

# KIC 012301181

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012301181-01	OBS	2059.01	6.147301	134.873318	118.5	2.812	21.8	23.2	0.75	4997	0.99	83.30
012301181-02	OBS	2059.02	2.185684	132.449228	32.0	1.965	8.4	9.0	0.75	4997	0.52	330.70

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012301181-01	OBS	PC	0.99	0	0	0	0	CENT_KIC_POS
012301181-02	OBS	PC	0.69	0	0	0	0	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.

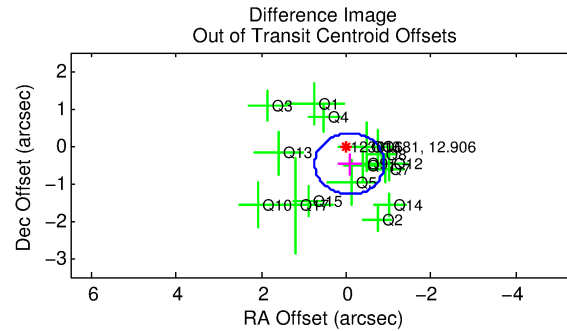
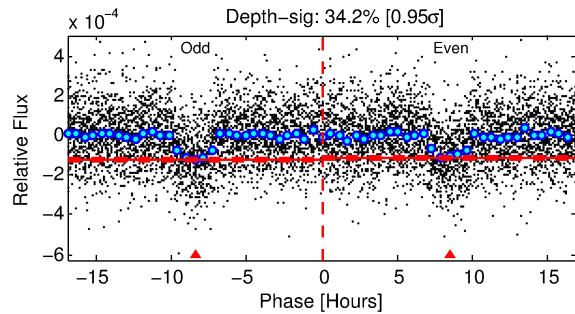
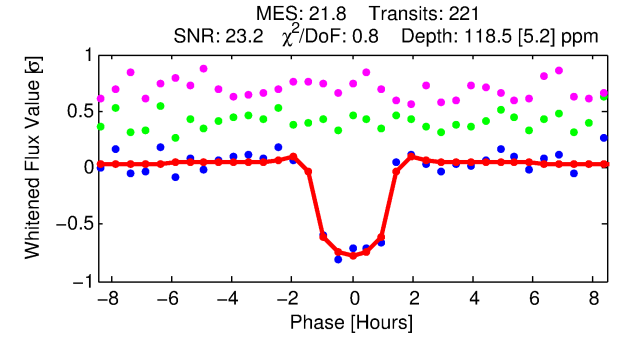
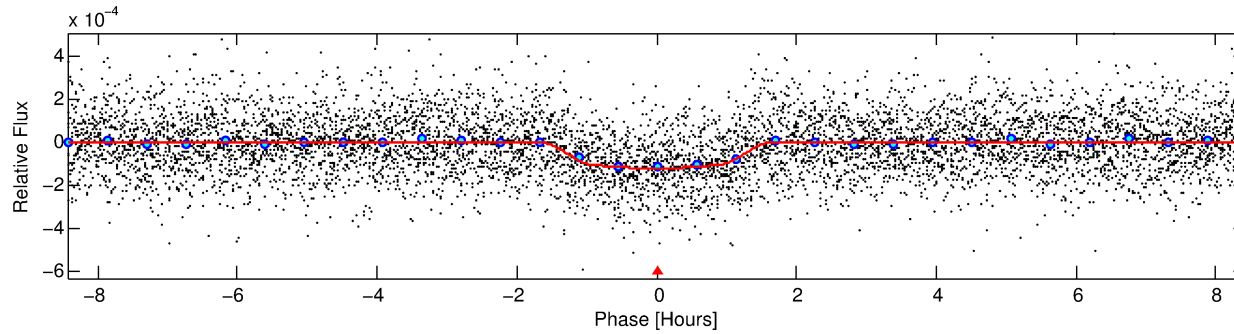
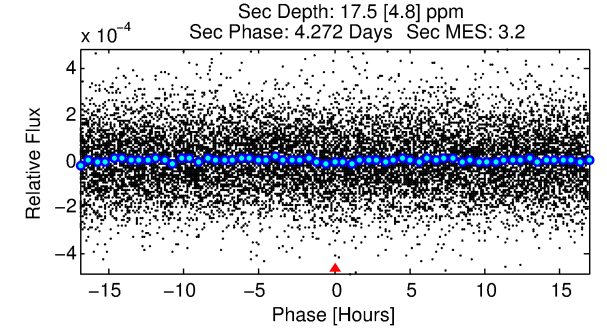
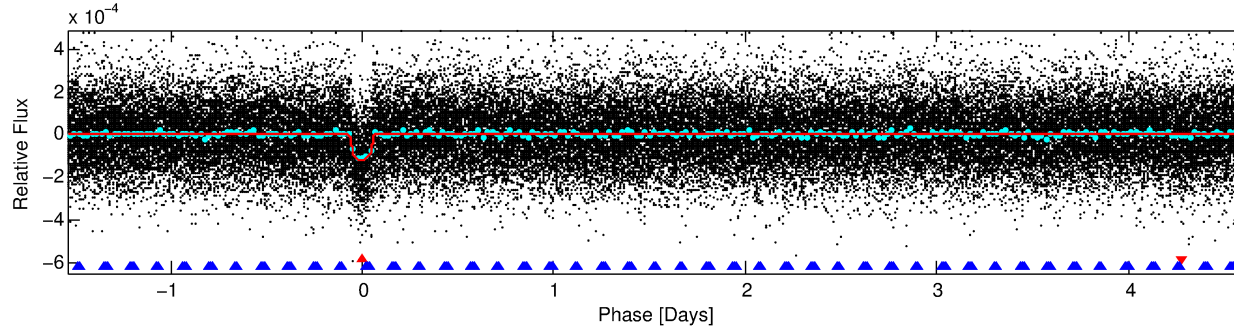
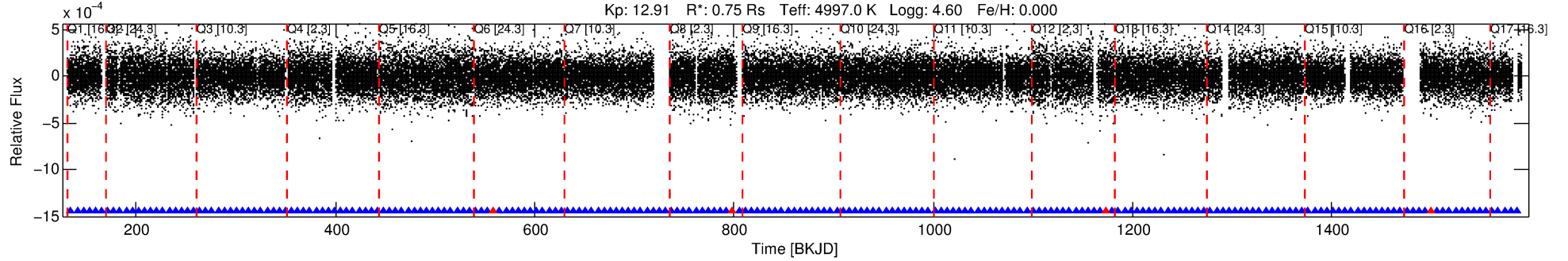
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 012301181-01

No Significant Match Found

# DV One-Page Summary

KIC: 12301181 Candidate: 1 of 2 Period: 6.147 d  
KOI: K02059.01 Corr: 0.981



## DV Fit Results:

Period = 6.14730 [0.00002] d  
Epoch = 134.8733 [0.0021] BKJD  
Rp/R\* = 0.0122 [0.0035]  
a/R\* = 7.79 [8.96]  
b = 0.90 [0.25]  
Seff = 83.30 [10.18]  
Teq = 770 [24] K  
Rp = 0.99 [0.29] Re  
a = 0.0611 [0.0037] AU  
Ag = 36.69 [23.84] [1.50σ]  
Teffp = 2931 [475] K [4.54σ]

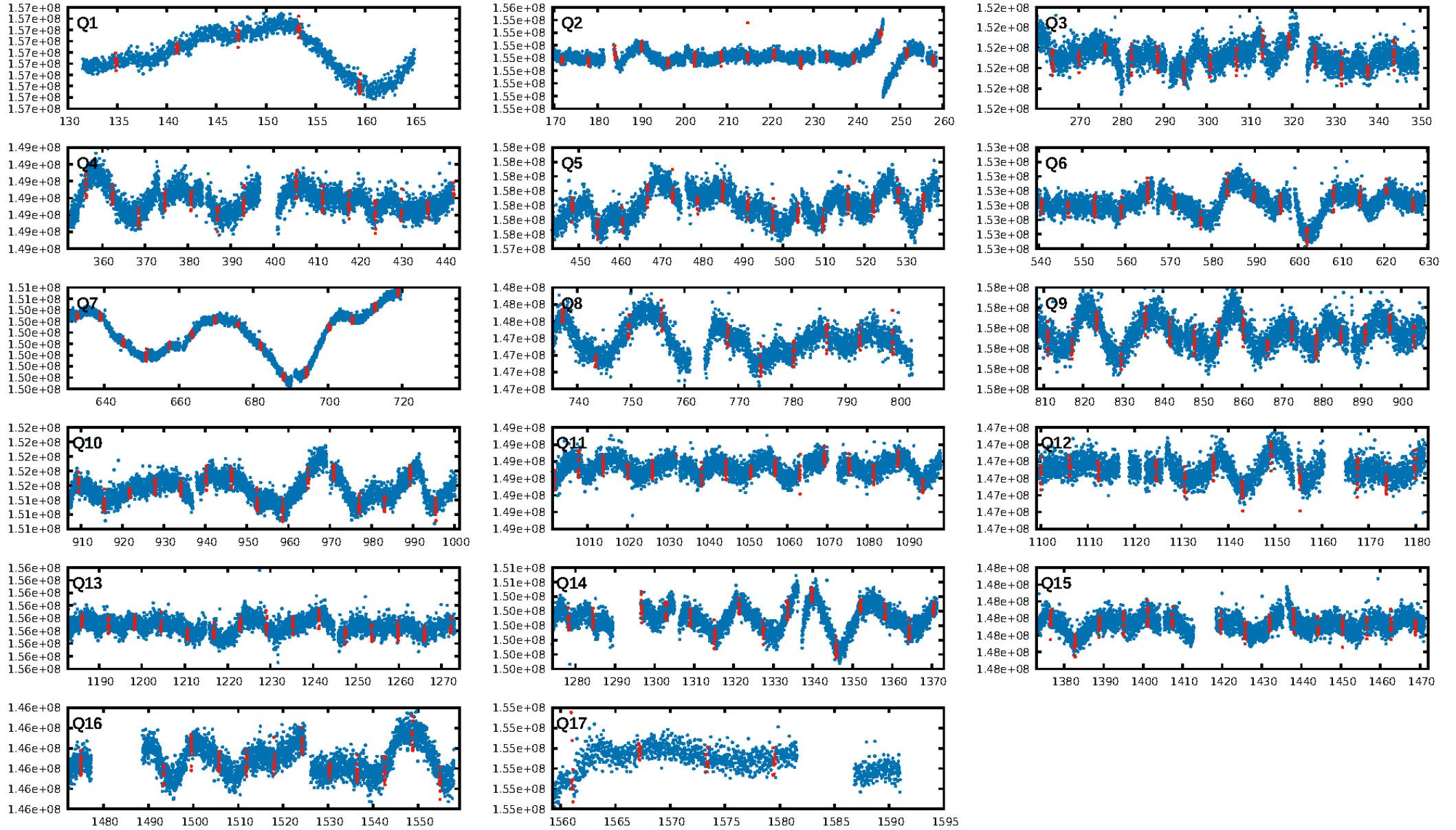
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [27.71σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 8.33e-101  
RollingBand-fgt: 0.98 [208/212]  
GhostDiagnostic-chr: 8.14  
Centroid-sig: N/A  
Centroid-so: 1.152 arcsec [1.82σ]  
OotOffset-rm: 0.487 arcsec [1.78σ]  
KicOffset-rm: 0.264 arcsec [0.99σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.88 [15/17]  
DiffImageOverlap-fno: 1.00 [17/17]

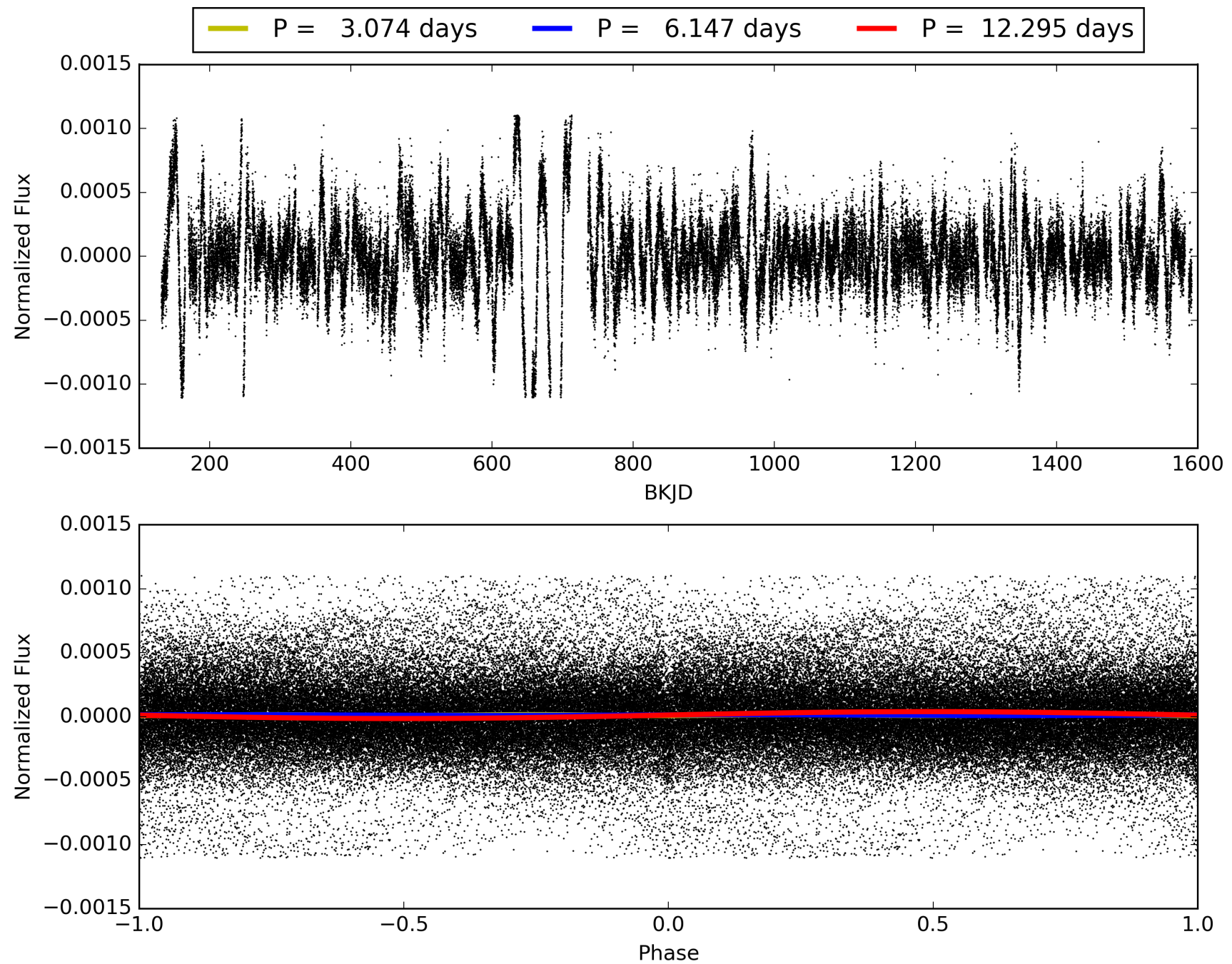
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 01:16:05 Z

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

# TCE 012301181-01, PDC Light Curves

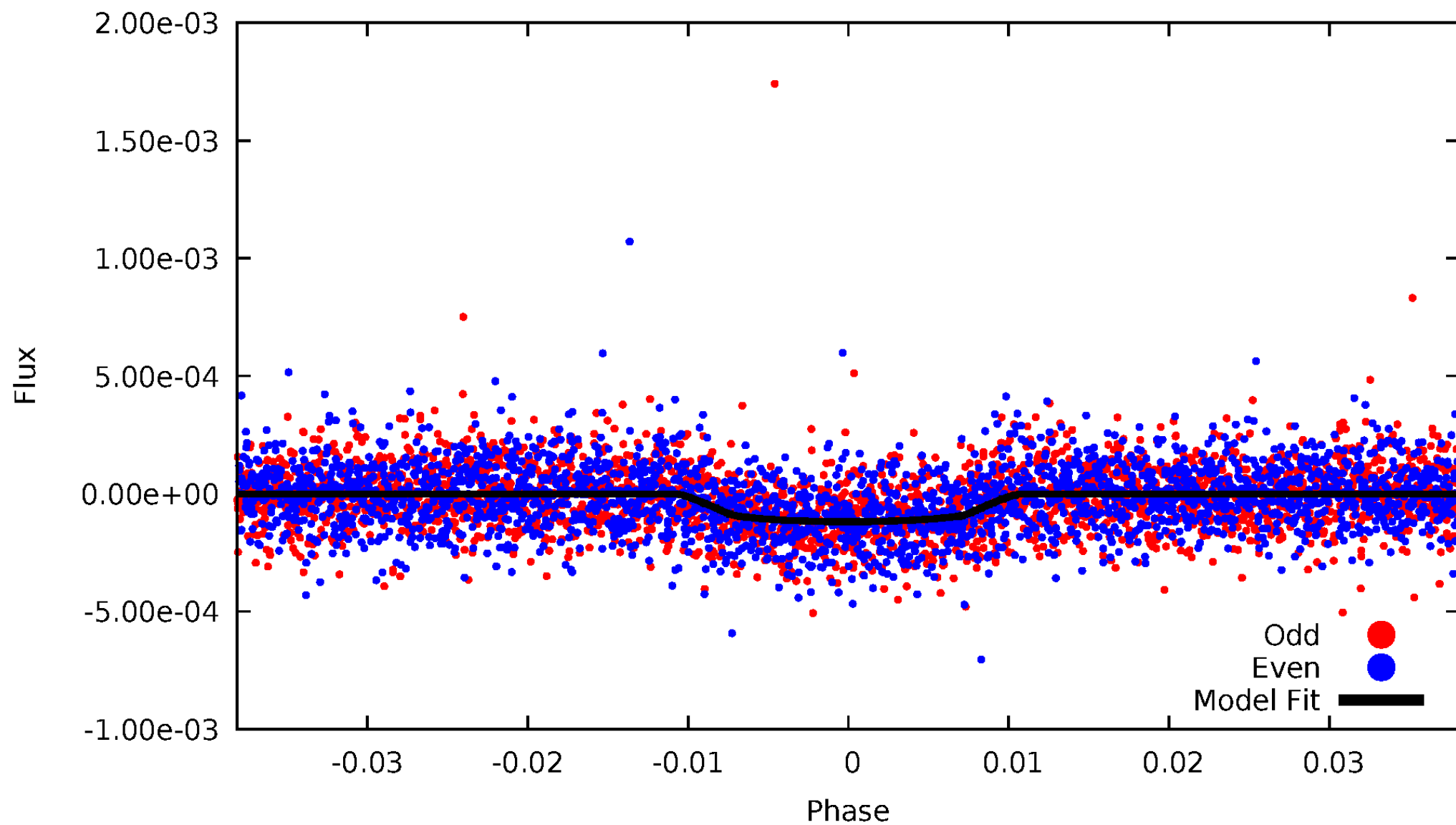


TCE 012301181-01



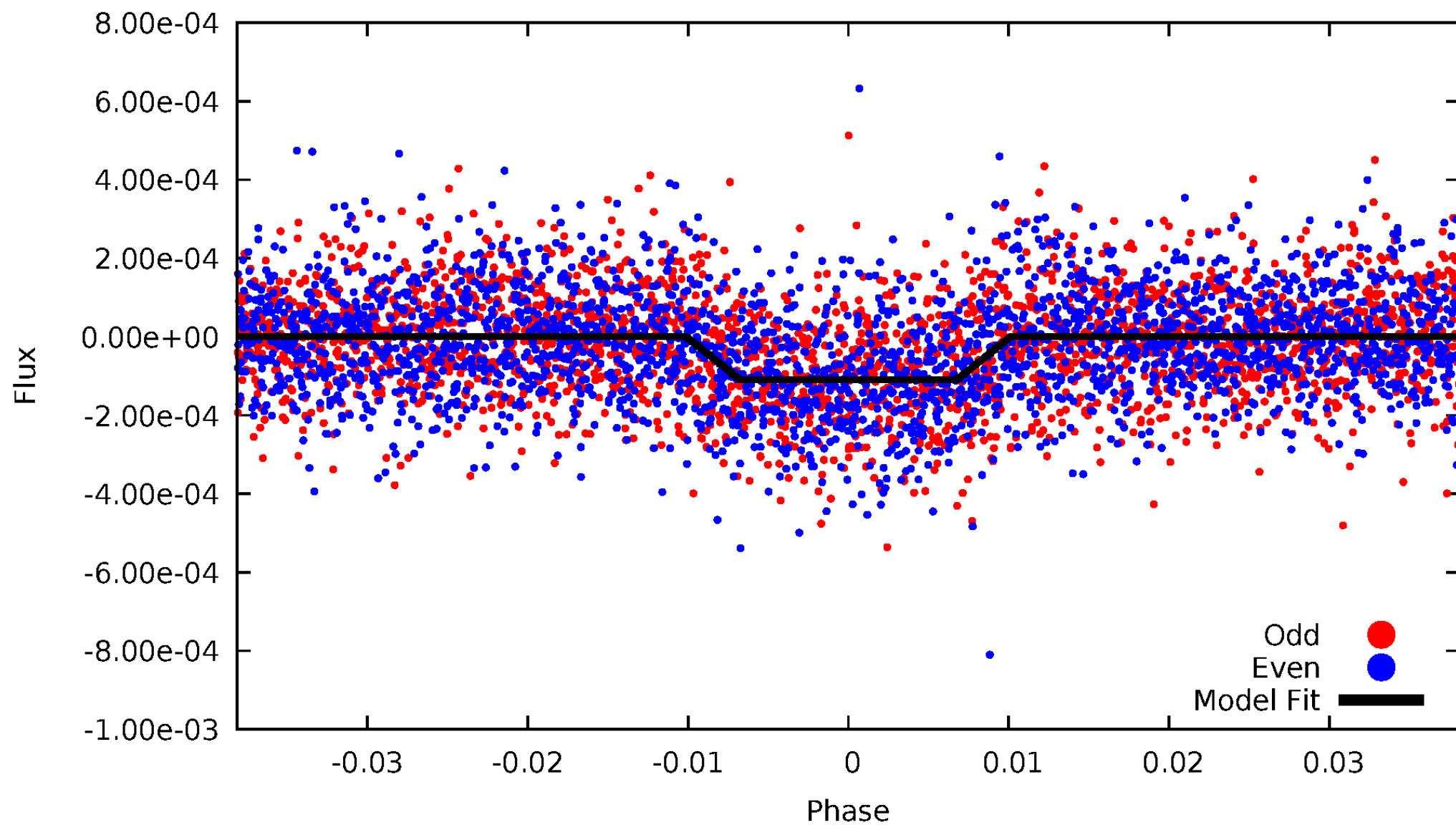
# DV Odd/Even

TCE 012301181-01



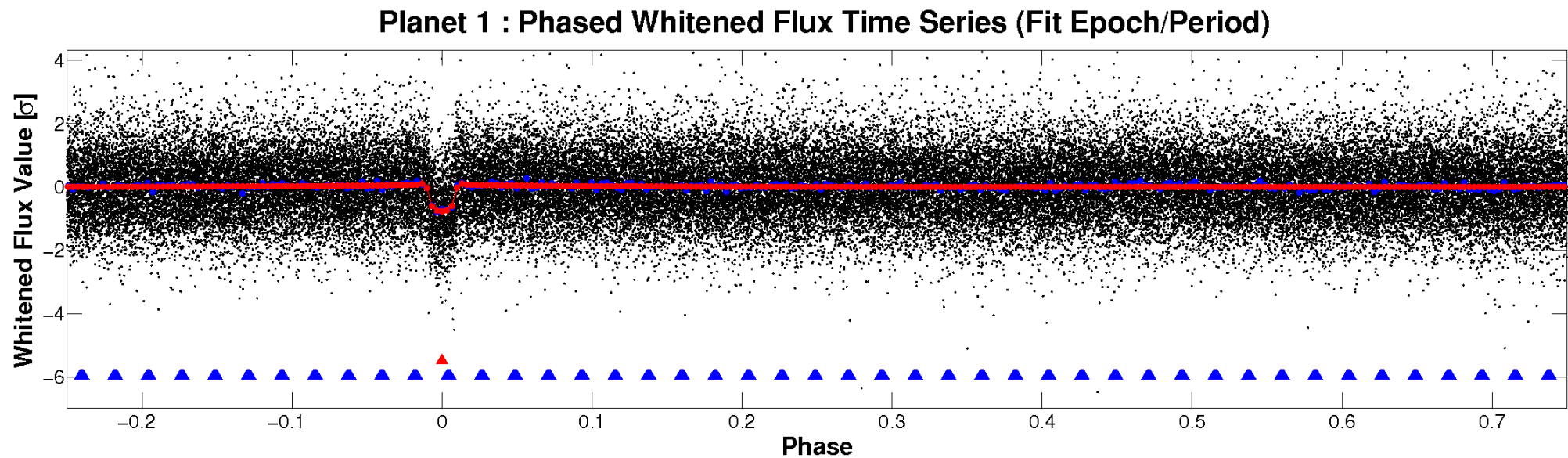
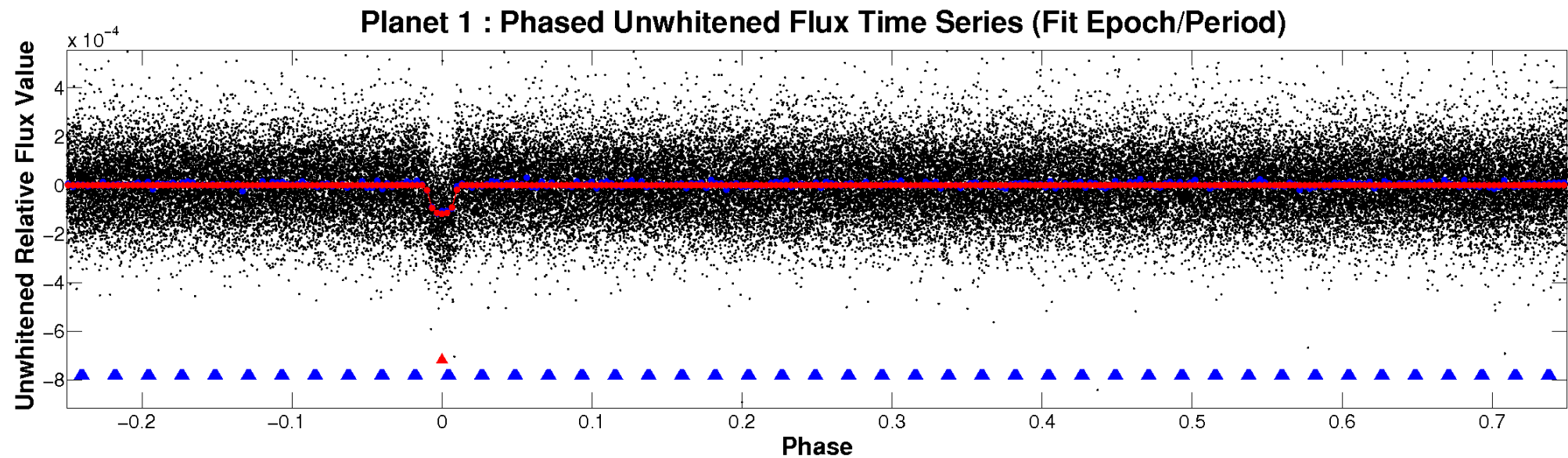
# ALT Odd/Even

TCE 012301181-01



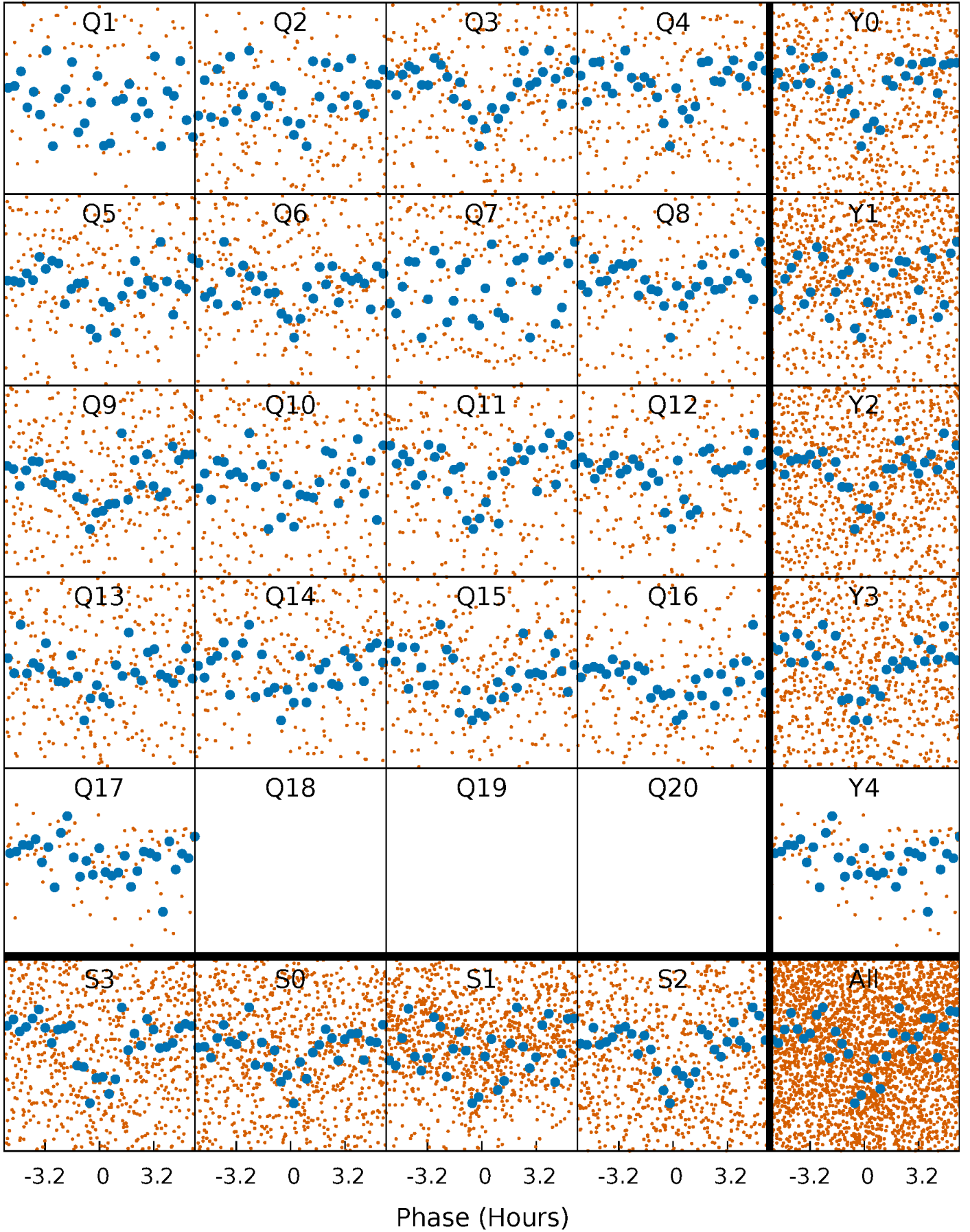


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

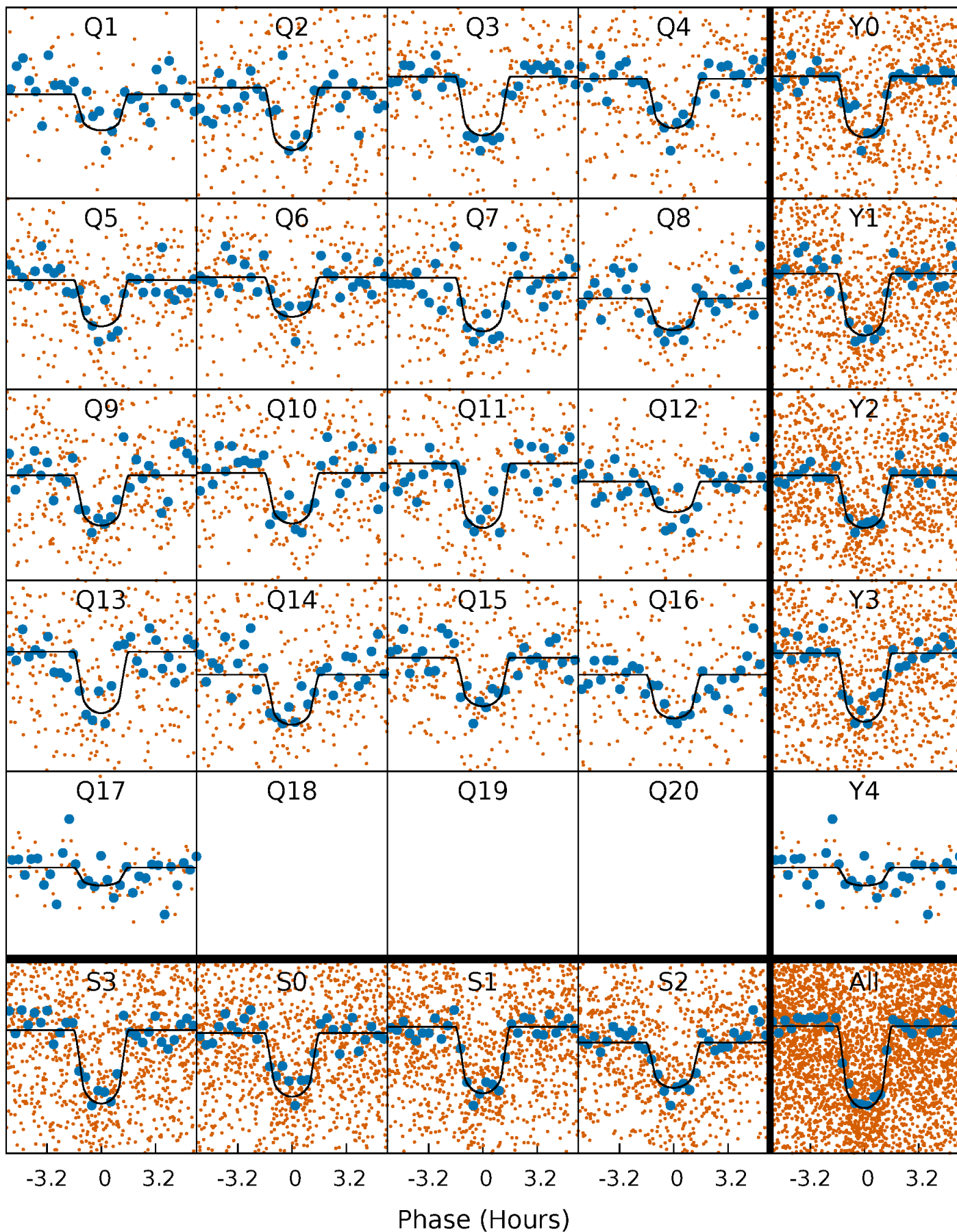
TCE 012301181-01 P= 6.147301 Days  $T_0=134.873318$  (BKJD)





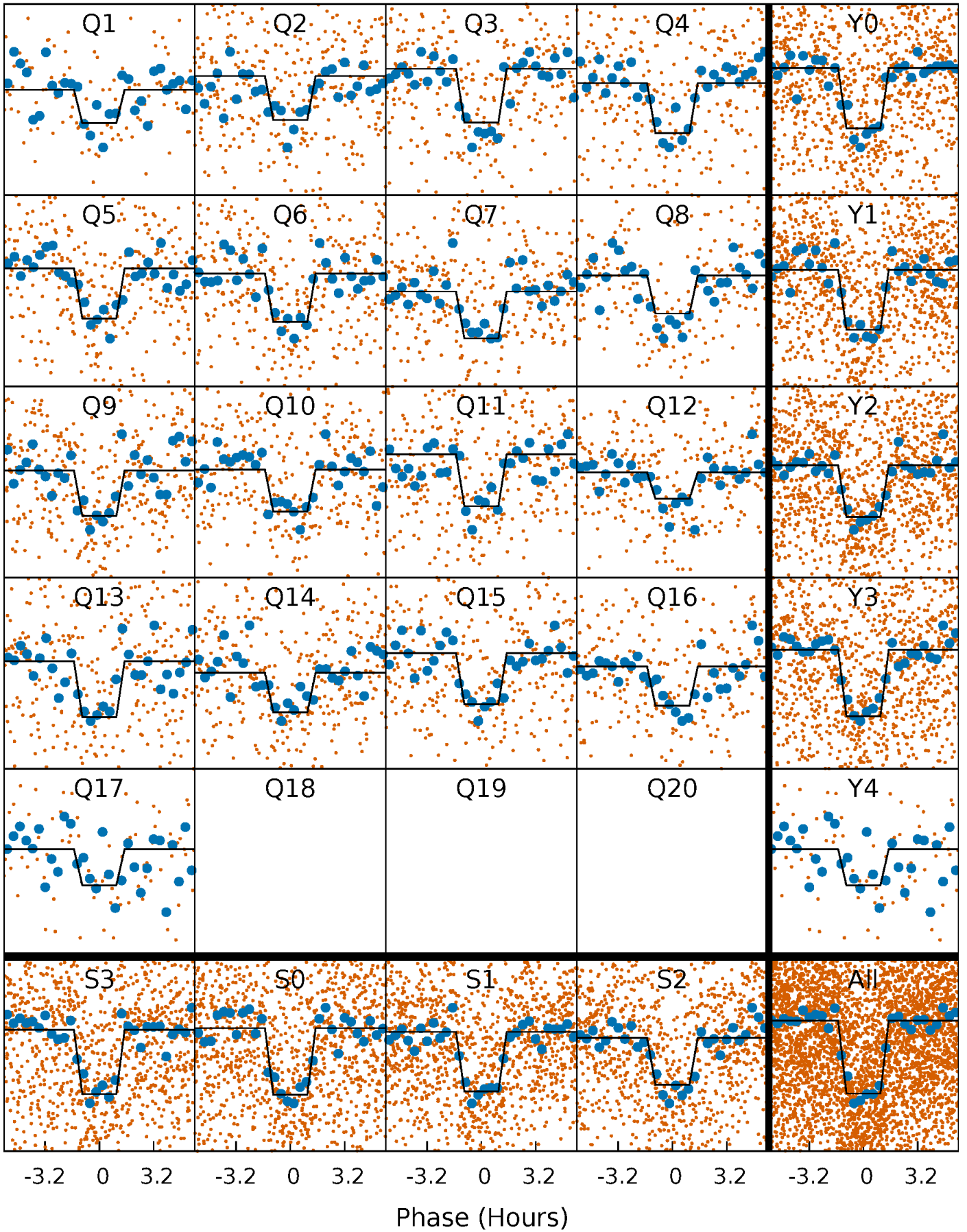
# DV Quarter-Phased Transit Curves

TCE 012301181-01 P= 6.147301 Days  $T_0=134.873318$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

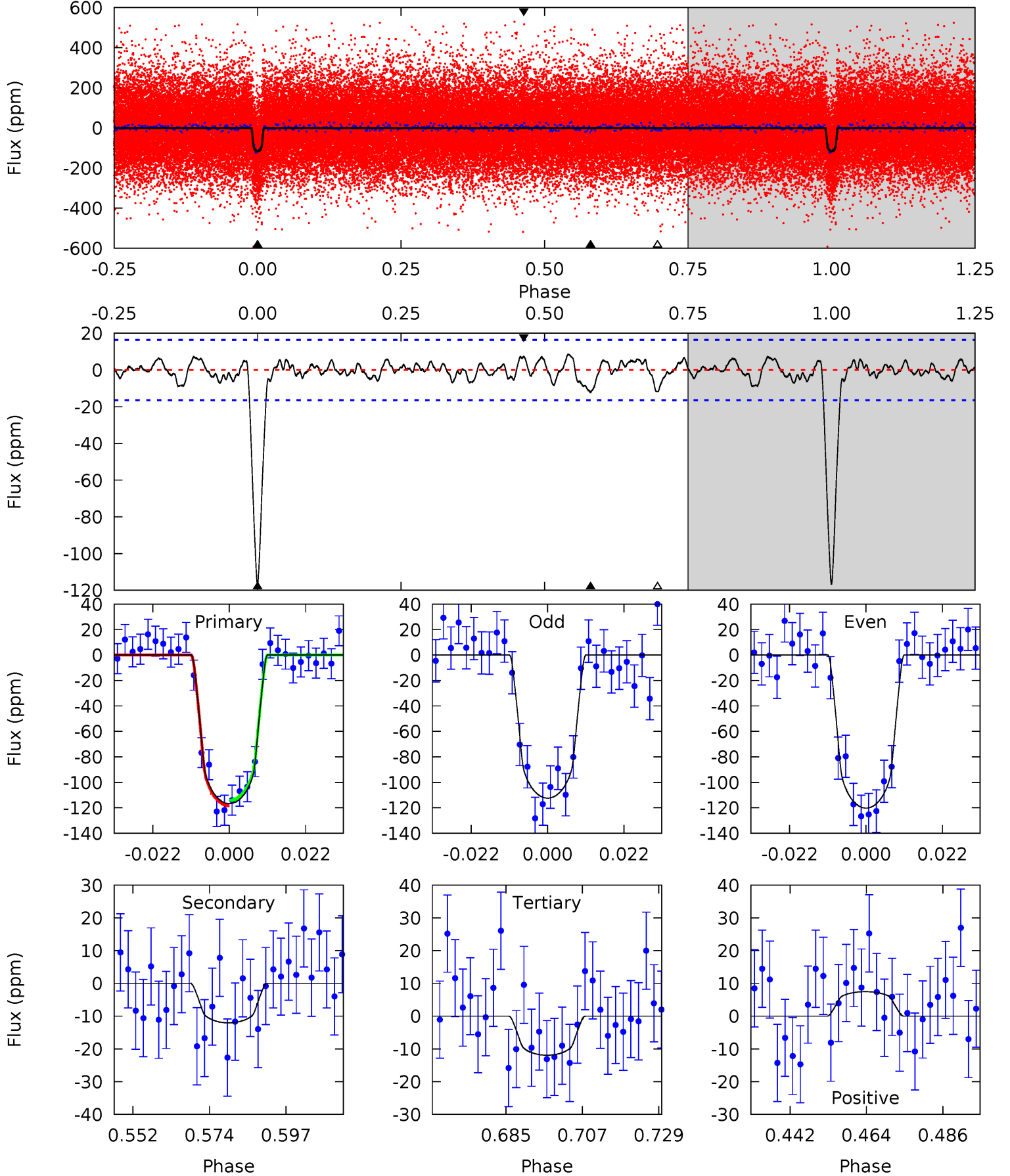
TCE 012301181-01 P= 6.147252 Days  $T_0=134.878209$  (BKJD)



# DV Model-Shift Uniqueness Test

012301181-01, P = 6.147301 Days, E = 128.726017 Days

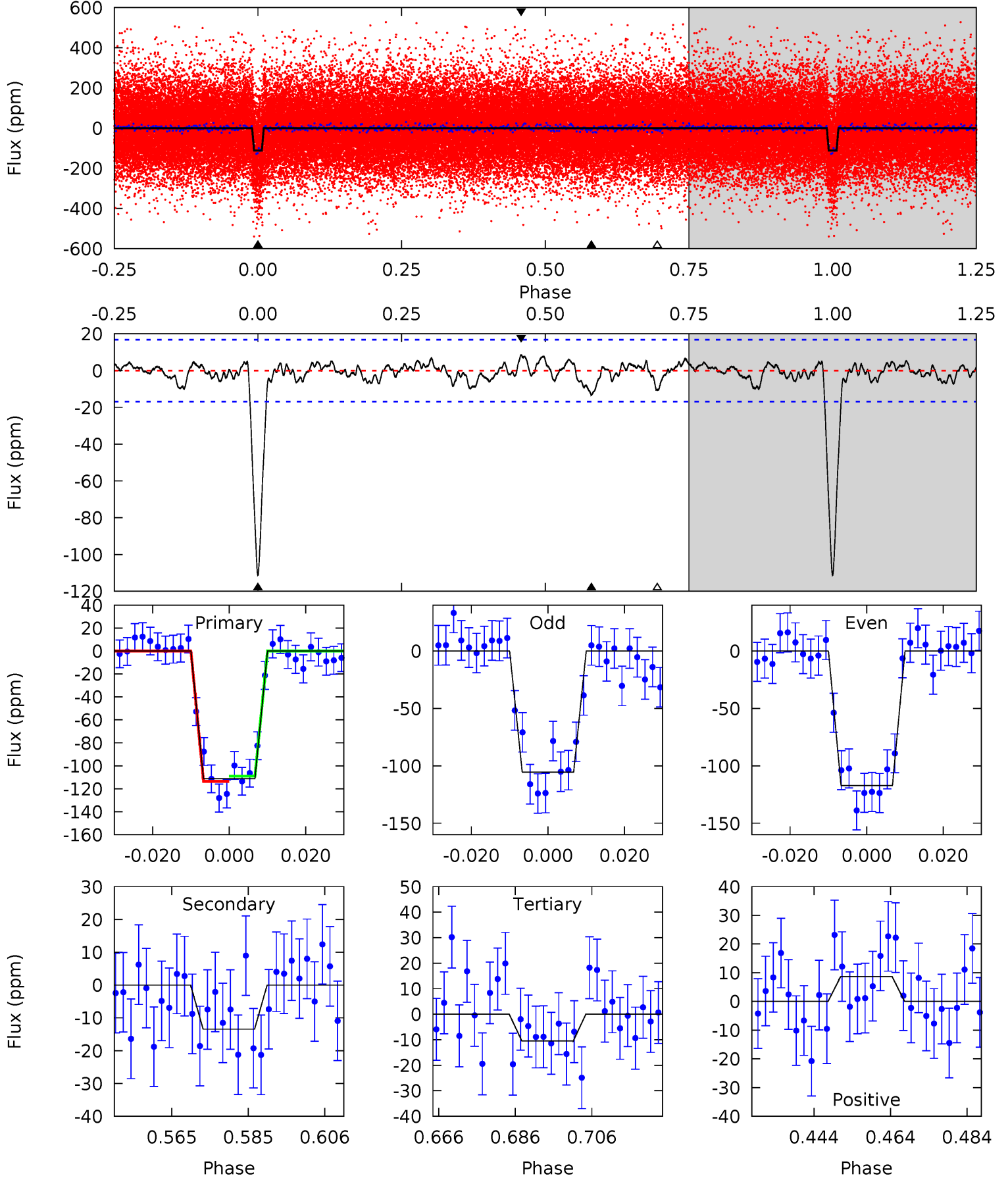
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
34.7	3.58	3.55	2.22	4.87	2.29	1.13	31.1	32.5	0.04	1.37	1.17	0.97	0.07	0.60



# Alt Model-Shift Uniqueness Test

012301181-01, P = 6.147252 Days, E = 128.730957 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
32.3	3.91	3.05	2.52	4.89	2.32	1.08	29.3	29.8	0.86	1.39	1.71	0.96	0.07	0.65



### Stellar Parameters For KIC 012301181

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4997^{+100}_{-100}$	$4.598^{+0.018}_{-0.053}$	$0.000^{+0.150}_{-0.150}$	$0.746^{+0.049}_{-0.030}$	$0.806^{+0.035}_{-0.051}$	$2.733^{+0.237}_{-0.451}$
	+2%/-2%	+0%/-1%	+inf%/-inf%	+7%/-4%	+4%/-6%	+9%/-16%
Source	SPE57	SPE57	SPE57	DSEP		

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

### Secondary Eclipse Parameters for KIC 012301181-01 / KOI 2059.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-12 \pm 3$	$1.00^{+0.28}_{-0.28}$	$1084^{+26}_{-26}$	$3206^{+366}_{-277}$	$25^{+25}_{-11}$
Alt.	$-13 \pm 3$	$0.83^{+0.33}_{-0.28}$	$1083^{+28}_{-25}$	$3450^{+530}_{-351}$	$39^{+53}_{-20}$

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



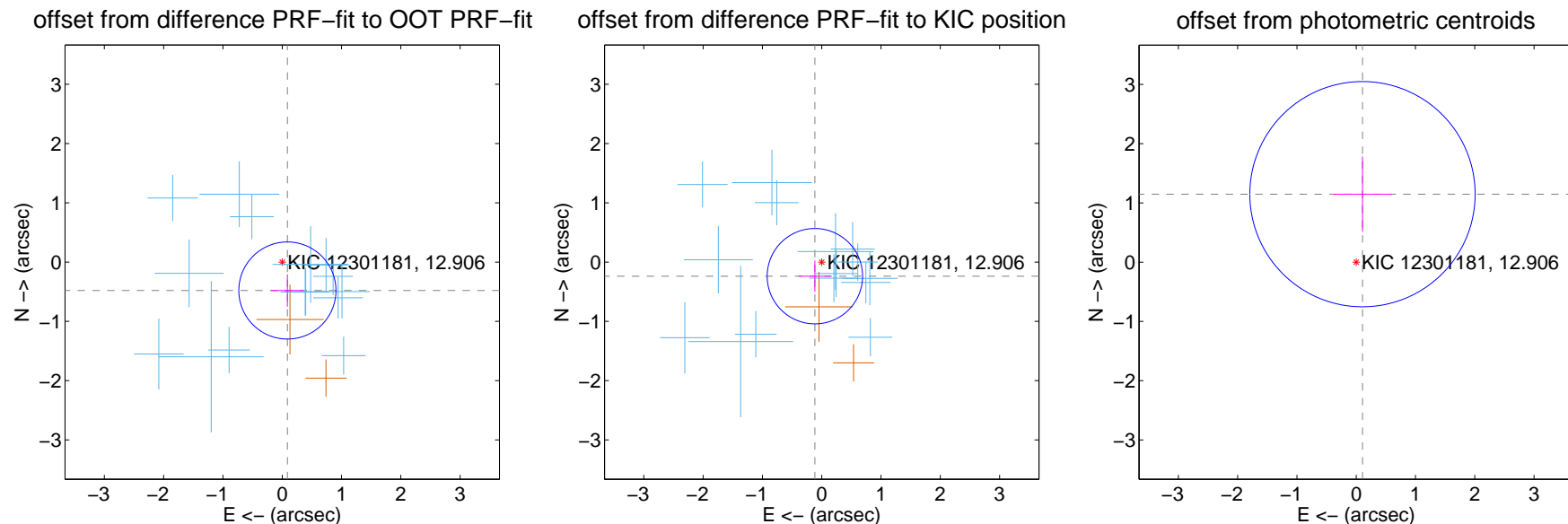
## DV Centroid Data

Supplemental centroid analysis for 012301181-01. Kepler magnitude: 12.91. Transit SNR 23.18

There are 15 quarters with good PRF difference image offsets

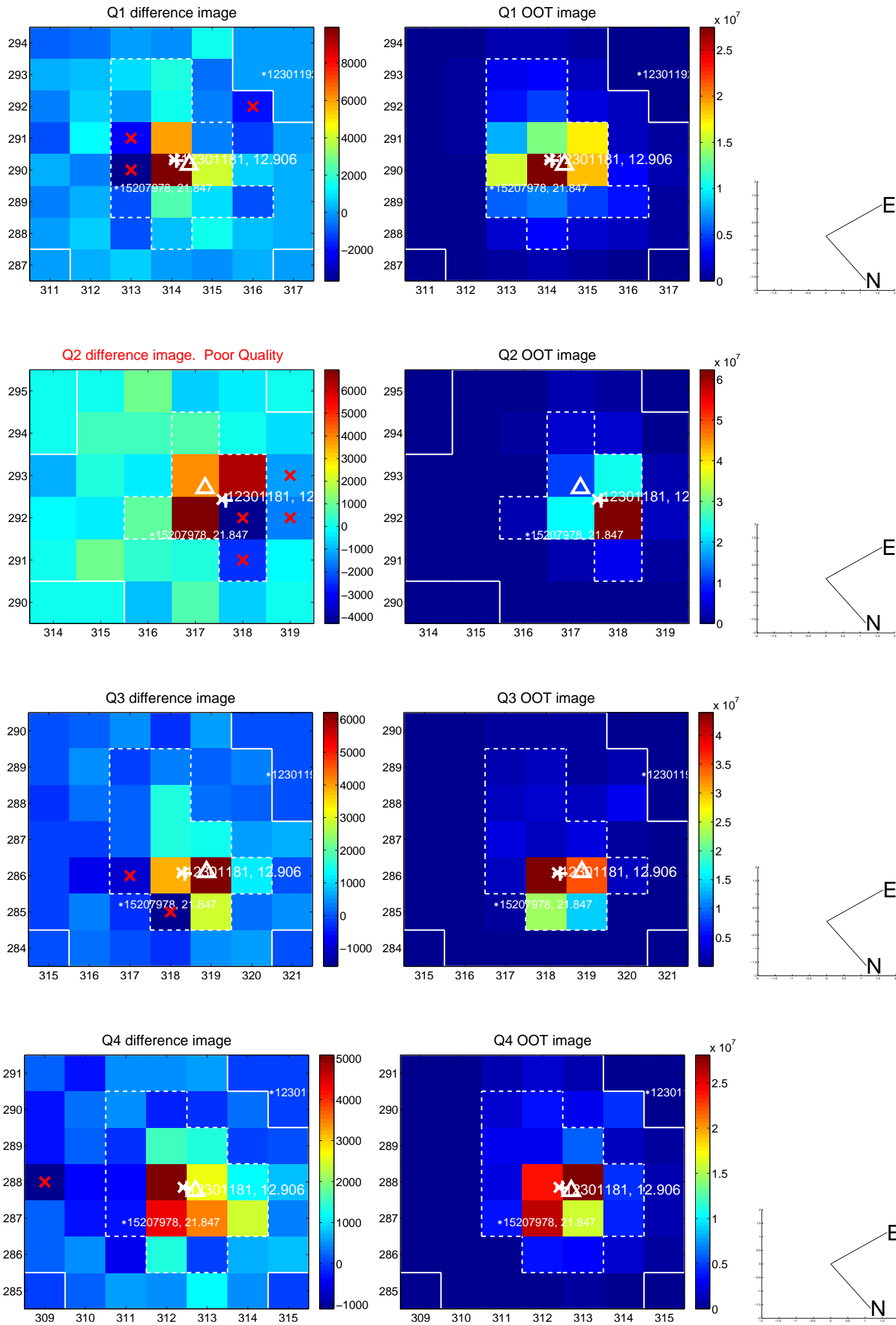
The direct PRF centroid is offset from the target star catalog position by about 0.31 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.487 \pm 0.273$	1.78	$-0.087 \pm 0.277$	$-0.479 \pm 0.273$
PRF-fit source offset from KIC position	$0.264 \pm 0.268$	0.99	$0.115 \pm 0.275$	$-0.238 \pm 0.266$
photometric centroid source offset	$1.15 \pm 0.63$	1.82	$-0.11 \pm 0.49$	$1.15 \pm 0.63$



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.

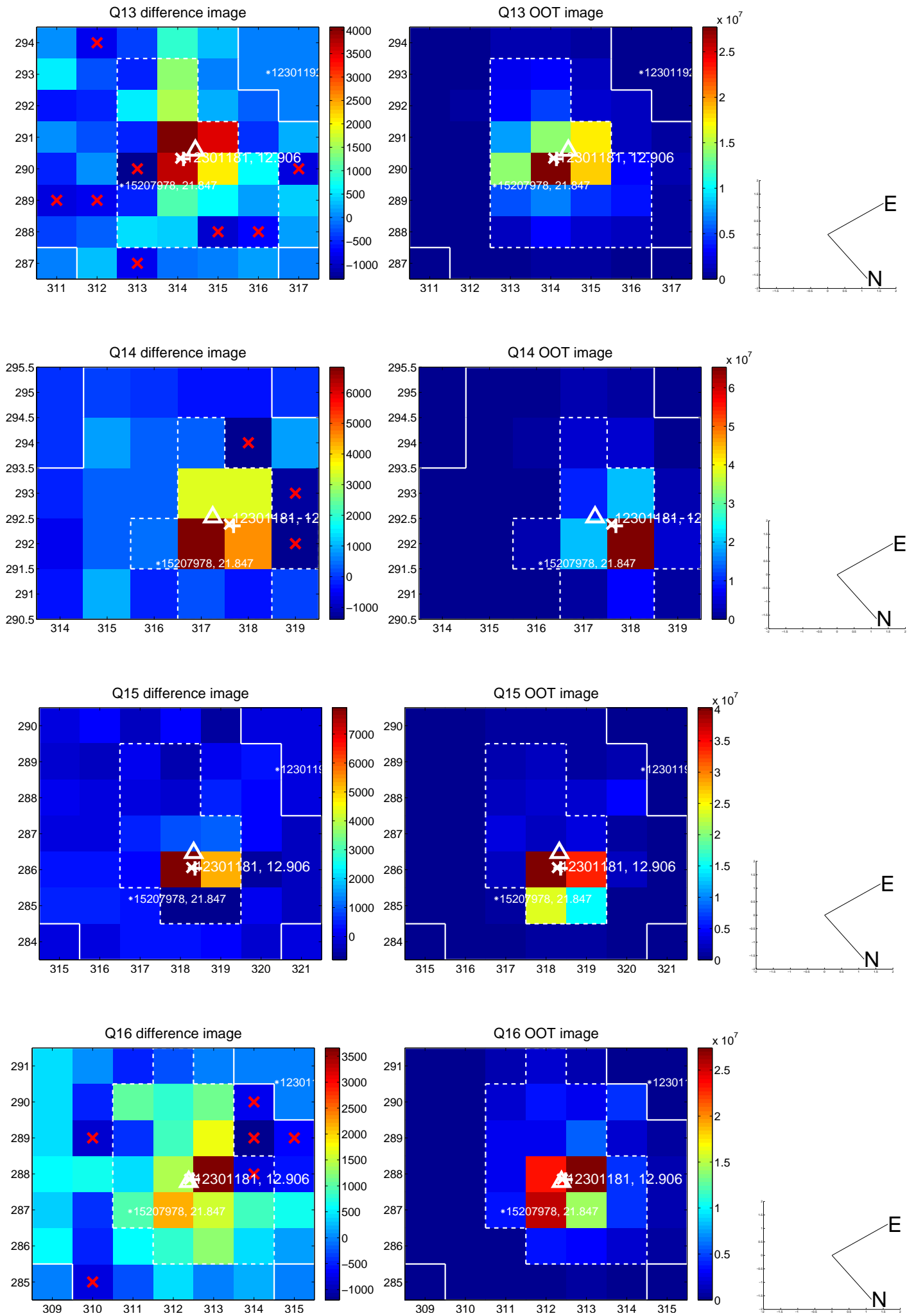
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





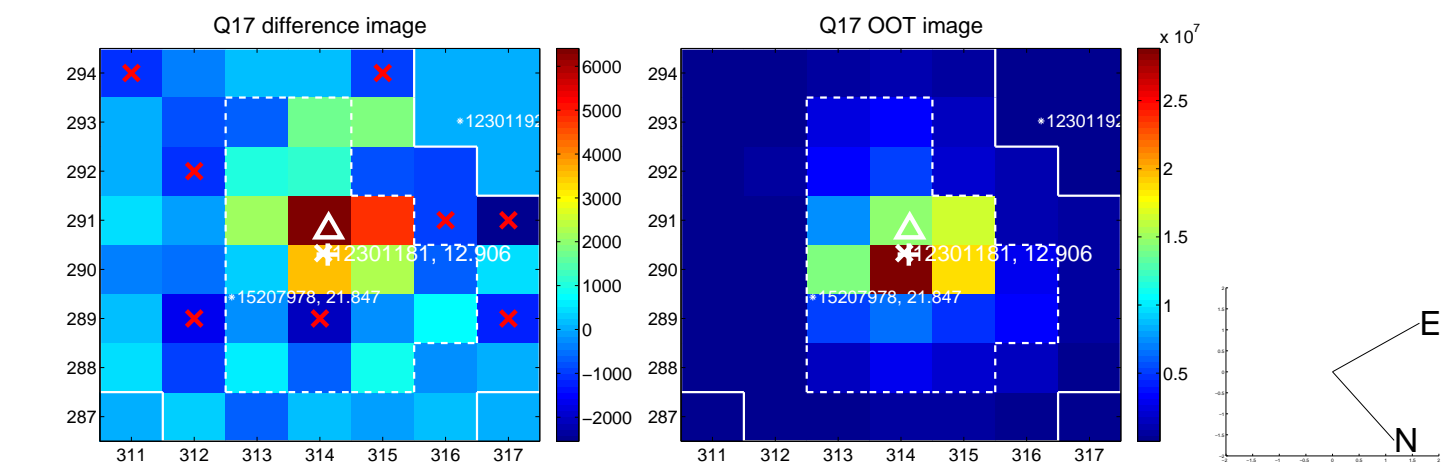


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

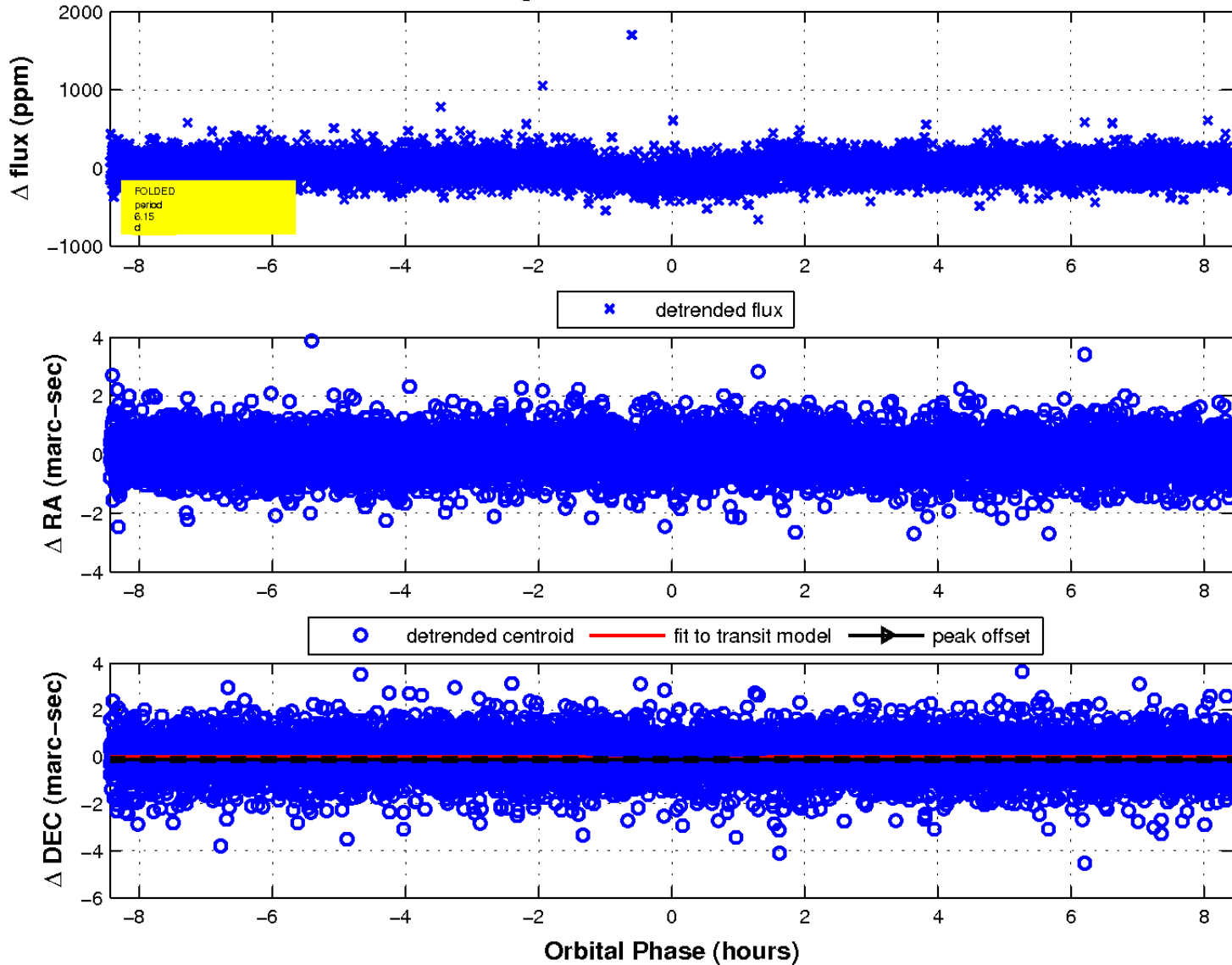




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

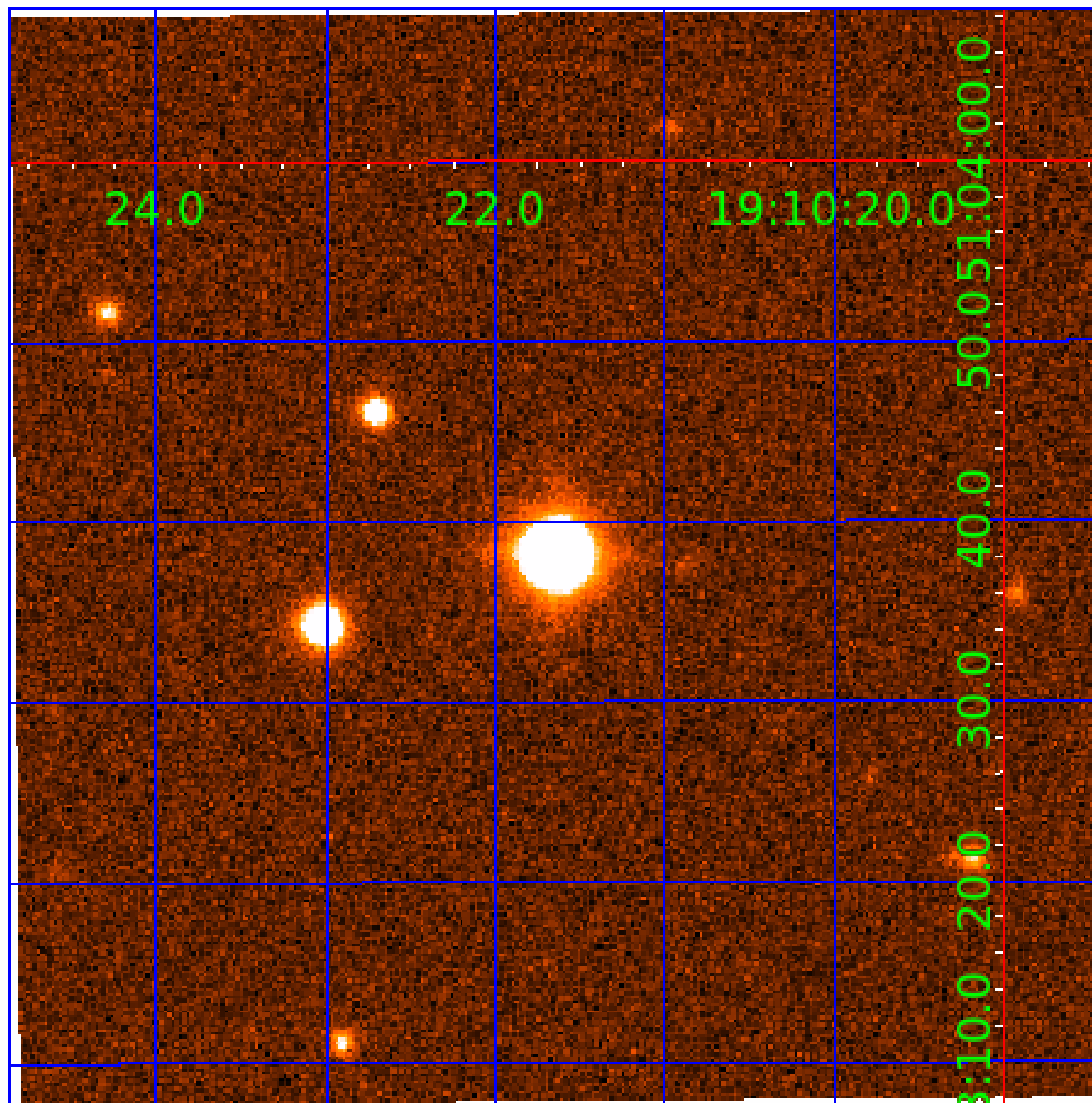


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



# KIC 012301181

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
012301181-01	OBS	2059.01	6.147301	134.873318	118.5	2.812	21.8	23.2	0.75	4997	0.99	83.30
012301181-02	OBS	2059.02	2.185684	132.449228	32.0	1.965	8.4	9.0	0.75	4997	0.52	330.70

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
012301181-01	OBS	PC	0.99	0	0	0	0	CENT_KIC_POS
012301181-02	OBS	PC	0.69	0	0	0	0	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.

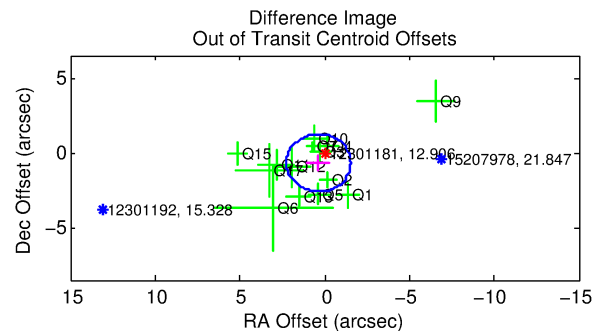
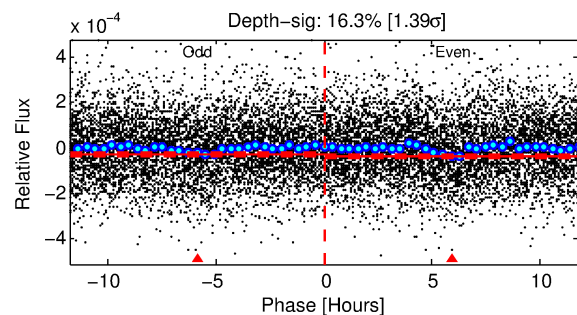
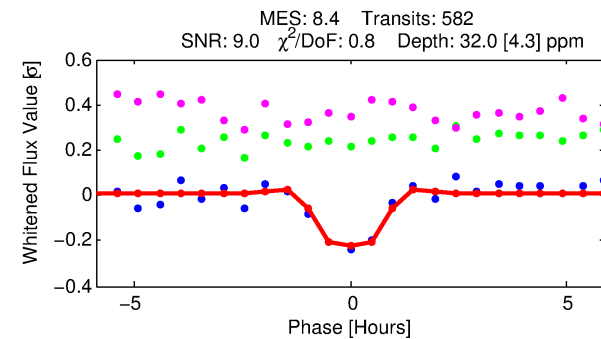
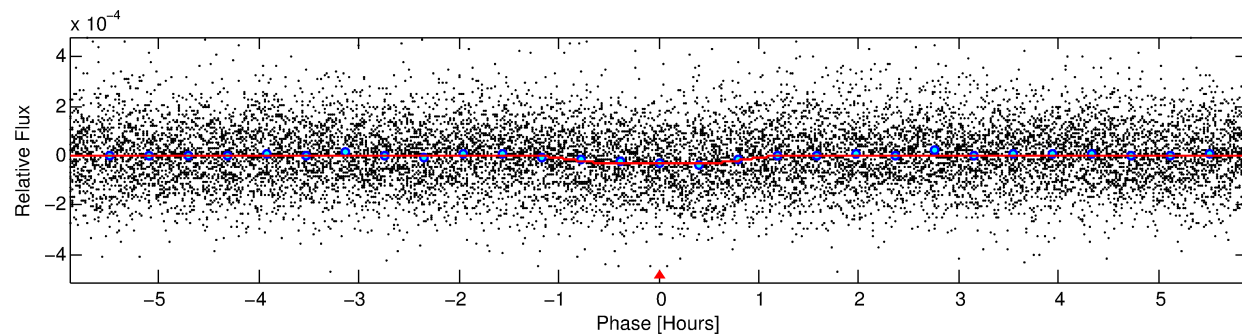
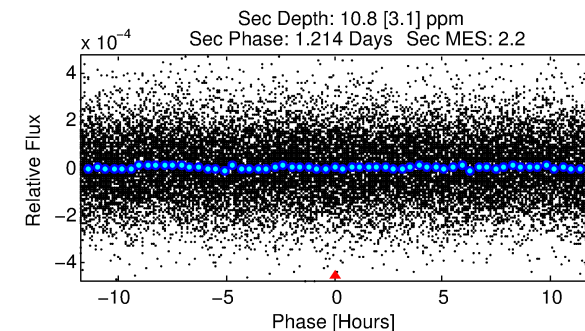
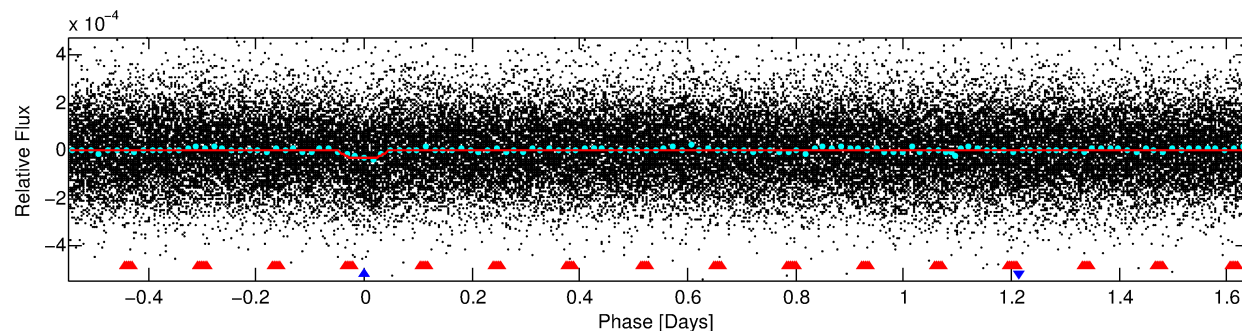
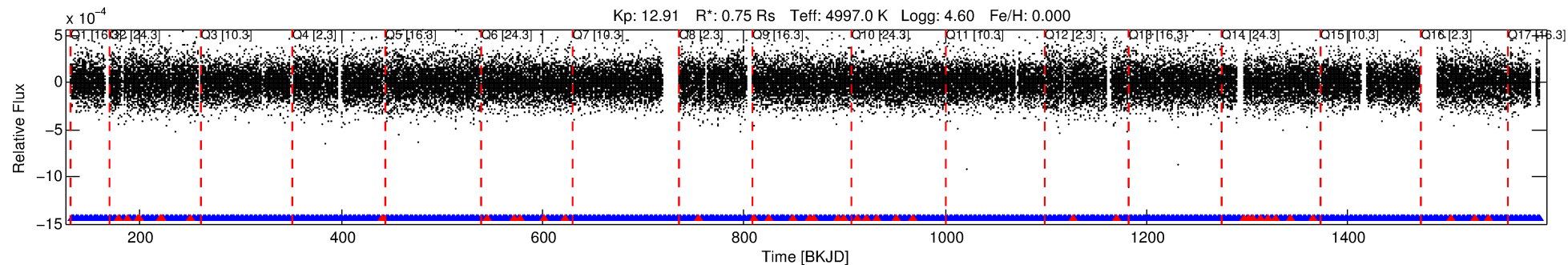
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 012301181-02

No Significant Match Found

# DV One-Page Summary

KIC: 12301181 Candidate: 2 of 2 Period: 2.186 d  
KOI: K02059.02 Corr: 0.910



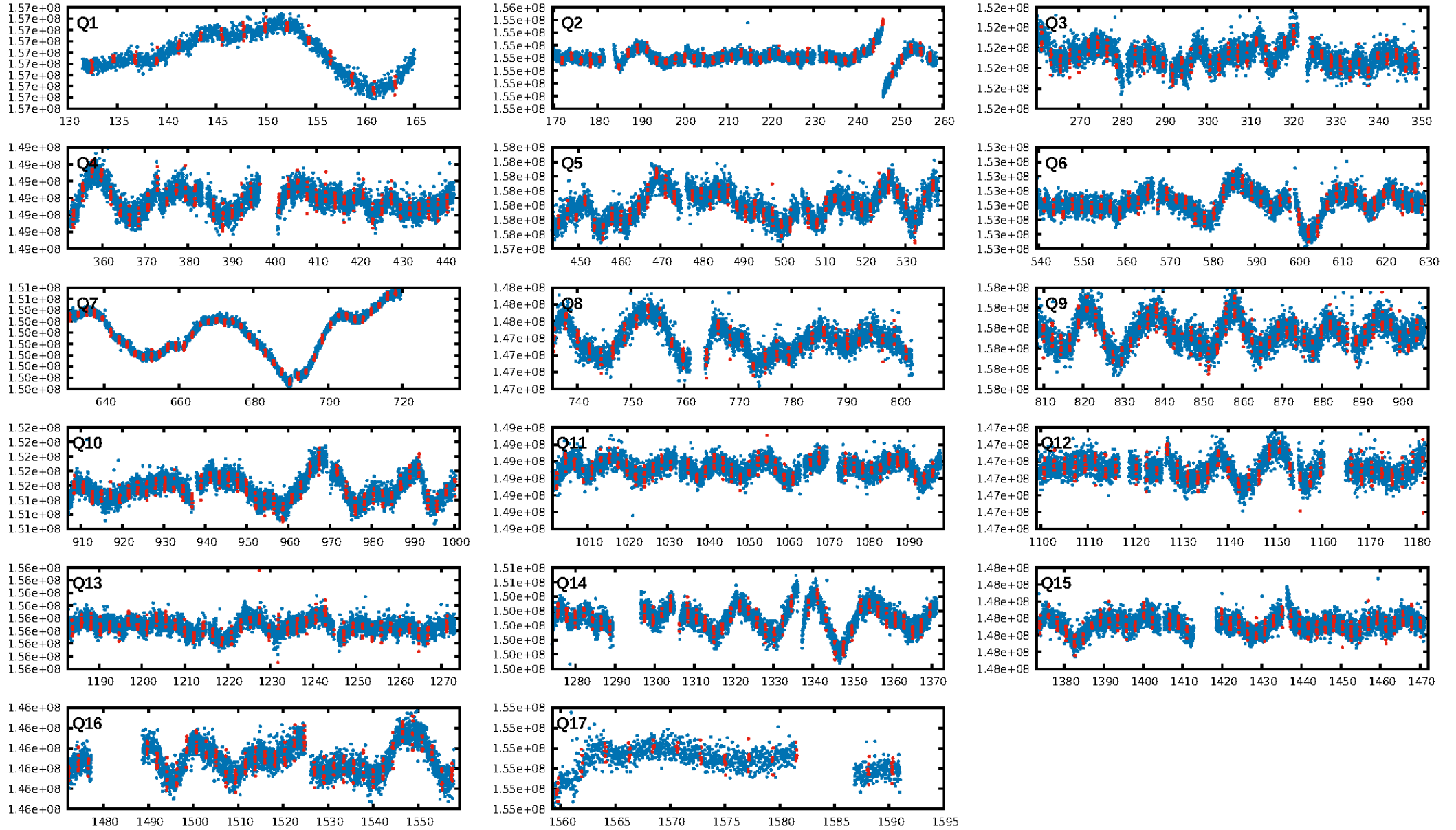
## DV Fit Results:

Period = 2.18568 [0.00001] d  
Epoch = 132.4492 [0.0033] BKJD  
Rp/R\* = 0.0063 [0.0041]  
a/R\* = 3.94 [9.68]  
b = 0.90 [0.57]  
Seff = 330.71 [40.43]  
Teq = 1087 [33] K  
Rp = 0.51 [0.34] Re  
a = 0.0307 [0.0018] AU  
Ag = 21.11 [28.20] [0.71σ]  
Teffp = 3604 [1203] K [2.09σ]

## DV Diagnostic Results:

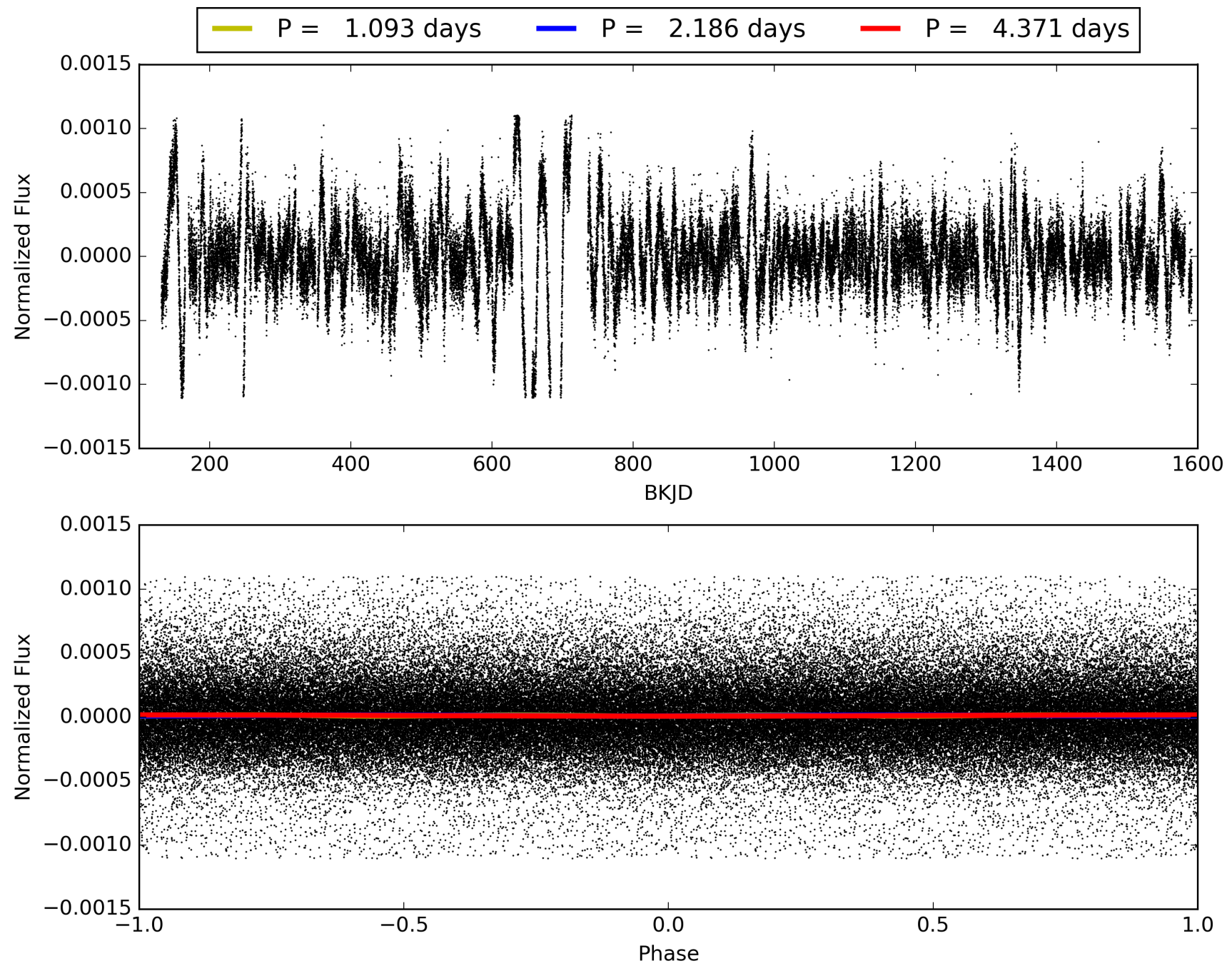
ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [27.71σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 3.46e-17  
RollingBand-fgt: 0.93 [516/555]  
GhostDiagnostic-chr: 55.53  
Centroid-sig: N/A  
Centroid-so: 1.788 arcsec [1.22σ]  
OotOffset-rm: 0.773 arcsec [1.21σ]  
OotOffset-st: 3/4/2/5 [14]  
KicOffset-rm: 0.715 arcsec [0.91σ]  
KicOffset-st: 3/4/2/5 [14]  
DiffImageQuality-fgm: 0.50 [7/14]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 012301181-02, PDC Light Curves



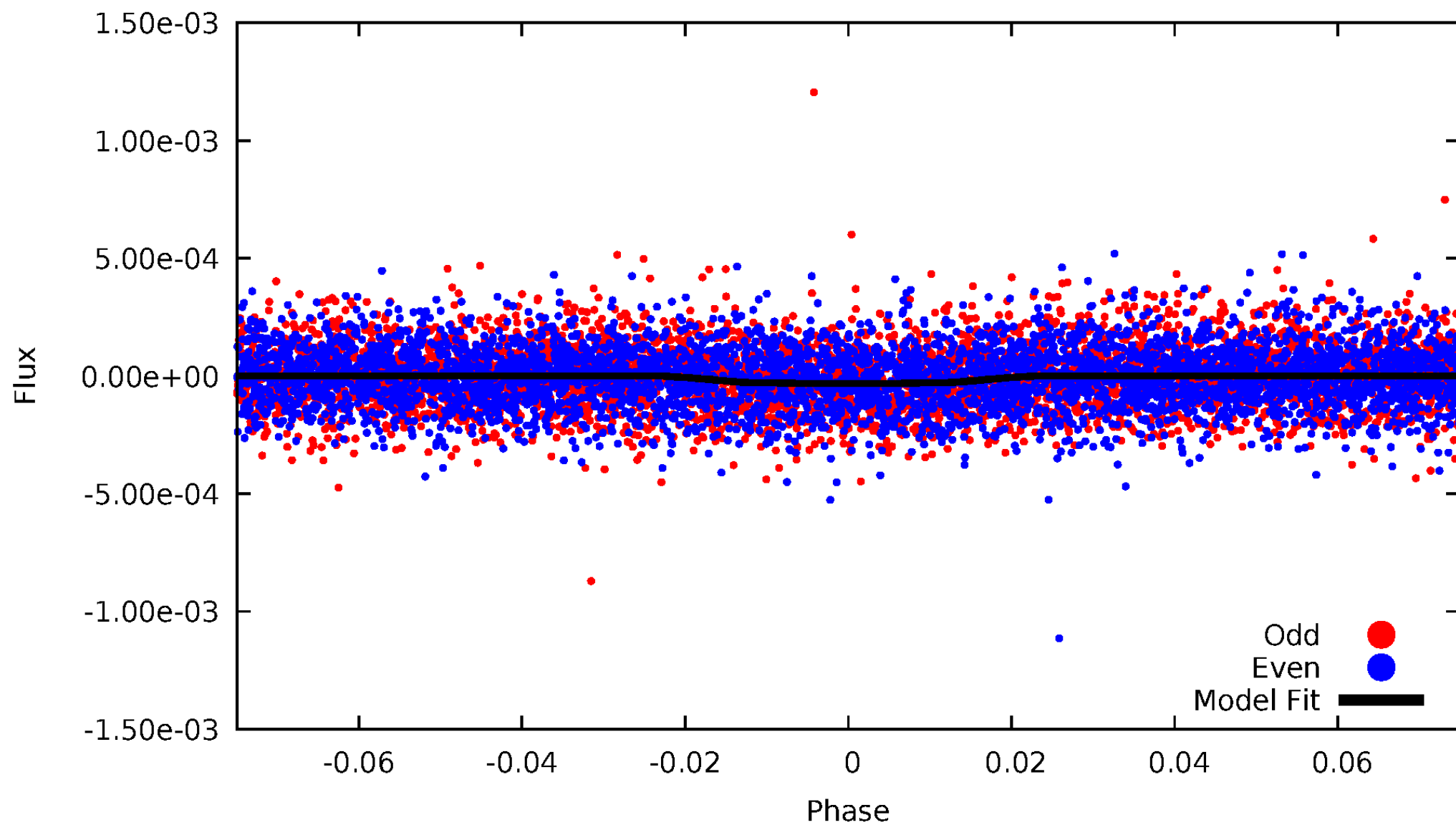


TCE 012301181-02



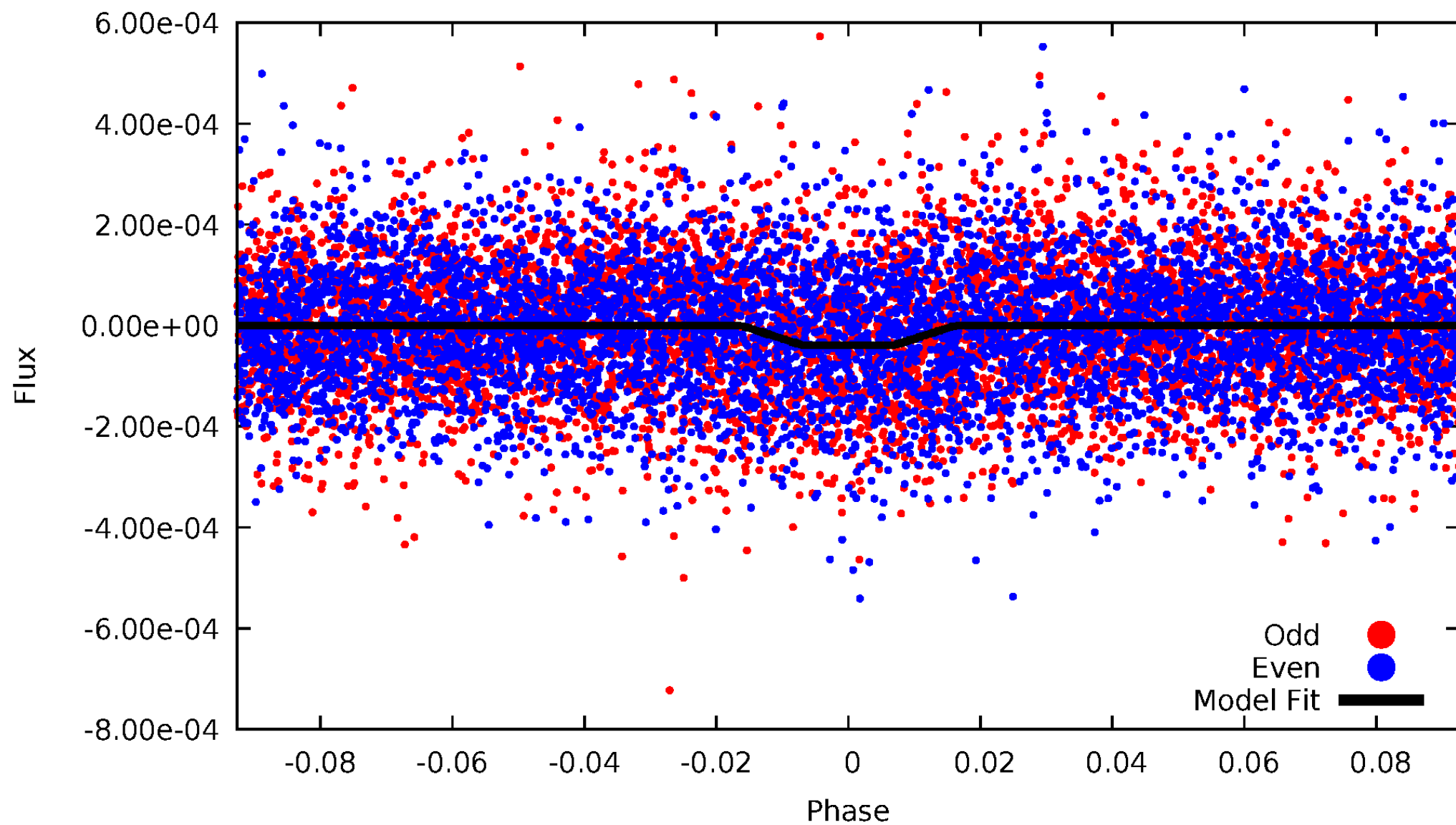
# DV Odd/Even

TCE 012301181-02



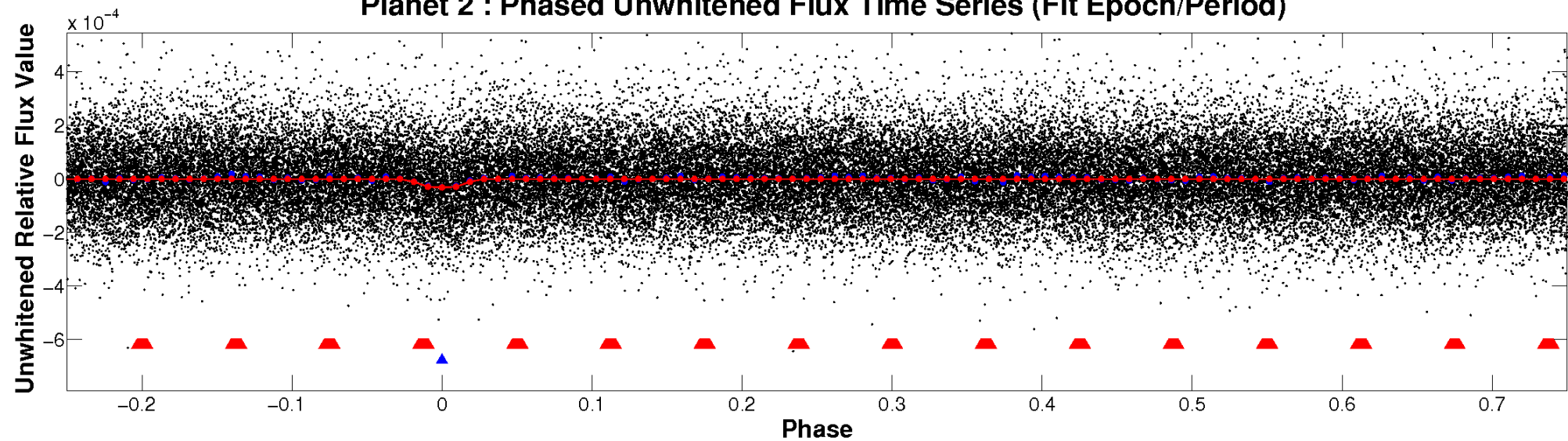
# ALT Odd/Even

TCE 012301181-02

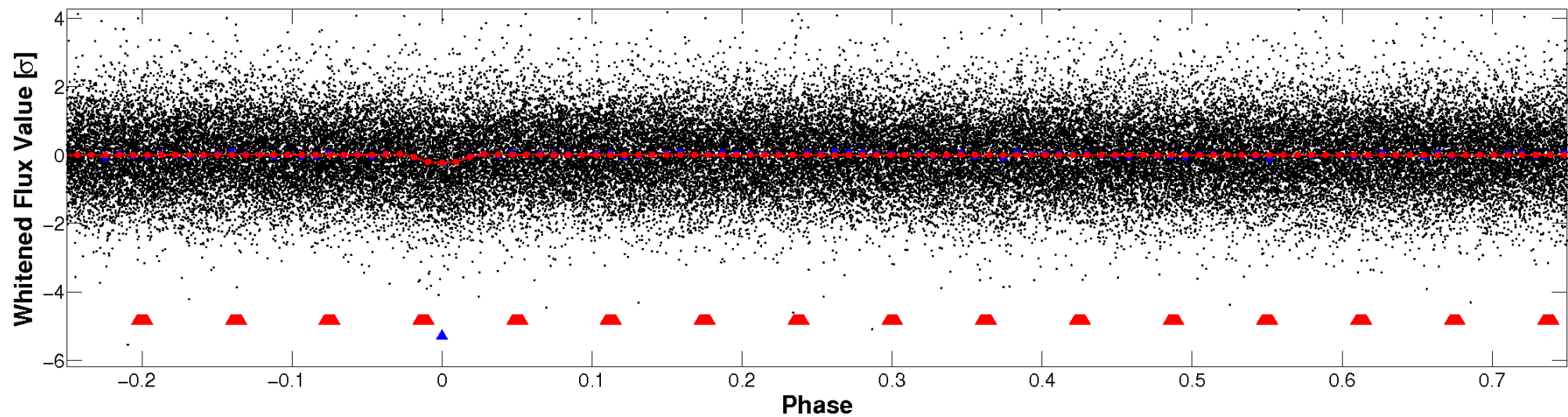


# Non-Whitened Vs. Whitened Light Curve

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



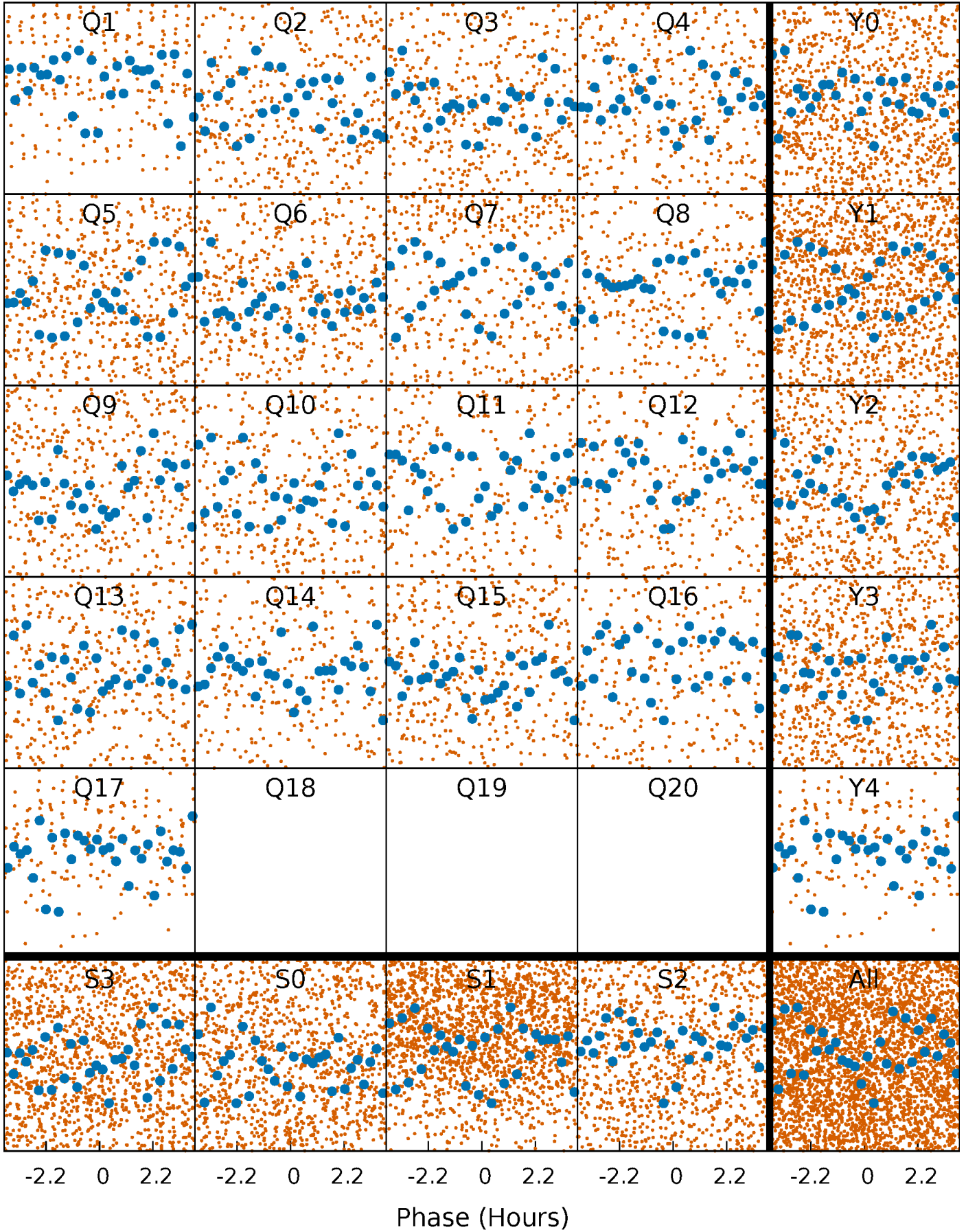
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

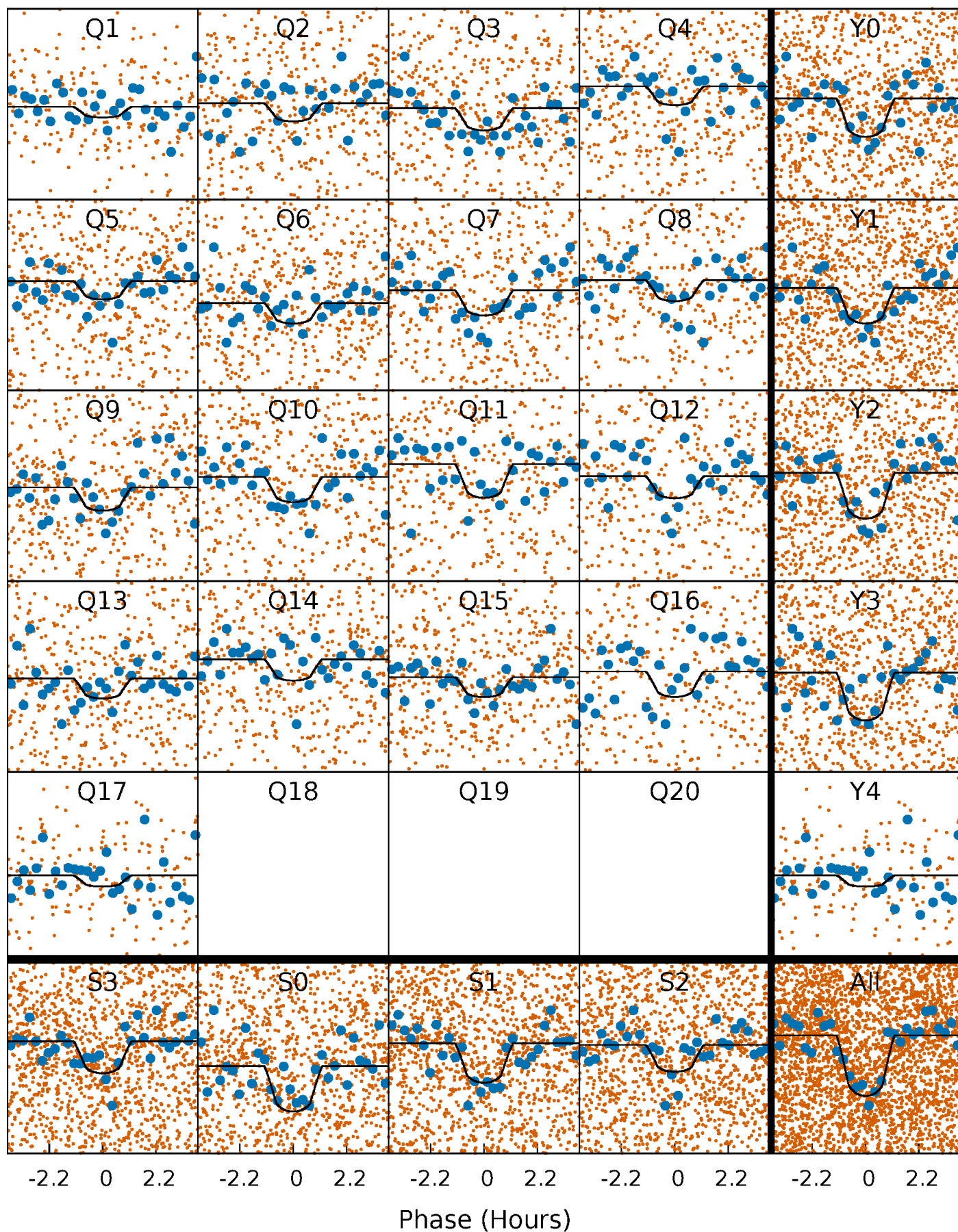
TCE 012301181-02   P= 2.185684 Days    $T_0=132.449228$  (BKJD)





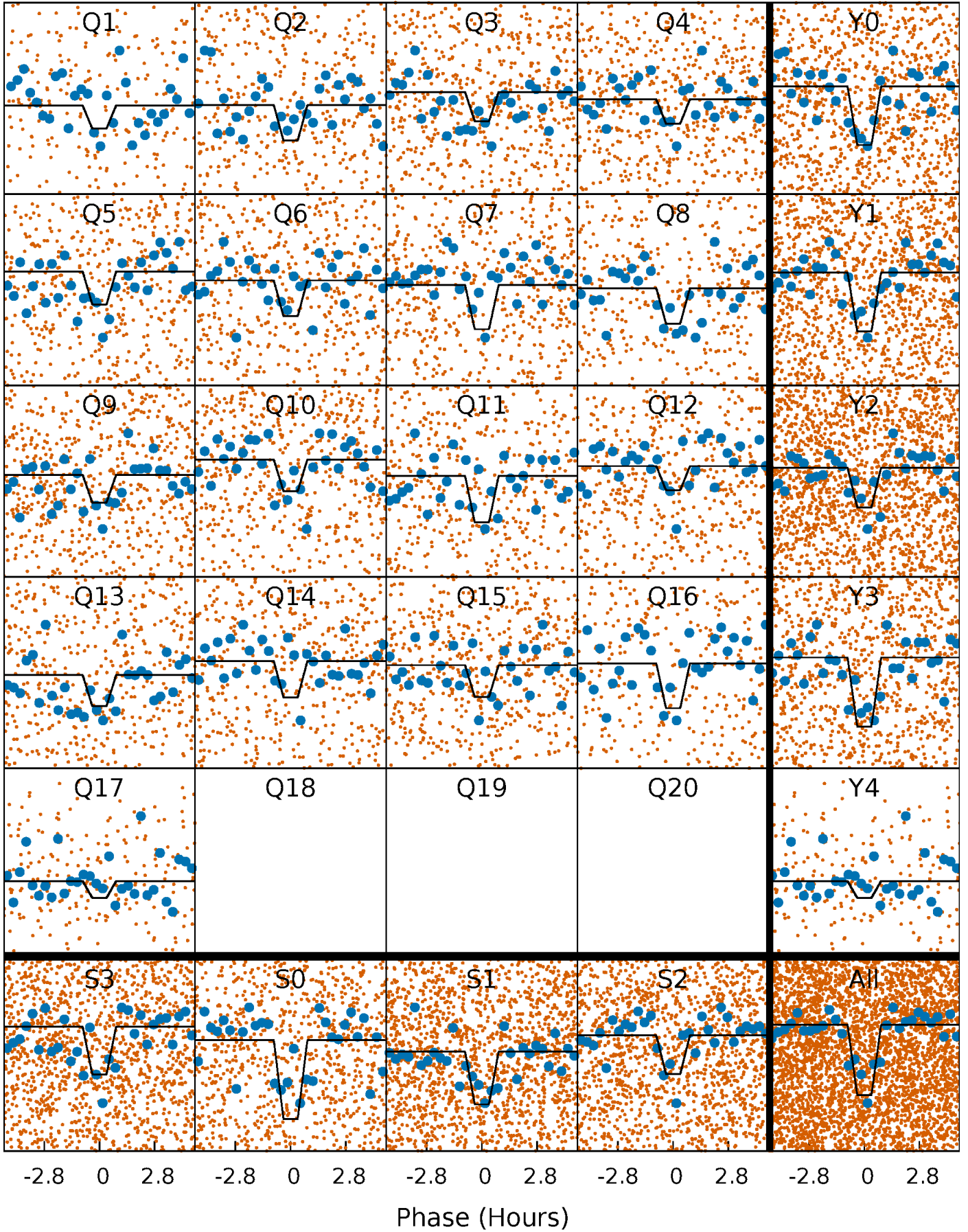
# DV Quarter-Phased Transit Curves

TCE 012301181-02   P= 2.185684 Days    $T_0=132.449228$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

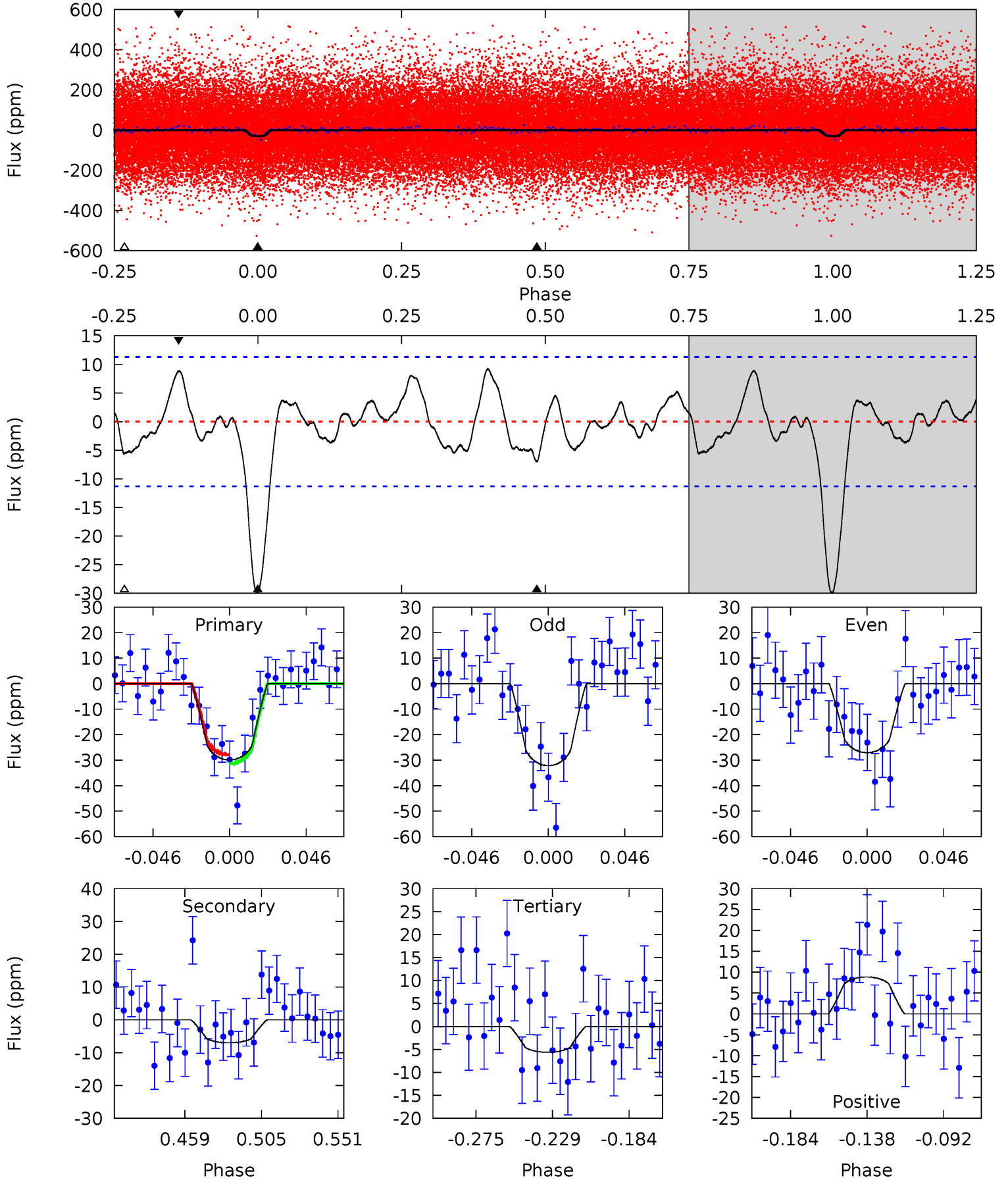
TCE 012301181-02   P= 2.185640 Days    $T_0=132.461787$  (BKJD)



# DV Model-Shift Uniqueness Test

012301181-02, P = 2.185684 Days, E = 130.263544 Days

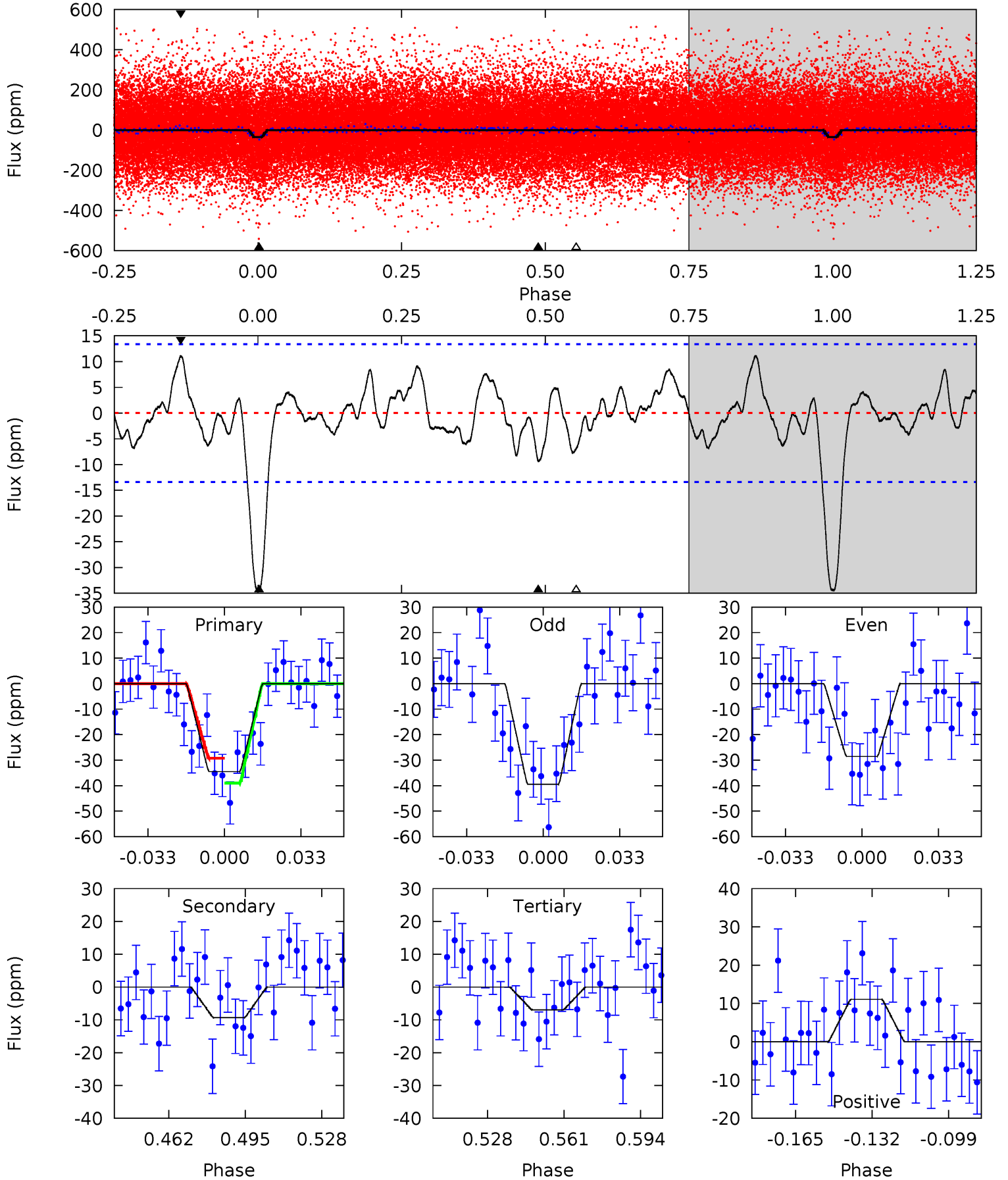
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.5	2.93	2.35	3.70	4.73	2.00	1.48	10.2	8.82	0.58	-0.77	1.07	0.94	0.24	0.71



# Alt Model-Shift Uniqueness Test

012301181-02, P = 2.185640 Days, E = 130.276147 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
12.3	3.34	2.48	3.97	4.79	2.13	1.44	9.86	8.38	0.86	-0.63	1.97	0.91	0.24	1.75



### Stellar Parameters For KIC 012301181

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4997^{+100}_{-100}$	$4.598^{+0.018}_{-0.053}$	$0.000^{+0.150}_{-0.150}$	$0.746^{+0.049}_{-0.030}$	$0.806^{+0.035}_{-0.051}$	$2.733^{+0.237}_{-0.451}$
	+2%/-2%	+0%/-1%	+inf%/-inf%	+7%/-4%	+4%/-6%	+9%/-16%
Source	SPE57	SPE57	SPE57	DSEP		

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

### Secondary Eclipse Parameters for KIC 012301181-02 / KOI 2059.02

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-7 \pm 2$	$0.54^{+0.35}_{-0.29}$	$1531^{+39}_{-37}$	$3514^{+1196}_{-546}$	$11^{+48}_{-7}$
Alt.	$-9 \pm 3$	$0.53^{+0.36}_{-0.28}$	$1531^{+38}_{-35}$	$3756^{+1362}_{-634}$	$16^{+69}_{-11}$

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



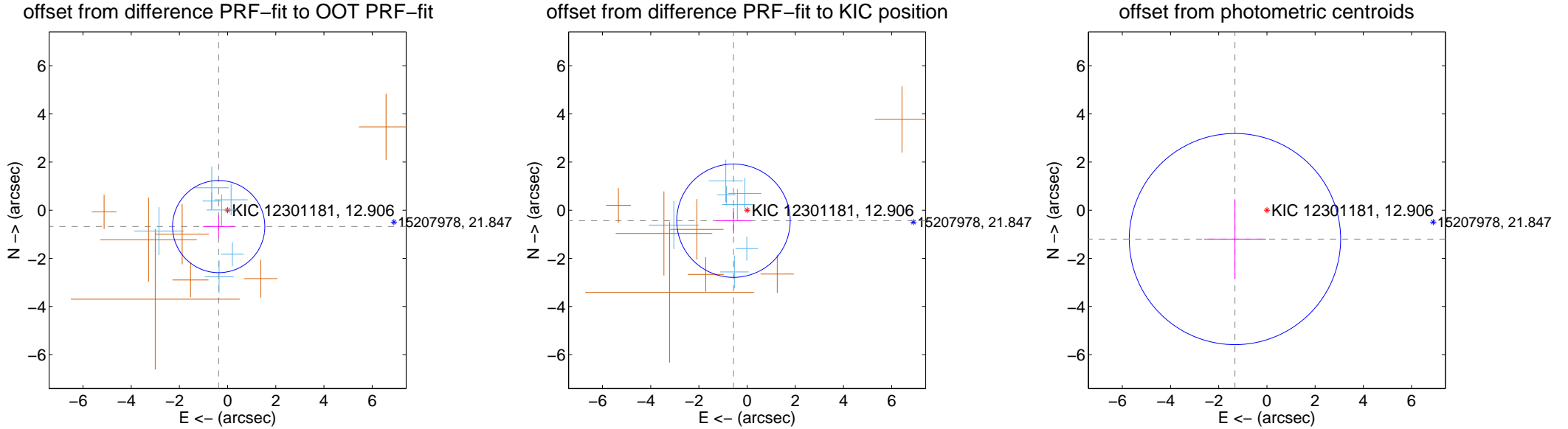
## DV Centroid Data

Supplemental centroid analysis for 012301181-02. Kepler magnitude: 12.91. Transit SNR 8.99

There are 7 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.31 arcsec

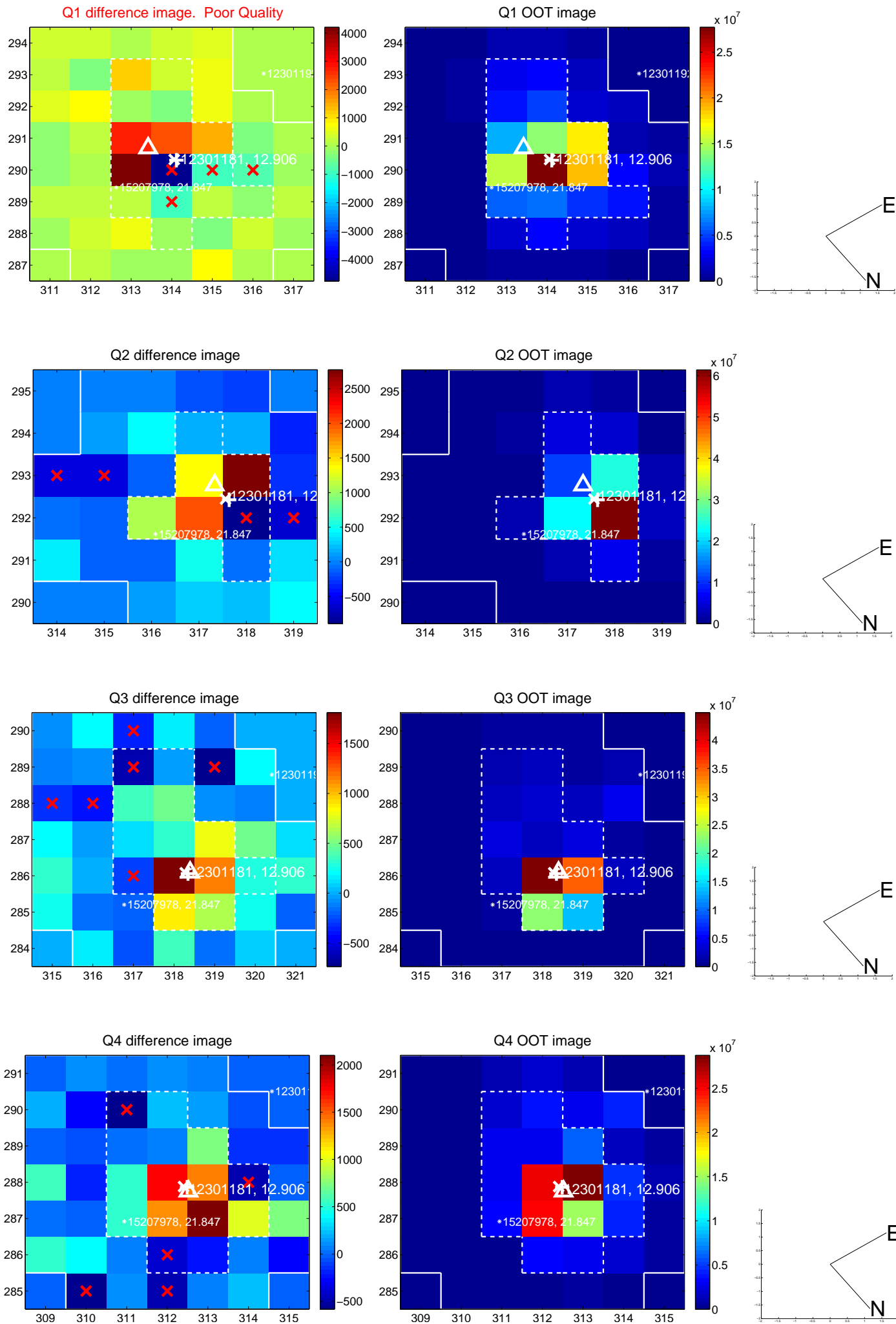
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.773 \pm 0.638$	1.21	$0.369 \pm 0.650$	$-0.680 \pm 0.475$
PRF-fit source offset from KIC position	$0.715 \pm 0.784$	0.91	$0.566 \pm 0.725$	$-0.436 \pm 0.538$
photometric centroid source offset	$1.79 \pm 1.46$	1.22	$1.33 \pm 1.28$	$-1.20 \pm 1.65$



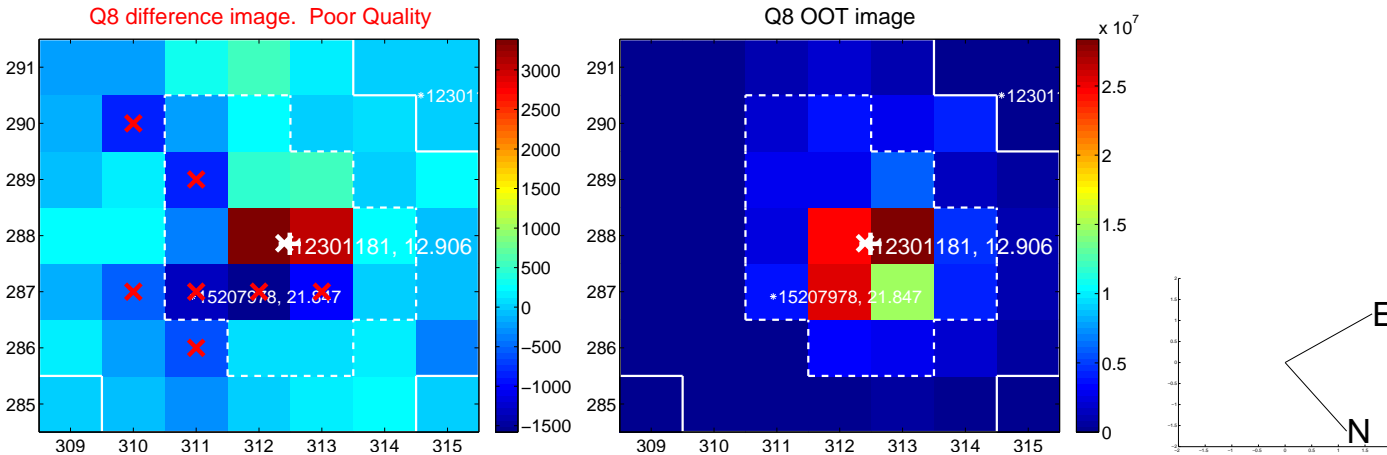
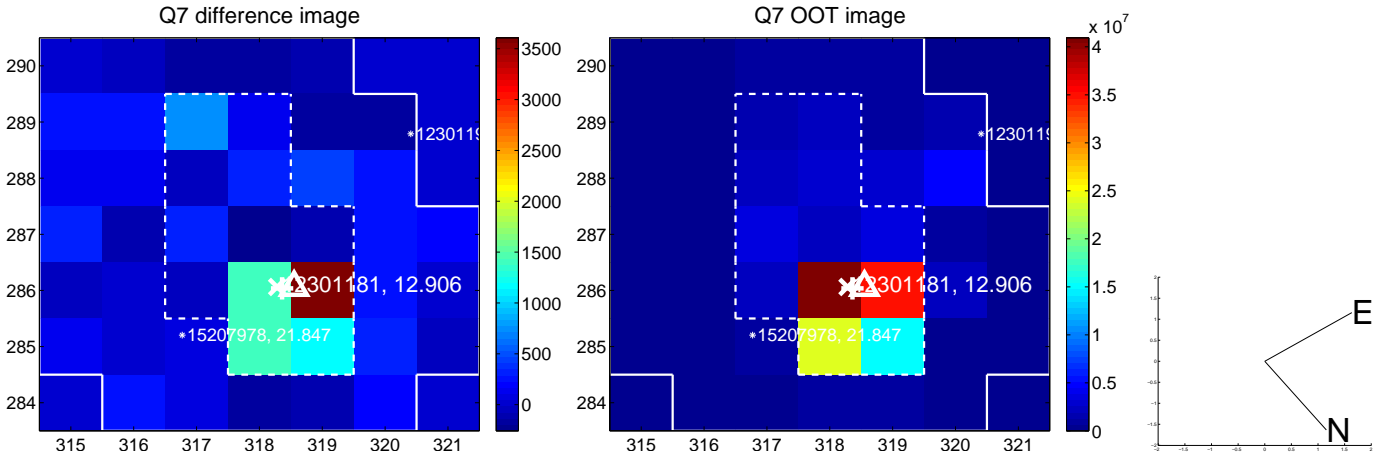
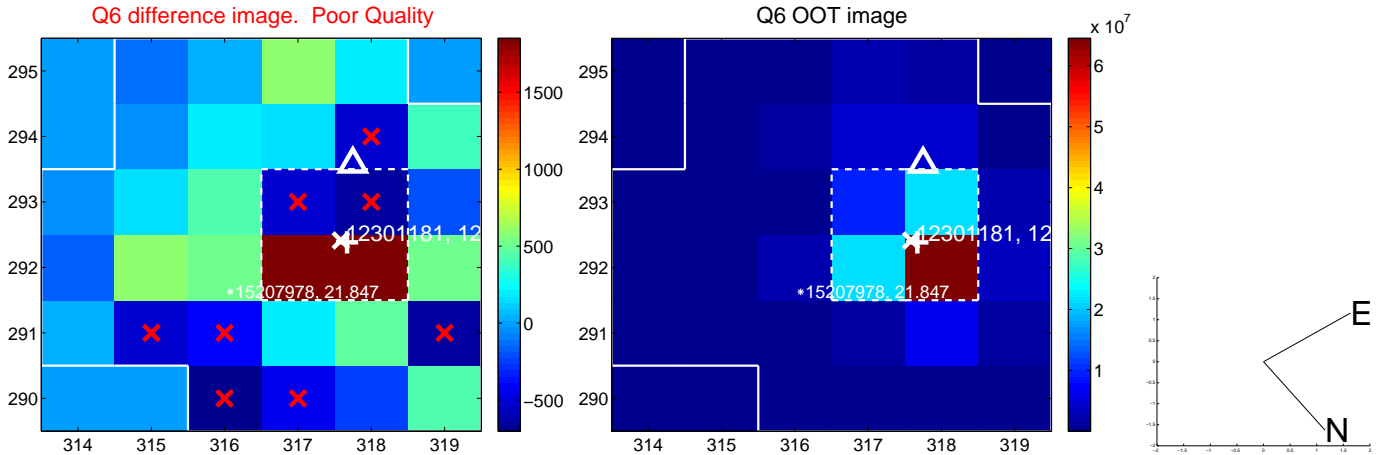
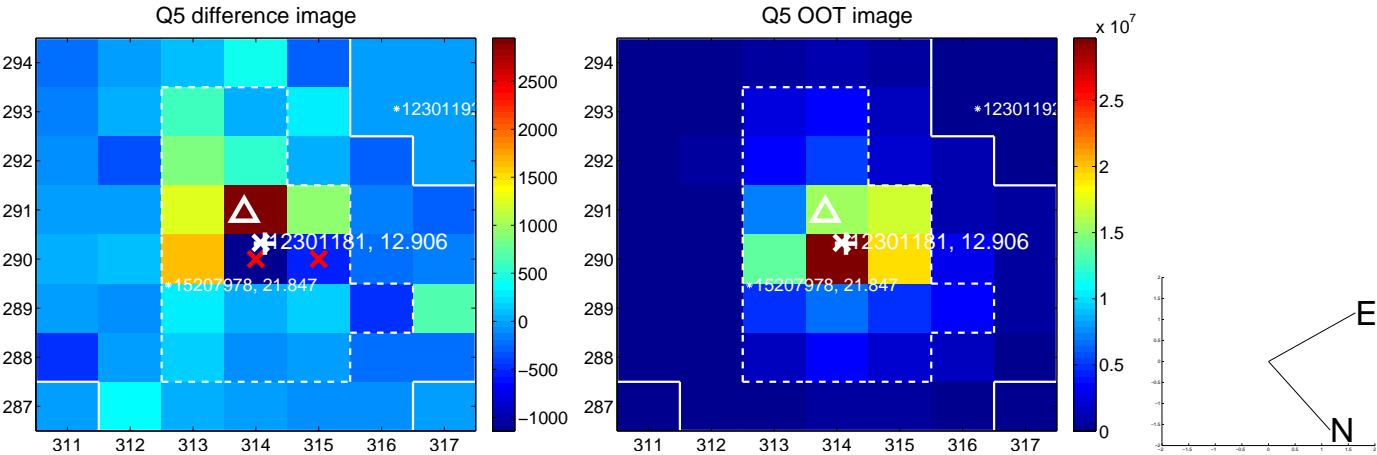
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



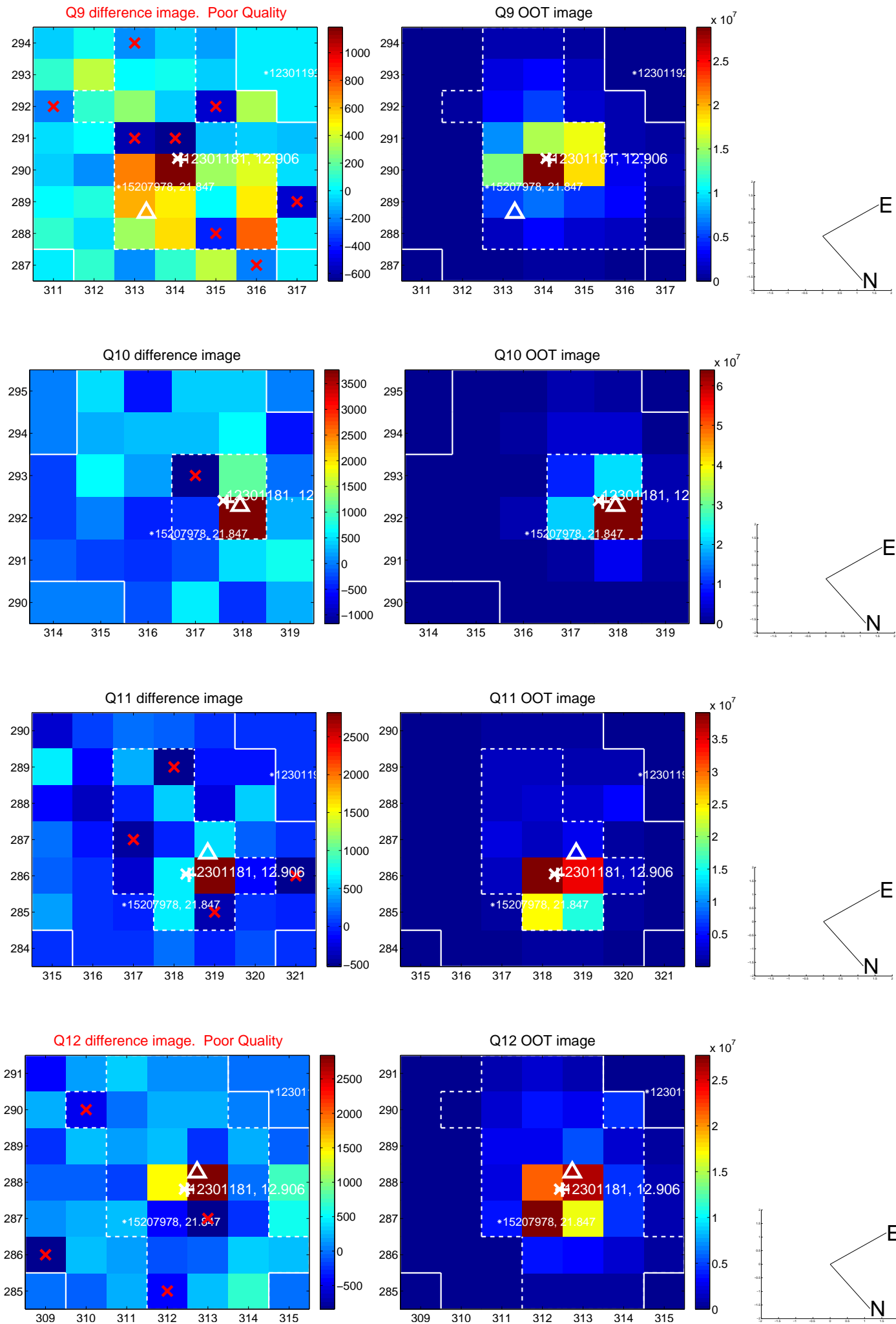
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



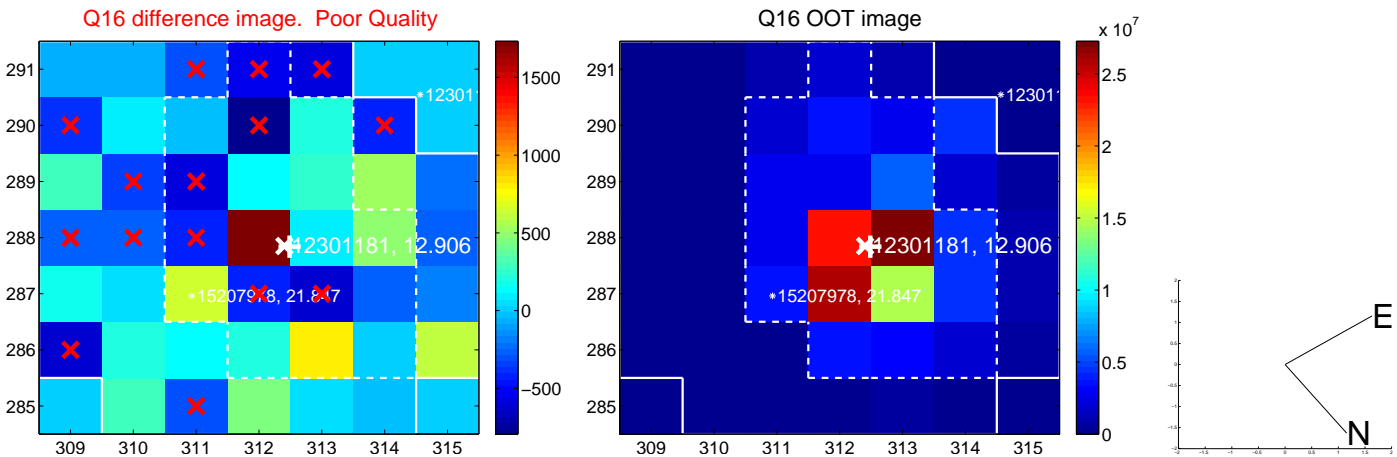
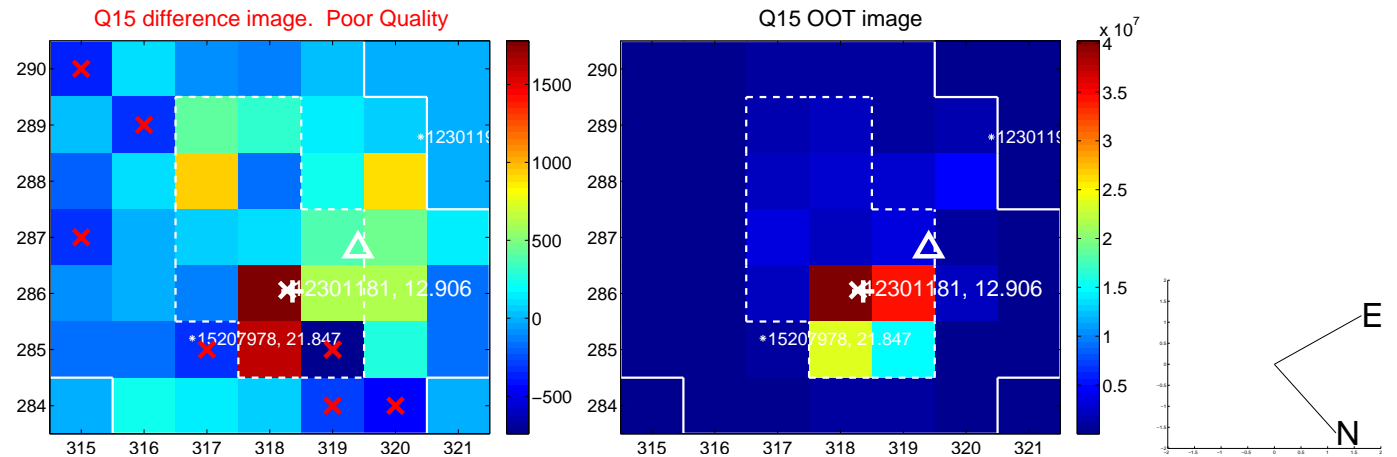
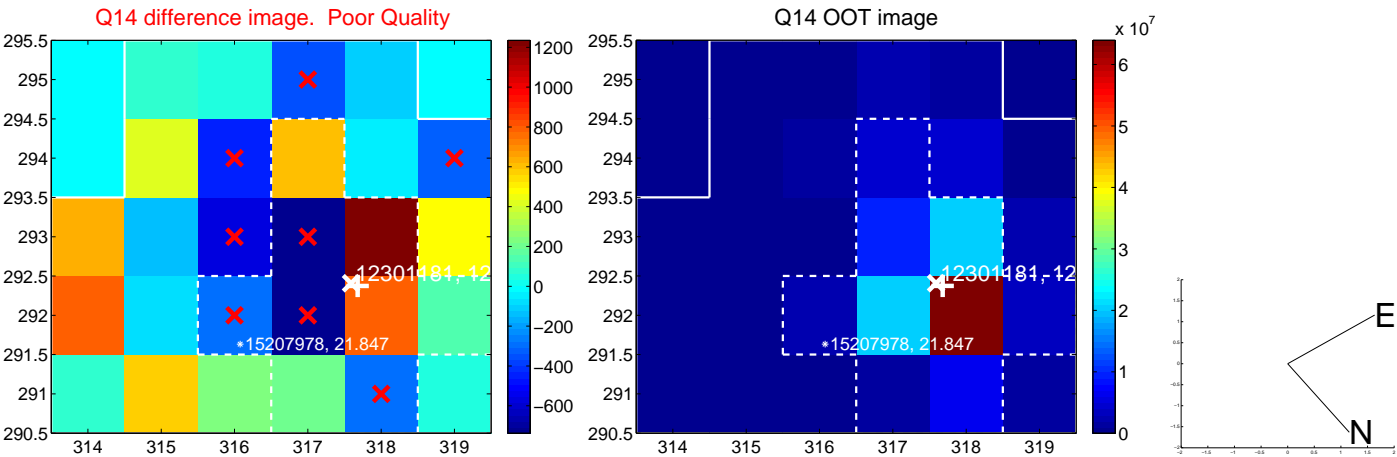
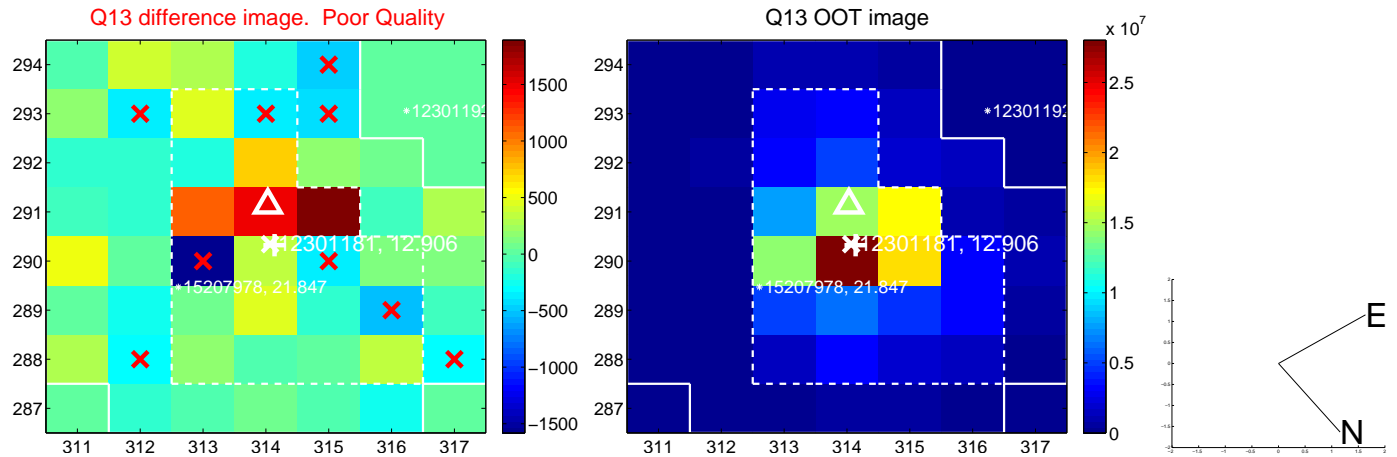
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



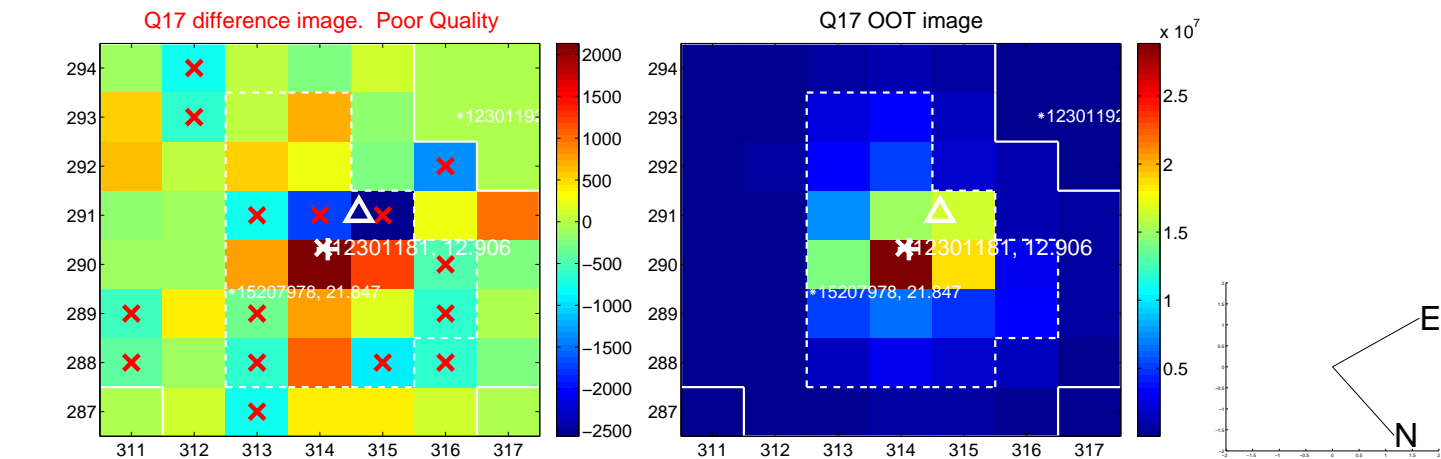
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



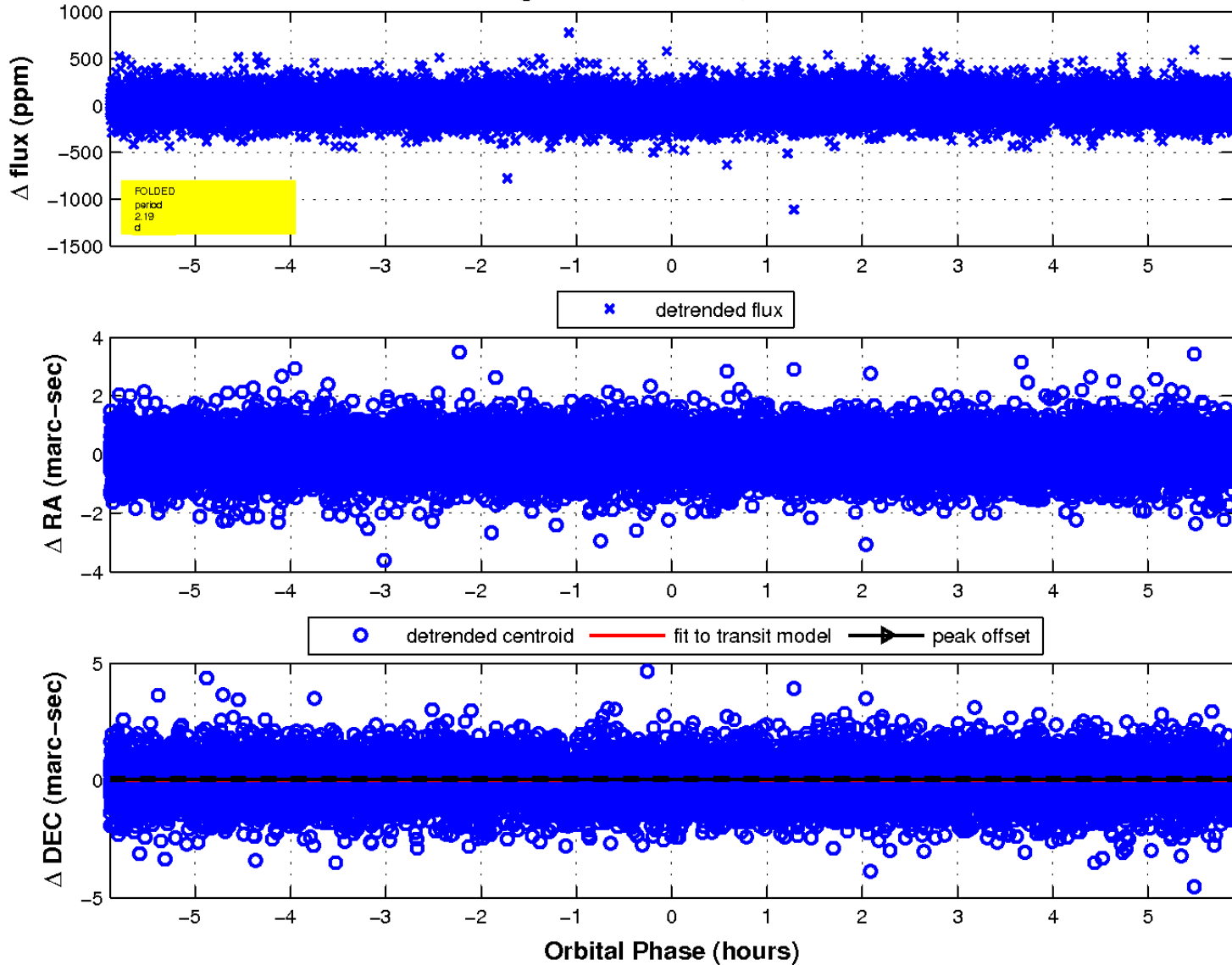
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

