

# KIC 005385471

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005385471-01	OBS	3502.01	12.426004	141.497155	881.5	24.352	21.9	30.2	0.85	5713	3.12	65.04
005385471-02	OBS	No	12.426140	133.927027	845.0	29.494	20.6	31.1	0.85	5713	3.18	65.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005385471-01	OBS	FP	0.00	1	0	1	1	LPP_DV—LPP_ALT—CENT_UNRESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
005385471-02	OBS	FP	0.00	1	0	1	1	LPP_DV—SAME_NTL_PERIOD—CENT_UNRESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH

**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 005385471-01

TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $\mu$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
005385471-01	5385471	V380-Cyg-pri	5385723	1:1	166.8	15	-39	5.77	15.99	164.32	Direct-PRF	0	0.81	1.35

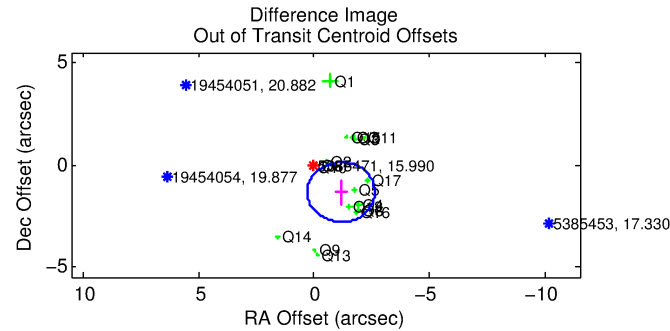
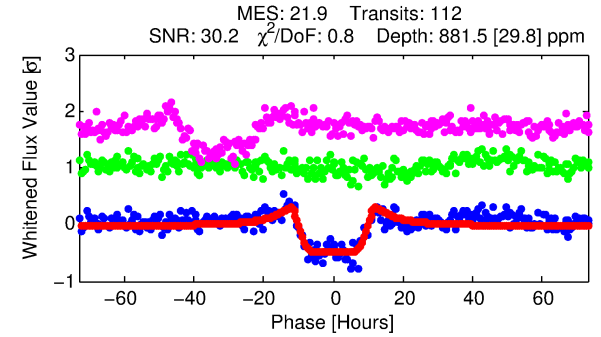
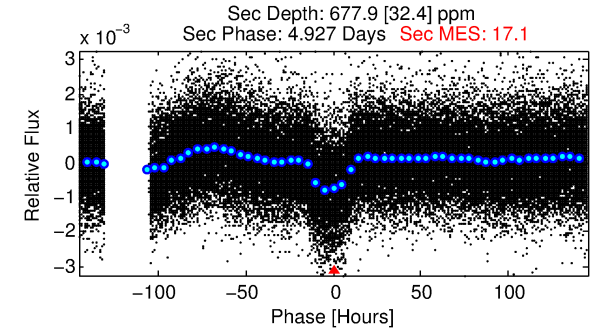
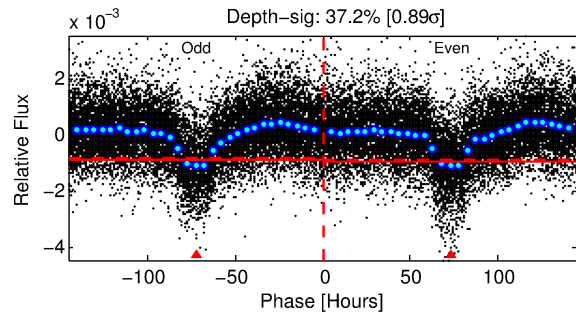
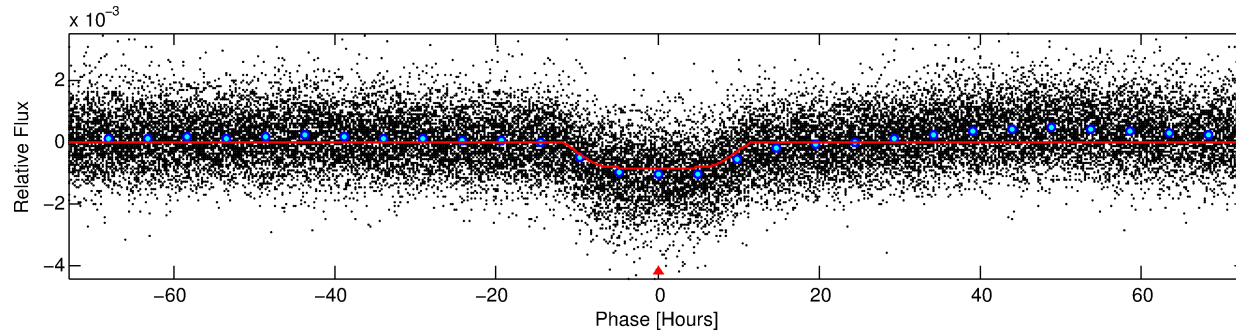
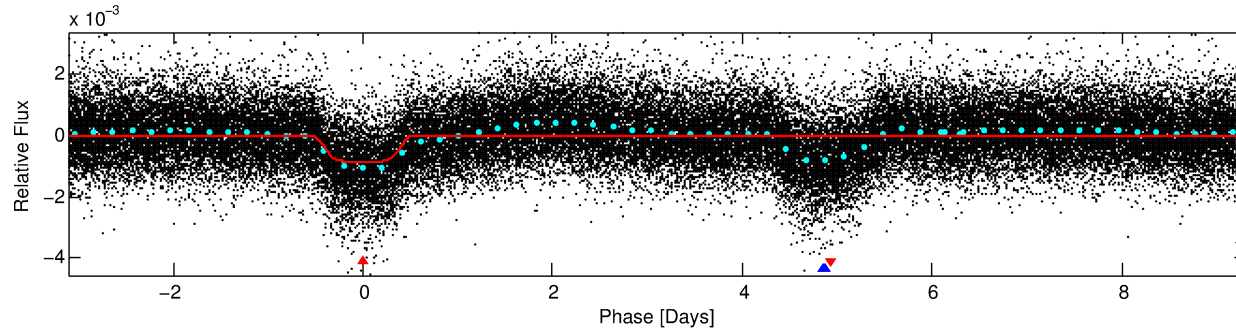
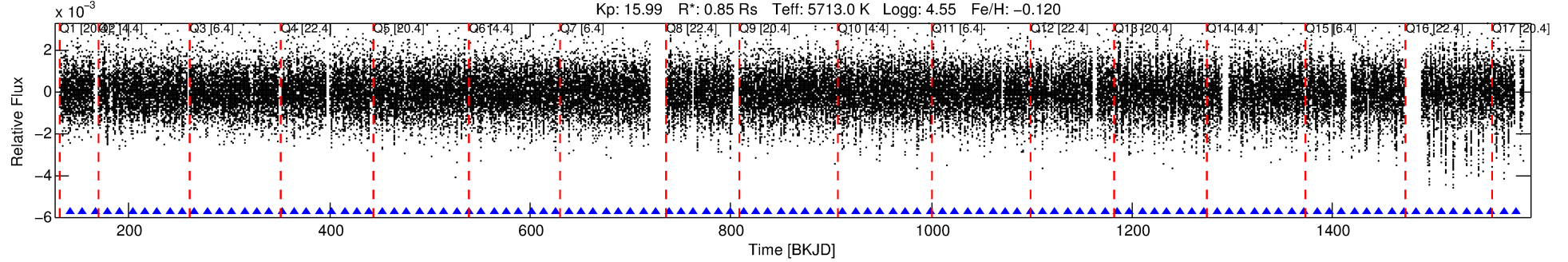
**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  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: 5385471 Candidate: 1 of 2 Period: 12.426 d

KOI: K03502.01 Corr: 0.928

Kp: 15.99 R\*: 0.85 Rs Teff: 5713.0 K Logg: 4.55 Fe/H: -0.120



## DV Fit Results:

Period = 12.42600 [0.00017] d  
Epoch = 141.4972 [0.0106] BKJD  
Rp/R\* = 0.0335 [0.0008]  
a/R\* = 2.00 [0.08]  
b = 0.93 [0.01]  
Seff = 65.04 [20.88]  
Teq = 724 [58] K  
Rp = 3.11 [0.75] Re  
a = 0.1031 [0.0208] AU  
Ag = 408.55 [122.84] [3.32σ]  
Teffp = 5034 [183] K [22.39σ]

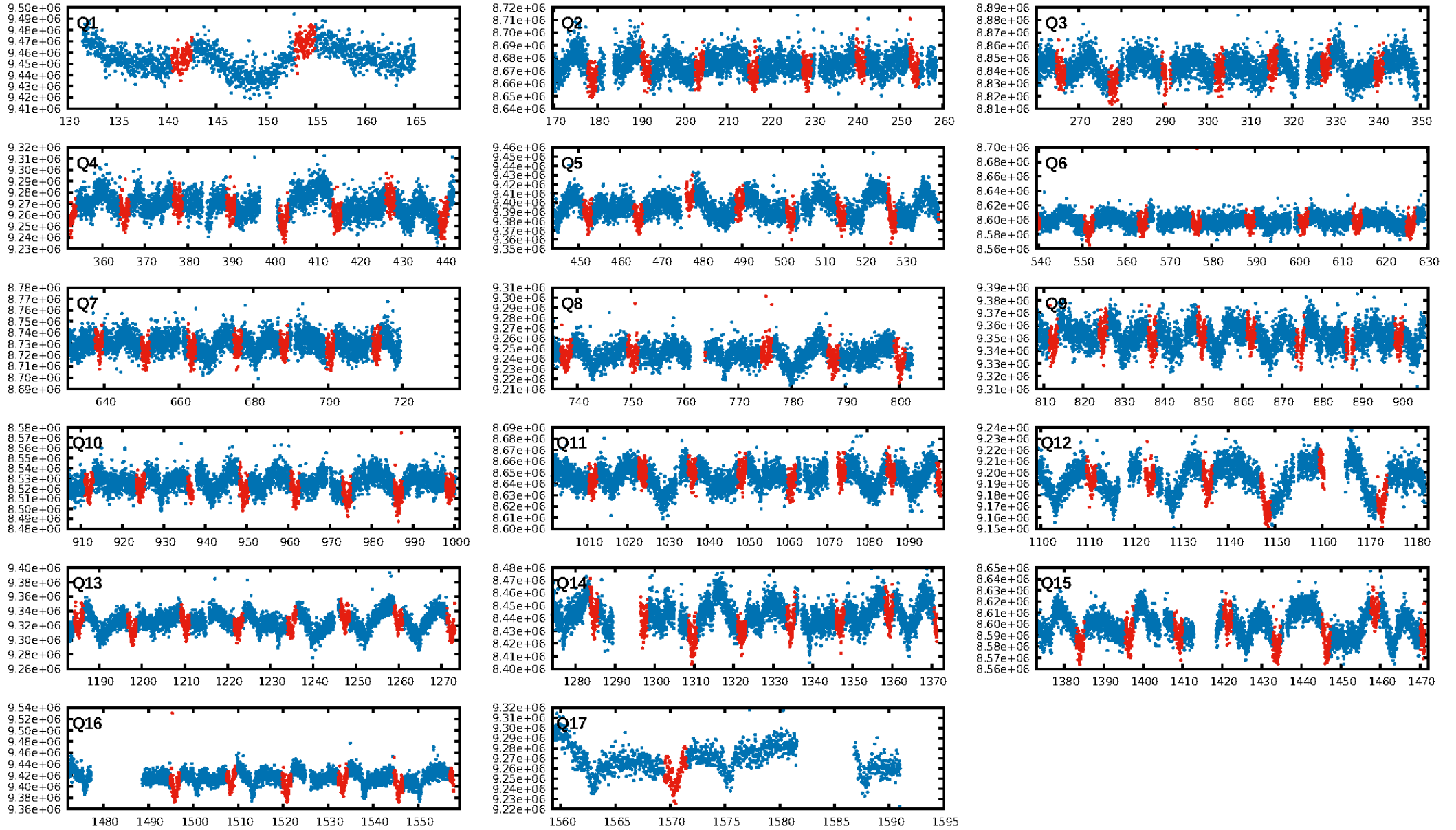
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 1.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 1.18e-124  
RollingBand-fgt: 1.00 [109/109]  
GhostDiagnostic-chr: 0.008062  
Centroid-sig: 0.0%  
Centroid-so: 1.182 arcsec [5.21σ]  
OotOffset-rm: 1.782 arcsec [3.67σ]  
KicOffset-rm: 1.658 arcsec [3.26σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.06 [1/17]  
DiffImageOverlap-fno: 1.00 [17/17]

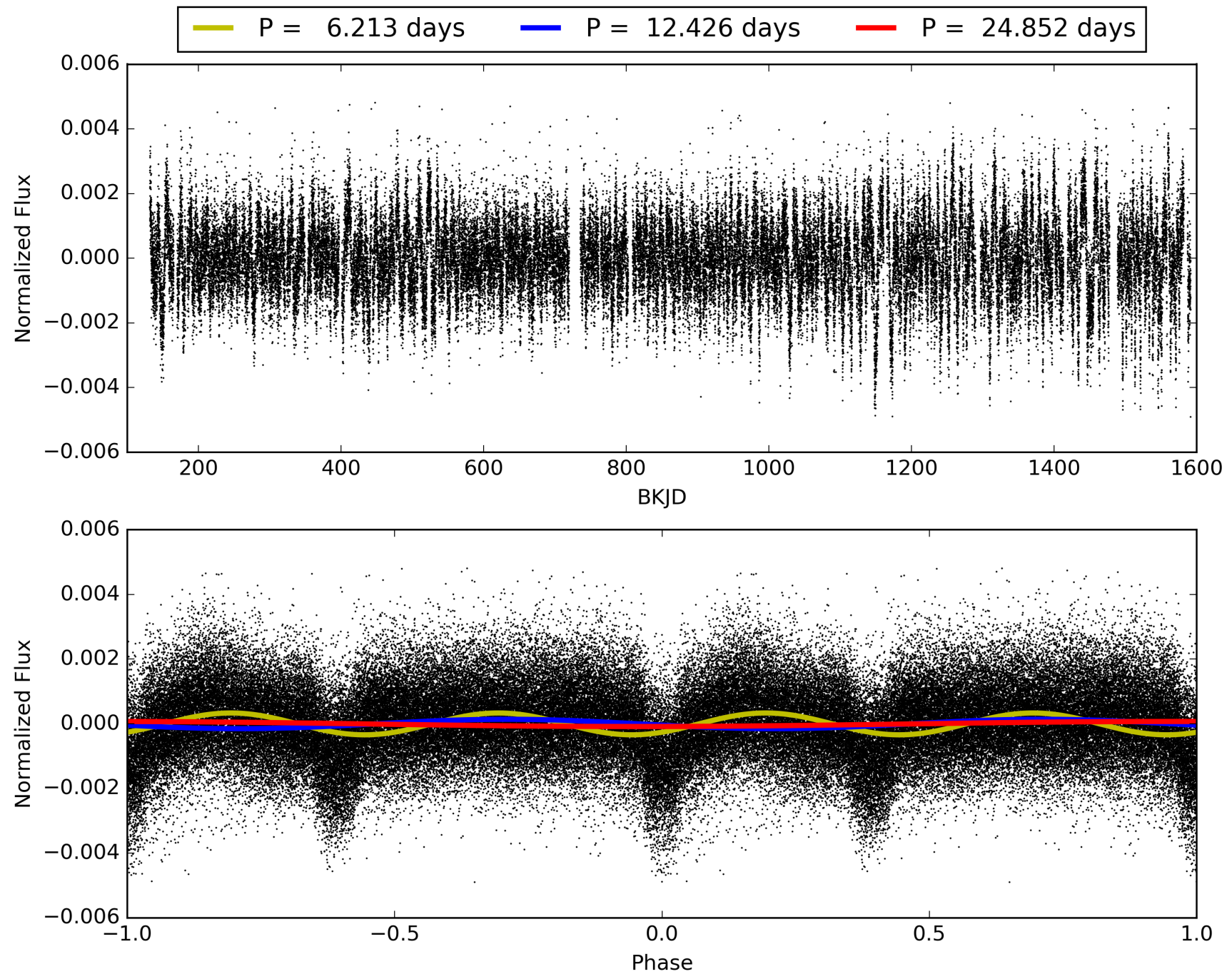
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 18:51:20 Z

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

# TCE 005385471-01, PDC Light Curves

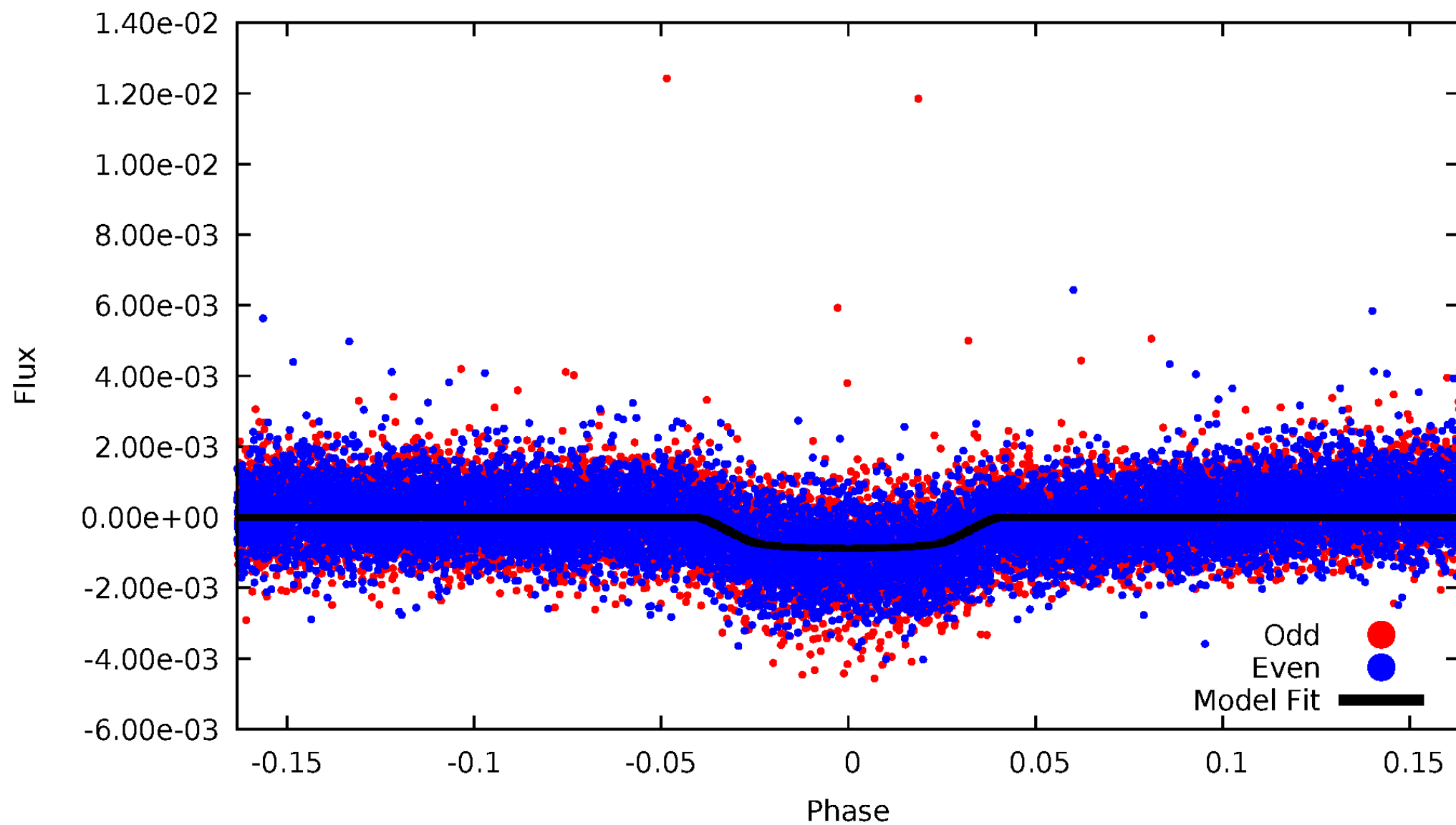


TCE 005385471-01



# DV Odd/Even

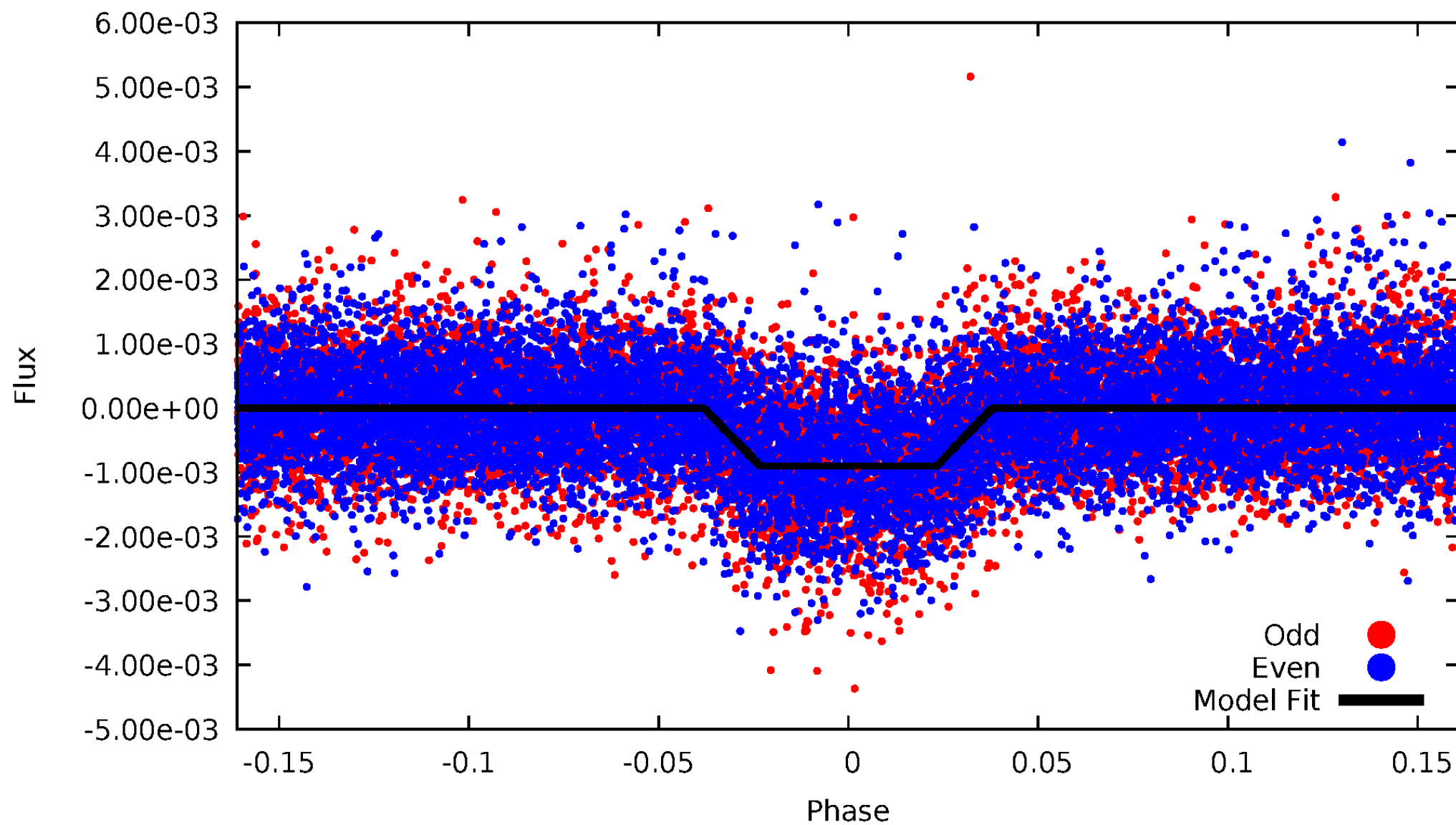
TCE 005385471-01





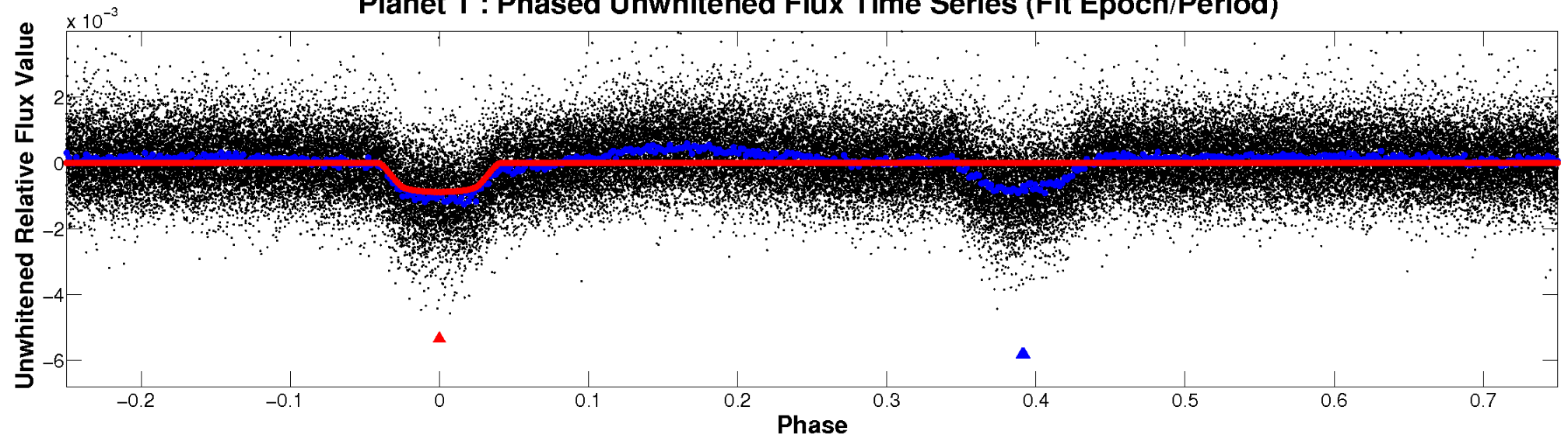
# ALT Odd/Even

TCE 005385471-01

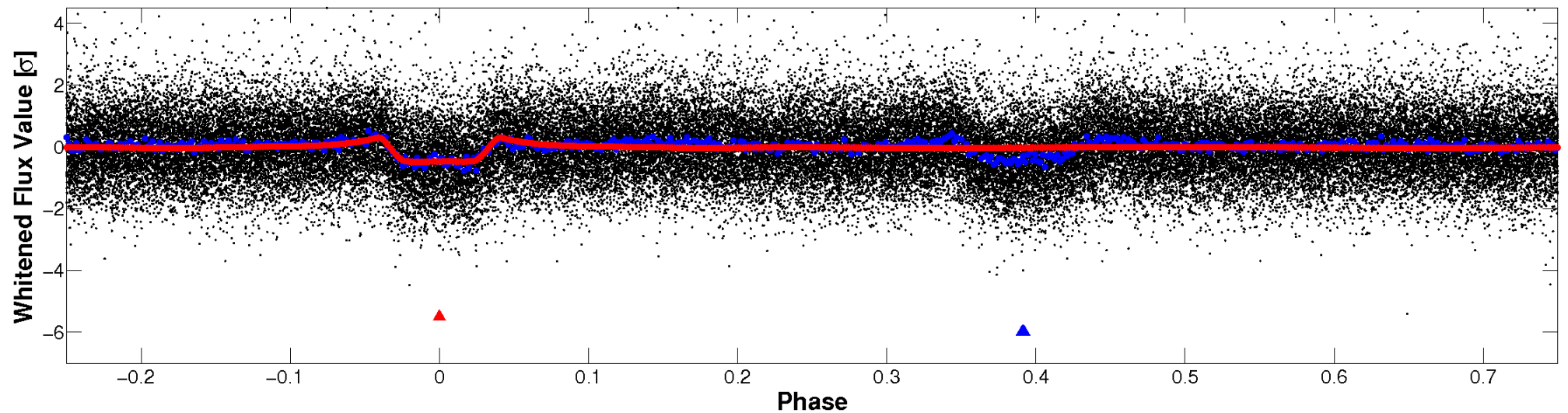


# Non-Whitened Vs. Whitened Light Curve

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

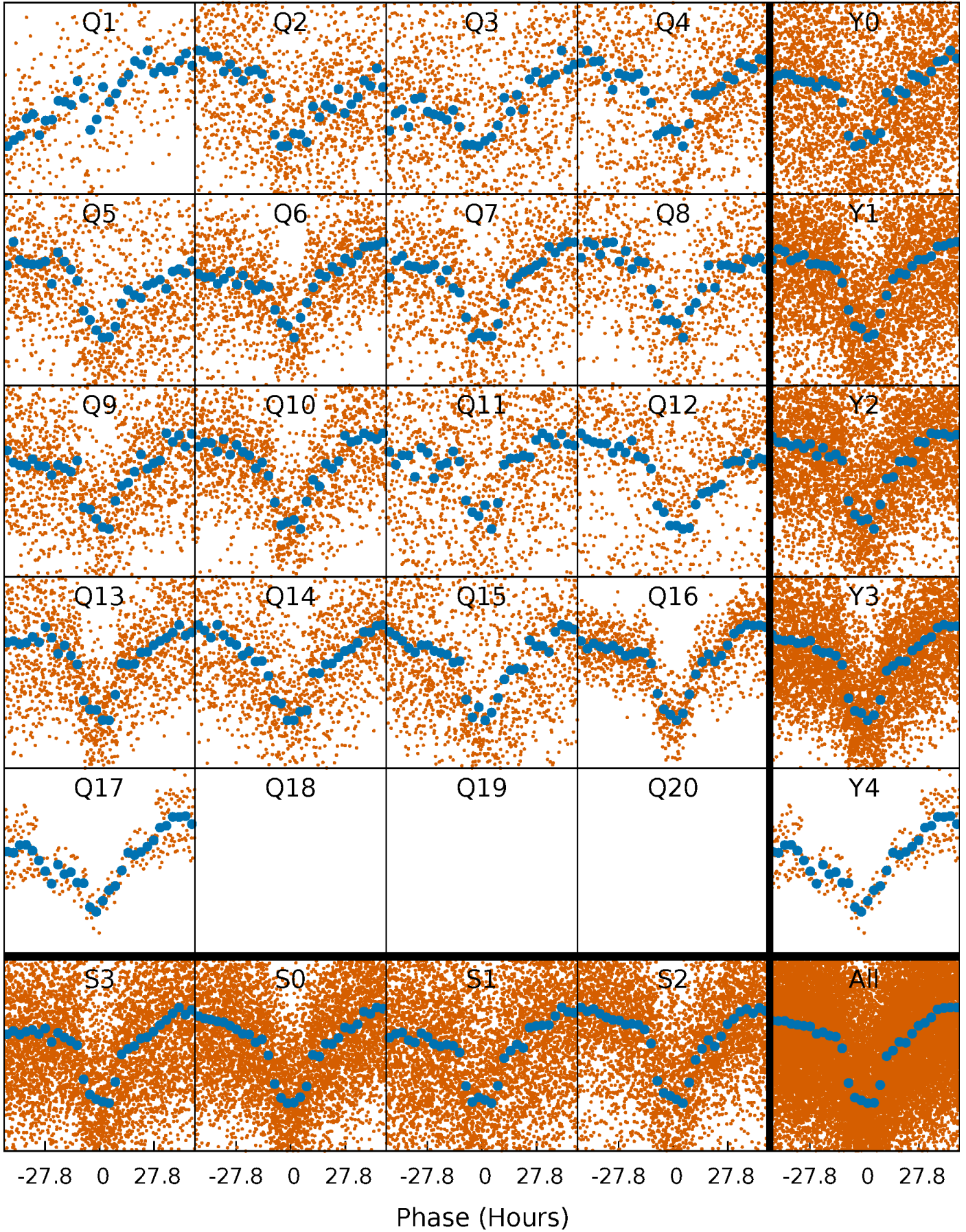


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

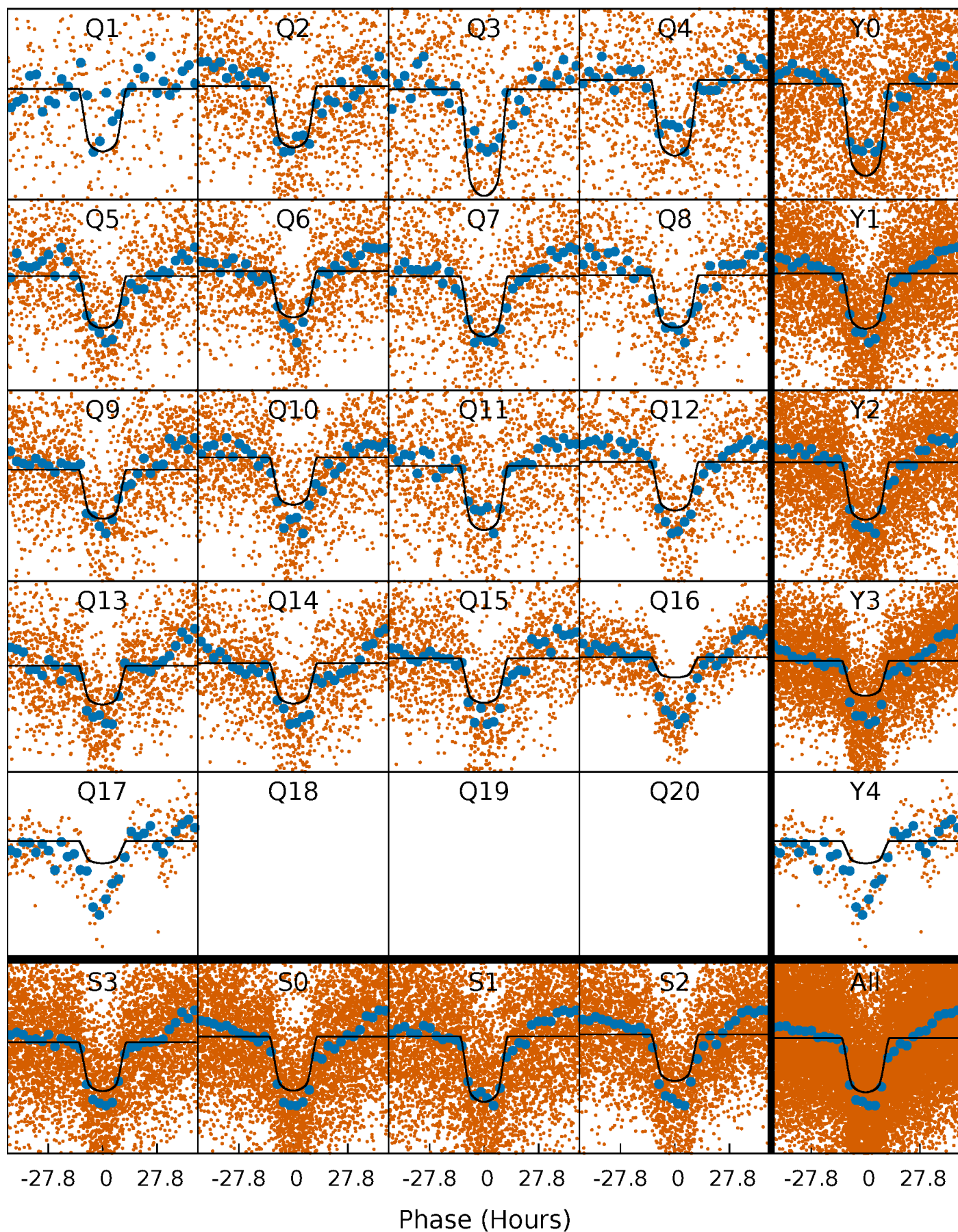
TCE 005385471-01 P= 12.426004 Days  $T_0=141.497155$  (BKJD)





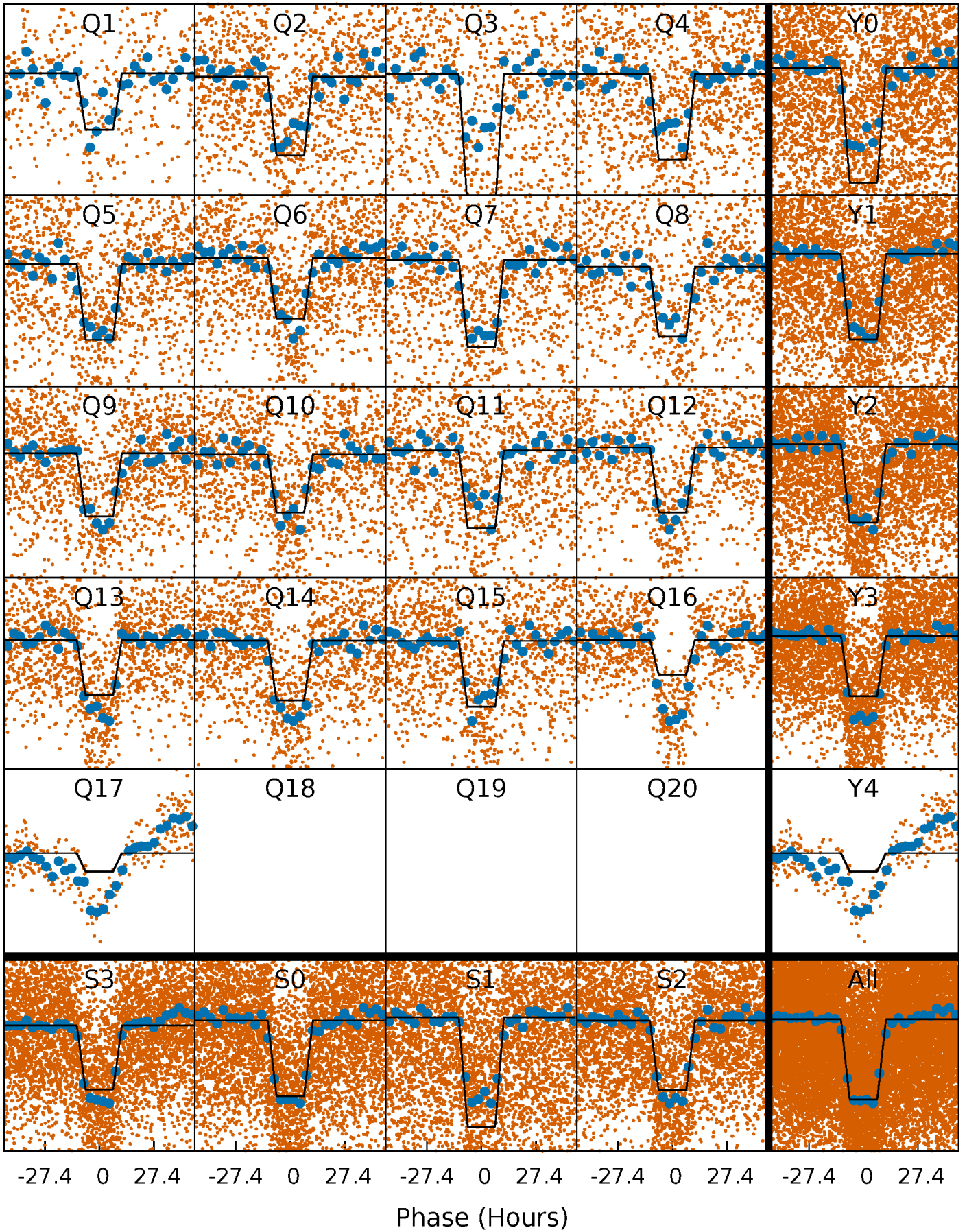
# DV Quarter-Phased Transit Curves

TCE 005385471-01 P= 12.426004 Days  $T_0=141.497155$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

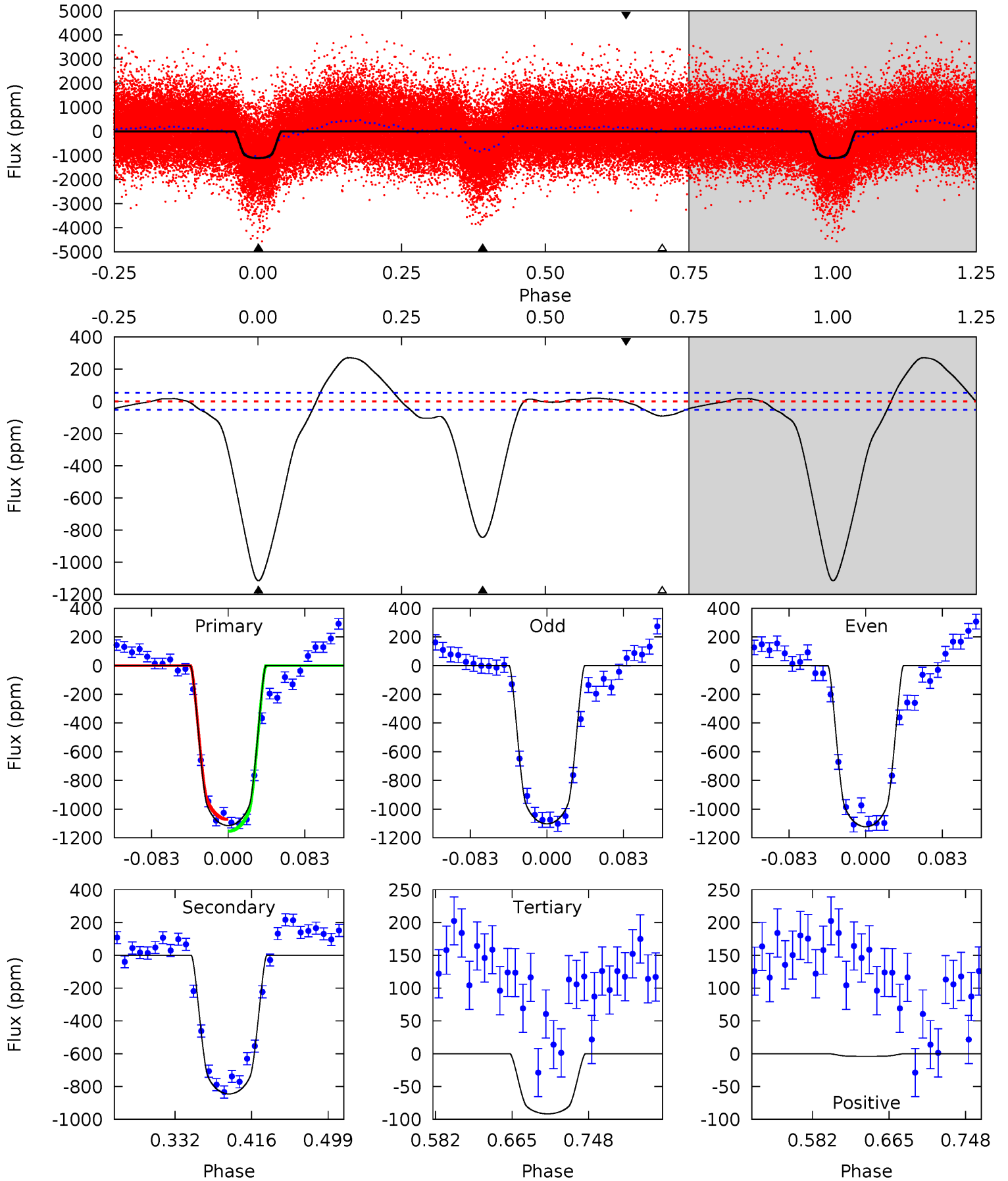
TCE 005385471-01 P= 12.425672 Days  $T_0=141.511768$  (BKJD)



# DV Model-Shift Uniqueness Test

005385471-01, P = 12.426004 Days, E = 129.071151 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
97.1	73.6	7.99	-0.35	4.60	1.73	8.29	89.1	97.5	65.7	74.0	0.87	1.02	0.20	3.43

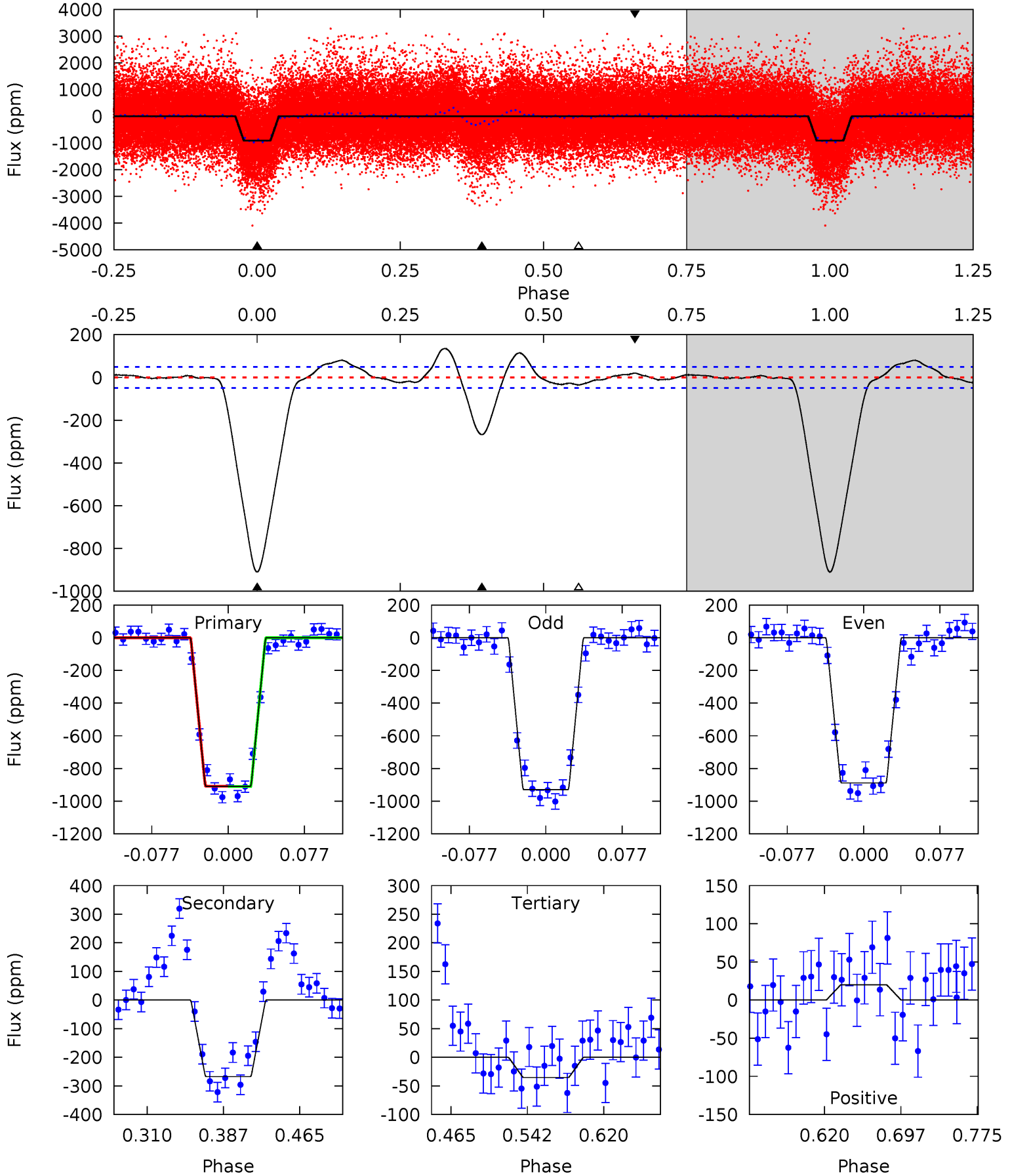




# Alt Model-Shift Uniqueness Test

005385471-01, P = 12.425672 Days, E = 129.086096 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
85.4	25.1	3.32	1.89	4.62	1.77	2.61	82.1	83.5	21.8	23.2	1.94	1.07	0.13	0.11





### Stellar Parameters For KIC 005385471

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5713^{+169}_{-186}$	$4.554^{+0.040}_{-0.160}$	$-0.120^{+0.300}_{-0.300}$	$0.851^{+0.205}_{-0.073}$	$0.948^{+0.094}_{-0.115}$	$2.164^{+0.459}_{-0.952}$
	+3%/-3%	+1%/-4%	+250%/-250%	+24%/-9%	+10%/-12%	+21%/-44%
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 005385471-01 / KOI 3502.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-845 \pm 11$	$3.18^{+0.39}_{-0.22}$	$1032^{+51}_{-45}$	$5359^{+163}_{-169}$	$482^{+58}_{-92}$
Alt.	$-267 \pm 11$	$2.86^{+0.33}_{-0.20}$	$1031^{+51}_{-45}$	$4407^{+119}_{-125}$	$188^{+26}_{-32}$

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

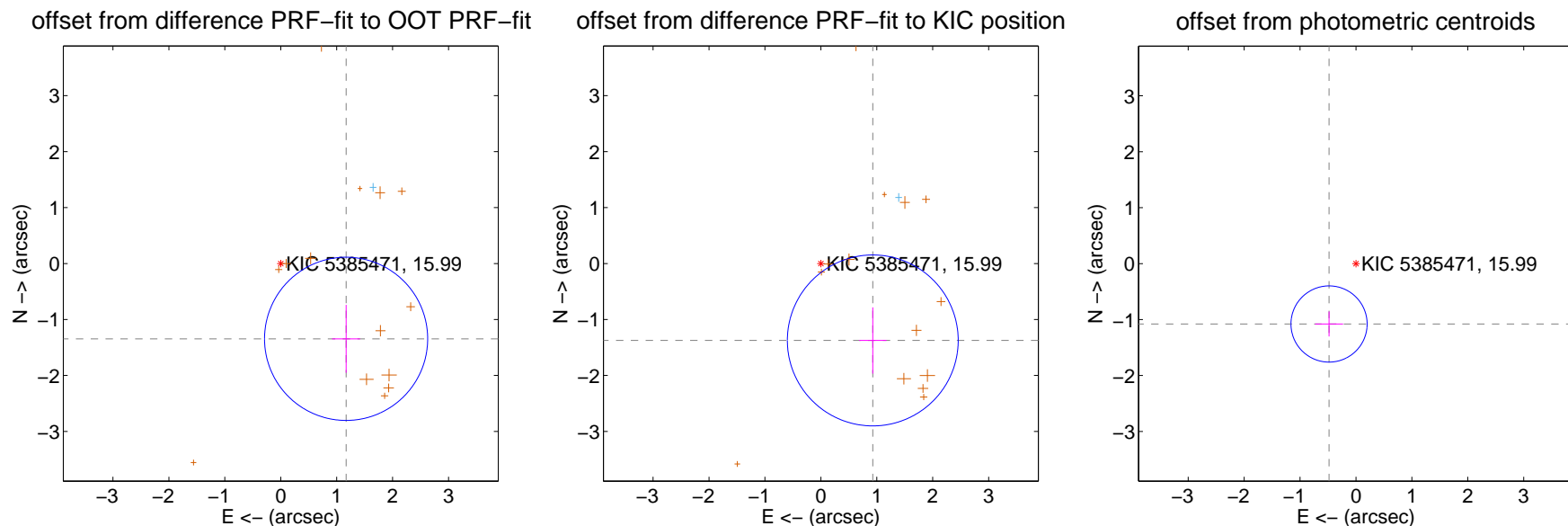
## DV Centroid Data

Supplemental centroid analysis for 005385471-01. Kepler magnitude: 15.99. Transit SNR 30.25

There are 1 quarters with good PRF difference image offsets

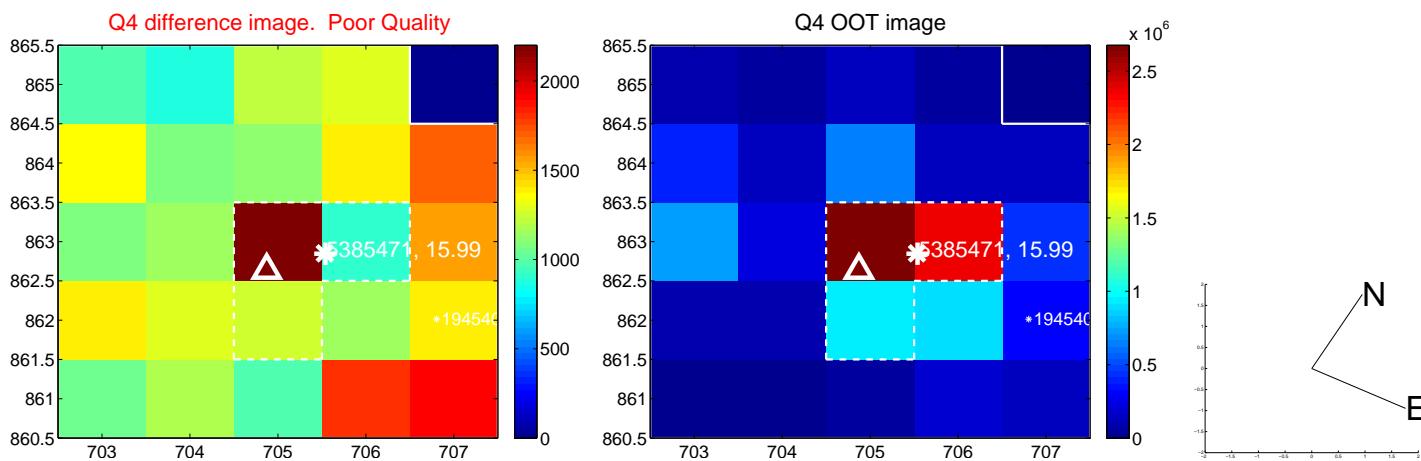
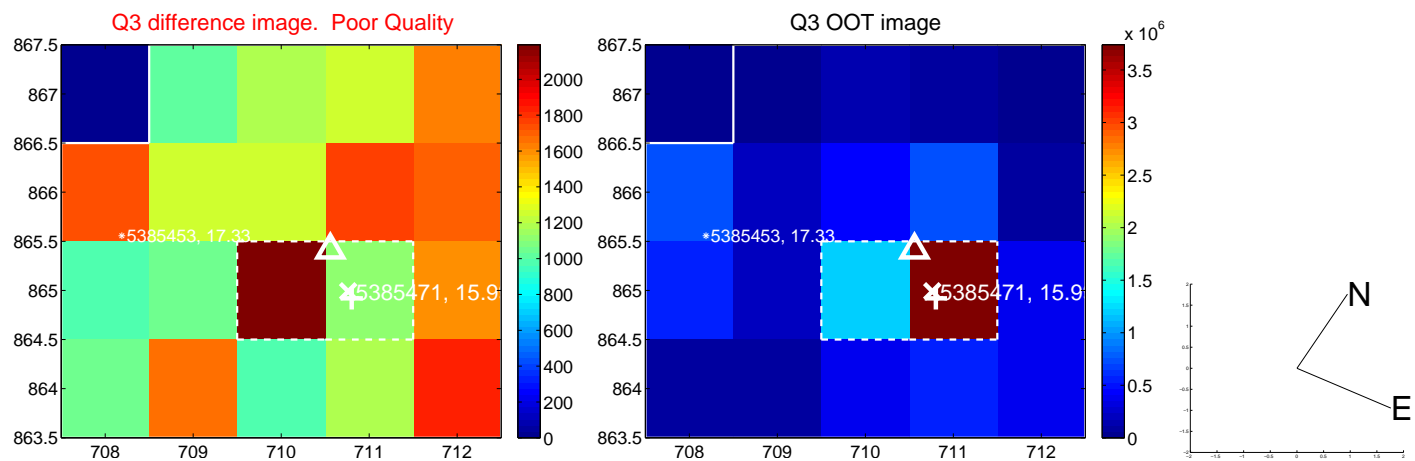
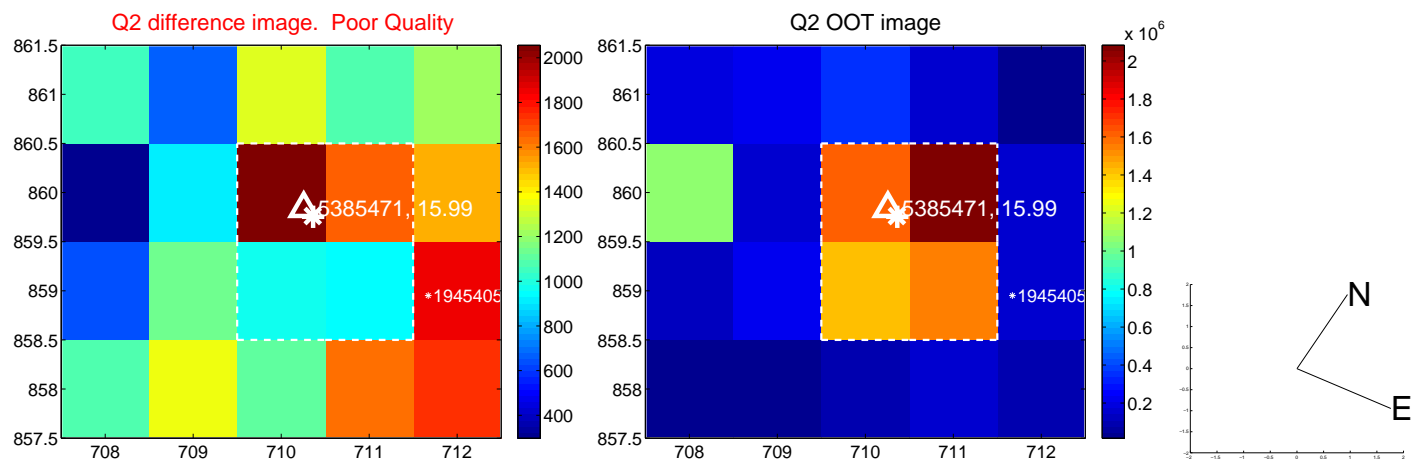
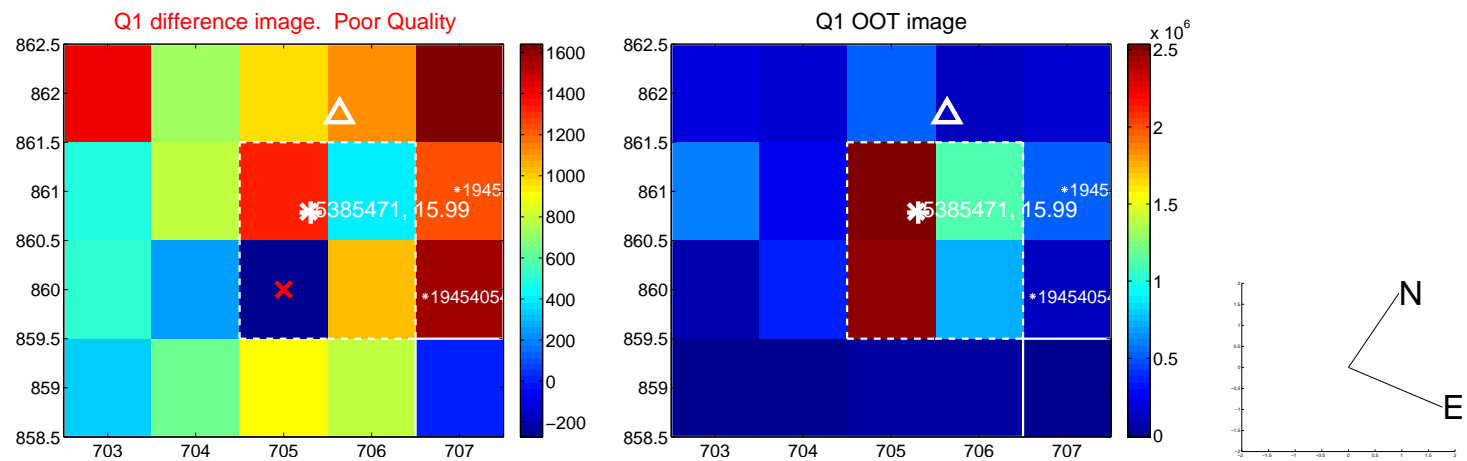
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.782 \pm 0.486$	3.67	$-1.169 \pm 0.251$	$-1.345 \pm 0.606$
PRF-fit source offset from KIC position	$1.658 \pm 0.509$	3.26	$-0.928 \pm 0.244$	$-1.374 \pm 0.592$
photometric centroid source offset	$1.18 \pm 0.23$	5.21	$0.48 \pm 0.25$	$-1.08 \pm 0.22$

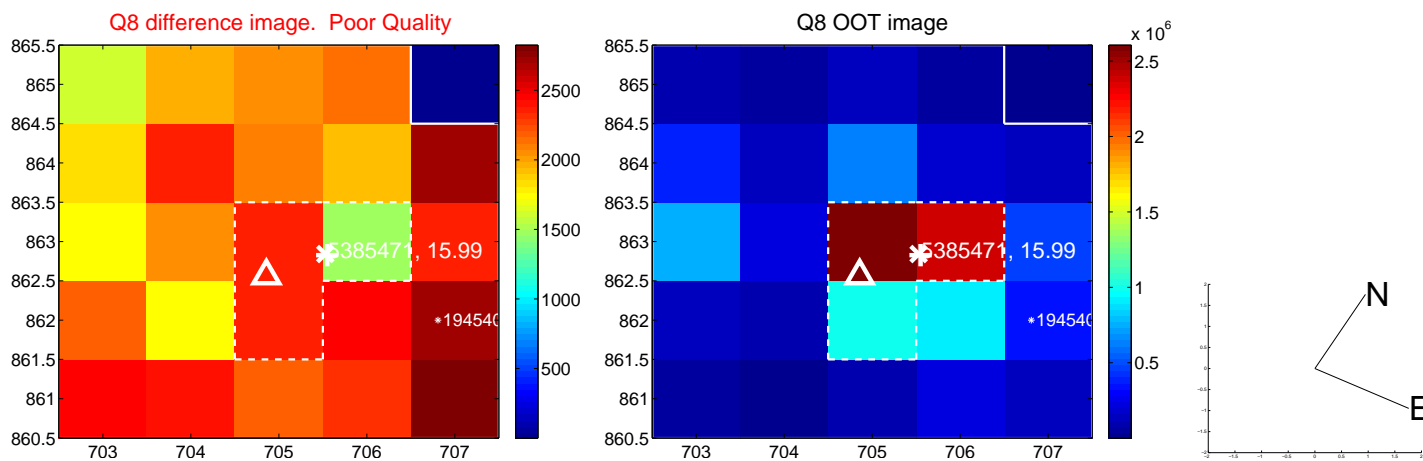
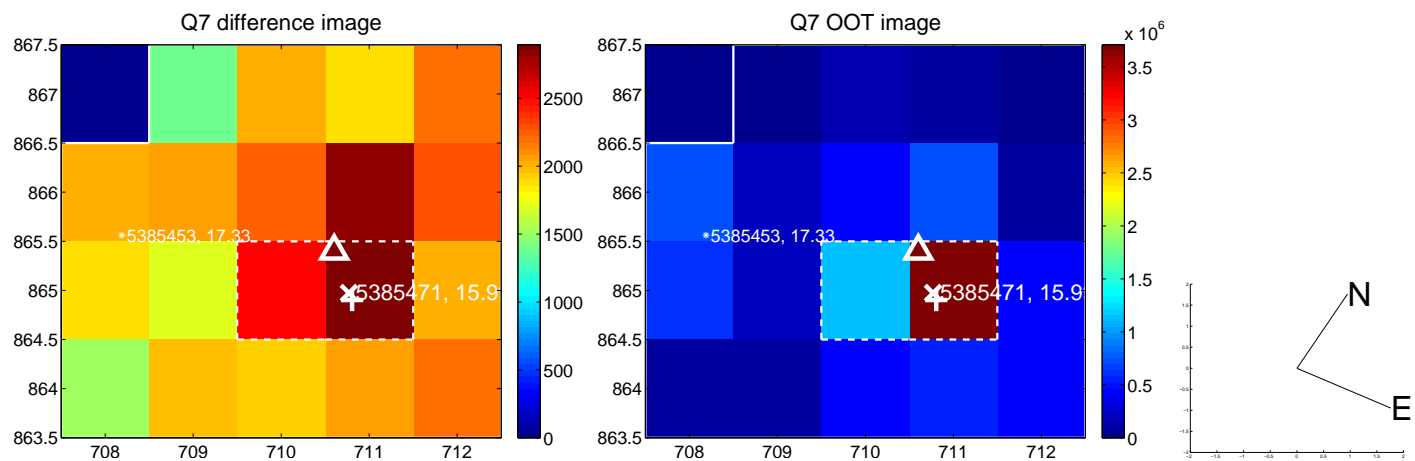
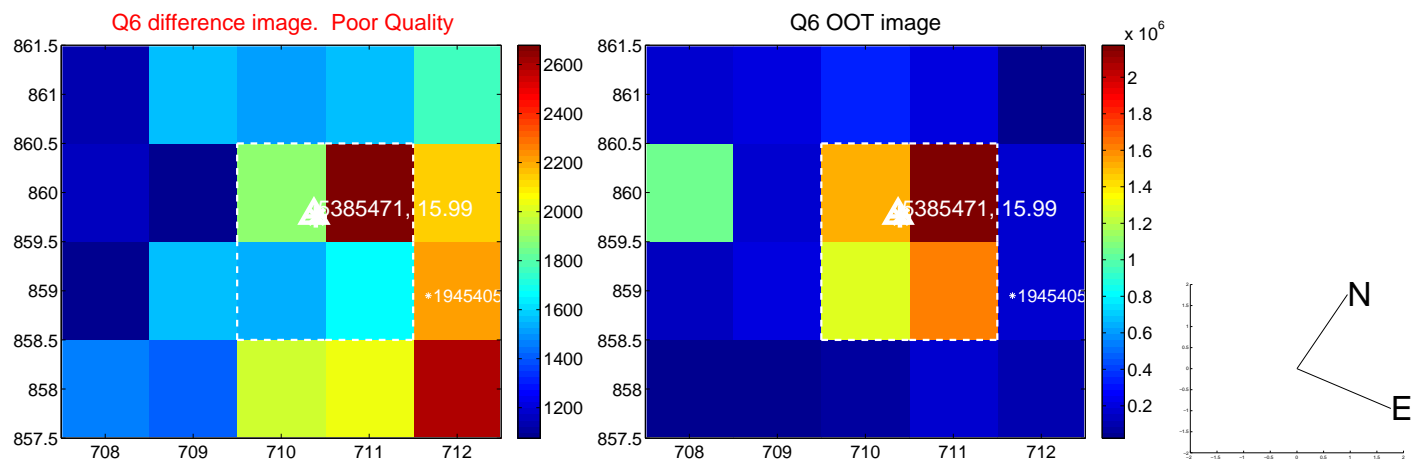
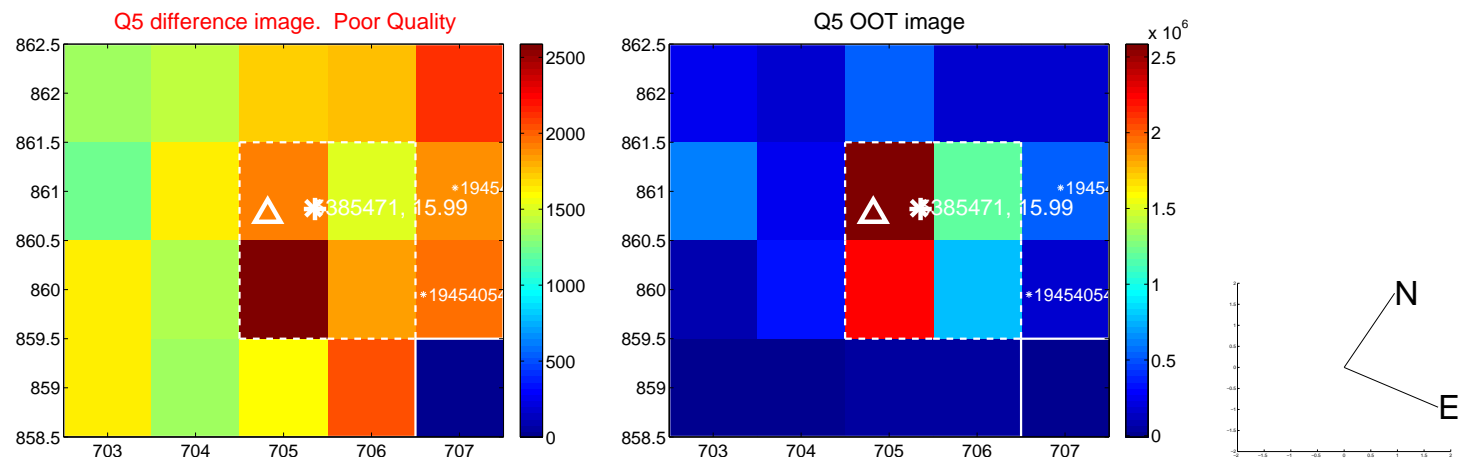


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

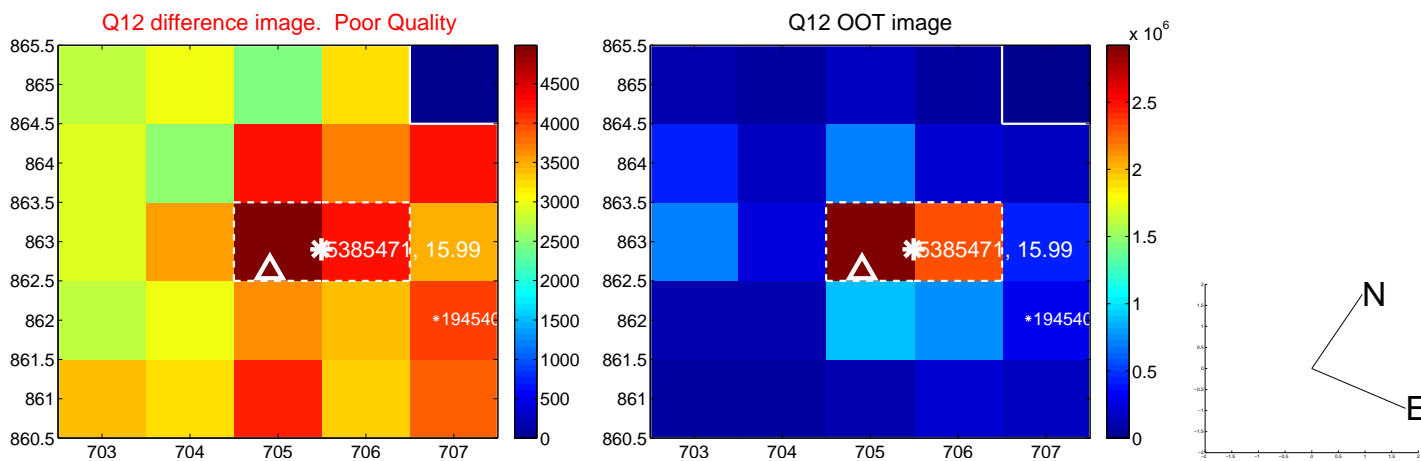
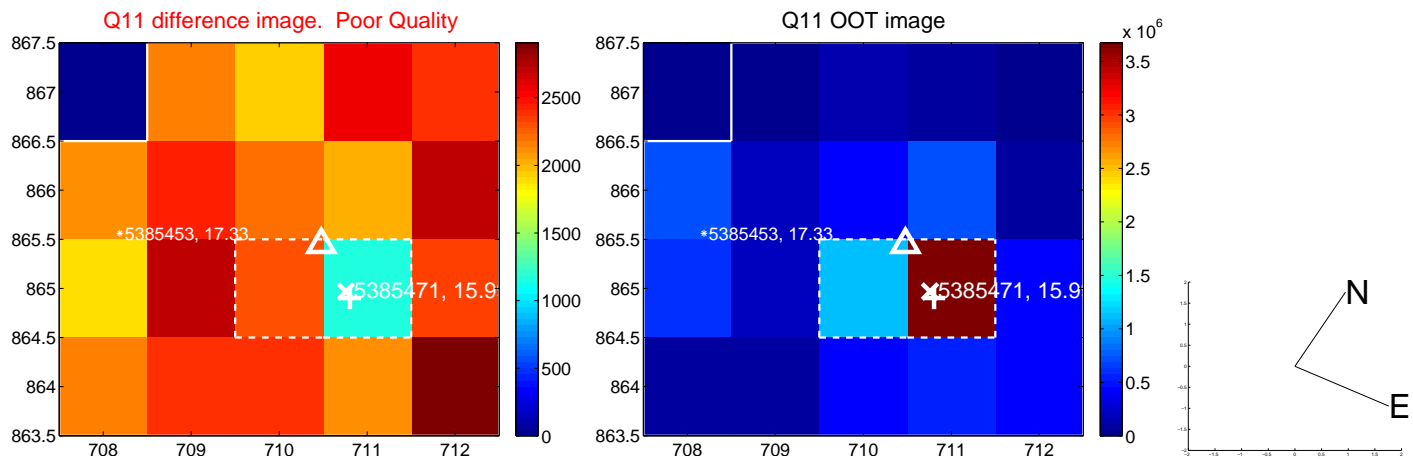
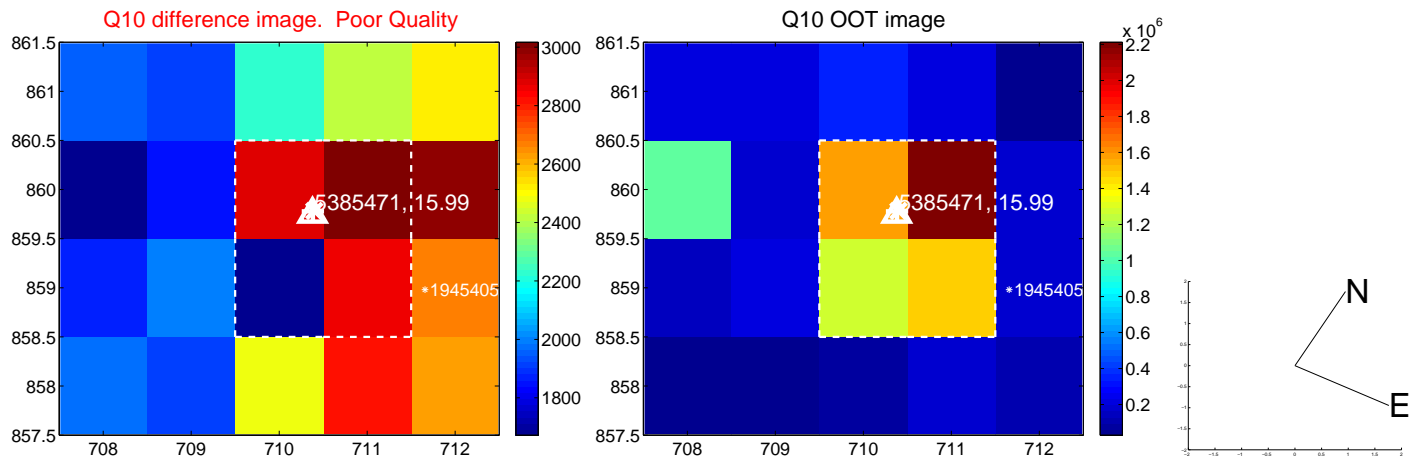
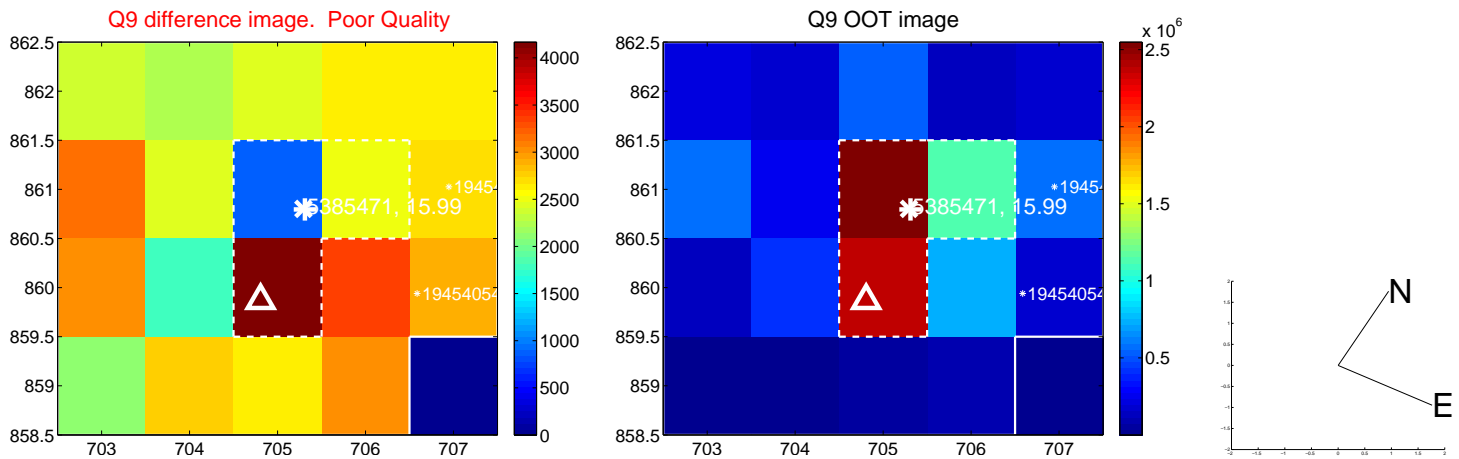


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

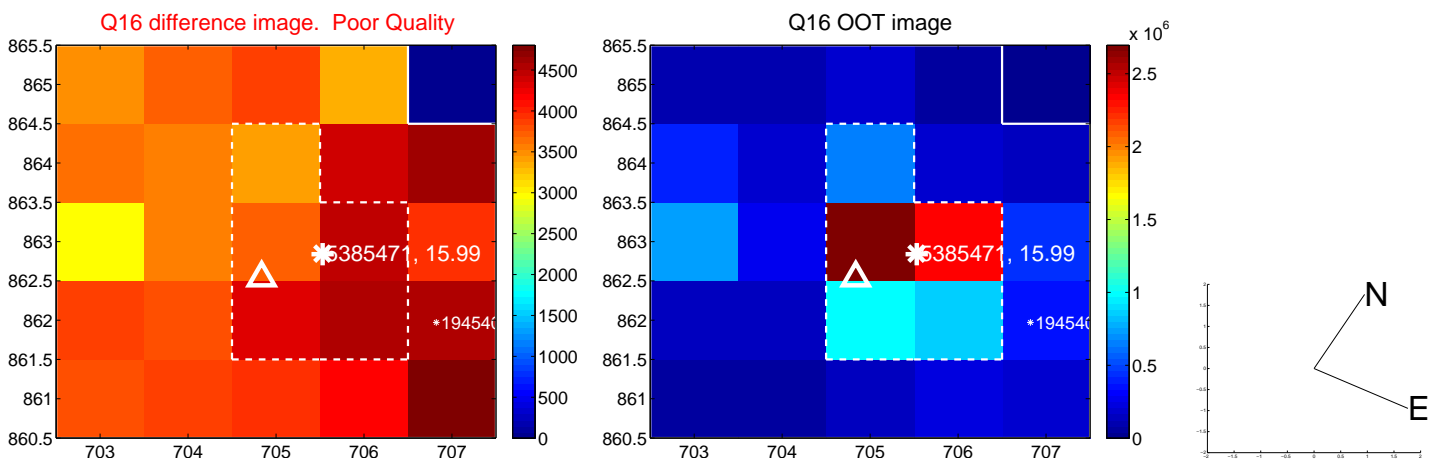
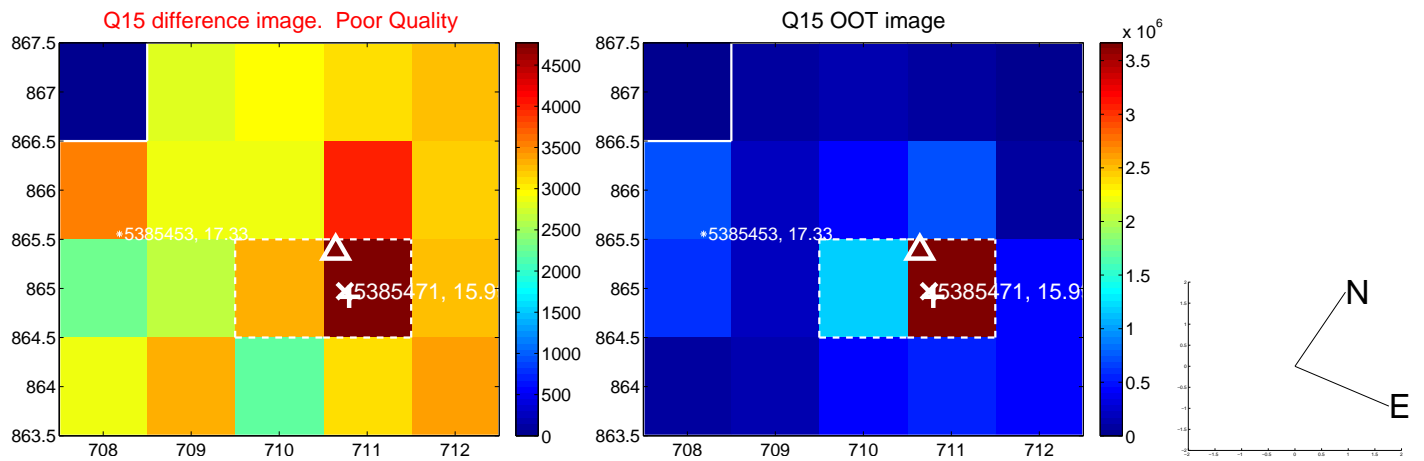
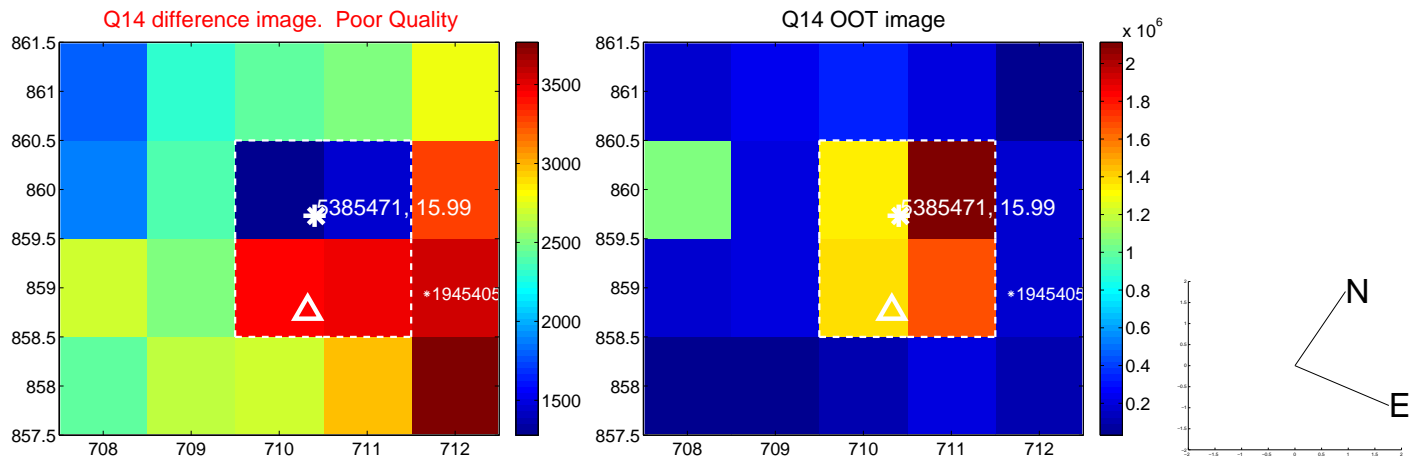
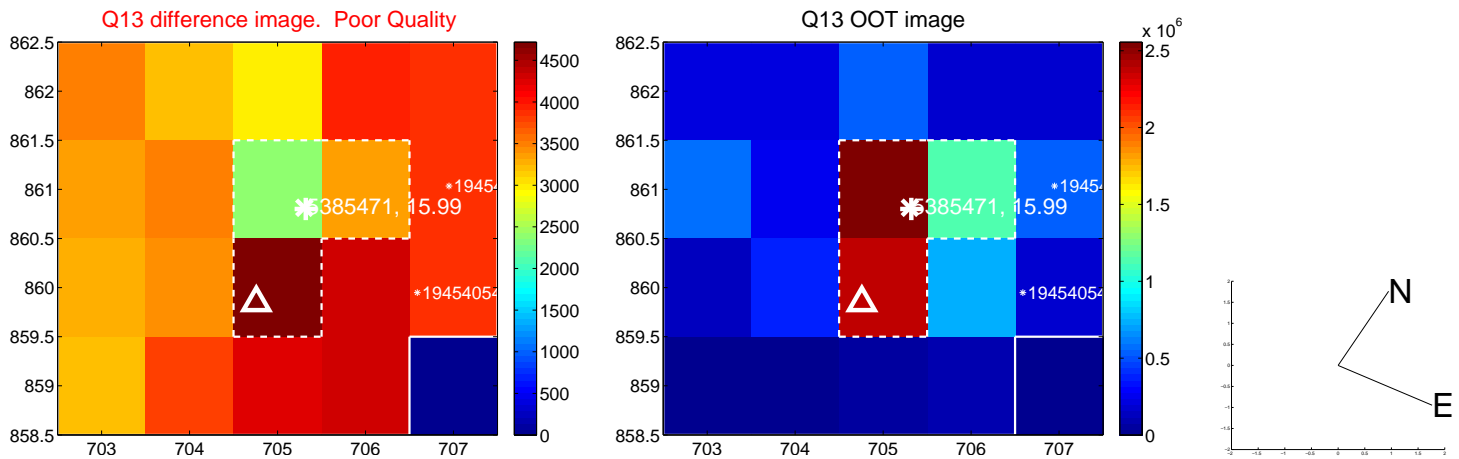




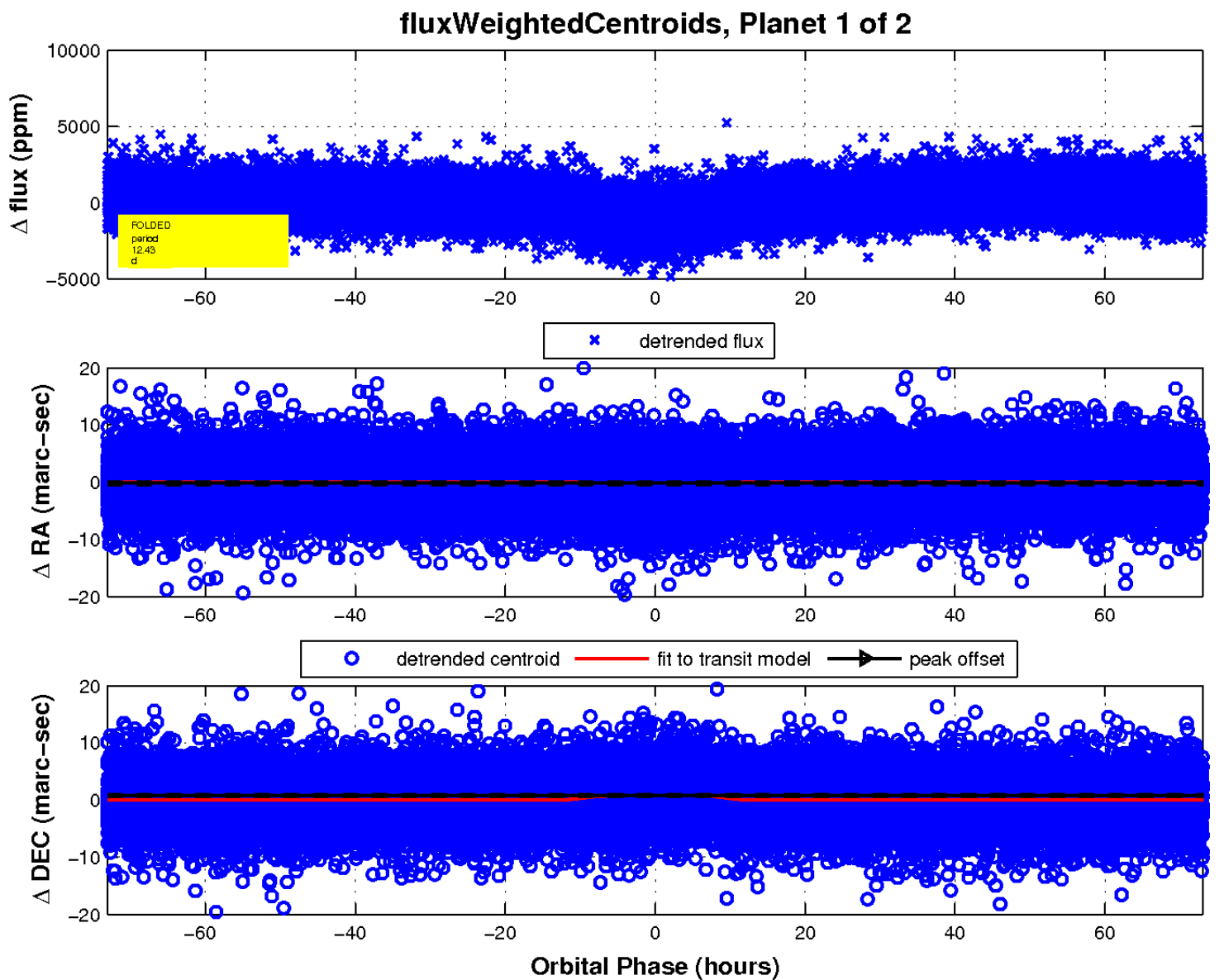
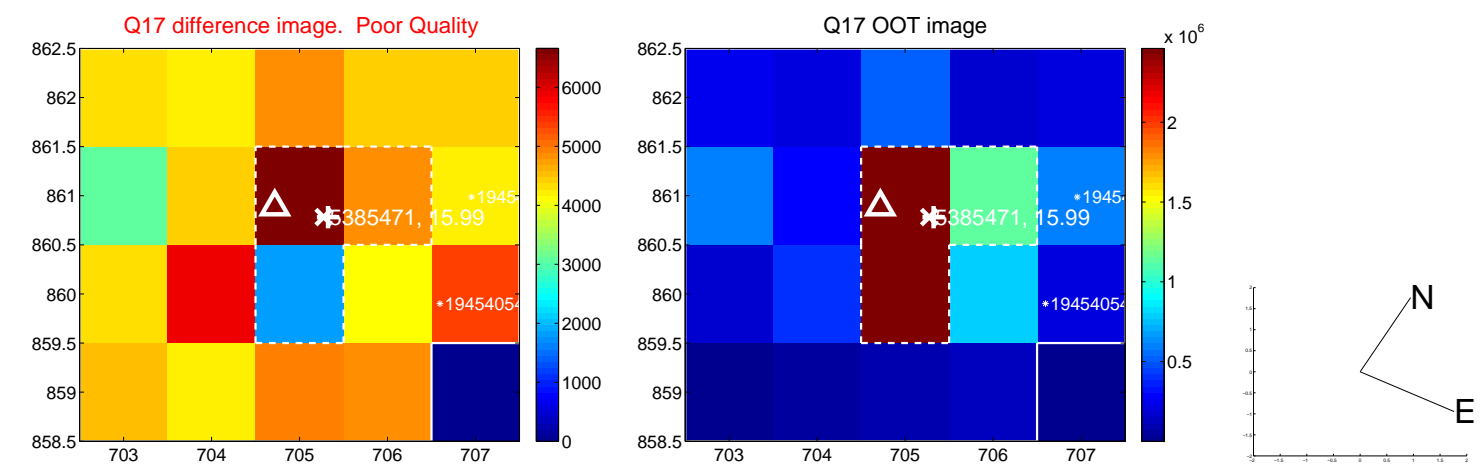
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

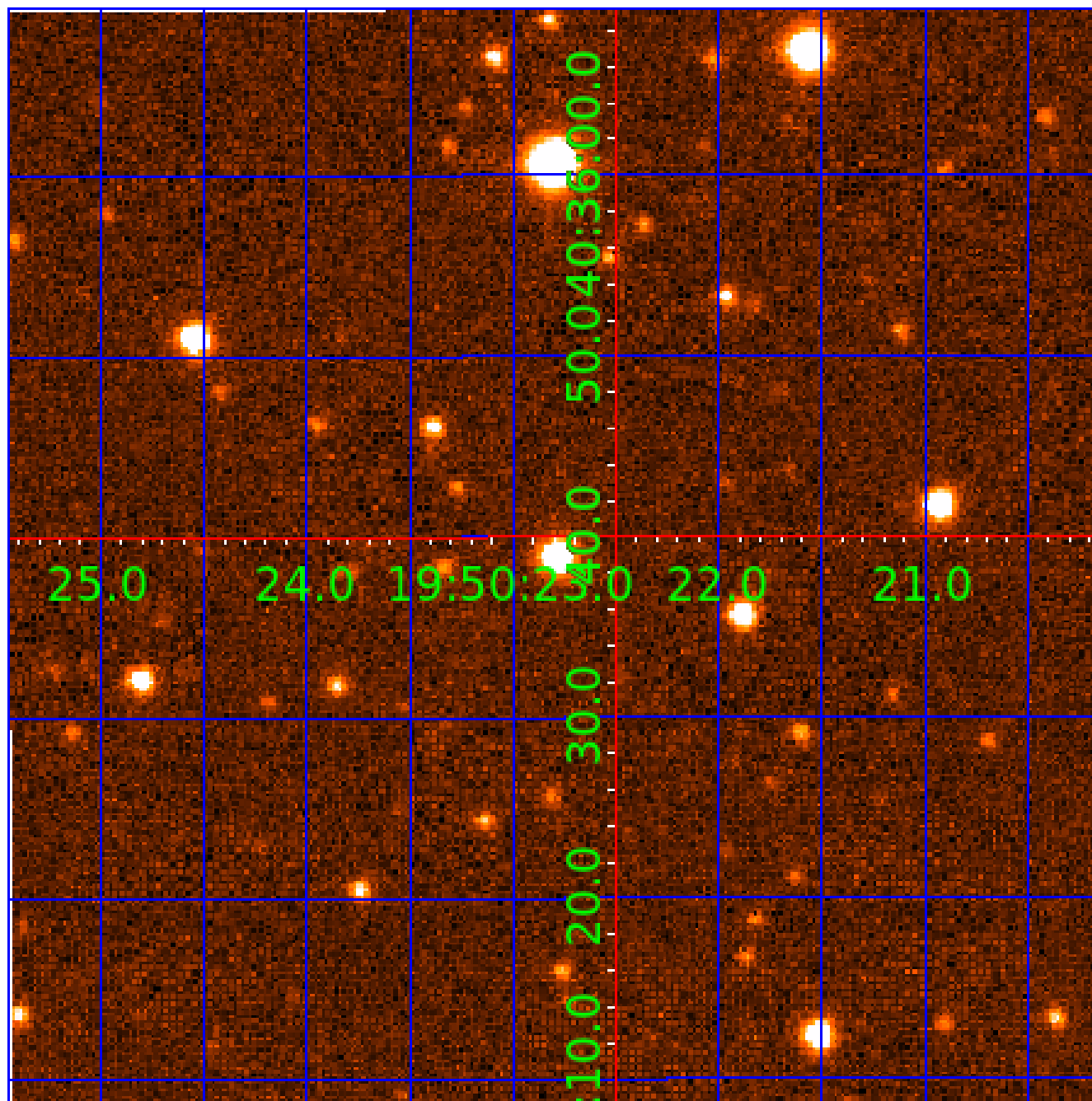


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 005385471

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005385471-01	OBS	3502.01	12.426004	141.497155	881.5	24.352	21.9	30.2	0.85	5713	3.12	65.04
005385471-02	OBS	No	12.426140	133.927027	845.0	29.494	20.6	31.1	0.85	5713	3.18	65.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005385471-01	OBS	FP	0.00	1	0	1	1	LPP_DV—LPP_ALT—CENT_UNRESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH
005385471-02	OBS	FP	0.00	1	0	1	1	LPP_DV—SAME_NTL_PERIOD—CENT_UNRESOLVED_OFFSET—HALO_GHOST—EPHEM_MATCH

**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 005385471-02

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	$\sigma_P$	$\sigma_T$
005385471-02	5385471	V380-Cyg-sec	5385723	1:1	166.8	15	-39	5.77	15.99	152.71	Direct-PRF	0	1.88	0.58

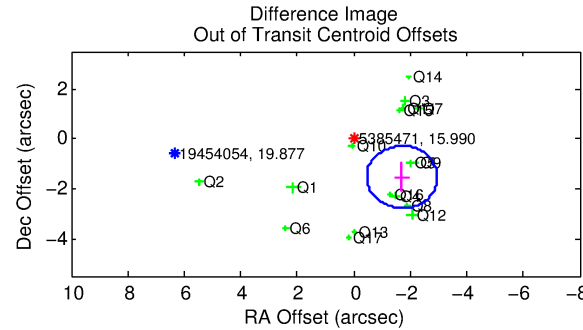
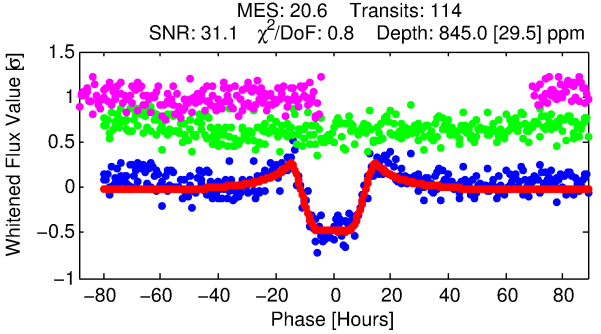
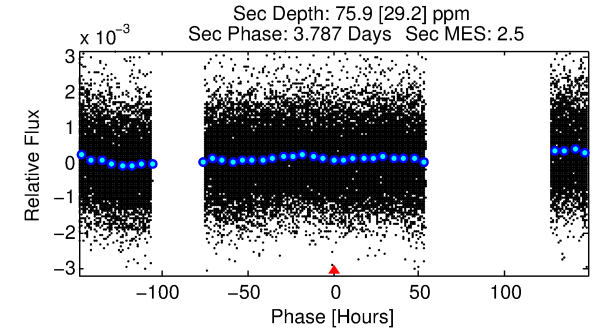
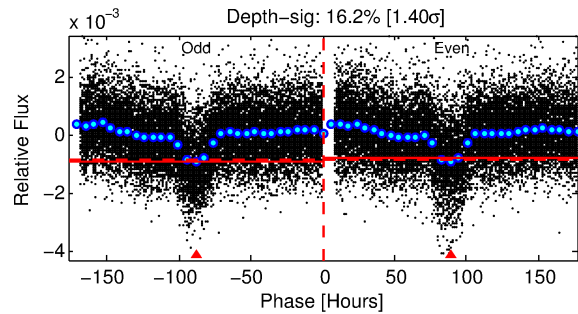
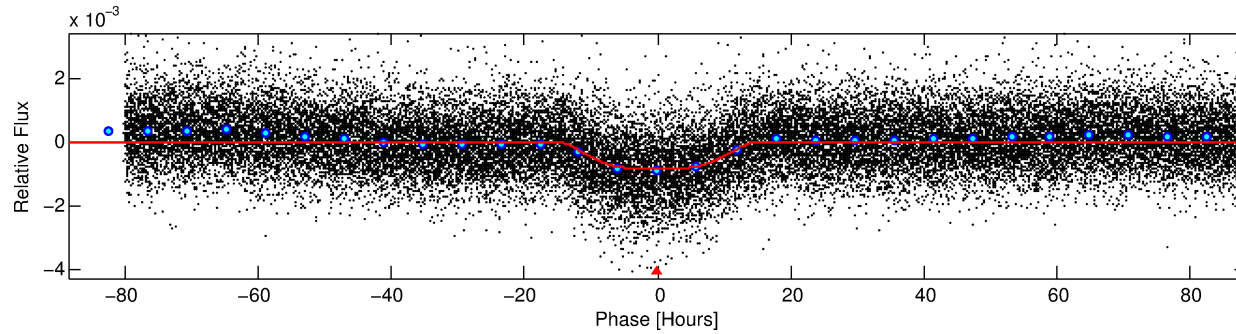
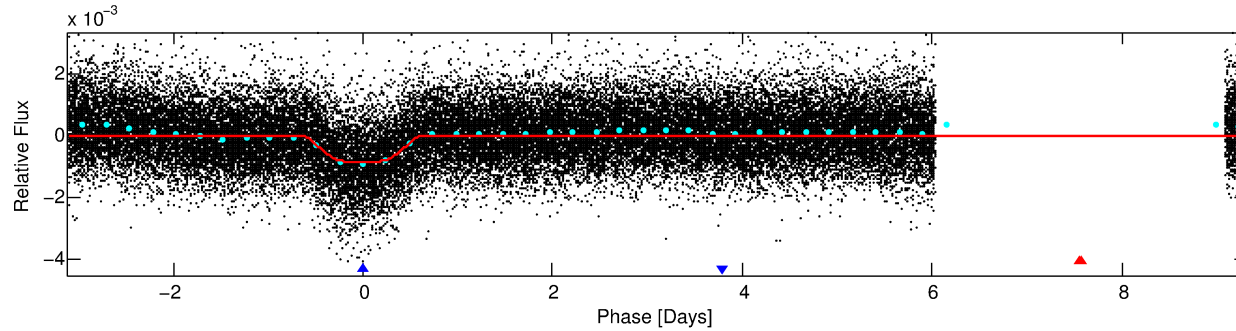
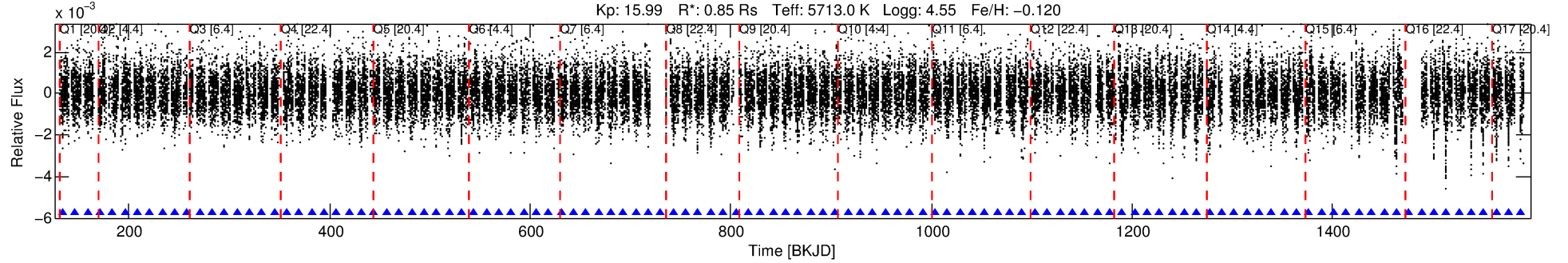
**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  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: 5385471 Candidate: 2 of 2 Period: 12.426 d

KOI: K03502 Corr: No Ephemeris Match

Kp: 15.99 R\*: 0.85 Rs Teff: 5713.0 K Logg: 4.55 Fe/H: -0.120



## DV Fit Results:

Period = 12.42614 [0.00023] d  
Epoch = 133.9270 [0.0142] BKJD  
Rp/R\* = 0.0342 [0.0008]  
a/R\* = 1.62 [0.04]  
b = 0.95 [0.00]  
Seff = 65.04 [20.88]  
Teq = 724 [58] K  
Rp = 3.18 [0.77] Re  
a = 0.1031 [0.0208] AU  
Ag = 43.88 [21.30] [2.01σ]  
Teff = 2882 [294] K [7.20σ]

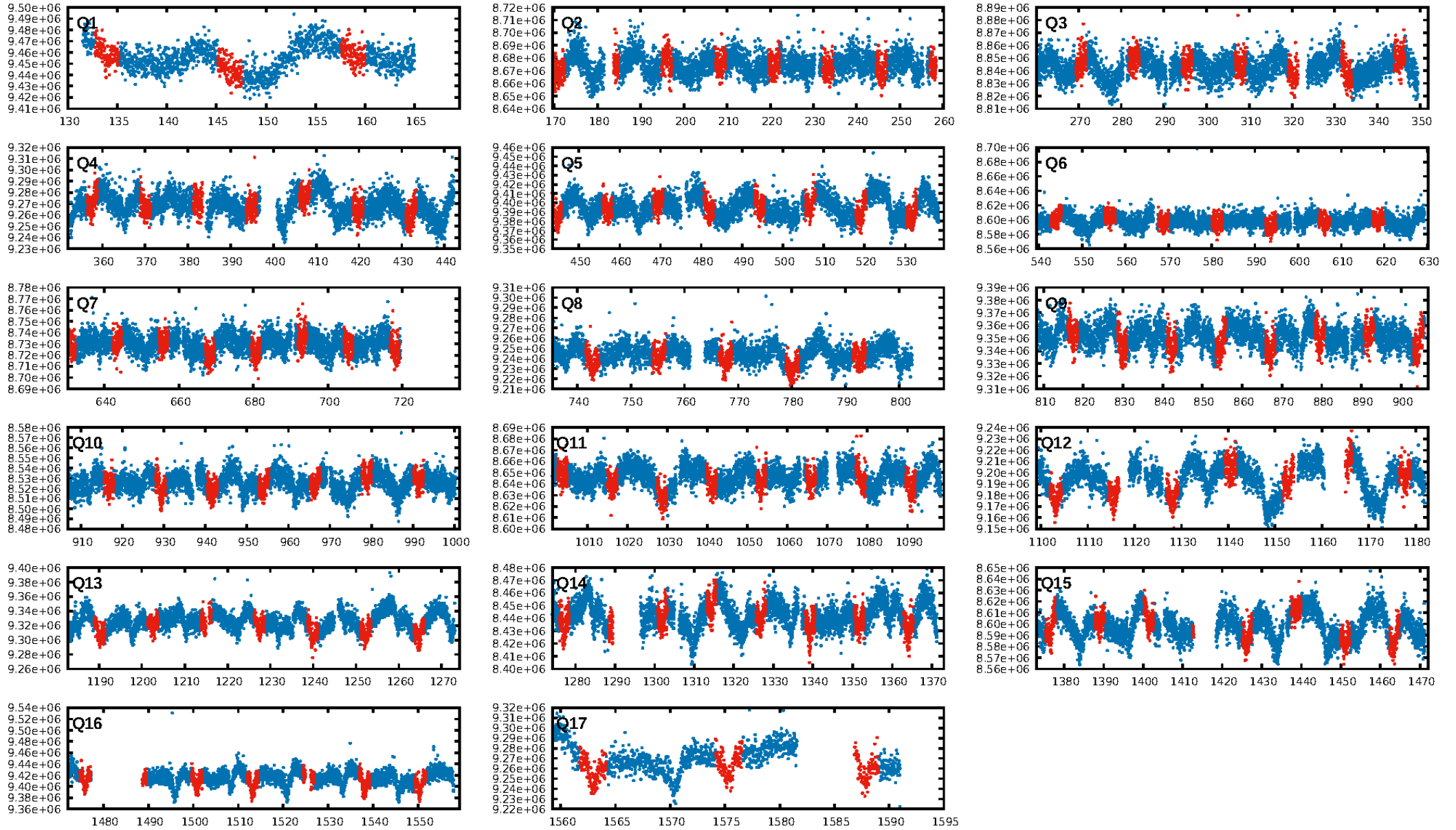
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.1%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 3.93e-110  
RollingBand-fgt: 1.00 [108/108]  
GhostDiagnostic-chr: -0.02141  
Centroid-sig: 0.0%  
Centroid-so: 1.198 arcsec [5.12σ]  
OotOffset-rm: 2.295 arcsec [5.52σ]  
KicOffset-rm: 2.193 arcsec [5.22σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.18 [3/17]  
DiffImageOverlap-fno: 1.00 [17/17]

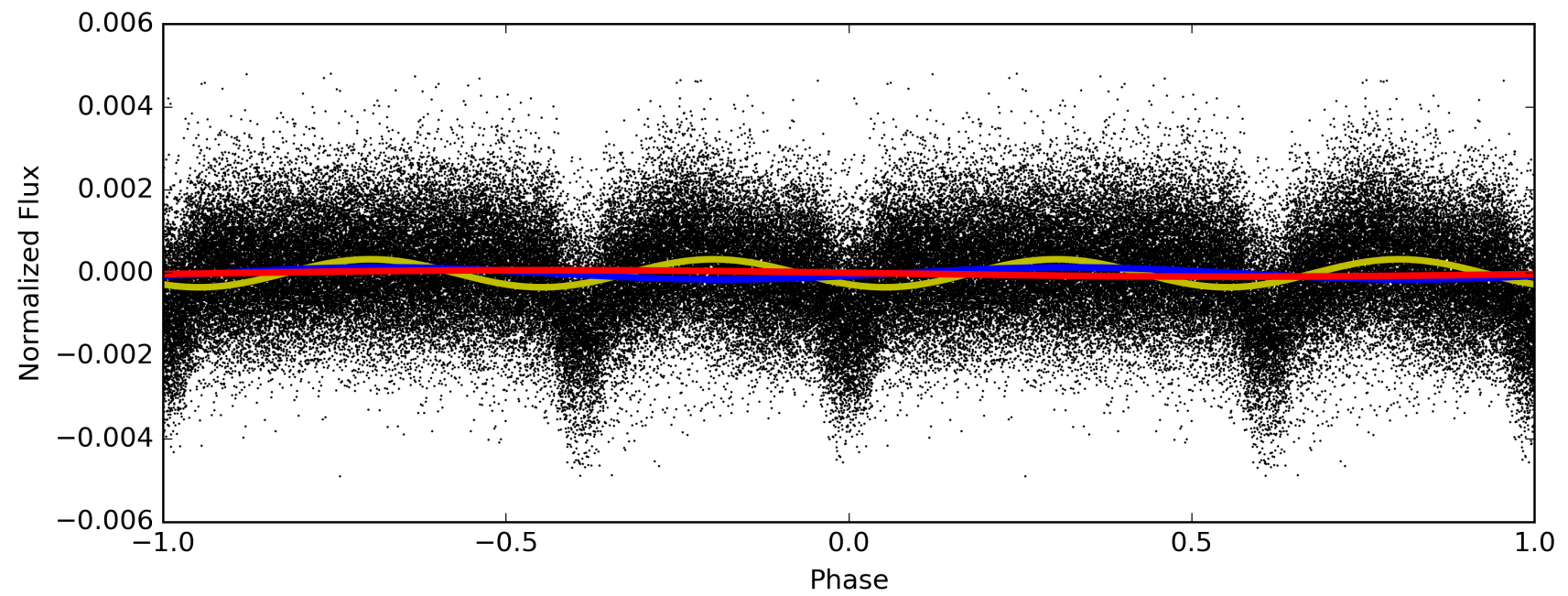
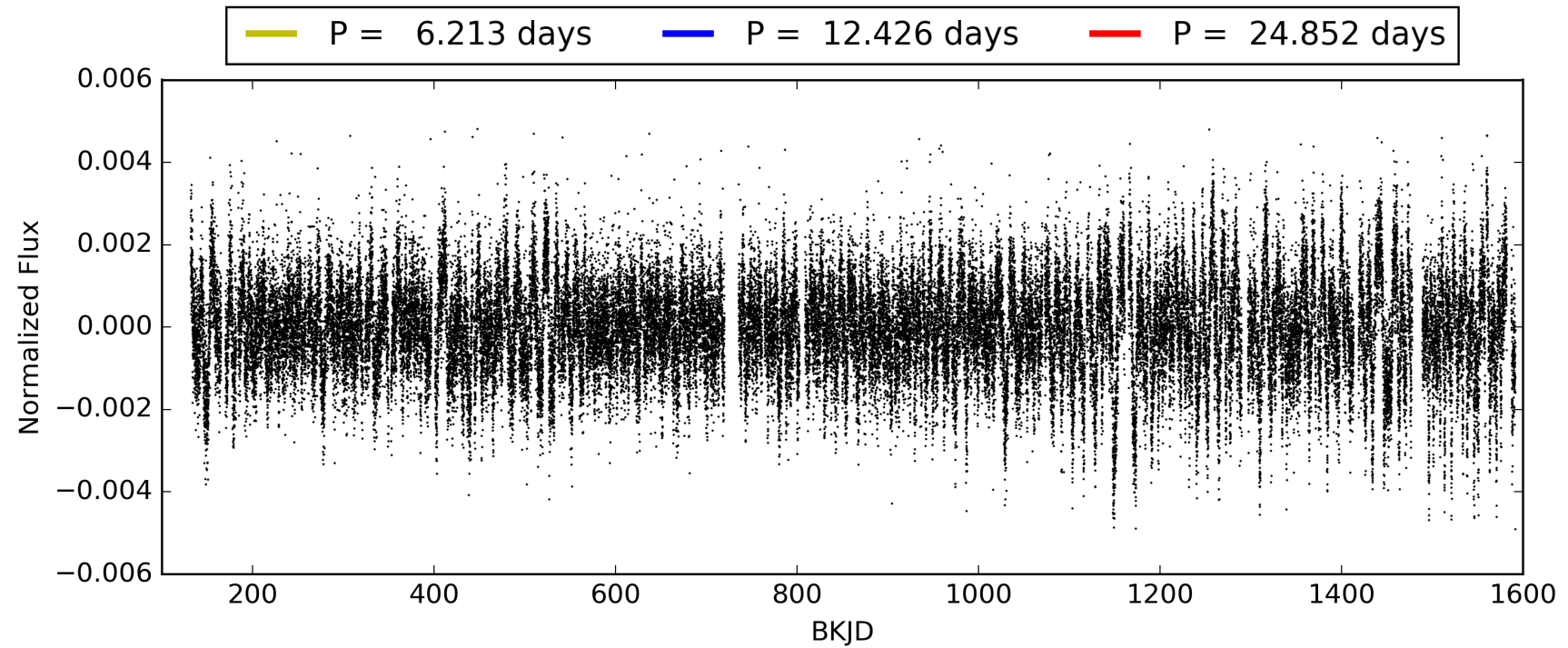
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 18:51:31 Z

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

# TCE 005385471-02, PDC Light Curves



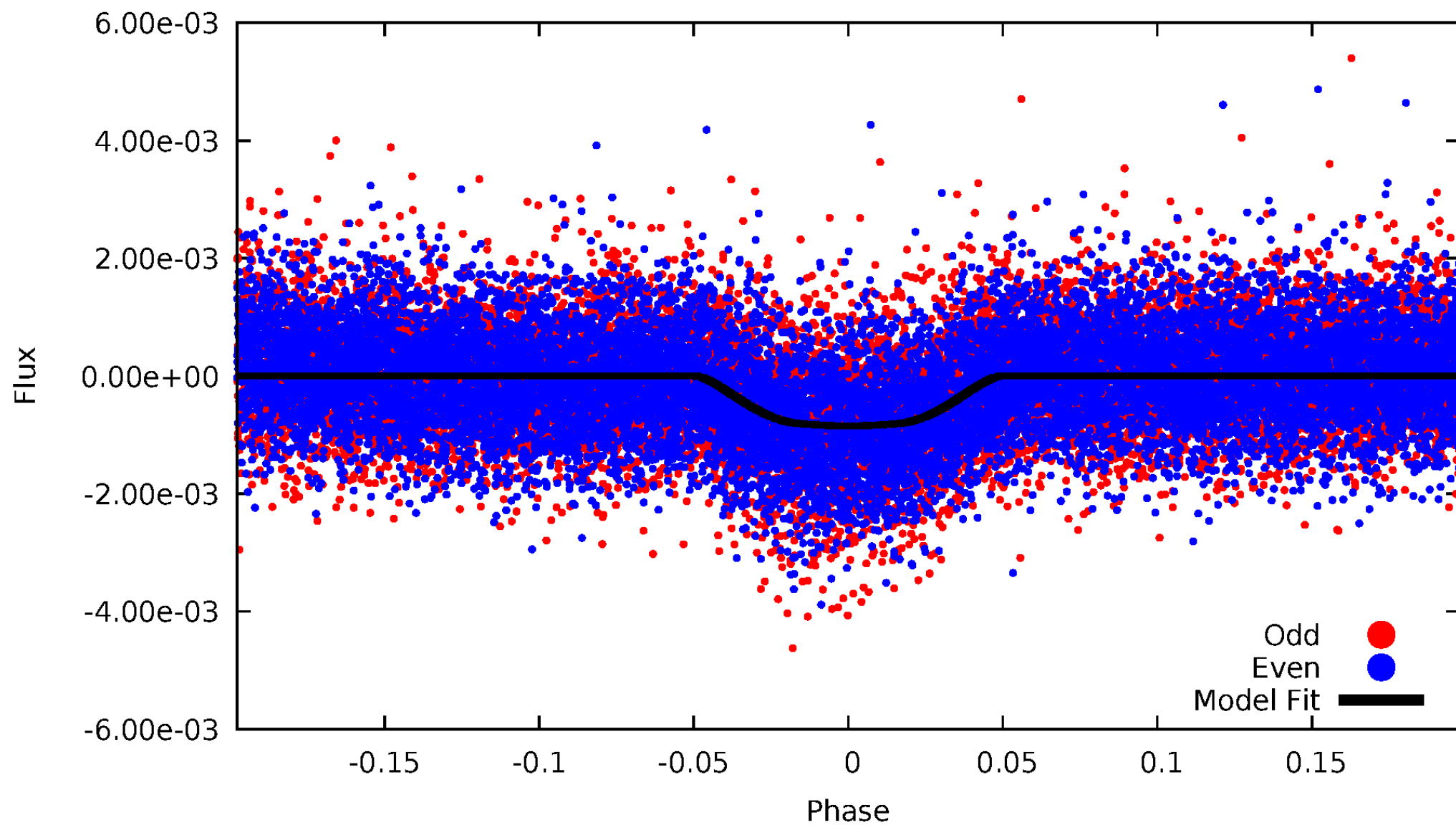
TCE 005385471-02





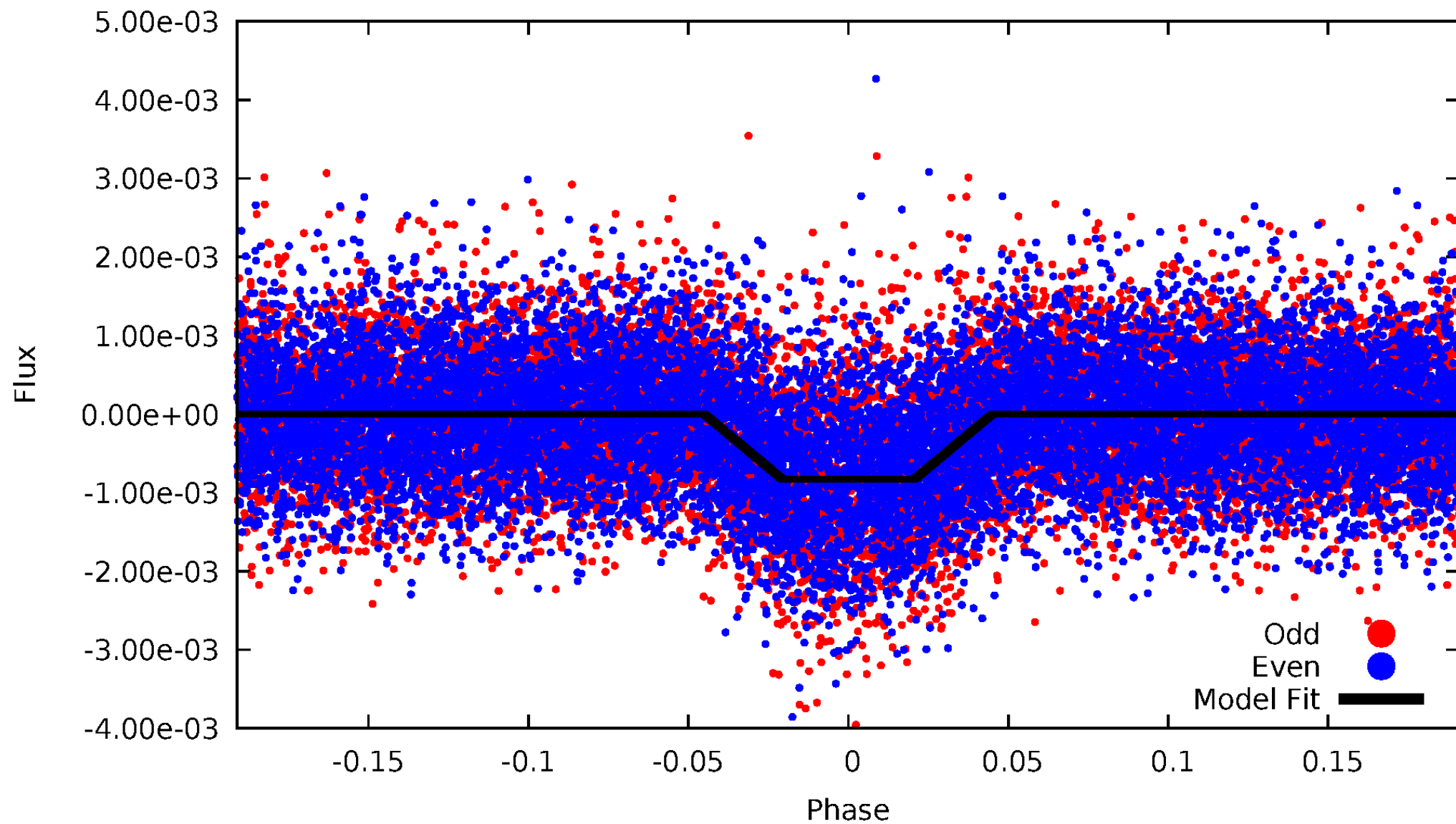
# DV Odd/Even

TCE 005385471-02



# ALT Odd/Even

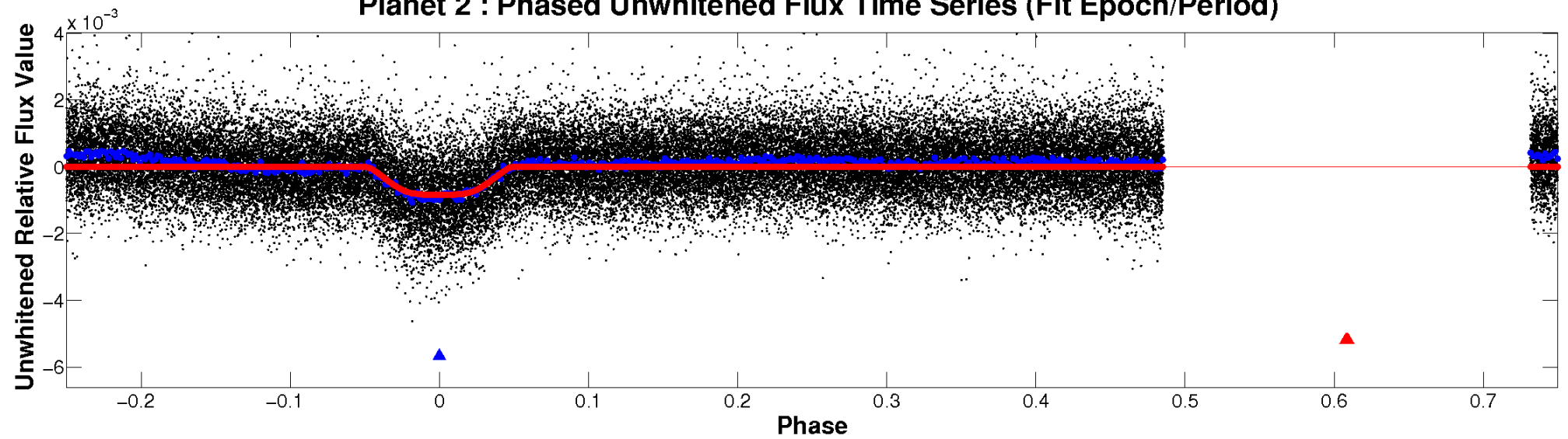
TCE 005385471-02



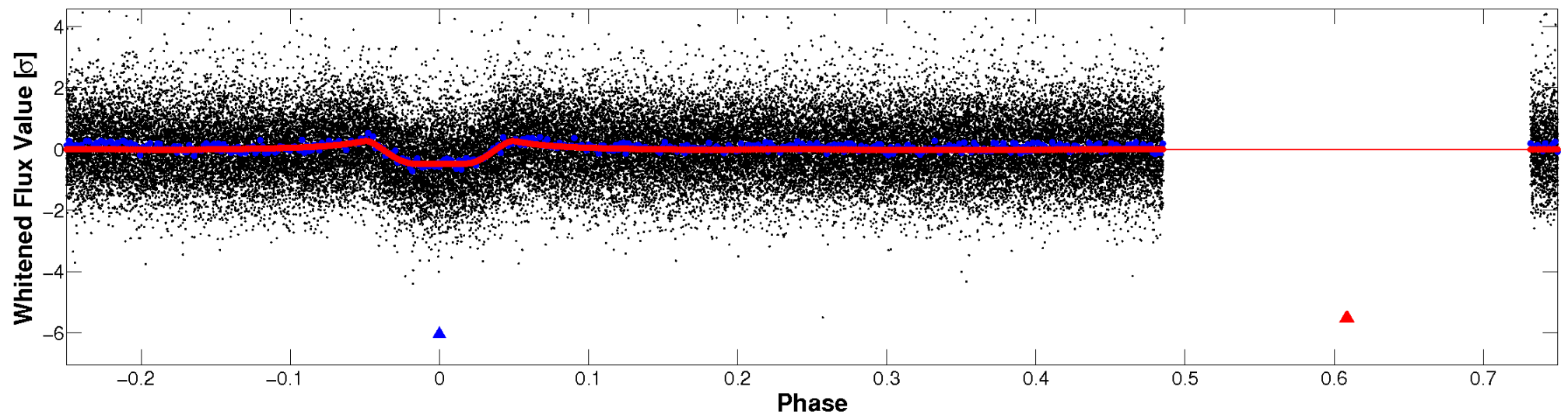


# Non-Whitened Vs. Whitened Light Curve

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

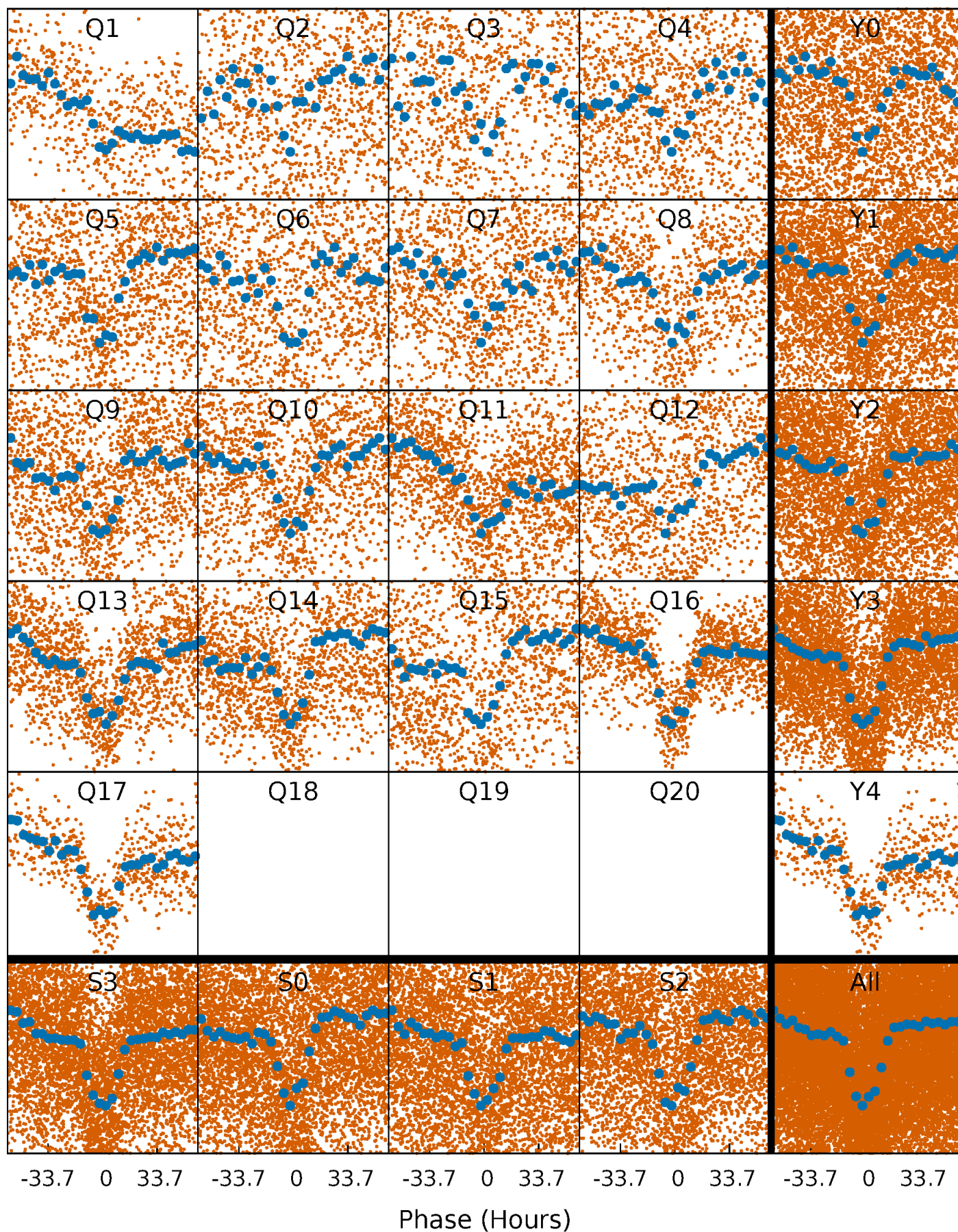


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

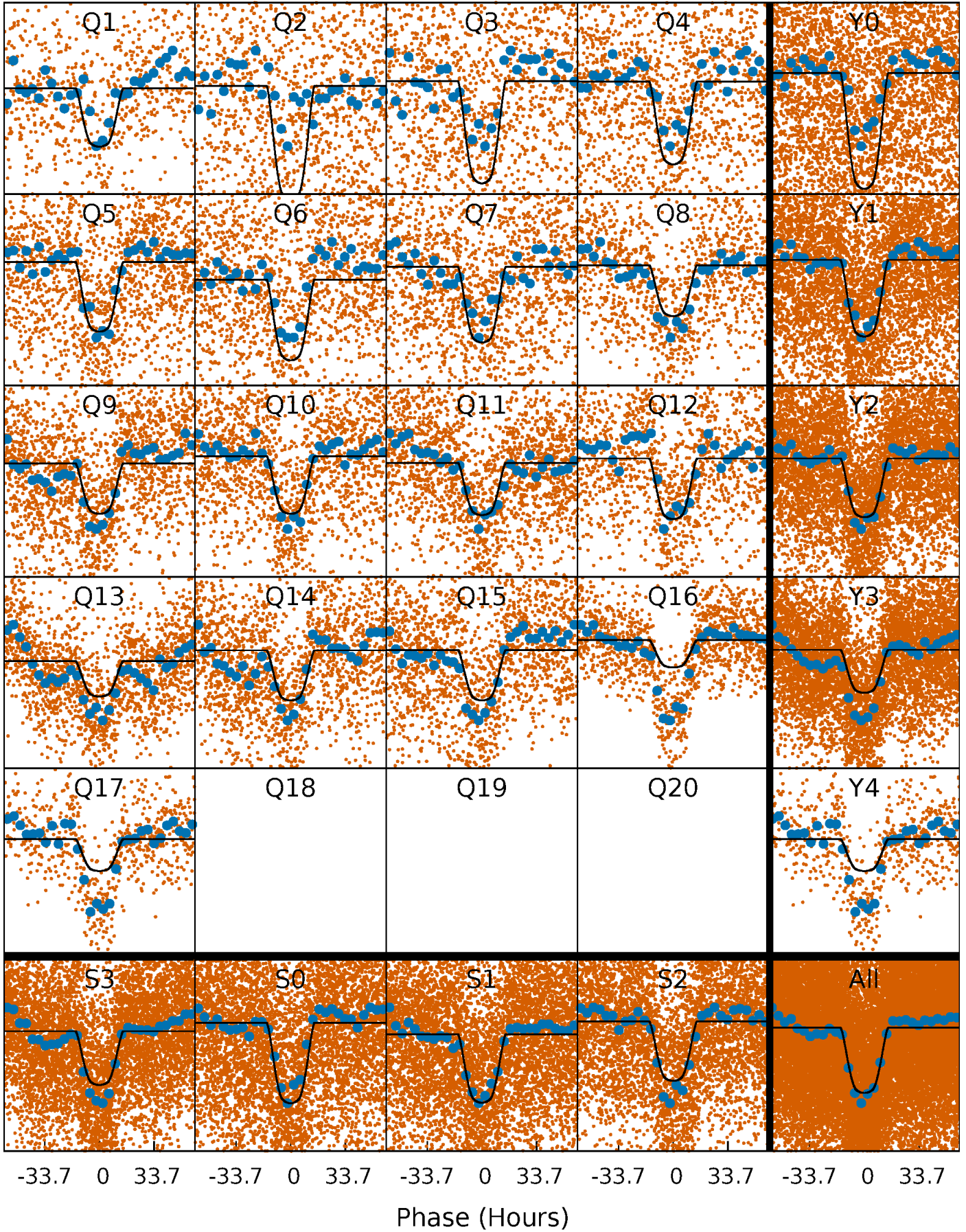
TCE 005385471-02 P= 12.426140 Days  $T_0=133.927027$  (BKJD)





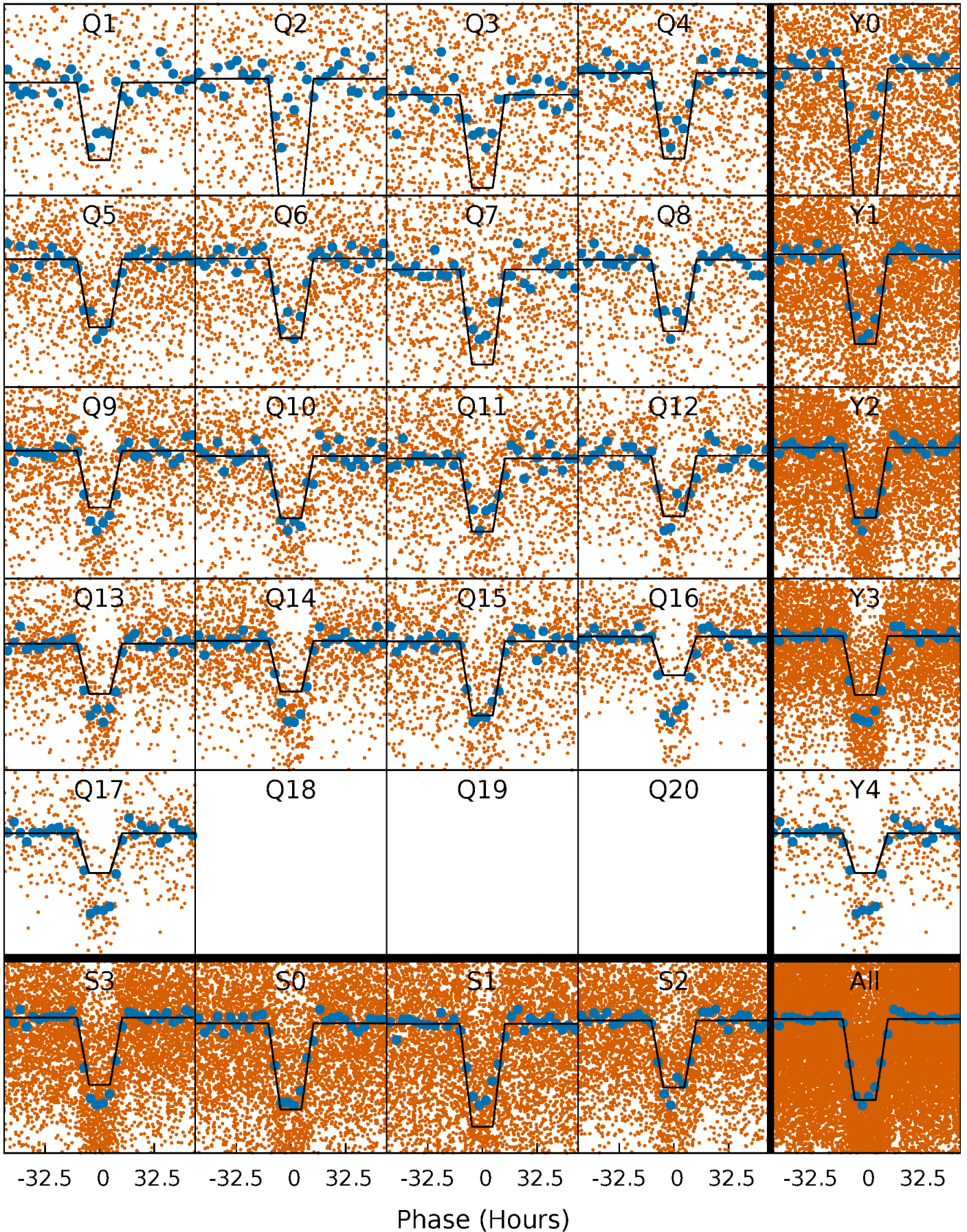
# DV Quarter-Phased Transit Curves

TCE 005385471-02 P= 12.426140 Days  $T_0=133.927027$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 005385471-02 P= 12.425003 Days  $T_0=133.995528$  (BKJD)

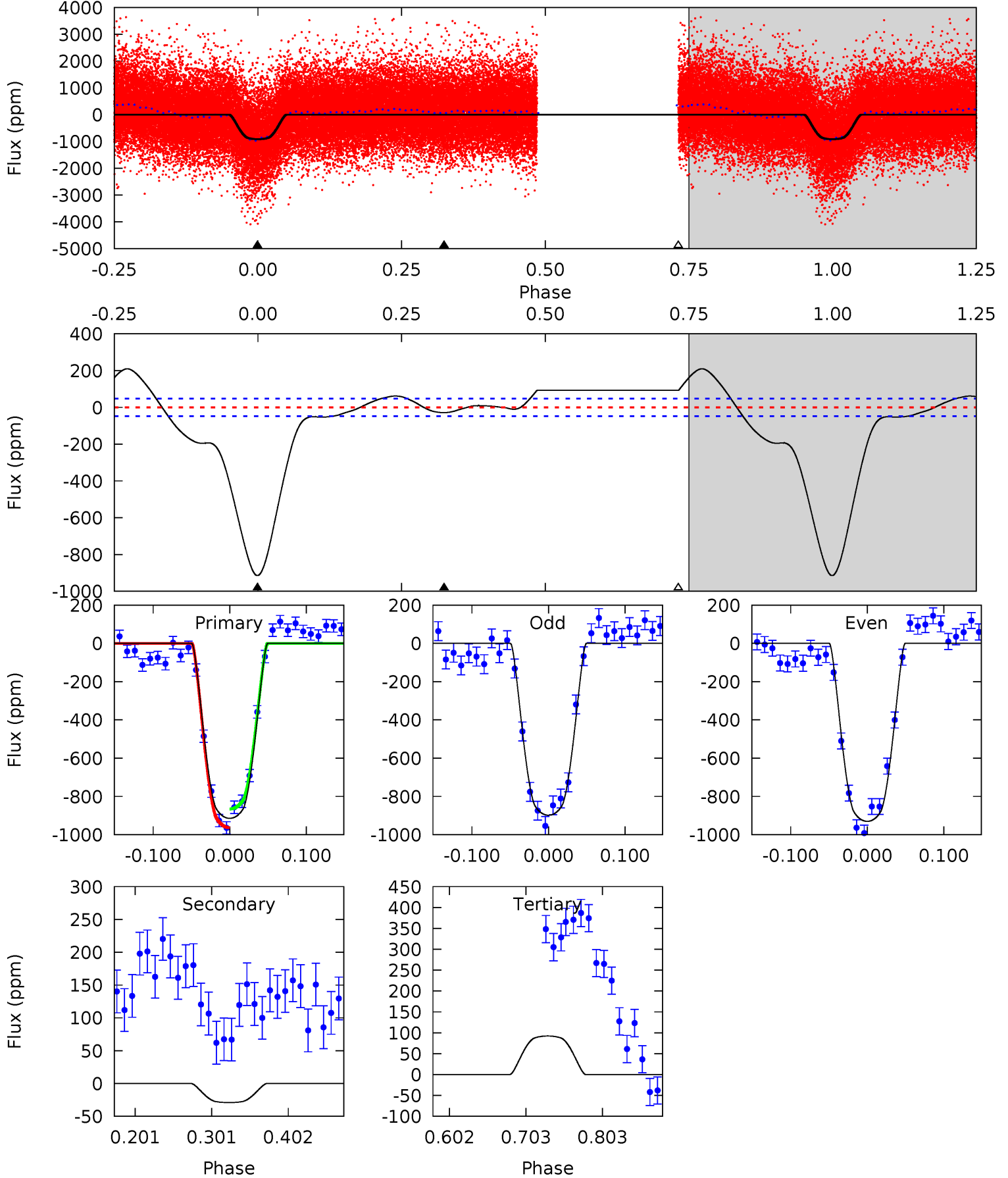




# DV Model-Shift Uniqueness Test

005385471-02, P = 12.426140 Days, E = 121.500887 Days

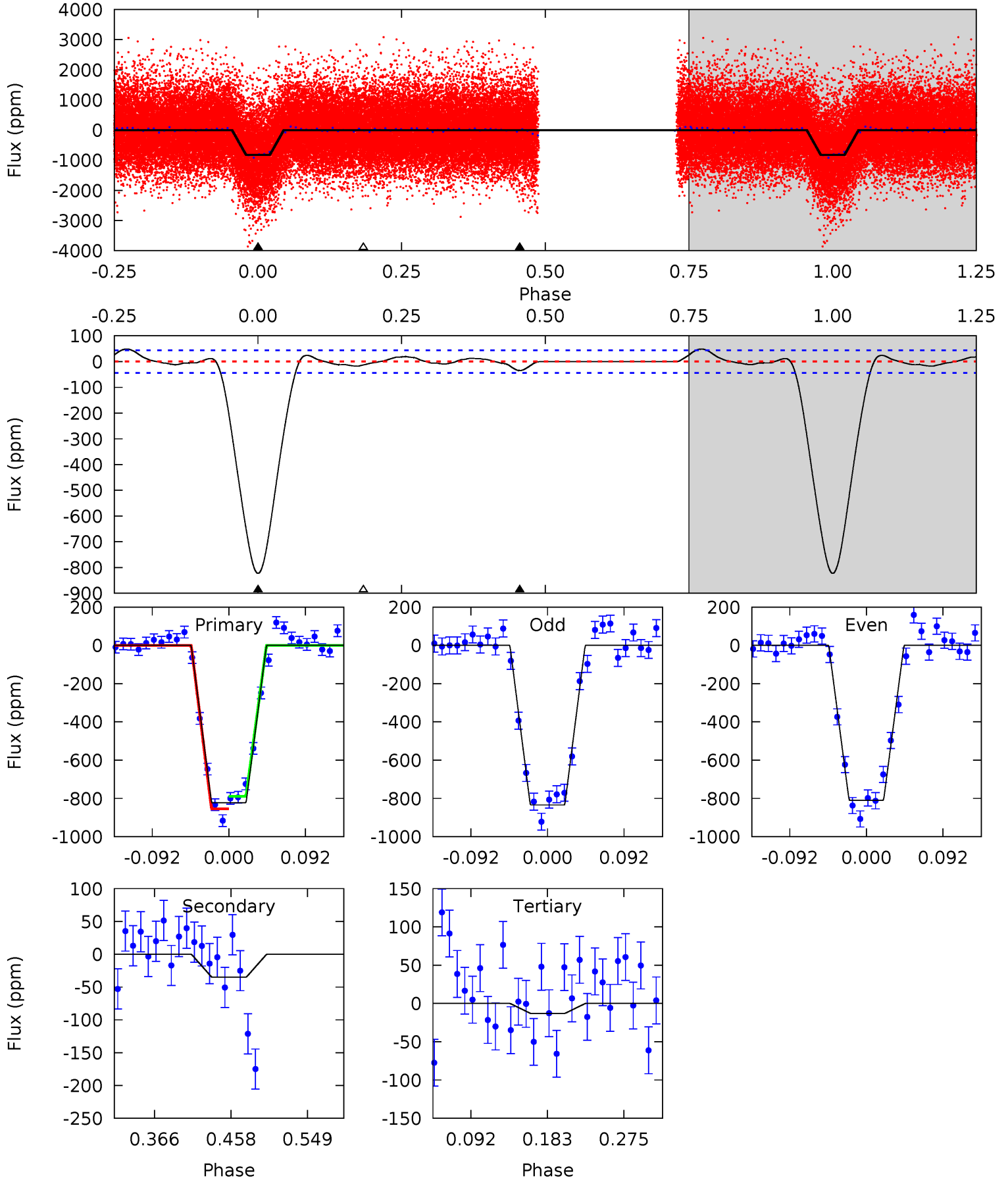
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
87.3	2.78	-8.82	0	4.56	1.64	9.73	96.1	87.3	11.6	2.78	1.54	1.03	0.19	4.84



# Alt Model-Shift Uniqueness Test

005385471-02,  $P = 12.425003$  Days,  $E = 121.570525$  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
85.8	3.65	1.35	0	4.58	1.69	1.64	84.4	85.8	2.30	3.65	1.29	0.97	0.06	3.46





### Stellar Parameters For KIC 005385471

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5713^{+169}_{-186}$	$4.554^{+0.040}_{-0.160}$	$-0.120^{+0.300}_{-0.300}$	$0.851^{+0.205}_{-0.073}$	$0.948^{+0.094}_{-0.115}$	$2.164^{+0.459}_{-0.952}$
	+3%/-3%	+1%/-4%	+250%/-250%	+24%/-9%	+10%/-12%	+21%/-44%
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 005385471-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-29 \pm 10$	$3.26^{+0.44}_{-0.22}$	$1034^{+57}_{-45}$	$2941^{+142}_{-162}$	$15^{+6}_{-6}$
Alt.	$-35 \pm 10$	$2.74^{+0.32}_{-0.20}$	$1029^{+61}_{-45}$	$3177^{+135}_{-163}$	$26^{+8}_{-8}$

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

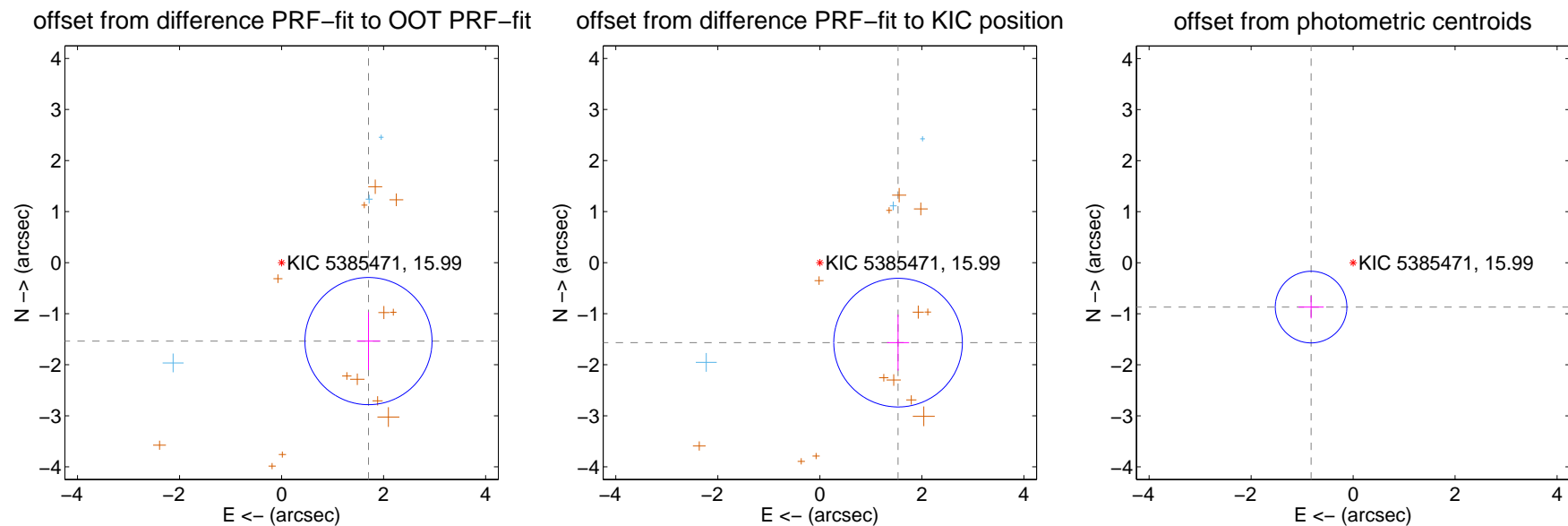
## DV Centroid Data

Supplemental centroid analysis for 005385471-02. Kepler magnitude: 15.99. Transit SNR 31.07

There are 3 quarters with good PRF difference image offsets

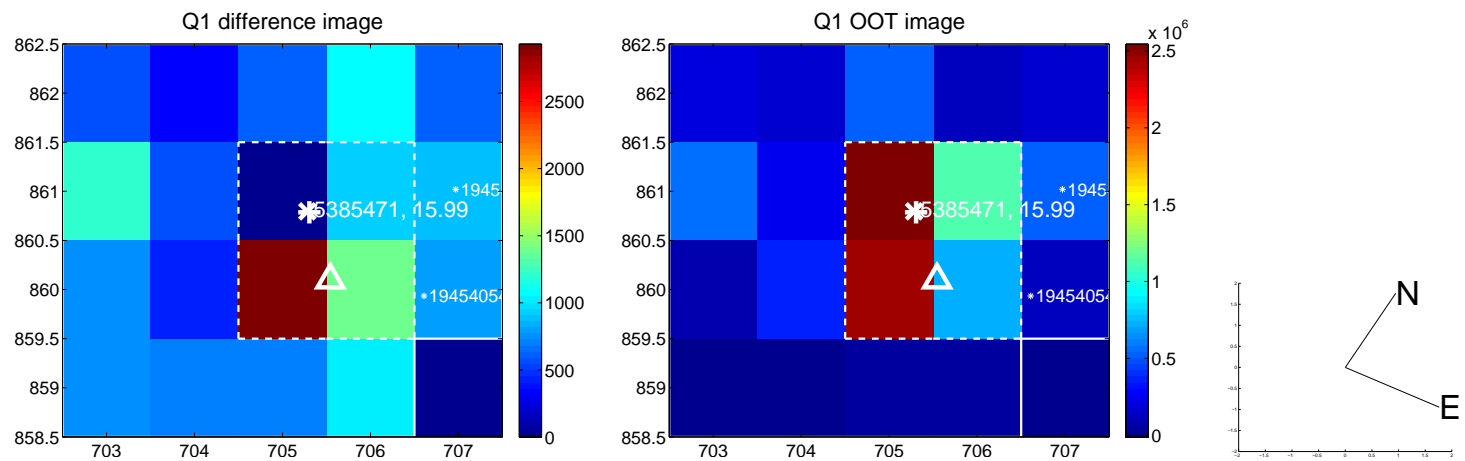
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.295 \pm 0.415$	5.52	$-1.704 \pm 0.227$	$-1.537 \pm 0.566$
PRF-fit source offset from KIC position	$2.193 \pm 0.420$	5.22	$-1.534 \pm 0.216$	$-1.567 \pm 0.548$
photometric centroid source offset	$1.20 \pm 0.23$	5.12	$0.82 \pm 0.25$	$-0.87 \pm 0.22$

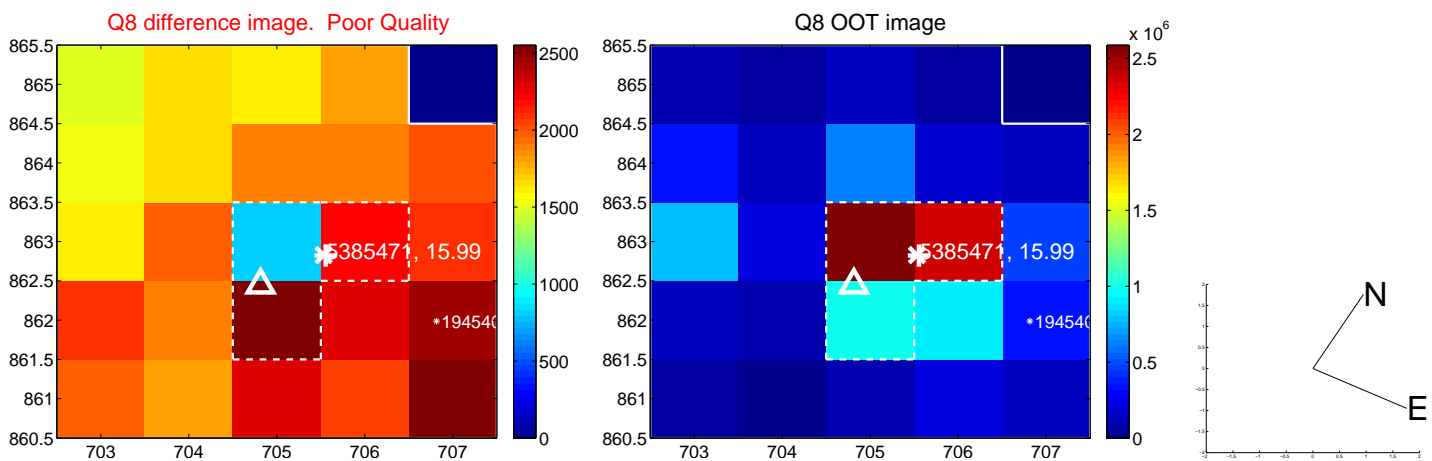
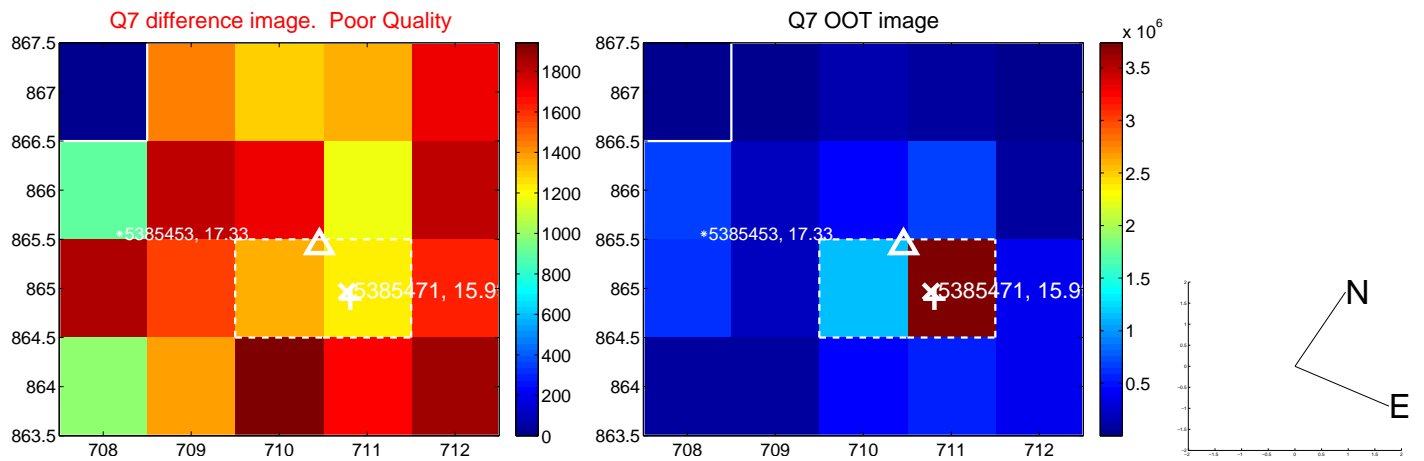
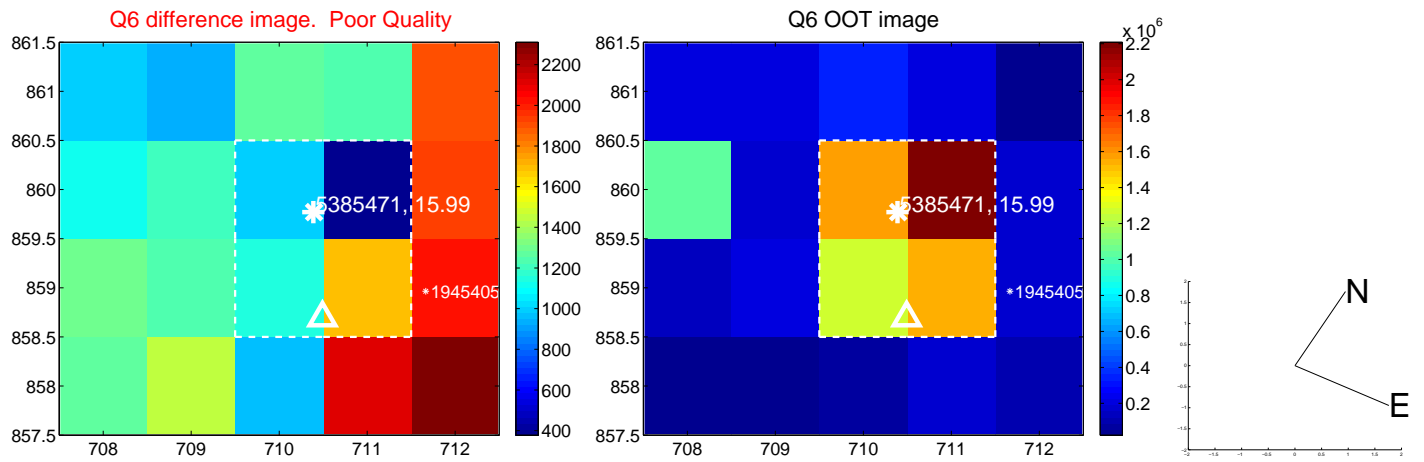
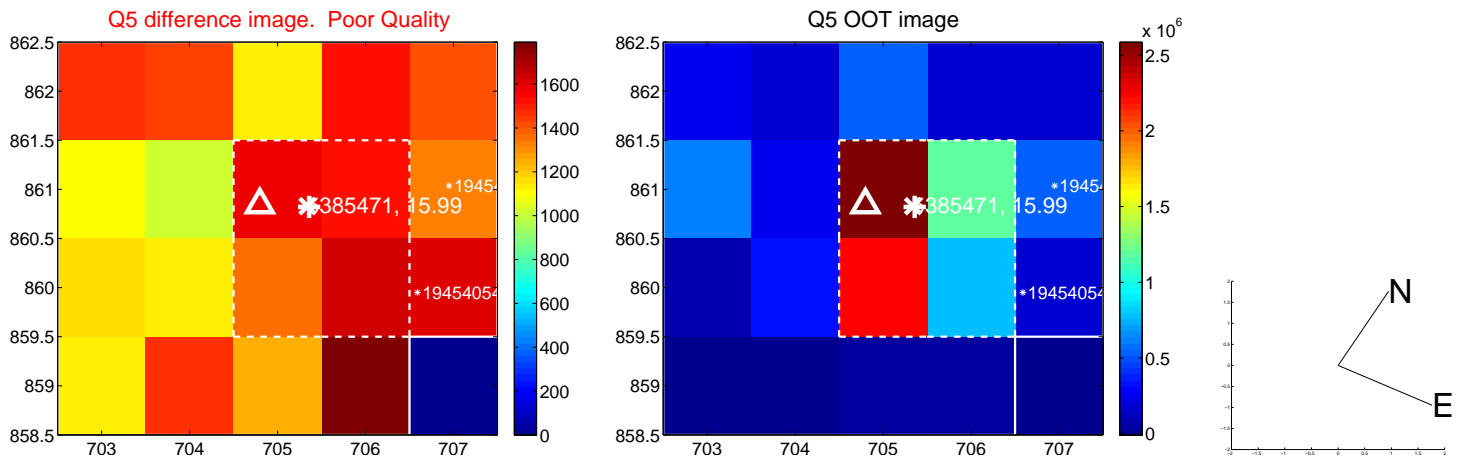


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

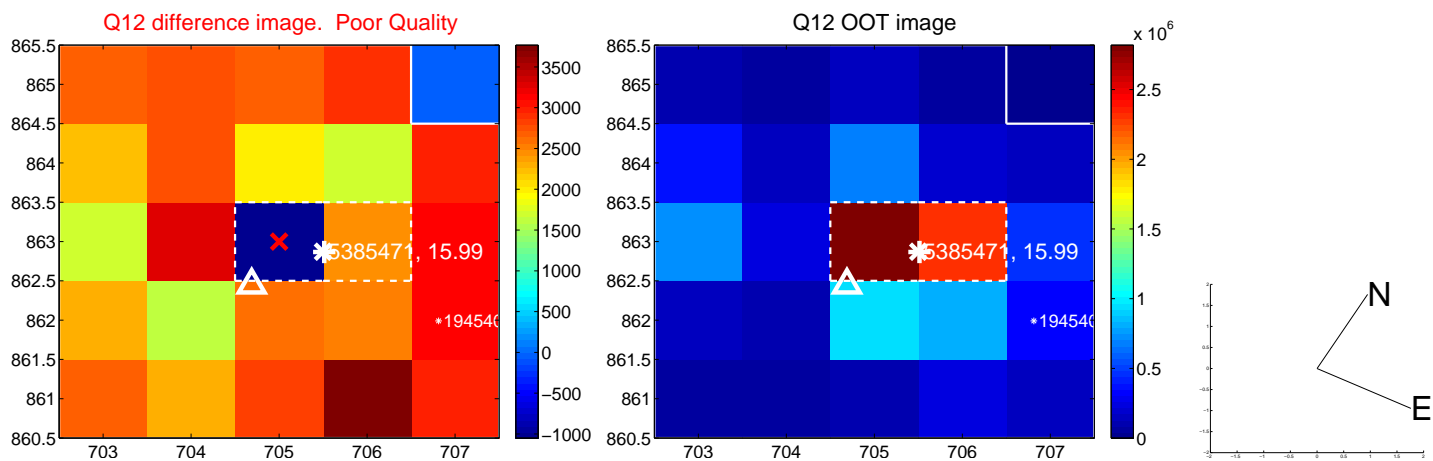
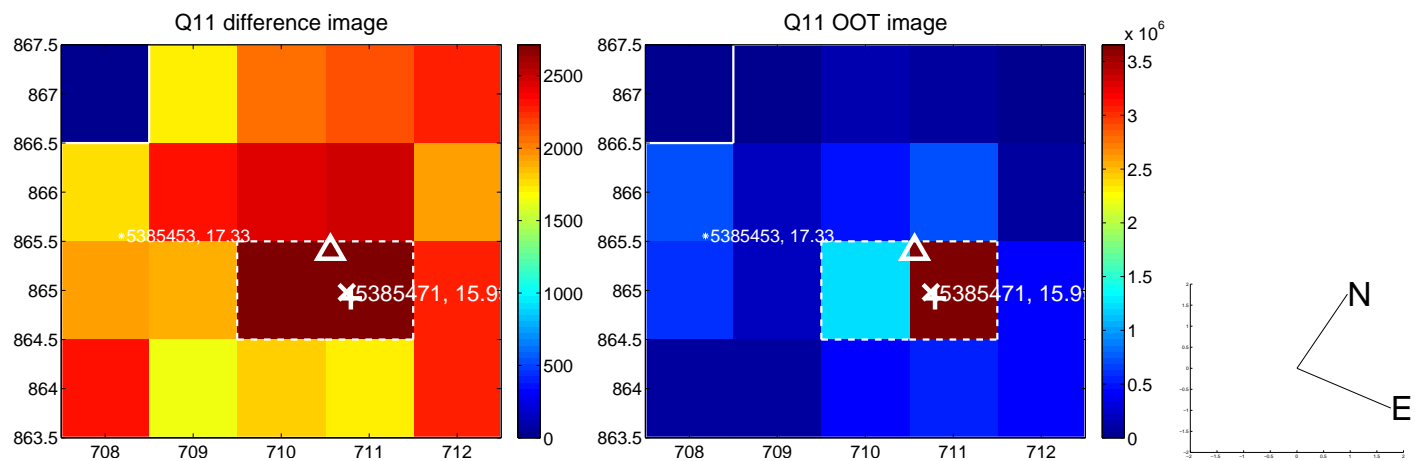
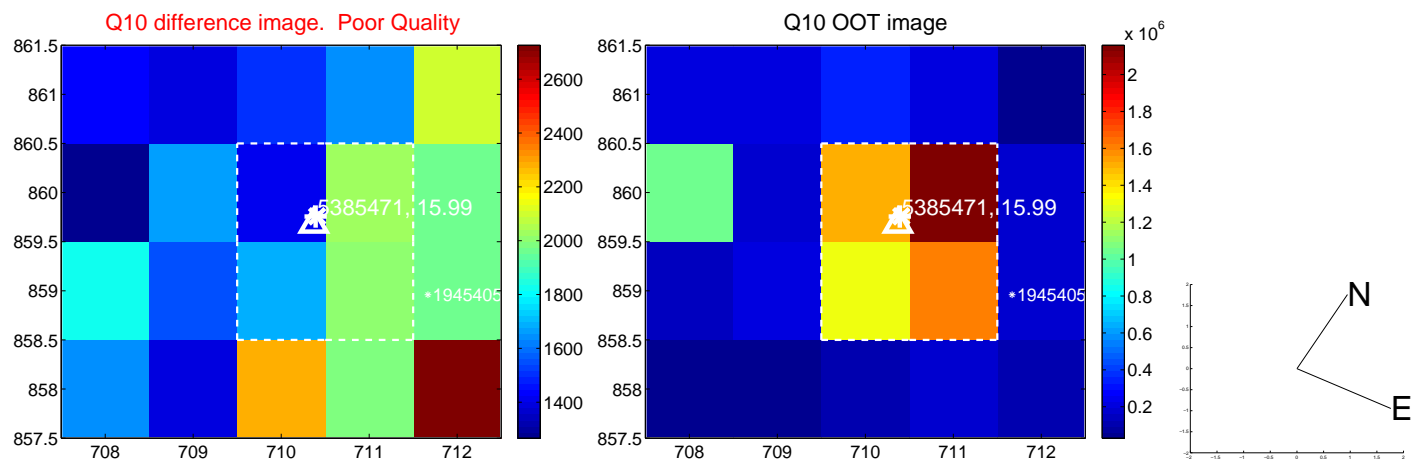
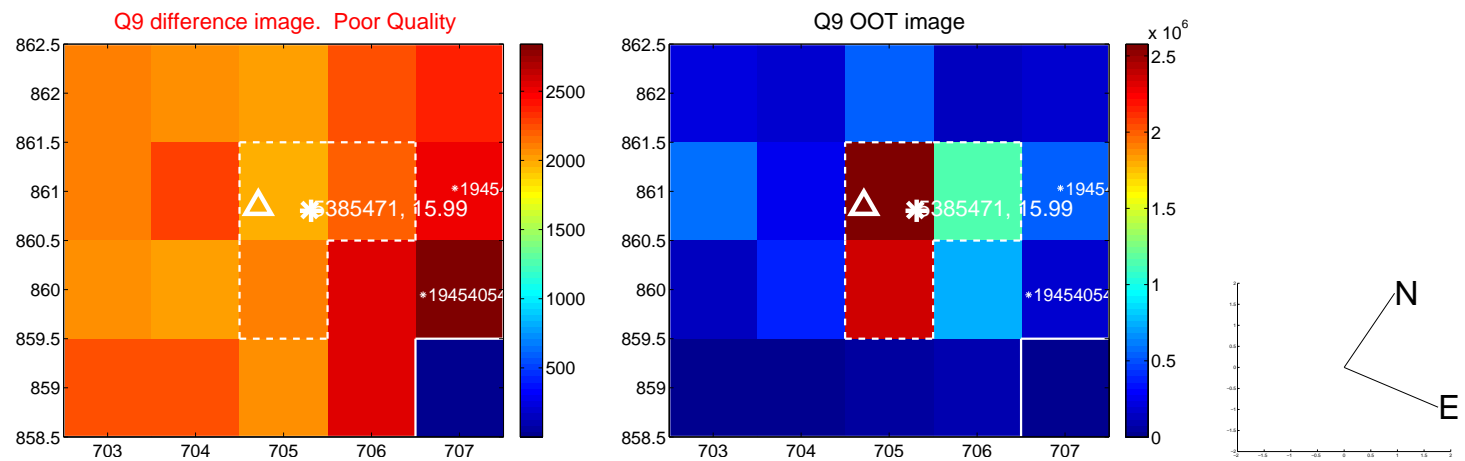
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

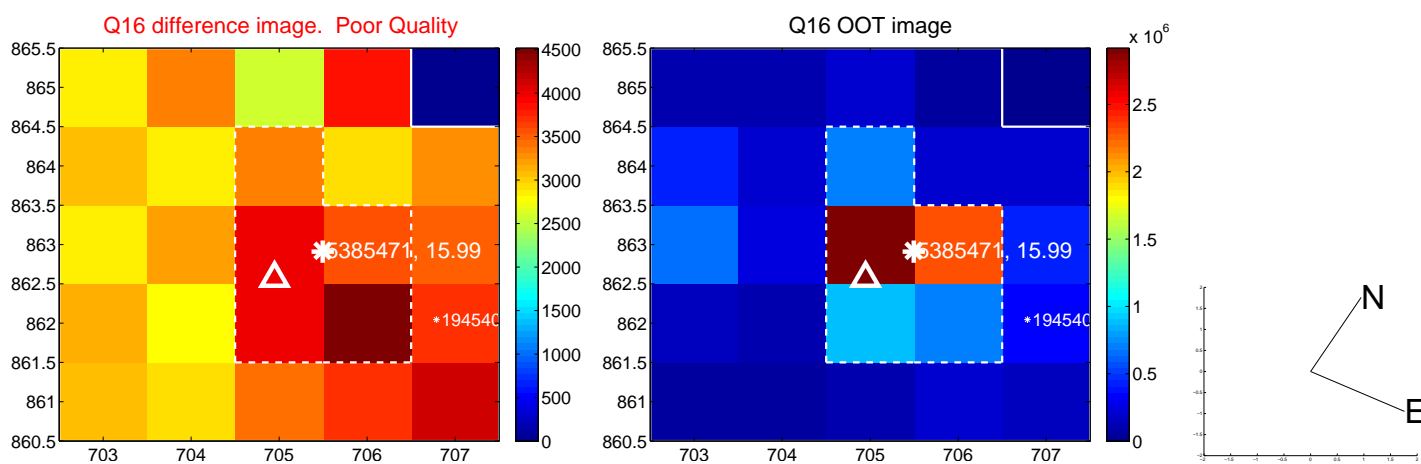
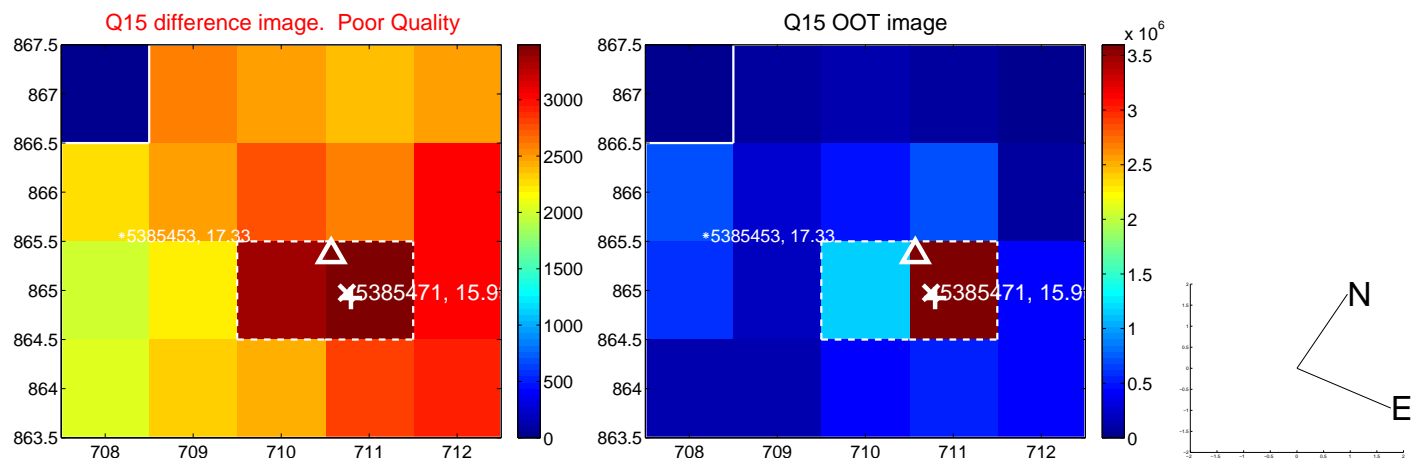
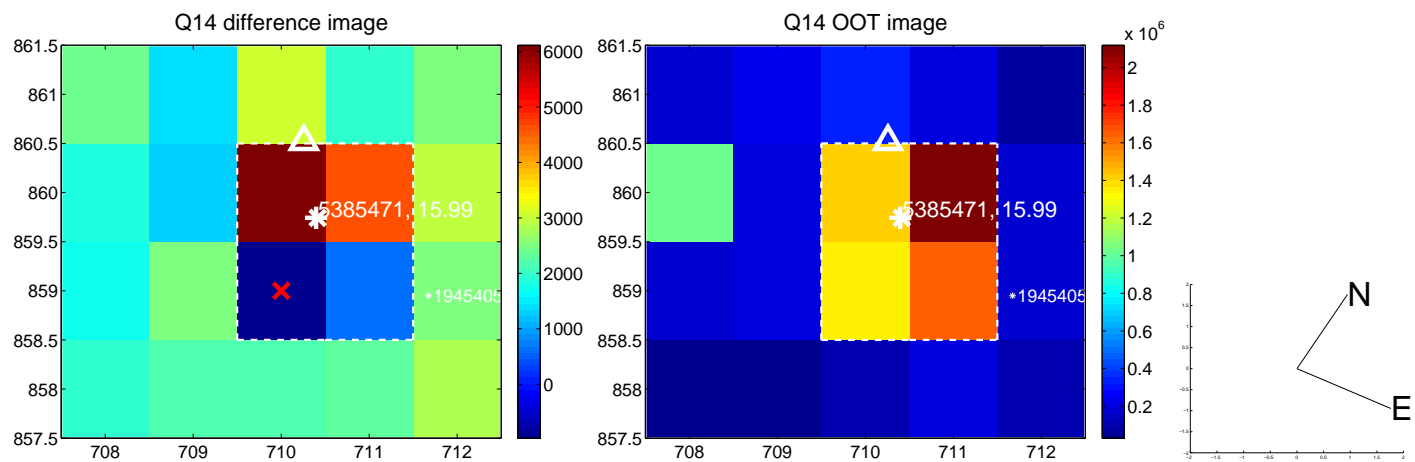
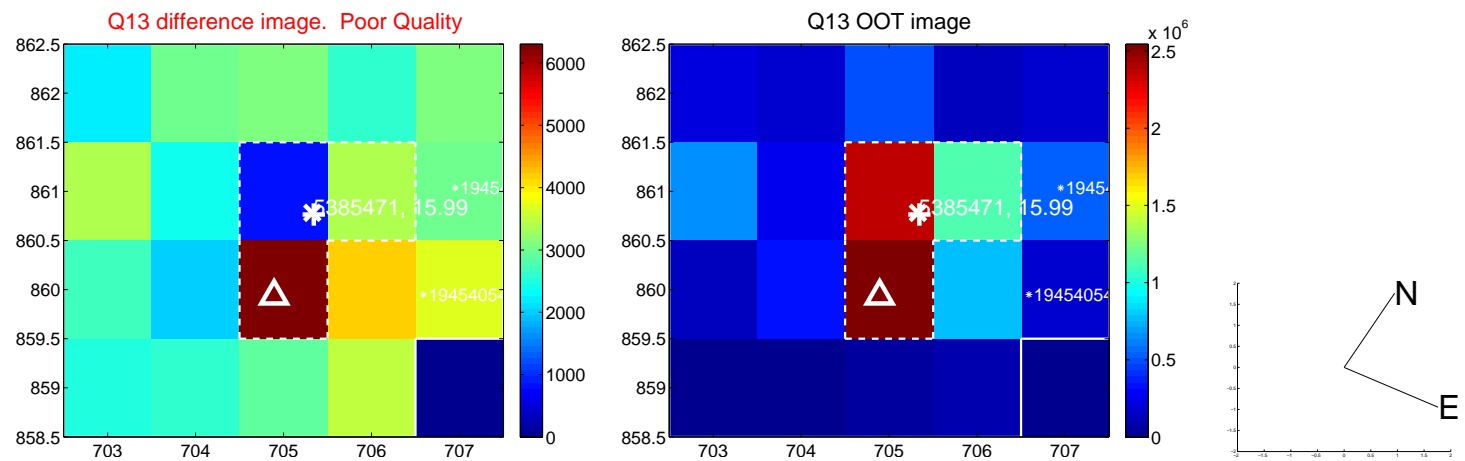


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

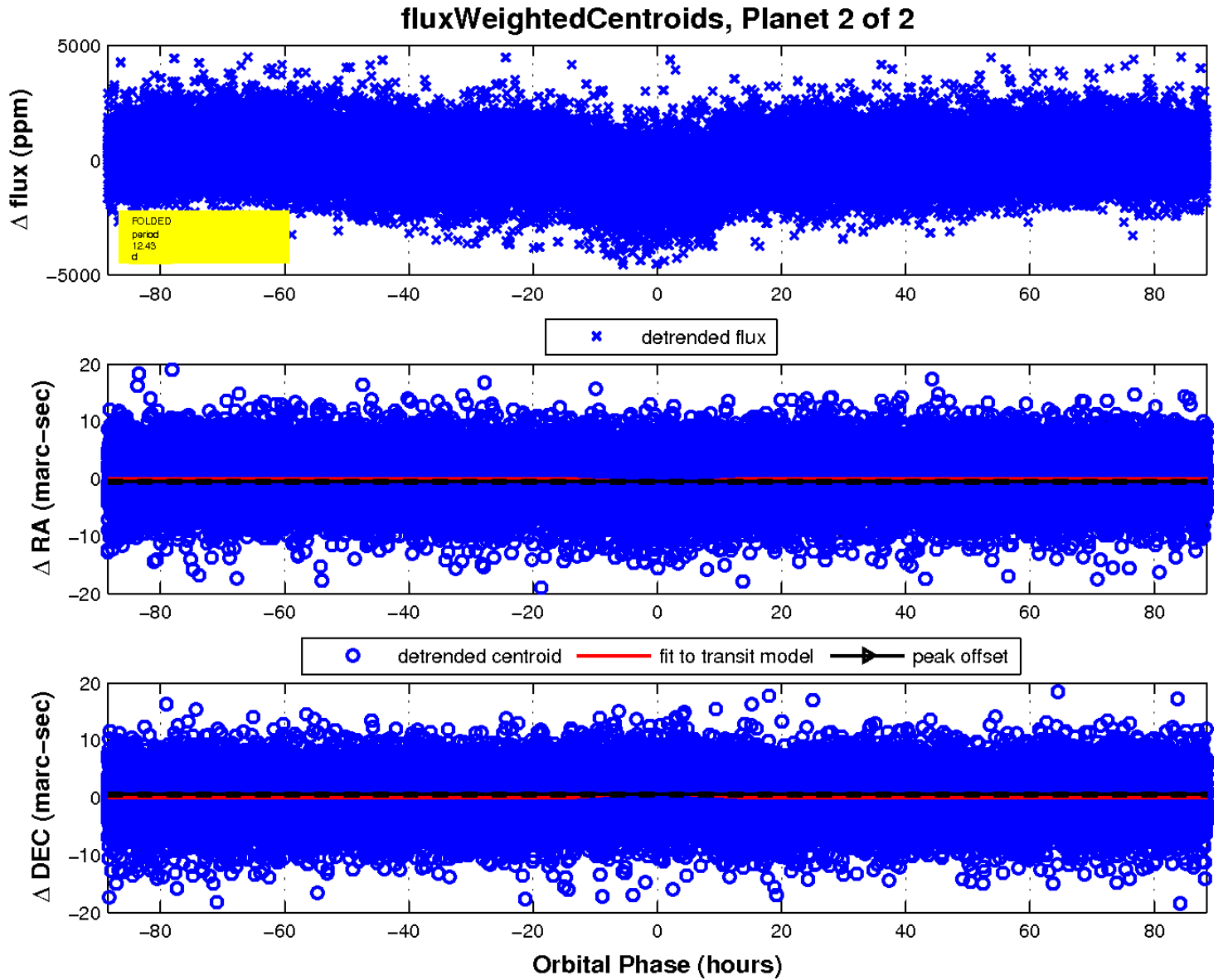
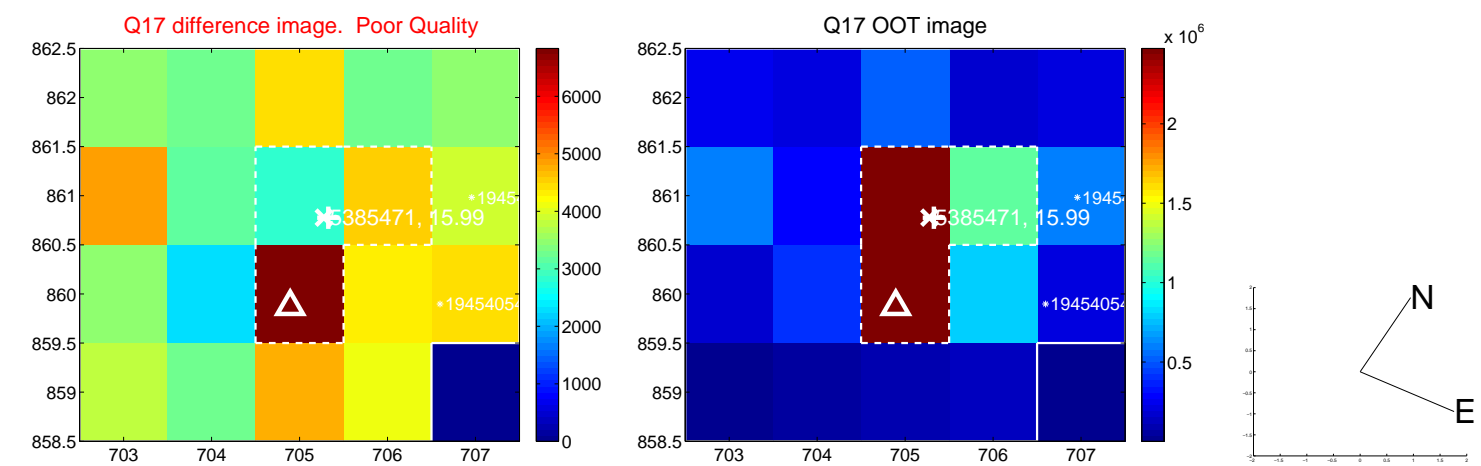




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image

Declination

