

# KIC 006387450

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006387450-01	OBS	1228.01	3.661321	131.609749	17989.6	2.606	1846.6	1448.9	0.80	5319	12.22	259.04
006387450-02	OBS	No	3.661325	133.439792	2497.3	2.598	274.4	273.7	0.80	5319	4.83	259.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006387450-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
006387450-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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 006387450-01

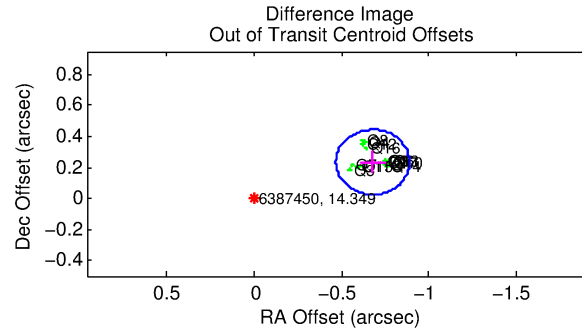
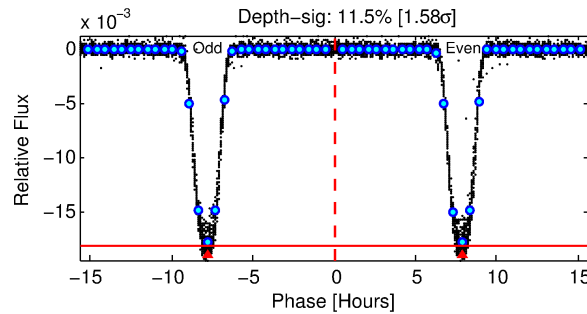
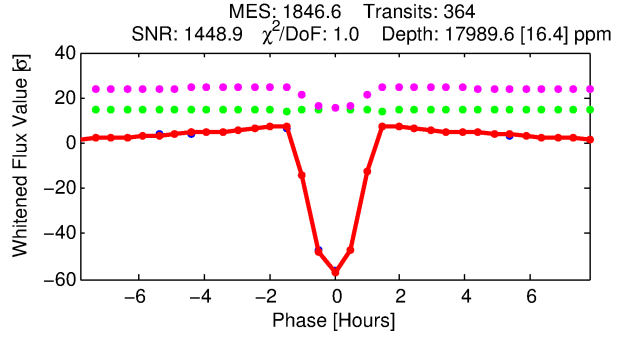
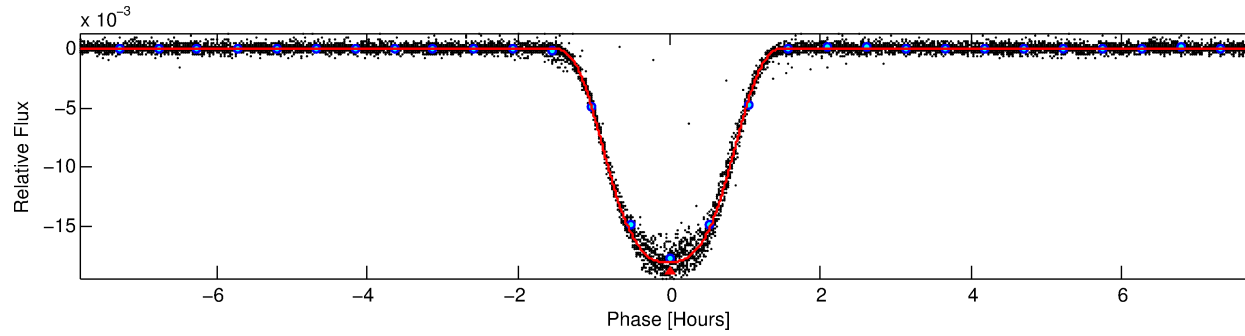
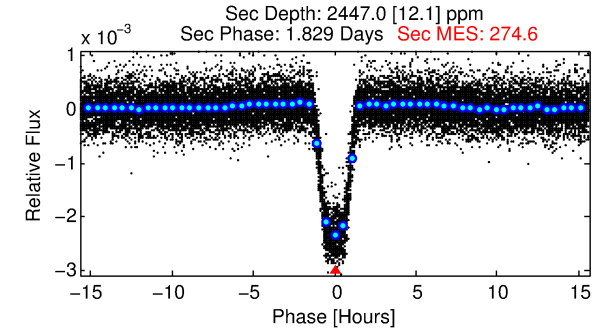
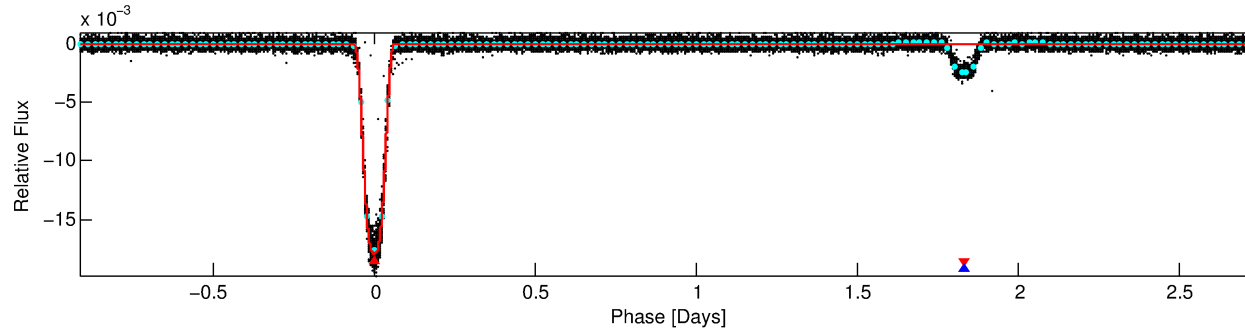
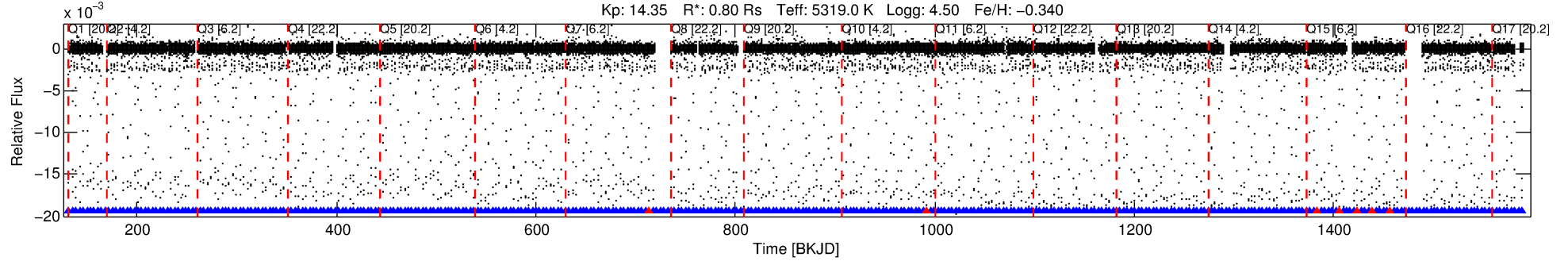
No Significant Match Found

# DV One-Page Summary

KIC: 6387450 Candidate: 1 of 2 Period: 3.661 d

KOI: K01228.01 Corr: 0.993

Kp: 14.35 R\*: 0.80 Rs Teff: 5319.0 K Logg: 4.50 Fe/H: -0.340



## DV Fit Results:

Period = 3.66132 [0.00000] d  
Epoch = 131.6097 [0.0000] BKJD  
Rp/R\* = 0.1403 [0.0001]  
a/R\* = 8.53 [0.02]  
b = 0.82 [0.00]  
Seff = 259.04 [57.53]  
Teq = 1023 [57] K  
Rp = 12.22 [1.68] Re  
a = 0.0420 [0.0050] AU  
Ag = 15.89 [2.84] [5.24 $\sigma$ ]  
Teff = 3158 [104] K [18.02 $\sigma$ ]

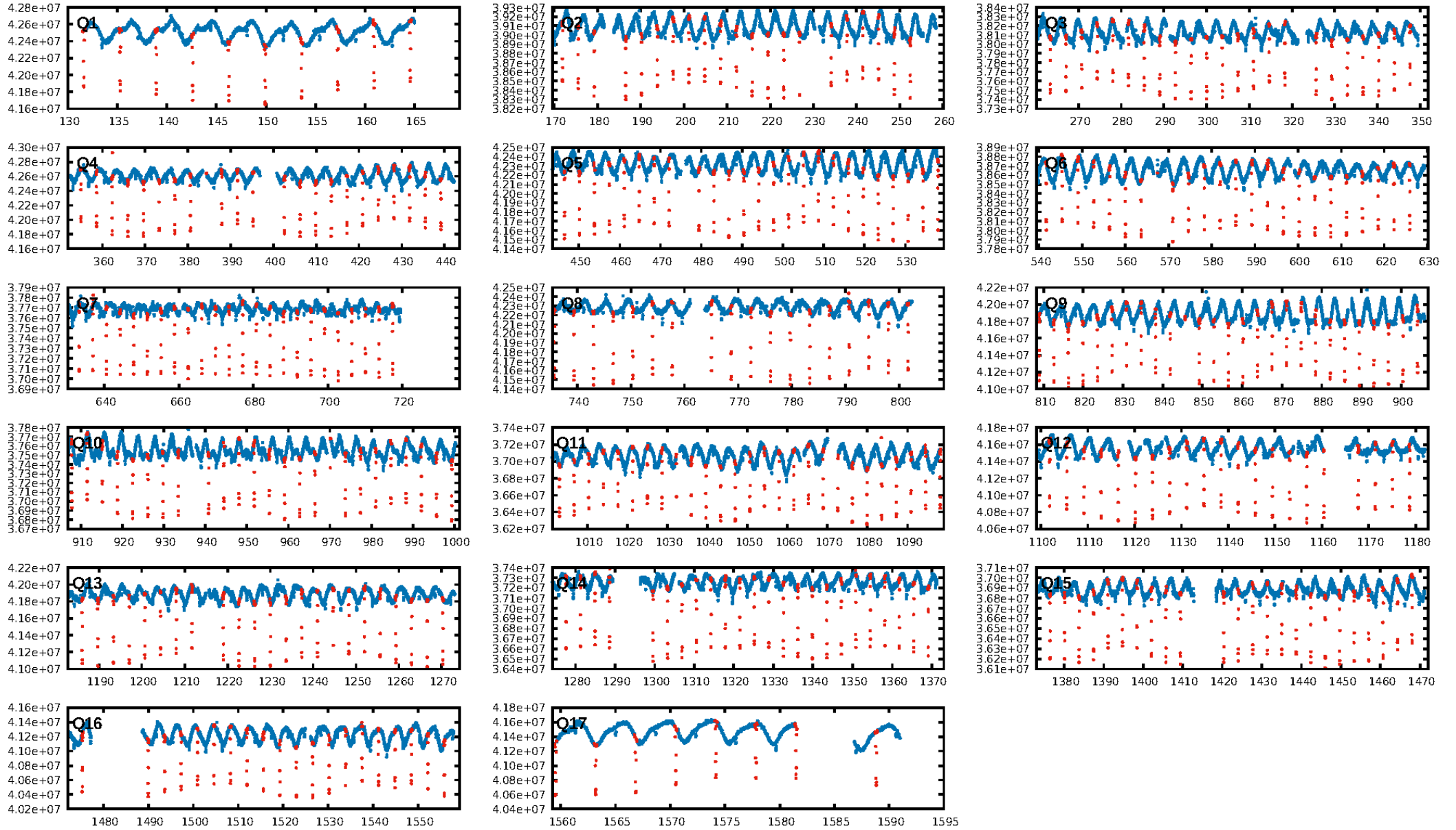
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.98 [339/346]  
GhostDiagnostic-chr: 2.972  
Centroid-sig: 0.0%  
Centroid-so: 0.458 arcsec [72.15 $\sigma$ ]  
OotOffset-rm: 0.717 arcsec [10.25 $\sigma$ ]  
KicOffset-rm: 0.533 arcsec [7.54 $\sigma$ ]  
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]

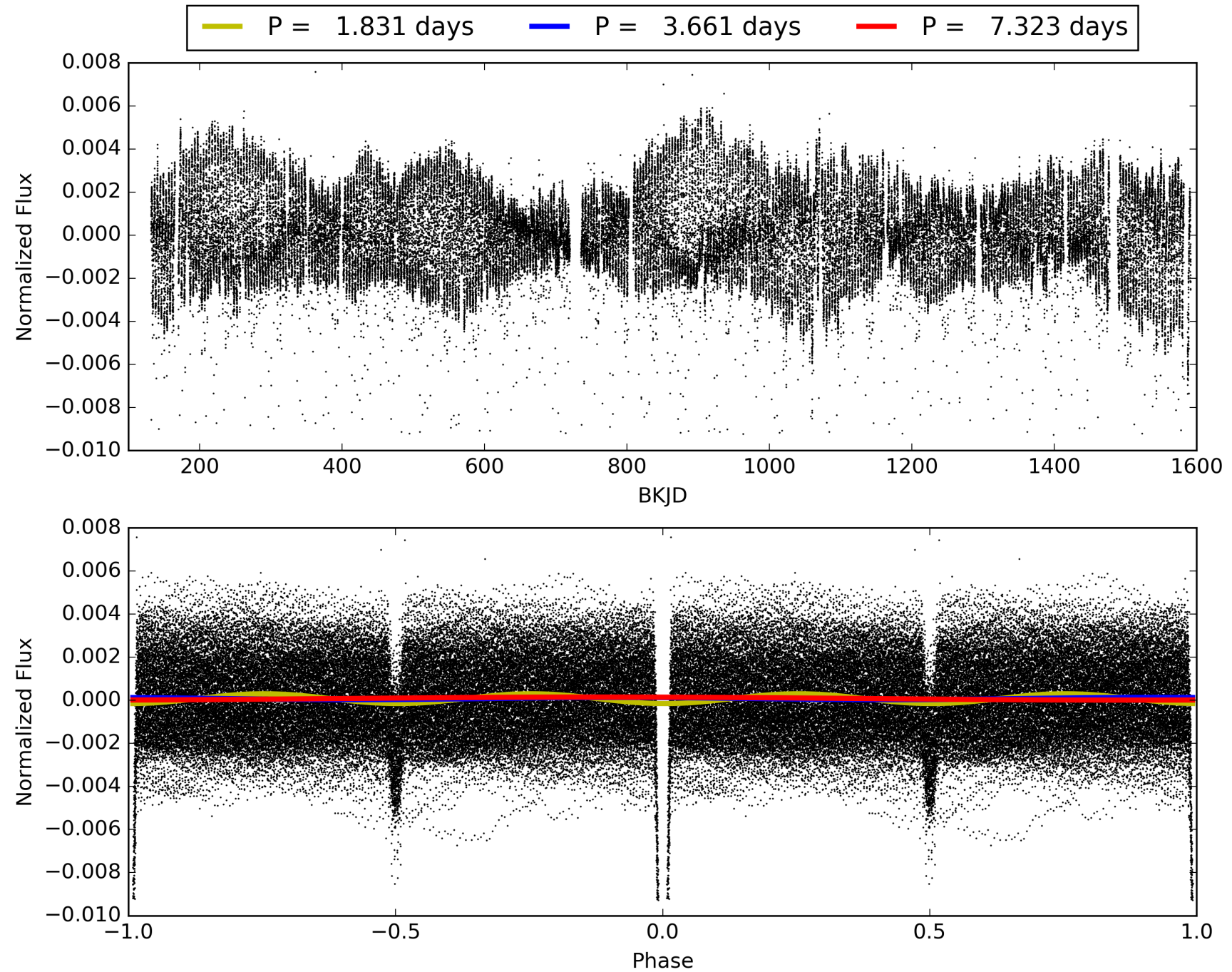
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 17:57:19 Z

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

# TCE 006387450-01, PDC Light Curves

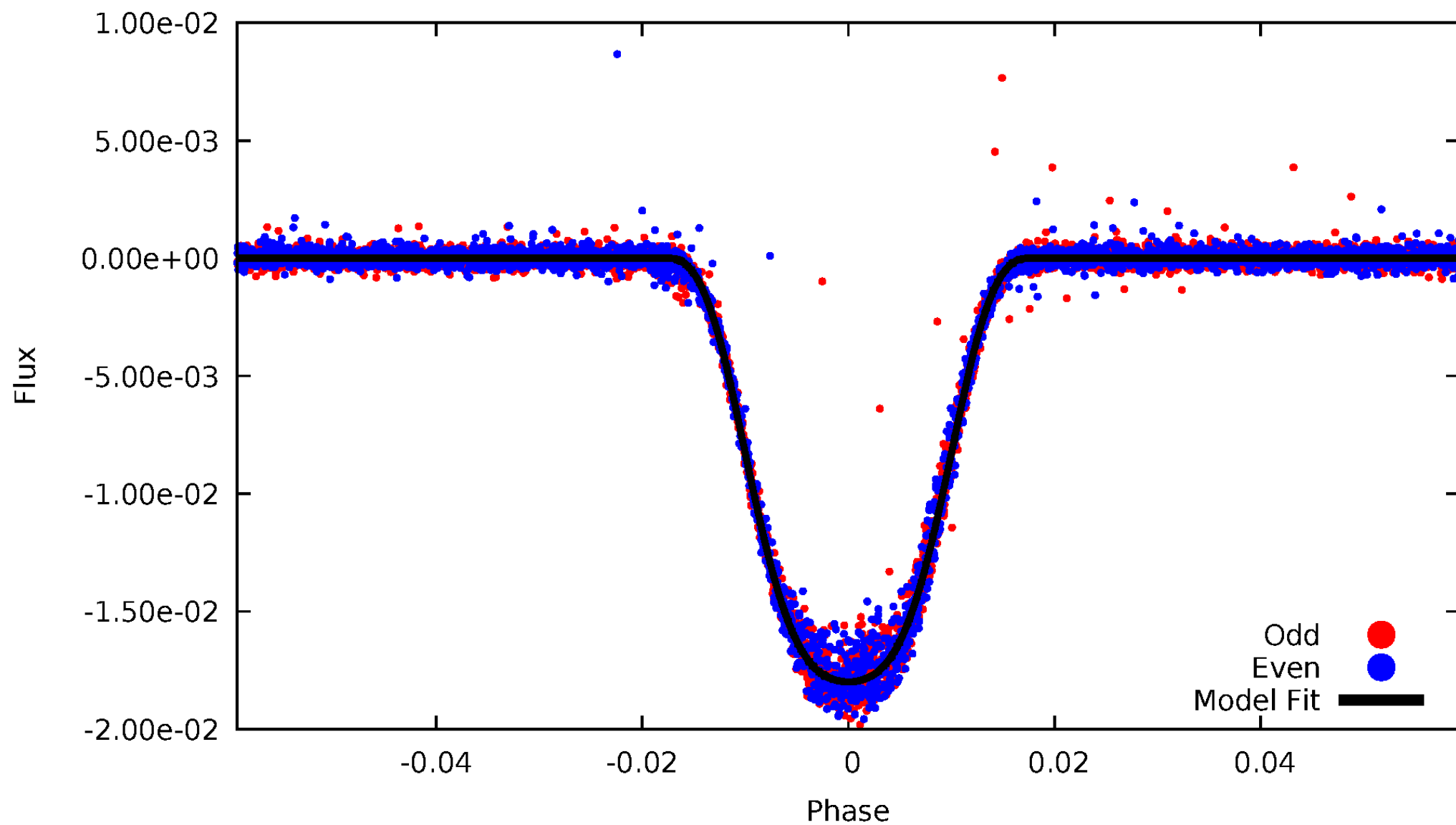


TCE 006387450-01



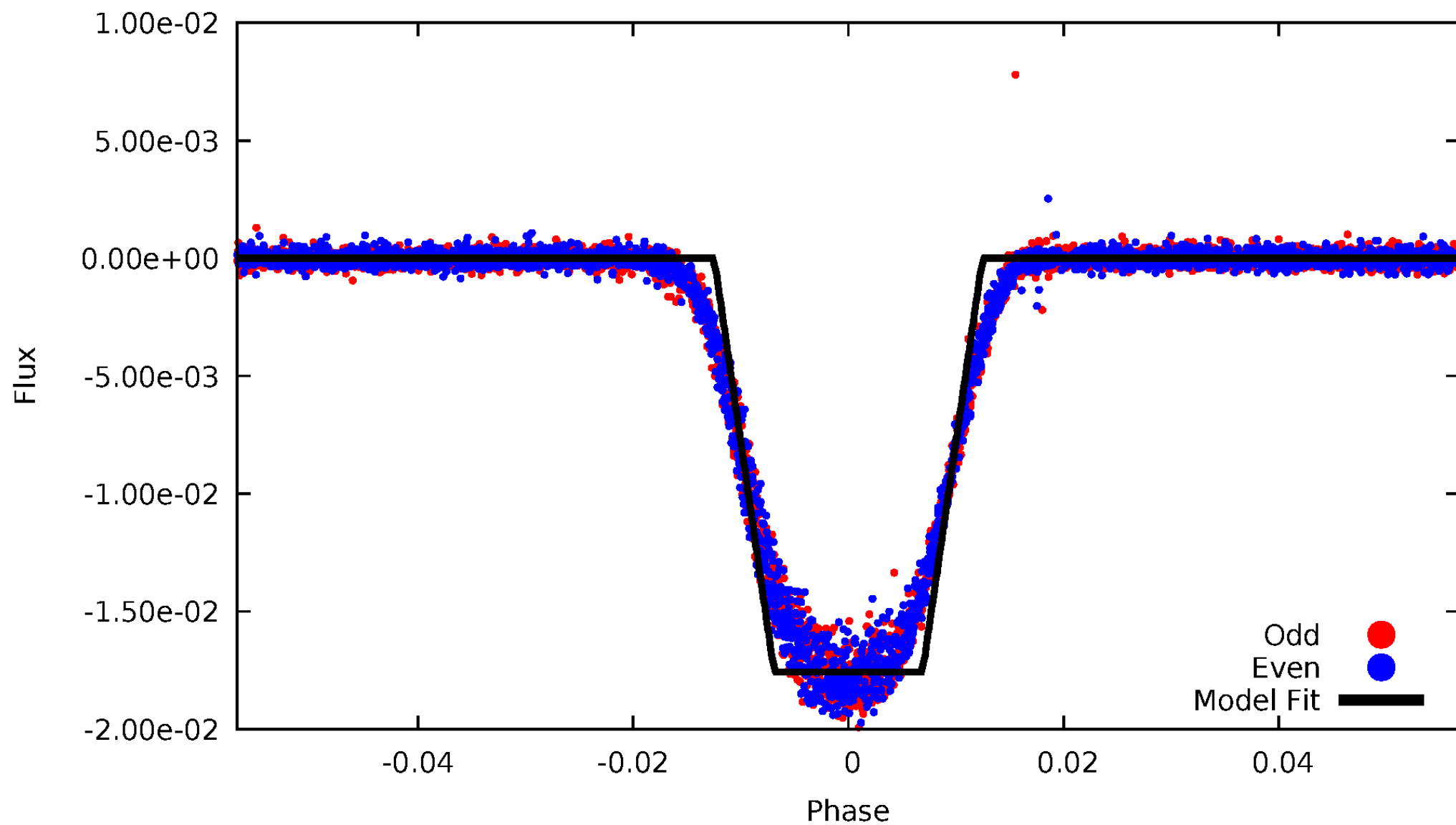
# DV Odd/Even

TCE 006387450-01



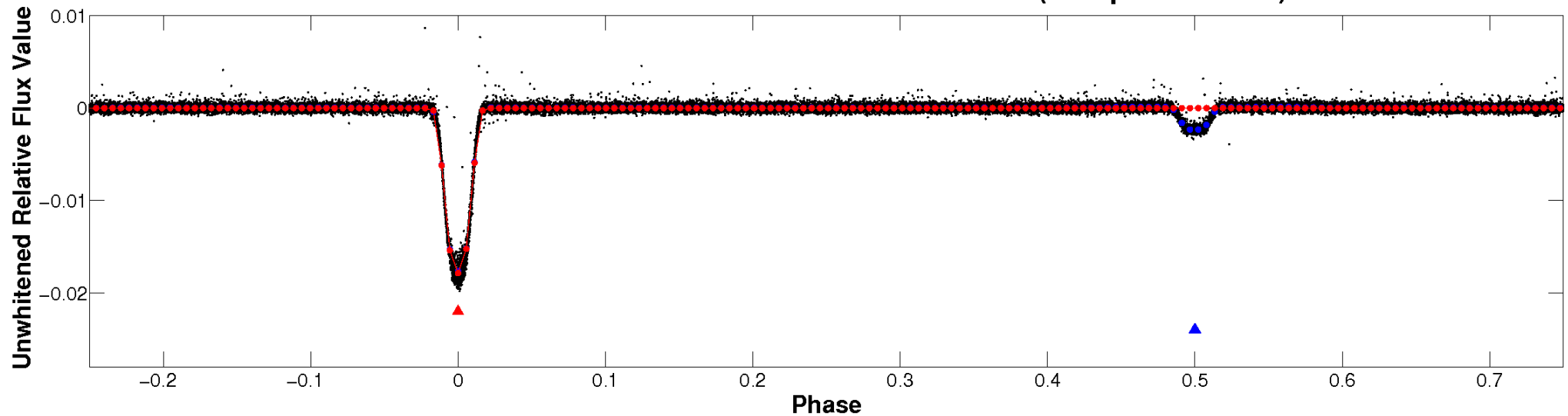
# ALT Odd/Even

TCE 006387450-01

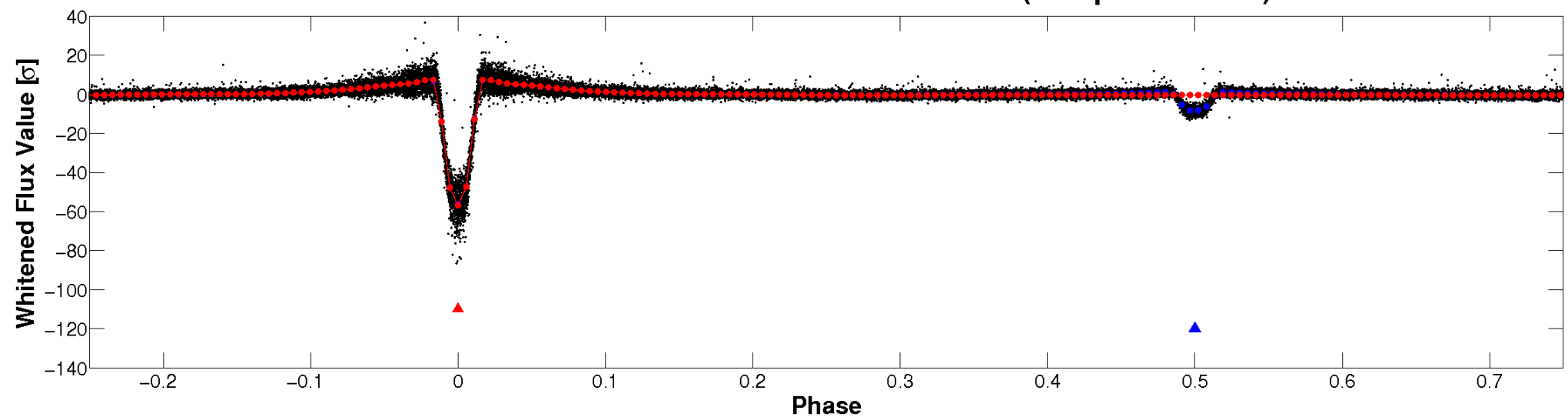


# Non-Whitened Vs. Whitened Light Curve

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



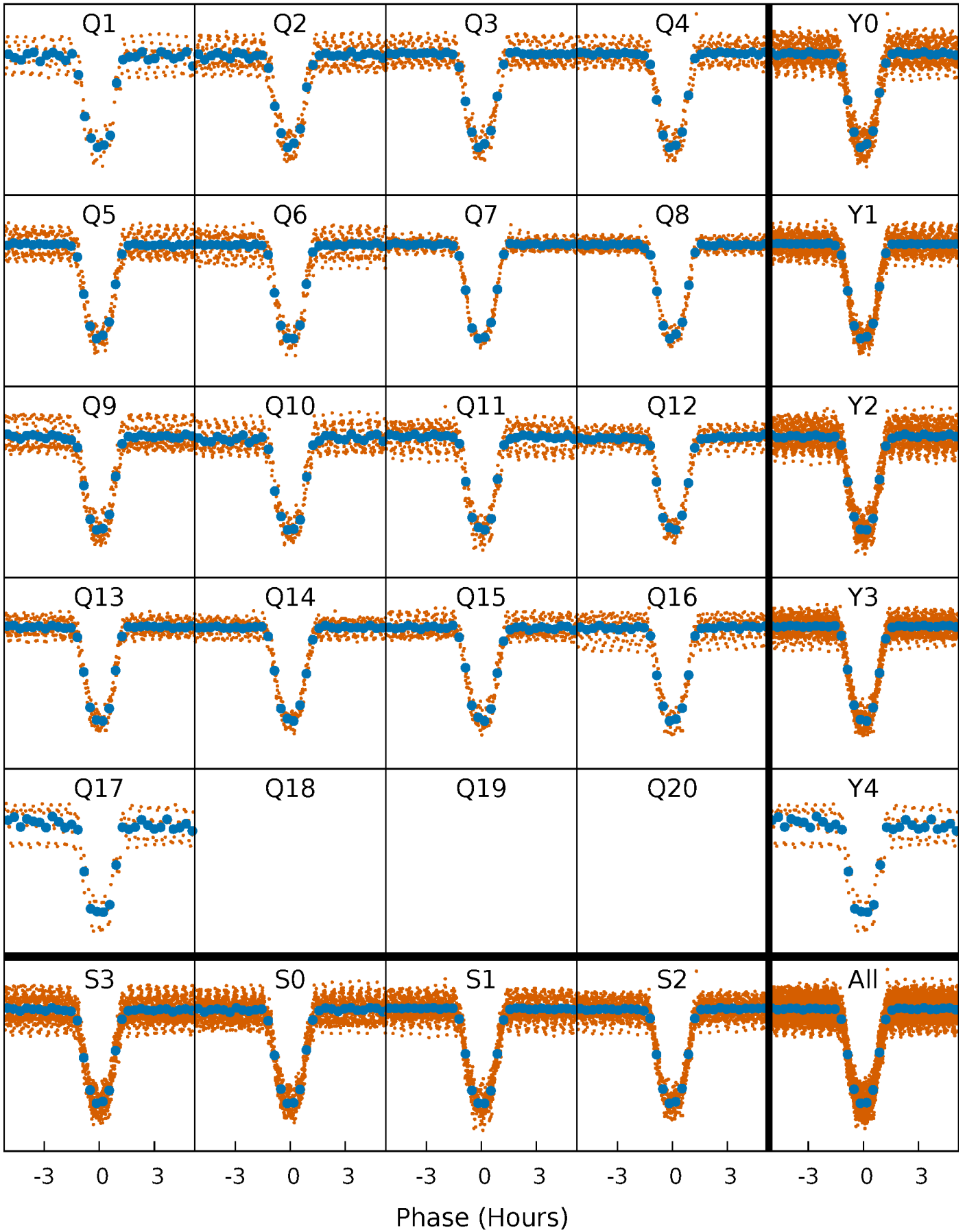
Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)





# PDC Quarter-Phased Transit Curves

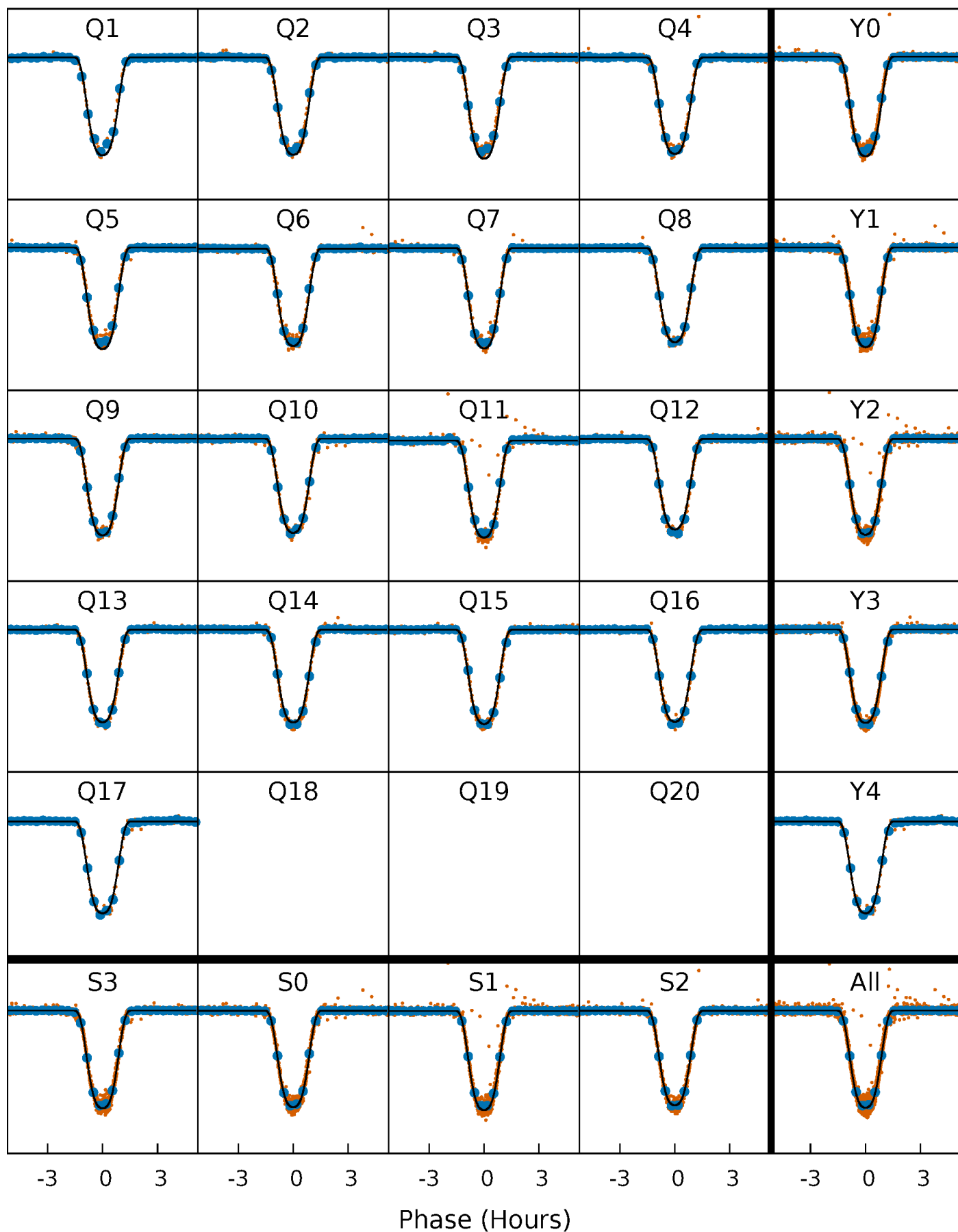
TCE 006387450-01 P= 3.661321 Days  $T_0=131.609749$  (BKJD)





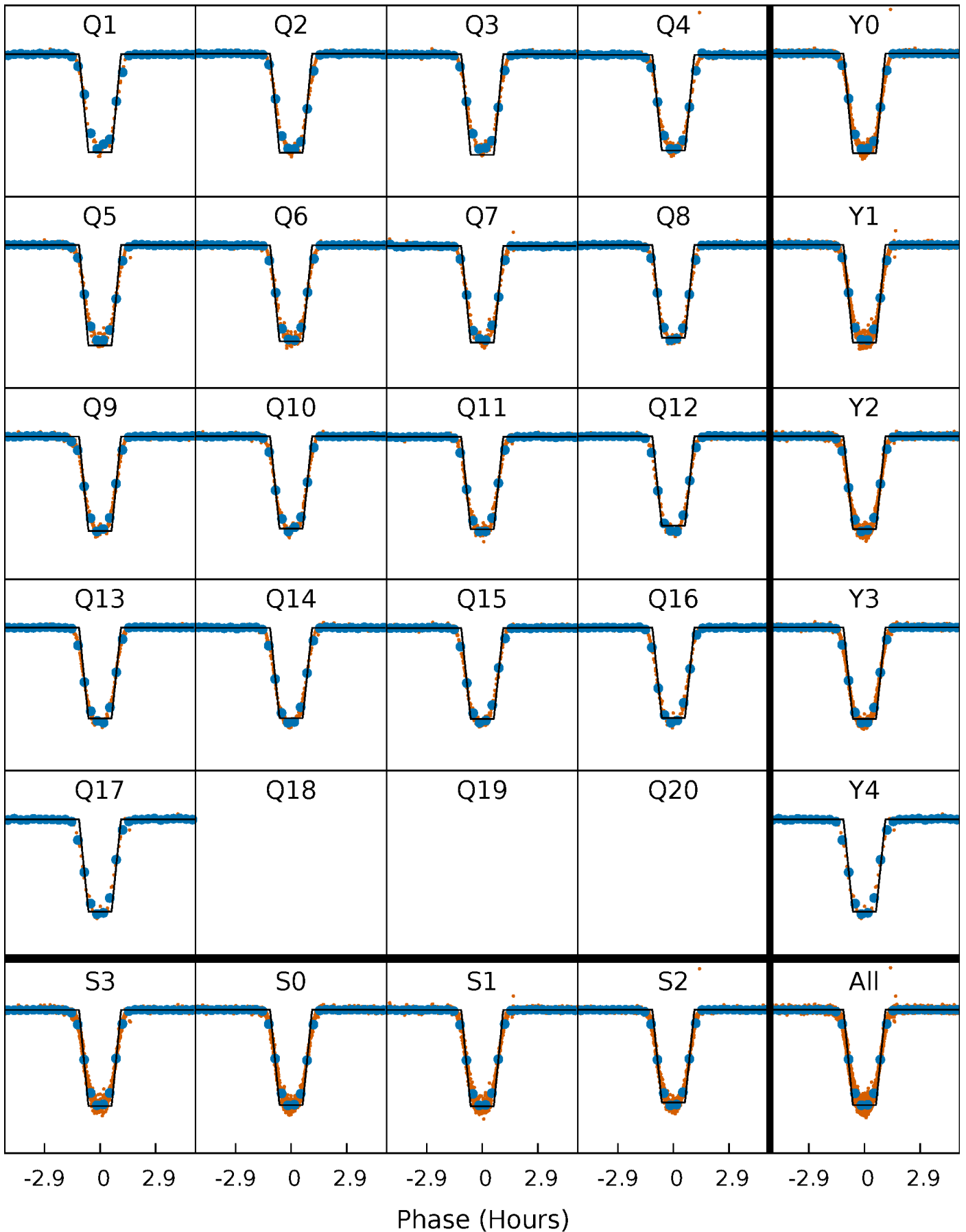
# DV Quarter-Phased Transit Curves

TCE 006387450-01 P= 3.661321 Days  $T_0=131.609749$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

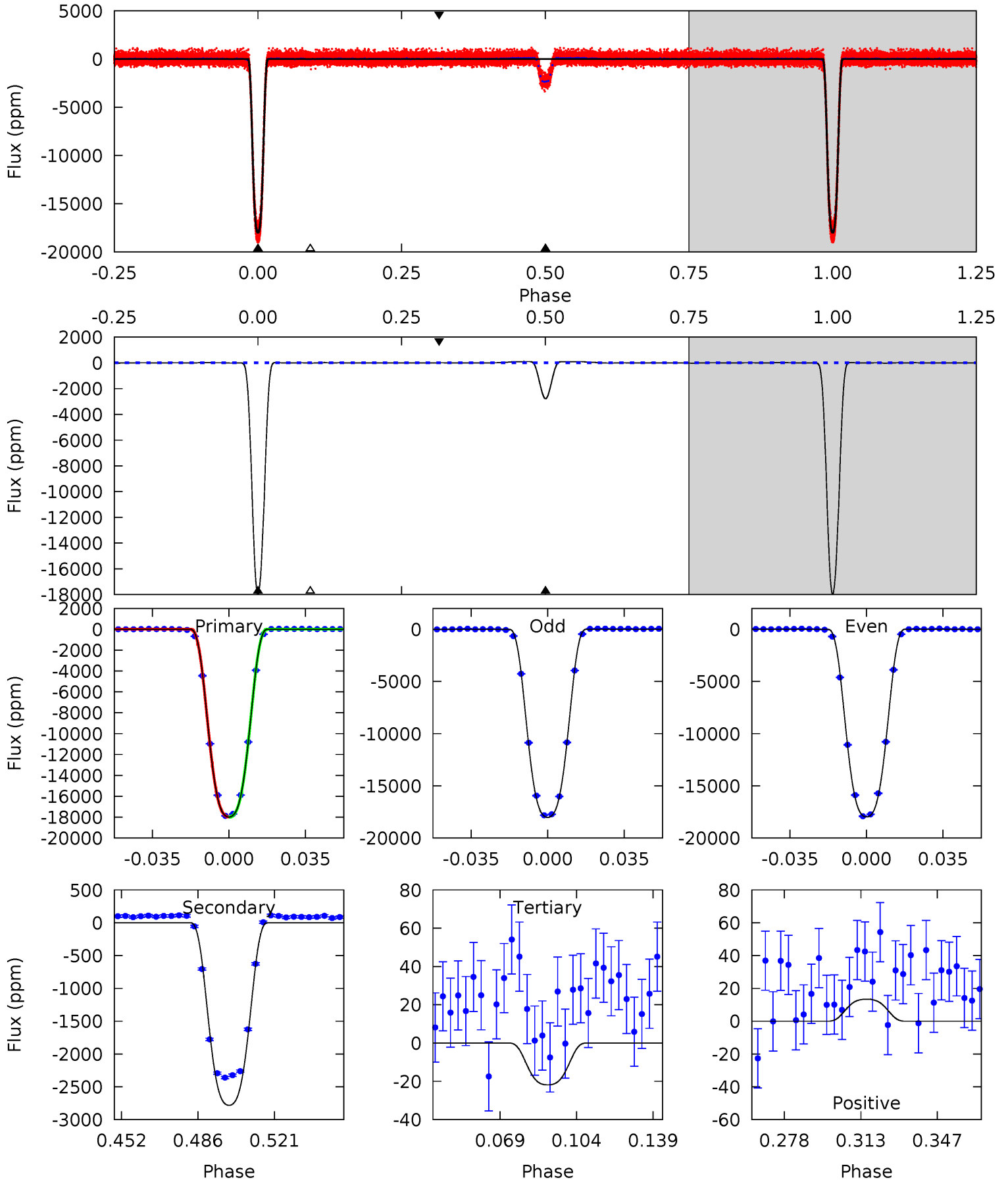
TCE 006387450-01 P= 3.661337 Days  $T_0=131.606437$  (BKJD)



# DV Model-Shift Uniqueness Test

006387450-01, P = 3.661321 Days, E = 127.948428 Days

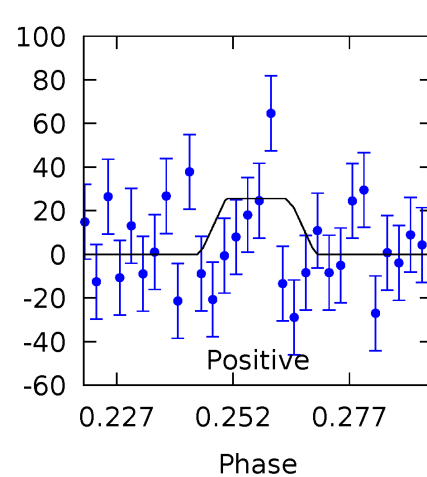
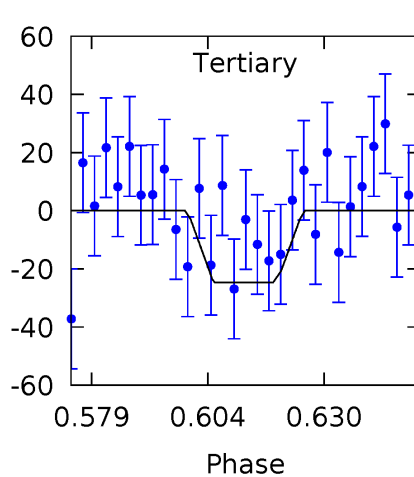
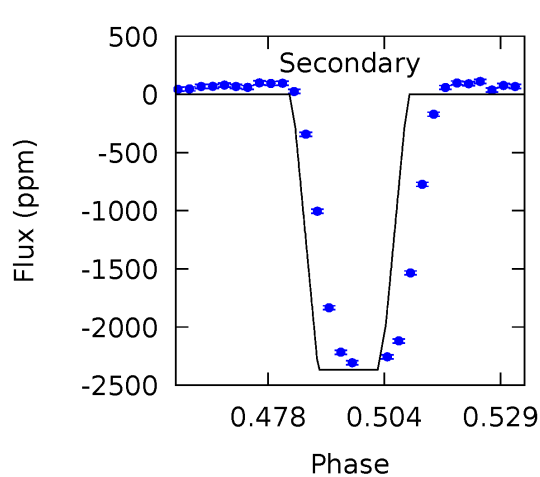
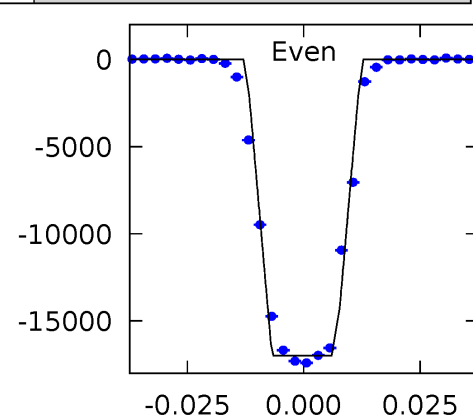
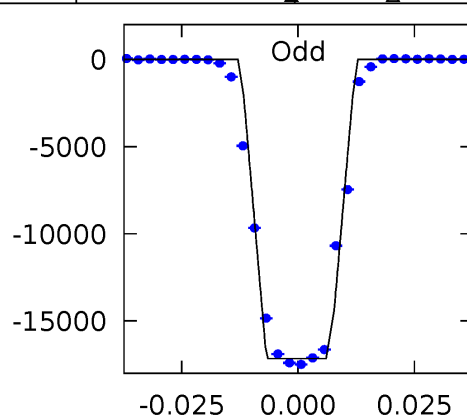
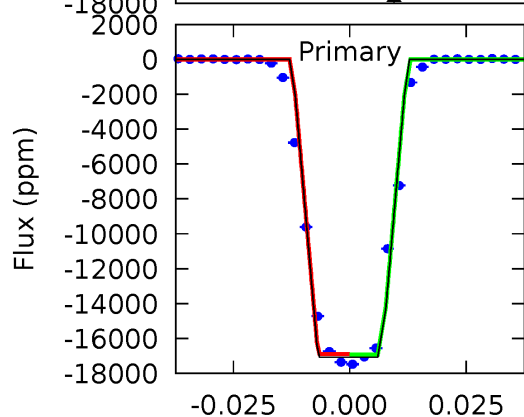
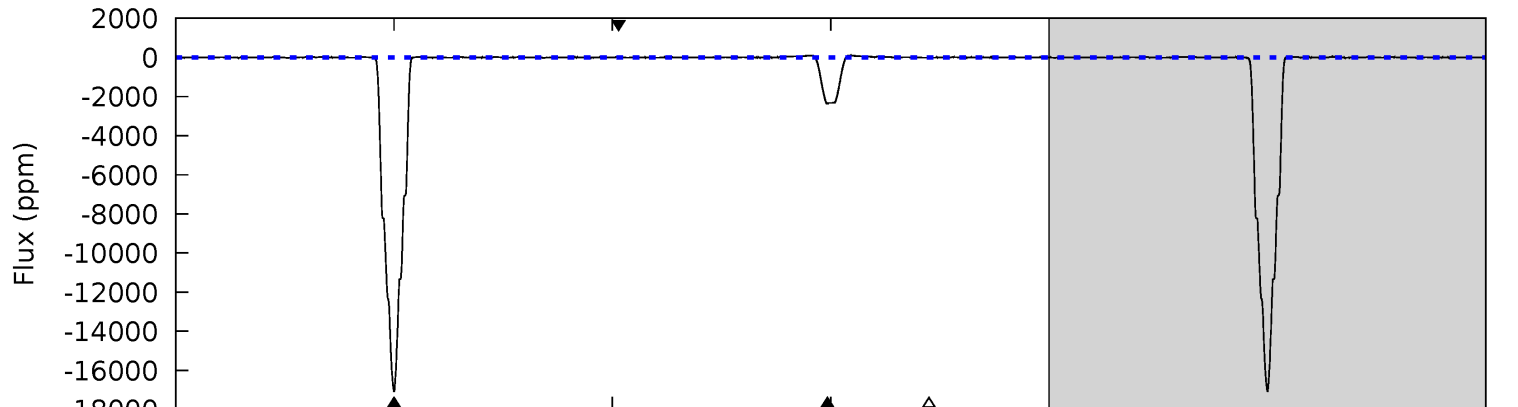
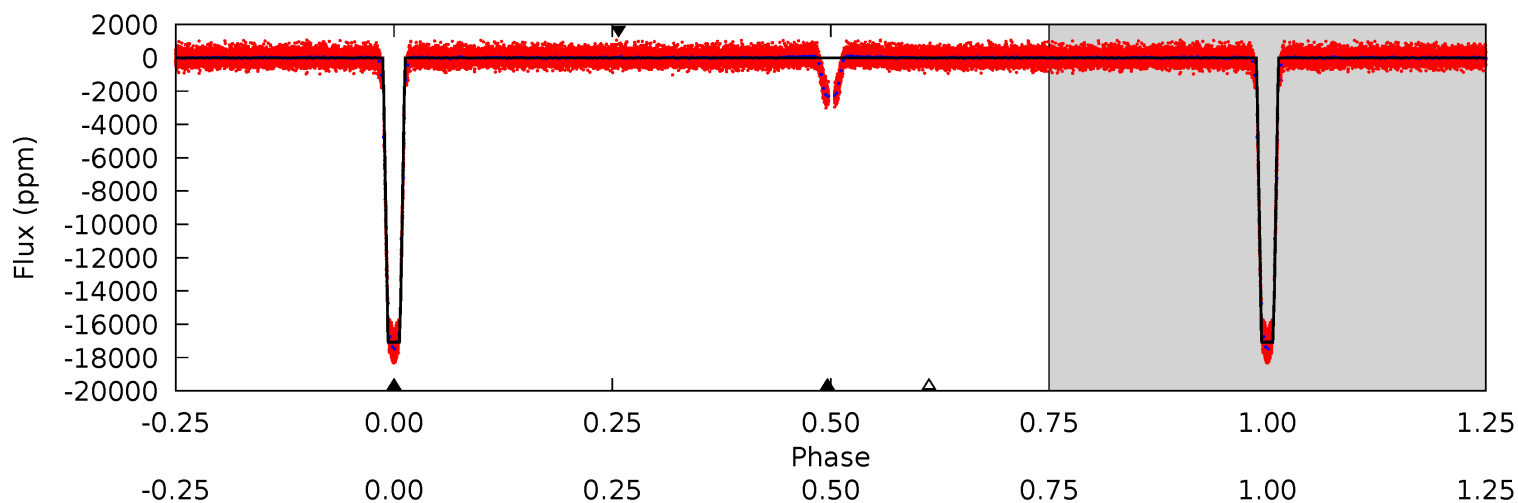
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3032	468.9	3.68	2.25	4.78	2.11	4.44	3028	3029	465.2	466.6	3.21	0.99	0.01	0



# Alt Model-Shift Uniqueness Test

006387450-01, P = 3.661337 Days, E = 127.945100 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
1940	268.9	2.80	2.91	4.85	2.24	1.97	1937	1937	266.1	266.0	9.25	1.00	0.01	1.25



### Stellar Parameters For KIC 006387450

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5319^{+175}_{-159}$	$4.501^{+0.100}_{-0.100}$	$-0.340^{+0.350}_{-0.300}$	$0.798^{+0.110}_{-0.099}$	$0.737^{+0.107}_{-0.054}$	$2.039^{+0.973}_{-0.608}$
	+3%/-3%	+2%/-2%	+103%/-88%	+14%/-12%	+15%/-7%	+48%/-30%
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 006387450-01 / KOI 1228.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-2783 \pm 6$	$12.28^{+1.08}_{-0.87}$	$1431^{+72}_{-60}$	$3656^{+84}_{-74}$	$18^{+3}_{-2}$
Alt.	$-2367 \pm 9$	$11.67^{+0.93}_{-0.88}$	$1429^{+72}_{-65}$	$3624^{+90}_{-81}$	$17^{+3}_{-2}$

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

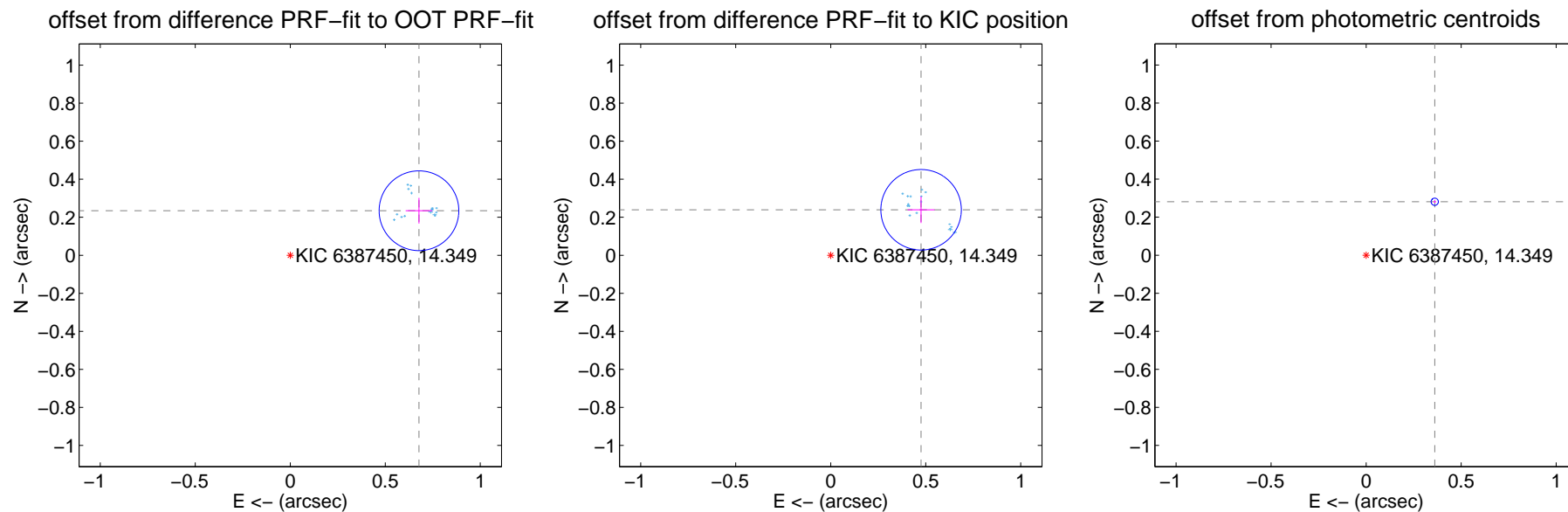
## DV Centroid Data

Supplemental centroid analysis for 006387450-01. Kepler magnitude: 14.35. Transit SNR 1448.87

There are 17 quarters with good PRF difference image offsets

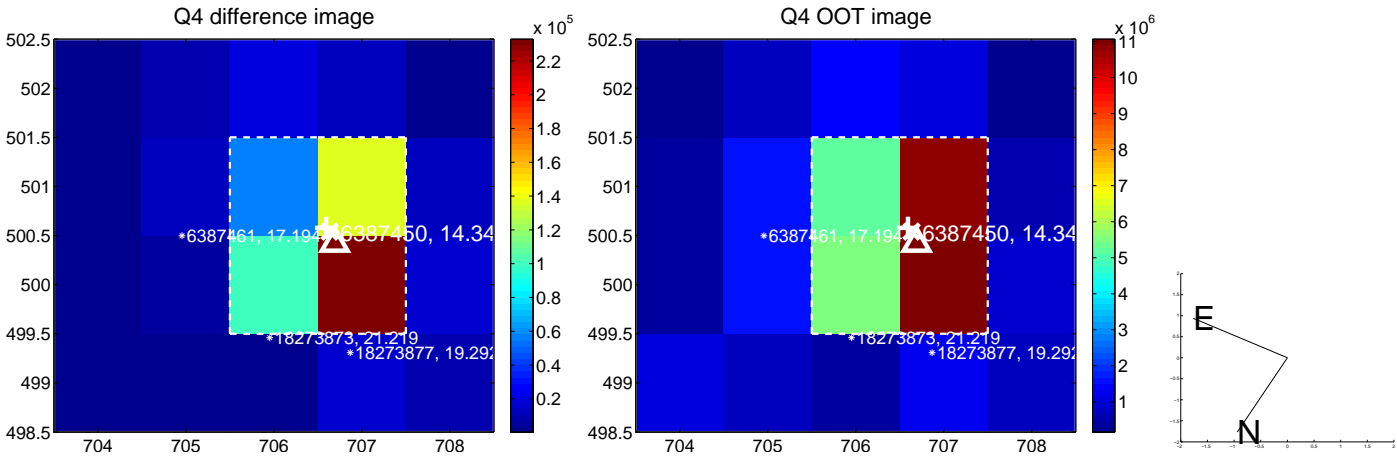
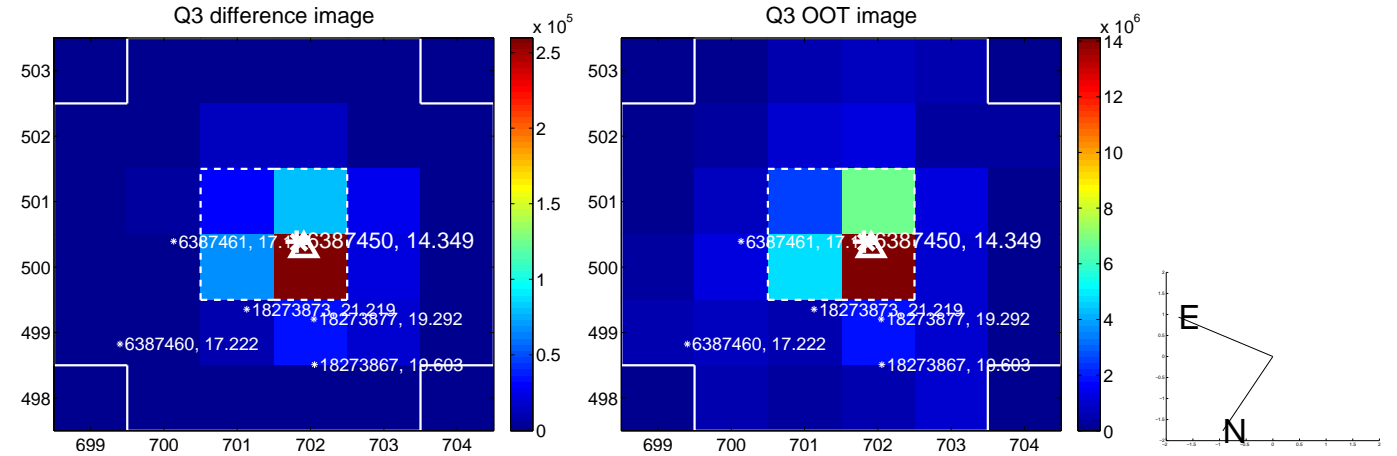
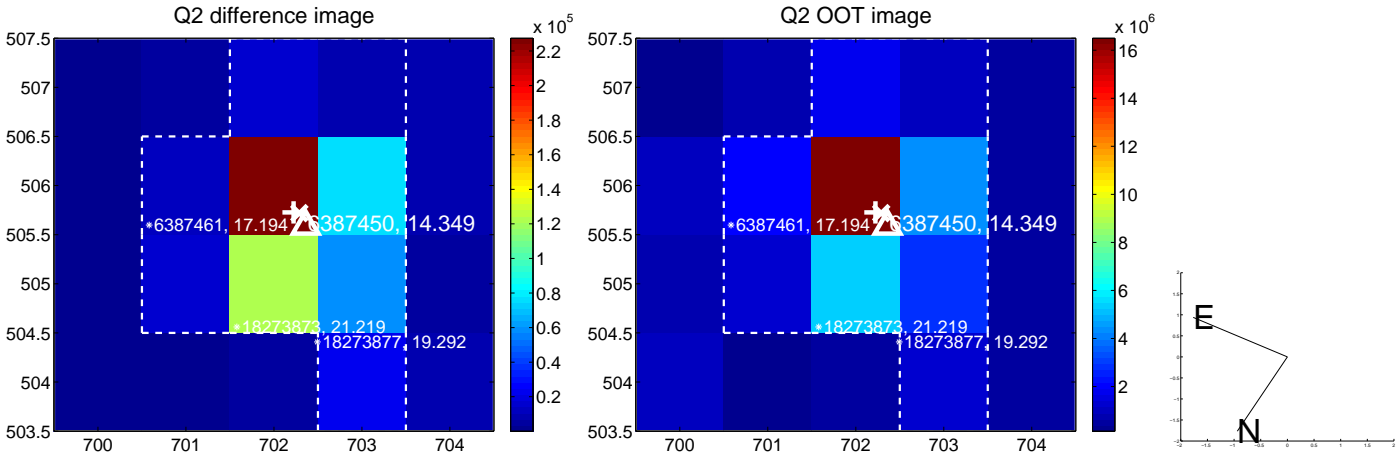
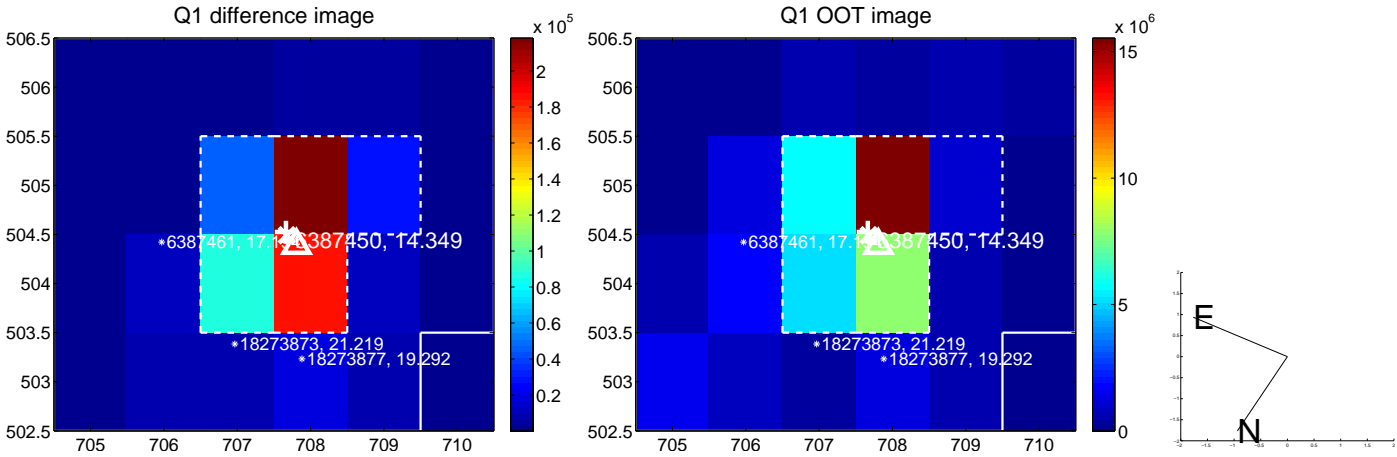
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.717 \pm 0.070$	10.25	$-0.678 \pm 0.070$	$0.234 \pm 0.067$
PRF-fit source offset from KIC position	$0.533 \pm 0.071$	7.54	$-0.476 \pm 0.071$	$0.239 \pm 0.070$
photometric centroid source offset	$0.46 \pm 0.01$	72.15	$-0.36 \pm 0.01$	$0.28 \pm 0.01$



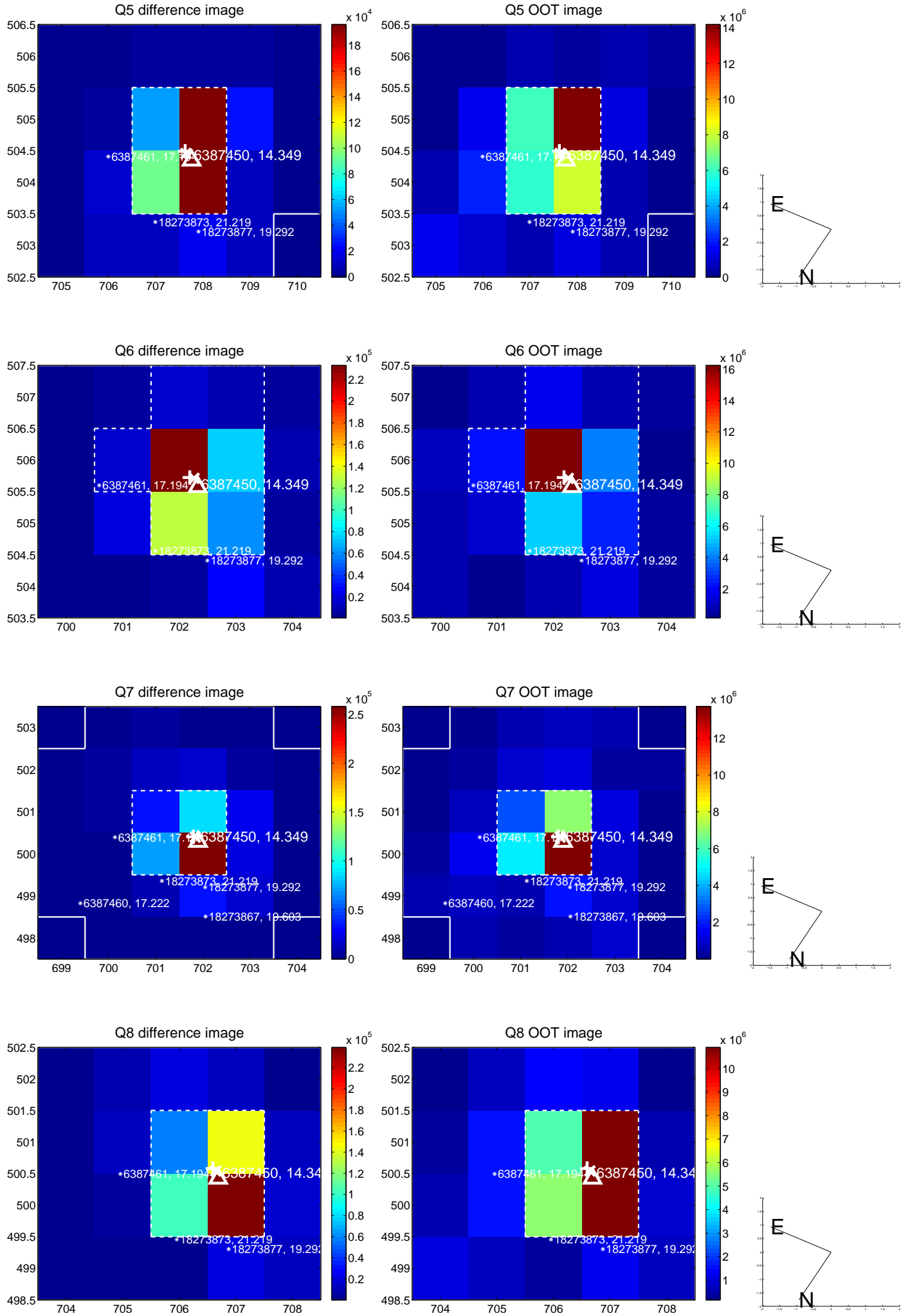
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

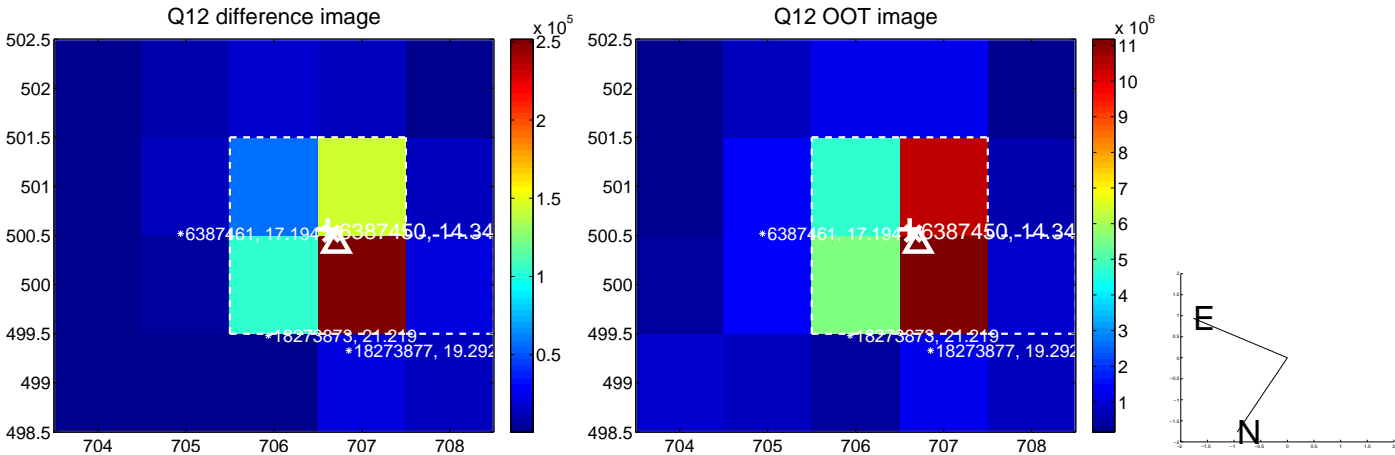
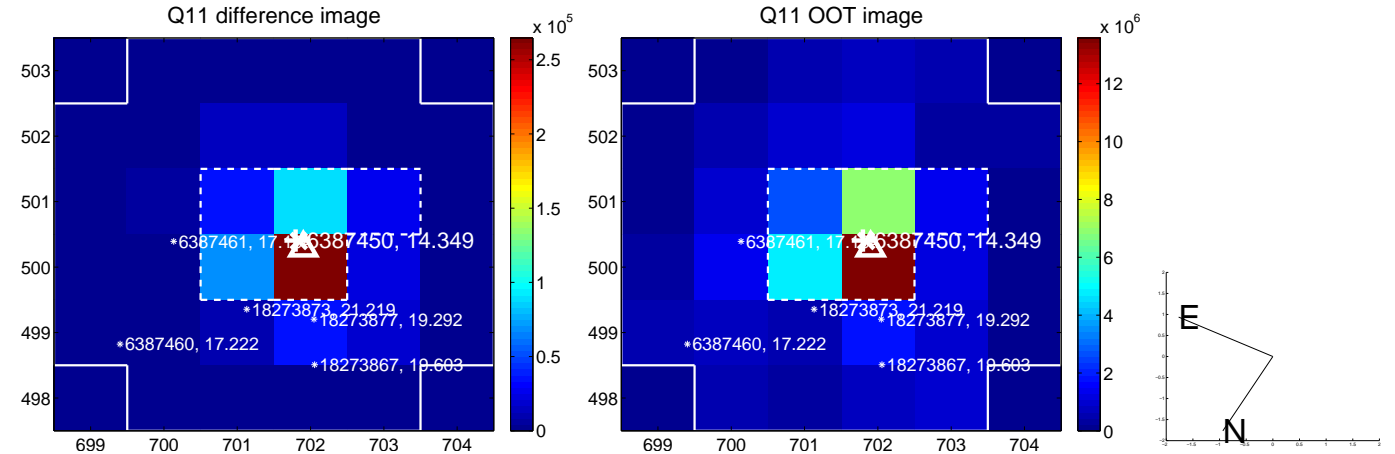
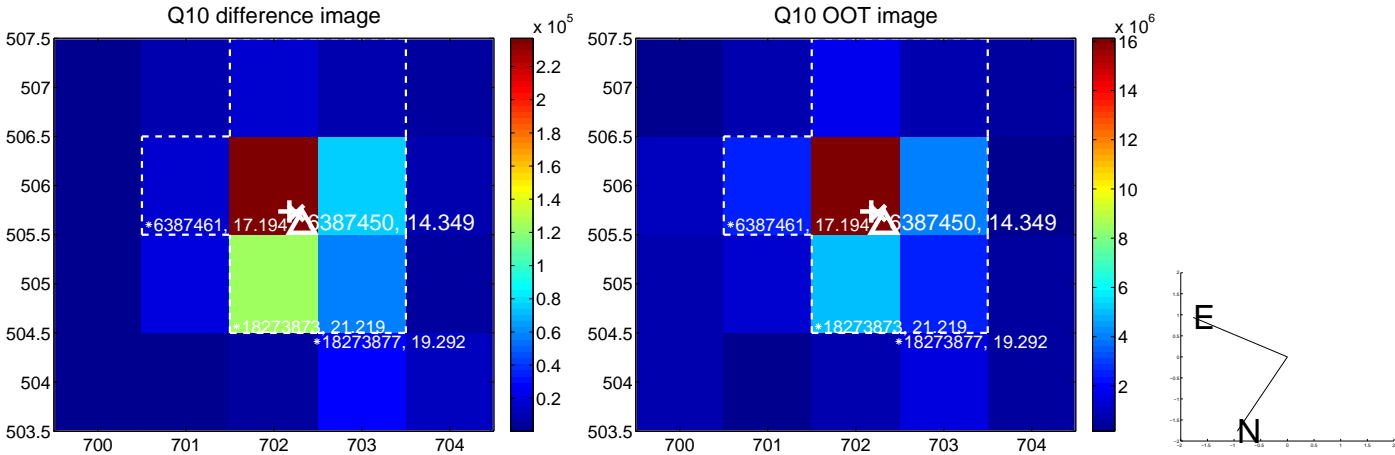
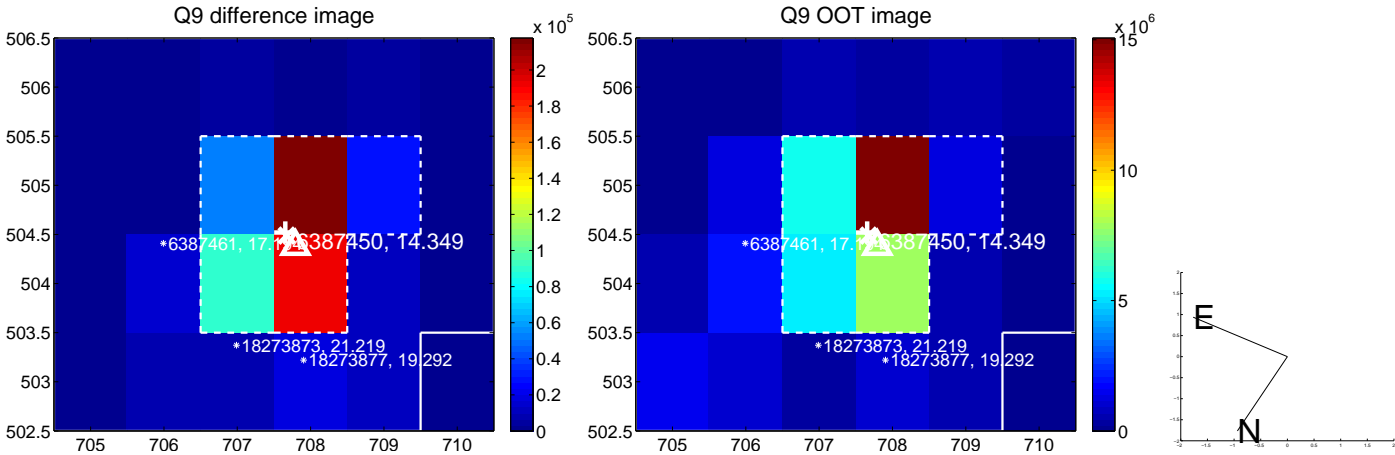




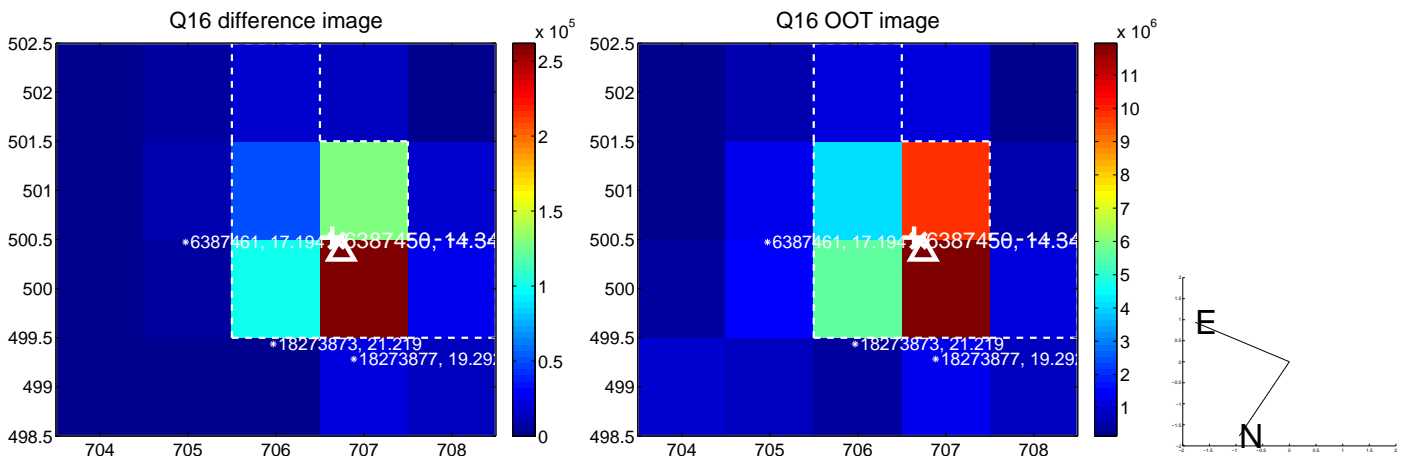
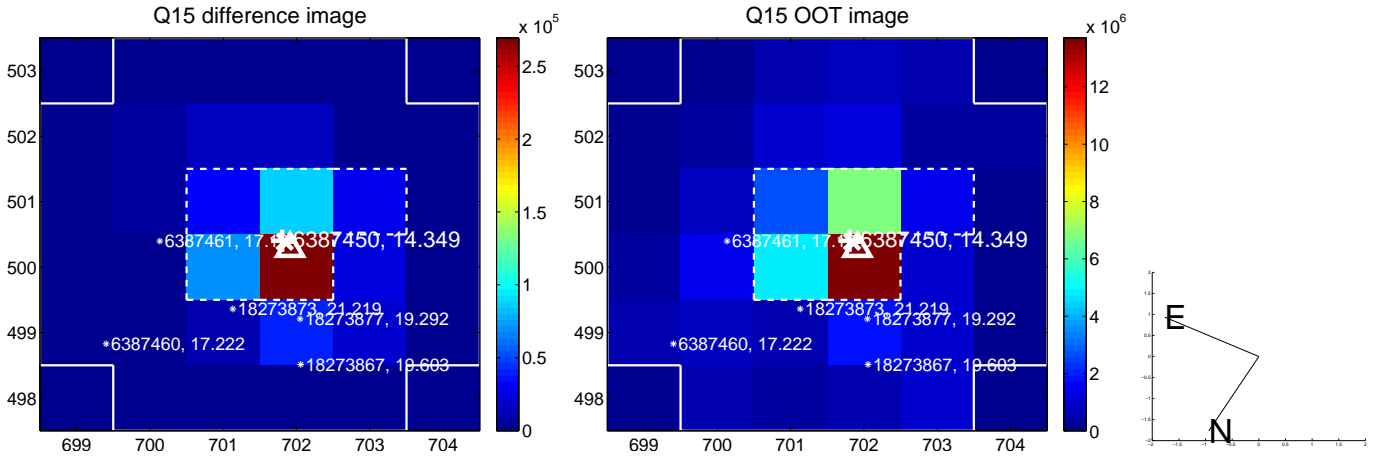
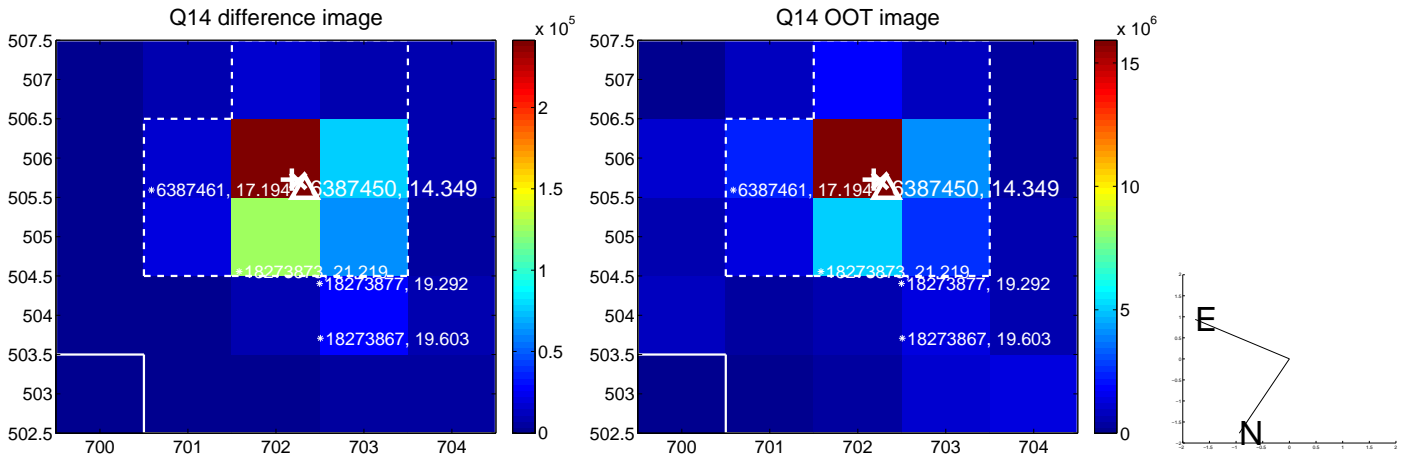
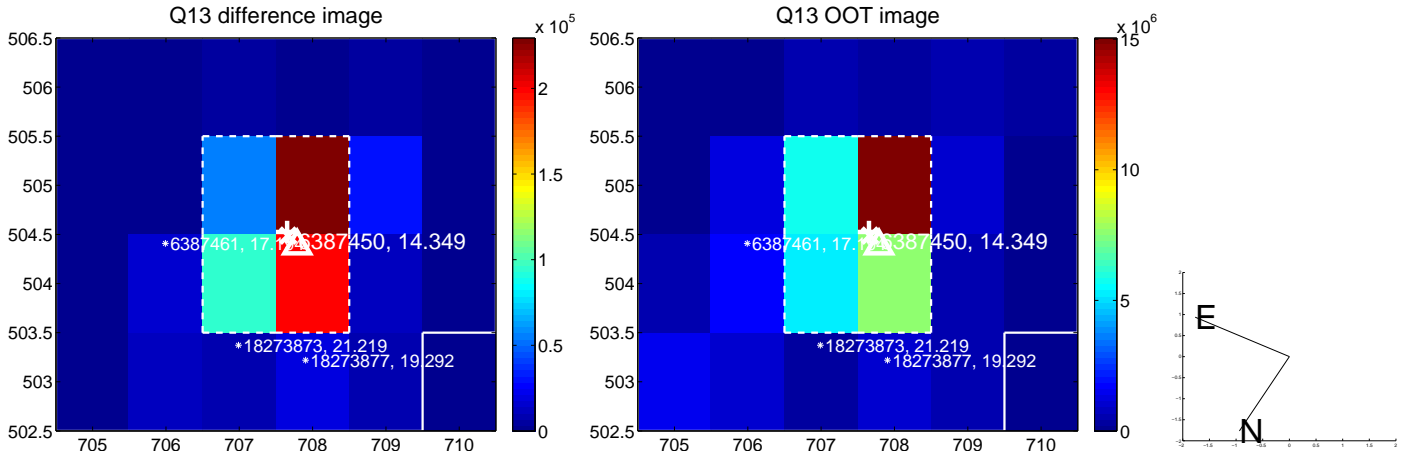
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



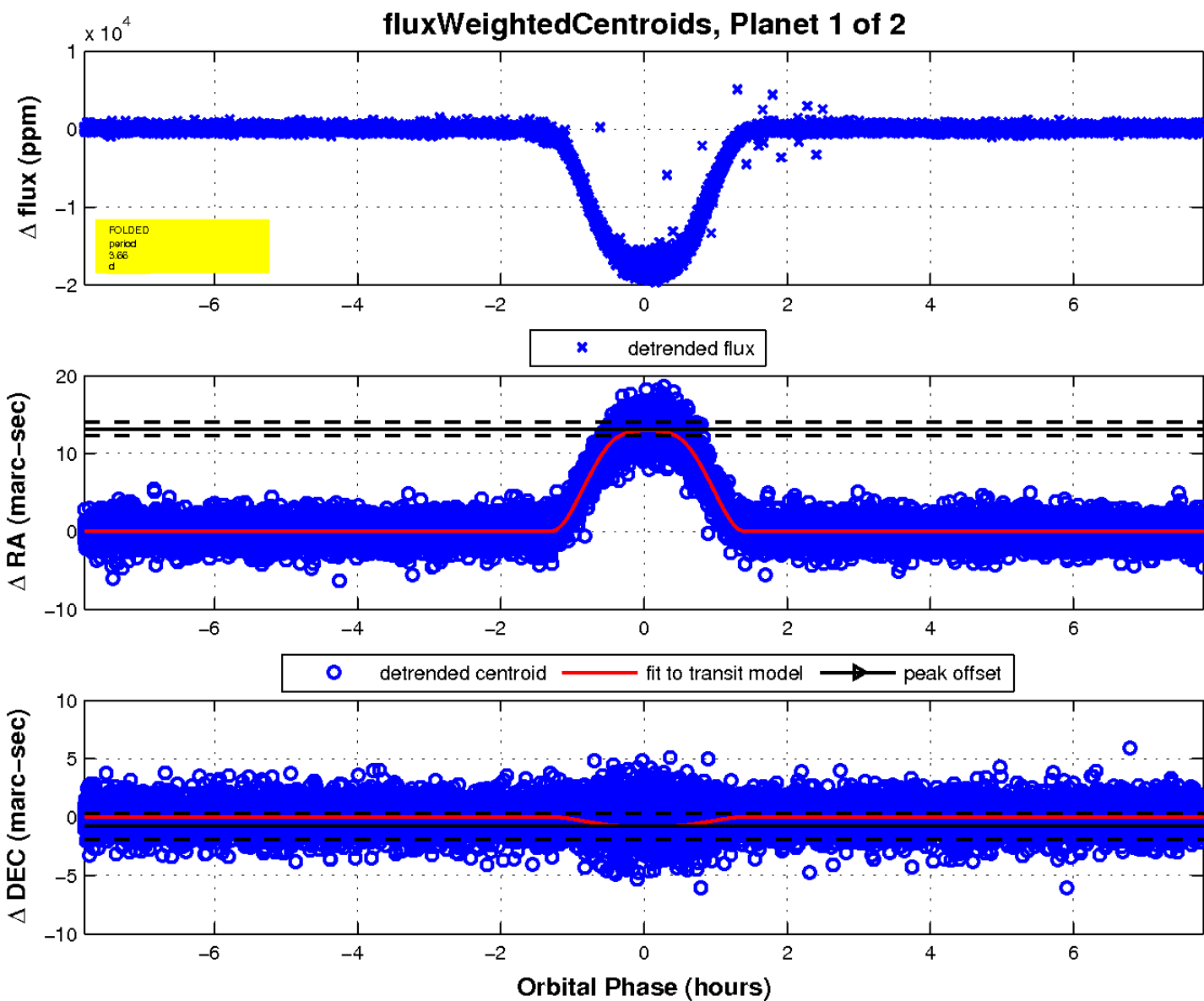
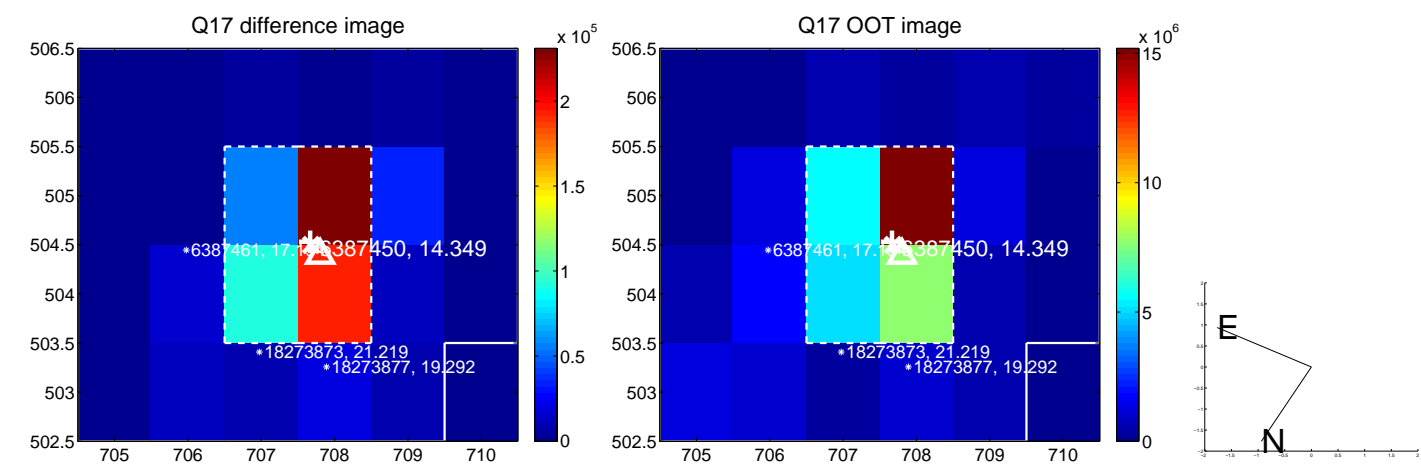
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

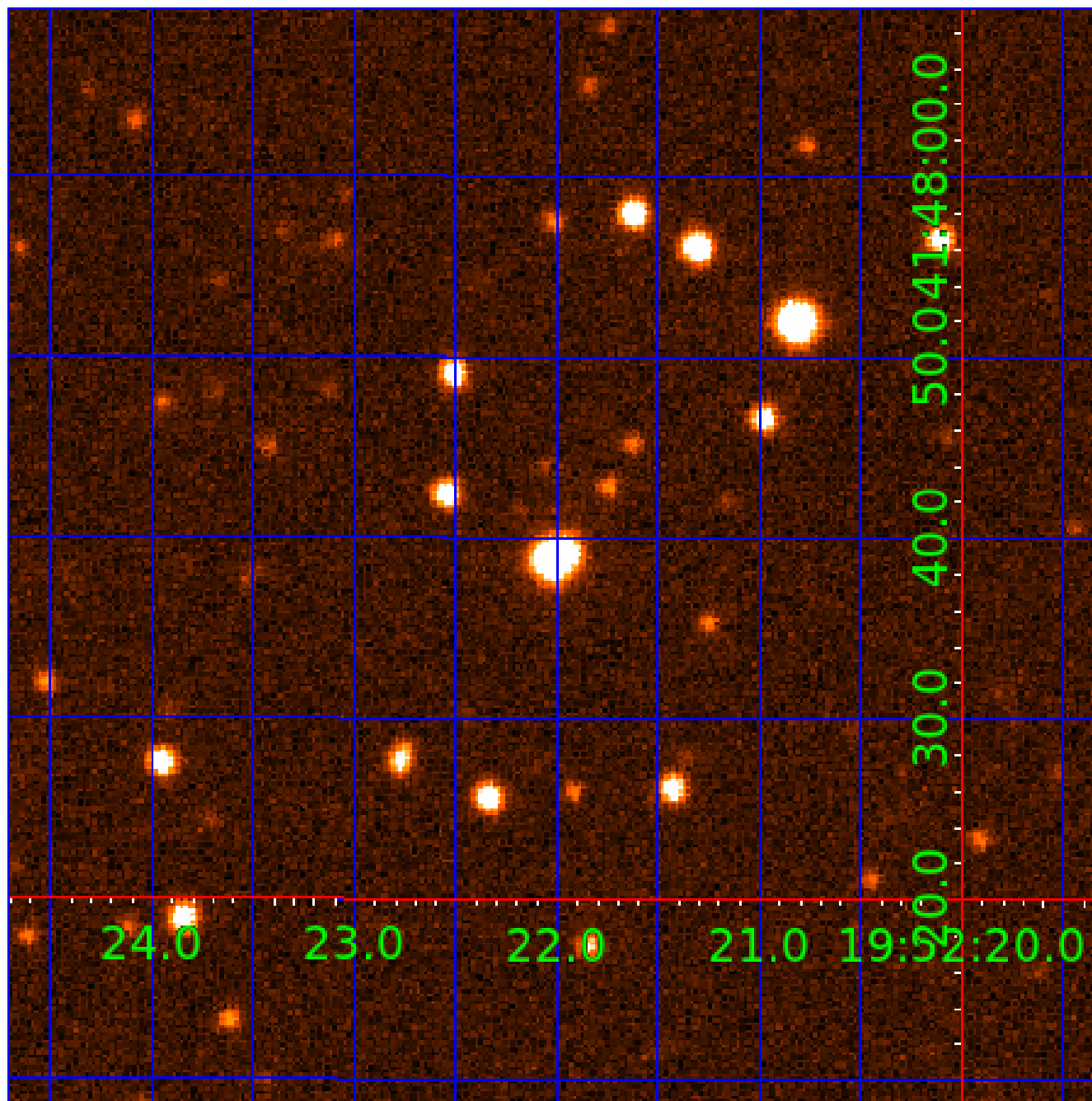


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 006387450

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006387450-01	OBS	1228.01	3.661321	131.609749	17989.6	2.606	1846.6	1448.9	0.80	5319	12.22	259.04
006387450-02	OBS	No	3.661325	133.439792	2497.3	2.598	274.4	273.7	0.80	5319	4.83	259.04

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006387450-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE
006387450-02	OBS	FP	0.00	1	1	0	0	IS_SEC_TCE

**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.

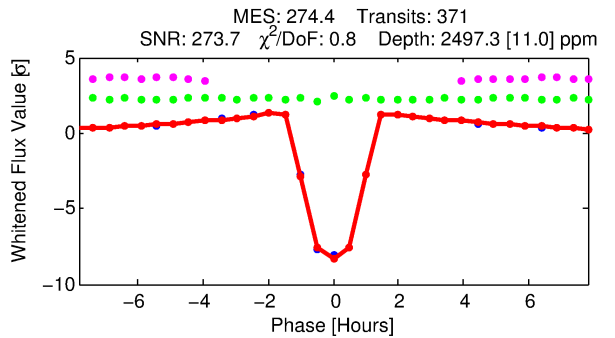
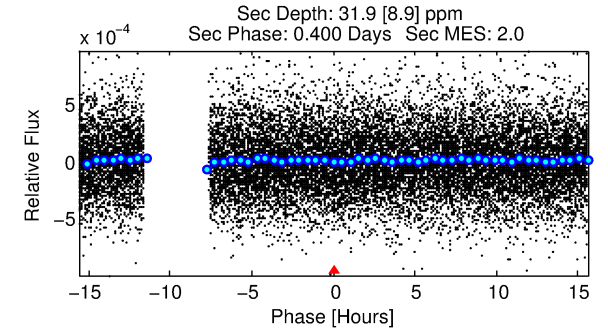
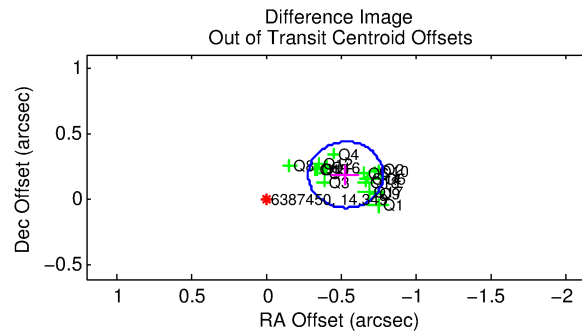
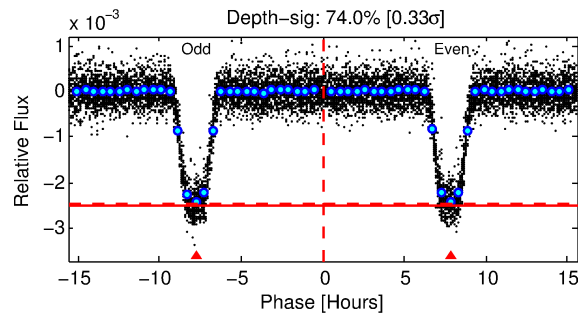
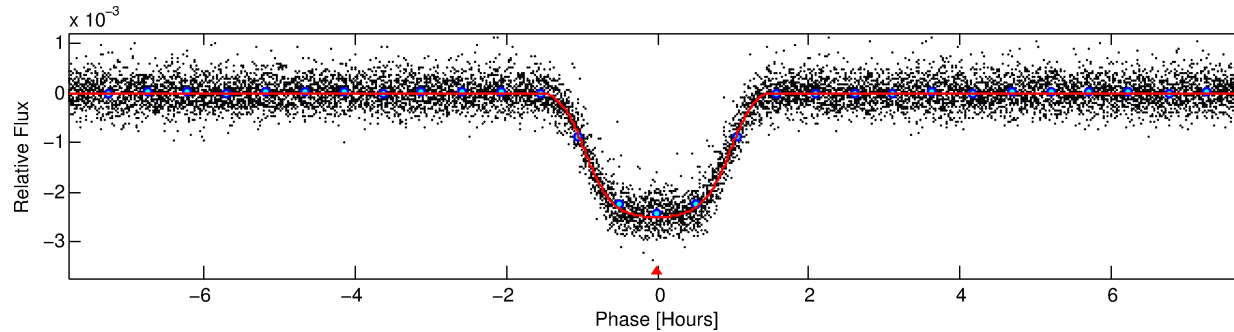
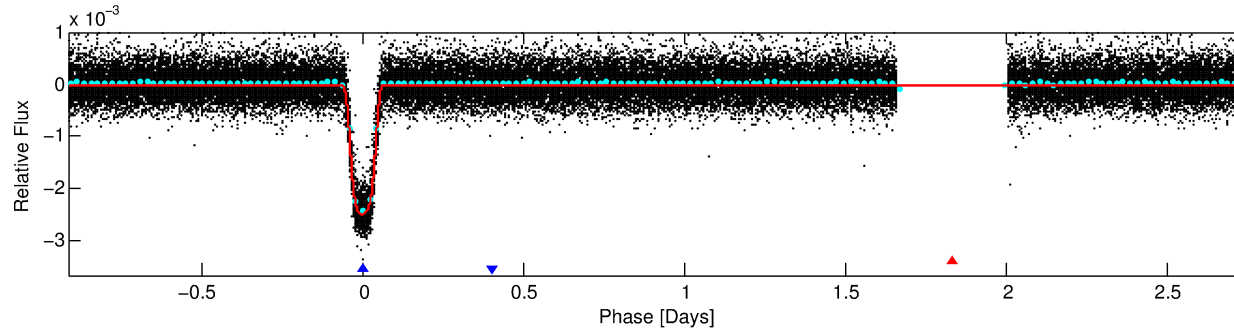
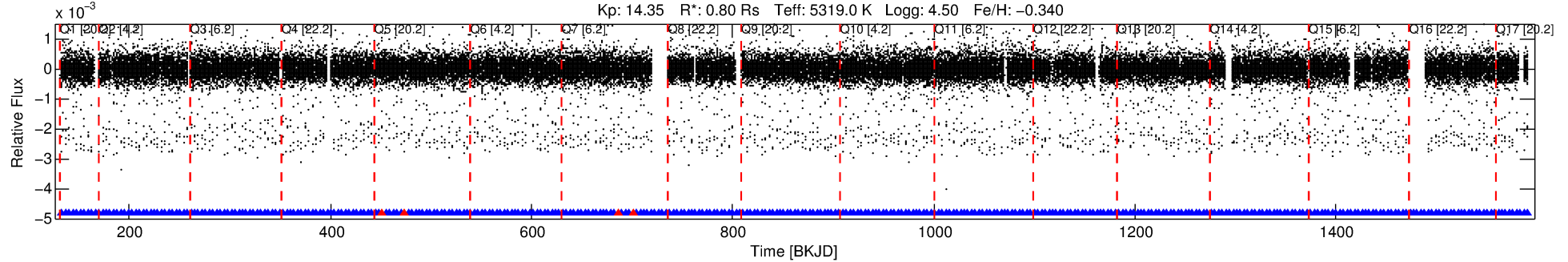
## Ephemeris Match Information For 006387450-02

No Significant Match Found

# DV One-Page Summary

KIC: 6387450 Candidate: 2 of 2 Period: 3.661 d  
KOI: K01228 Corr: No Ephemeris Match

Kp: 14.35 R\*: 0.80 Rs Teff: 5319.0 K Logg: 4.50 Fe/H: -0.340



## DV Fit Results:

Period = 3.66133 [0.00000] d  
Epoch = 133.4398 [0.0002] BKJD  
Rp/R\* = 0.0554 [0.0003]  
a/R\* = 5.94 [0.09]  
b = 0.90 [0.00]  
Seff = 259.04 [57.53]  
Teq = 1023 [57] K  
Rp = 4.83 [0.67] Re  
a = 0.0420 [0.0050] AU  
Ag = 1.33 [0.44] [0.74σ]  
Teffp = 1697 [132] K [4.70σ]

## DV Diagnostic Results:

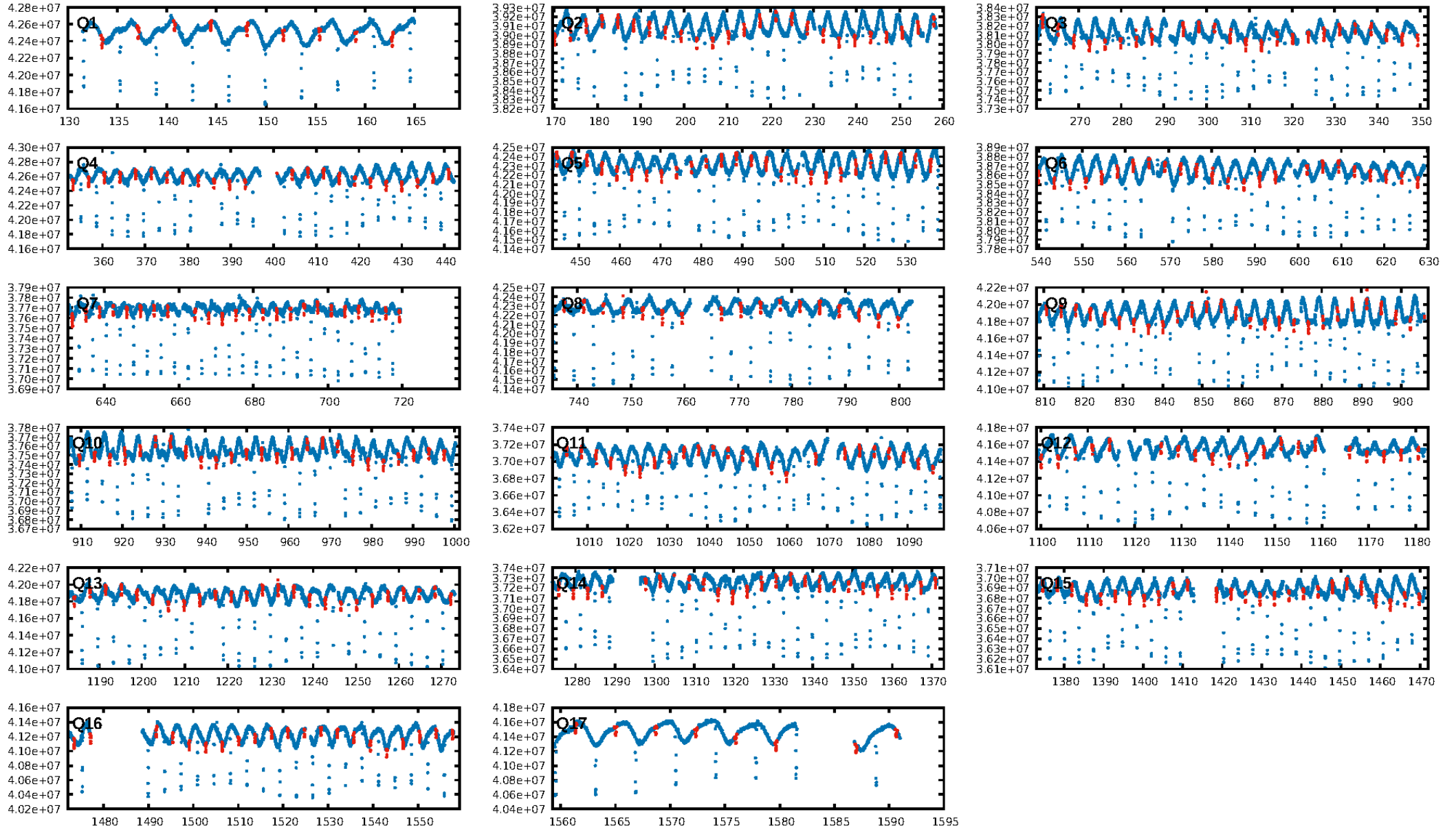
ShortPeriod-sig: 0.0% [0.00σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.99 [350/354]  
GhostDiagnostic-chr: 3.069  
Centroid-sig: 0.0%  
Centroid-so: 0.337 arcsec [8.06σ]  
OotOffset-rm: 0.567 arcsec [6.80σ]  
KicOffset-rm: 0.378 arcsec [4.55σ]  
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: 30-Jan-2016 17:57:25 Z

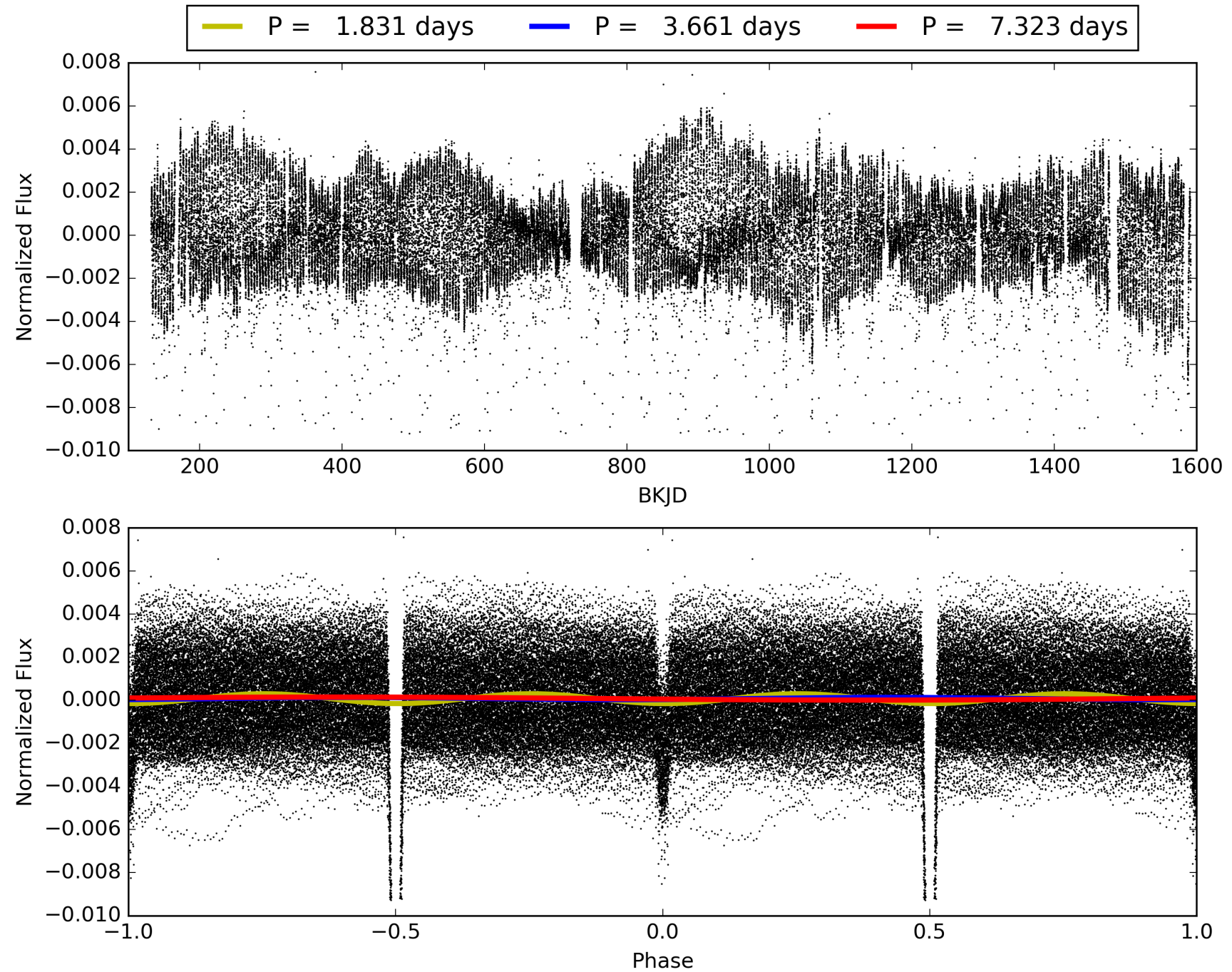
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 006387450-02, PDC Light Curves

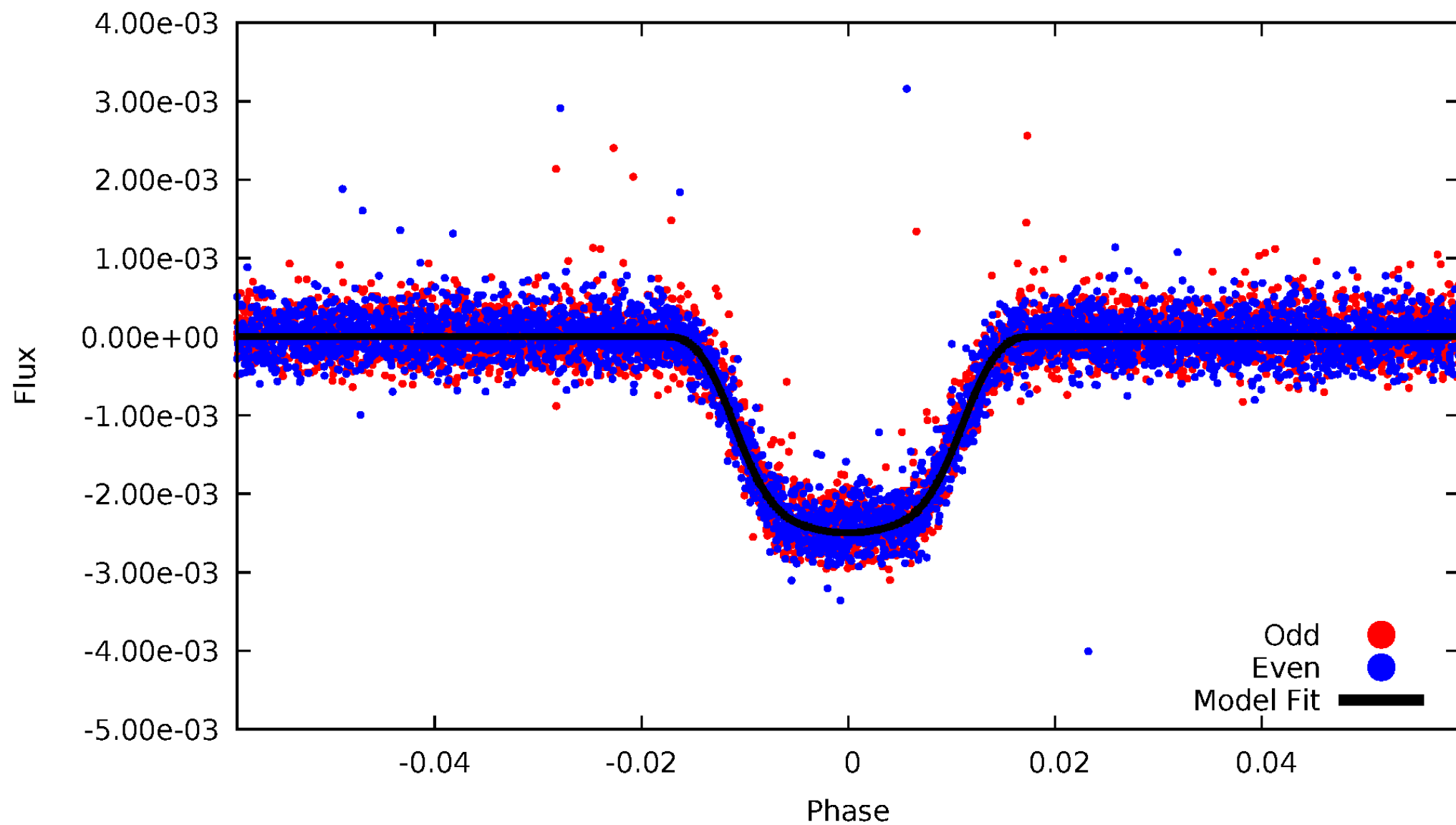


# TCE 006387450-02



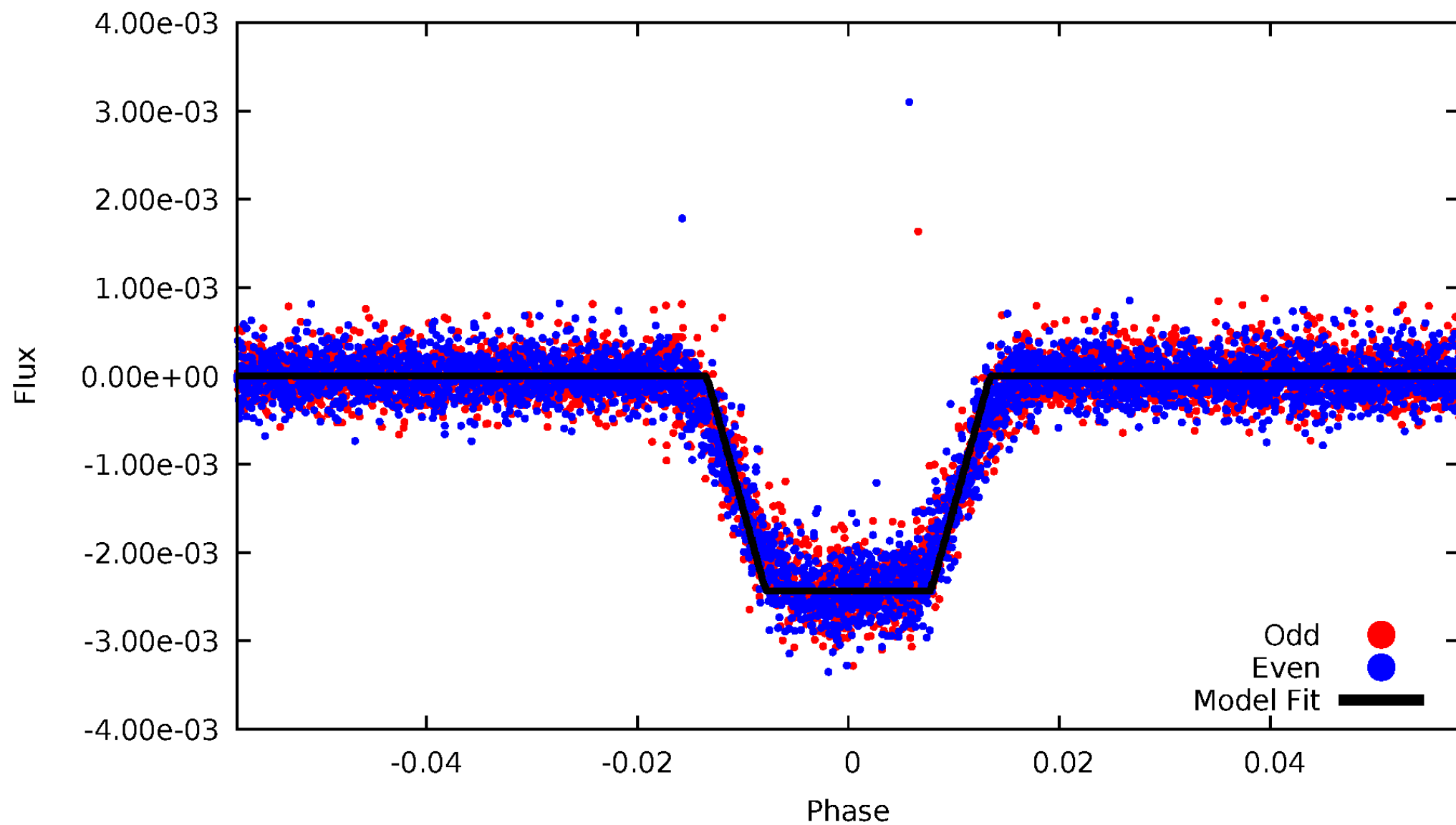
# DV Odd/Even

TCE 006387450-02



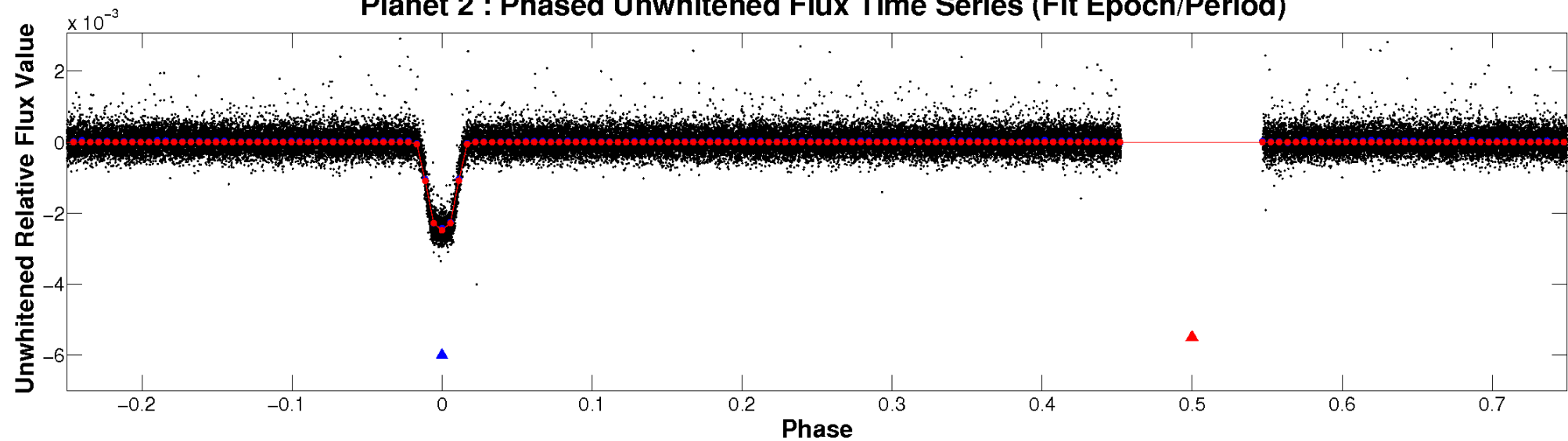
# ALT Odd/Even

TCE 006387450-02

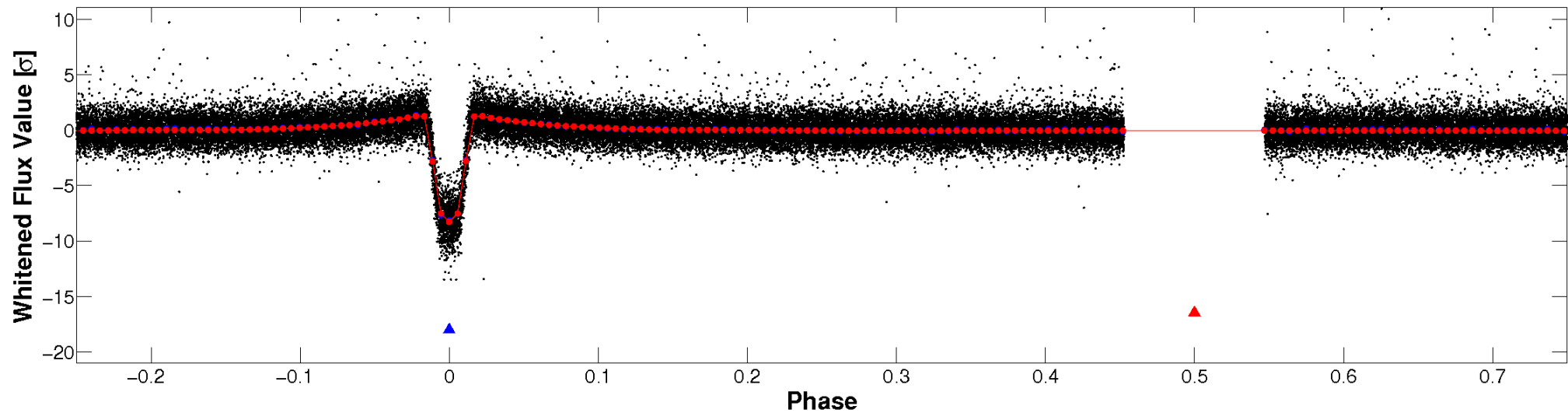


# Non-Whitened Vs. Whitened Light Curve

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



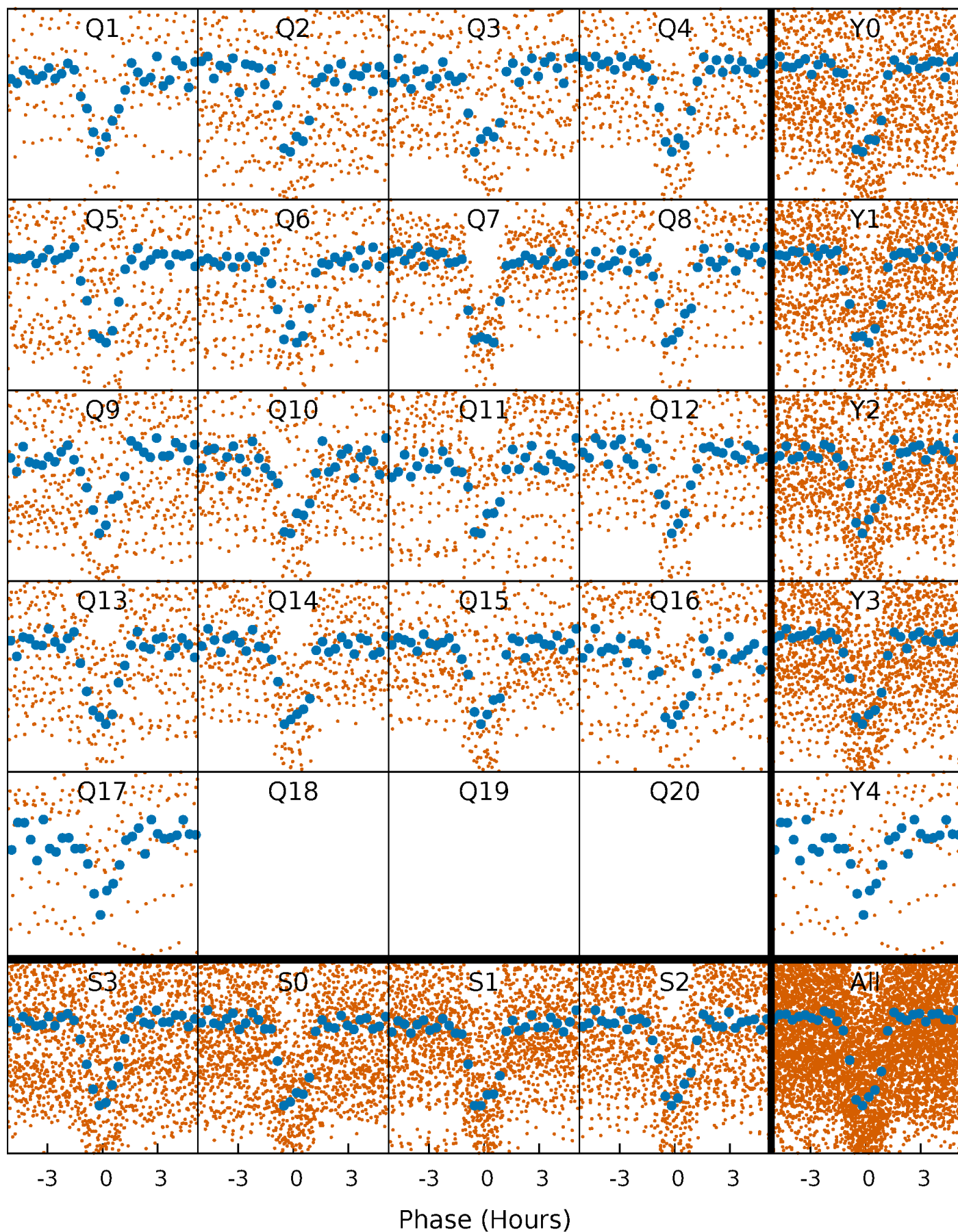
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





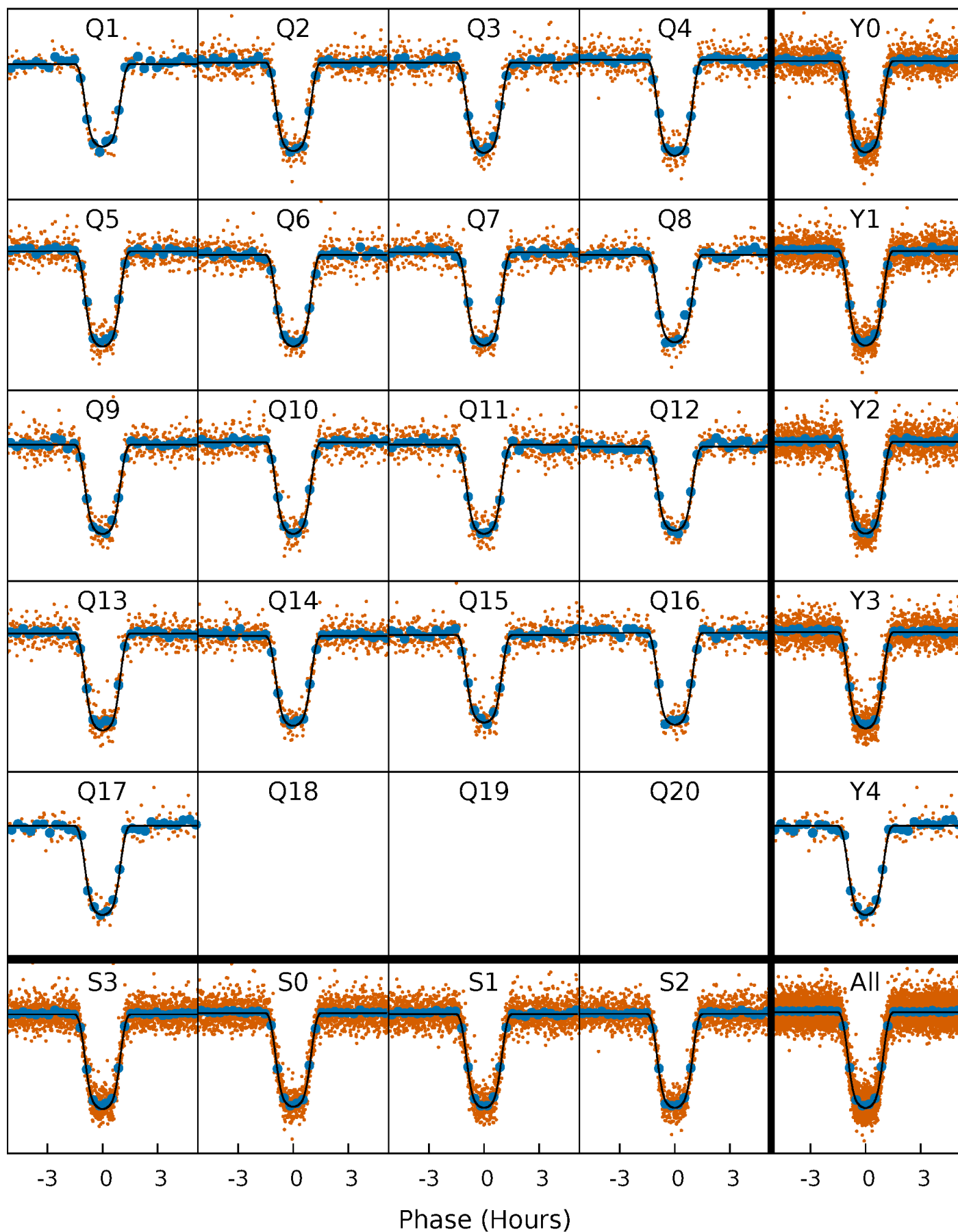
# PDC Quarter-Phased Transit Curves

TCE 006387450-02   P= 3.661325 Days    $T_0=133.439792$  (BKJD)



# DV Quarter-Phased Transit Curves

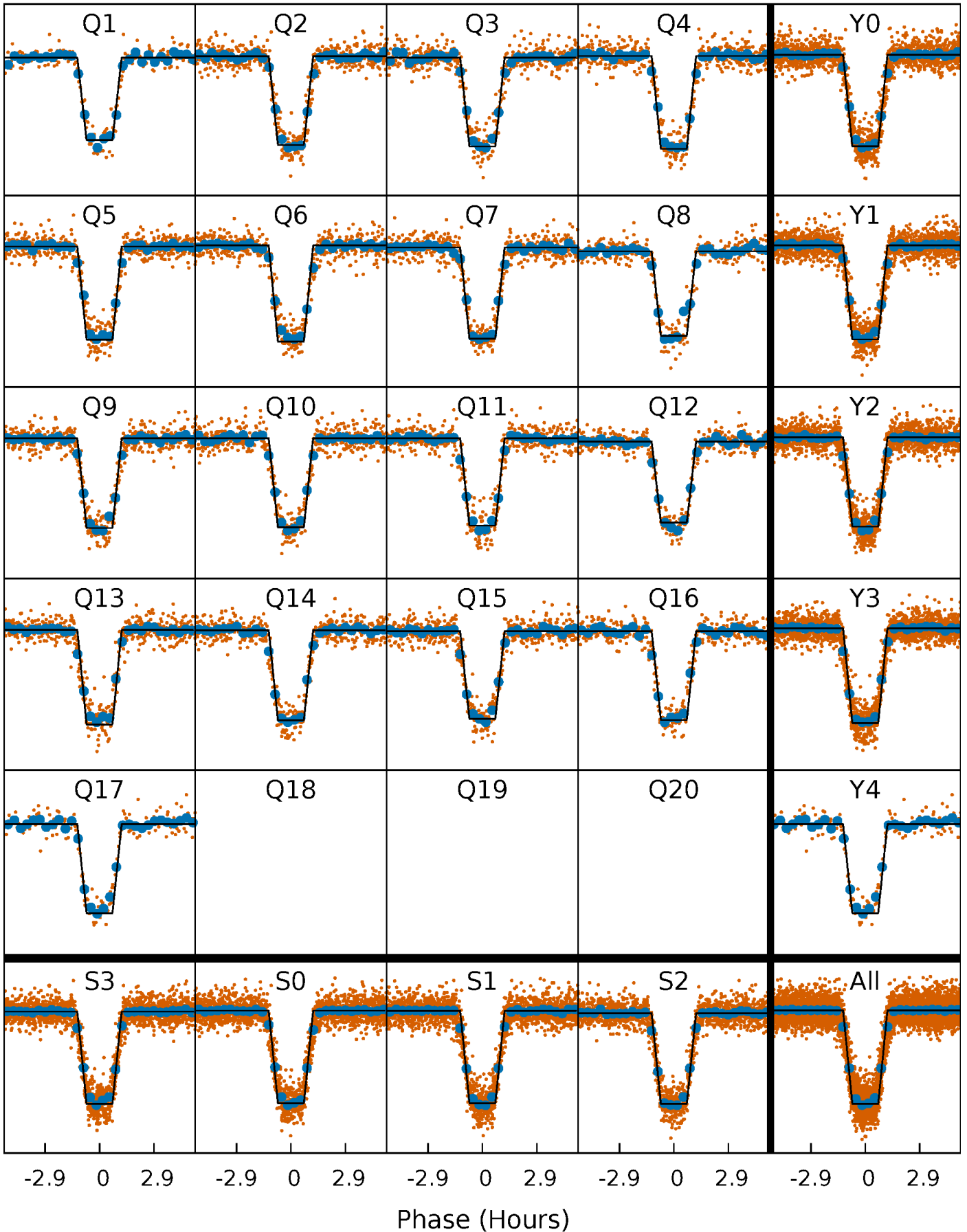
TCE 006387450-02   P= 3.661325 Days    $T_0=133.439792$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

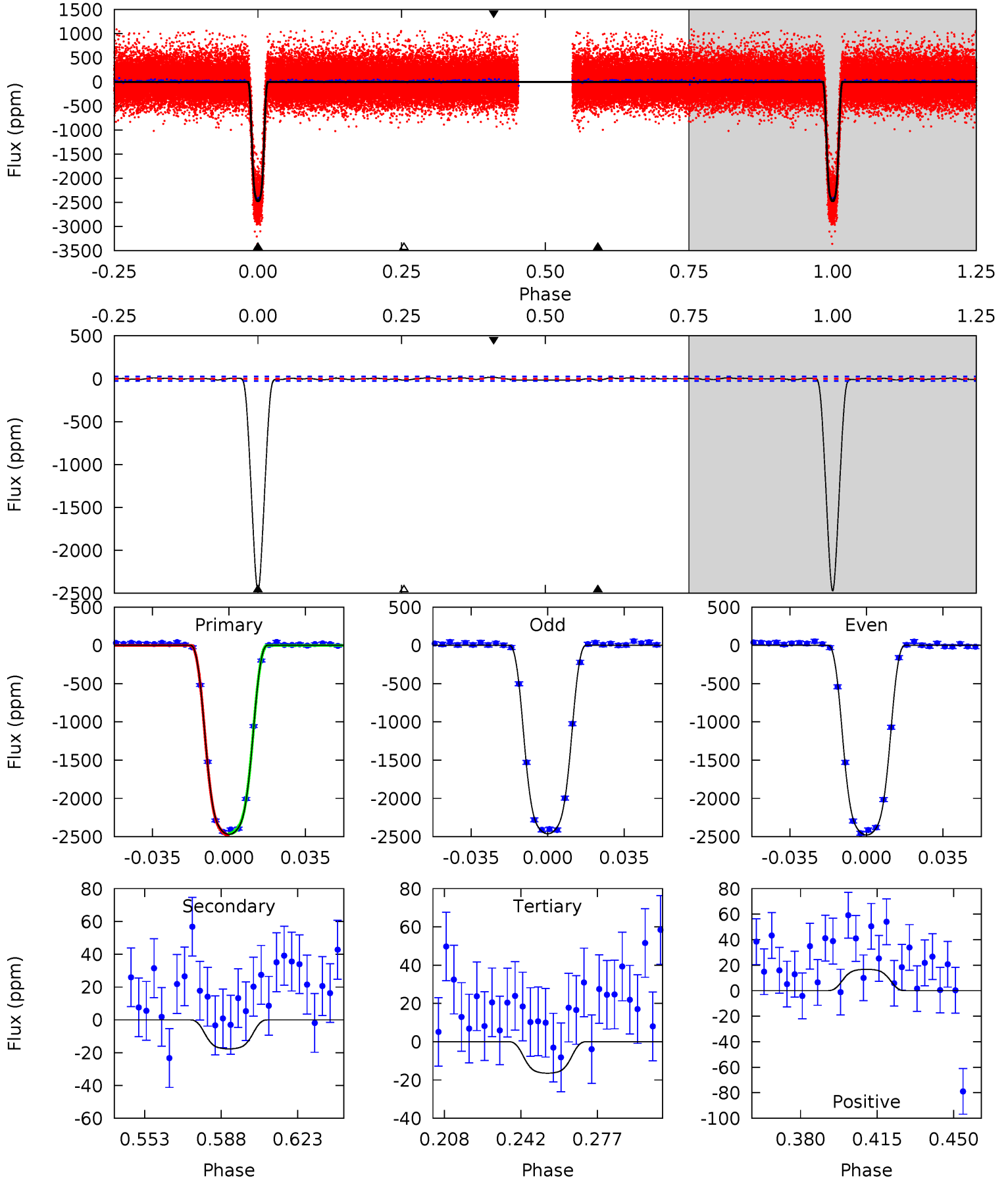
TCE 006387450-02   P= 3.661337 Days    $T_0=133.437281$  (BKJD)



# DV Model-Shift Uniqueness Test

006387450-02, P = 3.661325 Days, E = 129.778467 Days

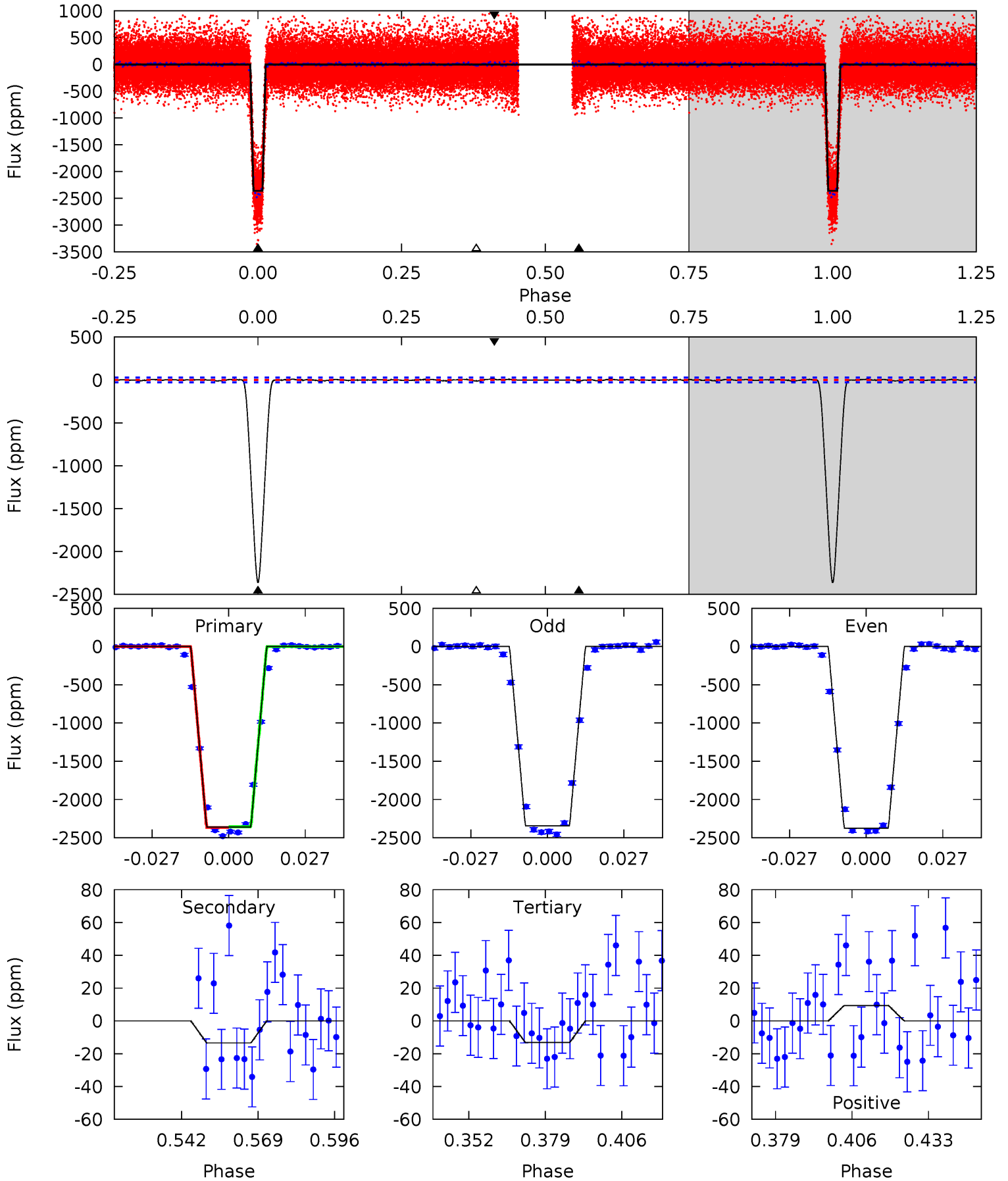
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
447.5	3.21	2.98	3.04	4.78	2.11	1.22	444.5	444.4	0.23	0.17	1.49	1.00	0.01	1.67



# Alt Model-Shift Uniqueness Test

006387450-02, P = 3.661337 Days, E = 129.775944 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
420.3	2.39	2.35	1.67	4.83	2.21	0.79	418.0	418.7	0.04	0.72	2.67	1.00	0.00	0.94



### Stellar Parameters For KIC 006387450

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5319^{+175}_{-159}$	$4.501^{+0.100}_{-0.100}$	$-0.340^{+0.350}_{-0.300}$	$0.798^{+0.110}_{-0.099}$	$0.737^{+0.107}_{-0.054}$	$2.039^{+0.973}_{-0.608}$
	+3%/-3%	+2%/-2%	+103%/-88%	+14%/-12%	+15%/-7%	+48%/-30%
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 006387450-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-18 \pm 6$	$4.89^{+0.42}_{-0.36}$	$1430^{+74}_{-63}$	$2211^{+121}_{-194}$	$0.716^{+0.269}_{-0.245}$
Alt.	$-13 \pm 6$	$4.35^{+0.35}_{-0.33}$	$1429^{+72}_{-60}$	$2202^{+142}_{-296}$	$0.704^{+0.313}_{-0.310}$

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

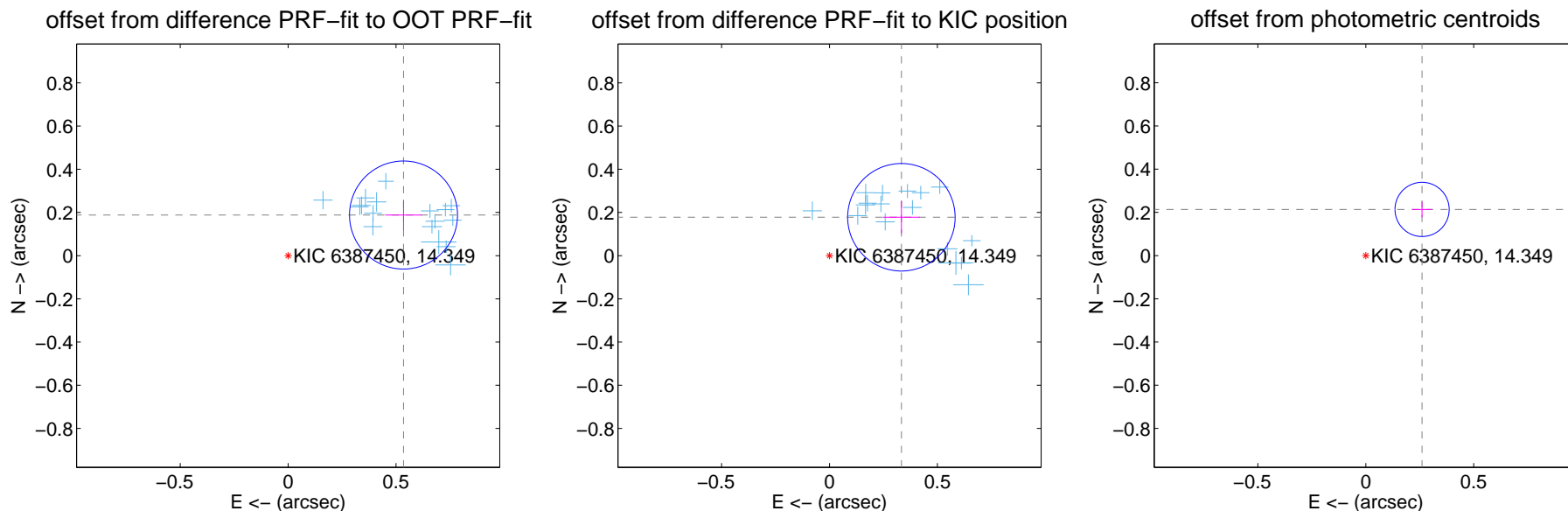
## DV Centroid Data

Supplemental centroid analysis for 006387450-02. Kepler magnitude: 14.35. Transit SNR 273.67

There are 17 quarters with good PRF difference image offsets

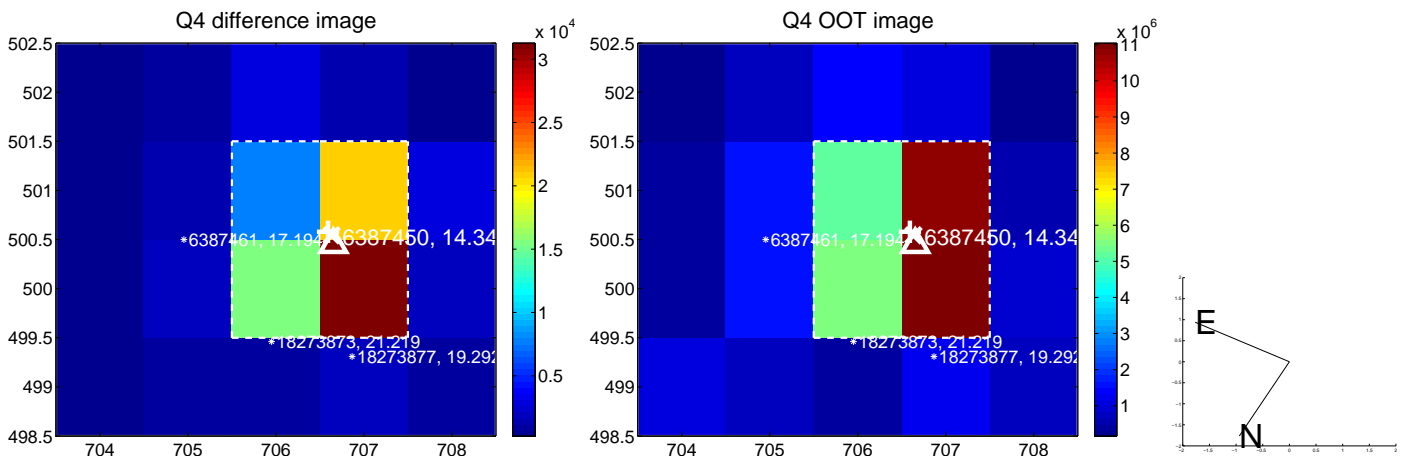
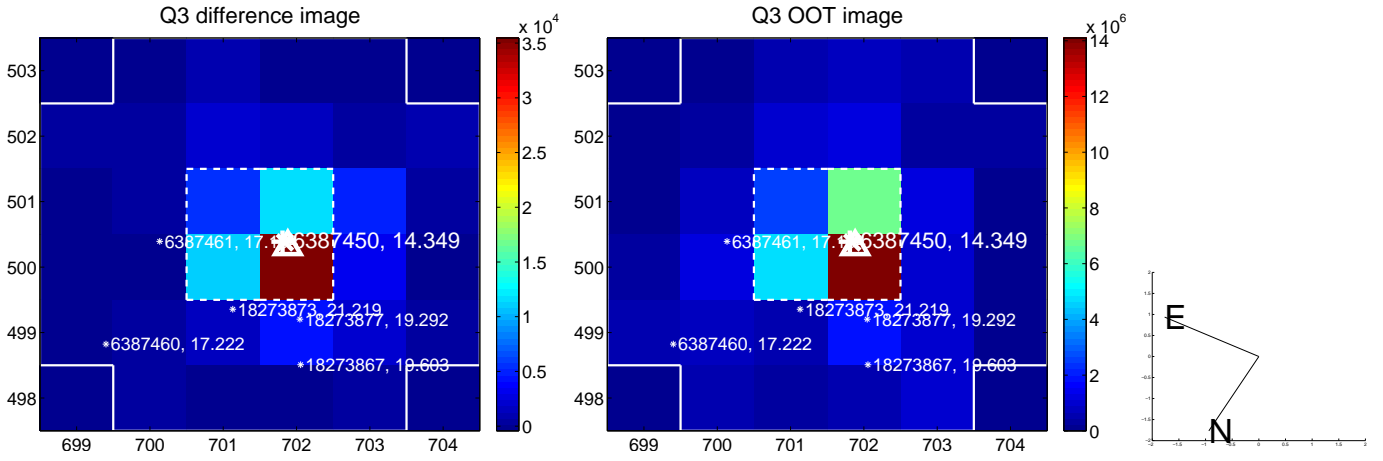
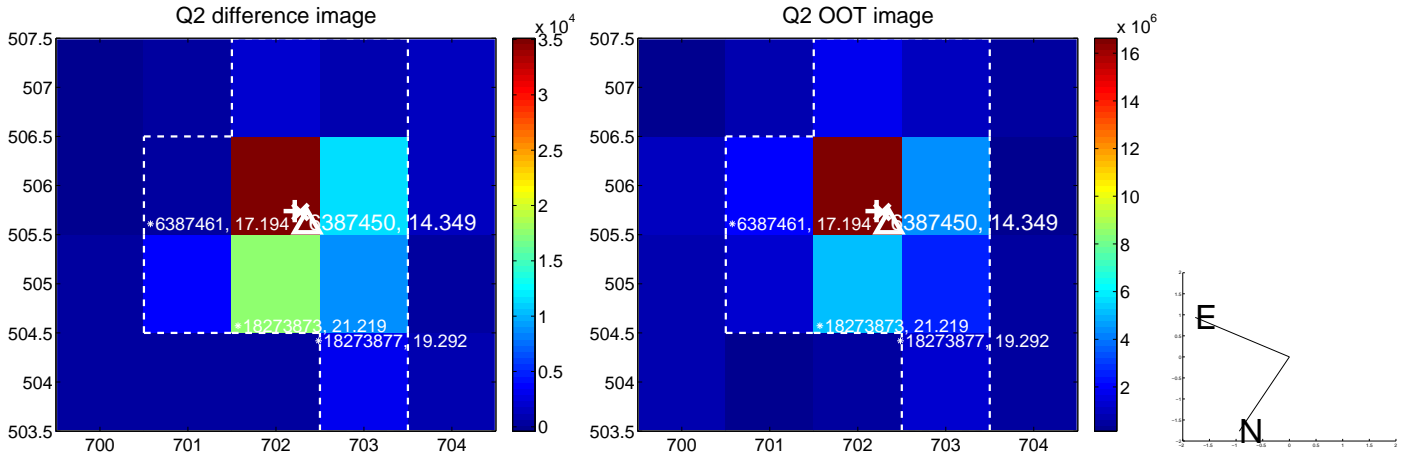
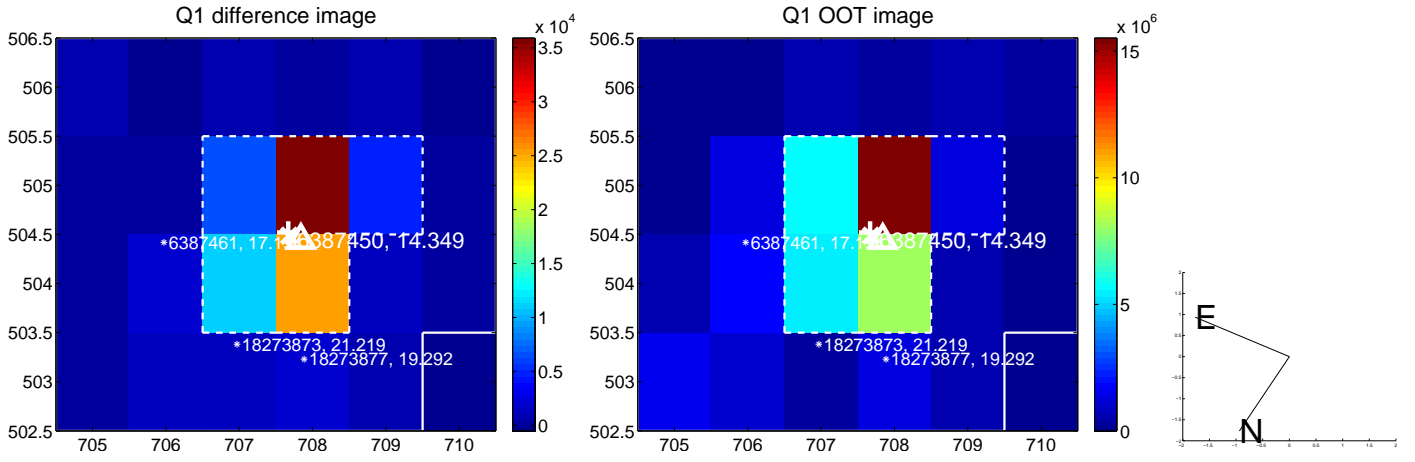
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.567 \pm 0.083$	6.80	$-0.535 \pm 0.085$	$0.188 \pm 0.070$
PRF-fit source offset from KIC position	$0.378 \pm 0.083$	4.55	$-0.333 \pm 0.085$	$0.178 \pm 0.075$
photometric centroid source offset	$0.34 \pm 0.04$	8.06	$-0.26 \pm 0.05$	$0.21 \pm 0.04$

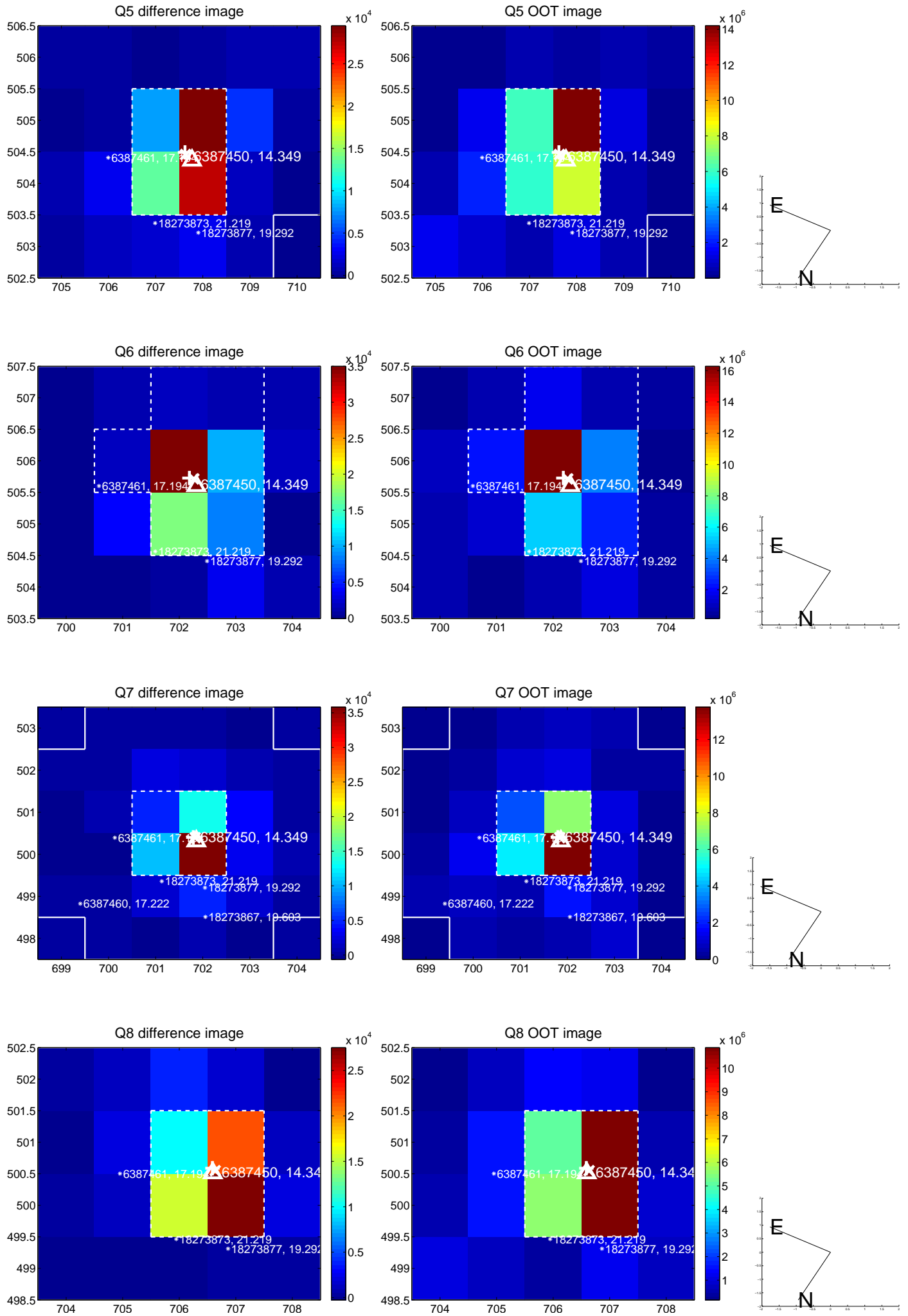


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

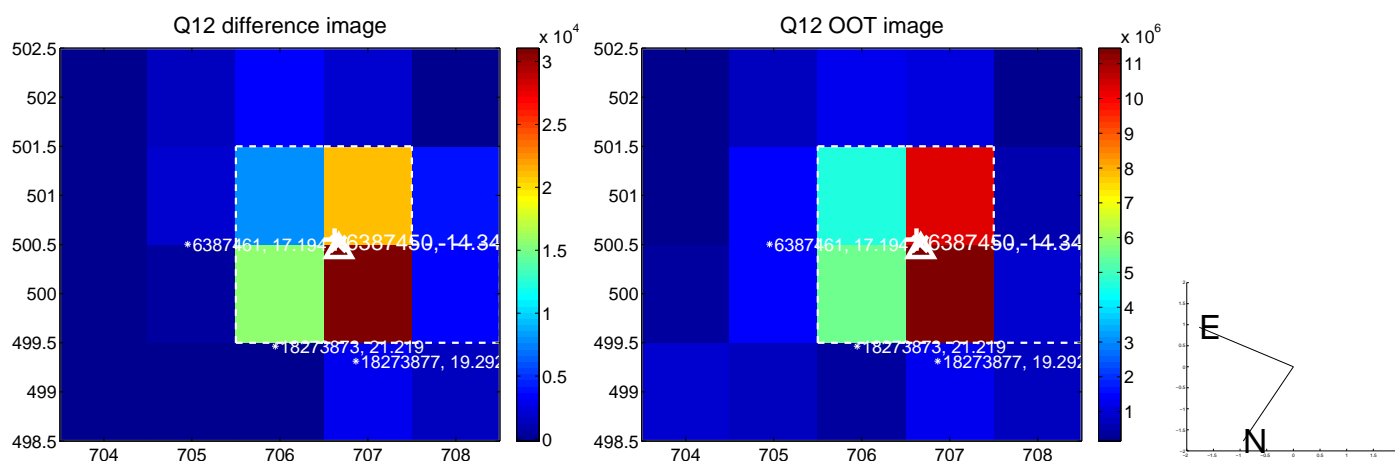
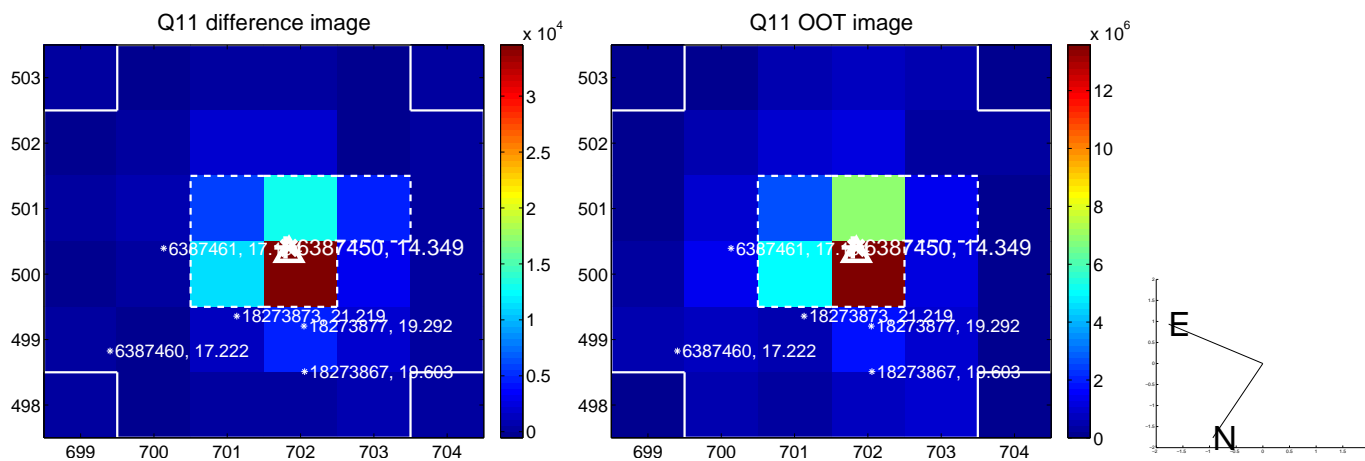
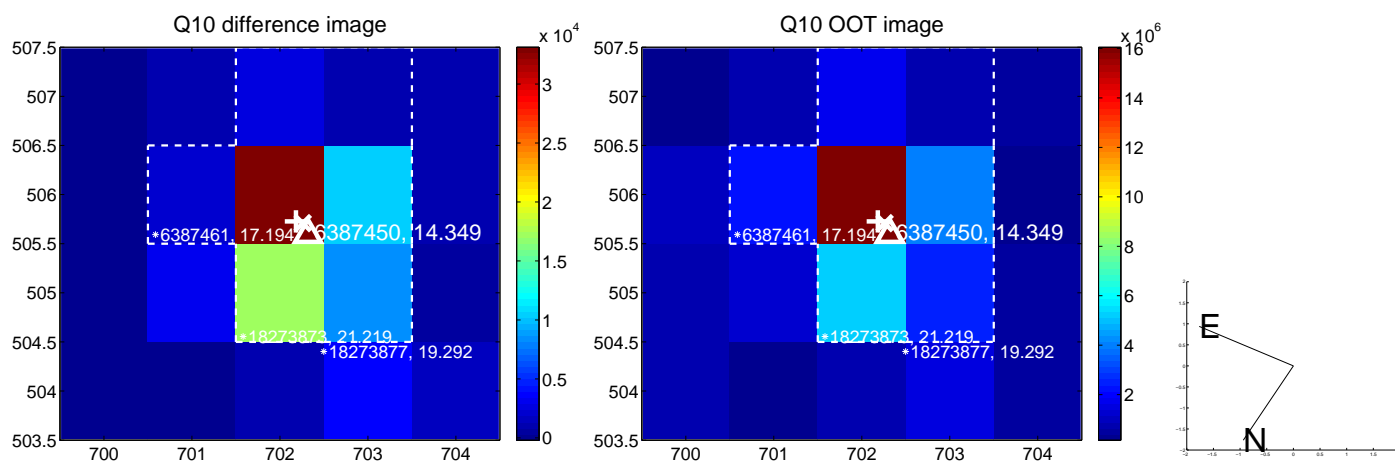
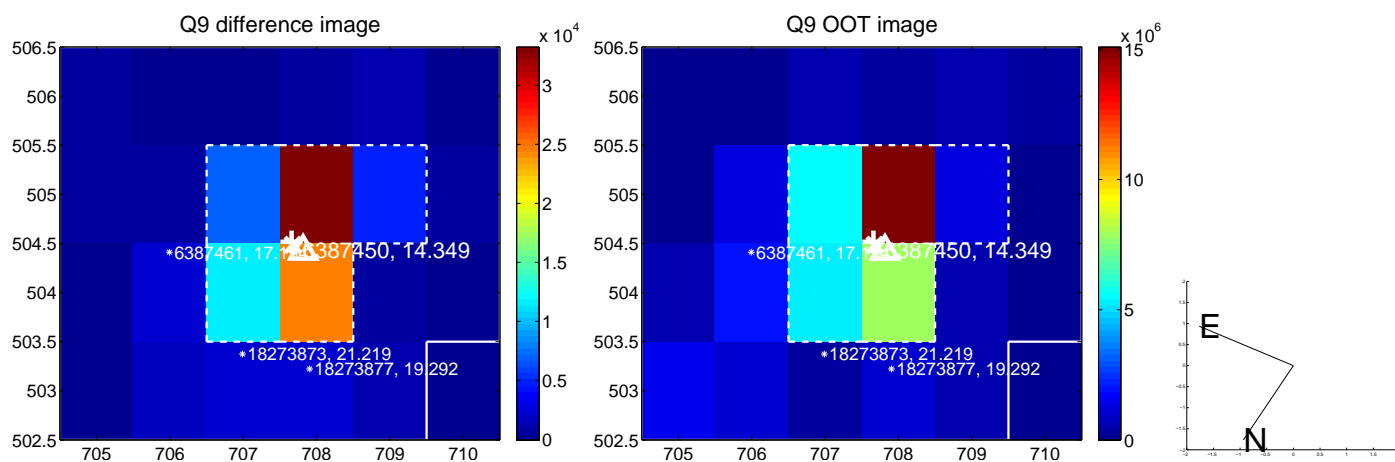


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

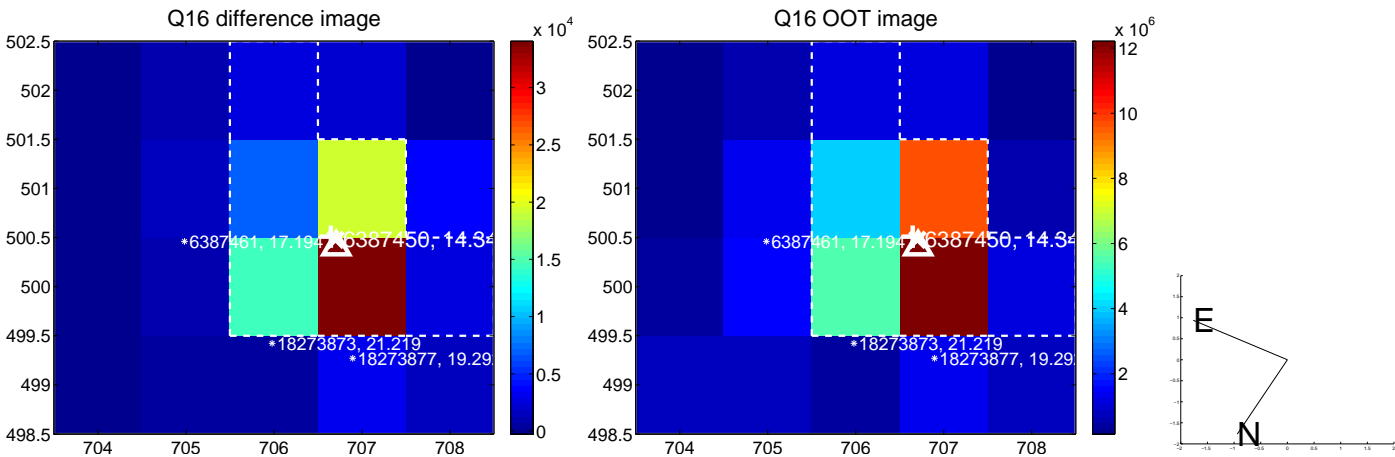
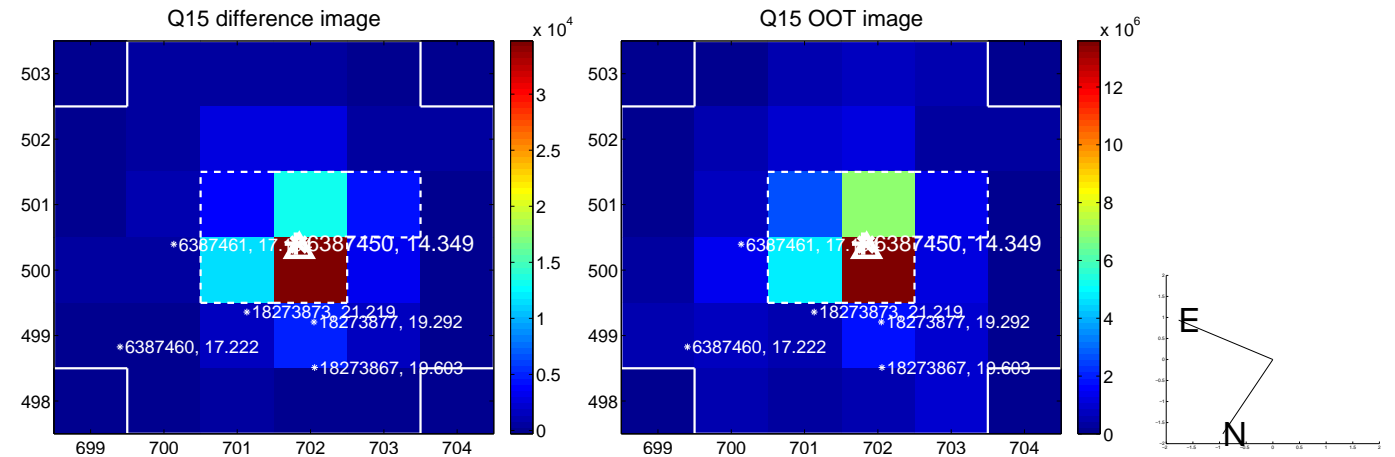
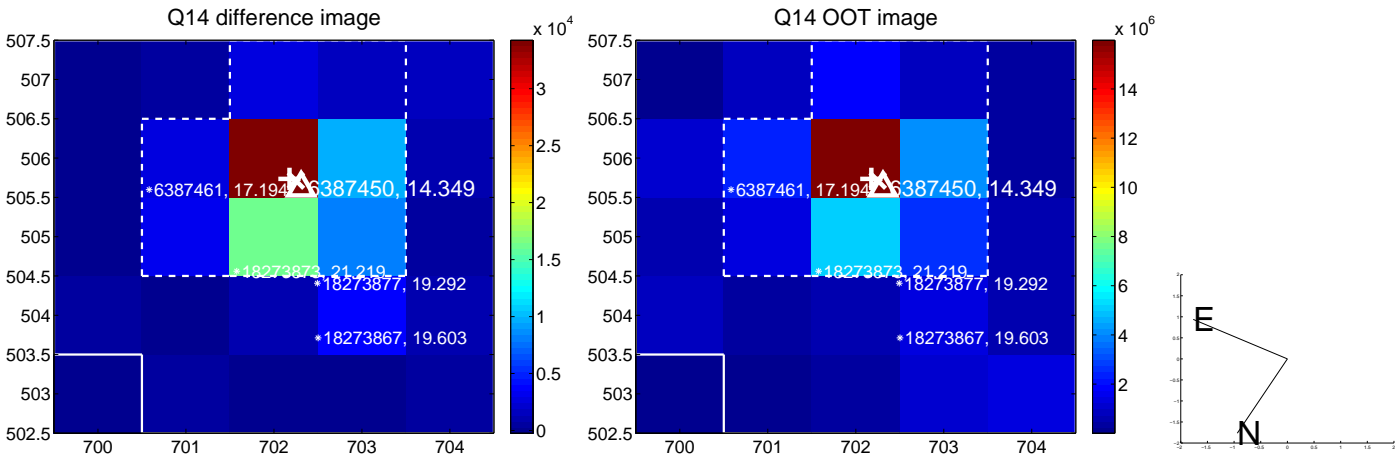
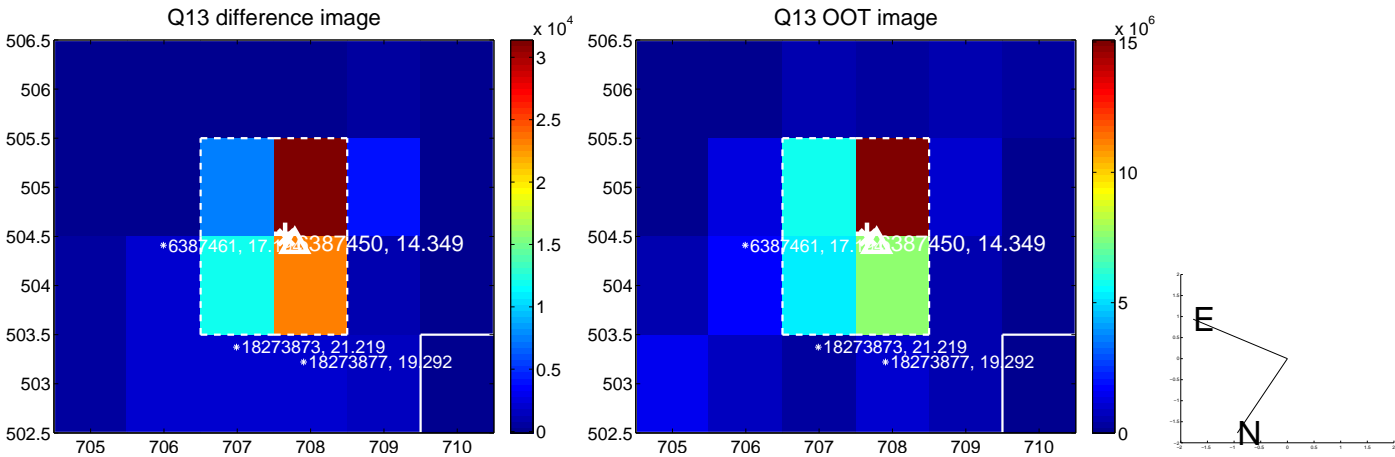




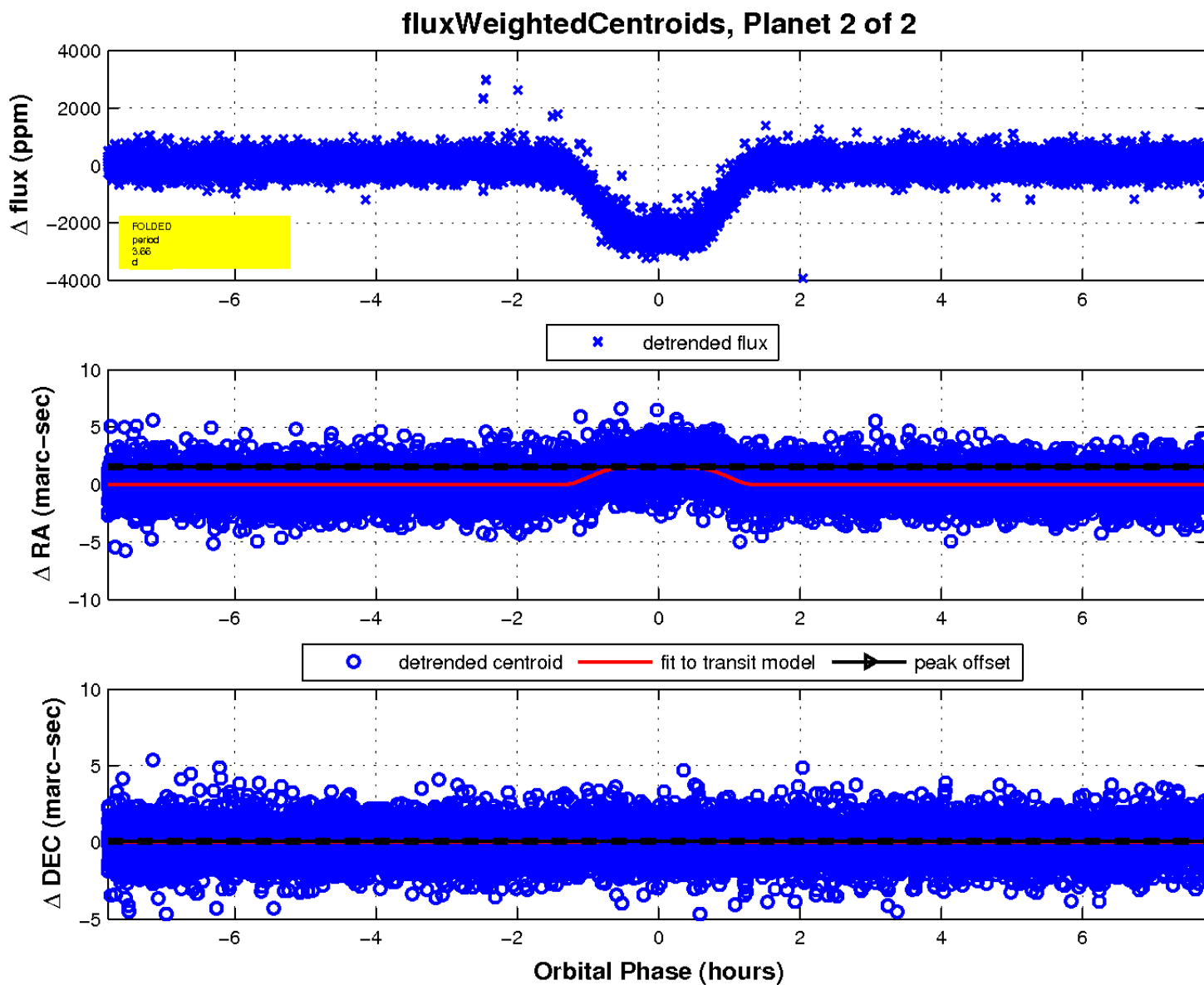
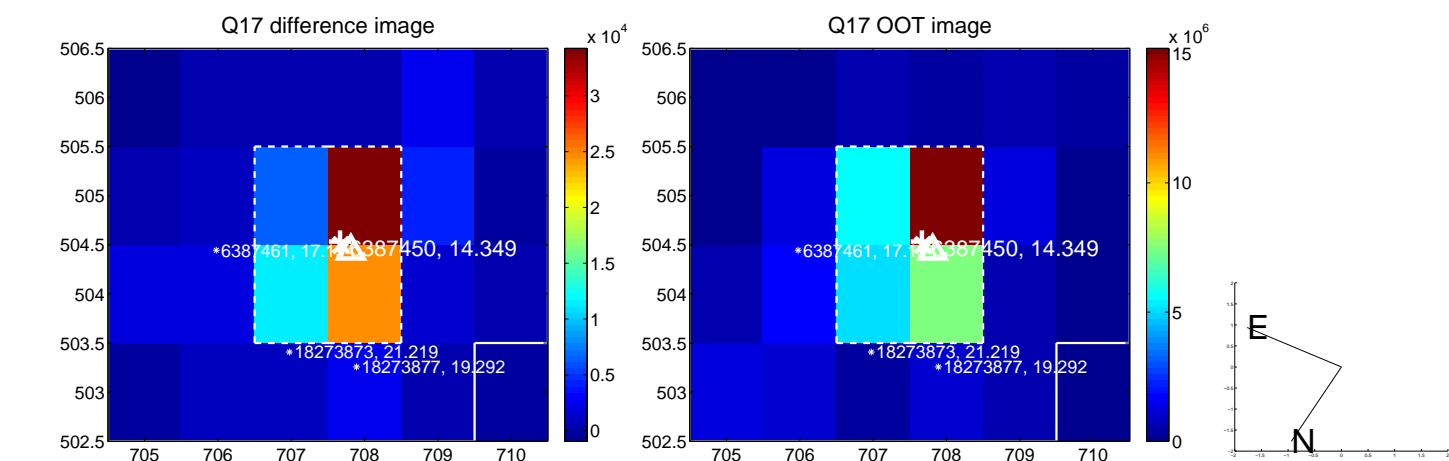
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

