

# KIC 006152974

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006152974-01	OBS	0216.01	20.172021	141.209118	5388.9	3.272	198.6	196.5	0.86	5064	6.66	24.04
006152974-02	OBS	0216.02	7.518581	132.529211	283.6	2.802	14.7	16.4	0.86	5064	1.73	89.61

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006152974-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
006152974-02	OBS	PC	0.99	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.

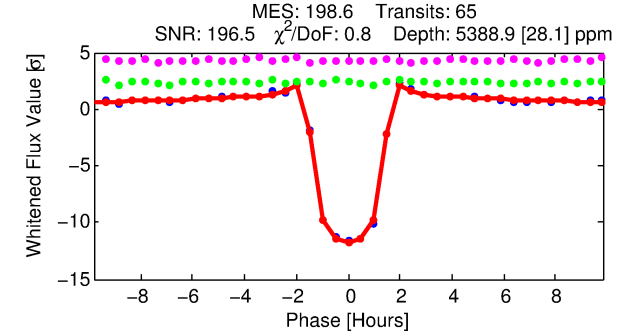
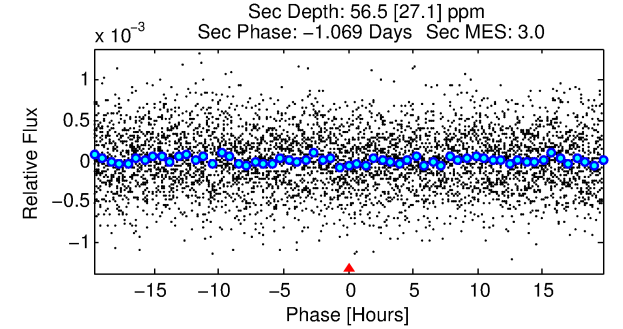
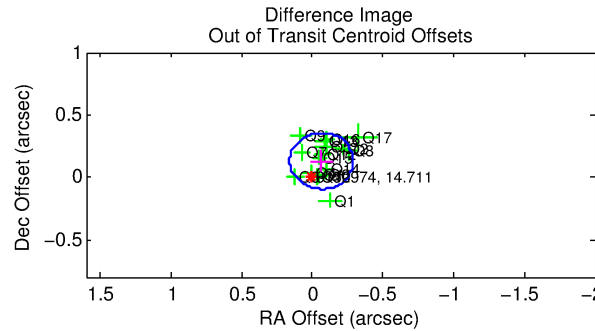
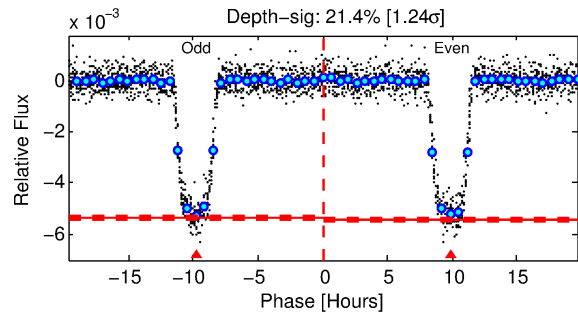
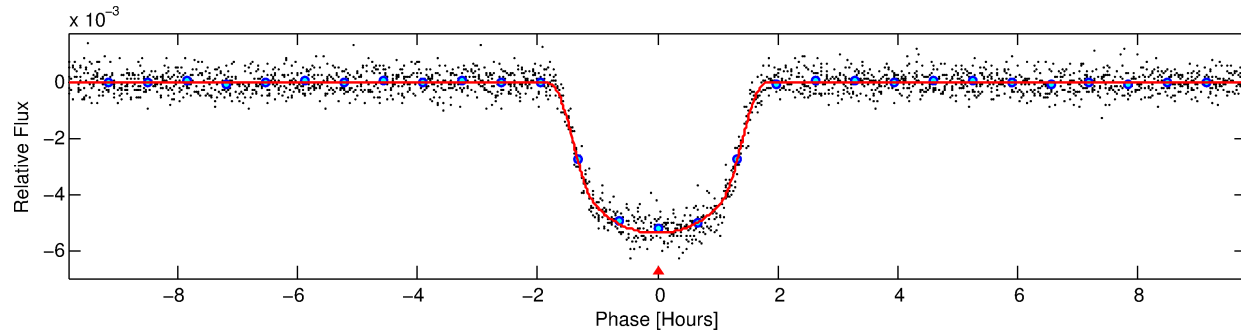
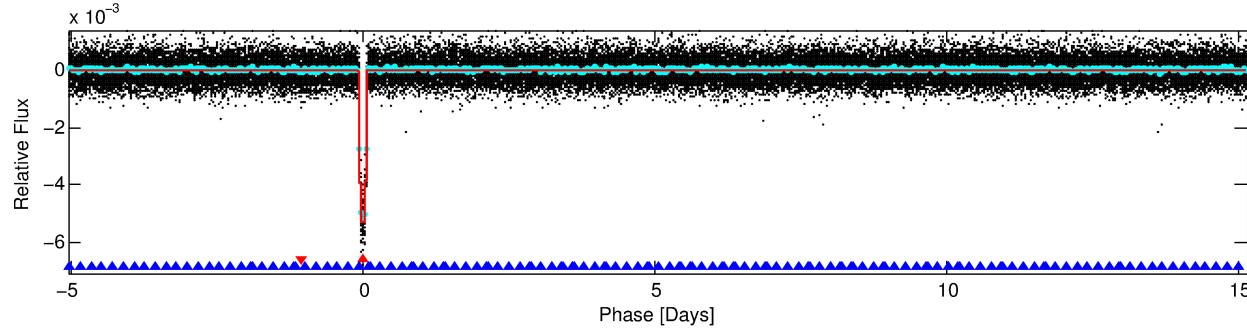
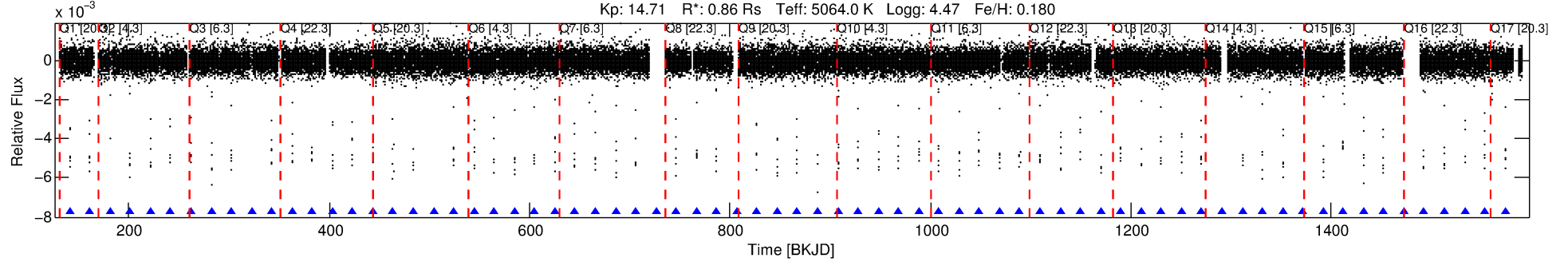
## Ephemeris Match Information For 006152974-01

No Significant Match Found

# DV One-Page Summary

KIC: 6152974 Candidate: 1 of 2 Period: 20.172 d  
KOI: K00216.01 Name: Kepler-118c Corr: 0.978

Kp: 14.71 R\*: 0.86 Rs Teff: 5064.0 K Logg: 4.47 Fe/H: 0.180



## DV Fit Results:

Period = 20.17202 [0.00001] d  
Epoch = 141.2091 [0.0003] BKJD  
Rp/R\* = 0.0706 [0.0017]  
a/R\* = 40.08 [3.09]  
b = 0.65 [0.07]  
Seff = 24.04 [3.94]  
Teq = 565 [23] K  
Rp = 6.66 [0.61] Re  
a = 0.1353 [0.0123] AU  
Ag = 12.83 [6.47] [1.83σ]  
Teffp = 1652 [201] K [5.38σ]

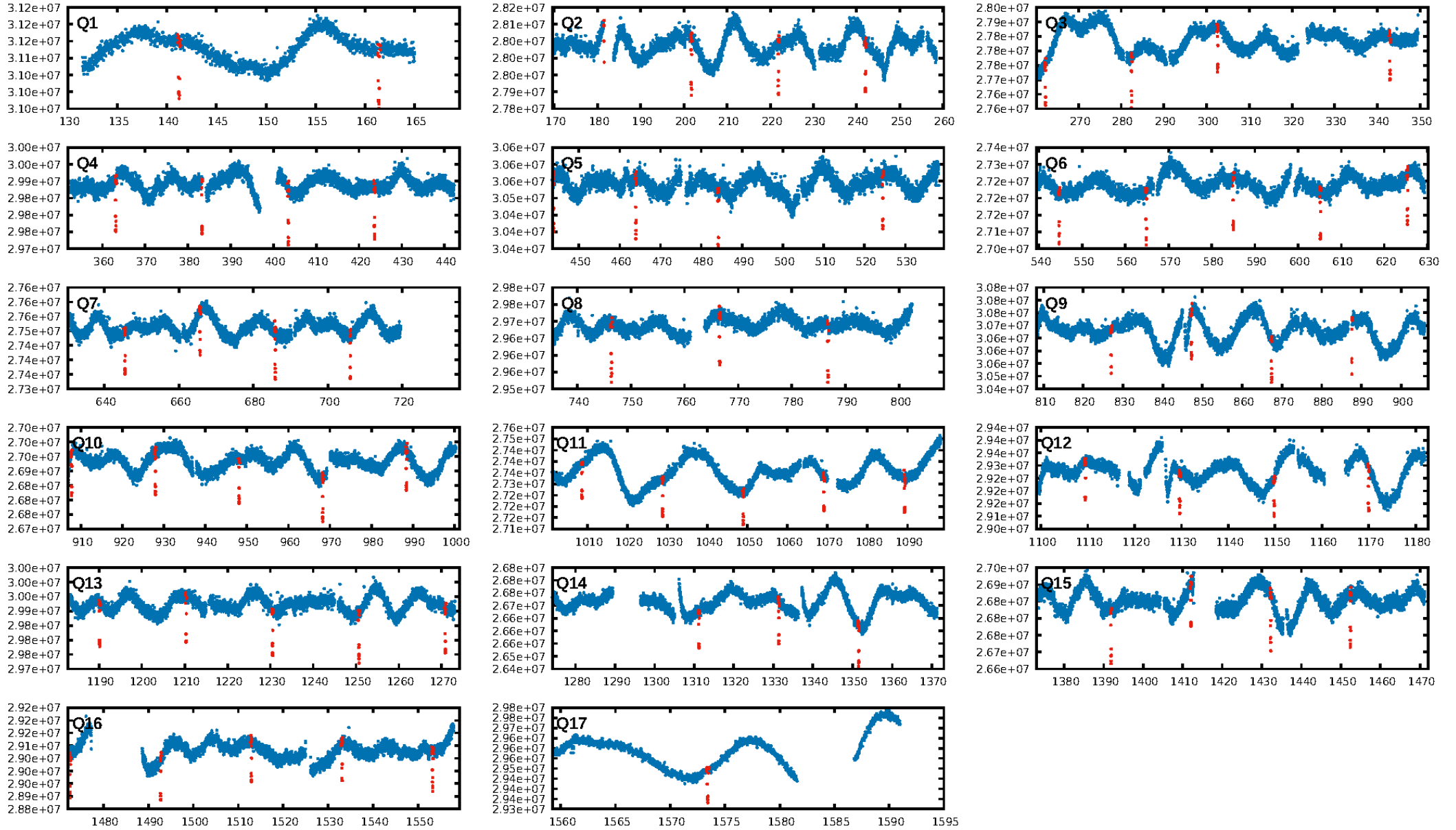
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [70.50σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 68.2%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [62/62]  
GhostDiagnostic-chr: 4.648  
Centroid-sig: 0.0%  
Centroid-so: 0.580 arcsec [10.43σ]  
OotOffset-rm: 0.145 arcsec [1.93σ]  
KicOffset-rm: 0.186 arcsec [2.26σ]  
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]

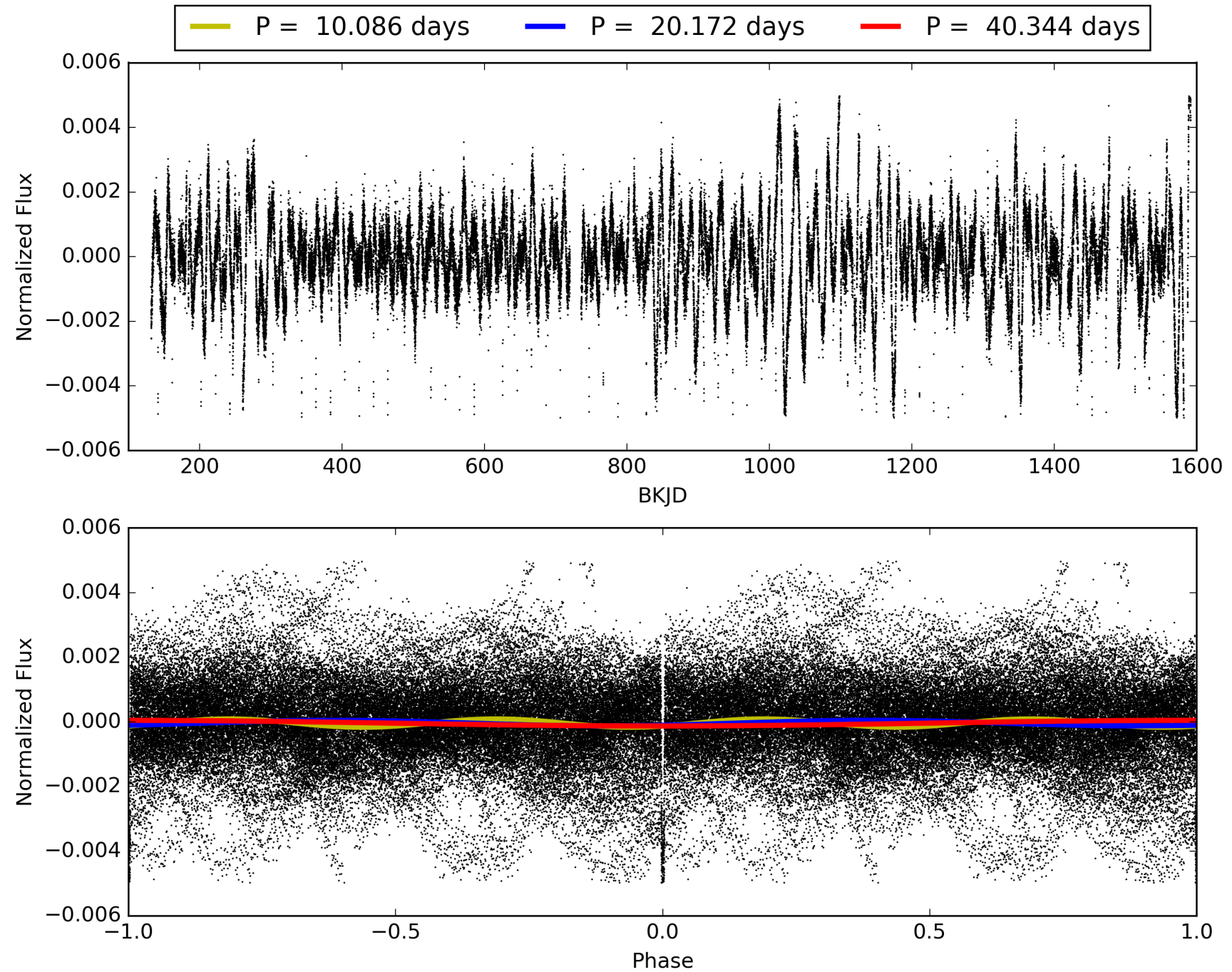
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 09:23:40 Z

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

# TCE 006152974-01, PDC Light Curves

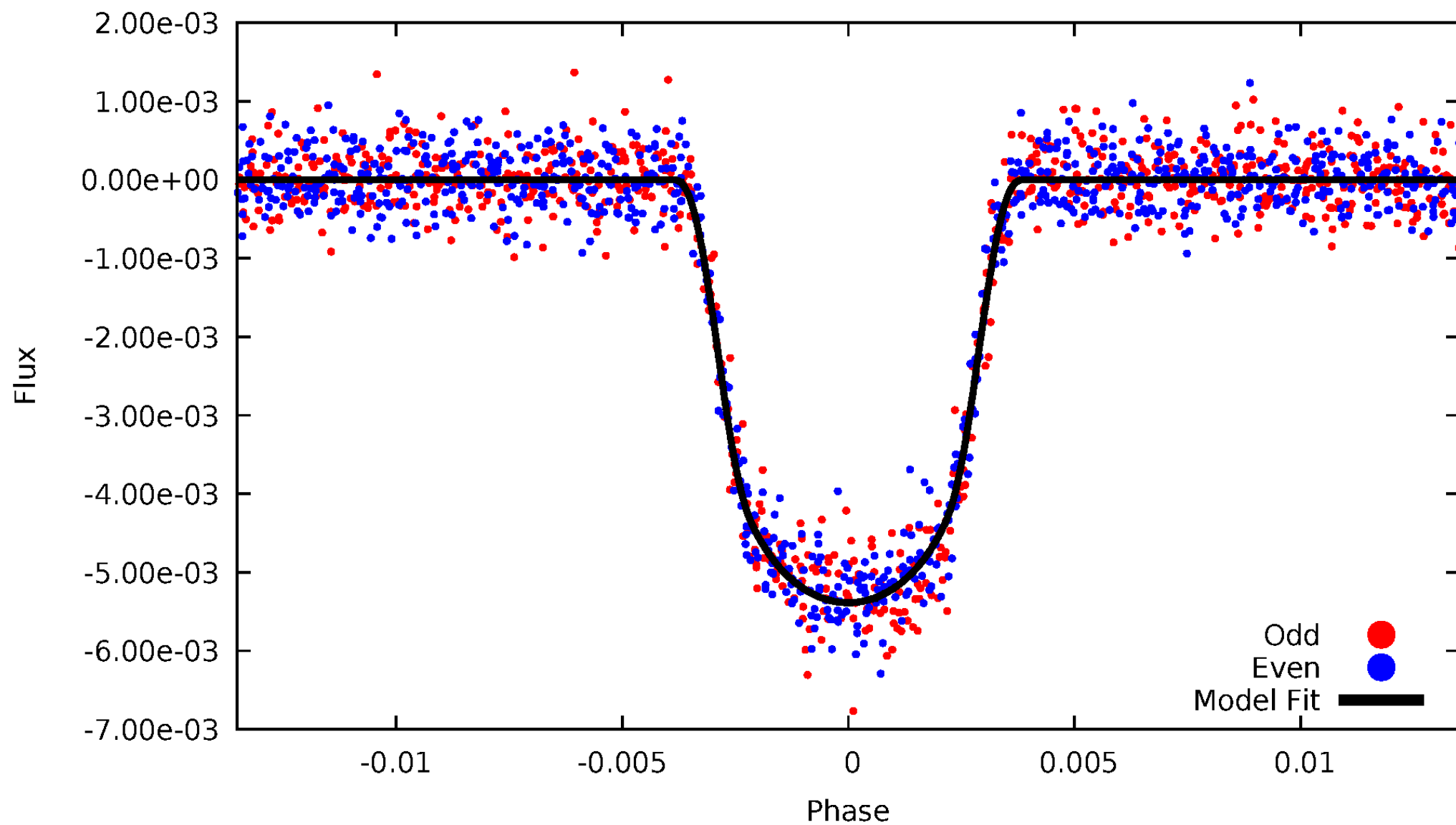


TCE 006152974-01



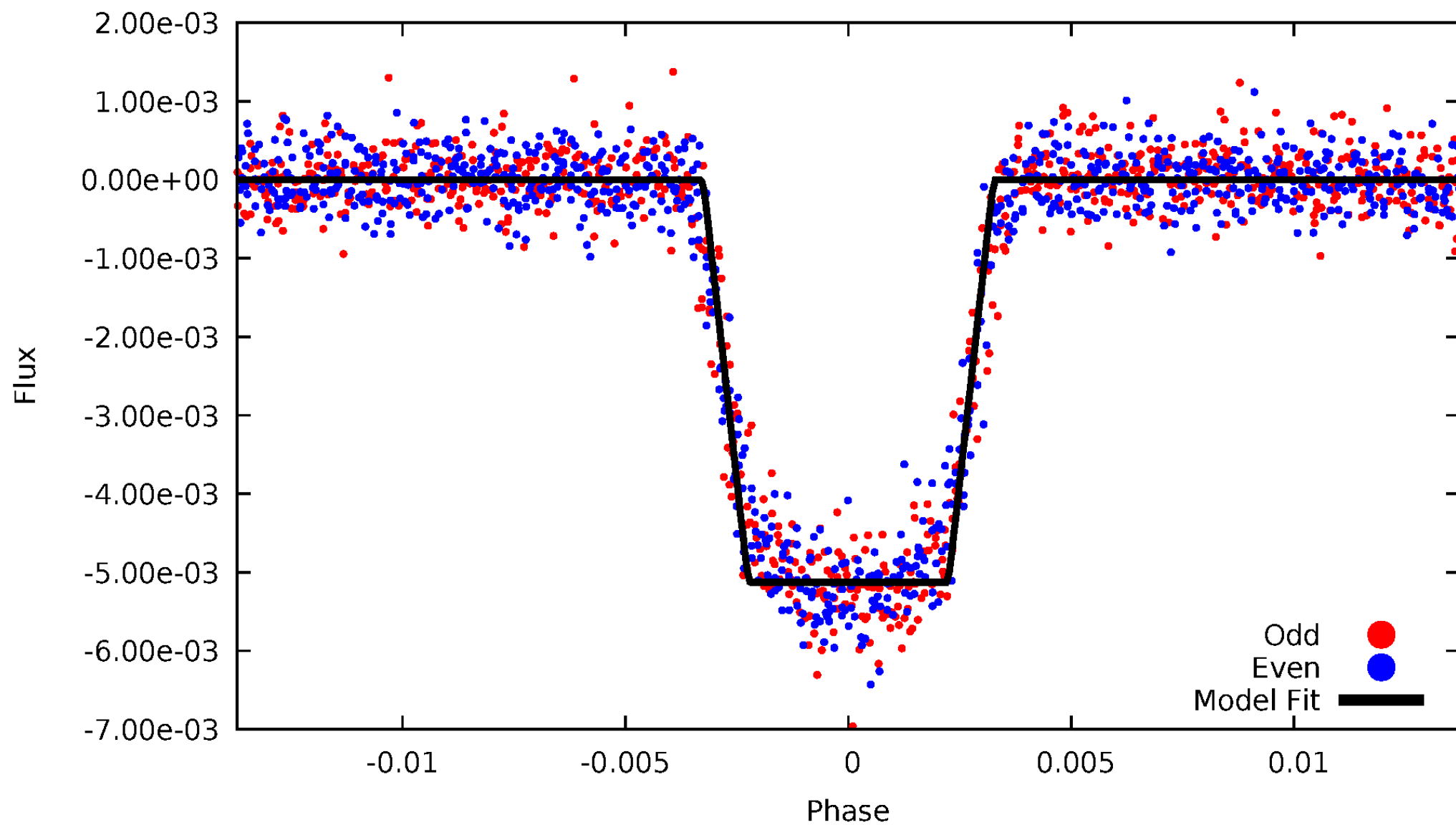
# DV Odd/Even

TCE 006152974-01



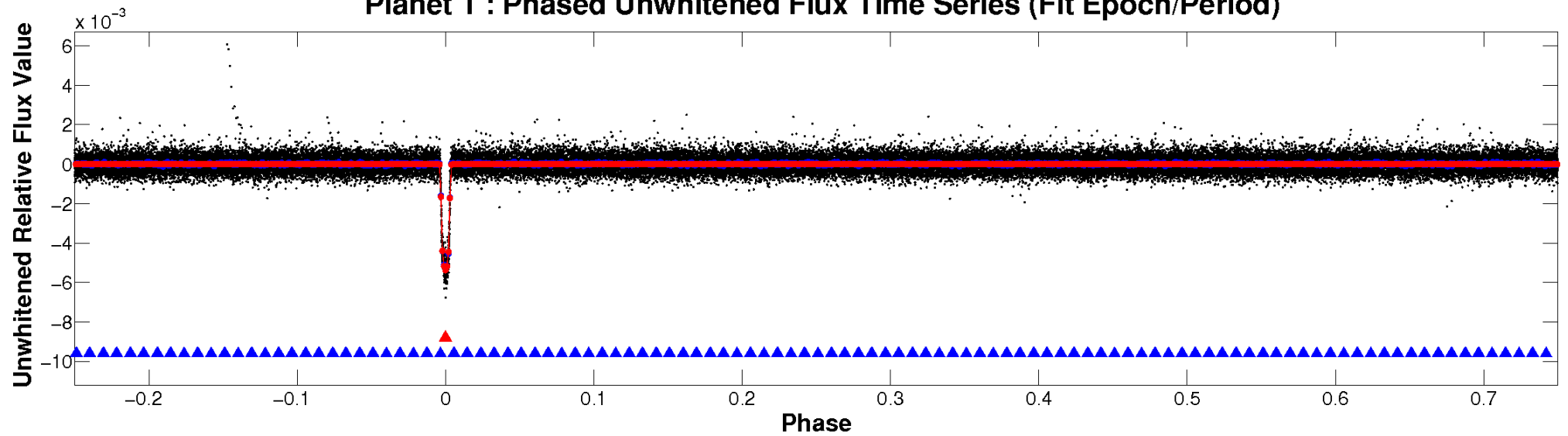
# ALT Odd/Even

TCE 006152974-01

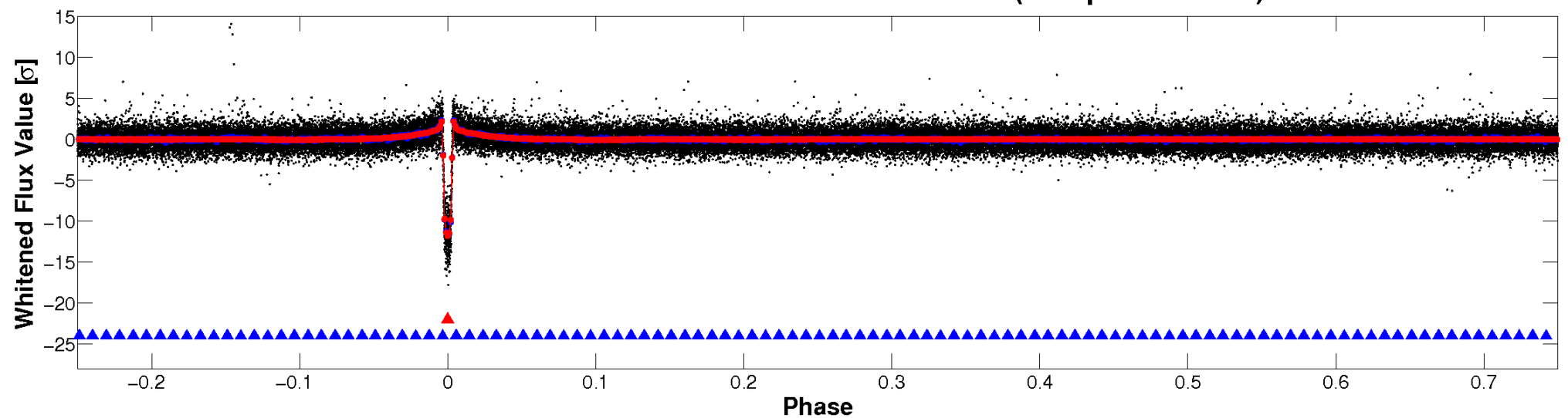


# Non-Whitened Vs. Whitened Light Curve

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



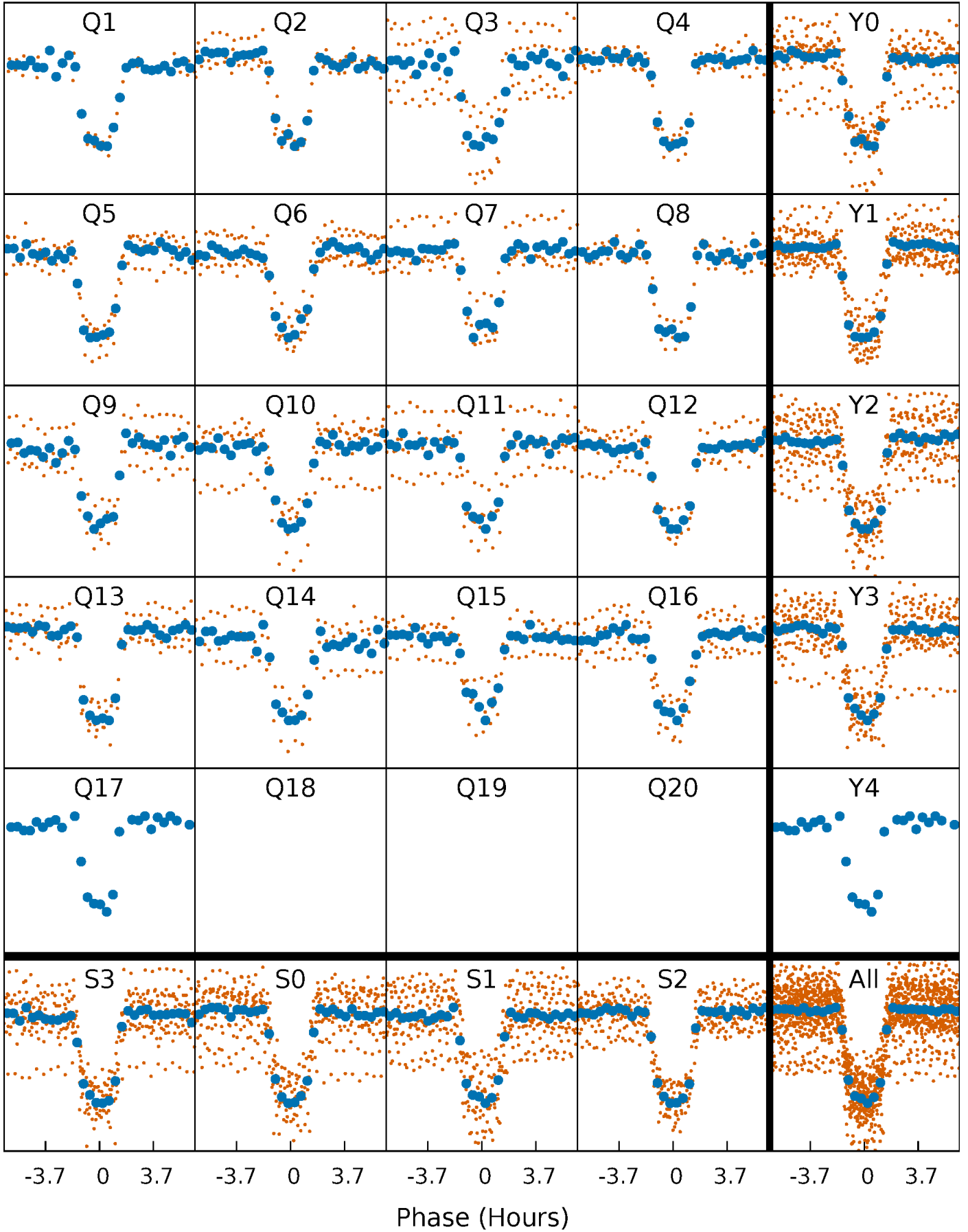
Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

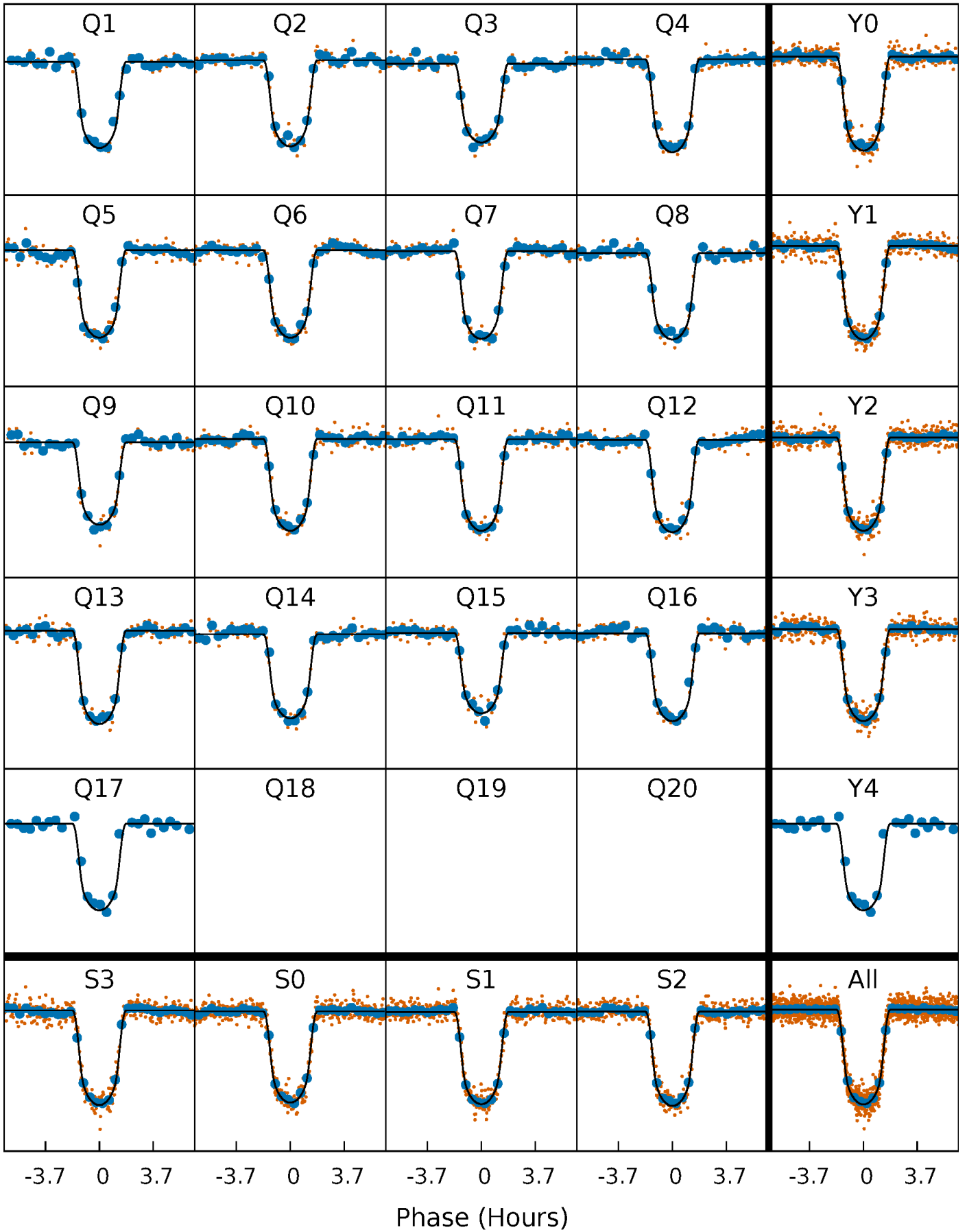
TCE 006152974-01 P= 20.172021 Days  $T_0=141.209118$  (BKJD)





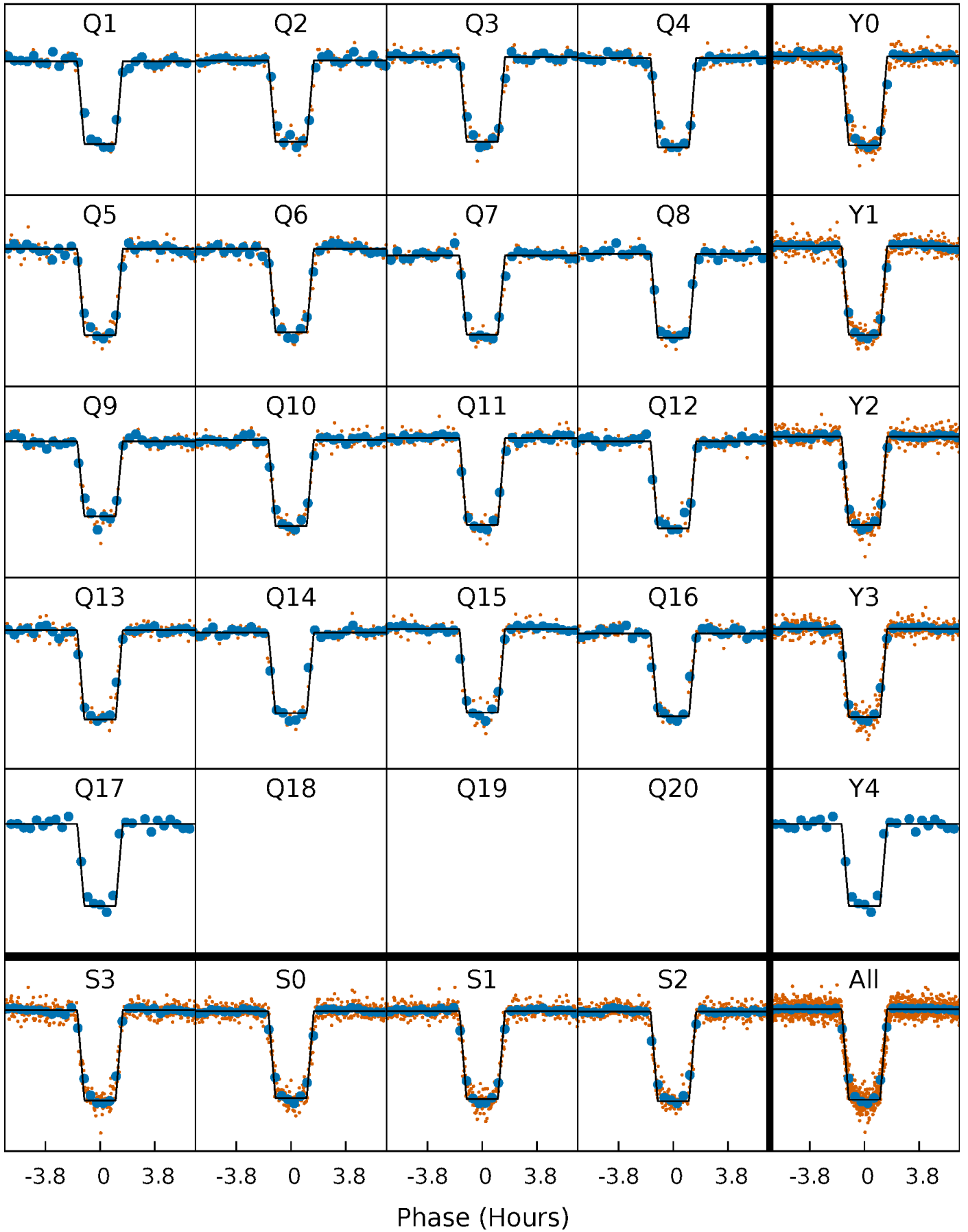
# DV Quarter-Phased Transit Curves

TCE 006152974-01 P= 20.172021 Days  $T_0=141.209118$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

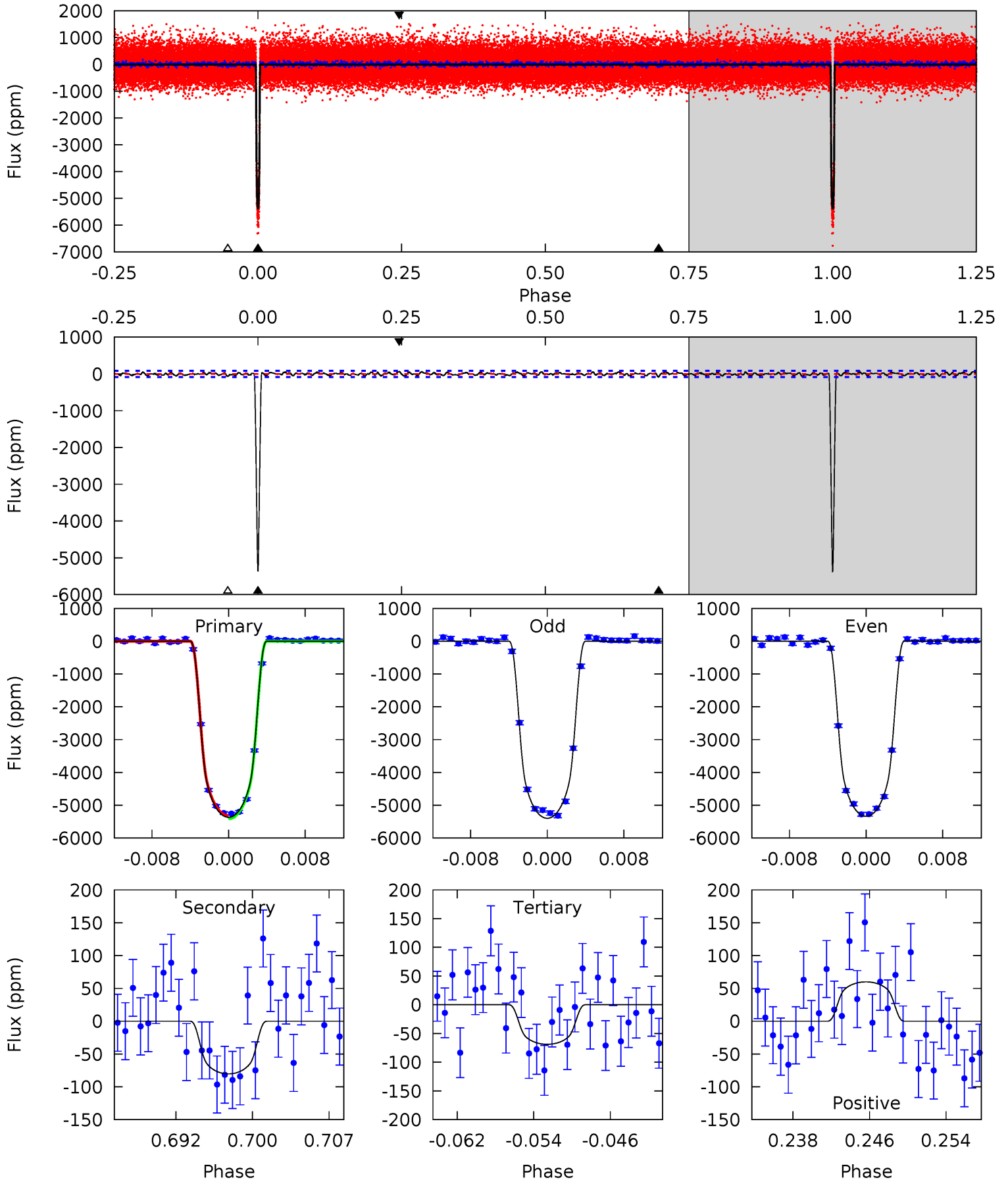
TCE 006152974-01 P= 20.172168 Days  $T_0=141.203969$  (BKJD)



# DV Model-Shift Uniqueness Test

006152974-01, P = 20.172021 Days, E = 121.037097 Days

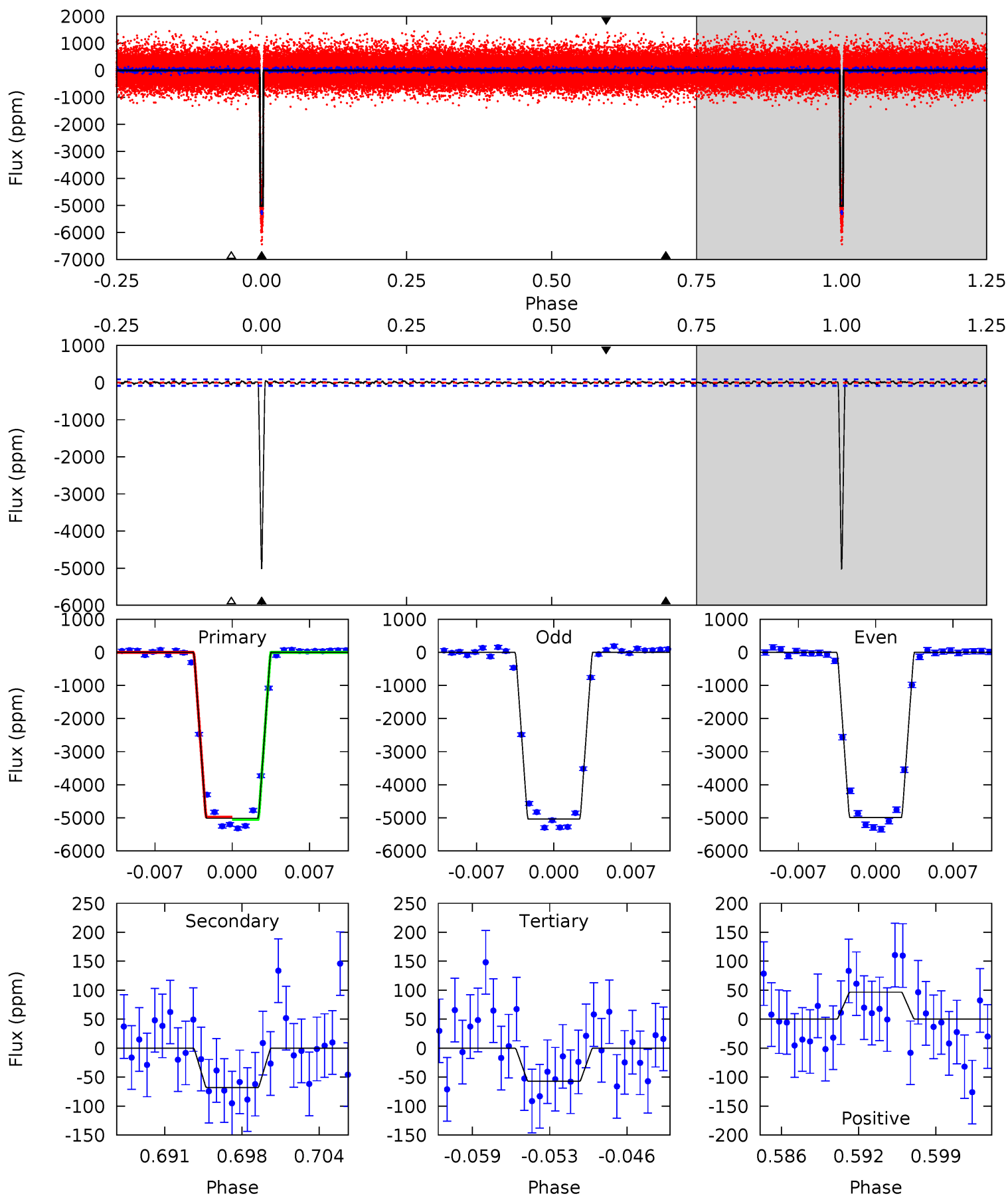
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
324.3	4.85	4.16	3.62	5.08	2.67	1.49	320.2	320.7	0.70	1.24	1.78	0.99	0.01	2.73



# Alt Model-Shift Uniqueness Test

006152974-01, P = 20.172168 Days, E = 121.031801 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
293.4	3.97	3.34	2.73	5.11	2.72	1.14	290.1	290.7	0.63	1.25	1.33	0.99	0.01	2.01



### Stellar Parameters For KIC 006152974

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5064^{+83}_{-75}$	$4.474^{+0.090}_{-0.030}$	$0.180^{+0.150}_{-0.150}$	$0.864^{+0.038}_{-0.076}$	$0.811^{+0.052}_{-0.030}$	$1.769^{+0.600}_{-0.195}$
	+2%/-1%	+2%/-1%	+83%/-83%	+4%/-9%	+6%/-4%	+34%/-11%
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 006152974-01 / KOI 0216.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-80 \pm 17$	$6.62^{+0.29}_{-0.34}$	$784^{+18}_{-20}$	$2591^{+68}_{-86}$	$19^{+4}_{-4}$
Alt.	$-68 \pm 17$	$6.71^{+0.28}_{-0.39}$	$784^{+19}_{-21}$	$2530^{+80}_{-99}$	$16^{+5}_{-4}$

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

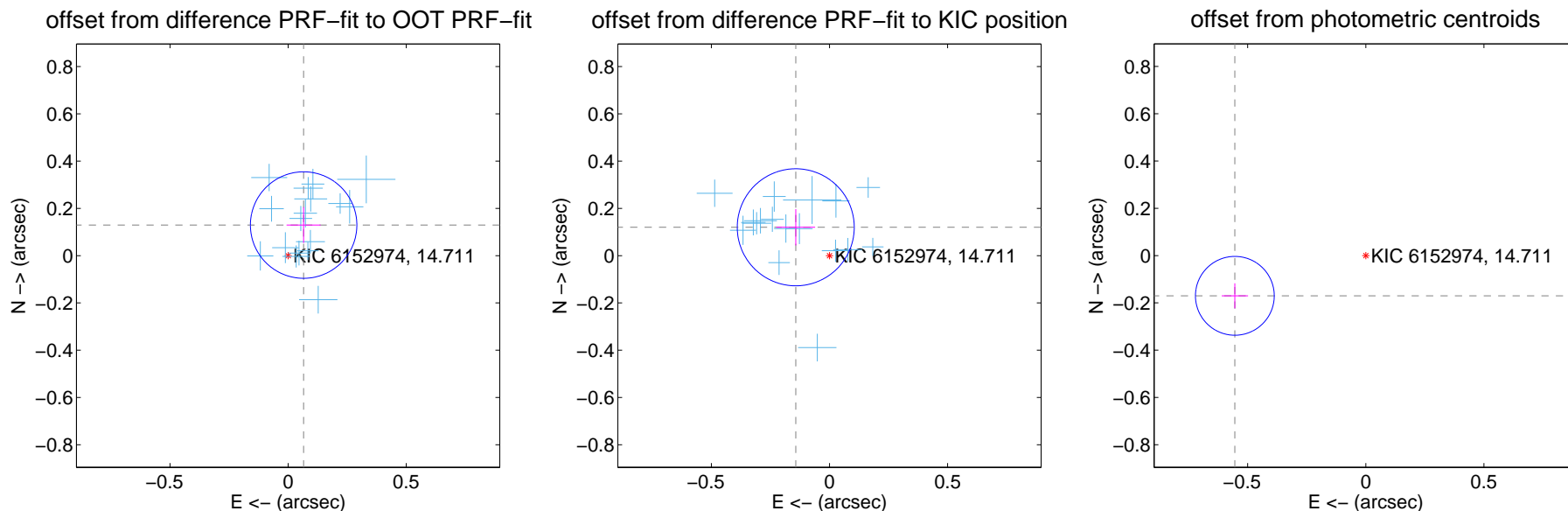
## DV Centroid Data

Supplemental centroid analysis for 006152974-01. Kepler magnitude: 14.71. Transit SNR 196.45

There are 17 quarters with good PRF difference image offsets

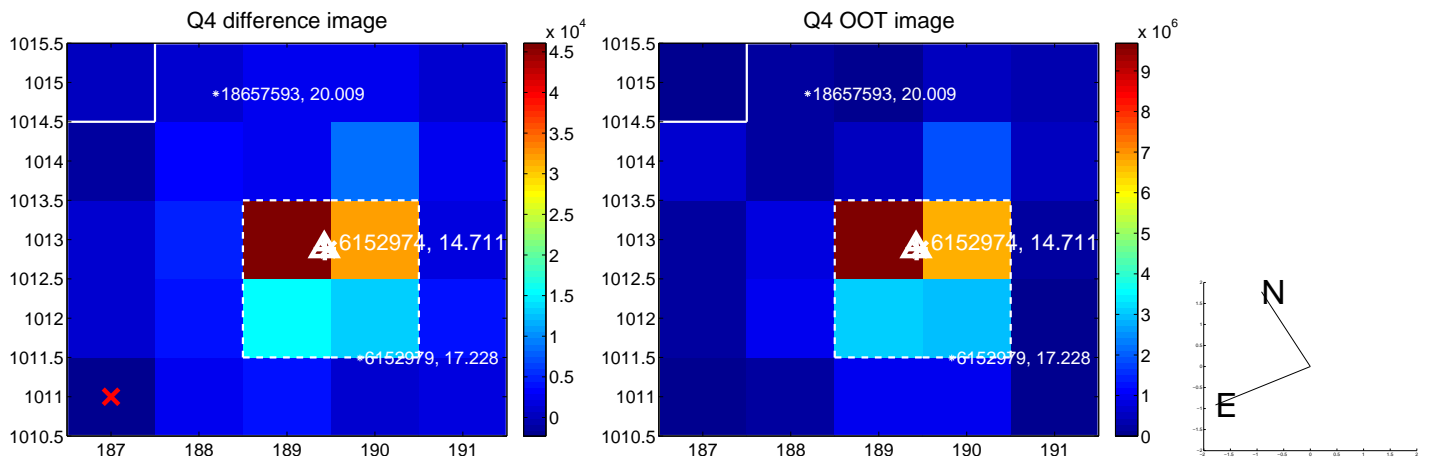
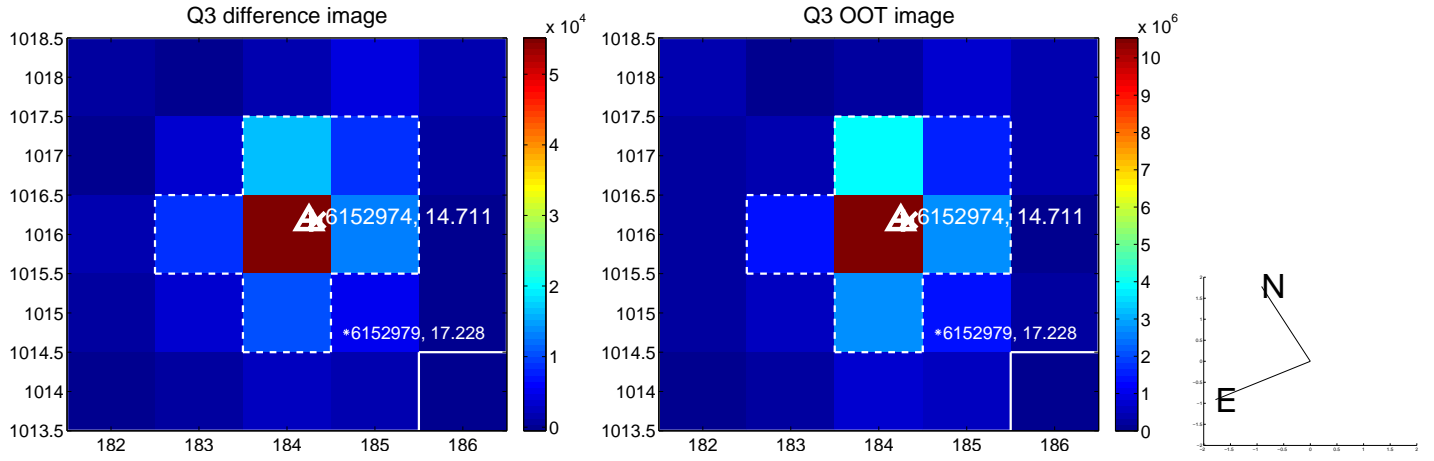
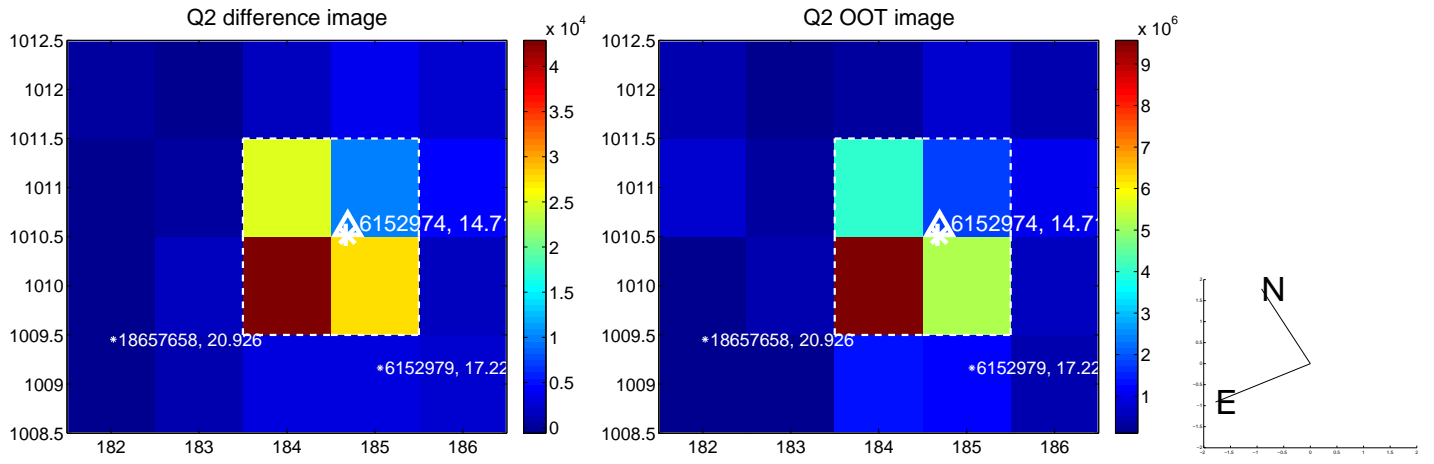
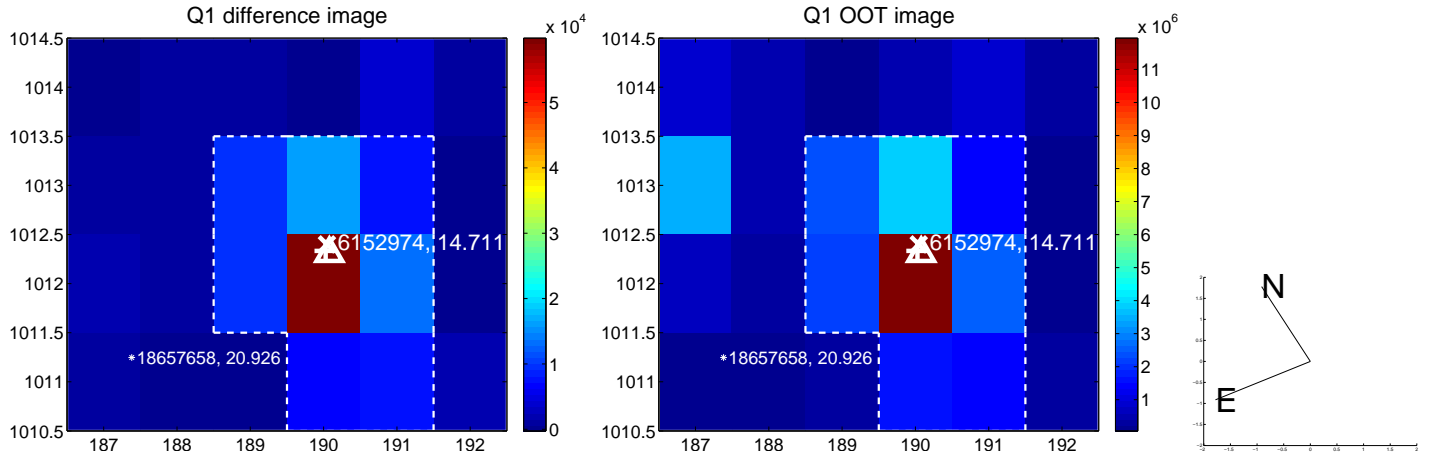
The direct PRF centroid is offset from the target star catalog position by about 0.41 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.145 \pm 0.075$	1.93	$-0.066 \pm 0.072$	$0.129 \pm 0.076$
PRF-fit source offset from KIC position	$0.186 \pm 0.083$	2.26	$0.143 \pm 0.082$	$0.120 \pm 0.077$
photometric centroid source offset	$0.58 \pm 0.06$	10.43	$0.55 \pm 0.06$	$-0.17 \pm 0.05$



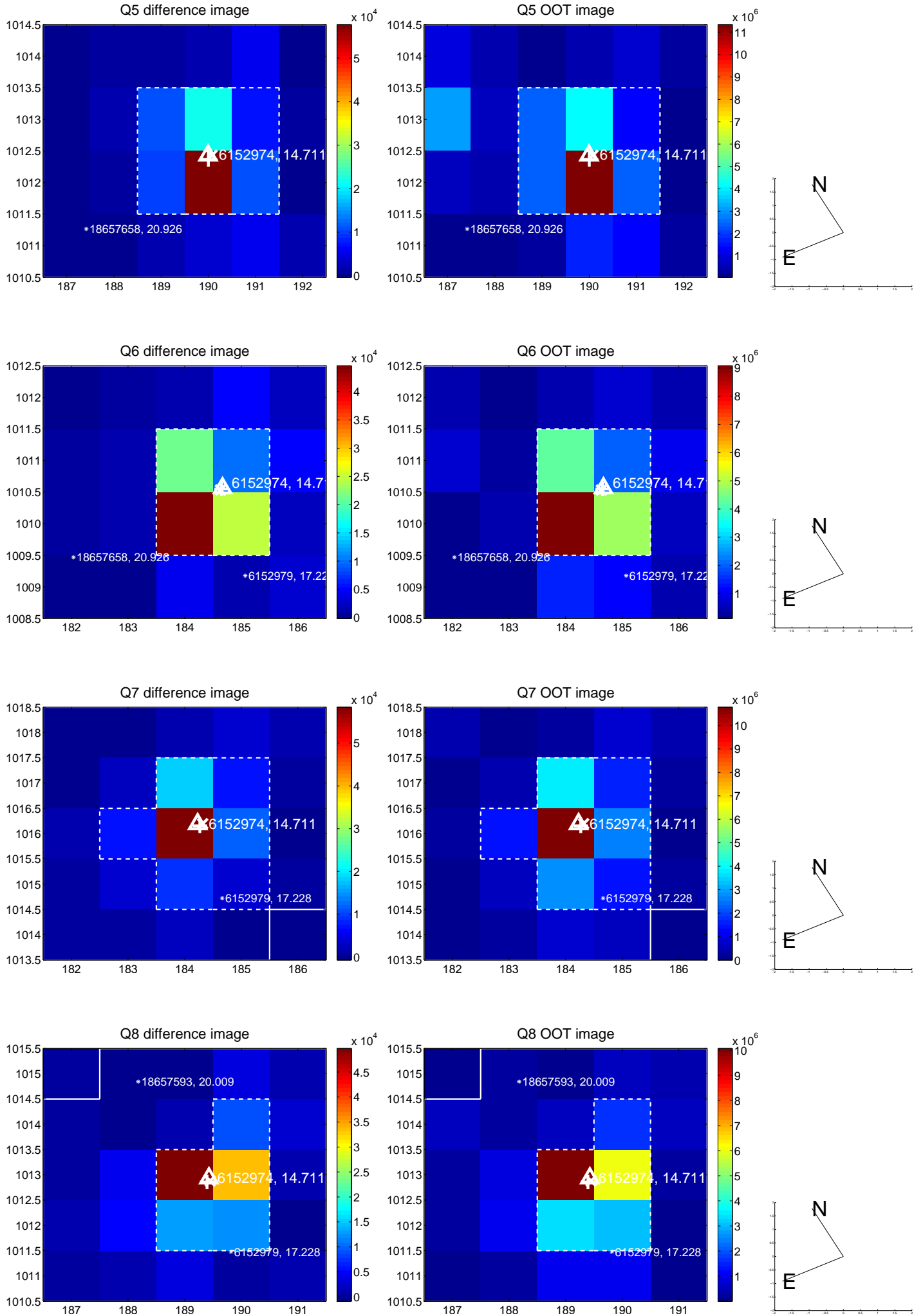
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

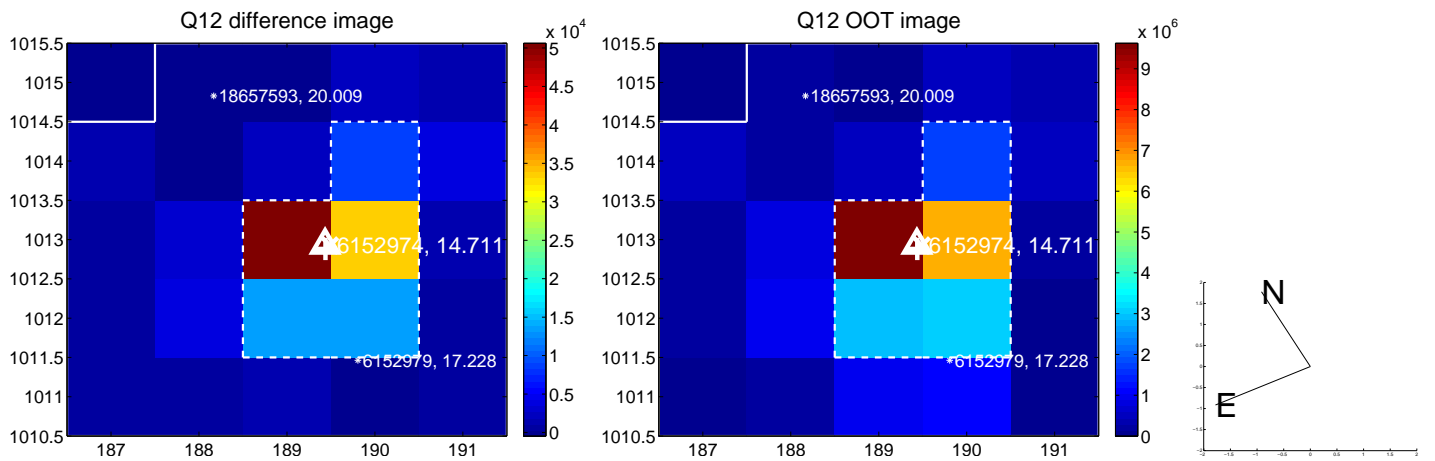
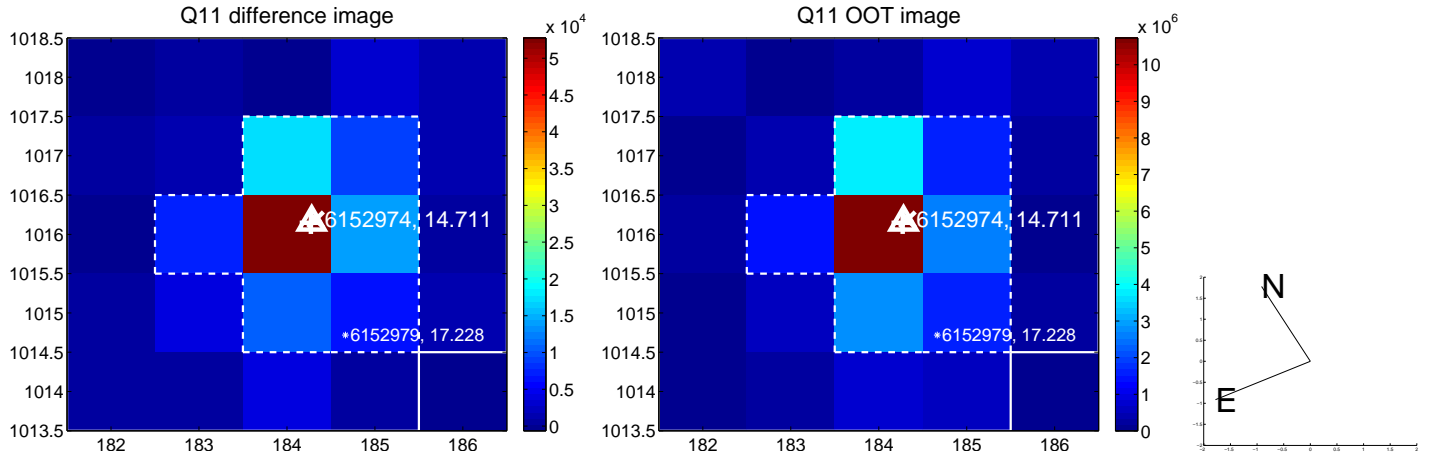
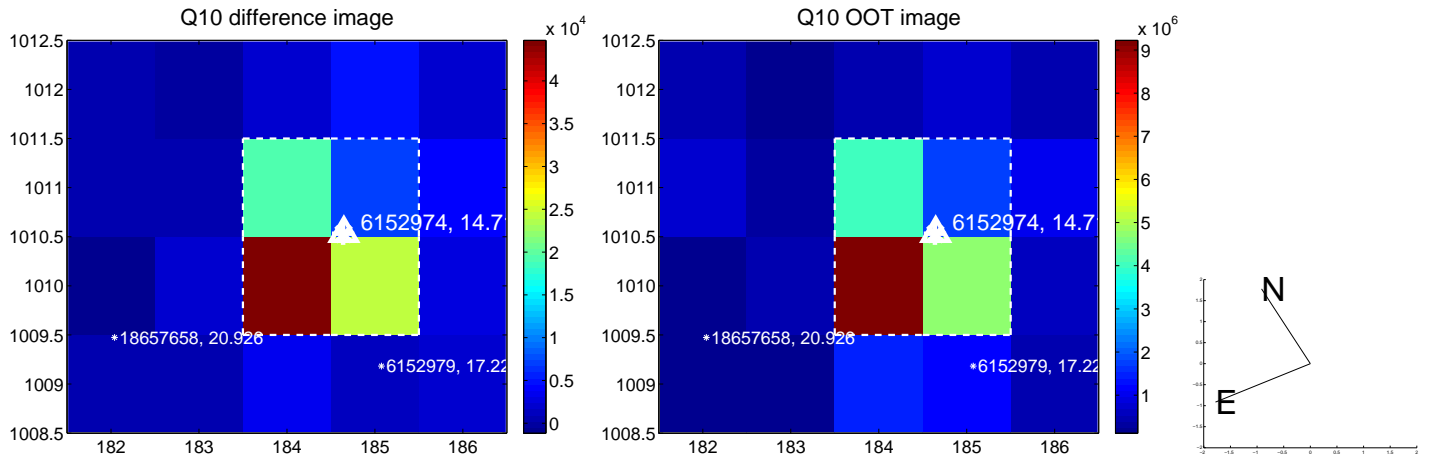
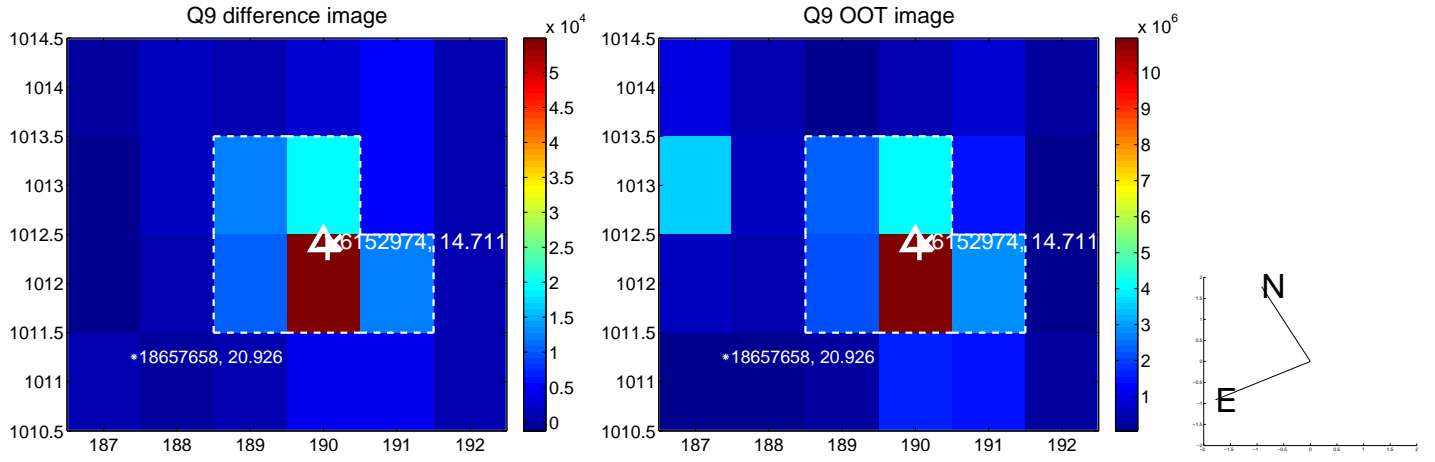




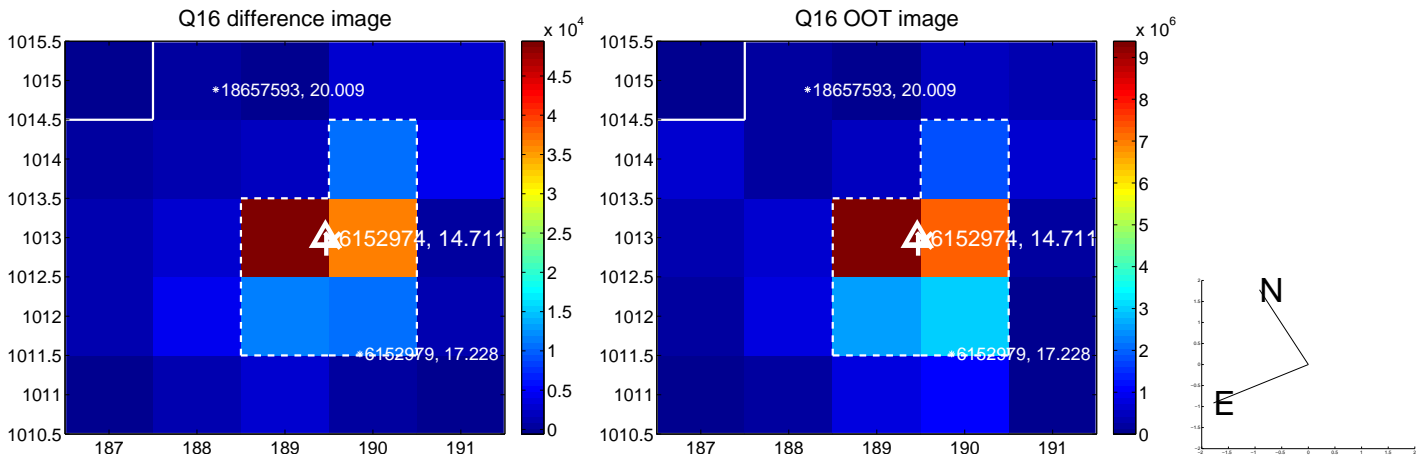
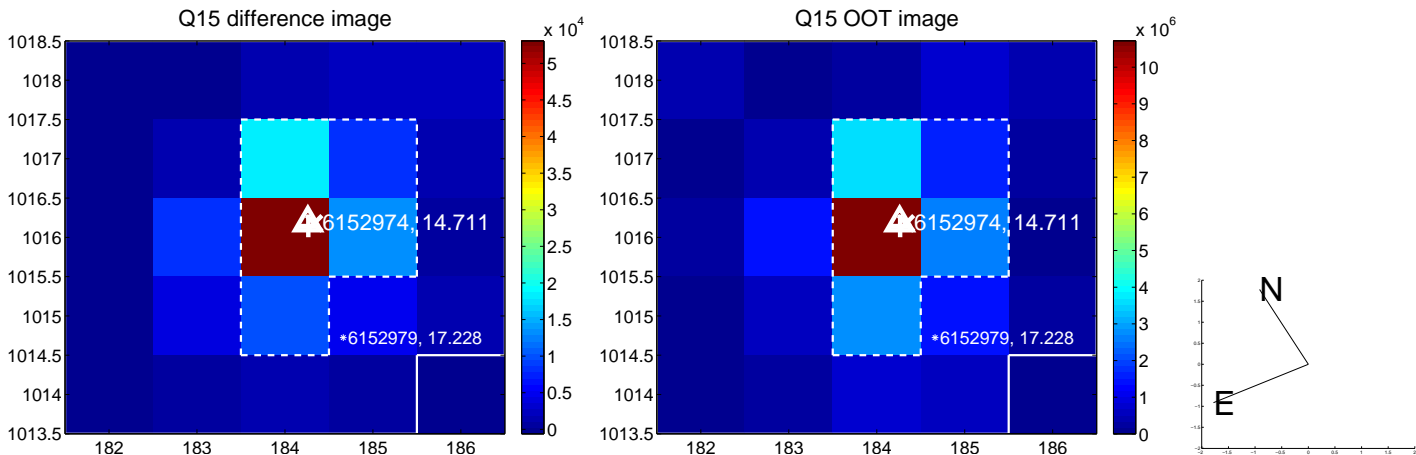
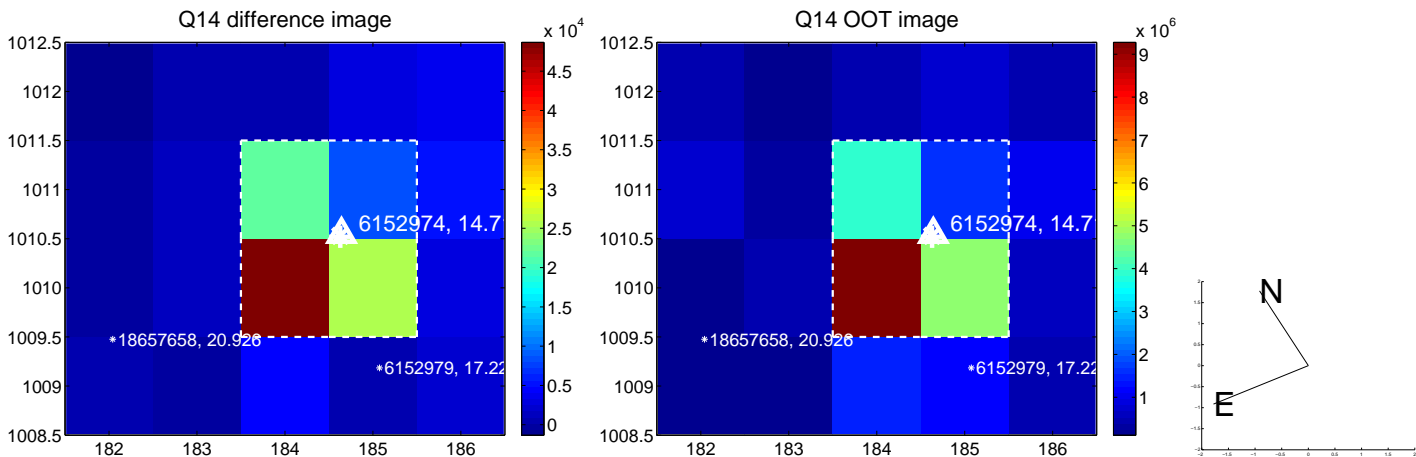
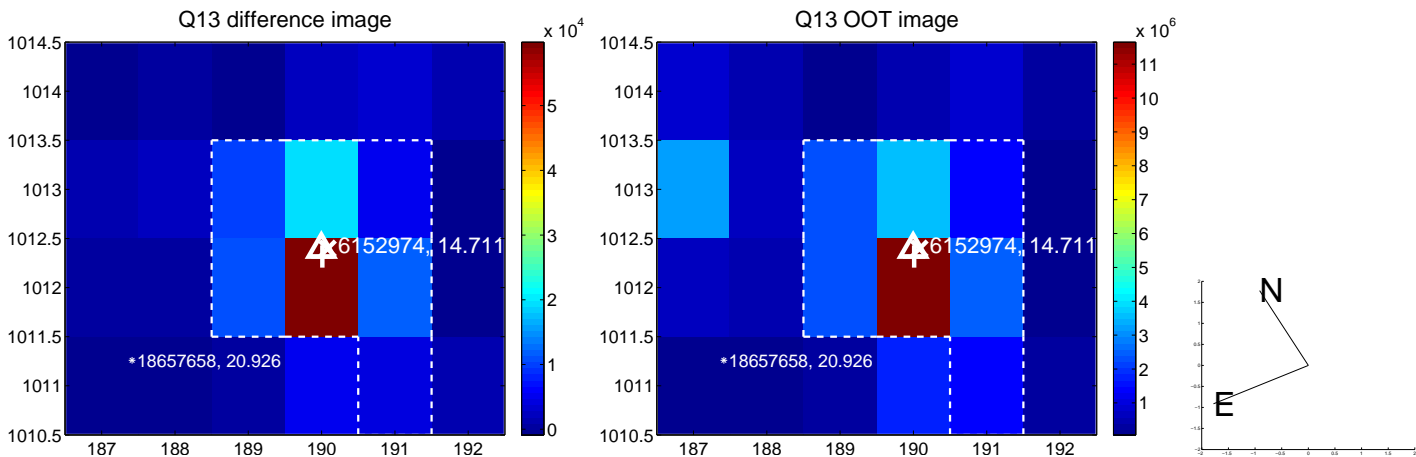
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



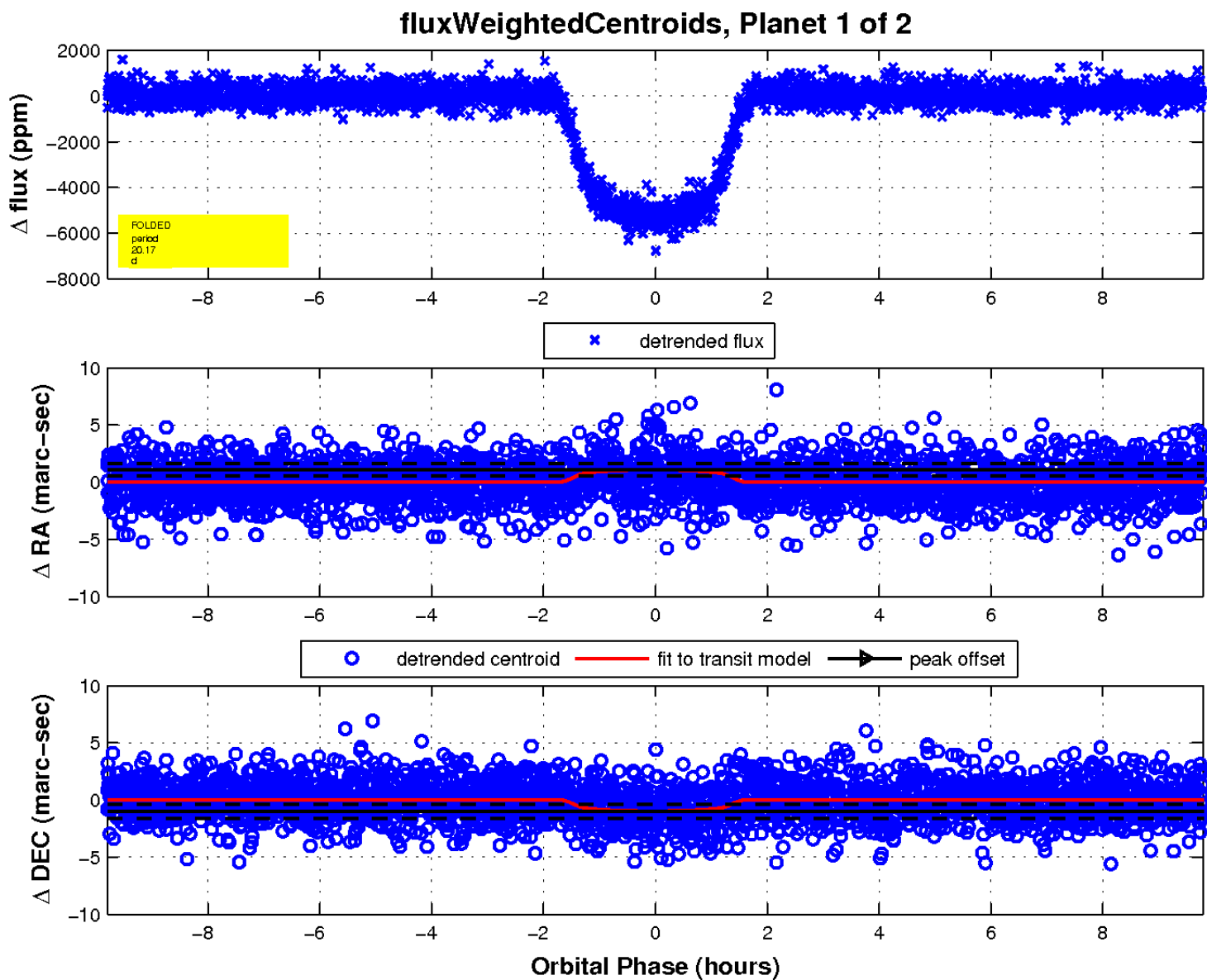
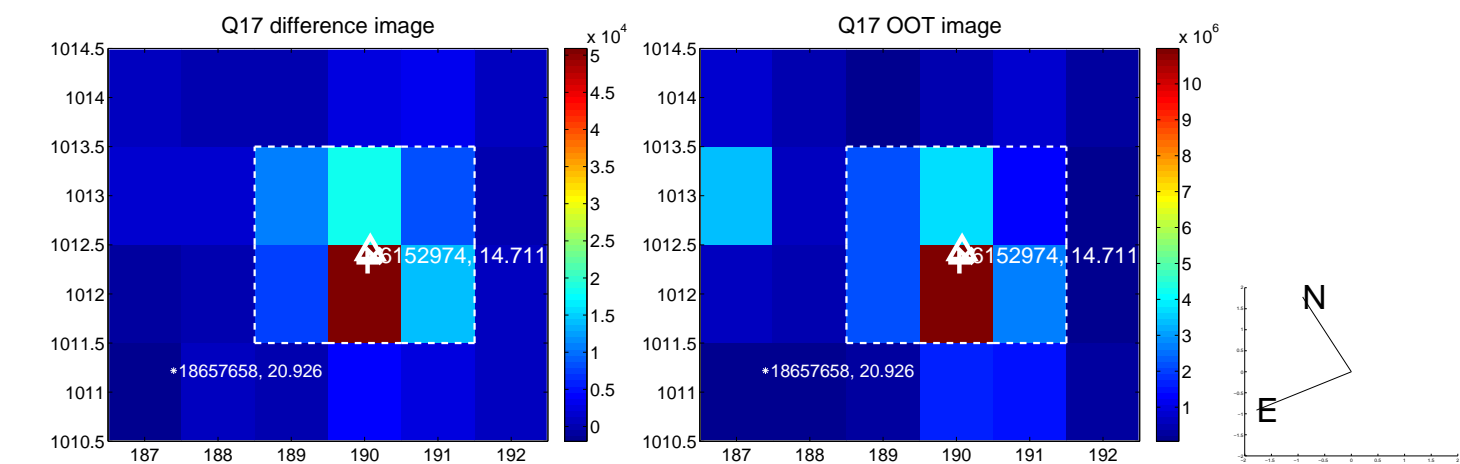
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

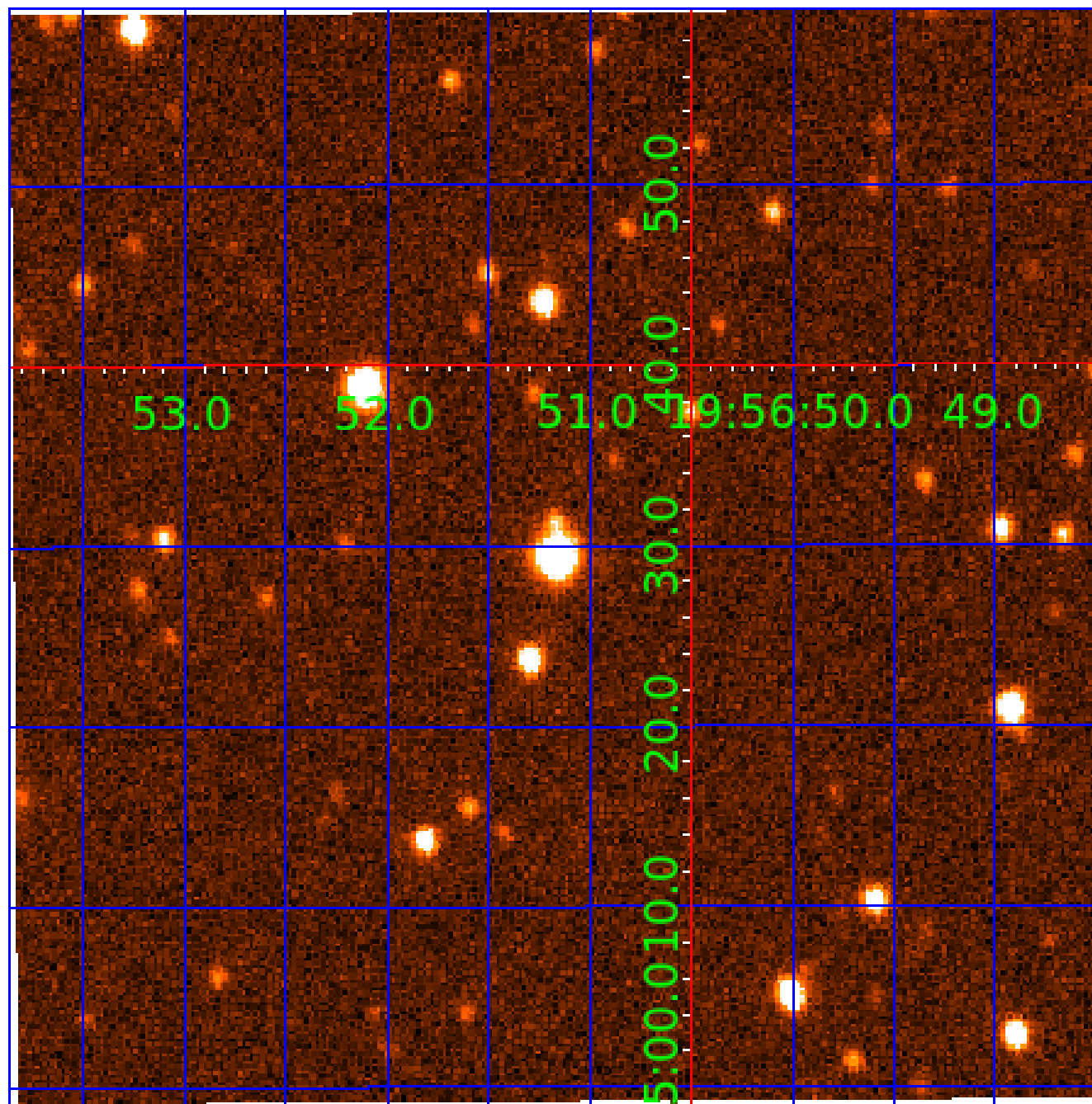


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 006152974

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006152974-01	OBS	0216.01	20.172021	141.209118	5388.9	3.272	198.6	196.5	0.86	5064	6.66	24.04
006152974-02	OBS	0216.02	7.518581	132.529211	283.6	2.802	14.7	16.4	0.86	5064	1.73	89.61

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006152974-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
006152974-02	OBS	PC	0.99	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.

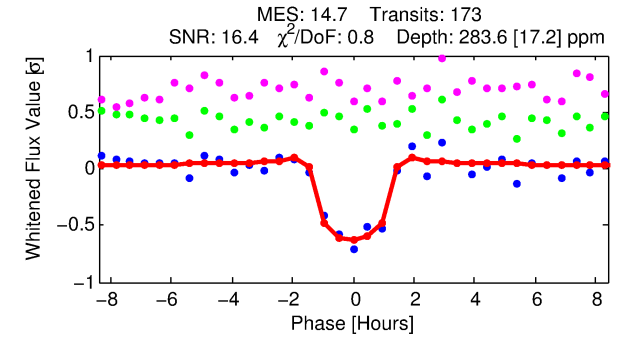
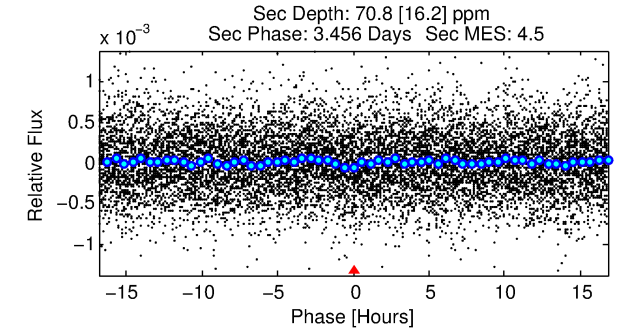
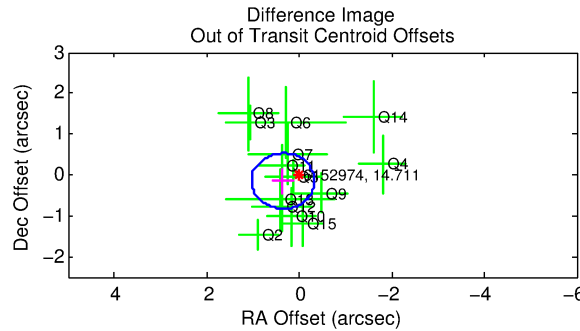
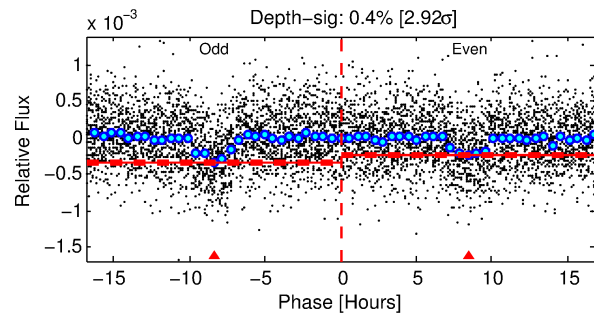
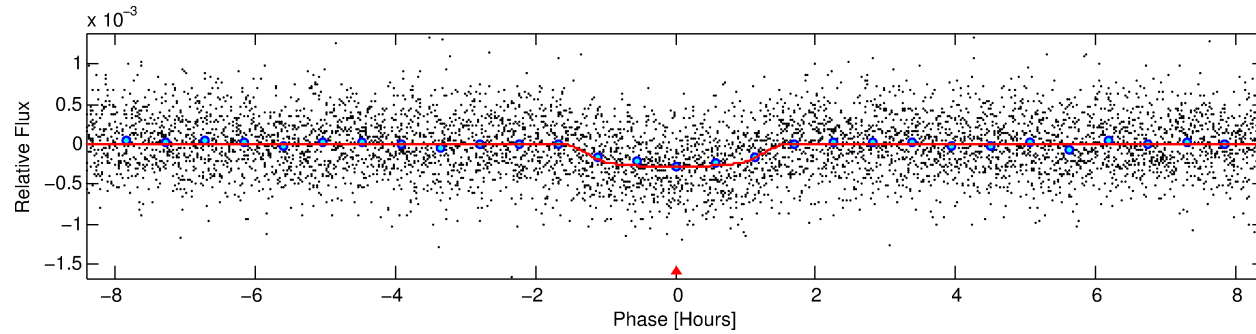
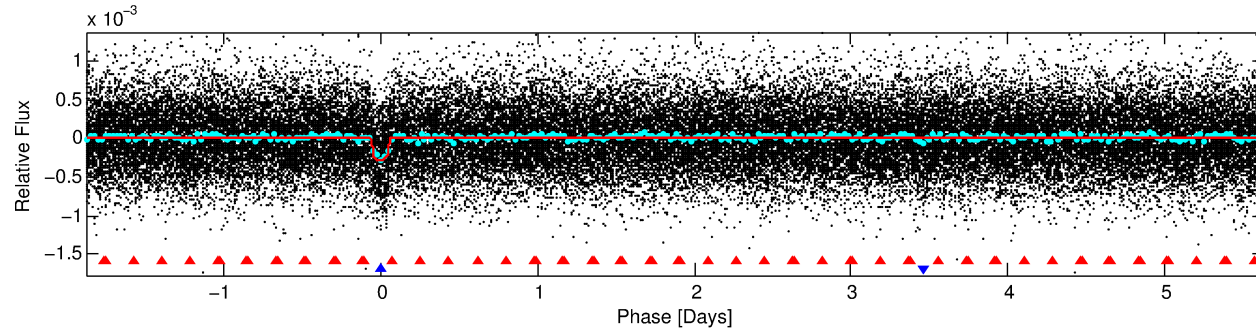
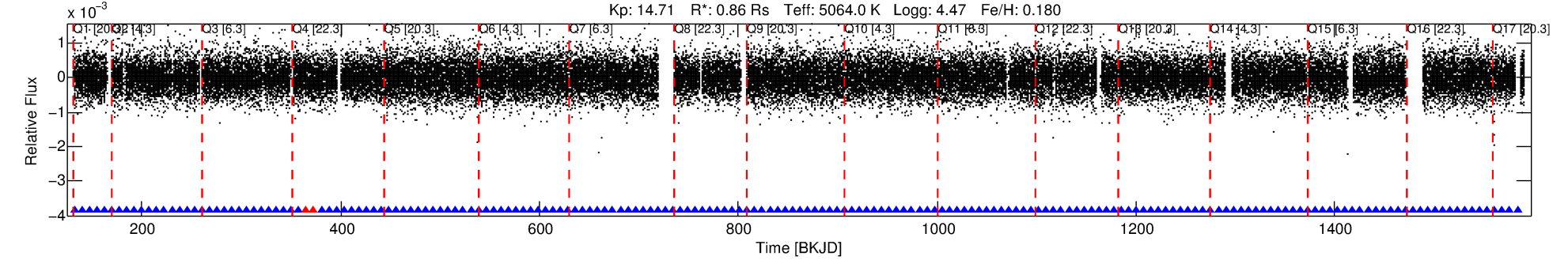
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006152974-02

No Significant Match Found

# DV One-Page Summary

KIC: 6152974 Candidate: 2 of 2 Period: 7.519 d  
KOI: K00216.02 Name: Kepler-118b Corr: 0.962



## DV Fit Results:

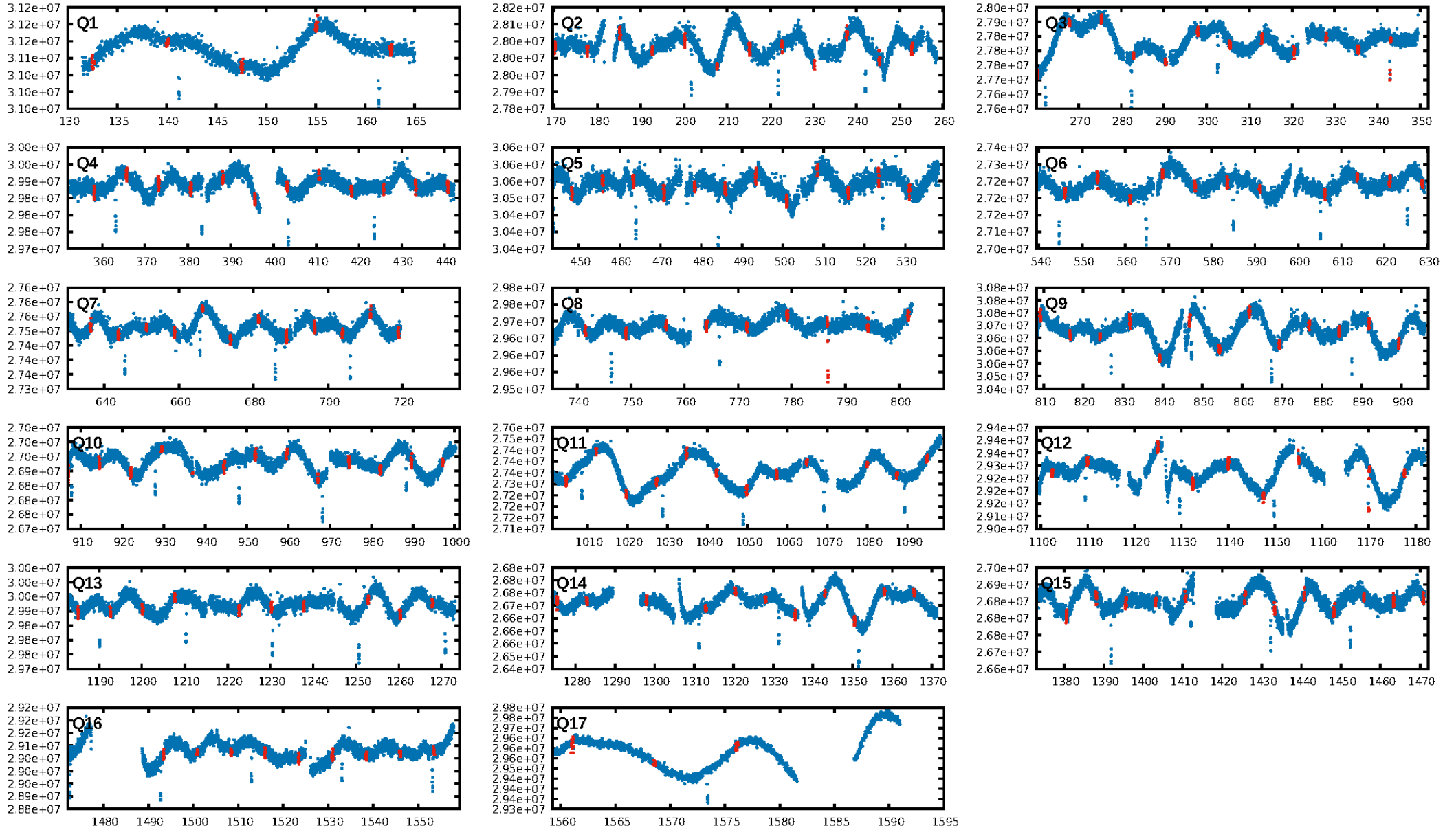
Period = 7.51858 [0.00003] d  
Epoch = 132.5292 [0.0029] BKJD  
Rp/R\* = 0.0183 [0.0076]  
a/R\* = 10.69 [16.86]  
b = 0.88 [0.43]  
Seff = 89.61 [14.68]  
Teff = 785 [32] K  
Rp = 1.73 [0.73] Re  
a = 0.0701 [0.0063] AU  
Ag = 63.99 [55.58] [1.13σ]  
Teffp = 3431 [736] K [3.59σ]

## DV Diagnostic Results:

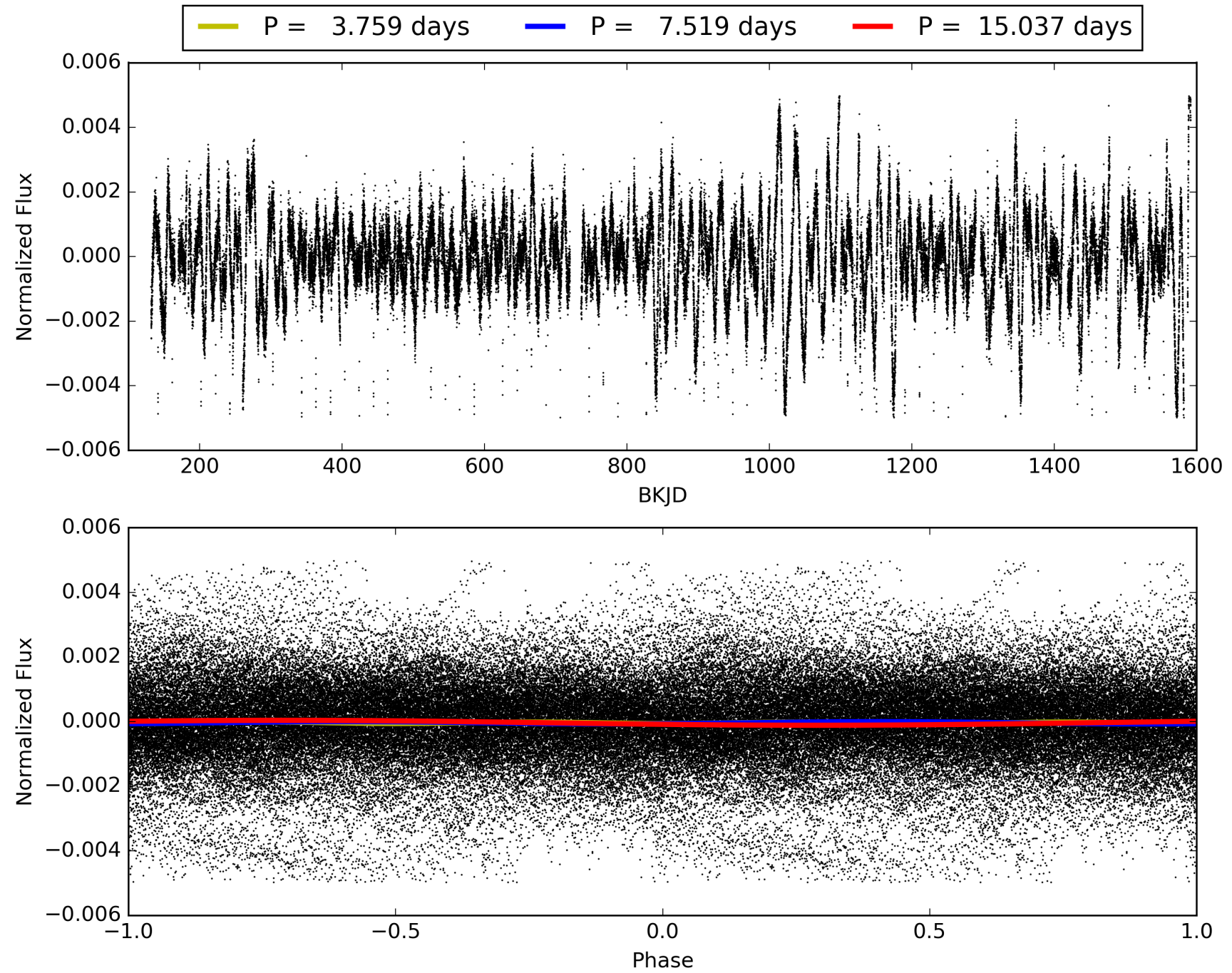
ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [70.50σ]  
ModelChiSquare2-sig: 100.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.49e-44  
RollingBand-fgt: 0.99 [163/165]  
GhostDiagnostic-chr: 3.484  
Centroid-sig: 0.5%  
Centroid-so: 0.860 arcsec [1.31σ]  
OotOffset-rm: 0.384 arcsec [1.70σ]  
KicOffset-rm: 0.579 arcsec [2.20σ]  
OotOffset-st: 4/4/3/3 [14]  
KicOffset-st: 4/4/3/3 [14]  
DiffImageQuality-fgm: 0.86 [12/14]  
DiffImageOverlap-fno: 1.00 [17/17]



# TCE 006152974-02, PDC Light Curves

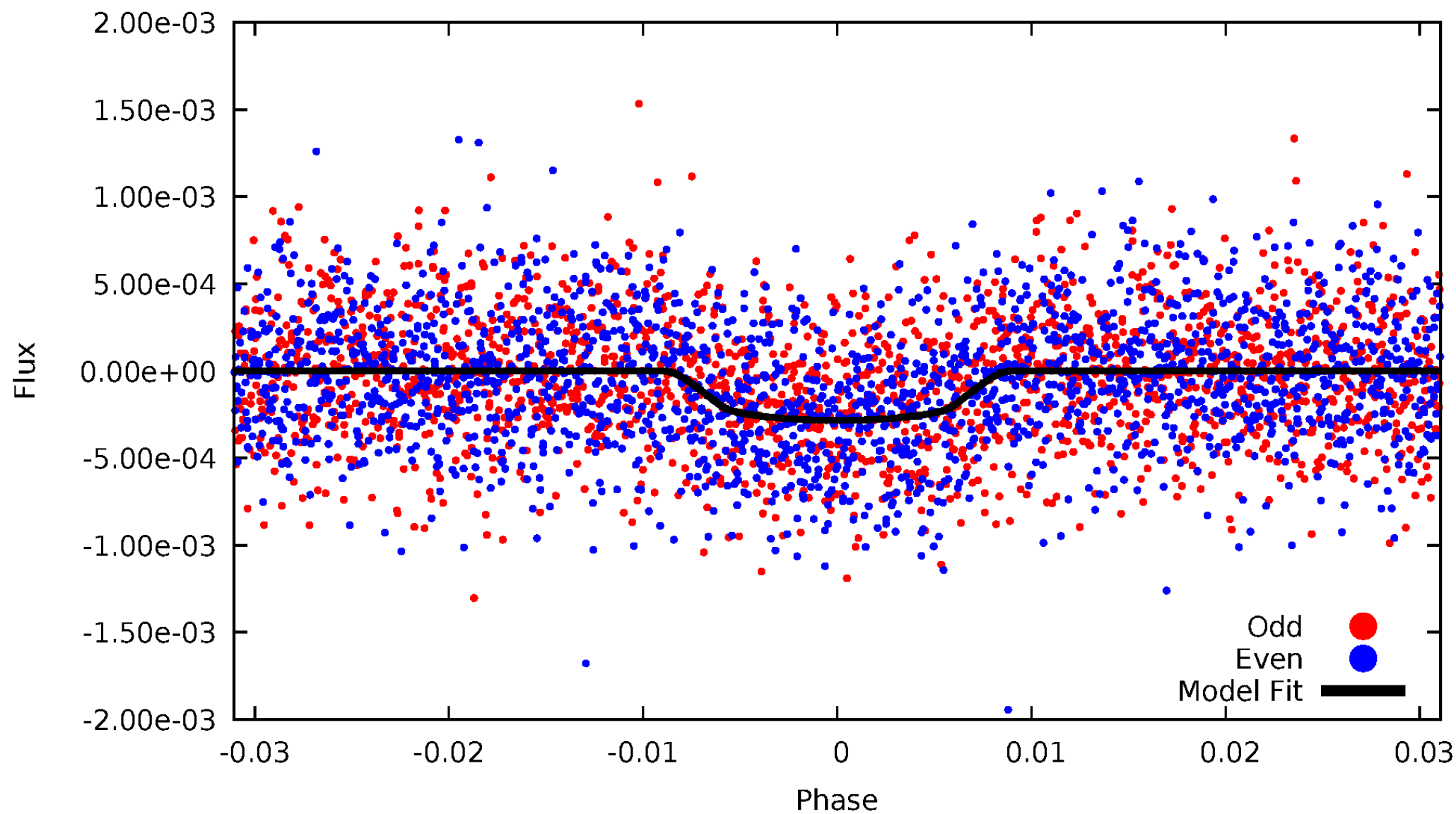


TCE 006152974-02



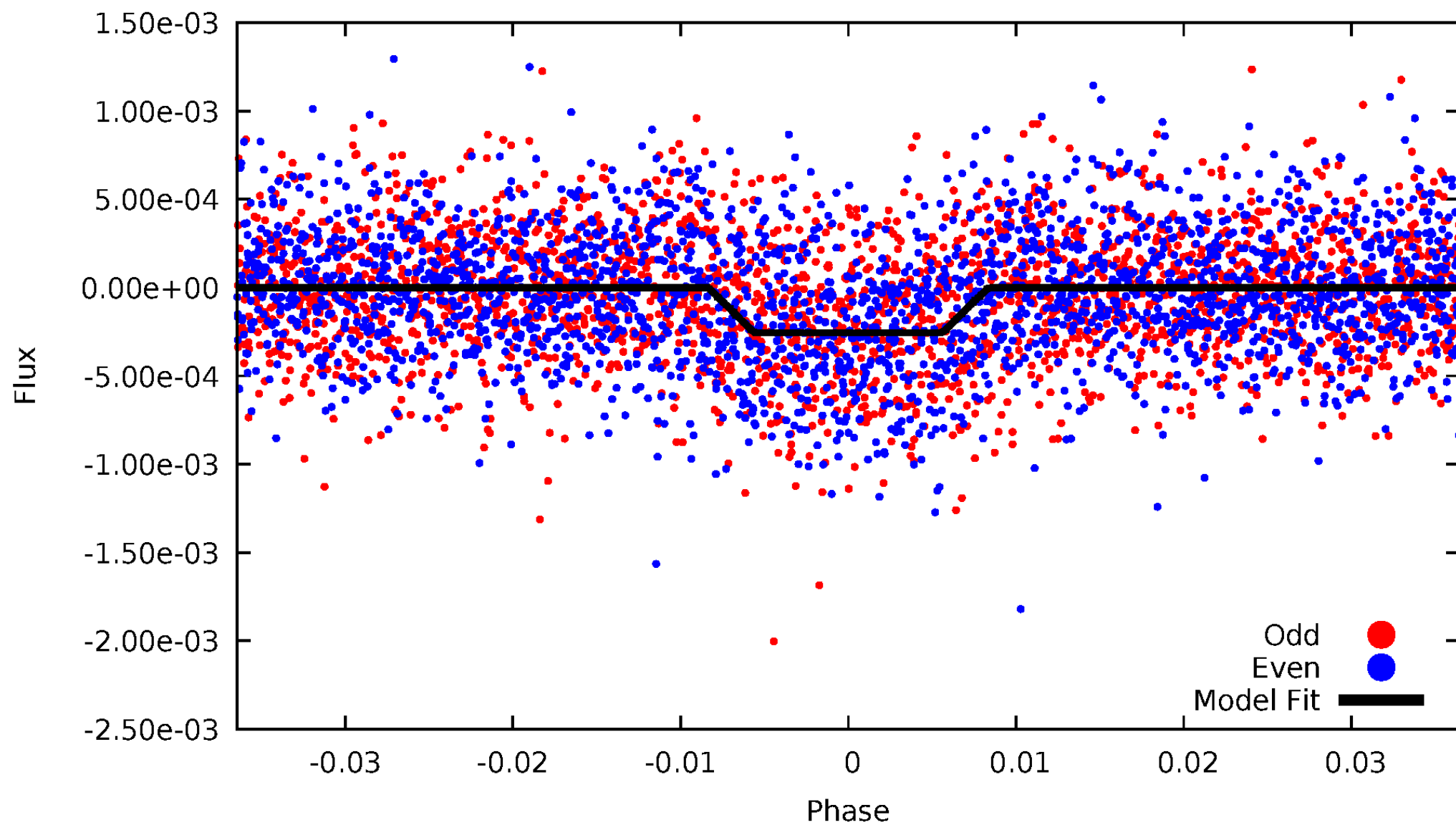
# DV Odd/Even

TCE 006152974-02



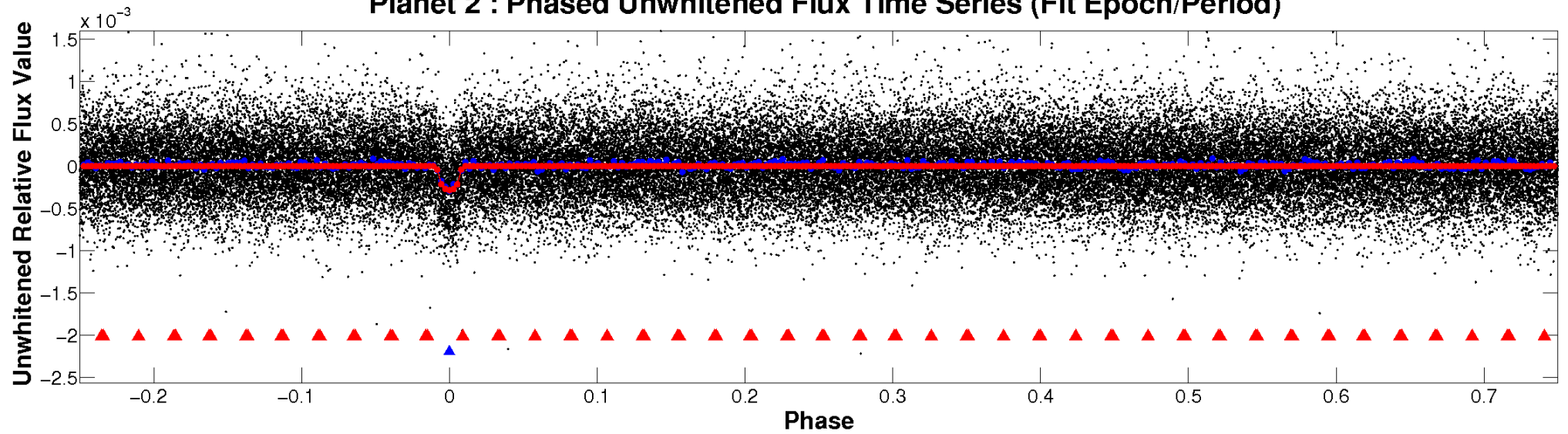
# ALT Odd/Even

TCE 006152974-02

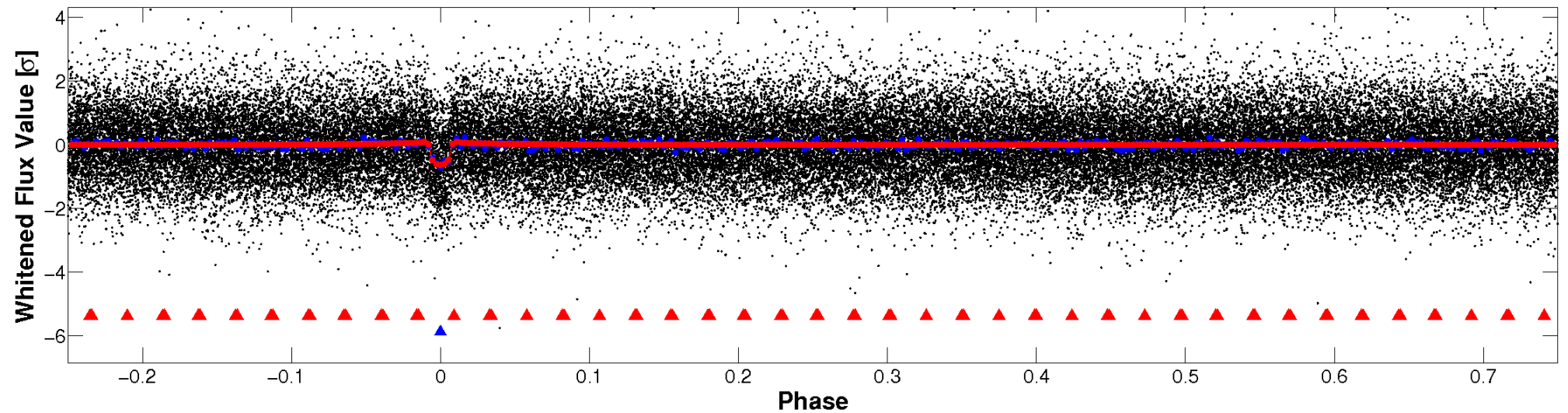


# Non-Whitened Vs. Whitened Light Curve

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



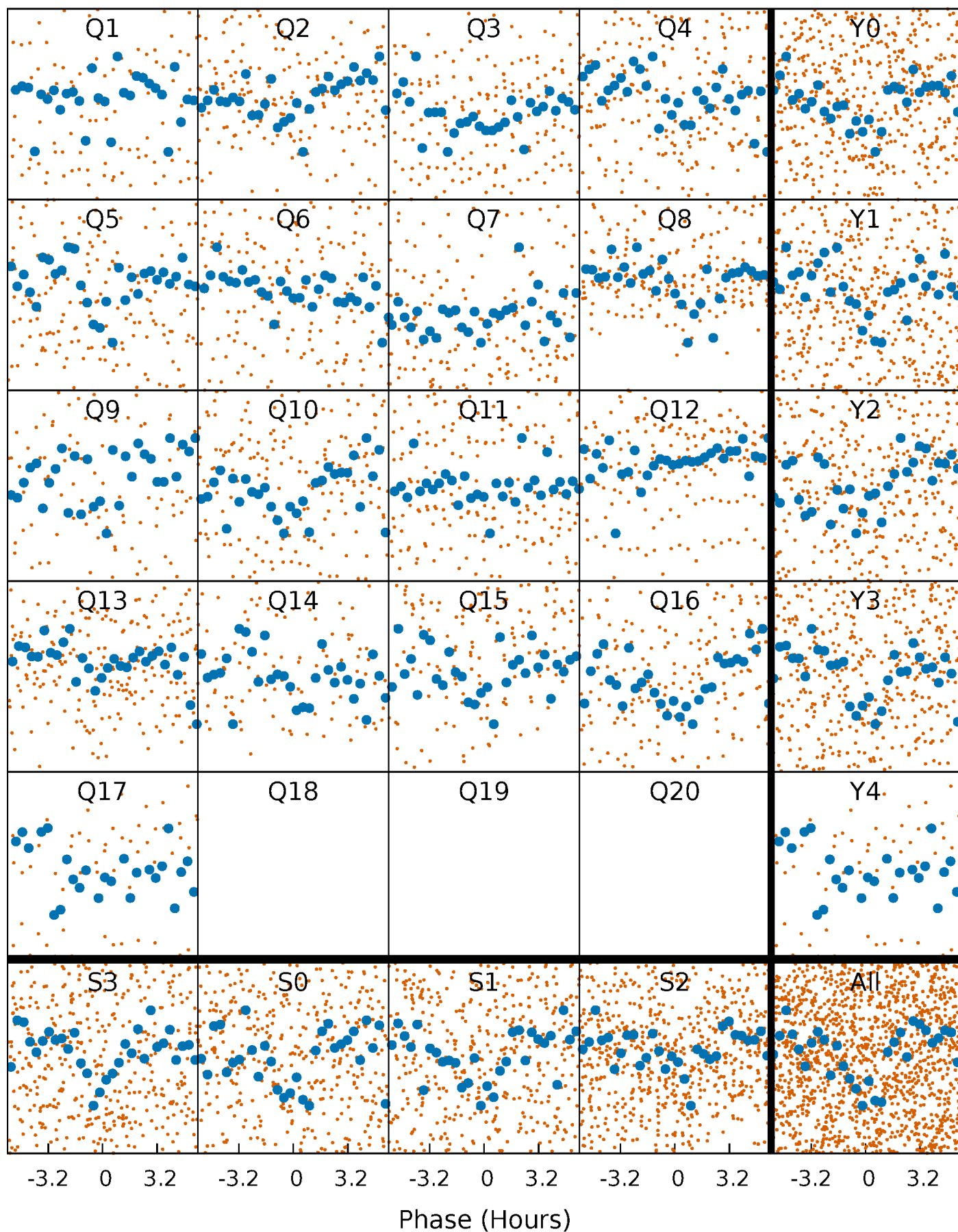
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





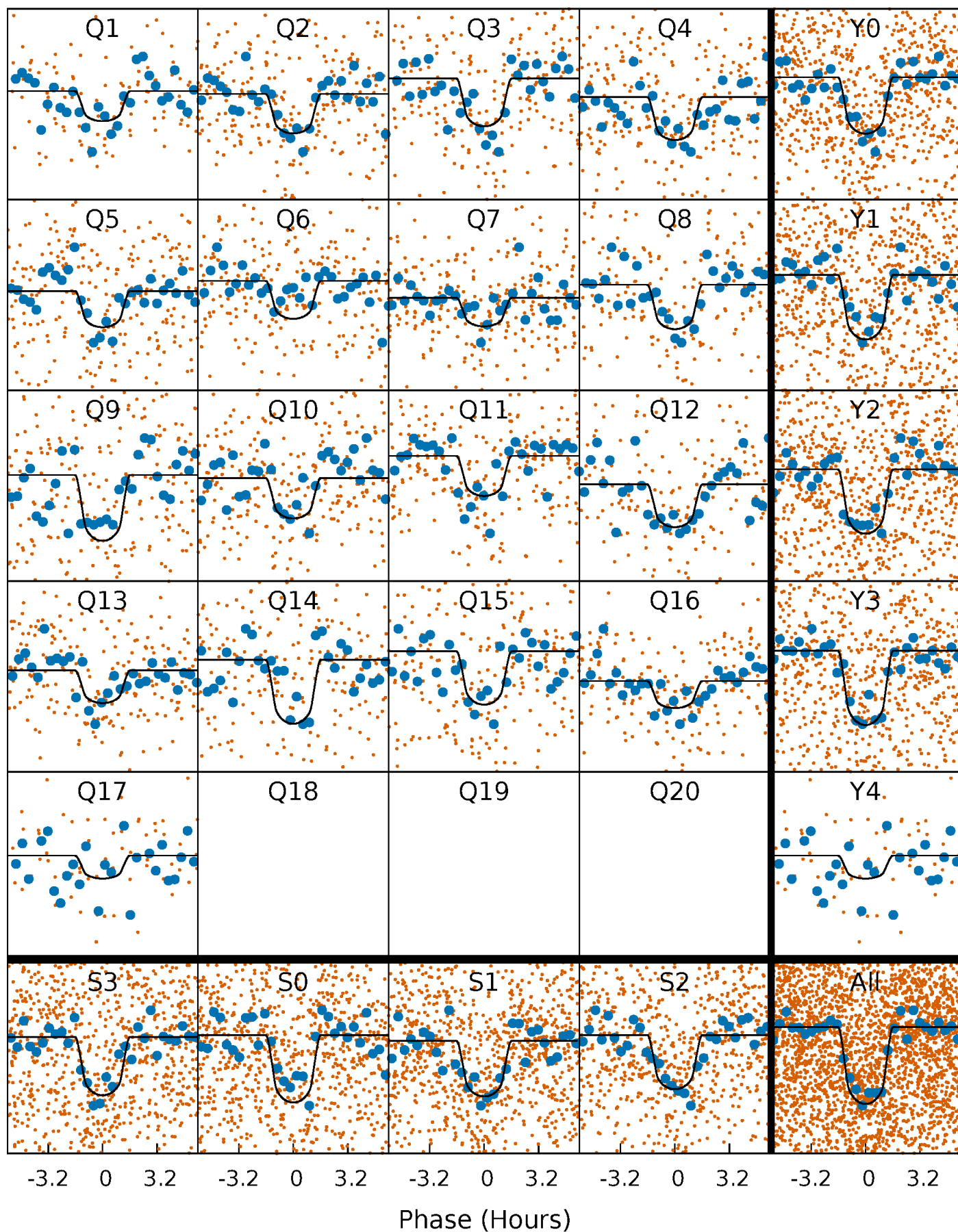
# PDC Quarter-Phased Transit Curves

TCE 006152974-02   P= 7.518581 Days    $T_0=132.529211$  (BKJD)



# DV Quarter-Phased Transit Curves

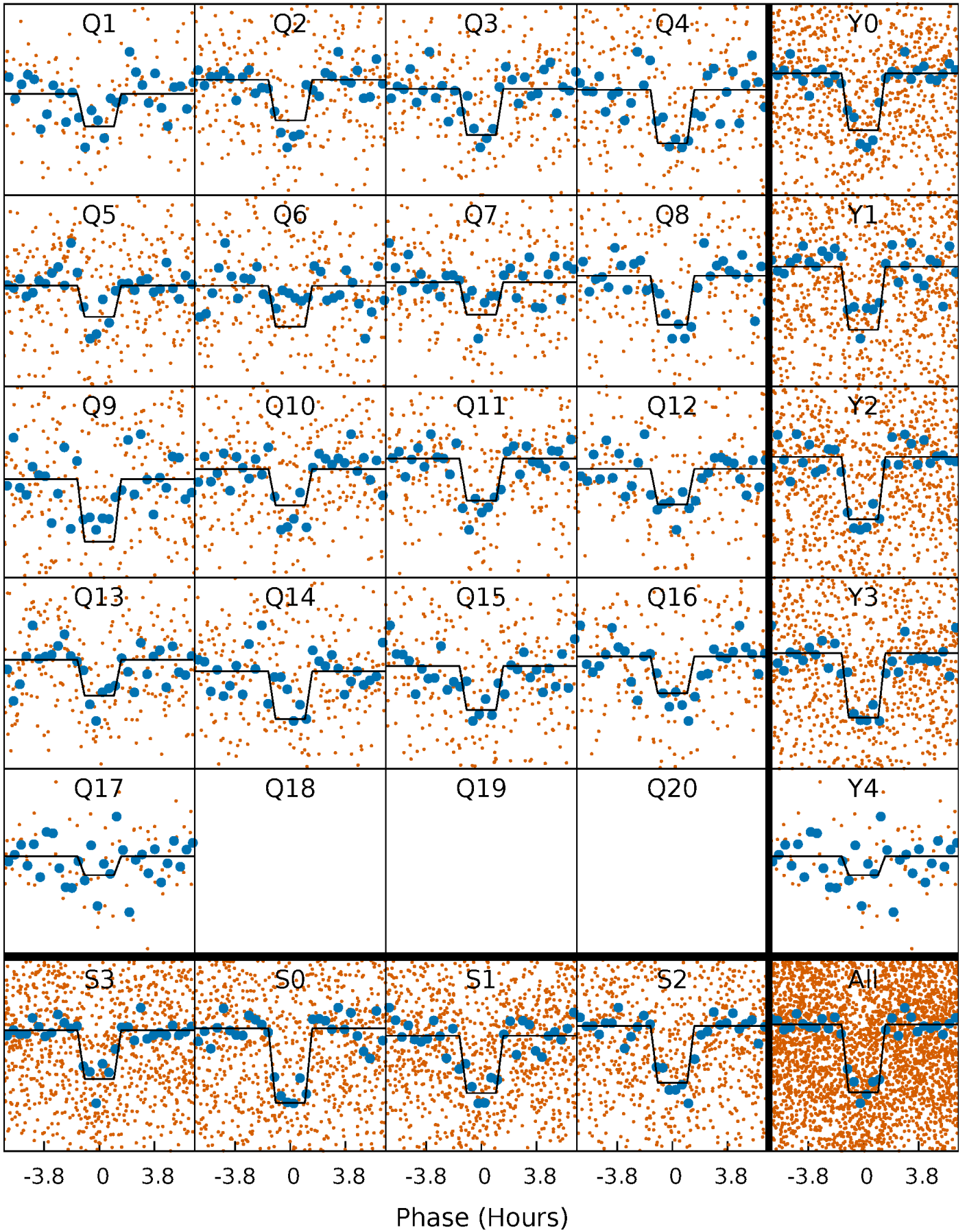
TCE 006152974-02   P= 7.518581 Days    $T_0=132.529211$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

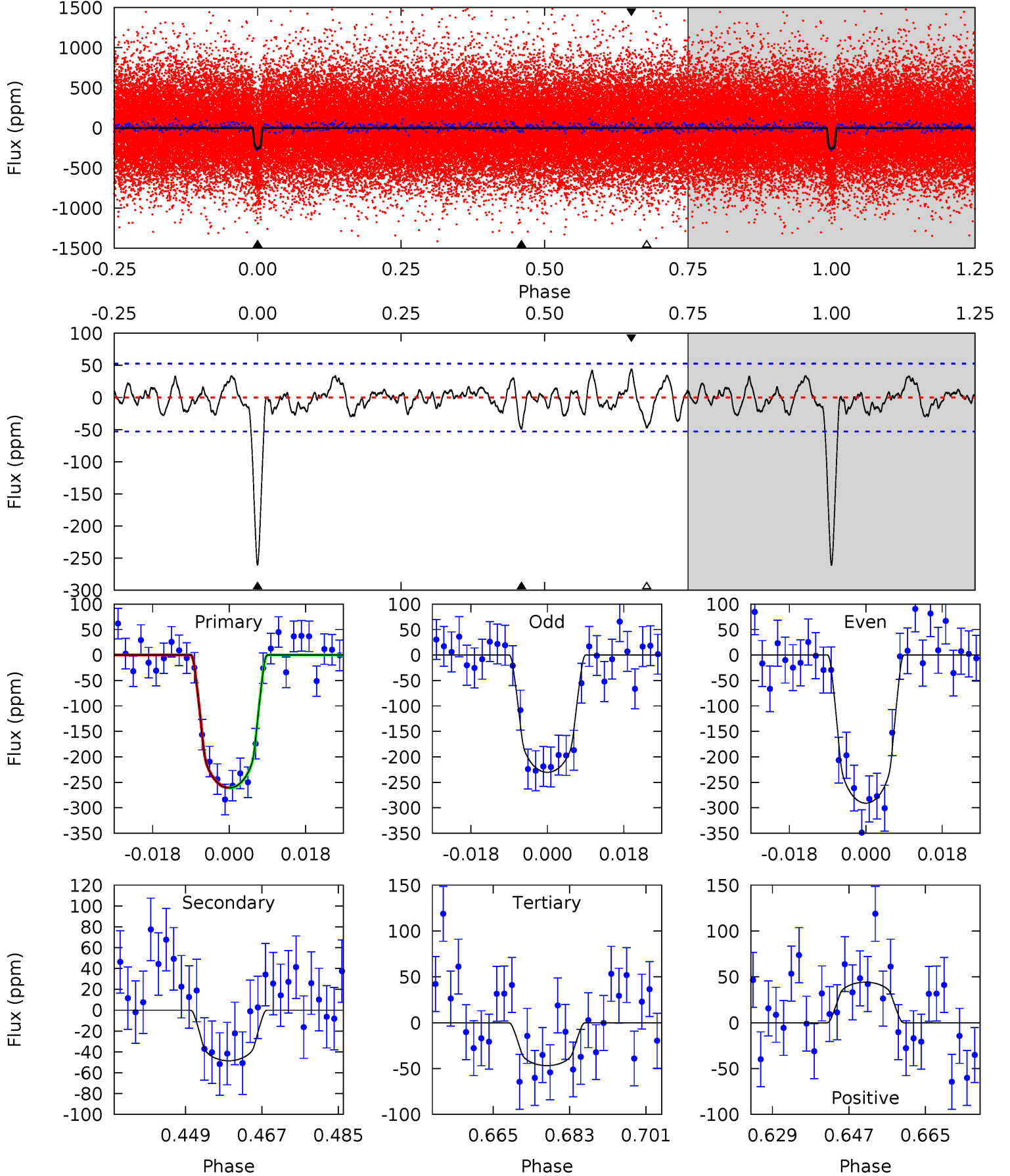
TCE 006152974-02 P= 7.518481 Days  $T_0=132.537043$  (BKJD)



# DV Model-Shift Uniqueness Test

006152974-02, P = 7.518581 Days, E = 125.010630 Days

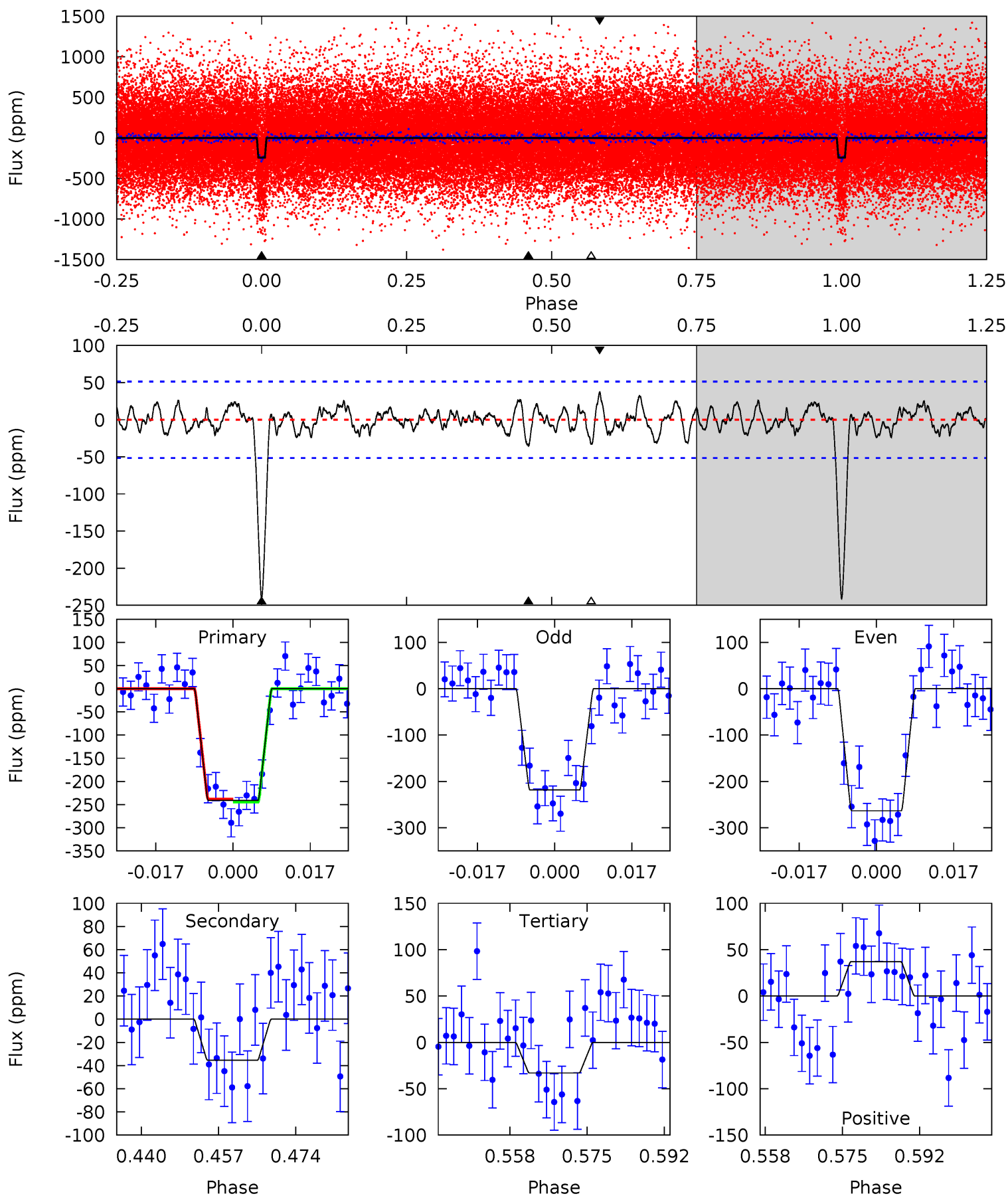
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
24.2	4.51	4.35	4.10	4.91	2.37	1.45	19.9	20.1	0.16	0.41	2.82	0.99	0.14	0.03



# Alt Model-Shift Uniqueness Test

006152974-02, P = 7.518481 Days, E = 125.018562 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
23.1	3.39	3.16	3.55	4.92	2.39	1.19	19.9	19.5	0.23	-0.16	2.14	0.95	0.13	0.30



### Stellar Parameters For KIC 006152974

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5064^{+83}_{-75}$	$4.474^{+0.090}_{-0.030}$	$0.180^{+0.150}_{-0.150}$	$0.864^{+0.038}_{-0.076}$	$0.811^{+0.052}_{-0.030}$	$1.769^{+0.600}_{-0.195}$
	+2%/-1%	+2%/-1%	+83%/-83%	+4%/-9%	+6%/-4%	+34%/-11%
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 006152974-02 / KOI 0216.02

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-49 \pm 11$	$1.73^{+0.65}_{-0.69}$	$1089^{+25}_{-29}$	$3517^{+684}_{-361}$	$44^{+80}_{-23}$
Alt.	$-35 \pm 10$	$1.53^{+0.70}_{-0.70}$	$1088^{+26}_{-32}$	$3493^{+774}_{-459}$	$41^{+92}_{-24}$

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

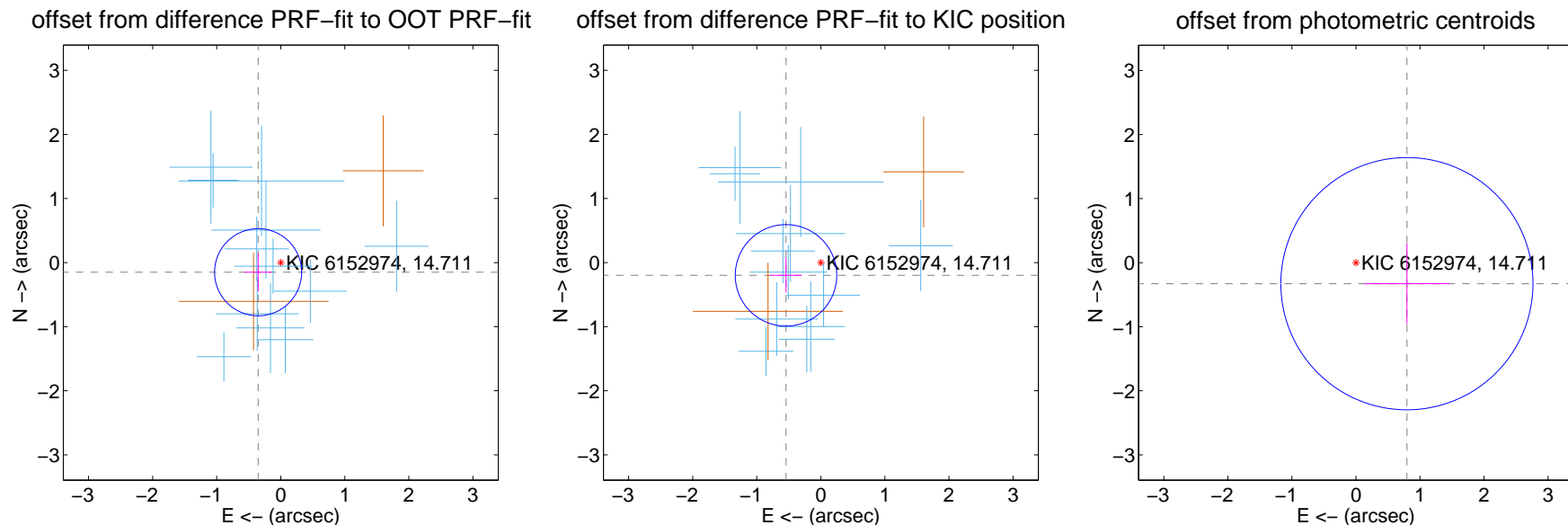
## DV Centroid Data

Supplemental centroid analysis for 006152974-02. Kepler magnitude: 14.71. Transit SNR 16.45

There are 12 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.29 arcsec

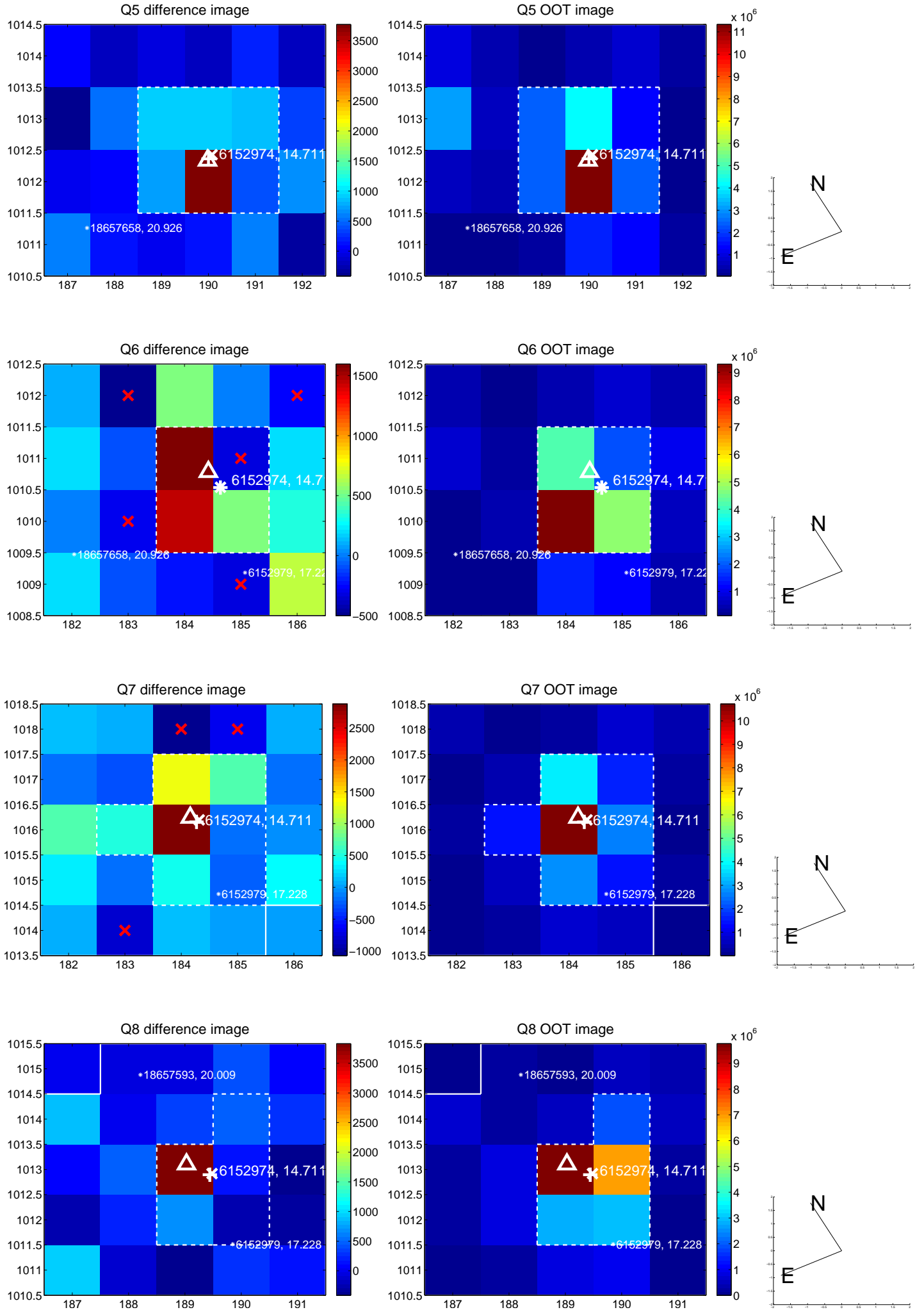
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.384 \pm 0.226$	1.70	$0.353 \pm 0.211$	$-0.151 \pm 0.299$
PRF-fit source offset from KIC position	$0.579 \pm 0.264$	2.20	$0.544 \pm 0.245$	$-0.199 \pm 0.270$
photometric centroid source offset	$0.86 \pm 0.66$	1.31	$-0.80 \pm 0.66$	$-0.33 \pm 0.63$



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.

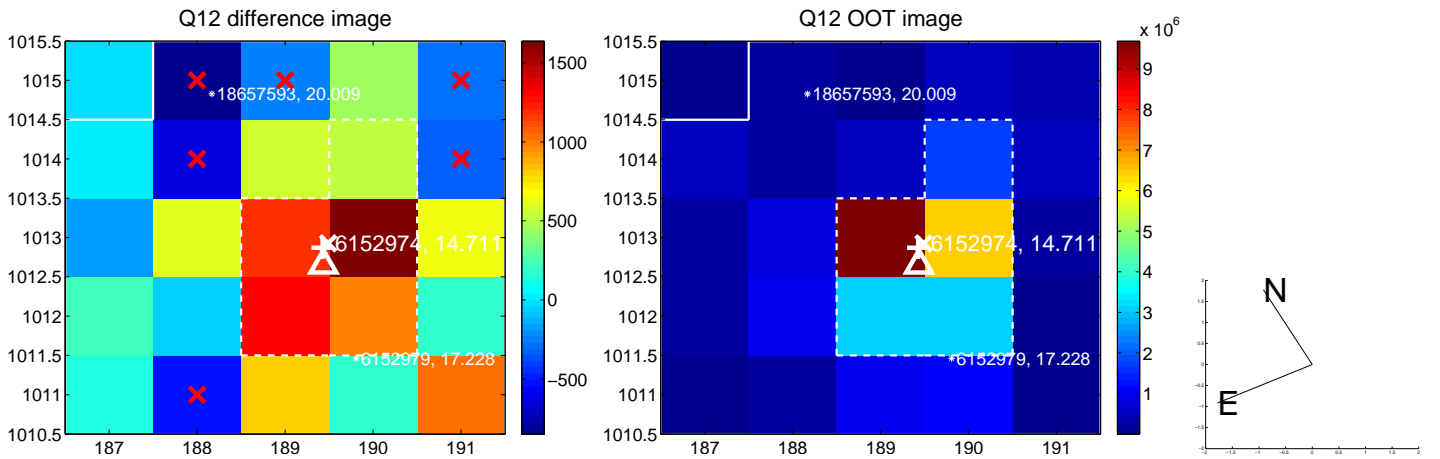
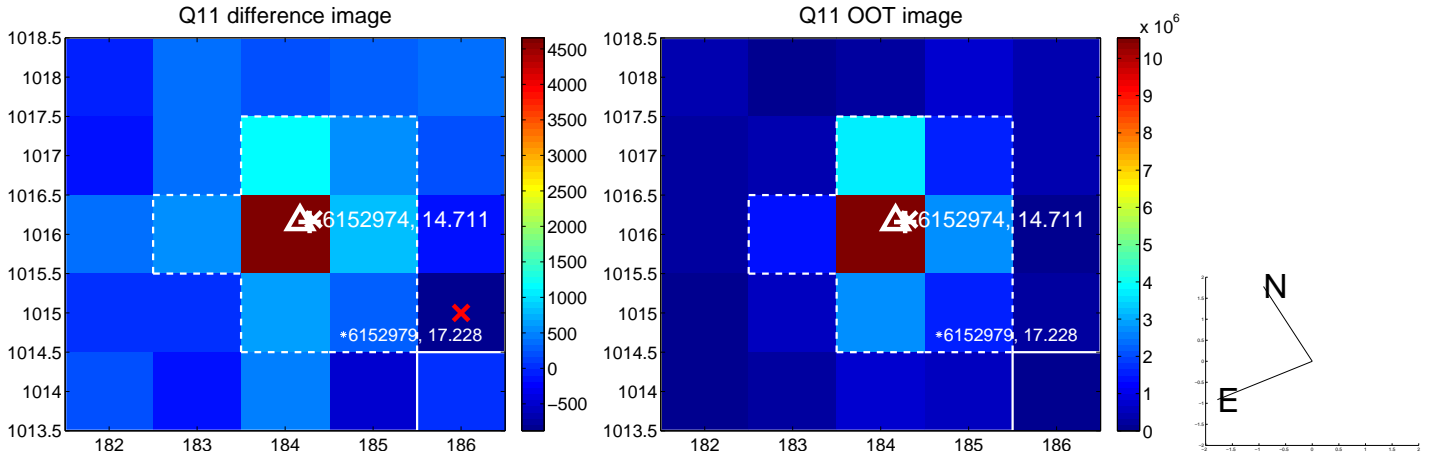
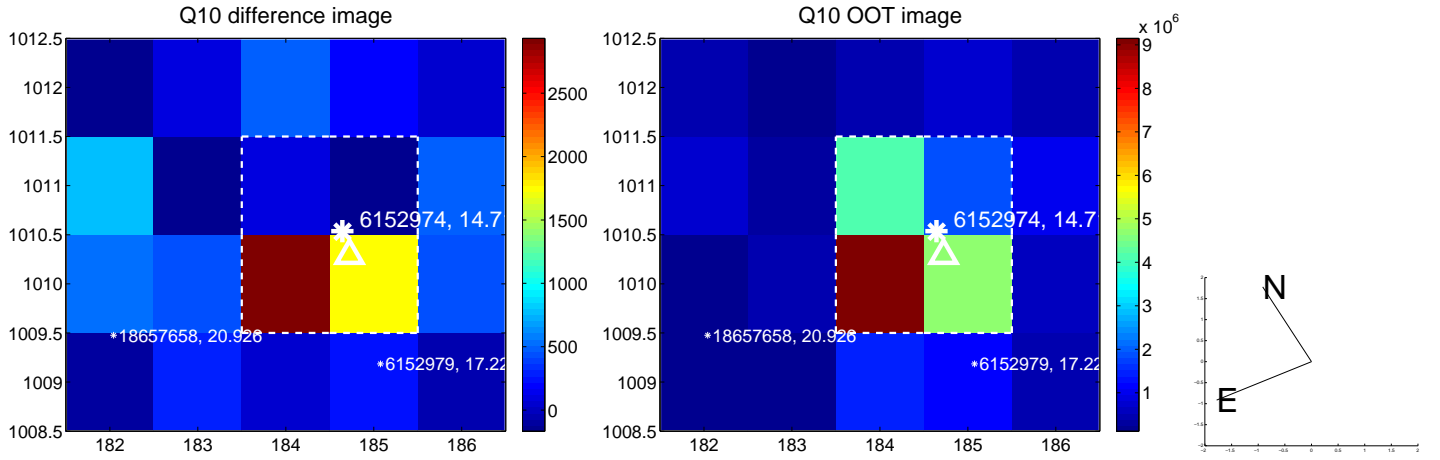
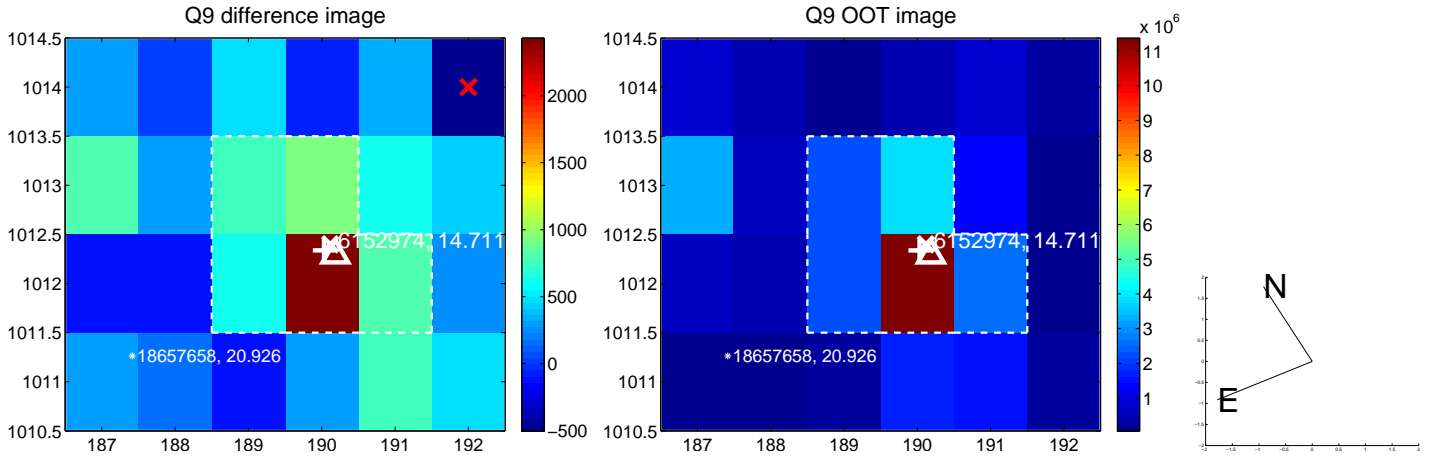


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

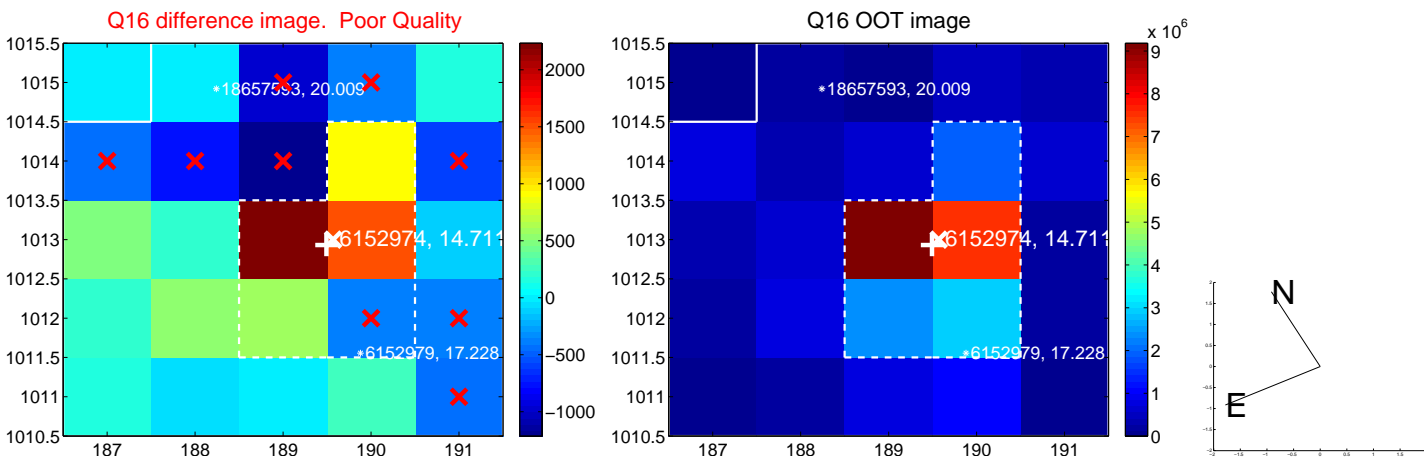
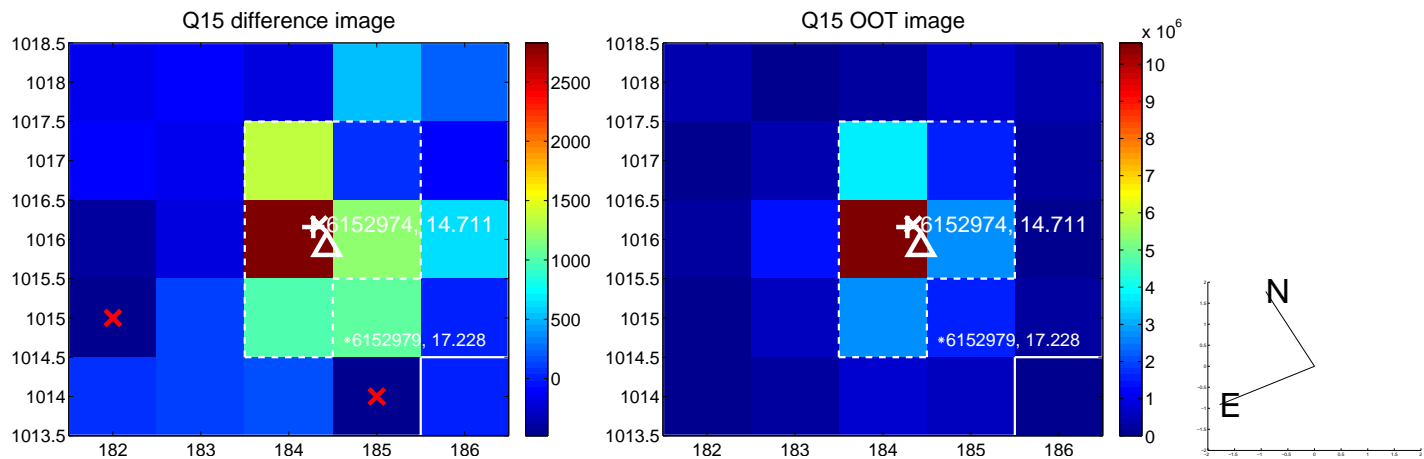
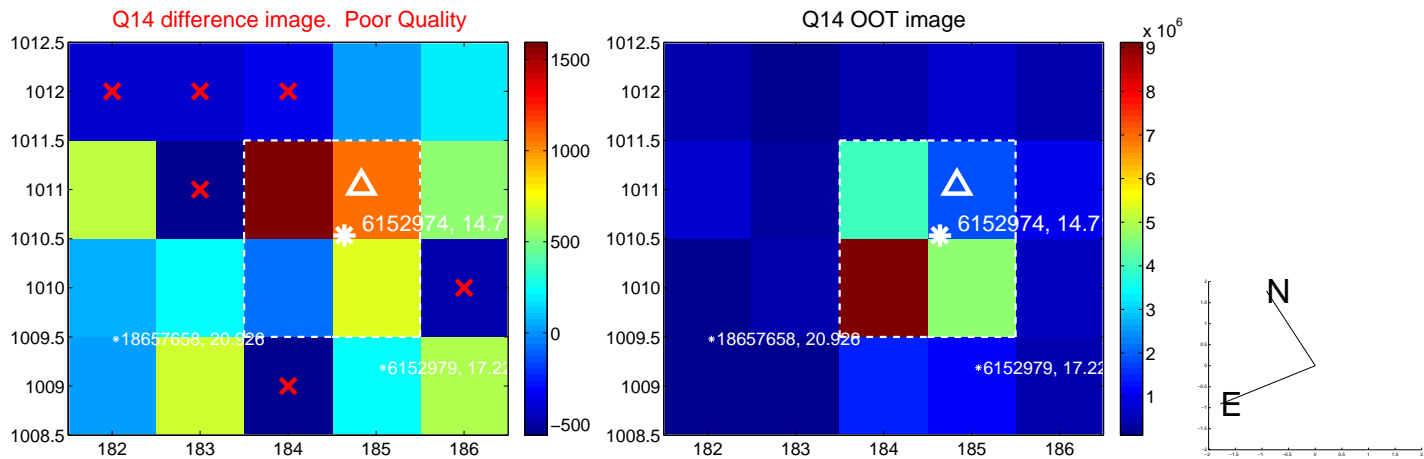
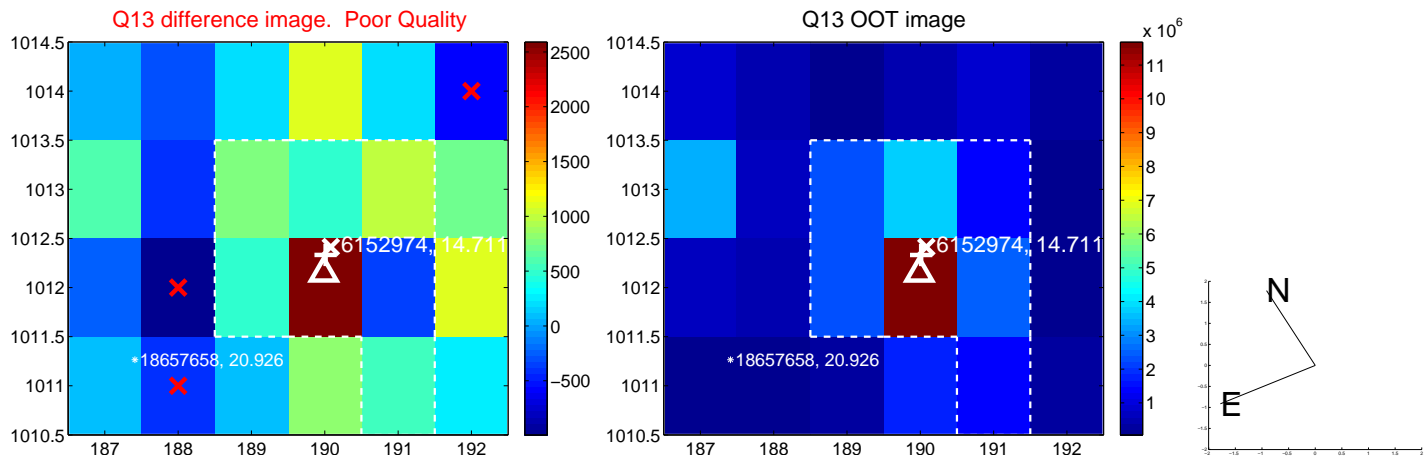




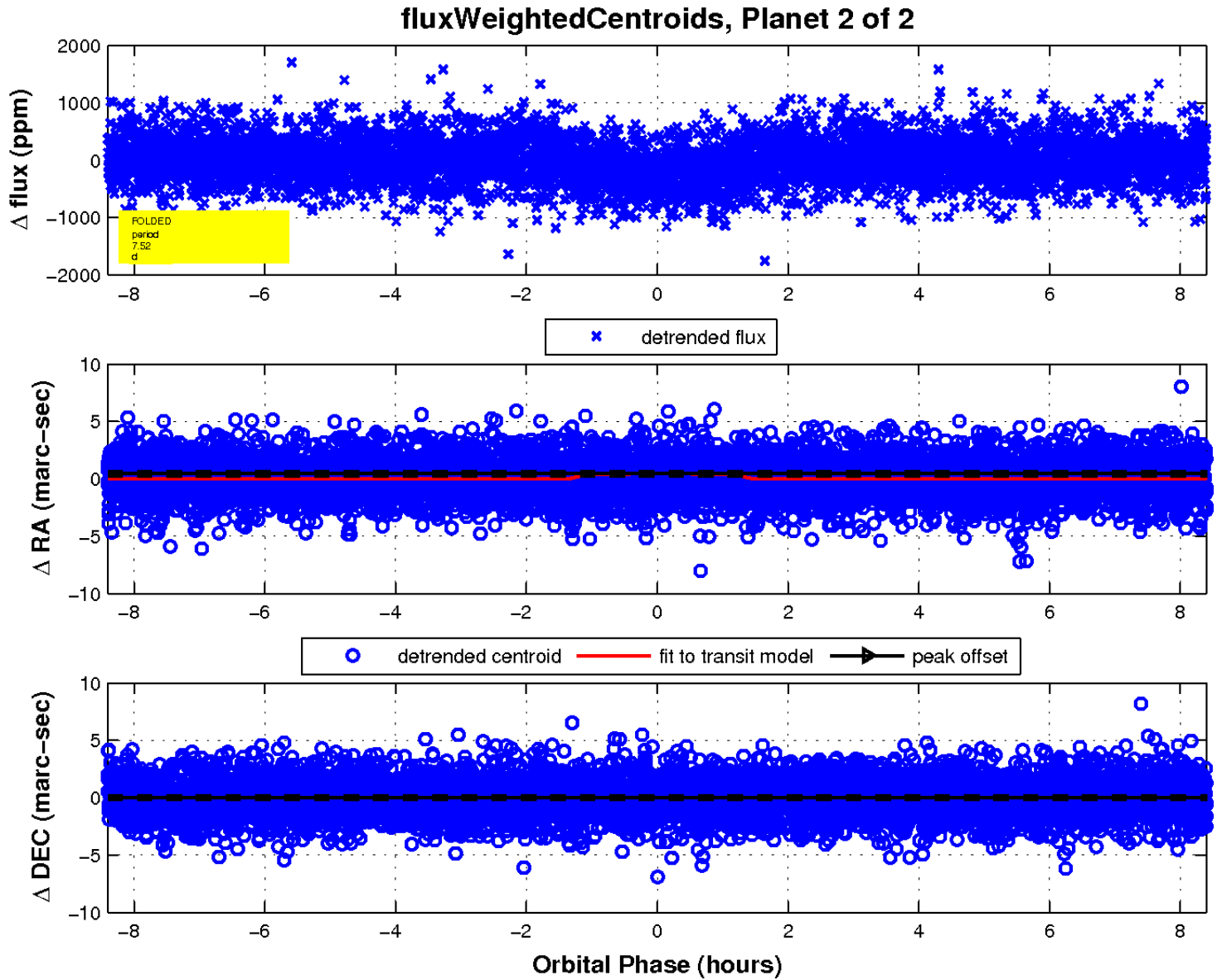
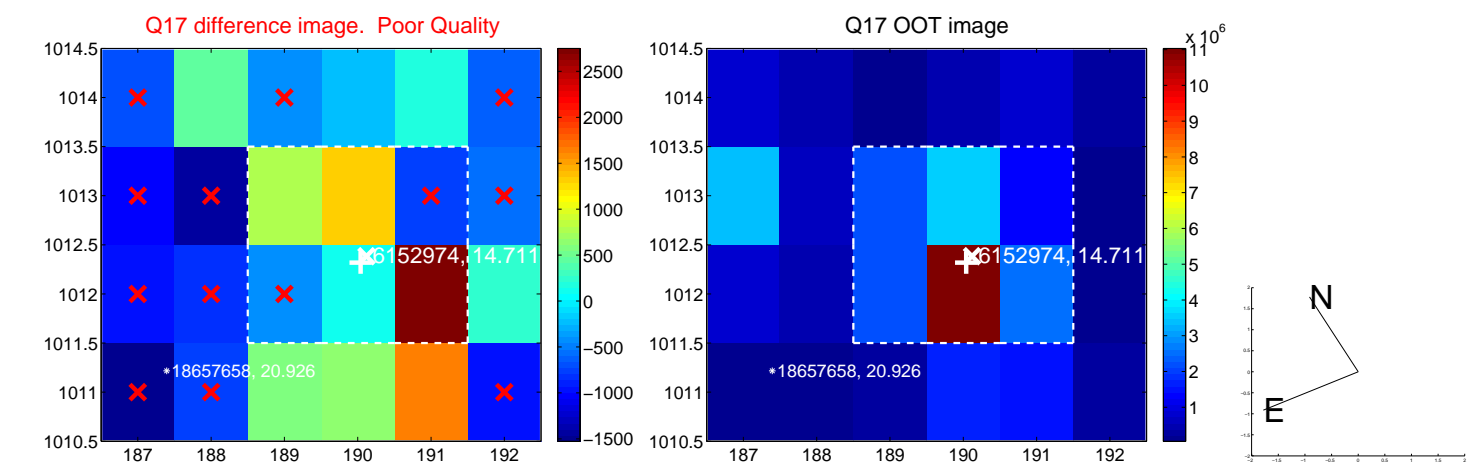
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.



UKIRT Image

Declination

