

# KIC 006428700

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006428700-01	OBS	0853.01	8.203974	136.875062	1004.6	3.146	44.8	48.7	0.83	5015	3.21	71.66
006428700-02	OBS	0853.02	14.496399	143.416344	675.5	4.080	20.9	23.0	0.83	5015	3.55	33.54

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006428700-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
006428700-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

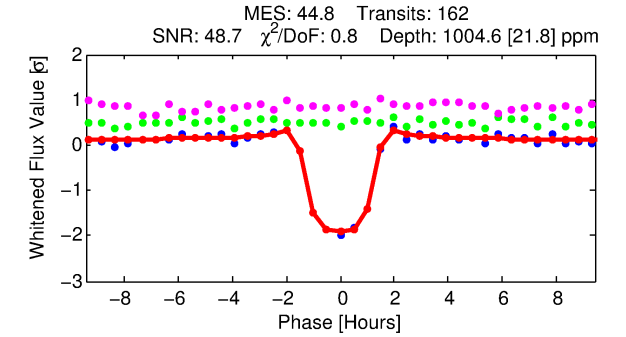
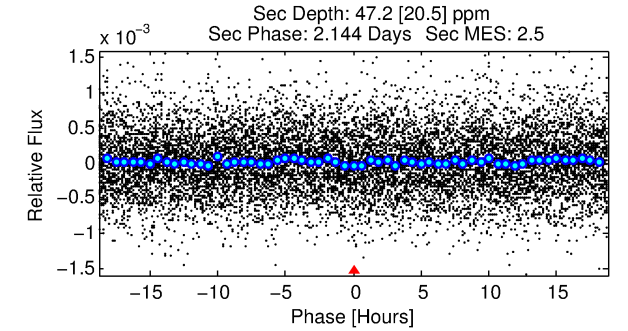
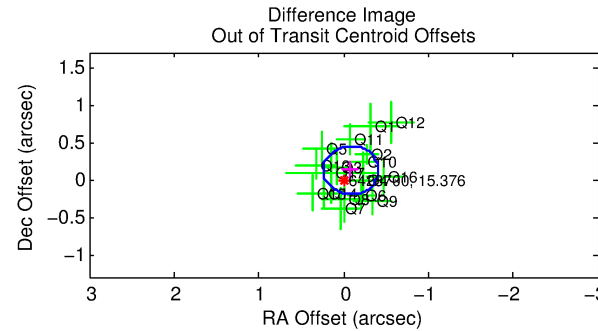
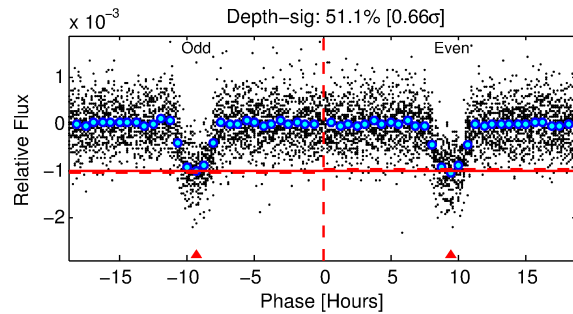
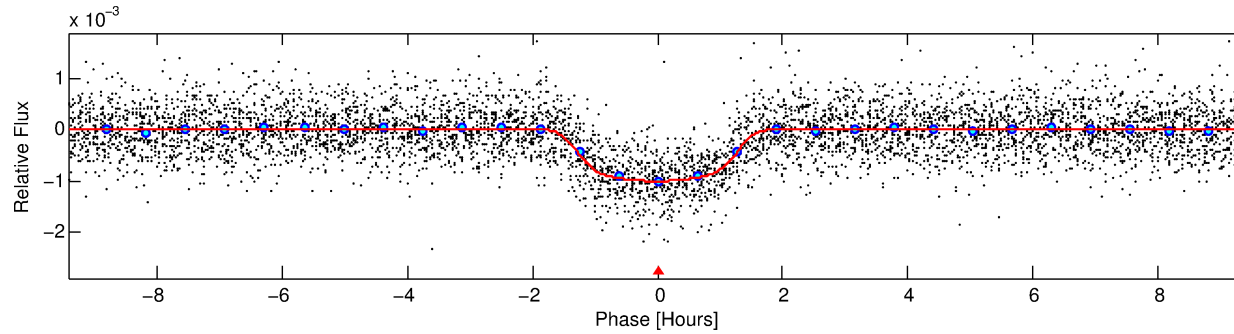
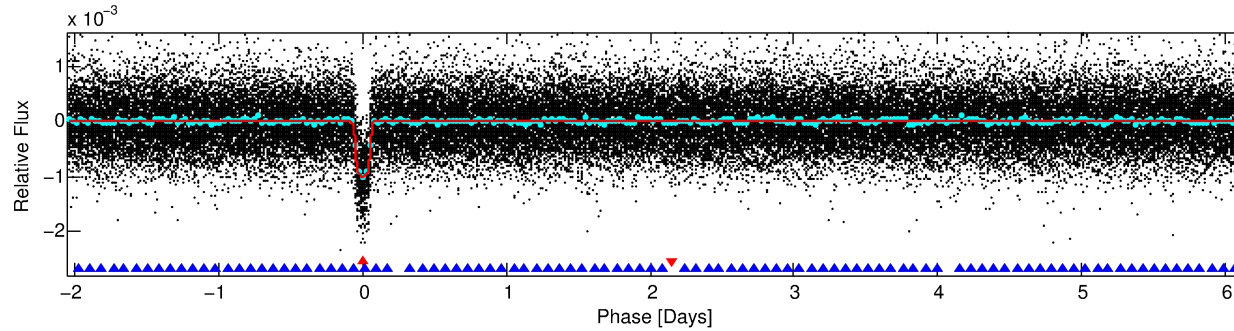
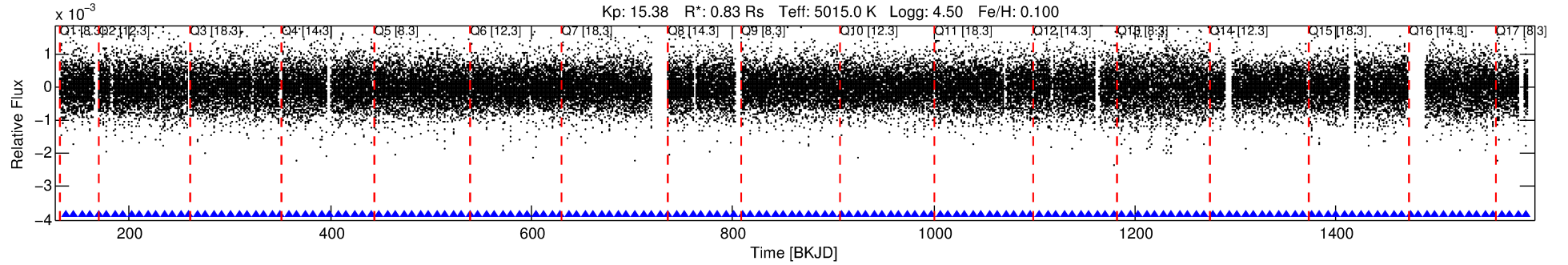
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 006428700-01

No Significant Match Found

# DV One-Page Summary

KIC: 6428700 Candidate: 1 of 2 Period: 8.204 d  
KOI: K00853.01 Name: Kepler-242b Corr: 0.968



## DV Fit Results:

Period = 8.20397 [0.00001] d  
Epoch = 136.8751 [0.0013] BKJD  
Rp/R\* = 0.0356 [0.0015]  
a/R\* = 10.13 [1.47]  
b = 0.90 [0.03]  
Seff = 71.66 [13.91]  
Teq = 742 [36] K  
Rp = 3.21 [0.35] Re  
a = 0.0735 [0.0071] AU  
Ag = 13.61 [6.37] [1.98 $\sigma$ ]  
Teffp = 2203 [252] K [5.74 $\sigma$ ]

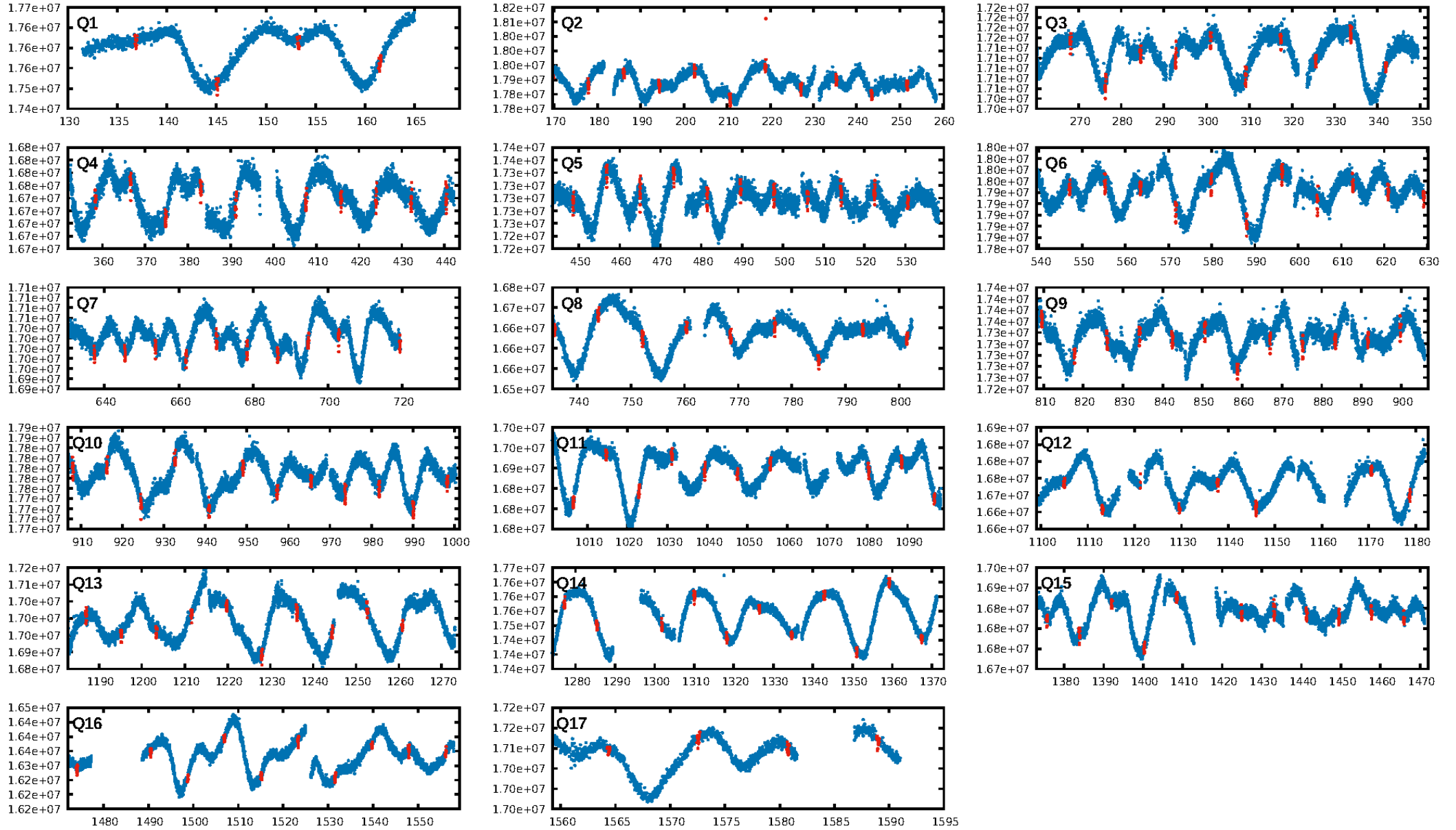
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [29.31 $\sigma$ ]  
ModelChiSquare2-sig: 99.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [154/154]  
GhostDiagnostic-chr: 5.976  
Centroid-sig: 0.9%  
Centroid-so: 0.367 arcsec [1.55 $\sigma$ ]  
OotOffset-rm: 0.152 arcsec [1.41 $\sigma$ ]  
KicOffset-rm: 0.224 arcsec [2.07 $\sigma$ ]  
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]

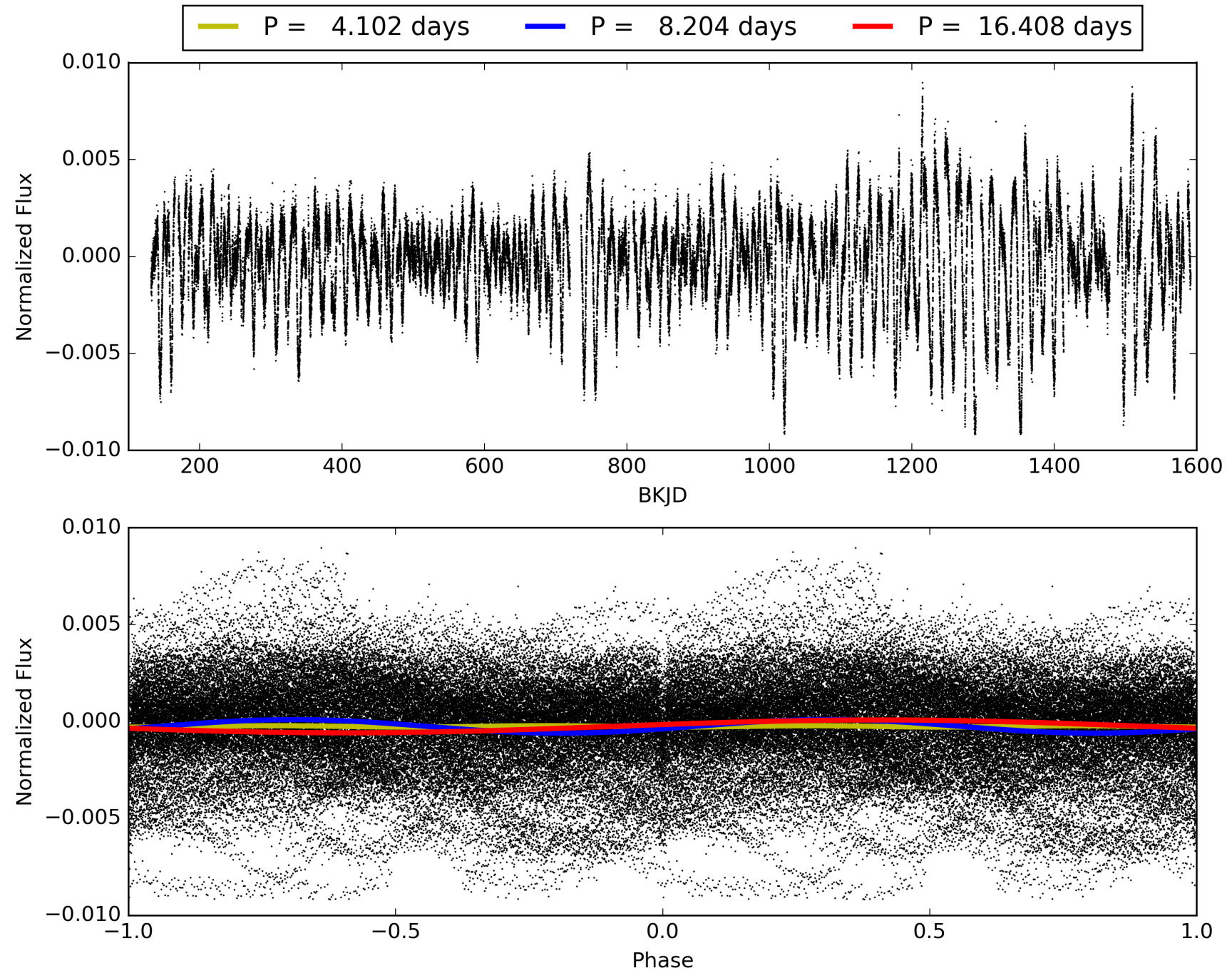
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 23:26:25 Z

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

# TCE 006428700-01, PDC Light Curves

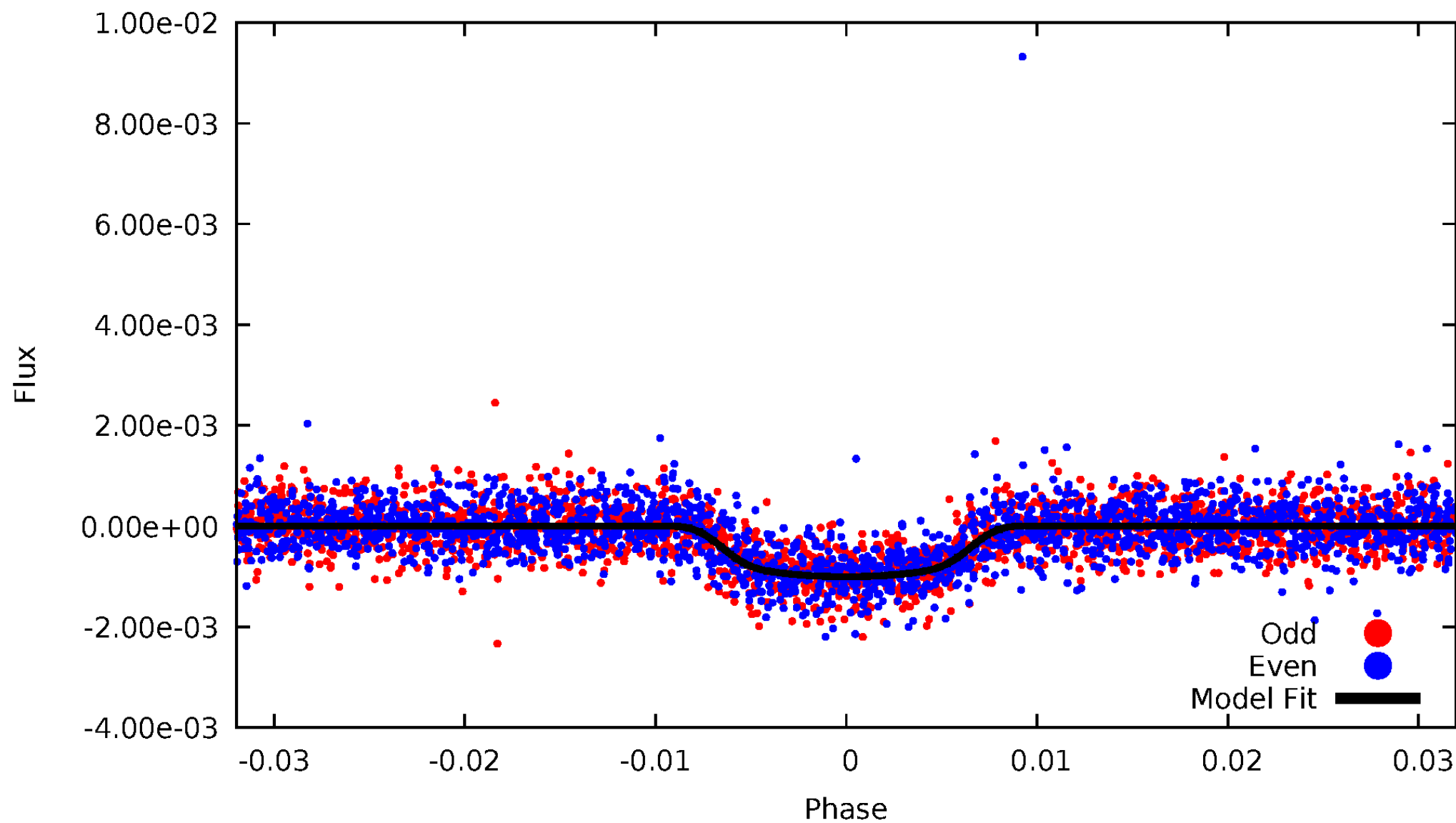


TCE 006428700-01



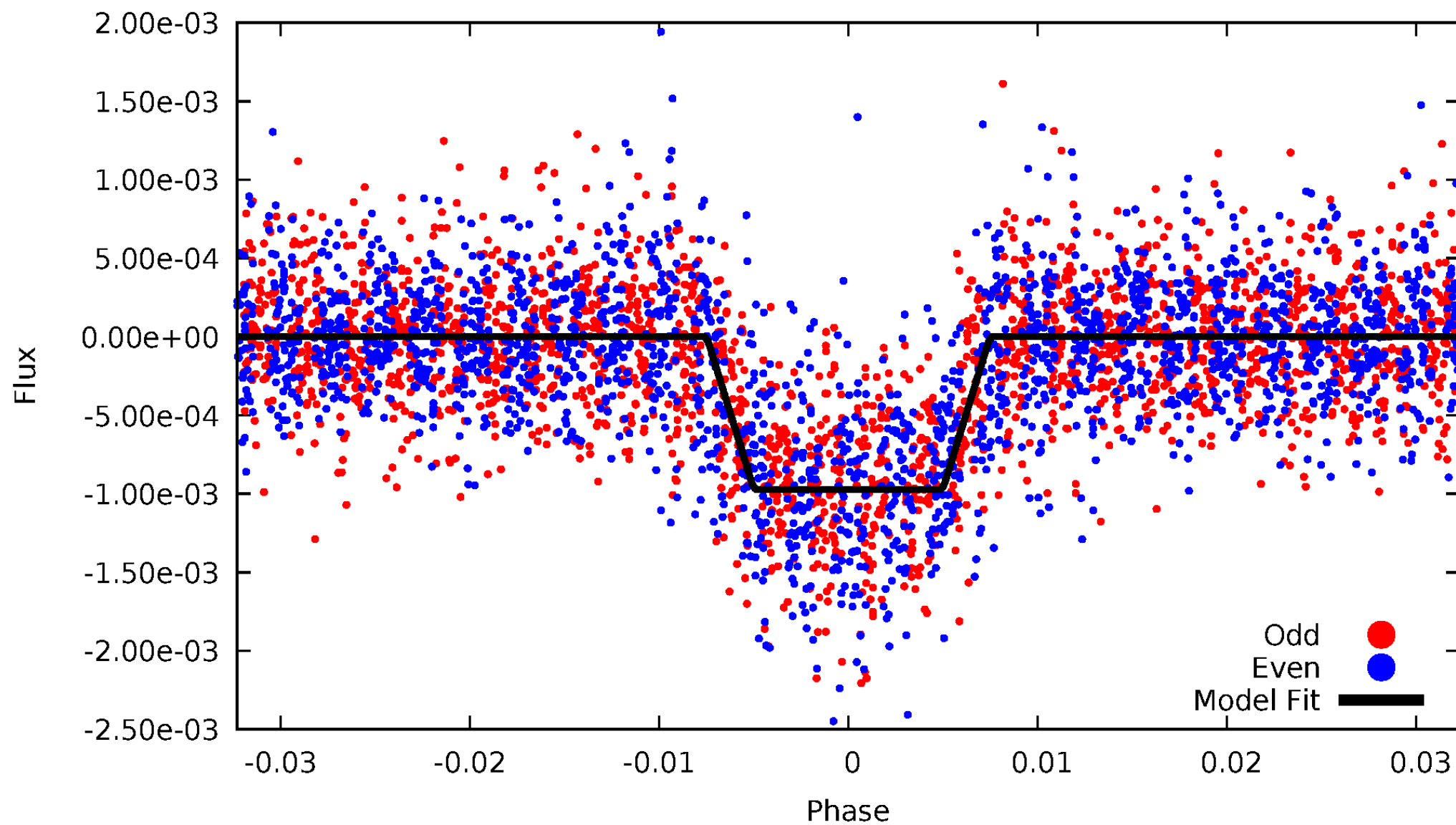
# DV Odd/Even

TCE 006428700-01



# ALT Odd/Even

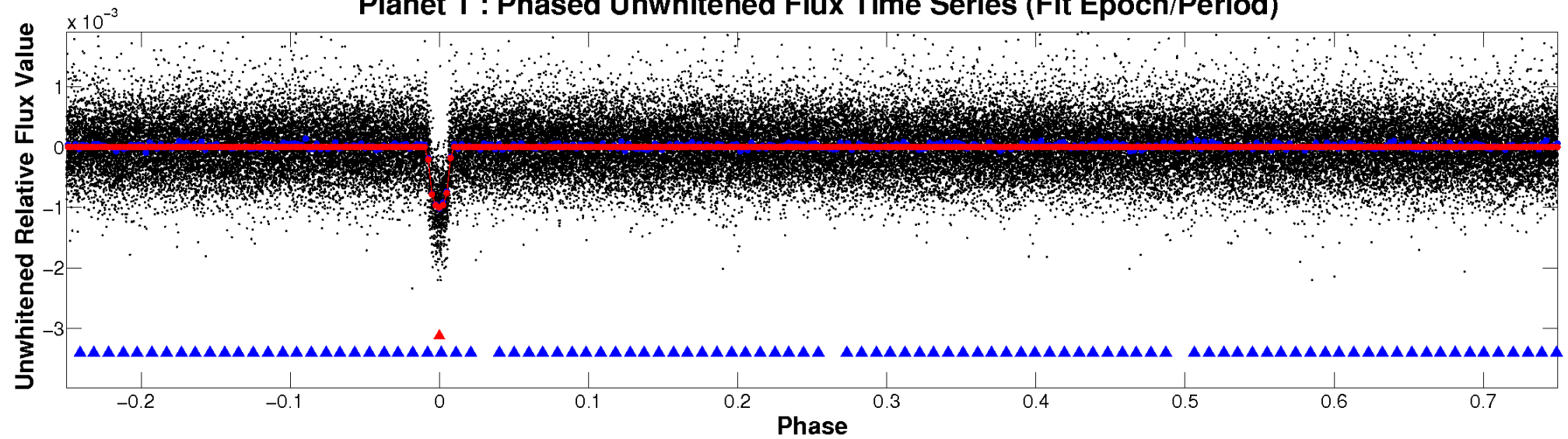
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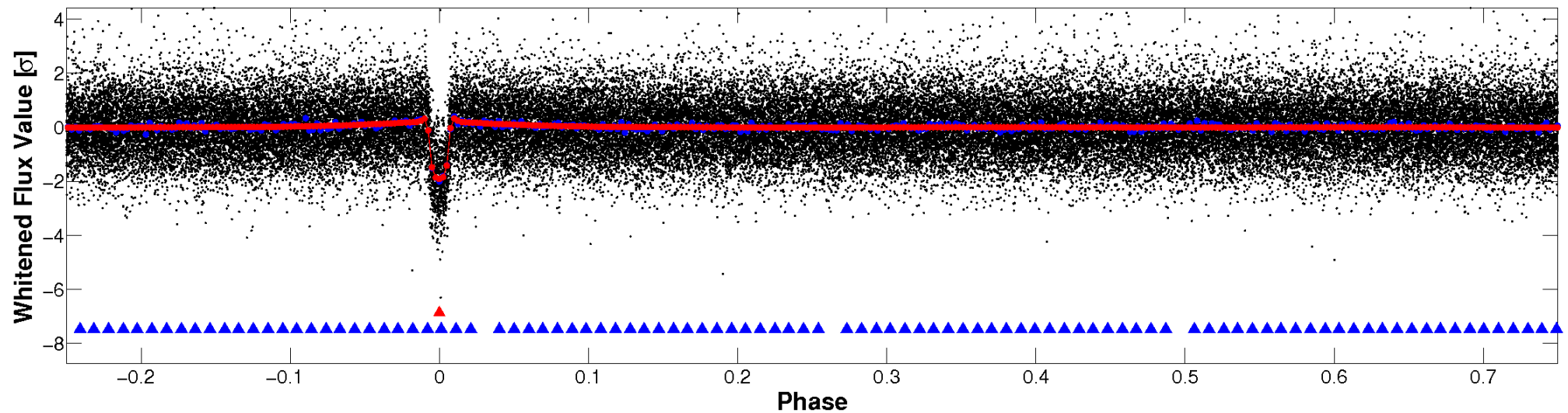


# Non-Whitened Vs. Whitened Light Curve

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

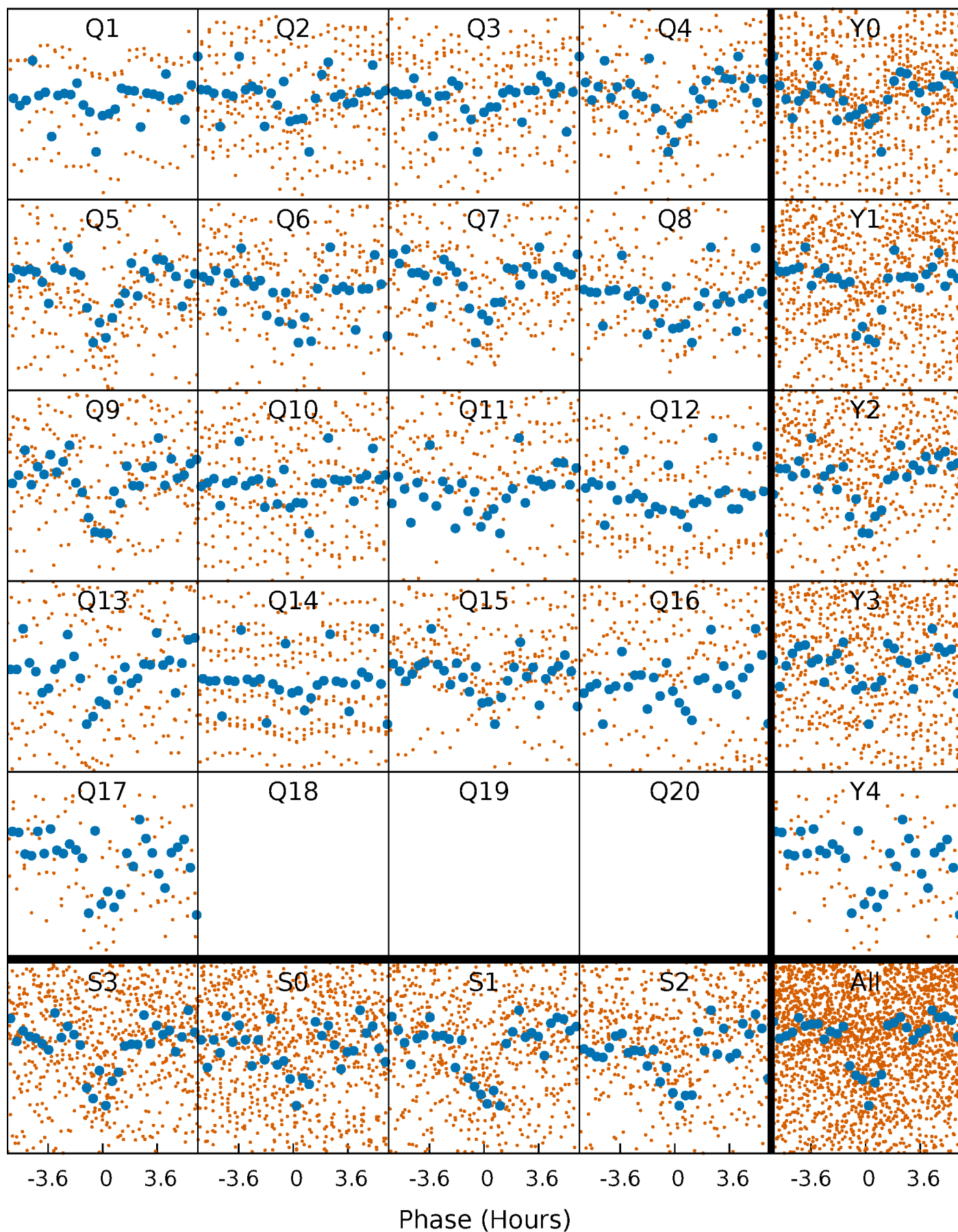


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

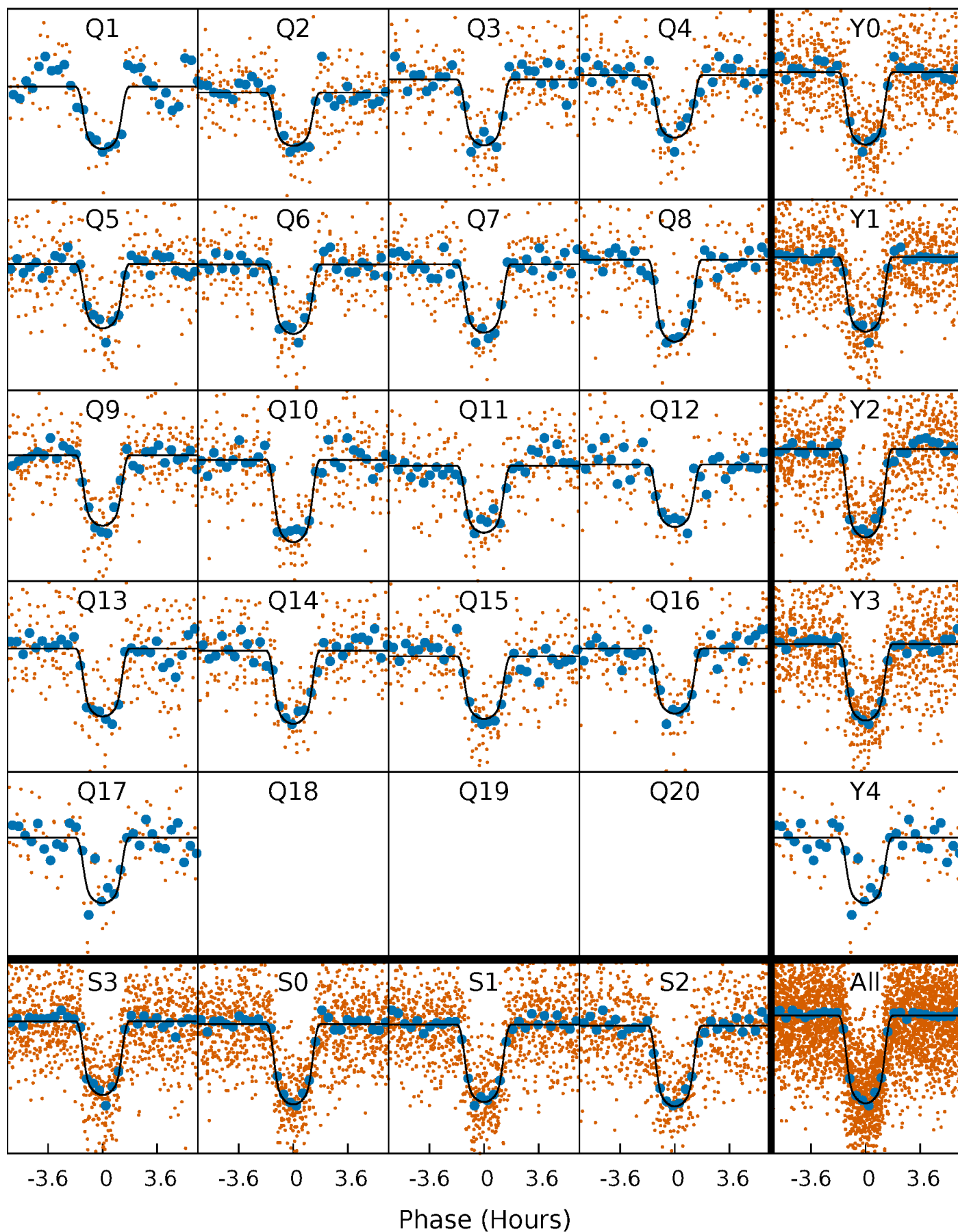
TCE 006428700-01   P= 8.203974 Days    $T_0=136.875062$  (BKJD)





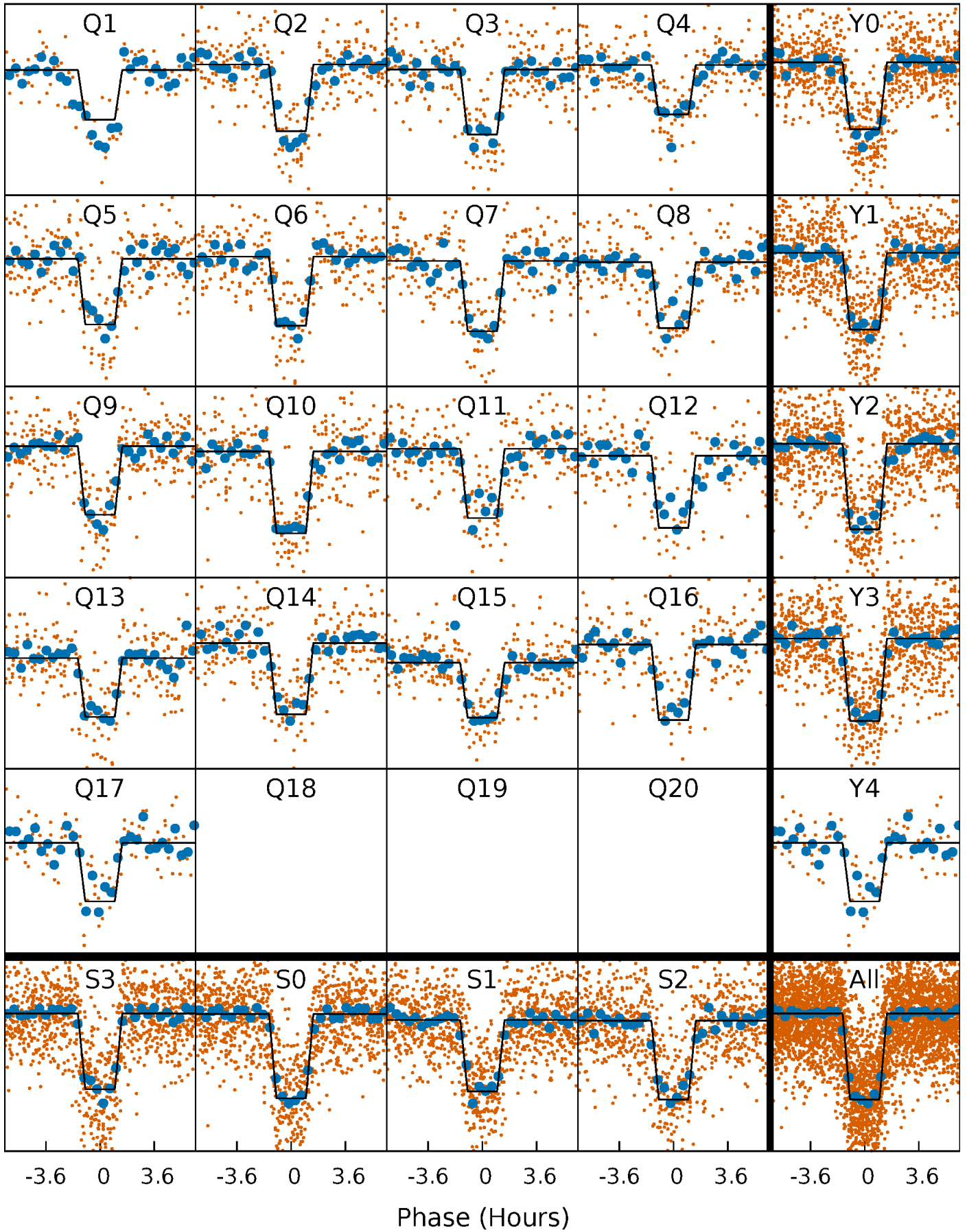
# DV Quarter-Phased Transit Curves

TCE 006428700-01   P= 8.203974 Days    $T_0=136.875062$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

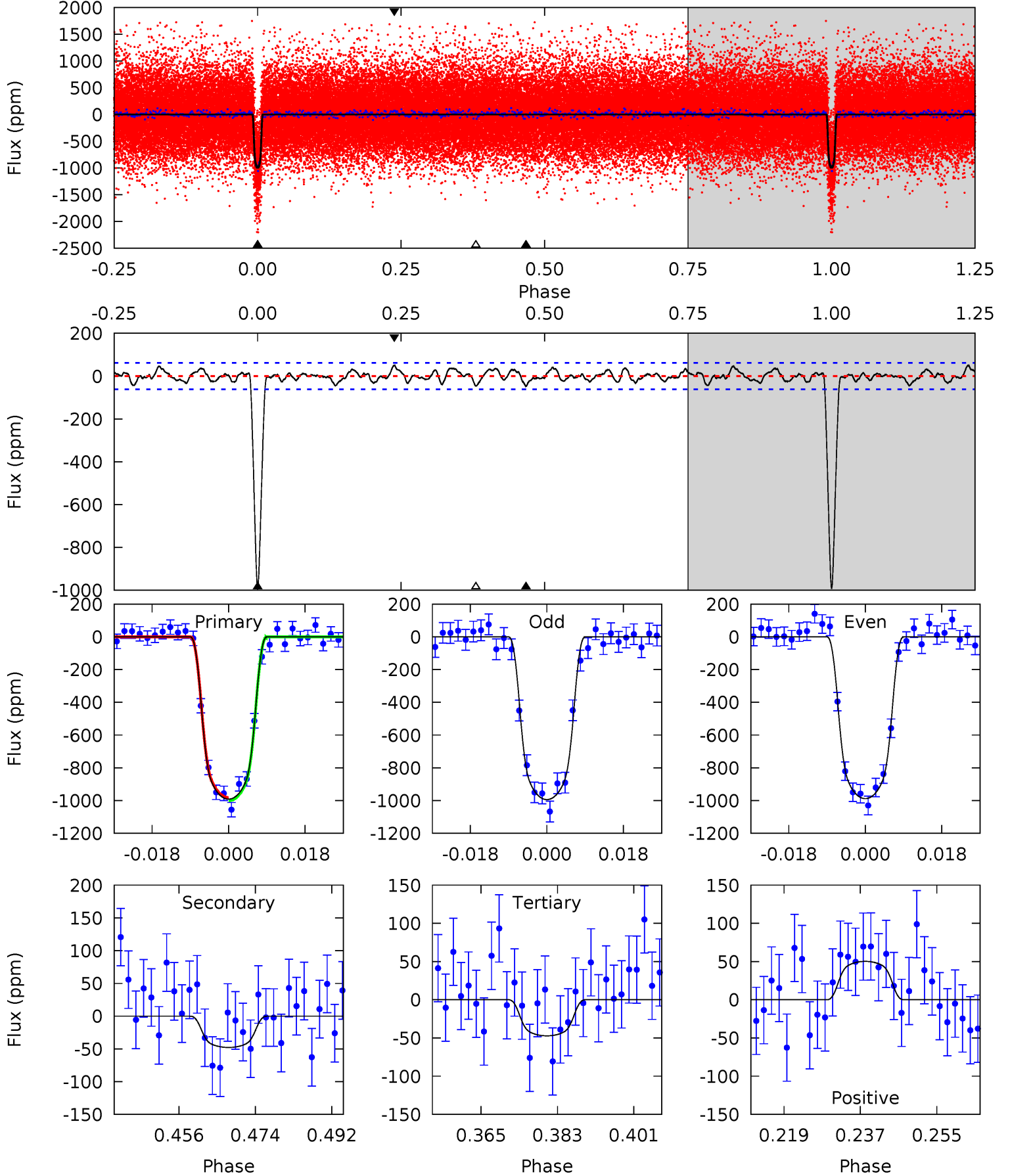
TCE 006428700-01 P= 8.204012 Days  $T_0=136.871641$  (BKJD)



# DV Model-Shift Uniqueness Test

006428700-01, P = 8.203974 Days, E = 128.671088 Days

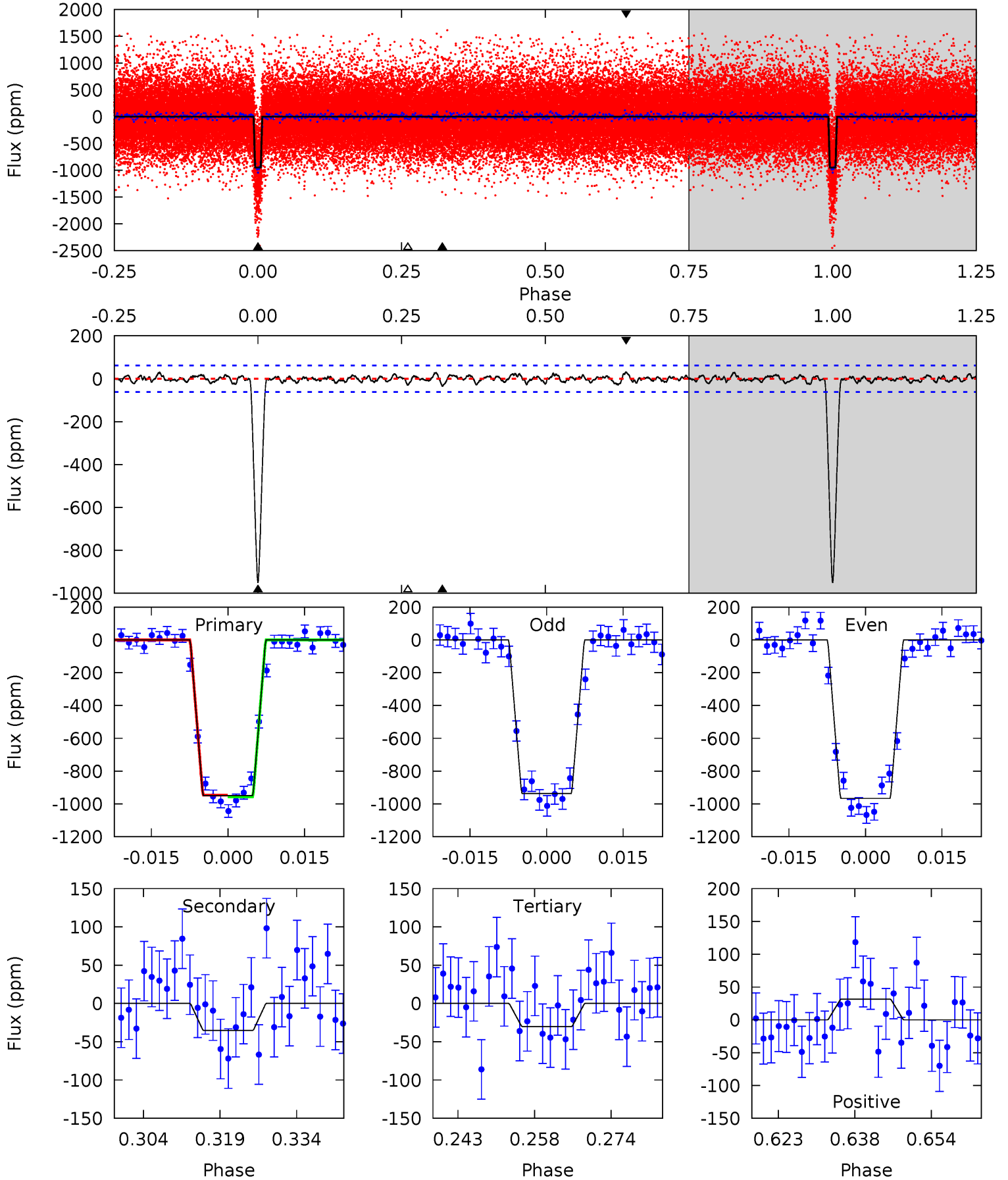
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
78.7	3.79	3.75	3.99	4.91	2.36	1.50	75.0	74.7	0.05	-0.19	0.24	0.99	0.05	0.72



# Alt Model-Shift Uniqueness Test

006428700-01, P = 8.204012 Days, E = 128.667629 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
76.2	2.83	2.42	2.52	4.95	2.43	0.88	73.8	73.7	0.40	0.30	1.22	0.99	0.03	0.43



### Stellar Parameters For KIC 006428700

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5015^{+149}_{-149}$	$4.499^{+0.090}_{-0.060}$	$0.100^{+0.250}_{-0.300}$	$0.826^{+0.066}_{-0.083}$	$0.785^{+0.078}_{-0.056}$	$1.960^{+0.666}_{-0.376}$
	+3%/-3%	+2%/-1%	+250%/-300%	+8%/-10%	+10%/-7%	+34%/-19%
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 006428700-01 / KOI 0853.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-48 \pm 13$	$3.22^{+0.22}_{-0.23}$	$1032^{+42}_{-40}$	$2878^{+117}_{-127}$	$14^{+4}_{-4}$
Alt.	$-35 \pm 12$	$2.79^{+0.24}_{-0.21}$	$1031^{+38}_{-44}$	$2852^{+147}_{-168}$	$13^{+5}_{-5}$

$T_{\text{max}}$  = 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

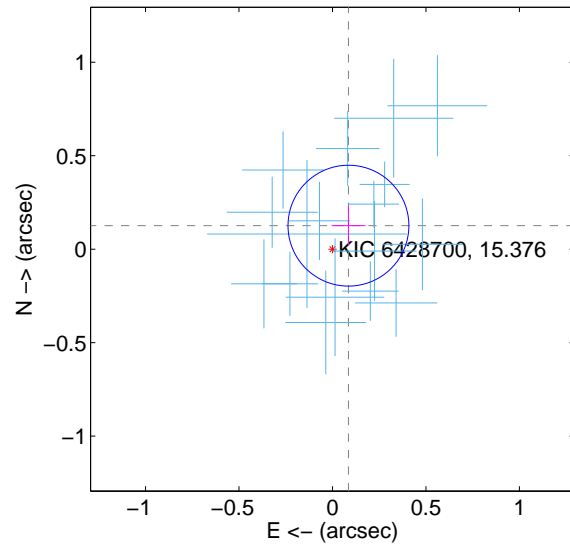
Supplemental centroid analysis for 006428700-01. Kepler magnitude: 15.38. Transit SNR 48.69

There are 17 quarters with good PRF difference image offsets

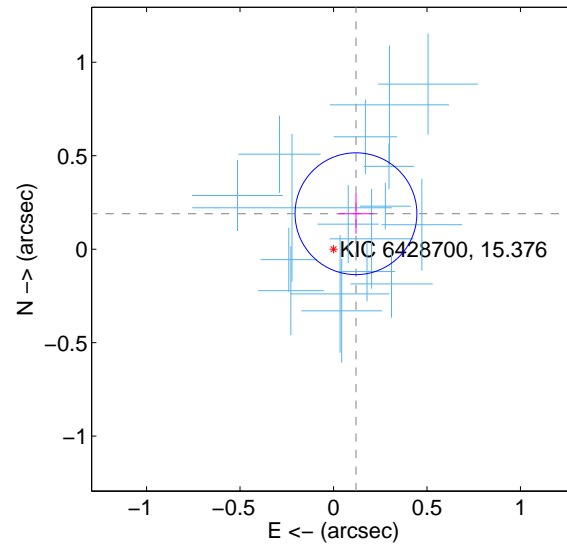
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.152 \pm 0.108$	1.41	$-0.085 \pm 0.090$	$0.126 \pm 0.106$
PRF-fit source offset from KIC position	$0.224 \pm 0.109$	2.07	$-0.120 \pm 0.093$	$0.190 \pm 0.106$
photometric centroid source offset	$0.37 \pm 0.24$	1.55	$0.00 \pm 0.25$	$0.37 \pm 0.24$

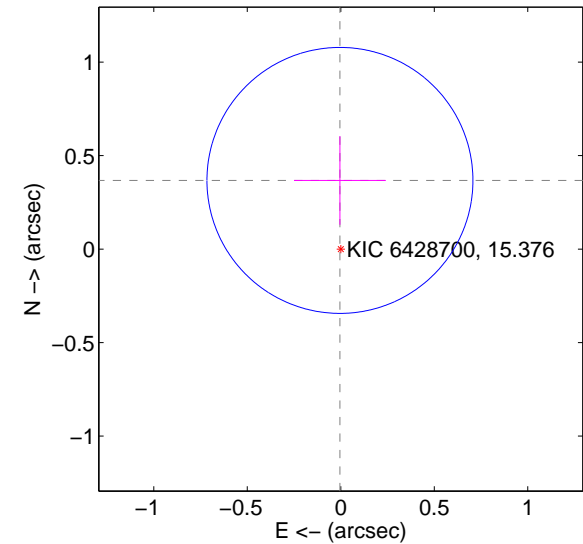
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

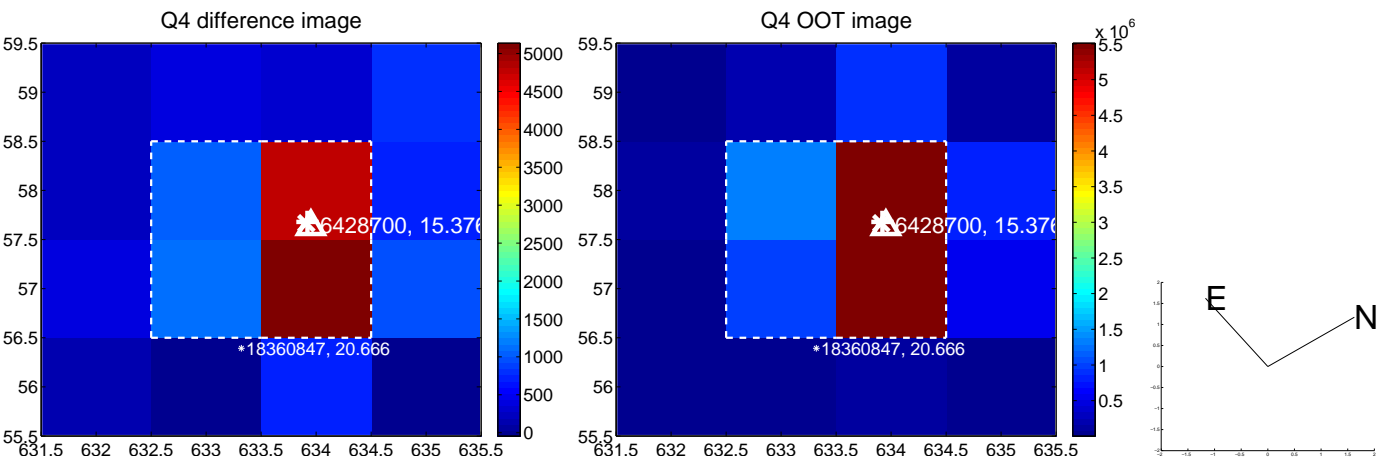
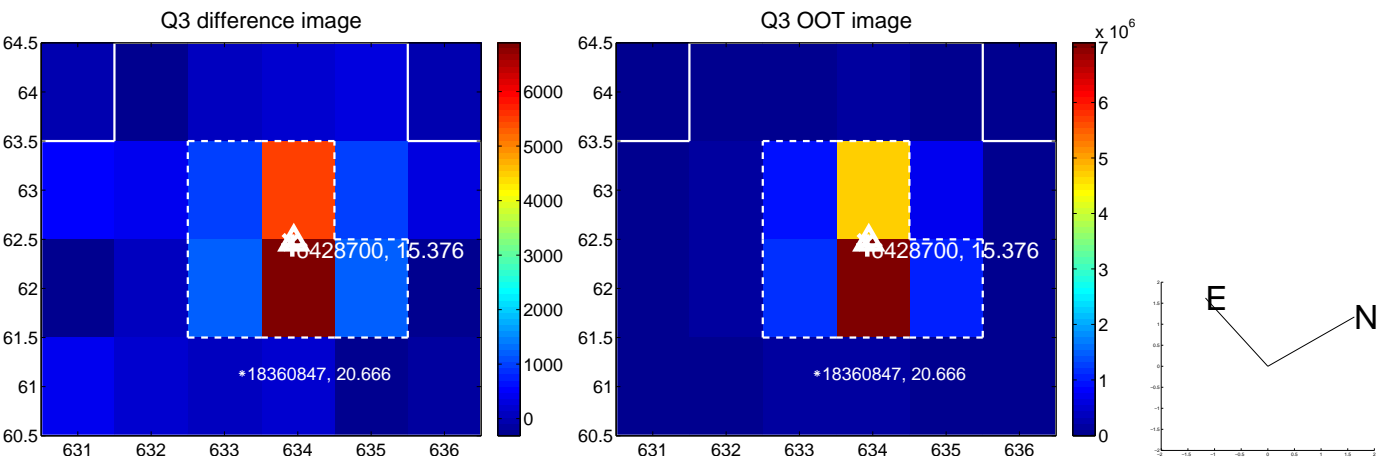
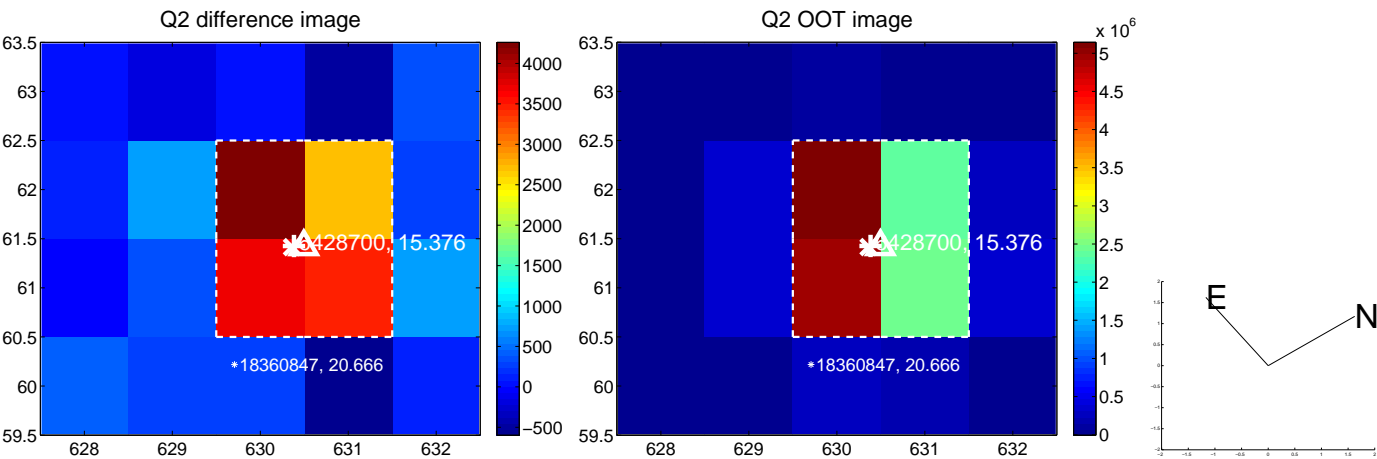
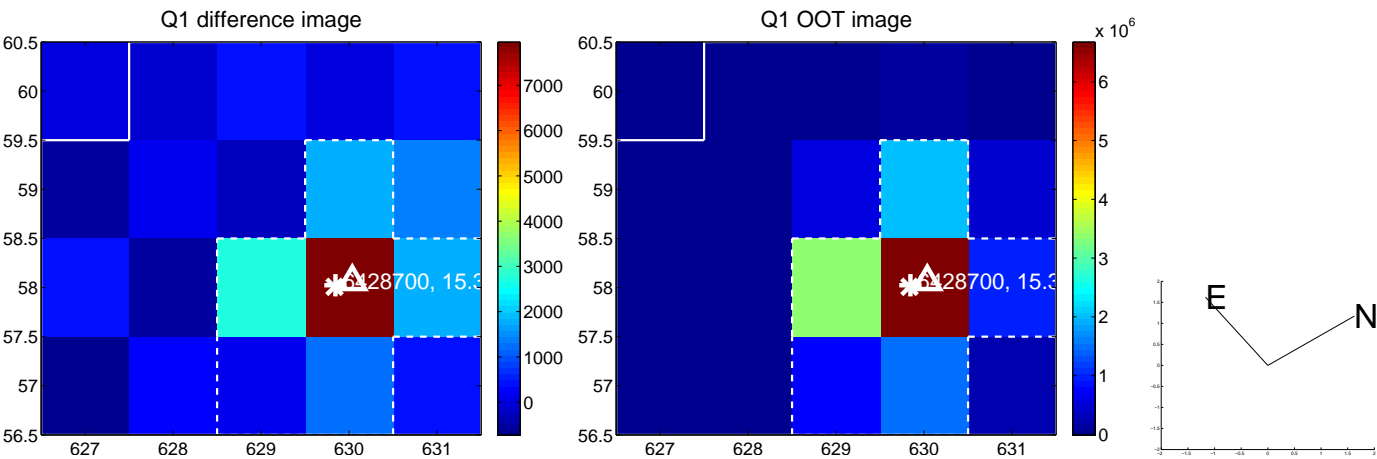


offset from photometric centroids

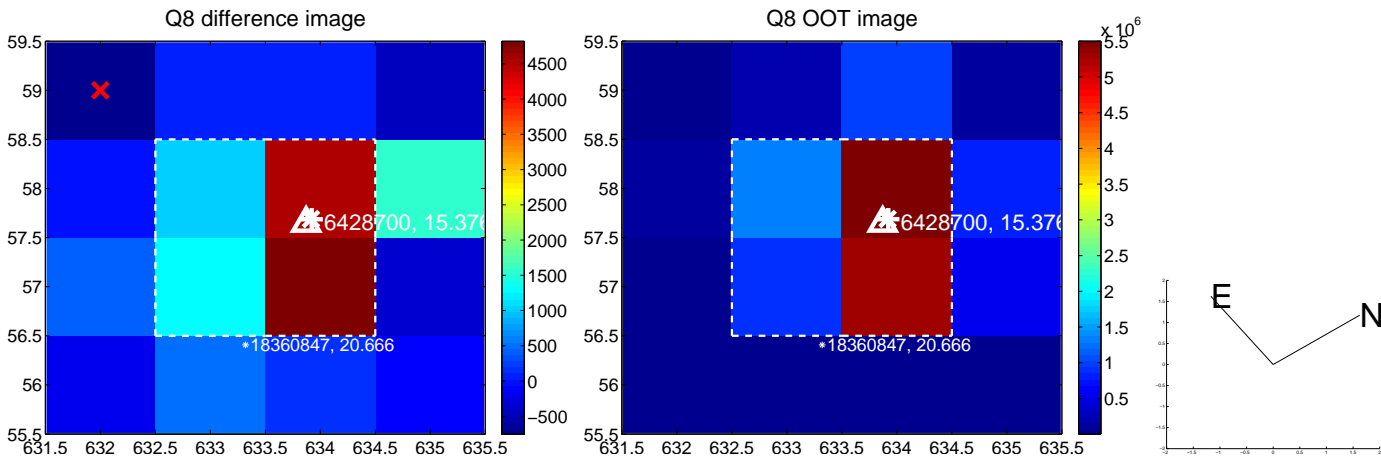
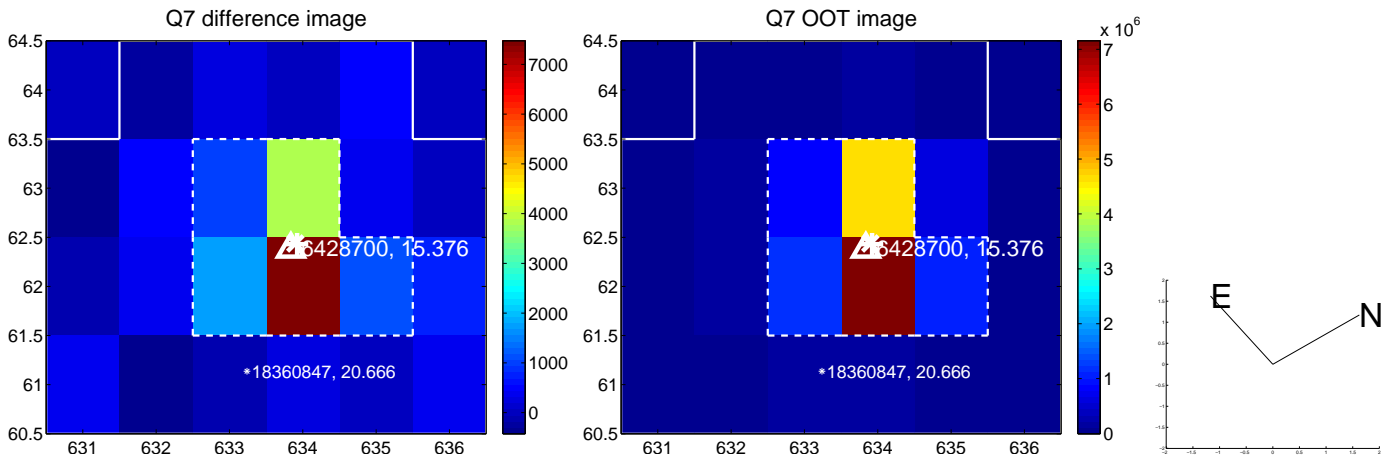
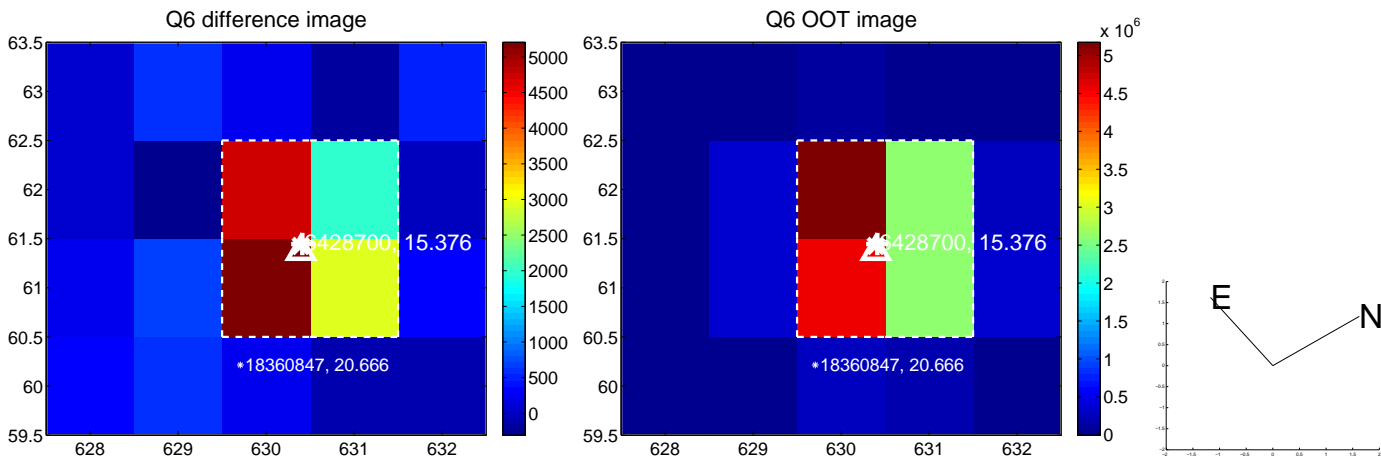
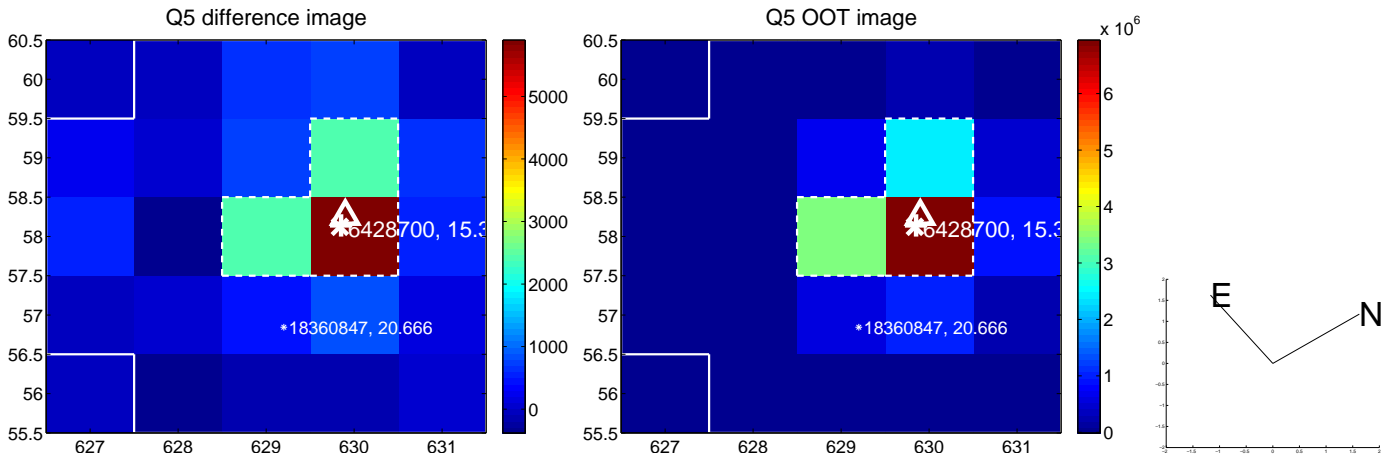


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

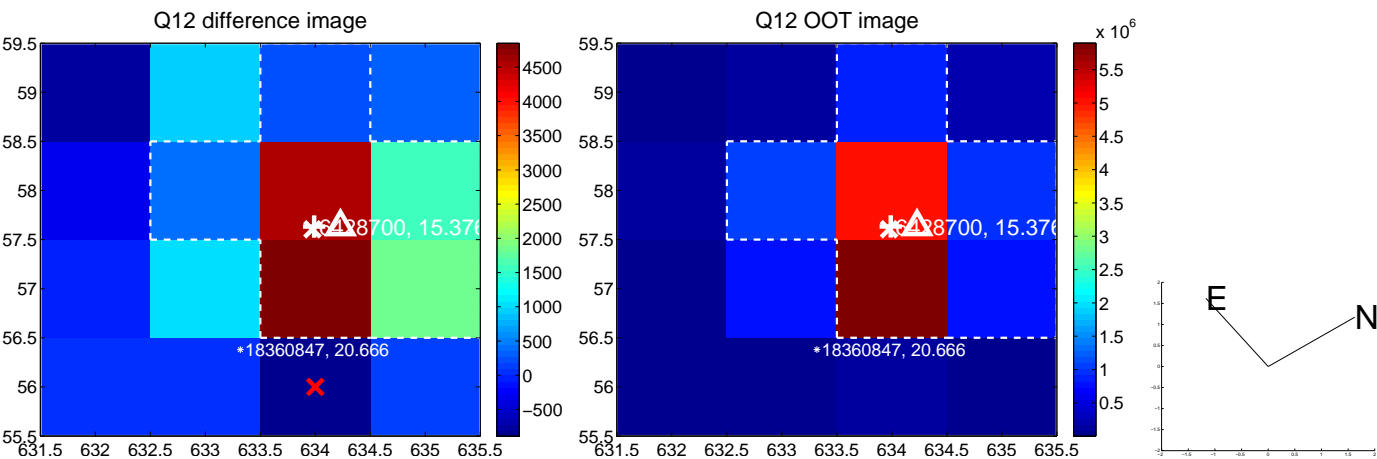
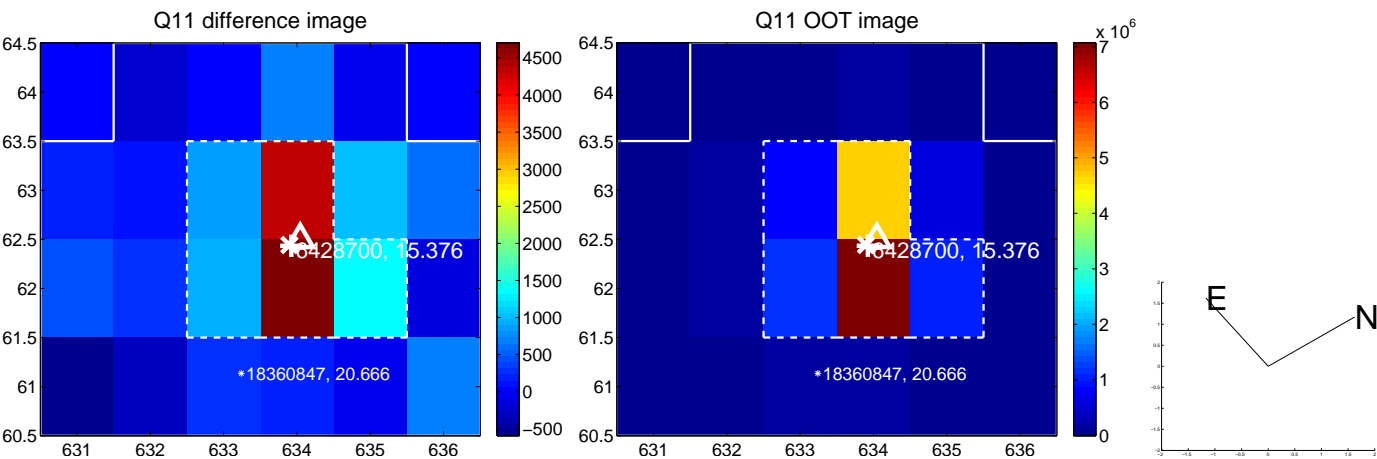
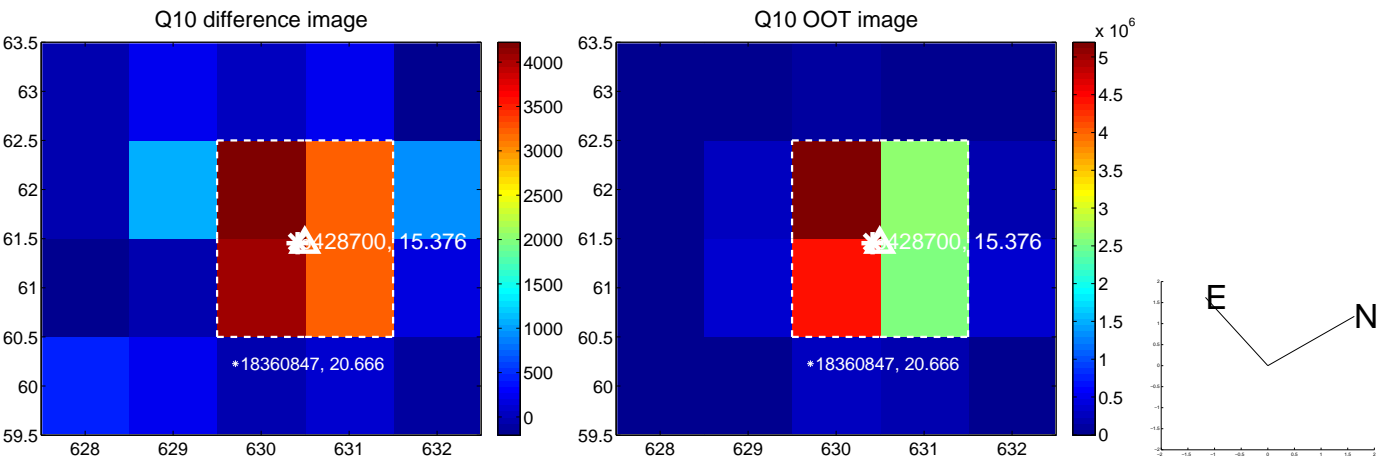
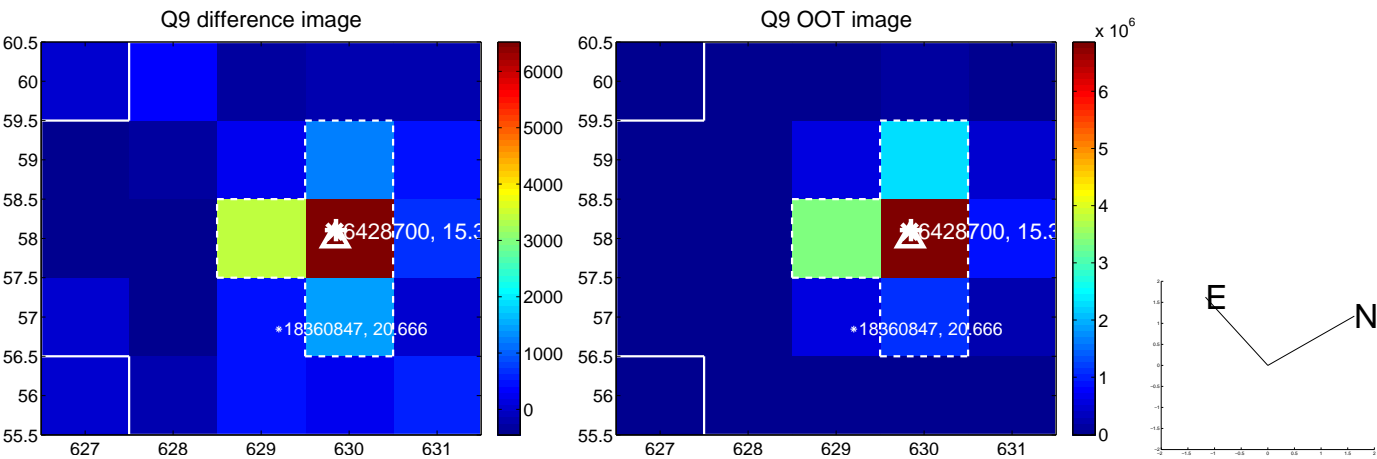
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



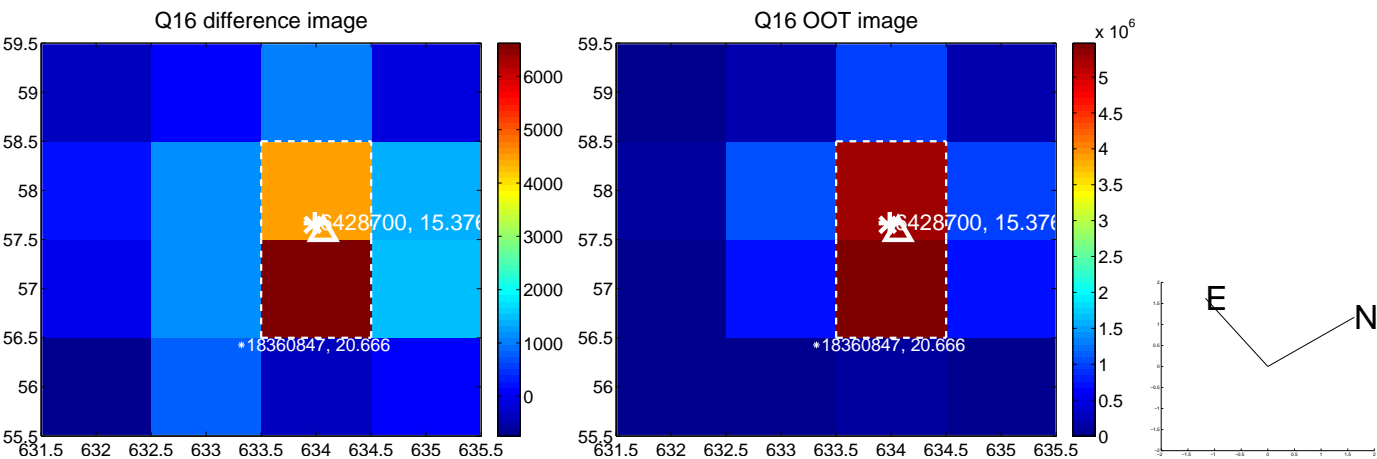
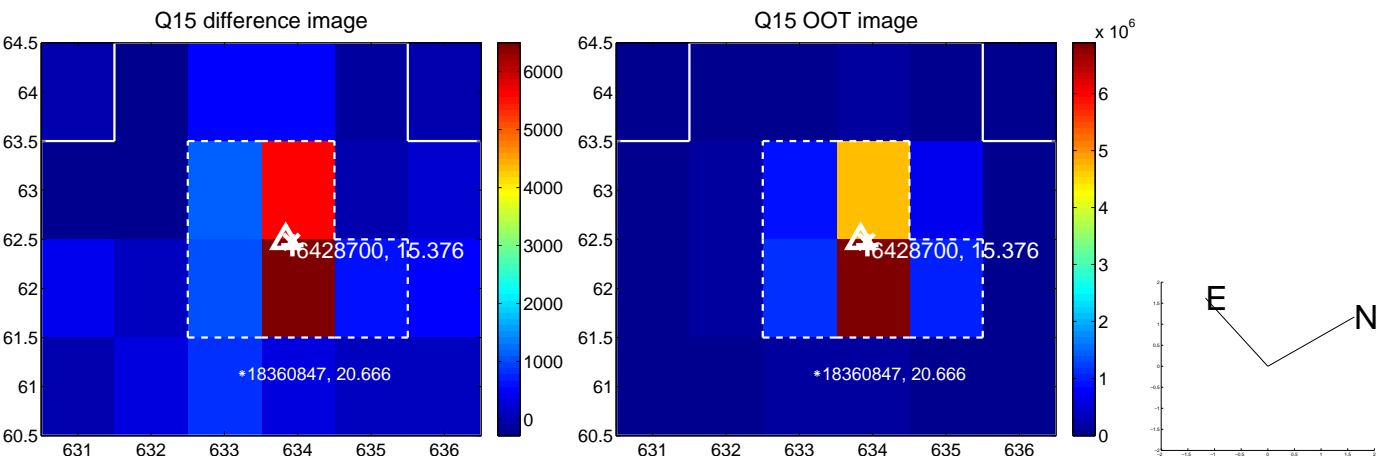
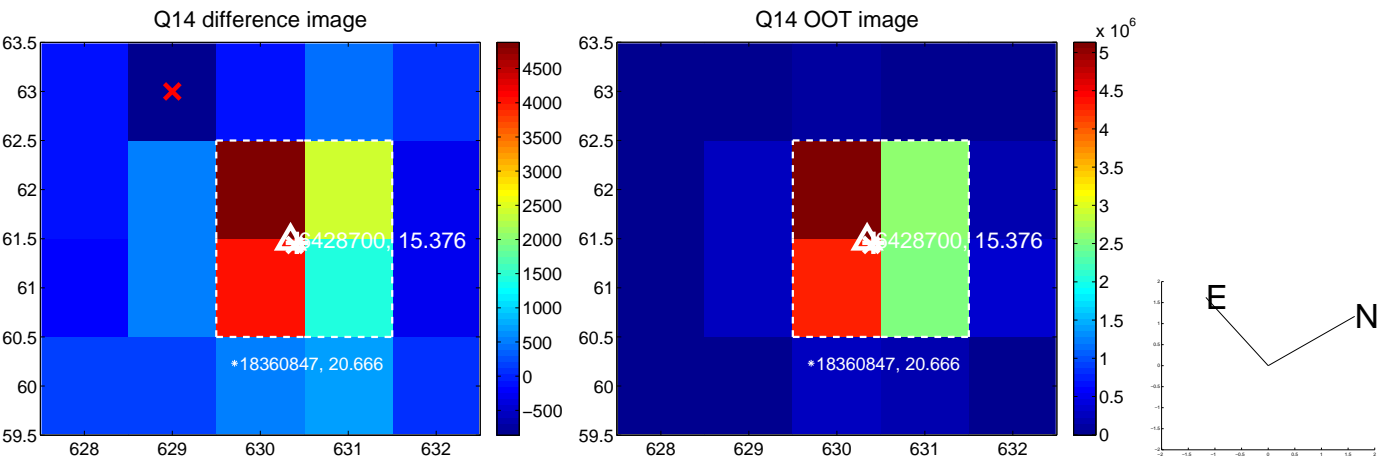
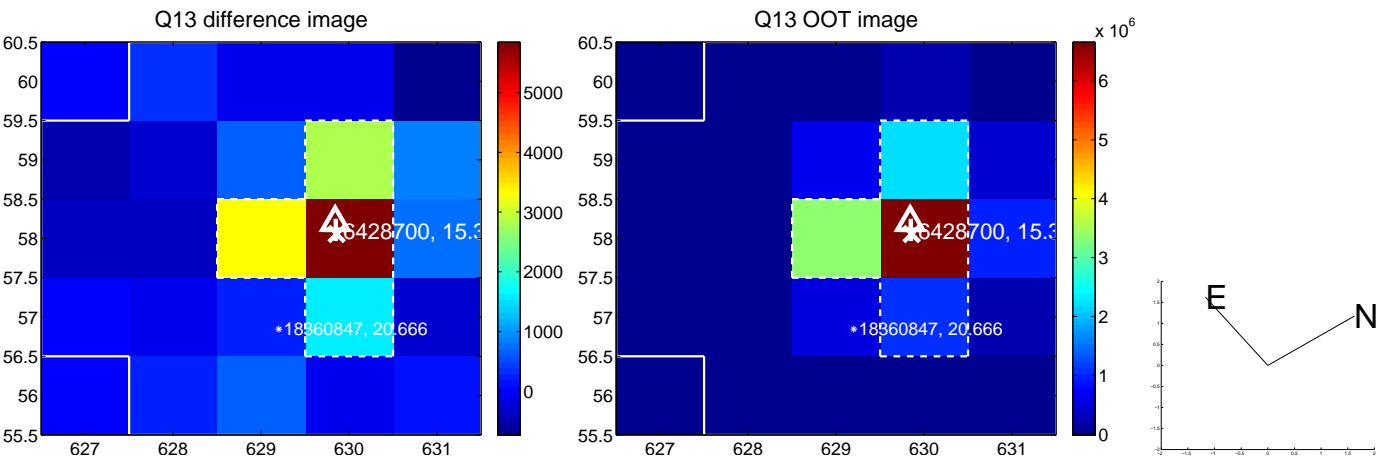
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

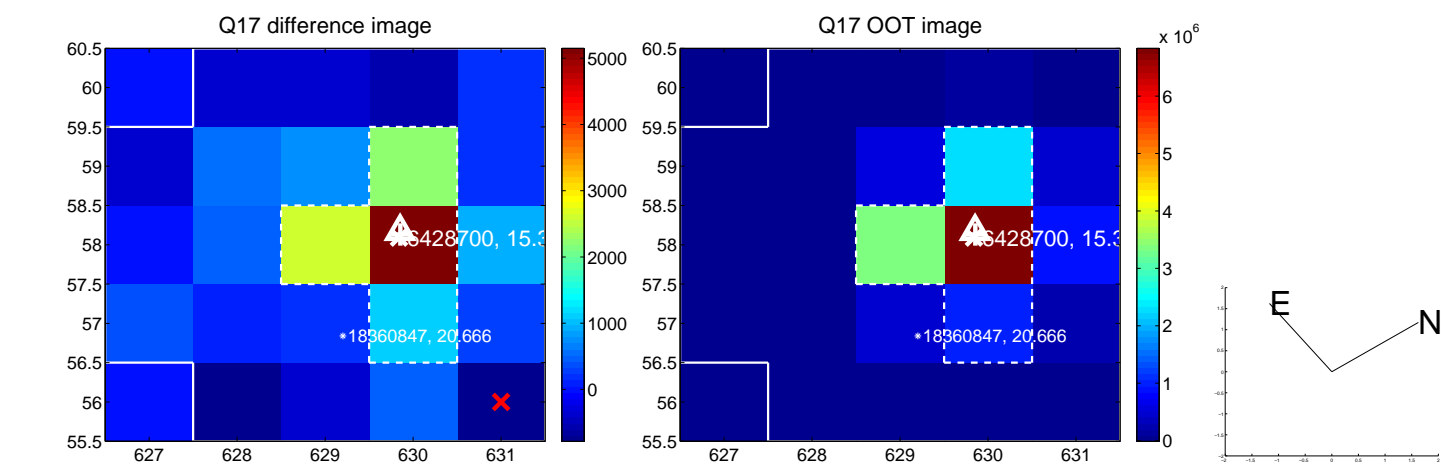


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

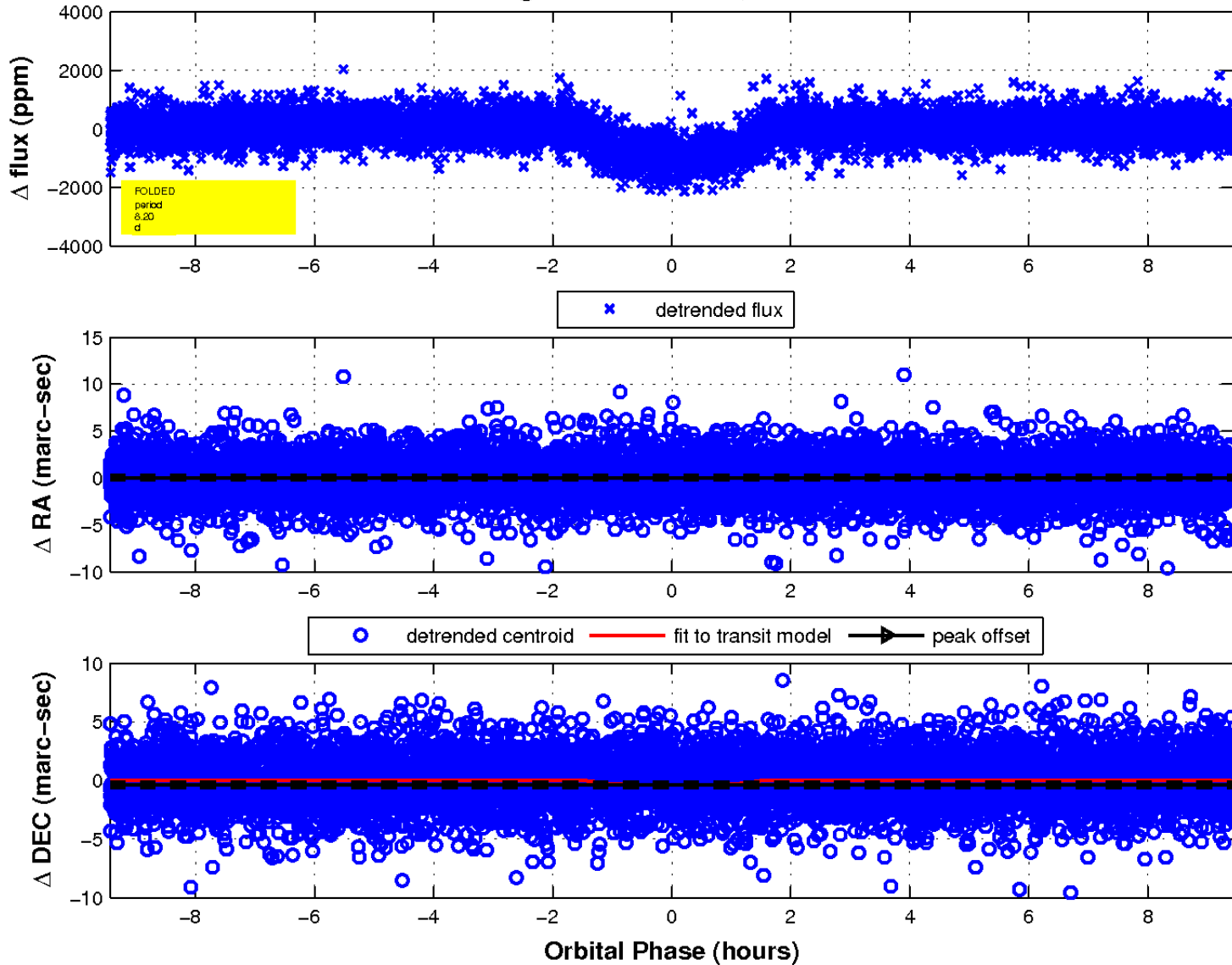




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

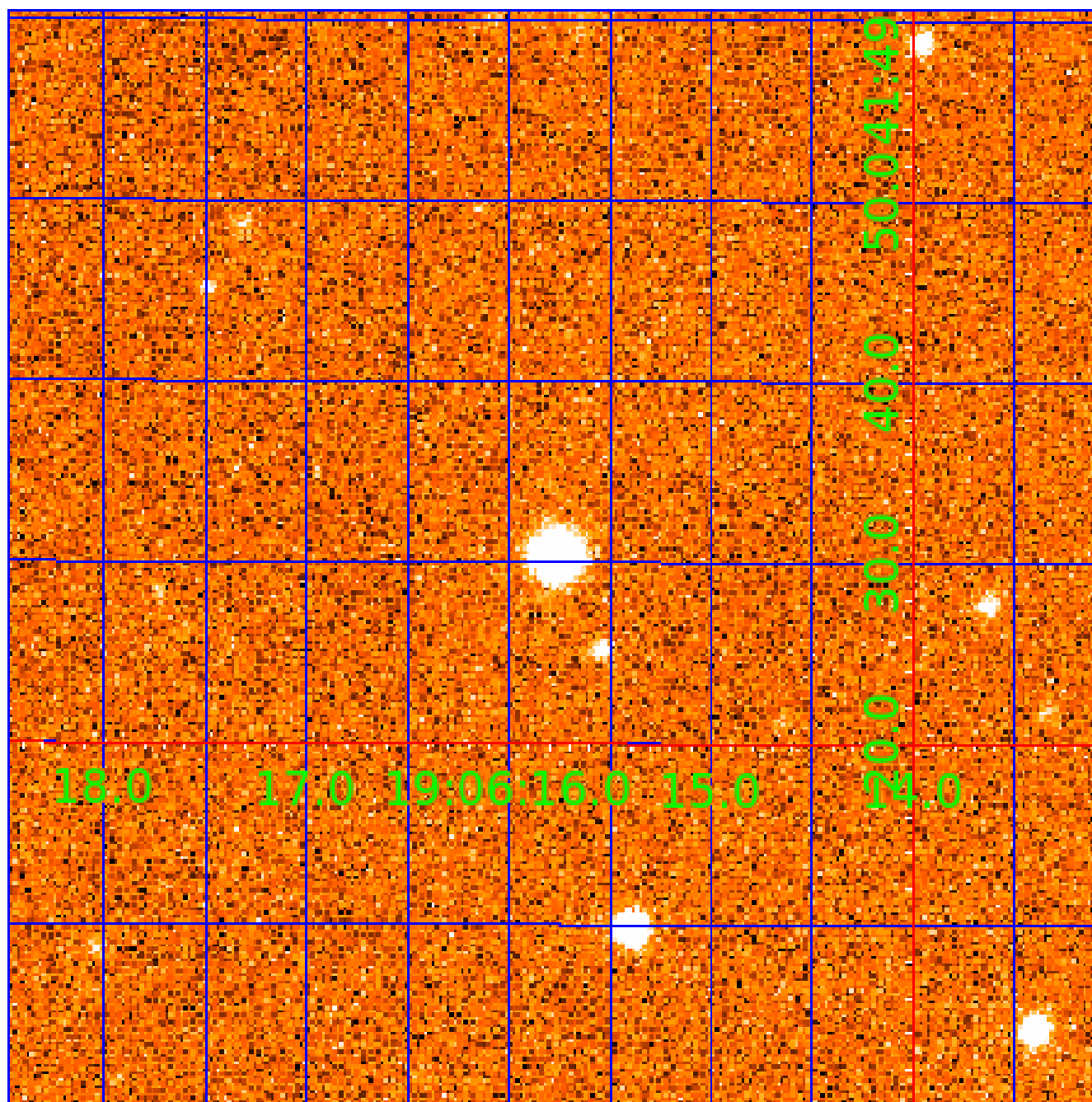


fluxWeightedCentroids, Planet 1 of 2



# UKIRT Image

Declination



# KIC 006428700

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
006428700-01	OBS	0853.01	8.203974	136.875062	1004.6	3.146	44.8	48.7	0.83	5015	3.21	71.66
006428700-02	OBS	0853.02	14.496399	143.416344	675.5	4.080	20.9	23.0	0.83	5015	3.55	33.54

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
006428700-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
006428700-02	OBS	PC	1.00	0	0	0	0	NO_COMMENT

**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.

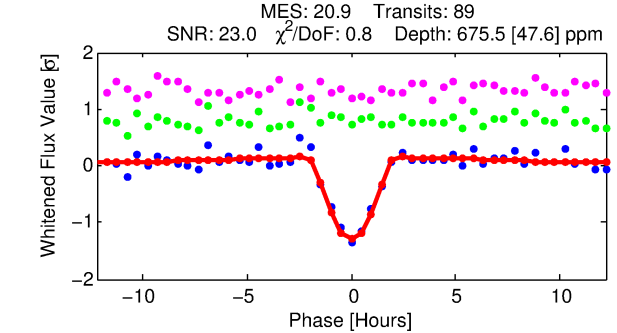
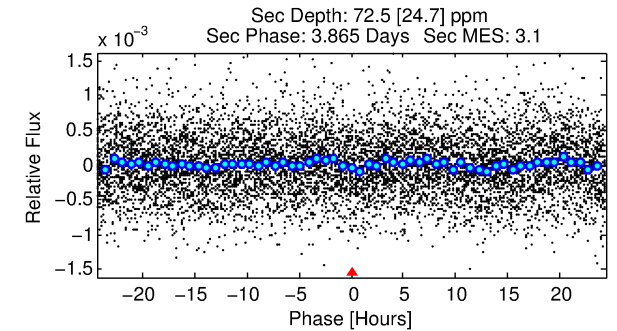
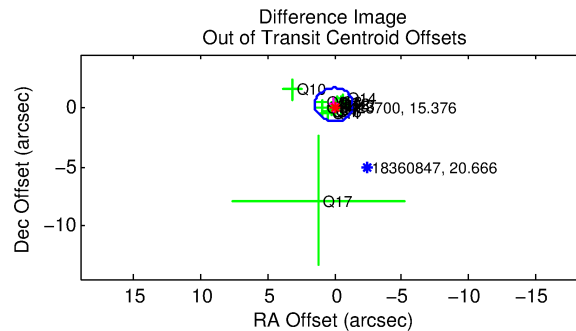
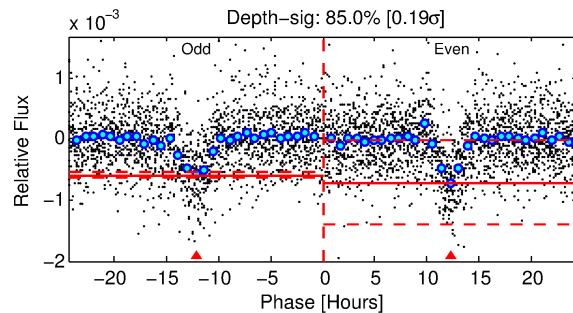
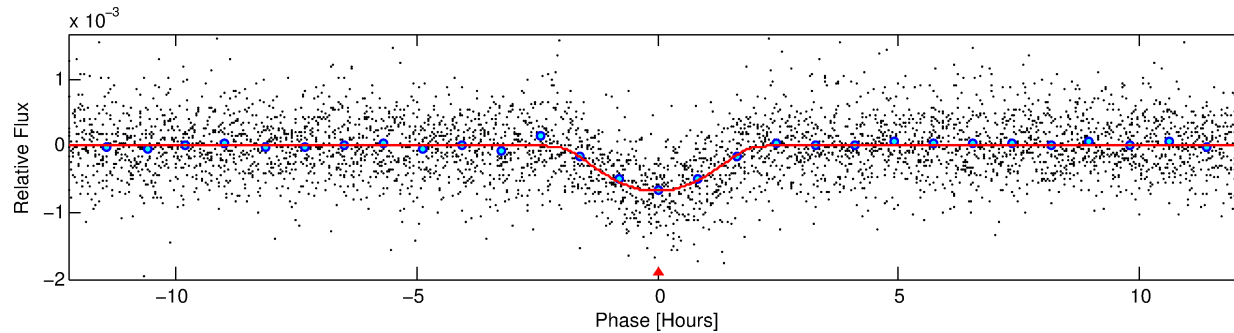
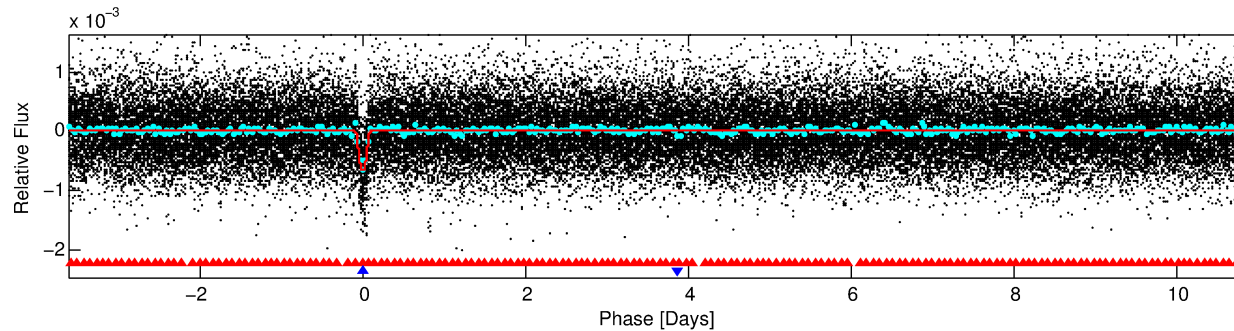
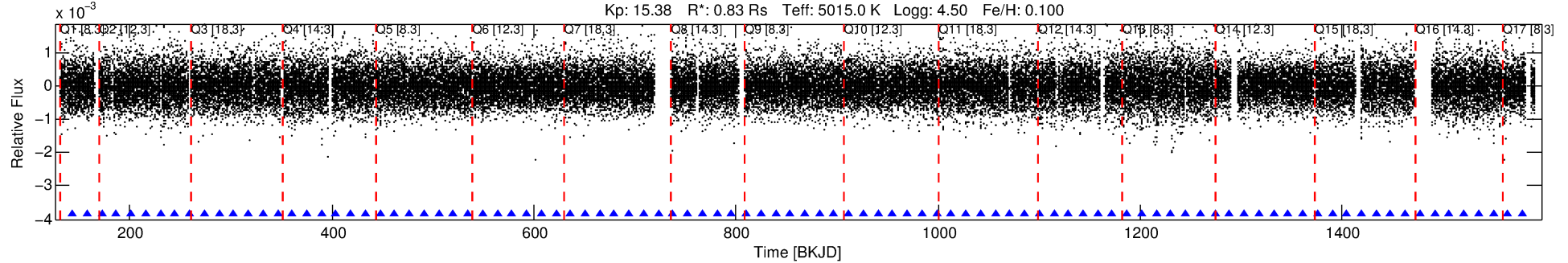
## Ephemeris Match Information For 006428700-02

No Significant Match Found

# DV One-Page Summary

KIC: 6428700 Candidate: 2 of 2 Period: 14.496 d  
KOI: K00853.02 Name: Kepler-242c Corr: 0.973

Kp: 15.38 R\*: 0.83 Rs Teff: 5015.0 K Logg: 4.50 Fe/H: 0.100



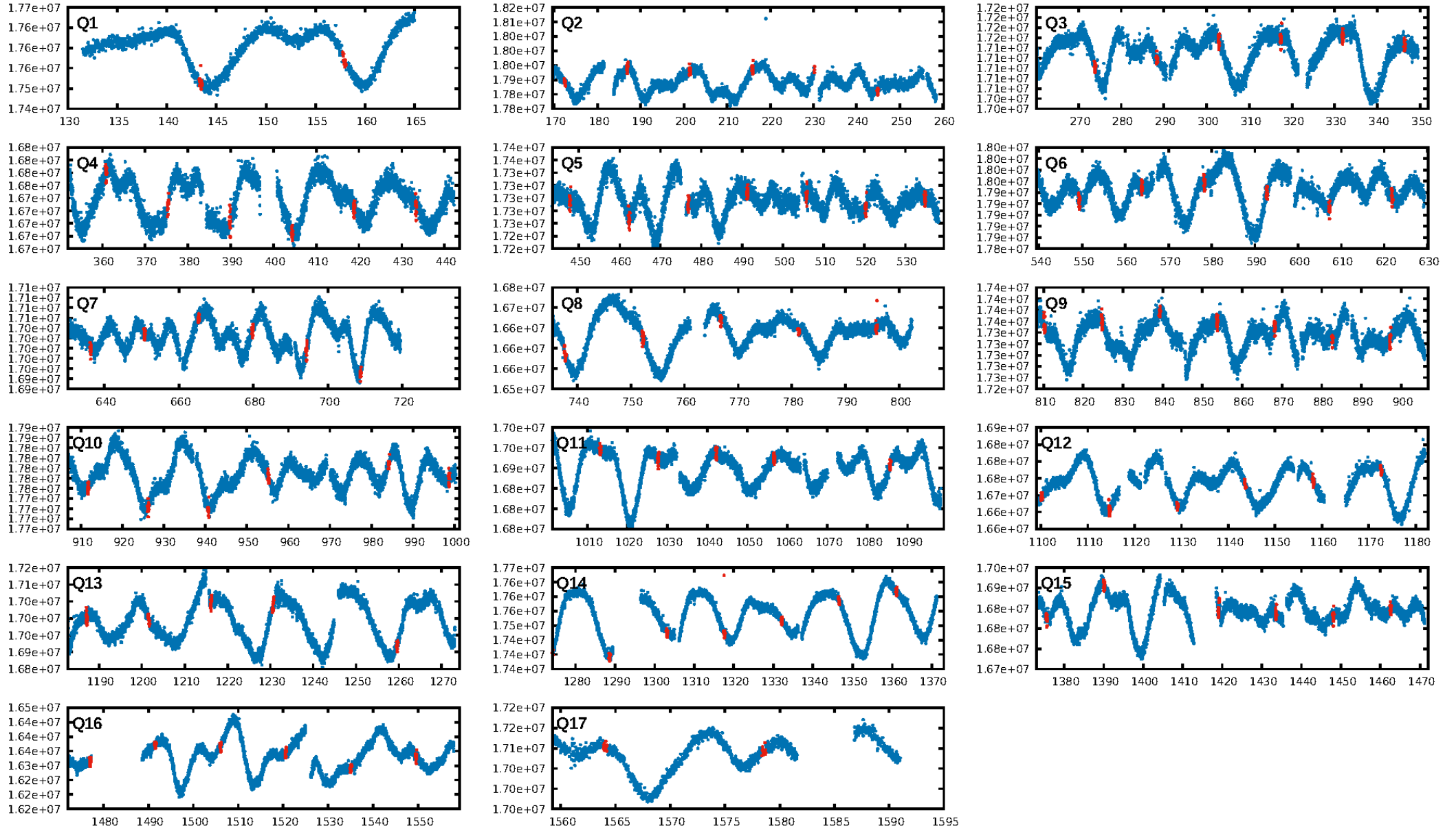
## DV Fit Results:

Period = 14.49640 [0.00007] d  
Epoch = 143.4163 [0.0039] BKJD  
Rp/R\* = 0.0394 [0.0234]  
a/R\* = 9.17 [2.00]  
b = 0.98 [0.04]  
Seff = 33.54 [6.51]  
Teq = 614 [30] K  
Rp = 3.55 [2.14] Re  
a = 0.1074 [0.0103] AU  
Ag = 36.54 [45.46] [0.78σ]  
Teffp = 2333 [723] K [2.37σ]

## DV Diagnostic Results:

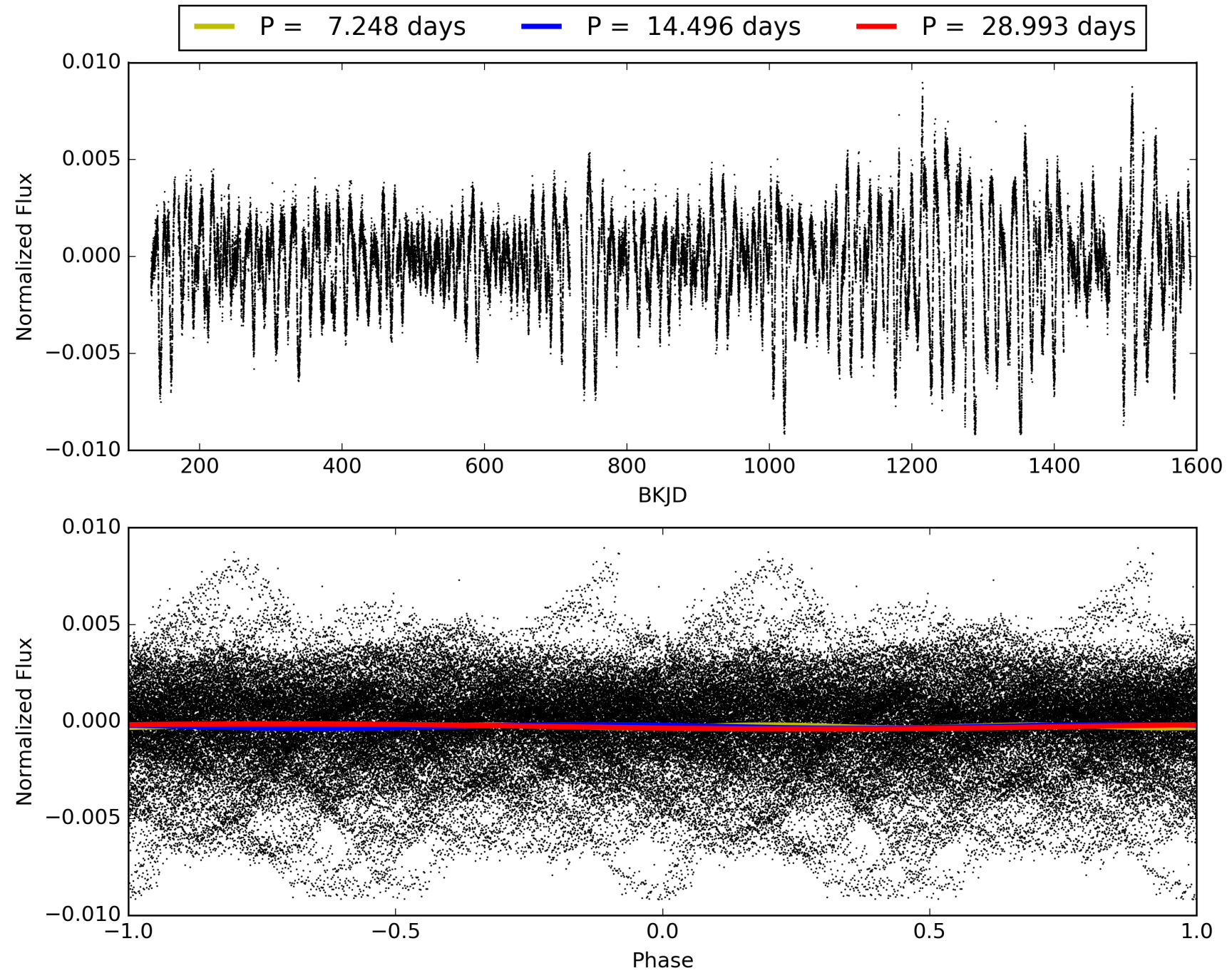
ShortPeriod-sig: 100.0% [29.31σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 68.4%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 3.15e-88  
RollingBand-fgt: 1.00 [85/85]  
GhostDiagnostic-chr: 5.546  
Centroid-sig: 3.6%  
Centroid-so: 0.766 arcsec [1.59σ]  
OotOffset-rm: 0.235 arcsec [0.50σ]  
KicOffset-rm: 0.306 arcsec [0.59σ]  
OotOffset-st: 4/4/4/3 [15]  
KicOffset-st: 4/4/4/3 [15]  
DiffImageQuality-fgm: 0.87 [13/15]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 006428700-02, PDC Light Curves



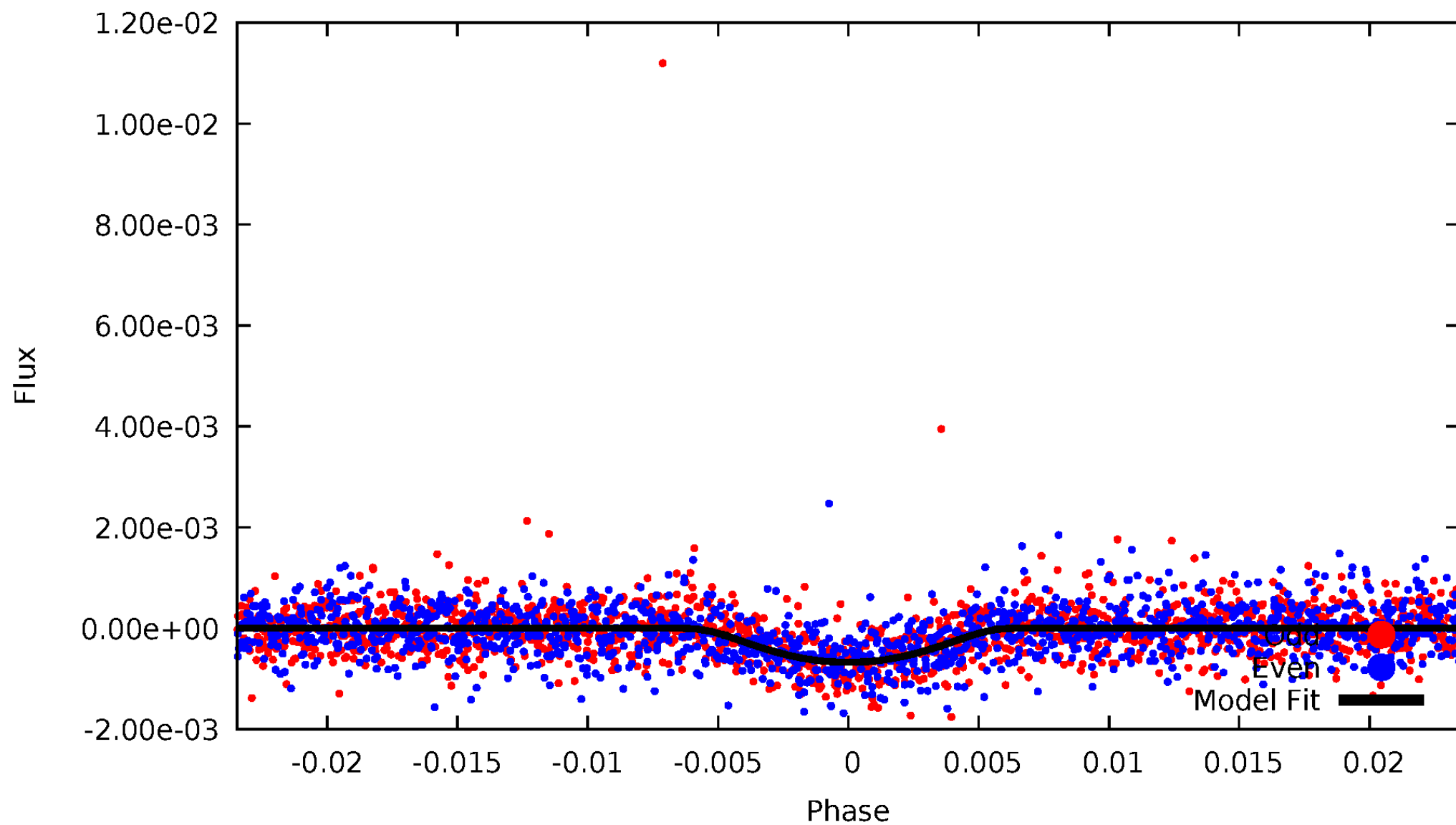


TCE 006428700-02



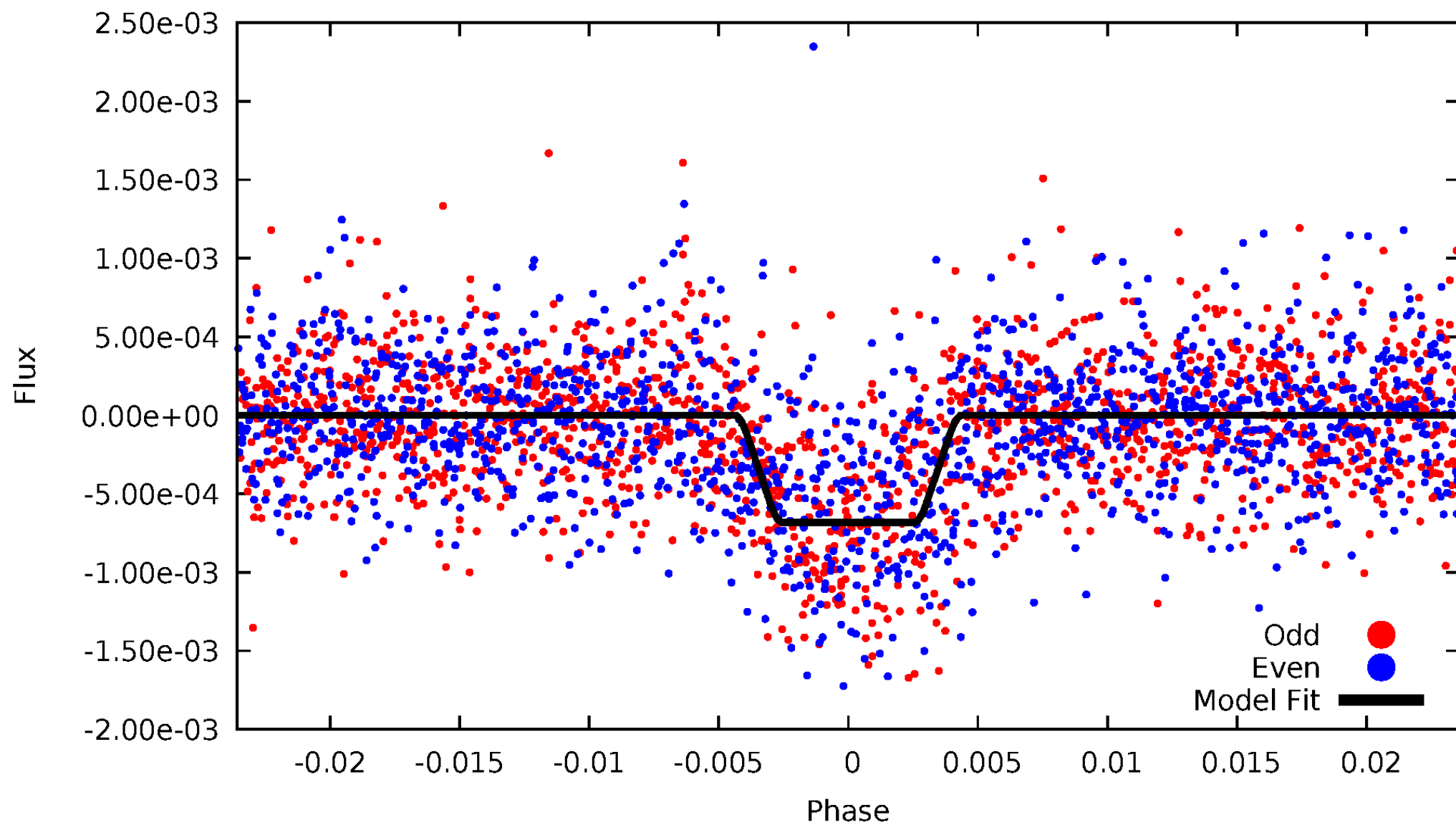
# DV Odd/Even

TCE 006428700-02



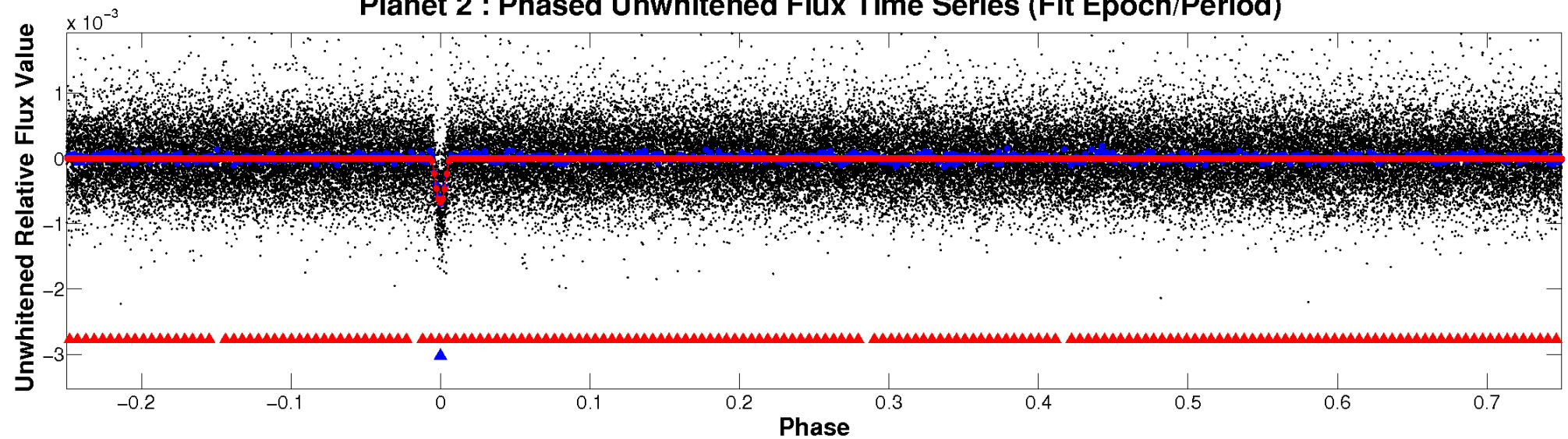
# ALT Odd/Even

TCE 006428700-02

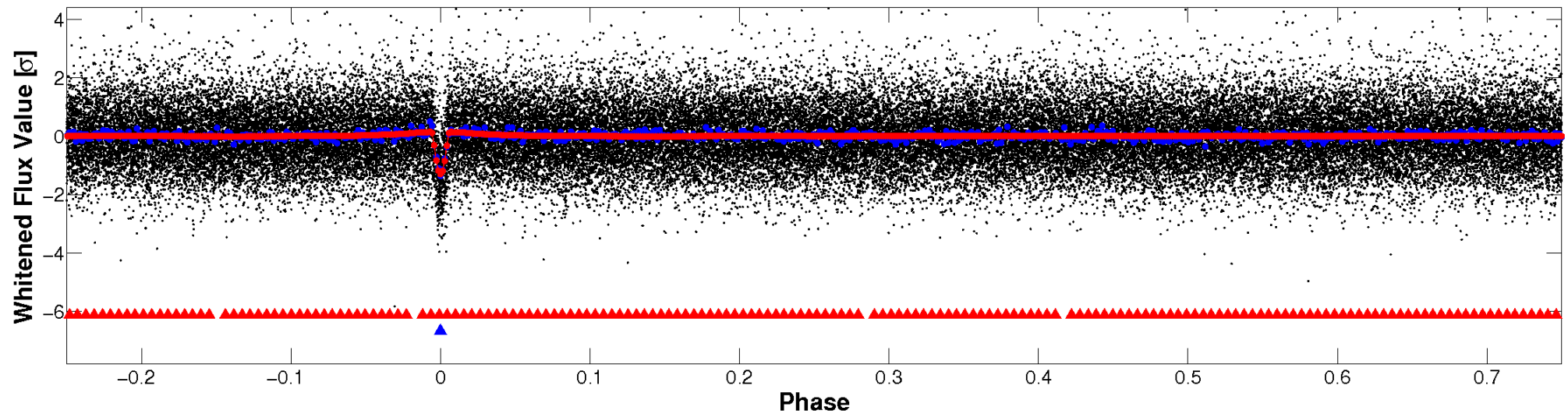


# Non-Whitened Vs. Whitened Light Curve

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

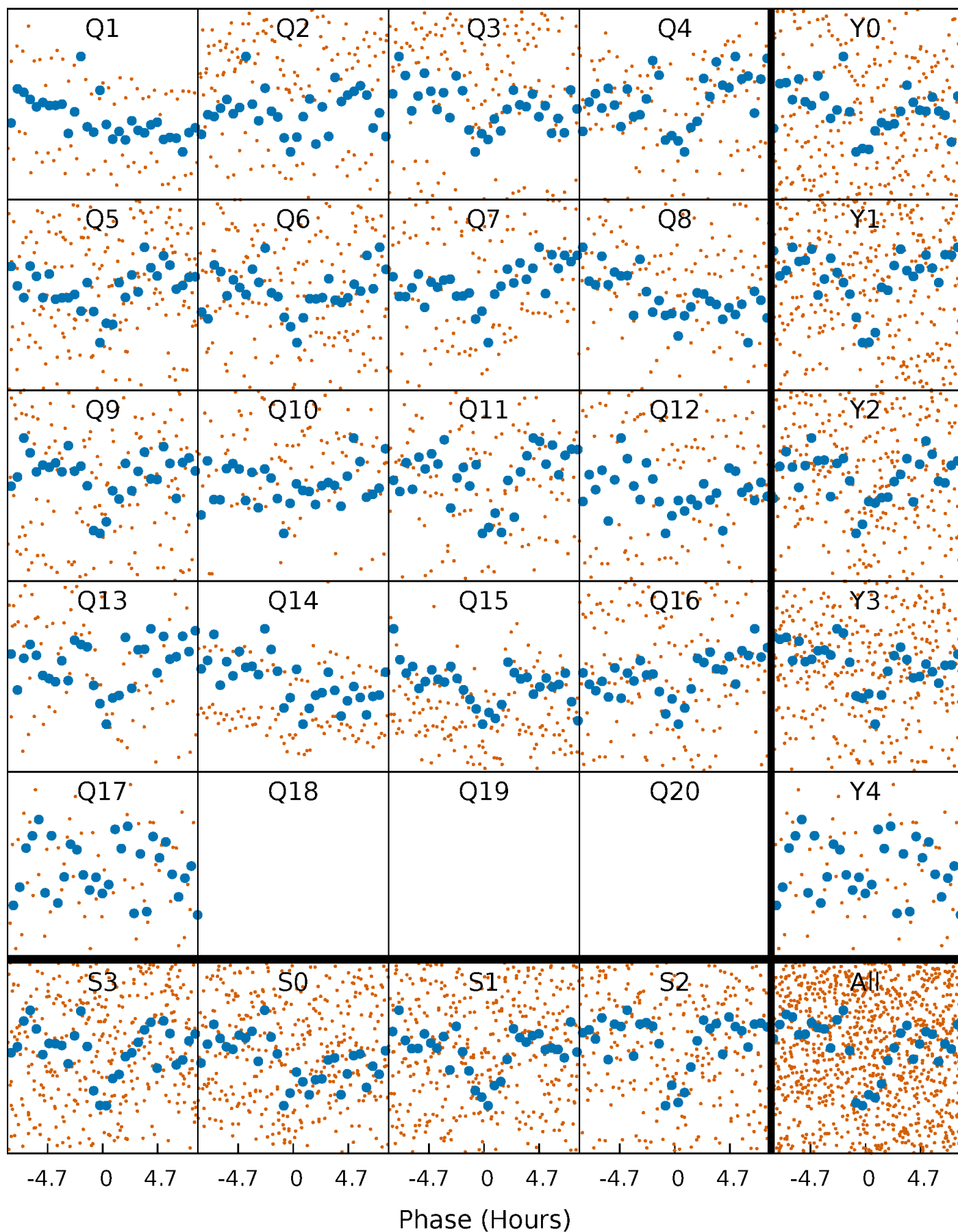


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

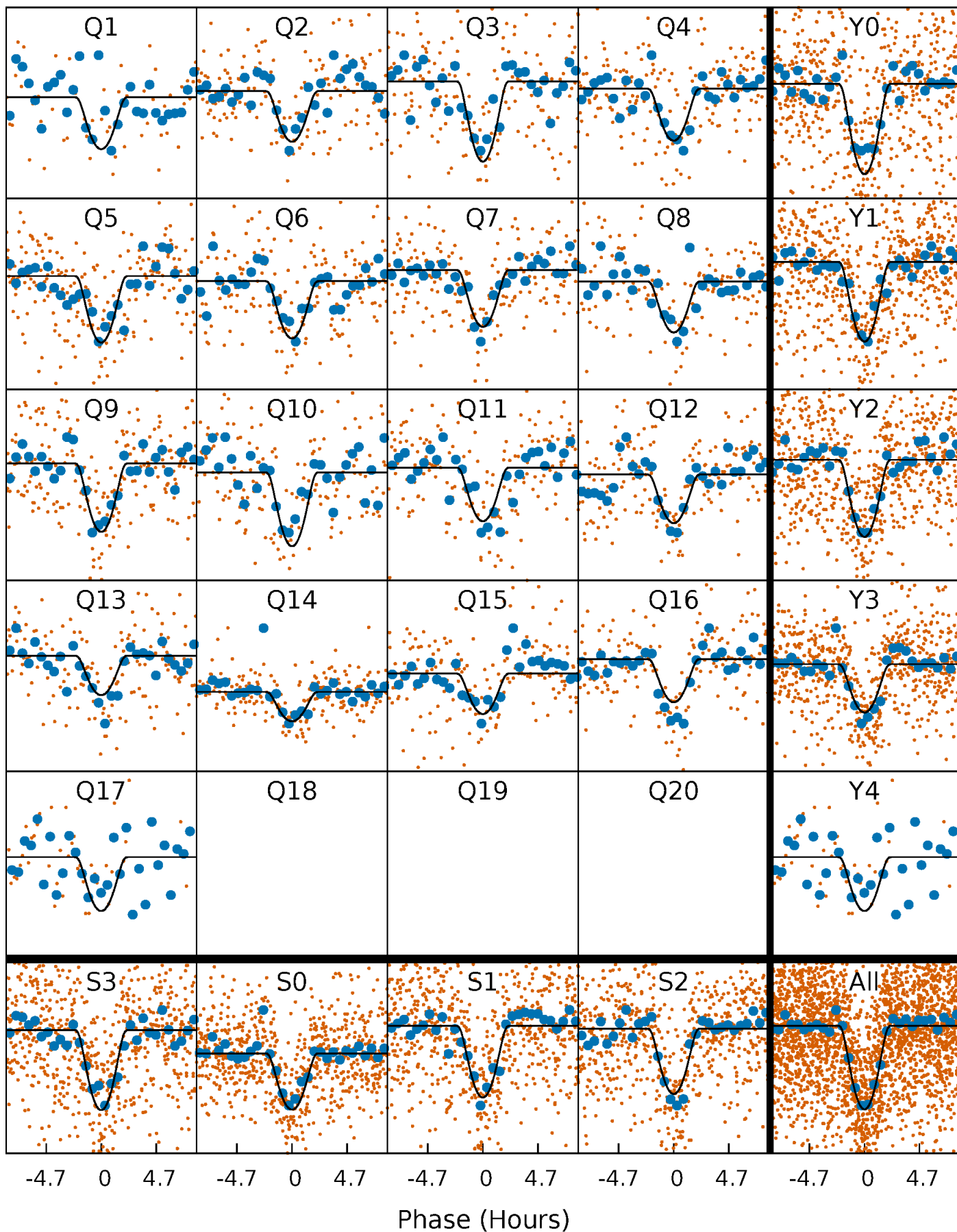
TCE 006428700-02   P= 14.496399 Days    $T_0=143.416344$  (BKJD)





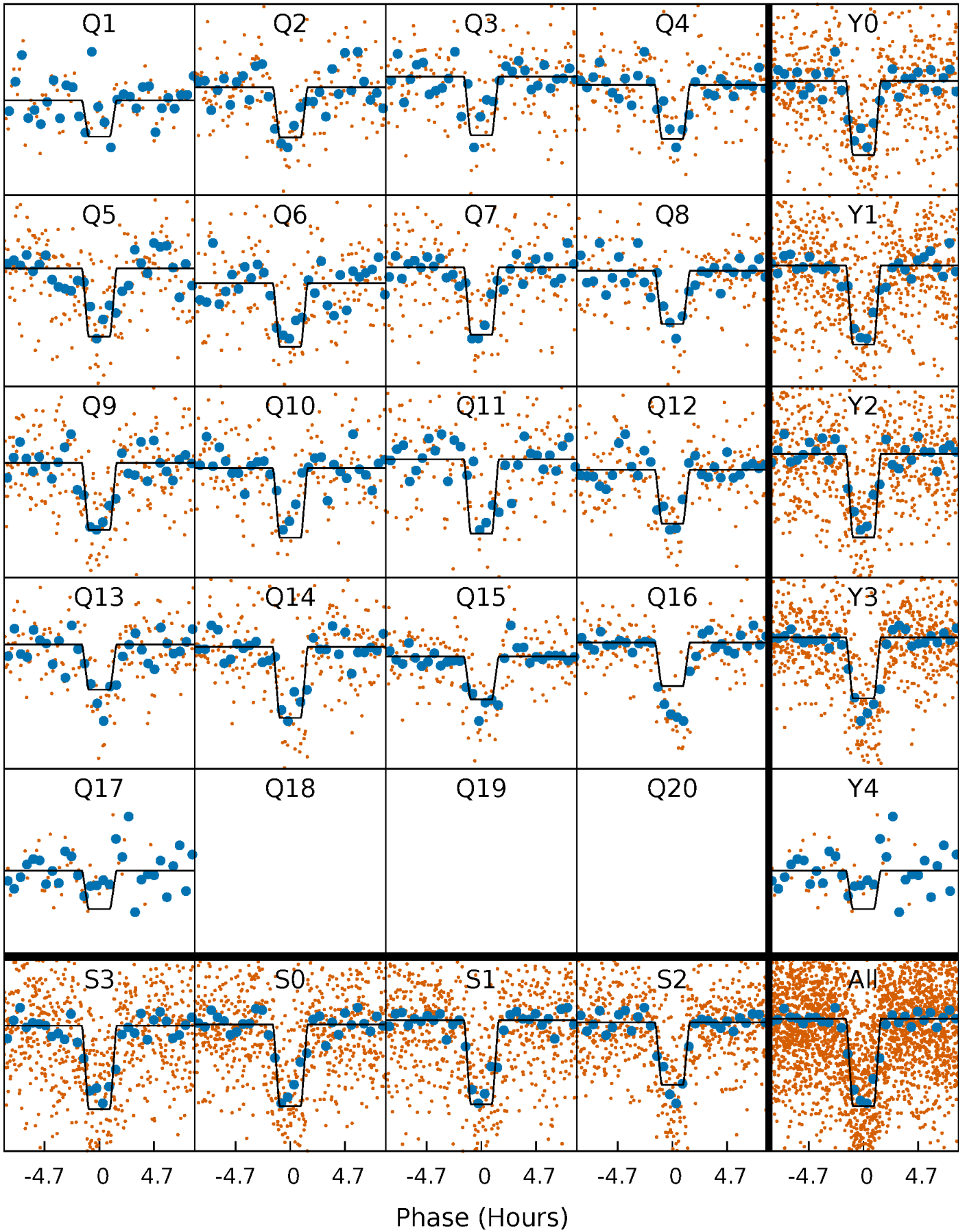
# DV Quarter-Phased Transit Curves

TCE 006428700-02 P= 14.496399 Days  $T_0=143.416344$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

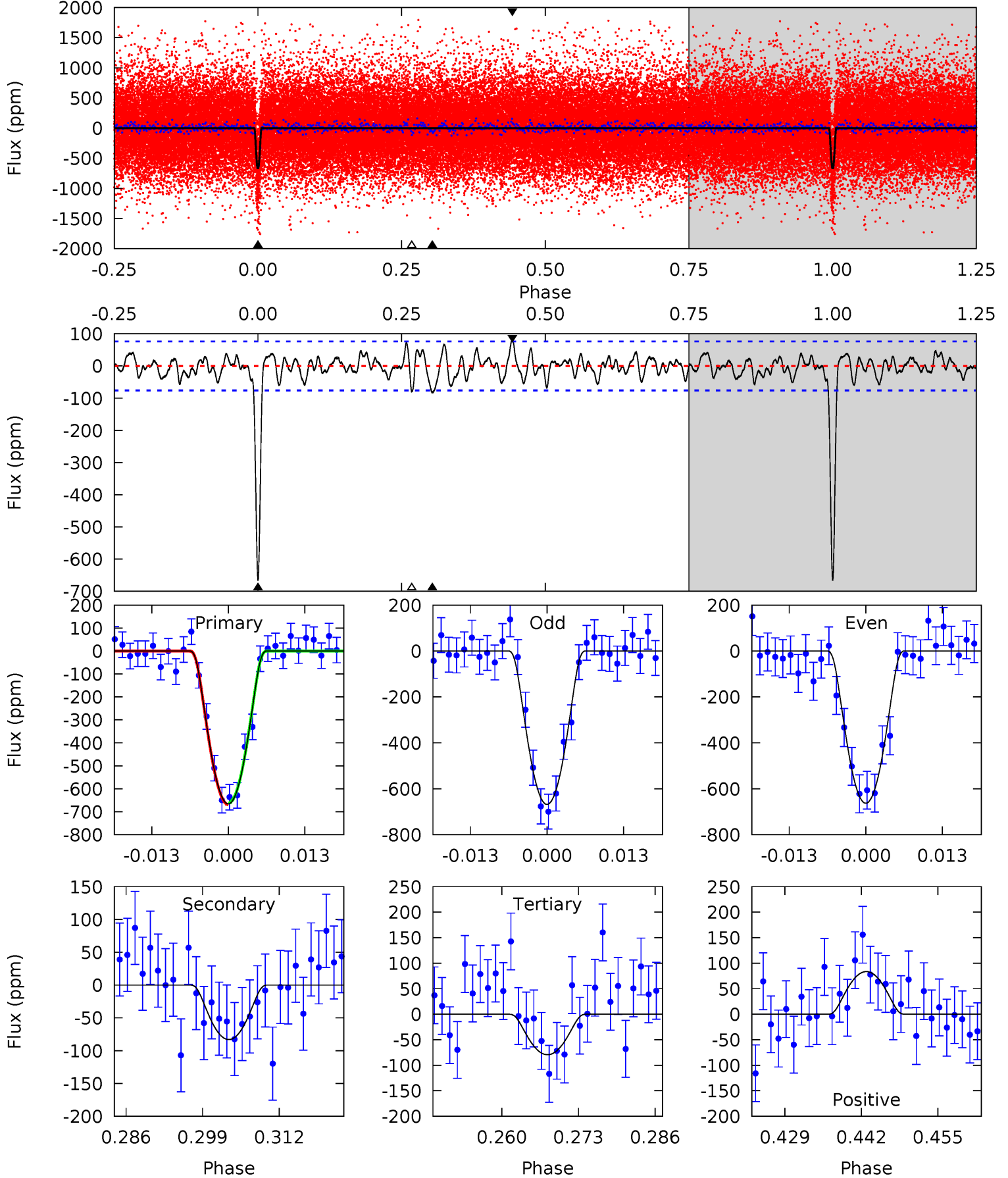
TCE 006428700-02   P= 14.496283 Days    $T_0=143.425080$  (BKJD)



# DV Model-Shift Uniqueness Test

006428700-02,  $P = 14.496399$  Days,  $E = 128.919945$  Days

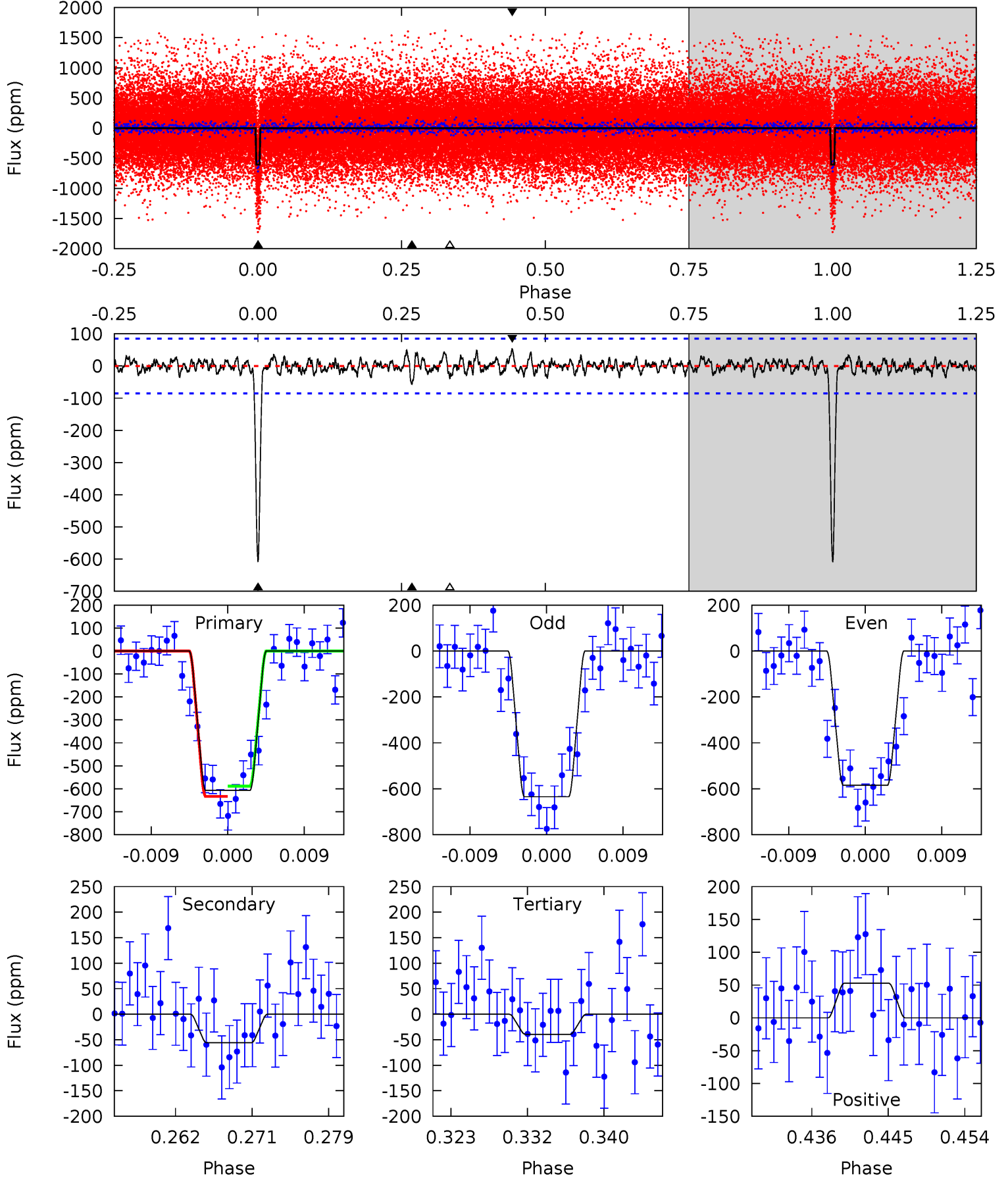
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
43.6	5.44	5.20	5.47	4.98	2.48	1.73	38.4	38.1	0.24	-0.03	0.16	1.02	0.11	0.21



# Alt Model-Shift Uniqueness Test

006428700-02, P = 14.496283 Days, E = 128.928797 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
36.1	3.34	2.35	3.14	5.05	2.62	0.90	33.8	33.0	0.99	0.20	1.50	0.99	0.08	1.33



### Stellar Parameters For KIC 006428700

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5015^{+149}_{-149}$	$4.499^{+0.090}_{-0.060}$	$0.100^{+0.250}_{-0.300}$	$0.826^{+0.066}_{-0.083}$	$0.785^{+0.078}_{-0.056}$	$1.960^{+0.666}_{-0.376}$
	+3%/-3%	+2%/-1%	+250%/-300%	+8%/-10%	+10%/-7%	+34%/-19%
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 006428700-02 / KOI 0853.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-83 \pm 15$	$3.77^{+2.04}_{-1.89}$	$854^{+33}_{-33}$	$2974^{+695}_{-348}$	$37^{+111}_{-22}$
Alt.	$-56 \pm 17$	$2.78^{+2.04}_{-1.74}$	$852^{+36}_{-34}$	$3057^{+1106}_{-436}$	$46^{+269}_{-31}$

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

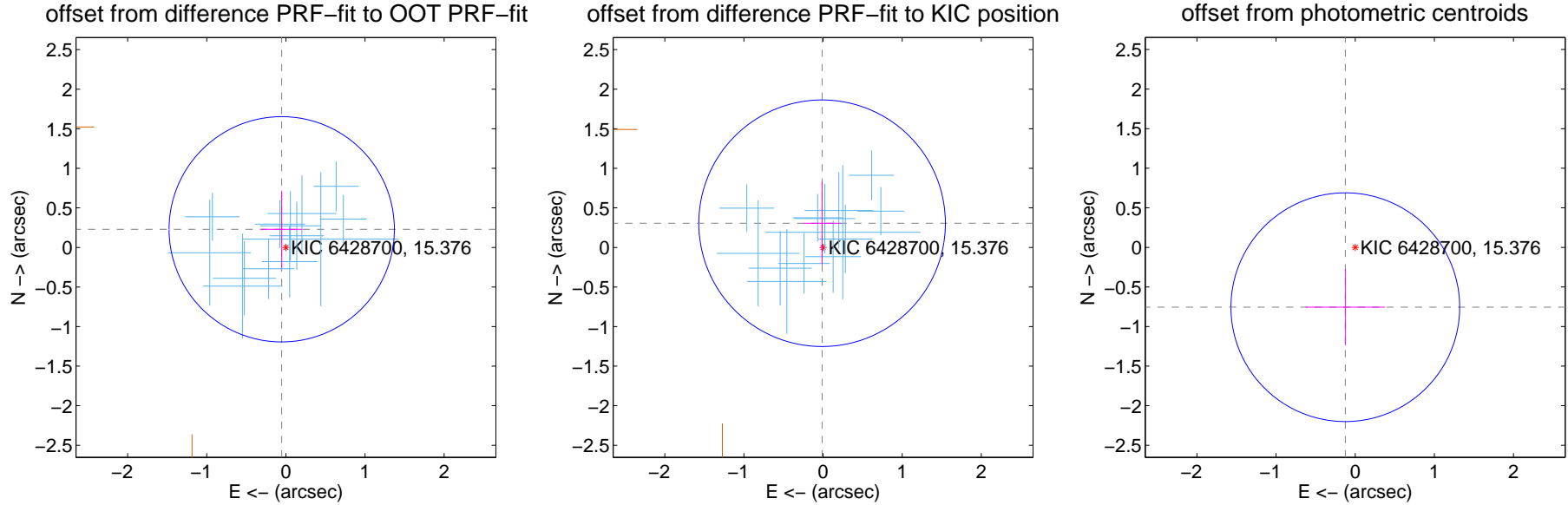
## DV Centroid Data

Supplemental centroid analysis for 006428700-02. Kepler magnitude: 15.38. Transit SNR 23.00

There are 13 quarters with good PRF difference image offsets

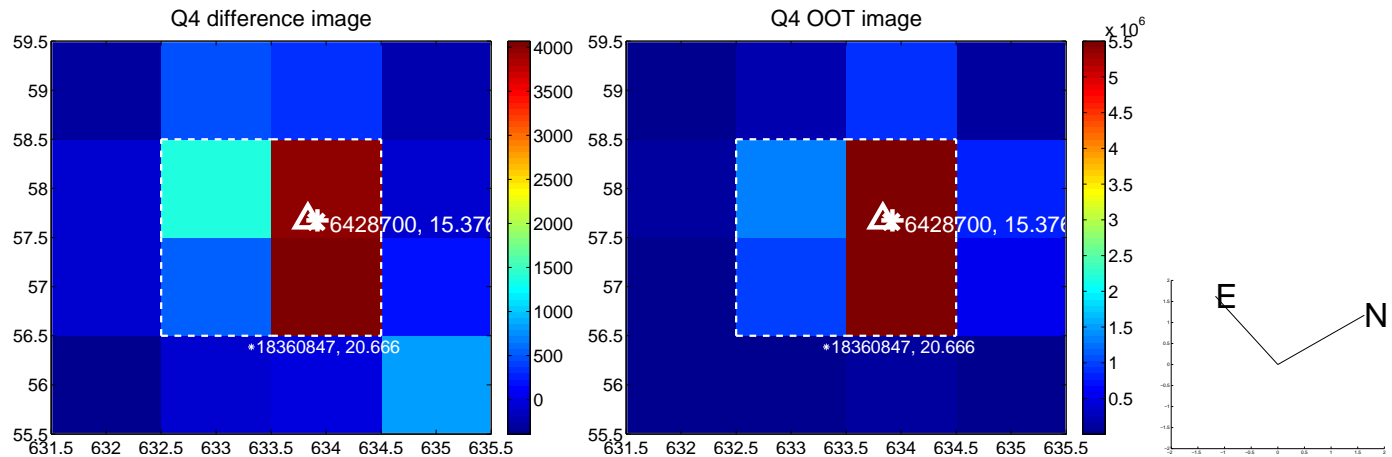
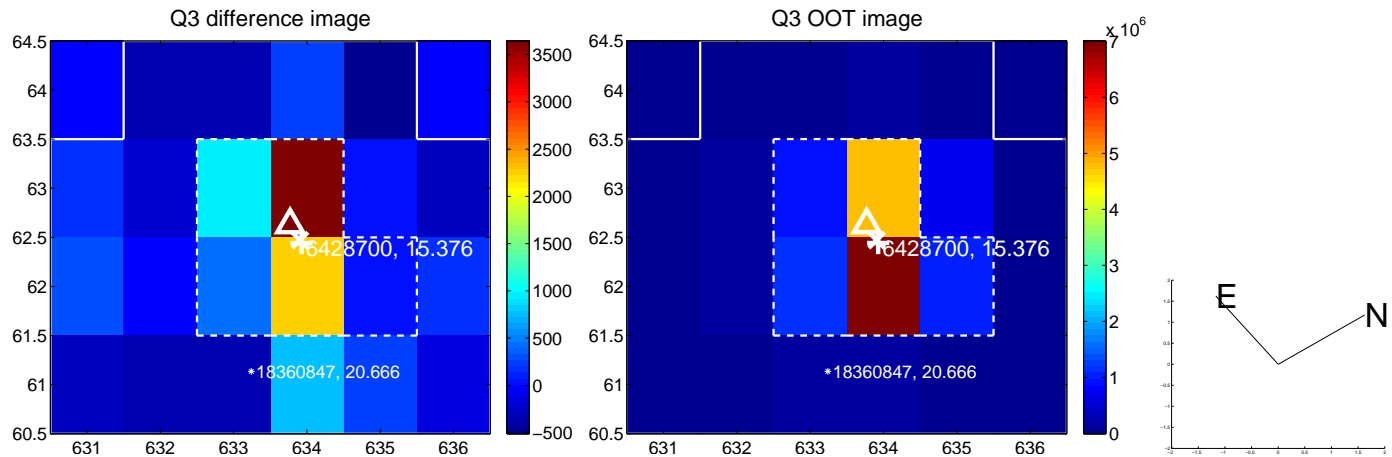
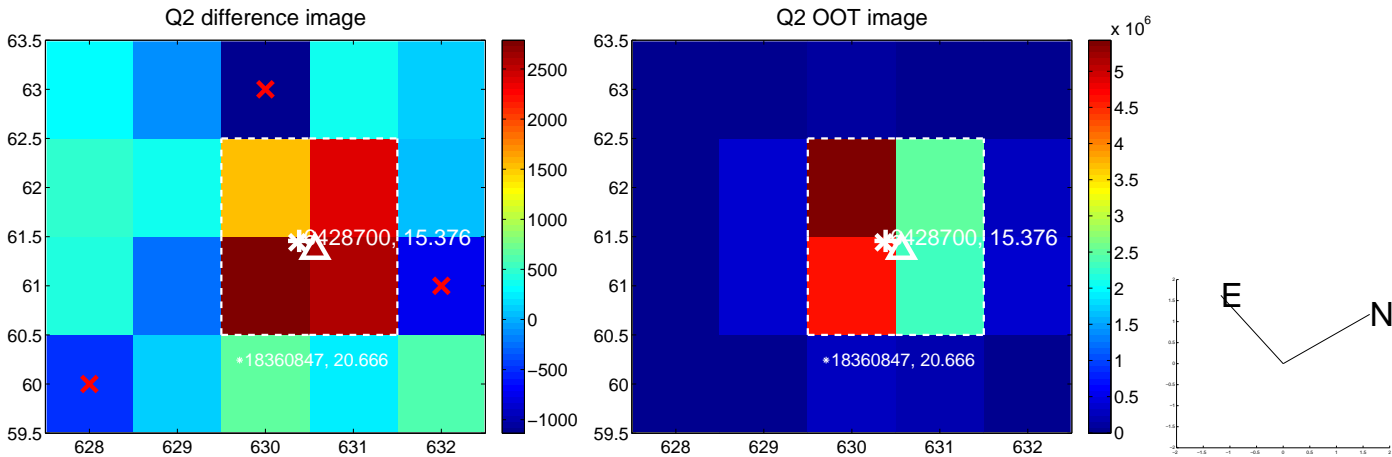
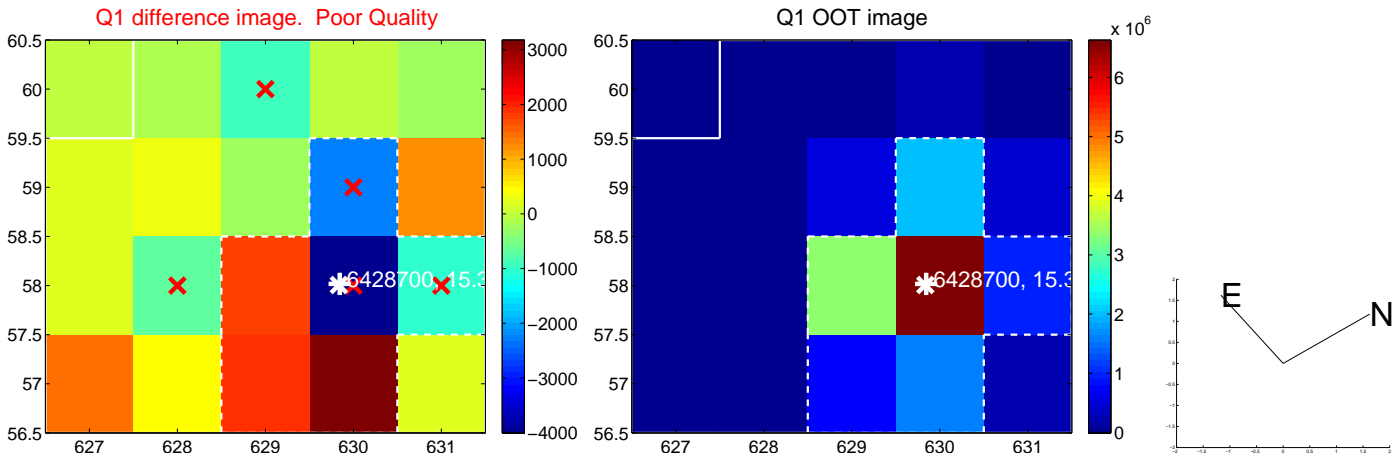
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.235 \pm 0.474$	0.50	$0.053 \pm 0.260$	$0.230 \pm 0.488$
PRF-fit source offset from KIC position	$0.306 \pm 0.519$	0.59	$0.012 \pm 0.234$	$0.306 \pm 0.521$
photometric centroid source offset	$0.77 \pm 0.48$	1.59	$0.13 \pm 0.50$	$-0.76 \pm 0.48$



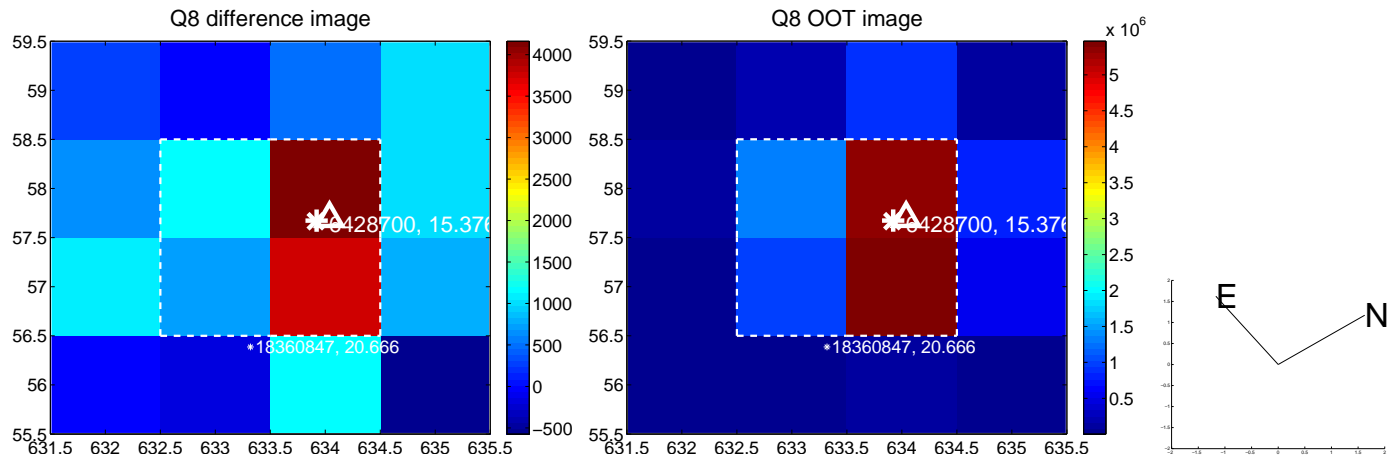
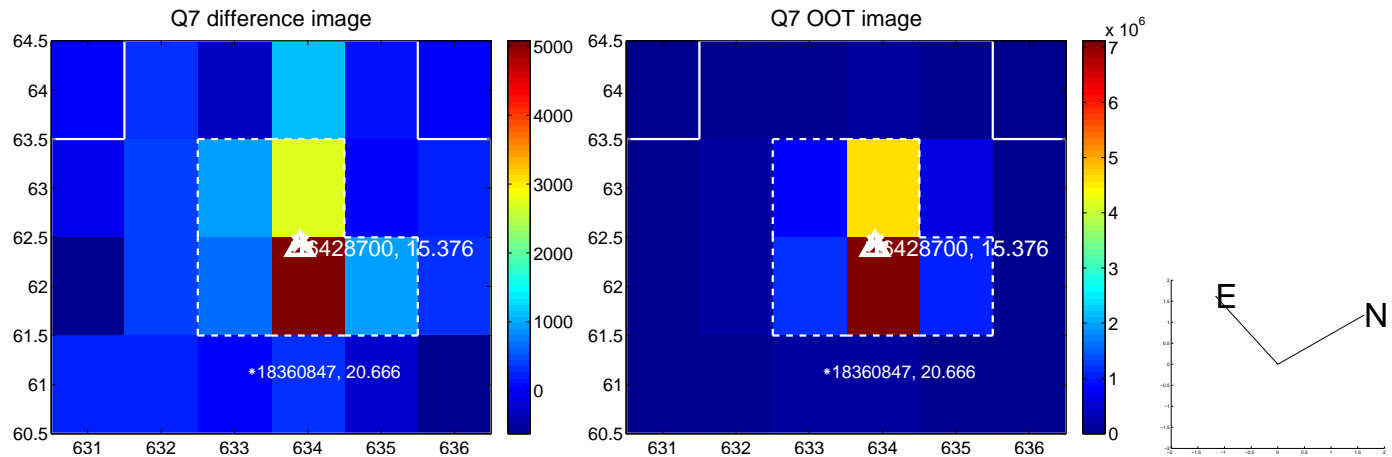
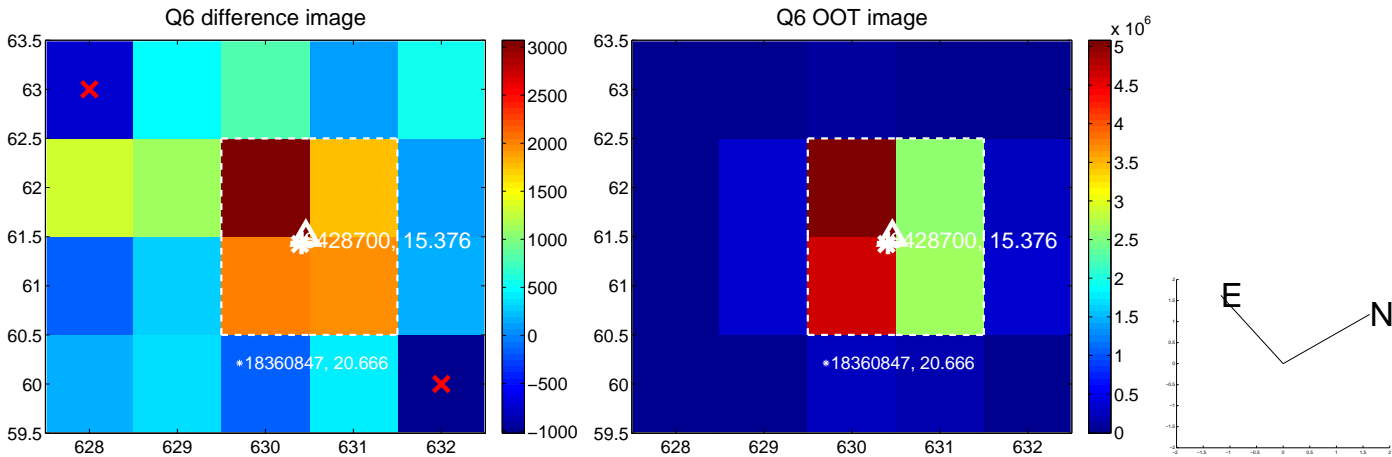
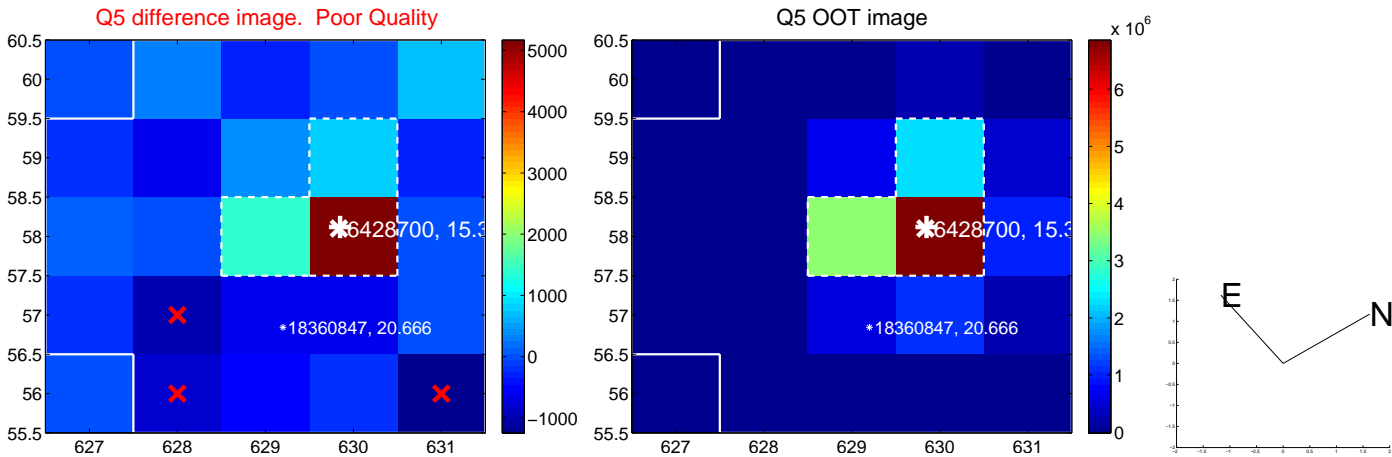
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

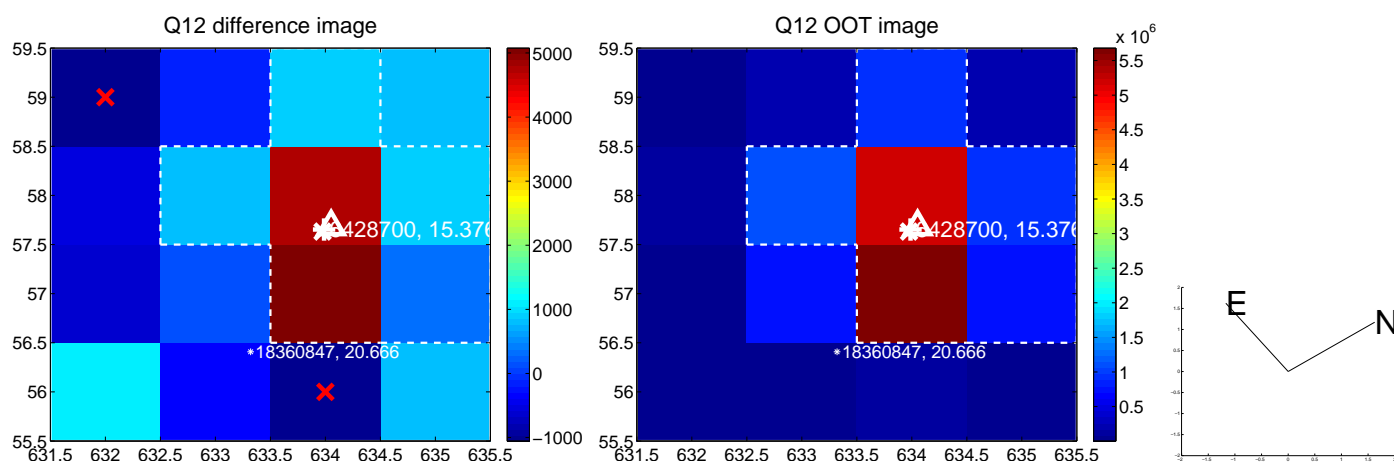
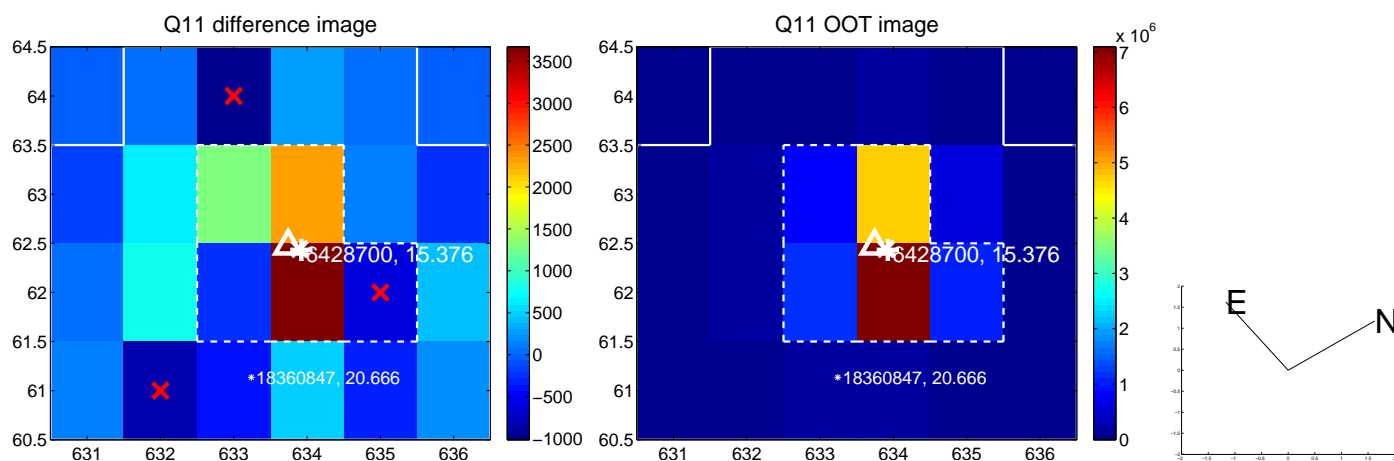
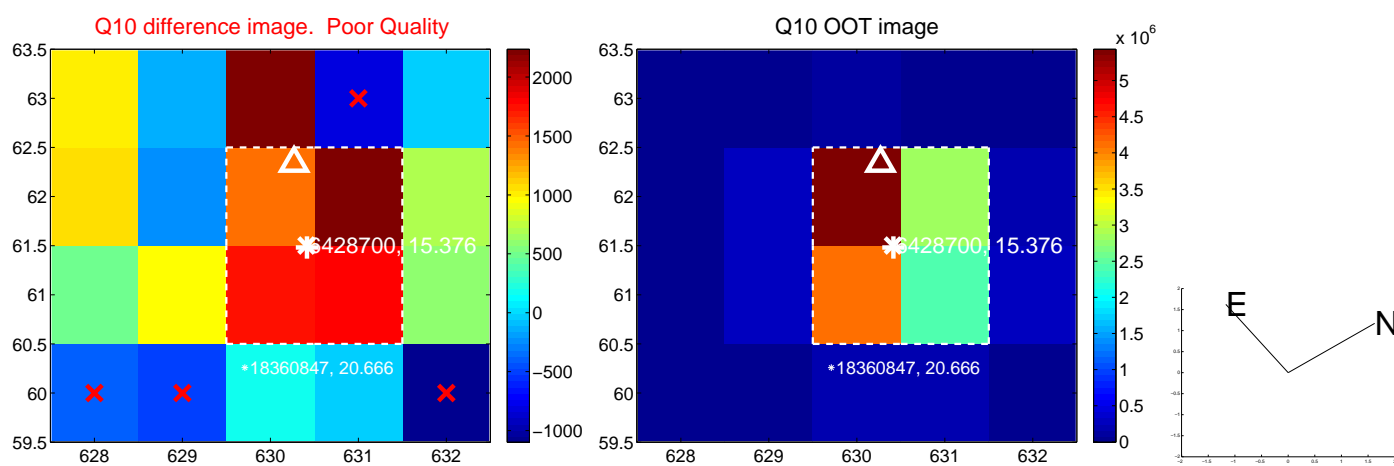
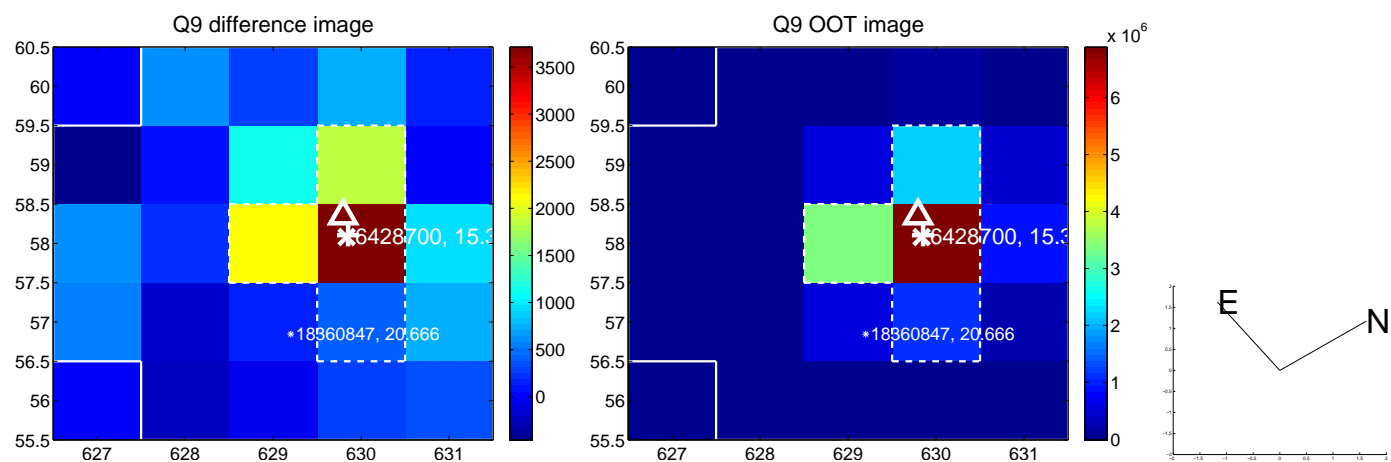




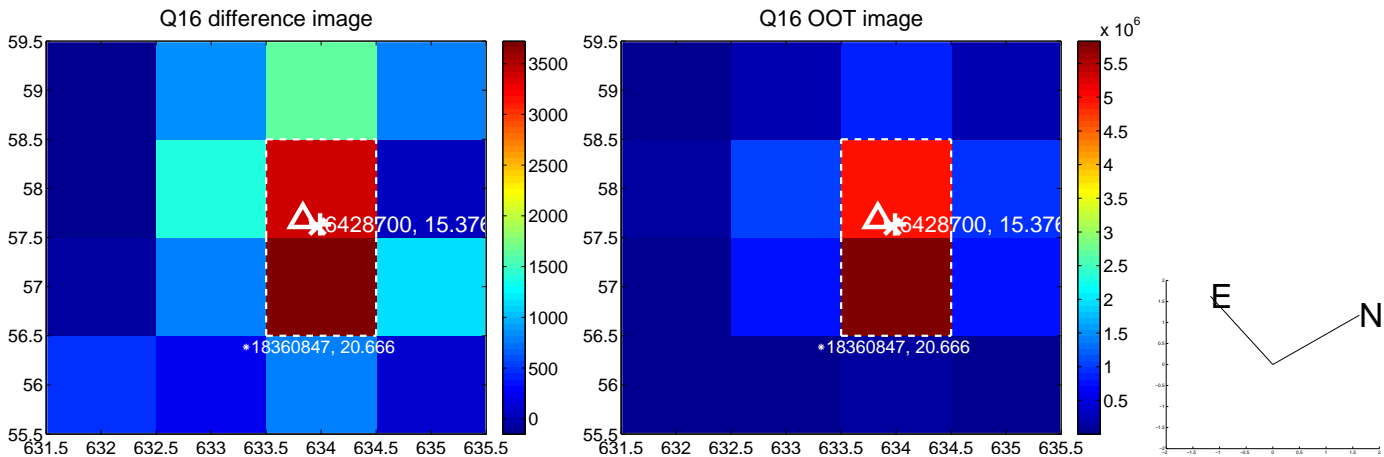
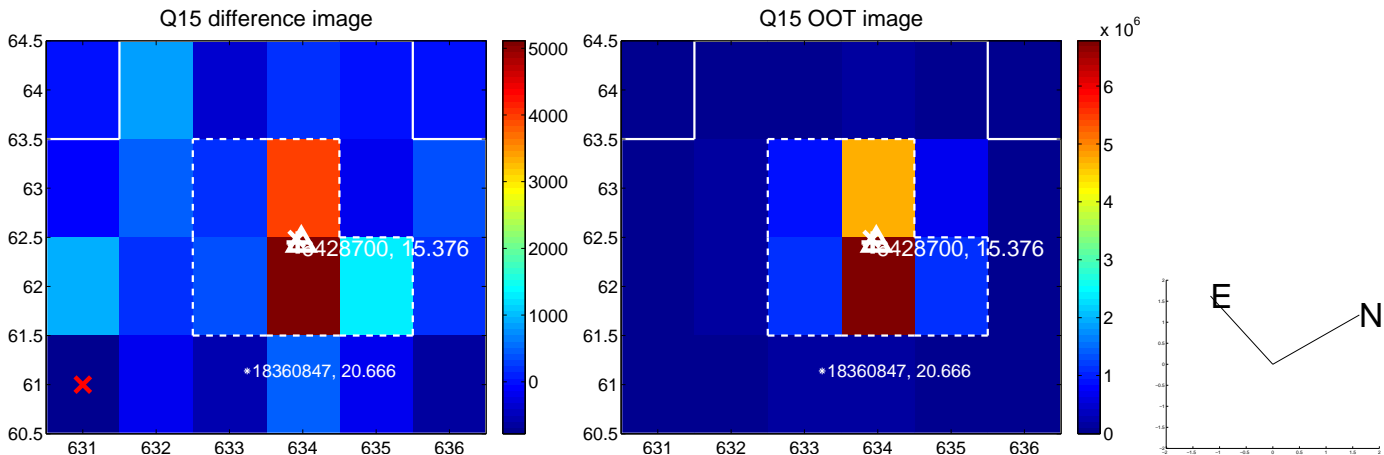
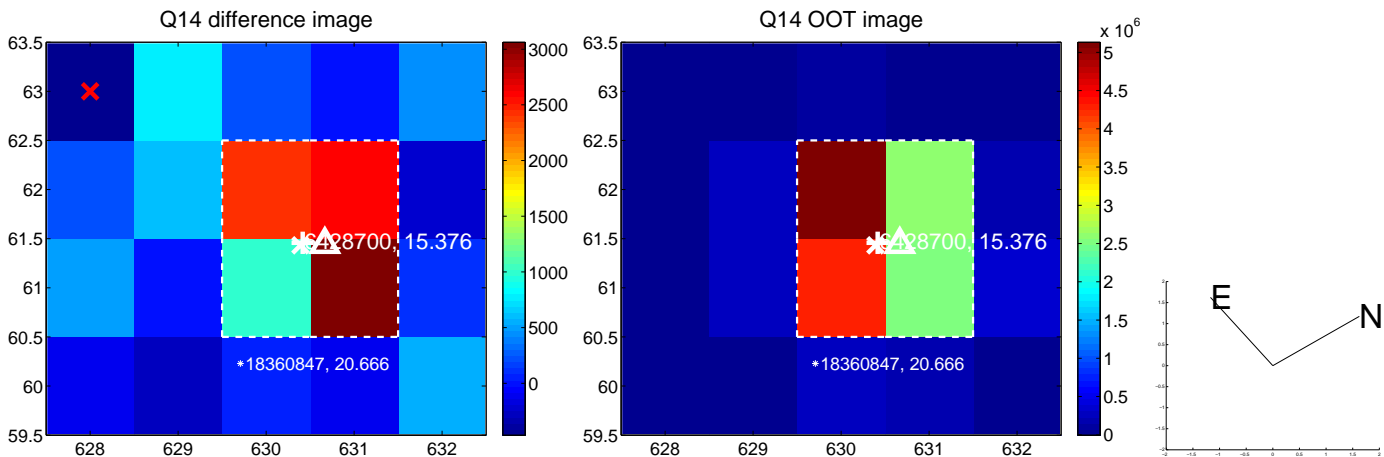
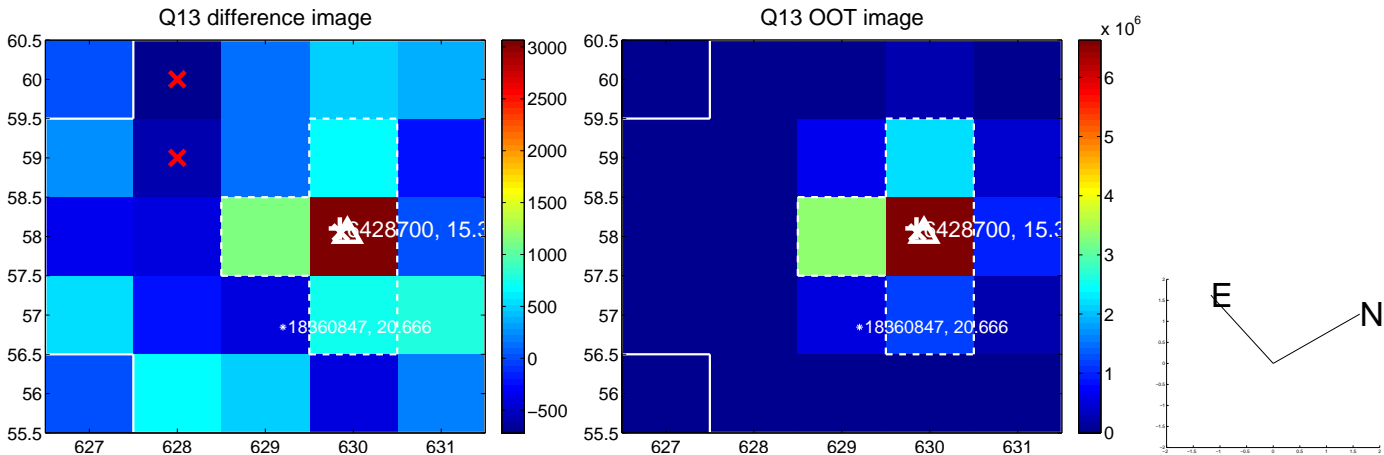
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



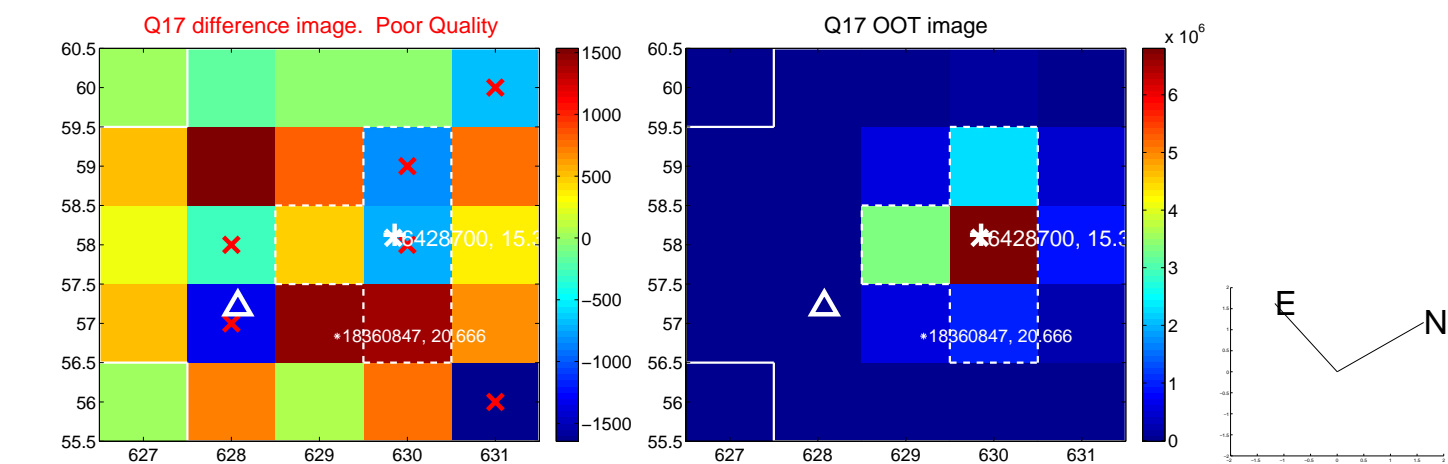
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



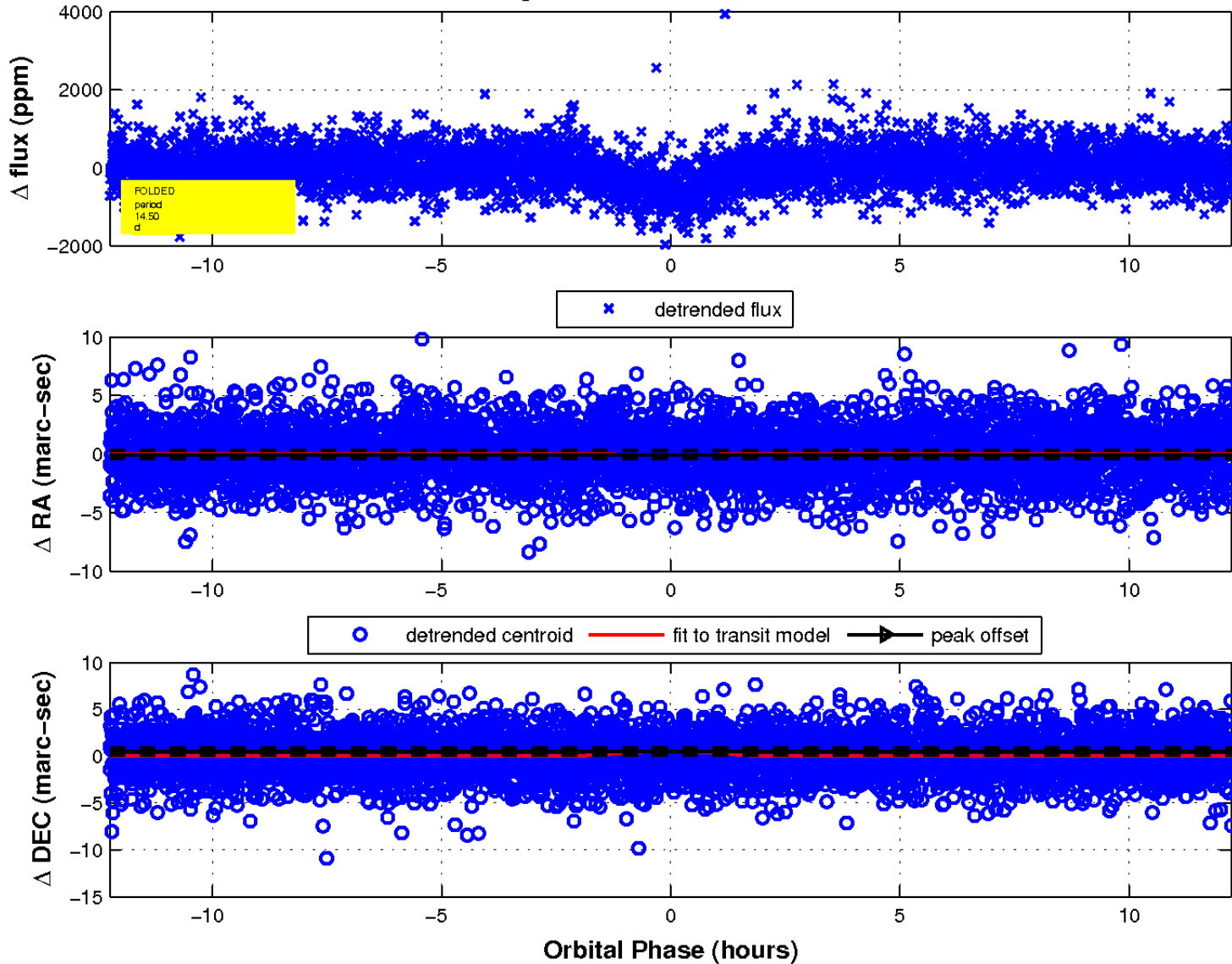
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



# UKIRT Image

Declination

