

# KIC 006041734

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006041734-01	OBS	2167.01	24.339560	136.064227	772.8	3.743	20.4	22.0	1.47	5596	5.04	69.94
006041734-02	OBS	2167.03	76.535782	164.174138	724.1	6.387	12.3	13.4	1.47	5596	4.85	15.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006041734-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
006041734-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

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

## Ephemeris Match Information For 006041734-01

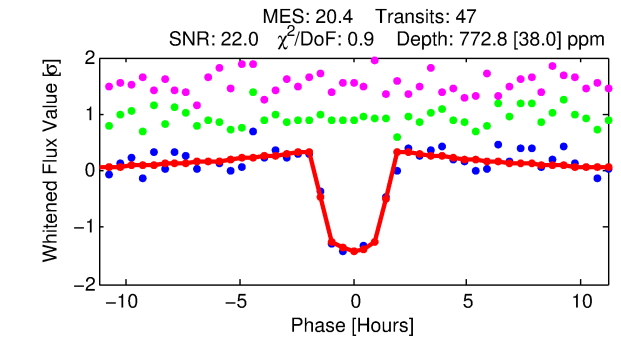
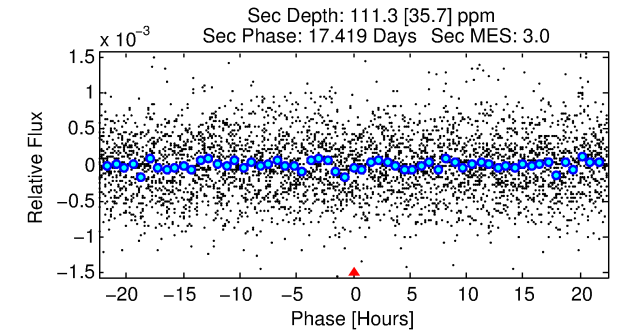
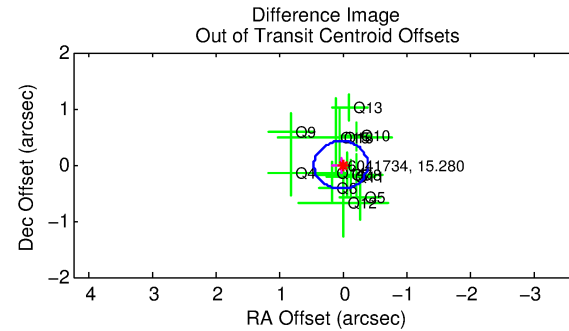
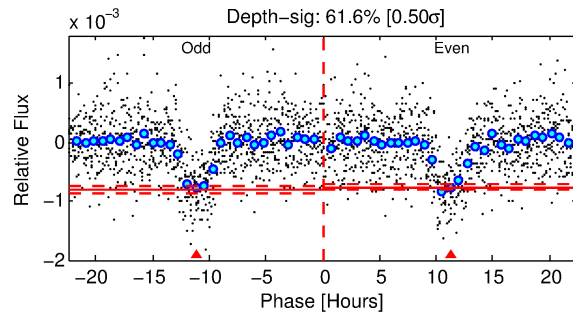
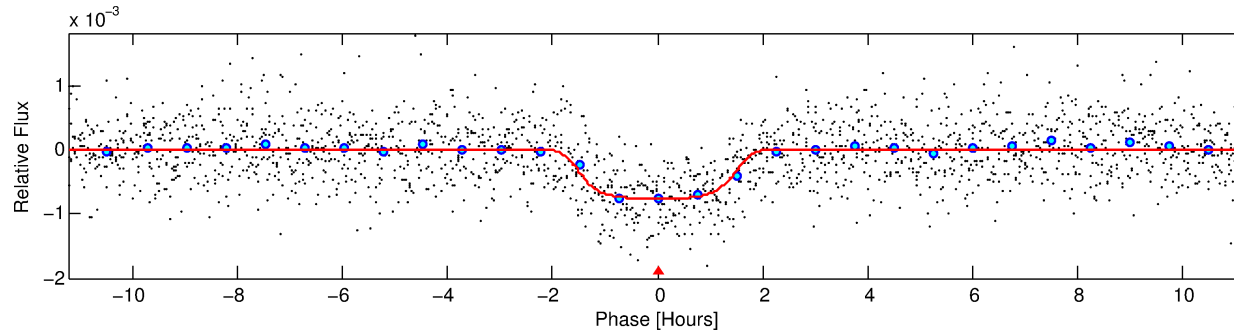
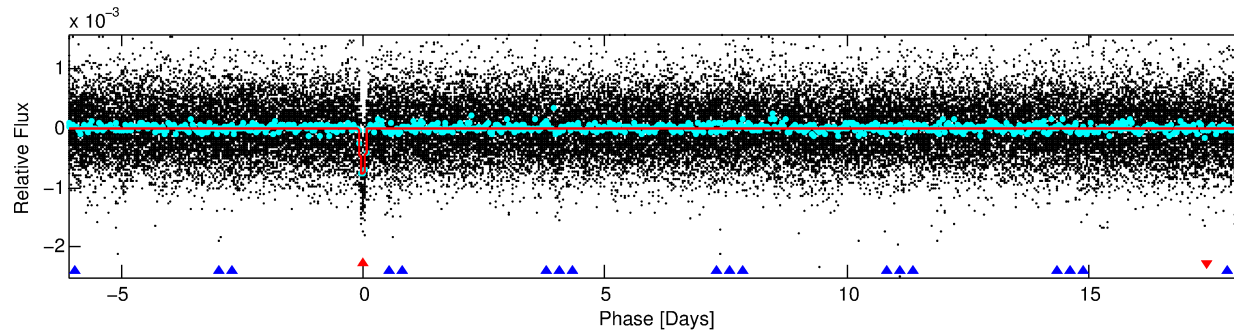
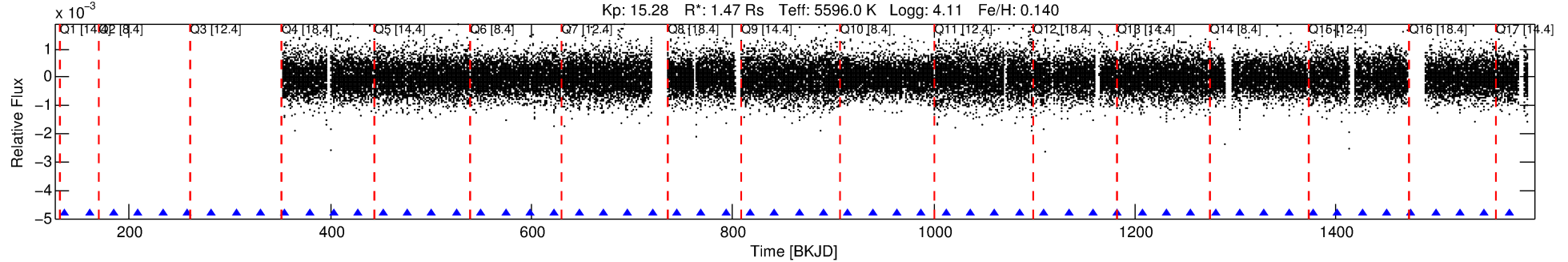
No Significant Match Found

# DV One-Page Summary

KIC: 6041734 Candidate: 1 of 2 Period: 24.340 d

KOI: K02167.01 Corr: 0.938

Kp: 15.28 R\*: 1.47 Rs Teff: 5596.0 K Logg: 4.11 Fe/H: 0.140



## DV Fit Results:

Period = 24.33956 [0.00012] d  
Epoch = 136.0642 [0.0043] BKJD  
Rp/R\* = 0.0315 [0.0018]  
a/R\* = 22.57 [4.52]  
b = 0.93 [0.03]  
Seff = 69.94 [24.50]  
Teq = 737 [65] K  
Rp = 5.04 [1.16] Re  
a = 0.1643 [0.0353] AU  
Ag = 65.07 [31.53] [2.03σ]  
Teffp = 3238 [280] K [8.71σ]

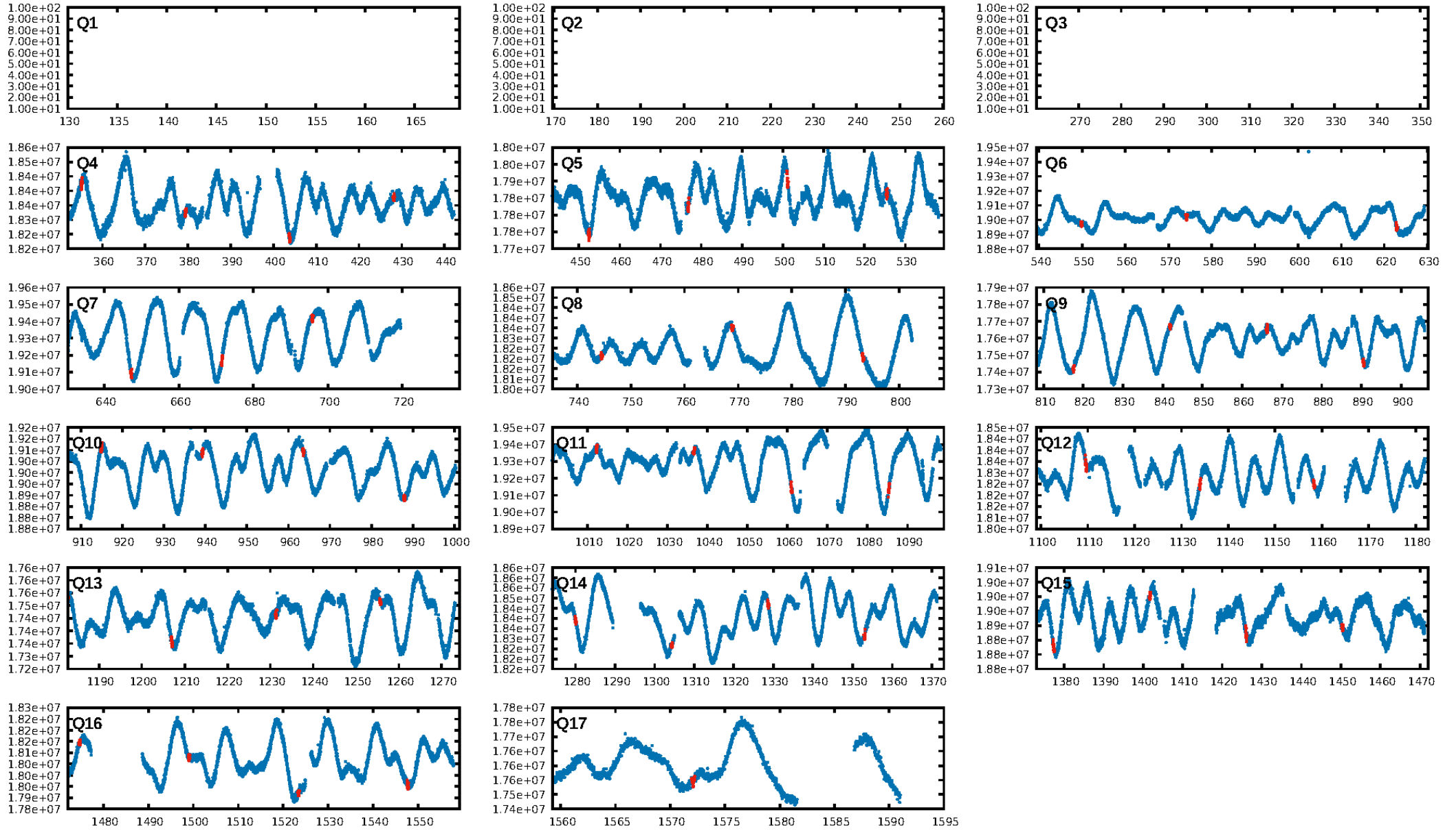
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [169.21σ]  
ModelChiSquare2-sig: 94.4%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.44e-82  
RollingBand-fgt: 1.00 [46/46]  
GhostDiagnostic-chr: -2.736  
Centroid-sig: 66.1%  
Centroid-so: 0.746 arcsec [1.06σ]  
OotOffset-rm: 0.042 arcsec [0.29σ]  
KicOffset-rm: 0.065 arcsec [0.47σ]  
OotOffset-st: 3/3/4/3 [13]  
KicOffset-st: 3/3/4/3 [13]  
DiffImageQuality-fgm: 1.00 [13/13]  
DiffImageOverlap-fno: 1.00 [14/14]

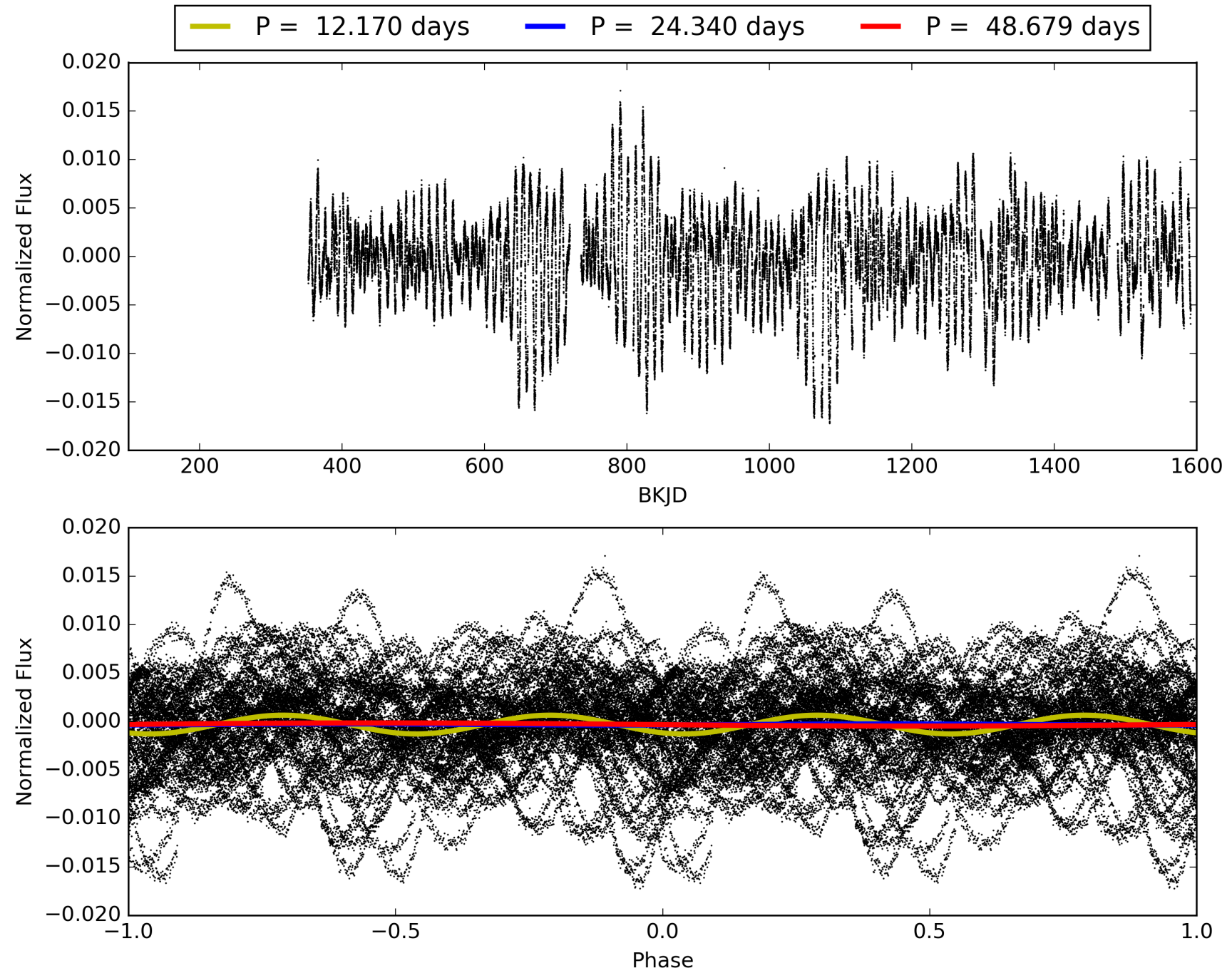
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 18:42:43 Z

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

# TCE 006041734-01, PDC Light Curves

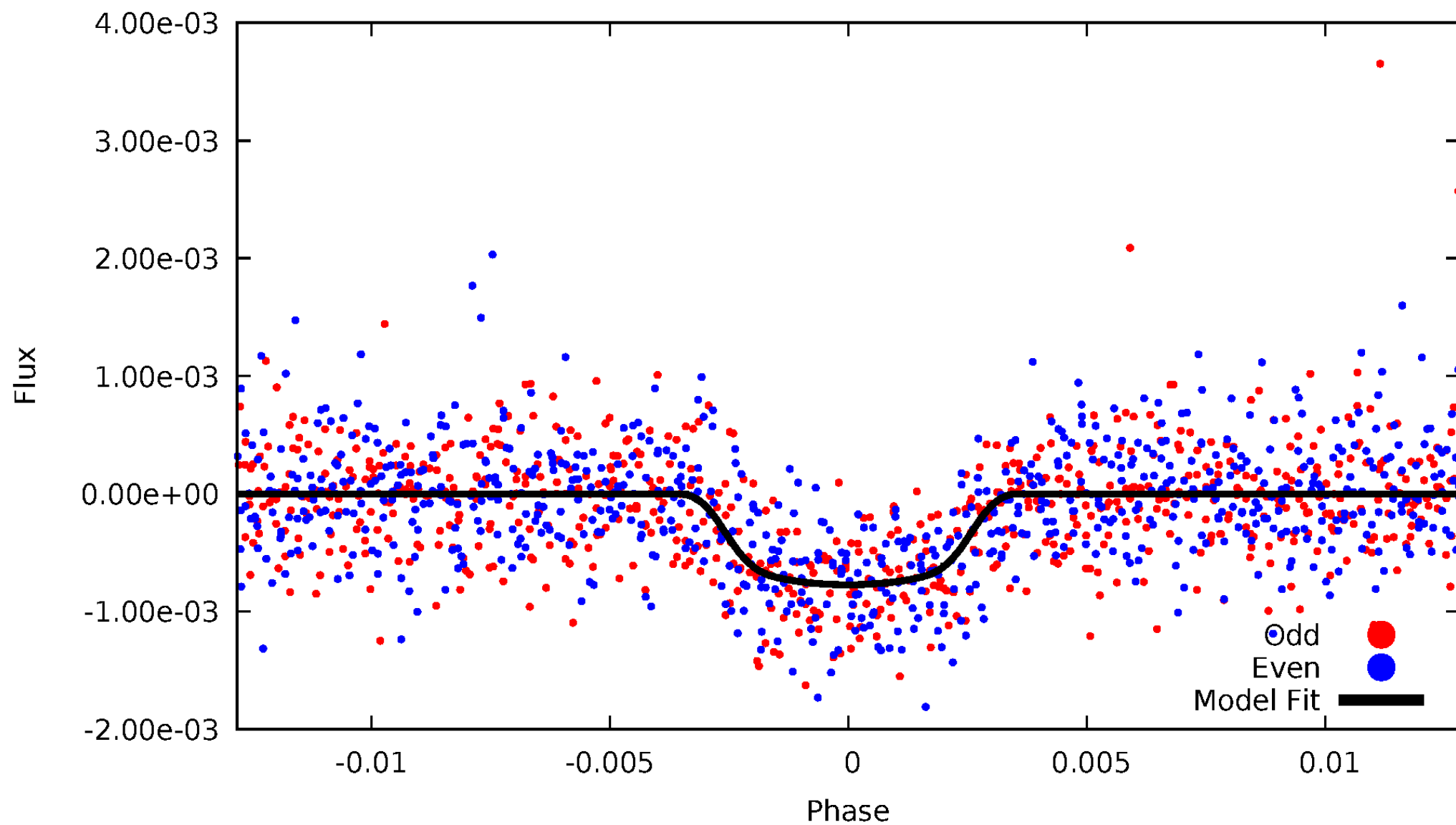


TCE 006041734-01



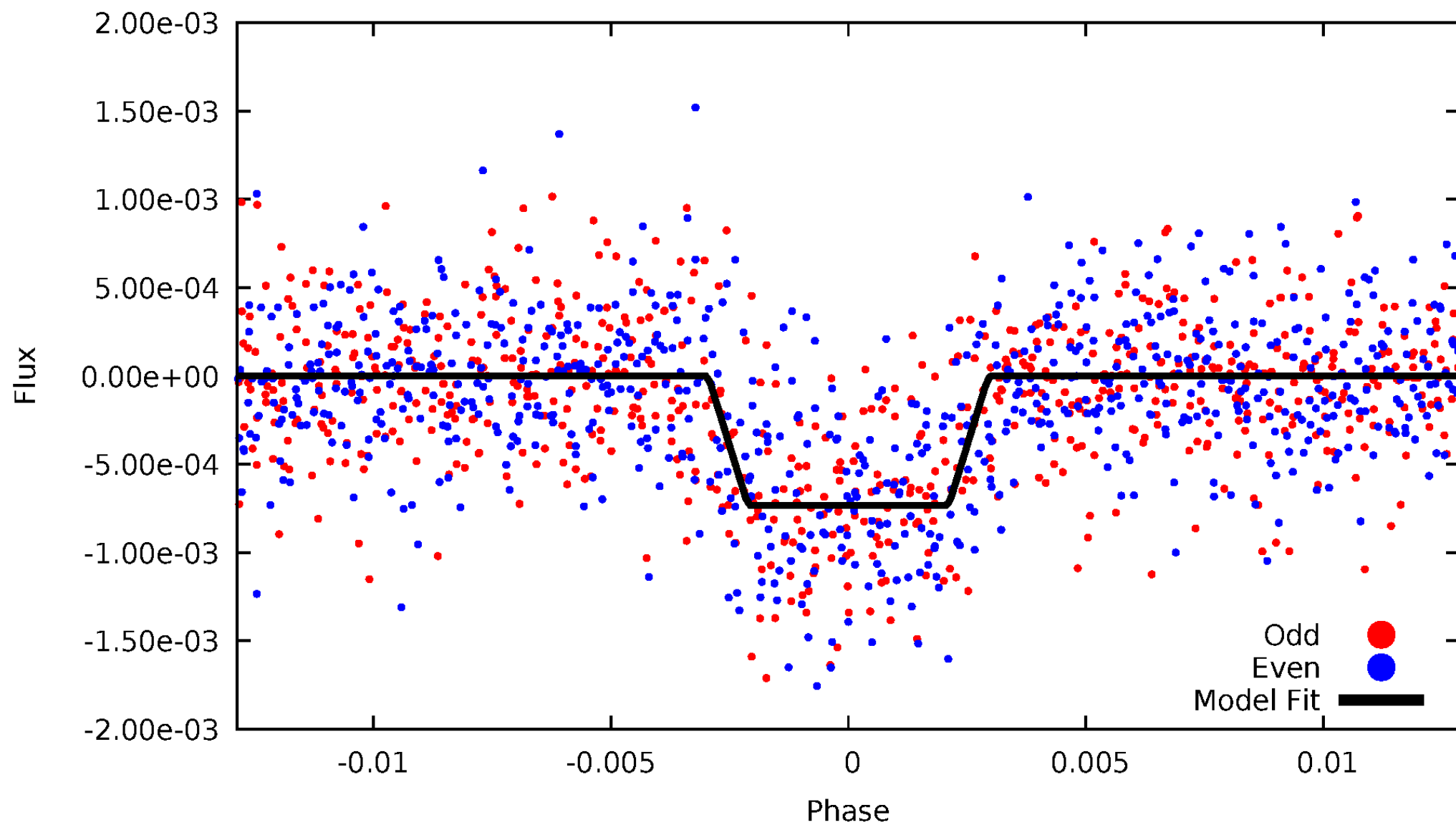
# DV Odd/Even

TCE 006041734-01



# ALT Odd/Even

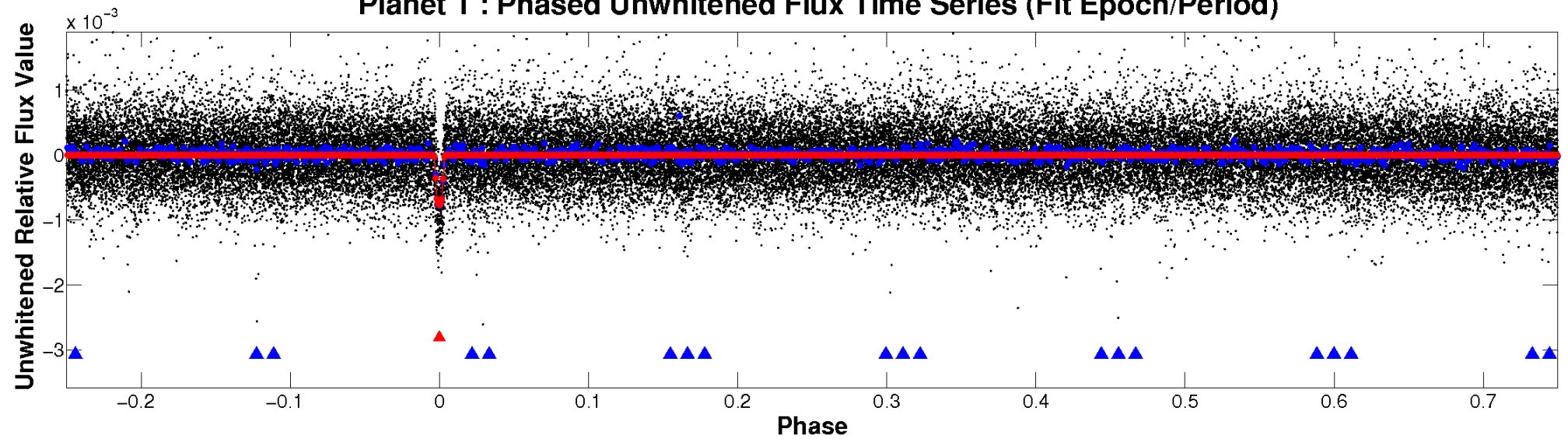
TCE 006041734-01



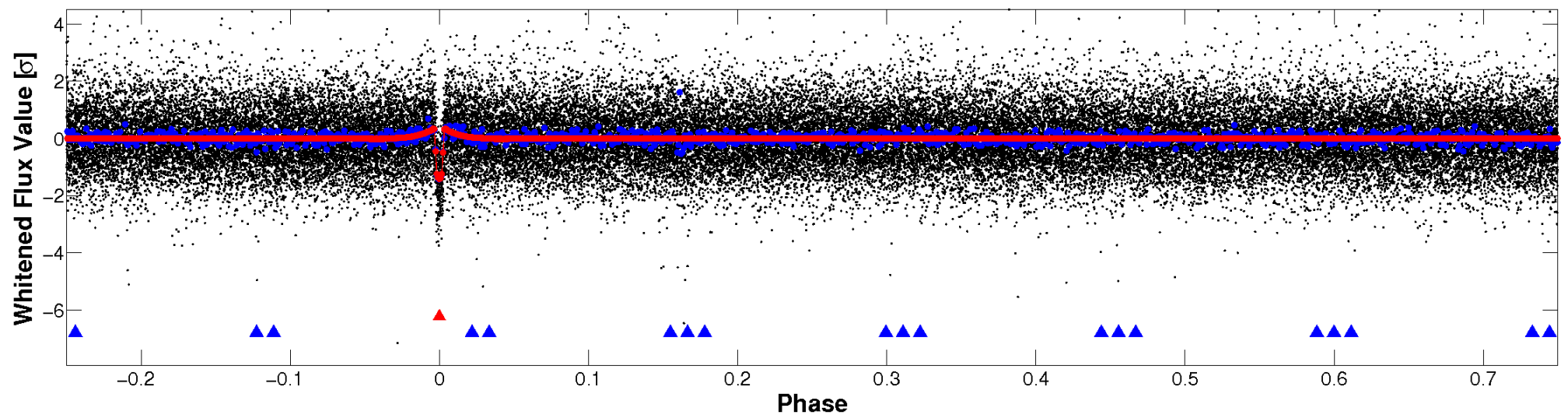


# Non-Whitened Vs. Whitened Light Curve

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

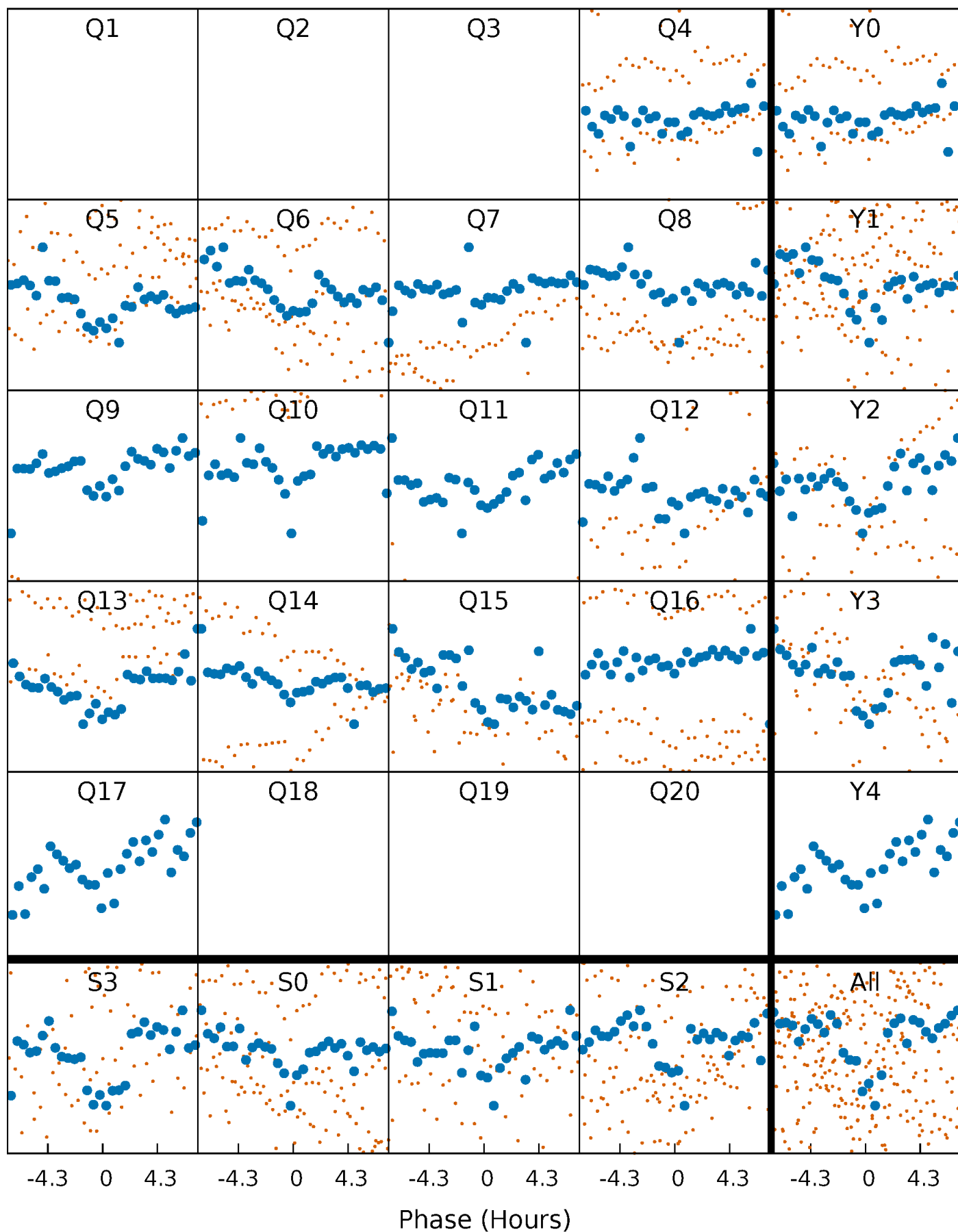


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

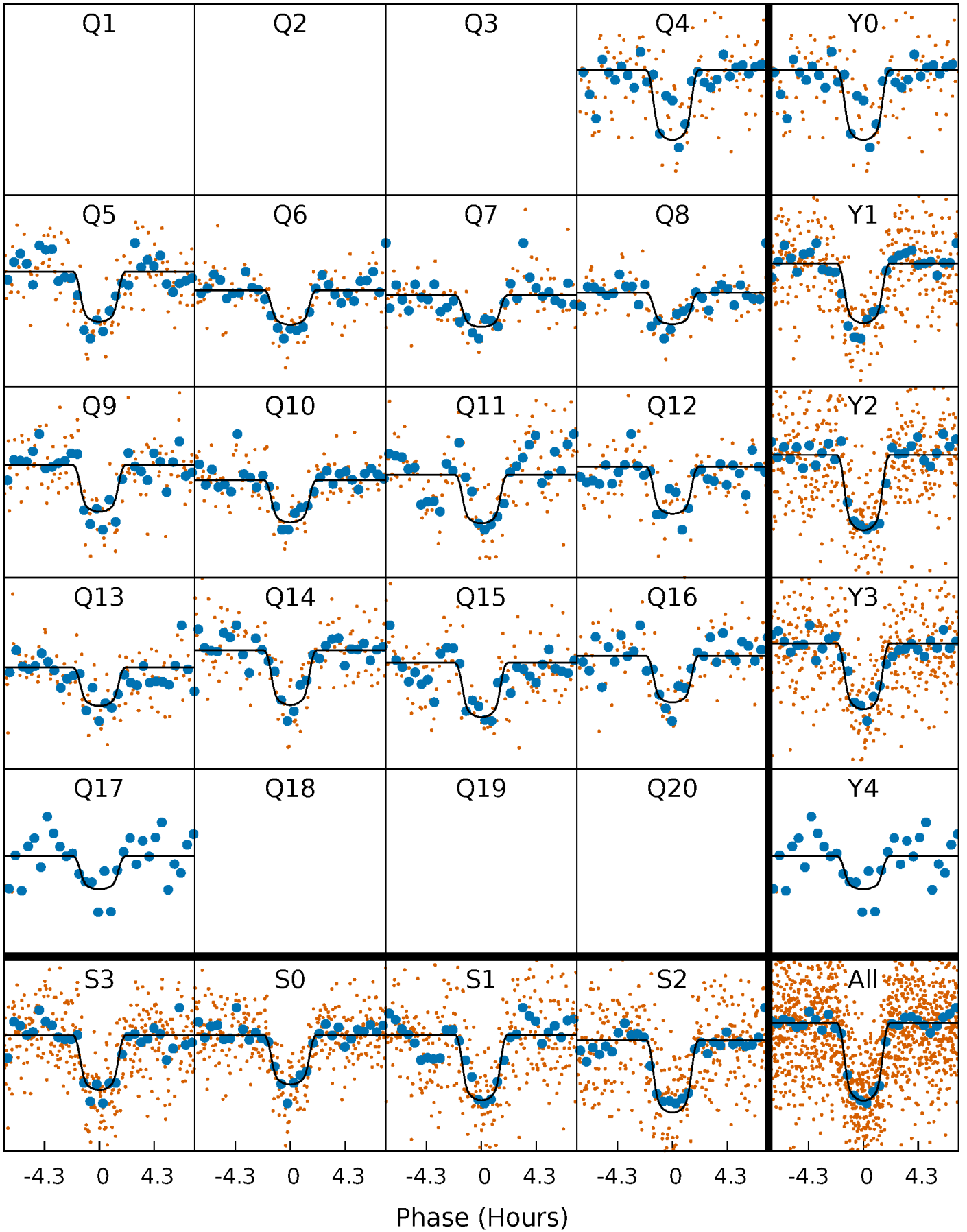
TCE 006041734-01 P= 24.339560 Days  $T_0=136.064227$  (BKJD)





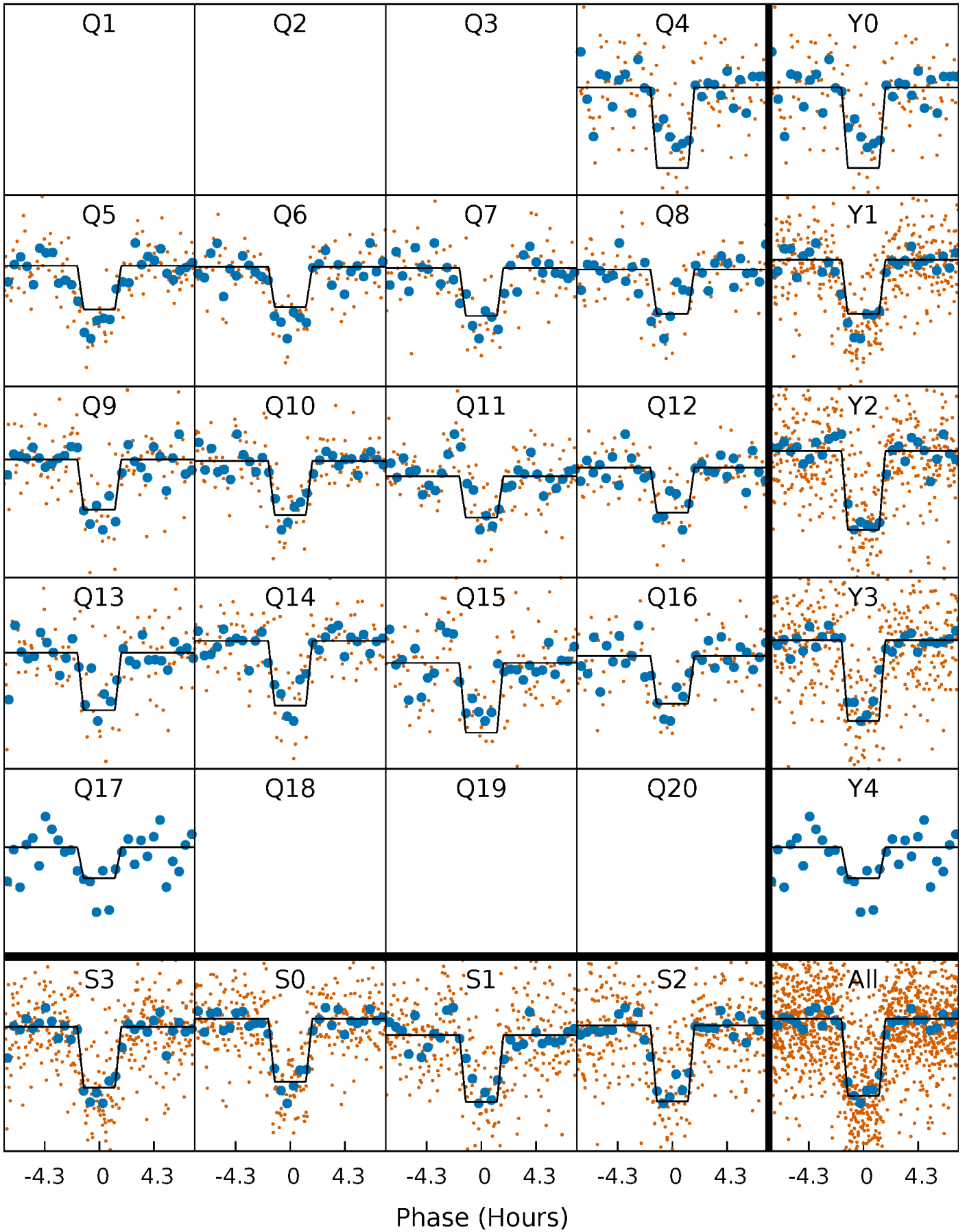
# DV Quarter-Phased Transit Curves

TCE 006041734-01 P= 24.339560 Days  $T_0=136.064227$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

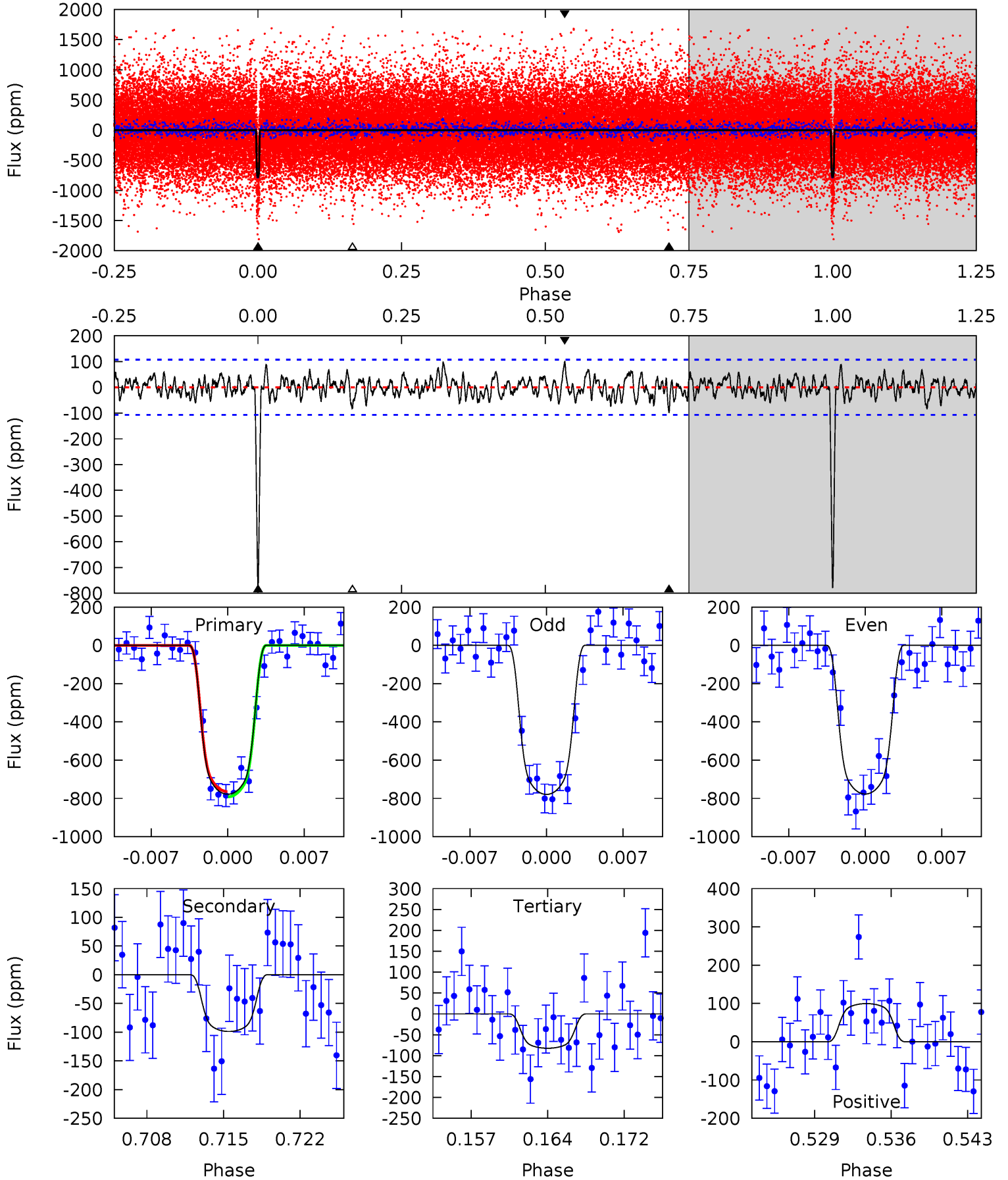
TCE 006041734-01 P= 24.339723 Days  $T_0=136.061484$  (BKJD)



# DV Model-Shift Uniqueness Test

006041734-01, P = 24.339560 Days, E = 136.064227 Days

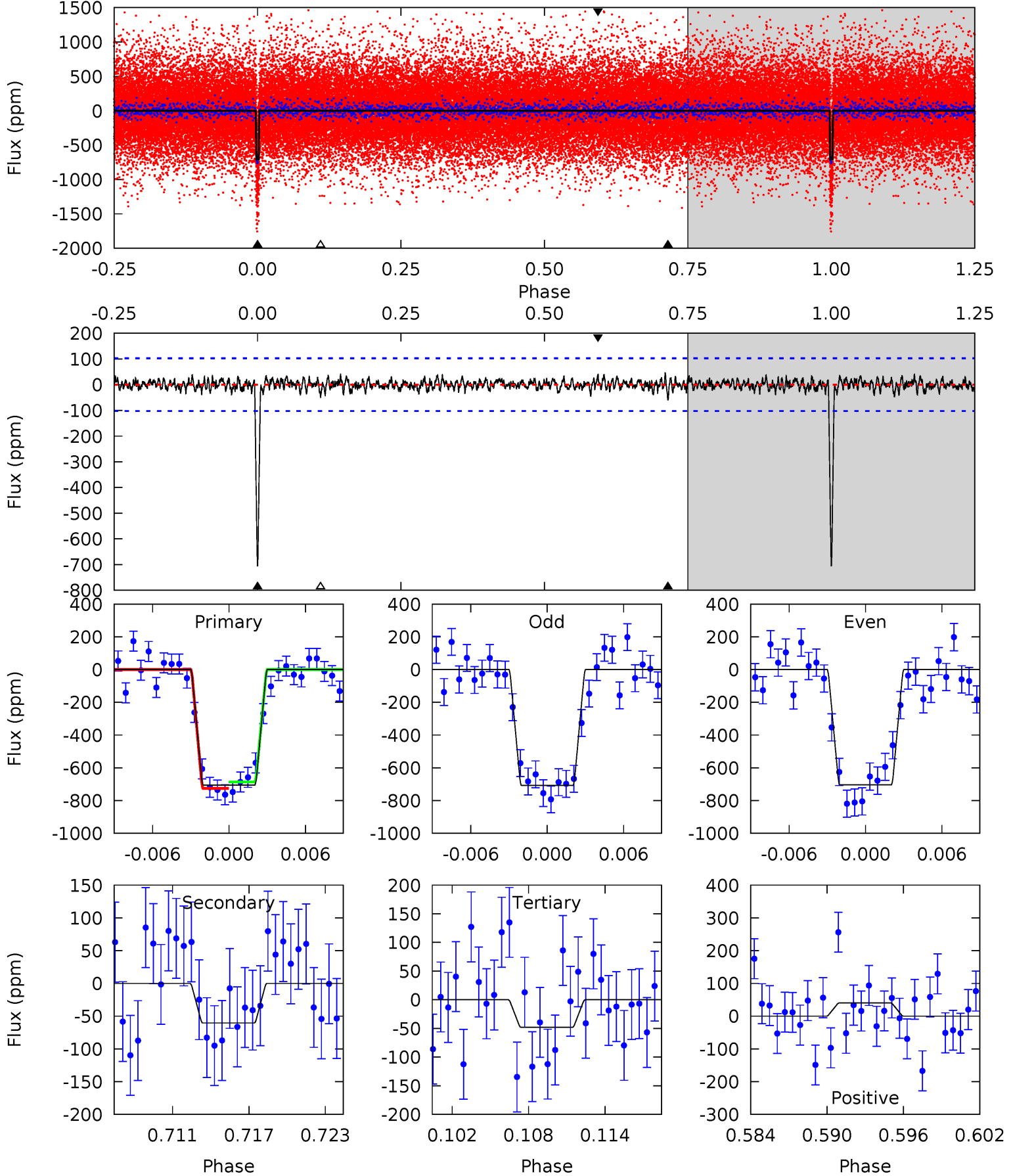
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
37.0	4.70	3.91	4.73	5.09	2.69	1.46	33.1	32.2	0.79	-0.04	0.05	1.00	0.11	0.66



# Alt Model-Shift Uniqueness Test

006041734-01, P = 24.339723 Days, E = 136.061484 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
35.3	3.02	2.40	2.00	5.12	2.75	0.72	32.9	33.3	0.63	1.02	0.07	0.98	0.06	0.98



### Stellar Parameters For KIC 006041734

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5596^{+84}_{-75}$	$4.105^{+0.203}_{-0.101}$	$0.140^{+0.150}_{-0.150}$	$1.466^{+0.244}_{-0.326}$	$0.998^{+0.081}_{-0.066}$	$0.446^{+0.450}_{-0.139}$
	+2%/-1%	+5%/-2%	+107%/-107%	+17%/-22%	+8%/-7%	+101%/-31%
Source	SPE90	SPE90	SPE90	DSEP		

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

### Secondary Eclipse Parameters for KIC 006041734-01 / KOI 2167.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-99 \pm 21$	$4.99^{+0.63}_{-0.67}$	$1025^{+49}_{-67}$	$3582^{+142}_{-157}$	$59^{+24}_{-17}$
Alt.	$-60 \pm 20$	$4.29^{+0.53}_{-0.54}$	$1025^{+45}_{-59}$	$3485^{+172}_{-234}$	$50^{+21}_{-18}$

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

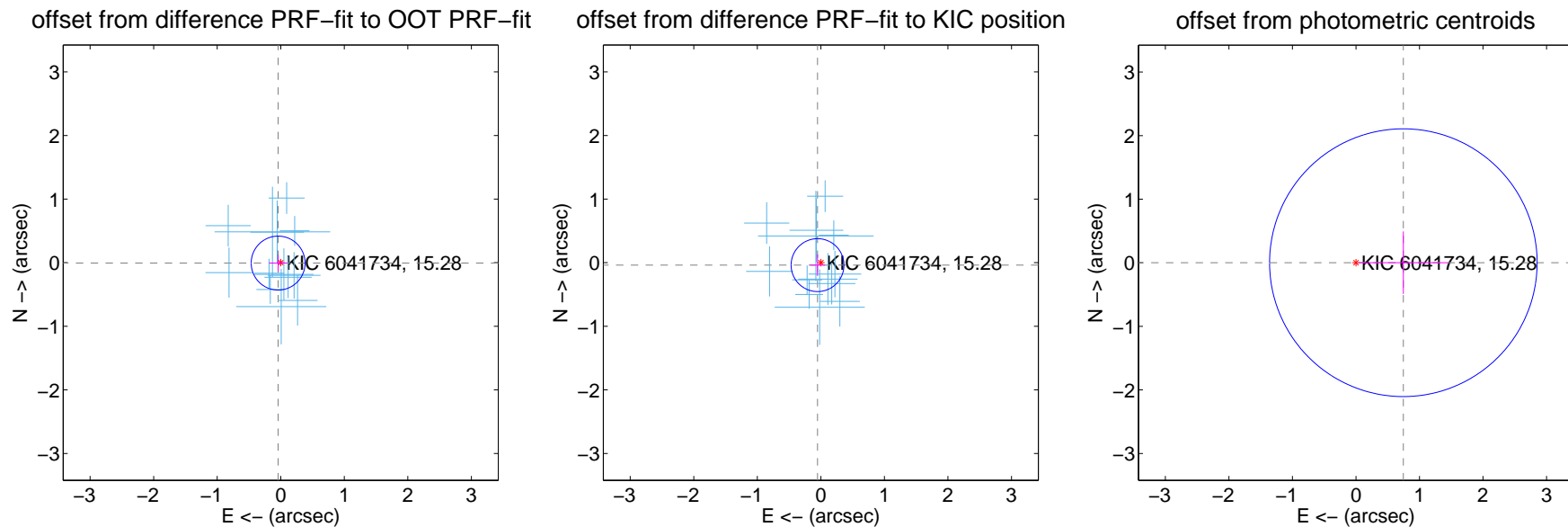
## DV Centroid Data

Supplemental centroid analysis for 006041734-01. Kepler magnitude: 15.28. Transit SNR 21.96

There are 13 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.03 arcsec

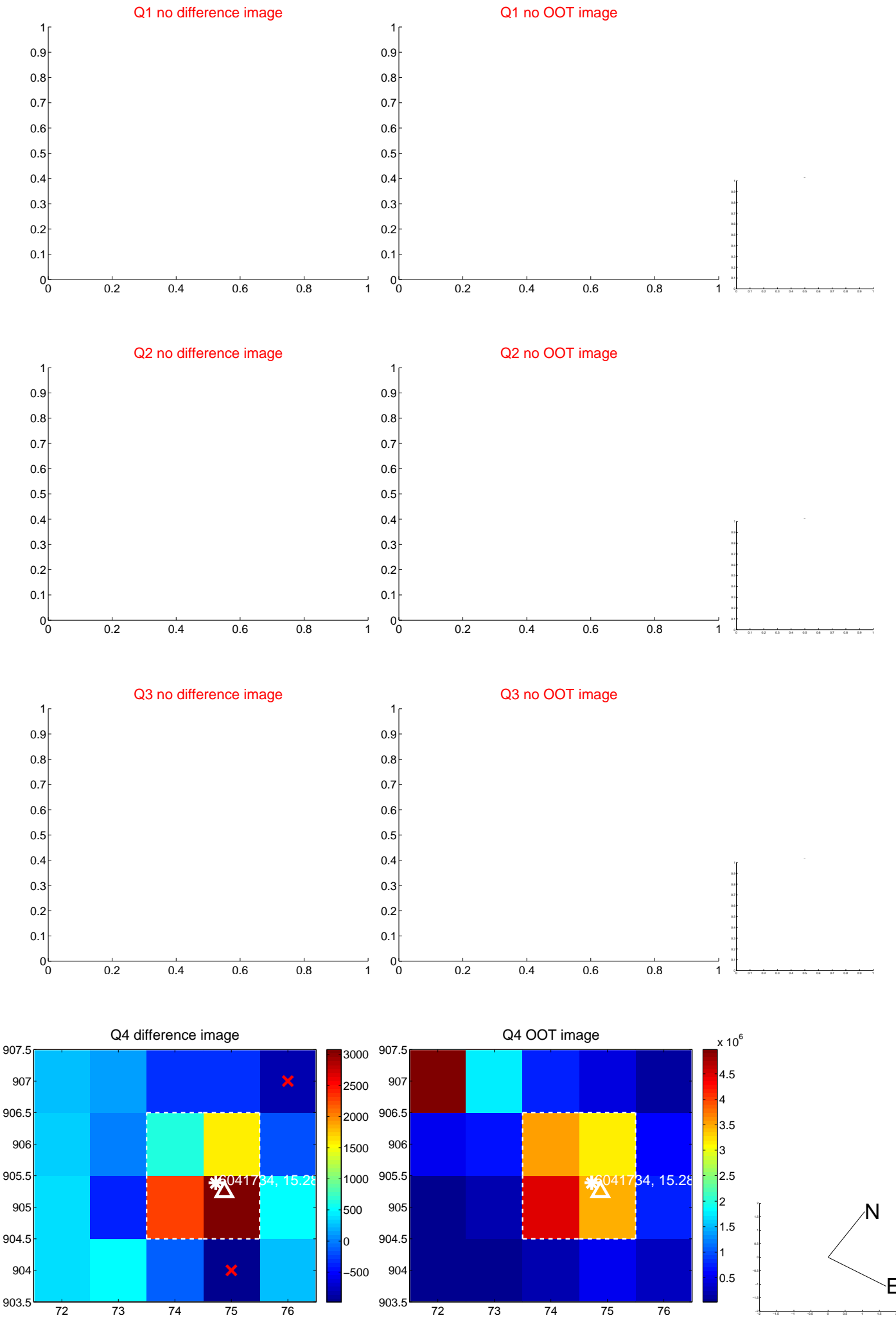
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.042 \pm 0.141$	0.29	$0.041 \pm 0.142$	$-0.006 \pm 0.131$
PRF-fit source offset from KIC position	$0.065 \pm 0.139$	0.47	$0.052 \pm 0.118$	$-0.038 \pm 0.171$
photometric centroid source offset	$0.75 \pm 0.70$	1.06	$-0.75 \pm 0.70$	$0.00 \pm 0.49$



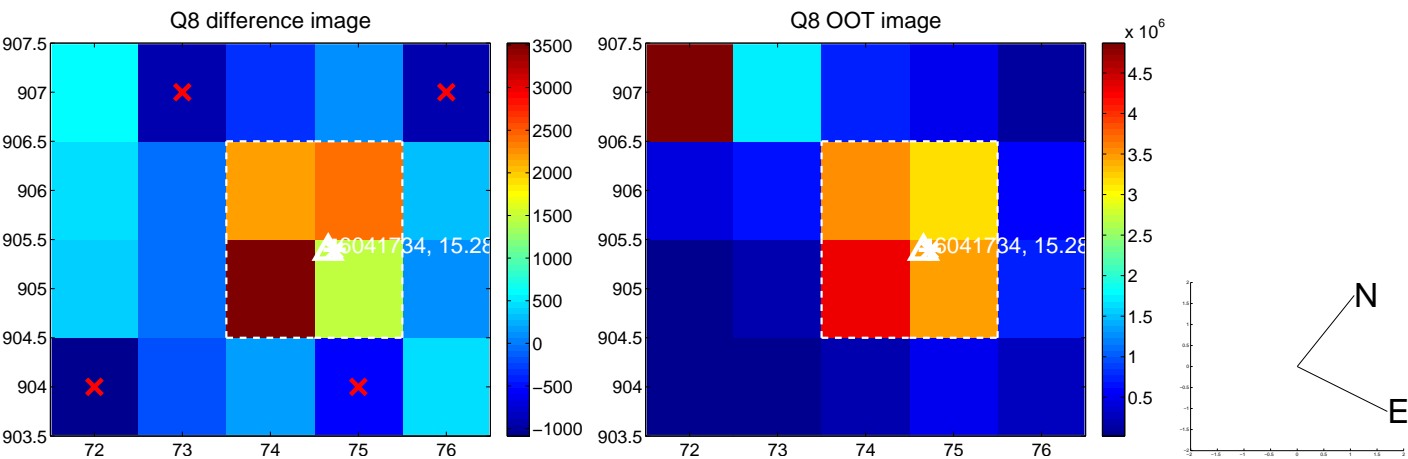
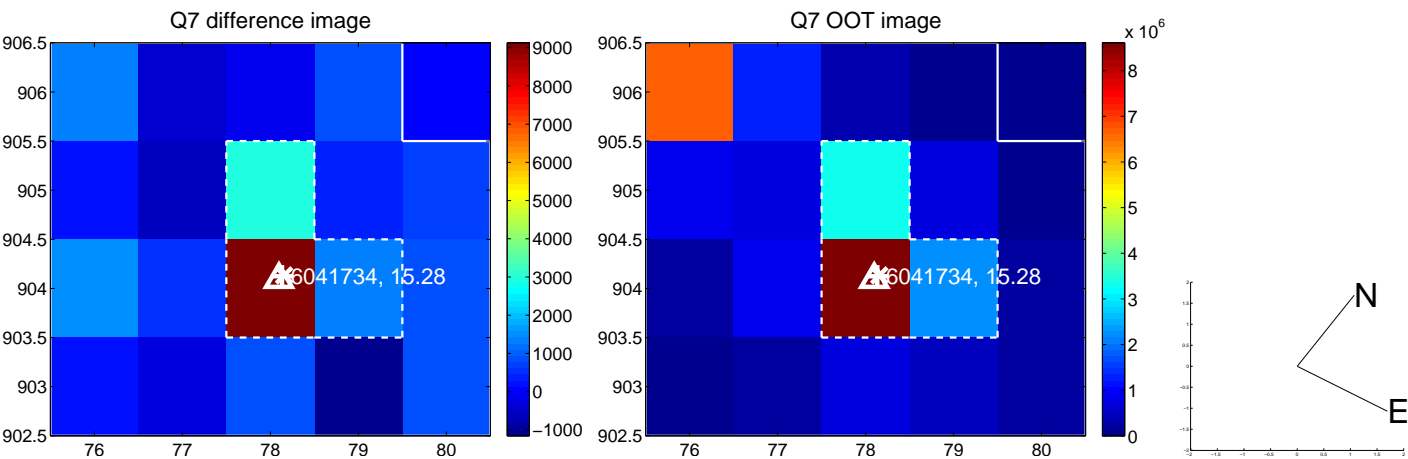
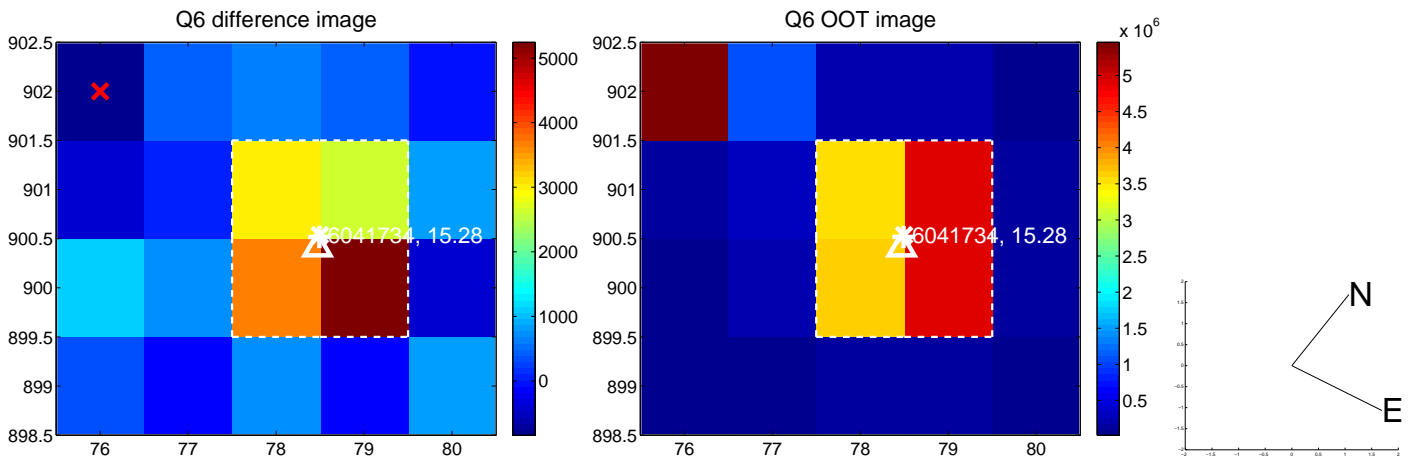
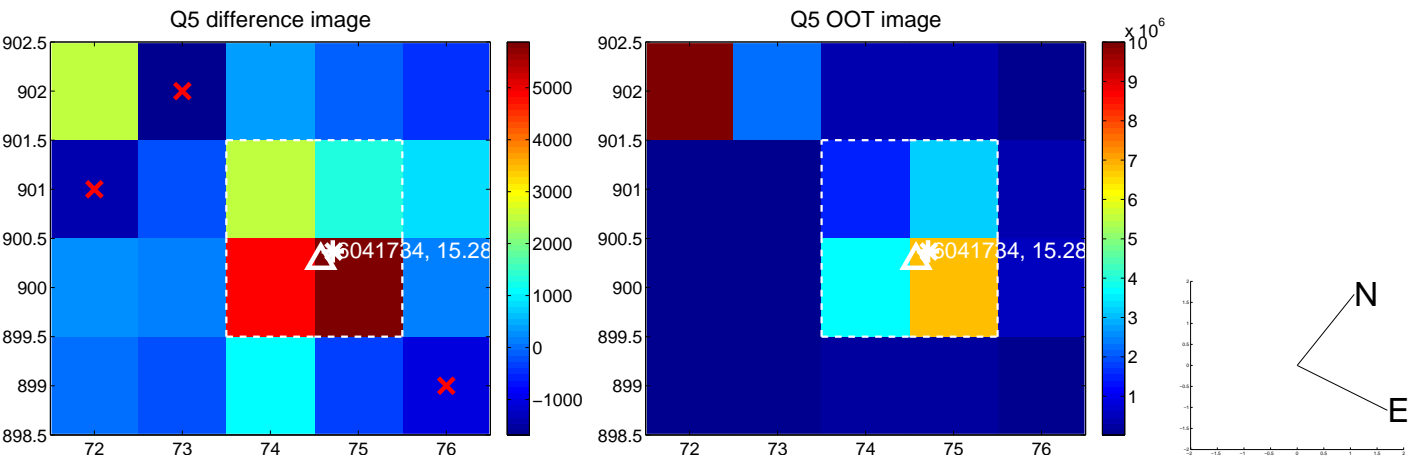
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



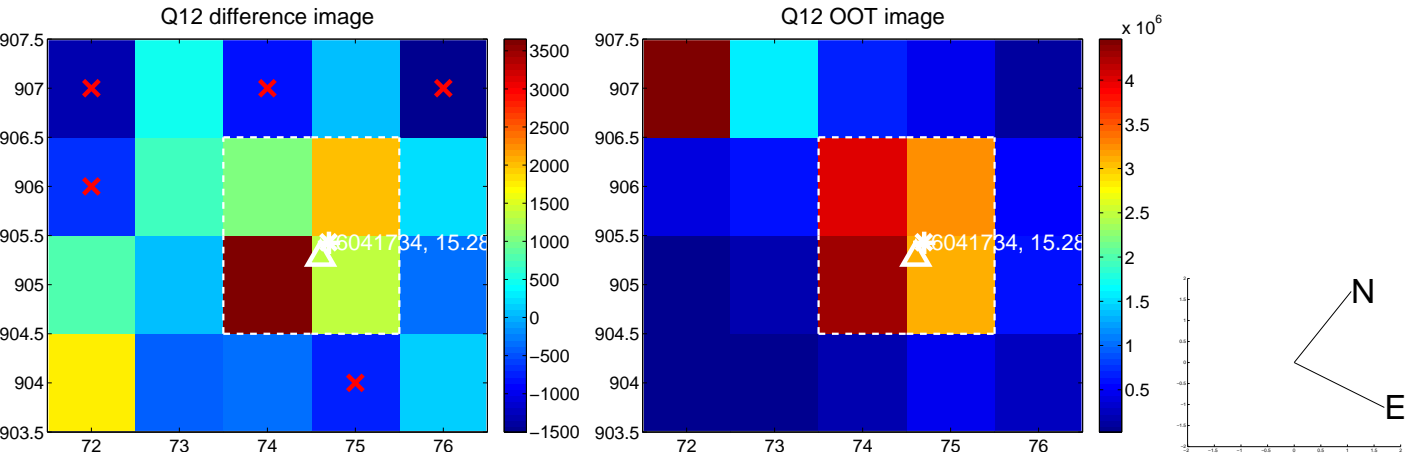
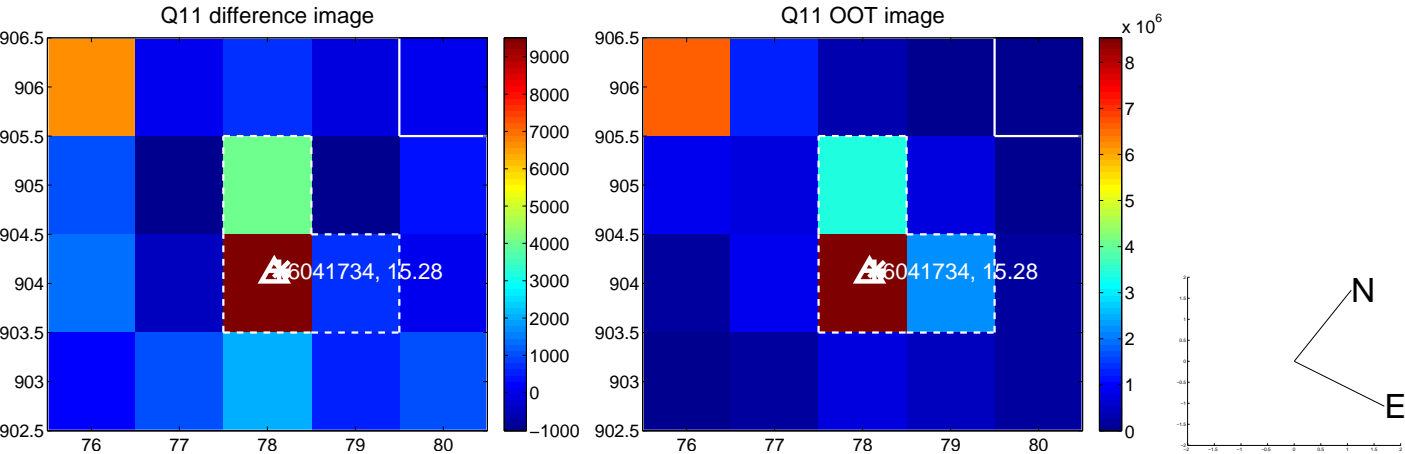
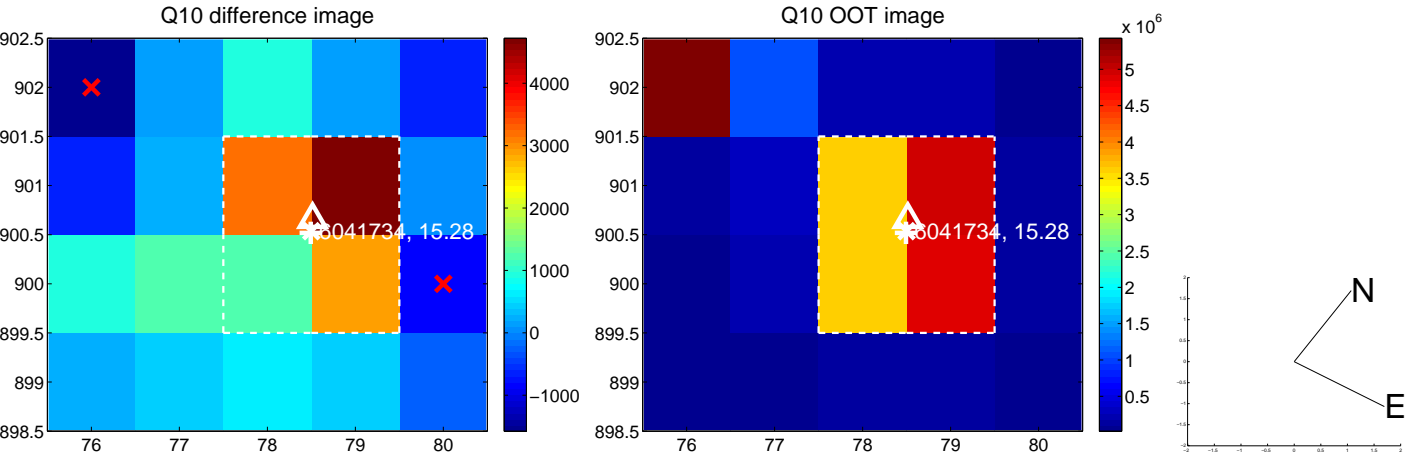
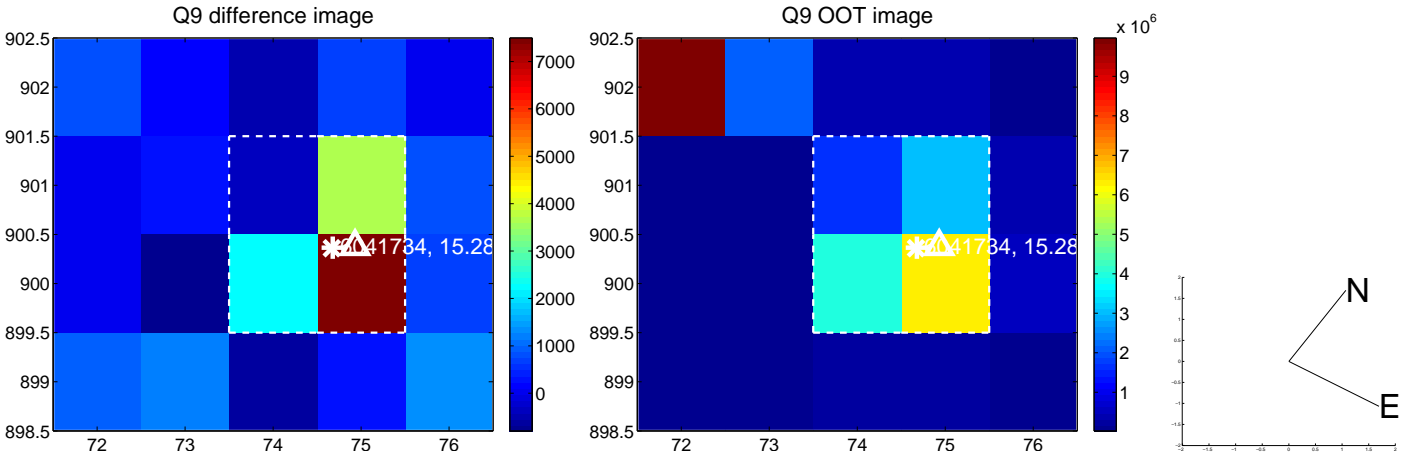
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



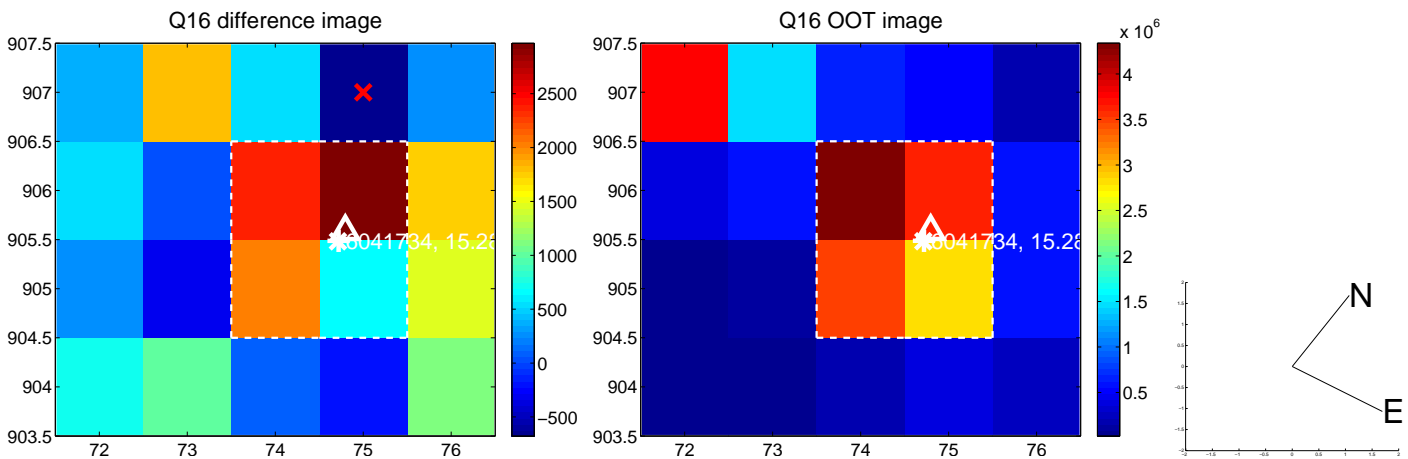
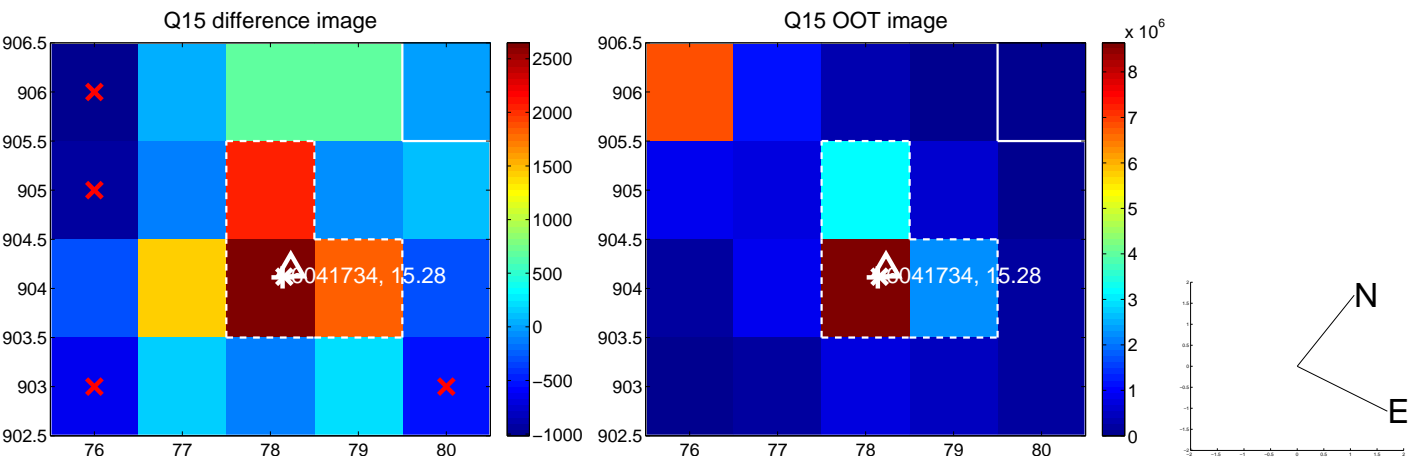
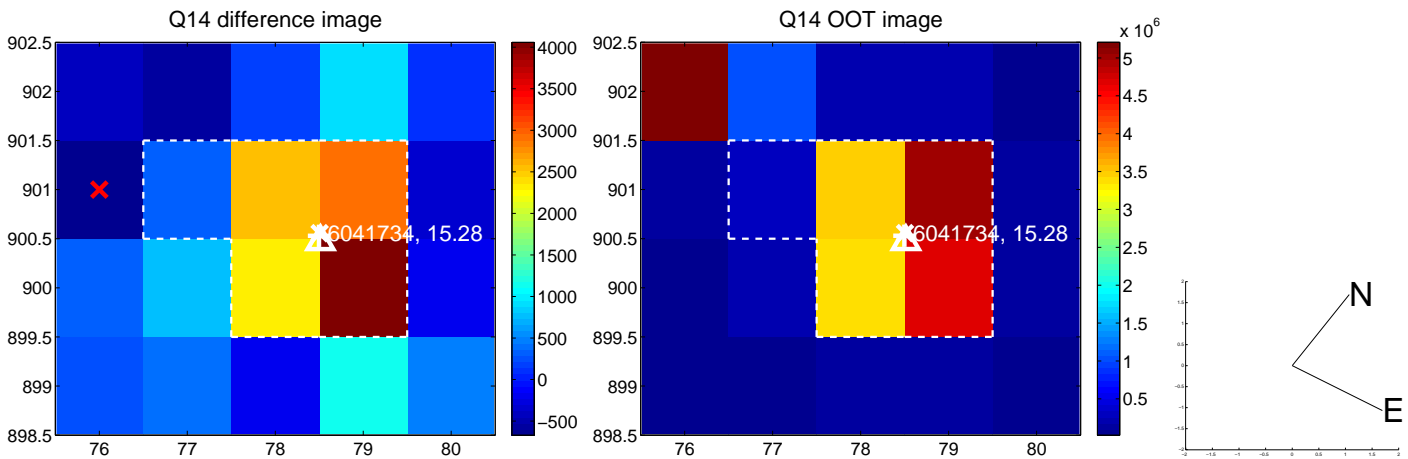
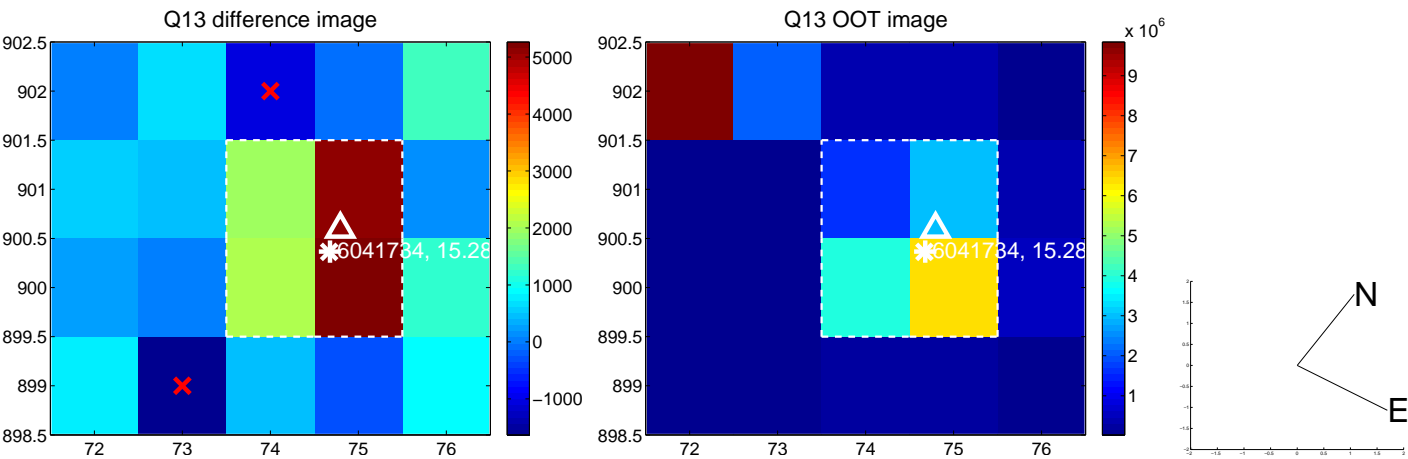
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



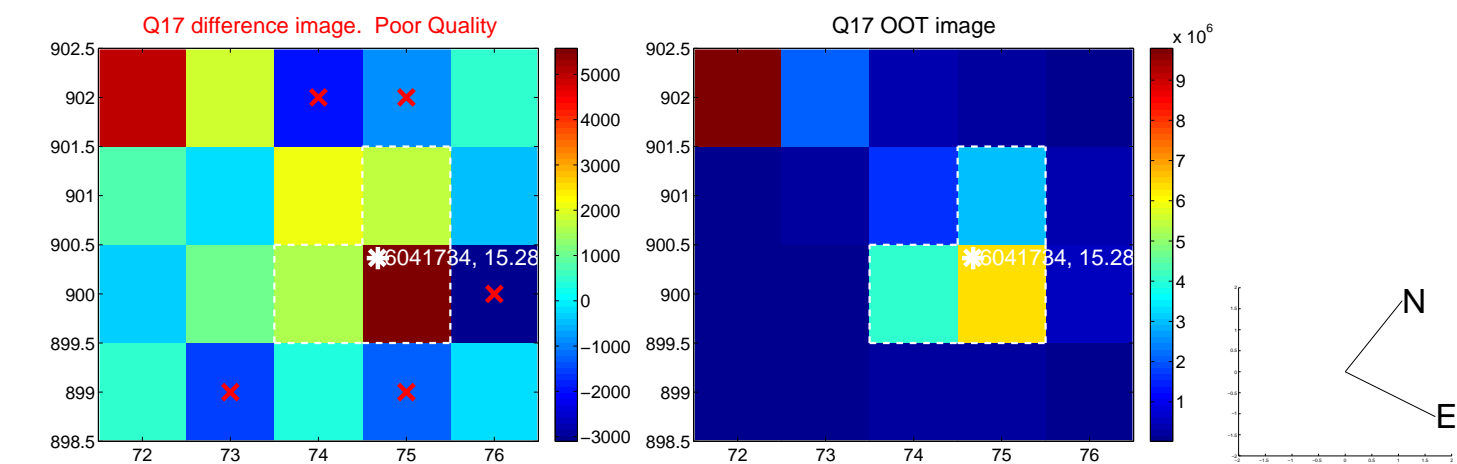
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



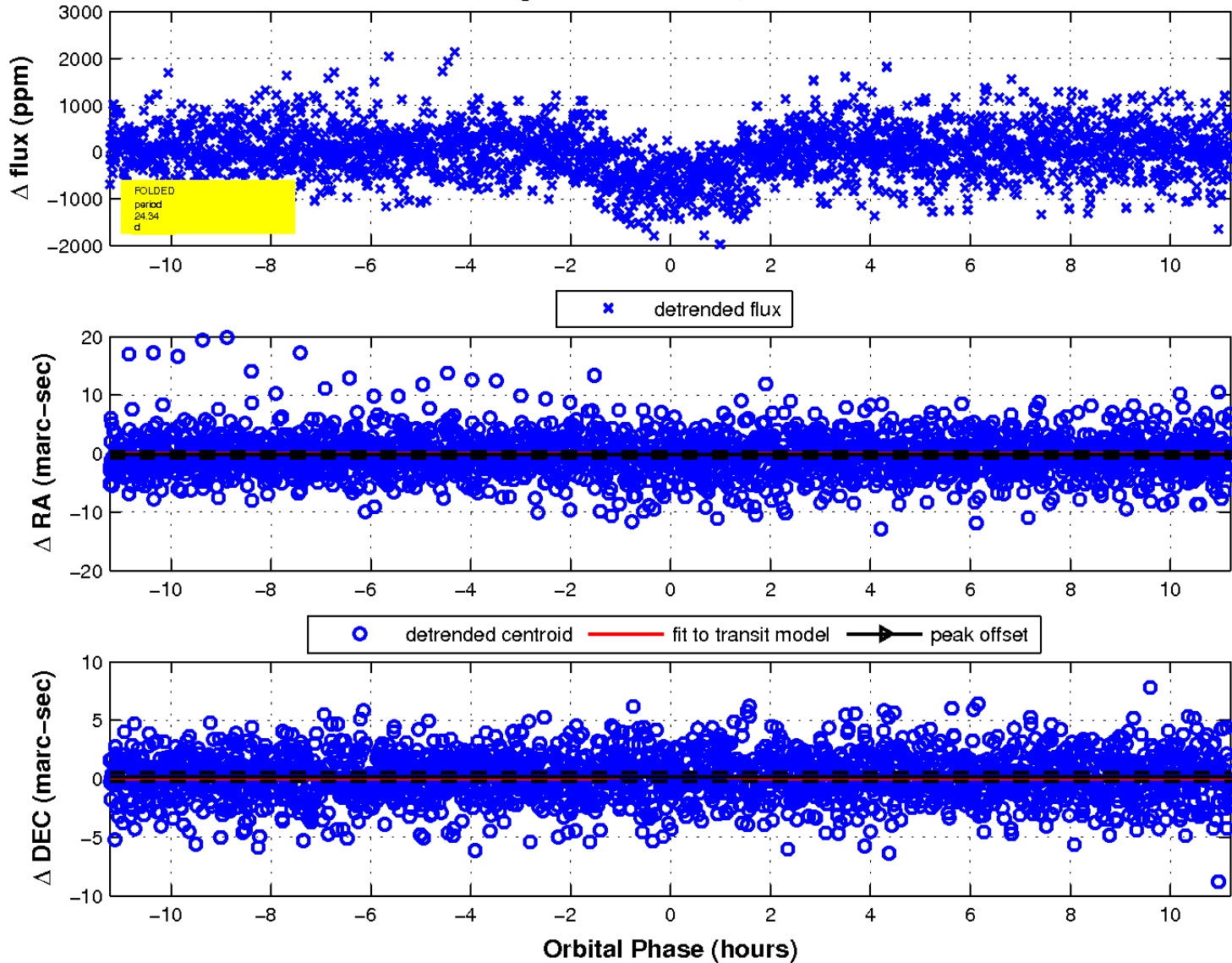
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

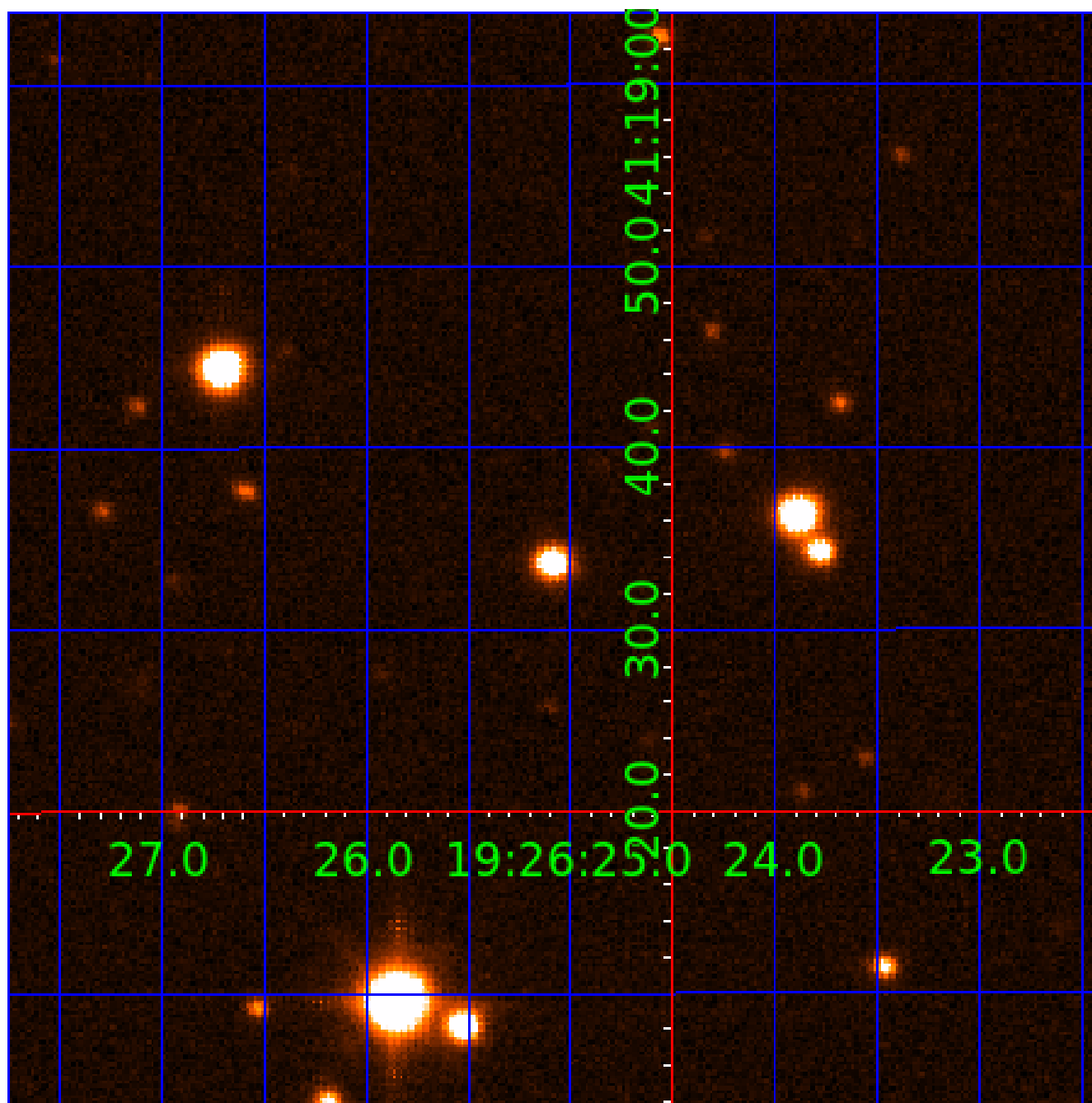


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 006041734

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006041734-01	OBS	2167.01	24.339560	136.064227	772.8	3.743	20.4	22.0	1.47	5596	5.04	69.94
006041734-02	OBS	2167.03	76.535782	164.174138	724.1	6.387	12.3	13.4	1.47	5596	4.85	15.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006041734-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
006041734-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

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

## Ephemeris Match Information For 006041734-02

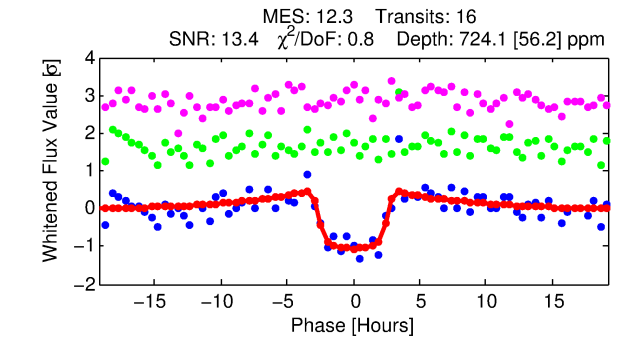
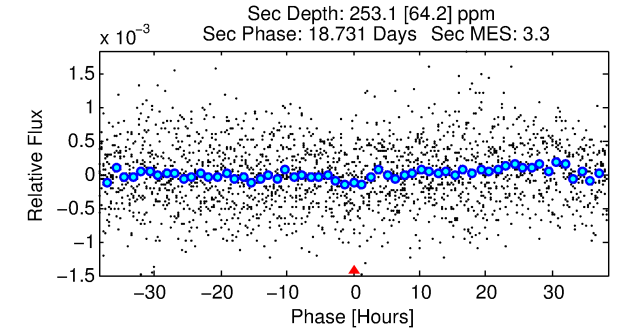
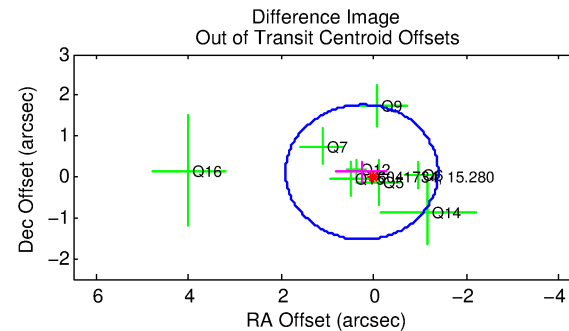
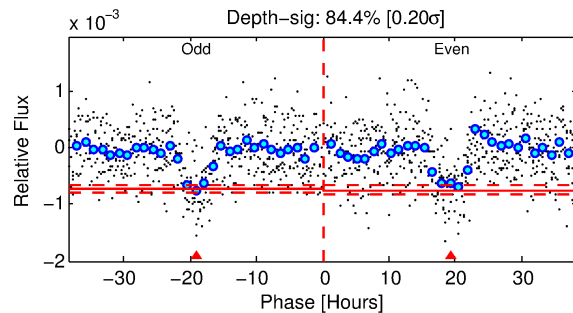
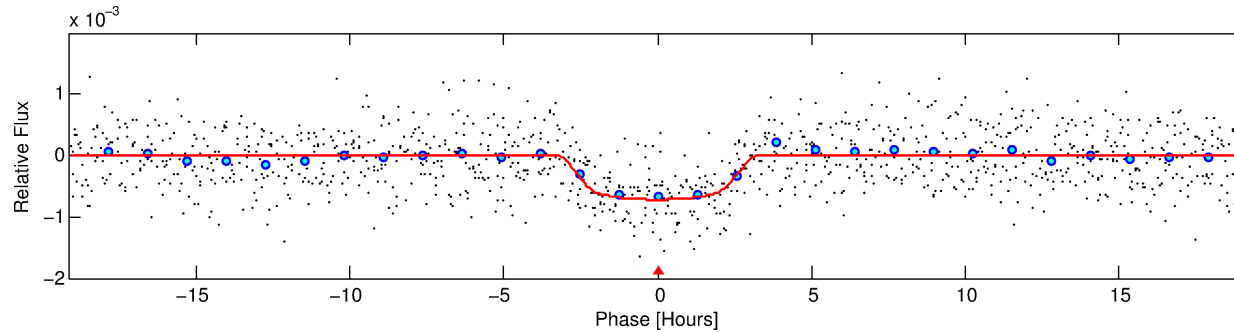
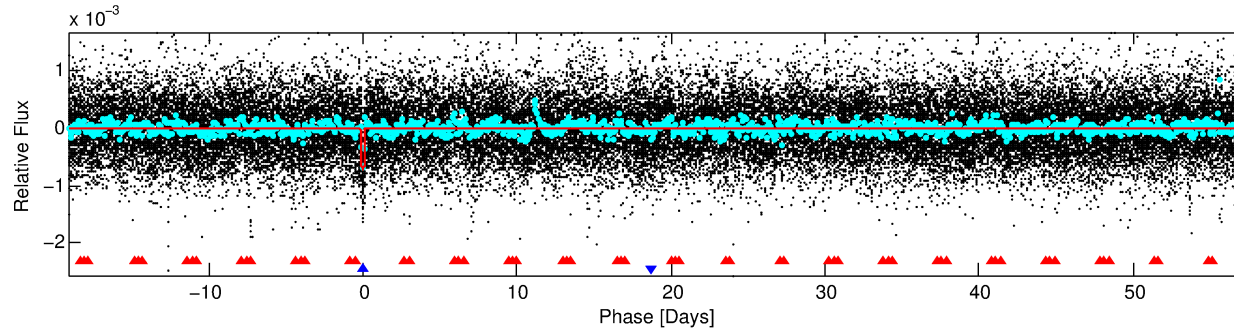
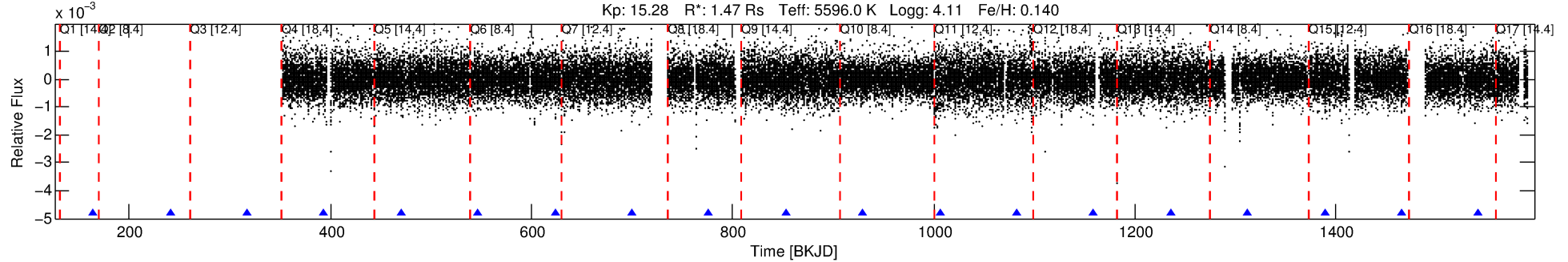
No Significant Match Found

# DV One-Page Summary

KIC: 6041734 Candidate: 2 of 2 Period: 76.536 d

KOI: K02167.03 Corr: 0.939

Kp: 15.28 R\*: 1.47 Rs Teff: 5596.0 K Logg: 4.11 Fe/H: 0.140



## DV Fit Results:

Period = 76.53578 [0.00086] d  
Epoch = 164.1741 [0.0100] BKJD  
Rp/R\* = 0.0303 [0.0022]  
a/R\* = 41.93 [10.20]  
b = 0.92 [0.04]  
Seff = 15.18 [5.32]  
Teq = 503 [44] K  
Rp = 4.85 [1.13] Re  
a = 0.3527 [0.0758] AU  
Ag = 735.40 [332.44] [2.21σ]  
Teff = 4053 [302] K [11.63σ]

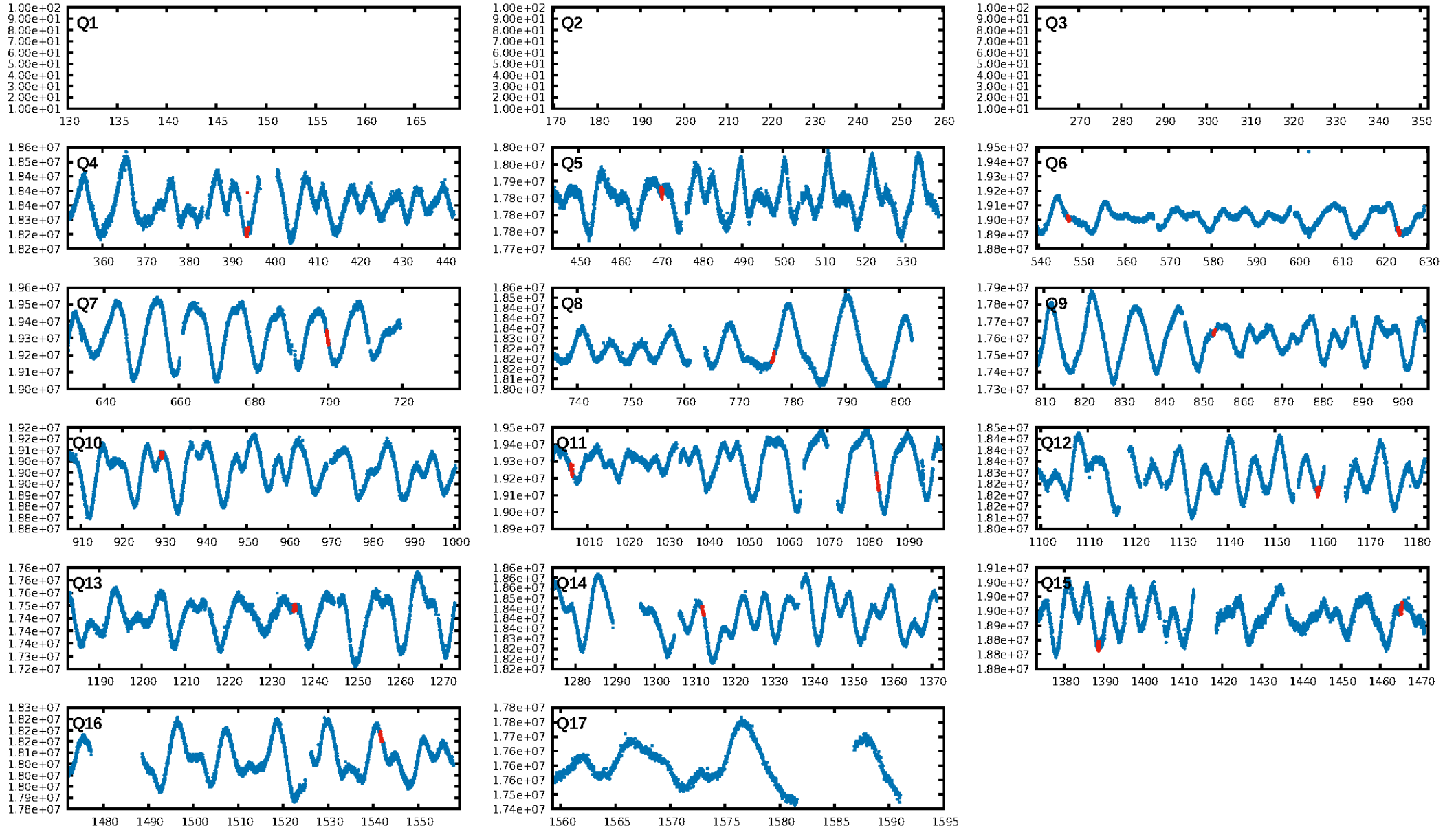
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [169.21σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 99.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 7.07e-26  
RollingBand-fgt: 1.00 [16/16]  
GhostDiagnostic-chr: 3.995  
Centroid-sig: 51.6%  
Centroid-so: 0.423 arcsec [0.41σ]  
OotOffset-rm: 0.280 arcsec [0.51σ]  
KicOffset-rm: 0.255 arcsec [0.44σ]  
OotOffset-st: 2/2/2/2 [8]  
KicOffset-st: 2/2/2/2 [8]  
DiffImageQuality-fgm: 0.75 [6/8]  
DiffImageOverlap-fno: 1.00 [12/12]

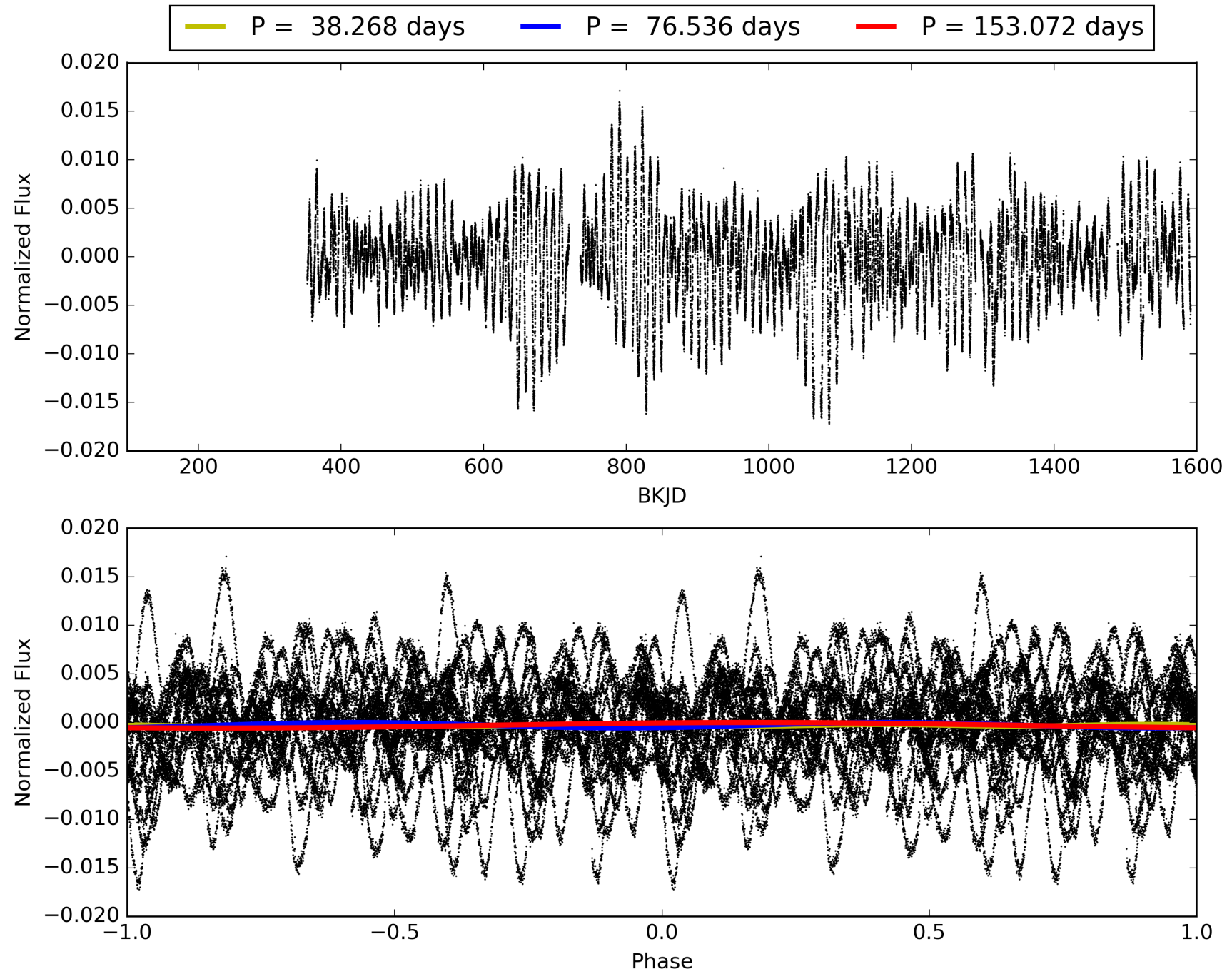
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 18:42:49 Z

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

# TCE 006041734-02, PDC Light Curves

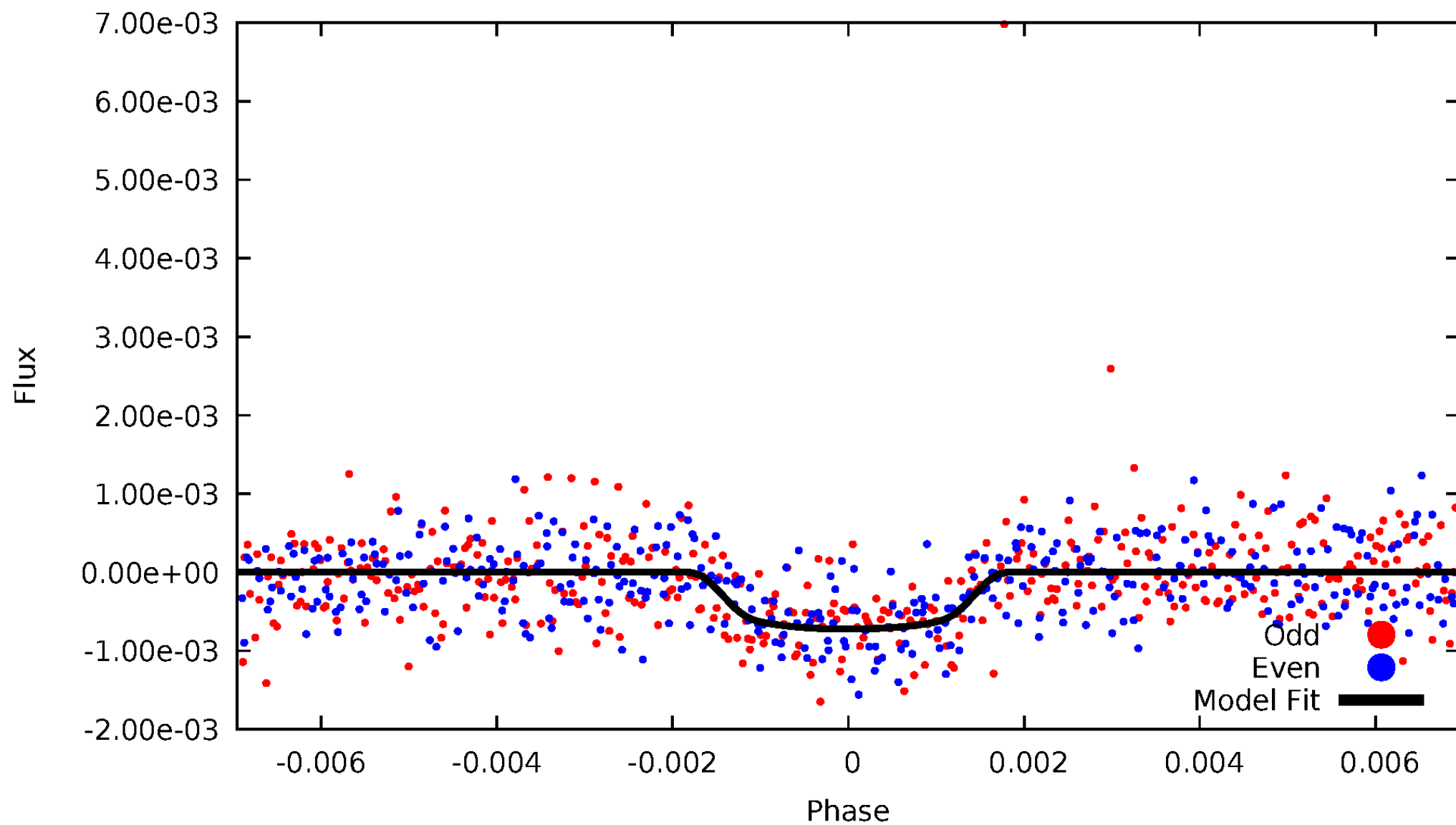


TCE 006041734-02



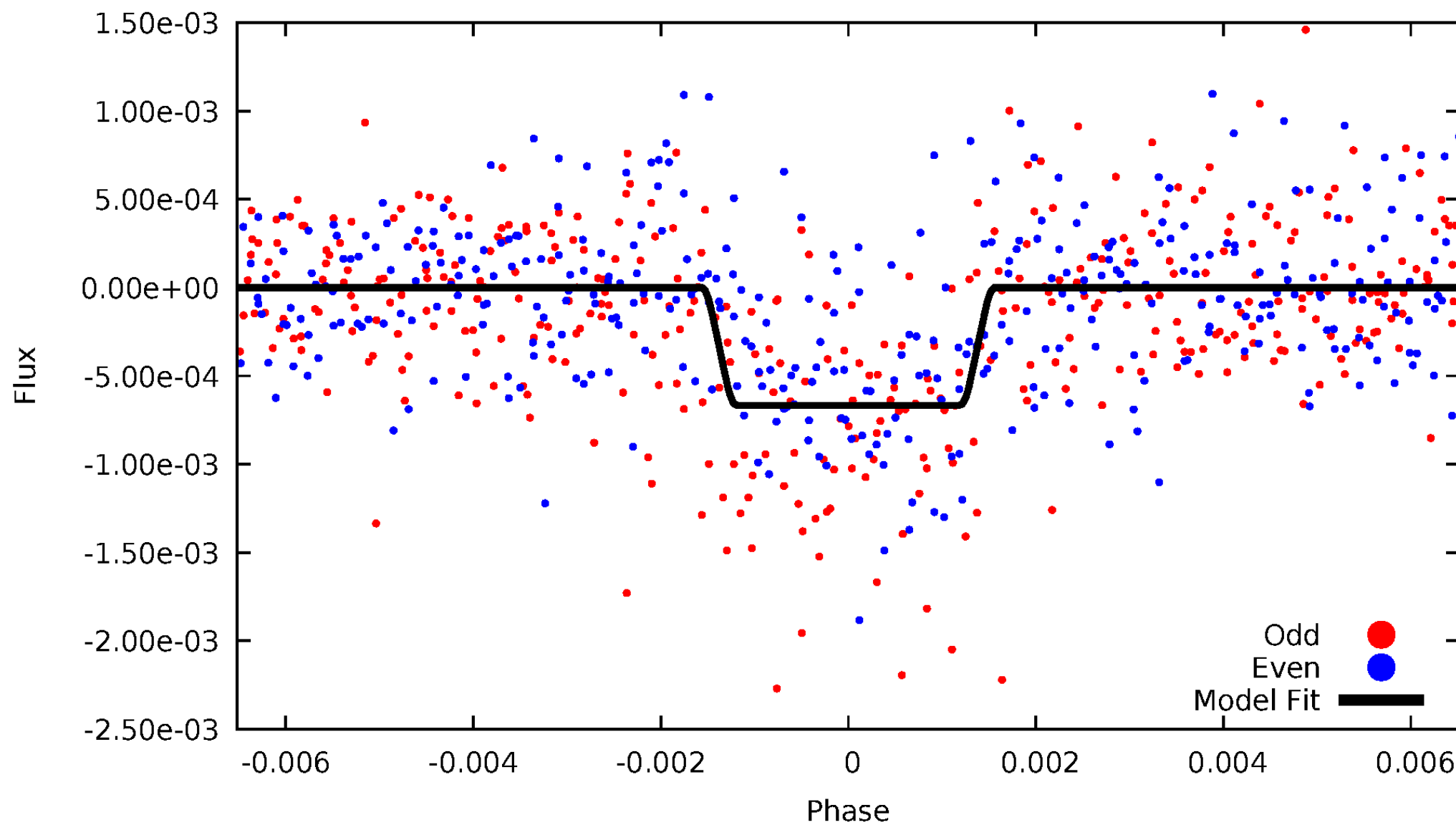
# DV Odd/Even

TCE 006041734-02



# ALT Odd/Even

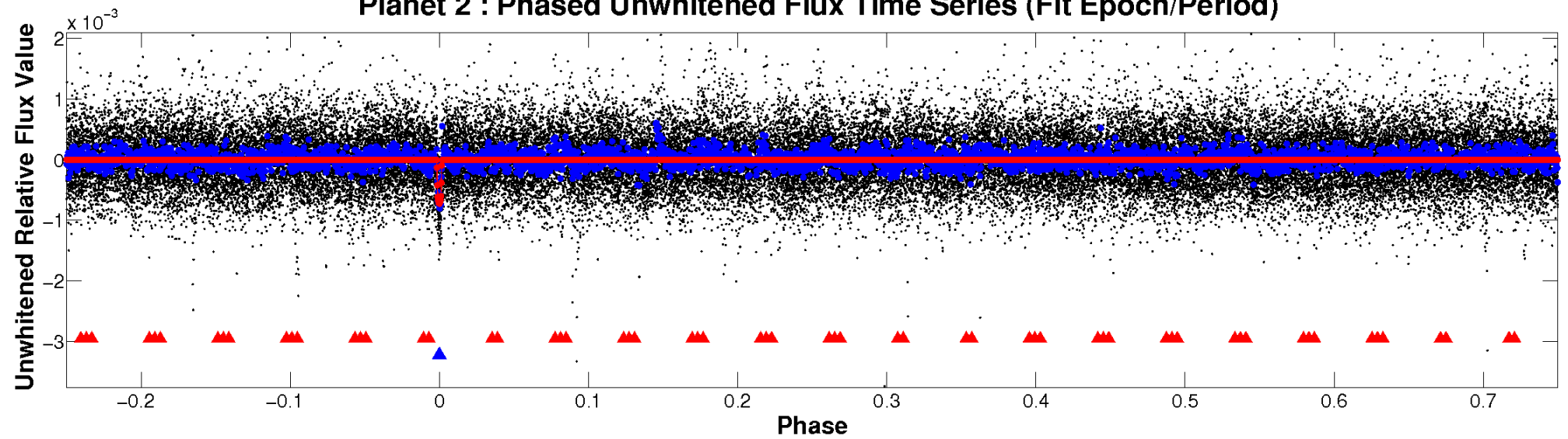
TCE 006041734-02



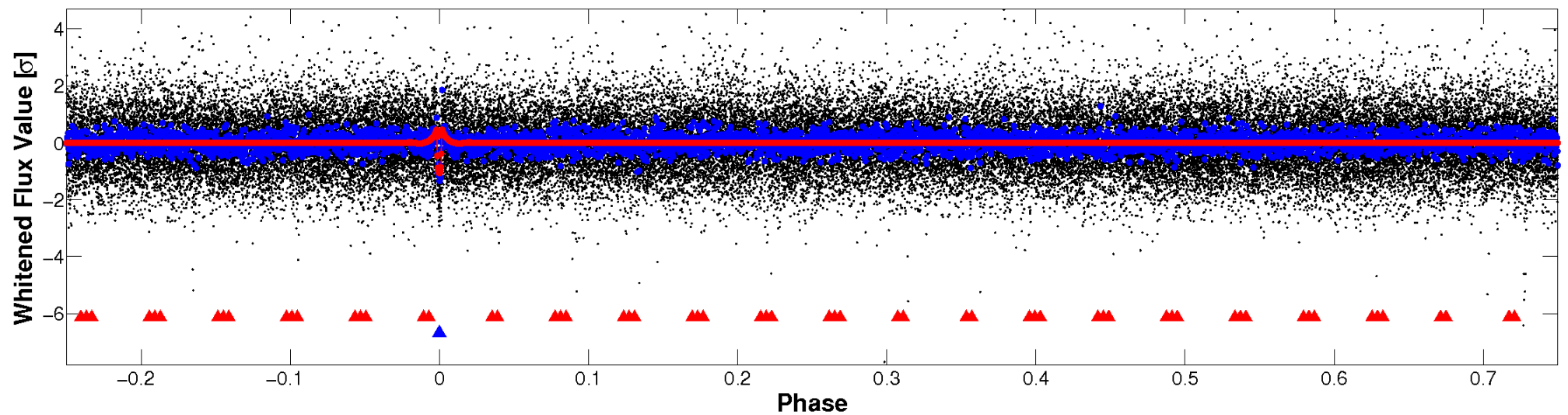


# Non-Whitened Vs. Whitened Light Curve

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

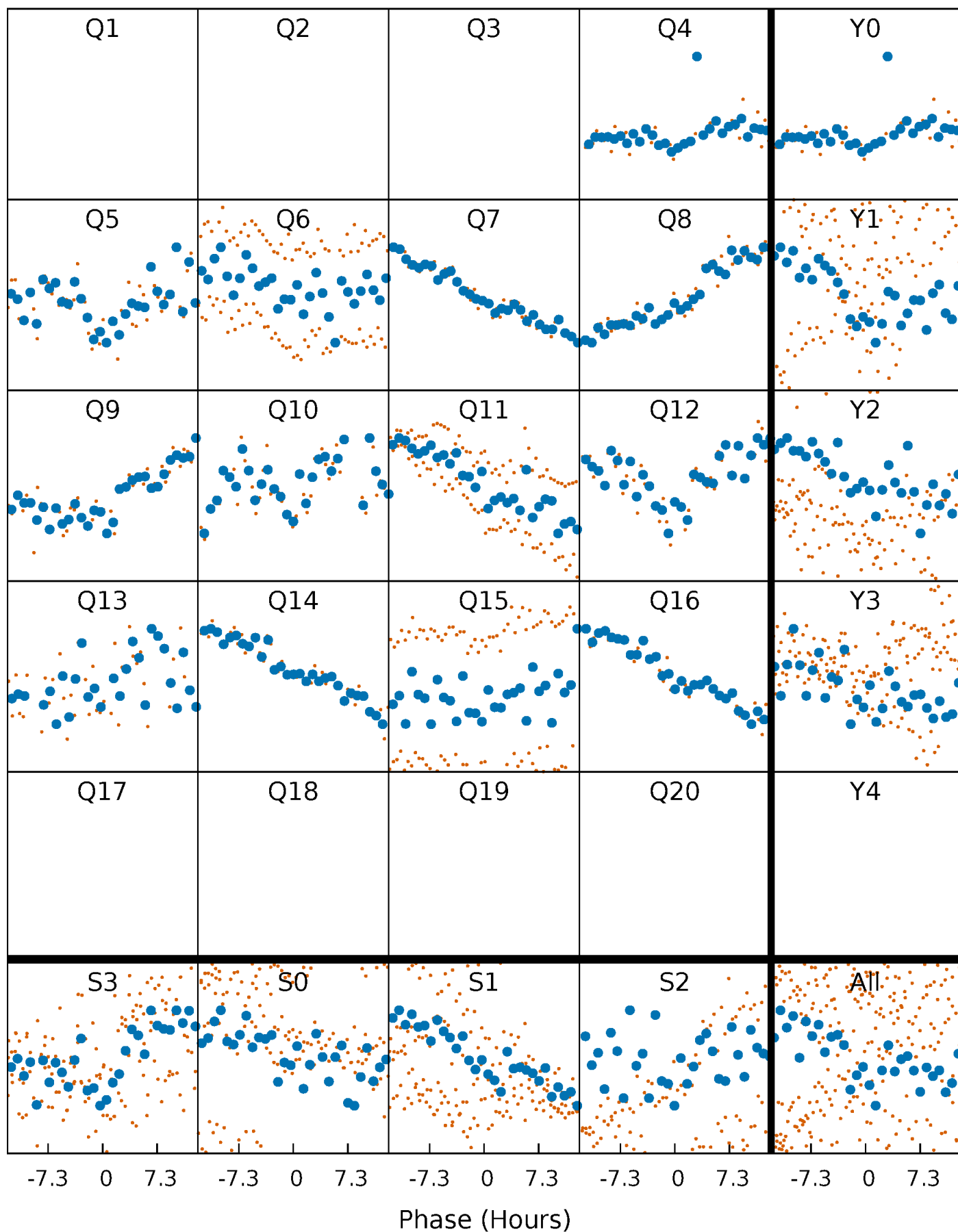


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



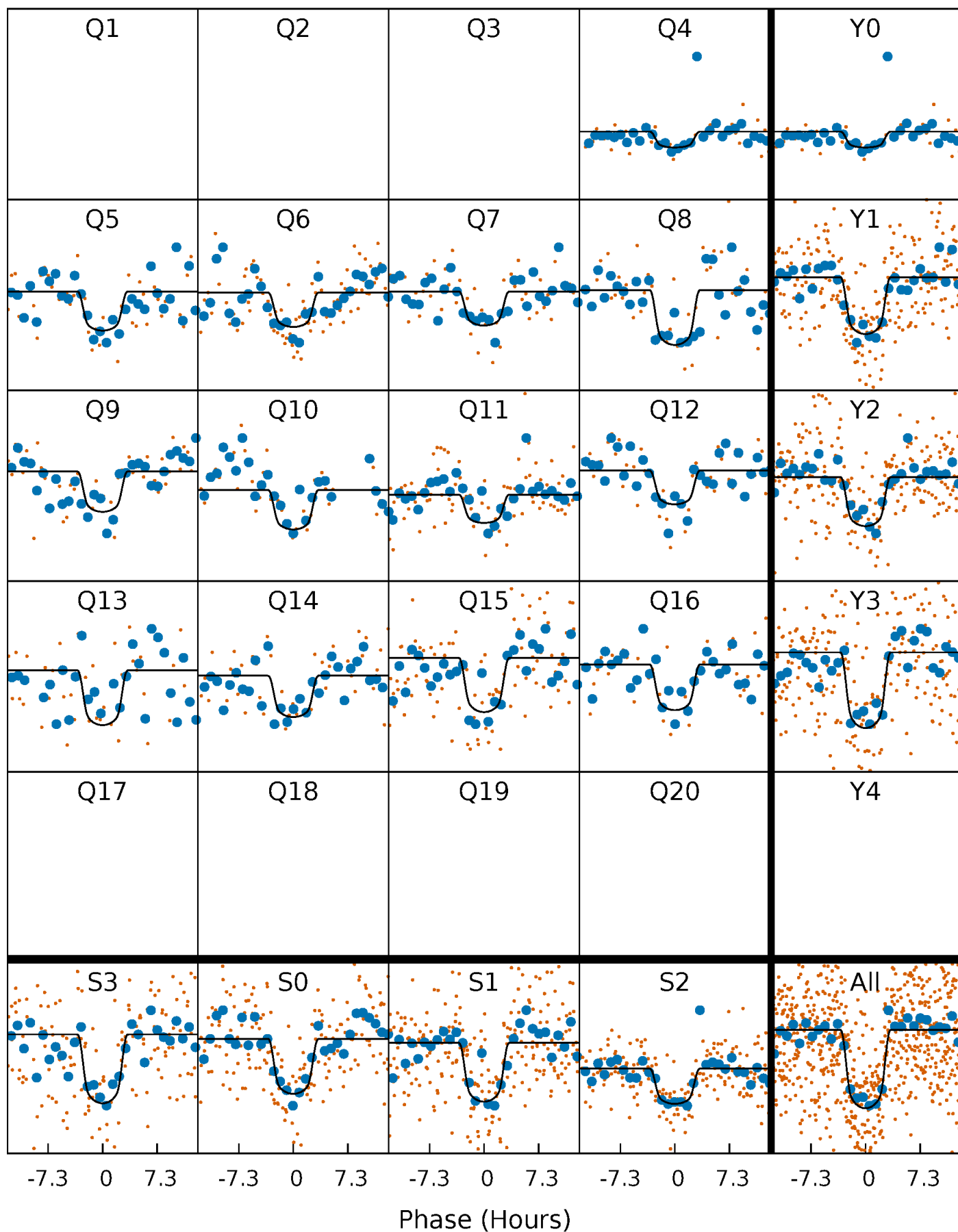
# PDC Quarter-Phased Transit Curves

TCE 006041734-02 P= 76.535782 Days  $T_0=164.174138$  (BKJD)



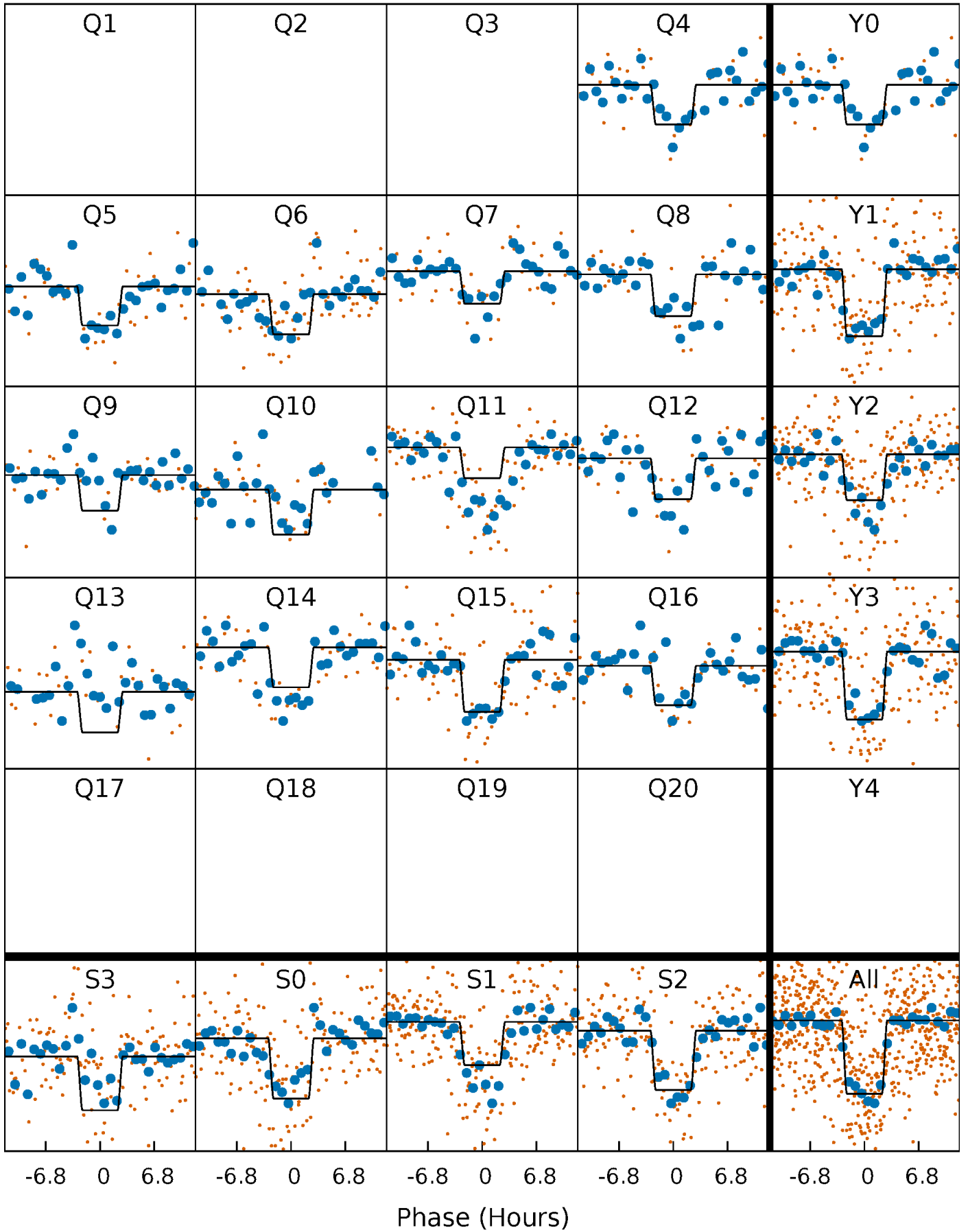
# DV Quarter-Phased Transit Curves

TCE 006041734-02 P= 76.535782 Days  $T_0=164.174138$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

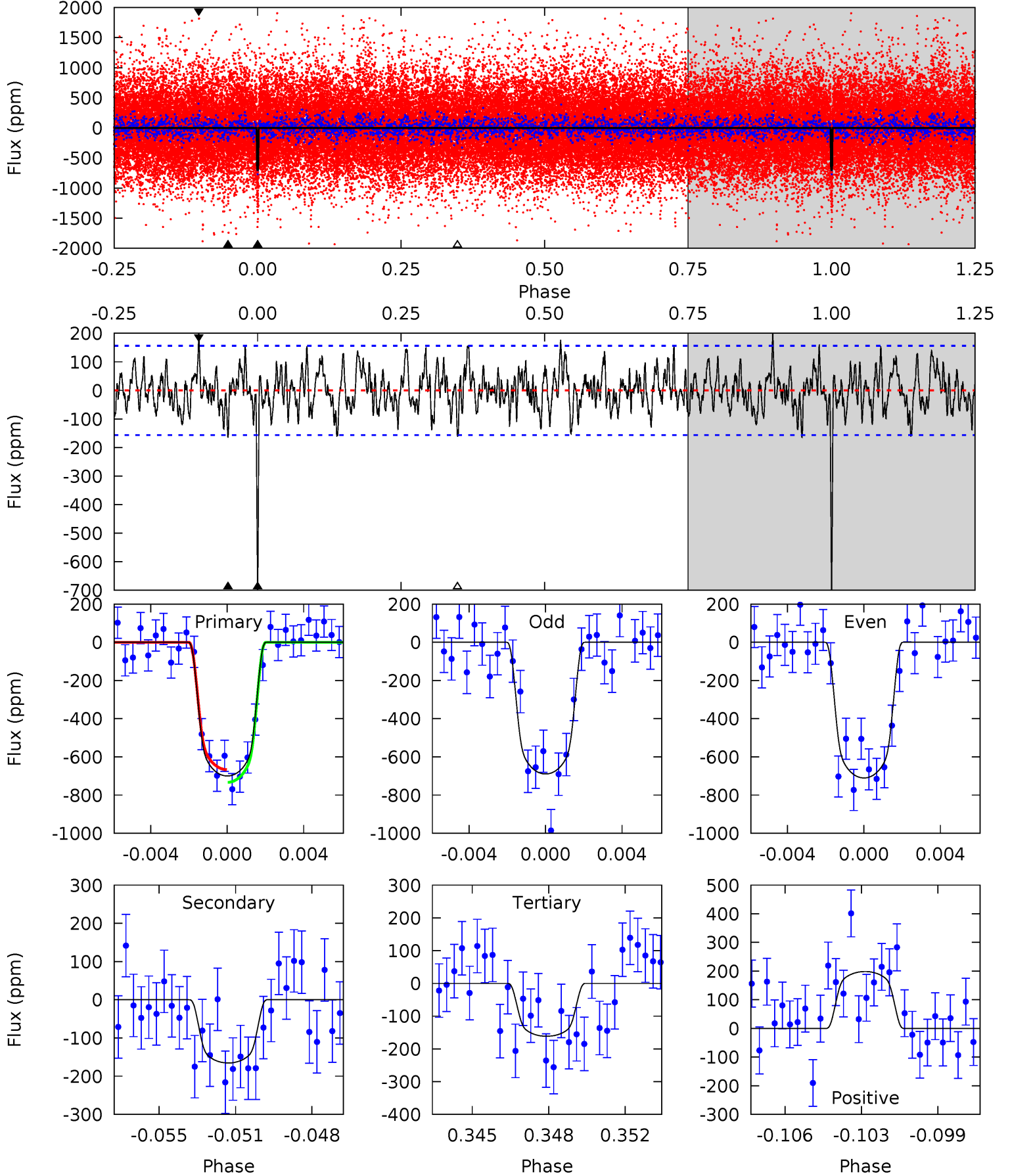
TCE 006041734-02 P= 76.534958 Days  $T_0=164.184179$  (BKJD)



# DV Model-Shift Uniqueness Test

006041734-02, P = 76.535782 Days, E = 164.174138 Days

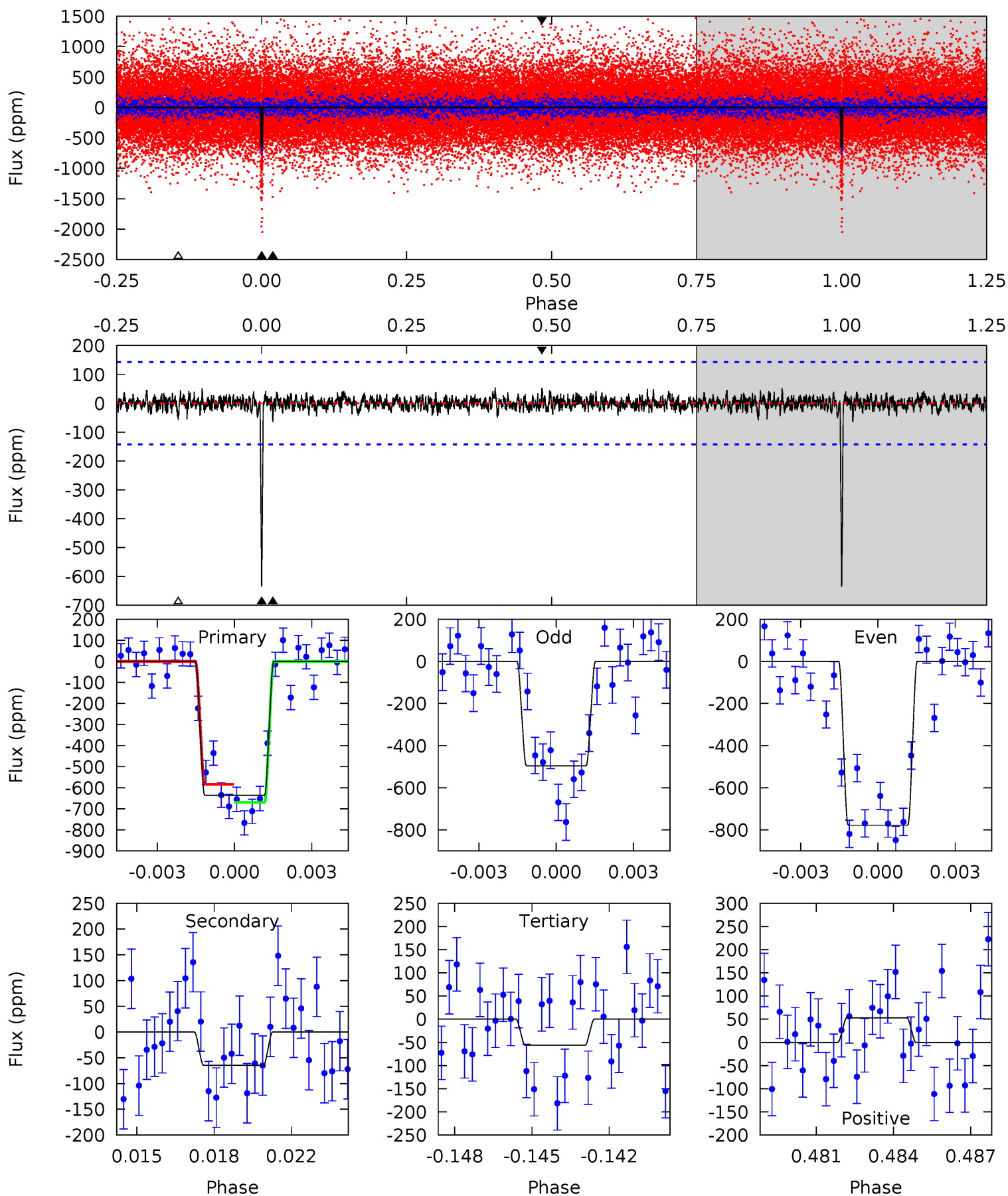
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
23.3	5.52	5.39	6.62	5.22	2.91	1.97	18.0	16.7	0.13	-1.10	0.35	1.00	0.22	1.11



# Alt Model-Shift Uniqueness Test

006041734-02, P = 76.534958 Days, E = 164.184179 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
23.4	2.38	2.08	1.96	5.25	2.96	0.57	21.4	21.5	0.30	0.42	5.21	0.96	0.08	1.59





### Stellar Parameters For KIC 006041734

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5596^{+84}_{-75}$	$4.105^{+0.203}_{-0.101}$	$0.140^{+0.150}_{-0.150}$	$1.466^{+0.244}_{-0.326}$	$0.998^{+0.081}_{-0.066}$	$0.446^{+0.450}_{-0.139}$
	+2%/-1%	+5%/-2%	+107%/-107%	+17%/-22%	+8%/-7%	+101%/-31%
Source	SPE90	SPE90	SPE90	DSEP		

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

### Secondary Eclipse Parameters for KIC 006041734-02 / KOI 2167.03

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-165 \pm 30$	$4.77^{+0.60}_{-0.65}$	$700^{+32}_{-45}$	$3964^{+166}_{-167}$	$501^{+183}_{-136}$
Alt.	$-65 \pm 27$	$4.10^{+0.52}_{-0.61}$	$700^{+33}_{-42}$	$3565^{+259}_{-274}$	$263^{+159}_{-115}$

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

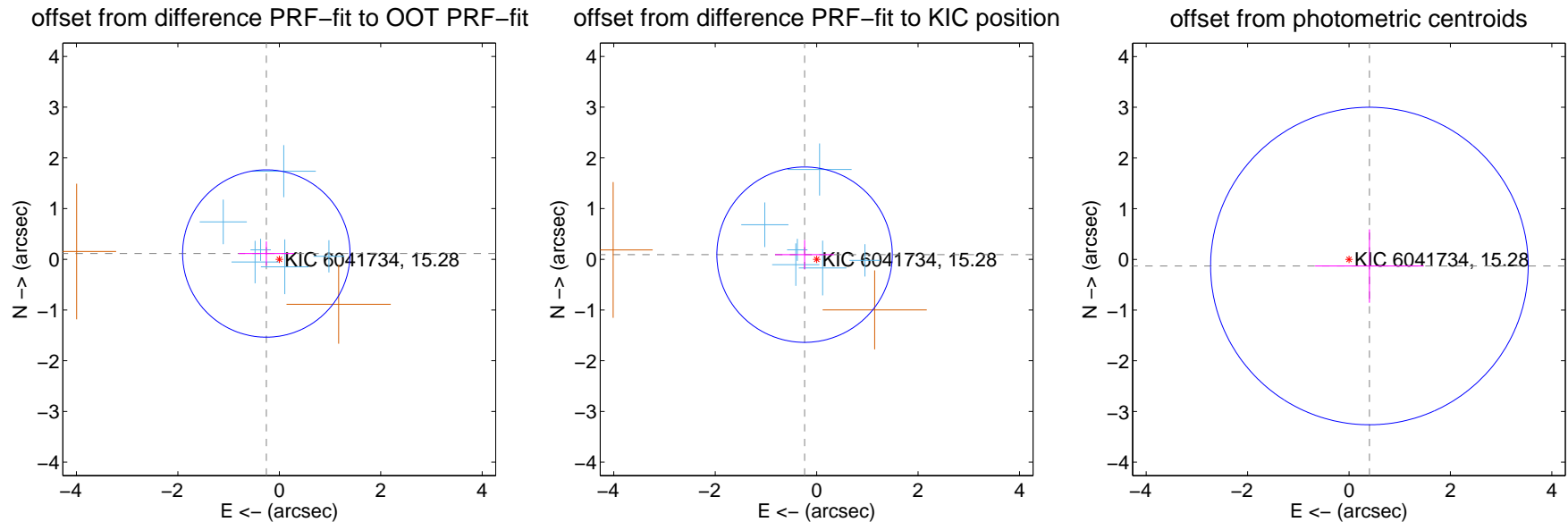
## DV Centroid Data

Supplemental centroid analysis for 006041734-02. Kepler magnitude: 15.28. Transit SNR 13.41

There are 6 quarters with good PRF difference image offsets

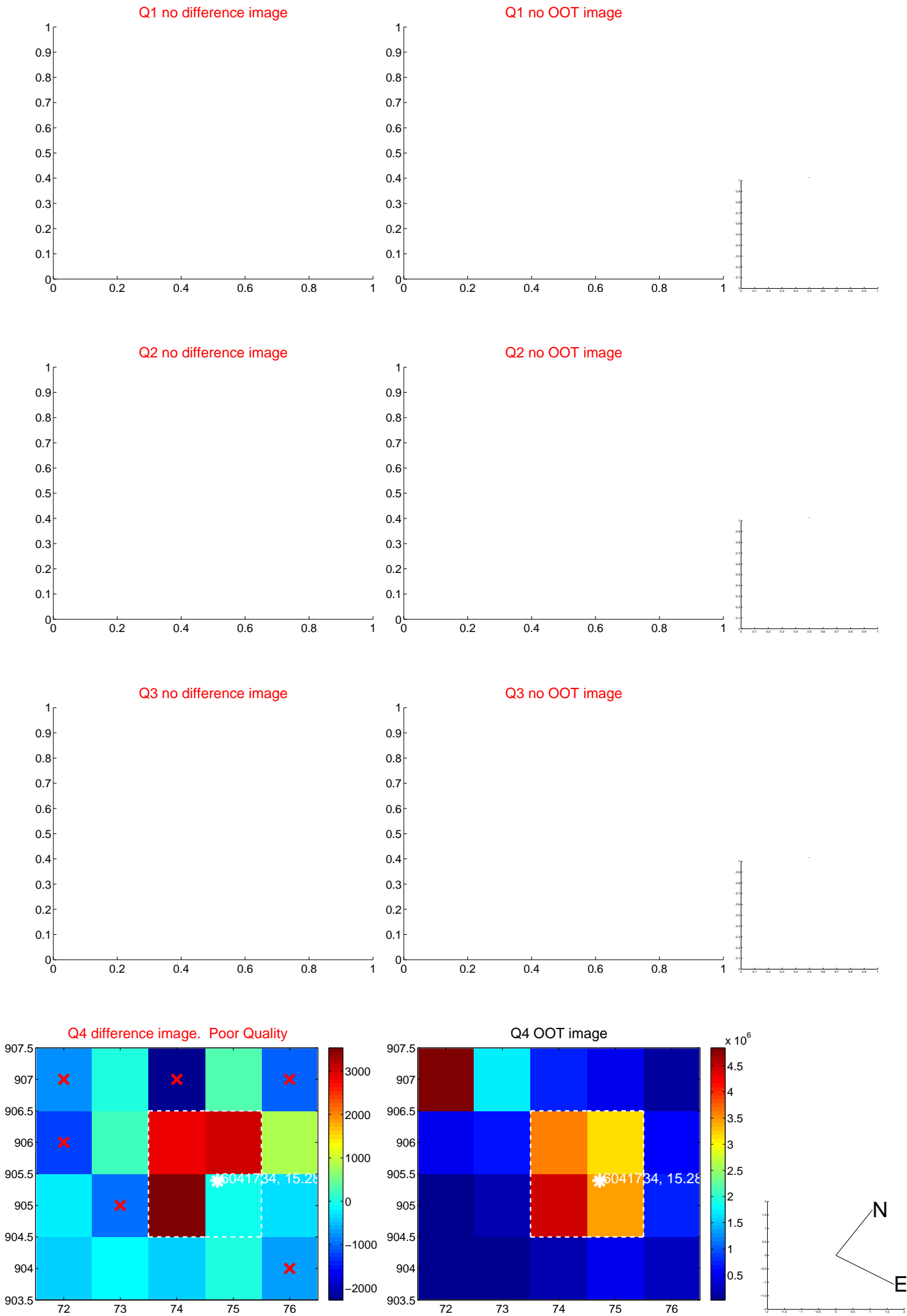
The direct PRF centroid is offset from the target star catalog position by about 0.03 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.280 \pm 0.550$	0.51	$0.256 \pm 0.545$	$0.114 \pm 0.238$
PRF-fit source offset from KIC position	$0.255 \pm 0.576$	0.44	$0.238 \pm 0.582$	$0.091 \pm 0.289$
photometric centroid source offset	$0.42 \pm 1.04$	0.41	$-0.40 \pm 1.07$	$-0.13 \pm 0.72$

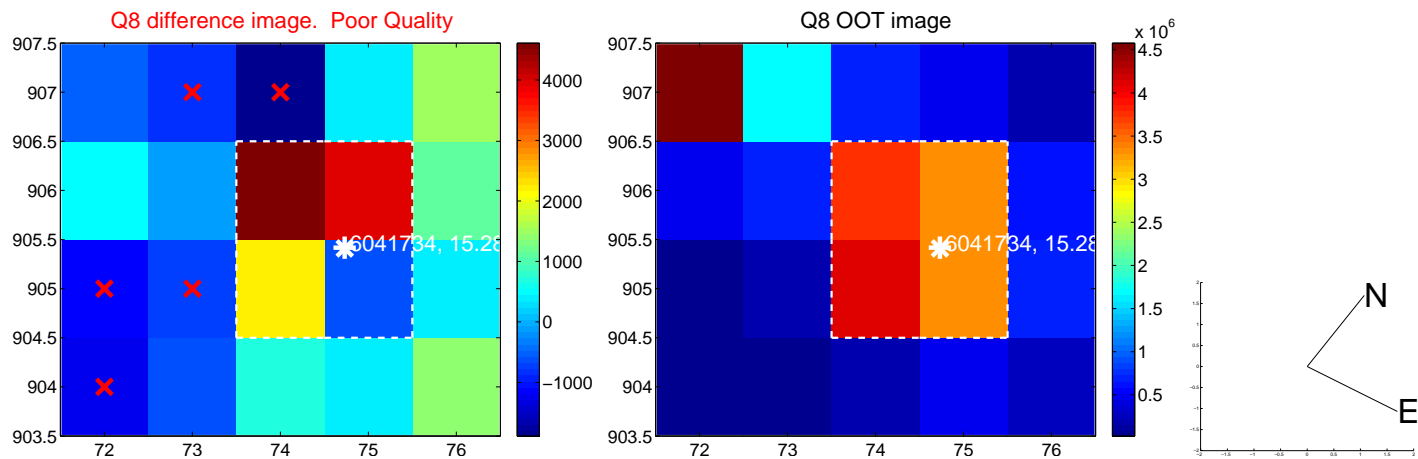
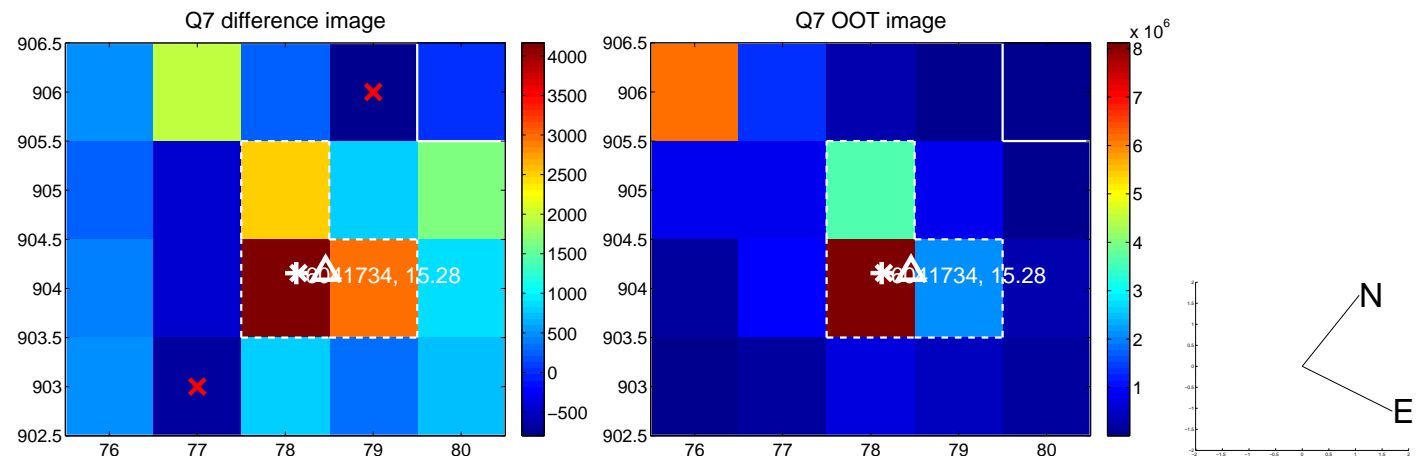
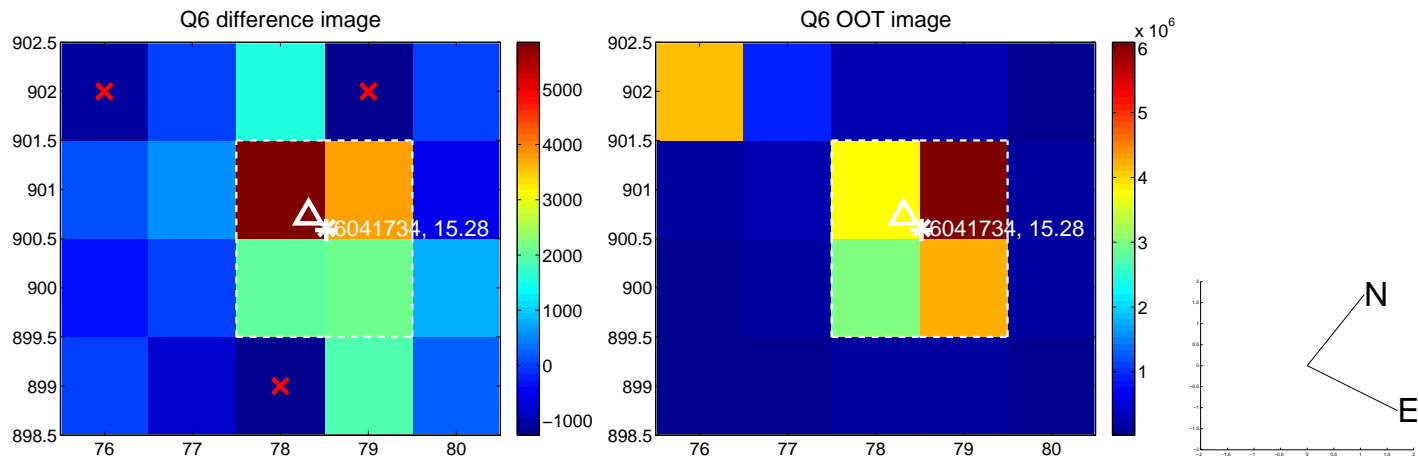
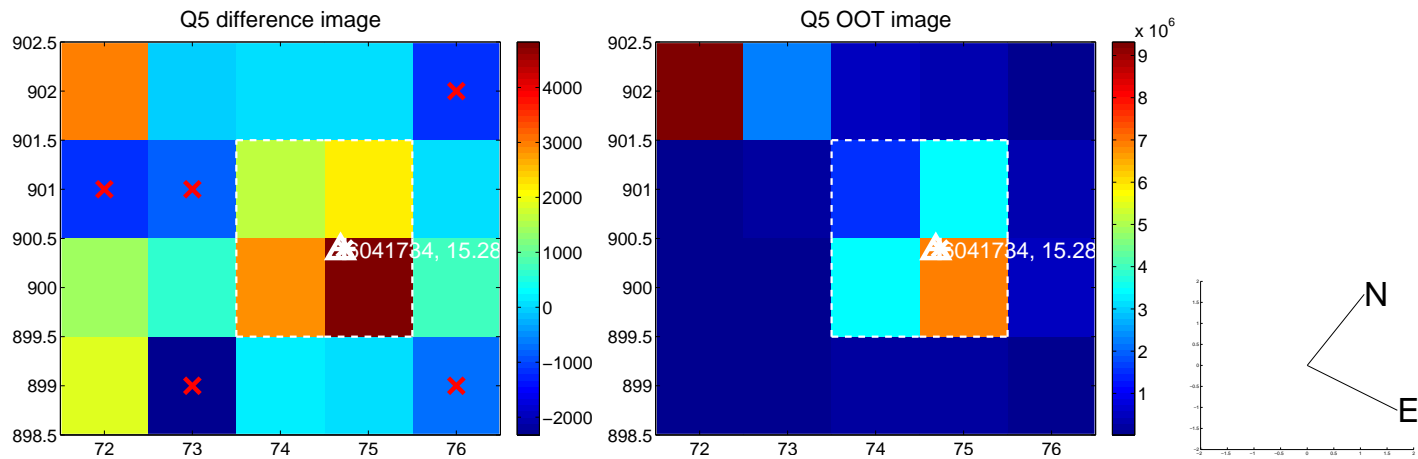


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

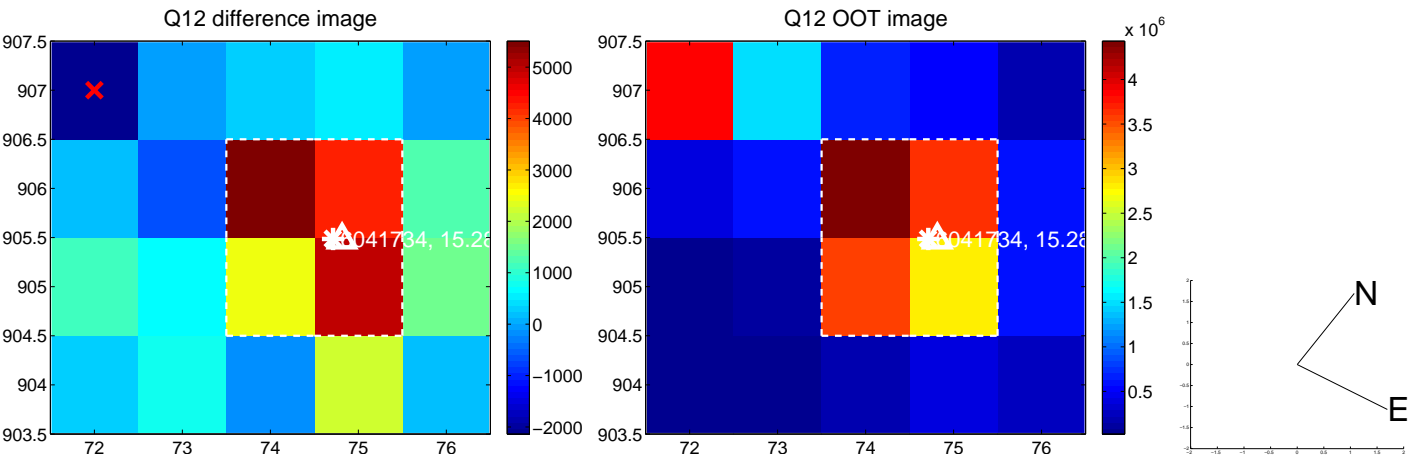
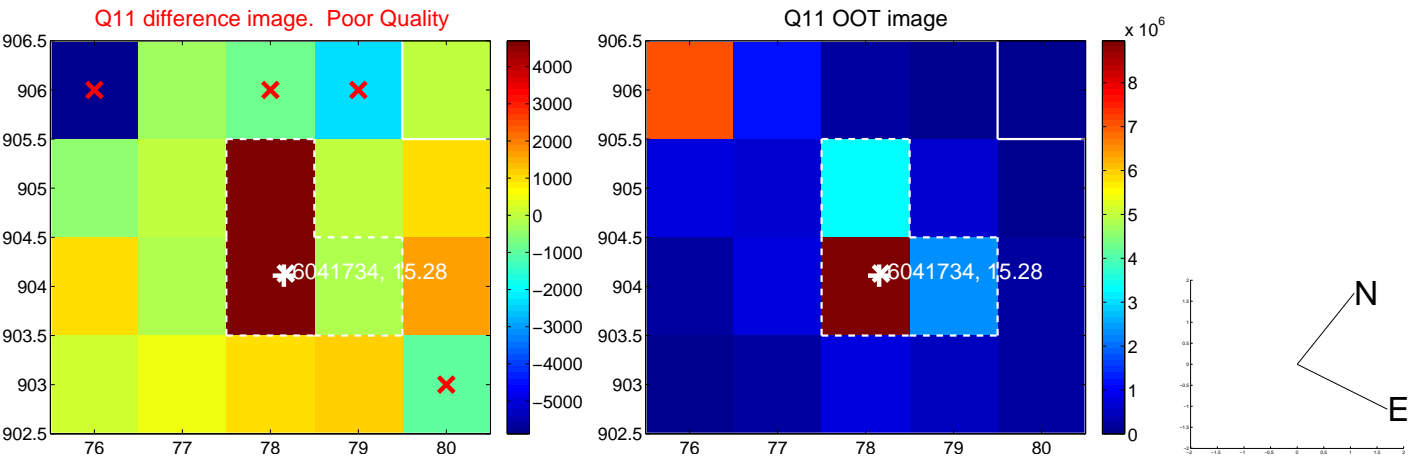
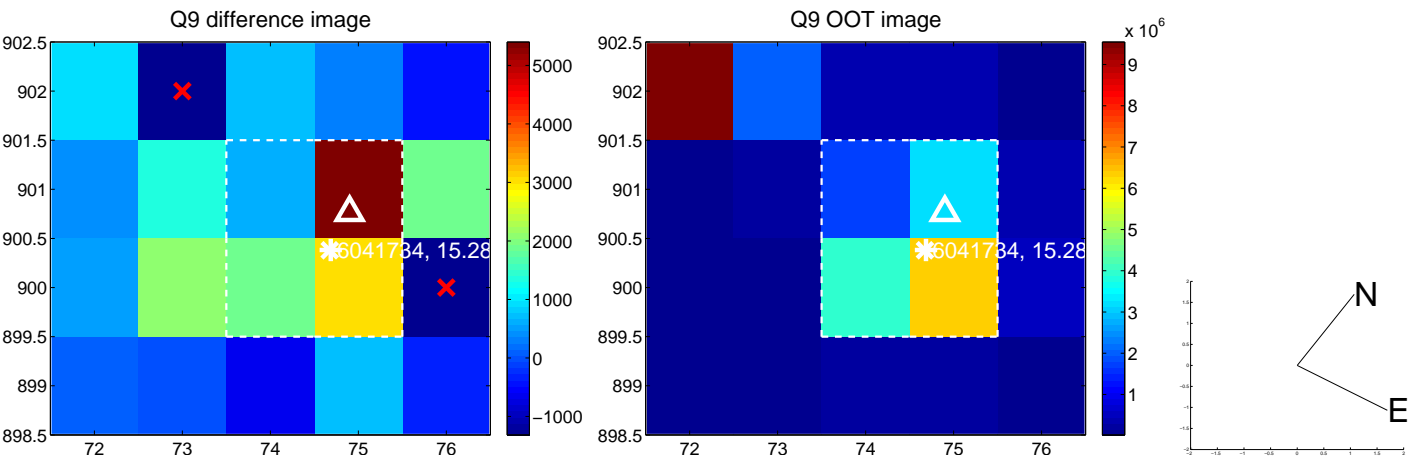
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



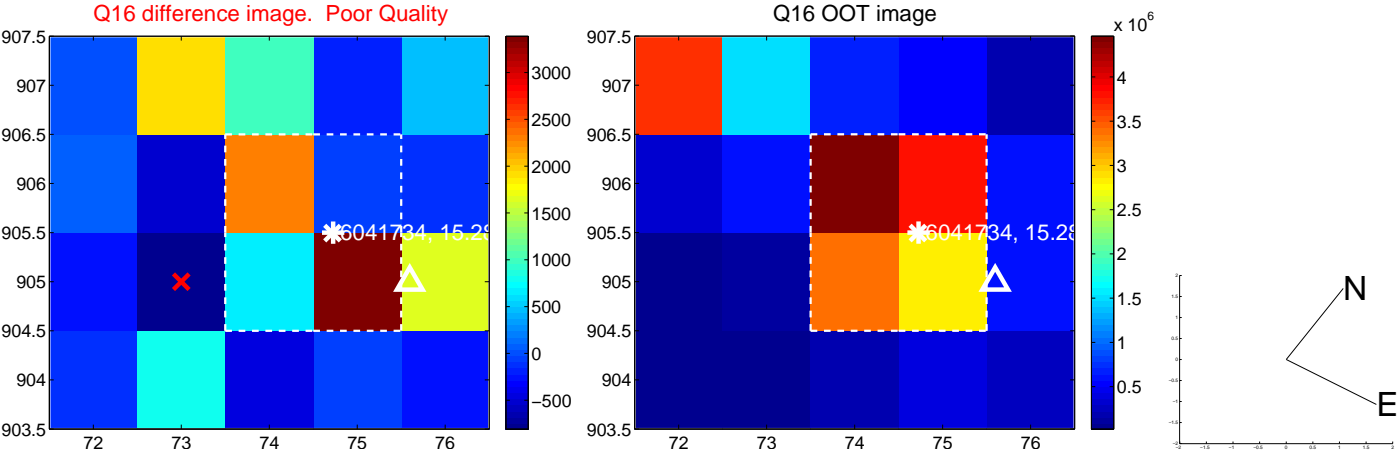
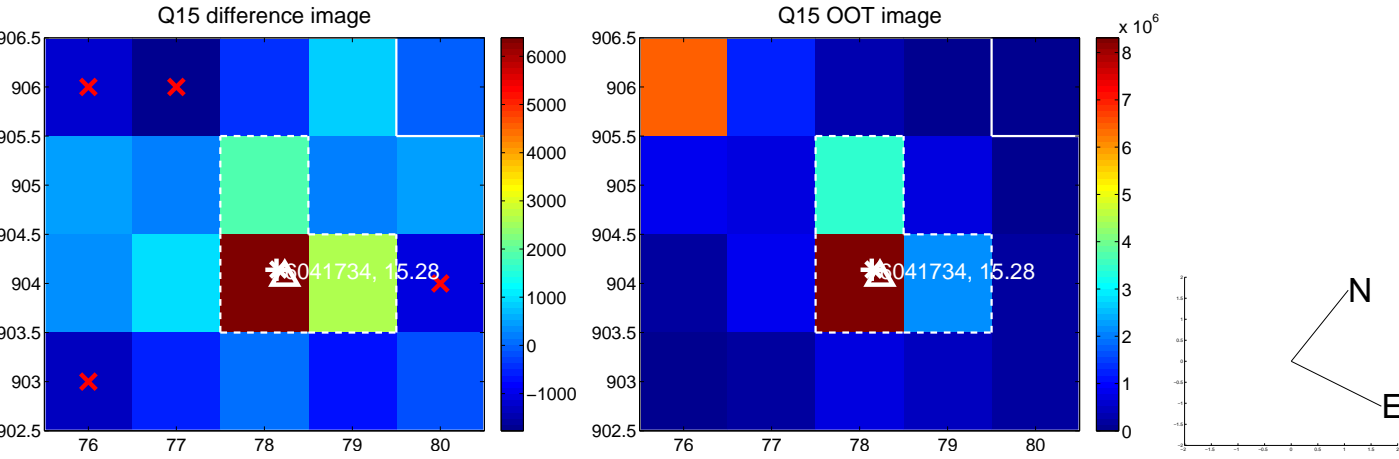
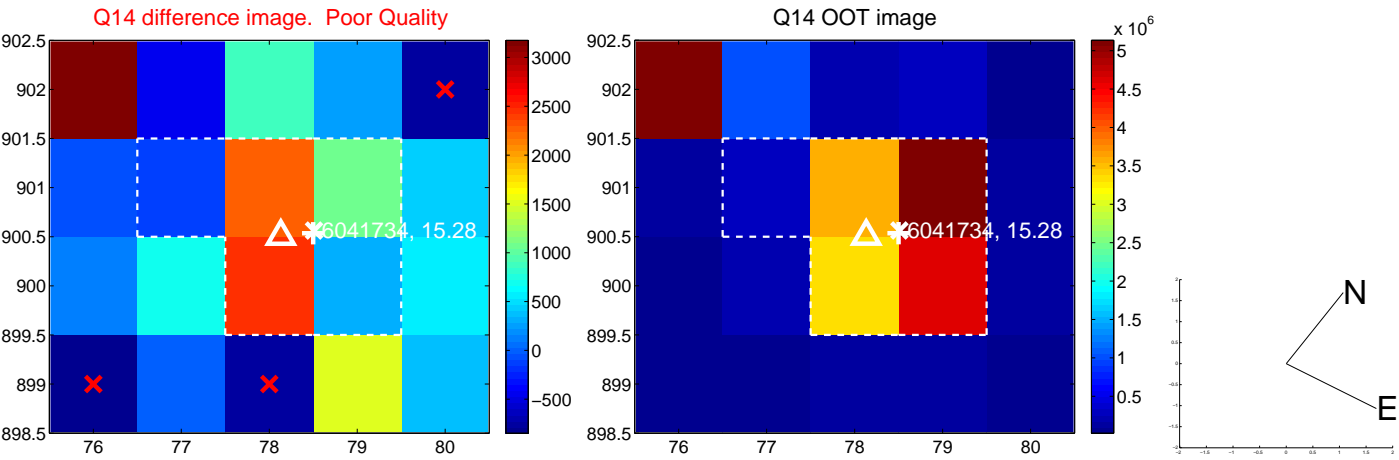
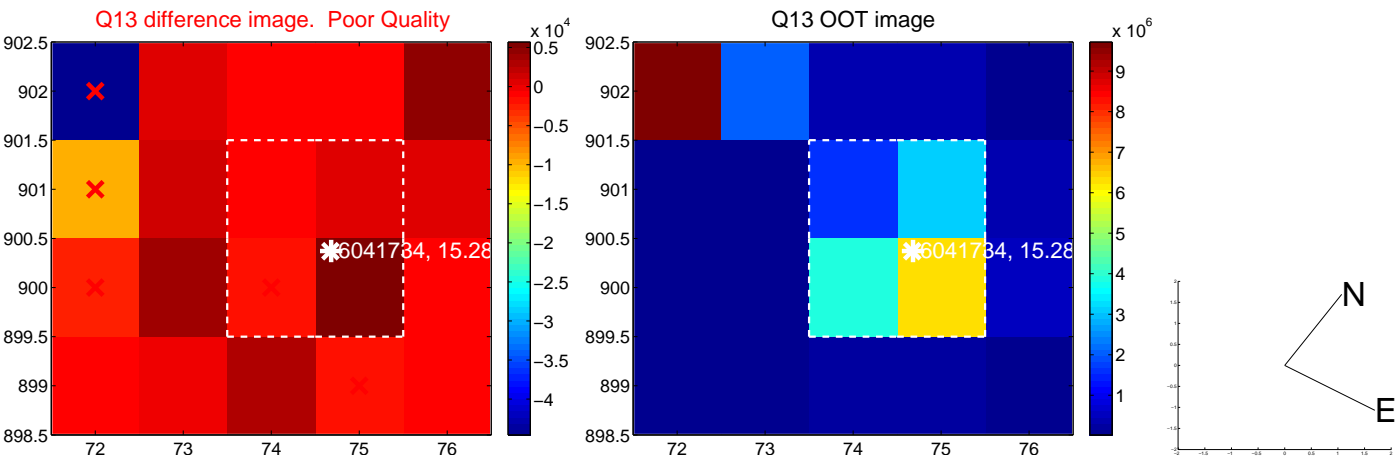
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



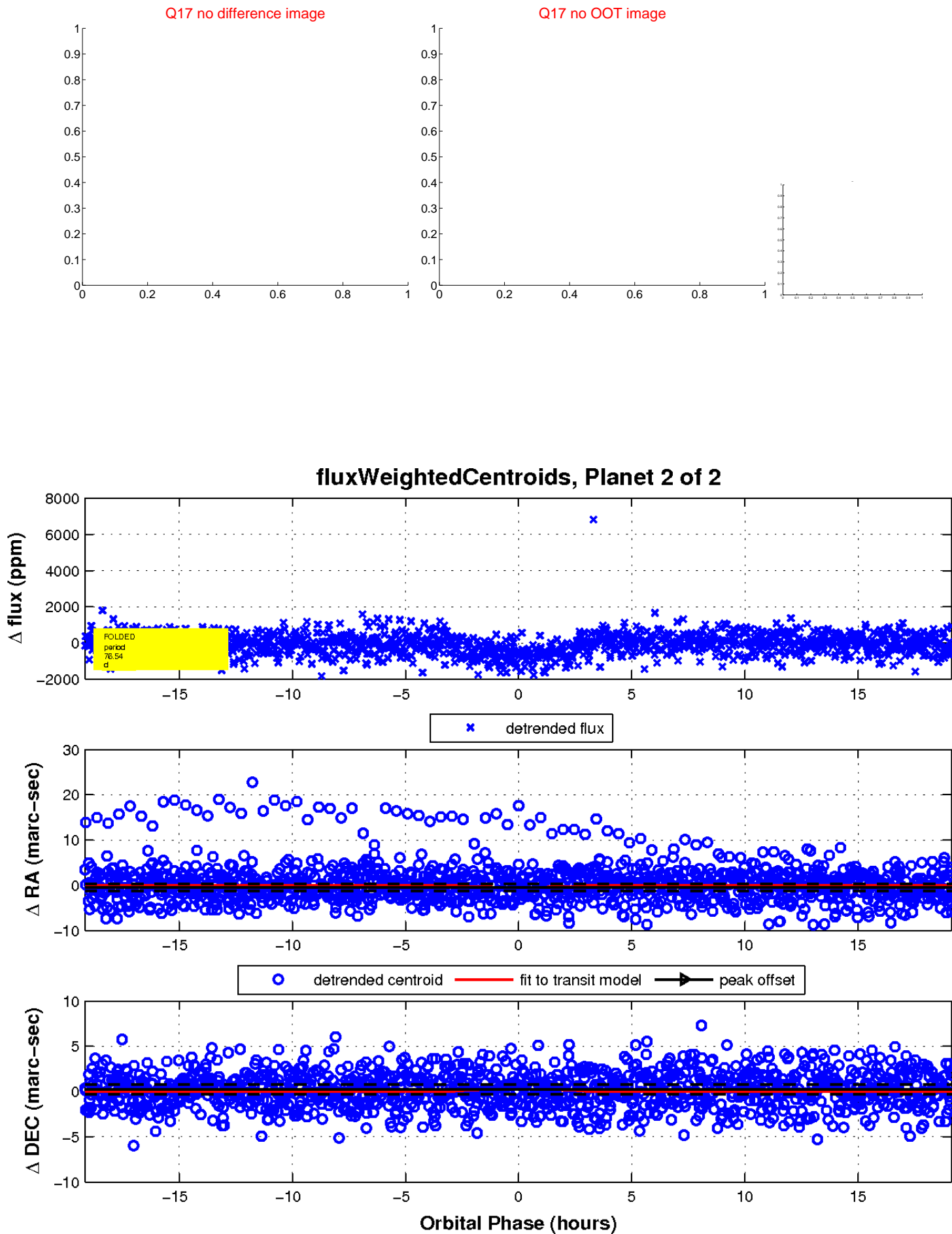
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image

Declination

