

# KIC 004770617

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004770617-01	OBS	2243.01	5.185606	132.324131	245.1	4.124	22.7	24.3	1.47	6172	2.62	706.76
004770617-02	OBS	2243.02	8.458043	137.061802	261.7	3.045	16.0	16.9	1.47	6172	2.57	368.11
004770617-03	OBS	2243.03	31.445200	154.582687	457.6	1.454	9.4	10.7	1.47	6172	3.42	63.91

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004770617-01	OBS	PC	1.00	0	0	0	0	CENT_KIC_POS
004770617-02	OBS	PC	0.99	0	0	0	0	CENT_KIC_POS
004770617-03	OBS	PC	0.97	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.

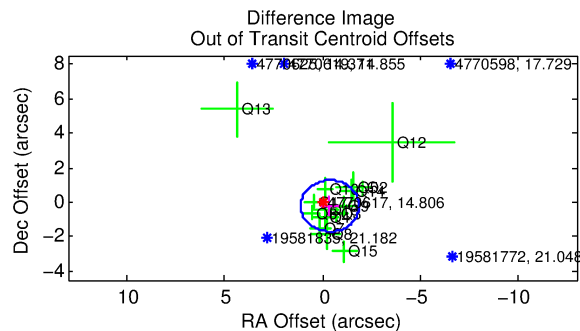
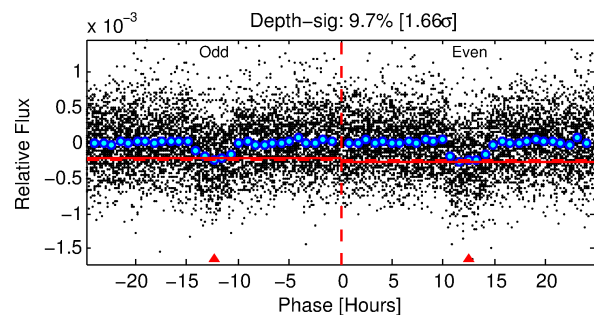
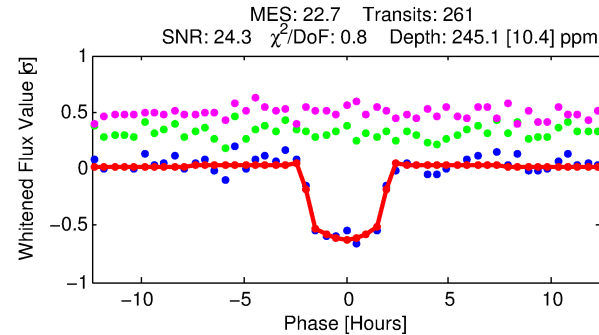
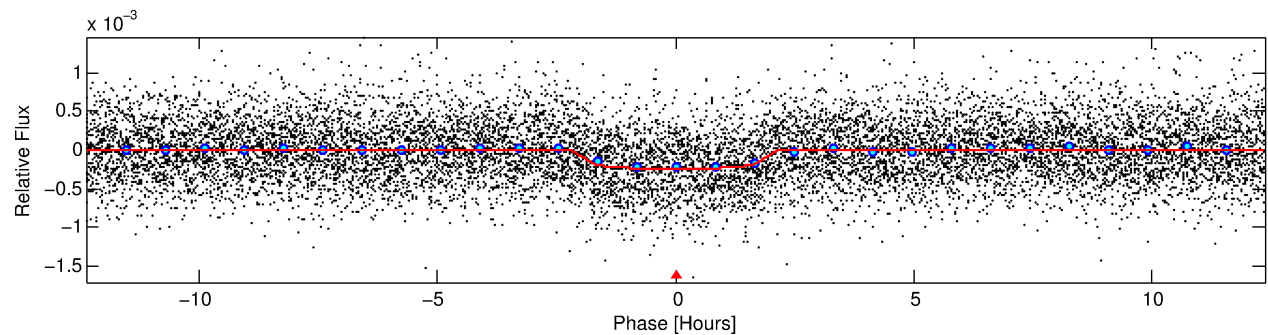
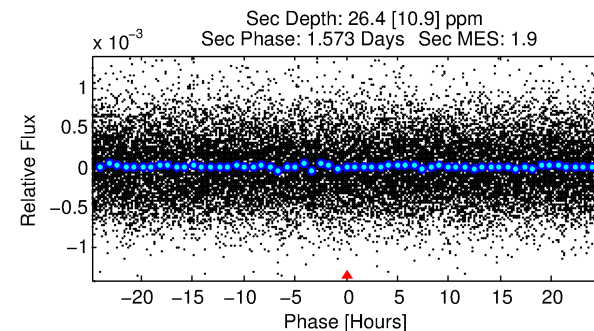
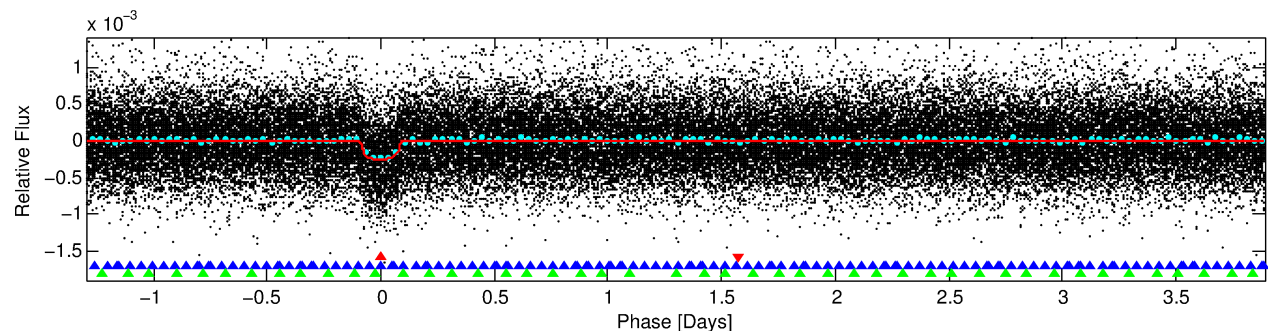
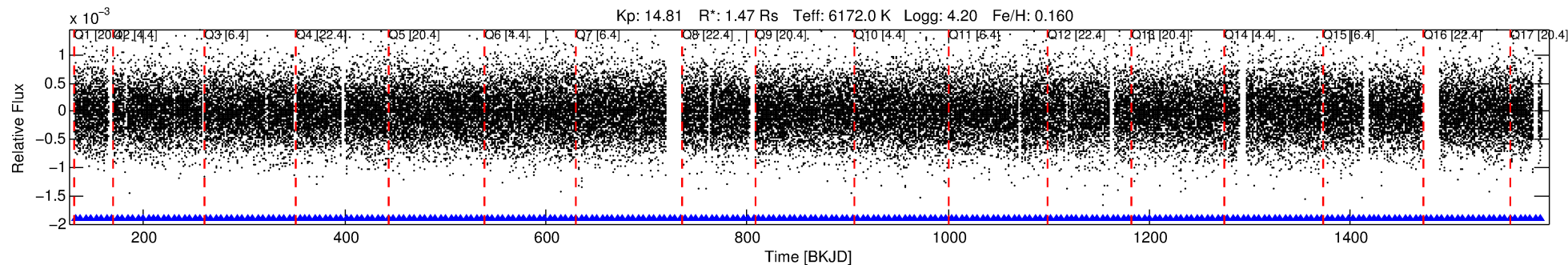
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004770617-01

No Significant Match Found

# DV One-Page Summary

KIC: 4770617 Candidate: 1 of 3 Period: 5.186 d  
KOI: K02243.01 Corr: 0.988



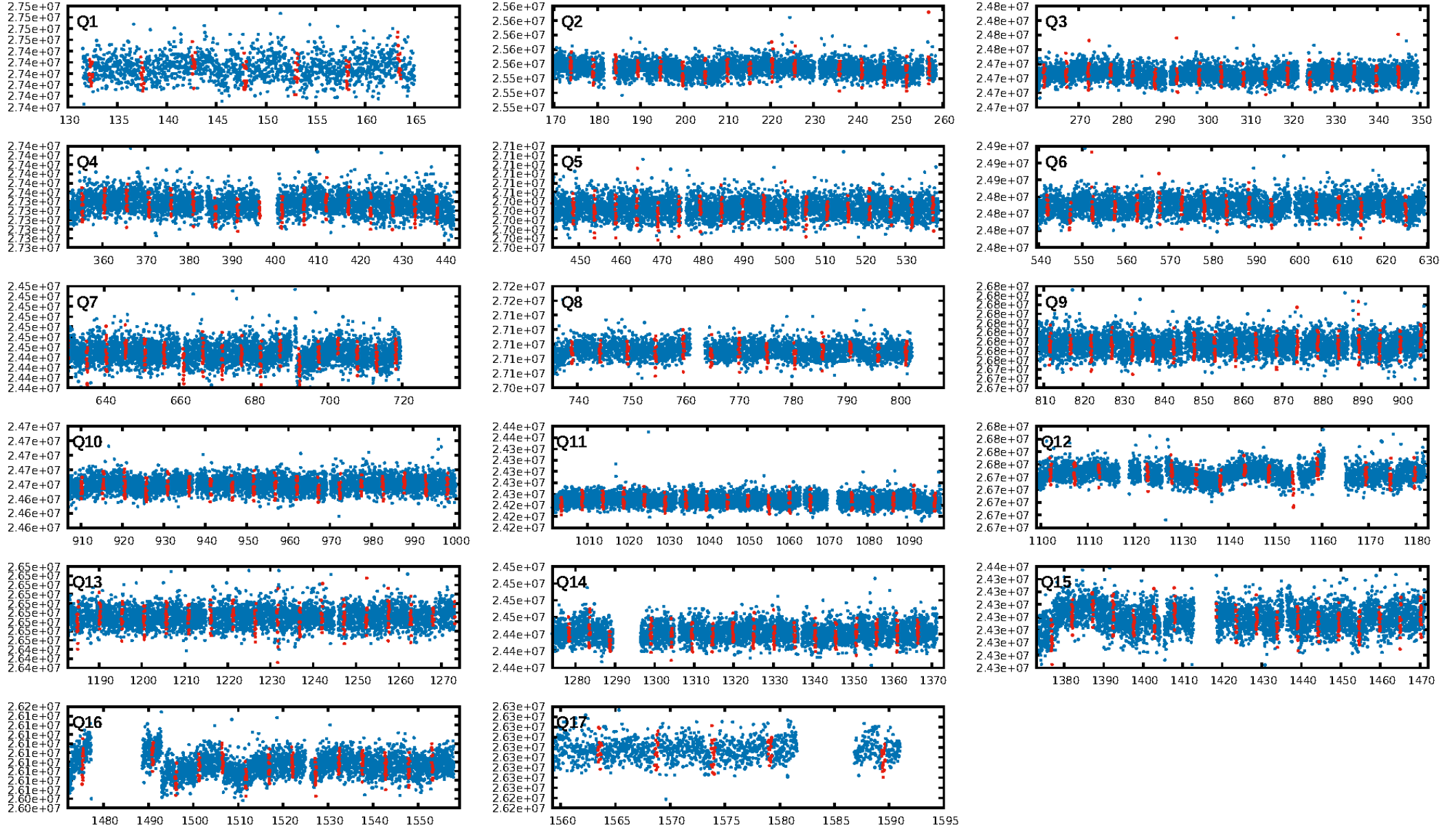
## DV Fit Results:

Period = 5.18561 [0.00002] d  
Epoch = 132.3241 [0.0027] BKJD  
Rp/R\* = 0.0163 [0.0040]  
a/R\* = 5.44 [6.48]  
b = 0.85 [0.41]  
Seff = 706.76 [175.33]  
Teq = 1315 [82] K  
Rp = 2.62 [0.83] Re  
a = 0.0631 [0.0107] AU  
Ag = 8.45 [5.78] [1.29σ]  
Teffp = 3466 [556] K [3.83σ]

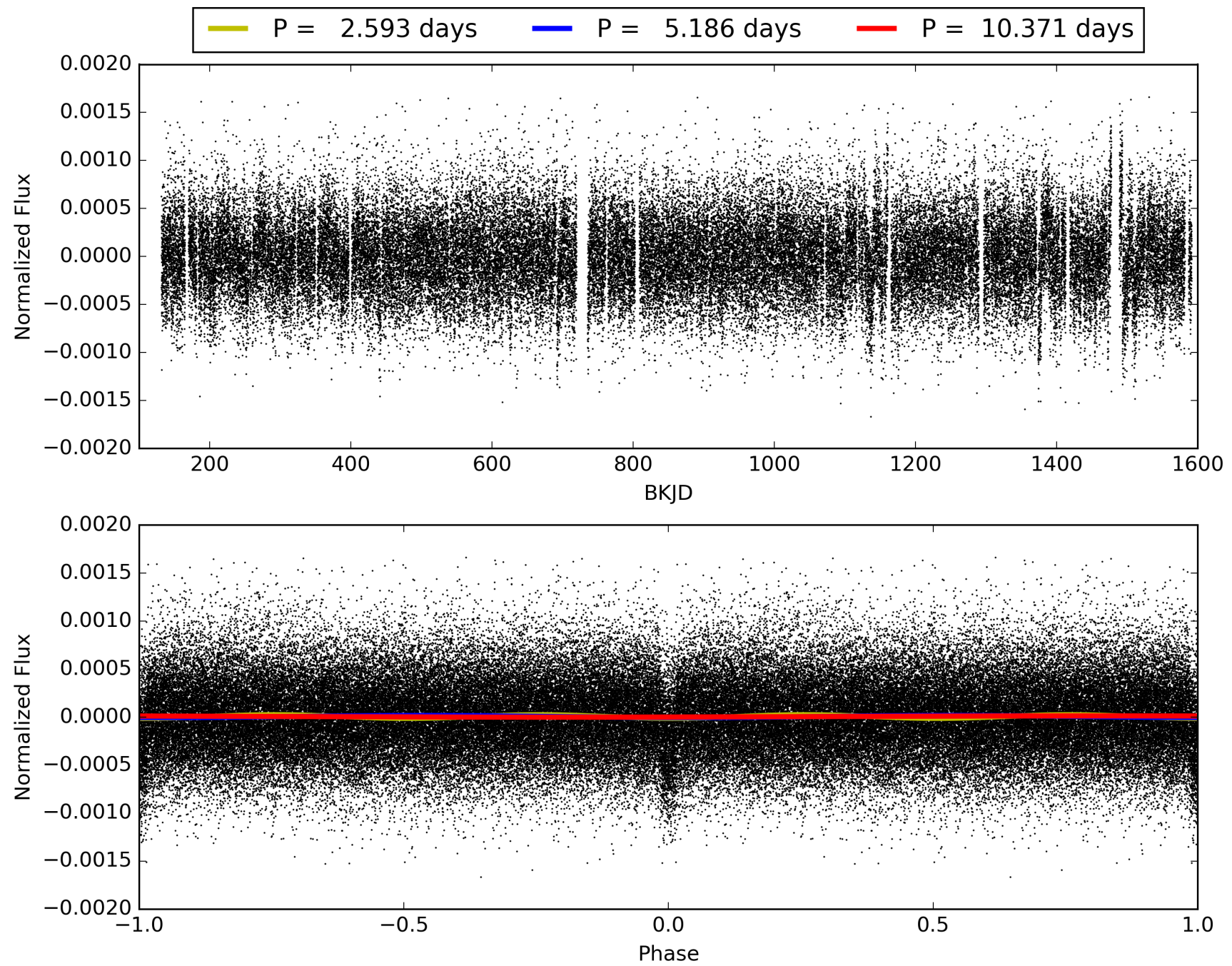
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [15.32σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 7.41e-111  
RollingBand-fgt: 1.00 [249/249]  
GhostDiagnostic-chr: 4.461  
Centroid-sig: 0.0%  
Centroid-so: 0.432 arcsec [1.30σ]  
OotOffset-rm: 0.427 arcsec [0.86σ]  
KicOffset-rm: 0.399 arcsec [0.76σ]  
OotOffset-st: 4/3/4/4 [15]  
KicOffset-st: 4/3/4/4 [15]  
DiffImageQuality-fgm: 0.87 [13/15]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 004770617-01, PDC Light Curves



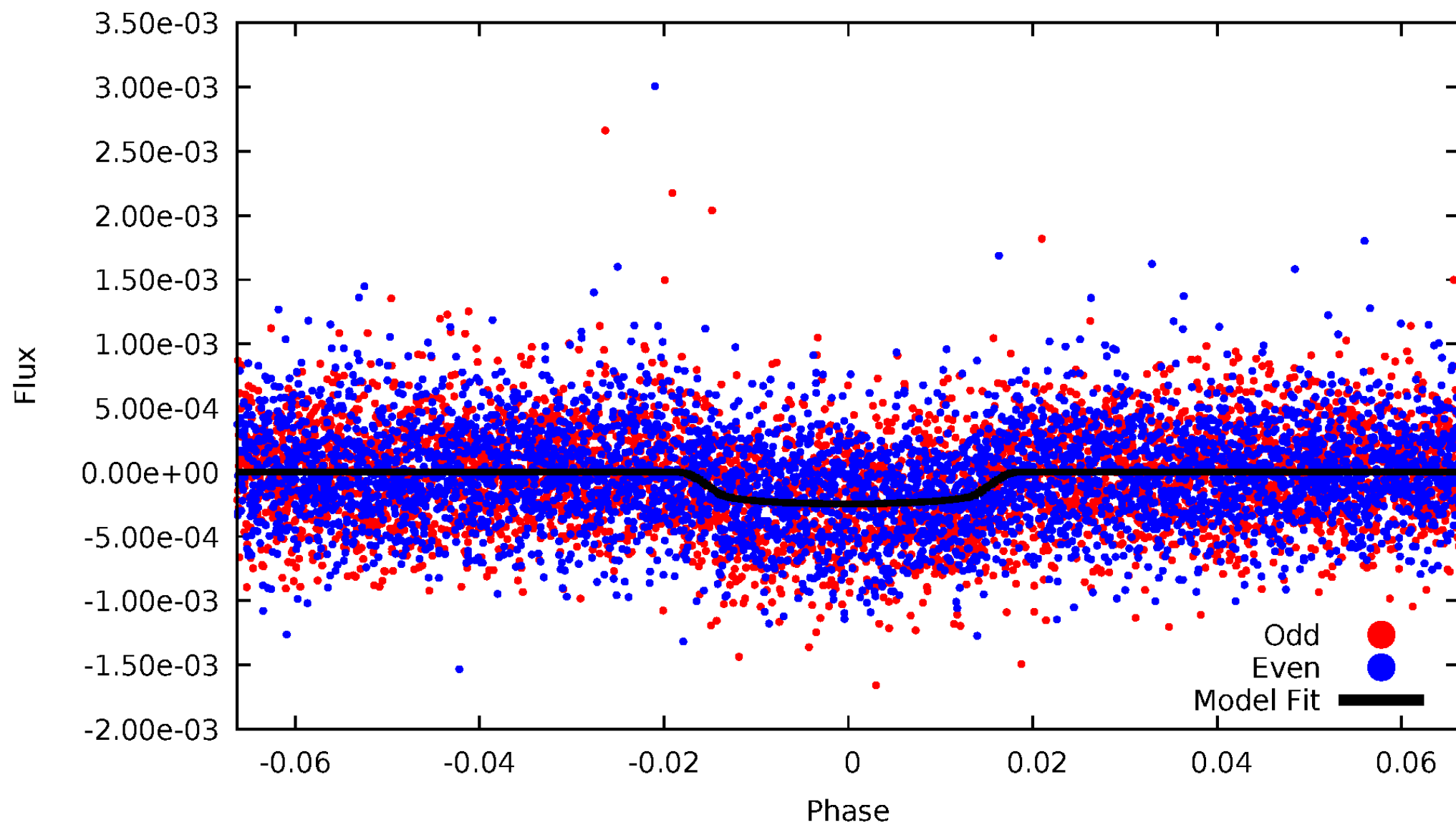
TCE 004770617-01





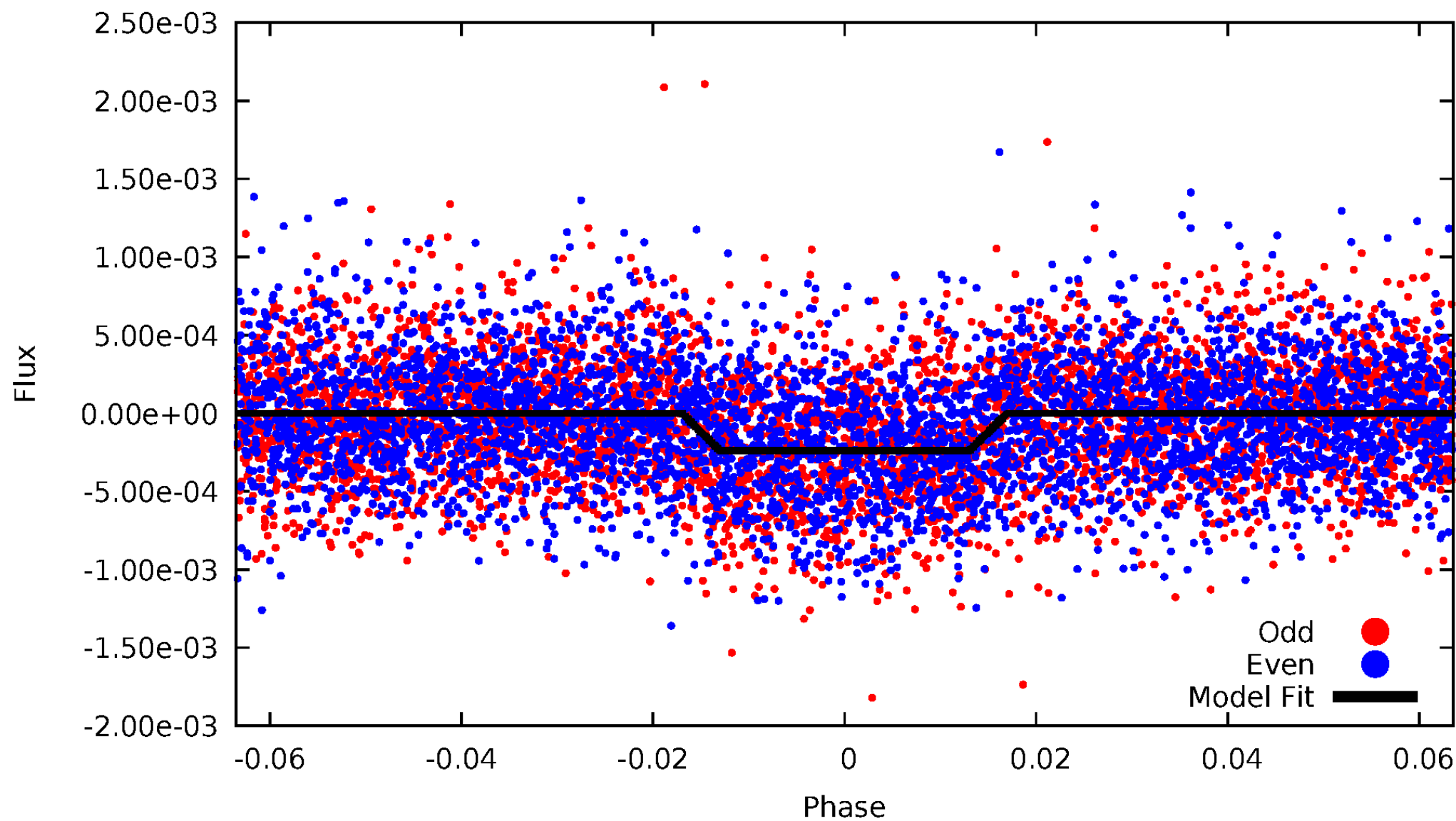
# DV Odd/Even

TCE 004770617-01



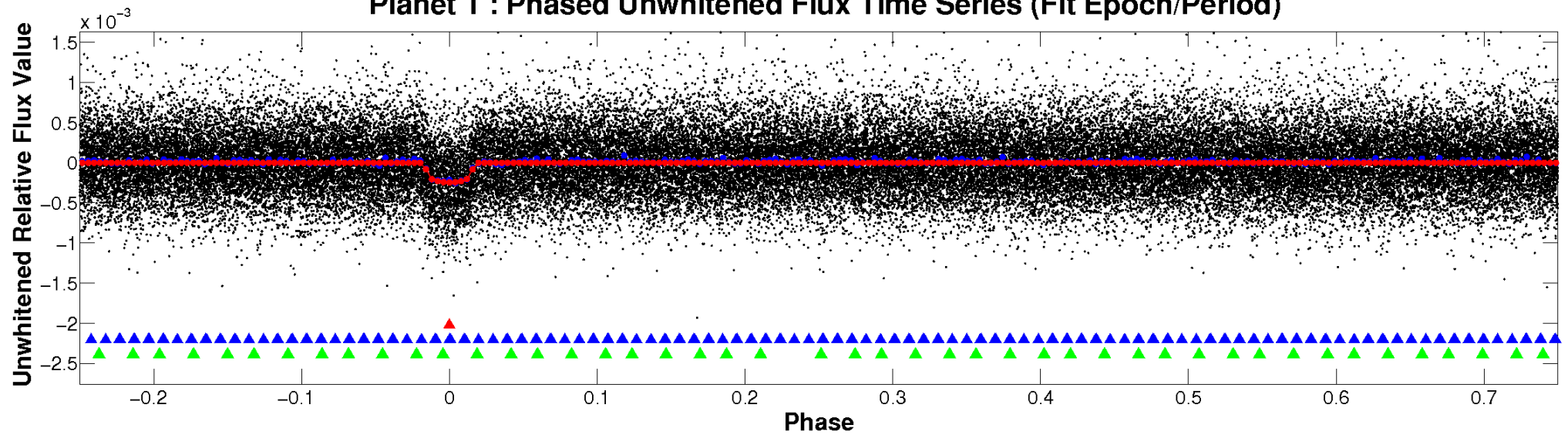
# ALT Odd/Even

TCE 004770617-01

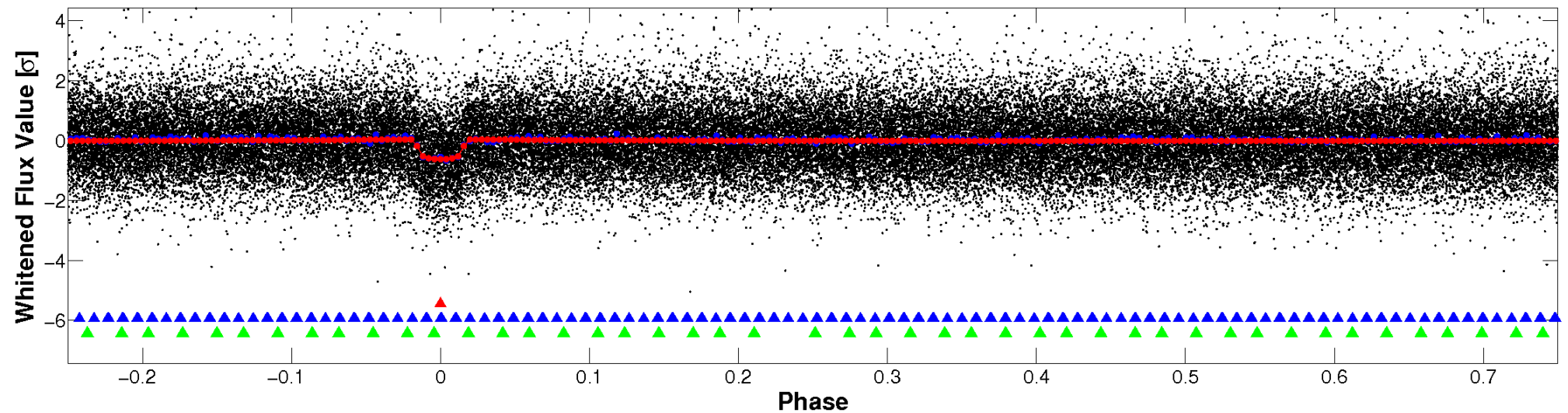


# Non-Whitened Vs. Whitened Light Curve

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

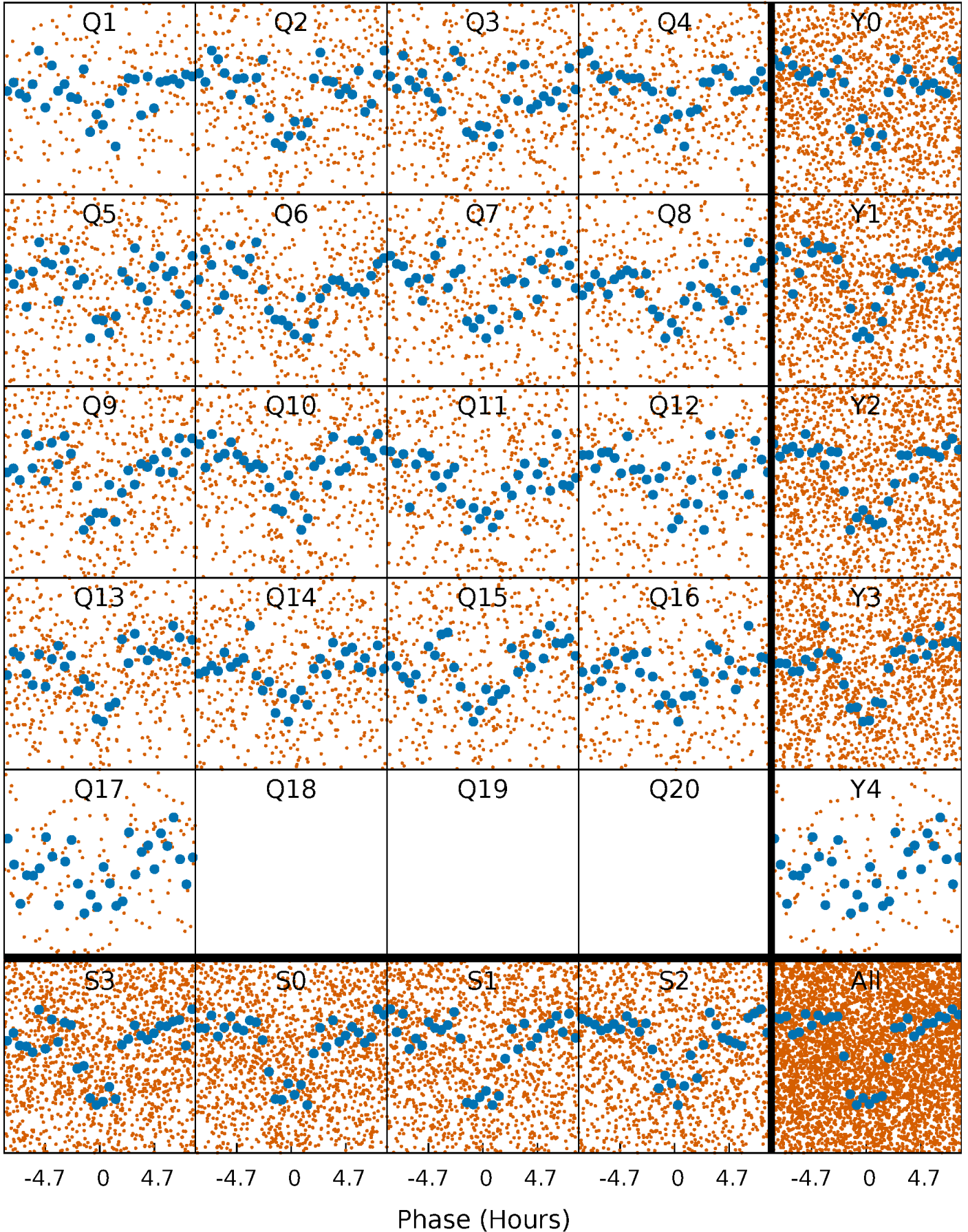


## Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

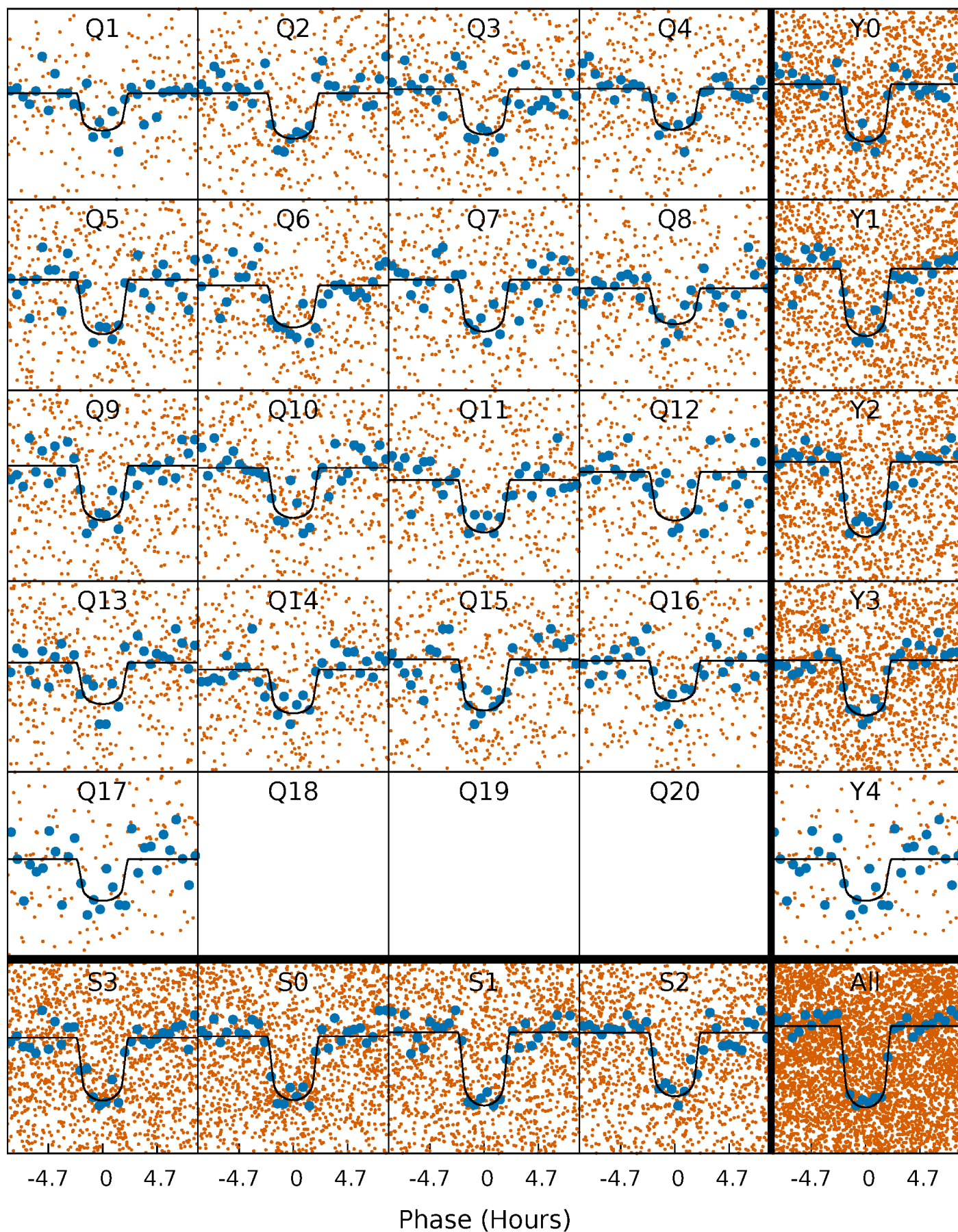
TCE 004770617-01 P= 5.185606 Days  $T_0=132.324131$  (BKJD)





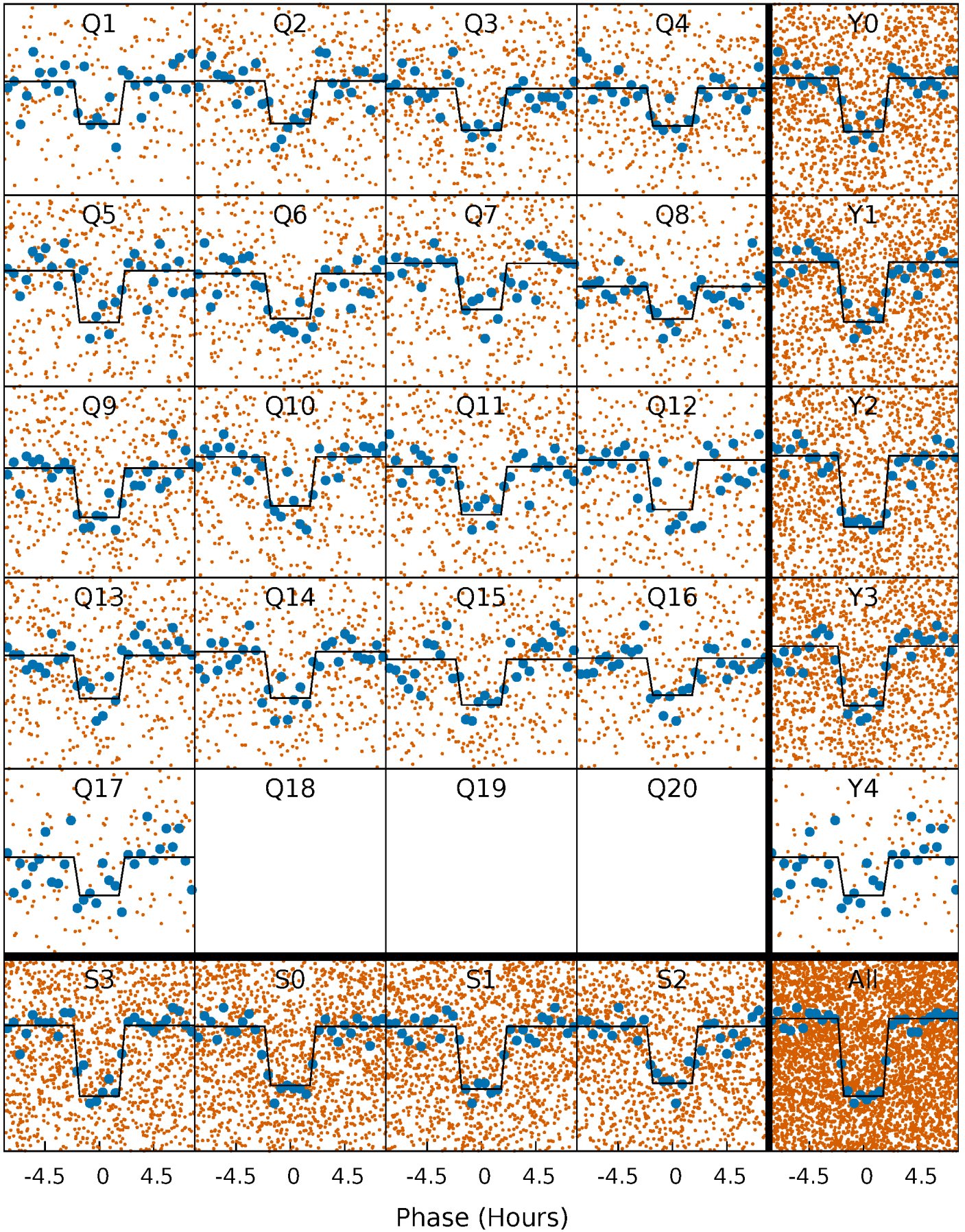
# DV Quarter-Phased Transit Curves

TCE 004770617-01 P= 5.185606 Days  $T_0=132.324131$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

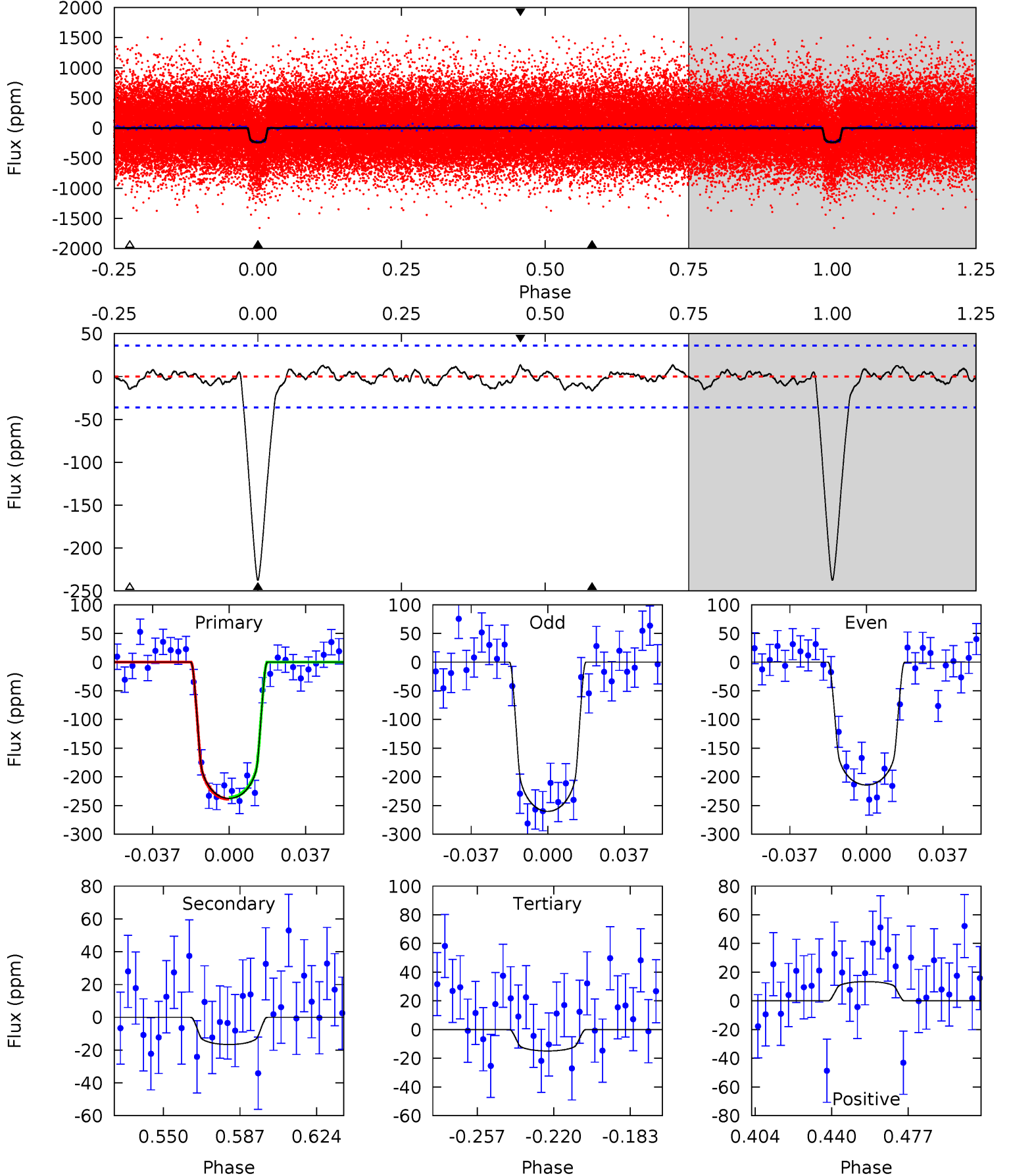
TCE 004770617-01 P= 5.185616 Days  $T_0=132.322856$  (BKJD)



# DV Model-Shift Uniqueness Test

004770617-01, P = 5.185606 Days, E = 127.138525 Days

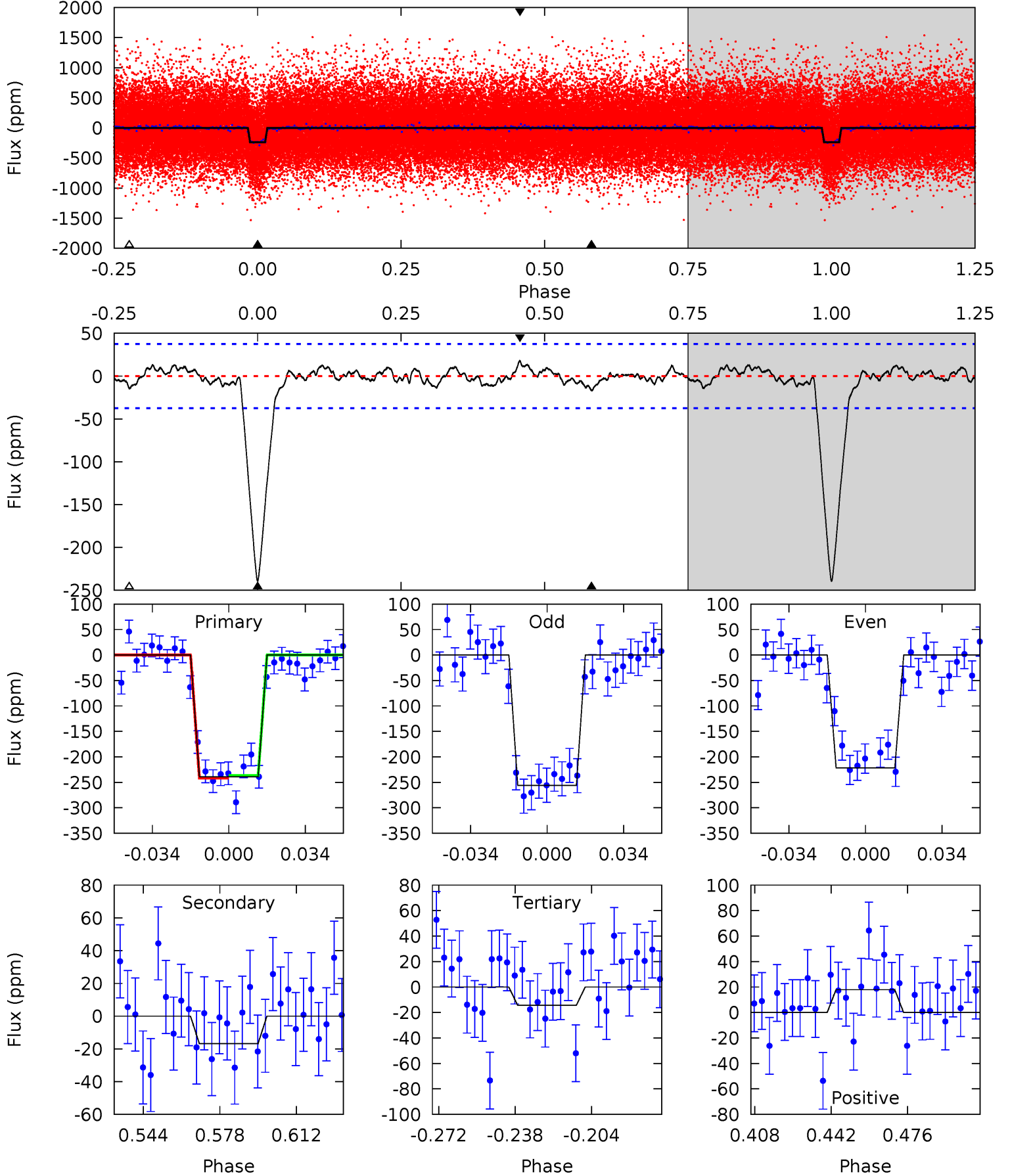
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
31.5	2.20	1.98	1.78	4.77	2.09	0.82	29.5	29.7	0.23	0.42	3.04	1.02	0.05	0.19



# Alt Model-Shift Uniqueness Test

004770617-01, P = 5.185616 Days, E = 127.137240 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
30.6	2.14	1.84	2.29	4.79	2.12	0.85	28.7	28.3	0.31	-0.15	2.21	1.02	0.07	0.33





### Stellar Parameters For KIC 004770617

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6172^{+74}_{-86}$	$4.198^{+0.130}_{-0.130}$	$0.160^{+0.150}_{-0.150}$	$1.471^{+0.301}_{-0.247}$	$1.250^{+0.095}_{-0.116}$	$0.553^{+0.339}_{-0.209}$
	+1%/-1%	+3%/-3%	+94%/-94%	+20%/-17%	+8%/-9%	+61%/-38%
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 004770617-01 / KOI 2243.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-17 \pm 8$	$2.58^{+0.78}_{-0.62}$	$1831^{+91}_{-83}$	$3468^{+465}_{-385}$	$4.986^{+5.741}_{-2.624}$
Alt.	$-17 \pm 8$	$2.48^{+0.73}_{-0.69}$	$1839^{+92}_{-90}$	$3567^{+503}_{-433}$	$5.752^{+6.414}_{-3.184}$

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

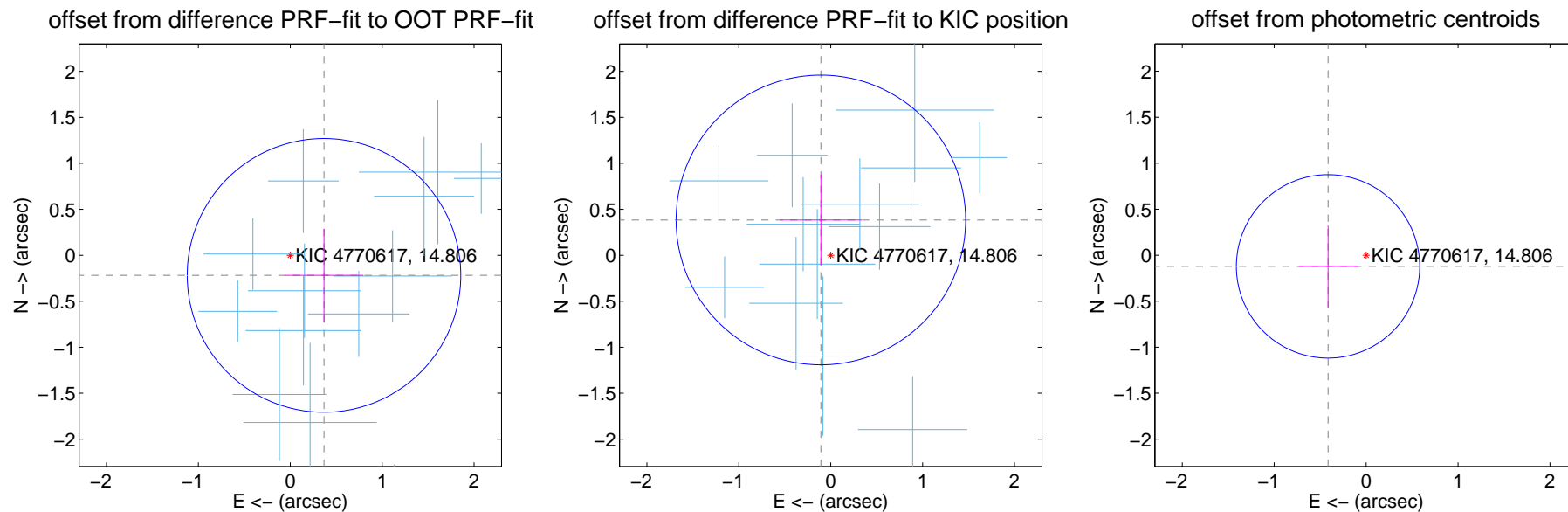
## DV Centroid Data

Supplemental centroid analysis for 004770617-01. Kepler magnitude: 14.81. Transit SNR 24.32

There are 13 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 1.13 arcsec

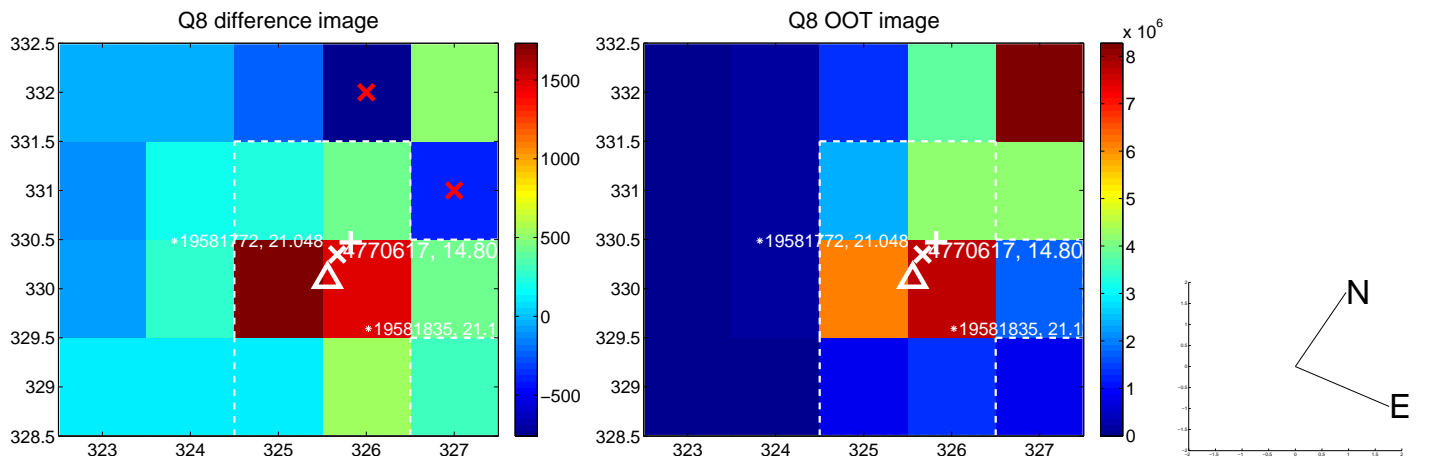
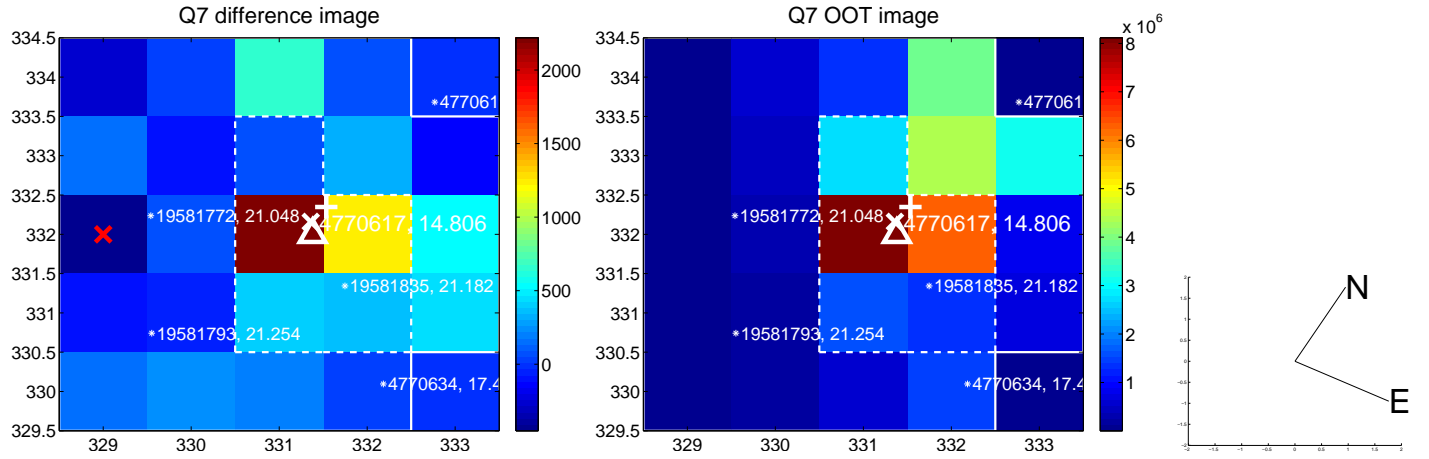
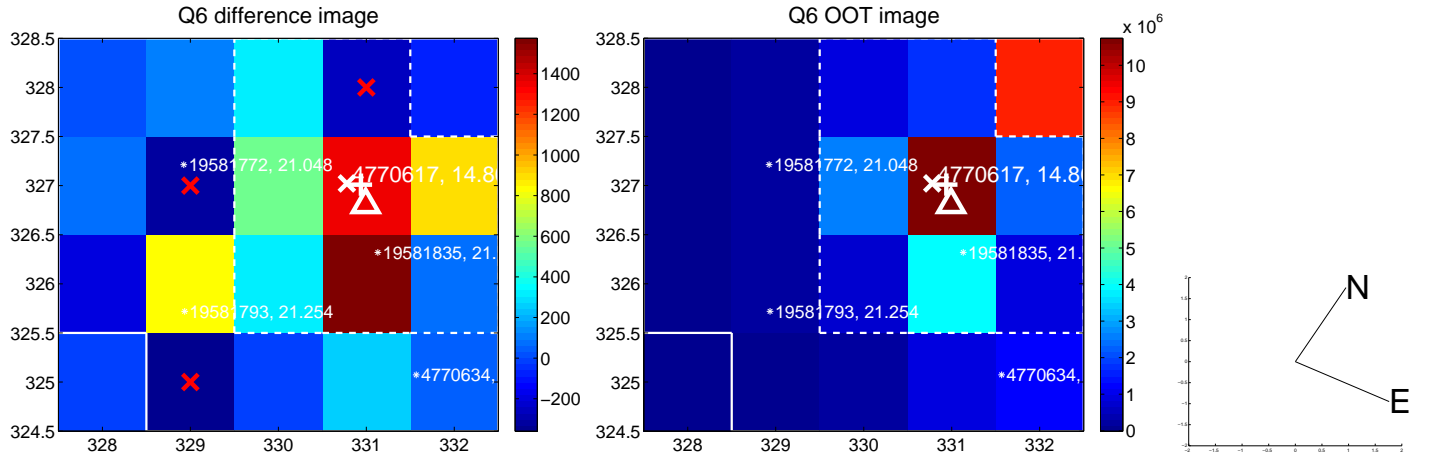
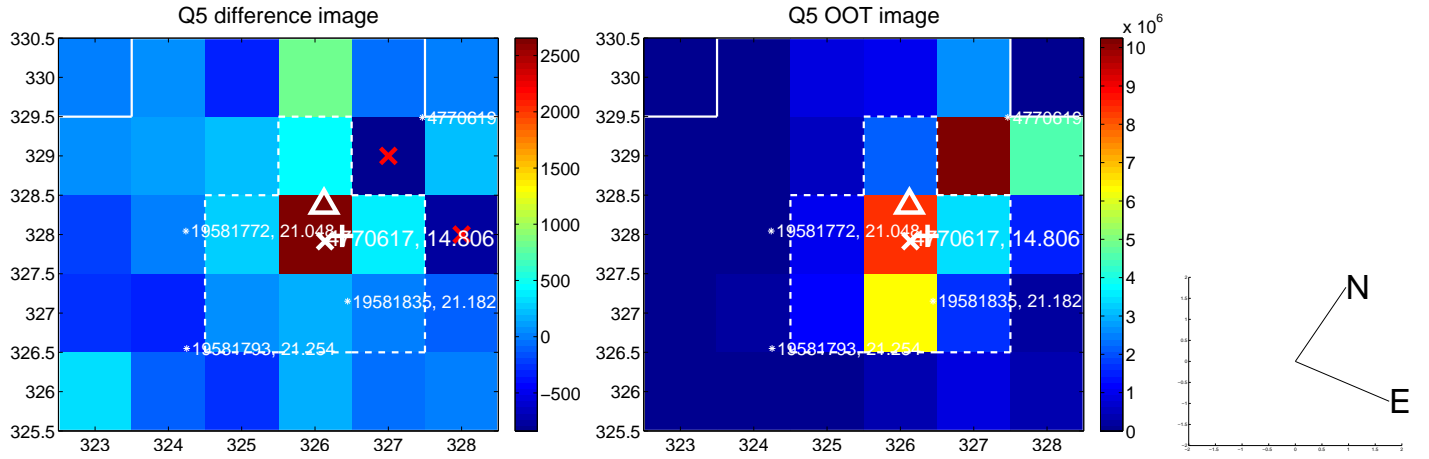
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.427 \pm 0.496$	0.86	$-0.367 \pm 0.428$	$-0.219 \pm 0.508$
PRF-fit source offset from KIC position	$0.399 \pm 0.525$	0.76	$0.107 \pm 0.447$	$0.384 \pm 0.494$
photometric centroid source offset	$0.43 \pm 0.33$	1.30	$0.41 \pm 0.32$	$-0.12 \pm 0.44$



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.

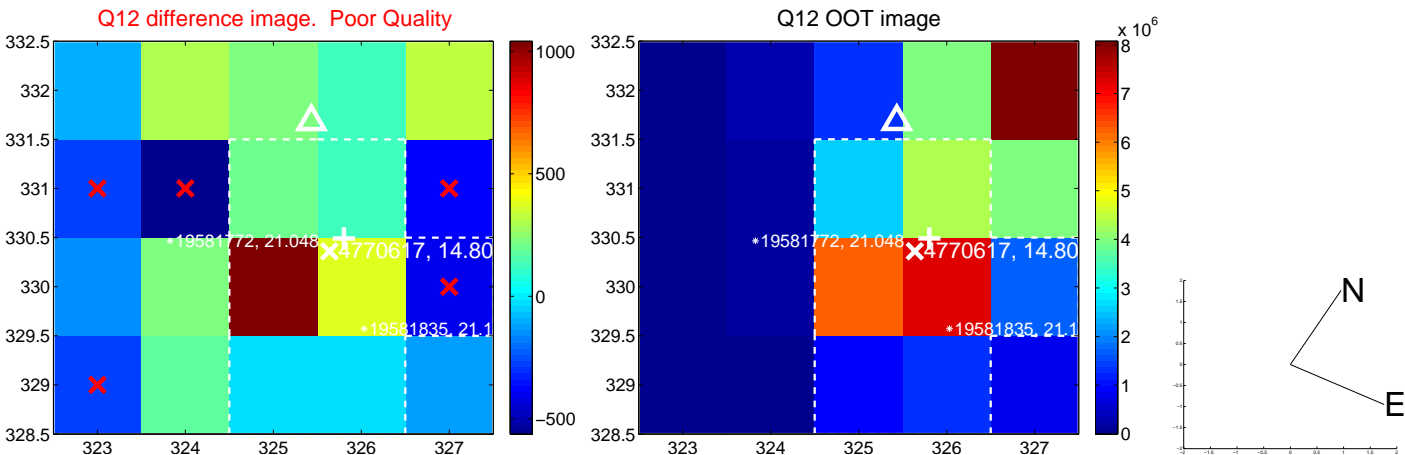
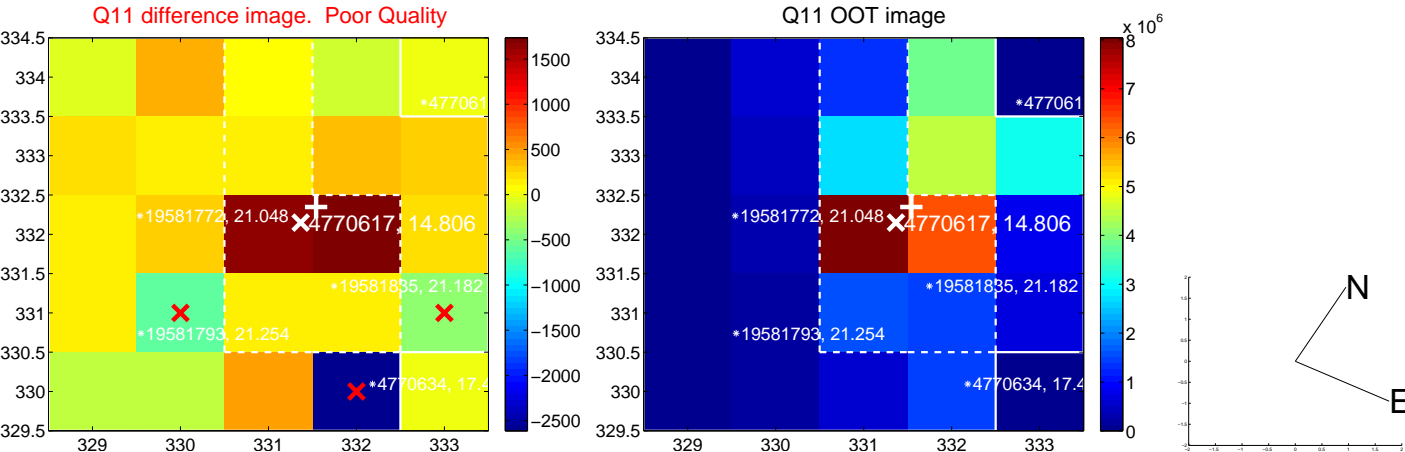
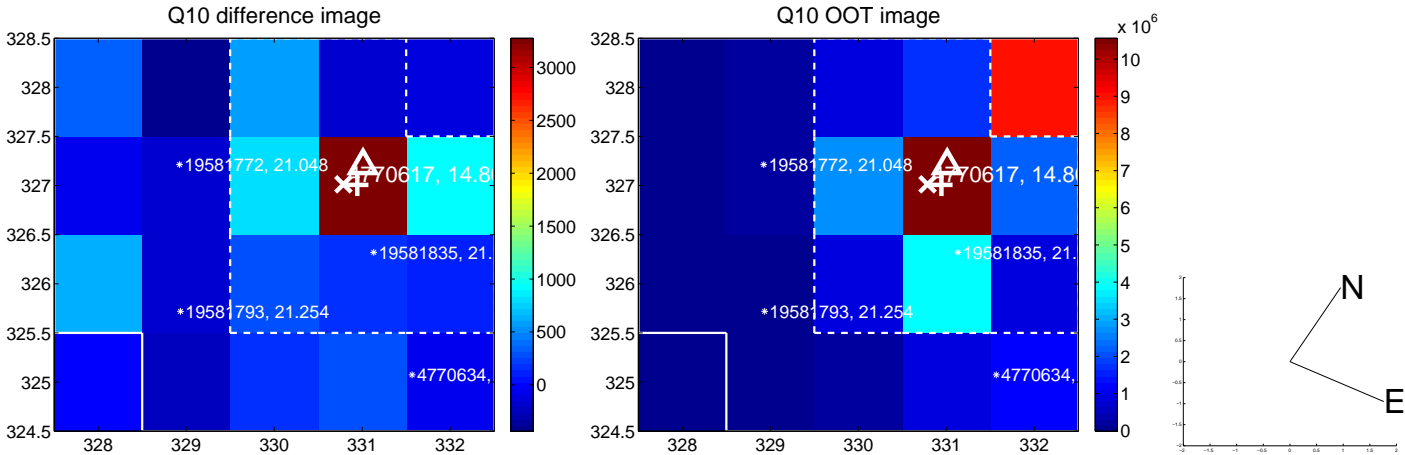
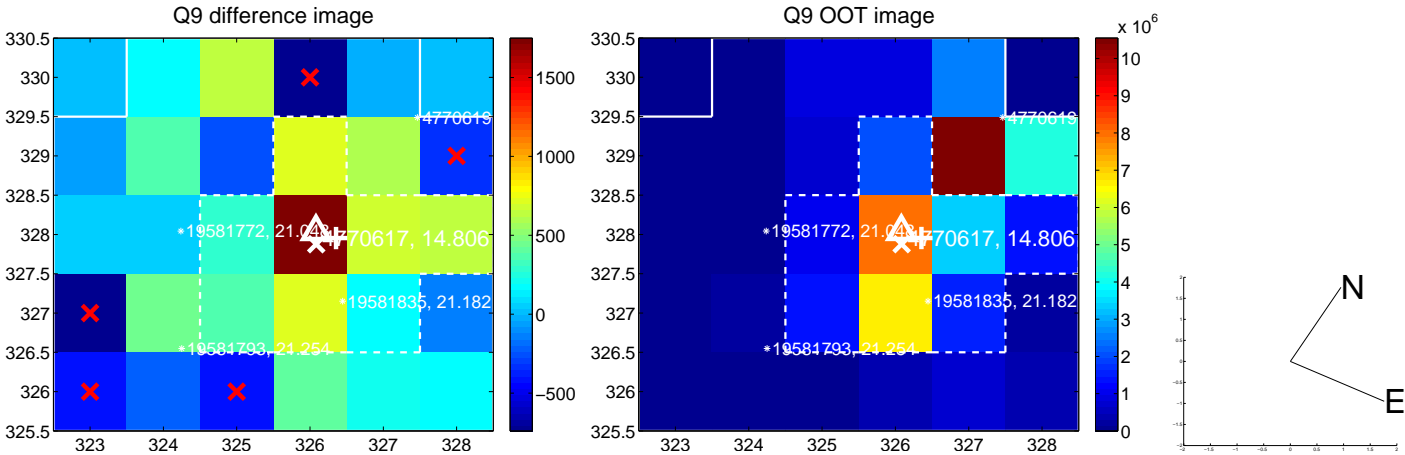


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

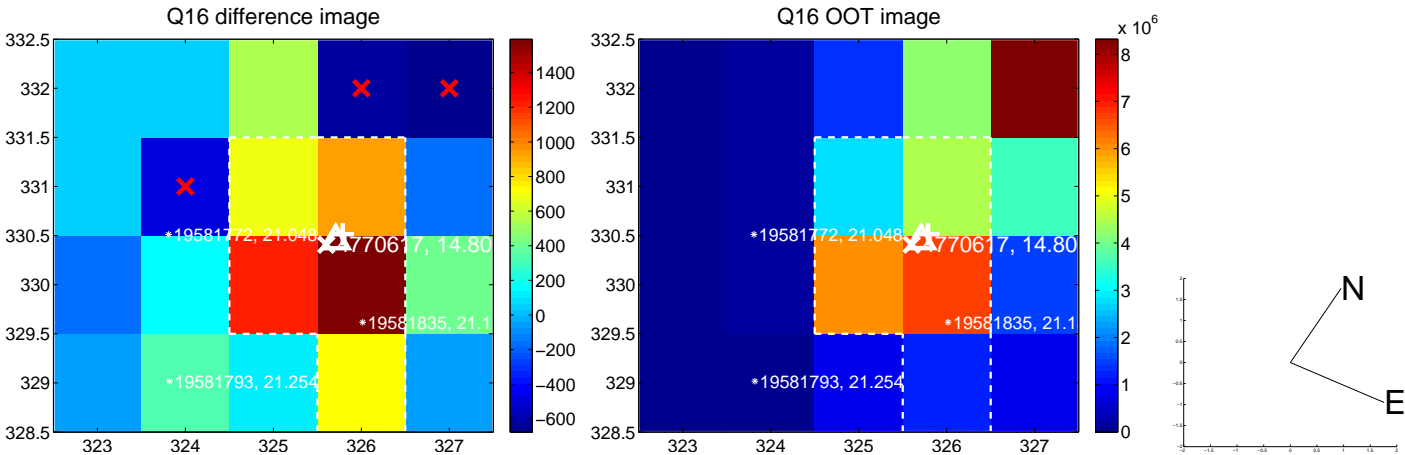
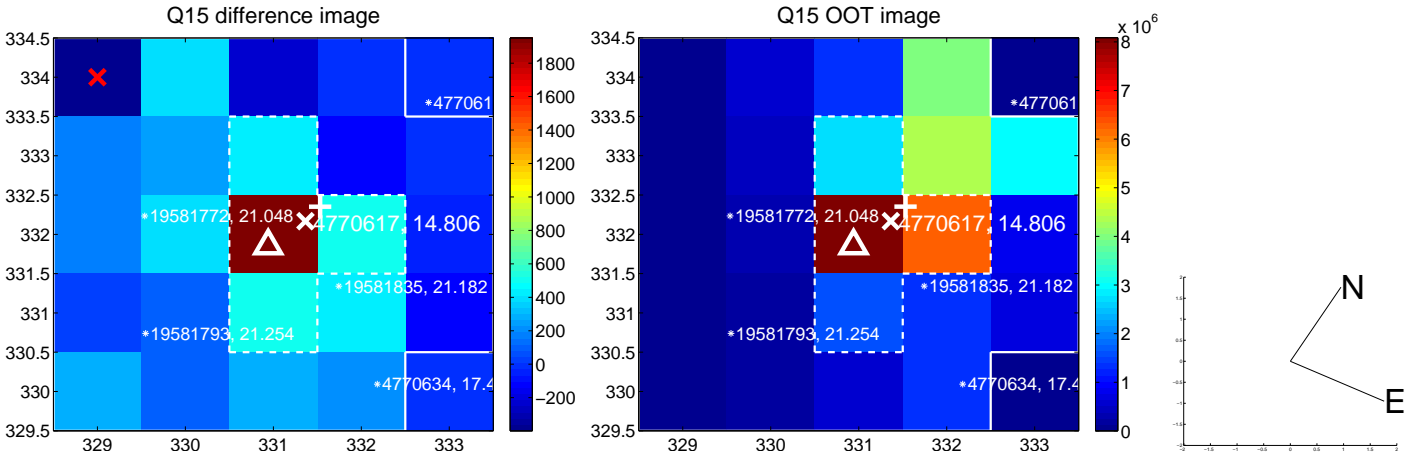
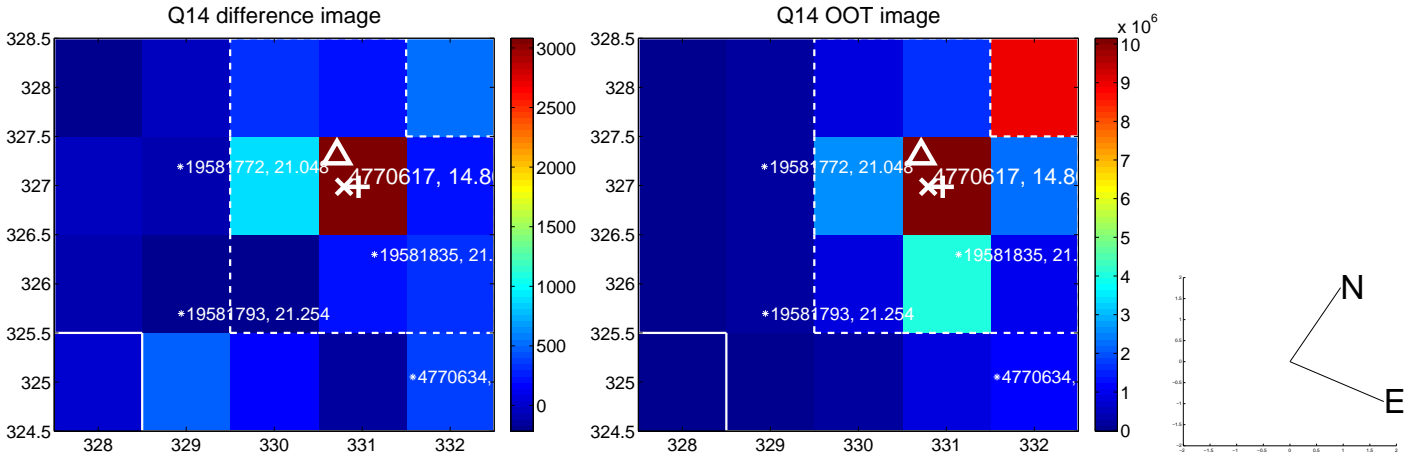
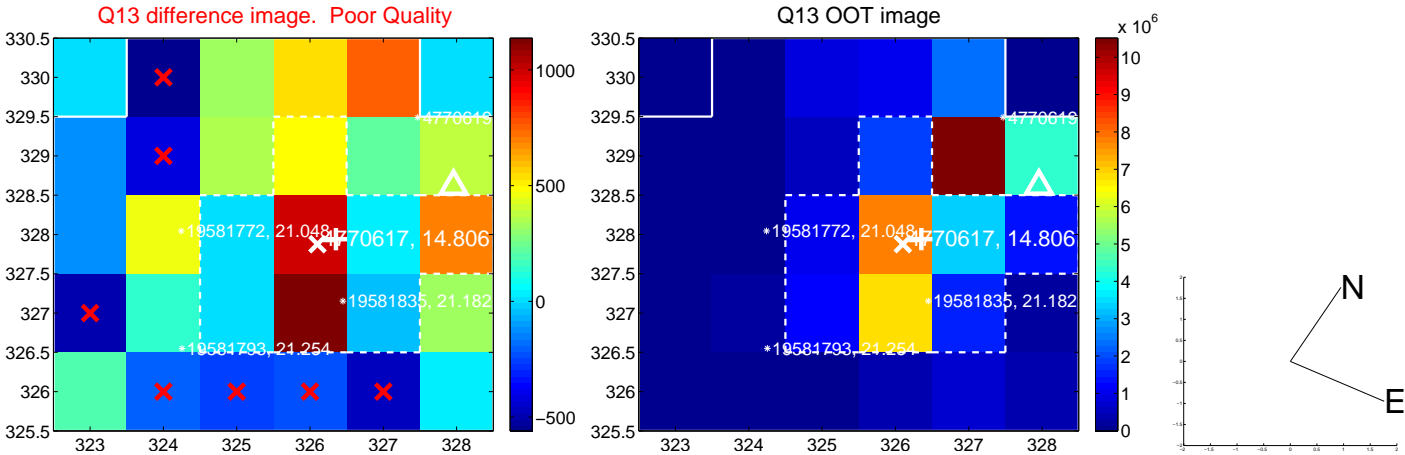




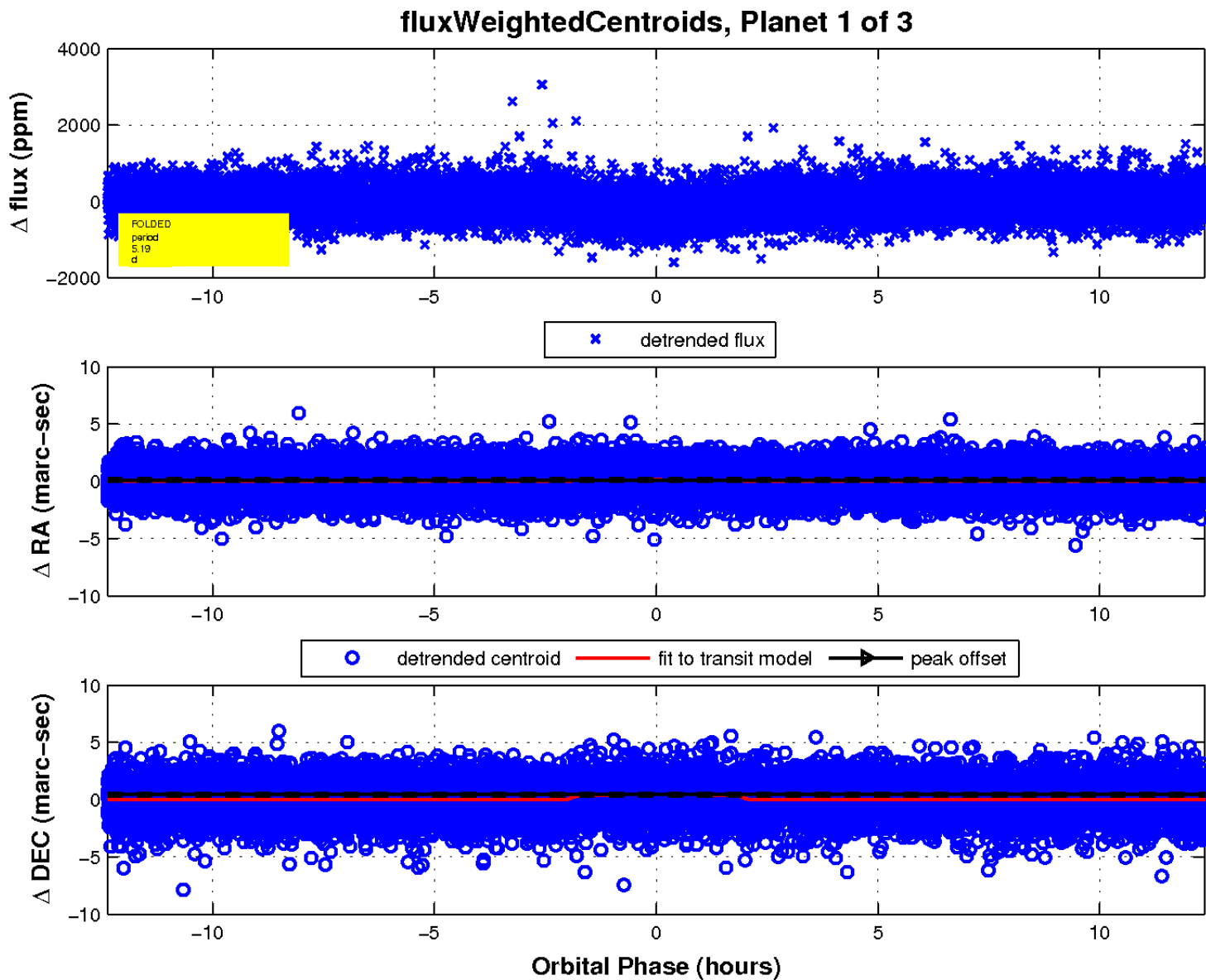
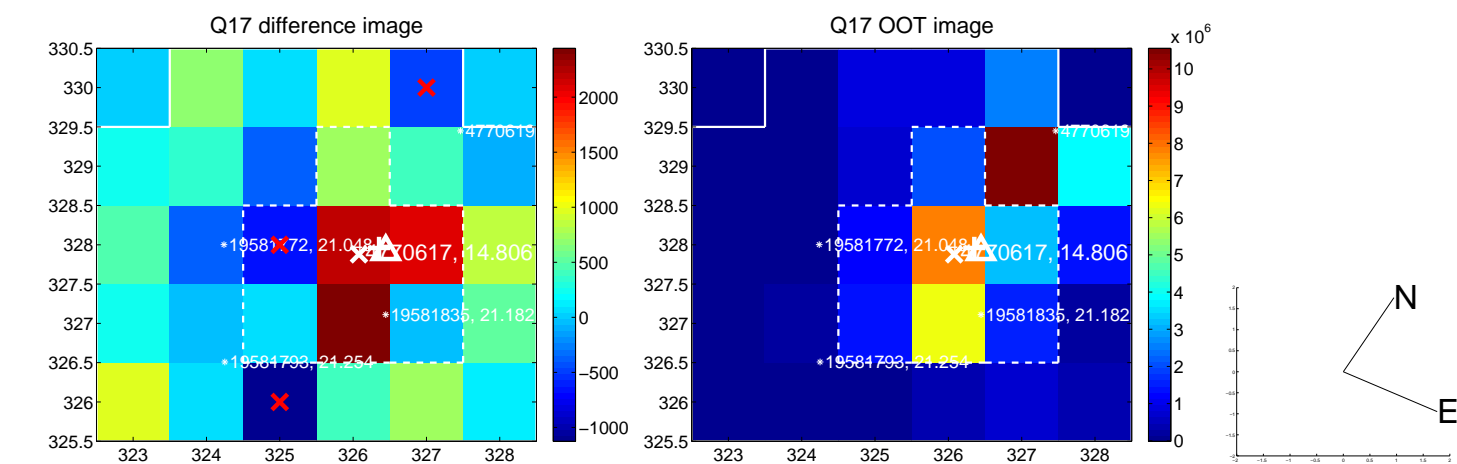
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

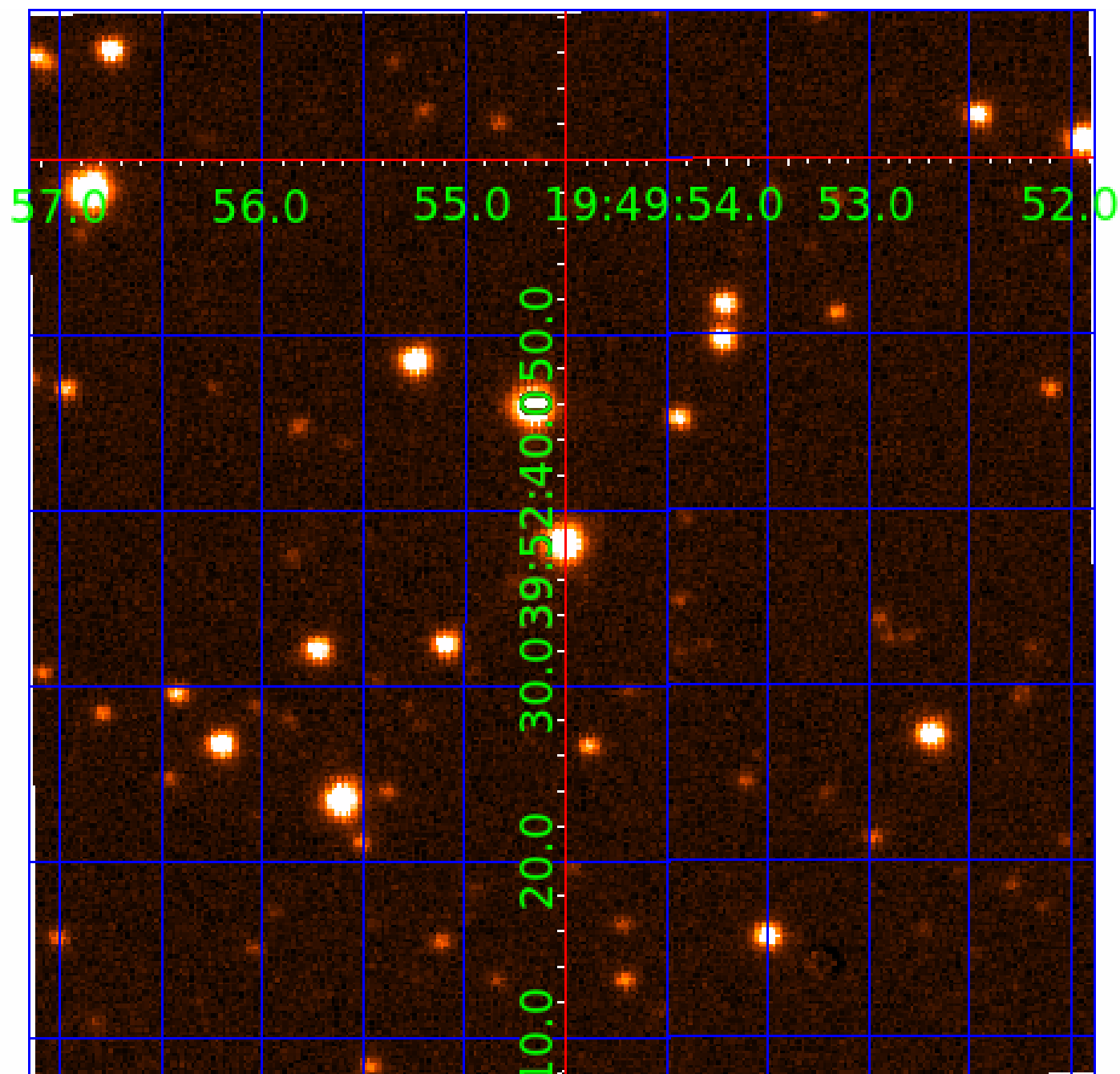


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



UKIRT Image

Declination



# KIC 004770617

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004770617-01	OBS	2243.01	5.185606	132.324131	245.1	4.124	22.7	24.3	1.47	6172	2.62	706.76
004770617-02	OBS	2243.02	8.458043	137.061802	261.7	3.045	16.0	16.9	1.47	6172	2.57	368.11
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004770617-01	OBS	PC	1.00	0	0	0	0	CENT_KIC_POS
004770617-02	OBS	PC	0.99	0	0	0	0	CENT_KIC_POS
004770617-03	OBS	PC	0.97	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.

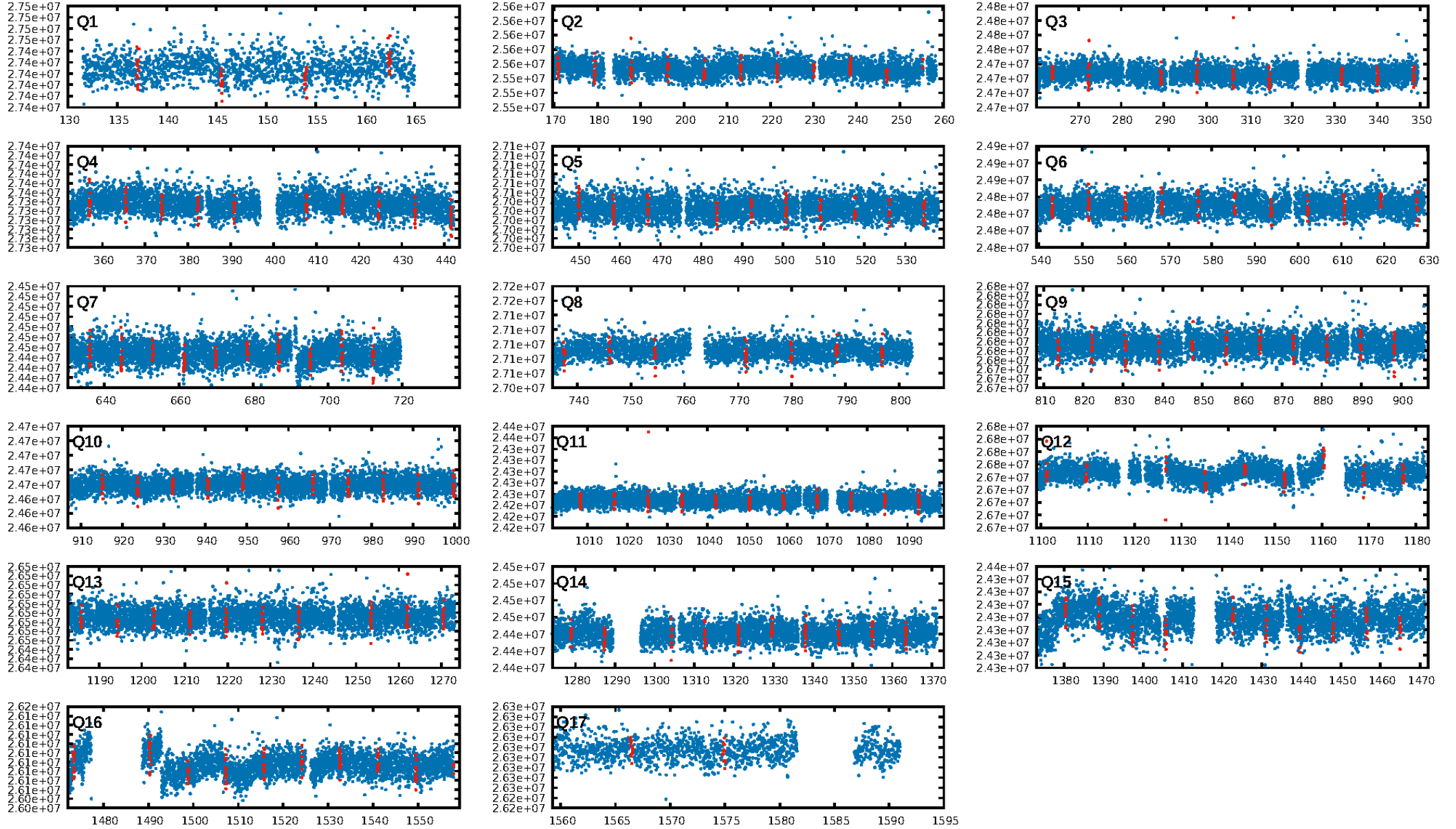
## Ephemeris Match Information For 004770617-02

No Significant Match Found

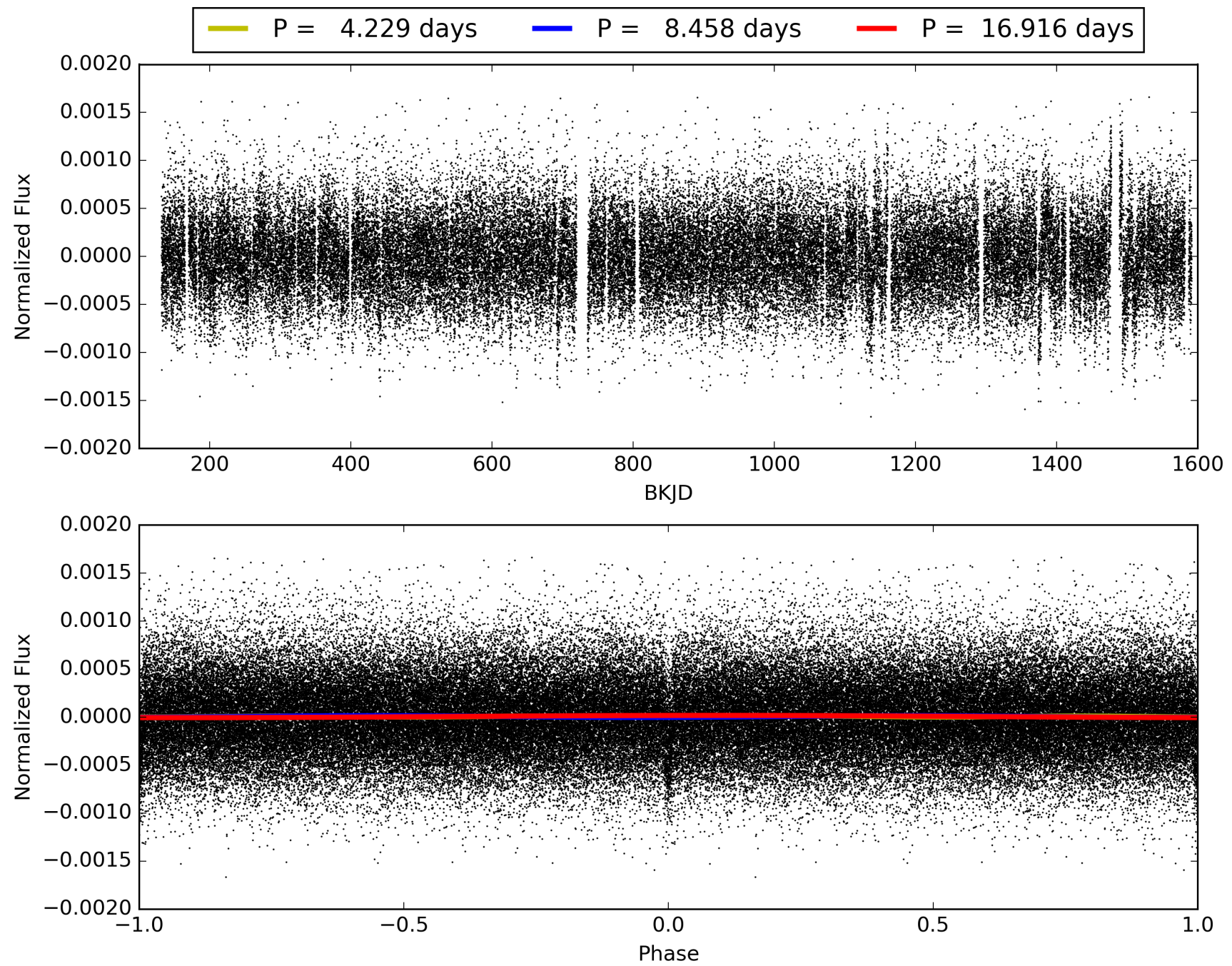


This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004770617-02, PDC Light Curves

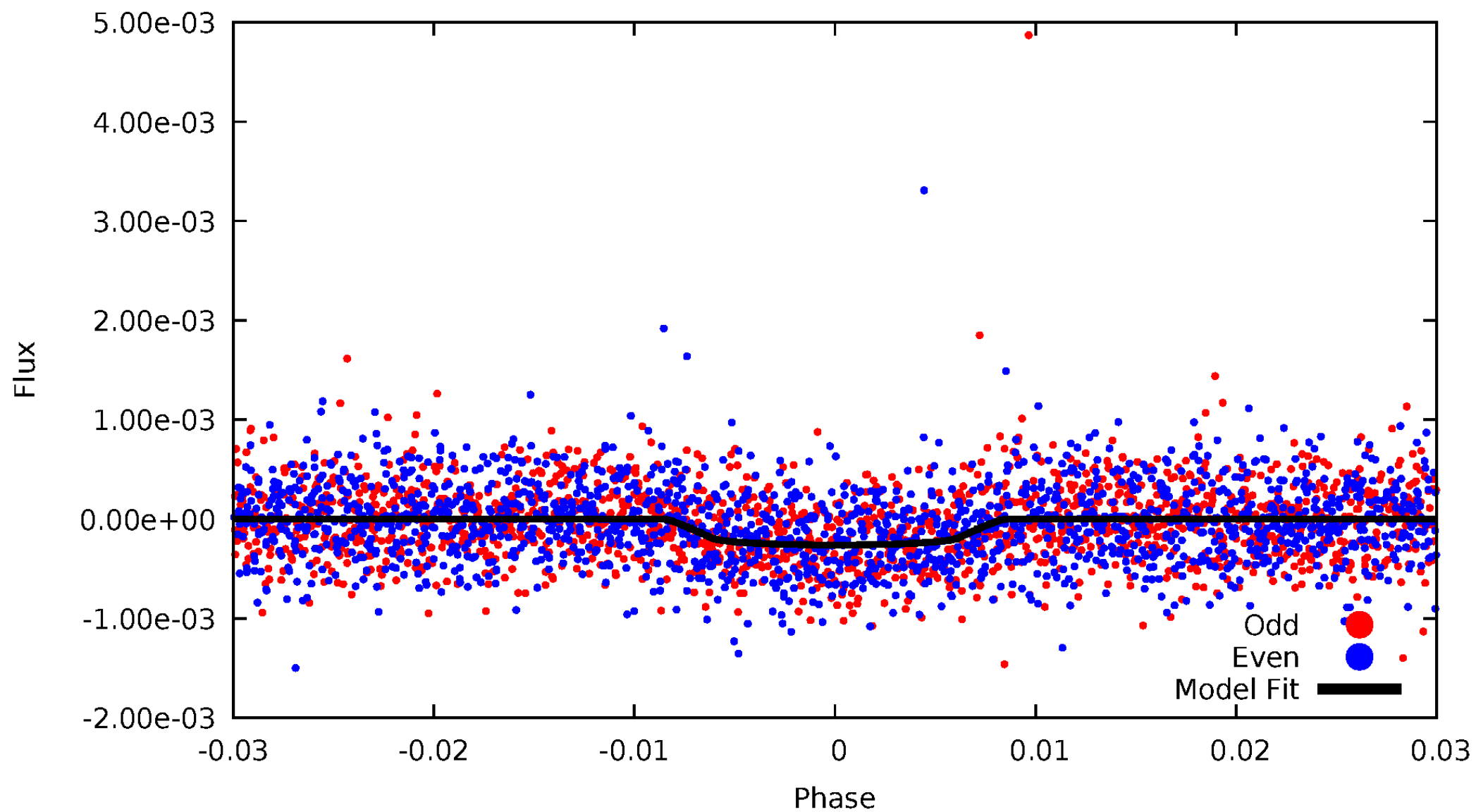


TCE 004770617-02



# DV Odd/Even

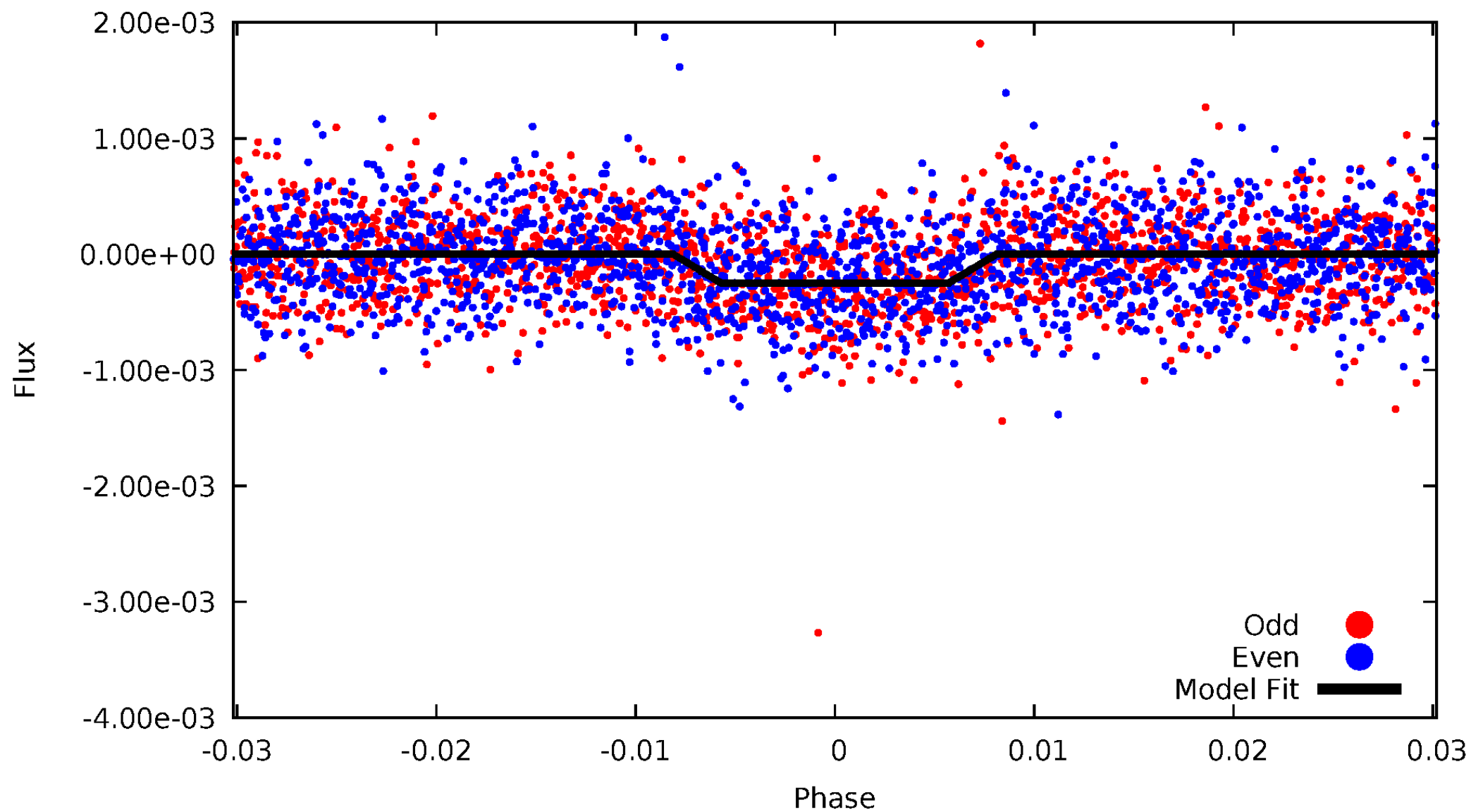
TCE 004770617-02





# ALT Odd/Even

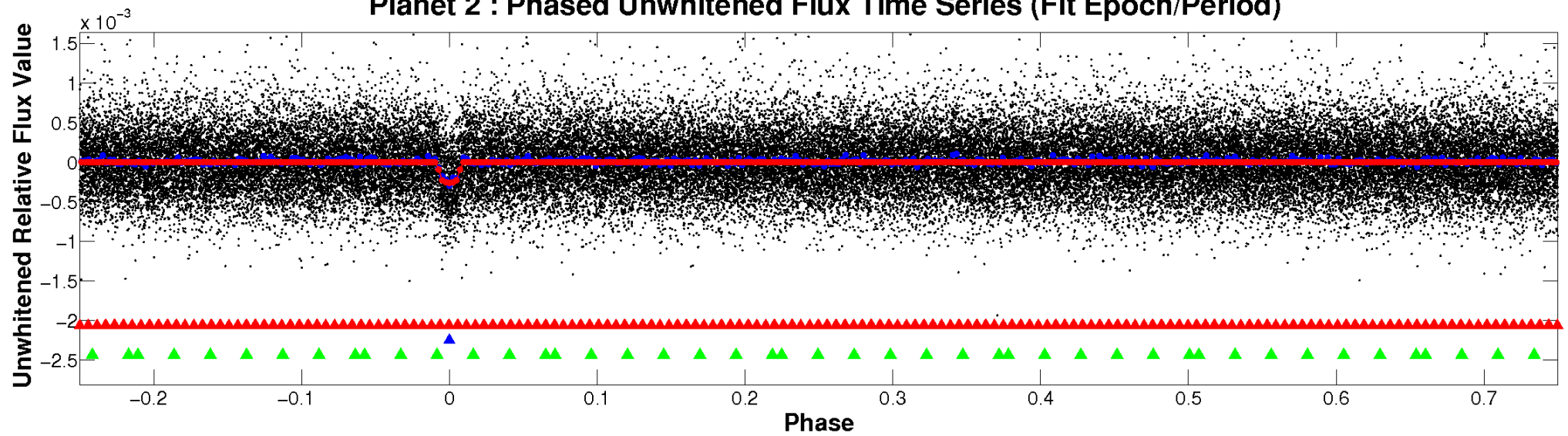
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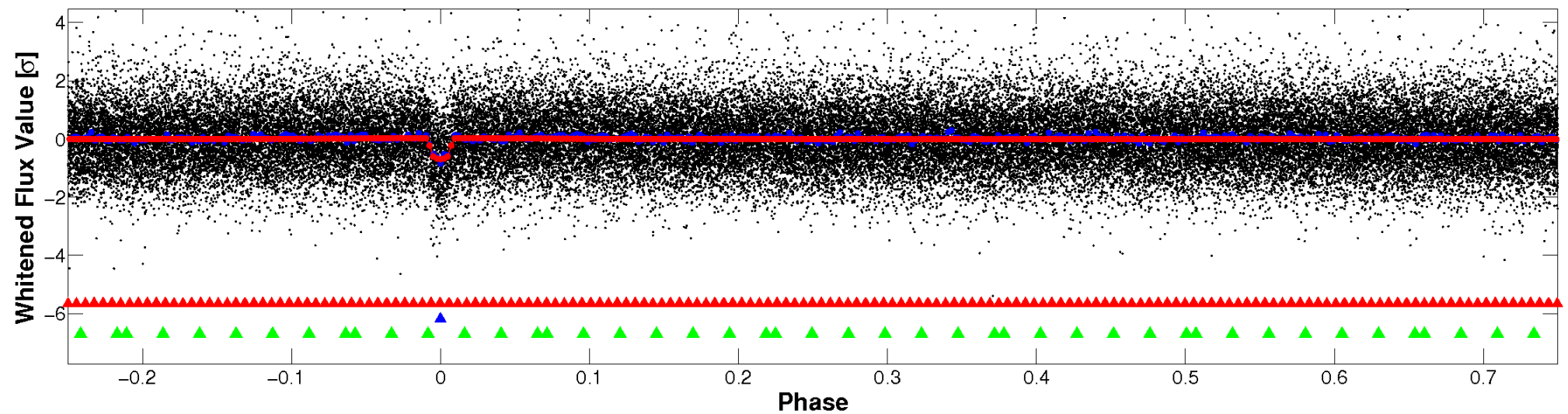


# Non-Whitened Vs. Whitened Light Curve

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

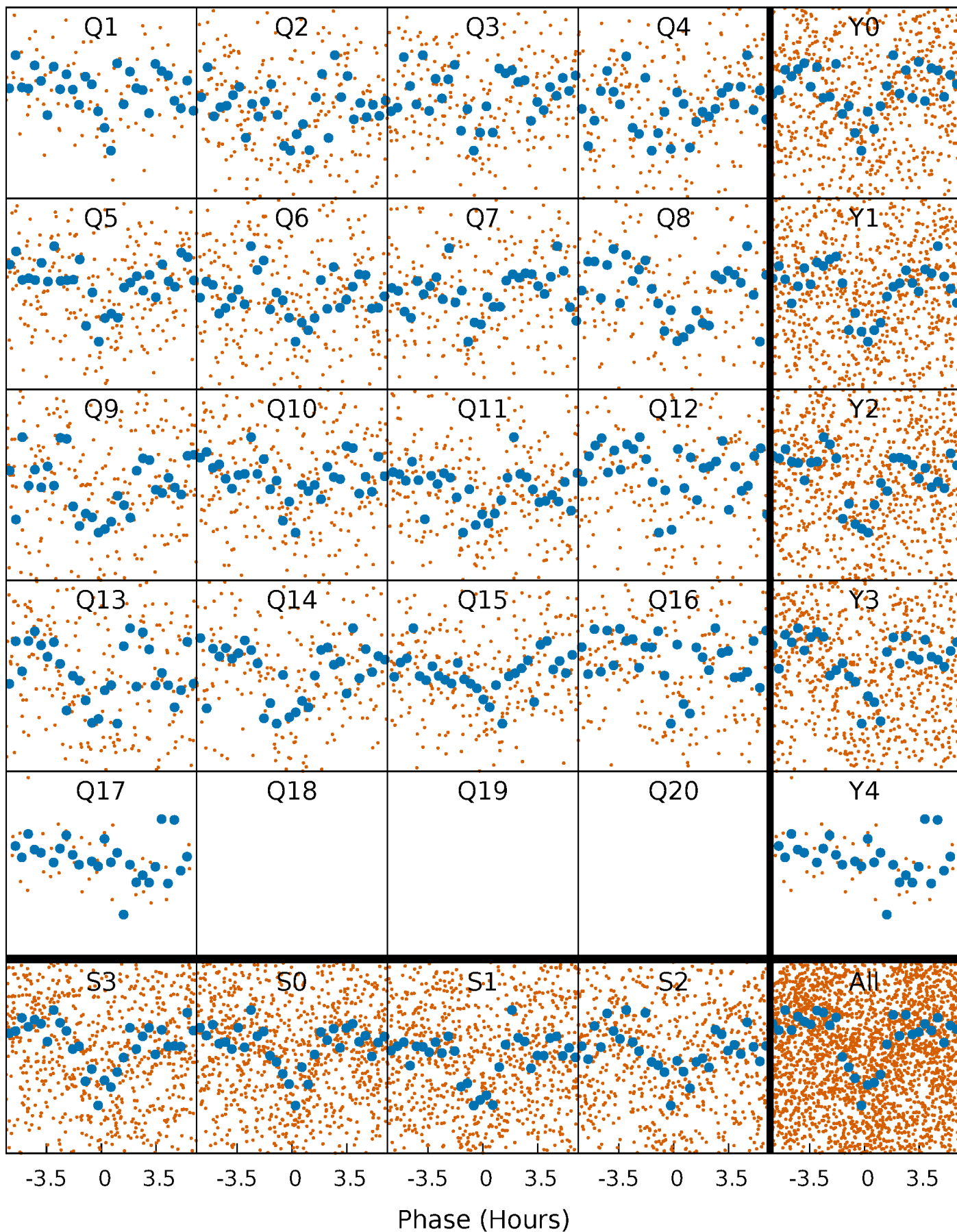


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



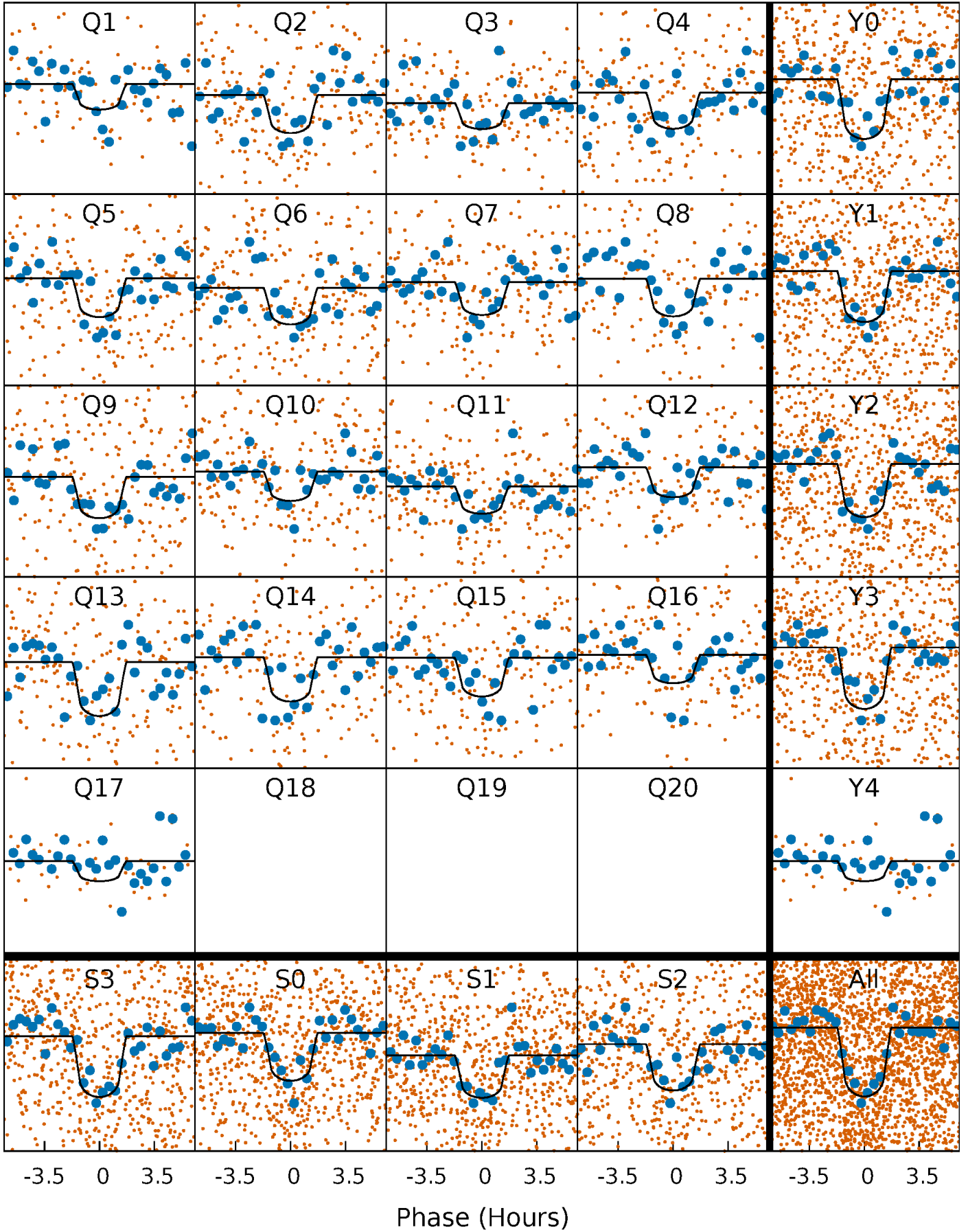
# PDC Quarter-Phased Transit Curves

TCE 004770617-02   P= 8.458043 Days    $T_0=137.061802$  (BKJD)



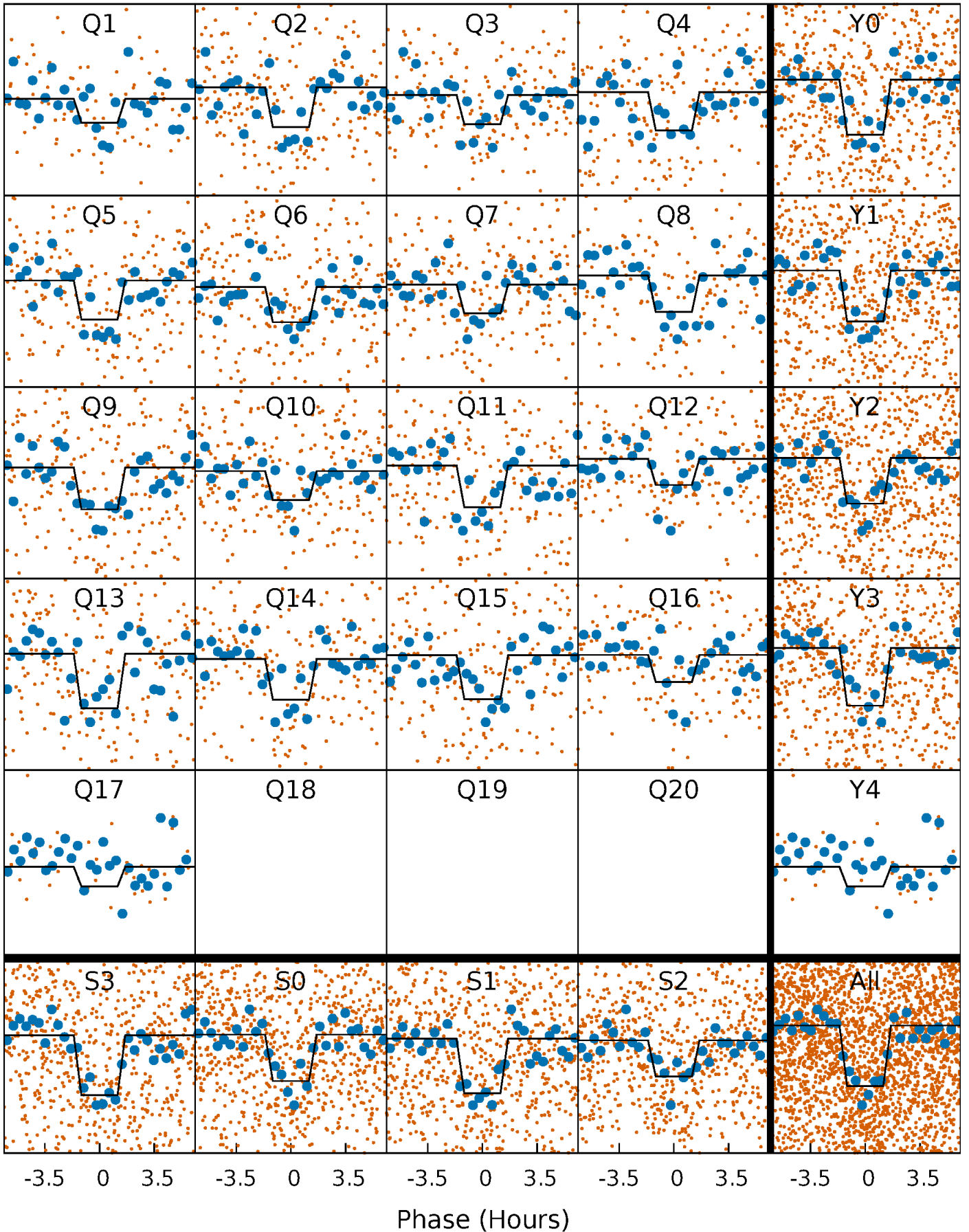
# DV Quarter-Phased Transit Curves

TCE 004770617-02     $P = 8.458043$  Days     $T_0 = 137.061802$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 004770617-02 P= 8.458011 Days  $T_0=137.065412$  (BKJD)

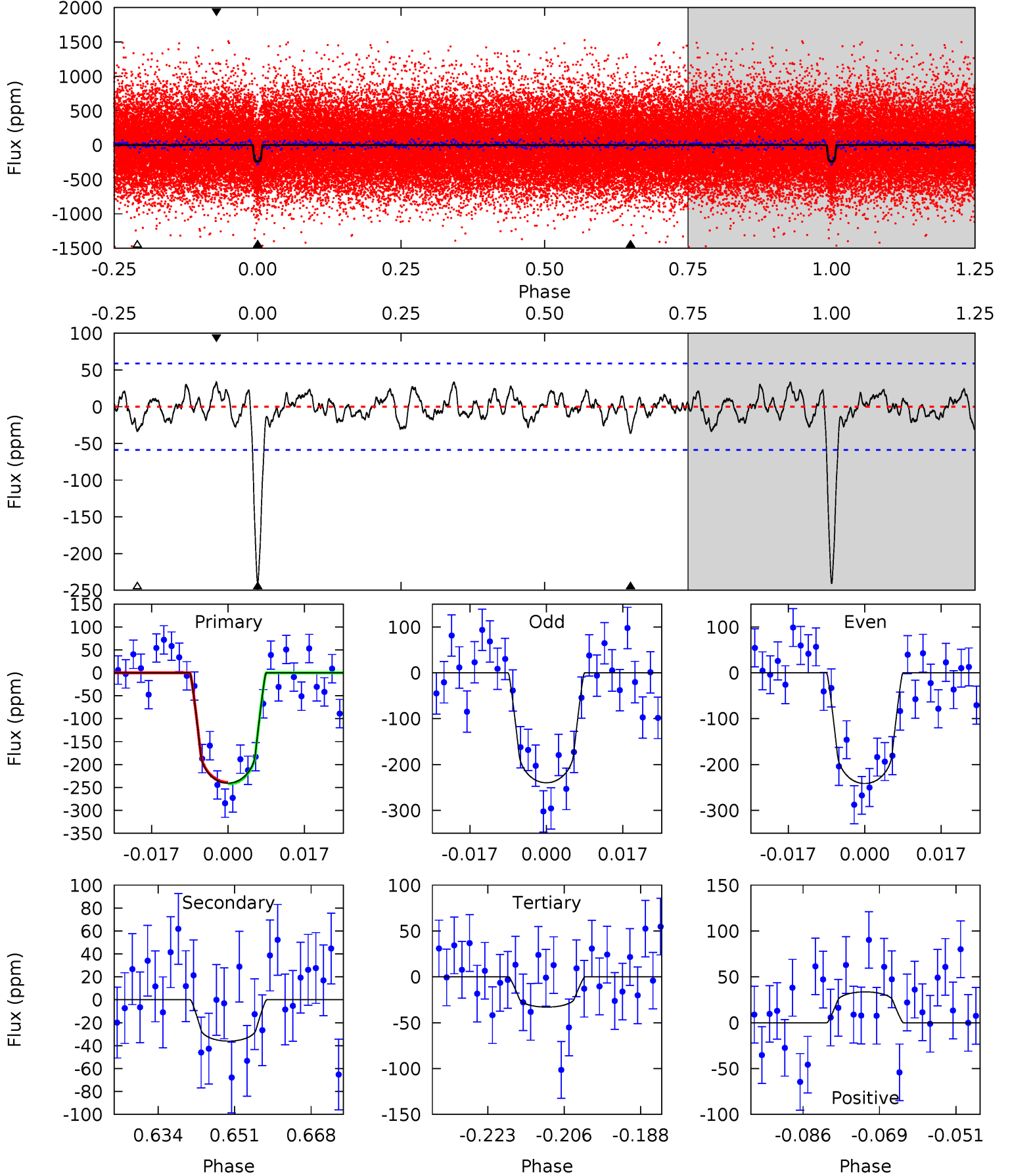




# DV Model-Shift Uniqueness Test

004770617-02, P = 8.458043 Days, E = 128.603759 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
20.1	3.02	2.76	2.81	4.92	2.38	1.11	17.4	17.3	0.25	0.21	0.07	1.02	0.12	0.13

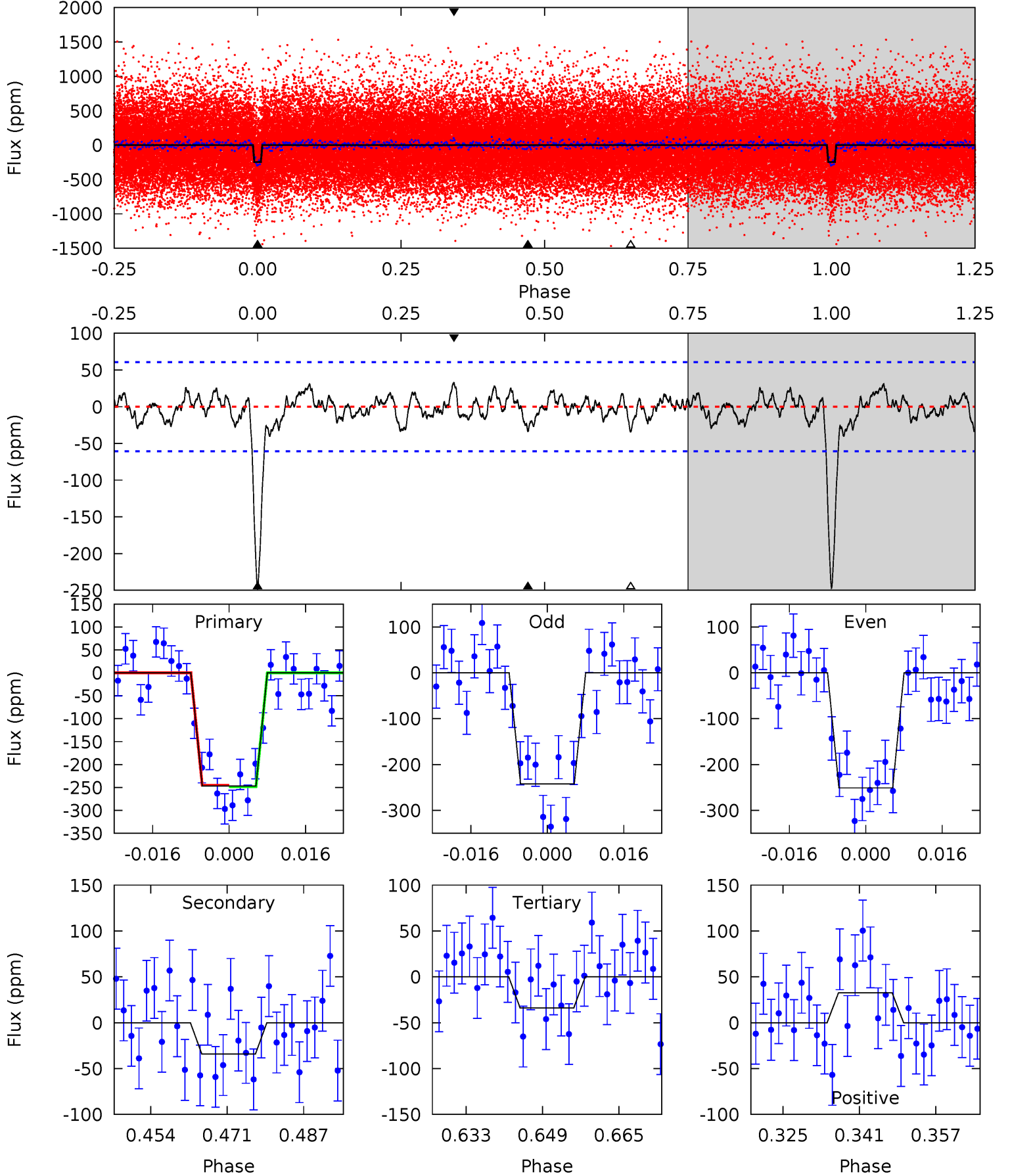




# Alt Model-Shift Uniqueness Test

004770617-02, P = 8.458011 Days, E = 128.607401 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
20.1	2.77	2.76	2.65	4.93	2.40	1.07	17.3	17.4	0.02	0.13	0.35	1.00	0.12	0.13



### Stellar Parameters For KIC 004770617

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6172^{+74}_{-86}$	$4.198^{+0.130}_{-0.130}$	$0.160^{+0.150}_{-0.150}$	$1.471^{+0.301}_{-0.247}$	$1.250^{+0.095}_{-0.116}$	$0.553^{+0.339}_{-0.209}$
	+1%/-1%	+3%/-3%	+94%/-94%	+20%/-17%	+8%/-9%	+61%/-38%
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 004770617-02 / KOI 2243.02

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-36 \pm 12$	$2.64^{+1.68}_{-1.38}$	$1557^{+72}_{-70}$	$4011^{+1409}_{-690}$	$21^{+73}_{-15}$
Alt.	$-34 \pm 12$	$2.55^{+1.54}_{-1.36}$	$1556^{+83}_{-74}$	$3998^{+1506}_{-631}$	$21^{+84}_{-13}$

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

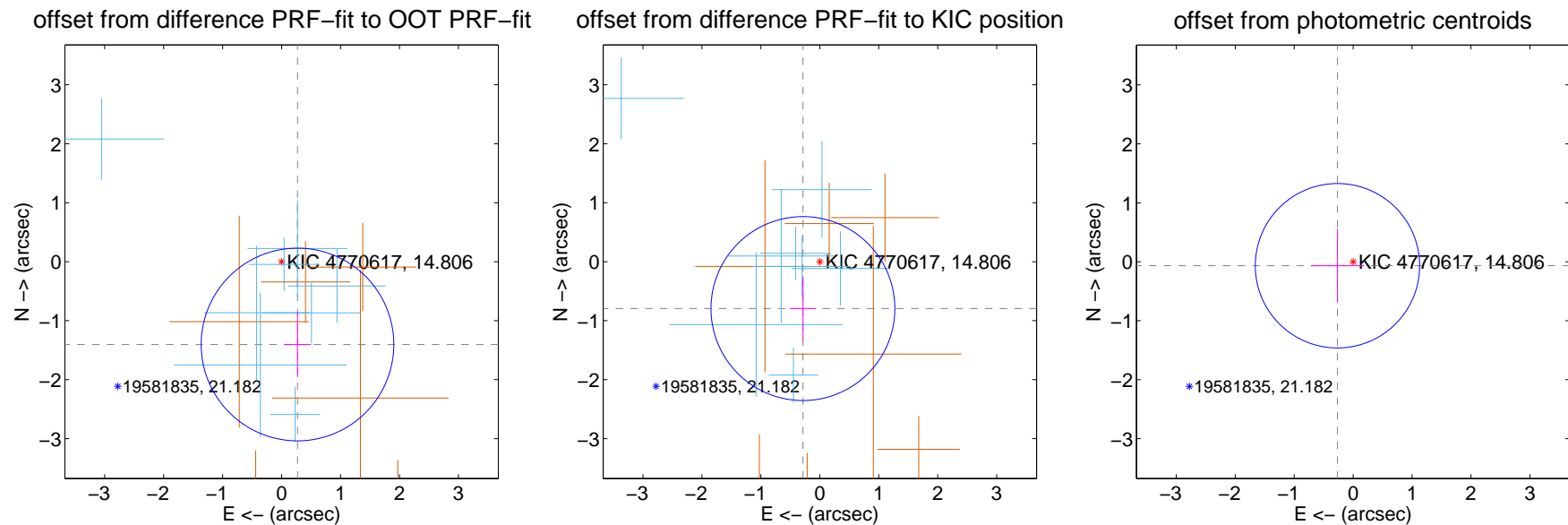
## DV Centroid Data

Supplemental centroid analysis for 004770617-02. Kepler magnitude: 14.81. Transit SNR 16.89

There are 8 quarters with good PRF difference image offsets

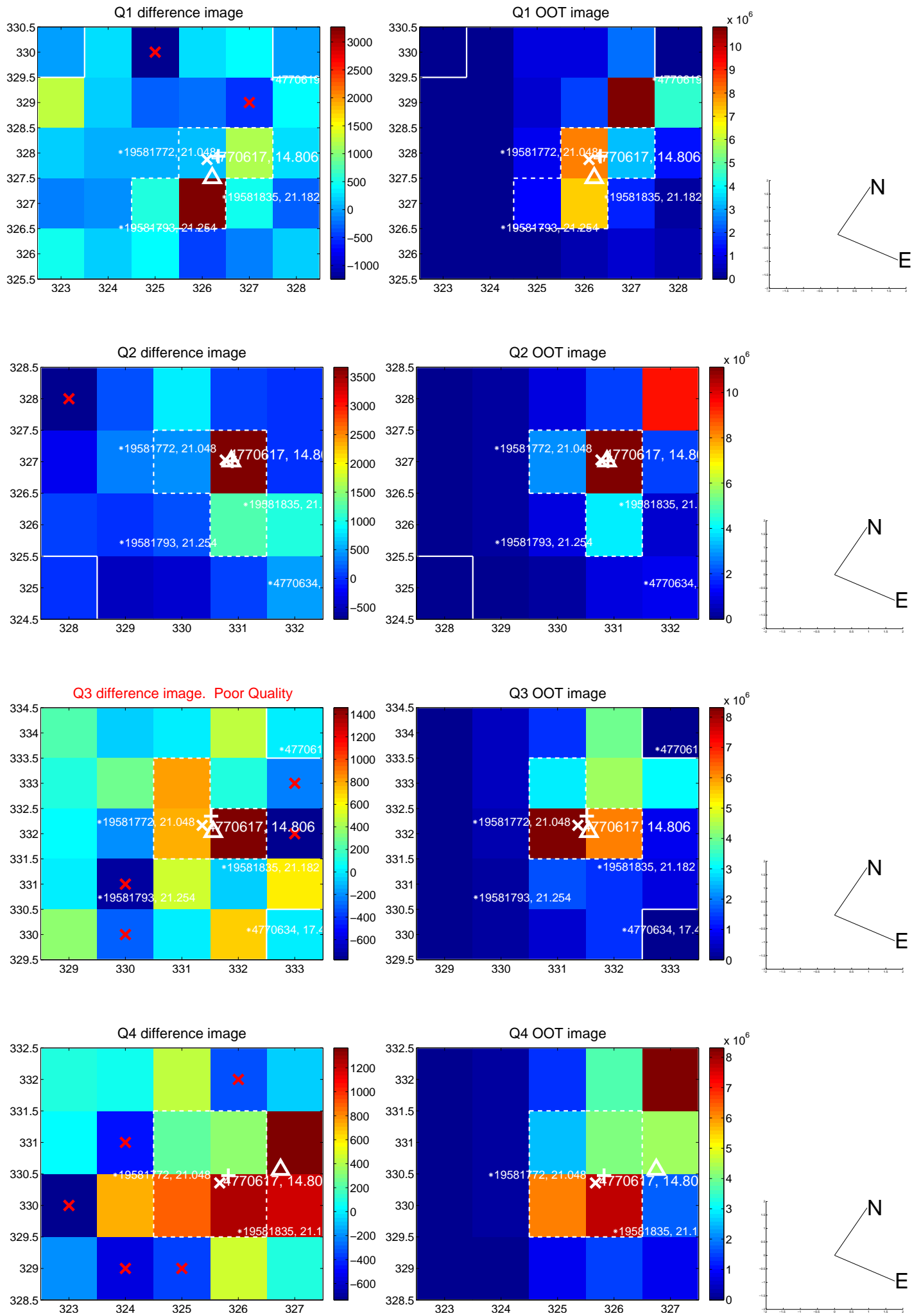
The direct PRF centroid is offset from the target star catalog position by about 1.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.429 \pm 0.544$	2.63	$-0.270 \pm 0.229$	$-1.404 \pm 0.553$
PRF-fit source offset from KIC position	$0.845 \pm 0.520$	1.63	$0.287 \pm 0.226$	$-0.795 \pm 0.546$
photometric centroid source offset	$0.27 \pm 0.46$	0.59	$0.27 \pm 0.45$	$-0.07 \pm 0.63$

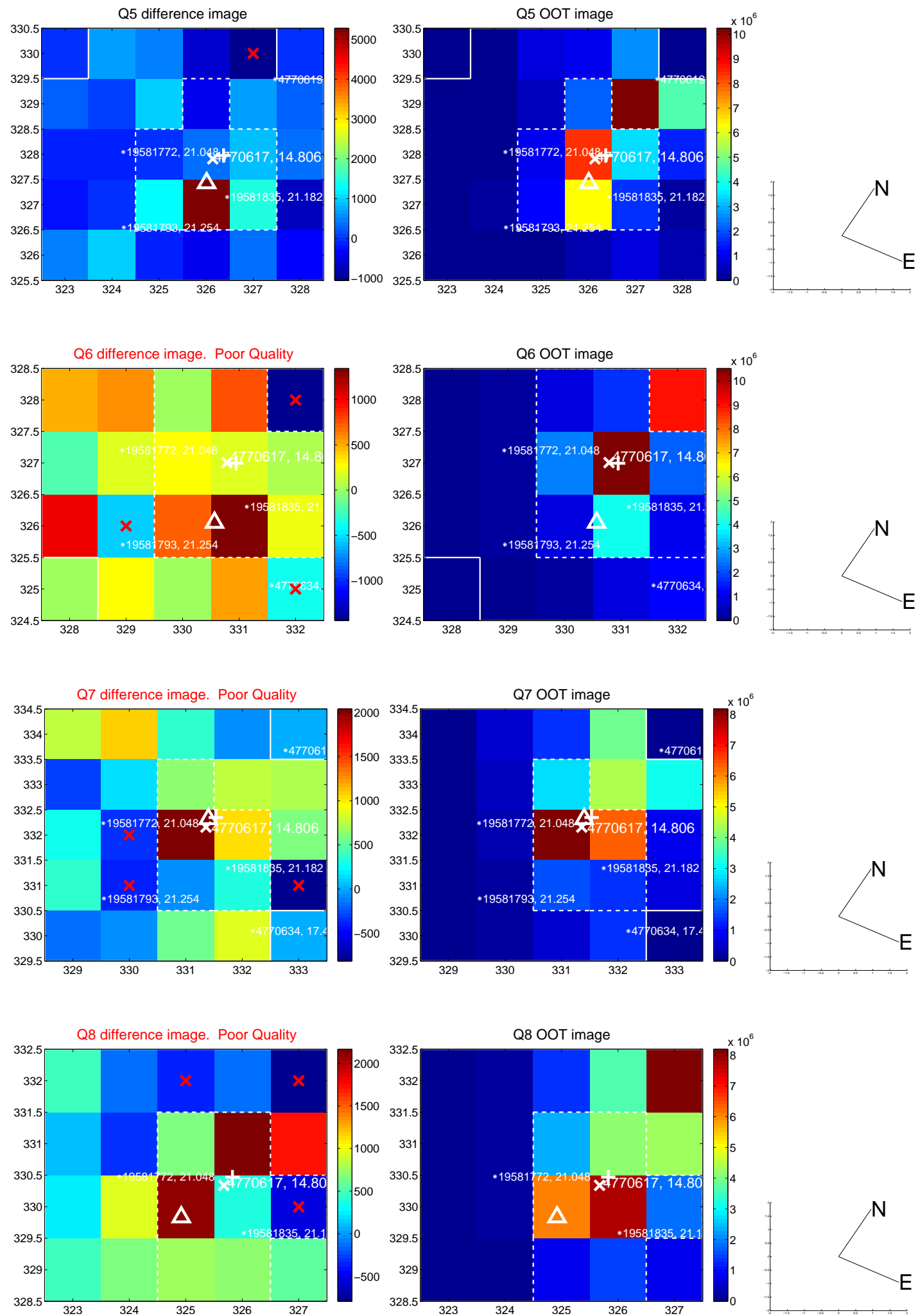


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

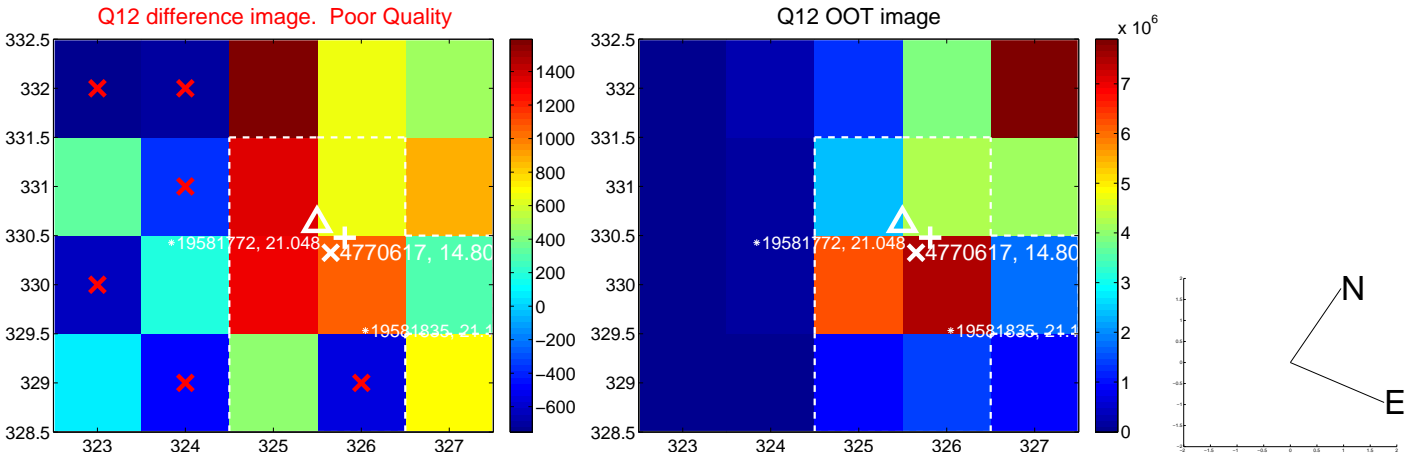
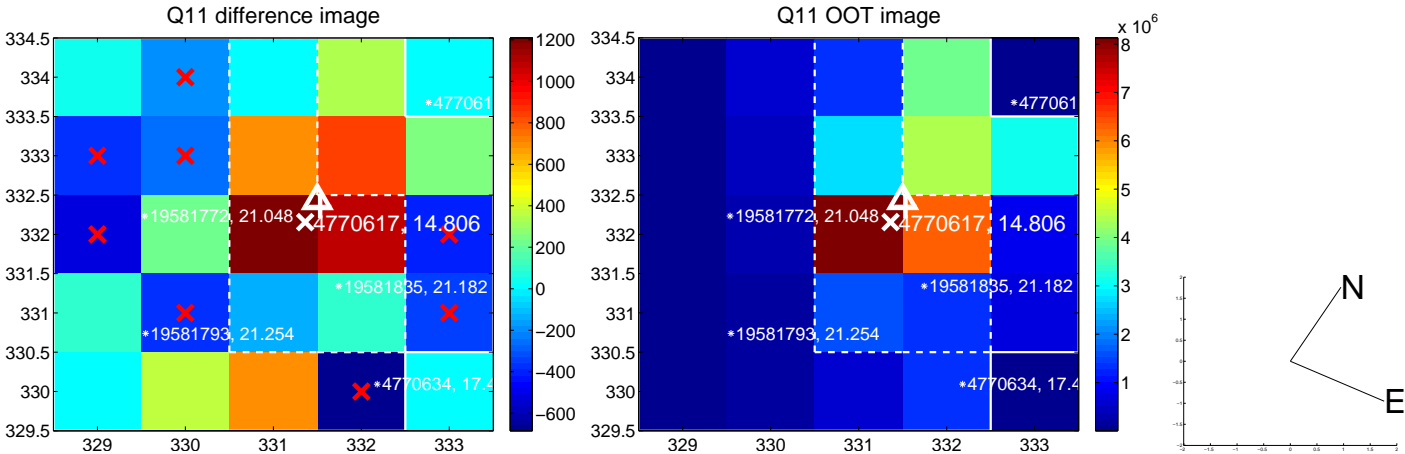
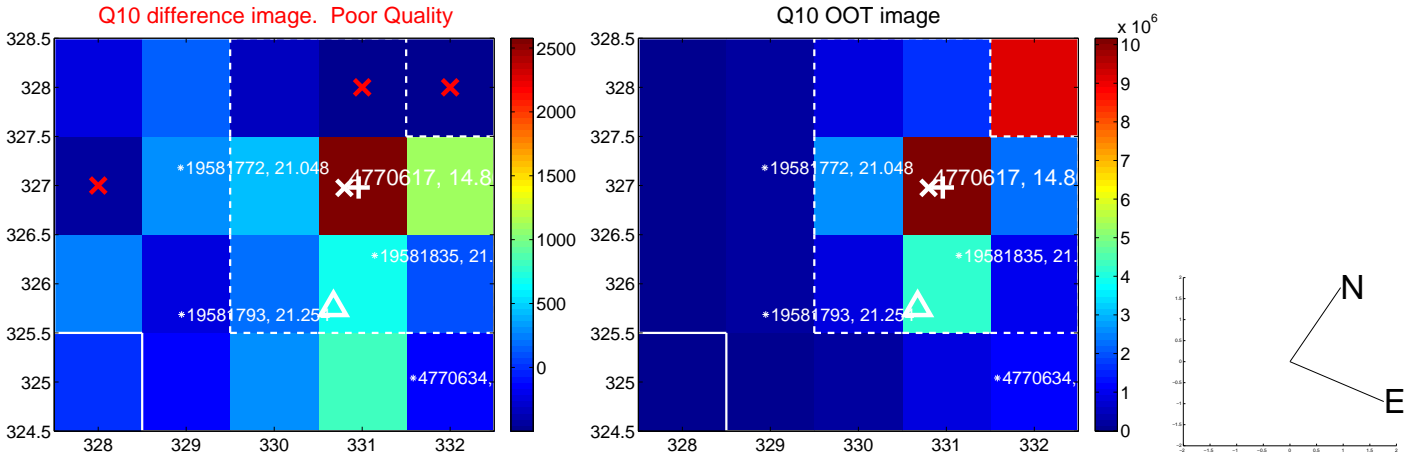
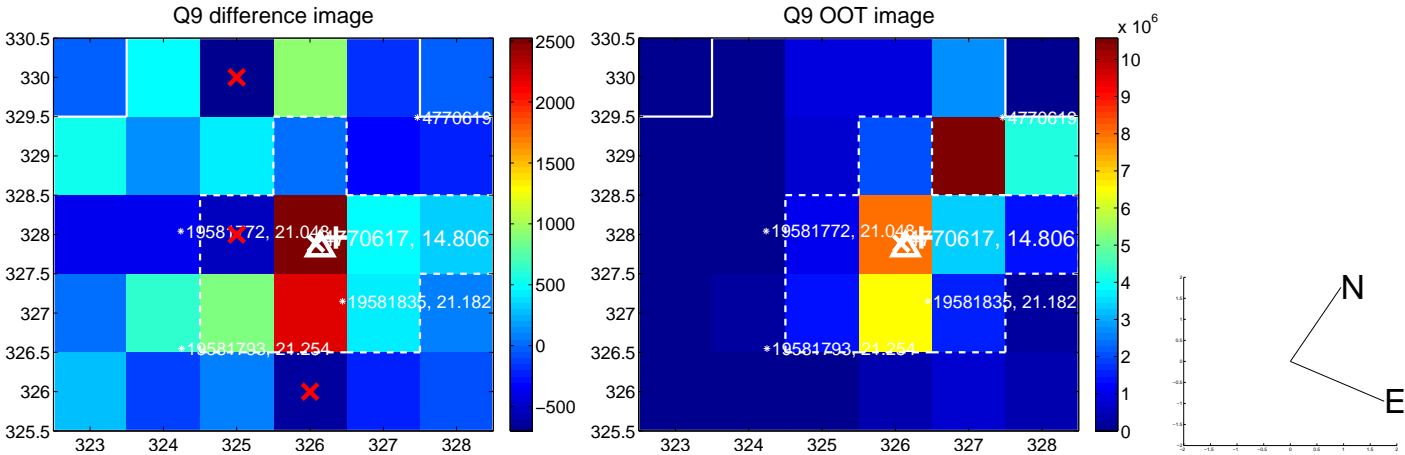


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

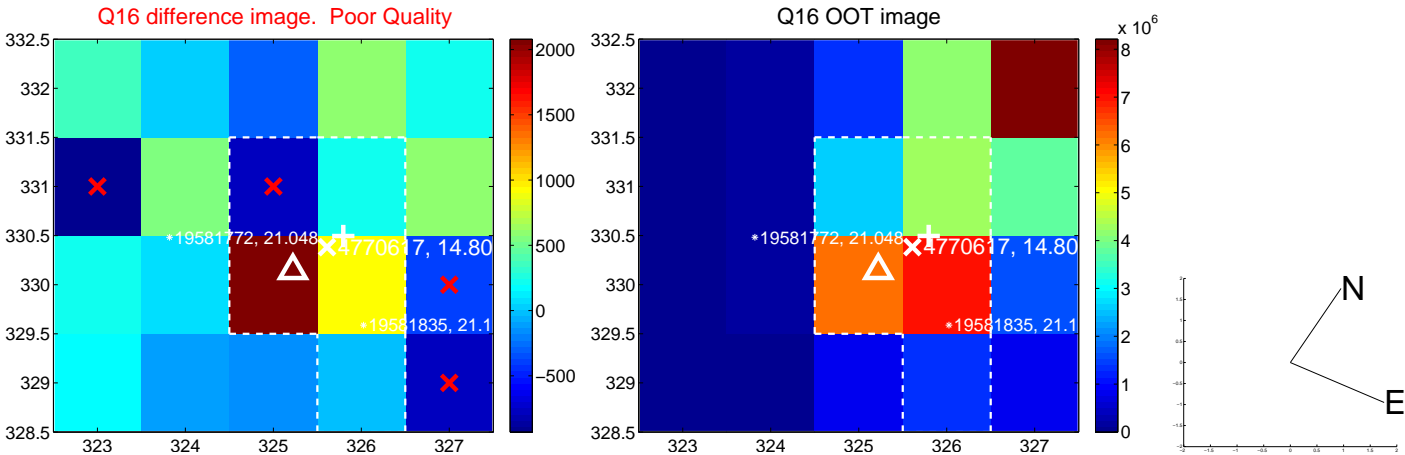
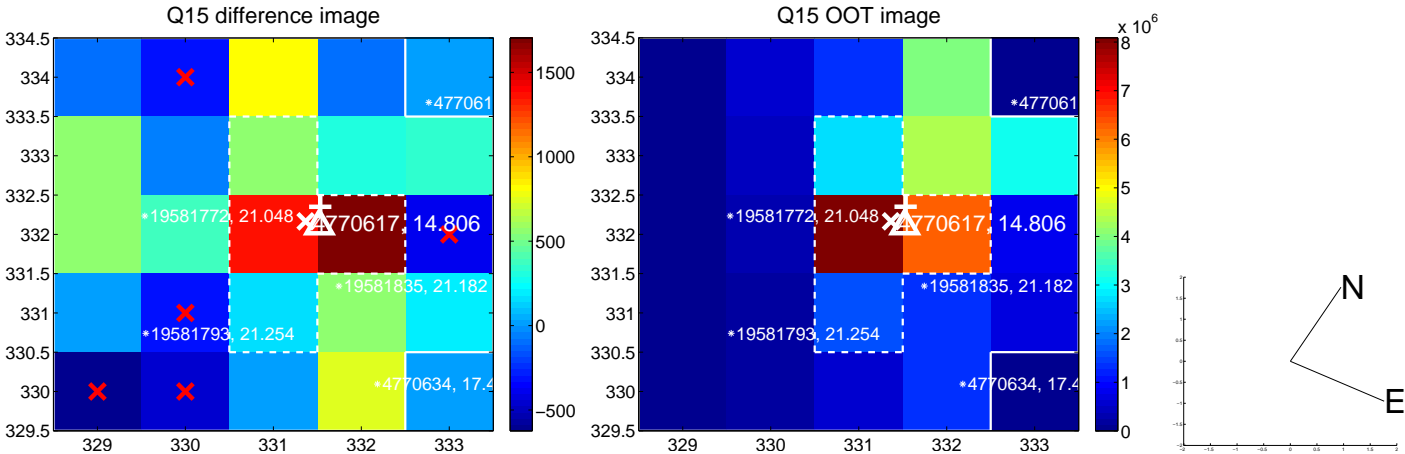
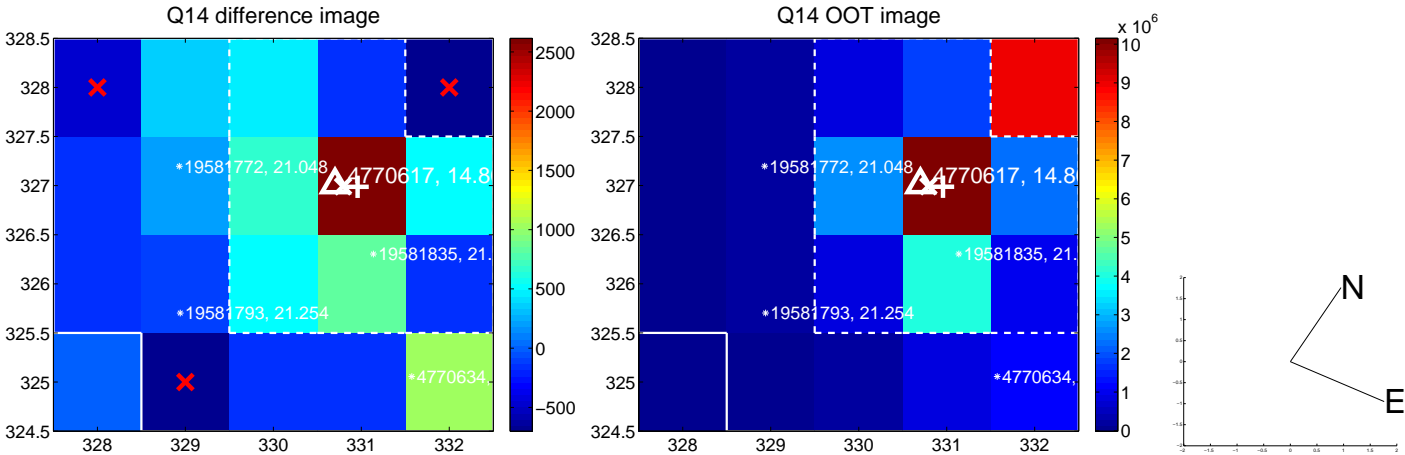
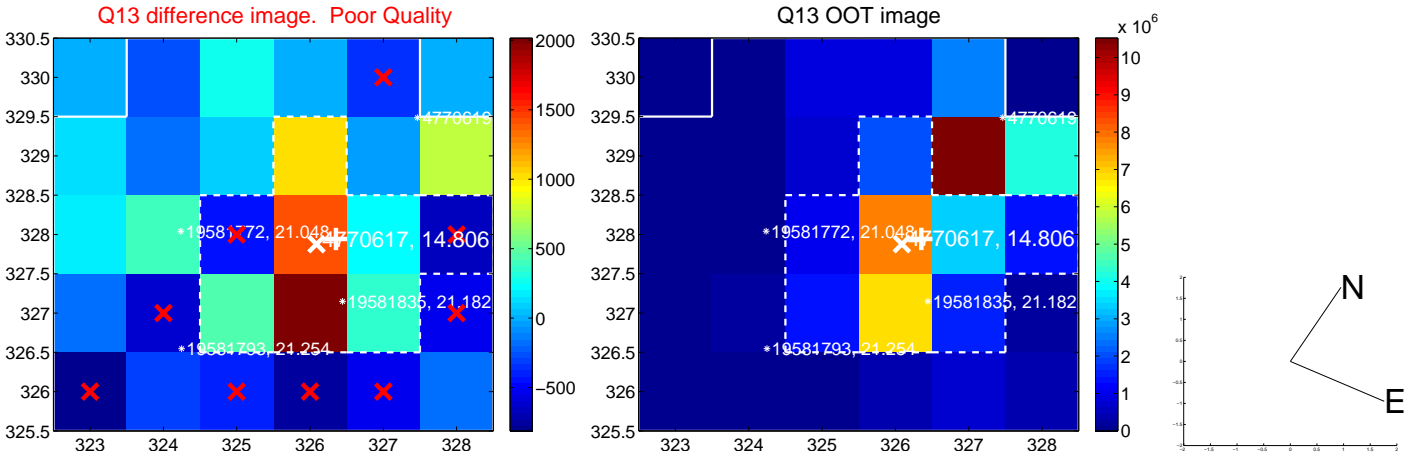




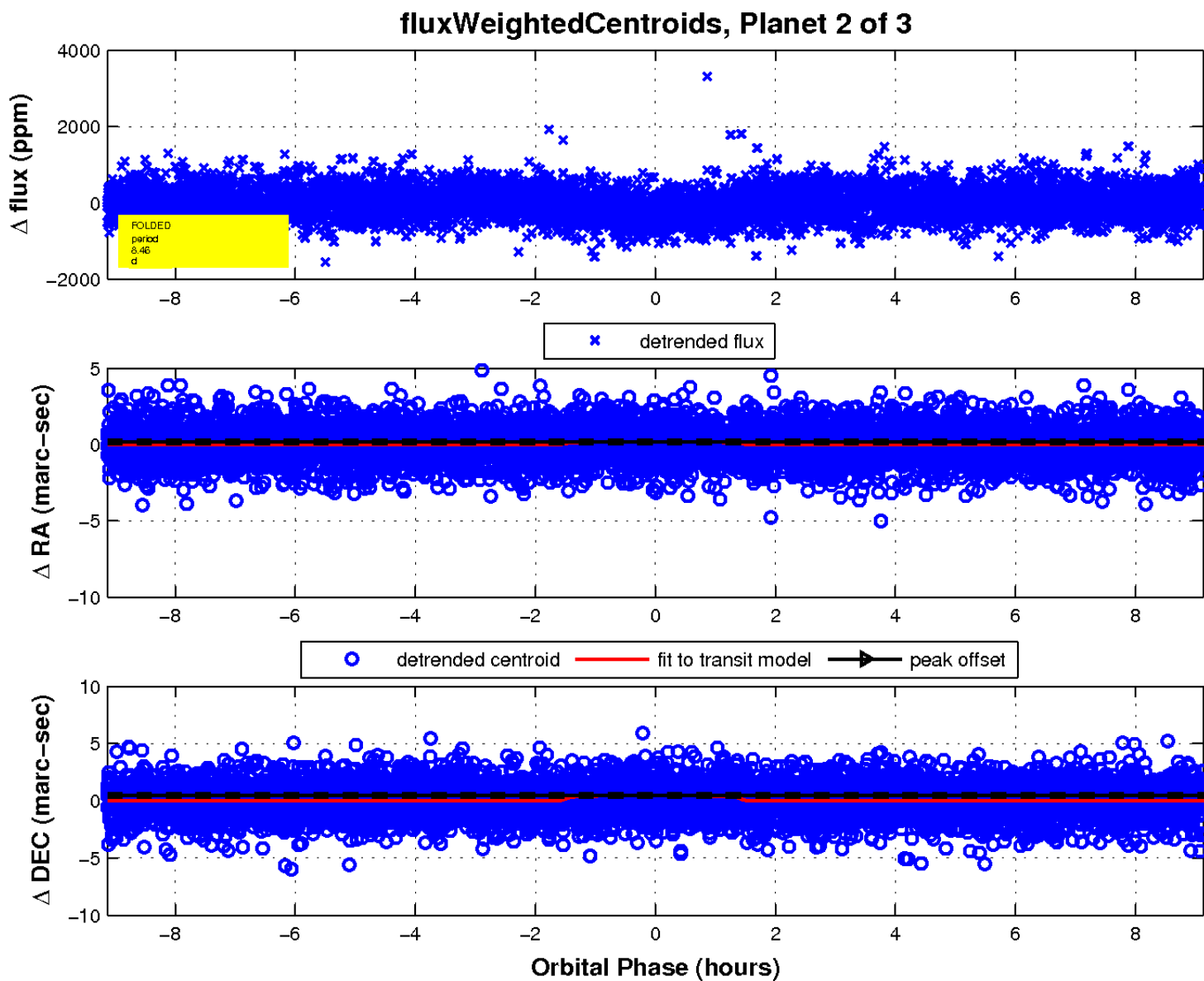
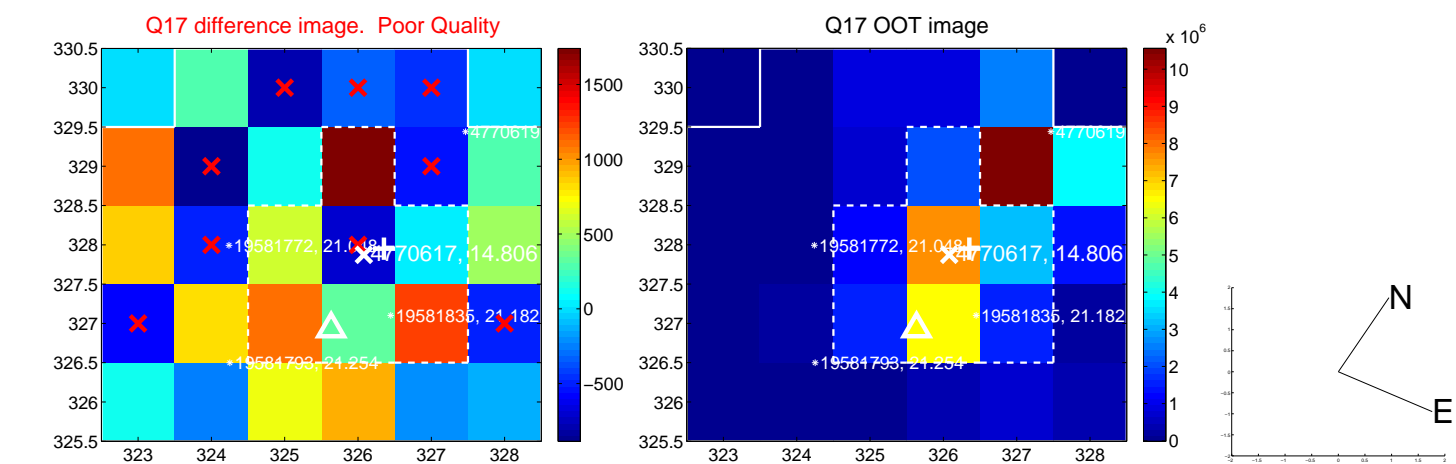
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

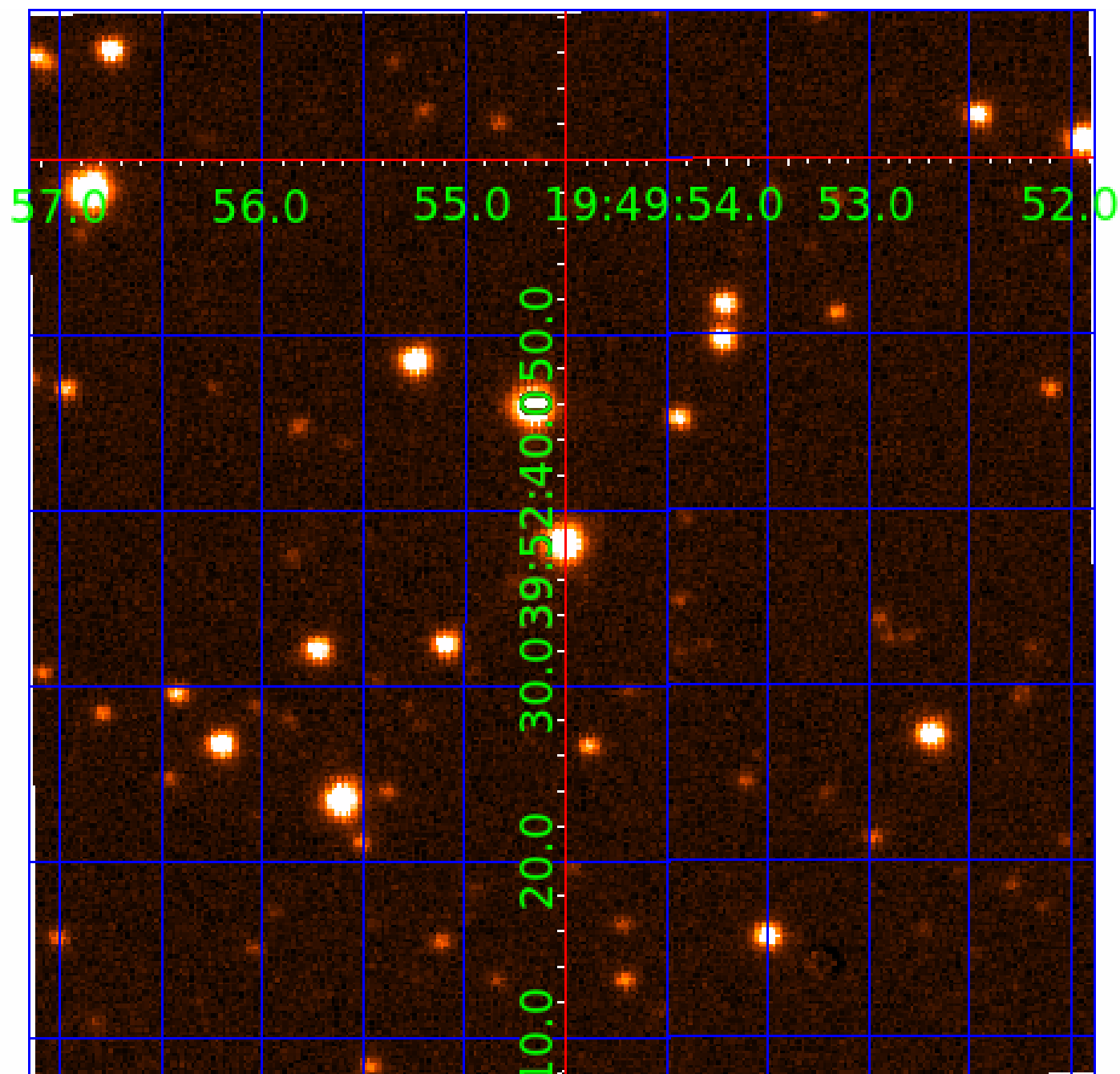


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004770617

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004770617-01	OBS	2243.01	5.185606	132.324131	245.1	4.124	22.7	24.3	1.47	6172	2.62	706.76
004770617-02	OBS	2243.02	8.458043	137.061802	261.7	3.045	16.0	16.9	1.47	6172	2.57	368.11
004770617-03	OBS	2243.03	31.445200	154.582687	457.6	1.454	9.4	10.7	1.47	6172	3.42	63.91

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004770617-01	OBS	PC	1.00	0	0	0	0	CENT_KIC_POS
004770617-02	OBS	PC	0.99	0	0	0	0	CENT_KIC_POS
004770617-03	OBS	PC	0.97	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.

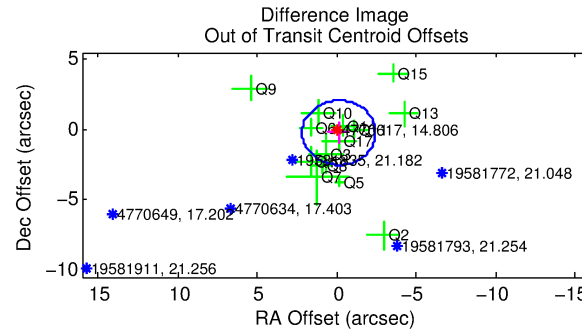
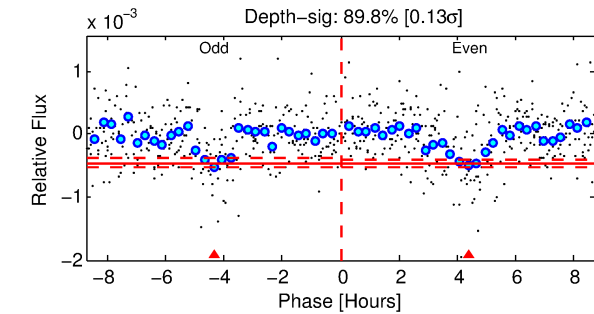
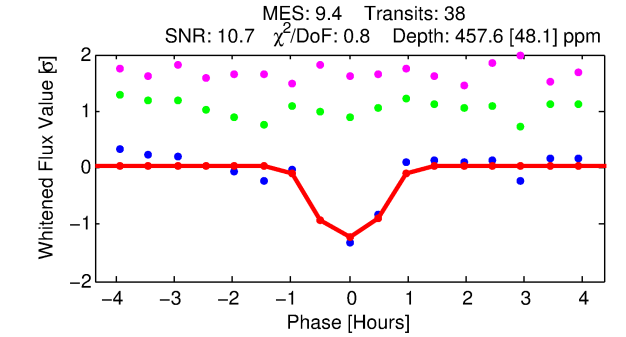
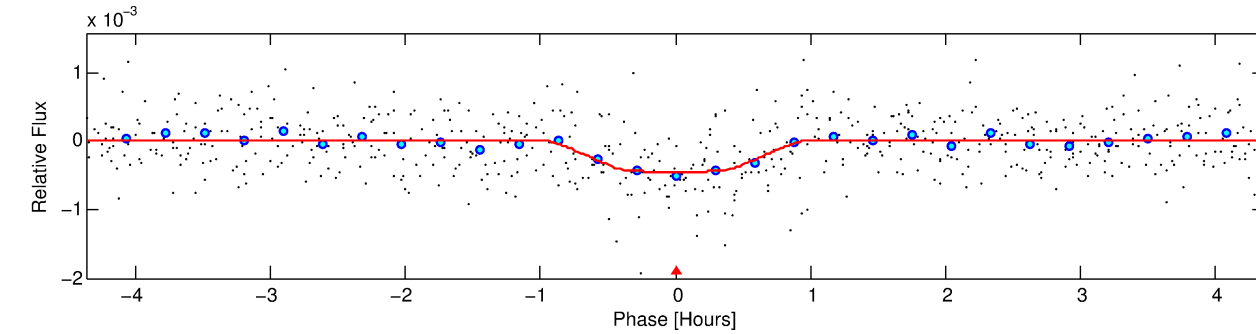
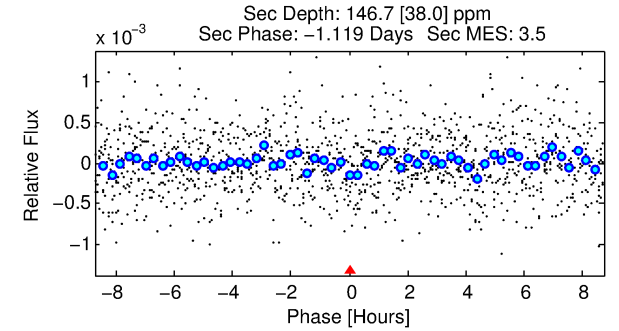
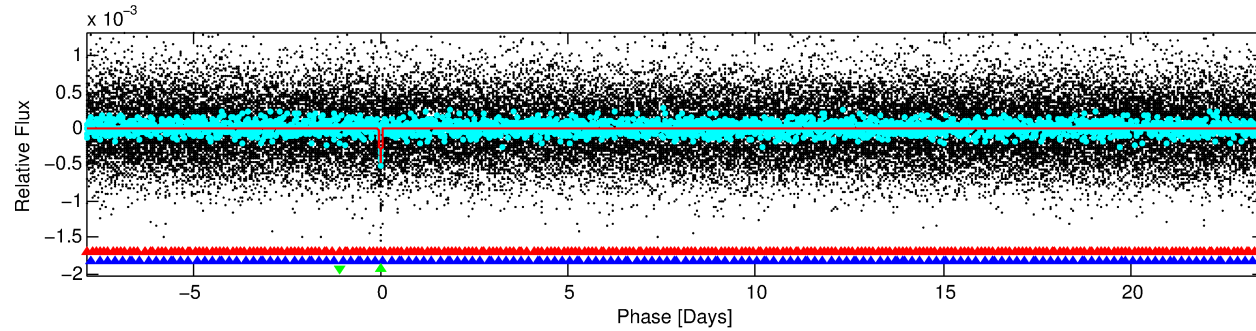
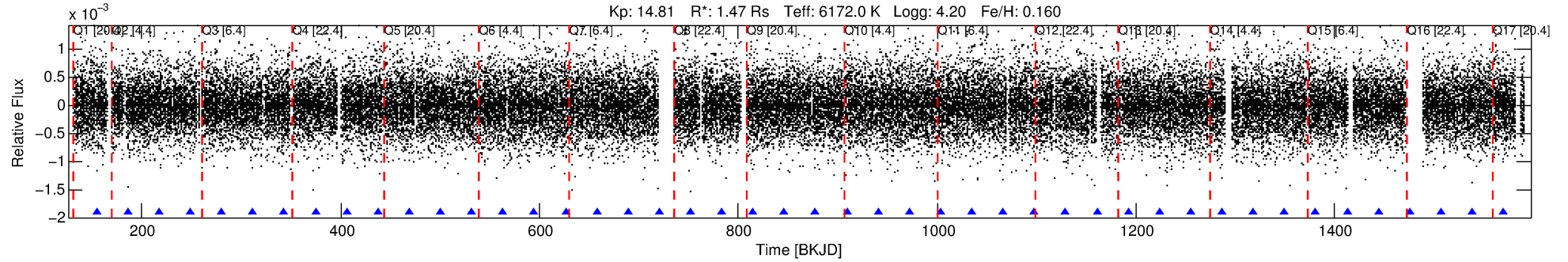
Ephemeris Match Information For 004770617-03

No Significant Match Found

# DV One-Page Summary

KIC: 4770617 Candidate: 3 of 3 Period: 31.445 d

KOI: K02243 Corr: No Ephemeris Match



## DV Fit Results:

Period = 31.44520 [0.00016] d  
Epoch = 154.5827 [0.0041] BKJD  
Rp/R\* = 0.0213 [0.0259]  
a/R\* = 115.43 [680.53]  
b = 0.74 [3.58]  
Seff = 63.91 [15.86]  
Teq = 721 [45] K  
Rp = 3.42 [4.22] Re  
a = 0.2098 [0.0355] AU  
Ag = 302.95 [743.70] [0.41 $\sigma$ ]  
Teffp = 4651 [2841] K [1.38 $\sigma$ ]

## DV Diagnostic Results:

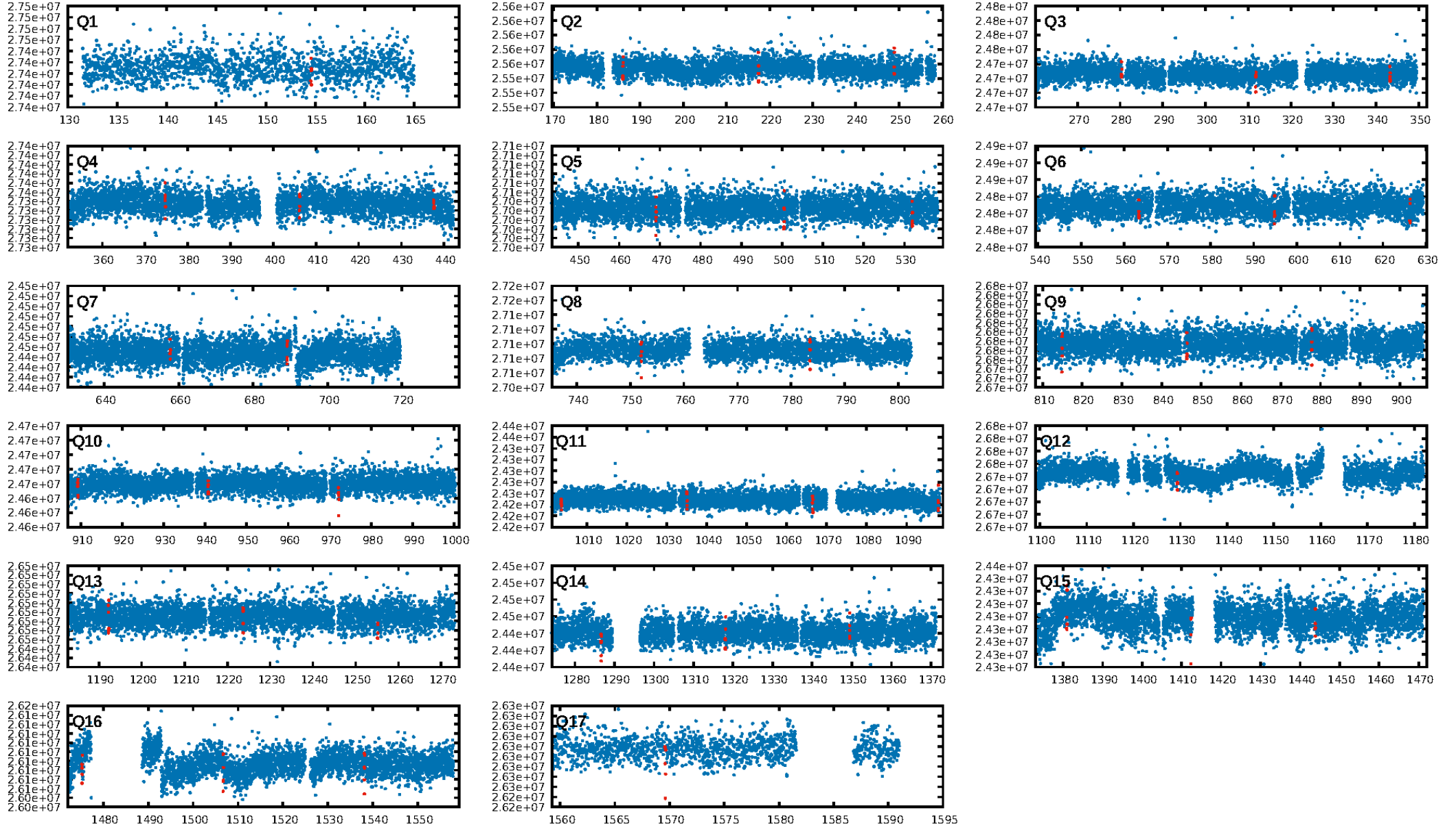
ShortPeriod-sig: 100.0% [163.51 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 65.1%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 4.88e-21  
RollingBand-fgt: 1.00 [36/36]  
GhostDiagnostic-chr: -0.8509  
Centroid-sig: 83.5%  
Centroid-so: 1.667 arcsec [1.76 $\sigma$ ]  
OotOffset-rm: 0.266 arcsec [0.35 $\sigma$ ]  
KicOffset-rm: 0.644 arcsec [0.88 $\sigma$ ]  
OotOffset-st: 4/4/1/5 [14]  
KicOffset-st: 4/4/1/5 [14]  
DiffImageQuality-fgm: 0.29 [4/14]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 16:01:25 Z

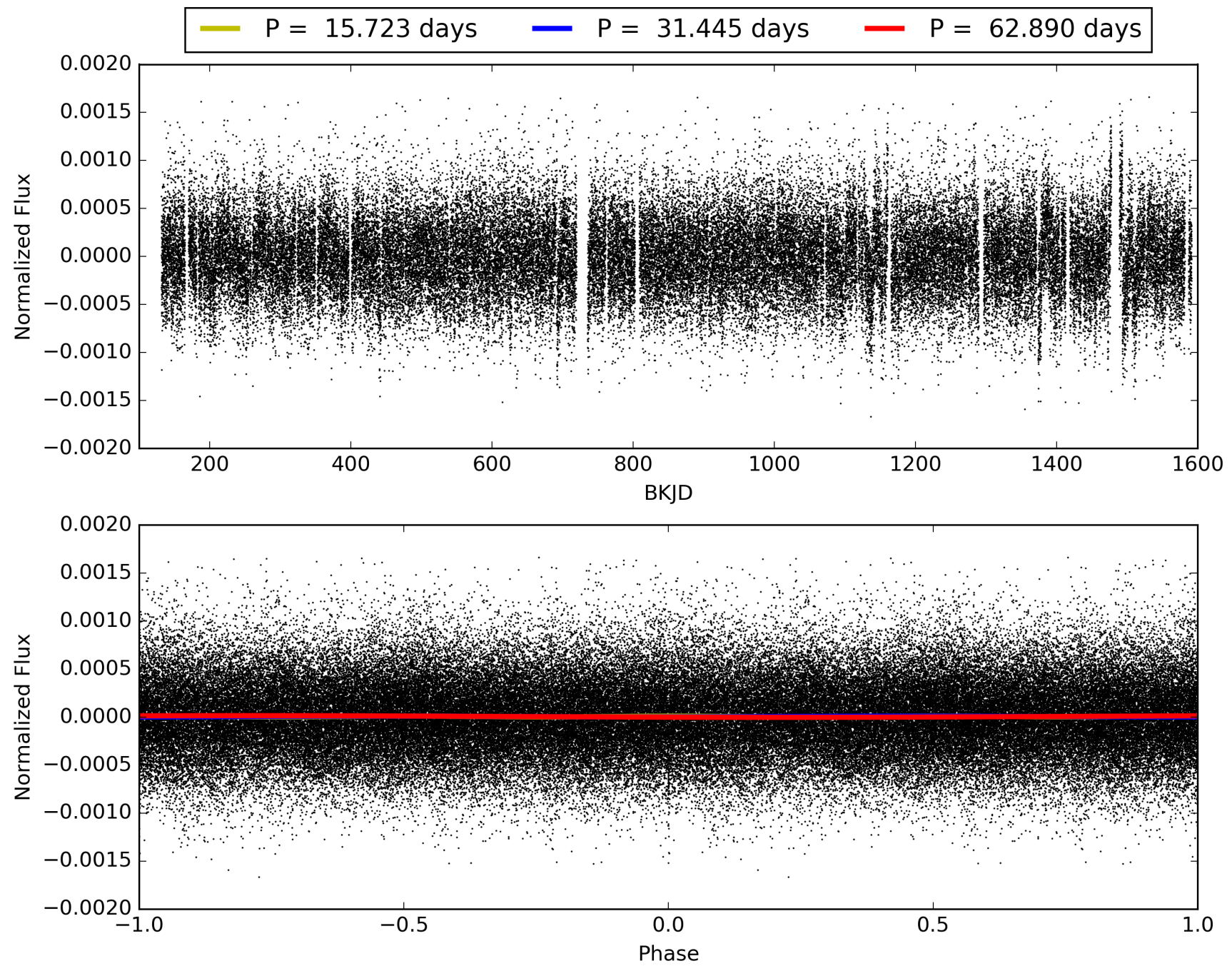
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 004770617-03, PDC Light Curves

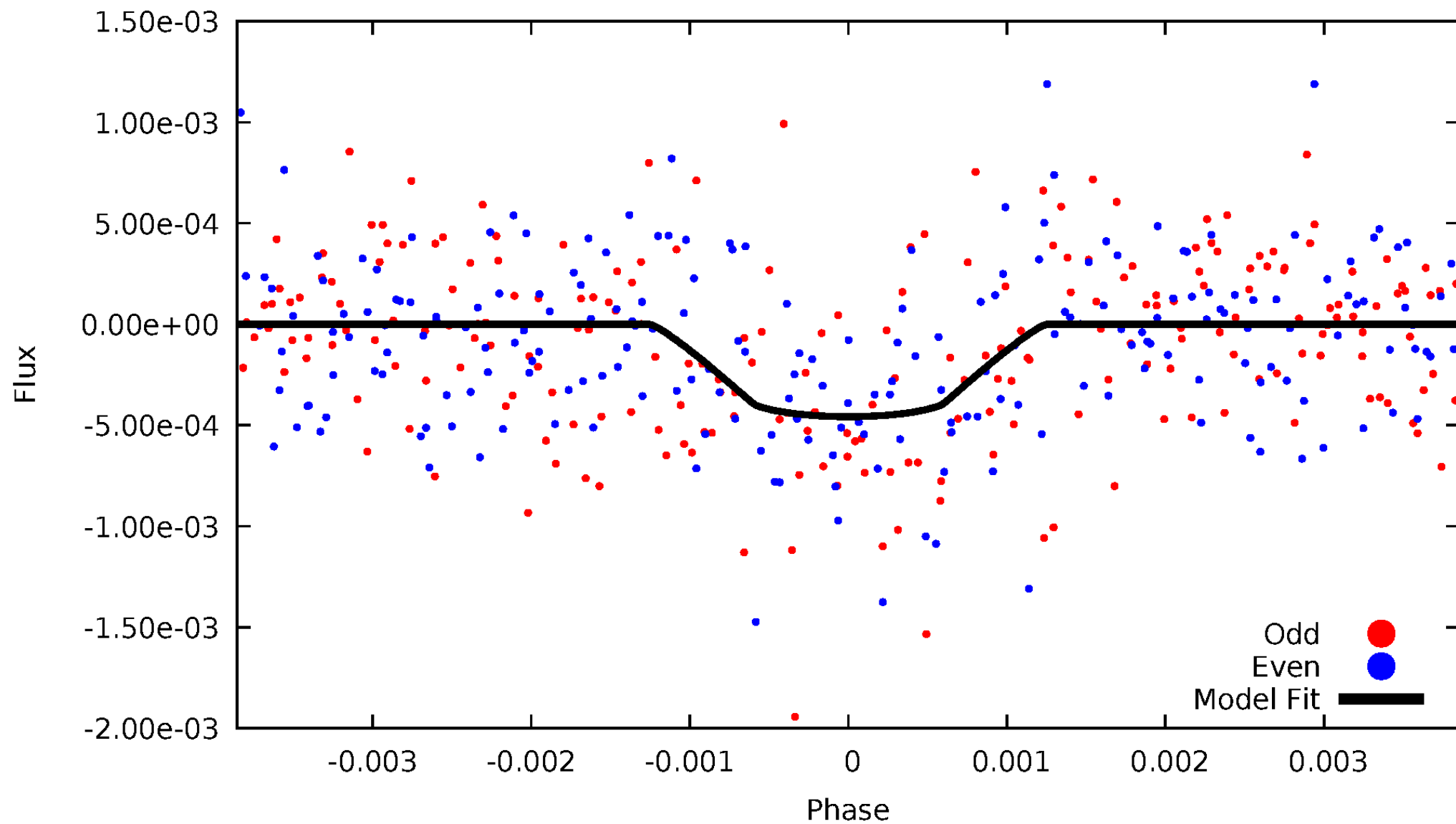


TCE 004770617-03



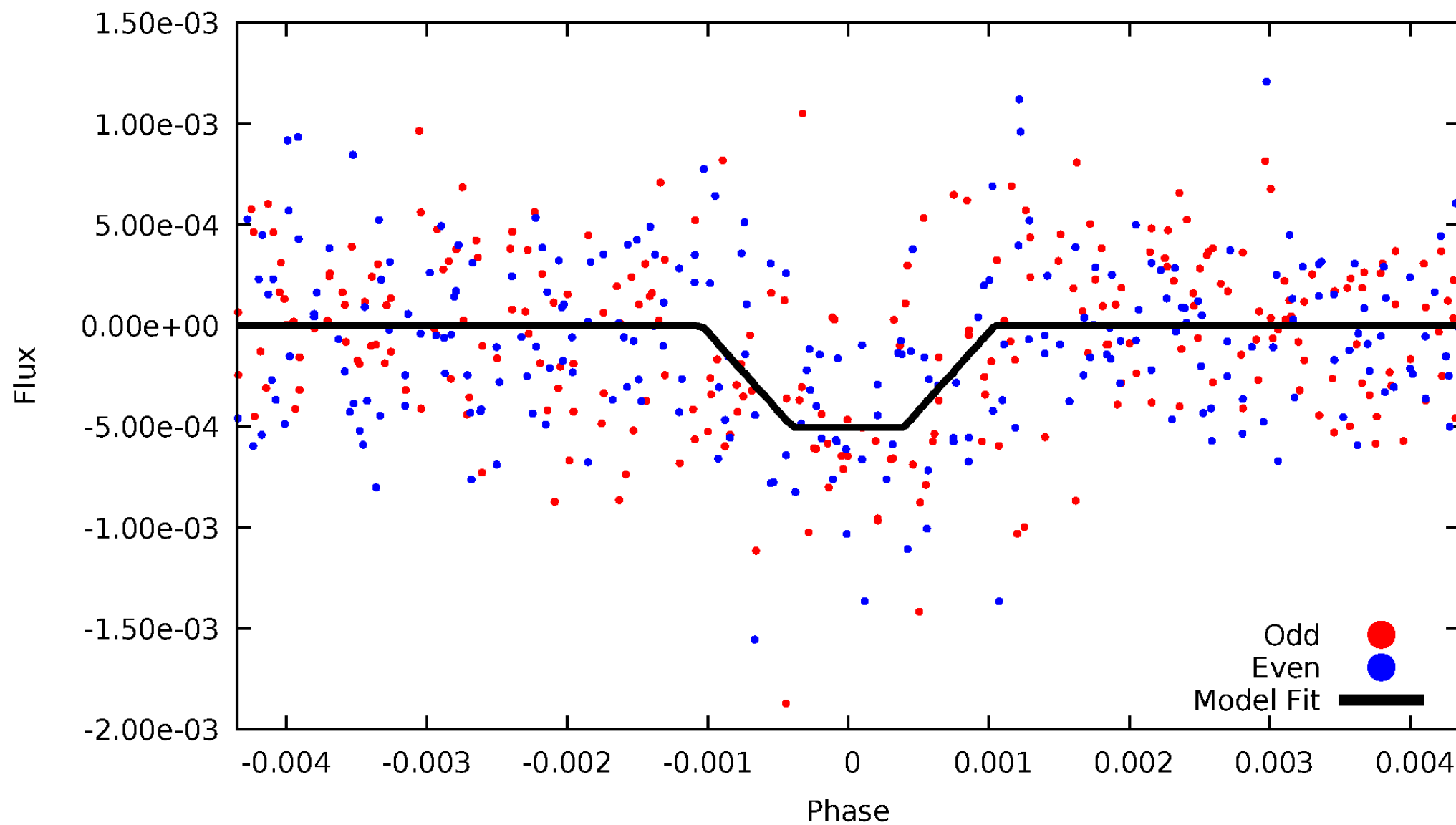
# DV Odd/Even

TCE 004770617-03



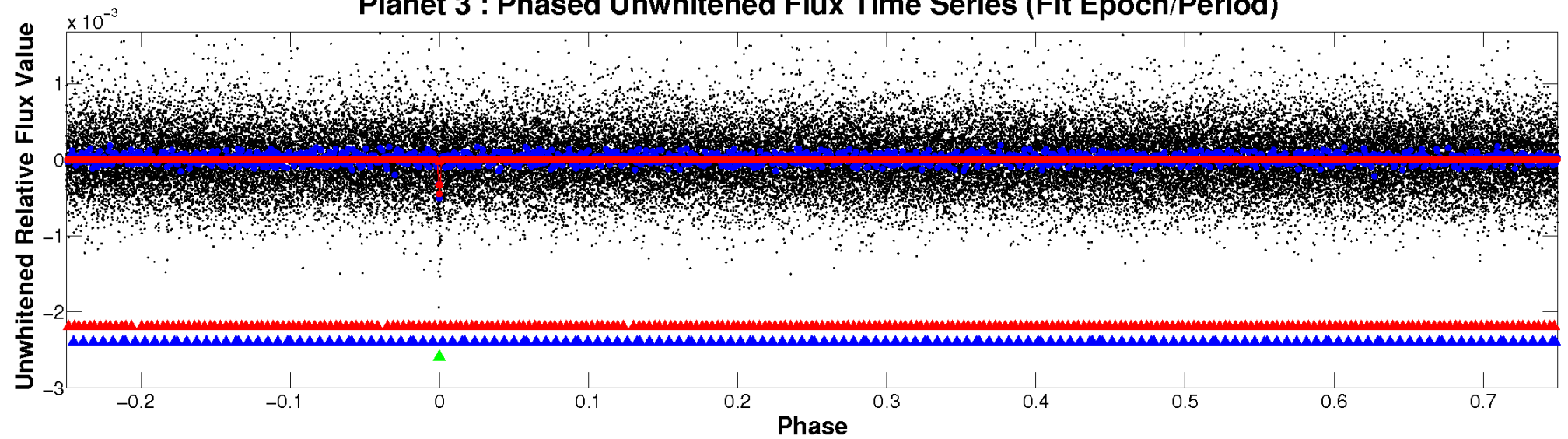
# ALT Odd/Even

TCE 004770617-03

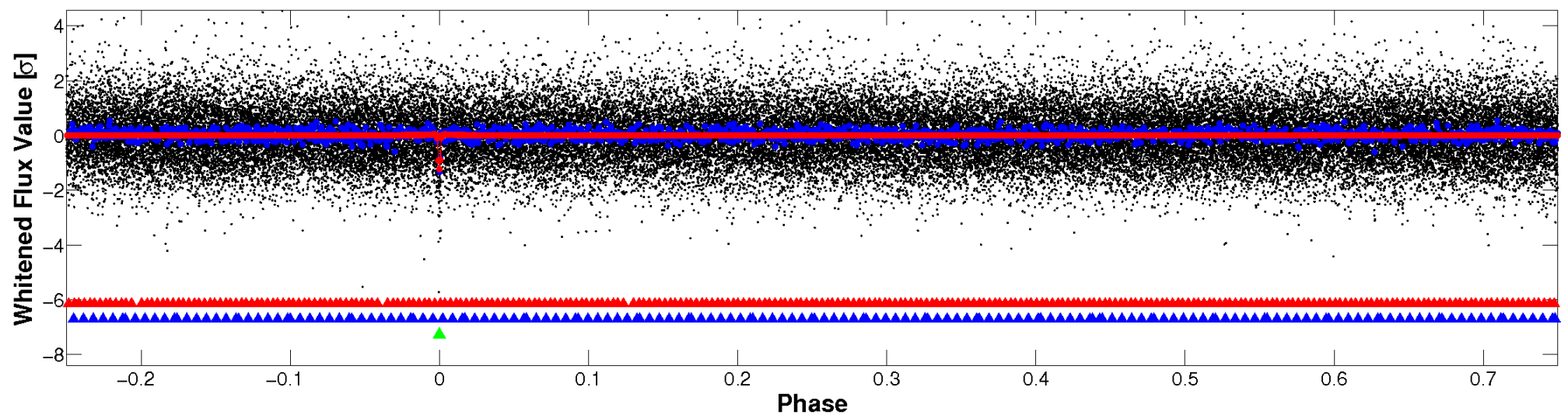


# Non-Whitened Vs. Whitened Light Curve

**Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)**

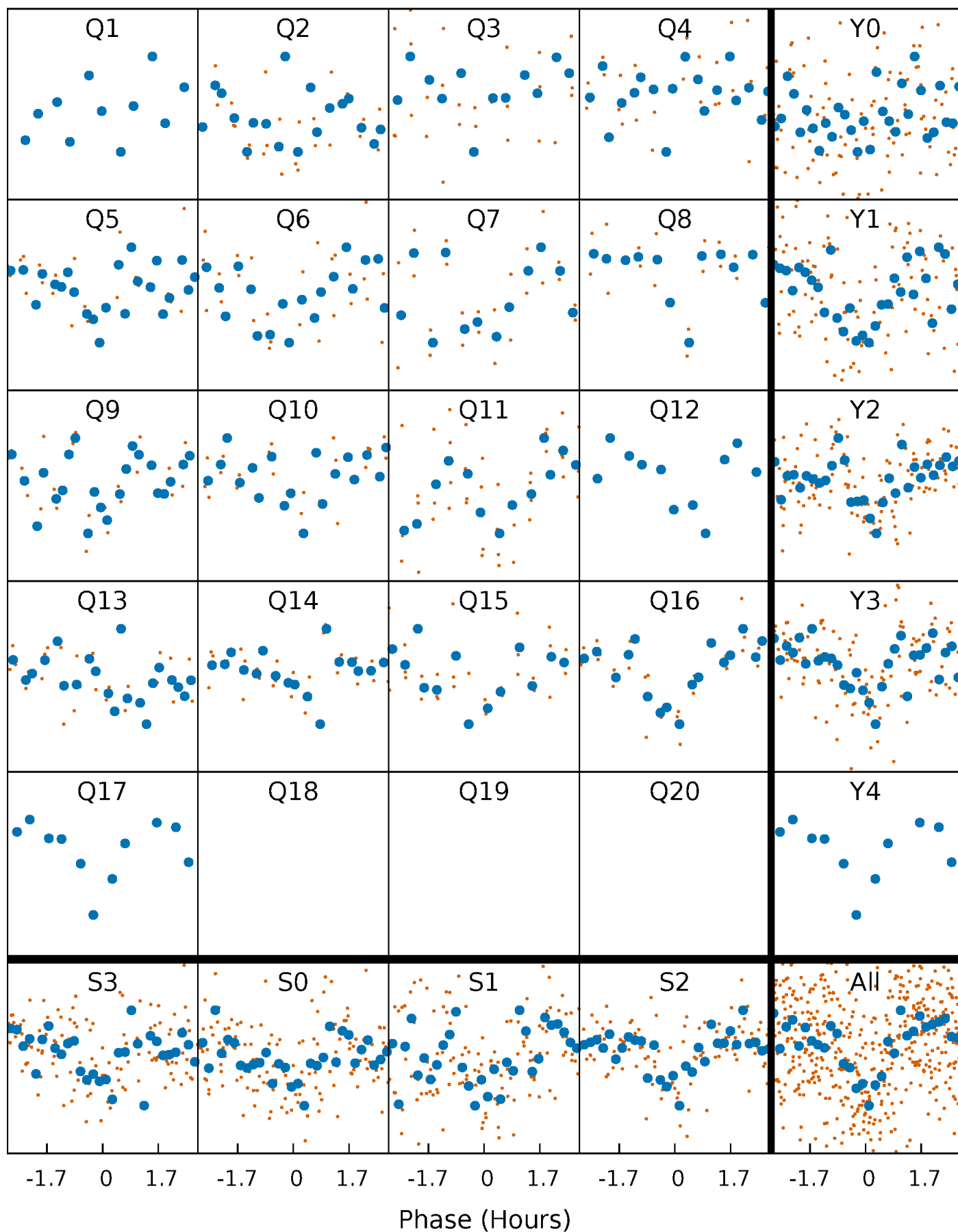


**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

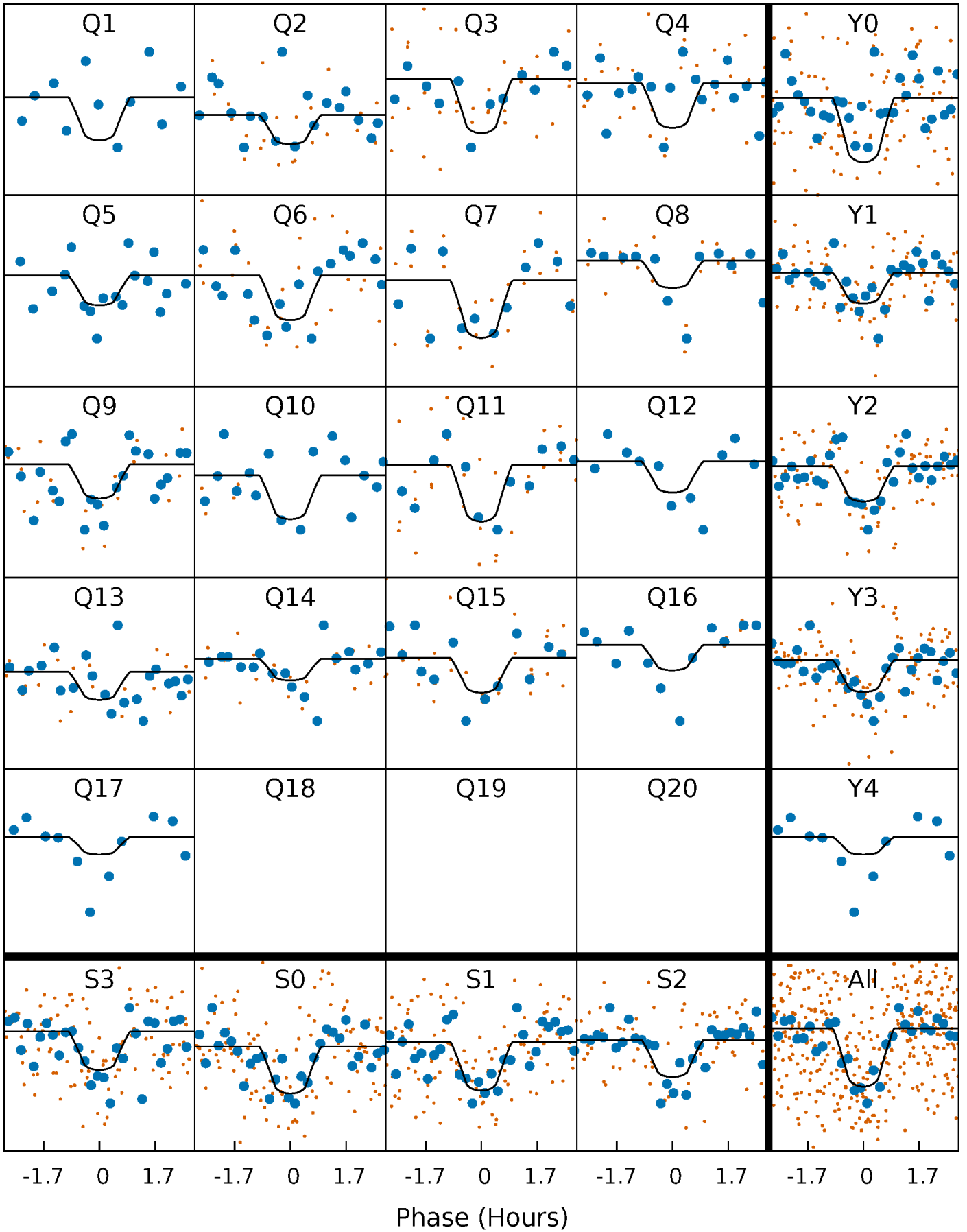
TCE 004770617-03 P= 31.445200 Days  $T_0=154.582687$  (BKJD)





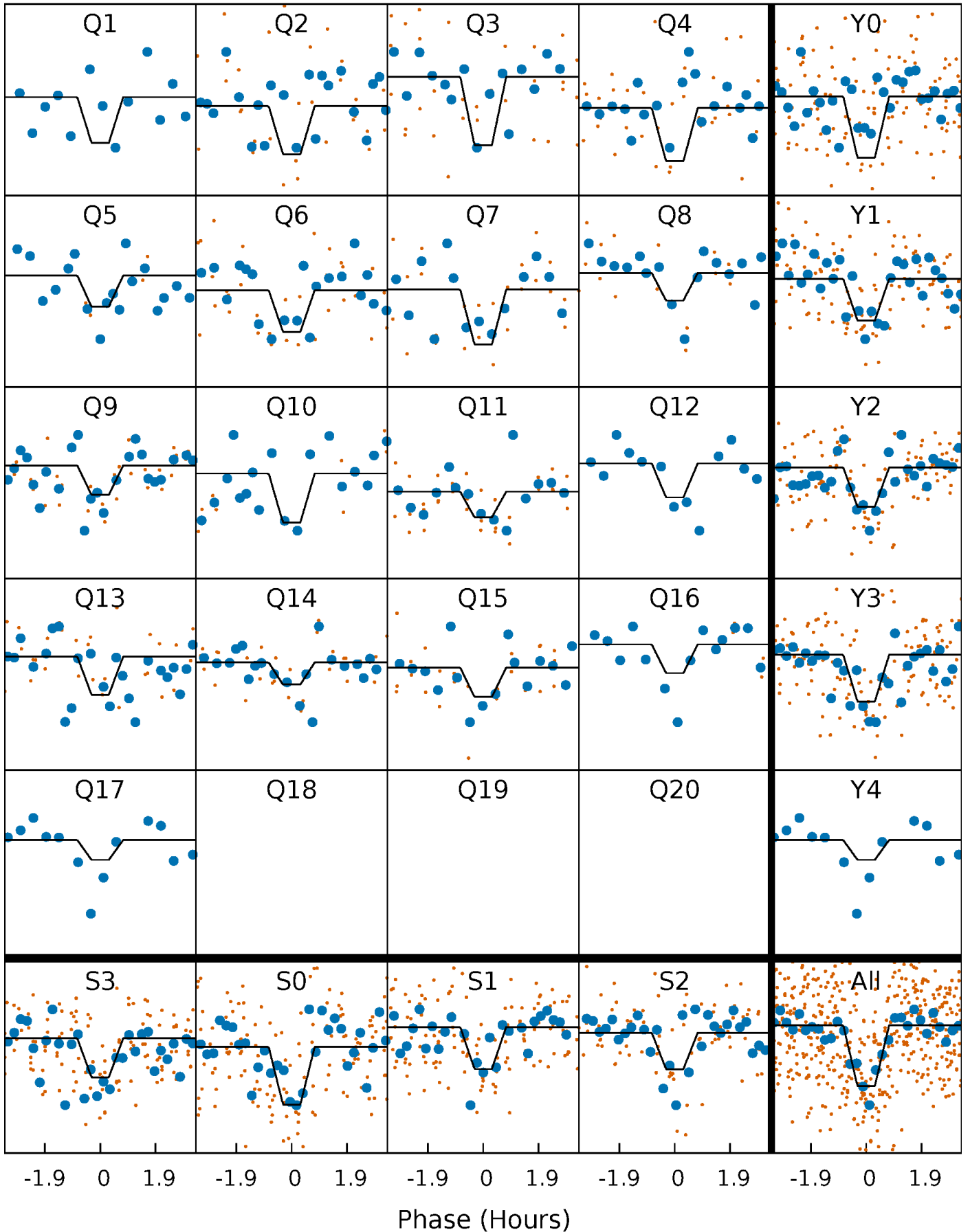
# DV Quarter-Phased Transit Curves

TCE 004770617-03 P= 31.445200 Days  $T_0=154.582687$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

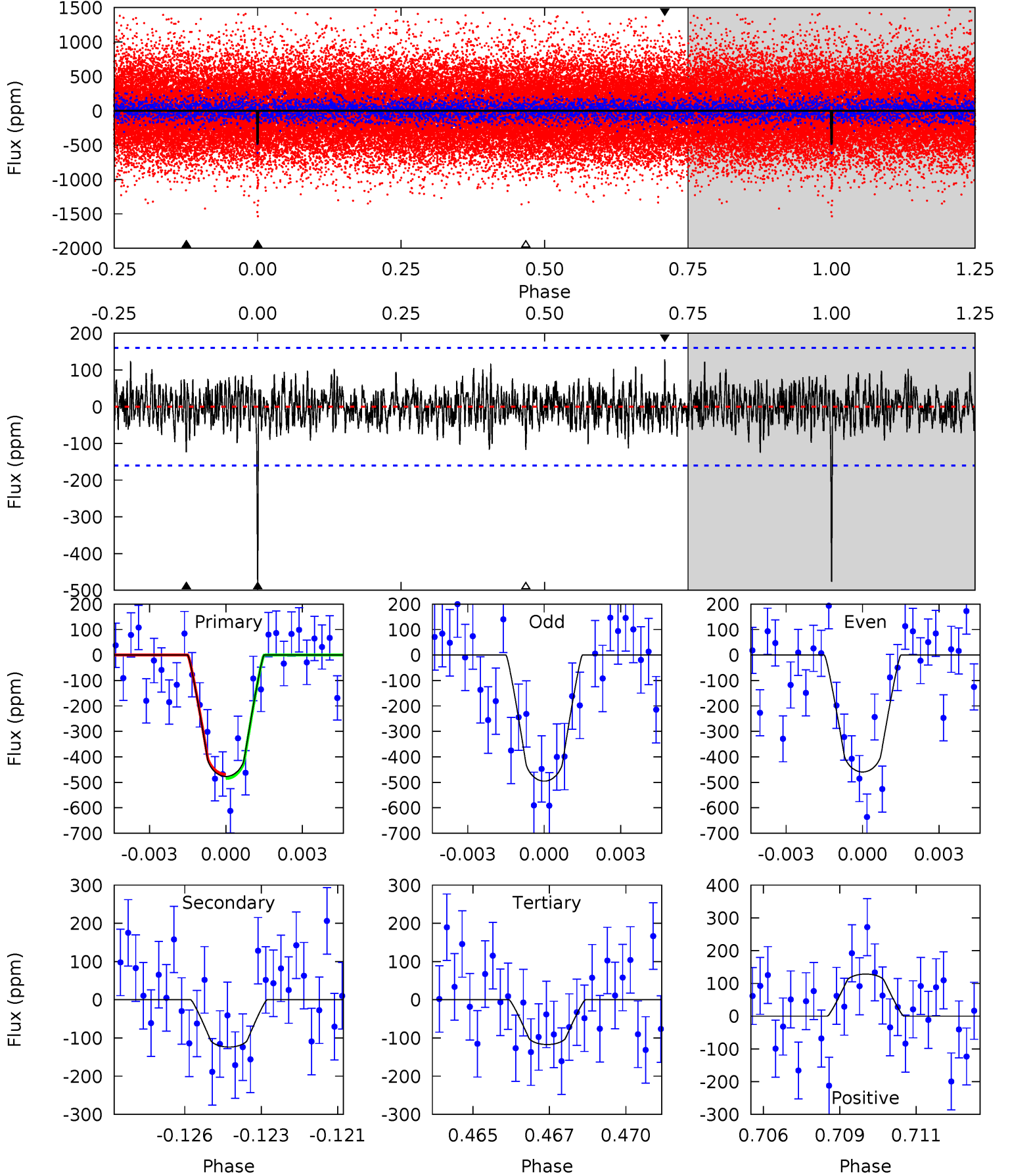
TCE 004770617-03 P= 31.445340 Days  $T_0=154.579673$  (BKJD)



# DV Model-Shift Uniqueness Test

004770617-03, P = 31.445200 Days, E = 123.137487 Days

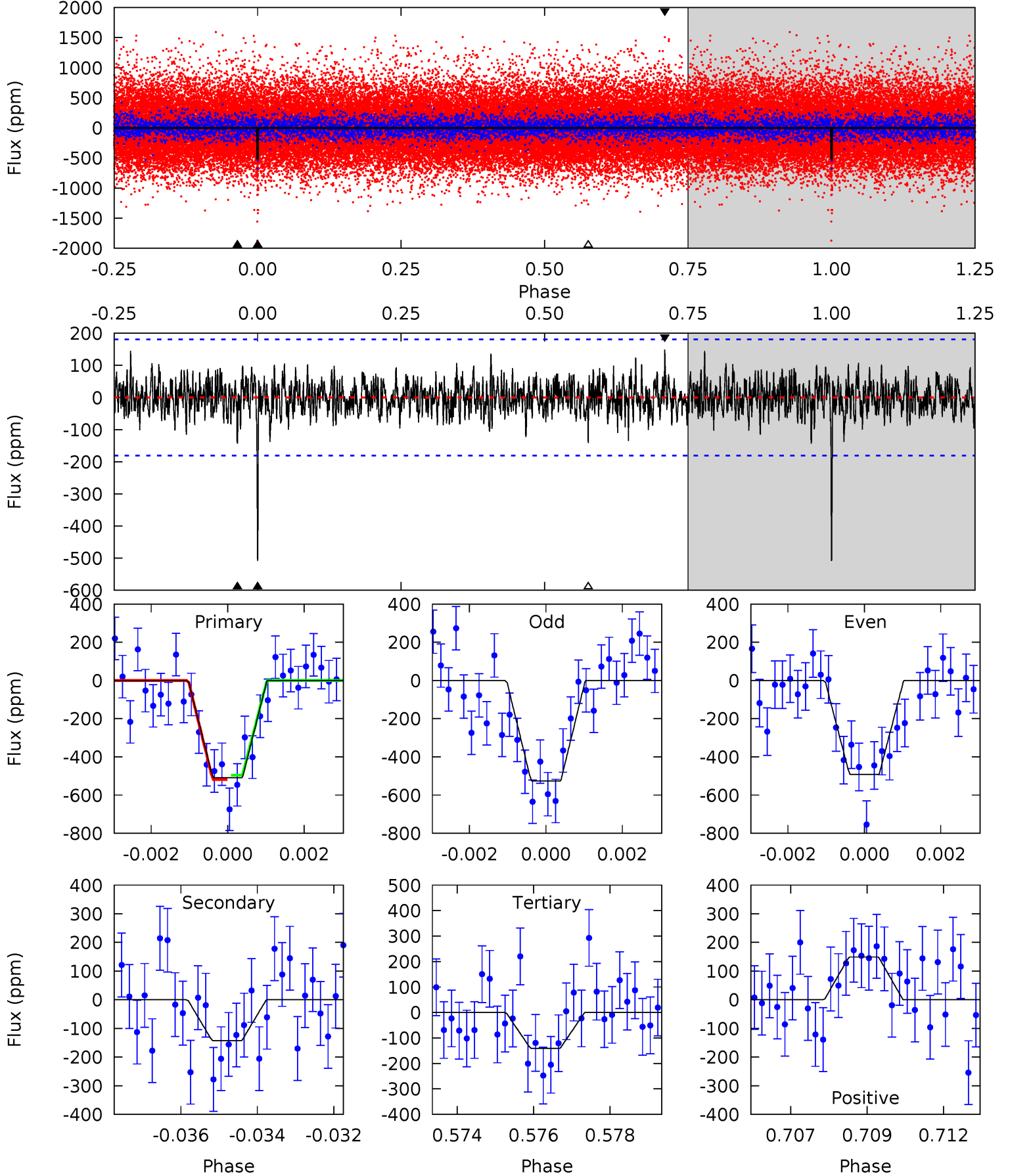
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.7	4.09	3.87	4.24	5.29	3.02	1.23	11.9	11.5	0.22	-0.15	0.60	0.97	0.21	0.27



# Alt Model-Shift Uniqueness Test

004770617-03, P = 31.445340 Days, E = 123.134333 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.0	4.21	4.16	4.40	5.32	3.09	1.20	10.8	10.6	0.05	-0.19	0.50	0.87	0.23	0.34



### Stellar Parameters For KIC 004770617

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6172^{+74}_{-86}$	$4.198^{+0.130}_{-0.130}$	$0.160^{+0.150}_{-0.150}$	$1.471^{+0.301}_{-0.247}$	$1.250^{+0.095}_{-0.116}$	$0.553^{+0.339}_{-0.209}$
	+1%/-1%	+3%/-3%	+94%/-94%	+20%/-17%	+8%/-9%	+61%/-38%
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 004770617-03 / KOI 2243.03

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-124 \pm 30$	$4.33^{+3.55}_{-2.84}$	$1004^{+53}_{-44}$	$4196^{+2590}_{-806}$	$155^{+1224}_{-111}$
Alt.	$-143 \pm 34$	$4.59^{+3.64}_{-2.88}$	$1005^{+51}_{-48}$	$4239^{+2176}_{-792}$	$168^{+994}_{-118}$

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



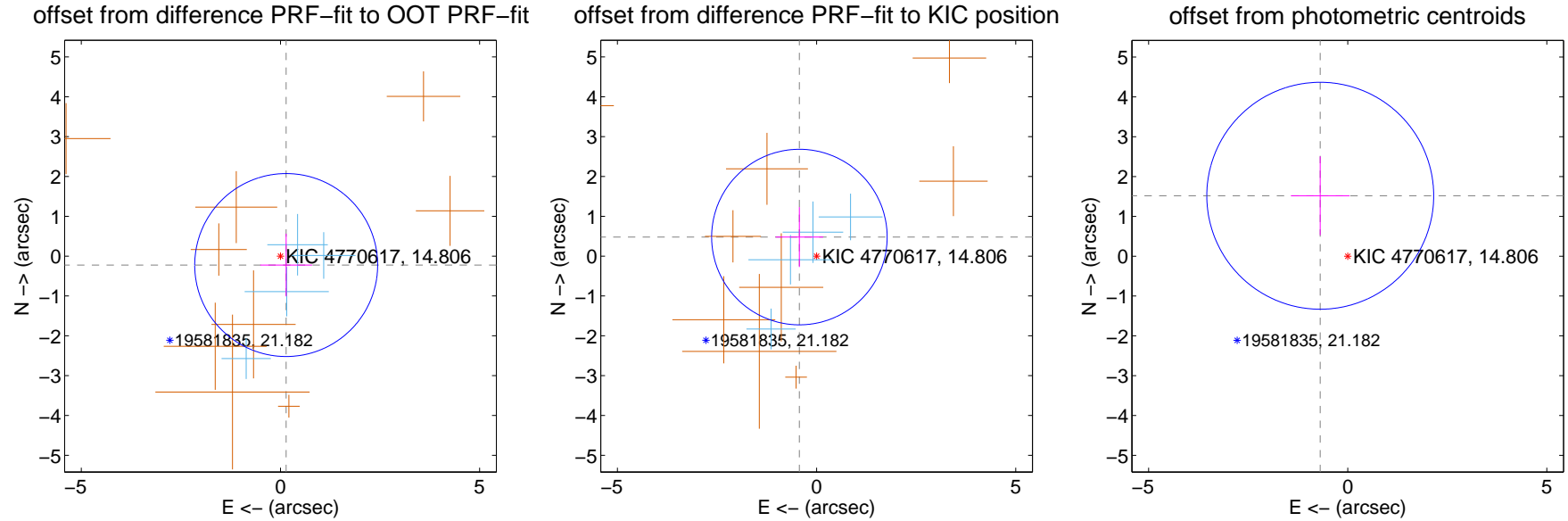
## DV Centroid Data

Supplemental centroid analysis for 004770617-03. Kepler magnitude: 14.81. Transit SNR 10.68

There are 4 quarters with good PRF difference image offsets

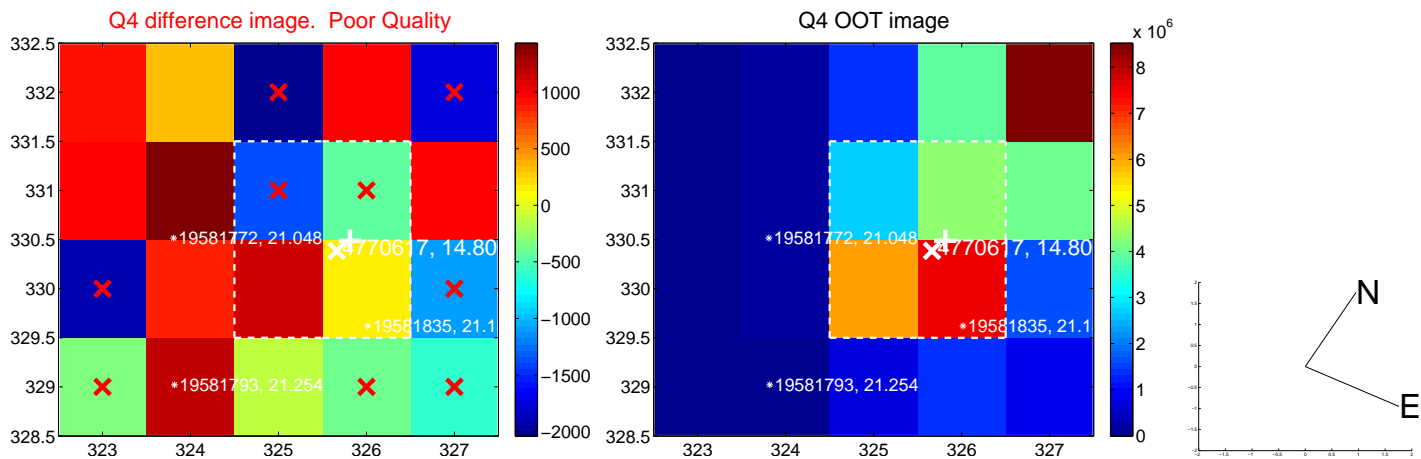
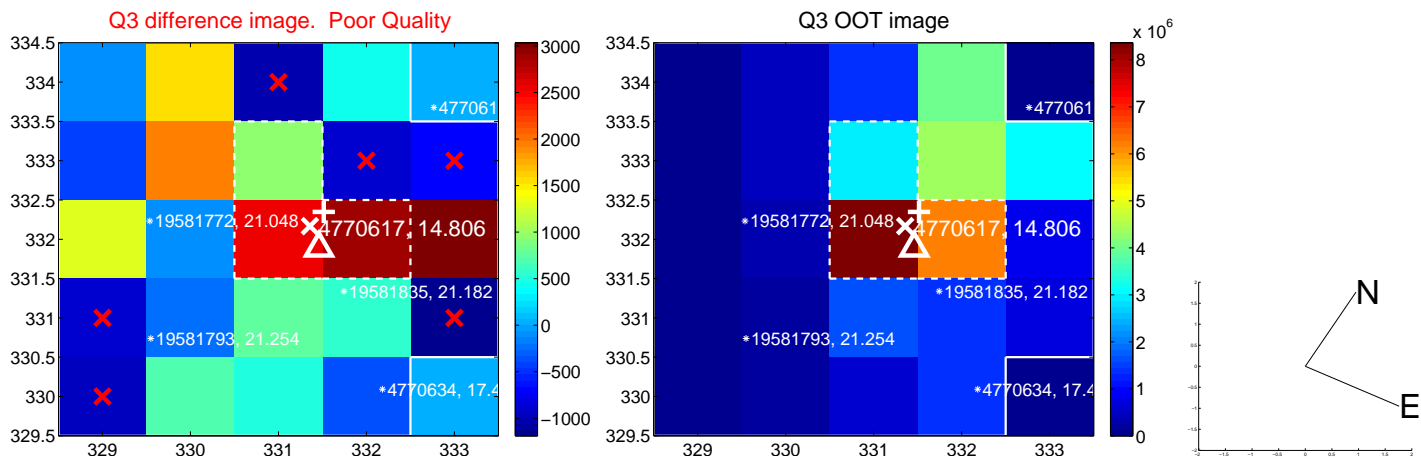
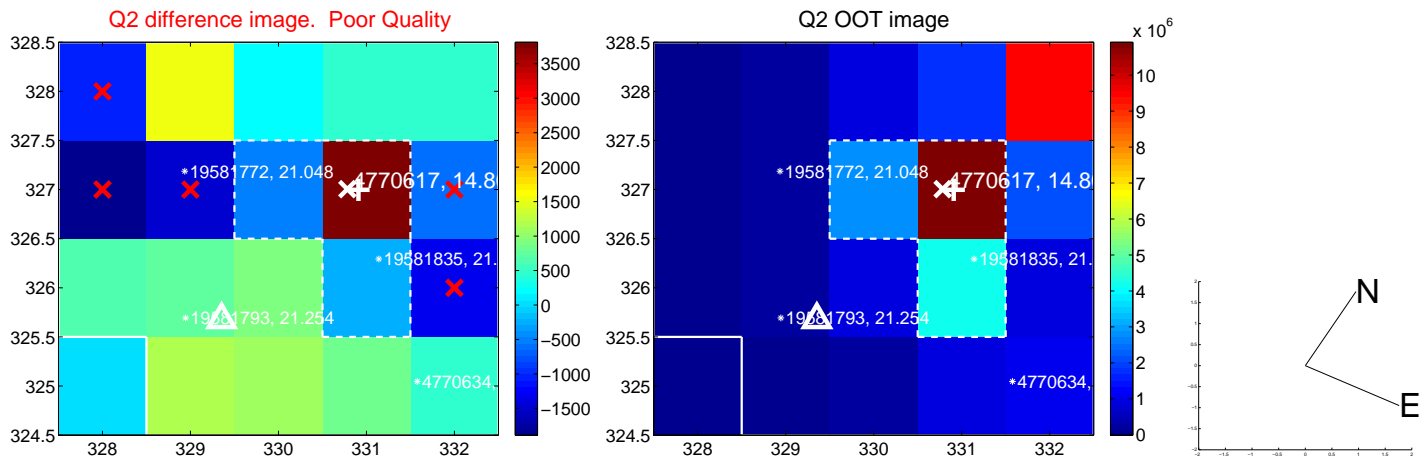
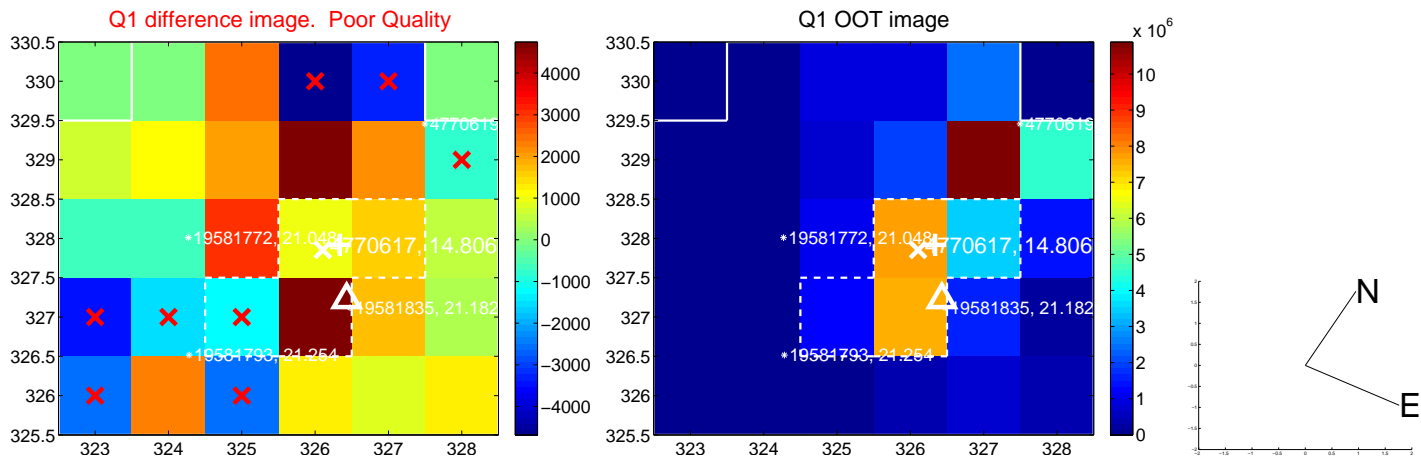
The direct PRF centroid is offset from the target star catalog position by about 1.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.266 \pm 0.766$	0.35	$-0.144 \pm 0.650$	$-0.224 \pm 0.786$
PRF-fit source offset from KIC position	$0.644 \pm 0.735$	0.88	$0.431 \pm 0.597$	$0.479 \pm 0.752$
photometric centroid source offset	$1.67 \pm 0.95$	1.76	$0.69 \pm 0.74$	$1.52 \pm 0.99$

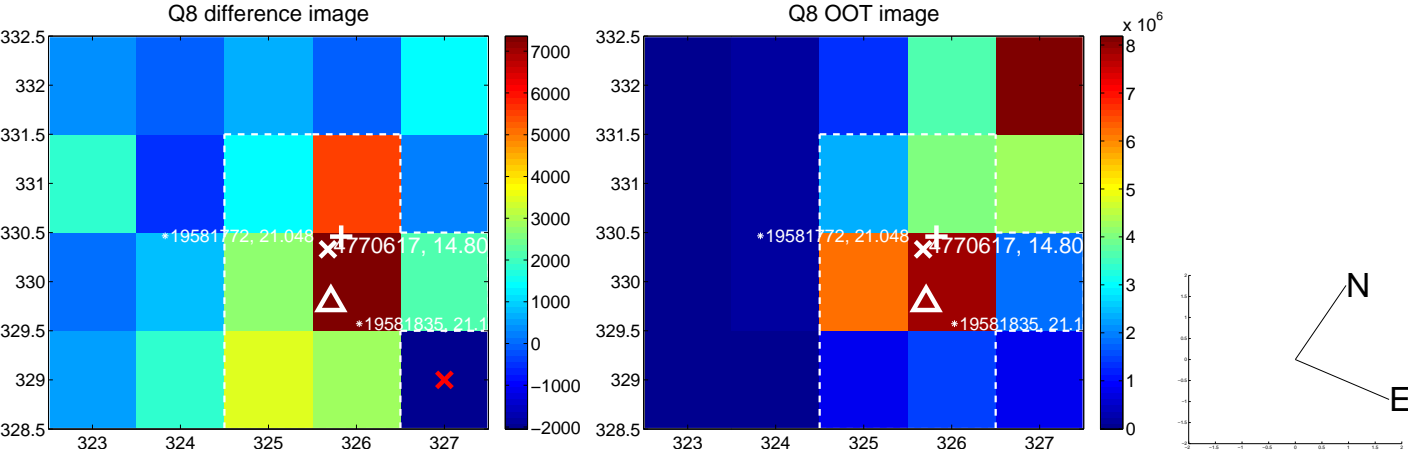
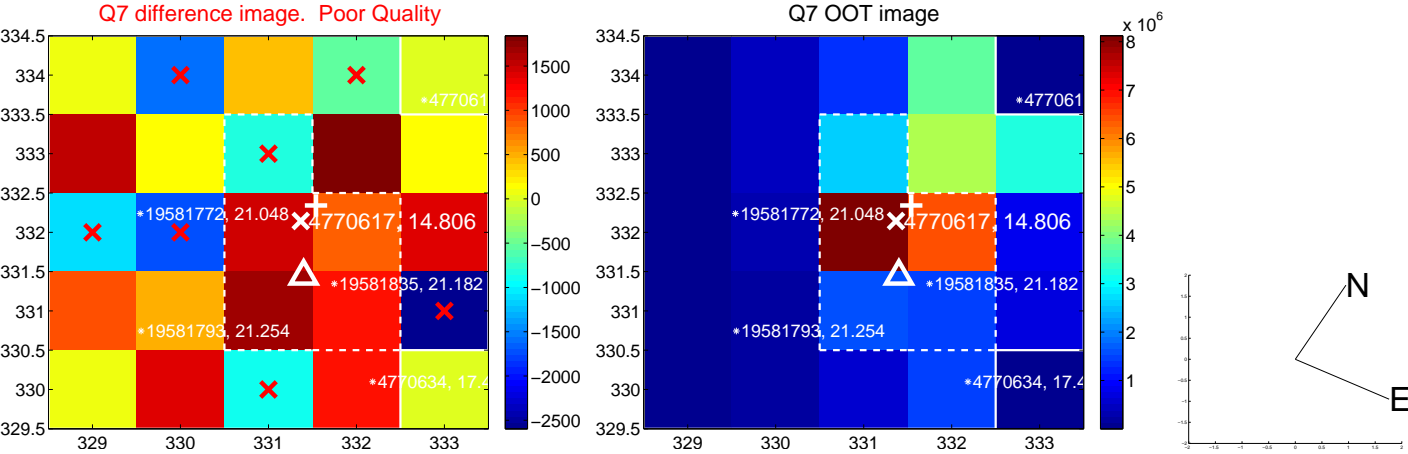
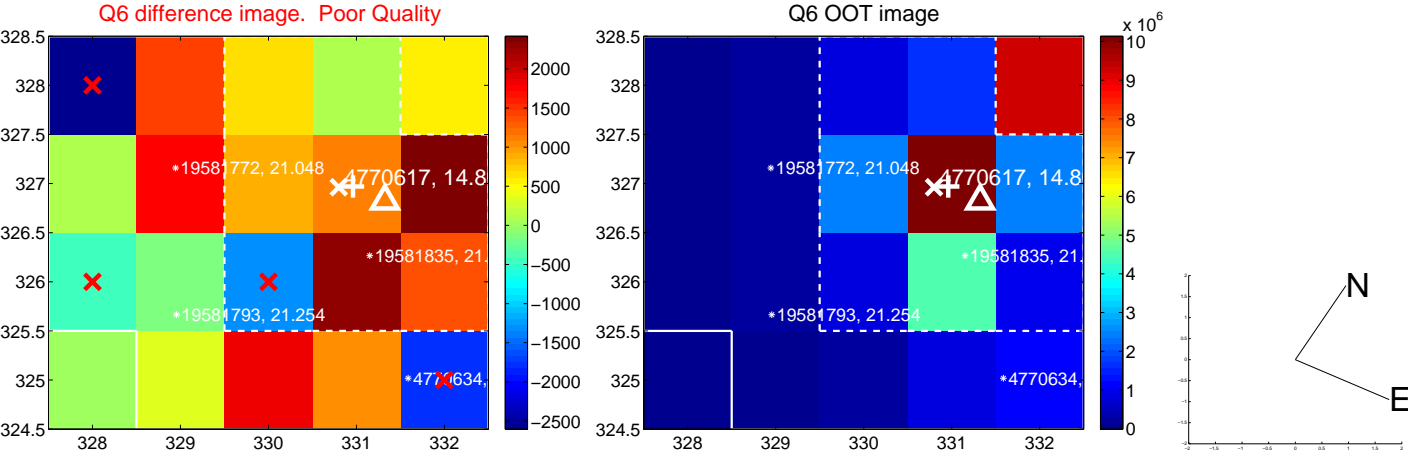
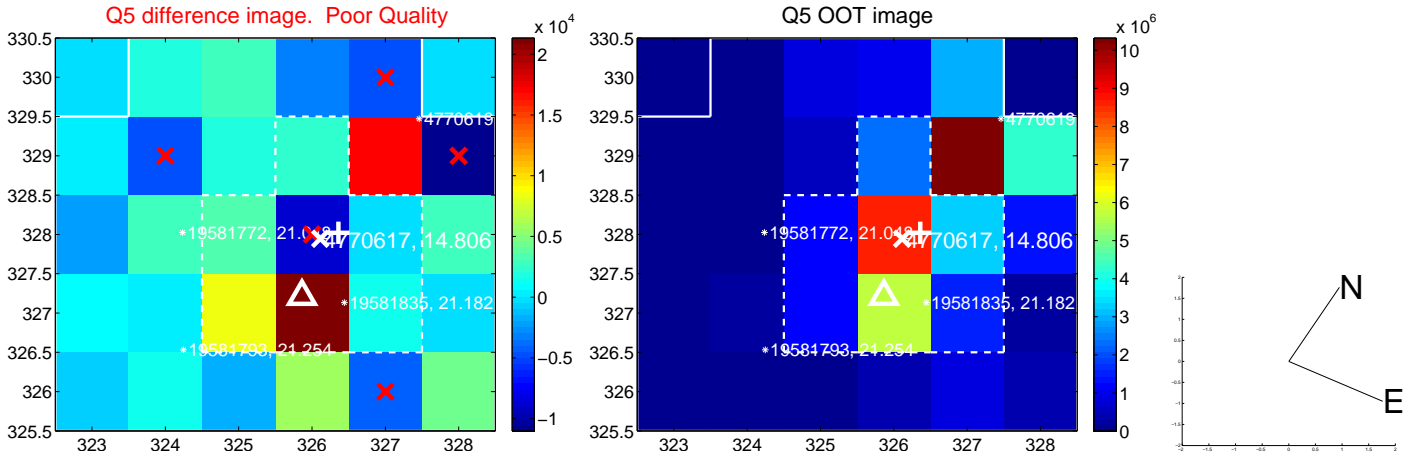


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

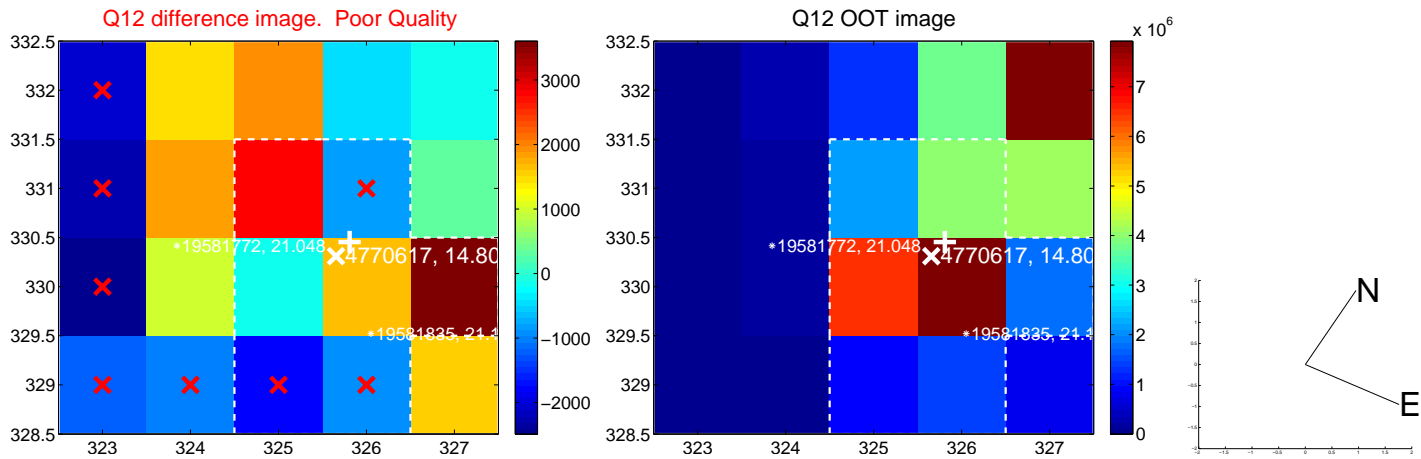
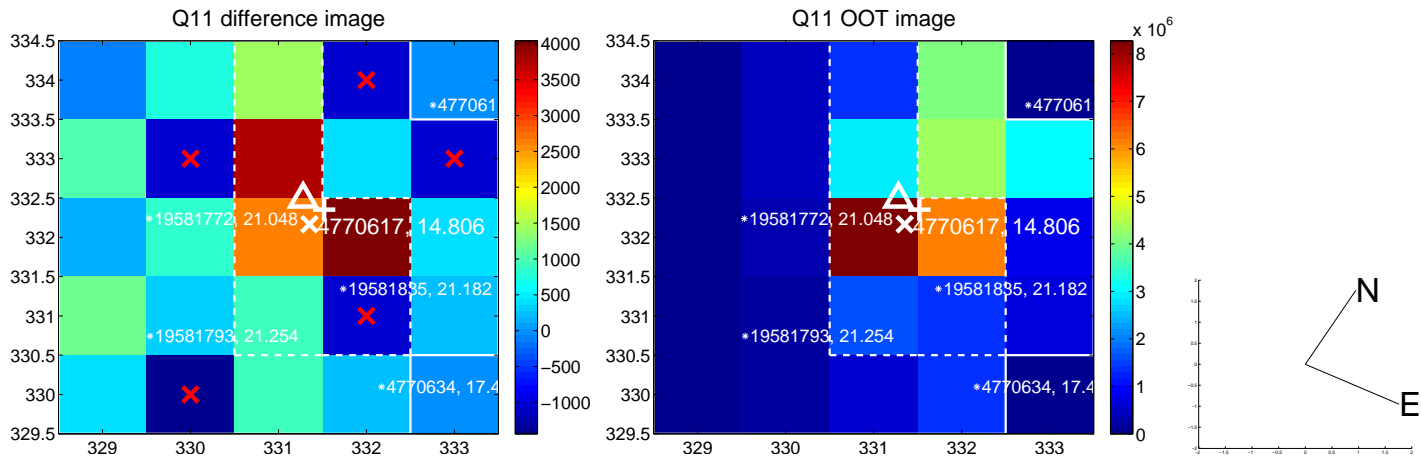
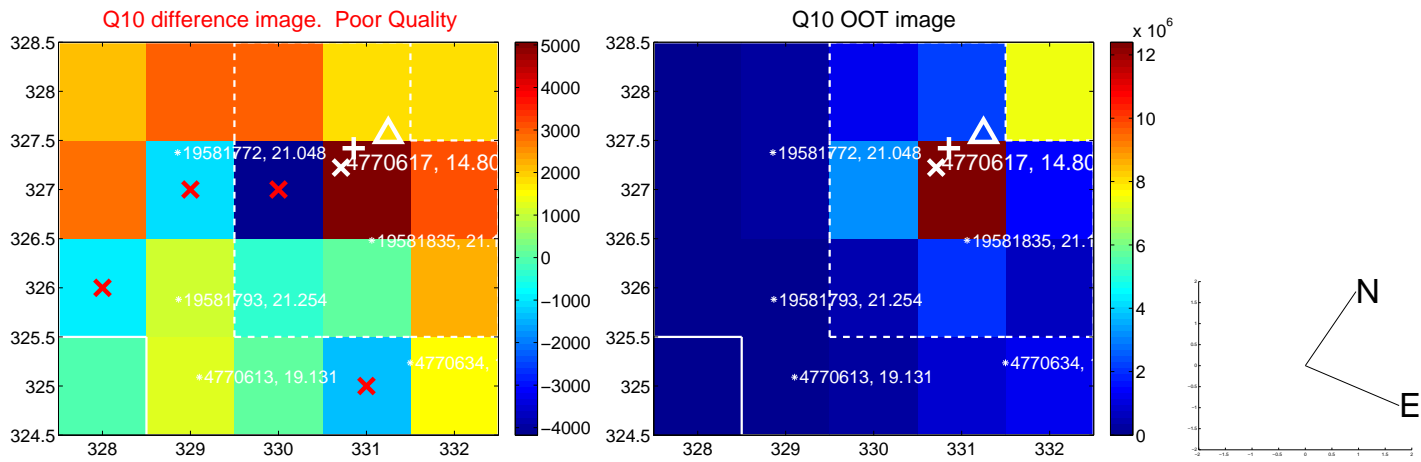
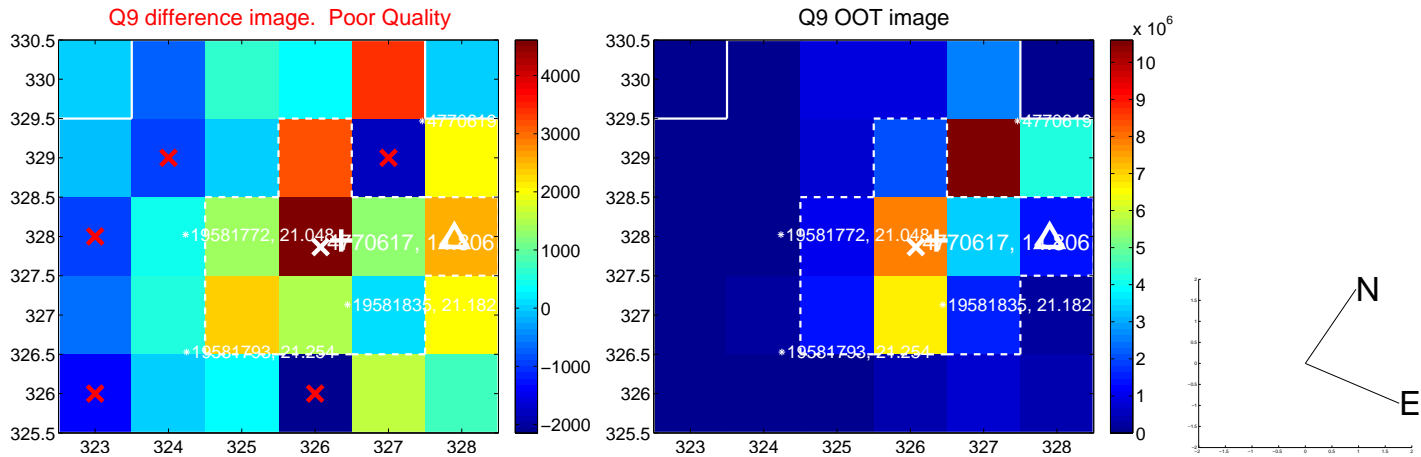
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



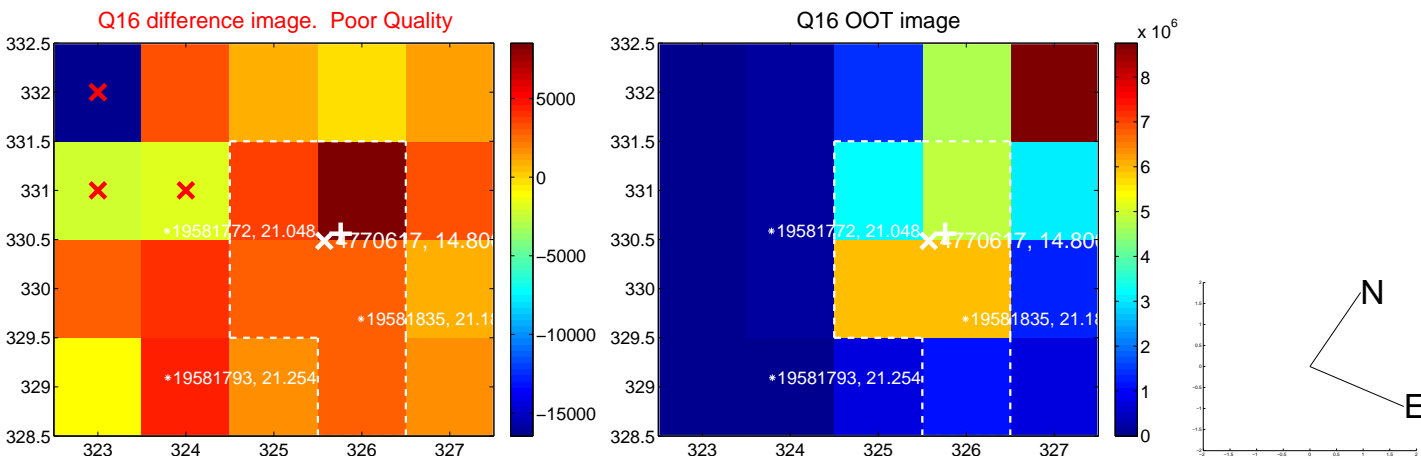
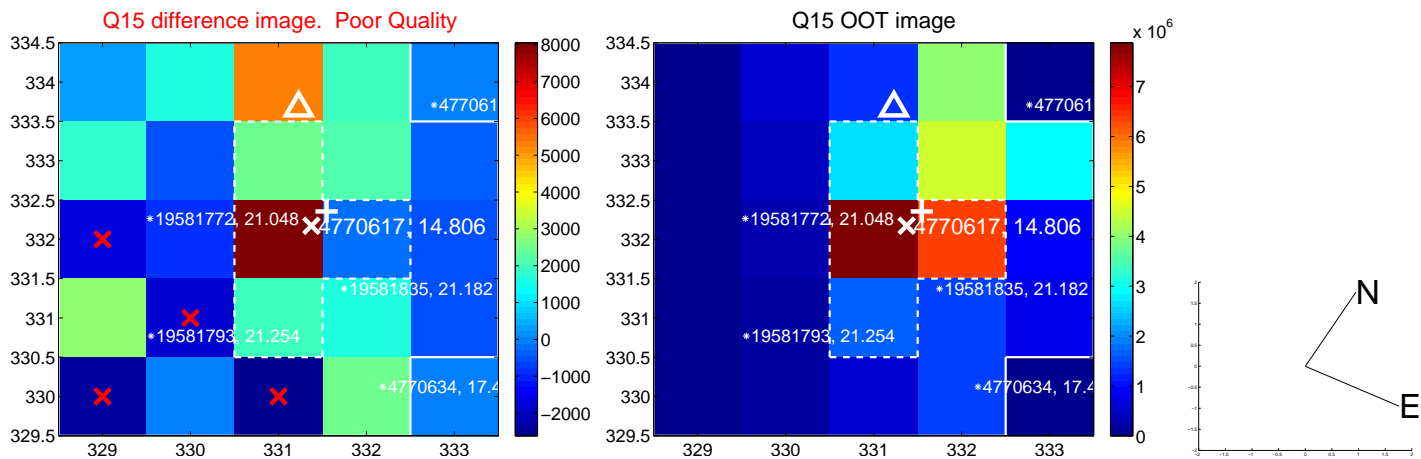
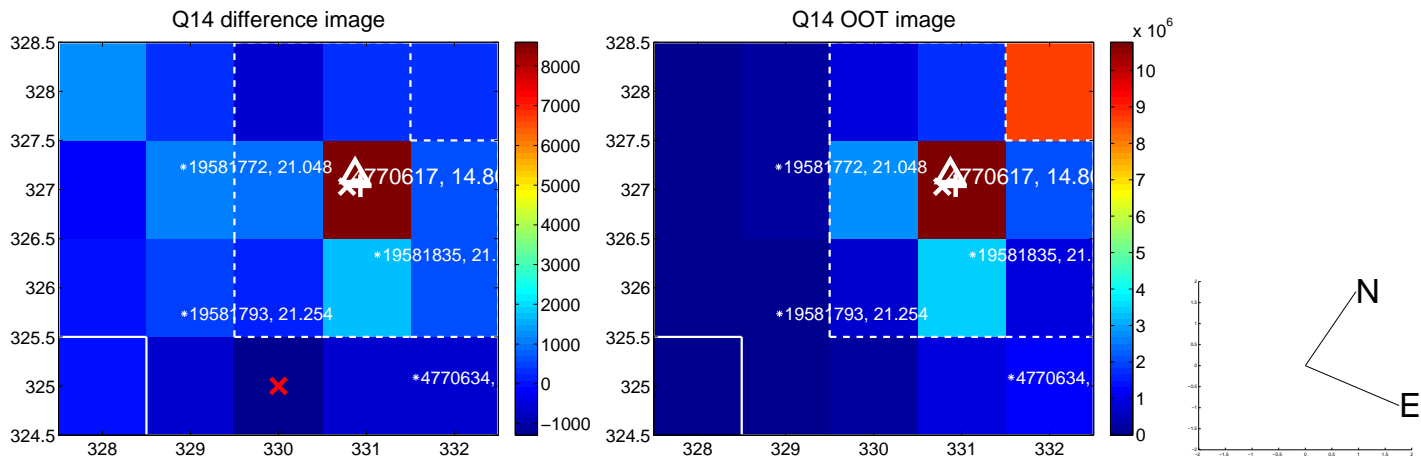
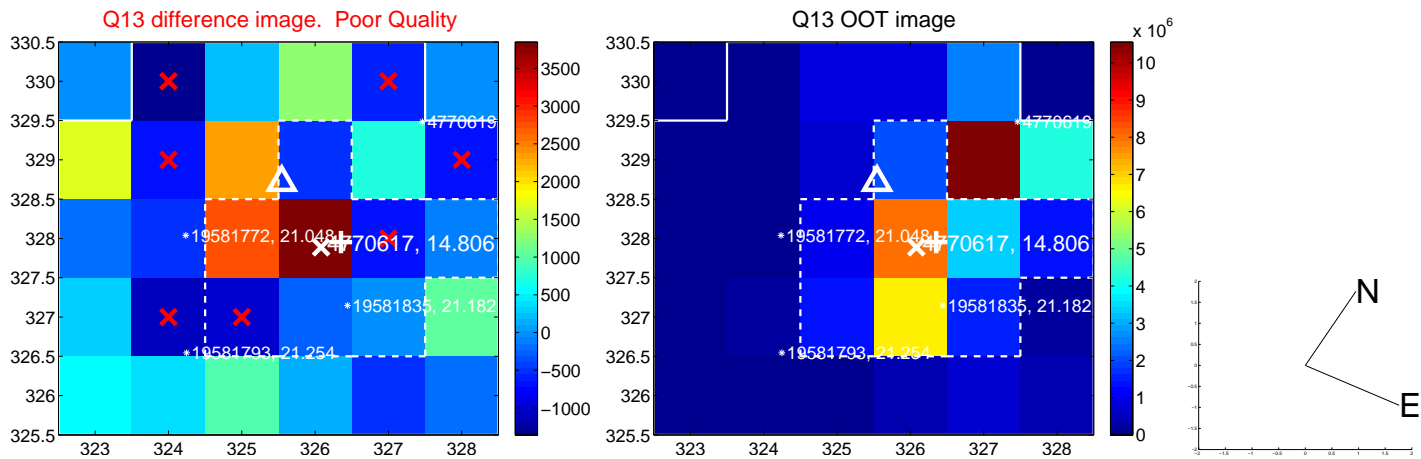
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

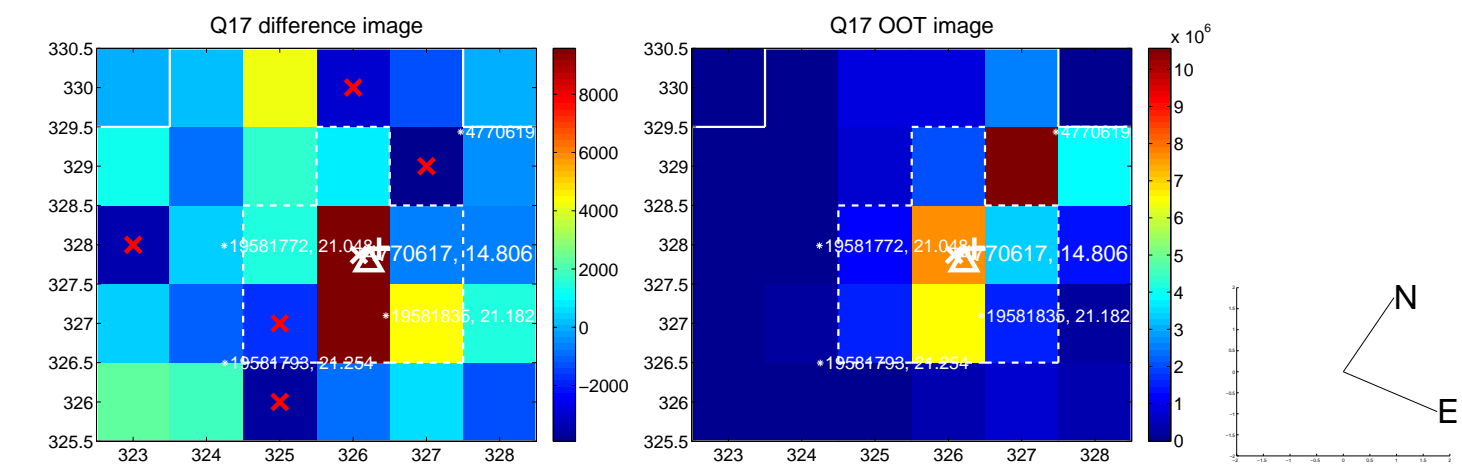


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

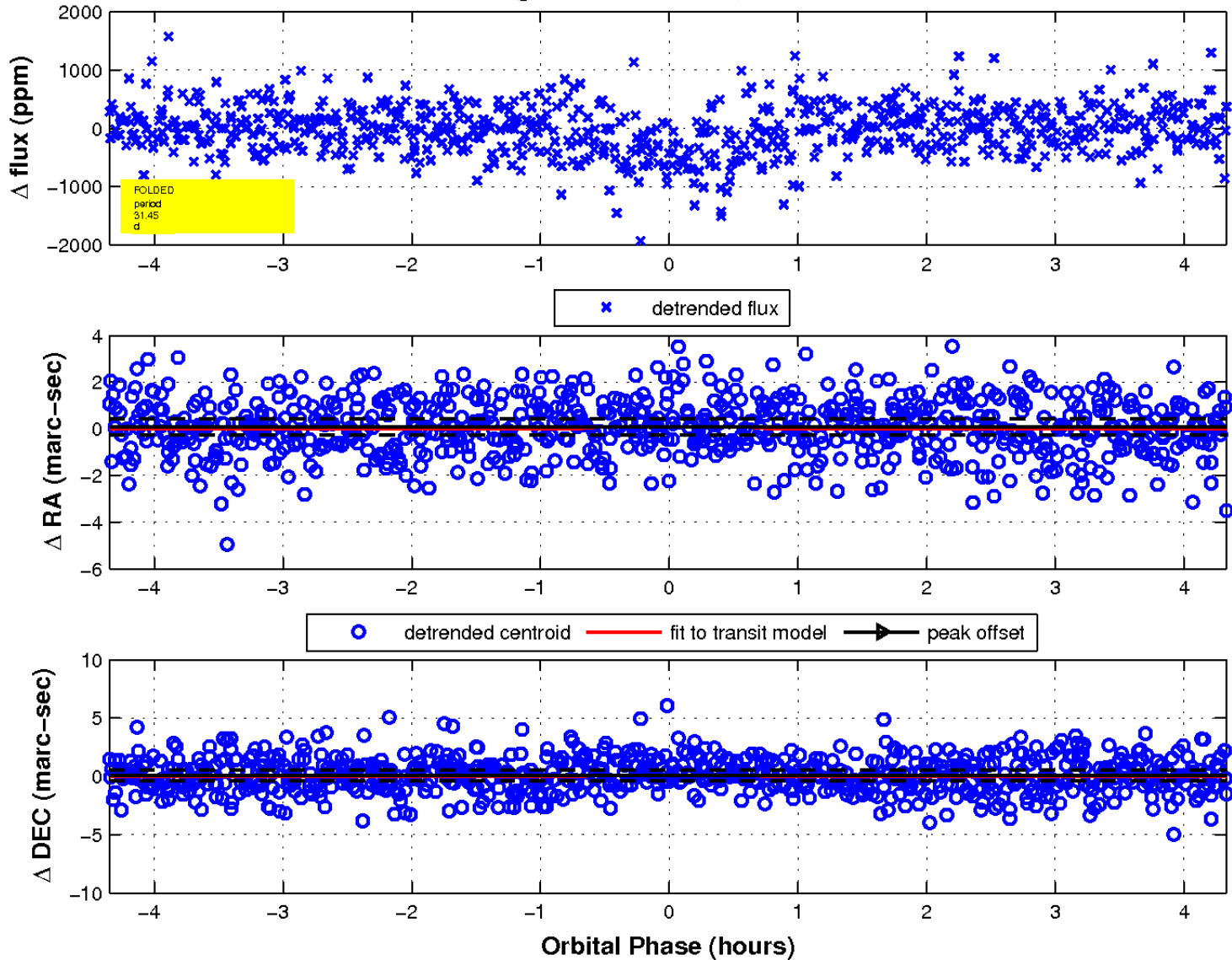




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 3 of 3



UKIRT Image

Declination

