

# KIC 006866228

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006866228-01	OBS	1348.01	7.702374	137.563754	18227.1	3.830	787.0	778.0	0.83	5598	16.95	109.71
006866228-02	OBS	No	7.702370	133.639902	1028.9	3.732	41.5	46.4	0.83	5598	4.65	109.71

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006866228-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
006866228-02	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.

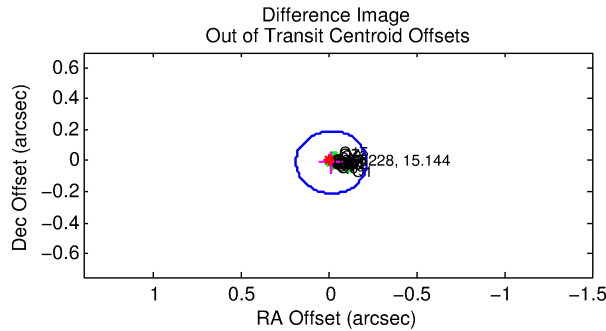
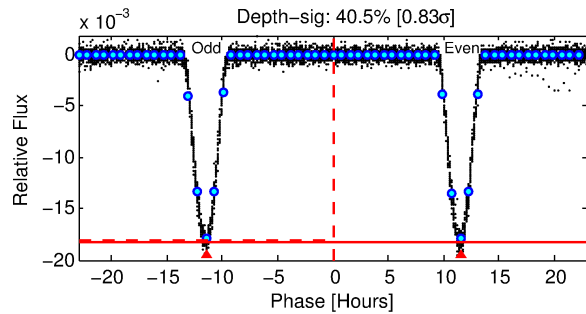
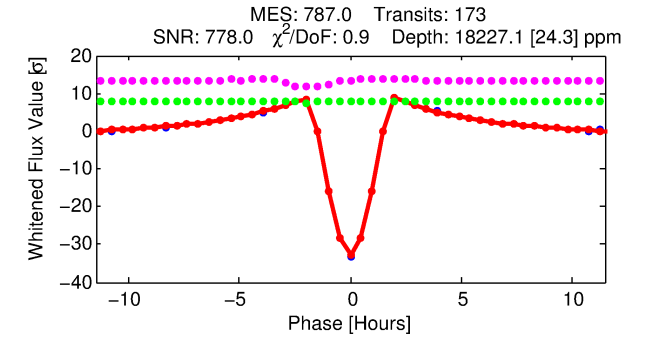
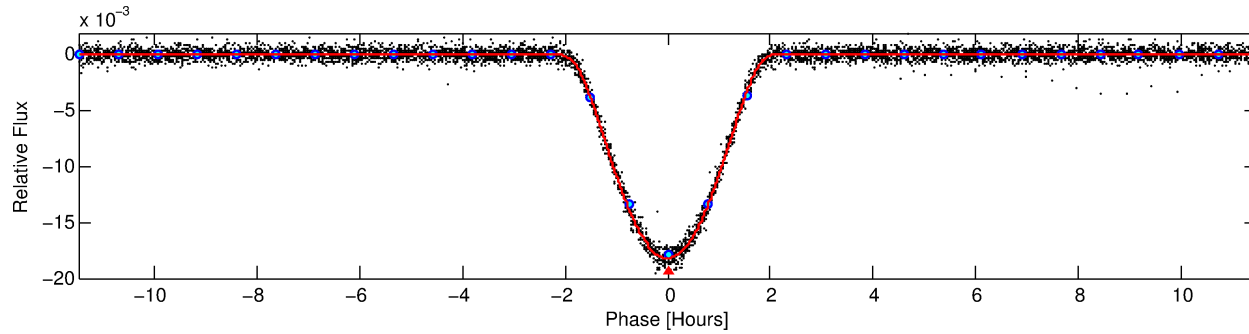
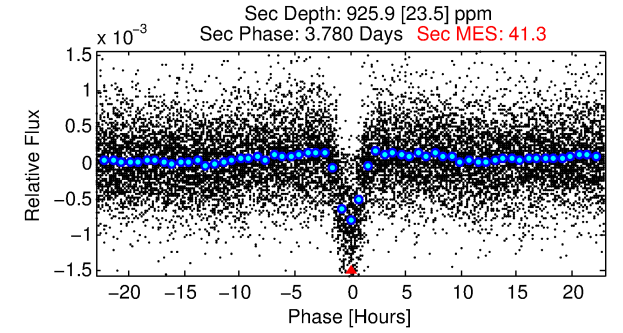
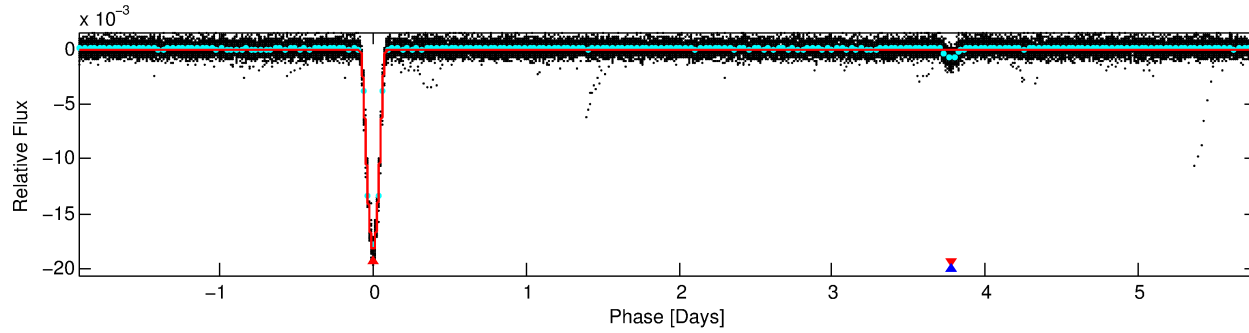
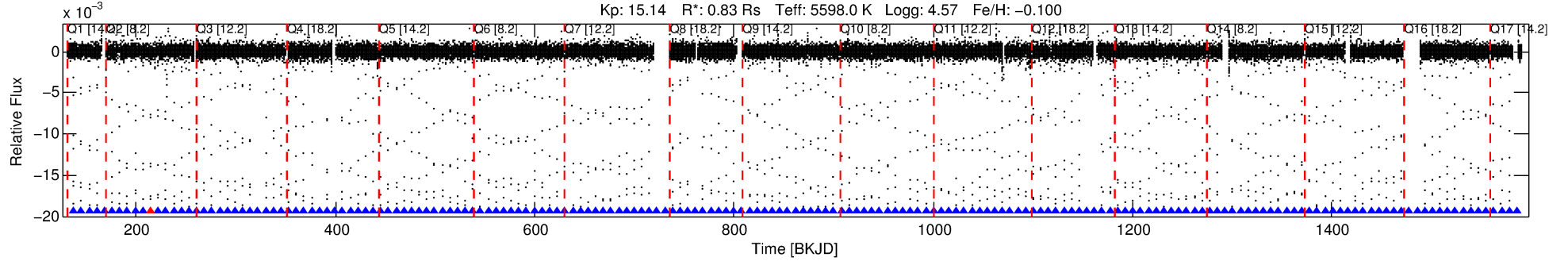
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006866228-01

No Significant Match Found

# DV One-Page Summary

KIC: 6866228 Candidate: 1 of 2 Period: 7.702 d  
KOI: K01348.01 Corr: 0.998



## DV Fit Results:

Period = 7.70237 [0.00000] d  
Epoch = 137.5638 [0.0001] BKJD  
Rp/R\* = 0.1871 [0.0059]  
a/R\* = 10.99 [0.06]  
b = 0.95 [0.01]  
Seff = 109.71 [32.94]  
Teq = 825 [62] K  
Rp = 16.95 [3.73] Re  
a = 0.0743 [0.0139] AU  
Ag = 9.80 [2.78] [3.17 $\sigma$ ]  
Teffp = 2258 [78] K [14.35 $\sigma$ ]

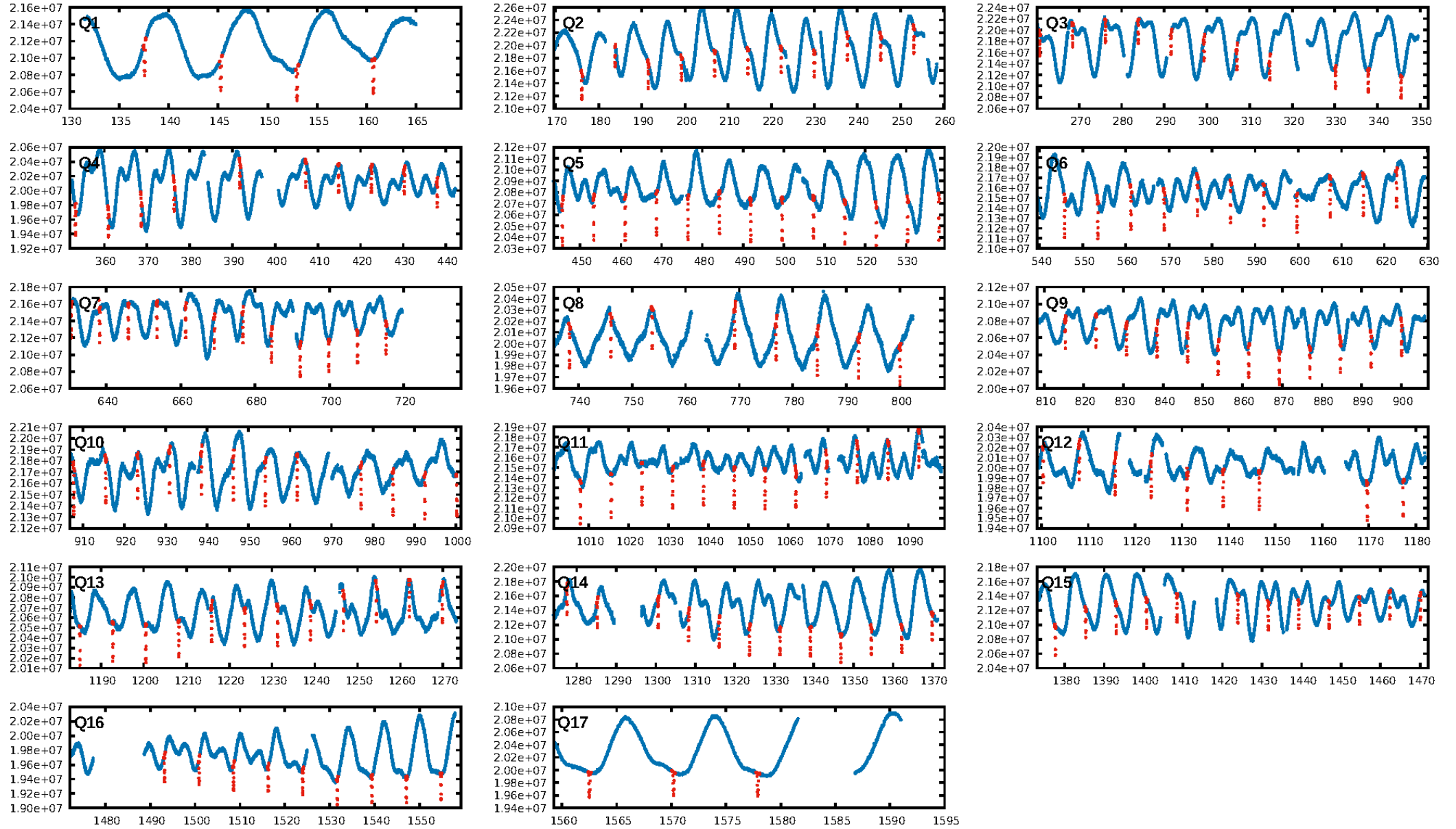
## DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.99 [165/166]  
GhostDiagnostic-chr: 2.435  
Centroid-sig: 0.1%  
Centroid-so: 0.166 arcsec [13.11 $\sigma$ ]  
OotOffset-rm: 0.017 arcsec [0.25 $\sigma$ ]  
KicOffset-rm: 0.112 arcsec [1.64 $\sigma$ ]  
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]

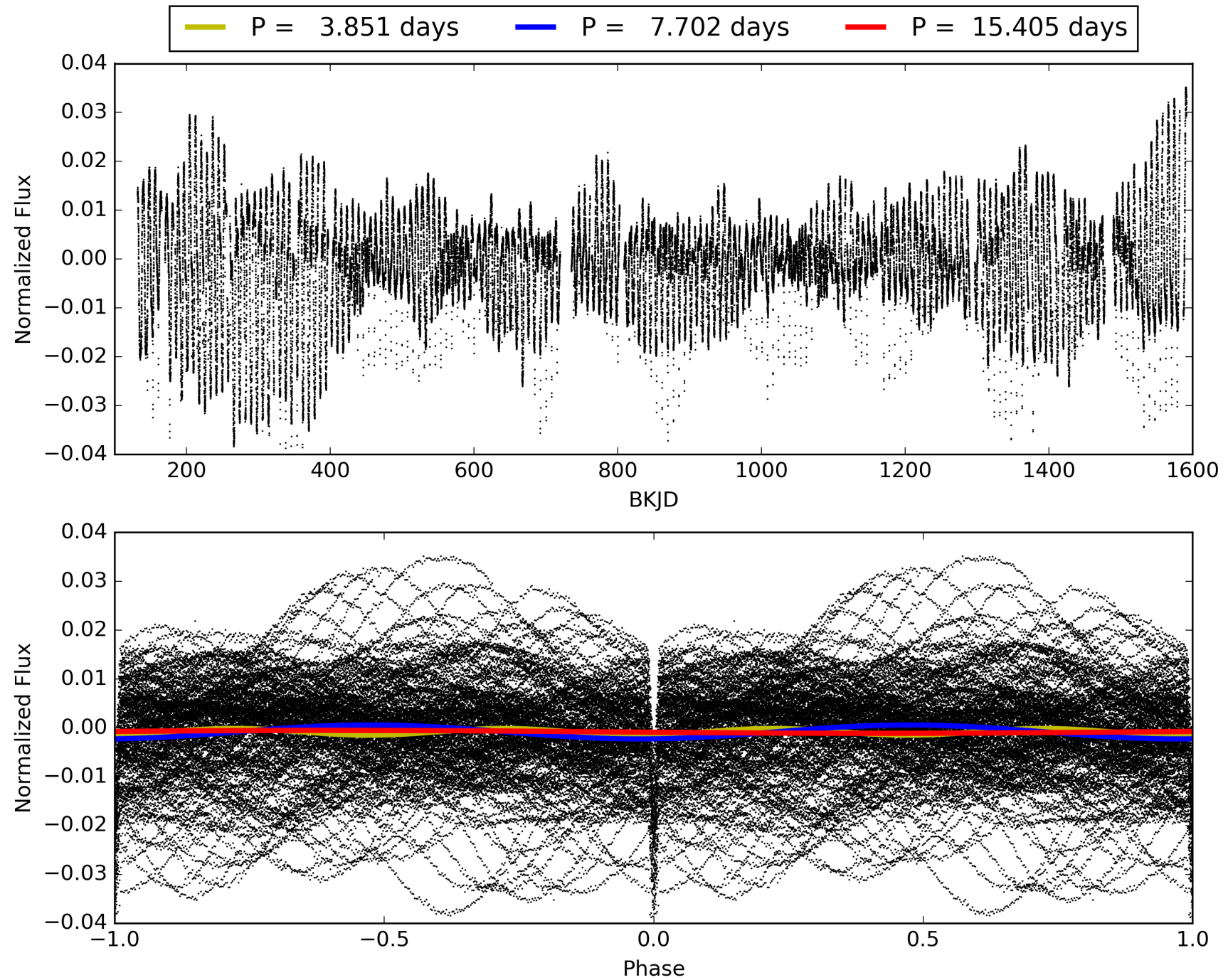
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 19:11:29 Z

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

# TCE 006866228-01, PDC Light Curves

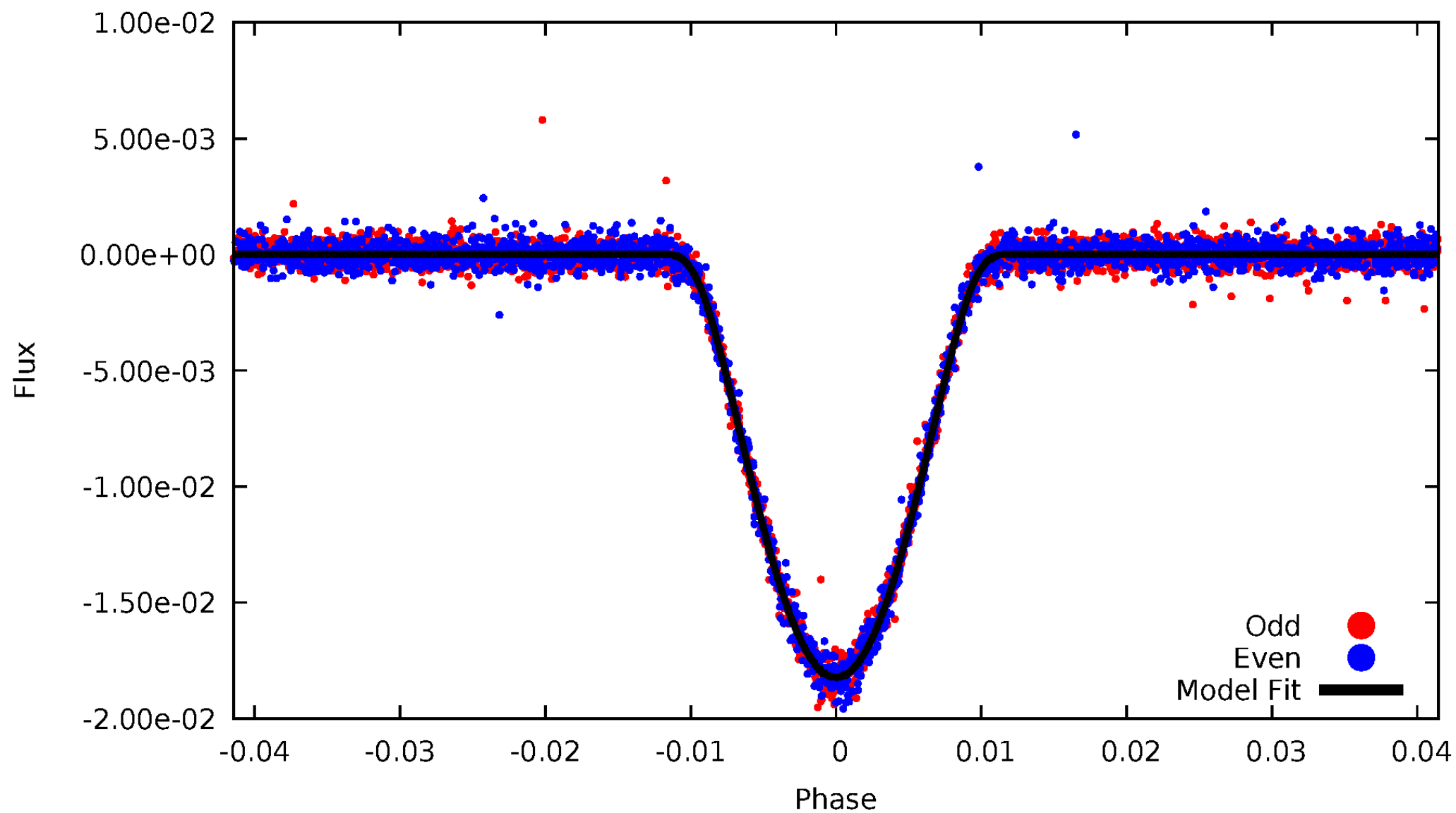


TCE 006866228-01



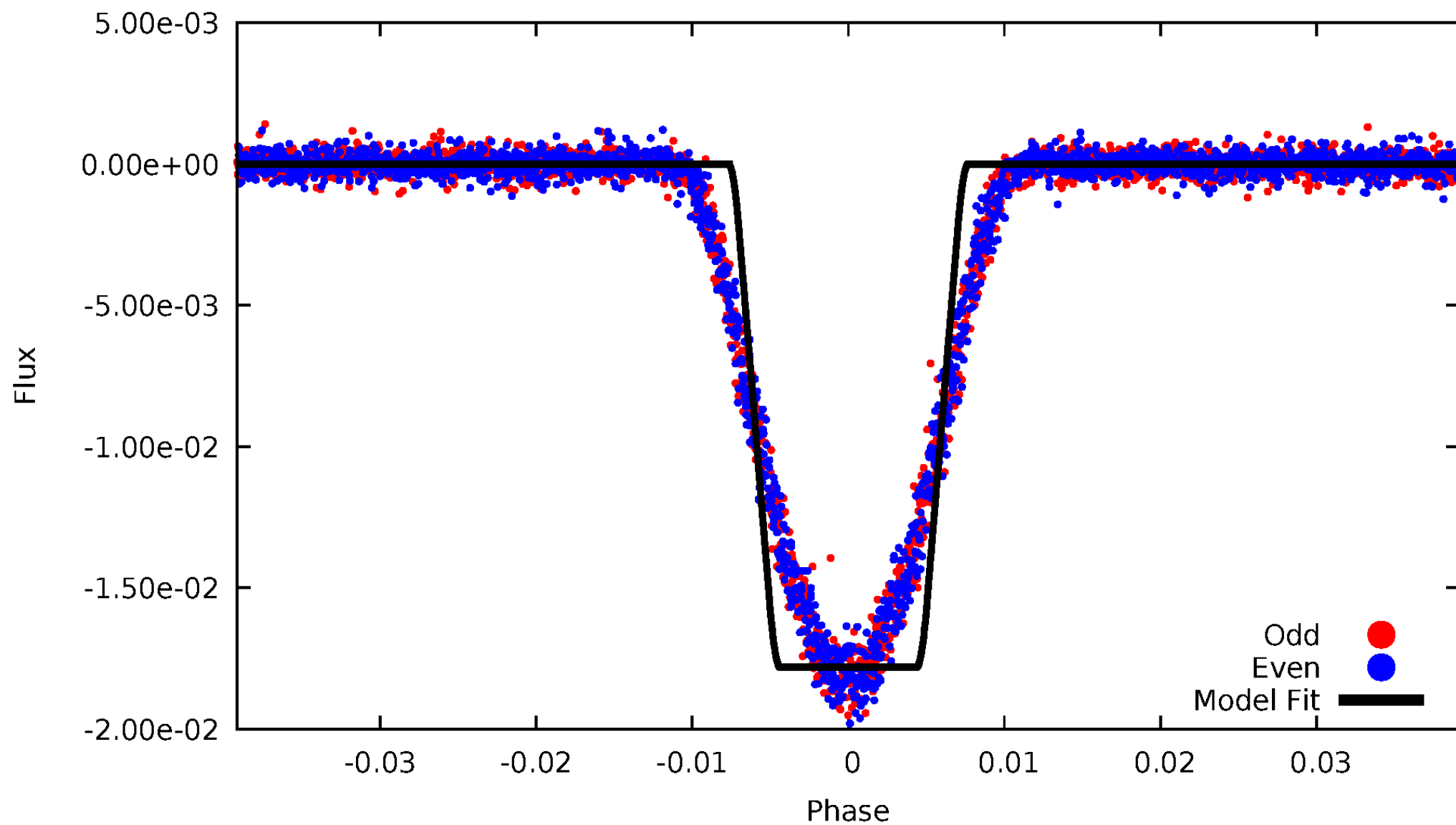
# DV Odd/Even

TCE 006866228-01



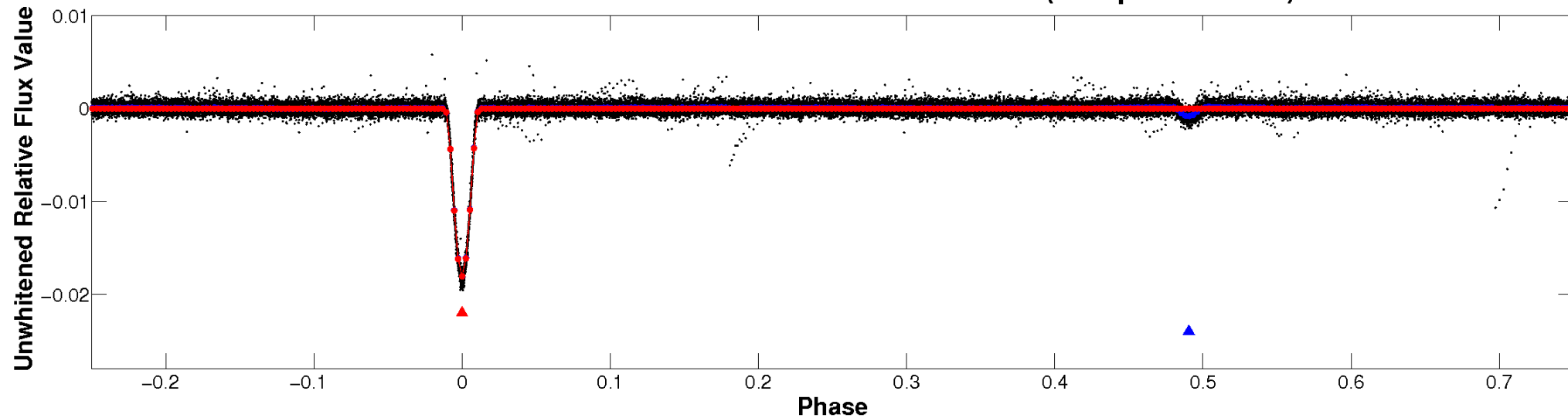
# ALT Odd/Even

TCE 006866228-01

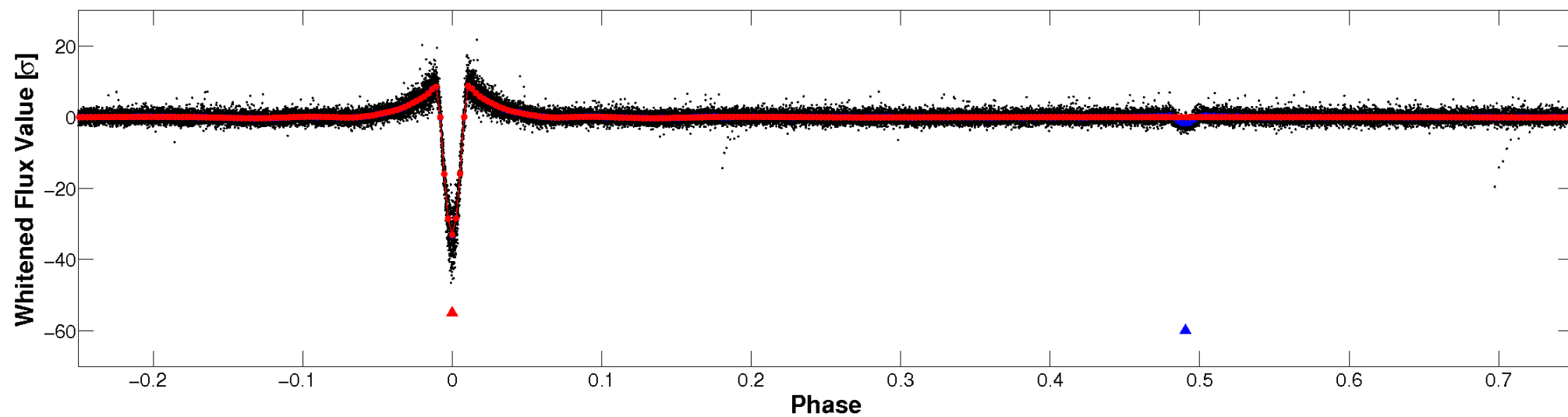


# Non-Whitened Vs. Whitened Light Curve

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



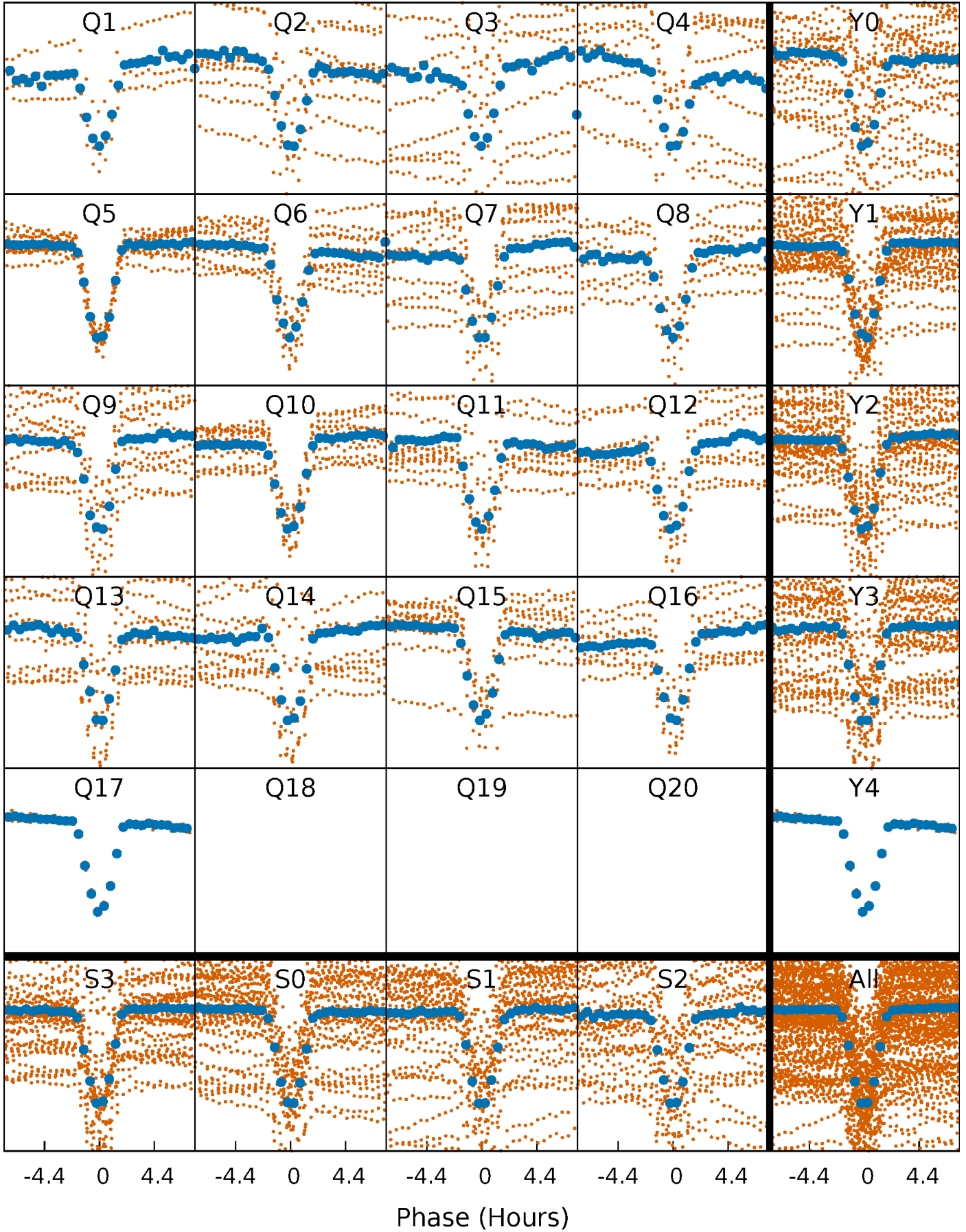
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

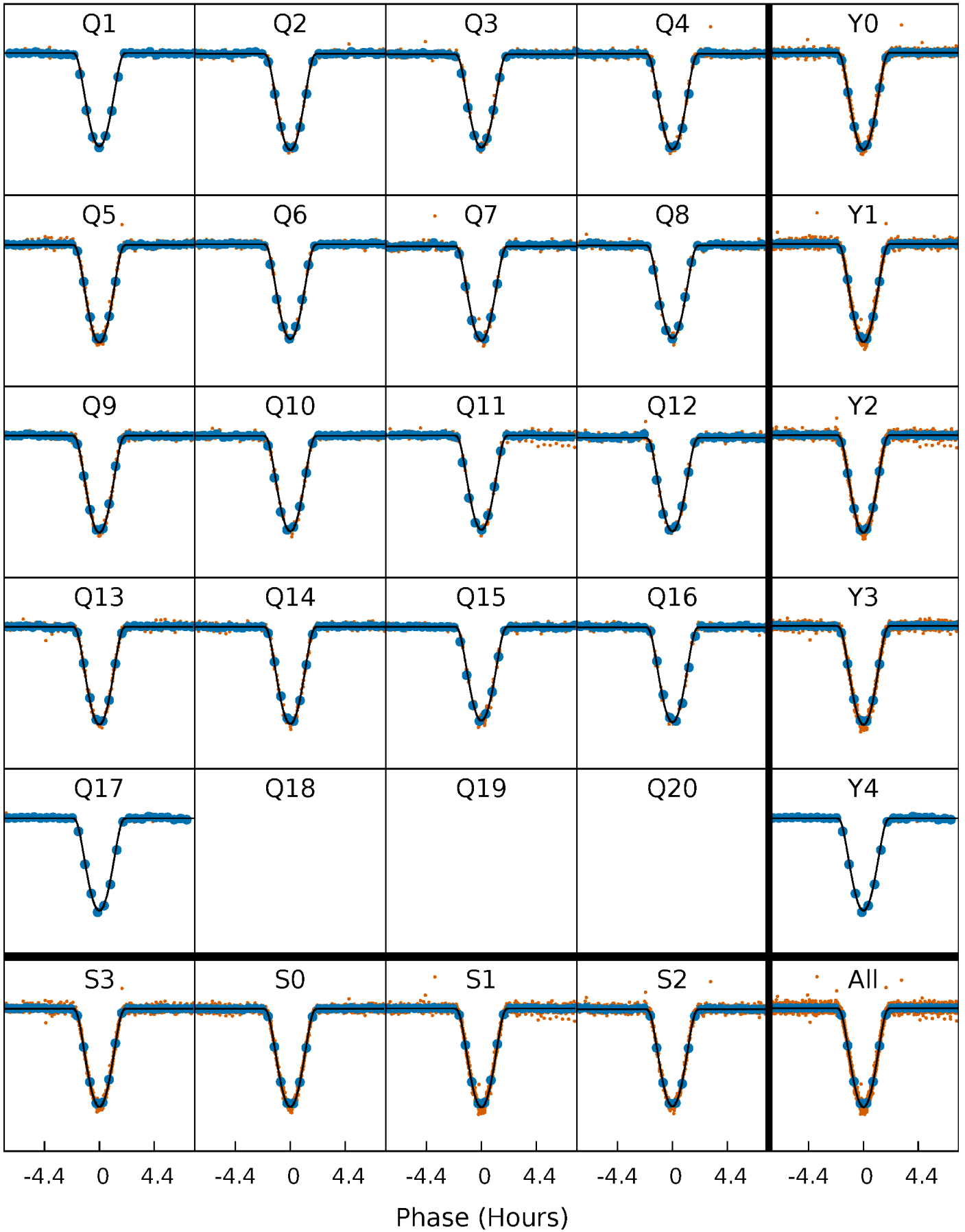
TCE 006866228-01 P= 7.702374 Days  $T_0=137.563754$  (BKJD)





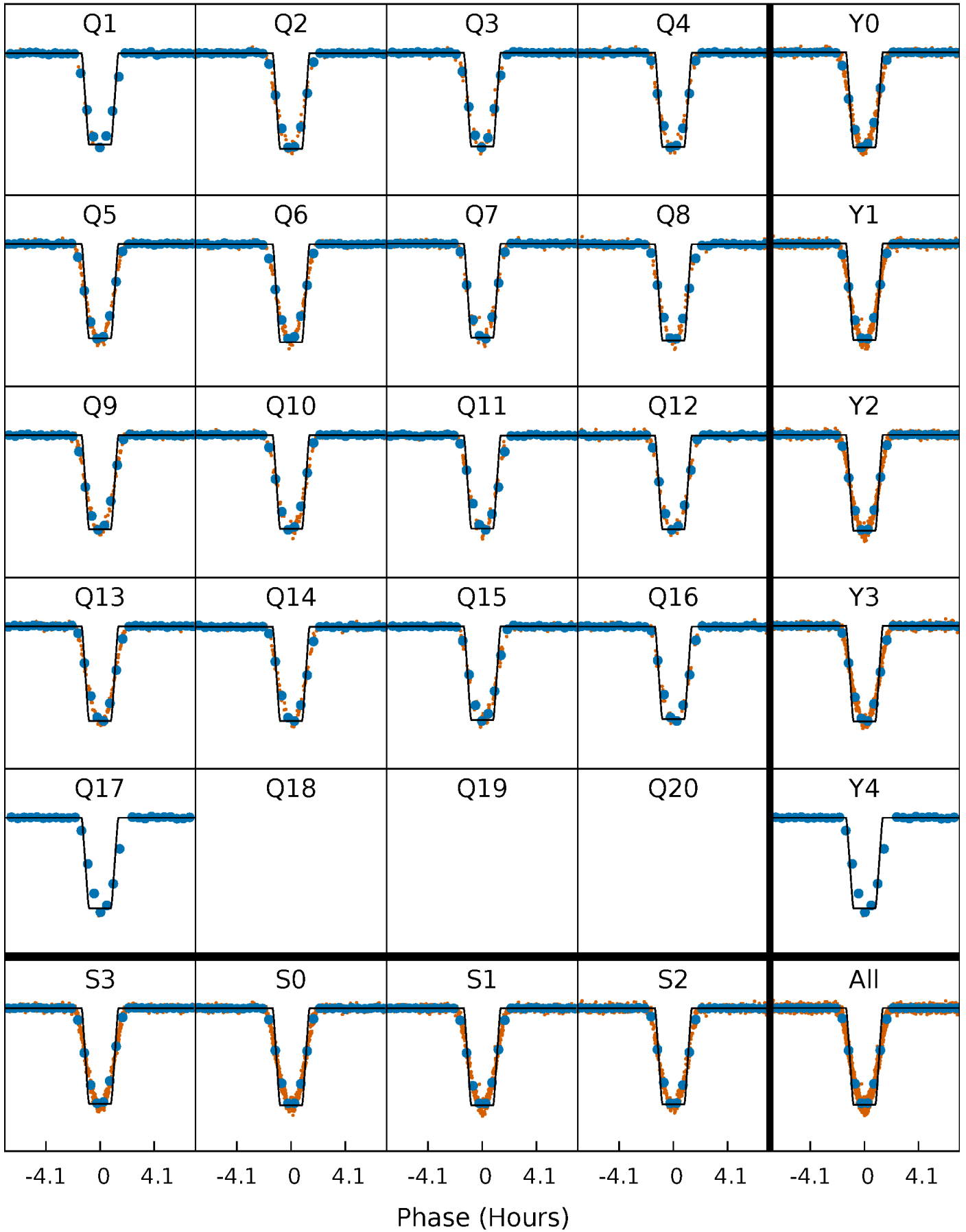
# DV Quarter-Phased Transit Curves

TCE 006866228-01 P= 7.702374 Days  $T_0=137.563754$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

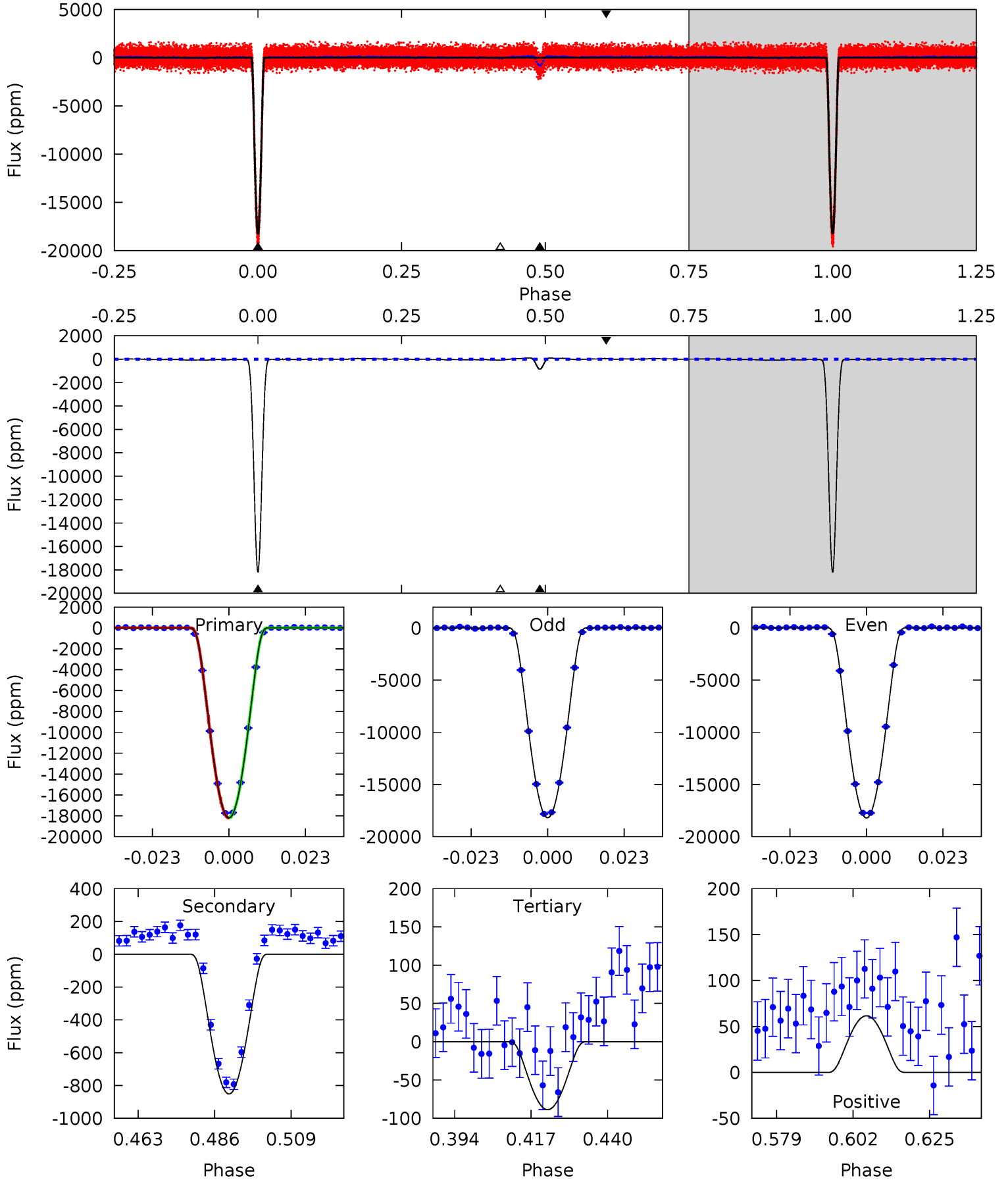
TCE 006866228-01 P= 7.702335 Days  $T_0=137.567280$  (BKJD)



# DV Model-Shift Uniqueness Test

006866228-01, P = 7.702374 Days, E = 129.861380 Days

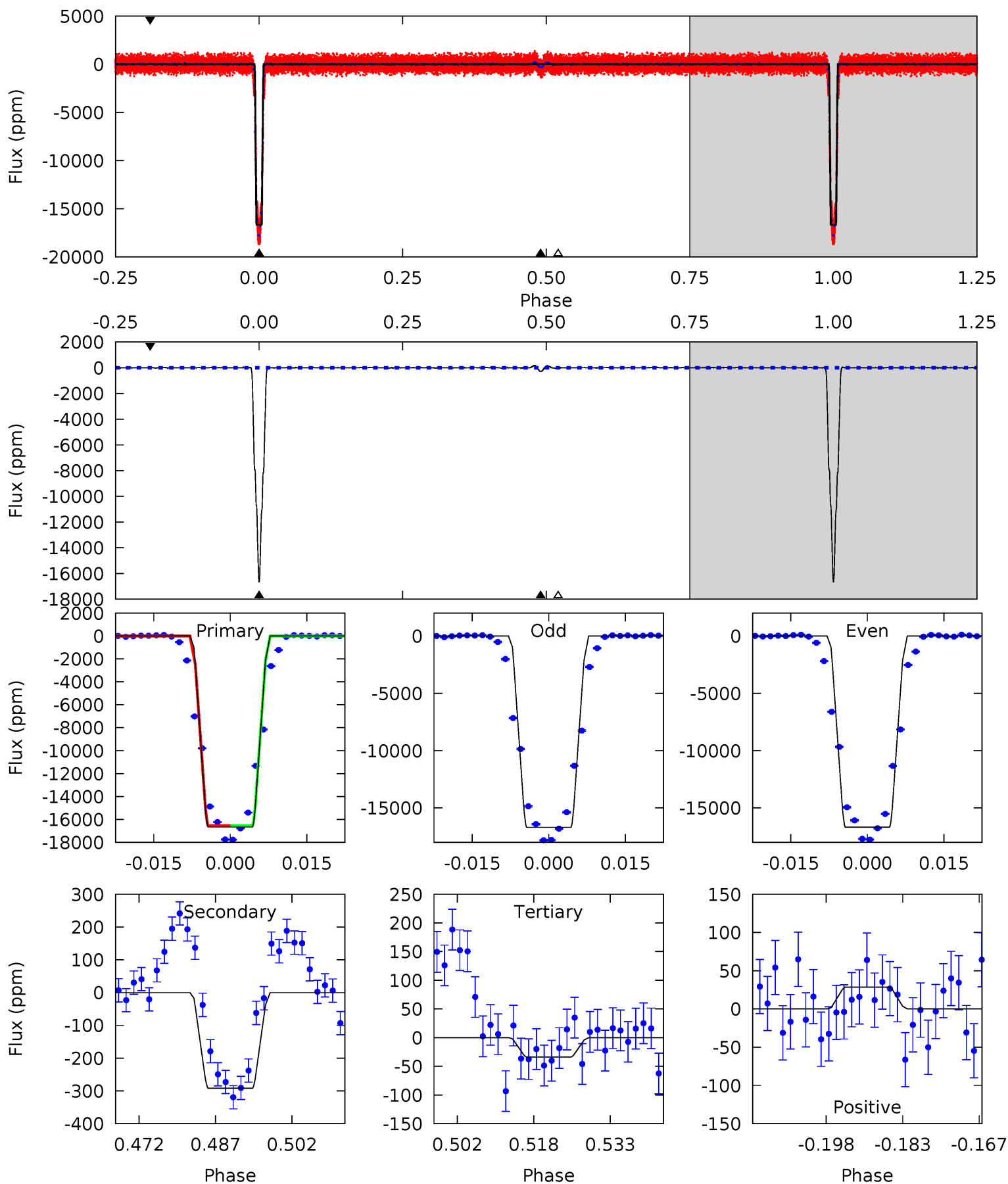
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1716	80.3	8.37	5.81	4.86	2.27	3.50	1708	1710	72.0	74.5	1.00	1.00	0.01	1.75



# Alt Model-Shift Uniqueness Test

006866228-01, P = 7.702335 Days, E = 129.864945 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
1317	23.1	2.66	2.24	4.95	2.43	0.87	1314	1315	20.4	20.8	0.43	1.00	0.01	0.12



### Stellar Parameters For KIC 006866228

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5598^{+152}_{-169}$	$4.565^{+0.038}_{-0.152}$	$-0.100^{+0.300}_{-0.300}$	$0.830^{+0.181}_{-0.078}$	$0.928^{+0.085}_{-0.114}$	$2.285^{+0.452}_{-0.959}$
	+3%/-3%	+1%/-3%	+300%/-300%	+22%/-9%	+9%/-12%	+20%/-42%
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 006866228-01 / KOI 1348.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-852 \pm 11$	$17.37^{+2.30}_{-1.31}$	$1173^{+62}_{-45}$	$2894^{+50}_{-58}$	$8.387^{+1.225}_{-1.575}$
Alt.	$-292 \pm 13$	$12.46^{+1.39}_{-1.11}$	$1176^{+60}_{-51}$	$2739^{+62}_{-57}$	$5.616^{+0.958}_{-0.942}$

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

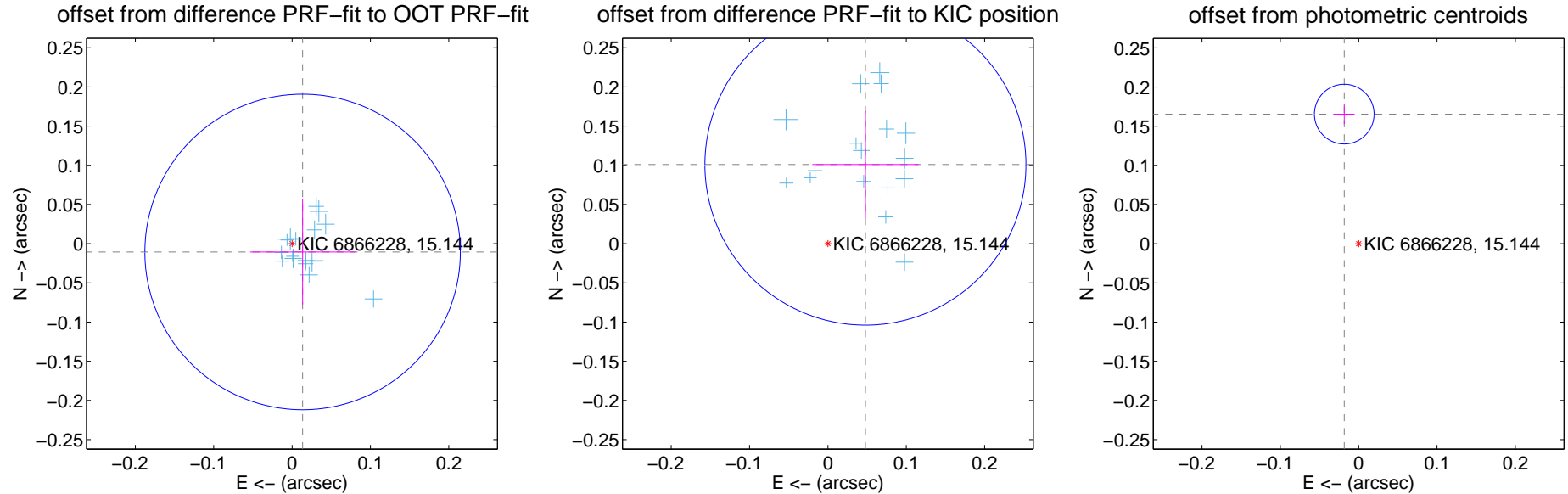
## DV Centroid Data

Supplemental centroid analysis for 006866228-01. Kepler magnitude: 15.14. Transit SNR 778.00

There are 17 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

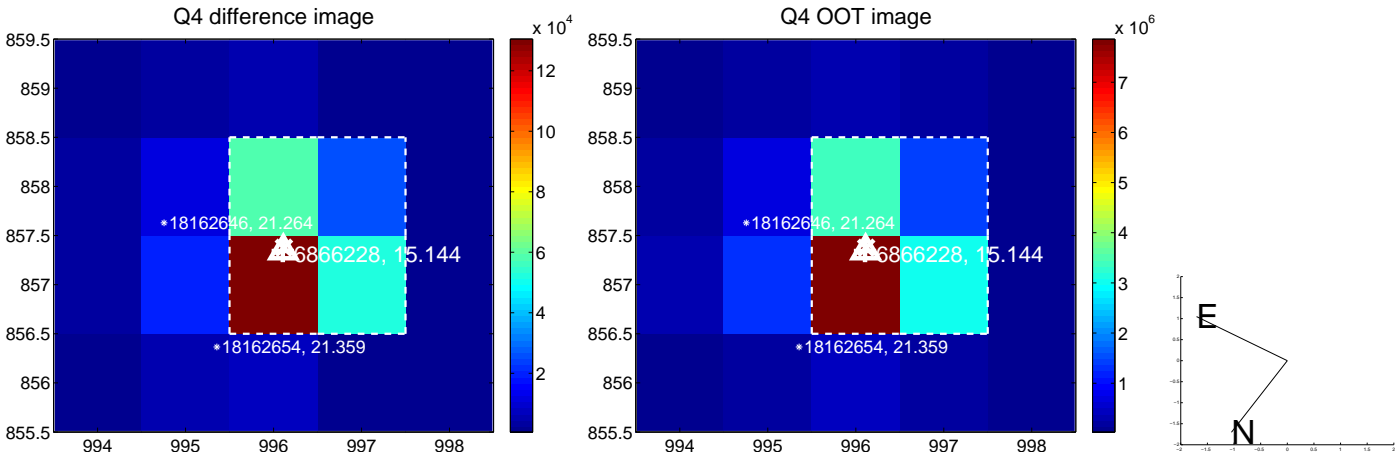
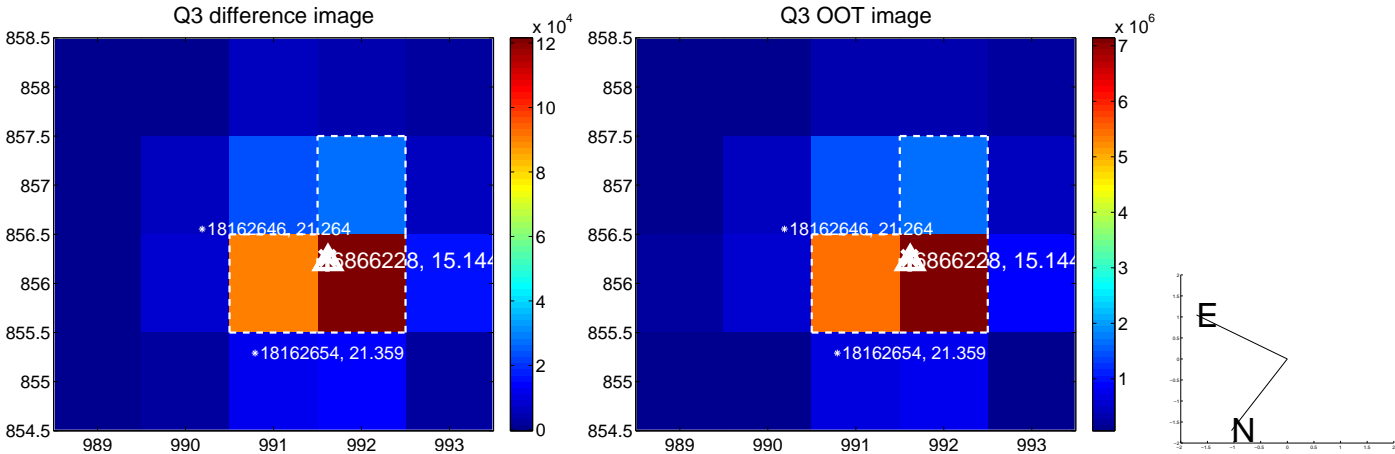
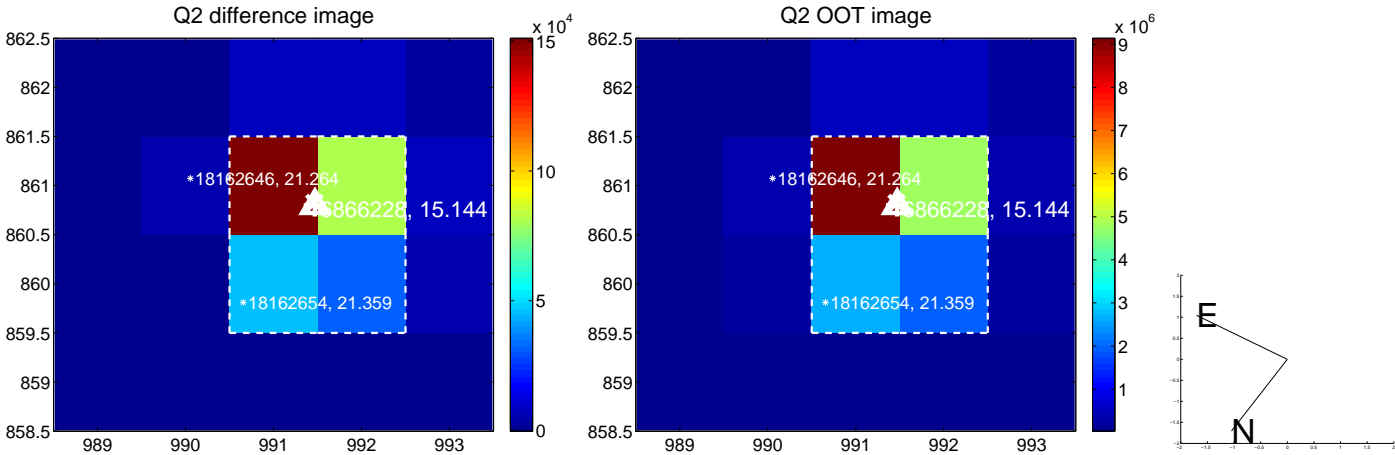
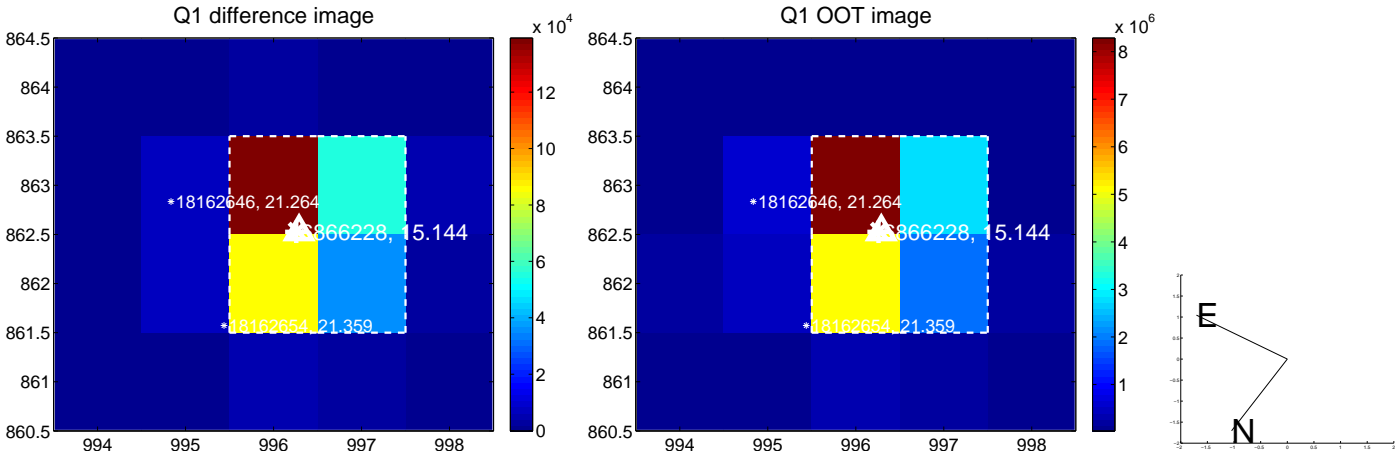
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.017 \pm 0.067$	0.25	$-0.013 \pm 0.067$	$-0.011 \pm 0.067$
PRF-fit source offset from KIC position	$0.112 \pm 0.068$	1.64	$-0.048 \pm 0.068$	$0.101 \pm 0.068$
photometric centroid source offset	$0.17 \pm 0.01$	13.11	$0.02 \pm 0.01$	$0.17 \pm 0.01$



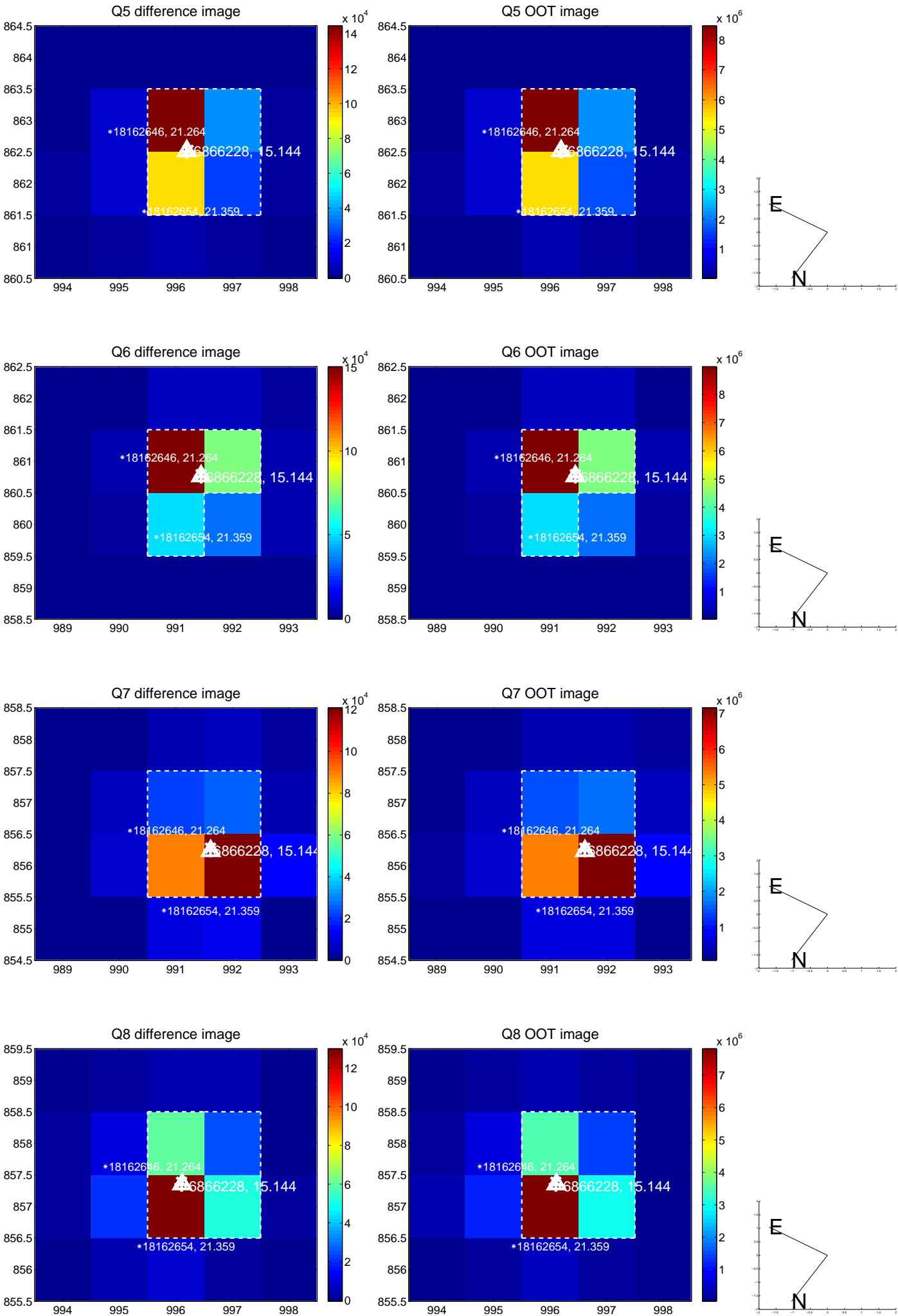
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



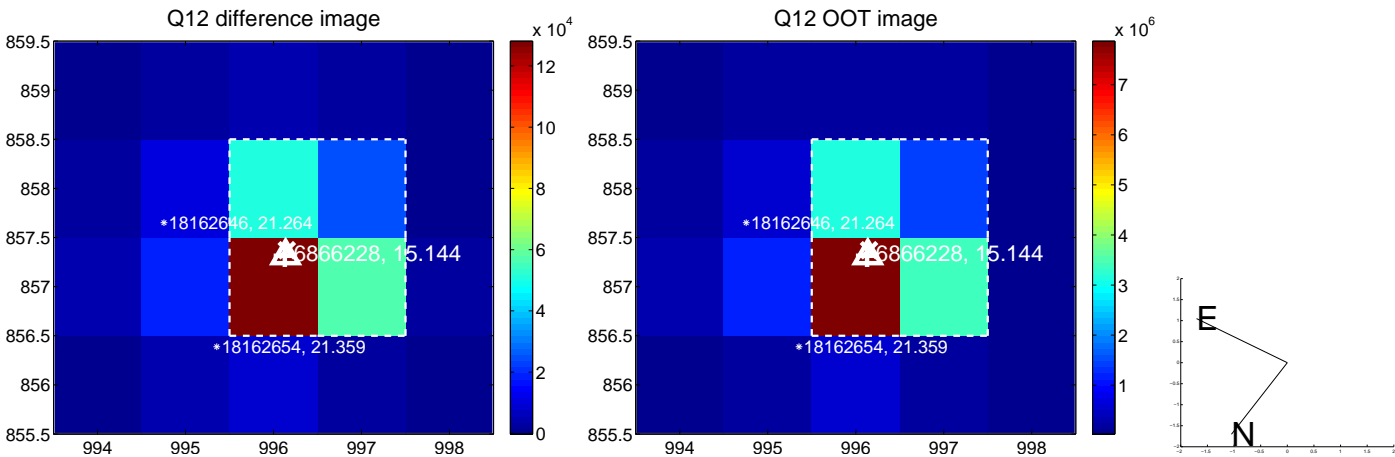
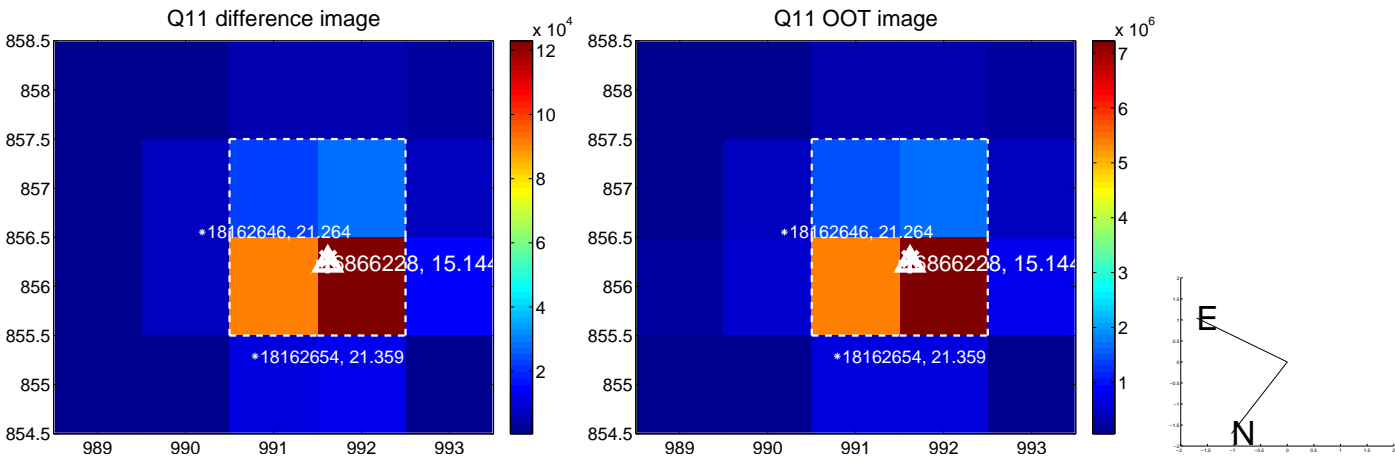
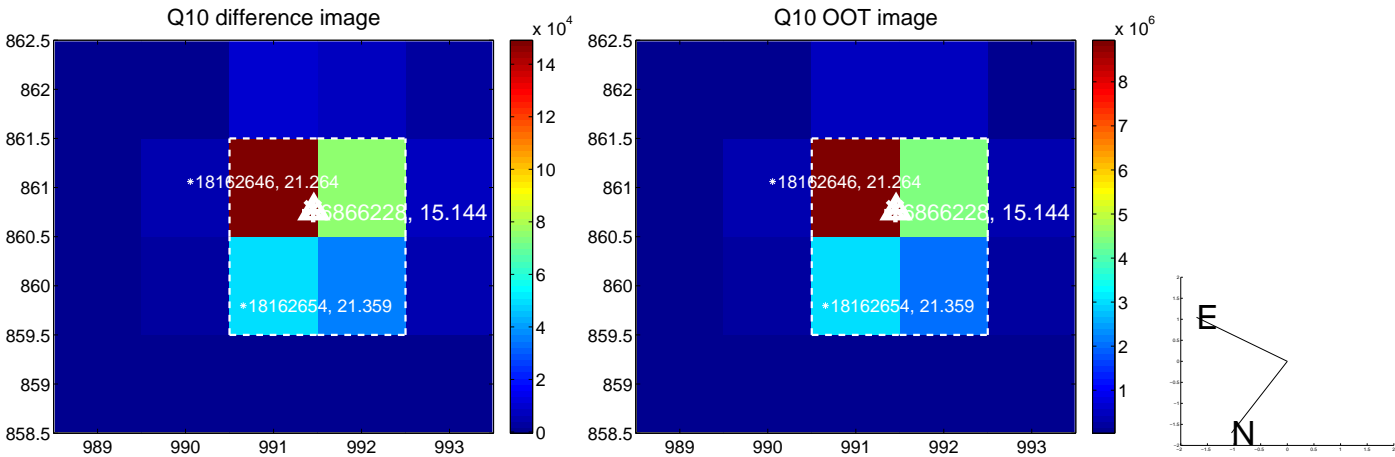
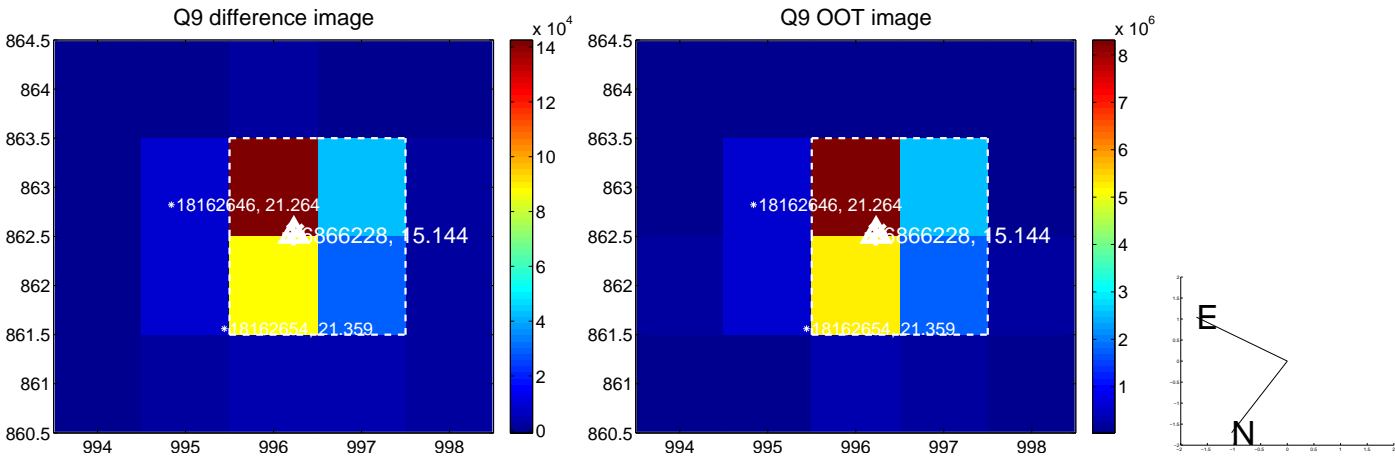
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



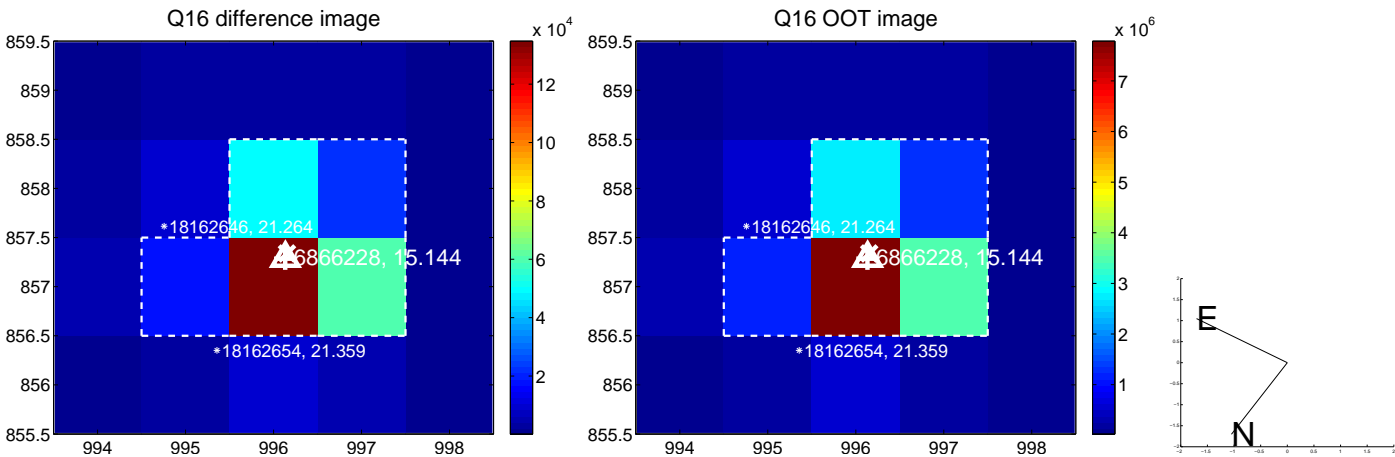
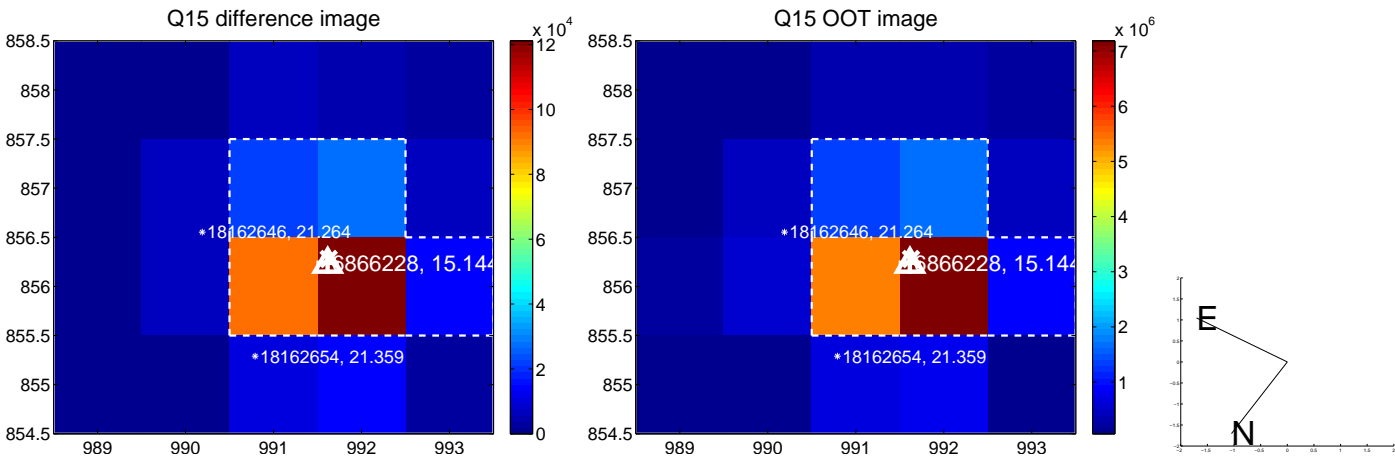
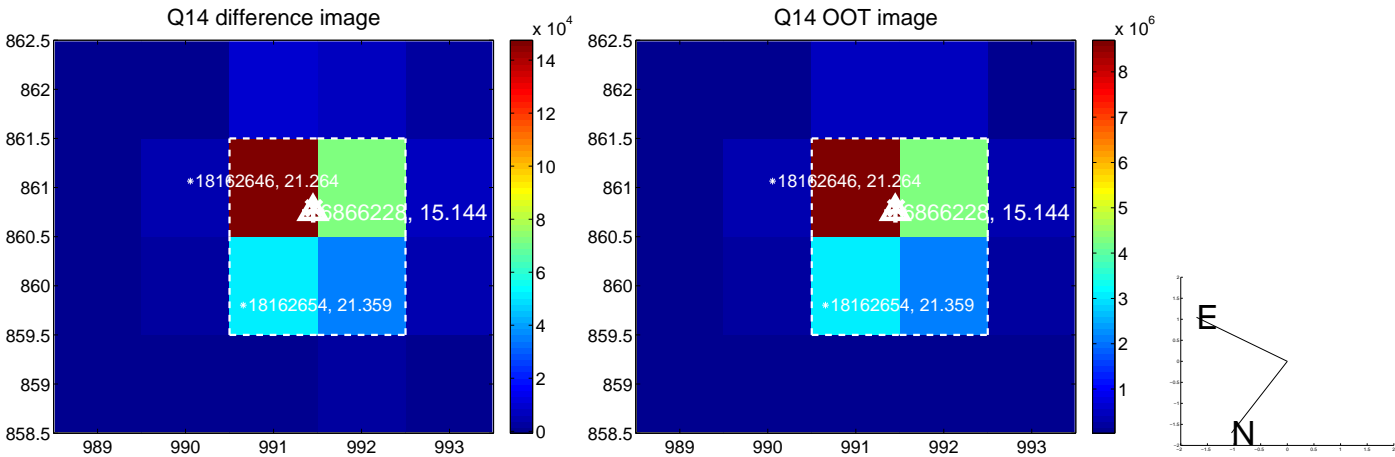
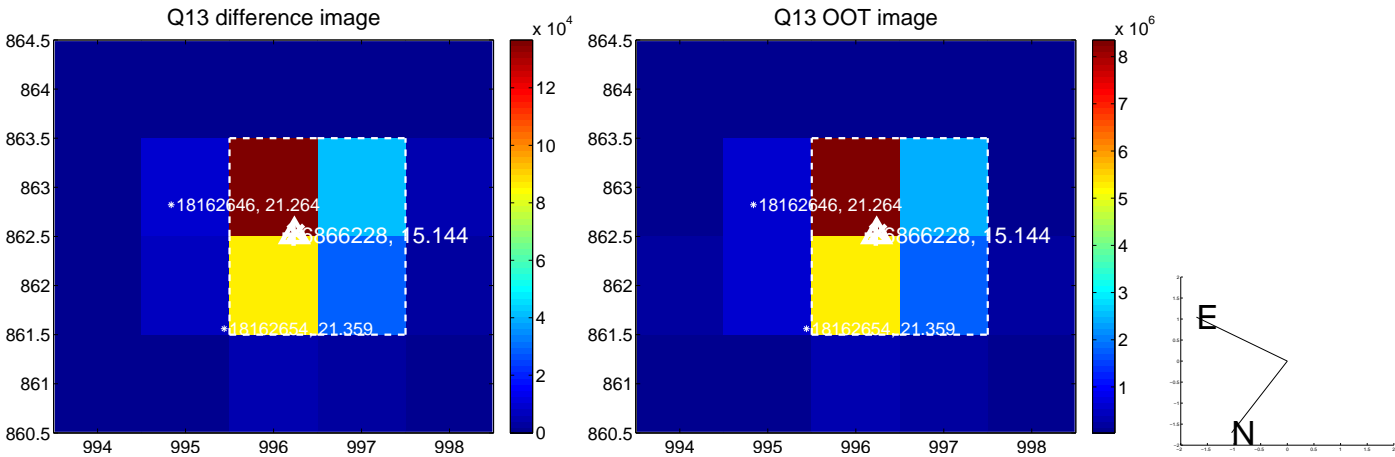
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



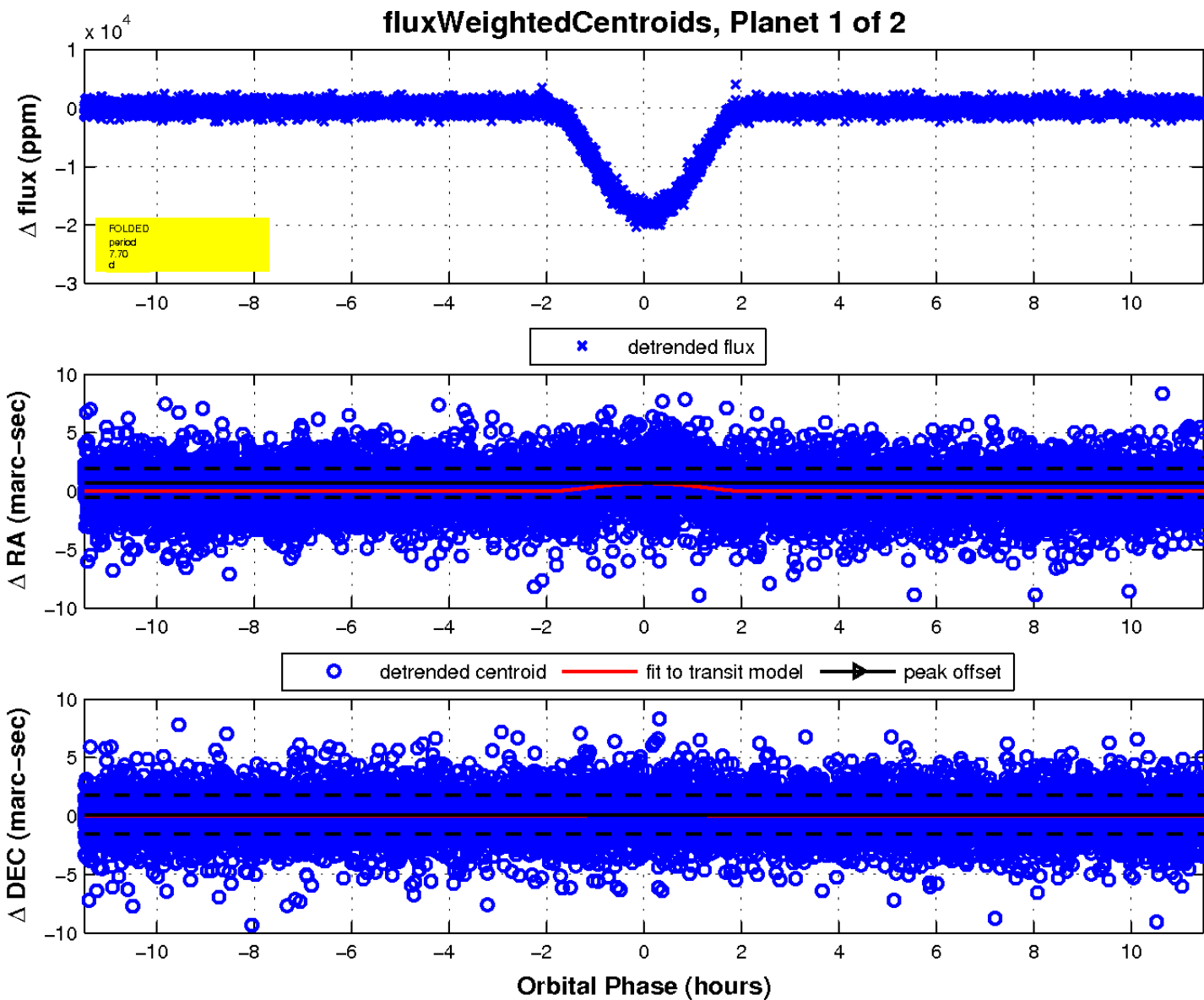
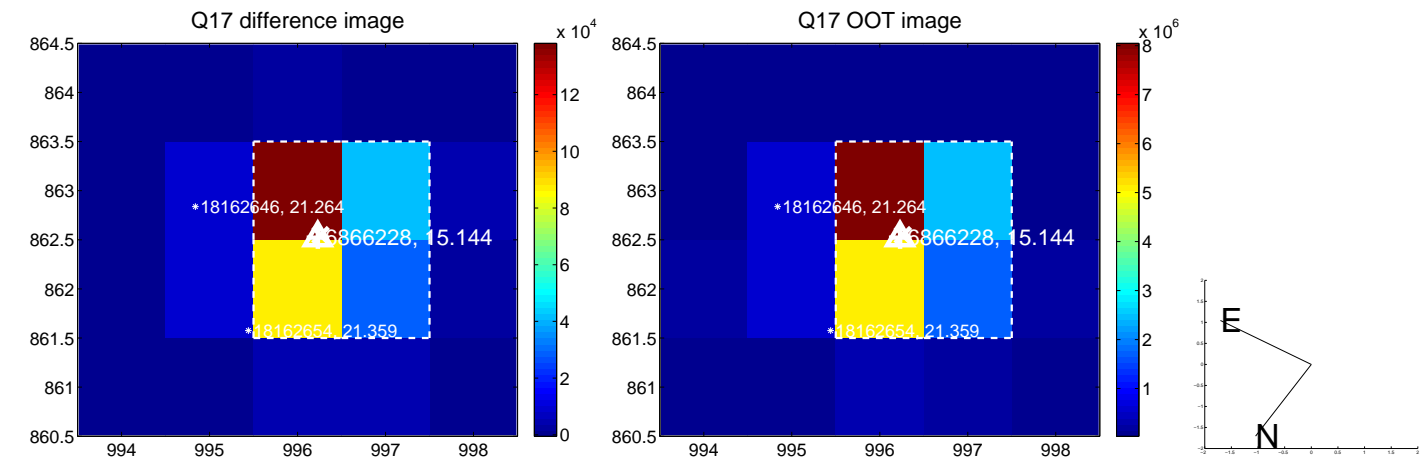
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

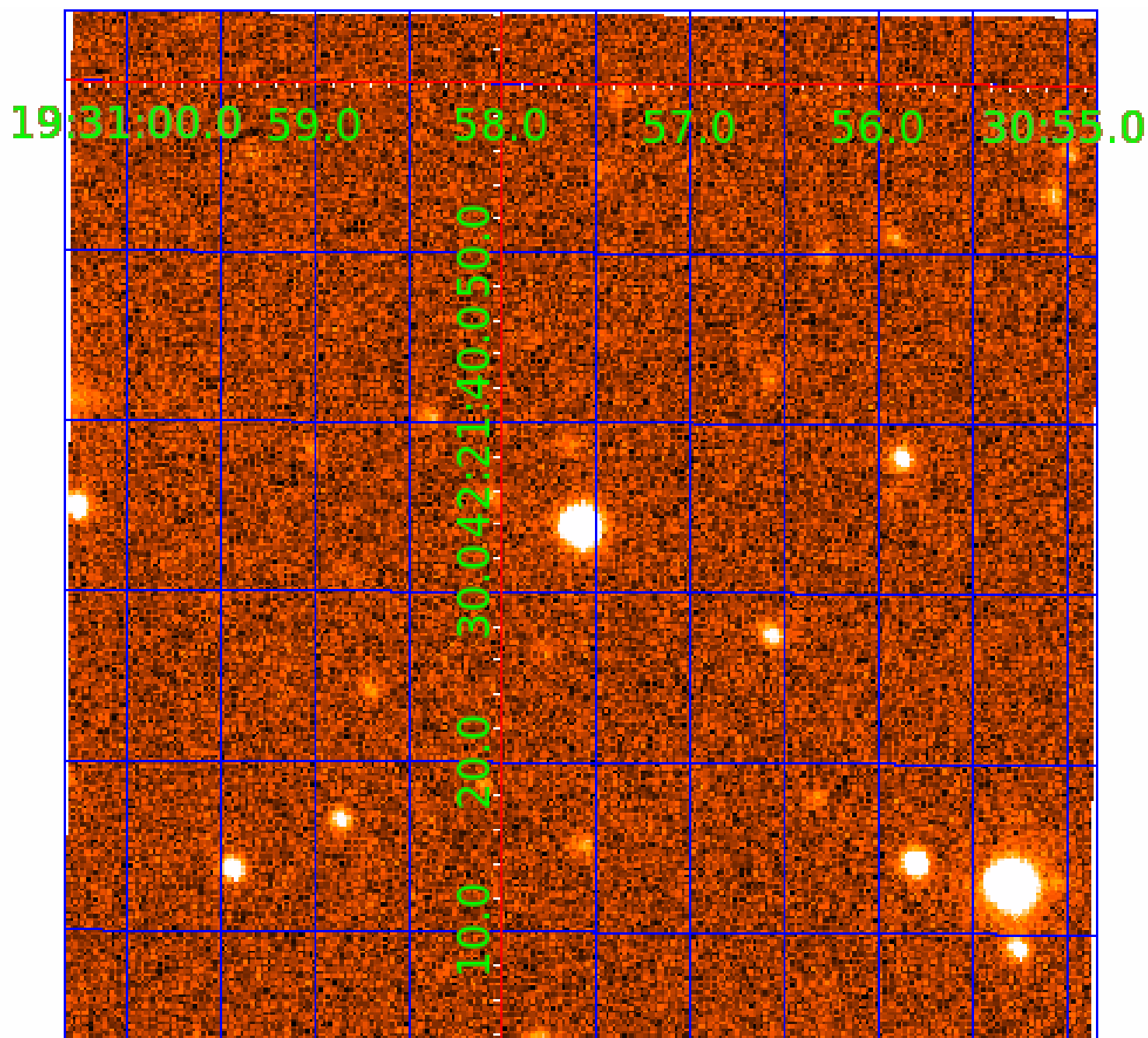


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 006866228

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006866228-01	OBS	1348.01	7.702374	137.563754	18227.1	3.830	787.0	778.0	0.83	5598	16.95	109.71
006866228-02	OBS	No	7.702370	133.639902	1028.9	3.732	41.5	46.4	0.83	5598	4.65	109.71

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006866228-01	OBS	FP	0.00	0	1	0	0	MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE
006866228-02	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.

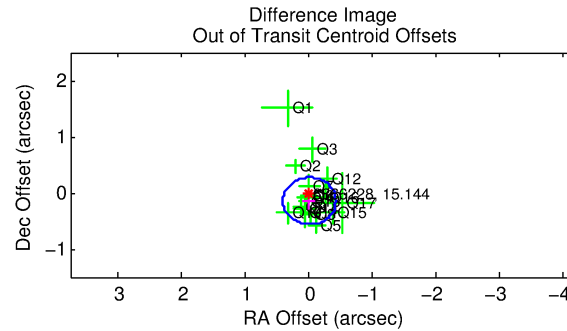
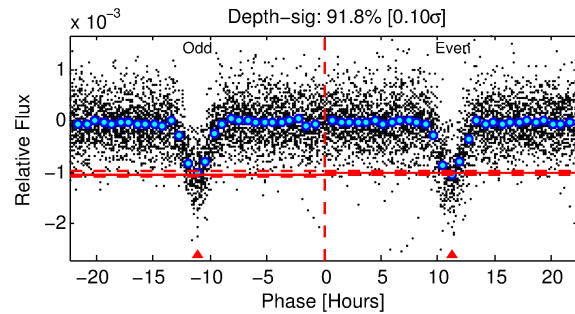
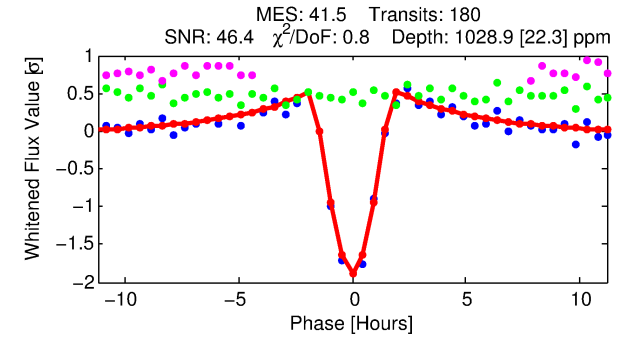
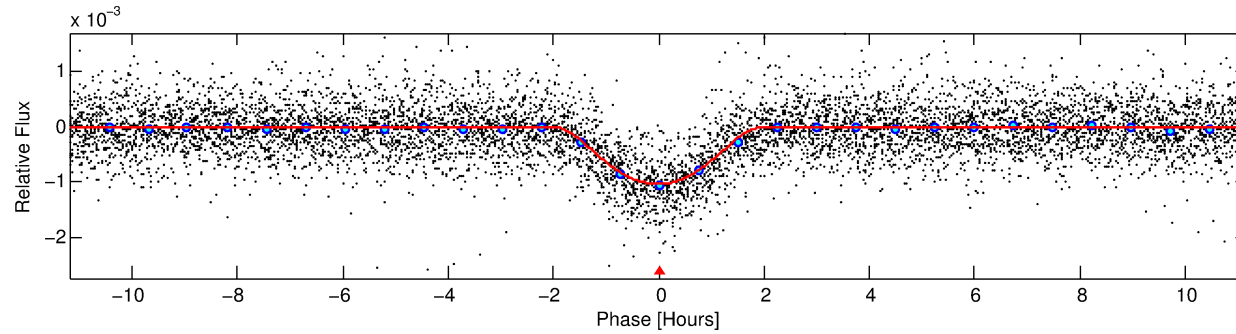
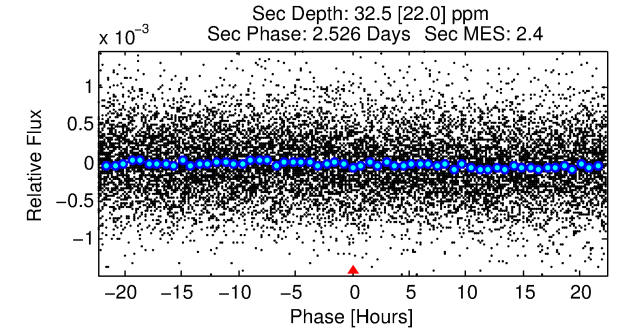
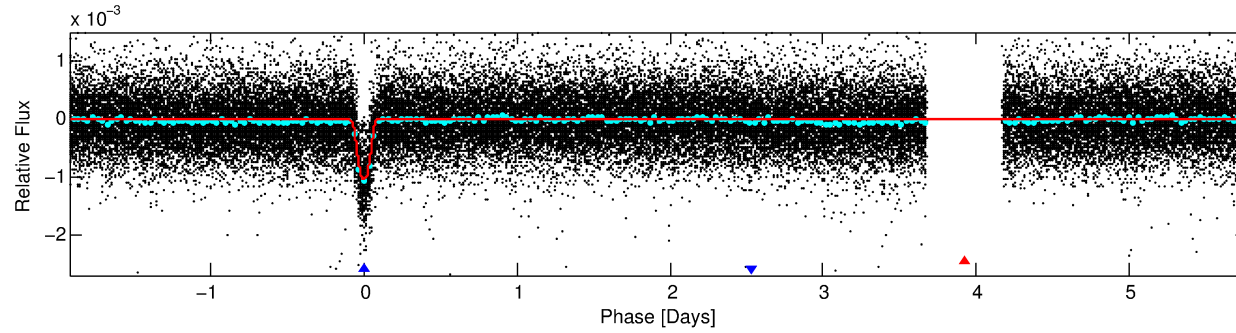
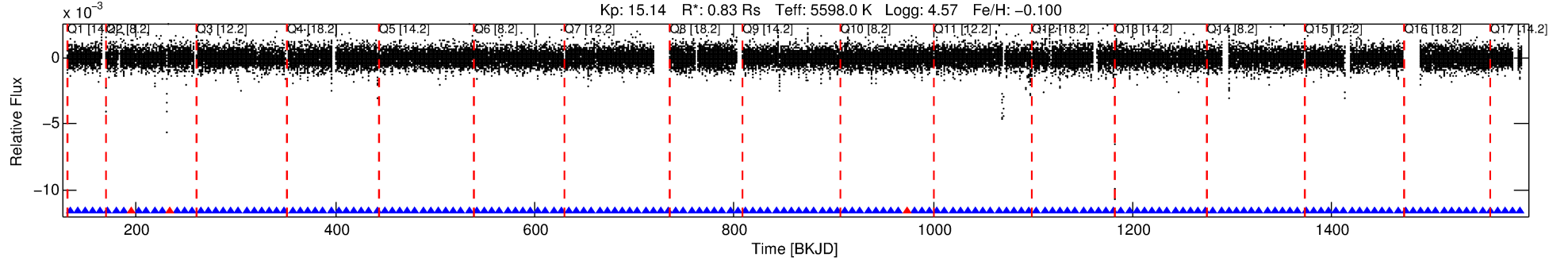
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006866228-02

No Significant Match Found

# DV One-Page Summary

KIC: 6866228 Candidate: 2 of 2 Period: 7.702 d  
KOI: K01348 Corr: No Ephemeris Match



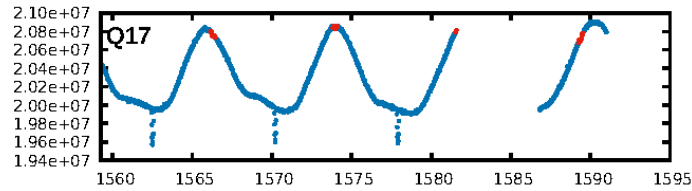
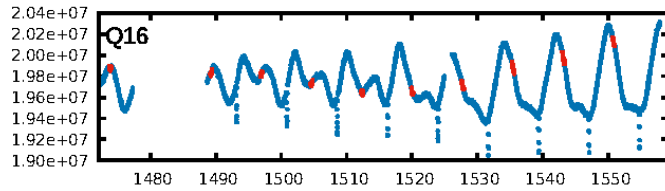
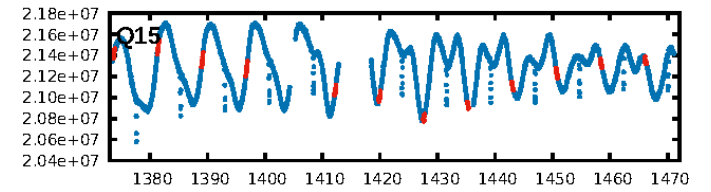
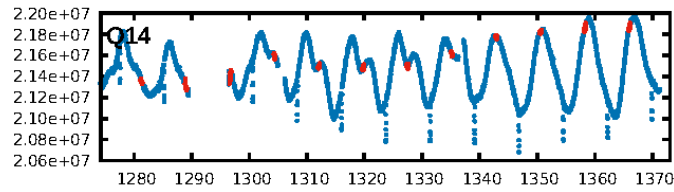
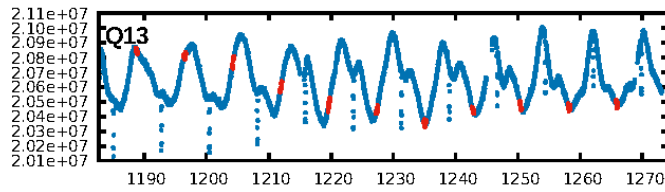
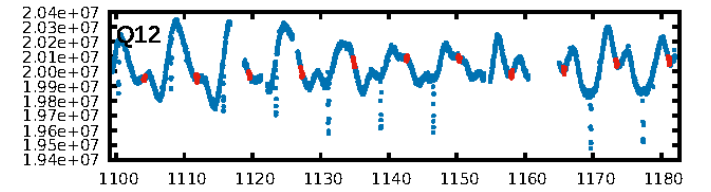
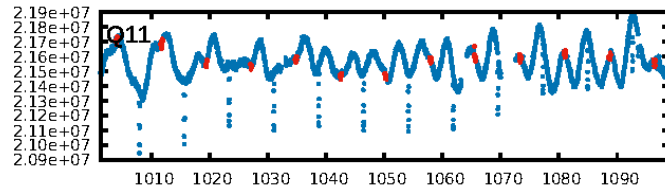
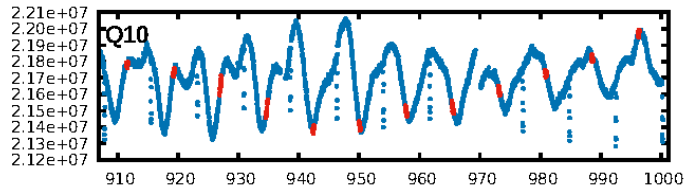
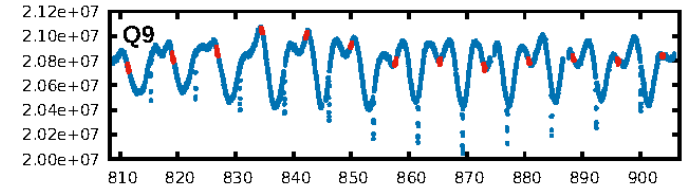
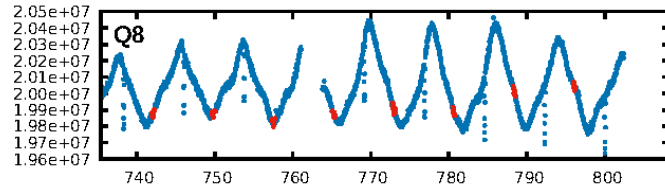
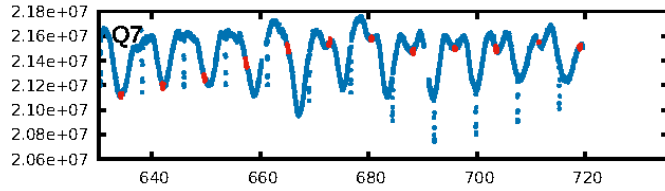
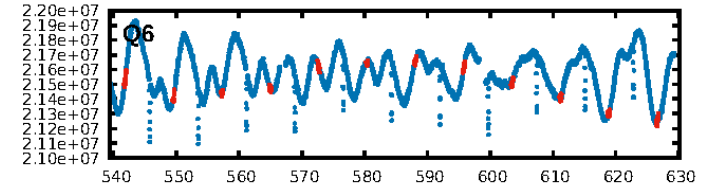
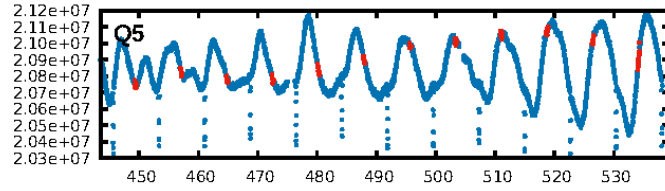
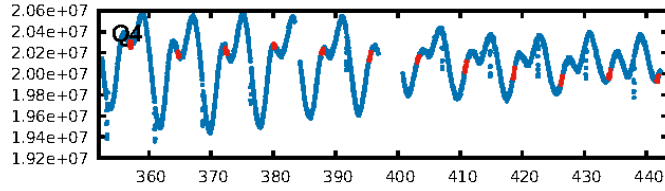
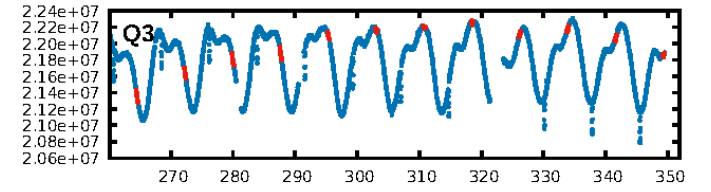
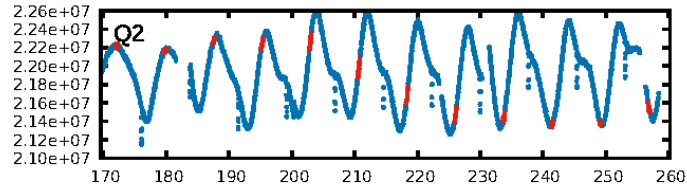
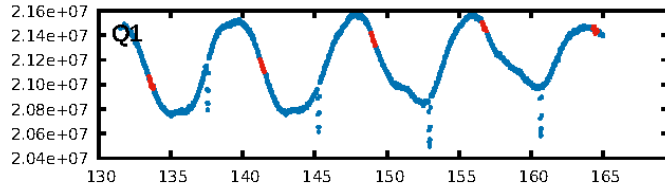
## DV Fit Results:

Period = 7.70237 [0.00001] d  
Epoch = 133.6399 [0.0015] BKJD  
Rp/R\* = 0.0514 [0.0237]  
a/R\* = 5.67 [0.73]  
b = 0.99 [0.04]  
Seff = 109.71 [32.94]  
Teff = 825 [62] K  
Rp = 4.65 [2.38] Re  
a = 0.0743 [0.0139] AU  
Ag = 4.56 [5.37] [0.66σ]  
Teffp = 1864 [536] K [1.92σ]

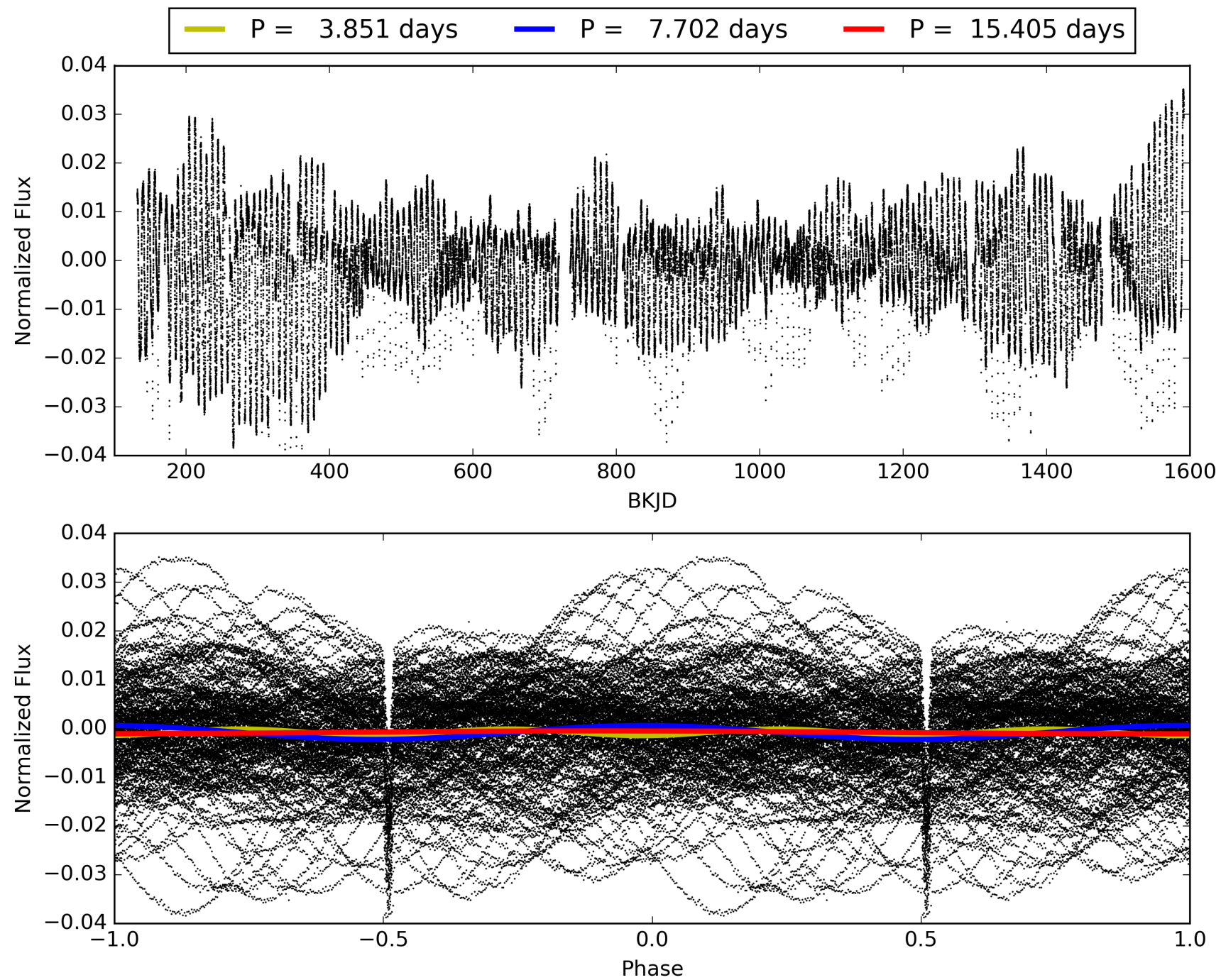
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 0.0% [0.00σ]  
ModelChiSquare2-sig: 99.6%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 0.98 [169/172]  
GhostDiagnostic-chr: 1.889  
Centroid-sig: 66.8%  
Centroid-so: 0.081 arcsec [0.37σ]  
OotOffset-rm: 0.148 arcsec [1.06σ]  
KicOffset-rm: 0.035 arcsec [0.41σ]  
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]

# TCE 006866228-02, PDC Light Curves

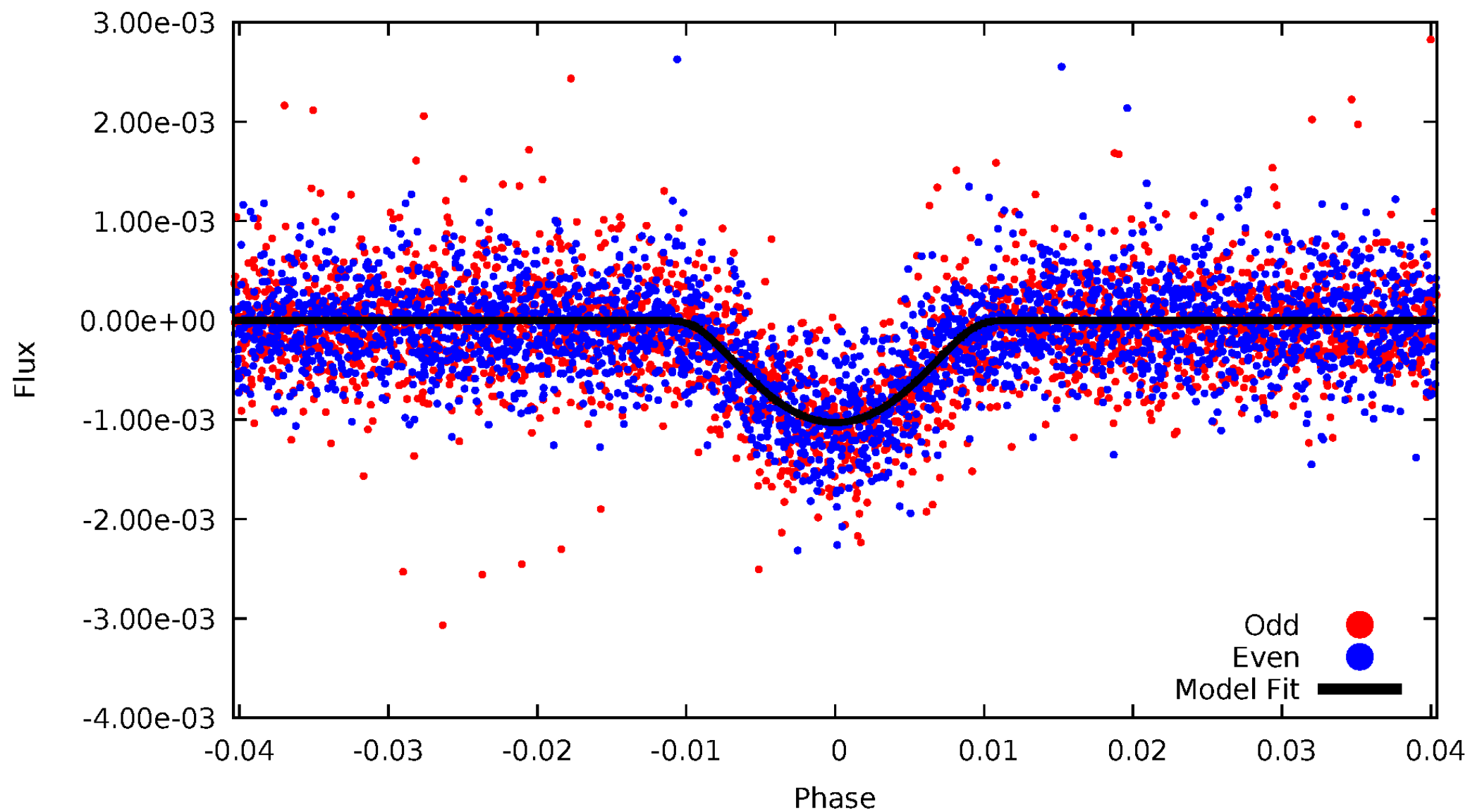


TCE 006866228-02



# DV Odd/Even

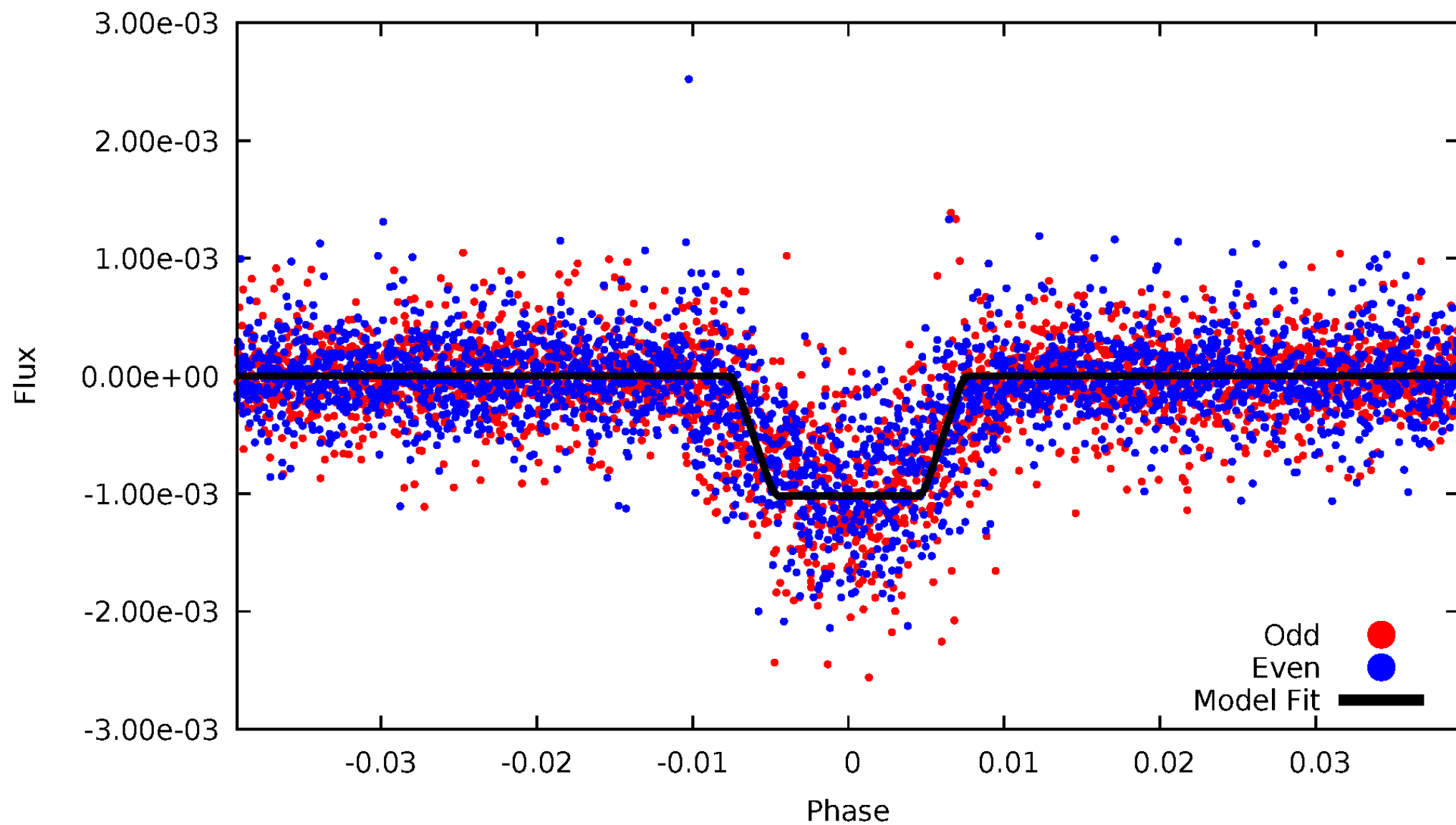
TCE 006866228-02





# ALT Odd/Even

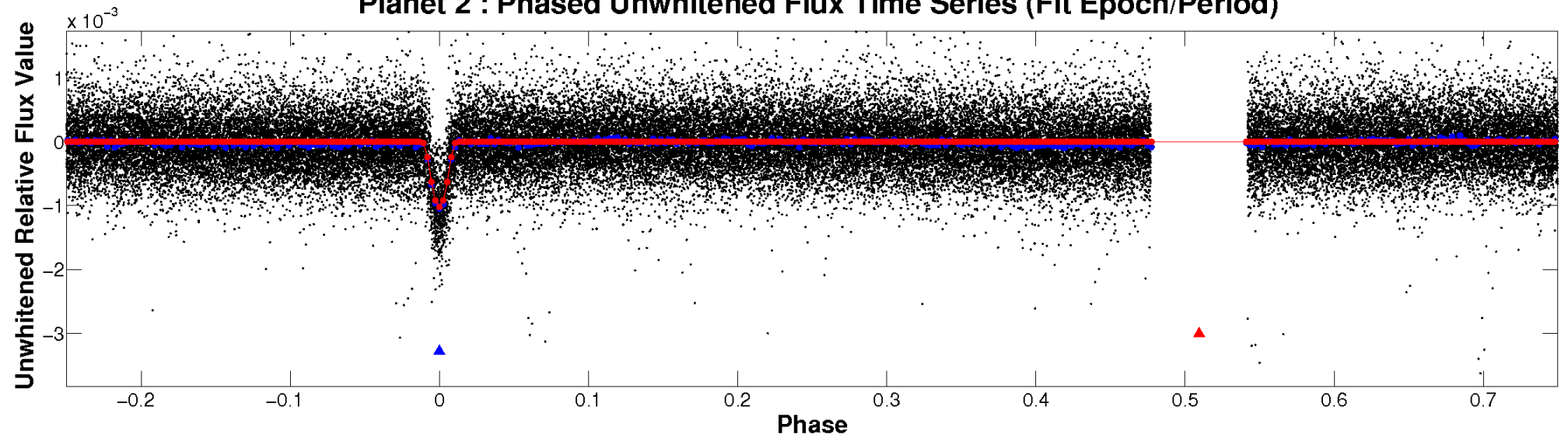
TCE 006866228-02



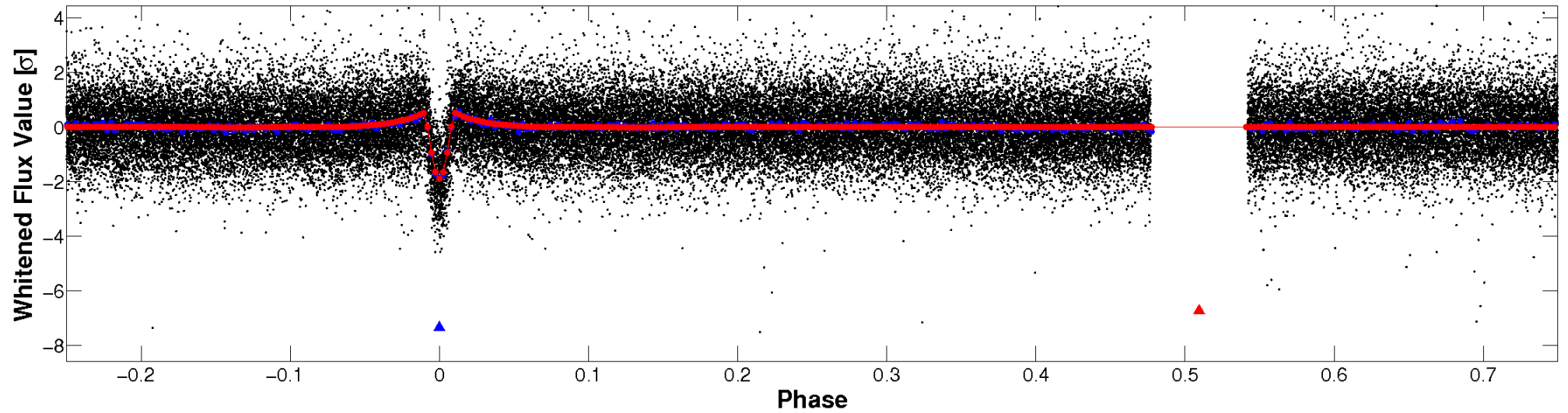


# Non-Whitened Vs. Whitened Light Curve

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

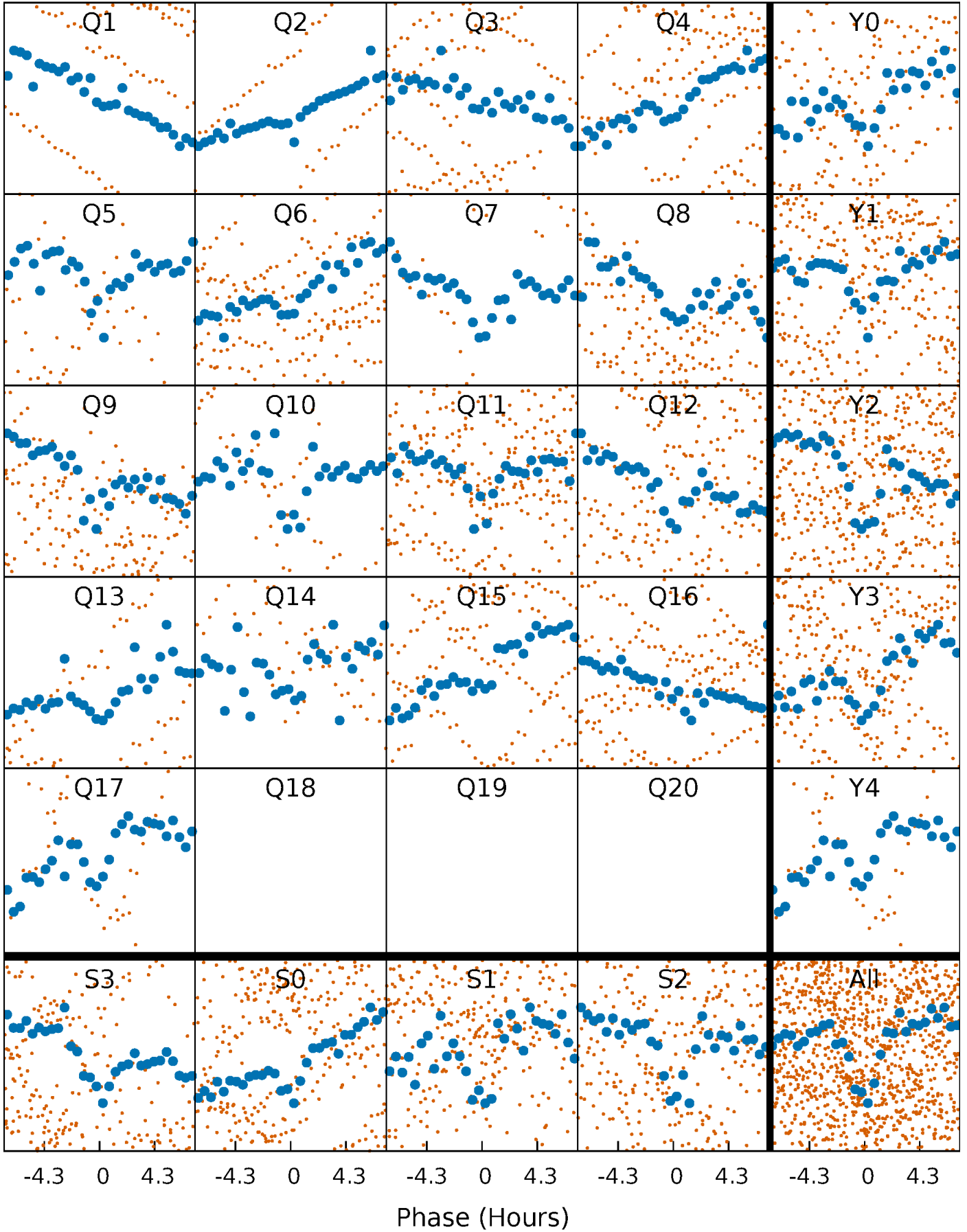


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



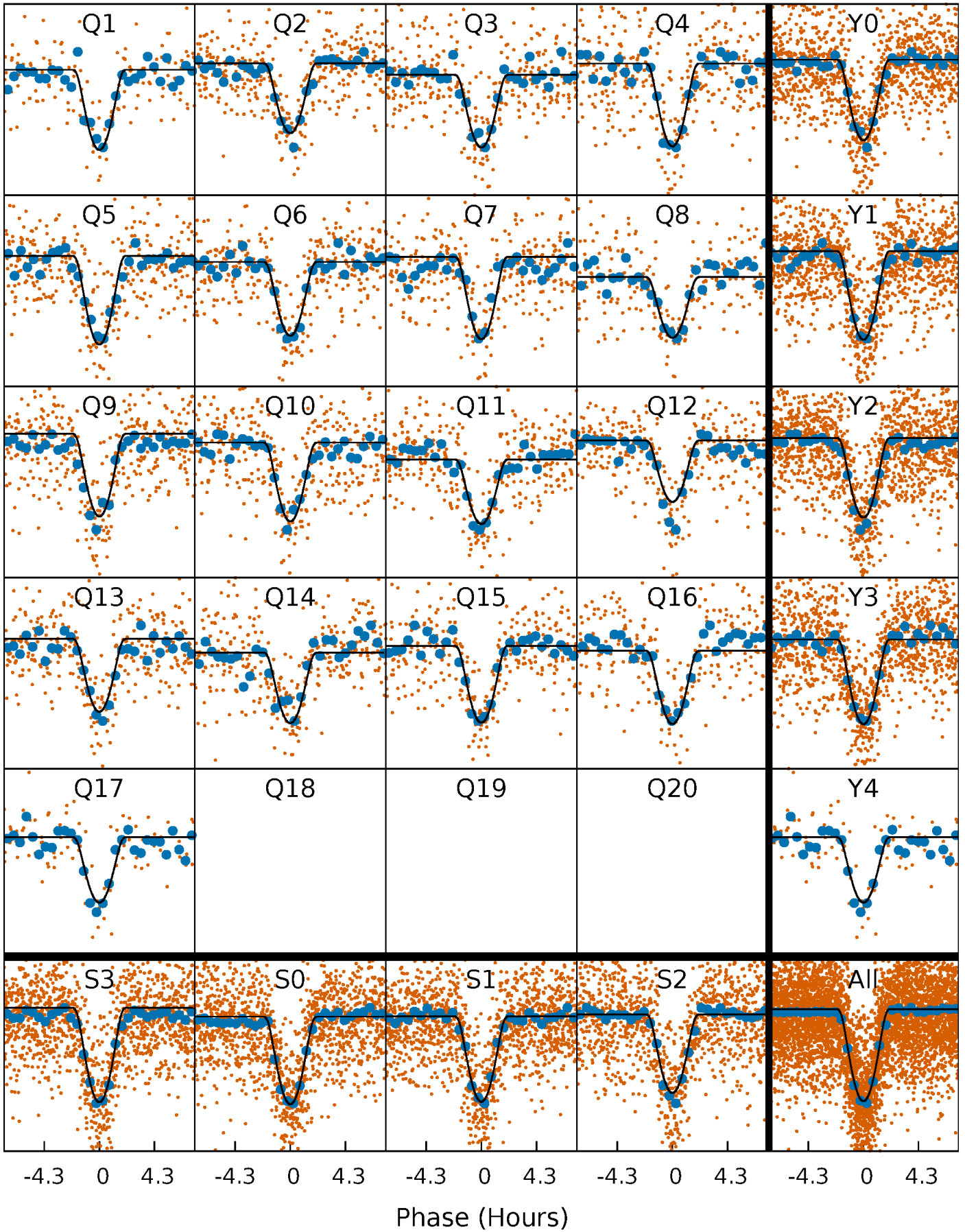
# PDC Quarter-Phased Transit Curves

TCE 006866228-02   P= 7.702370 Days    $T_0=133.639902$  (BKJD)



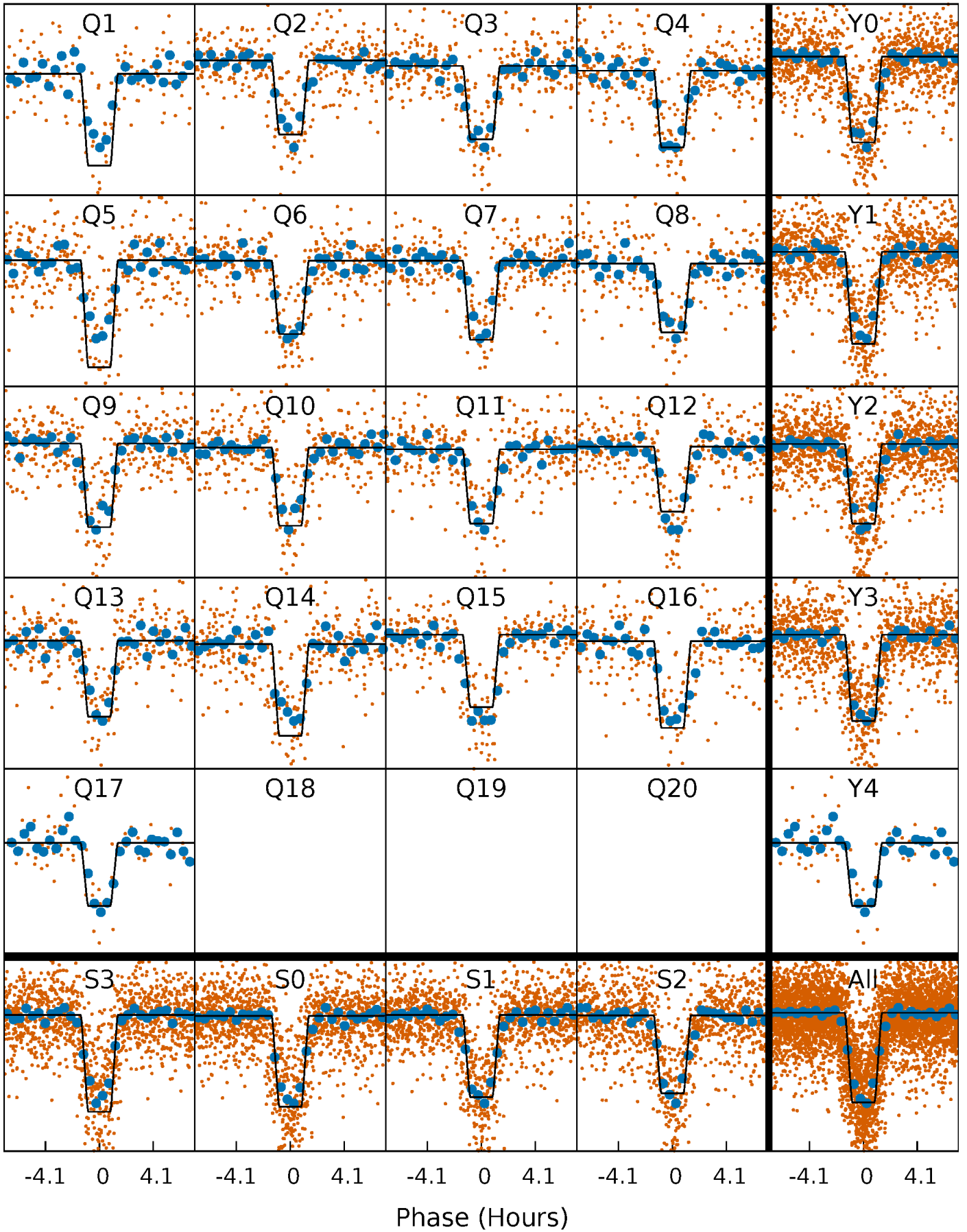
# DV Quarter-Phased Transit Curves

TCE 006866228-02   P= 7.702370 Days    $T_0=133.639902$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

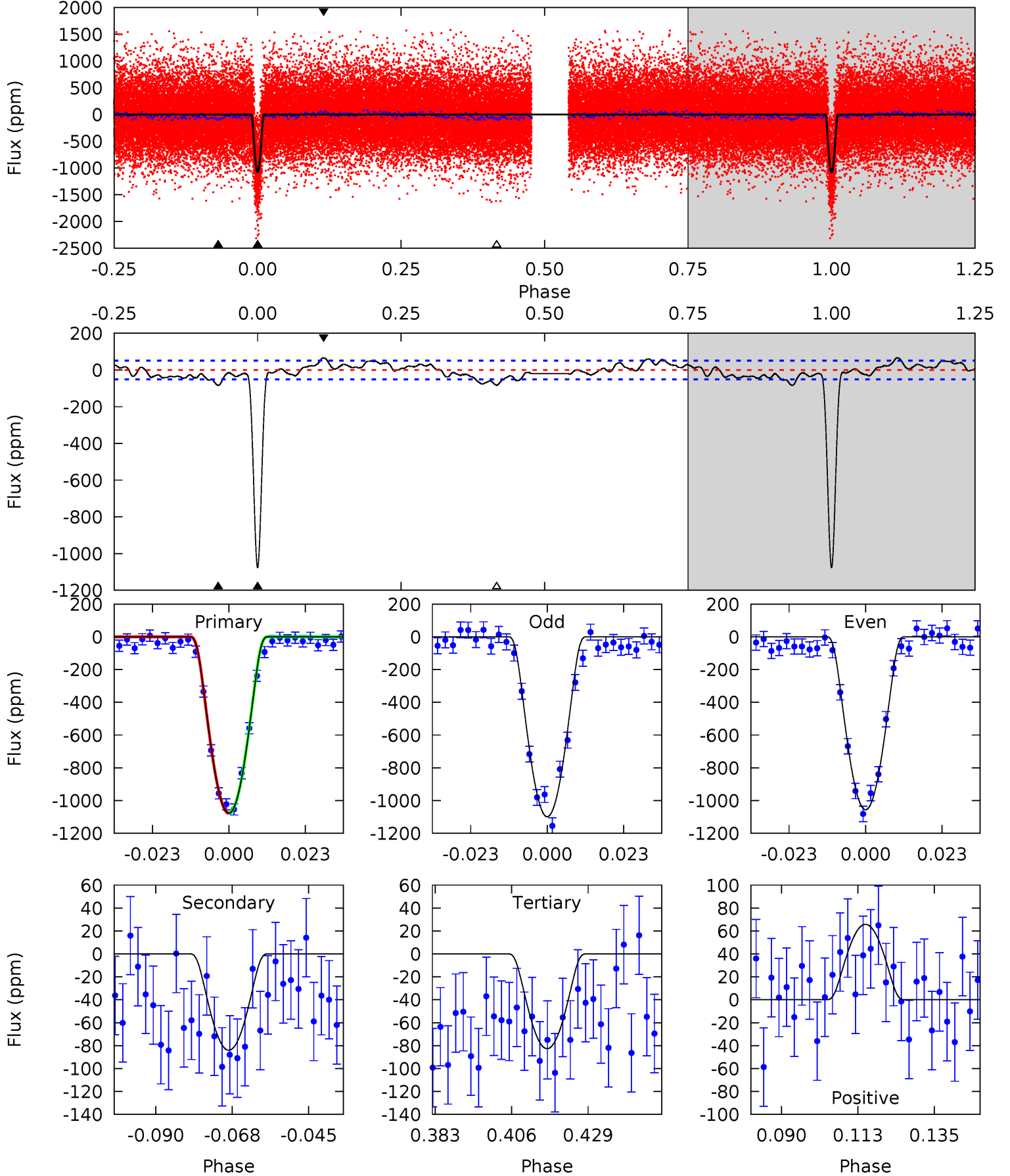
TCE 006866228-02   P= 7.702340 Days    $T_0=133.641750$  (BKJD)



# DV Model-Shift Uniqueness Test

006866228-02, P = 7.702370 Days, E = 125.937532 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
102.9	8.03	7.90	6.29	4.87	2.28	3.09	95.0	96.7	0.13	1.74	2.05	1.02	0.06	0.03

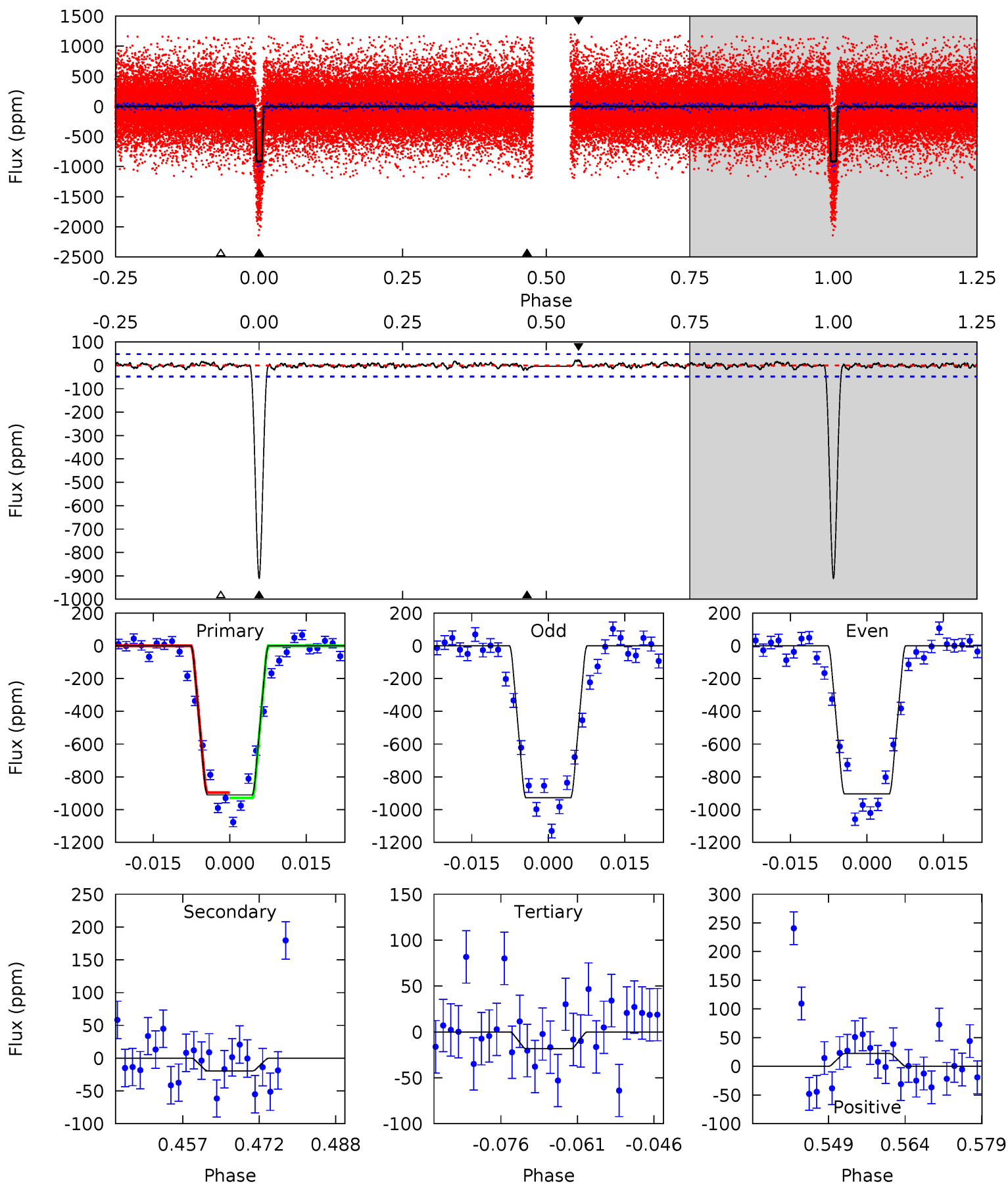




# Alt Model-Shift Uniqueness Test

006866228-02, P = 7.702340 Days, E = 125.939410 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
93.5	2.00	1.89	2.30	4.94	2.43	0.68	91.6	91.2	0.11	-0.30	1.21	1.04	0.02	1.69





### Stellar Parameters For KIC 006866228

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5598^{+152}_{-169}$	$4.565^{+0.038}_{-0.152}$	$-0.100^{+0.300}_{-0.300}$	$0.830^{+0.181}_{-0.078}$	$0.928^{+0.085}_{-0.114}$	$2.285^{+0.452}_{-0.959}$
	+3%/-3%	+1%/-3%	+300%/-300%	+22%/-9%	+9%/-12%	+20%/-42%
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 006866228-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-84 \pm 10$	$4.92^{+2.36}_{-2.15}$	$1178^{+58}_{-49}$	$2978^{+600}_{-294}$	$10^{+22}_{-6}$
Alt.	$-19 \pm 10$	$3.31^{+2.18}_{-1.91}$	$1174^{+60}_{-47}$	$2707^{+755}_{-430}$	$4.975^{+23.715}_{-3.525}$

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

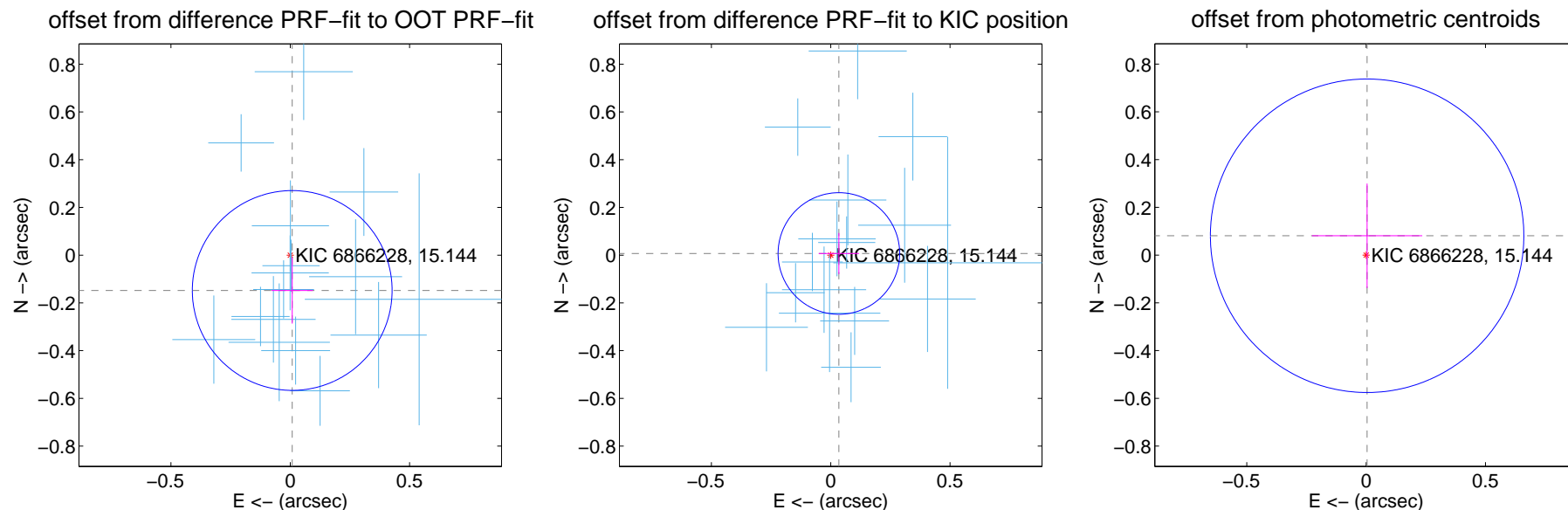
## DV Centroid Data

Supplemental centroid analysis for 006866228-02. Kepler magnitude: 15.14. Transit SNR 46.44

There are 17 quarters with good PRF difference image offsets

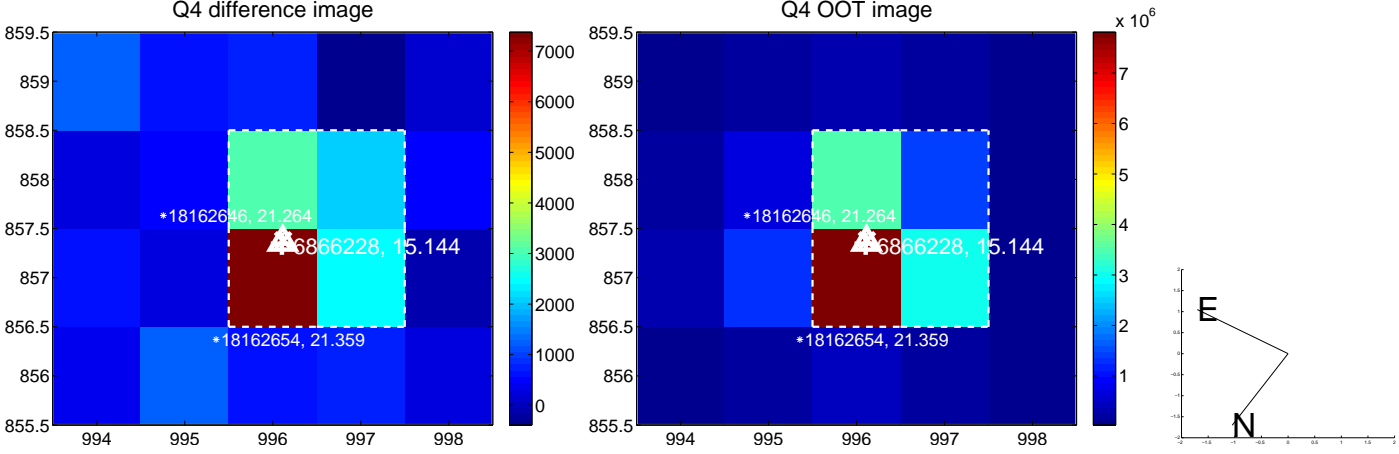
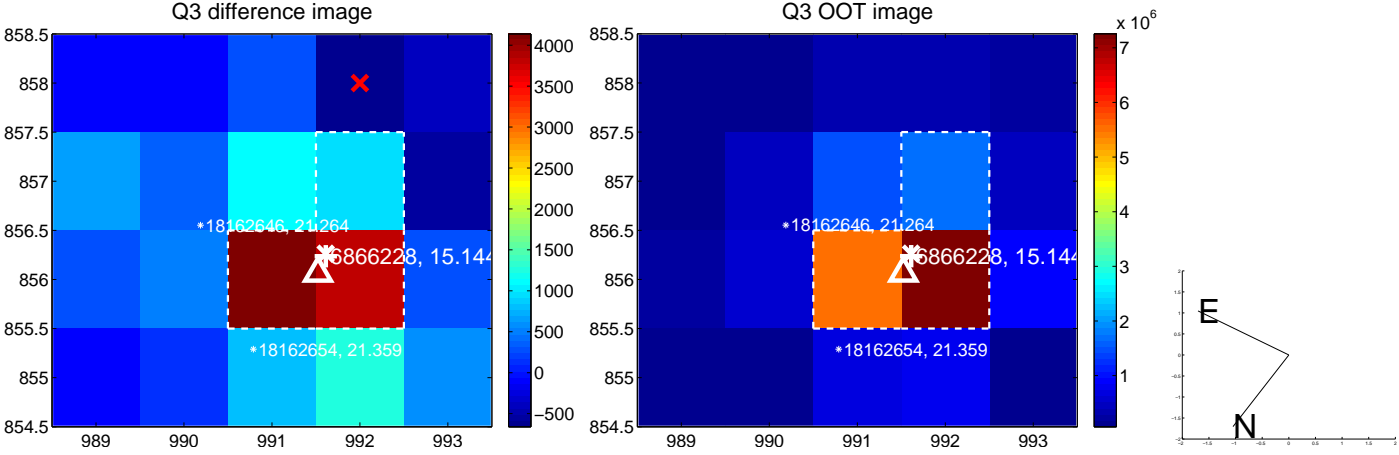
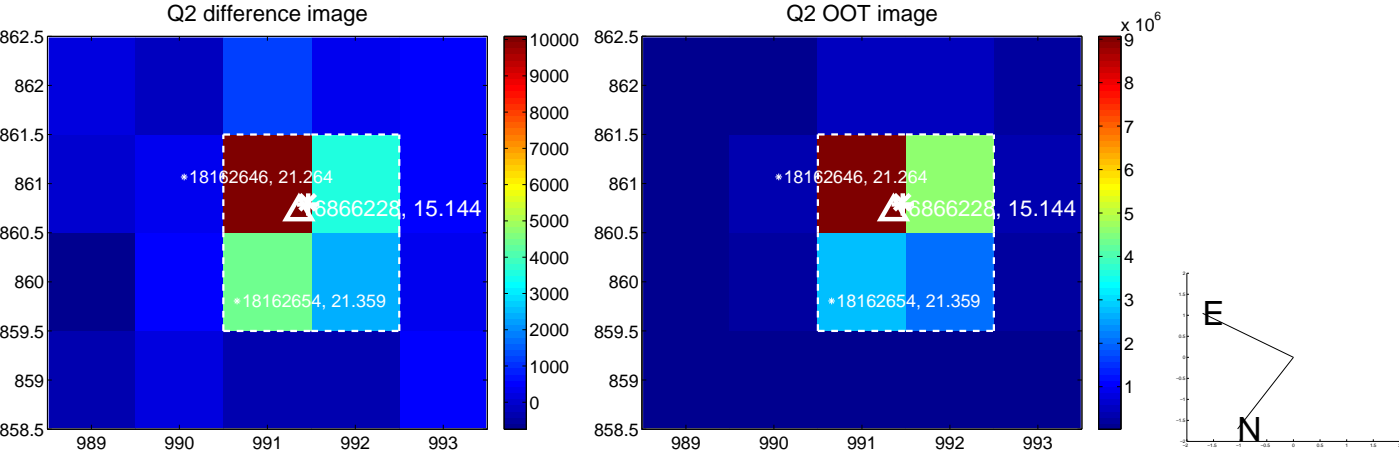
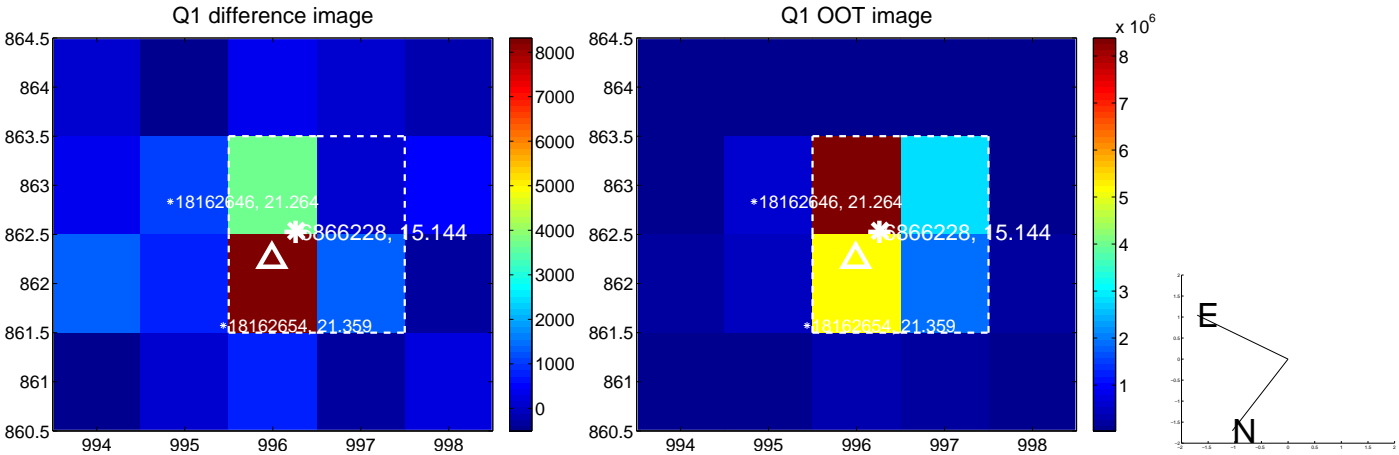
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.148 \pm 0.139$	1.06	$-0.008 \pm 0.087$	$-0.148 \pm 0.139$
PRF-fit source offset from KIC position	$0.035 \pm 0.085$	0.41	$-0.034 \pm 0.085$	$0.007 \pm 0.086$
photometric centroid source offset	$0.08 \pm 0.22$	0.37	$-0.00 \pm 0.23$	$0.08 \pm 0.22$

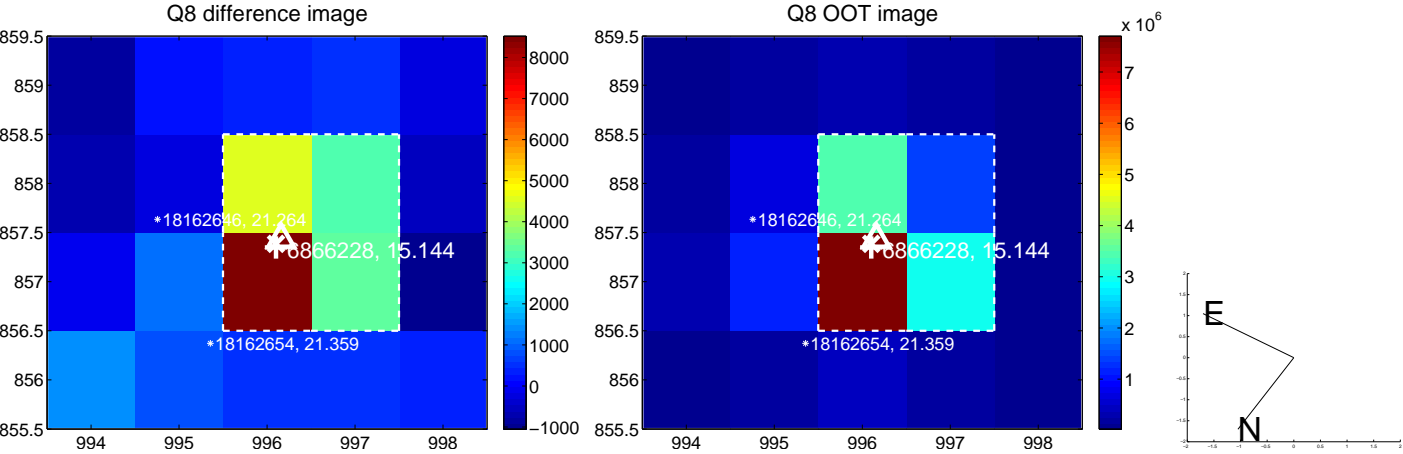
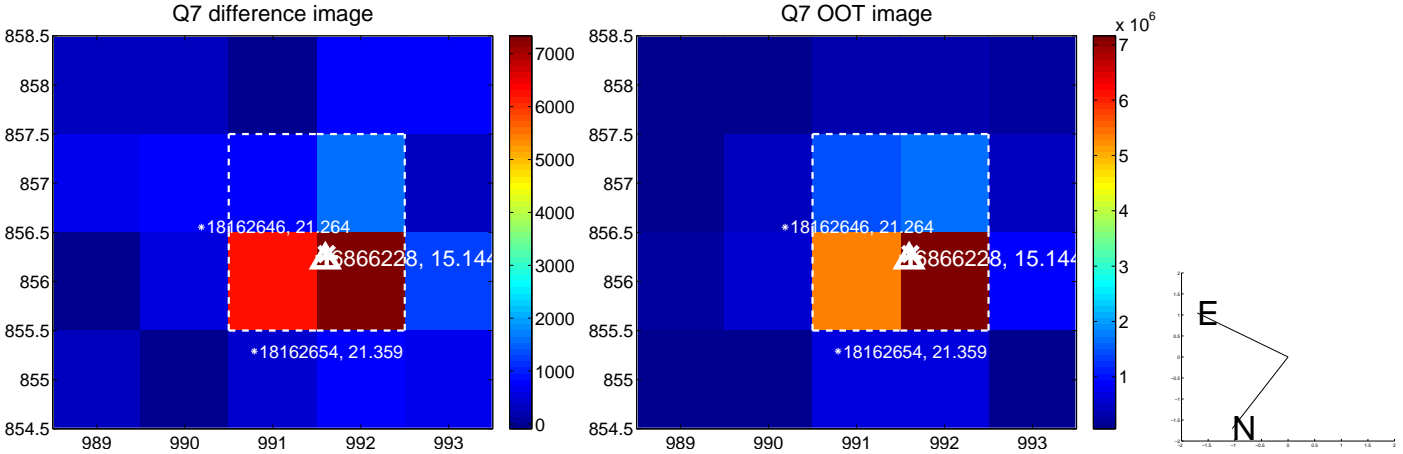
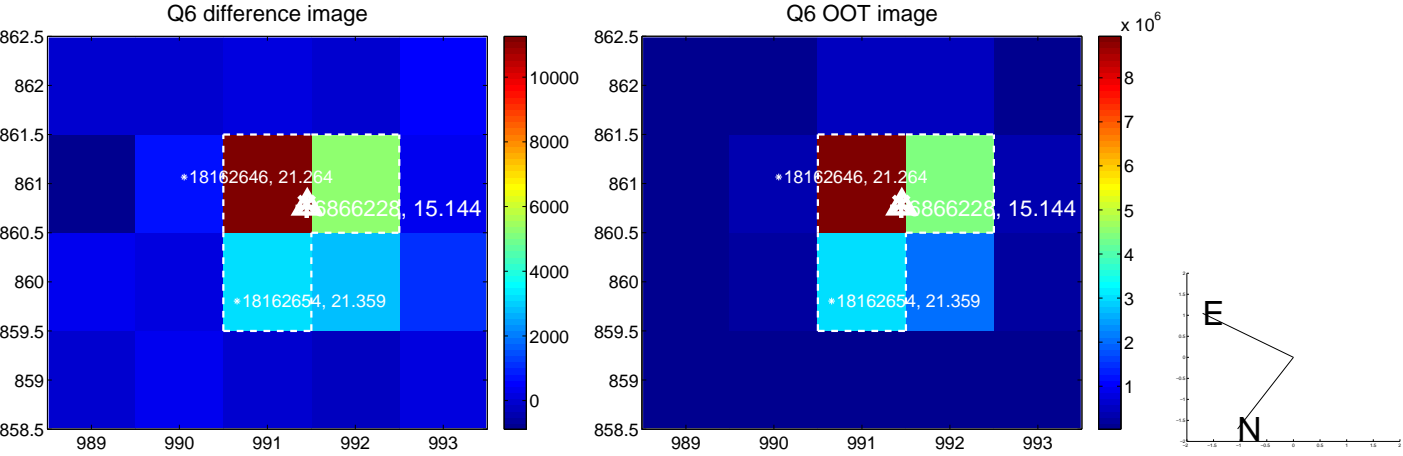
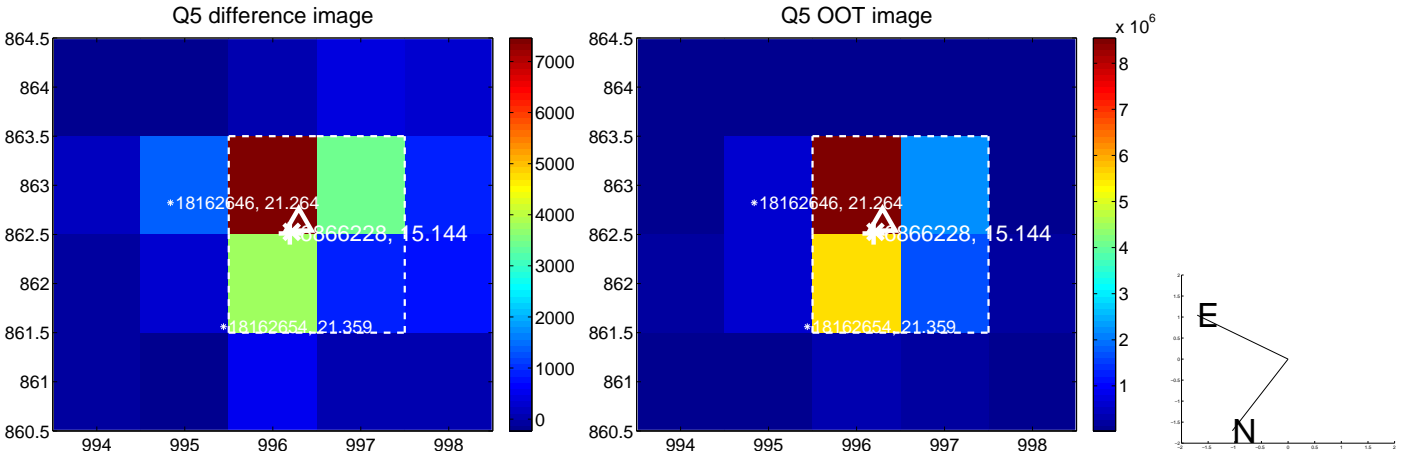


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

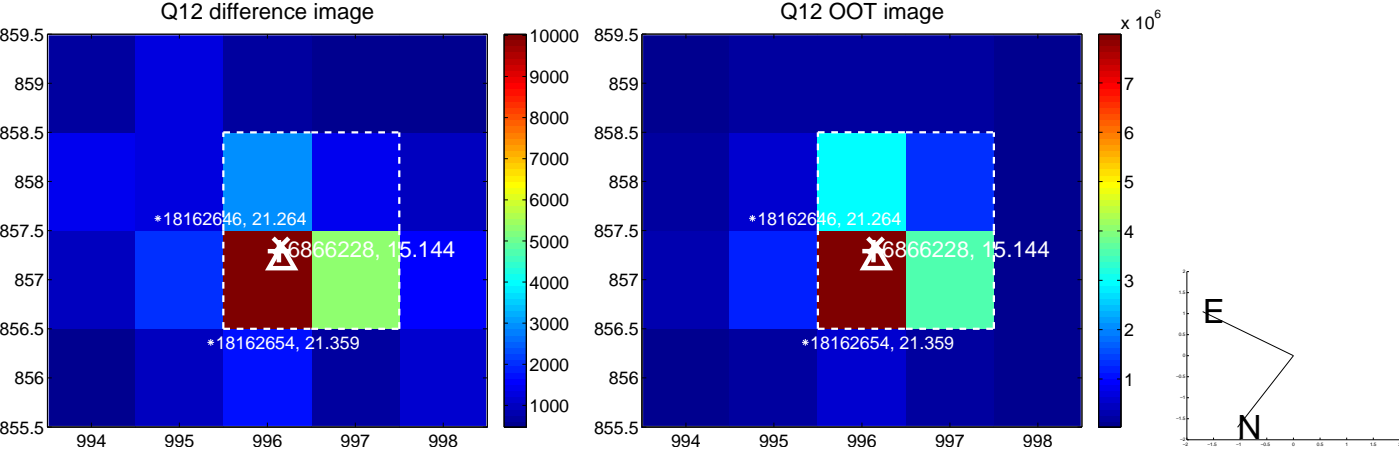
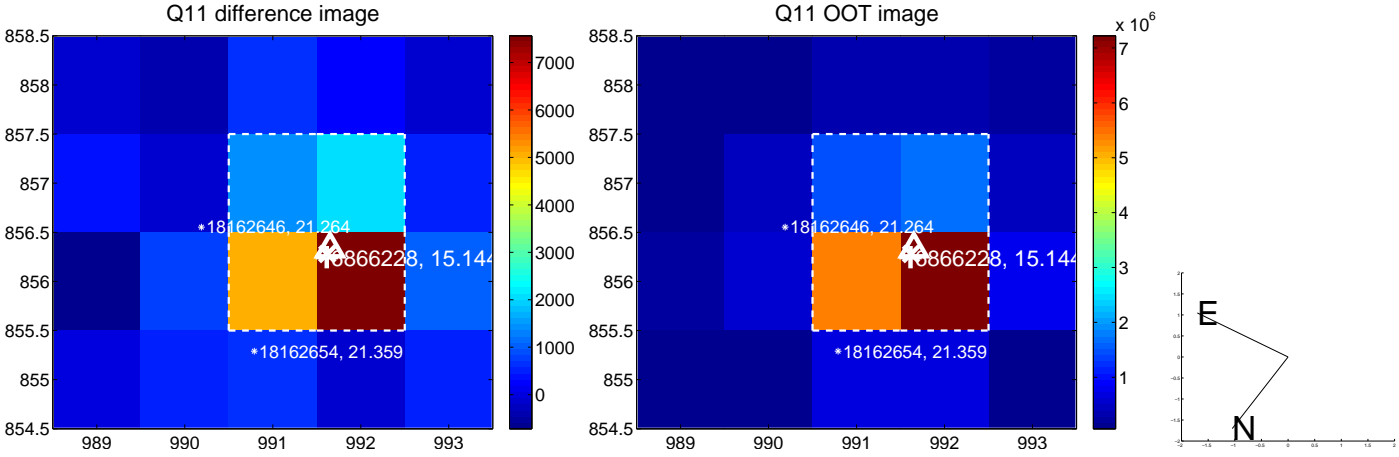
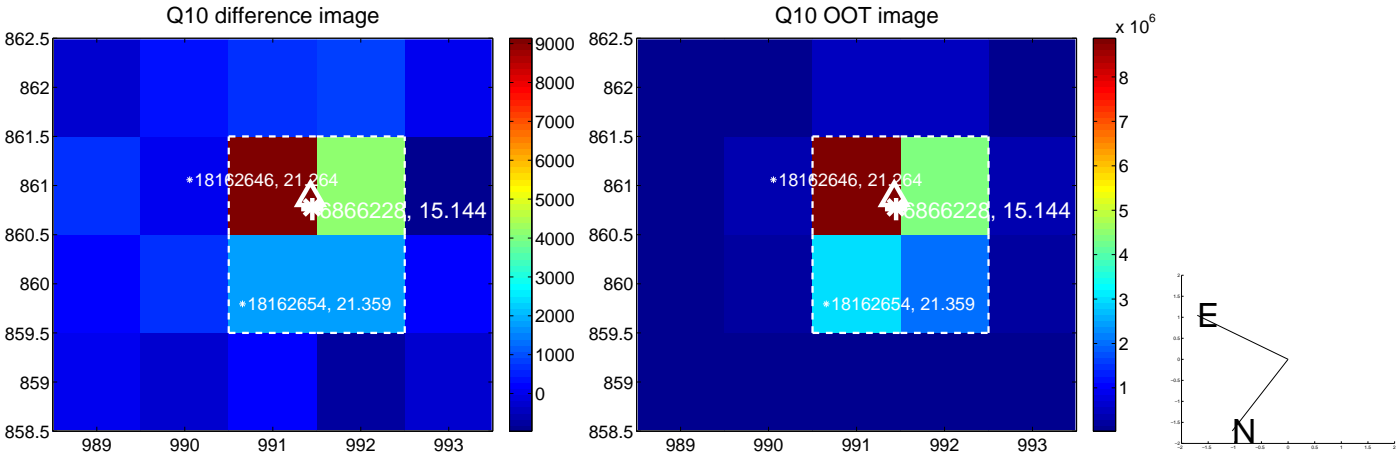
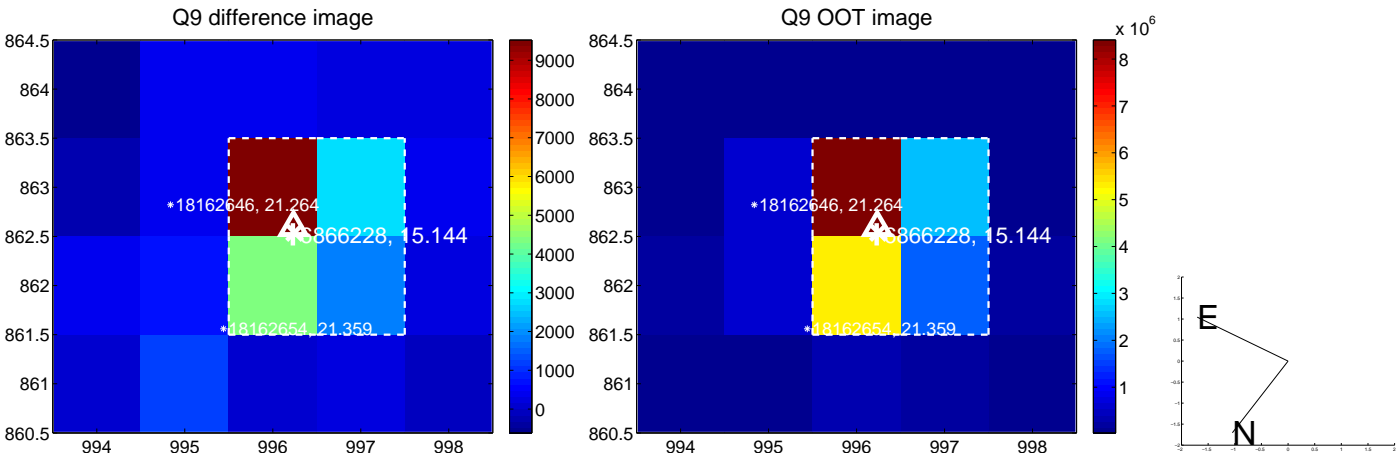
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



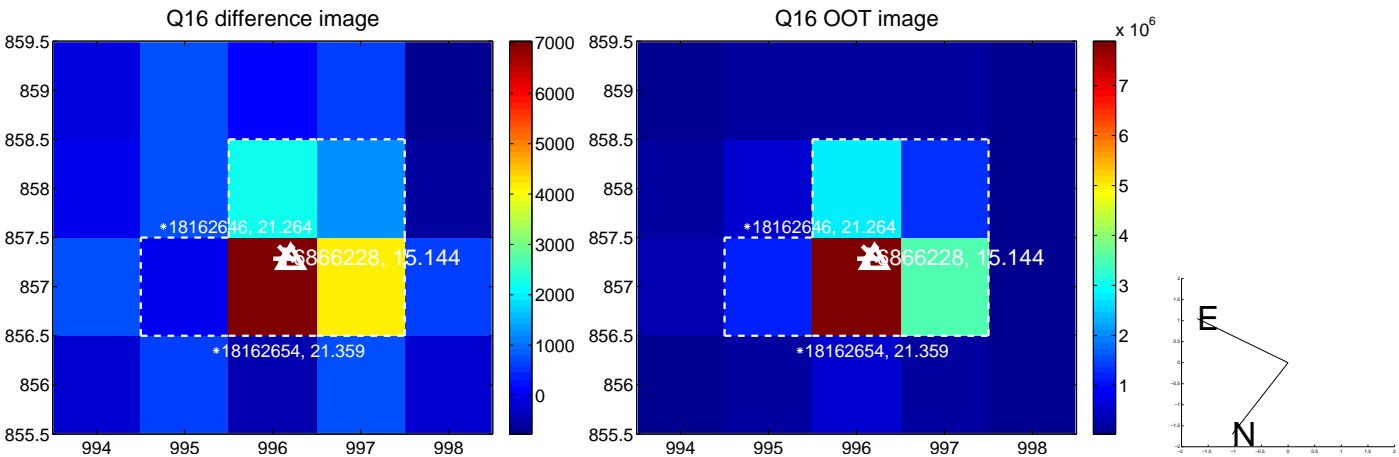
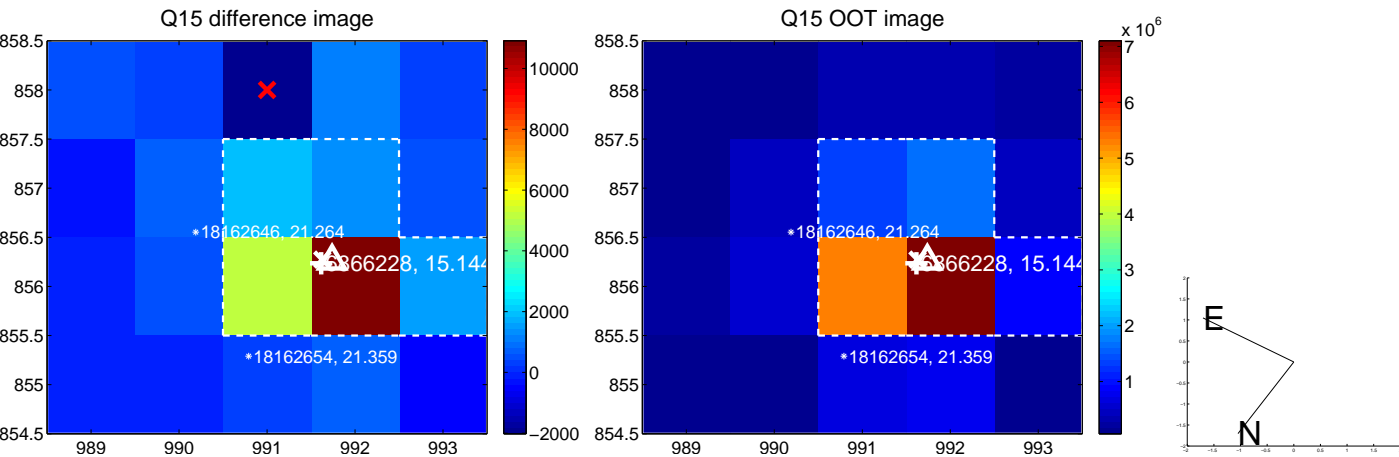
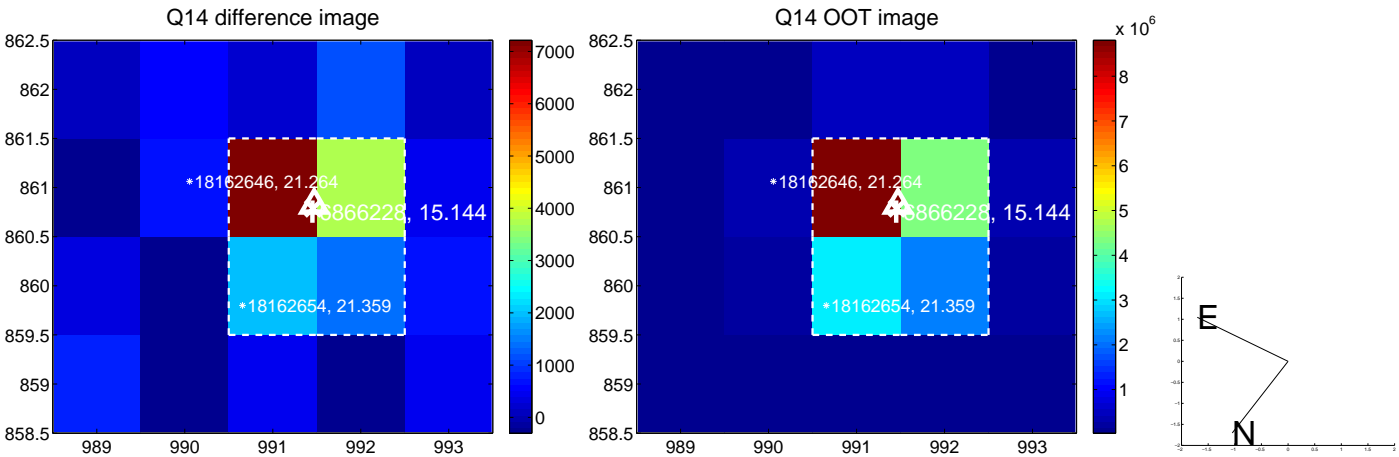
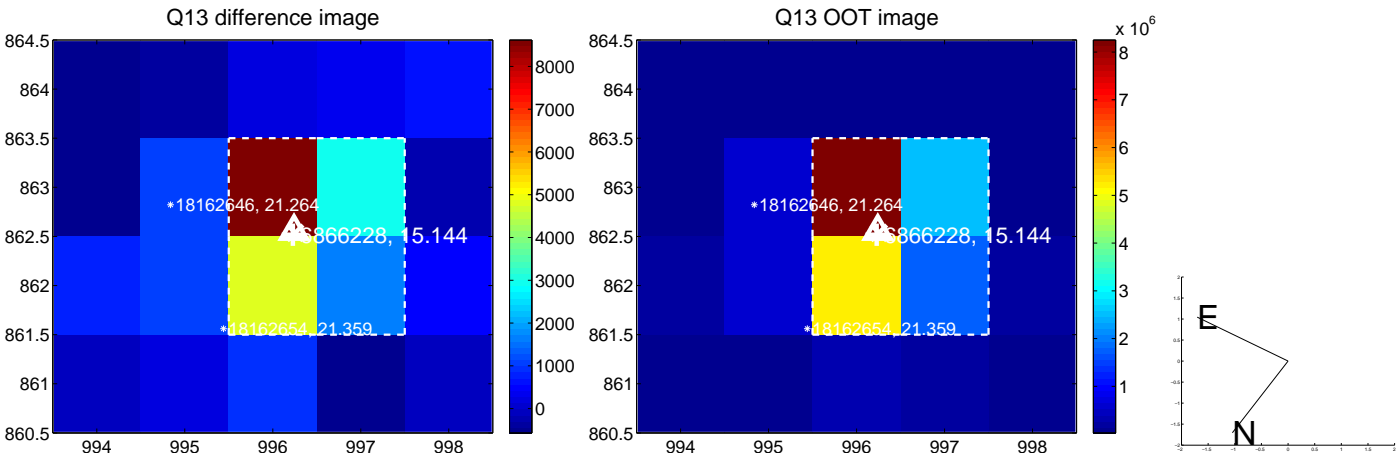
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.





# UKIRT Image

Declination

