

# KIC 010471107

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010471107-01	OBS	No	0.933717	131.547272	30.1	3.340	7.5	6.4	0.86	5792	0.56	2212.74
010471107-02	OBS	No	345.328019	147.706527	641.4	13.711	8.7	9.2	0.86	5792	2.33	0.83

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010471107-01	OBS	FP	0.00	1	0	1	1	LPP_DV—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
010471107-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—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.

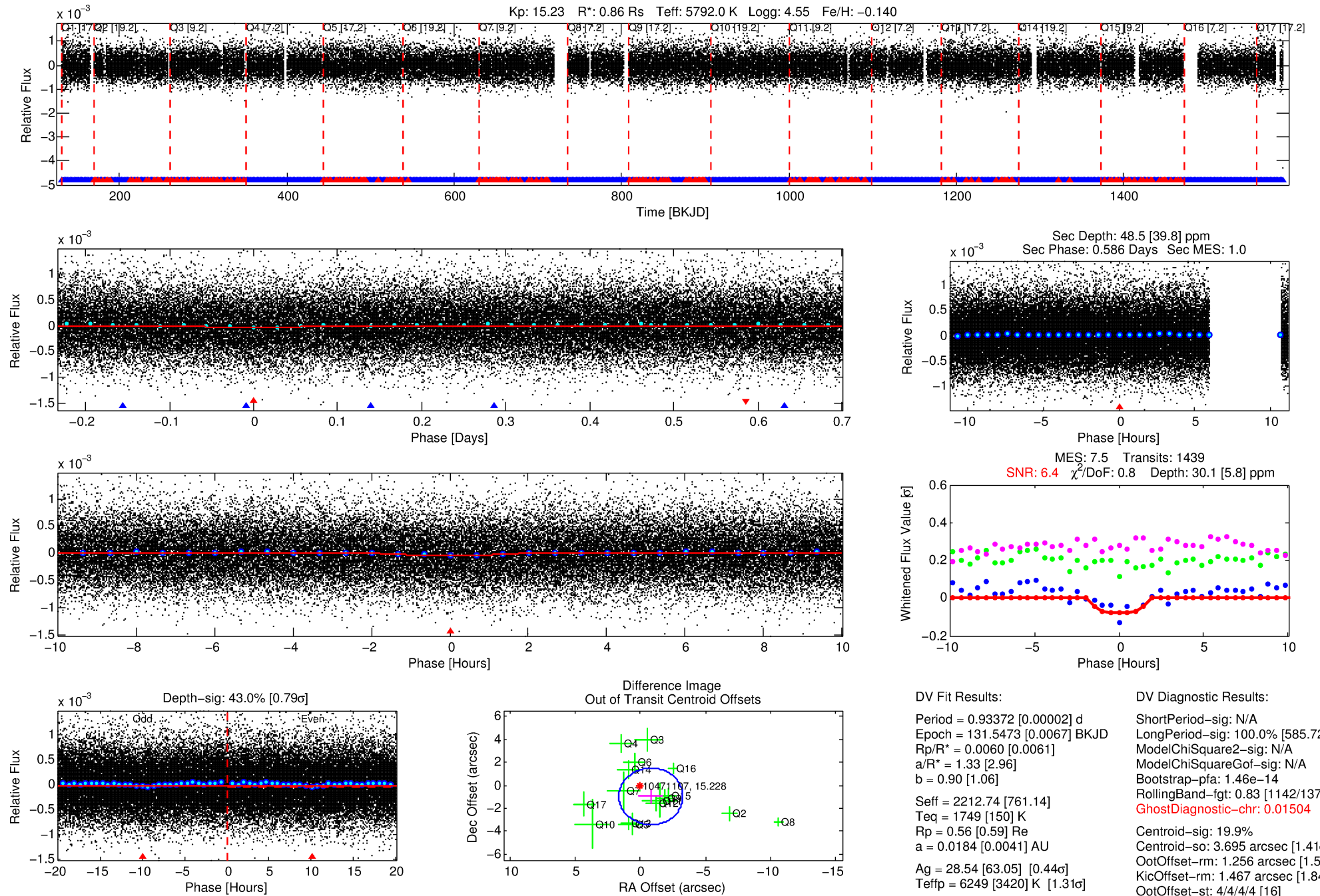
## Ephemeris Match Information For 010471107-01

TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
010471107-01	10471107	7612.01	10471167	1:1	69.0	12	-13	13.01	15.23	5.37	Direct-PRF	1	1.37	0.42

**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  and  $\sigma_T$  are the significance of the match in period and epoch. For a match to be considered significant  $\sigma_P < 5.0$  and  $\sigma_T < 5.0$ . Matches which have  $\sigma_P$  and  $\sigma_T$  very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

# DV One-Page Summary

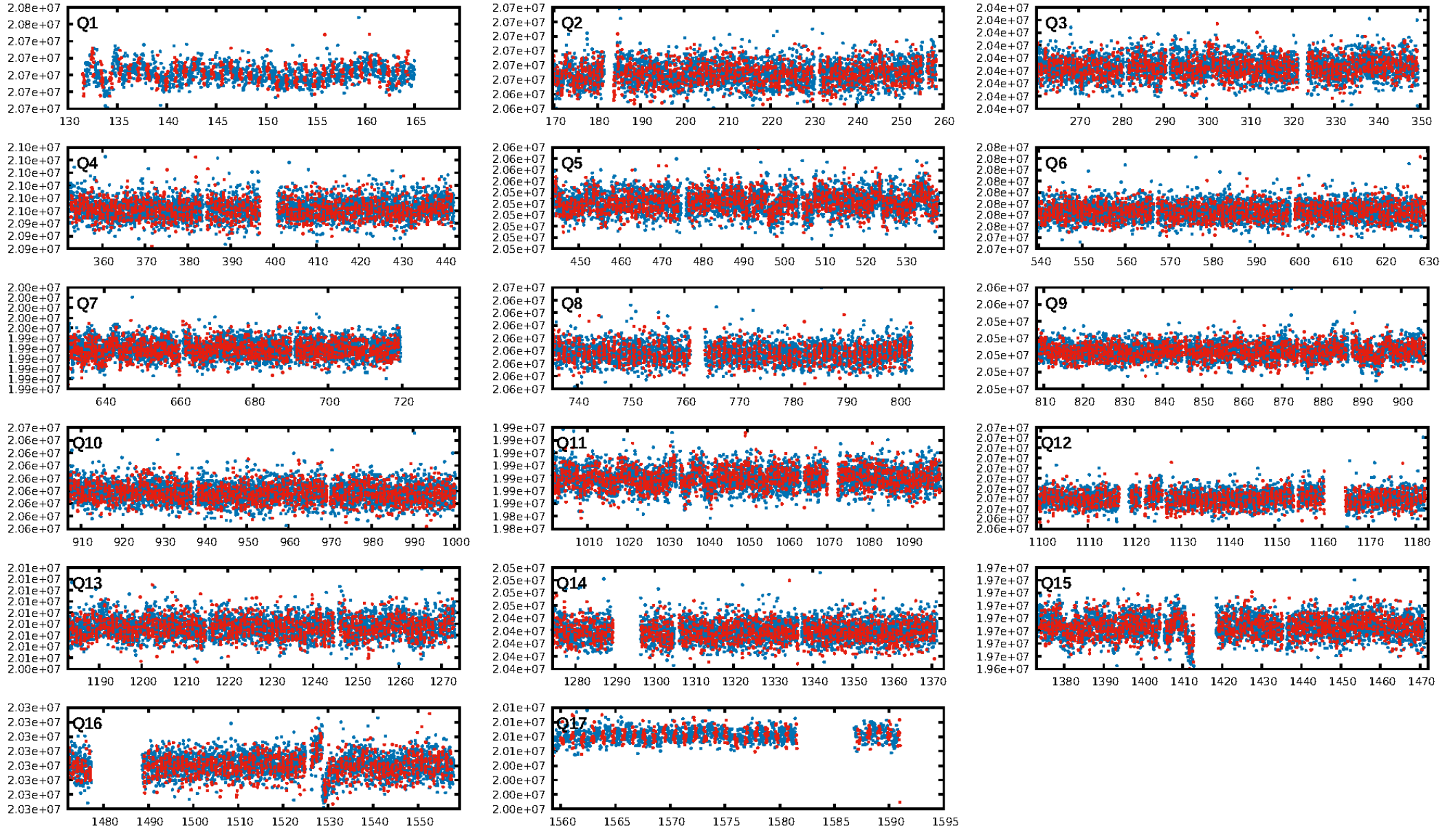
KIC: 10471107 Candidate: 1 of 2 Period: 0.934 d



Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 03:33:38 Z

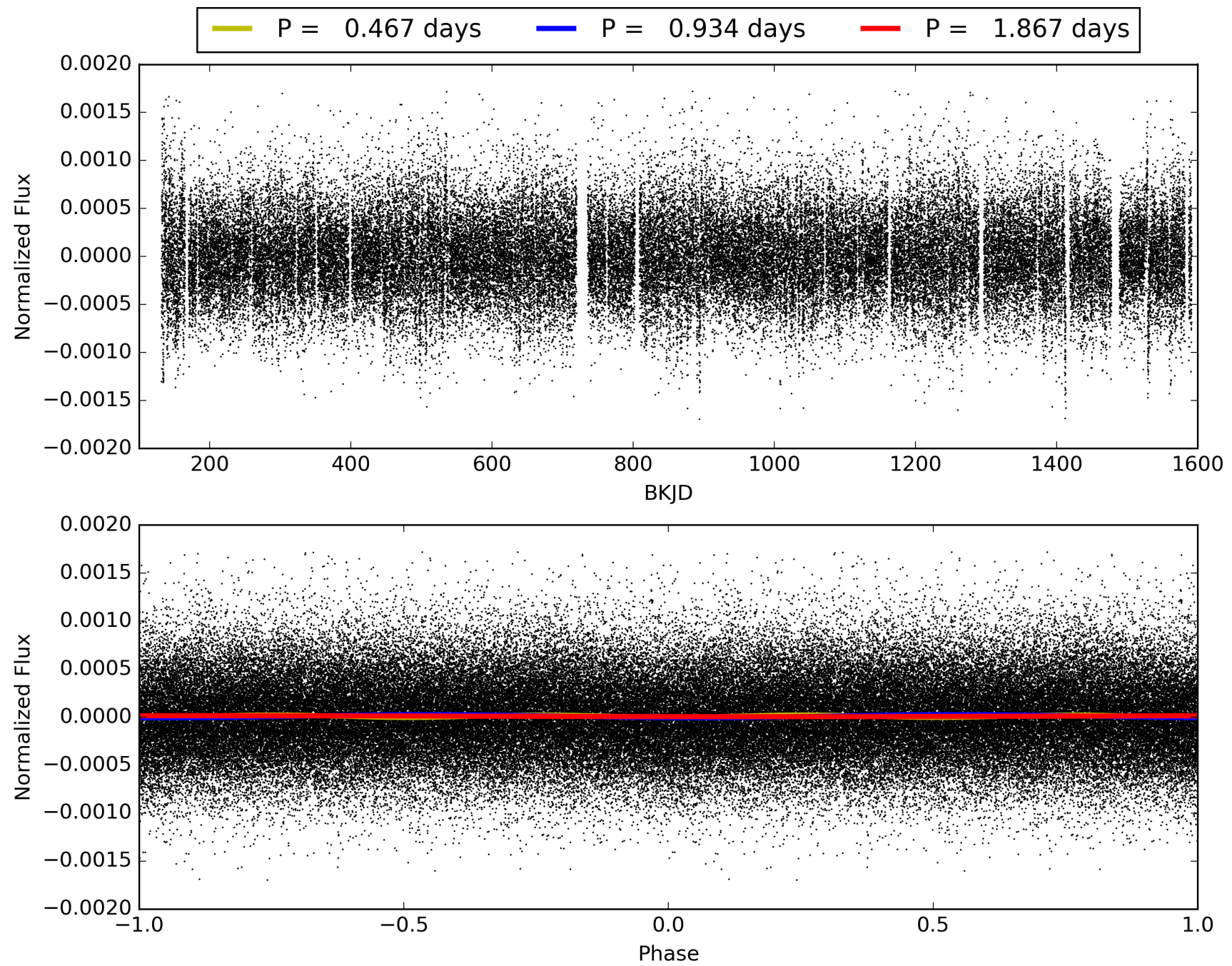
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010471107-01, PDC Light Curves



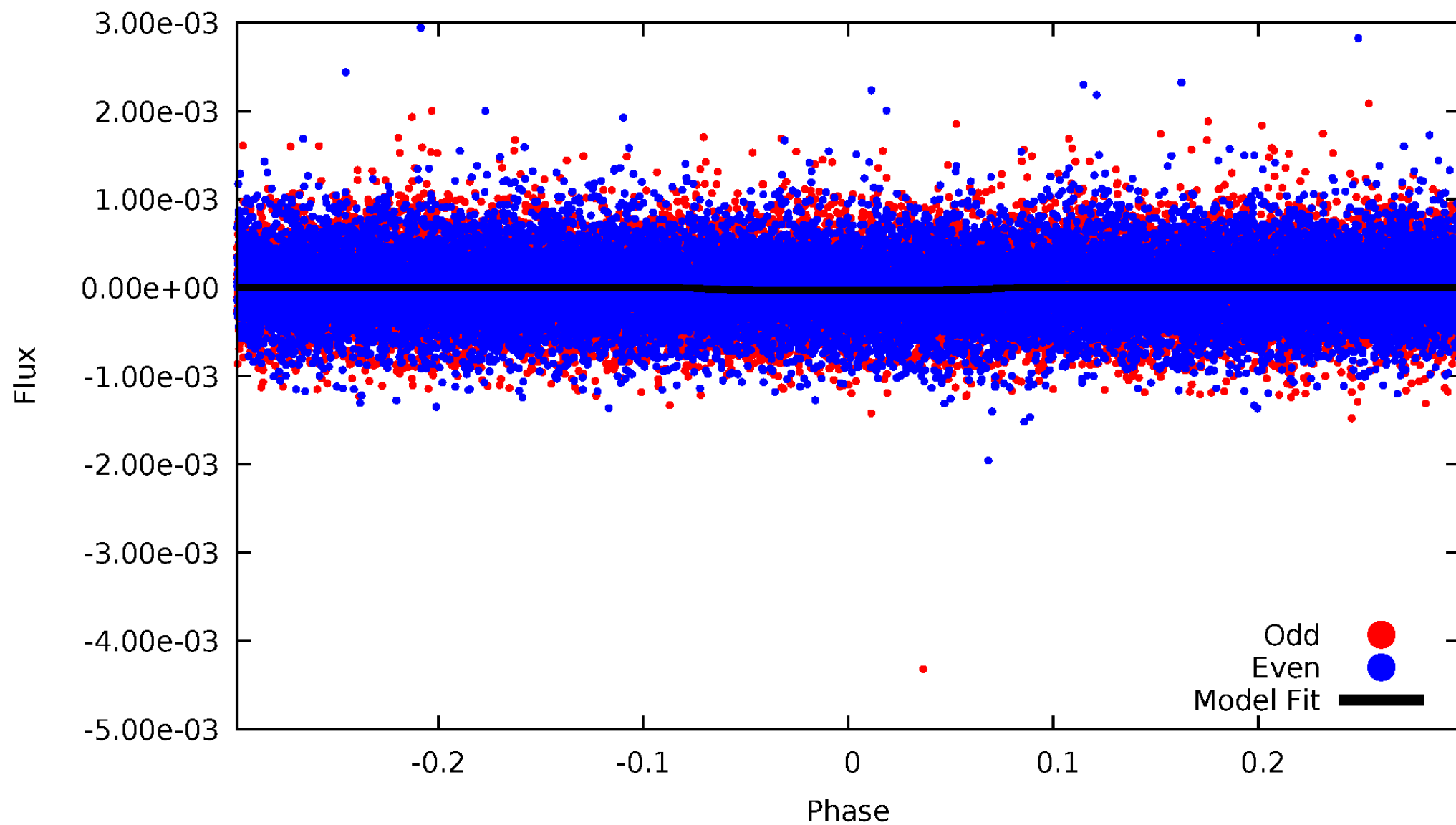


TCE 010471107-01



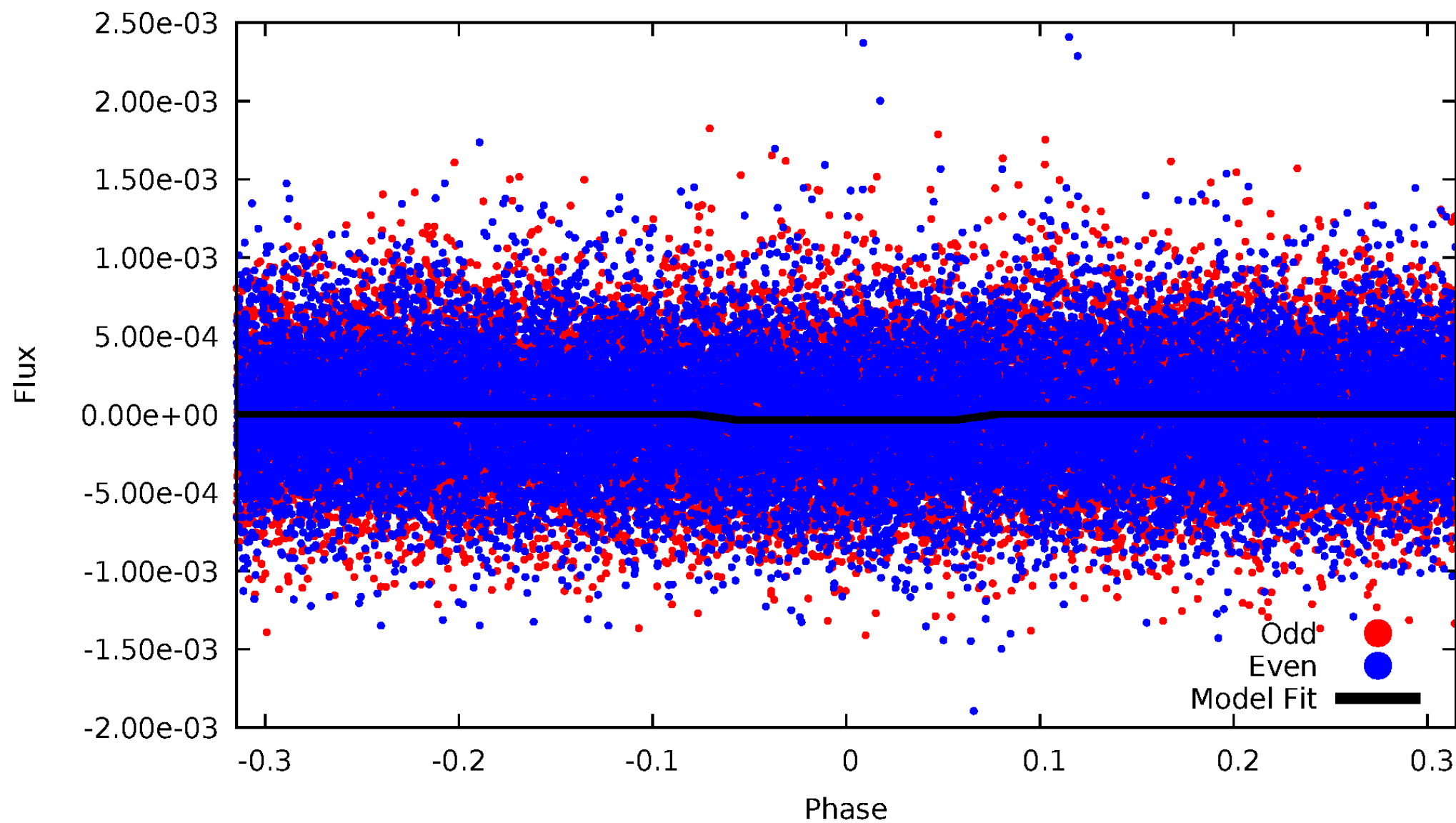
# DV Odd/Even

TCE 010471107-01



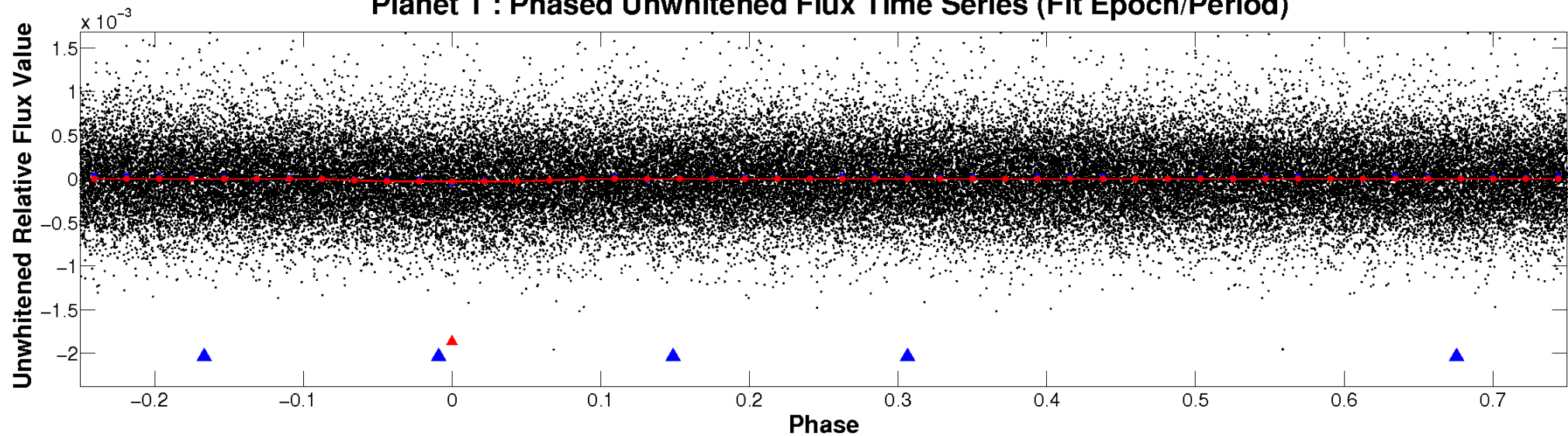
# ALT Odd/Even

TCE 010471107-01

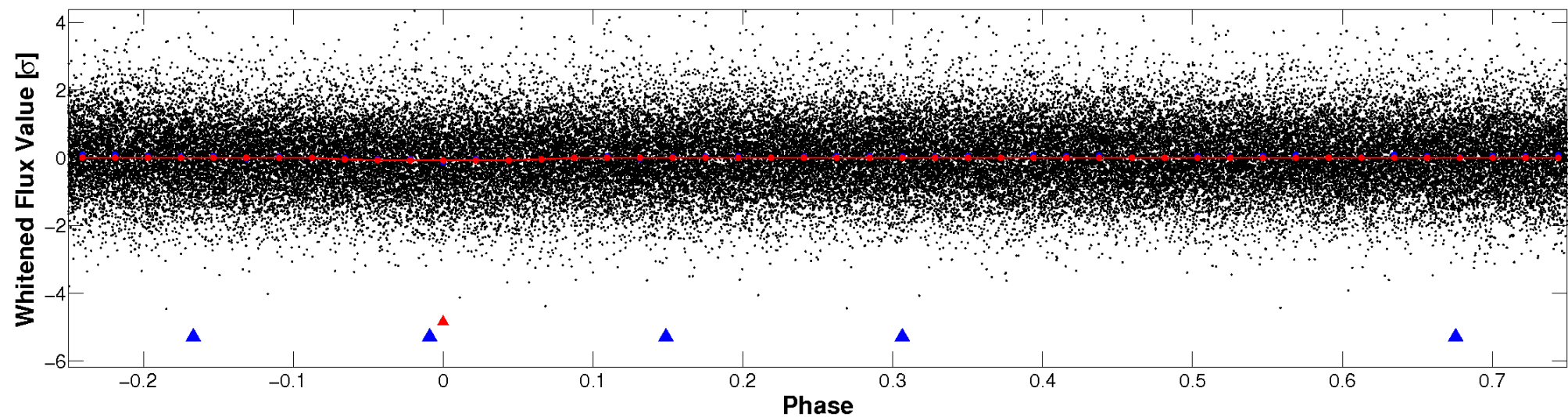


# Non-Whitened Vs. Whitened Light Curve

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



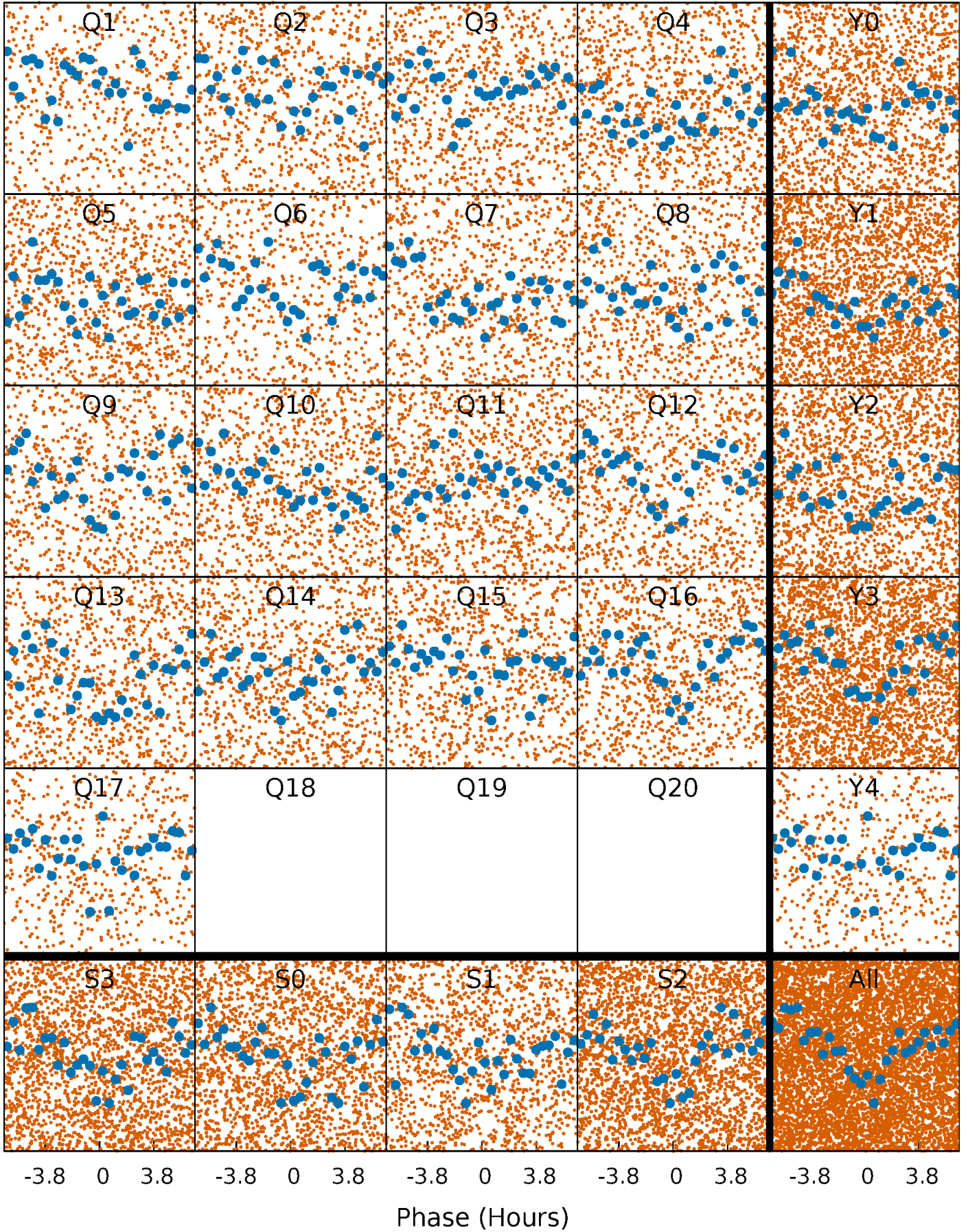
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

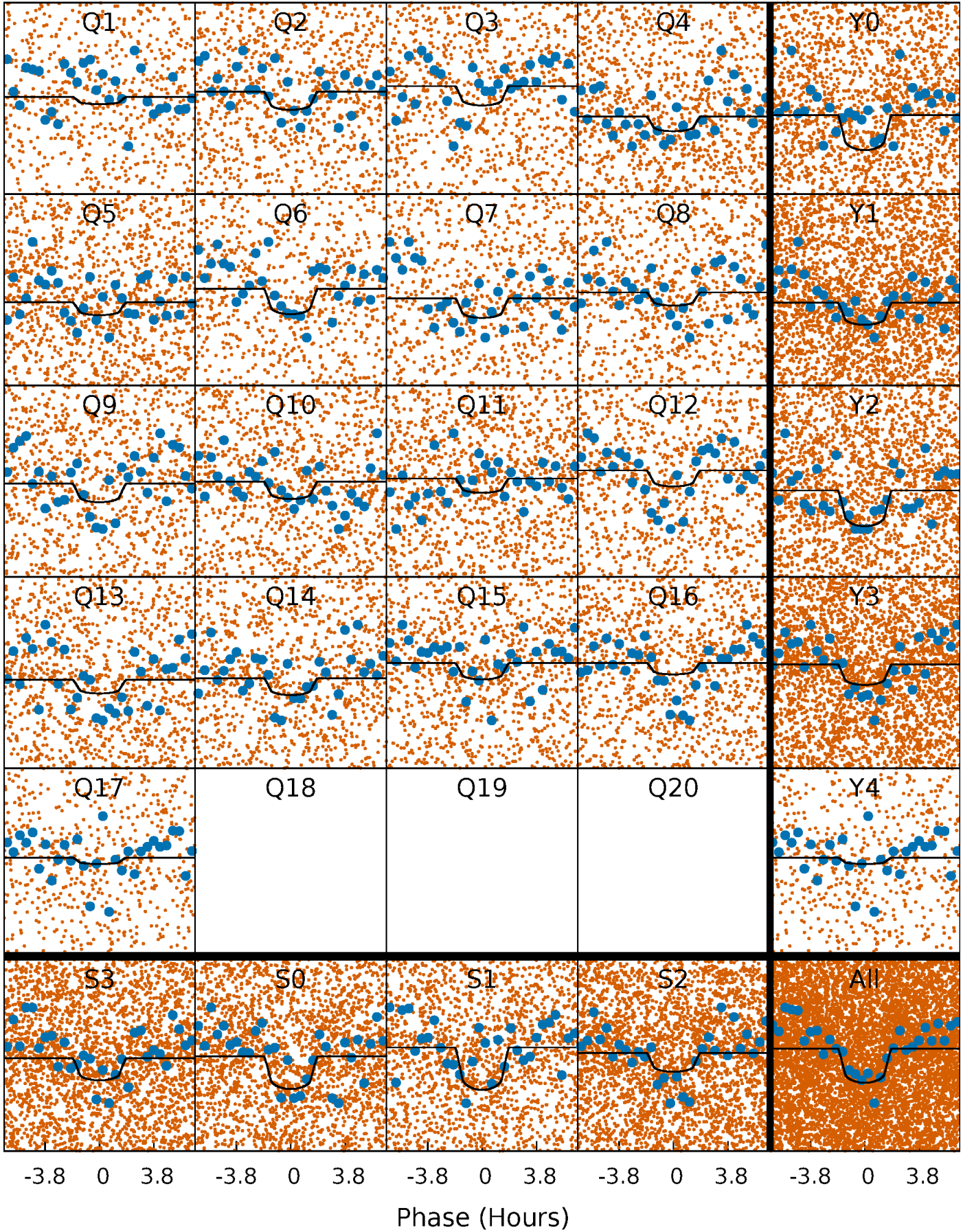
TCE 010471107-01 P= 0.933717 Days  $T_0=131.547272$  (BKJD)





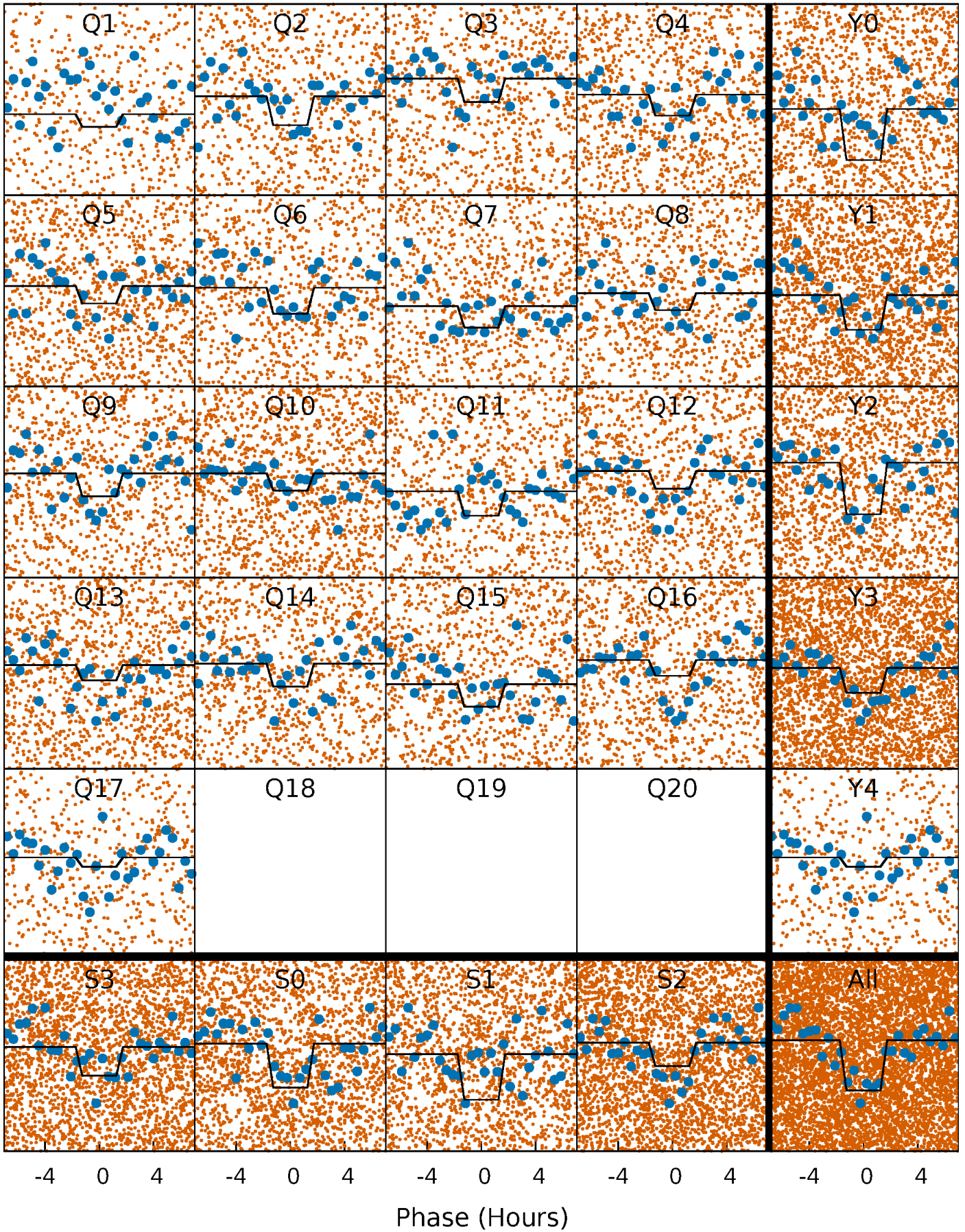
# DV Quarter-Phased Transit Curves

TCE 010471107-01 P= 0.933717 Days  $T_0=131.547272$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 010471107-01 P= 0.933722 Days  $T_0=131.546972$  (BKJD)

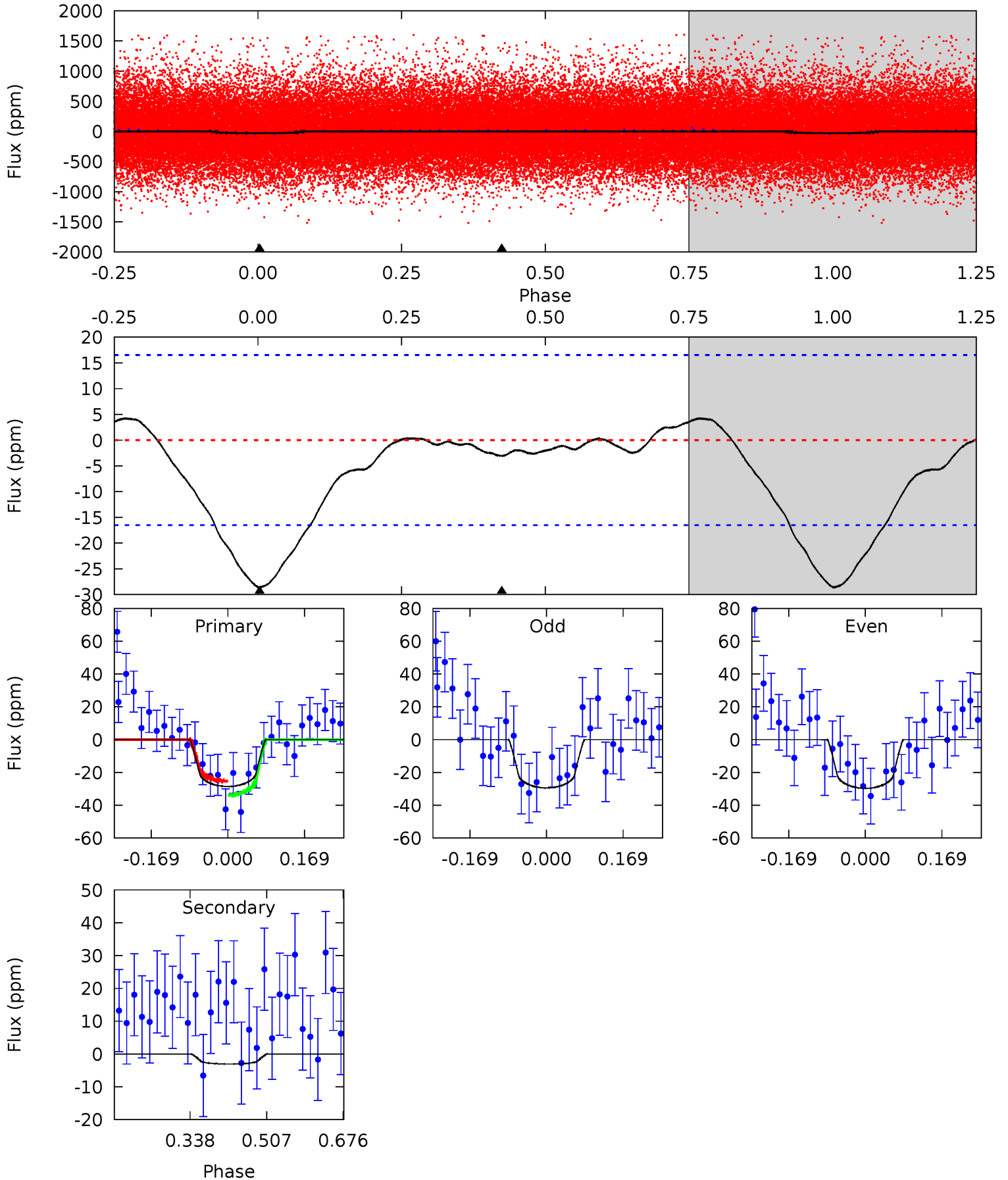




# DV Model-Shift Uniqueness Test

010471107-01, P = 0.933717 Days, E = 130.613555 Days

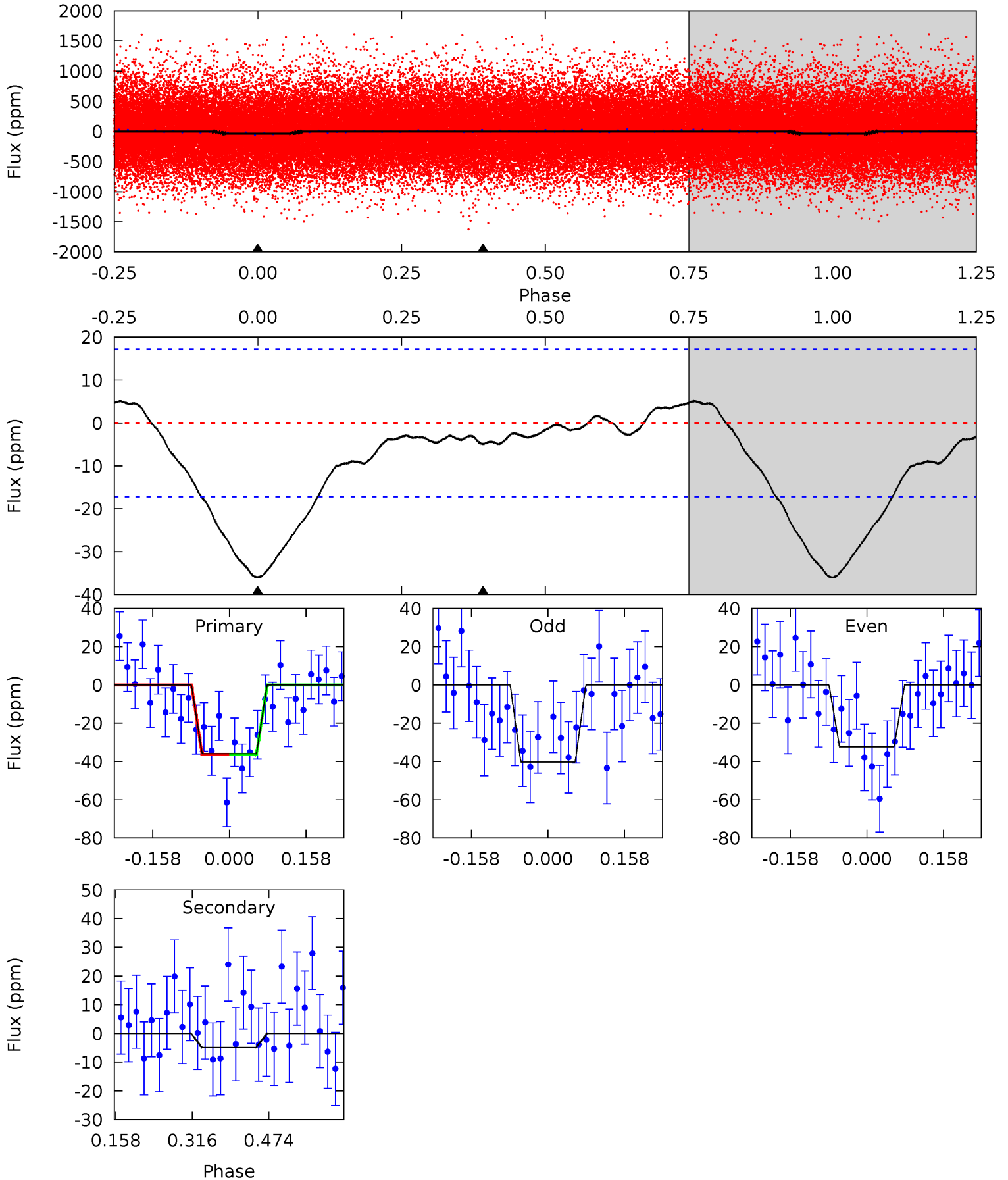
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.71	0.83	0	0	4.45	1.38	0.75	7.71	7.71	0.83	0.83	0.03	0.96	0.13	1.16



# Alt Model-Shift Uniqueness Test

010471107-01, P = 0.933722 Days, E = 130.613250 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
9.35	1.28	0	0	4.47	1.41	1.12	9.35	9.35	1.28	1.28	1.02	0.94	0.12	0.00





### Stellar Parameters For KIC 010471107

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5792^{+144}_{-172}$	$4.547^{+0.044}_{-0.176}$	$-0.140^{+0.300}_{-0.300}$	$0.864^{+0.229}_{-0.076}$	$0.959^{+0.102}_{-0.112}$	$2.094^{+0.473}_{-0.950}$
	+2%/-3%	+1%/-4%	+214%/-214%	+27%/-9%	+11%/-12%	+23%/-45%
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 010471107-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-3\pm4$	$0.71^{+0.58}_{-0.44}$	$2487^{+135}_{-111}$	$3126^{+1508}_{-5993}$	$1.005^{+5.622}_{-1.045}$
Alt.	$-5\pm4$	$0.71^{+0.55}_{-0.44}$	$2490^{+143}_{-115}$	$3364^{+1834}_{-5851}$	$1.476^{+10.489}_{-1.322}$

$T_{\text{max}}$  = 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

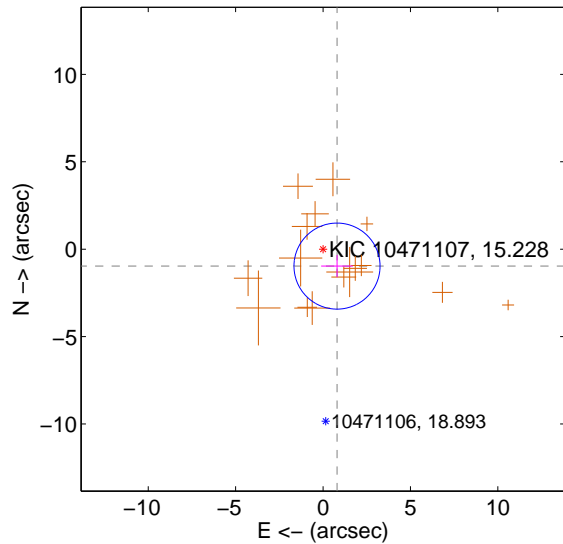
Supplemental centroid analysis for 010471107-01. Kepler magnitude: 15.23. Transit SNR 6.38

There are 0 quarters with good PRF difference image offsets

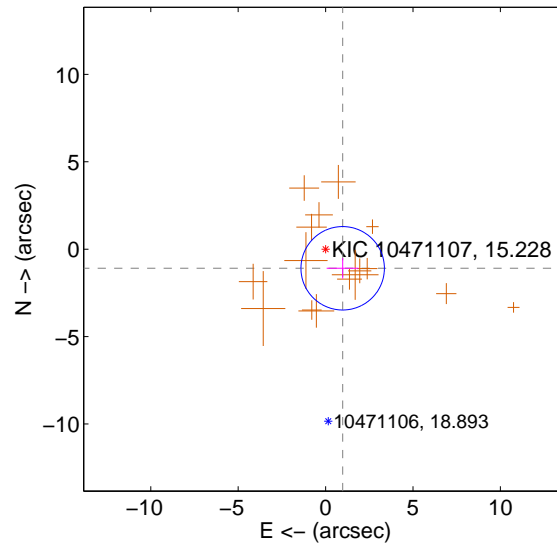
The direct PRF centroid is offset from the target star catalog position by about 0.24 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.256 \pm 0.821$	1.53	$-0.800 \pm 0.910$	$-0.969 \pm 0.630$
PRF-fit source offset from KIC position	$1.467 \pm 0.796$	1.84	$-0.978 \pm 0.912$	$-1.094 \pm 0.586$
photometric centroid source offset	$3.70 \pm 2.61$	1.41	$3.51 \pm 2.63$	$-1.16 \pm 2.48$

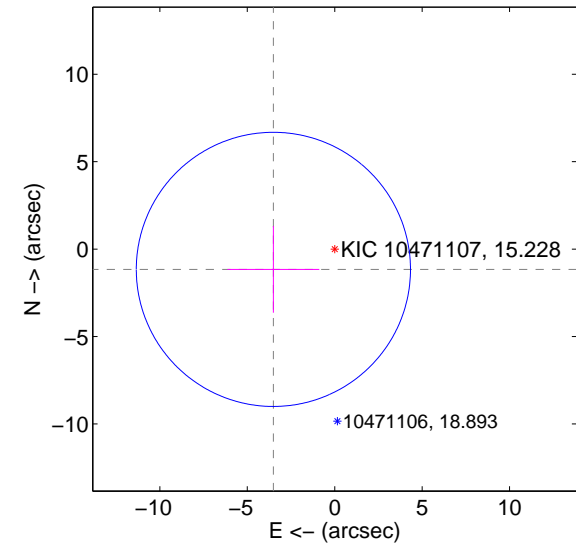
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

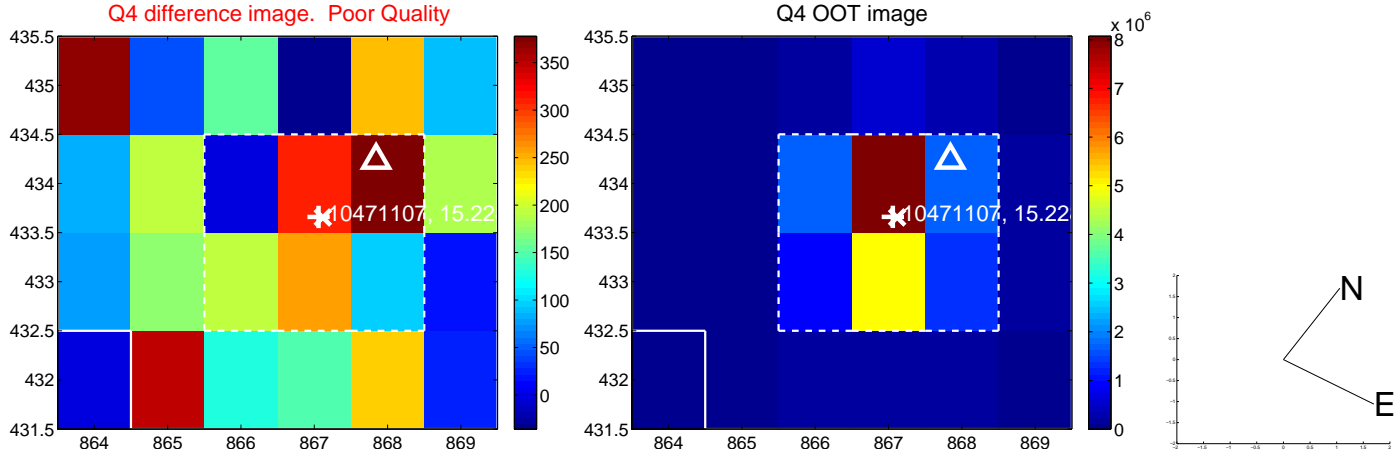
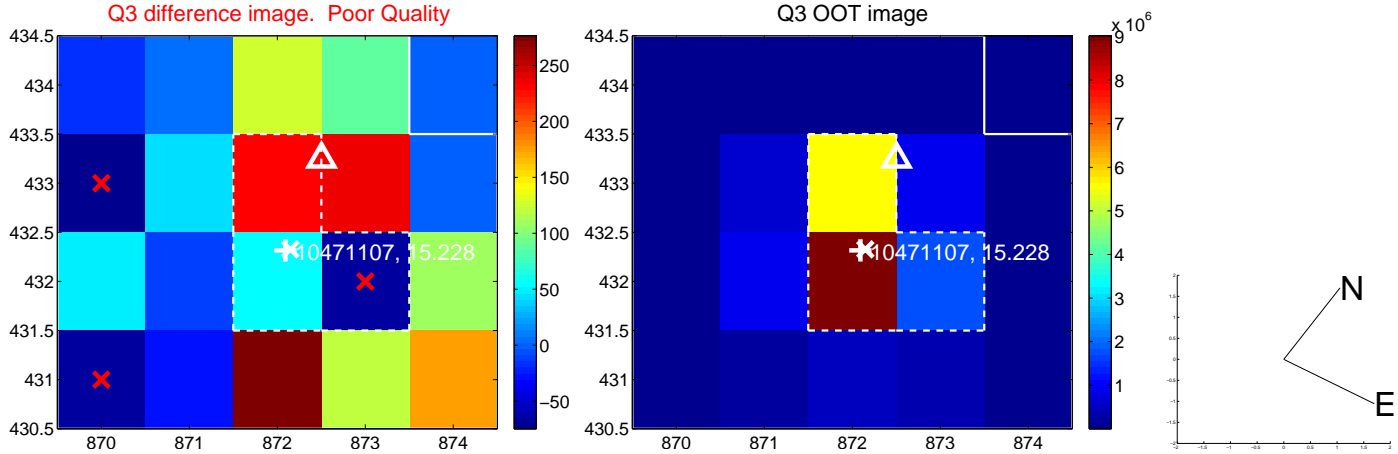
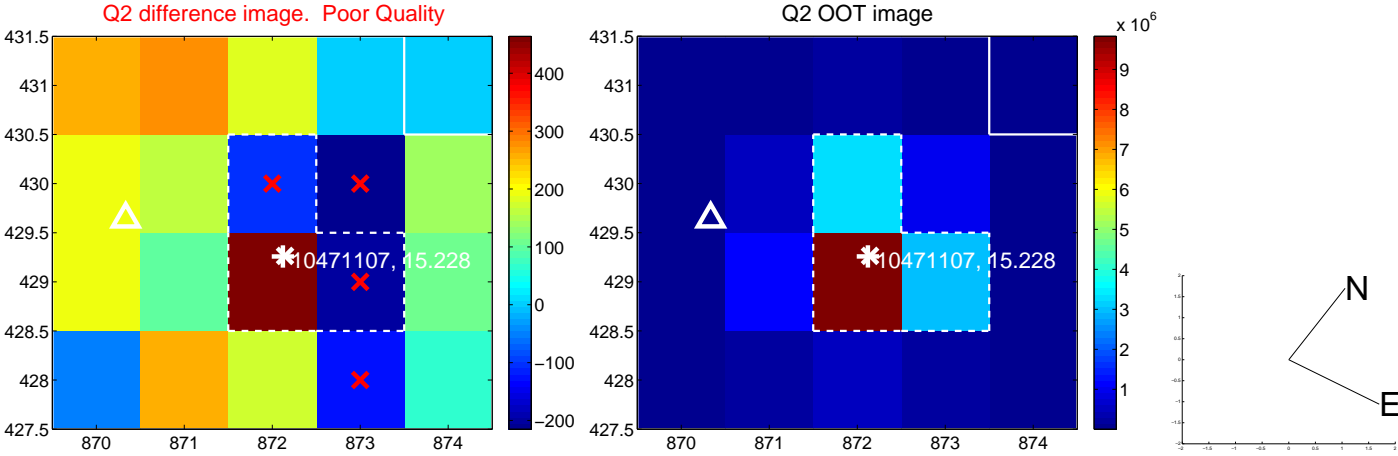
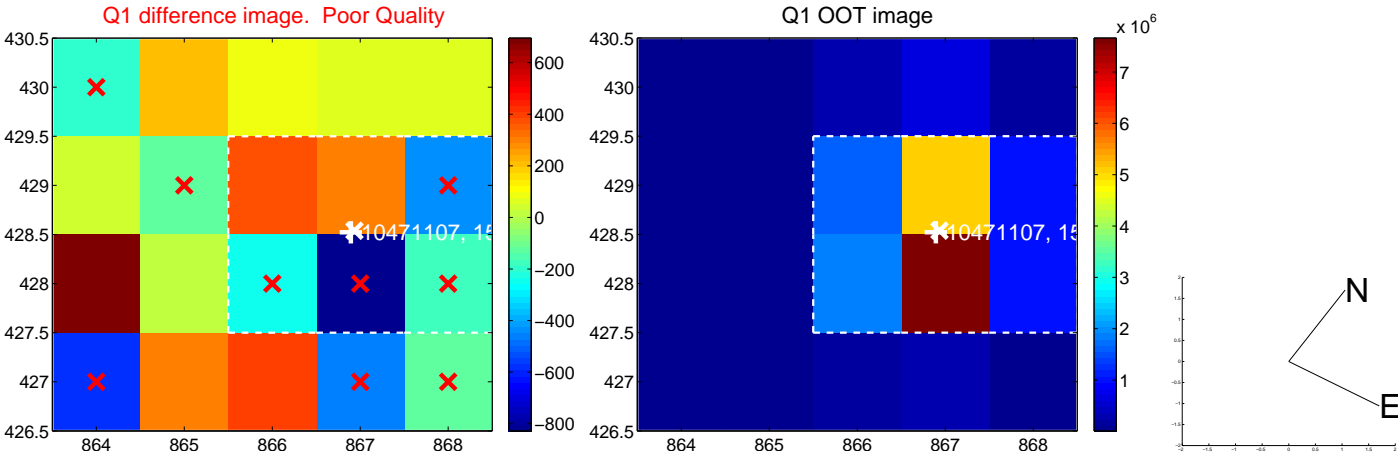


offset from photometric centroids

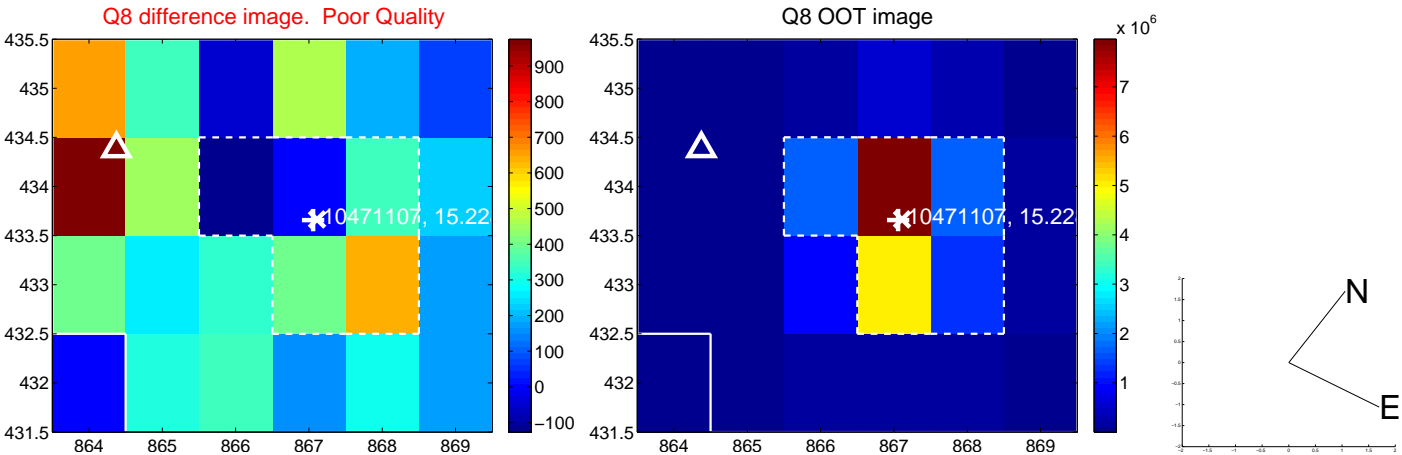
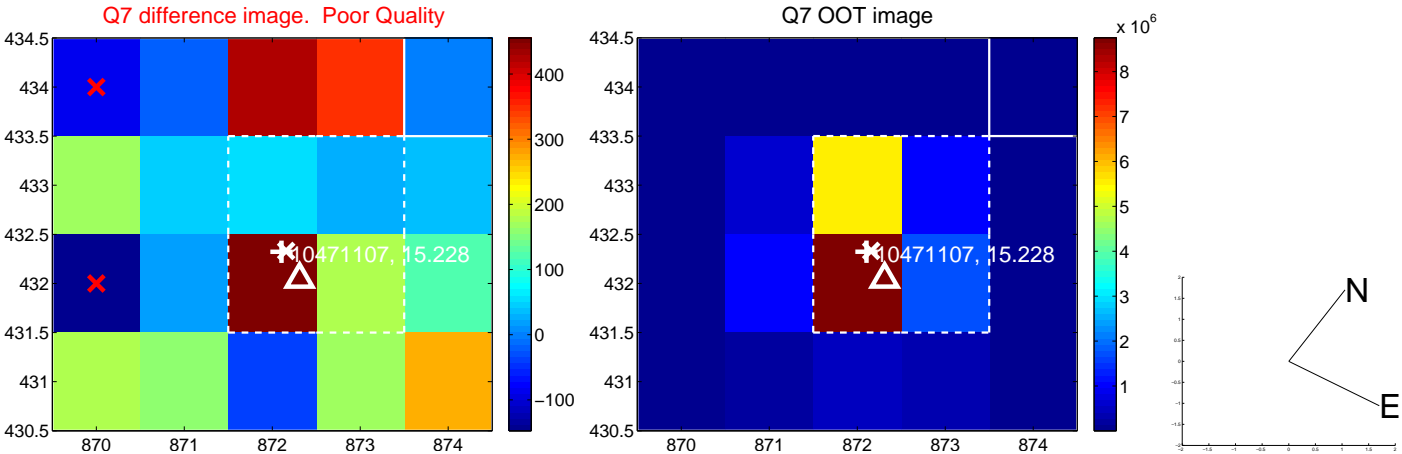
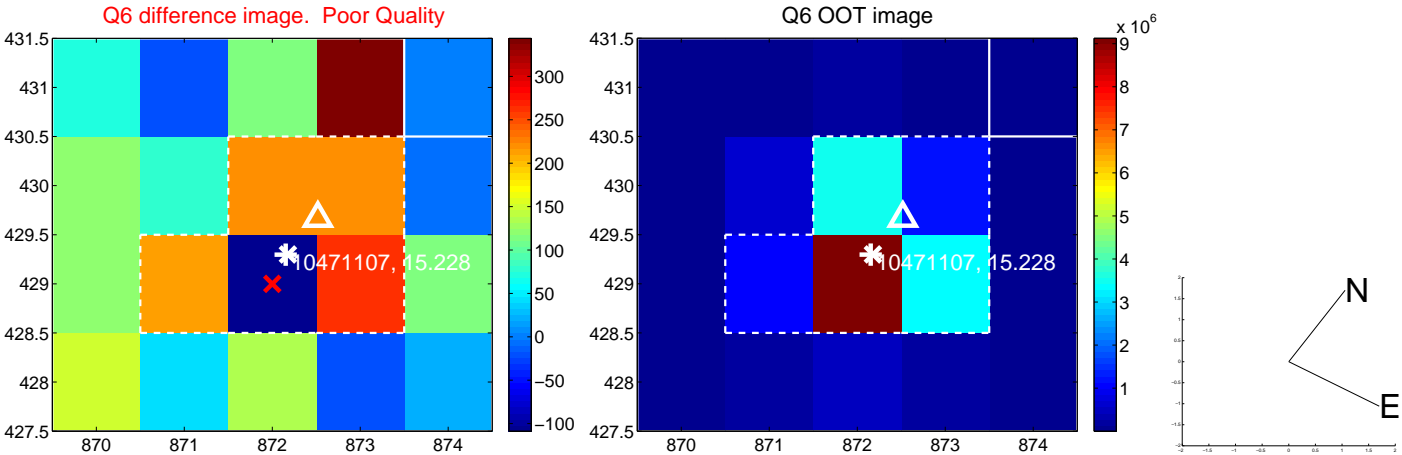
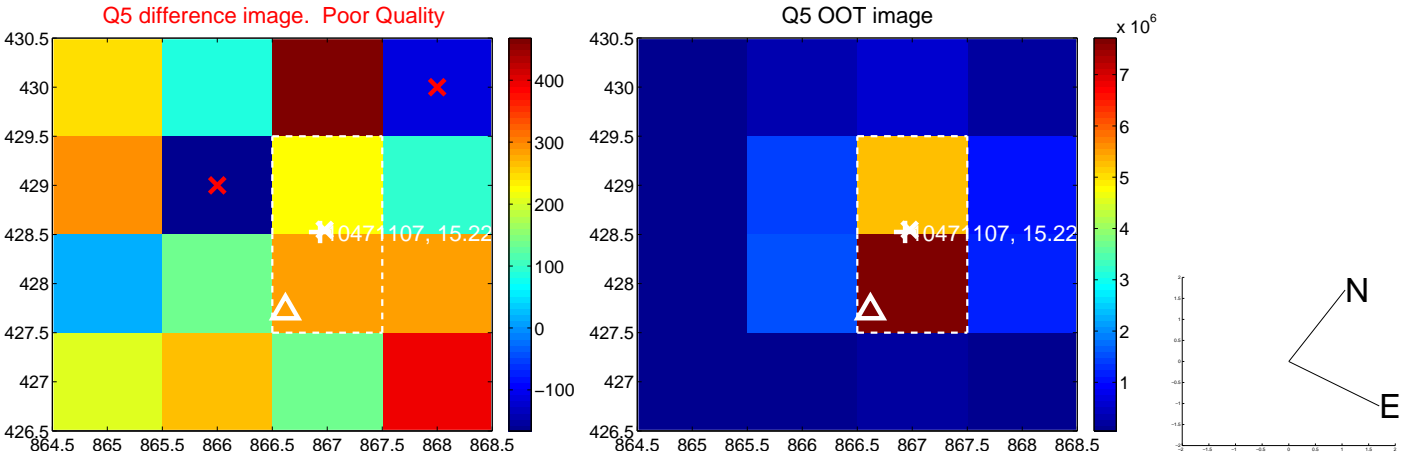


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

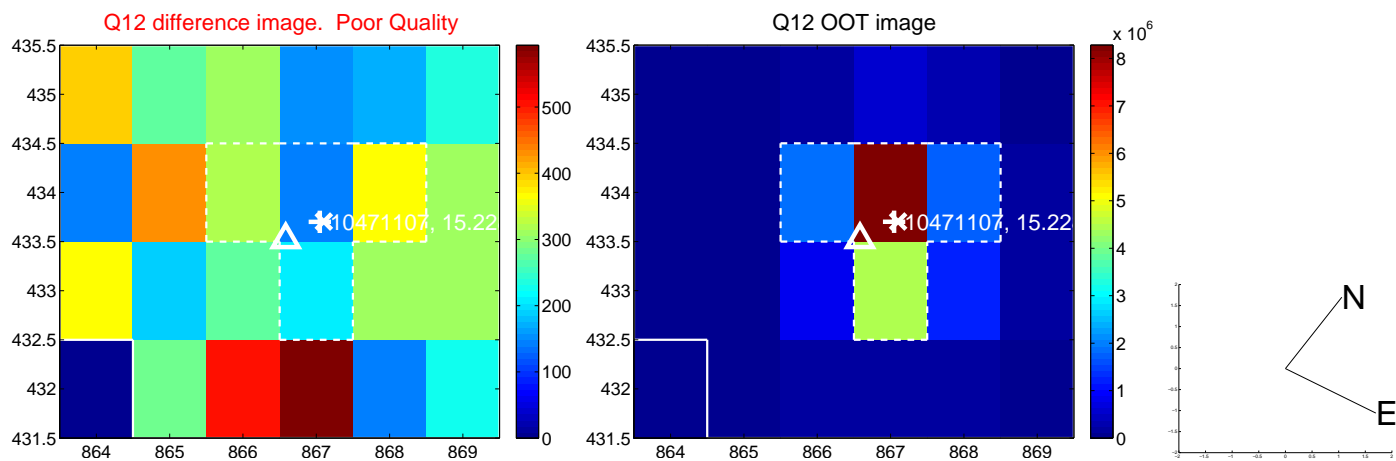
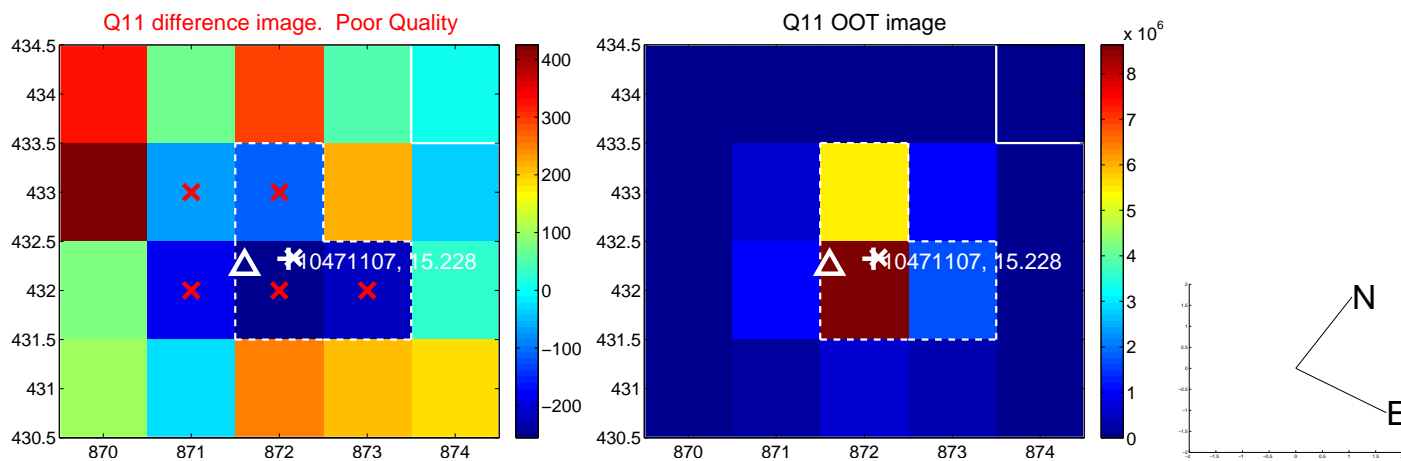
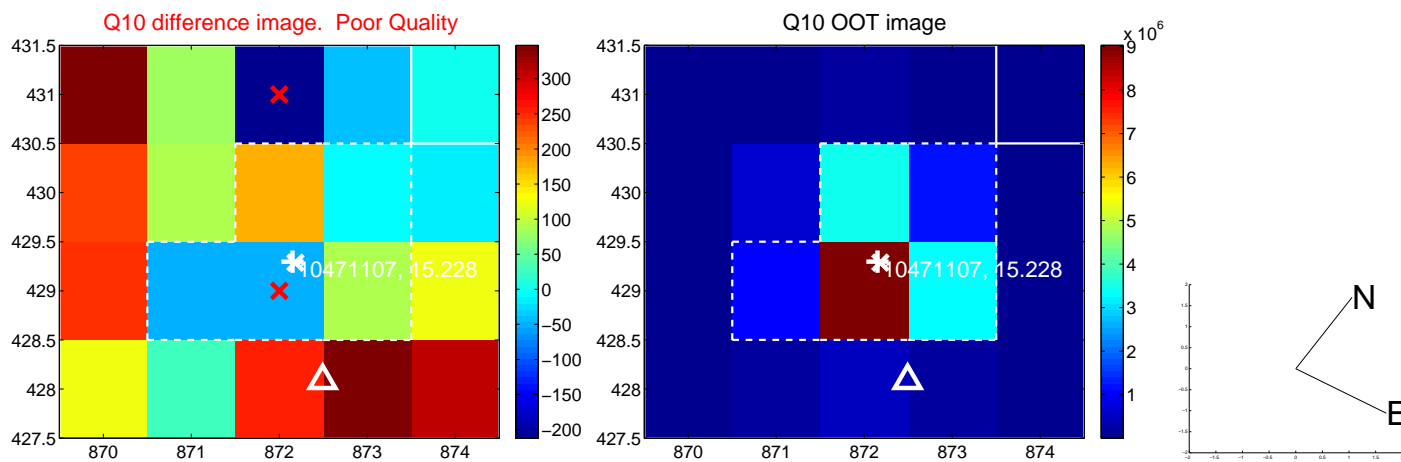
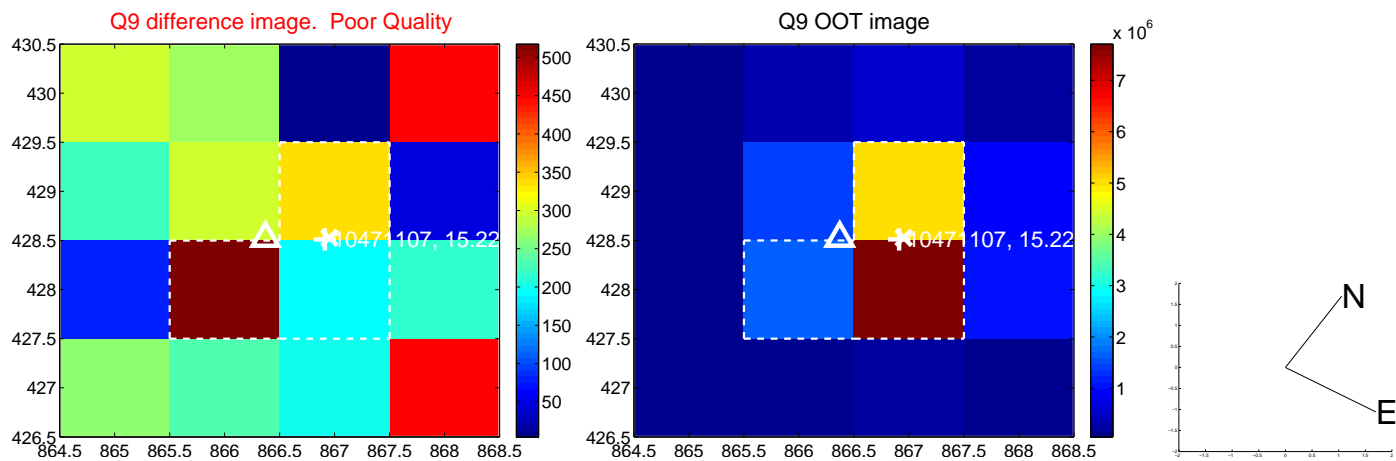


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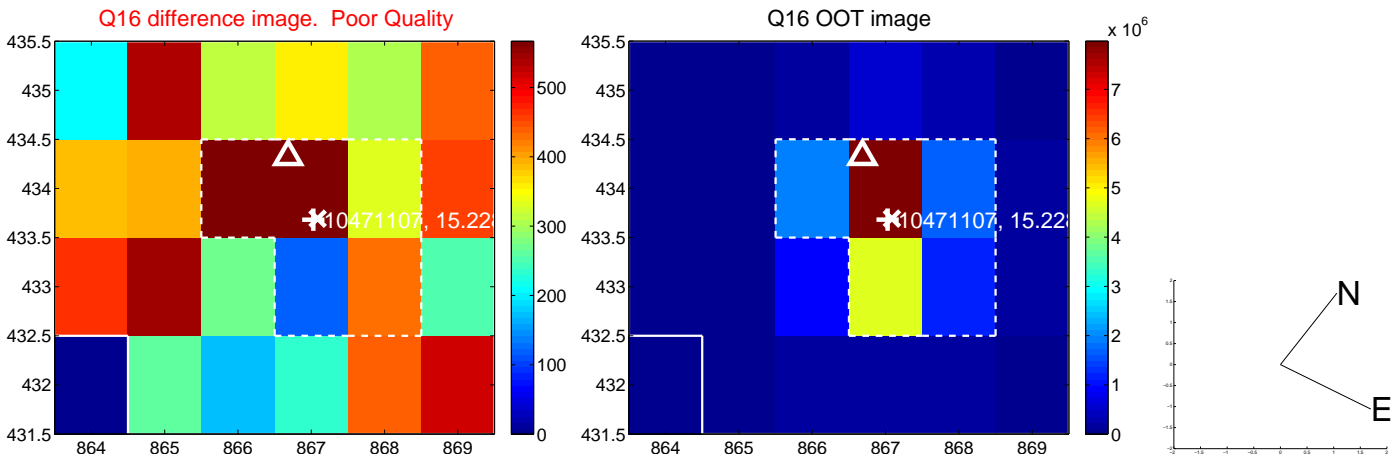
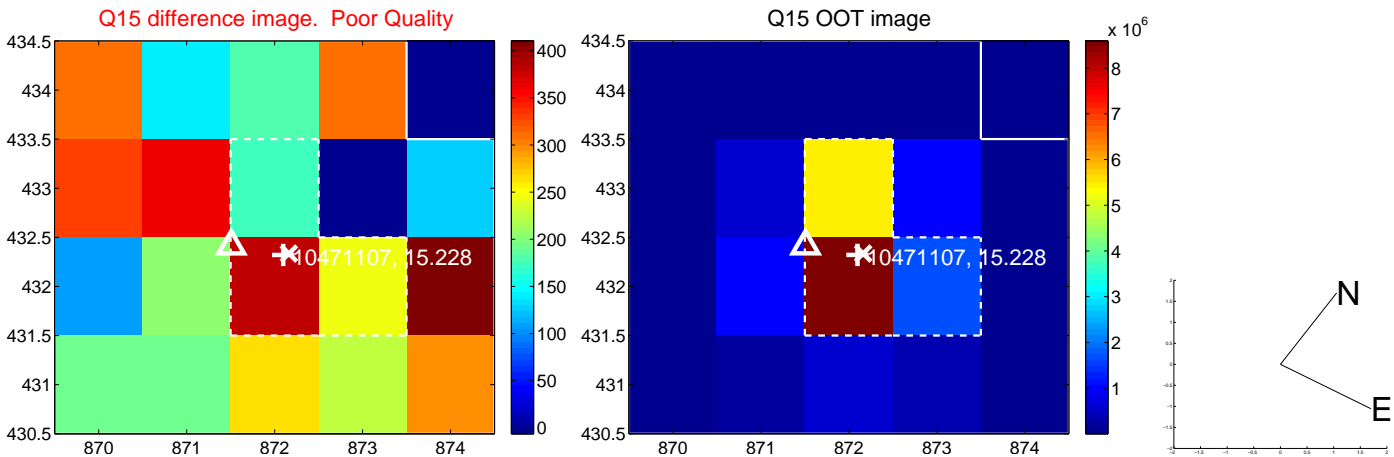
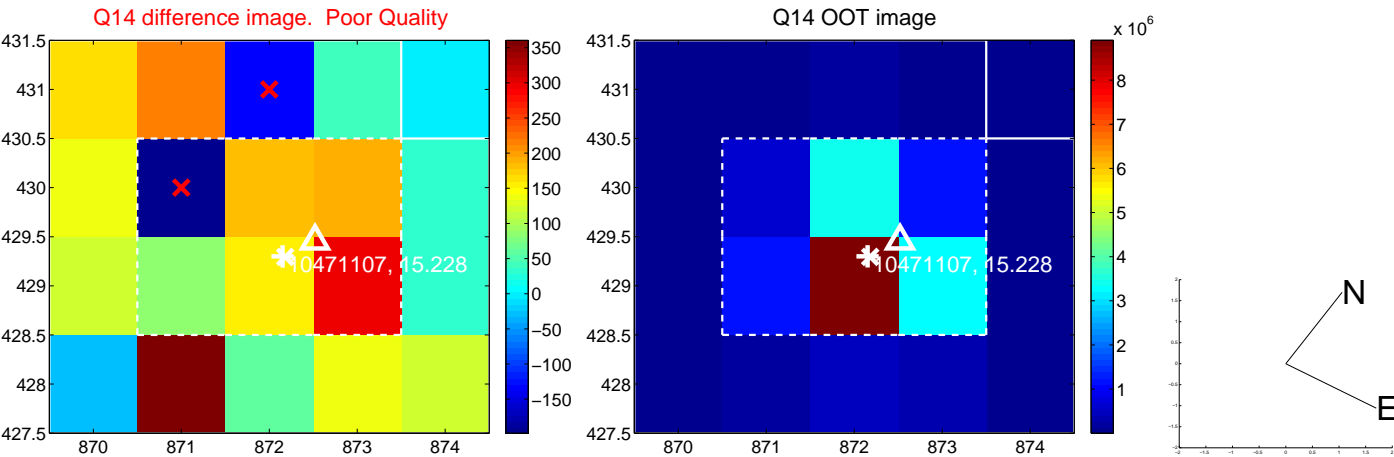
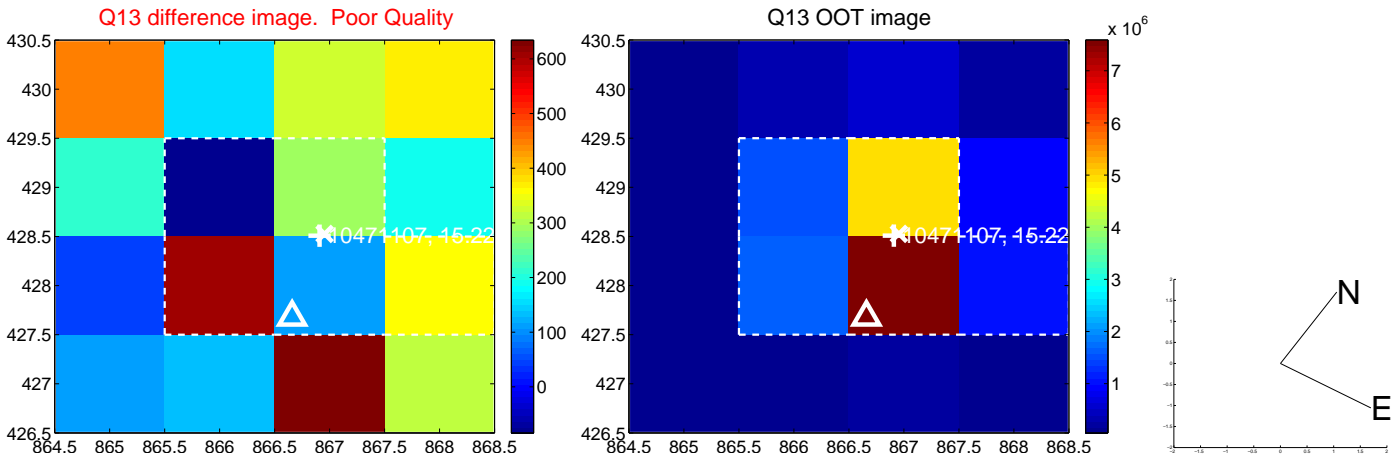




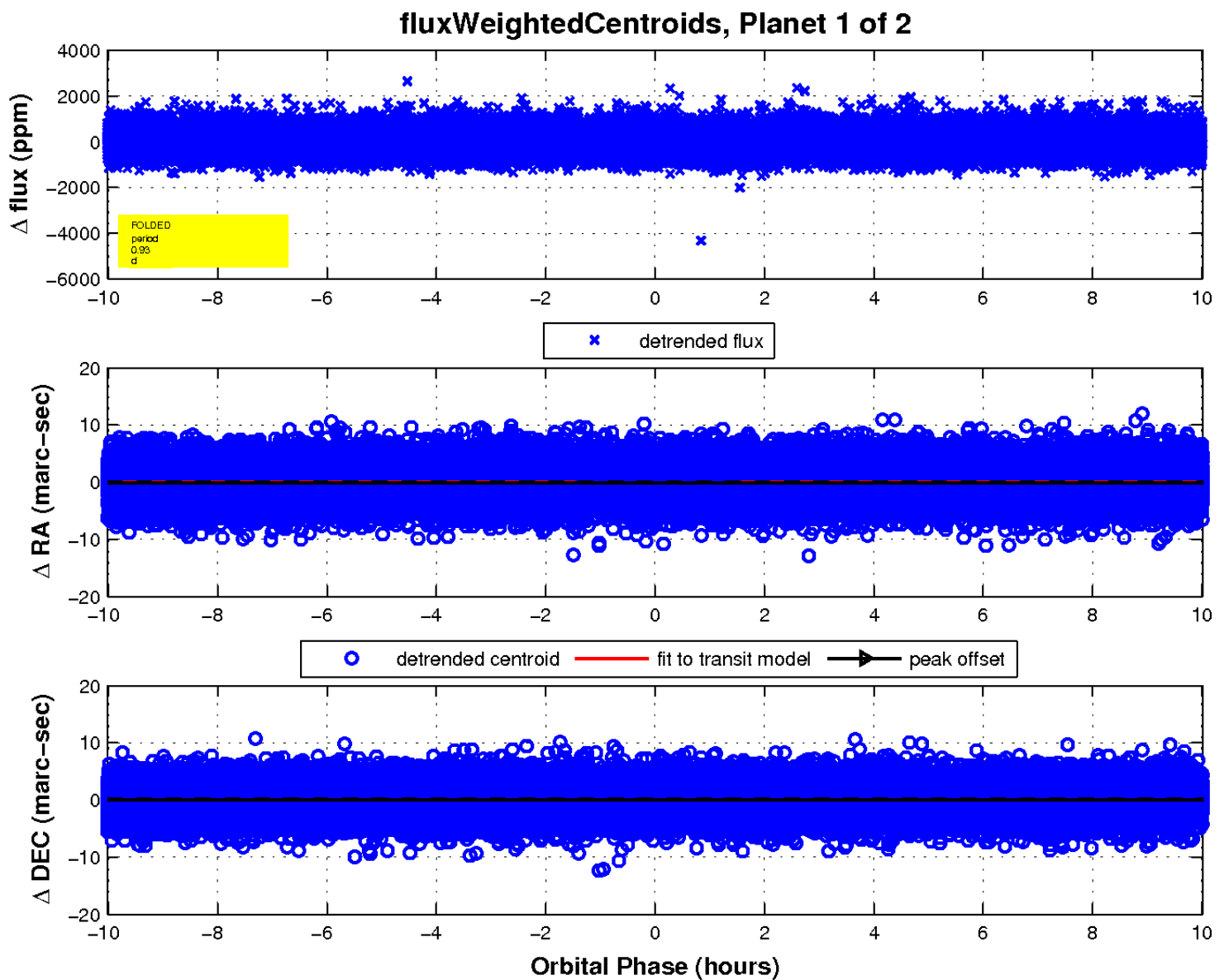
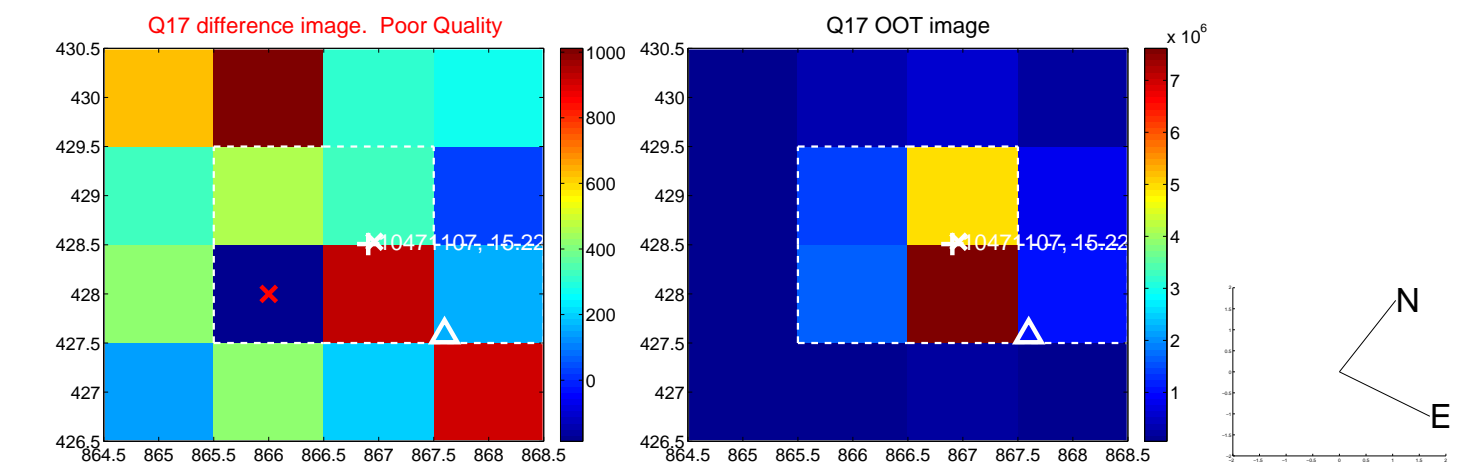
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

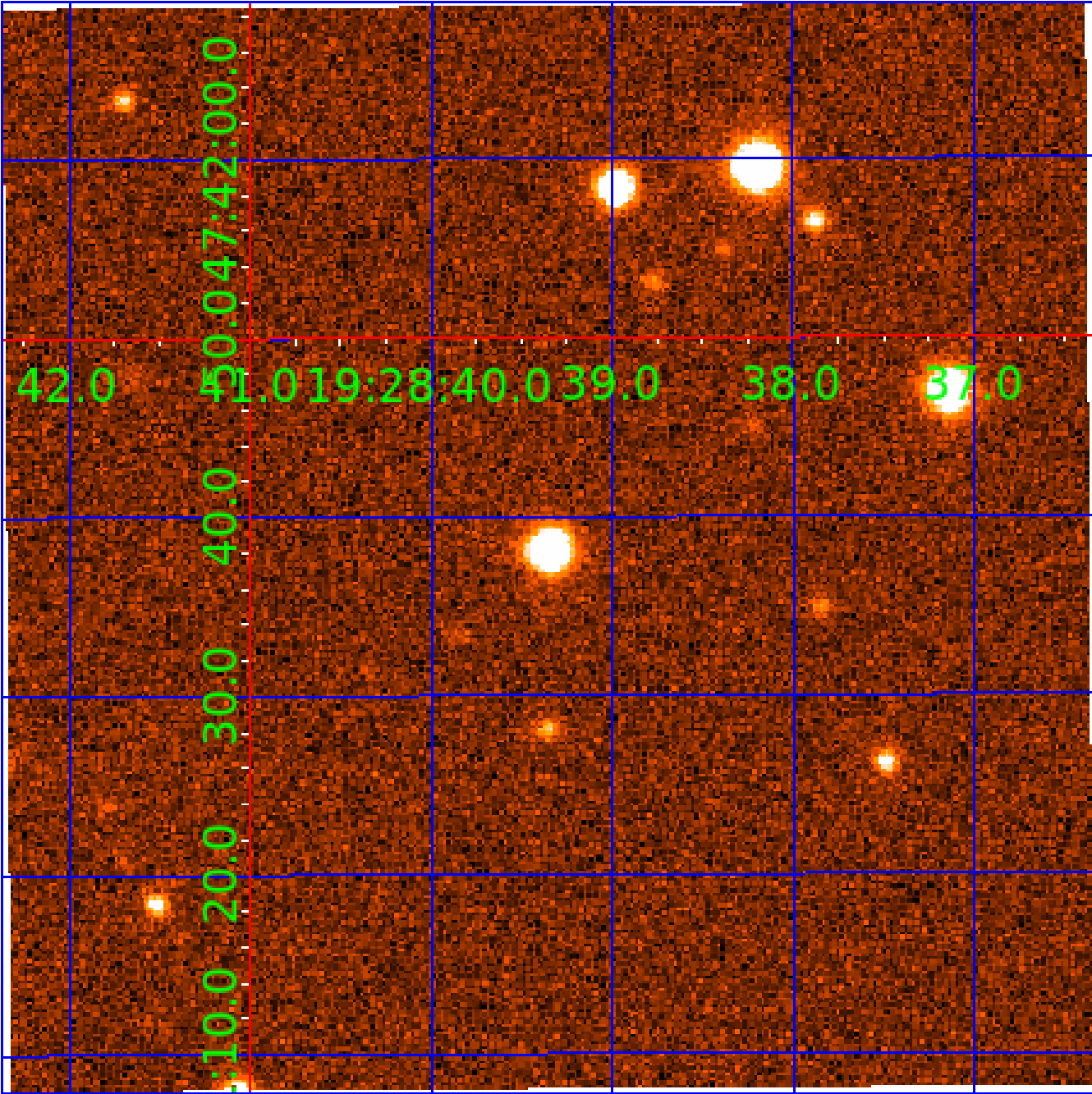


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 010471107

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010471107-01	OBS	No	0.933717	131.547272	30.1	3.340	7.5	6.4	0.86	5792	0.56	2212.74
010471107-02	OBS	No	345.328019	147.706527	641.4	13.711	8.7	9.2	0.86	5792	2.33	0.83

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010471107-01	OBS	FP	0.00	1	0	1	1	LPP_DV—CENT_RESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
010471107-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

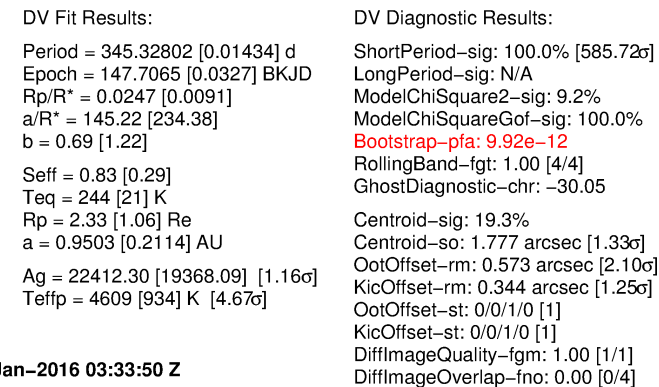
N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

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.

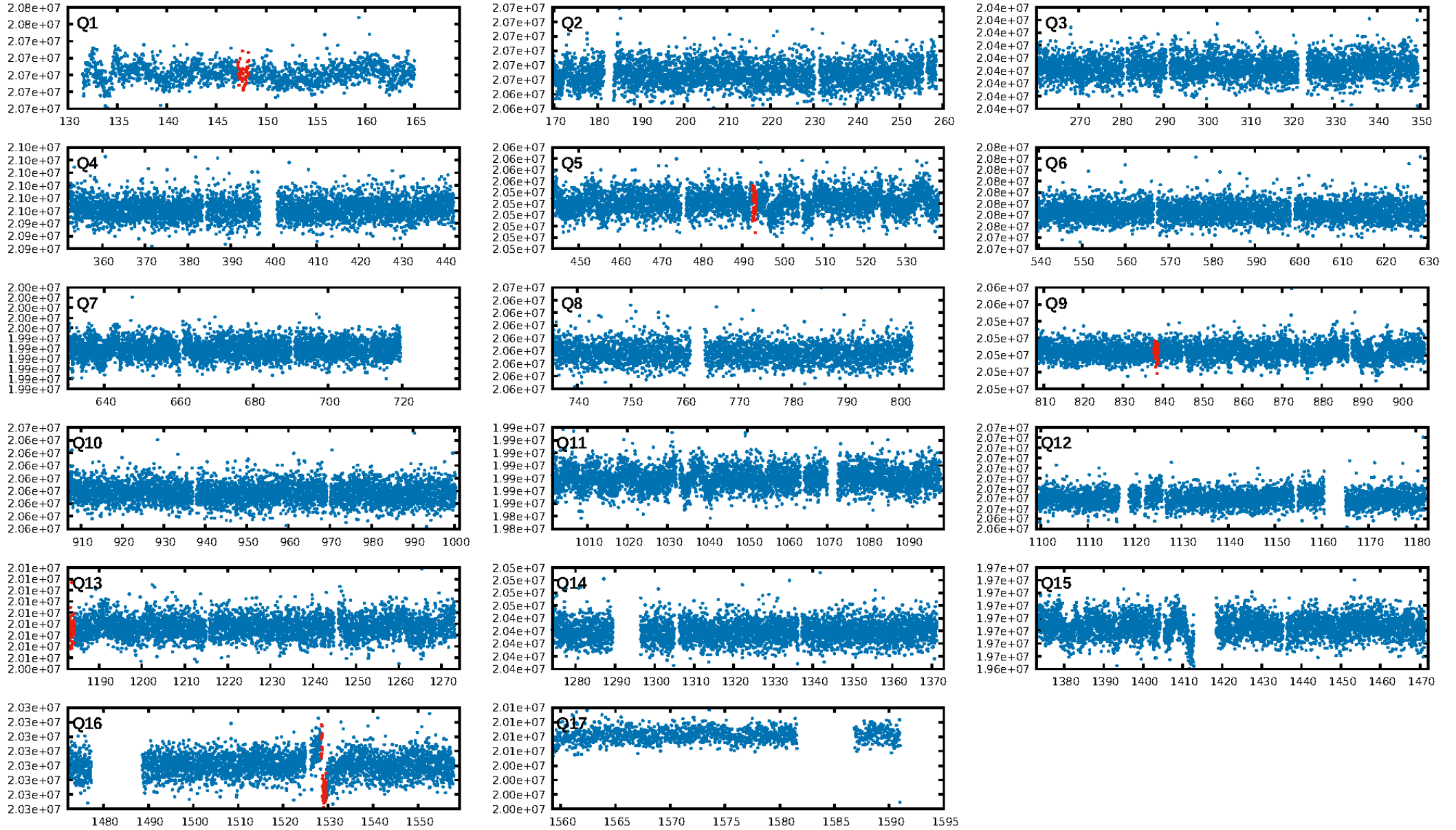
## Ephemeris Match Information For 010471107-02

No Significant Match Found

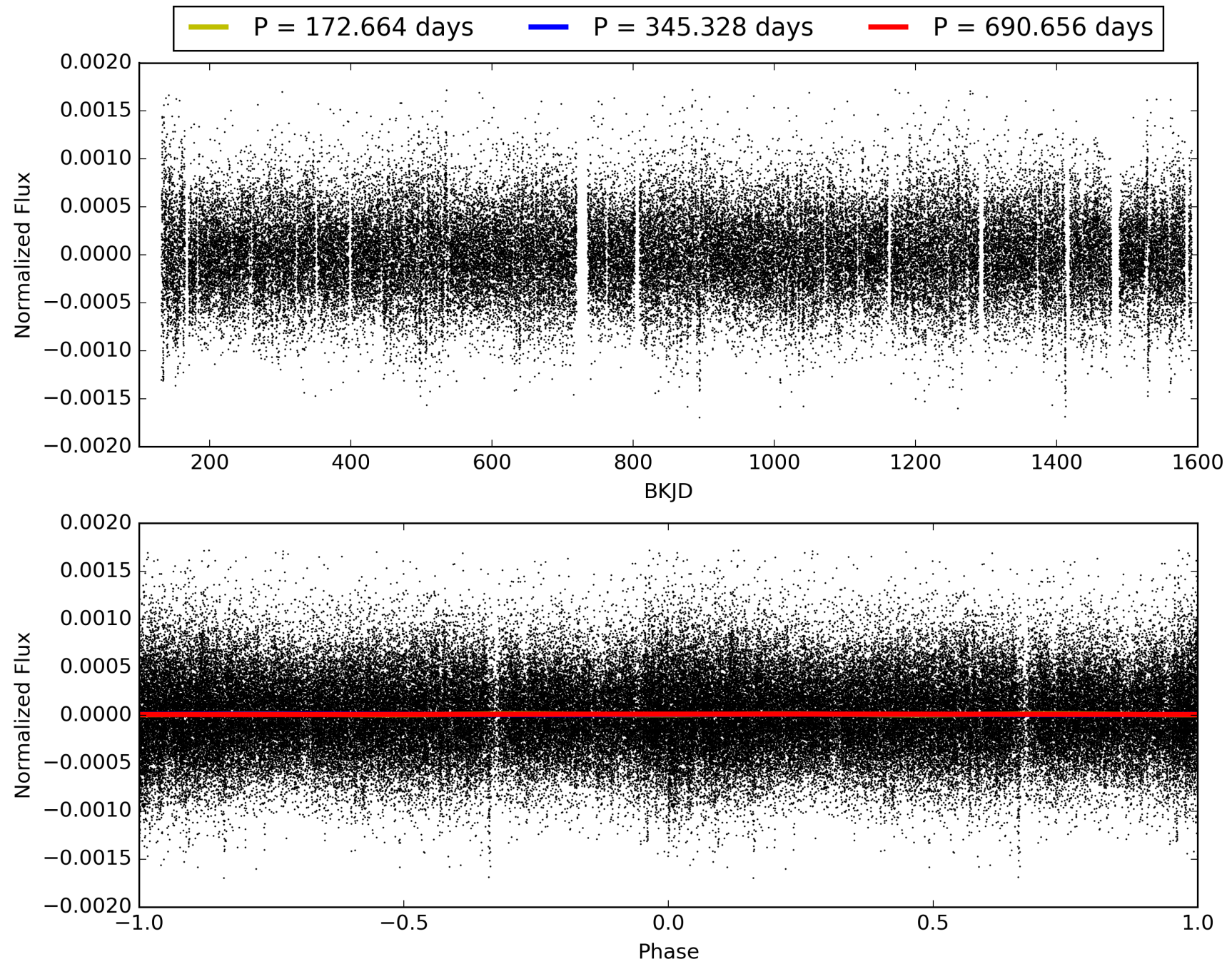
## KIC: 10471107    Candidate: 2 of 2    Period: 345.328 d



# TCE 010471107-02, PDC Light Curves



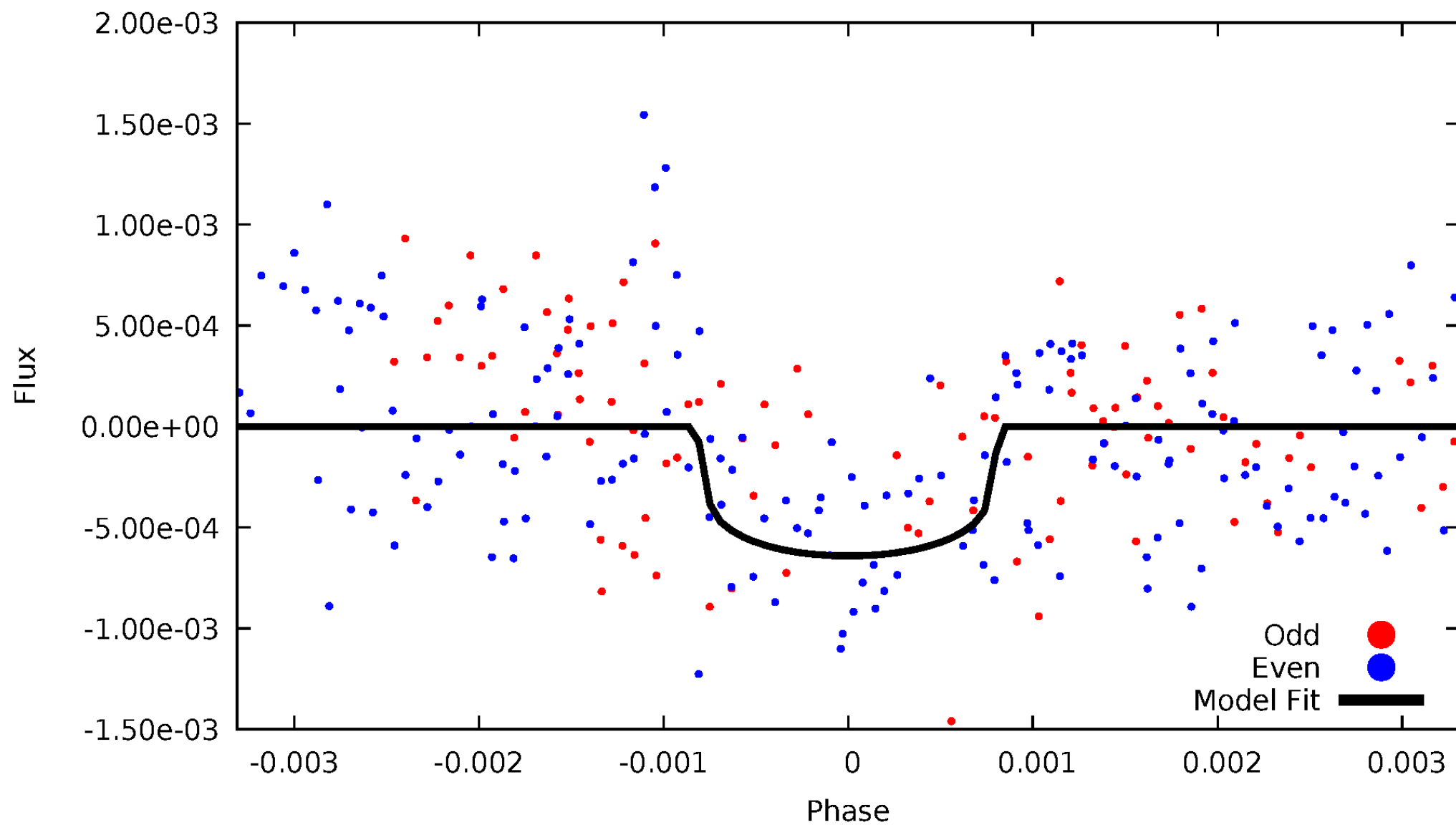
TCE 010471107-02





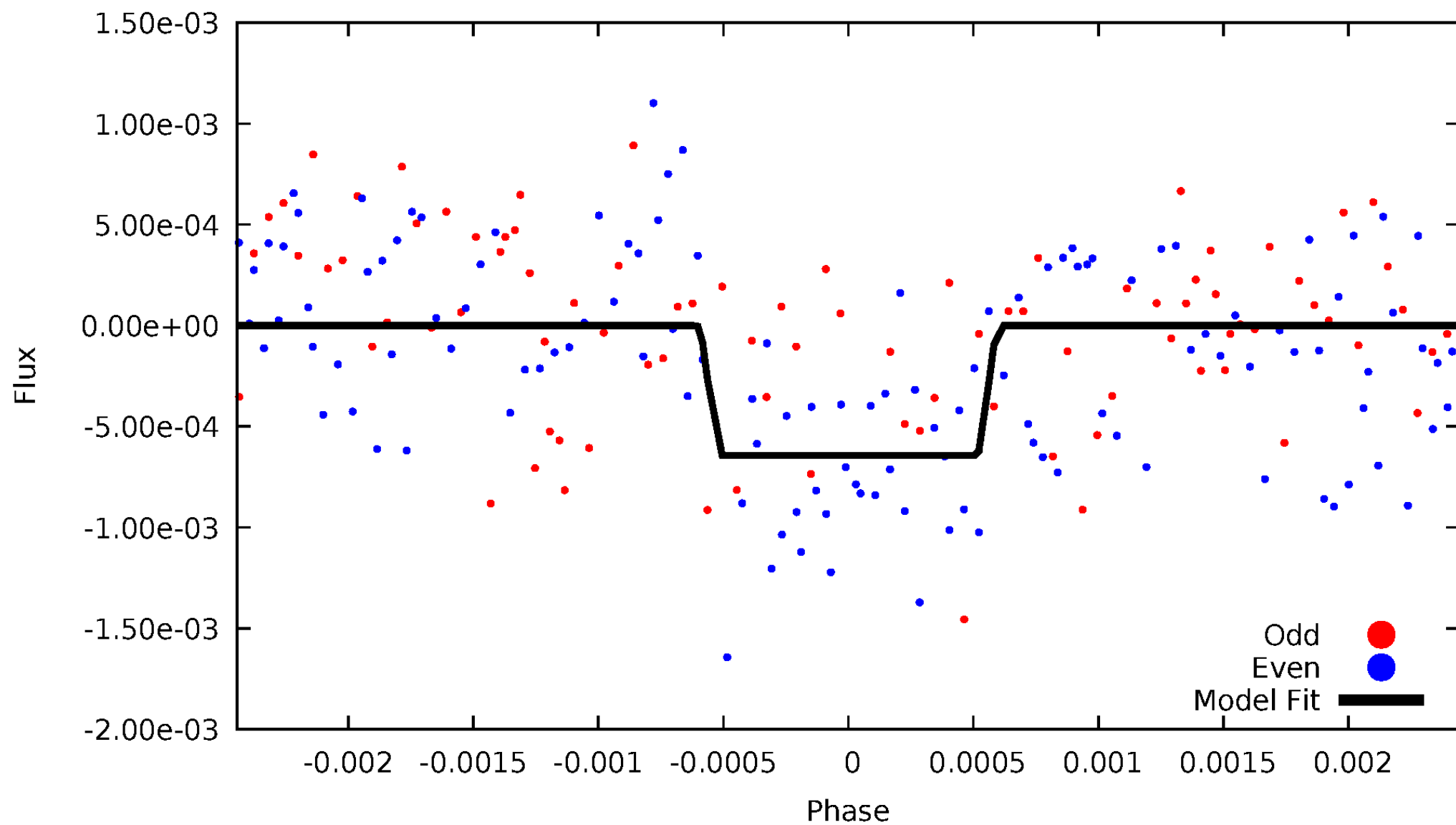
# DV Odd/Even

TCE 010471107-02



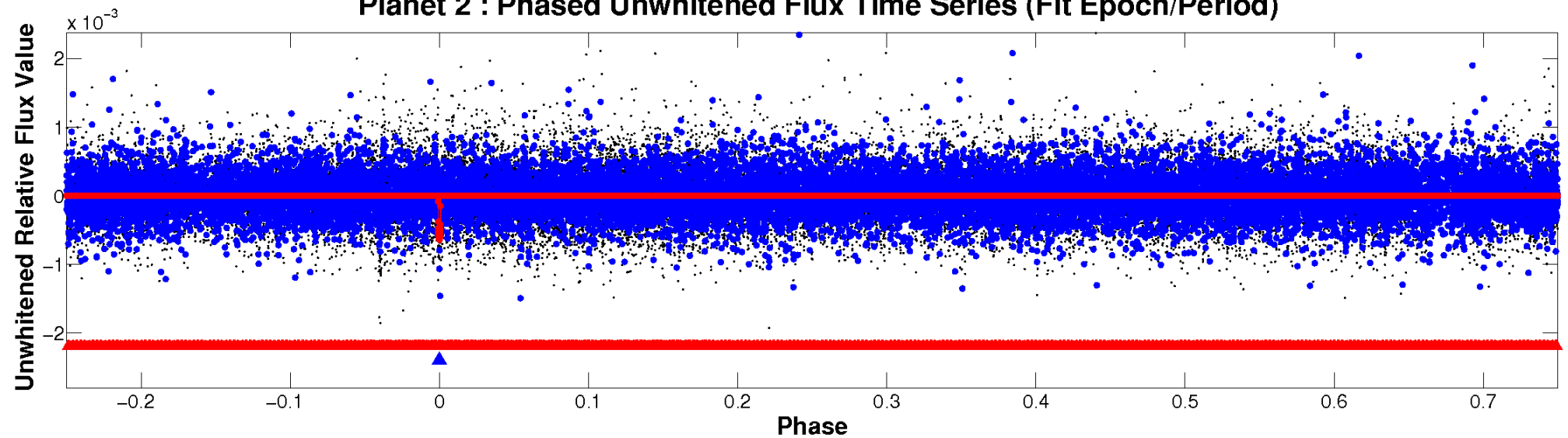
# ALT Odd/Even

TCE 010471107-02

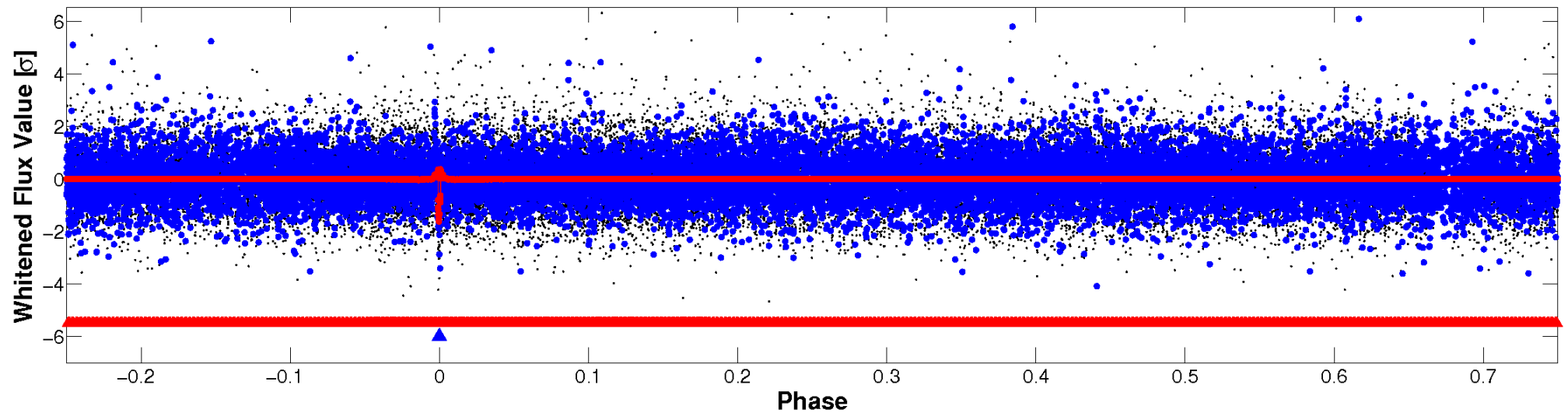


# Non-Whitened Vs. Whitened Light Curve

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

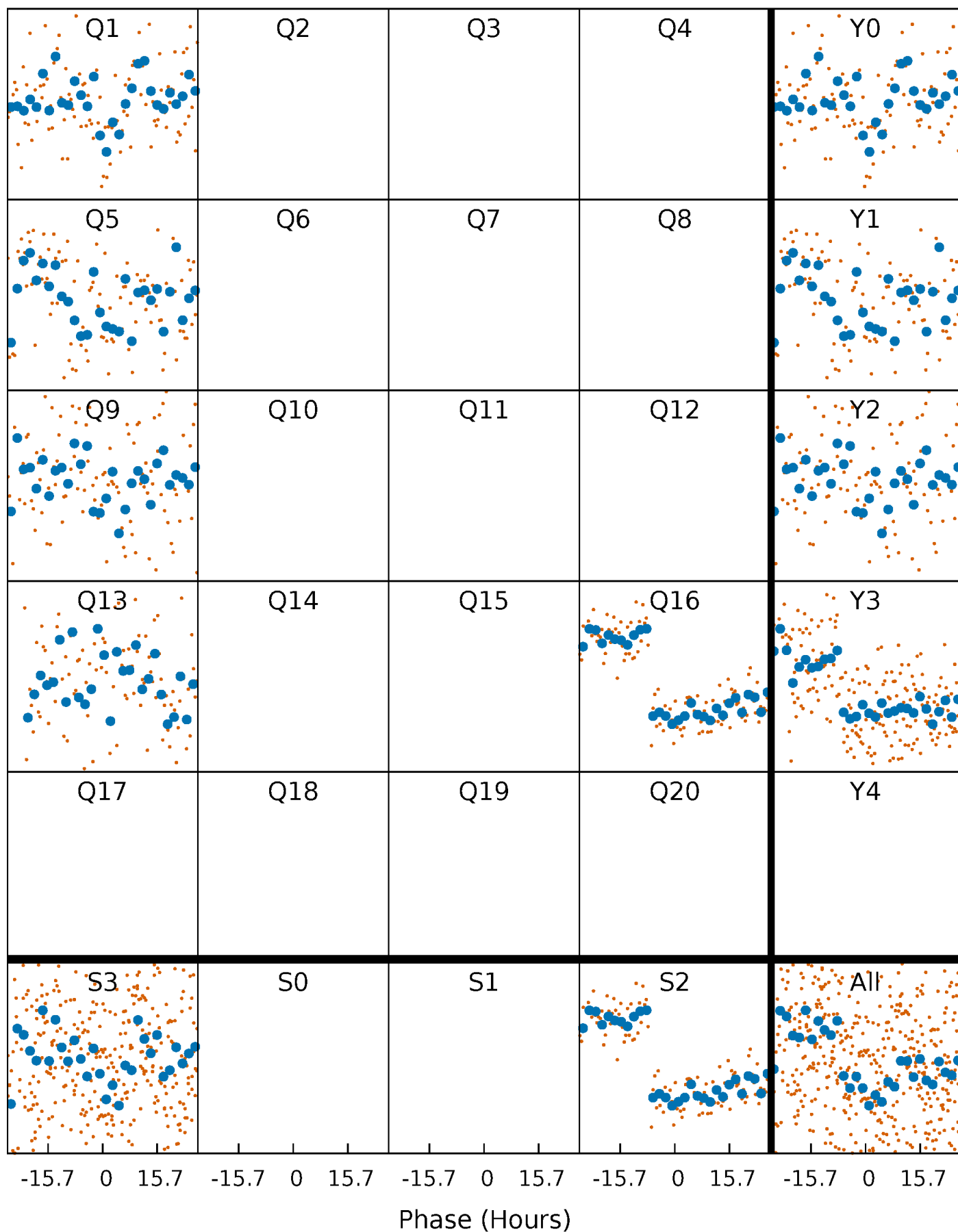


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



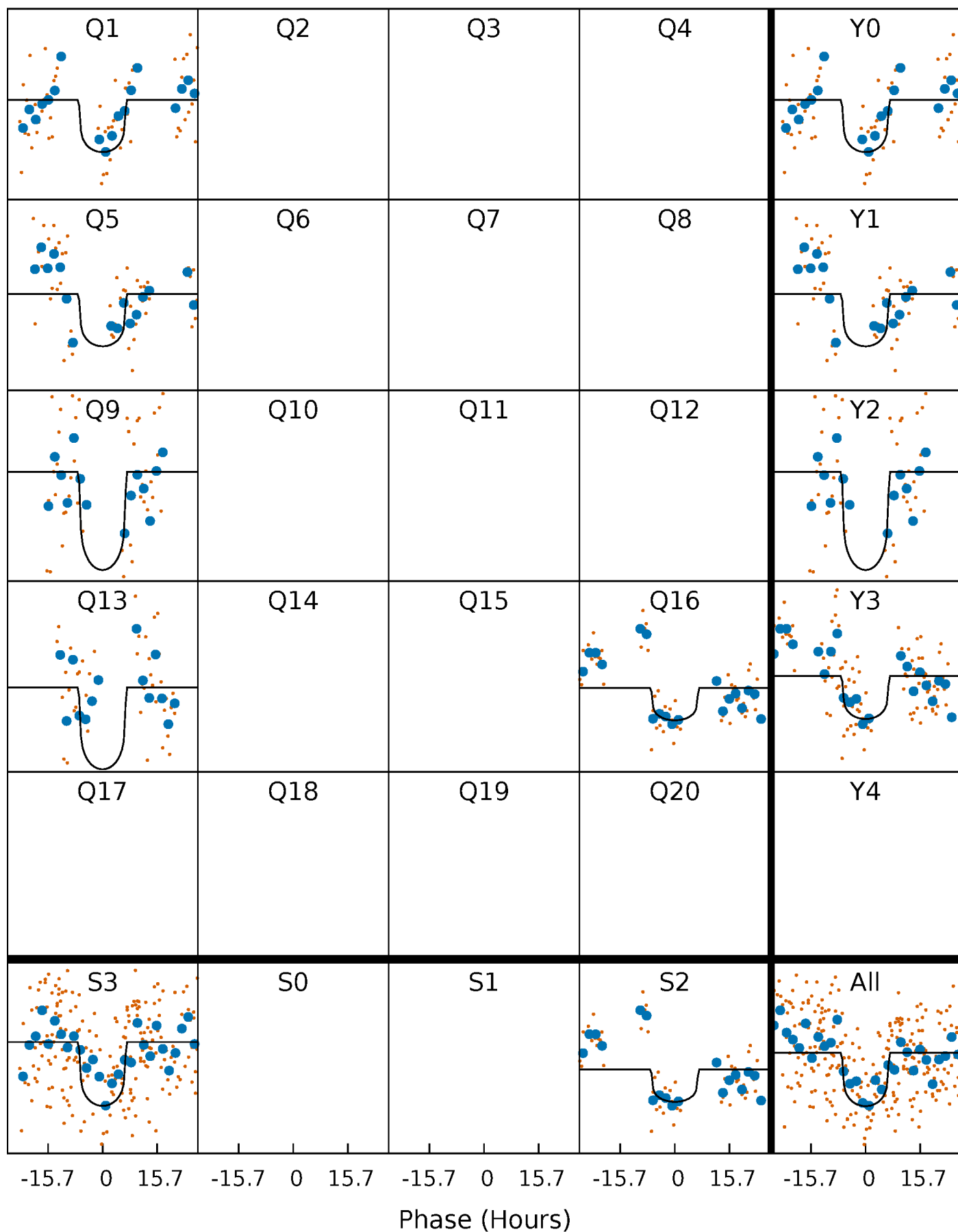
# PDC Quarter-Phased Transit Curves

TCE 010471107-02 P=345.328019 Days  $T_0=147.706527$  (BKJD)



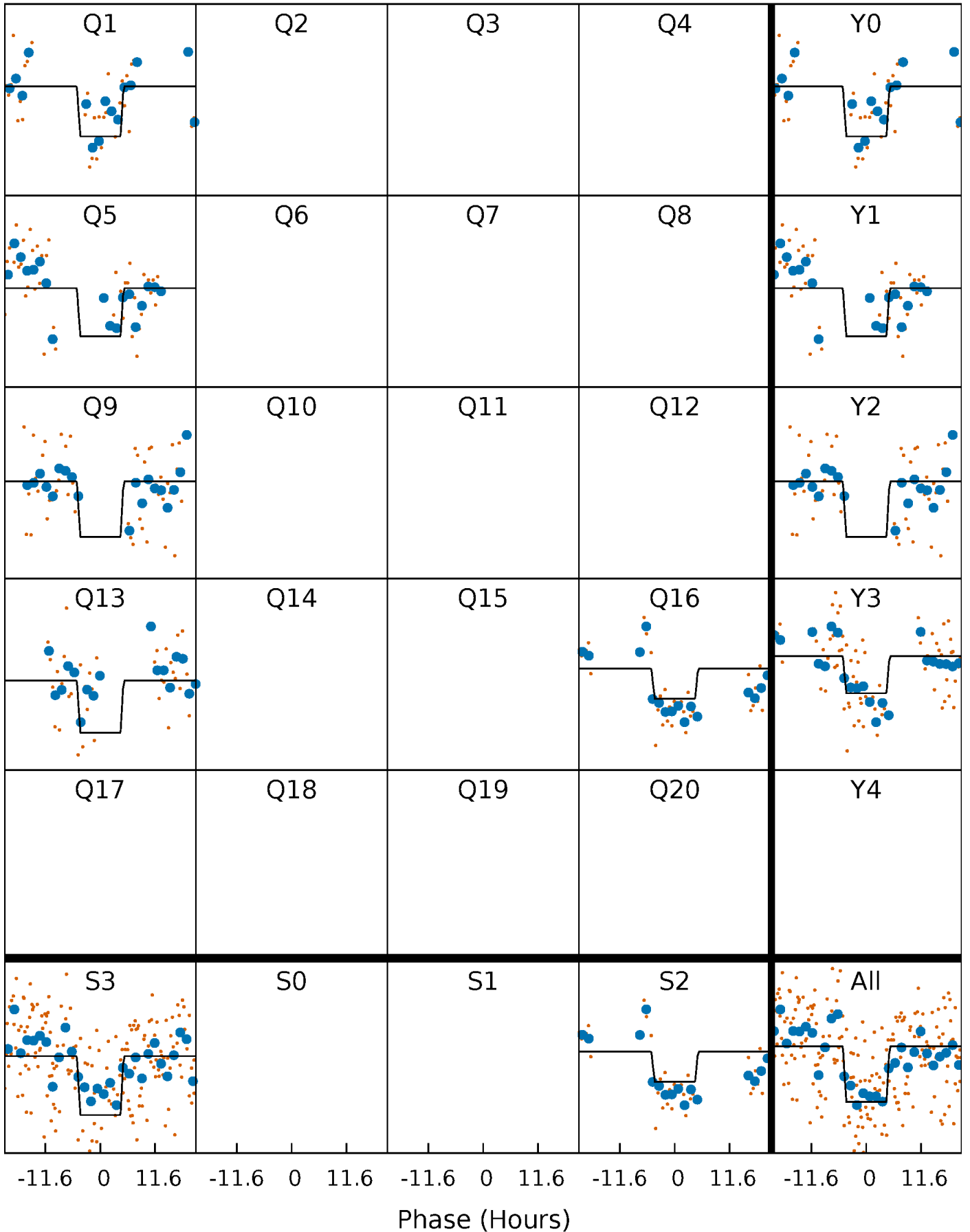
# DV Quarter-Phased Transit Curves

TCE 010471107-02     $P=345.328019$  Days     $T_0=147.706527$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 010471107-02 P=345.279486 Days  $T_0=147.787865$  (BKJD)

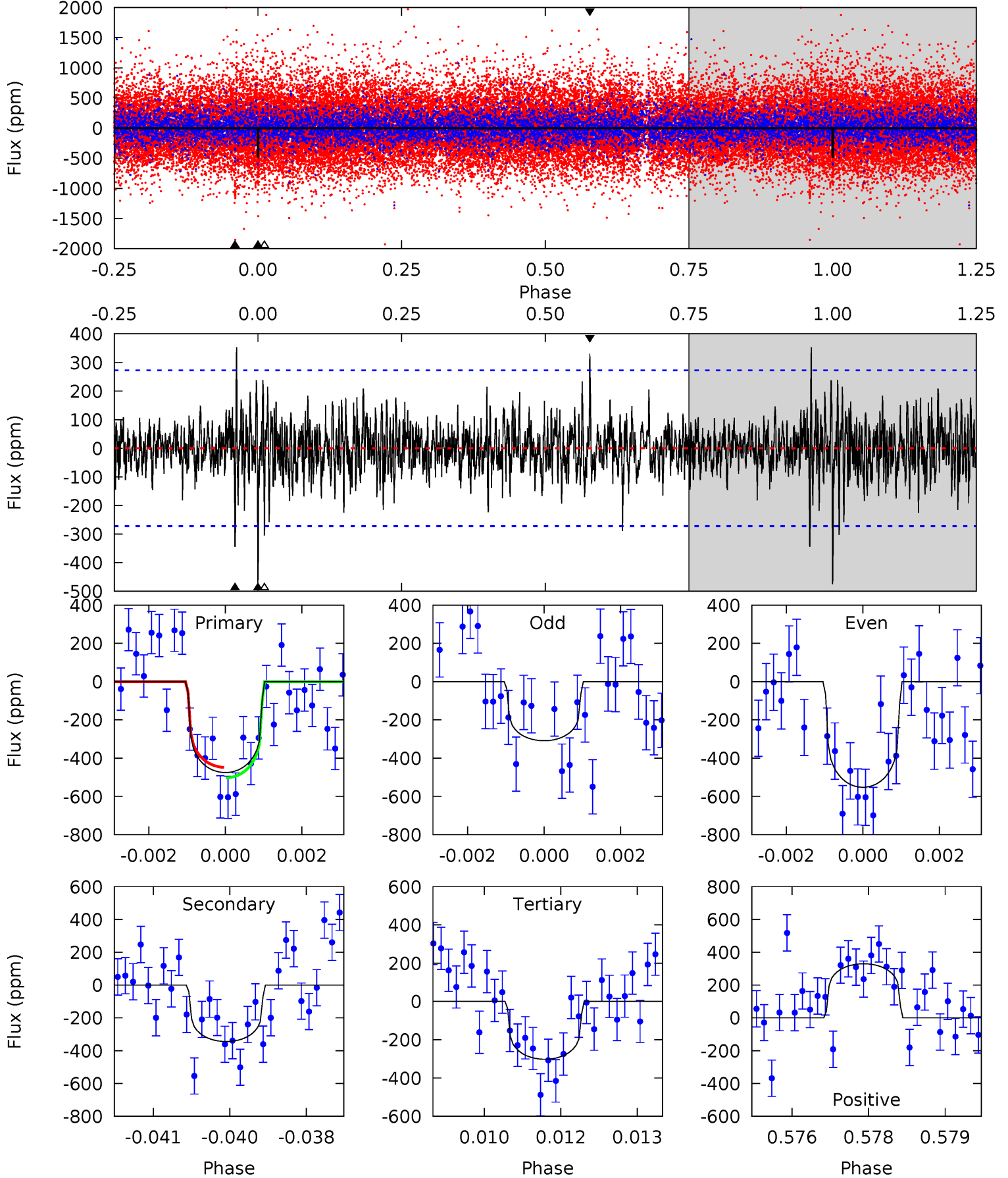




# DV Model-Shift Uniqueness Test

010471107-02, P = 345.328019 Days, E = 147.706527 Days

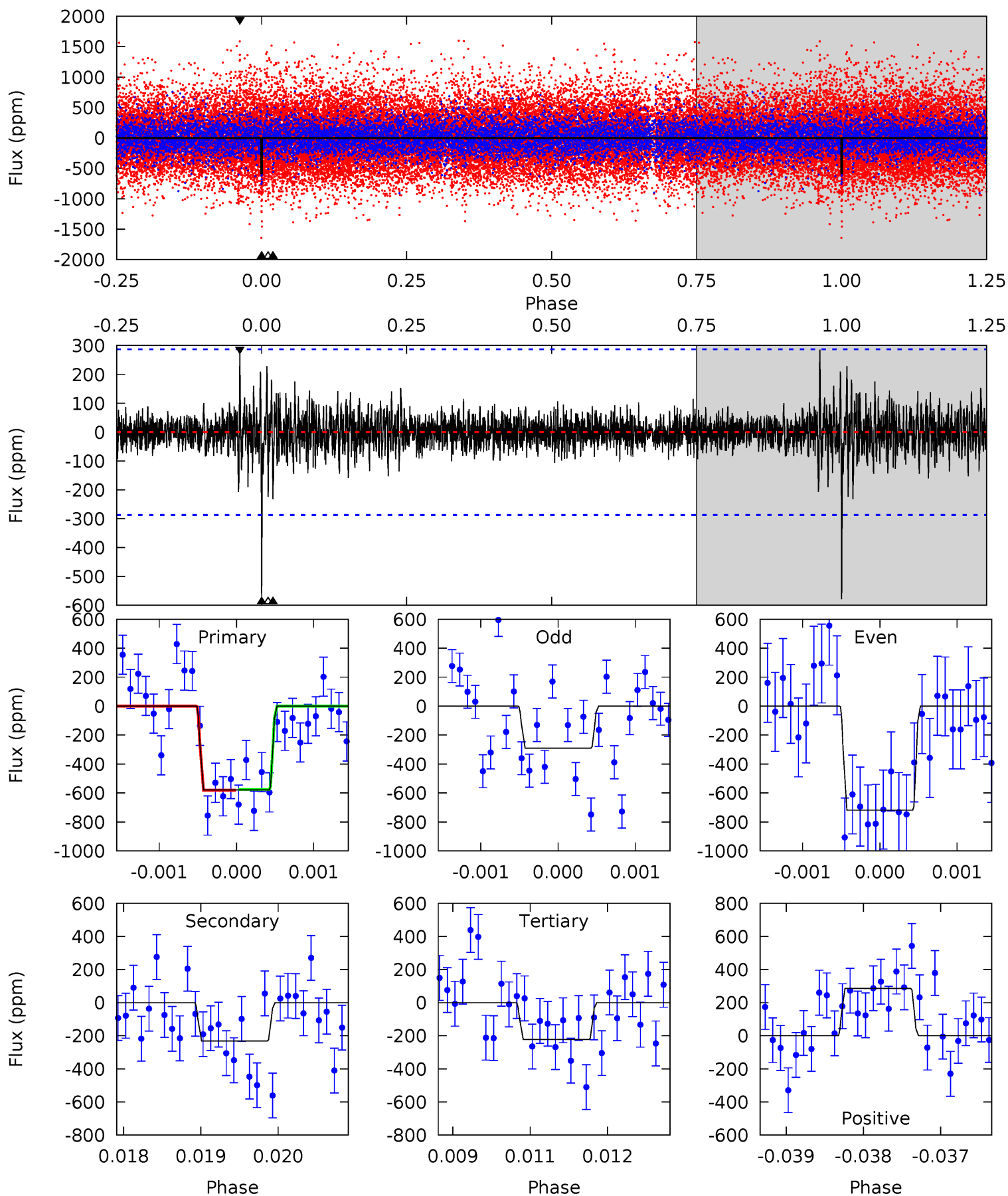
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.34	6.77	5.94	6.49	5.36	3.15	1.41	3.40	2.86	0.83	0.28	2.25	0.98	0.43	0.54



# Alt Model-Shift Uniqueness Test

010471107-02, P = 345.279486 Days, E = 147.787865 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
10.9	4.38	4.21	5.39	5.42	3.24	0.85	6.71	5.53	0.17	-1.02	3.79	1.15	0.33	0.04



### Stellar Parameters For KIC 010471107

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5792^{+144}_{-172}$	$4.547^{+0.044}_{-0.176}$	$-0.140^{+0.300}_{-0.300}$	$0.864^{+0.229}_{-0.076}$	$0.959^{+0.102}_{-0.112}$	$2.094^{+0.473}_{-0.950}$
	+2%/-3%	+1%/-4%	+214%/-214%	+27%/-9%	+11%/-12%	+23%/-45%
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 010471107-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-344 \pm 51$	$2.40^{+0.93}_{-0.84}$	$347^{+21}_{-15}$	$5087^{+1120}_{-605}$	$29112^{+40403}_{-14189}$
Alt.	$-232 \pm 53$	$2.46^{+1.05}_{-0.94}$	$346^{+20}_{-15}$	$4631^{+1051}_{-569}$	$18085^{+29461}_{-9407}$

$T_{\text{max}}$  = 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

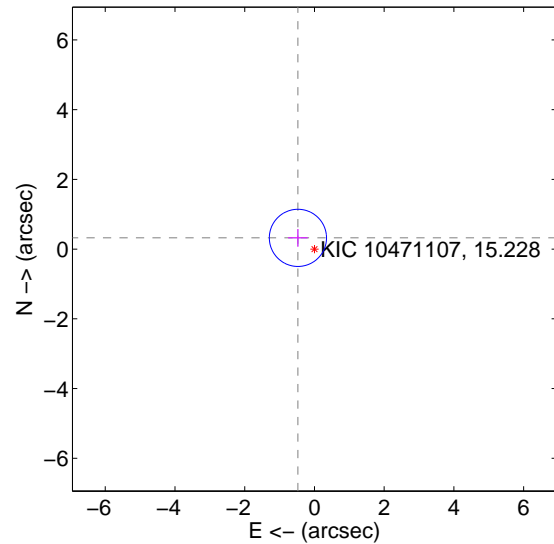
Supplemental centroid analysis for 010471107-02. Kepler magnitude: 15.23. Transit SNR 9.23

There are 1 quarters with good PRF difference image offsets

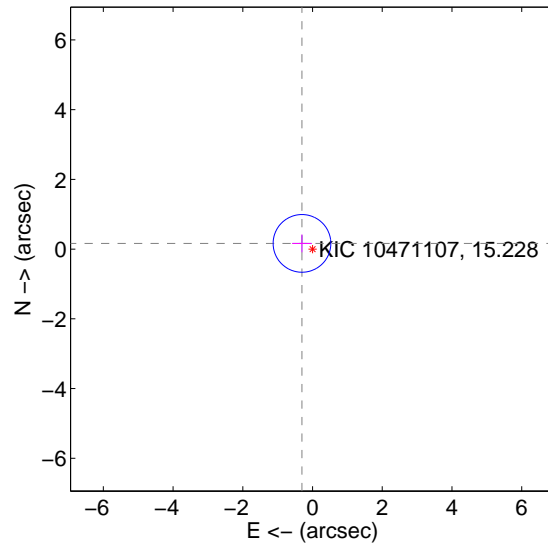
The direct PRF centroid is offset from the target star catalog position by about 0.23 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.573 \pm 0.273$	2.10	$0.474 \pm 0.282$	$0.322 \pm 0.254$
PRF-fit source offset from KIC position	$0.344 \pm 0.276$	1.25	$0.302 \pm 0.282$	$0.164 \pm 0.254$
photometric centroid source offset	$1.78 \pm 1.34$	1.33	$1.55 \pm 1.35$	$-0.87 \pm 1.28$

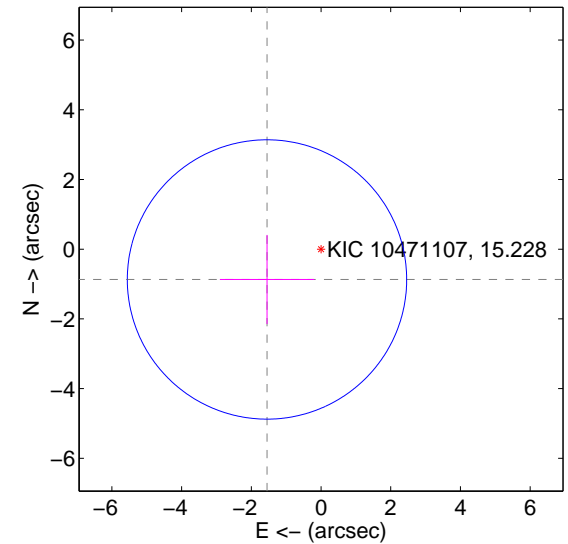
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

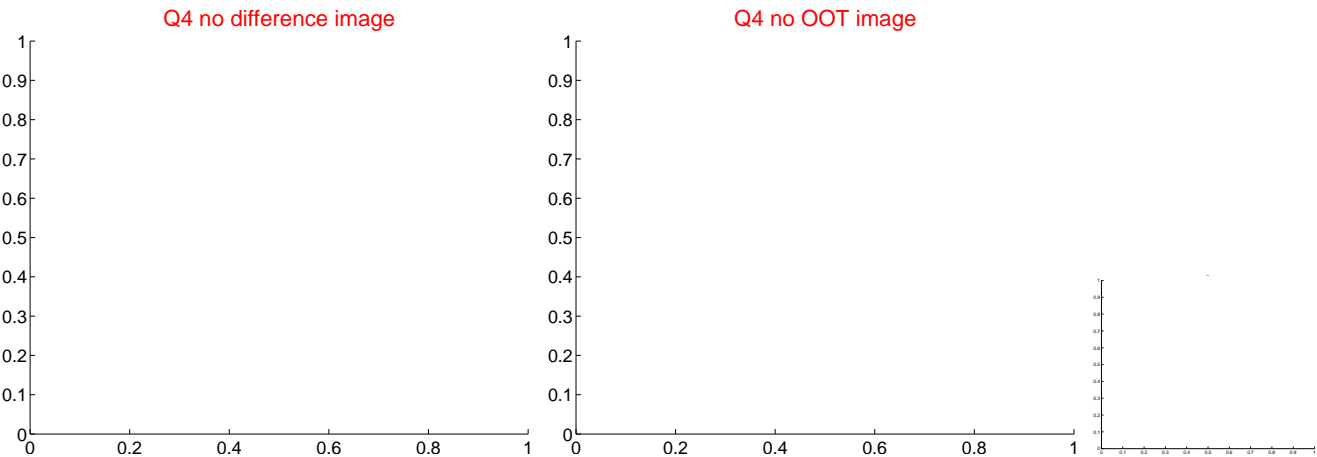
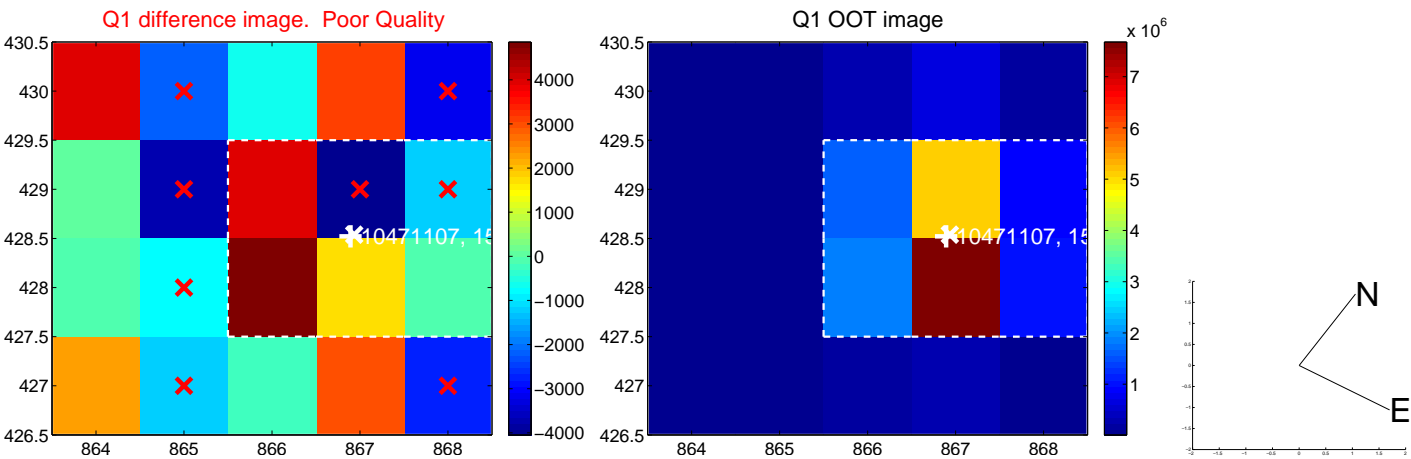


offset from photometric centroids

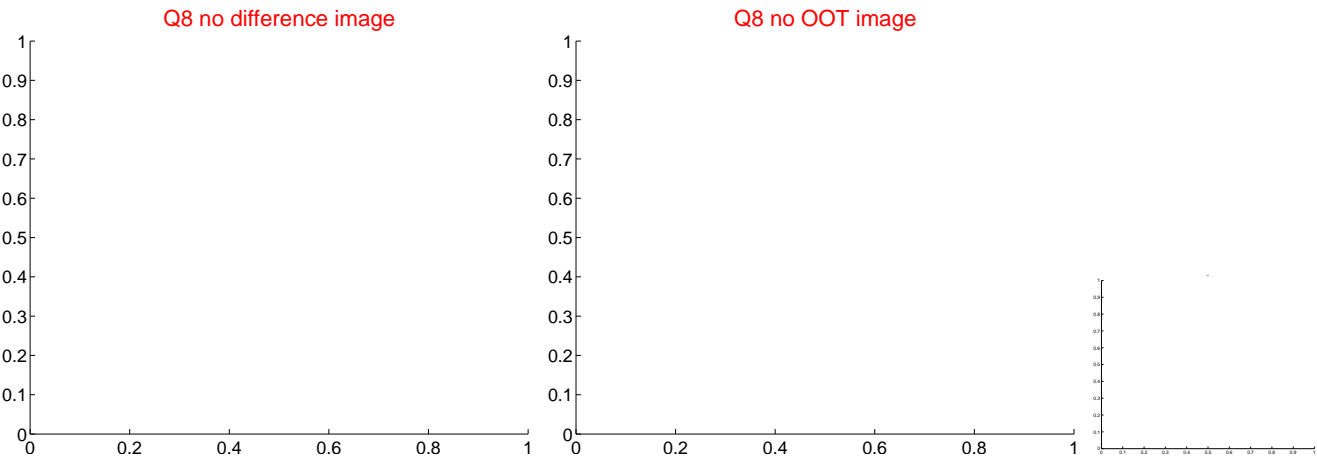
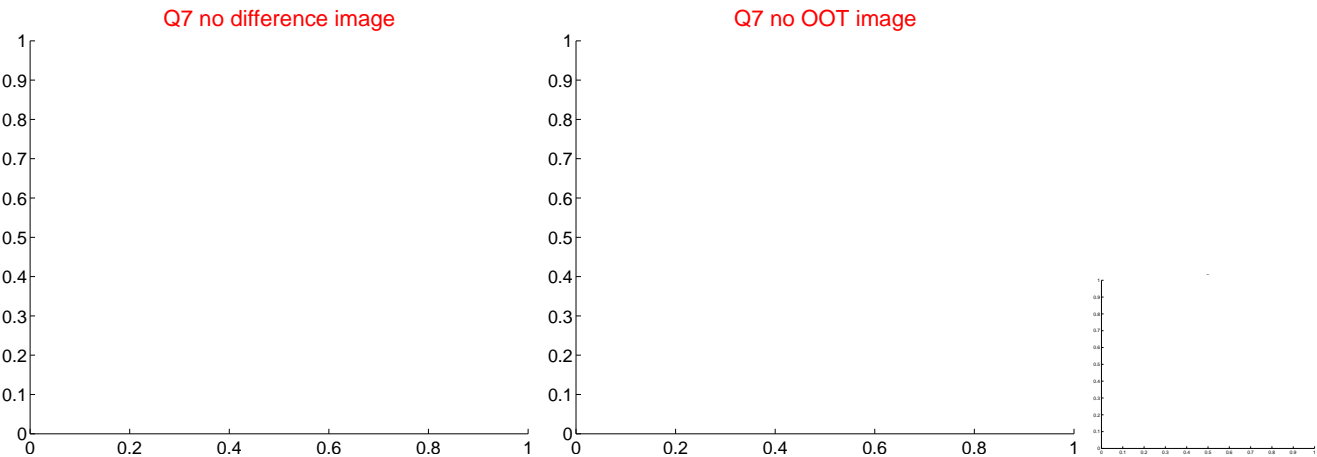
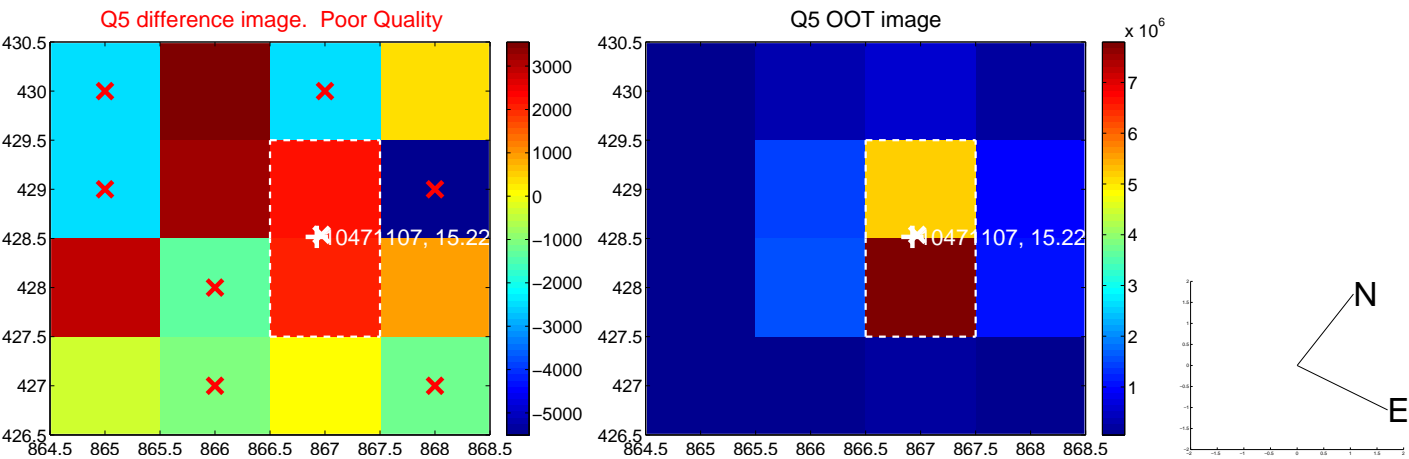


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . 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 ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

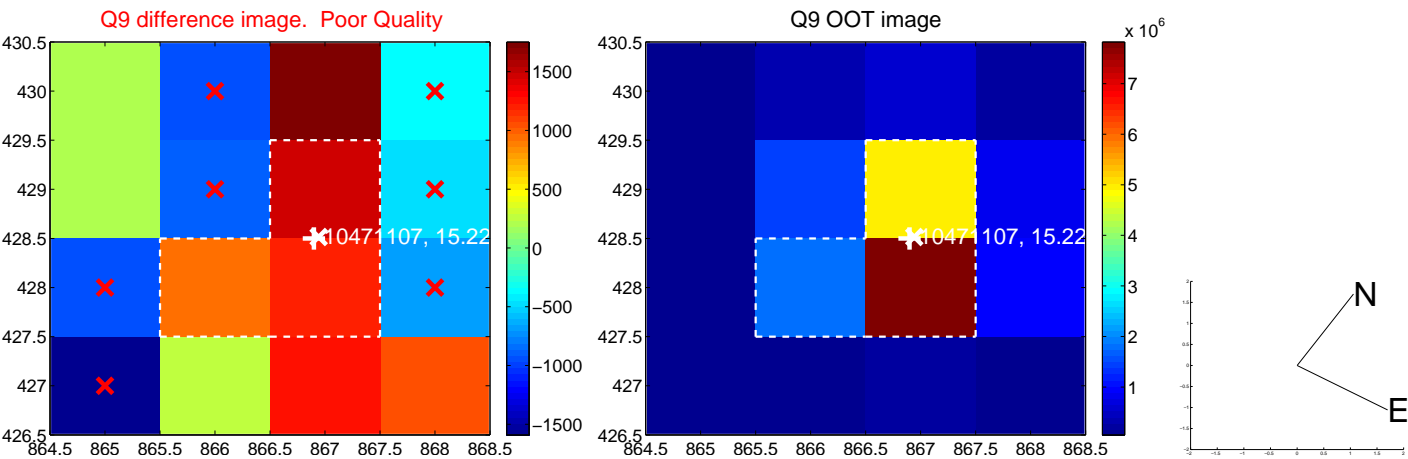


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

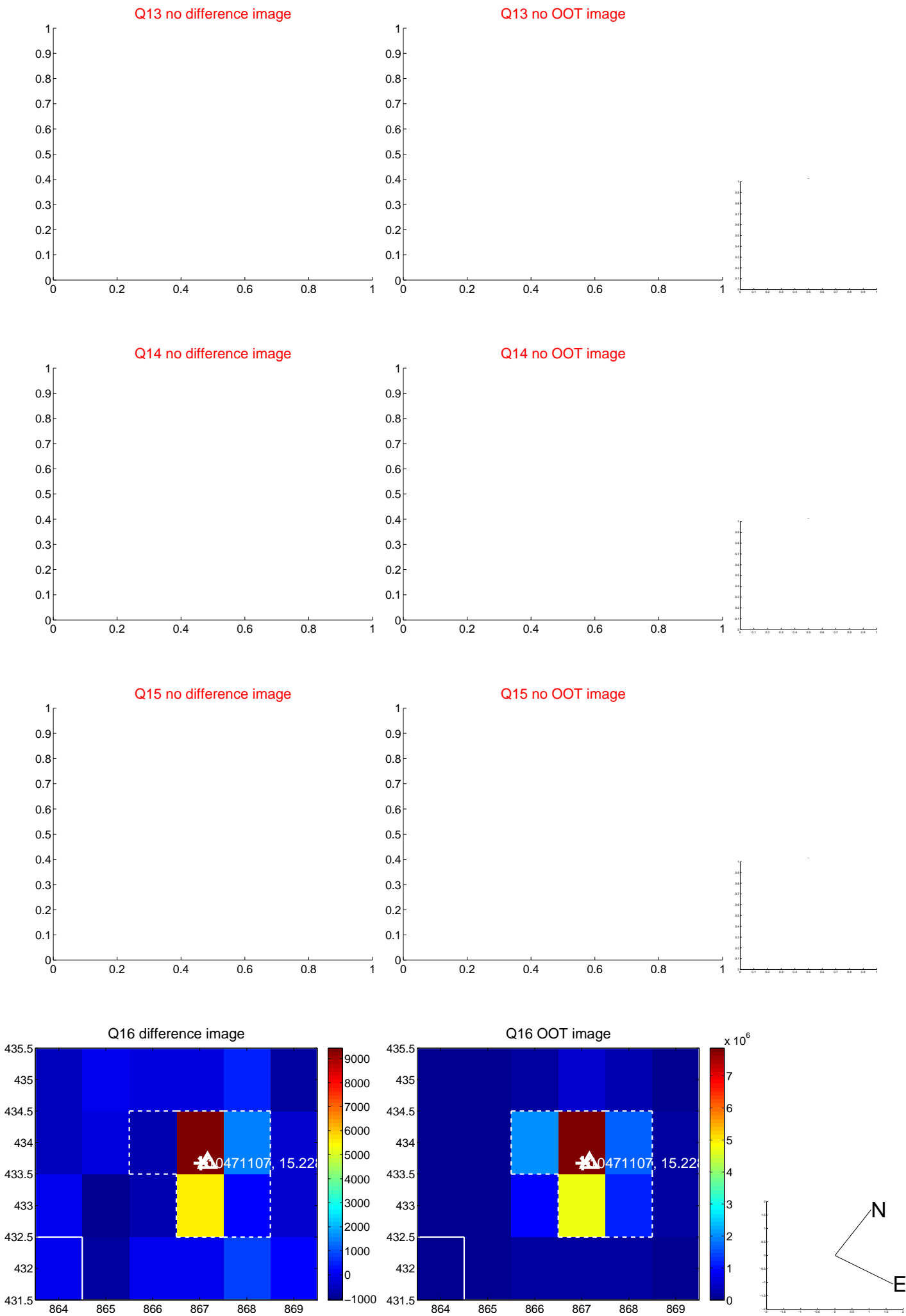




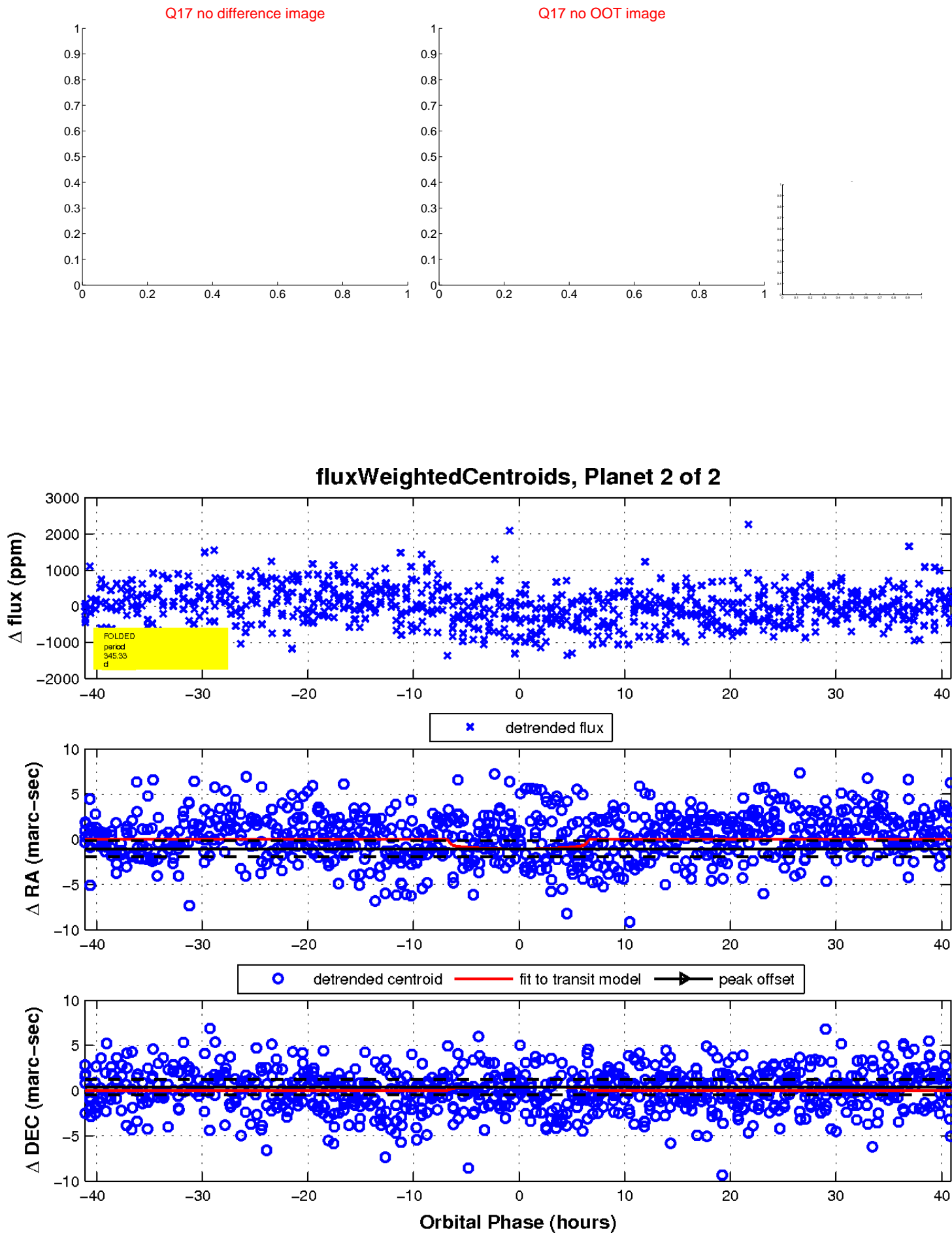
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

