

# KIC 007376490

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007376490-01	OBS	3586.01	5.877117	136.421628	8399.4	4.373	1405.5	798.3	1.04	5778	17.29	300.59
007376490-02	OBS	No	5.877120	132.071155	2613.8	3.433	489.6	281.6	1.04	5778	10.04	300.59

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007376490-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH
007376490-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_RESOLVED_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 007376490-01

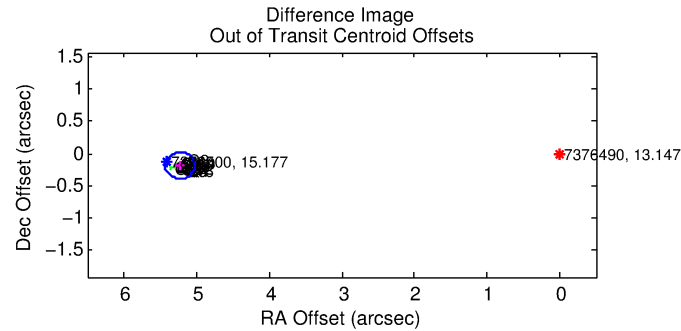
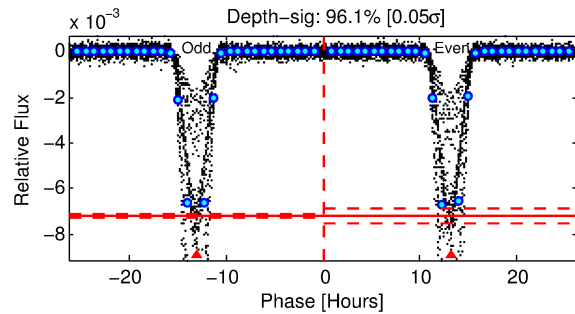
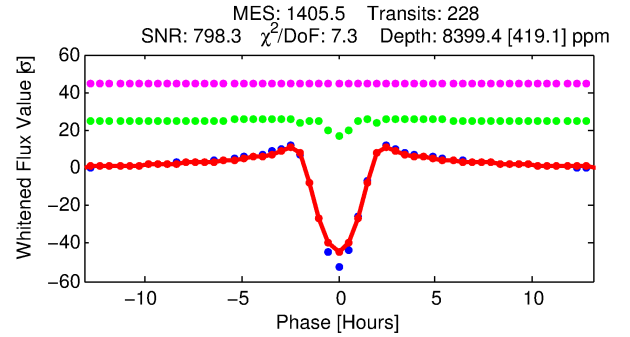
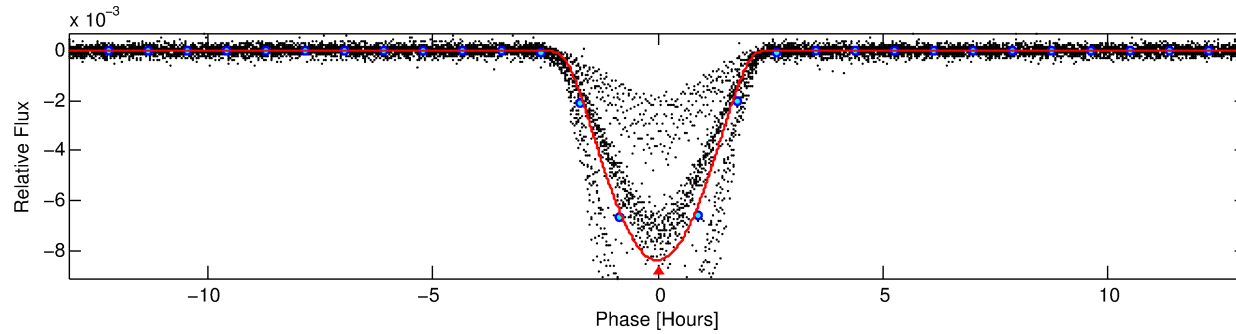
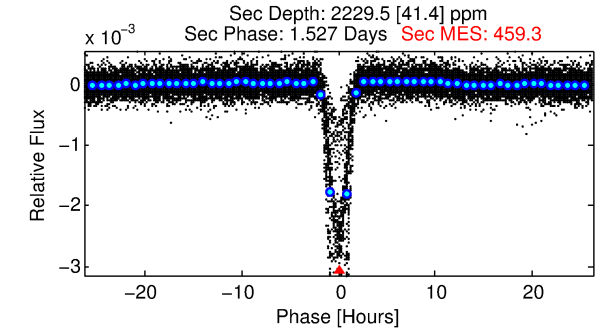
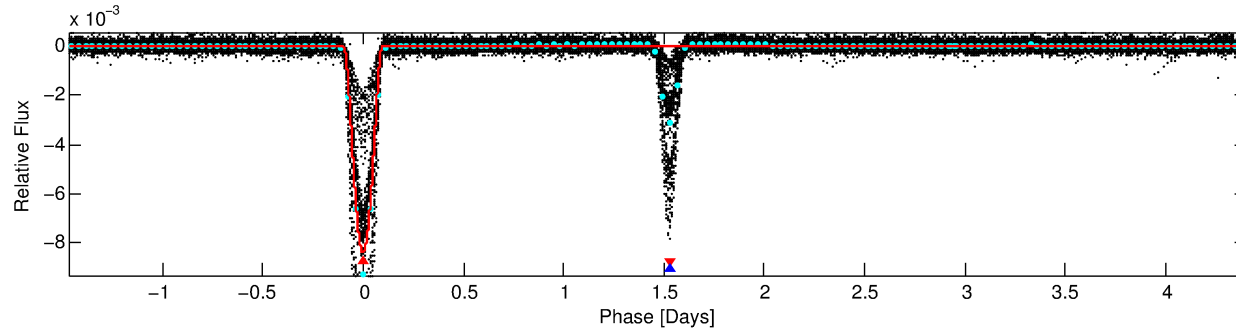
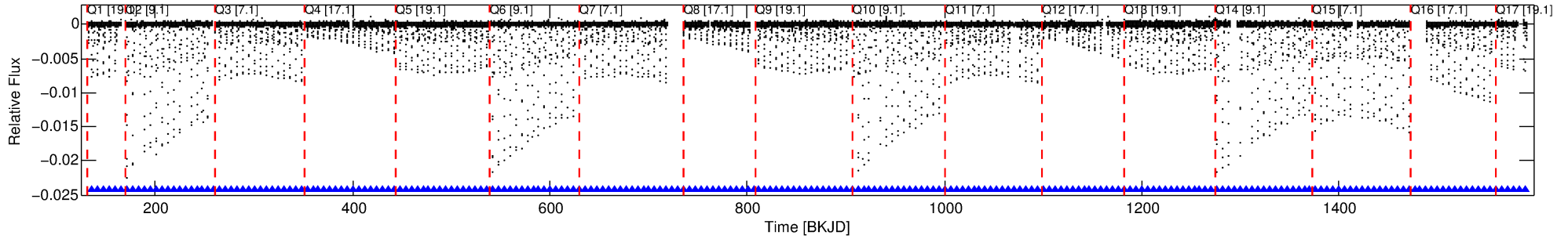
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
007376490-01	7376490	3535.01	7376500	1:1	5.4	-1	0	15.18	13.15	45.35	Direct-PRF	0	0.04	0.03

**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: 7376490 Candidate: 1 of 2 Period: 5.877 d  
KOI: K03586.01 Corr: 0.986

Kp: 13.15 R\*: 1.04 Rs Teff: 5778.0 K Logg: 4.33 Fe/H: -0.340



## DV Fit Results:

Period = 5.87712 [0.00000] d  
Epoch = 136.4216 [0.0002] BKJD  
Rp/R\* = 0.1519 [0.0146]  
a/R\* = 5.96 [0.08]  
b = 1.00 [0.03]  
Seff = 300.59 [119.65]  
Teq = 1062 [106] K  
Rp = 17.29 [5.39] Re  
a = 0.0601 [0.0154] AU  
Ag = 14.82 [6.36] [2.17σ]  
Teffp = 3221 [178] K [10.43σ]

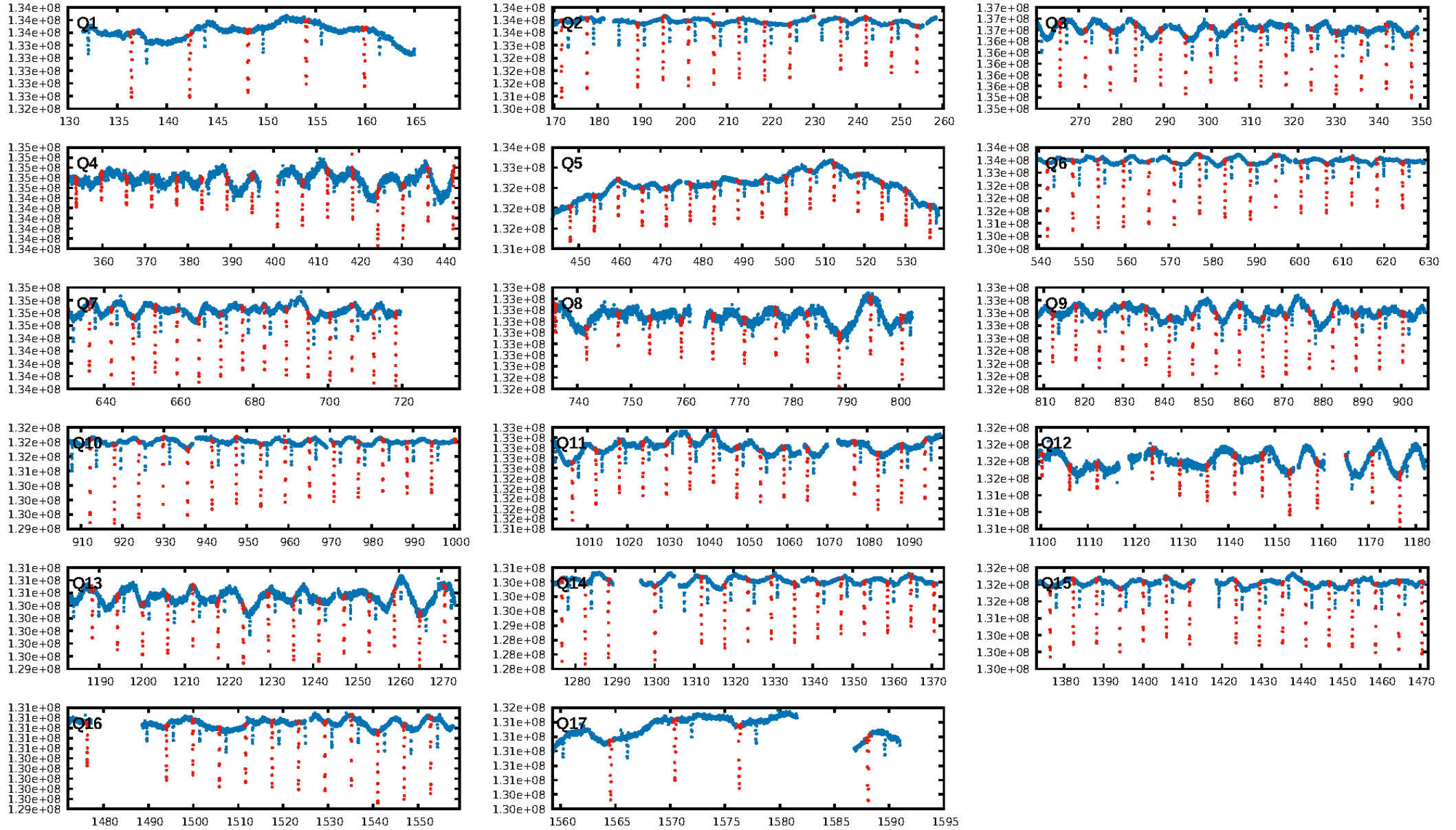
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [219/219]  
GhostDiagnostic-chr: -0.2606  
Centroid-sig: 0.0%  
Centroid-so: 24.130 arcsec [2757.61σ]  
OotOffset-rm: 5.237 arcsec [76.64σ]  
KicOffset-rm: 5.447 arcsec [80.16σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

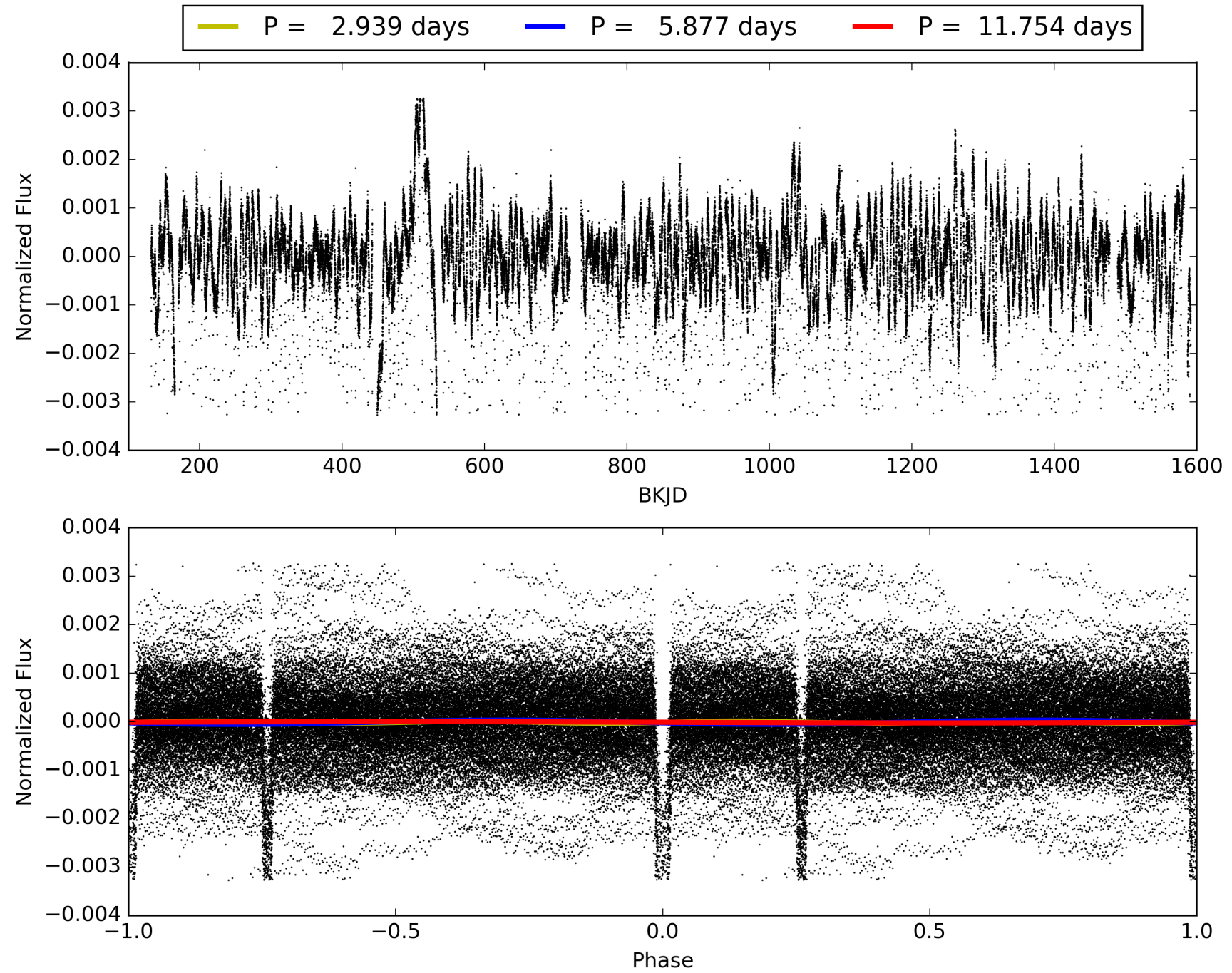
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 12:39:15 Z

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

# TCE 007376490-01, PDC Light Curves

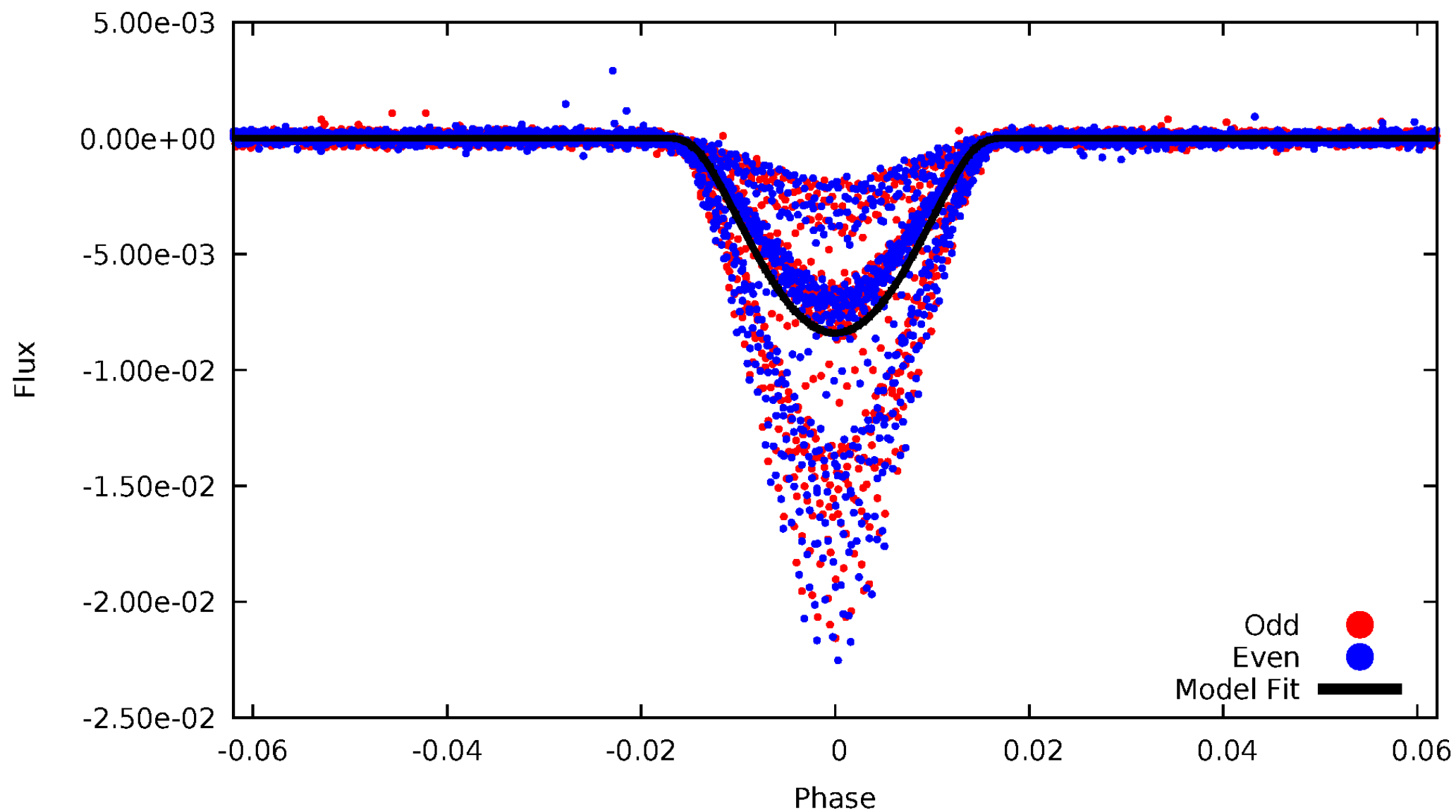


TCE 007376490-01



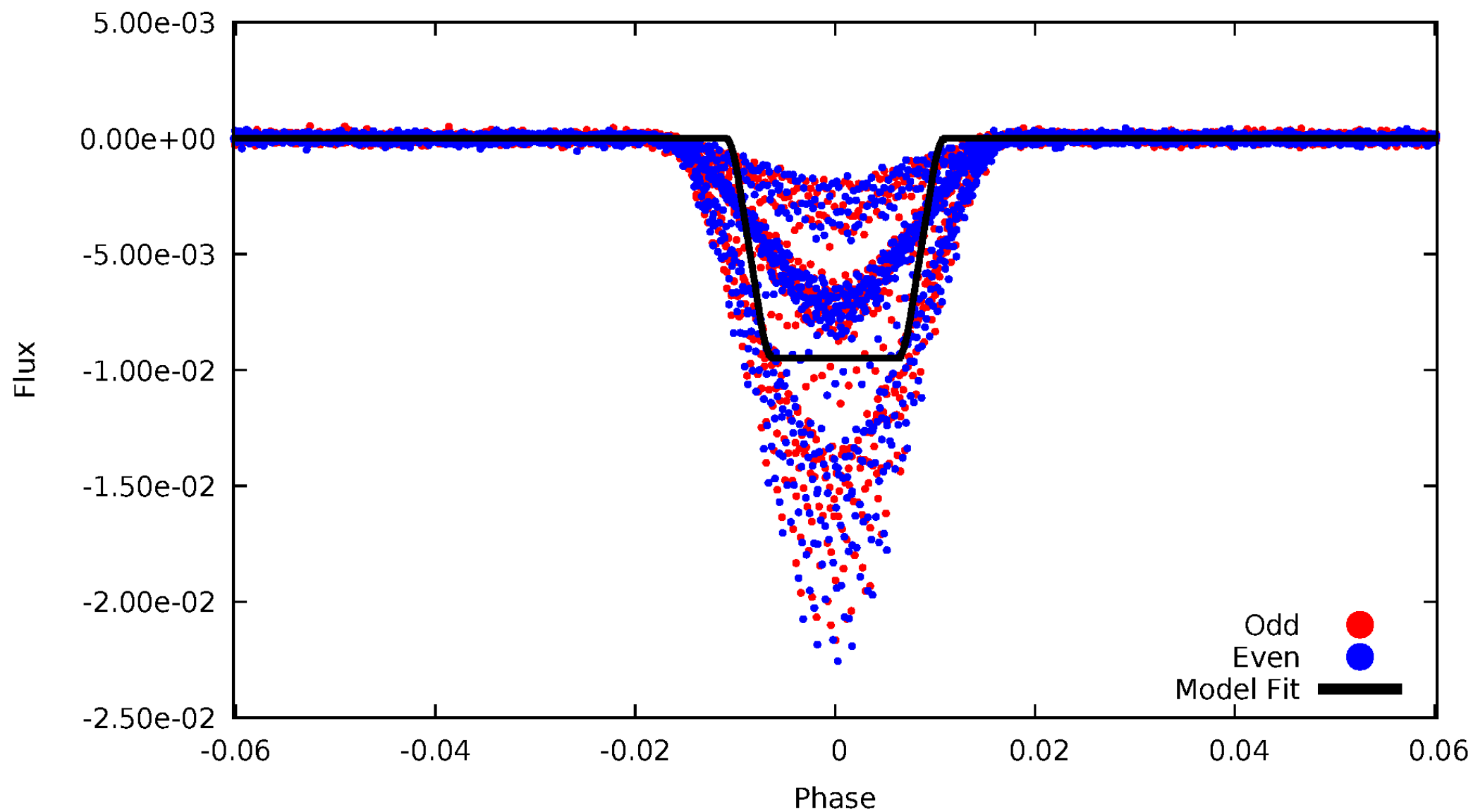
# DV Odd/Even

TCE 007376490-01



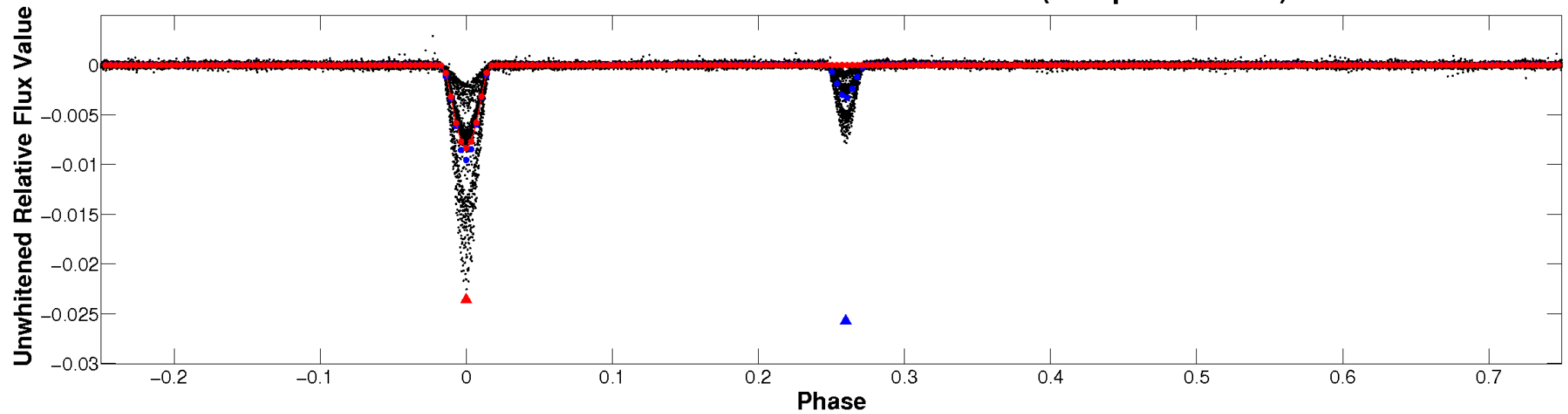
# ALT Odd/Even

TCE 007376490-01

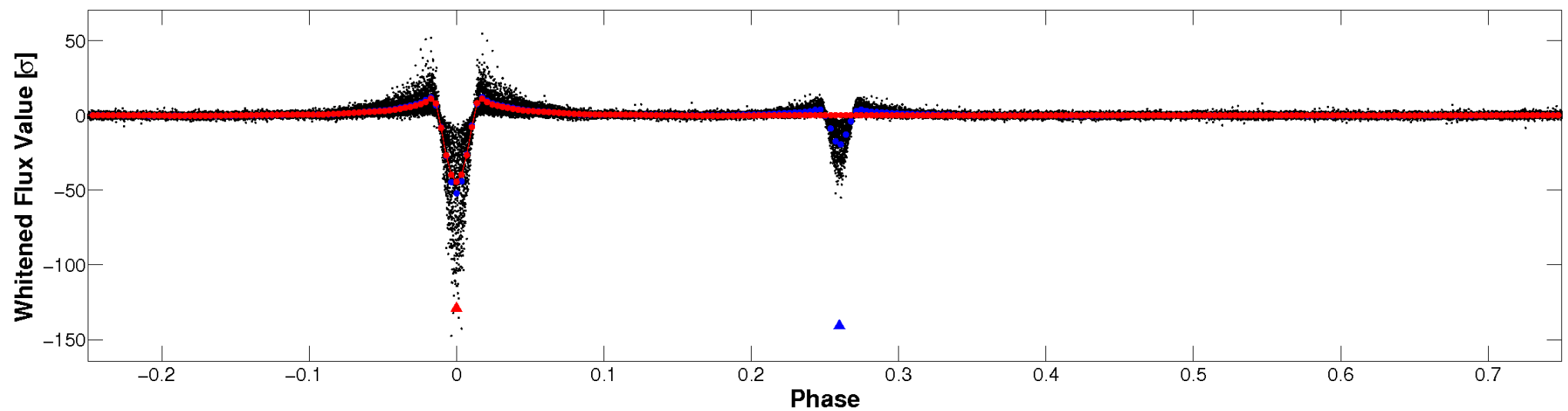


# Non-Whitened Vs. Whitened Light Curve

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



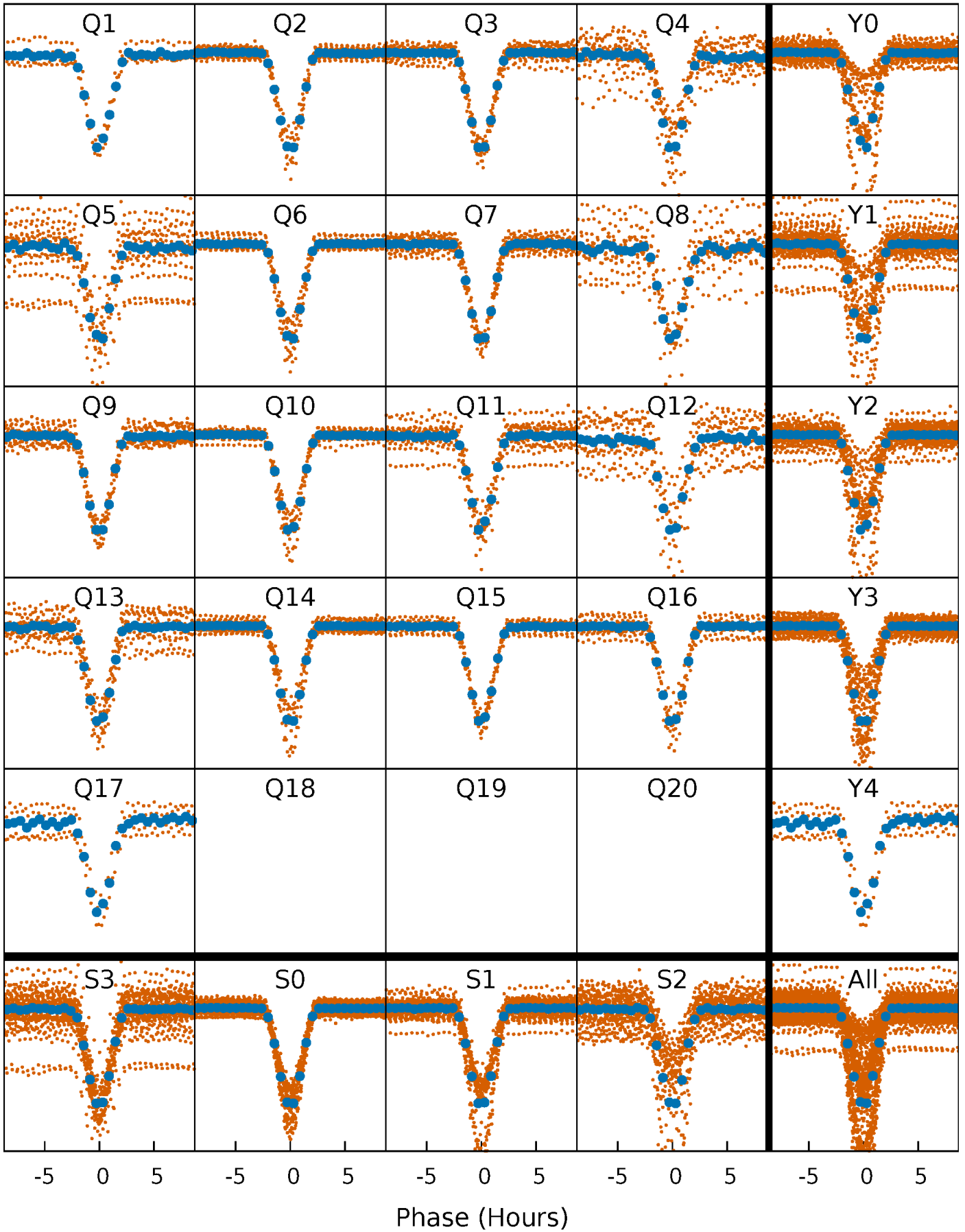
Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

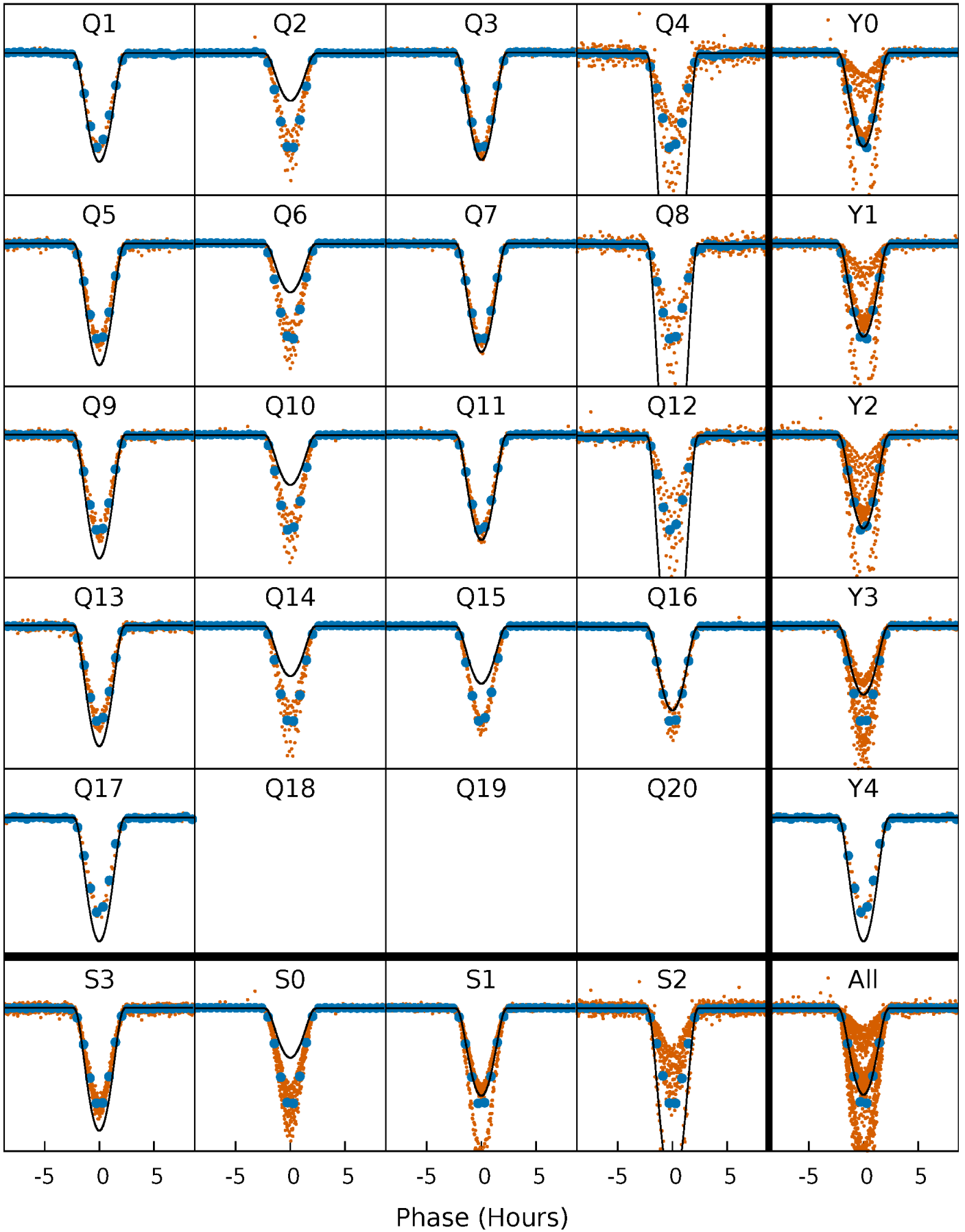
TCE 007376490-01 P= 5.877117 Days  $T_0=136.421628$  (BKJD)





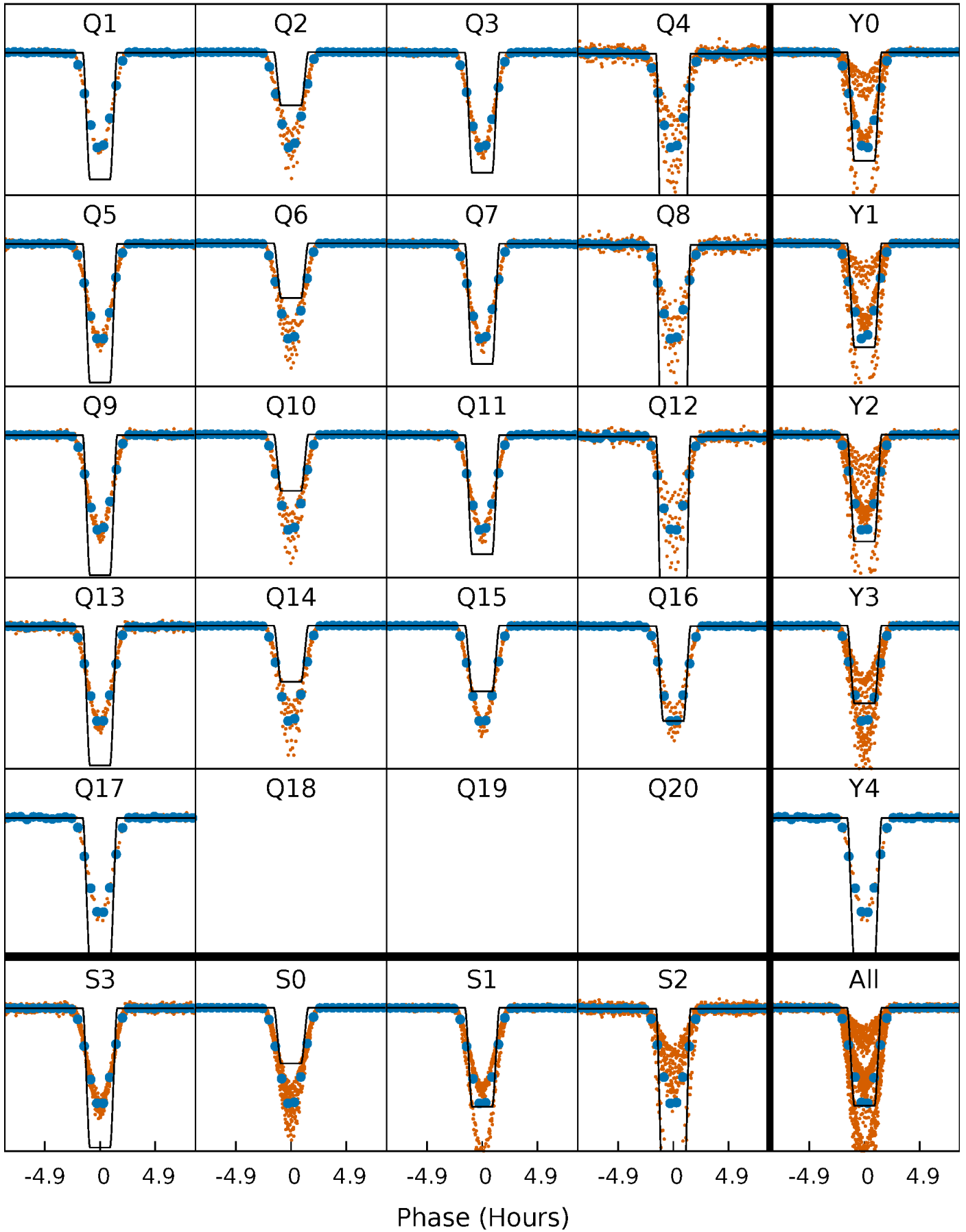
# DV Quarter-Phased Transit Curves

TCE 007376490-01 P= 5.877117 Days  $T_0=136.421628$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

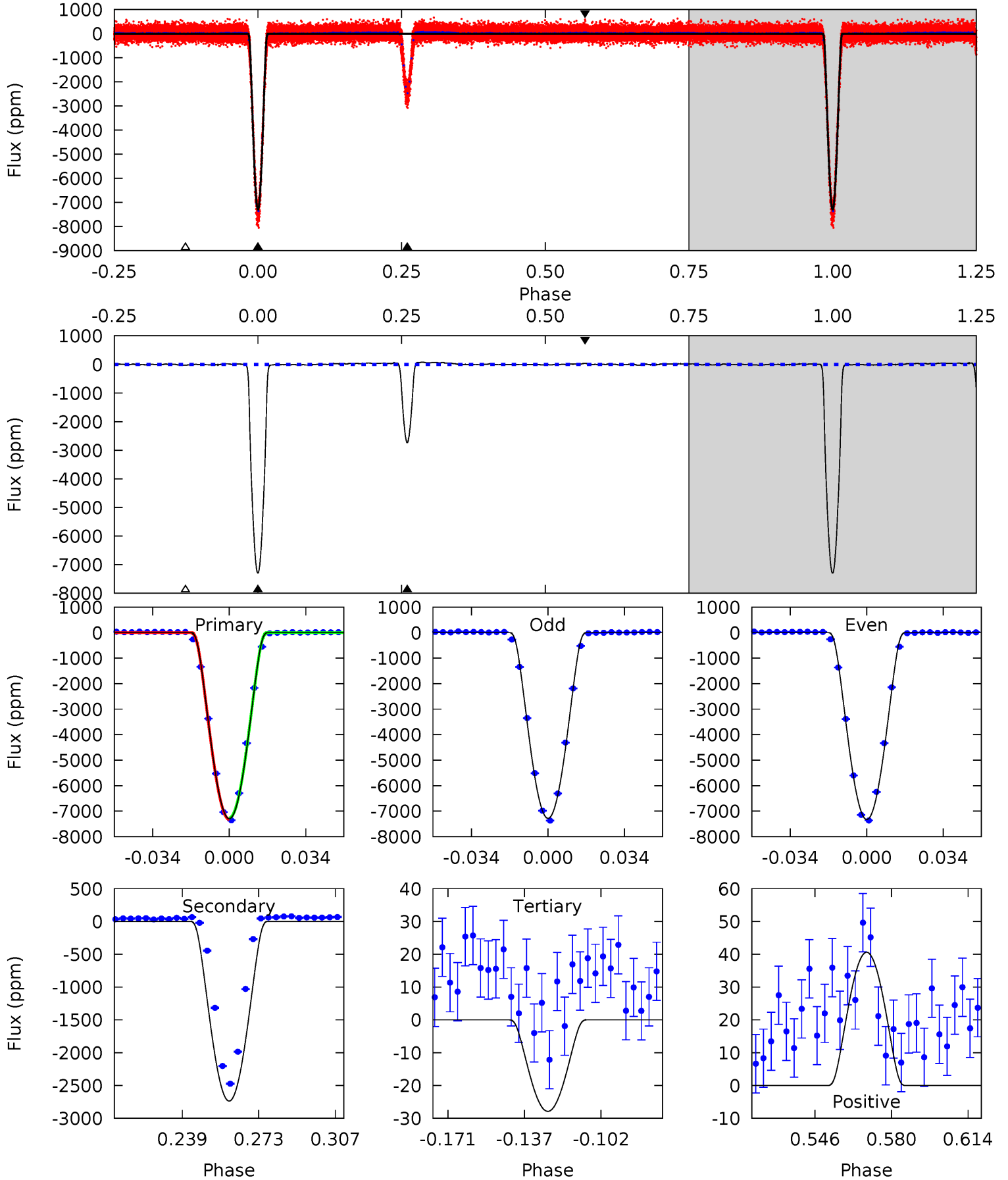
TCE 007376490-01 P= 5.877113 Days  $T_0=136.421942$  (BKJD)



# DV Model-Shift Uniqueness Test

007376490-01, P = 5.877117 Days, E = 130.544511 Days

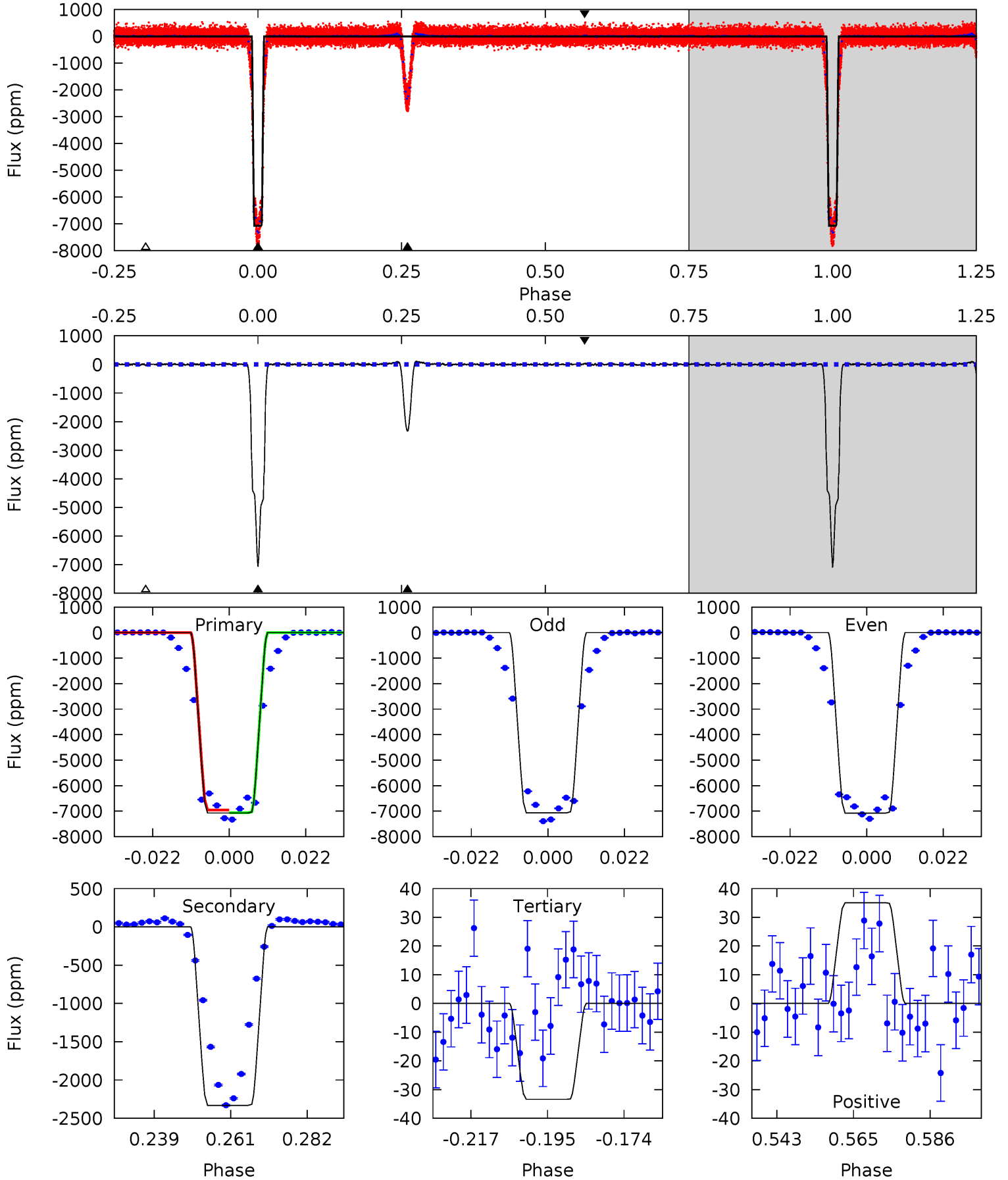
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1628	611.1	6.23	9.07	4.79	2.12	4.31	1622	1619	604.9	602.1	5.00	1.25	0.01	0



# Alt Model-Shift Uniqueness Test

007376490-01, P = 5.877113 Days, E = 130.544829 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
852.5	281.0	4.03	4.23	4.88	2.30	1.57	848.4	848.2	277.0	276.8	0.74	1.26	0.02	3.81



### Stellar Parameters For KIC 007376490

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5778^{+155}_{-155}$	$4.325^{+0.214}_{-0.195}$	$-0.340^{+0.300}_{-0.250}$	$1.043^{+0.309}_{-0.231}$	$0.839^{+0.127}_{-0.063}$	$1.041^{+1.011}_{-0.507}$
	+3%/-3%	+5%/-5%	+88%/-74%	+30%/-22%	+15%/-8%	+97%/-49%
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 007376490-01 / KOI 3586.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-2737 \pm 4$	$17.24^{+3.24}_{-2.75}$	$1479^{+121}_{-108}$	$3783^{+137}_{-140}$	$19^{+7}_{-6}$
Alt.	$-2331 \pm 8$	$11.14^{+2.65}_{-2.17}$	$1487^{+118}_{-109}$	$4292^{+300}_{-229}$	$38^{+20}_{-14}$

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

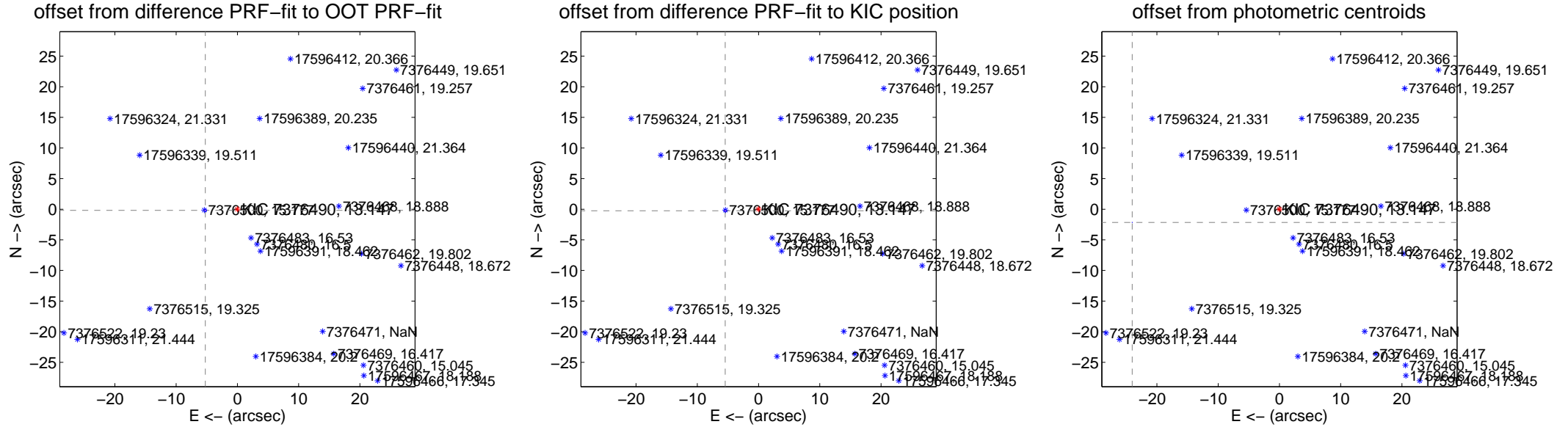
## DV Centroid Data

Supplemental centroid analysis for 007376490-01. Kepler magnitude: 13.15. Transit SNR 798.27

There are 17 quarters with good PRF difference image offsets

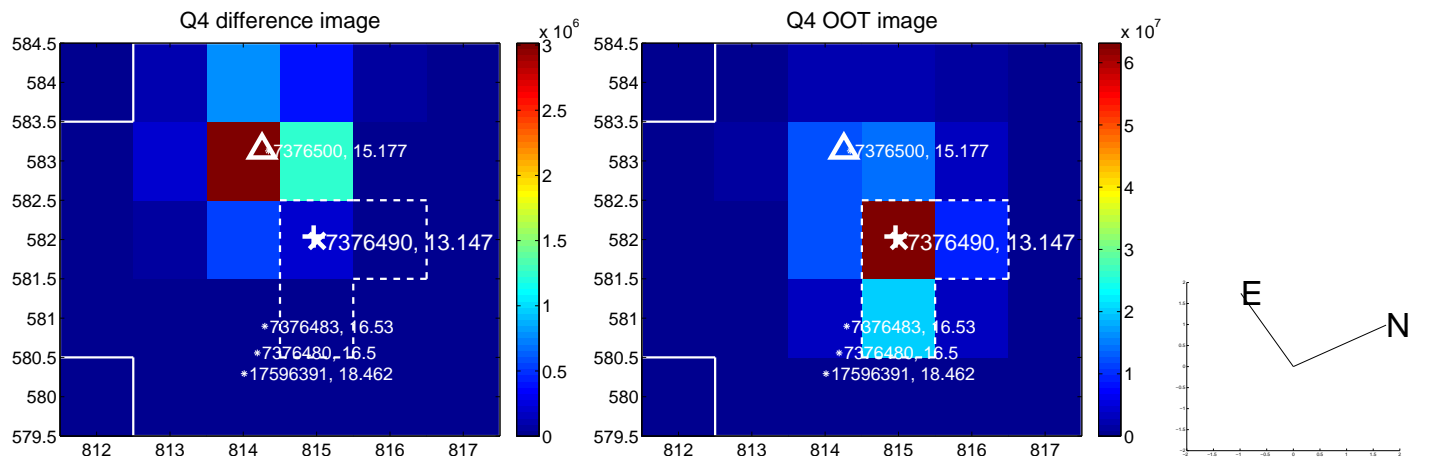
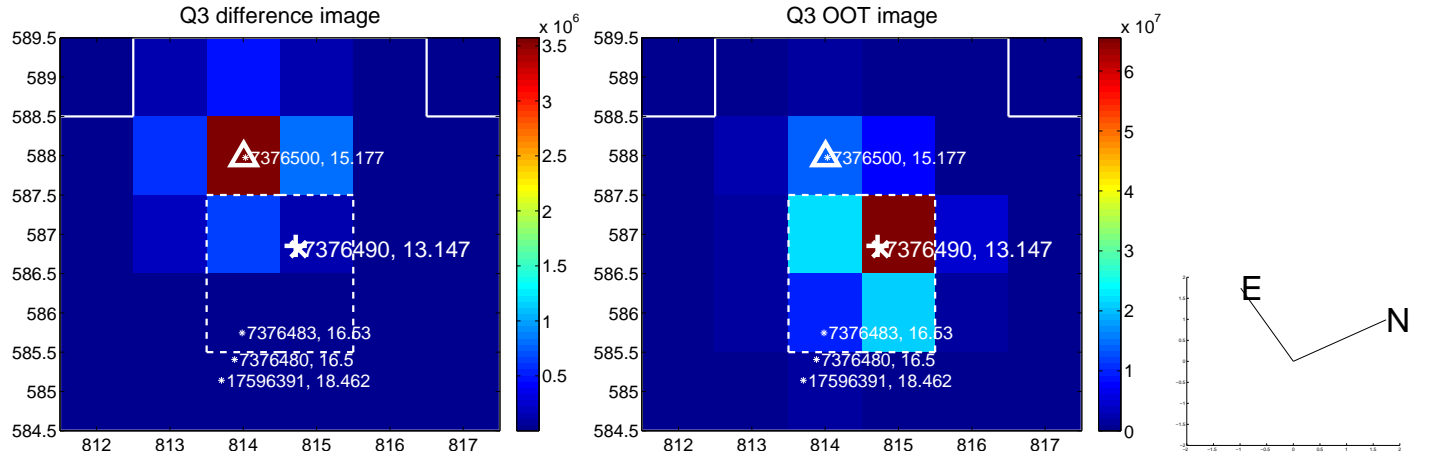
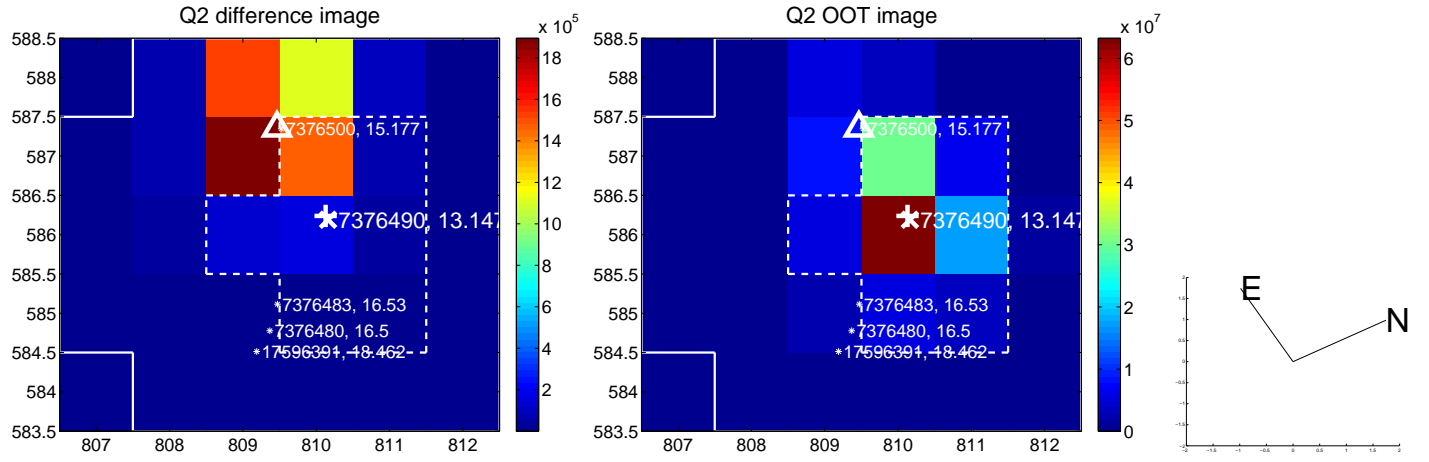
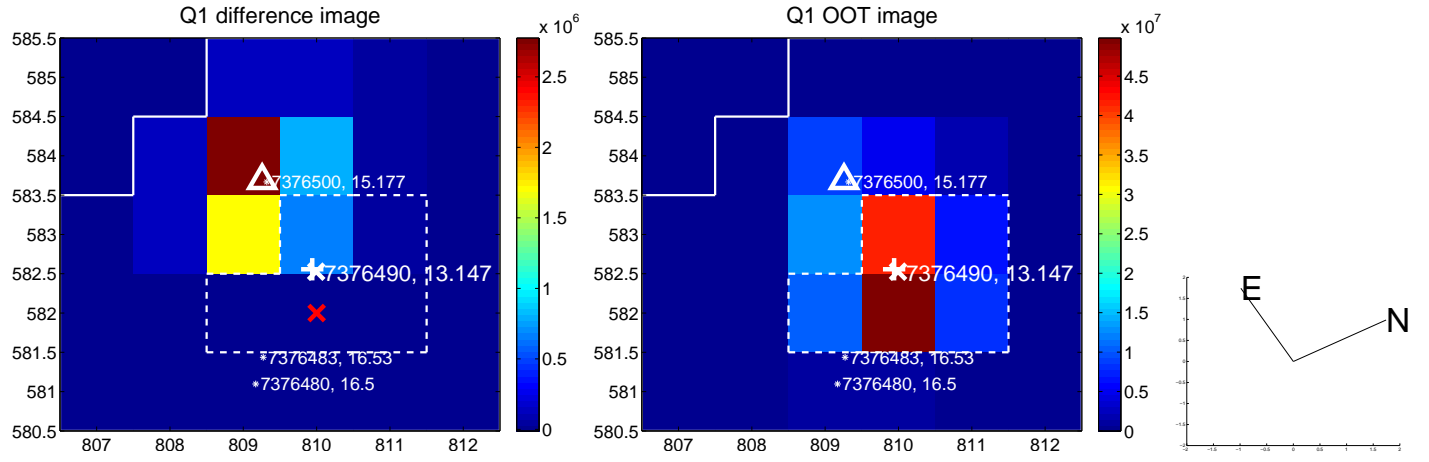
The direct PRF centroid is offset from the target star catalog position by about 0.23 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$5.237 \pm 0.068$	76.64	$5.233 \pm 0.068$	$-0.191 \pm 0.068$
PRF-fit source offset from KIC position	$5.447 \pm 0.068$	80.16	$5.441 \pm 0.068$	$-0.254 \pm 0.071$
photometric centroid source offset	$24.13 \pm 0.01$	2757.60	$24.03 \pm 0.01$	$-2.16 \pm 0.01$



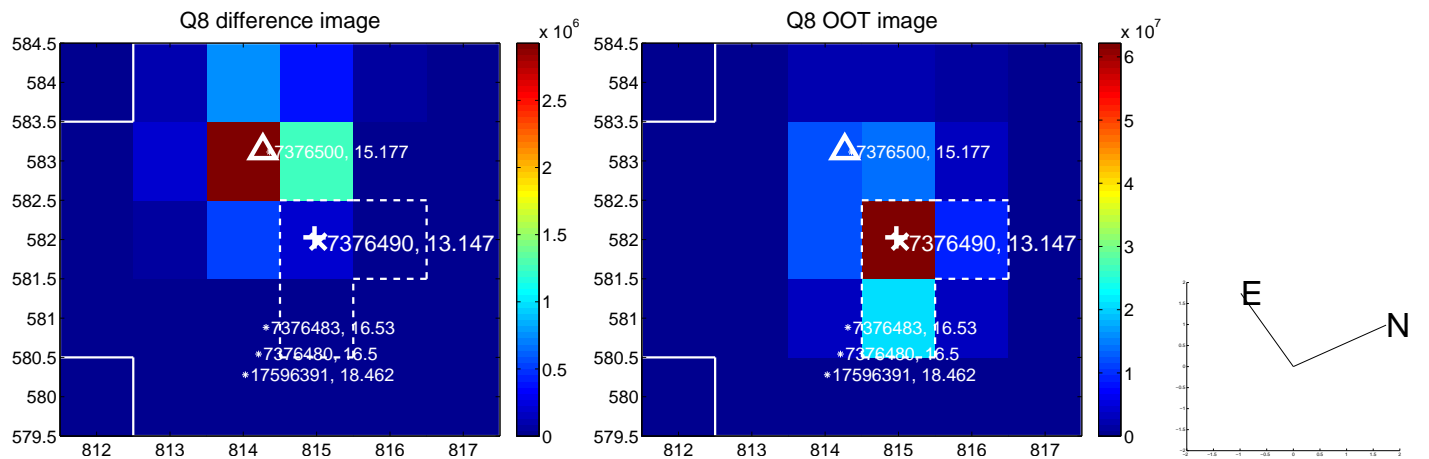
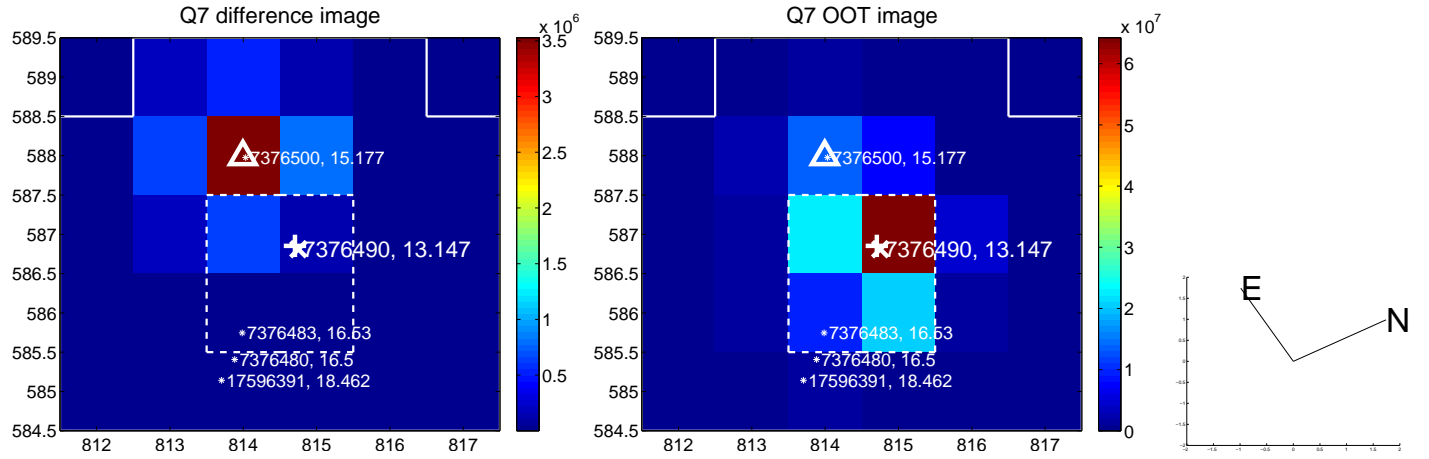
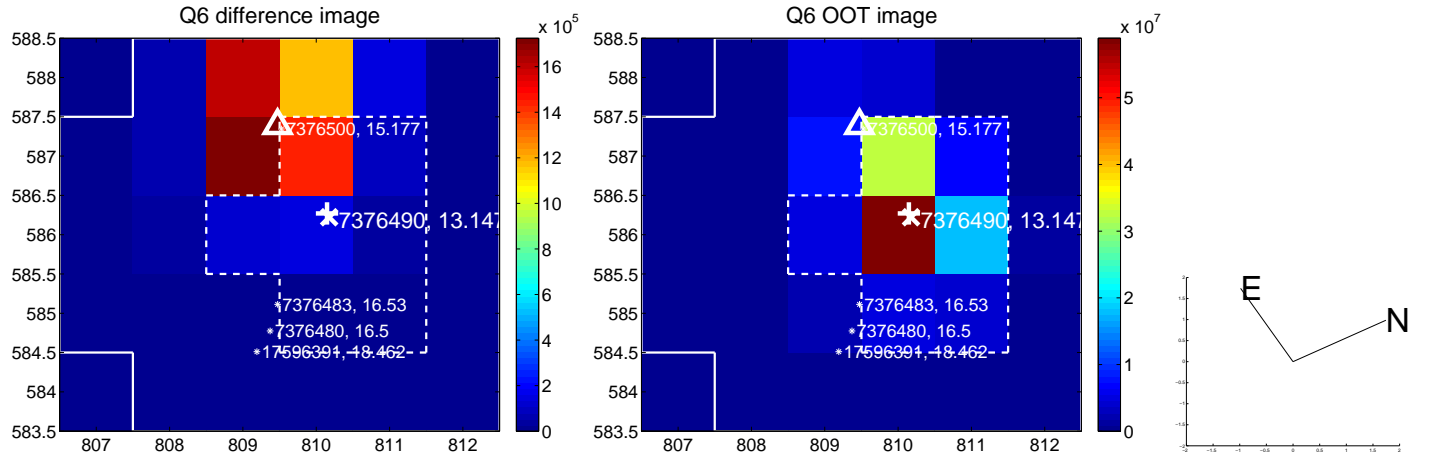
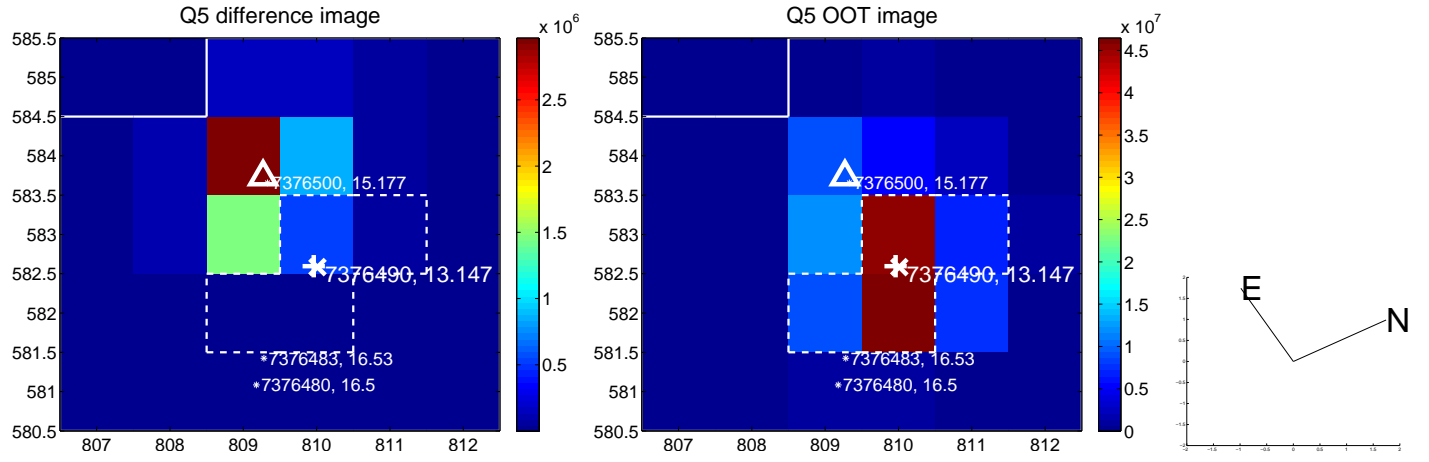
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

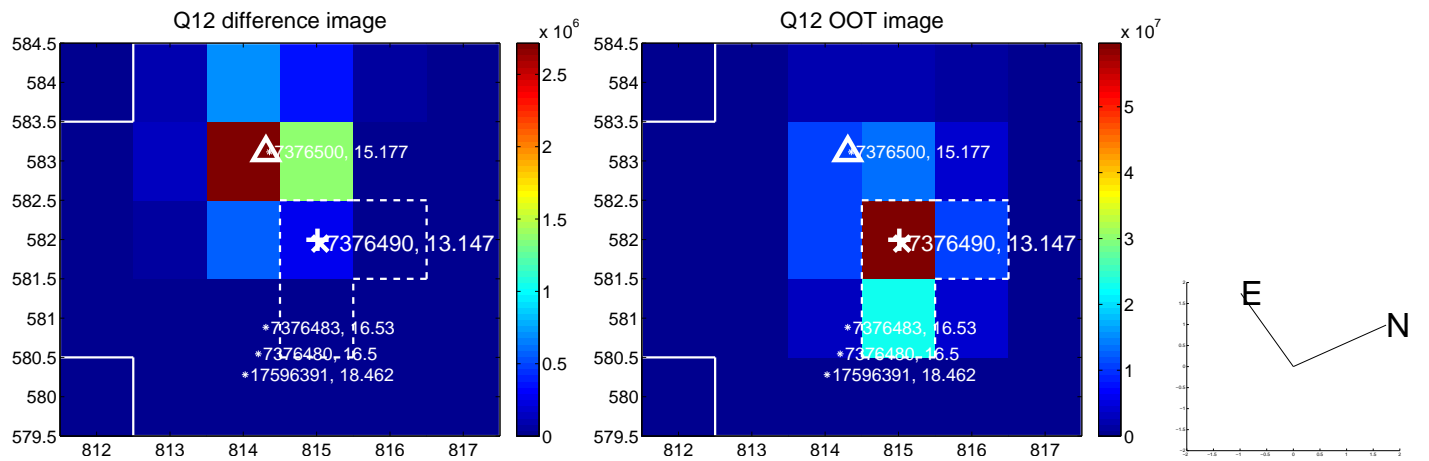
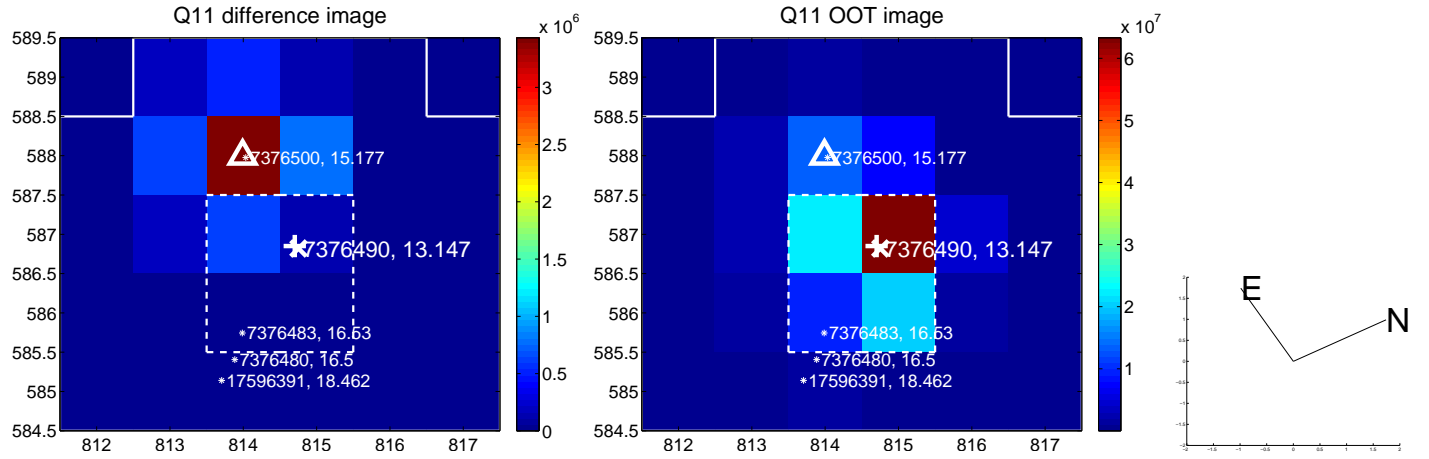
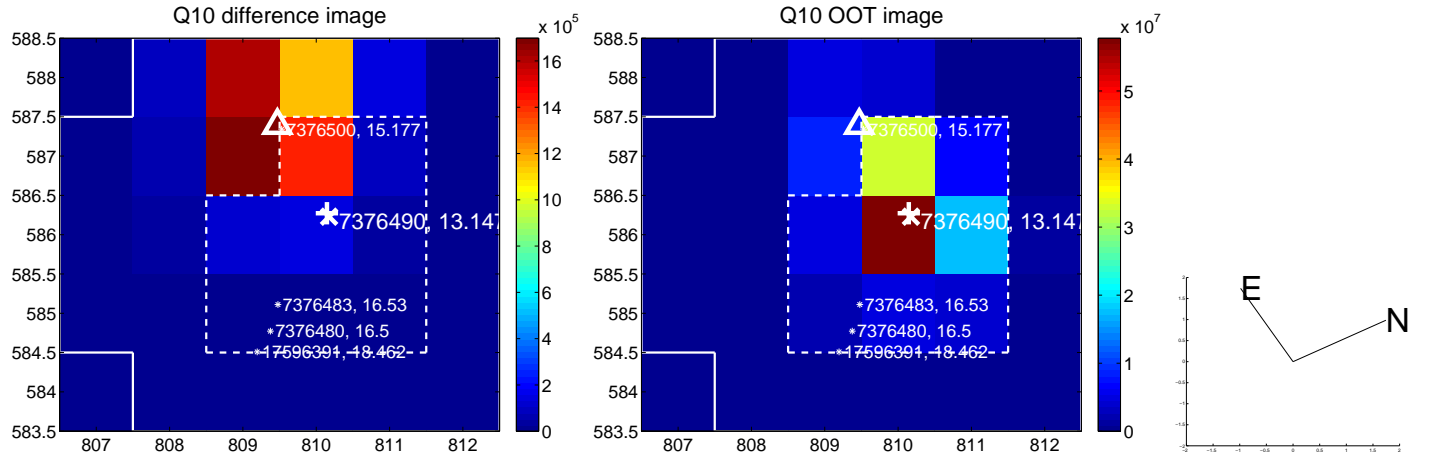
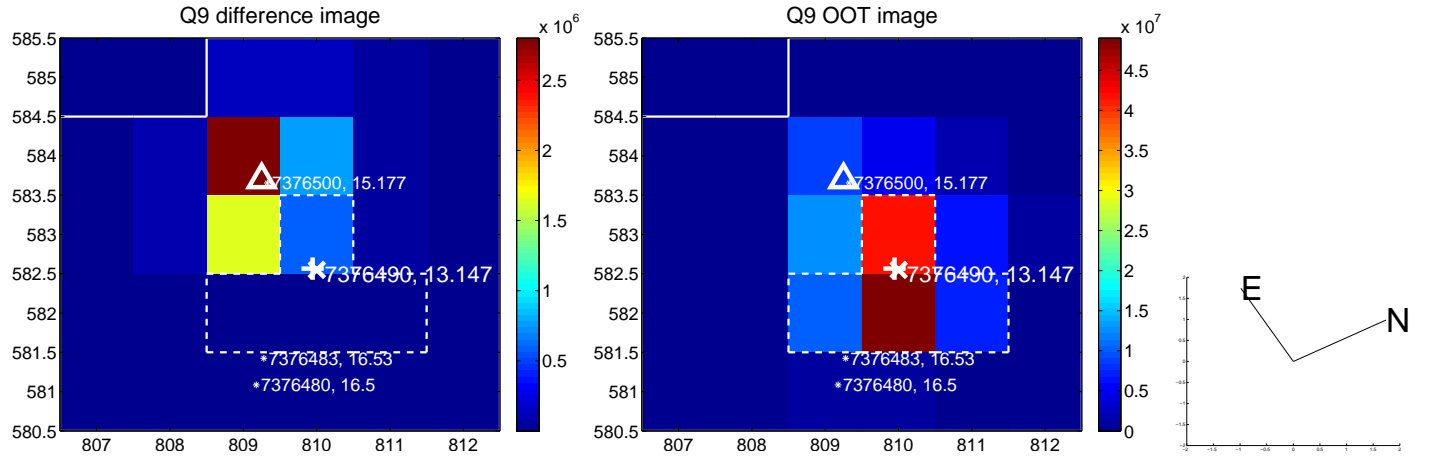




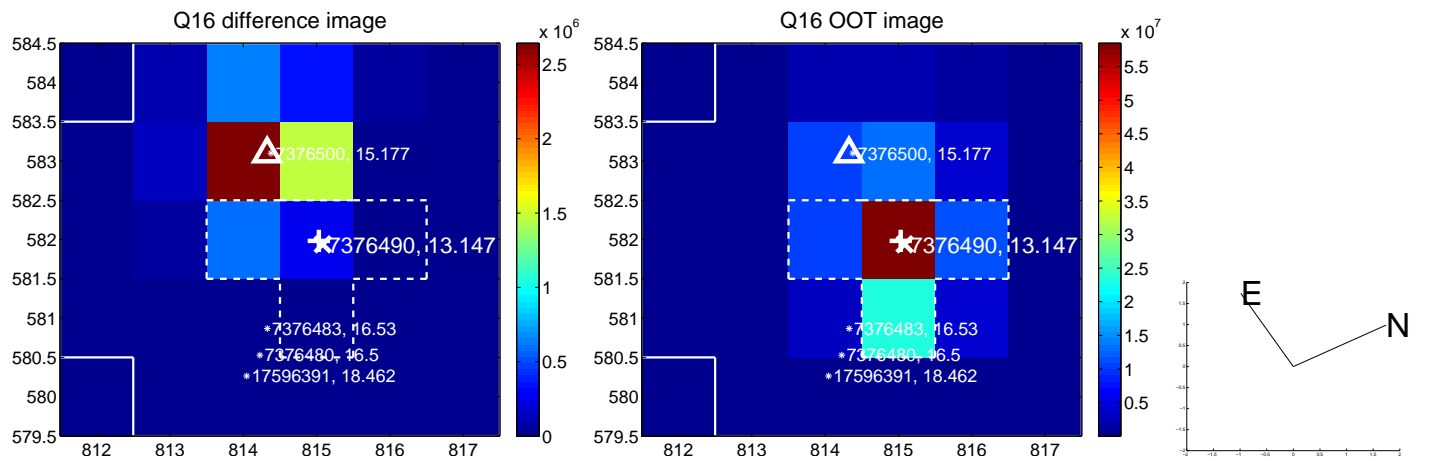
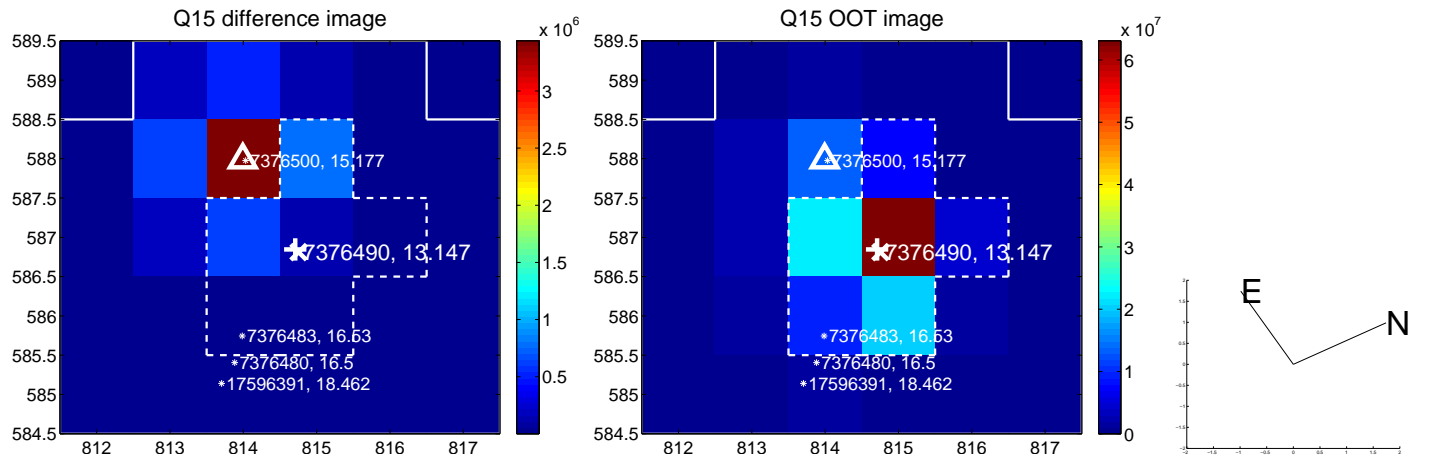
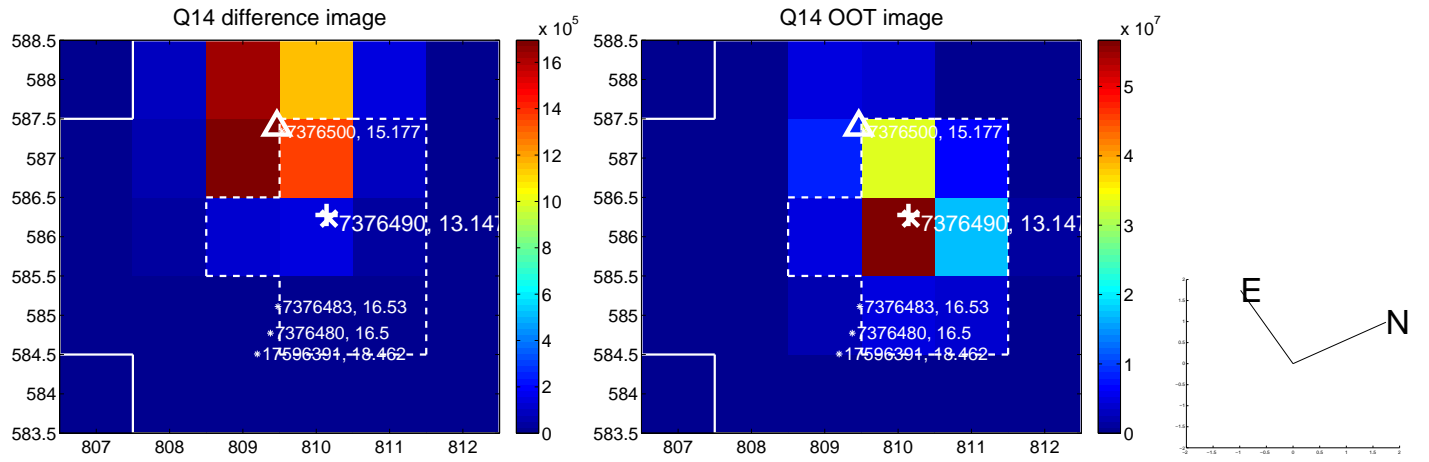
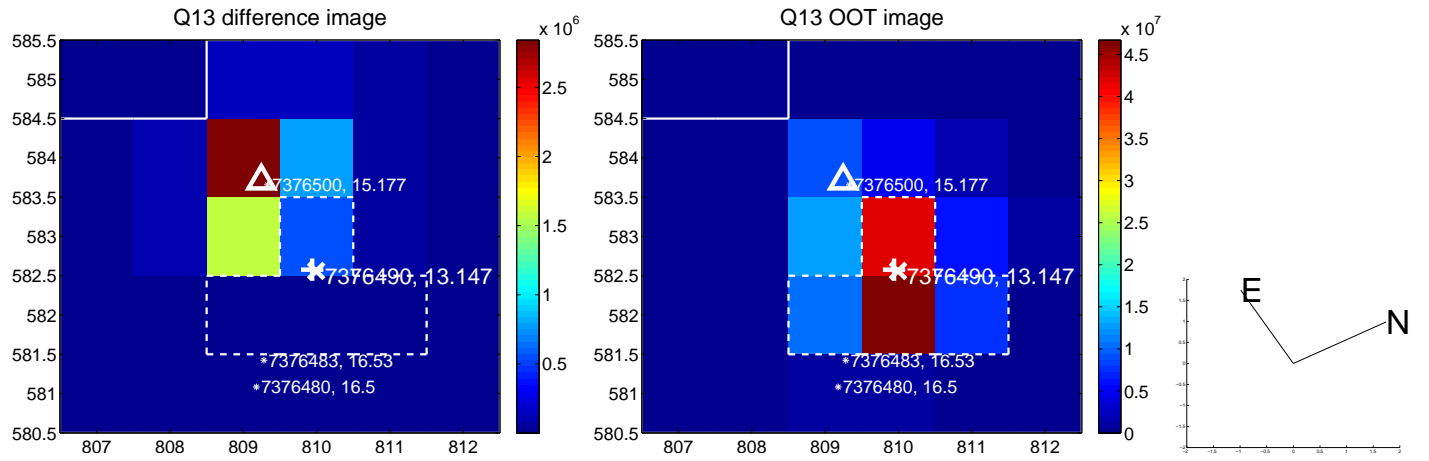
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



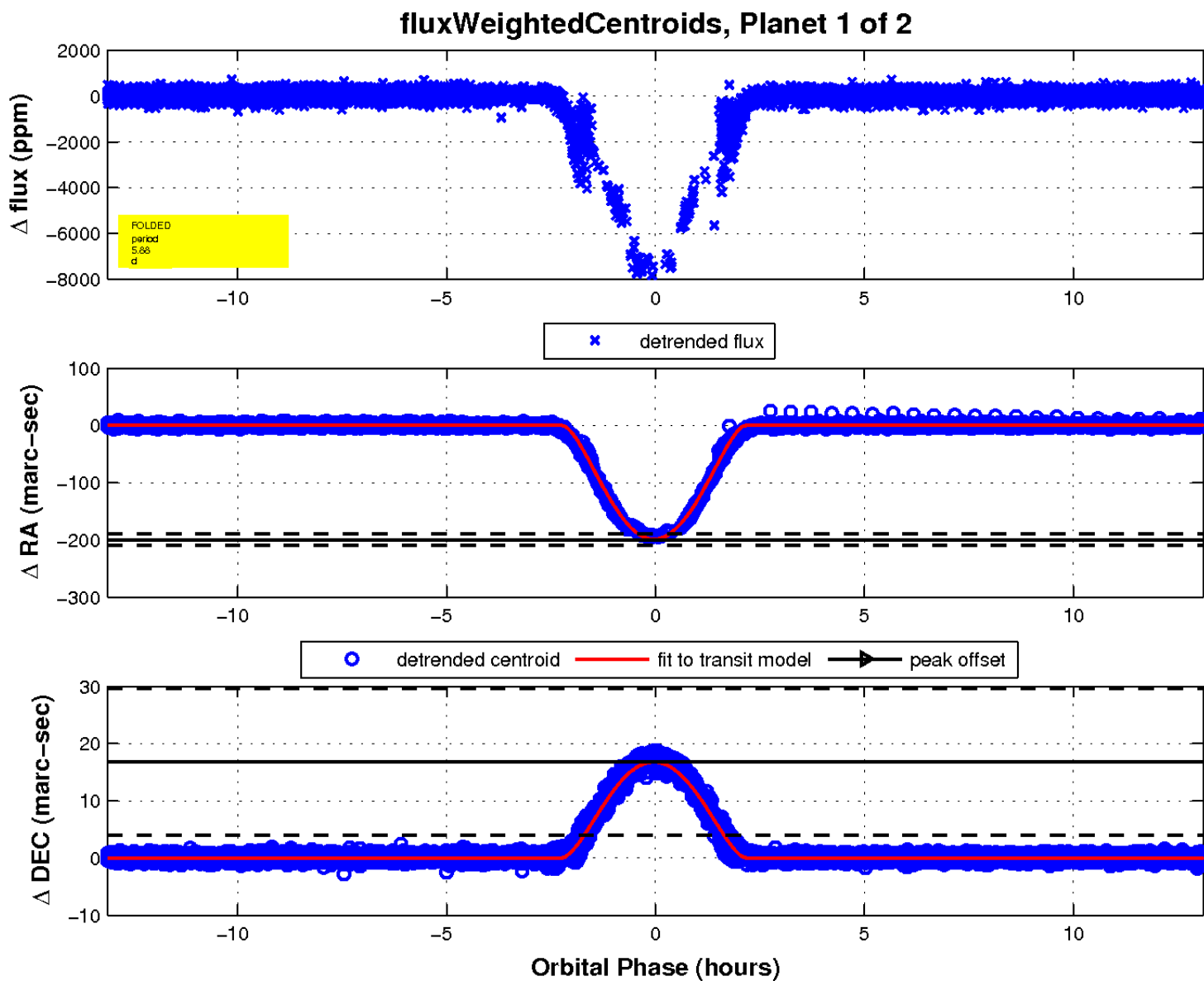
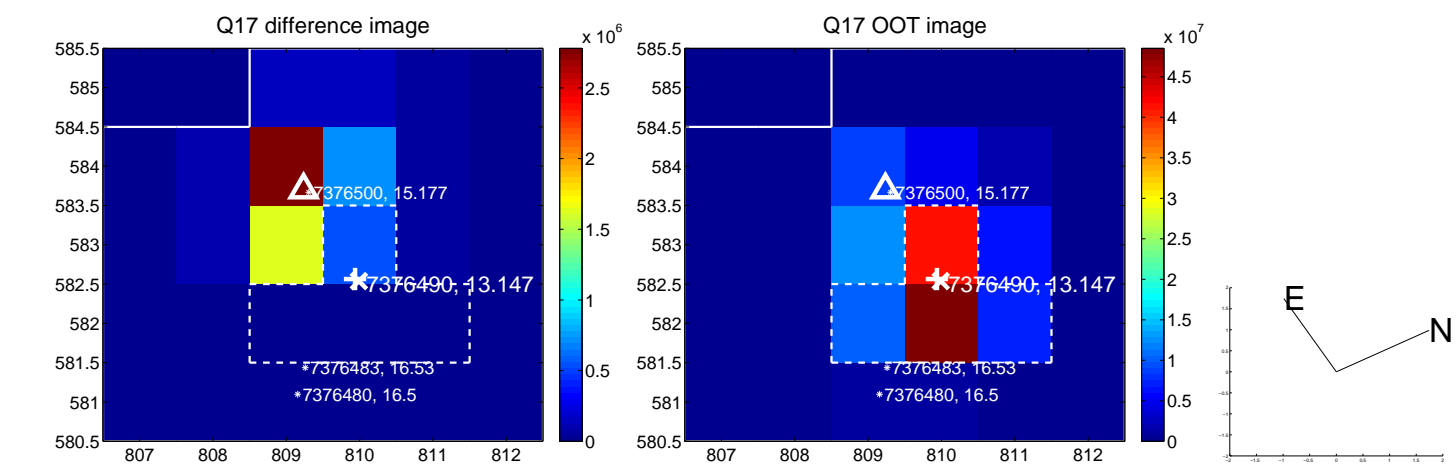
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

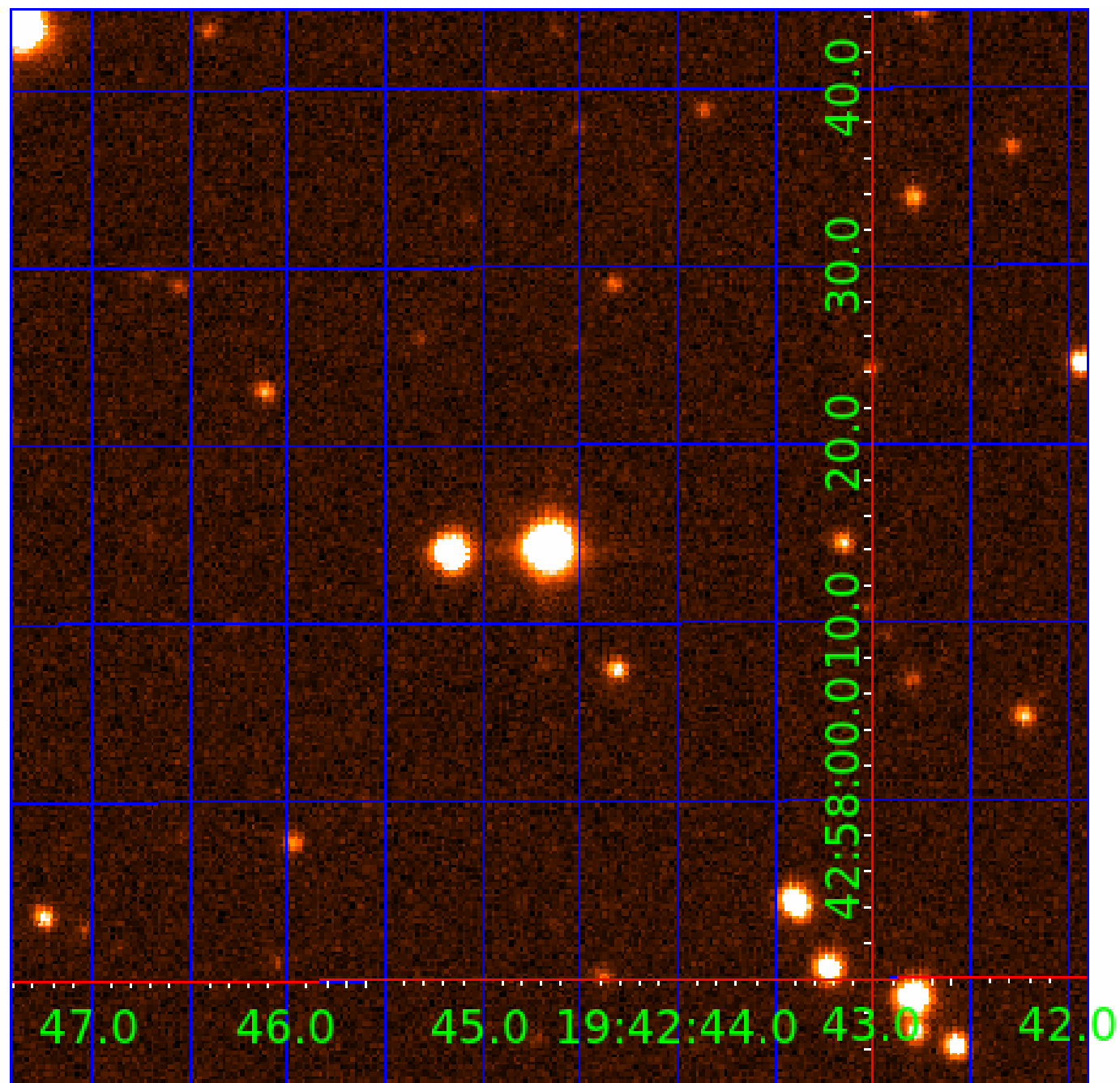


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 007376490

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007376490-01	OBS	3586.01	5.877117	136.421628	8399.4	4.373	1405.5	798.3	1.04	5778	17.29	300.59
007376490-02	OBS	No	5.877120	132.071155	2613.8	3.433	489.6	281.6	1.04	5778	10.04	300.59

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007376490-01	OBS	FP	0.00	0	1	1	1	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH
007376490-02	OBS	FP	0.00	1	1	1	1	IS_SEC_TCE—CENT_RESOLVED_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 007376490-02

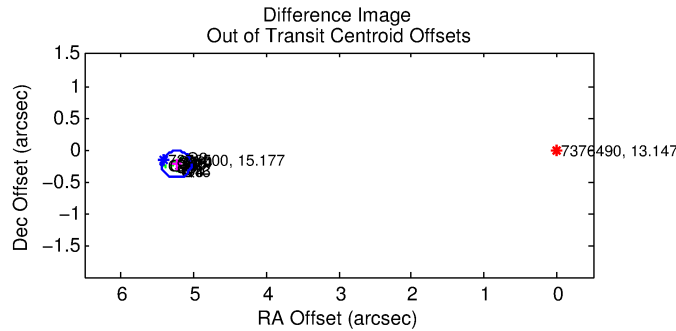
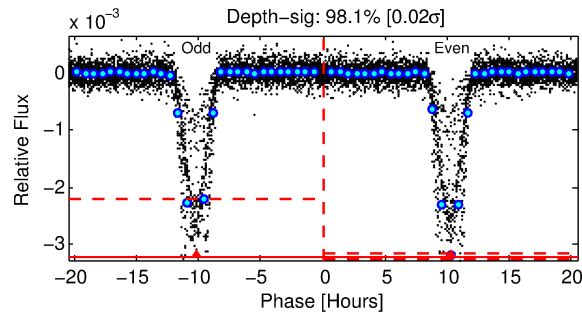
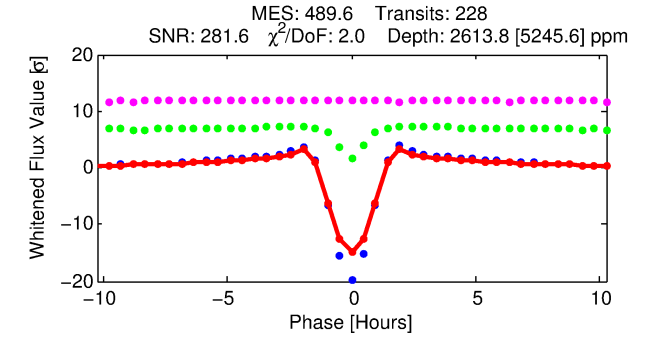
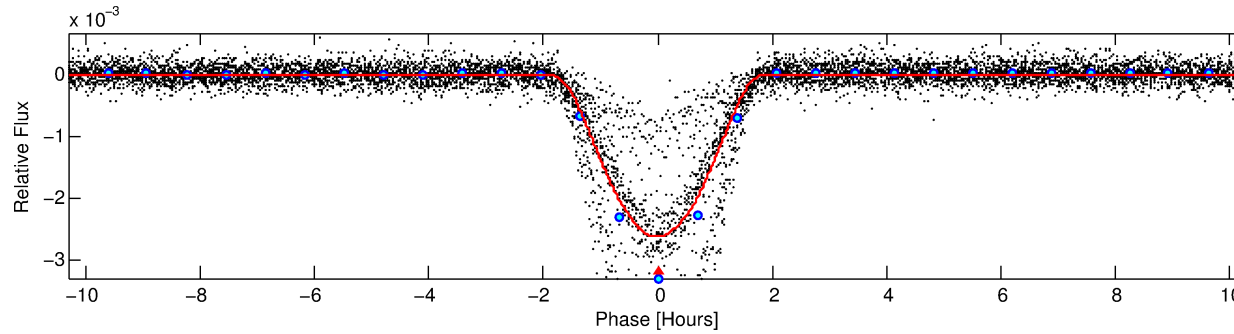
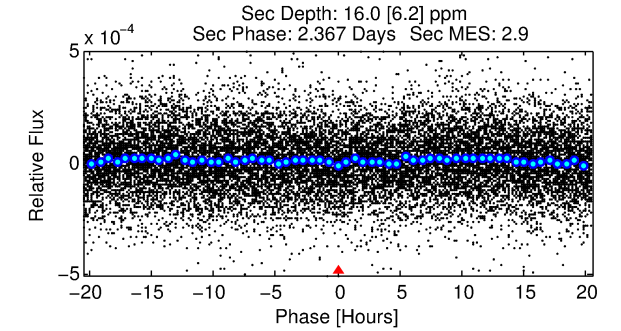
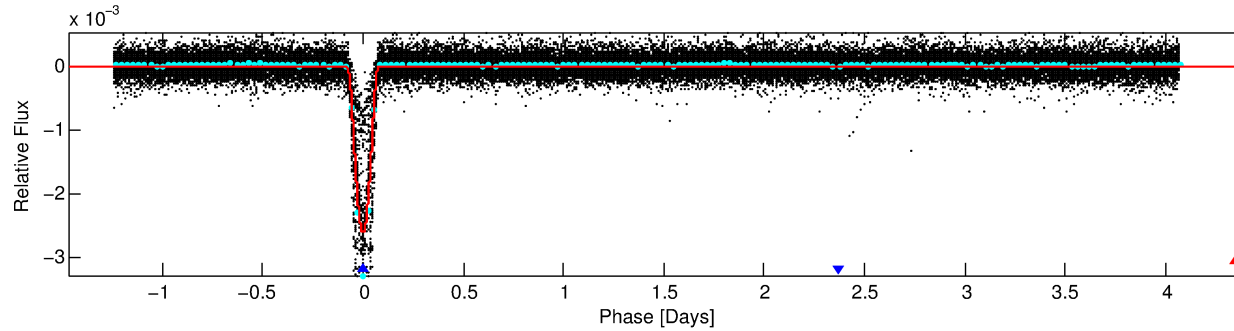
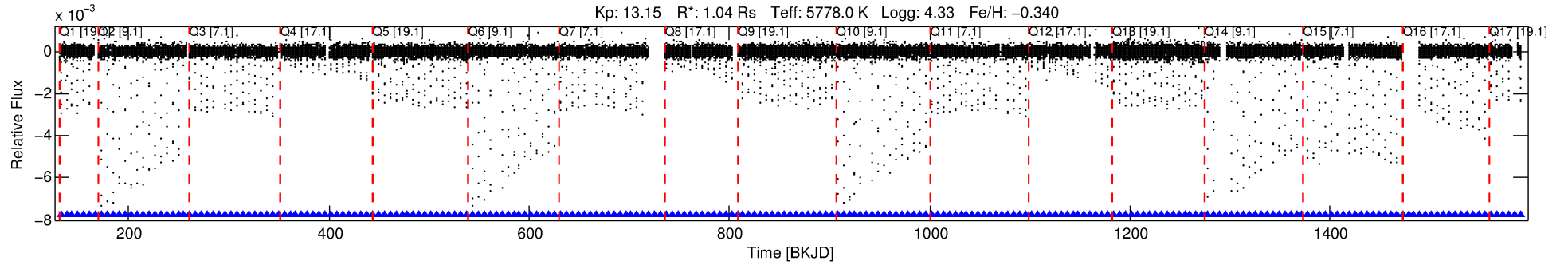
TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
007376490-02	7376490	007376500-sec	7376500	1:1	5.4	-1	0	15.18	13.15	32.52	Direct-PRF	0	0.07	1.27

**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: 7376490 Candidate: 2 of 2 Period: 5.877 d  
KOI: K03586 Corr: No Ephemeris Match

Kp: 13.15 R\*: 1.04 Rs Teff: 5778.0 K Logg: 4.33 Fe/H: -0.340



## DV Fit Results:

Period = 5.87712 [0.00000] d  
Epoch = 132.0712 [0.0003] BKJD  
Rp/R\* = 0.0882 [0.0141]  
a/R\* = 5.71 [0.18]  
b = 1.00 [0.14]  
Seff = 300.59 [119.65]  
Teq = 1062 [106] K  
Rp = 10.04 [3.38] Re  
a = 0.0601 [0.0154] AU  
Ag = 0.31 [0.20] [-3.44σ]  
Teff = 1230 [158] K [0.88σ]

## DV Diagnostic Results:

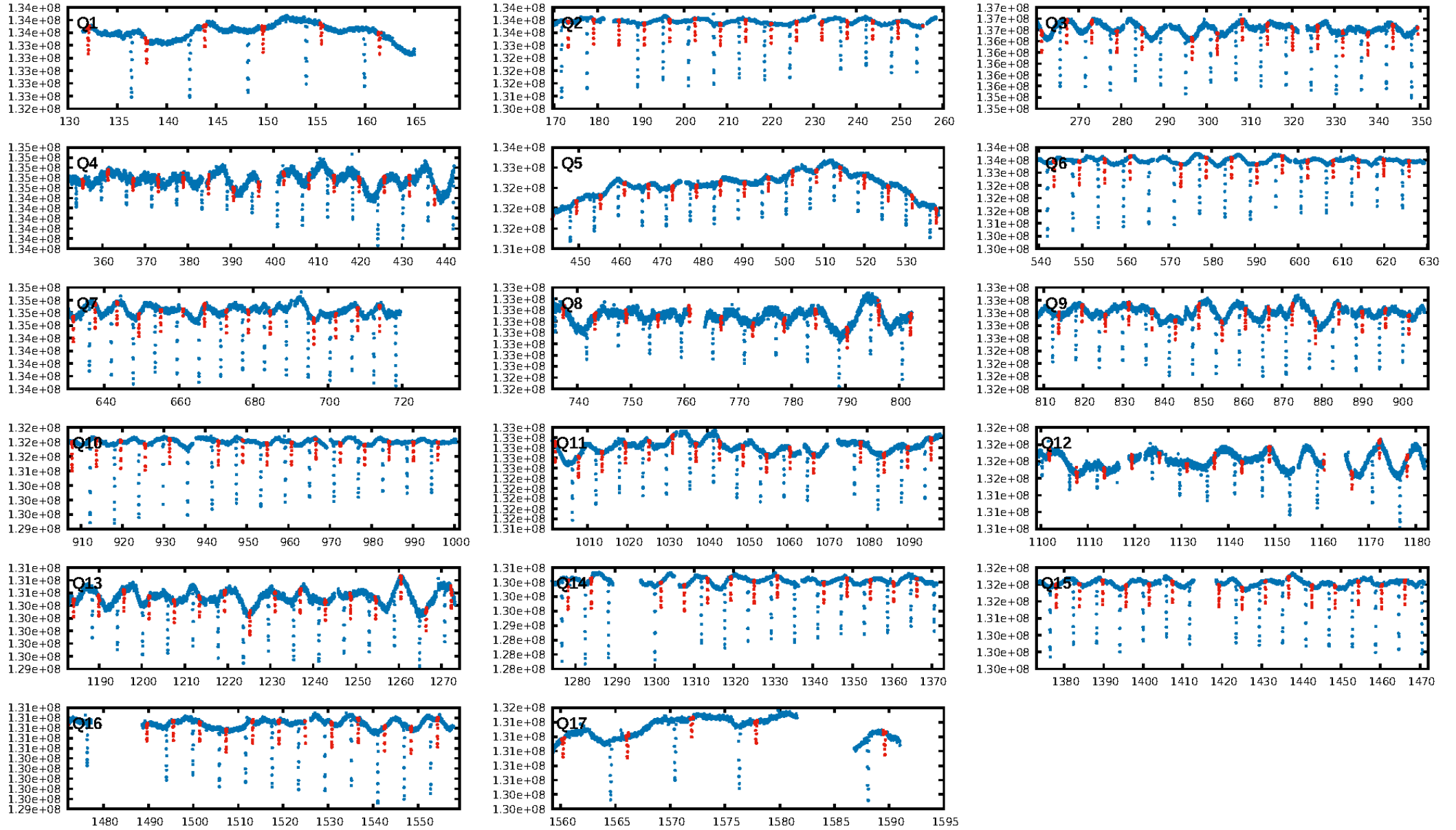
ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [217/217]  
GhostDiagnostic-chr: -0.2329  
Centroid-sig: 0.0%  
Centroid-so: 27.406 arcsec [968.84σ]  
OotOffset-rm: 5.242 arcsec [75.48σ]  
KicOffset-rm: 5.454 arcsec [79.22σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 12:39:21 Z

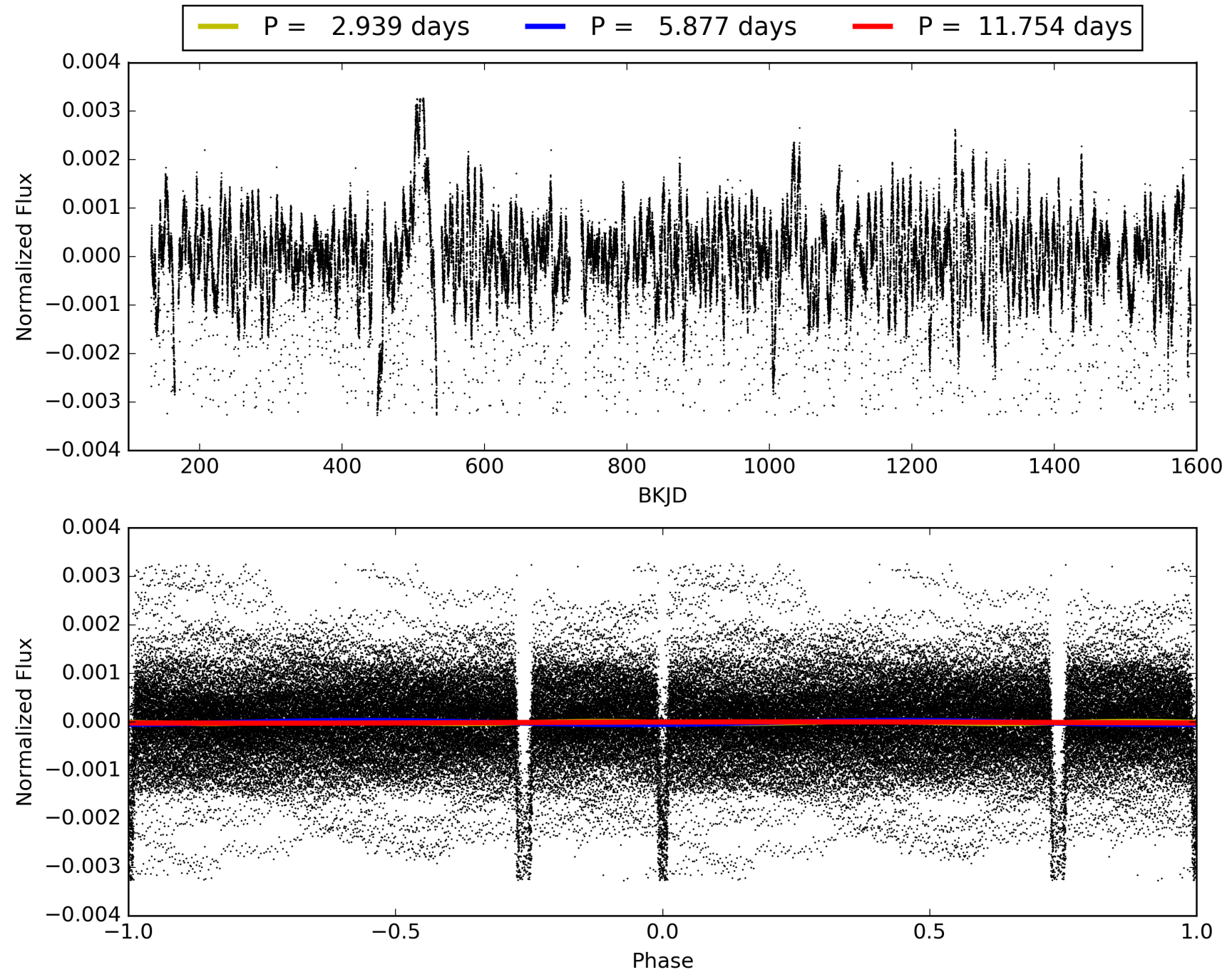
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 007376490-02, PDC Light Curves

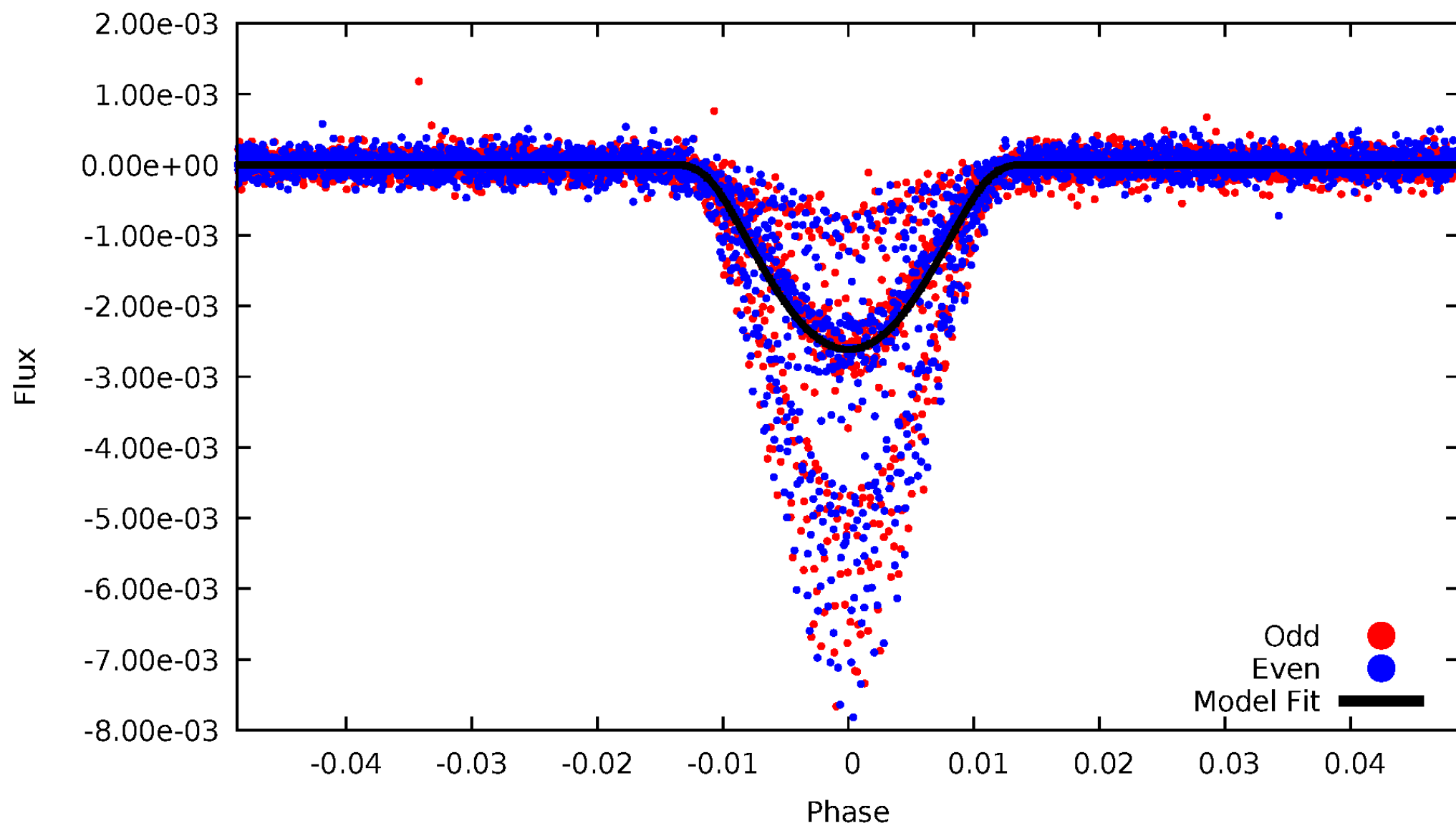


TCE 007376490-02



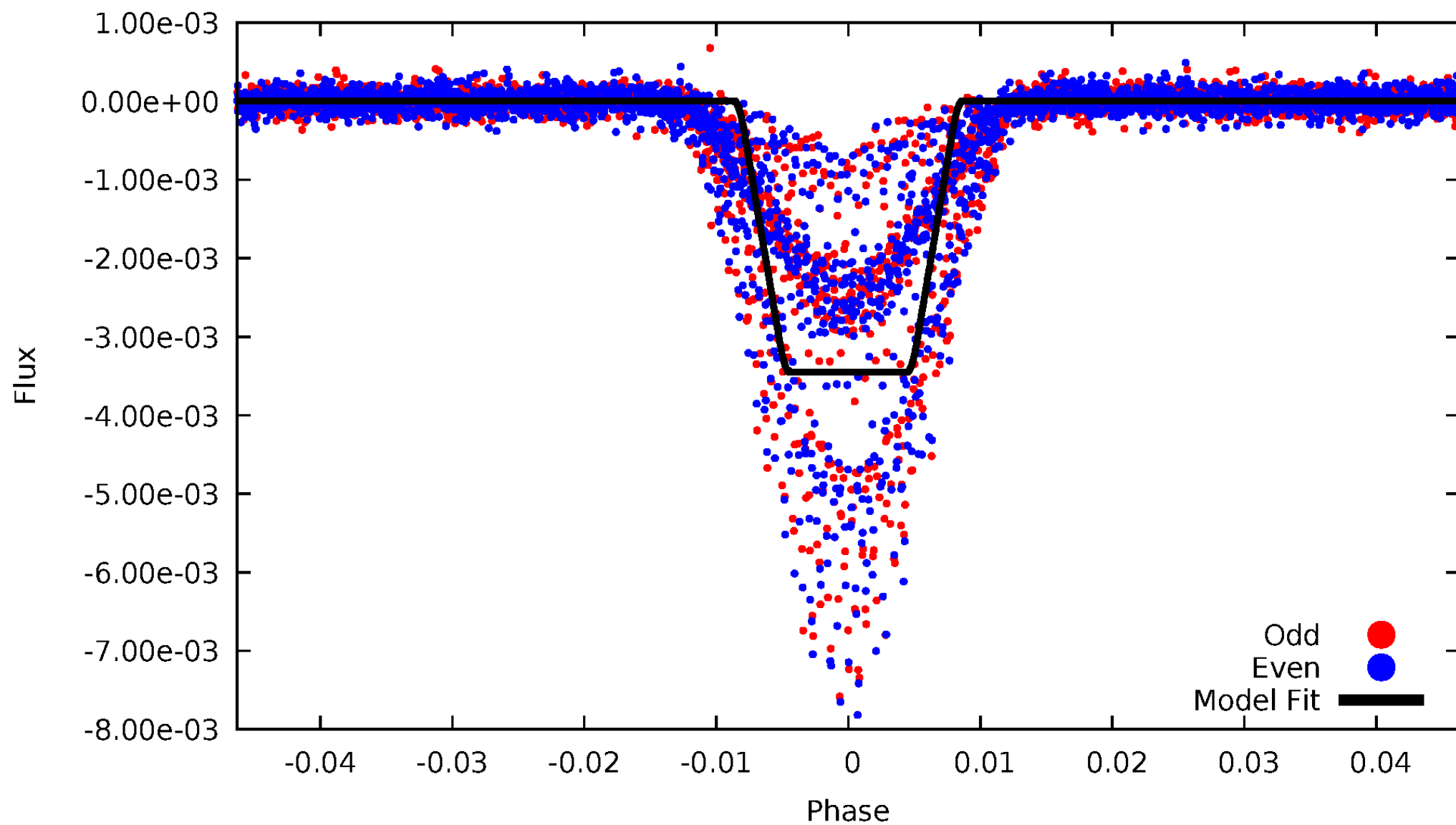
# DV Odd/Even

TCE 007376490-02



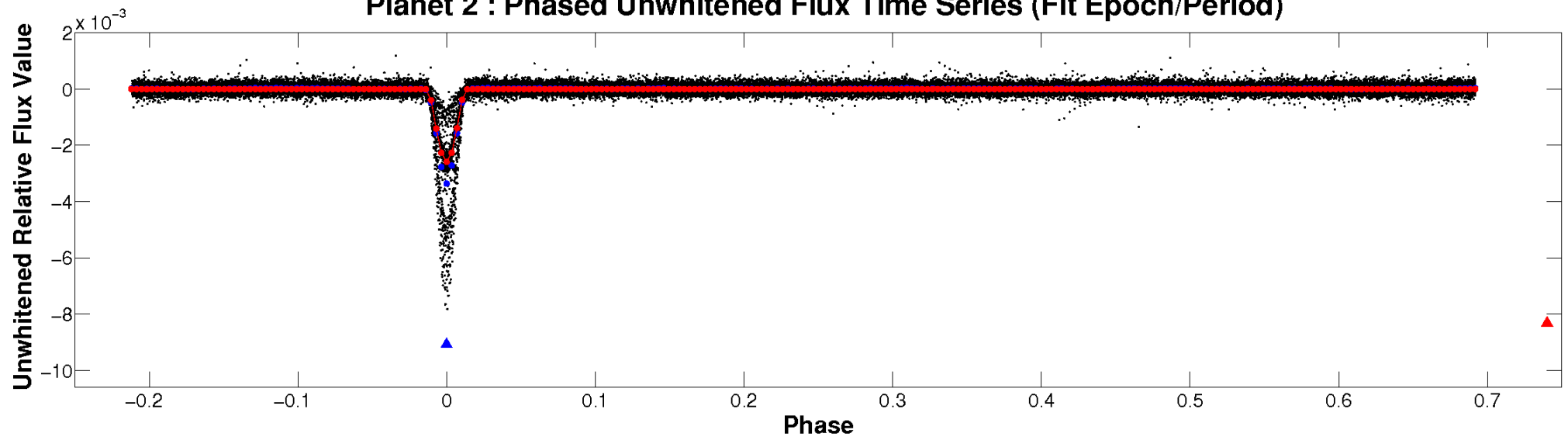
# ALT Odd/Even

TCE 007376490-02

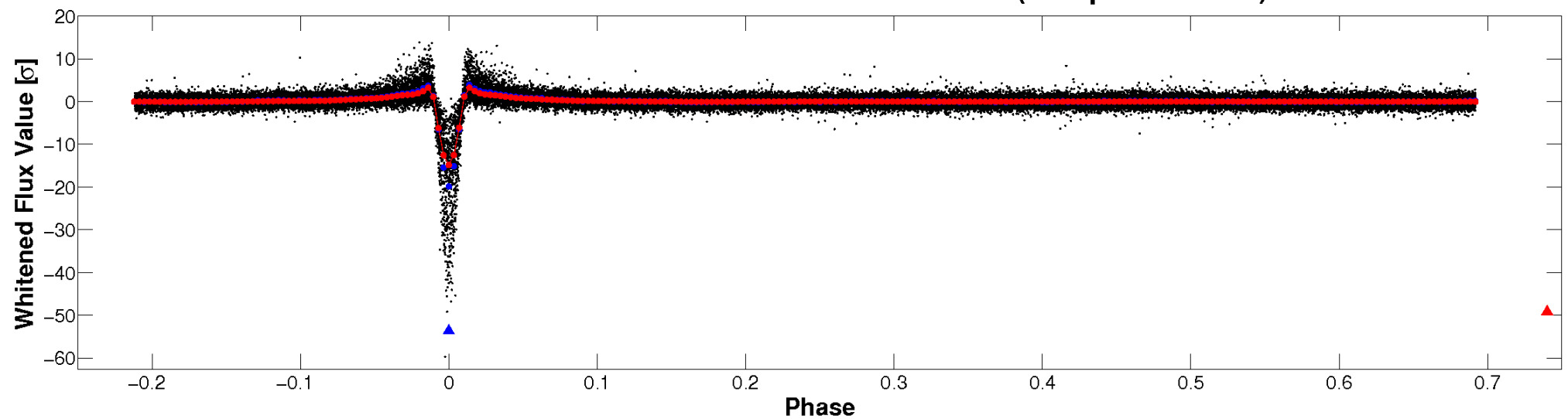


# Non-Whitened Vs. Whitened Light Curve

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

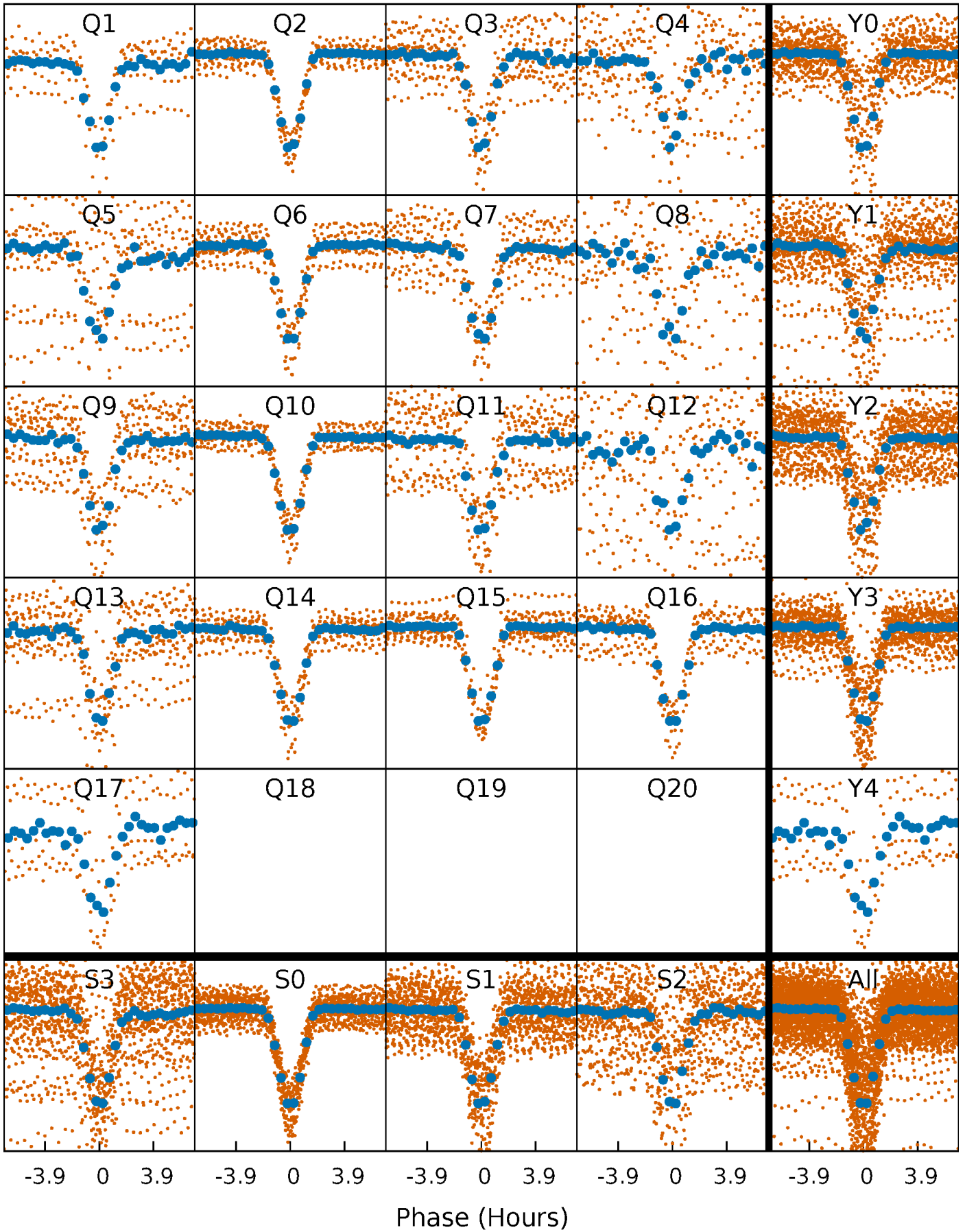


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

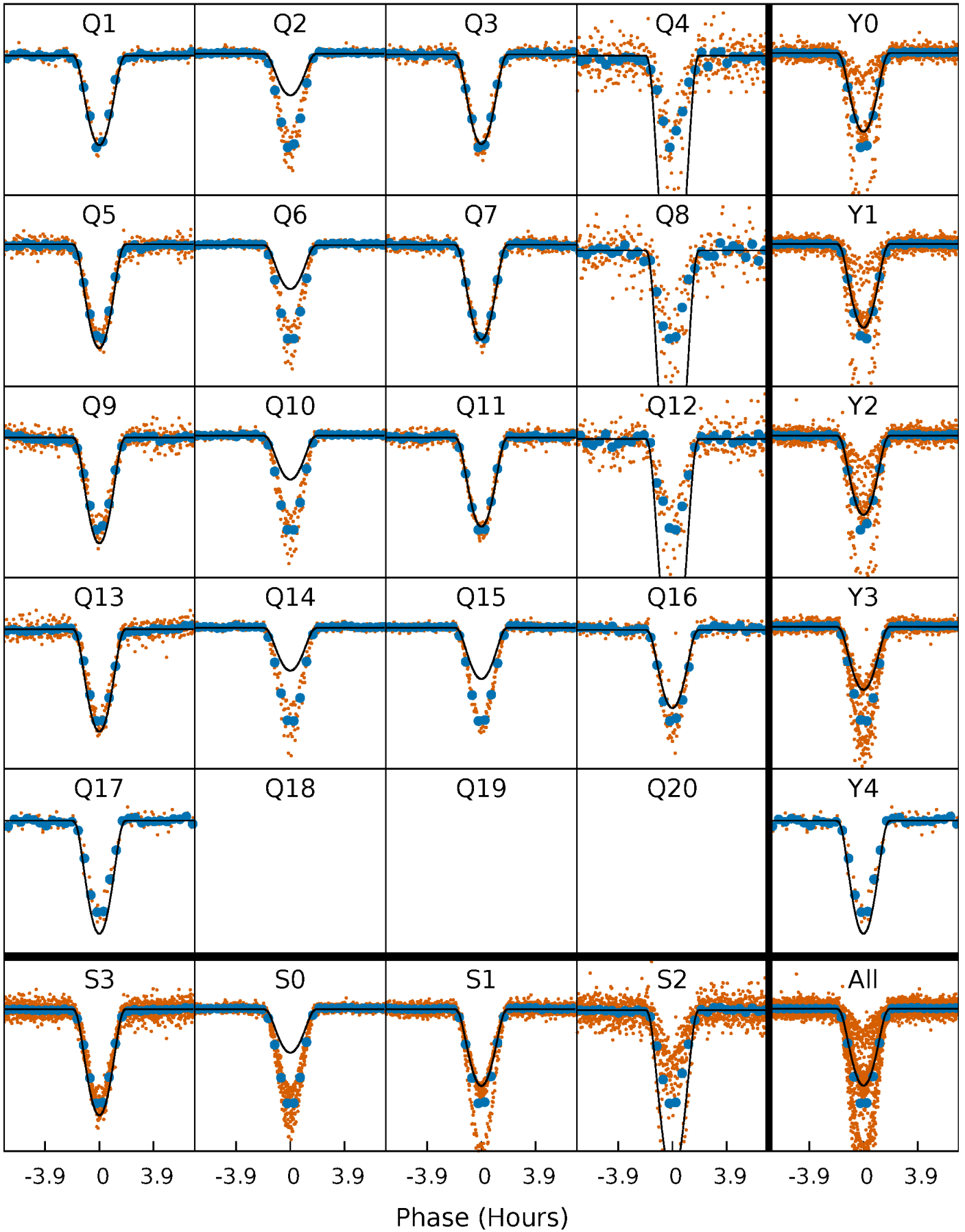
TCE 007376490-02   P= 5.877120 Days    $T_0=132.071155$  (BKJD)





# DV Quarter-Phased Transit Curves

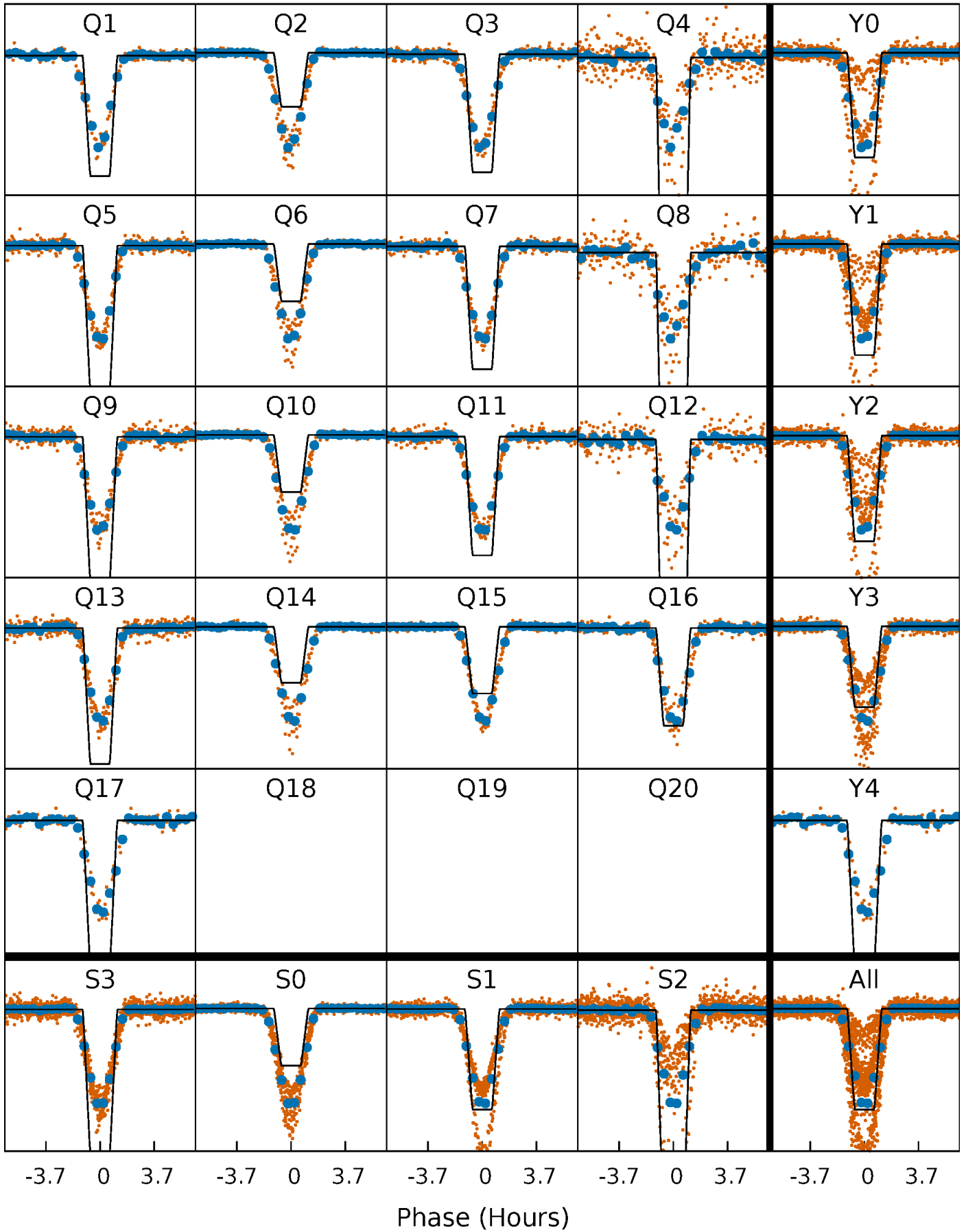
TCE 007376490-02 P= 5.877120 Days  $T_0=132.071155$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

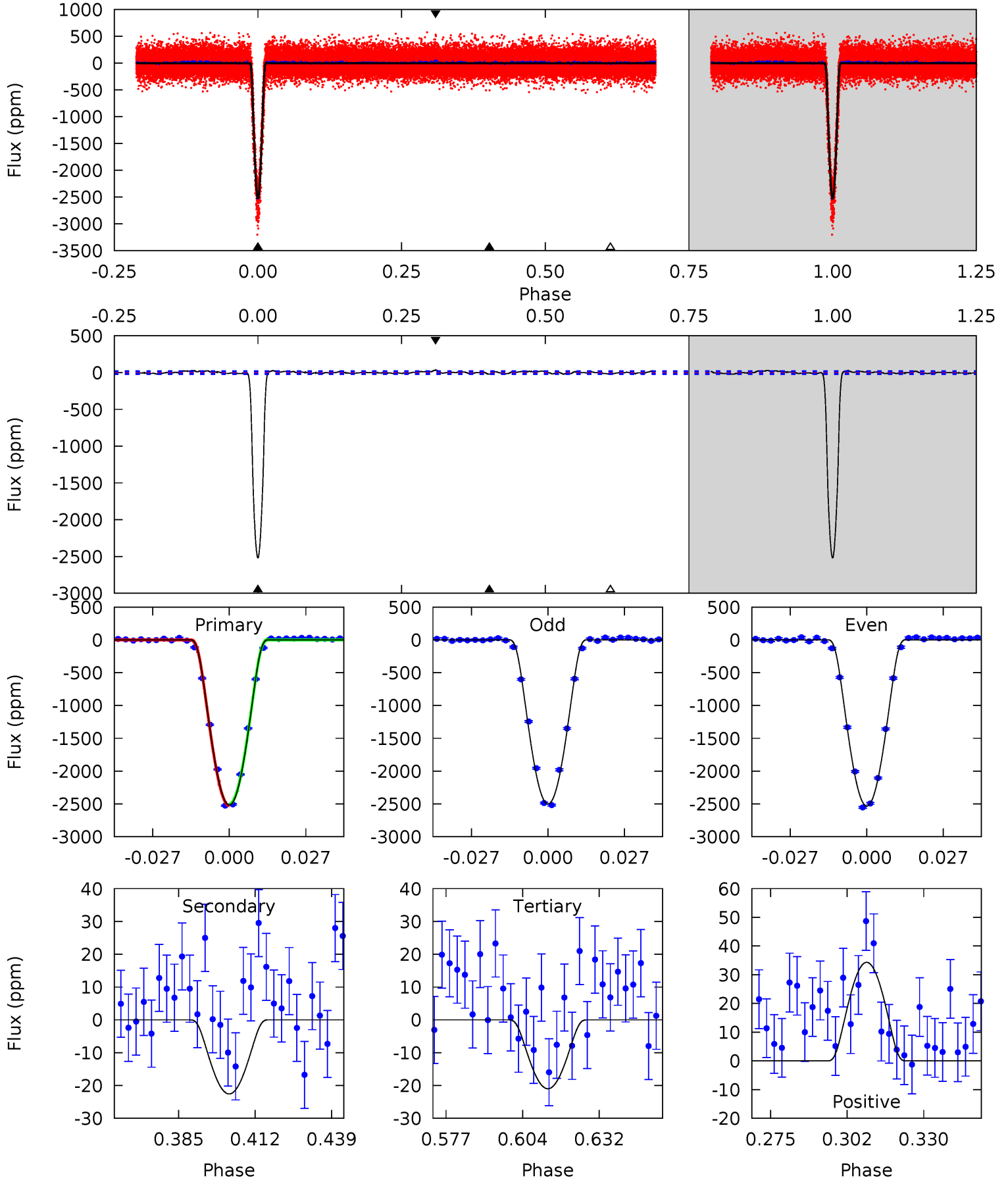
TCE 007376490-02 P= 5.877095 Days  $T_0=132.074205$  (BKJD)



# DV Model-Shift Uniqueness Test

007376490-02, P = 5.877120 Days, E = 126.194035 Days

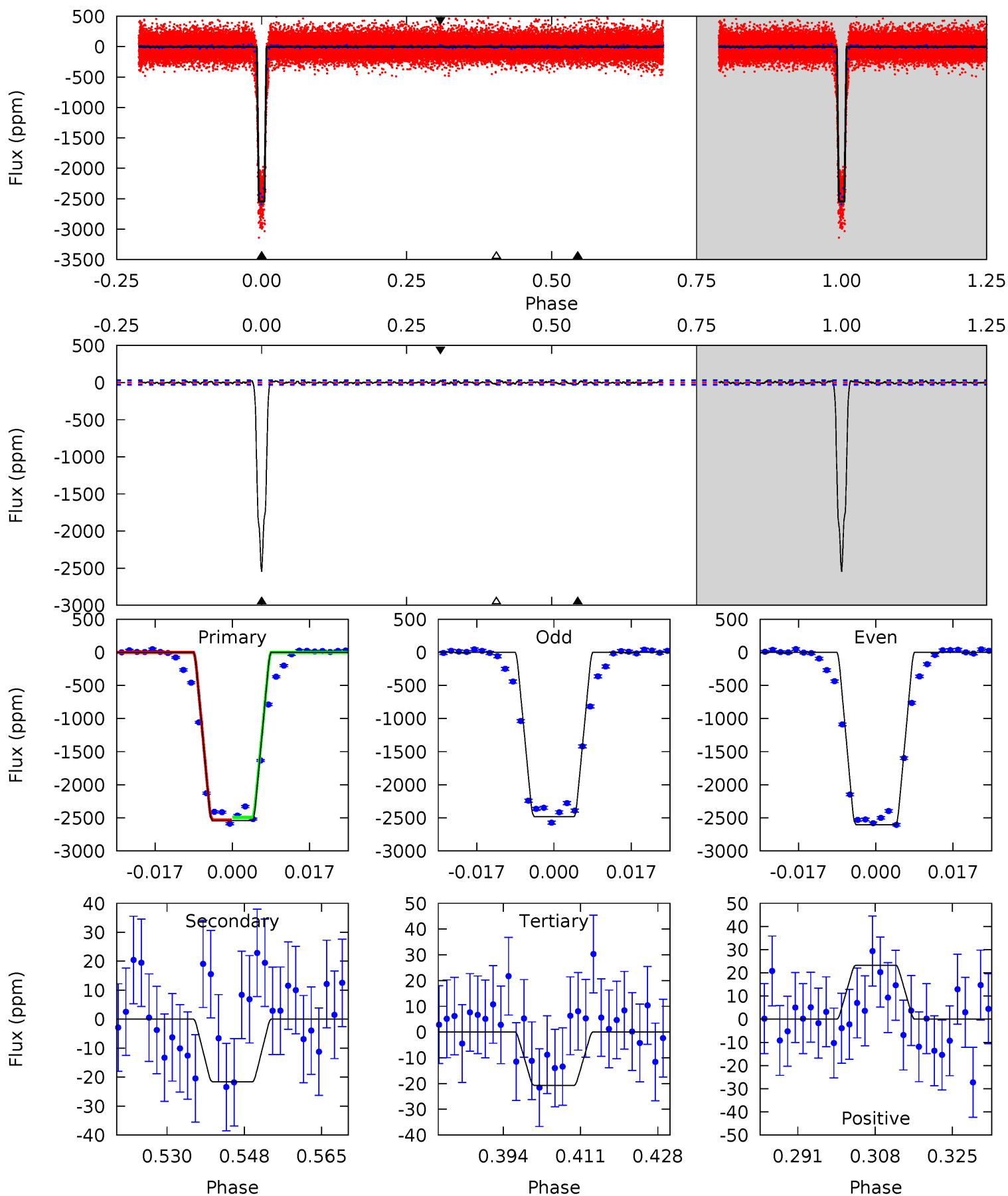
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
633.8	5.69	5.29	8.64	4.83	2.20	2.75	628.5	625.1	0.40	-2.95	3.96	1.22	0.01	2.93



# Alt Model-Shift Uniqueness Test

007376490-02, P = 5.877095 Days, E = 126.197110 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
419.1	3.56	3.41	3.84	4.92	2.38	1.29	415.7	415.2	0.15	-0.28	10.1	1.24	0.01	0



### Stellar Parameters For KIC 007376490

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5778^{+155}_{-155}$	$4.325^{+0.214}_{-0.195}$	$-0.340^{+0.300}_{-0.250}$	$1.043^{+0.309}_{-0.231}$	$0.839^{+0.127}_{-0.063}$	$1.041^{+1.011}_{-0.507}$
	+3%/-3%	+5%/-5%	+88%/-74%	+30%/-22%	+15%/-8%	+97%/-49%
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 007376490-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-23 \pm 4$	$9.95^{+2.33}_{-1.94}$	$1472^{+132}_{-97}$	$2017^{+193}_{-3623}$	$0.452^{+0.270}_{-0.164}$
Alt.	$-22 \pm 6$	$6.56^{+2.05}_{-1.60}$	$1480^{+117}_{-107}$	$2371^{+231}_{-263}$	$0.960^{+0.920}_{-0.443}$

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

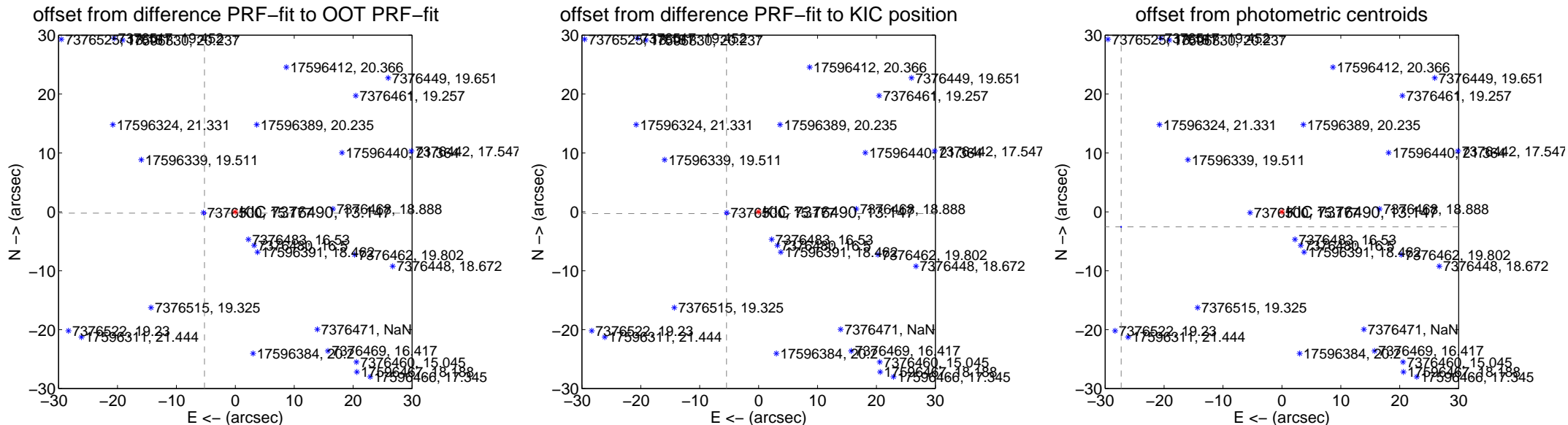
## DV Centroid Data

Supplemental centroid analysis for 007376490-02. Kepler magnitude: 13.15. Transit SNR 281.59

There are 17 quarters with good PRF difference image offsets

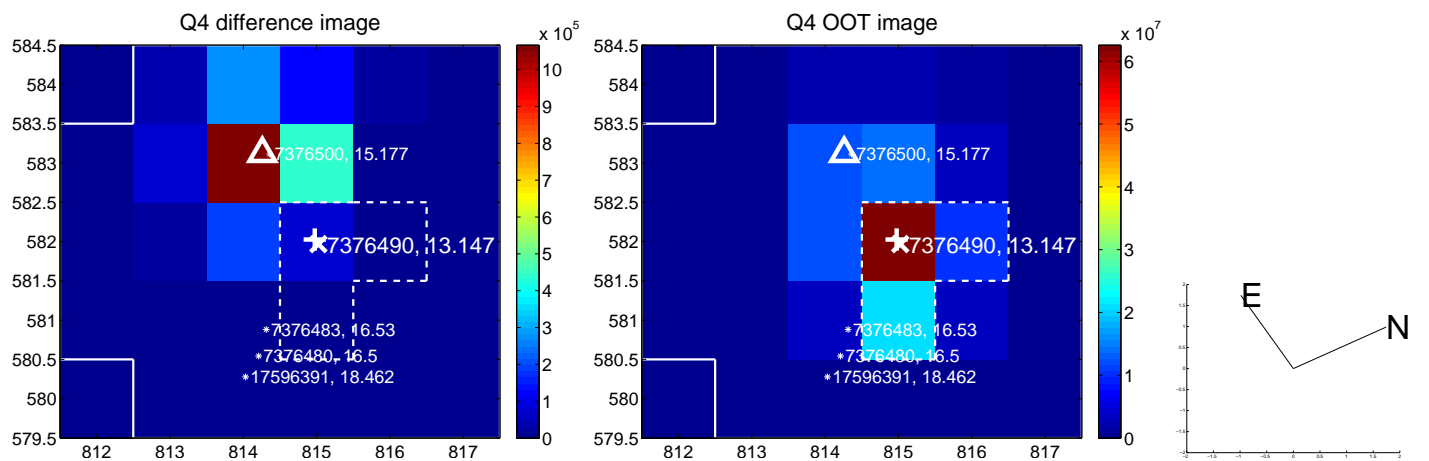
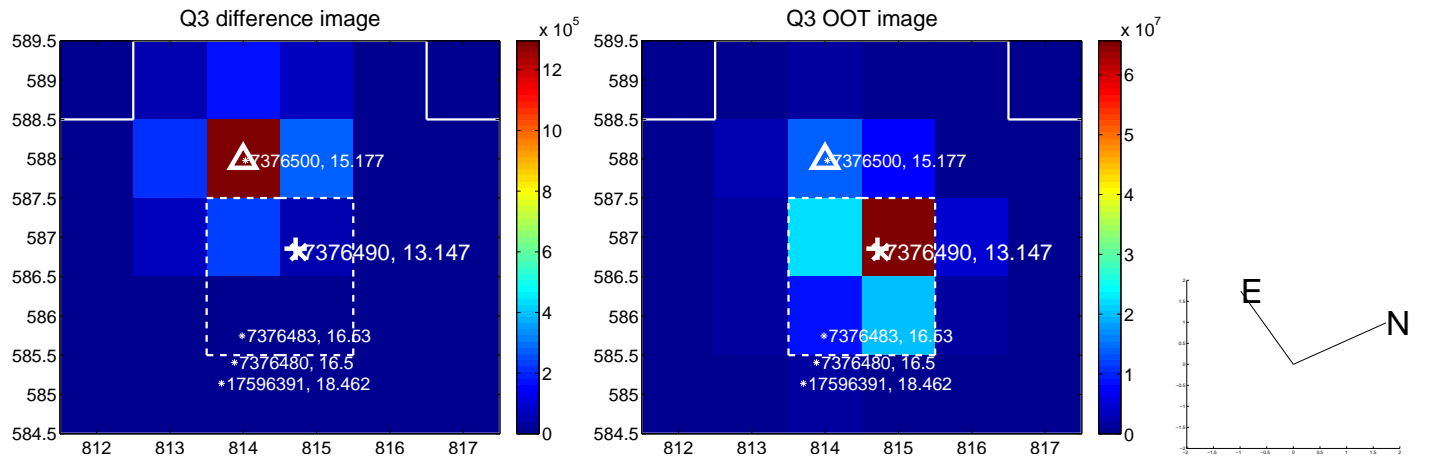
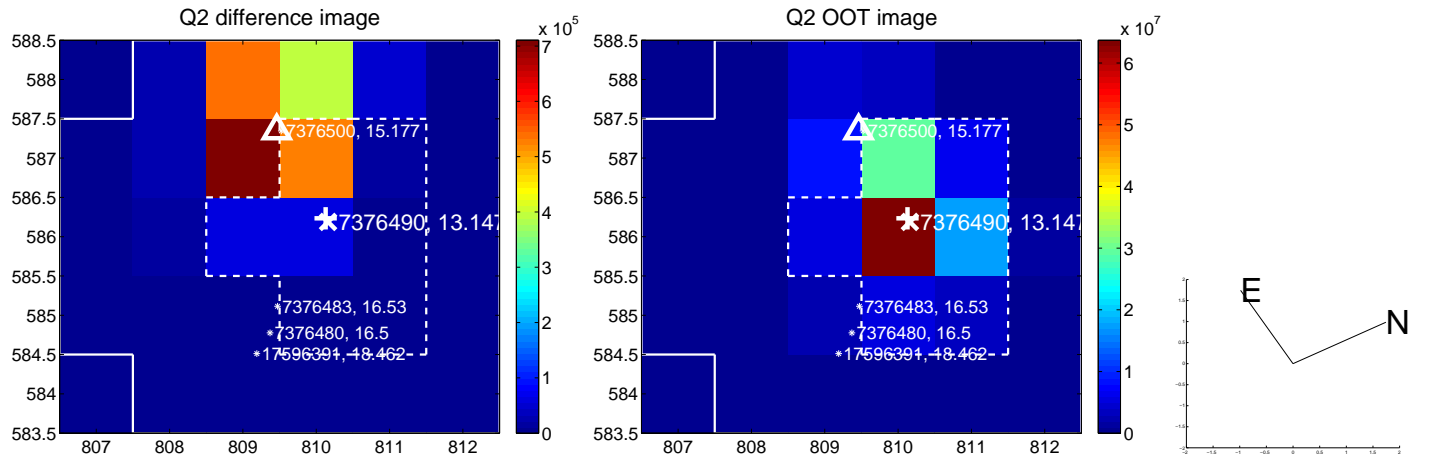
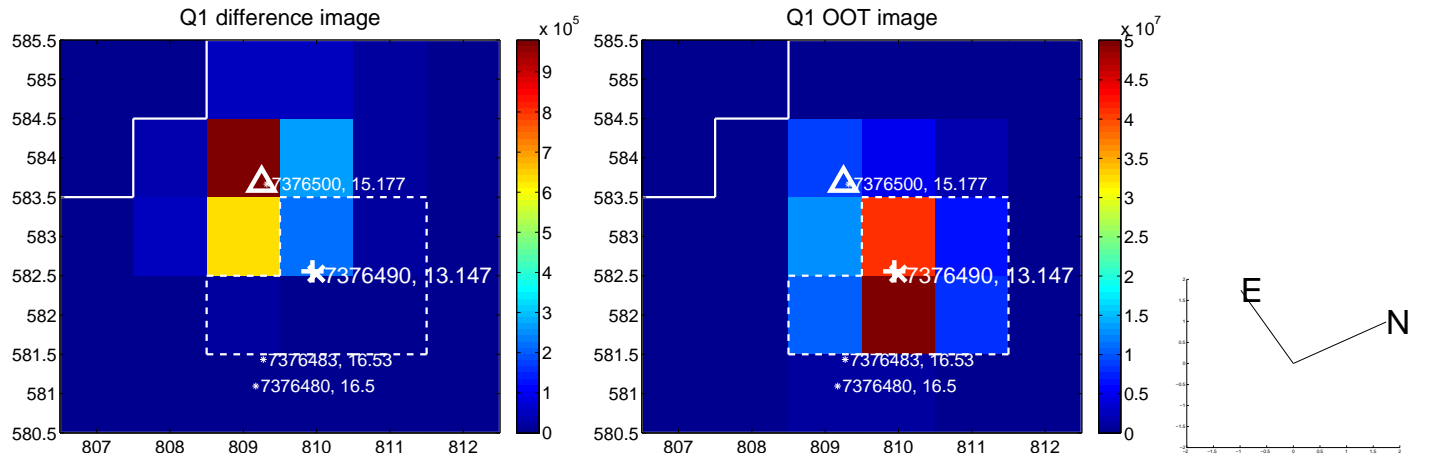
The direct PRF centroid is offset from the target star catalog position by about 0.23 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>5.242 <math>\pm</math> 0.069</b>	<b>75.48</b>	$5.237 \pm 0.069$	$-0.220 \pm 0.068$
PRF-fit source offset from KIC position	<b>5.454 <math>\pm</math> 0.069</b>	<b>79.22</b>	$5.446 \pm 0.069$	$-0.288 \pm 0.070$
photometric centroid source offset	<b>27.41 <math>\pm</math> 0.03</b>	<b>968.84</b>	$27.29 \pm 0.03$	$-2.55 \pm 0.02$

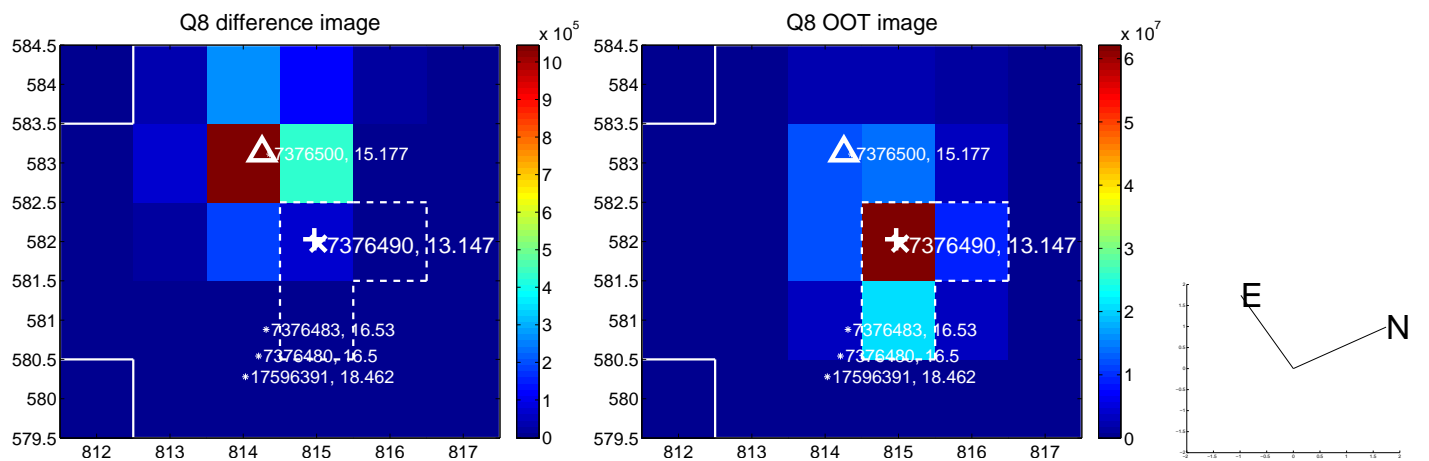
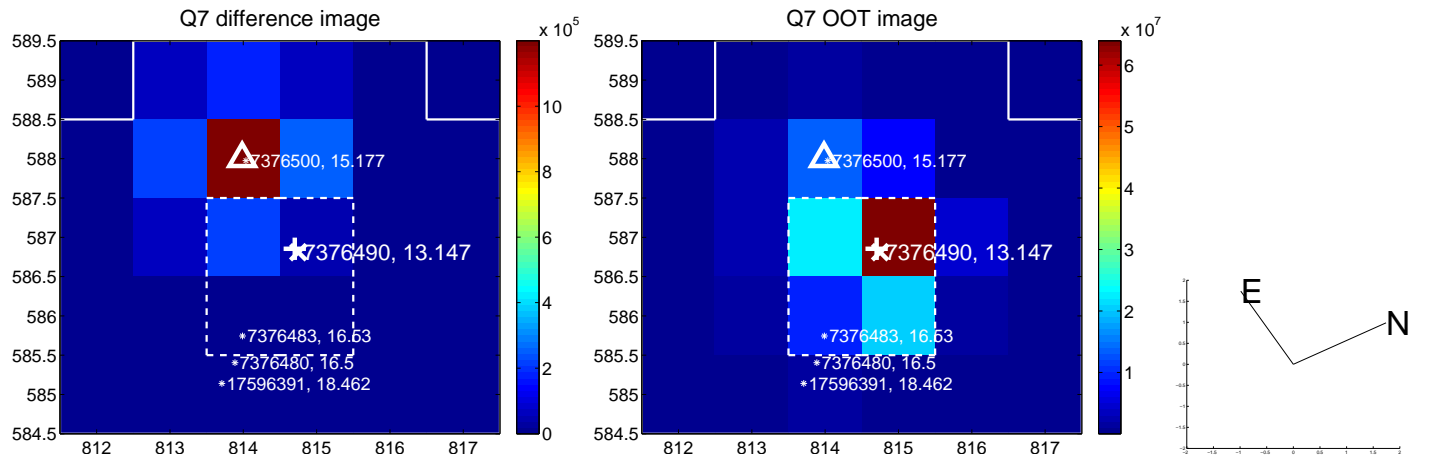
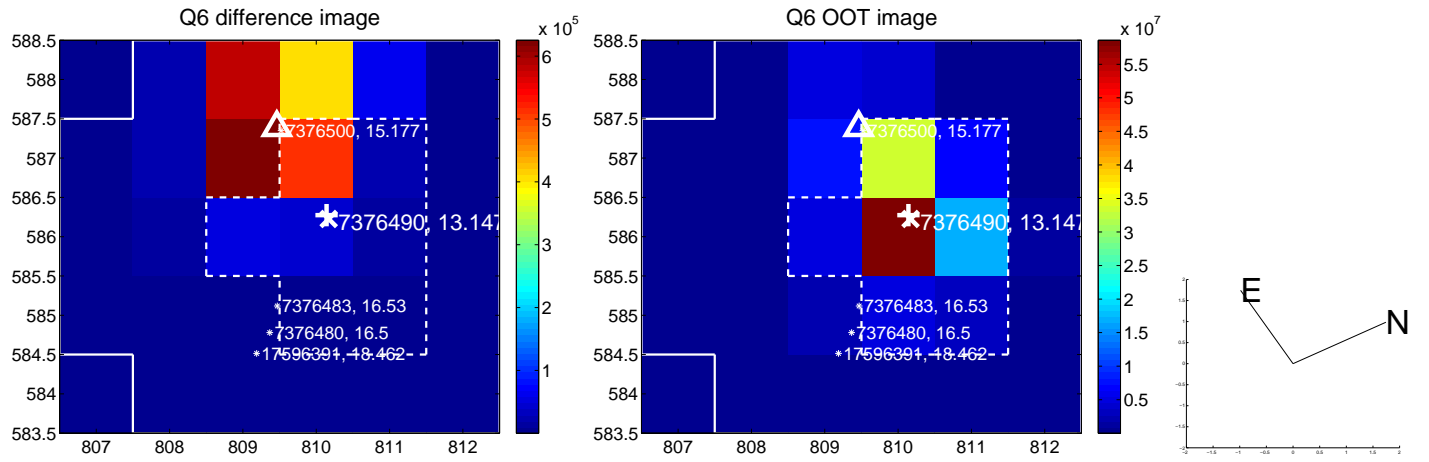
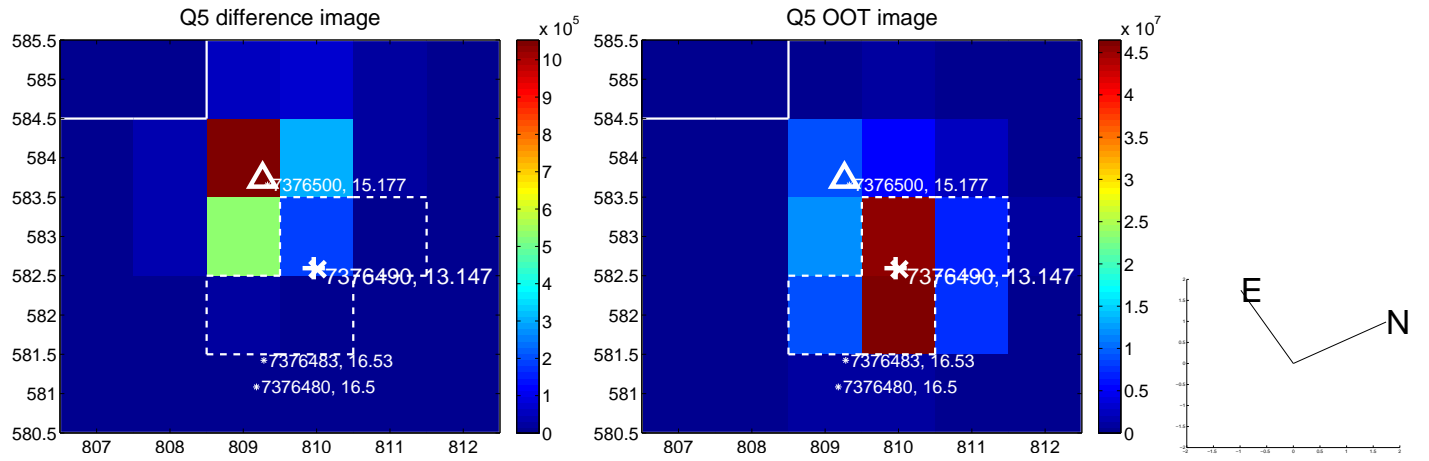


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

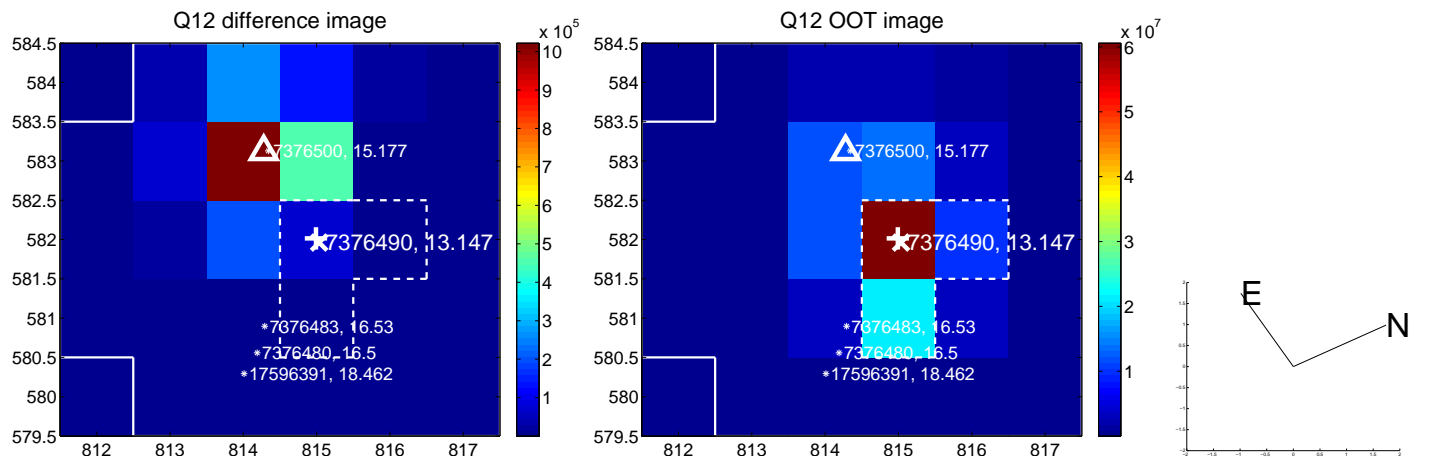
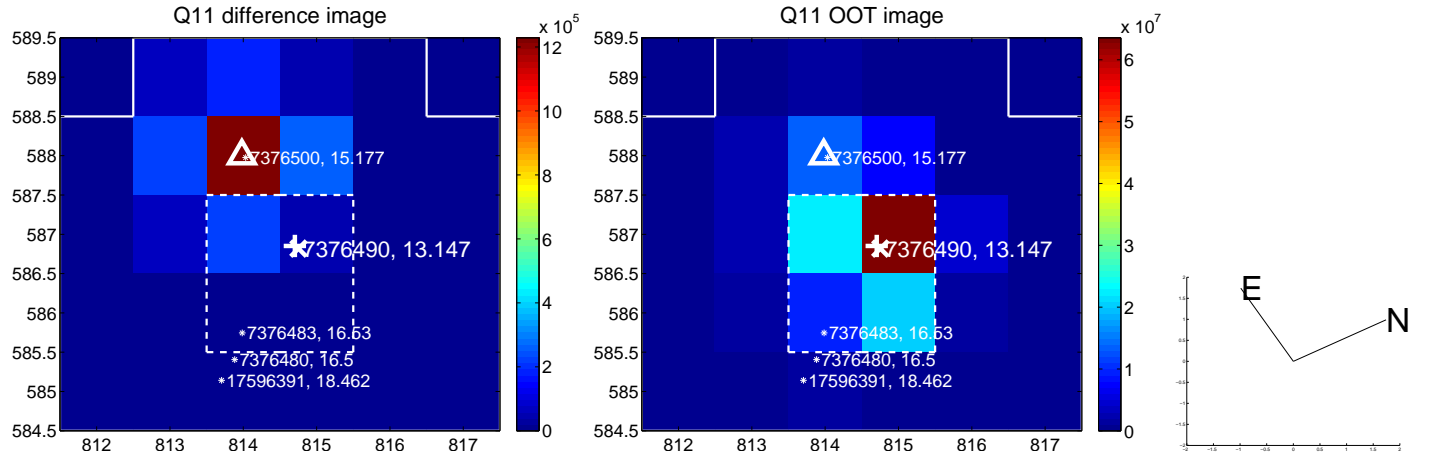
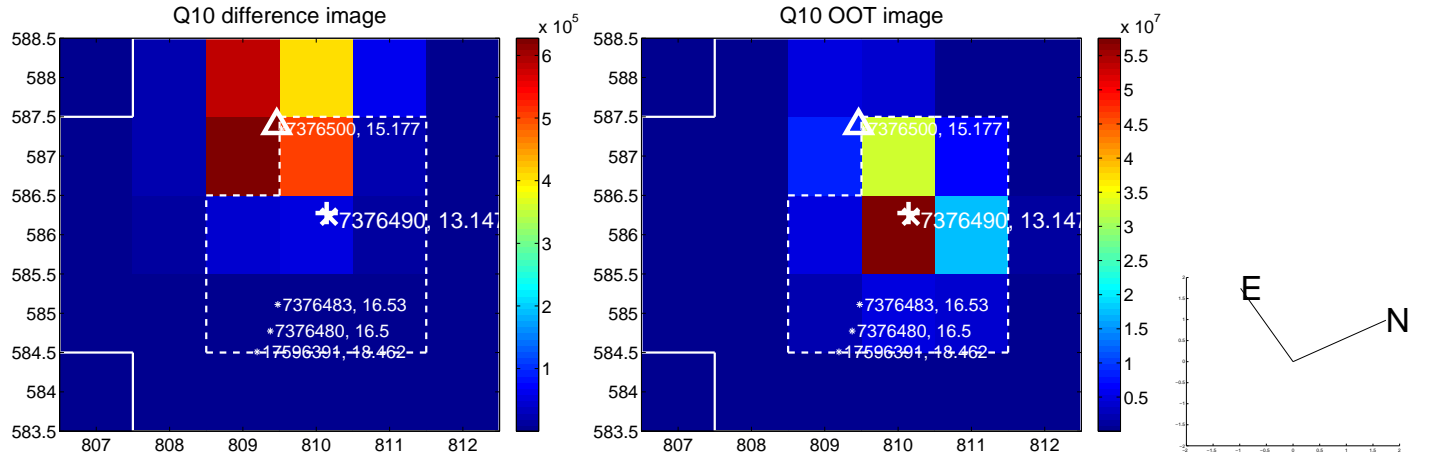
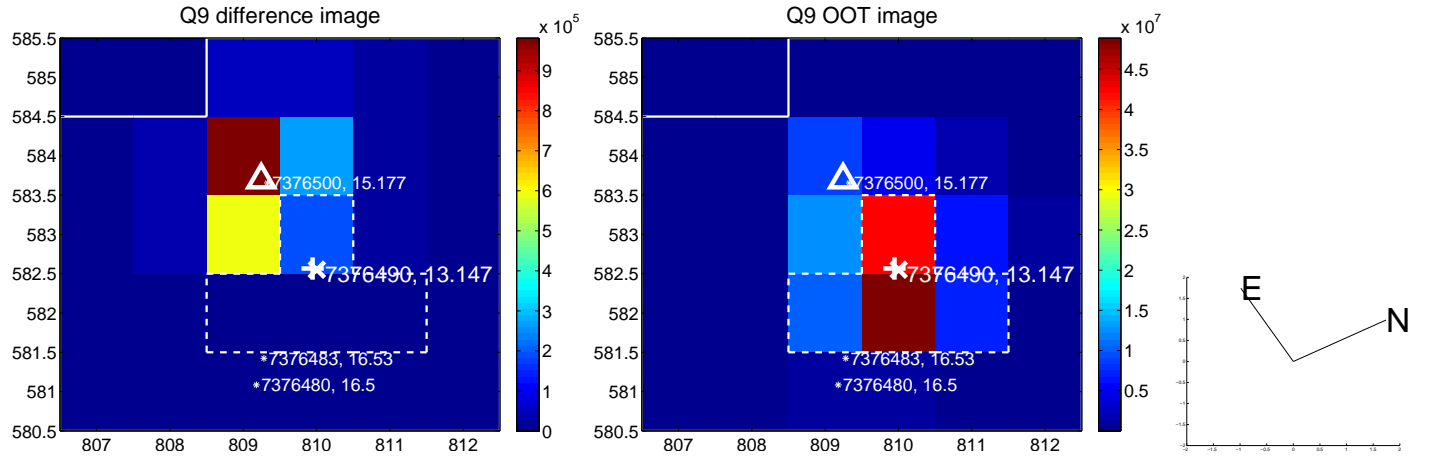
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

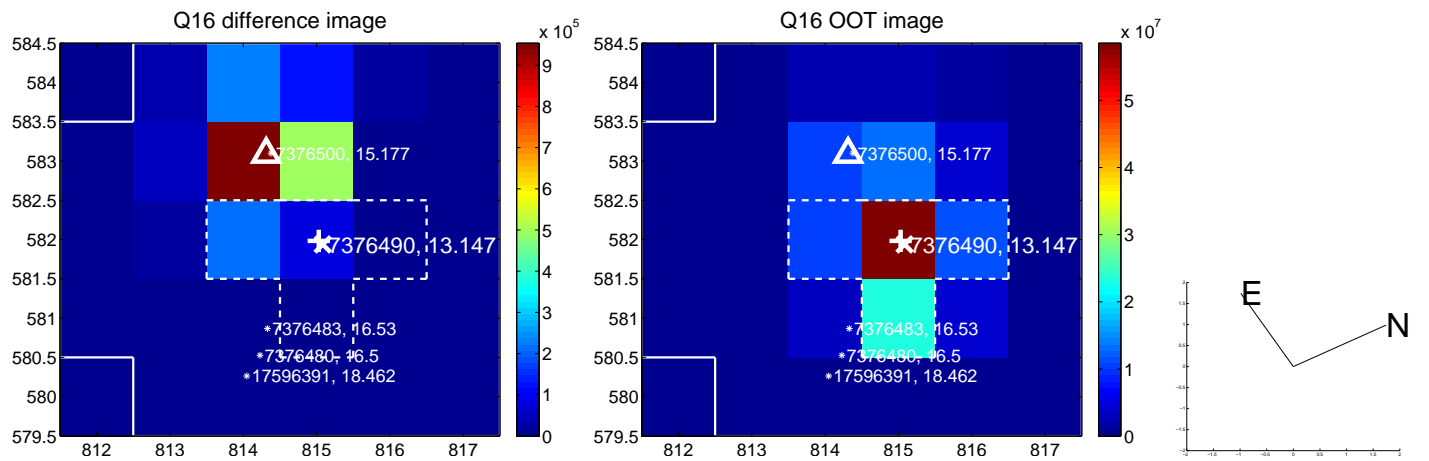
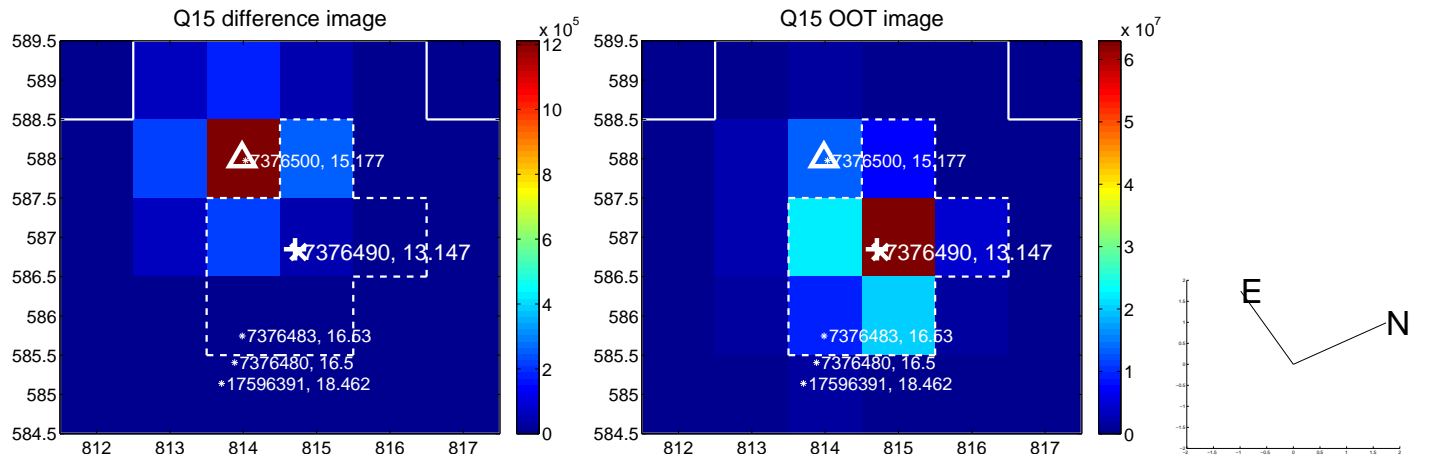
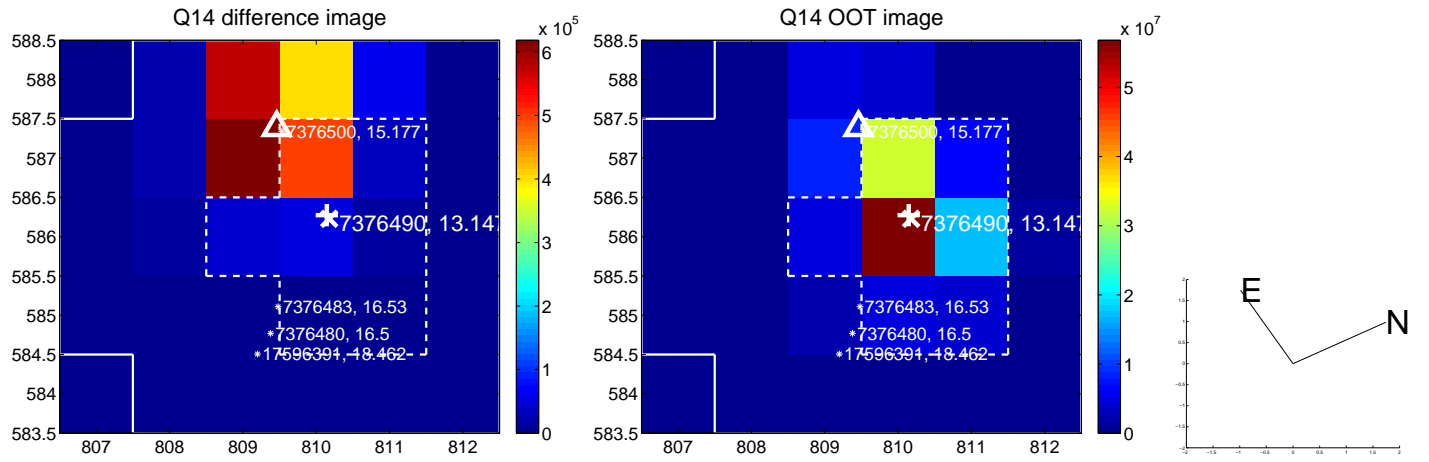
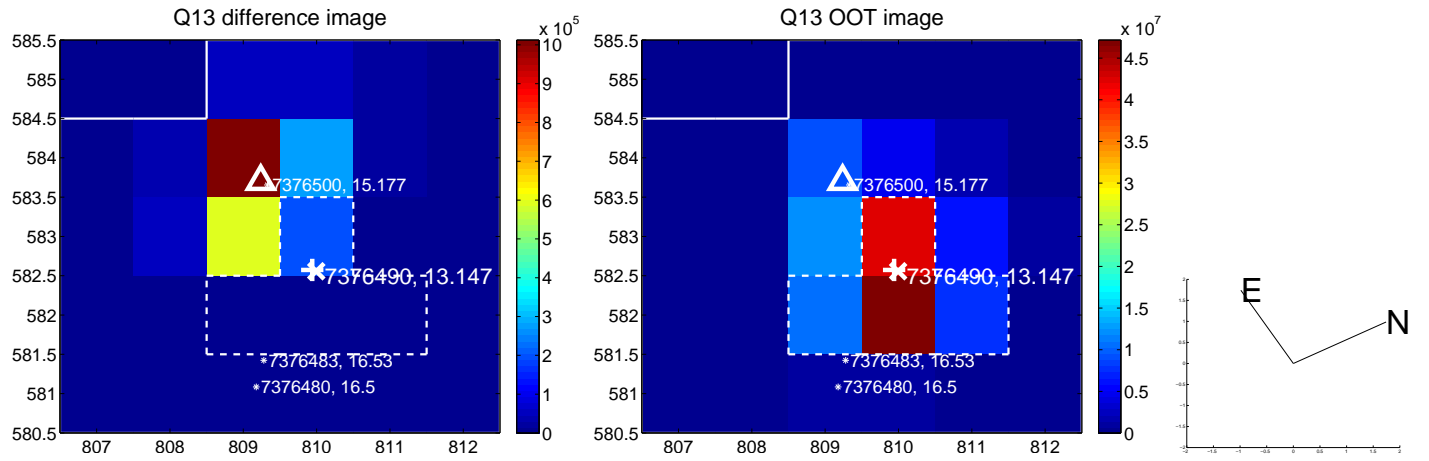


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

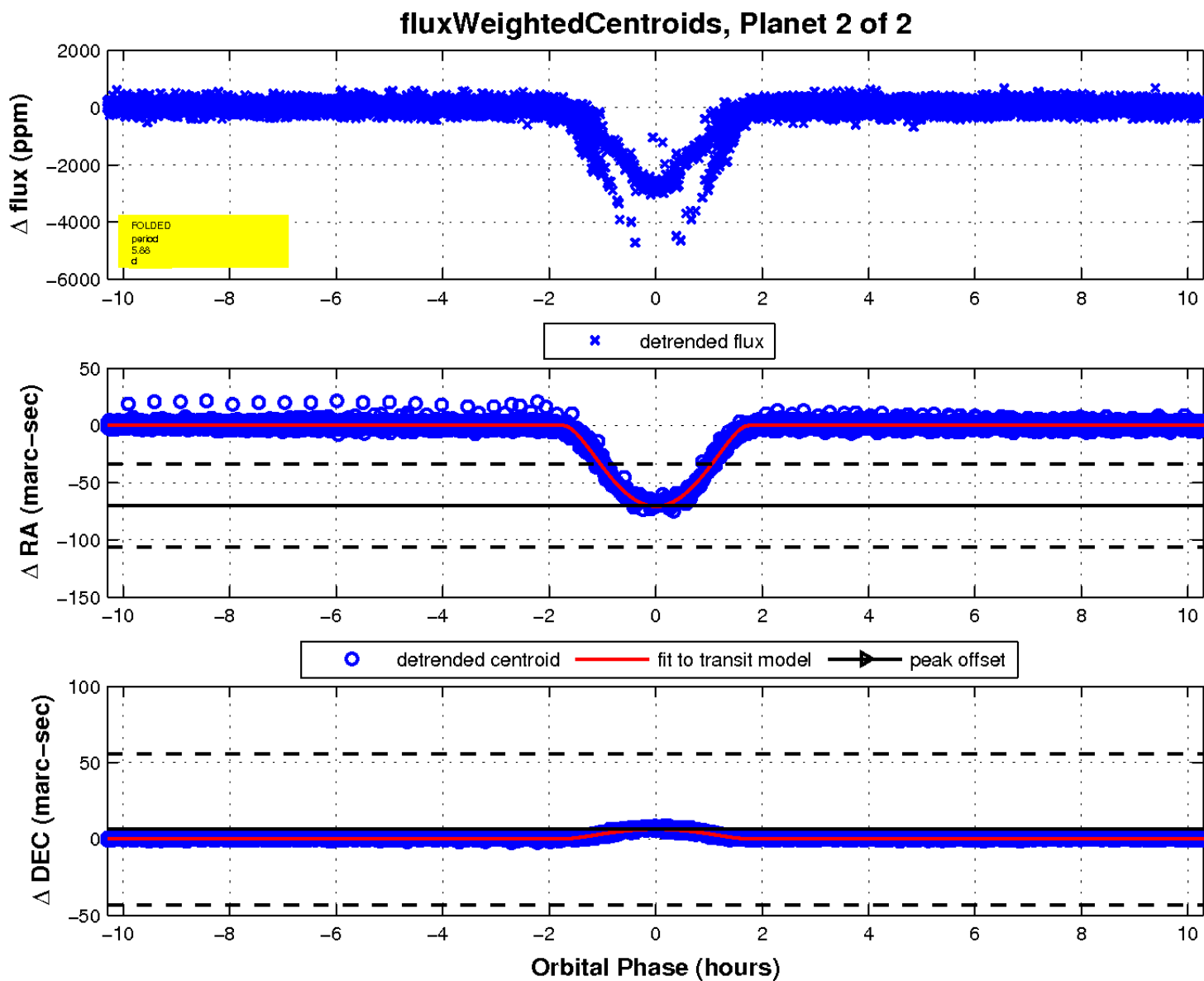
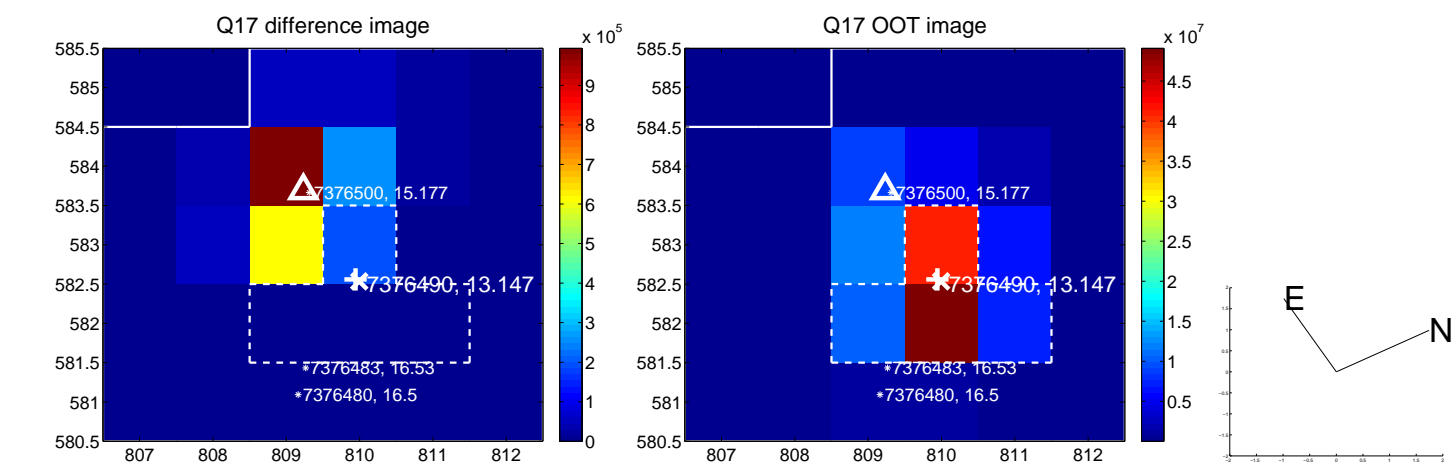




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image

Declination

