

# KIC 010471113

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010471113-01	OBS	7332.01	0.933715	131.532721	48.3	3.616	11.2	9.5	1.03	6170	0.84	3838.86
010471113-02	OBS	No	191.277720	137.400803	750.3	6.011	8.5	6.5	1.03	6170	3.58	3.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010471113-01	OBS	PC	0.69	0	0	0	0	NO_COMMENT
010471113-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS

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

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

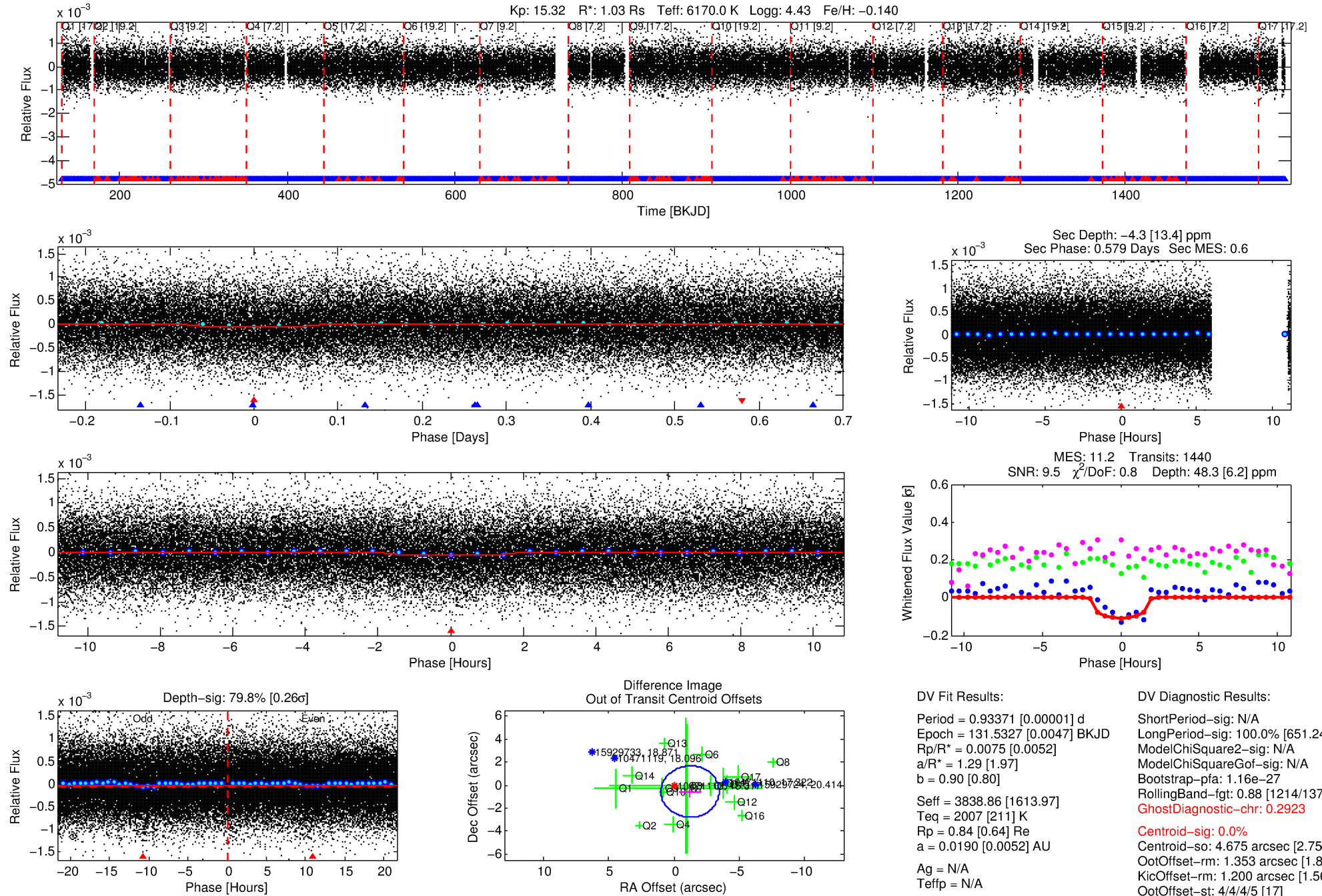
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010471113-01

No Significant Match Found

# DV One-Page Summary

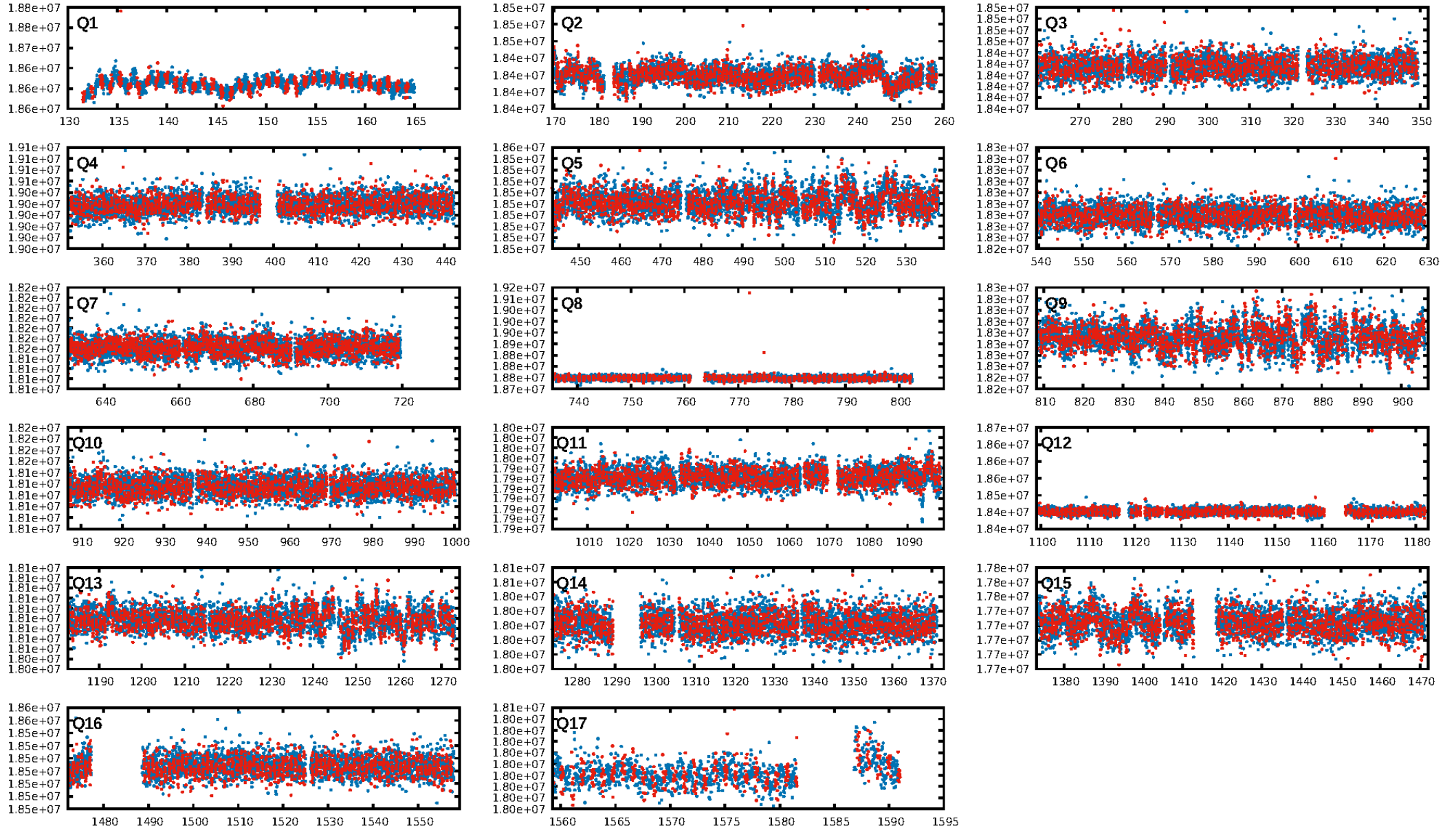
KIC: 10471113 Candidate: 1 of 2 Period: 0.934 d  
KOI: K07332.01 Corr: 0.905



Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 04:45:03 Z

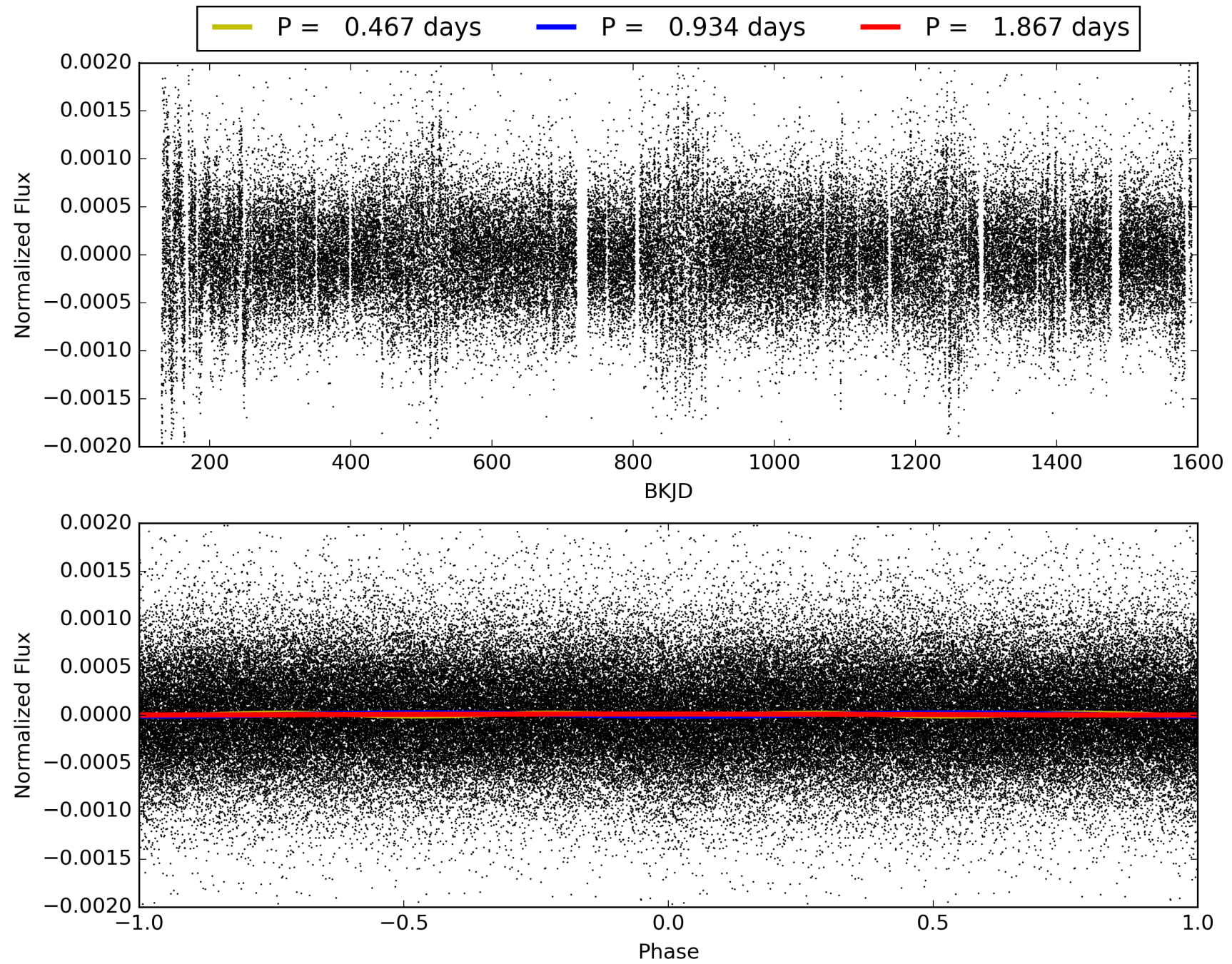
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010471113-01, PDC Light Curves



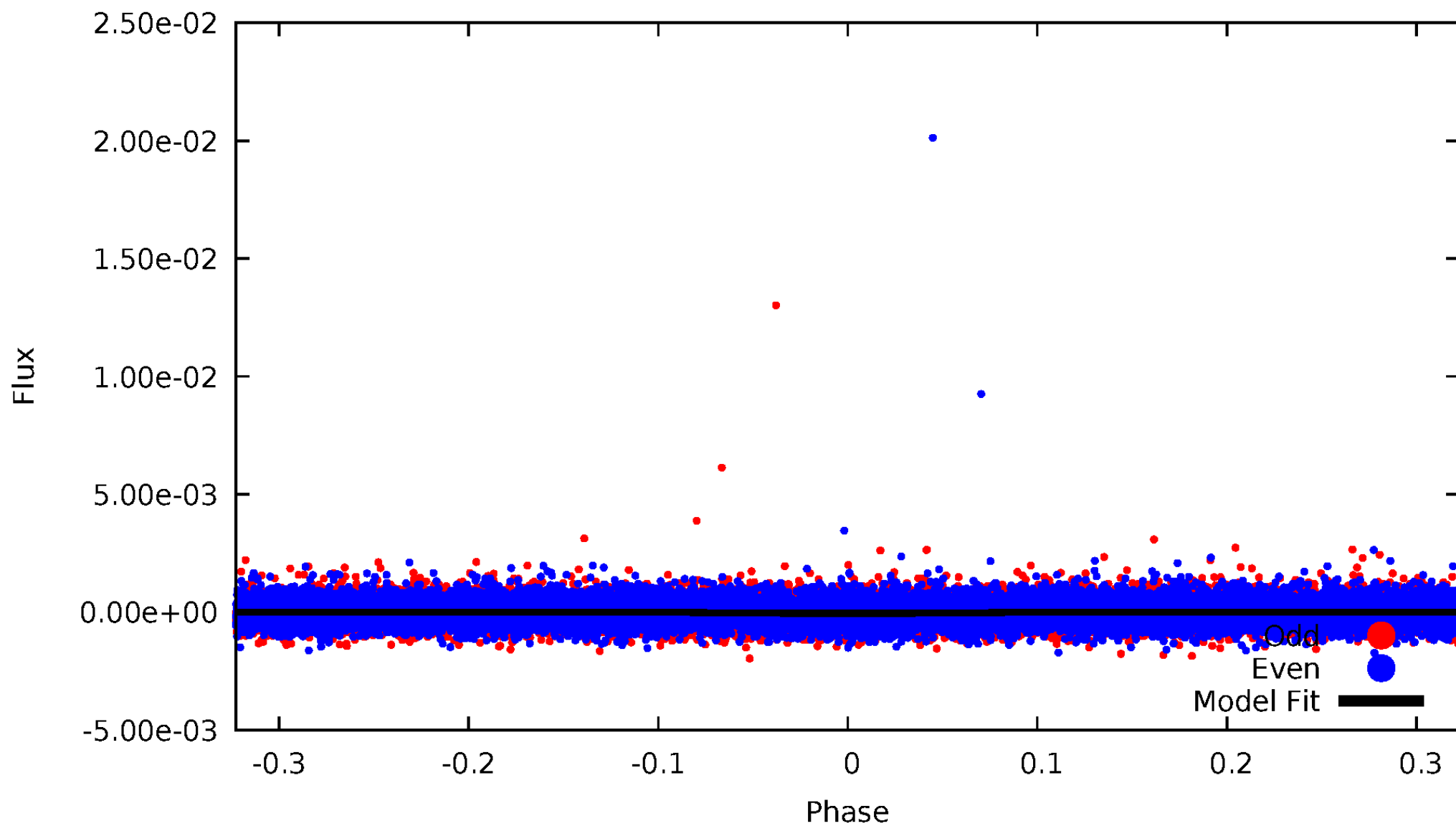


TCE 010471113-01



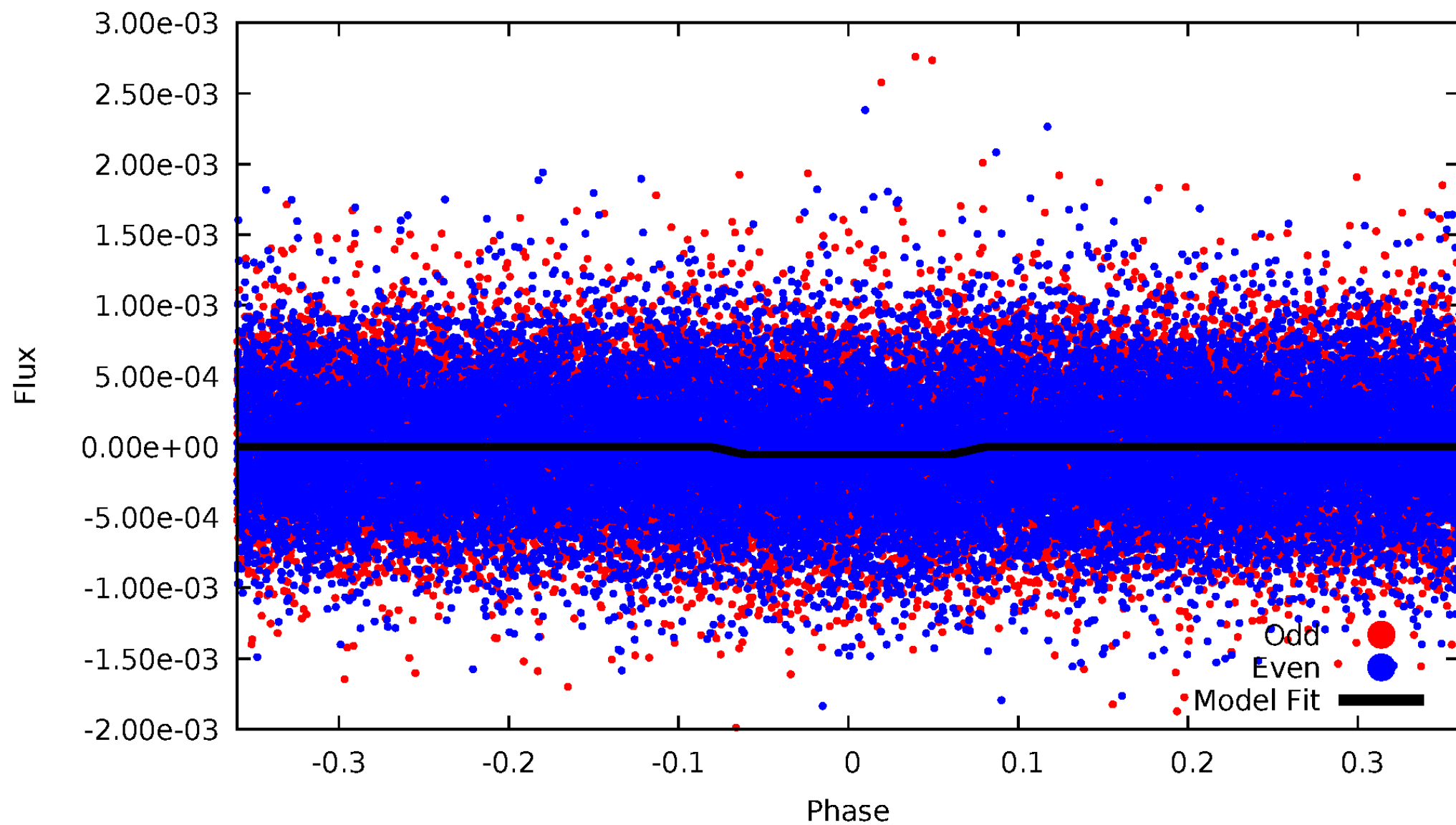
# DV Odd/Even

TCE 010471113-01



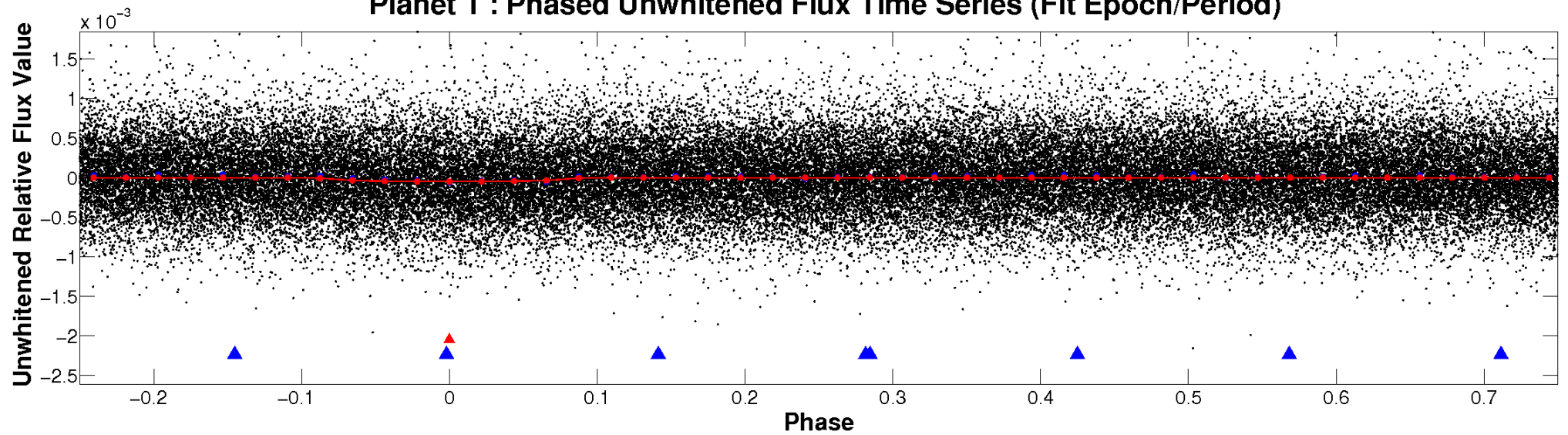
# ALT Odd/Even

TCE 010471113-01

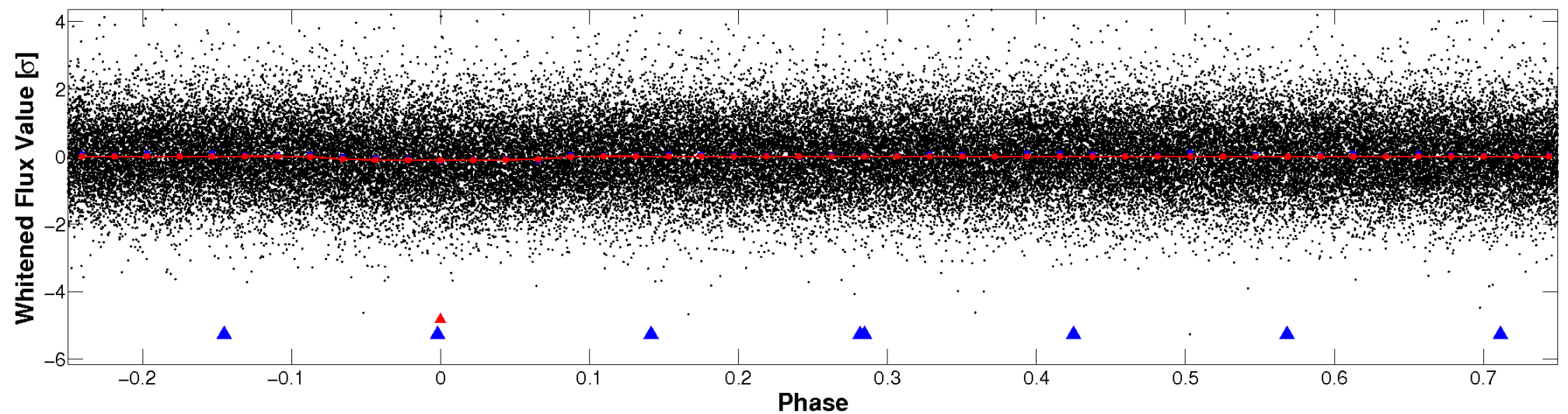


# Non-Whitened Vs. Whitened Light Curve

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



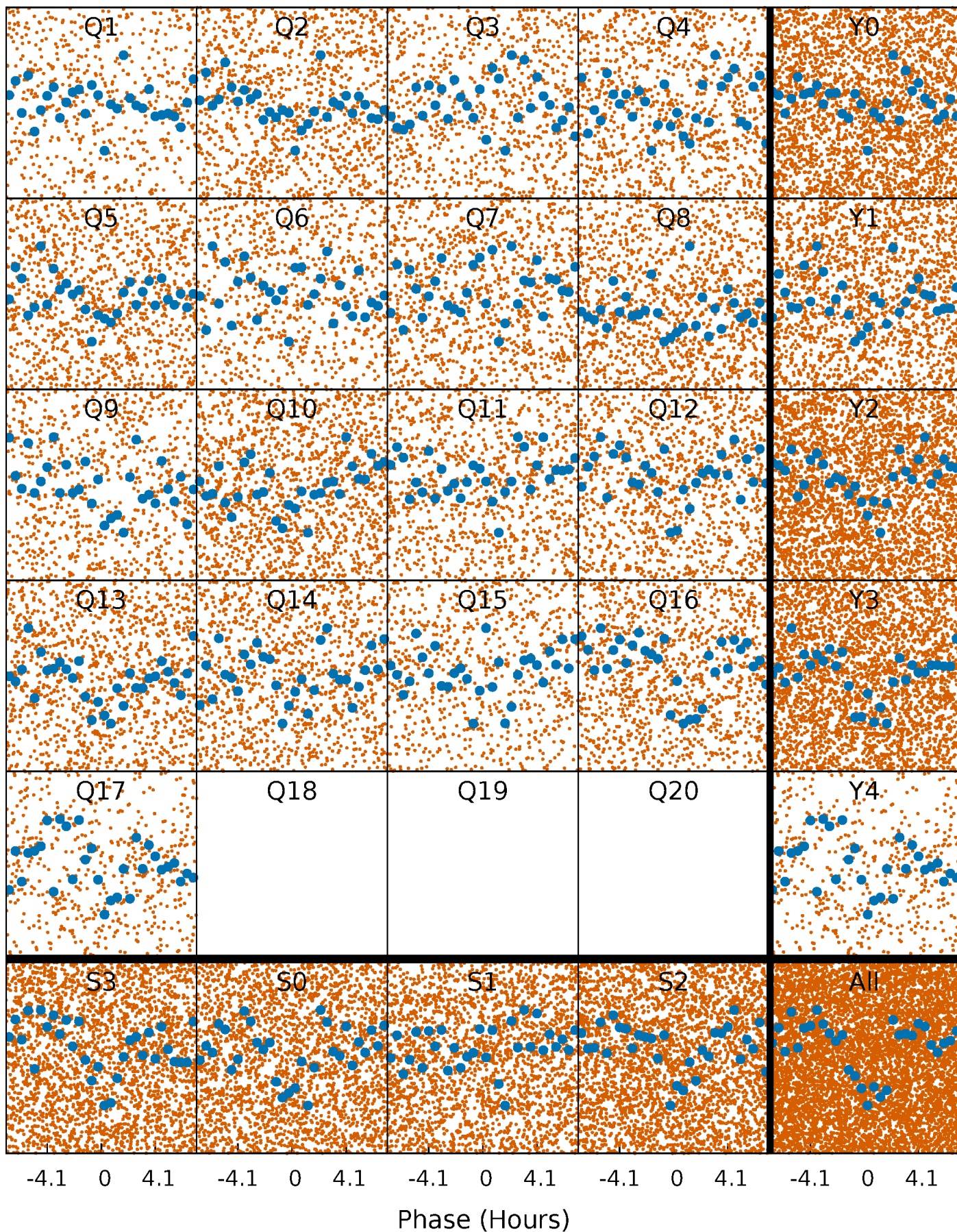
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

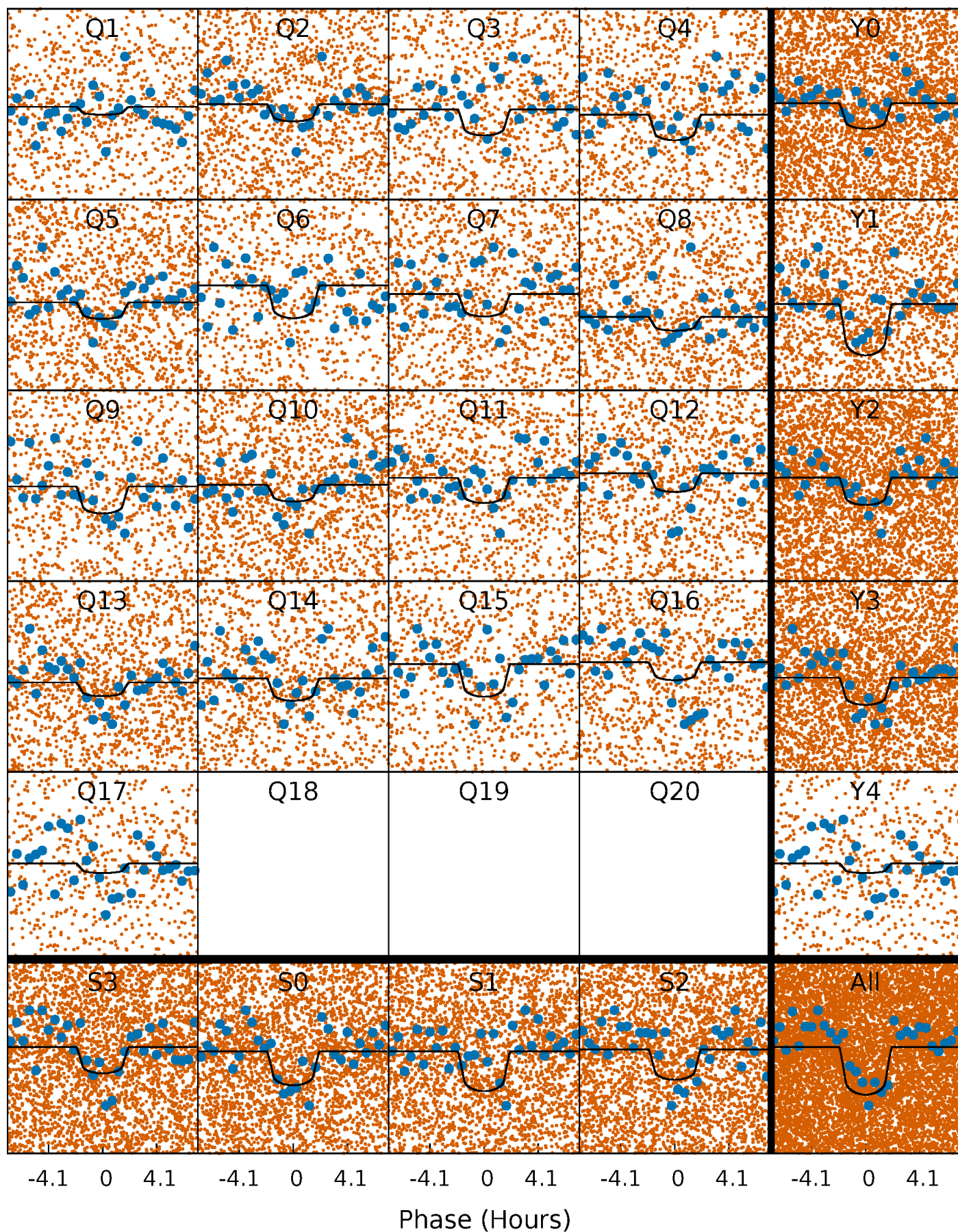
TCE 010471113-01 P= 0.933715 Days  $T_0=131.532721$  (BKJD)





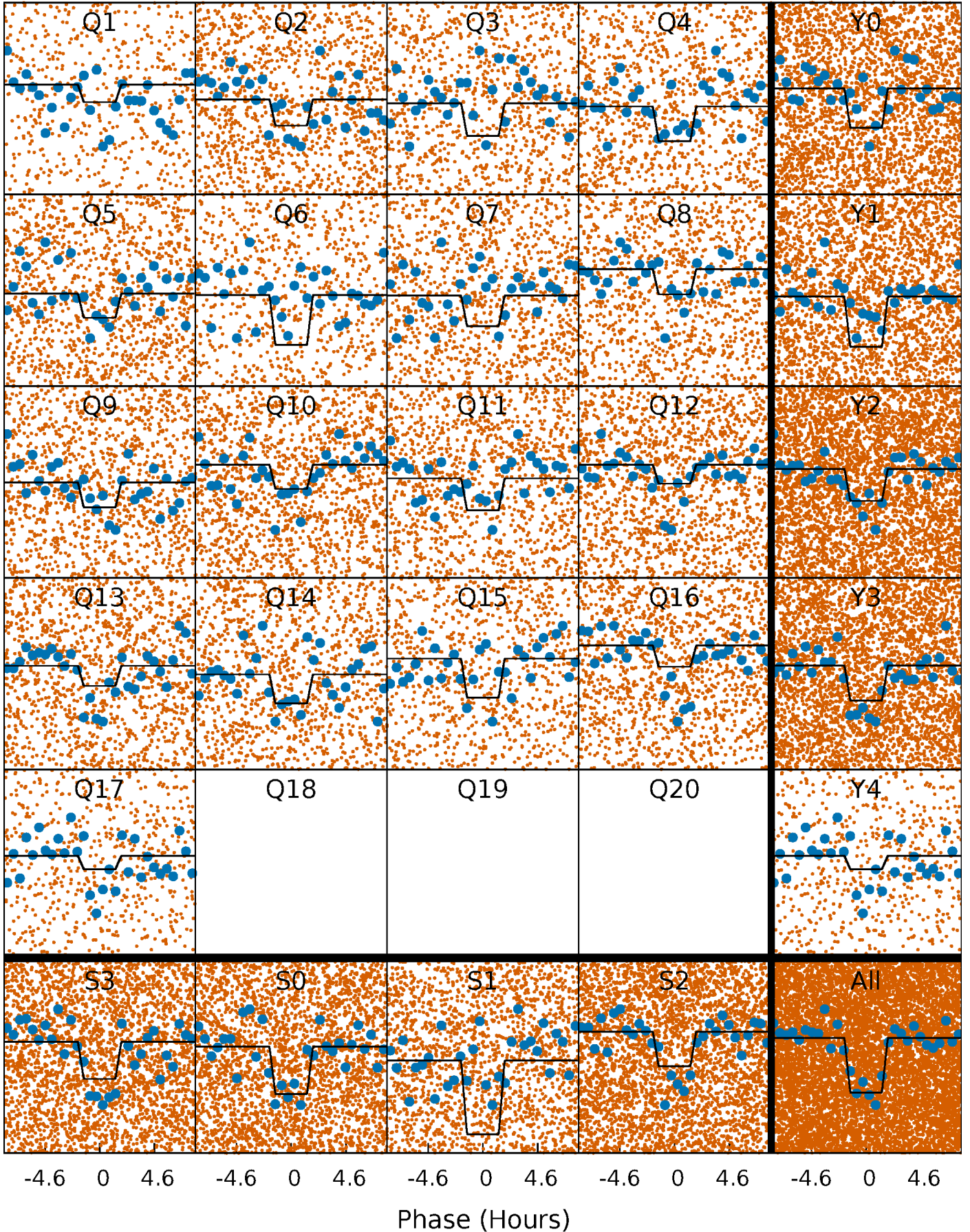
# DV Quarter-Phased Transit Curves

TCE 010471113-01 P= 0.933715 Days  $T_0=131.532721$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 010471113-01 P= 0.933740 Days  $T_0=131.521556$  (BKJD)

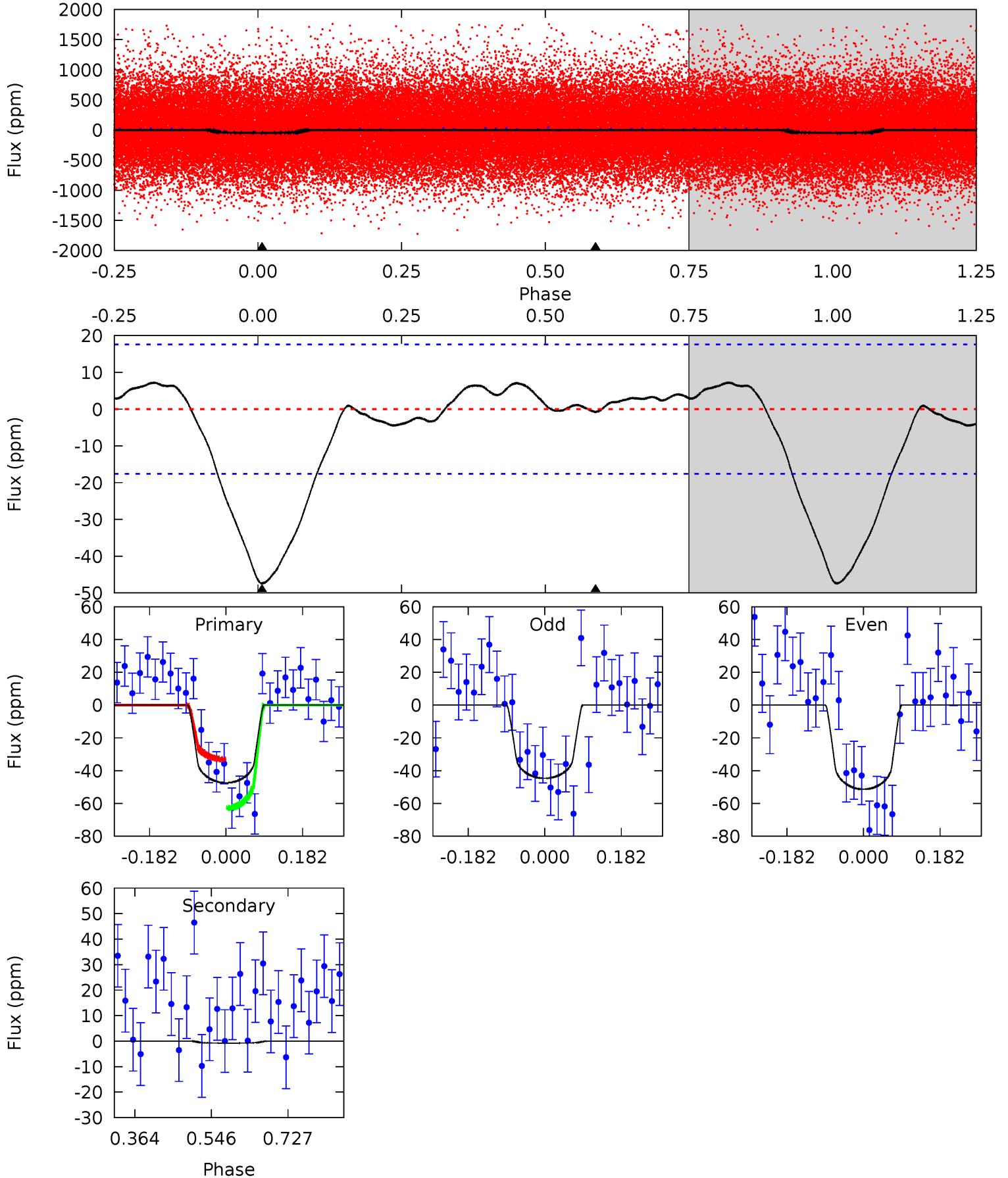




# DV Model-Shift Uniqueness Test

010471113-01, P = 0.933715 Days, E = 130.599006 Days

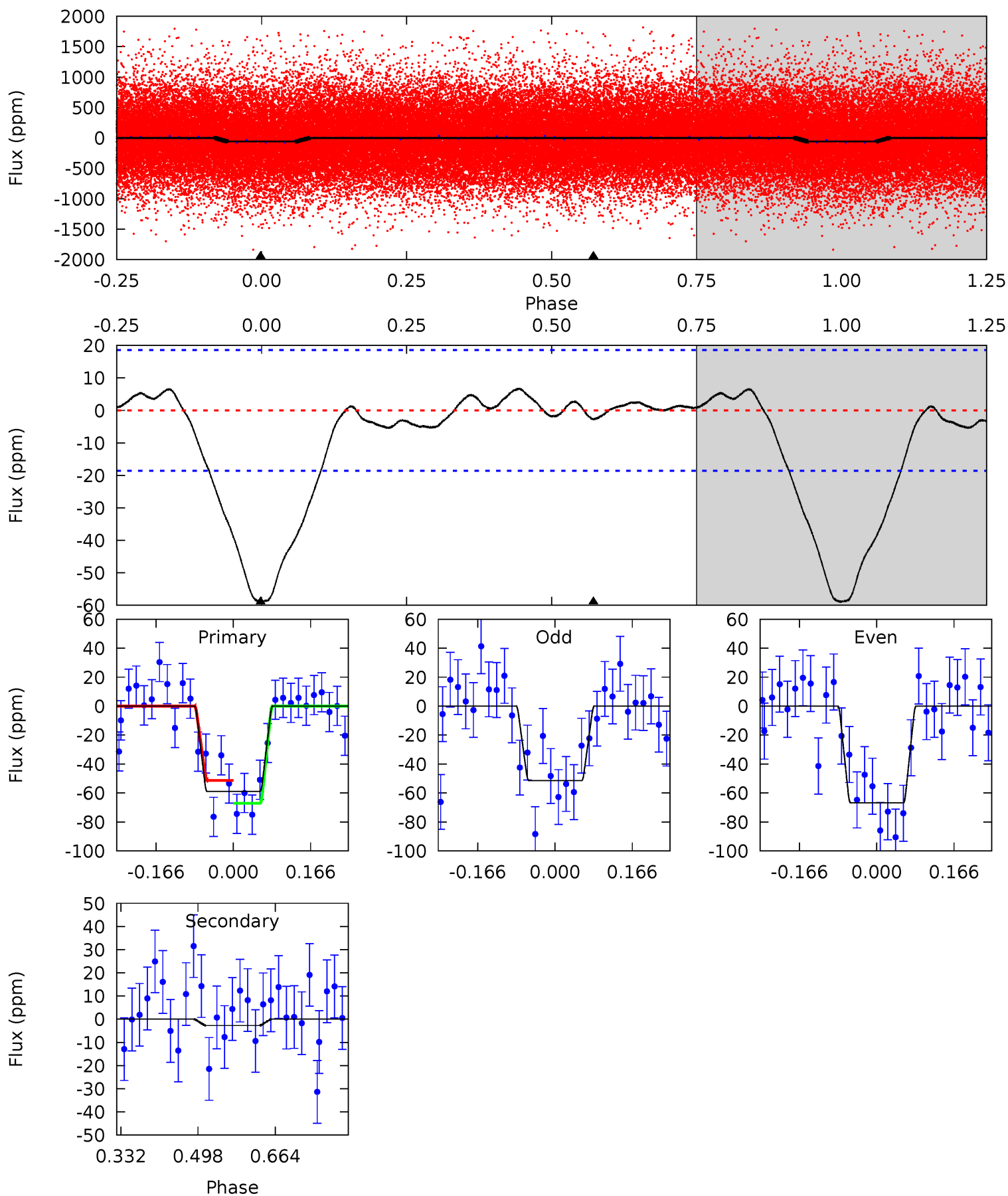
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.0	0.20	0	0	4.44	1.34	1.10	12.0	12.0	0.20	0.20	0.85	0.77	0.13	3.79



# Alt Model-Shift Uniqueness Test

010471113-01, P = 0.933740 Days, E = 130.587816 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
14.1	0.66	0	0	4.46	1.39	0.89	14.1	14.1	0.66	0.66	1.85	0.95	0.10	1.91





### Stellar Parameters For KIC 010471113

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6170^{+171}_{-214}$	$4.430^{+0.072}_{-0.217}$	$-0.140^{+0.250}_{-0.350}$	$1.032^{+0.334}_{-0.119}$	$1.040^{+0.166}_{-0.135}$	$1.331^{+0.422}_{-0.721}$
	+3%/-3%	+2%/-5%	+179%/-250%	+32%/-12%	+16%/-13%	+32%/-54%
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 010471113-01 / KOI 7332.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1 \pm 4$	$0.94^{+0.61}_{-0.54}$	$2856^{+222}_{-148}$	$-2832^{+6669}_{-874}$	$0.109^{+1.711}_{-0.940}$
Alt.	$-3 \pm 4$	$0.91^{+0.62}_{-0.55}$	$2857^{+216}_{-140}$	$2851^{+1525}_{-6208}$	$0.507^{+2.830}_{-0.777}$

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

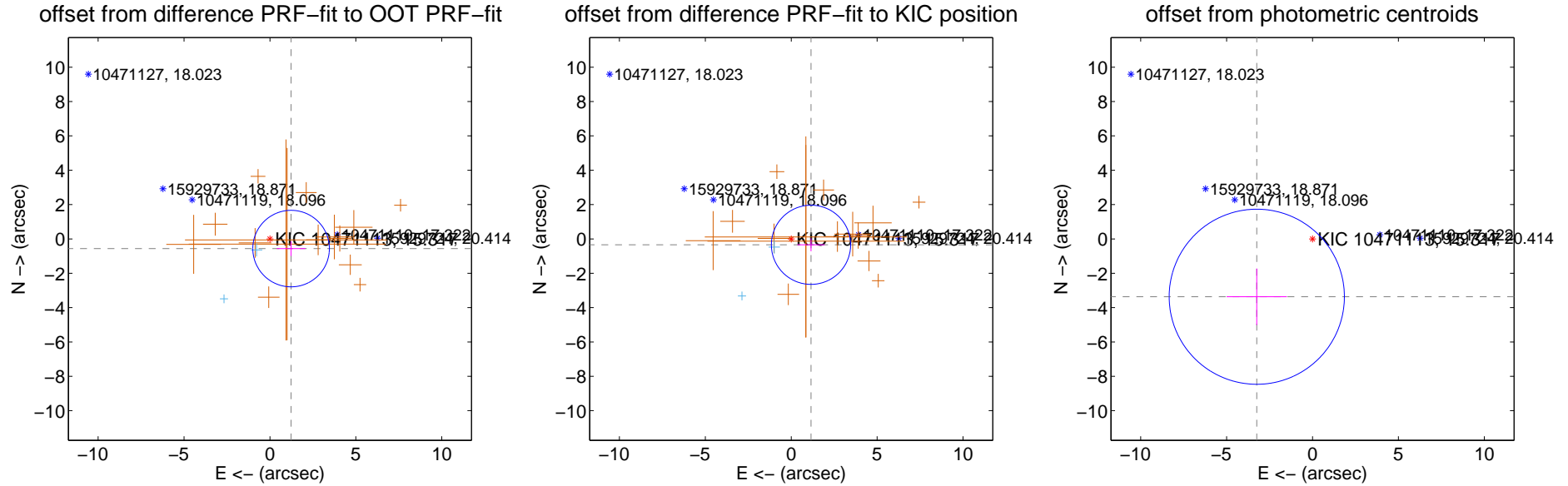
## DV Centroid Data

Supplemental centroid analysis for 010471113-01. Kepler magnitude: 15.32. Transit SNR 9.52

There are 2 quarters with good PRF difference image offsets

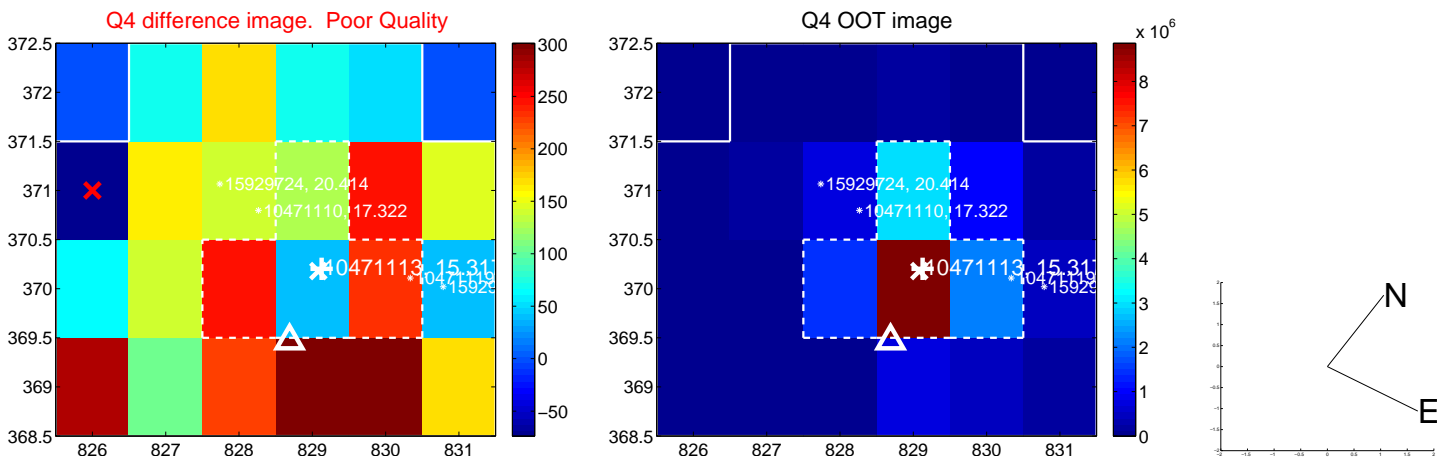
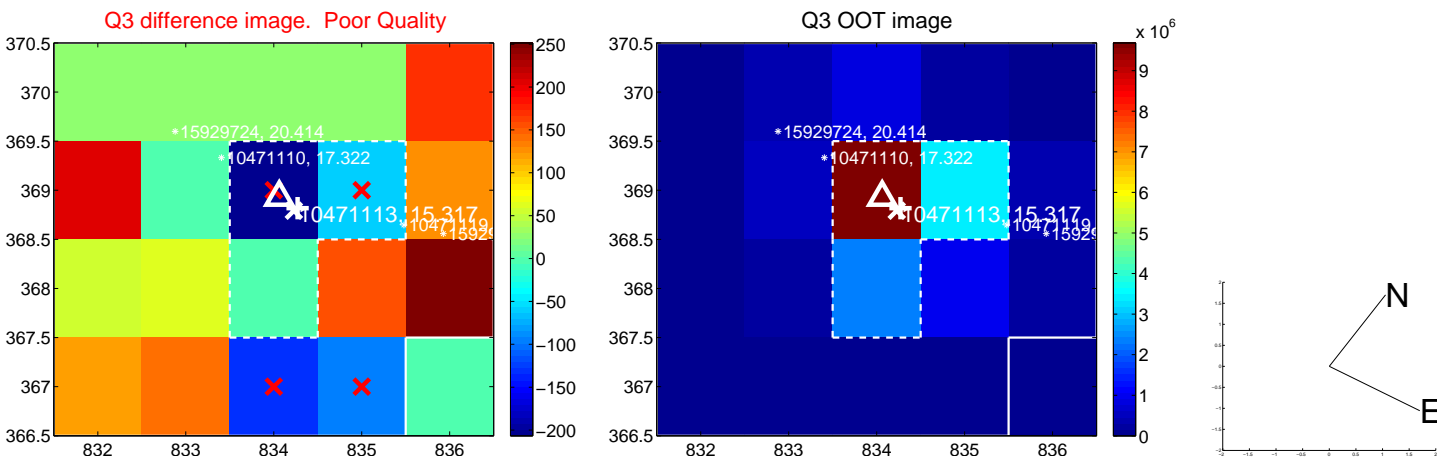
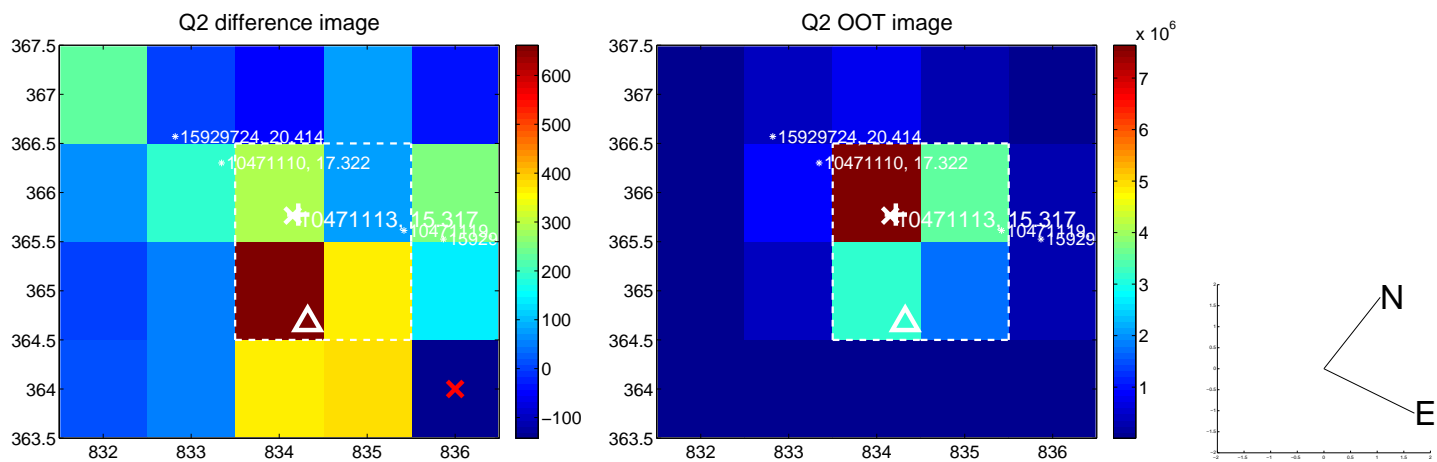
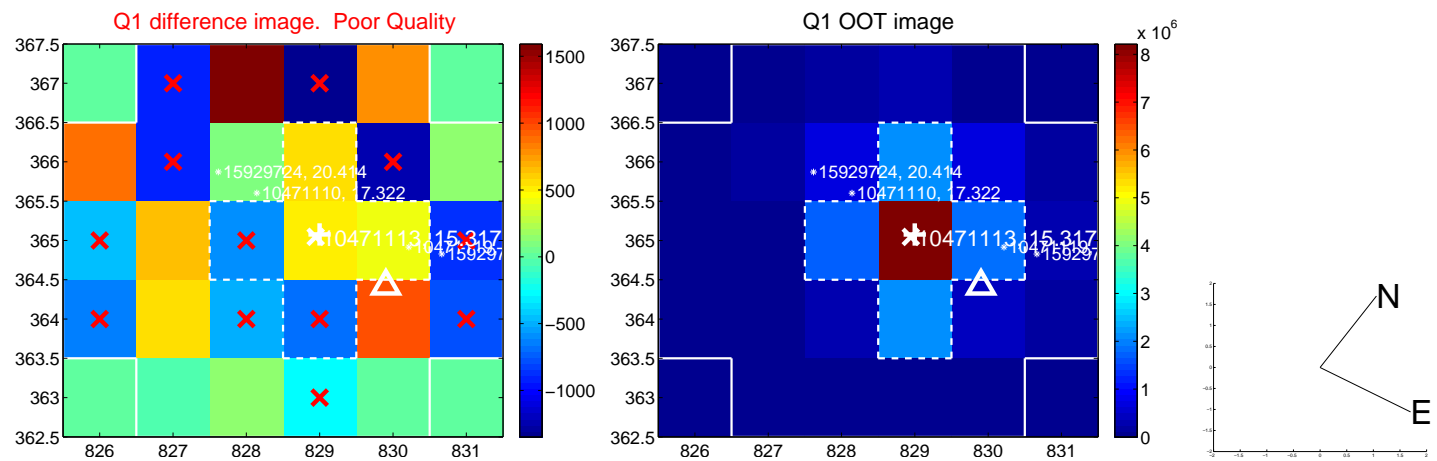
The direct PRF centroid is offset from the target star catalog position by about 0.28 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.353 \pm 0.743$	1.82	$-1.231 \pm 0.832$	$-0.562 \pm 0.428$
PRF-fit source offset from KIC position	$1.200 \pm 0.768$	1.56	$-1.151 \pm 0.794$	$-0.341 \pm 0.380$
photometric centroid source offset	$4.67 \pm 1.70$	2.75	$3.24 \pm 1.76$	$-3.37 \pm 1.65$

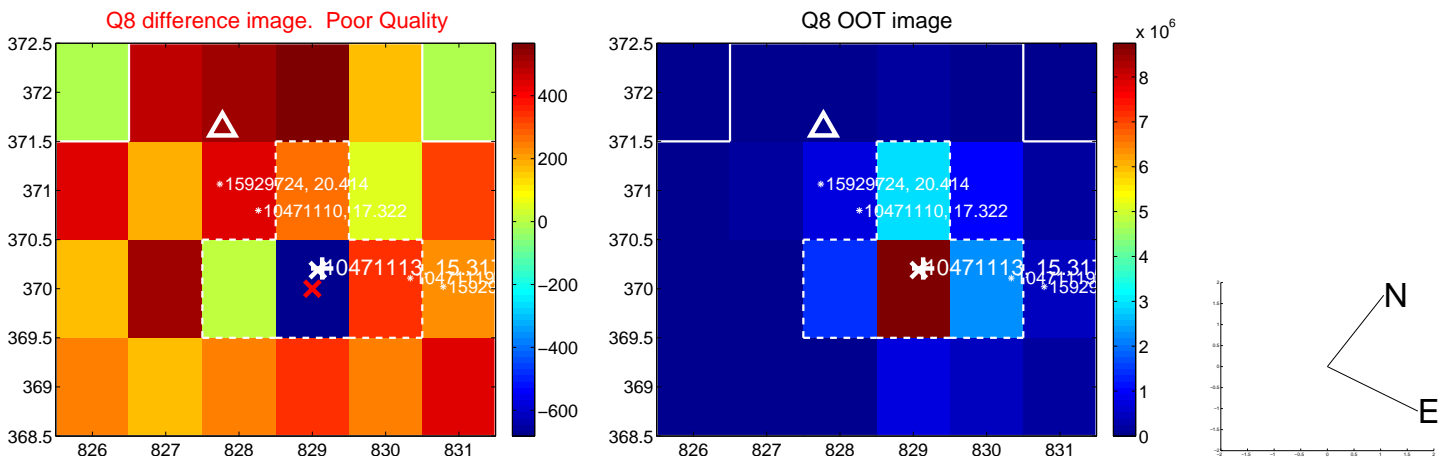
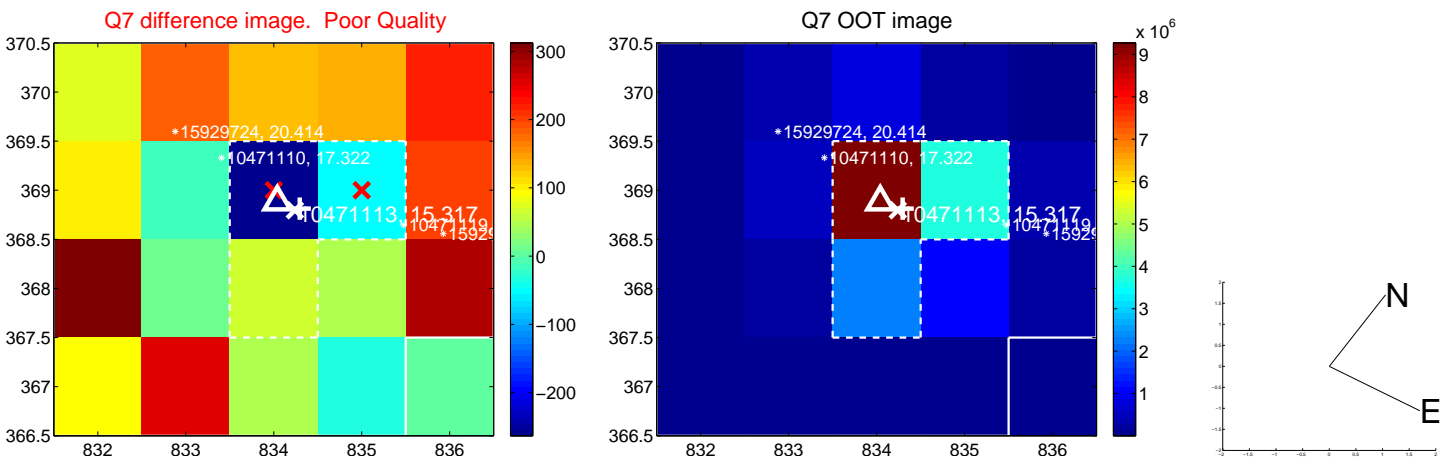
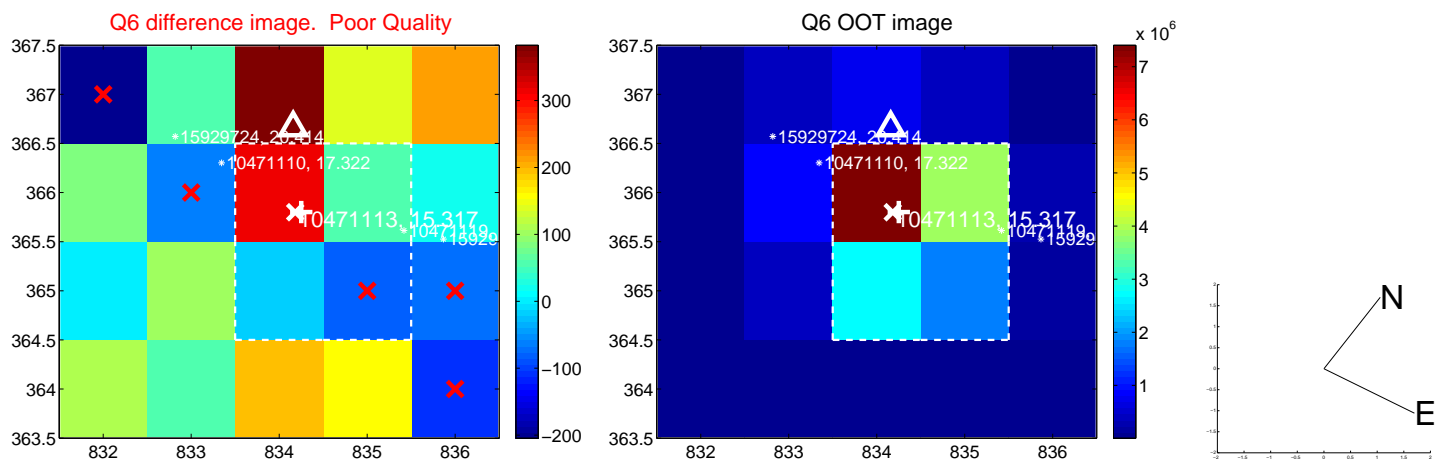
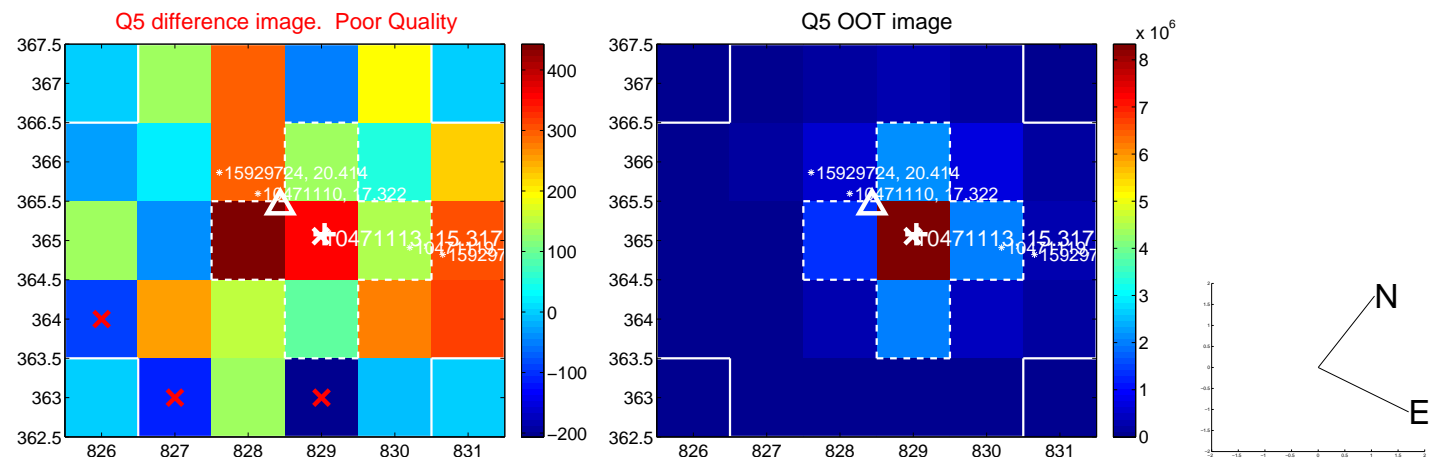


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

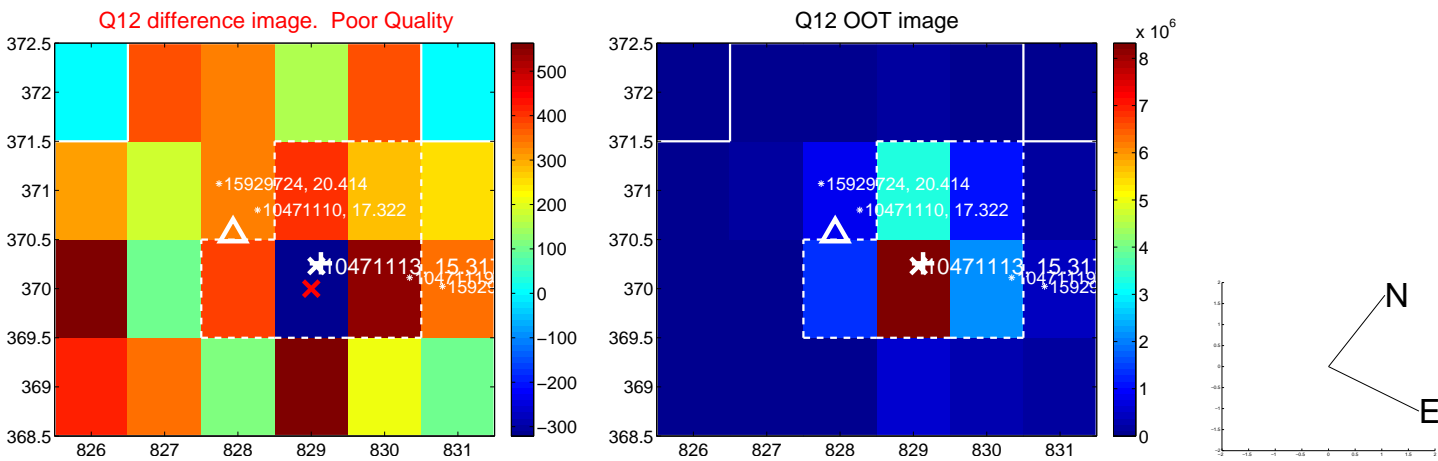
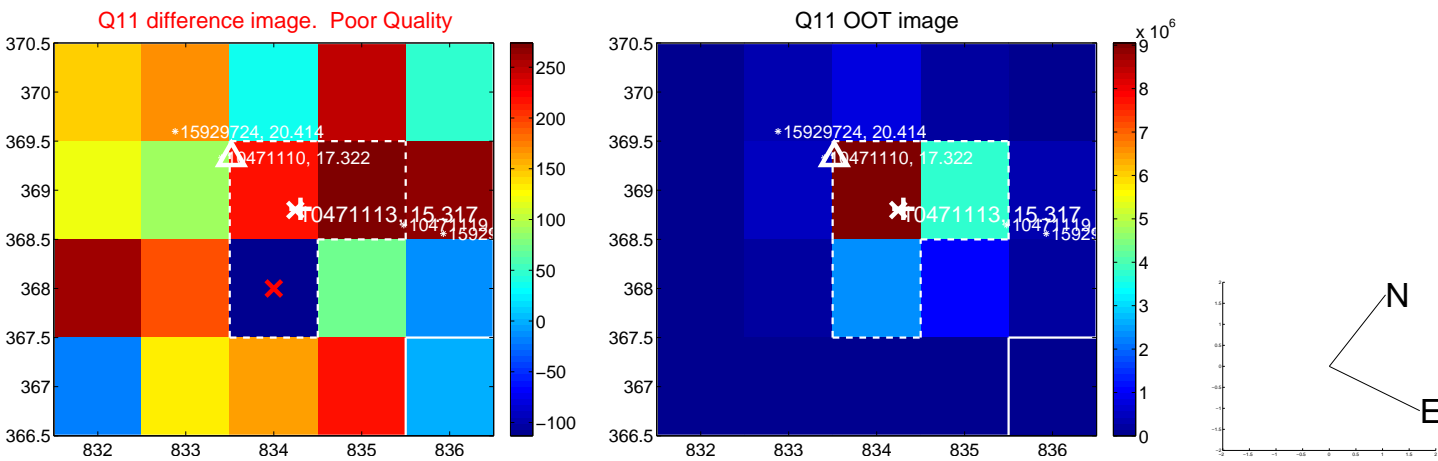
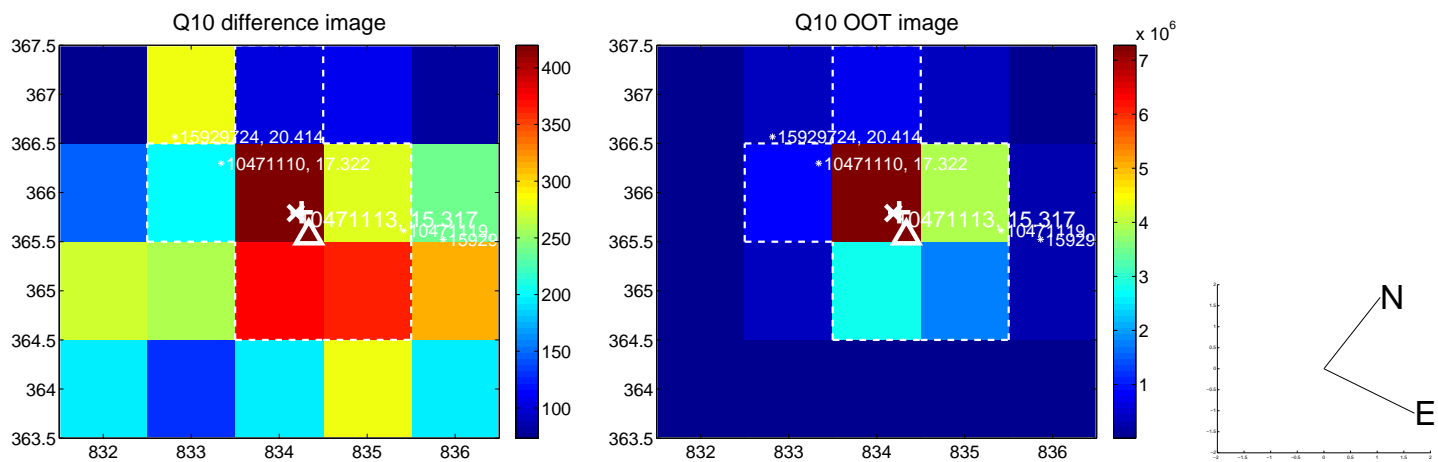
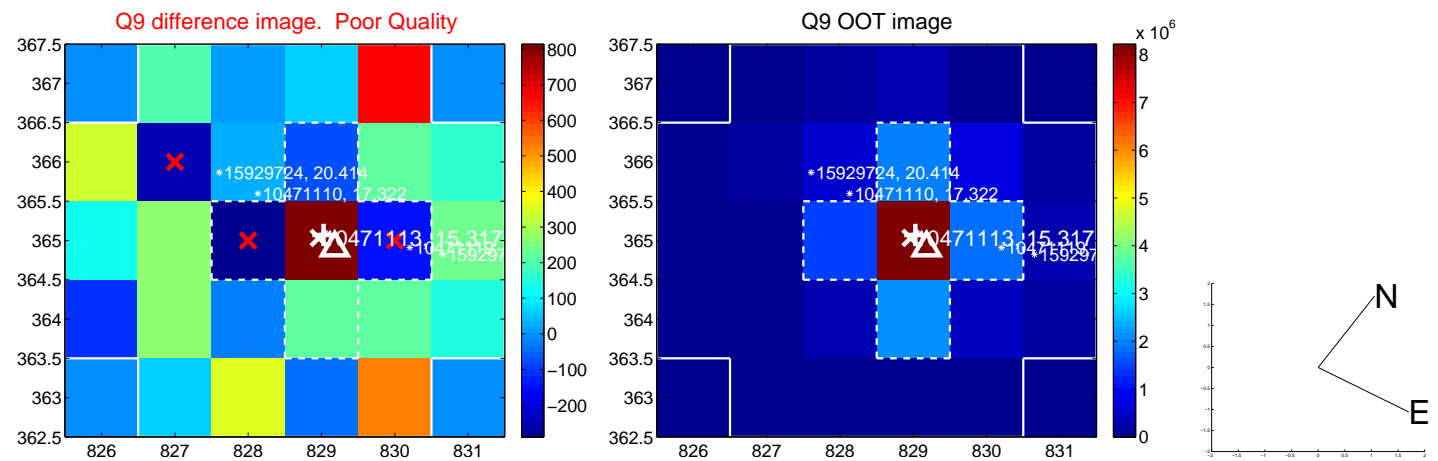


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

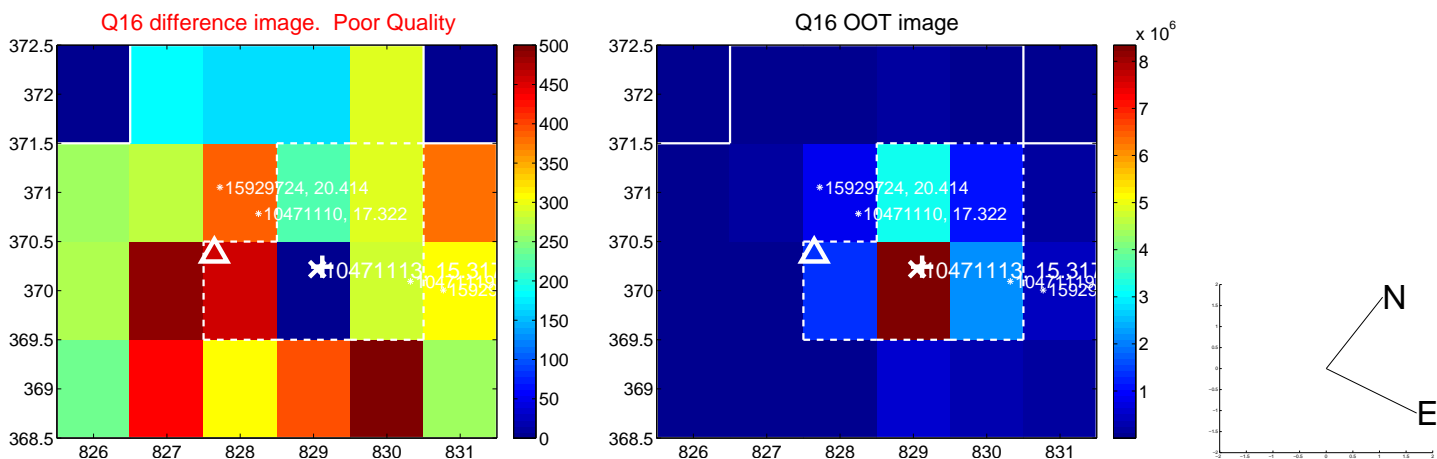
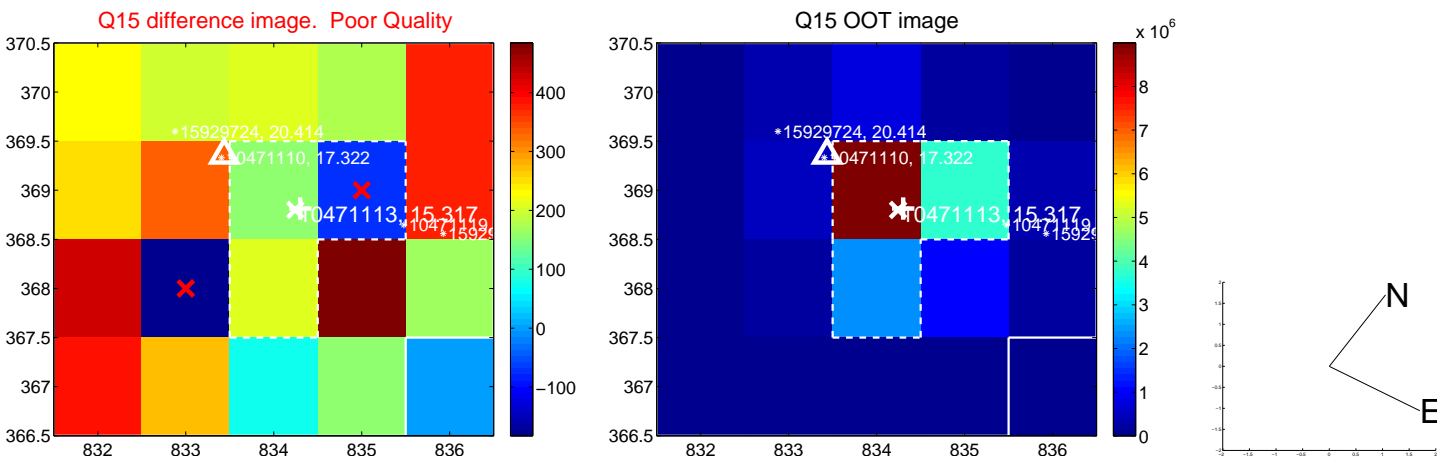
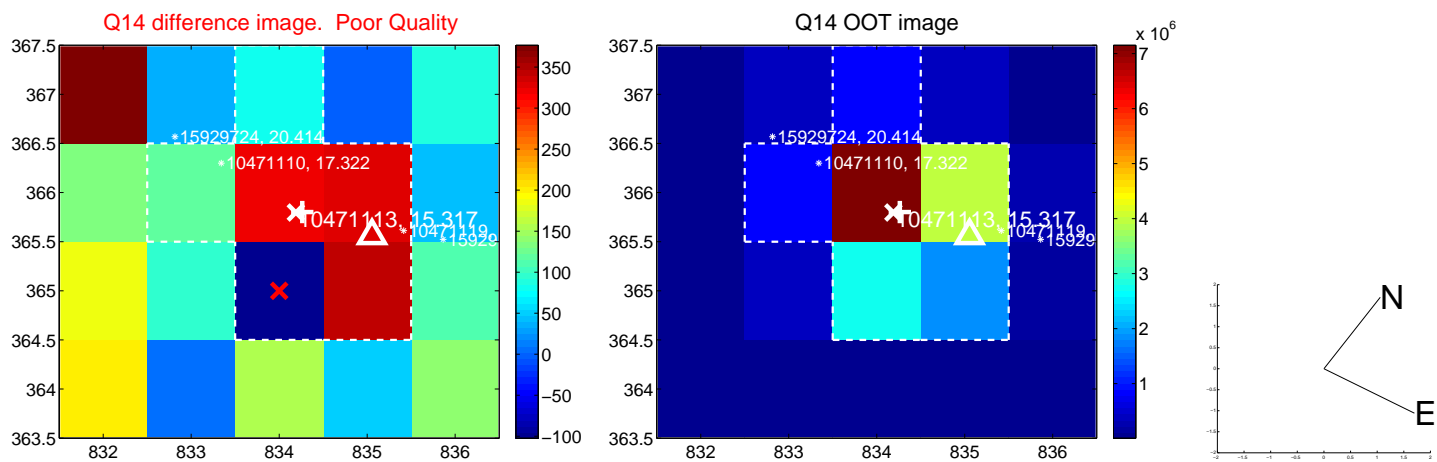
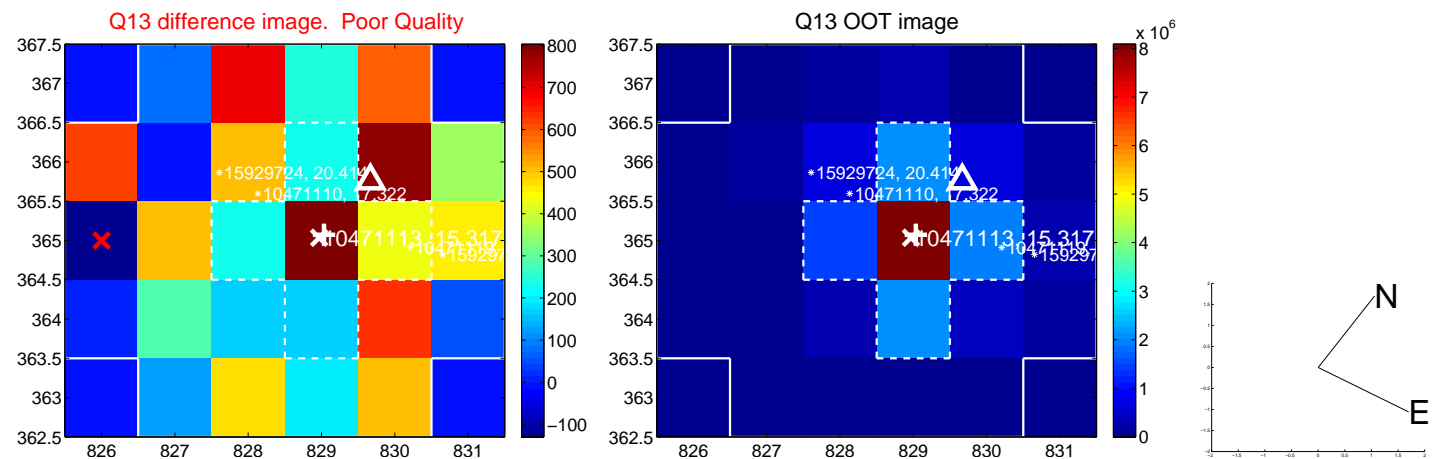




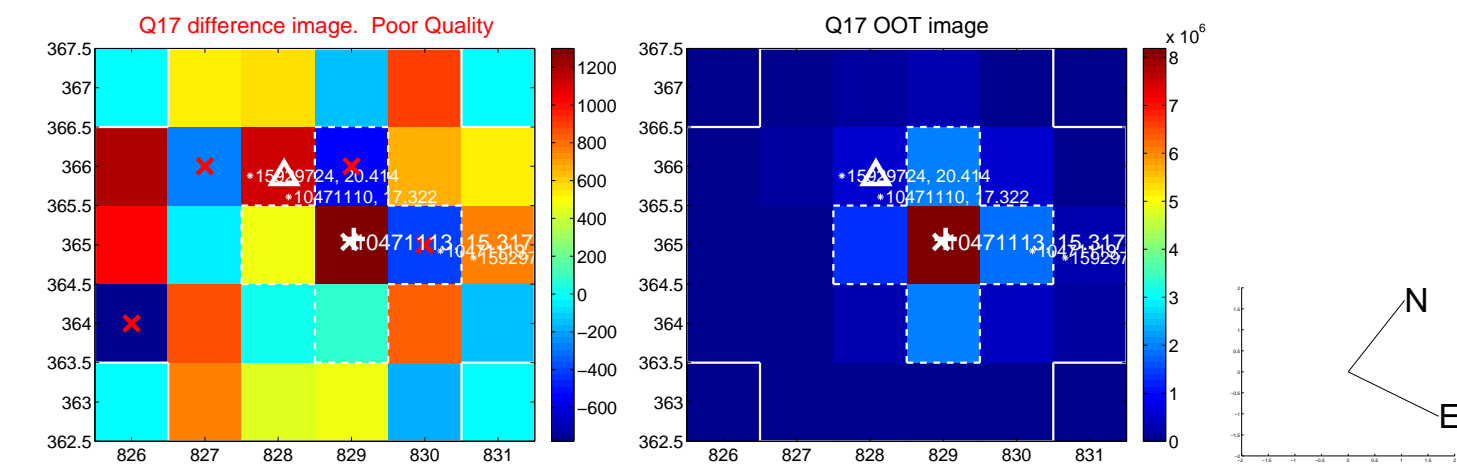
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



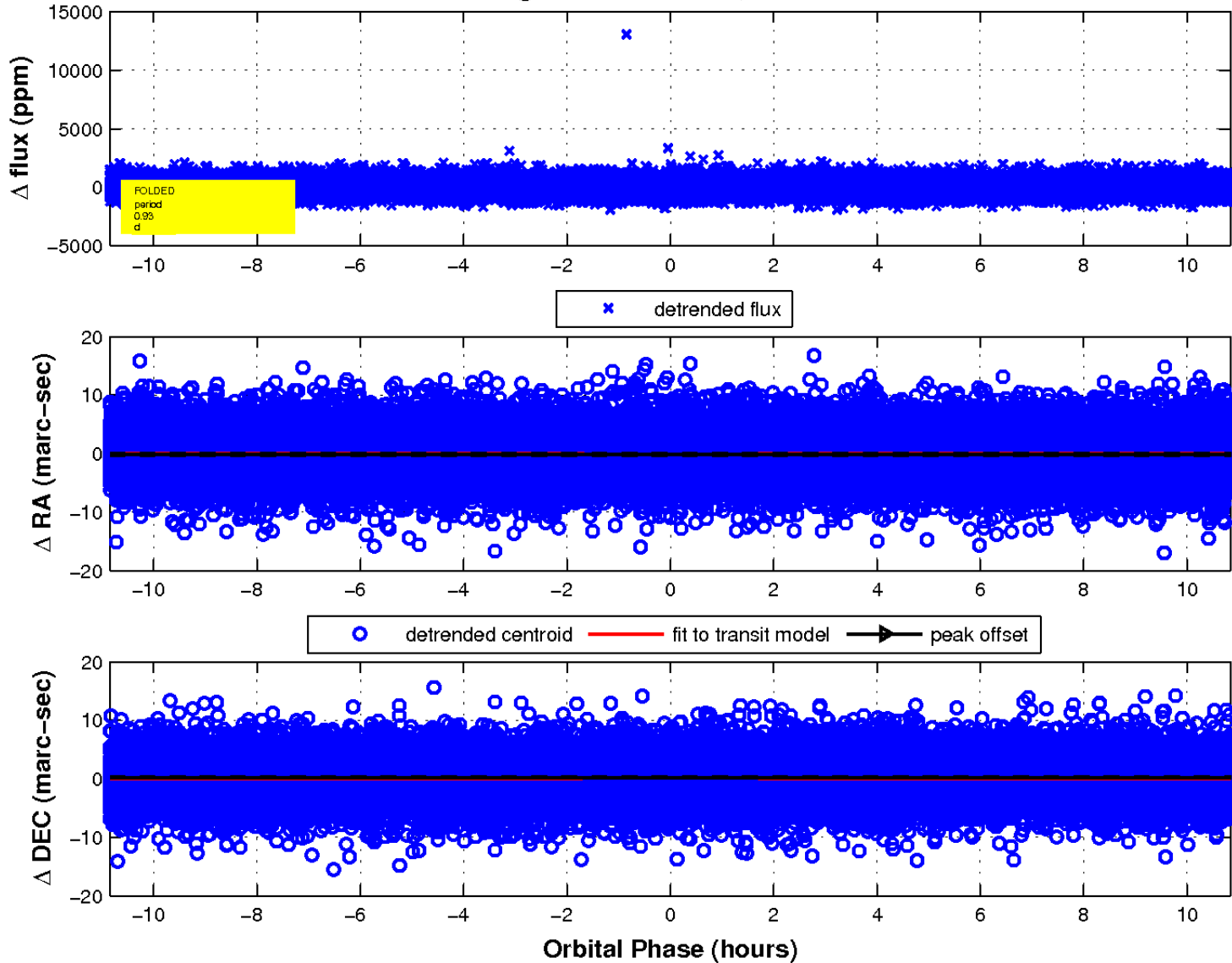
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

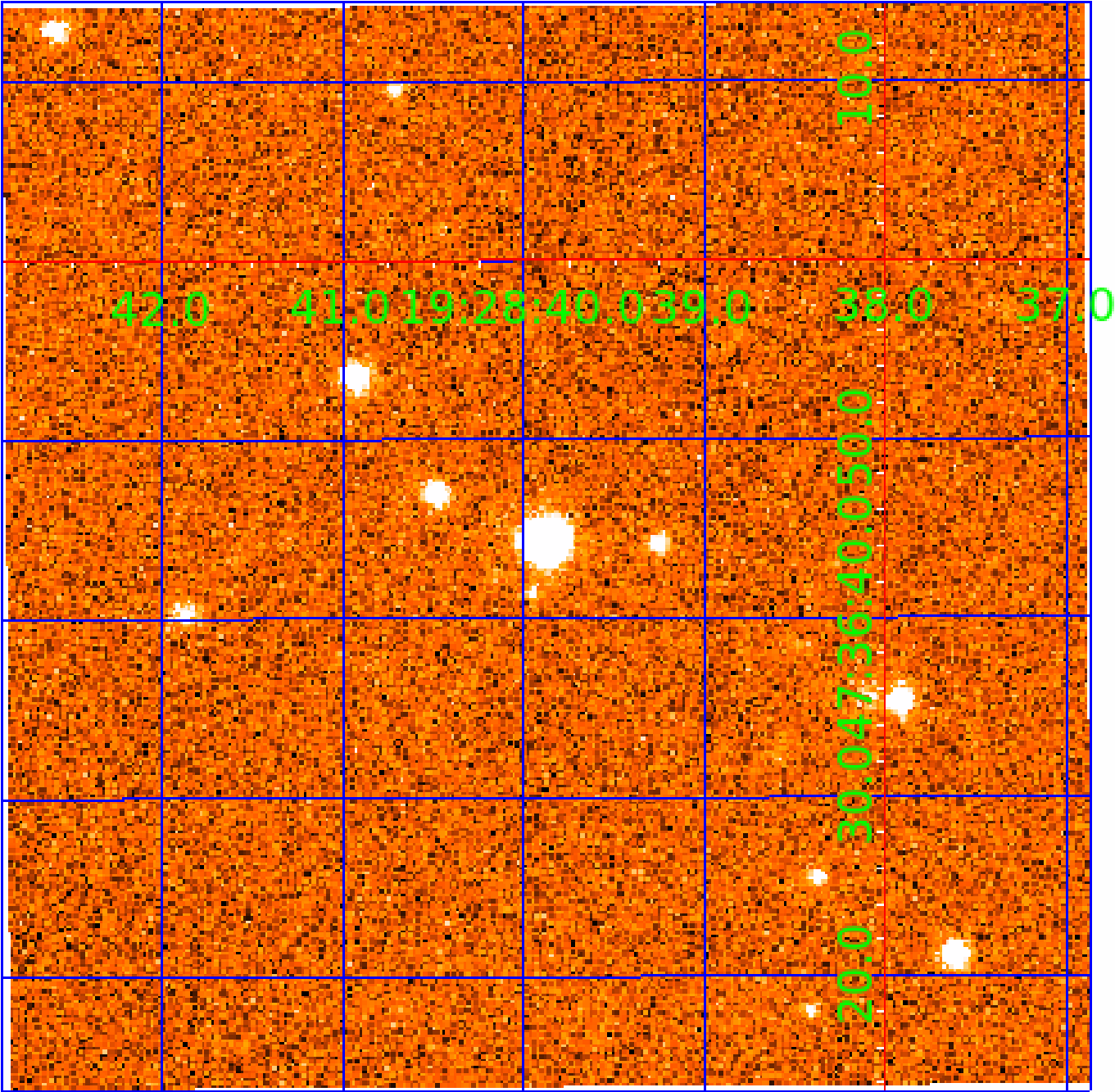


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 010471113

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010471113-01	OBS	7332.01	0.933715	131.532721	48.3	3.616	11.2	9.5	1.03	6170	0.84	3838.86
010471113-02	OBS	No	191.277720	137.400803	750.3	6.011	8.5	6.5	1.03	6170	3.58	3.18

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010471113-01	OBS	PC	0.69	0	0	0	0	NO_COMMENT
010471113-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL_SKYE—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS

**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.

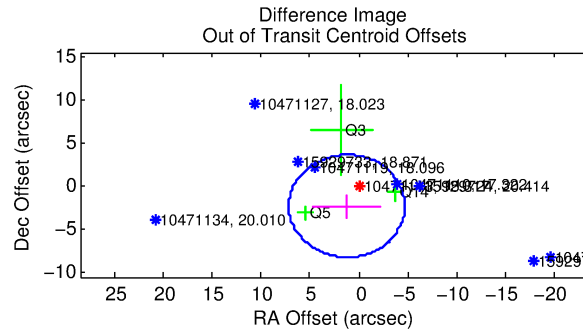
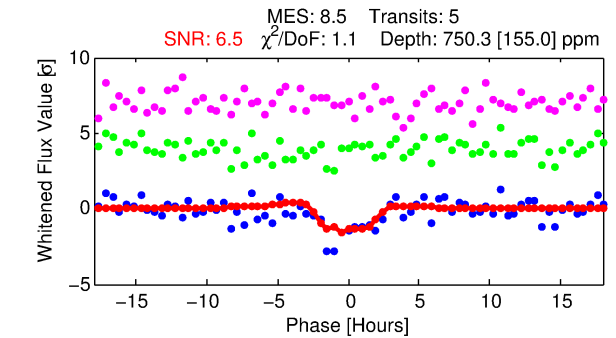
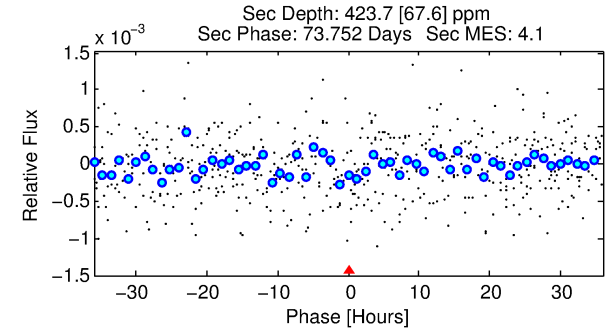
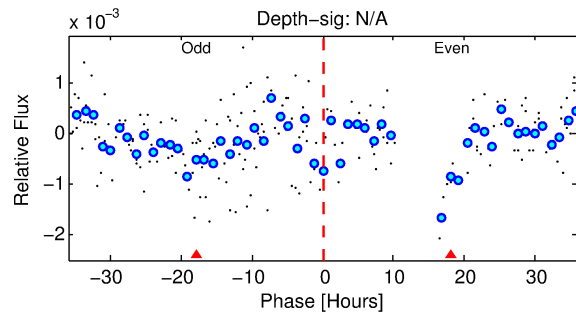
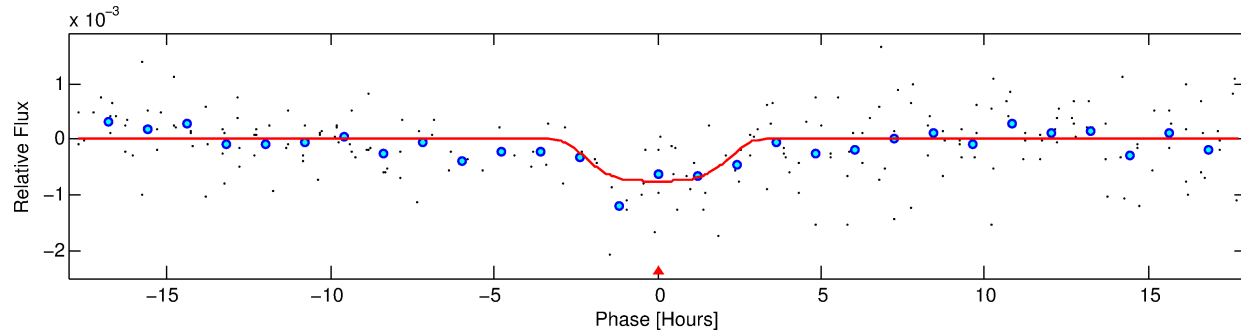
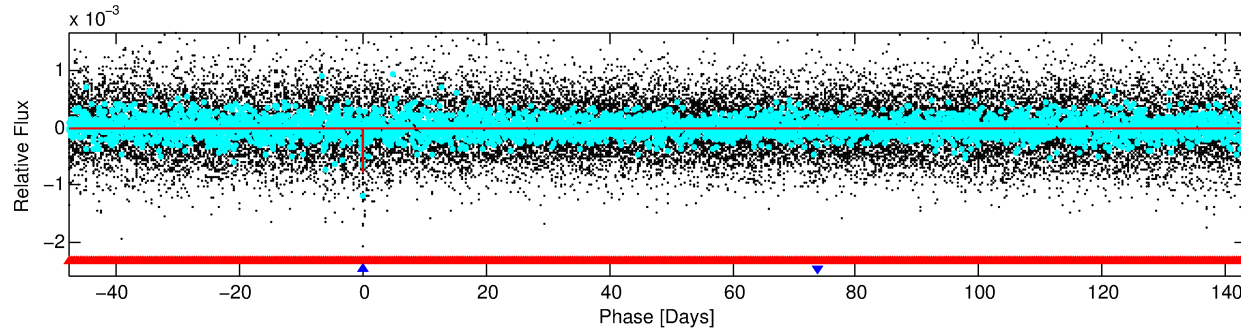
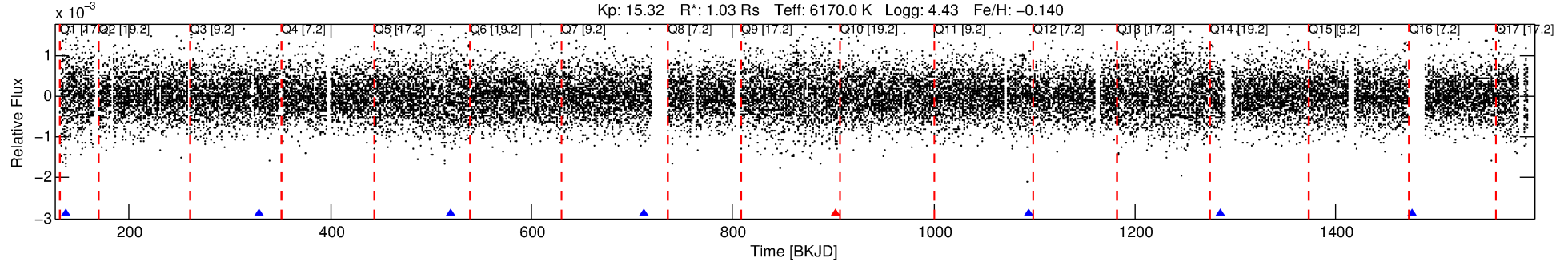
## Ephemeris Match Information For 010471113-02

No Significant Match Found

# DV One-Page Summary

KIC: 10471113 Candidate: 2 of 2 Period: 191.278 d  
KOI: K07332 Corr: No Ephemeris Match

Kp: 15.32 R\*: 1.03 Rs Teff: 6170.0 K Logg: 4.43 Fe/H: -0.140



## DV Fit Results:

Period = 191.27772 [0.00675] d  
Epoch = 137.4008 [0.0357] BKJD  
Rp/R\* = 0.0318 [0.0051]  
a/R\* = 93.77 [41.44]  
b = 0.96 [0.04]  
Seff = 3.18 [1.34]  
Teq = 340 [36] K  
Rp = 3.58 [1.29] Re  
a = 0.6596 [0.1798] AU  
Ag = 7896.09 [4220.68] [1.87σ]  
Teffp = 4962 [476] K [9.67σ]

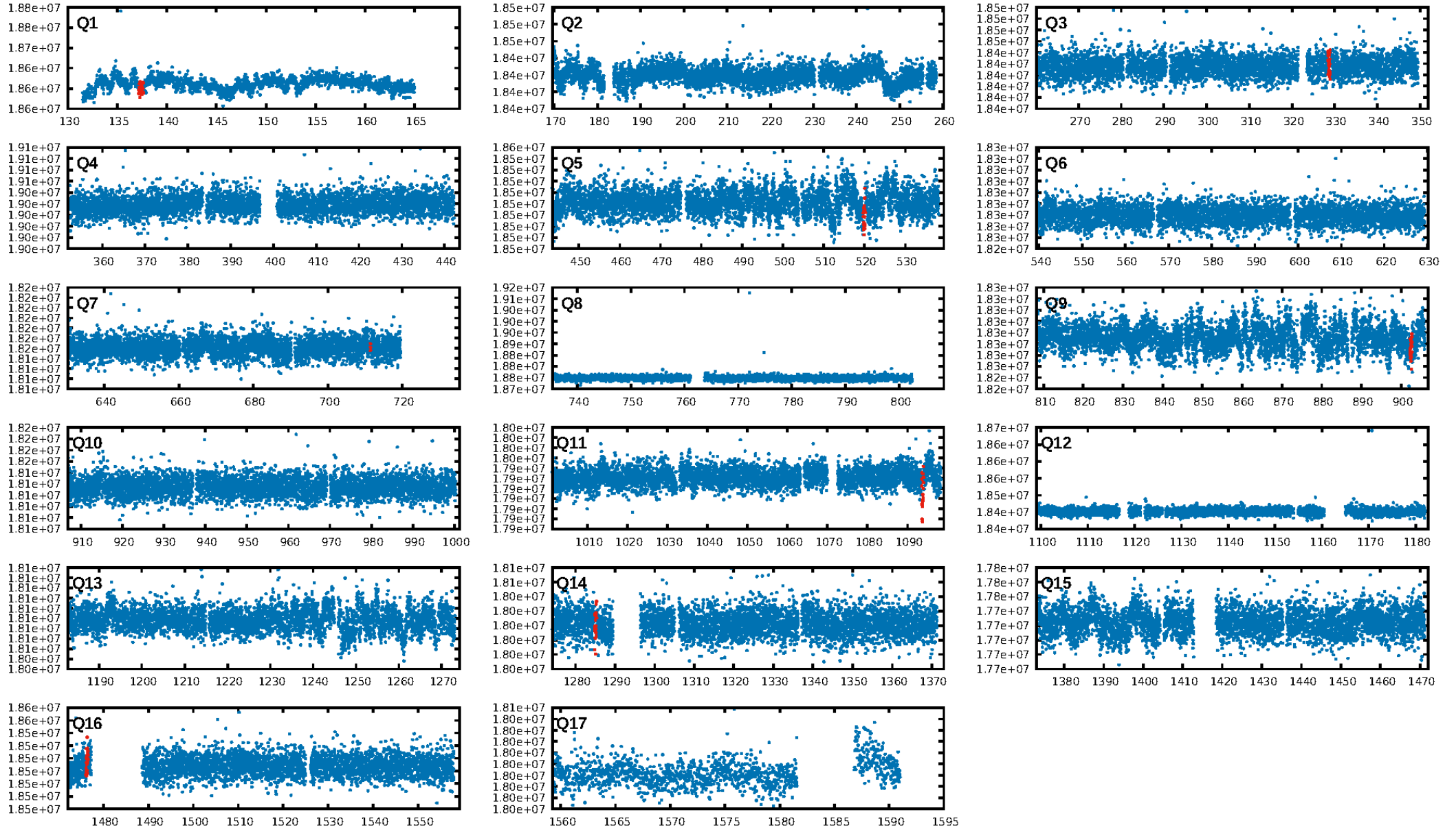
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [651.24σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 2.2%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 8.73e-15  
RollingBand-fgt: 0.75 [3/4]  
GhostDiagnostic-chr: 7.822  
Centroid-sig: 50.2%  
Centroid-so: 1.689 arcsec [0.81σ]  
OotOffset-rm: 2.619 arcsec [1.33σ]  
KicOffset-rm: 2.525 arcsec [0.98σ]  
OotOffset-st: 1/1/0/1 [3]  
KicOffset-st: 1/1/0/1 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 0.00 [0/5]

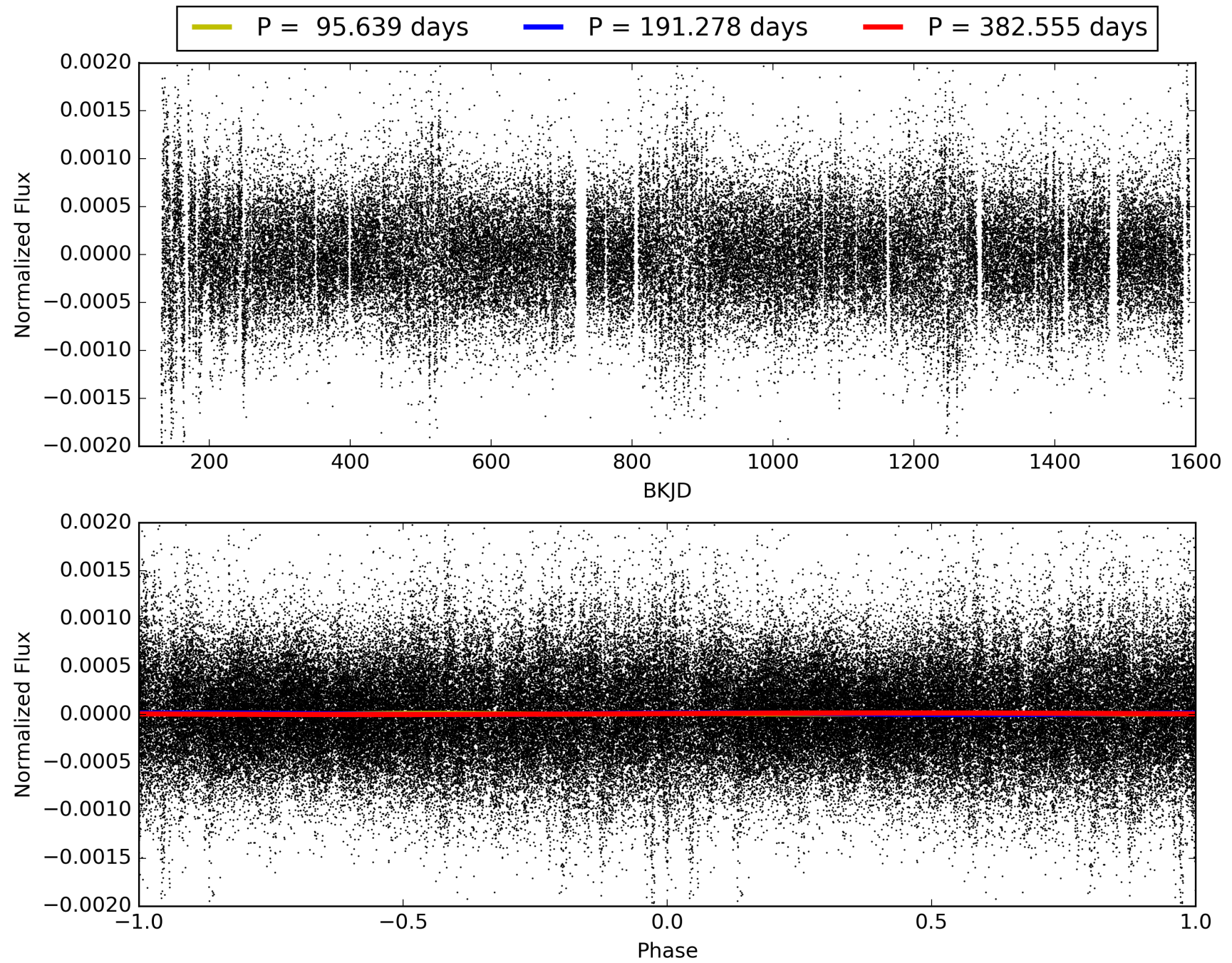
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 04:45:14 Z

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

# TCE 010471113-02, PDC Light Curves

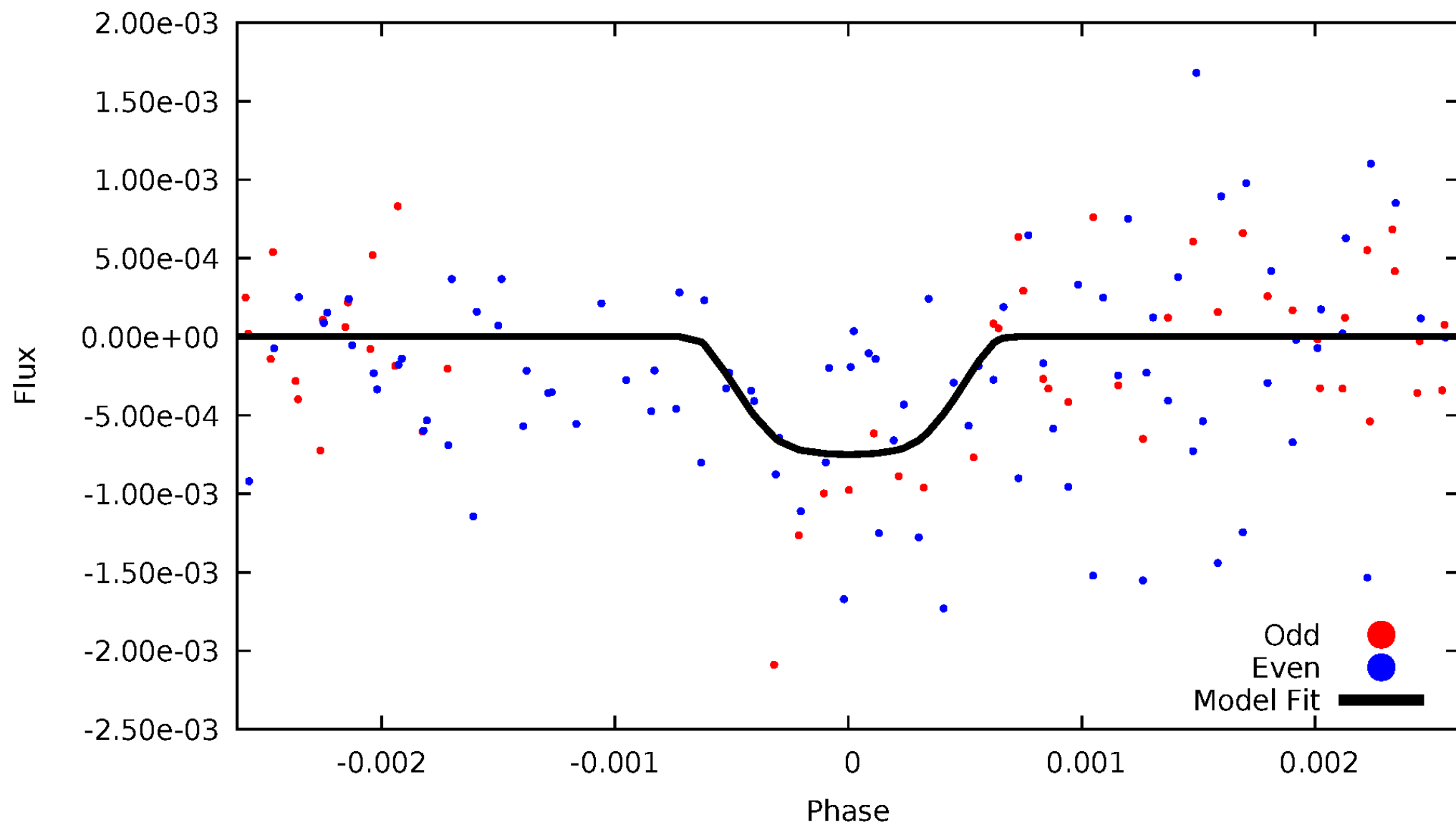


# TCE 010471113-02



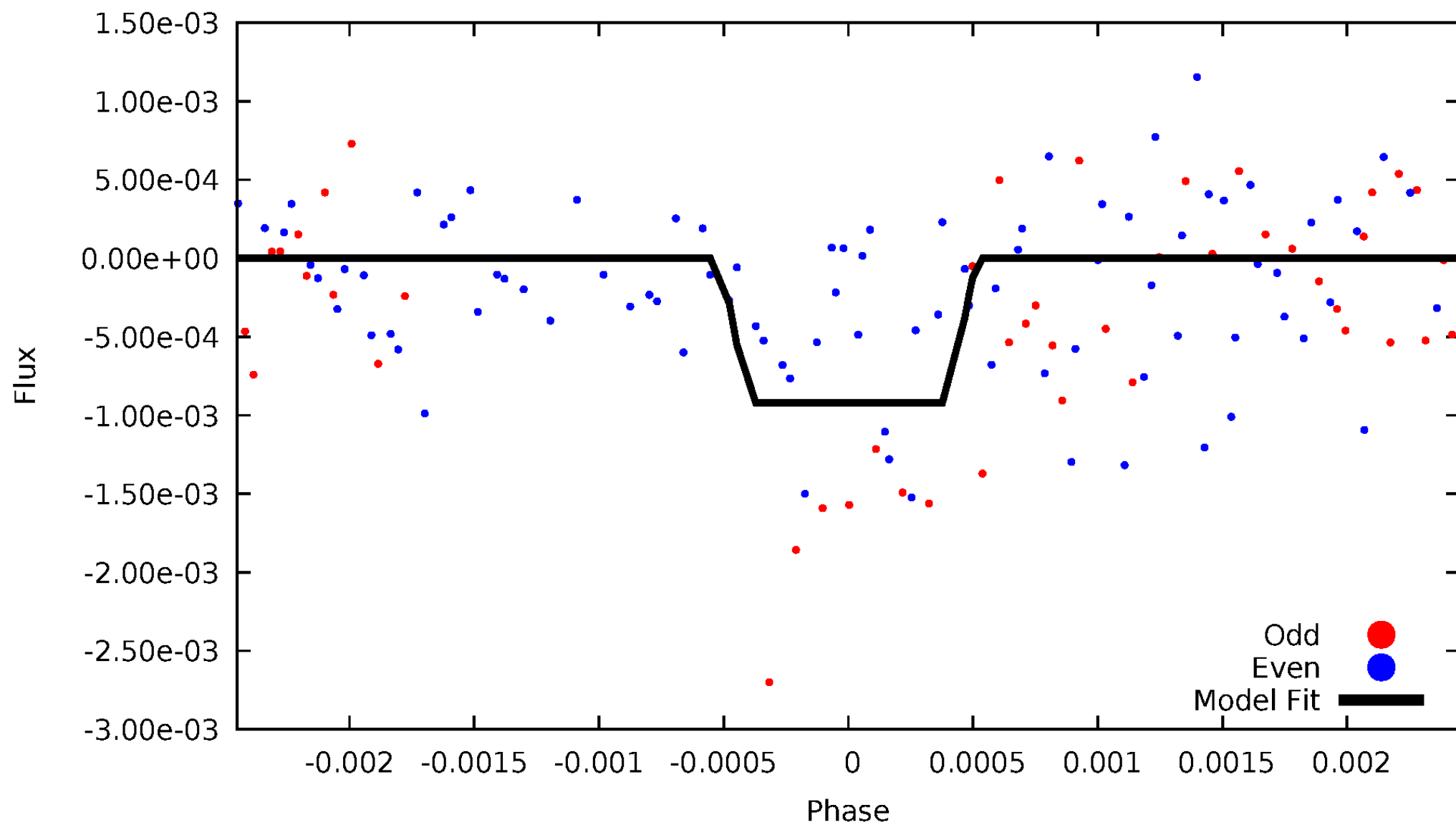
# DV Odd/Even

TCE 010471113-02



# ALT Odd/Even

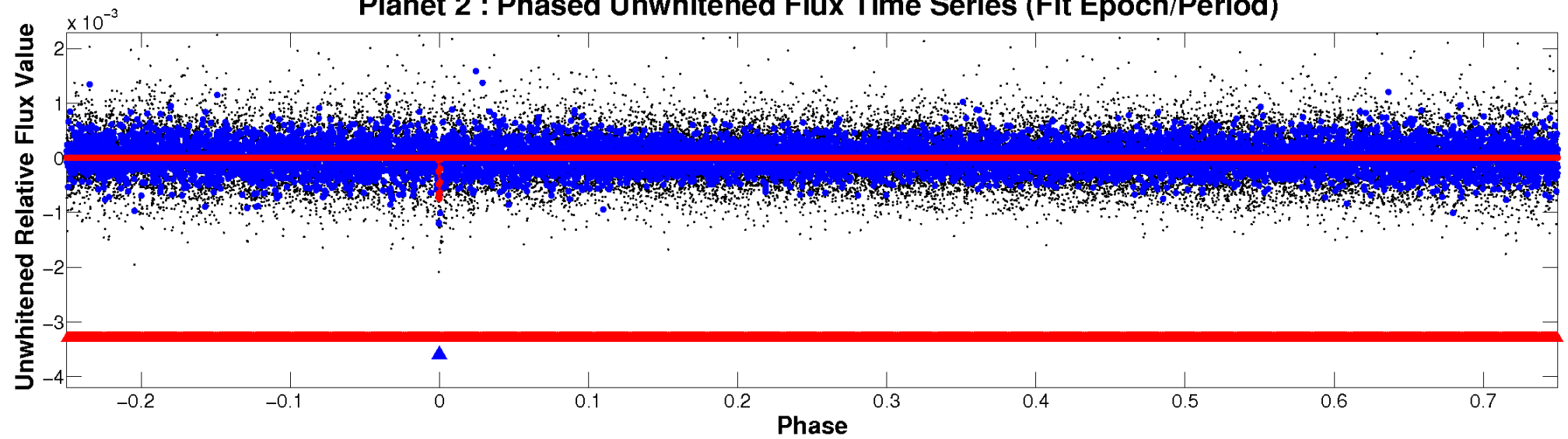
TCE 010471113-02



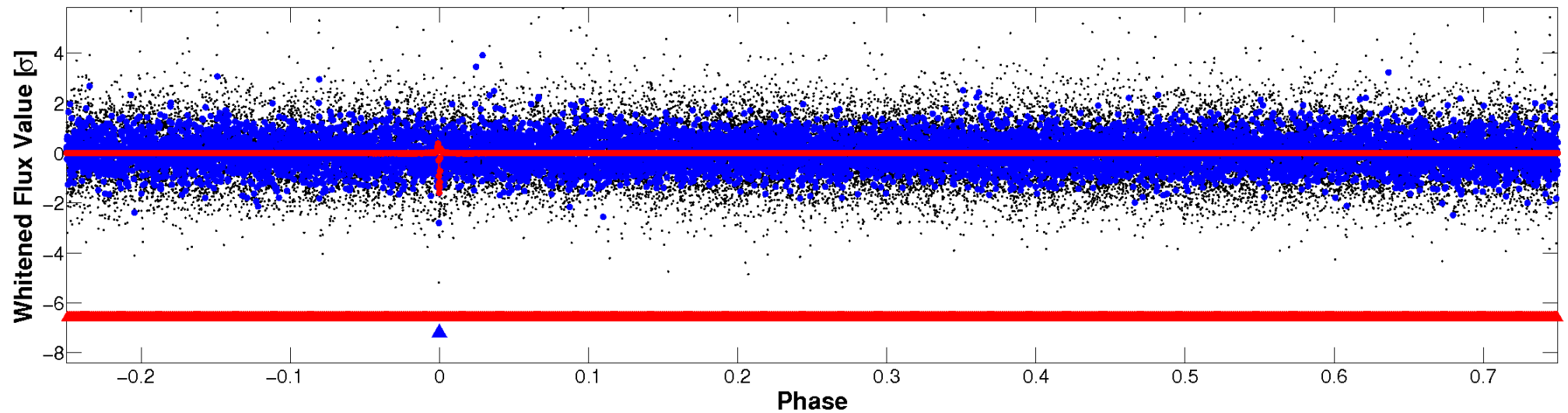


# Non-Whitened Vs. Whitened Light Curve

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

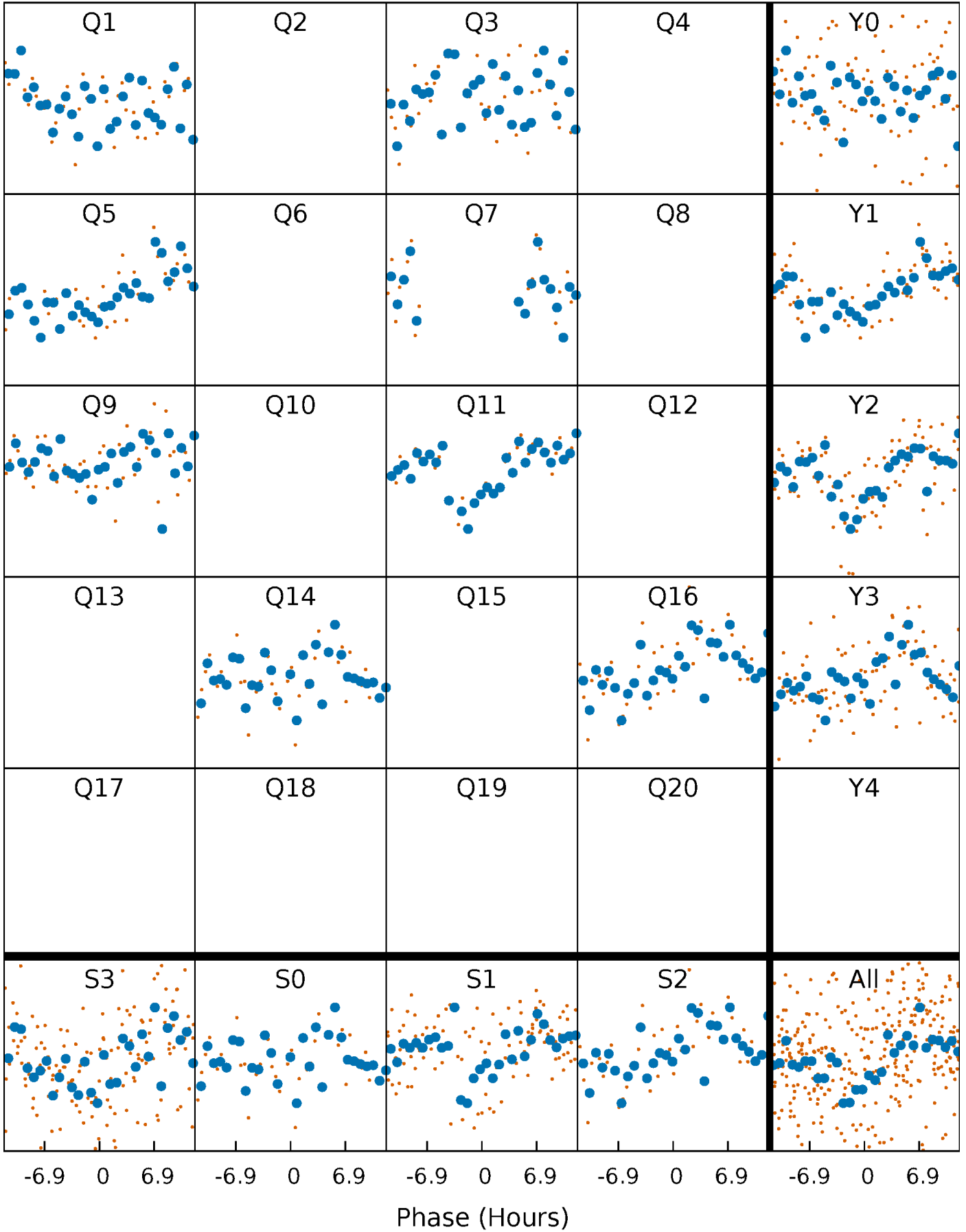


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



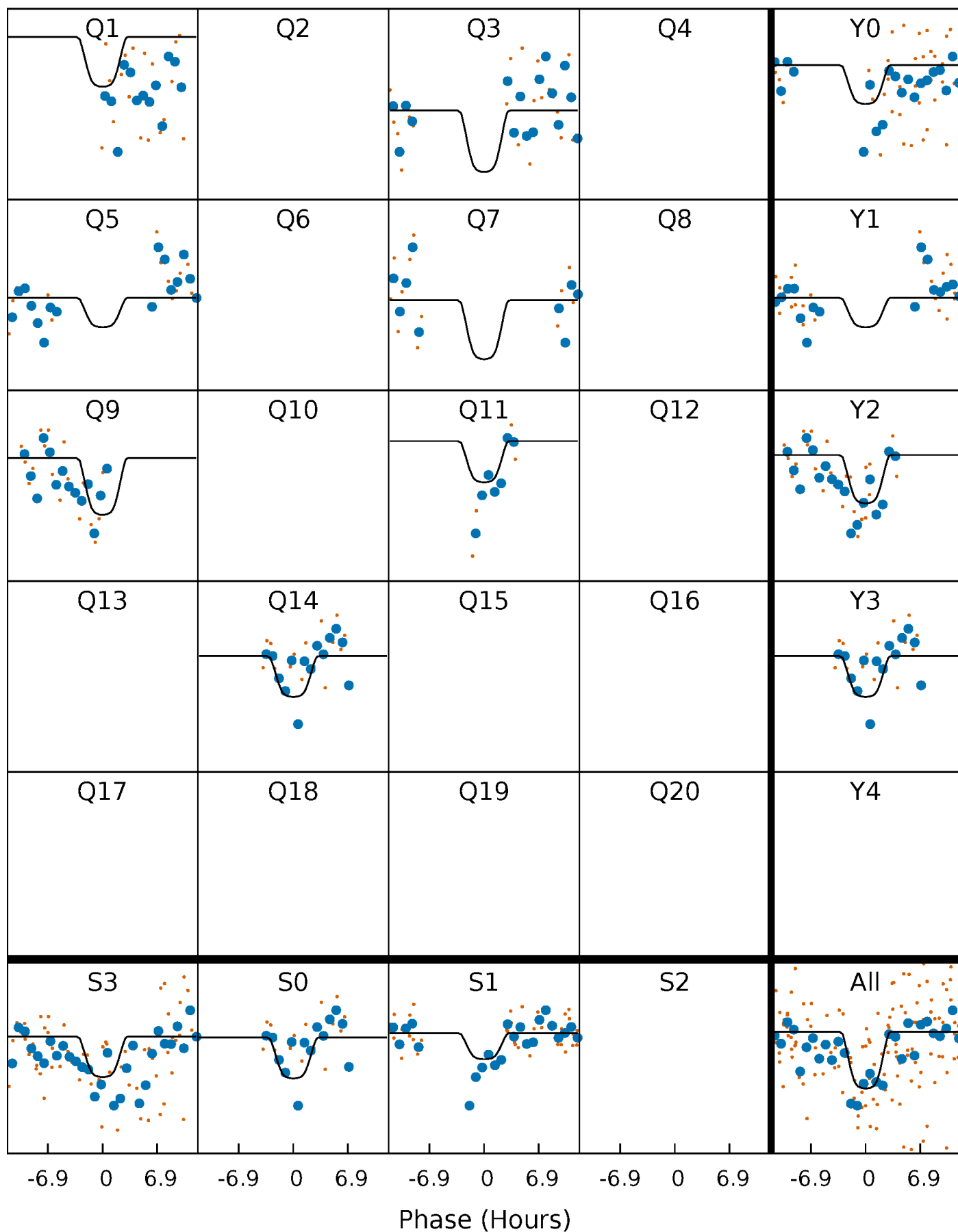
# PDC Quarter-Phased Transit Curves

TCE 010471113-02 P=191.277720 Days  $T_0=137.400803$  (BKJD)



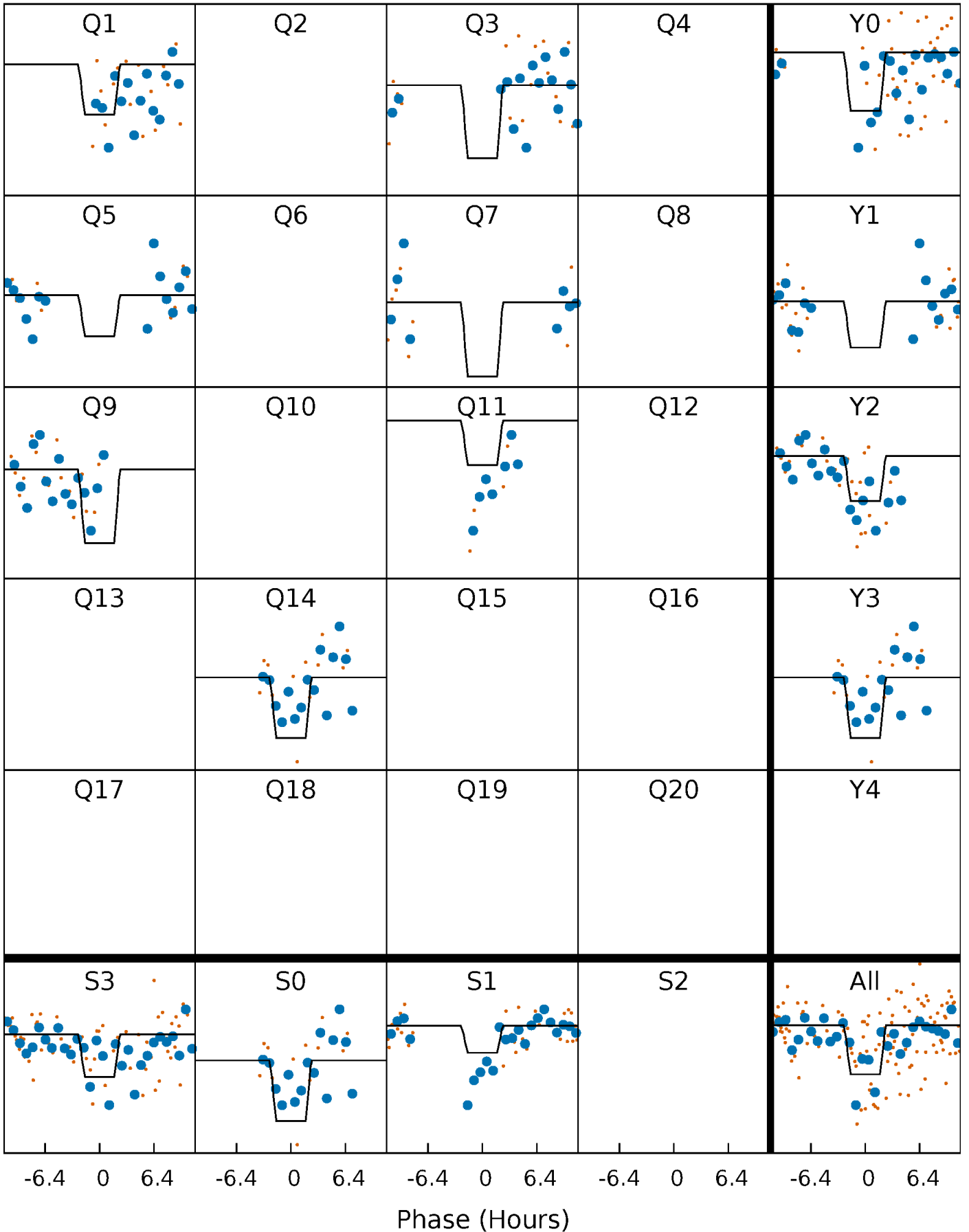
# DV Quarter-Phased Transit Curves

TCE 010471113-02 P=191.277720 Days  $T_0=137.400803$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

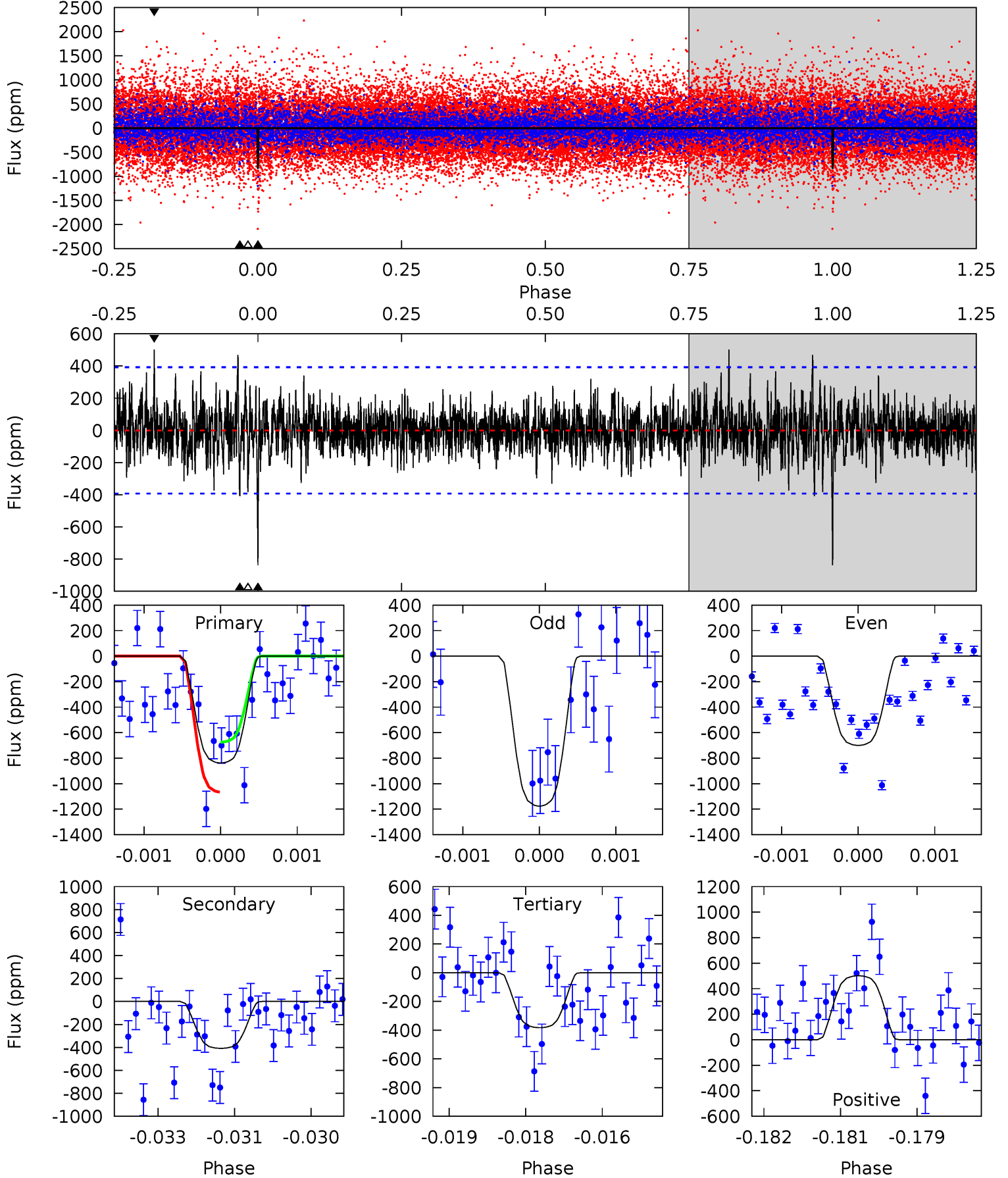
TCE 010471113-02 P=191.271746 Days  $T_0=137.430403$  (BKJD)



# DV Model-Shift Uniqueness Test

010471113-02, P = 191.277720 Days, E = 137.400803 Days

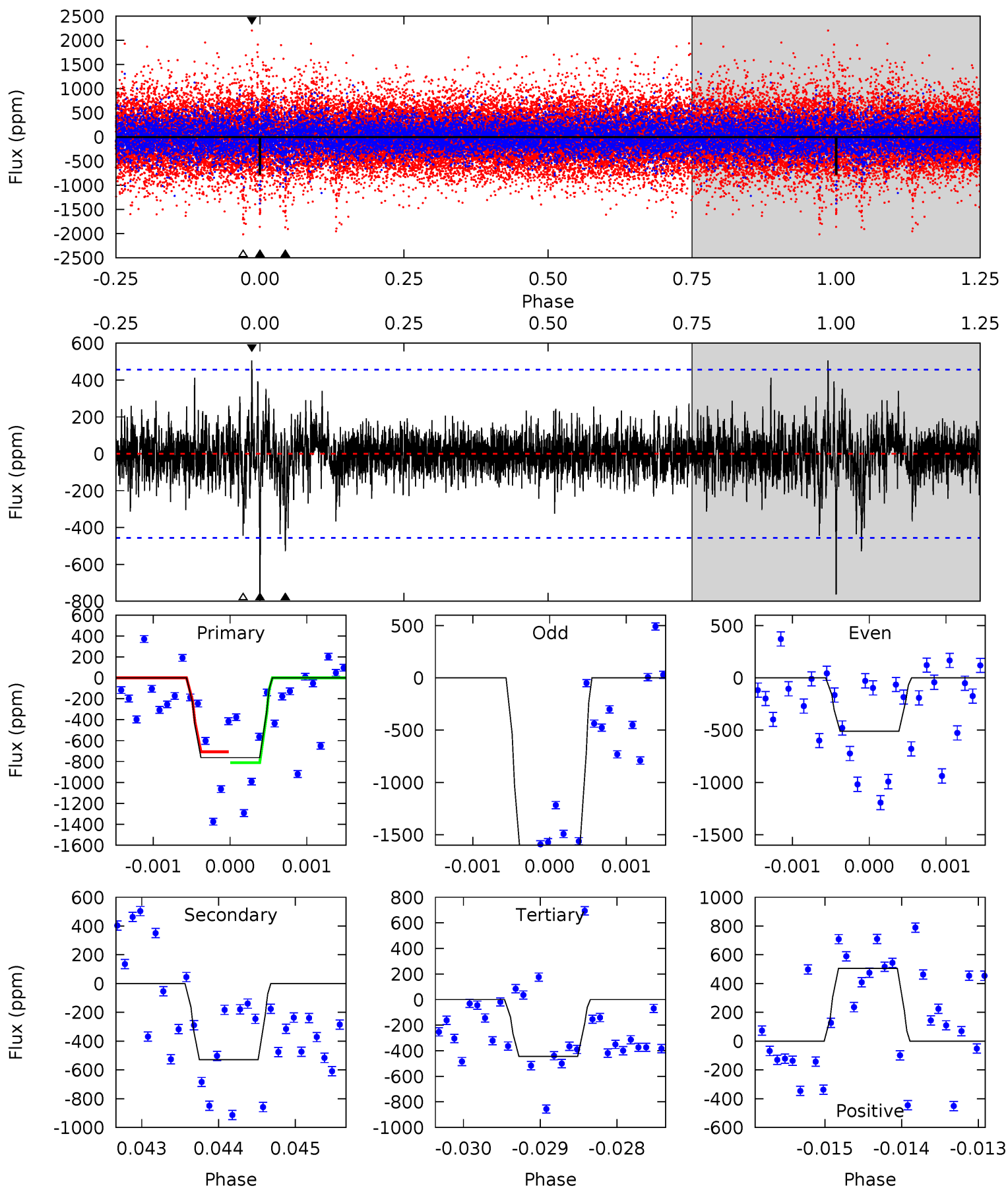
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.5	5.61	5.26	6.89	5.40	3.20	1.42	6.25	4.62	0.35	-1.28	3.04	0.95	0.37	2.60



# Alt Model-Shift Uniqueness Test

010471113-02, P = 191.271746 Days, E = 137.430403 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
9.11	6.31	5.31	6.05	5.46	3.30	1.08	3.81	3.06	1.00	0.26	6.58	1.33	0.40	0.61





### Stellar Parameters For KIC 010471113

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6170^{+171}_{-214}$	$4.430^{+0.072}_{-0.217}$	$-0.140^{+0.250}_{-0.350}$	$1.032^{+0.334}_{-0.119}$	$1.040^{+0.166}_{-0.135}$	$1.331^{+0.422}_{-0.721}$
	+3%/-3%	+2%/-5%	+179%/-250%	+32%/-12%	+16%/-13%	+32%/-54%
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 010471113-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-408 \pm 73$	$3.73^{+0.95}_{-0.65}$	$485^{+38}_{-26}$	$4975^{+477}_{-394}$	$6788^{+3567}_{-2518}$
Alt.	$-528 \pm 84$	$3.54^{+0.81}_{-0.66}$	$484^{+33}_{-24}$	$5398^{+542}_{-429}$	$9830^{+5444}_{-3336}$

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

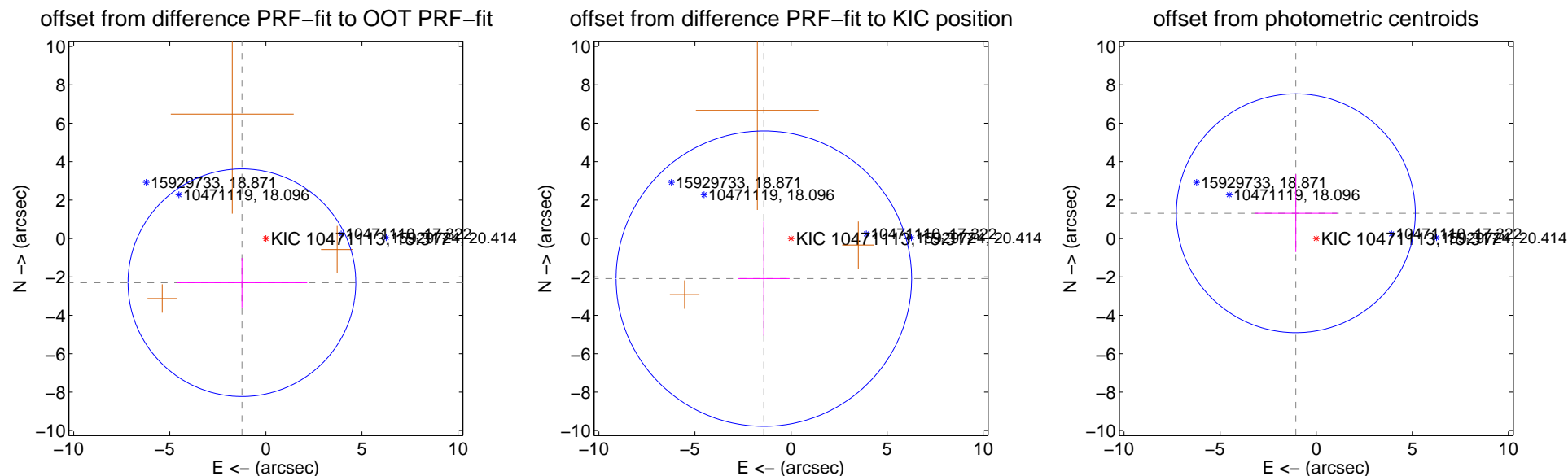
## DV Centroid Data

Supplemental centroid analysis for 010471113-02. Kepler magnitude: 15.32. Transit SNR 6.48

There are 0 quarters with good PRF difference image offsets

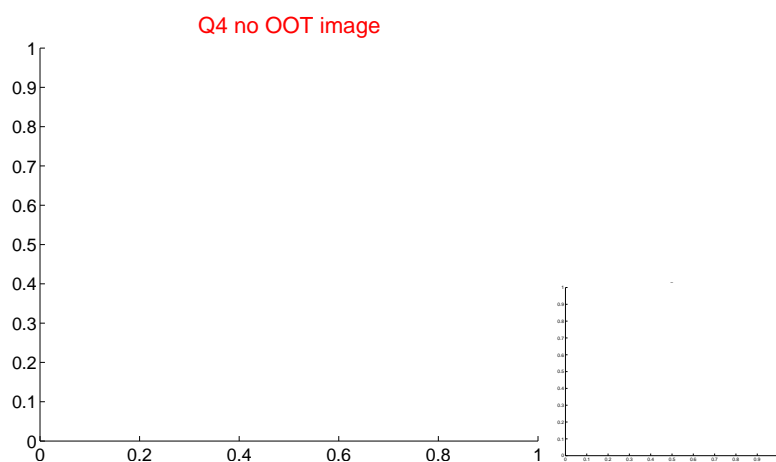
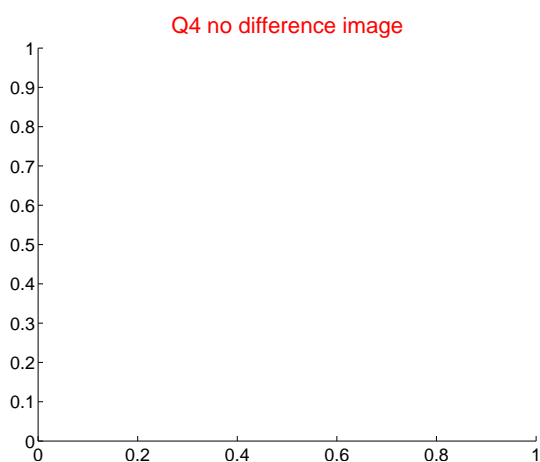
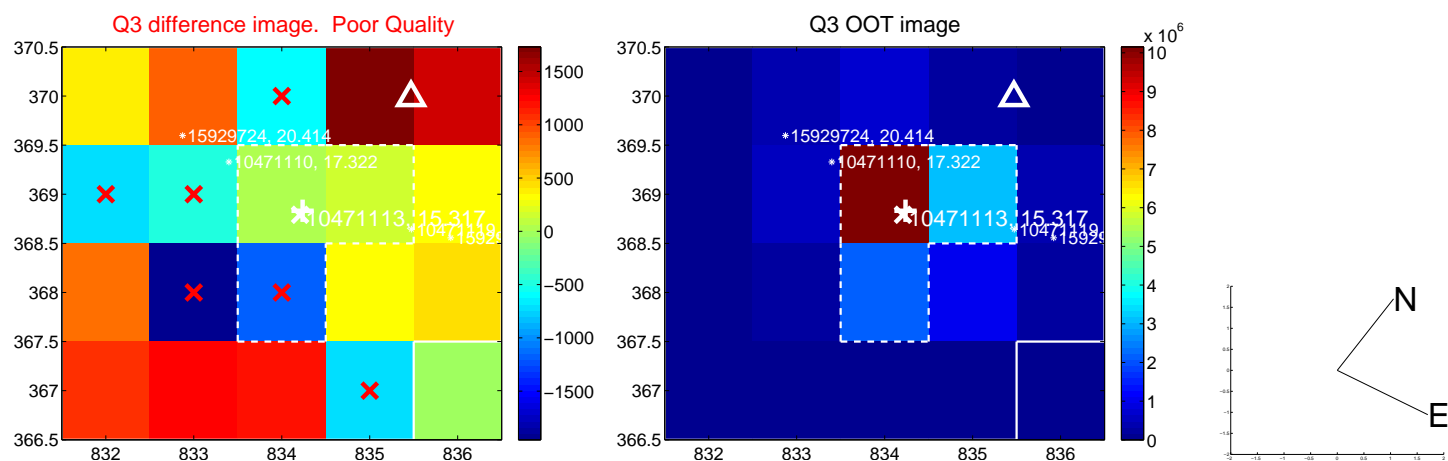
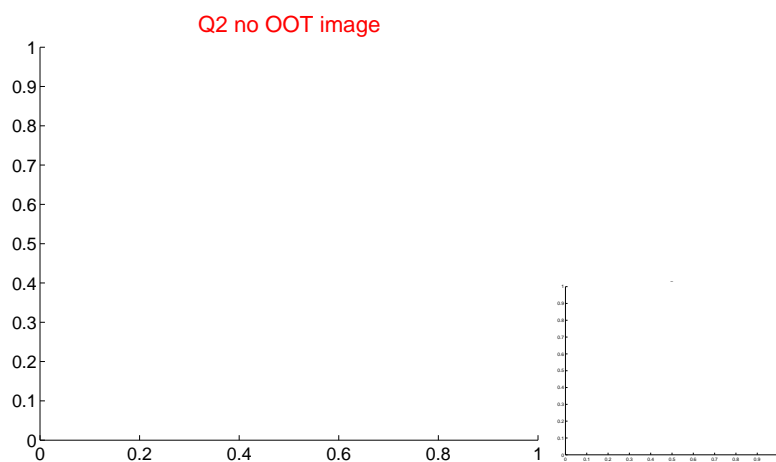
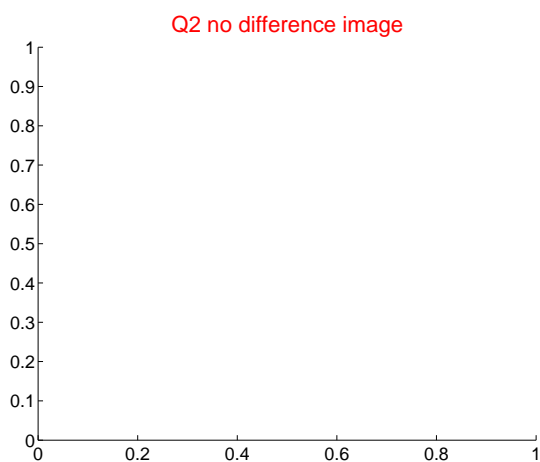
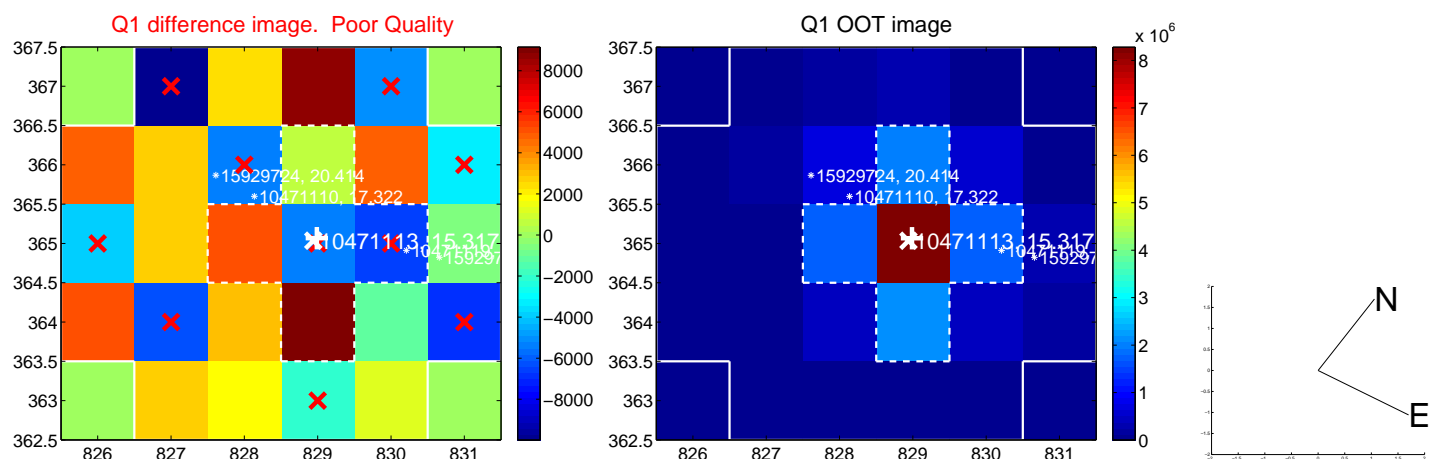
The direct PRF centroid is offset from the target star catalog position by about 0.31 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.619 \pm 1.975$	1.33	$1.247 \pm 3.399$	$-2.303 \pm 1.288$
PRF-fit source offset from KIC position	$2.525 \pm 2.563$	0.98	$1.414 \pm 1.340$	$-2.091 \pm 2.965$
photometric centroid source offset	$1.69 \pm 2.07$	0.81	$1.06 \pm 2.15$	$1.31 \pm 2.02$

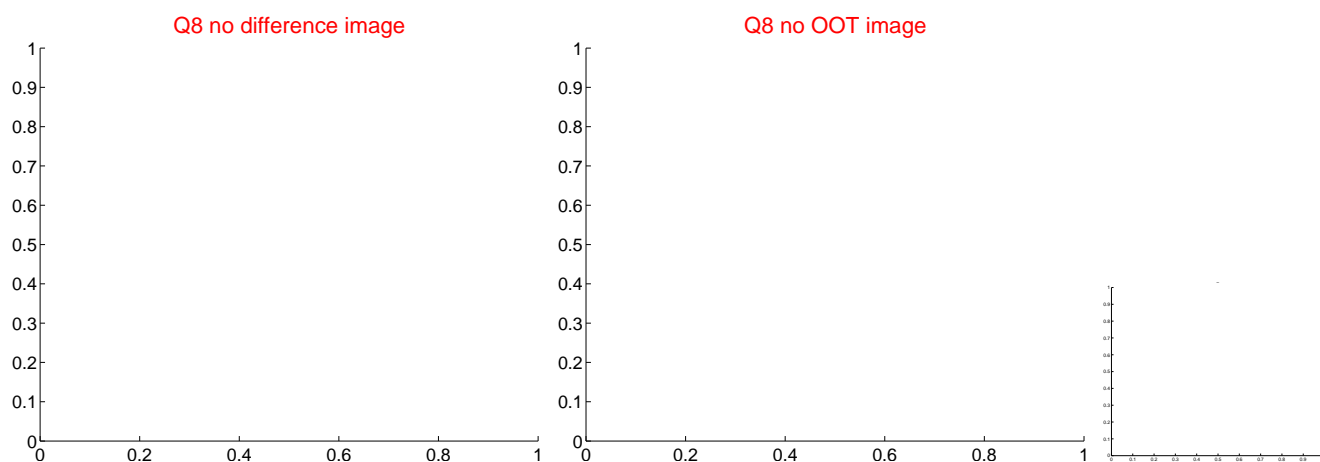
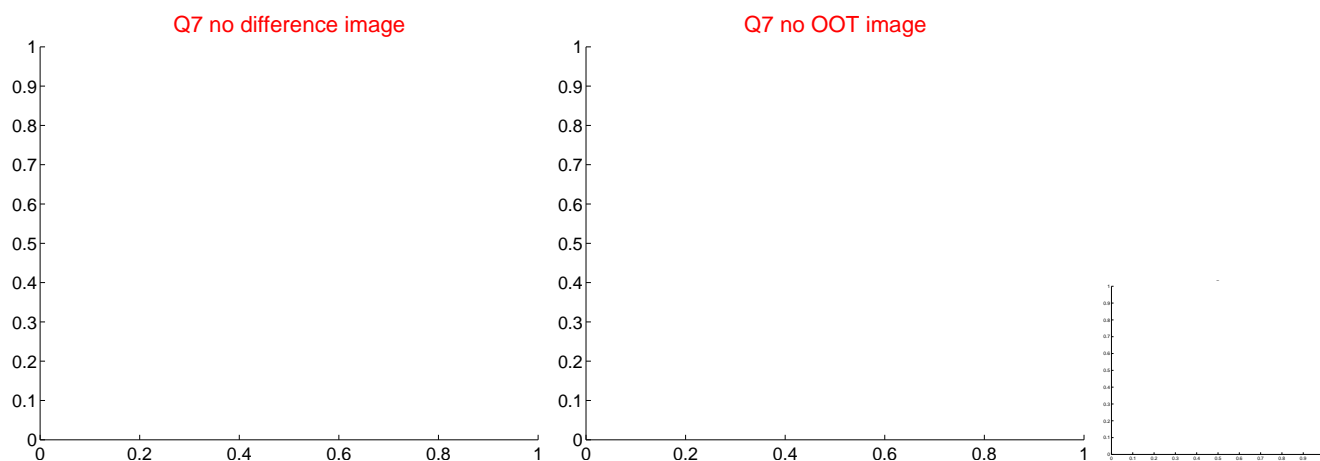
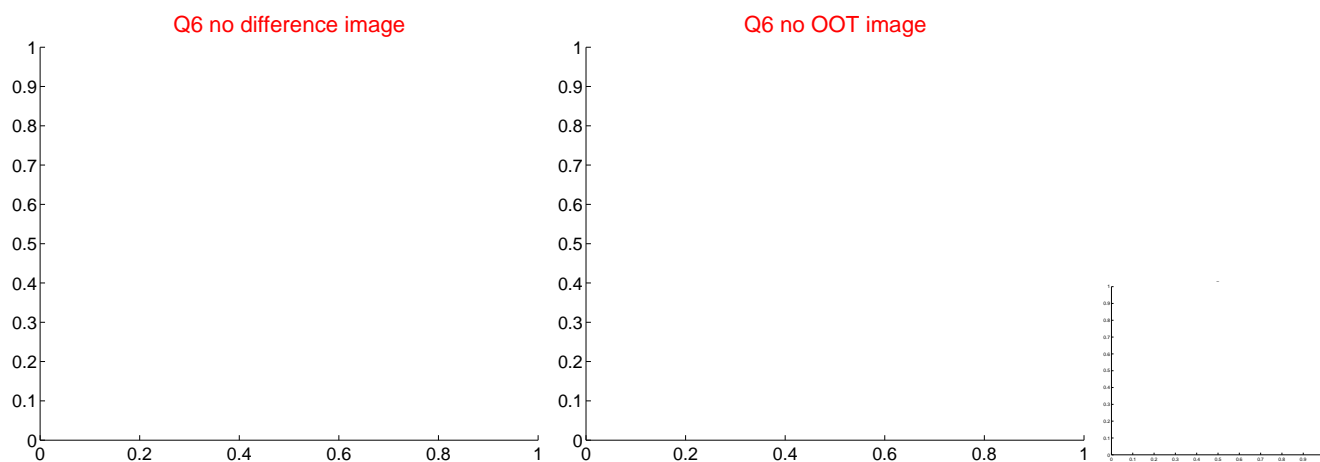
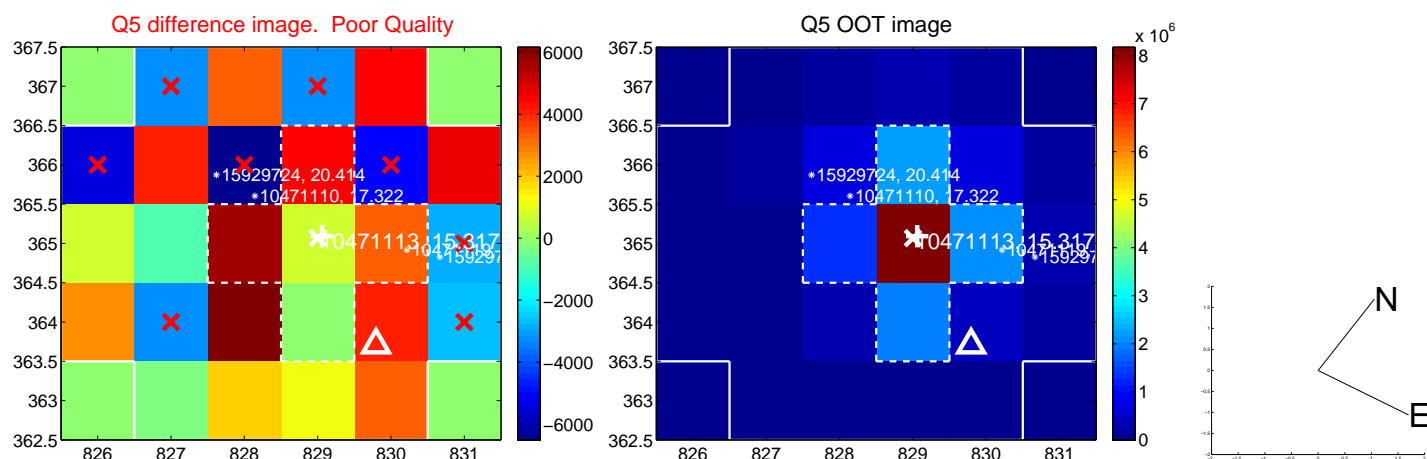


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

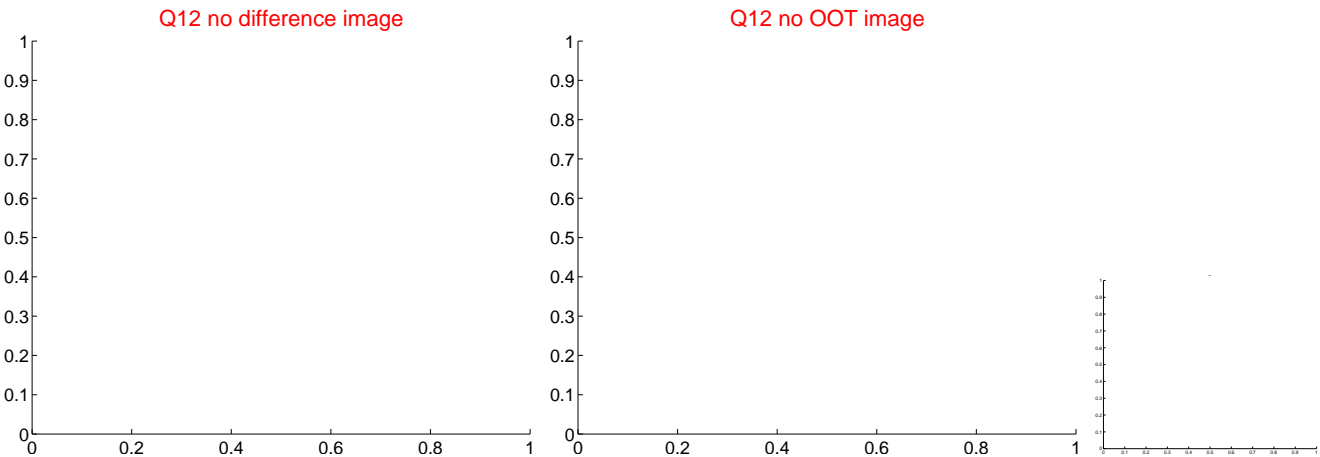
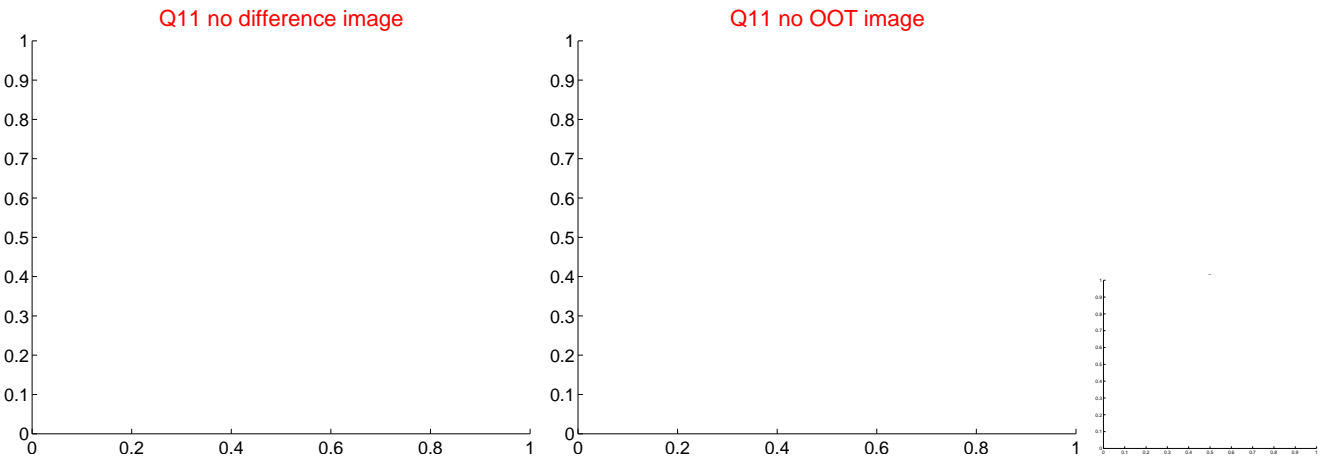
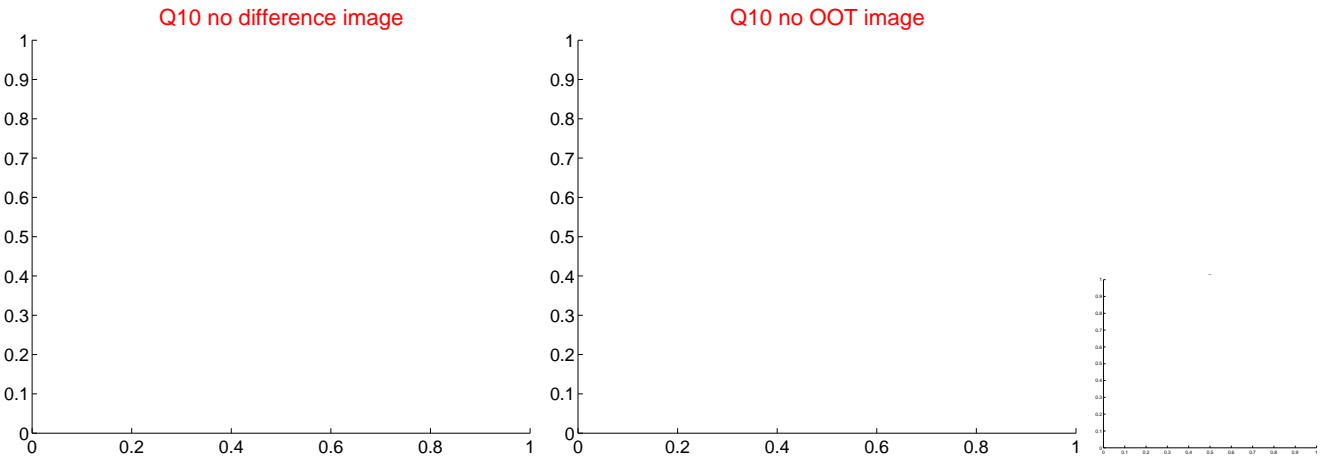
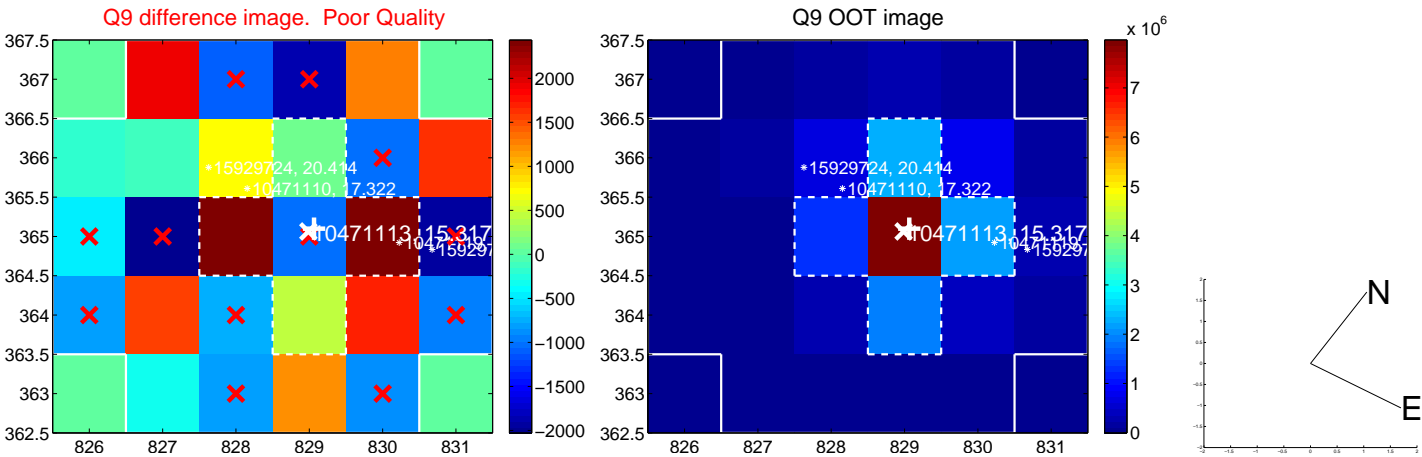
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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



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

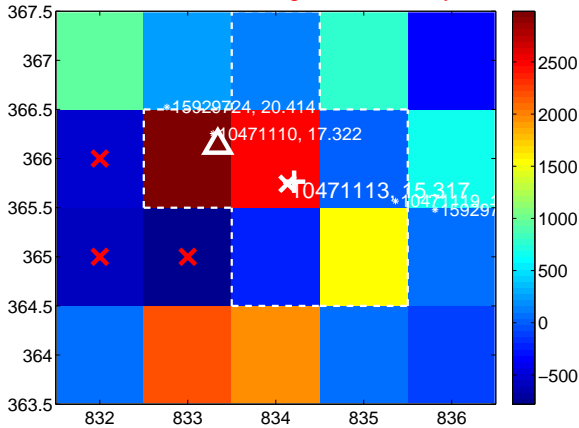
Q13 no difference image



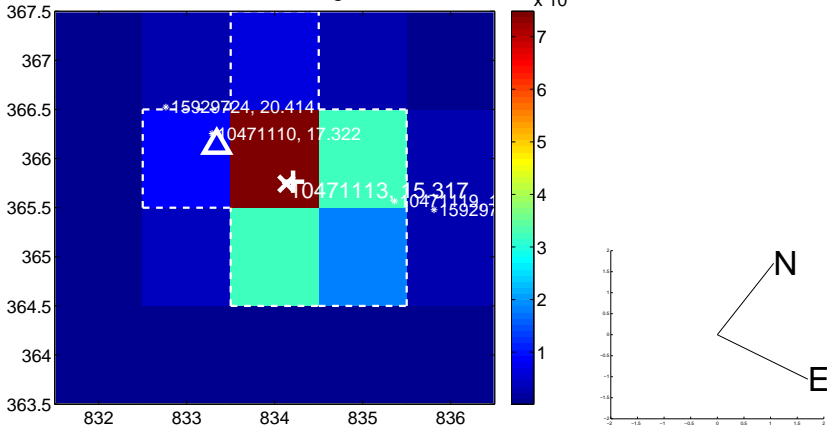
Q13 no OOT image



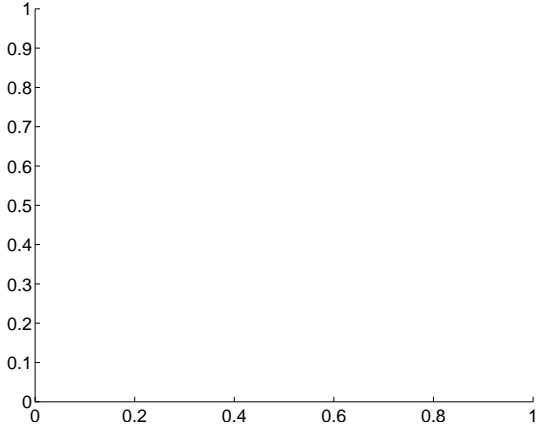
Q14 difference image. Poor Quality



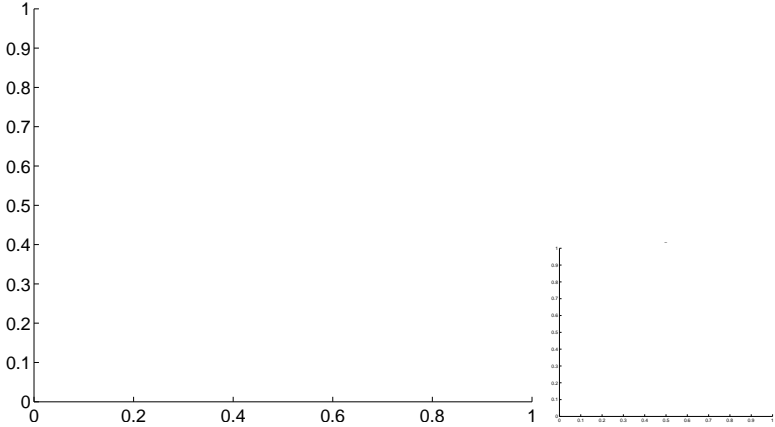
Q14 OOT image



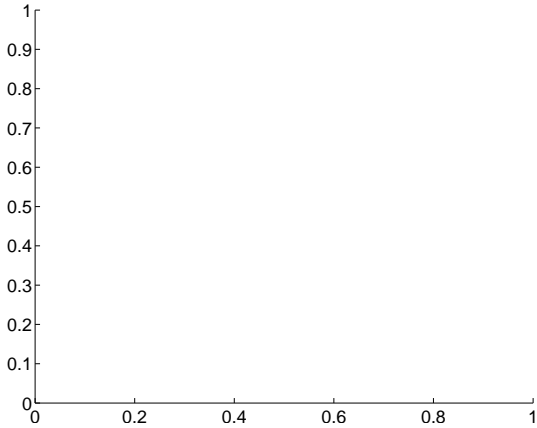
Q15 no difference image



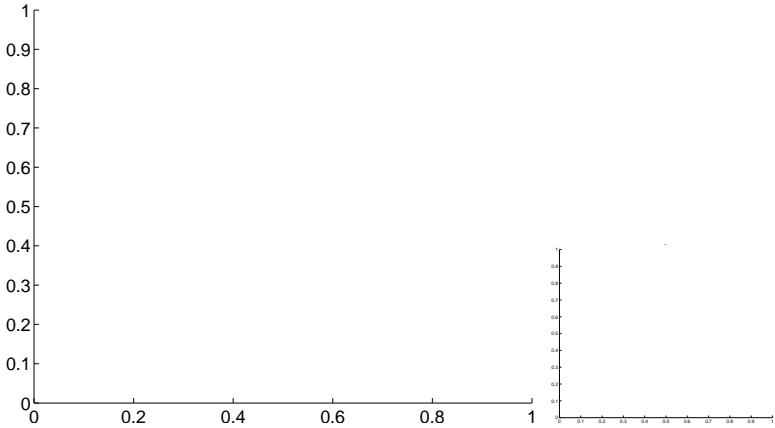
Q15 no OOT image



Q16 no difference image

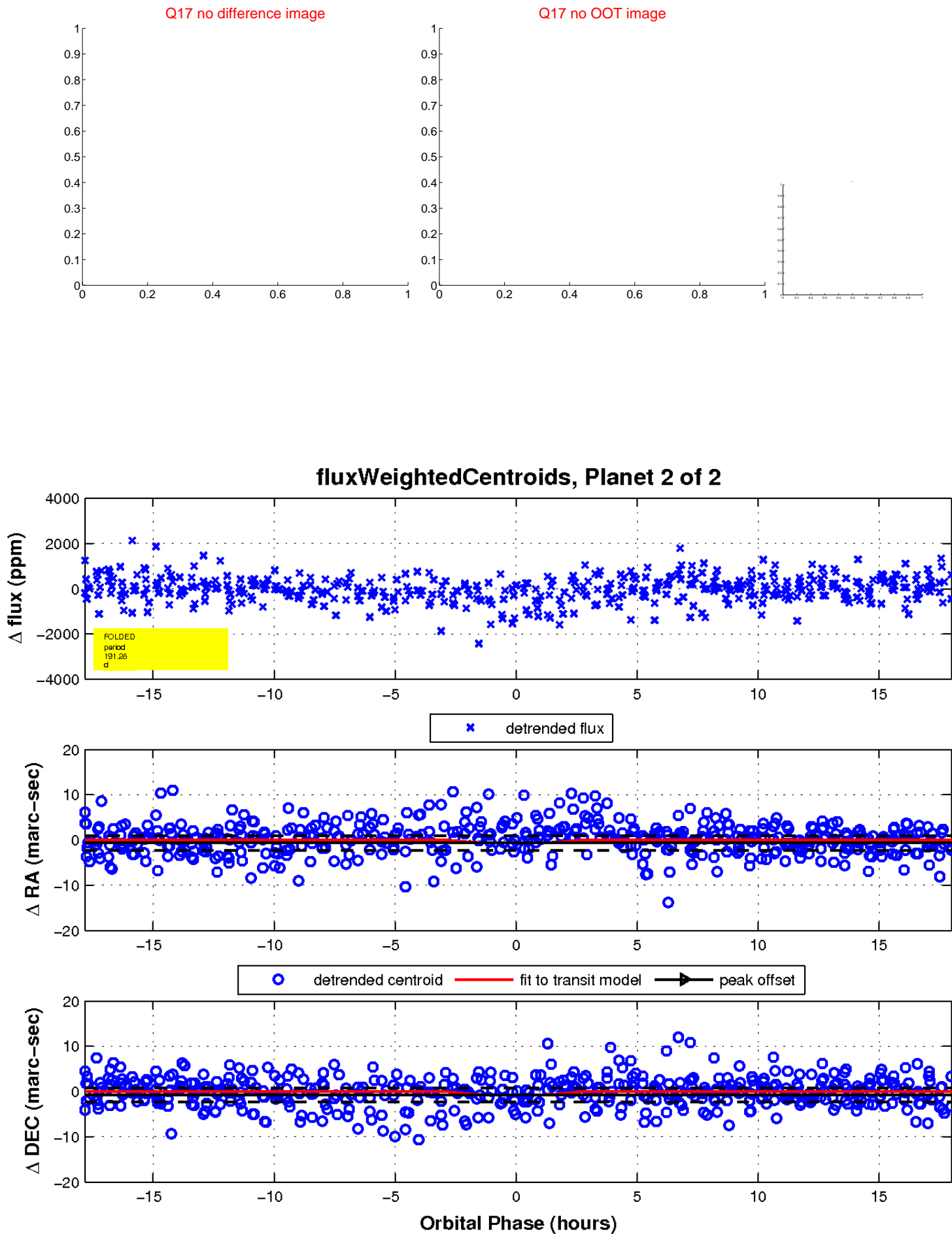


Q16 no OOT image





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



UKIRT Image

Declination

