

# KIC 010471621

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010471621-01	OBS	2554.02	10.271281	135.175866	357.5	3.085	13.8	15.7	0.51	4405	1.06	16.05
010471621-02	OBS	2554.01	39.756517	150.600263	626.5	1.280	7.7	9.5	0.51	4405	1.56	2.64

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010471621-01	OBS	PC	0.99	0	0	0	0	NO_COMMENT
010471621-02	OBS	PC	0.58	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 010471621-01

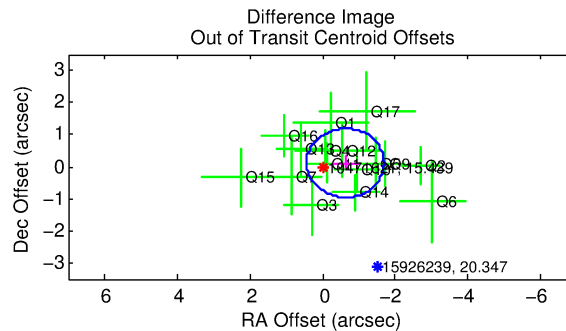
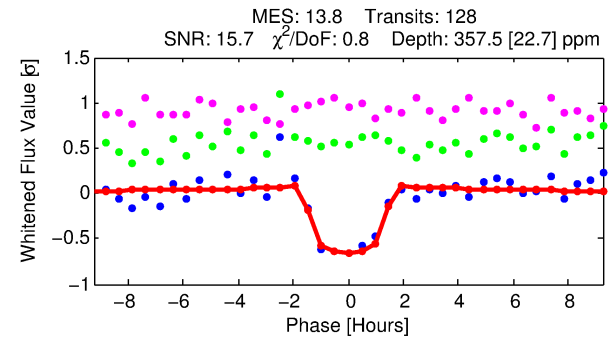
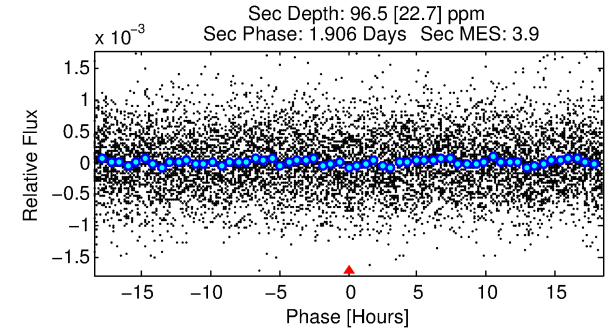
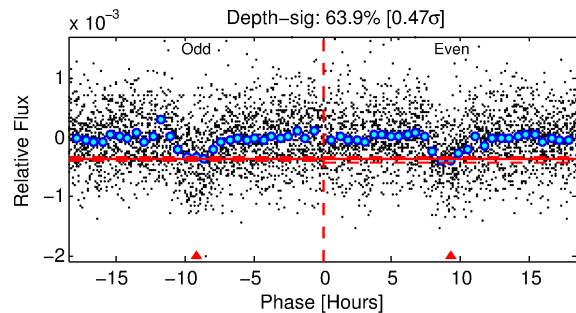
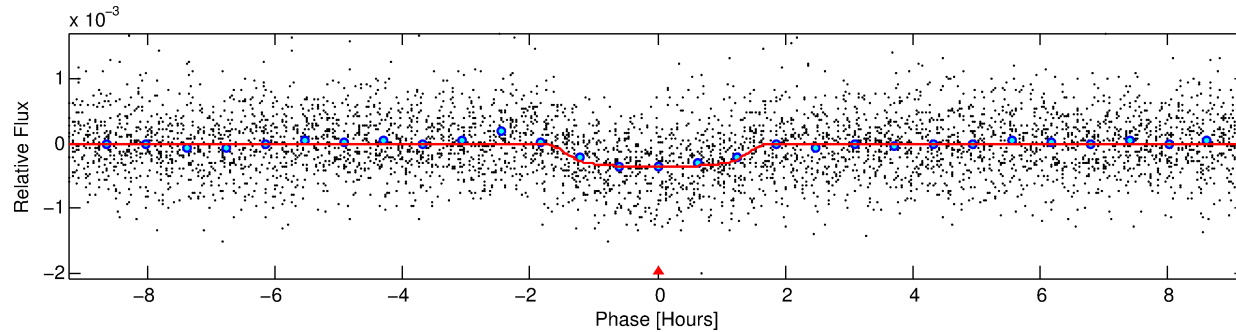
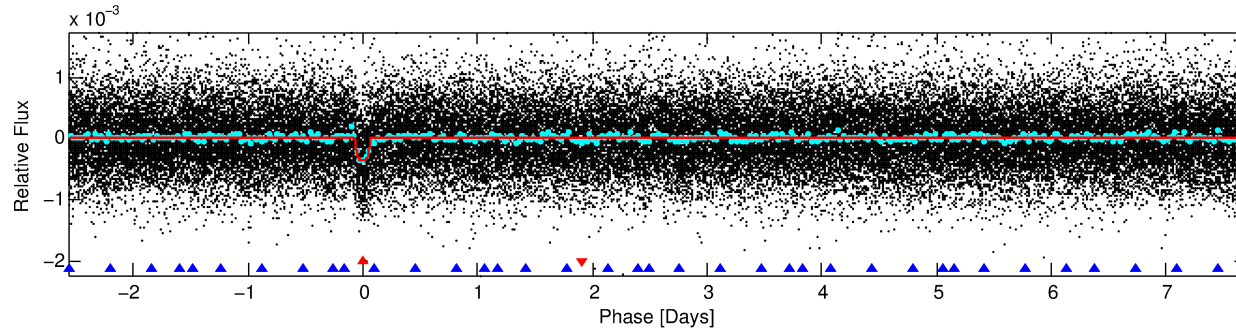
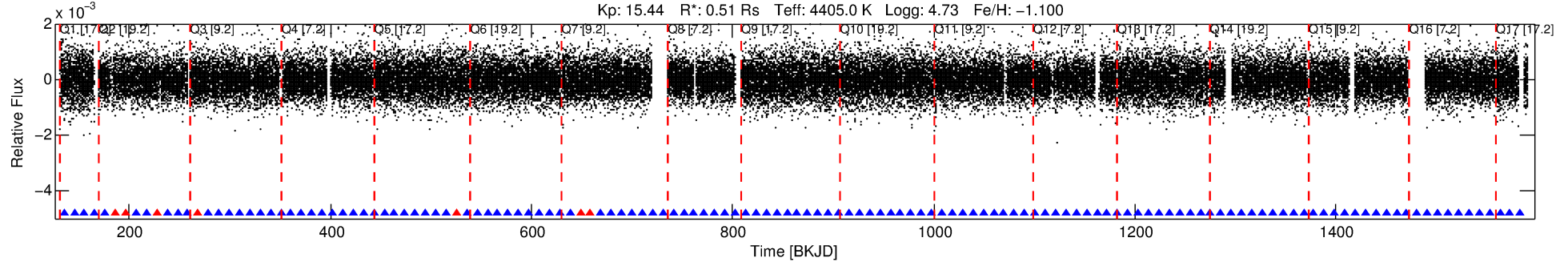
No Significant Match Found

# DV One-Page Summary

KIC: 10471621 Candidate: 1 of 2 Period: 10.271 d

KOI: K02554.02 Corr: 0.983

Kp: 15.44 R\*: 0.51 Rs Teff: 4405.0 K Logg: 4.73 Fe/H: -1.100



## DV Fit Results:

Period = 10.27128 [0.00005] d  
Epoch = 135.1759 [0.0039] BKJD  
Rp/R\* = 0.0191 [0.0123]  
a/R\* = 16.71 [45.40]  
b = 0.78 [1.39]  
Seff = 16.05 [2.73]  
Teq = 510 [22] K  
Rp = 1.07 [0.69] Re  
a = 0.0741 [0.0055] AU  
Ag = 256.79 [338.08] [0.76σ]  
Teffp = 3159 [1042] K [2.54σ]

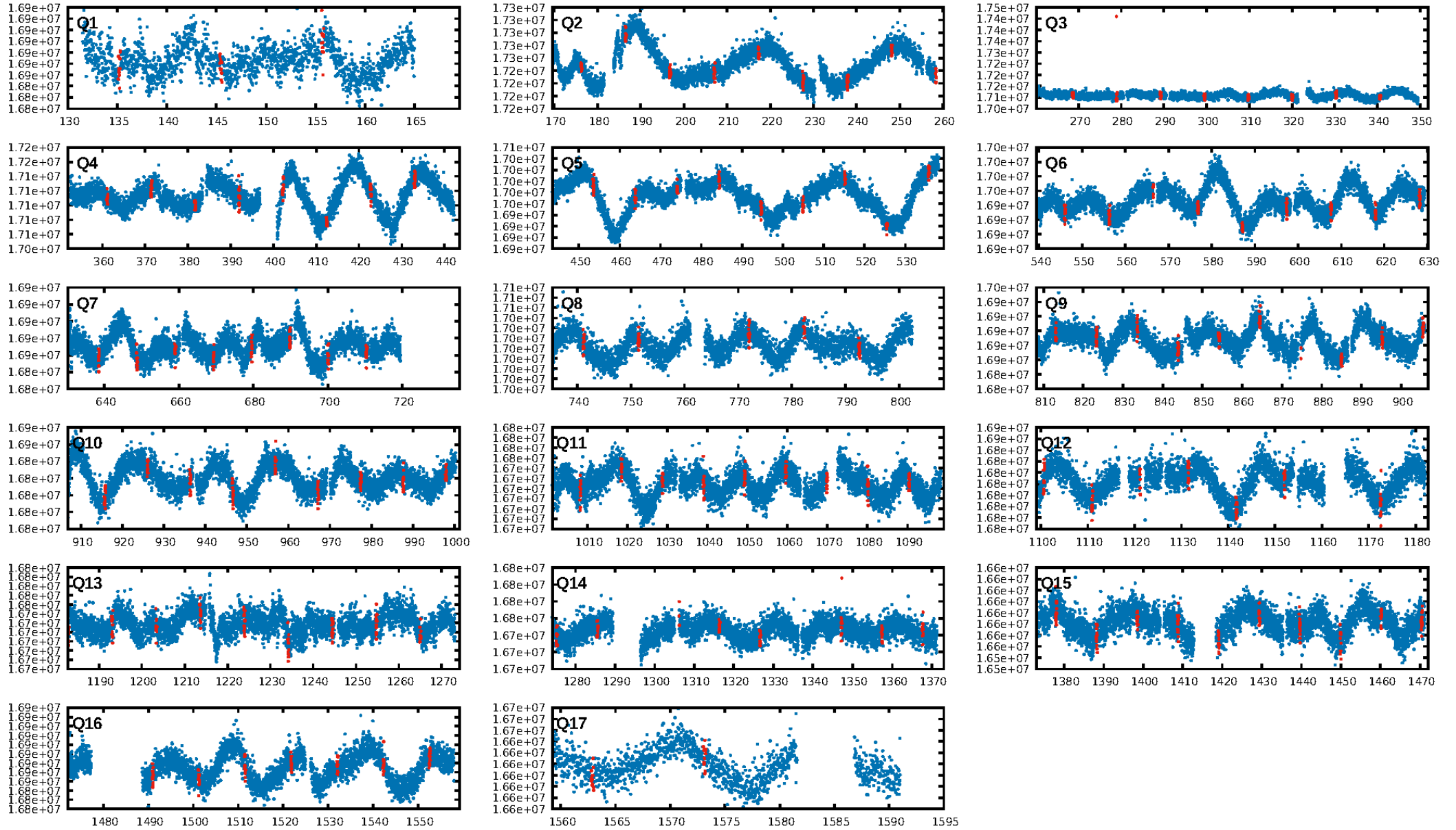
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [211.88σ]  
ModelChiSquare2-sig: 100.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 7.14e-42  
RollingBand-fgt: 0.94 [116/123]  
GhostDiagnostic-chr: 3.833  
Centroid-sig: 29.9%  
Centroid-so: 0.664 arcsec [0.83σ]  
OotOffset-rm: 0.640 arcsec [1.80σ]  
KicOffset-rm: 0.668 arcsec [1.89σ]  
OotOffset-st: 4/4/3/5 [16]  
KicOffset-st: 4/4/3/5 [16]  
DiffImageQuality-fgm: 0.81 [13/16]  
DiffImageOverlap-fno: 1.00 [17/17]

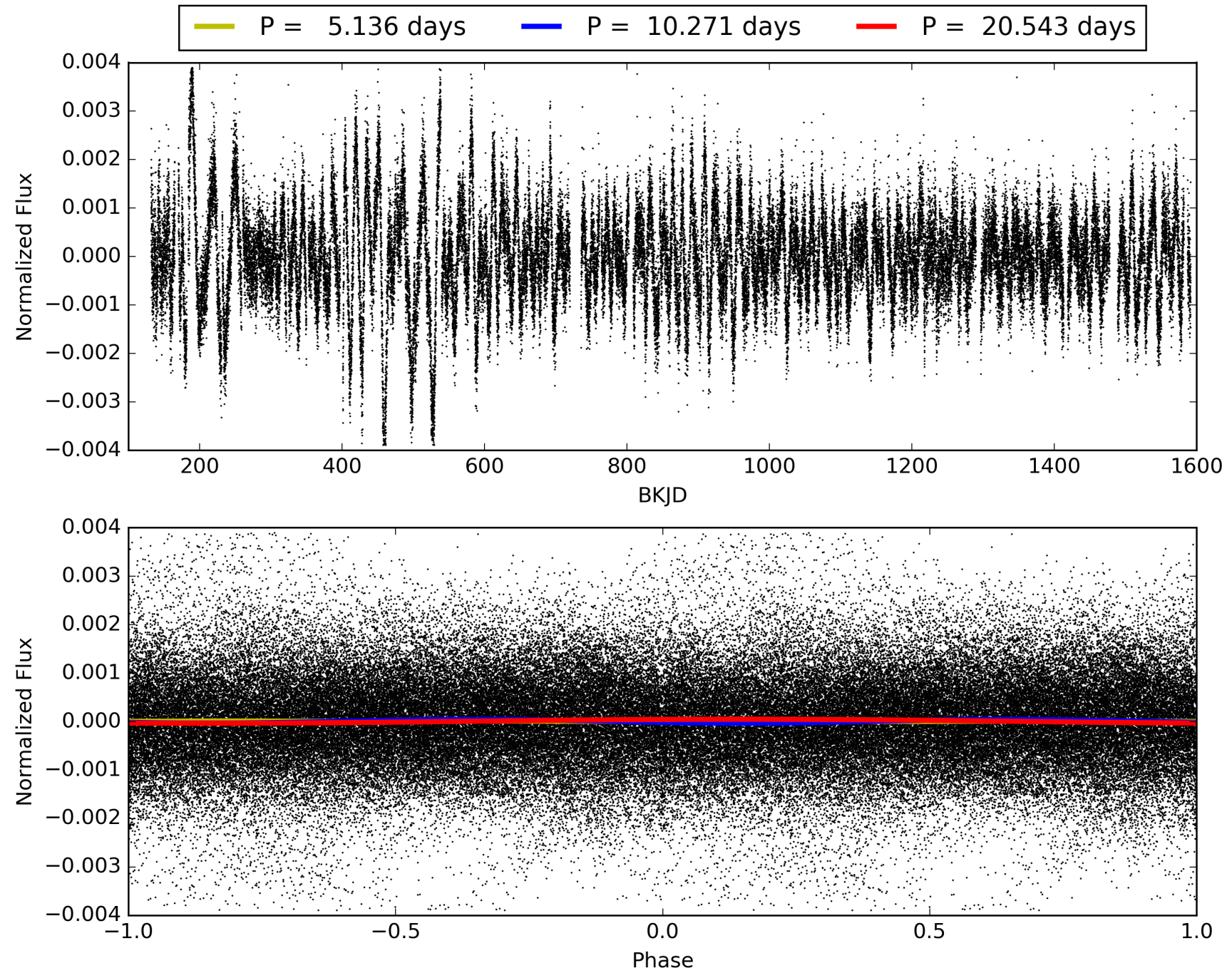
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 06:04:52 Z

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

# TCE 010471621-01, PDC Light Curves

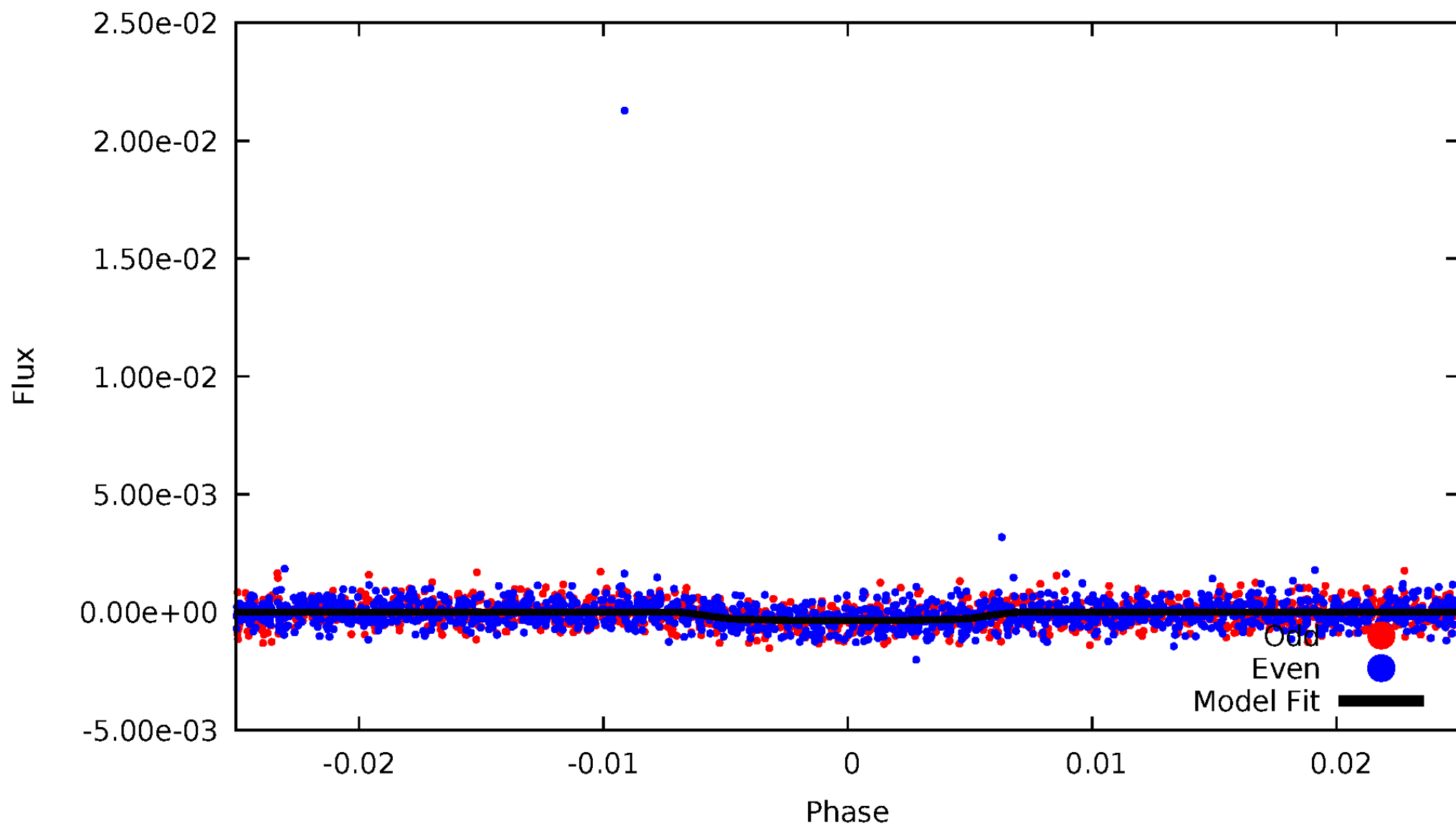


# TCE 010471621-01



# DV Odd/Even

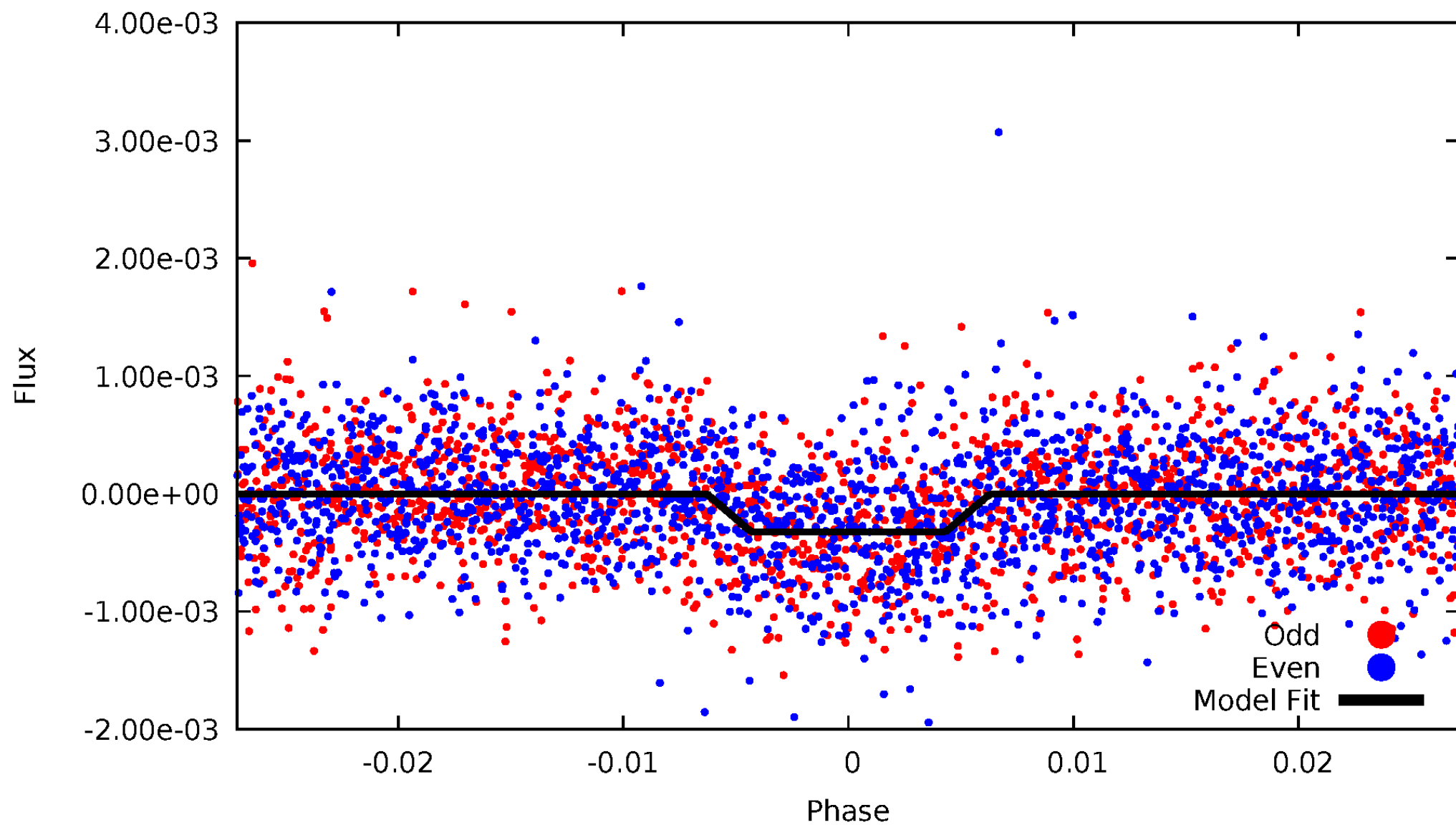
TCE 010471621-01



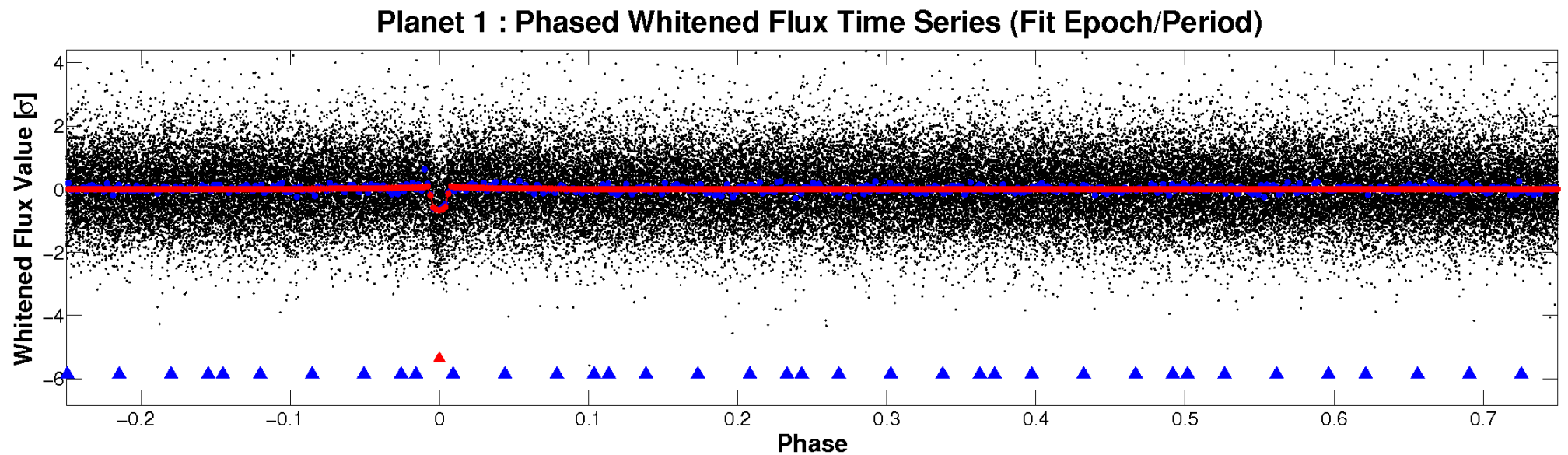
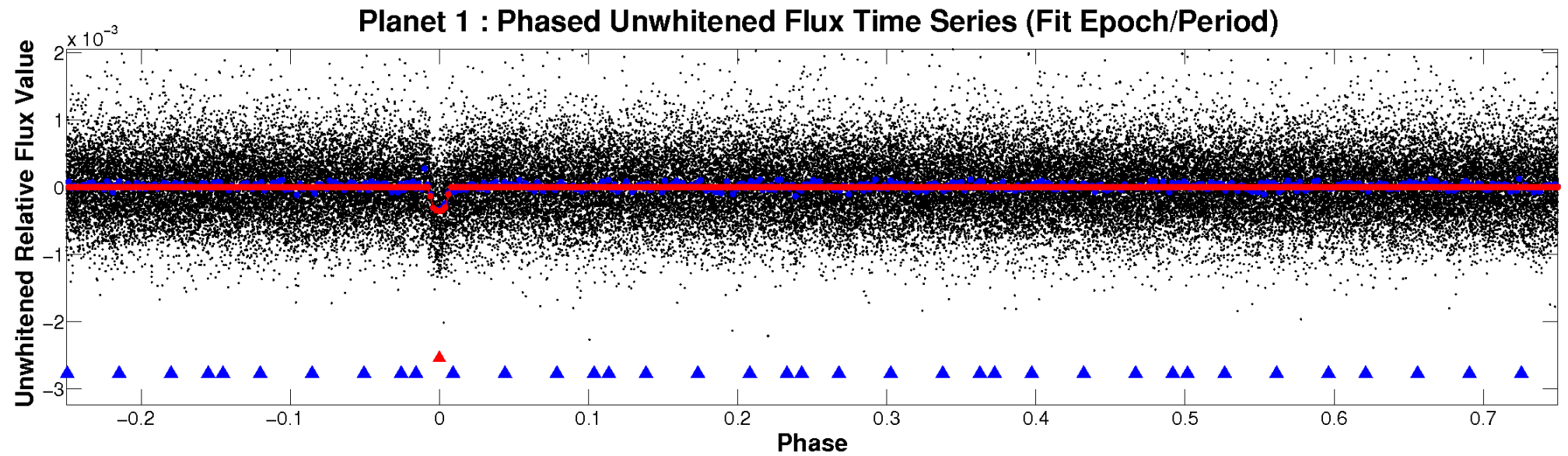


# ALT Odd/Even

TCE 010471621-01

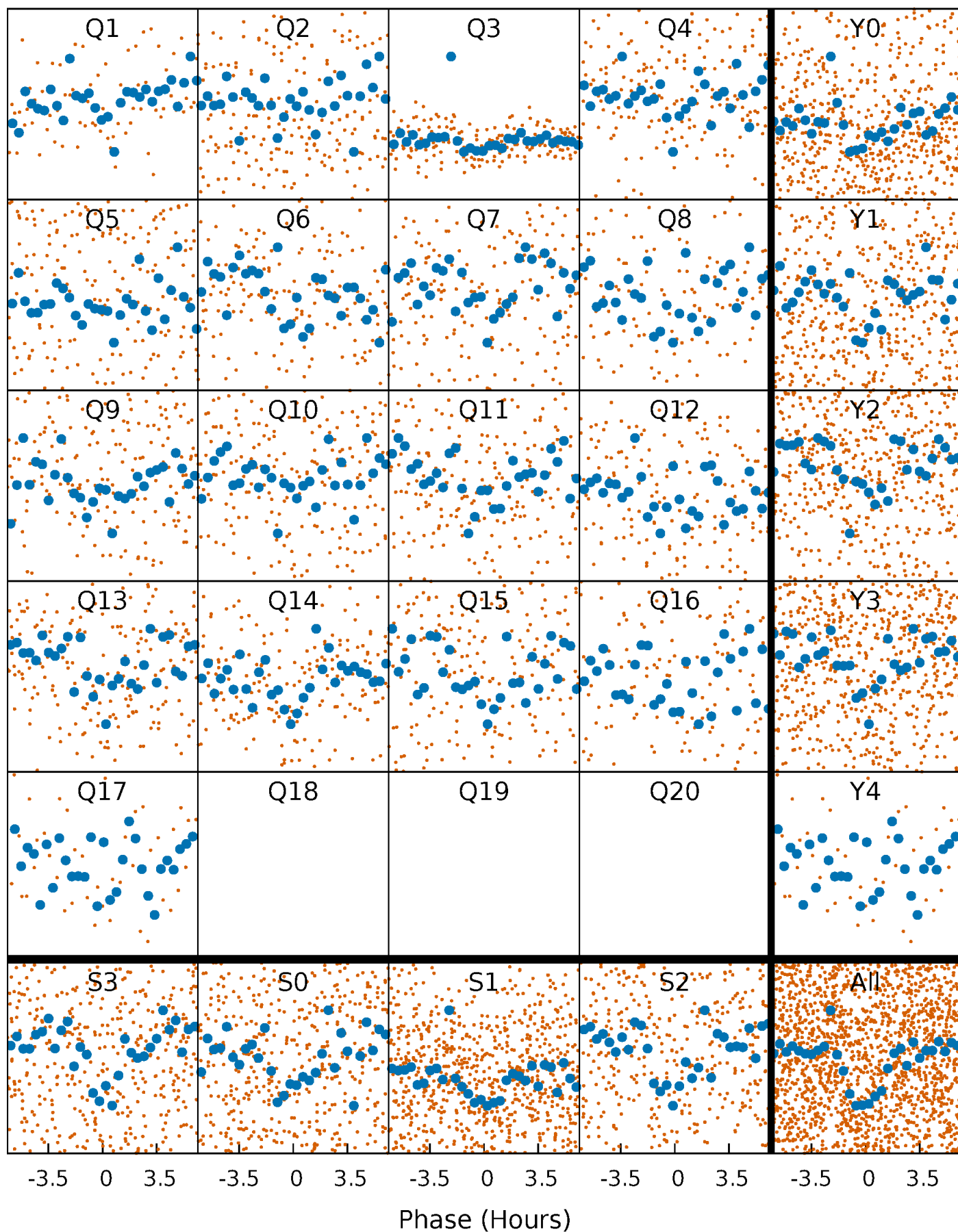


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

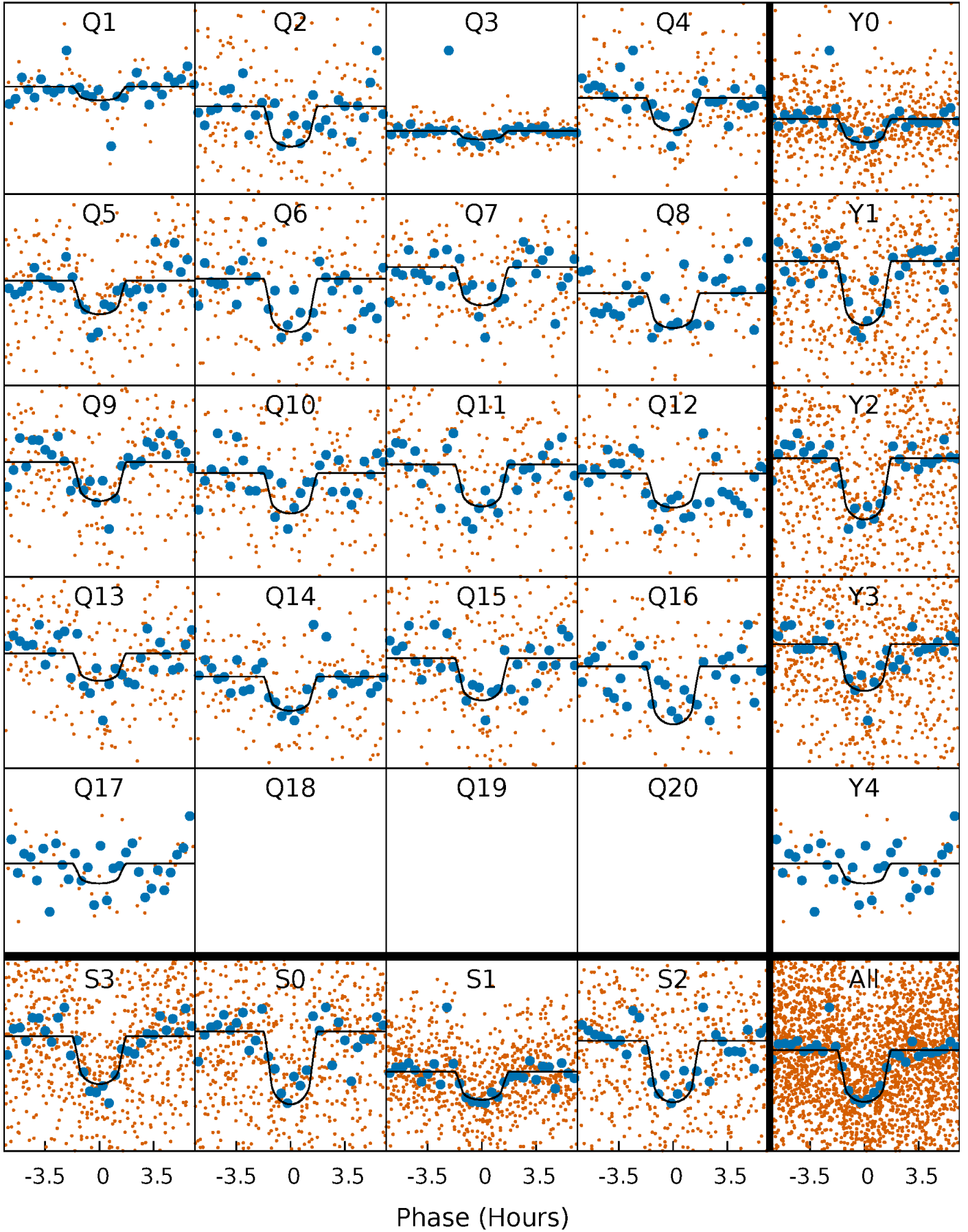
TCE 010471621-01 P= 10.271281 Days  $T_0=135.175866$  (BKJD)





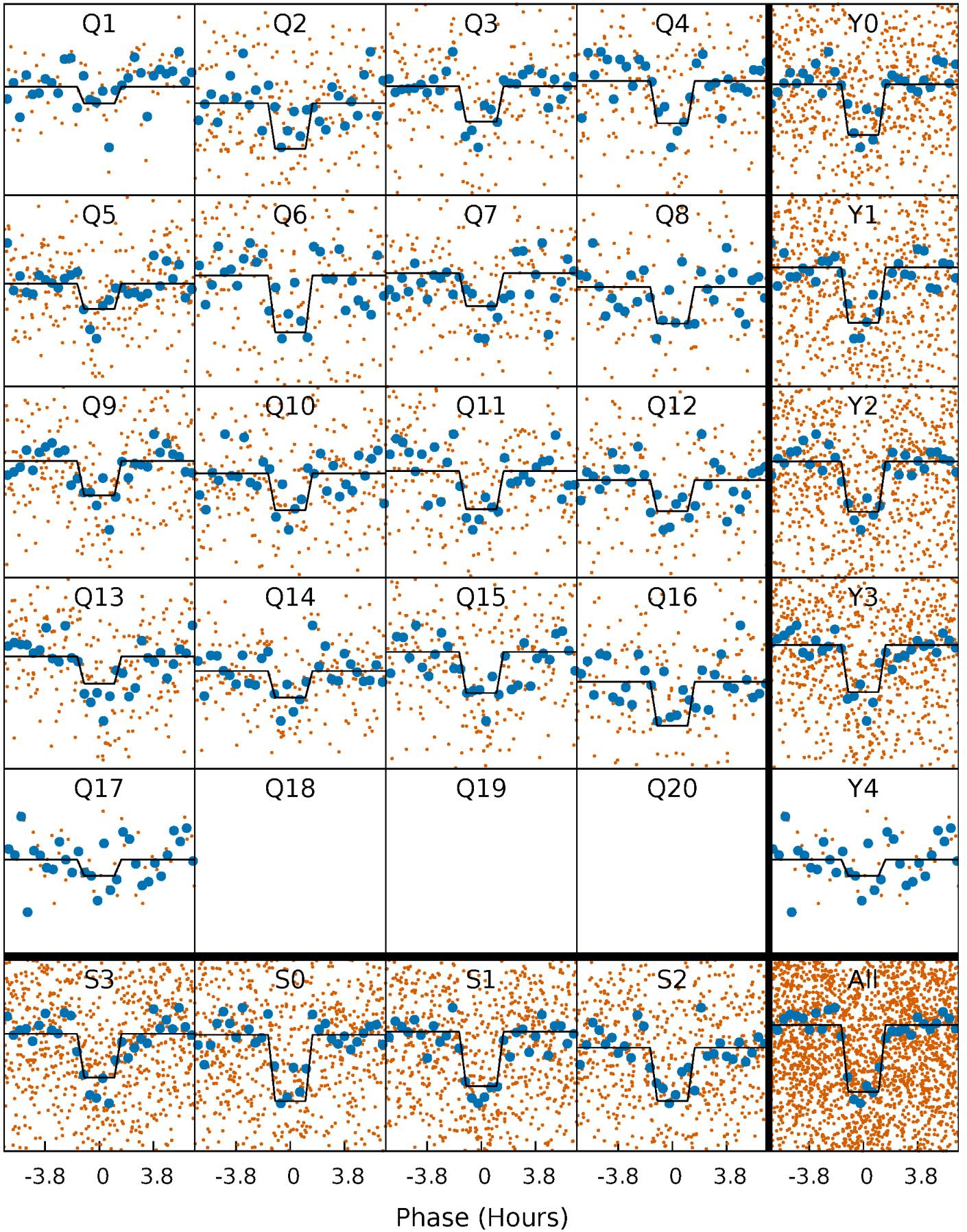
# DV Quarter-Phased Transit Curves

TCE 010471621-01 P= 10.271281 Days  $T_0=135.175866$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

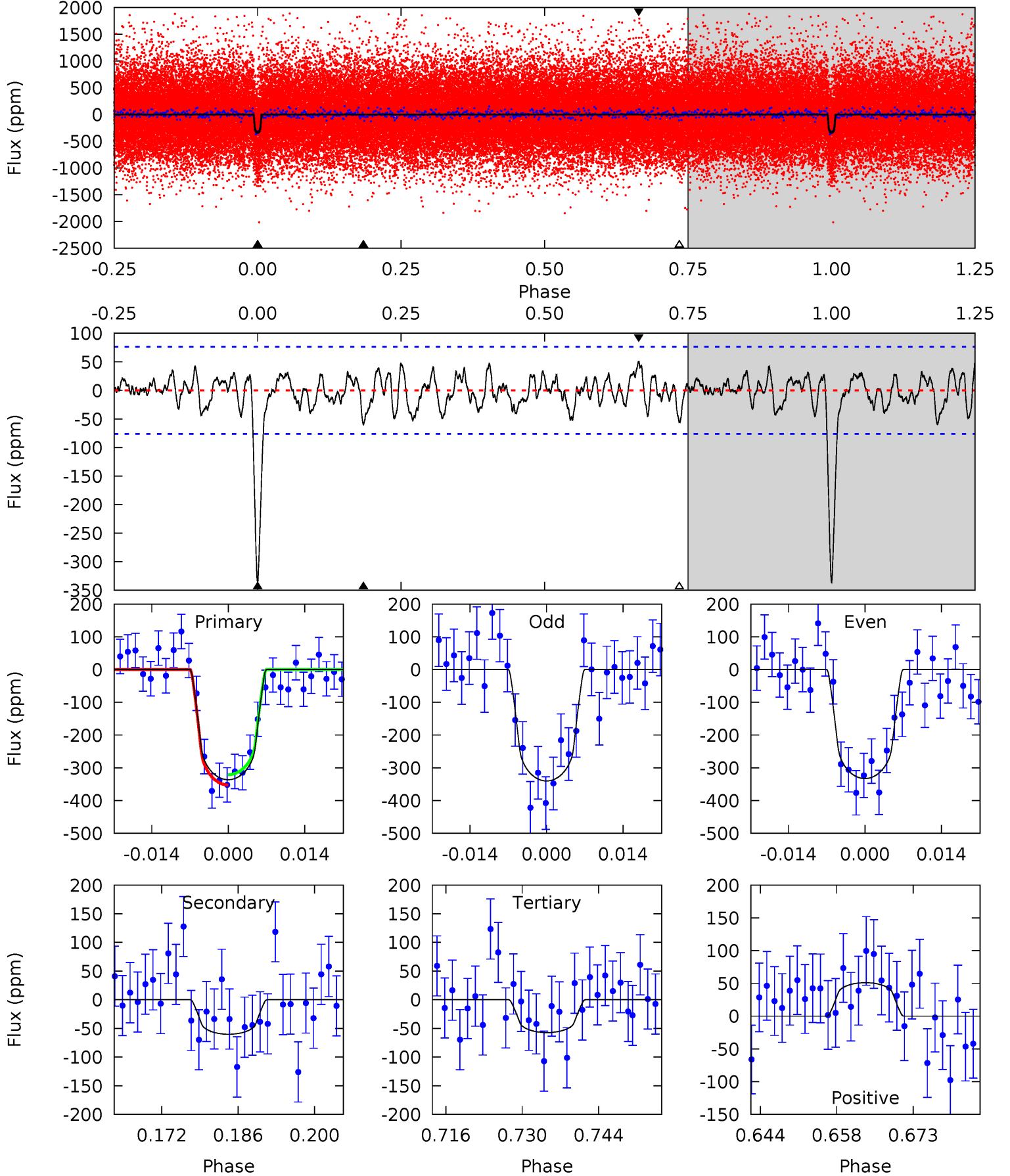
TCE 010471621-01 P= 10.271243 Days  $T_0=135.176448$  (BKJD)



# DV Model-Shift Uniqueness Test

010471621-01,  $P = 10.271281$  Days,  $E = 124.904585$  Days

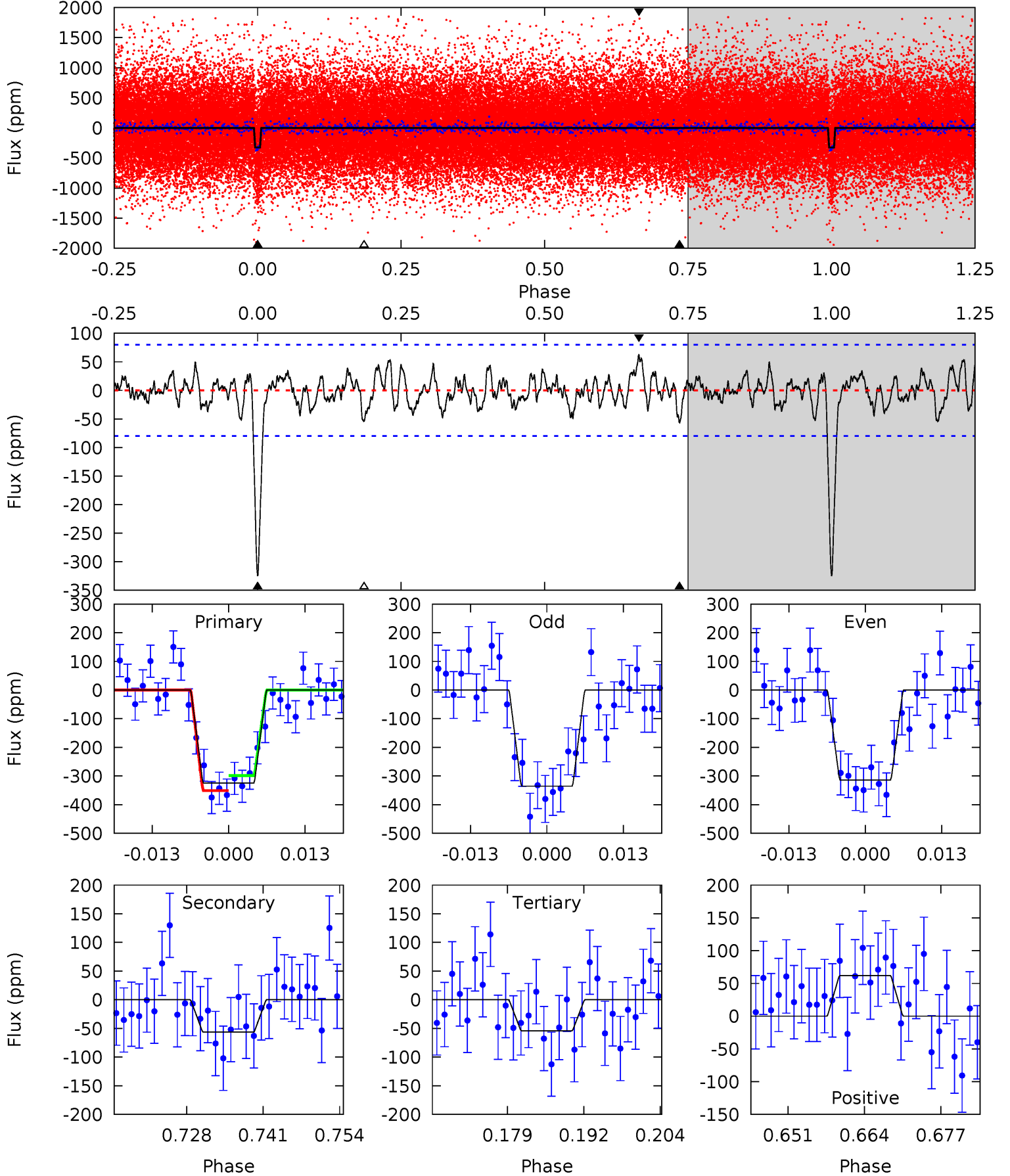
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
21.9	3.92	3.73	3.33	4.96	2.45	1.40	18.2	18.6	0.19	0.59	0.24	0.99	0.13	1.02



# Alt Model-Shift Uniqueness Test

010471621-01,  $P = 10.271243$  Days,  $E = 124.905205$  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
20.3	3.53	3.39	3.87	4.98	2.49	1.31	16.9	16.4	0.14	-0.34	0.68	1.02	0.16	1.63



### Stellar Parameters For KIC 010471621

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4405^{+119}_{-146}$	$4.732^{+0.058}_{-0.031}$	$-1.100^{+0.300}_{-0.350}$	$0.511^{+0.037}_{-0.045}$	$0.513^{+0.040}_{-0.033}$	$5.421^{+1.459}_{-0.739}$
	+3%/-3%	+1%/-1%	+27%/-32%	+7%/-9%	+8%/-6%	+27%/-14%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 010471621-01 / KOI 2554.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-60 \pm 15$	$1.13^{+0.60}_{-0.62}$	$709^{+21}_{-27}$	$3173^{+956}_{-374}$	$143^{+561}_{-85}$
Alt.	$-56 \pm 16$	$1.10^{+0.64}_{-0.58}$	$707^{+25}_{-25}$	$3152^{+944}_{-403}$	$135^{+560}_{-82}$

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



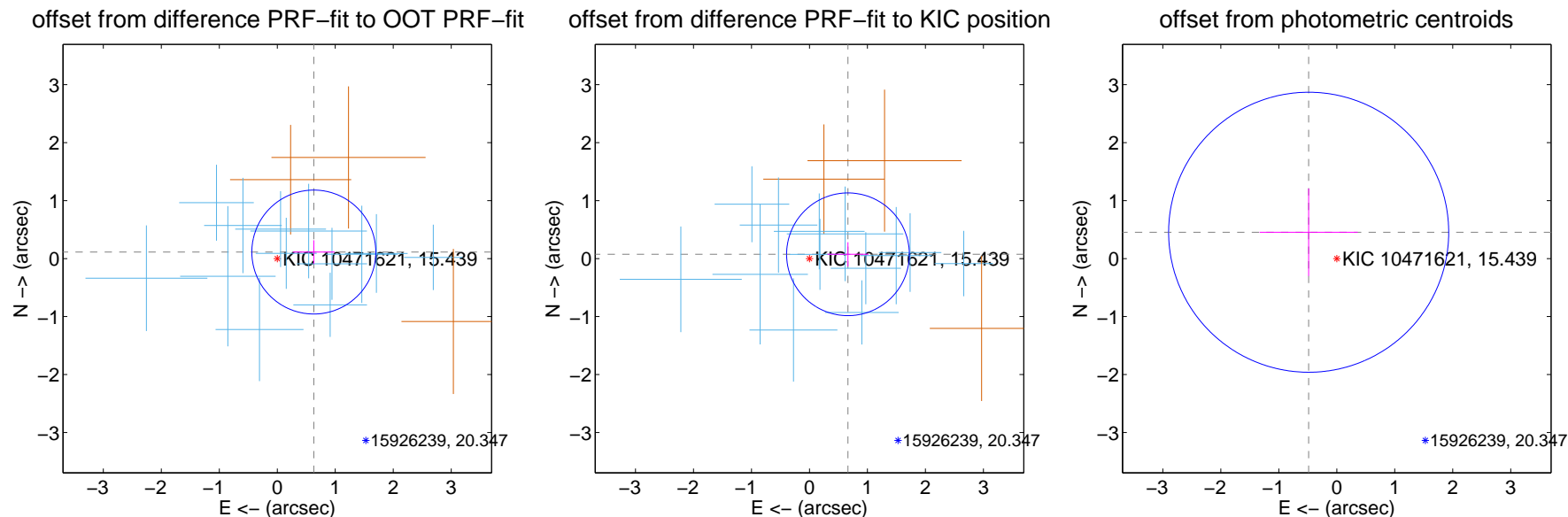
## DV Centroid Data

Supplemental centroid analysis for 010471621-01. Kepler magnitude: 15.44. Transit SNR 15.67

There are 13 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

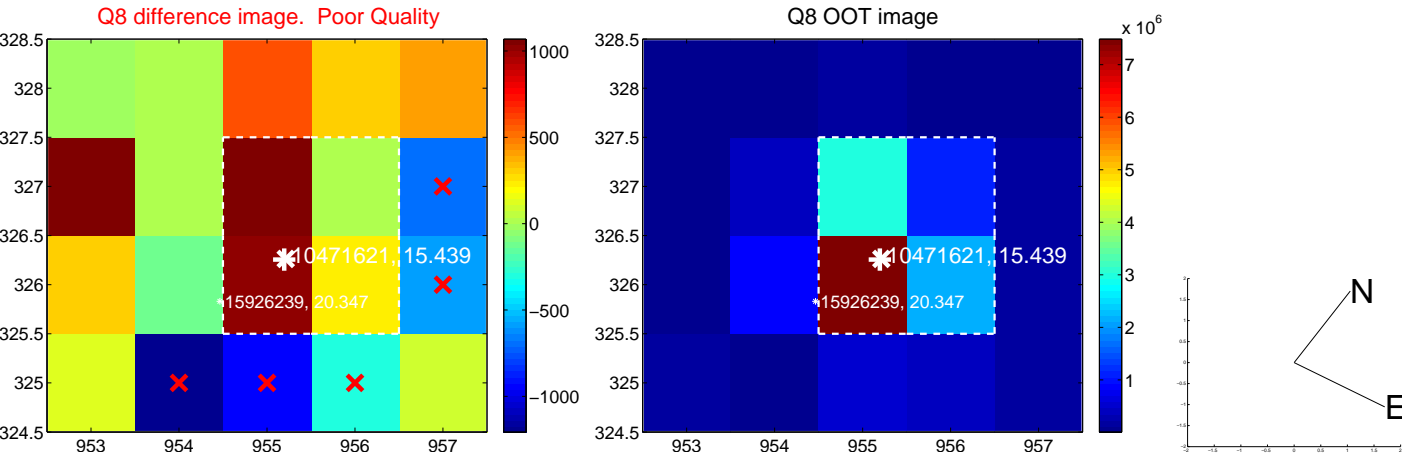
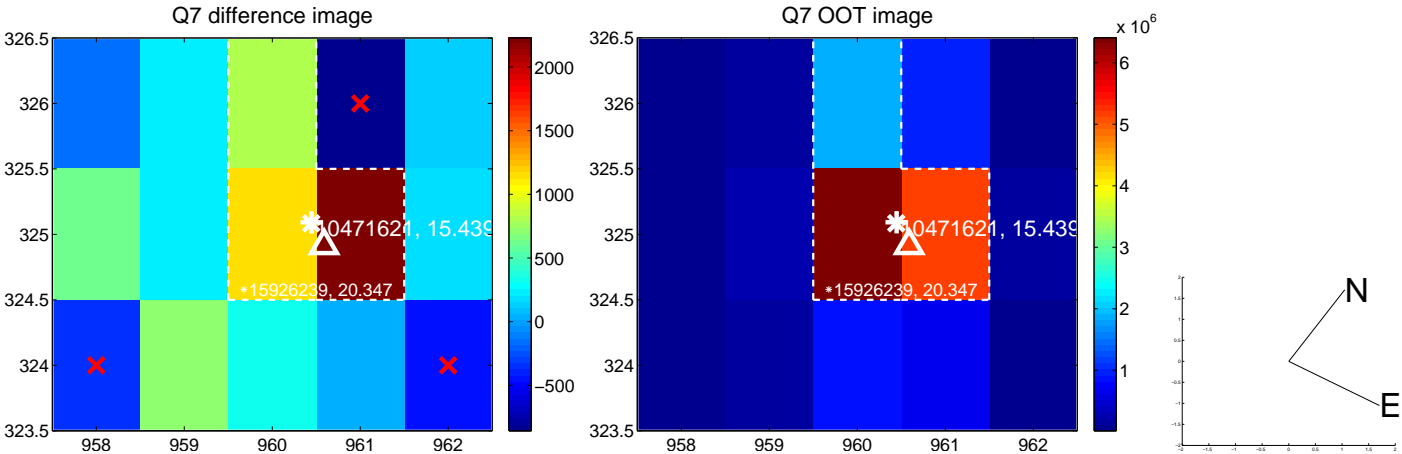
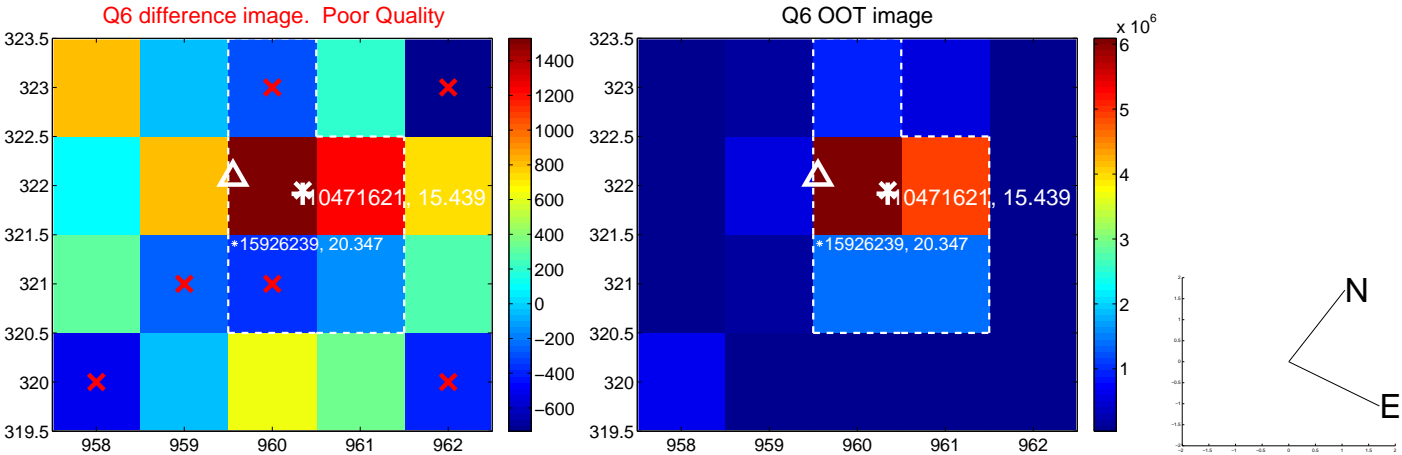
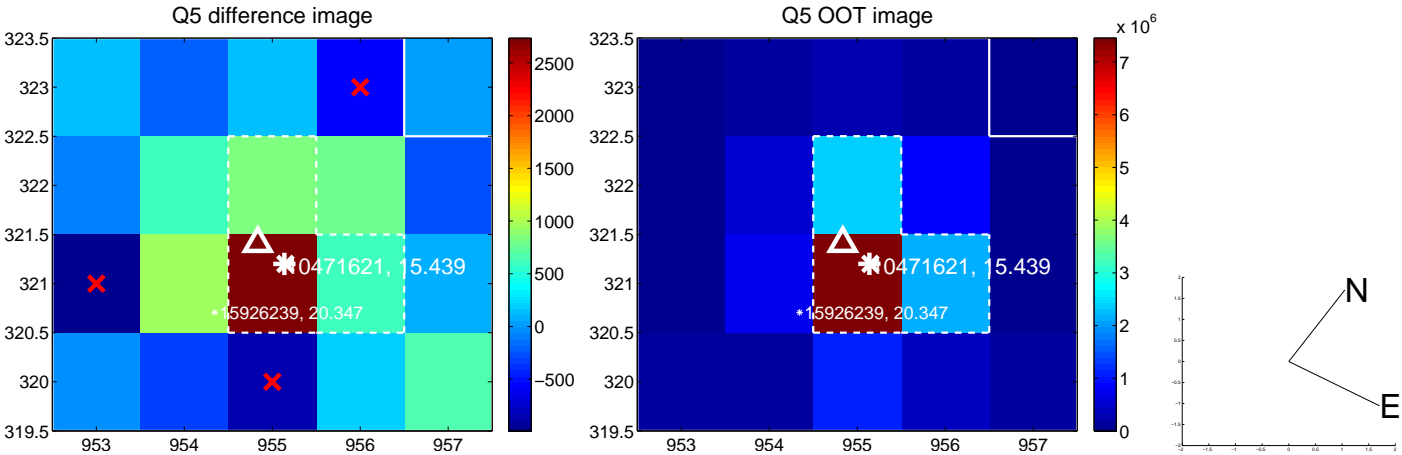
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.640 \pm 0.356$	1.80	$-0.630 \pm 0.360$	$0.113 \pm 0.204$
PRF-fit source offset from KIC position	$0.668 \pm 0.353$	1.89	$-0.664 \pm 0.354$	$0.074 \pm 0.208$
photometric centroid source offset	$0.66 \pm 0.80$	0.83	$0.48 \pm 0.85$	$0.45 \pm 0.75$



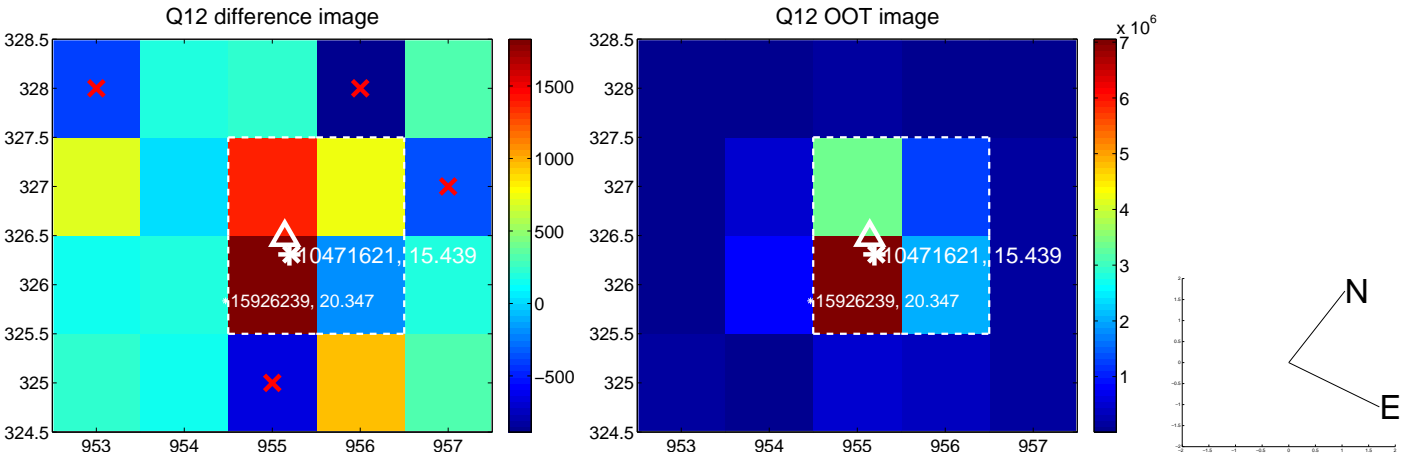
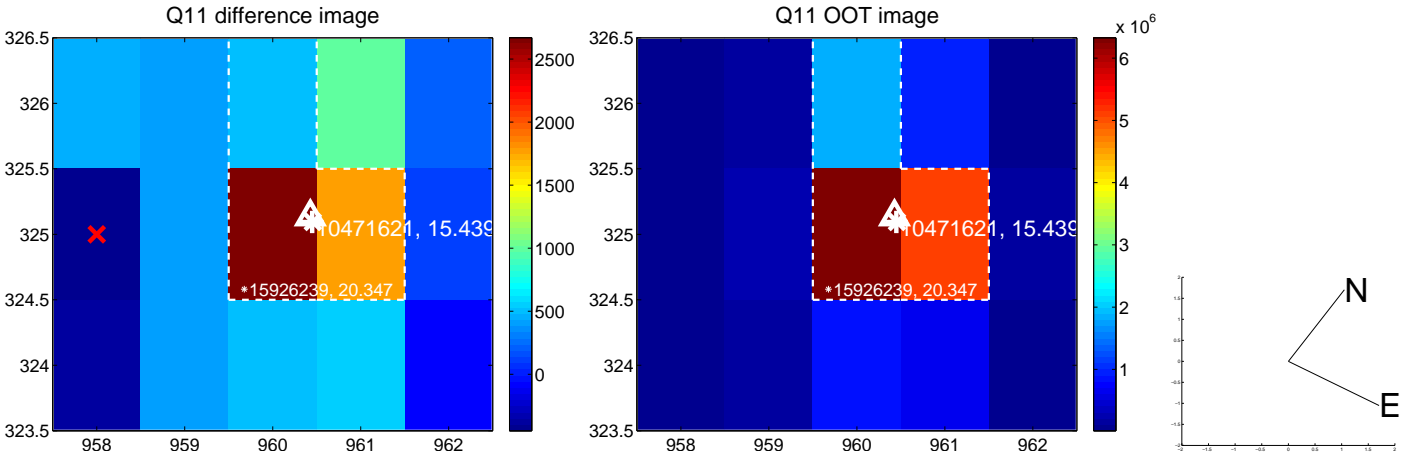
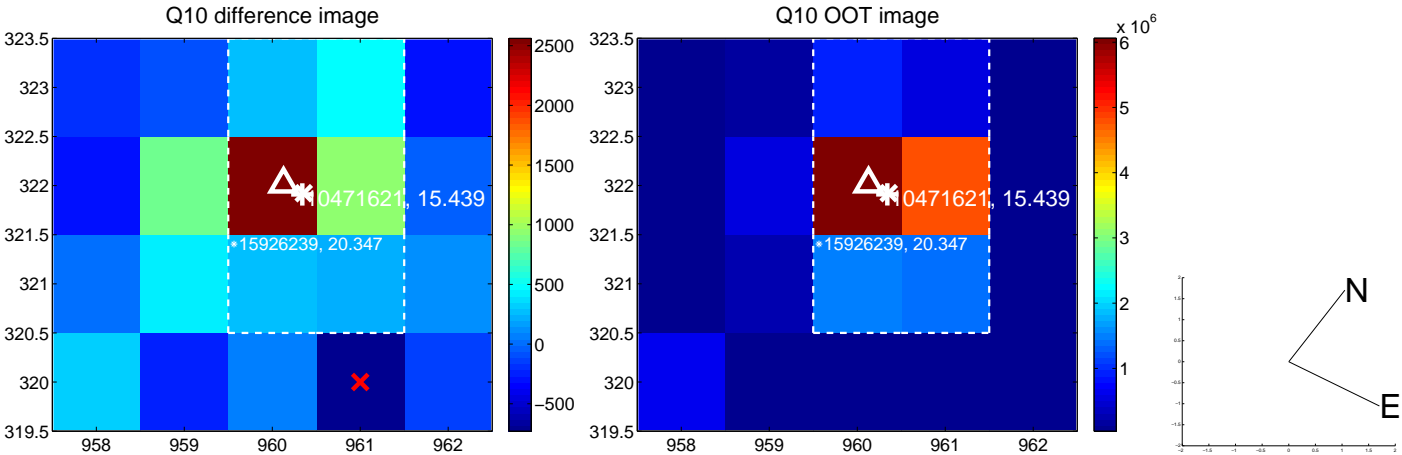
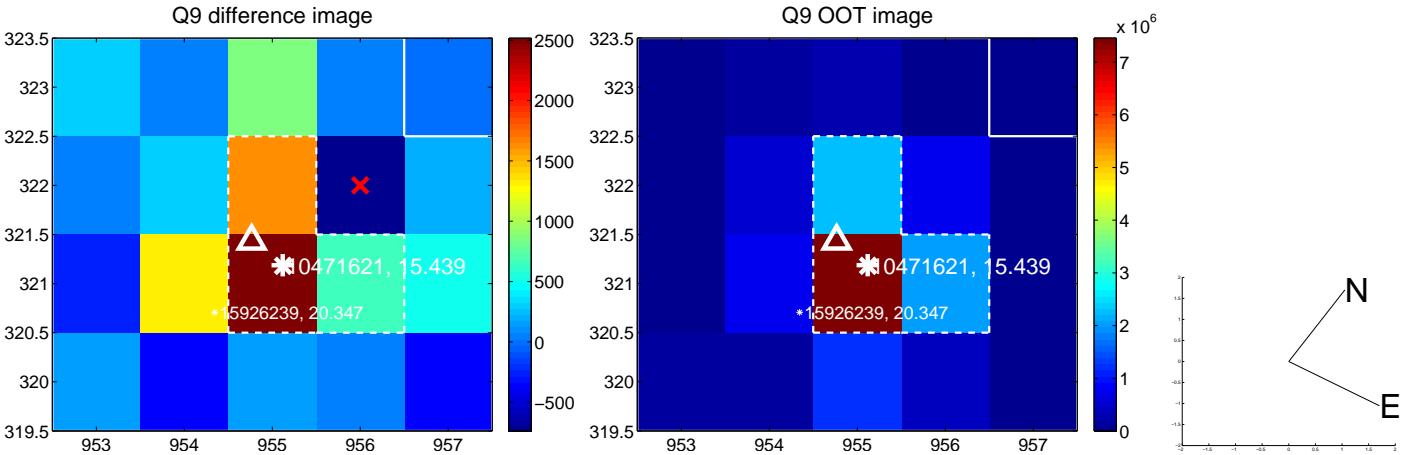
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



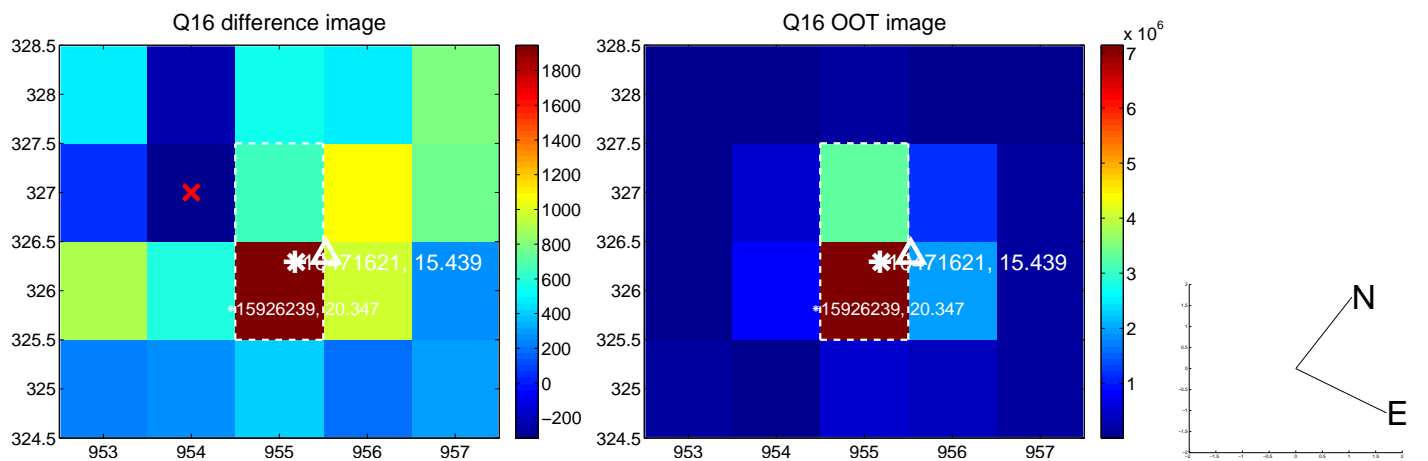
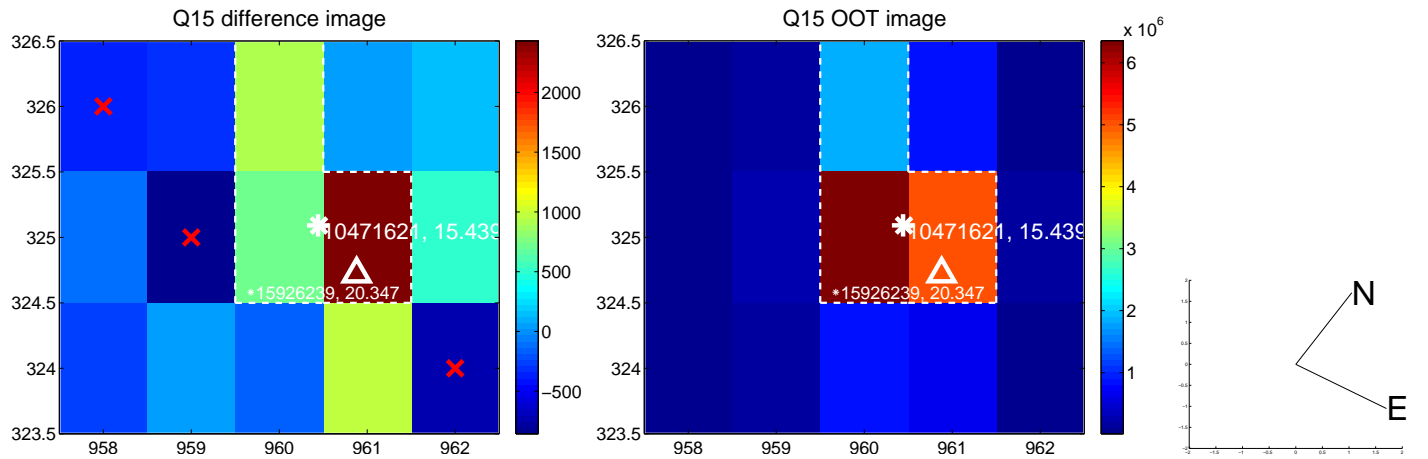
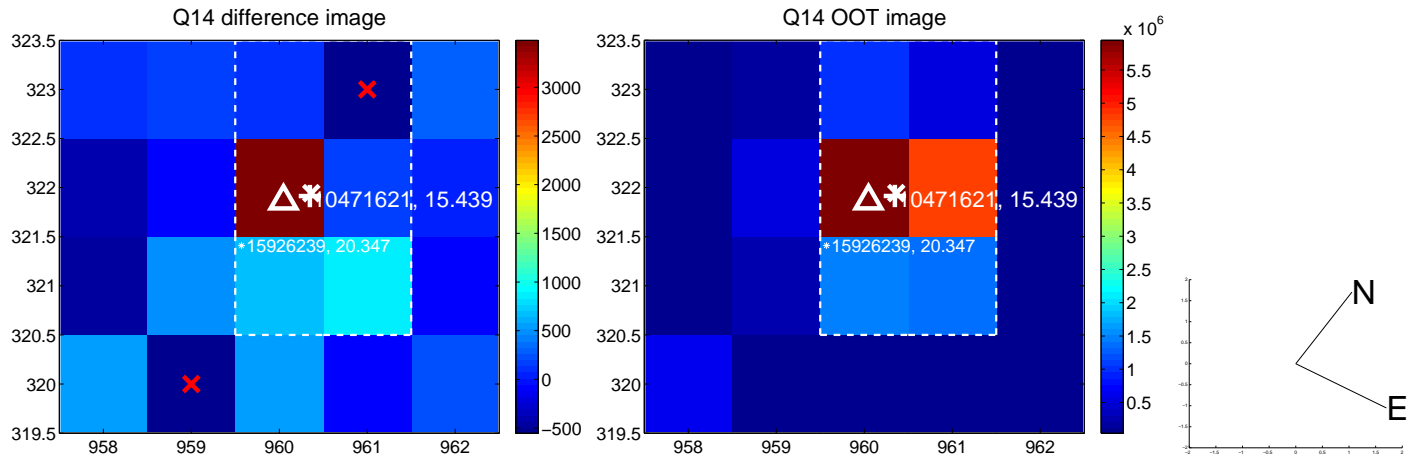
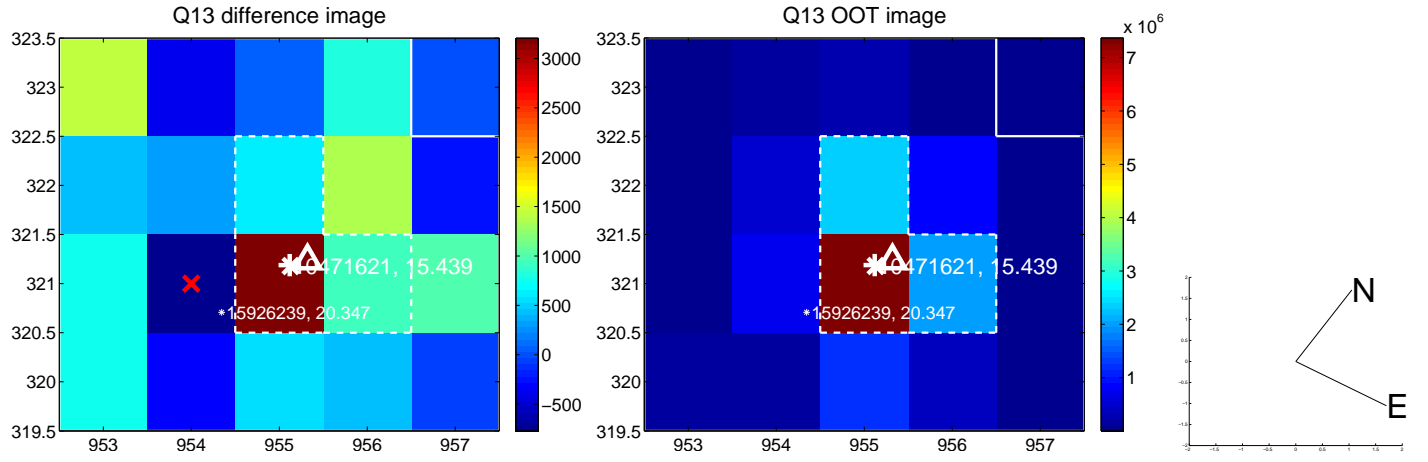
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

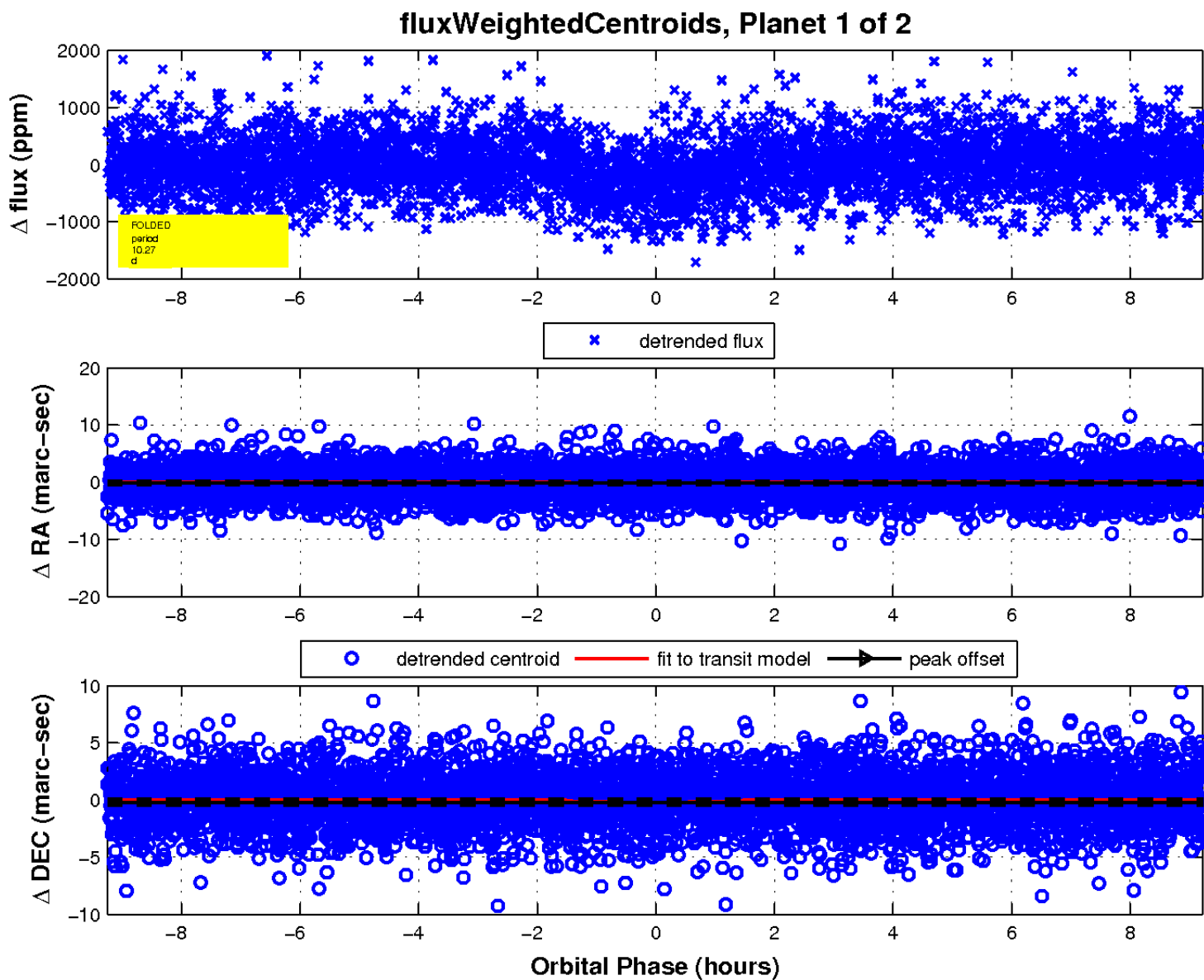
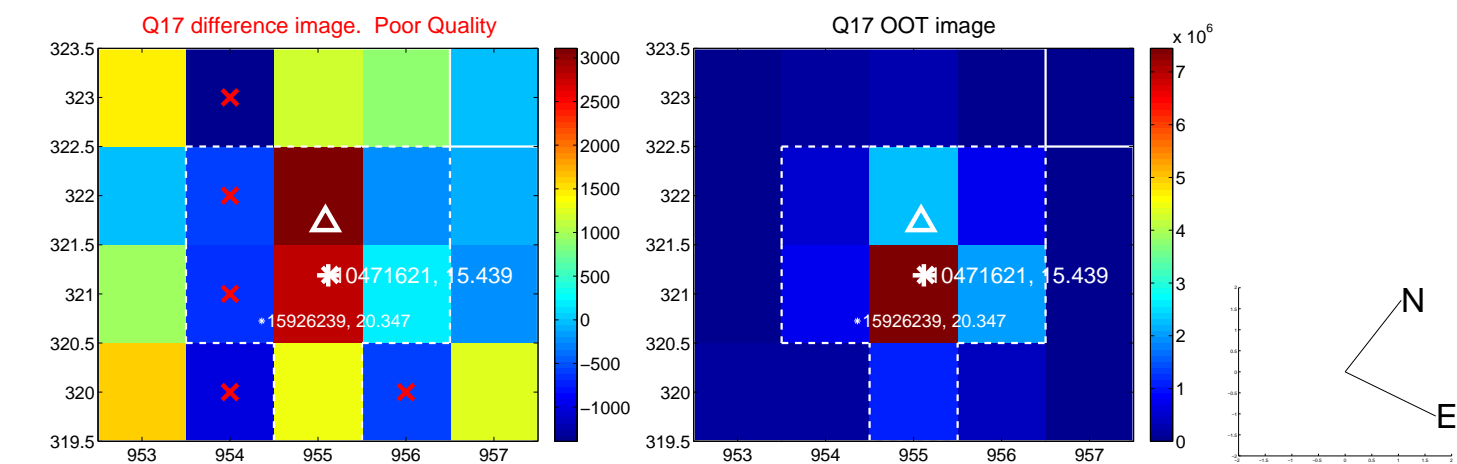


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



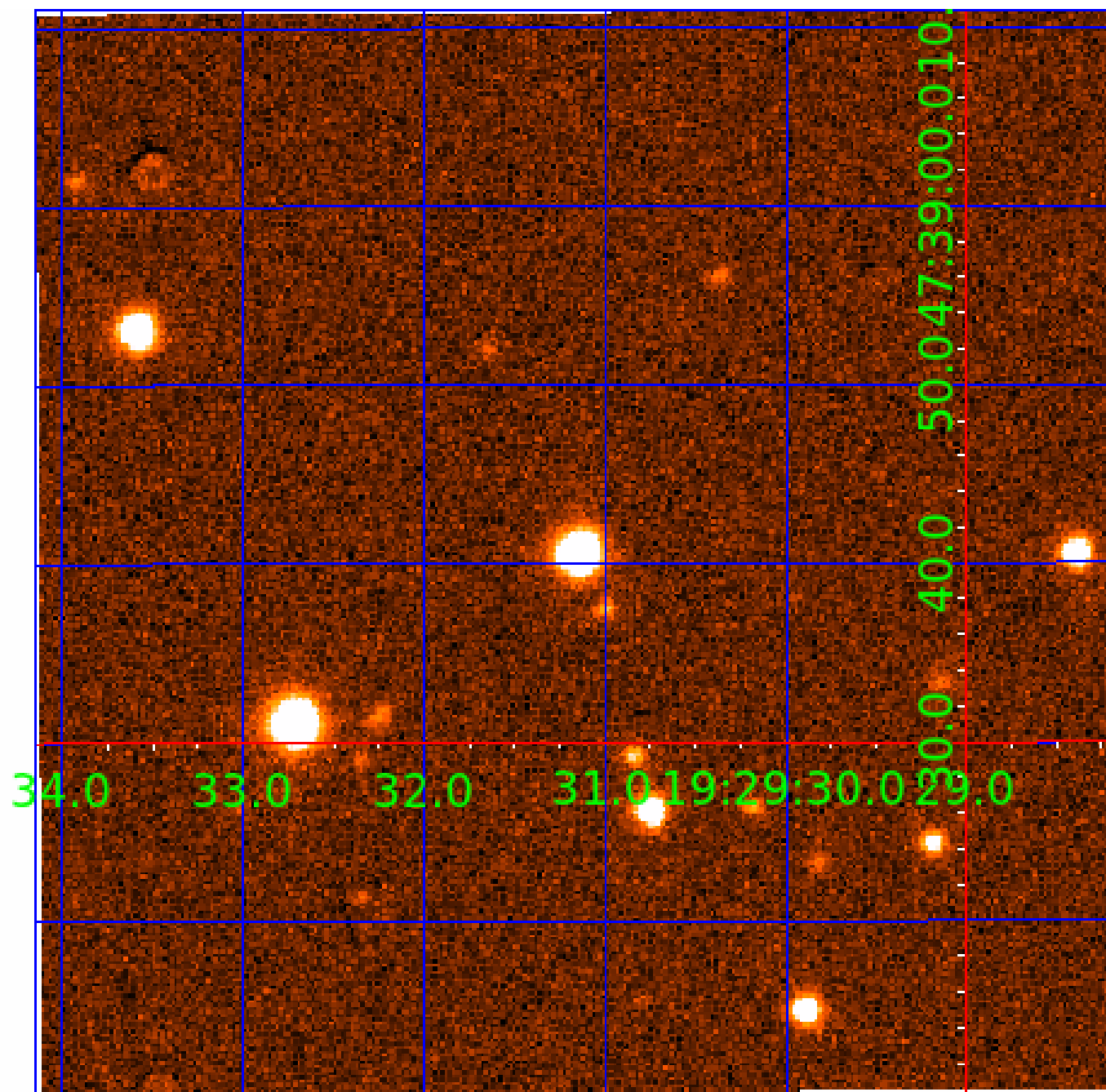


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010471621

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010471621-01	OBS	2554.02	10.271281	135.175866	357.5	3.085	13.8	15.7	0.51	4405	1.06	16.05
010471621-02	OBS	2554.01	39.756517	150.600263	626.5	1.280	7.7	9.5	0.51	4405	1.56	2.64

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010471621-01	OBS	PC	0.99	0	0	0	0	NO_COMMENT
010471621-02	OBS	PC	0.58	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.

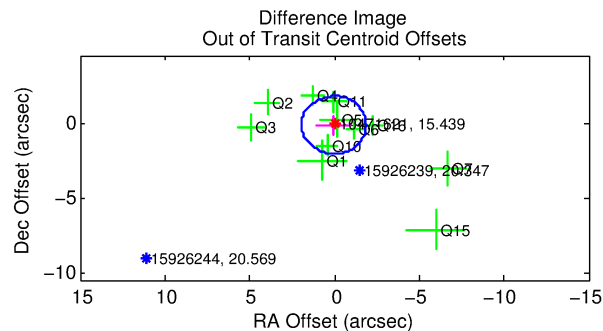
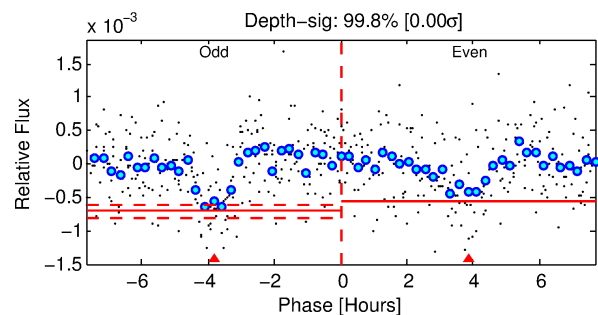
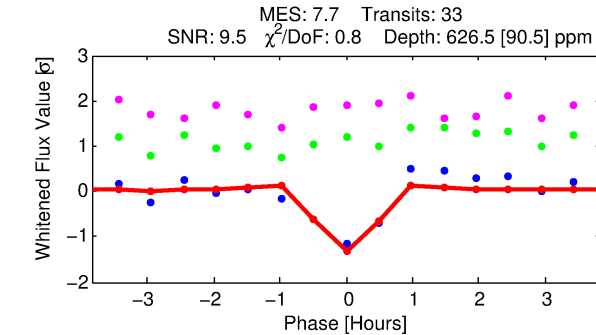
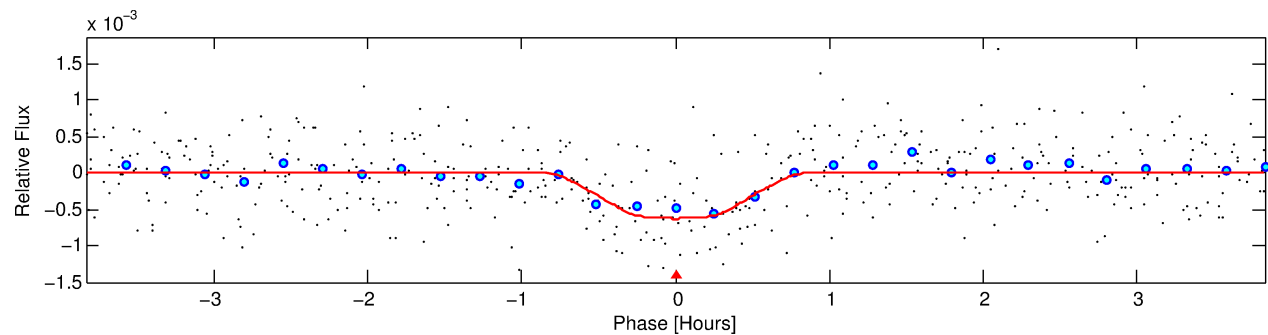
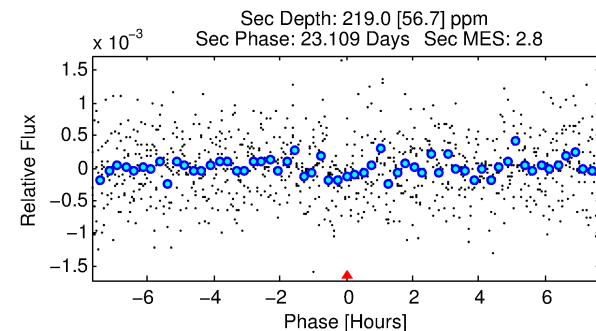
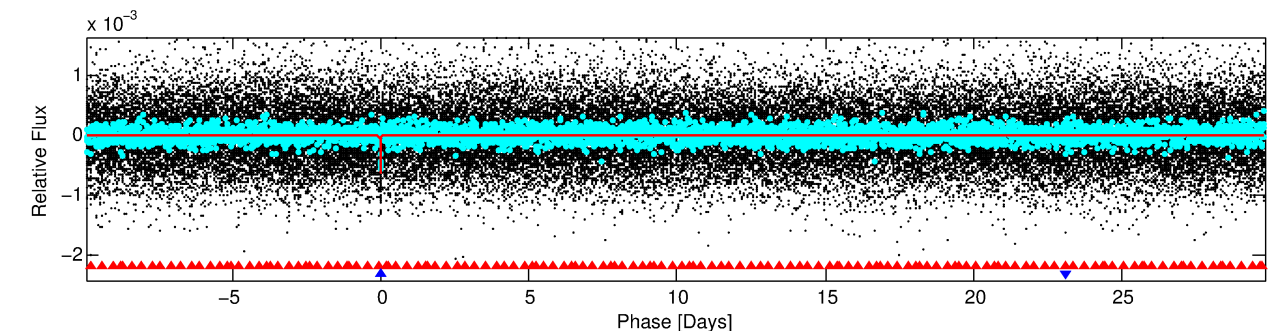
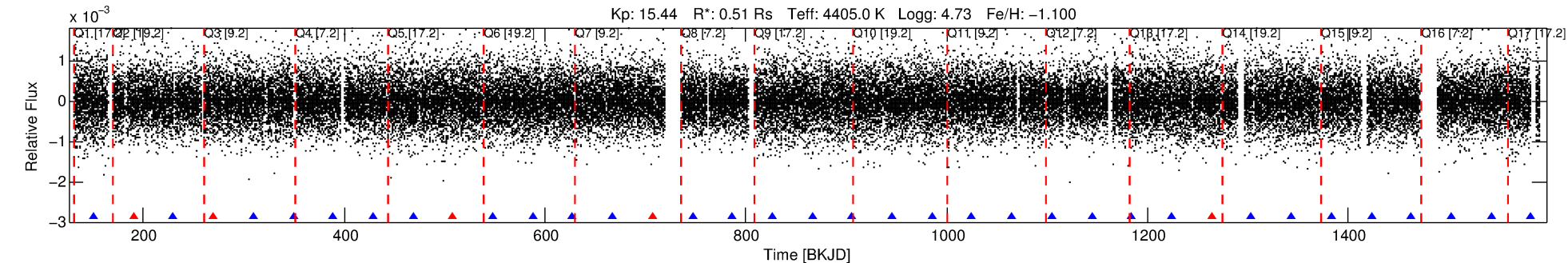
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010471621-02

No Significant Match Found

# DV One-Page Summary

KIC: 10471621 Candidate: 2 of 2 Period: 39.757 d  
KOI: K02554.01 Corr: 0.784



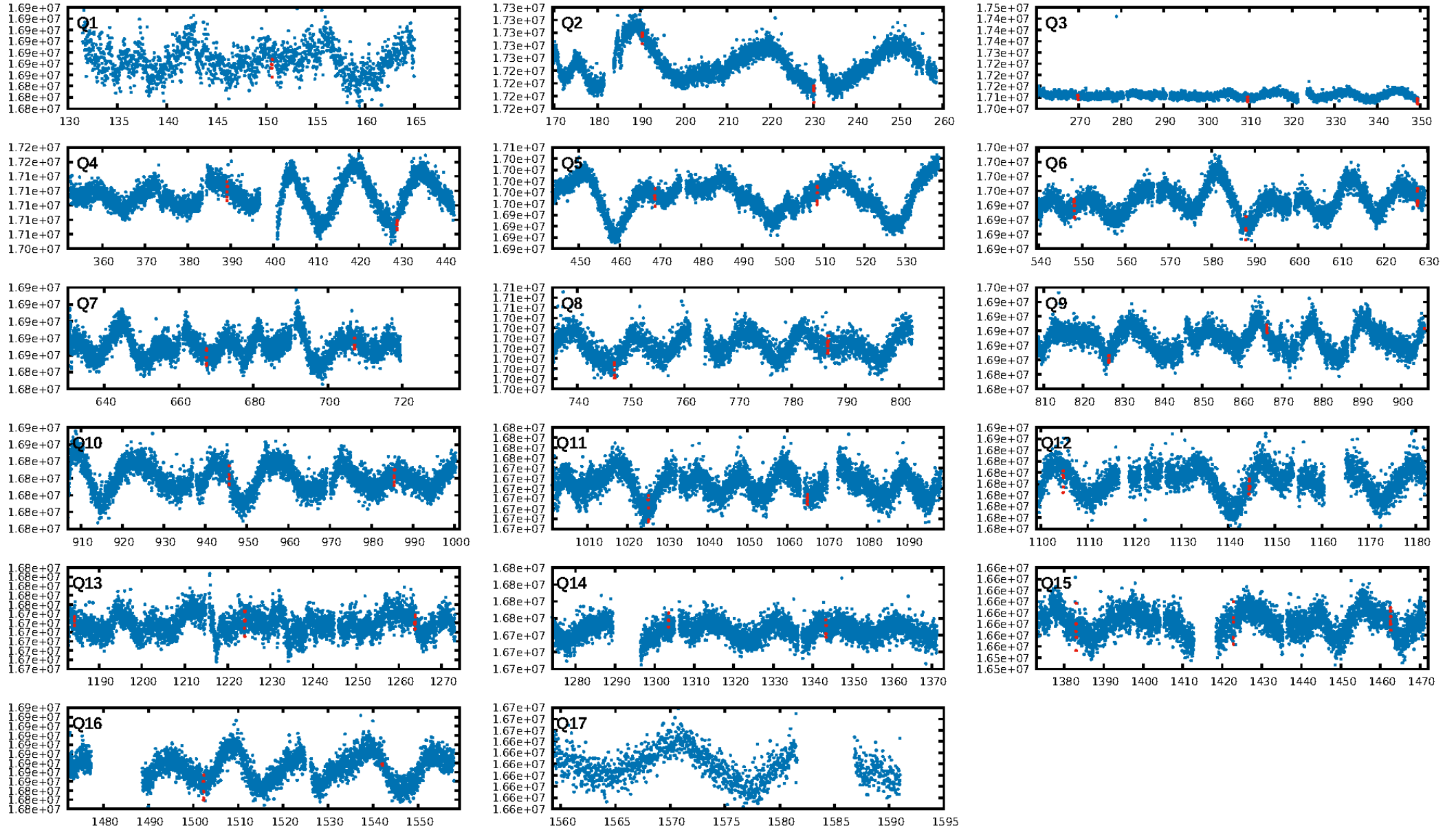
## DV Fit Results:

Period = 39.75652 [0.00016] d  
Epoch = 150.6003 [0.0036] BKJD  
Rp/R\* = 0.0281 [0.0159]  
a/R\* = 112.01 [271.69]  
b = 0.91 [0.46]  
Seff = 2.64 [0.45]  
Teq = 325 [14] K  
Rp = 1.56 [0.90] Re  
a = 0.1826 [0.0135] AU  
Ag = 1642.39 [1917.30] [0.86 $\sigma$ ]  
Teffp = 3199 [936] K [3.07 $\sigma$ ]

## DV Diagnostic Results:

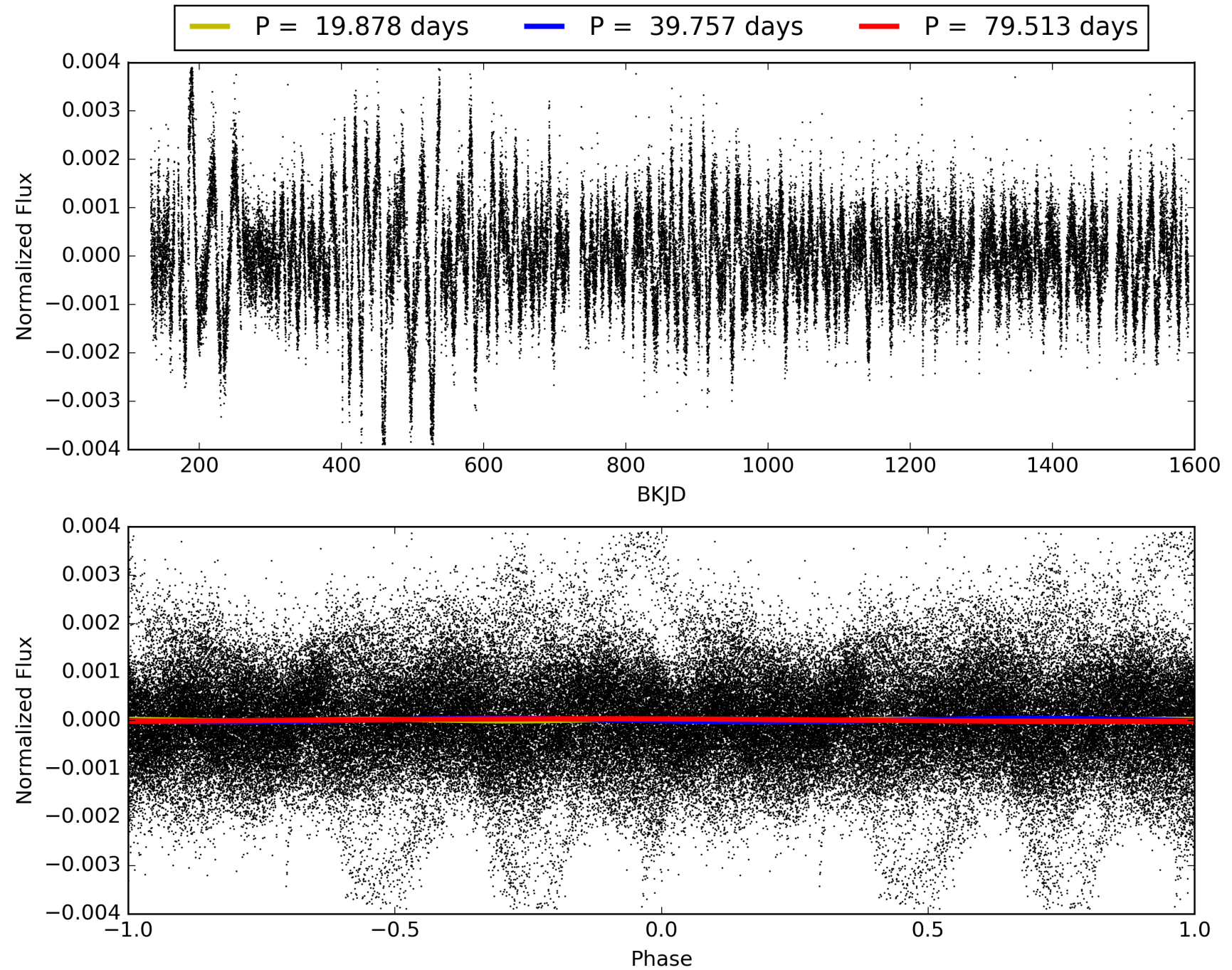
ShortPeriod-sig: 100.0% [211.88 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 44.7%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 3.04e-14  
RollingBand-fgt: 0.84 [27/32]  
GhostDiagnostic-chr: 3.806  
Centroid-sig: 15.6%  
Centroid-so: 1.267 arcsec [0.91 $\sigma$ ]  
OotOffset-rm: 0.155 arcsec [0.24 $\sigma$ ]  
KicOffset-rm: 0.188 arcsec [0.23 $\sigma$ ]  
OotOffset-st: 3/4/2/2 [11]  
KicOffset-st: 3/4/2/2 [11]  
DiffImageQuality-fgm: 0.55 [6/11]  
DiffImageOverlap-fno: 1.00 [16/16]

# TCE 010471621-02, PDC Light Curves



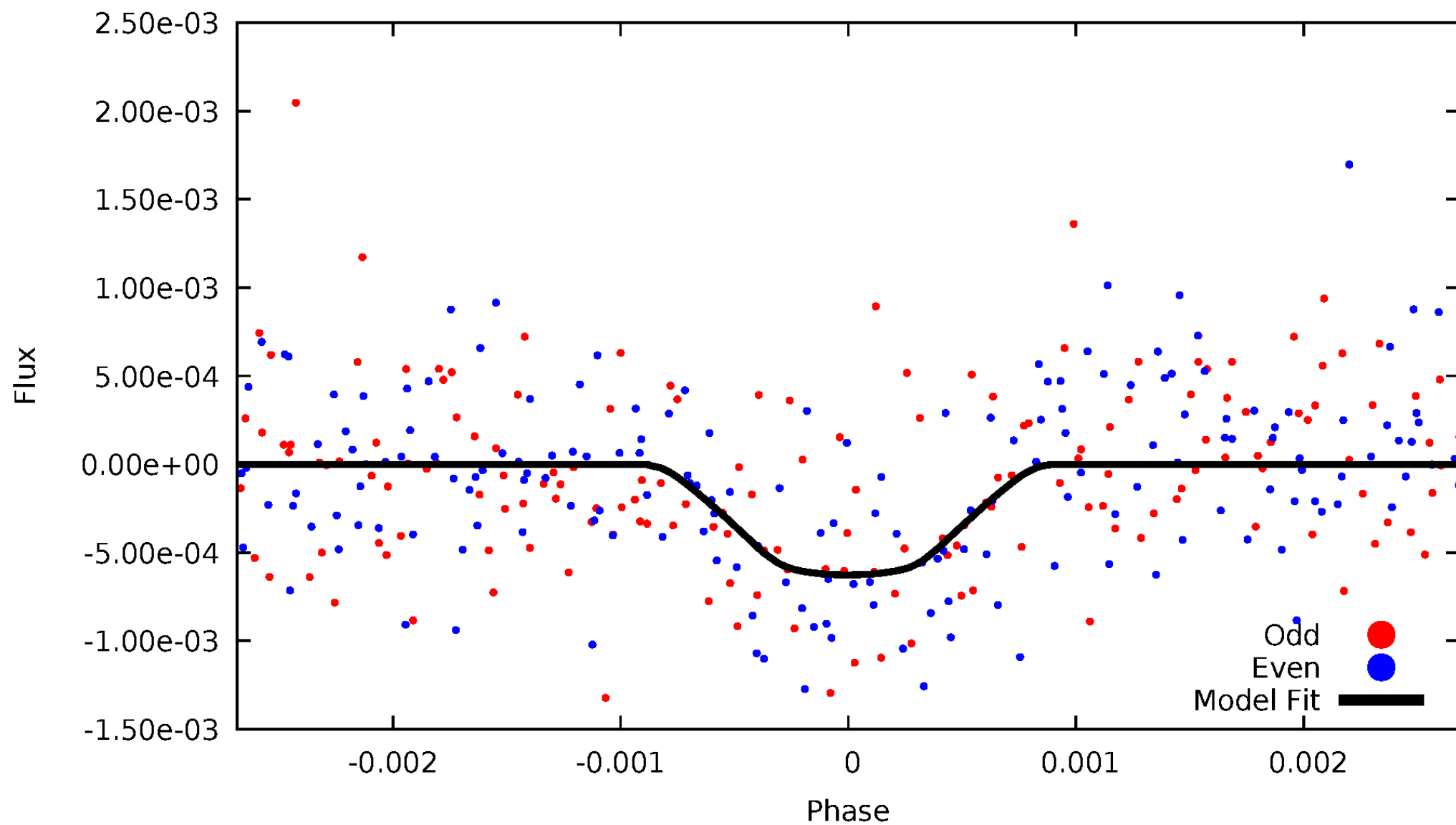


# TCE 010471621-02



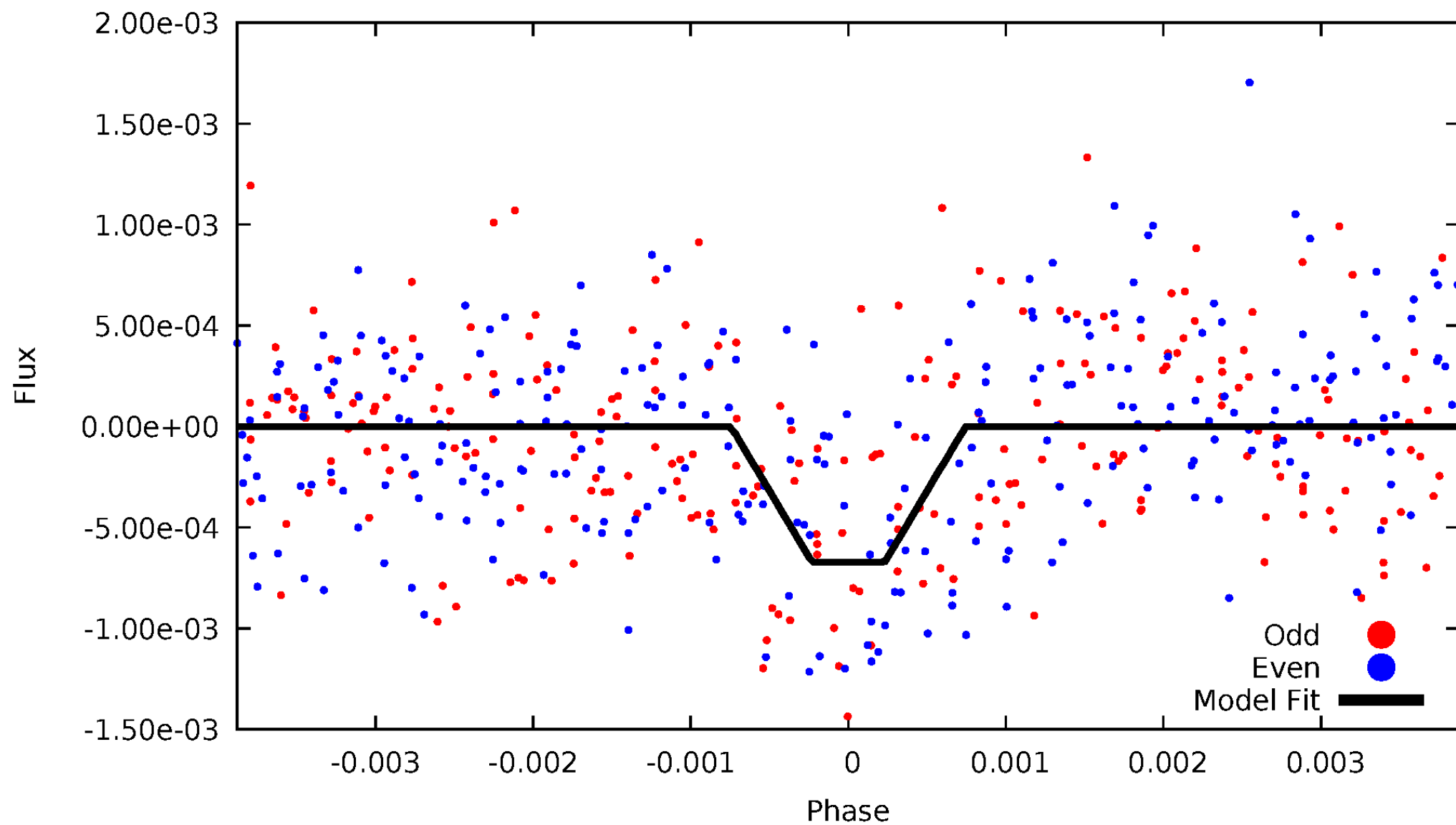
# DV Odd/Even

TCE 010471621-02



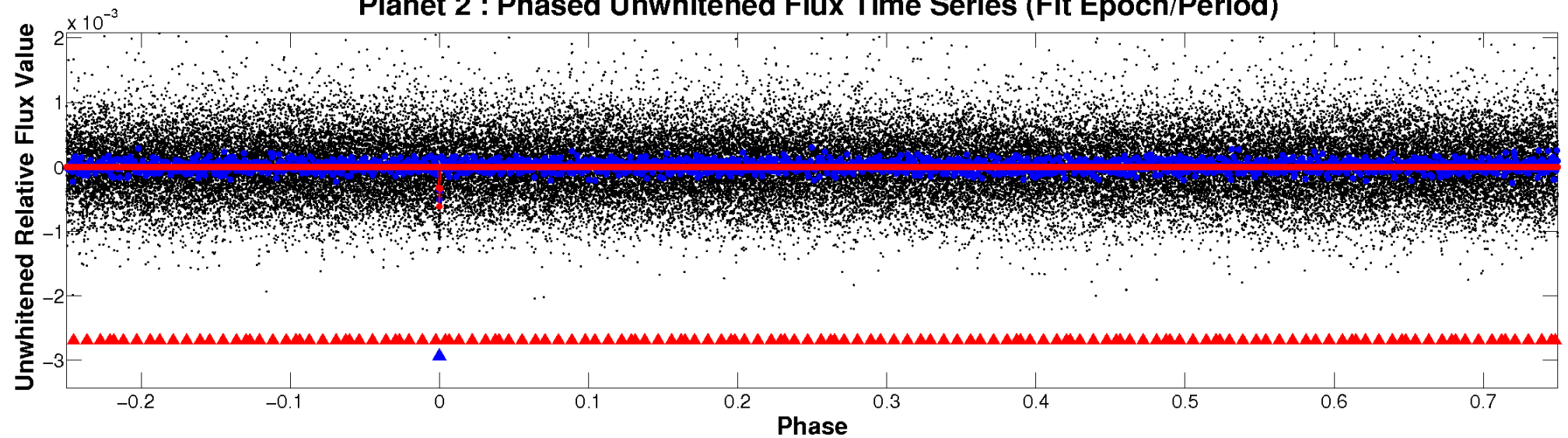
# ALT Odd/Even

TCE 010471621-02

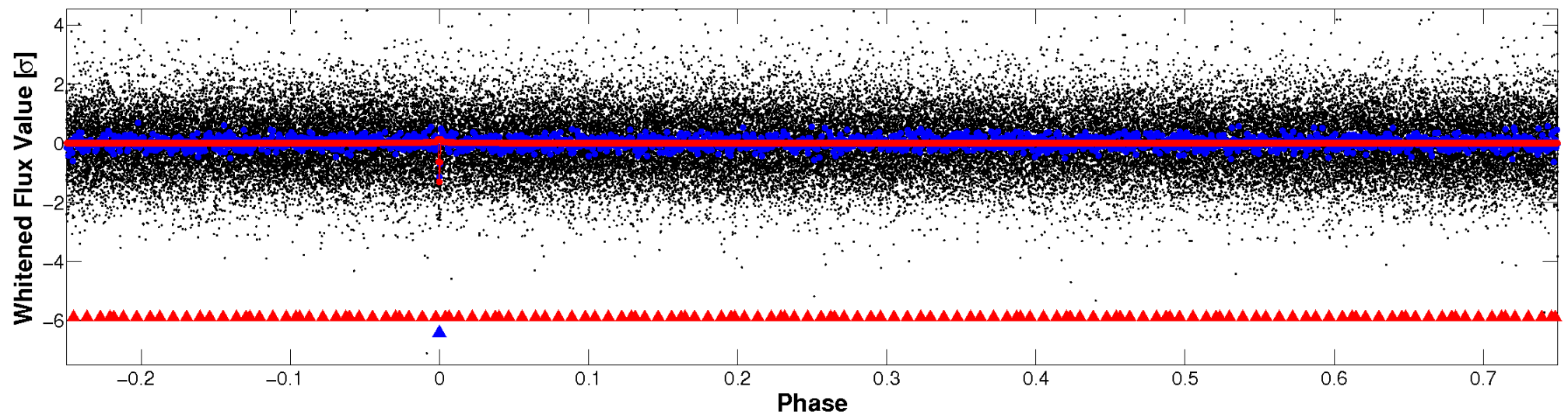


# Non-Whitened Vs. Whitened Light Curve

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

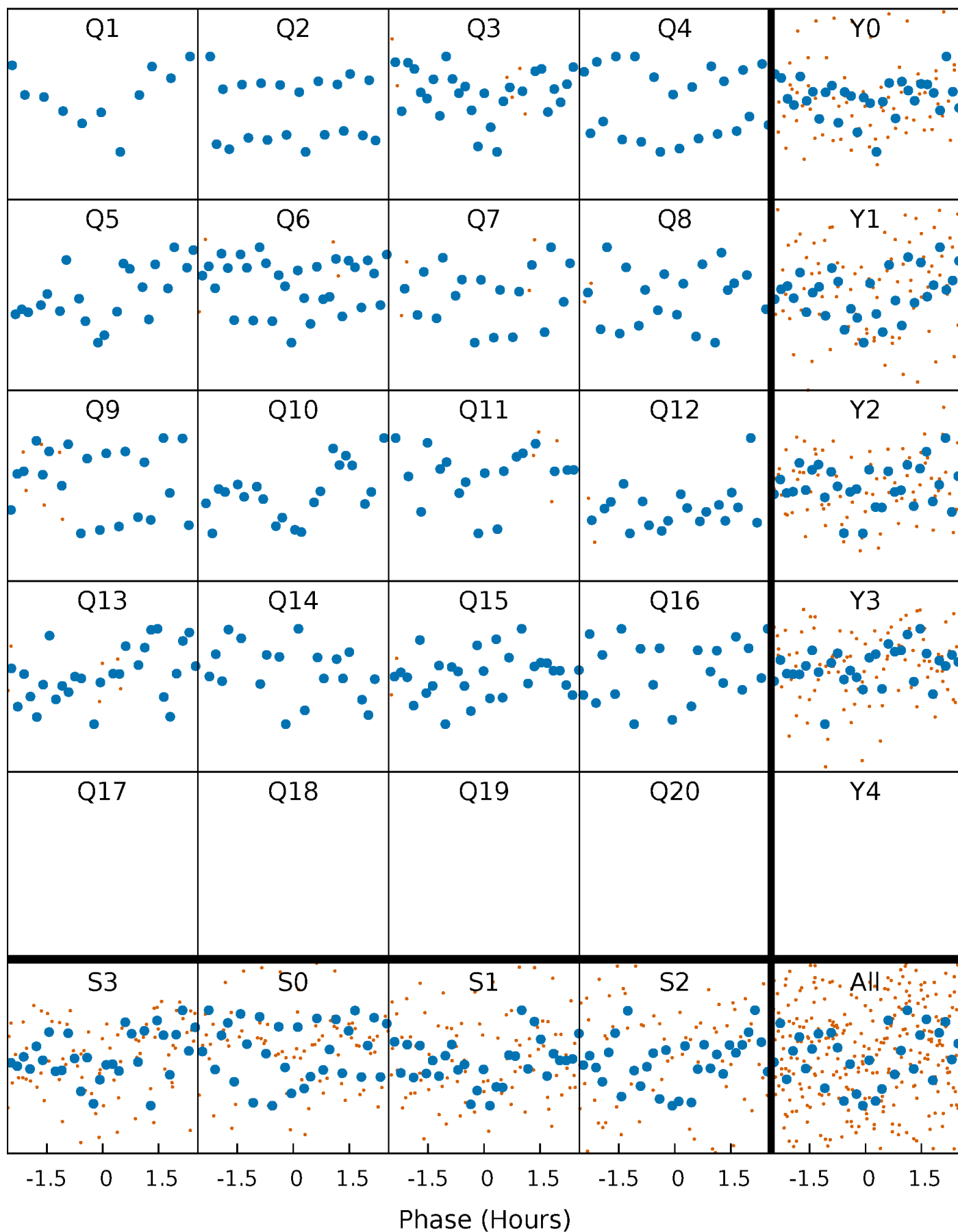


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

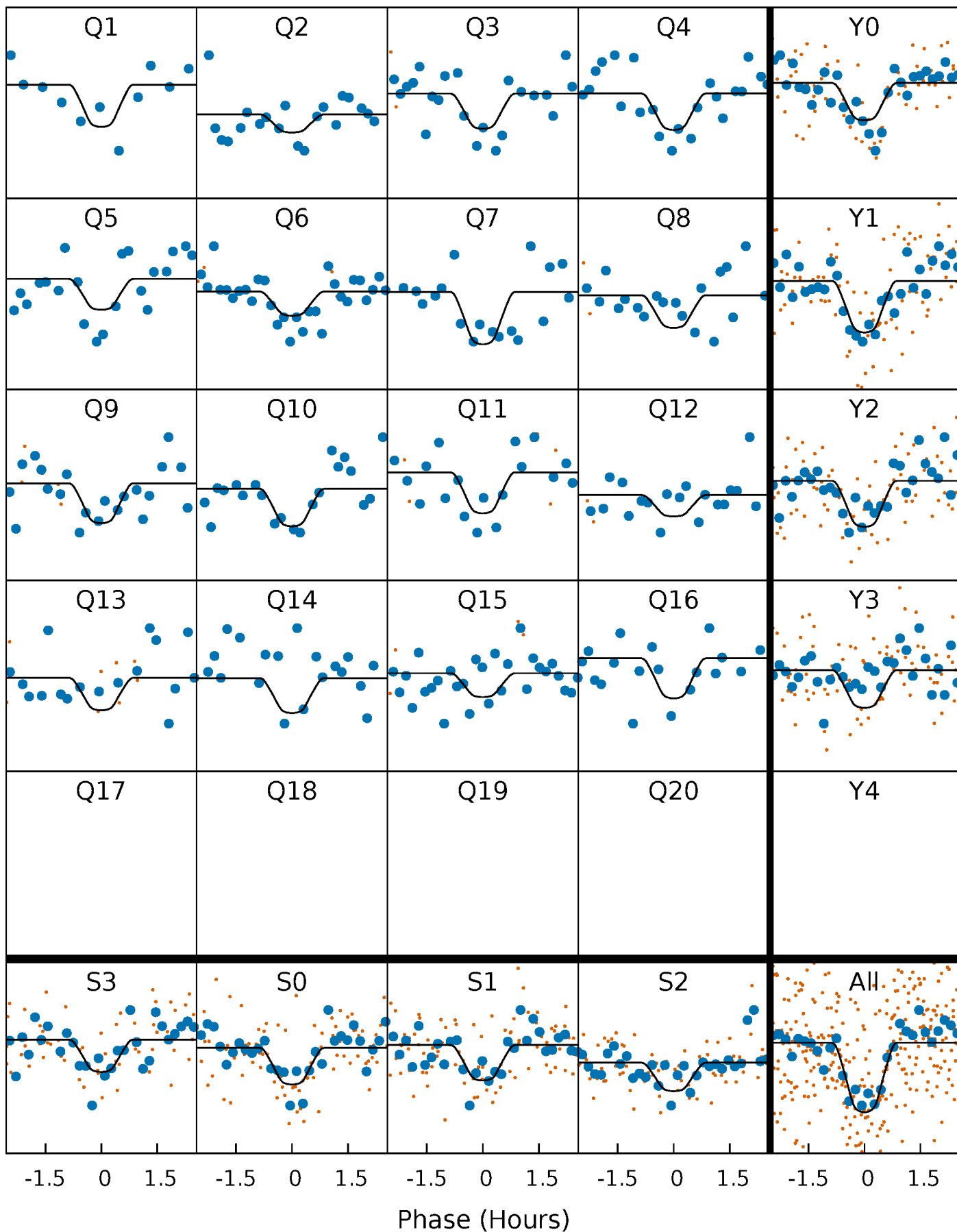
TCE 010471621-02 P= 39.756517 Days  $T_0=150.600263$  (BKJD)





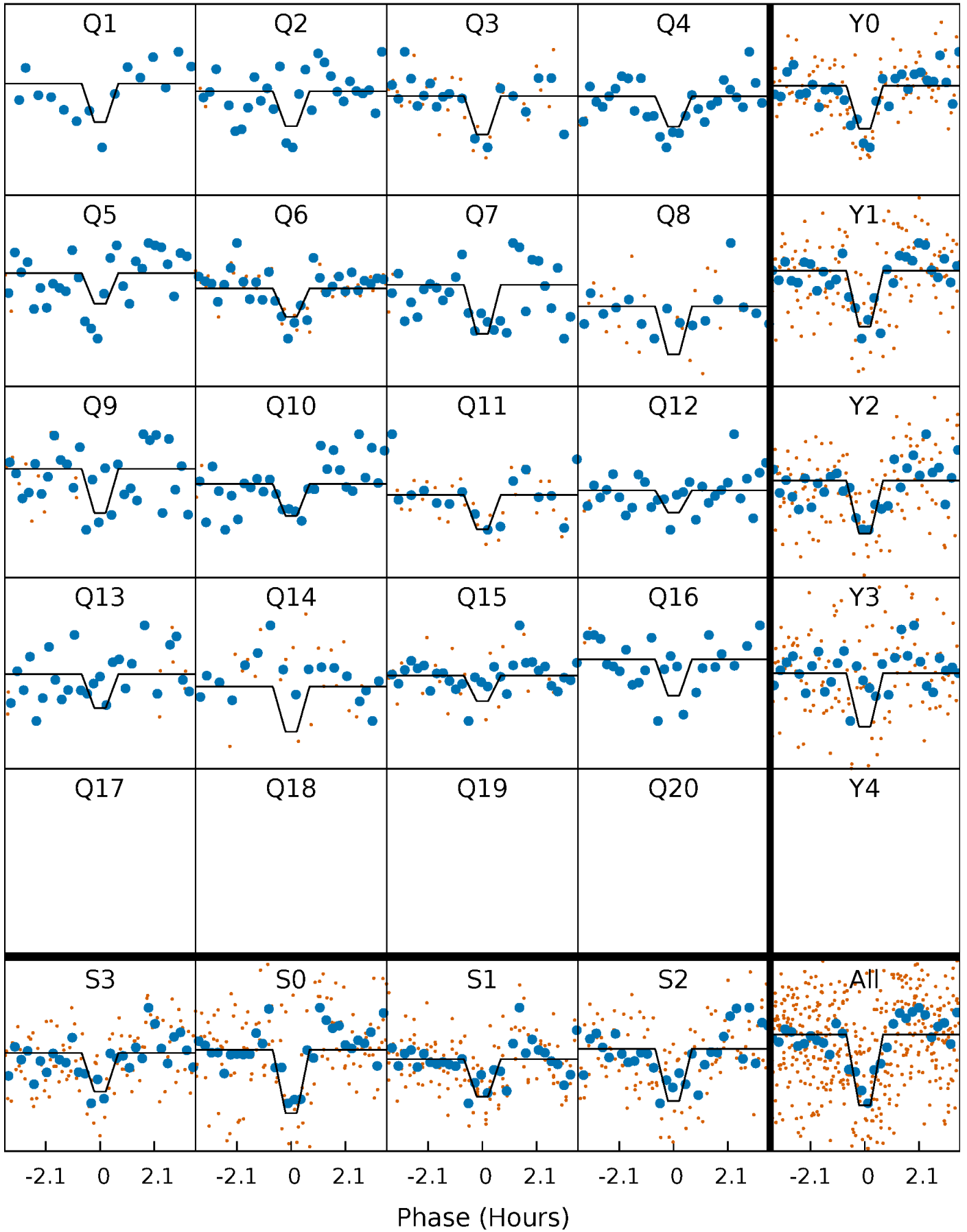
# DV Quarter-Phased Transit Curves

TCE 010471621-02   P= 39.756517 Days    $T_0=150.600263$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

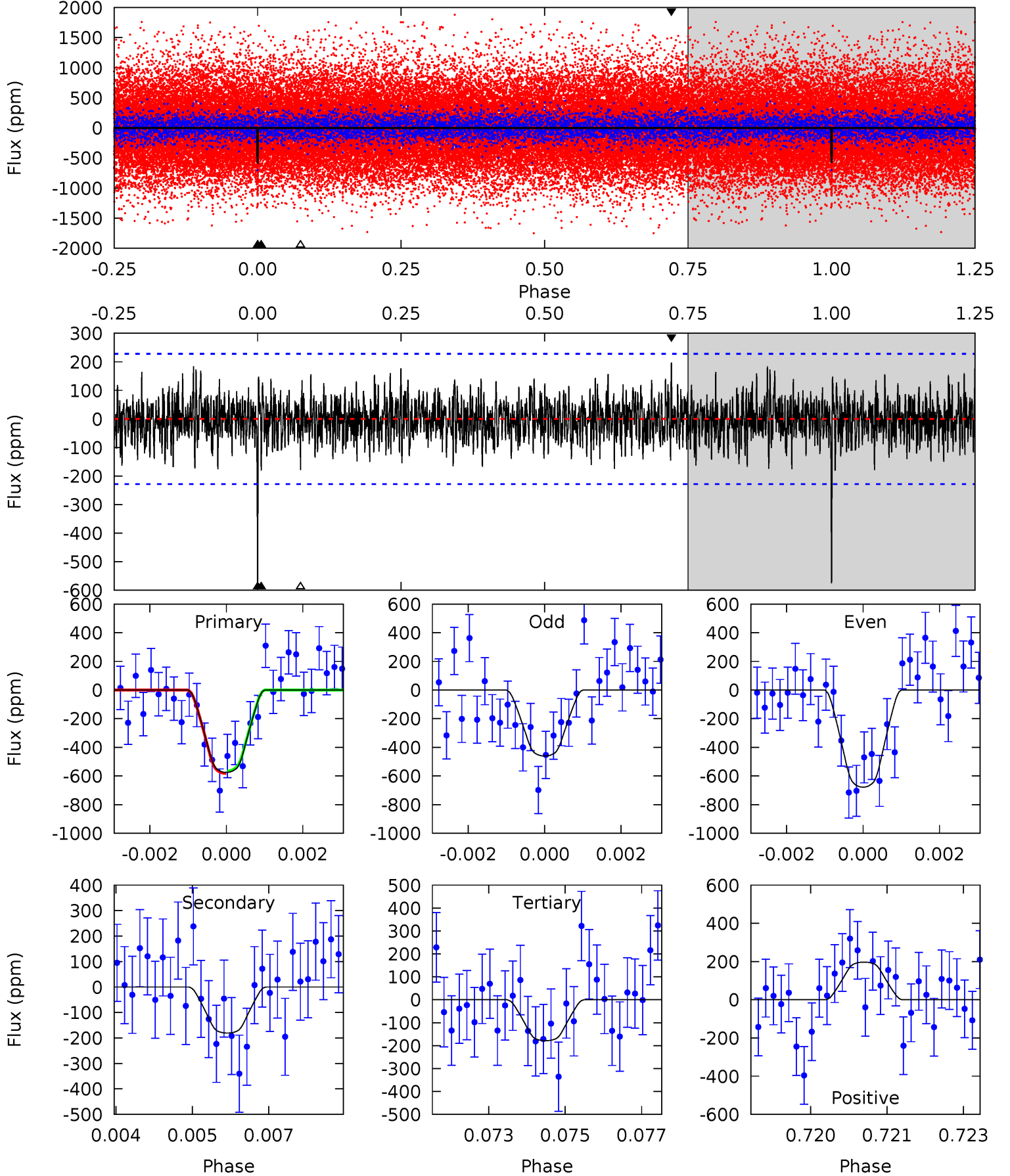
TCE 010471621-02     $P = 39.755511$  Days     $T_0 = 150.610593$  (BKJD)



# DV Model-Shift Uniqueness Test

010471621-02,  $P = 39.756517$  Days,  $E = 110.843746$  Days

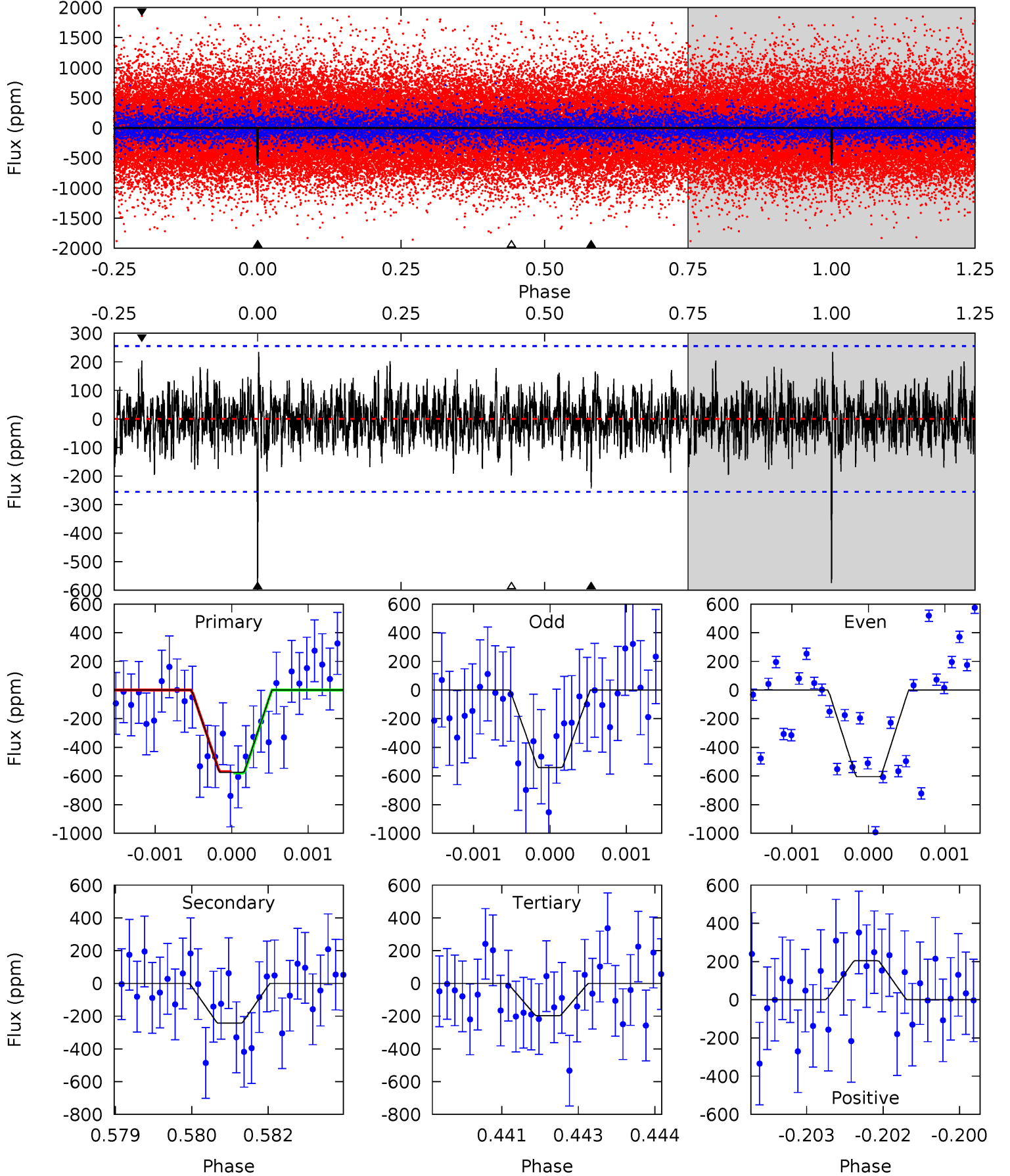
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
13.5	4.23	4.18	4.61	5.35	3.12	1.36	9.28	8.86	0.05	-0.38	2.55	0.82	0.26	0.19



# Alt Model-Shift Uniqueness Test

010471621-02,  $P = 39.755511$  Days,  $E = 110.855082$  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
12.1	5.13	4.17	4.31	5.39	3.19	1.31	7.96	7.82	0.96	0.82	0.68	0.90	0.29	0.10



### Stellar Parameters For KIC 010471621

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4405^{+119}_{-146}$	$4.732^{+0.058}_{-0.031}$	$-1.100^{+0.300}_{-0.350}$	$0.511^{+0.037}_{-0.045}$	$0.513^{+0.040}_{-0.033}$	$5.421^{+1.459}_{-0.739}$
	+3%/-3%	+1%/-1%	+27%/-32%	+7%/-9%	+8%/-6%	+27%/-14%
Source	PHO1	KIC0	KIC0	DSEP		

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

### Secondary Eclipse Parameters for KIC 010471621-02 / KOI 2554.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-181 \pm 43$	$1.54^{+0.86}_{-0.76}$	$451^{+15}_{-17}$	$3401^{+988}_{-423}$	$1366^{+4420}_{-790}$
Alt.	$-243 \pm 47$	$1.44^{+0.83}_{-0.72}$	$451^{+16}_{-17}$	$3662^{+1112}_{-482}$	$2171^{+7066}_{-1281}$

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

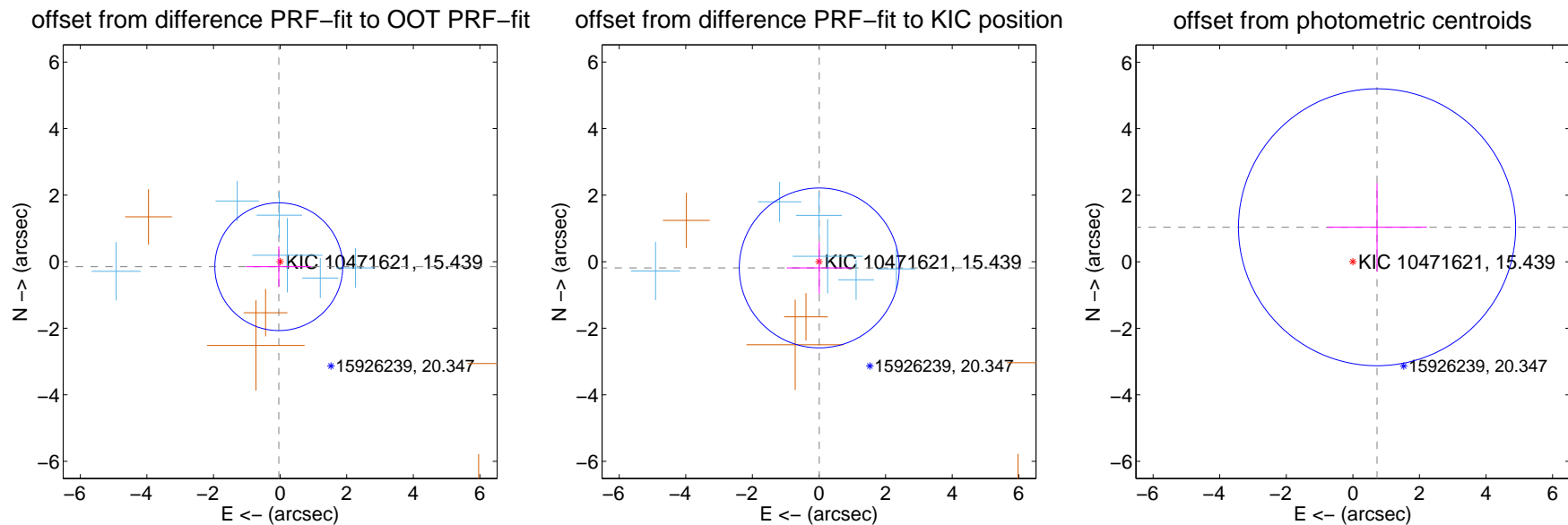
## DV Centroid Data

Supplemental centroid analysis for 010471621-02. Kepler magnitude: 15.44. Transit SNR 9.49

There are 6 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

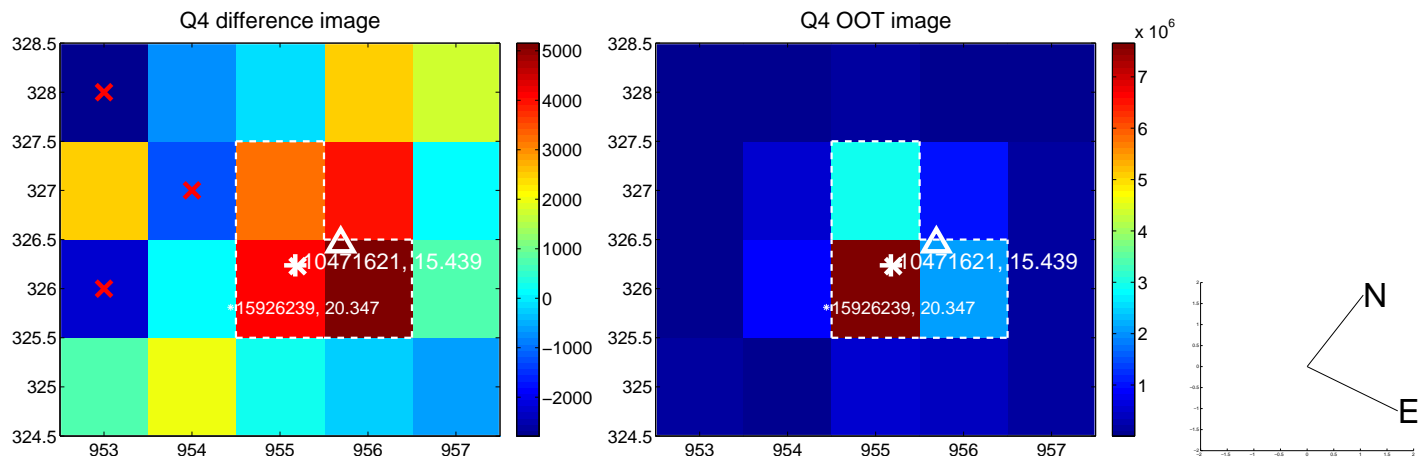
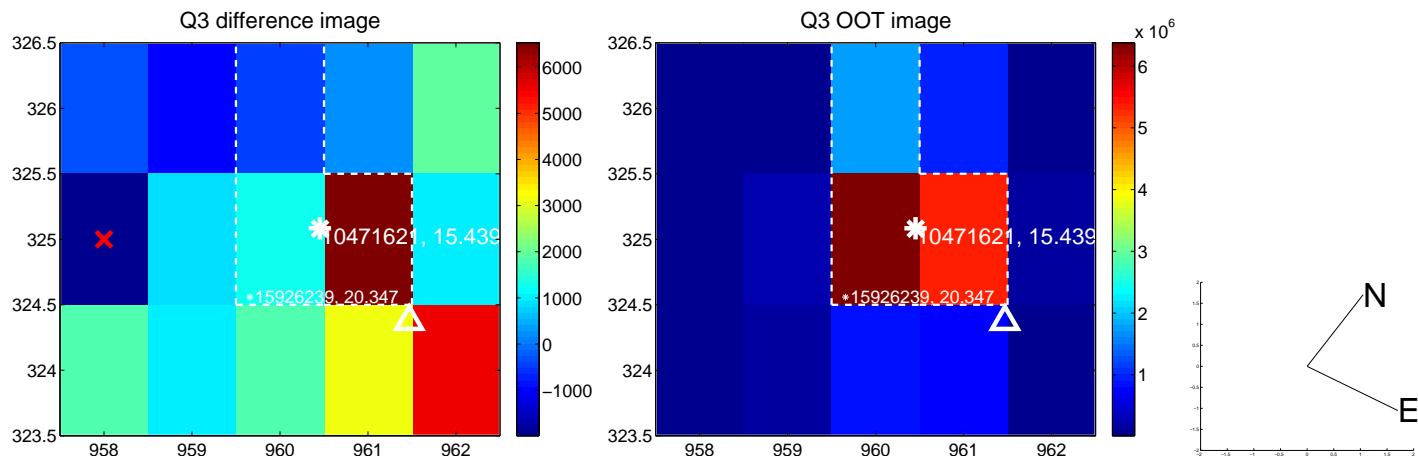
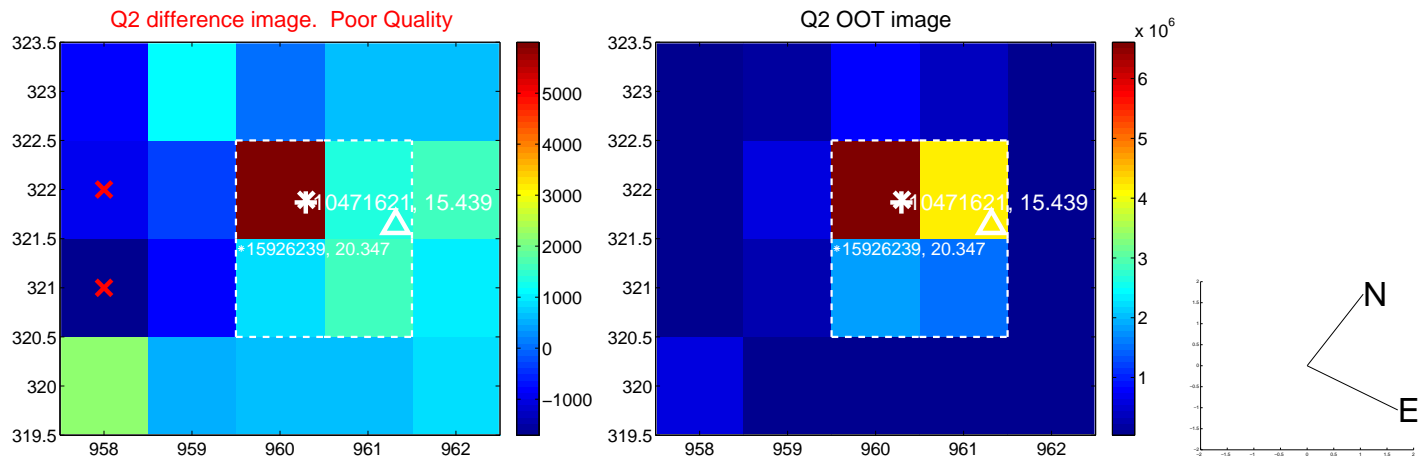
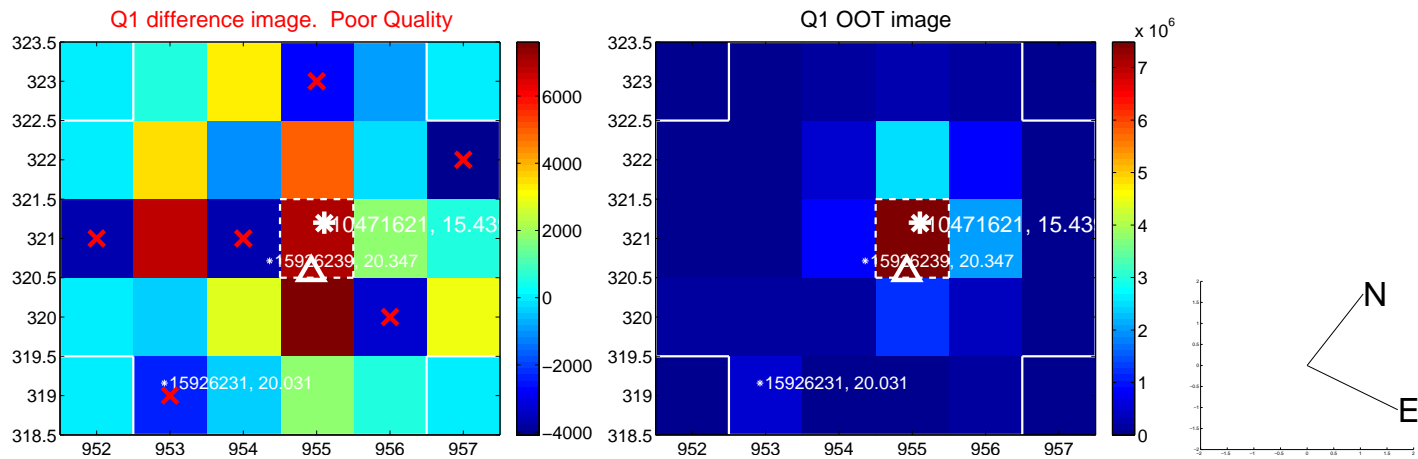
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.155 \pm 0.640$	0.24	$0.040 \pm 0.980$	$-0.150 \pm 0.609$
PRF-fit source offset from KIC position	$0.188 \pm 0.801$	0.23	$-0.008 \pm 0.975$	$-0.188 \pm 0.773$
photometric centroid source offset	$1.27 \pm 1.39$	0.91	$-0.73 \pm 1.50$	$1.04 \pm 1.33$



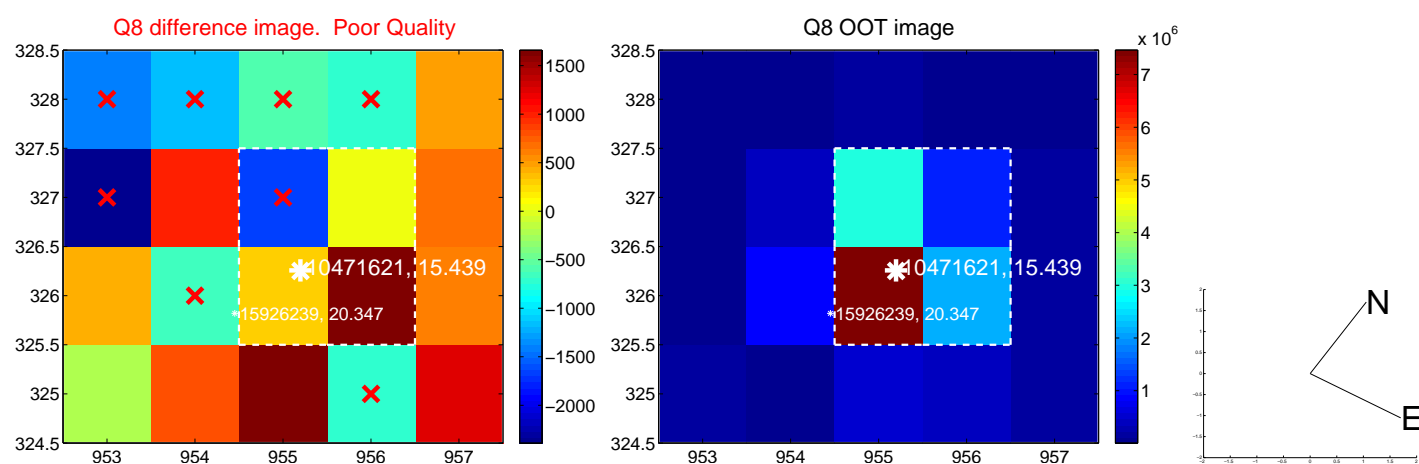
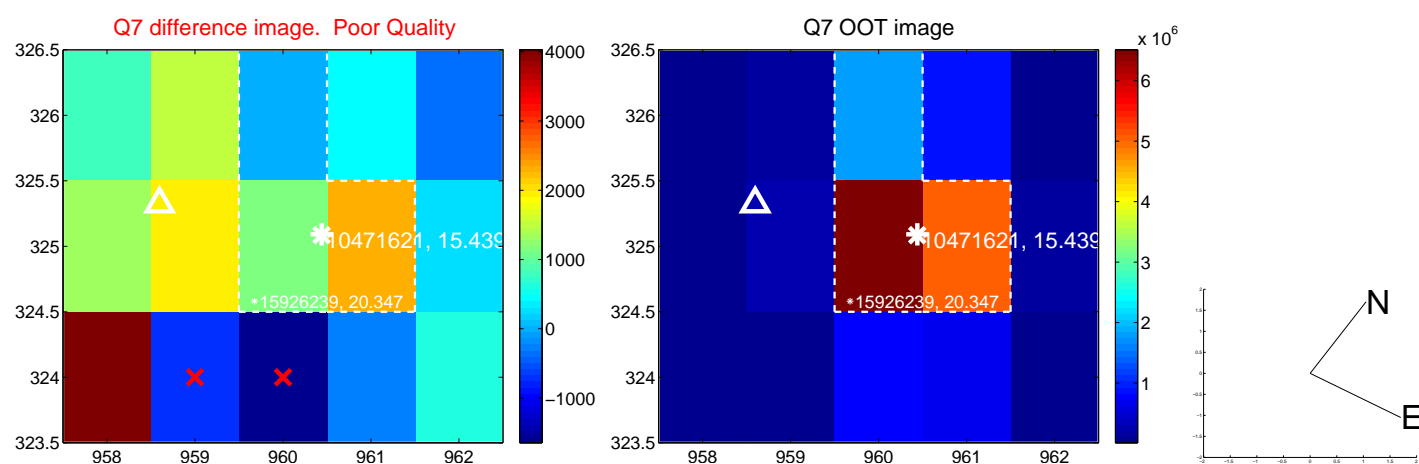
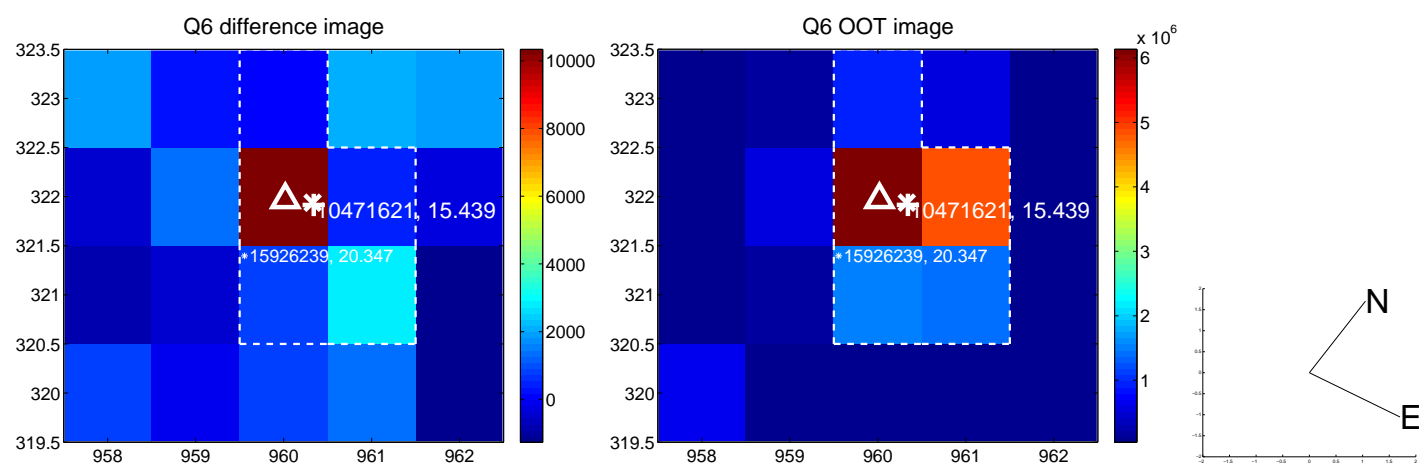
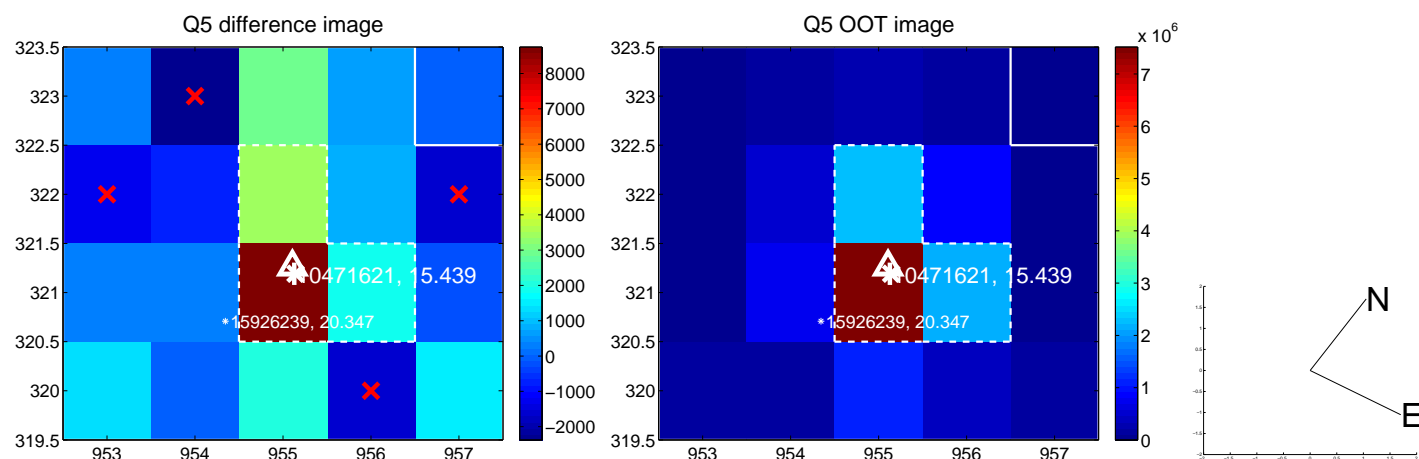
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



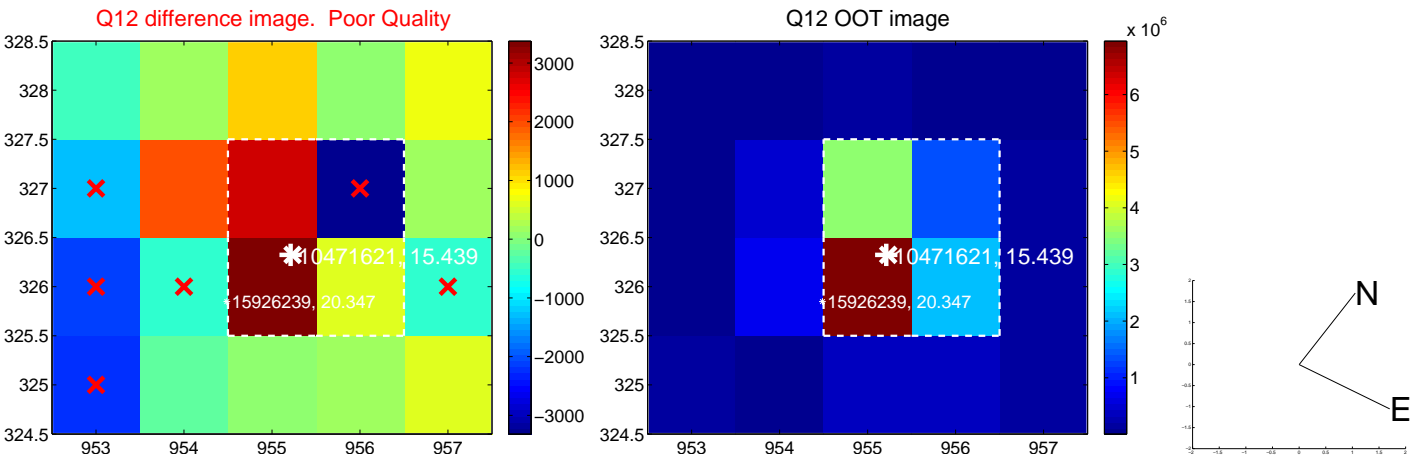
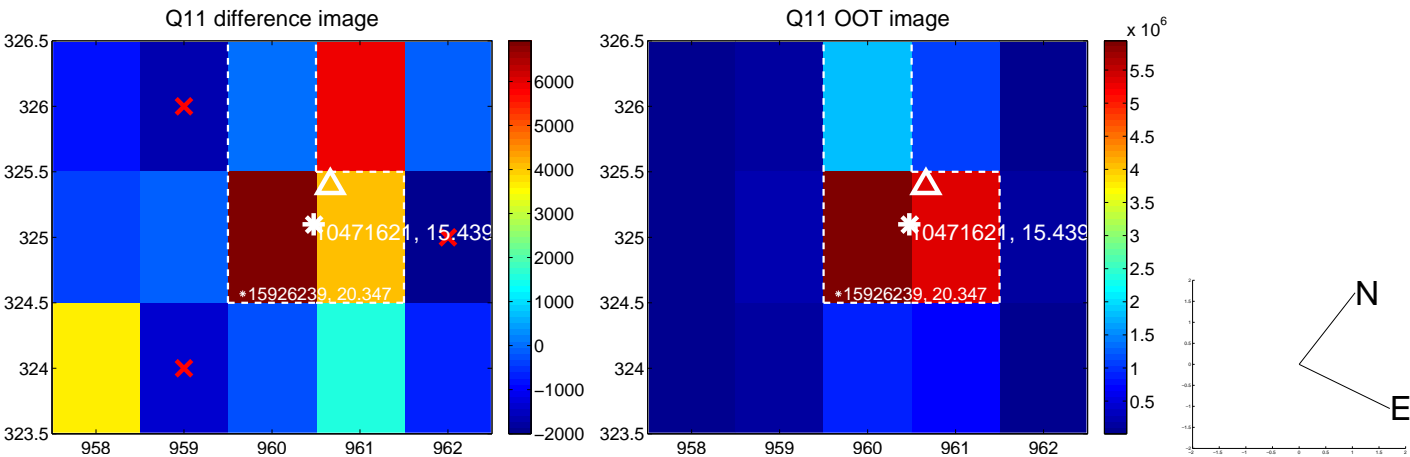
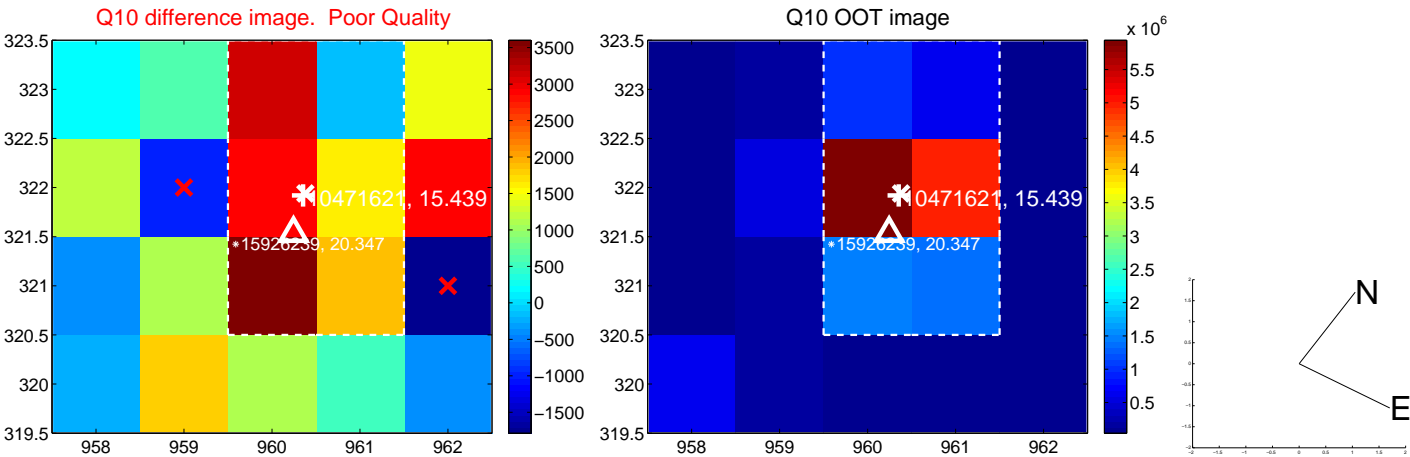
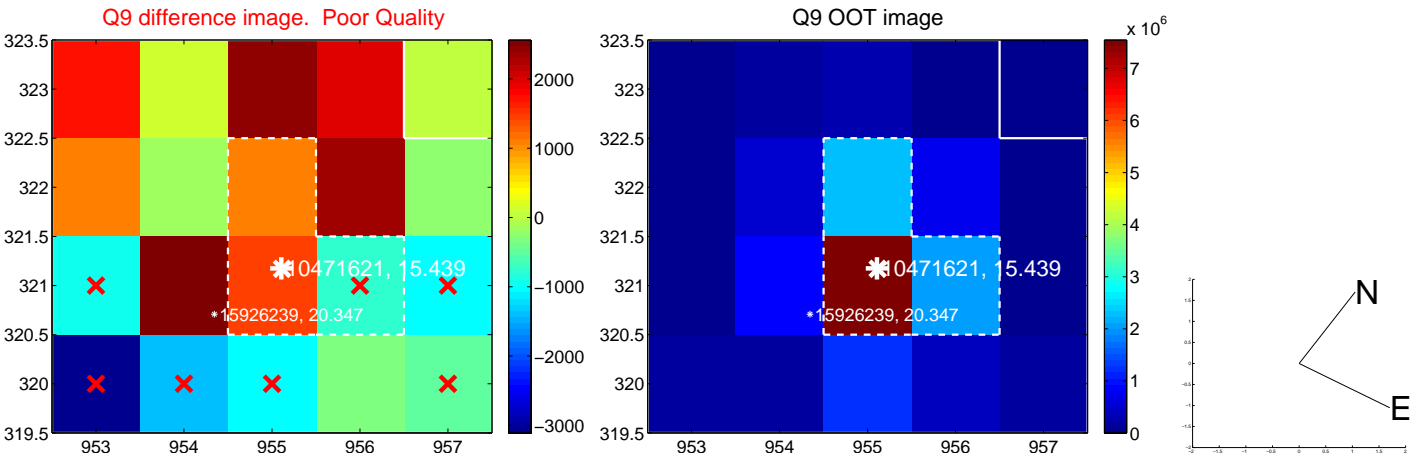
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



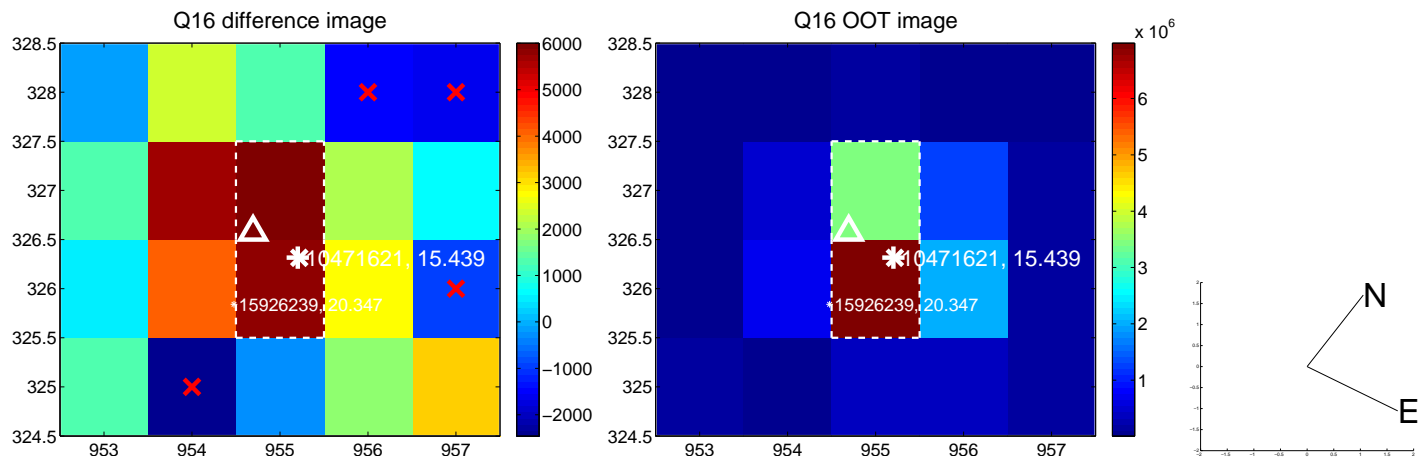
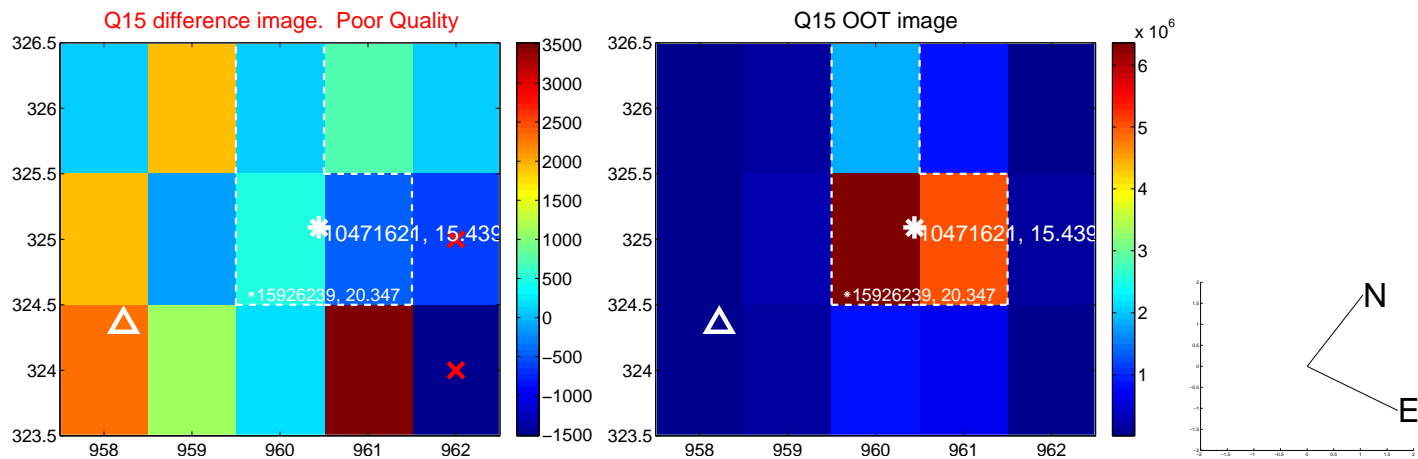
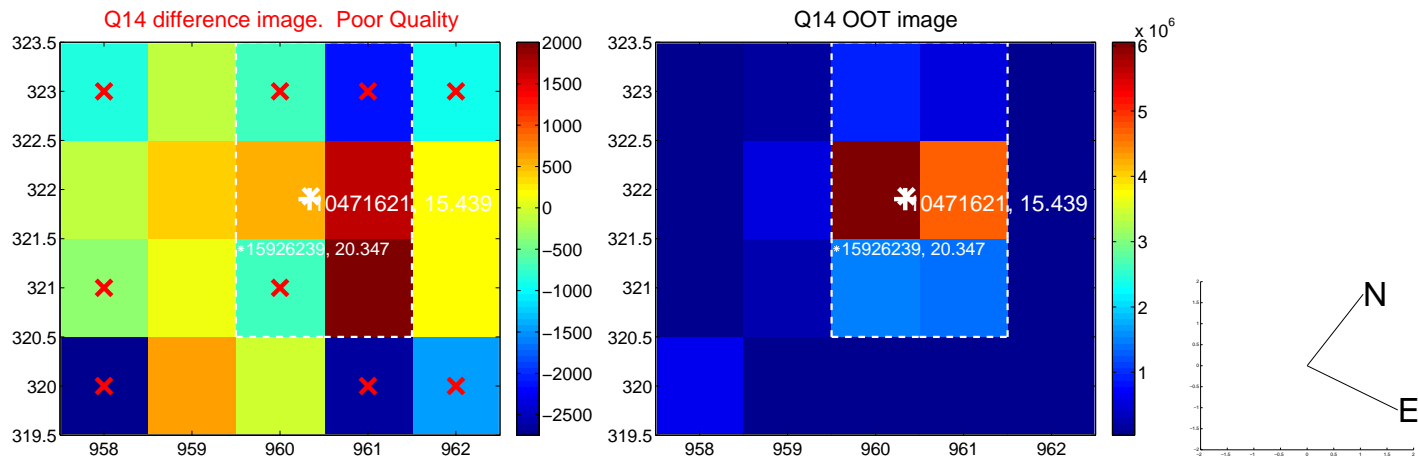
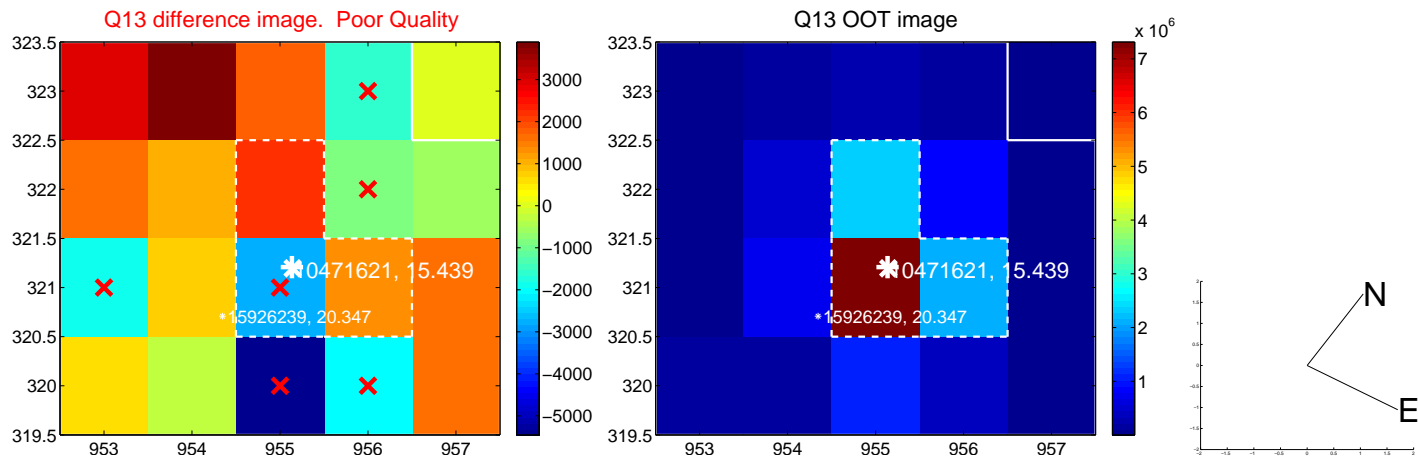
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



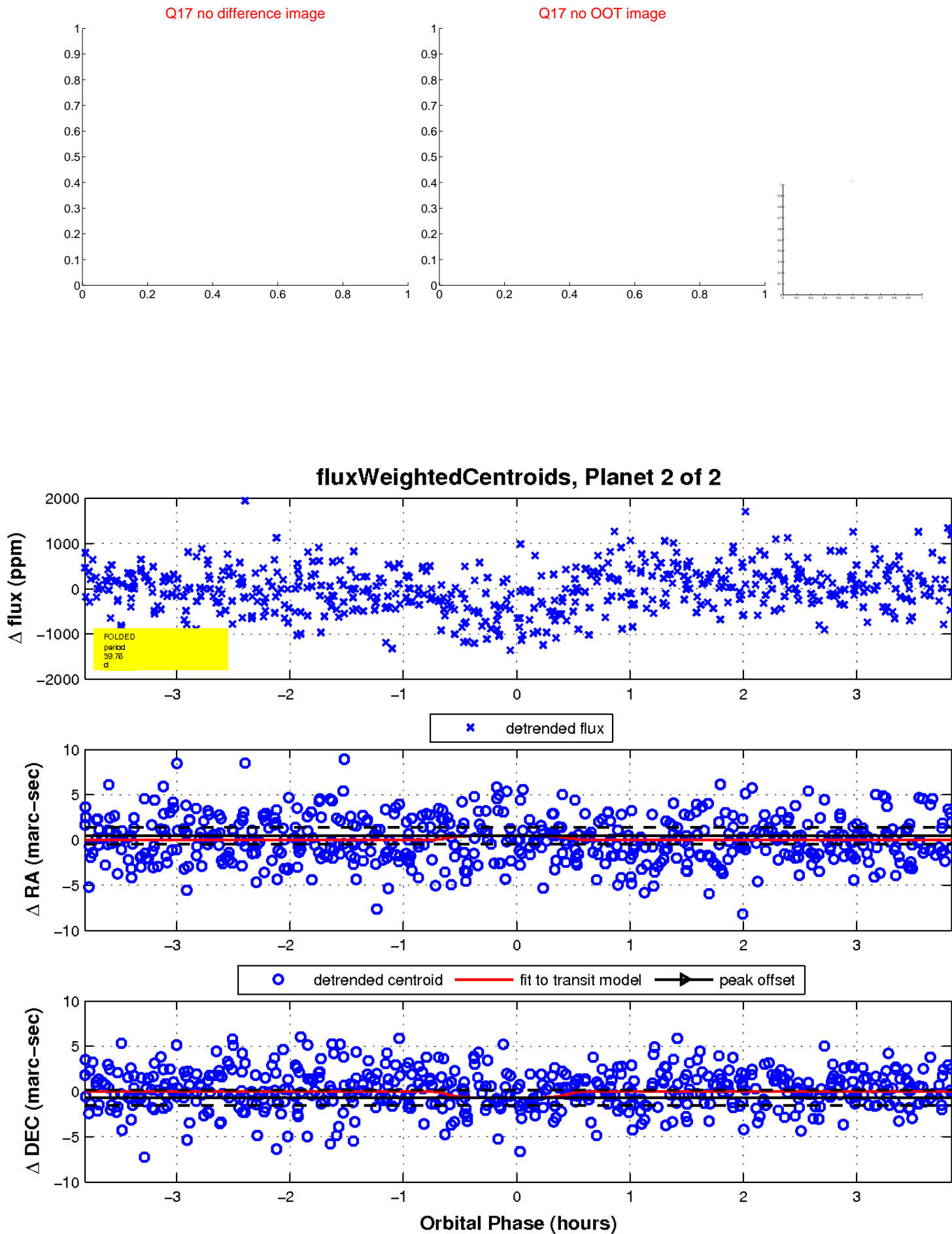
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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UKIRT Image

Declination

