

# KIC 008838950

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008838950-01	OBS	2421.01	2.270500	133.543673	97.5	2.058	13.1	14.2	0.53	4671	0.62	157.81
008838950-02	OBS	2421.02	4.023139	135.431631	83.0	2.596	8.2	9.6	0.53	4671	0.52	73.60

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008838950-01	OBS	PC	0.91	0	0	0	0	NO_COMMENT
008838950-02	OBS	PC	0.89	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 008838950-01

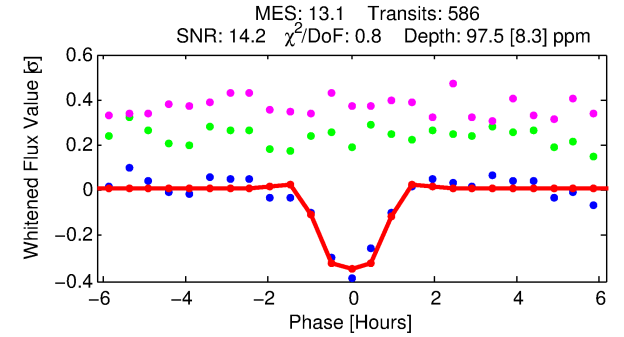
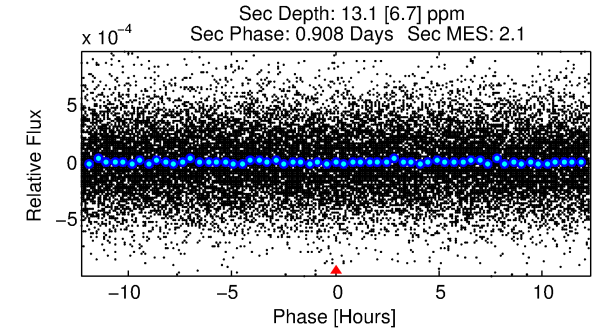
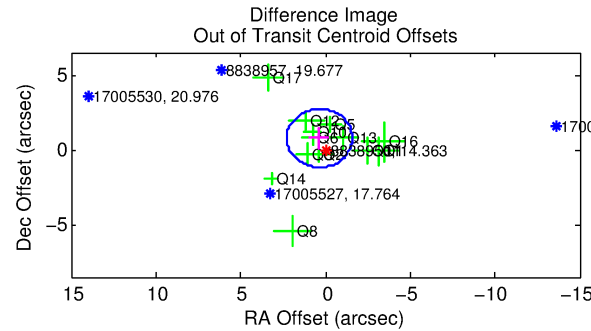
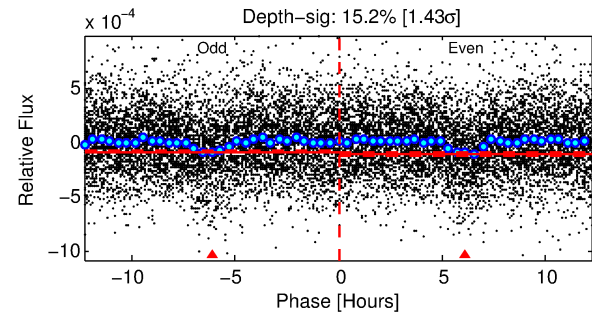
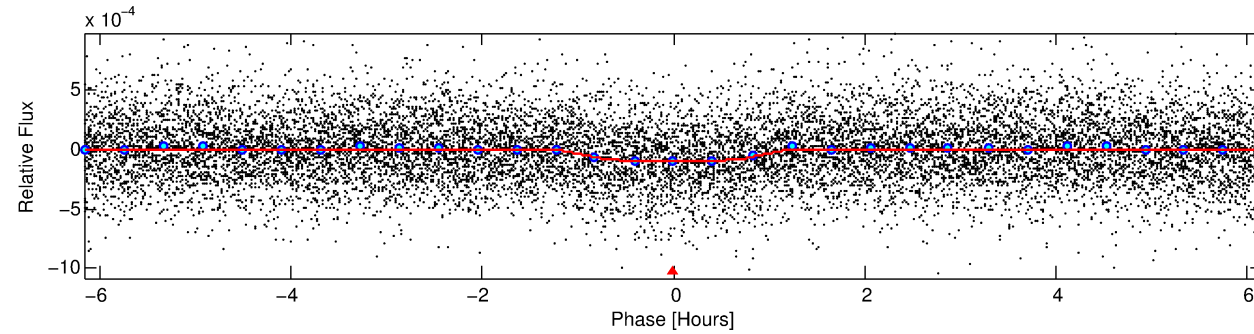
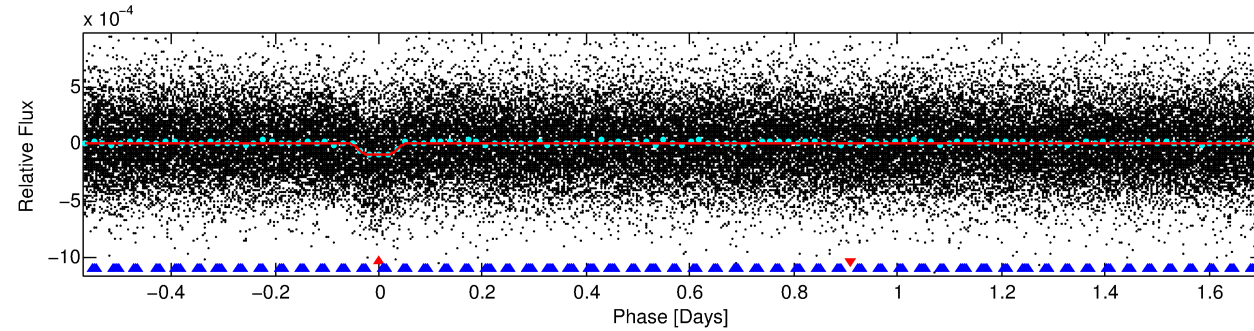
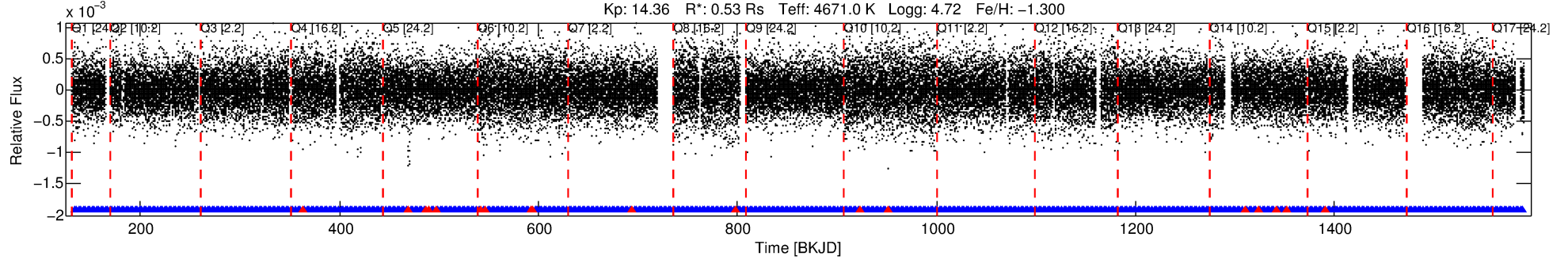
No Significant Match Found

# DV One-Page Summary

KIC: 8838950 Candidate: 1 of 2 Period: 2.270 d

KOI: K02421.01 Corr: 0.981

Kp: 14.36 R\*: 0.53 Rs Teff: 4671.0 K Logg: 4.72 Fe/H: -1.300



## DV Fit Results:

Period = 2.27050 [0.00001] d  
Epoch = 133.5437 [0.0022] BKJD  
Rp/R\* = 0.0108 [0.0073]  
a/R\* = 4.08 [10.98]  
b = 0.89 [0.66]  
Seff = 157.81 [24.67]  
Teff = 904 [35] K  
Rp = 0.62 [0.42] Re  
a = 0.0274 [0.0016] AU  
Ag = 14.01 [20.24] [0.64σ]  
Teffp = 2704 [979] K [1.84σ]

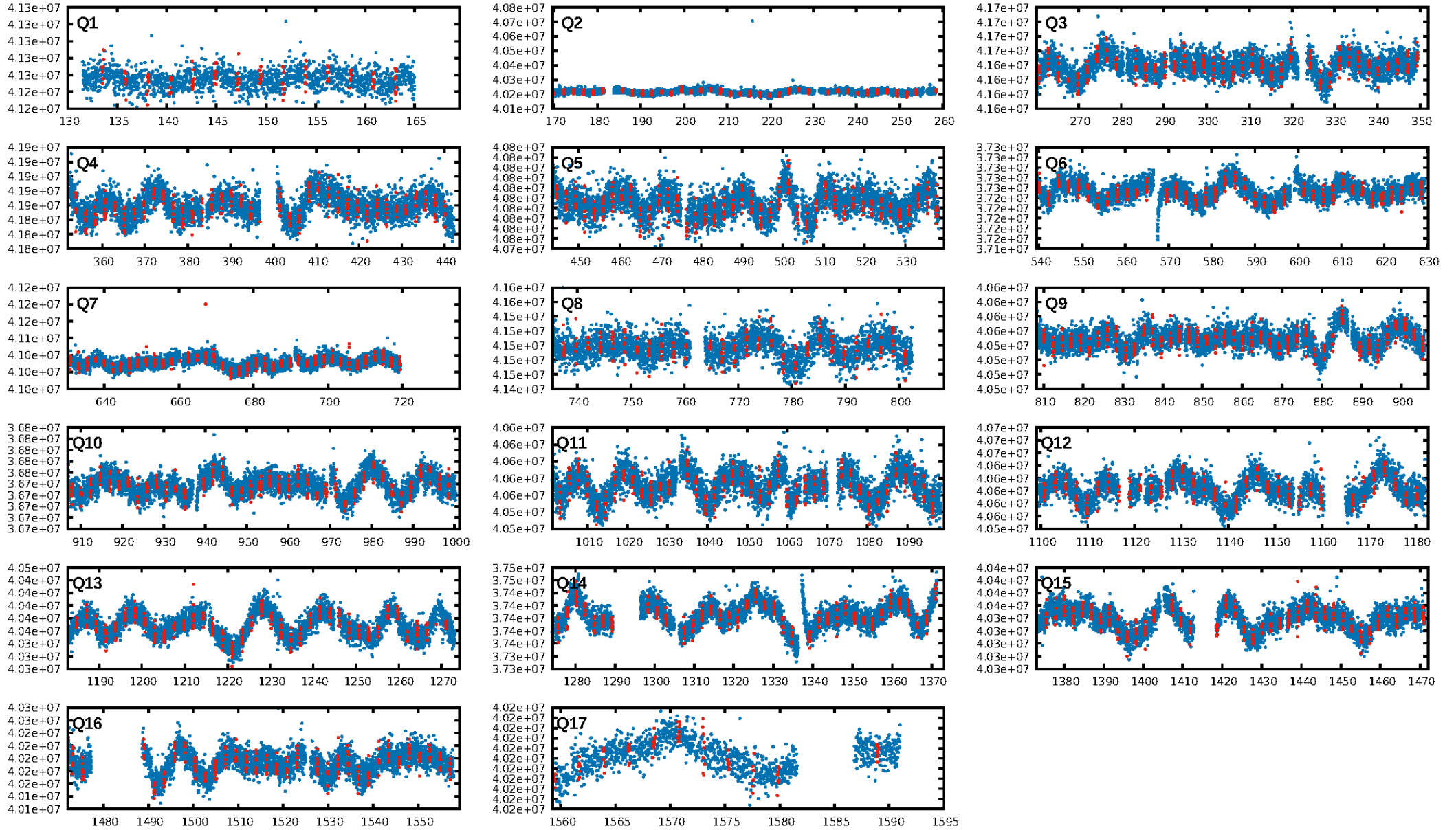
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [12.70σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 2.30e-38  
RollingBand-fgt: 0.97 [543/561]  
**GhostDiagnostic-chr: 0.9241**  
Centroid-sig: 36.1%  
Centroid-so: 0.753 arcsec [0.84σ]  
OotOffset-rm: 0.848 arcsec [1.31σ]  
KicOffset-rm: 0.767 arcsec [1.28σ]  
OotOffset-st: 4/2/3/4 [13]  
KicOffset-st: 4/2/3/4 [13]  
DiffImageQuality-fgm: 0.54 [7/13]  
DiffImageOverlap-fno: 1.00 [17/17]

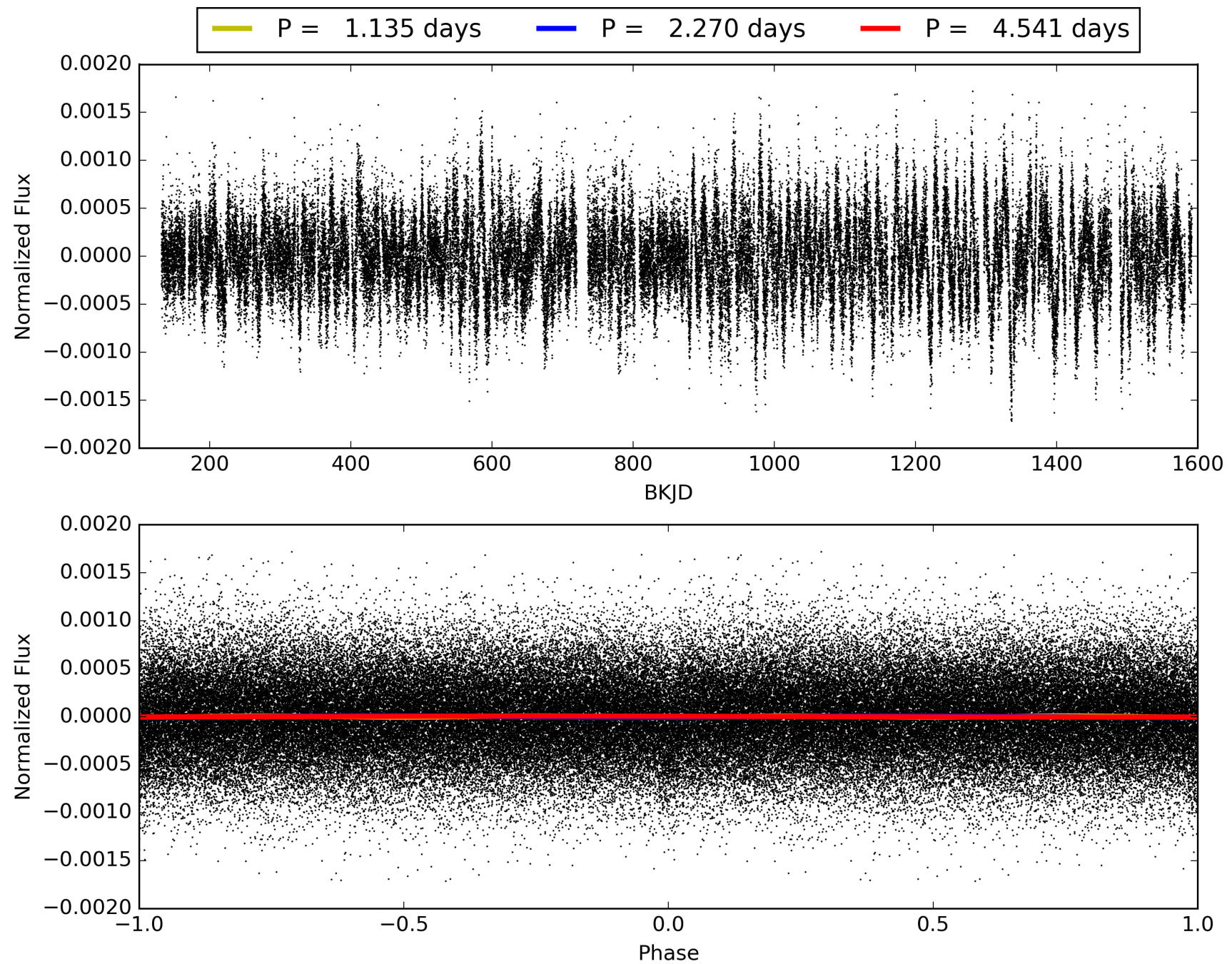
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 22:22:02 Z

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

# TCE 008838950-01, PDC Light Curves



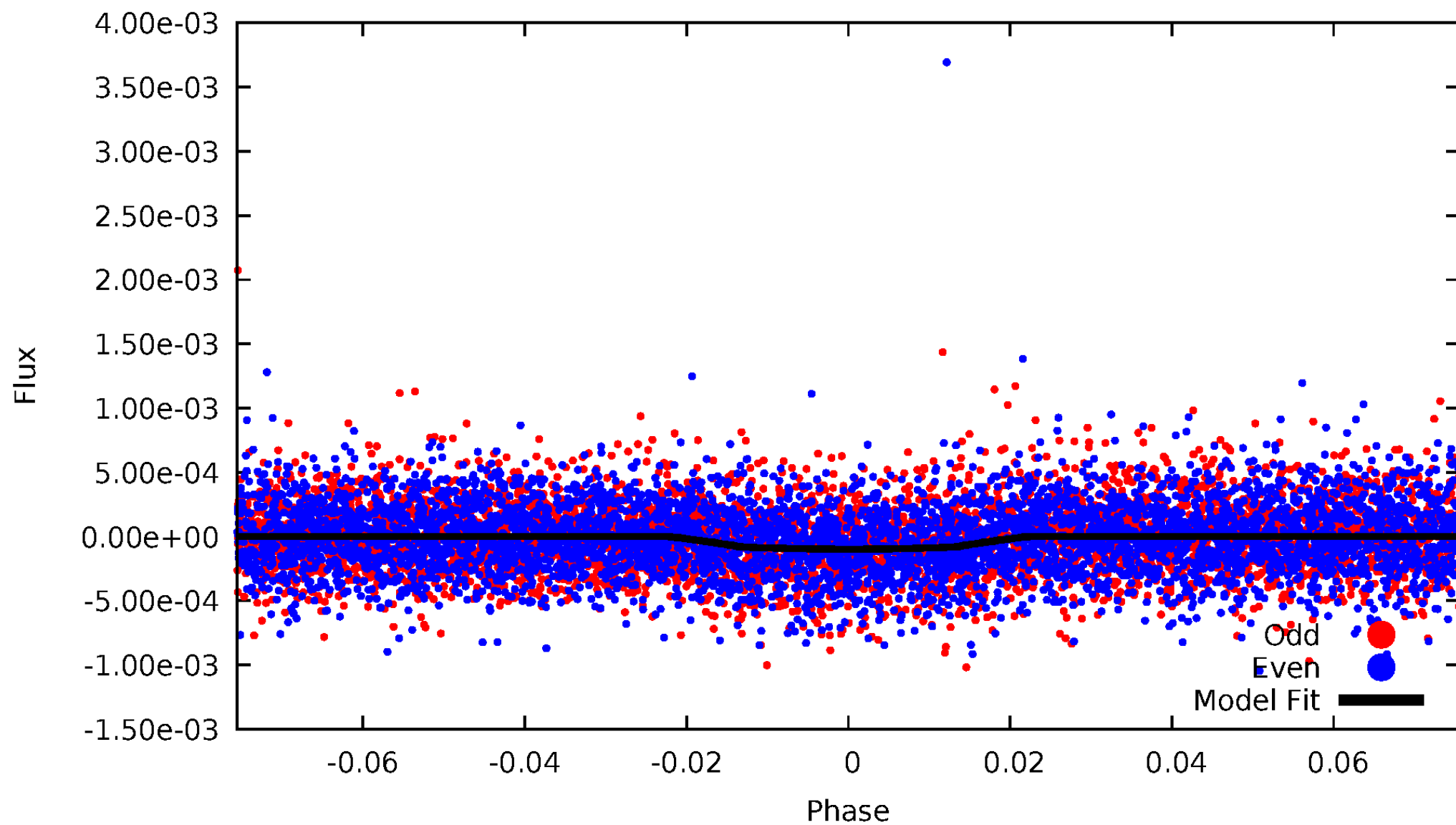
TCE 008838950-01





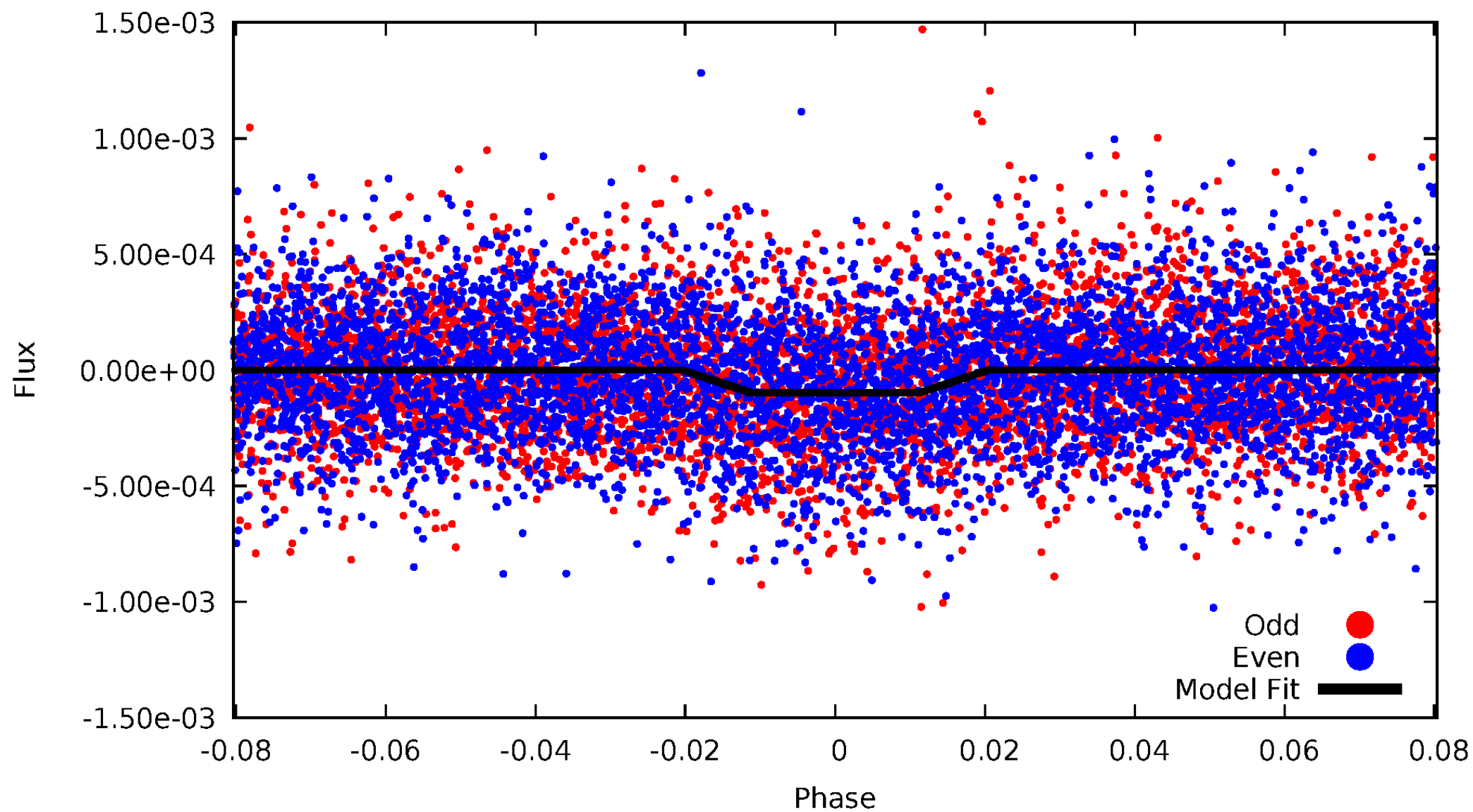
# DV Odd/Even

TCE 008838950-01

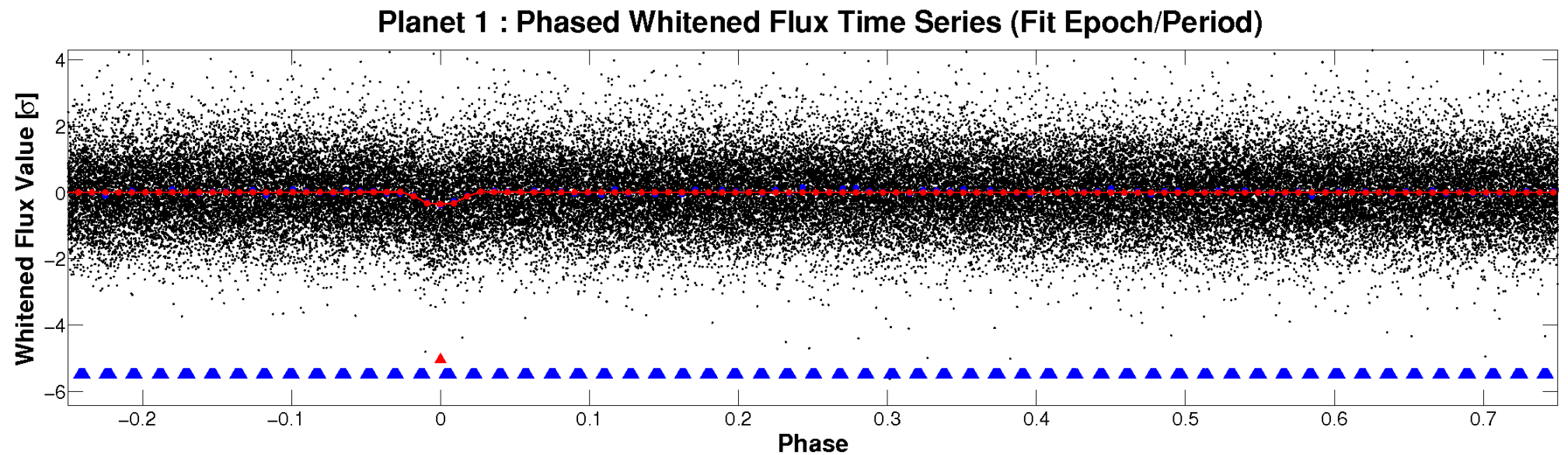
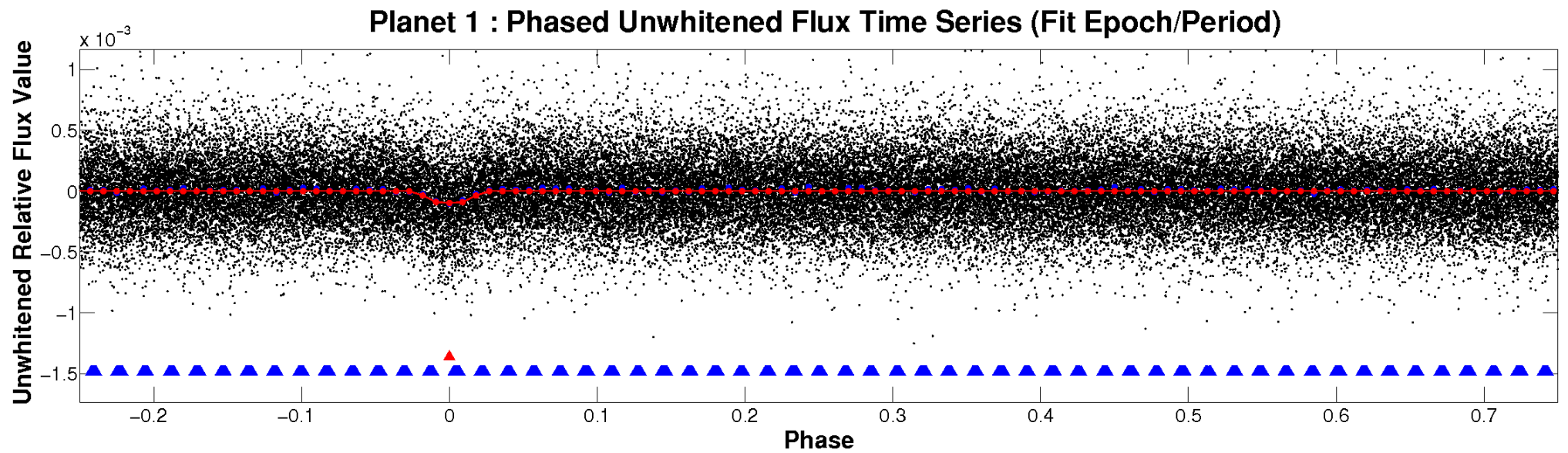


# ALT Odd/Even

TCE 008838950-01

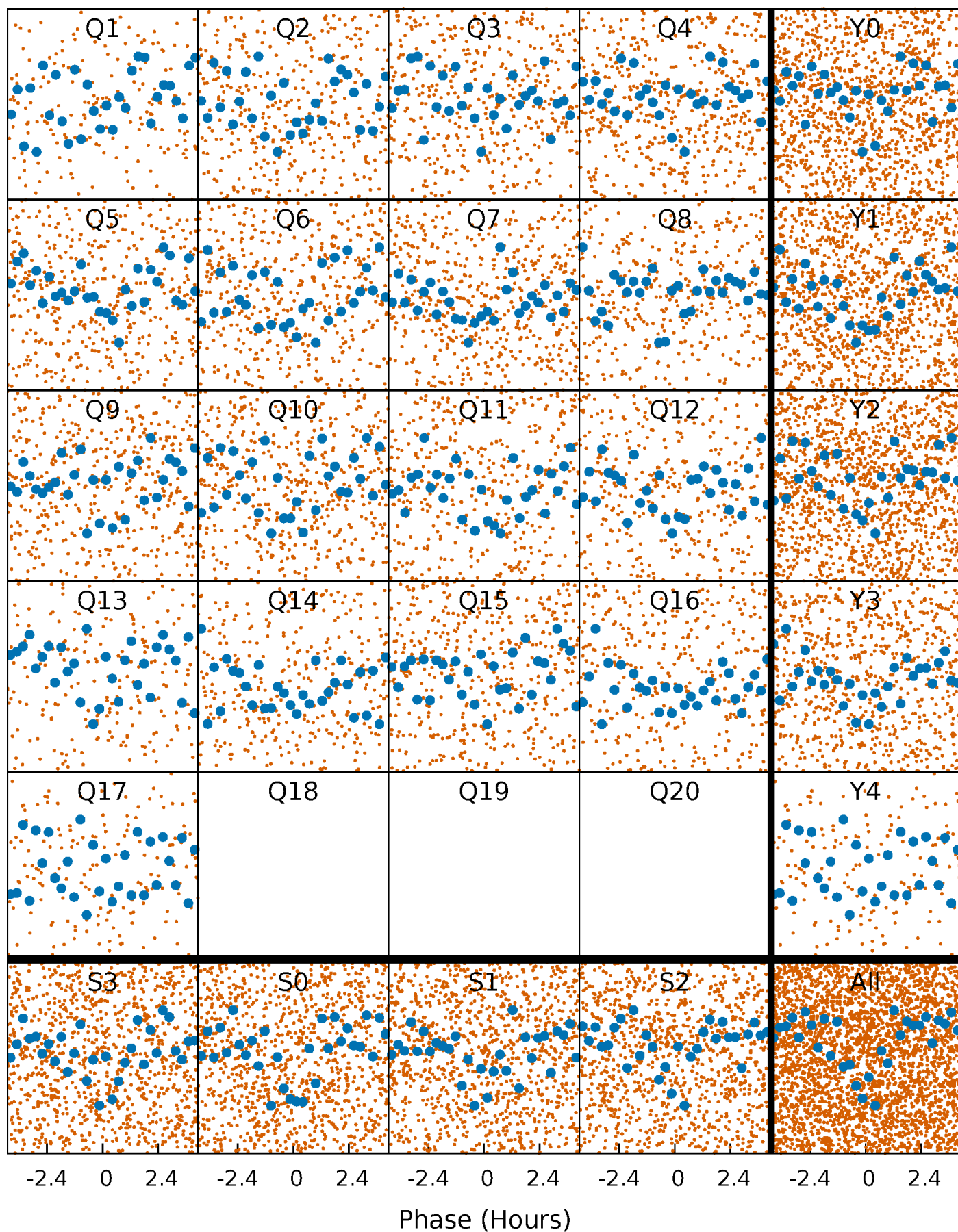


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

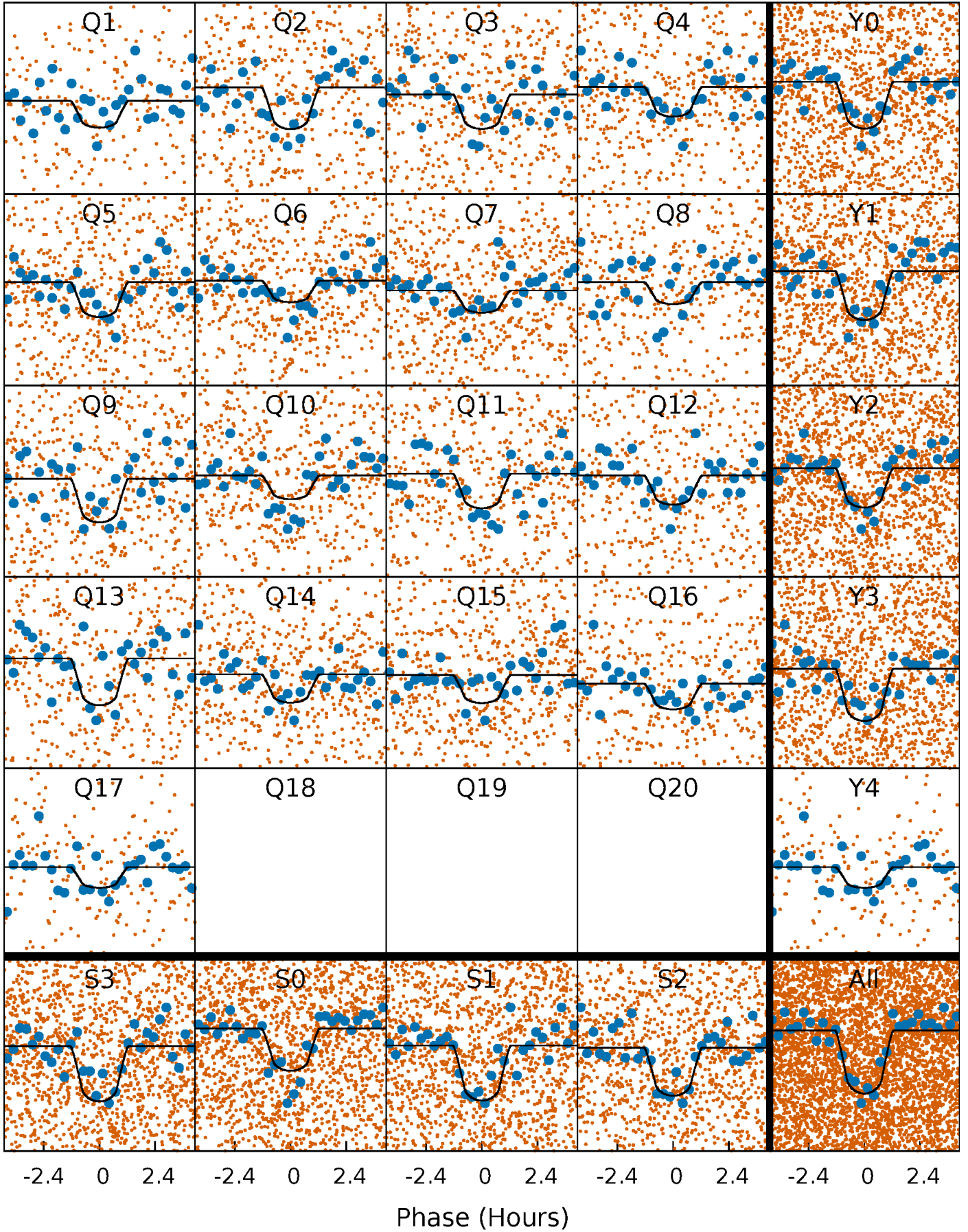
TCE 008838950-01 P= 2.270500 Days  $T_0=133.543673$  (BKJD)





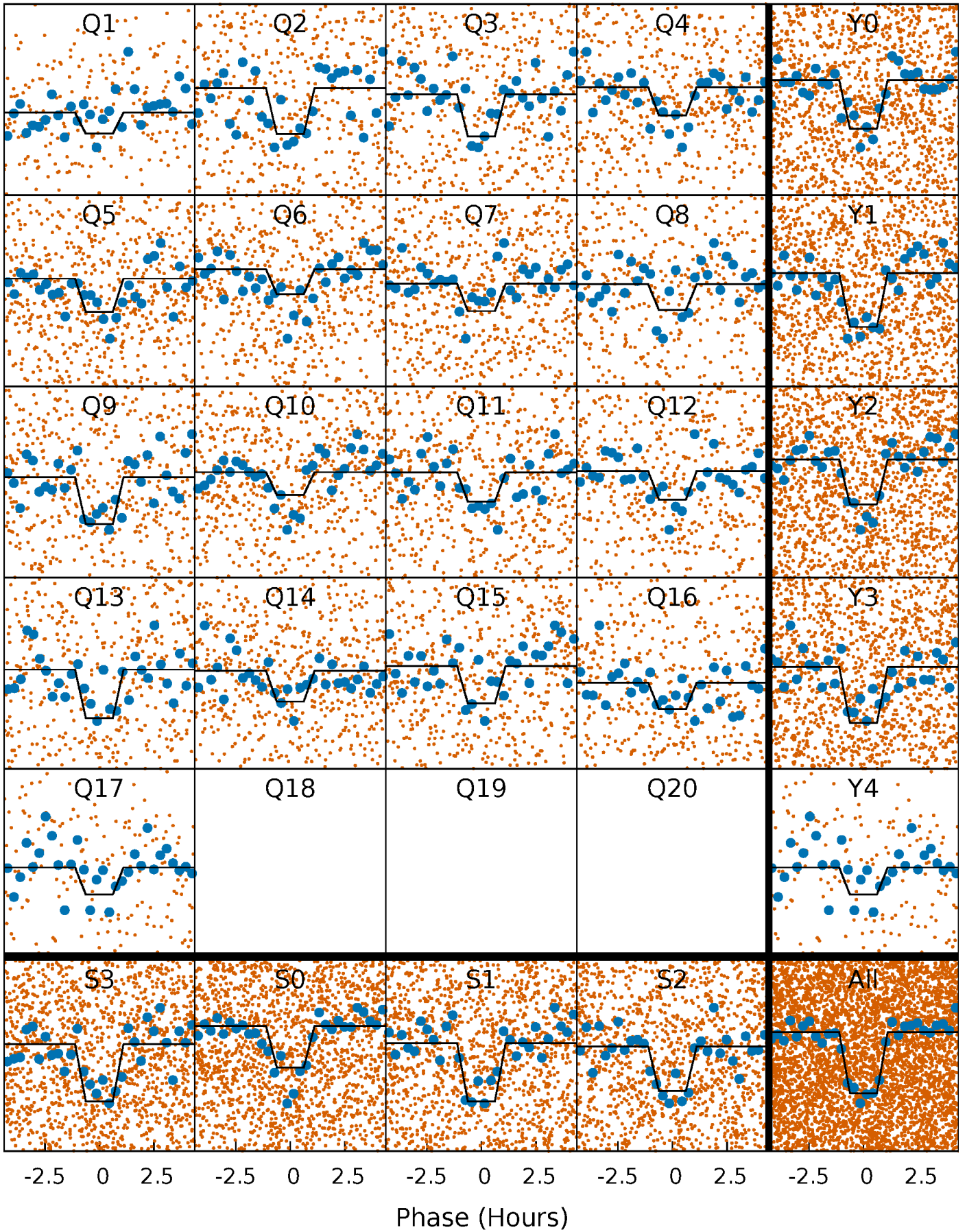
# DV Quarter-Phased Transit Curves

TCE 008838950-01   P= 2.270500 Days    $T_0=133.543673$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

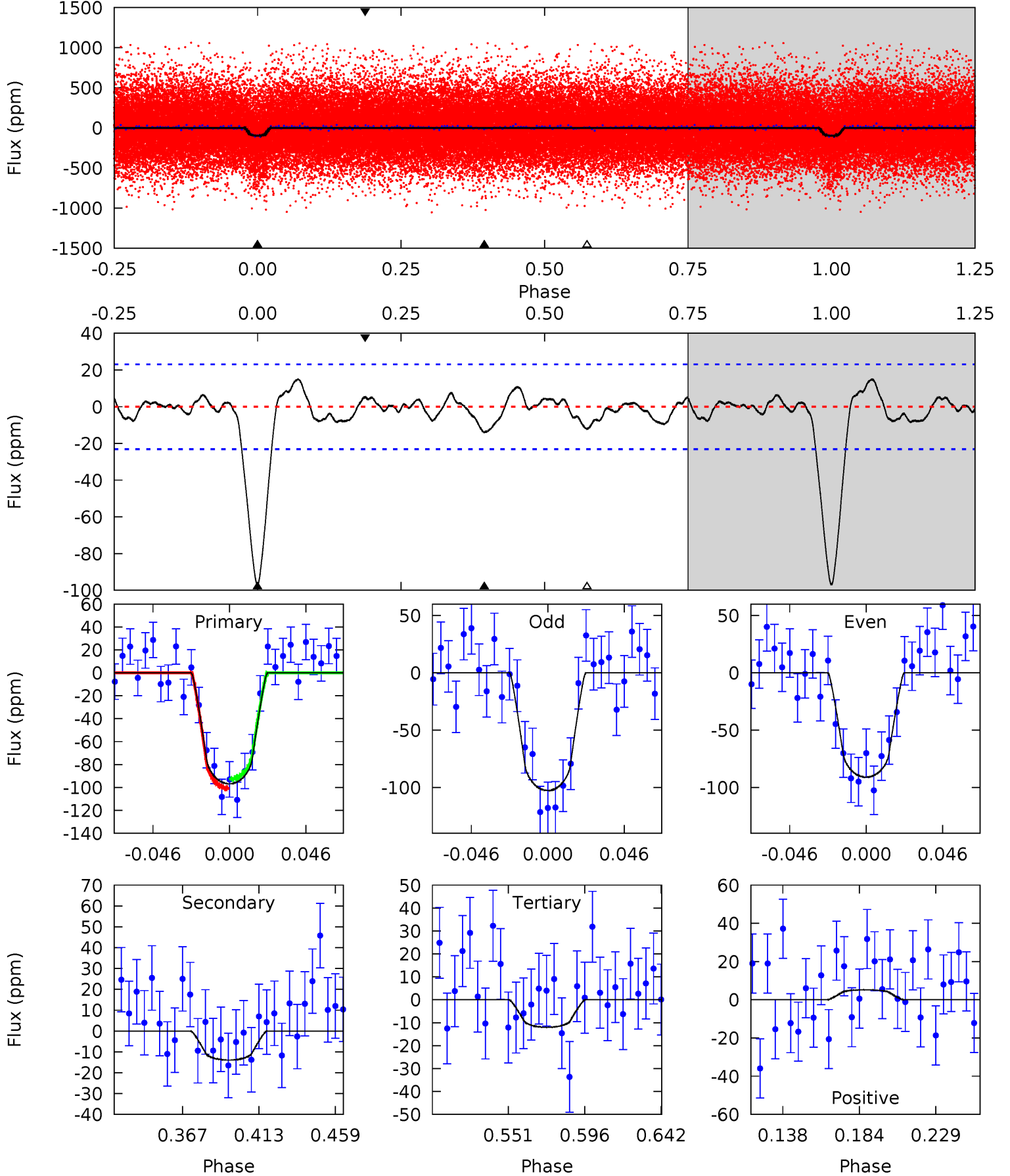
TCE 008838950-01 P= 2.270490 Days  $T_0=133.546259$  (BKJD)



# DV Model-Shift Uniqueness Test

008838950-01, P = 2.270500 Days, E = 131.273173 Days

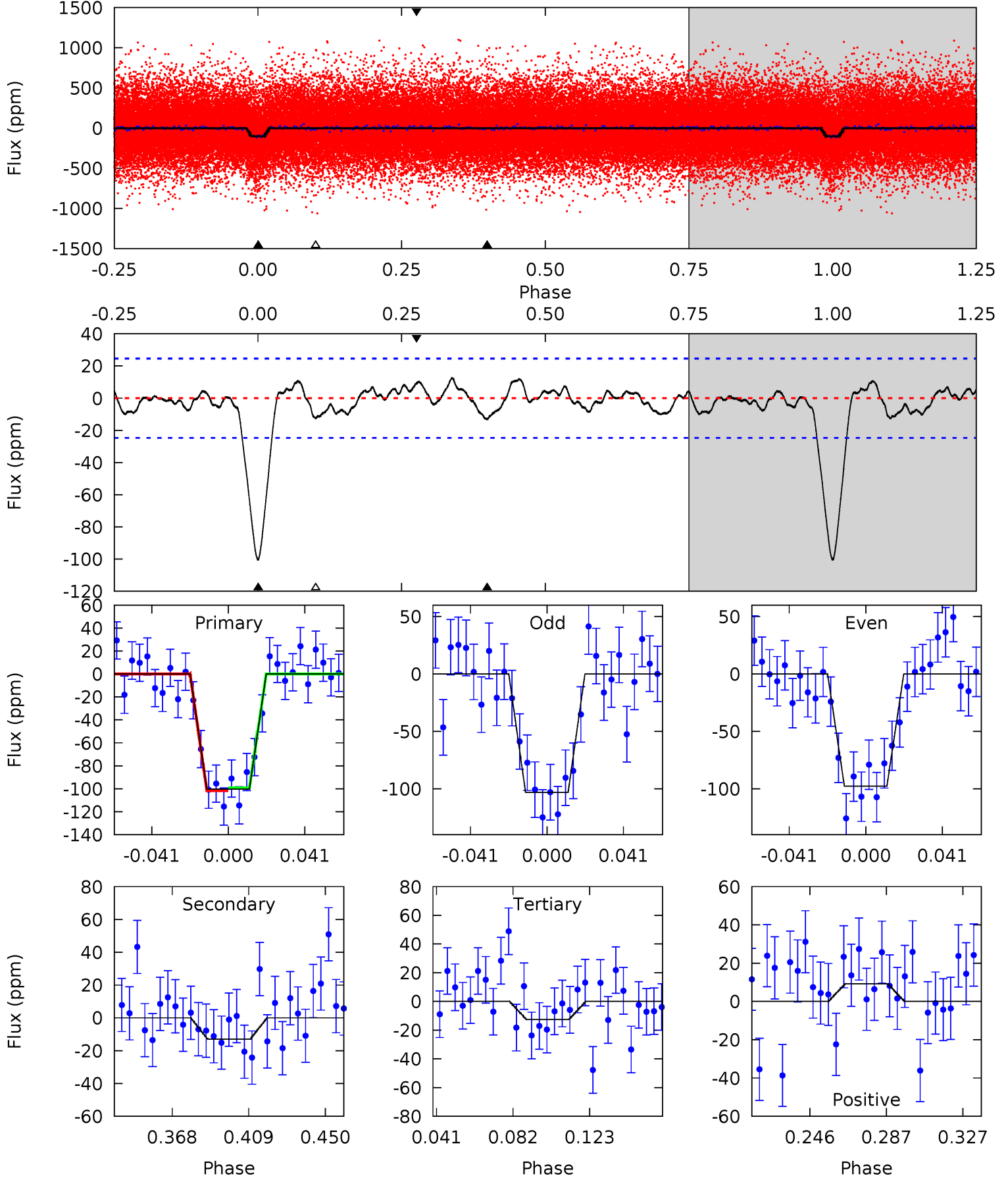
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
19.8	2.85	2.46	1.07	4.73	2.00	1.06	17.3	18.7	0.39	1.79	1.19	0.96	0.13	0.82



# Alt Model-Shift Uniqueness Test

008838950-01, P = 2.270490 Days, E = 131.275769 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
19.4	2.51	2.43	1.78	4.75	2.04	1.07	16.9	17.6	0.08	0.74	0.53	1.07	0.11	0.22





### Stellar Parameters For KIC 008838950

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4671^{+139}_{-153}$	$4.721^{+0.048}_{-0.028}$	$-1.300^{+0.300}_{-0.300}$	$0.528^{+0.028}_{-0.034}$	$0.534^{+0.036}_{-0.022}$	$5.111^{+1.008}_{-0.578}$
	+3%/-3%	+1%/-1%	+23%/-23%	+5%/-6%	+7%/-4%	+20%/-11%
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 008838950-01 / KOI 2421.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-14 \pm 5$	$0.68^{+0.38}_{-0.39}$	$1260^{+39}_{-46}$	$3150^{+1013}_{-446}$	$13^{+60}_{-8}$
Alt.	$-13 \pm 5$	$0.59^{+0.41}_{-0.34}$	$1258^{+43}_{-44}$	$3219^{+1136}_{-502}$	$15^{+71}_{-10}$

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

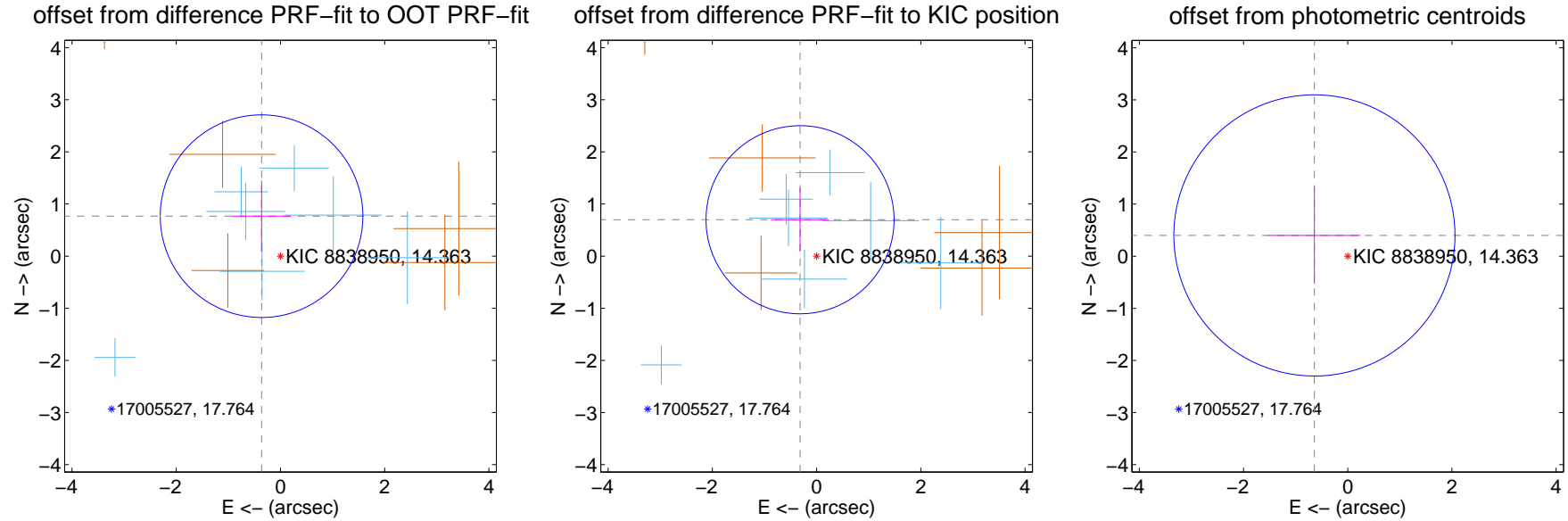
## DV Centroid Data

Supplemental centroid analysis for 008838950-01. Kepler magnitude: 14.36. Transit SNR 14.22

There are 7 quarters with good PRF difference image offsets

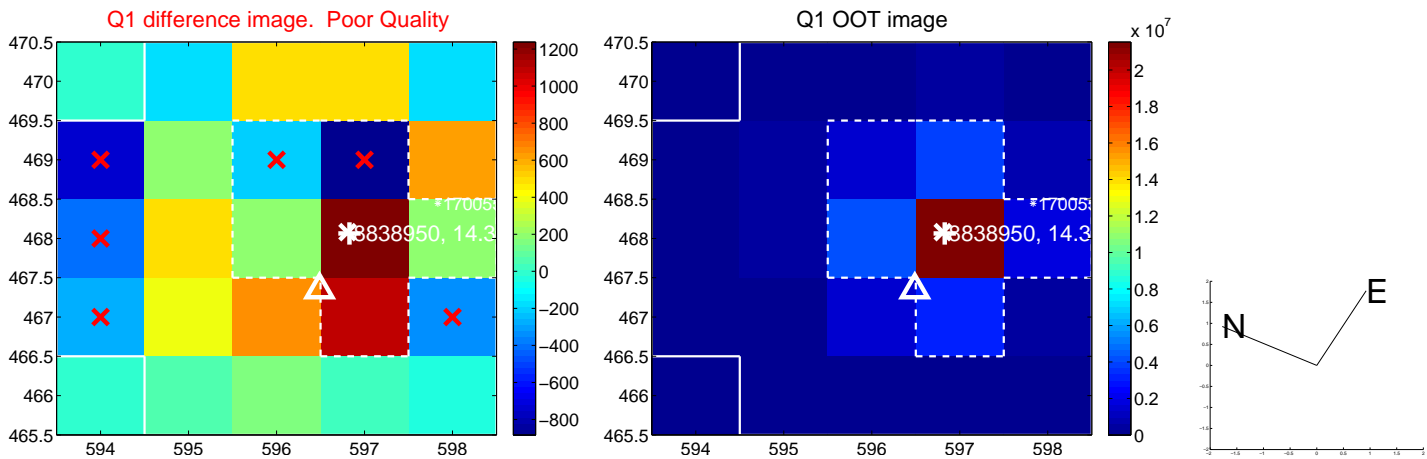
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.848 \pm 0.648$	1.31	$0.363 \pm 0.570$	$0.767 \pm 0.683$
PRF-fit source offset from KIC position	$0.767 \pm 0.601$	1.28	$0.317 \pm 0.556$	$0.698 \pm 0.608$
photometric centroid source offset	$0.75 \pm 0.90$	0.84	$0.64 \pm 0.89$	$0.40 \pm 0.93$

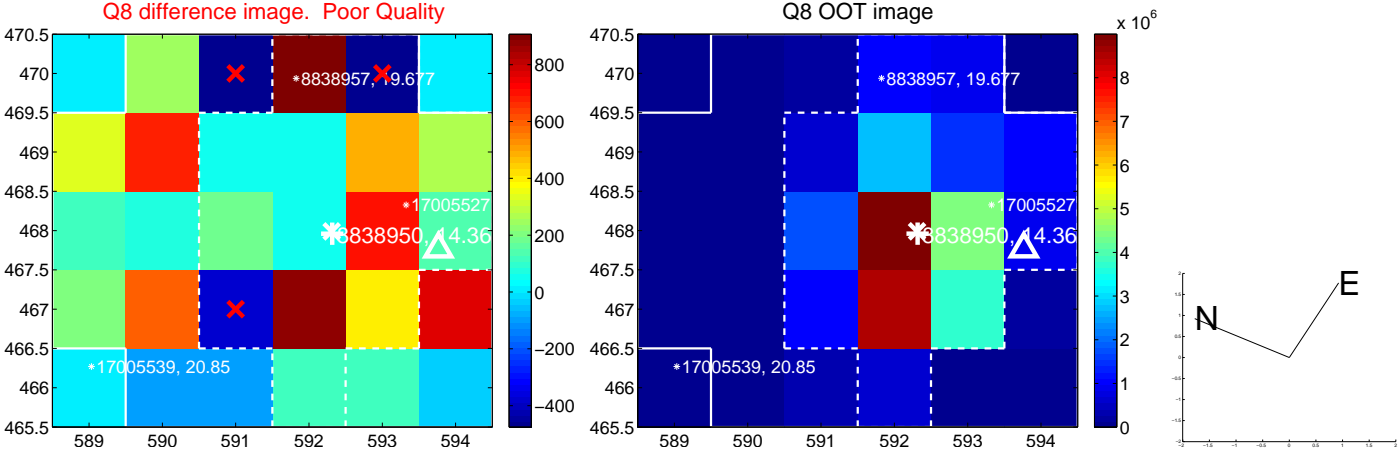
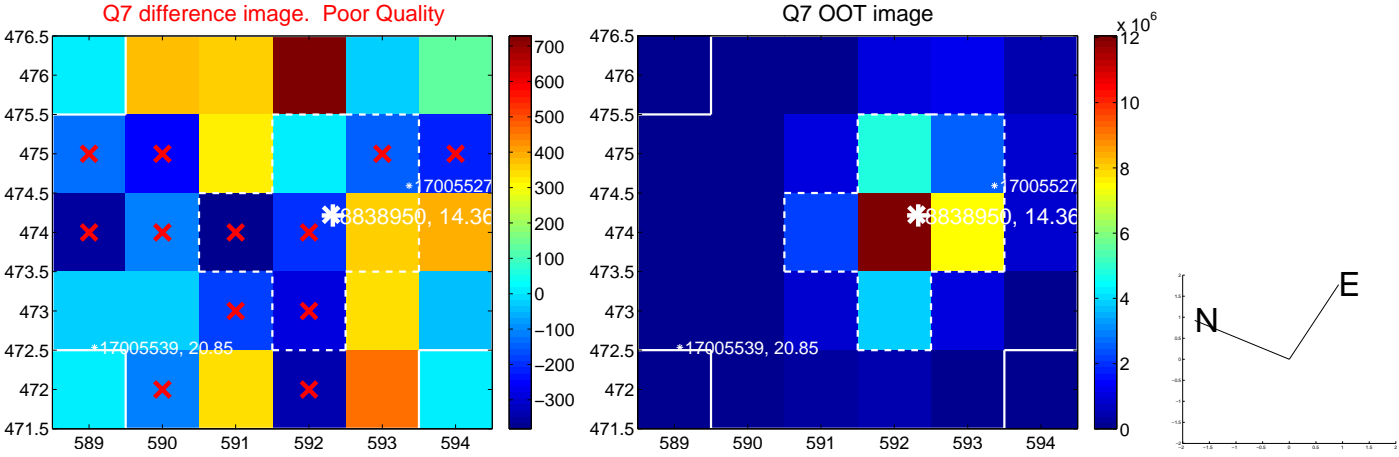
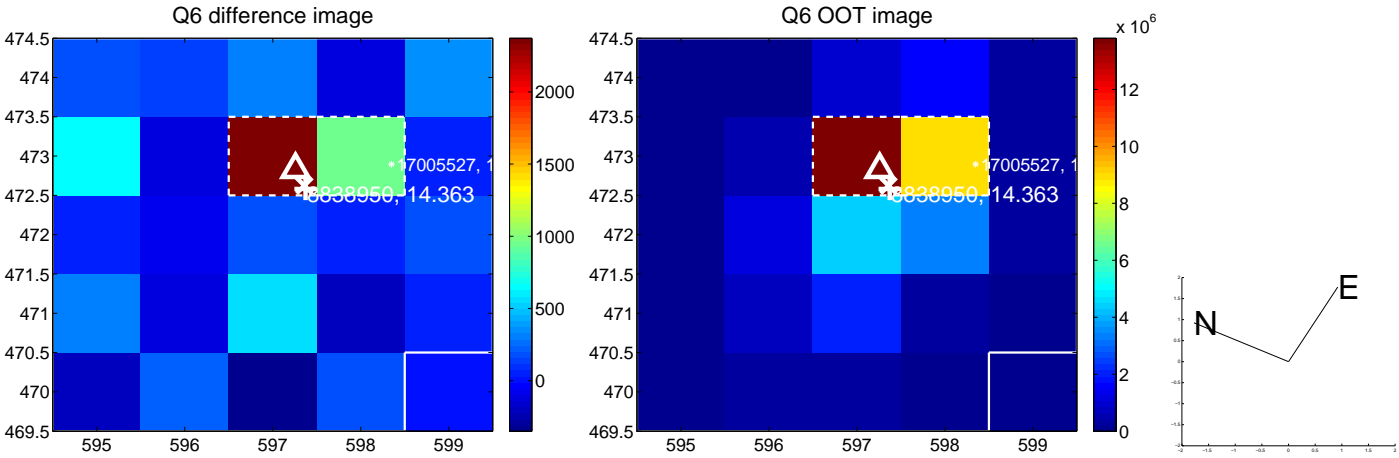
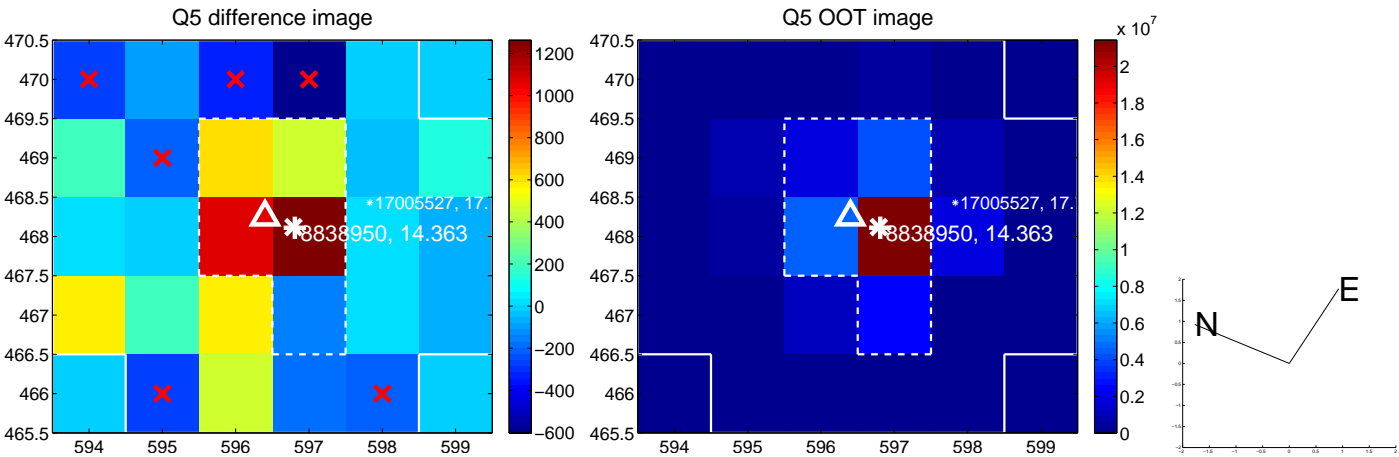


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



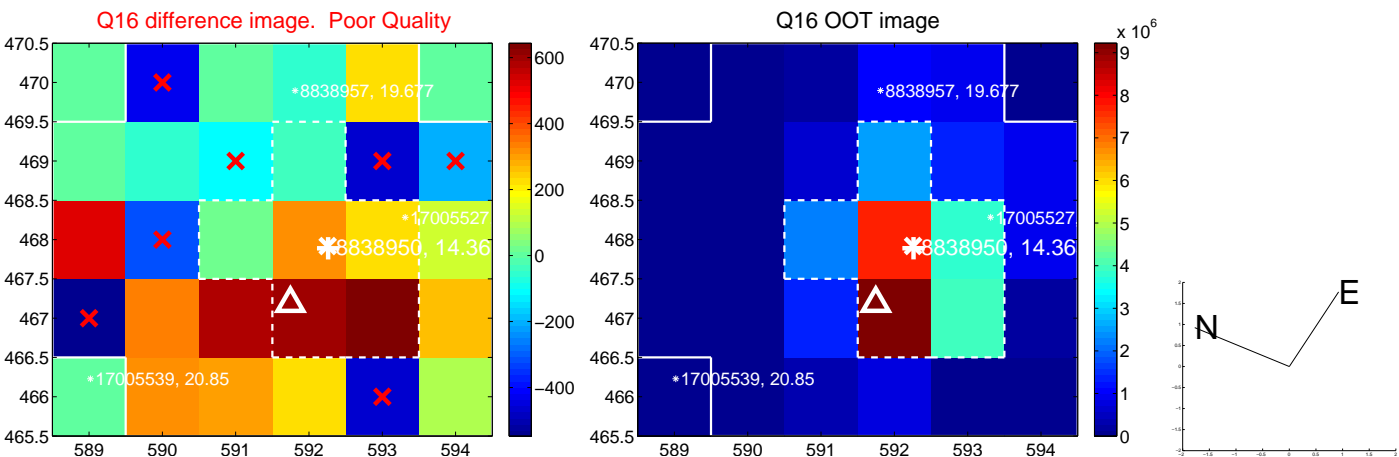
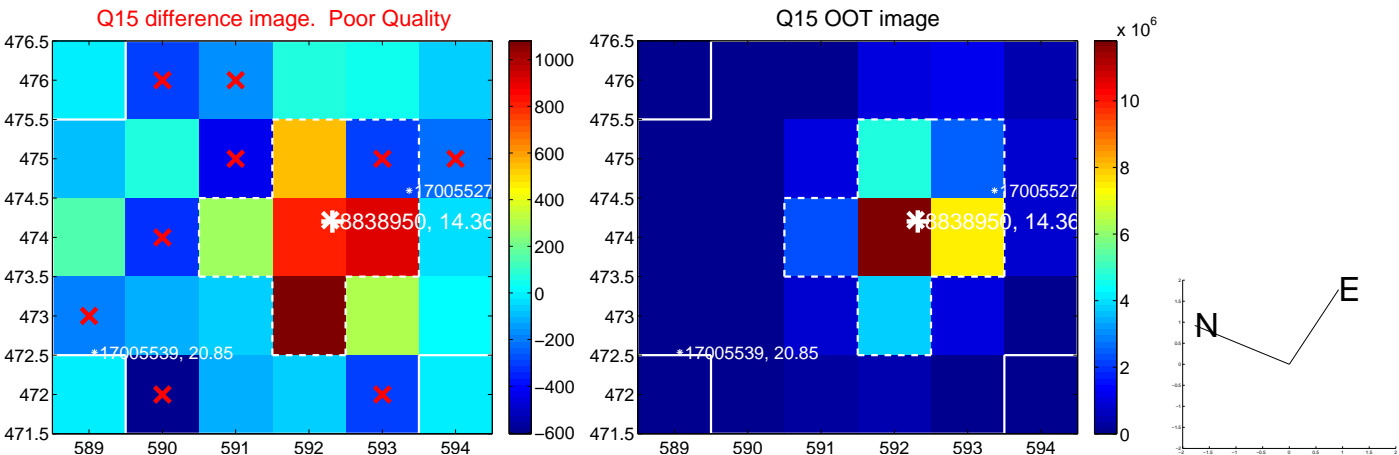
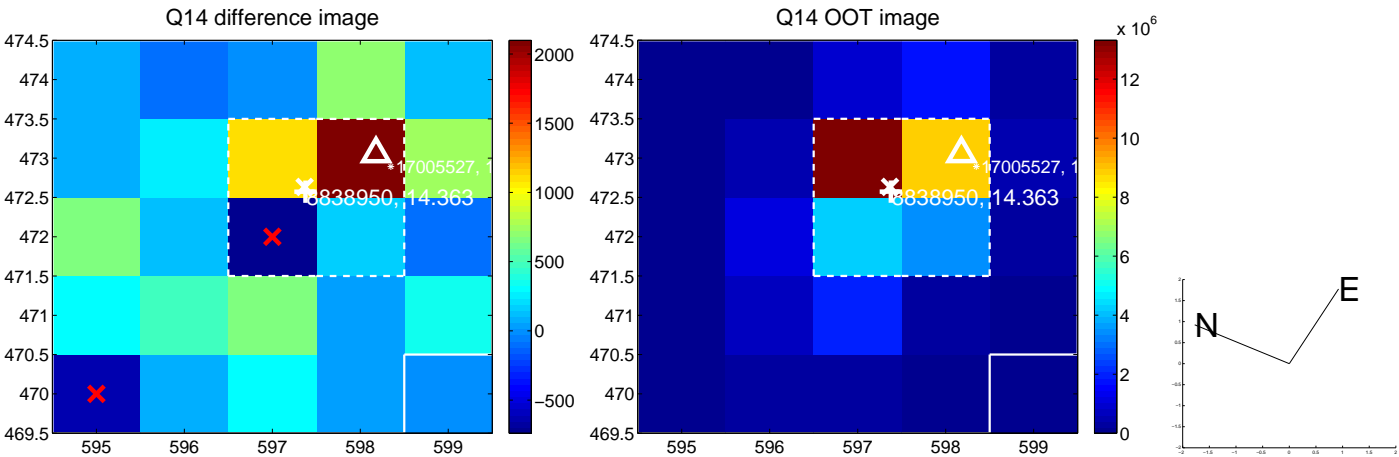
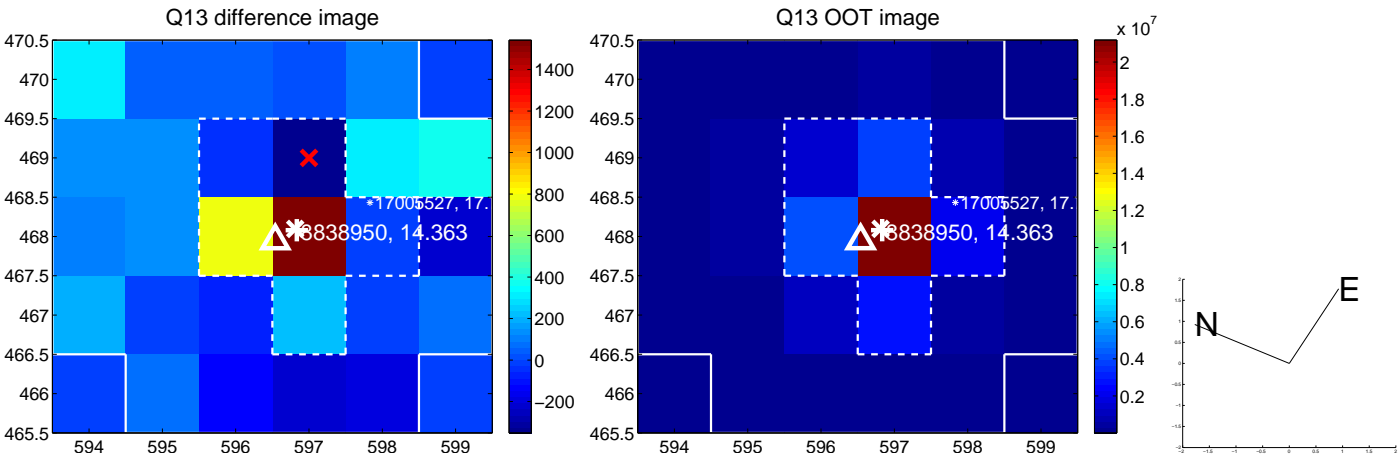
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



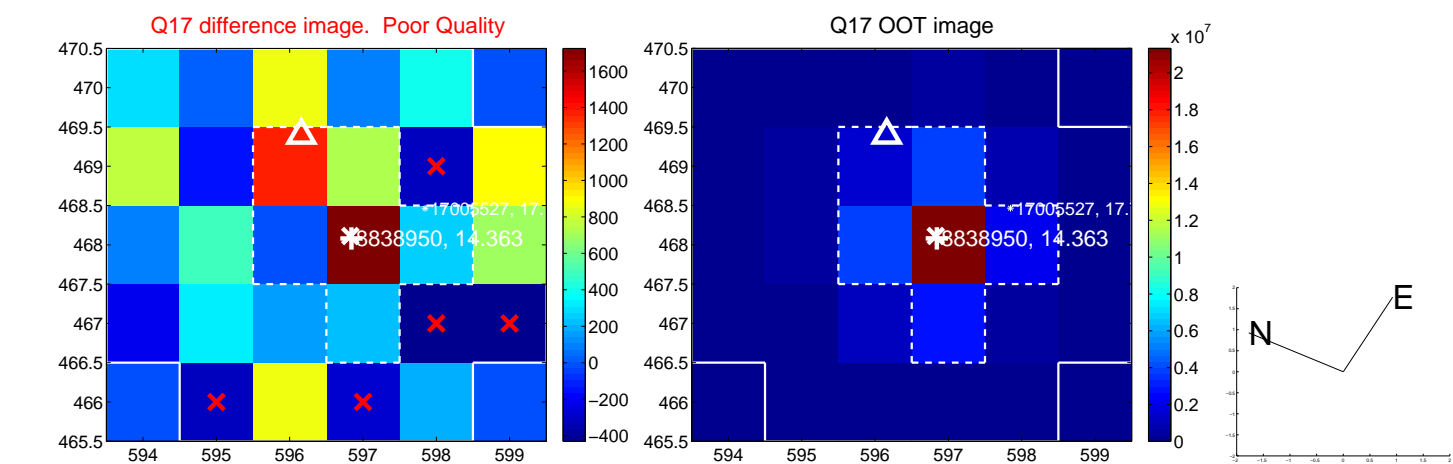




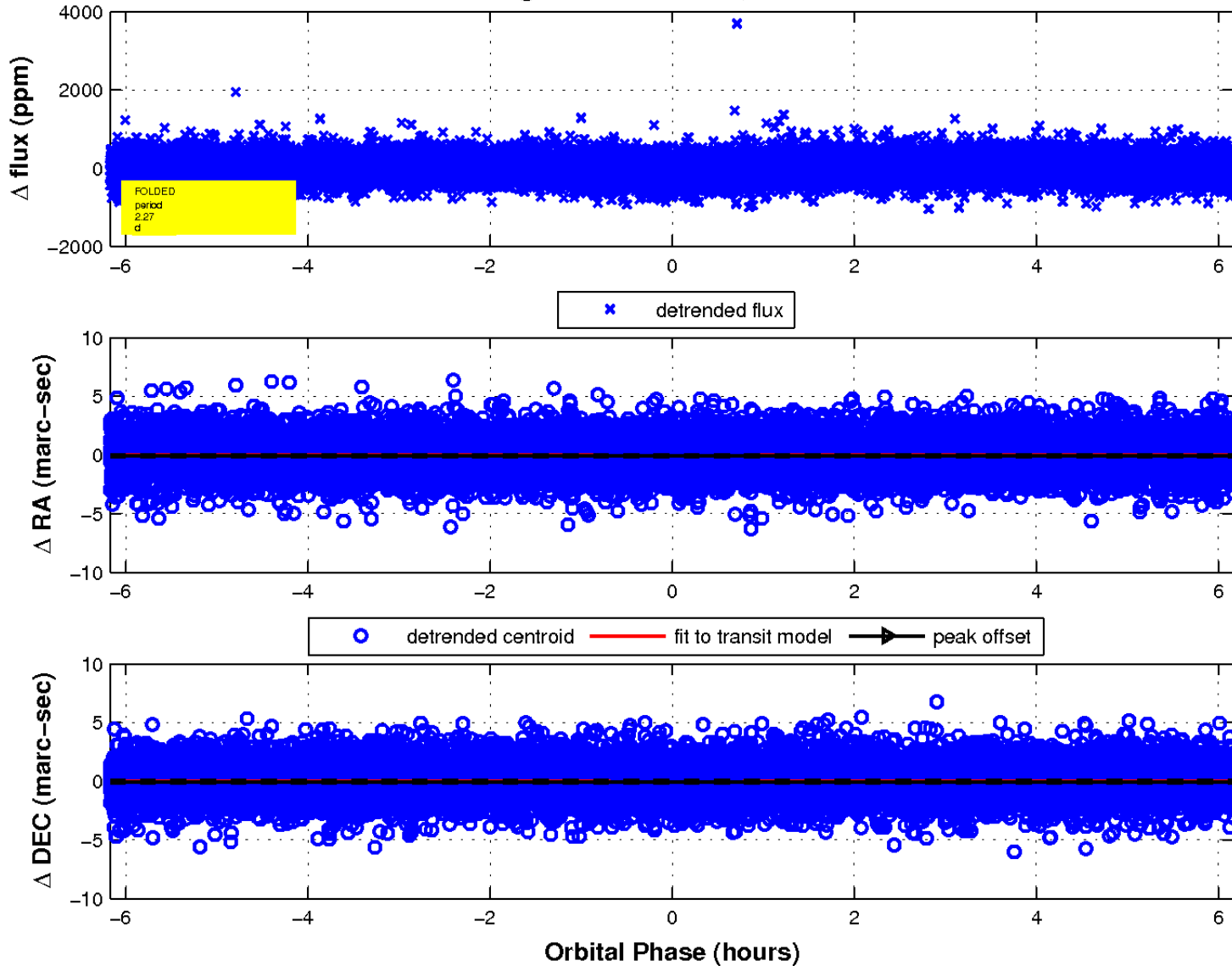
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

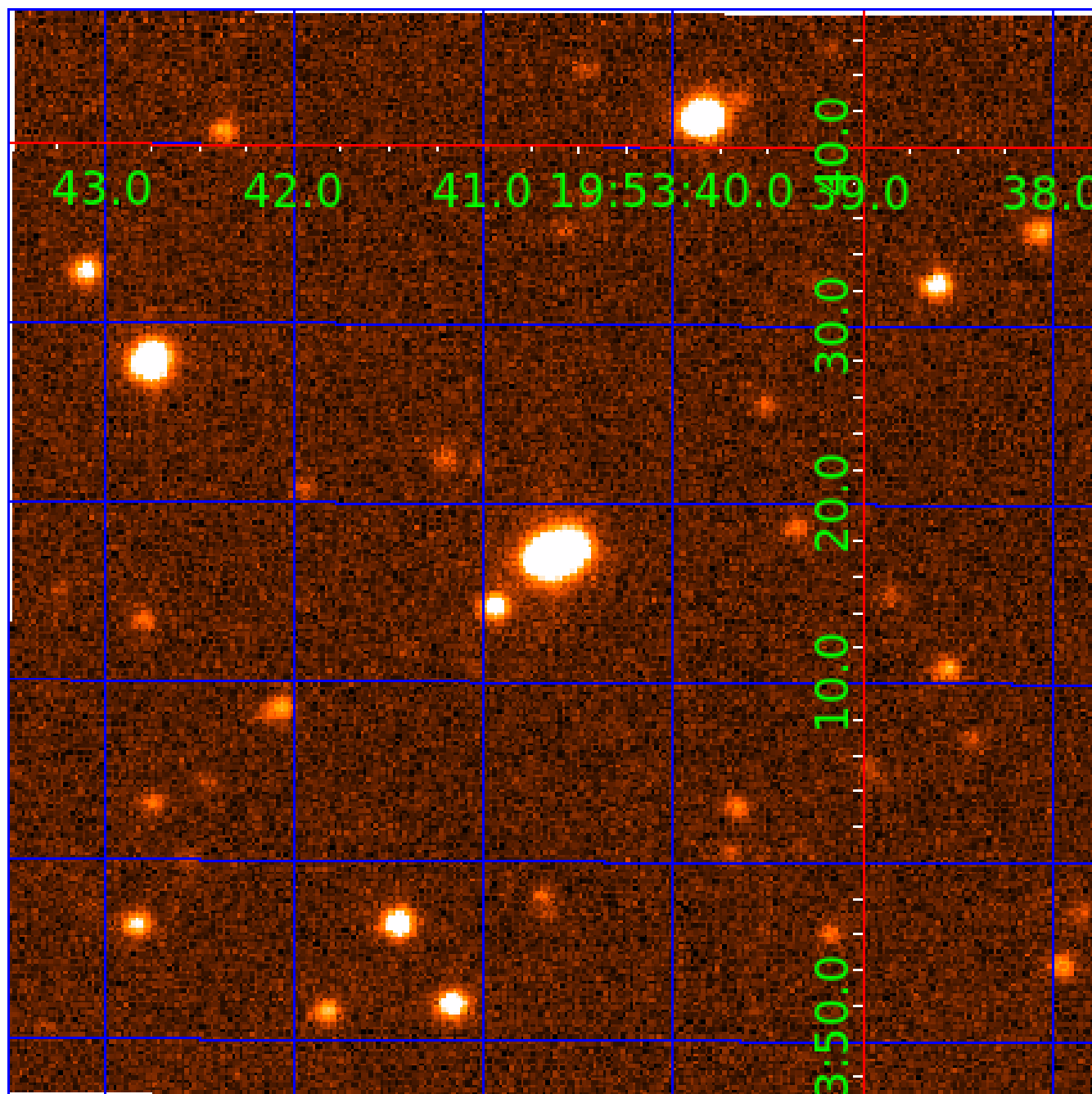


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 008838950

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008838950-01	OBS	2421.01	2.270500	133.543673	97.5	2.058	13.1	14.2	0.53	4671	0.62	157.81
008838950-02	OBS	2421.02	4.023139	135.431631	83.0	2.596	8.2	9.6	0.53	4671	0.52	73.60

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008838950-01	OBS	PC	0.91	0	0	0	0	NO_COMMENT
008838950-02	OBS	PC	0.89	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.

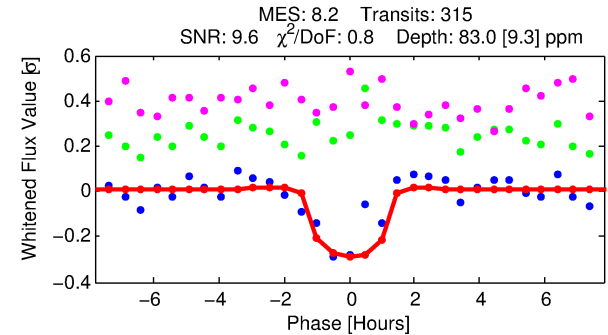
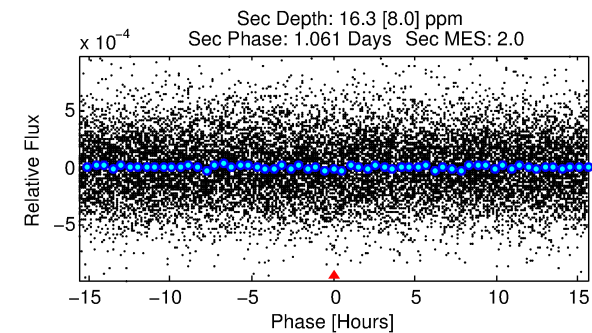
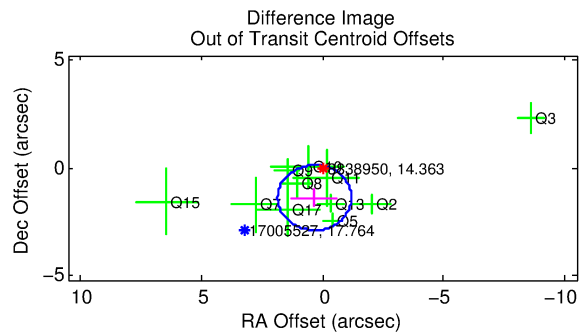
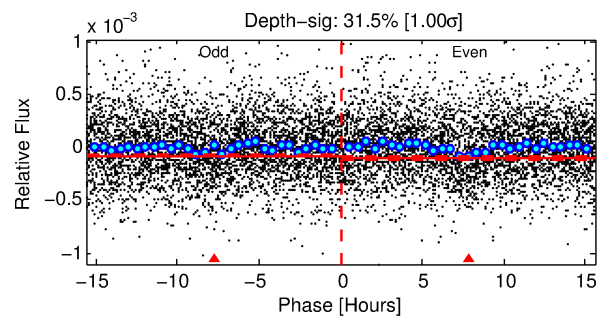
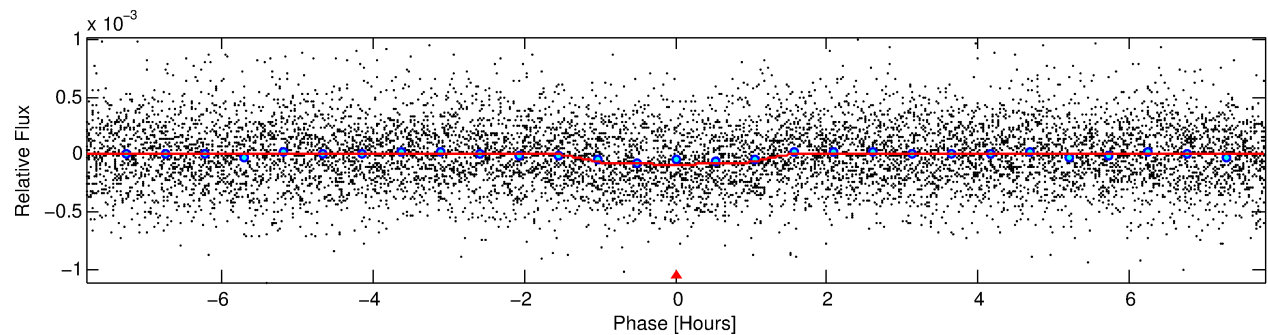
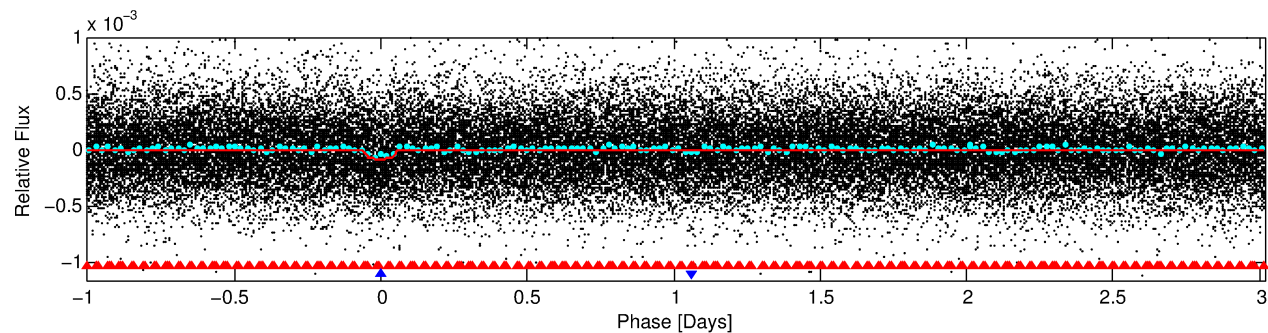
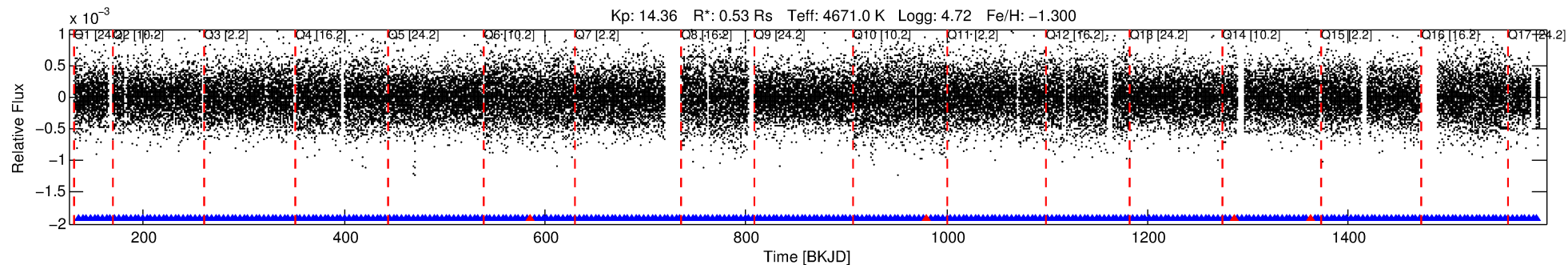
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008838950-02

No Significant Match Found

# DV One-Page Summary

KIC: 8838950 Candidate: 2 of 2 Period: 4.023 d  
KOI: K02421.02 Corr: 0.936



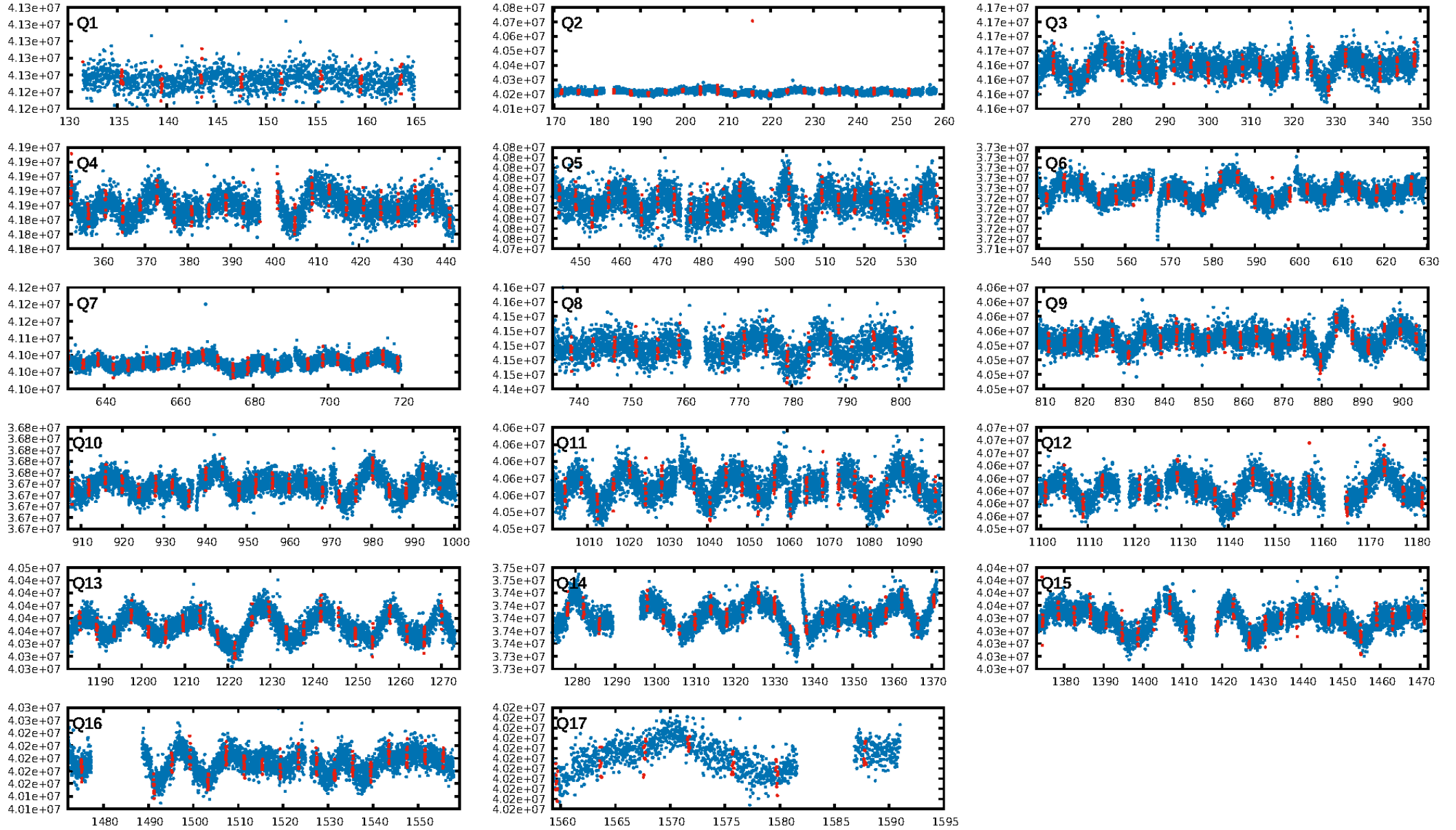
## DV Fit Results:

Period = 4.02314 [0.00003] d  
Epoch = 135.4316 [0.0046] BKJD  
Rp/R\* = 0.0090 [0.0071]  
a/R\* = 8.18 [25.07]  
b = 0.74 [1.95]  
Seff = 73.60 [11.51]  
Teq = 747 [29] K  
Rp = 0.52 [0.41] Re  
a = 0.0402 [0.0023] AU  
Ag = 53.28 [87.39] [0.60 $\sigma$ ]  
Teffp = 3120 [1282] K [1.85 $\sigma$ ]

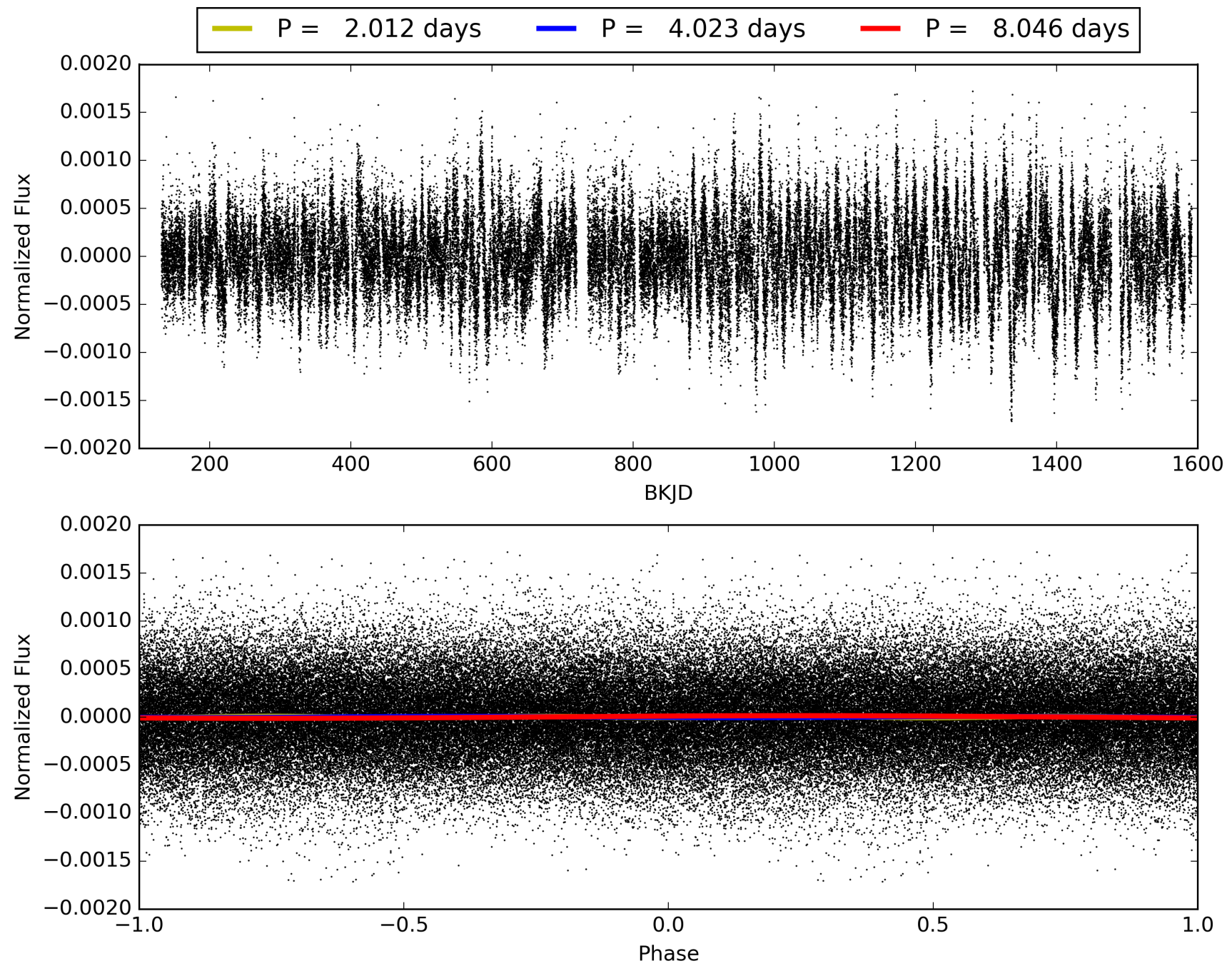
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [12.70 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 1.32e-16  
RollingBand-fgt: 0.99 [296/300]  
GhostDiagnostic-chr: -6.946  
Centroid-sig: 31.9%  
Centroid-so: 1.175 arcsec [0.95 $\sigma$ ]  
OotOffset-rm: 1.446 arcsec [2.85 $\sigma$ ]  
KicOffset-rm: 1.605 arcsec [2.90 $\sigma$ ]  
OotOffset-st: 2/4/1/4 [11]  
KicOffset-st: 2/4/1/4 [11]  
DiffImageQuality-fgm: 0.55 [6/11]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 008838950-02, PDC Light Curves



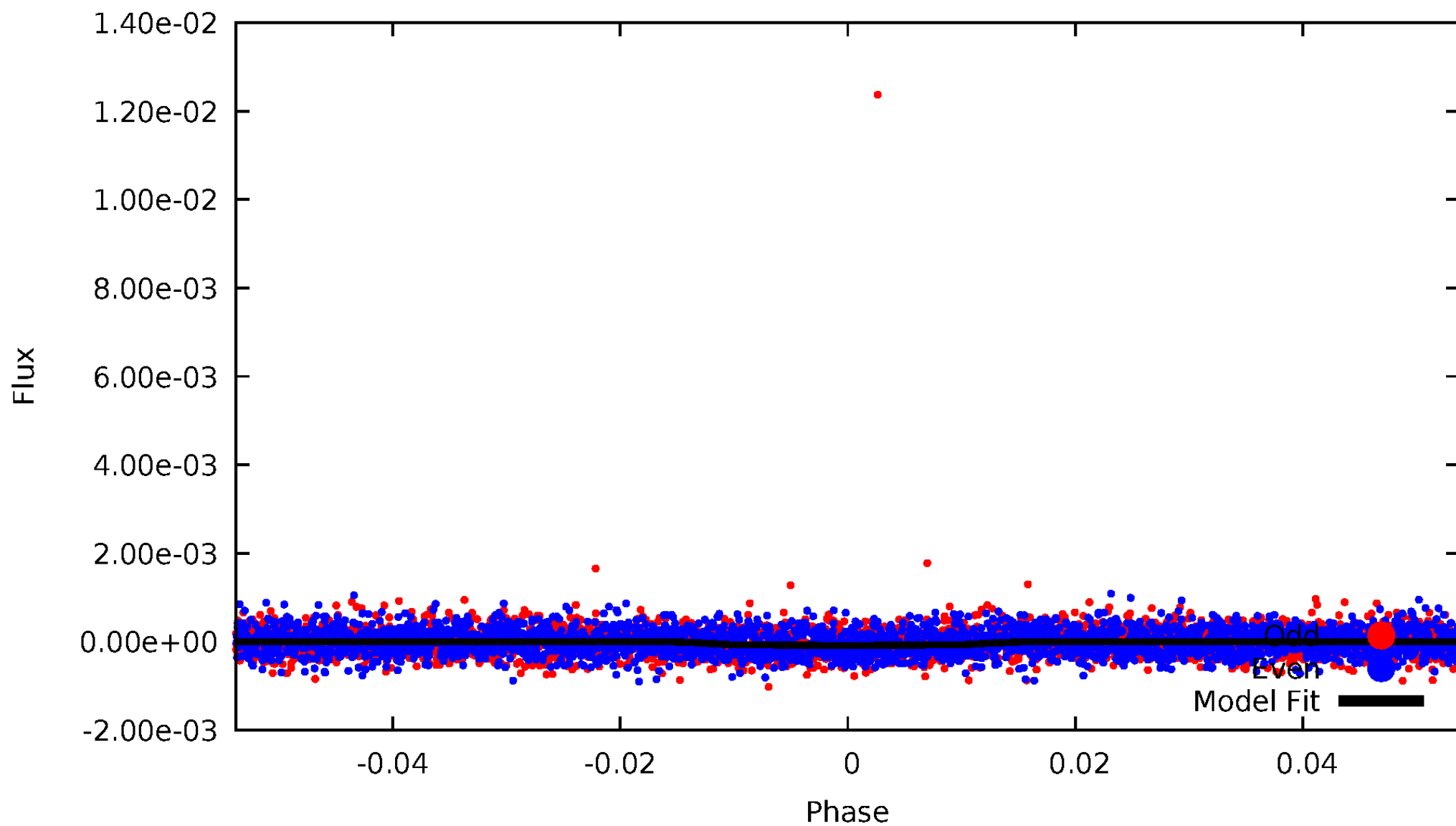
TCE 008838950-02





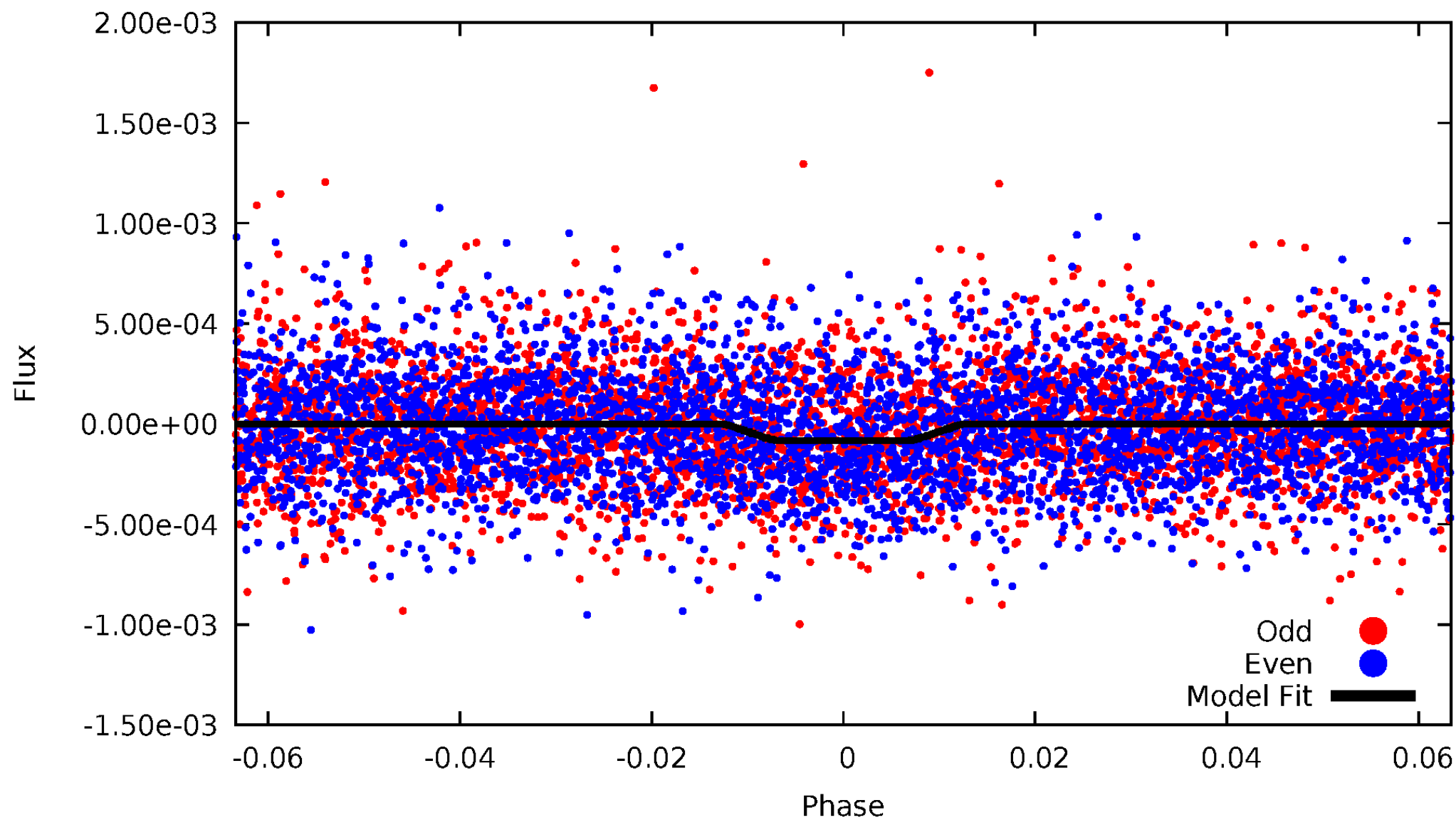
# DV Odd/Even

TCE 008838950-02



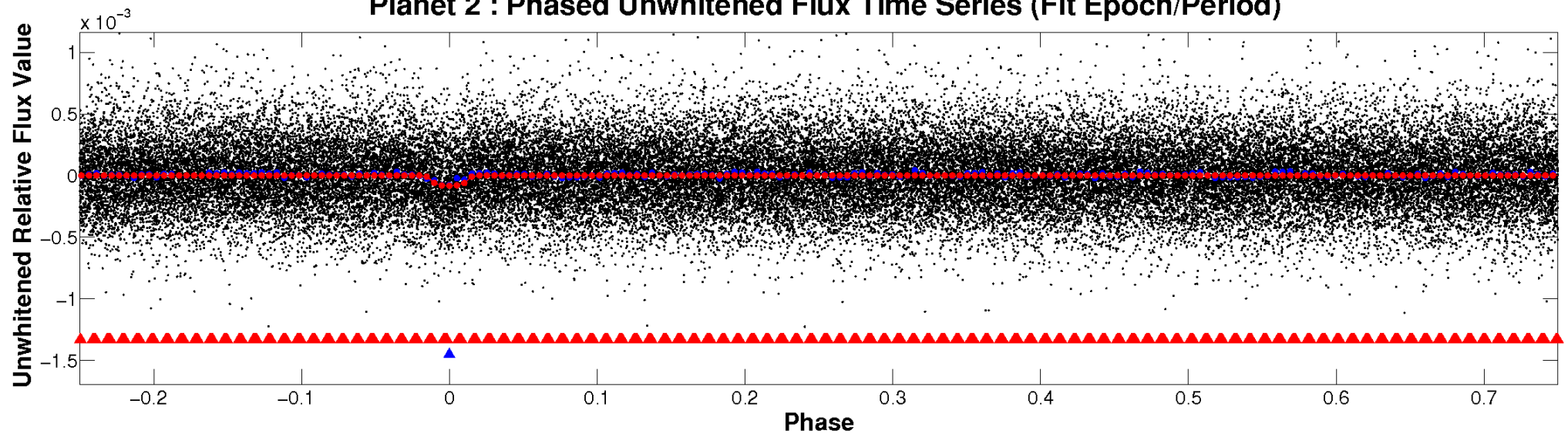
# ALT Odd/Even

TCE 008838950-02

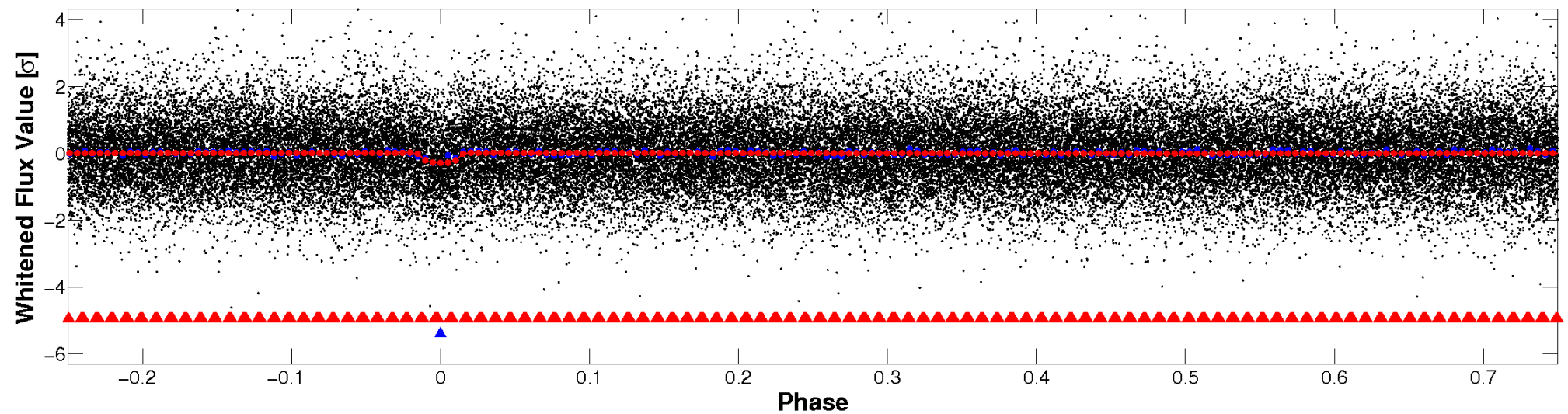


# Non-Whitened Vs. Whitened Light Curve

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

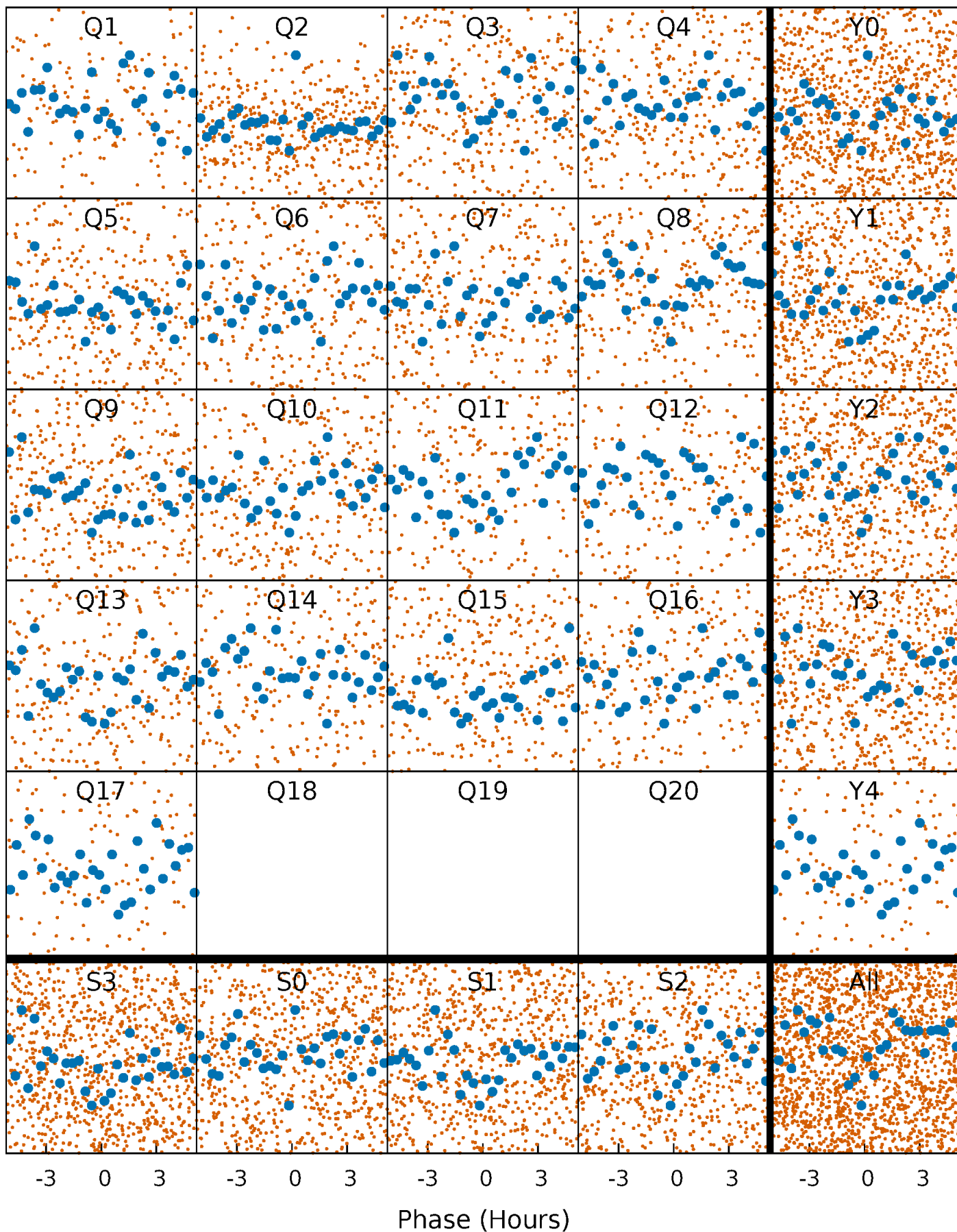


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



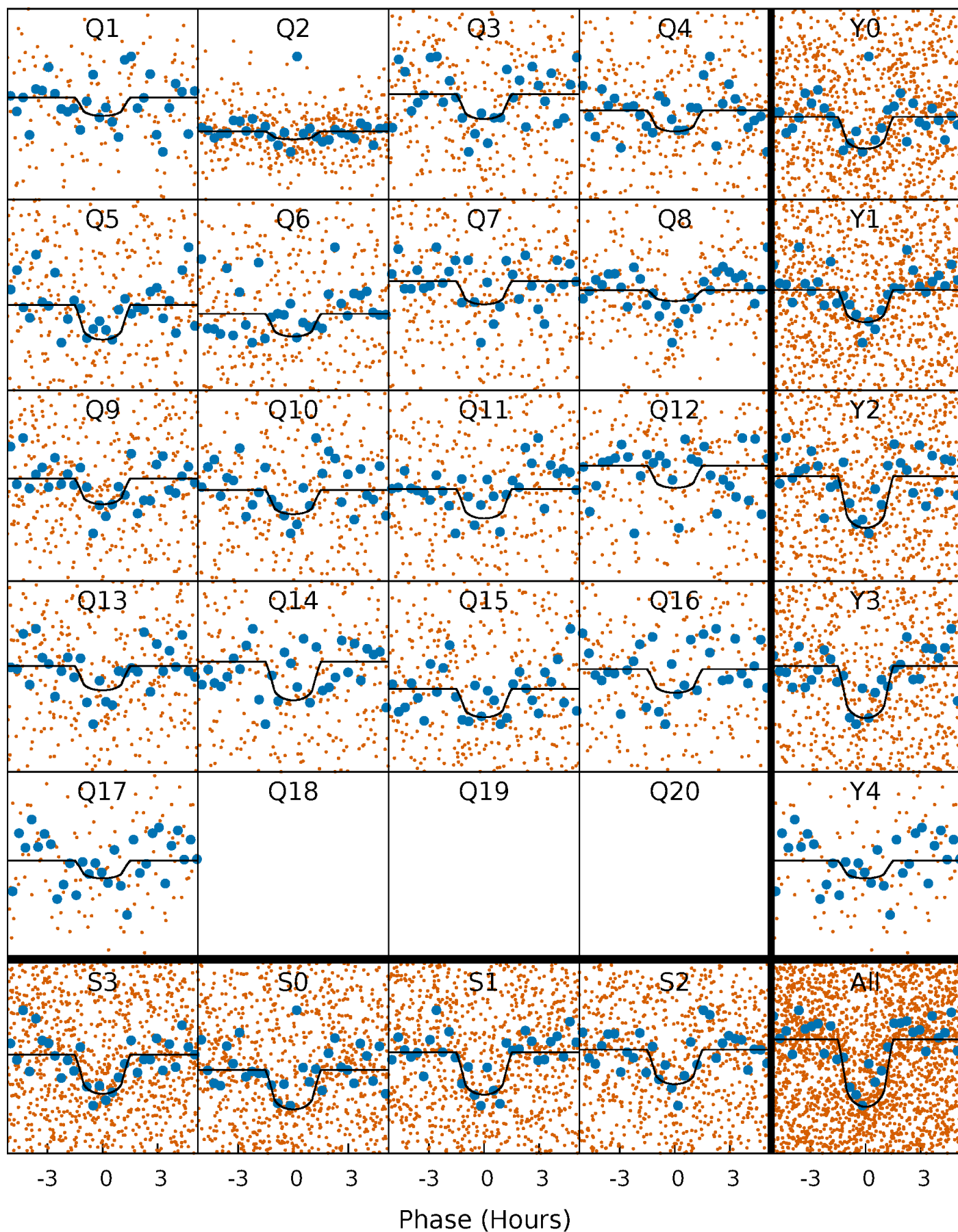
# PDC Quarter-Phased Transit Curves

TCE 008838950-02   P= 4.023139 Days    $T_0=135.431631$  (BKJD)



# DV Quarter-Phased Transit Curves

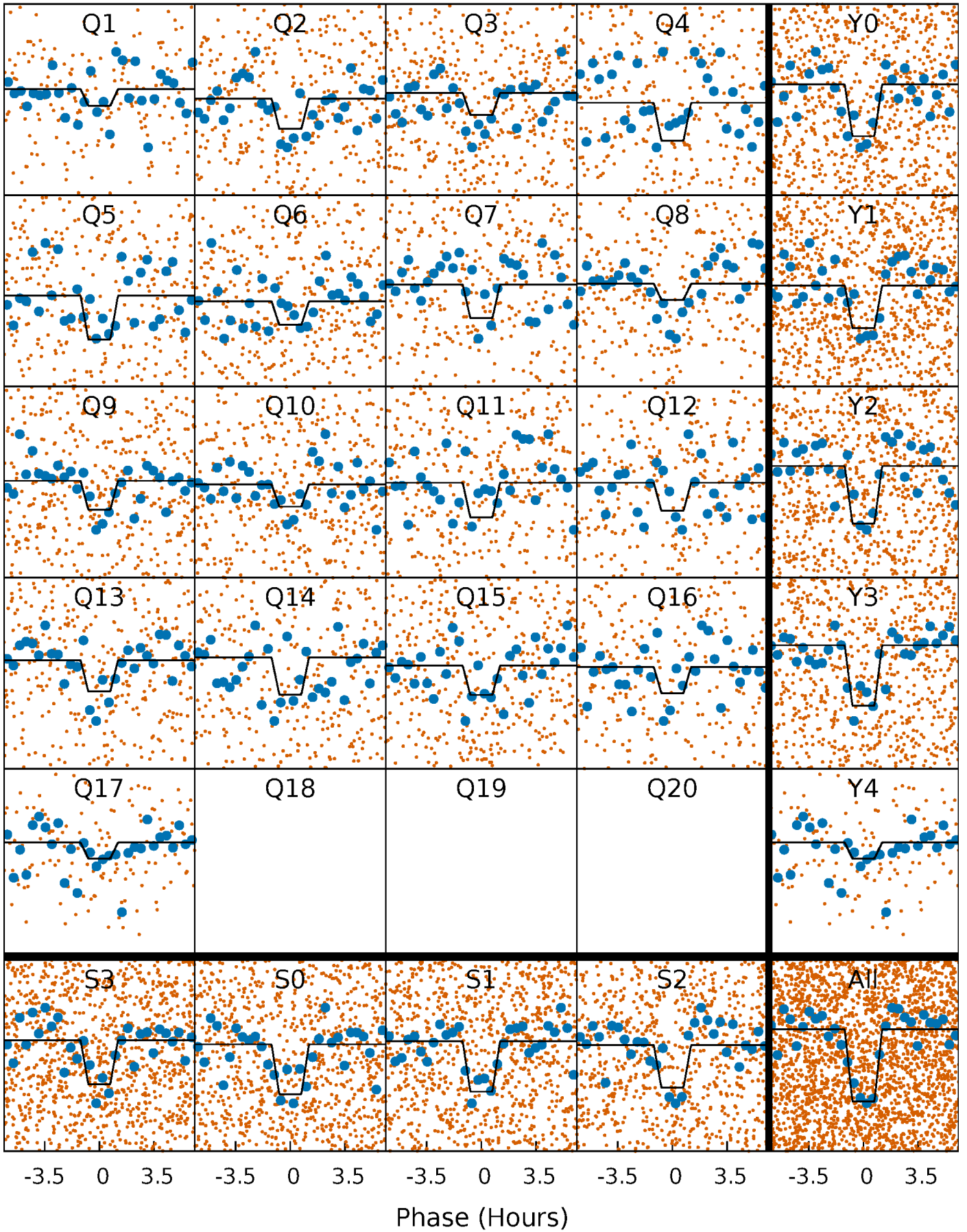
TCE 008838950-02 P= 4.023139 Days  $T_0=135.431631$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

TCE 008838950-02 P= 4.023108 Days  $T_0=135.431697$  (BKJD)

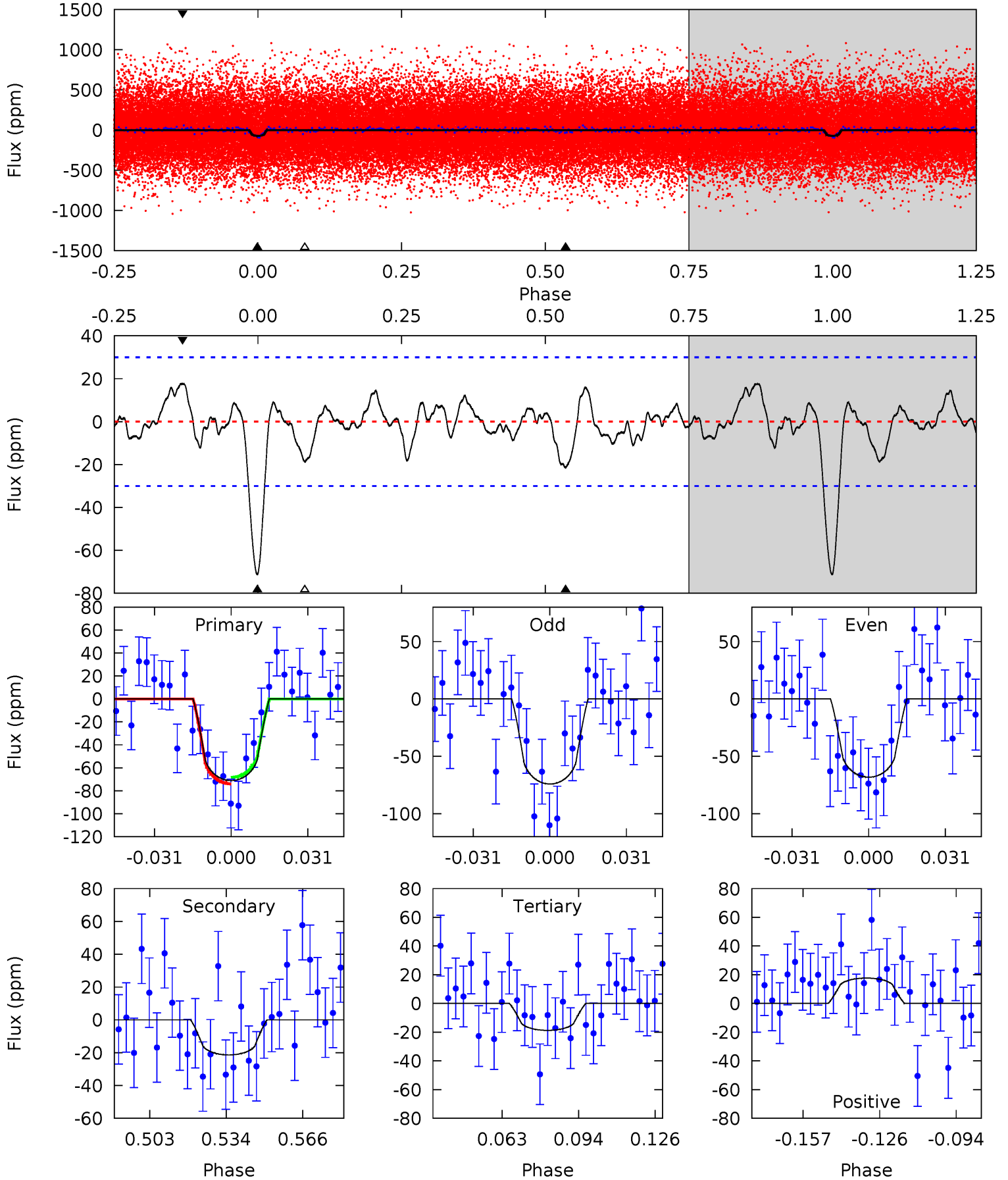




# DV Model-Shift Uniqueness Test

008838950-02, P = 4.023139 Days, E = 131.408492 Days

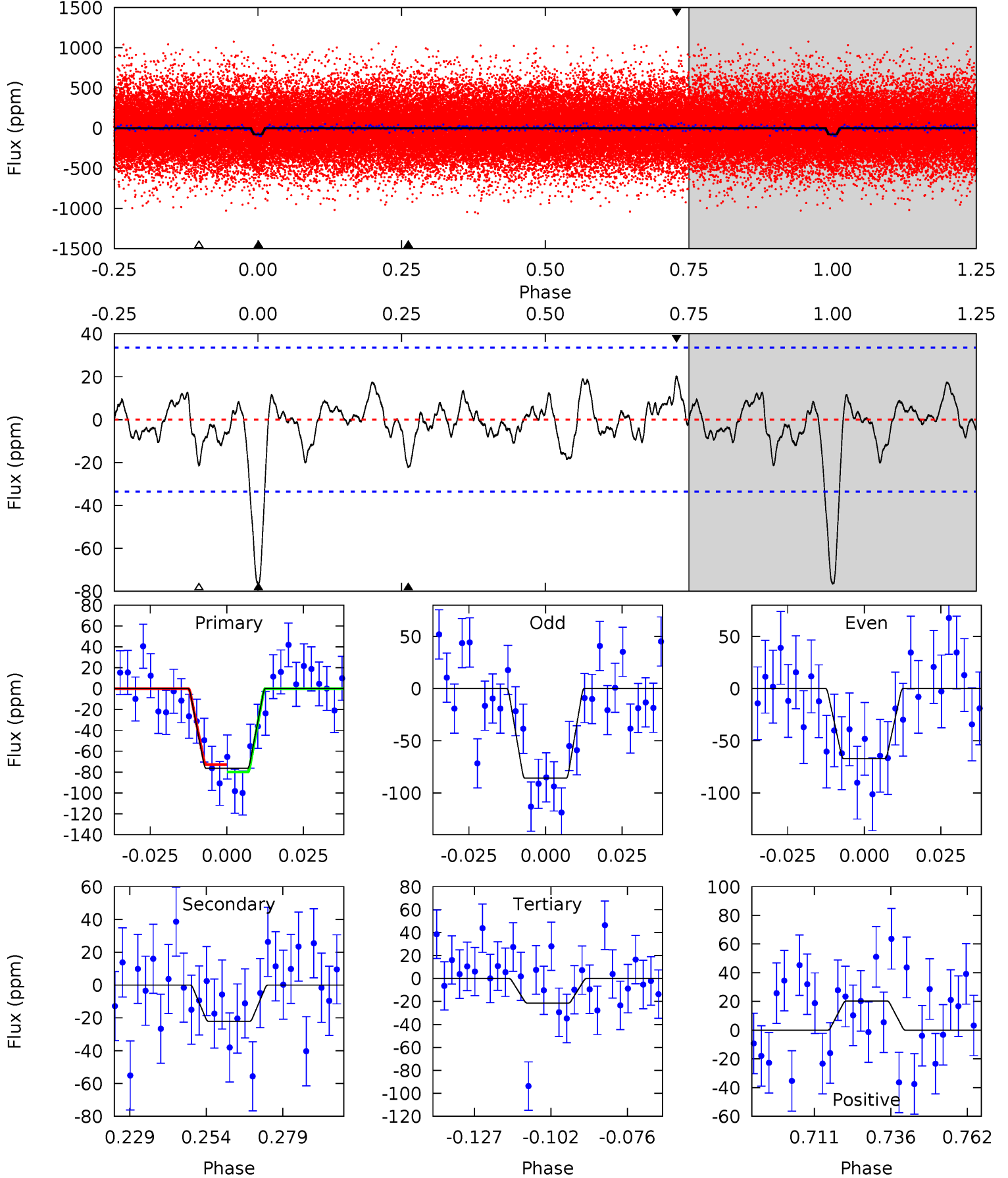
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.4	3.42	3.00	2.83	4.80	2.15	1.11	8.39	8.56	0.42	0.59	0.48	0.69	0.20	0.46



# Alt Model-Shift Uniqueness Test

008838950-02, P = 4.023108 Days, E = 131.408589 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
11.0	3.19	3.08	2.92	4.84	2.24	1.12	7.95	8.11	0.11	0.27	1.36	0.88	0.21	0.51



### Stellar Parameters For KIC 008838950

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4671^{+139}_{-153}$	$4.721^{+0.048}_{-0.028}$	$-1.300^{+0.300}_{-0.300}$	$0.528^{+0.028}_{-0.034}$	$0.534^{+0.036}_{-0.022}$	$5.111^{+1.008}_{-0.578}$
	+3%/-3%	+1%/-1%	+23%/-23%	+5%/-6%	+7%/-4%	+20%/-11%
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 008838950-02 / KOI 2421.02

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-21 \pm 6$	$0.56^{+0.40}_{-0.36}$	$1040^{+36}_{-38}$	$3573^{+1603}_{-614}$	$61^{+382}_{-43}$
Alt.	$-22 \pm 7$	$0.56^{+0.37}_{-0.34}$	$1039^{+33}_{-35}$	$3570^{+1463}_{-529}$	$62^{+330}_{-41}$

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

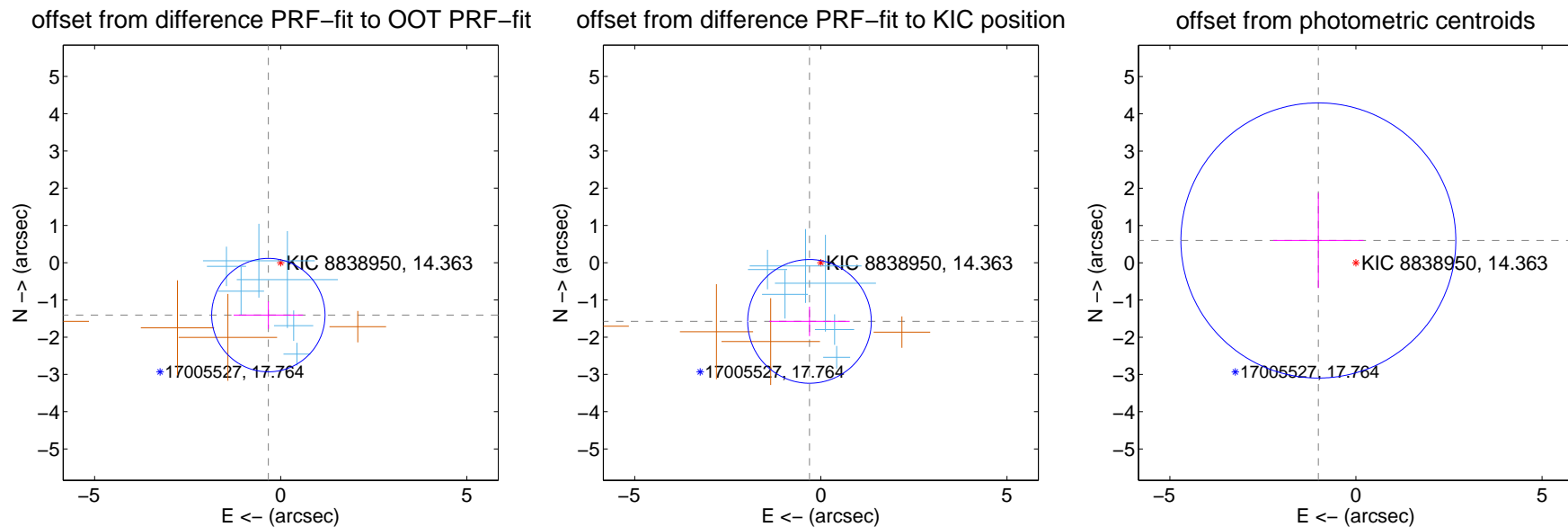
## DV Centroid Data

Supplemental centroid analysis for 008838950-02. Kepler magnitude: 14.36. Transit SNR 9.59

There are 6 quarters with good PRF difference image offsets

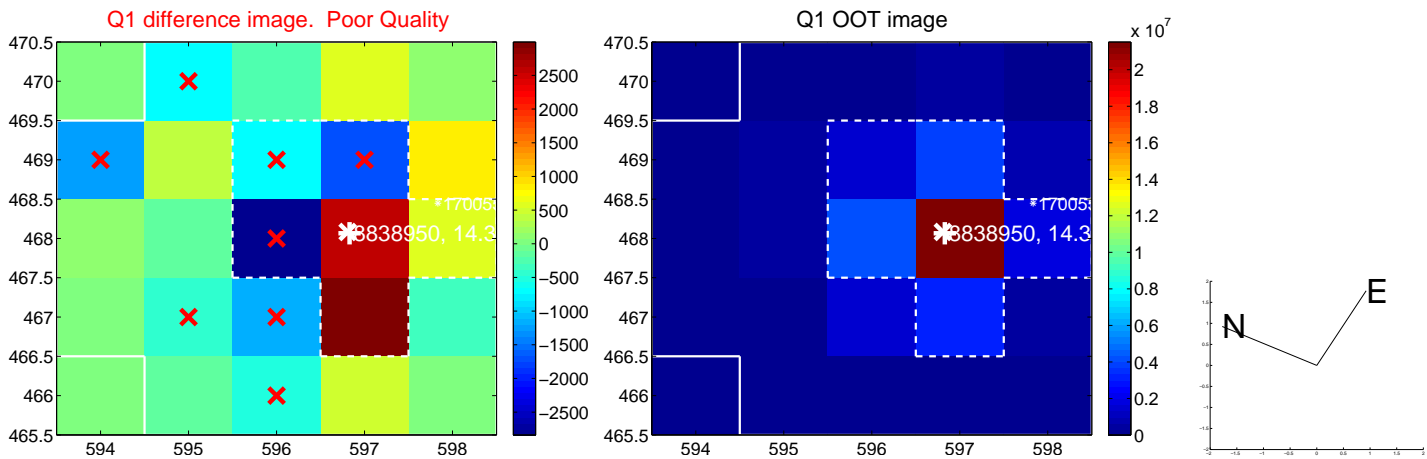
The direct PRF centroid is offset from the target star catalog position by about 0.13 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.446 \pm 0.508$	2.85	$0.333 \pm 0.931$	$-1.407 \pm 0.370$
PRF-fit source offset from KIC position	$1.605 \pm 0.554$	2.90	$0.306 \pm 1.082$	$-1.576 \pm 0.395$
photometric centroid source offset	$1.17 \pm 1.23$	0.95	$1.01 \pm 1.22$	$0.60 \pm 1.28$

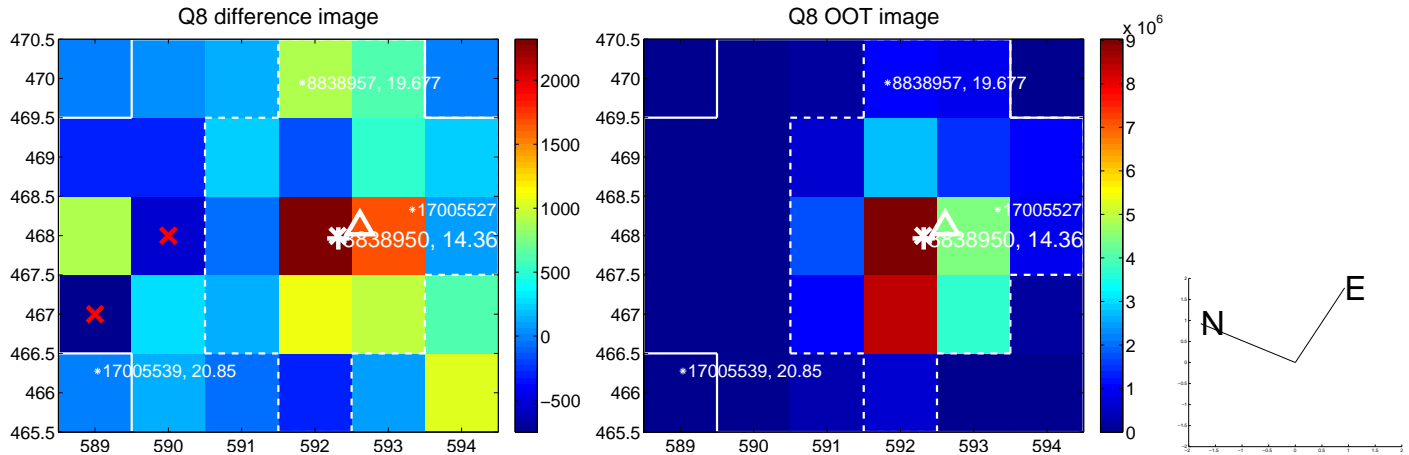
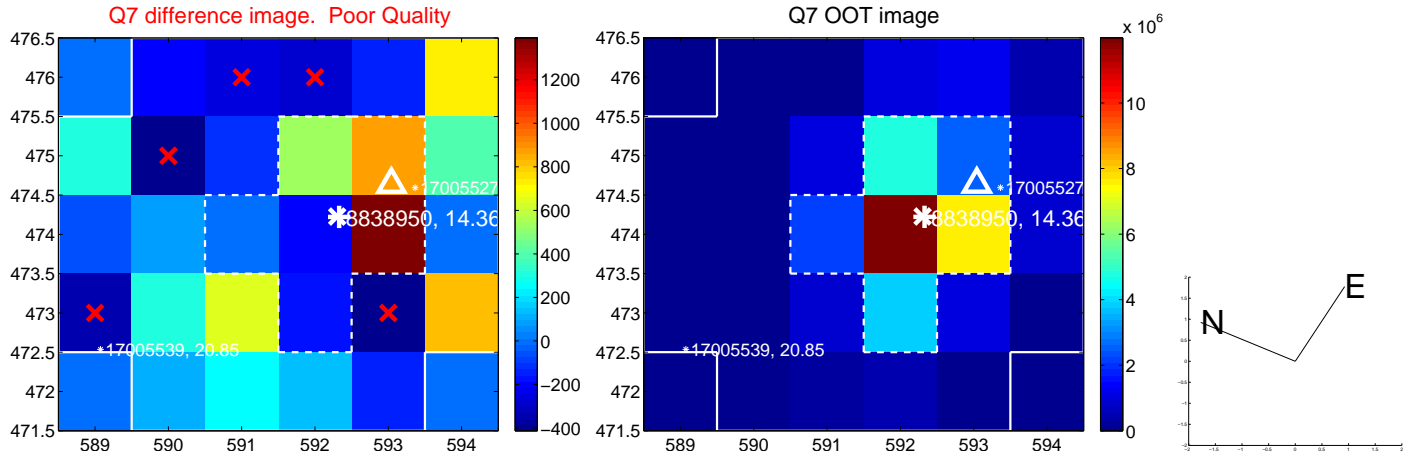
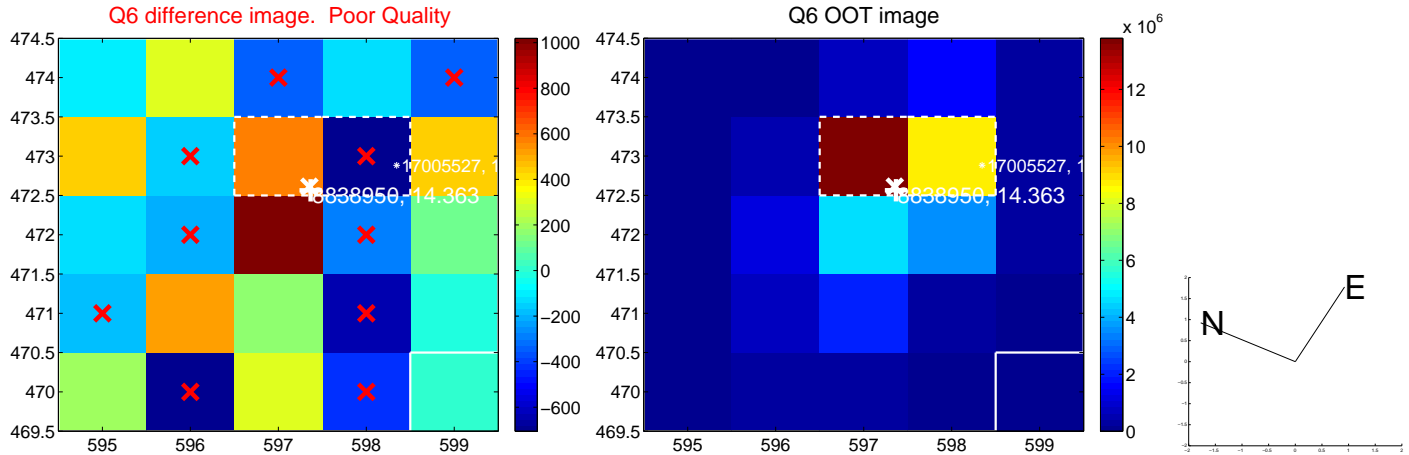
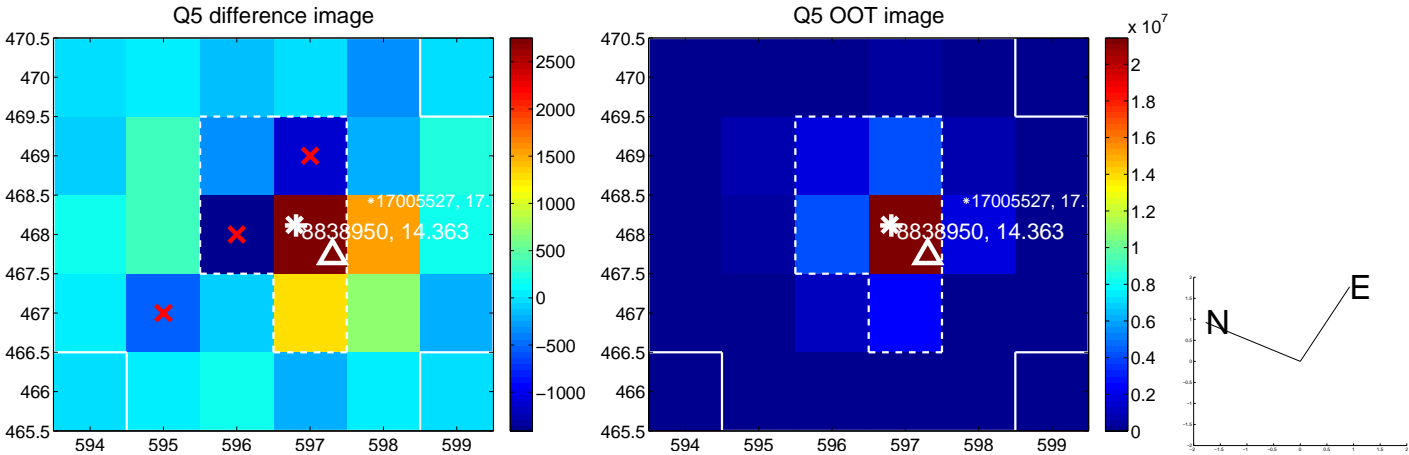


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

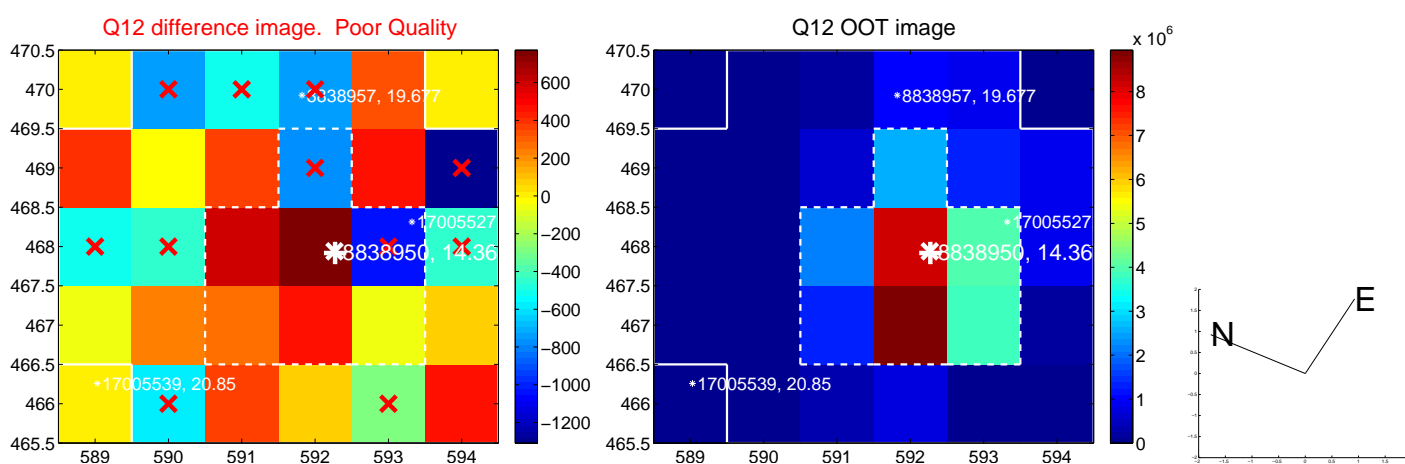
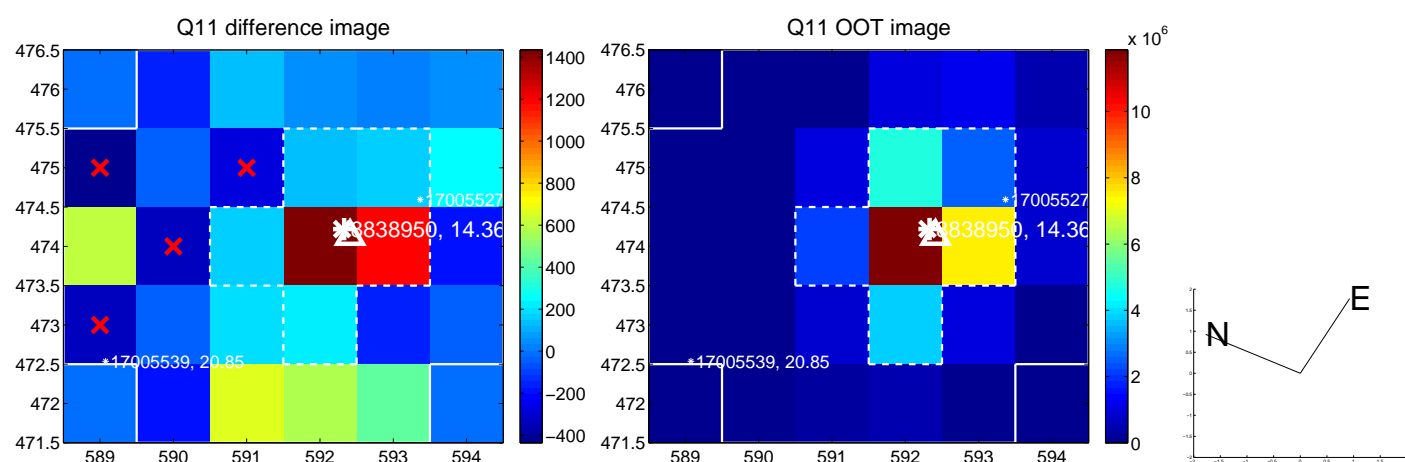
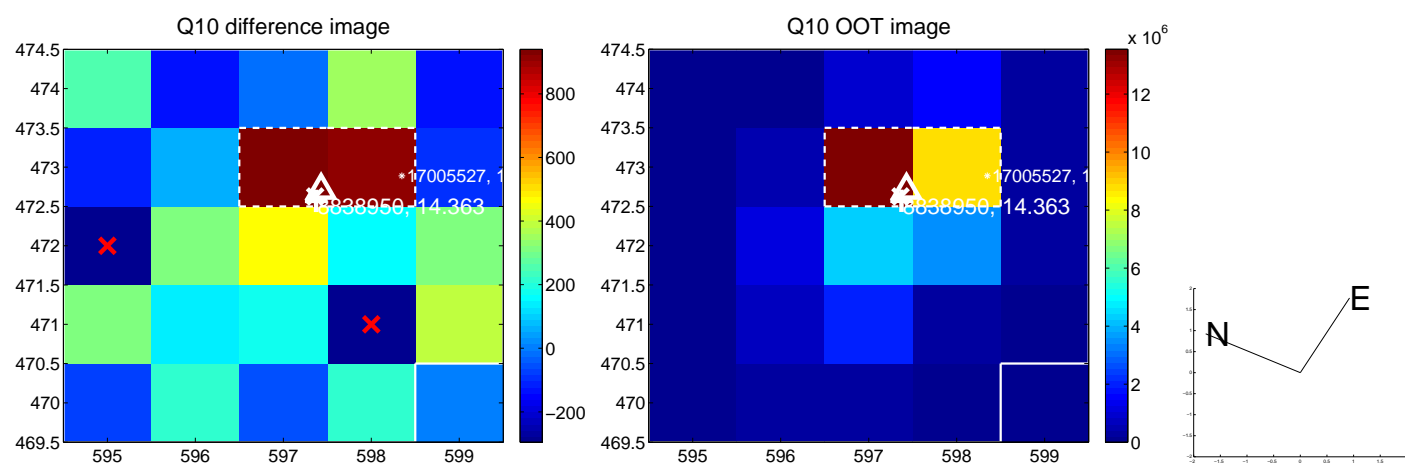
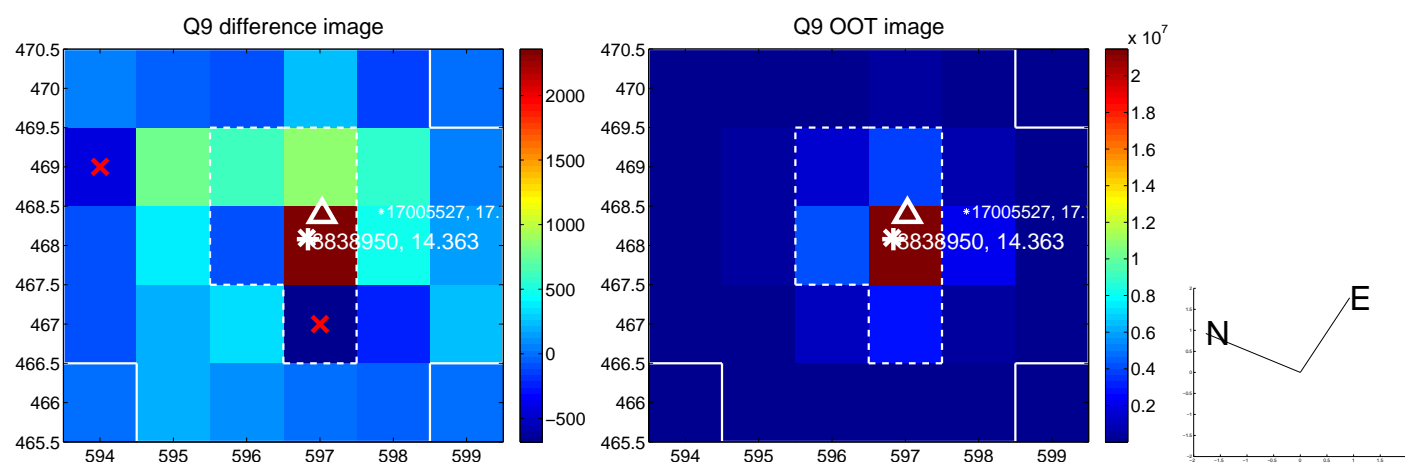


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

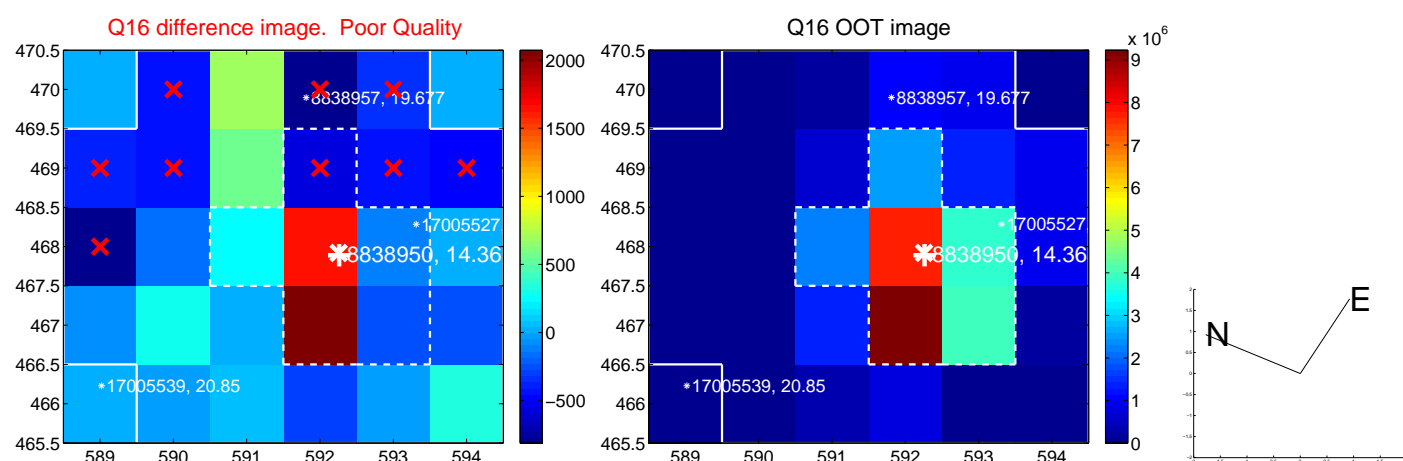
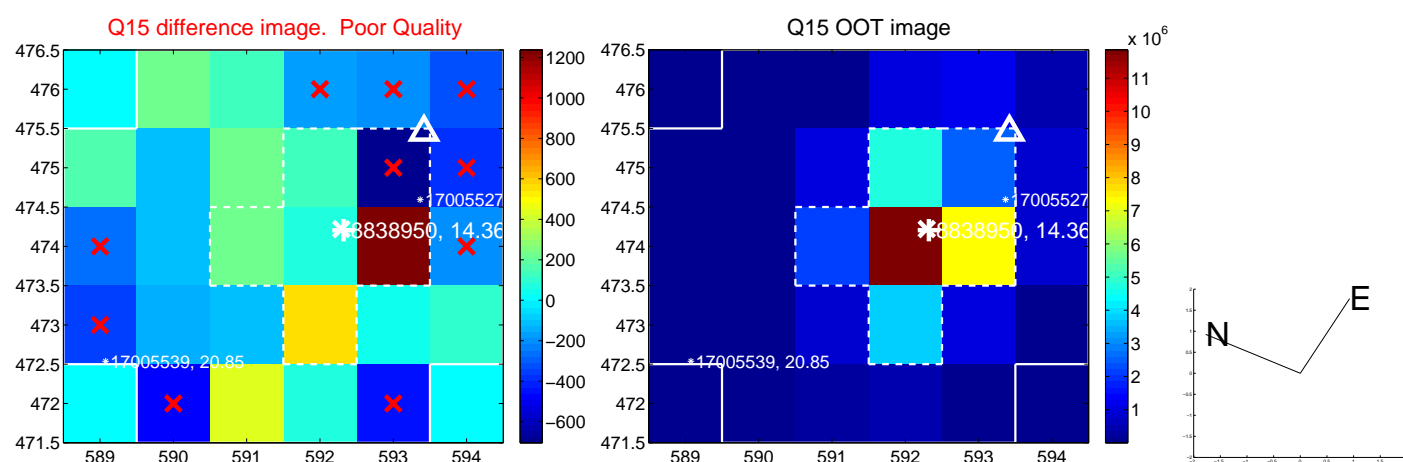
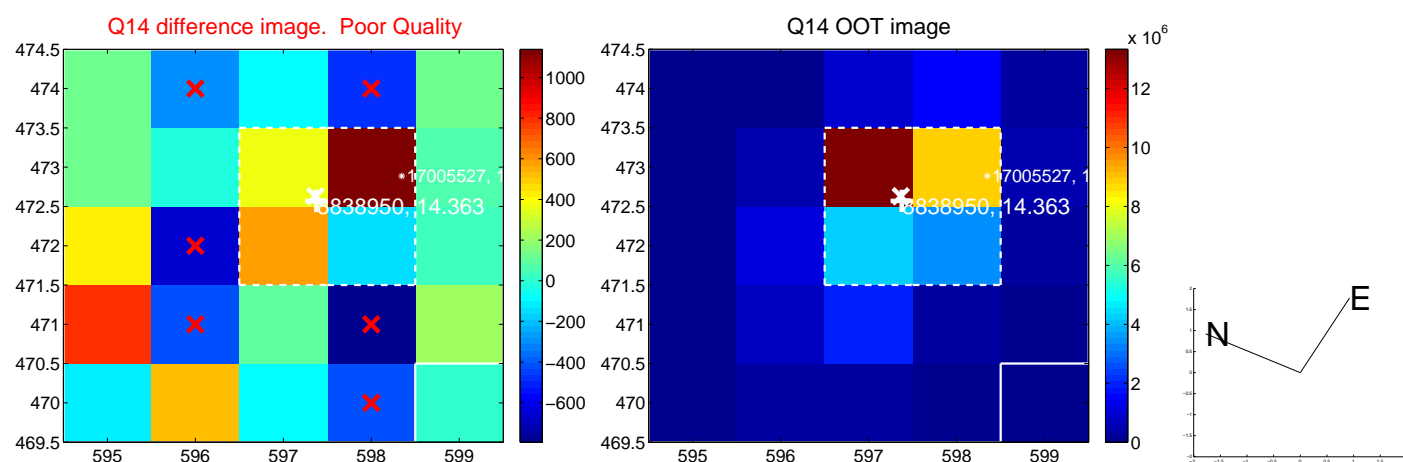
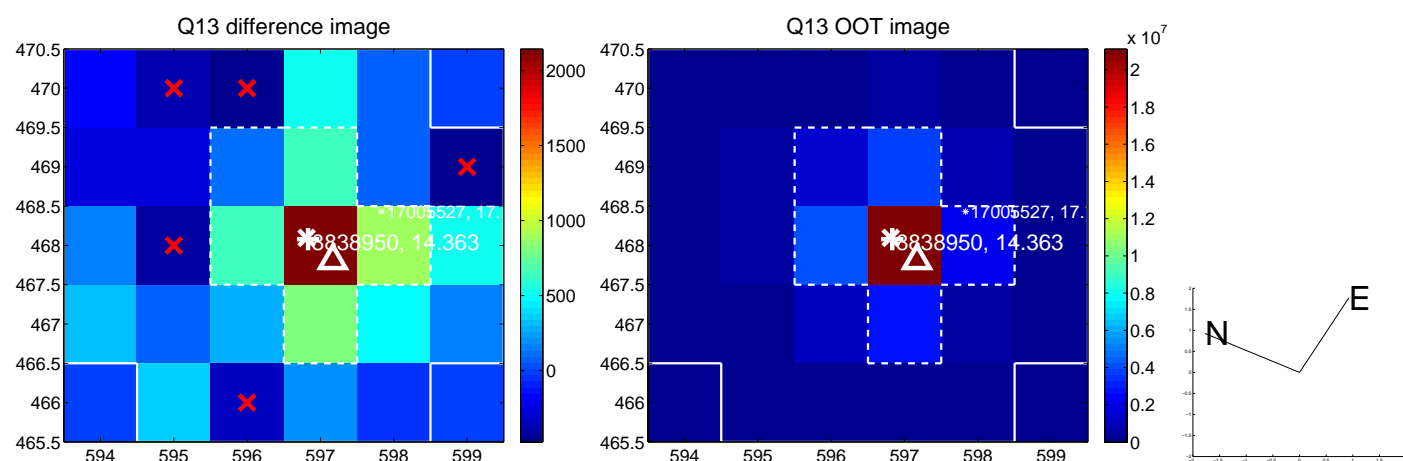




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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





UKIRT Image

Declination

