

# KIC 010736179

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010736179-01	OBS	4408.01	2.210160	132.559519	148.7	2.771	8.5	12.0	0.75	5296	1.14	409.51
010736179-02	OBS	No	1.105053	132.564933	124.0	2.587	10.5	10.2	0.75	5296	1.00	1031.94

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010736179-01	OBS	FP	0.00	0	1	0	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—EPHEM_MATCH
010736179-02	OBS	FP	0.00	1	1	0	1	IS_SEC_TCE—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.

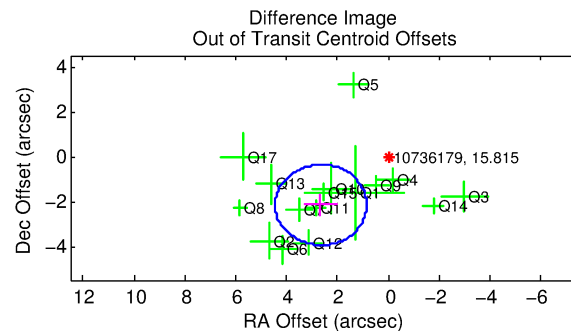
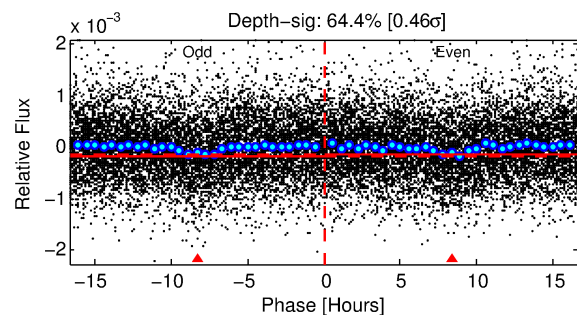
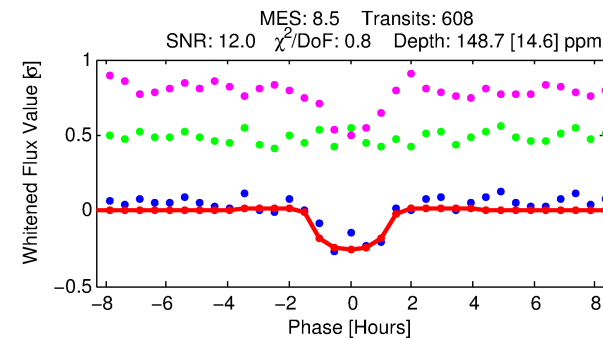
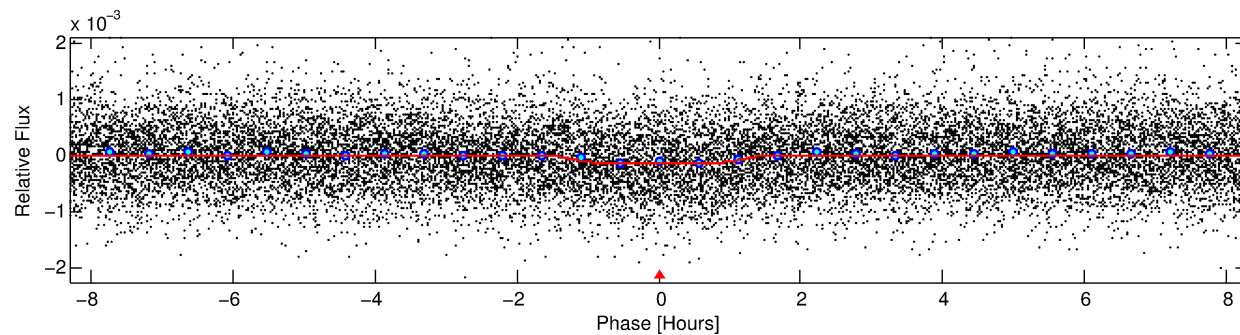
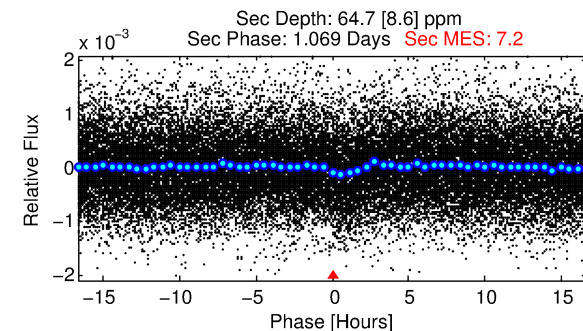
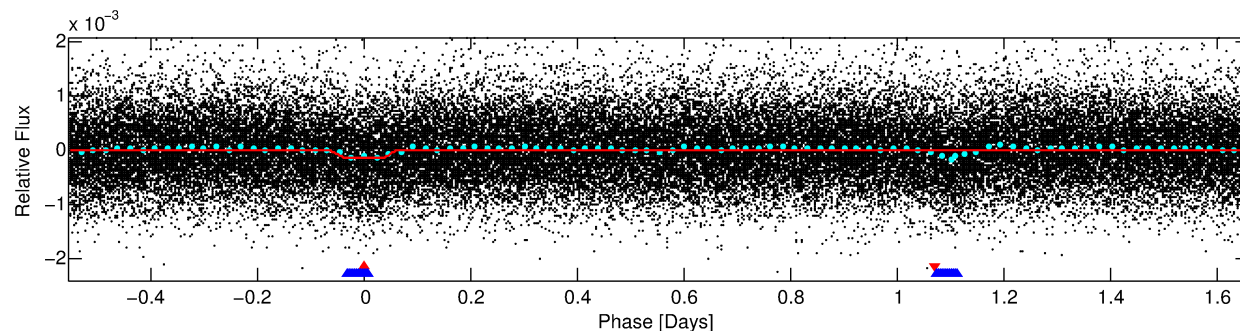
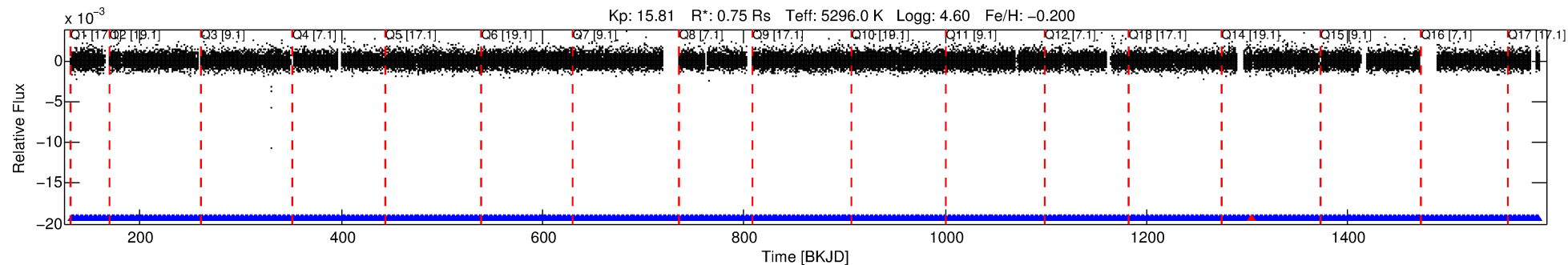
## Ephemeris Match Information For 010736179-01

TCE (1)	KIC	Parent (2)	Parent KIC	P <sub>1</sub> :P <sub>2</sub>	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	m <sub>2</sub>	m <sub>1</sub>	D <sub>2</sub> /D <sub>1</sub>	Mechanism	Flag	$\sigma_P$	$\sigma_T$
010736179-01	10736179	V2290-Cyg-pri	10736223	2:1	46.5	9	7	13.65	15.81	5215.80	Direct-PRF	0	1.99	0.93

**Notes:** P<sub>1</sub>:P<sub>2</sub> 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<sub>2</sub> and m<sub>1</sub> are the magnitudes of the parent and child. D<sub>2</sub>/D<sub>1</sub> 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: 10736179 Candidate: 1 of 2 Period: 2.210 d  
KOI: K04408 Corr: No Ephemeris Match



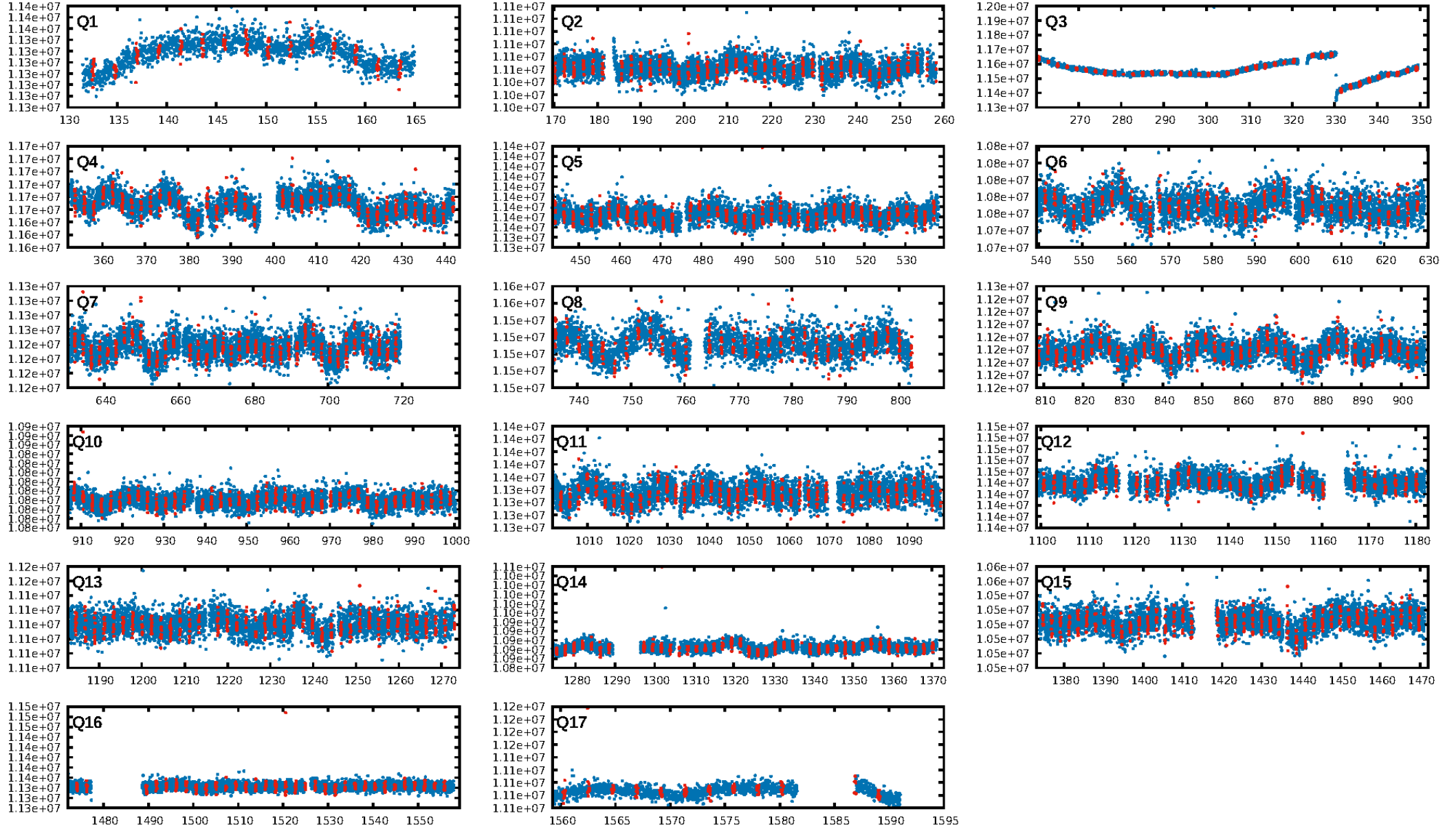
## DV Fit Results:

Period = 2.21016 [0.00001] d  
Epoch = 132.5595 [0.0034] BKJD  
Rp/R\* = 0.0139 [0.0061]  
a/R\* = 2.70 [4.58]  
b = 0.93 [0.31]  
Seff = 409.51 [89.99]  
Teq = 1147 [63] K  
Rp = 1.14 [0.53] Re  
a = 0.0312 [0.0041] AU  
Ag = 26.67 [24.13] [1.06σ]  
**Teffp = 4030 [901] K [3.19σ]**

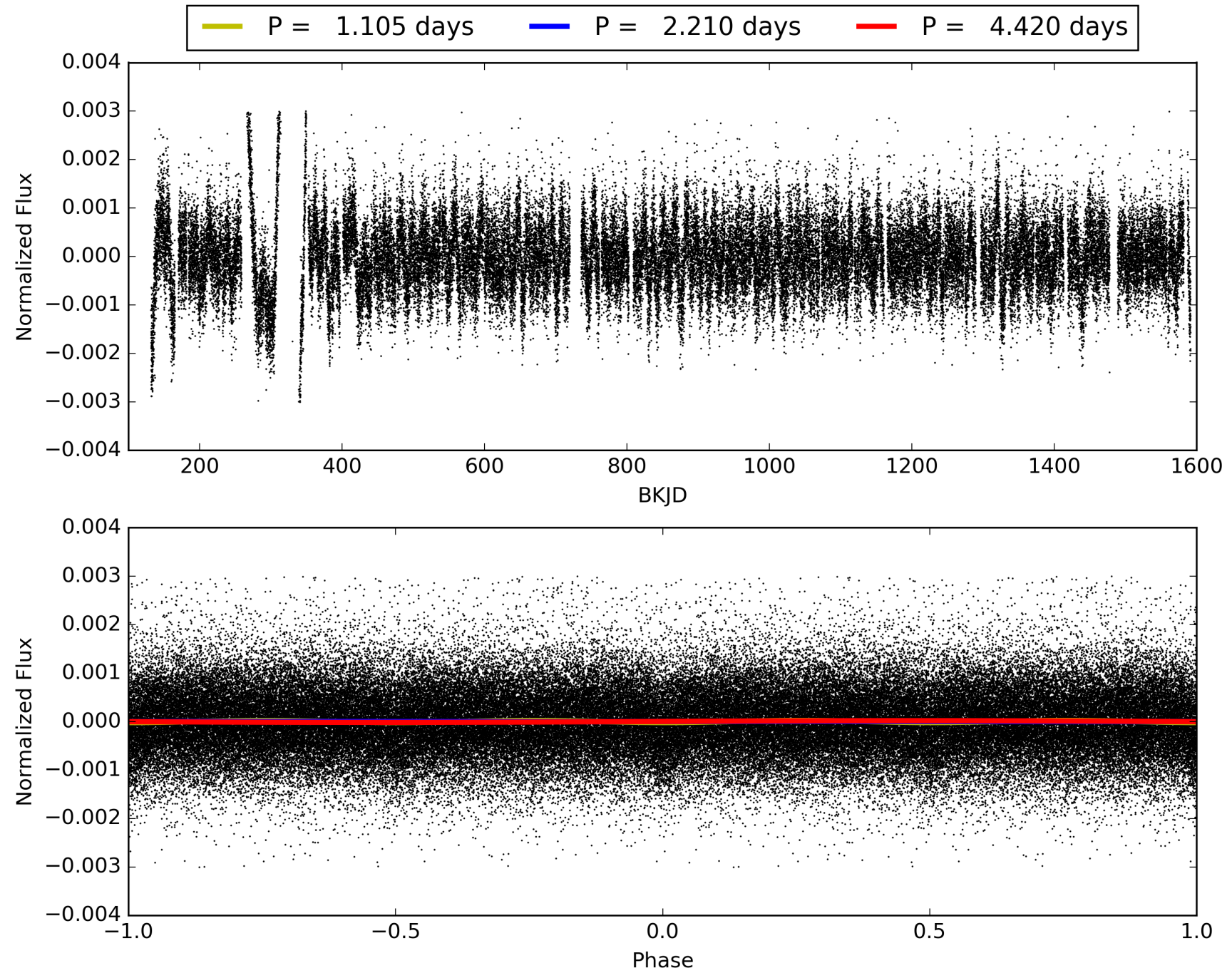
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [7.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.86e-16  
RollingBand-fgt: 1.00 [580/581]  
**GhostDiagnostic-chr: -0.4782**  
Centroid-sig: 96.6%  
Centroid-so: 0.122 arcsec [0.07σ]  
**OotOffset-rm: 3.417 arcsec [5.72σ]**  
**KicOffset-rm: 3.513 arcsec [6.13σ]**  
OotOffset-st: 4/4/3/5 [16]  
KicOffset-st: 4/4/3/5 [16]  
DiffImageQuality-fgm: 0.00 [0/16]  
DiffImageOverlap-fno: 0.00 [0/17]

# TCE 010736179-01, PDC Light Curves

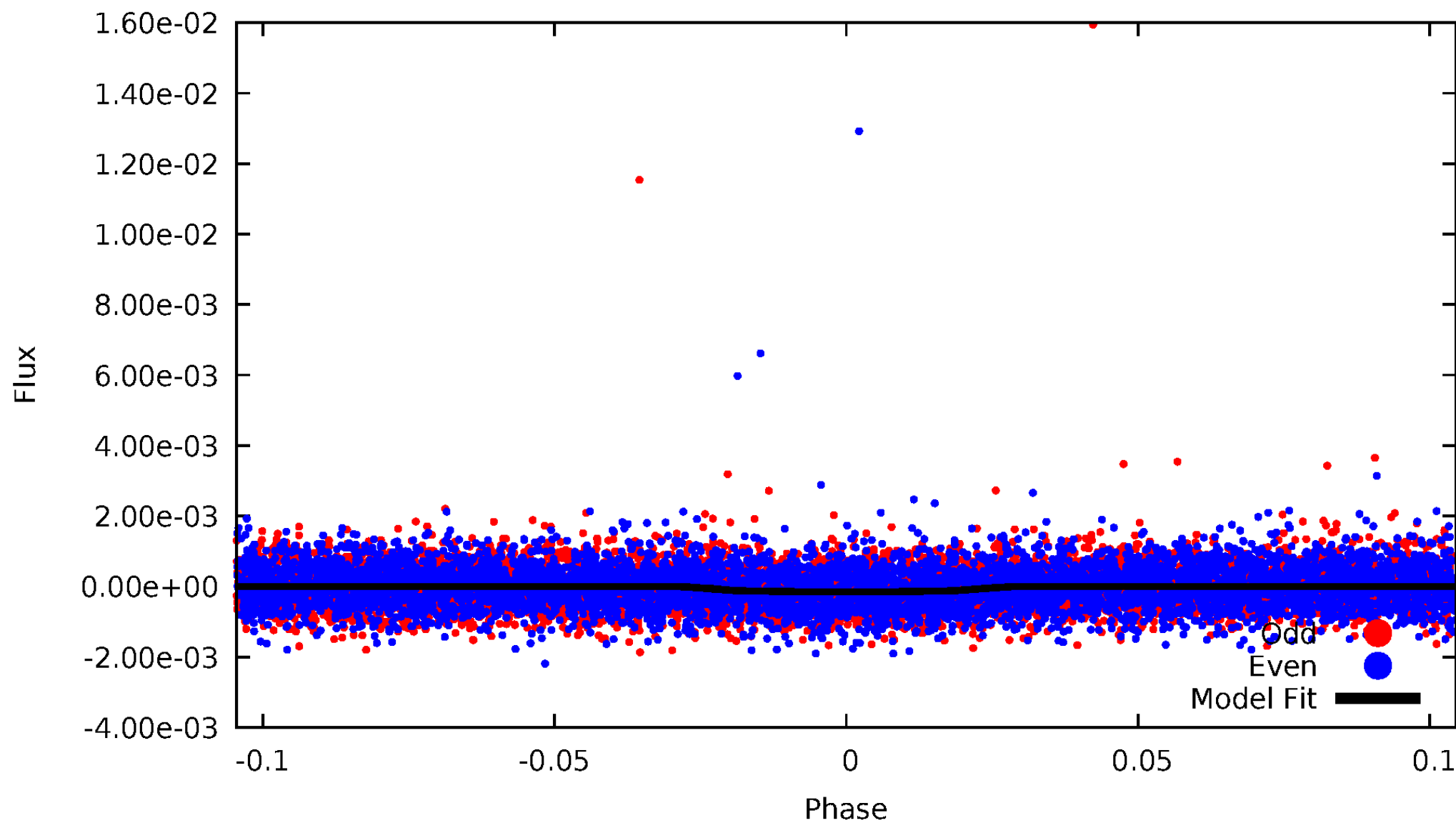


TCE 010736179-01



# DV Odd/Even

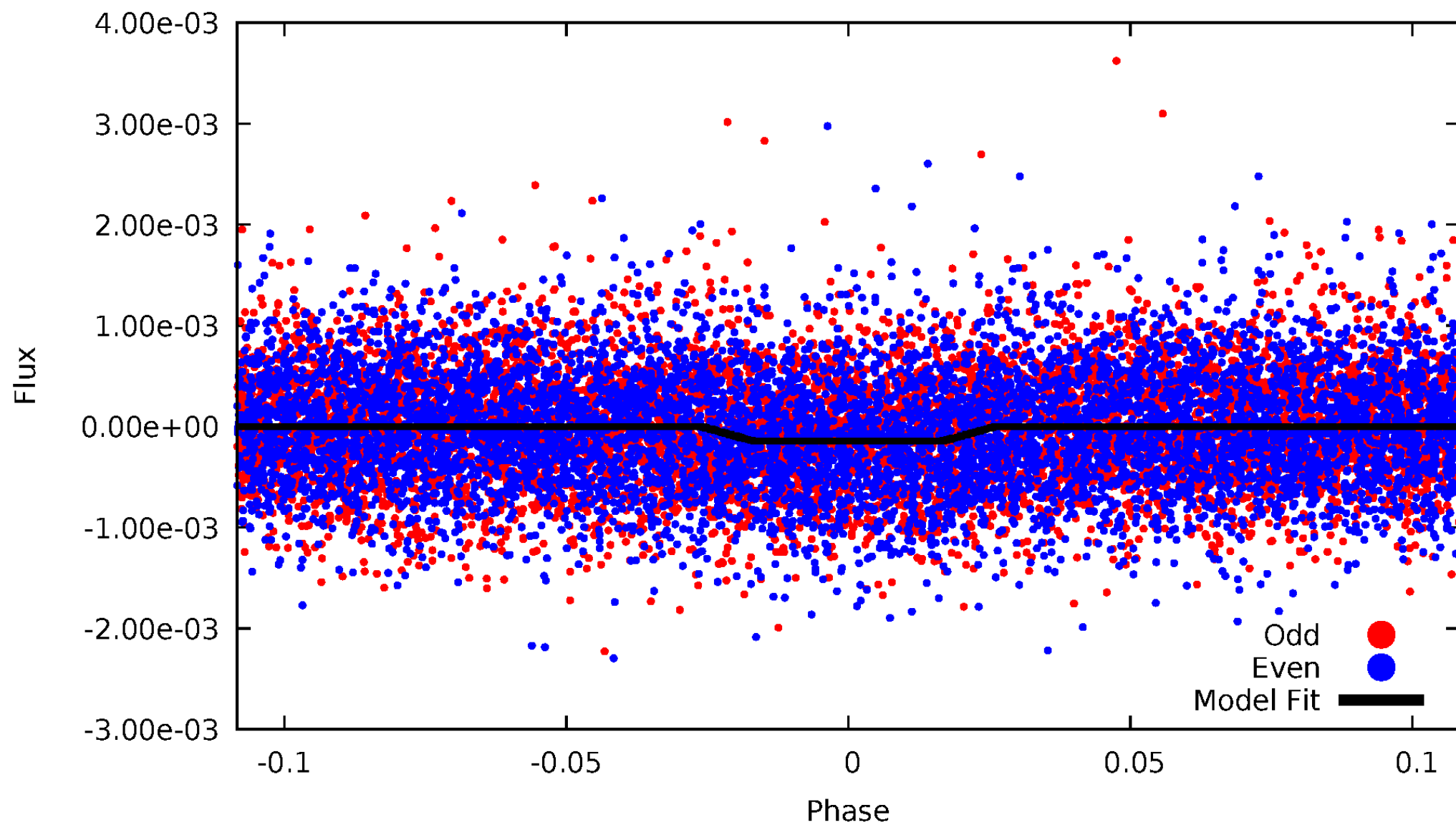
TCE 010736179-01



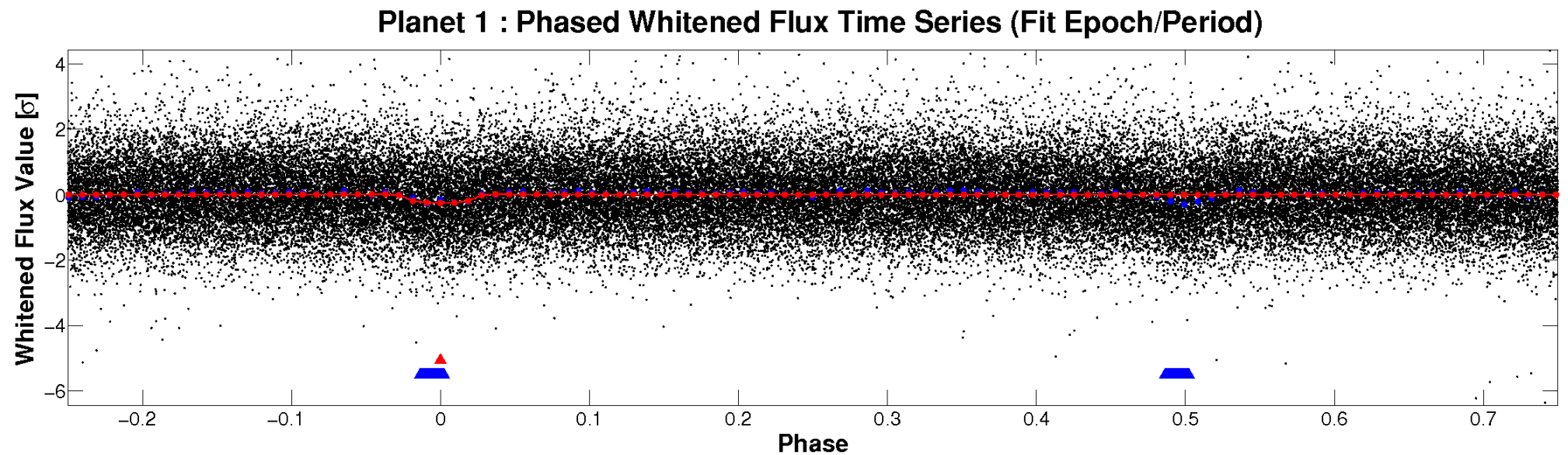
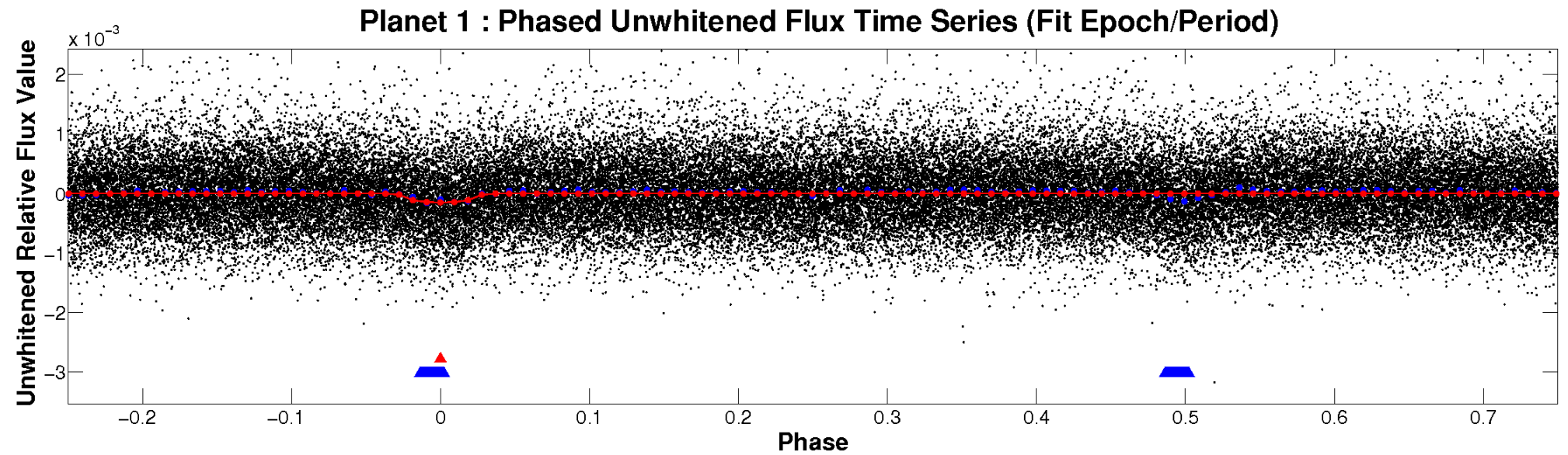


# ALT Odd/Even

TCE 010736179-01

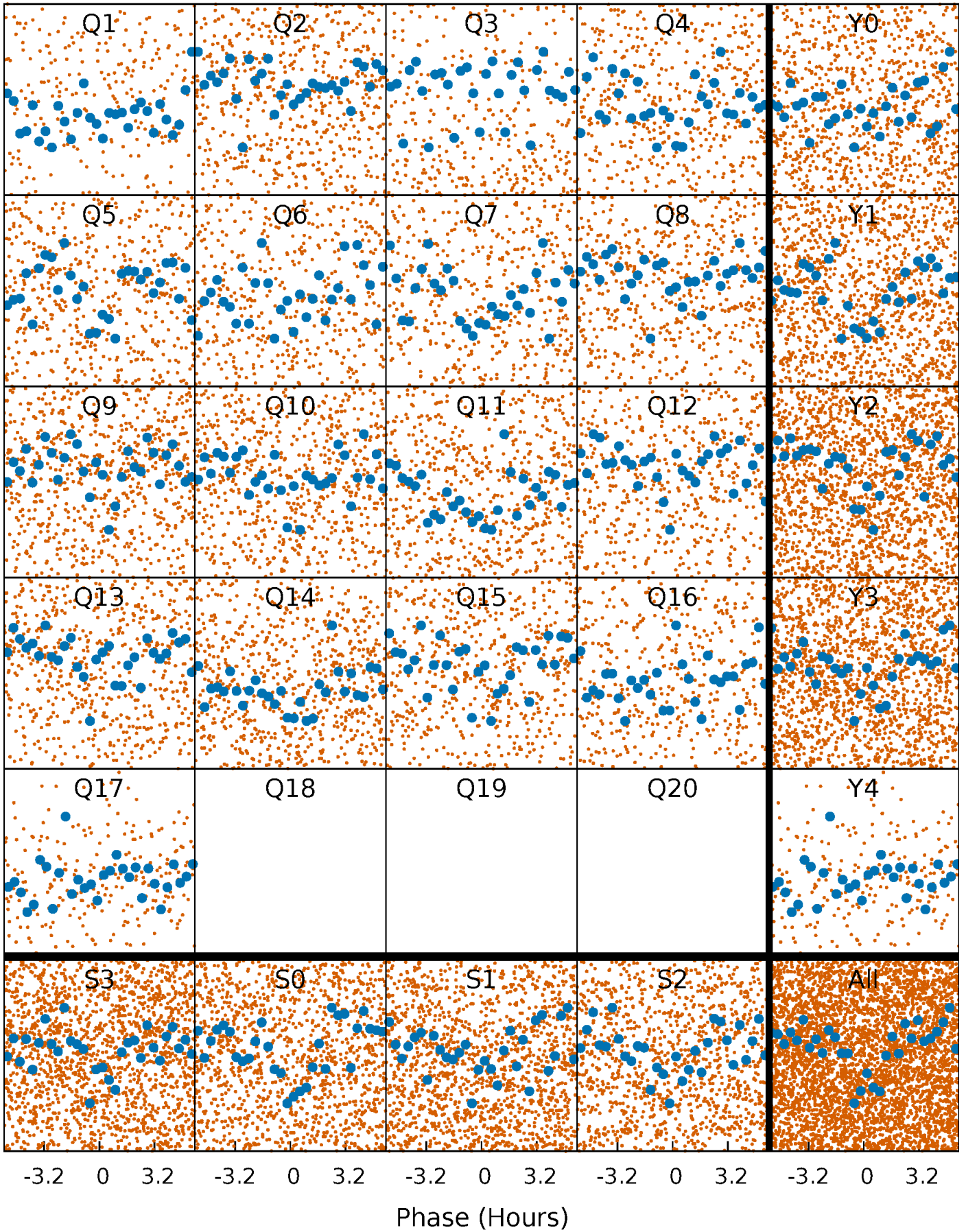


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

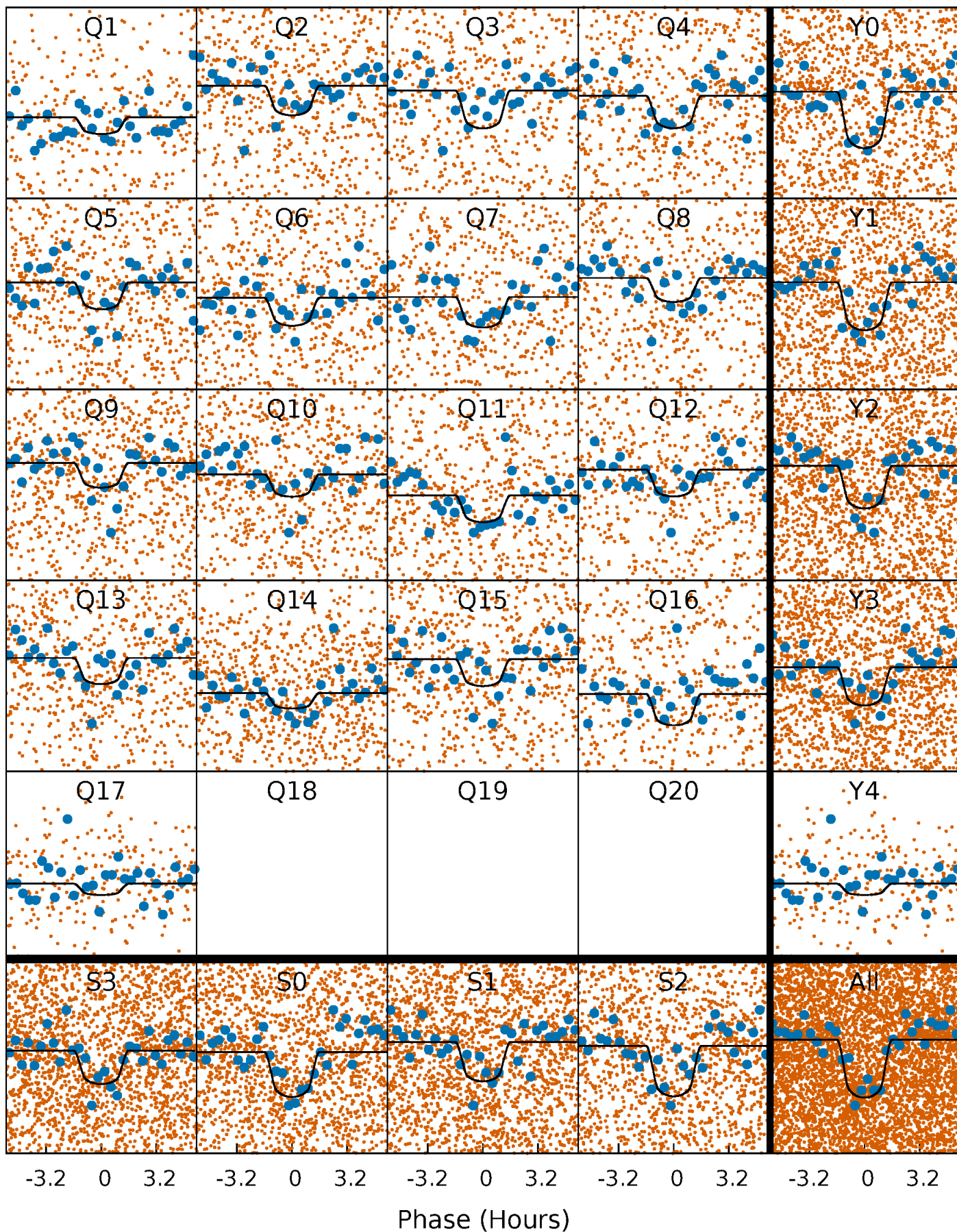
TCE 010736179-01 P= 2.210160 Days  $T_0=132.559519$  (BKJD)





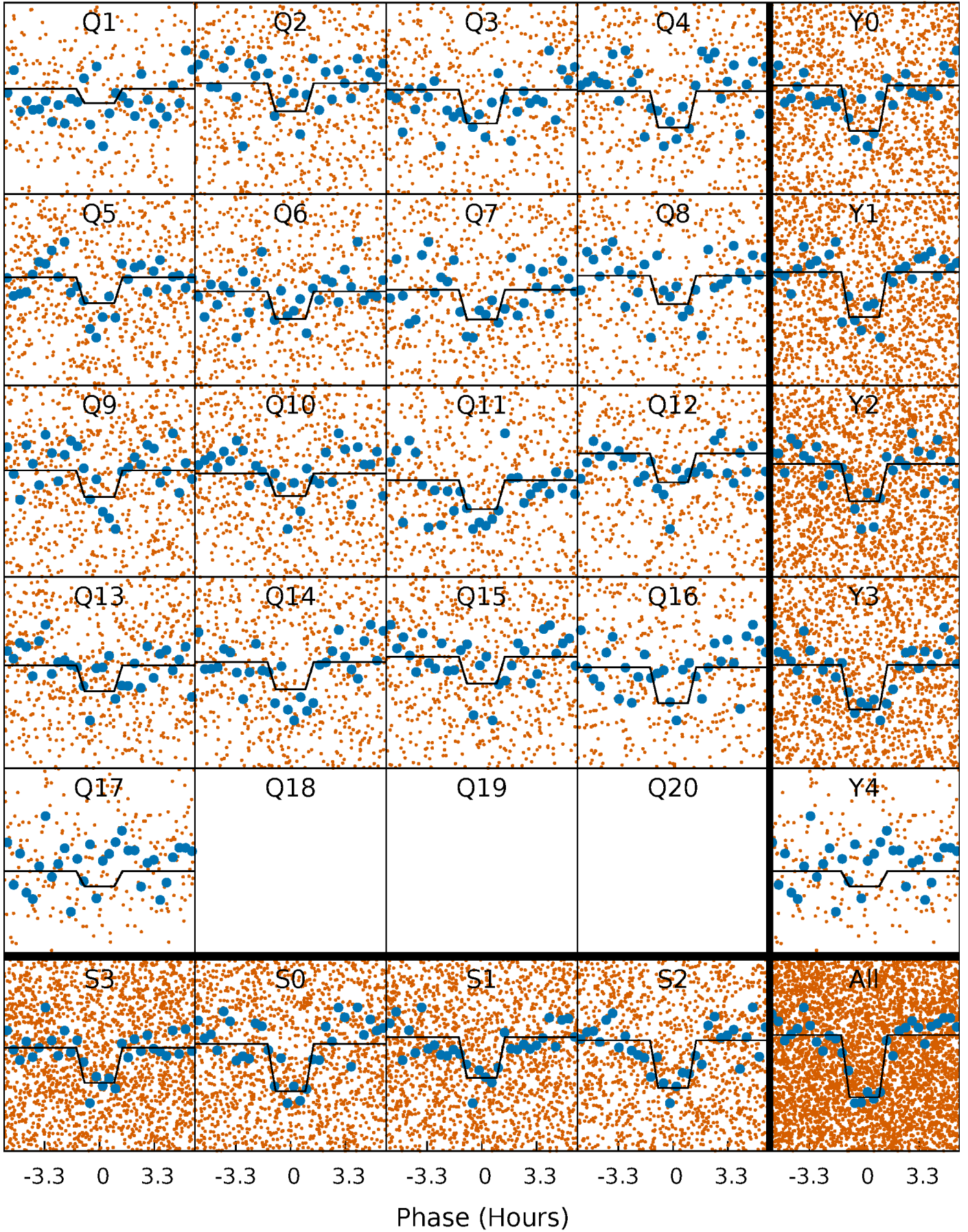
# DV Quarter-Phased Transit Curves

TCE 010736179-01 P= 2.210160 Days  $T_0=132.559519$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

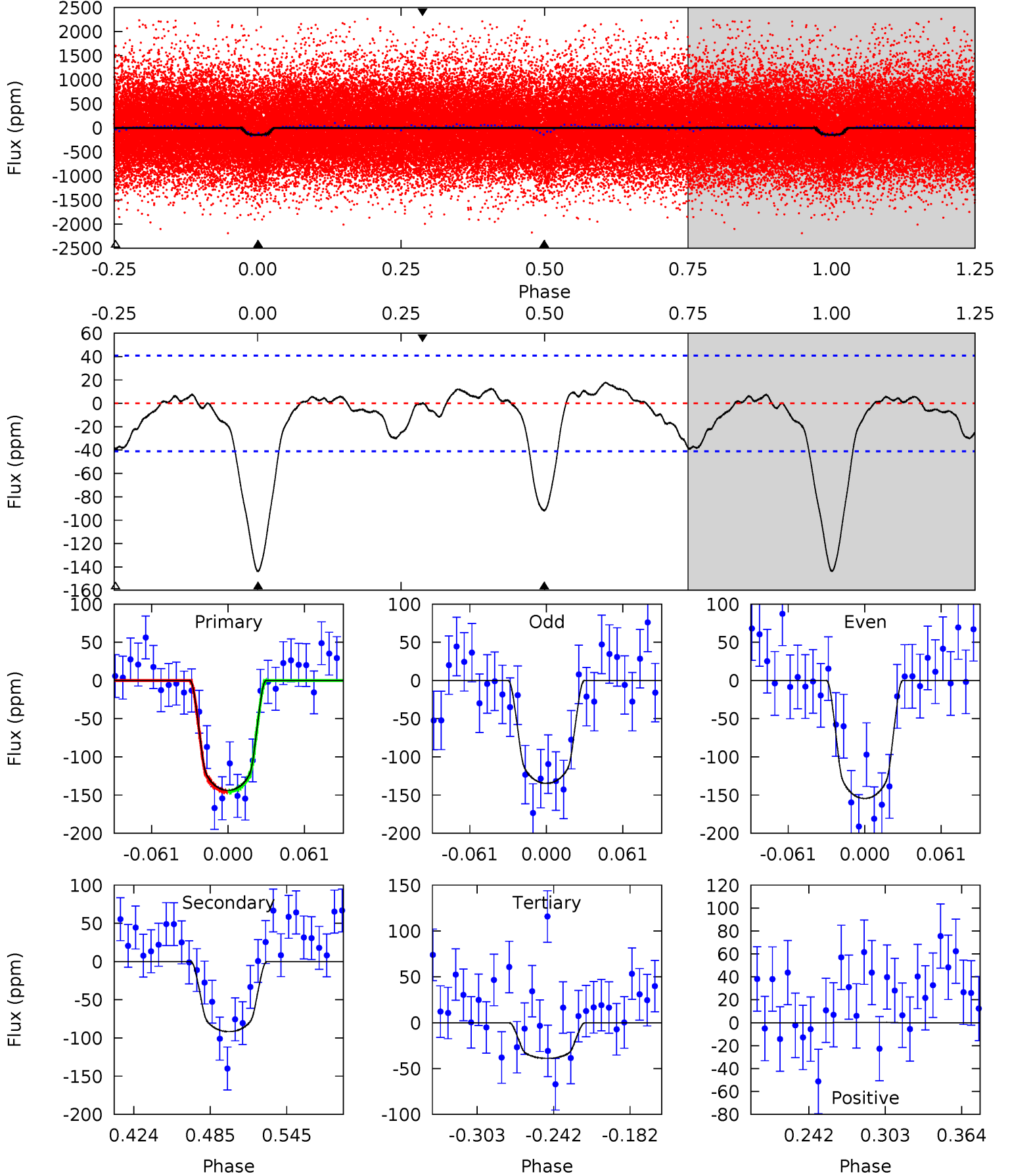
TCE 010736179-01 P= 2.210149 Days  $T_0=132.564383$  (BKJD)



# DV Model-Shift Uniqueness Test

010736179-01, P = 2.210160 Days, E = 130.349359 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
16.4	10.5	4.43	0.01	4.67	1.88	1.47	12.0	16.4	6.02	10.4	1.13	1.00	0.11	0.00

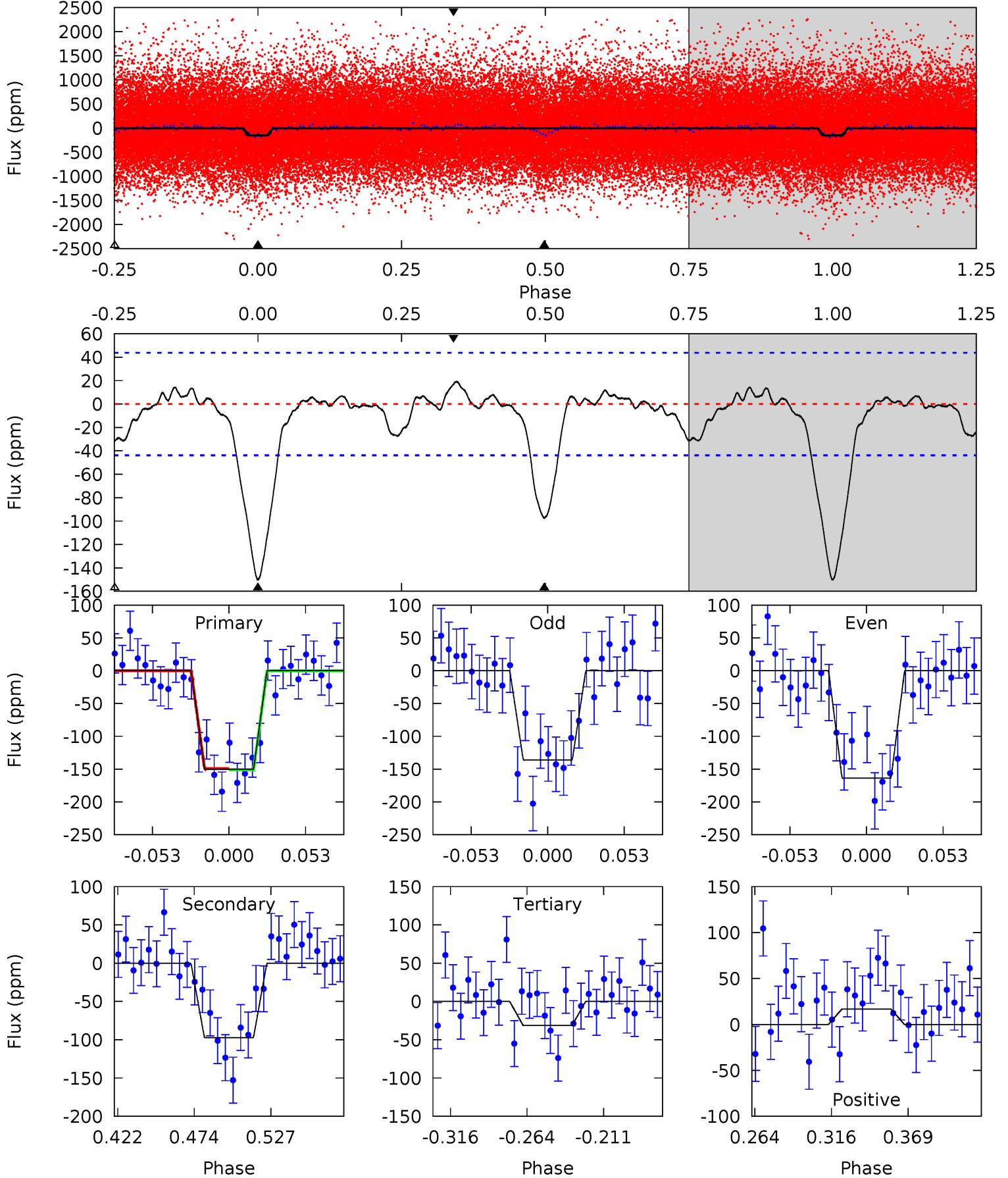




# Alt Model-Shift Uniqueness Test

010736179-01, P = 2.210149 Days, E = 130.354234 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
16.1	10.4	3.36	1.80	4.70	1.94	1.10	12.7	14.3	7.06	8.63	1.49	0.99	0.11	0.10





### Stellar Parameters For KIC 010736179

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5296^{+159}_{-159}$	$4.604^{+0.032}_{-0.097}$	$-0.200^{+0.300}_{-0.300}$	$0.752^{+0.122}_{-0.057}$	$0.835^{+0.078}_{-0.096}$	$2.772^{+0.501}_{-0.892}$
	+3%/-3%	+1%/-2%	+150%/-150%	+16%/-8%	+9%/-11%	+18%/-32%
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 010736179-01 / KOI 4408.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-92 \pm 9$	$1.12^{+0.56}_{-0.48}$	$1626^{+67}_{-61}$	$4633^{+1296}_{-681}$	$39^{+84}_{-22}$
Alt.	$-97 \pm 9$	$1.04^{+0.56}_{-0.48}$	$1625^{+75}_{-66}$	$4803^{+1750}_{-718}$	$47^{+126}_{-27}$

$T_{\text{max}}$  = 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

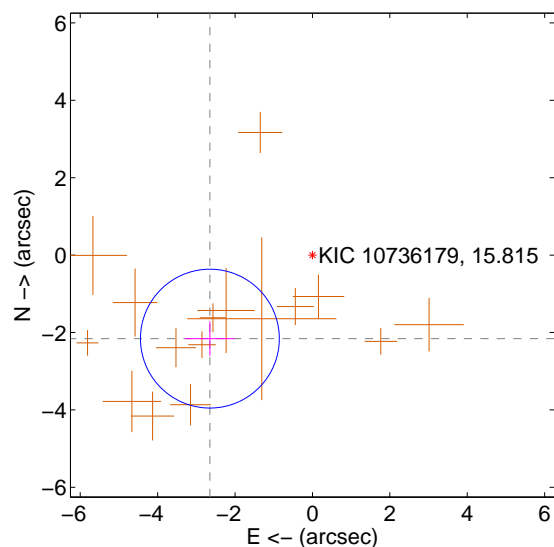
Supplemental centroid analysis for 010736179-01. Kepler magnitude: 15.81. Transit SNR 12.02

There are 0 quarters with good PRF difference image offsets

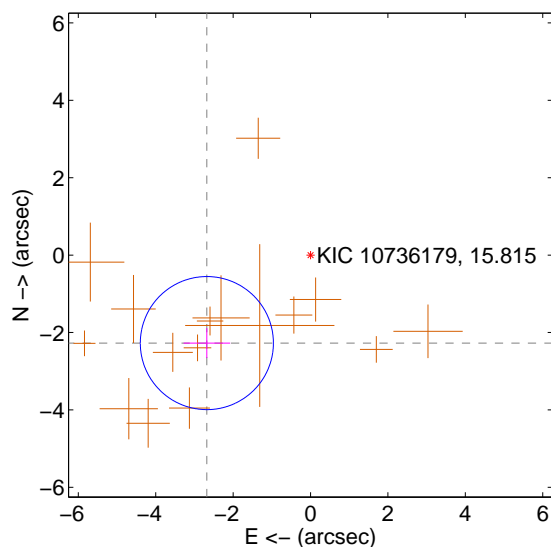
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$3.417 \pm 0.598$	5.72	$2.649 \pm 0.643$	$-2.158 \pm 0.443$
PRF-fit source offset from KIC position	$3.513 \pm 0.573$	6.13	$2.679 \pm 0.603$	$-2.273 \pm 0.386$
photometric centroid source offset	$0.12 \pm 1.67$	0.07	$-0.09 \pm 1.78$	$-0.08 \pm 1.52$

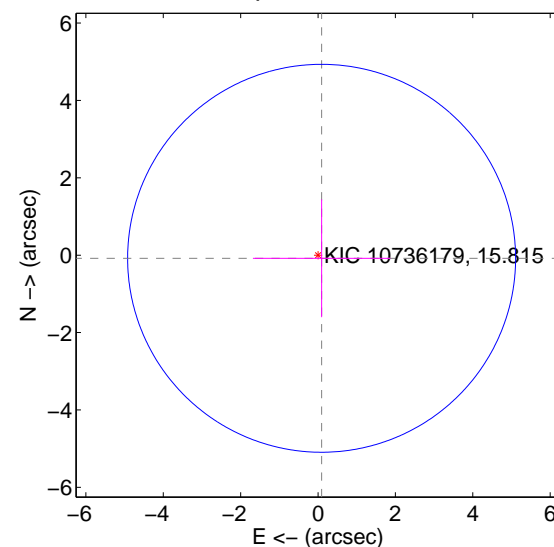
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

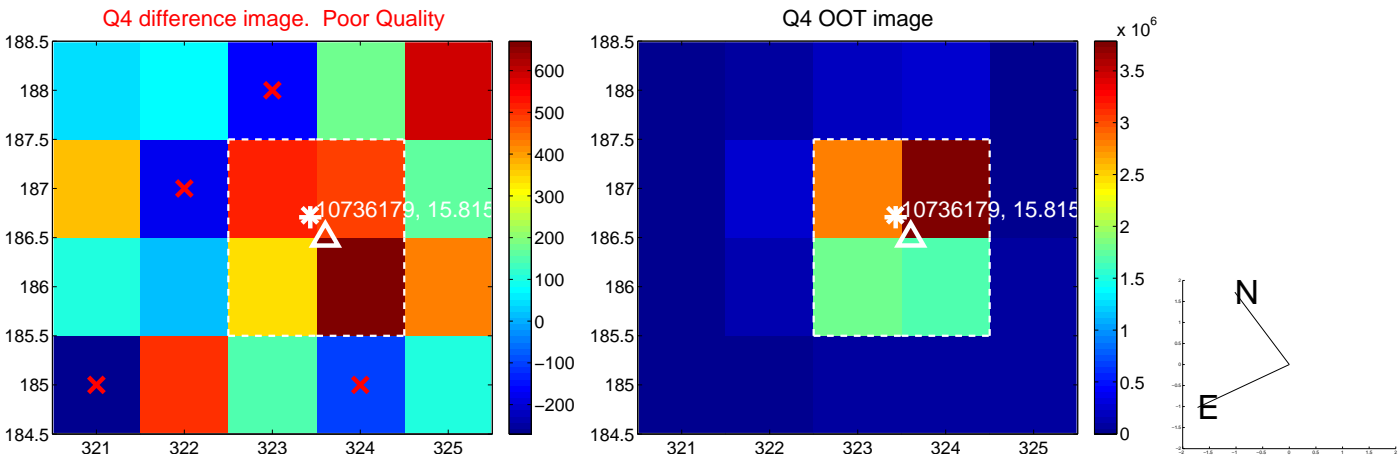
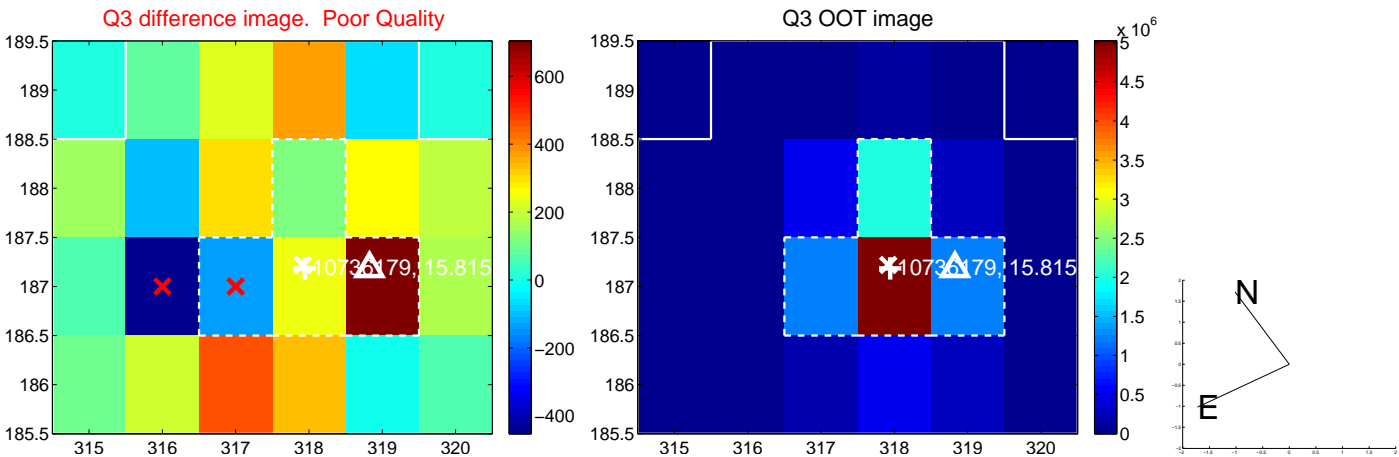
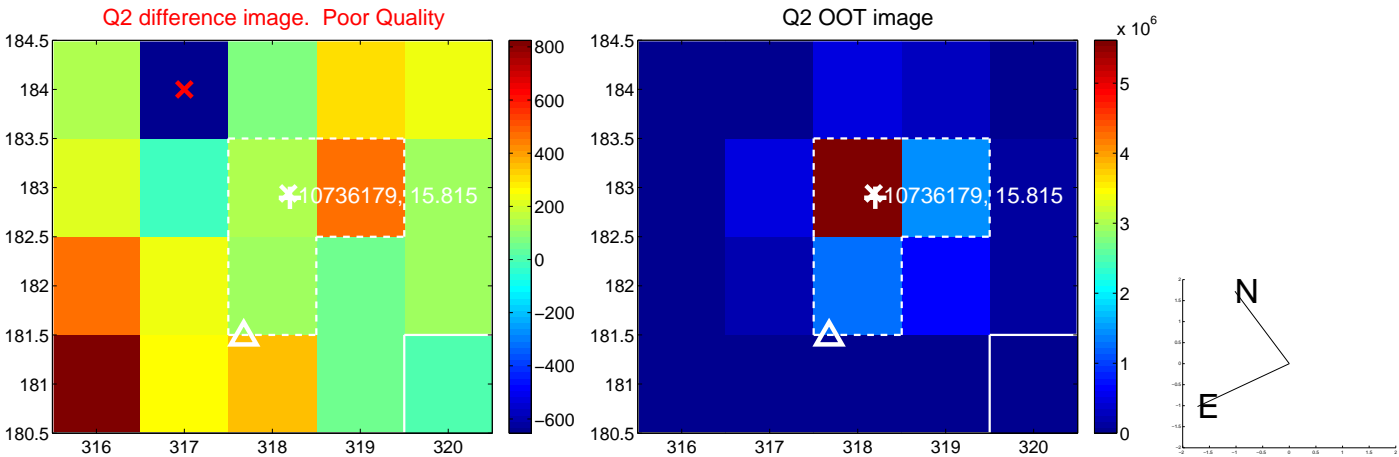
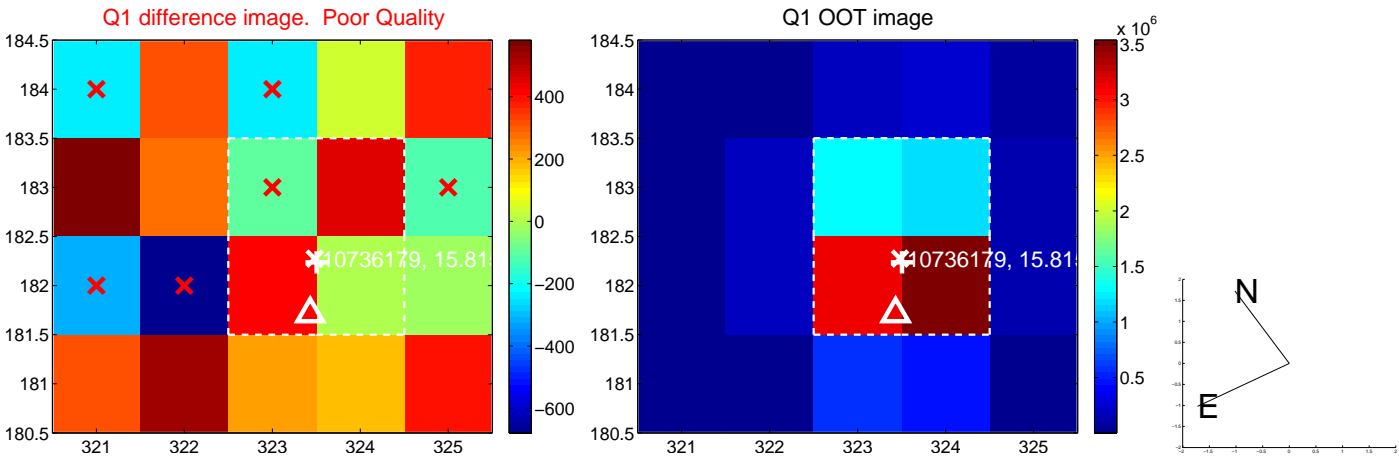


offset from photometric centroids

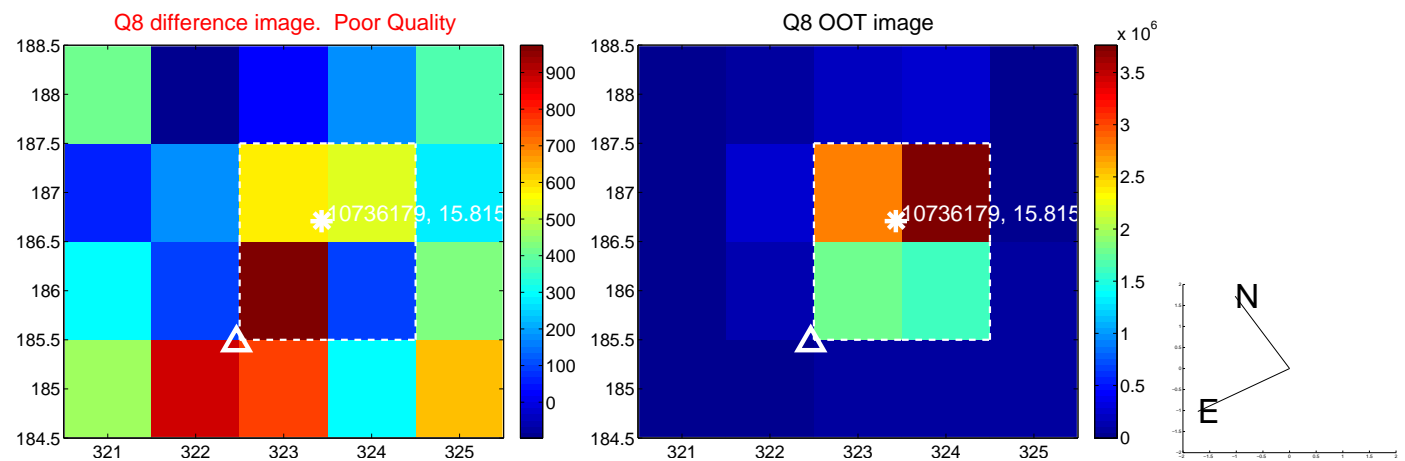
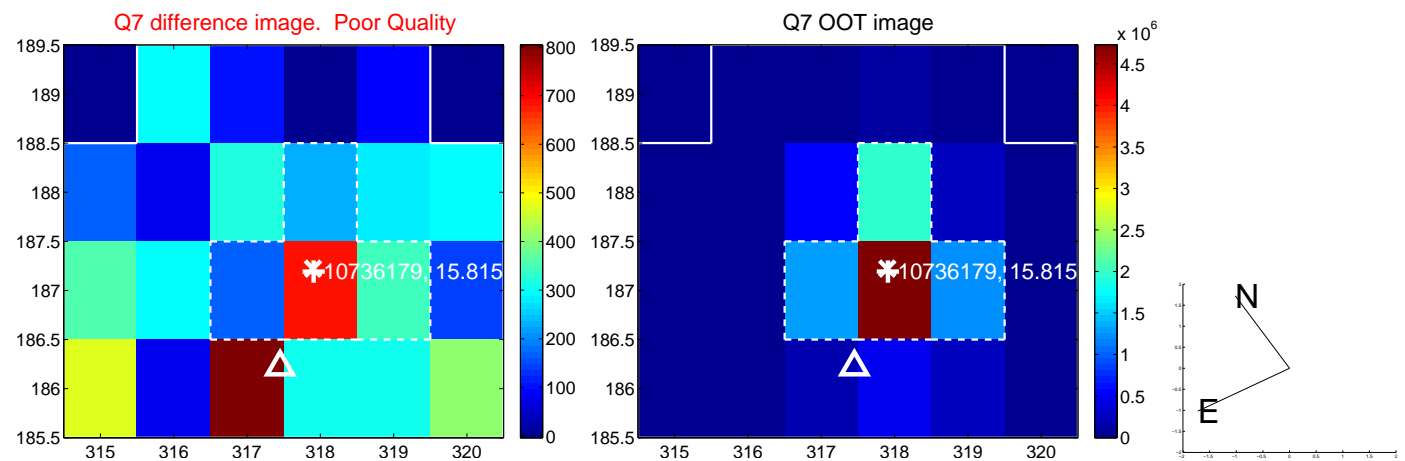
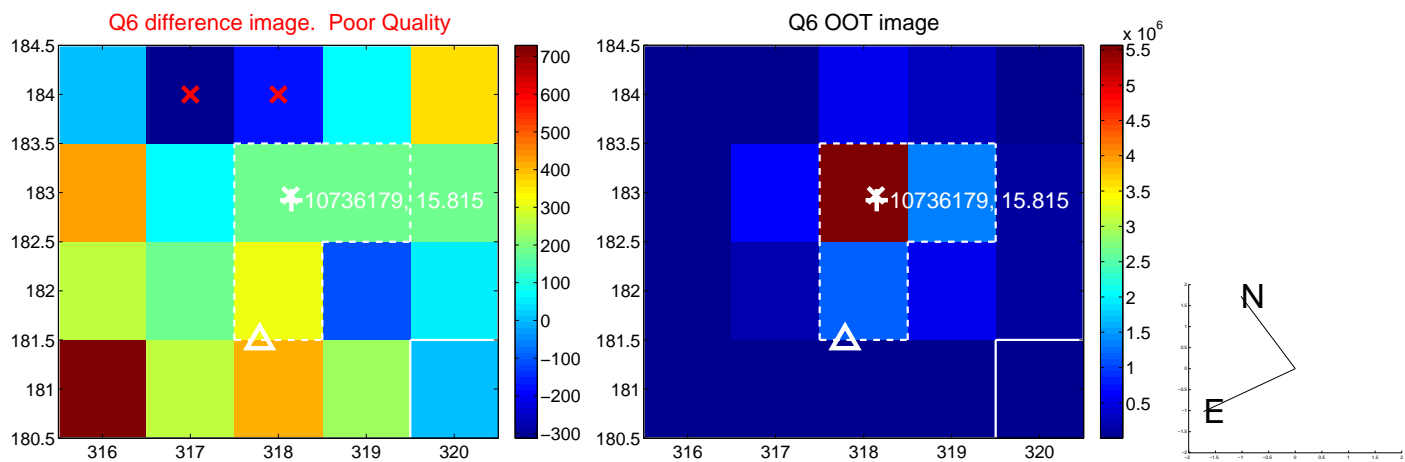
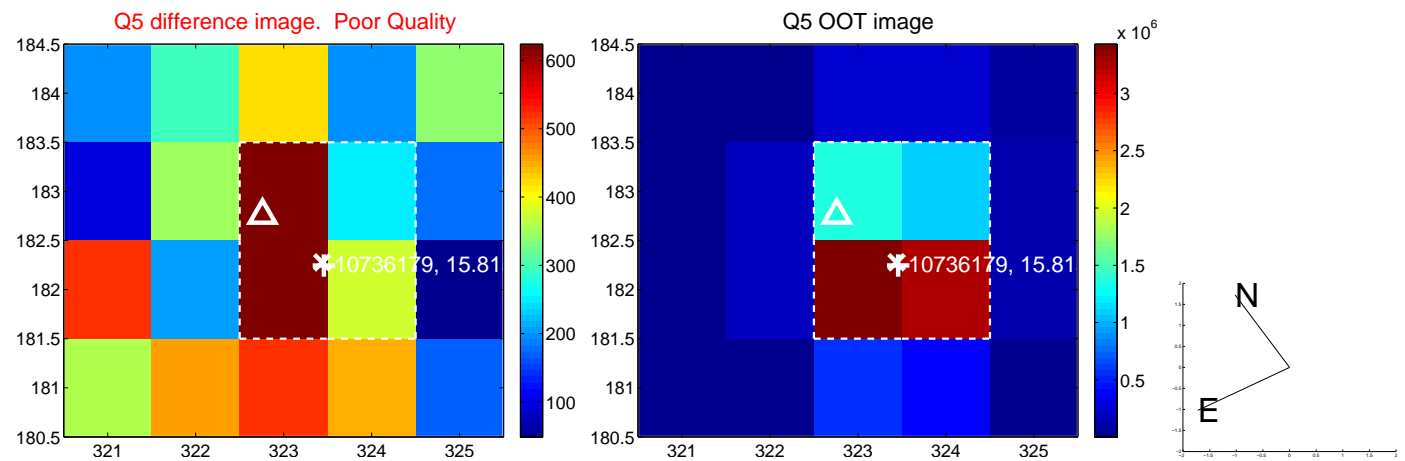


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

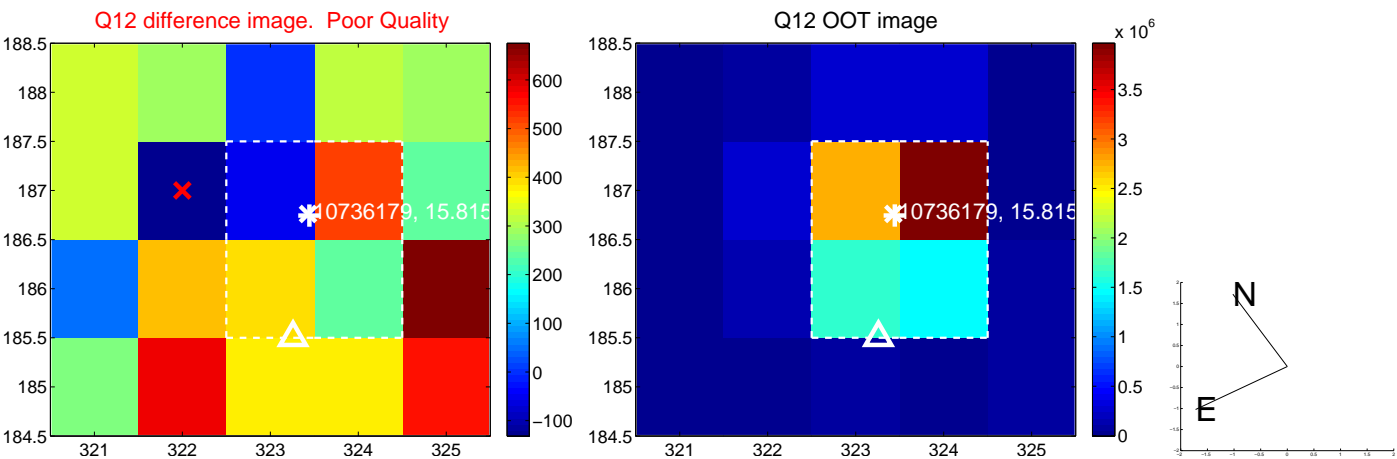
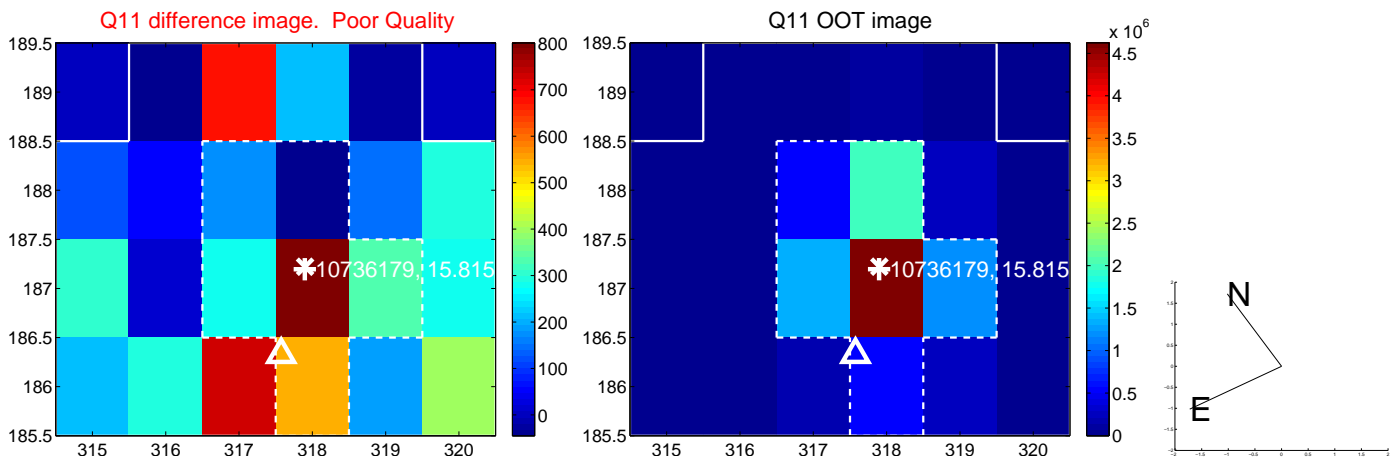
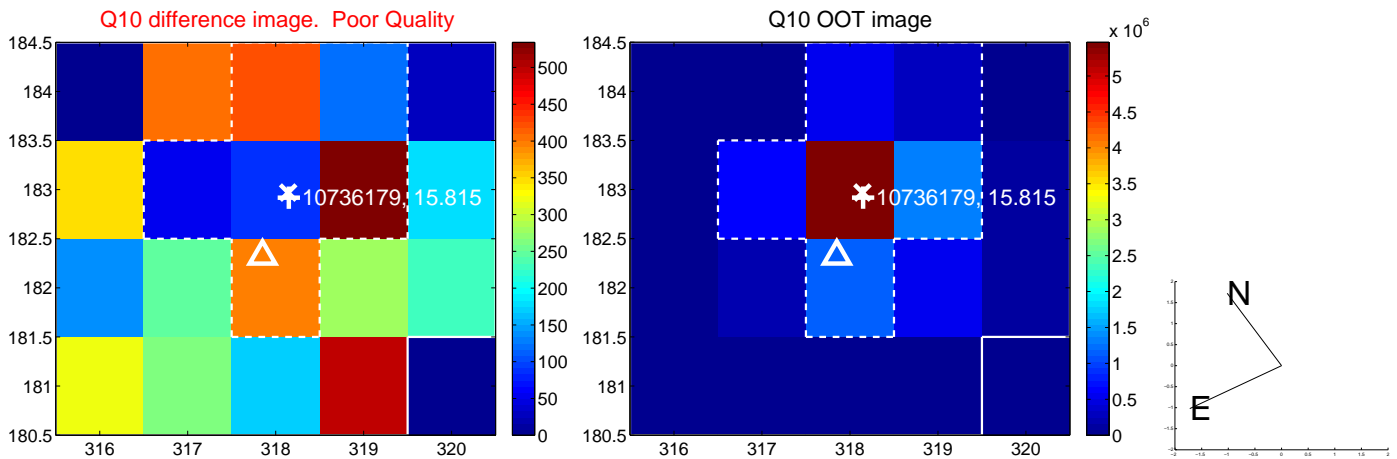
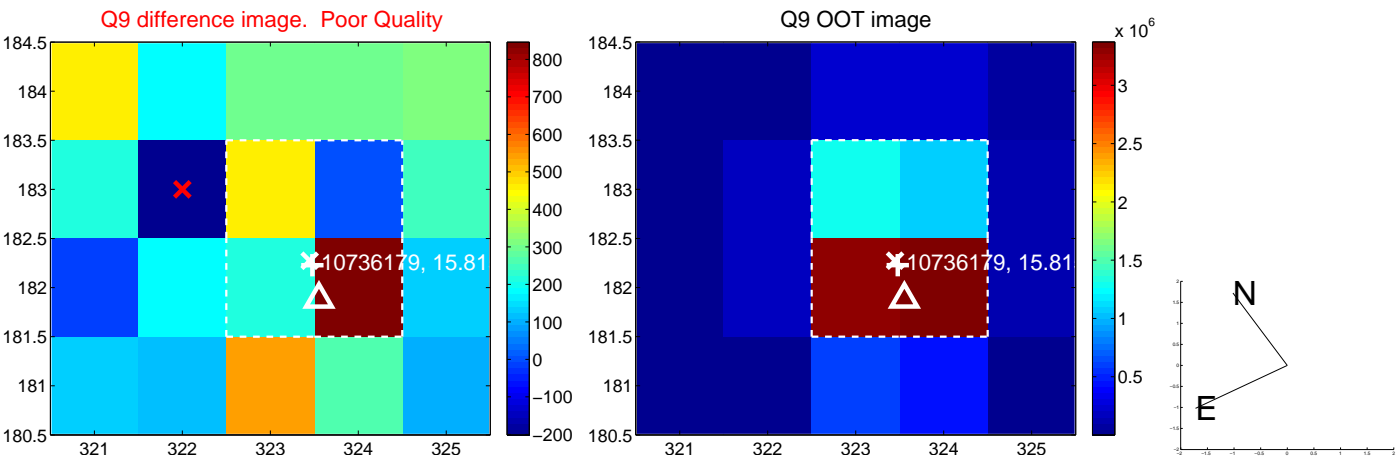


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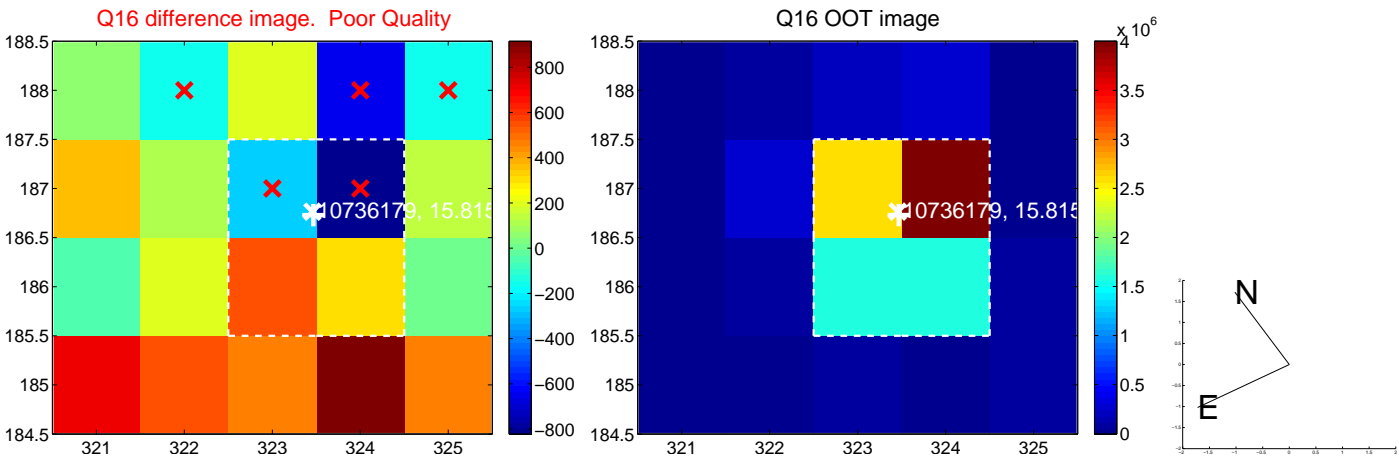
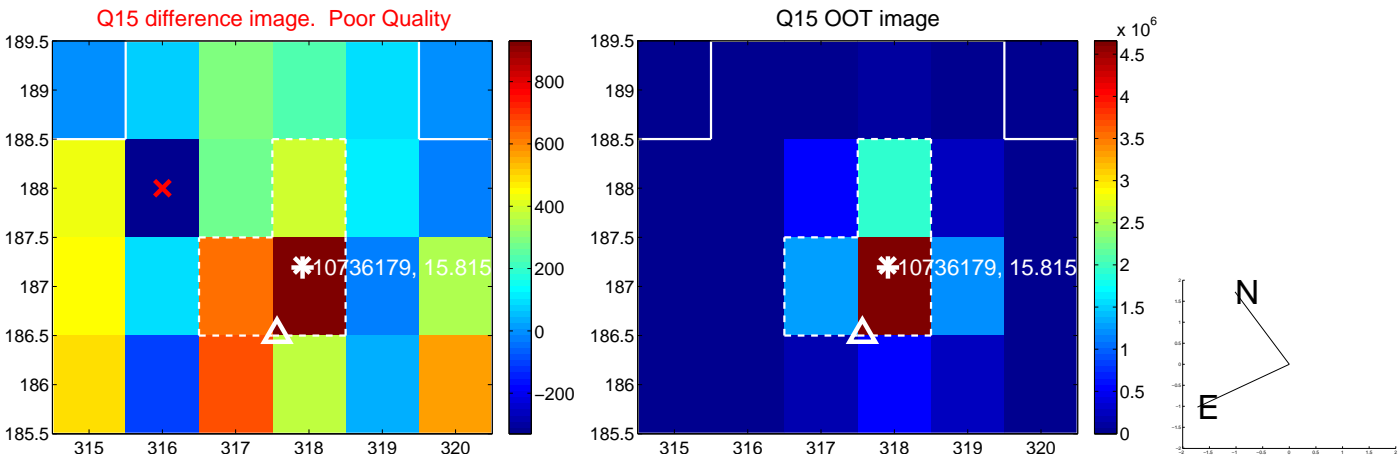
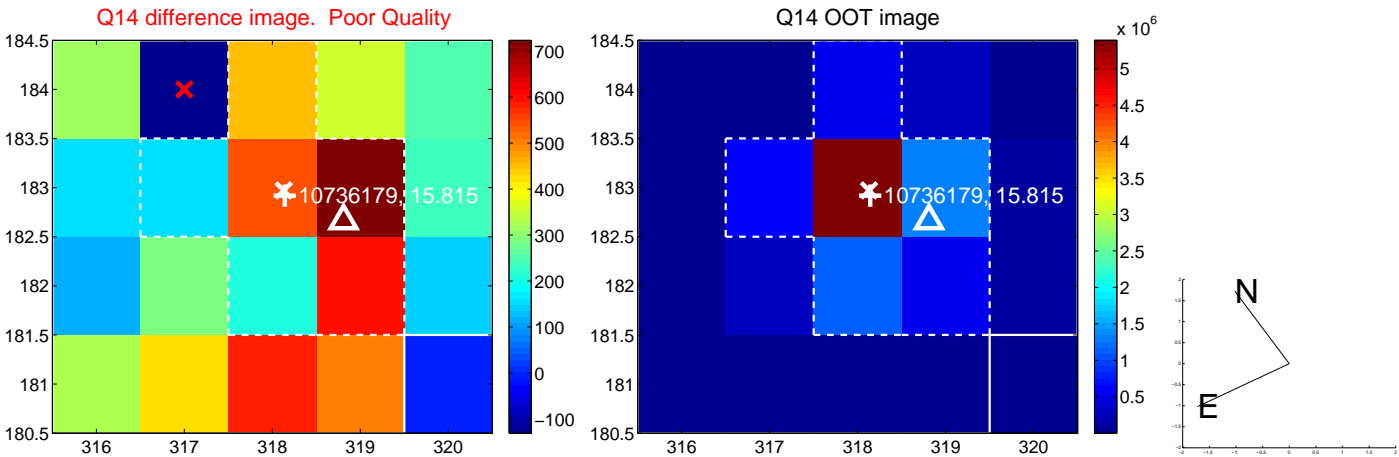
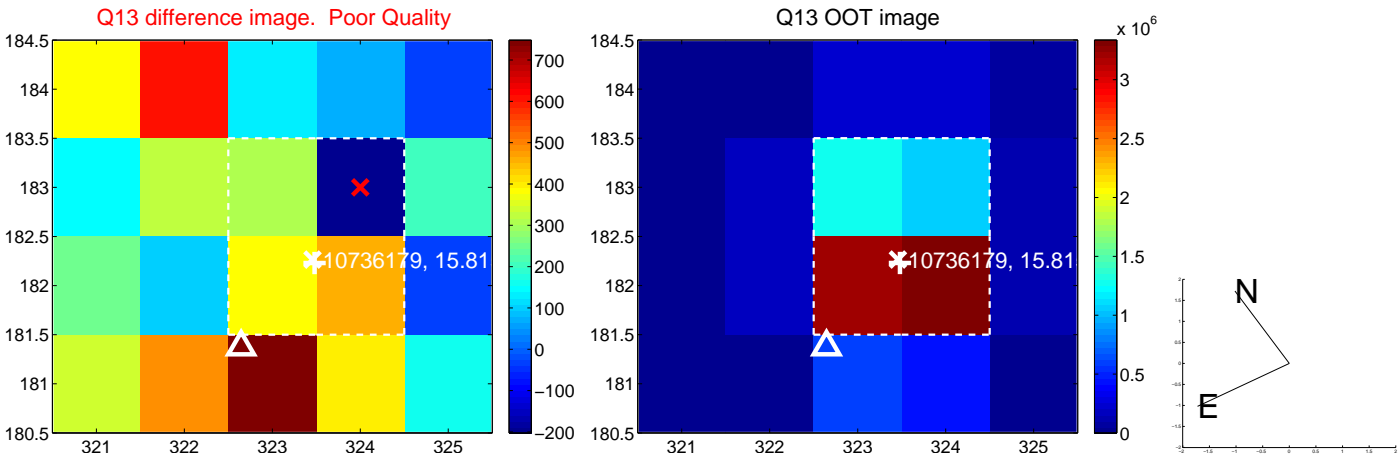




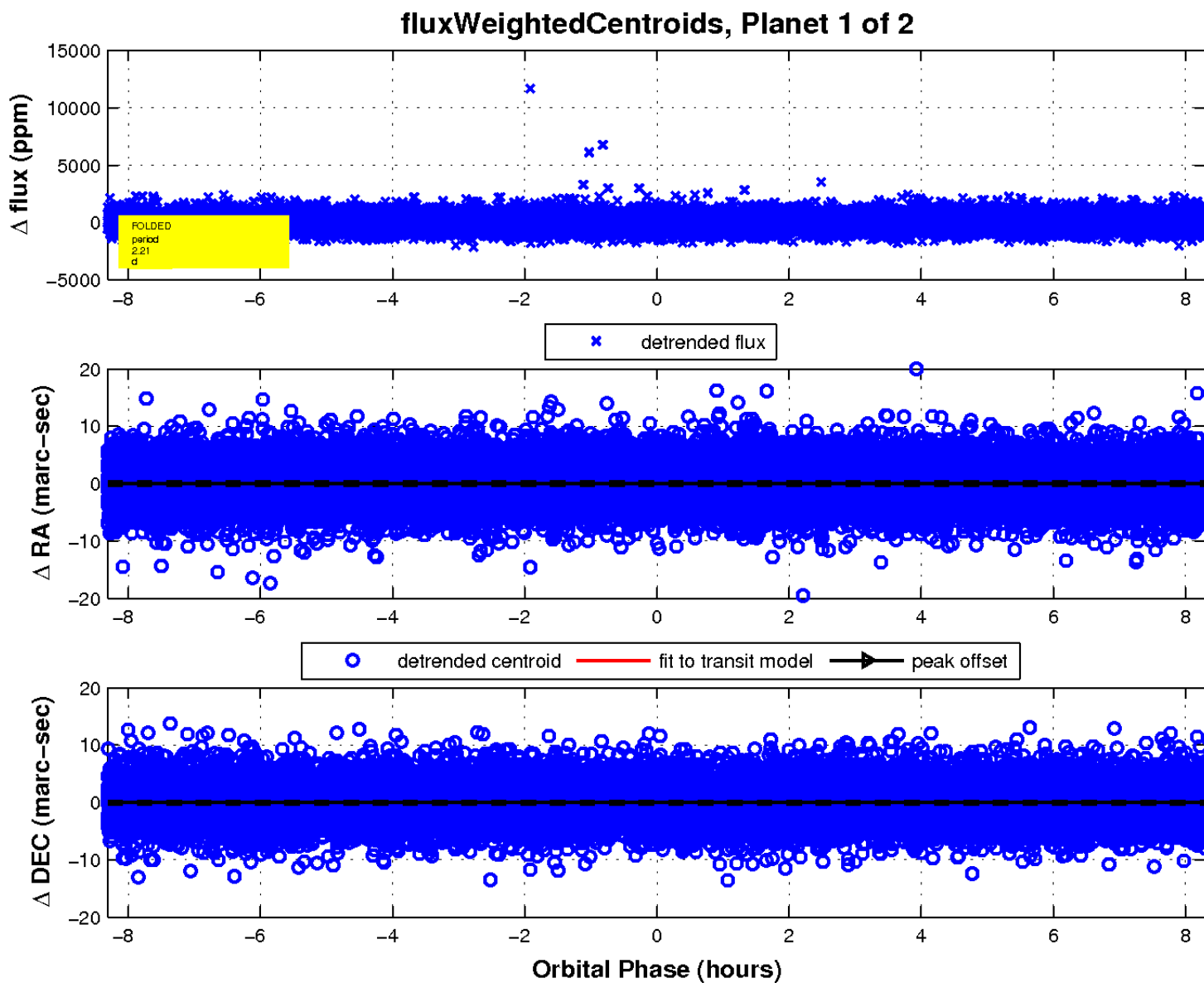
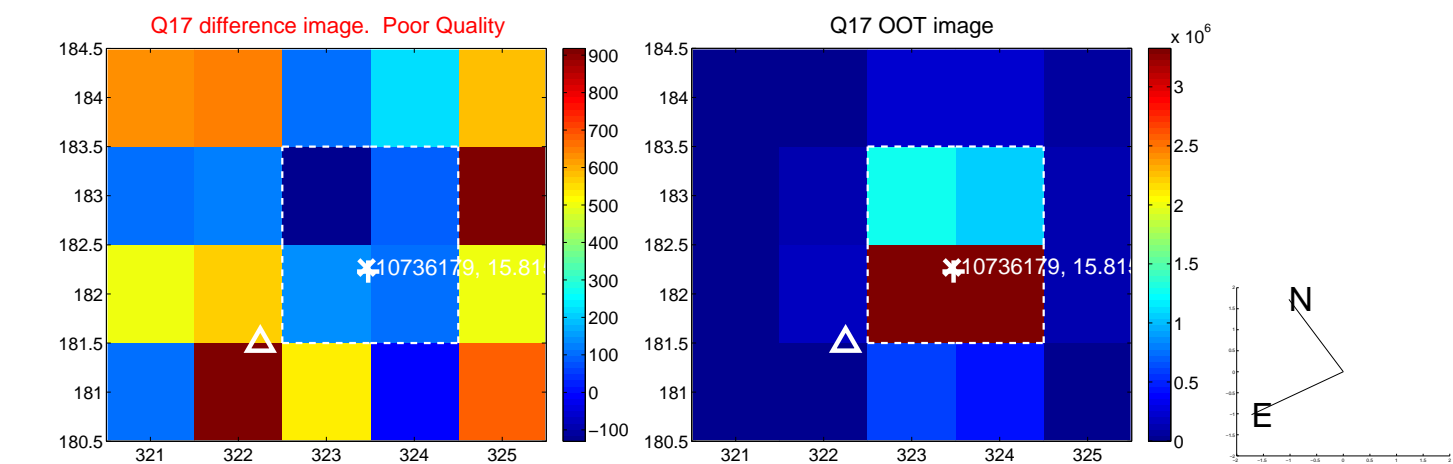
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

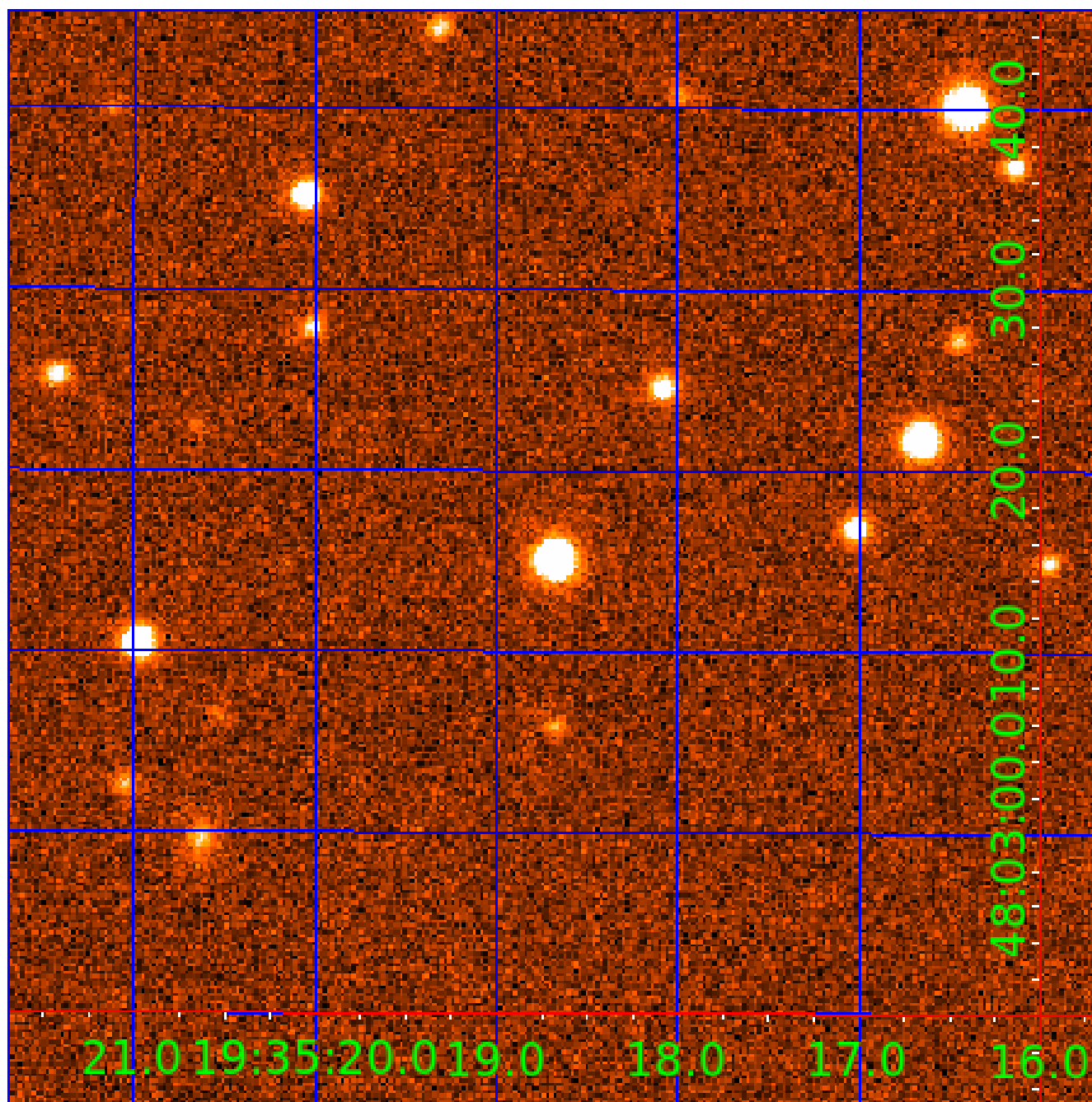


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 010736179

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010736179-01	OBS	4408.01	2.210160	132.559519	148.7	2.771	8.5	12.0	0.75	5296	1.14	409.51
010736179-02	OBS	No	1.105053	132.564933	124.0	2.587	10.5	10.2	0.75	5296	1.00	1031.94

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010736179-01	OBS	FP	0.00	0	1	0	1	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—EPHEM_MATCH
010736179-02	OBS	FP	0.00	1	1	0	1	IS_SEC_TCE—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.

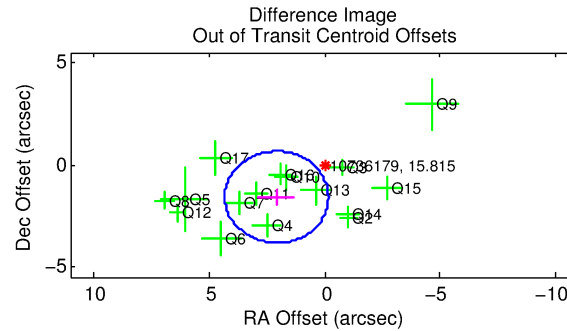
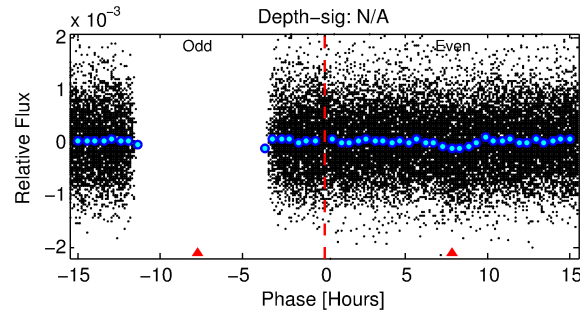
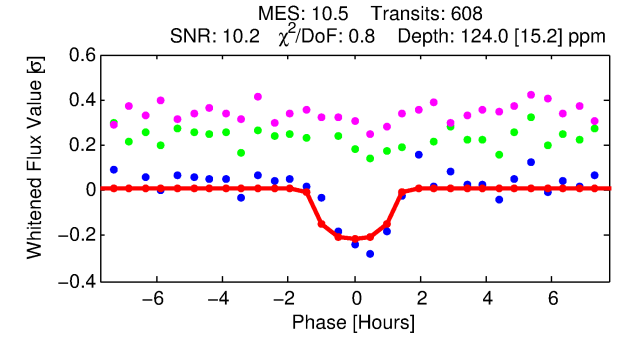
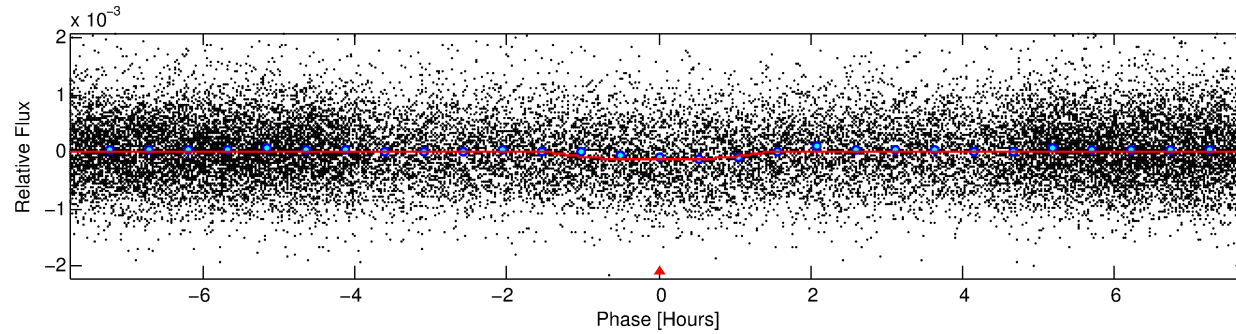
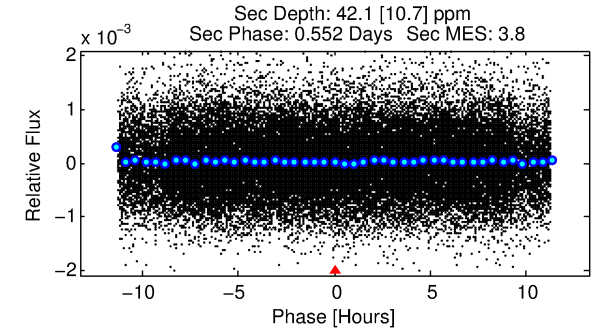
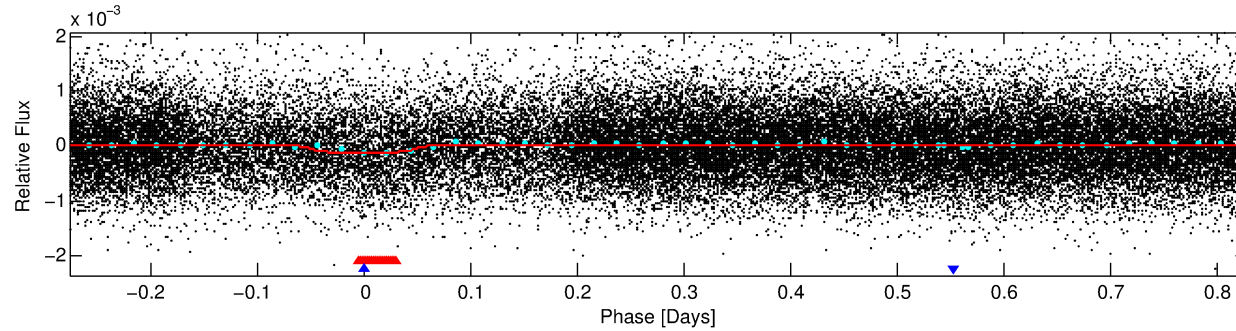
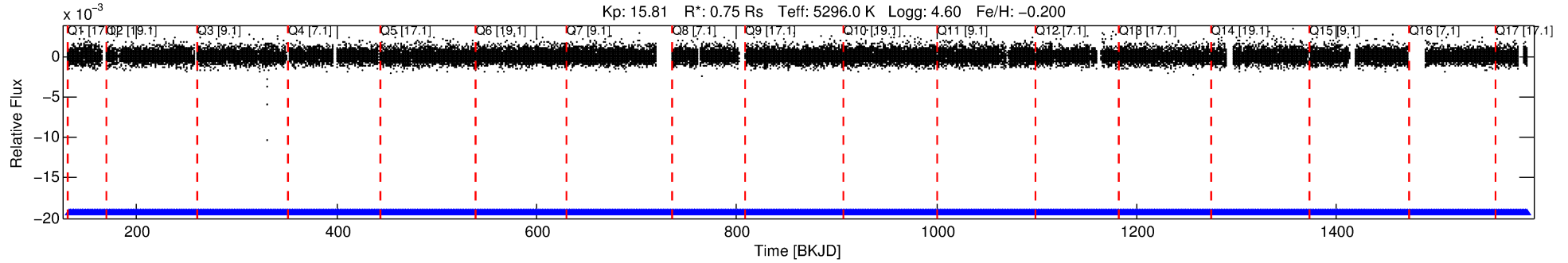
## Ephemeris Match Information For 010736179-02

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	$\sigma_P$	$\sigma_T$
010736179-02	10736179	V2290-Cyg-pri	10736223	1:1	46.5	9	7	13.65	15.81	6267.40	Direct-PRF	0	3.18	1.47

**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: 10736179 Candidate: 2 of 2 Period: 1.105 d  
KOI: K04408.01 Corr: 0.837



## DV Fit Results:

Period = 1.10505 [0.00001] d  
Epoch = 132.5649 [0.0033] BKJD  
Rp/R\* = 0.0122 [0.0105]  
a/R\* = 1.82 [4.74]  
b = 0.89 [0.88]  
Seff = 1031.94 [226.77]  
Teq = 1445 [79] K  
Rp = 1.00 [0.88] Re  
a = 0.0197 [0.0026] AU  
Ag = 8.94 [15.71] [0.51σ]  
Teffp = 3864 [1692] K [1.43σ]

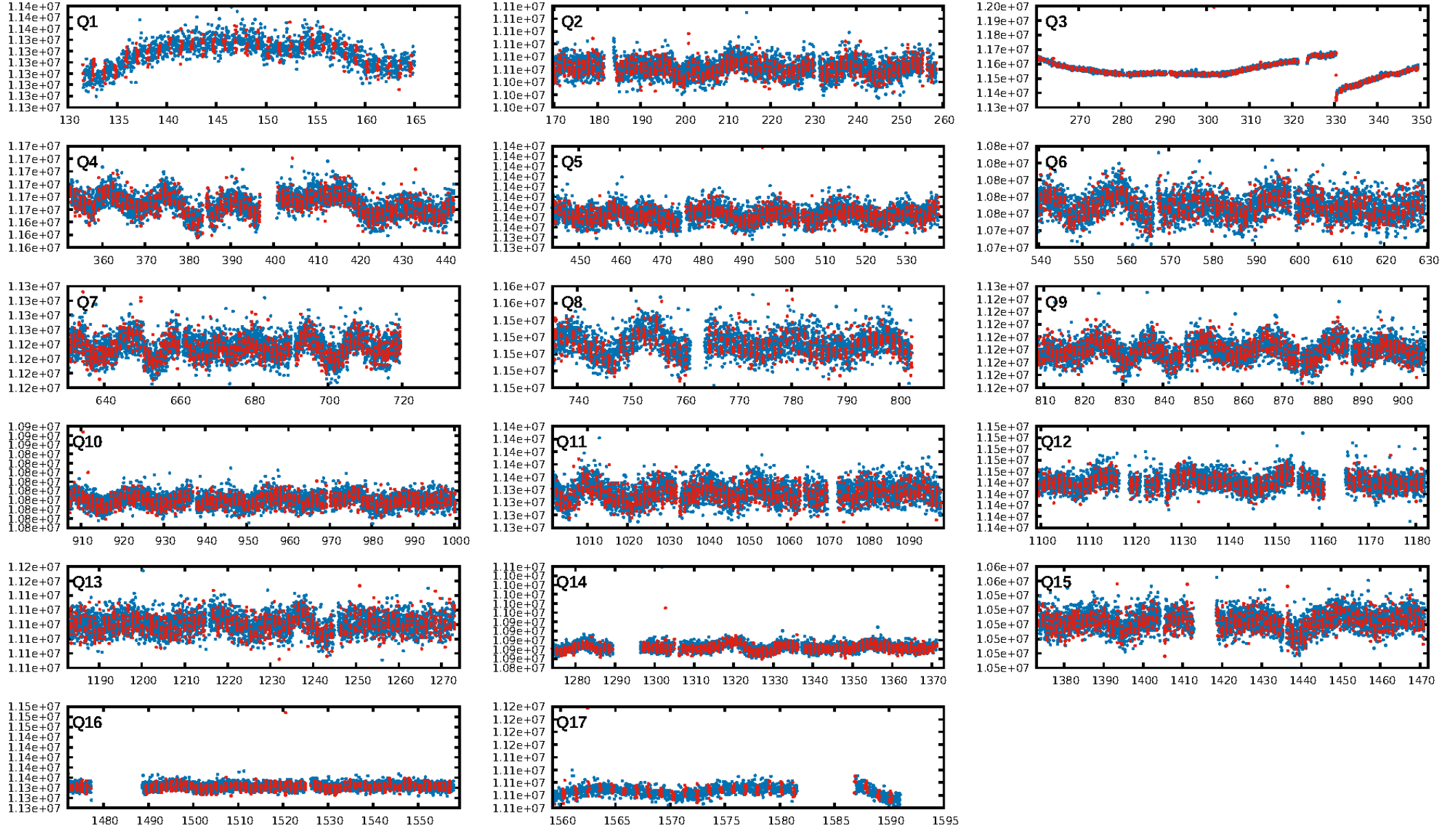
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [7.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.49e-24  
RollingBand-fgt: 1.00 [579/579]  
GhostDiagnostic-chr: 0.4534  
Centroid-sig: 0.0%  
Centroid-so: 3.693 arcsec [2.74σ]  
OotOffset-rm: 2.618 arcsec [3.50σ]  
KicOffset-rm: 2.724 arcsec [3.68σ]  
OotOffset-st: 4/4/4/4 [16]  
KicOffset-st: 4/4/4/4 [16]  
DiffImageQuality-fgm: 0.19 [3/16]  
DiffImageOverlap-fno: 1.00 [17/17]

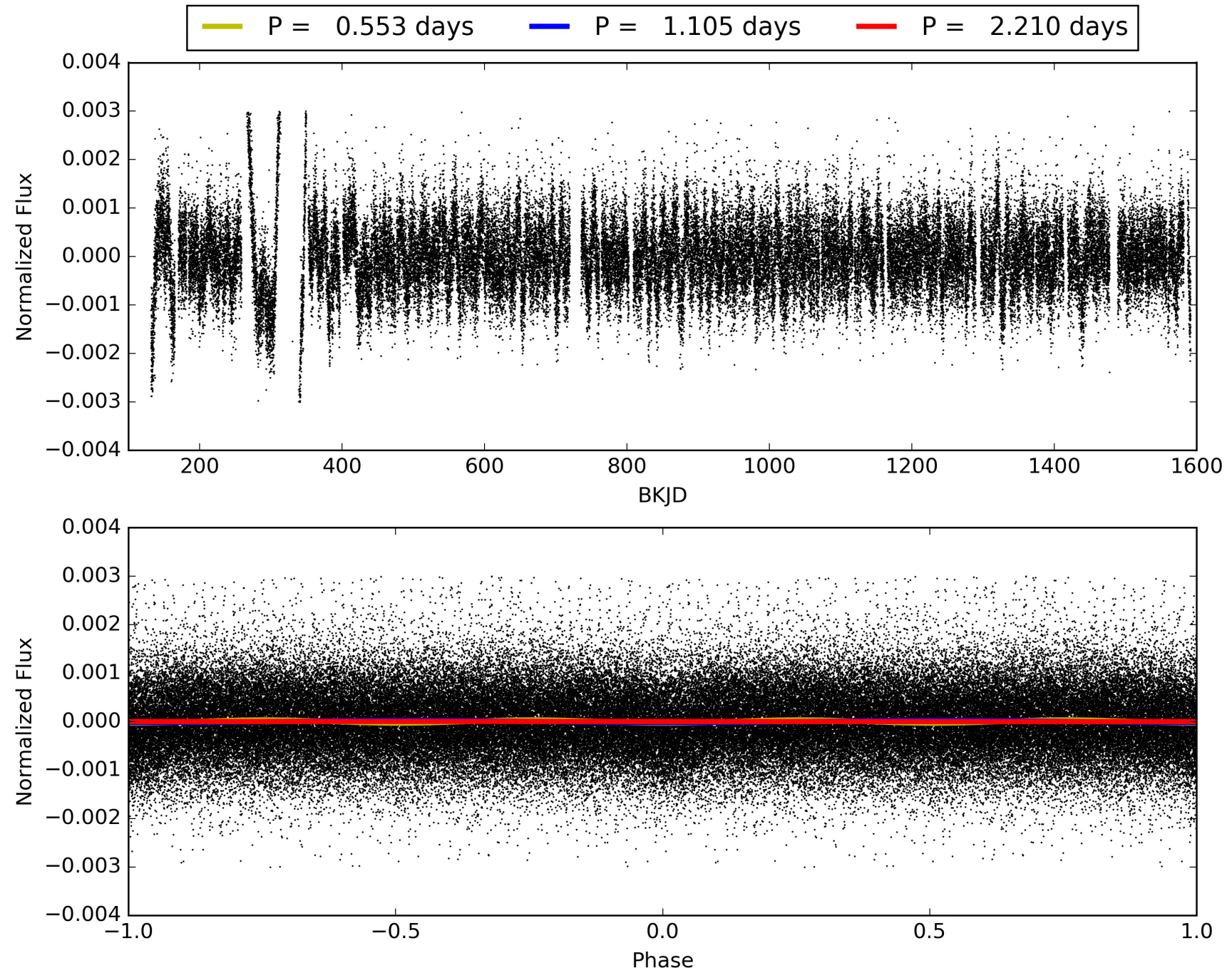
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 20:23:34 Z

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

# TCE 010736179-02, PDC Light Curves



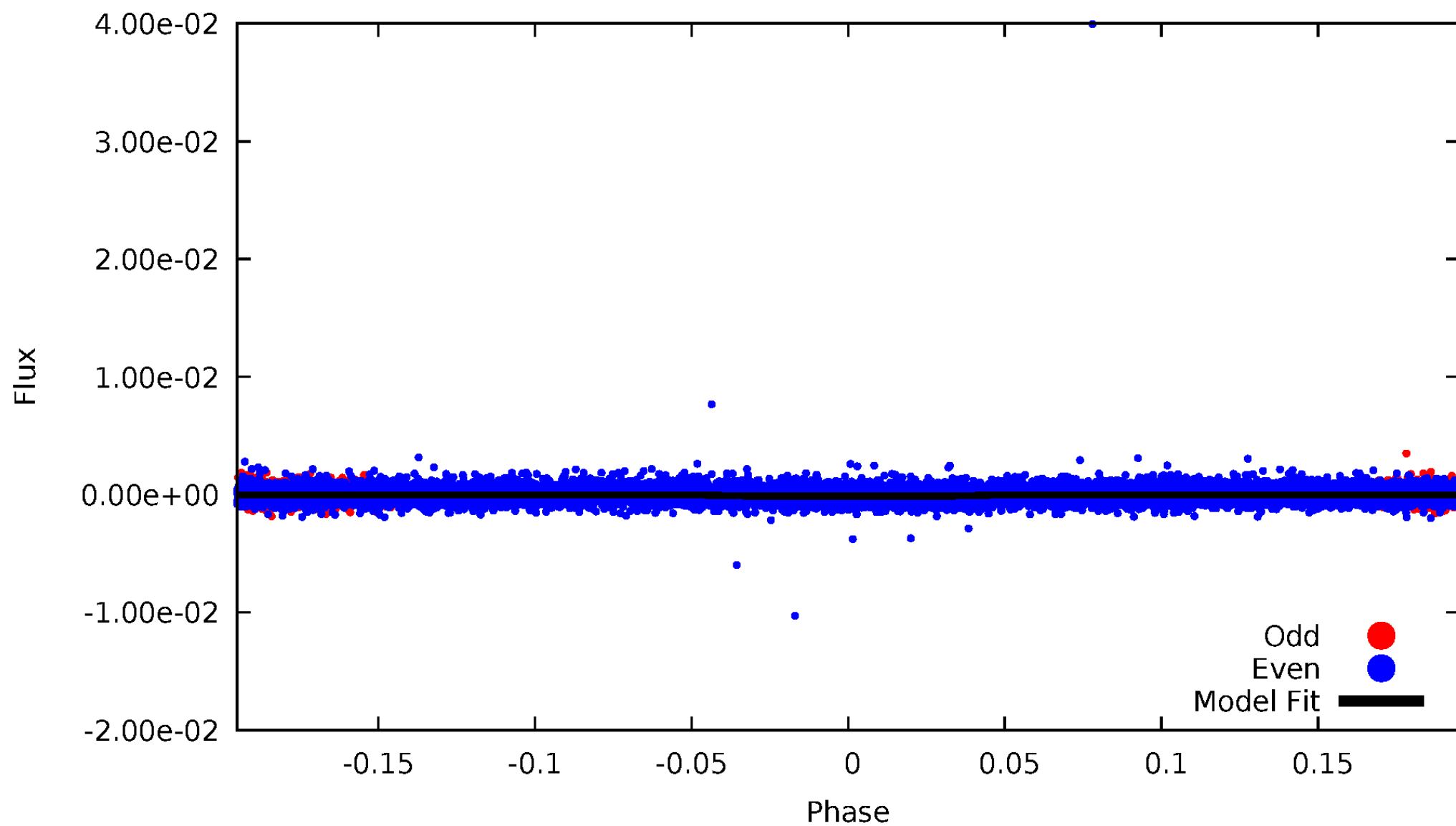
# TCE 010736179-02





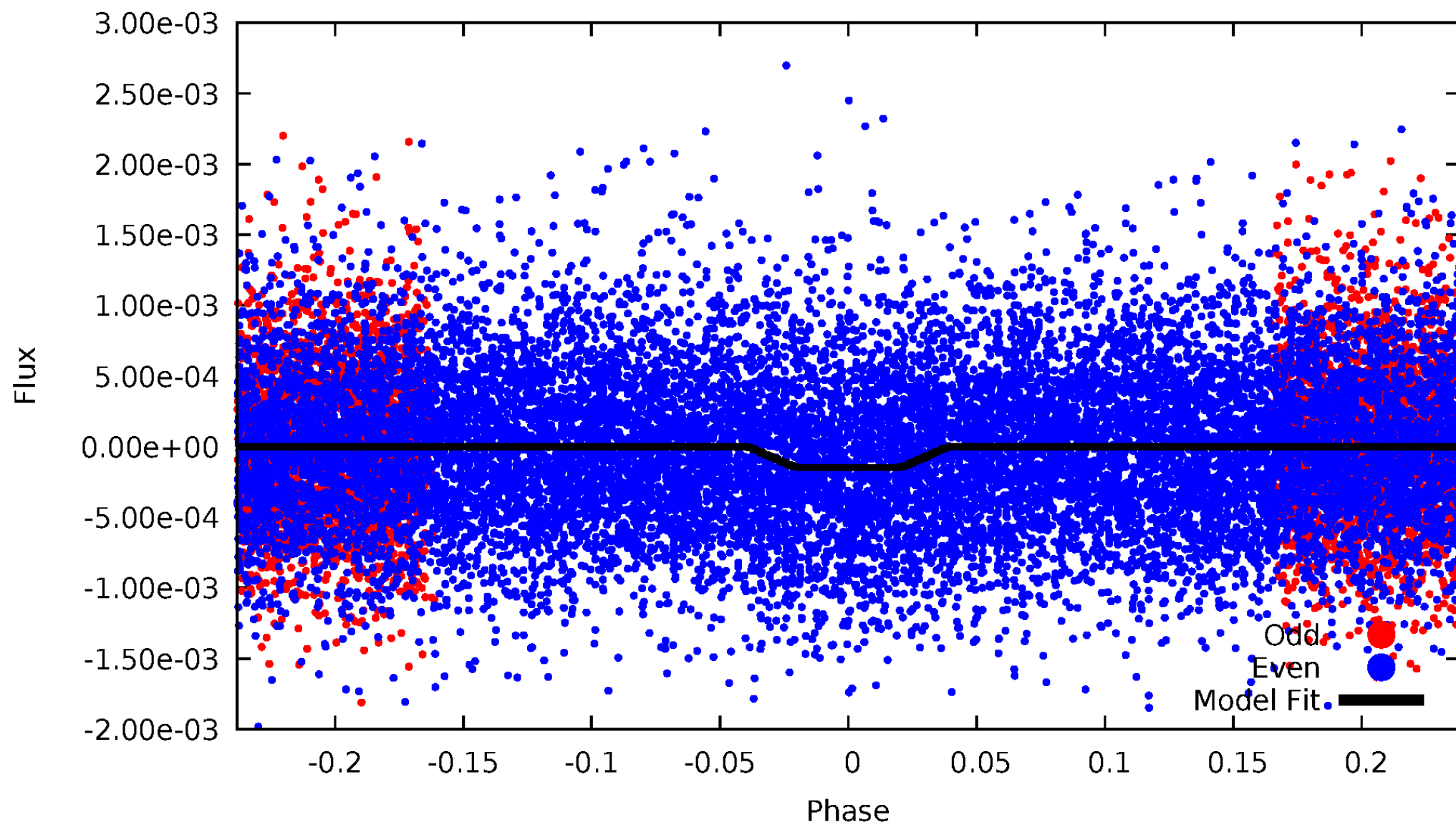
# DV Odd/Even

TCE 010736179-02



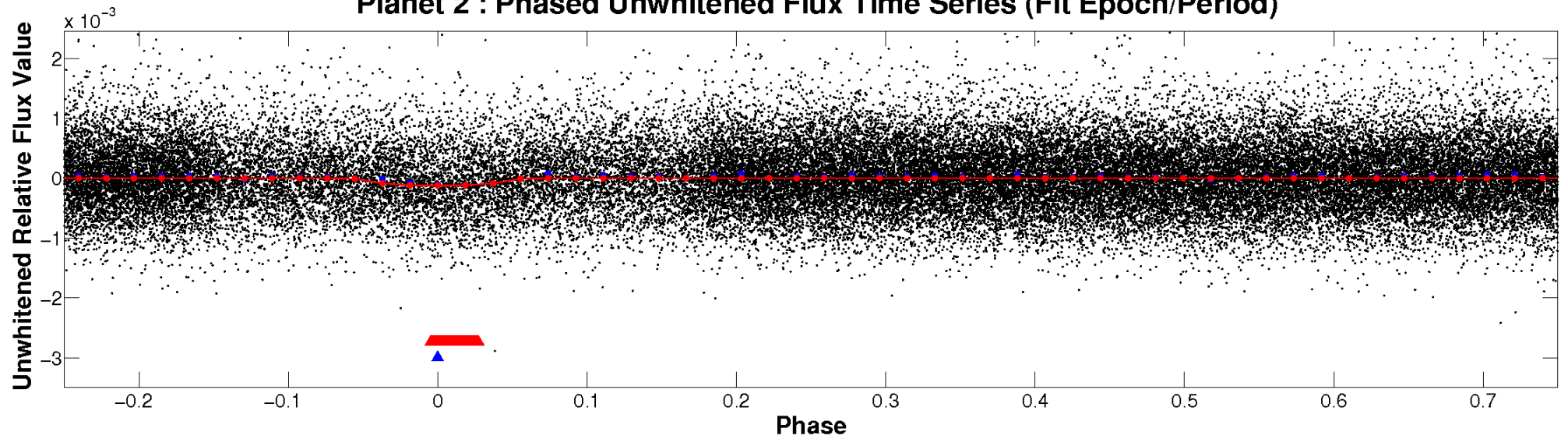
# ALT Odd/Even

TCE 010736179-02

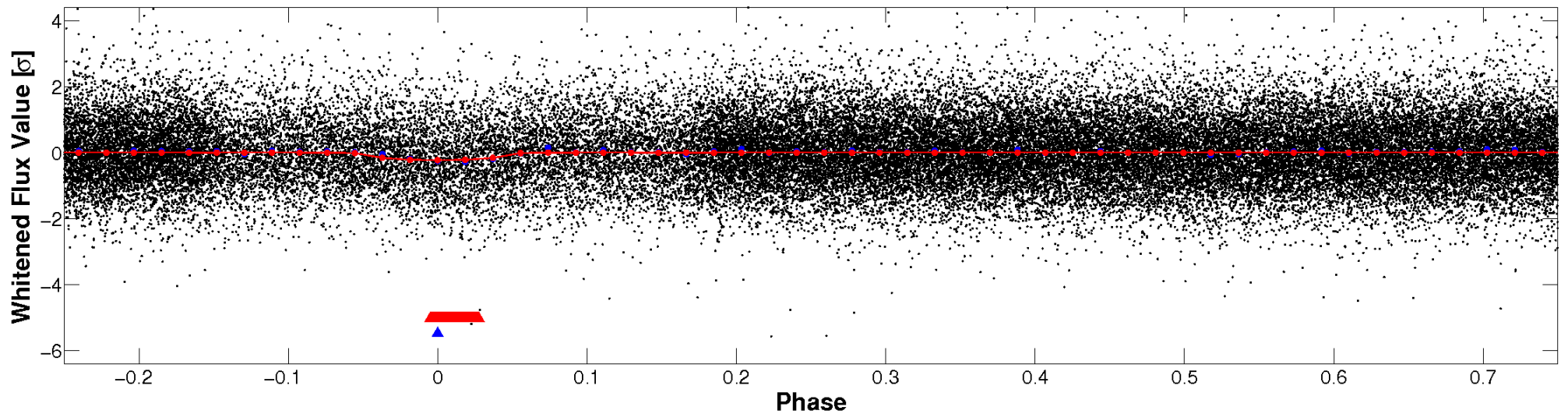


# Non-Whitened Vs. Whitened Light Curve

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

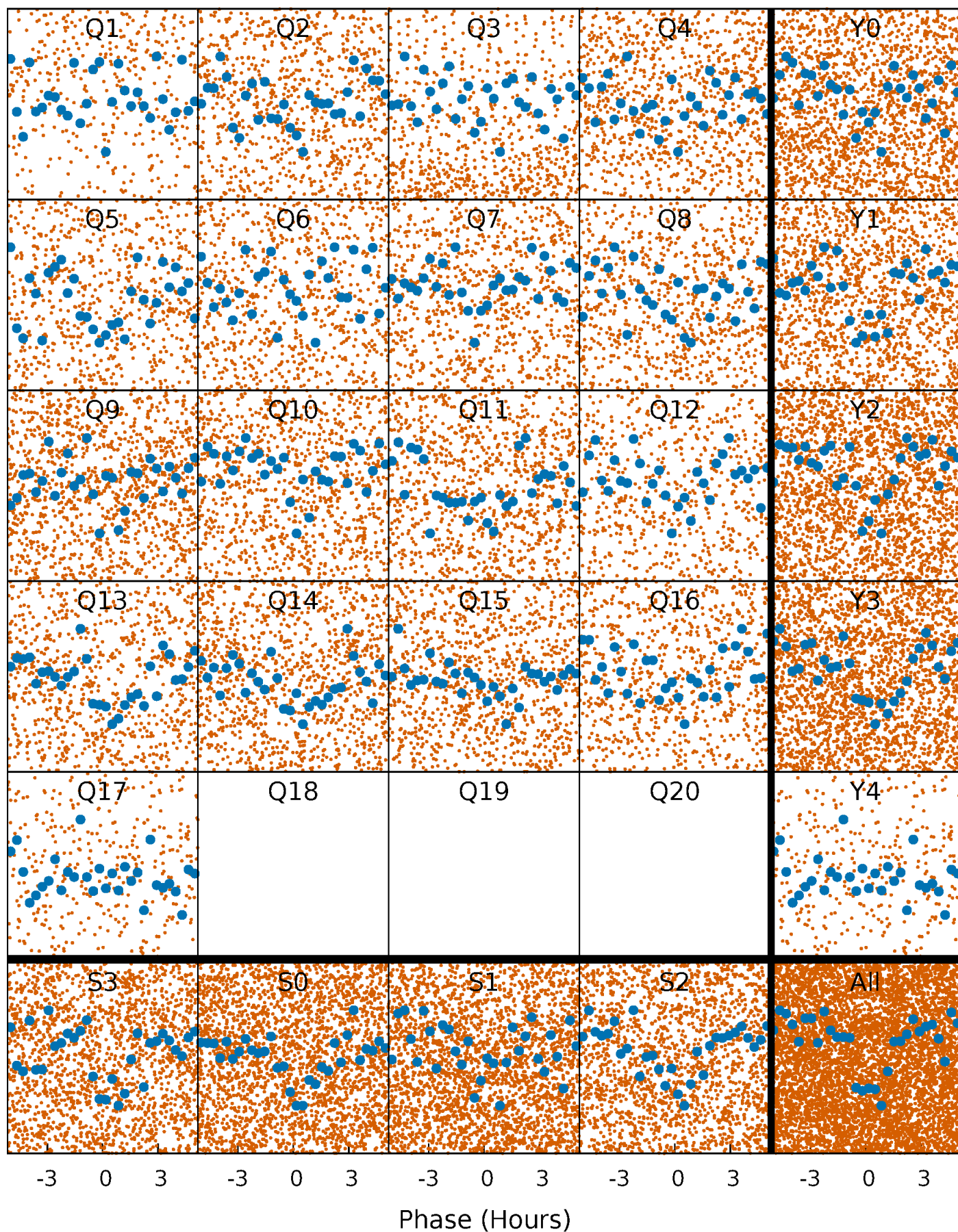


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

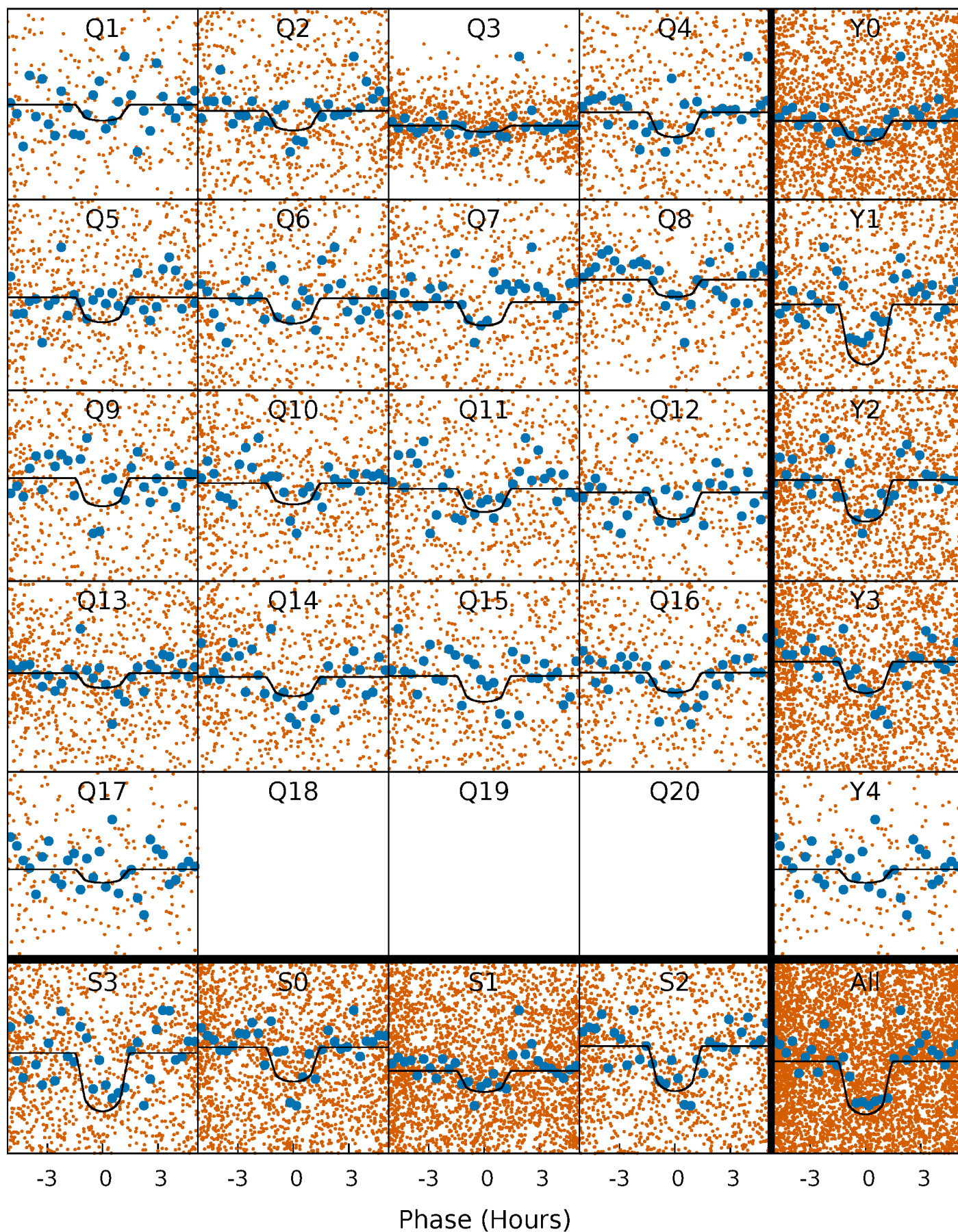
TCE 010736179-02 P= 1.105053 Days  $T_0=132.564933$  (BKJD)





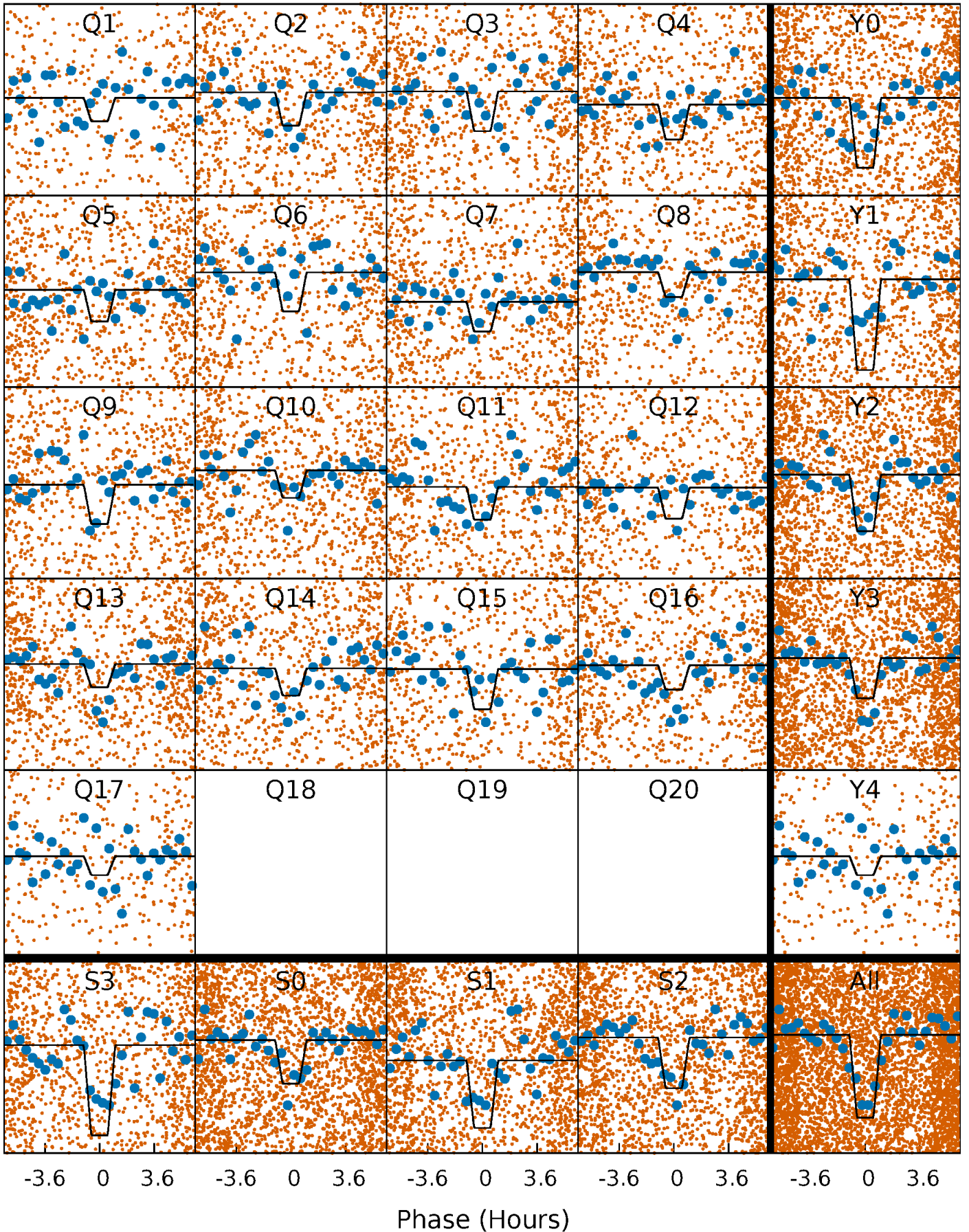
# DV Quarter-Phased Transit Curves

TCE 010736179-02 P= 1.105053 Days  $T_0=132.564933$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

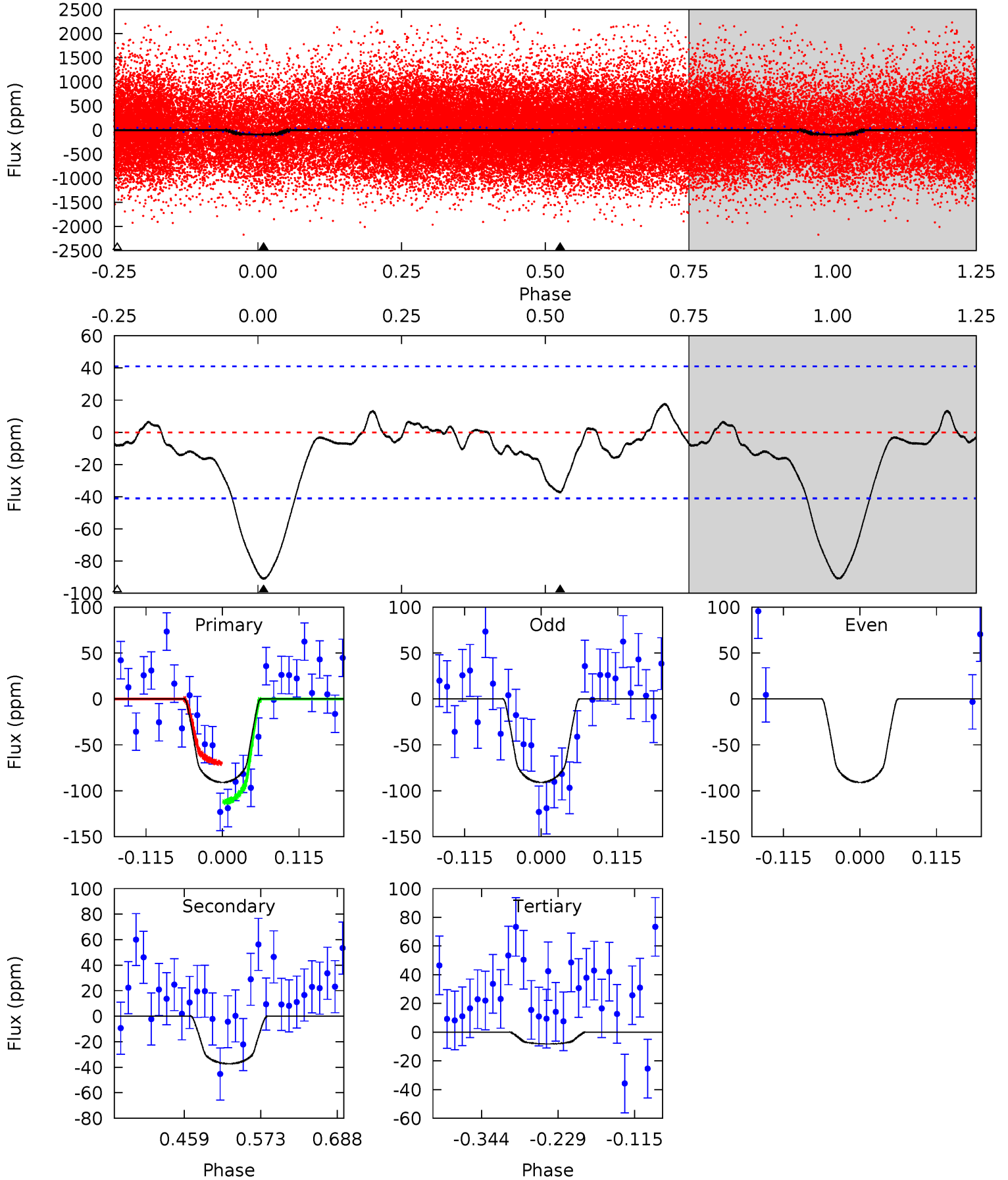
TCE 010736179-02 P= 1.105086 Days  $T_0=132.554110$  (BKJD)



# DV Model-Shift Uniqueness Test

010736179-02, P = 1.105053 Days, E = 131.459880 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
10.0	4.12	0.91	0	4.54	1.58	0.75	9.14	10.0	3.21	4.12	0	0.99	0.16	2.37

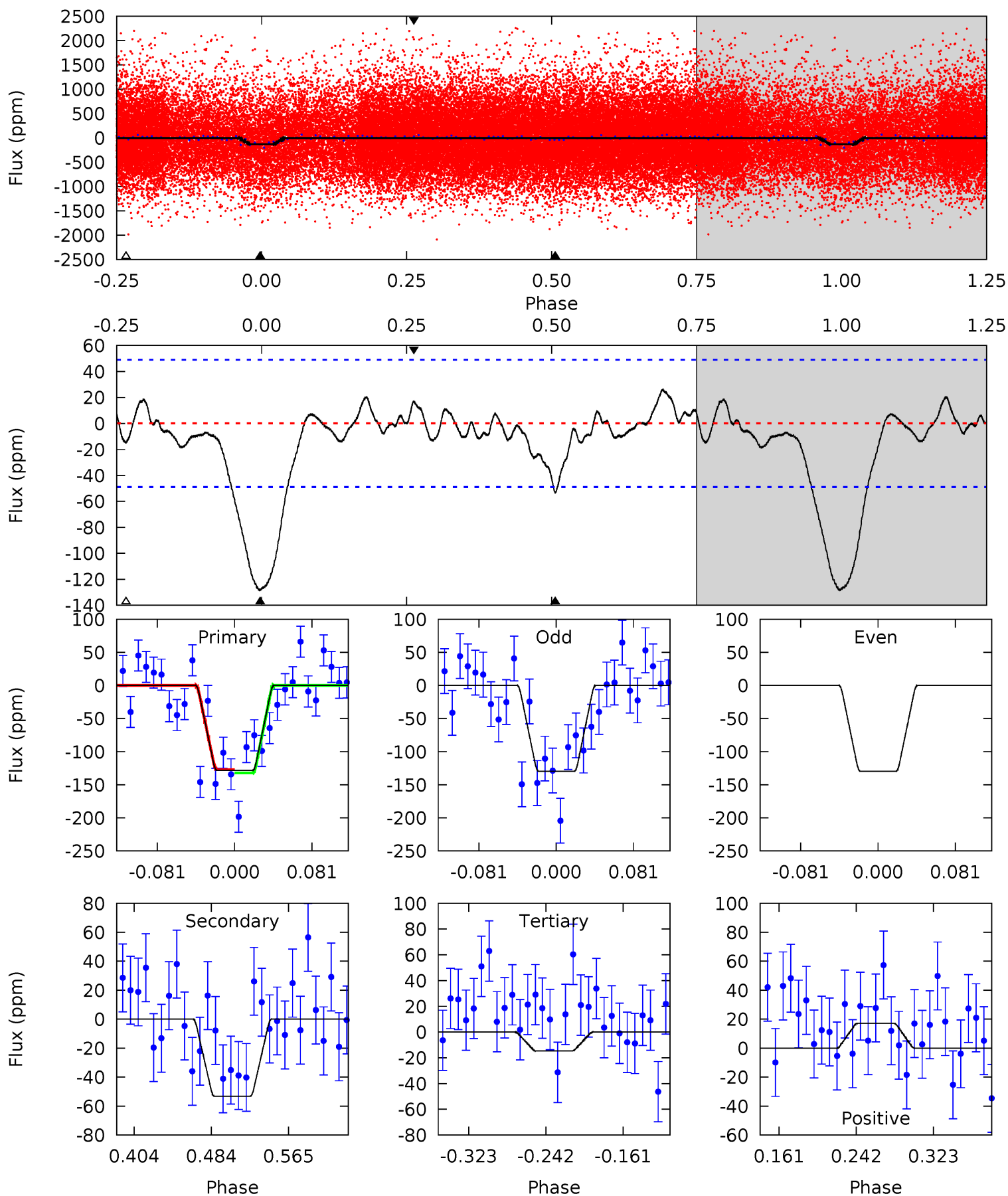




# Alt Model-Shift Uniqueness Test

010736179-02, P = 1.105086 Days, E = 131.449024 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	5.01	1.38	1.61	4.61	1.75	0.90	10.7	10.5	3.63	3.40	0	0.95	0.17	0.24



### Stellar Parameters For KIC 010736179

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5296^{+159}_{-159}$	$4.604^{+0.032}_{-0.097}$	$-0.200^{+0.300}_{-0.300}$	$0.752^{+0.122}_{-0.057}$	$0.835^{+0.078}_{-0.096}$	$2.772^{+0.501}_{-0.892}$
	+3%/-3%	+1%/-2%	+150%/-150%	+16%/-8%	+9%/-11%	+18%/-32%
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 010736179-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-37 \pm 9$	$1.16^{+0.87}_{-0.74}$	$2042^{+88}_{-70}$	$3798^{+2030}_{-657}$	$5.639^{+39.993}_{-3.761}$
Alt.	$-53 \pm 11$	$1.16^{+0.82}_{-0.73}$	$2051^{+92}_{-78}$	$4073^{+2178}_{-704}$	$8.011^{+50.810}_{-5.194}$

$T_{\text{max}}$  = 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

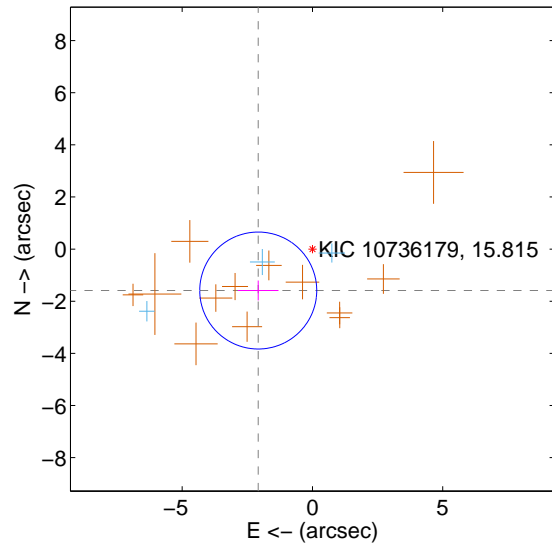
Supplemental centroid analysis for 010736179-02. Kepler magnitude: 15.81. Transit SNR 10.15

There are 3 quarters with good PRF difference image offsets

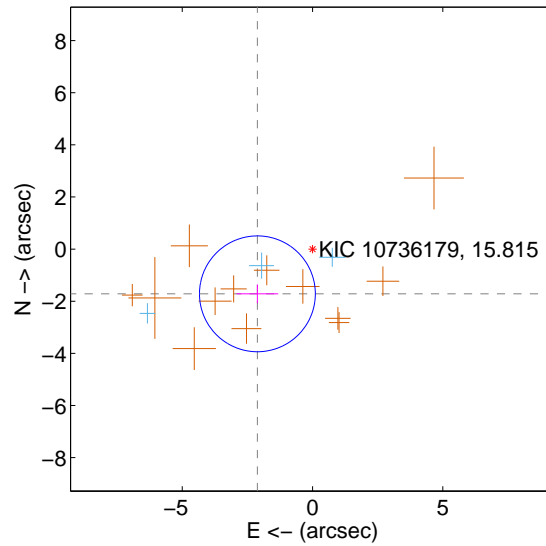
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.618 \pm 0.748$	3.50	$2.080 \pm 0.777$	$-1.590 \pm 0.381$
PRF-fit source offset from KIC position	$2.724 \pm 0.741$	3.68	$2.115 \pm 0.799$	$-1.716 \pm 0.359$
photometric centroid source offset	$3.69 \pm 1.35$	2.74	$1.03 \pm 1.55$	$-3.55 \pm 1.33$

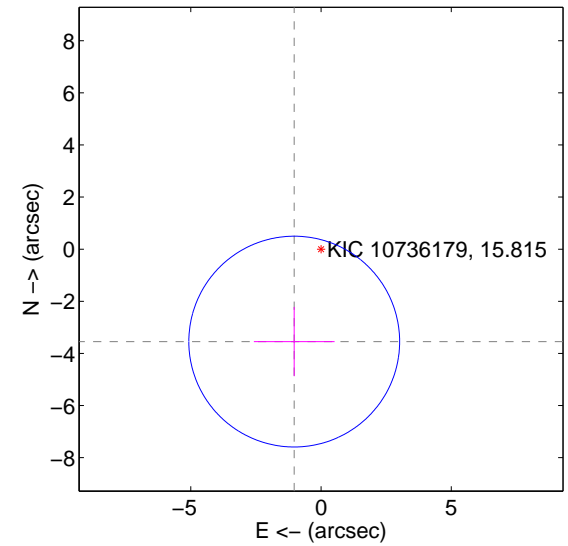
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

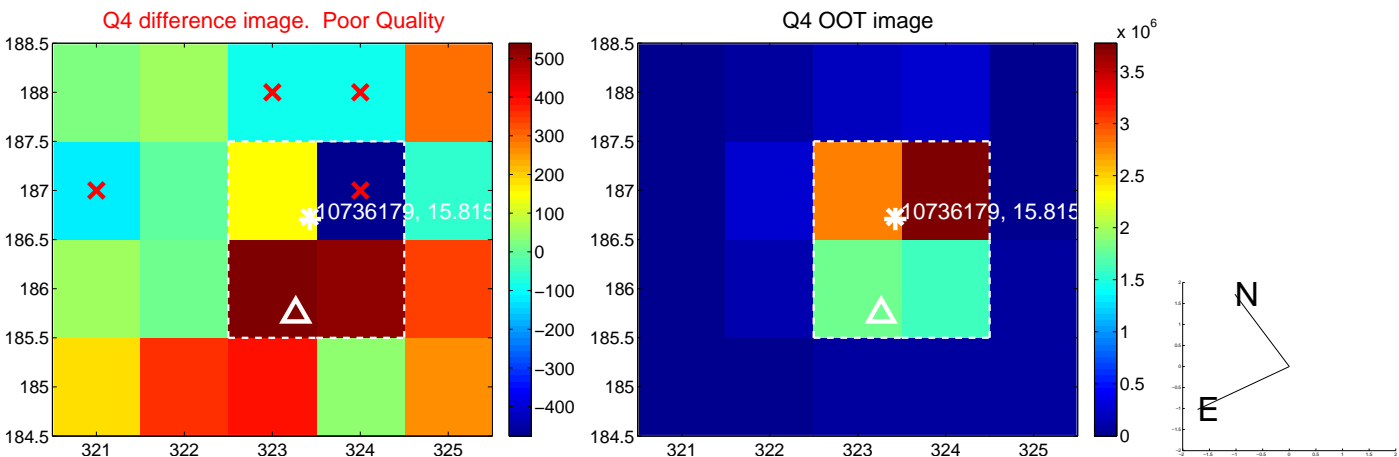
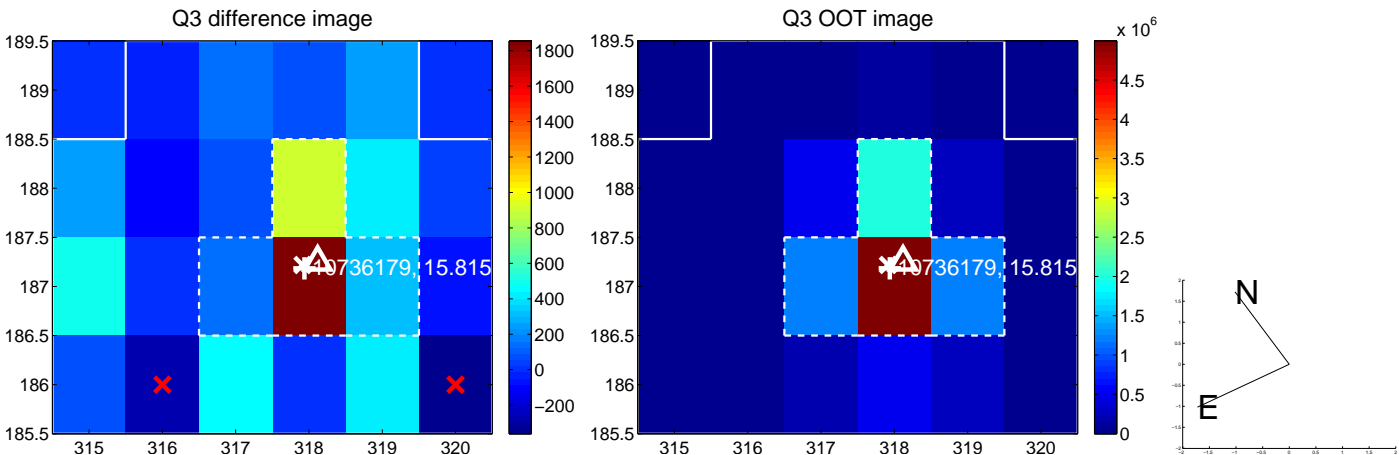
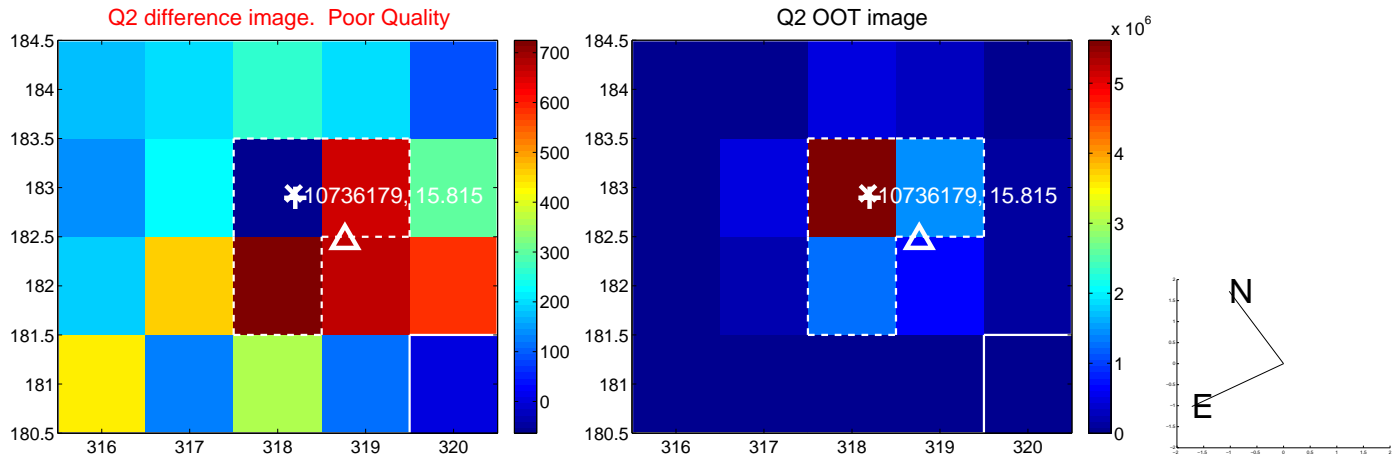
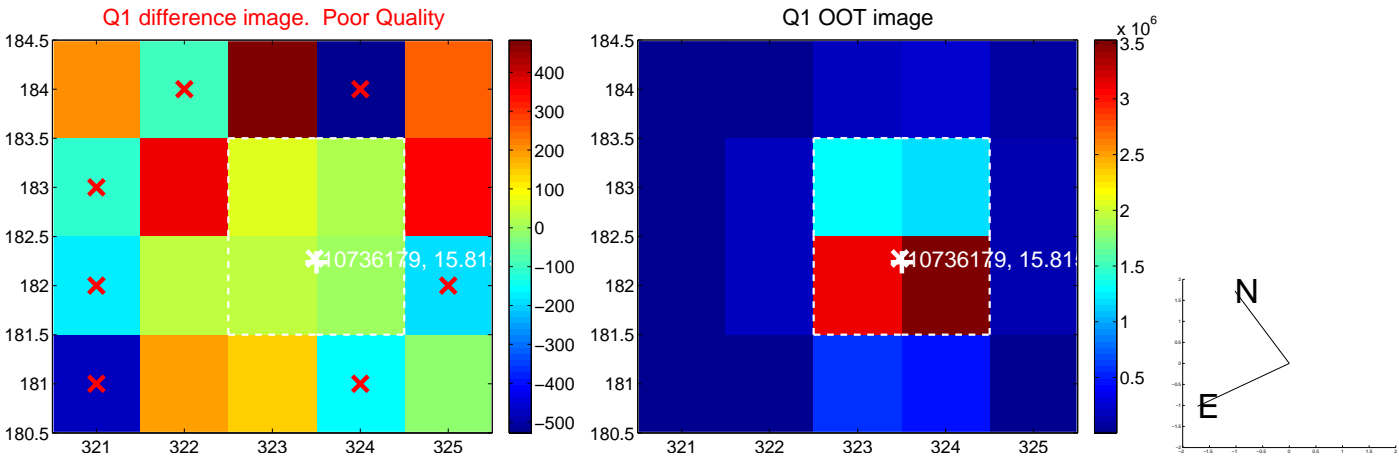


offset from photometric centroids

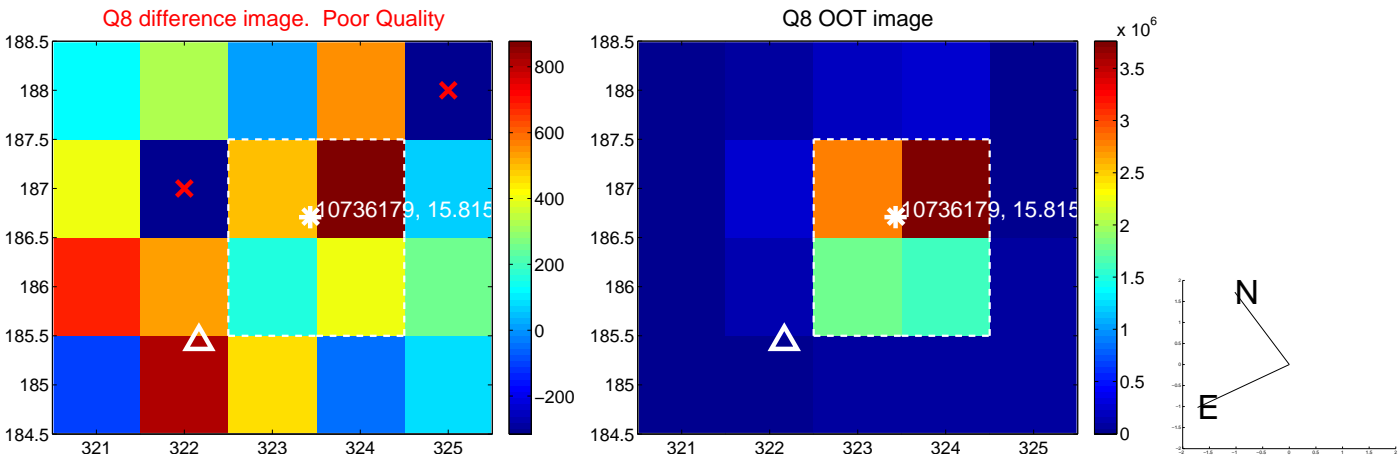
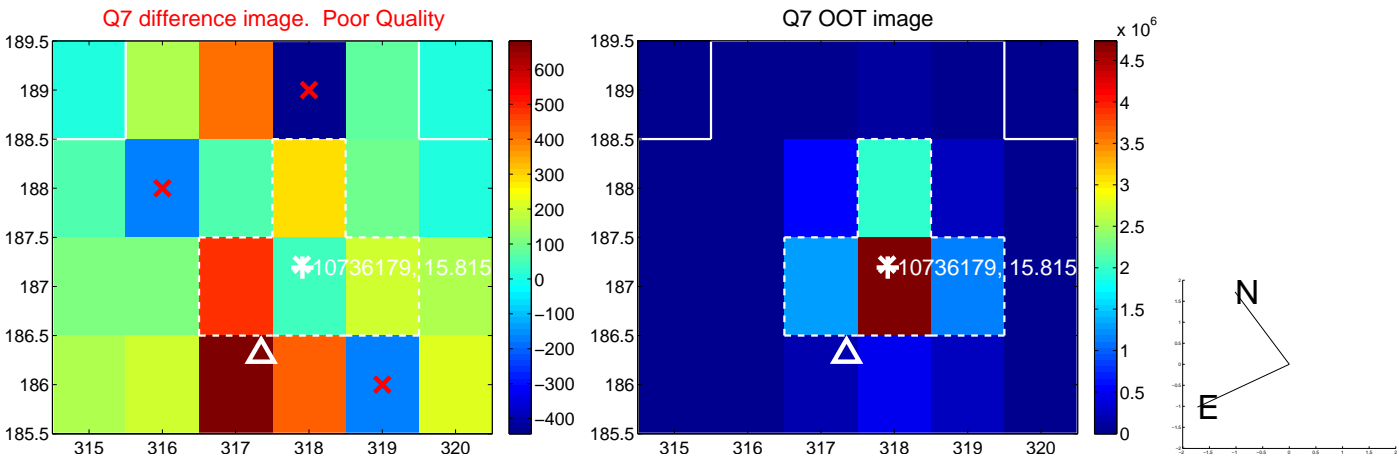
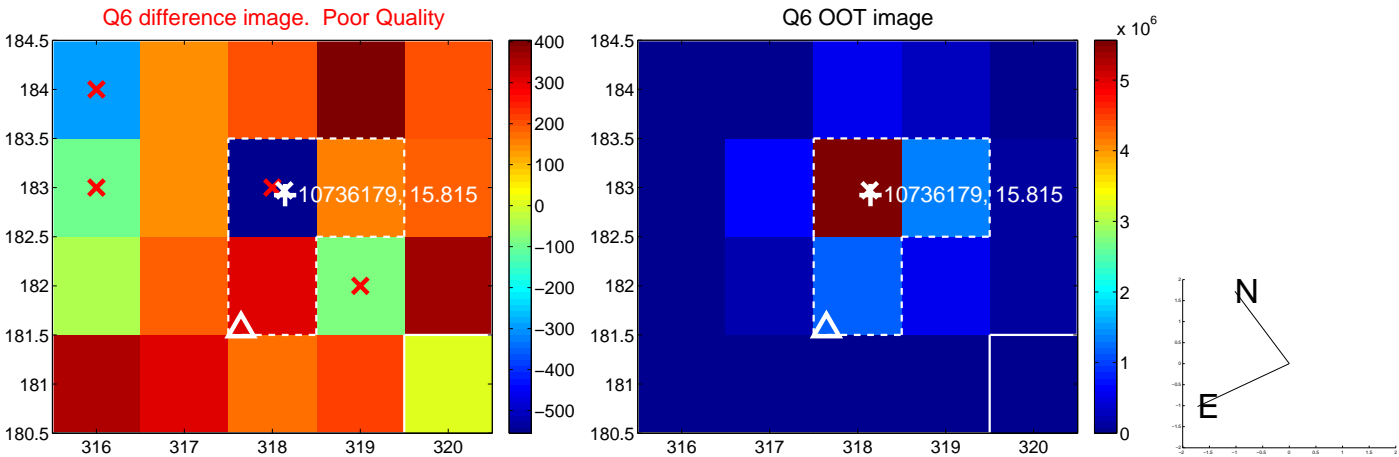
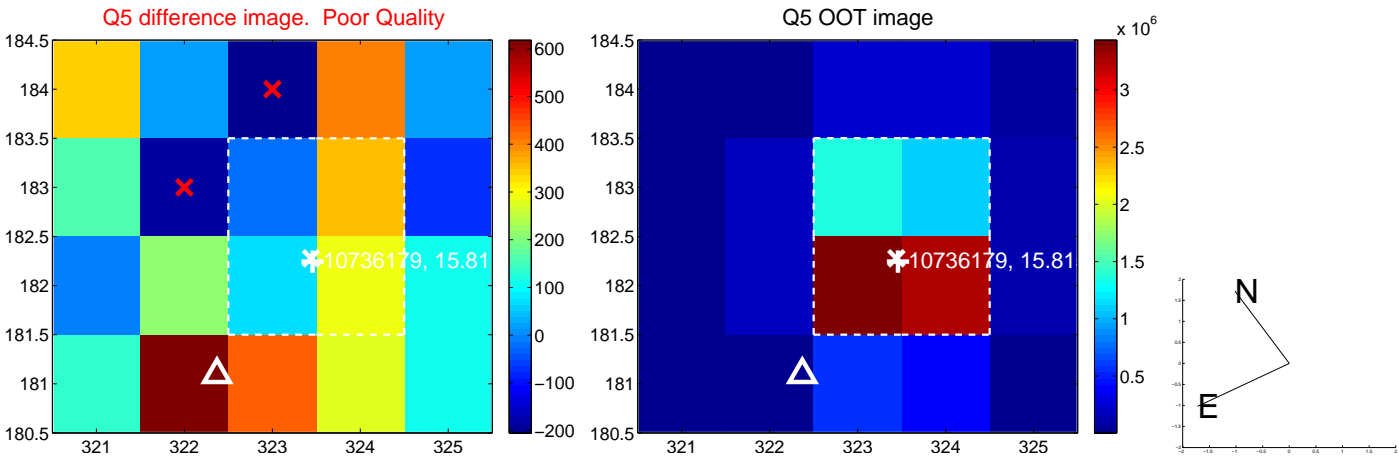


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

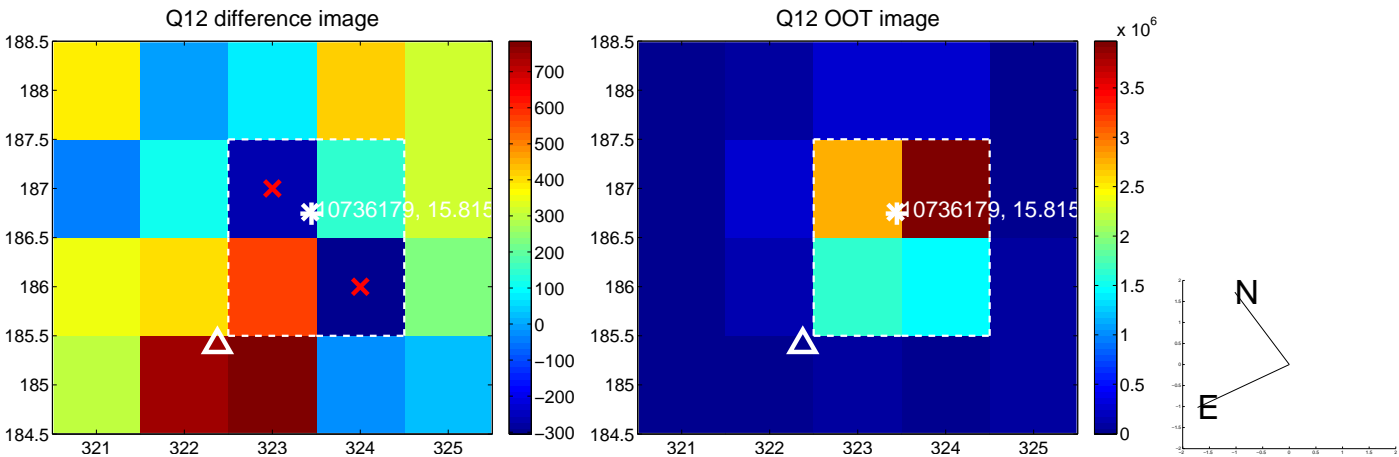
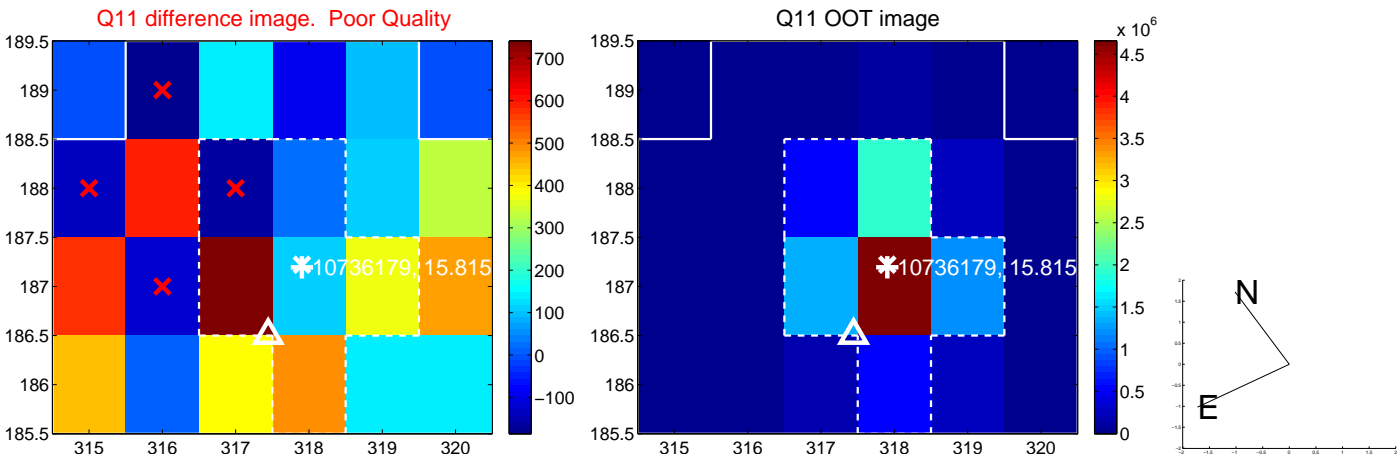
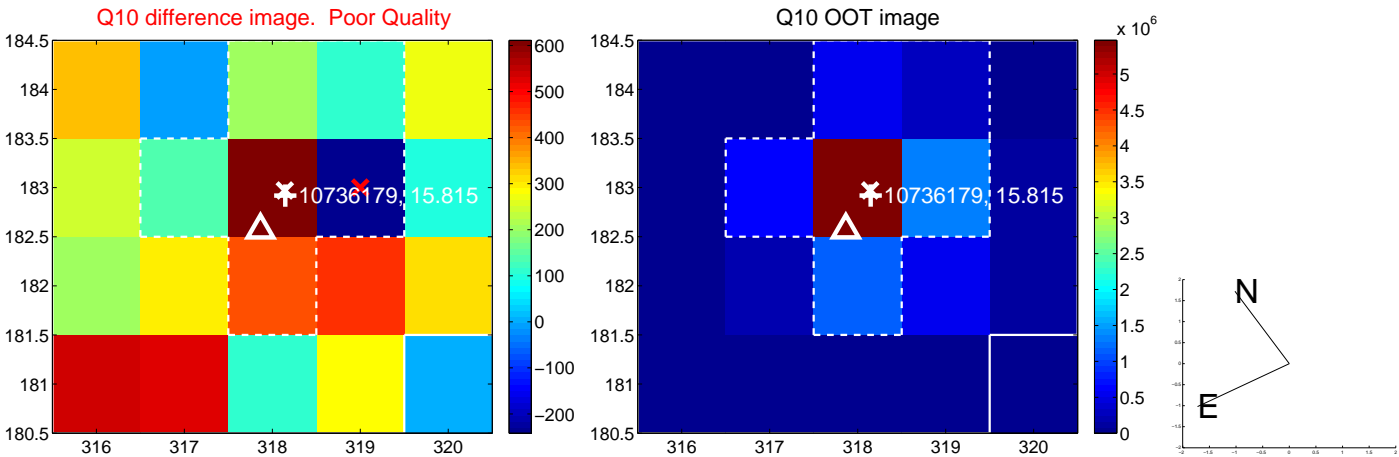
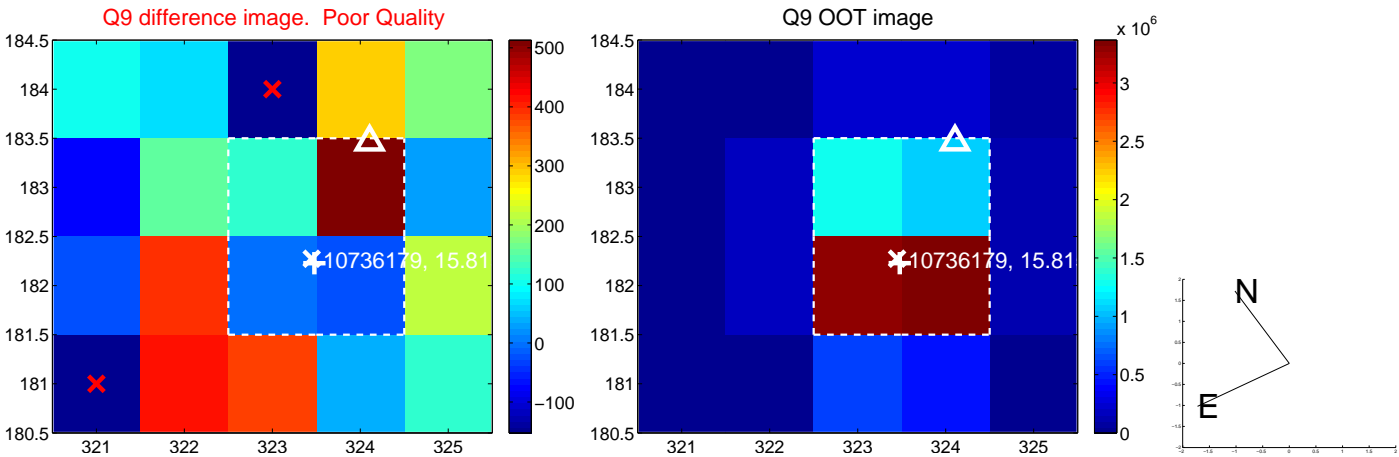
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



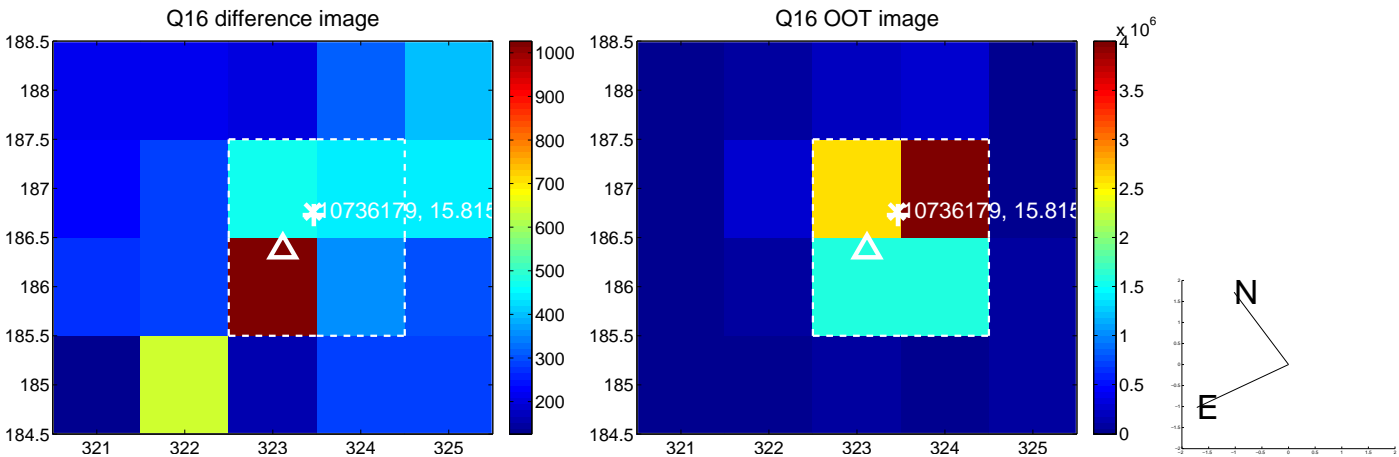
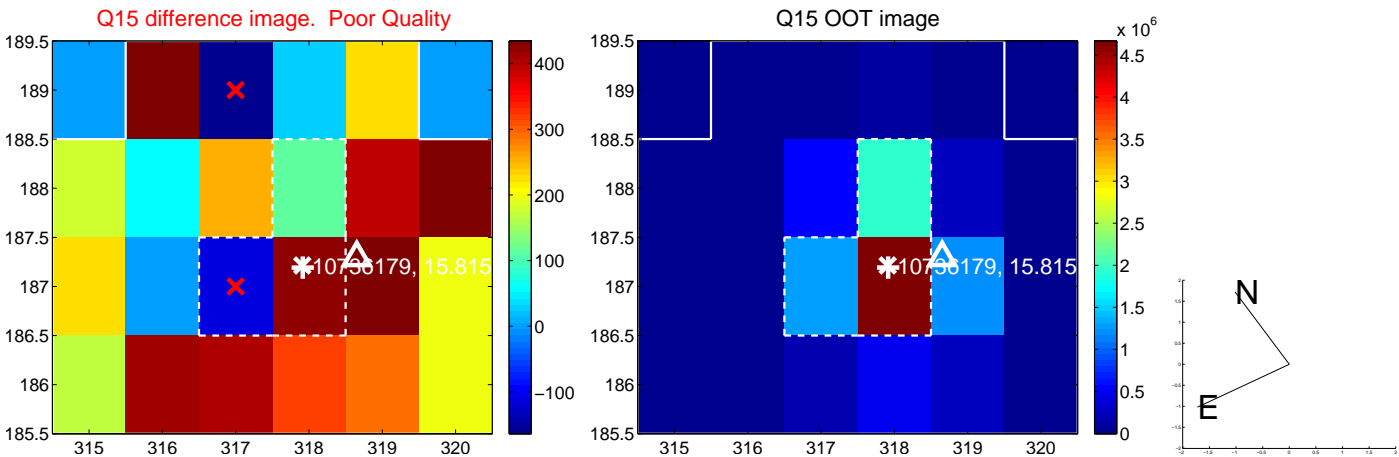
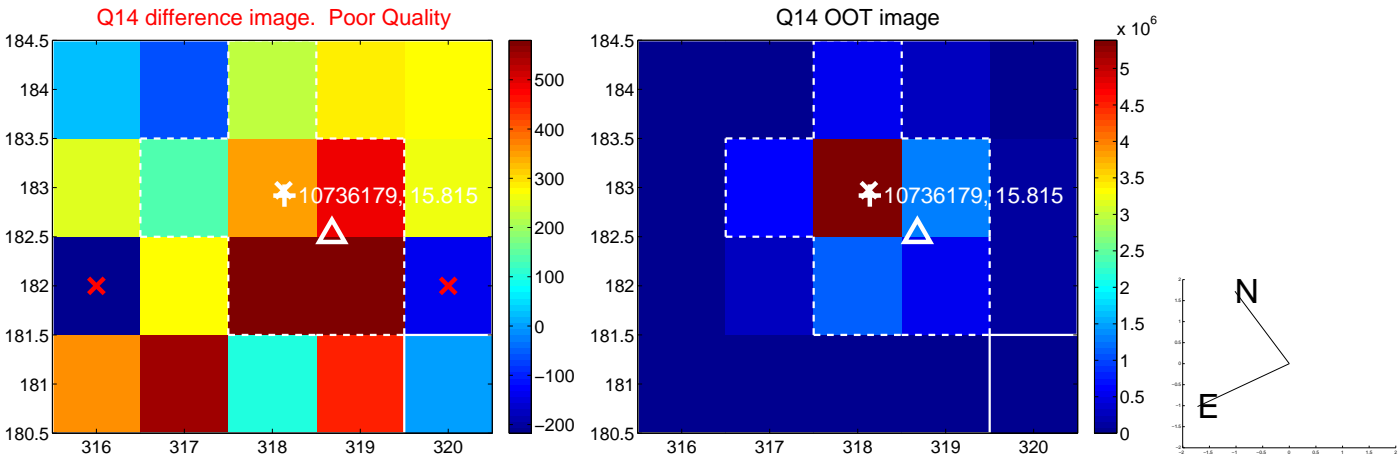
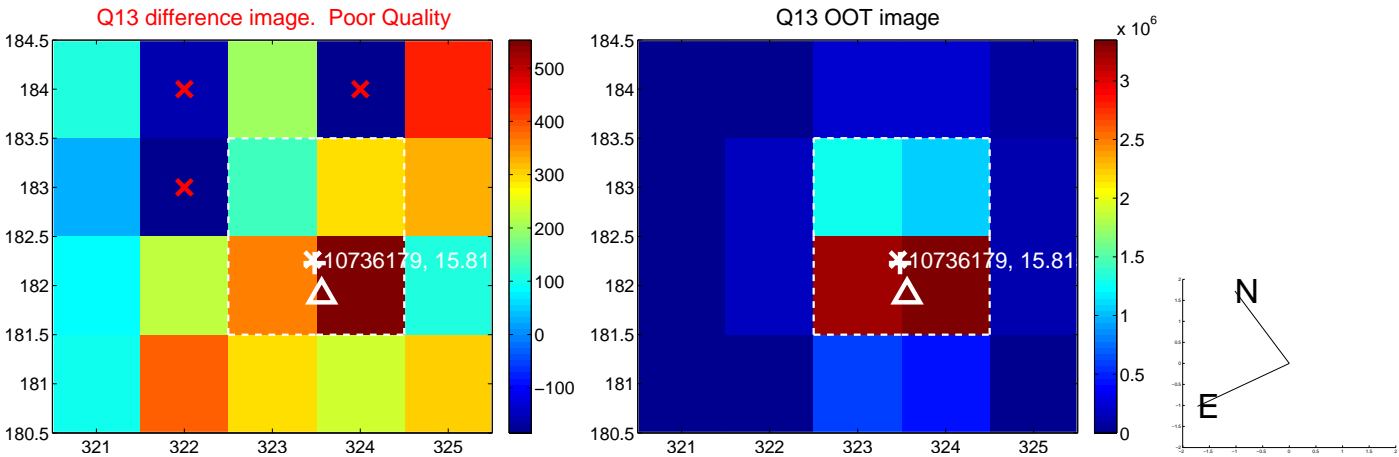
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

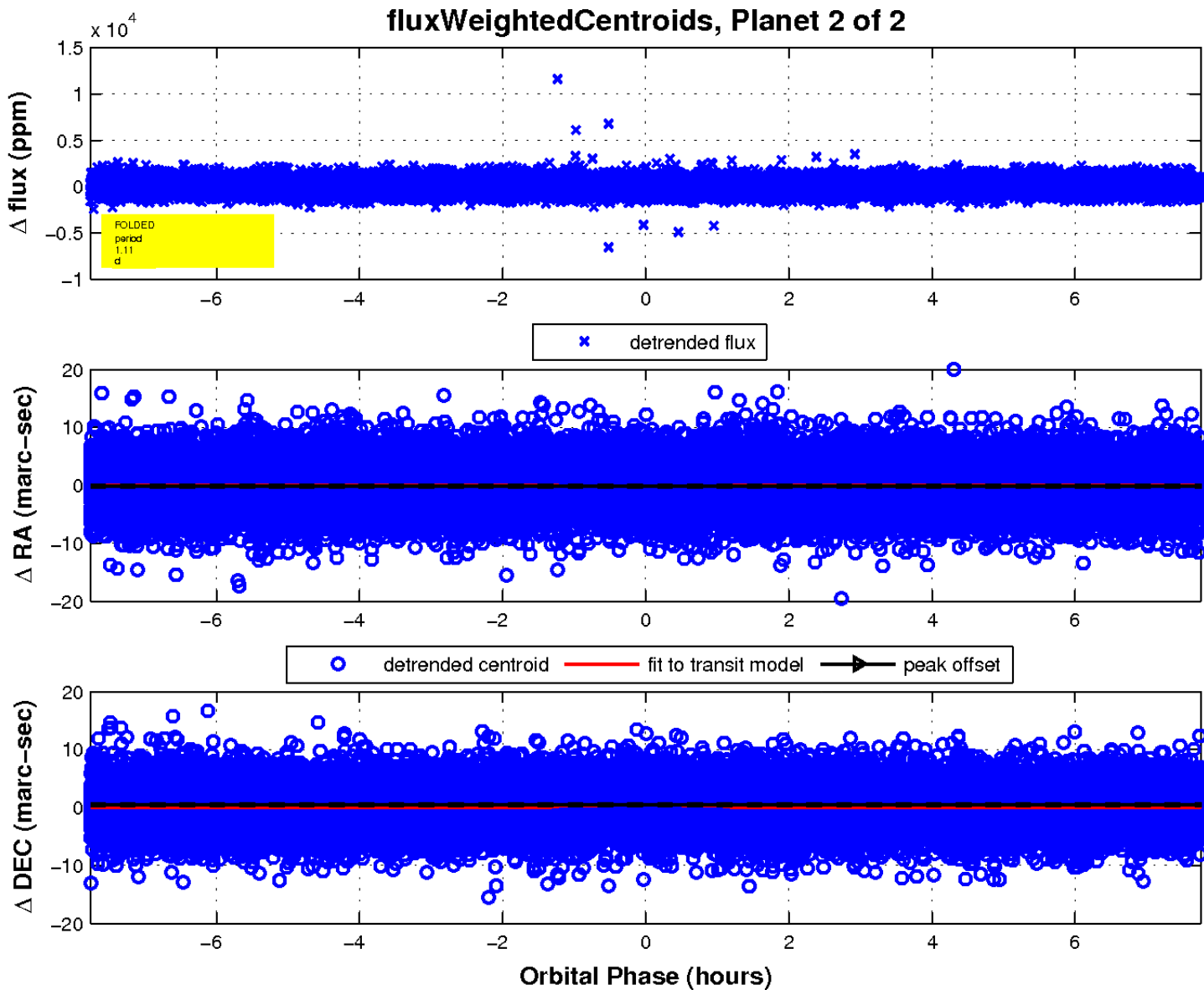
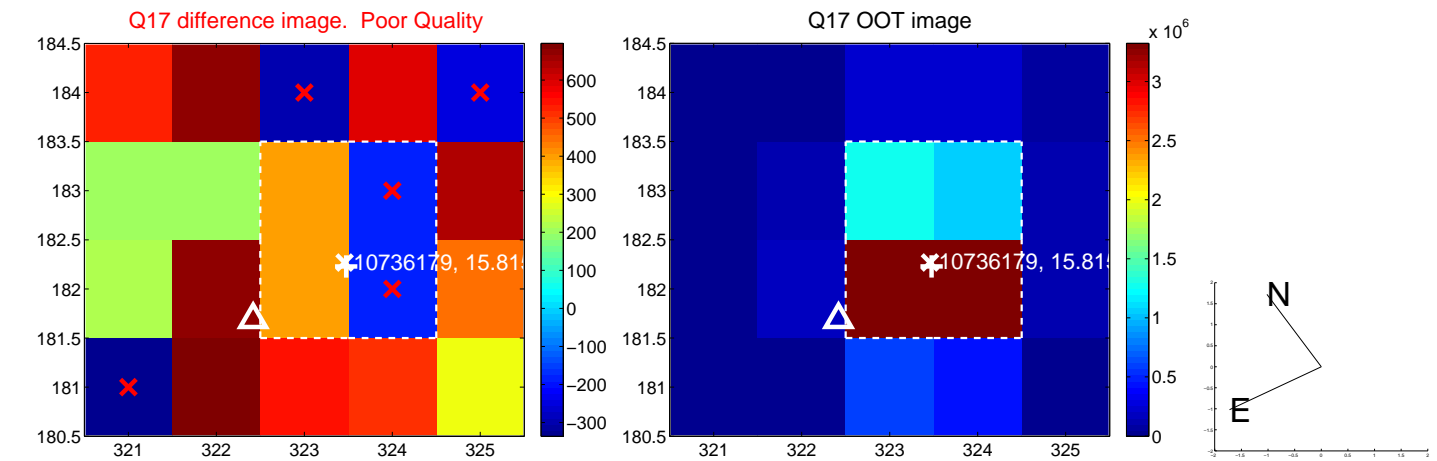


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



UKIRT Image

Declination

