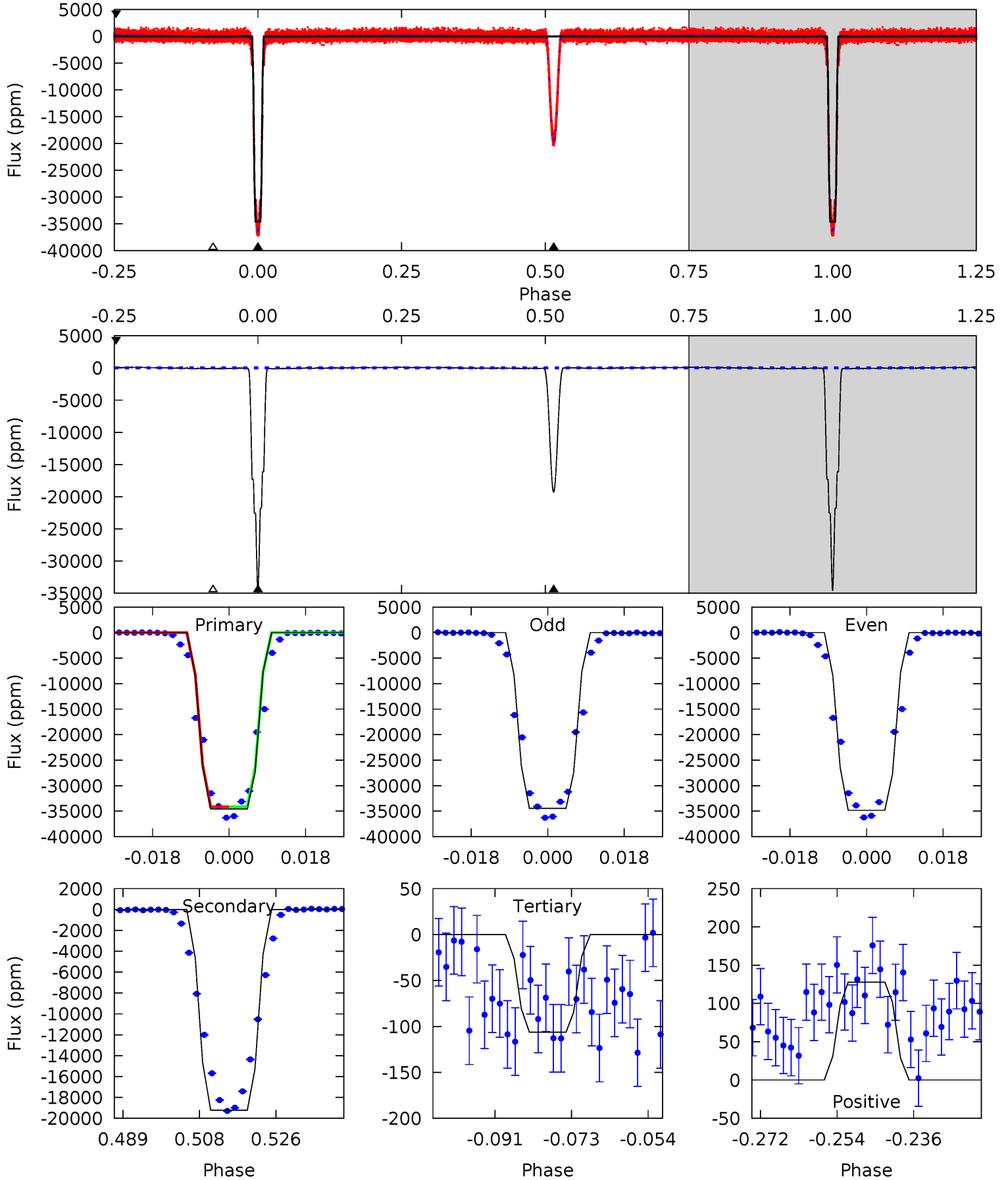
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4053	2129	6.01	5.54	4.83	2.20	5.37	4047	4047	2123	2123	1.50	0.99	0.01	0.16



# Alt Model-Shift Uniqueness Test

006231401-01, P = 6.091935 Days, E = 131.498250 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
2288	1273	7.03	8.46	4.91	2.36	3.80	2281	2280	1266	1264	12.6	1.00	0.00	0.24



### Stellar Parameters For KIC 006231401

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6063^{+182}_{-182}$	$4.424^{+0.135}_{-0.165}$	$-0.780^{+0.300}_{-0.300}$	$0.913^{+0.227}_{-0.140}$	$0.806^{+0.093}_{-0.057}$	$1.493^{+0.912}_{-0.652}$
	+3%/-3%	+3%/-4%	+38%/-38%	+25%/-15%	+12%/-7%	+61%/-44%
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 006231401-01 / KOI 6679.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-19198 \pm 9$	$26.93^{+3.77}_{-2.55}$	$1453^{+99}_{-81}$	$4544^{+123}_{-116}$	$56^{+11}_{-13}$
Alt.	$-19233 \pm 15$	$19.07^{+2.65}_{-1.92}$	$1455^{+101}_{-84}$	$5255^{+172}_{-157}$	$110^{+24}_{-24}$

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

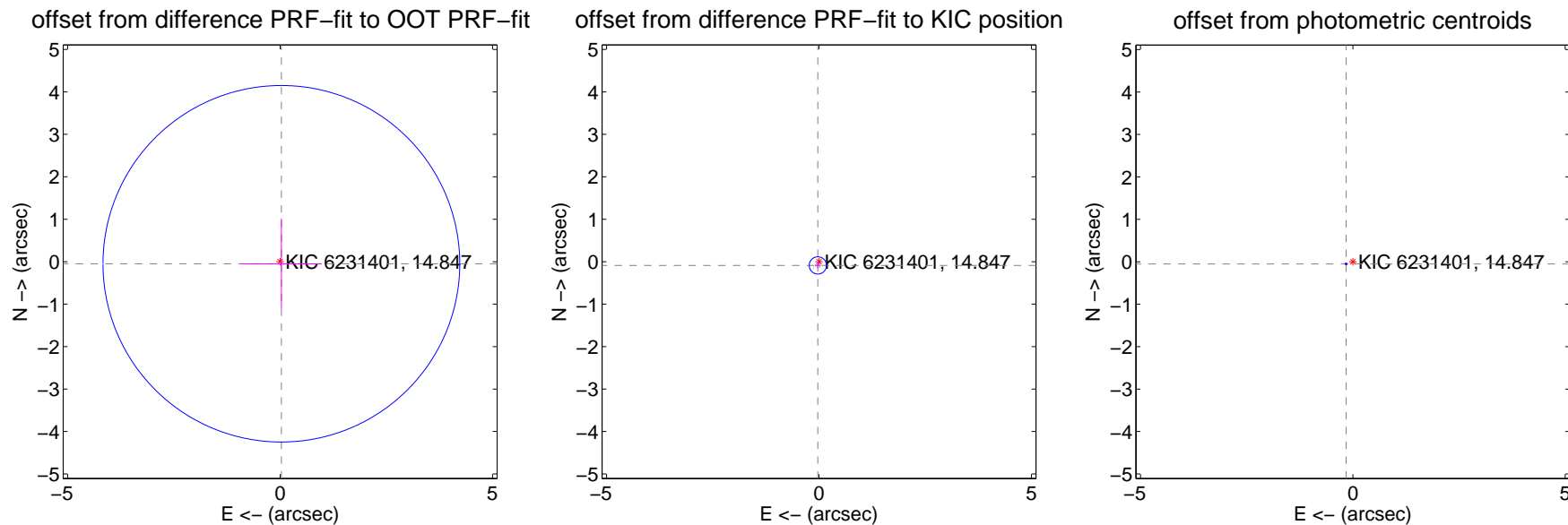
## DV Centroid Data

Supplemental centroid analysis for 006231401-01. Kepler magnitude: 14.85. Transit SNR 2087.03

There are 17 quarters with good PRF difference image offsets

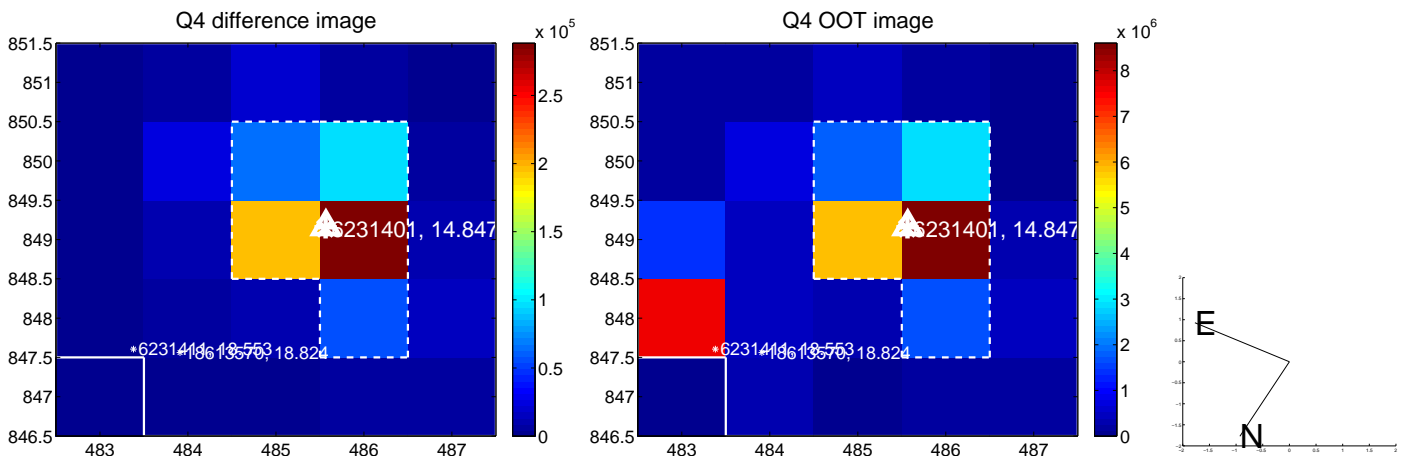
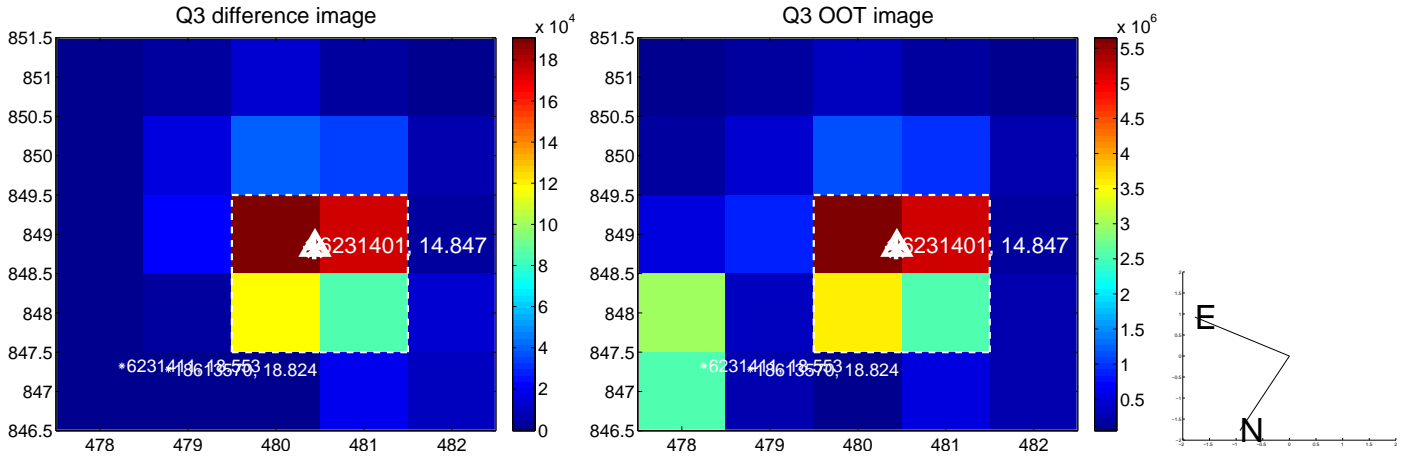
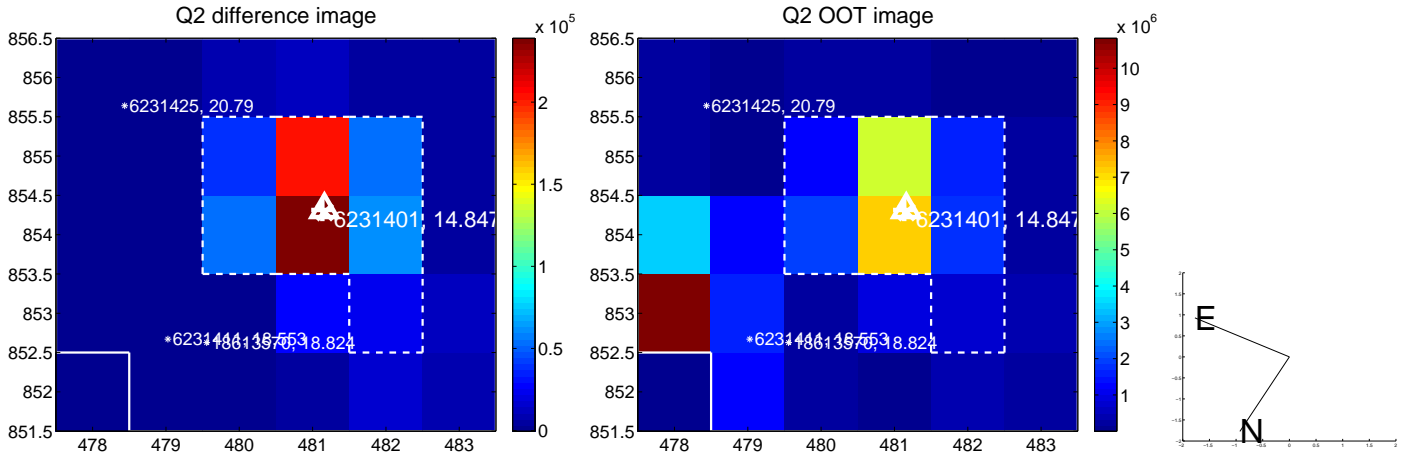
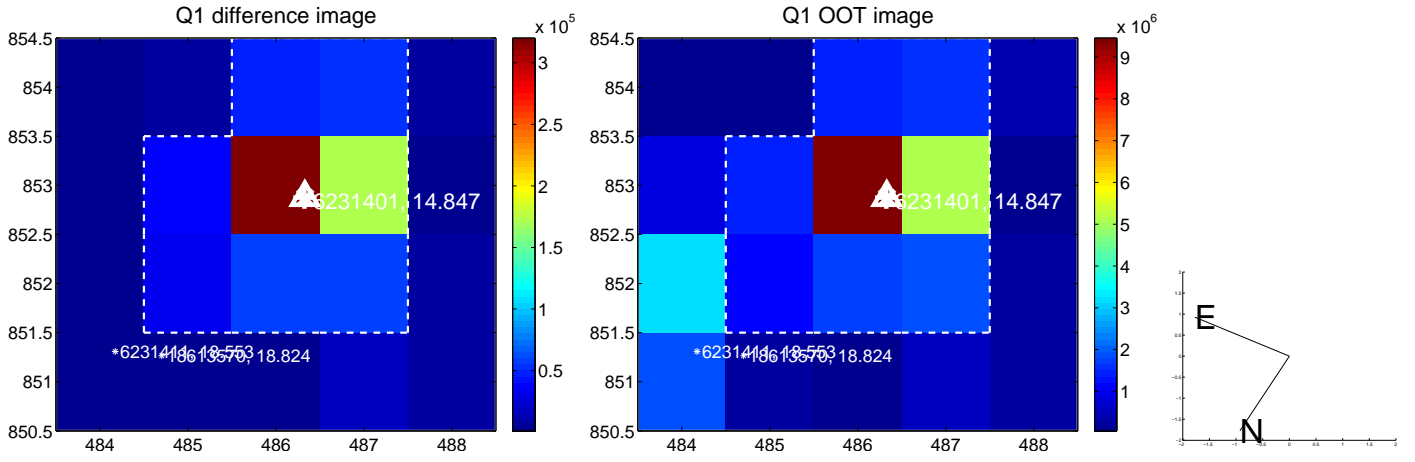
The OOT PRF centroid is offset from the target star catalog position by about 13.87 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.057 \pm 1.400$	0.04	$-0.030 \pm 0.952$	$-0.049 \pm 1.060$
PRF-fit source offset from KIC position	$0.092 \pm 0.068$	1.35	$0.027 \pm 0.068$	$-0.088 \pm 0.068$
photometric centroid source offset	$0.17 \pm 0.01$	25.60	$0.16 \pm 0.01$	$-0.05 \pm 0.01$

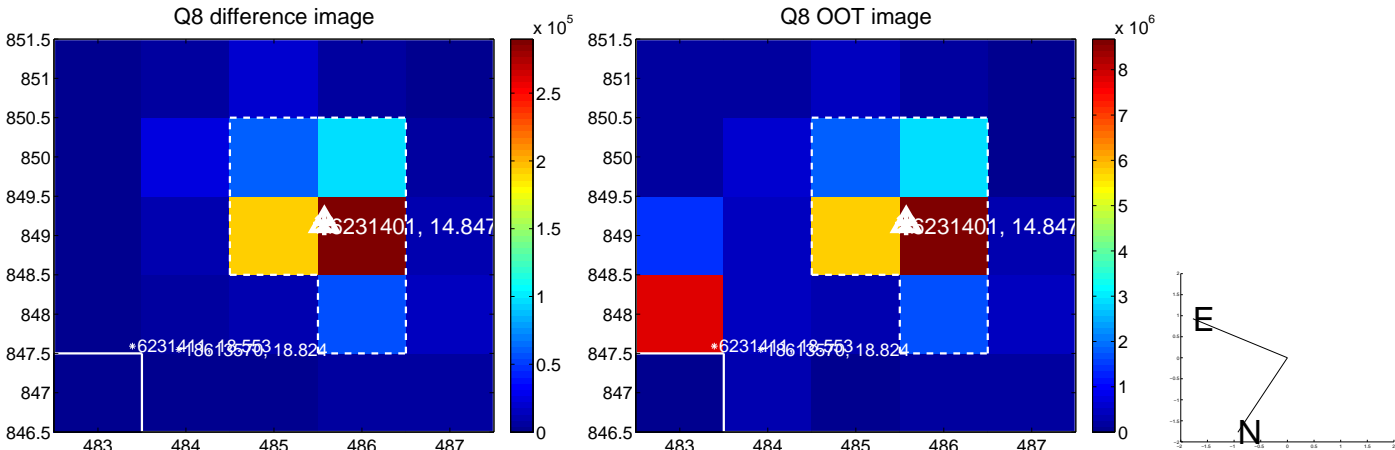
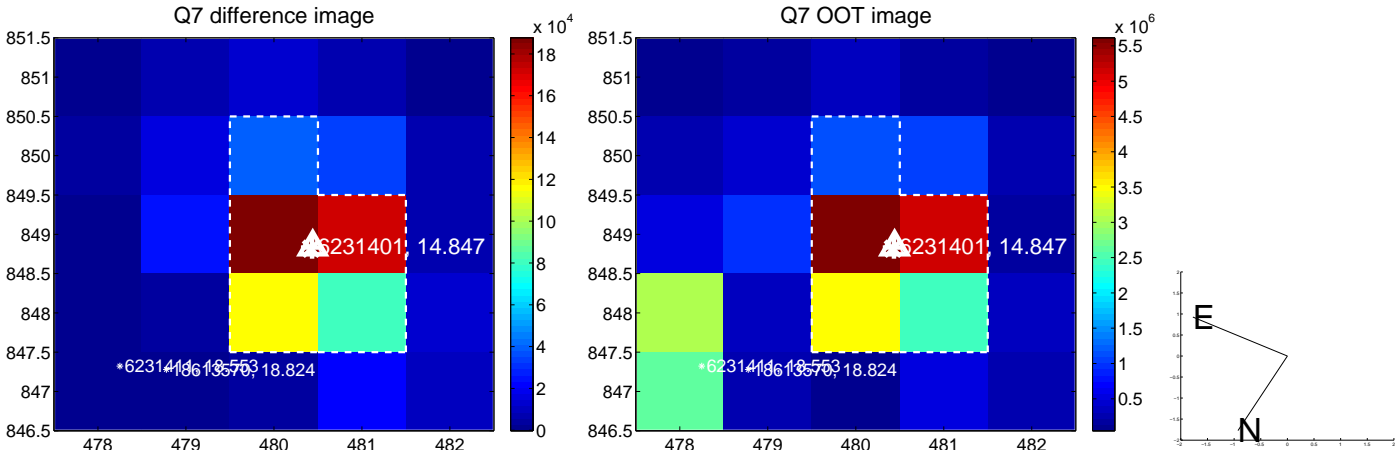
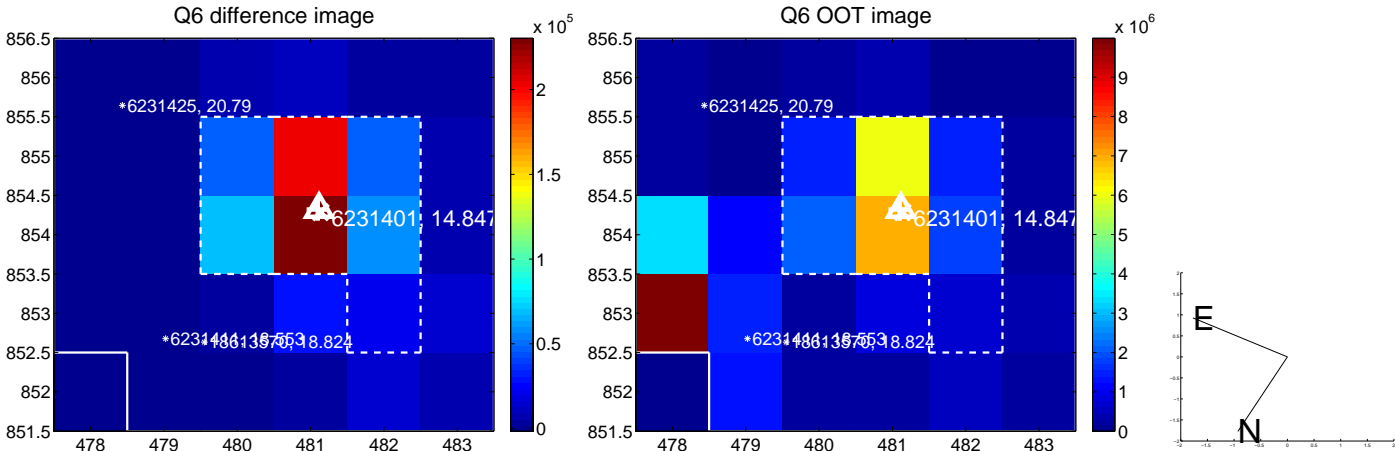
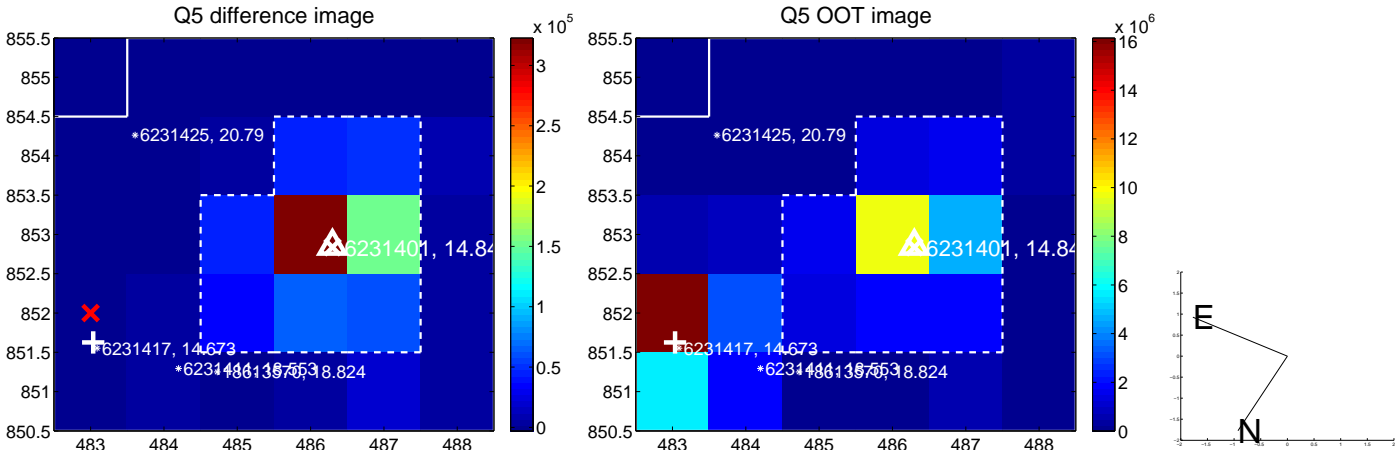


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

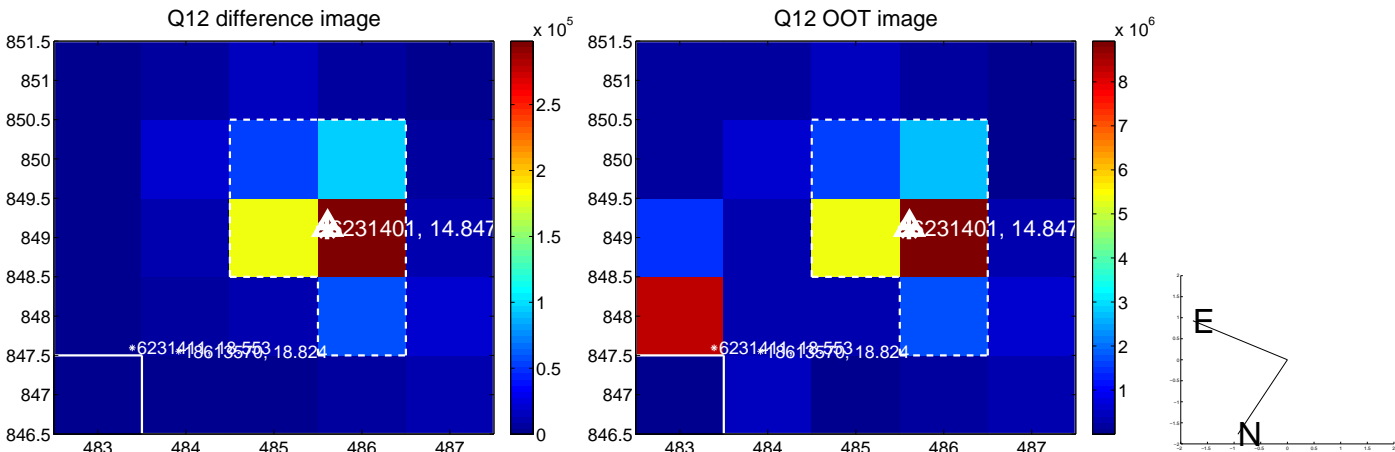
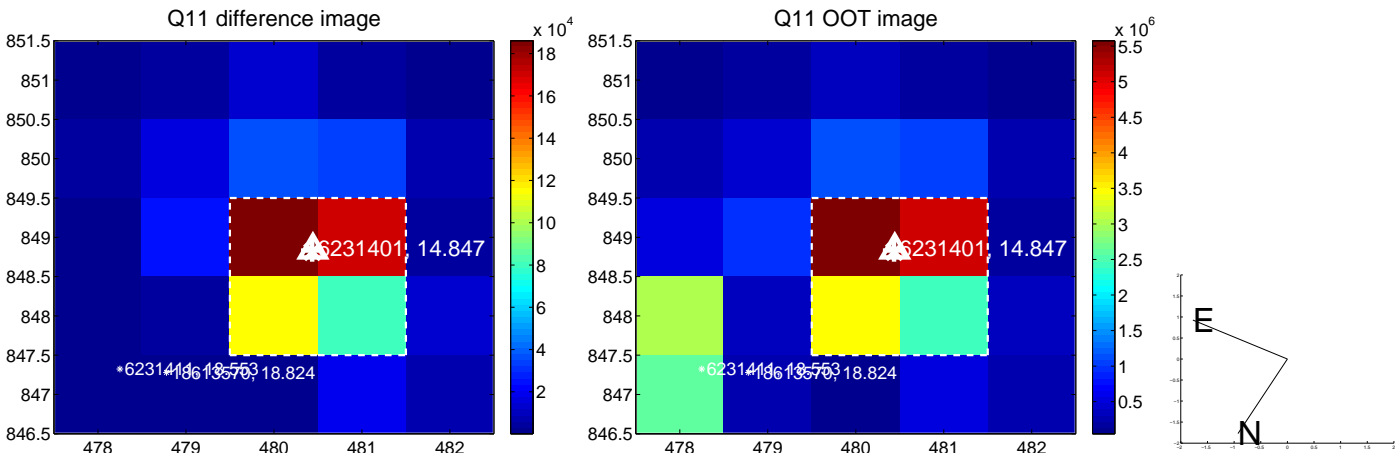
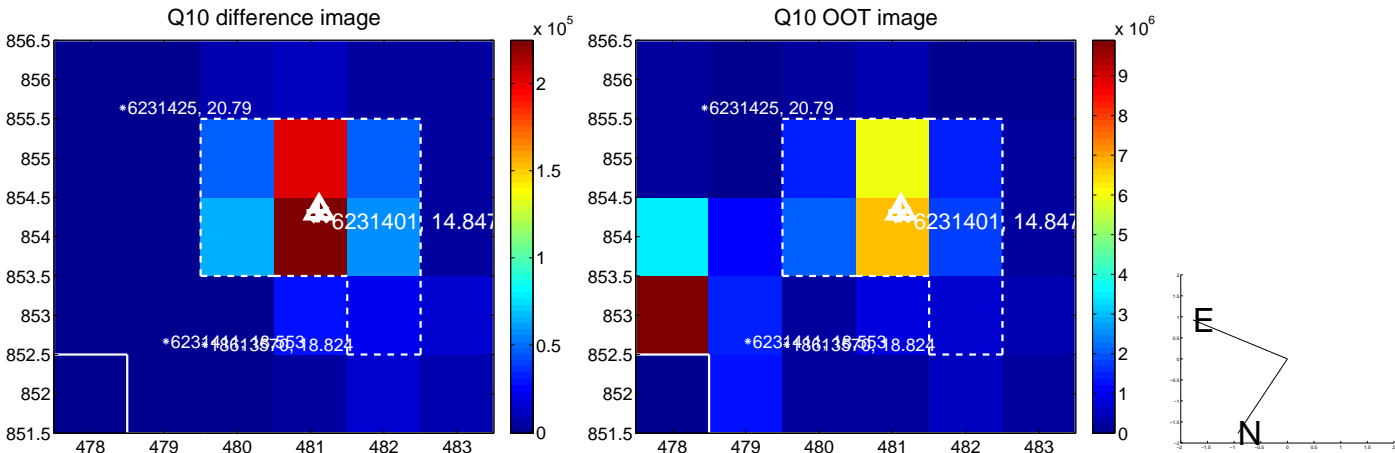
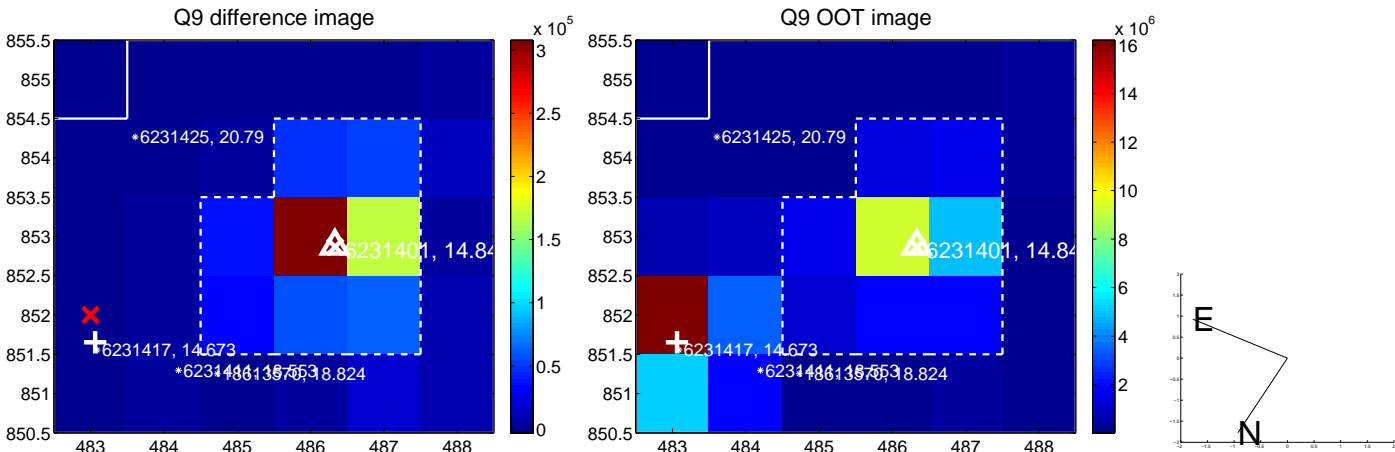


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

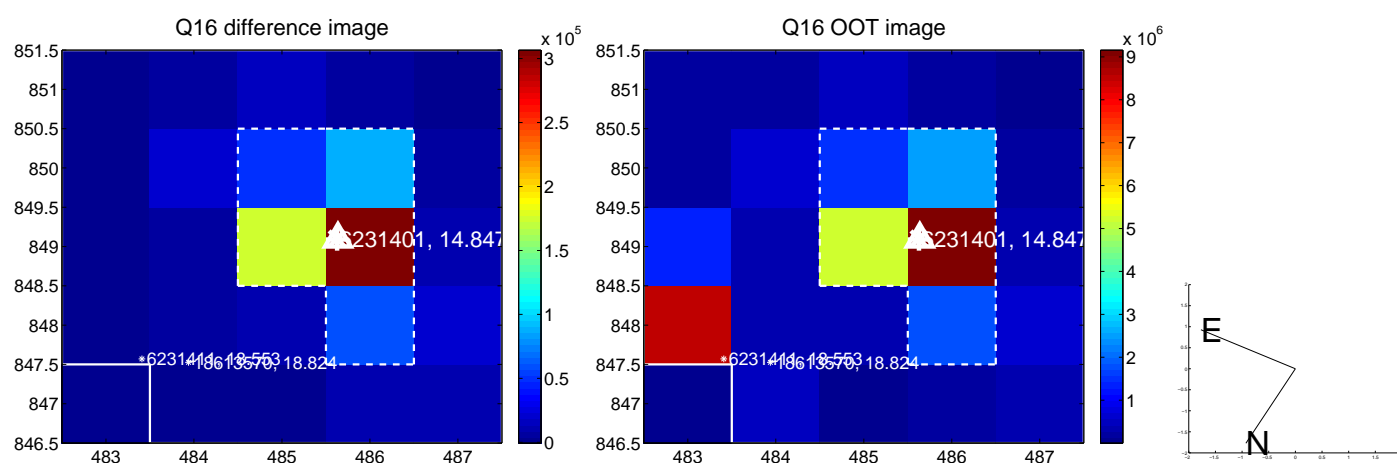
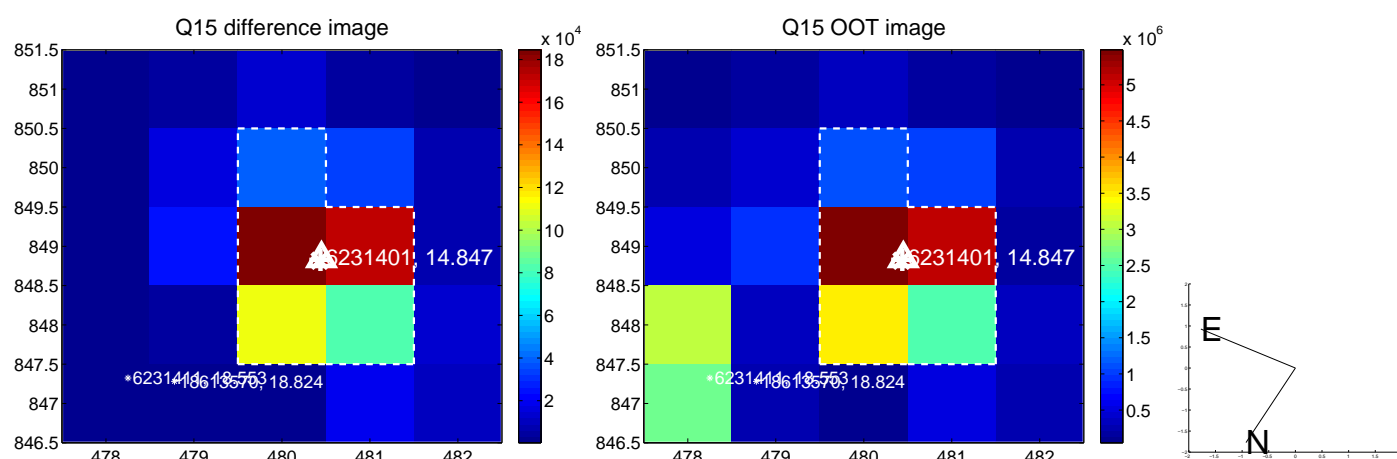
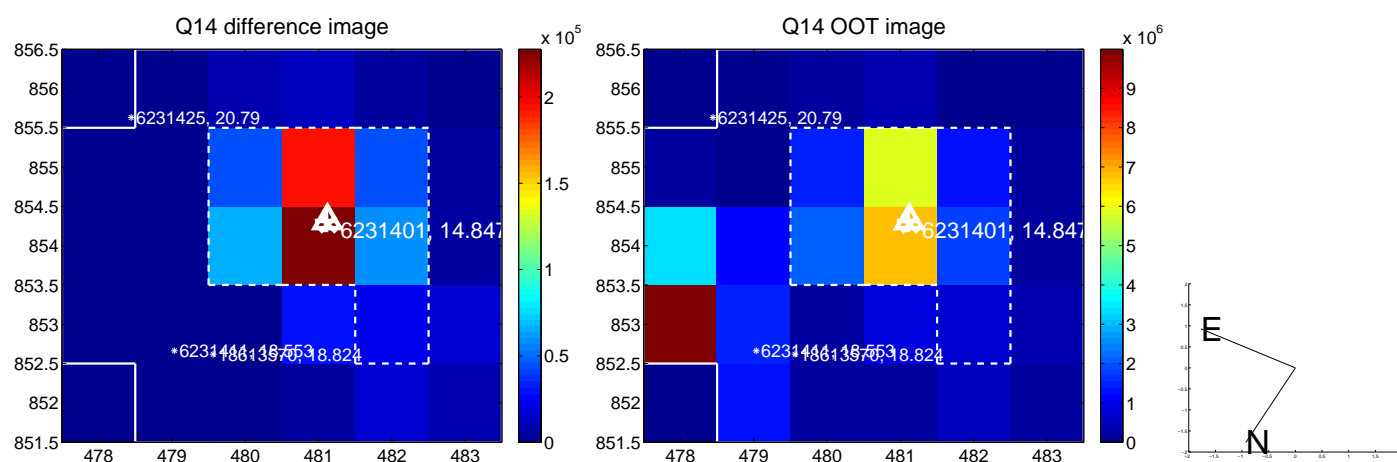
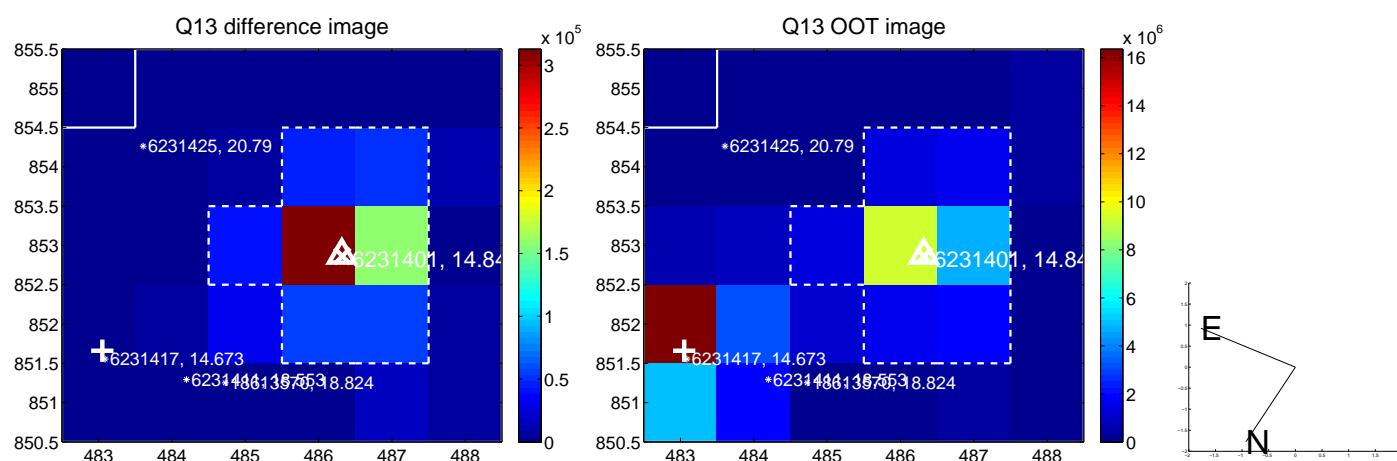




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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





Declination

# KIC 006231401

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006231401-01	OBS	6679.01	6.091955	137.587733	36605.7	3.603	2145.6	2087.0	0.91	6063	26.84	273.08
006231401-02	OBS	No	6.091955	134.631322	19406.3	3.546	1160.9	1104.5	0.91	6063	21.05	273.08

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006231401-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_KIC_POS
006231401-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE—CENT_KIC_POS

**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.

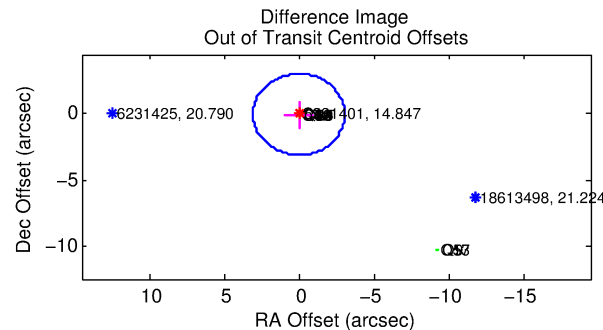
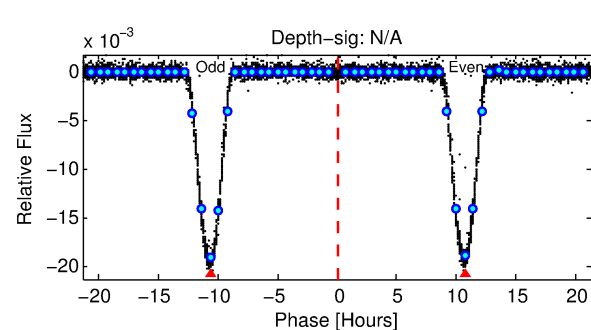
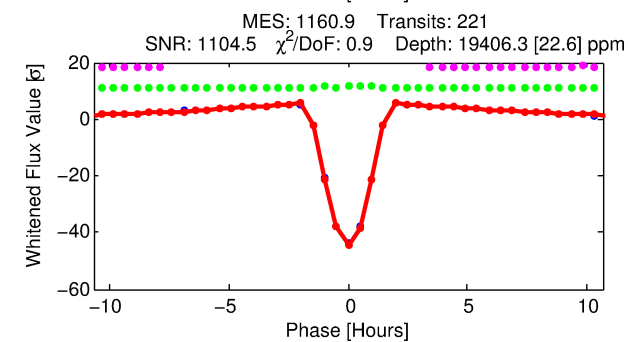
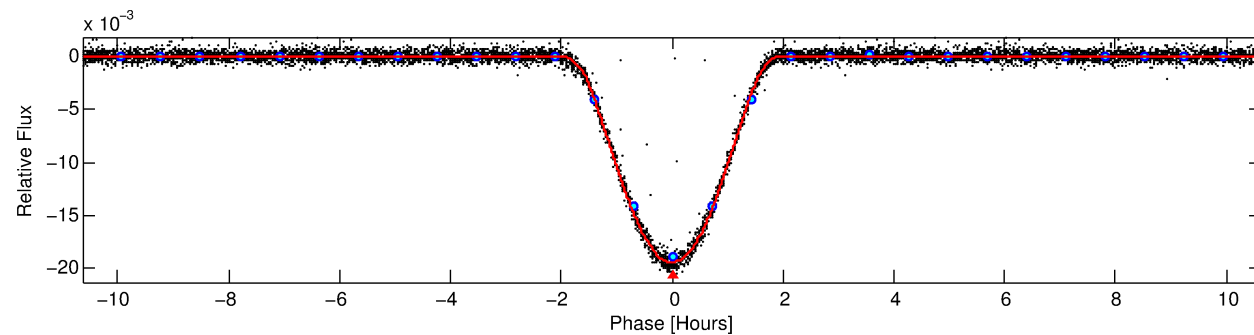
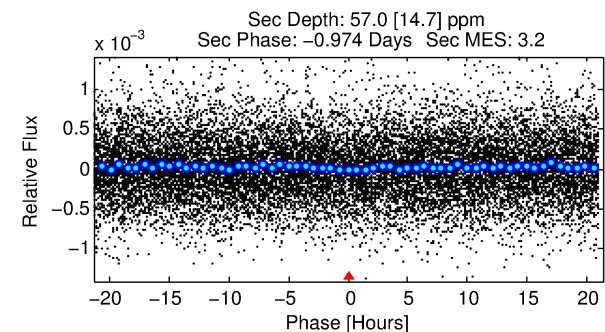
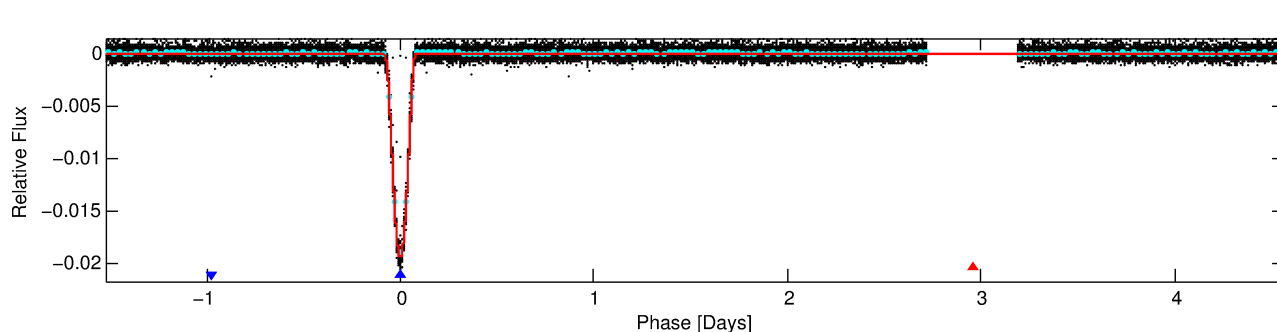
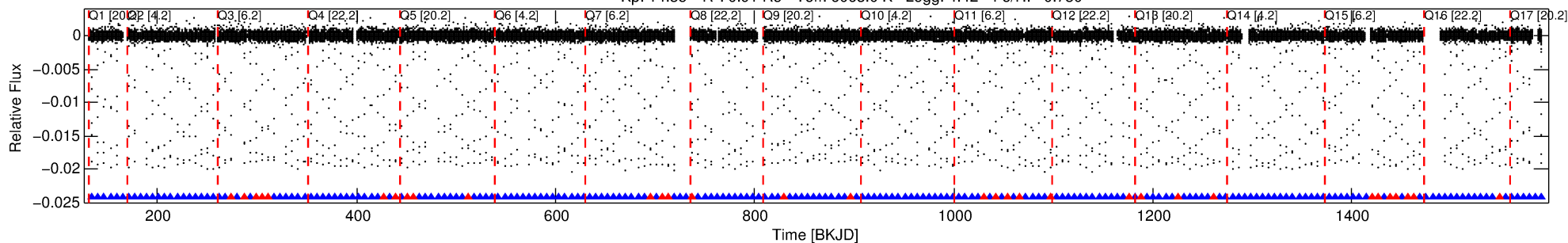
## Ephemeris Match Information For 006231401-02

No Significant Match Found

# DV One-Page Summary

KIC: 6231401 Candidate: 2 of 2 Period: 6.092 d  
KOI: K06679 Corr: No Ephemeris Match

Kp: 14.85 R\*: 0.91 Rs Teff: 6063.0 K Logg: 4.42 Fe/H: -0.780



## DV Fit Results:

Period = 6.09196 [0.00000] d  
Epoch = 134.6313 [0.0001] BKJD  
Rp/R\* = 0.2113 [0.0093]  
a/R\* = 9.35 [0.05]  
b = 0.98 [0.01]  
Seff = 273.08 [88.93]  
Teq = 1037 [84] K  
Rp = 21.05 [5.31] Re  
a = 0.0608 [0.0127] AU  
Ag = 0.26 [0.11] [-6.93σ]  
Teff = 1146 [85] K [0.91σ]

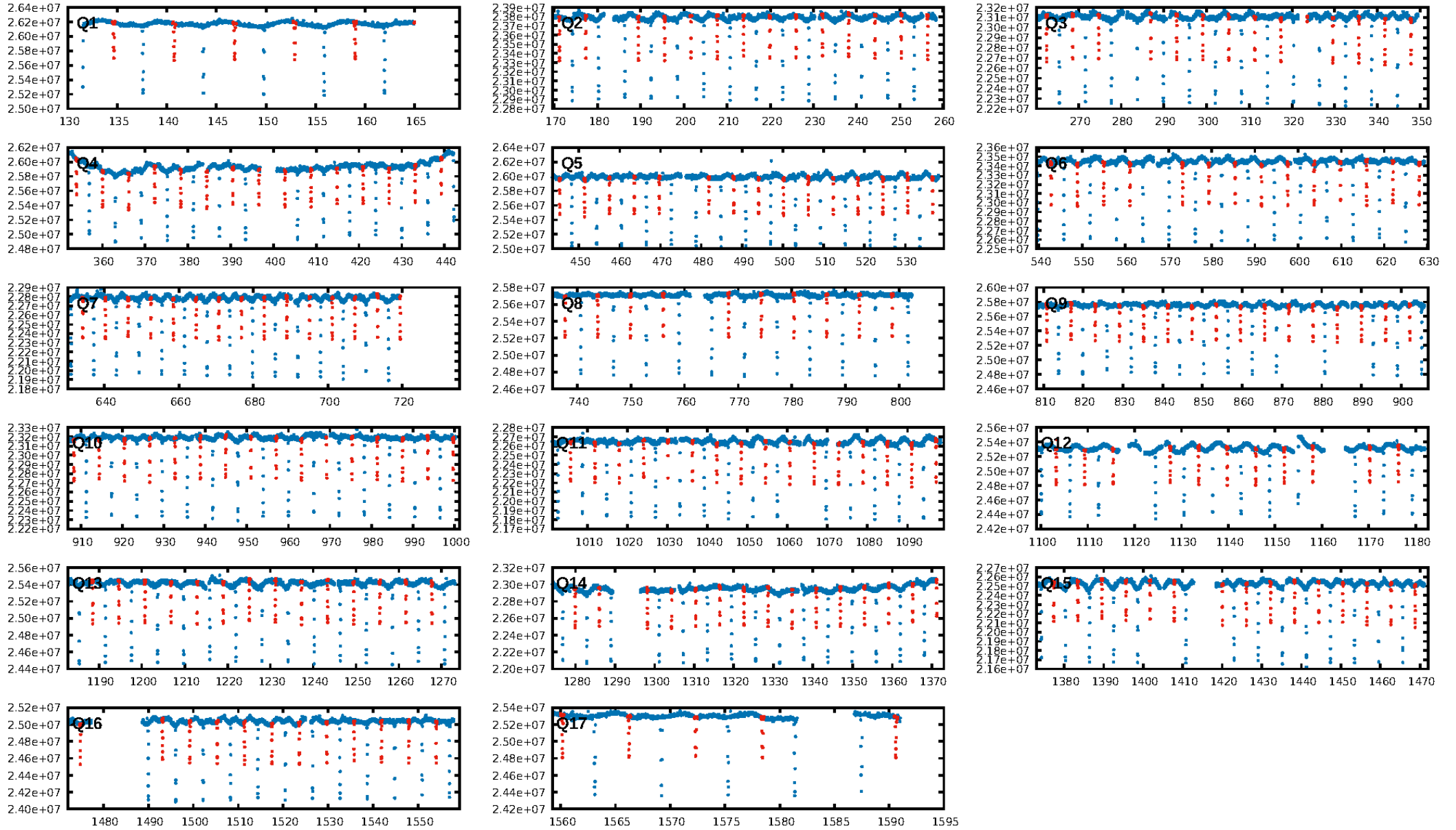
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.85 [179/211]  
GhostDiagnostic-chr: 6.778  
Centroid-sig: 0.0%  
Centroid-so: 0.140 arcsec [11.26σ]  
OotOffset-rm: 0.051 arcsec [0.05σ]  
KicOffset-rm: 0.103 arcsec [1.52σ]  
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]

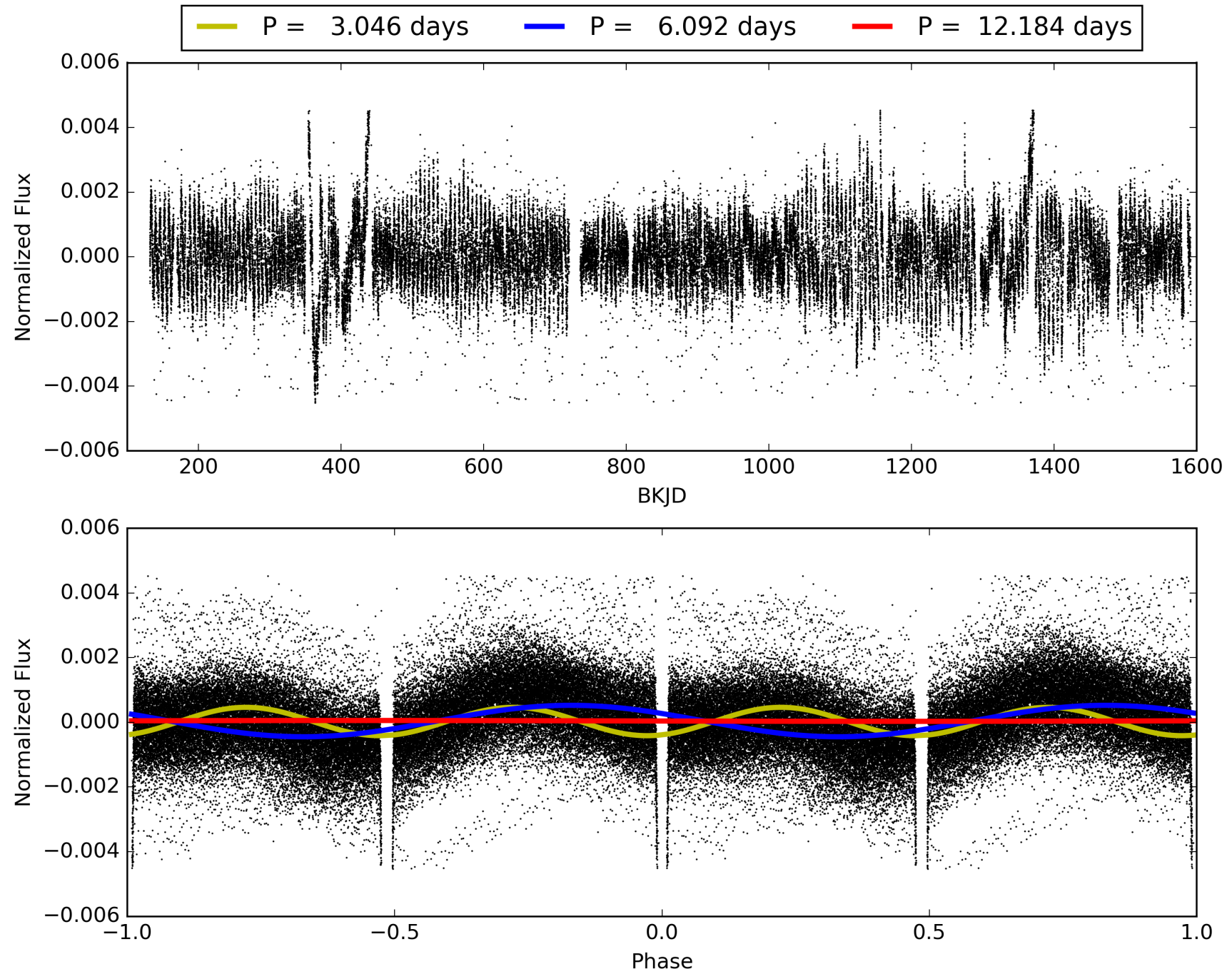
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:06:49 Z

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

# TCE 006231401-02, PDC Light Curves



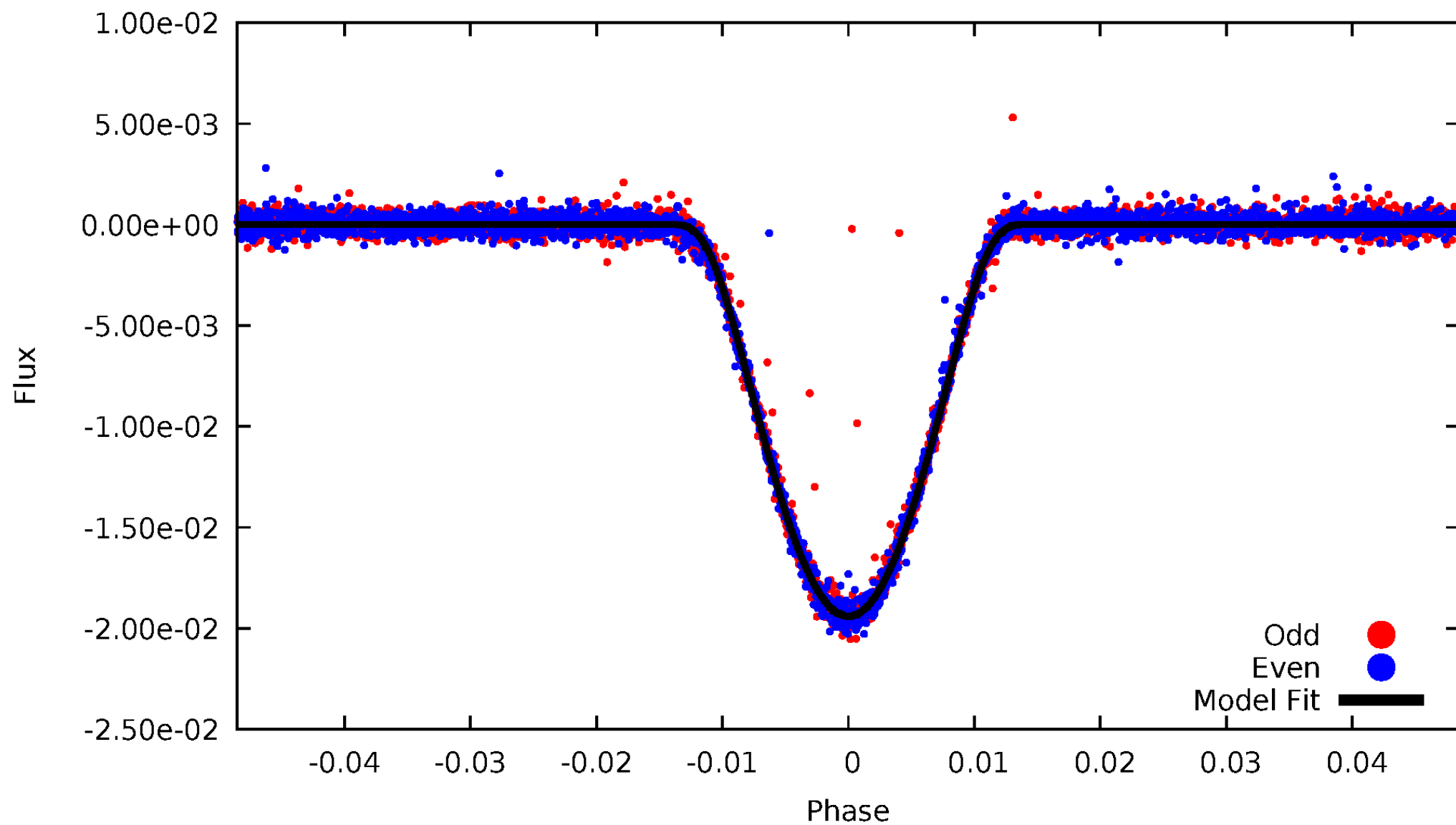
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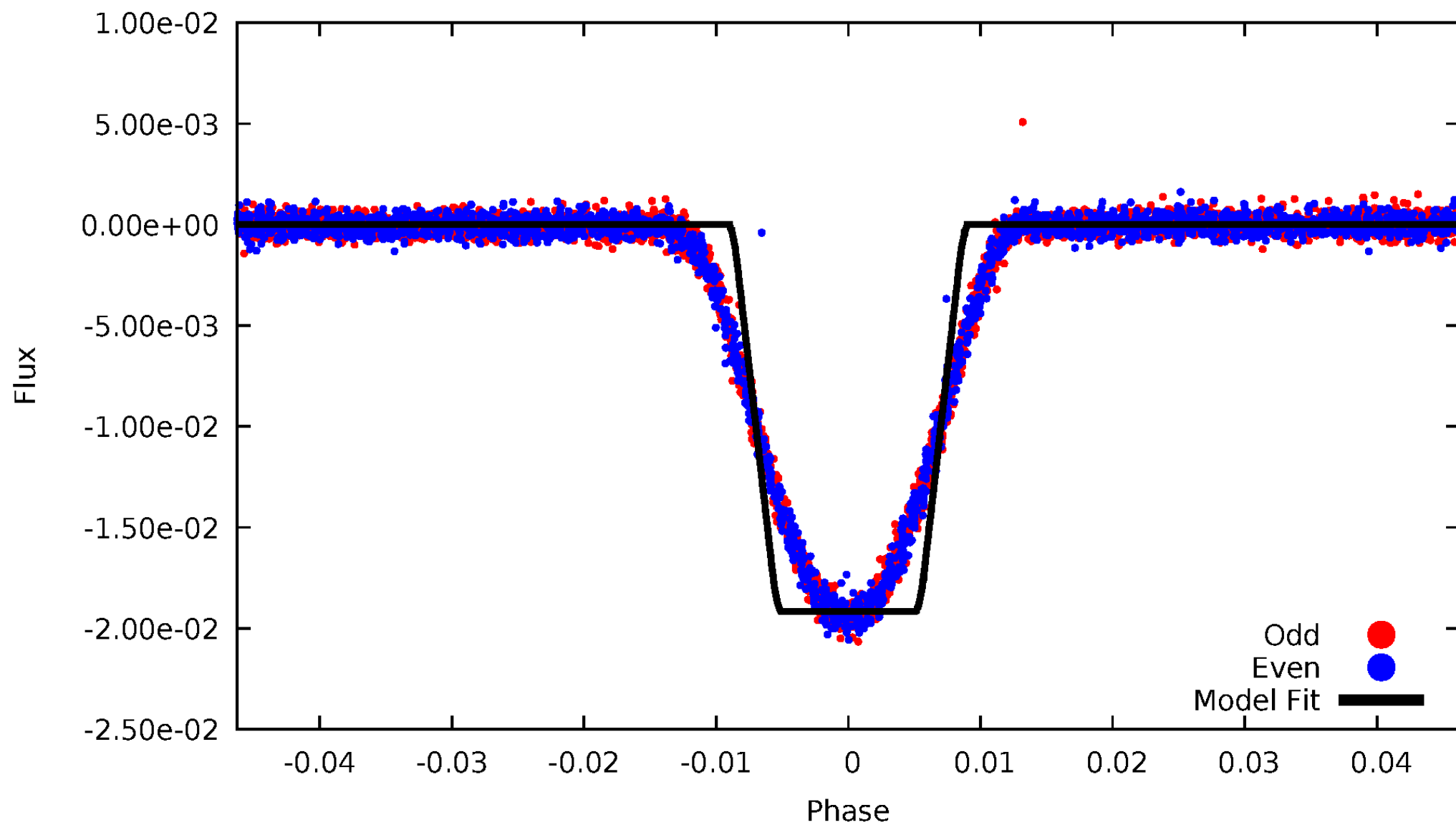
# DV Odd/Even

TCE 006231401-02



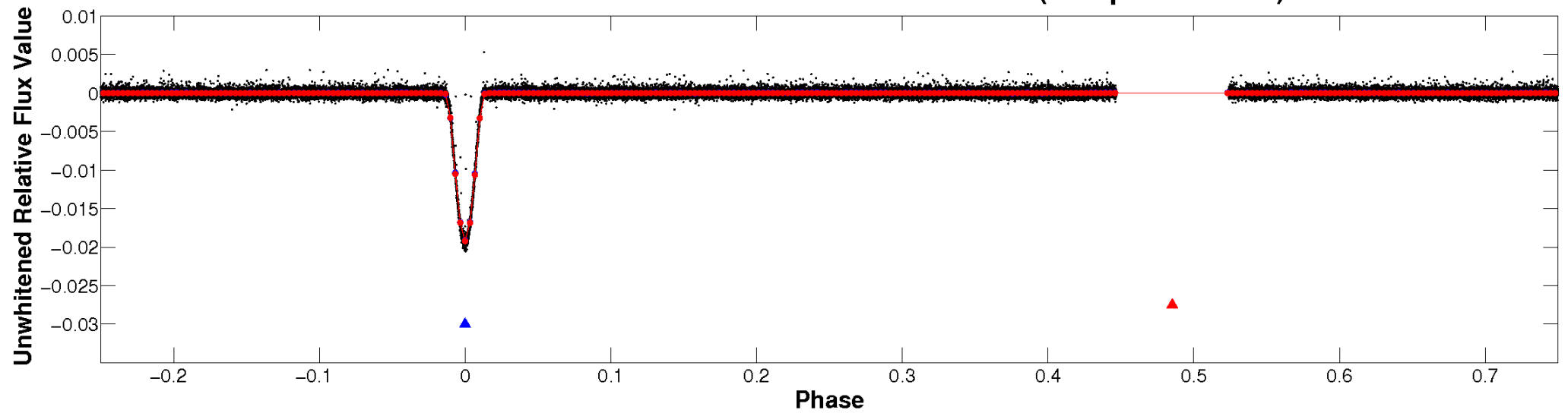
# ALT Odd/Even

TCE 006231401-02

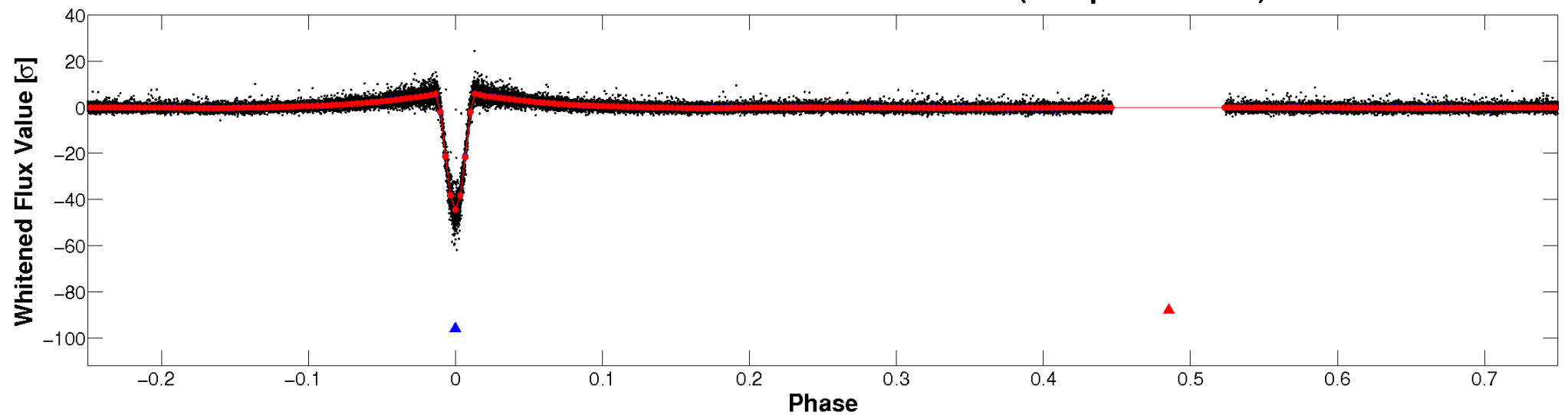


# Non-Whitened Vs. Whitened Light Curve

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

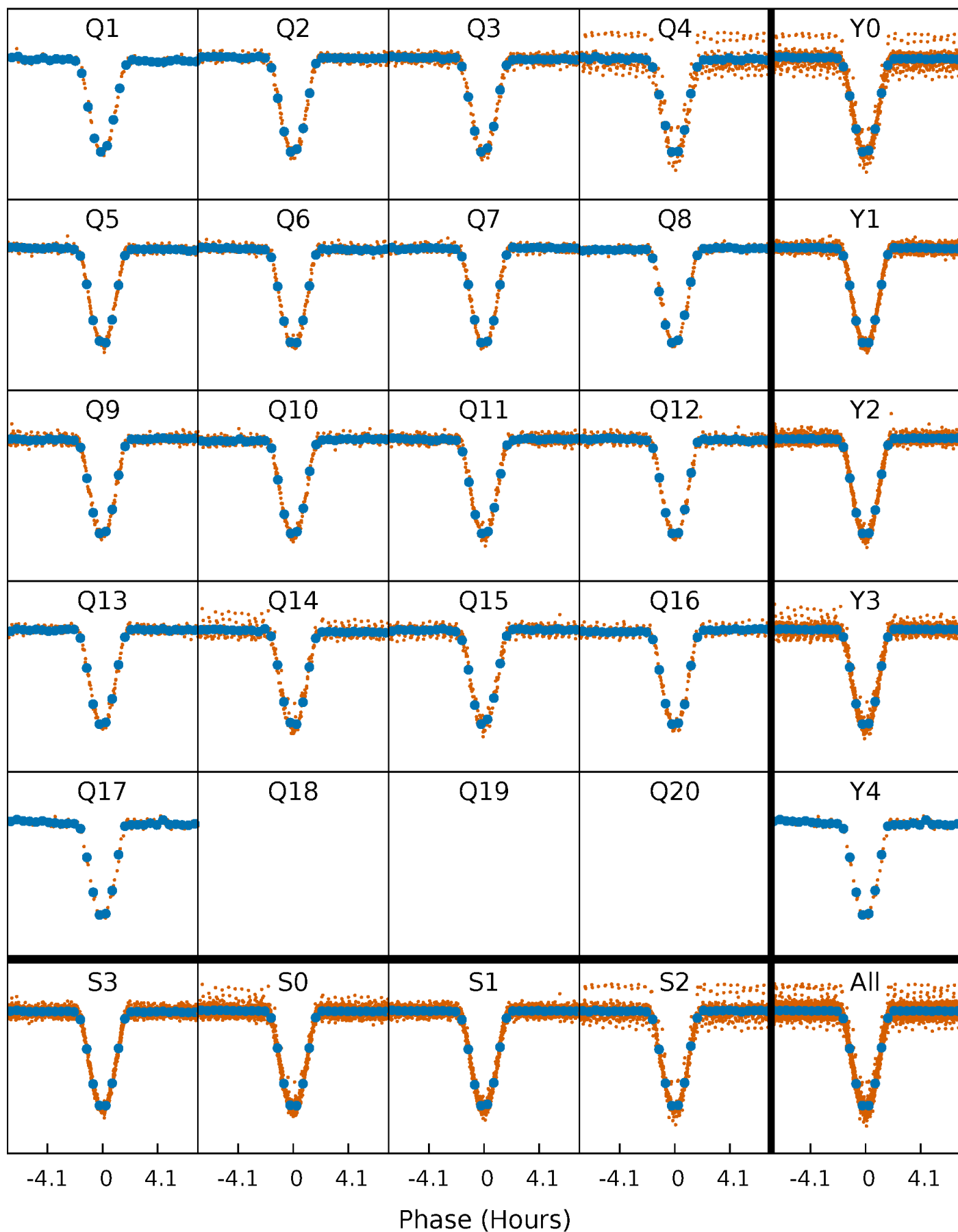


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



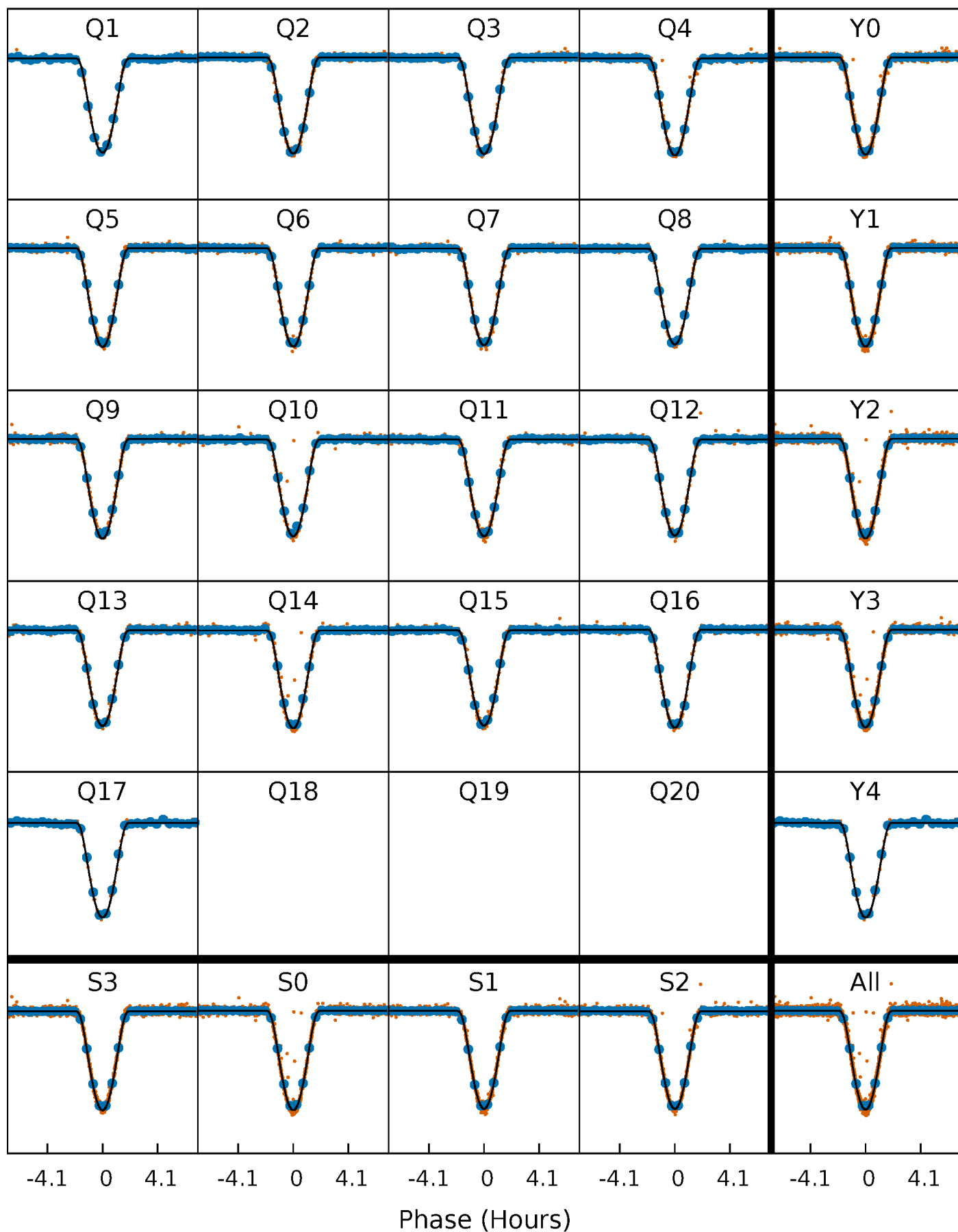
# PDC Quarter-Phased Transit Curves

TCE 006231401-02   P= 6.091955 Days    $T_0=134.631322$  (BKJD)



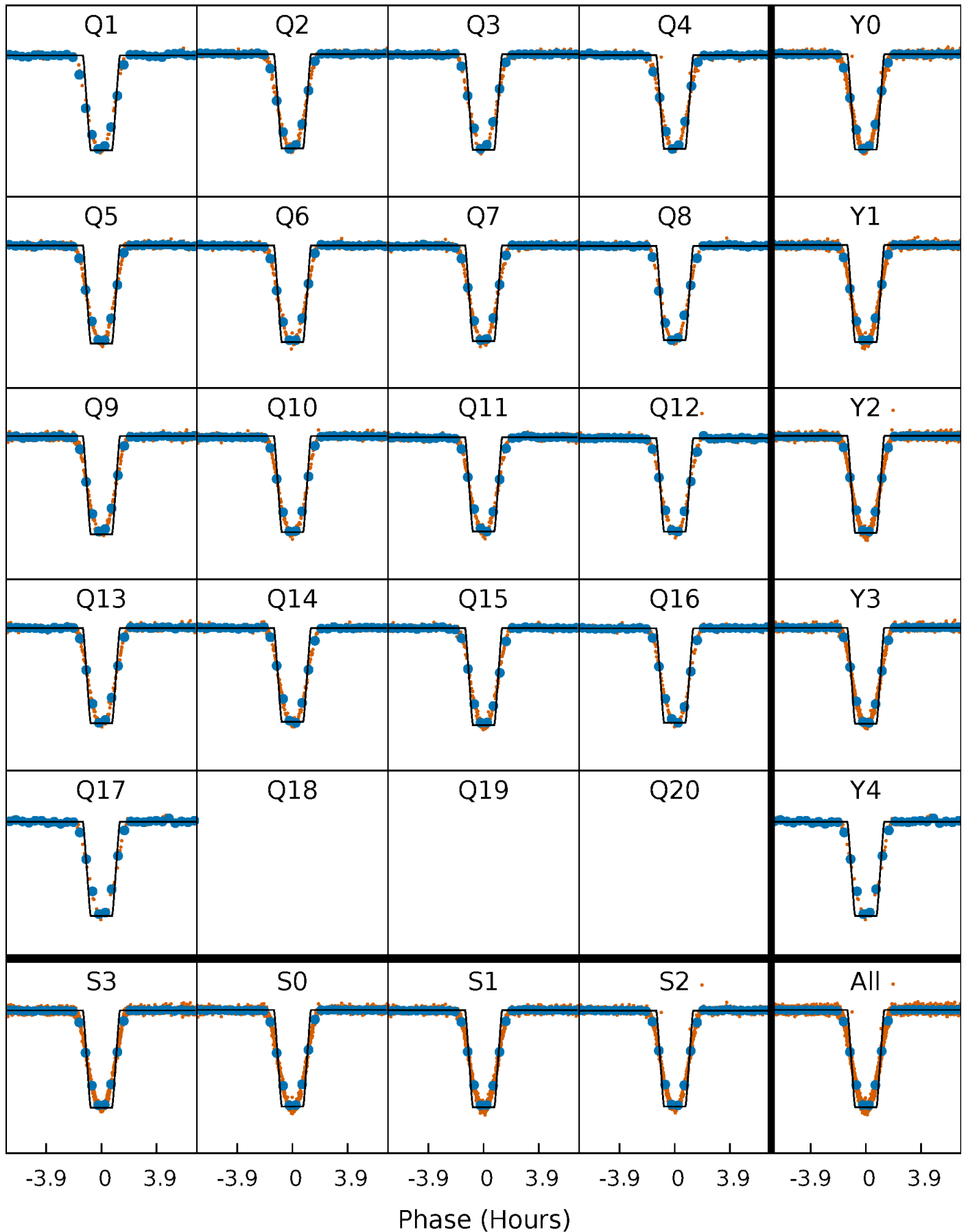
# DV Quarter-Phased Transit Curves

TCE 006231401-02   P= 6.091955 Days    $T_0=134.631322$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

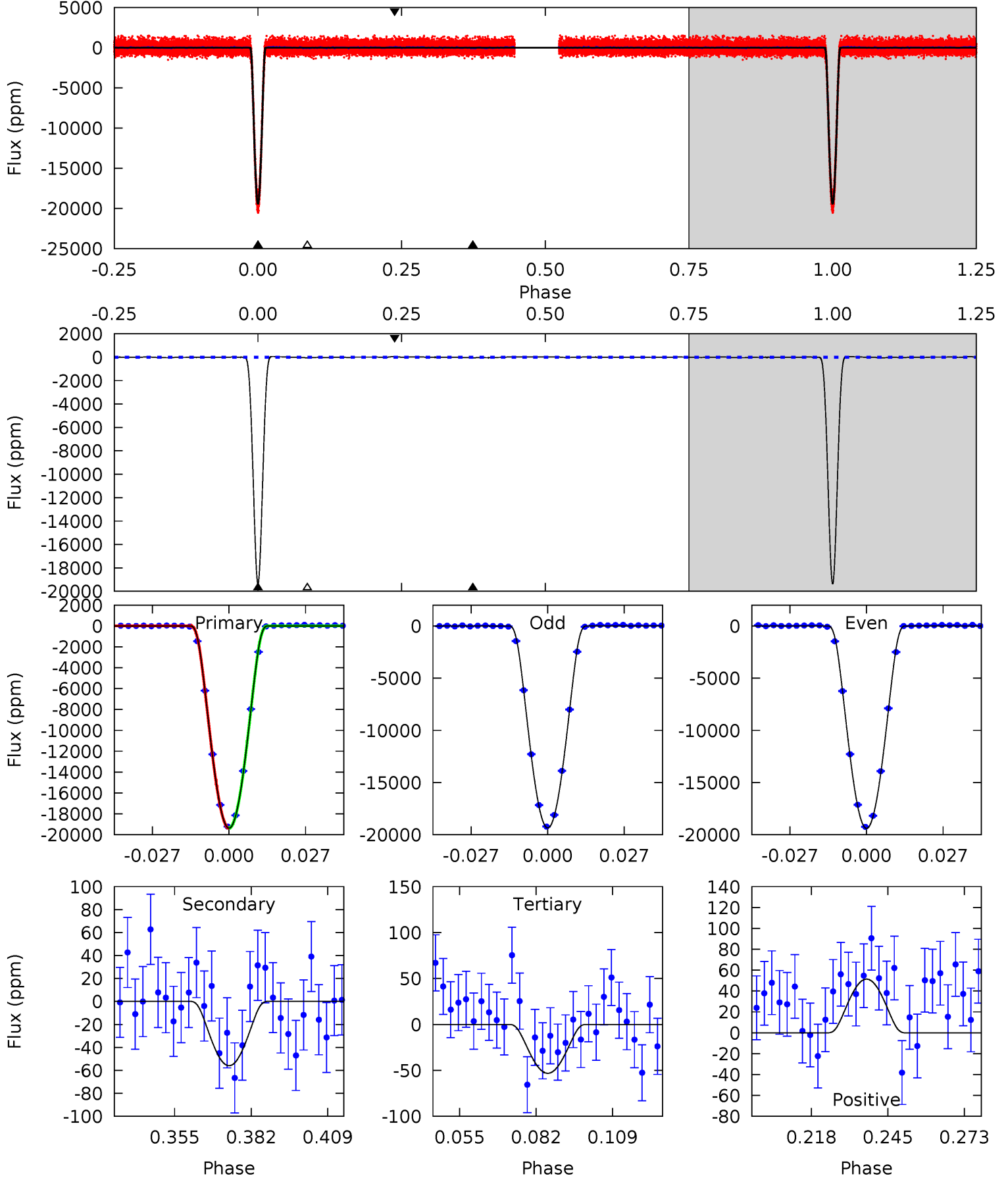
TCE 006231401-02   P= 6.091935 Days    $T_0=134.633697$  (BKJD)



# DV Model-Shift Uniqueness Test

006231401-02, P = 6.091955 Days, E = 128.539367 Days

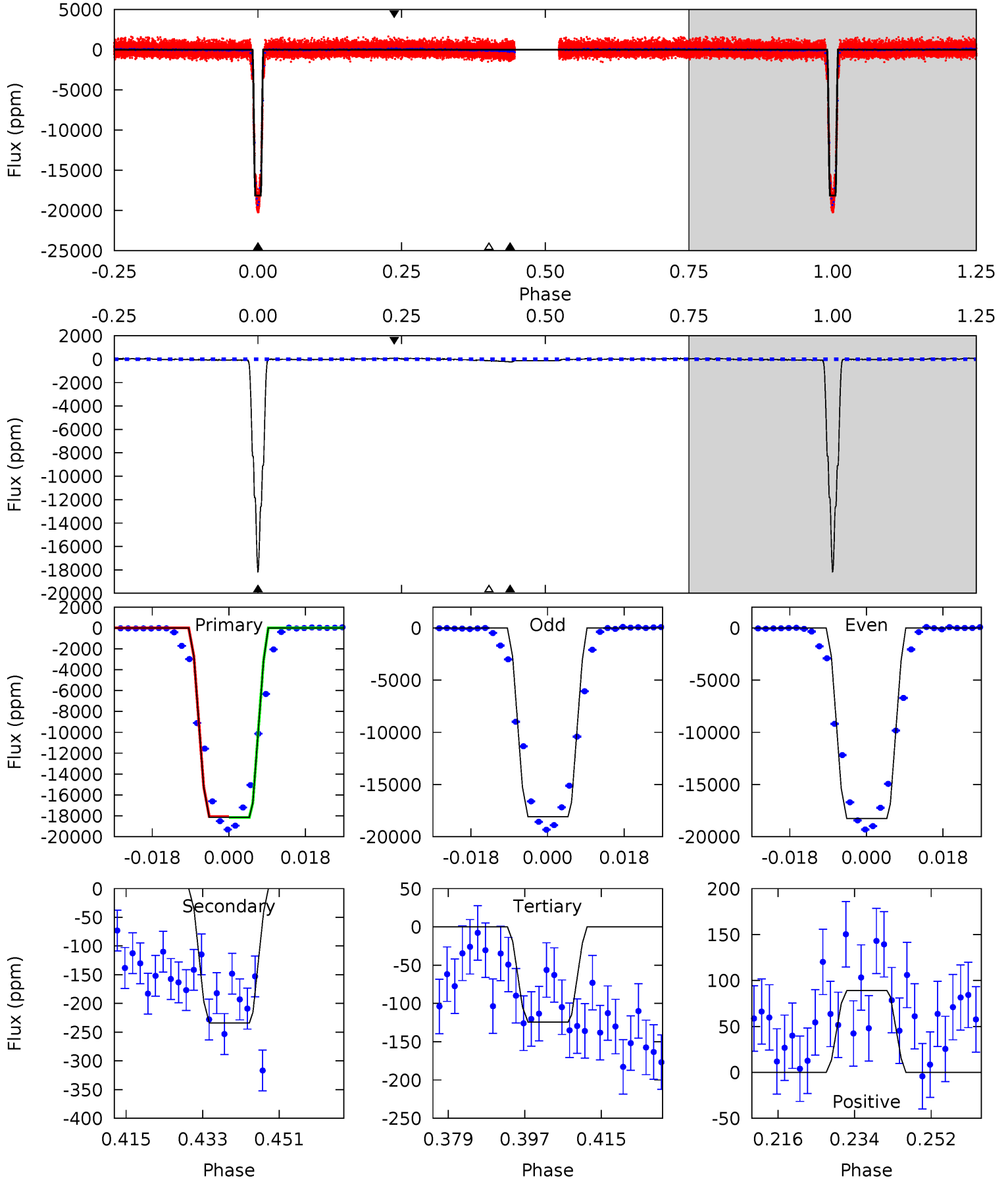
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2164	6.25	5.94	5.74	4.83	2.21	2.04	2158	2158	0.30	0.51	2.39	0.99	0.00	0



# Alt Model-Shift Uniqueness Test

006231401-02, P = 6.091935 Days, E = 128.541762 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
1343	17.3	9.21	6.60	4.91	2.37	3.33	1334	1337	8.10	10.7	6.35	1.00	0.00	2.94





### Stellar Parameters For KIC 006231401

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6063^{+182}_{-182}$	$4.424^{+0.135}_{-0.165}$	$-0.780^{+0.300}_{-0.300}$	$0.913^{+0.227}_{-0.140}$	$0.806^{+0.093}_{-0.057}$	$1.493^{+0.912}_{-0.652}$
	+3%/-3%	+3%/-4%	+38%/-38%	+25%/-15%	+12%/-7%	+61%/-44%
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 006231401-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-56 \pm 9$	$21.18^{+2.97}_{-2.10}$	$1451^{+99}_{-74}$	$-1796^{+3472}_{-190}$	$0.251^{+0.076}_{-0.066}$
Alt.	$-234 \pm 14$	$13.98^{+1.79}_{-1.75}$	$1446^{+96}_{-78}$	$2720^{+75}_{-71}$	$2.462^{+0.735}_{-0.546}$

$T_{\text{max}}$  = 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

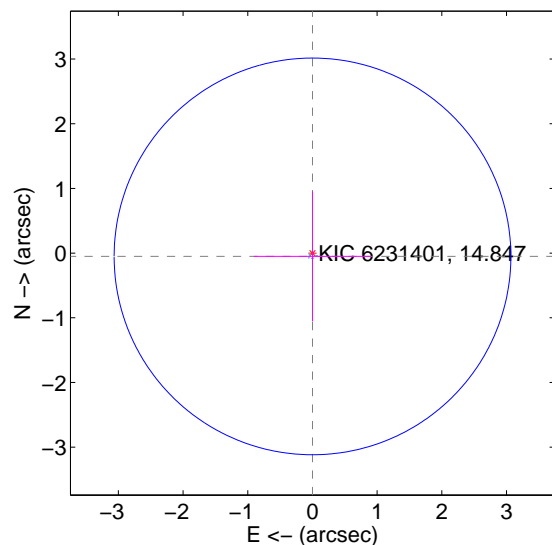
Supplemental centroid analysis for 006231401-02. Kepler magnitude: 14.85. Transit SNR 1104.53

There are 17 quarters with good PRF difference image offsets

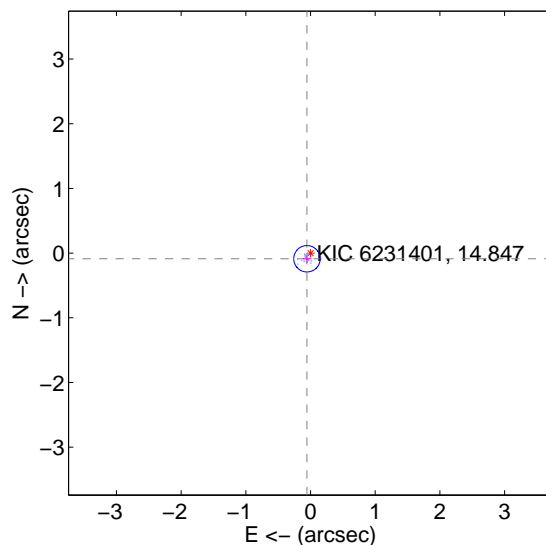
The OOT PRF centroid is offset from the target star catalog position by about 13.88 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.051 \pm 1.022$	0.05	$-0.001 \pm 0.905$	$-0.051 \pm 1.005$
PRF-fit source offset from KIC position	$0.103 \pm 0.068$	1.52	$0.055 \pm 0.068$	$-0.087 \pm 0.068$
photometric centroid source offset	$0.14 \pm 0.01$	11.26	$0.14 \pm 0.01$	$-0.00 \pm 0.01$

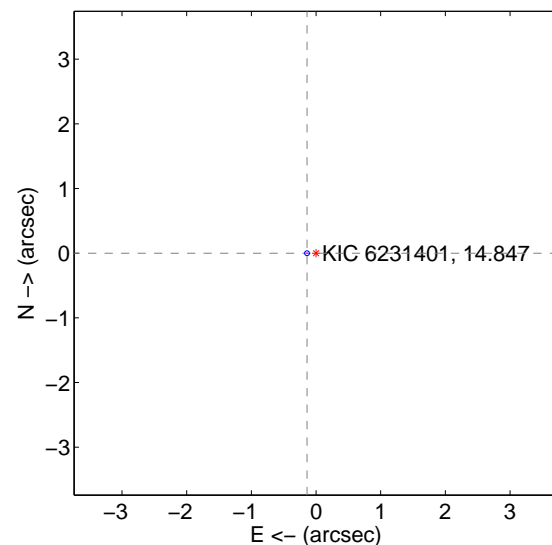
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

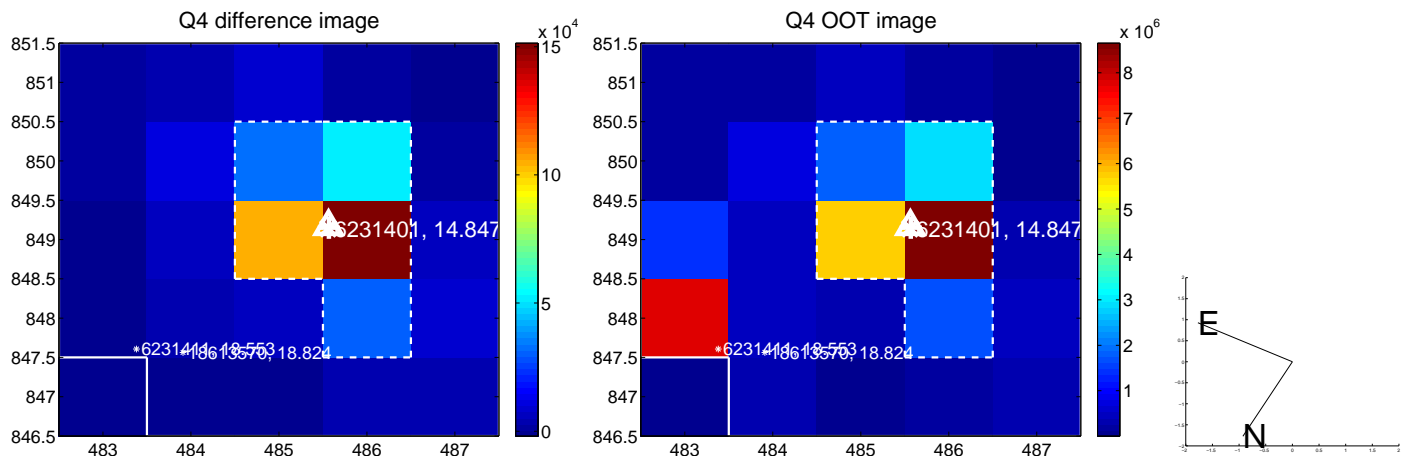
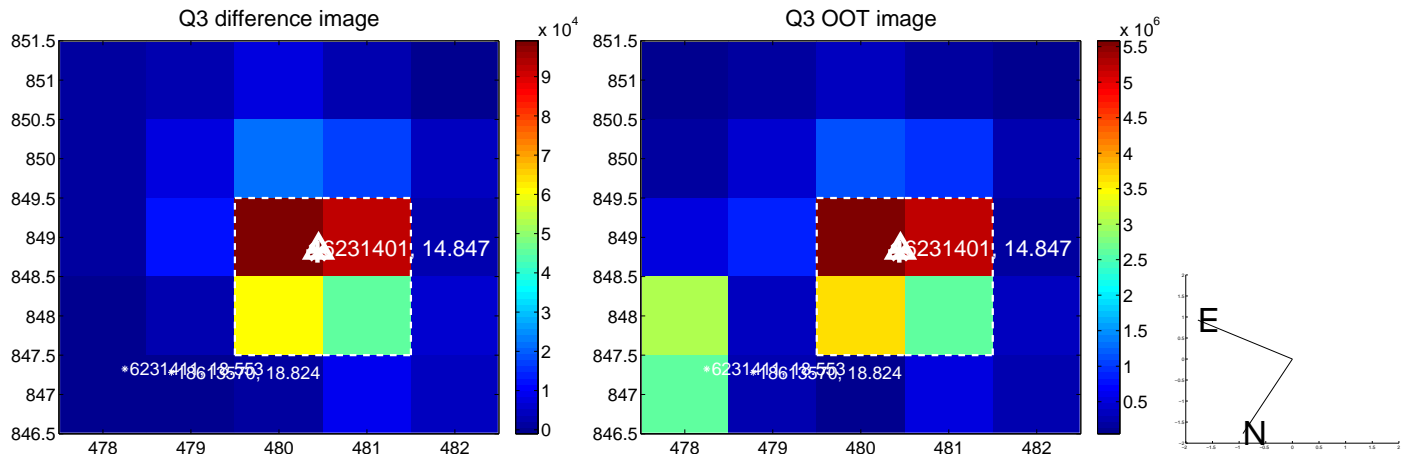
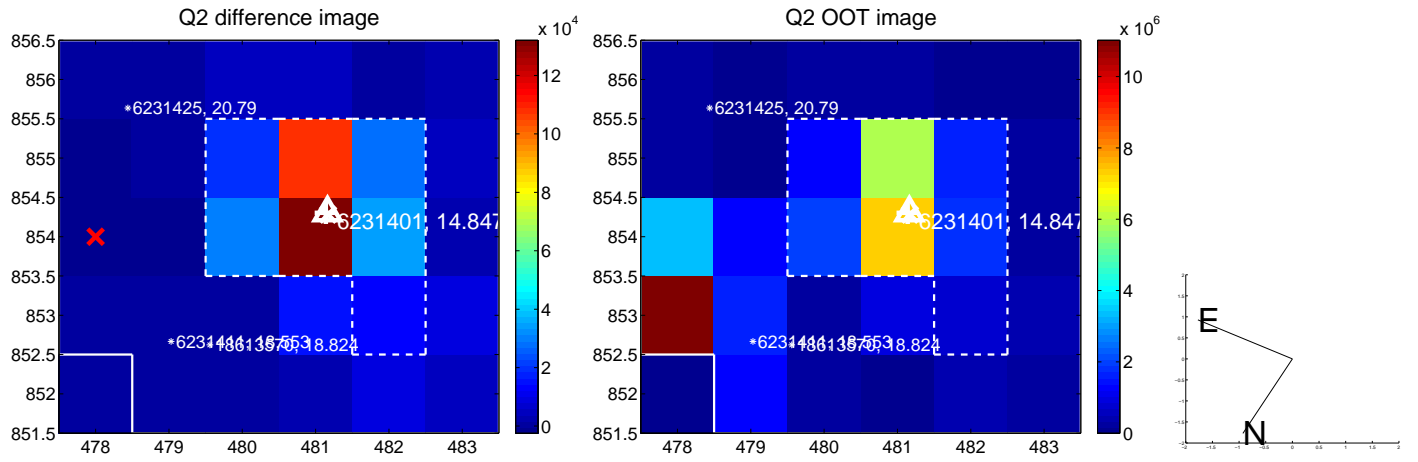
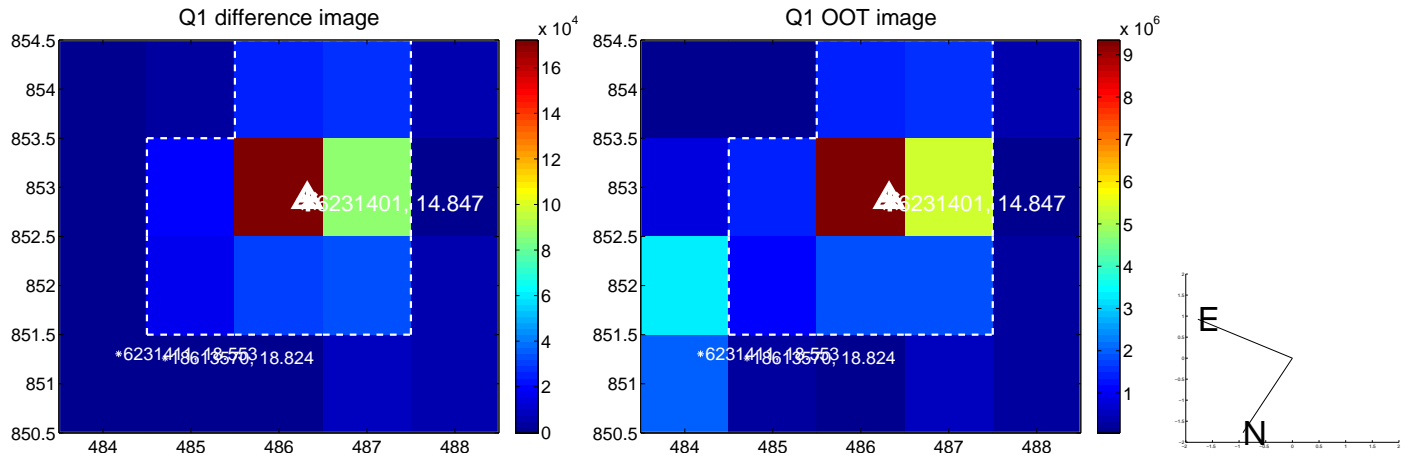


offset from photometric centroids

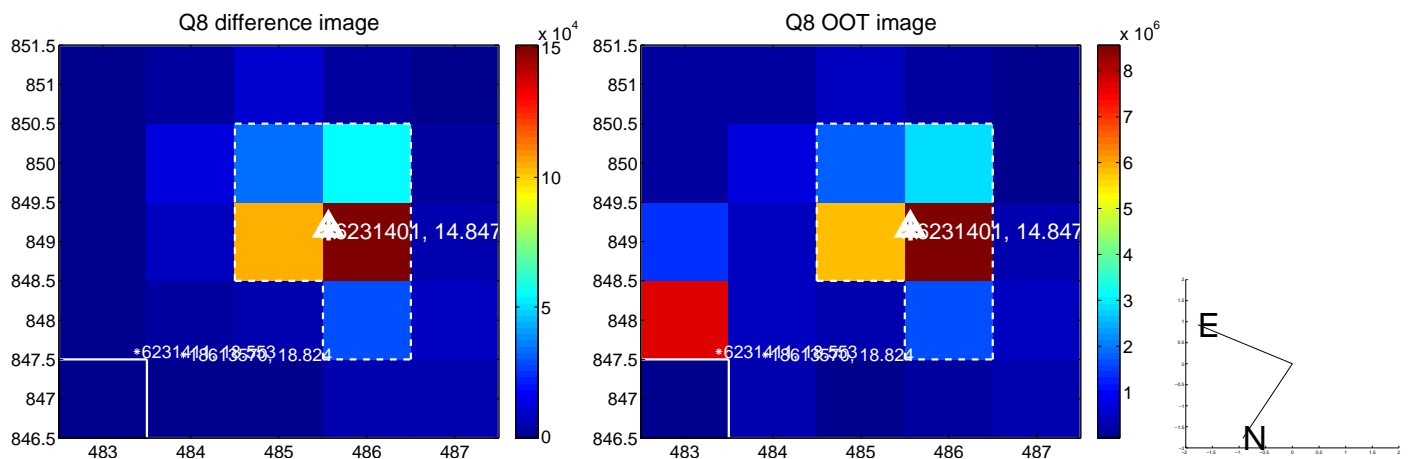
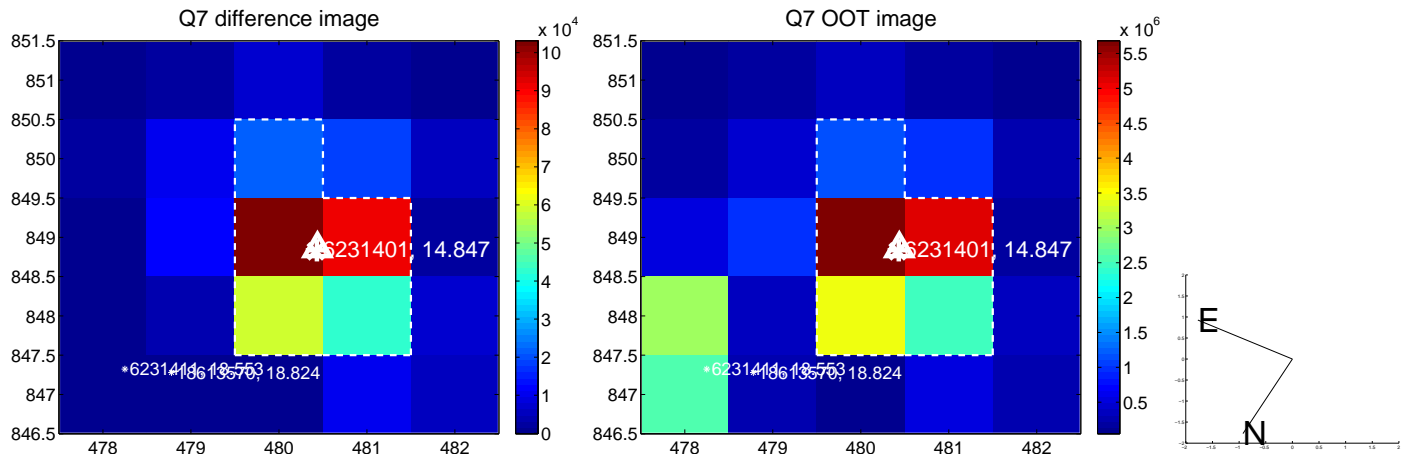
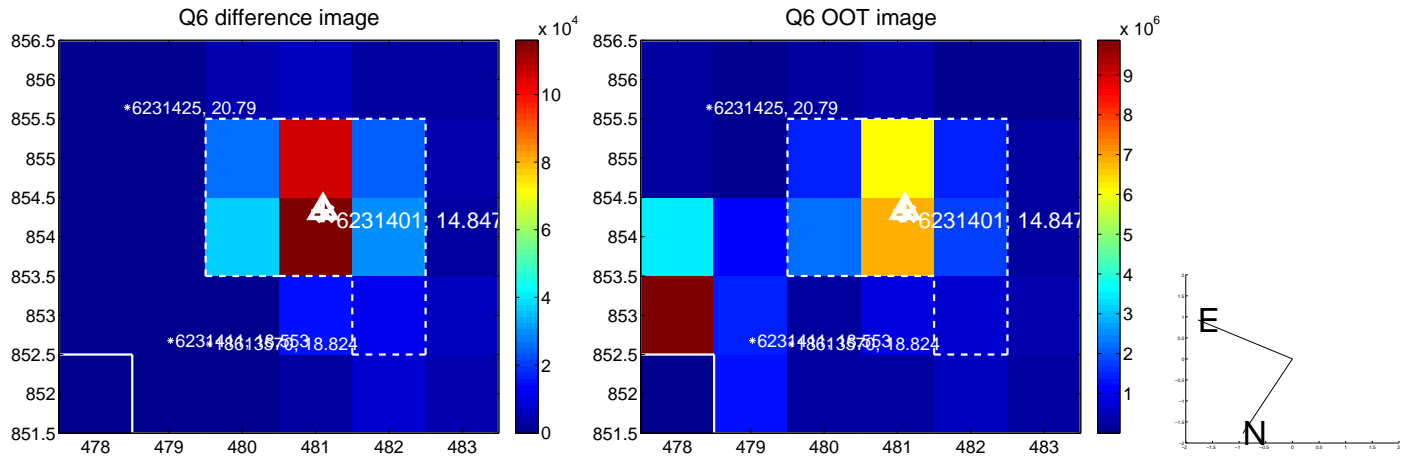
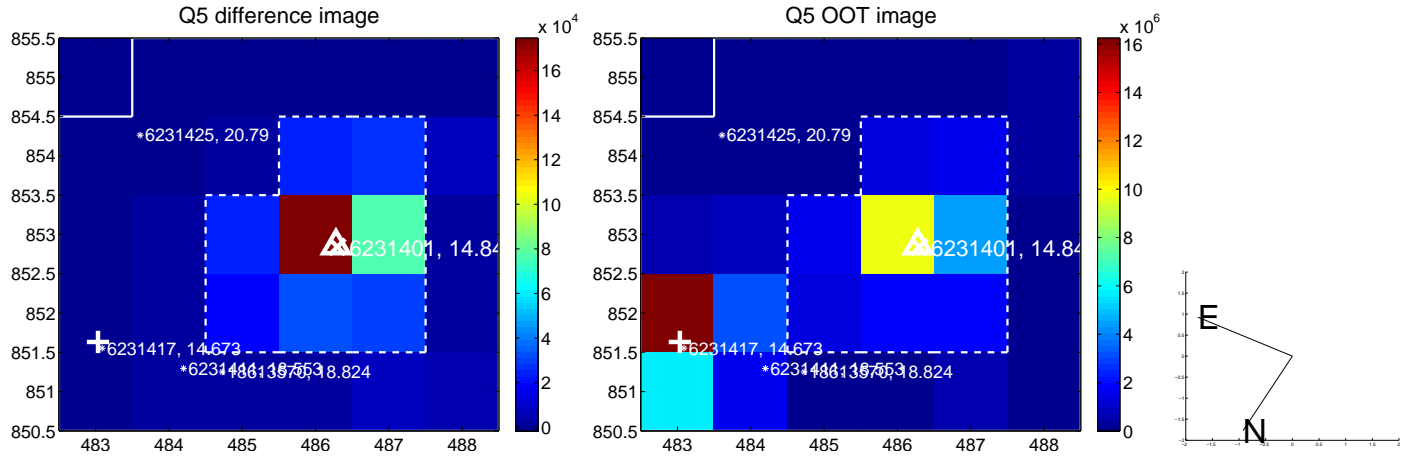


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

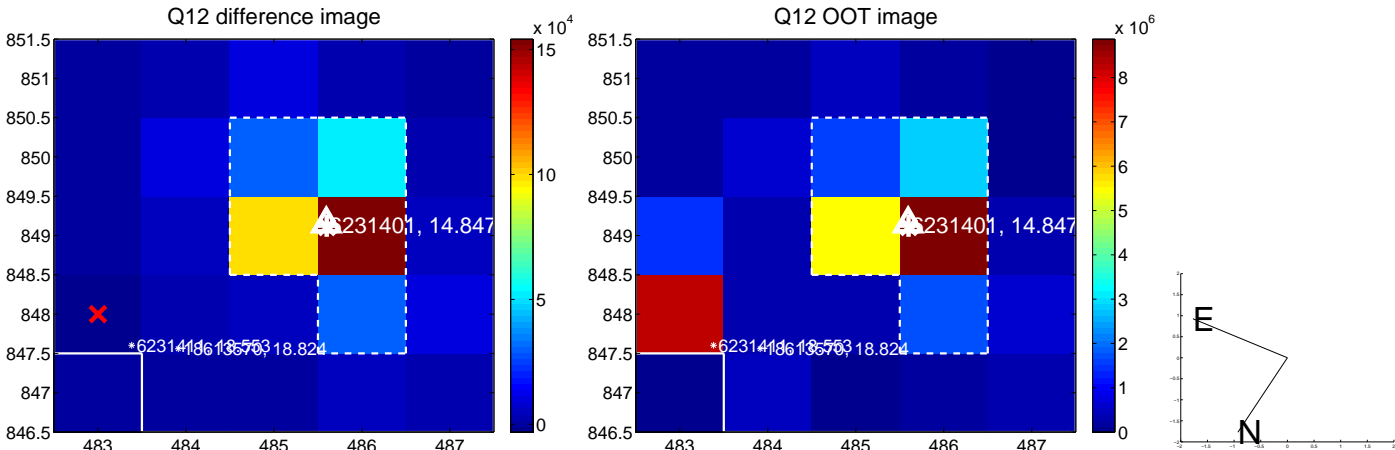
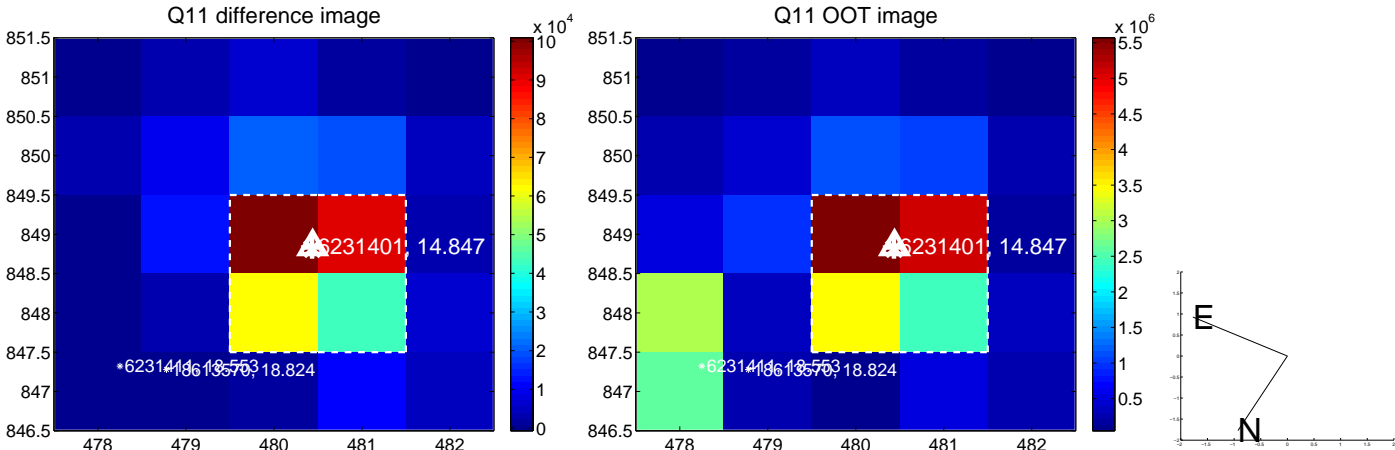
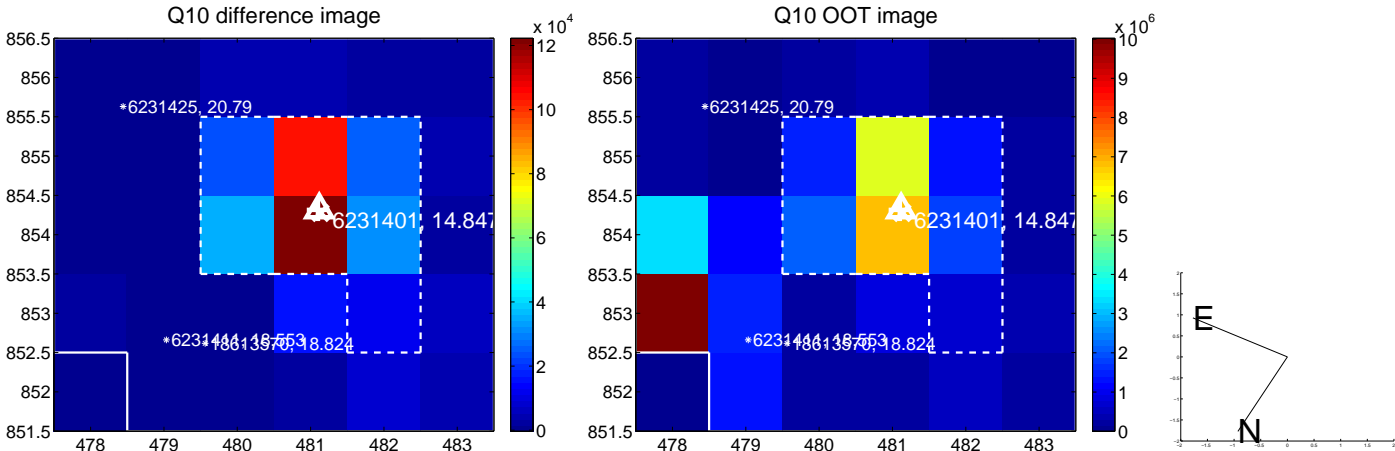
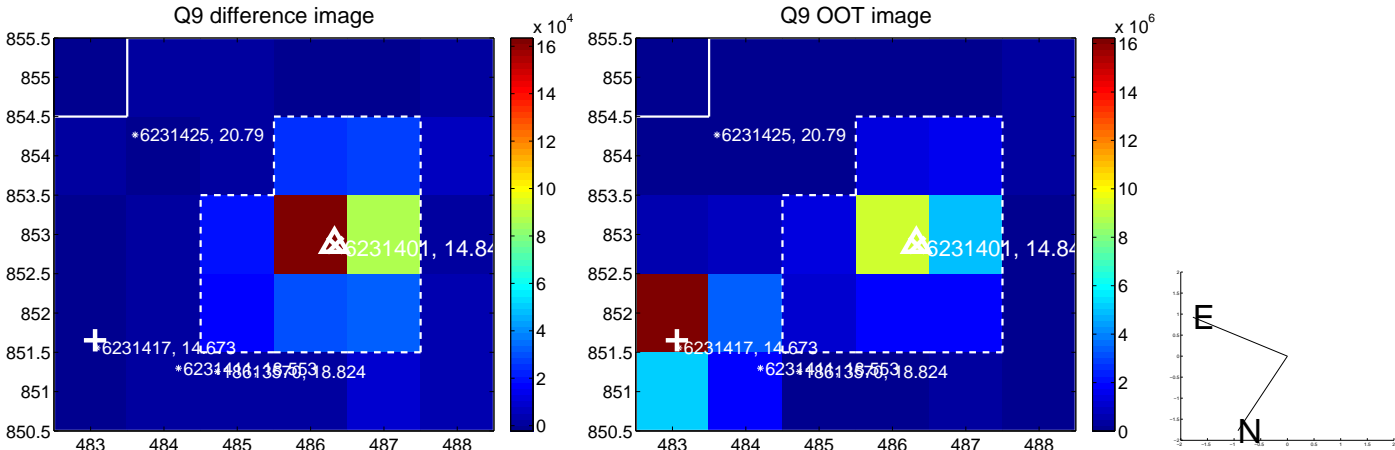
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



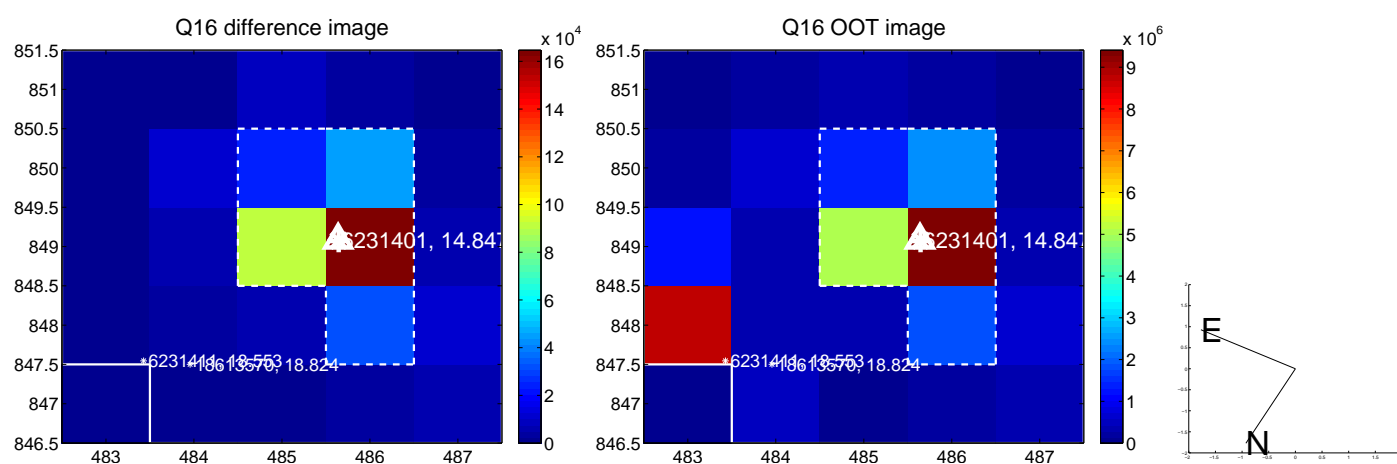
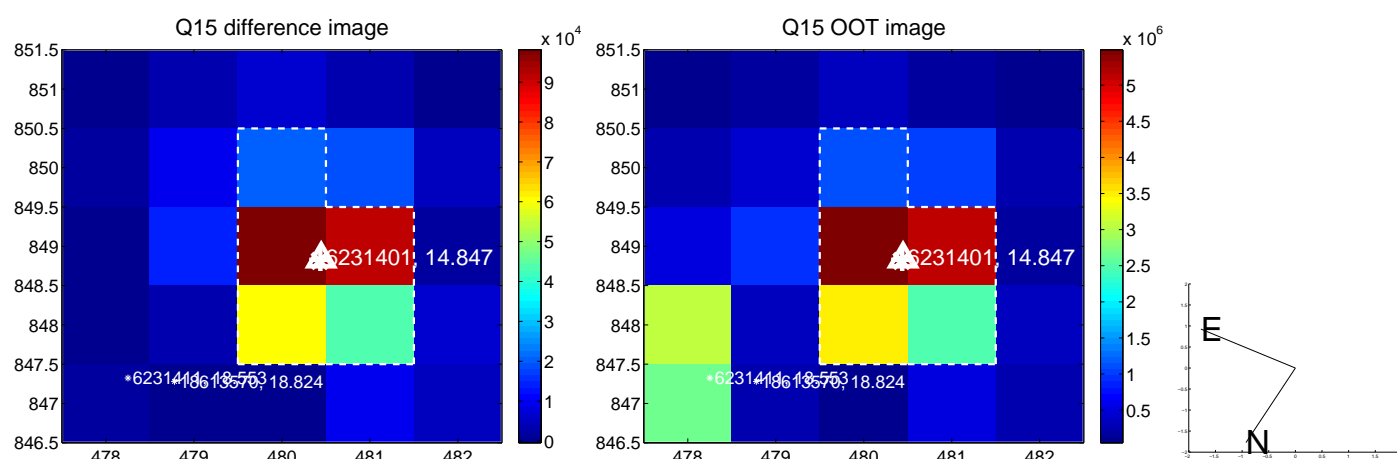
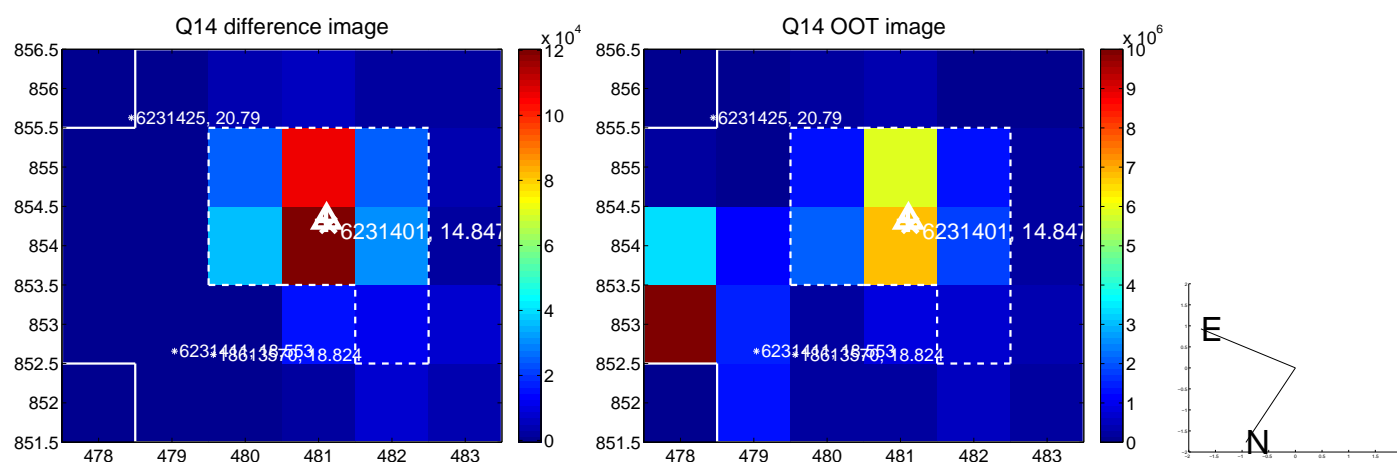
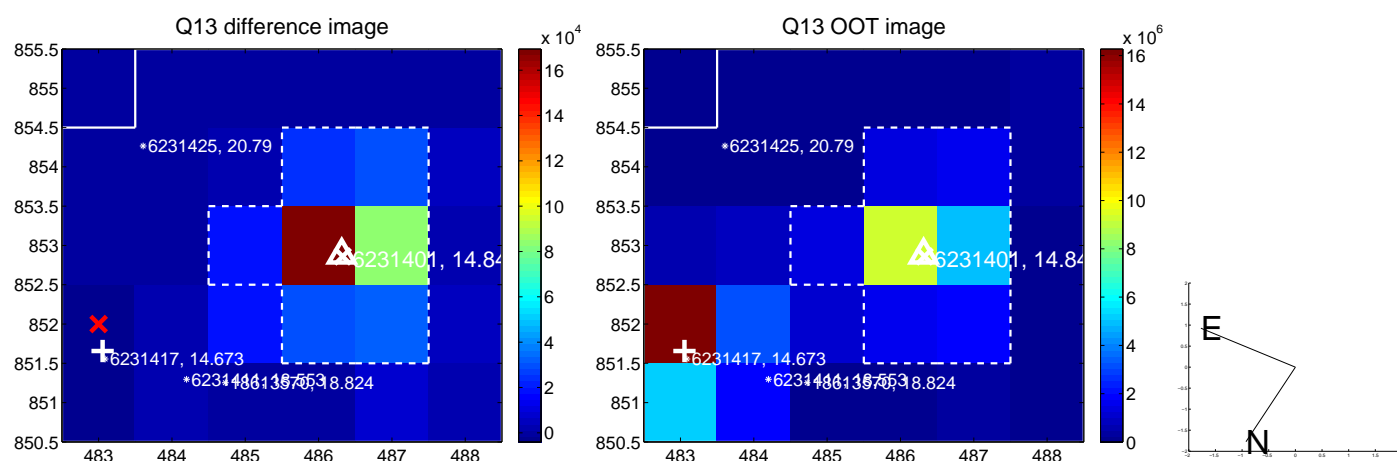
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



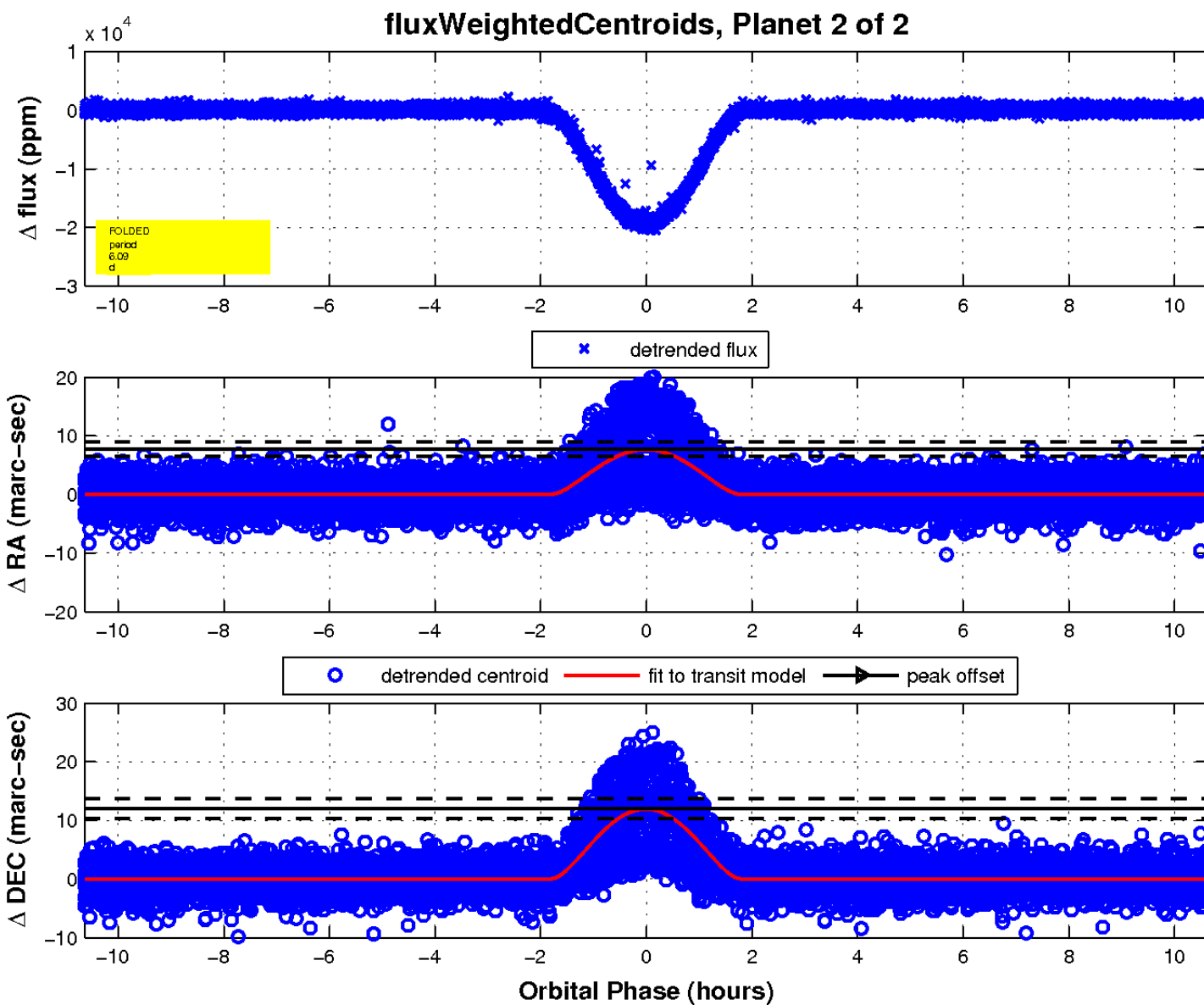
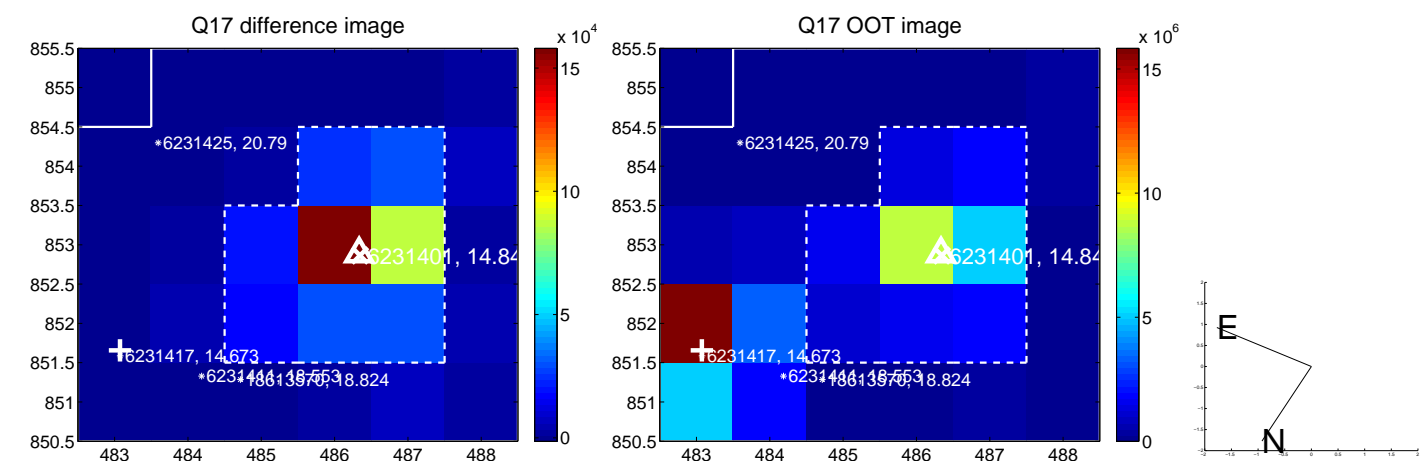
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

